SPECIFICATIONS

FASTENER SPECIFICATIONS

Single Use Non-Threaded Fasteners/Components

NOTE:
All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.

Application
Axle Shaft Seals
Differential Adjuster Nut Lock Ring
Drive Pinion Gear Collapsible Spacer
Drive Pinion Gear Nut
Drive Pinion Gear Washer
Front Differential Carrier Gasket
Front Differential Carrier Cover Gasket
Front Drive Axle Inner Shaft Retaining Ring
Front Drive Axle Inner Shaft Seal
Pinion Gear Shaft Lock Pin

Single Use Threaded Fastener/Component Tightening Specifications

NOTE:
All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.

Application	Specification
	Metric (English)
Ring Gear Bolts, 8.25 Axle	120 N.m (89 lb ft)
Ring Gear Bolts, 9.25 Axle	138 N.m (102 lb ft)

Reusable Threaded Fastener Tightening Specifications

NOTE:

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All fasteners listed in this table can be reused after removal.	
Application	**Specification**
	Metric (English)
Differential Adjuster Lock Nut Bolt (9.25 Clamshell Axle)	9 N.m (80 lb in)
Differential Carrier Assembly Case Bolts 8.25 Axle	73 N.m (54 lb ft)
Differential Carrier Assembly Case Bolts 9.25 Axle	47 N.m (35 lb ft)
Differential Carrier Assembly Mounting Bolts and Nuts	100 N.m (74 lb ft)
Differential Carrier Bracket to Frame Nuts	100 N.m (74 lb ft)
Front Differential Carrier Shield Bolts	20 N.m (15 lb ft)
Front Differential Housing Cover Bolt	40 N.m (30 lb ft)
Front Drive Axle Actuator	30 N.m (22 lb ft)
Inner Shaft Housing to Bracket Nuts	100 N.m (74 lb ft)
Inner Shaft Housing to Differential Carrier Assembly Bolts 8.25 Axle	55 N.m (41 lb ft)
Inner Shaft Housing to Differential Carrier Assembly Bolts 9.25 Axle	80 N.m (59 lb ft)
Pinion Shaft Lock Bolt, 9.25 Axle	53 N.m (39 lb ft)
Plug, Drain and Fill	33 N.m (24 lb ft)
Stabilizer Link Nut	18 N.m (13 lb ft)
Vent Hose Connector	28 N.m (21 lb ft)
Wheel Drive Shaft Inboard Flange Bolts	79 N.m (58 lb ft)
Wheel Drive Shaft to Front Hub Nut	240 N.m (177 lb ft)
Yoke Retainer Bolts	25 N.m (18 lb ft)

AXLE PRELOAD AND BACKLASH SPECIFICATIONS

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

APPROXIMATE FLUID CAPACITIES

See **Fluid and Lubricant Recommendations** for more information. All capacities are approximate. When adding, be sure to fill to the approximate level, as recommended in this manual. Recheck fluid level after filling.

Application	Specifications

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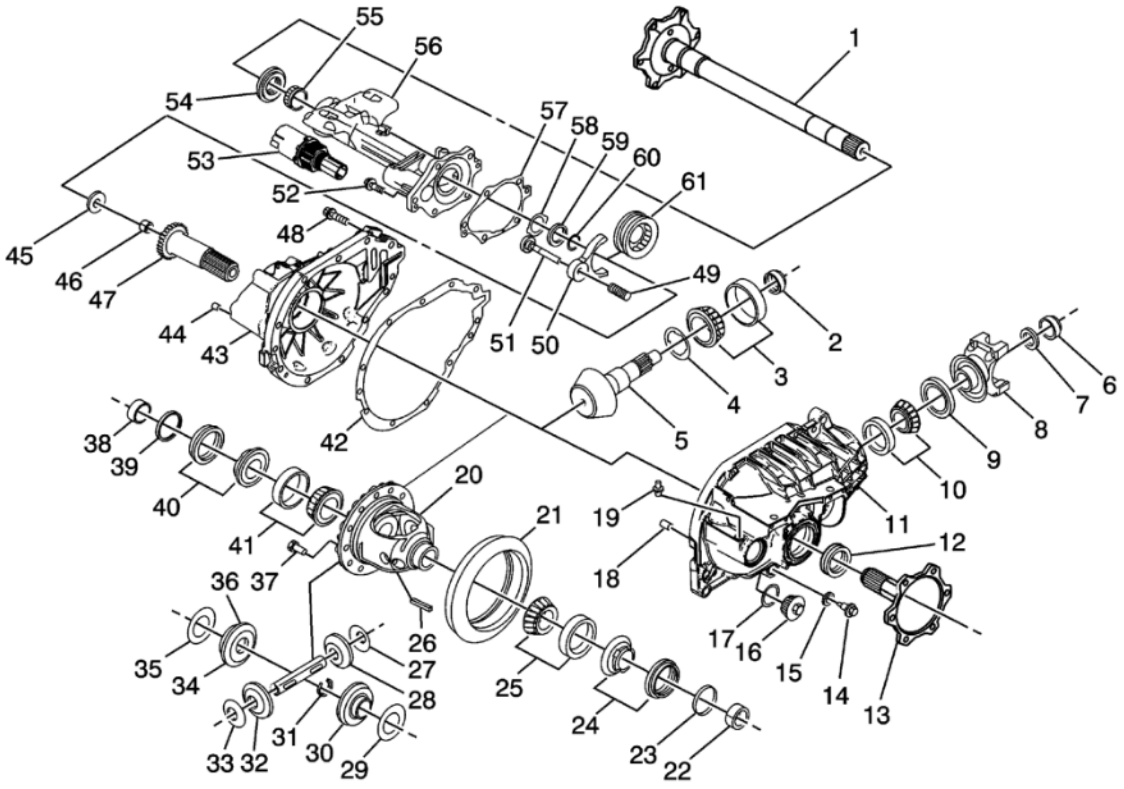
Axle Capacities	Metric	US English
• Front Axle 1000 Series (8.25")	1.43 liters	1.51 quarts
• Front Axle 2000 Series (9.25")	1.8 liters	1.9 quarts

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

Application	Type of Material	GM Part Number	Canadian Part Number
Differential Carrier Assembly Case Mating Surfaces	Sealant	GM P/N 1052942	Canadian P/N 10953466 or equivalent
Electric Motor Actuator	Sealant	GM P/N 12346004 or equivalent	Canadian P/N 10953480 or equivalent
Front Drive Axle	Lubricant	Synthetic Gear Oil GM P/N 88900401 (GM Spec 9986115)	Canadian P/N 89021678
Front Drive Axle Inner Shaft Housing to Differential Carrier Assembly	Sealant	GM P/N 1052942 (Canadian P/N 10953466) or equivalent	Canadian P/N 10953466 or equivalent
Pinion Yoke Splines	Sealant	GM P/N 12346004 (Canadian P/N 10953480) or equivalent	Canadian P/N 10953480 or equivalent

COMPONENT LOCATOR

FRONT DRIVE AXLE DISASSEMBLED VIEWS (8.25 INCH AXLE)



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Fig. 1: Front Drive Axle Disassembled Views (8.25 Inch Axle)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Output Shaft
2	Pinion Bearing Spacer
3	Pinion Head Bearing Assembly
4	Pinion Shim
5	Stem Pinion
6	Pinion Flange Nut
7	Pinion Flange Washer
8	Pinion Flange Assembly
9	Pinion Seal
10	Pinion Tail Bearing Assembly
11	Carrier Housing
12	Output Shaft Seal Assembly
13	Output Shaft
14	Drain Plug Assembly
15	Drain Plug Washer
16	Fill Plug Assembly
17	Fill Plug O-ring Seal
18	Carrier Locator Pin
19	Vent Connector
20	Differential Case
21	Ring Gear
22	Output Shaft Bearing Assembly
23	8-Point Lock Ring
24	Sleeve and Insert Assembly
25	Differential Side Bearing Assembly
26	Differential Cross Pin Lock
27	Differential Pinion Thrust Washer
28	Differential Pinion Gear
29	Differential Side Gear Washer
30	Differential Side Gear
31	Output Shaft Snap Ring
32	Differential Pinion Gear
33	Differential Pinion Gear Thrust Washer
34	Differential Side Gear
35	Differential Side Gear Washer
36	Differential Cross Pin
37	Ring Gear Bolt
38	Output Shaft Bearing Assembly
39	8-Point Lock Ring
40	Sleeve and Insert Assembly
41	Differential Side Bearing Assembly

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Callout	Component Name
42	Carrier Gasket
43	Carrier Cover
44	Tube Locator Pin
45	Inner Output Shaft Thrust Washer
46	Inner Output Shaft Bearing Assembly
47	Inner Output Shaft
48	Carrier Bolt
49	Shifter Spring
50	Shifter Fork
51	Shifter Fork Rod
52	Tube Bolt
53	Shift Actuator Assembly
54	Output Shaft Seal Assembly
55	Output Shaft Bearing Assembly
56	Tube
57	Tube Gasket
58	Output Shaft Locator Thrust Washer
59	Output Shaft Thrust Washer
60	Output Shaft Snap Ring
61	Shifter Sleeve

FRONT DRIVE AXLE DISASSEMBLED VIEWS (9.25 INCH AXLE)

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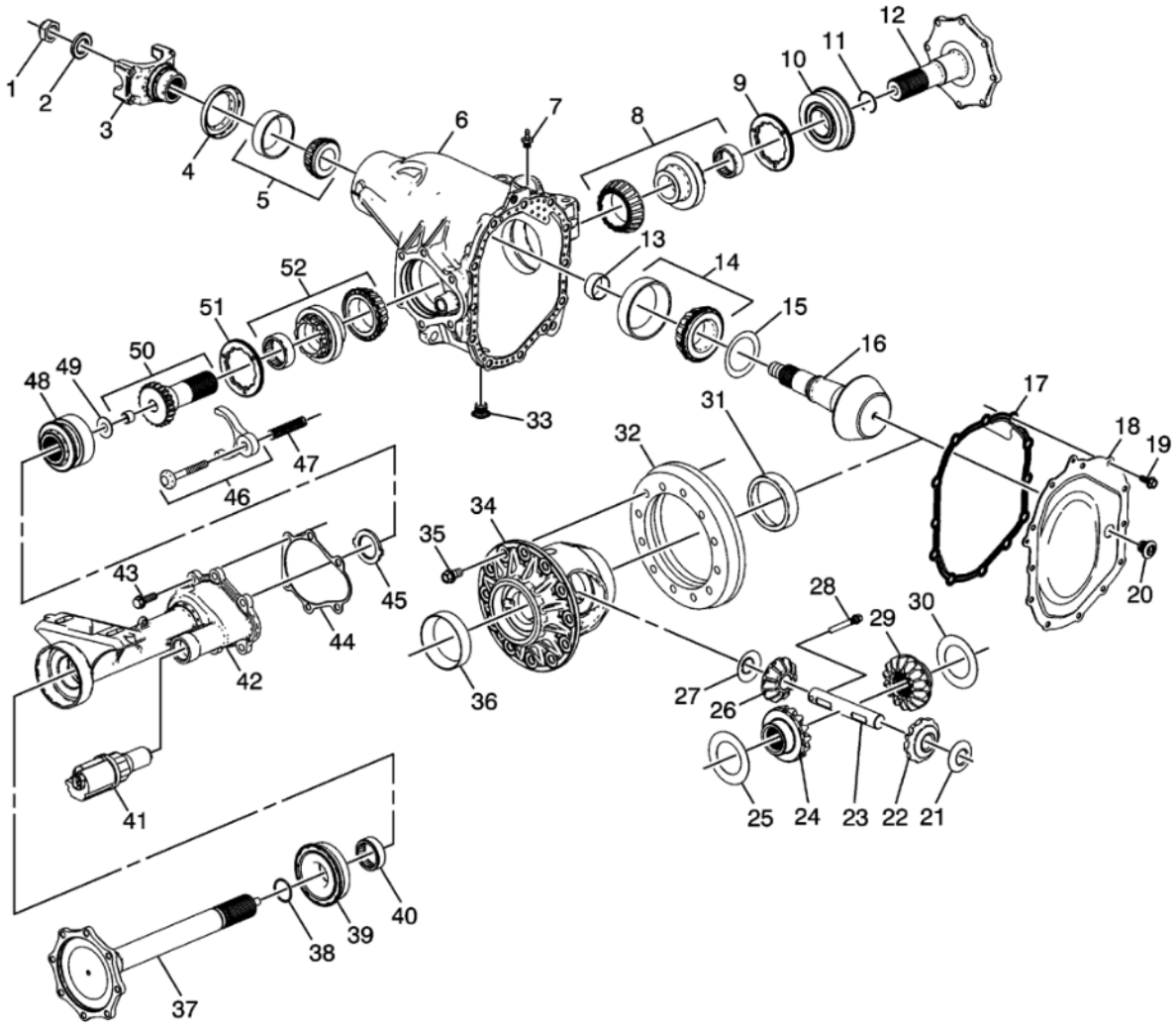


Fig. 2: Front Drive Axle Disassembled Views (9.25 inch Axle)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Pinion Flange Nut
2	Pinion Flange Washer
3	Pinion Flange Assembly
4	Pinion Seal
5	Pinion Tail Bearing Assembly
6	Carrier Housing
7	Vent Connector
8	Bearing Adjuster Assembly
9	Front Differential Bearing Adjuster Lock
10	Front Drive Axle Inner Shaft Seal
11	Front Drive Axle Inner Shaft Retaining Ring
12	Output Shaft - Left Side
13	Front Differential Drive Pinion Gear Bearing Spacer
14	Front Differential Drive Pinion Gear Inner Bearing Assembly
15	Differential Drive Pinion Gear Bearing Shim
16	Front Differential Drive Pinion Gear

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Callout	Component Name
17	Cover Gasket
18	Differential Carrier Cover
19	Carrier Cover Bolt
20	Fill Plug
21	Differential Pinion Gear Thrust Washer
22	Differential Pinion Gear
23	Front Differential Pinion Gear Shaft
24	Differential Side Gear
25	Differential Side Gear Thrust Washer
26	Differential Pinion Gear
27	Differential Pinion Gear Thrust Washer
28	Differential Pinion Gear Shaft Lock Bolt
29	Differential Side Gear
30	Differential Side Gear Thrust Washer
31	Differential Bearing Cup
32	Ring Gear
33	Drain Plug
34	Front Differential Case
35	Ring Gear Bolt
36	Differential Bearing Cup
37	Output Shaft - Right Side
38	Front Drive Axle Inner Shaft Retaining Ring
39	Front Drive Axle Inner Shaft Seal
40	Output Shaft Bearing Assembly
41	Shift Actuator Assembly
42	Differential Tube Bolt
43	Differential Tube
44	Tube Gasket
45	Output Shaft Locator Thrust Washer
46	Shift Fork Assembly
47	Shifter Spring
48	Shifter Sleeve
49	Inner Output Shaft Thrust Washer
50	Inner Output Shaft Assembly
51	Adjuster Lock
52	Bearing Adjuster Assembly

DIAGNOSTIC INFORMATION AND PROCEDURES

SYMPTOMS - FRONT DRIVE AXLE

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

Noise Diagnosis

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

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

Classifying the Symptom

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

- Leaks
- Noises
- Vibrations

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

Visual/Physical Inspection

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

Symptoms List

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

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

FRONT DRIVE AXLE NOISES

Gear Noise

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

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

Gear noise most frequently has periods where the noise is more prominent, usually between 48-64 km/h (30-40

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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: 1. **Front Axle Disassemble (8.25 Inch Axle)Front Axle Disassemble (9.25 Inch Axle)** 2. **Front Differential Case Disassemble (9.25 Inch Axle)Front Differential Case Disassemble (8.25 Inch Axle)** 3. **Front Differential Case Assemble (9.25 Inch Axle)Front Differential Case Assemble (8.25 Inch Axle)** 4. **Front Differential Drive Pinion Gear Bearing Cup Installation**

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Checks	Action
	(9.25 Inch Axle)Front Differential Drive Pinion Gear Bearing Cup Installation (8.25 Inch Axle) 5. **Front Axle Assemble (8.25 Inch Axle)Front Axle Assemble (9.25 Inch Axle)**
Worn pinion bearings	Replace the pinion bearings. Perform the following procedures: 1. **Front Axle Disassemble (8.25 Inch Axle)Front Axle Disassemble (9.25 Inch Axle)** 2. **Front Differential Drive Pinion Gear Bearing Cup Installation (9.25 Inch Axle)Front Differential Drive Pinion Gear Bearing Cup Installation (8.25 Inch Axle)** 3. **Front Axle Assemble (8.25 Inch Axle)Front Axle Assemble (9.25 Inch Axle)**
Loose pinion bearings	Adjust the pinion bearings preload. Perform the following procedures: 1. **Front Axle Disassemble (8.25 Inch Axle)Front Axle Disassemble (9.25 Inch Axle)** 2. **Front Axle Assemble (8.25 Inch Axle)Front Axle Assemble (9.25 Inch Axle)** 3. **Backlash Inspection and Adjustment**
Excessive pinion end play	Adjust the pinion end play. Refer to **Front Axle Assemble (8.25 Inch Axle)Front Axle Assemble (9.25 Inch Axle)**.
Worn differential bearings	Replace the differential bearings. Perform the following procedures: 1. **Front Axle Disassemble (8.25 Inch Axle)Front Axle Disassemble (9.25 Inch Axle)** 2. **Front Differential Case Disassemble (9.25 Inch Axle)Front Differential Case Disassemble (8.25 Inch Axle)** 3. **Front Differential Case Assemble (9.25 Inch Axle)Front Differential Case Assemble (8.25 Inch Axle)** 4. **Front Axle Assemble (8.25 Inch Axle)Front Axle Assemble (9.25 Inch Axle)**
Loose differential bearings	Adjust the differential bearing preload. Perform the following procedures: 1. **Front Axle Disassemble (8.25 Inch Axle)Front Axle Disassemble (9.25 Inch Axle)** 2. **Front Axle Assemble (8.25 Inch Axle)Front Axle Assemble (9.25 Inch Axle)**
Excessive ring gear runout	Replace the ring gear. Perform the following procedures: 1. **Front Axle Disassemble (8.25 Inch Axle)Front Axle Disassemble (9.25 Inch Axle)**

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Checks	Action
	2. **Front Axle Assemble (8.25 Inch Axle)Front Axle Assemble (9.25 Inch Axle)**
Low oil level	Fill the fluid level to specifications with the proper lubricant. Refer to **Front Axle Lubricant Level Inspection (9.25 Inch Axle)Front Axle Lubricant Level Inspection (8.25 Inch Axle)**.
Wrong or poor grade oil	Drain and refill the system with the proper lubricant. Refer to **Front Axle Lubricant Replacement (8.25 Inch Axle)Front Axle Lubricant Replacement (9.25 Inch Axle)**.

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 **Front Axle Disassemble (8.25 Inch Axle)Front Axle Disassemble (9.25 Inch Axle)**.
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 **Front Axle Disassemble (8.25 Inch Axle)Front Axle Disassemble (9.25 Inch Axle)**.
Loose differential case assembly	Set the differential case assembly to the proper preload and backlash. Refer to **Front Axle Disassemble (8.25 Inch Axle)Front Axle Disassemble (9.25 Inch Axle)**, and **Backlash Inspection and Adjustment**.

CONSTANT NOISE

Checks	Action
Flat spot on the pinion or the ring gear teeth	Replace the pinion and the ring gear. Refer to **Front Axle Disassemble (8.25 Inch Axle)Front Axle Disassemble (9.25 Inch Axle)**.
Flat spot on the pinion bearing	Replace the bearing. Refer to **Front Axle Disassemble (8.25 Inch Axle)Front Axle Disassemble (9.25 Inch Axle)**.
Worn pinion splines	Replace the pinion. Refer to **Front Axle Disassemble (8.25 Inch Axle)Front Axle Disassemble (9.25 Inch Axle)**.

NOISY ON TURNS

Checks	Action
Worn differential side gears and pinions	Replace the differential side gears and pinions. Refer to **Front Differential Case Disassemble (9.25 Inch Axle)Front Differential Case Disassemble (8.25 Inch Axle)**.
Worn differential spider	Replace the spine gears. Refer to **Front Differential Case Disassemble (9.25 Inch Axle)Front Differential Case Disassemble (8.25 Inch**

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Checks	Action
	Axle).
Worn axle shaft splines	Replace the axle shaft. Refer to **Front Drive Axle Inner Shaft Replacement (Left Side)Front Drive Axle Inner Shaft Replacement (Right Side - 8.25 Inch Axle)Front Drive Axle Inner Shaft Replacement (Right Side - 9.25 Inch Axle)**.

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)

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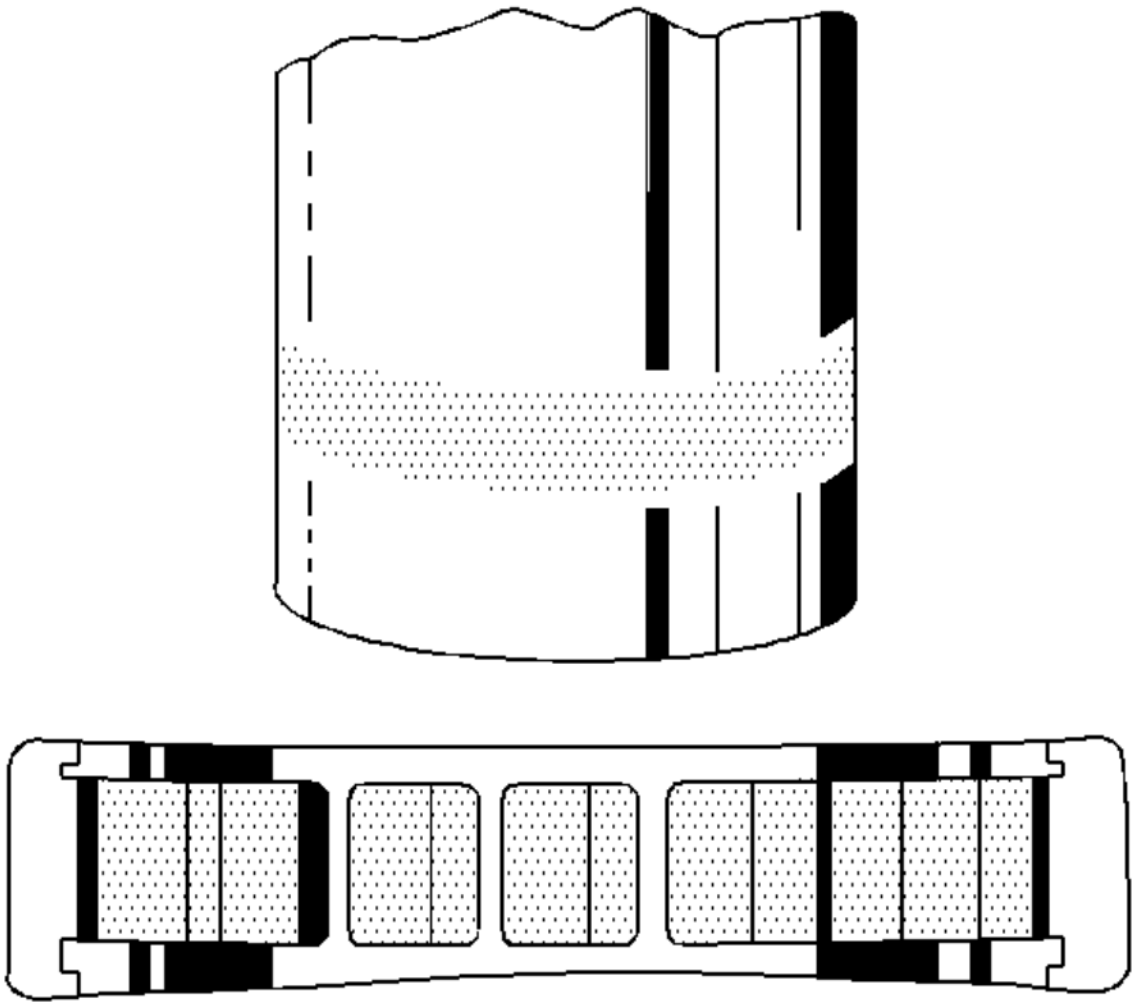


Fig. 3: Identifying Minor Wear
Courtesy of GENERAL MOTORS COMPANY

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)

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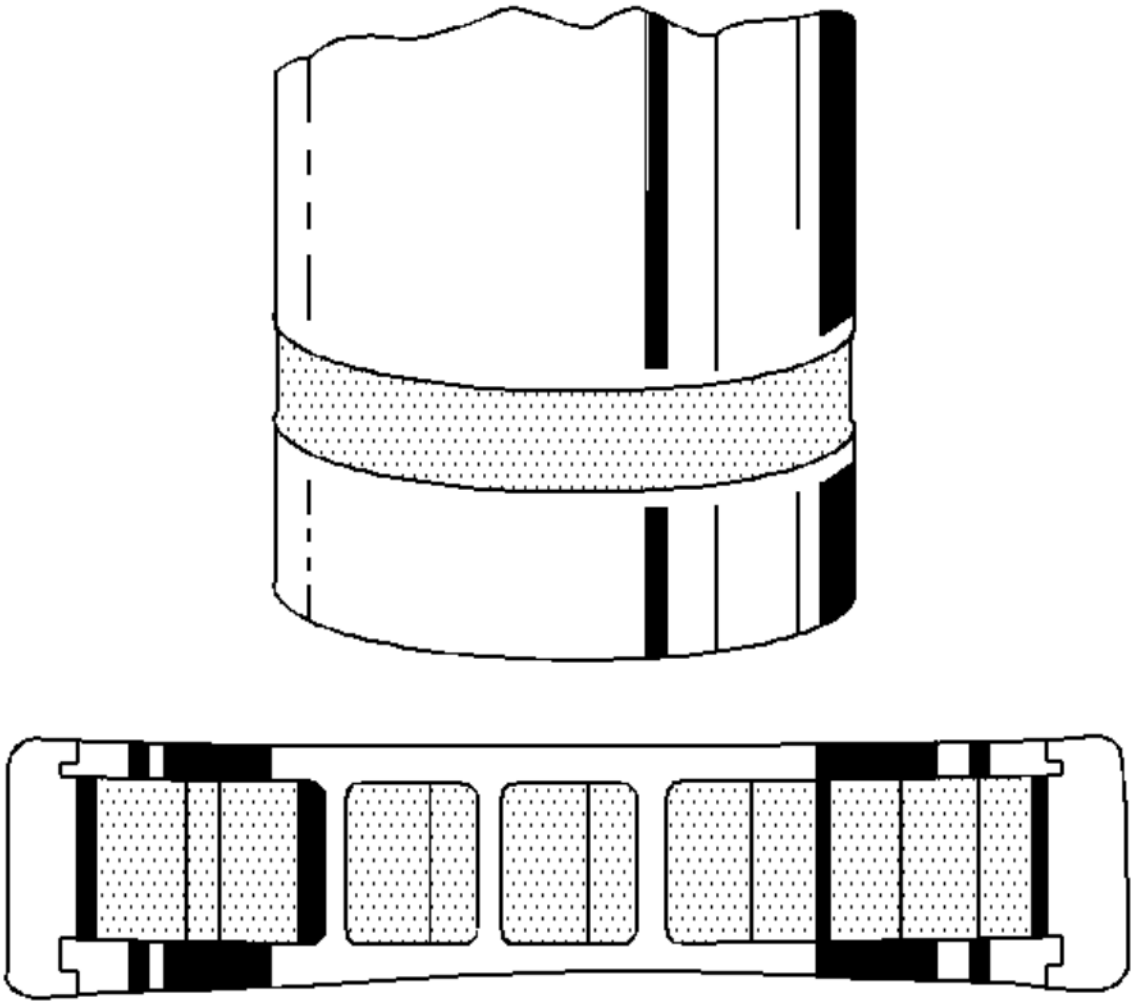


Fig. 4: Identifying Major Wear
Courtesy of GENERAL MOTORS COMPANY

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

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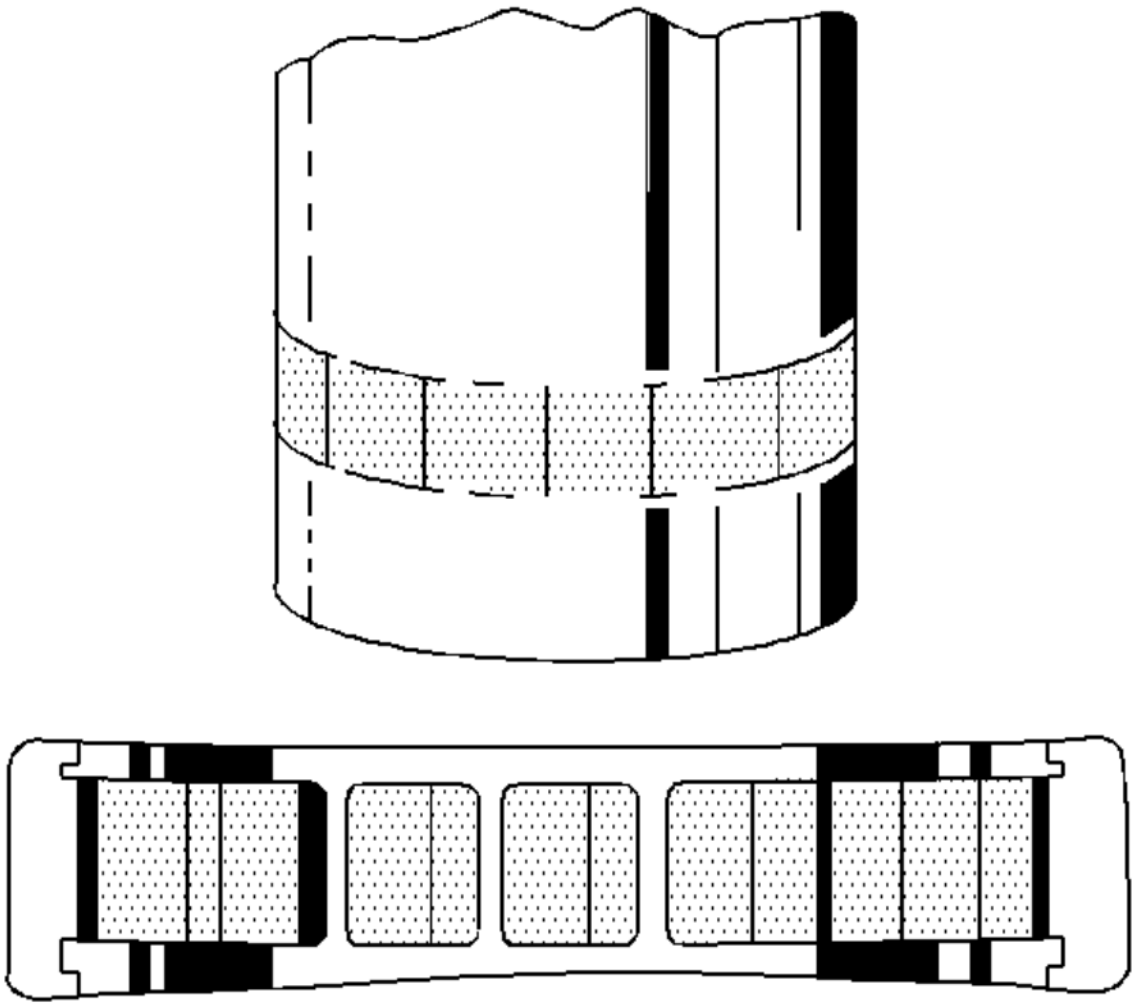


Fig. 5: Identifying Brinelling
Courtesy of GENERAL MOTORS COMPANY

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

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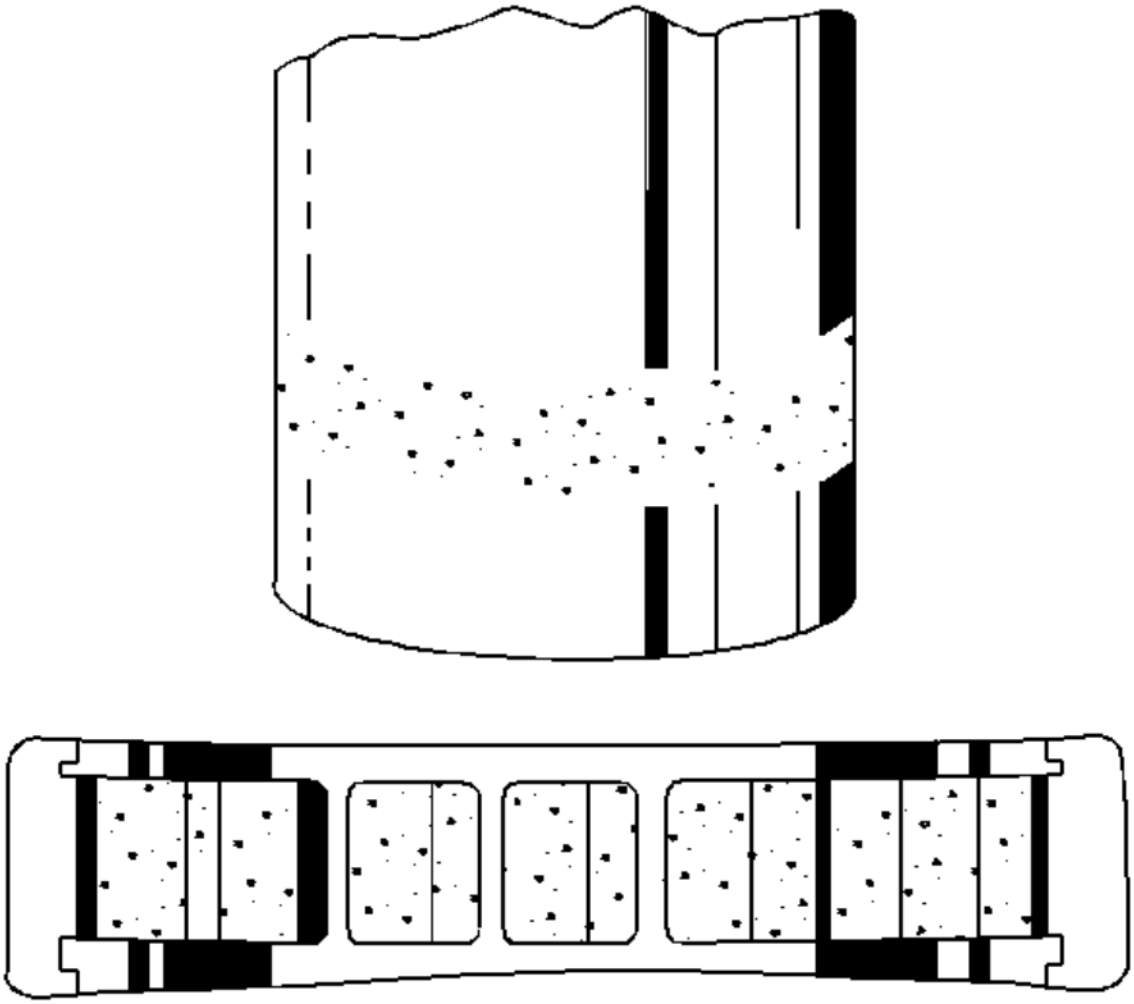


Fig. 6: Identifying Indentations
Courtesy of GENERAL MOTORS COMPANY

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

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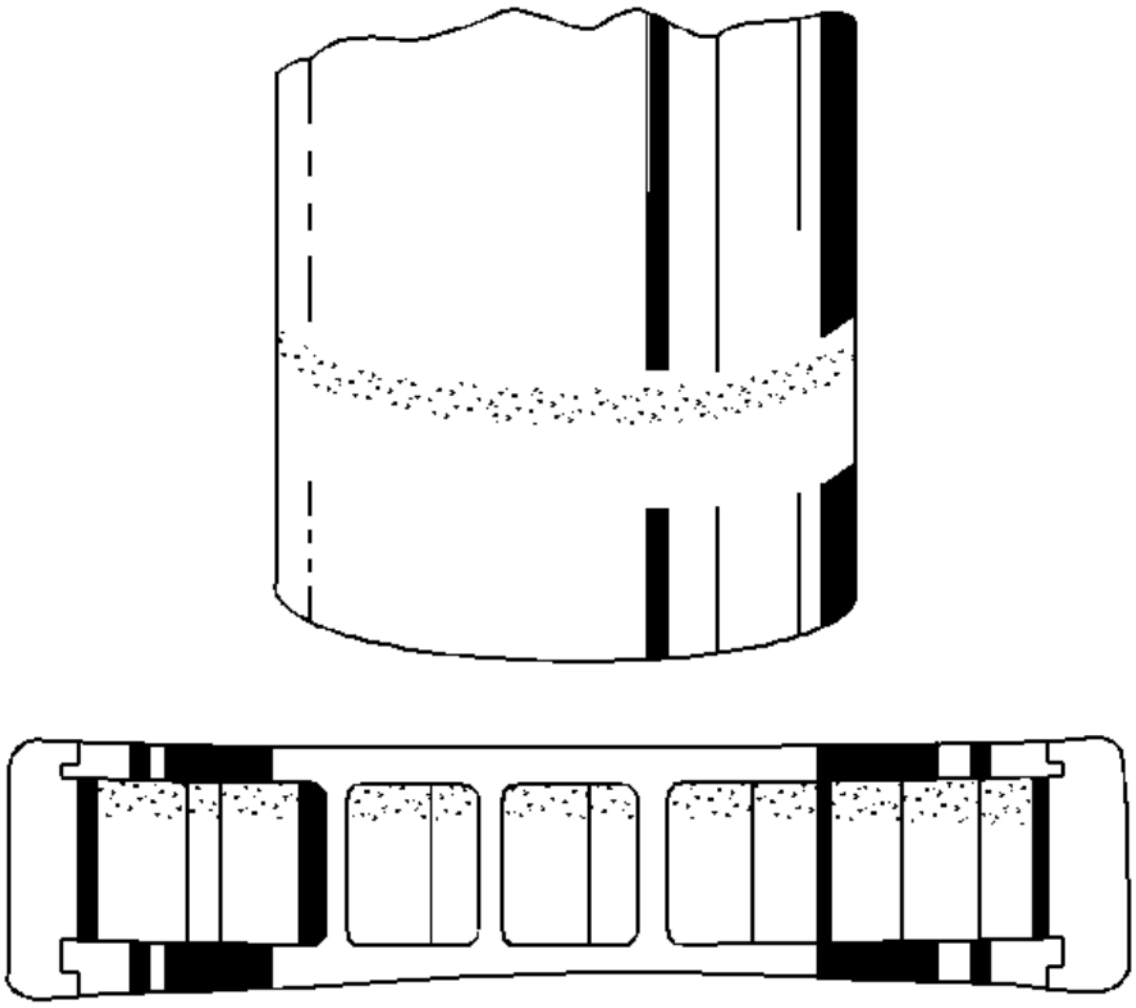


Fig. 7: Identifying Single Edge Pitting
Courtesy of GENERAL MOTORS COMPANY

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

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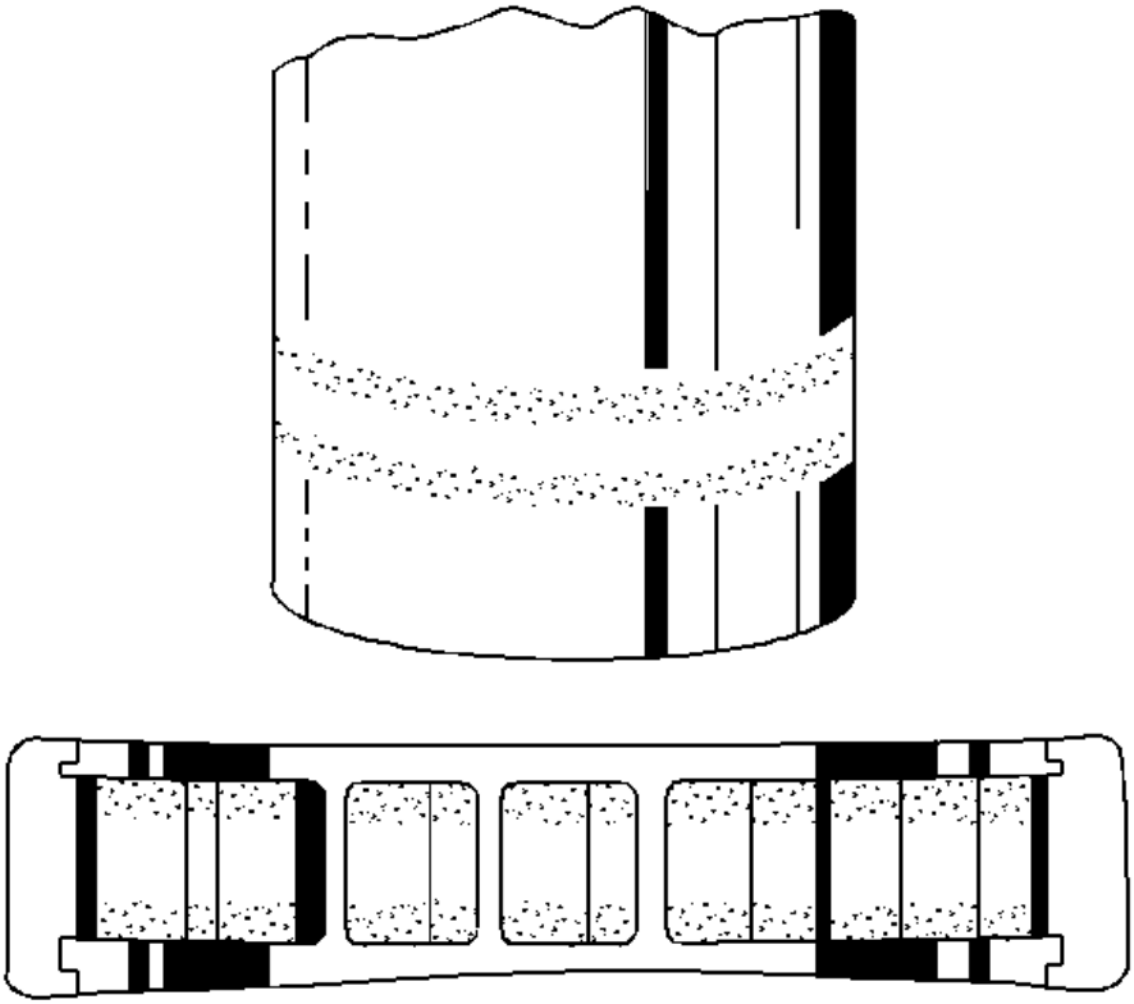


Fig. 8: Identifying Double Edge Pitting
Courtesy of GENERAL MOTORS COMPANY

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

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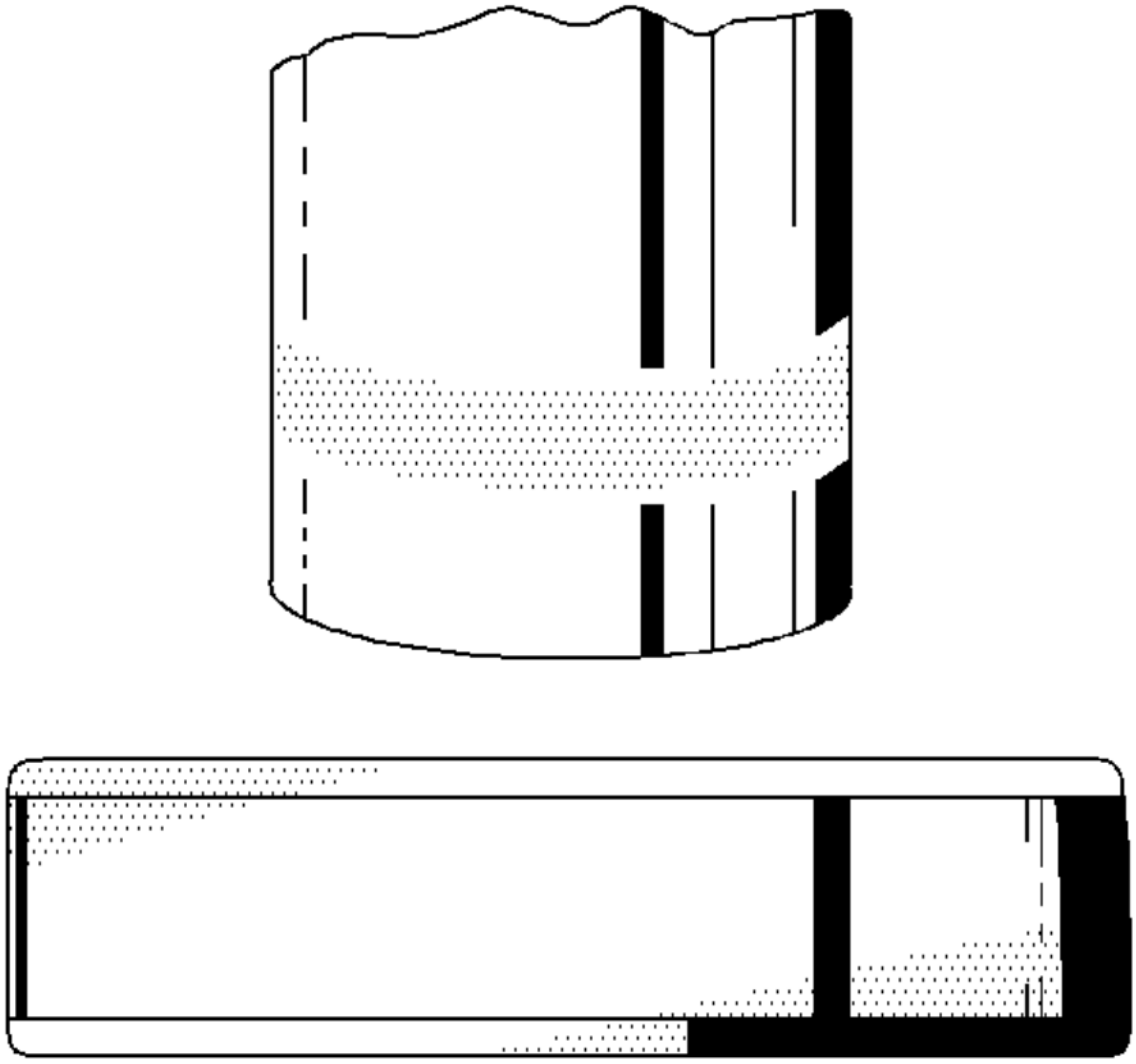


Fig. 9: Identifying Misalignment
Courtesy of GENERAL MOTORS COMPANY

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

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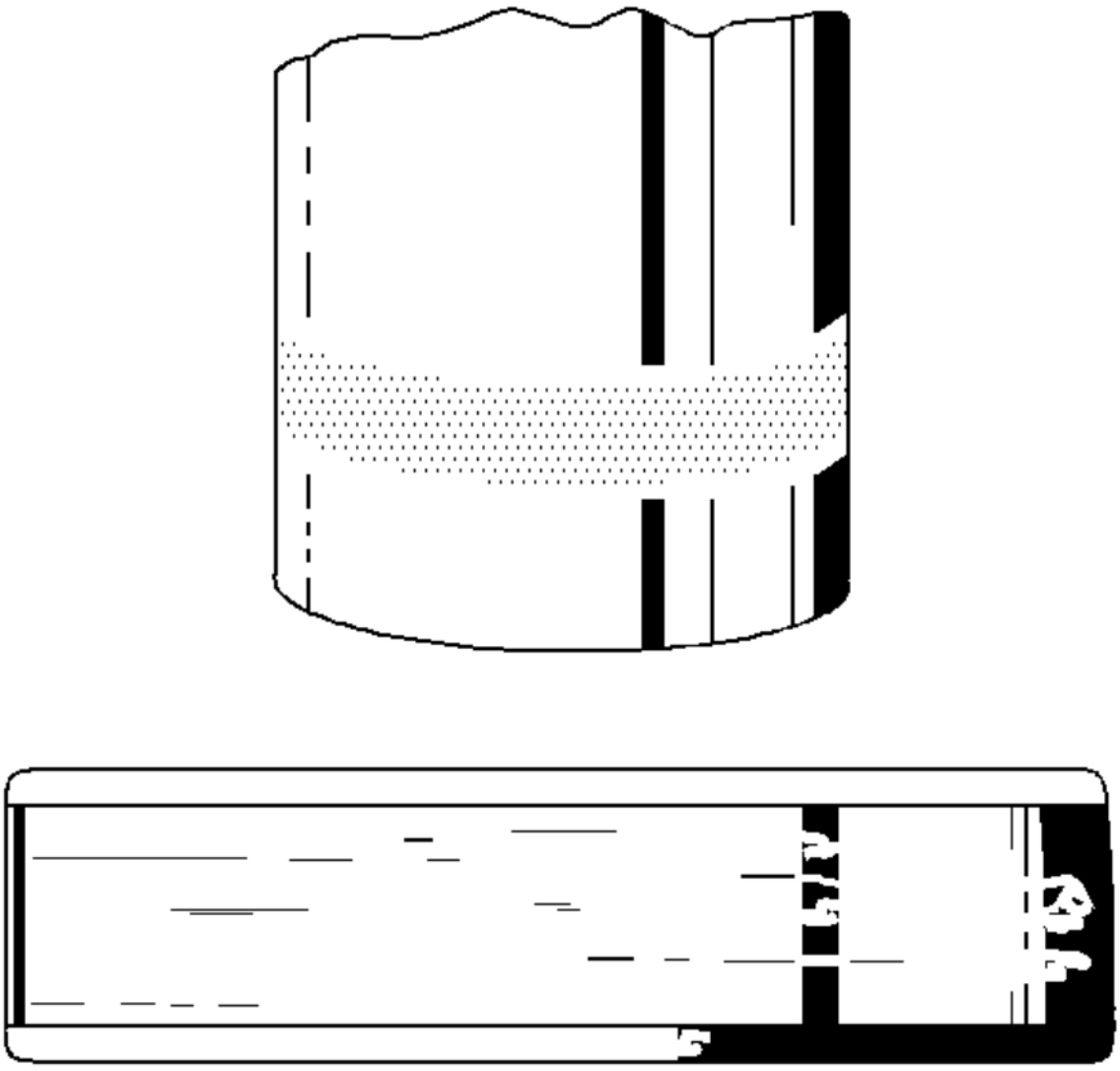


Fig. 10: Identifying Frettage
Courtesy of GENERAL MOTORS COMPANY

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

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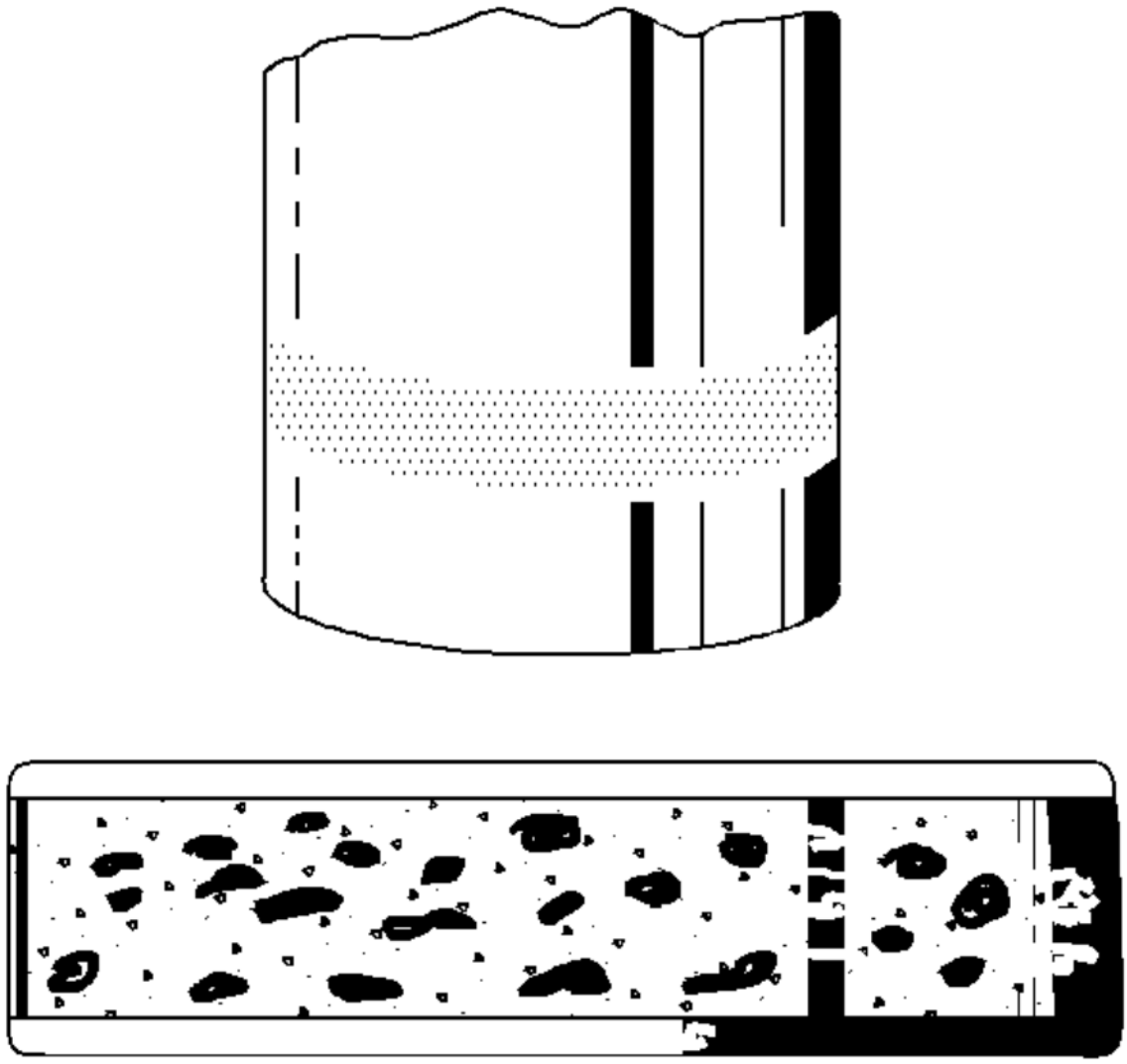


Fig. 11: Identifying Smears
Courtesy of GENERAL MOTORS COMPANY

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

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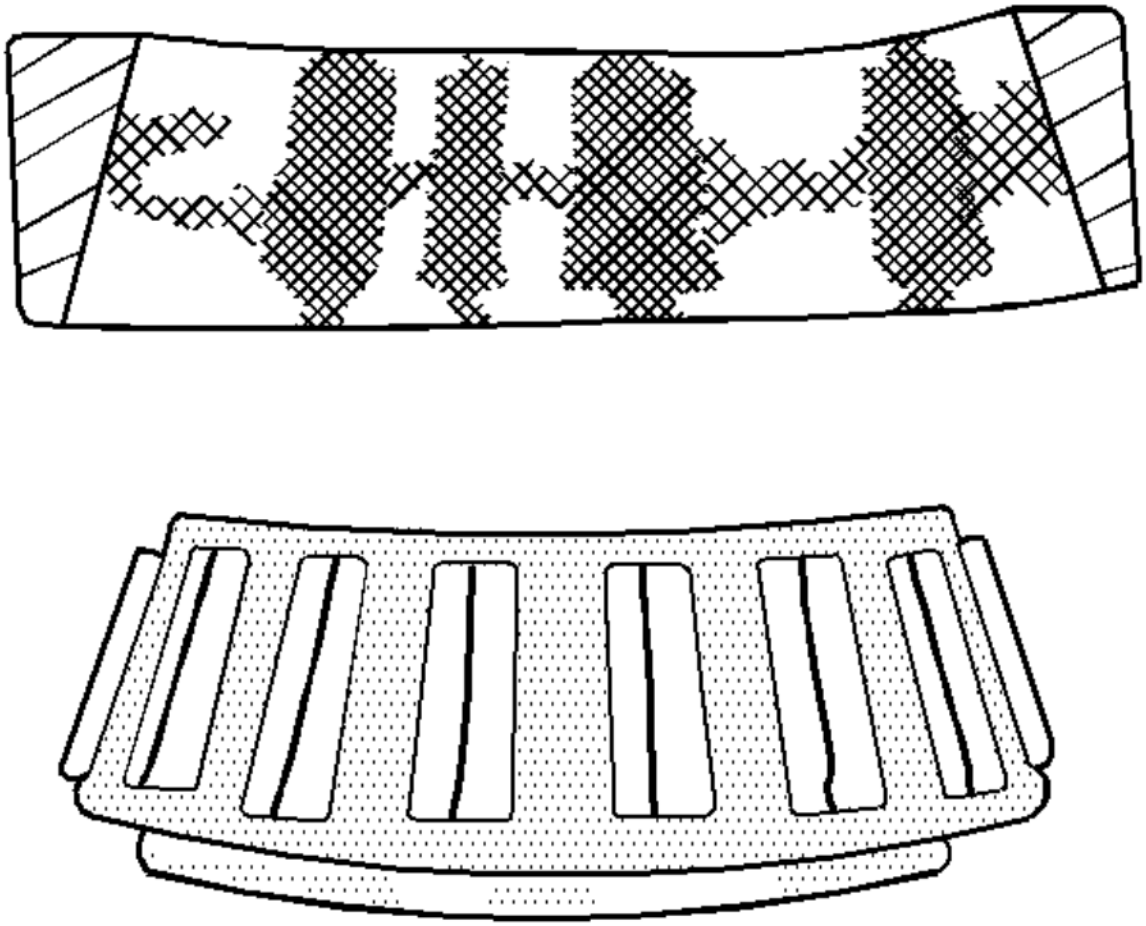


Fig. 12: Identifying Abrasive Roller Wear
Courtesy of GENERAL MOTORS COMPANY

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

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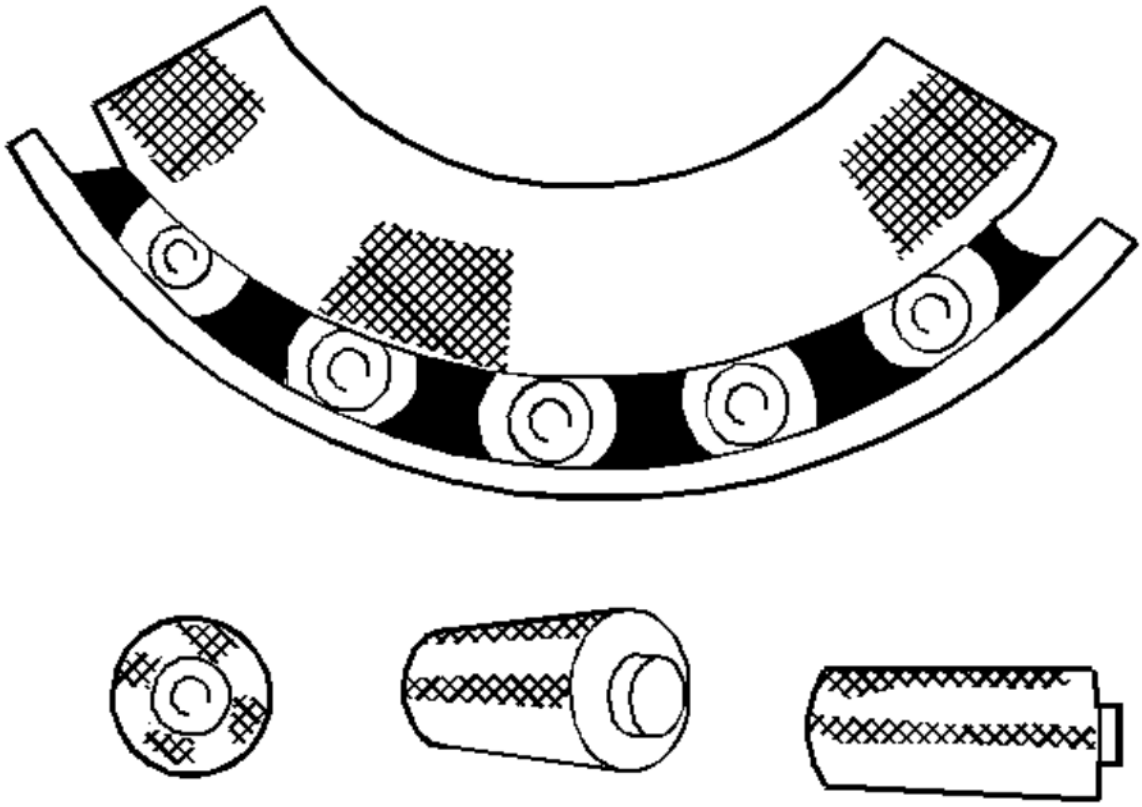


Fig. 13: Identifying Abrasive Step Wear
Courtesy of GENERAL MOTORS COMPANY

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

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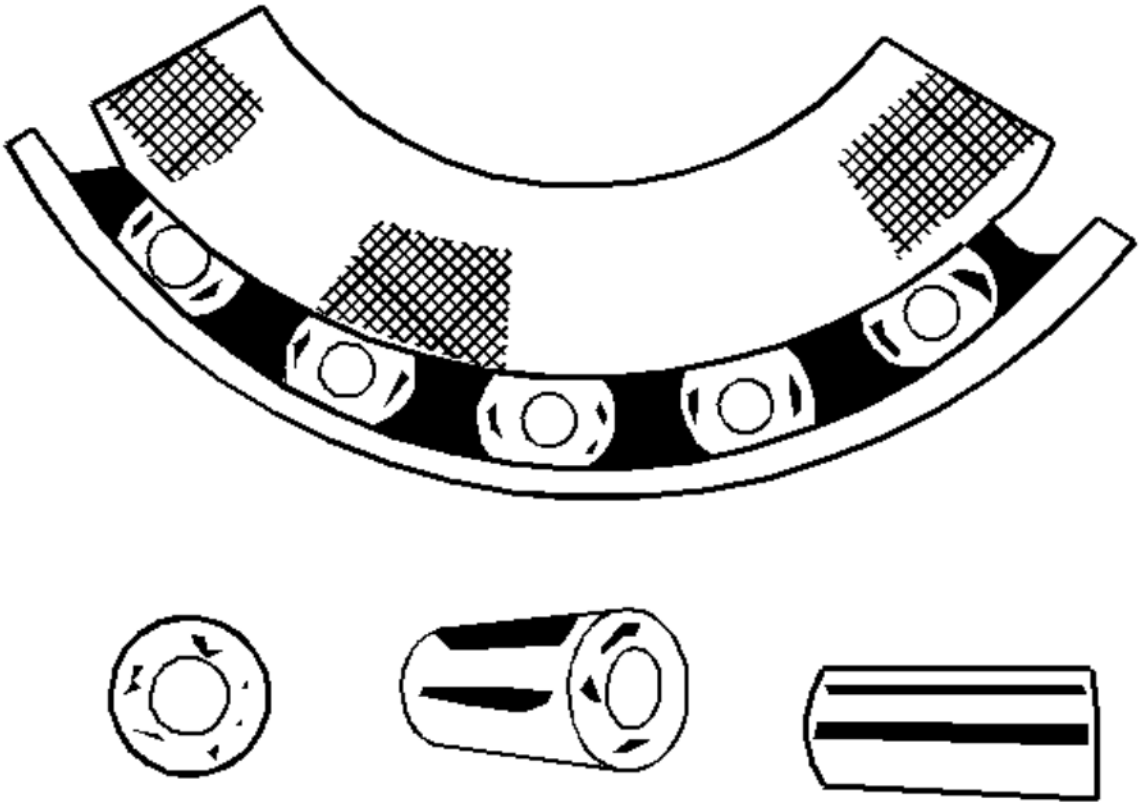


Fig. 14: Identifying Galling
Courtesy of GENERAL MOTORS COMPANY

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

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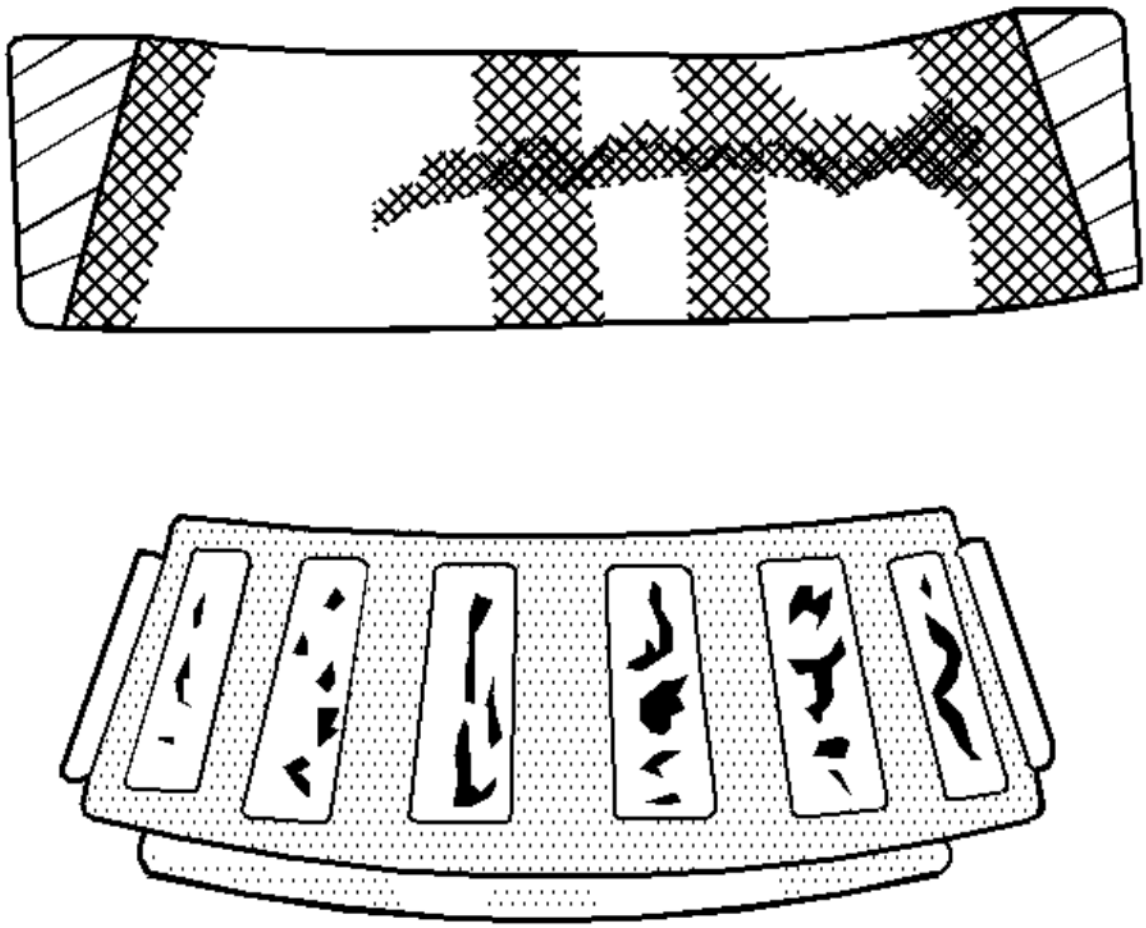


Fig. 15: Identifying Etching
Courtesy of GENERAL MOTORS COMPANY

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

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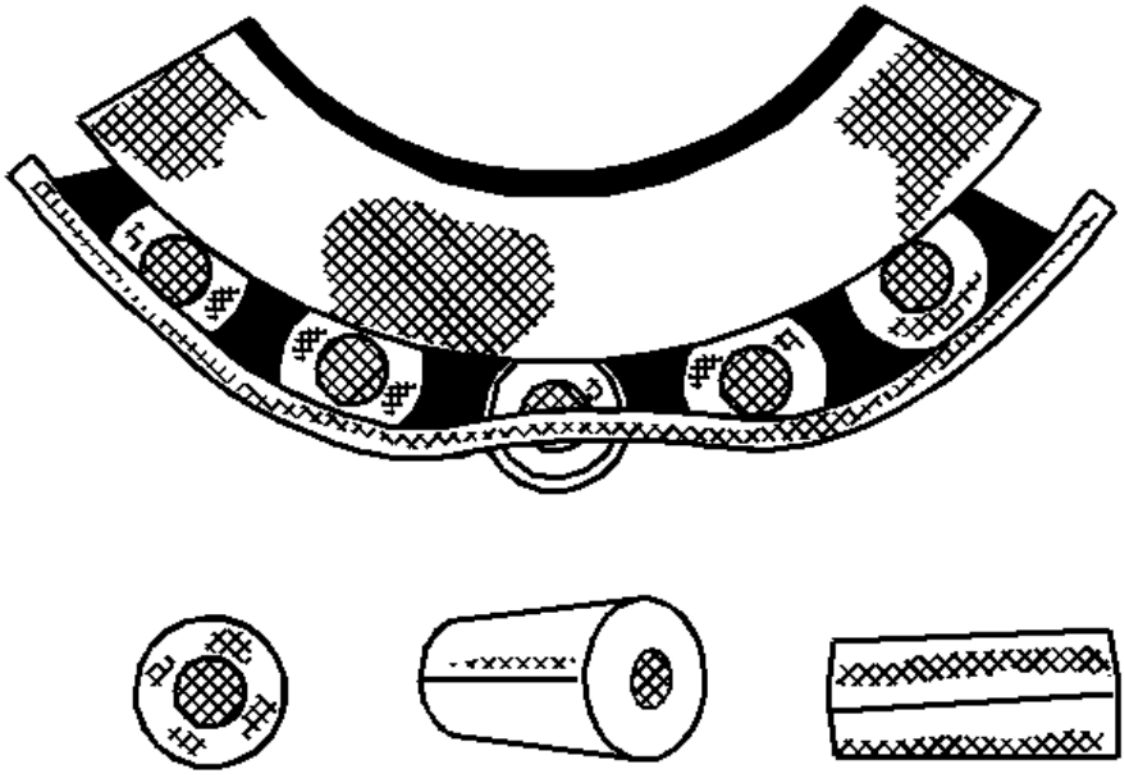


Fig. 16: Identifying Bent Roller Cage
Courtesy of GENERAL MOTORS COMPANY

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

Cage Wear

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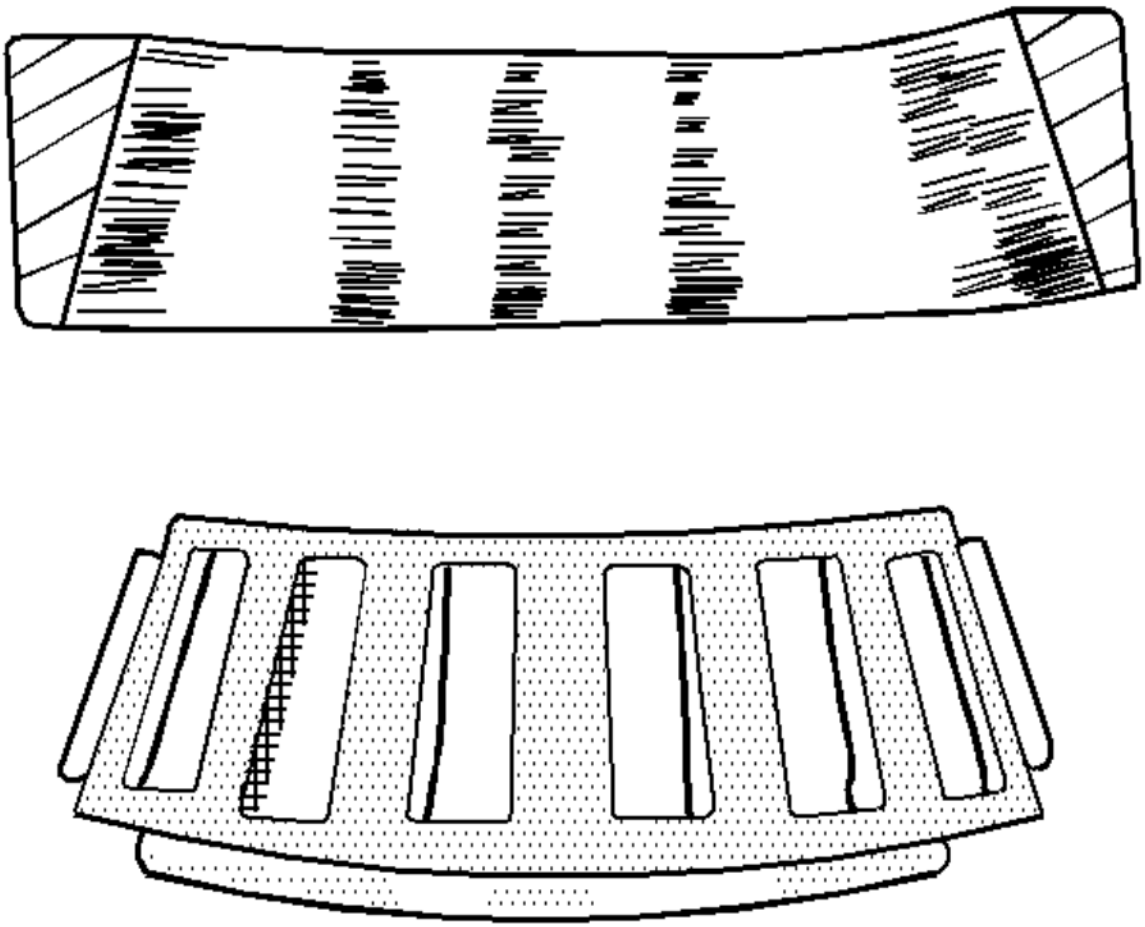


Fig. 17: Identifying Cage Wear
Courtesy of GENERAL MOTORS COMPANY

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

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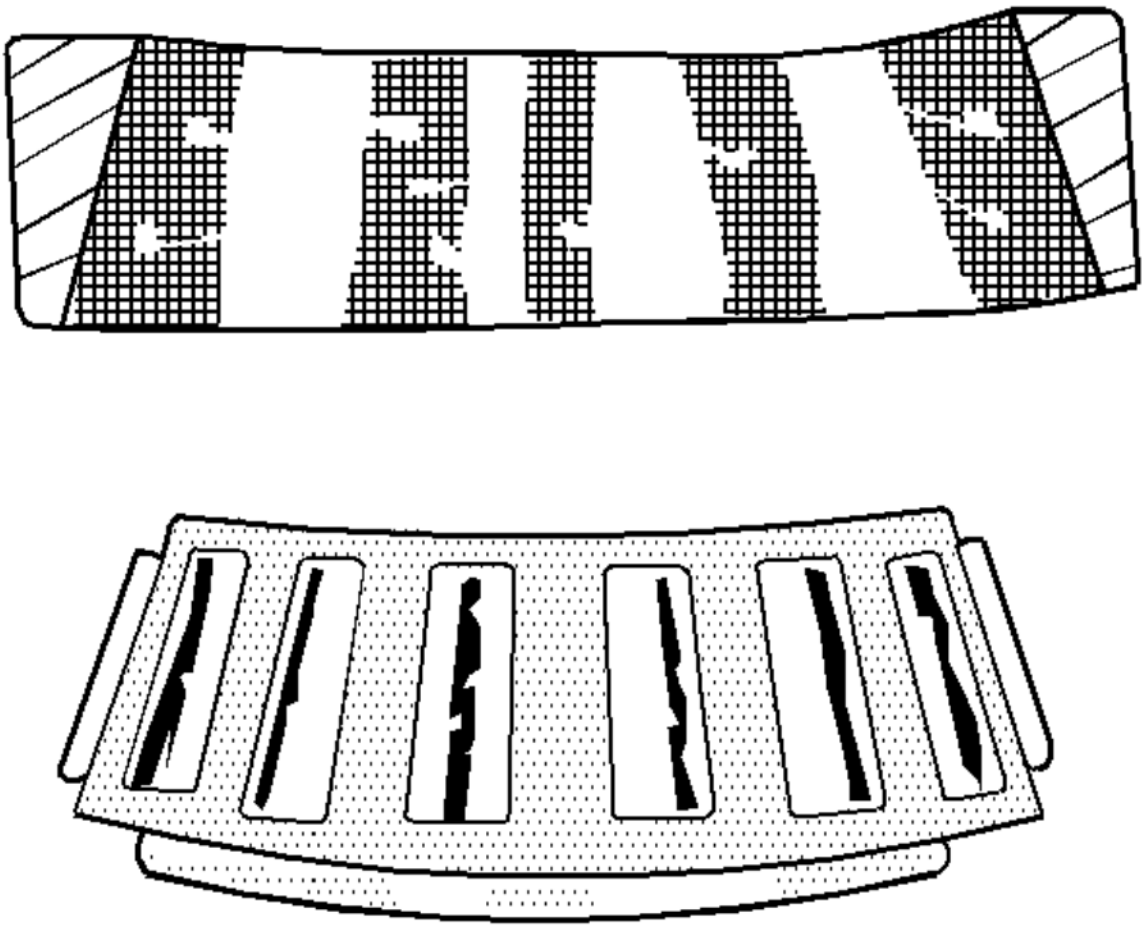


Fig. 18: Inspecting Bearing Rollers & Races For Heat Discoloration
Courtesy of GENERAL MOTORS COMPANY

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

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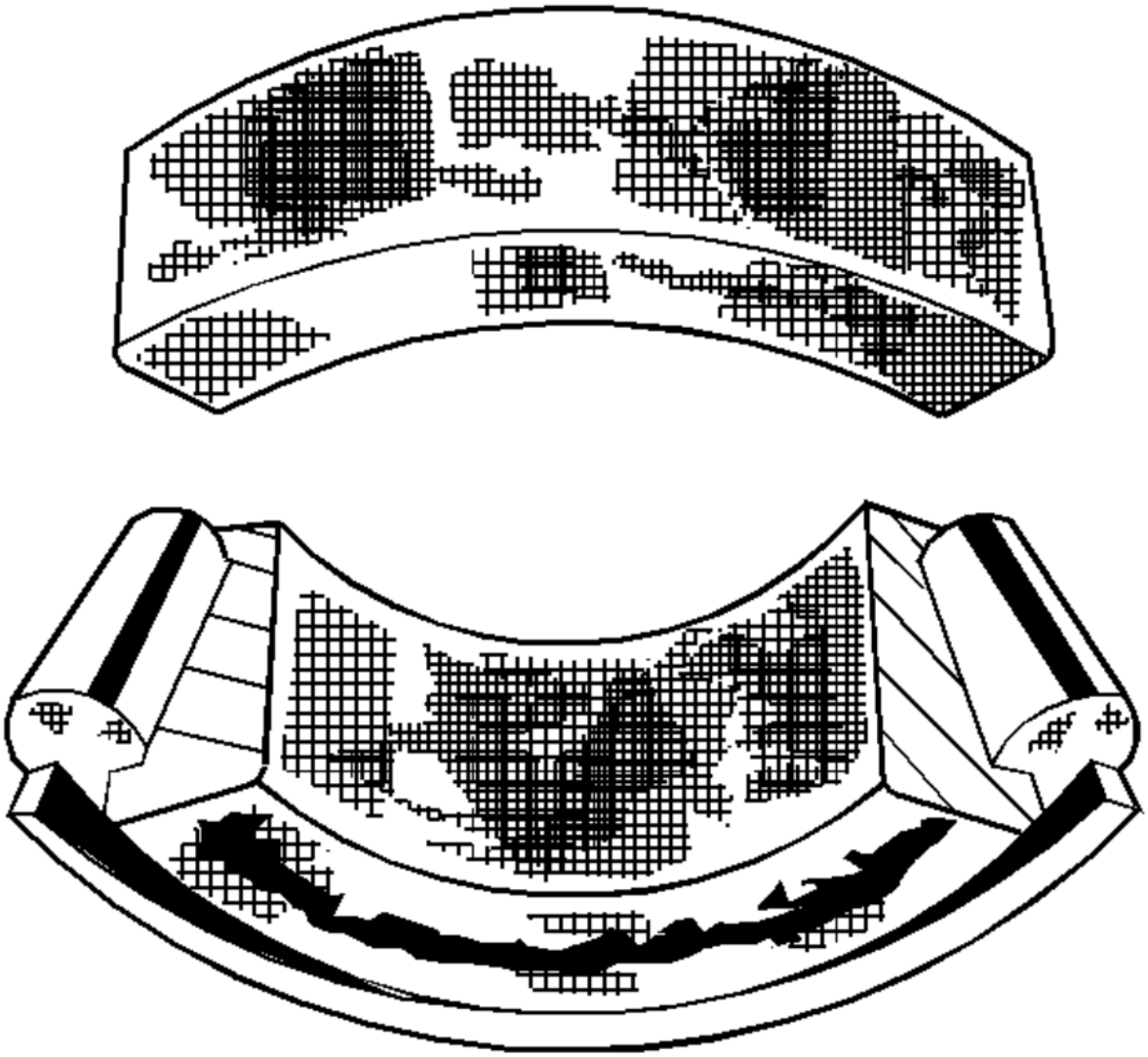


Fig. 19: Identifying Frettage
Courtesy of GENERAL MOTORS COMPANY

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

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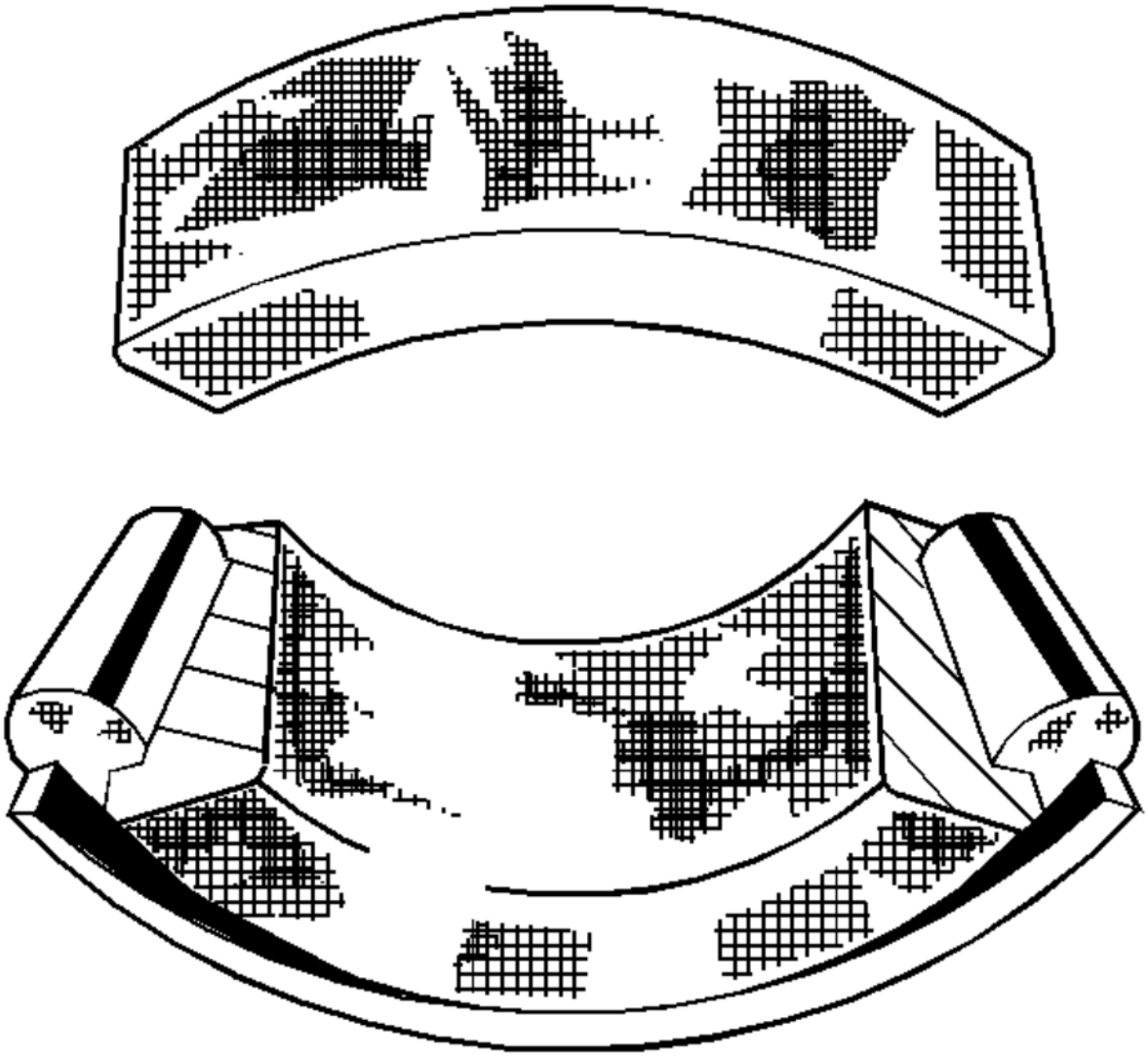


Fig. 20: Identifying Smears
Courtesy of GENERAL MOTORS COMPANY

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

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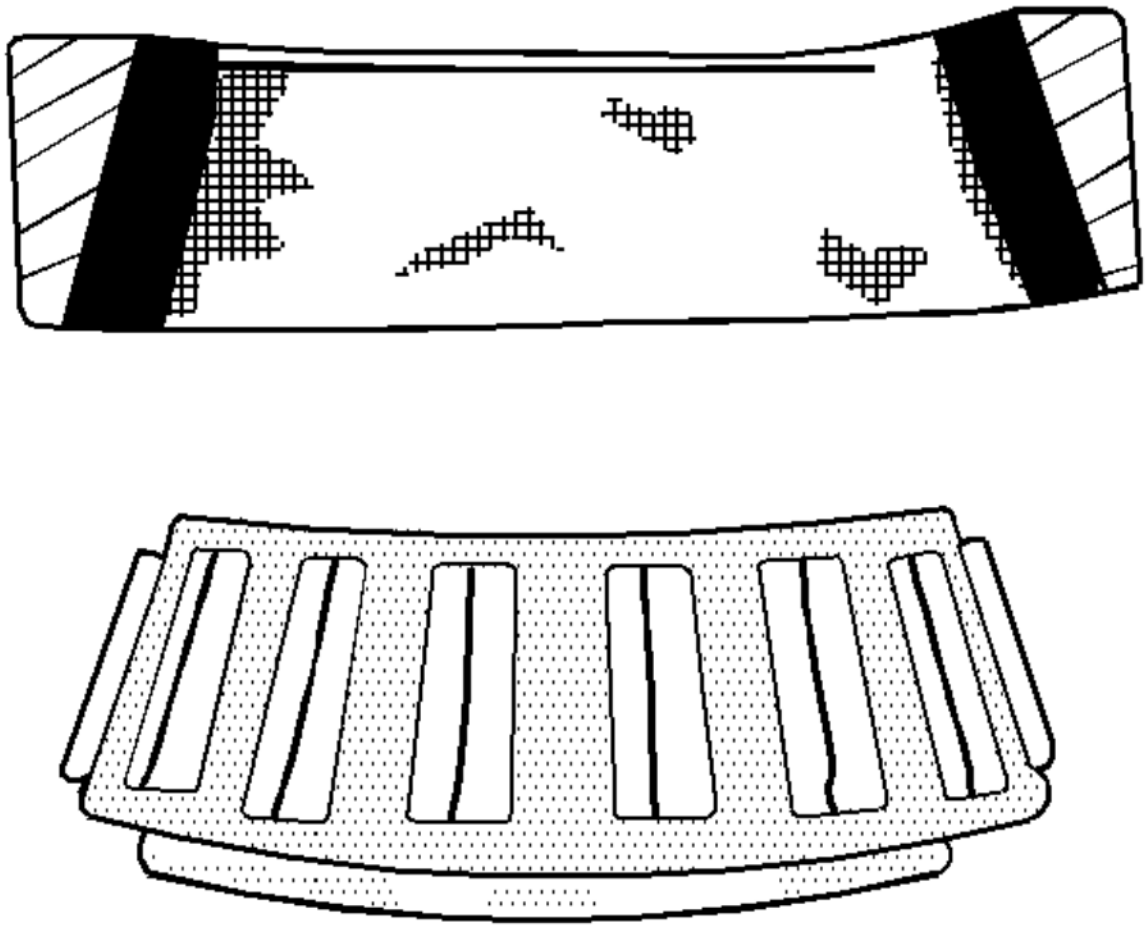


Fig. 21: Identifying Stain Discoloration
Courtesy of GENERAL MOTORS COMPANY

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

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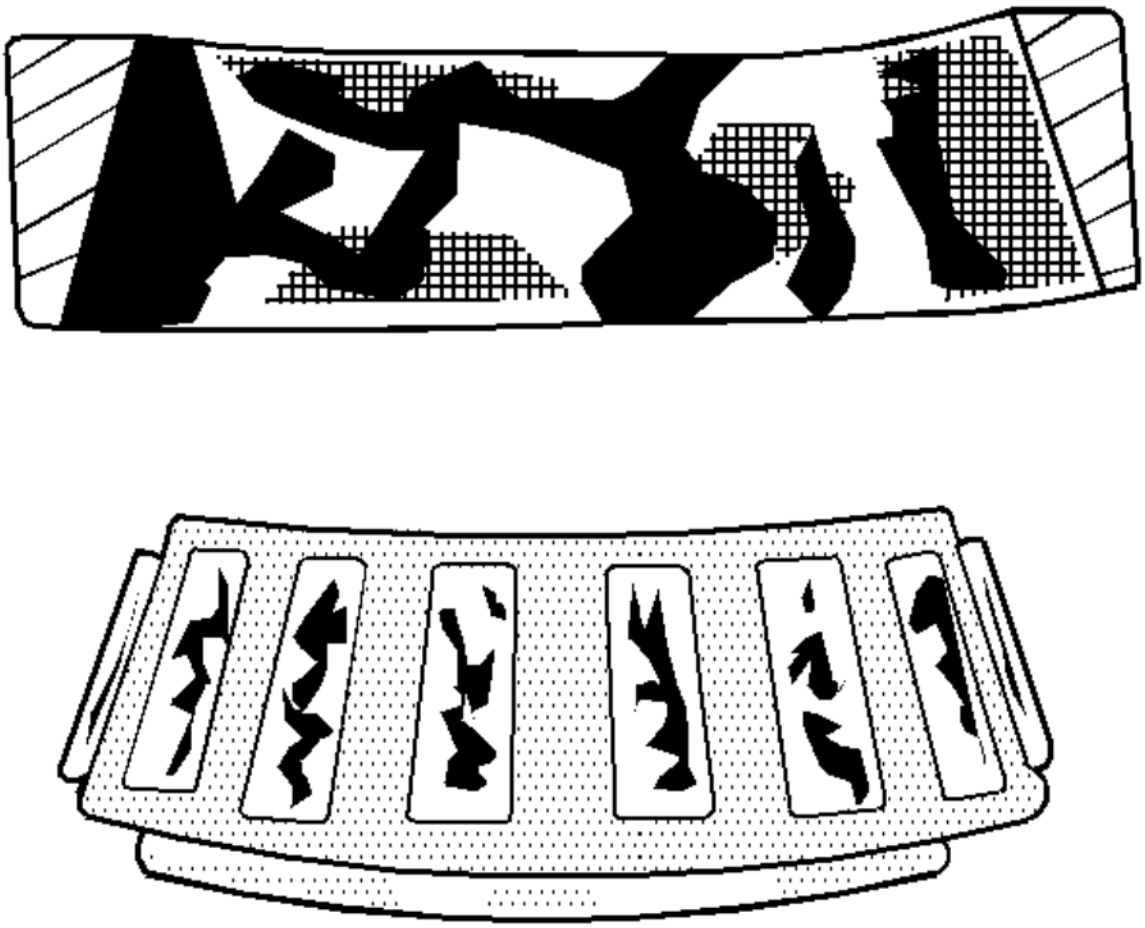


Fig. 22: Identifying Heat Discoloration
Courtesy of GENERAL MOTORS COMPANY

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

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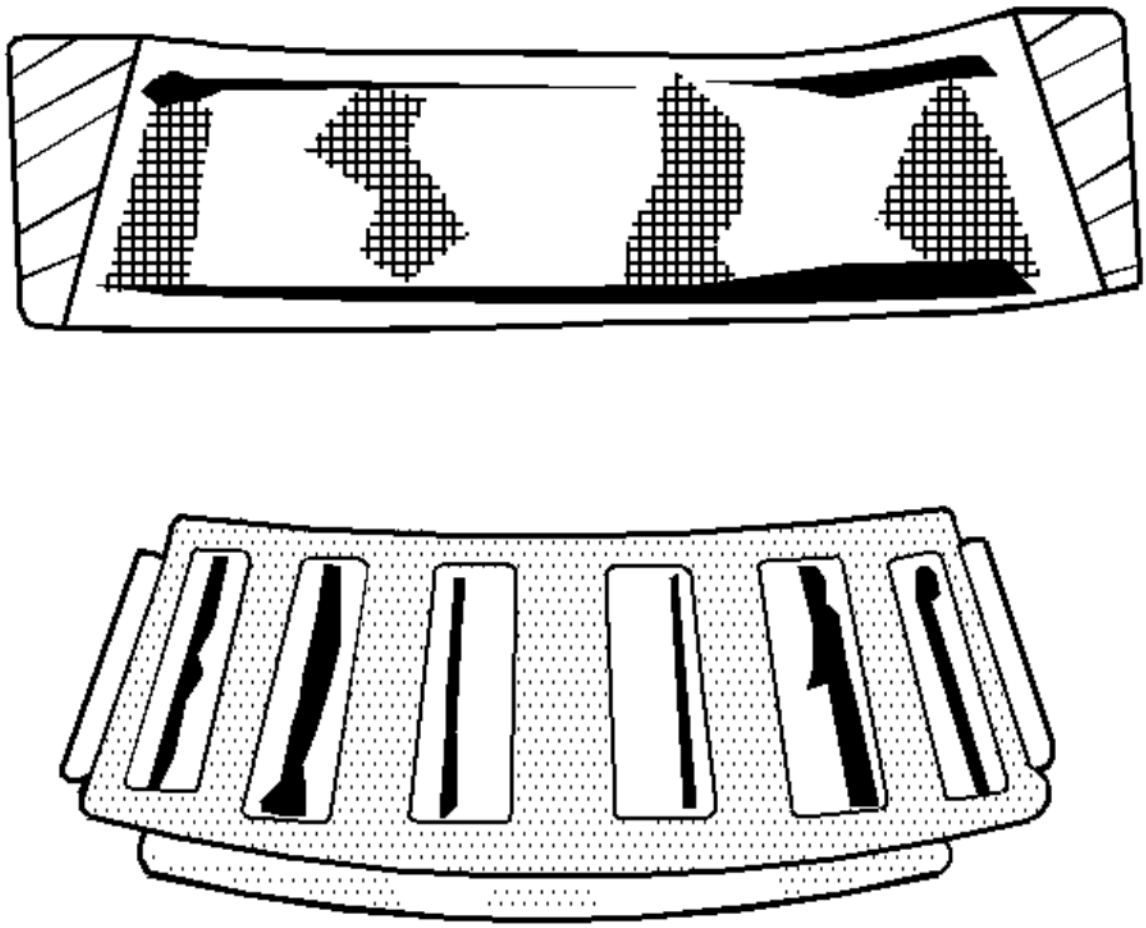


Fig. 23: Identifying Misalignment
Courtesy of GENERAL MOTORS COMPANY

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

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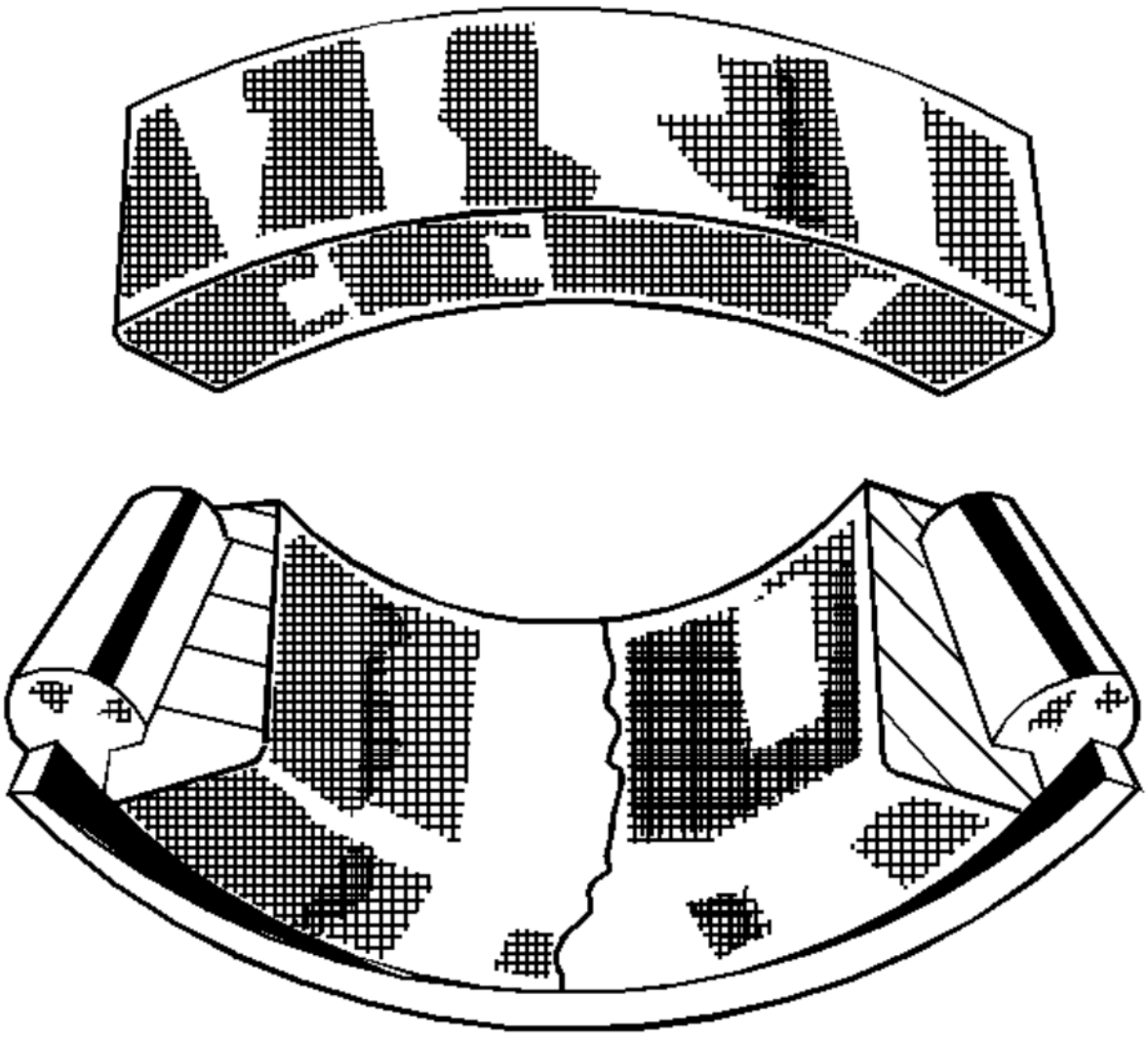


Fig. 24: Identifying Cracked Inner Race
Courtesy of GENERAL MOTORS COMPANY

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

Fatigue Spalling

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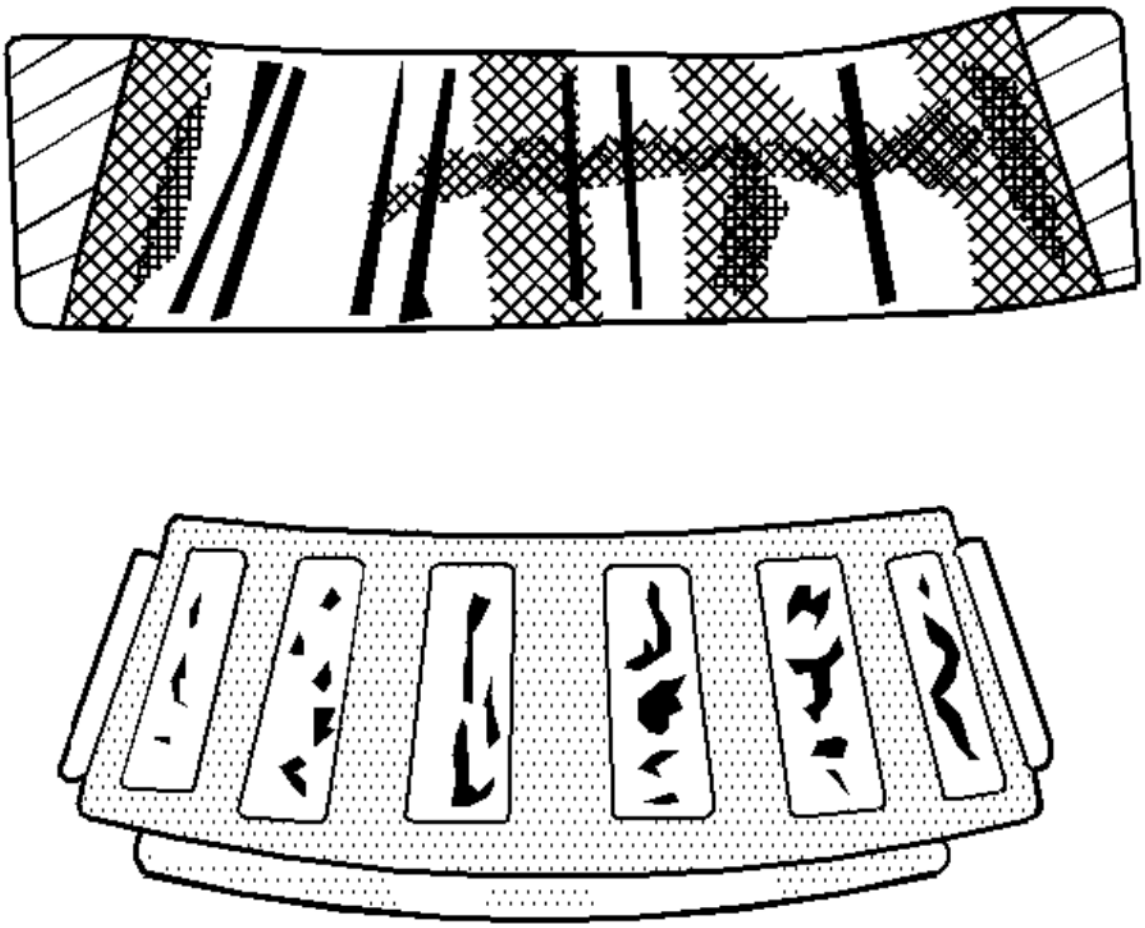


Fig. 25: Inspecting Bearing Rollers & Races For Pitting, Grooves, Spalling & Excessive Wear
Courtesy of GENERAL MOTORS COMPANY

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

Brinelling

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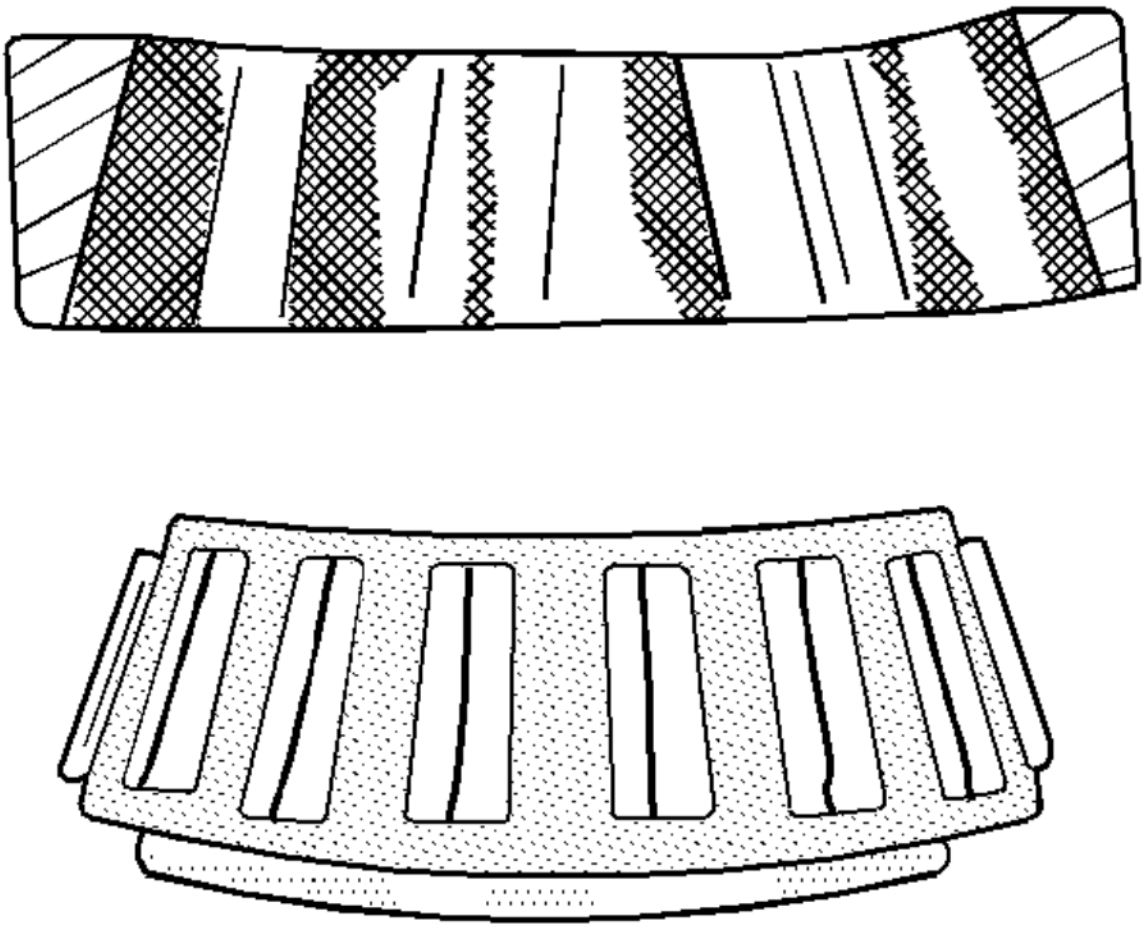


Fig. 26: Identifying Brinelling
Courtesy of GENERAL MOTORS COMPANY

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.

FOUR-WHEEL DRIVE DOES NOT ENGAGE

NOTE: **Before performing the following diagnostic procedure, ensure that all electrical diagnostic procedures have been performed and there are no DTCs.**

Step	Action	Yes	No
1	Confirm operation of system. Refer to **Front Drive Axle Description and Operation**. Is the system operating properly?	Test the system	Go to **Step 2**
2	1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** . 2. Remove the actuator motor. Refer to **Front Drive**	Test the system	Go to **Step 3**

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Step	Action	Yes	No
	Axle Actuator Replacement (1500 Series)Front Drive Axle Actuator Replacement (2500/3500 Series). 3. Using a brass drift, apply pressure to the clutch fork. 4. Turn the right wheel to align the clutch gears. While turning the right wheel, does the left wheel turn in the opposite direction?		
3	1. Remove the inner axle shaft and housing assembly. Refer to **Front Drive Axle Inner Shaft Housing Replacement (8.25 Inch Axle)Front Drive Axle Inner Shaft Housing Replacement (9.25 Inch Axle)**. 2. Inspect the following: • Clutch Fork • Clutch Sleeve • Clutch Gear • Clutch Return Spring Repair as needed. Did you complete the repair?	Test the system	System OK

FOUR-WHEEL DRIVE DOES NOT DISENGAGE

NOTE: **Before performing the following diagnostic procedure, ensure that all electrical diagnostic procedures have been performed and there are no DTCs.**

Step	Action	Yes	No
1	Confirm operation of system. Refer to **Front Drive Axle Description and Operation**. Is the system operating properly?	Test the system	Go to **Step 2**
2	1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** . 2. Remove the actuator motor. Refer to **Front Drive Axle Actuator Replacement (1500 Series)Front Drive Axle Actuator Replacement (2500/3500 Series)**. 3. Using a brass drift, apply pressure to the clutch fork. 4. Turn the right wheel to align the clutch gears. While turning the right wheel, does the left wheel turn in the opposite direction?	Test the system	Go to **Step 3**

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Step	Action	Yes	No
3	1. Remove the inner axle shaft and housing assembly. Refer to **Front Drive Axle Inner Shaft Housing Replacement (8.25 Inch Axle)Front Drive Axle Inner Shaft Housing Replacement (9.25 Inch Axle)**. 2. Inspect the following: • Clutch Fork • Clutch Sleeve • Clutch Gear • Clutch Return Spring Repair as needed. Did you complete the repair?	Test the system	System OK

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

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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 (8.25 INCH AXLE)

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the steering gear skid shield, if equipped. Refer to **Steering Gear Skid Shield Replacement** .
3. Clean the area around the front axle fill plug and the drain plug.

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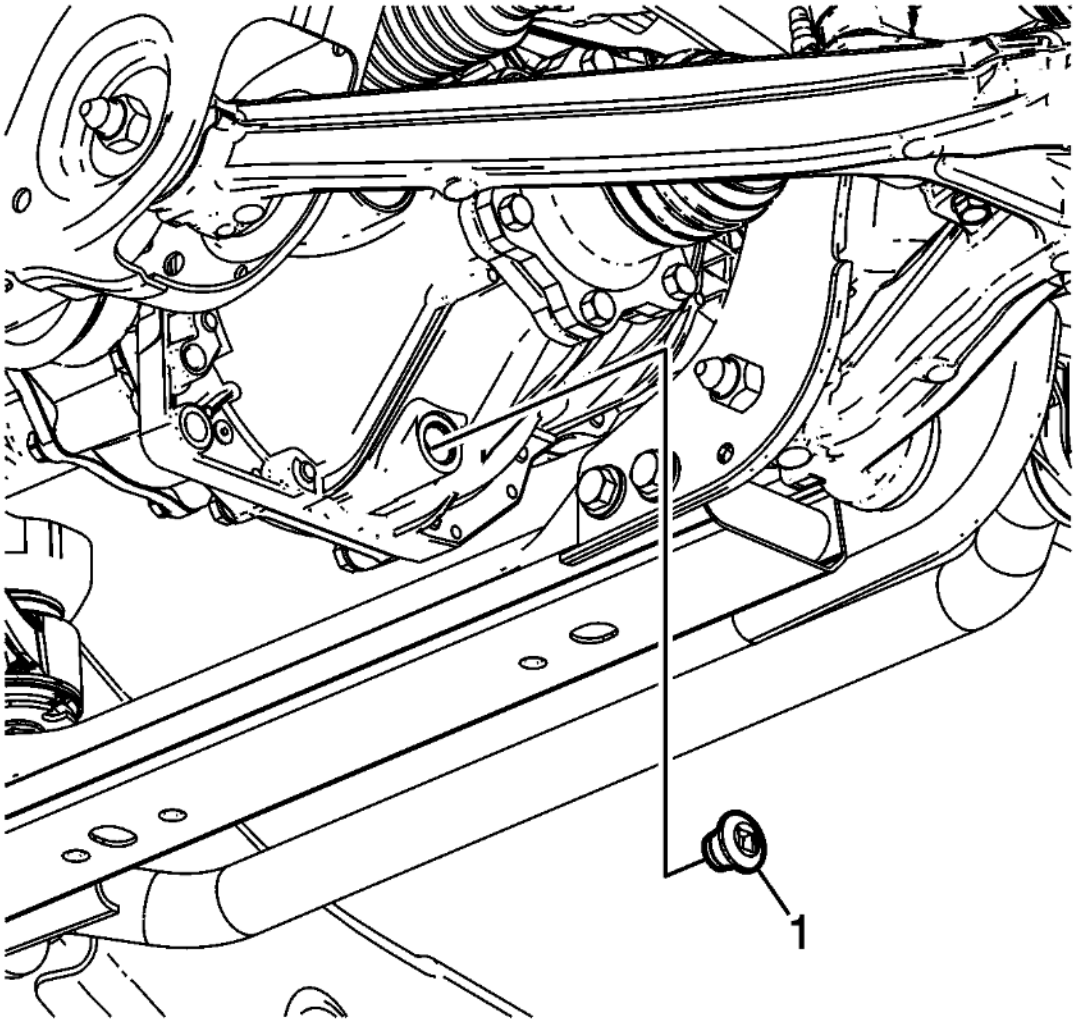


Fig. 27: Front Axle Drain Plug
Courtesy of GENERAL MOTORS COMPANY

4. Remove the drain plug (1).
5. Drain the fluid from the front differential carrier assembly.

Installation Procedure

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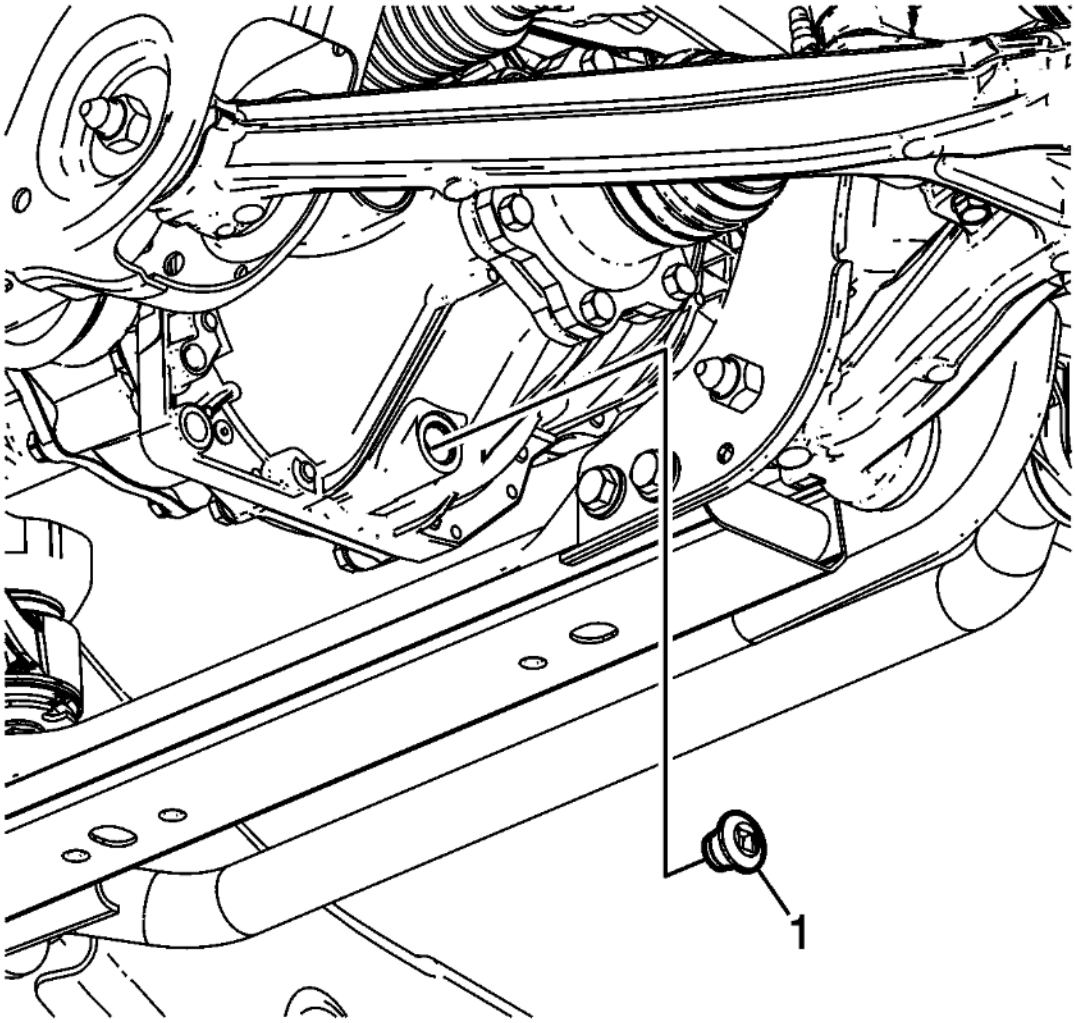


Fig. 28: Front Axle Drain Plug
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

1. Install the drain plug (1).

Tighten

Tighten the drain plug to 33 N.m (24 lb ft).

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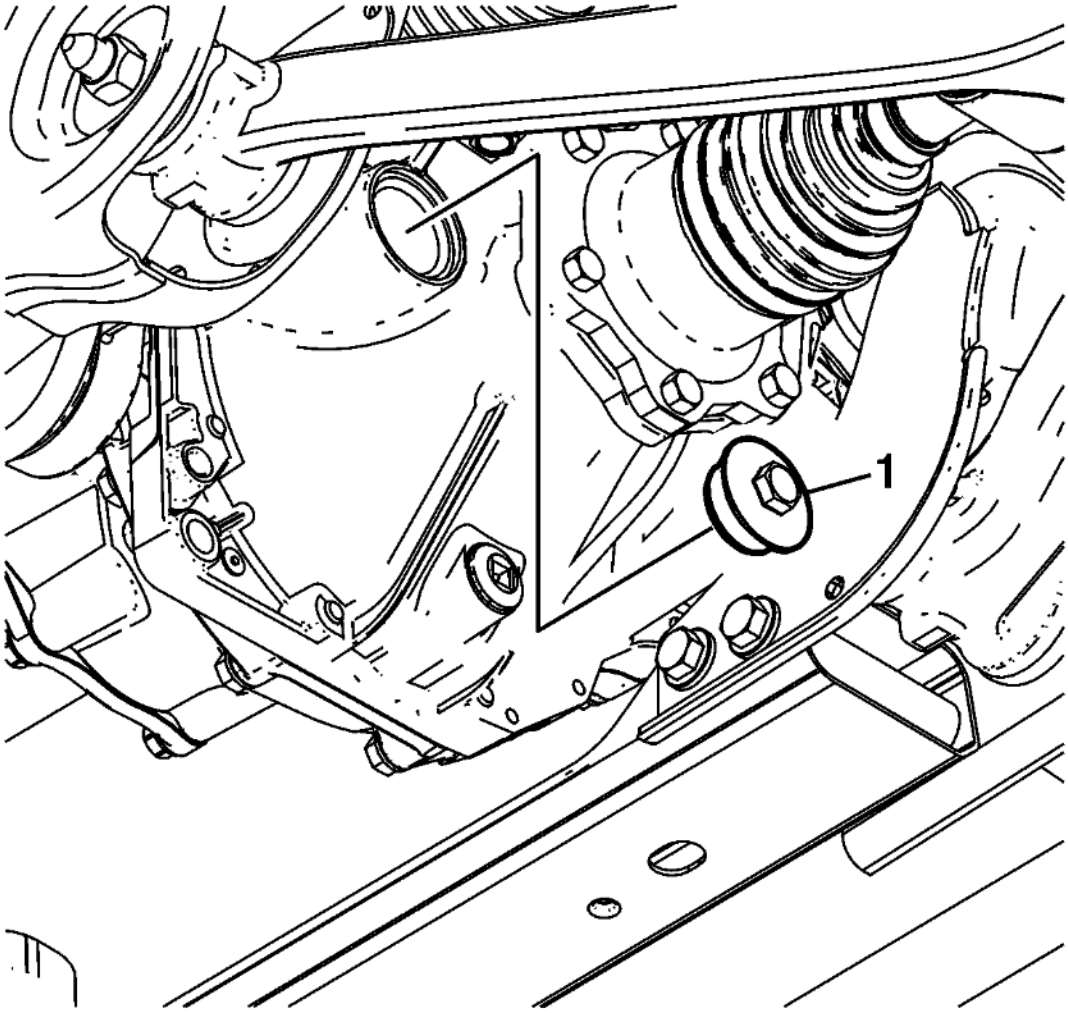


Fig. 29: Front Axle Fill Plug
Courtesy of GENERAL MOTORS COMPANY

2. Remove the fill plug (1)
3. Fill the differential carrier assembly with axle lubricant. Use the correct fluid. Refer to **Approximate Fluid Capacities**, and **Adhesives, Fluids, Lubricants, and Sealers**.
4. Install the fill plug (1).

Tighten

Tighten the fill plug to 33 N.m (24 lb ft).

5. Install the steering gear skid shield, if equipped. Refer to **Steering Gear Skid Shield Replacement** .
6. Lower the vehicle.

FRONT AXLE LUBRICANT REPLACEMENT (9.25 INCH AXLE)

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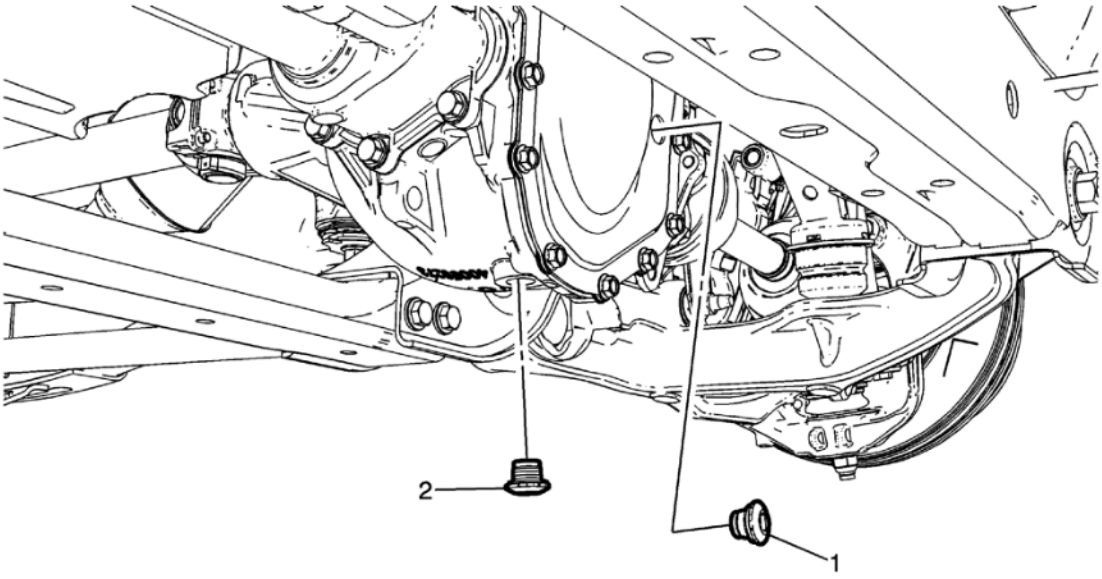


Fig. 30: Front Axle Lubricant Drain And Fill Plugs (9.25 Inch Axle)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure 1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** . 2. Remove the engine shield, if equipped. Refer to **Steering Gear Skid Shield Replacement** .	
1	Front Differential Carrier Oil Fill Plug **CAUTION:** **Refer to Fastener Caution .** **Procedure** 1. Fill with the front drive axle with the proper fluid. Refer to **Adhesives, Fluids, Lubricants, and Sealers** 2. Fill the front drive axle to the proper capacity. Refer to **Approximate Fluid Capacities** **Tighten** 40 N.m (30 lb ft).
2	Front Differential Carrier Oil Drain Plug **Tighten** 40 N.m (30 lb ft).

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FRONT AXLE VENT HOSE REPLACEMENT (9.25 INCH AXLE)

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the steering gear skid shield , if equipped. Refer to **Steering Gear Skid Shield Replacement** .

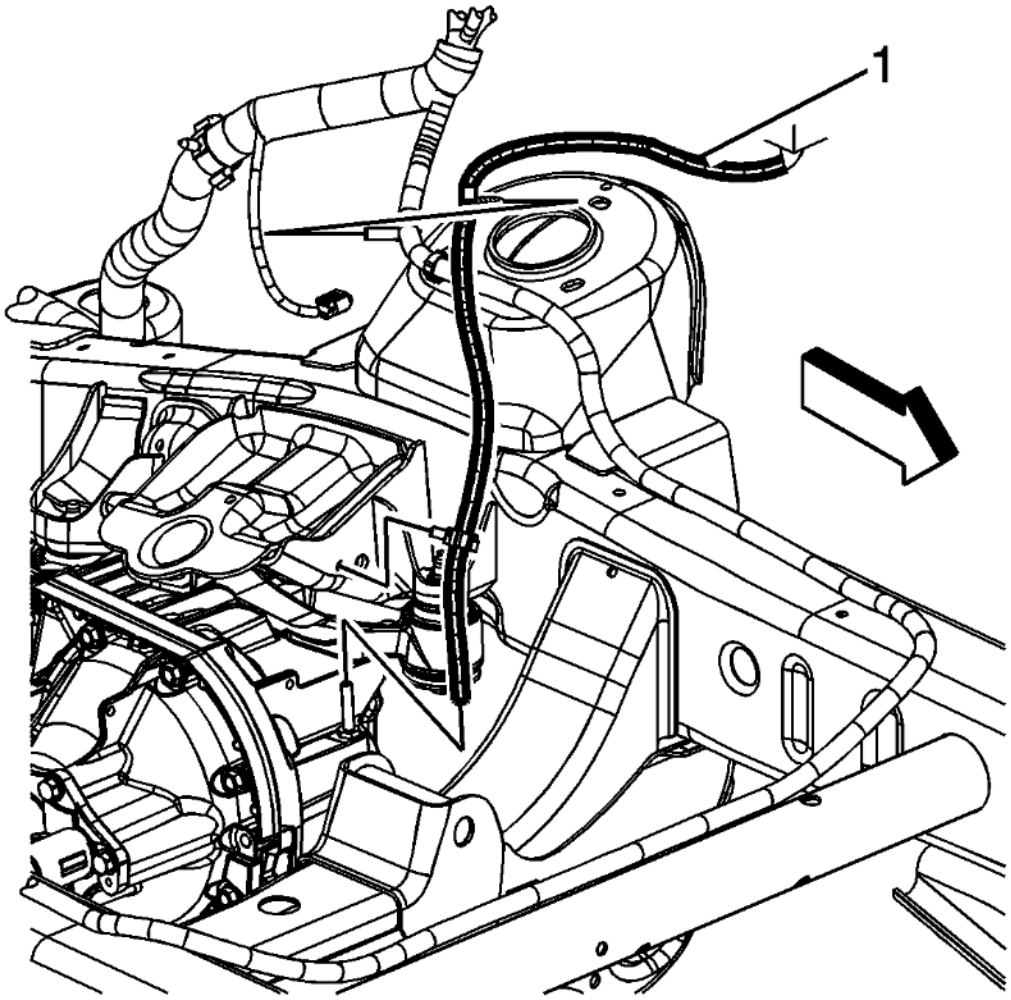


Fig. 31: Locating Vent Hose & Components
Courtesy of GENERAL MOTORS COMPANY

3. Remove the vent hose (1) the retainers from the frame.
4. Lower the vehicle.

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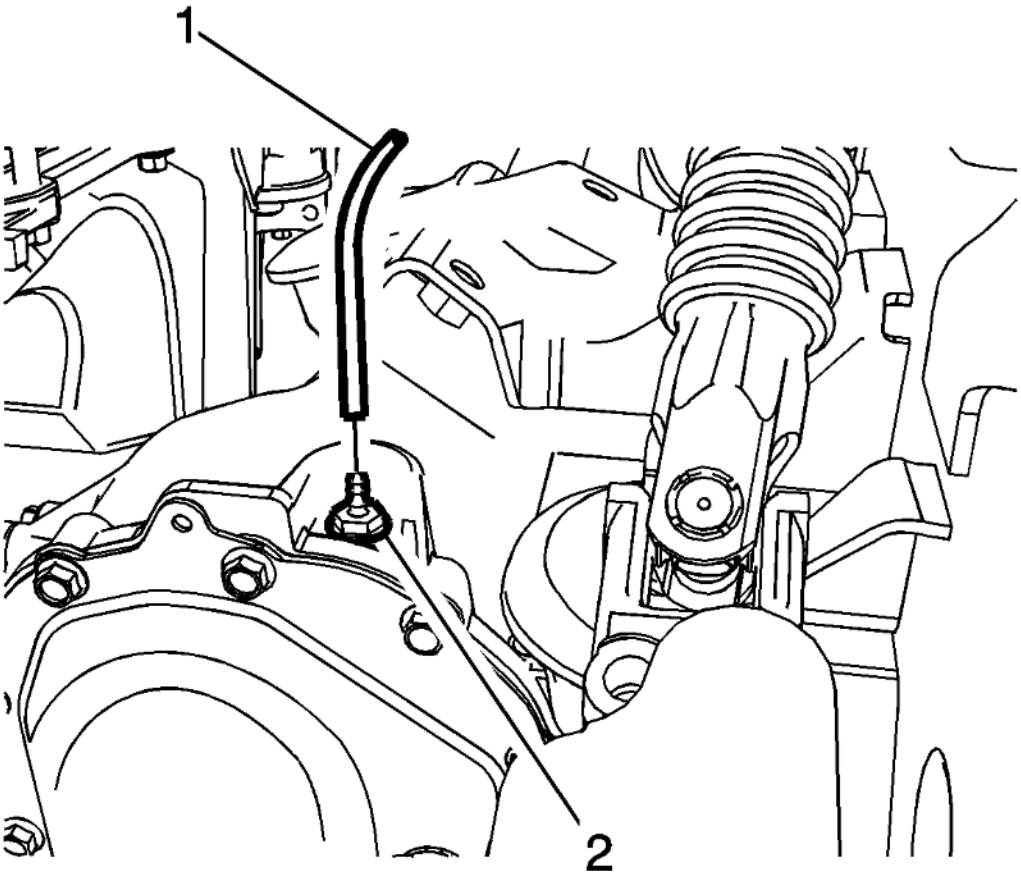


Fig. 32: Differential Carrier Vent And Hose
Courtesy of GENERAL MOTORS COMPANY

5. Remove the vent hose from the connector.

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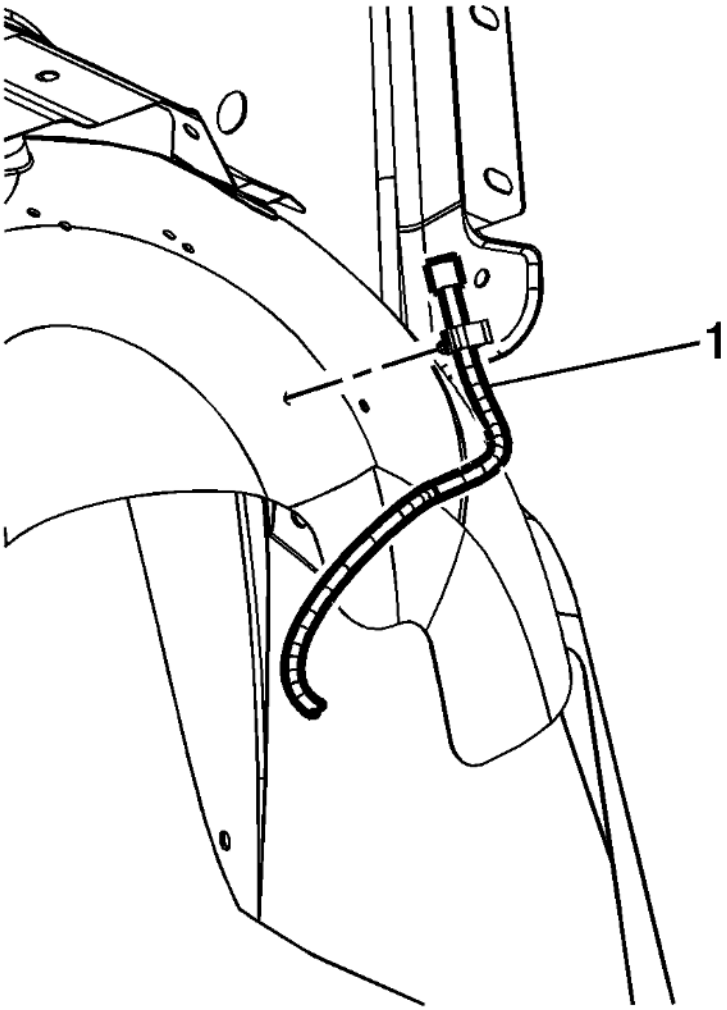


Fig. 33: View Of Vent Hose
Courtesy of GENERAL MOTORS COMPANY

6. Remove the vent hose (1) from the inner fender.

Installation Procedure

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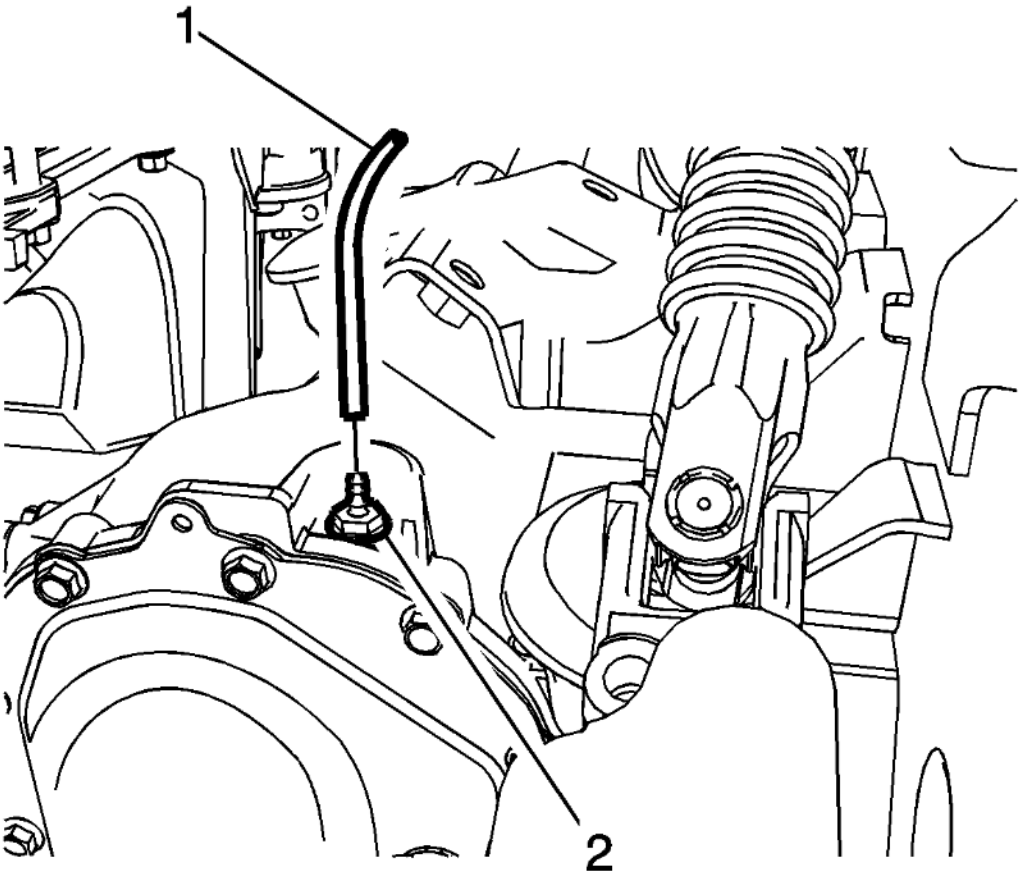


Fig. 34: Differential Carrier Vent And Hose
Courtesy of GENERAL MOTORS COMPANY

1. Install the vent hose (1) to the connector (2).

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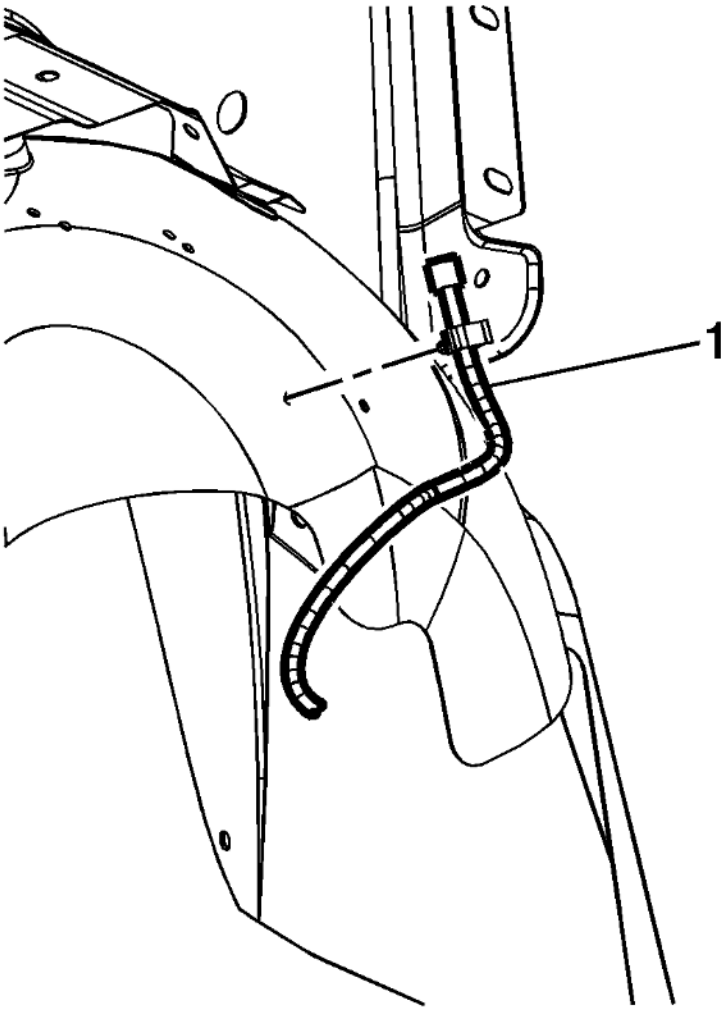


Fig. 35: View Of Vent Hose
Courtesy of GENERAL MOTORS COMPANY

2. Install the vent hose (1) to the inner fender.
3. Raise the vehicle.

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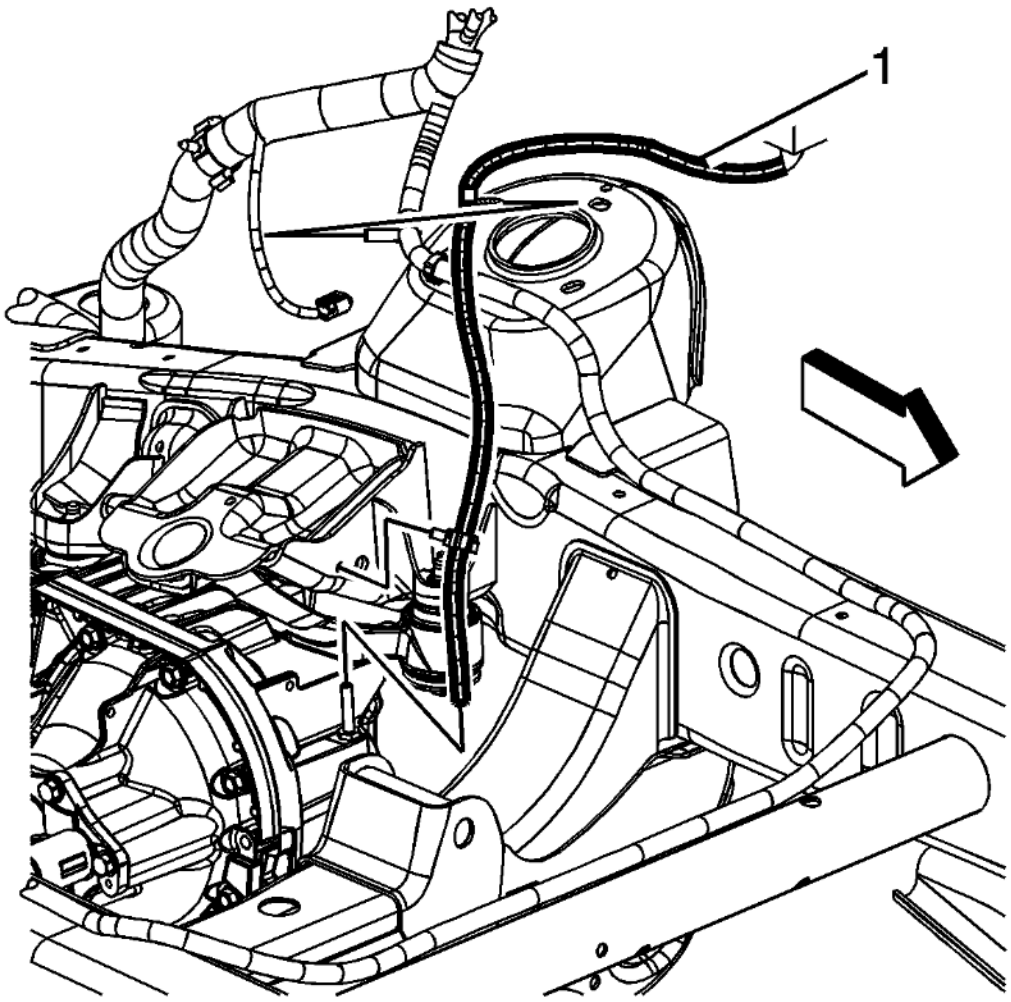


Fig. 36: Locating Vent Hose & Components
Courtesy of GENERAL MOTORS COMPANY

4. Install the vent hose (1) retainers to the frame.
5. Install the steering gear skid shield , if equipped. Refer to **Steering Gear Skid Shield Replacement** .
6. Lower the vehicle.

FRONT AXLE VENT HOSE CONNECTOR REPLACEMENT (9.25 INCH AXLE)

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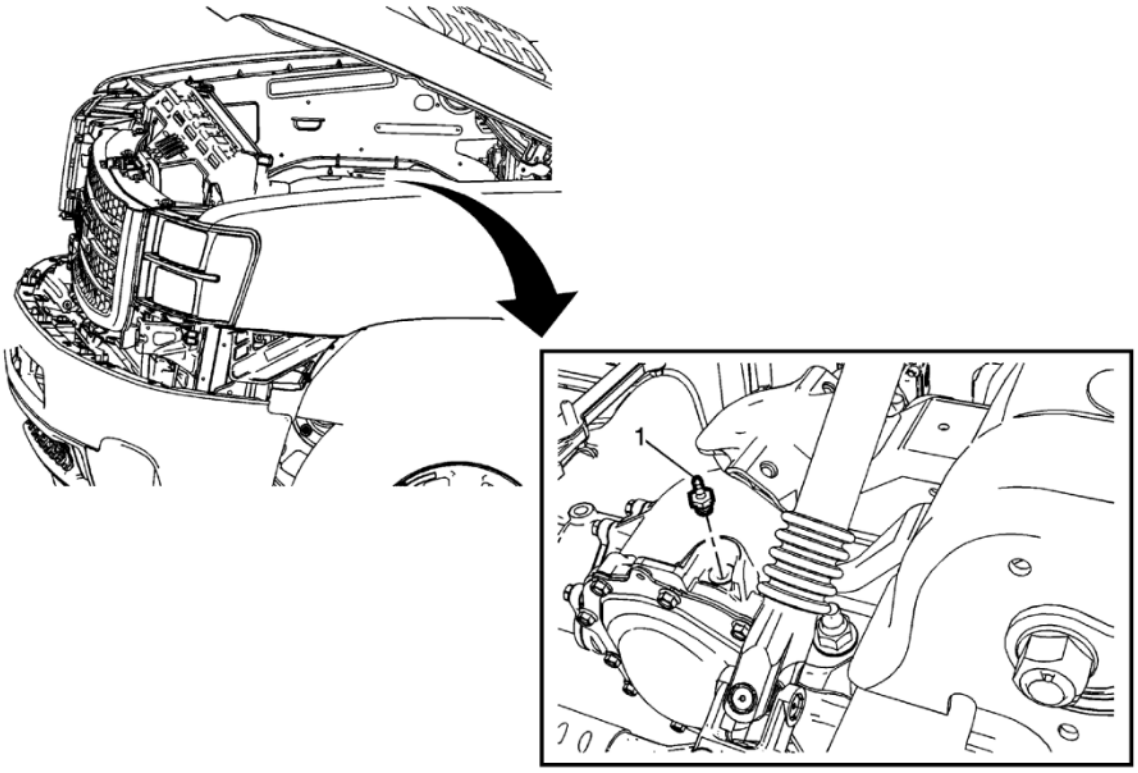


Fig. 37: Front Axle Vent Hose Connector
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Disconnect the front differential carrier vent hose.	
1	Front Differential Carrier Vent Hose Connector **CAUTION:** **Refer to** **Fastener Caution** . **Tighten** 28 N.m (21 lb ft).

FRONT AXLE VENT HOSE CONNECTOR REPLACEMENT (8.25 INCH AXLE)

Removal Procedure

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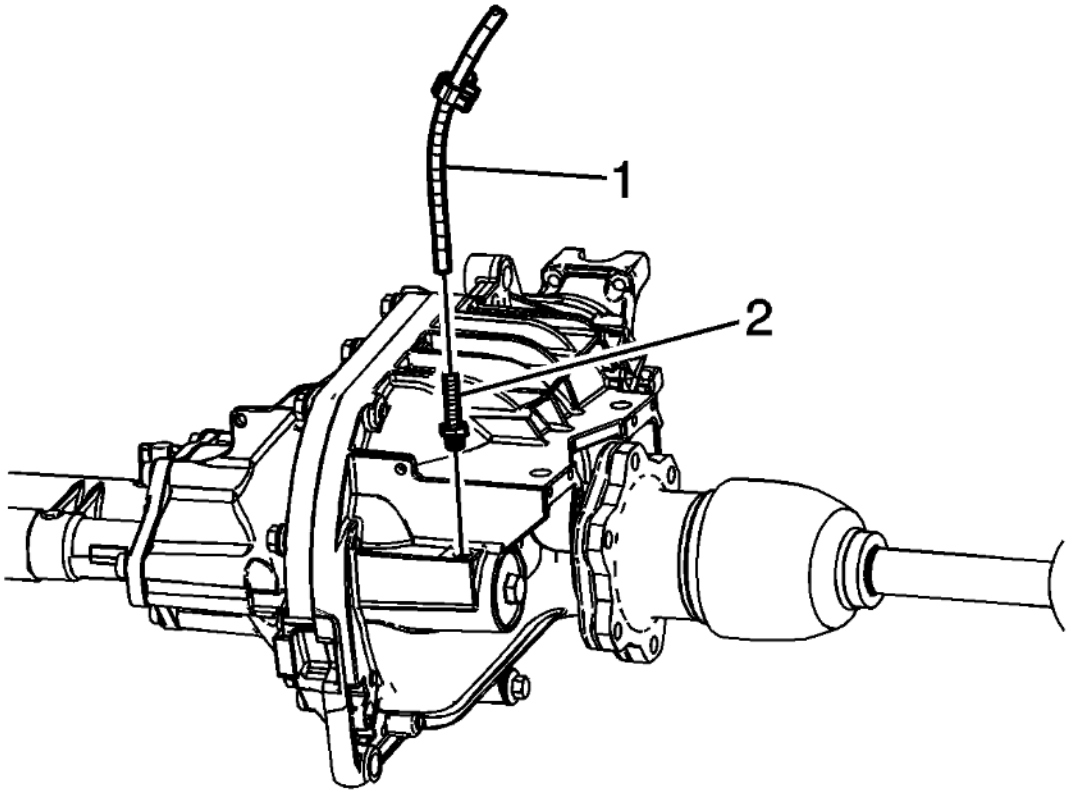


Fig. 38: View Of Vent Hose & Connector
Courtesy of GENERAL MOTORS COMPANY

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the steering gear skid shield, if equipped. Refer to **Steering Gear Skid Shield Replacement** .
3. Remove the vent hose (1).
4. Remove the vent hose connector (2).

Installation Procedure

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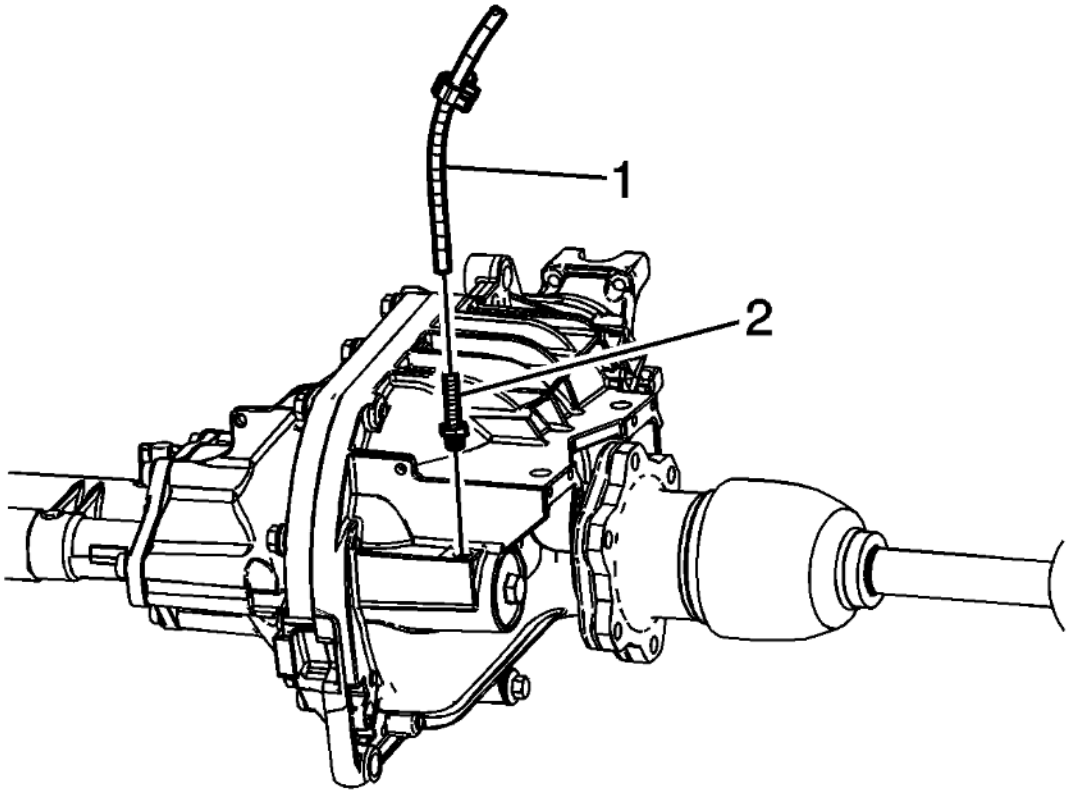


Fig. 39: View Of Vent Hose & Connector
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

1. Install the vent hose connector (2). Apply a small amount of sealer GM P/N 12346004 (Canadian P/N 10953480) or equivalent to the threads.

   Tighten

   Tighten the vent connector to 20 N.m (15 lb ft).

2. Install the vent hose (1).
3. Install the steering gear skid shield, if equipped. Refer to **Steering Gear Skid Shield Replacement** .
4. Lower the vehicle.

FRONT DRIVE AXLE INNER SHAFT REPLACEMENT (LEFT SIDE)

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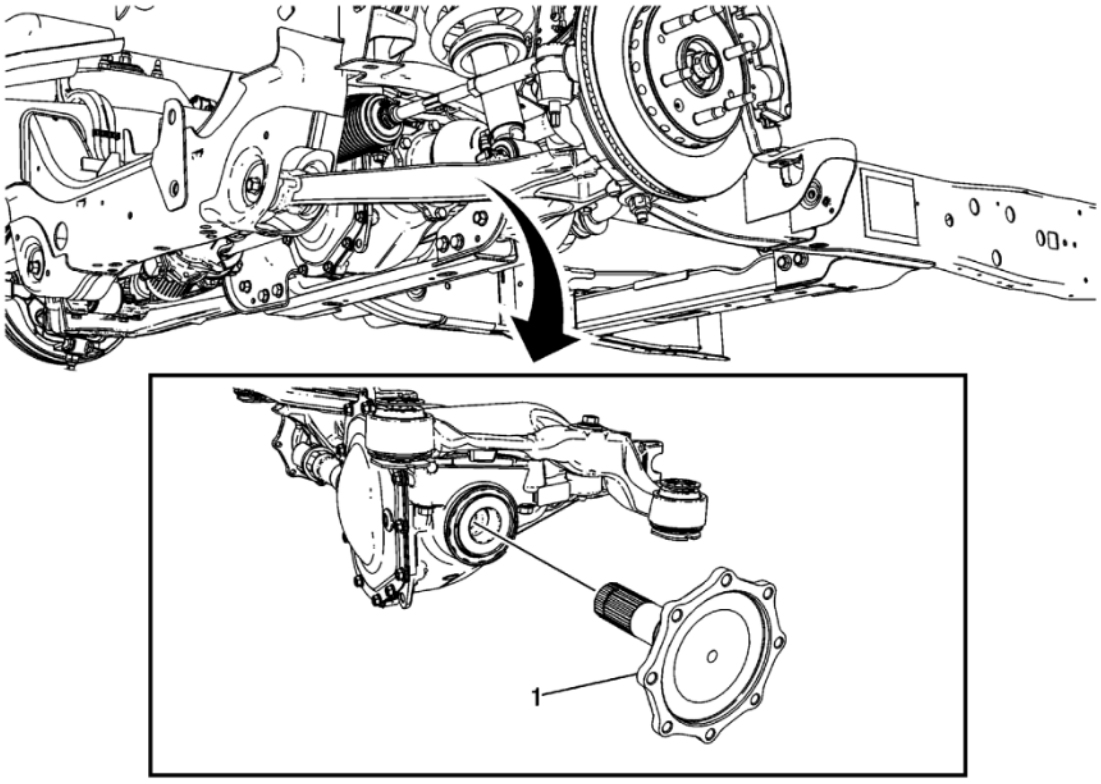


Fig. 40: Front Drive Axle Inner Shaft Replacement (Left Side)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** . 2. Remove the wheel drive shaft. Refer to **Front Wheel Drive Shaft Replacement - Left Side** .	
1	Front Drive Axle Inner Shaft **Procedure** **NOTE:** **It maybe necessary to have the aid of an assistant to hold the steering knuckle assembly to side in order to have enough access to the front drive axle**

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Callout	Component Name
	inner shaft. 1. Using the **J-45859** puller and the **J-2619-4** slide hammer , remove the front drive axle inner shaft. **NOTE:** **In some rare cases, it may be difficult to remove the left front axle shaft from the front axle assembly when replacing the axle seal. To ease removal, the left front axle shaft C-clip needs to be centered in the retaining groove.** 2. If the left hand inner axle shaft does not come out using moderate force follow steps below. 1. Remove the front axle assembly from the vehicle. 2. Position the front axle assembly straight up and down so the left hand inner axle shaft is facing upward. If required, secure in a large bench vise. 3. Using a ball peen hammer, or preferably a brass hammer, tap the left inner axle shaft flange up and down repeatedly until the stub shaft separates from the axle assembly. This step centers the C-clip in the retaining groove of the stub shaft. Take care not to damage the machined face of the axle shaft. 4. Inspect the C-clip and replace if necessary. **Special Tools** • **J-2619-4** Slide Hammer • **J-45225** Seal Installer • **J-45859** Puller For equivalent regional tools, refer to **Special Tools**.

FRONT DRIVE AXLE INNER SHAFT REPLACEMENT (RIGHT SIDE - 8.25 INCH AXLE)

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Removal Procedure

1. Raise the vehicle. **Lifting and Jacking the Vehicle**
2. Drain the differential carrier. **Front Axle Lubricant Replacement (8.25 Inch Axle)Front Axle Lubricant Replacement (9.25 Inch Axle)**
3. Remove the power steering assist motor. **Power Steering Assist Motor Replacement (Light Duty)**

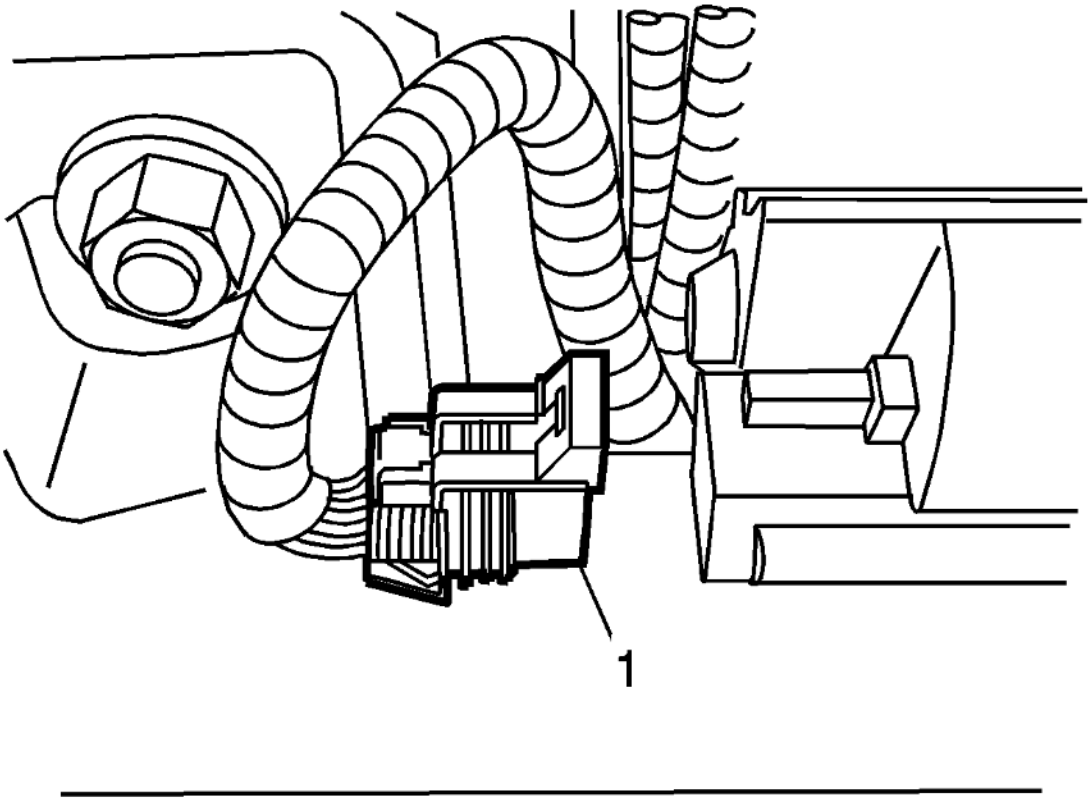


Fig. 41: Disconnecting Electric Motor Actuator Electrical Connector - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

4. Disconnect the actuator electrical connector (1).

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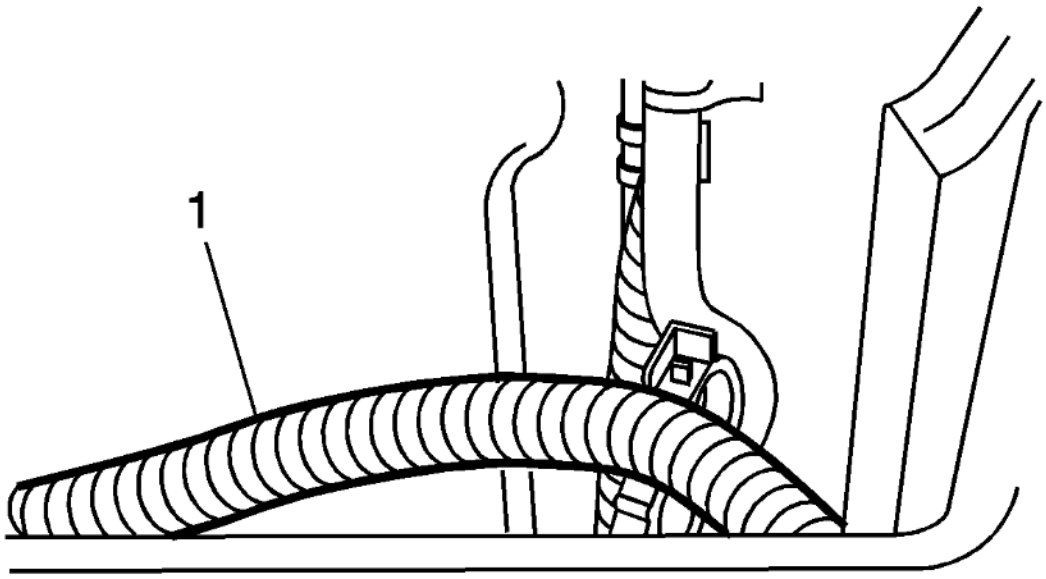


Fig. 42: Inner Axle Shaft Housing Wire Harness - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

5. Disconnect the wire harness (1) from the inner axle housing.
6. Remove the front shock module. **Shock Absorber and Spring Removal and Installation (Light Duty, Without Z85/Z95)** **Shock Absorber and Spring Removal and Installation (Light Duty, With Z85/Z95)**

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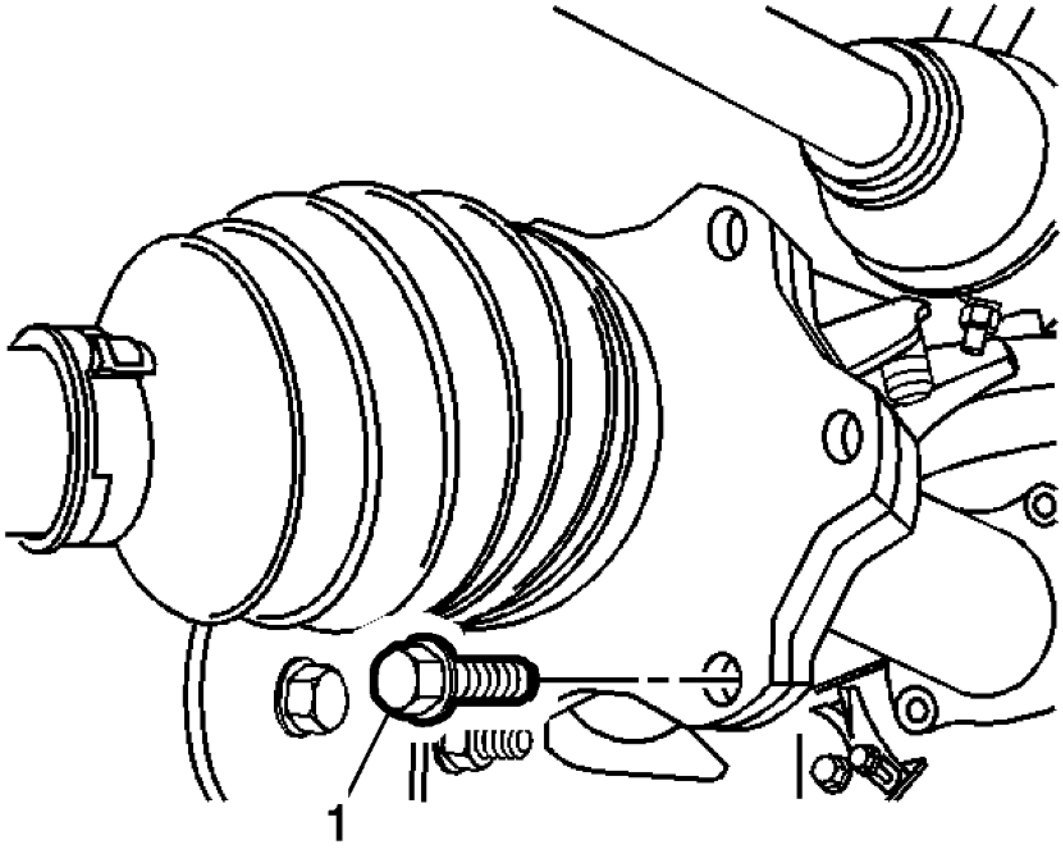


Fig. 43: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

7. Remove the wheel drive shaft flange bolts (1).

NOTE: **Support the wheel drive shaft in order to not over flex the constant velocity (CV) joint.**

8. Disconnect the wheel drive shaft from the inner axle shaft.

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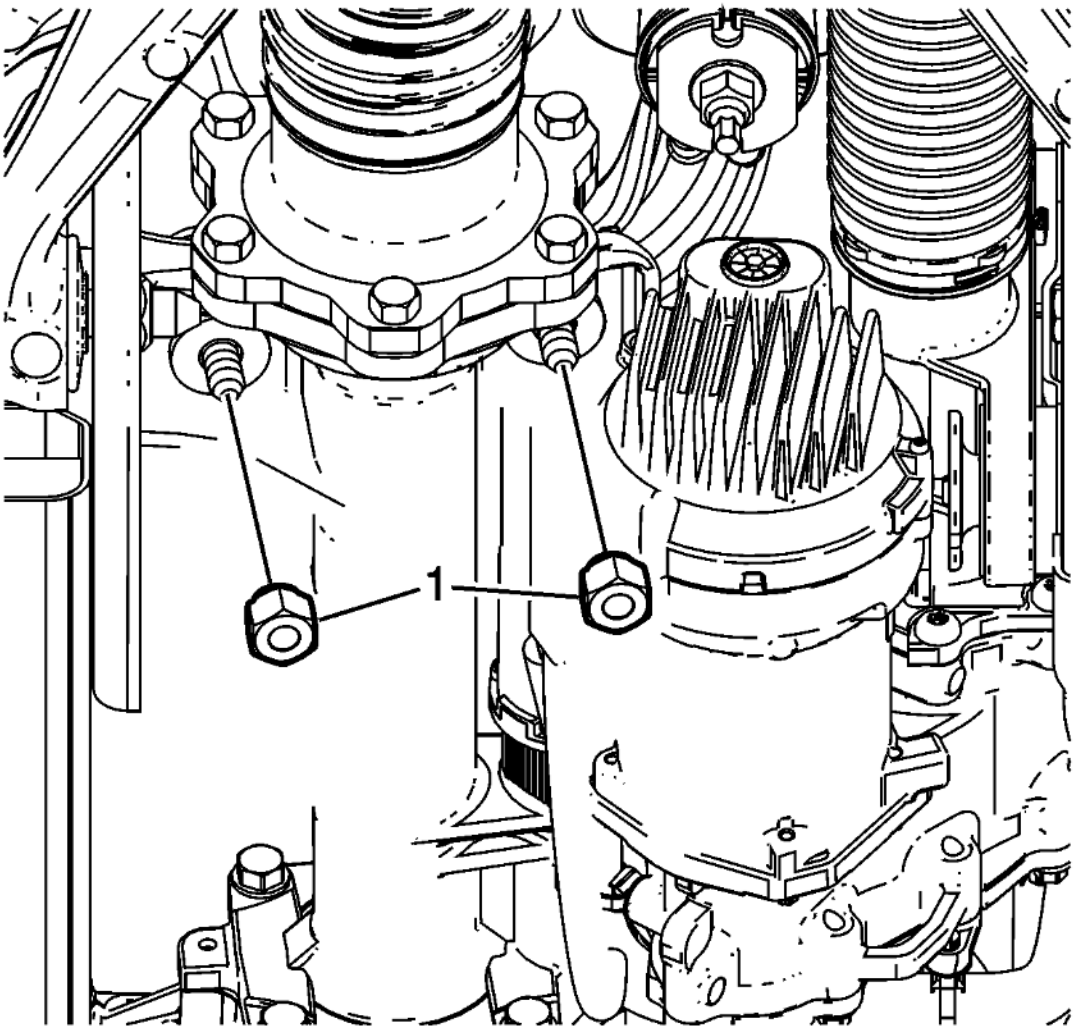


Fig. 44: Inner Axle Shaft Housing Washers And Nuts
Courtesy of GENERAL MOTORS COMPANY

9. Remove the inner axle housing mounting nuts (1).

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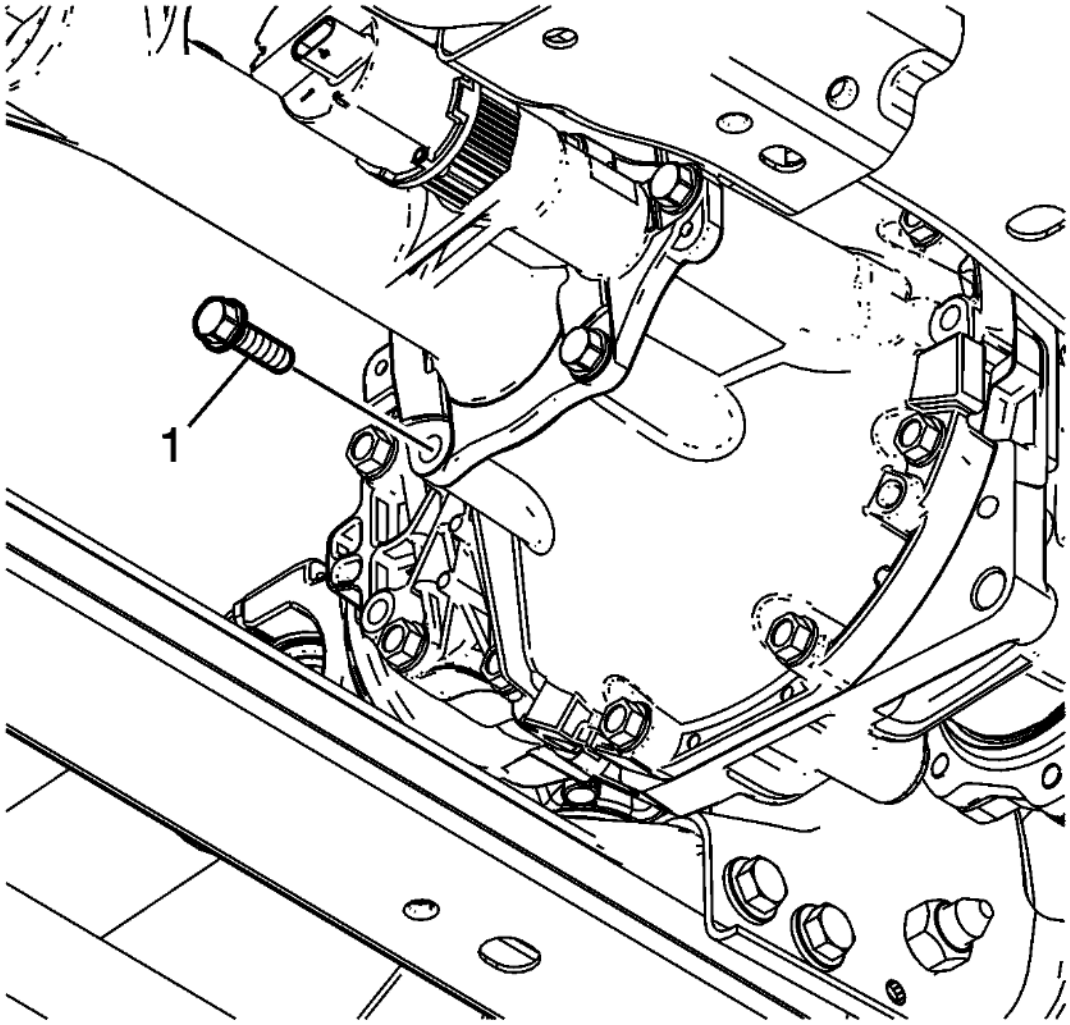


Fig. 45: Inner Axle Shaft Housing Bolts
Courtesy of GENERAL MOTORS COMPANY

10. Remove the inner axle shaft mounting bolts .

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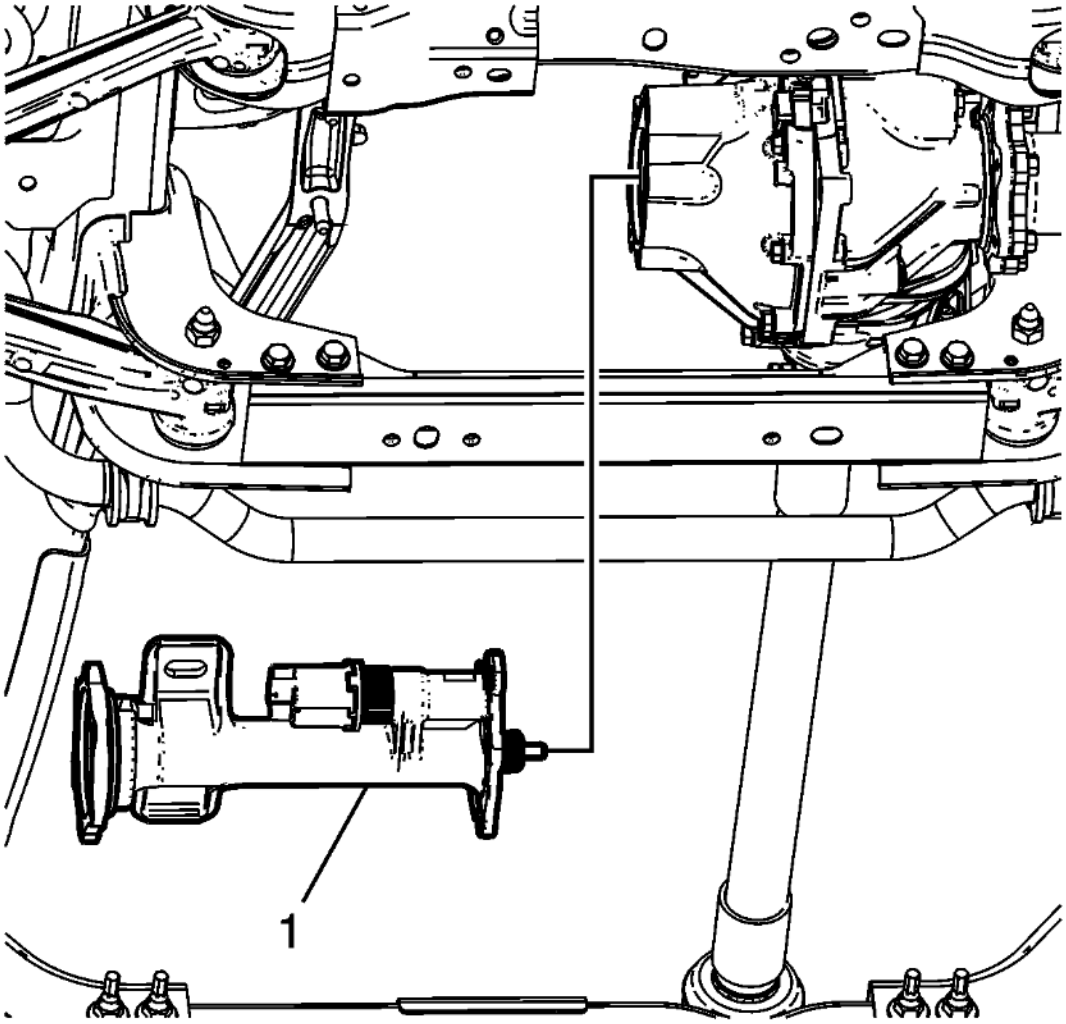


Fig. 46: Inner Axle Shaft Housing Assembly
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Keep the open end of the inner axle housing assembly up.**

11. Carefully remove the inner axle shaft housing assembly from the differential carrier assembly.

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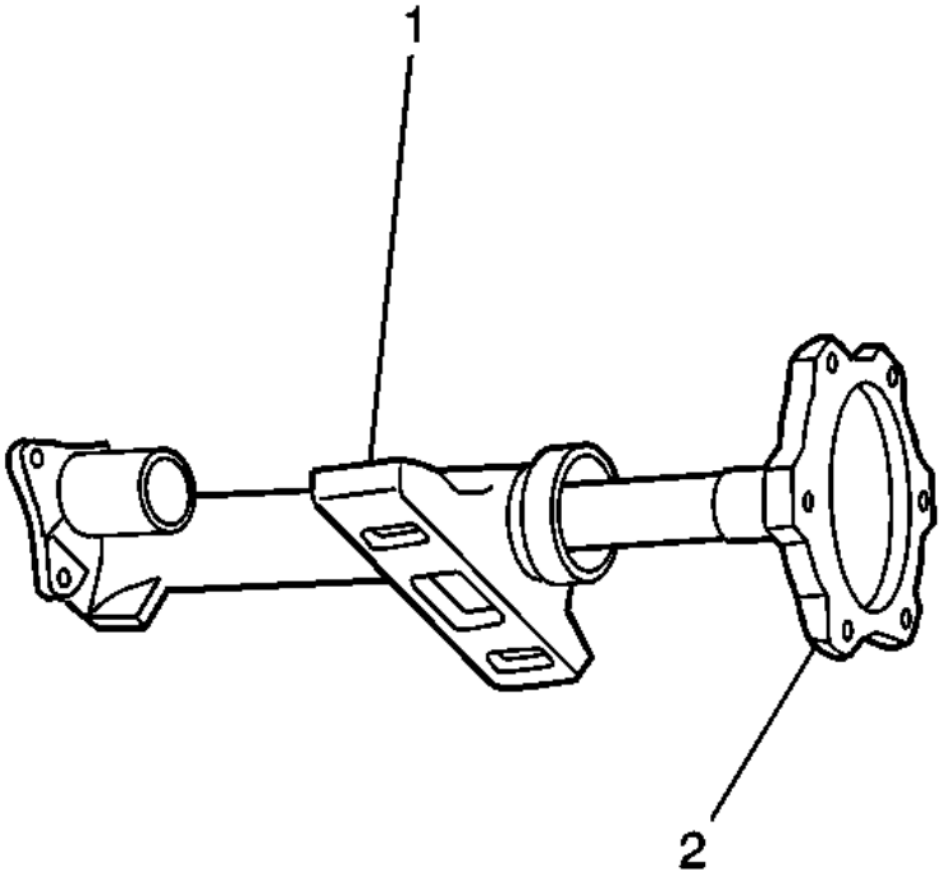


Fig. 47: Axle Shaft & Inner Axle Shaft Housing - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

12. Using a soft-faced mallet (if necessary), remove the inner axle shaft (2).

Installation Procedure

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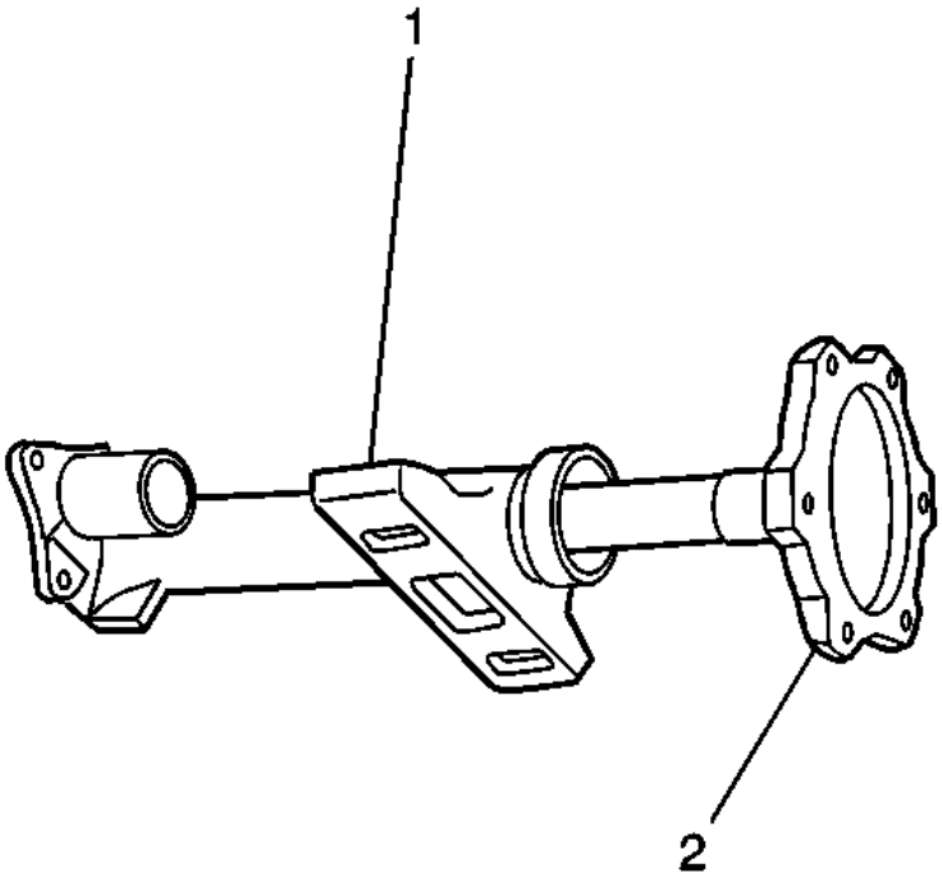


Fig. 48: Axle Shaft & Inner Axle Shaft Housing - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

1. Using a soft faced mallet, carefully tap the inner axle shaft (2) into the inner axle shaft housing (1).
2. Place the inner axle shaft housing on end so that the splines of the inner axle shaft is facing up.
3. Install the axle housing gasket on to the differential carrier.

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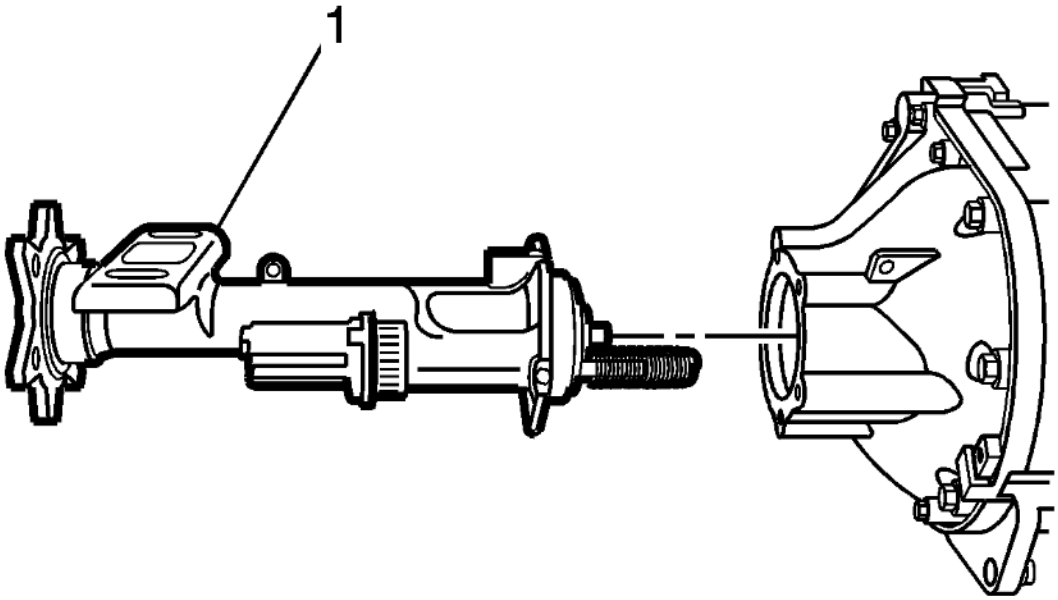


Fig. 49: Installing Inner Axle Shaft Housing Assembly - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

4. Install the inner axle shaft housing assembly (1) to the differential carrier assembly.

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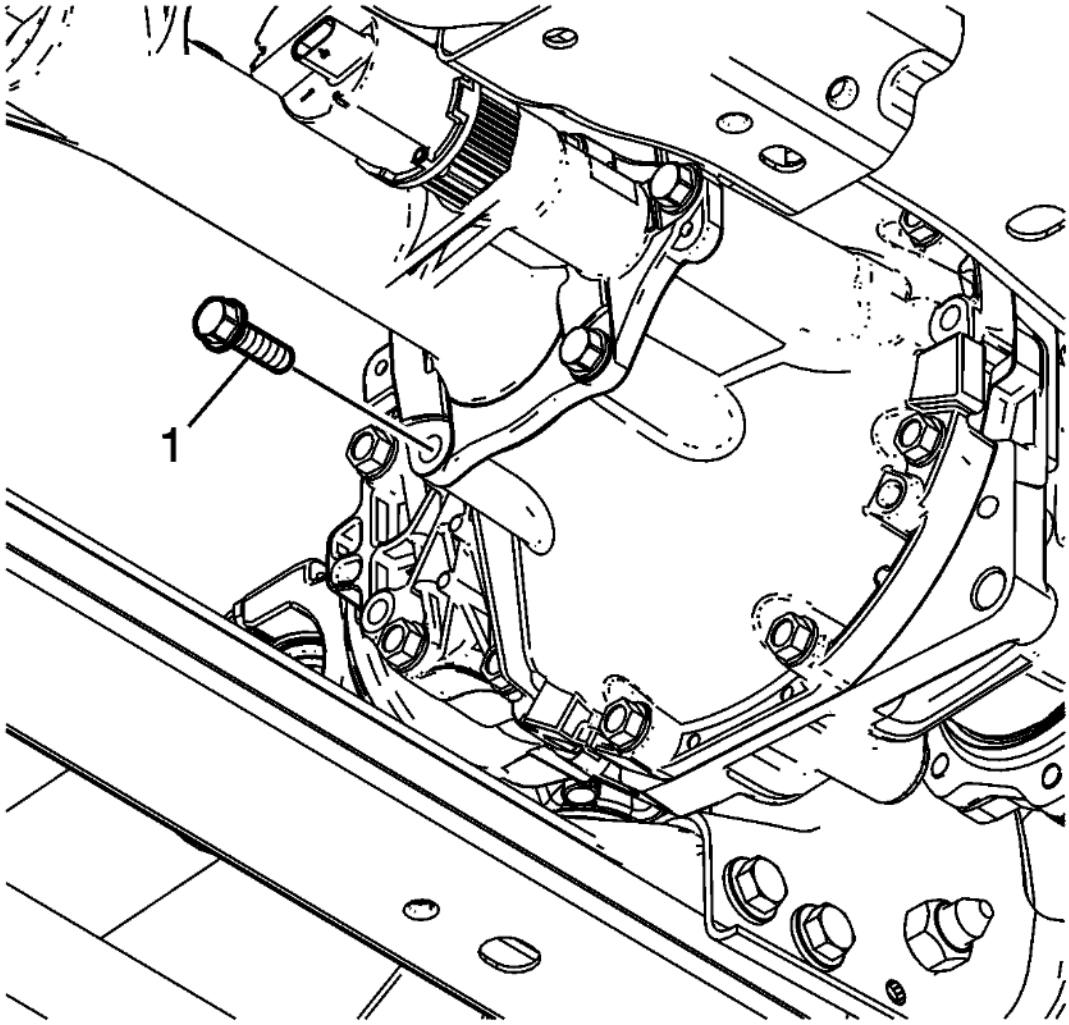


Fig. 50: Inner Axle Shaft Housing Bolts
Courtesy of GENERAL MOTORS COMPANY

5. Install the inner axle shaft housing bolts (1) and tighten to 55 N.m (41 lb ft).

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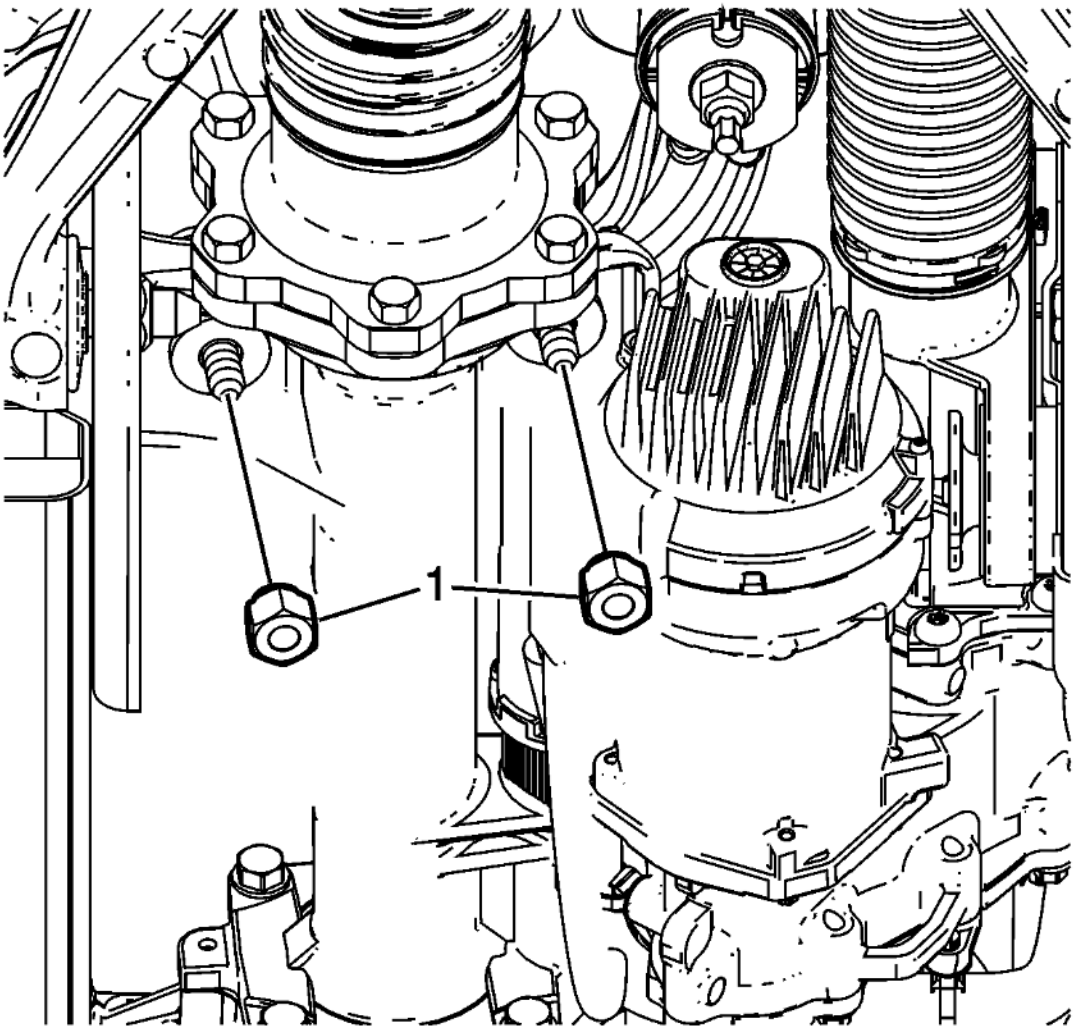


Fig. 51: Inner Axle Shaft Housing Washers And Nuts
Courtesy of GENERAL MOTORS COMPANY

6. Install the inner axle shaft housing washers and nuts (1) to the bracket and tighten the nuts to 100 N.m (75 lb ft).
7. Connect the wheel drive shaft inboard flange to the inner axle shaft.

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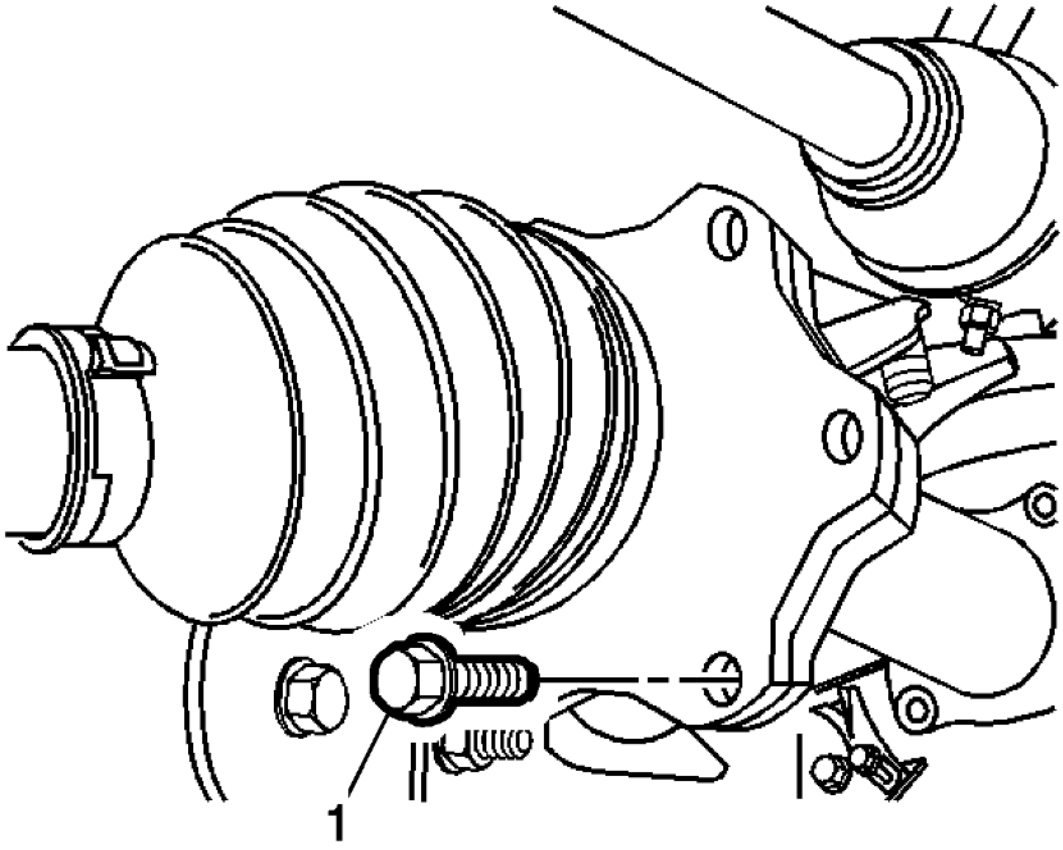


Fig. 52: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

8. Install the wheel drive shaft inboard flange to the inner axle shaft bolts (1) and tighten the bolts to 79 N.m (58 lb ft).

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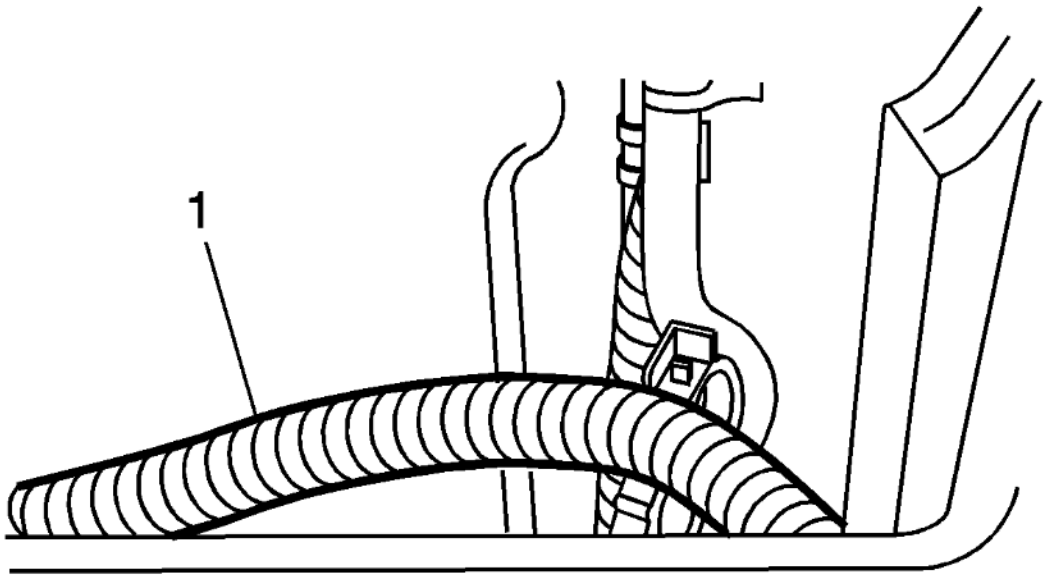


Fig. 53: Inner Axle Shaft Housing Wire Harness - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

9. Connect the wire harness (1) to the inner axle shaft housing.

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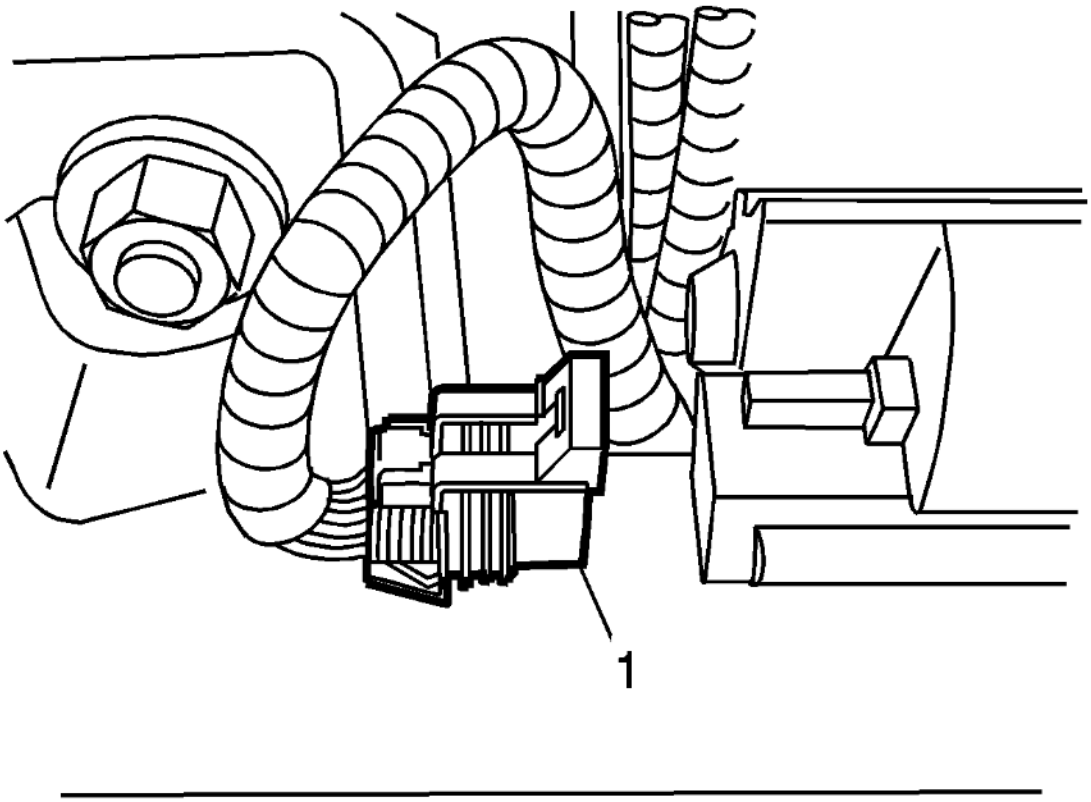


Fig. 54: Disconnecting Electric Motor Actuator Electrical Connector - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

10. Connect the electrical connector (1) to actuator.
11. Install the front shock module. Shock Absorber and Spring Removal and Installation (Light Duty, Without Z85/Z95) Shock Absorber and Spring Removal and Installation (Light Duty, With Z85/Z95)
12. Install the power steering assist motor. Power Steering Assist Motor Replacement (Light Duty)
13. With either replacement procedure, fill the differential carrier assembly with axle lubricant. Use the correct fluid. Front Axle Lubricant Replacement (8.25 Inch Axle)Front Axle Lubricant Replacement (9.25 Inch Axle)
14. Lower the vehicle.

FRONT DRIVE AXLE INNER SHAFT REPLACEMENT (RIGHT SIDE - 9.25 INCH AXLE)

Removal Procedure

1. Raise the vehicle. Refer to Lifting and Jacking the Vehicle .
2. Drain the differential carrier. Refer to Front Axle Lubricant Replacement (8.25 Inch Axle)Front Axle Lubricant Replacement (9.25 Inch Axle).

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3. Remove the front drive axle actuator. Refer to **Front Drive Axle Actuator Replacement (1500 Series)Front Drive Axle Actuator Replacement (2500/3500 Series)**.
4. Disconnect the wire harness from the front drive axle inner shaft housing.

NOTE: **Support the wheel drive shaft in order to not over flex the constant velocity (CV) joint.**

5. Separate the wheel drive shaft from the front wheel inner drive shaft. Refer to **Front Wheel Drive Shaft Replacement - Right Side** , and **Front Wheel Drive Shaft Replacement - Left Side** .
6. Remove the stabilizer shaft link. Refer to **Stabilizer Shaft Link Replacement (Light Duty)** **Stabilizer Shaft Link Replacement (Heavy Duty)** .

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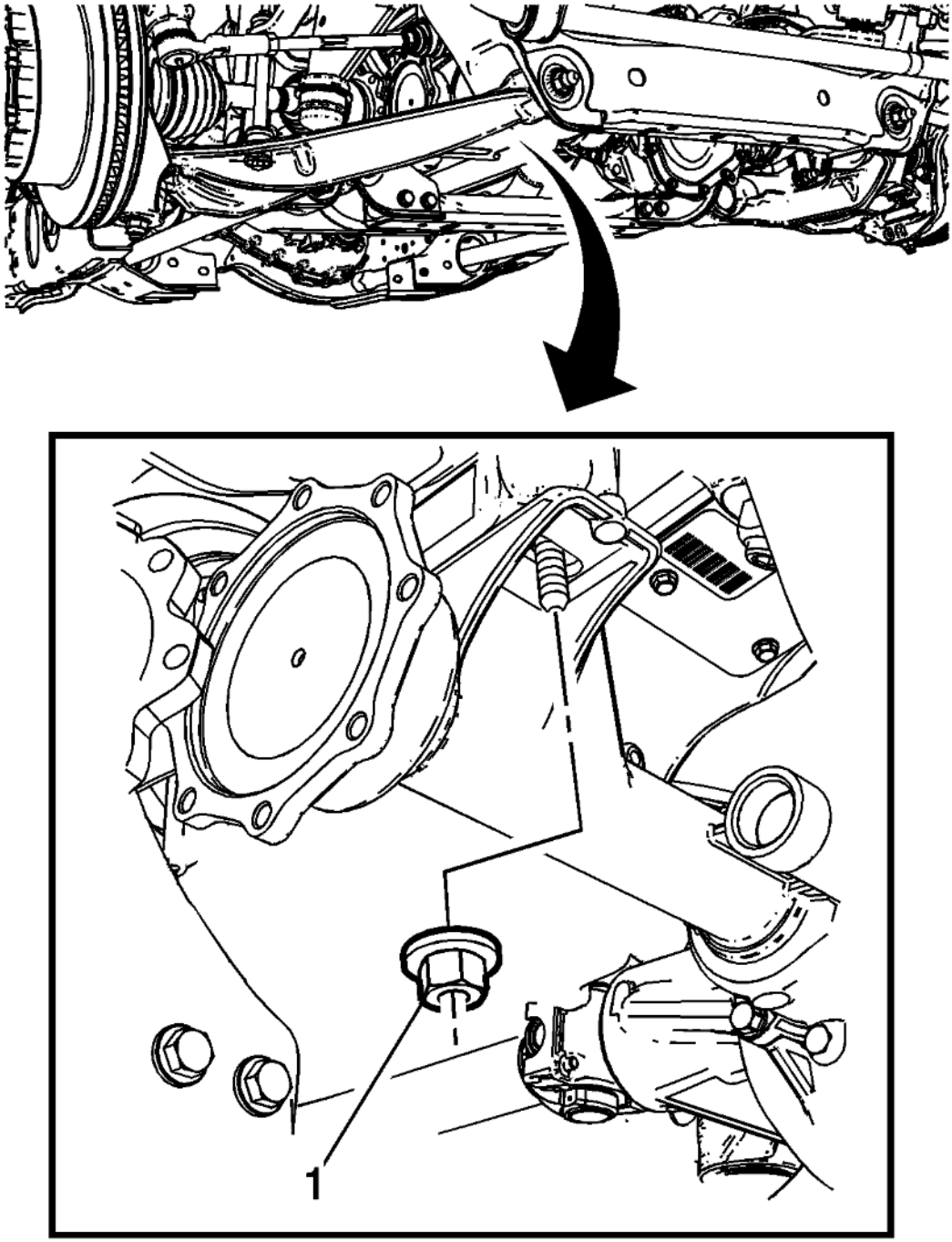


Fig. 55: Front Differential Carrier Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

7. Remove the two front differential carrier bracket nuts (1).

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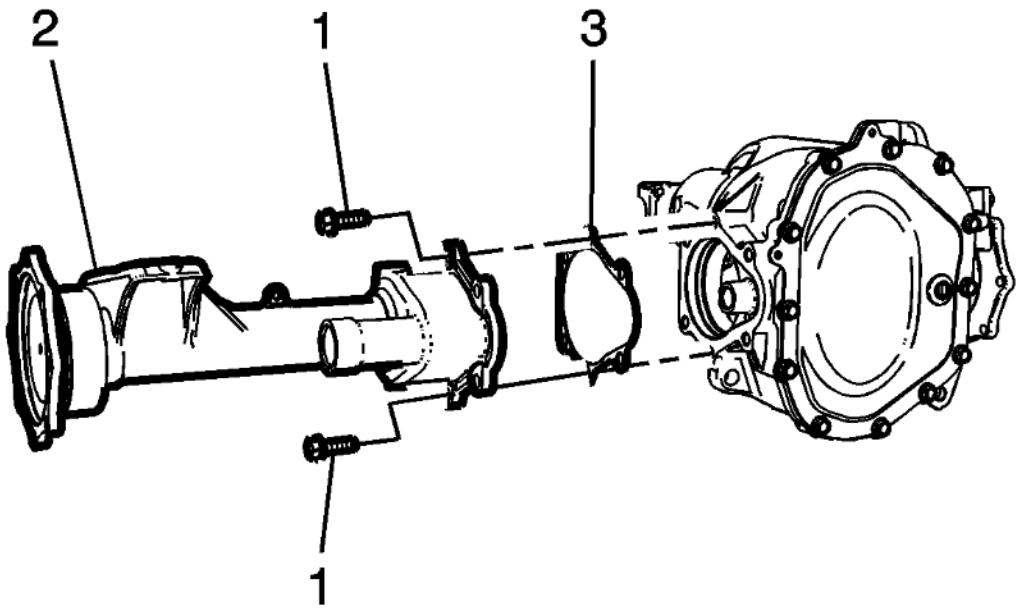


Fig. 56: Identifying Front Drive Axle Inner Axle Assembly, Gasket And Bolts
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **Allow the front drive axle inner shaft housing to drain before completely removing it from the vehicle.**
- **Keep the open end of the inner axle housing assembly up**

8. Remove the six front drive axle inner shaft housing bolts (1).
9. Remove the front drive axle inner shaft housing (2) and the gasket (3).

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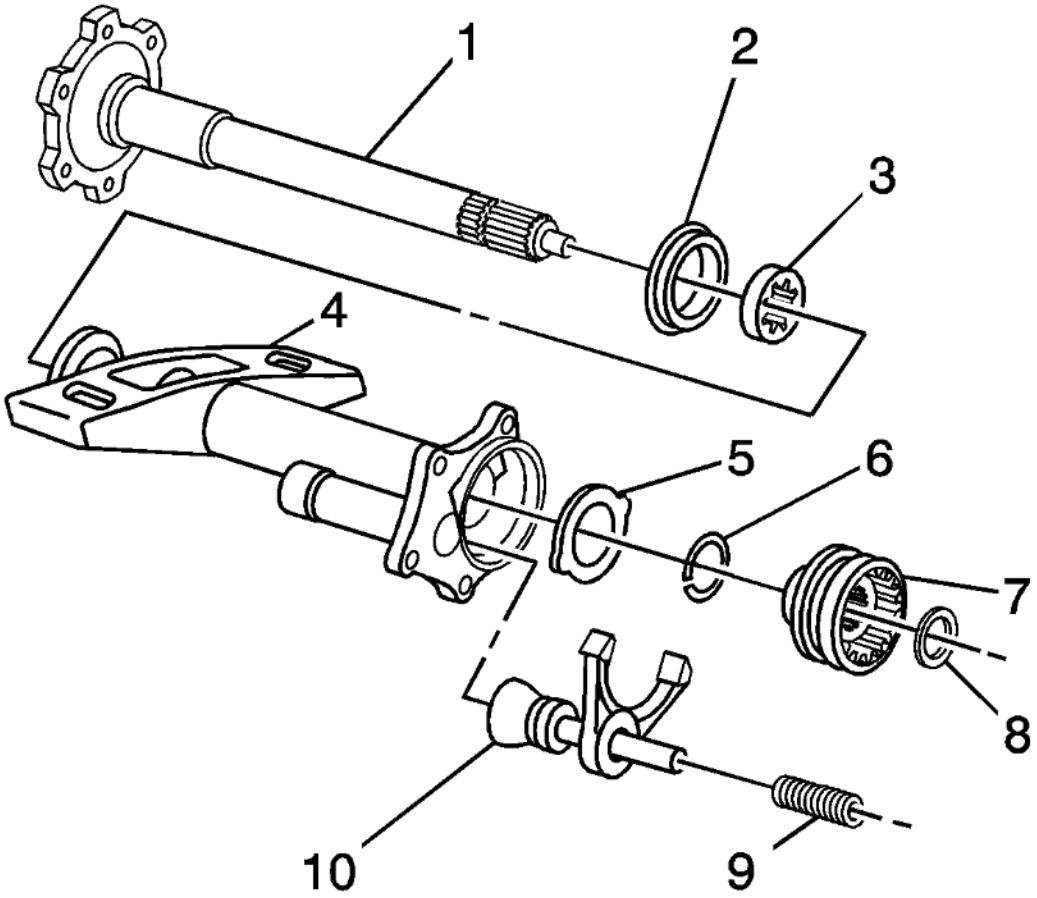


Fig. 57: Identifying Inner Axle Shaft Housing Components
Courtesy of GENERAL MOTORS COMPANY

10. Remove the front drive axle clutch fork inner spring (9) and the clutch fork (10).
11. Remove the front drive axle clutch gear shim (8), sleeve (7), and thrust washer (5).
12. Remove and discard the front drive axle inner shaft retaining ring (6).
13. Remove the front drive axle inner shaft (1).

Installation Procedure

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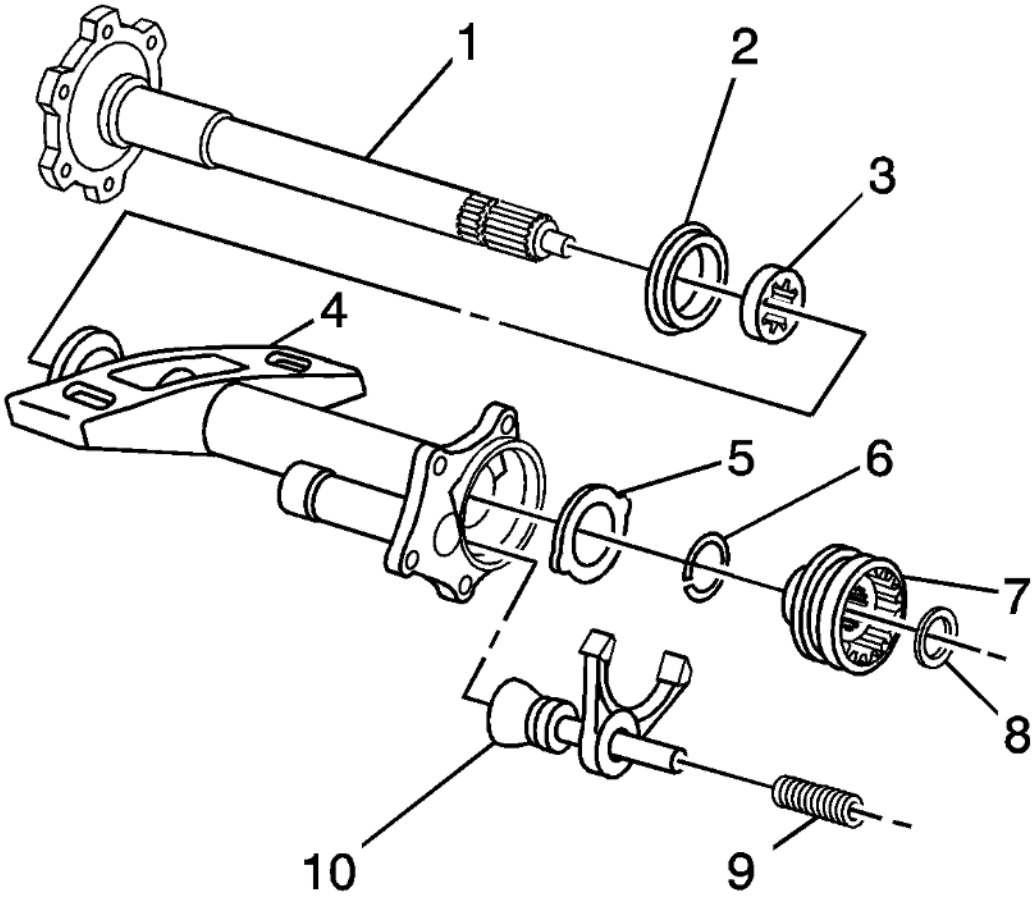


Fig. 58: Identifying Inner Axle Shaft Housing Components
Courtesy of GENERAL MOTORS COMPANY

1. Install the NEW inner axle shaft (1).
2. Install the NEW retaining ring (6), and original thrust washer (5) on the inner axle shaft (1).
3. Determine the clutch gear shim thickness. Refer to **Front Drive Axle Clutch Gear Shim Adjustment**.
4. Install the clutch sleeve (7), correct clutch gear shim (8), clutch fork assembly (10), and the clutch fork inner spring (9), in the front drive axle inner shaft housing.

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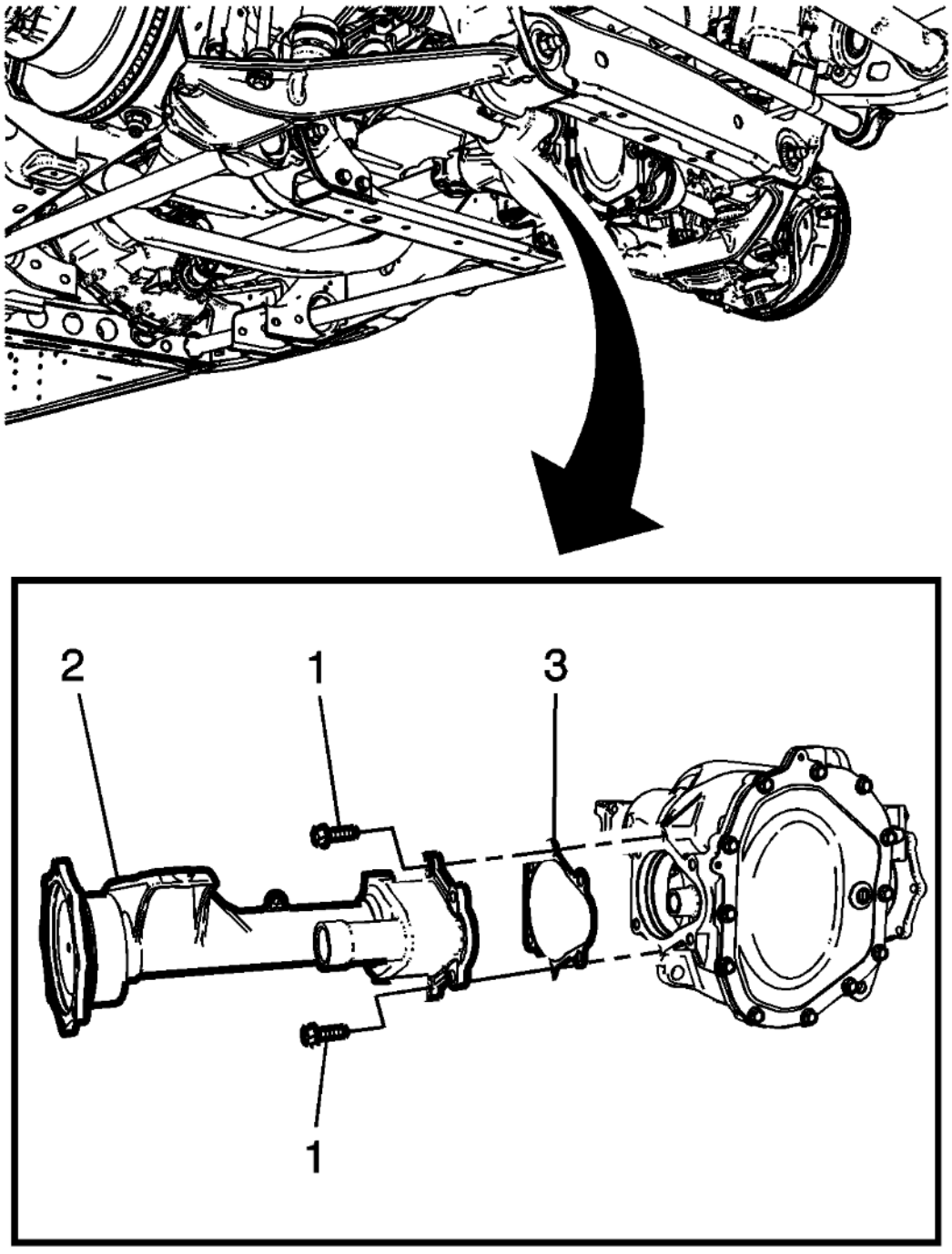


Fig. 59: Front Drive Axle Inner Shaft Housing Assembly
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

5. Install the front drive axle inner shaft housing assembly (2), gasket (3), and the six bolts (1).
6. Tighten the six front drive axle inner shaft housing bolts (1) to 65 N.m (48 lb ft).

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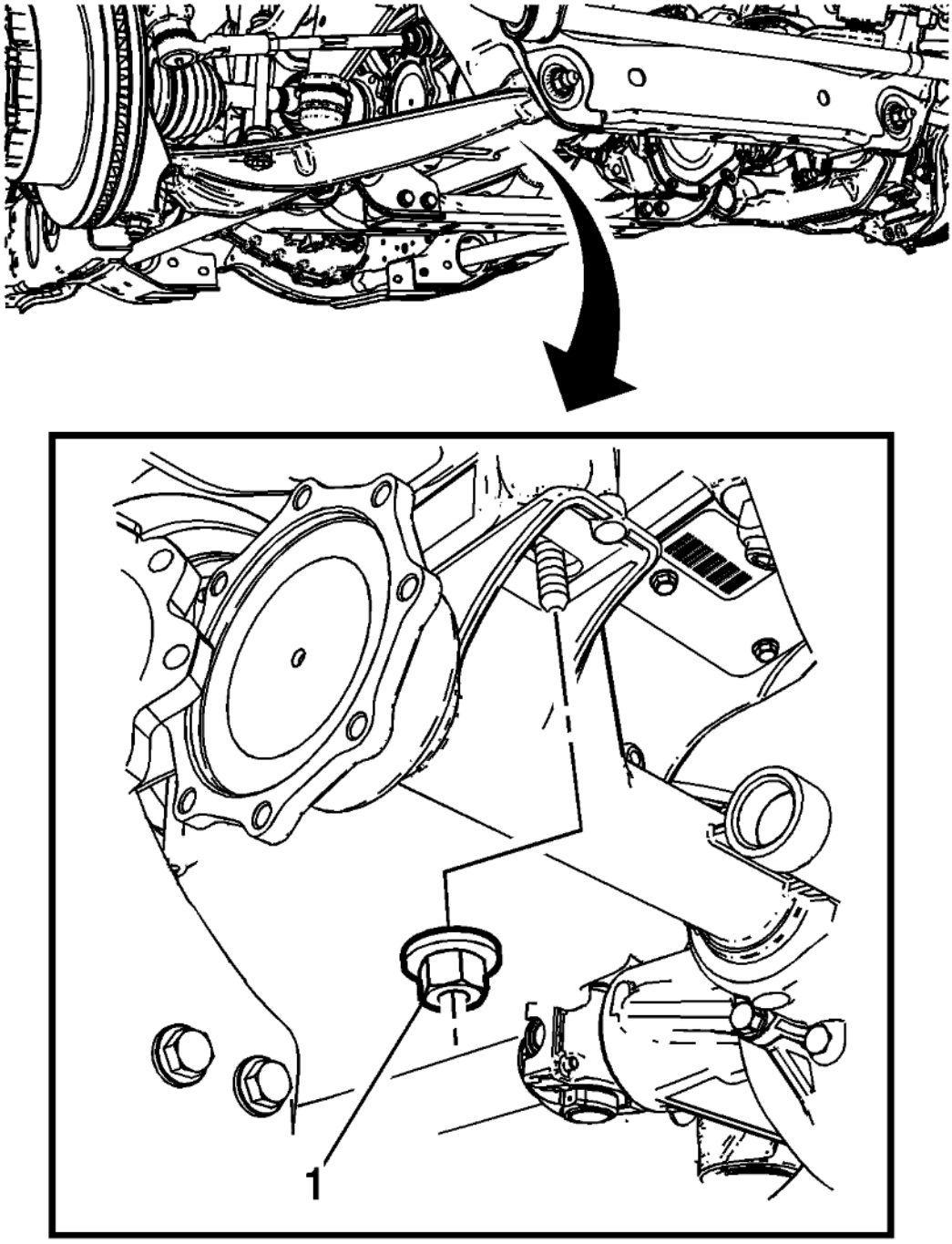


Fig. 60: Front Differential Carrier Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

7. Install the front differential carrier bracket nuts (1) and tighten to 100 N.m (74 lb ft).

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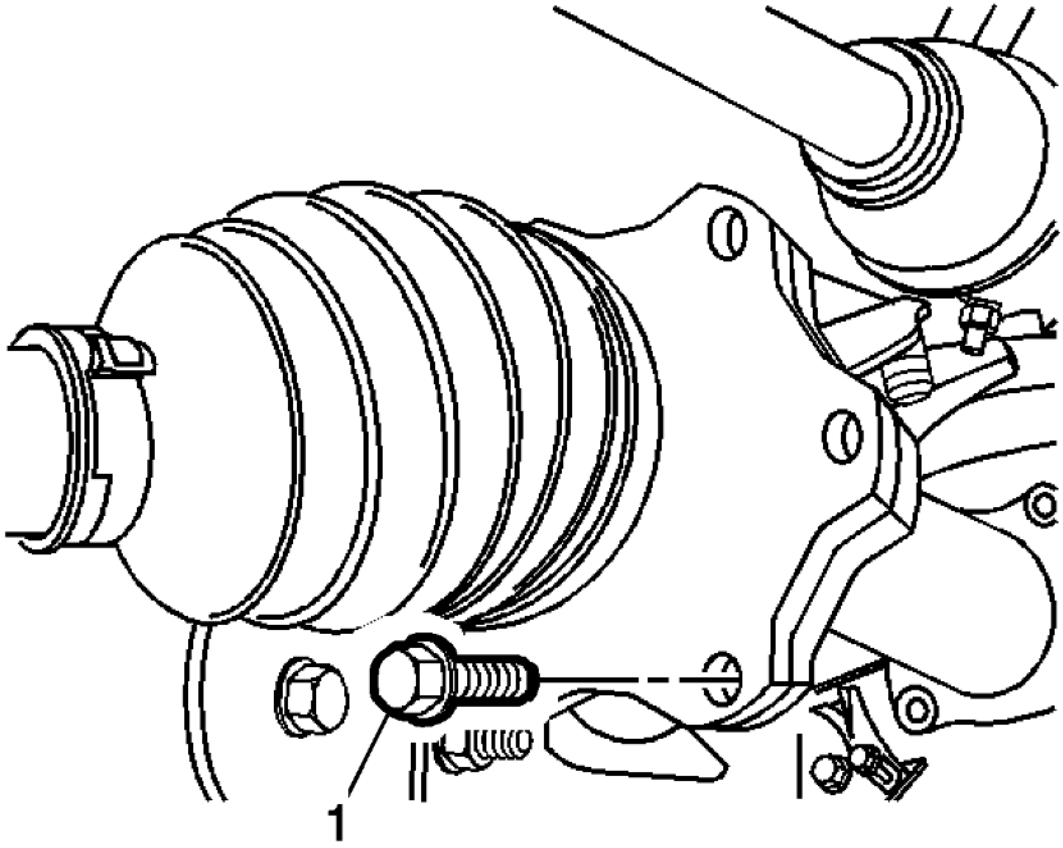


Fig. 61: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

8. Install the wheel drive shaft bolts (1) and tighten to 79 N.m (58 lb ft).
9. Install the front drive axle actuator. Refer to **Front Drive Axle Actuator Replacement (1500 Series)Front Drive Axle Actuator Replacement (2500/3500 Series)**.

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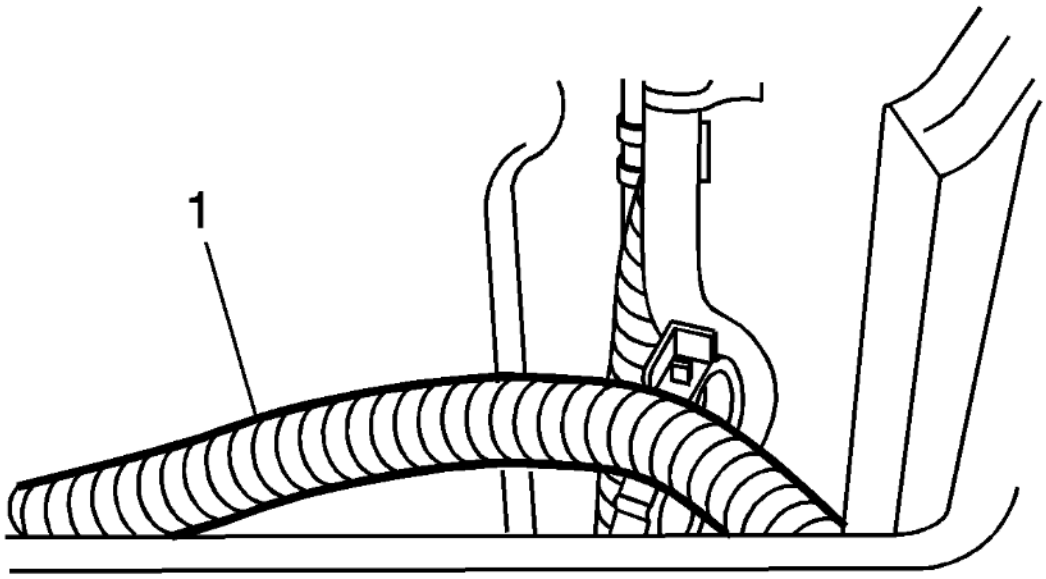


Fig. 62: Inner Axle Shaft Housing Wire Harness - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

10. Connect the wire harness (1) to the inner axle shaft housing.

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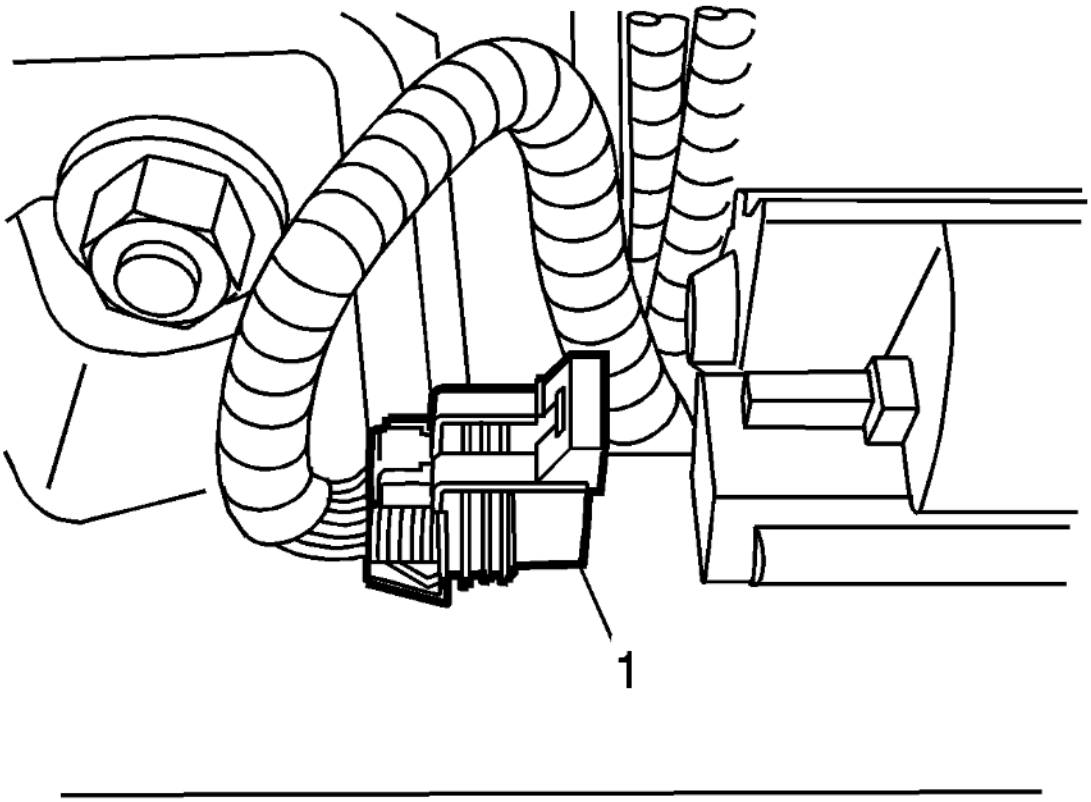


Fig. 63: Disconnecting Electric Motor Actuator Electrical Connector - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

11. Connect the electrical (1) connector to actuator.
12. Fill the differential carrier assembly with axle lubricant. Use the correct fluid. Refer to **Front Axle Lubricant Replacement (8.25 Inch Axle)Front Axle Lubricant Replacement (9.25 Inch Axle)**.
13. Lower the vehicle.

FRONT DRIVE AXLE INNER SHAFT SEAL REPLACEMENT - RIGHT SIDE

Special Tools

- **J-8092** Universal Driver Handle
- **J-45225** Seal Installer

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

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the front drive axle inner shaft from the inner shaft housing. Refer to **Front Drive Axle Inner**

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Shaft Replacement (Left Side)Front Drive Axle Inner Shaft Replacement (Right Side - 8.25 Inch Axle)Front Drive Axle Inner Shaft Replacement (Right Side - 9.25 Inch Axle).

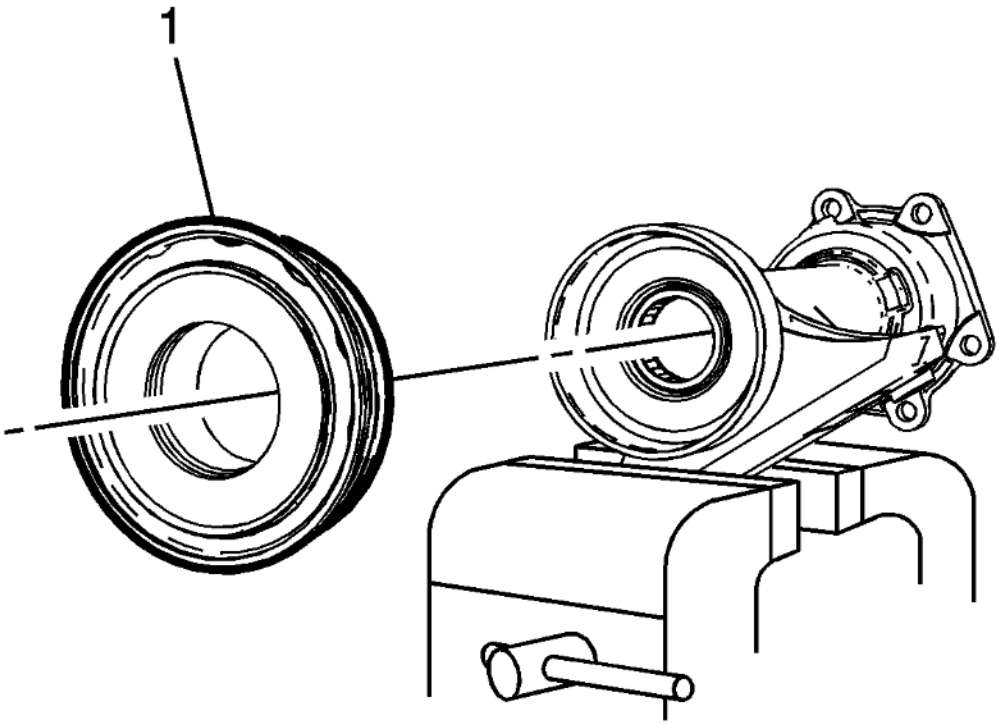


Fig. 64: Front Drive Axle Inner Shaft Seal
Courtesy of GENERAL MOTORS COMPANY

3. Install the front drive axle inner shaft housing in a vise.
4. Using the appropriate tool, remove the front drive axle inner shaft seal (1).

Installation Procedure

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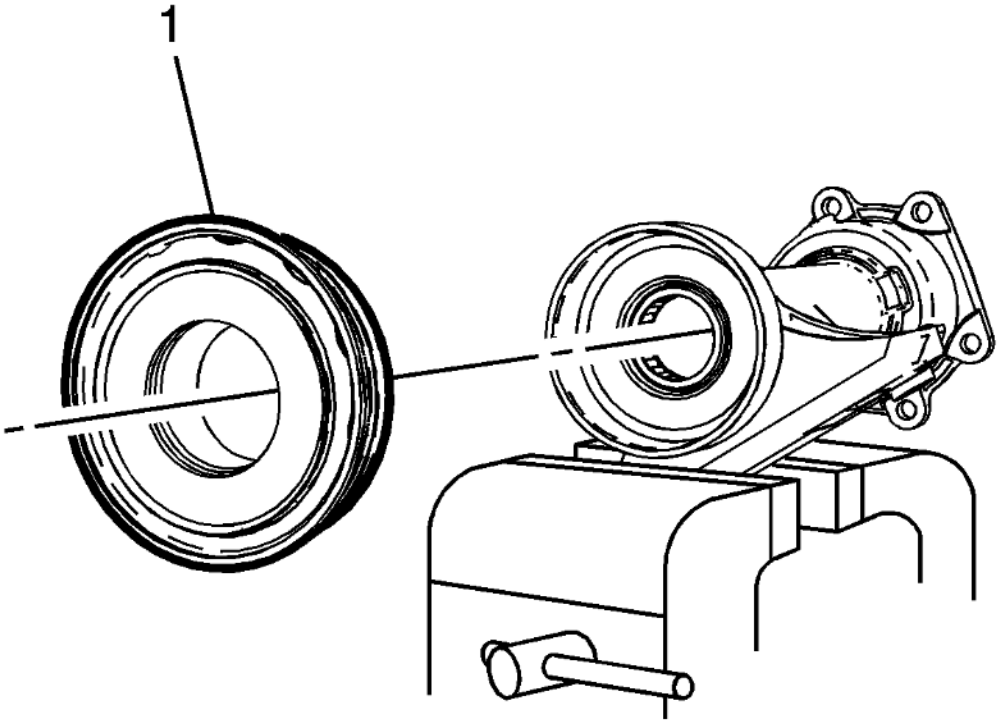


Fig. 65: Front Drive Axle Inner Shaft Seal
Courtesy of GENERAL MOTORS COMPANY

NOTE: **New seal has a metal surface oriented outward to the air side, and is marked "AIR SIDE" on the seal itself. Be sure to install seal with correct orientation.**

1. Position the NEW front drive axle inner seal (1) so that it is even in the front drive axle inner shaft housing.

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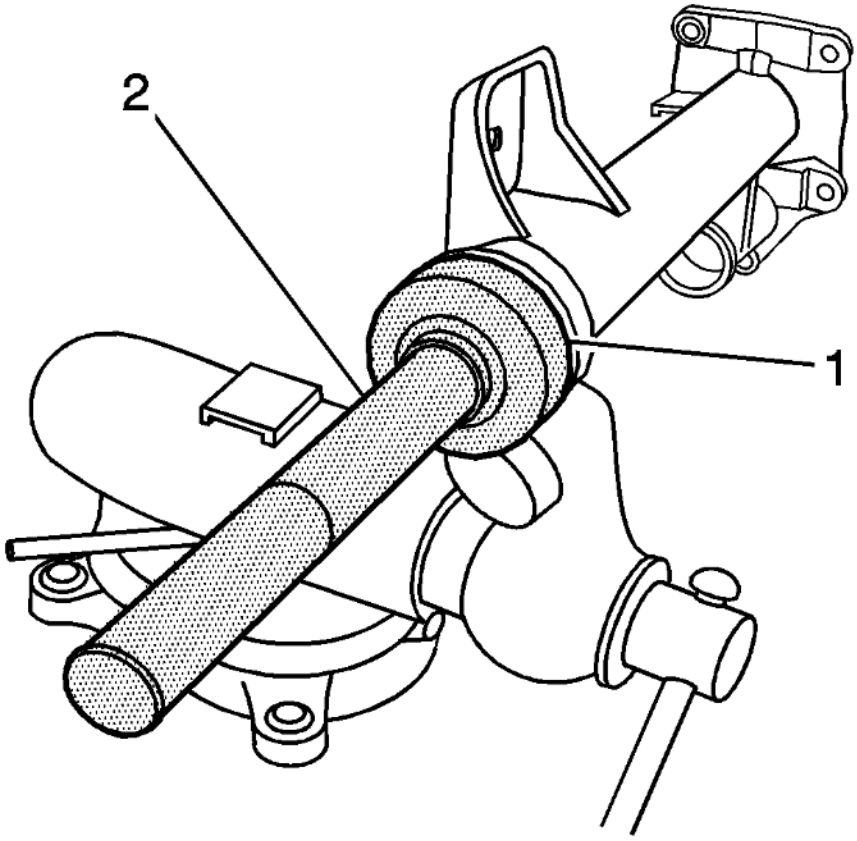


Fig. 66: Installing New Axle Shaft Seal - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

2. Using the **J 45225** installer (1) and the **J-8092** handle (2).
3. Install the front drive axle inner shaft in the inner shaft housing. Refer to **Front Drive Axle Inner Shaft Replacement (Left Side)Front Drive Axle Inner Shaft Replacement (Right Side - 8.25 Inch Axle)Front Drive Axle Inner Shaft Replacement (Right Side - 9.25 Inch Axle)**.
4. Remove the support and lower the vehicle.

FRONT DRIVE AXLE INNER SHAFT SEAL REPLACEMENT - LEFT SIDE

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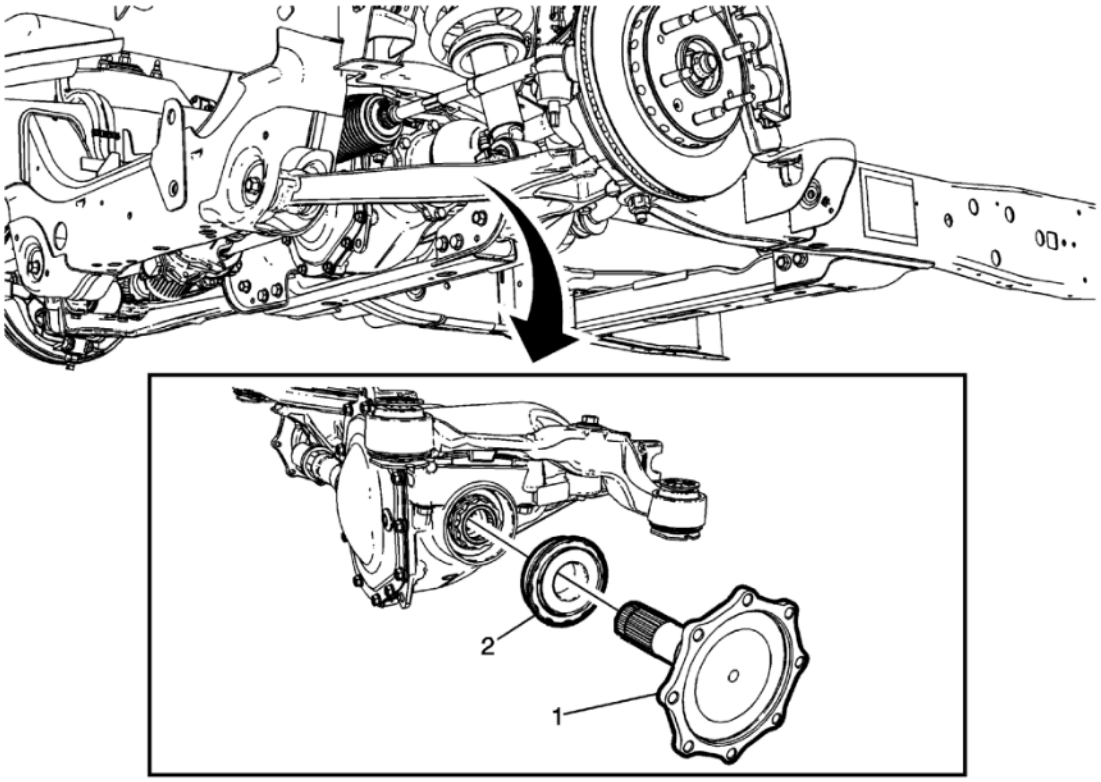


Fig. 67: Identifying Front Drive Axle Inner Shaft And Seal
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** . 2. Remove the wheel drive shaft. Refer to **Front Wheel Drive Shaft Replacement - Left Side** .	
1	Front Drive Axle Inner Shaft **Procedure** **NOTE:** **It maybe necessary to have the aid of an assistant to hold the steering knuckle assembly to side in order to have enough access to the front**

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Callout	Component Name
	drive axle inner shaft. 1. Using the **J-45859** puller and the **J-2619-4** slide hammer , remove the front drive axle inner shaft. **NOTE:** **In some rare cases, it may be difficult to remove the left front axle shaft from the front axle assembly when replacing the axle seal. To ease removal, the left front axle shaft C-clip needs to be centered in the retaining groove.** 2. If the left hand inner axle shaft does not come out using moderate force follow steps below. 1. Remove the front axle assembly from the vehicle. 2. Position the front axle assembly straight up and down so the left hand inner axle shaft is facing upward. If required, secure in a large bench vise. 3. Using a ball peen hammer, or preferably a brass hammer, tap the left inner axle shaft flange up and down repeatedly until the stub shaft separates from the axle assembly. This step centers the C-clip in the retaining groove of the stub shaft. Take care not to damage the machined face of the axle shaft. 4. Inspect the C-clip and replace if necessary. **Special Tools** • **J-2619-4** Slide Hammer • **J-45225** Seal Installer • **J-45859** Puller For equivalent regional tools, refer to **Special Tools**.

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Callout	Component Name
2	Front Drive Axle Inner Shaft Seal **Procedure** Using the **J-45225** installer and a soft face mallet, install the front drive axle inner shaft seal. **NOTE:** **An old style seal had a polymer coated surface oriented outward to air side. A new seal will have a metal surface oriented outward to air side, and is marked "AIR SIDE" on the seal itself. Be sure to install seal with correct orientation.** **Special Tools** **J-45225** Installer For equivalent regional tools, refer to **Special Tools**.

FRONT DRIVE AXLE INNER SHAFT BEARING REPLACEMENT (LEFT SIDE)

Special Tools

- **GE-8092** Universal Driver Handle
- **J-2619-01** Slide Hammer
- **J-29369-1** Bushing and Bearing Remover
- **J-36609** Axle Tube Bearing Installer
- **J-45225** Axle Seal Installer

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

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the differential carrier assembly. Refer to **Front Axle Lubricant Replacement (8.25 Inch**

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Axle)Front Axle Lubricant Replacement (9.25 Inch Axle).

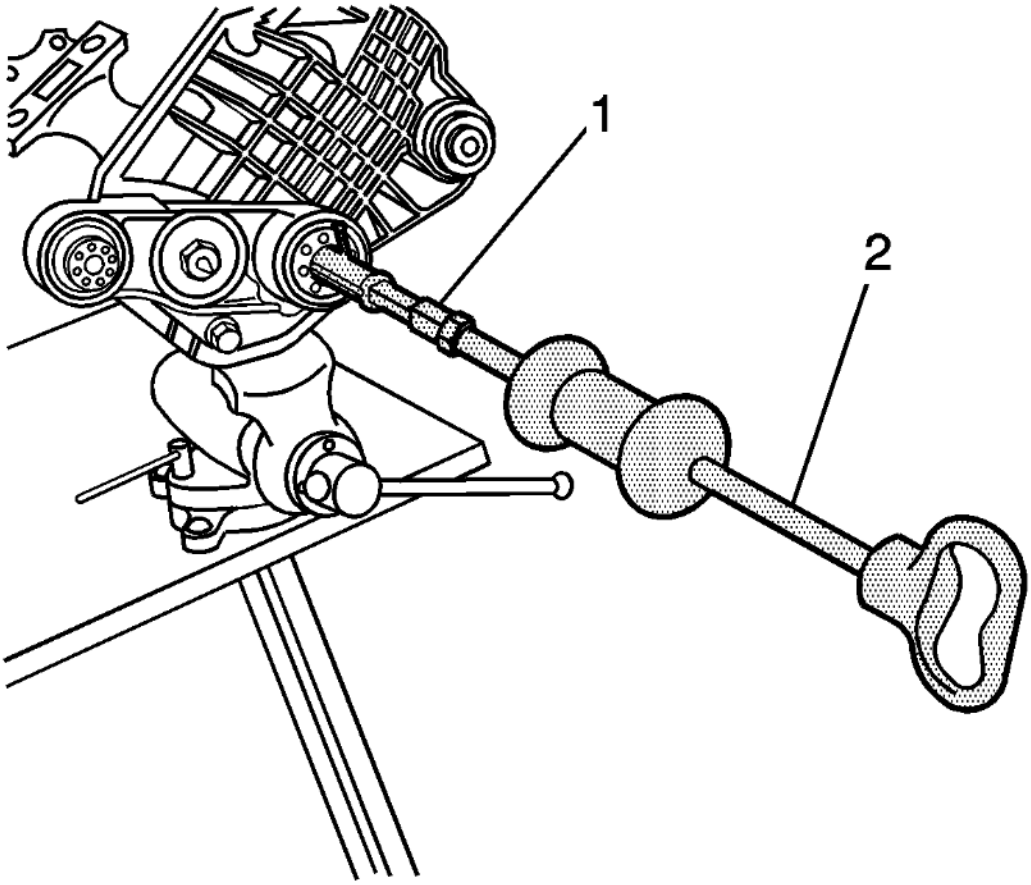


Fig. 68: Removing Inner Axle Shaft Seal/Bearing - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

3. Remove the Front Axle Assembly. Refer to Front Axle Replacement (8.25 Inch Axle)Front Axle Replacement (9.25 Inch Axle).
    1. Place the differential carrier assembly into a vise.

       Clamp only on the mounting flange of the differential carrier assembly case.

    2. Remove the inner axle shaft using a hammer and a brass drift.
    3. Remove the inner axle shaft seal. Refer to Front Drive Axle Inner Shaft Seal Replacement - Left Side.
    4. Install the **J-29369-1** bushing and bearing remover behind the inner axle shaft bearing as necessary.
    5. Install the **J-2619-01** slide hammer (2) to the **J-29369-1** bushing and bearing remover (1).
    6. Remove the inner axle shaft bearing using the **J-2619-01** slide hammer (2).

Installation Procedure

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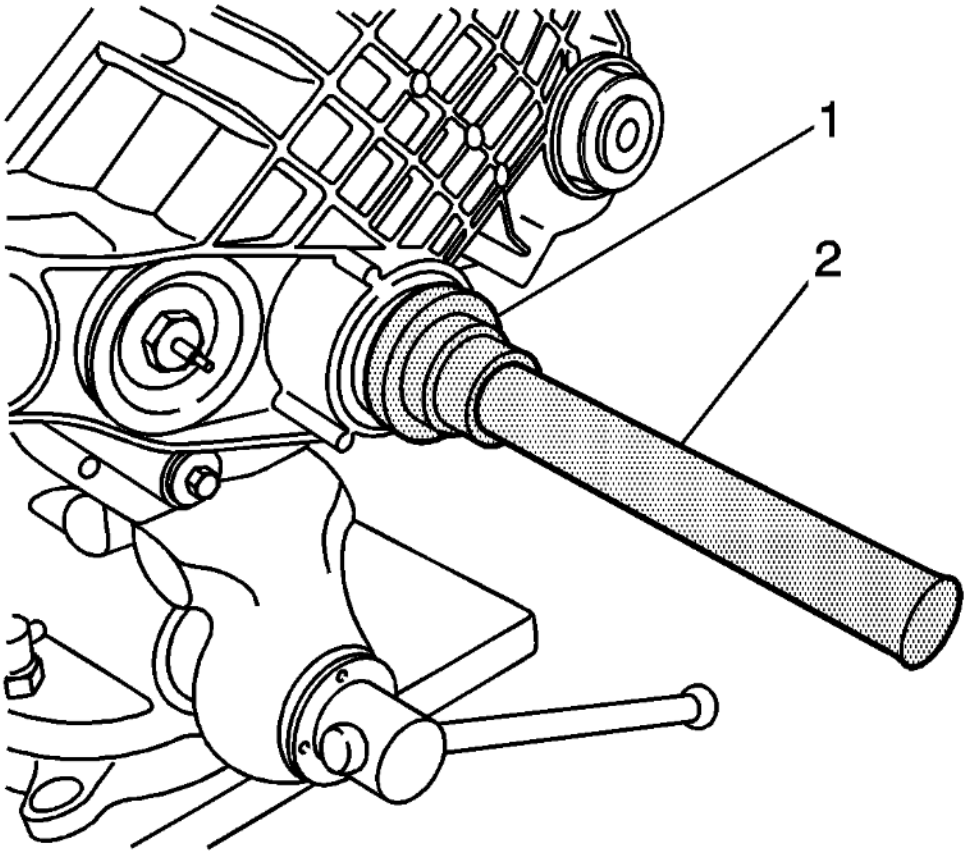


Fig. 69: Install The Left Side Bearing Using J 36609 & J 8092 - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

1. Install the left side bearing with the square shoulder in using the **J-36609** axle tube bearing installer (1) and the **GE-8092** universal driver handle (2).
2. Install the inner axle shaft seal. Refer to **Front Drive Axle Inner Shaft Seal Replacement - Left Side**.

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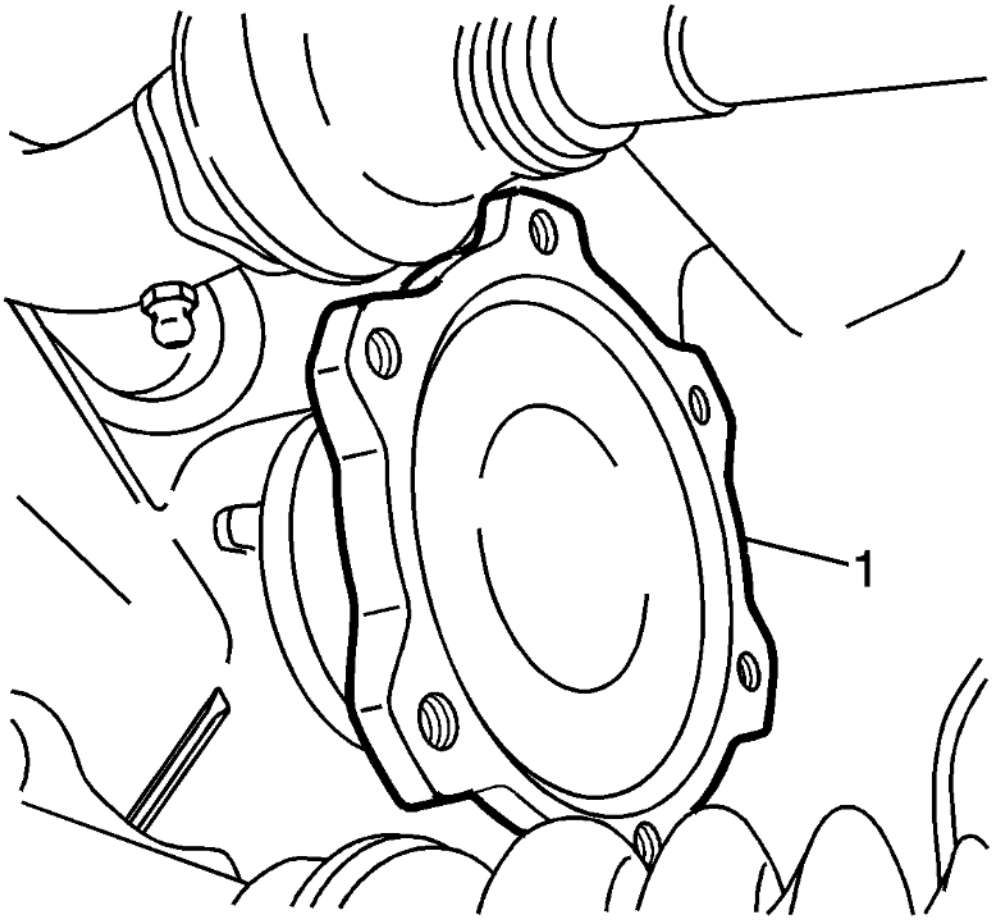


Fig. 70: Axle Shaft Inner Flange - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

3. Install the inner axle shaft into the differential case side gear using a soft-faced mallet until the retaining ring on the inner axle shaft is fully seated within the groove in the differential case side gear.

   Pull back on the inner axle shaft to ensure that the inner axle shaft is properly retained in the differential case side gear.

4. Install the front differential carrier assembly. Refer to **Front Axle Replacement (8.25 Inch Axle)Front Axle Replacement (9.25 Inch Axle)**.
5. Install the wheel drive shaft to the inner axle shaft.
6. Fill the differential carrier assembly. Use the correct fluid. Refer to **Front Axle Lubricant Replacement (8.25 Inch Axle)Front Axle Lubricant Replacement (9.25 Inch Axle)**.
7. Lower the vehicle.

FRONT DRIVE AXLE INNER SHAFT BEARING REPLACEMENT (RIGHT SIDE)

Special Tools

- **GE-8092** Universal Driver Handle

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- **J-2619-01** Slide Hammer
- **J-29369-1** Bushing and Bearing Remover
- **J-36609** Axle Tube Bearing Installer
- **J-45225** Axle Seal Installer

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

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the differential carrier assembly. Refer to **Front Axle Lubricant Replacement (8.25 Inch Axle)Front Axle Lubricant Replacement (9.25 Inch Axle)**.
3. Remove the right side bearing by performing the following steps:
    1. Remove the inner axle shaft and housing assembly from the differential carrier case assembly. Refer to **Front Drive Axle Inner Shaft Housing Replacement (8.25 Inch Axle)Front Drive Axle Inner Shaft Housing Replacement (9.25 Inch Axle)**.
    2. Remove the clutch fork assembly components and the inner axle shaft from the inner axle shaft housing. Refer to **Front Drive Axle Inner Shaft Housing Replacement (8.25 Inch Axle)Front Drive Axle Inner Shaft Housing Replacement (9.25 Inch Axle)**.
    3. Install the inner axle shaft housing into a vise.

       Clamp only on the mounting flange of the inner axle shaft housing.

    4. Install the **J-2619-01** slide hammer behind the inner axle bearing.

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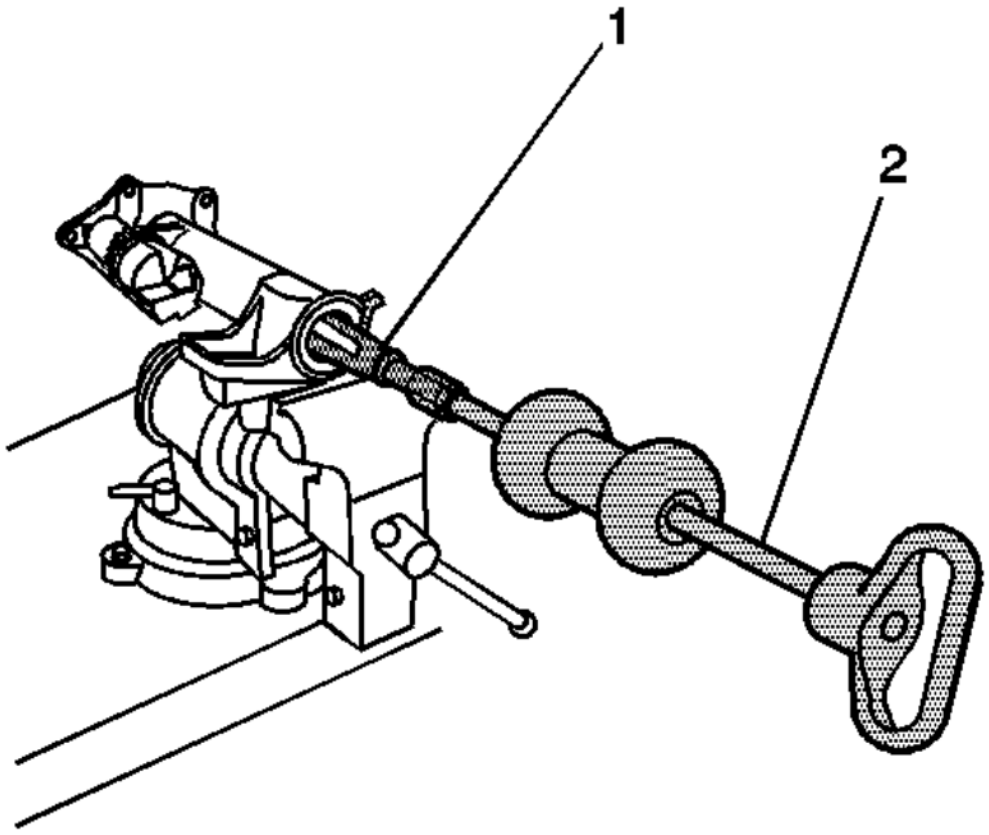


Fig. 71: Inner Axle Shaft Seal And/Or The Inner Axle Shaft Bearing And Special Tools
Courtesy of GENERAL MOTORS COMPANY

5. Install the **J-2619-01** slide hammer (2) to the **J-29369-1** bushing and bearing remover (1).
6. Remove the inner axle shaft bearing using the **J-2619-01** slide hammer.

Installation Procedure

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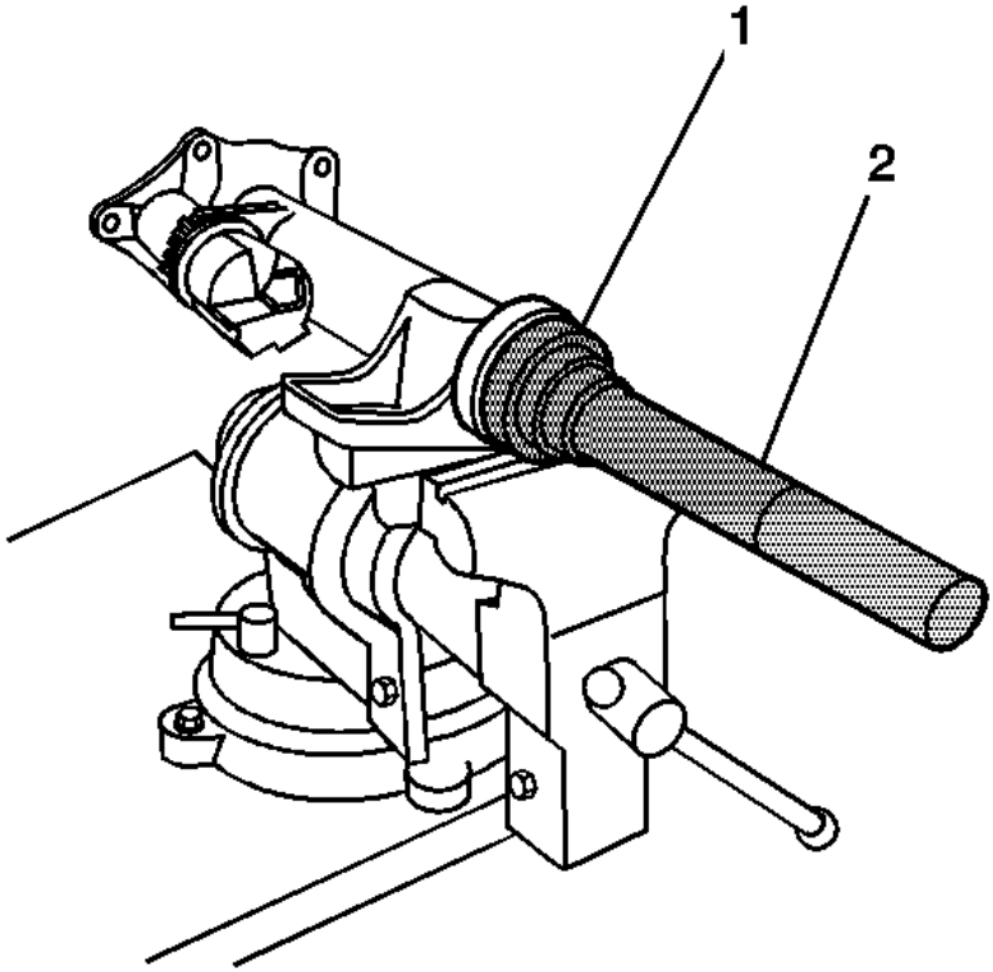


Fig. 72: Installing Side Bearing - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

1. Using the **J-36609** installer (1) and the **GE-8092** handle (2), install the right side bearing with the square shoulder in .
2. Install the inner axle shaft into the inner axle shaft housing.

   Carefully tap the inner axle shaft into place with a soft-faced mallet.

3. Install the inner axle shaft and clutch fork assembly components into the inner shaft housing. Refer to **Front Drive Axle Inner Shaft Housing Replacement (8.25 Inch Axle)Front Drive Axle Inner Shaft Housing Replacement (9.25 Inch Axle)**.
4. Install the inner axle shaft and housing assembly to the differential carrier case assembly. Refer to **Front Drive Axle Inner Shaft Housing Replacement (8.25 Inch Axle)Front Drive Axle Inner Shaft Housing Replacement (9.25 Inch Axle)**.
5. Install the shock module. Refer to **Shock Absorber and Spring Removal and Installation (Light Duty, Without Z85/Z95) Shock Absorber and Spring Removal and Installation (Light Duty, With Z85/Z95)** .
6. If only the left side seal was removed, perform the following step. Install the wheel drive shaft to the inner axle shaft.
7. Fill the differential carrier assembly. Use the correct fluid. Refer to **Front Axle Lubricant Replacement**

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(8.25 Inch Axle)Front Axle Lubricant Replacement (9.25 Inch Axle).

8. Lower the vehicle.

FRONT DRIVE AXLE INNER SHAFT HOUSING REPLACEMENT (8.25 INCH AXLE)

Removal Procedure

1. Raise the vehicle. Lifting and Jacking the Vehicle
2. Drain the differential carrier. Front Axle Lubricant Replacement (8.25 Inch Axle)Front Axle Lubricant Replacement (9.25 Inch Axle)
3. Remove the power steering assist motor. Power Steering Assist Motor Replacement (Light Duty)

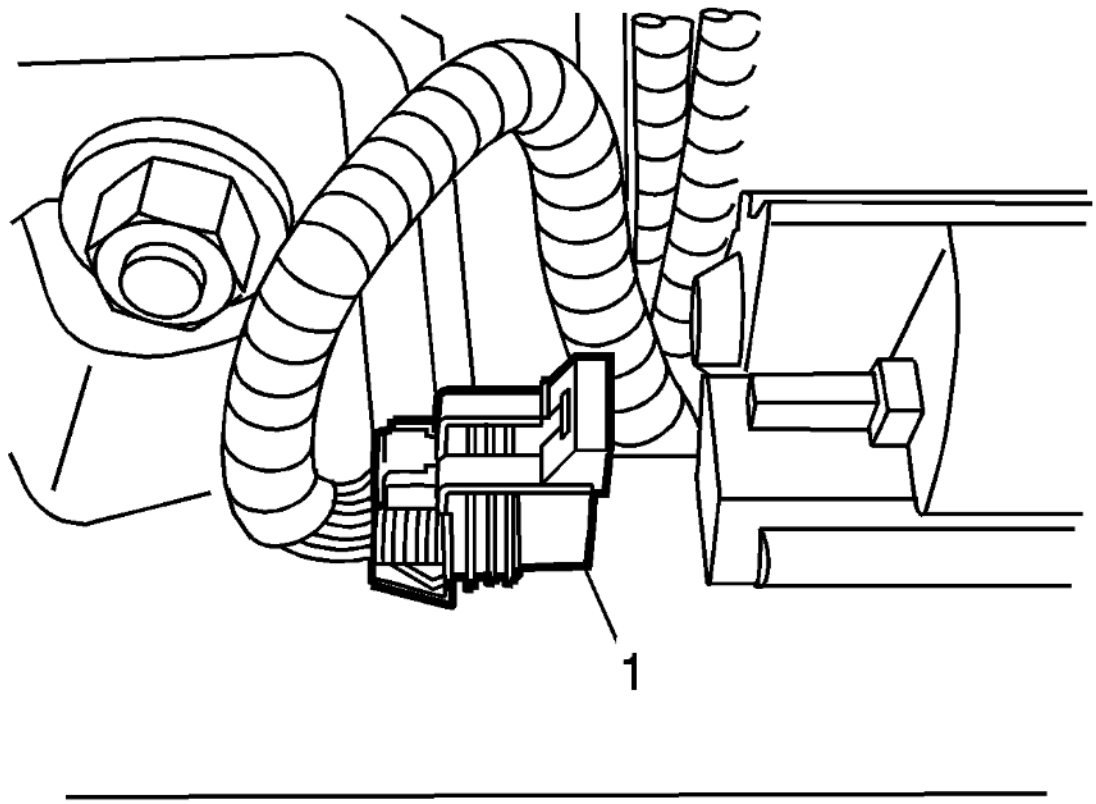


Fig. 73: Disconnecting Electric Motor Actuator Electrical Connector - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

4. Disconnect the actuator electrical connector (1).

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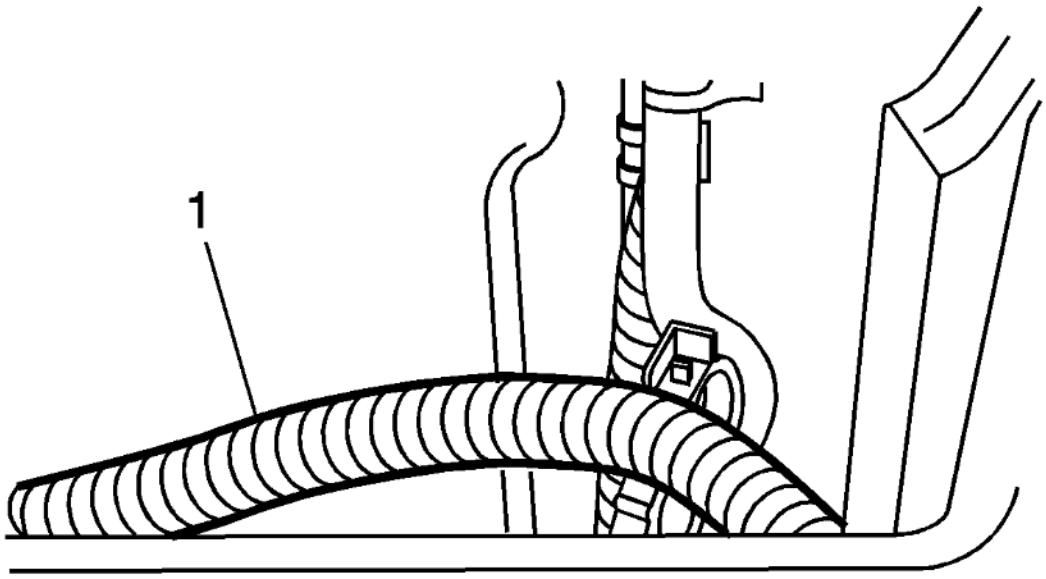


Fig. 74: Inner Axle Shaft Housing Wire Harness - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

5. Disconnect the wire harness (1) from the inner axle housing.
6. Remove the front shock module. **Shock Absorber and Spring Removal and Installation (Light Duty, Without Z85/Z95)** **Shock Absorber and Spring Removal and Installation (Light Duty, With Z85/Z95)**

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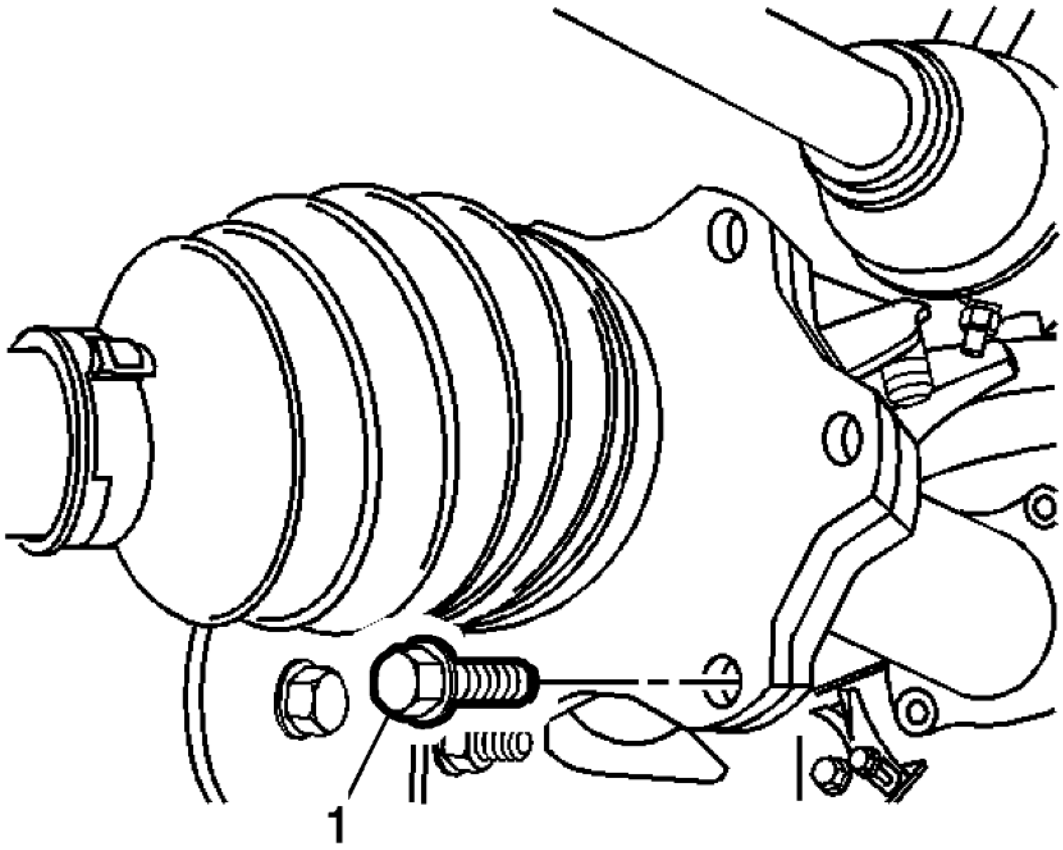


Fig. 75: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

7. Remove the wheel drive shaft flange bolts (1).

NOTE: **Support the wheel drive shaft in order to not over flex the constant velocity (CV) joint.**

8. Disconnect the wheel drive shaft from the inner axle shaft.

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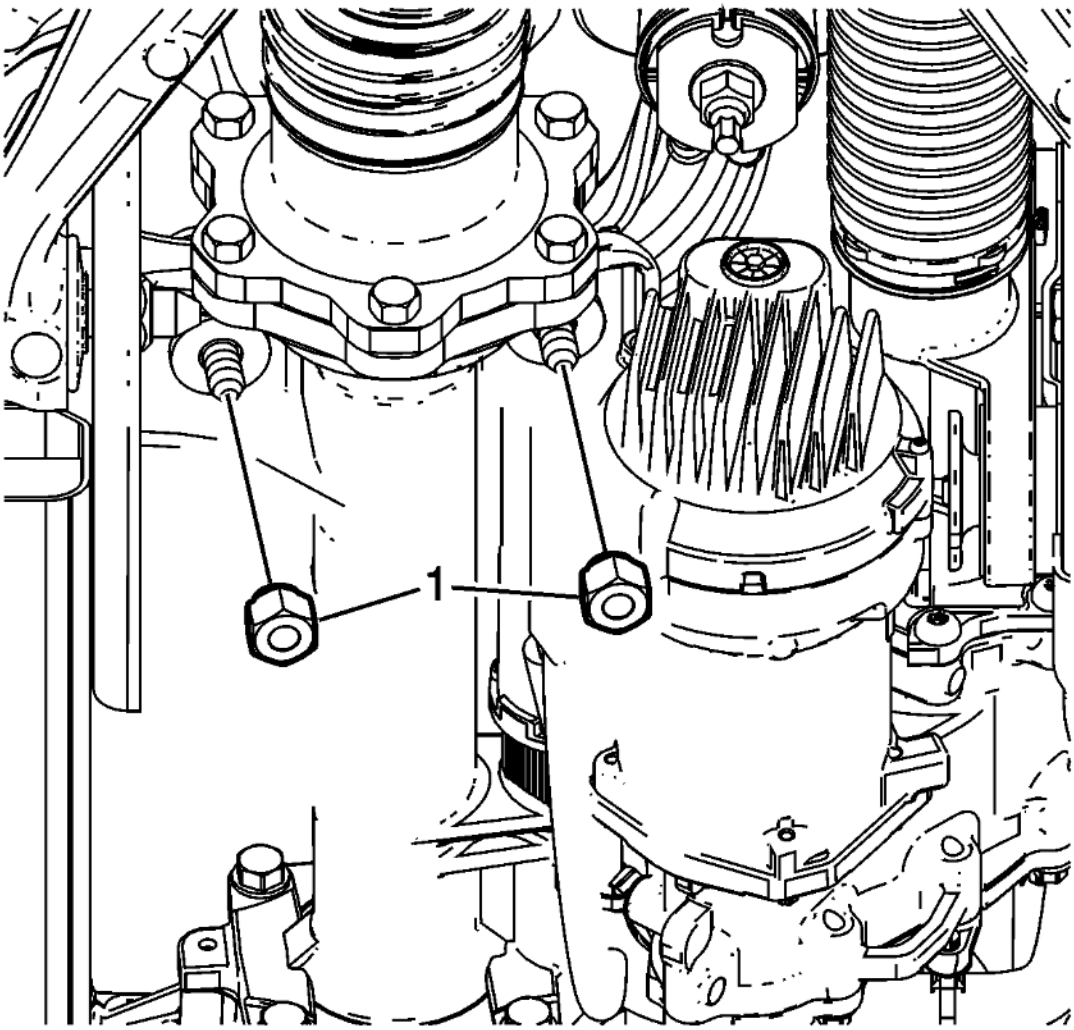


Fig. 76: Inner Axle Shaft Housing Washers And Nuts
Courtesy of GENERAL MOTORS COMPANY

9. Remove the inner axle housing mounting nuts (1).

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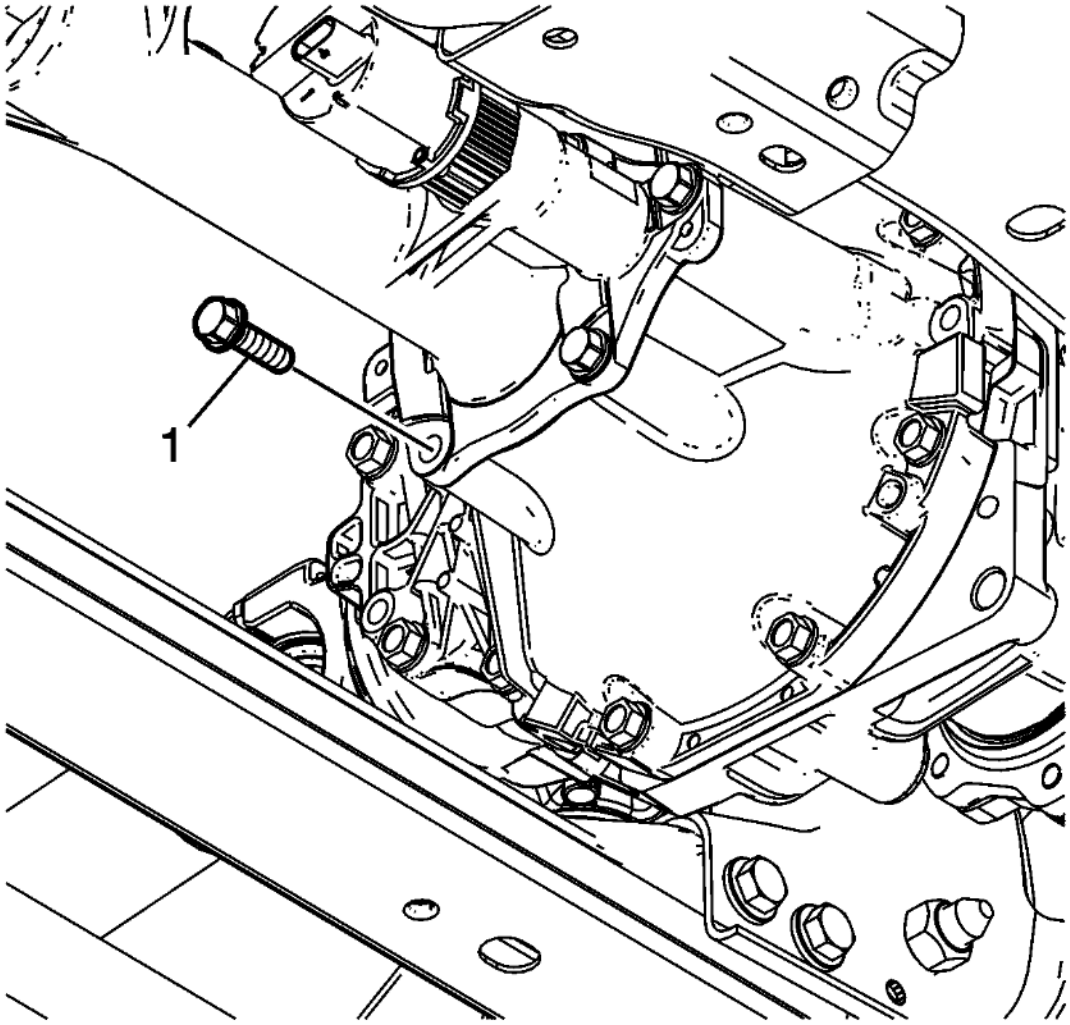


Fig. 77: Inner Axle Shaft Housing Bolts
Courtesy of GENERAL MOTORS COMPANY

10. Remove the inner axle shaft mounting bolts .

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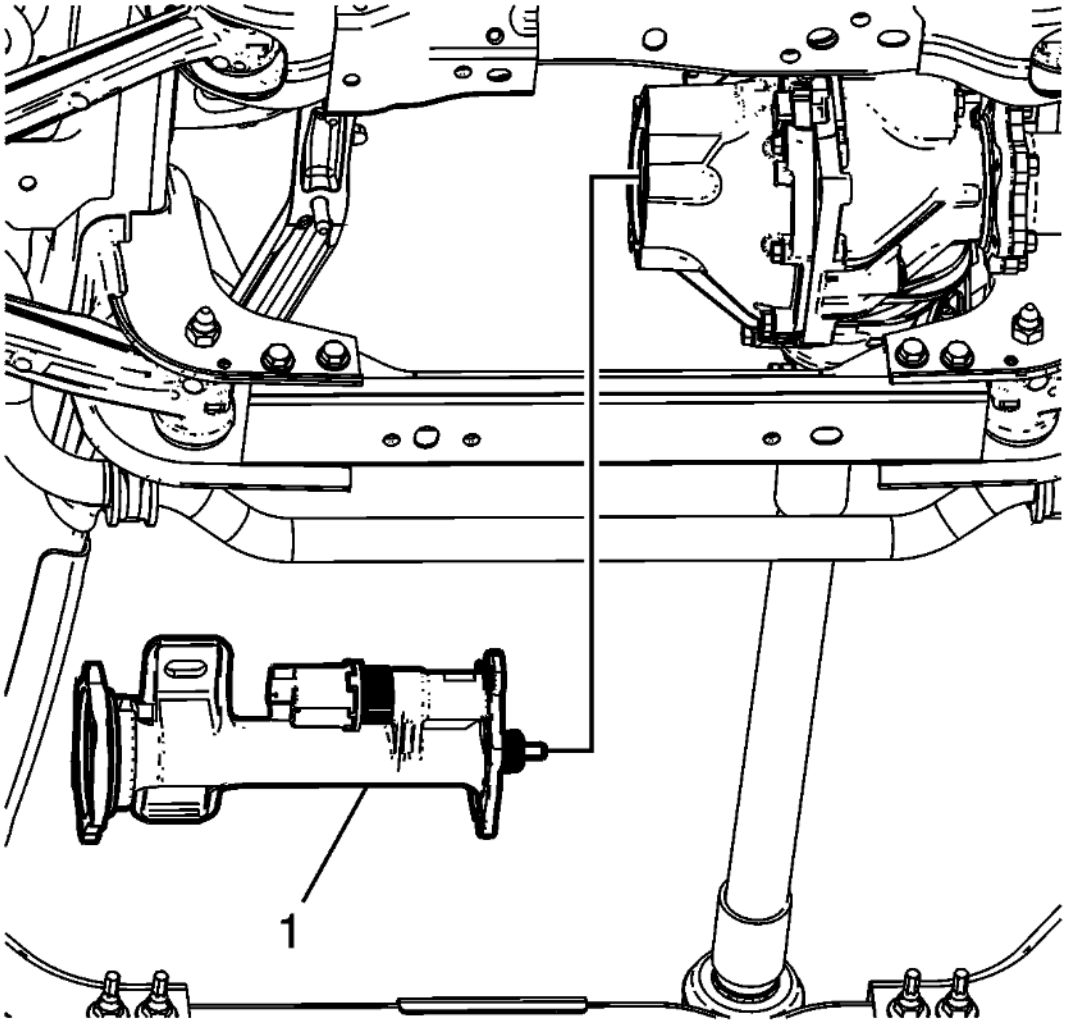


Fig. 78: Inner Axle Shaft Housing Assembly
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Keep the open end of the inner axle housing assembly up.**

11. Carefully remove the inner axle shaft housing assembly from the differential carrier assembly.

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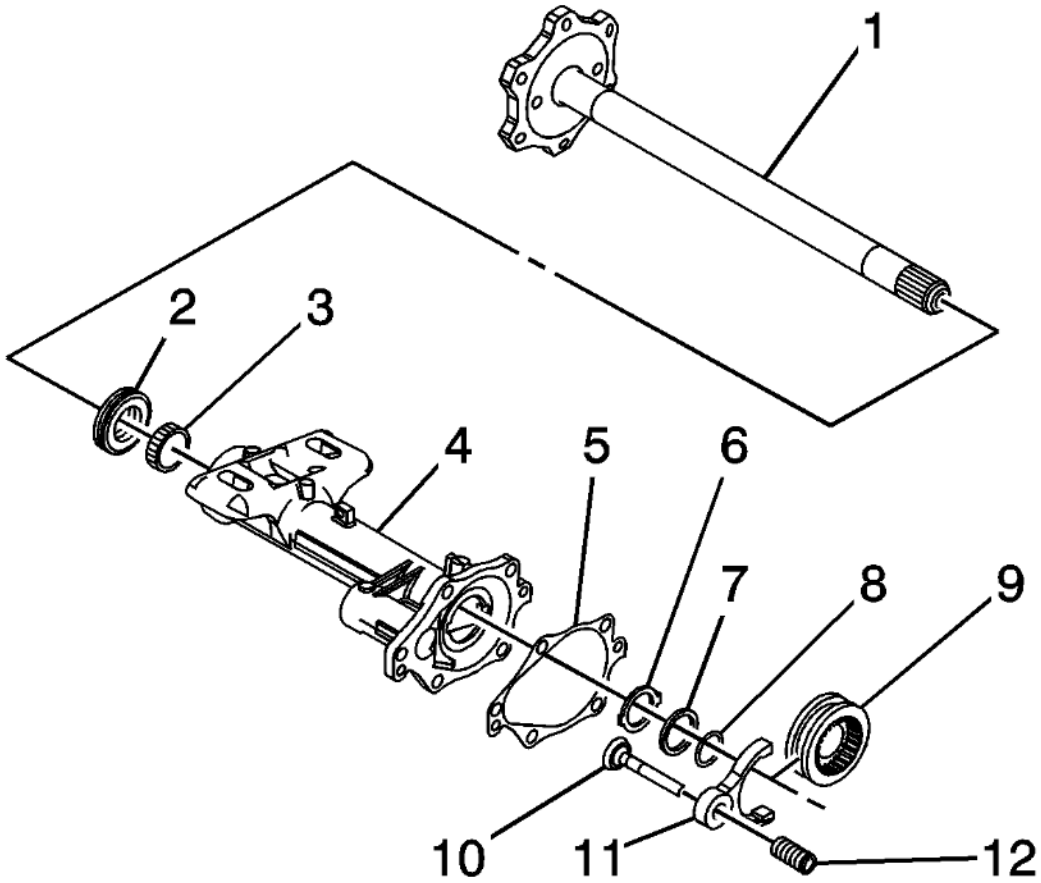


Fig. 79: View Of Inner Axle Shaft & Components
Courtesy of GENERAL MOTORS COMPANY

12. Remove the following components from the inner axle housing:
    1. Clamp the inner axle shaft housing (4) in a vise. Clamp only on the mounting flange.
    2. Shifter fork spring (12)
    3. Shifter fork (11)
    4. Shifter fork rod (10)
    5. Shifter connector gear (9)
    6. Axle shaft snap ring (8)
    7. Axle shaft thrust washer (7)
    8. Axle shaft tabbed thrust washer (6)
    9. Inner axle shaft housing gasket (5)

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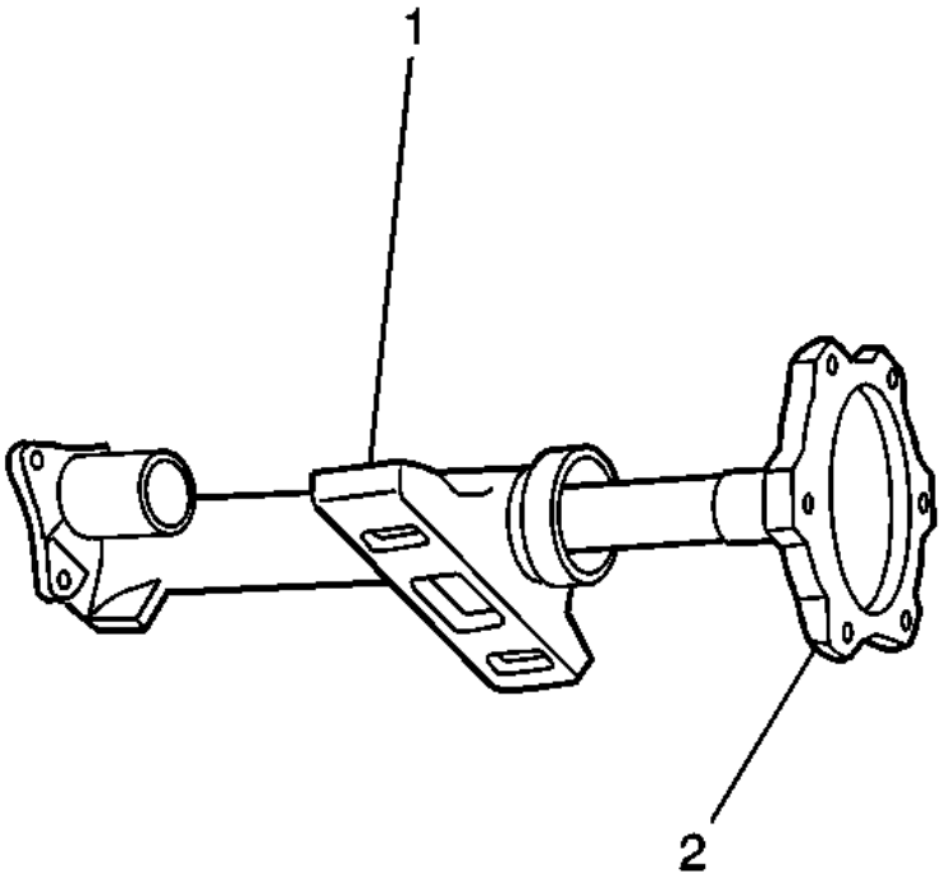


Fig. 80: Axle Shaft & Inner Axle Shaft Housing - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

13. Using a soft-faced mallet (if necessary), remove the inner axle shaft (2).
14. Remove the inner axle seal and the bearing from the axle housing. **Front Drive Axle Inner Shaft Seal Replacement - Right Side**, **Front Drive Axle Inner Shaft Bearing Replacement (Left Side)Front Drive Axle Inner Shaft Bearing Replacement (Right Side)**

Installation Procedure

1. Install the new inner axle shaft bearing and the seal to the axle housing. **Front Drive Axle Inner Shaft Seal Replacement - Right Side**, **Front Drive Axle Inner Shaft Bearing Replacement (Left Side)Front Drive Axle Inner Shaft Bearing Replacement (Right Side)**

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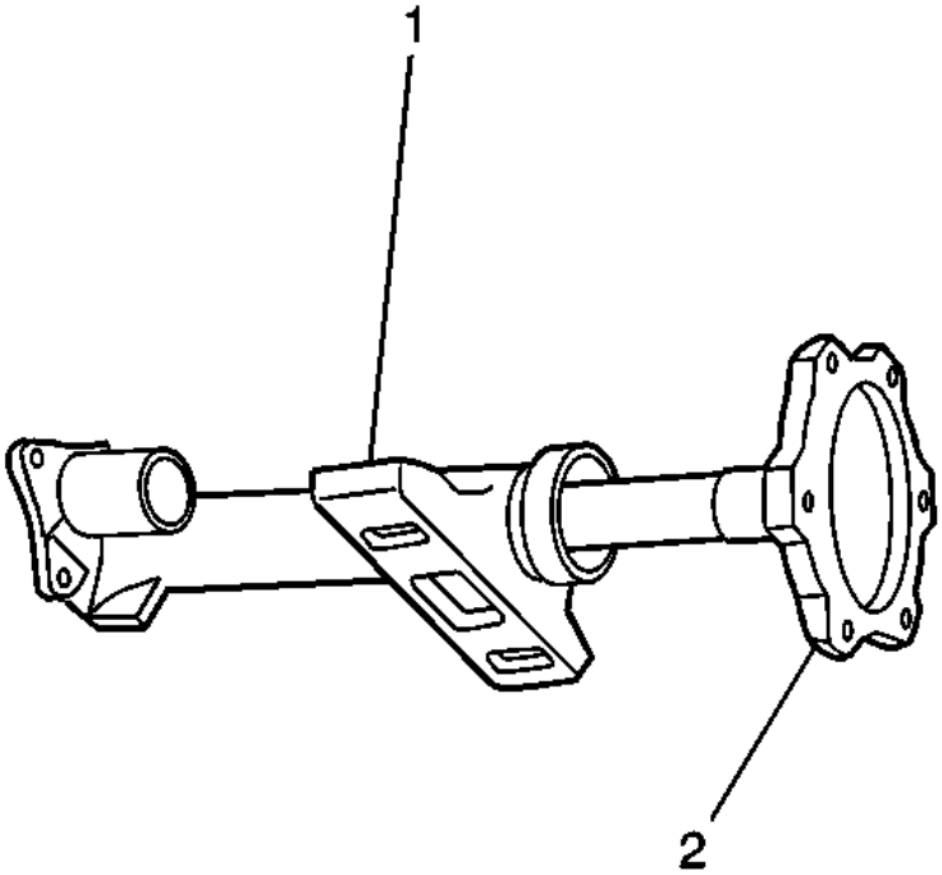


Fig. 81: Axle Shaft & Inner Axle Shaft Housing - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

2. Using a soft faced mallet, carefully tap the inner axle shaft (2) into the inner axle shaft housing (1).
3. Place the inner axle shaft housing on end so that the splines of the inner axle shaft is facing up.

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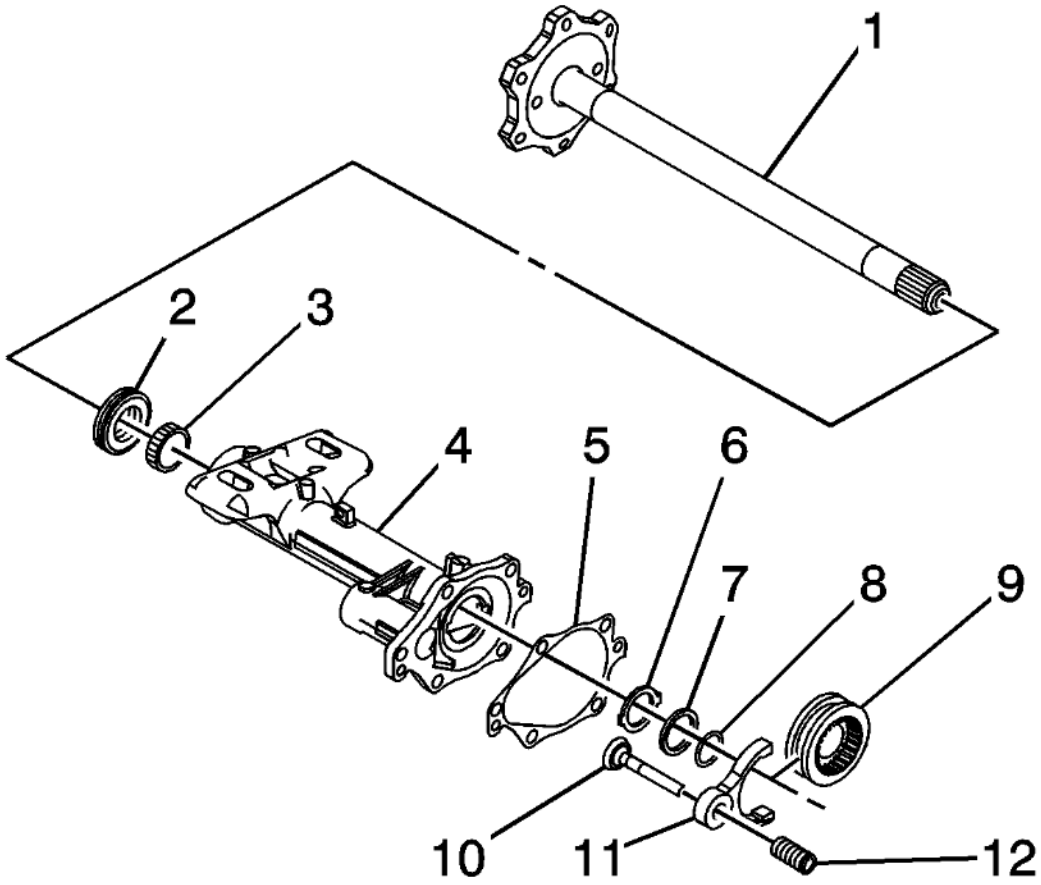


Fig. 82: View Of Inner Axle Shaft & Components
Courtesy of GENERAL MOTORS COMPANY

4. Install the following components into the inner axle housing:
    1. Clamp the inner axle shaft housing (4) in a vise. Clamp only on the mounting flange.

    NOTE: Use chassis grease in order to hold the thrust washer in place.

    2. Axle shaft tabbed thrust washer (6)
    3. Axle shaft thrust washer (7)
    4. Axle shaft snap ring (8)
    5. Shifter connector gear (9)
    6. Shifter fork (11)
    7. Shifter fork rod (10)
    8. Shifter fork spring (12)
    9. Inner Axle shaft housing gasket (5)
5. Install the axle housing gasket on to the differential carrier.

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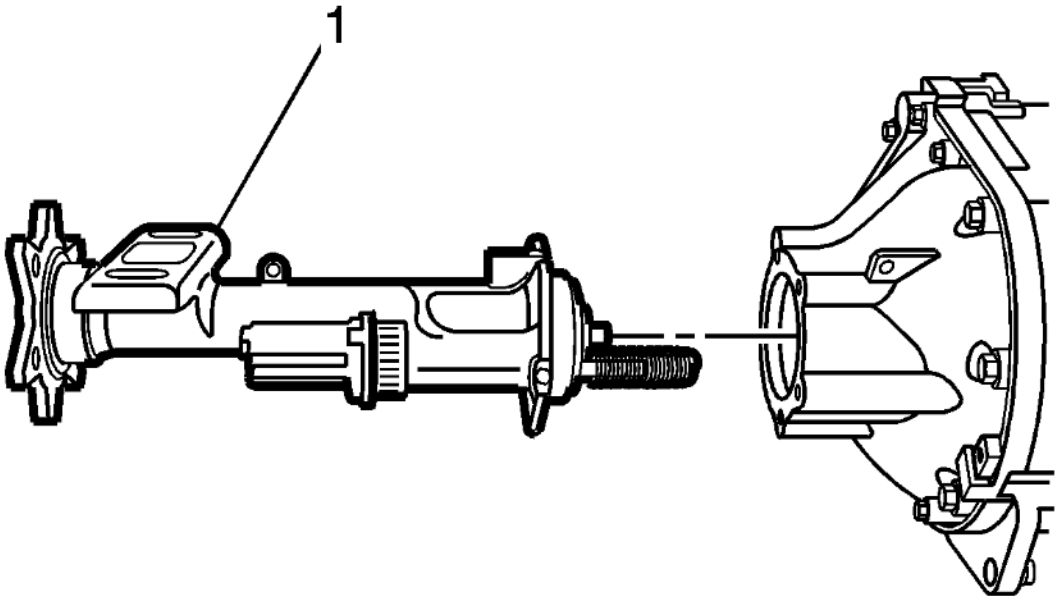


Fig. 83: Installing Inner Axle Shaft Housing Assembly - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

6. Install the inner axle shaft housing assembly (1) to the differential carrier assembly.

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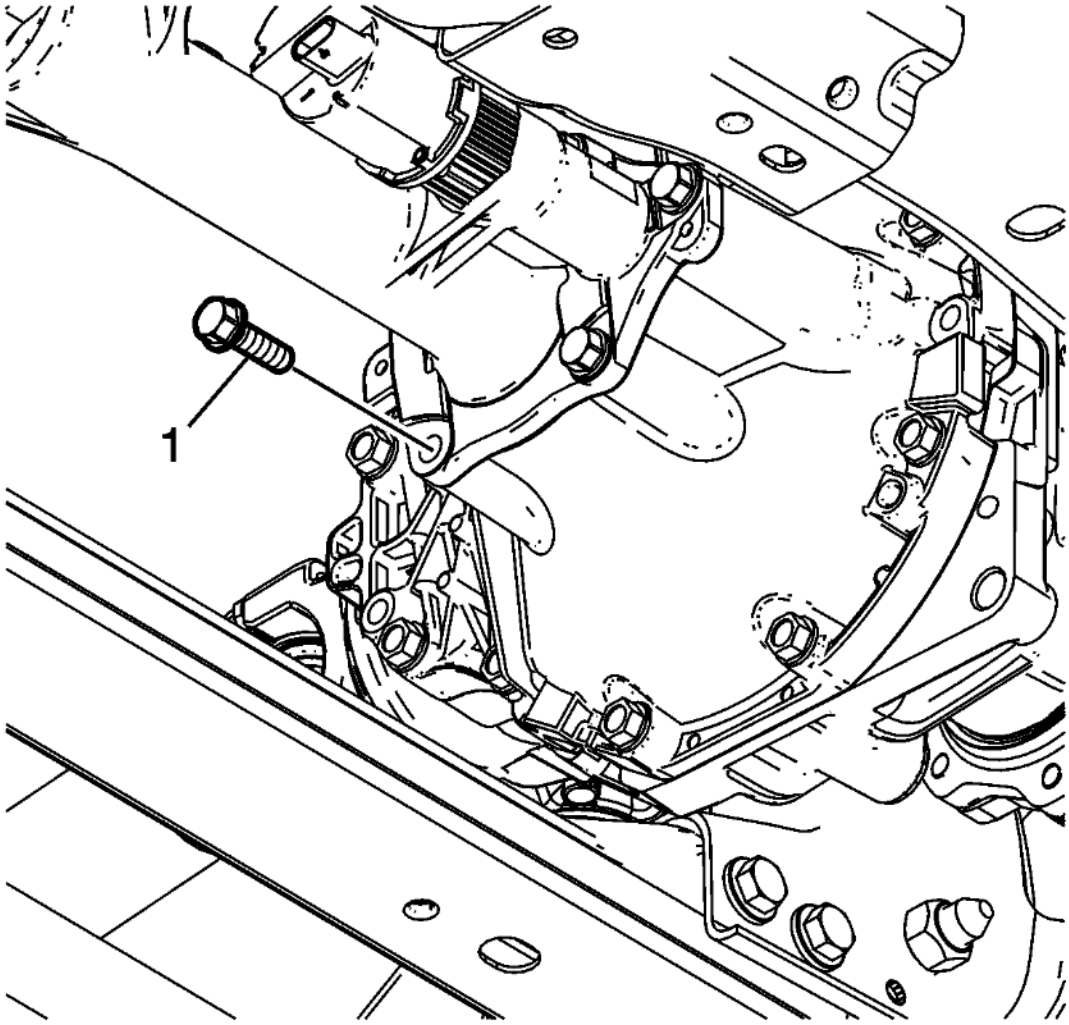


Fig. 84: Inner Axle Shaft Housing Bolts
Courtesy of GENERAL MOTORS COMPANY

7. Install the inner axle shaft housing bolts (1) and tighten to 55 N.m (41 lb ft).

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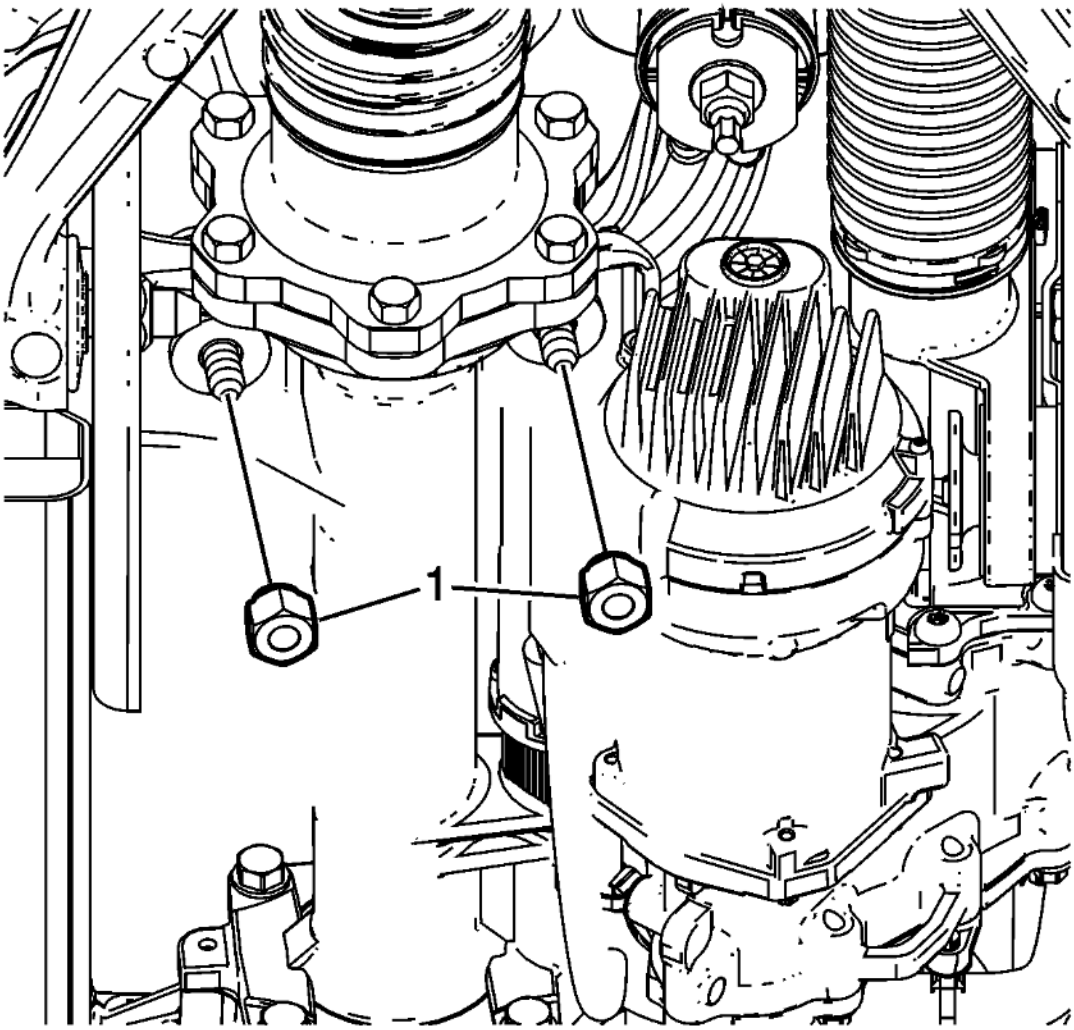


Fig. 85: Inner Axle Shaft Housing Washers And Nuts
Courtesy of GENERAL MOTORS COMPANY

8. Install the inner axle shaft housing washers and nuts (1) to the bracket and tighten the nuts to 100 N.m (75 lb ft).
9. Connect the wheel drive shaft inboard flange to the inner axle shaft.

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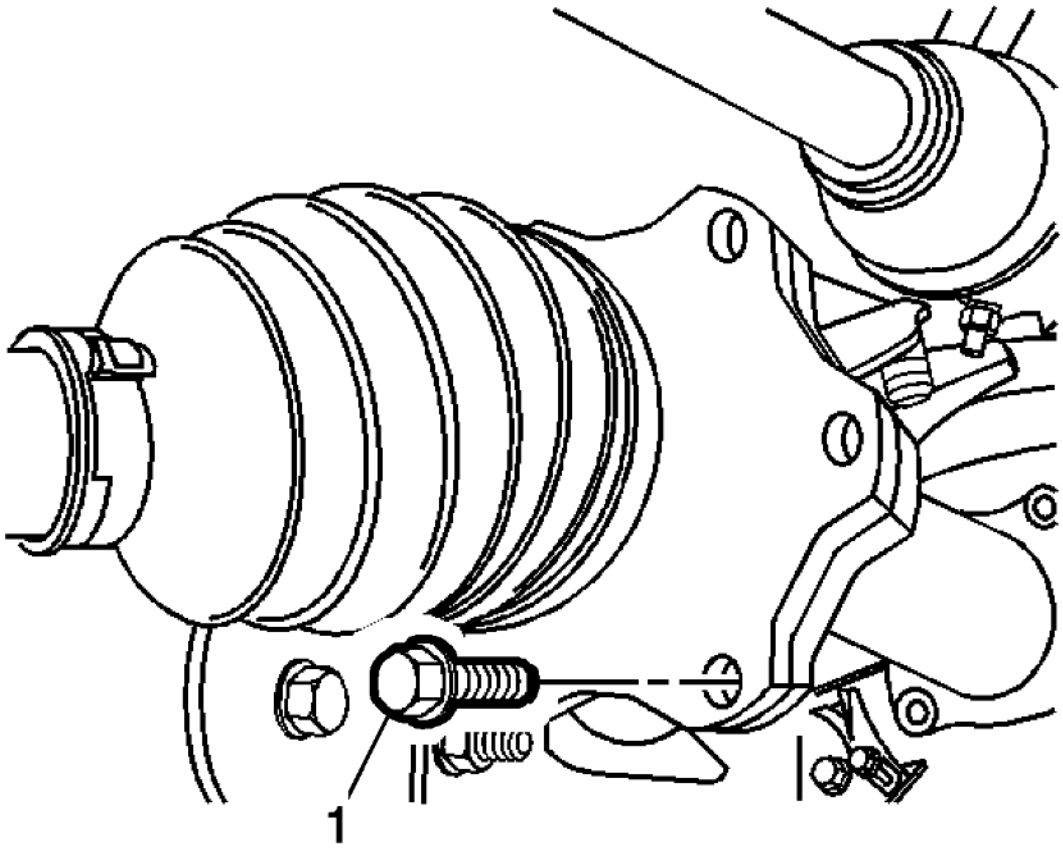


Fig. 86: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

10. Install the wheel drive shaft inboard flange to the inner axle shaft bolts (1) and tighten the bolts to 79 N.m (58 lb ft).

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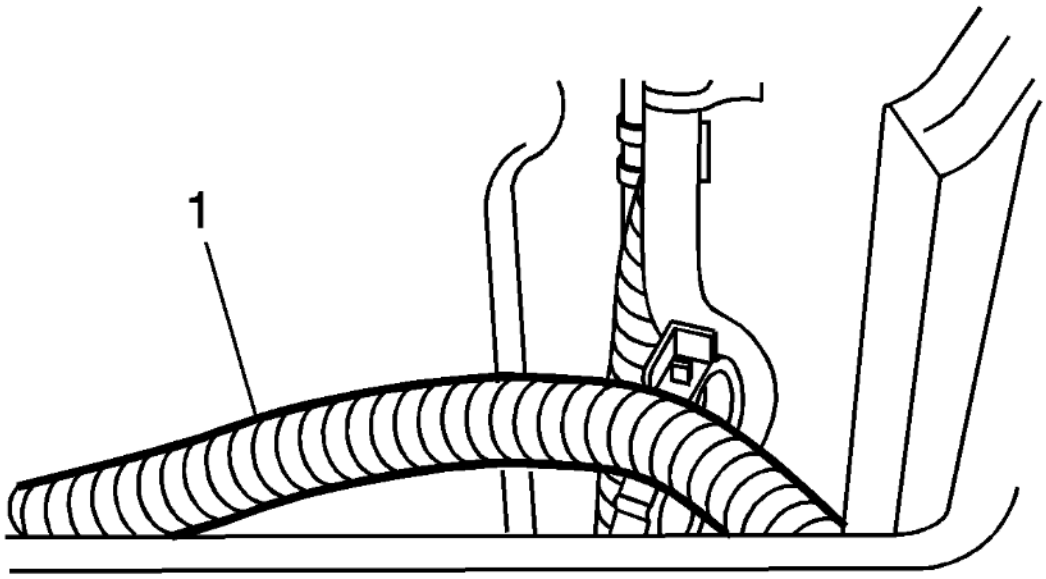


Fig. 87: Inner Axle Shaft Housing Wire Harness - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

11. Connect the wire harness (1) to the inner axle shaft housing.

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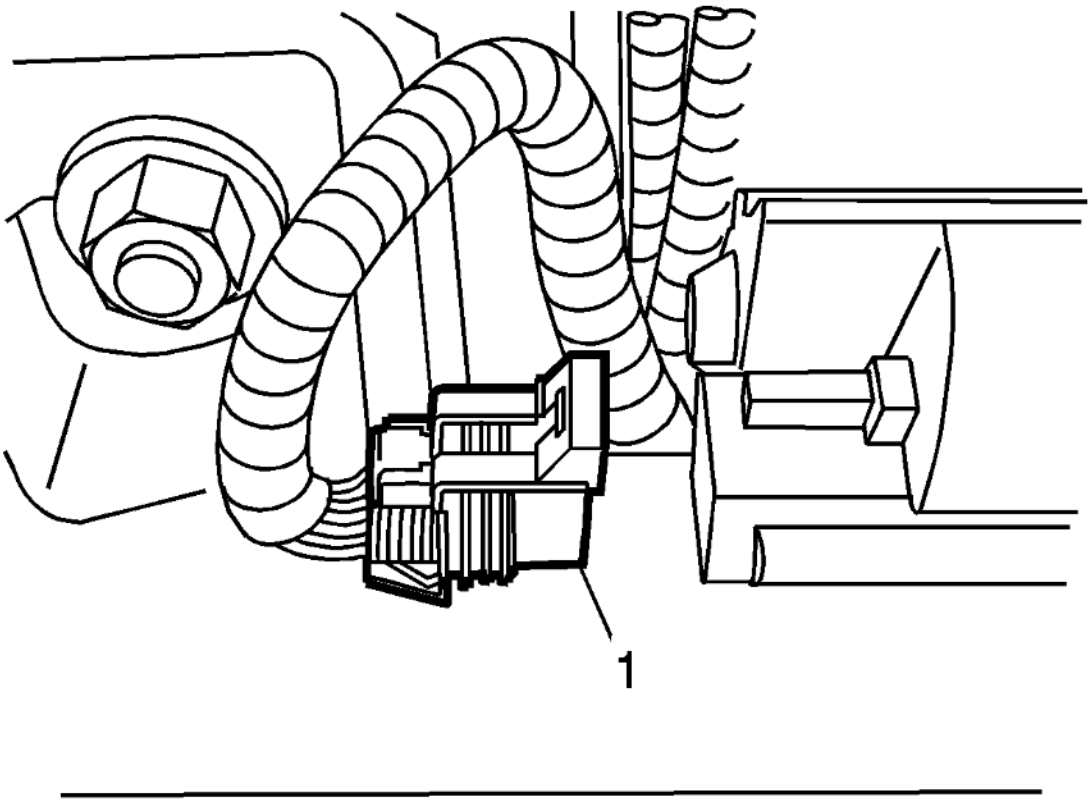


Fig. 88: Disconnecting Electric Motor Actuator Electrical Connector - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

12. Connect the electrical connector (1) to actuator.
13. Install the front shock module. **Shock Absorber and Spring Removal and Installation (Light Duty, Without Z85/Z95)** **Shock Absorber and Spring Removal and Installation (Light Duty, With Z85/Z95)**
14. Install the power steering assist motor. **Power Steering Assist Motor Replacement (Light Duty)**
15. With either replacement procedure, fill the differential carrier assembly with axle lubricant. Use the correct fluid. **Front Axle Lubricant Replacement (8.25 Inch Axle)** **Front Axle Lubricant Replacement (9.25 Inch Axle)**
16. Lower the vehicle.

FRONT DRIVE AXLE INNER SHAFT HOUSING REPLACEMENT (9.25 INCH AXLE)

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the differential carrier. Refer to **Front Axle Lubricant Replacement (8.25 Inch Axle)** **Front Axle Lubricant Replacement (9.25 Inch Axle)**.

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3. Remove the front drive axle actuator. Refer to **Front Drive Axle Actuator Replacement (1500 Series)Front Drive Axle Actuator Replacement (2500/3500 Series)**.
4. Disconnect the wire harness from the front drive axle inner shaft housing.

NOTE: **Support the wheel drive shaft in order to not over flex the constant velocity (CV) joint.**

5. Separate the wheel drive shaft from the front wheel inner drive shaft. Refer to **Front Wheel Drive Shaft Replacement - Right Side** , and **Front Wheel Drive Shaft Replacement - Left Side** .
6. Remove the stabilizer shaft link. Refer to **Stabilizer Shaft Link Replacement (Light Duty)** **Stabilizer Shaft Link Replacement (Heavy Duty)** .

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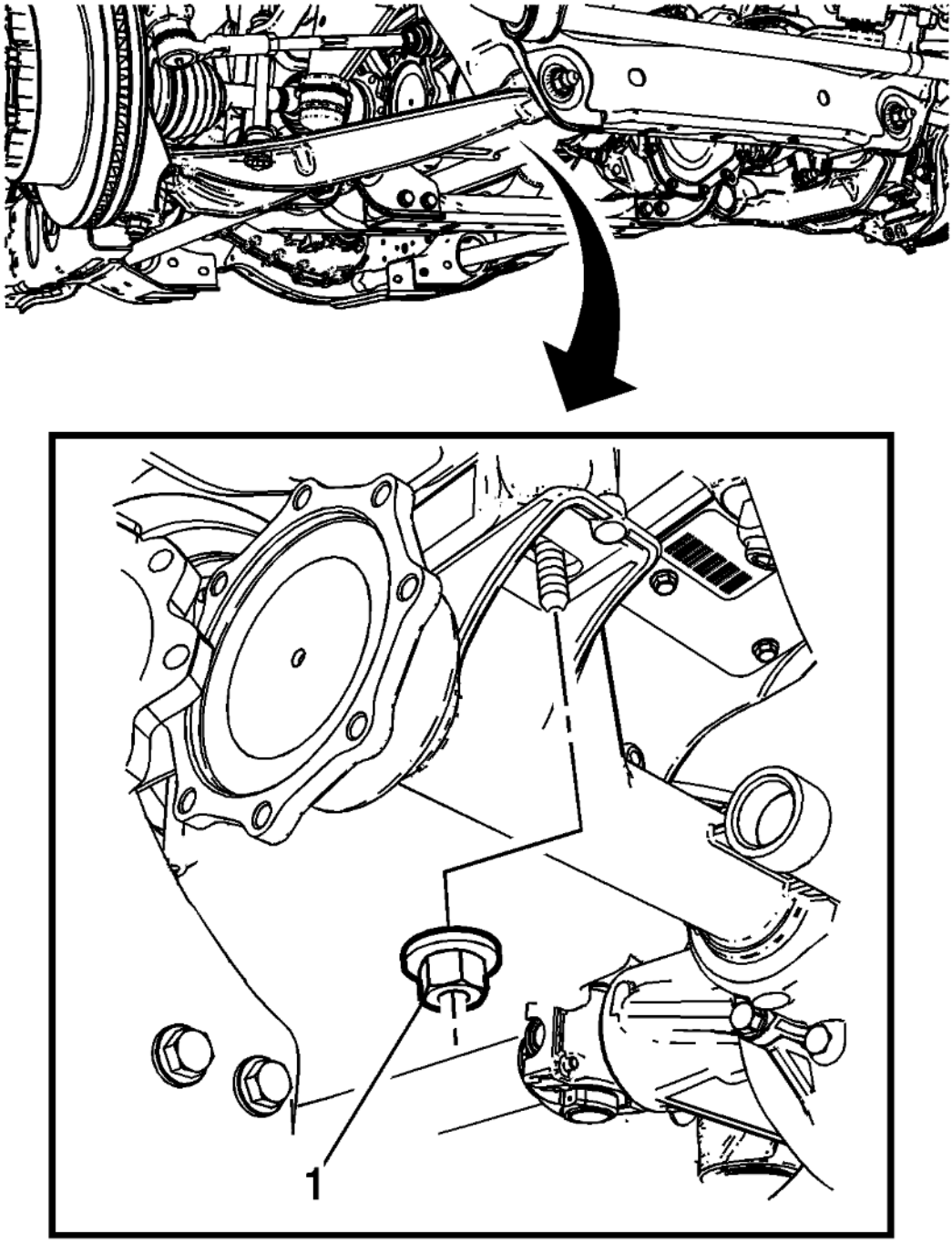


Fig. 89: Front Differential Carrier Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

7. Remove the two front differential carrier bracket nuts (1).

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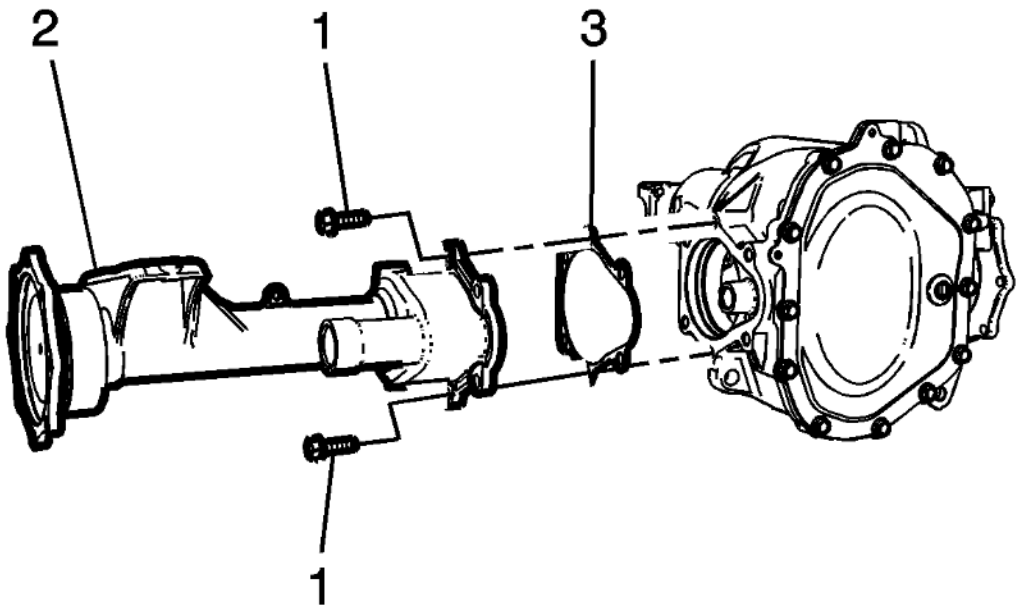


Fig. 90: Identifying Front Drive Axle Inner Axle Assembly, Gasket And Bolts
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **Allow the front drive axle inner shaft housing to drain before completely removing it from the vehicle.**
- **Keep the open end of the inner axle housing assembly up**

8. Remove the six front drive axle inner shaft housing bolts (1).
9. Remove the front drive axle inner shaft housing (2) and the gasket (3).

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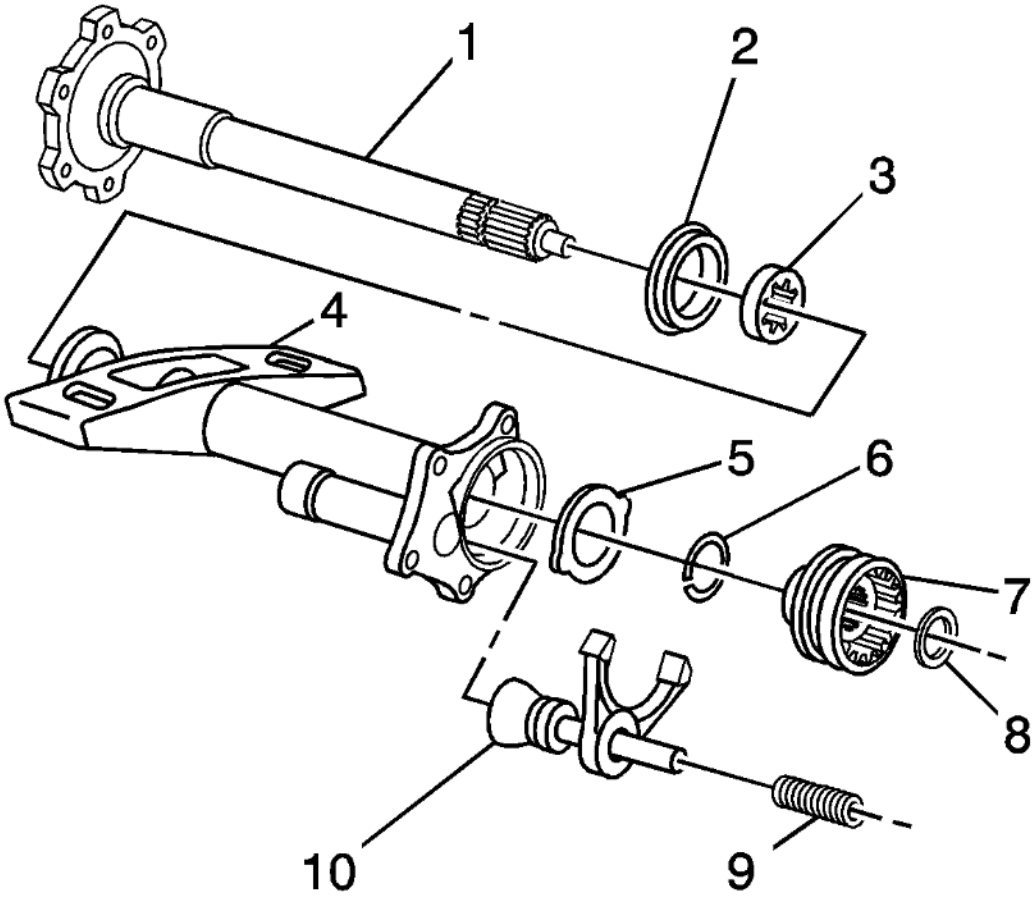


Fig. 91: Identifying Inner Axle Shaft Housing Components
Courtesy of GENERAL MOTORS COMPANY

10. Remove the front drive axle clutch fork inner spring (9) and the clutch fork (10).
11. Remove the front drive axle clutch gear shim (8), sleeve (7), and thrust washer (5).
12. Remove and discard the front drive axle inner shaft retaining ring (6).
13. Remove the front drive axle inner shaft (1).
14. Remove the front drive axle inner shaft seal and the front drive axle inner shaft bearing. Refer to **Front Drive Axle Inner Shaft Seal Replacement - Right Side**, and **Front Drive Axle Inner Shaft Bearing Replacement (Left Side)Front Drive Axle Inner Shaft Bearing Replacement (Right Side)**.

Installation Procedure

1. Install the front drive axle inner shaft seal and the front drive axle inner shaft bearing. Refer to **Front Drive Axle Inner Shaft Seal Replacement - Right Side**, and **Front Drive Axle Inner Shaft Bearing Replacement (Left Side)Front Drive Axle Inner Shaft Bearing Replacement (Right Side)**.

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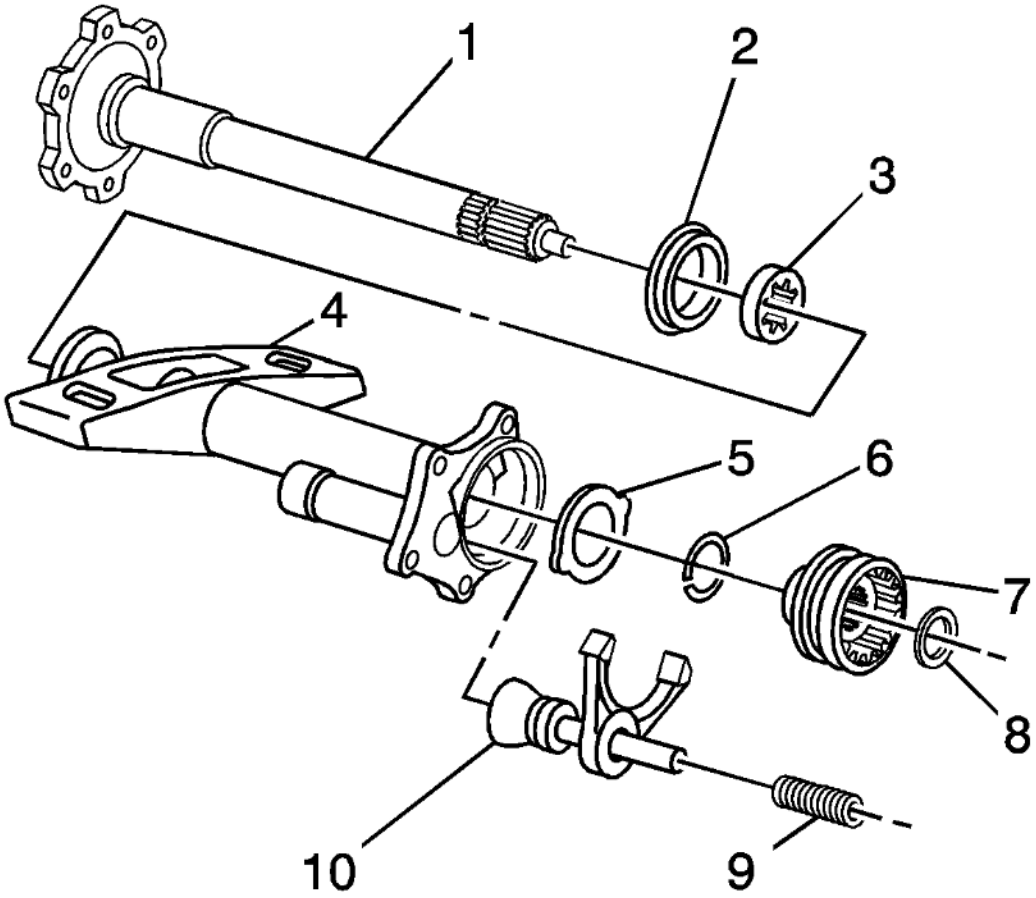


Fig. 92: Identifying Inner Axle Shaft Housing Components
Courtesy of GENERAL MOTORS COMPANY

2. Install the inner axle shaft (1).
3. Install the NEW retaining ring (6), and original thrust washer (5) on the inner axle shaft (1).
4. Determine the clutch gear shim thickness. Refer to **Front Drive Axle Clutch Gear Shim Adjustment**.
5. Install the clutch sleeve (7), correct clutch gear shim (8), clutch fork assembly (10), and the clutch fork inner spring (9), in the front drive axle inner shaft housing.

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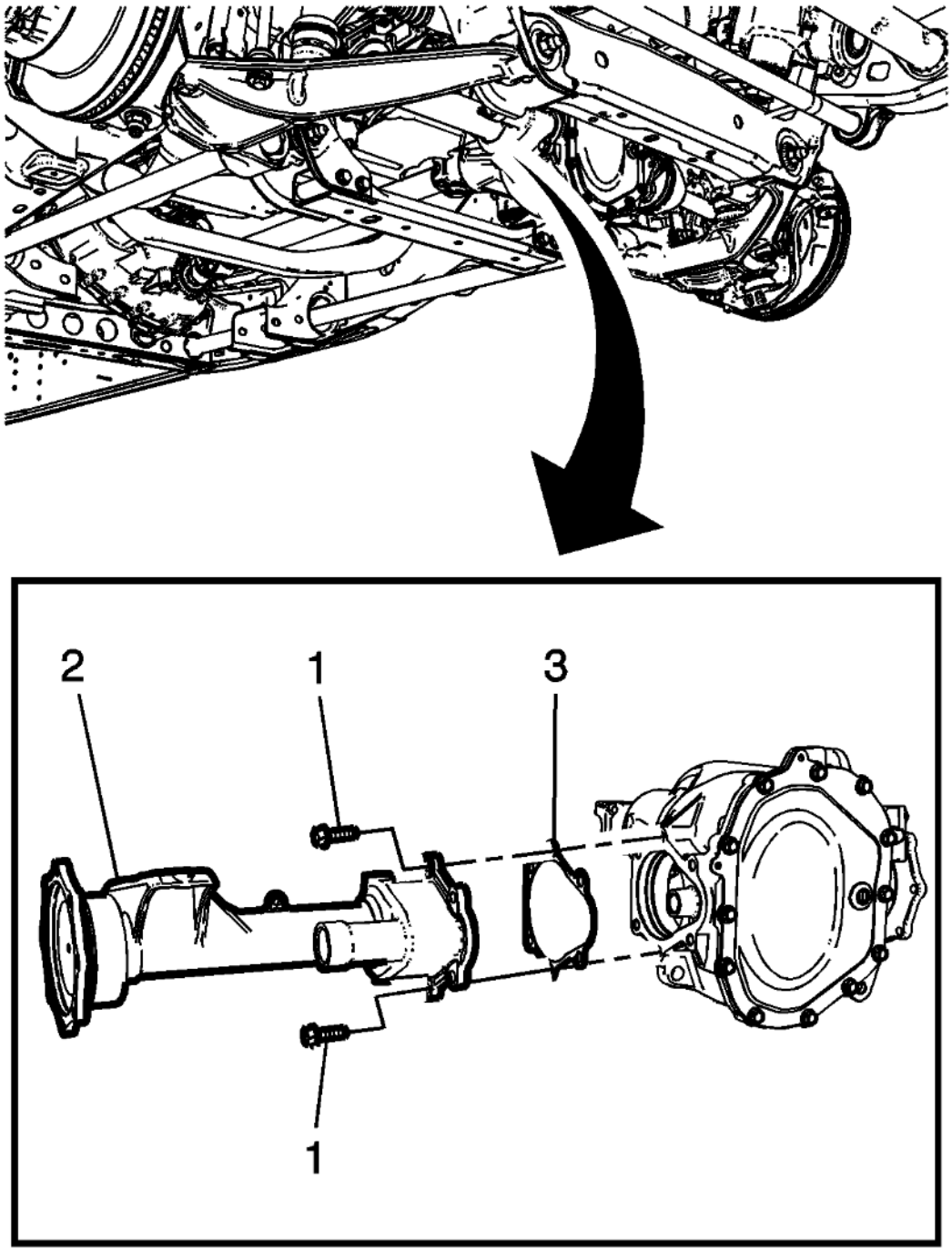


Fig. 93: Front Drive Axle Inner Shaft Housing Assembly
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

6. Install the front drive axle inner shaft housing assembly (2), gasket (3), and the six bolts (1).
7. Tighten the six front drive axle inner shaft housing bolts (1) to 80 N.m (59 lb ft).

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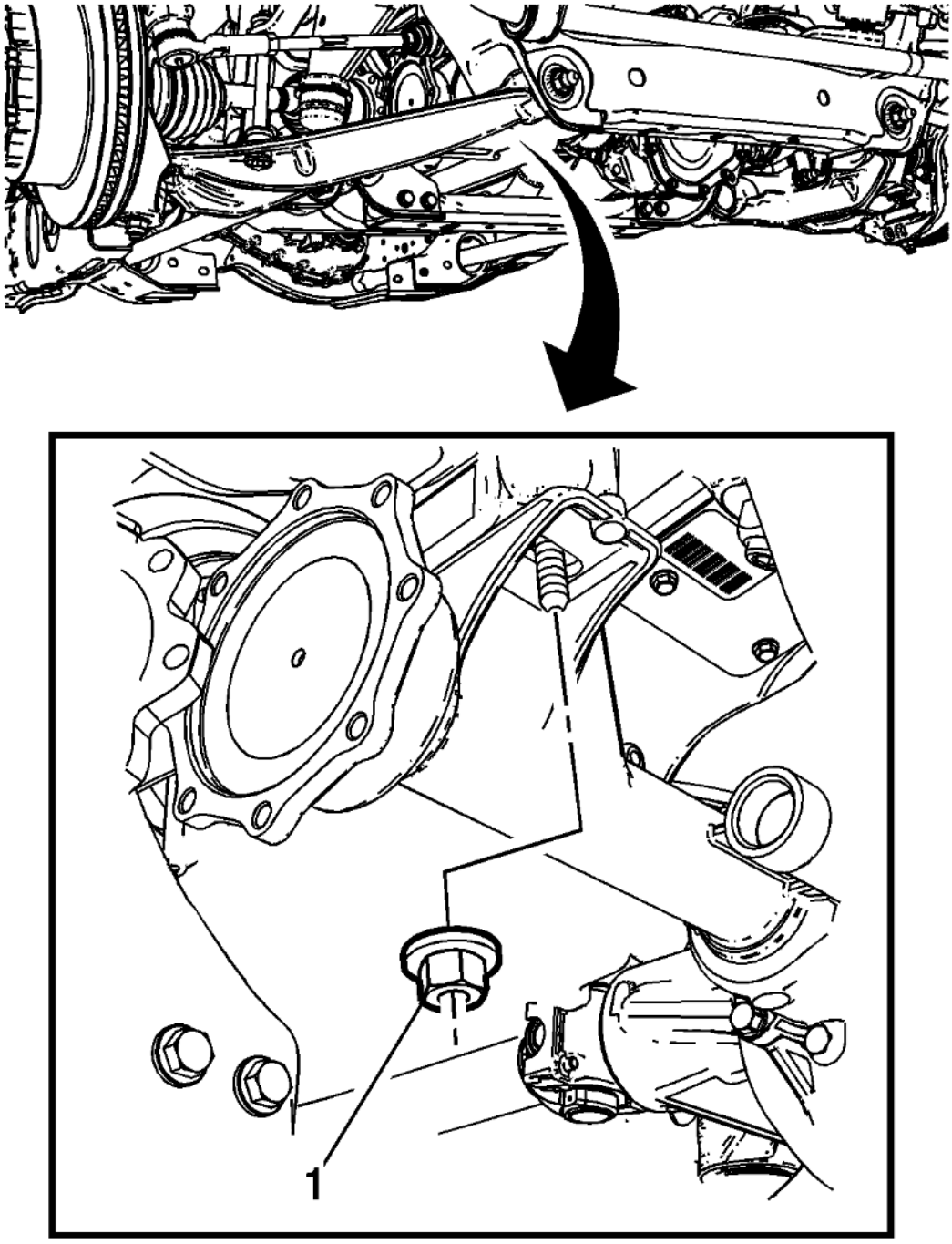


Fig. 94: Front Differential Carrier Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

8. Install the front differential carrier bracket nuts (1) and tighten to 100 N.m (74 lb ft).

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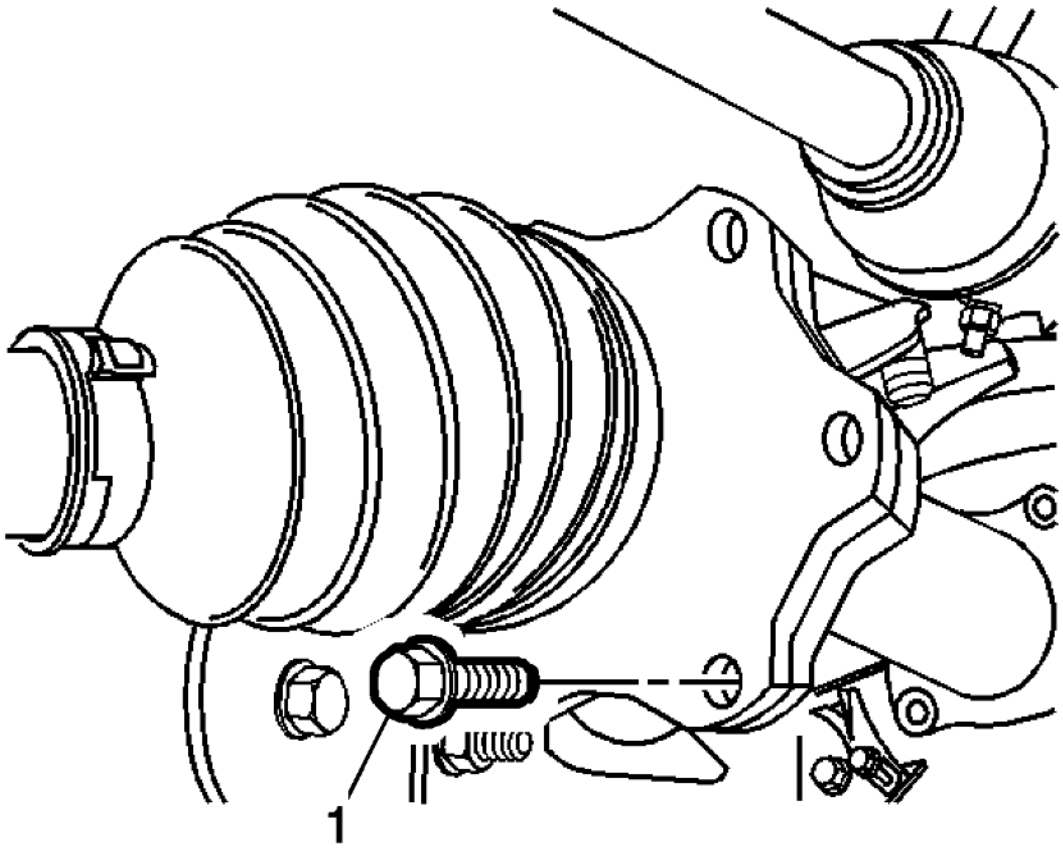


Fig. 95: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

9. Install the wheel drive shaft bolts (1) and tighten to 79 N.m (58 lb ft).
10. Install the front drive axle actuator. Refer to **Front Drive Axle Actuator Replacement (1500 Series)Front Drive Axle Actuator Replacement (2500/3500 Series)**.

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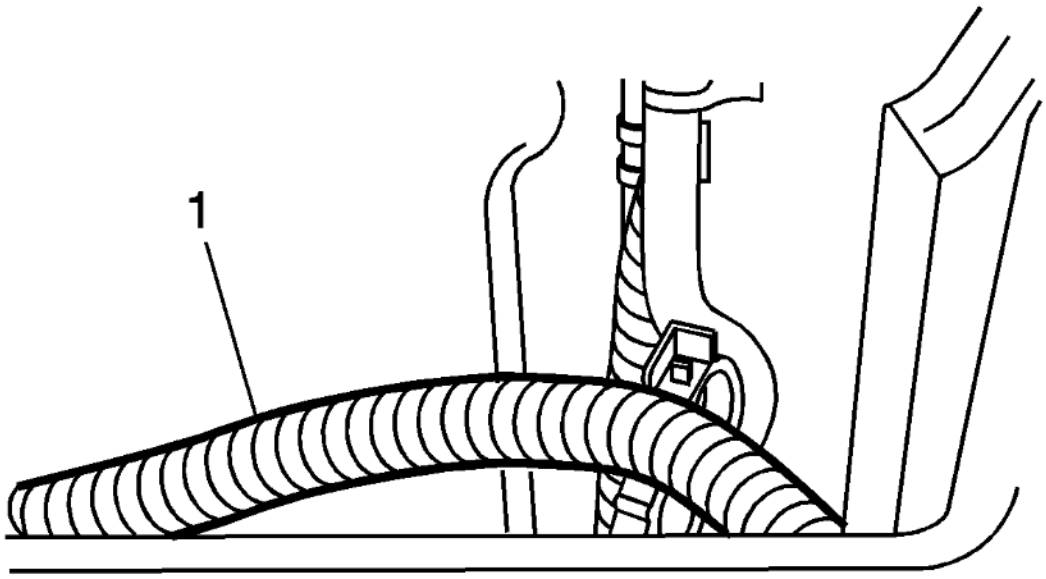


Fig. 96: Inner Axle Shaft Housing Wire Harness - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

11. Connect the wire harness (1) to the inner axle shaft housing.

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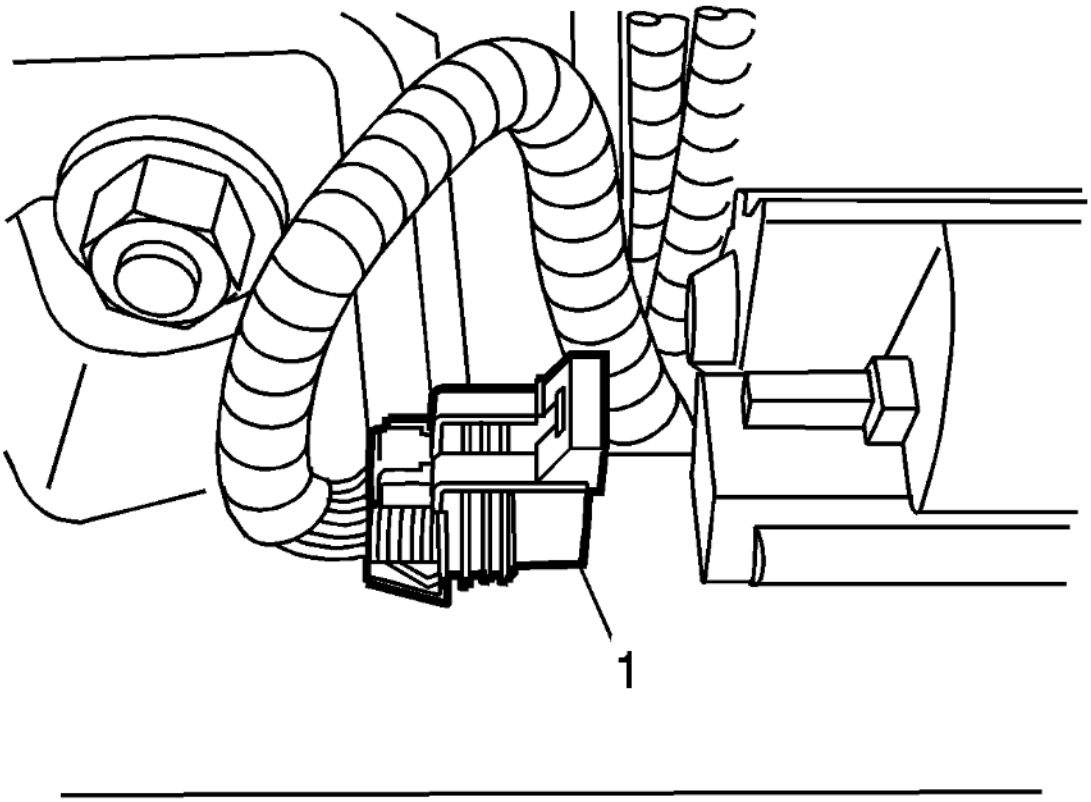


Fig. 97: Disconnecting Electric Motor Actuator Electrical Connector - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

12. Connect the electrical (1) connector to actuator.
13. Fill the differential carrier assembly with axle lubricant. Use the correct fluid. Refer to Front Axle Lubricant Replacement (8.25 Inch Axle)Front Axle Lubricant Replacement (9.25 Inch Axle).
14. Lower the vehicle.

FRONT DRIVE AXLE CLUTCH FORK REPLACEMENT

Removal Procedure

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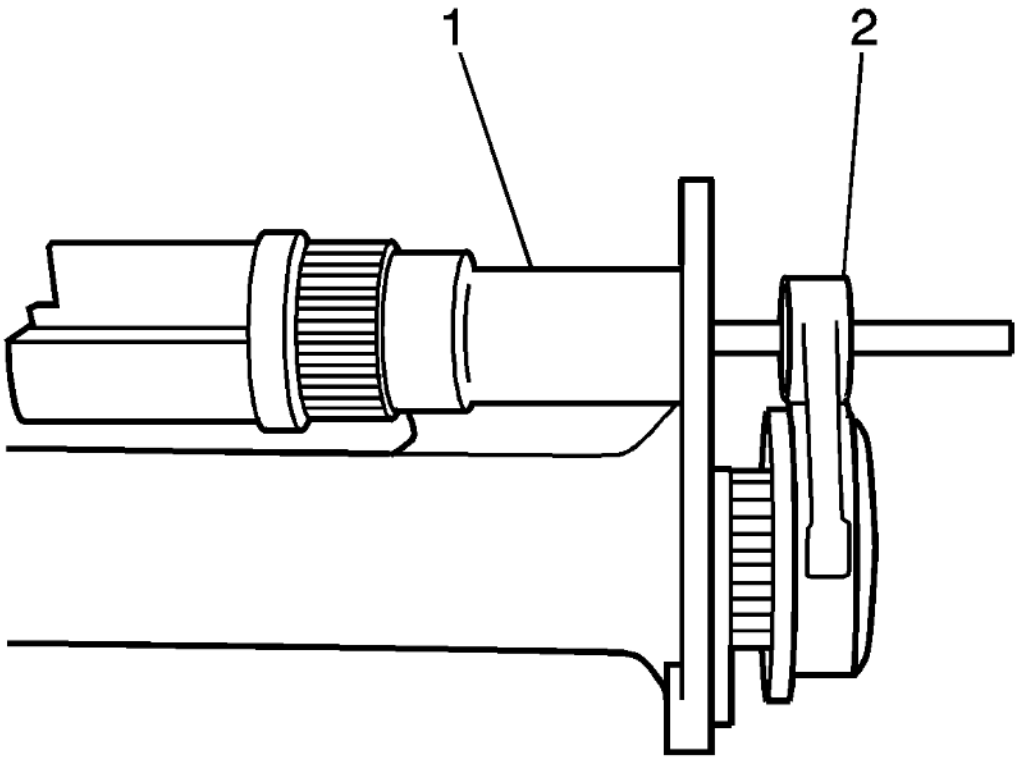


Fig. 98: Inner Axle Shaft Housing & Clutch Fork Assembly - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

1. Remove the inner axle shaft and housing assembly. Refer to **Front Drive Axle Inner Shaft Housing Replacement (8.25 Inch Axle)Front Drive Axle Inner Shaft Housing Replacement (9.25 Inch Axle)**.
2. Remove the clutch fork assembly (2) from the inner axle shaft housing (1).
3. Remove the clutch fork inner spring from the differential carrier case assembly, if necessary.

Installation Procedure

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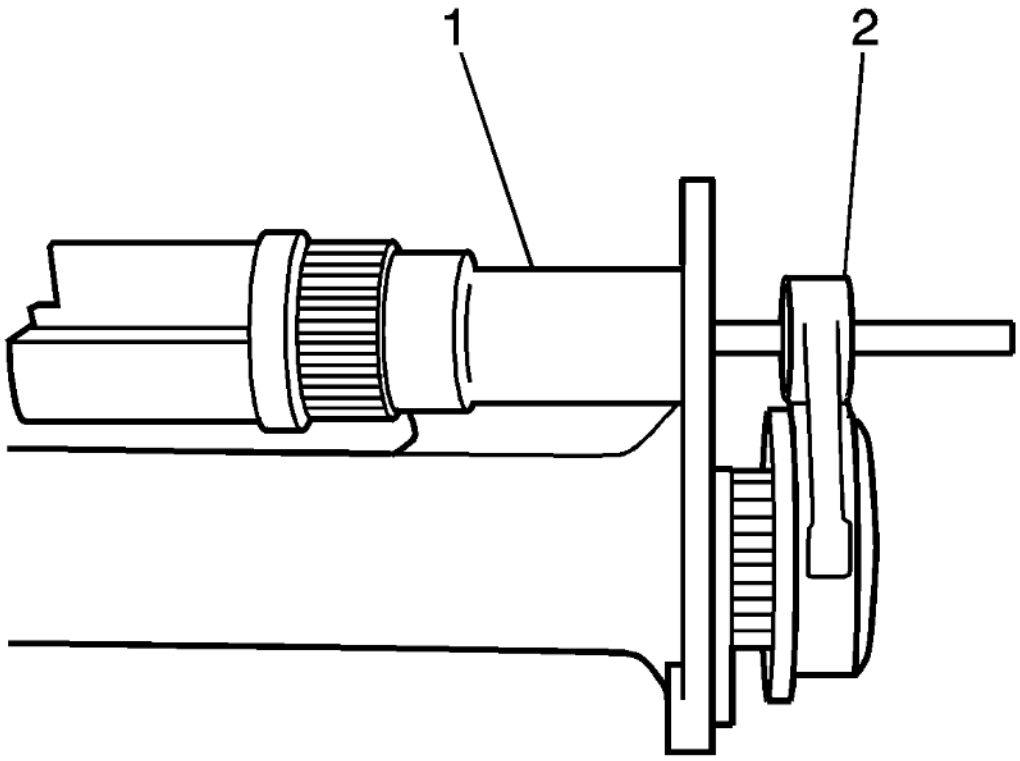


Fig. 99: Inner Axle Shaft Housing & Clutch Fork Assembly - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

1. Install the clutch fork inner spring into the differential carrier case assembly, if necessary.
2. Install the clutch fork assembly (2) into the inner axle shaft housing (1).
3. Install the inner axle shaft and housing assembly. Refer to **Front Drive Axle Inner Shaft Housing Replacement (8.25 Inch Axle)Front Drive Axle Inner Shaft Housing Replacement (9.25 Inch Axle)**.

FRONT DRIVE AXLE CLUTCH SHAFT BEARING REPLACEMENT

Tools Required

- **J-33842** Pilot Bearing Installer
- **J-34011** Pilot Bearing Remover

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

Removal Procedure

1. Remove the inner axle shaft and housing assembly. Refer to **Front Drive Axle Inner Shaft Housing Replacement (8.25 Inch Axle)Front Drive Axle Inner Shaft Housing Replacement (9.25 Inch Axle)**.
2. Remove the clutch shaft from the differential carrier assembly.

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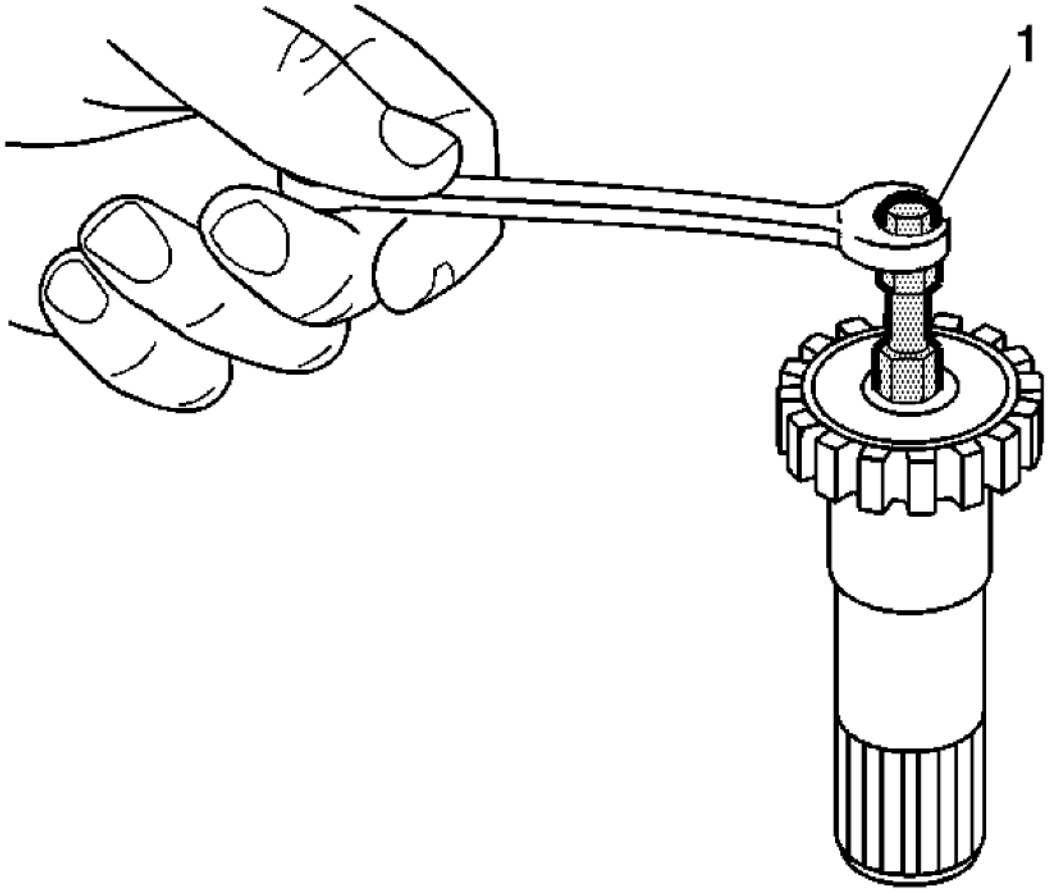


Fig. 100: Removing Clutch Shaft Pilot Bearing - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

3. Remove the clutch shaft pilot bearing using the **J-34011** pilot bearing remover.

Installation Procedure

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

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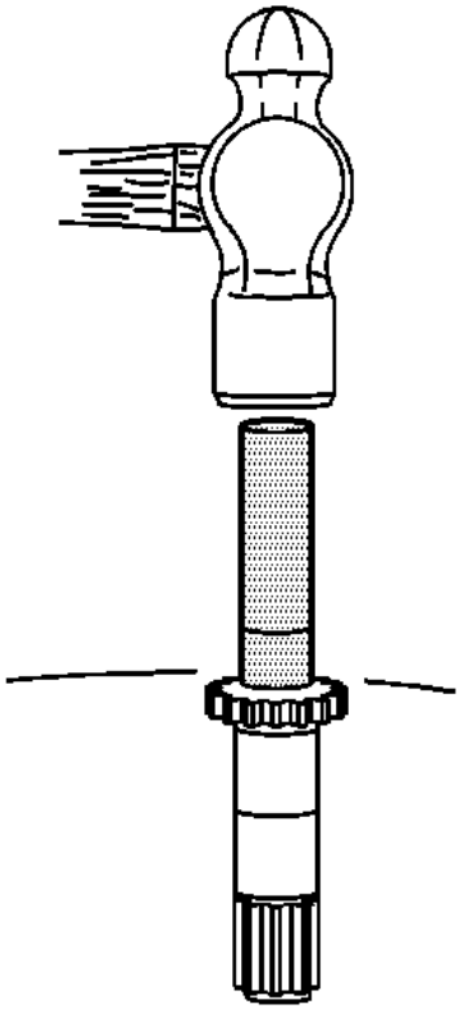


Fig. 101: Installing Clutch Shaft Pilot Bearing - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

2. Install the clutch shaft pilot bearing using the **J-33842** pilot bearing installer.
3. Install the clutch shaft to the differential carrier assembly.
4. Install the inner axle shaft and housing assembly. Refer to **Front Drive Axle Inner Shaft Housing Replacement (8.25 Inch Axle)Front Drive Axle Inner Shaft Housing Replacement (9.25 Inch Axle)**.

FRONT DIFFERENTIAL CARRIER GASKET REPLACEMENT

Inspection Procedure

Perform the following before disassembling the axle:

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. Check the ring gear backlash. Refer to **Backlash Inspection and Adjustment**.

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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.

Removal Procedure

1. Install the differential carrier assembly in a vise.

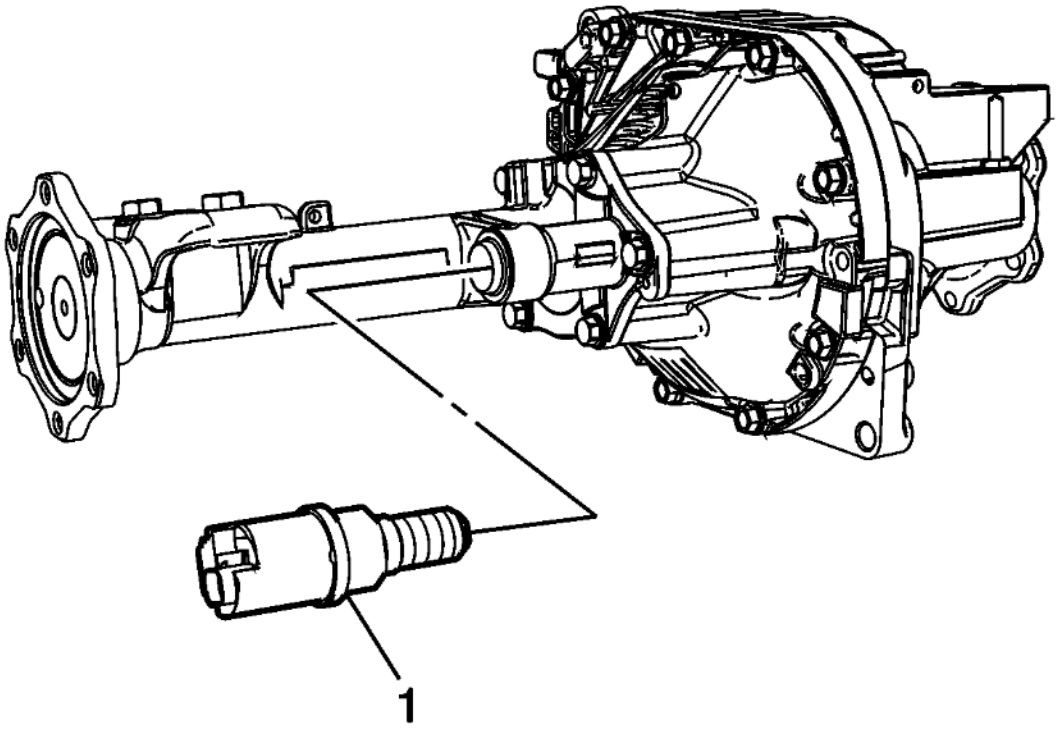


Fig. 102: Front Axle Actuator
Courtesy of GENERAL MOTORS COMPANY

2. Remove the front axle actuator (1).
3. Remove the inner axle shaft housing to differential carrier assembly bolts.

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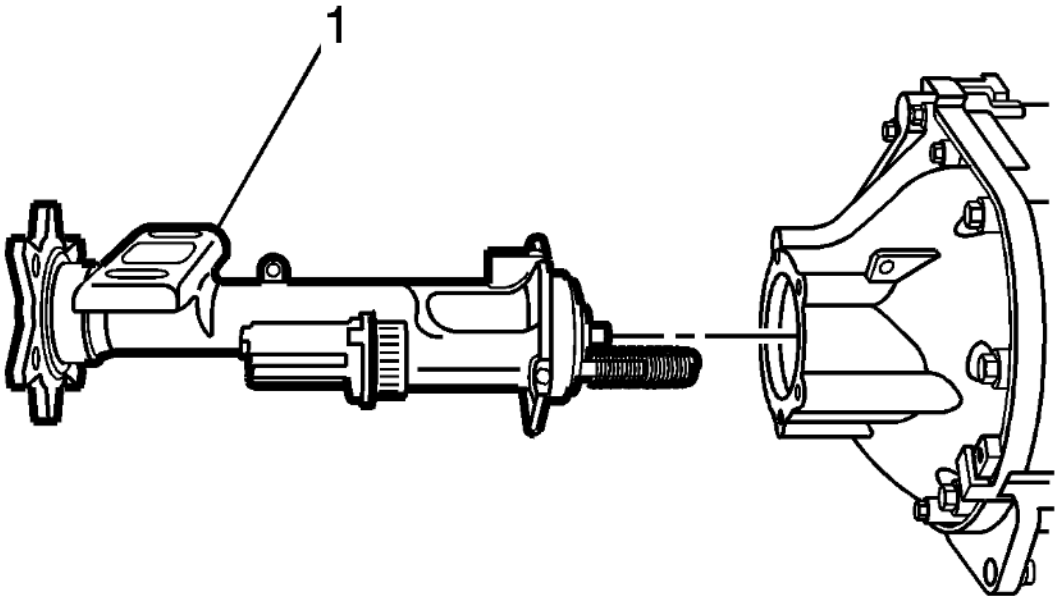


Fig. 103: Installing Inner Axle Shaft Housing Assembly - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

4. Carefully remove the inner axle shaft housing (1) with the inner axle shaft and clutch fork components from the differential carrier assembly.

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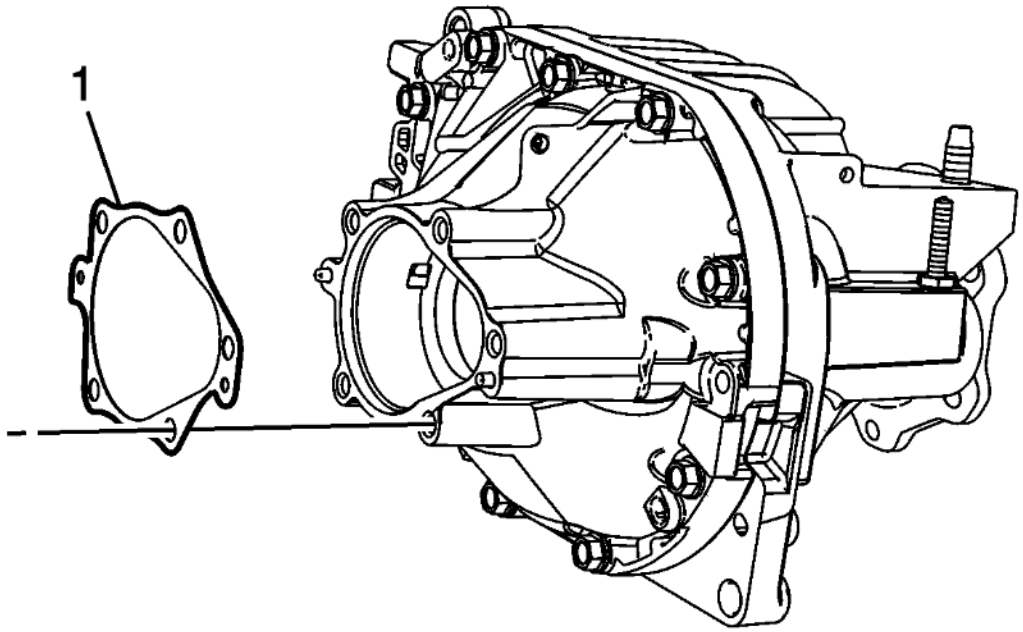


Fig. 104: Inner Axle Housing To Differential Carrier Gasket
Courtesy of GENERAL MOTORS COMPANY

5. Remove the inner axle housing to differential carrier gasket (1).

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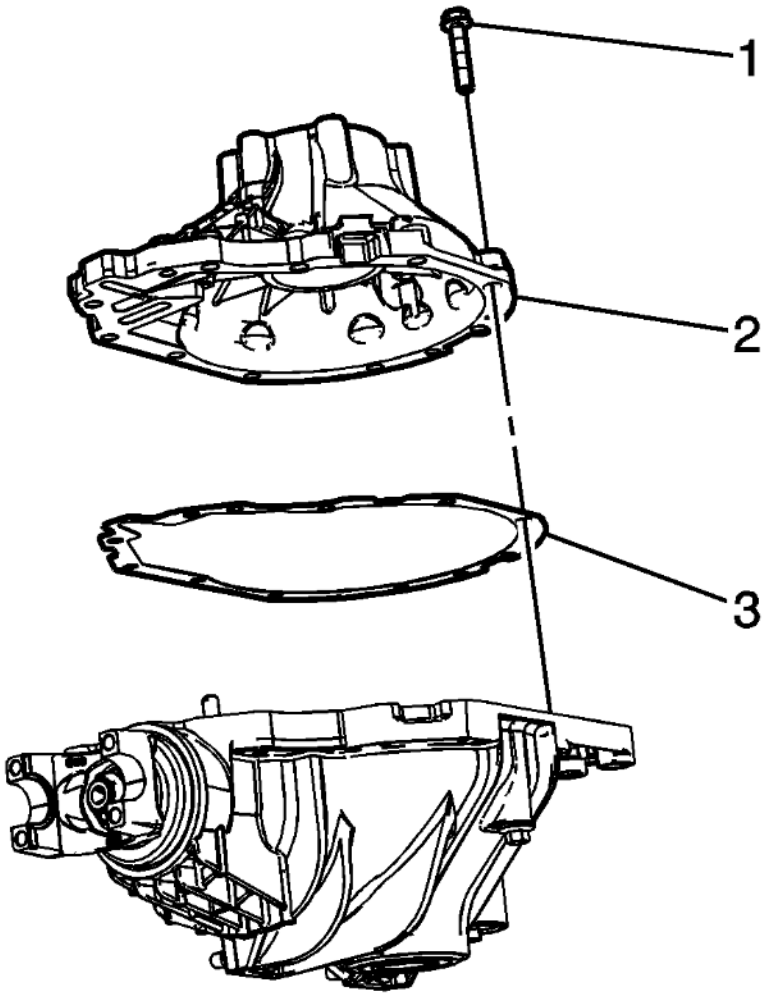


Fig. 105: View Of Differential Carrier Housing, Gasket & Bolts
Courtesy of GENERAL MOTORS COMPANY

6. Remove the differential carrier assembly bolts (1).
7. Separate the left carrier case half from the right carrier case half (2) by tapping on the on the carrier case with a hammer and a brass drift.
8. Remove the differential carrier housing (2) and the differential carrier housing gasket (3).

Installation Procedure

1. Install the differential carrier housing gasket (3) and the differential carrier housing (2).

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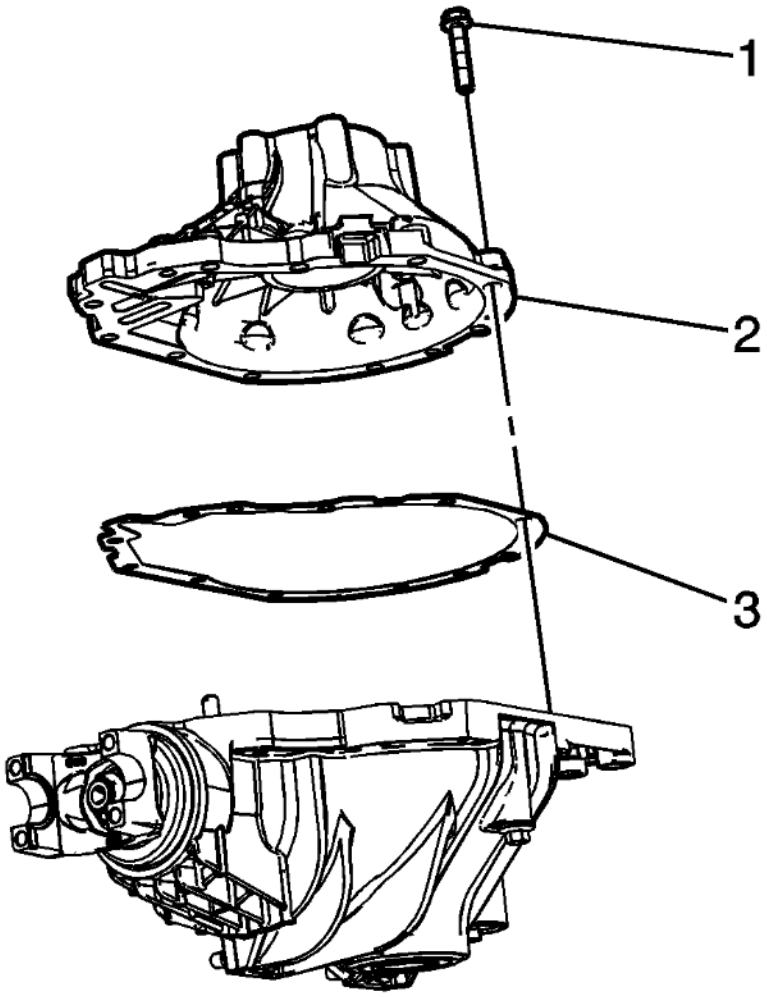


Fig. 106: View Of Differential Carrier Housing, Gasket & Bolts
Courtesy of GENERAL MOTORS COMPANY

2. Install the differential carrier assembly bolts (1) and tighten to 73 N.m (54 lb ft).

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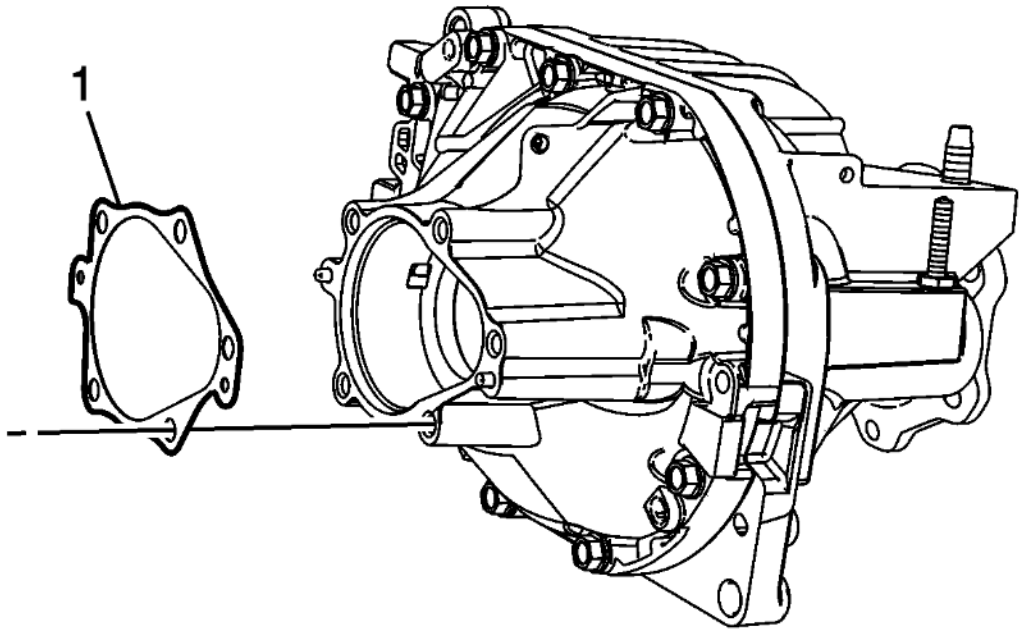


Fig. 107: Inner Axle Housing To Differential Carrier Gasket
Courtesy of GENERAL MOTORS COMPANY

3. Install the inner axle housing to differential carrier gasket (1).

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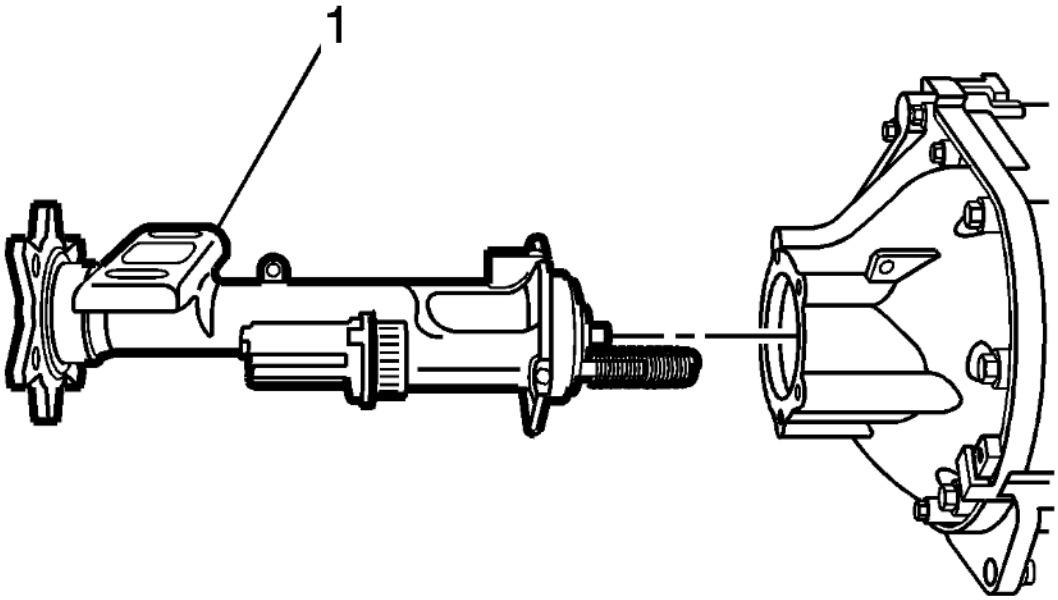


Fig. 108: Installing Inner Axle Shaft Housing Assembly - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

4. Carefully Install the inner axle shaft housing (1) with the inner axle shaft and clutch fork components into the differential carrier assembly.
5. Install the inner axle shaft housing to differential carrier assembly bolts. Tighten to 55 N.m (41 lb ft)

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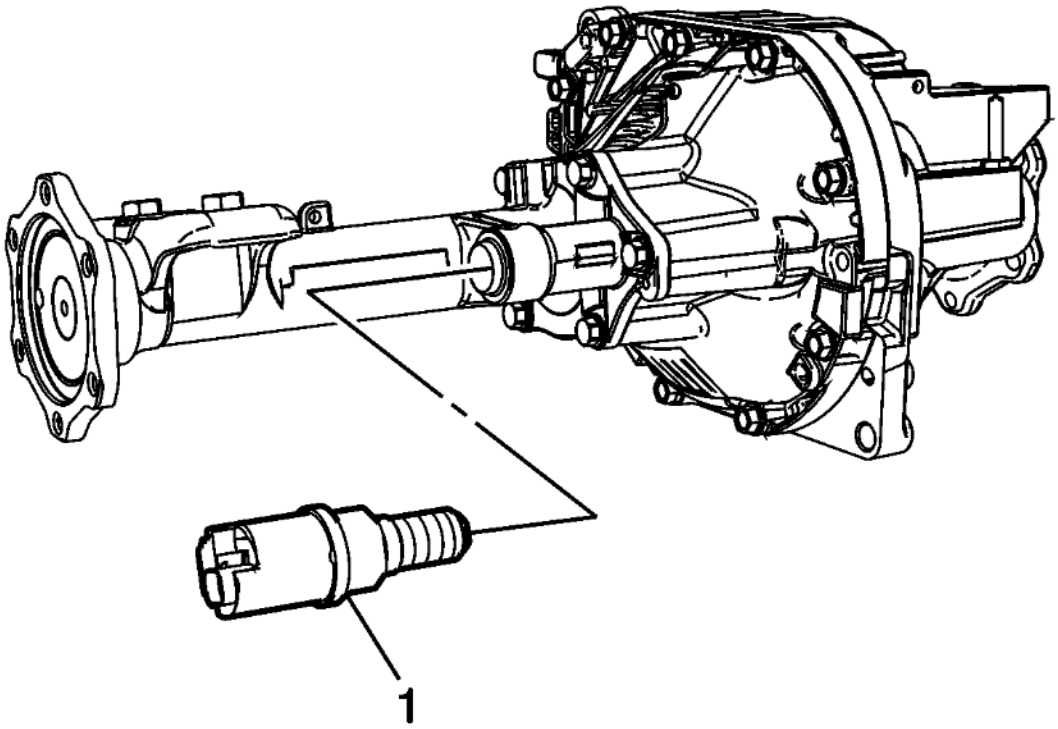


Fig. 109: Front Axle Actuator
Courtesy of GENERAL MOTORS COMPANY

6. Install the front axle actuator (1) and tighten to 20 N.m (15 lb ft)
7. Install the differential carrier assembly in a vise.

FRONT DRIVE AXLE ACTUATOR REPLACEMENT (1500 SERIES)

Removal Procedure

1. Remove the electric belt drive rack and pinion steering gear. **Electric Belt Drive Rack and Pinion Steering Gear Replacement (Light Duty)**
2. Remove the underbody skid shield. **Underbody Skid Shield Replacement** .
3. Disconnect the electrical connector from the actuator.

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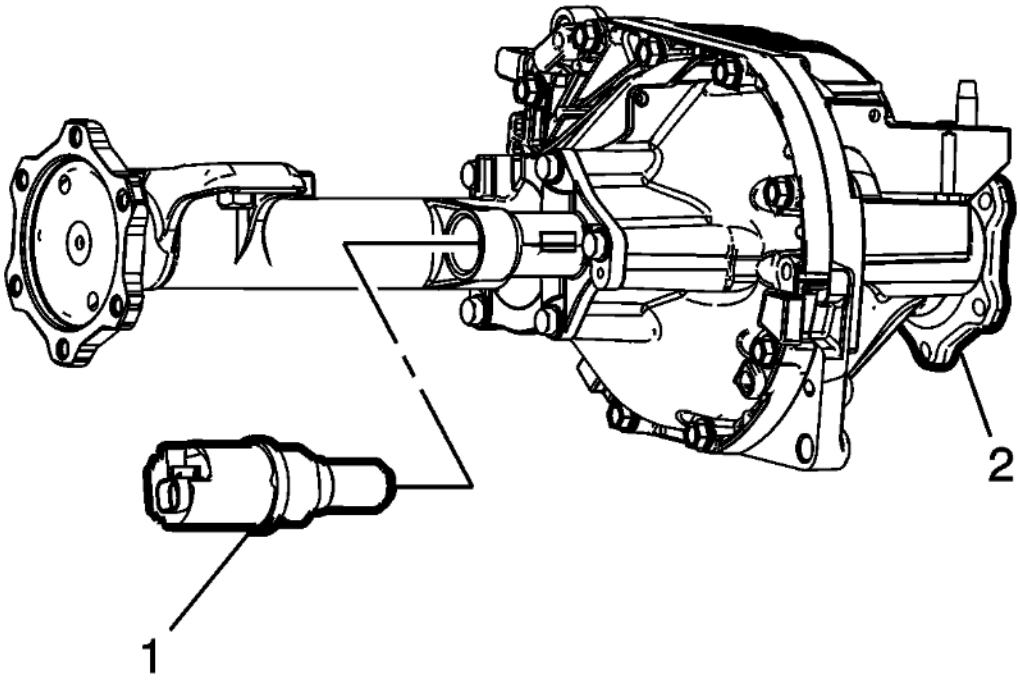


Fig. 110: Front Drive Axle Actuator
Courtesy of GENERAL MOTORS COMPANY

4. Remove the actuator (1) by turning the actuator counterclockwise.

Installation Procedure

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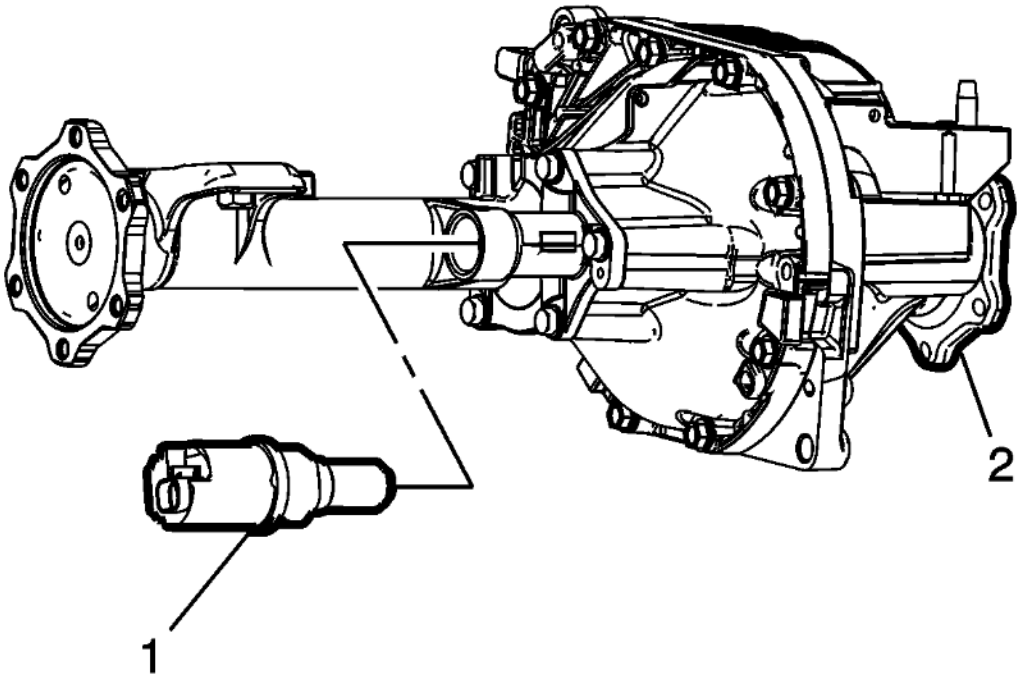


Fig. 111: Front Drive Axle Actuator
Courtesy of GENERAL MOTORS COMPANY

1. Apply sealant to the threads of the actuator (1). Adhesives, Fluids, Lubricants, and Sealers

CAUTION: Refer to Fastener Caution .

2. Install the actuator (1) and tighten to 30 N.m (22 lb ft)..
3. Connect the electrical connector to the actuator.
4. Install the electric belt drive rack and pinion steering gear. Electric Belt Drive Rack and Pinion Steering Gear Replacement (Light Duty)
5. Install the underbody skid shield. Underbody Skid Shield Replacement .

FRONT DRIVE AXLE ACTUATOR REPLACEMENT (2500/3500 SERIES)

Removal Procedure

1. Remove the underbody skid shield. Underbody Skid Shield Replacement .
2. Disconnect the electrical connector from the actuator.

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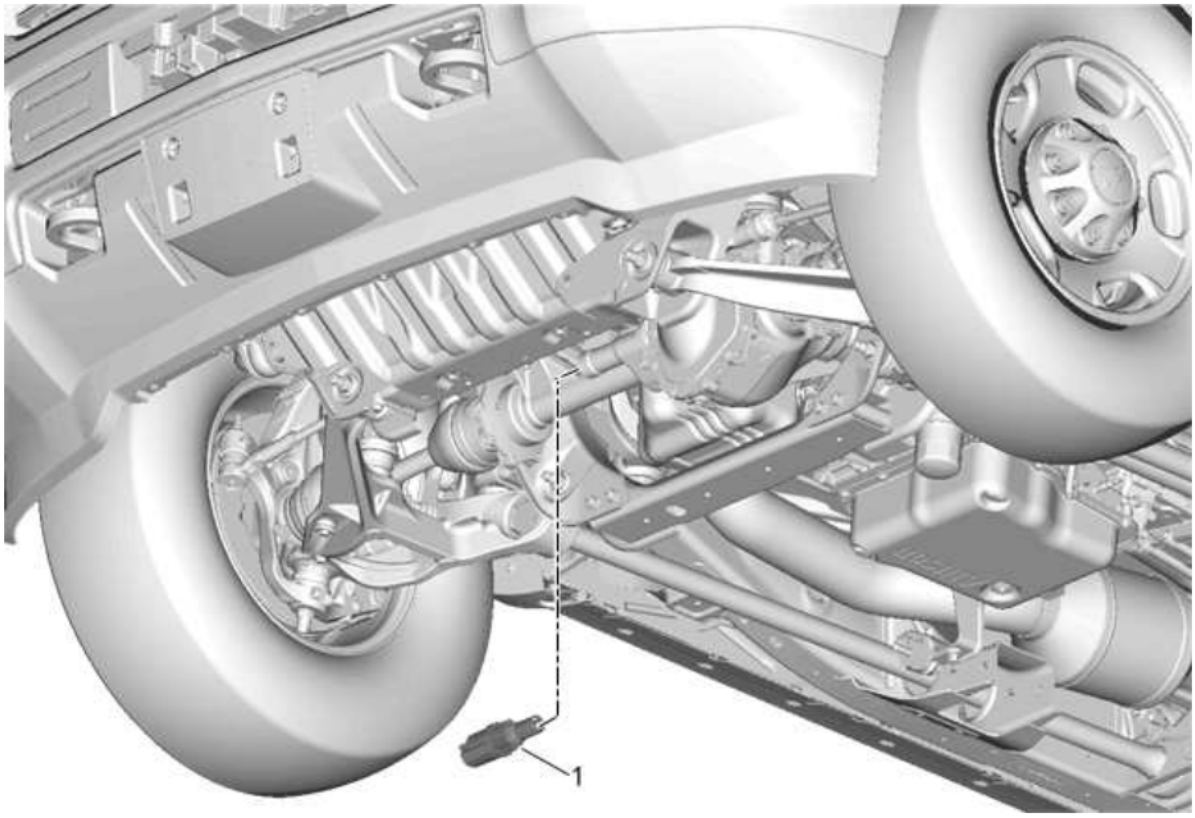
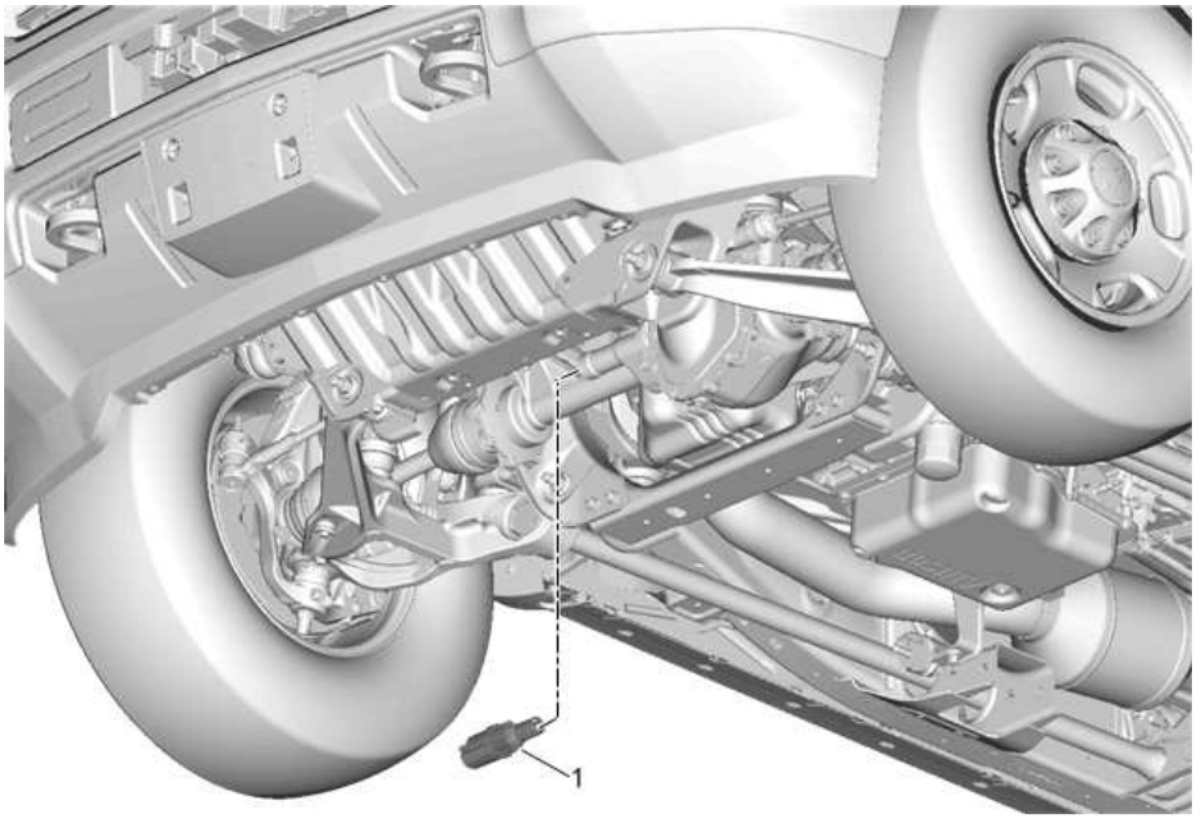


Fig. 112: Front Drive Axle Actuator
Courtesy of GENERAL MOTORS COMPANY

3. Remove the actuator (1) by turning the actuator counterclockwise.

Installation Procedure



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Fig. 113: Front Drive Axle Actuator
Courtesy of GENERAL MOTORS COMPANY

1. Apply sealant to the threads of the actuator (1). Adhesives, Fluids, Lubricants, and Sealers

CAUTION: Refer to Fastener Caution .

2. Install the actuator (1) and tighten to 30 N.m (22 lb ft)..
3. Connect the electrical connector to the actuator.
4. Install the underbody skid shield. Underbody Skid Shield Replacement .

FRONT DIFFERENTIAL CARRIER COVER REPLACEMENT

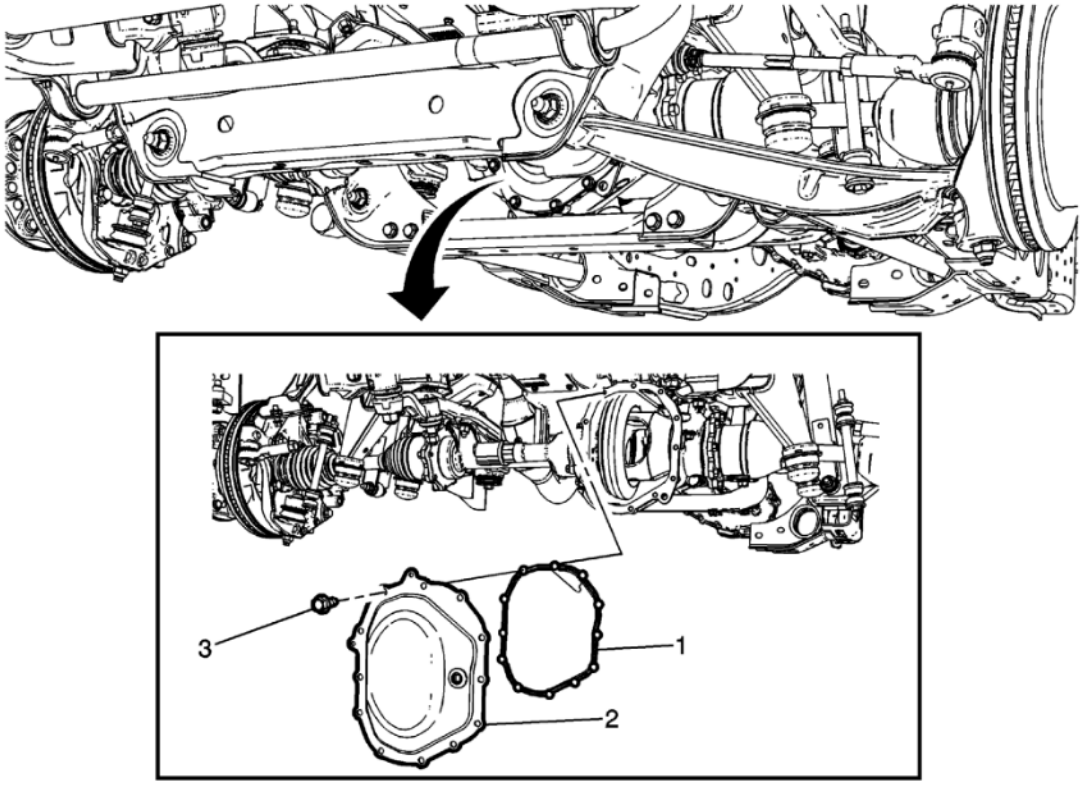


Fig. 114: Front Differential Carrier Cover
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle 2. Remove the engine shield, if equipped. Refer to Steering Gear Skid Shield Replacement . 3. Drain the front drive axle. Refer to Front Axle Lubricant Replacement (8.25 Inch Axle)Front Axle Lubricant Replacement (9.25 Inch Axle).	
1	Front Differential Housing Cover Bolt (Qty : 12) **CAUTION:**

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Callout	Component Name
	Refer to Fastener Caution . **Tighten** 40 N.m (30 lb ft)
2	Front Differential Carrier Cover
3	Front Differential Carrier Cover Gasket

FRONT DIFFERENTIAL CARRIER COVER GASKET REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the front axle. Refer to **Front Axle Lubricant Replacement (8.25 Inch Axle)Front Axle Lubricant Replacement (9.25 Inch Axle)**.

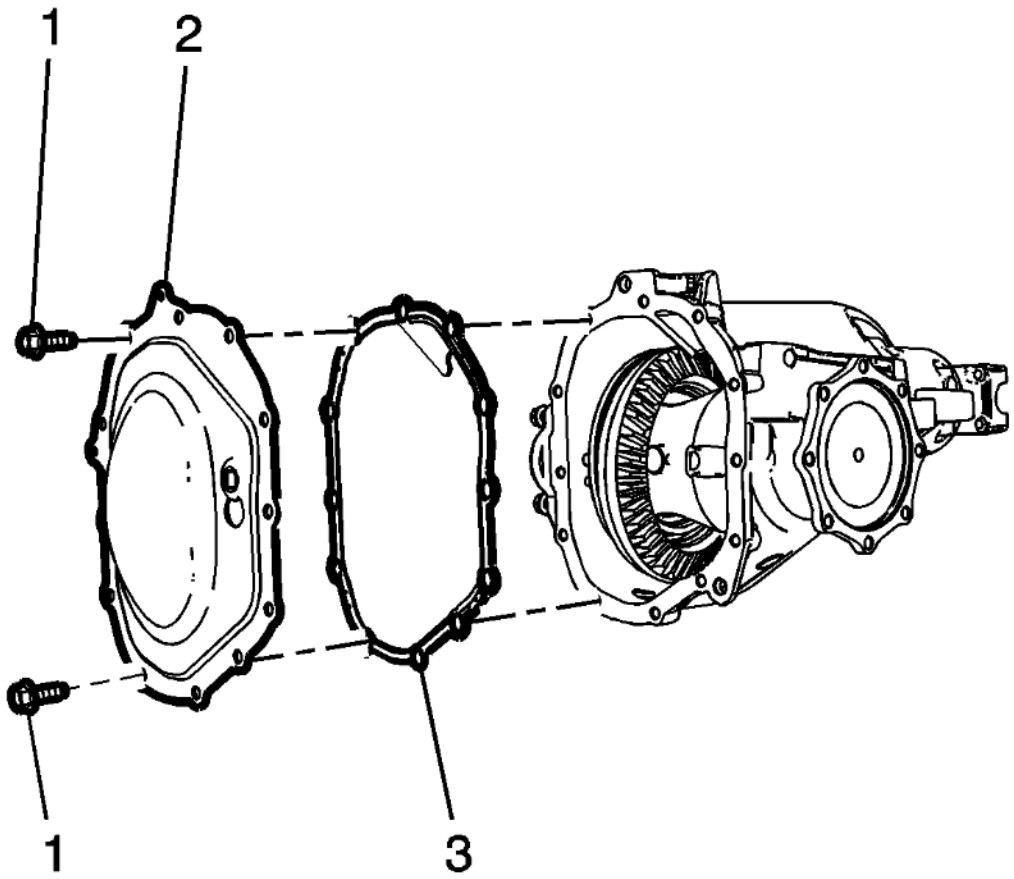


Fig. 115: Rear Axle Housing Cover Gasket, Rear Axle Housing Cover And Bolts
Courtesy of GENERAL MOTORS COMPANY

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3. Remove the front differential carrier cover bolts (1).
4. Remove the front differential carrier cover (2) and the gasket (3) from the axle housing. Discard the gasket (3).
5. Drain the remaining axle lubricant into a suitable container.

Installation Procedure

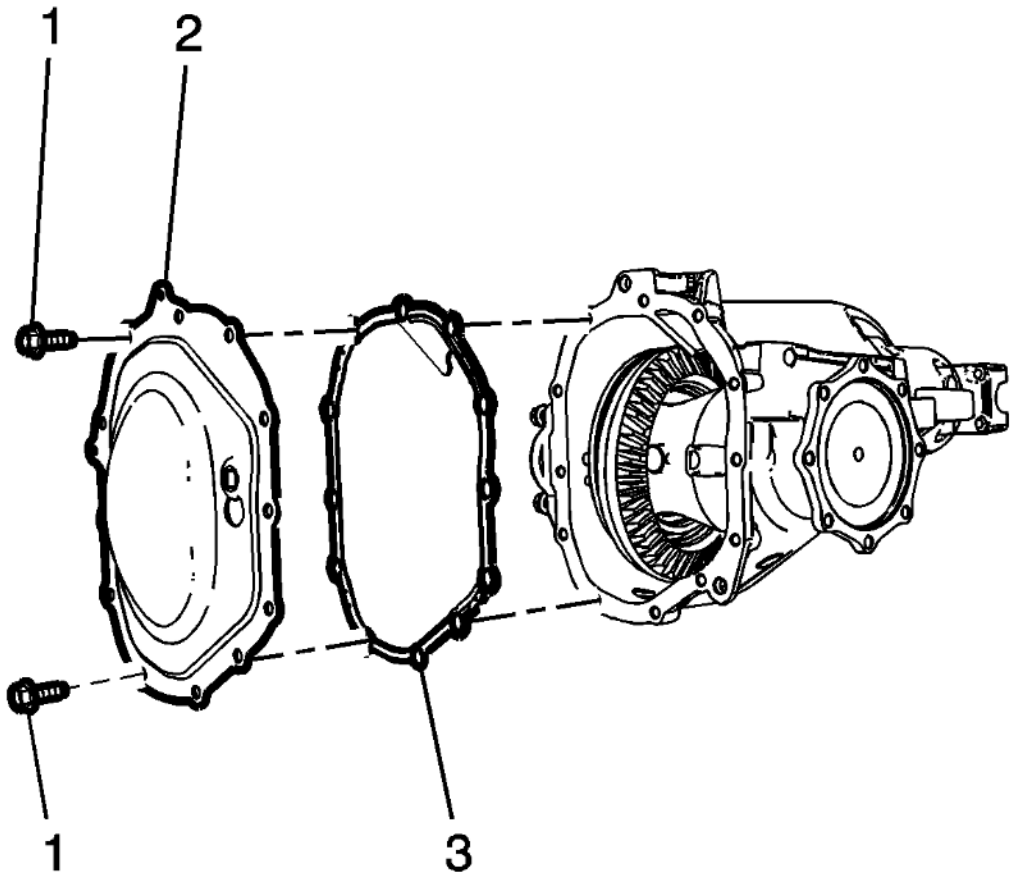


Fig. 116: Rear Axle Housing Cover Gasket, Rear Axle Housing Cover And Bolts
Courtesy of GENERAL MOTORS COMPANY

1. Clean the sealing surfaces of the front axle housing and the front axle cover with a suitable cleaner.
2. Install the NEW front differential carrier cover gasket (3) and the cover (2) to the front axle housing.

CAUTION: Refer to Fastener Caution .

3. Install the front differential carrier cover bolts (1) and tighten to 40 N.m (30 lb ft).
4. Install the drain plug. Refer to **Front Axle Lubricant Replacement (8.25 Inch Axle)Front Axle Lubricant Replacement (9.25 Inch Axle)**.
5. Fill the front axle with the proper axle lubricant. Refer to **Front Axle Lubricant Level Inspection (9.25 Inch Axle)Front Axle Lubricant Level Inspection (8.25 Inch Axle)**.
6. Remove the support and lower the vehicle.

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FRONT DIFFERENTIAL DRIVE PINION GEAR YOKE REPLACEMENT

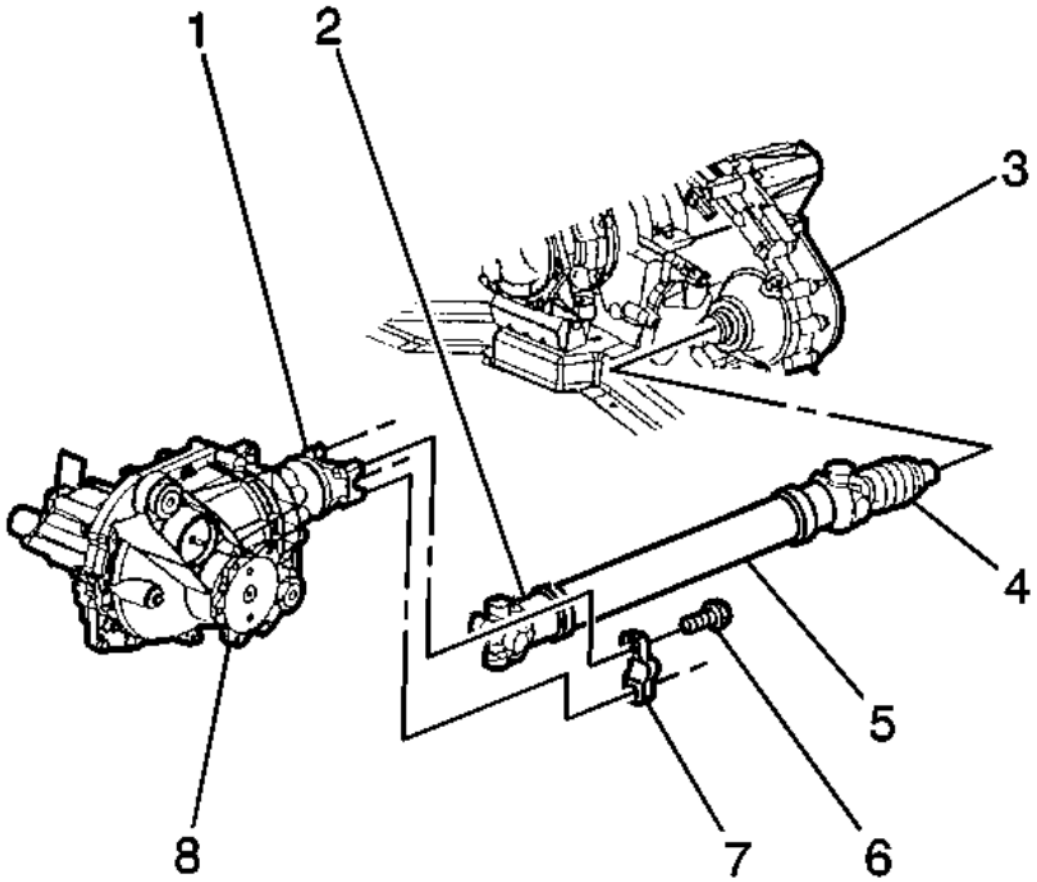
Special Tools

J-8614-01 Flange and Pulley Holding Tool

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

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the drive axle. Refer to **Front Axle Lubricant Replacement (8.25 Inch Axle)Front Axle Lubricant Replacement (9.25 Inch Axle)**.
3. Remove the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel) Tire and Wheel Removal and Installation (8-Lug Wheel) Tire and Wheel Removal and Installation (Dual Rear Wheels)** .
4. Remove the brake calipers. Refer to **Front Brake Caliper Replacement (JD9) Front Brake Caliper Replacement (J95, J96)** .
5. Remove the steering gear skid shield, if equipped. Refer to **Steering Gear Skid Shield Replacement** .
6. Reference mark the relationship of the propeller shaft to the front axle pinon yoke.



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Fig. 117: Front Axle Pinion Yoke, Propeller Shaft Universal Joint, Yoke Retainer & Bolts
Courtesy of GENERAL MOTORS COMPANY

7. Remove the yoke retainer bolts (6) and the yoke retainers (7) from the front axle pinion yoke (1).

CAUTION: When removing the propeller shaft, do not attempt to remove the shaft by pounding on the yoke ears or using a tool between the yoke and the universal joint. If the propeller shaft is removed by using such means, the injection joints may fracture and lead to premature failure of the joint.

8. Disconnect the propeller shaft universal joint (2) from the front axle pinion yoke (1).

   Wrap the bearing caps with tape in order to prevent the loss of bearing rollers.

9. Support the propeller shaft and move out of the way as necessary.

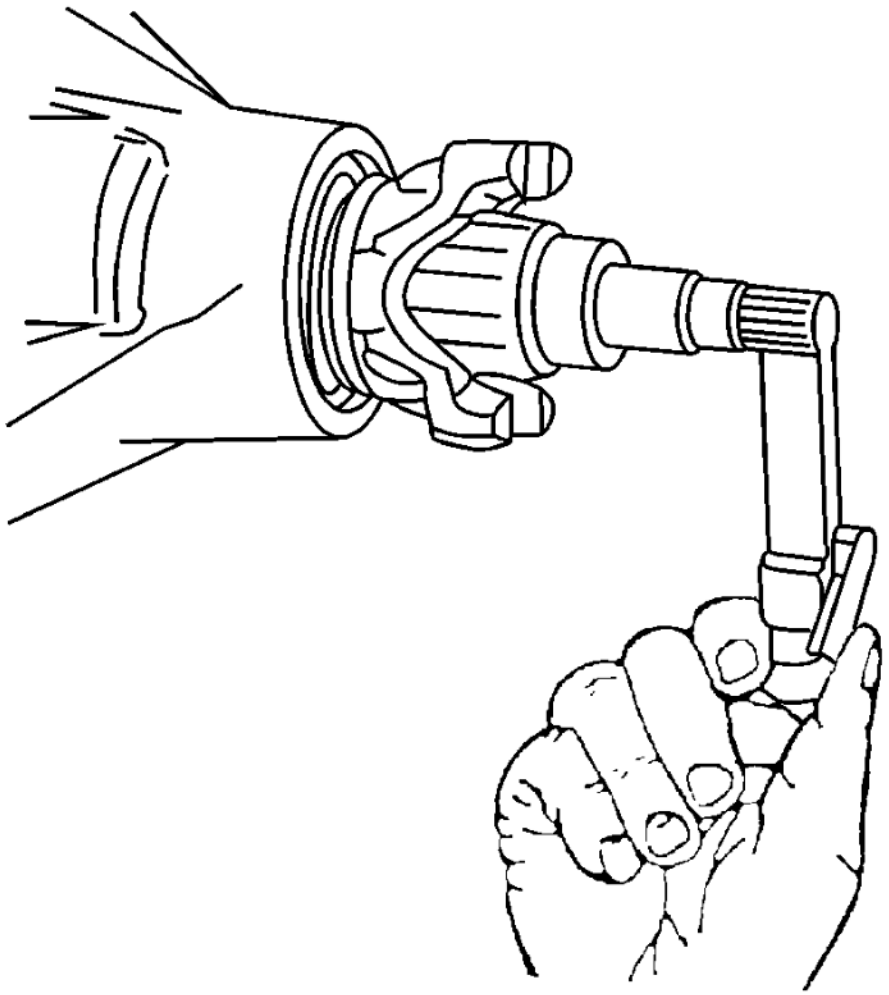


Fig. 118: Measuring Pinion Rotation Torque - Front Axle
Courtesy of GENERAL MOTORS COMPANY

10. 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:

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- The pinion bearings
- The pinion seal
- The carrier bearings
- The axle bearings
- The axle seals

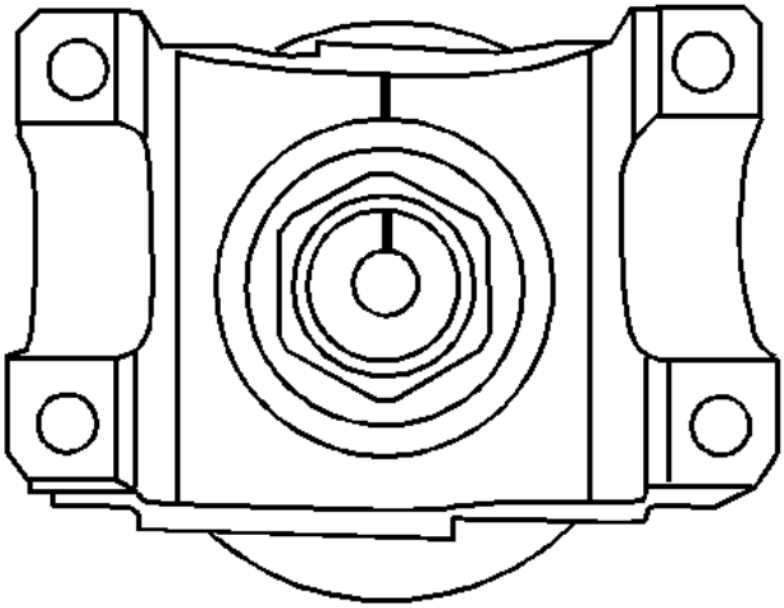


Fig. 119: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS COMPANY

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

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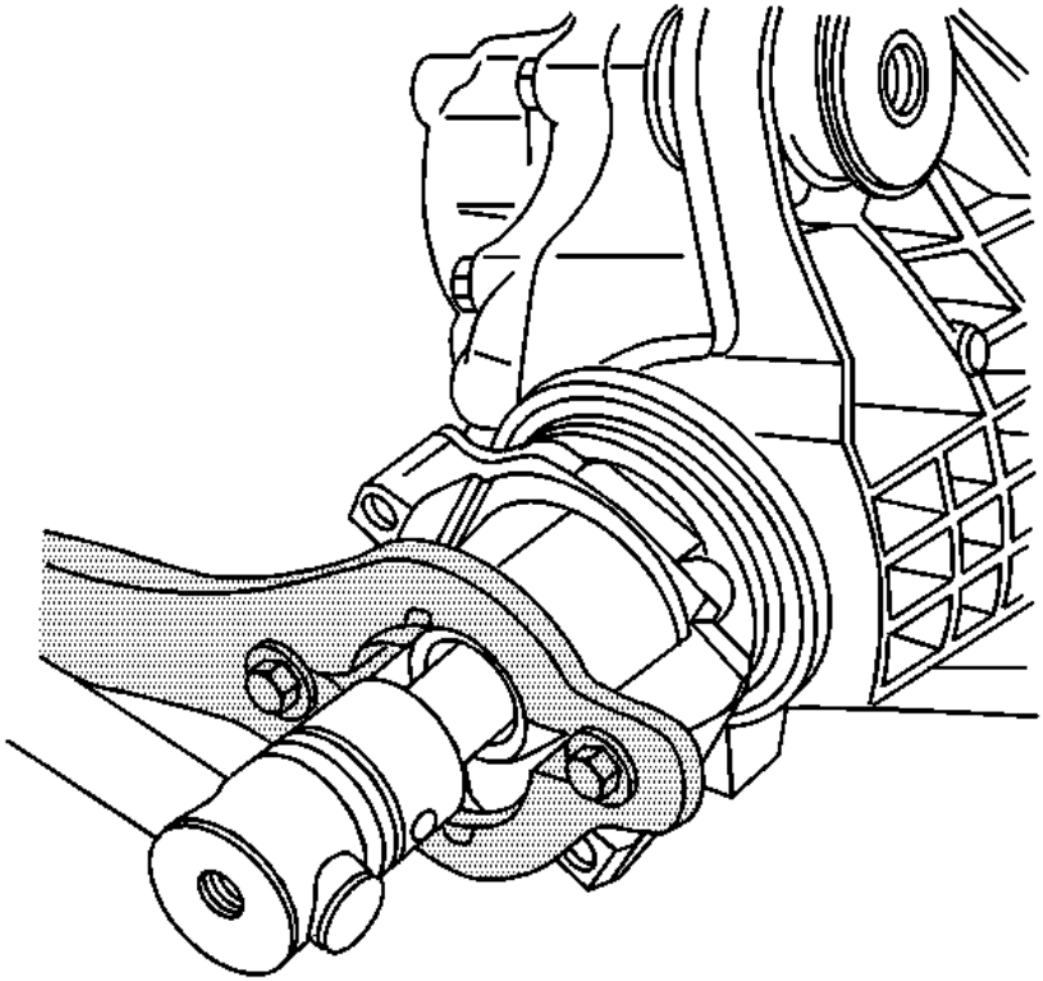


Fig. 120: Holding Pinion Flange Using Special Tool
Courtesy of GENERAL MOTORS COMPANY

12. Install the **J-8614-01** holding tool onto the pinion as shown.
13. Remove the pinion nut while holding the **J-8614-01** holding tool.

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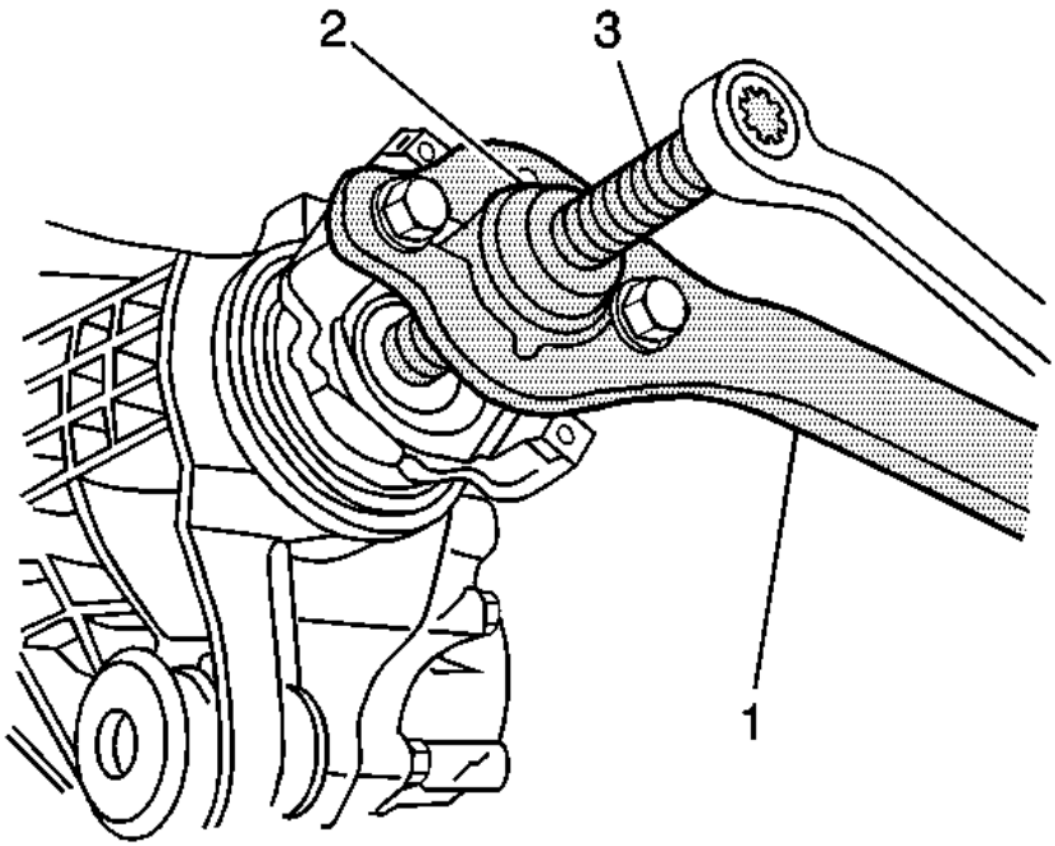


Fig. 121: Removing Pinion Yoke
Courtesy of GENERAL MOTORS COMPANY

14. Install the J-8614-2 (2) and the J-8614-3 (3) into the **J-8614-01** holding tool (1) as shown.
15. Remove the pinon yoke by turning the J-8614-3 (3) clockwise while holding the **J-8614-01** holding tool (1).

Installation Procedure

1. Apply sealant GM P/N 12346004 (Canadian P/N 10953480) or equivalent to the splines of the drive pinion yoke.
2. Install the pinion yoke.

   Align the reference marks made during removal.

   CAUTION: Refer to Pinion Flange/Yoke Installation Caution .

3. 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.
4. Install the washer and a new pinion nut.

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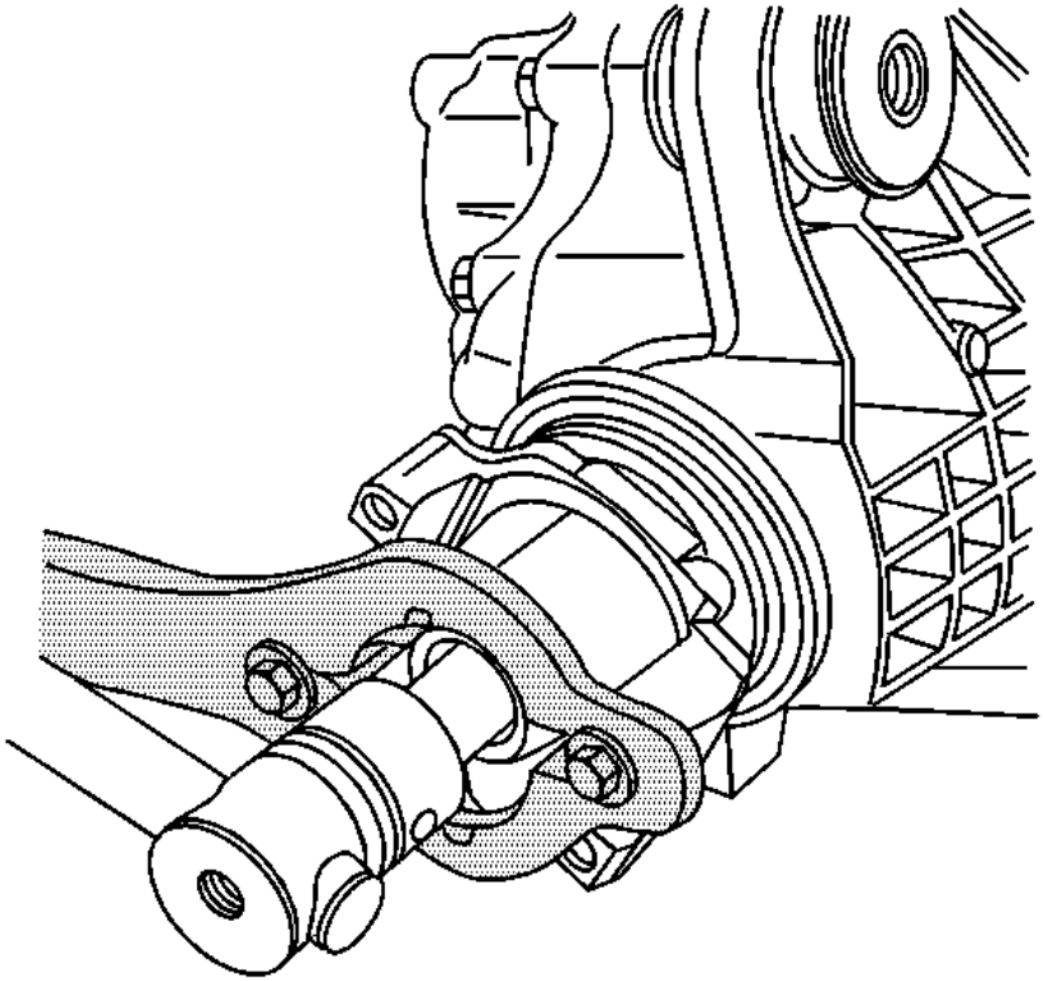


Fig. 122: Holding Pinion Flange Using Special Tool
Courtesy of GENERAL MOTORS COMPANY

5. Install the **J-8614-01** holding tool onto the pinion yoke as shown.

CAUTION: **Refer to Fastener Caution .**

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

6. Tighten the pinion nut while holding the **J-8614-01** holding tool.

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.

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

Compare the measurement with the rotating torque recorded earlier.

Tighten

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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.

8. 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.

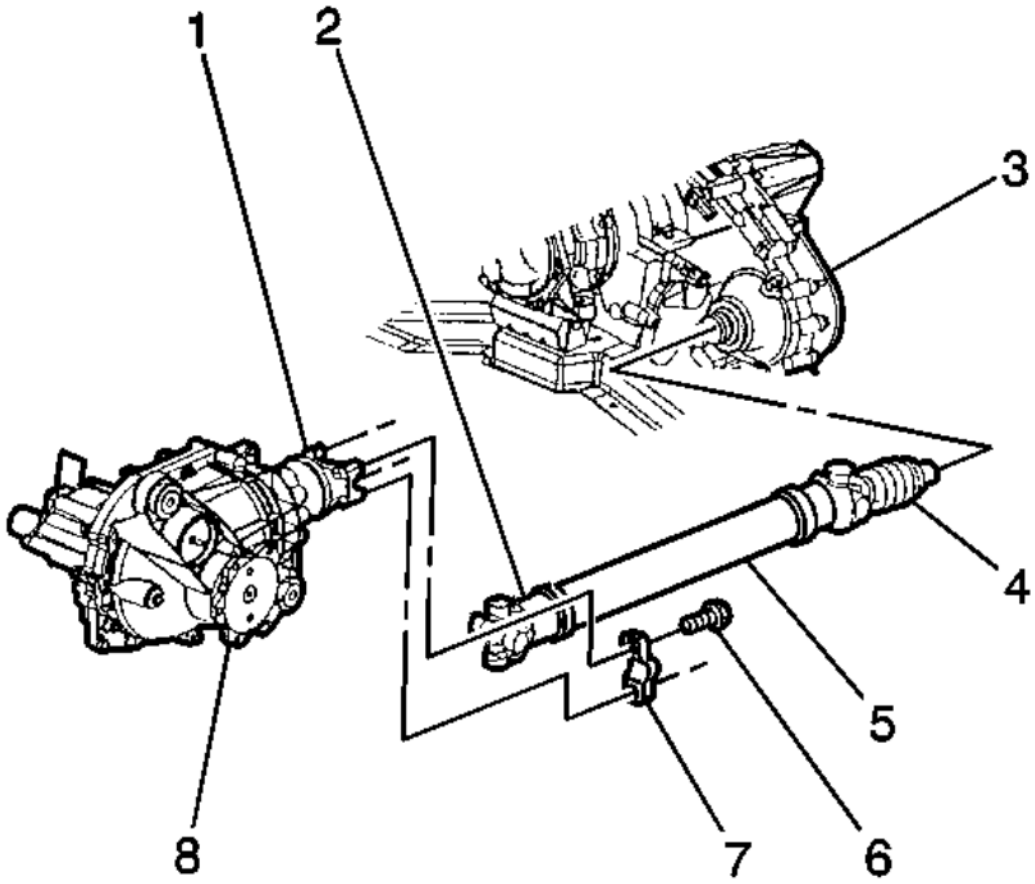


Fig. 123: Front Axle Pinion Yoke, Propeller Shaft Universal Joint, Yoke Retainer & Bolts
Courtesy of GENERAL MOTORS COMPANY

9. Install the propeller shaft universal joint (2) to the pinion yoke (1).

   Align the reference marks made during removal.

10. Install the yoke retainers (7) and the yoke retainer bolts (6) to the pinion yoke (1).

    Tighten

    Tighten the yoke retainer bolts to 25 N.m (18 lb ft).

11. Inspect the axle lubricant level, and add, if necessary. Refer to **Front Axle Lubricant Level Inspection (9.25 Inch Axle)Front Axle Lubricant Level Inspection (8.25 Inch Axle)**.

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12. Install the steering gear skid shield, if equipped. Refer to **Steering Gear Skid Shield Replacement** .
13. Install the brake calipers. Refer to **Front Brake Caliper Replacement (JD9)** **Front Brake Caliper Replacement (J95, J96)** .
14. Fill the drive axle. Refer to **Front Axle Lubricant Replacement (8.25 Inch Axle)Front Axle Lubricant Replacement (9.25 Inch Axle)**.
15. Install the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** **Tire and Wheel Removal and Installation (Dual Rear Wheels)** .
16. Lower the vehicle.

FRONT DIFFERENTIAL DRIVE PINION GEAR SEAL REPLACEMENT

Special Tools

- **J-36366** Pinion Oil Seal Installer
- **J-8614-01** Flange and Pulley Holding Tool

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the drive axle. Refer to **Front Axle Lubricant Replacement (8.25 Inch Axle)Front Axle Lubricant Replacement (9.25 Inch Axle)**.
3. Remove the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** **Tire and Wheel Removal and Installation (Dual Rear Wheels)** .
4. Remove the brake calipers. Refer to **Front Brake Caliper Replacement (JD9)** **Front Brake Caliper Replacement (J95, J96)** .
5. Remove the steering gear skid shield, if equipped. Refer to **Steering Gear Skid Shield Replacement** .
6. Reference mark the relationship of the propeller shaft to the front axle pinon yoke.

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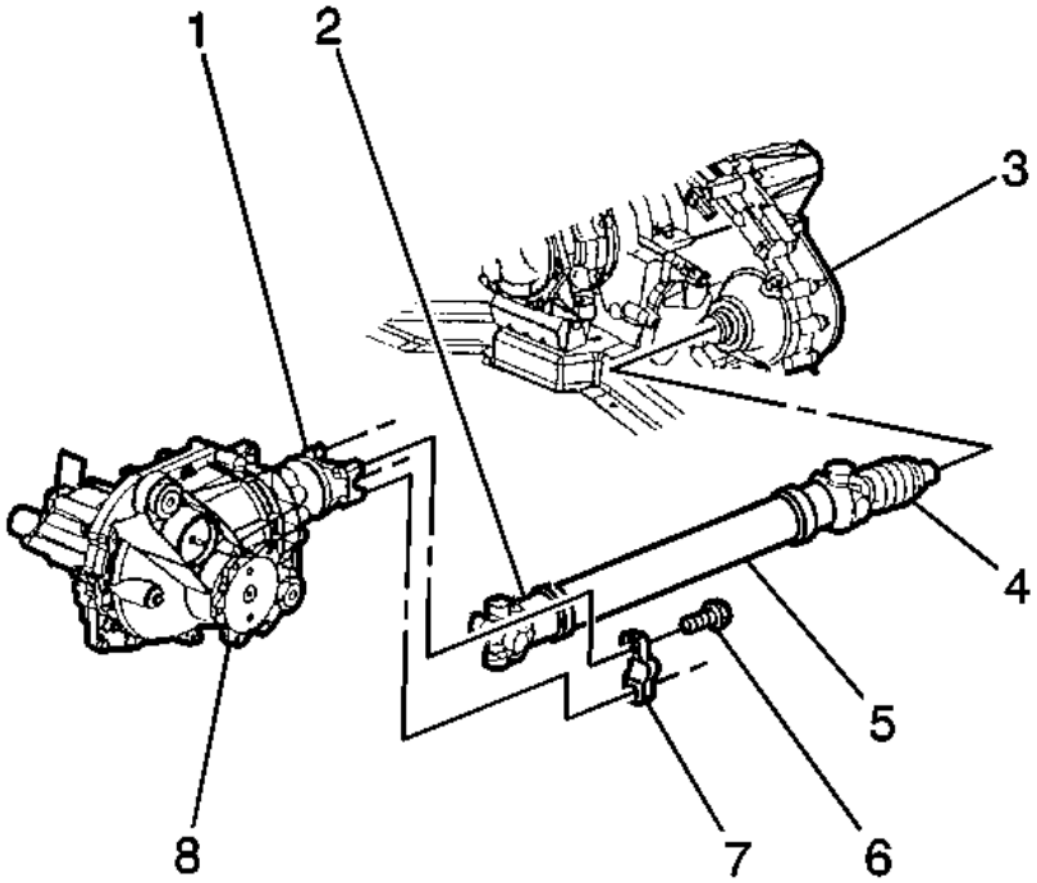


Fig. 124: Front Axle Pinion Yoke, Propeller Shaft Universal Joint, Yoke Retainer & Bolts
Courtesy of GENERAL MOTORS COMPANY

7. Remove the yoke retainer bolts (6) and the yoke retainers (7) from the front axle pinion yoke (1).

CAUTION: When removing the propeller shaft, do not attempt to remove the shaft by pounding on the yoke ears or using a tool between the yoke and the universal joint. If the propeller shaft is removed by using such means, the injection joints may fracture and lead to premature failure of the joint.

8. Disconnect the propeller shaft universal joint (2) from the front axle pinion yoke (1).

   Wrap the bearing caps with tape in order to prevent the loss of bearing rollers.

9. Support the propeller shaft and move out of the way as necessary.

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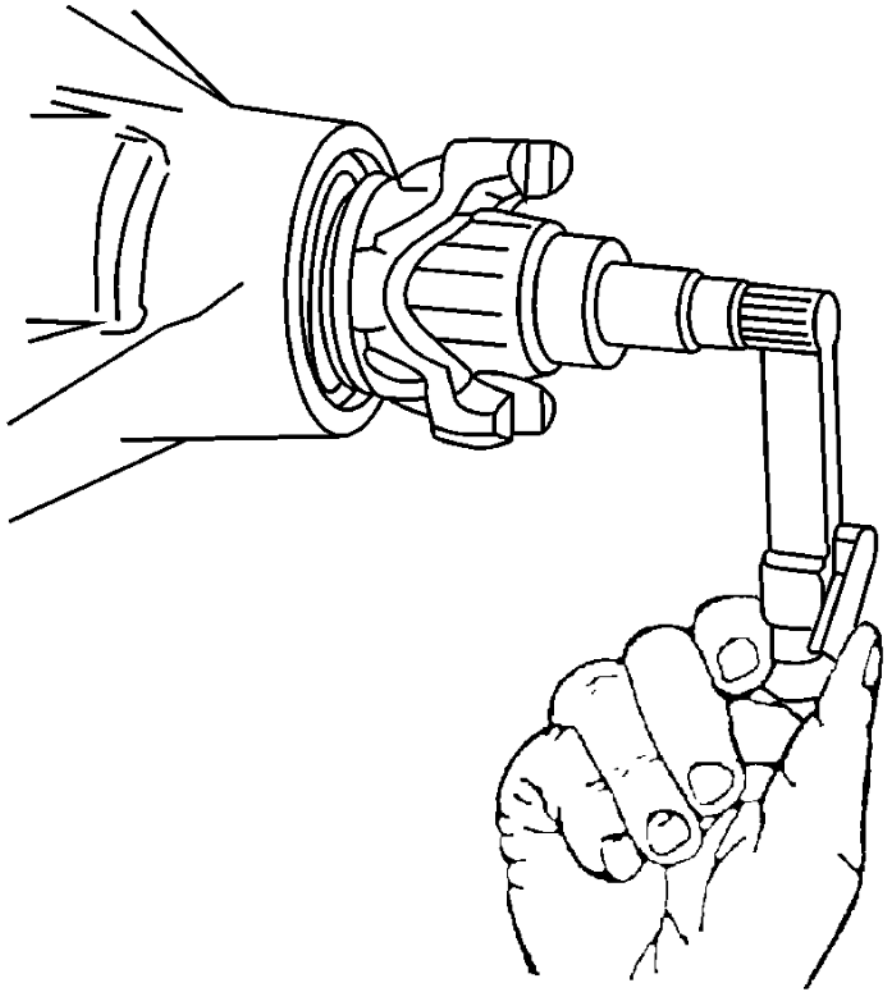


Fig. 125: Measuring Pinion Rotation Torque - Front Axle
Courtesy of GENERAL MOTORS COMPANY

10. 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

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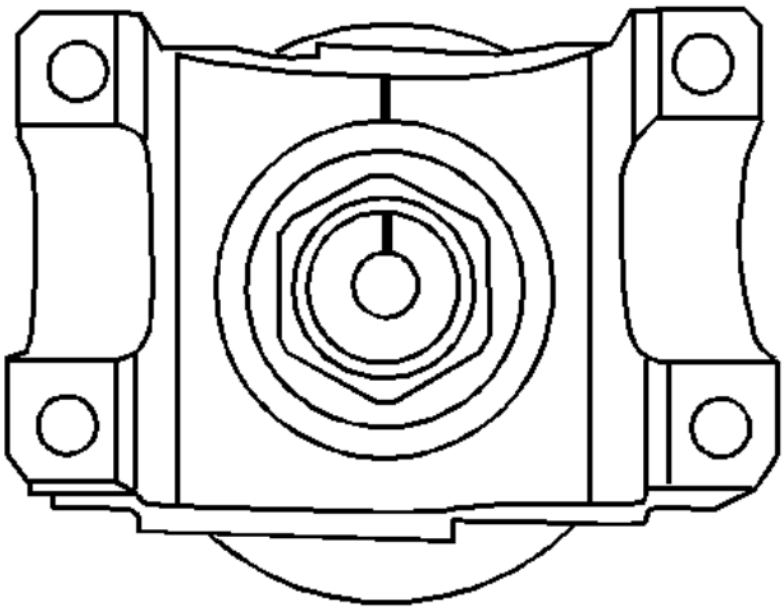


Fig. 126: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS COMPANY

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

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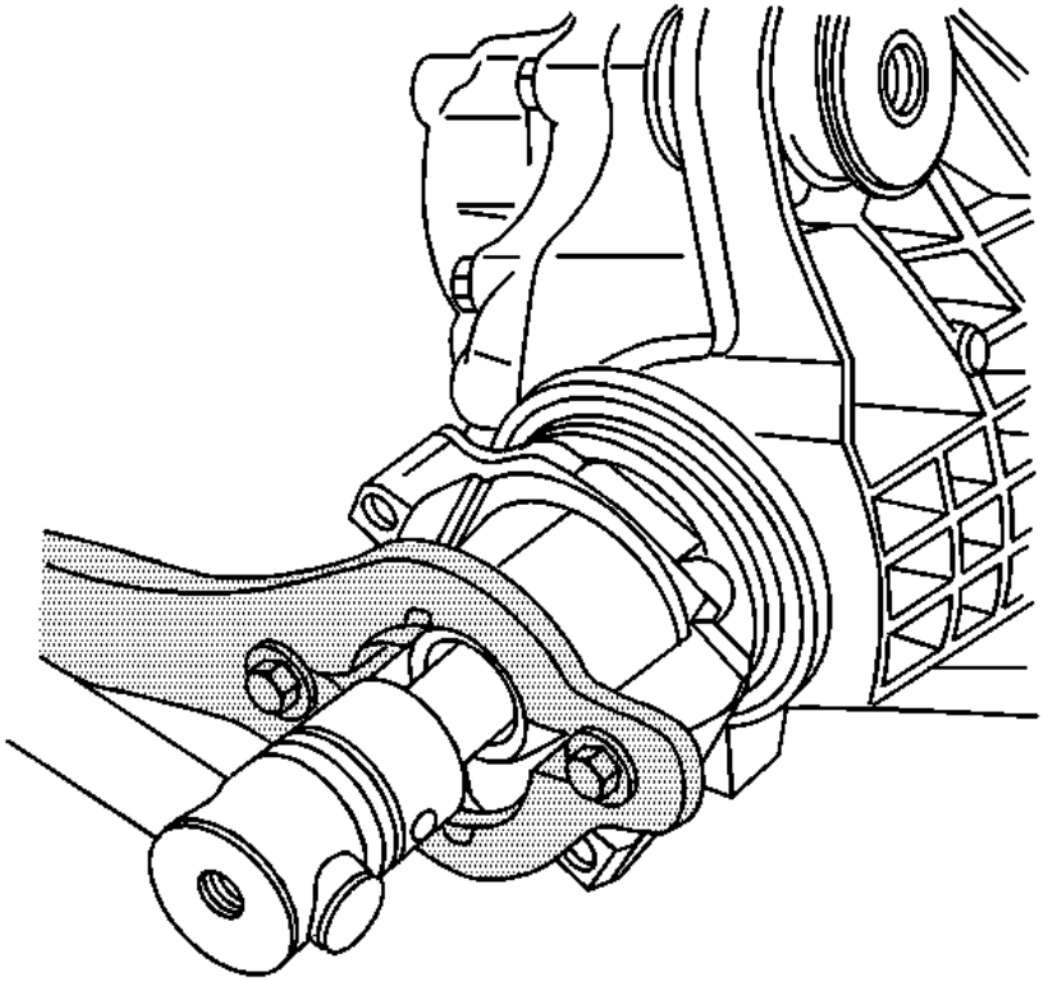


Fig. 127: Holding Pinion Flange Using Special Tool
Courtesy of GENERAL MOTORS COMPANY

12. Install the **J-8614-01** holding tool onto the pinion as shown.
13. Remove the pinion nut while holding the **J-8614-01** holding tool.

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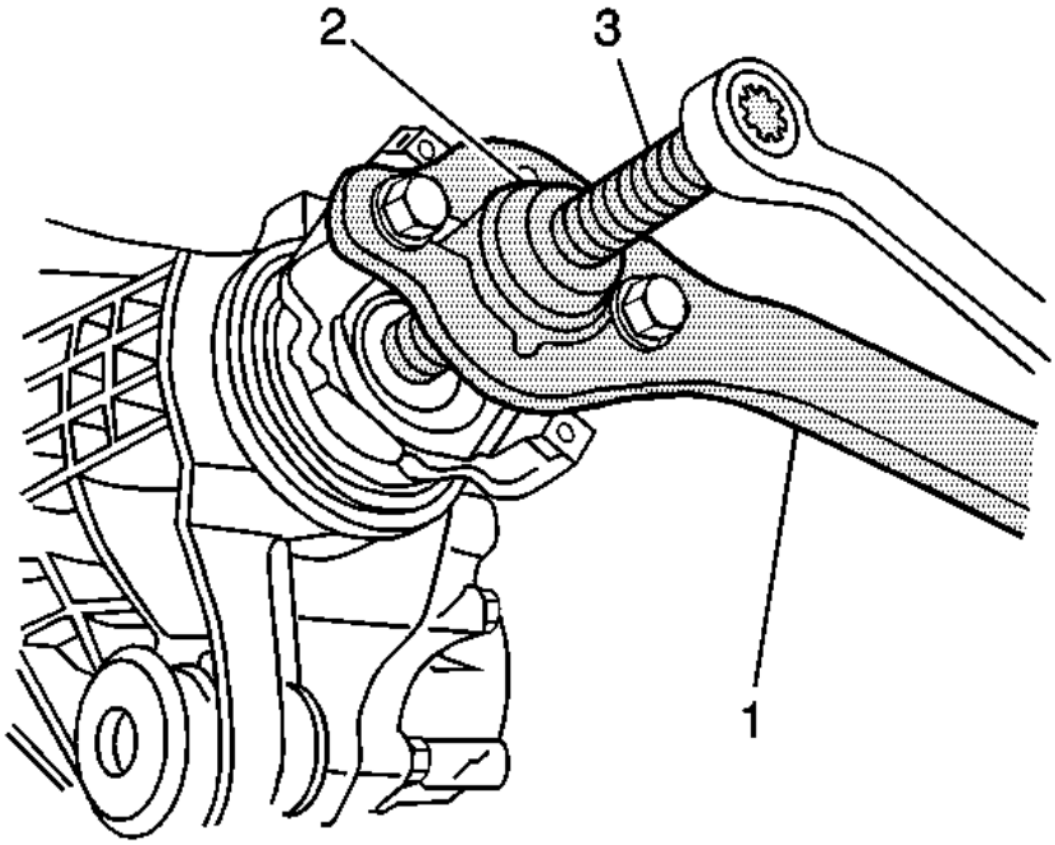


Fig. 128: Removing Pinion Yoke
Courtesy of GENERAL MOTORS COMPANY

14. Install the J-8614-2 (2) and the J-8614-3 (3) into the **J-8614-01** holding tool (1) as shown.
15. Remove the pinon yoke by turning the J-8614-3 (3) clockwise while holding the **J-8614-01** holding tool (1).

NOTE: **Carefully remove the oil seal from the bore. Do not distort or scratch the aluminum case.**

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

Installation Procedure

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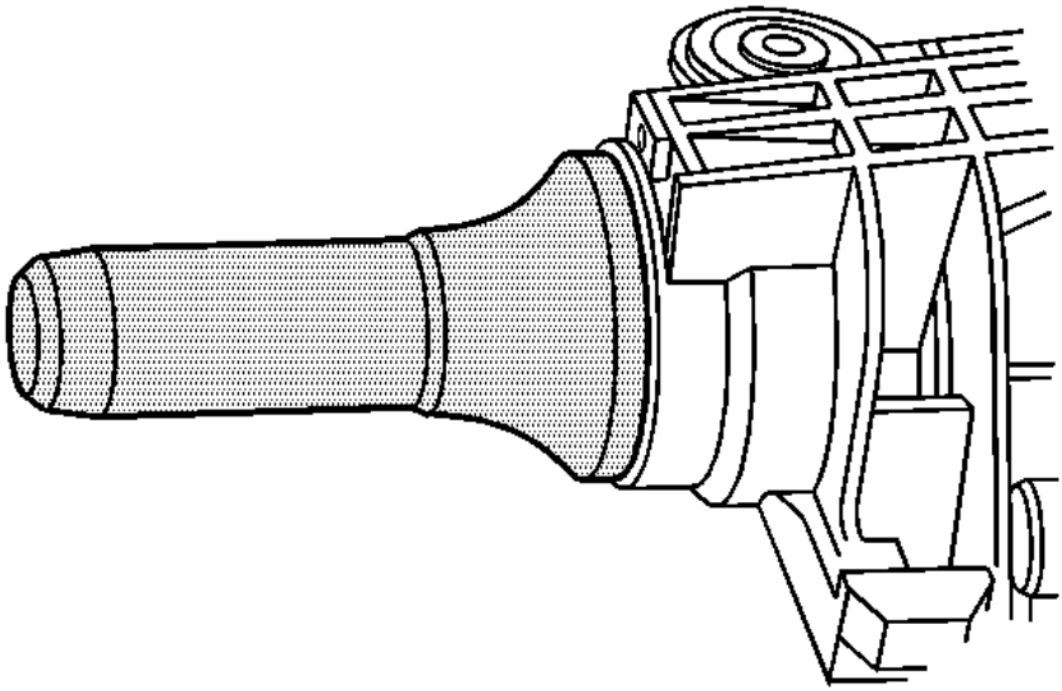


Fig. 129: Installing Oil Seal - Front Axle
Courtesy of GENERAL MOTORS COMPANY

1. Install the oil seal by doing the following:
    1. Position the oil seal over the seal bore.
    2. Install the **J-36366** oil seal installer over the oil seal.
    3. Strike the **J-36366** oil seal installer with a hammer until the seal flange seats on the axle housing surface.
2. Apply sealant GM P/N 12346004 (Canadian P/N 10953480) or equivalent to the splines of the drive pinion yoke.
3. Install the pinion yoke.

   Align the reference marks made during removal.

   CAUTION: Refer to Pinion Flange/Yoke Installation Caution .

4. 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.
5. Install the washer and a new pinion nut.

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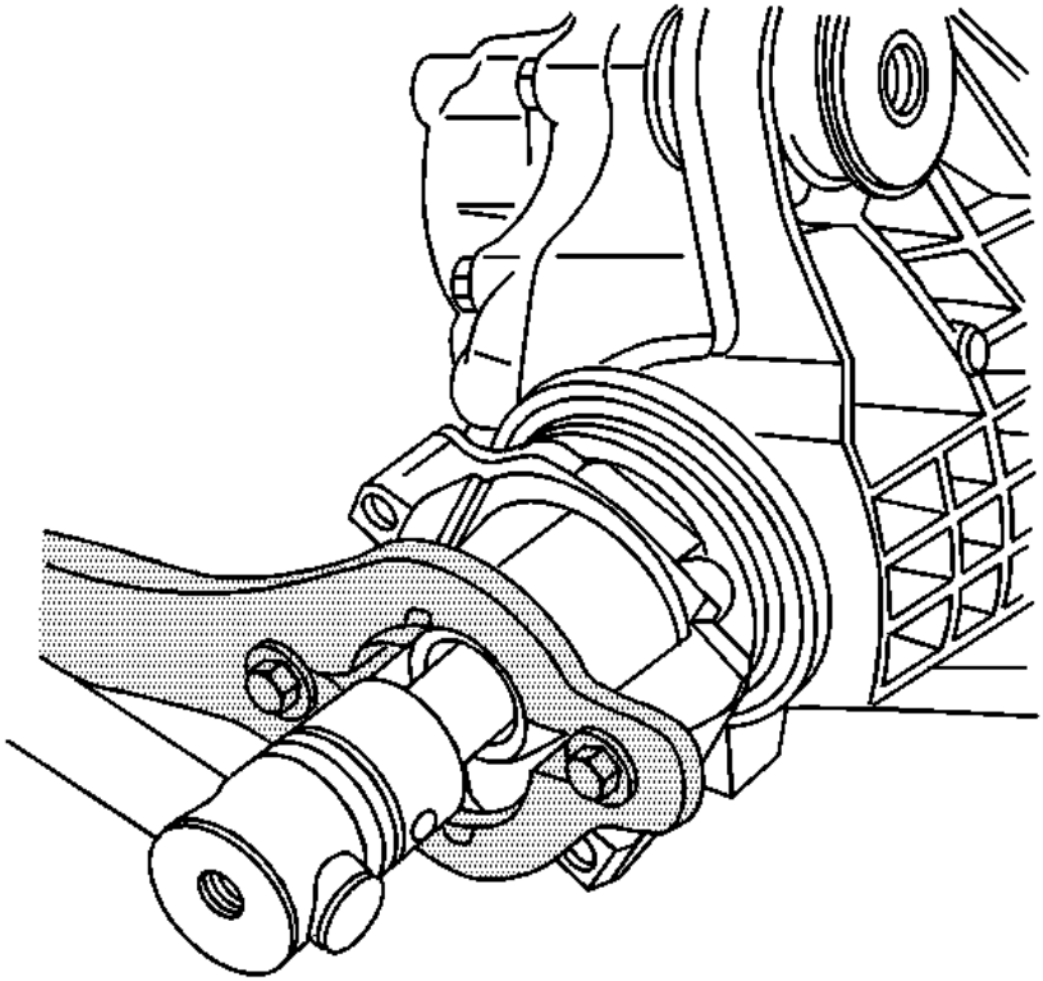


Fig. 130: Holding Pinion Flange Using Special Tool
Courtesy of GENERAL MOTORS COMPANY

6. Install the **J-8614-01** holding tool onto the pinion yoke as shown.

CAUTION: **Refer to Fastener Caution .**

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

7. Tighten the pinion nut while holding the **J-8614-01** holding tool.

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.

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

Compare the measurement with the rotating torque recorded earlier.

Tighten

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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.

9. 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.

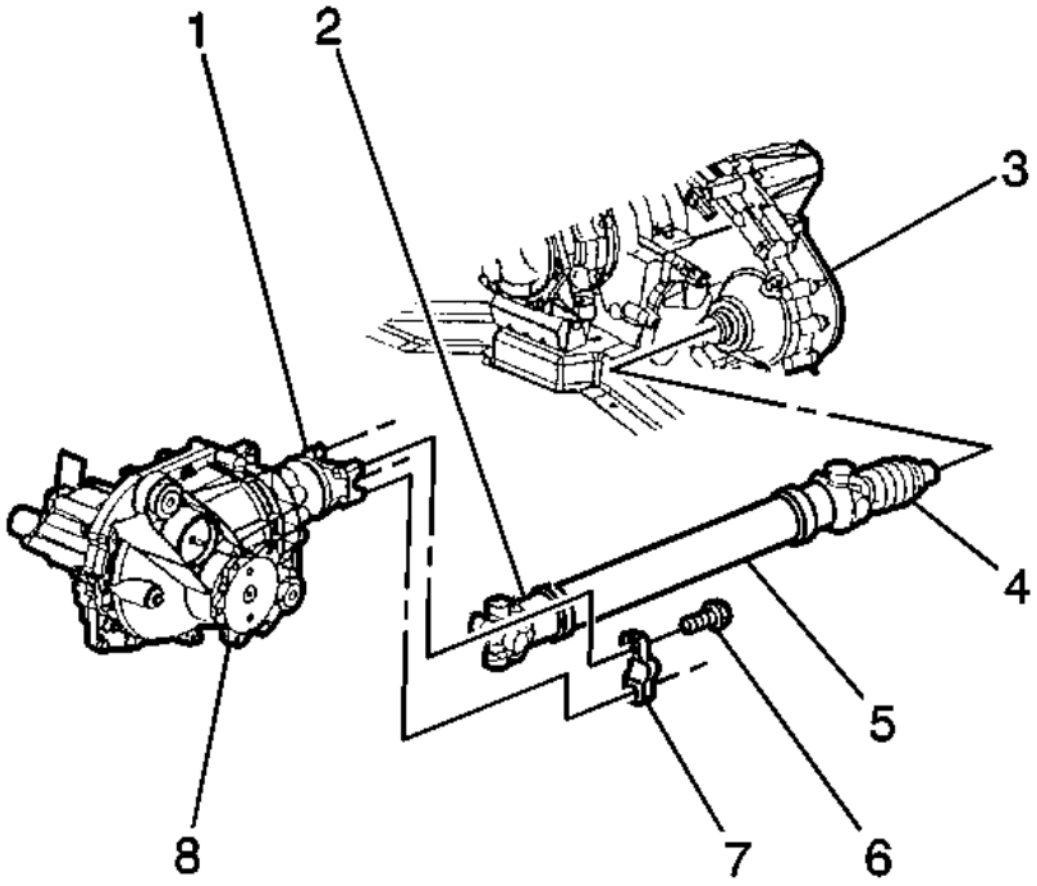


Fig. 131: Front Axle Pinion Yoke, Propeller Shaft Universal Joint, Yoke Retainer & Bolts
Courtesy of GENERAL MOTORS COMPANY

10. Install the propeller shaft universal joint (2) to the pinion yoke (1).

    Align the reference marks made during removal.

11. Install the yoke retainers (7) and the yoke retainer bolts (6) to the pinion yoke (1).

    Tighten

    Tighten the yoke retainer bolts to 25 N.m (18 lb ft).

12. Inspect the axle lubricant level, and add, if necessary. Refer to **Front Axle Lubricant Level Inspection (9.25 Inch Axle)Front Axle Lubricant Level Inspection (8.25 Inch Axle)**.

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13. Install the steering gear skid shield, if equipped. Refer to **Steering Gear Skid Shield Replacement** .
14. Install the brake calipers. Refer to **Front Brake Caliper Replacement (JD9)** **Front Brake Caliper Replacement (J95, J96)** .
15. Fill the drive axle. Refer to **Front Axle Lubricant Replacement (8.25 Inch Axle)** **Front Axle Lubricant Replacement (9.25 Inch Axle)**.
16. Install the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** **Tire and Wheel Removal and Installation (Dual Rear Wheels)** .
17. Lower the vehicle.

FRONT AXLE REPLACEMENT (8.25 INCH AXLE)

Removal Procedure

NOTE: **During removal or installation of light duty front axle assembly, exercise caution to avoid damage to the electric steering gear assembly or in particular to the steering gear boot. Steering gear malfunction, repair or replacement could result.**

1. Remove the steering gear. Refer to **Electric Belt Drive Rack and Pinion Steering Gear Replacement (Light Duty)**
2. Remove the lower control arm crossmember. Refer to **Drivetrain and Front Suspension Frame Front Crossmember Replacement (Light Duty)** **Drivetrain and Front Suspension Frame Front Crossmember Replacement (Heavy Duty)** .

NOTE: **If removing the differential carrier assembly to service other components, it is not necessary to drain the differential carrier.**

3. Drain the differential carrier. Refer to **Front Axle Lubricant Replacement (8.25 Inch Axle)**.

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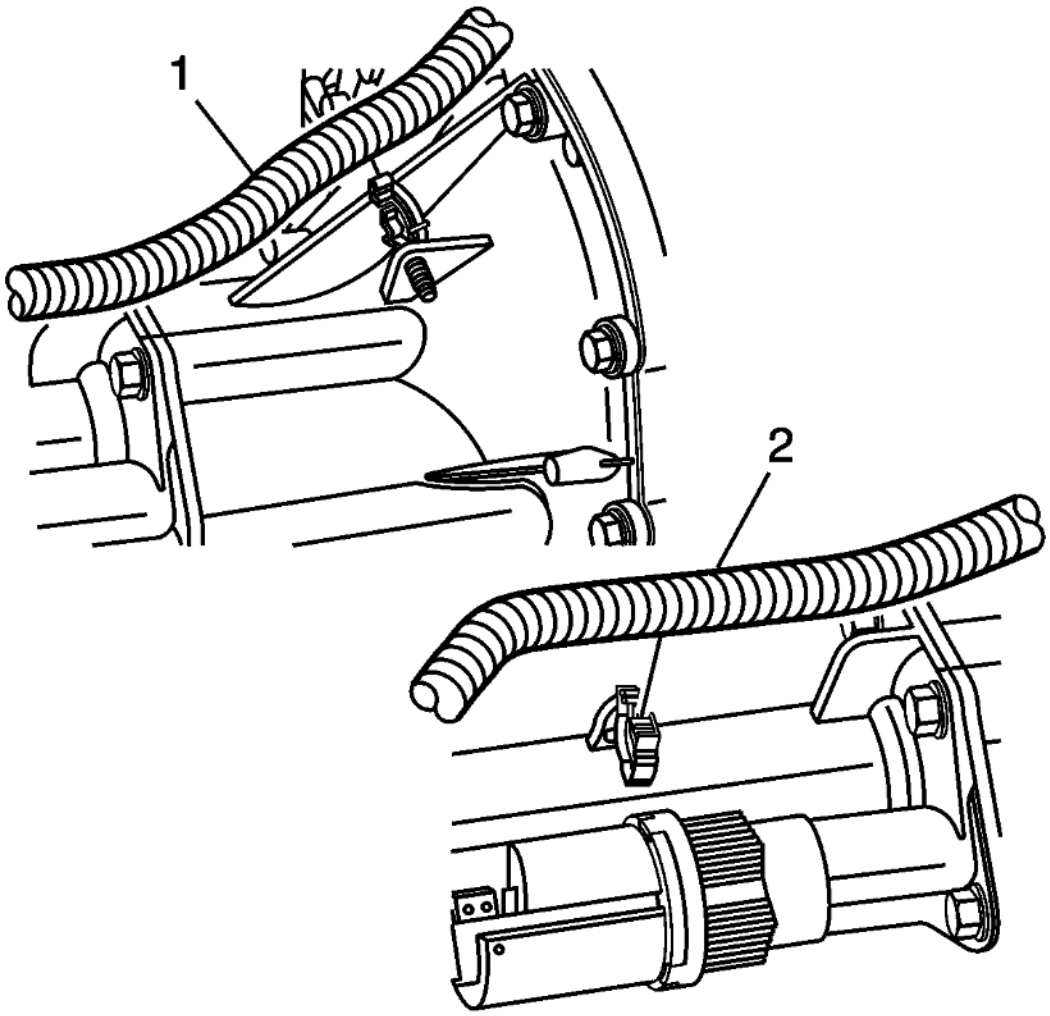


Fig. 132: Wiring Harness From Differential Carrier
Courtesy of GENERAL MOTORS COMPANY

4. Remove the wiring harness from the differential carrier(1 and 2), if needed.

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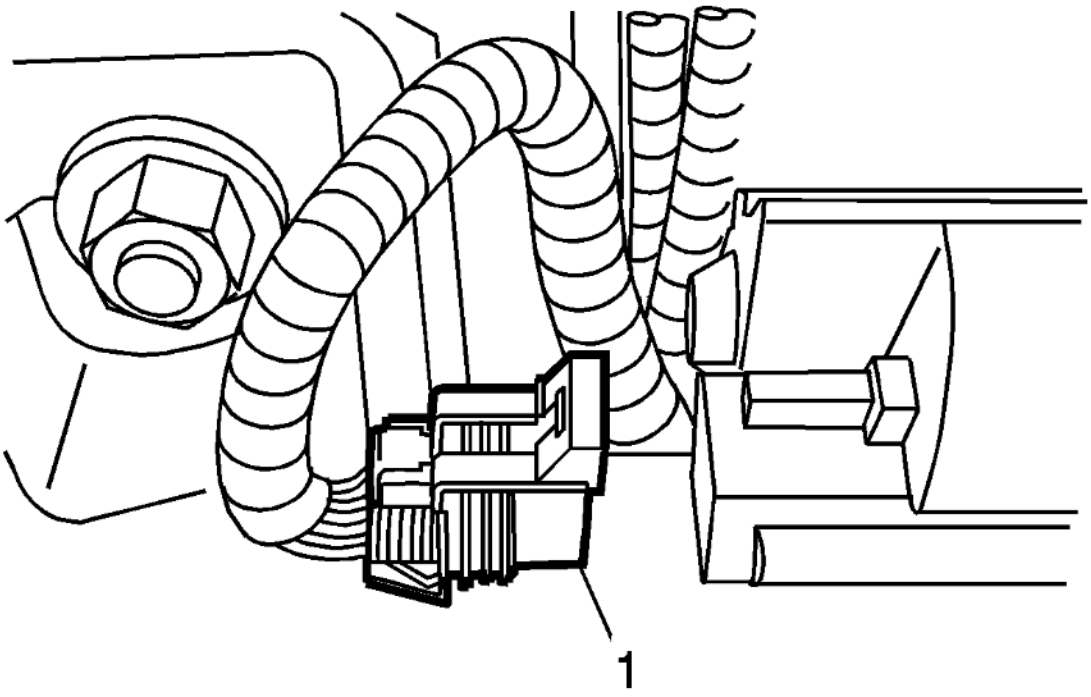


Fig. 133: Disconnecting Electric Motor Actuator Electrical Connector - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

5. Remove the electrical connector (1) from the actuator motor.

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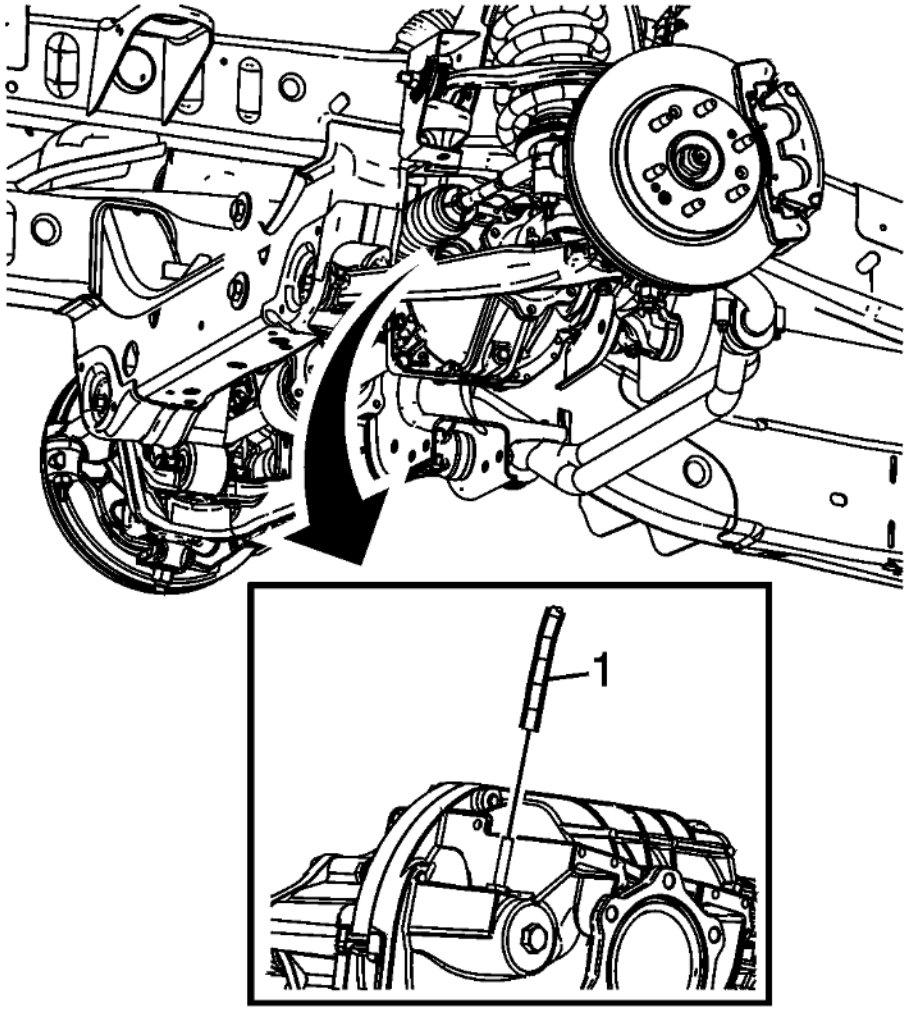


Fig. 134: Differential Carrier Vent Hose
Courtesy of GENERAL MOTORS COMPANY

6. Remove the differential carrier vent hose (1).

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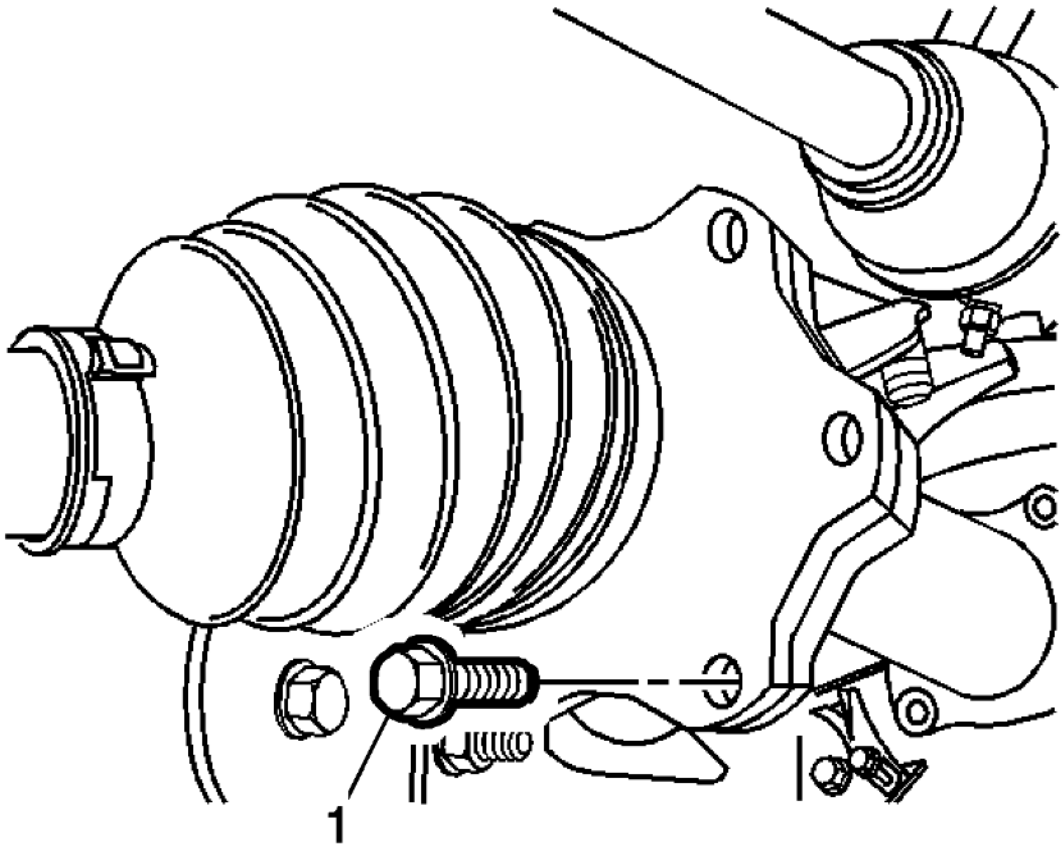


Fig. 135: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

7. Remove the wheel drive shaft mounting bolts (1).
8. Remove the front propeller shaft. Refer to **Front Axle Propeller Shaft Replacement** .
9. Support the differential carrier with a transmission jack.

NOTE: **Loosen the upper steering rack bolts .**

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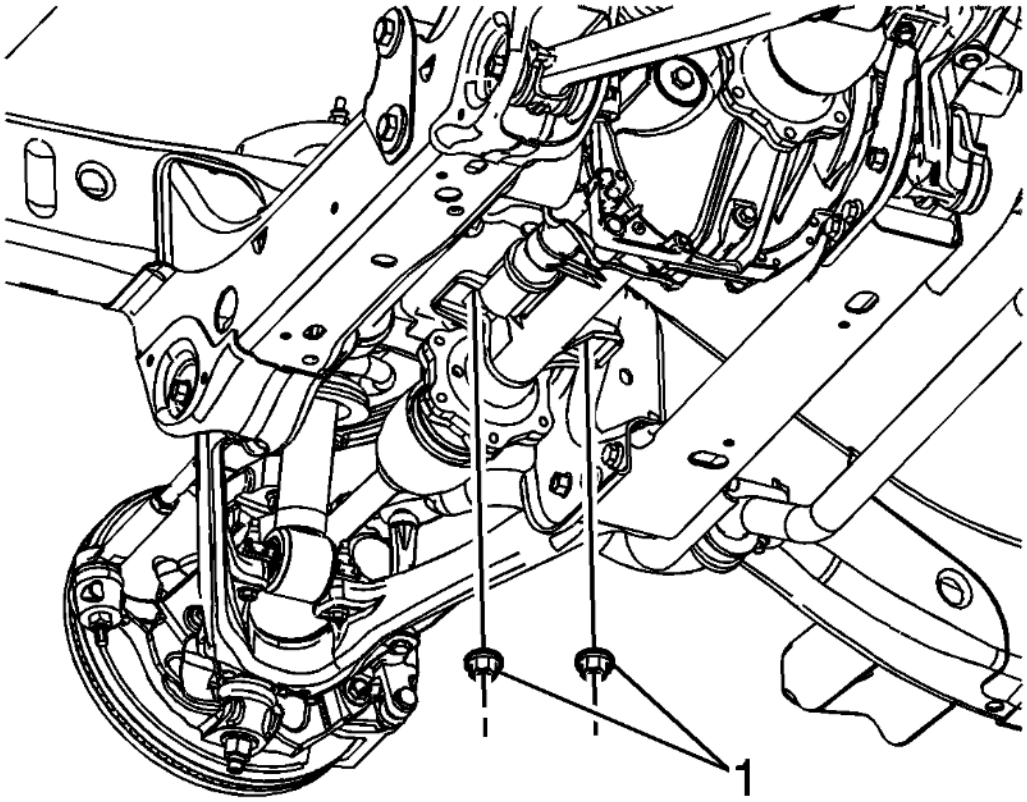


Fig. 136: View Of Right Differential Carrier Mounting Nuts & Washers
Courtesy of GENERAL MOTORS COMPANY

10. Remove the right differential carrier mounting nuts and washers (1).

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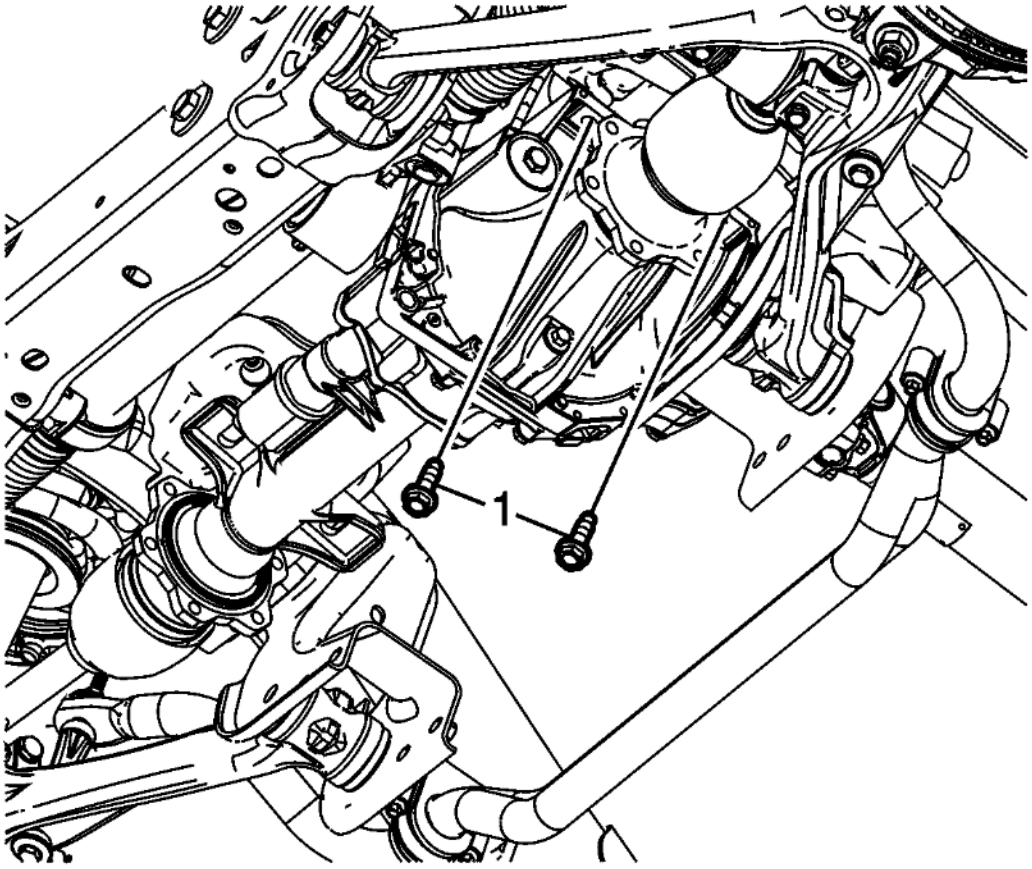


Fig. 137: Left Side Differential Carrier Mounting Bolts
Courtesy of GENERAL MOTORS COMPANY

11. Remove the left differential carrier mounting bolts (1).

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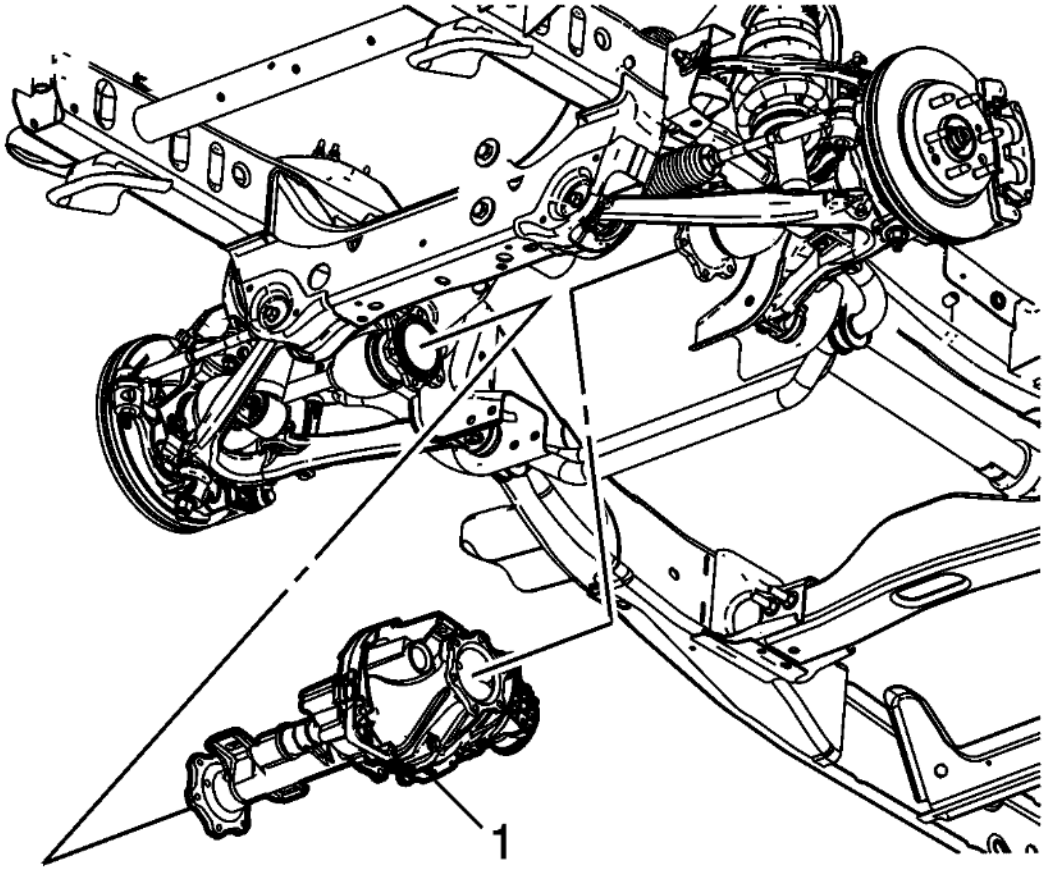


Fig. 138: Differential Carrier Assembly
Courtesy of GENERAL MOTORS COMPANY

12. With the aid of an assistant, pivot the differential carrier forward and down to remove it from the vehicle.
13. Remove the differential carrier assembly (1) from the vehicle.

Installation Procedure

1. With the aid of an assistant, maneuver the differential carrier so that the wheel drive shafts can be installed.

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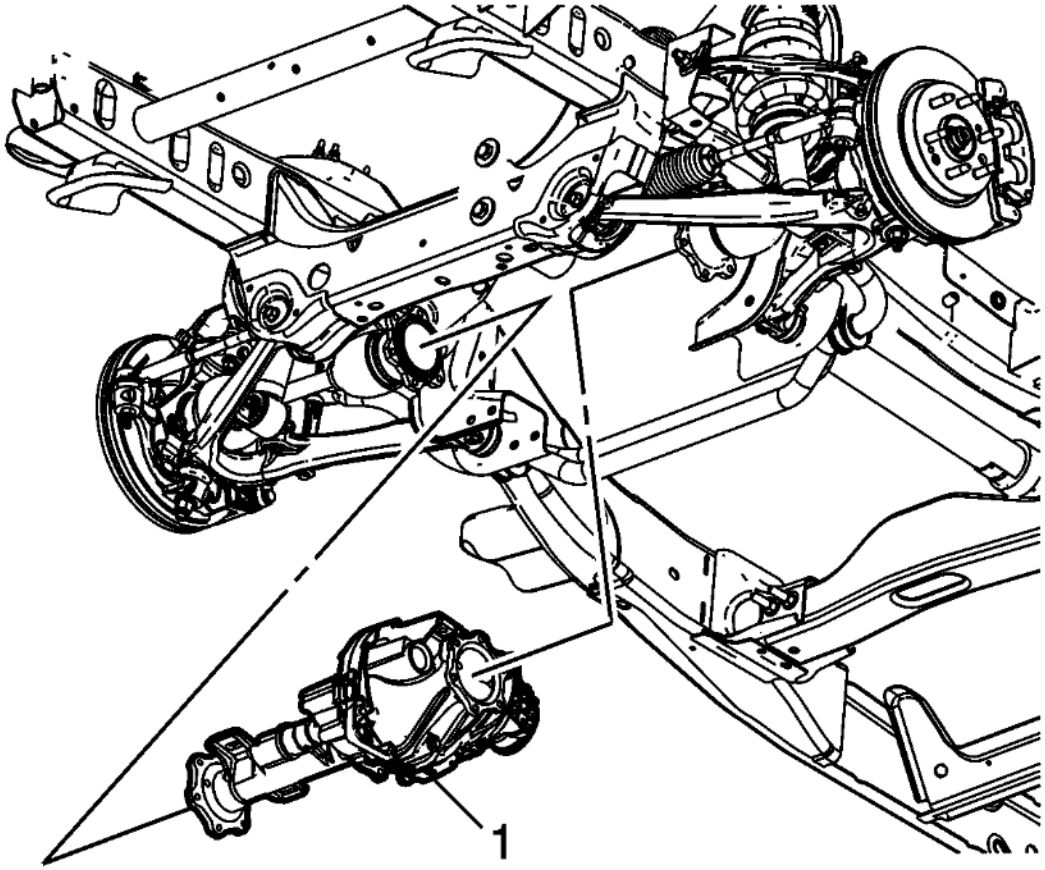


Fig. 139: Differential Carrier Assembly
Courtesy of GENERAL MOTORS COMPANY

2. Install the differential carrier assembly (1).

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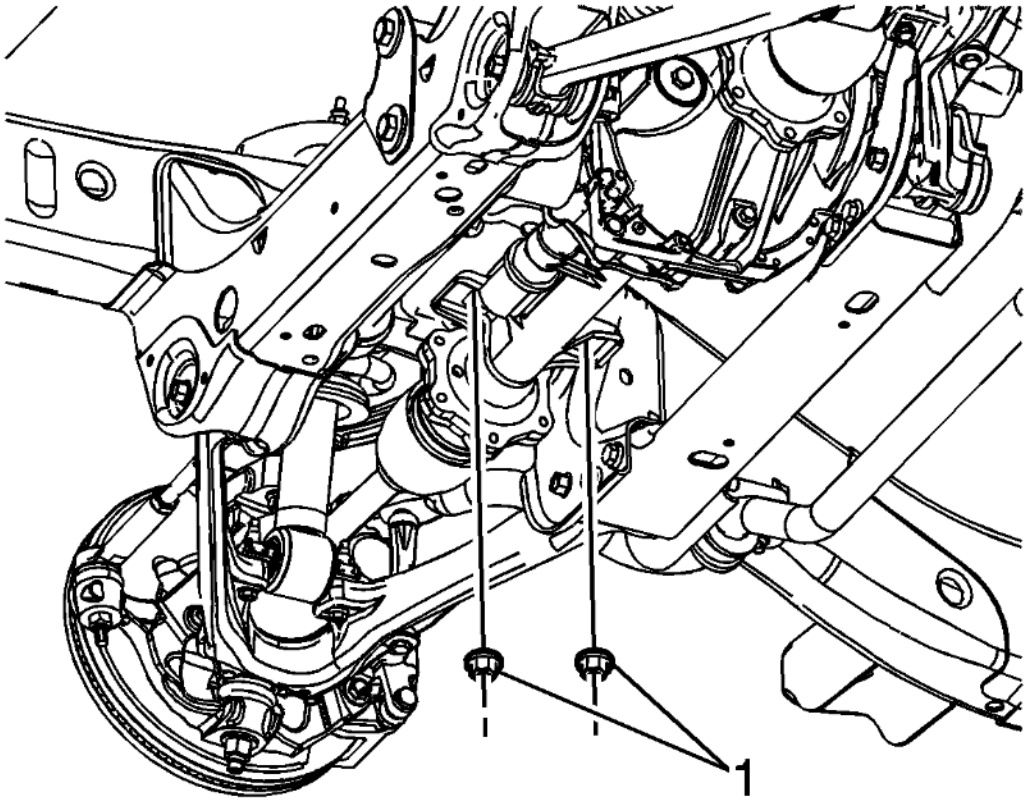


Fig. 140: View Of Right Differential Carrier Mounting Nuts & Washers
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

3. Install the right side mounting nuts and washers (1).

Tighten

Tighten the mounting nuts to 100 N.m (75 lb ft).

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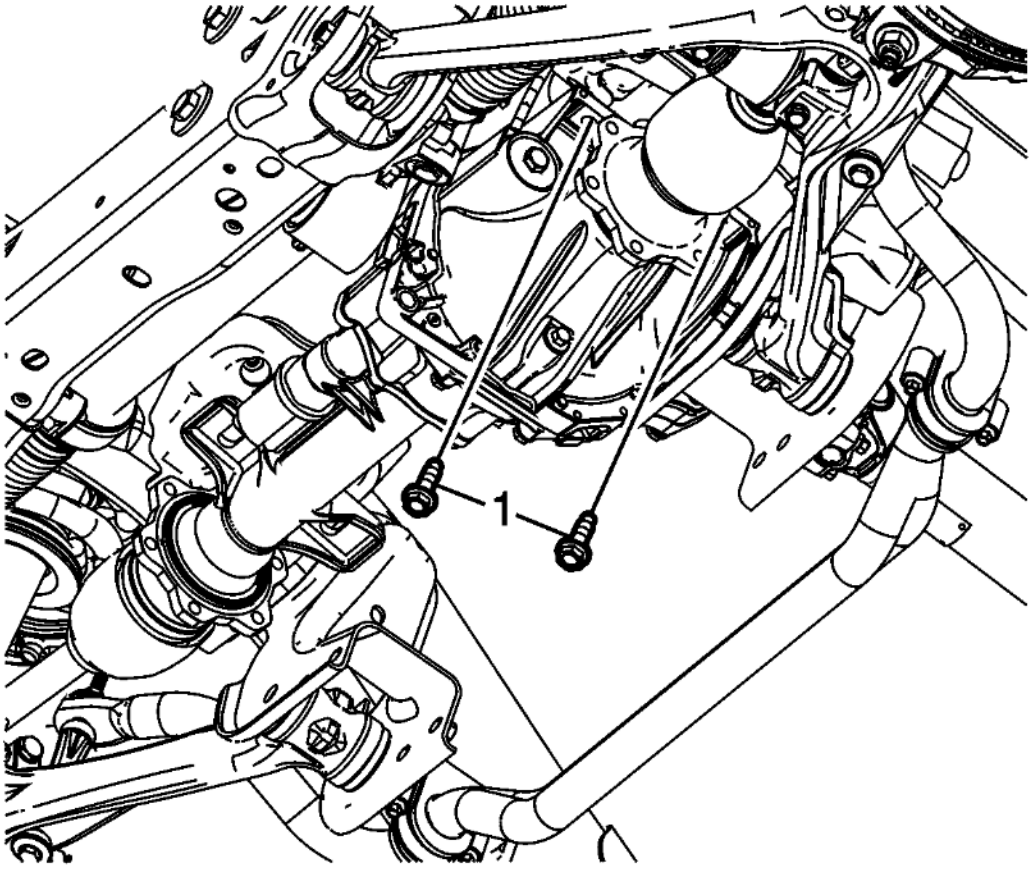


Fig. 141: Left Side Differential Carrier Mounting Bolts
Courtesy of GENERAL MOTORS COMPANY

4. Install the left side mounting bolts (1) for the differential carrier.

   Tighten

   Tighten the mounting nuts to 100 N.m (75 lb ft).

5. Remove the transmission jack stand.
6. Install the propeller shaft. Refer to **Front Axle Propeller Shaft Replacement** .

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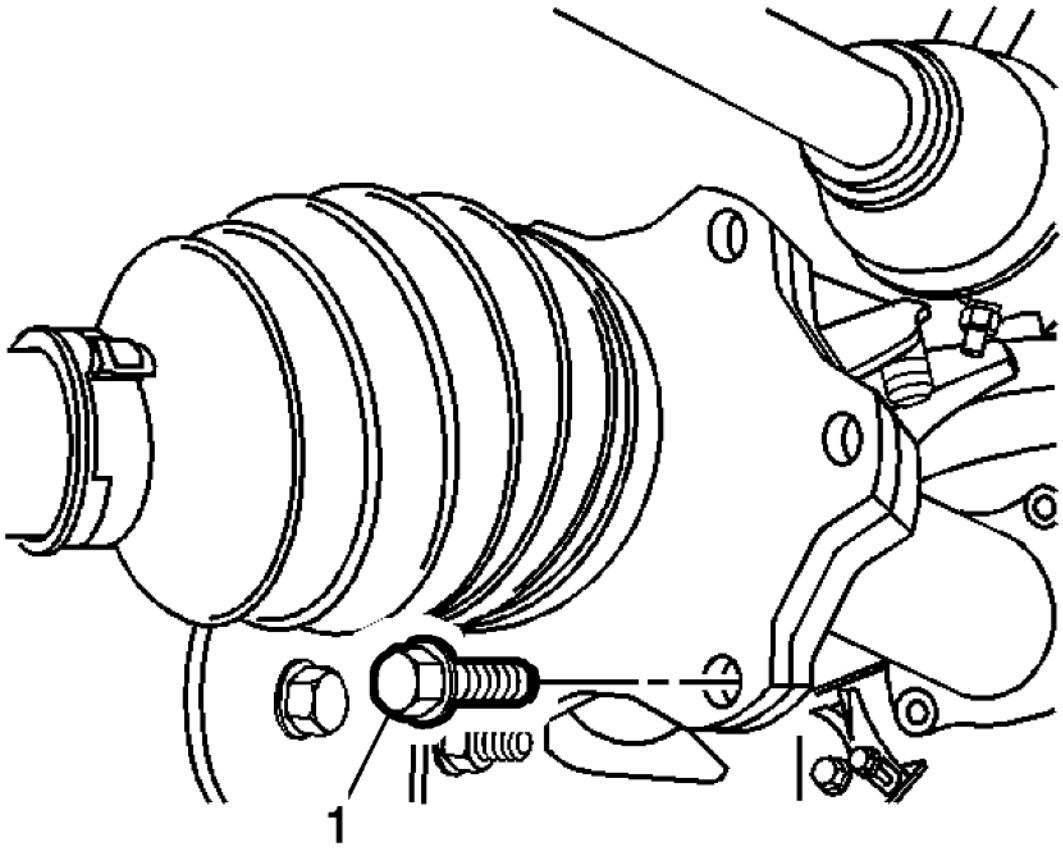


Fig. 142: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

7. Install the wheel drive shaft mounting bolts (1).

Tighten

Tighten the mounting bolts to 79 N.m (58 lb ft).

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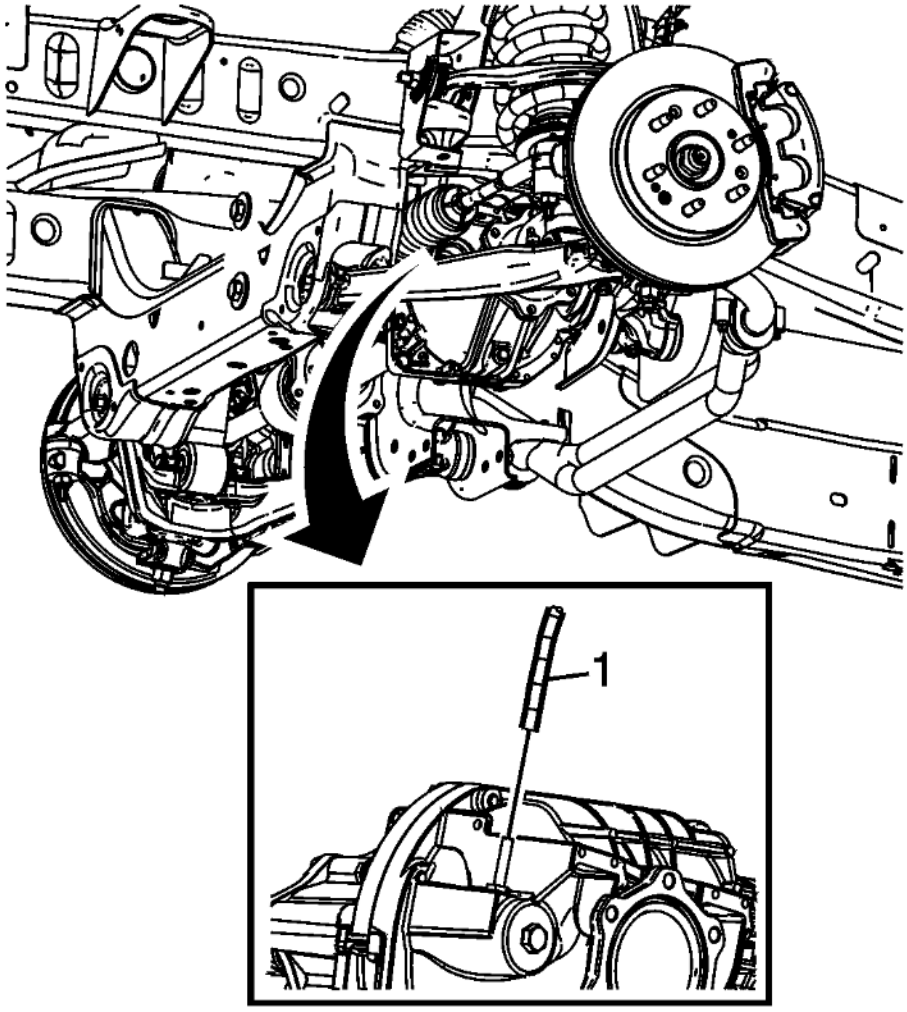


Fig. 143: Differential Carrier Vent Hose
Courtesy of GENERAL MOTORS COMPANY

8. Install the differential carrier vent hose (1).

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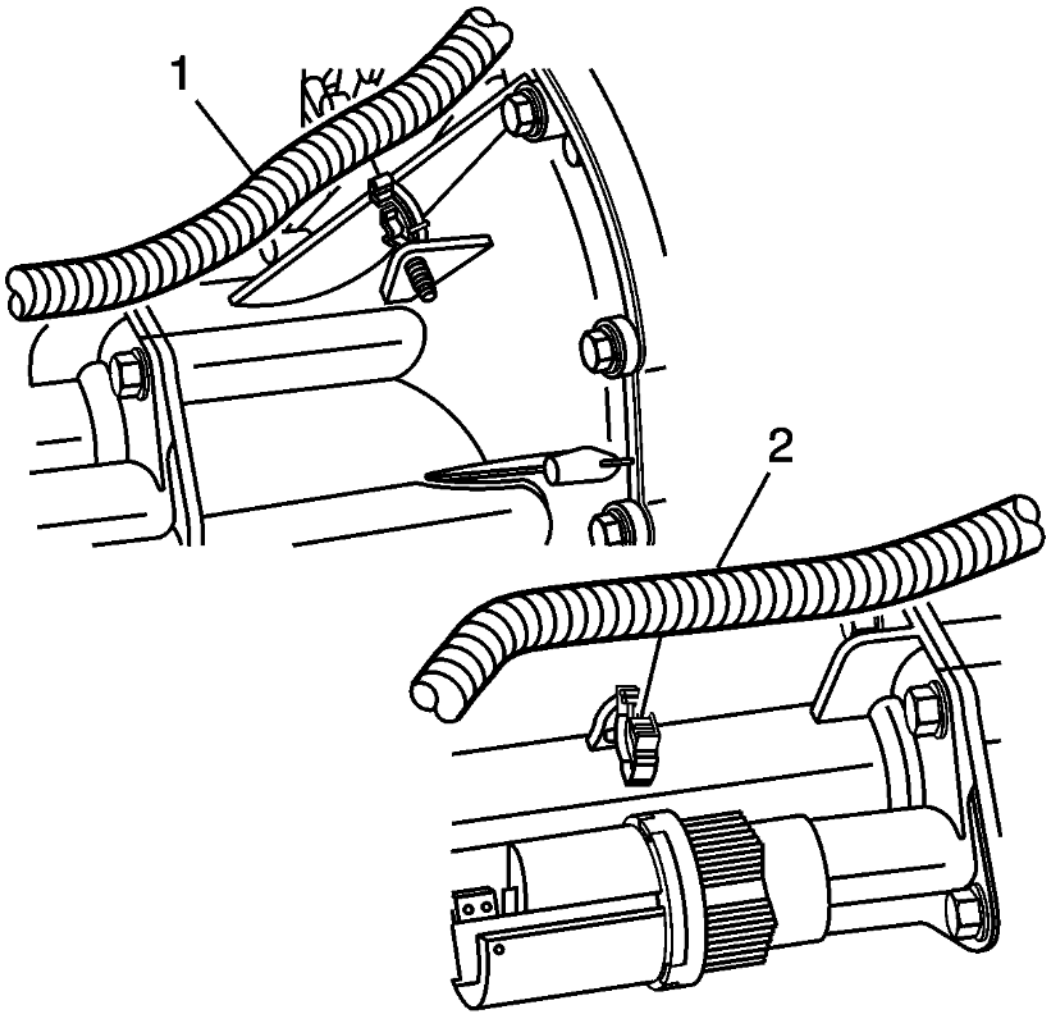


Fig. 144: Wiring Harness From Differential Carrier
Courtesy of GENERAL MOTORS COMPANY

9. Install the wiring harness on the differential carrier (1 and 2), if needed.

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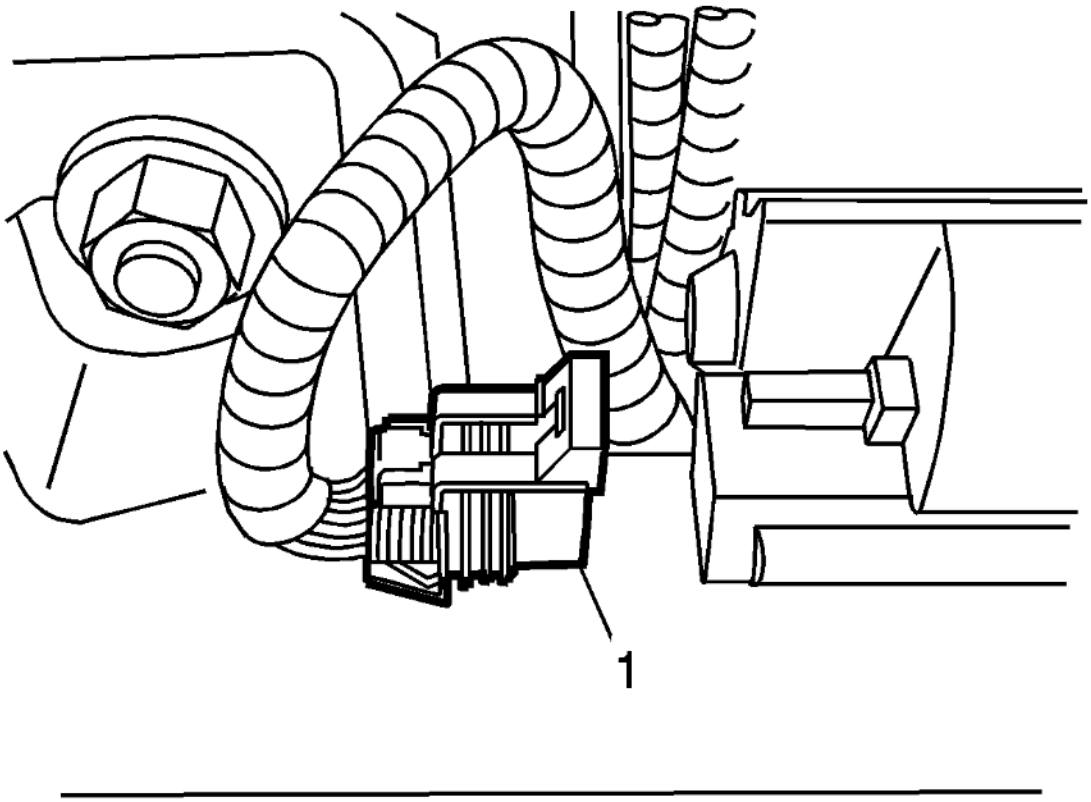


Fig. 145: Disconnecting Electric Motor Actuator Electrical Connector - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

10. Install the electrical connector (1) to the actuator motor, if needed.
11. Install the lower control arm crossmember. Refer to **Drivetrain and Front Suspension Frame Front Crossmember Replacement (Light Duty)** **Drivetrain and Front Suspension Frame Front Crossmember Replacement (Heavy Duty)** .
12. Fill the differential carrier. Refer to **Front Axle Lubricant Replacement (8.25 Inch Axle)**.
13. Install the steering gear. Refer to **Electric Belt Drive Rack and Pinion Steering Gear Replacement (Light Duty)** .

FRONT AXLE REPLACEMENT (9.25 INCH AXLE)

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the steering gear skid shield, if equipped. Refer to **Steering Gear Skid Shield Replacement** .
3. Drain the differential carrier assembly. Refer to **Front Axle Lubricant Replacement (9.25 Inch Axle)**.
4. Disconnect the front propeller shaft from the differential carrier assembly. Refer to **Front Axle Propeller Shaft Replacement** .

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5. Remove the relay rod. Refer to **Relay Rod Replacement** .

NOTE: **Ensure that the front differential is securely attached to the hydraulic jack.**

6. Support the differential carrier assembly with a hydraulic jack.
7. Separate the wheel drive shafts from the front inner axle shafts. Refer to **Front Wheel Drive Shaft Replacement - Right Side** , and **Front Wheel Drive Shaft Replacement - Left Side** .
8. Once the wheel drive shaft have been separated from the inner drive shaft, secure the wheel drive shaft to the side.

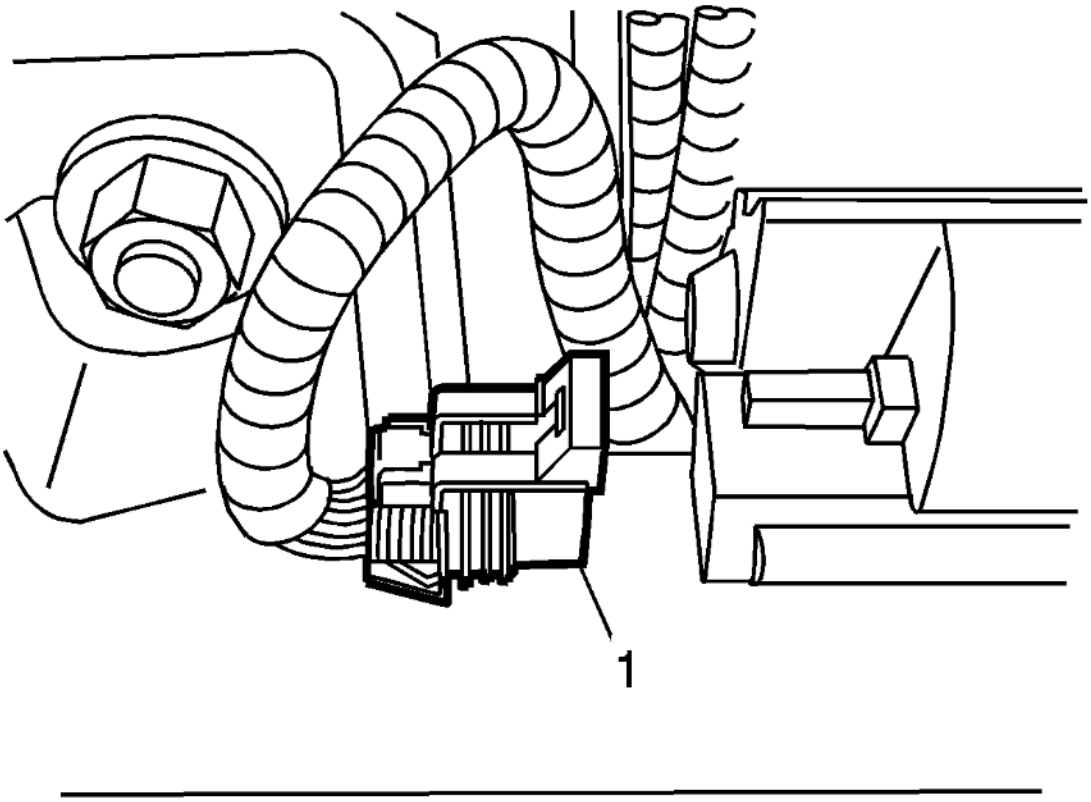


Fig. 146: Disconnecting Electric Motor Actuator Electrical Connector - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

9. Remove the electrical connector from the front axle actuator.

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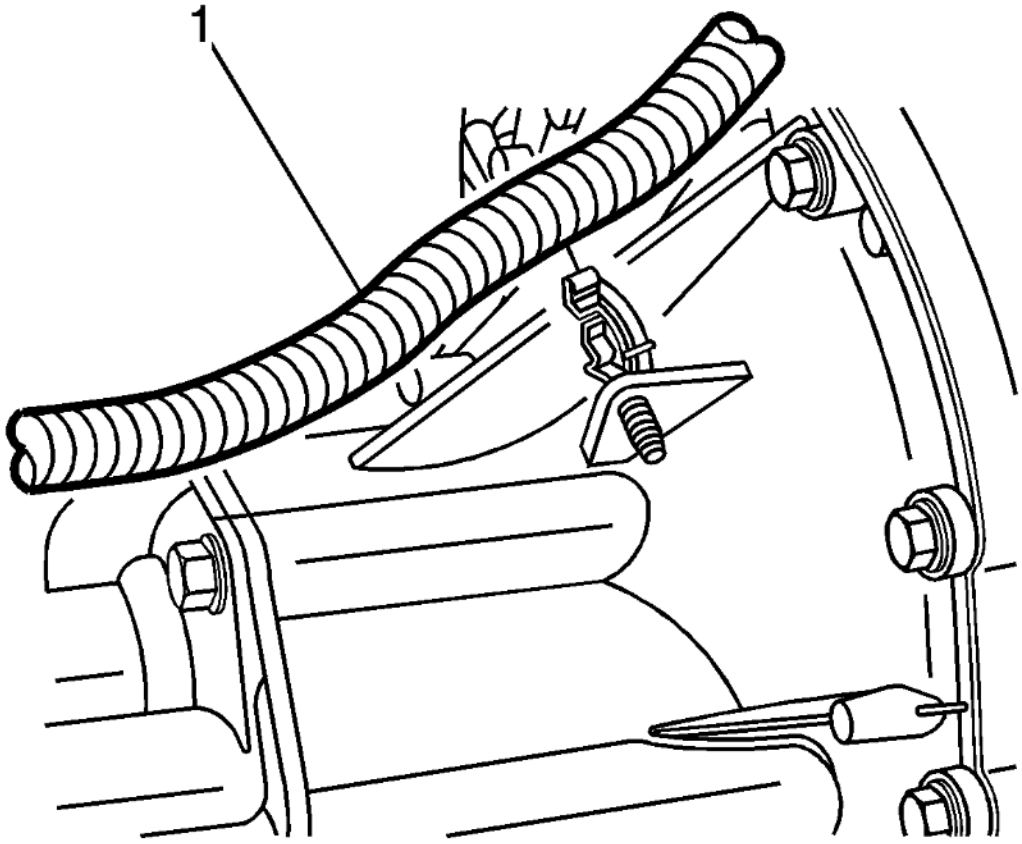


Fig. 147: Disconnecting Wire Harness From Differential Carrier Assembly (S4WD Axle Only)
Courtesy of GENERAL MOTORS COMPANY

10. Disconnect the wire harness from the differential carrier assembly.

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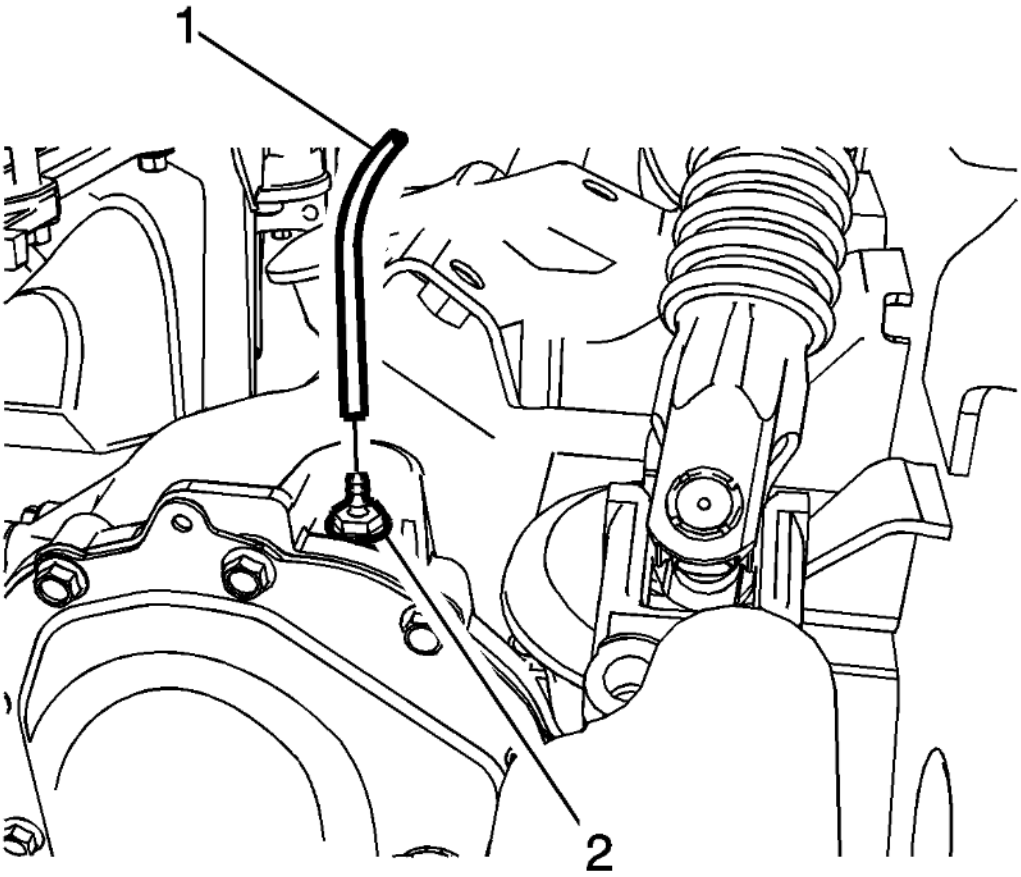


Fig. 148: Differential Carrier Vent And Hose
Courtesy of GENERAL MOTORS COMPANY

11. Disconnect the vent hose (1) from the front differential carrier vent hose connector (2).
12. Remove the front differential carrier bracket nuts and bolts from the front differential carrier assembly.
    - For the right side, refer to **Front Differential Carrier Bracket Replacement - Right Side (9.25 Inch Axle)**.
    - For the left side, refer to **Front Differential Carrier Bracket Replacement - Left Side (9.25 Inch Axle)**.

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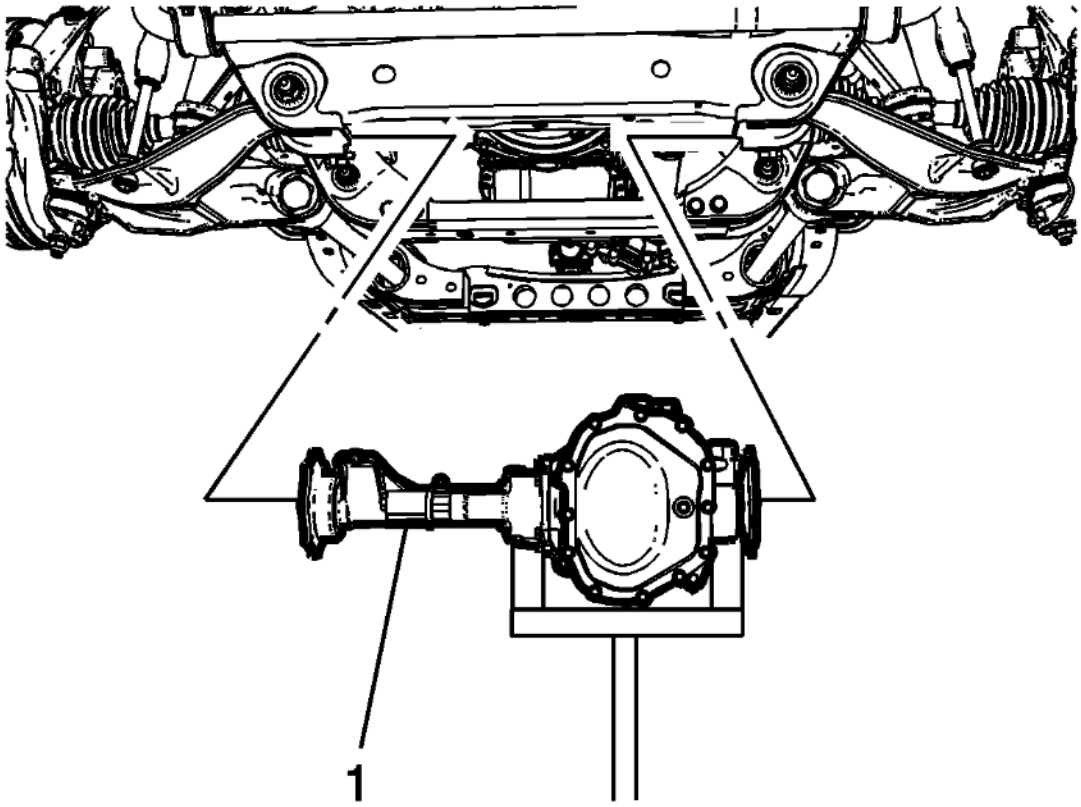


Fig. 149: Front Differential Carrier Assembly
Courtesy of GENERAL MOTORS COMPANY

NOTE: **The front differential carrier assembly maybe have to be maneuvered in such away as to remove it from the vehicle.**

13. Remove the front differential carrier assembly (1).

Installation Procedure

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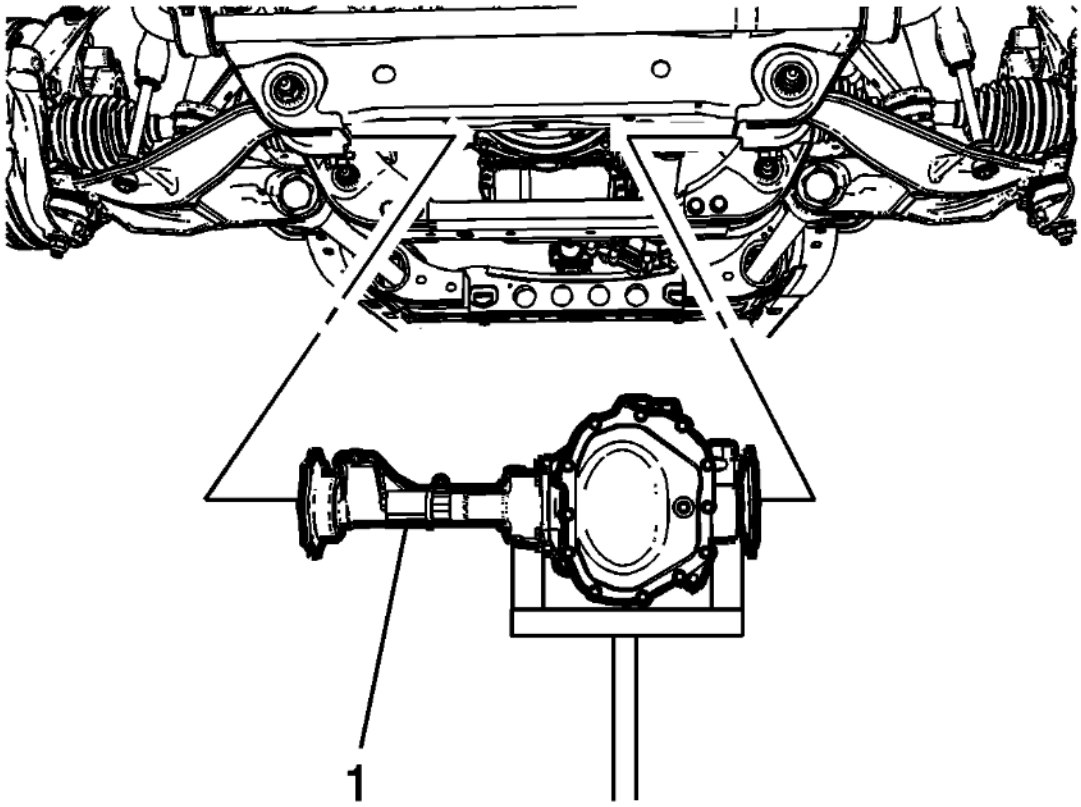


Fig. 150: Front Differential Carrier Assembly
Courtesy of GENERAL MOTORS COMPANY

1. Position the front differential carrier assembly (1) in the vehicle.
2. Install the front differential carrier bracket nuts and bolts to the front differential carrier assembly.
    - For the right side, refer to **Front Differential Carrier Bracket Replacement - Right Side (9.25 Inch Axle)**.
    - For the left side, refer to **Front Differential Carrier Bracket Replacement - Left Side (9.25 Inch Axle)**.

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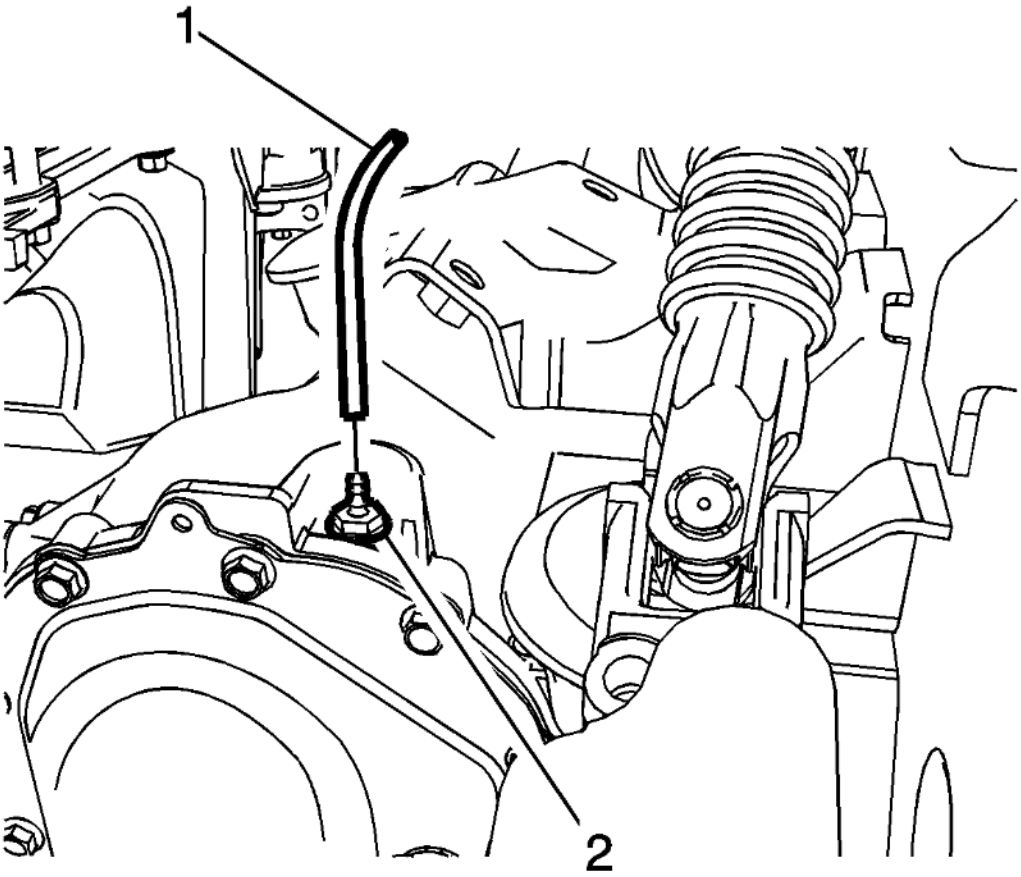


Fig. 151: Differential Carrier Vent And Hose
Courtesy of GENERAL MOTORS COMPANY

3. Disconnect the vent hose (1) from the front differential carrier vent hose connector (2).
4. Remove the transmission jack.

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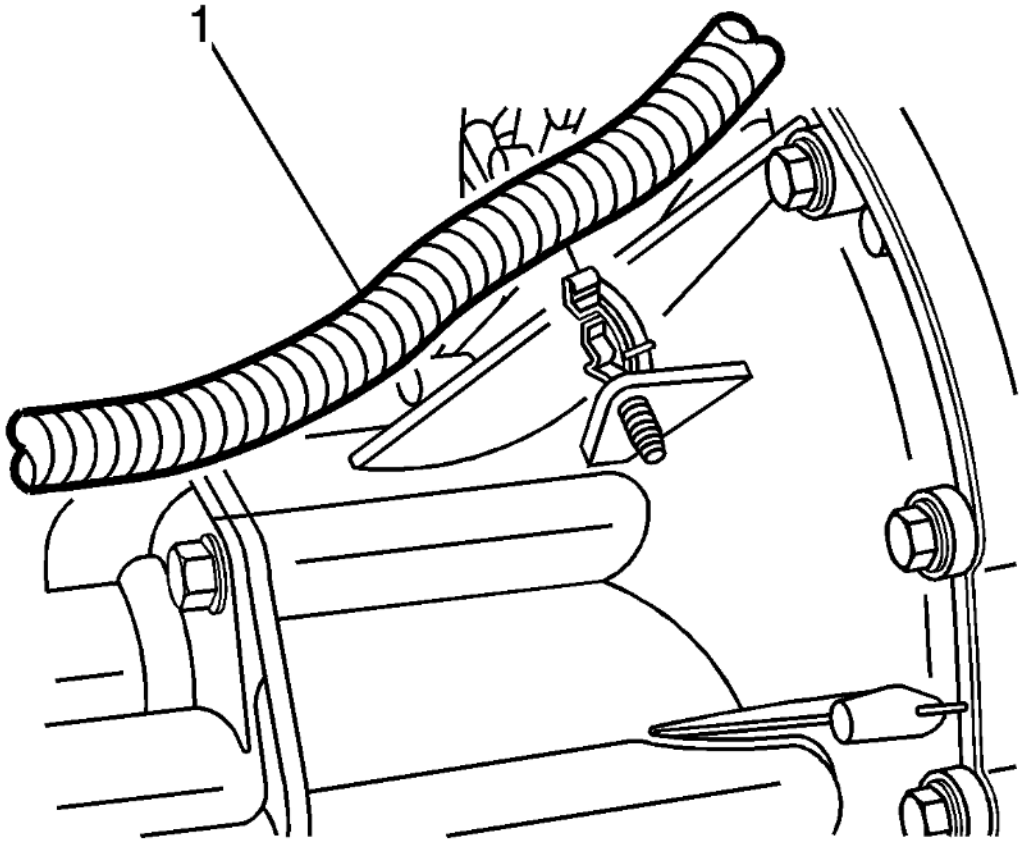


Fig. 152: Disconnecting Wire Harness From Differential Carrier Assembly (S4WD Axle Only)
Courtesy of GENERAL MOTORS COMPANY

5. Install the wire harness for the front drive axle actuator on the differential carrier assembly.

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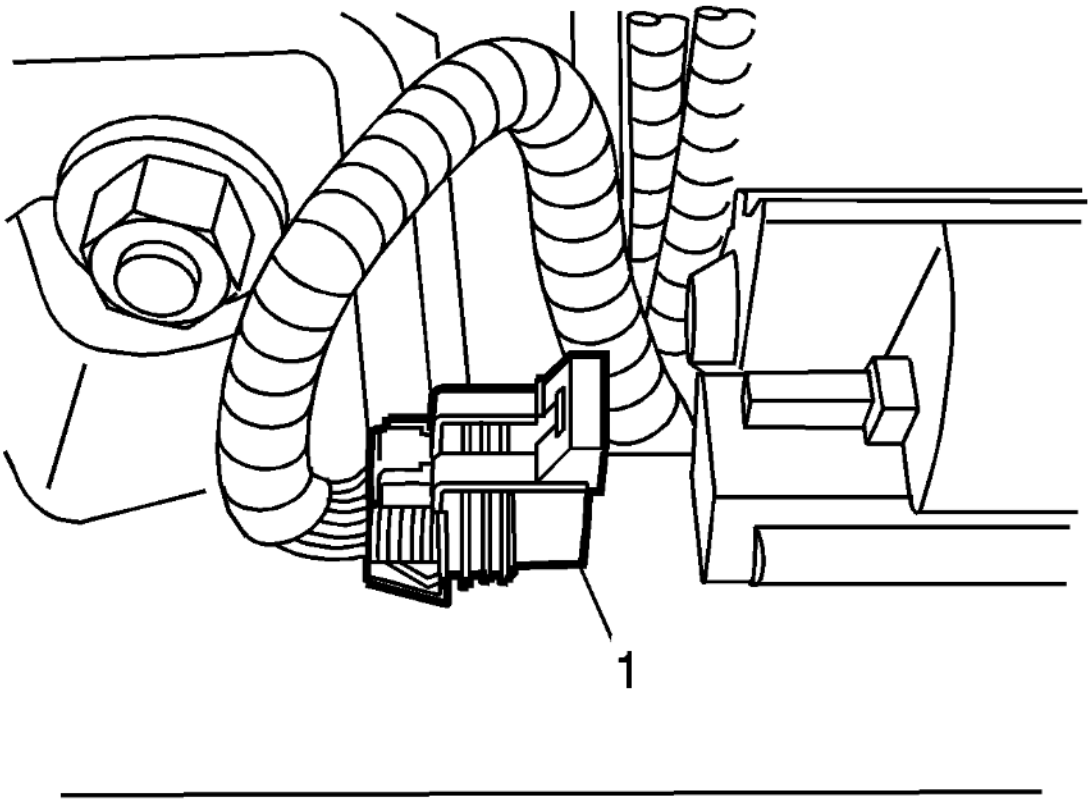


Fig. 153: Disconnecting Electric Motor Actuator Electrical Connector - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

6. Install the electrical connector to the front drive axle actuator.
7. Install the wheel drive shafts to the front inner axle shafts. Refer to **Front Wheel Drive Shaft Replacement - Right Side** , and **Front Wheel Drive Shaft Replacement - Left Side** .
8. Install the relay rod. Refer to **Relay Rod Replacement** .
9. Install the front propeller shaft to the differential carrier assembly. Refer to **Front Axle Propeller Shaft Replacement** .
10. Fill the differential carrier assembly. Use the correct fluid. Refer to **Front Axle Lubricant Replacement (9.25 Inch Axle)**.
11. Install the steering gear skid shield, if equipped. Refer to **Steering Gear Skid Shield Replacement** .
12. Remove the supports and lower the vehicle.

FRONT DIFFERENTIAL CARRIER BRACKET REPLACEMENT - RIGHT SIDE (9.25 INCH AXLE)

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the steering gear skid shield from the vehicle, if equipped. Refer to **Steering Gear Skid Shield**

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Replacement .

3. Remove the vent hose from the front differential carrier, if needed.
4. Remove the front drive axle actuator electrical connector from the actuator.
5. Remove the wiring harness for the front drive axle actuator.

NOTE: **Ensure that the front differential carrier assembly is securely tied to the hydraulic jack.**

6. Support the front differential carrier assembly with a hydraulic jack stand.

NOTE: **Loosen the bolts enough to allow the front differential carrier to be lowered to permit the removal of the right differential carrier bracket.**

7. Loosen the left front differential carrier bracket bolts.

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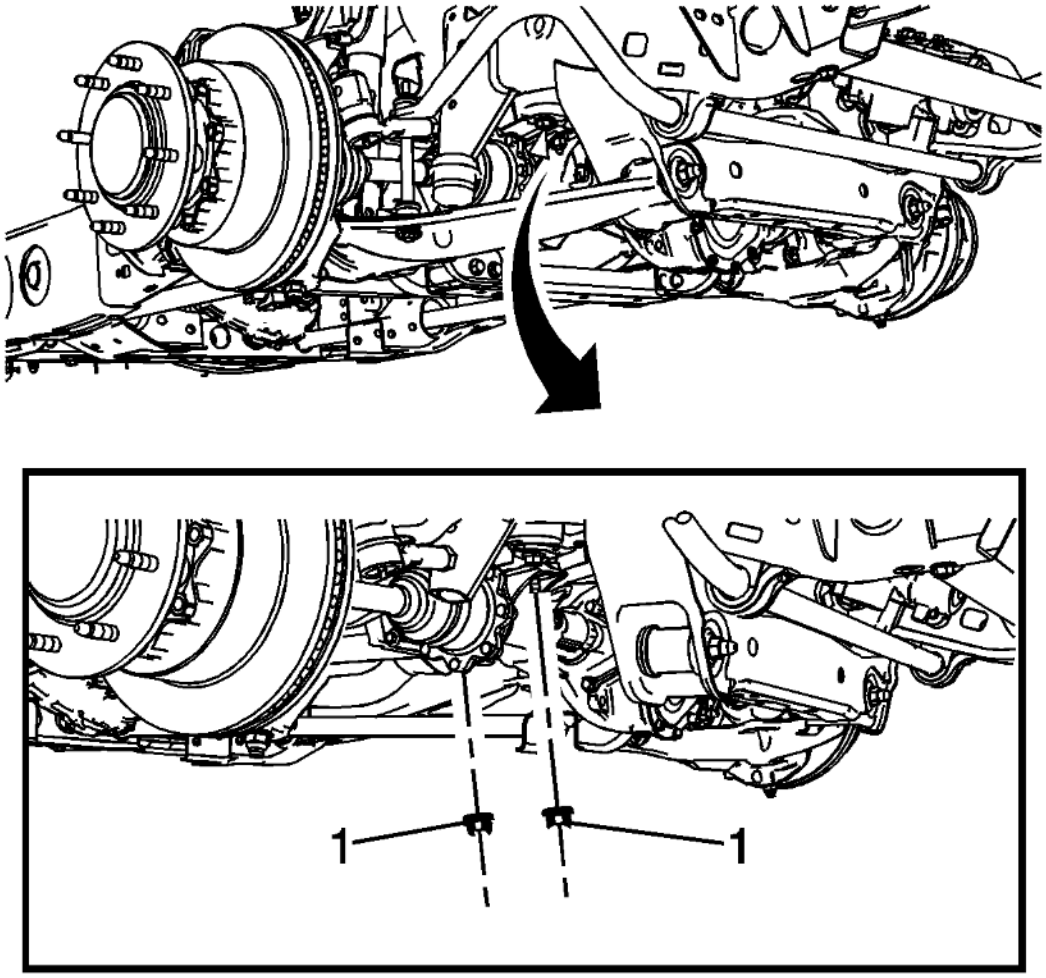


Fig. 154: Front Differential Carrier Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

8. Remove the front differential carrier bracket nuts (1).
9. Lower the front differential carrier.

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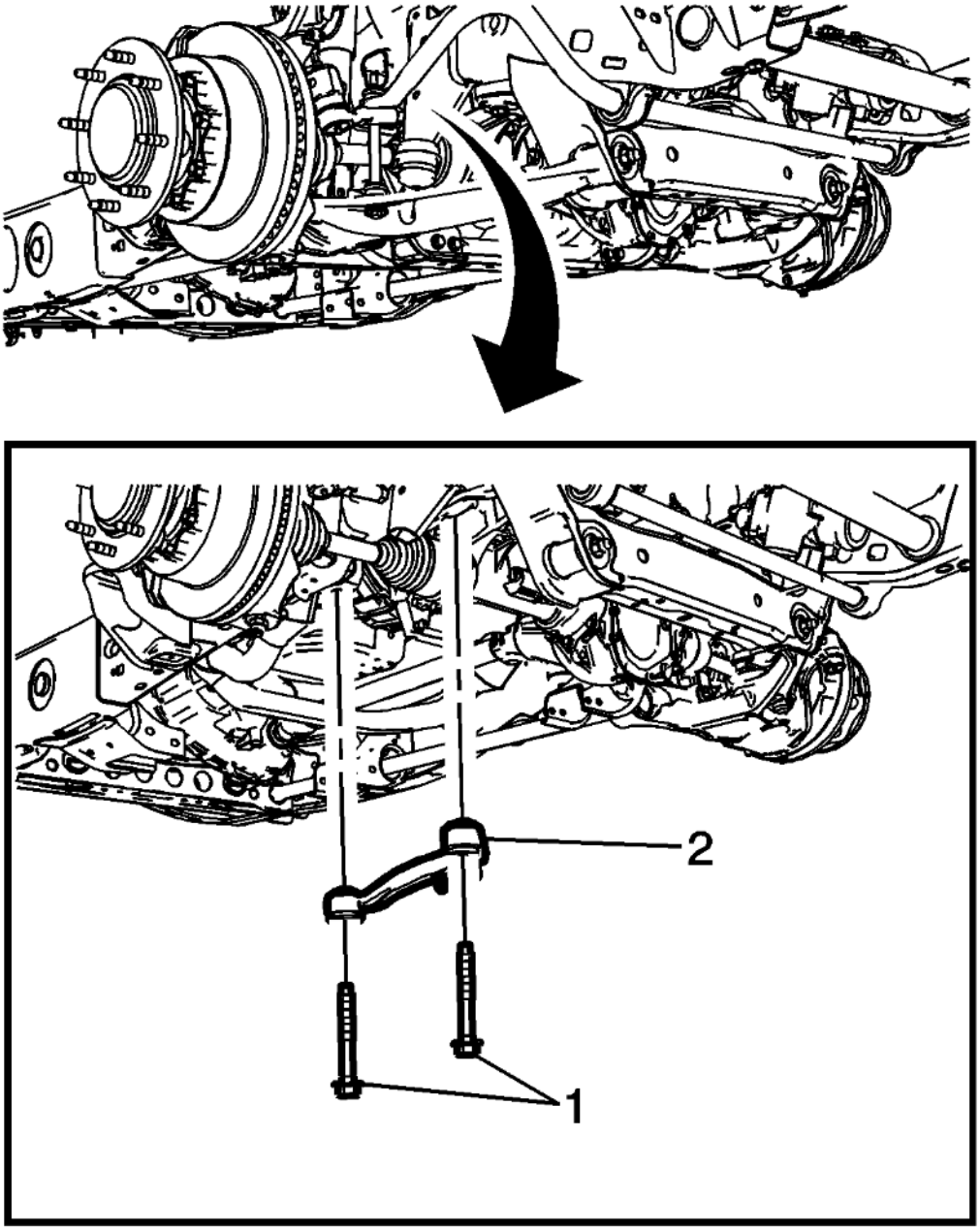


Fig. 155: Front Differential Carrier Bracket Bolts And Bracket
Courtesy of GENERAL MOTORS COMPANY

NOTE: **It maybe necessary to maneuver the front differential carrier bracket in such away to allow the removal of the front differential carrier bracket.**

10. Remove the front differential carrier bracket bolts (1).

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11. Remove the front differential carrier bracket (2).

Installation Procedure

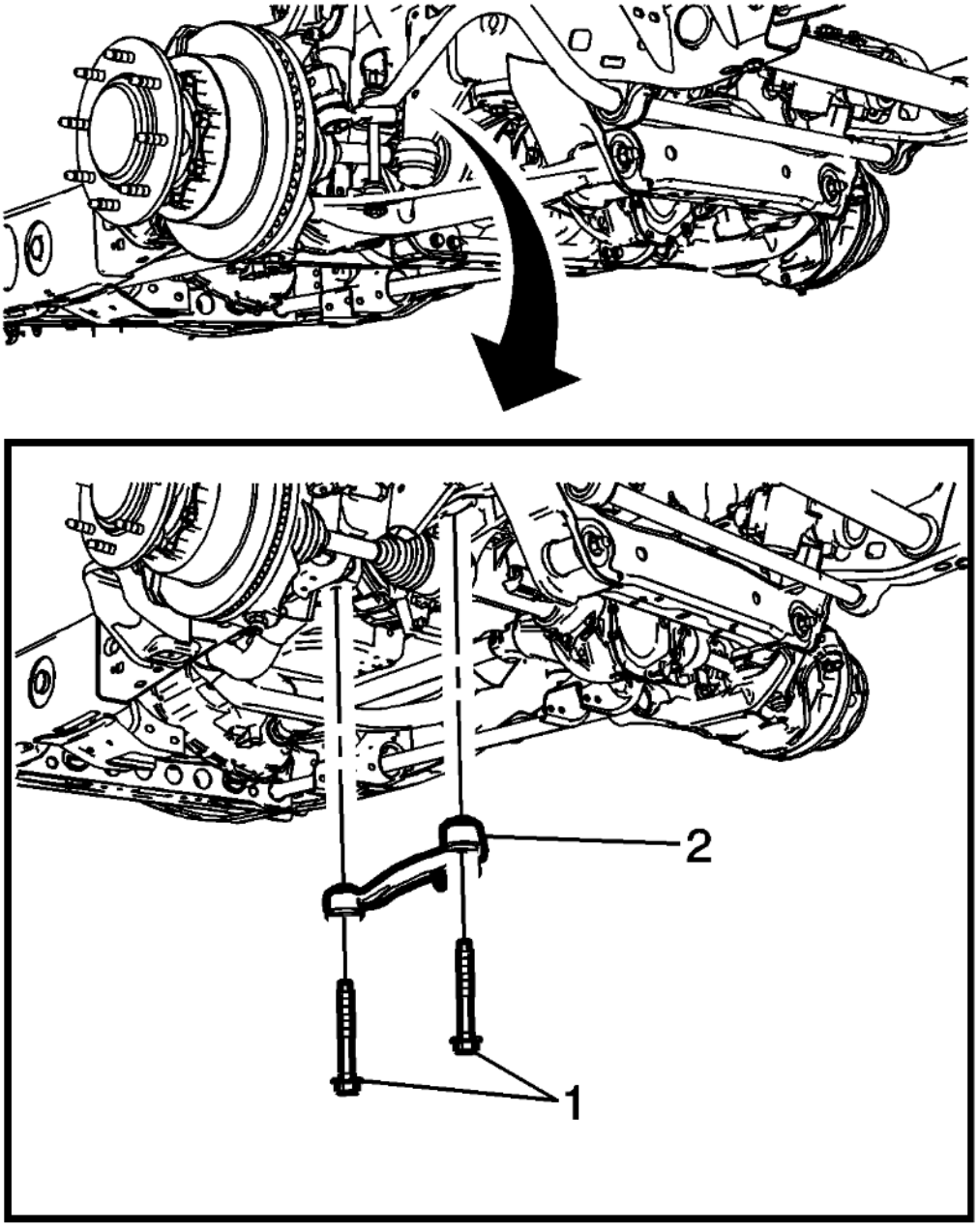


Fig. 156: Front Differential Carrier Bracket Bolts And Bracket
Courtesy of GENERAL MOTORS COMPANY

1. Position the front differential carrier bracket (2) between the front differential carrier and the frame.

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CAUTION: **Refer to Fastener Caution .**

2. Install the front differential carrier bracket bolts (1) and tighten to 100 N.m (74 lb ft).
3. Using the hydraulic jack, lift the front differential carrier into it's proper position.

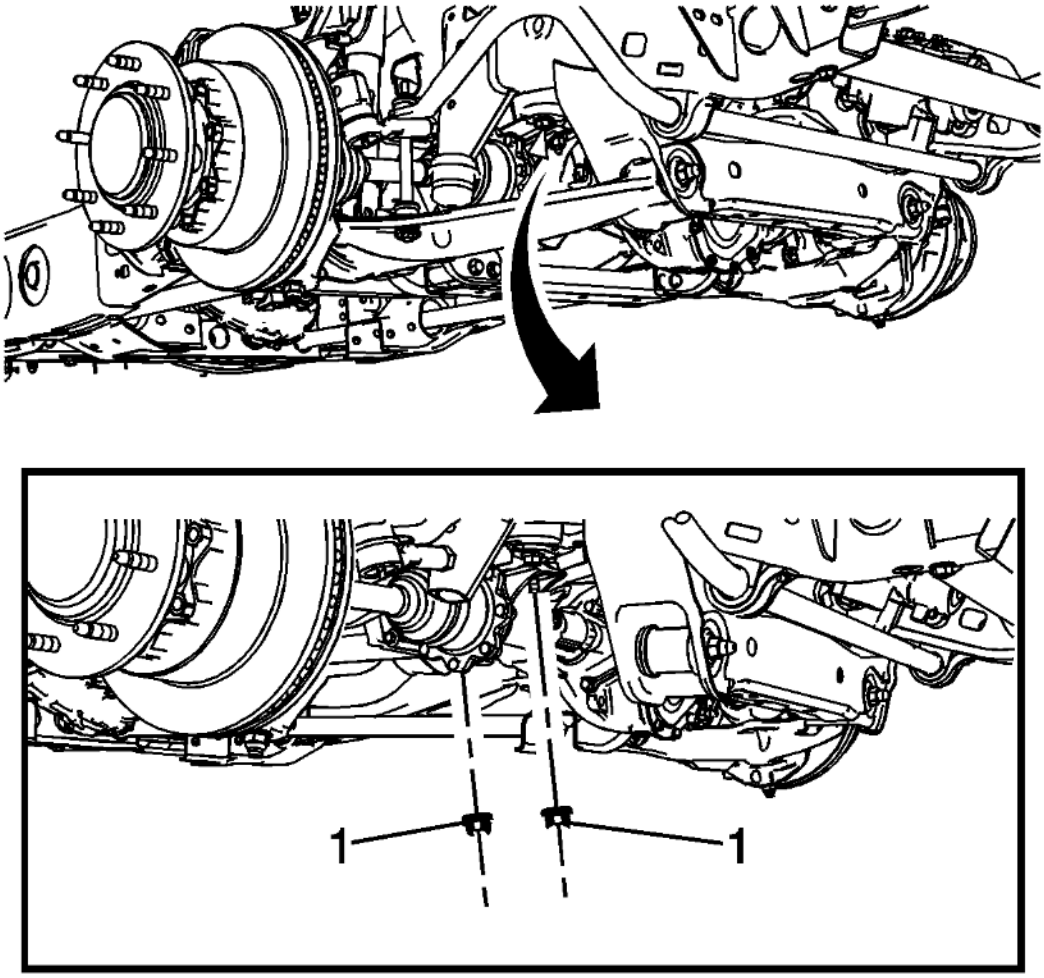


Fig. 157: Front Differential Carrier Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

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4. Install the front differential carrier bracket nuts (1) and tighten to 100 N.m (74 lb ft)
5. Install the vent hose to the front differential carrier, if removed.
6. Install the wiring harness for the front drive axle actuator.
7. Install the front drive axle actuator electrical connector to the actuator.
8. Remove the hydraulic jack stand.
9. Install the steering gear skid shield, if equipped. Refer to **Steering Gear Skid Shield Replacement** .
10. Remove the support and lower the vehicle.

FRONT DIFFERENTIAL CARRIER BRACKET REPLACEMENT - RIGHT SIDE (8.25 INCH AXLE)

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the steering gear skid shield from the vehicle, if equipped. Refer to **Steering Gear Skid Shield Replacement** .
3. Remove the vent hose from the front differential carrier, if needed.
4. Remove the front drive axle actuator electrical connector from the actuator.
5. Remove the wiring harness for the front drive axle actuator.

NOTE: **Ensure that the front differential carrier assembly is securely tied to the hydraulic jack.**

6. Support the front differential carrier assembly with a hydraulic jack stand.

NOTE: **Loosen the bolts enough to allow the front differential carrier to be lowered to permit the removal of the right differential carrier bracket.**

7. Loosen the left front differential carrier bracket bolts.

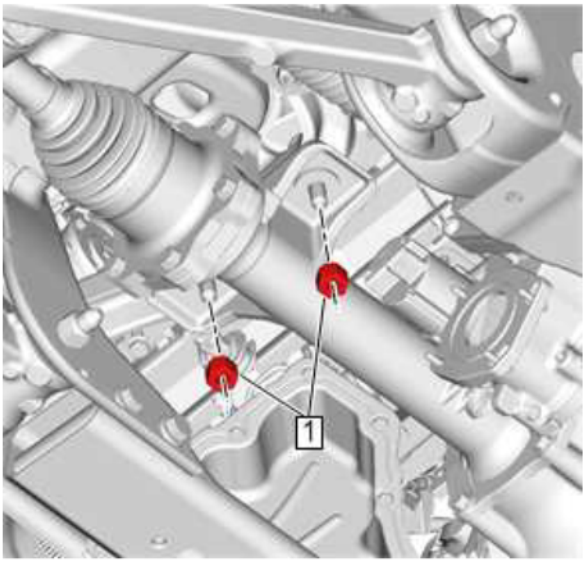


Fig. 158: Front Differential Carrier Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

8. Remove the front differential carrier bracket nuts (1).
9. Lower the front differential carrier.

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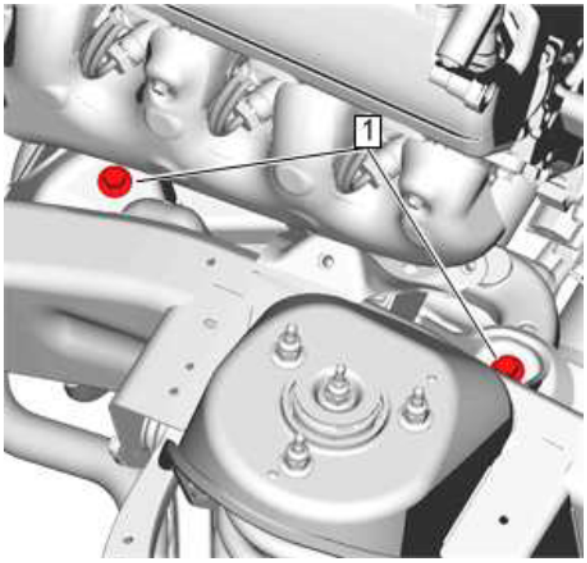


Fig. 159: Upper Differential Carrier Bracket Bolts
Courtesy of GENERAL MOTORS COMPANY

10. Remove the upper differential carrier bracket bolts (1).

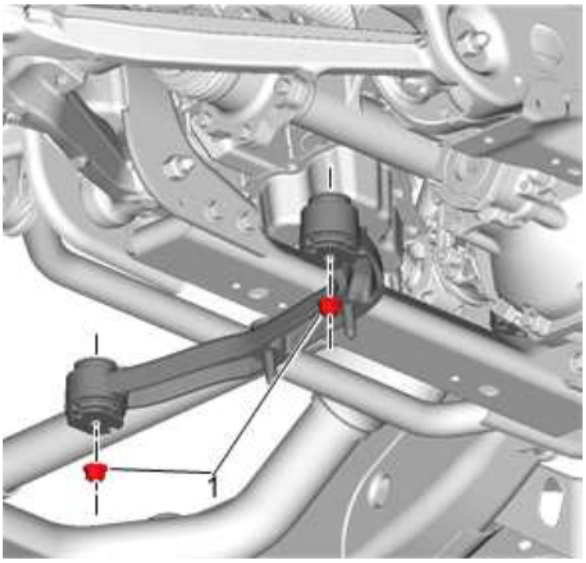


Fig. 160: Front Differential Carrier Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

NOTE: **It maybe necessary to maneuver the front differential carrier bracket in such away to allow the removal of the front differential carrier bracket.**

11. Remove the front differential carrier bracket nuts (1).
12. Remove the front differential carrier bracket (2).

Installation Procedure

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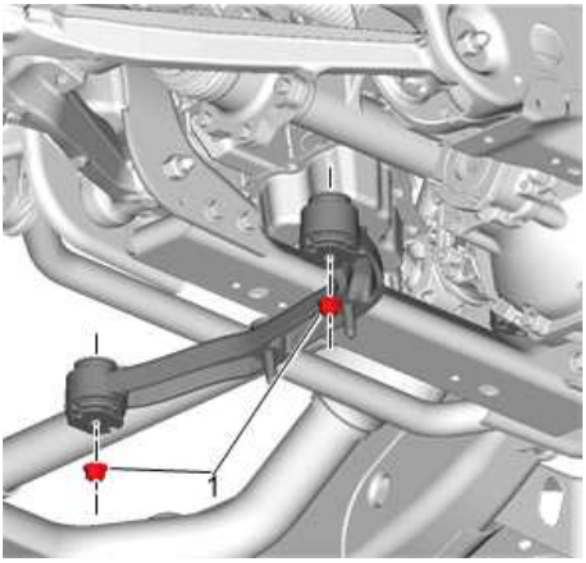


Fig. 161: Front Differential Carrier Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

1. Position the front differential carrier bracket (2) between the front differential carrier and the frame.

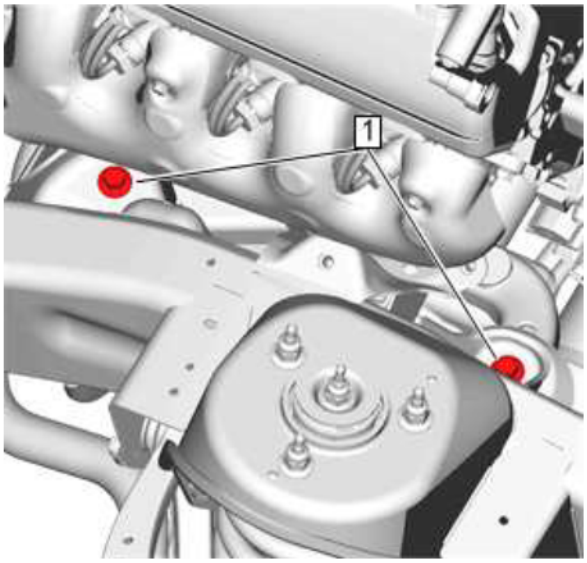


Fig. 162: Upper Differential Carrier Bracket Bolts
Courtesy of GENERAL MOTORS COMPANY

2. Install the upper differential carrier bracket bolts (1).

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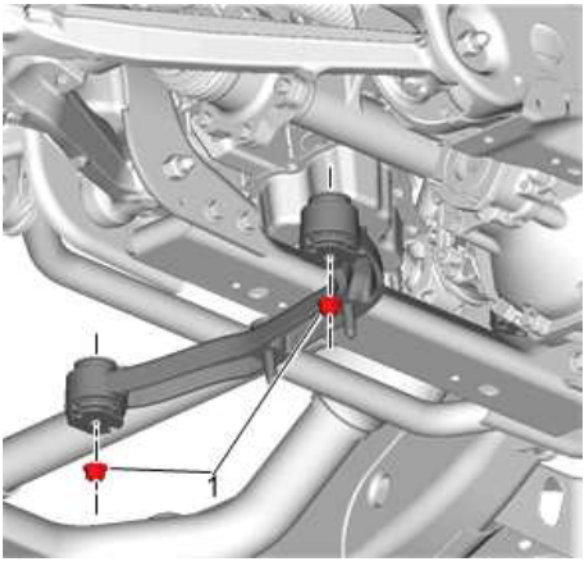


Fig. 163: Front Differential Carrier Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

3. Install the front differential carrier bracket nuts (1) and tighten to 100 N.m (74 lb ft).
4. Using the hydraulic jack, lift the front differential carrier into it's proper position.

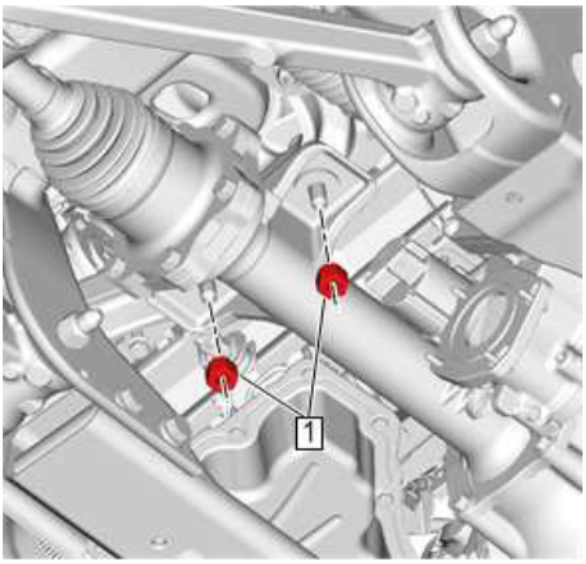


Fig. 164: Front Differential Carrier Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

5. Install the front differential carrier bracket nuts (1) and tighten to 100 N.m (74 lb ft)
6. Install the vent hose to the front differential carrier, if removed.
7. Install the wiring harness for the front drive axle actuator.
8. Install the front drive axle actuator electrical connector to the actuator.
9. Remove the hydraulic jack stand.
10. Install the steering gear skid shield, if equipped. Refer to **Steering Gear Skid Shield Replacement** .
11. Remove the support and lower the vehicle.

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FRONT DIFFERENTIAL CARRIER BRACKET REPLACEMENT - LEFT SIDE (9.25 INCH AXLE)

Removal Procedure

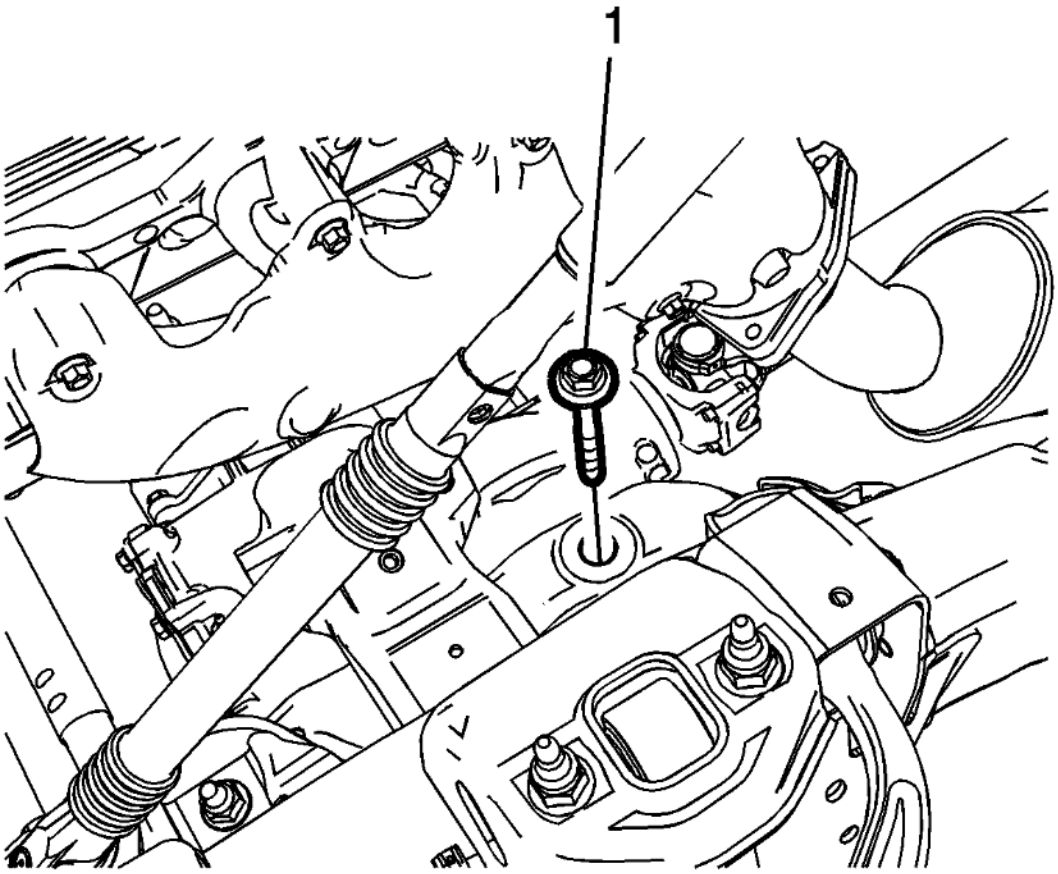


Fig. 165: Front Differential Bracket Upper Rear Bolt
Courtesy of GENERAL MOTORS COMPANY

1. Remove the front differential bracket upper rear bolt (1).
2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
3. Remove the steering gear skid shield from the vehicle, if equipped. Refer to **Steering Gear Skid Shield Replacement** .
4. Remove the electrical connector from the front drive axle actuator.
5. Remove the wiring harness for the front drive axle actuator from the front differential carrier.

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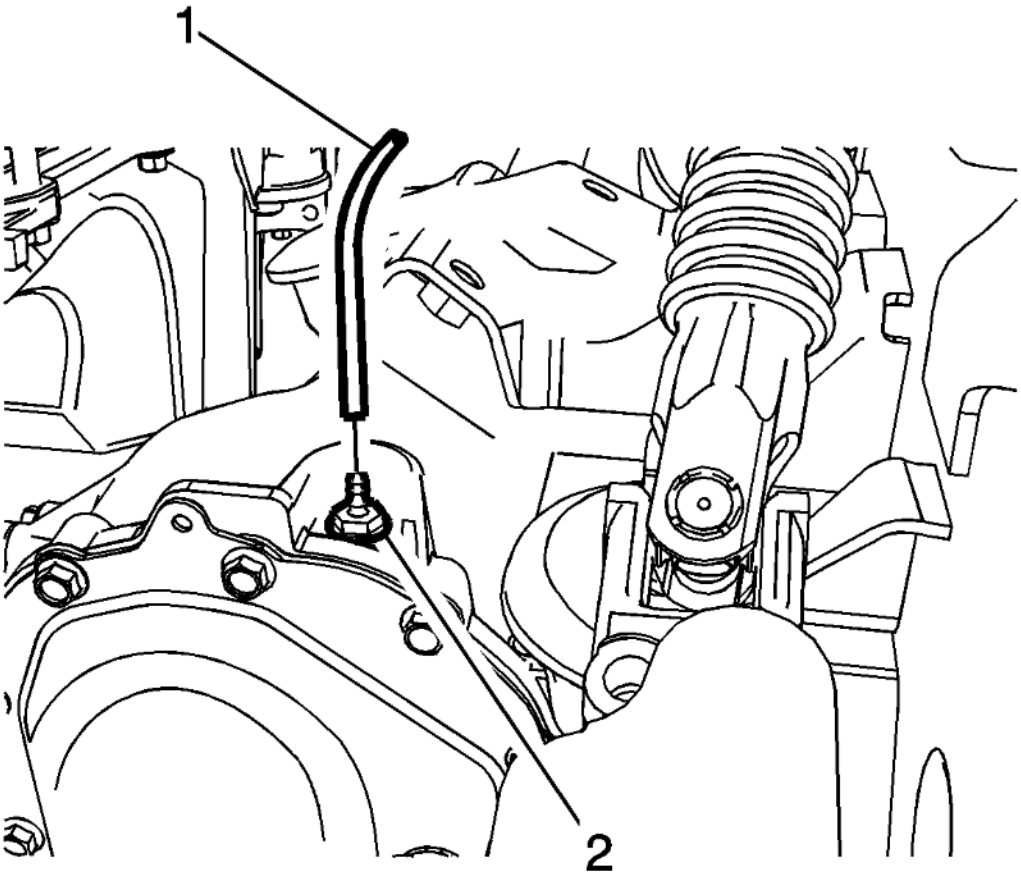


Fig. 166: Differential Carrier Vent And Hose
Courtesy of GENERAL MOTORS COMPANY

6. Remove the vent hose (1) from the front differential carrier.

NOTE: **Ensure that the front differential carrier is securely attached to the hydraulic jack stand.**

7. Support the front differential carrier with a suitable hydraulic jack.
8. Remove the right front differential carrier nuts. Refer to **Front Differential Carrier Bracket Replacement - Right Side (9.25 Inch Axle)**.

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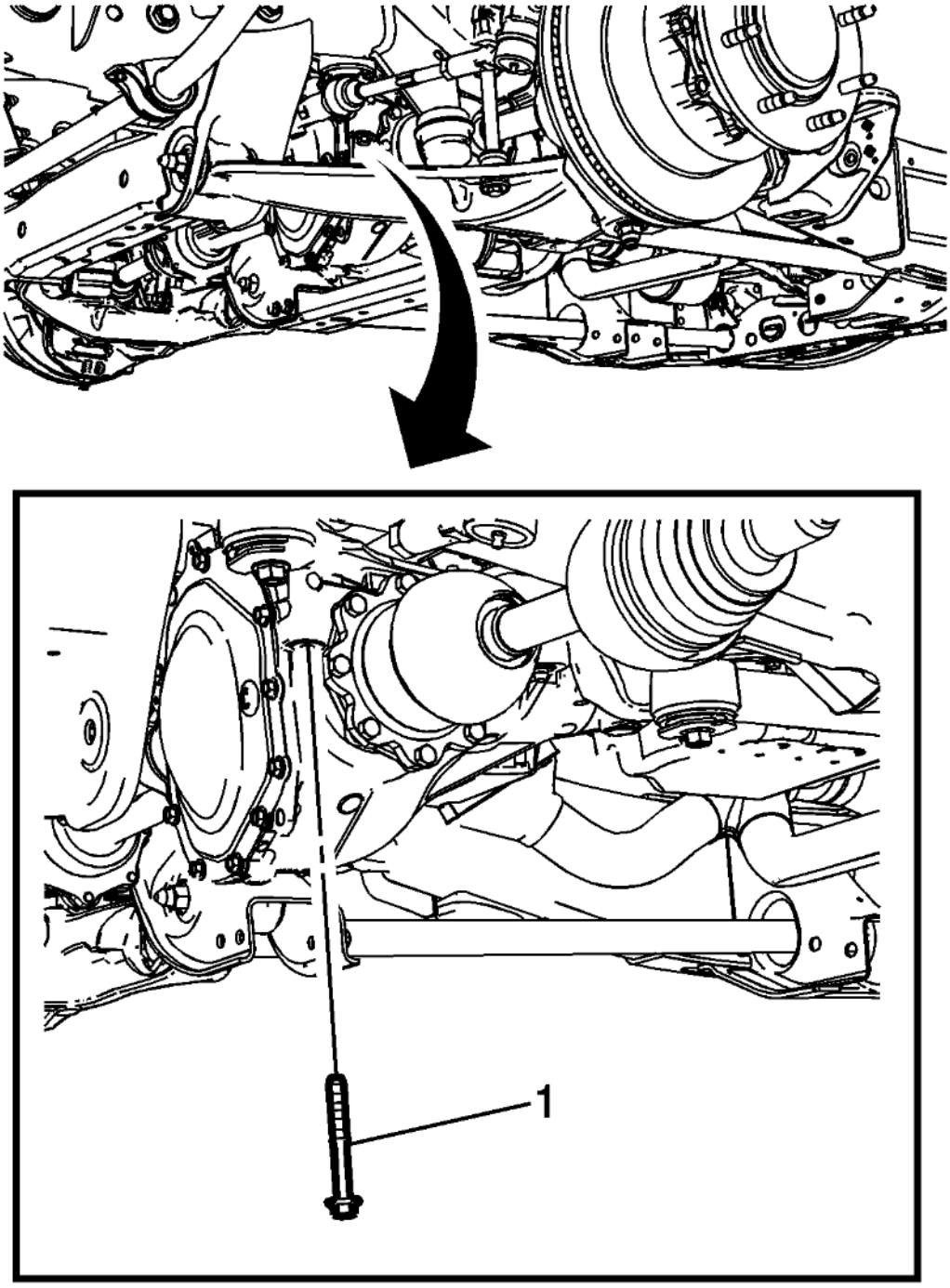


Fig. 167: Differential Carrier Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

9. Remove the front differential carrier bracket bolt (1).

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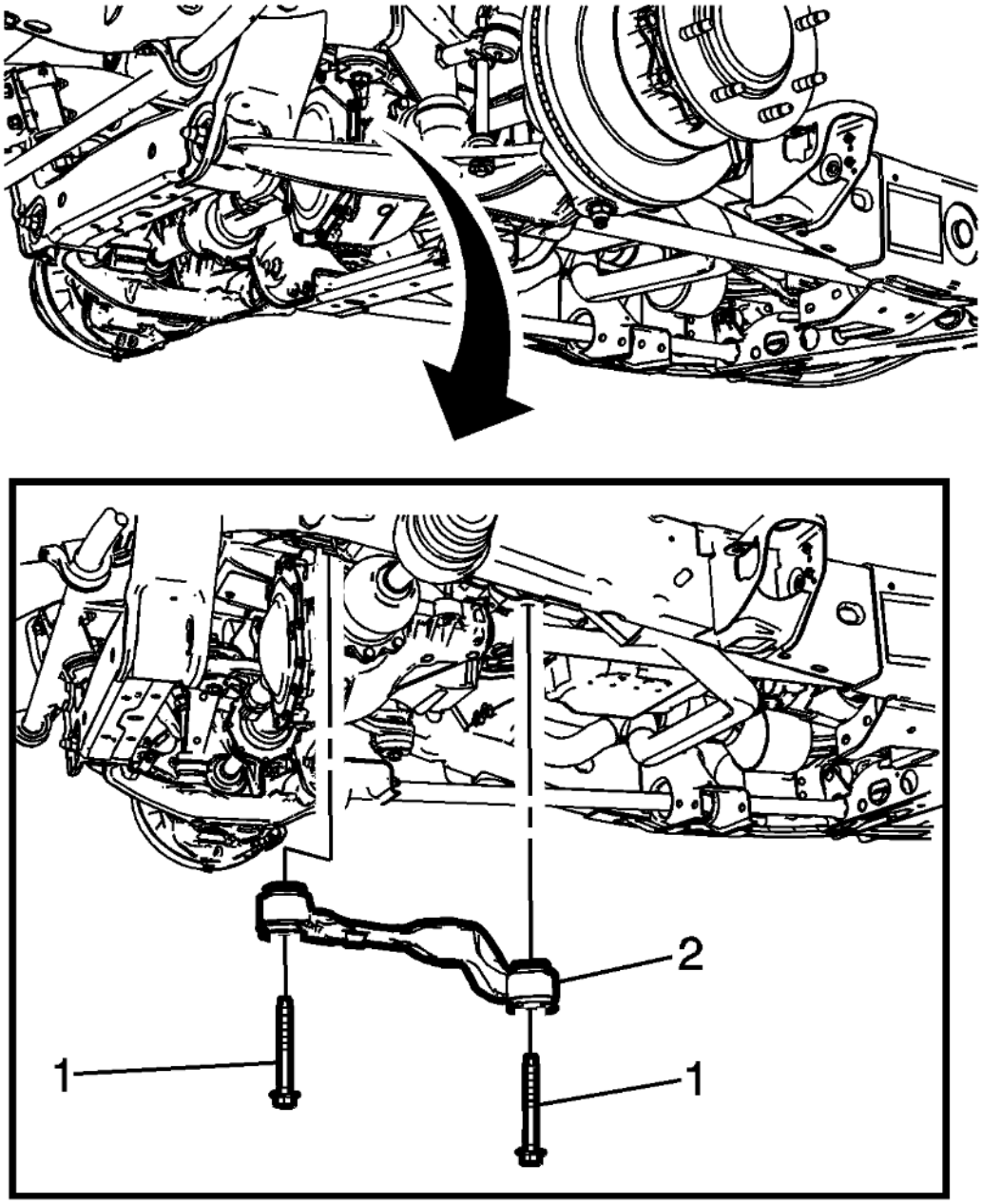


Fig. 168: Differential Carrier Bracket And Bolts
Courtesy of GENERAL MOTORS COMPANY

10. Lower the front differential carrier assembly to gain enough clearance to remove the front differential carrier bracket (2).
11. Remove the front differential carrier bracket bolts (1).

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NOTE: **It maybe necessary to maneuver the front differential carrier bracket in such away to remove it from the vehicle.**

12. Remove the front differential carrier bracket from the vehicle (2).

Installation Procedure

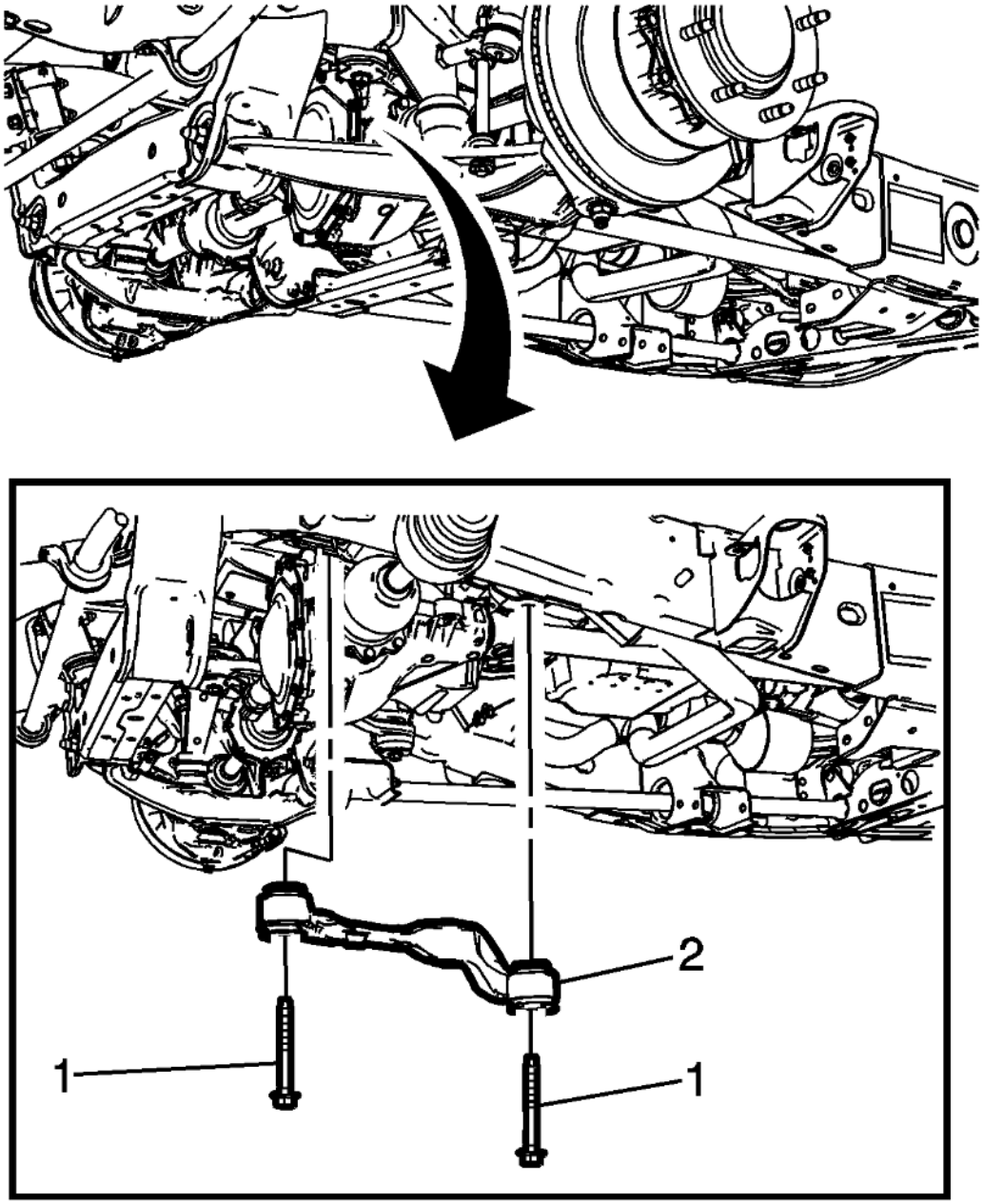


Fig. 169: Differential Carrier Bracket And Bolts

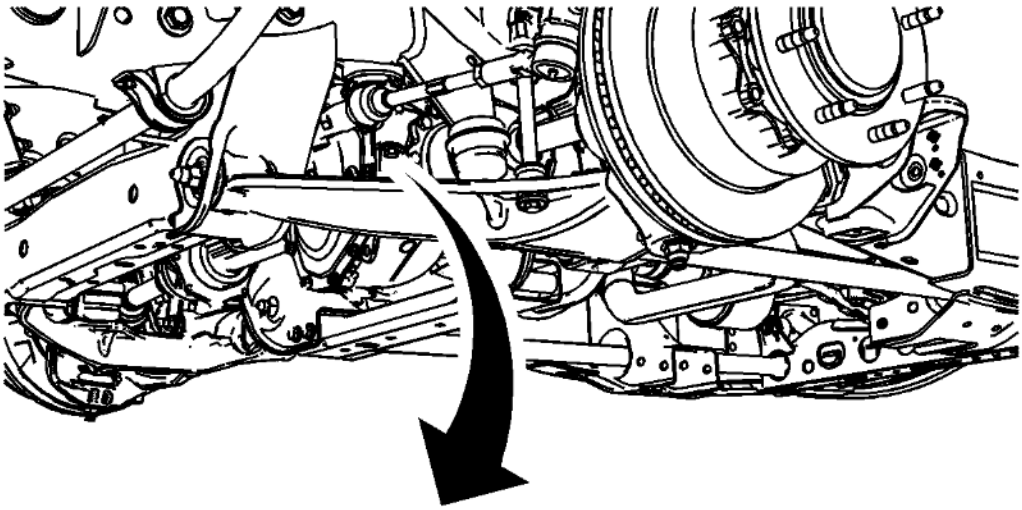
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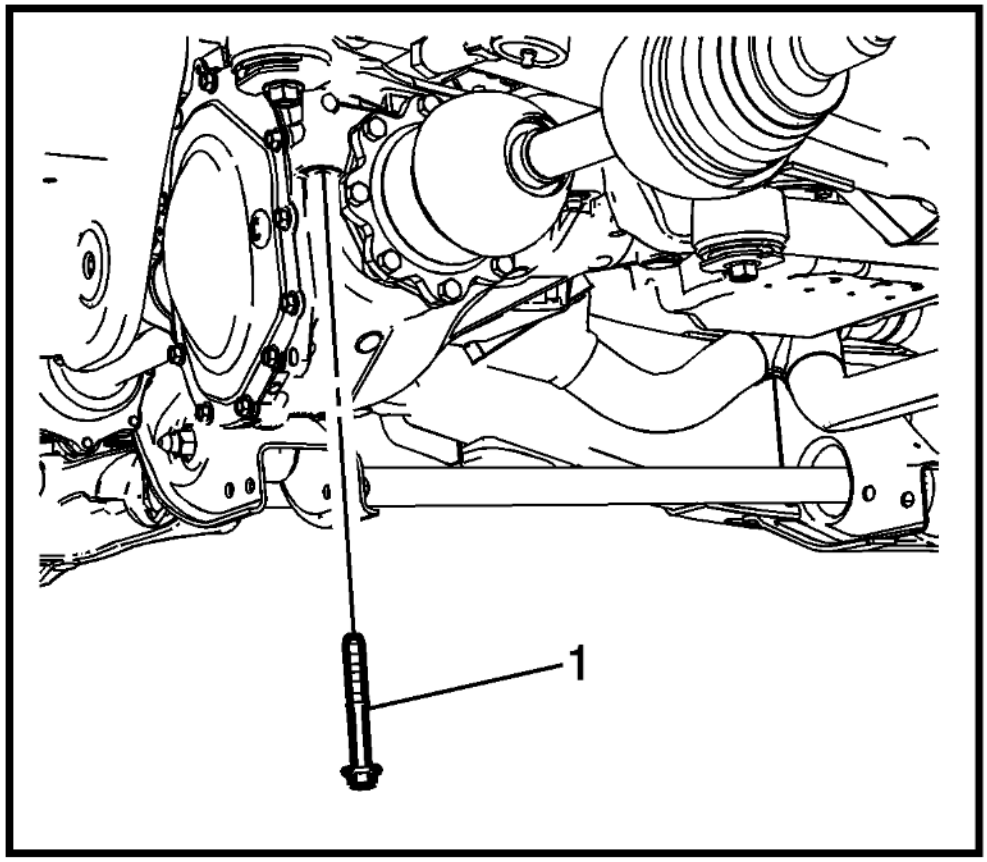
Courtesy of GENERAL MOTORS COMPANY

1. Position the front differential bracket 2 between the frame and the front differential carrier.

CAUTION: **Refer to Fastener Caution .**

2. Install the front differential carrier bolts 1 to the frame and tighten to 100 N.m (74 lb ft).





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Fig. 170: Differential Carrier Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

3. Install the front differential carrier bolts 1 to the front differential carrier bracket and tighten to 100 N.m (74 lb ft).
4. Using the hydraulic jack stand, lift the front differential carrier into the proper position.

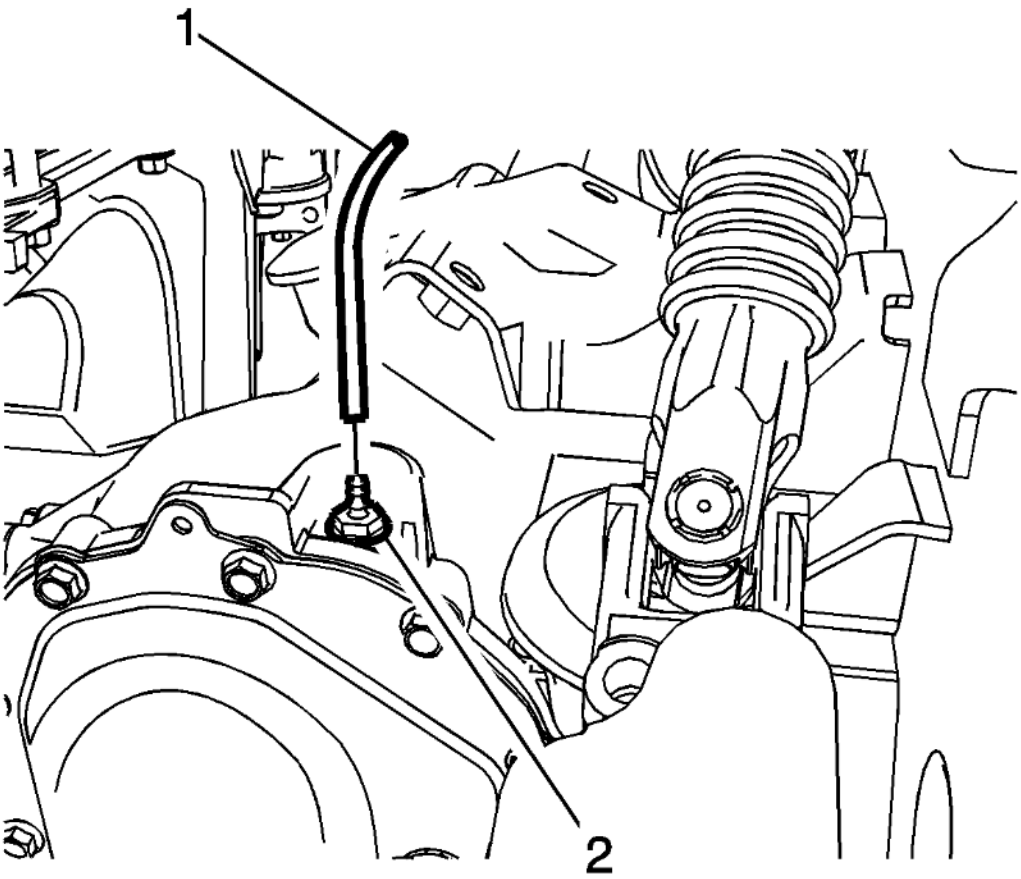


Fig. 171: Differential Carrier Vent And Hose
Courtesy of GENERAL MOTORS COMPANY

5. Install the vent hose (1) to the front differential carrier.
6. Install the wiring harness for the front drive axle actuator on the front differential carrier.
7. Install the electrical connector to the front drive axle actuator.
8. Install the right front differential carrier nuts. Refer to **Front Differential Carrier Bracket Replacement - Right Side (9.25 Inch Axle)**.
9. Install the steering gear skid shield, if equipped. Refer to **Steering Gear Skid Shield Replacement** .
10. Remove the hydraulic jack stand from the front differential carrier.
11. Remove the supports and lower the vehicle.

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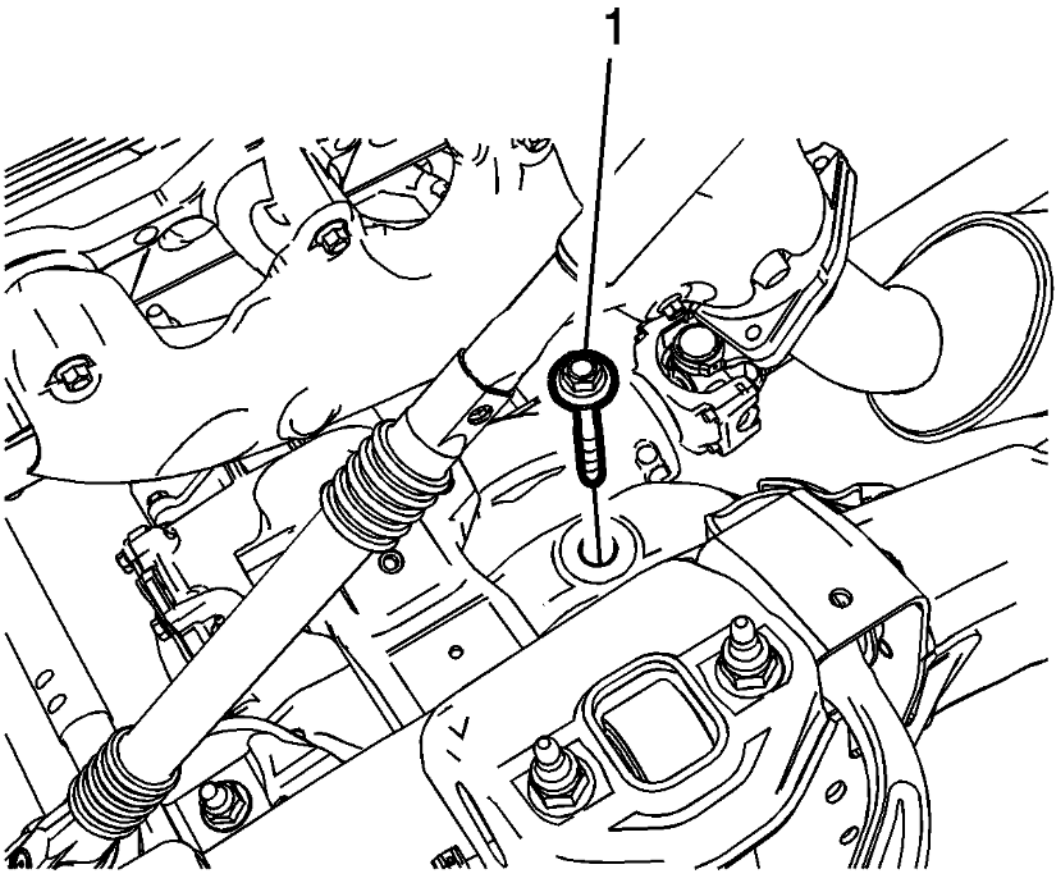


Fig. 172: Front Differential Bracket Upper Rear Bolt
Courtesy of GENERAL MOTORS COMPANY

12. Install the front differential bracket upper rear bolt (1) and tighten to 100 N.m (74 lb ft).

FRONT DIFFERENTIAL CARRIER BRACKET REPLACEMENT - LEFT SIDE (8.25 INCH AXLE)

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the steering gear skid shield from the vehicle, if equipped. Refer to **Steering Gear Skid Shield Replacement** .
3. Remove the electrical connector from the front drive axle actuator.
4. Remove the wiring harness for the front drive axle actuator from the front differential carrier.

NOTE: **Ensure that the front differential carrier is securely attached to the hydraulic jack stand.**

5. Support the front differential carrier with a suitable hydraulic jack.

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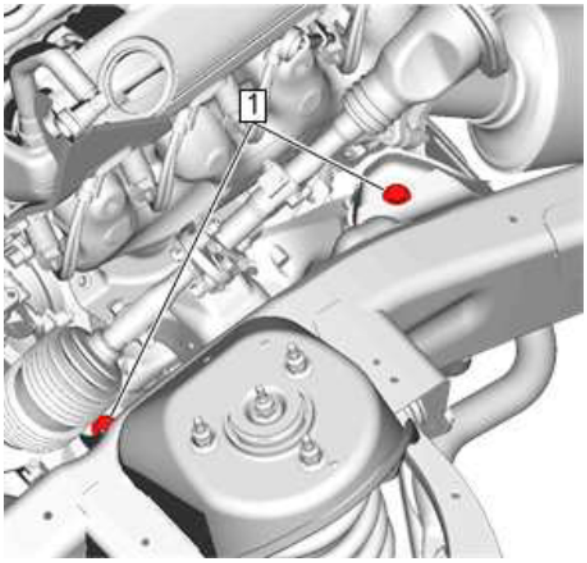


Fig. 173: Front Differential Bracket Upper Bolts
Courtesy of GENERAL MOTORS COMPANY

6. Remove the front differential bracket upper bolts (1).

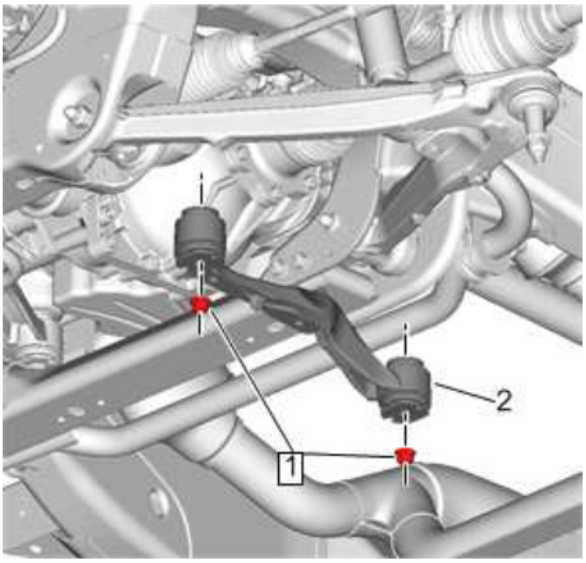


Fig. 174: Differential Carrier Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

7. Remove the differential carrier bracket nuts (1).

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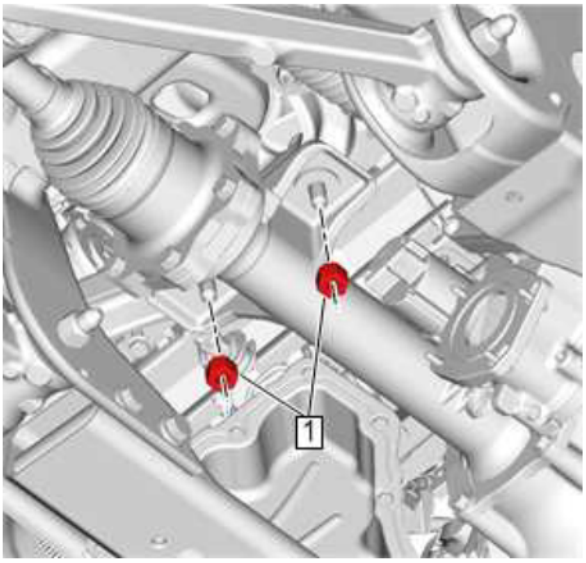


Fig. 175: Front Differential Carrier Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

8. Remove the right front differential carrier nuts. Refer to **Front Differential Carrier Bracket Replacement - Right Side (8.25 Inch Axle)**.

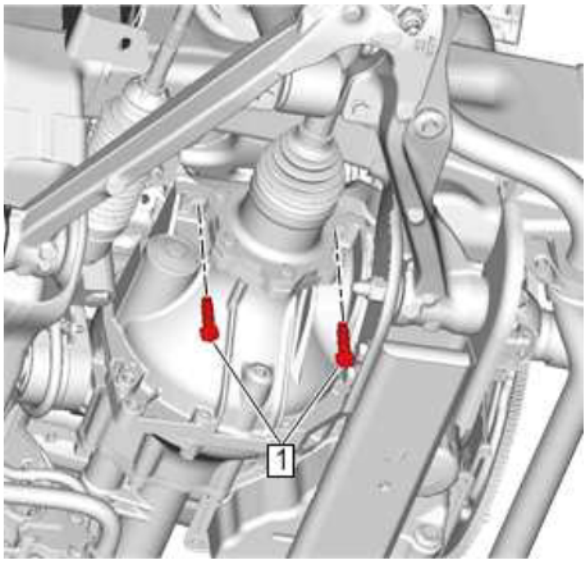


Fig. 176: Front Differential Carrier Bracket Bolts
Courtesy of GENERAL MOTORS COMPANY

9. Remove the front differential carrier bracket bolts (1).

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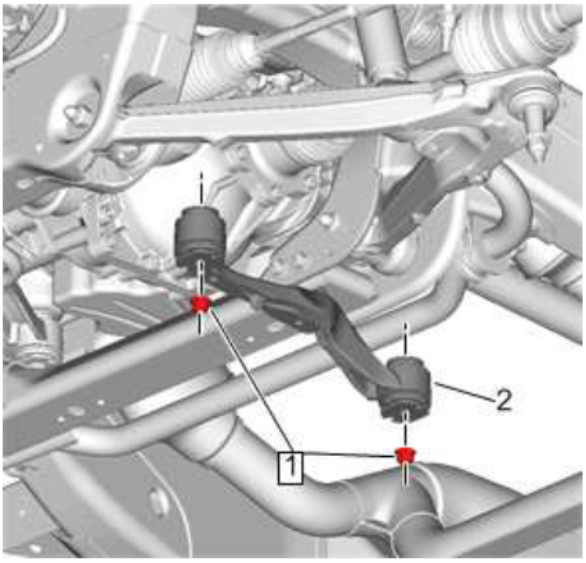


Fig. 177: Differential Carrier Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

10. Lower the front differential carrier assembly to gain enough clearance to remove the front differential carrier bracket (2).

NOTE: **It maybe necessary to maneuver the front differential carrier bracket in such away to remove it from the vehicle.**

11. Remove the front differential carrier bracket (2) from the vehicle.

Installation Procedure

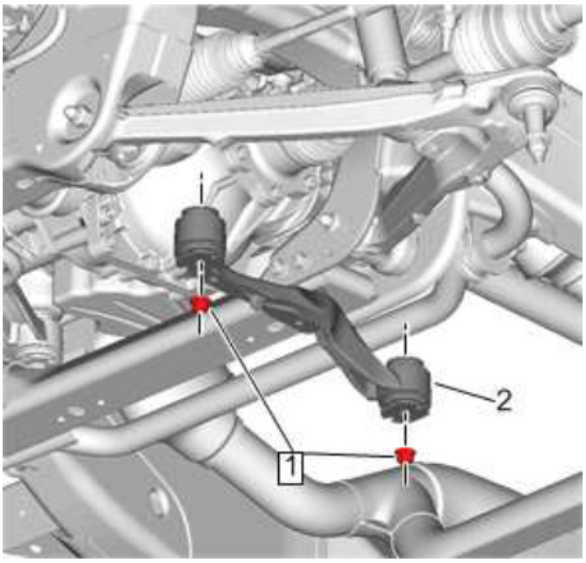


Fig. 178: Differential Carrier Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

1. Position the front differential bracket (2) between the frame and the front differential carrier.

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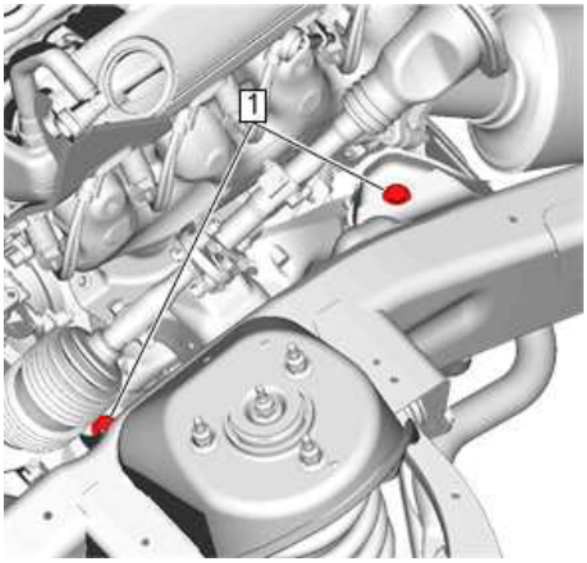


Fig. 179: Front Differential Bracket Upper Bolts
Courtesy of GENERAL MOTORS COMPANY

2. Install the front differential bracket upper bolts (1).

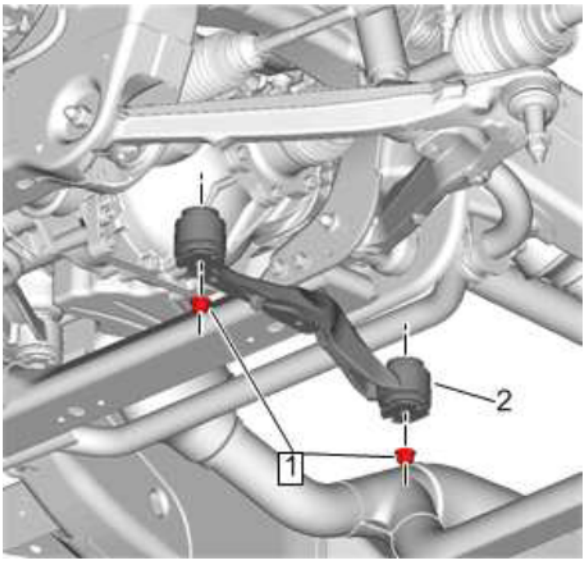


Fig. 180: Differential Carrier Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

3. Install the differential carrier bracket nuts (1) and tighten to 100 N.m (74 lb ft).
4. Using the hydraulic jack stand, lift the front differential carrier into the proper position.

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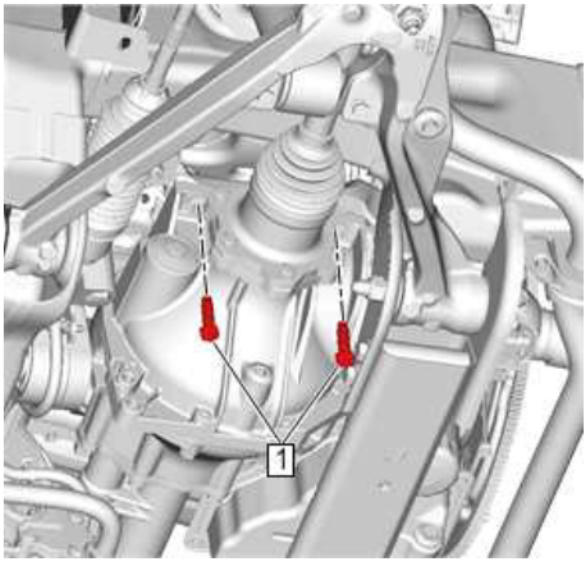


Fig. 181: Front Differential Carrier Bracket Bolts
Courtesy of GENERAL MOTORS COMPANY

5. Install the front differential carrier bolts (1) to the front differential carrier bracket and tighten to 100 N.m (74 lb ft)
6. Install the wiring harness for the front drive axle actuator on the front differential carrier.
7. Install the electrical connector to the front drive axle actuator.
8. Install the right front differential carrier nuts. Refer to **Front Differential Carrier Bracket Replacement - Right Side (8.25 Inch Axle)**.
9. Install the steering gear skid shield, if equipped. Refer to **Steering Gear Skid Shield Replacement** .
10. Remove the hydraulic jack stand from the front differential carrier.
11. Remove the supports and lower the vehicle.

FRONT AXLE LUBRICANT LEVEL INSPECTION (9.25 INCH AXLE)

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Make sure the vehicle is level.
3. Inspect the front axle for leaks. Refer to **Front Axle Lubricant Leak Diagnosis**.
4. Clean the area around the front axle fill plug.

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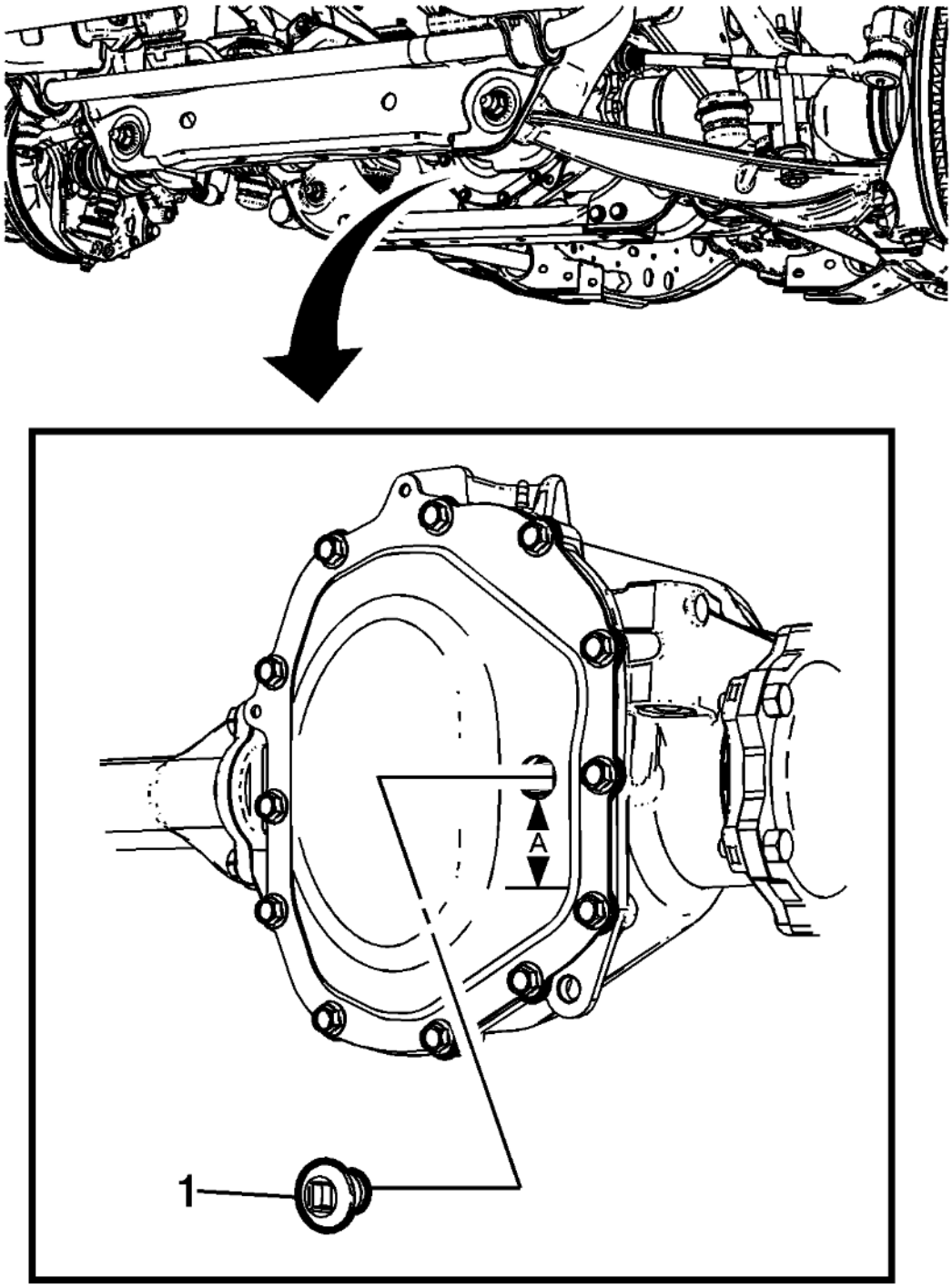


Fig. 182: Front Axle Fill Plug
Courtesy of GENERAL MOTORS COMPANY

5. Remove the front axle fill plug (1).
6. The oil level (A) should be between 0-6 mm (0-0.25 in) below the fill plug opening.
7. If the level is low, add oil until the level is between 0-6 mm (0-0.25 in). Use the correct fluid. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

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CAUTION: Refer to **Fastener Caution** .

8. Install the fill plug and tighten to 40 N.m (30 lb ft).
9. Lower the vehicle.

FRONT AXLE LUBRICANT LEVEL INSPECTION (8.25 INCH AXLE)

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Make sure the vehicle is level.
3. Inspect the front axle for leaks. Repair as necessary.
4. Clean the area around the front axle fill plug.

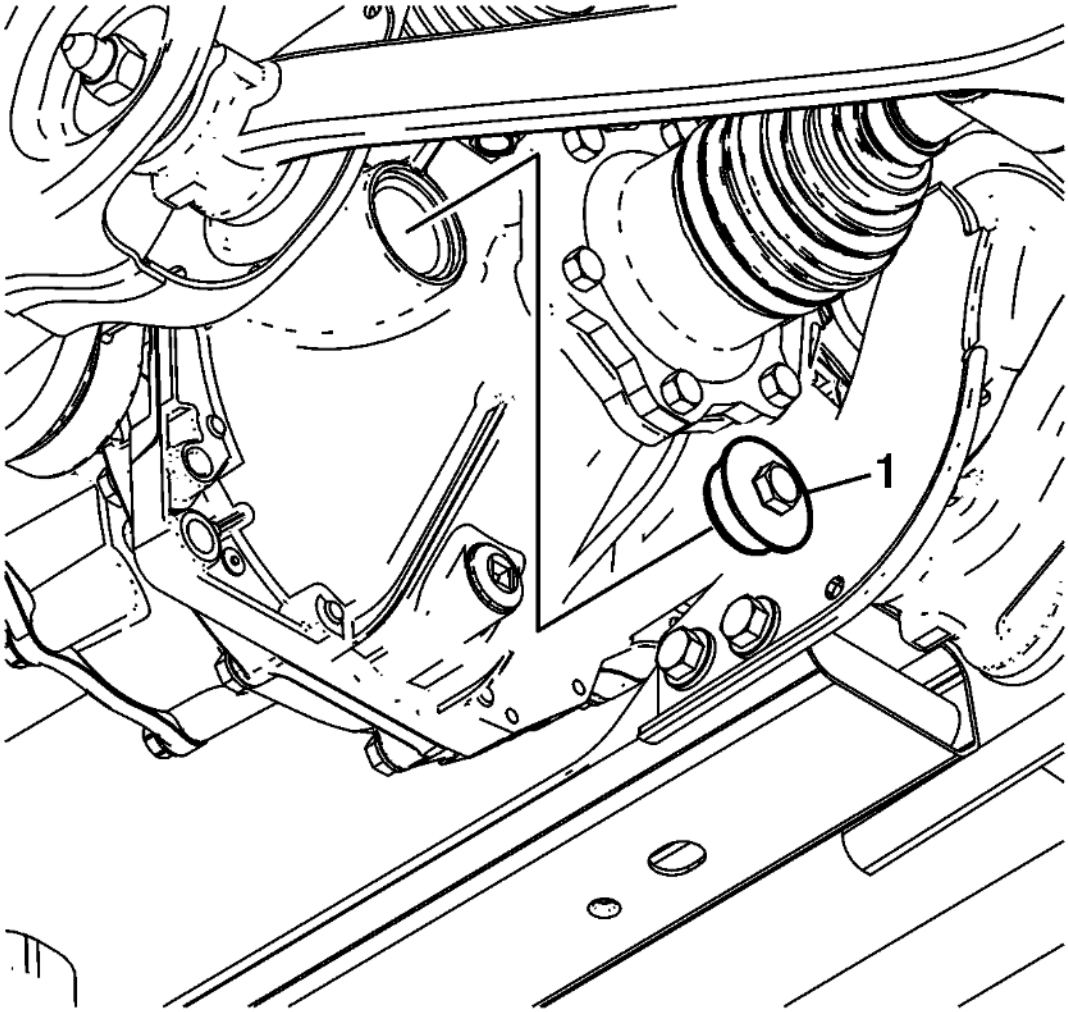


Fig. 183: Front Axle Fill Plug
Courtesy of GENERAL MOTORS COMPANY

5. Remove the front axle fill plug (1).
6. Inspect the oil level.

Specification

The oil level should be between 12-16 mm (0.50-0.625 in) below the fill plug opening.

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7. If the level is low, add oil until the level is between 12-16 mm (0.50-0.625 in). Use the correct fluid. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

CAUTION: Refer to Fastener Caution .

8. Install the fill plug and tighten to 33 N.m (24 lb ft).
9. Lower the vehicle.

FRONT DRIVE AXLE CLUTCH FORK INSPECTION

- Inspect the carrier connector for damaged splines and teeth. Replace as required.
- Inspect the shift 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.

FRONT DRIVE AXLE CLUTCH GEAR SHIM ADJUSTMENT

Special Tools

- **J-34672** Depth Micrometer
- **J-34673** Flat Gauge Bar
- **J-8001** Dial Indicator Set

The front drive axle clutch gear shim needs to be measured and adjusted if any of the following parts are replaced:

- The inner axle shaft
- The inner axle shaft housing
- The clutch shaft
- The differential carrier case
- The ring and pinion gears
- The differential assembly
- The differential bearings
- The carrier connector

Front drive axle clutch shims are available in the following sizes:

8.25 Inch Axle	9.25 Inch Axle
1.30 mm (0.05 in)	1.30 mm (0.05 in)
1.52 mm (0.06 in)	1.52 mm (0.06 in)
1.80 mm (0.07 in)	1.80 mm (0.07 in)
2.03 mm (0.08 in)	2.03 mm (0.08 in)
2.30 mm (0.09 in)	2.30 mm (0.09 in)
2.54 mm (0.10 in)	2.54 mm (0.10 in)
2.80 mm (0.11 in)	2.80 mm (0.11 in)
3.05 mm (0.12 in)	3.05 mm (0.12 in)

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8.25 Inch Axle	9.25 Inch Axle
3.30 mm (0.13 in)	3.30 mm (0.13 in)
3.55 mm (0.14 in)	3.55 mm (0.14 in)
3.80 mm (0.15 in)	3.80 mm (0.15 in)
4.05 mm (0.16 in)	4.05 mm (0.16 in)
4.30 mm (0.17 in)	4.30 mm (0.17 in)
4.55 mm (0.18 in)	4.55 mm (0.18 in)
4.80 mm (0.19 in)	4.80 mm (0.19 in)

1. Install the inner axle bearing and the inner axle seal, if necessary. Refer to **Front Drive Axle Inner Shaft Seal Replacement - Right Side**, **Front Drive Axle Inner Shaft Seal Replacement - Left Side**, and **Front Drive Axle Inner Shaft Bearing Replacement (Left Side)Front Drive Axle Inner Shaft Bearing Replacement (Right Side)**.

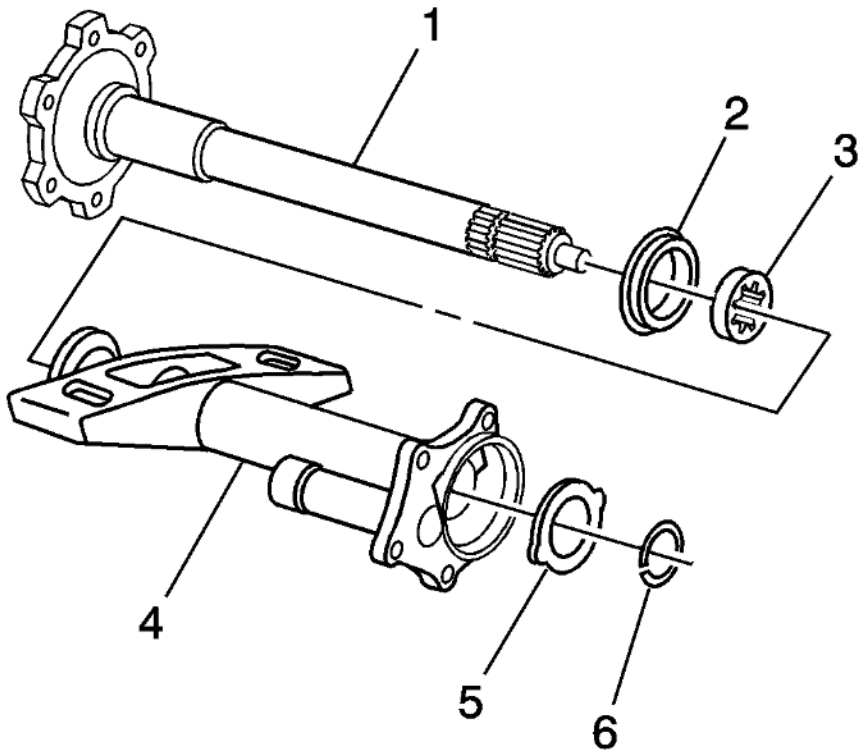


Fig. 184: Inner Axle Shaft Housing Components
Courtesy of GENERAL MOTORS COMPANY

2. Install the following components into the inner axle shaft housing:
    1. Install the inner axle shaft (1) into the inner axle shaft housing (4).
    2. Install the thrust washer (with tabs) (5).

    Ensure the tabs on the thrust washer are aligned with the slots in the inner shaft housing.

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3. Install the retaining ring (6) into the inner axle shaft (1).

3. Install the inner axle shaft housing into a vise. Clamp only on the mounting flange of the inner axle shaft housing.

NOTE: **In order to obtain an accurate measurement, the inner axle shaft must be moved outwards before measuring.**

4. Push on the inner end of the inner axle shaft and move the shaft outboard as far as it will go.

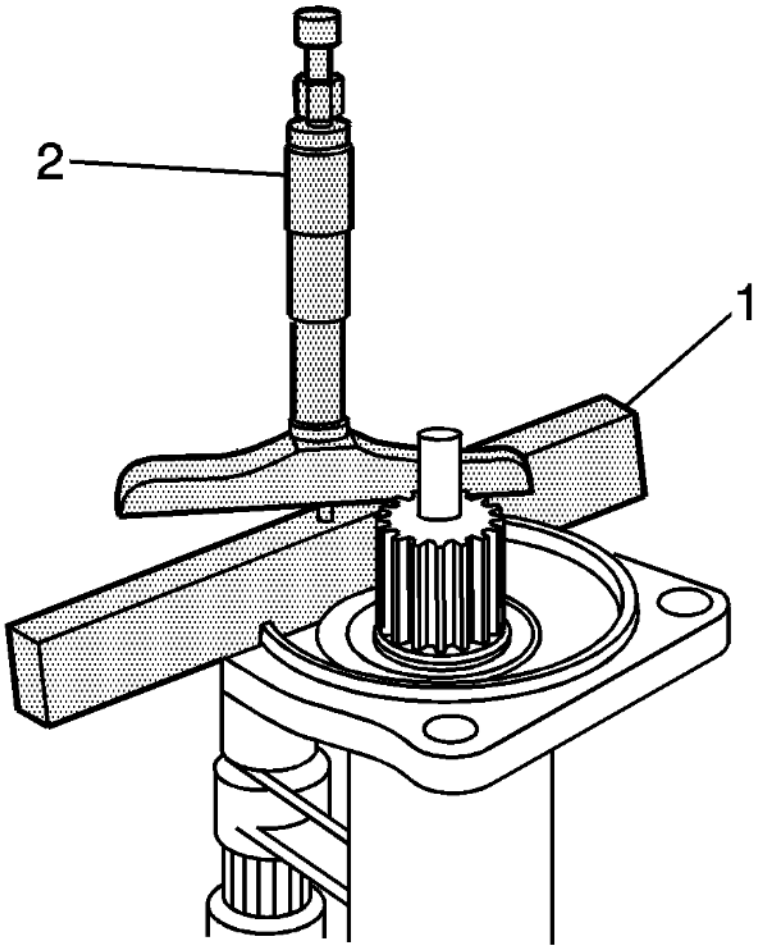


Fig. 185: Measuring Inner Axle Shaft Distance
Courtesy of GENERAL MOTORS COMPANY

5. Install the **J-34673** flat gauge bar (1) and the **J-34672** depth micrometer (2) onto the inner shaft housing as shown.
6. Using the **J-34672** depth micrometer , measure the distance from the edge of the inner axle shaft to the surface of the **J-34673** flat gauge bar. Ensure the base of the **J-34672** depth micrometer is flat against the inner axle shaft.

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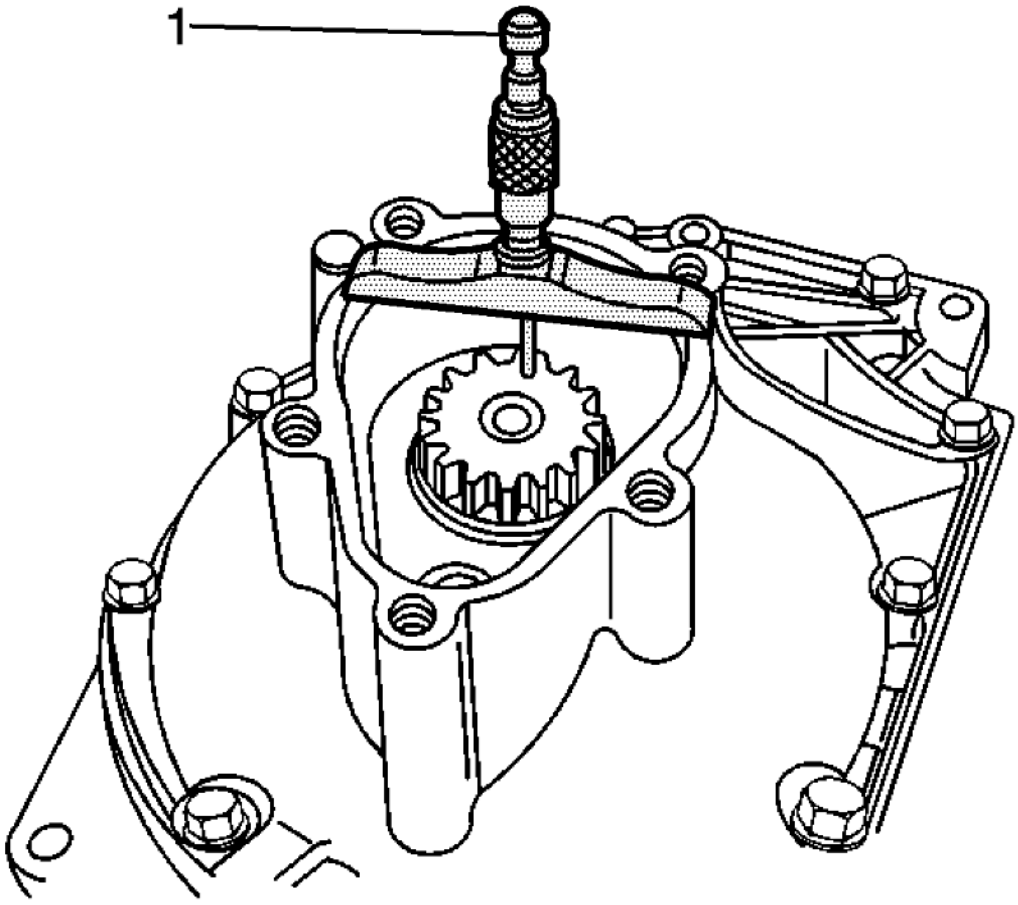


Fig. 186: Measuring Differential Carrier Housing Machined Surface To Front Drive Axle Clutch Shaft Outer Surface
Courtesy of GENERAL MOTORS COMPANY

7. Using the **J-34672** depth micrometer , measure the distance from the machined surface of the differential carrier housing to the outer surface of the front drive axle clutch shaft.
8. Subtract the measurement obtained in step 6 from the measurement obtained in step 7.

   This measurement is the distance between the inner axle shaft and the clutch shaft before subtracting the **J-34673** flat gauge bar.

9. Using a micrometer, measure the thickness of the **J-34673** flat gauge bar.
10. Subtract the thickness of the **J-34673** flat gauge bar , measured in step 9, from the measurement determined in step 8.

    This is the shim thickness for the front axle without having any axle shaft endplay.

11. The correct shim size will be one size smaller than the figure obtained in the previous step.

    Note the following examples:

    - If the figure obtained in step 8 was 3.53 mm (0.139 in), use a 3.30 mm (0.130 in) shim.

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- If the figure obtained in step 8 was 3.30 mm (0.130 in), use a 3.05 mm (0.120 in) shim.

Alternate Adjustment Method

NOTE: Use this method only if the proper tools for calculating the shim size are unavailable.

1. Install the original shim to the shaft.

   Use the chassis grease in order to hold the shim in place.

2. Install the inner axle housing assembly to the differential carrier case.

   Do not use sealer at this time.

CAUTION: Refer to Fastener Caution .

3. Install the bolts and tighten to 40 N.m (30 lb ft).

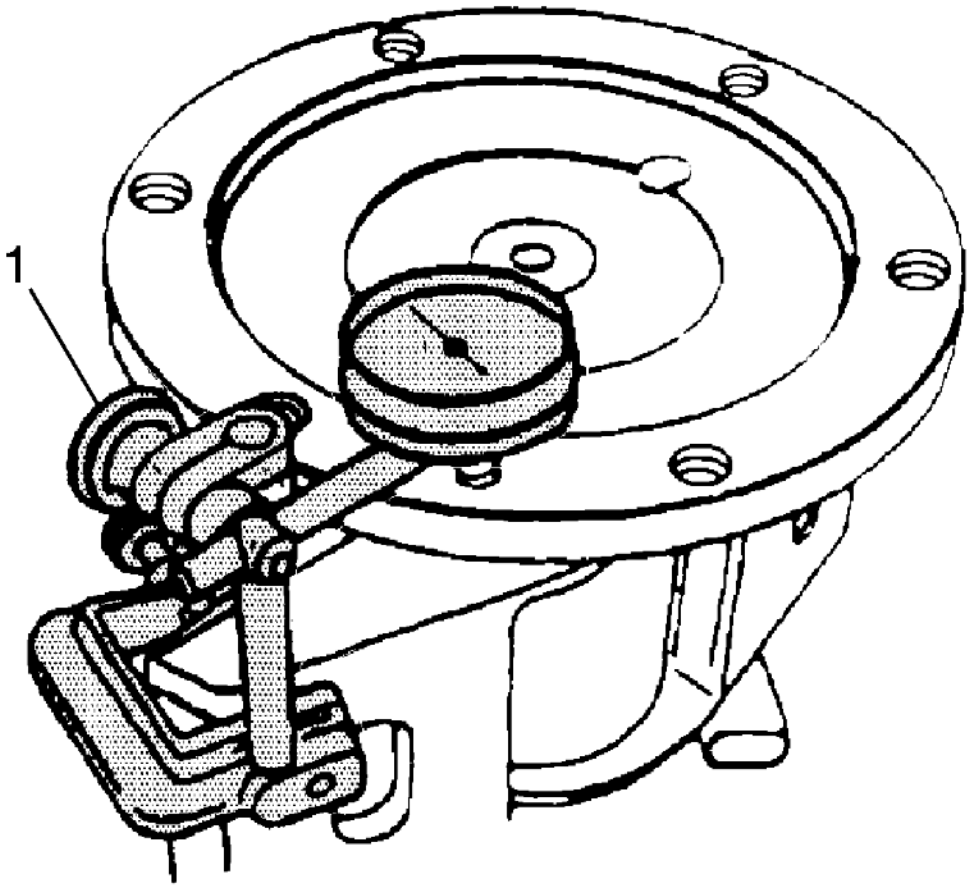


Fig. 187: Measuring Shaft End
Courtesy of GENERAL MOTORS COMPANY

4. Measure the shaft end play using the following procedure:

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1. Install the **J-8001** dial indicator set or the equivalent on the axle tube end.

   The plunger of the indicator must be at a right angle to the axle flange.

2. Move the shaft back and forth and read the end play.

   The correct end play is 0.03-0.51 mm (0.001-0.020 in).

3. If the end play is incorrect, install a thicker or thinner shim as needed in order to bring the end play into the specified range.

FRONT AXLE DISASSEMBLE (8.25 INCH AXLE)

Special Tools

- **J-22912-B** Split-Plate Bearing Puller
- **J-2619-01** Slide Hammer
- **J-29369-1** Bushing and Bearing Remover
- **J-34011** Pilot Bearing Remover
- **J-36598** Holding Fixture
- **J-36614** Inner Pinion Bearing Installer
- **J-45765** Pinion Remover
- **J-45858** Front Axle Bearing Race Remover/Installer
- **J-8614-01** Flange and Pulley Holding Tool

Inspection Procedure

Perform the following before disassembling the axle:

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. Check the ring gear backlash. Refer to **Backlash Inspection and Adjustment**.

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

1. Install the differential carrier assembly in a vise.

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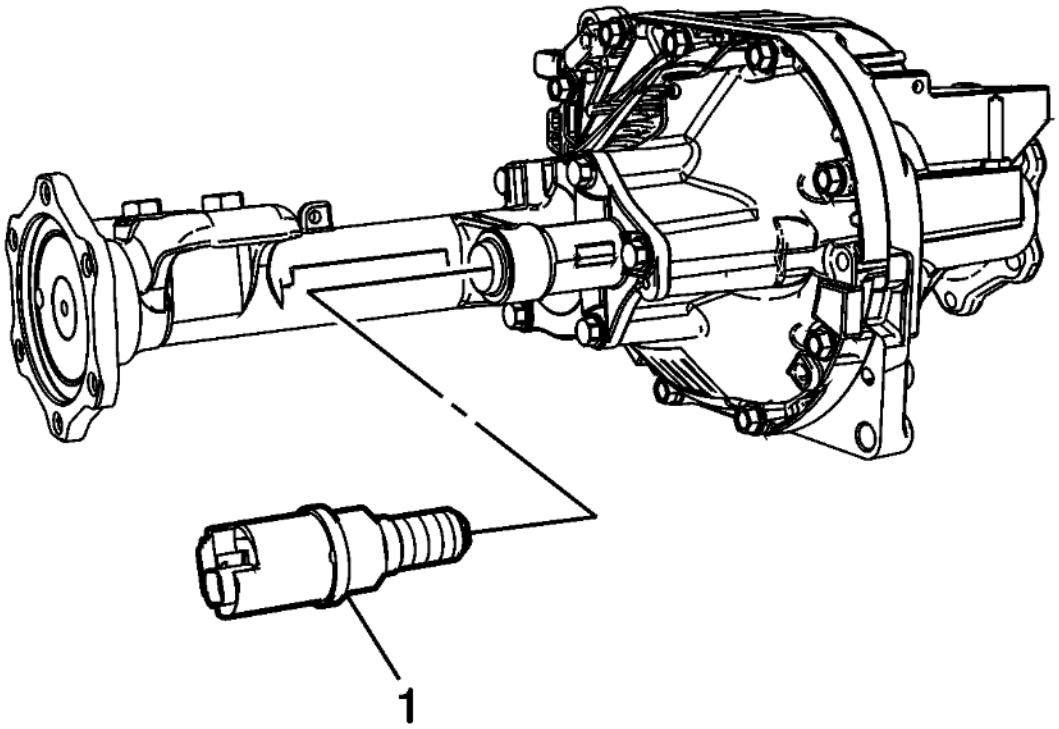


Fig. 188: Front Axle Actuator
Courtesy of GENERAL MOTORS COMPANY

2. Remove the front axle actuator (1).

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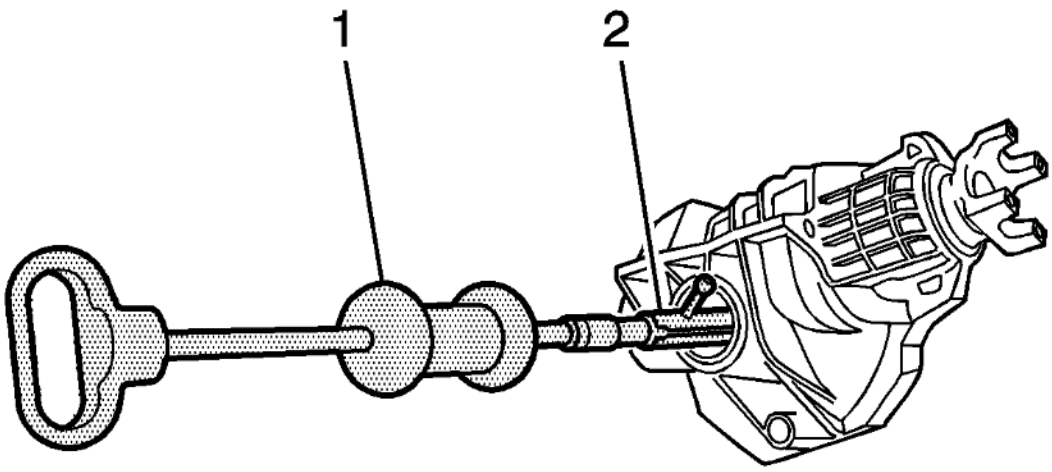


Fig. 189: View Of Differential Carrier Assembly Special Tools
Courtesy of GENERAL MOTORS COMPANY

3. Remove the left side inner axle shaft bearing and the inner axle shaft seal by performing the following steps:
    1. Install the **J-29369-1** bushing and bearing remover (1) behind the inner axle shaft bearing.
    2. Install the **J-2619-01** slide hammer (2) to the **J-29369-1** bushing and bearing remover (1).
    3. Using the **J-2619-01** slide hammer , remove the inner axle shaft bearing and the seal .
4. Remove the inner axle shaft housing to differential carrier assembly bolts.

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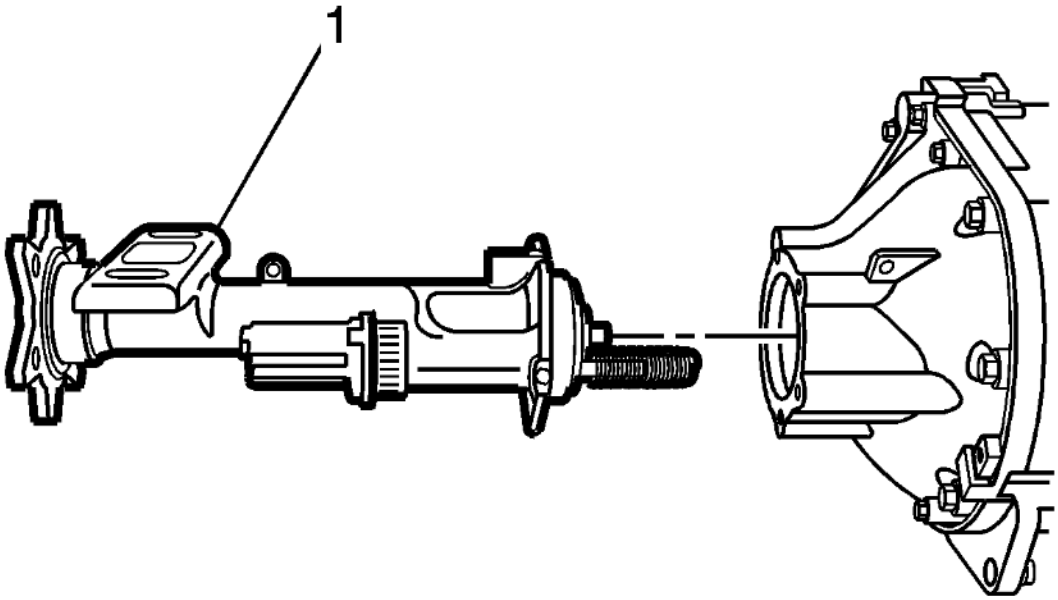


Fig. 190: Installing Inner Axle Shaft Housing Assembly - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

5. Carefully remove the inner axle shaft housing (1) with the inner axle shaft and clutch fork components from the differential carrier assembly.

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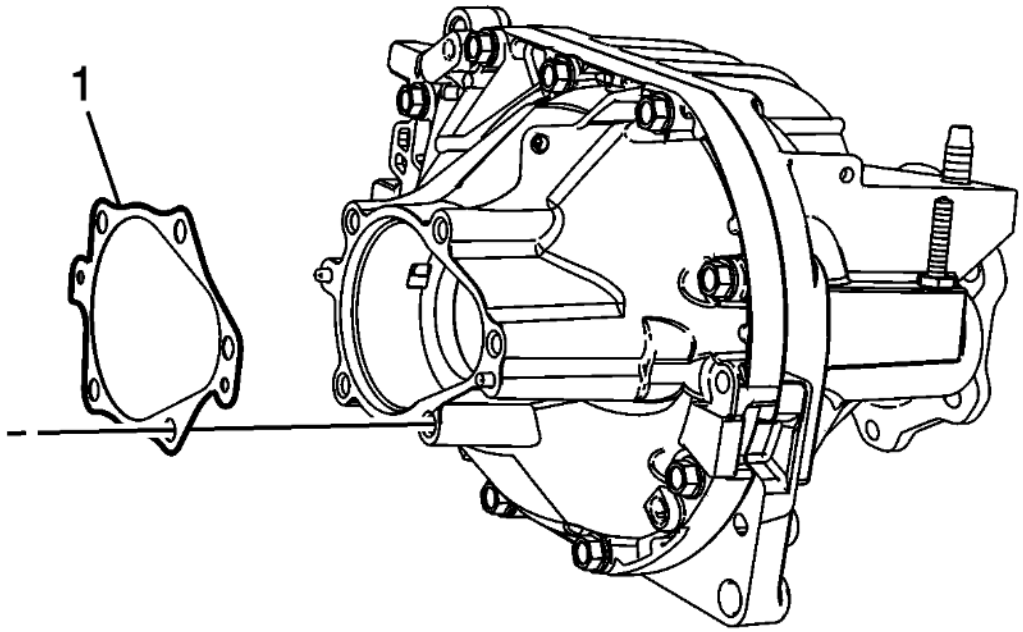


Fig. 191: Inner Axle Housing To Differential Carrier Gasket
Courtesy of GENERAL MOTORS COMPANY

6. Remove the inner axle housing to differential carrier gasket (1).

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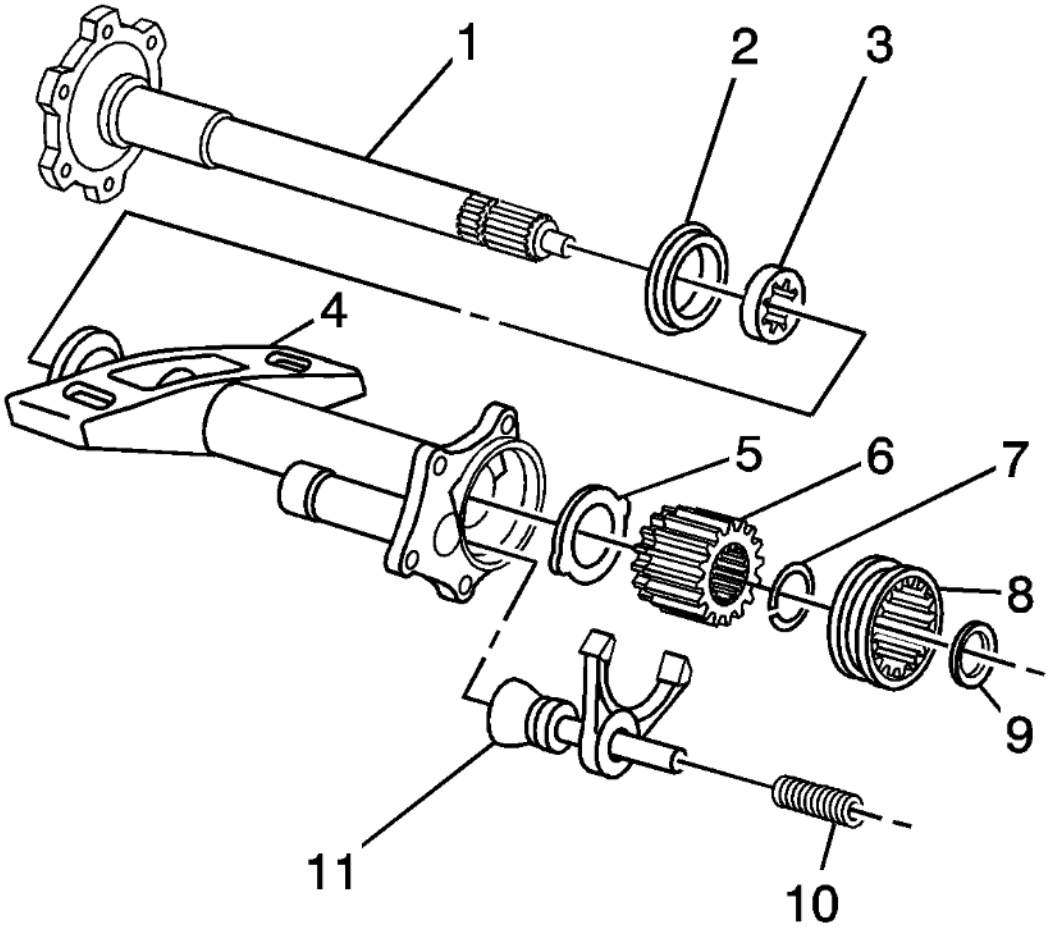


Fig. 192: Inner Axle Shaft Housing Components (8.25 Inch)
Courtesy of GENERAL MOTORS COMPANY

7. Remove the following components from the inner axle shaft housing:
    1. The clutch fork inner spring (10)
    2. The clutch fork assembly (11)
    3. The clutch shaft shim (9)
    4. The clutch shaft sleeve (8)
    5. The front drive axle clutch gear (6) by doing the following:
        1. Clamp the inner axle shaft housing (4) in a vise.

            Clamp only on the mounting flange.

        2. Strike the inside surface of the shaft (1) flange with a hammer and a brass drift in order to dislodge the front drive axle clutch gear (6) from the inner axle shaft (1).
    6. Remove the front drive axle clutch gear (6)
    7. Remove the thrust washer (5)
    8. Remove the inner axle shaft (1)

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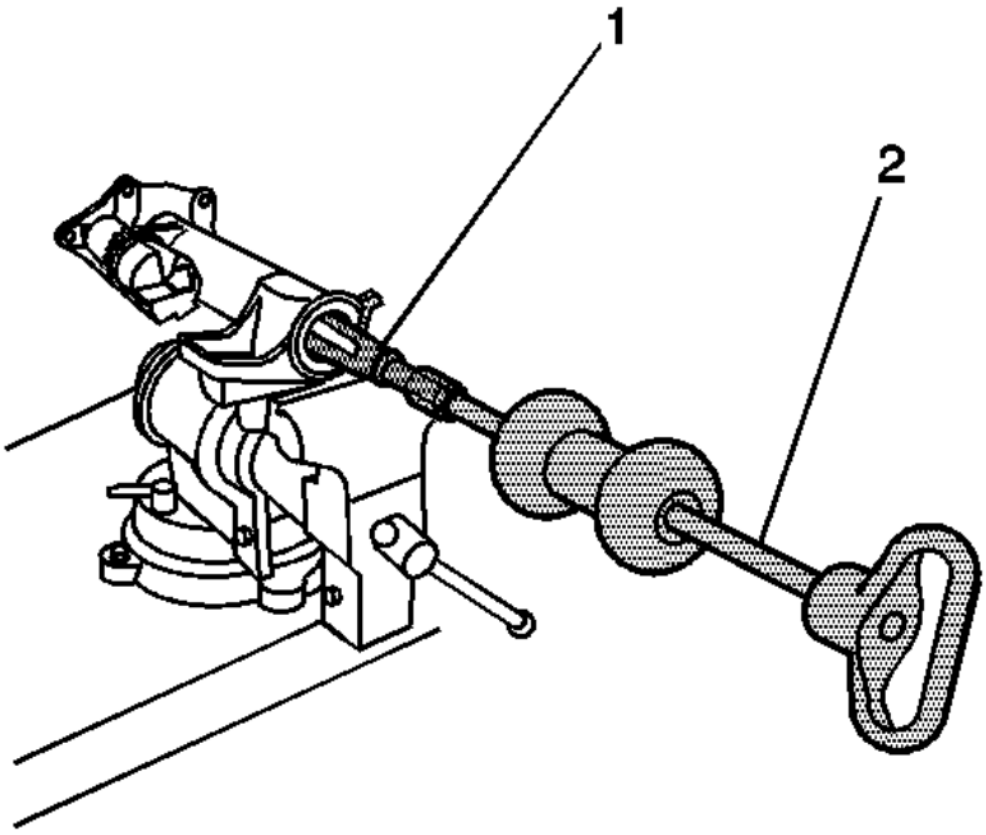


Fig. 193: Inner Axle Shaft Seal And/Or The Inner Axle Shaft Bearing And Special Tools
Courtesy of GENERAL MOTORS COMPANY

8. Remove the right side inner axle shaft bearing and the inner axle shaft seal by performing the following steps:
    1. Place the differential carrier assembly into a vise.

       Clamp only on the mounting flange of the differential carrier assembly case.

    2. Install the **J-29369-1** bushing and bearing remover (1) behind the inner axle shaft bearing.
    3. Install the **J-2619-01** slide hammer (2) to the **J 29369-1** bushing and bearing remover (1).
    4. Using the **J-2619-01** slide hammer (2), remove the inner axle shaft bearing and the inner axle shaft seal.
9. Remove the differential carrier assembly from the vise.
10. Remove the front drive axle clutch shaft.

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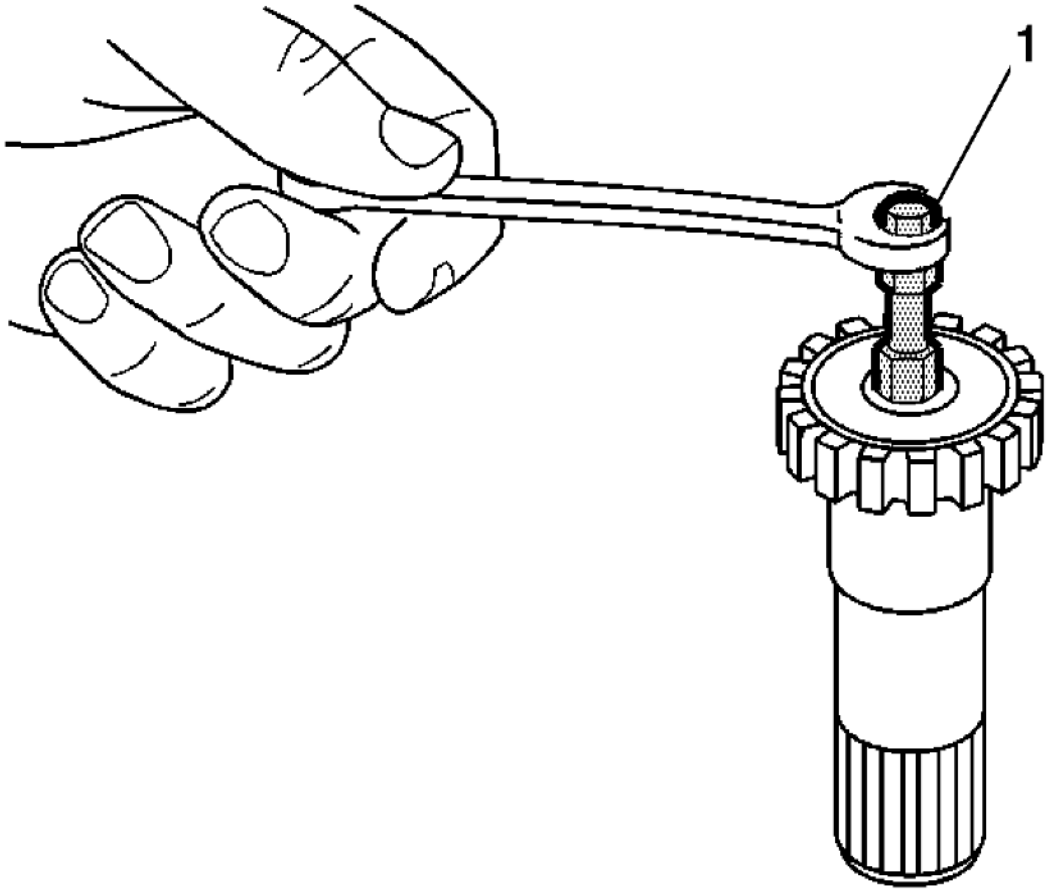


Fig. 194: Removing Clutch Shaft Pilot Bearing - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

11. Using the **J-34011** pilot bearing remover (1), remove the clutch shaft bearing.

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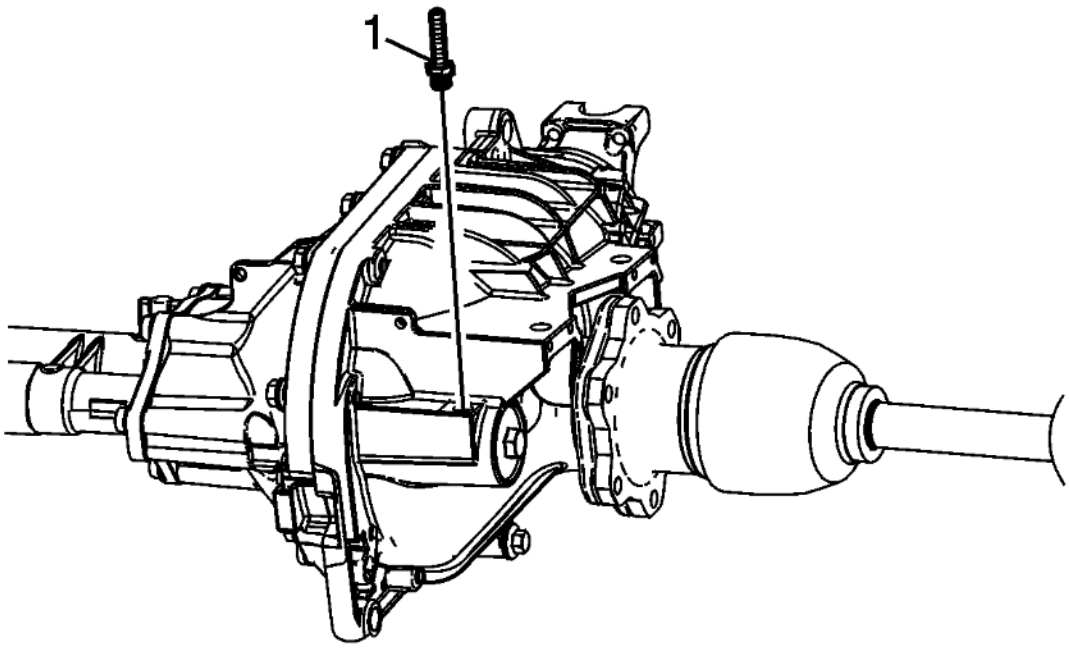


Fig. 195: Vent Connector
Courtesy of GENERAL MOTORS COMPANY

12. Remove the vent connector (1).

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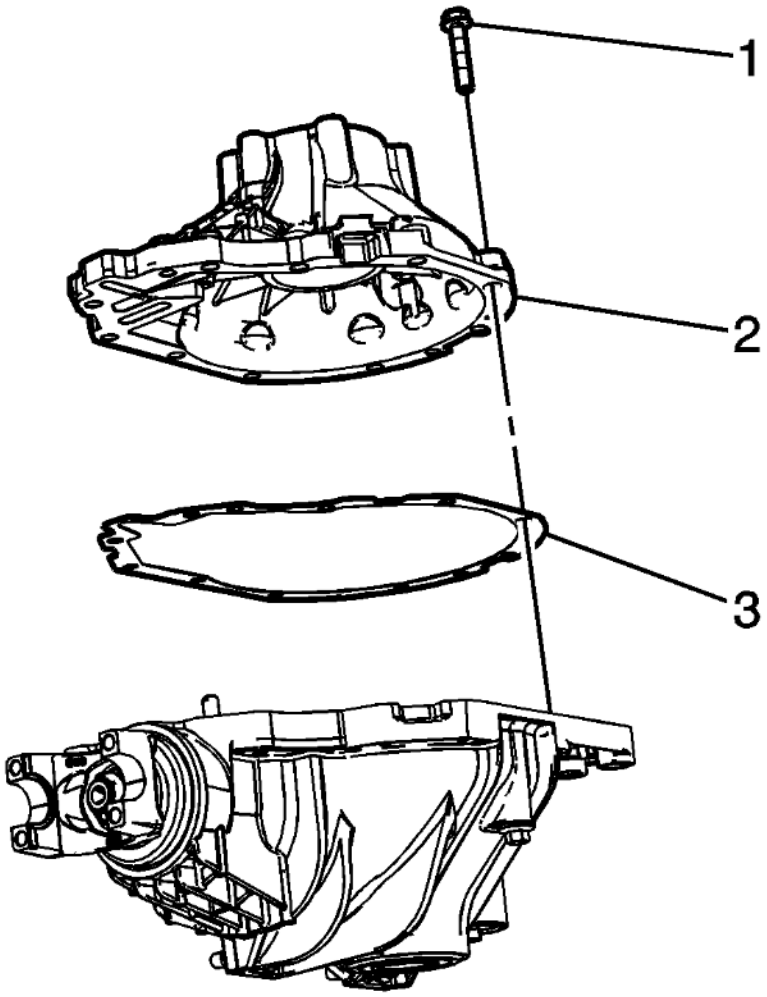


Fig. 196: View Of Differential Carrier Housing, Gasket & Bolts
Courtesy of GENERAL MOTORS COMPANY

13. Remove the differential carrier assembly bolts (1).
14. Separate the left carrier case half from the right carrier case half (2) by tapping on the on the carrier case with a hammer and a brass drift.
15. Remove the differential carrier housing (2) and the differential carrier housing gasket (3).
16. Remove the differential case assembly.

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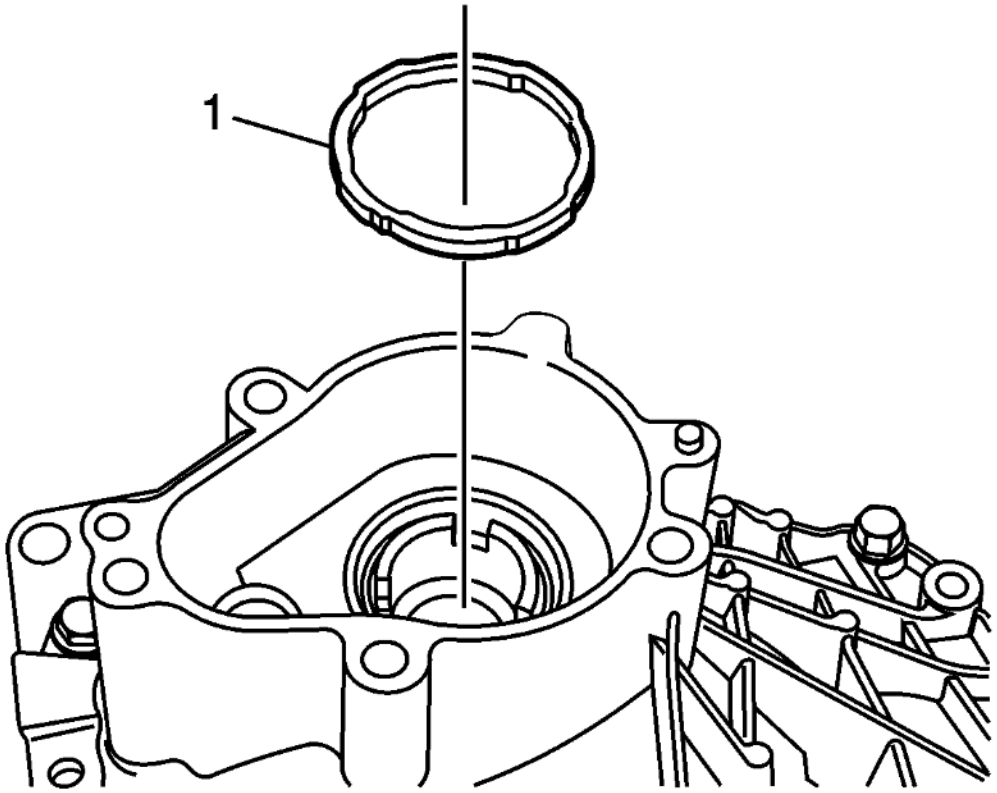


Fig. 197: Differential Bearing Adjuster Nut Locks
Courtesy of GENERAL MOTORS COMPANY

17. Using a suitable remover, remove the differential bearing adjuster nut locks (1).

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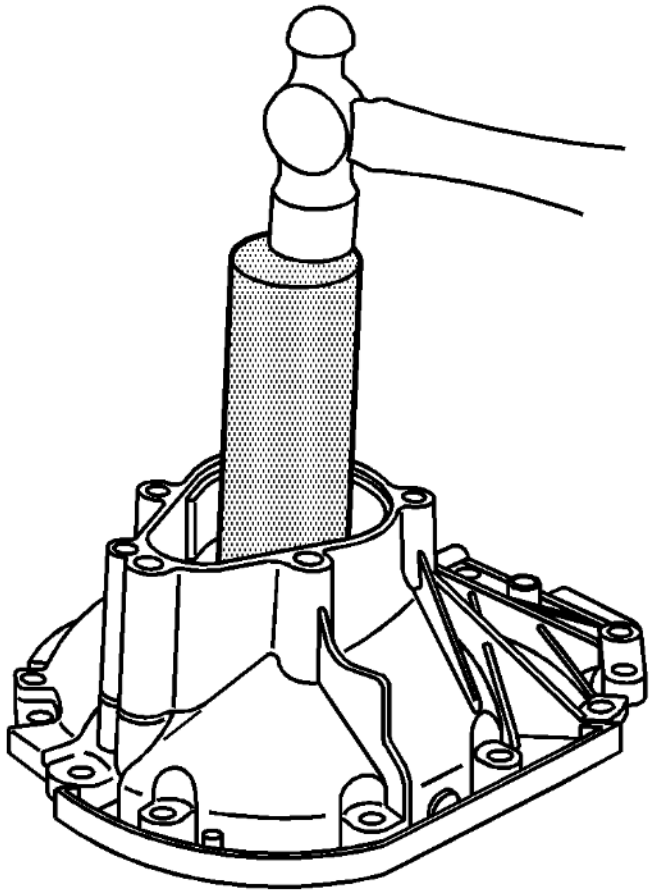


Fig. 198: Inner Pinion Bearing Installer
Courtesy of GENERAL MOTORS COMPANY

18. Using the **J-36614** inner pinion bearing installer , remove the differential bearing adjuster nuts and the differential bearing cups.

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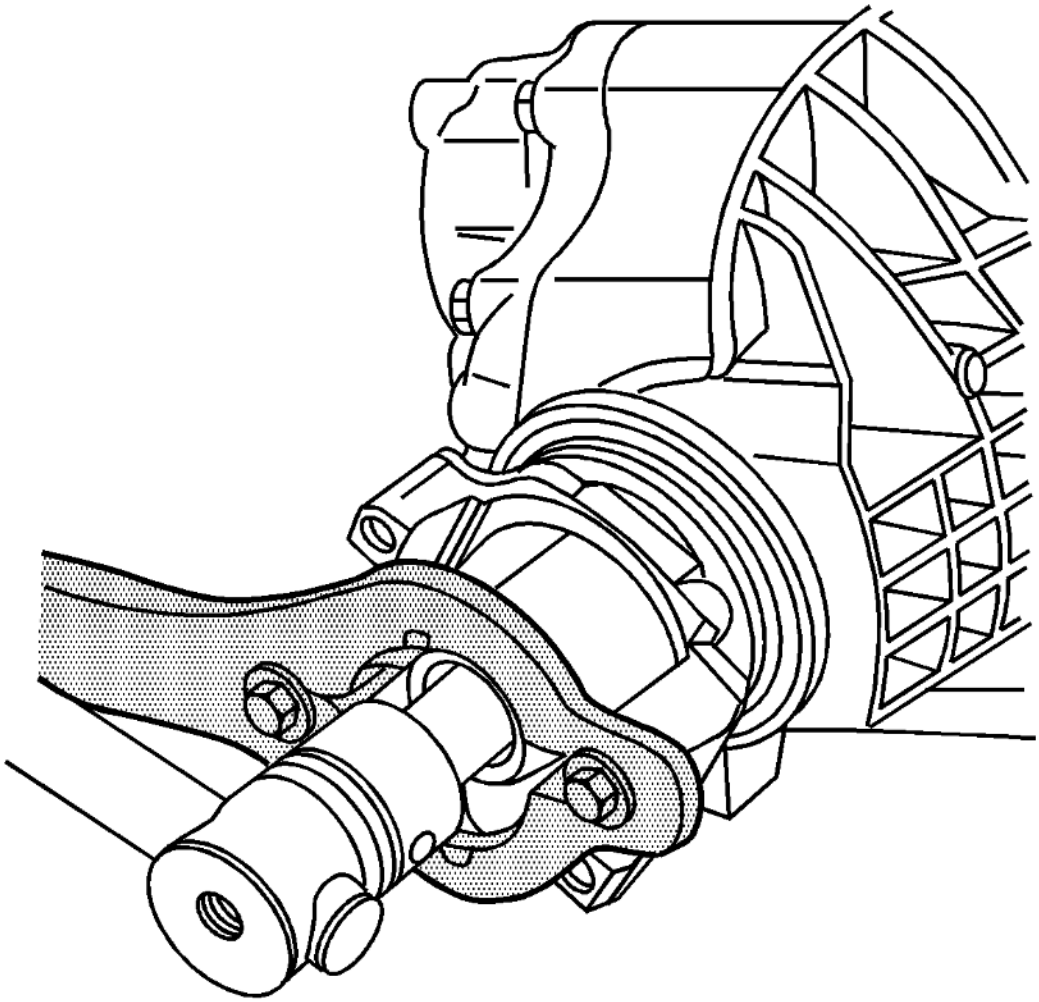


Fig. 199: Flange And Pulley Holding Tool
Courtesy of GENERAL MOTORS COMPANY

19. Install the **J-8614-01** flange and pulley holding tool as shown.

    Remove the pinion nut while holding the **J-8614-01** flange and pulley holding tool.

20. Remove the washer.

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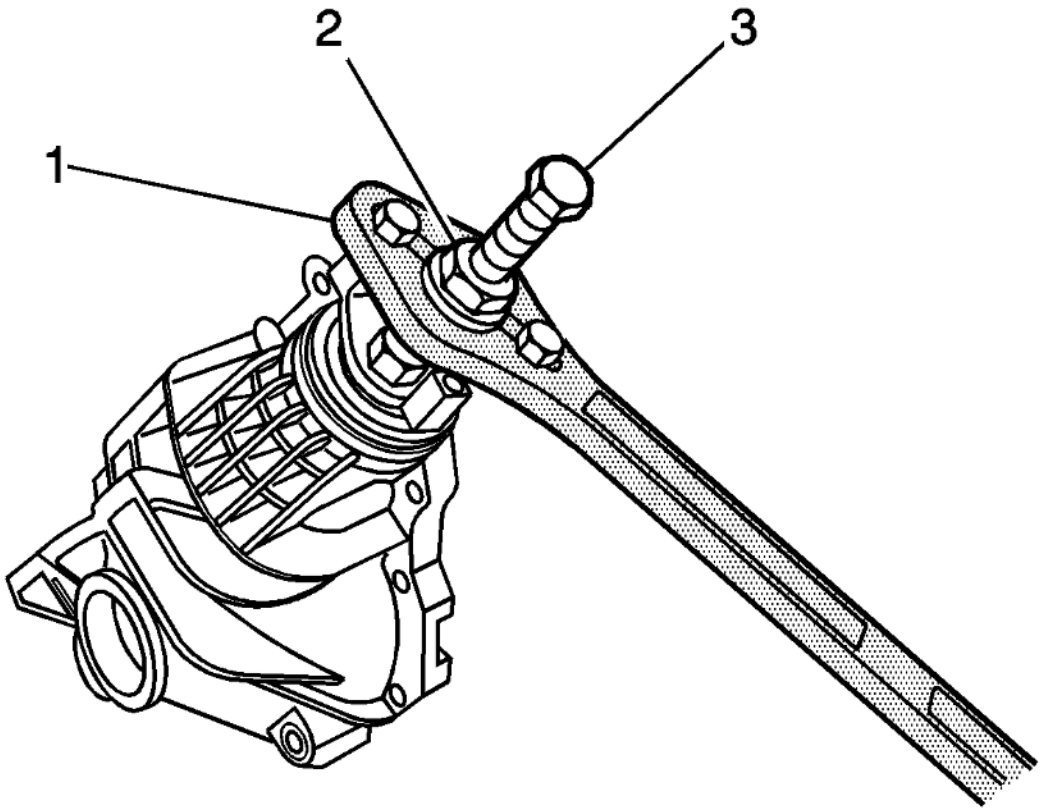


Fig. 200: View Of Pinion Yoke Removal Tools
Courtesy of GENERAL MOTORS COMPANY

21. Install the J-8614-2 (2) and the J-8614-3 (3) into the **J-8614-01** flange and pulley holding tool (1) as shown.
22. Remove the pinion yoke by turning the J-8614-3 (3) clockwise while holding the **J-8614-01** flange and pulley holding tool (1).
23. The steps below explain how to remove the drive pinion and pinion bearing cups using the **J-36598** holding fixture or the **J-45765** pinion remover and the **J-45858** front axle bearing race remover/installer. Follow the appropriate steps depending on what tool is available.
24. Install the **J-36598** holding fixture into a vise.

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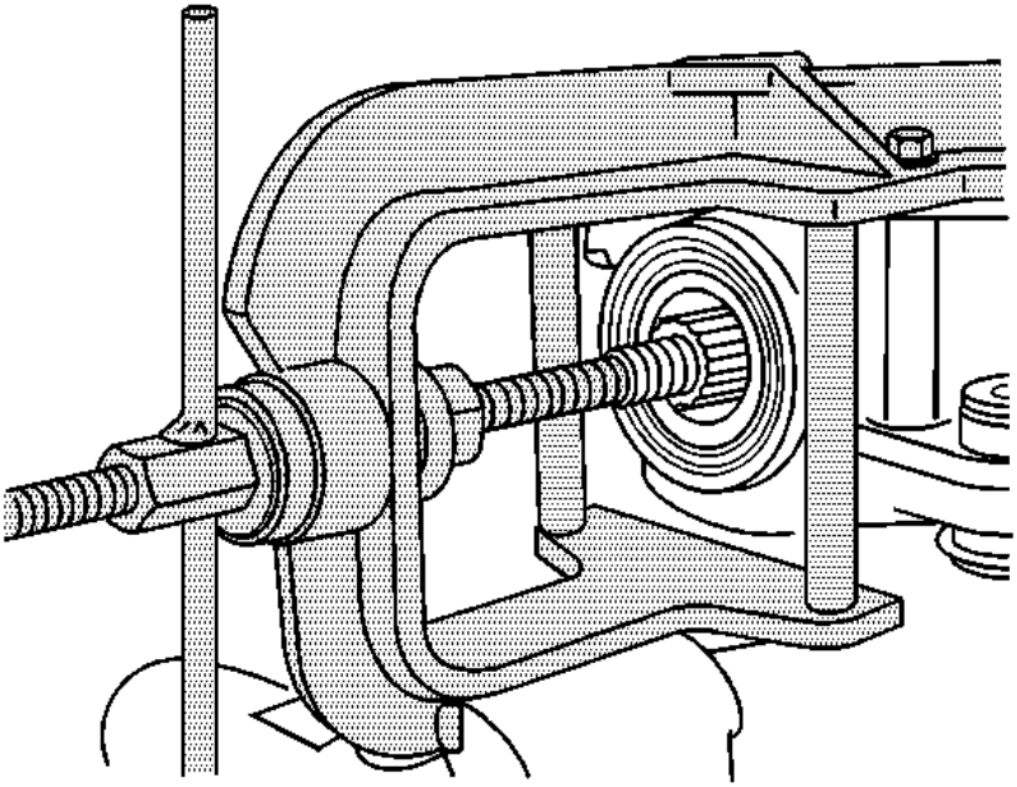


Fig. 201: Removing Pinion
Courtesy of GENERAL MOTORS COMPANY

25. Install the left differential carrier case half onto the **J-36598** holding fixture and the J-36598 (only 3 of the 4 mounting bolts will be used).
26. While holding the forcing screw of the **J-36598** holding fixture , turn the handle of the **J-36598** holding fixture counterclockwise in order to remove the pinion with the following components:
    - The pinion gear selectable shim
    - The inner pinion bearing
    - The collapsible spacer

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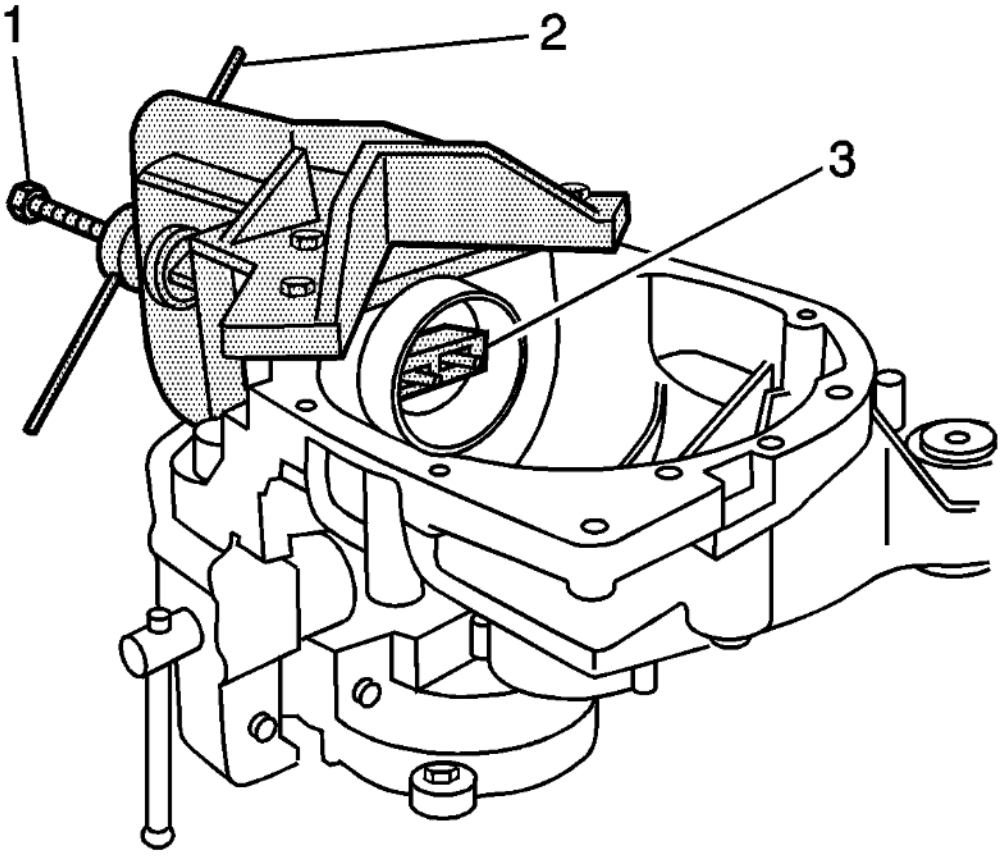


Fig. 202: Pressing Inner Bearing Cup Out From Differential Carrier Case
Courtesy of GENERAL MOTORS COMPANY

27. Install the J 36598-5 (3) behind the inner pinion bearing cup.
28. Thread the forcing screw of the **J-36598** holding fixture (1) onto the J-36598-5 (3) until fully seated.
29. While holding the forcing screw of the **J-36598** holding fixture (1), turn the handle of the **J-36598** holding fixture (2) counterclockwise and press the inner bearing cup out from the differential carrier case.

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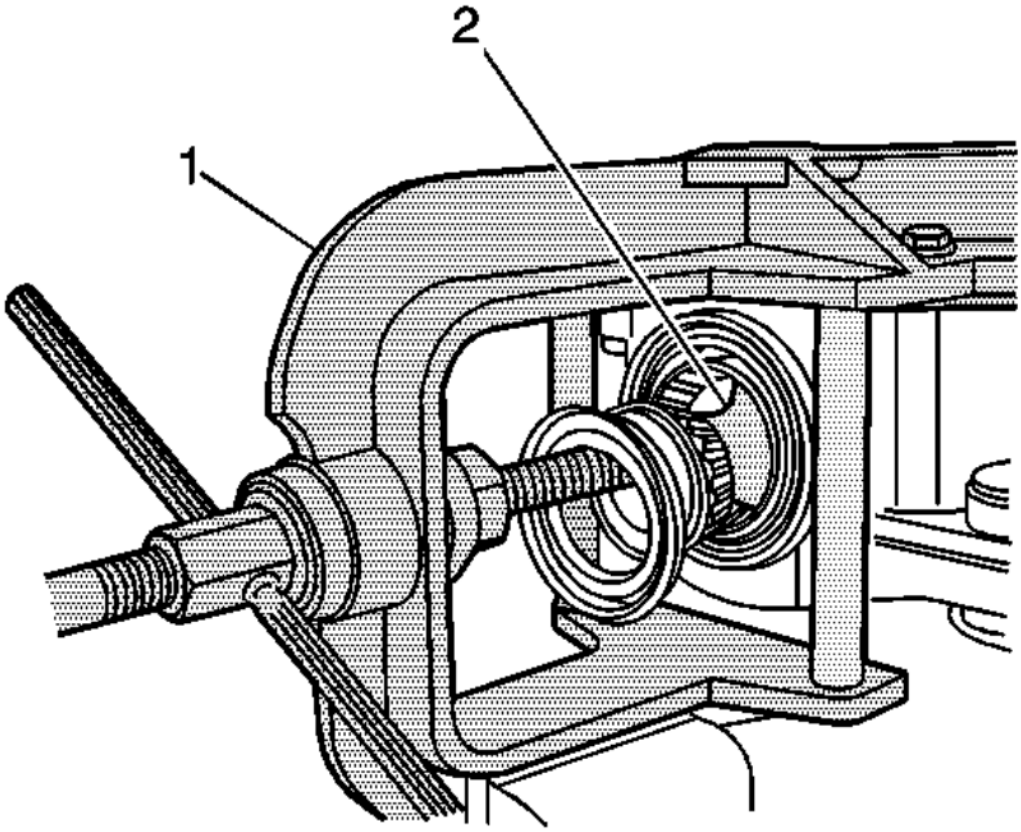


Fig. 203: Removing Pinion Oil Seal & Bearing
Courtesy of GENERAL MOTORS COMPANY

30. Install the J 36598-5 (2) behind the outer pinion bearing cup.
31. Install the forcing screw of the **J-36598** holding fixture (1) to the J-36598-5 (2).
32. While holding the forcing screw of the **J-36598** holding fixture , turn the handle of the **J-36598** holding fixture clockwise in order to remove the following components:
    - The pinion oil seal
    - The pinion outer bearing
    - The pinion outer bearing cup

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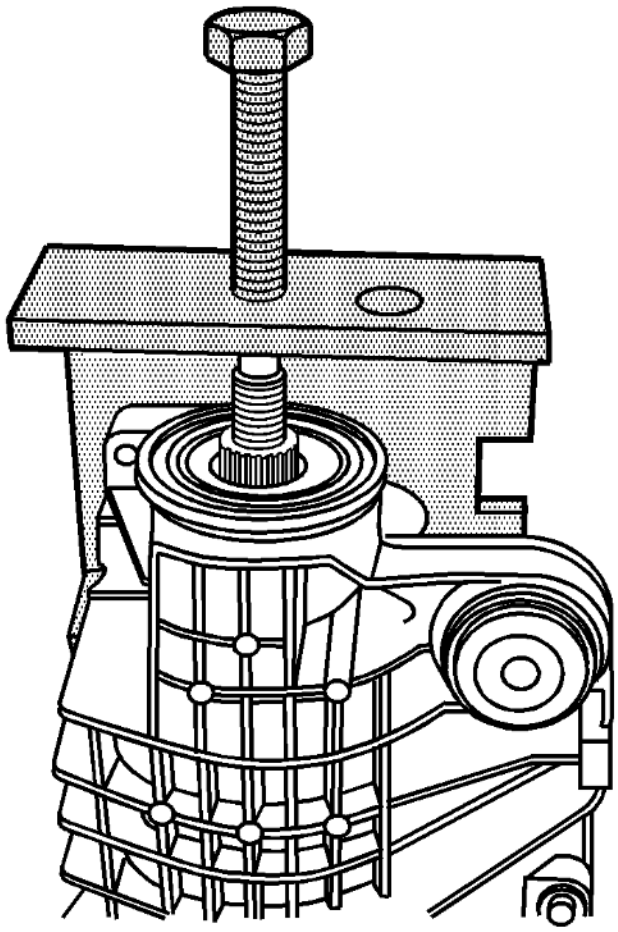


Fig. 204: Removing Pinion Components
Courtesy of GENERAL MOTORS COMPANY

33. Install the **J-45765** pinion remover to the left side differential carrier case half over the drive pinion as shown.
34. Turn the forcing screw of the **J-45765** pinion remover clockwise to remove the following components from the left side differential carrier case half:
    - The drive pinion gear
    - The pinion gear selectable shim
    - The inner pinion bearing
    - The collapsible spacer
35. Remove the drive pinion seal using a suitable seal remover.
36. Remove the outer pinion bearing from the differential carrier case half.

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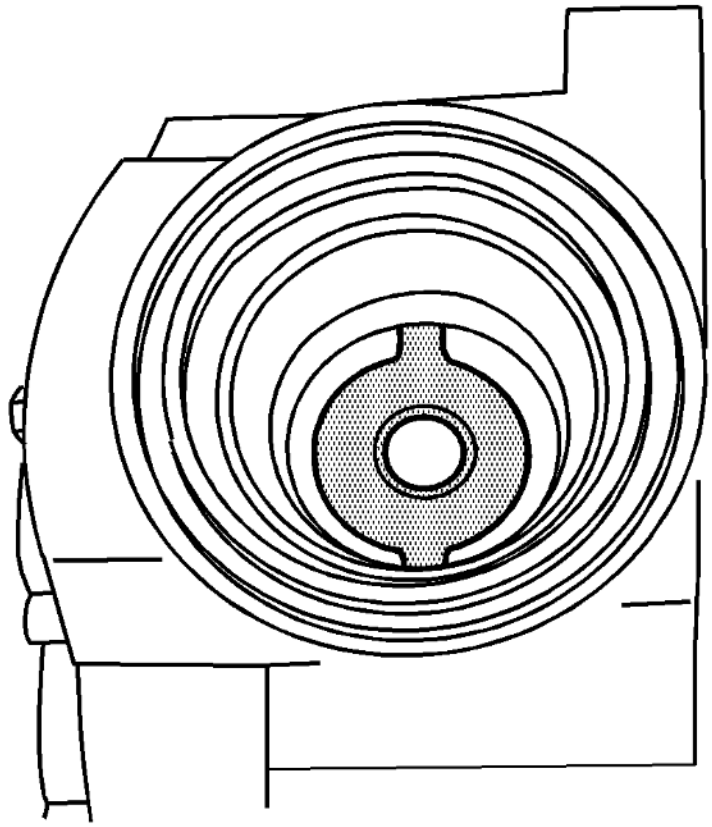


Fig. 205: Installing J 45858-4 Over Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

37. Install the J 45858-4 over the inner pinion bearing cup.

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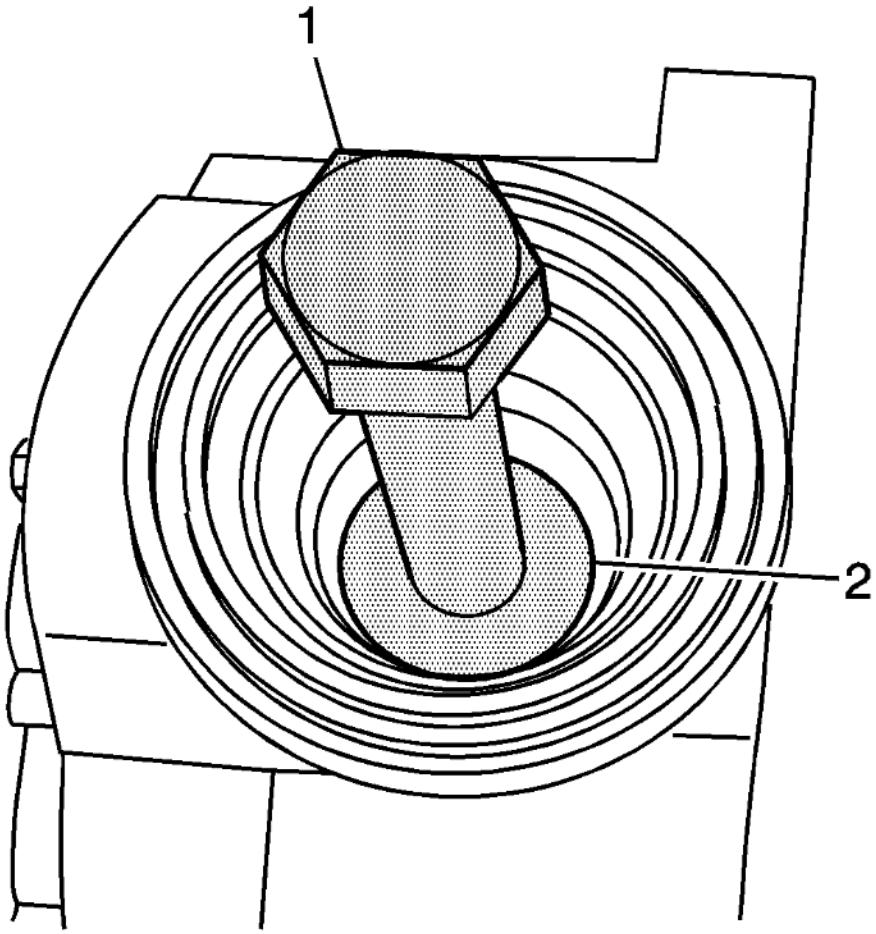


Fig. 206: Installing Forcing Screw Into J 45858-4 (8.25 Inch Axles)
Courtesy of GENERAL MOTORS COMPANY

38. Install the forcing screw (1) of the **J-45858** front axle bearing race remover/installer into the J-45858-4 (2).
39. Drive out the inner pinion bearing cup by pounding on the forcing screw with a hammer.

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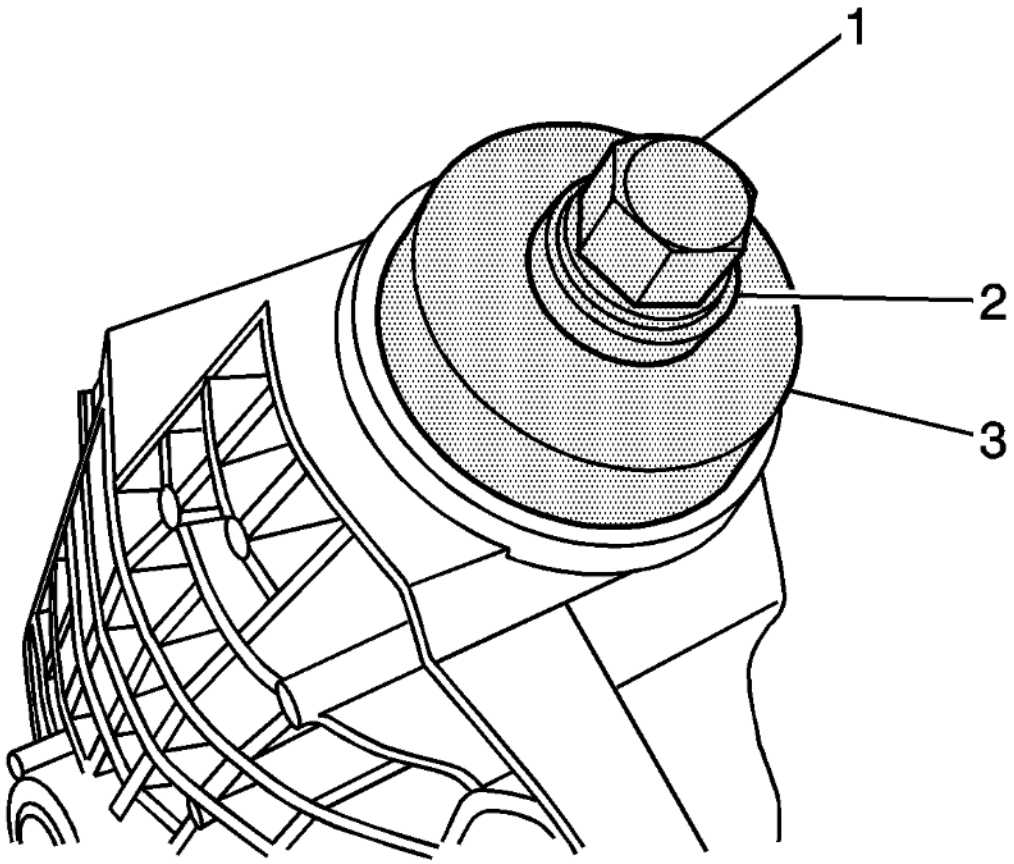


Fig. 207: View Of Thrust Bearing & Washer, Forcing Screw & Outer Pinion Bearing Cup Bore
Courtesy of GENERAL MOTORS COMPANY

40. Install the J-45858-3 (3), the thrust bearing and the washer (2), and the forcing screw (1) over the outer pinion bearing cup bore.

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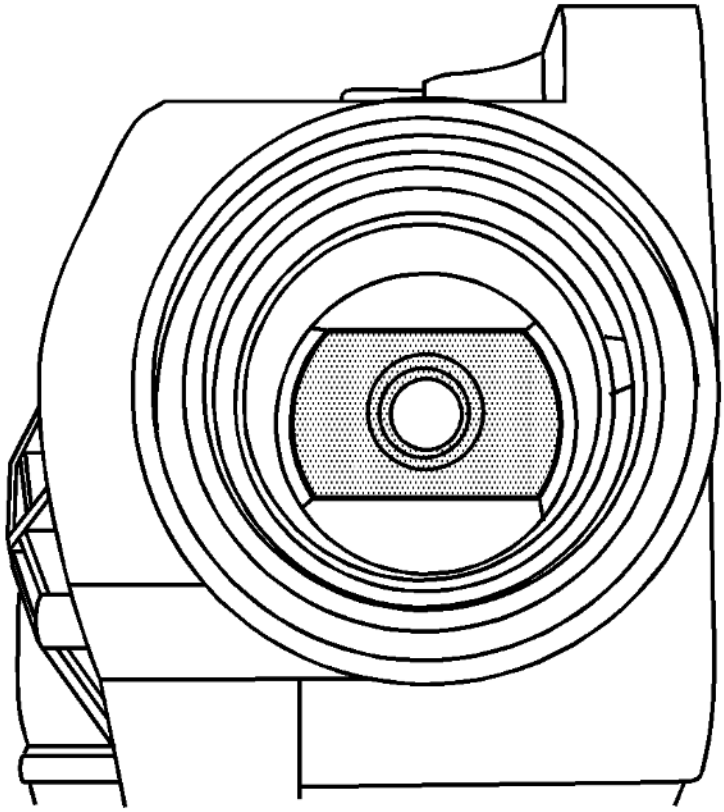


Fig. 208: Installing Front Axle Bearing Race Remover/Installer Into Pinion Bearing Bore (8.25 Inch Axles)
Courtesy of GENERAL MOTORS COMPANY

41. Install the J-45858-5 into the pinion bearing bore behind the outer pinion bearing cup.

    Slowly turn the forcing screw clockwise until the J-45858-5 is evenly seated behind the outer pinion bearing cup bore and the J-45858-3 is evenly seated over the outer pinion bearing cup bore.

42. Remove the outer pinion bearing cup by turning the forcing screw clockwise.
43. Remove the collapsible spacer from the drive pinion.

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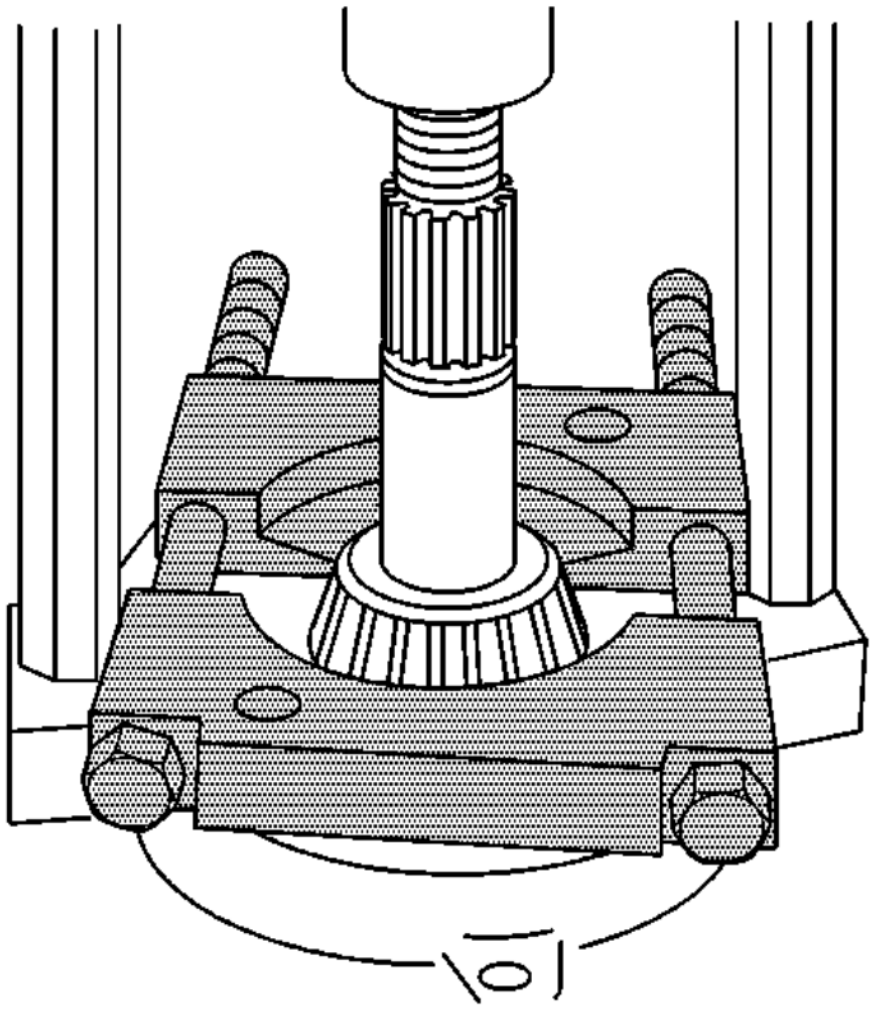


Fig. 209: View Of Inner Pinion Bearing & Hydraulic Press
Courtesy of GENERAL MOTORS COMPANY

44. Install the **J-22912-B** split-plate bearing puller between the pinion bearing and the drive pinion.
45. Using the **J-22912-B** split-plate bearing puller and a hydraulic press, remove the inner pinion bearing
46. Remove the pinion gear selectable shim.

FRONT AXLE DISASSEMBLE (9.25 INCH AXLE)

Tools Required

- **DT 49906-A** Bearing Cup Remover
- **J 2619-A** Slide Hammer
- **J 8614-A** Pinion Flange Holder Remover
- **J 22912-B** Split Plate Bearing Holder
- **J 29369-2** Bushing and Bearing Remover (2-3 in)
- **J 34011** Pilot Bearing Remover
- **J 45859** Axle Remover

Inspection Procedure

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Perform the following before disassembling the axle:

1. Remove the fill plug from the axle.
2. Remove the drain plug from the axle.
3. Drain the axle lubricant.
4. Inspect the oil and the case for metal chips.

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

5. Check the ring gear backlash. Refer to **Backlash Inspection and Adjustment**.

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

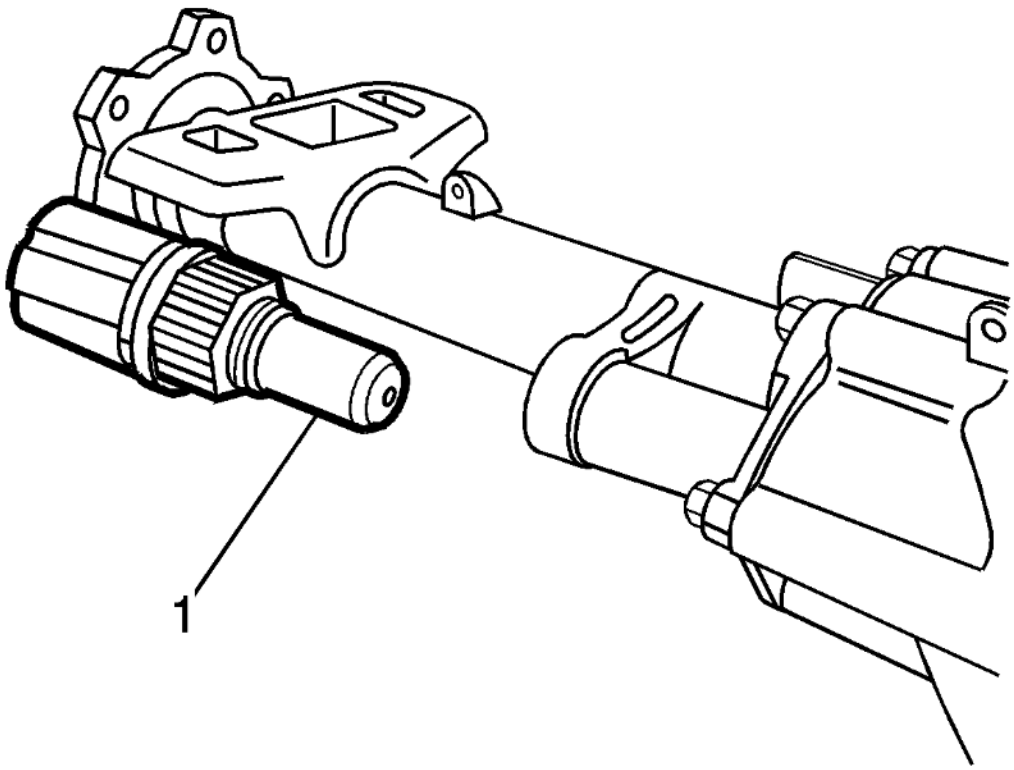


Fig. 210: Removing Inner Axle Shaft (8.25 Inch Axles)
Courtesy of GENERAL MOTORS COMPANY

1. Remove the front axle actuator (1).

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2. Remove the inner axle shaft housing to differential carrier assembly bolts.

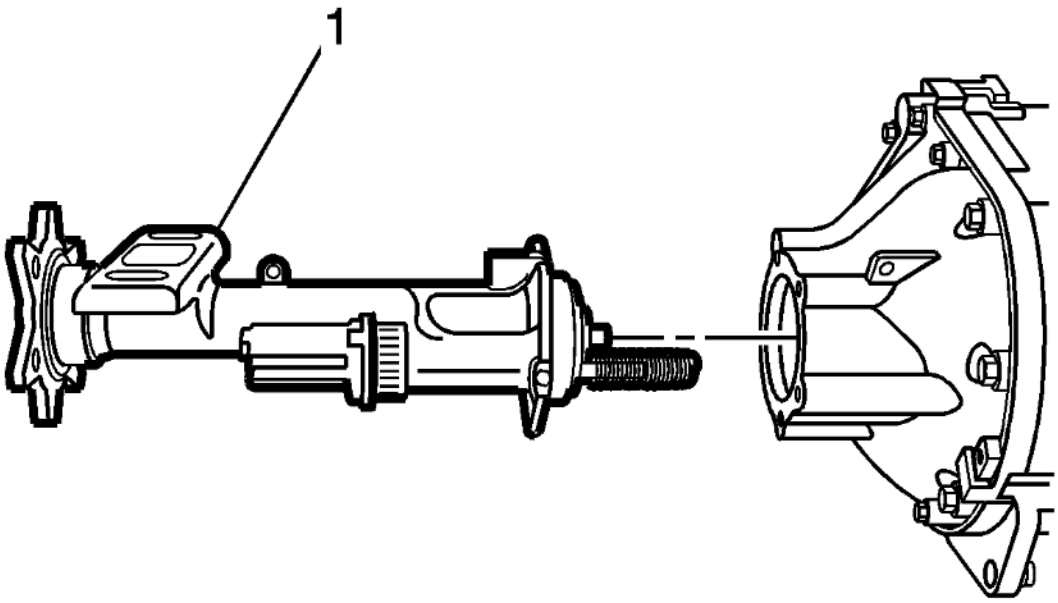


Fig. 211: Installing Inner Axle Shaft Housing Assembly - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

3. Remove the inner axle shaft housing assembly (1) from the differential carrier assembly.

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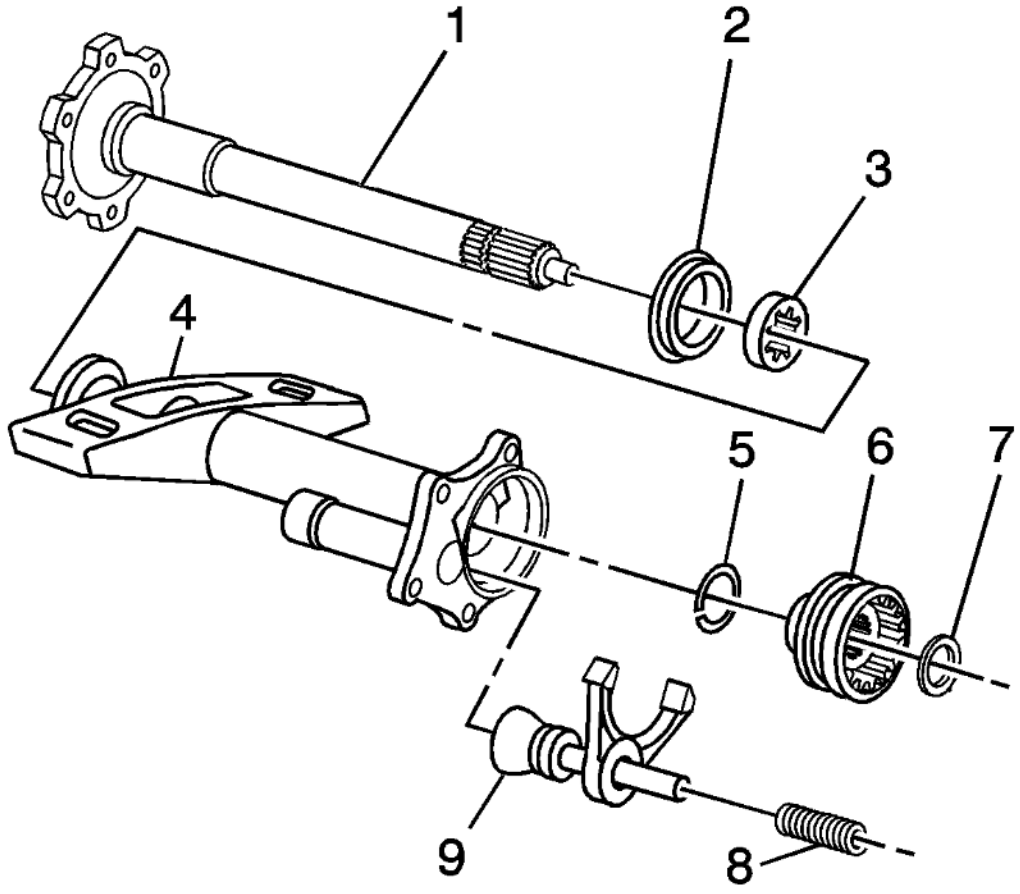


Fig. 212: Inner Axle Shaft, Inner Axle Shaft Housing, Thrust Washer With Tabs And Retaining Ring
Courtesy of GENERAL MOTORS COMPANY

4. Remove the clutch fork inner spring (9), clutch fork assembly (10), clutch shaft shim (8), clutch shaft sleeve (7), retainer ring (6), and the thrust washer (5) from the inner axle shaft housing (4).

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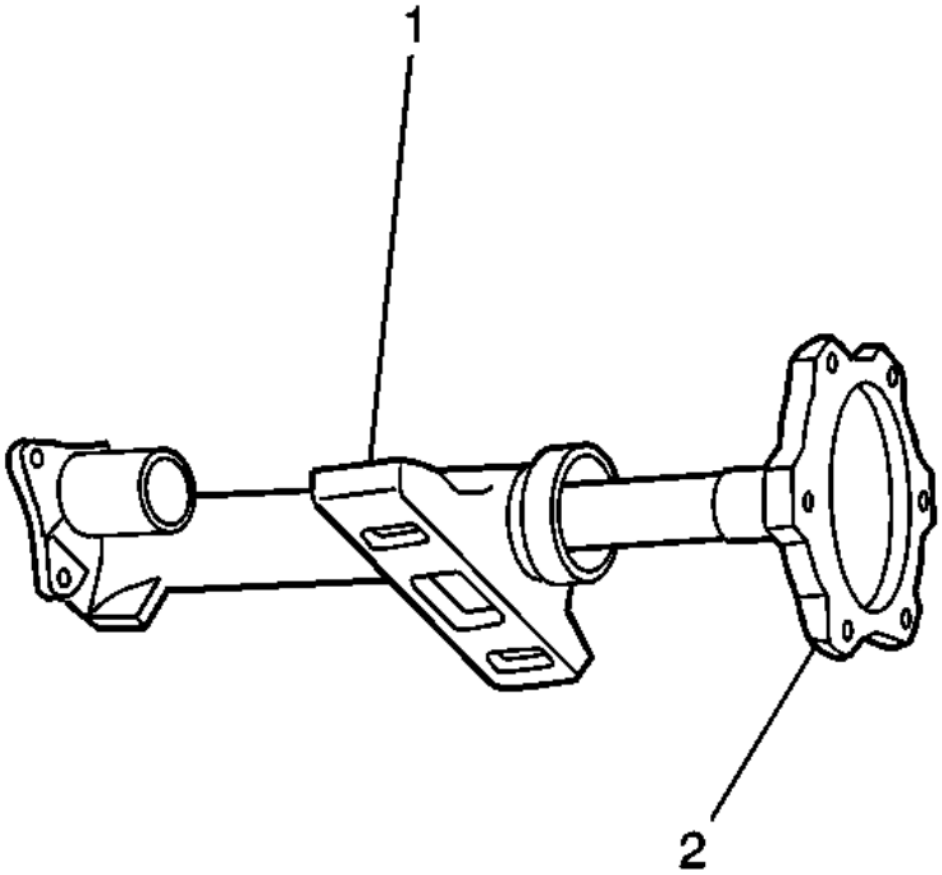


Fig. 213: Axle Shaft & Inner Axle Shaft Housing - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

5. Remove the inner axle shaft (2) from the inner axle shaft housing (1).

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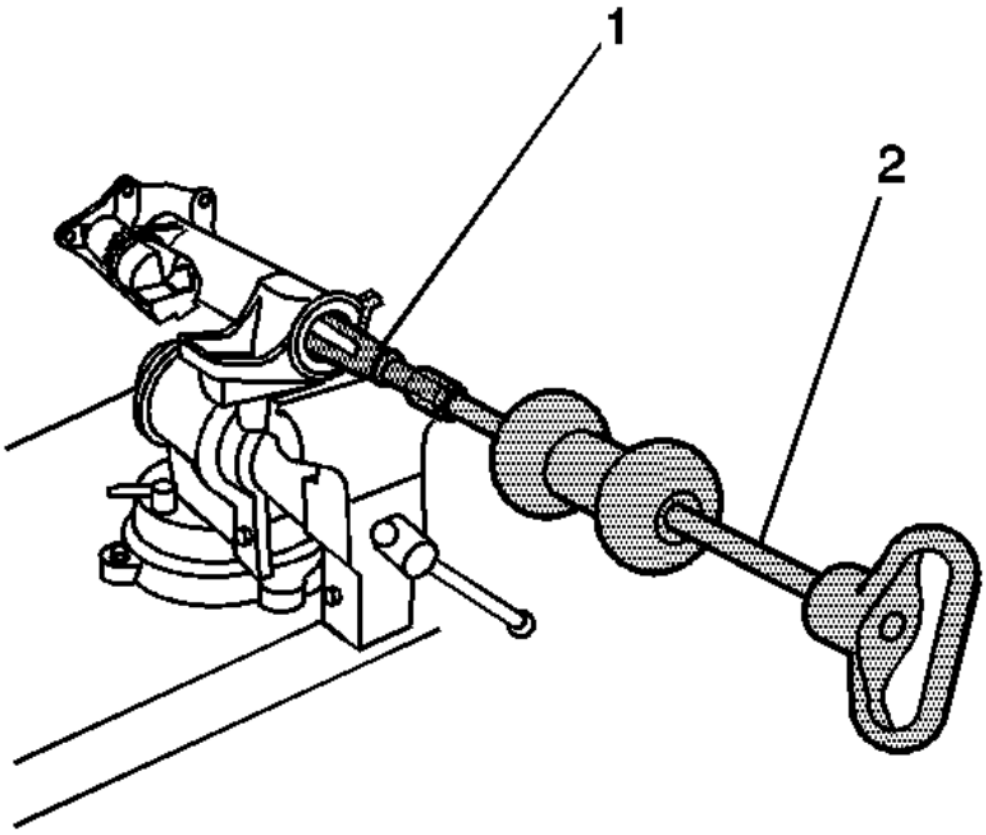


Fig. 214: Inner Axle Shaft Seal And/Or The Inner Axle Shaft Bearing And Special Tools
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Clamp only on the mounting flange of the inner axle shaft housing.**

6. Install the inner axle shaft housing into a vise.
7. Using the **J 29369-2** remover (2-3 in) (1) and the **J 2619-A** hammer (2), remove the inner axle shaft bearing and the seal.
8. Remove the inner axle shaft housing from the vise.
9. Remove the front drive axle clutch shaft.

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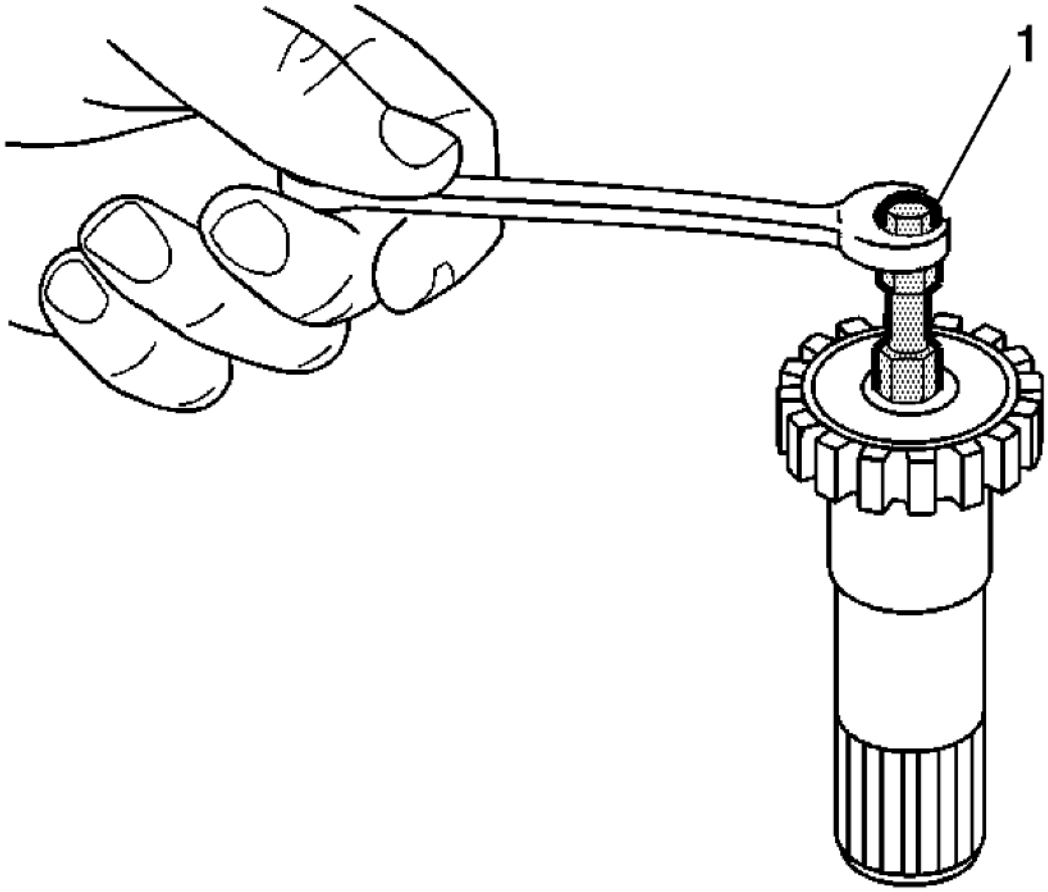


Fig. 215: Removing Clutch Shaft Pilot Bearing - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

10. Using the **J 34011** remover (1), remove the clutch shaft bearing.

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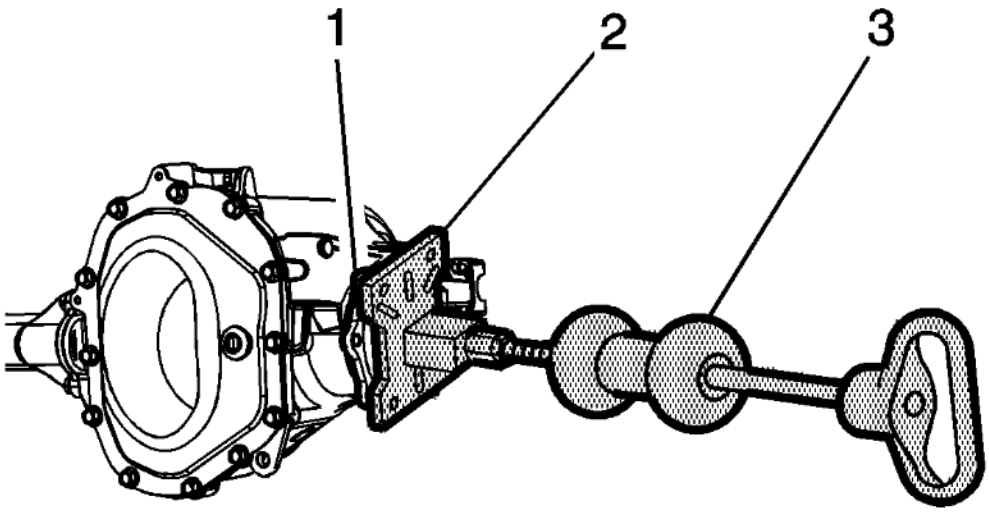


Fig. 216: Special Tools And Axle Shaft Flange
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Clamp only on the mounting flange of the differential carrier assembly case.**

11. Place the differential carrier assembly into a vise.
12. Using the **J 2619-A** hammer (3) and the **J 45859** remover (2), remove the axle shaft flange (1).

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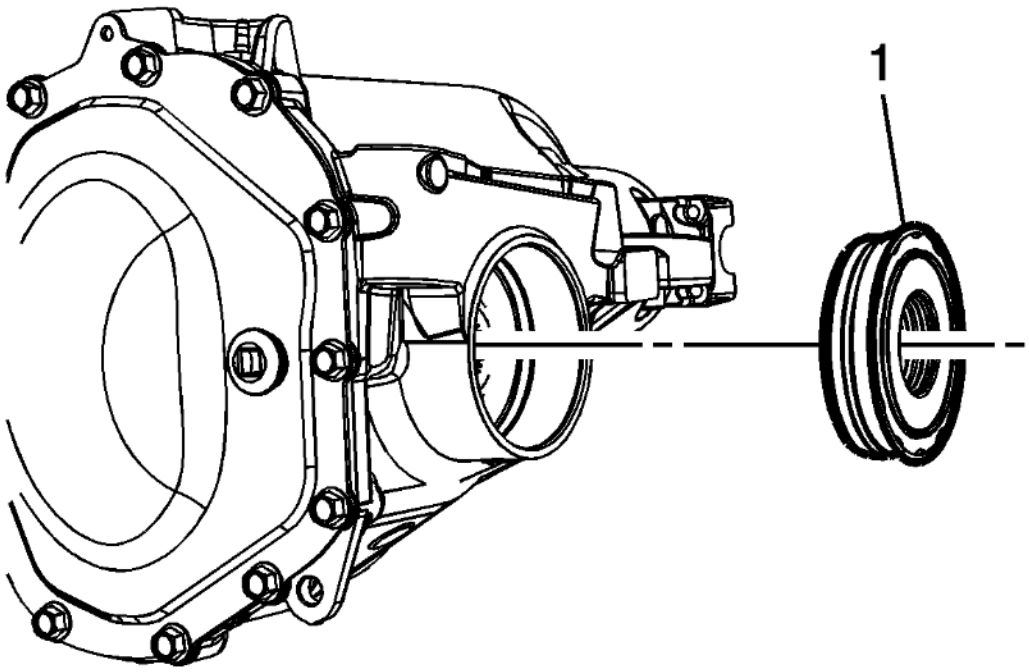


Fig. 217: Seal Deflector
Courtesy of GENERAL MOTORS COMPANY

13. Remove the axle shaft seal, including the seal deflector (1) if separated and retained on the axle shaft seal during remove.

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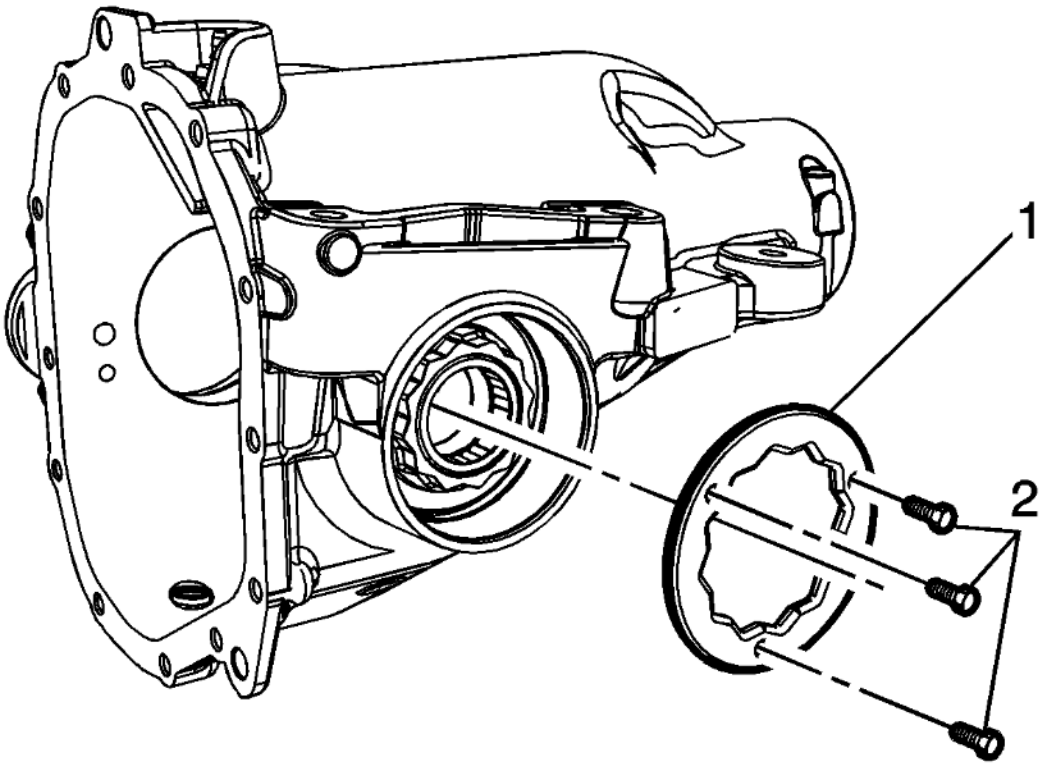


Fig. 218: Identifying M6X1X25 Bolts
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Use 3 M6X1X25 to thread into the adjuster lock.**

14. Using 3 M6X1X25 bolts (2) and turning them in equally, remove the adjuster lock.

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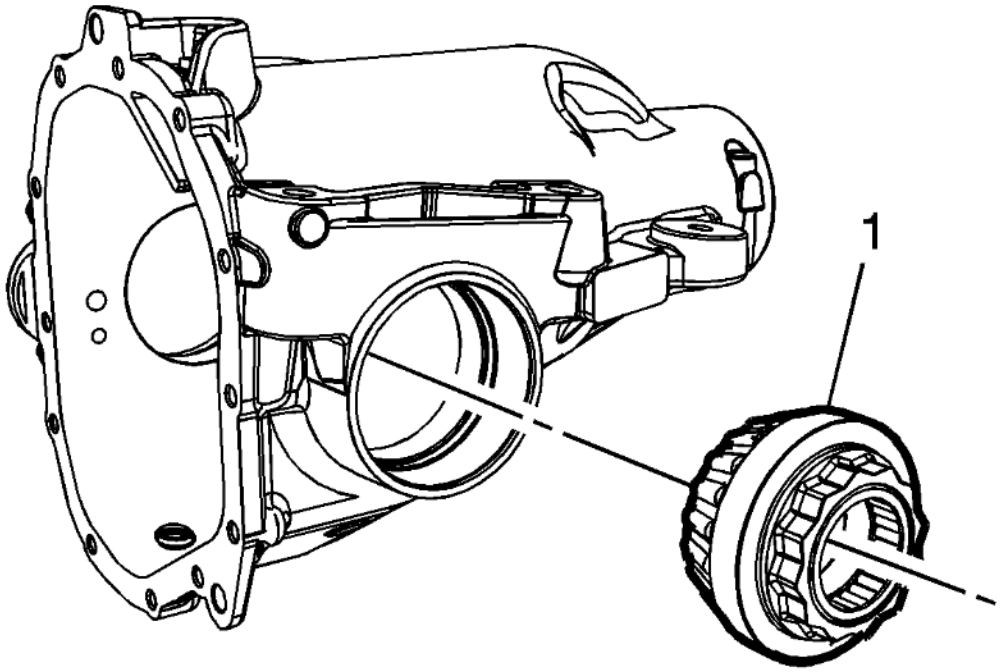


Fig. 219: Identifying Differential Side Bearing Adjuster
Courtesy of GENERAL MOTORS COMPANY

15. Using a 12 point 57 mm socket and rotate the socket counterclock wise in order to remove the differential side bearing adjuster .

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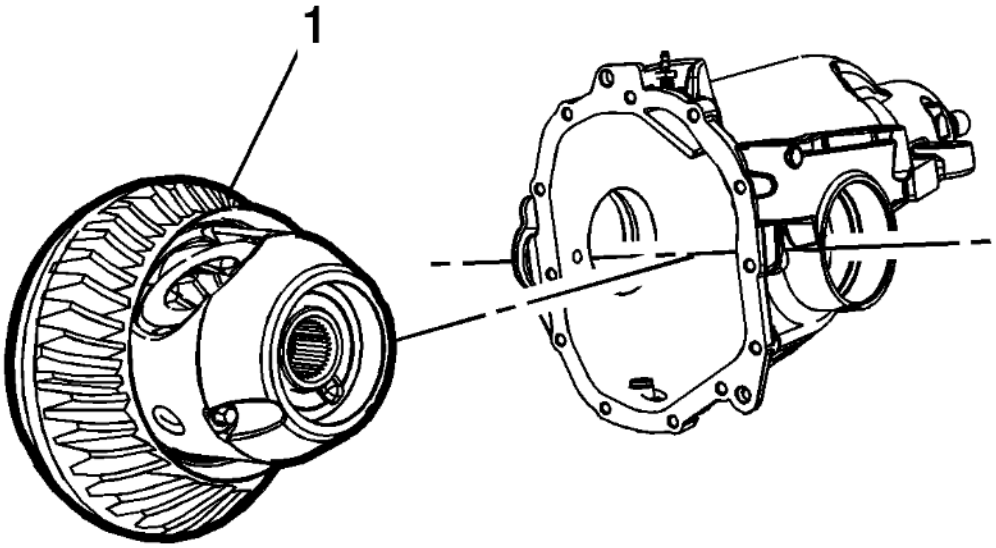


Fig. 220: Identifying Differential Carrier Assembly
Courtesy of GENERAL MOTORS COMPANY

16. Remove the differential carrier assembly (1) from the differential case.

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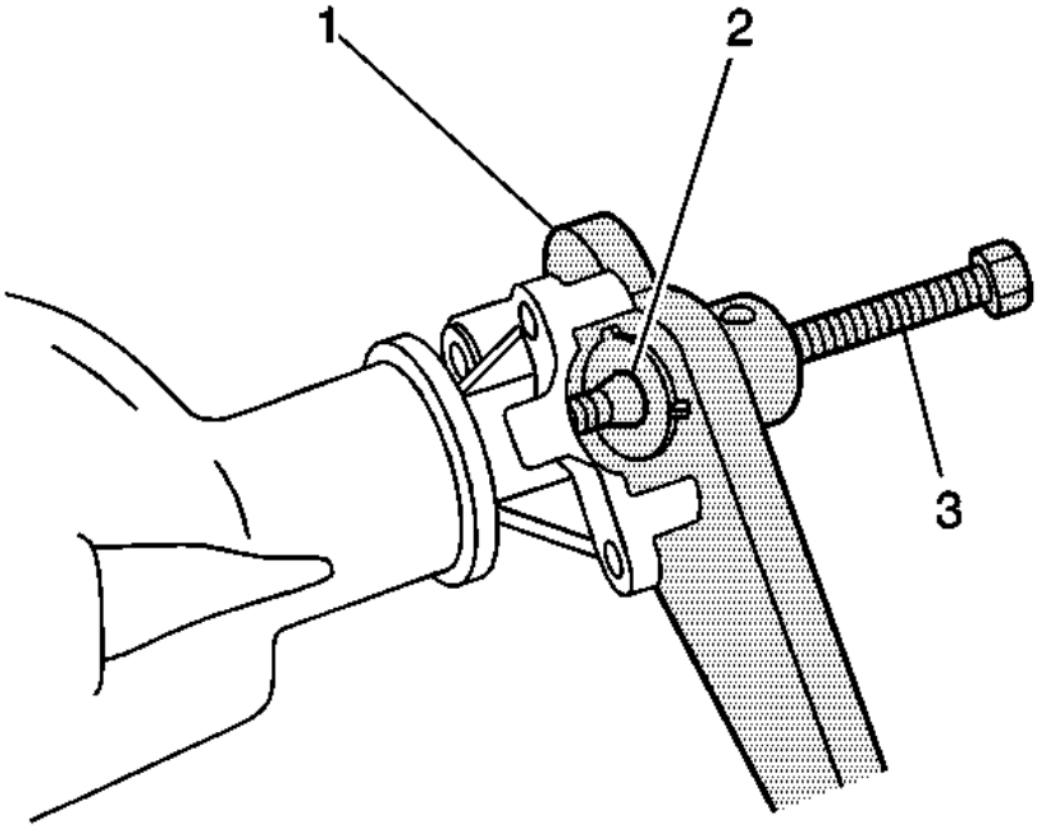


Fig. 221: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS COMPANY

17. Using the pinion **J 8614-A** remover (1, 2, 3), remove the drive flange nut.
18. Reposition the **J 8614-A** remover (1, 2, 3) on the drive pinion flange.
19. Using the **J 8614-A** remover (1, 2, 3), loosen the drive flange pinion flange.

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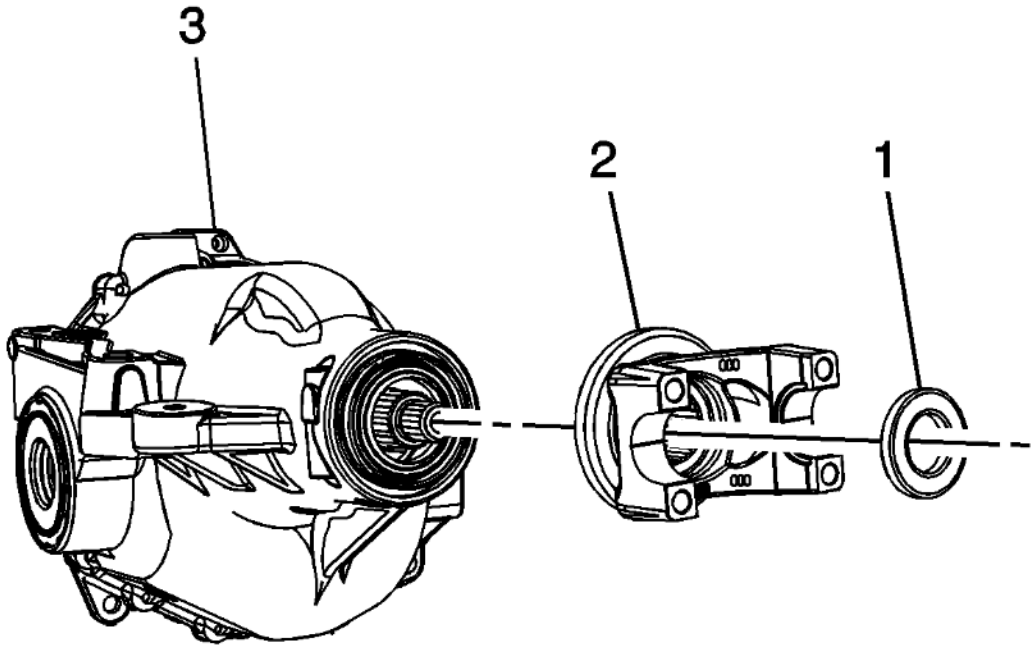


Fig. 222: Washer And Drive Pinion Flange
Courtesy of GENERAL MOTORS COMPANY

20. Remove the **J 8614-A** remover , and remove the washer (1) and the drive pinon flange (2) from the differential carrier (3).

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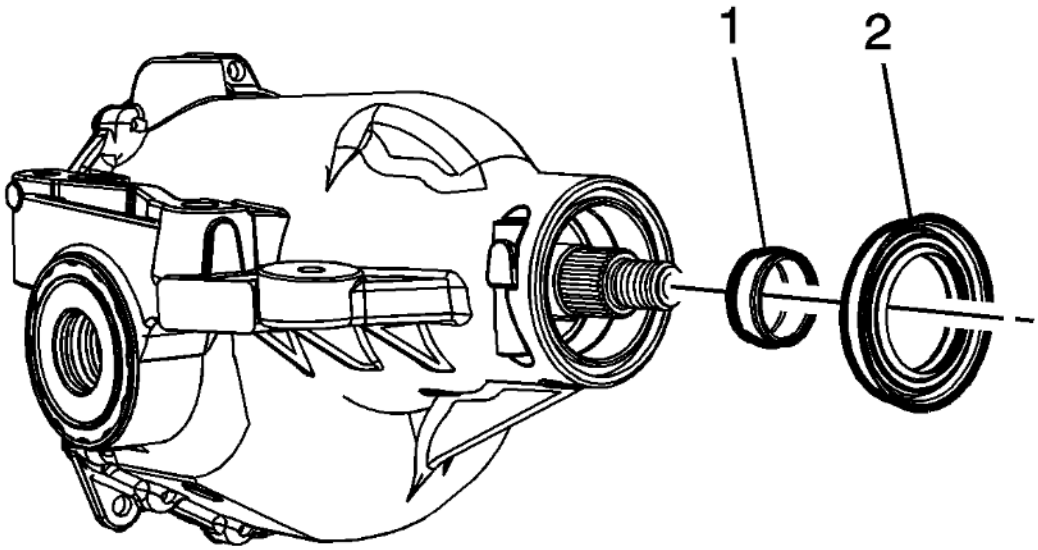


Fig. 223: Identifying Drive Pinion Flange Seal And Collapsible Spacer
Courtesy of GENERAL MOTORS COMPANY

21. Place the differential case on clean flat surface.
22. Using a suitable seal remover, remove the drive pinion flange seal (2) and the collapsible spacer (1).

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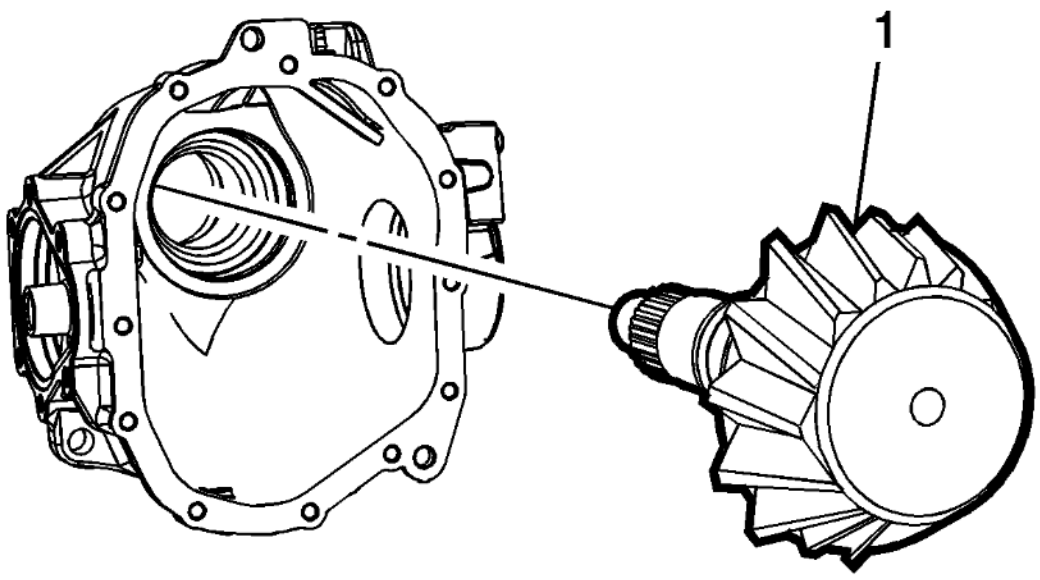


Fig. 224: Identifying Drive Pinion Gear
Courtesy of GENERAL MOTORS COMPANY

23. Remove the drive pinion gear (1) from the drive pinon gear.

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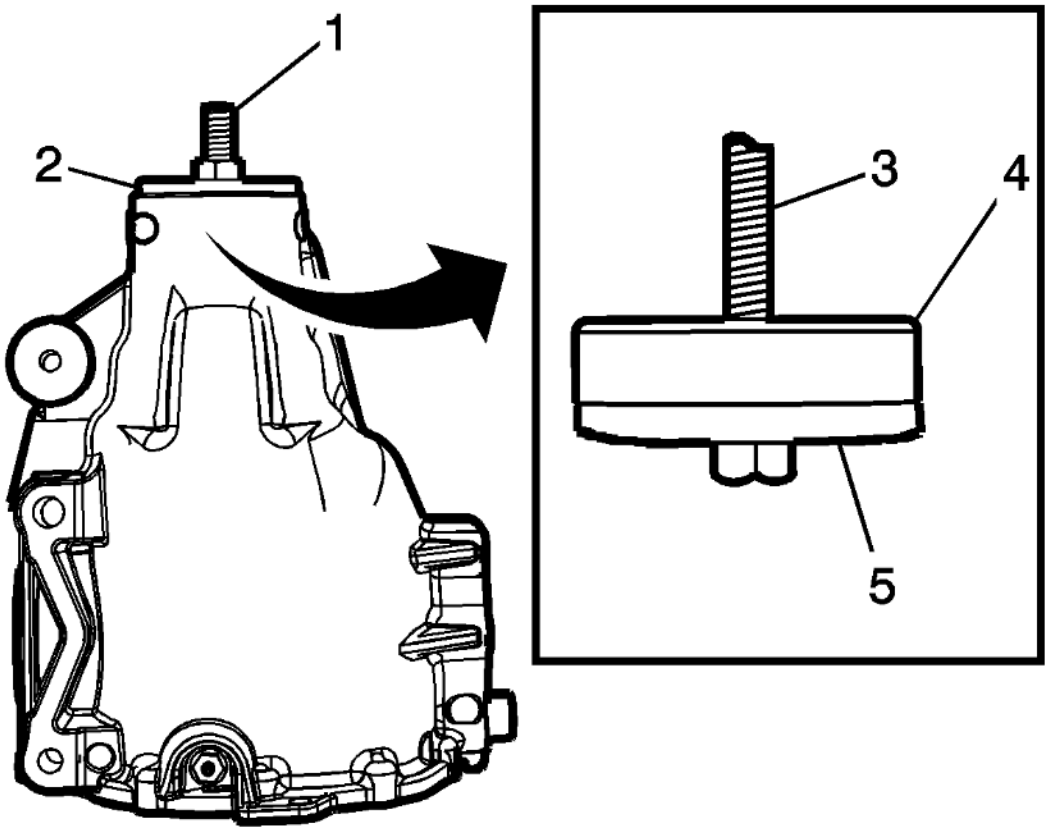


Fig. 225: Outer Drive Pinon Bearing Cup And Differential Housing
Courtesy of GENERAL MOTORS COMPANY

NOTE: **The inner drive pinion bearing is NOT serviceable. If the inner drive pinon bearing is found to be excessively worn or damaged, replace the front differential housing.**

24. Using the **DT 49906-A** remover (1, 2, 3, 4, 5), remove the outer drive pinon bearing cup from the differential housing.

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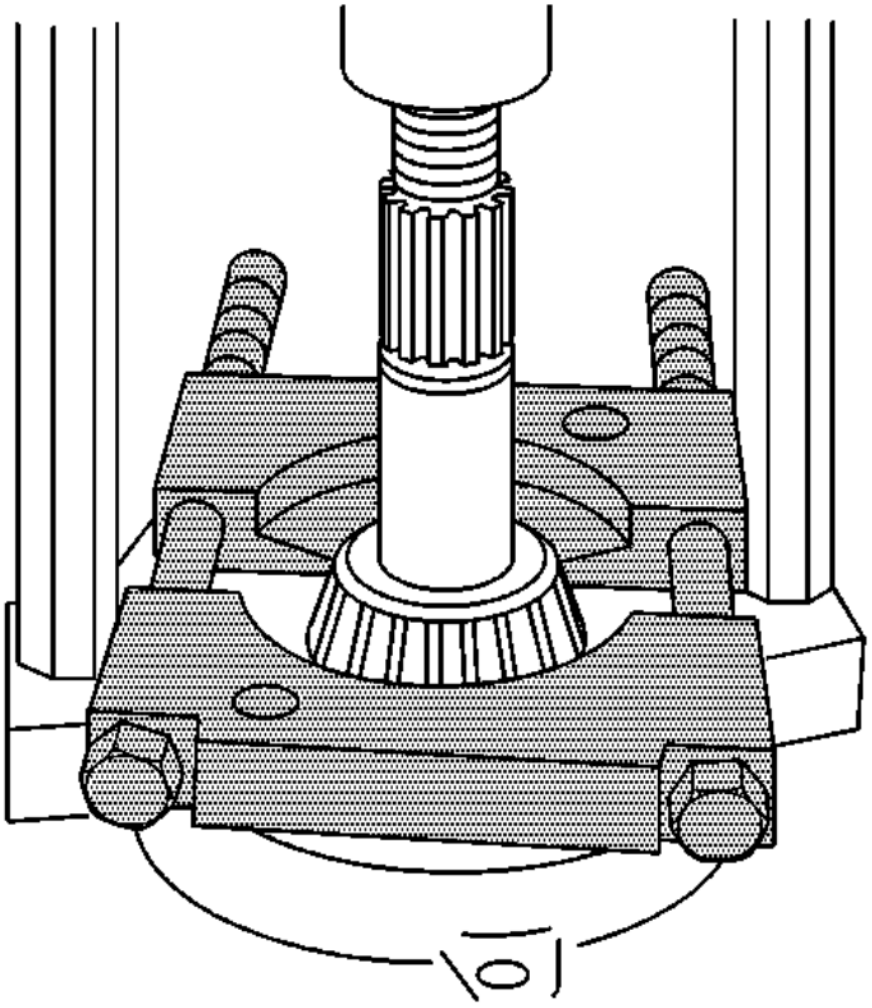


Fig. 226: View Of Inner Pinion Bearing & Hydraulic Press
Courtesy of GENERAL MOTORS COMPANY

25. Using the **J 22912-B** plate and a hydraulic press, remove the drive pinion bearing from the drive pinon gear.

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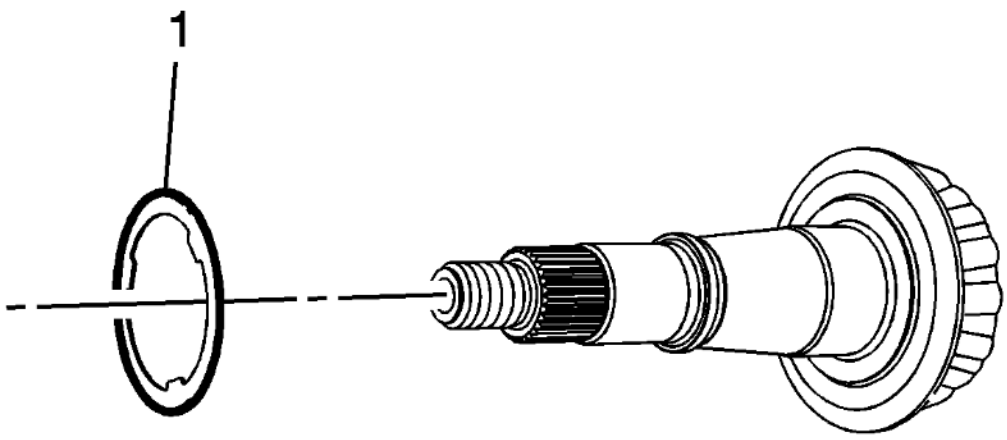


Fig. 227: Pinion Gear Selectable Shim
Courtesy of GENERAL MOTORS COMPANY

26. Remove the pinion gear selectable shim (1).

DRIVE PINION AND RING GEAR REPLACEMENT

Special Tools

- **J-22912-B** Split-Plate Bearing Puller
- **J-2619-01** Slide Hammer
- **J-29369-1** Bushing and Bearing Remover
- **J-34011** Pilot Bearing Remover
- **J-36598** Holding Fixture
- **J-36614** Inner Pinion Bearing Installer
- **J-45765** Pinion Remover
- **J-45858** Front Axle Bearing Race Remover/Installer
- **J-8614-01** Flange and Pulley Holding Tool
- **J-8107-2** Side Bearing Puller Pilot
- **J-22888-D** Side Bearing Remover Kit

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- **GE-8092** Driver Handle
- **J-22761** Differential Side Bearing Installer
- **GE-8092** Driver Handle (Universal Driver Handle-3/4 in 10)
- **J-35512** Inner Pinion Bearing Installer
- **J-36366** Pinion Oil Seal Installer
- **J-36599-A** Side Bearing Nut Wrench
- **J-36615** Side Bearing Nut Wrench

Inspection Procedure

Perform the following before disassembling the axle:

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. Check the ring gear backlash. Refer to **Backlash Inspection and Adjustment**.

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

1. Remove the differential carrier assembly. Refer to **Front Axle Replacement (8.25 Inch Axle)Front Axle Replacement (9.25 Inch Axle)**.
2. Install the differential carrier assembly in a vise.

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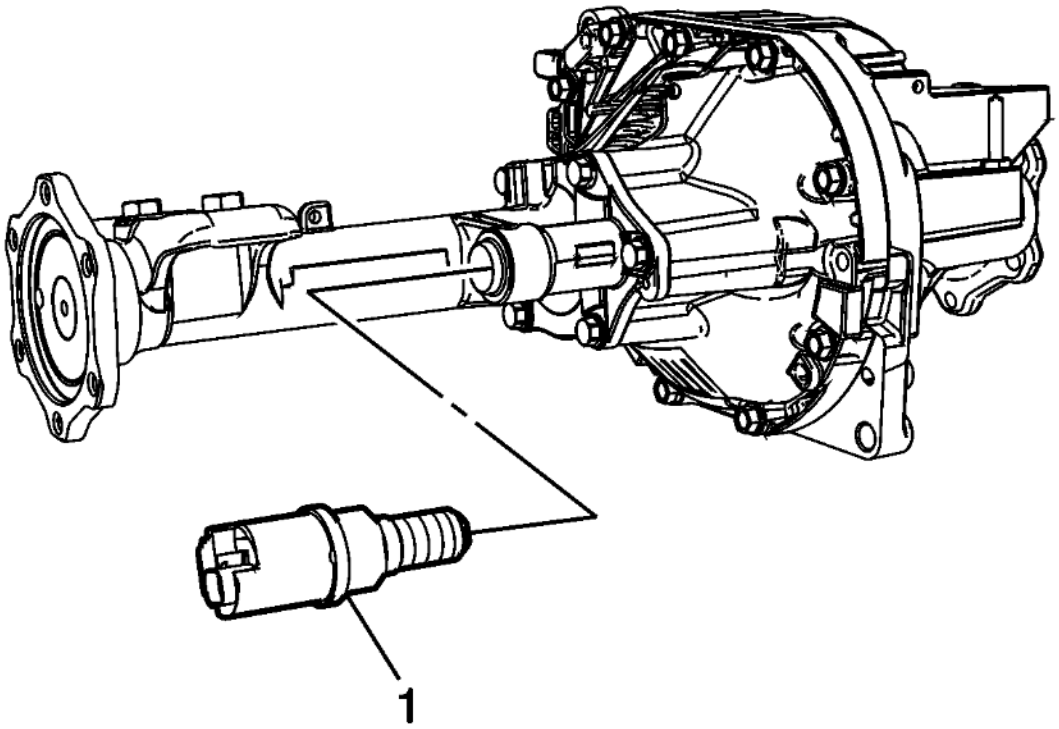


Fig. 228: Front Axle Actuator
Courtesy of GENERAL MOTORS COMPANY

3. Remove the front axle actuator (1).
4. Remove the inner axle shaft housing to differential carrier assembly bolts.

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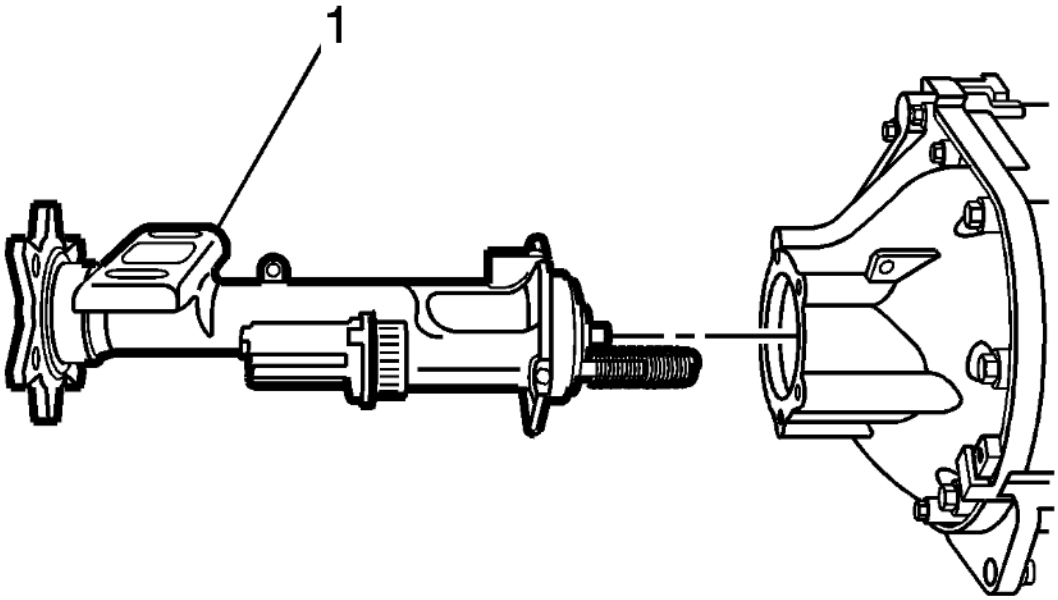


Fig. 229: Installing Inner Axle Shaft Housing Assembly - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

5. Carefully remove the inner axle shaft housing (1) with the inner axle shaft and clutch fork components from the differential carrier assembly.

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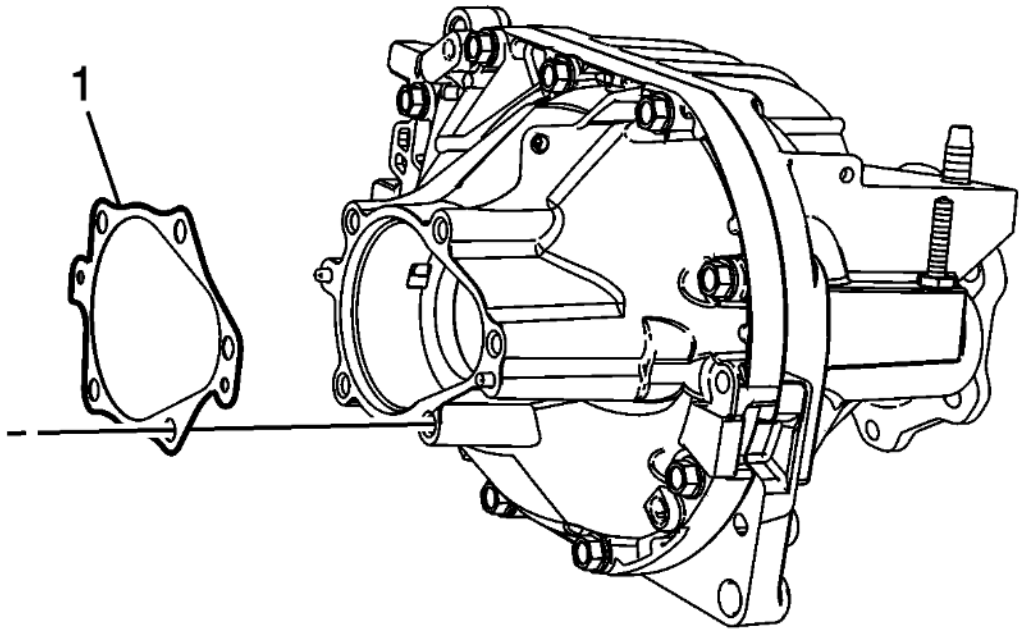


Fig. 230: Inner Axle Housing To Differential Carrier Gasket
Courtesy of GENERAL MOTORS COMPANY

6. Remove the inner axle housing to differential carrier gasket (1).
7. Remove the differential carrier assembly from the vise.
8. Remove the front drive axle clutch shaft.

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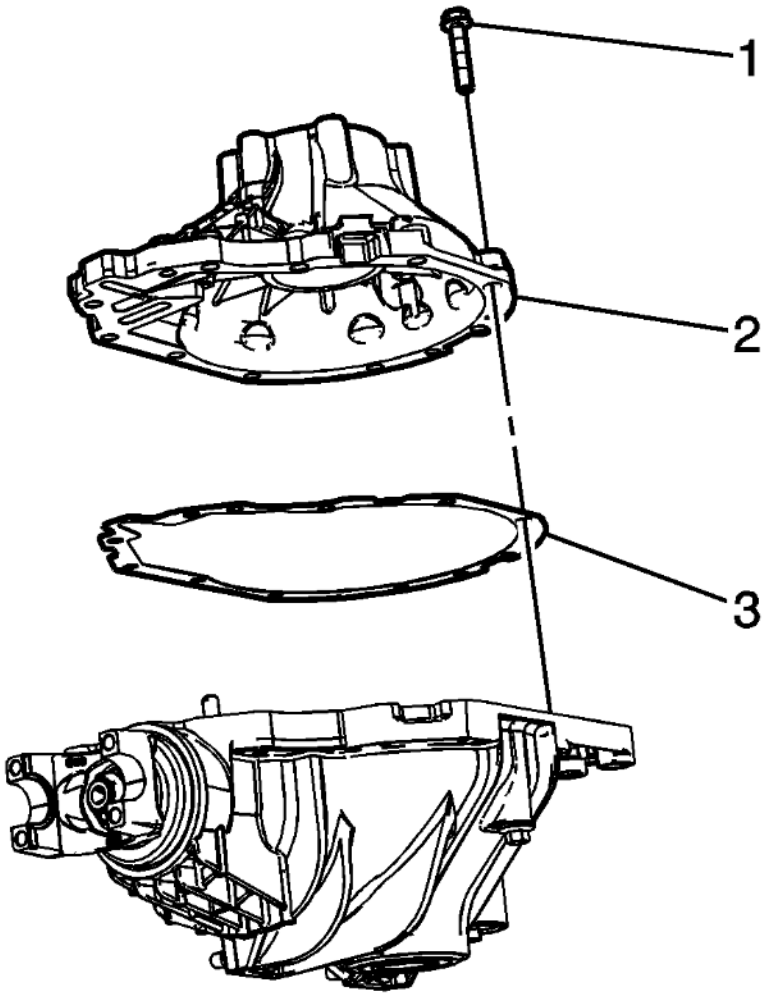


Fig. 231: View Of Differential Carrier Housing, Gasket & Bolts
Courtesy of GENERAL MOTORS COMPANY

9. Remove the differential carrier assembly bolts (1).
10. Separate the left carrier case half from the right carrier case half (2) by tapping on the on the carrier case with a hammer and a brass drift.
11. Remove the differential carrier housing (2) and the differential carrier housing gasket (3).
12. Remove the differential case assembly.

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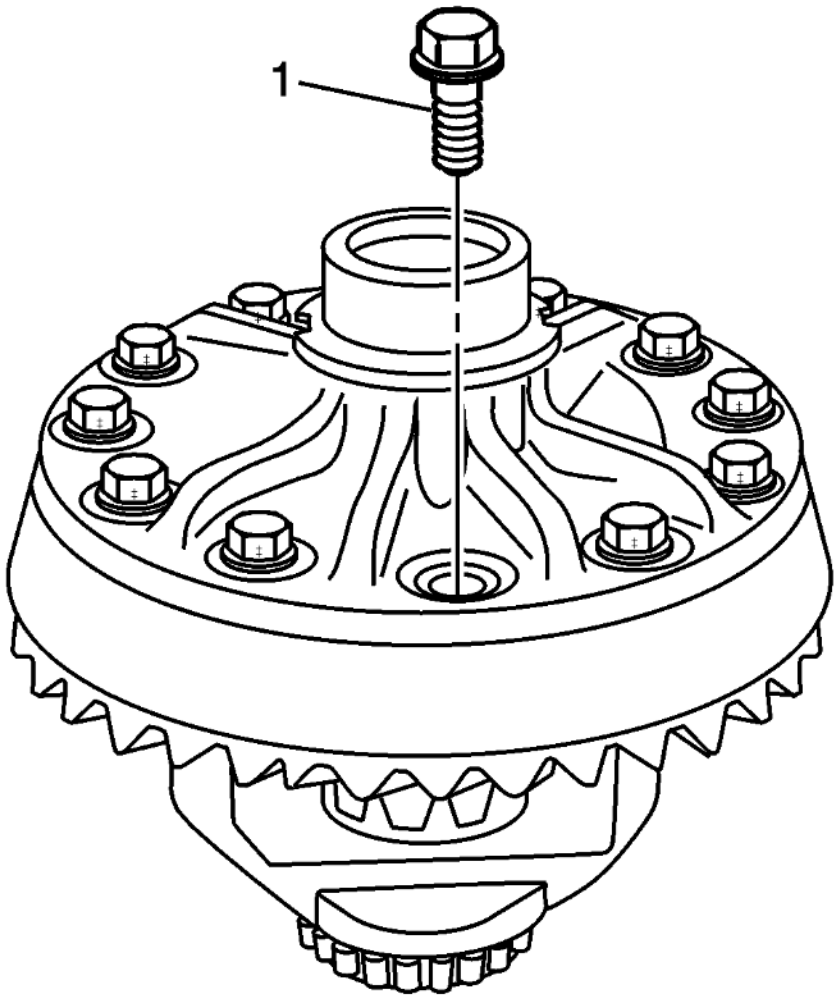


Fig. 232: Ring Gear Bolts Have Left-Hand Threads
Courtesy of GENERAL MOTORS COMPANY

NOTE: **The ring gear bolts have left-hand threads.**

13. Remove the ring gear bolts (1). Discard the bolts.

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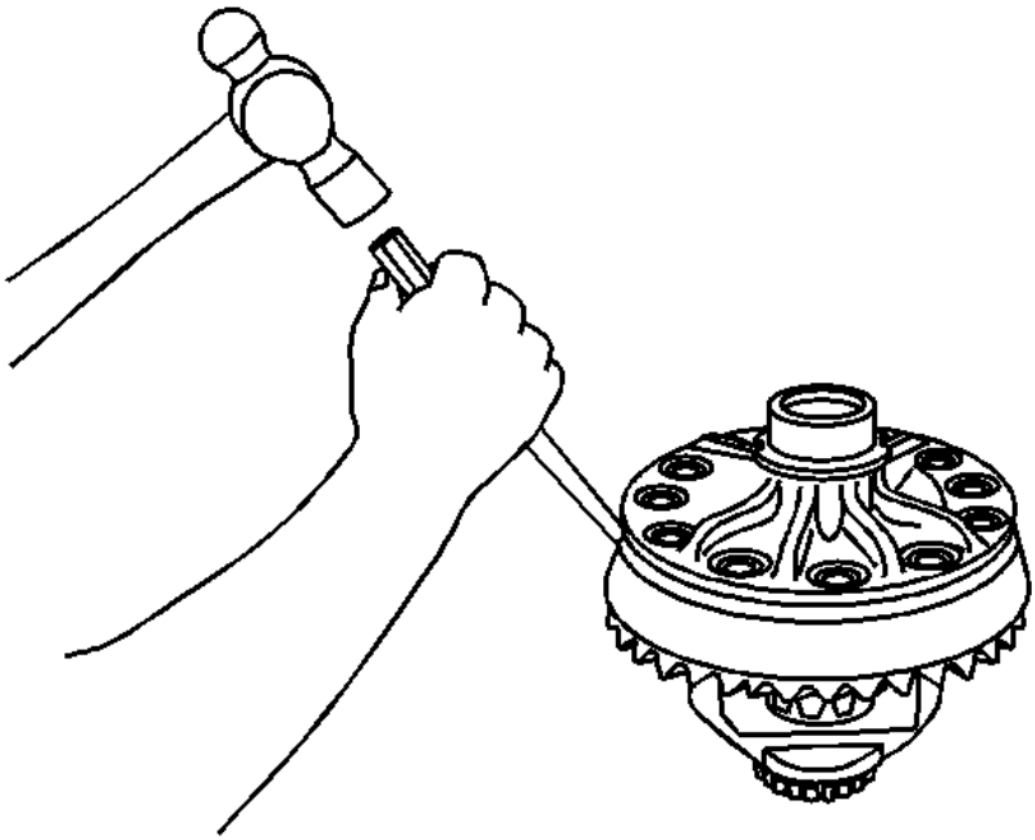


Fig. 233: Removing Ring Gear From Differential
Courtesy of GENERAL MOTORS COMPANY

CAUTION: 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.

14. Remove the ring gear from the differential case.

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

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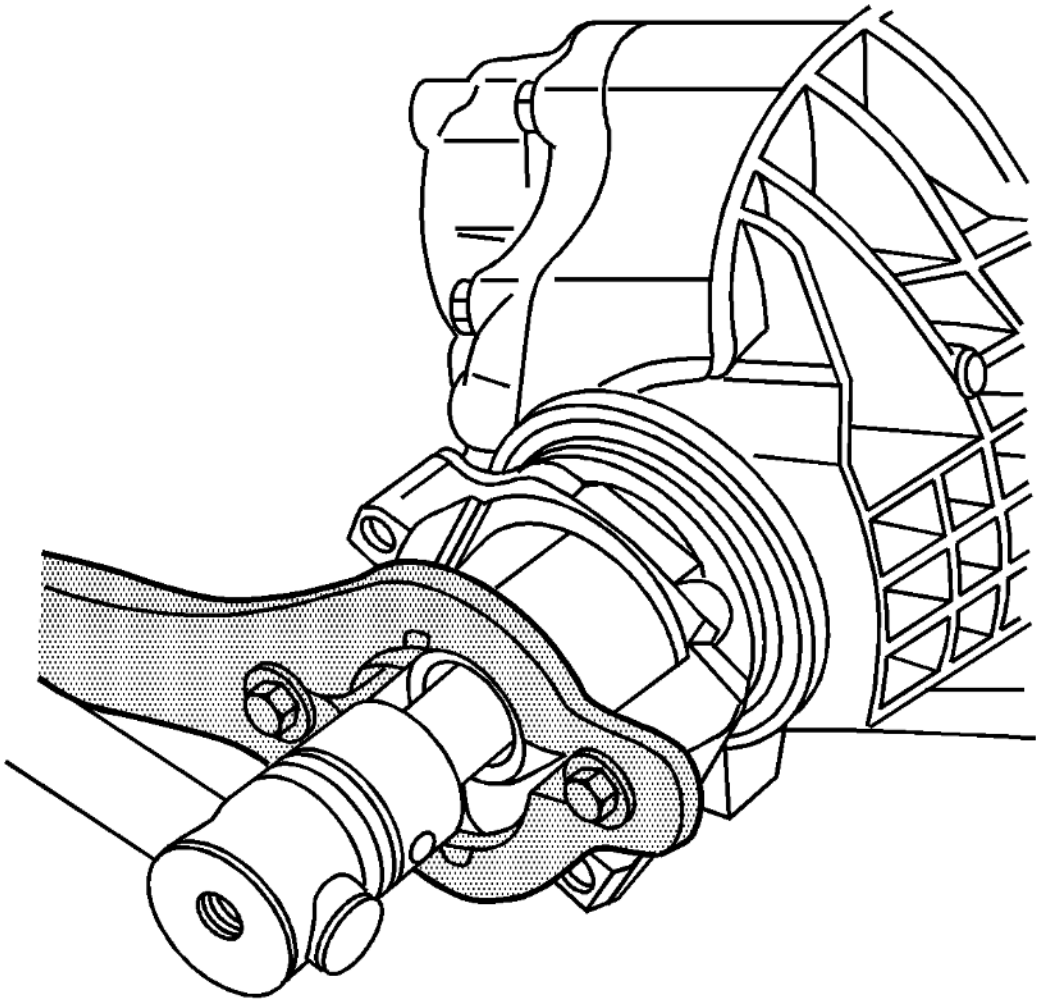


Fig. 234: Flange And Pulley Holding Tool
Courtesy of GENERAL MOTORS COMPANY

15. Install the **J-8614-01** flange and pulley holding tool as shown.

    Remove the pinion nut while holding the **J-8614-01** flange and pulley holding tool.

16. Remove the washer.

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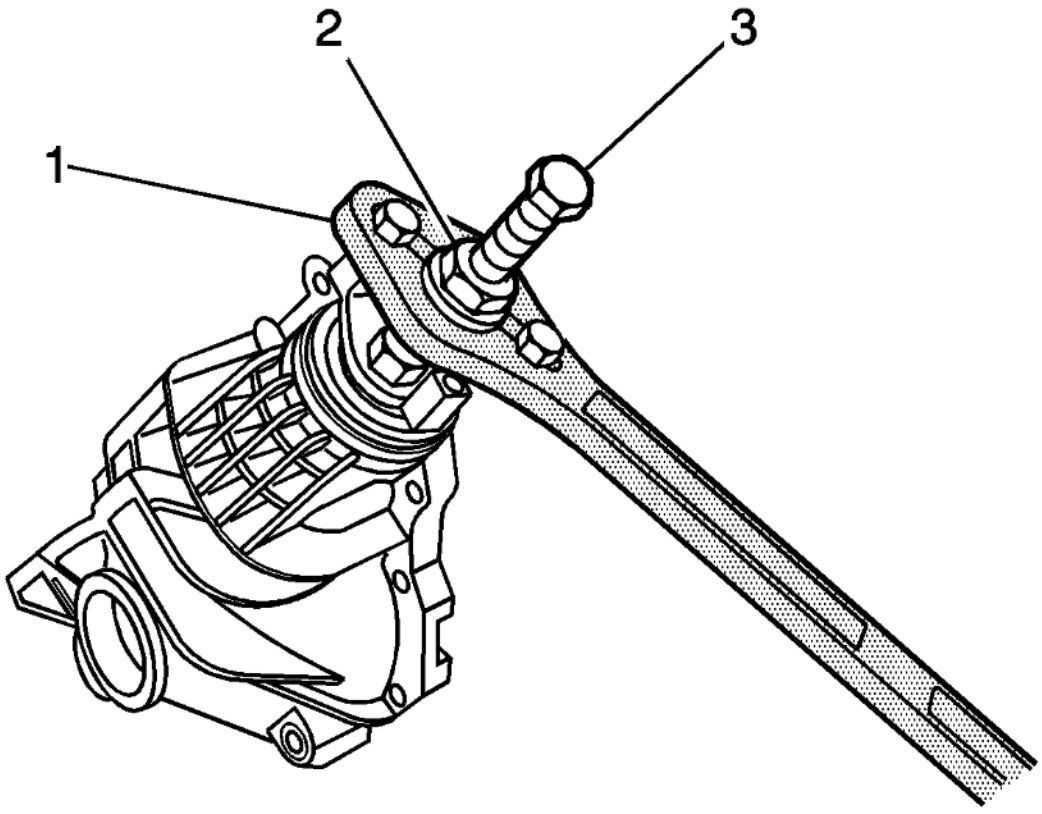


Fig. 235: View Of Pinion Yoke Removal Tools
Courtesy of GENERAL MOTORS COMPANY

17. Install the J 8614-2 (2) and the J 8614-3 (3) into the **J-8614-01** flange and pulley holding tool (1) as shown.
18. Remove the pinion yoke by turning the J 8614-3 (3) clockwise while holding the **J-8614-01** flange and pulley holding tool (1).
19. The steps below explain how to remove the drive pinion and pinion bearing cups using the **J-36598** holding fixture or the **J-45765** pinion remover and the **J-45858** front axle bearing race remover/installer. Follow the appropriate steps depending on what tool is available.
20. Install the **J-36598** holding fixture into a vise.

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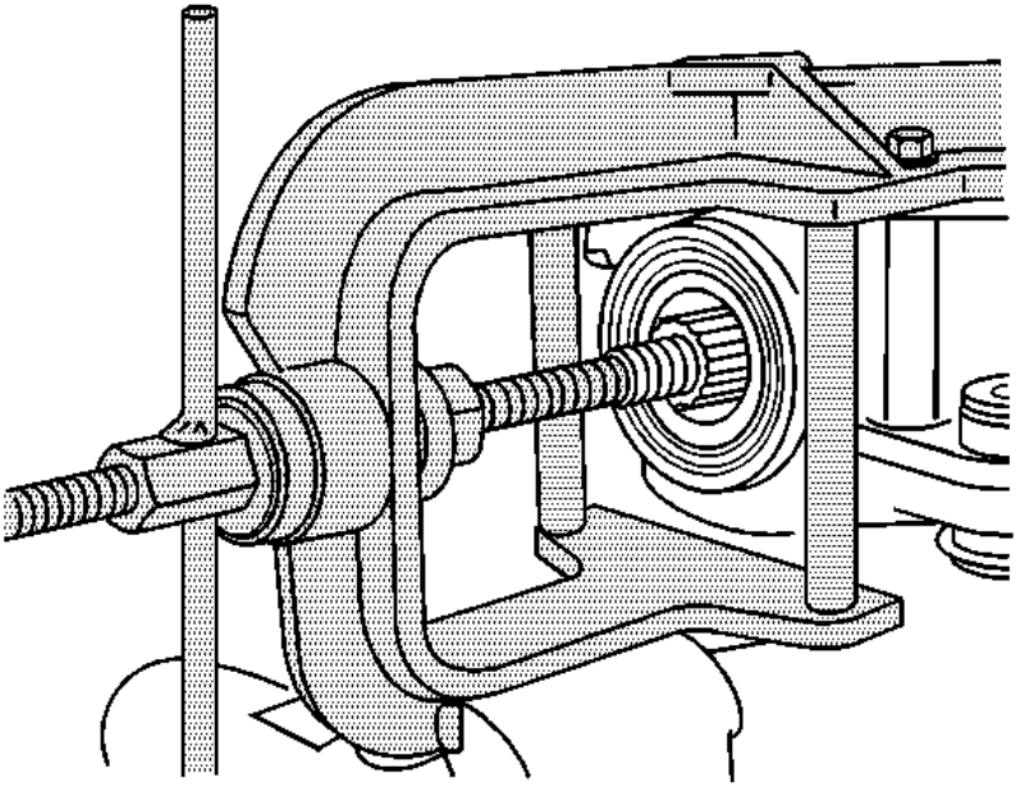


Fig. 236: Removing Pinion
Courtesy of GENERAL MOTORS COMPANY

21. Install the left differential carrier case half onto the **J-36598** holding fixture and the J-36598 - (only 3 of the 4 mounting bolts will be used).
22. While holding the forcing screw of the **J-36598** holding fixture , turn the handle of the **J-36598** holding fixture counterclockwise in order to remove the pinion with the following components:
    - The pinion gear selectable shim
    - The inner pinion bearing
    - The collapsible spacer

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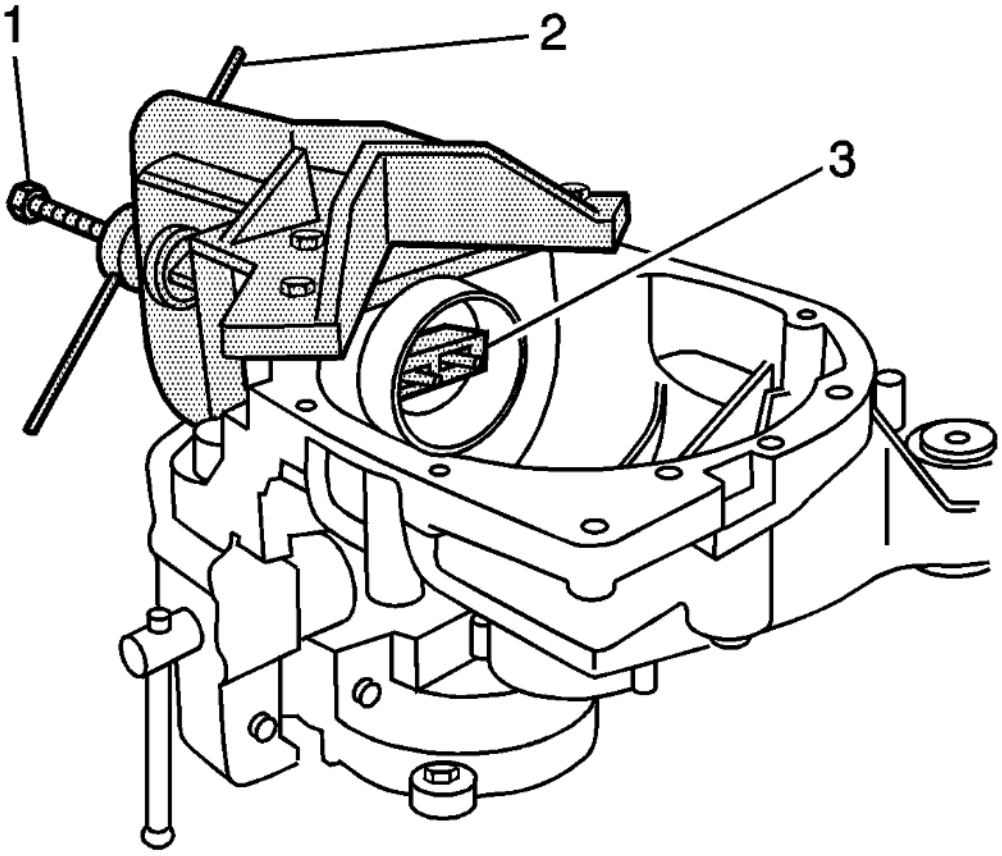


Fig. 237: Pressing Inner Bearing Cup Out From Differential Carrier Case
Courtesy of GENERAL MOTORS COMPANY

23. Install the J 36598-5 (3) behind the inner pinion bearing cup.
24. Thread the forcing screw of the **J-36598** holding fixture (1) onto the J-36598-5 (3) until fully seated.
25. While holding the forcing screw of the **J-36598** holding fixture (1), turn the handle of the **J-36598** holding fixture (2) counterclockwise and press the inner bearing cup out from the differential carrier case.

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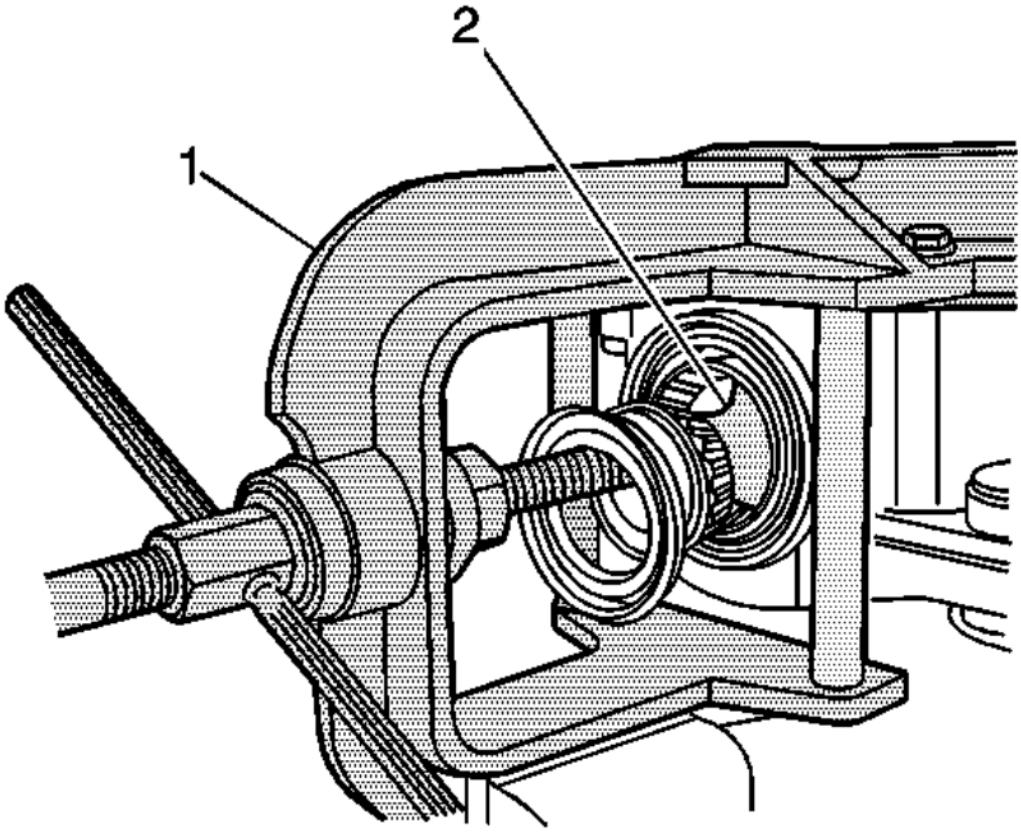


Fig. 238: Removing Pinion Oil Seal & Bearing
Courtesy of GENERAL MOTORS COMPANY

26. Install the J 36598-5 (2) behind the outer pinion bearing cup.
27. Install the forcing screw of the **J-36598** holding fixture (1) to the J-36598-5 (2).
28. While holding the forcing screw of the **J-36598** holding fixture , turn the handle of the **J-36598** holding fixture clockwise in order to remove the following components:
    - The pinion oil seal
    - The pinion outer bearing
    - The pinion outer bearing cup

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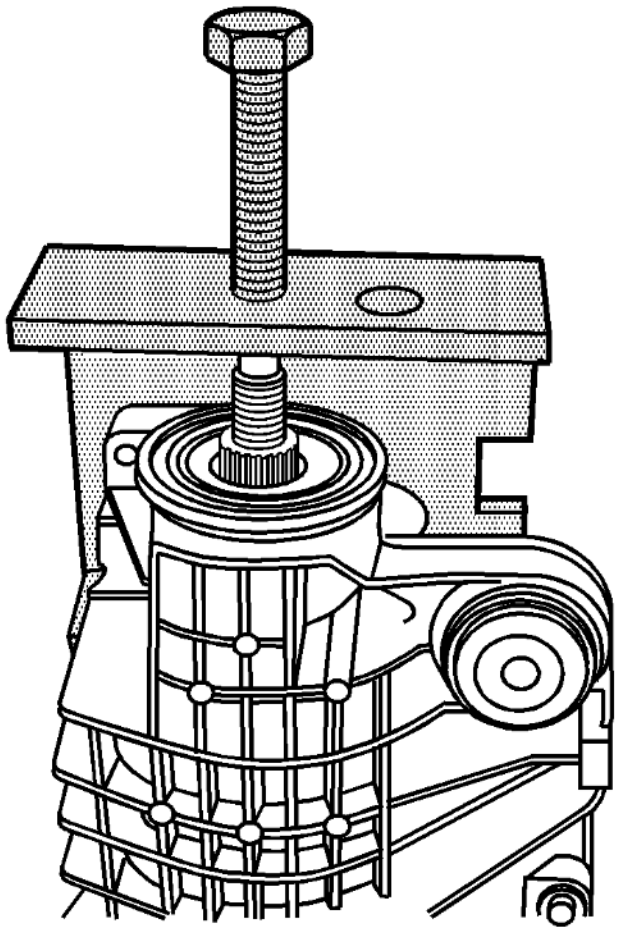


Fig. 239: Removing Pinion Components
Courtesy of GENERAL MOTORS COMPANY

29. Install the **J-45765** pinion remover to the left side differential carrier case half over the drive pinion as shown.
30. Turn the forcing screw of the **J-45765** pinion remover clockwise to remove the following components from the left side differential carrier case half:
    - The drive pinion gear
    - The pinion gear selectable shim
    - The inner pinion bearing
    - The collapsible spacer
31. Remove the drive pinion seal using a suitable seal remover.
32. Remove the outer pinion bearing from the differential carrier case half.

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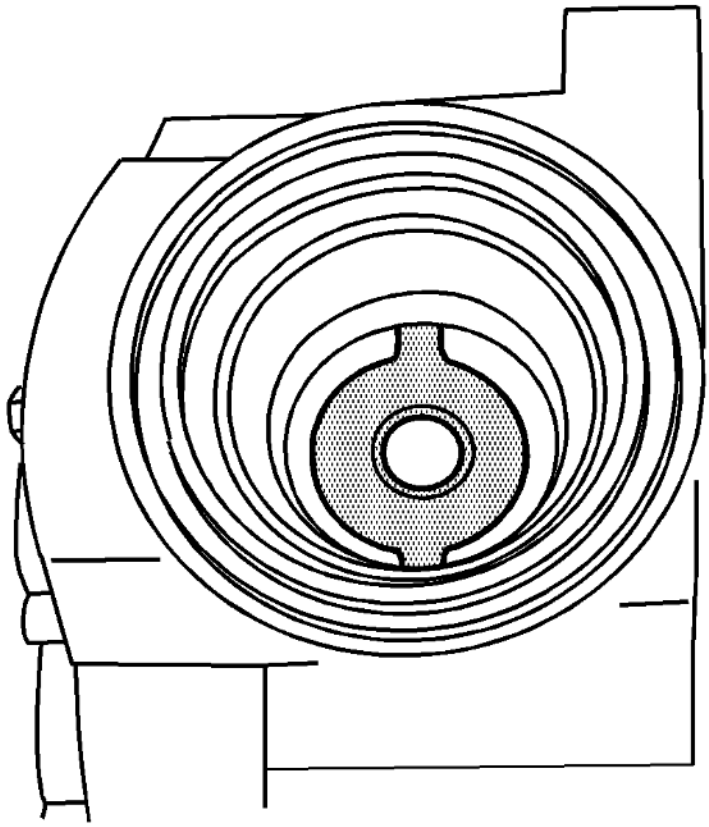


Fig. 240: Installing J 45858-4 Over Inner Pinion Bearing Cup (8.25 Inch Axles)
Courtesy of GENERAL MOTORS COMPANY

33. Install the J 45858-4 over the inner pinion bearing cup.

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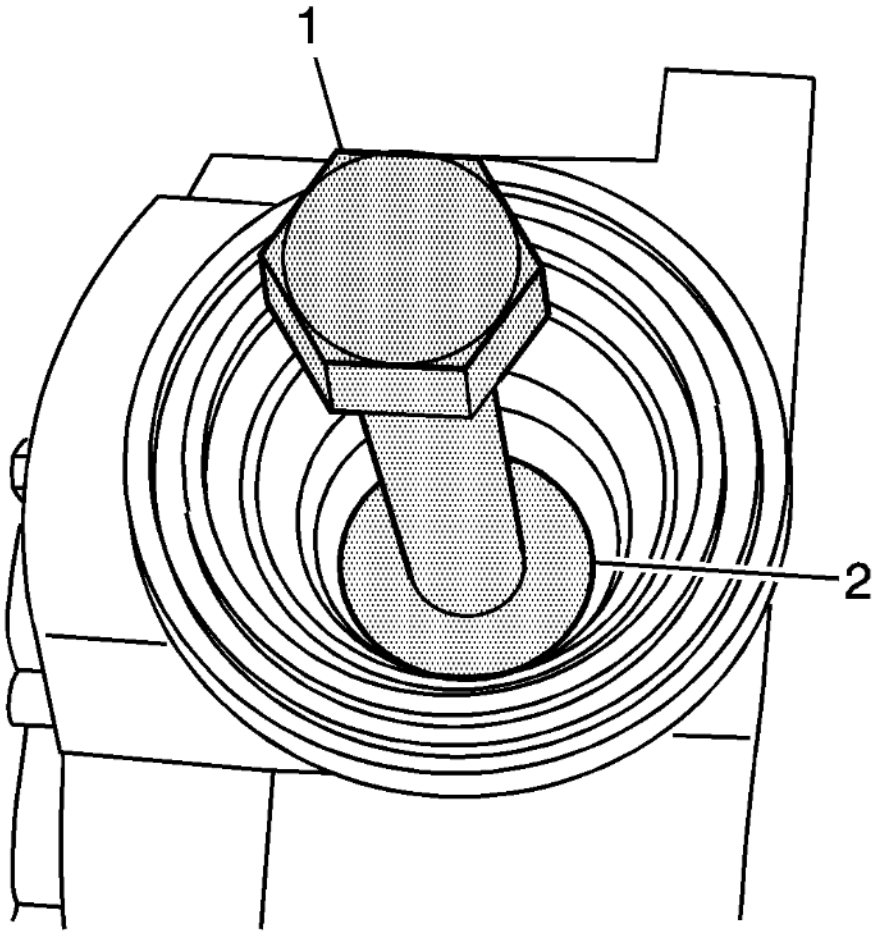


Fig. 241: Installing Forcing Screw Of J 45858 Into J 45858-4 (8.25 Inch Axles)
Courtesy of GENERAL MOTORS COMPANY

34. Install the forcing screw (1) of the **J-45858** front axle bearing race remover/installer into the J-45858-4 (2).
35. Drive out the inner pinion bearing cup by pounding on the forcing screw with a hammer.

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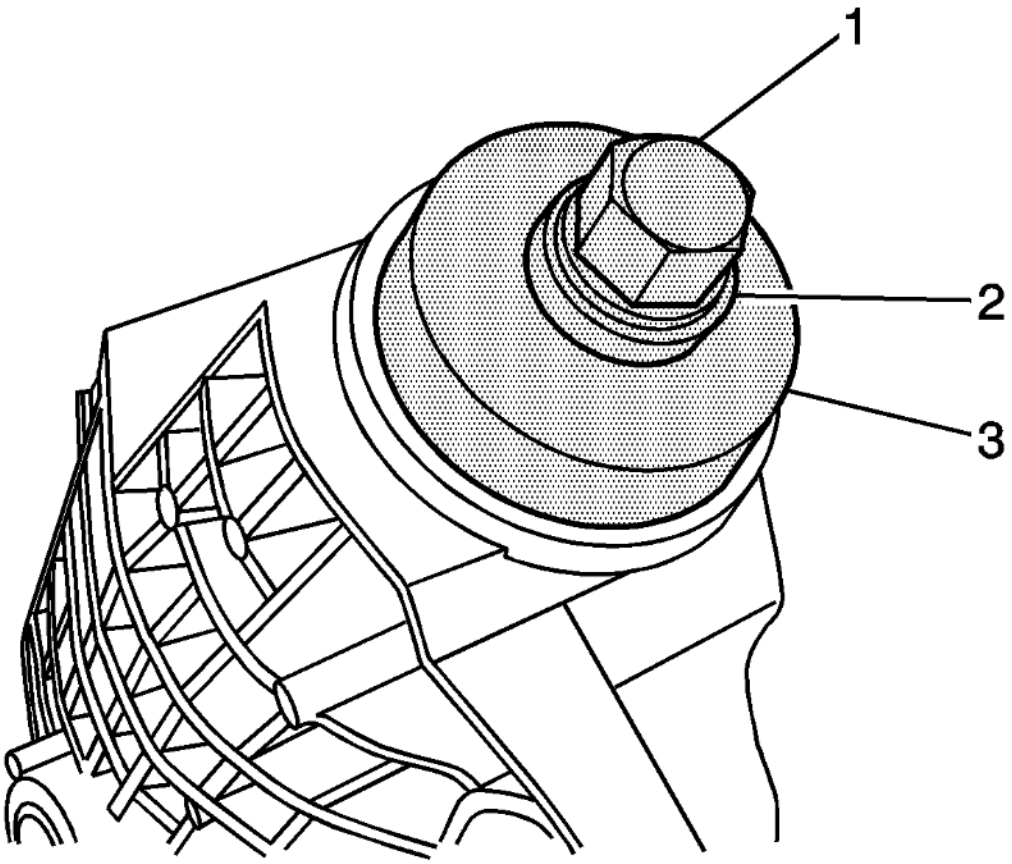


Fig. 242: View Of Thrust Bearing & Washer, Forcing Screw & Special Tool J 45858-3
Courtesy of GENERAL MOTORS COMPANY

36. Install the J 45858-3 (3), the thrust bearing and the washer (2), and the forcing screw (1) over the outer pinion bearing cup bore.

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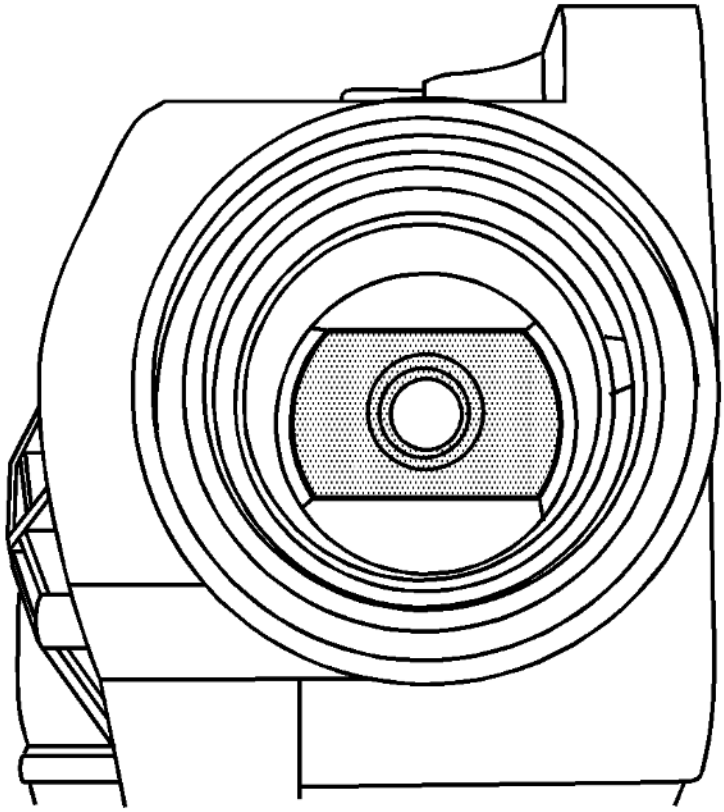


Fig. 243: Installing J 45858-5 Into Pinion Bearing Bore (8.25 Inch Axles)
Courtesy of GENERAL MOTORS COMPANY

37. Install the J 45858-5 into the pinion bearing bore behind the outer pinion bearing cup.

    Slowly turn the forcing screw clockwise until the J 45858-5 is evenly seated behind the outer pinion bearing cup bore and the J 45858-3 is evenly seated over the outer pinion bearing cup bore.

38. Remove the outer pinion bearing cup by turning the forcing screw clockwise.
39. Remove the collapsible spacer from the drive pinion.

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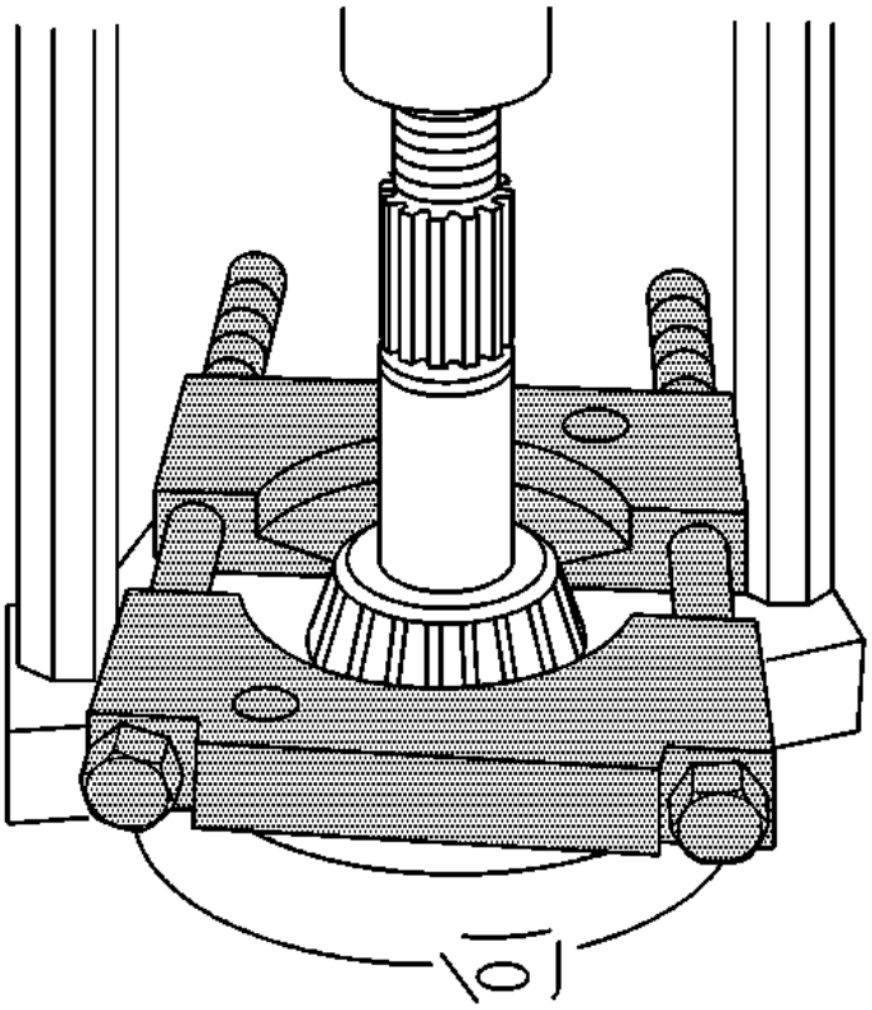


Fig. 244: View Of Inner Pinion Bearing & Hydraulic Press
Courtesy of GENERAL MOTORS COMPANY

40. Install the **J-22912-B** split-plate bearing puller between the pinion bearing and the drive pinion.
41. Using the **J-22912-B** split-plate bearing puller and a hydraulic press, remove the inner pinion bearing
42. Remove the pinion gear selectable shim.

Assembly Procedure

1. Install the selective shim between the inner pinion bearing and the shoulder of the pinion gear.

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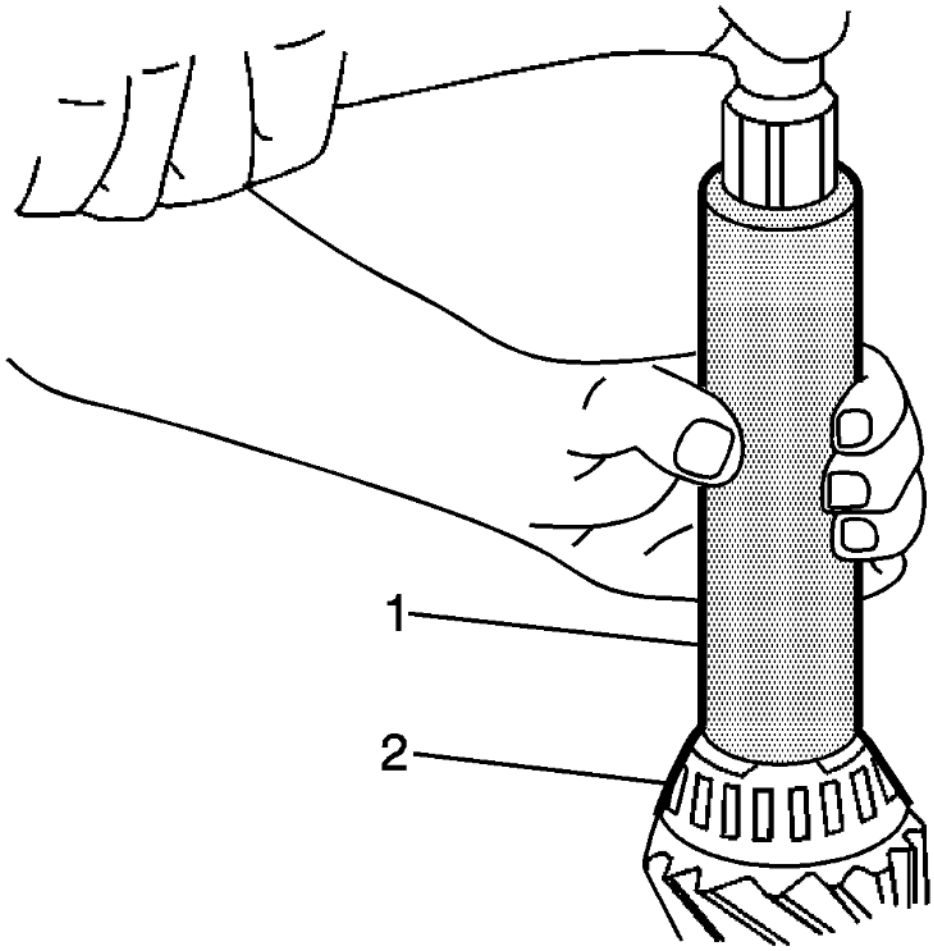


Fig. 245: Installing Inner Pinion Bearing Onto Pinion Gear
Courtesy of GENERAL MOTORS COMPANY

2. Using the **J-35512** inner pinion bearing installer , install the inner pinion bearing onto the pinion gear.
3. Install the new collapsible spacer onto the pinion gear.
4. Lubricate the inner and the outer pinion bearings with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .
5. Install the outer pinion bearing into the differential carrier case half.
6. Install the differential carrier case half into a vise. Place a shop towel in a vise in order to protect the differential case.
7. Before assembly, lubricate the following parts with axle lubricant. Use the proper fluid. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
    - The pinion bearings
    - The pinion and the differential gears
    - The thrust washers
    - The pinion bearing cups

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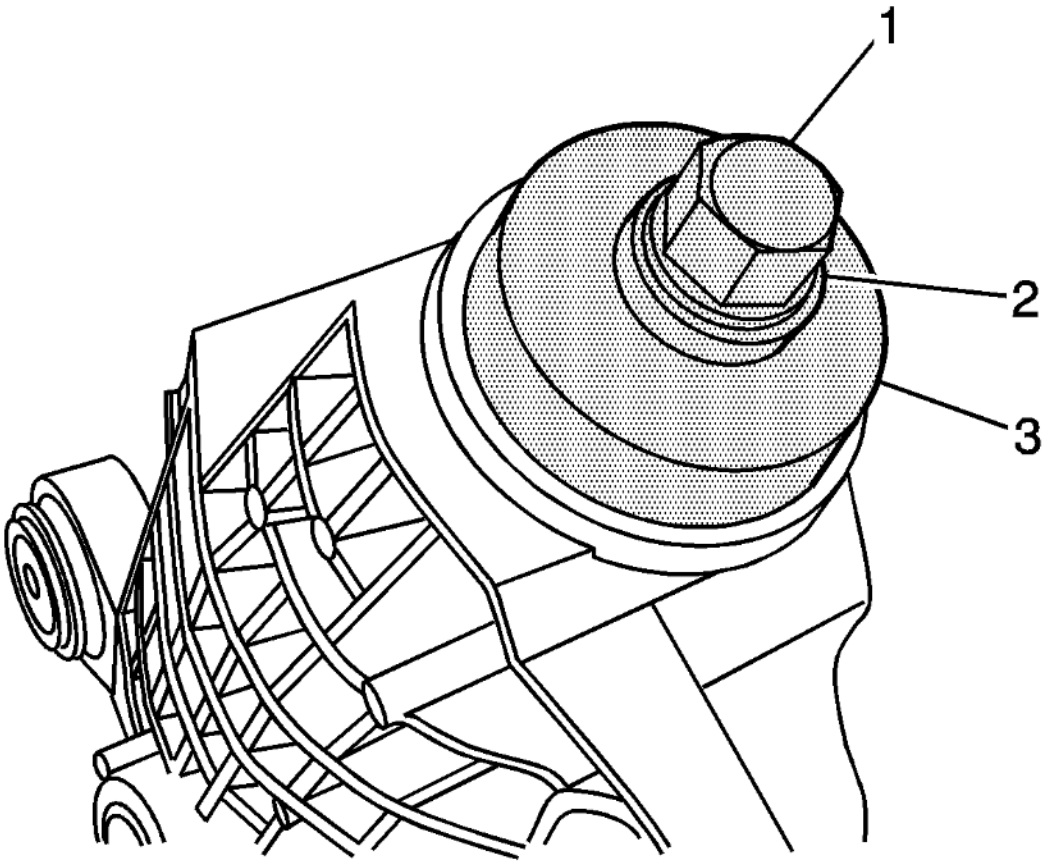


Fig. 246: Installing J 45858-3, Thrust Bearing & Washer, & Forcing Screw (8.25 Inch Axles)
Courtesy of GENERAL MOTORS COMPANY

8. Install the J-45858-3 (3), the thrust bearing and the washer (2), and the J-45858-6 (1) over the outer pinion bearing cup bore.

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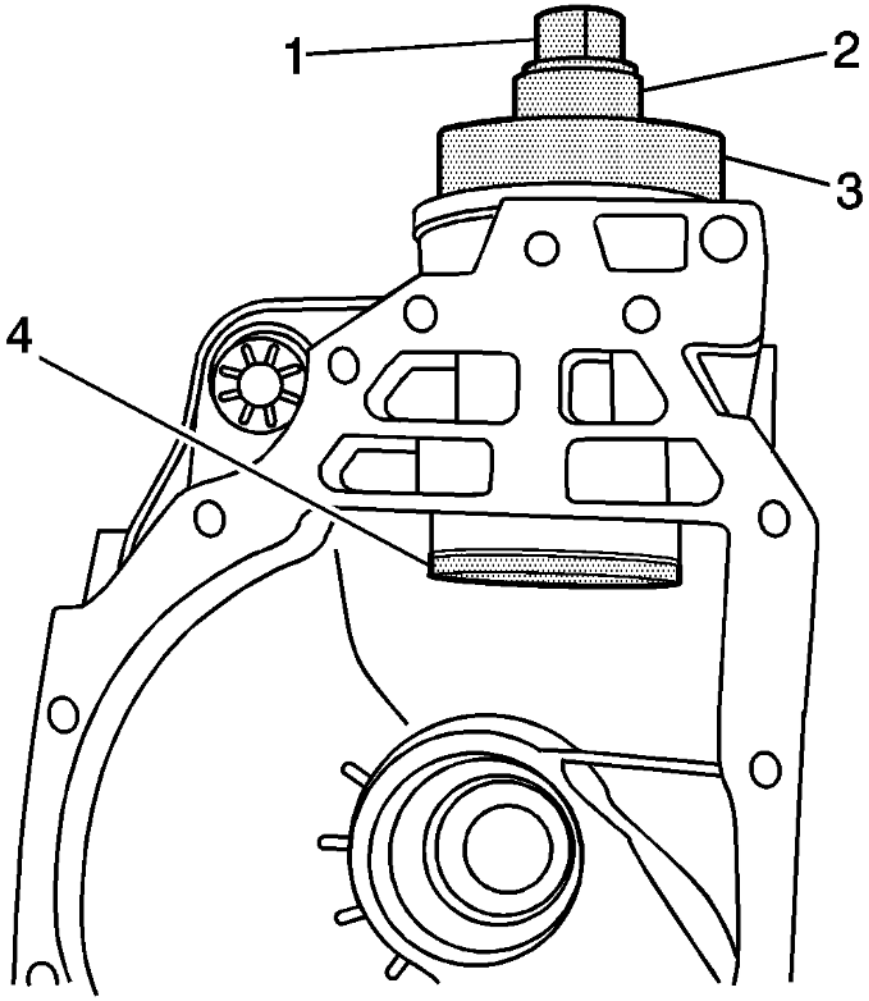


Fig. 247: Installing Inner Pinion Bearing Cup (8.25 Inch Axle)
Courtesy of GENERAL MOTORS COMPANY

9. Install the inner pinion bearing cup and the J-45858 or J-45858-2B (4) to the J-45858-6 (1).

   Slowly turn the J-45858-6 until the inner pinion bearing cup is evenly seated over the inner pinion bearing cup bore.

10. Turn the J-45858-6 clockwise slowly in order to draw the inner pinion bearing cup into the inner pinion bearing cup bore.

    Inspect the position of the inner pinion bearing cup as it is being drawn into the inner 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-45858** pinion bearing race remover/installer or **J-45858-B** pinion bearing race remover/installer and the inner pinion bearing cup and reposition the inner pinion bearing cup.

11. Tighten the J-45858-6 until the inner pinion bearing cup is seated in the inner pinion bearing cup bore.
12. Remove the **J-45858** pinion bearing race remover/installer or **J-45858-B** pinion bearing race remover/installer .

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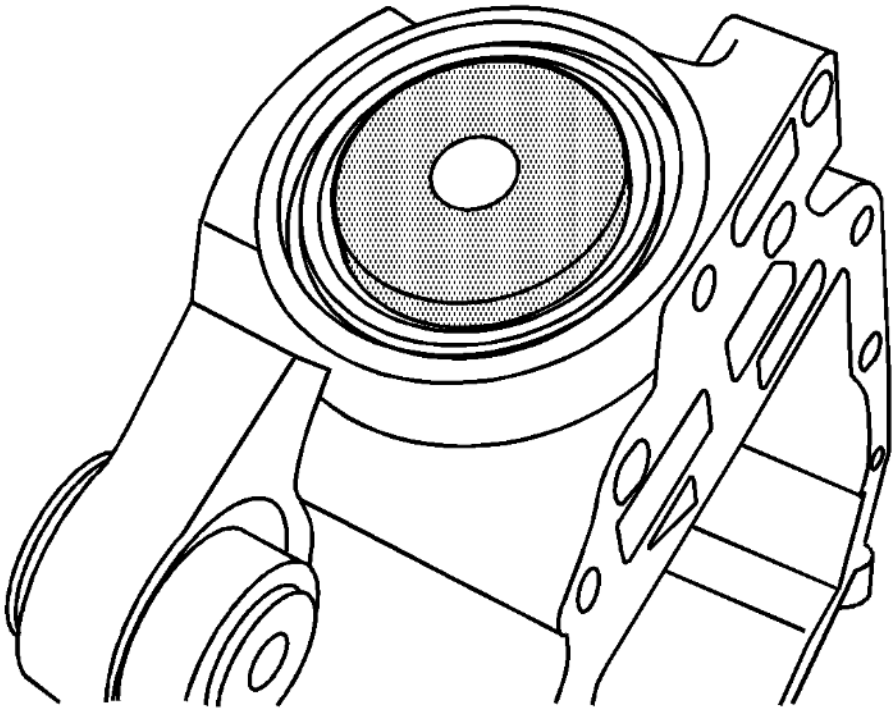


Fig. 248: Installing Outer Pinion Bearing Cup (8.25 Inch Axle)
Courtesy of GENERAL MOTORS COMPANY

13. Install the outer pinion bearing cup and the J-45858-1 or **J-45858-1A** pinion bearing race remover/installer over the outer pinion bearing cup bore.

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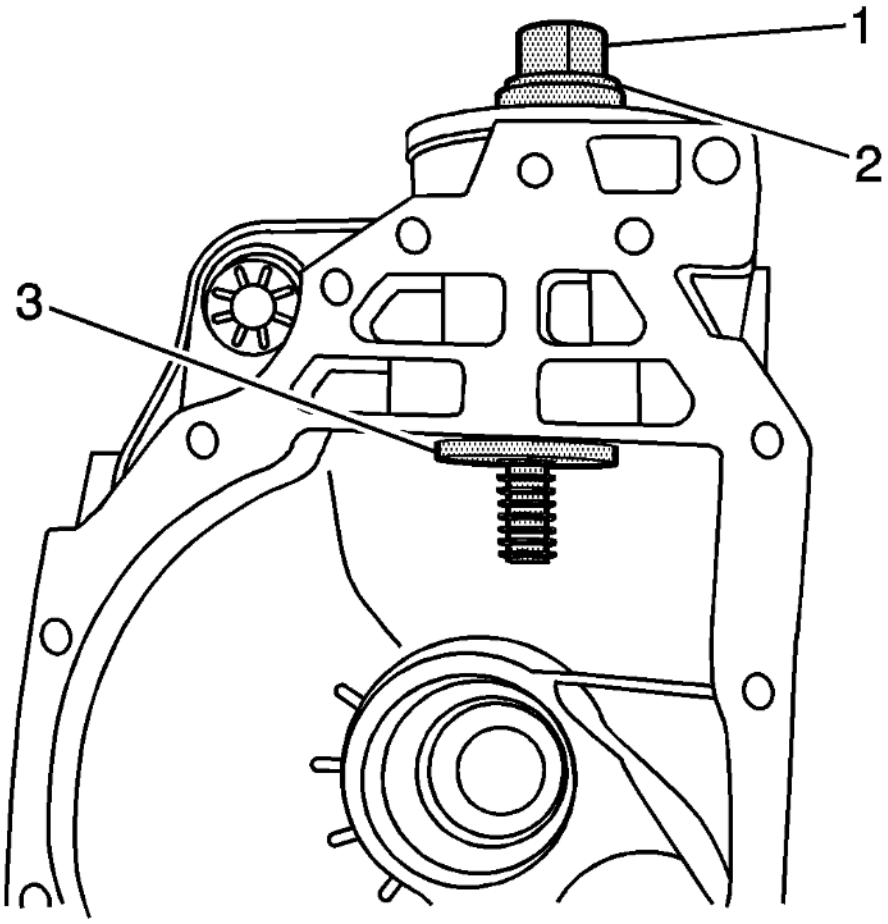


Fig. 249: Installing Thrust Bearing And Washer - 8.25 Inch Axle
Courtesy of GENERAL MOTORS COMPANY

14. Install the thrust bearing and the washer (2), the J-45858-6 (1), and the J-45858-2 or J-45858-2B (3) as shown.
15. Slowly turn the J-45858-6 until the outer pinion bearing cup is evenly seated over the outer pinion bearing cup bore and the J-45858-2 or J-45858-2B is evenly seated within the inner pinion bearing cup.
16. Turn the J-45858-6 clockwise slowly in order to draw the outer pinion bearing cup into the outer pinion bearing cup bore.

    Inspect the position of the outer pinion bearing cup as it is being drawn into the outer 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-45858** pinion bearing race remover/installer or **J-45858-B** pinion bearing race remover/installer and the outer pinion bearing cup and reposition the outer pinion bearing cup.

17. Tighten the forcing screw until the outer pinion bearing cup is seated in the outer pinion bearing cup bore.
18. Remove the **J-45858** pinion bearing race remover/installer ro **J-45858-B** pinion bearing race remover/installer .
19. Measure the pinion depth and determine the selectable pinion shim thickness. Refer to **Pinion Depth Adjustment (9.25 Inch Axle)Pinion Depth Adjustment (8.25 Inch Axle)**.

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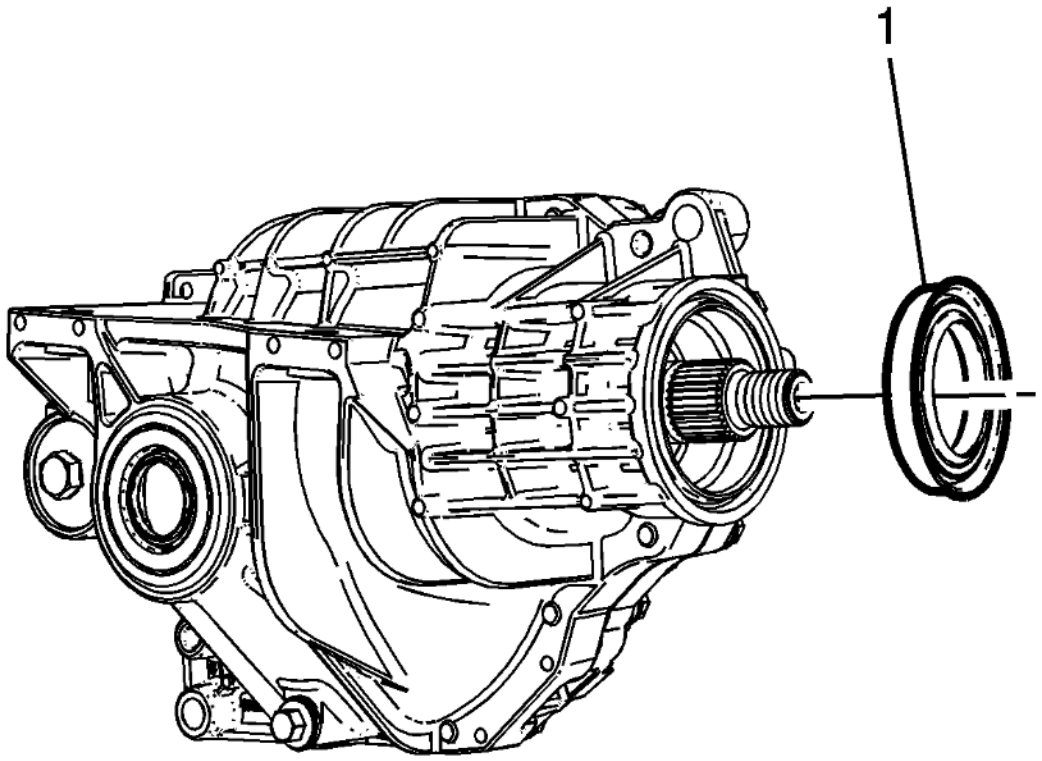


Fig. 250: Pinion Seal
Courtesy of GENERAL MOTORS COMPANY

20. Position the pinion seal (1) in the differential case.

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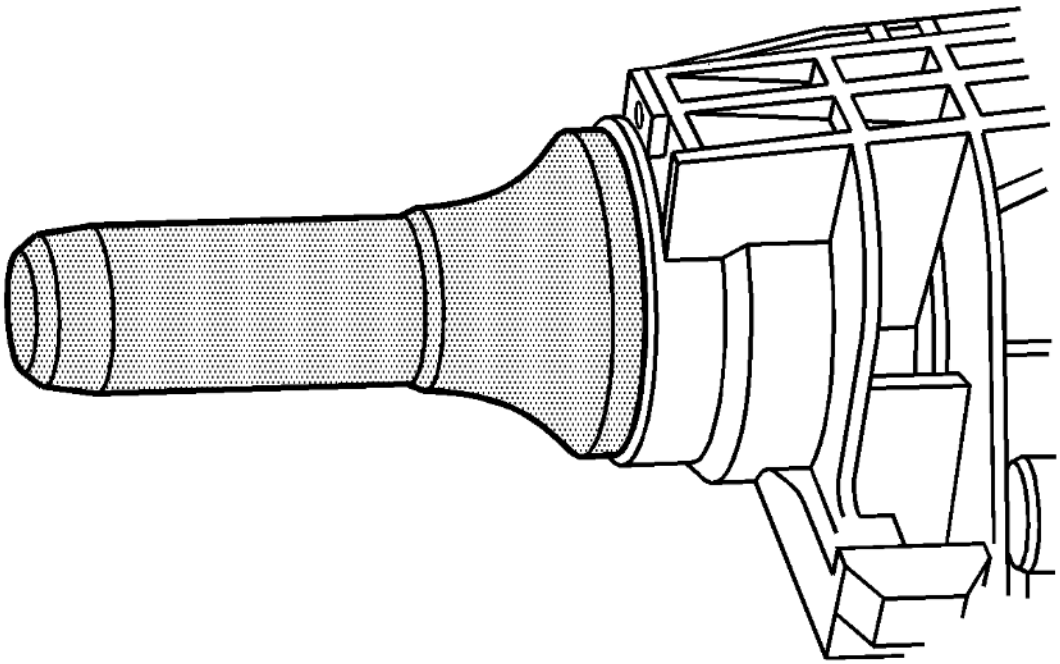


Fig. 251: Seal Installer
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Ensure that the pinion flange seal is seated on the axle housing surface.**

21. Using the **J-36366** pinion oil seal installer , install the pinion flange seal.
22. Using the correct sealant, apply sealant to the splines of the pinion yoke. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
23. Install the pinion gear, with the inner pinion bearing an the new collapsible spacer, into the left differential carrier case half.

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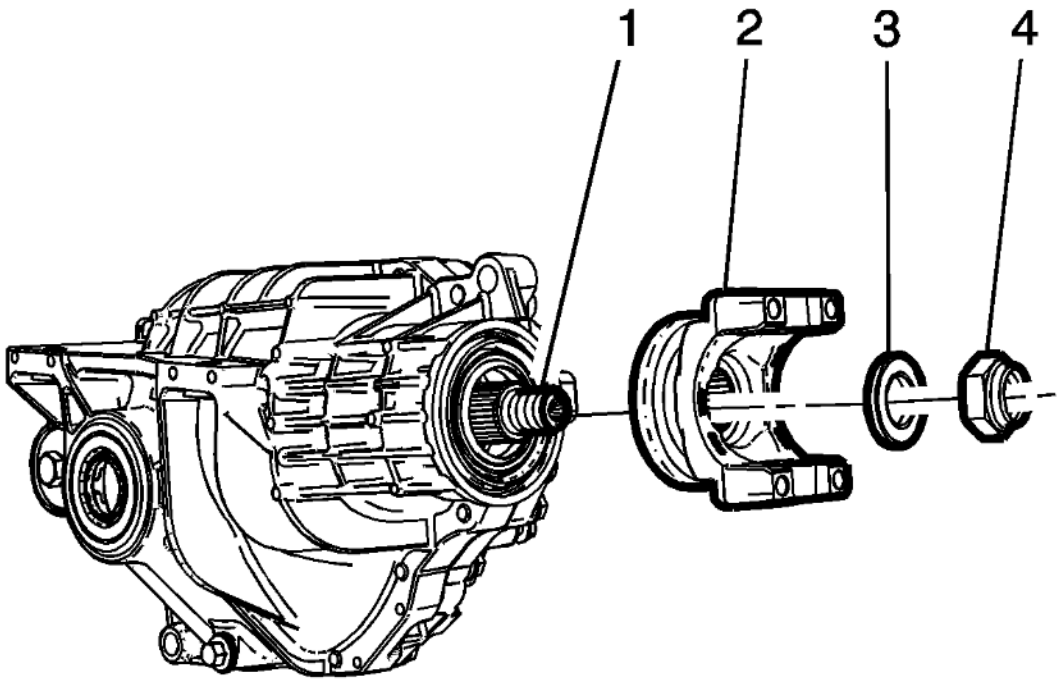


Fig. 252: Pinion Flange/Yoke Assembly Components
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Pinion Flange/Yoke Installation Caution .

24. Position the pinion flange/yoke assembly (2) on the pinion shaft (1).
25. Using a soft faced mallet, tap the on the pinion flange/yoke assembly (2) until a few pinion shaft by threads show through.
26. Install the NEW pinion washer (3) and the nut (4).
27. If the pinion nut cannot be installed, remove the pinion nut washer.
28. Install the old pinion nut and tighten the nut until a few of the shaft threads show through.
29. Remove the old pinion nut.
30. Install the **J-8614-01** flange and pulley holding tool onto the pinion flange/yoke assembly (2).

NOTE: If the rotating torque exceeded, the pinion will be removed and a new collapsible spacer installed.

31. Using the **J-8614-01** flange and pulley holding tool , tighten the pinion nut until the pinion end play is just taken up. Rotating the pinion while tightening the nut will seat the bearings.
32. Remove the **J-8614-01** flange and pulley holding tool.

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33. Using an inch pound torque wrench, measure the rotating torque of the pinion, which should be 1.0-2.3 N.m (10-20 lb in) for used bearings, 1.7-3.4 N.m (15-30 lb in) for new bearings.
34. 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** flange and pulley holding tool and continue to tighten the pinion nut, which should be 1.0-2.3 N.m (10-20 lb in) for used bearings, 1.7-3.4 N.m (15-30 lb in) for new bearings.
35. Once the specified torque is obtained, rotate the pinion several time to ensure the bearings have seated. Recheck the rotating torque and adjust if necessary.
36. Remove the **J-8614-01** flange and pulley holding tool.

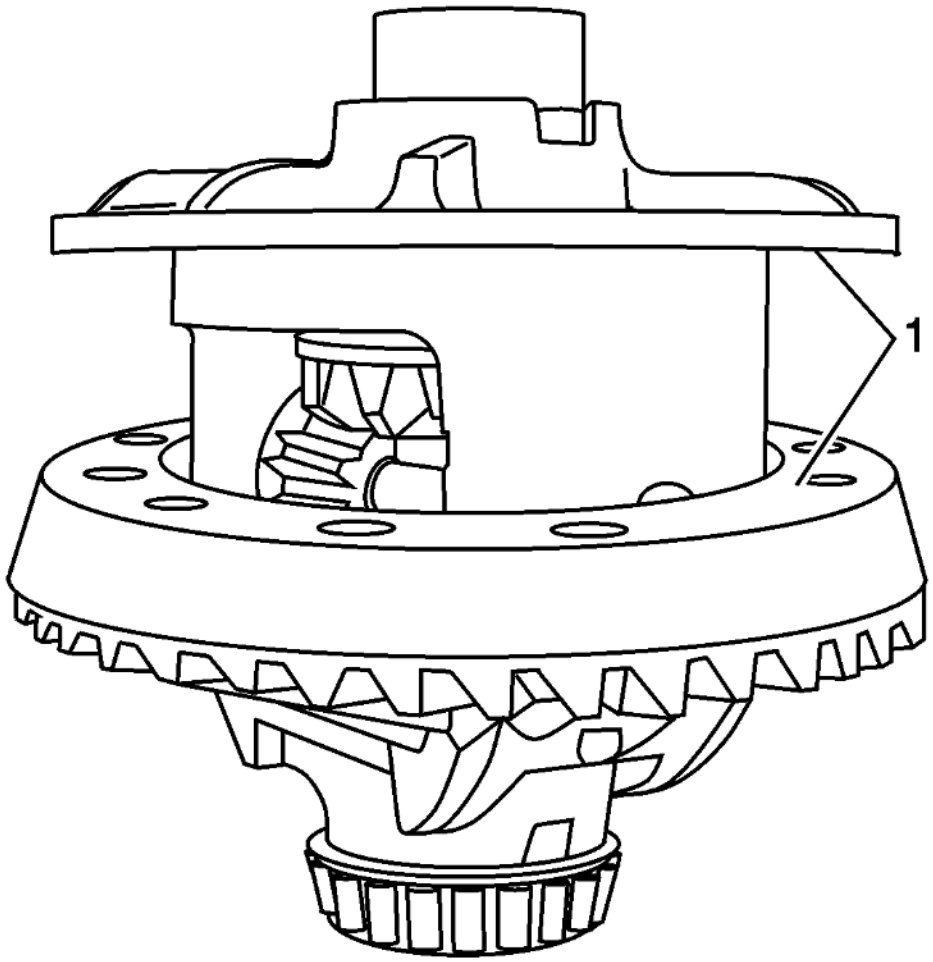


Fig. 253: Mating Surfaces Of Ring Gear And Differential Case
Courtesy of GENERAL MOTORS COMPANY

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

37. Install the ring gear onto the differential case.

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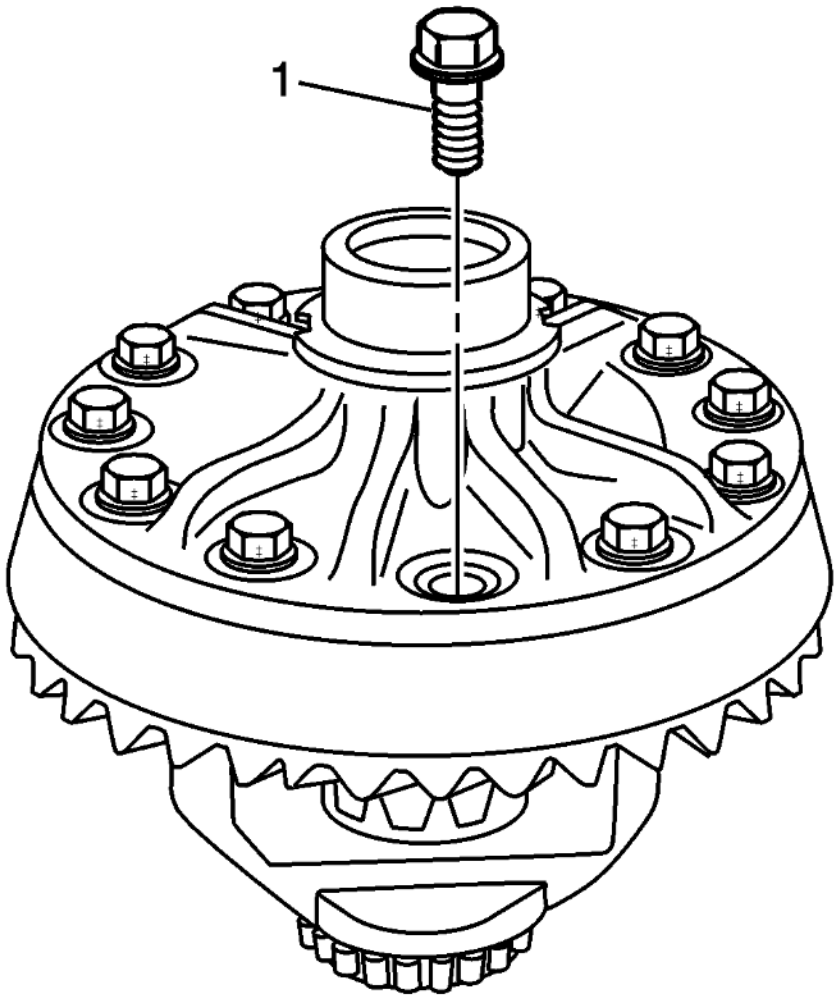


Fig. 254: Ring Gear Bolts Have Left-Hand Threads
Courtesy of GENERAL MOTORS COMPANY

NOTE: **The ring gear bolts have left-hand threads.**

38. Install the new ring gear bolts (1).

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

    CAUTION: **Refer to Fastener Caution .**

39. Install the ring gear bolts. Tighten the ring gear bolts alternately and in stages, gradually pulling the ring gear onto the differential case. Tighten the ring gear bolts in sequence to 120 N.m (89 lb ft).

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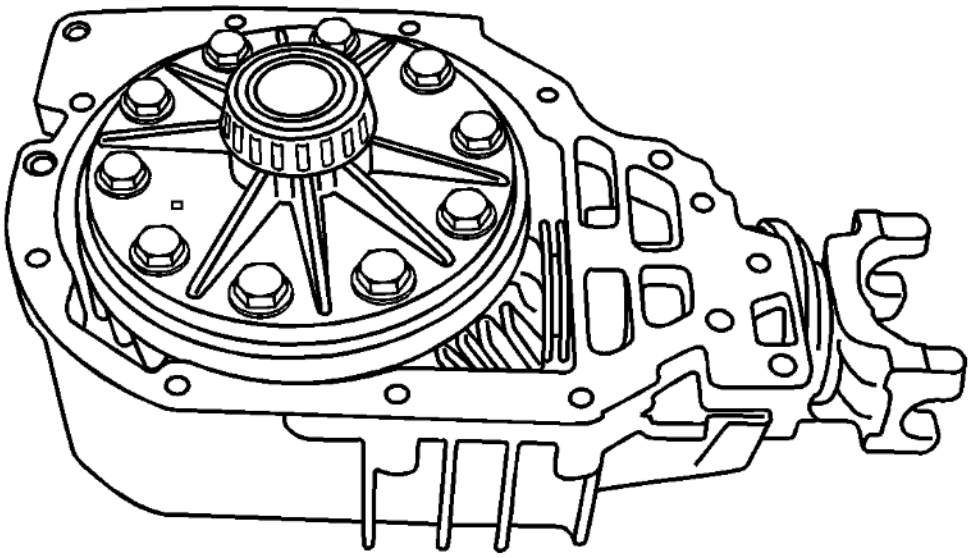


Fig. 255: View Of Differential Case Assembly & Carrier Case Half
Courtesy of GENERAL MOTORS COMPANY

40. Install the differential case assembly into the left differential carrier case half.

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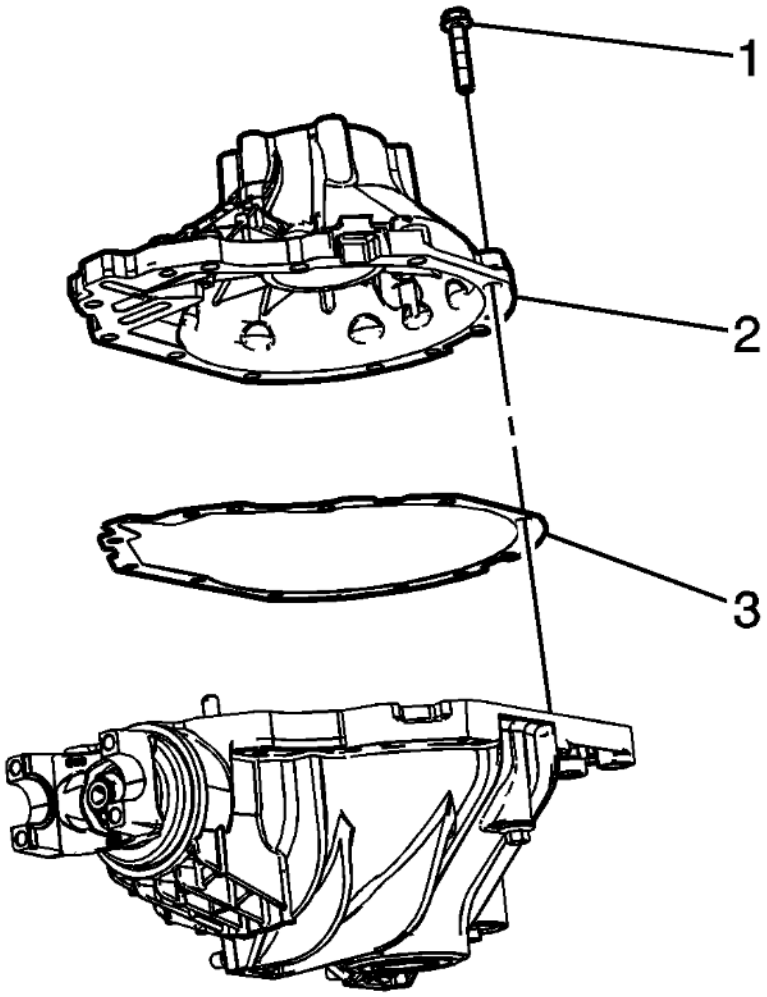


Fig. 256: View Of Differential Carrier Housing, Gasket & Bolts
Courtesy of GENERAL MOTORS COMPANY

NOTE: **The sealing surfaces of the differential carrier halves must be free of grease and oil to ensure that the gasket will seal properly.**

41. Install the differential carrier case gasket (3).
42. Install the differential carrier case (2) half to the left differential carrier case half. If the carrier case halves do not make complete contact, use the **J-36599-A** side bearing nut wrench in order to back out right differential adjuster nut sleeve until the differential carrier case halves make contact.
43. Install the differential carrier case bolts (1) and tighten to 73 N.m (54 lb ft).
44. Install the differential carrier assembly into a vise.
45. While rotating the pinion yoke back and forth, turn the right side differential adjuster nut clockwise using the **J-36599-A** side bearing nut wrench until 0.0254-0.072 mm (0.001-0.003 inch) of backlash can be felt between the ring gear and the drive pinion. If the backlash specification cannot be obtained, turn the left side differential adjuster nut sleeve counter clockwise using the **J-36599-A** side bearing nut wrench in small equal increments until the backlash specification can be obtained.

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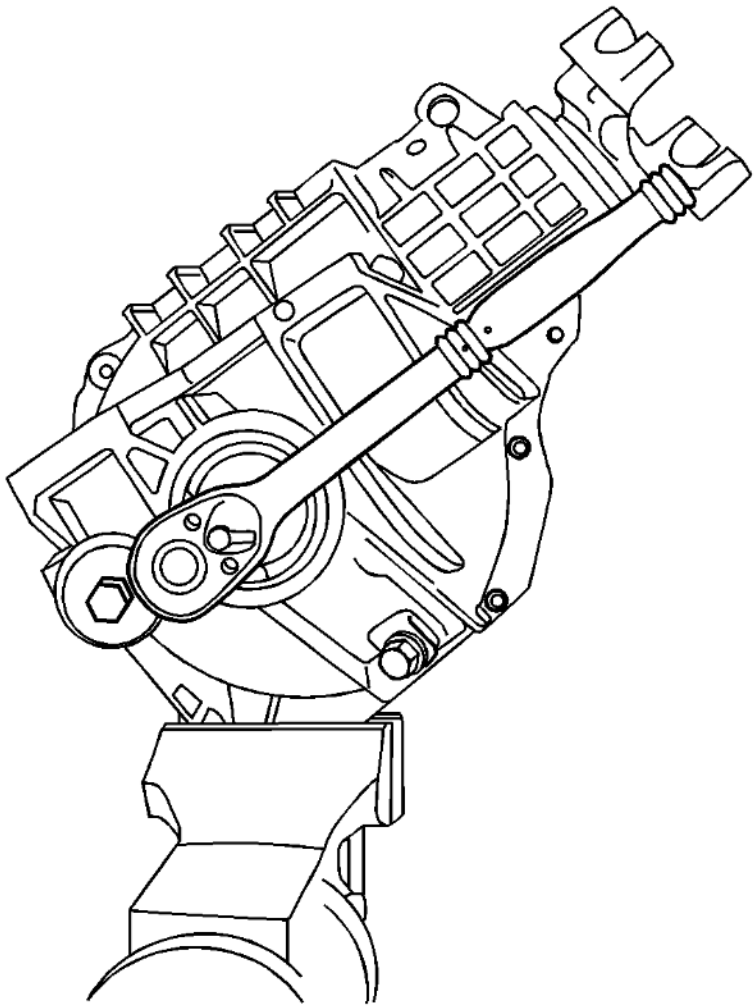


Fig. 257: Tightening Differential Adjuster Nut
Courtesy of GENERAL MOTORS COMPANY

46. Using the **J-36599-A** side bearing nut wrench turn the left side differential adjuster nut clockwise in order to preload the differential side bearings against the differential side bearings cups and tighten the adjuster nut to 75 N.m (55 lb ft).
47. Rotate the pinion several times in order to seat the pinion and differential side bearings.
48. Using an inch-pound torque wrench, measure the rotating torque of the drive pinion and differential assembly, which should be 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.
49. If the rotating torque of the drive pinion and differential assembly is not 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion, 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-36599-A** side bearing nut wrench , turn the left and right side differential adjuster sleeves in or clockwise in small equal increments.
    3. Using an inch pound torque wrench, measure the rotating torque of the pinion and differential assembly.
    4. Compare the new measurement to the specification listed in Step 22. If the rotating torque of the

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pinion and differential assembly is not within specifications, continue to tighten the left and right side differential adjuster nut sleeves in small equal increments on each side until the rotating torque of the pinion and differential assembly is within specifications.

50. If the rotating torque of the drive pinion and differential assembly is more than 1.13 N.m (10 lb in) above the rotating torque of the drive pinion measurement, 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-36599-A** side bearing nut wrench or the **J-36615** side bearing nut wrench , turn the left and right side differential adjuster nut sleeve out or clockwise in small equal increments.
    3. Using a torque wrench, measure the rotating torque of the pinion and differential assembly.
    4. Compare the new measurement to the specification listed in Step 22. 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 sleeve in small equal increments on each side until the rotating torque of the pinion and differential assembly is within specifications.
51. Once the specified rotating is obtained, rotate the pinion several times to ensure the bearings have seated. Recheck the rotating torque and adjust if necessary.
52. Measure the drive pinion to the ring gear backlash and adjust, if necessary. Refer to **Backlash Inspection and Adjustment**.
53. Once the bearing preload and drive pinion to the ring gear backlash is within specifications, perform a gear tooth contact pattern check to ensure proper contact between the pinon and the ring gear. Refer to **Gear Tooth Contact Pattern Inspection**.

FRONT DIFFERENTIAL SIDE AND PINION GEAR REPLACEMENT

Special Tools

- **J-22912-B** Split-Plate Bearing Puller
- **J-2619-01** Slide Hammer
- **J-29369-1** Bushing and Bearing Remover
- **J-34011** Pilot Bearing Remover
- **J-36598** Holding Fixture
- **J-36614** Inner Pinion Bearing Installer
- **J-45765** Pinion Remover
- **J-45858** Front Axle Bearing Race Remover/Installer
- **J-8614-01** Flange and Pulley Holding Tool
- **J-8107-2** Side Bearing Puller Pilot
- **J-22888-D** Side Bearing Remover Kit
- **GE-8092** Driver Handle
- **J-22761** Differential Side Bearing Installer

Inspection Procedure

Perform the following before disassembling the axle:

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

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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. Check the ring gear backlash. Refer to **Backlash Inspection and Adjustment**.

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.

Removal Procedure

1. Remove the differential carrier assembly. Refer to **Front Axle Replacement (8.25 Inch Axle)Front Axle Replacement (9.25 Inch Axle)**.
2. Install the differential carrier assembly in a vise.

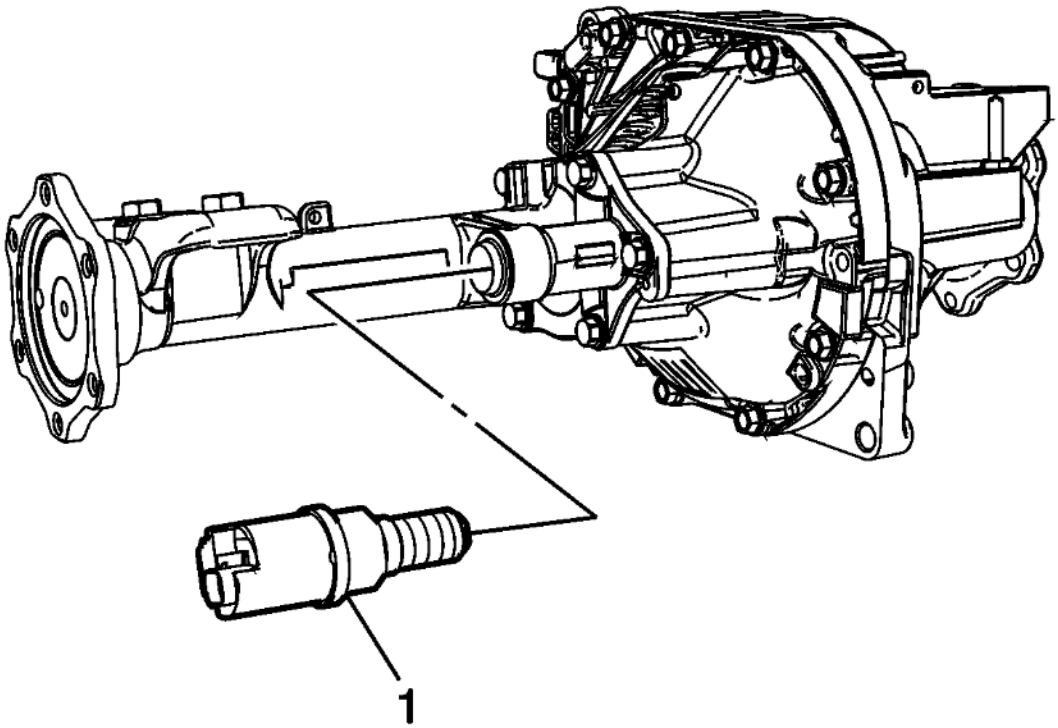


Fig. 258: Front Axle Actuator
Courtesy of GENERAL MOTORS COMPANY

3. Remove the front axle actuator (1).
4. Remove the inner axle shaft housing to differential carrier assembly bolts.

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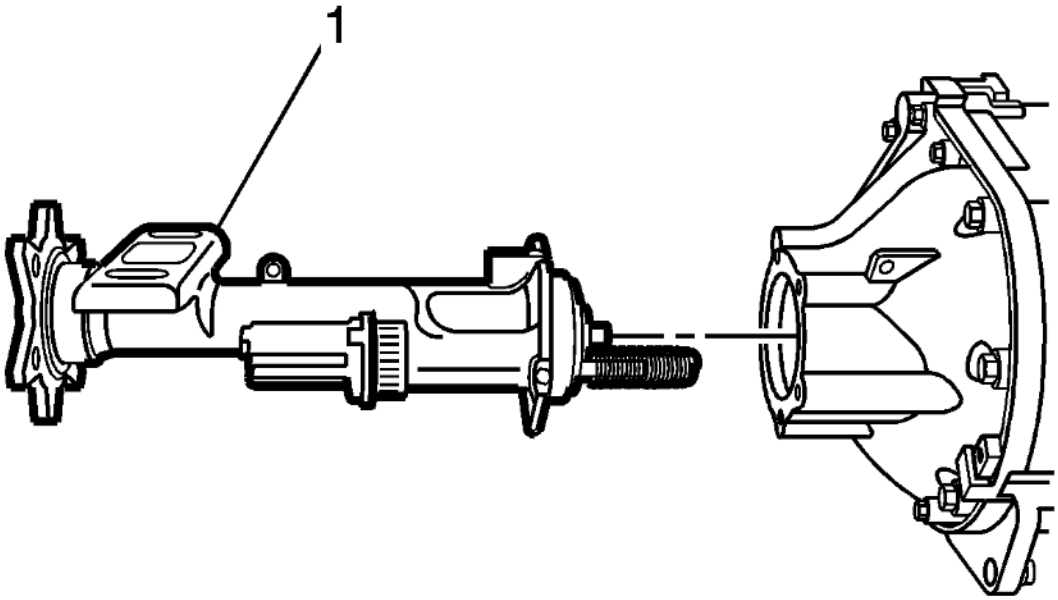


Fig. 259: Installing Inner Axle Shaft Housing Assembly - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

5. Carefully remove the inner axle shaft housing (1) with the inner axle shaft and clutch fork components from the differential carrier assembly.

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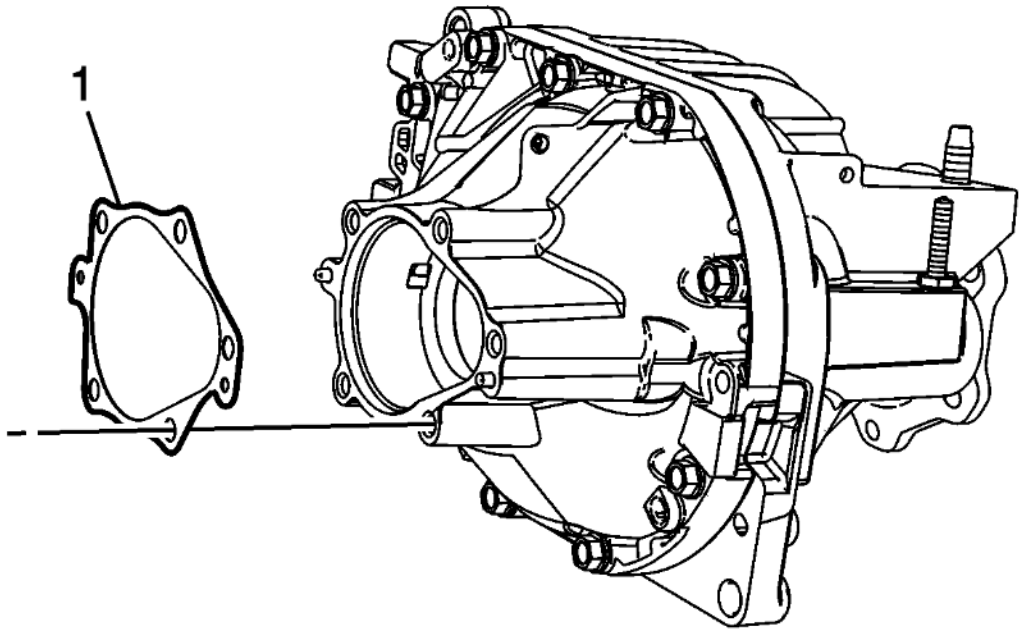


Fig. 260: Inner Axle Housing To Differential Carrier Gasket
Courtesy of GENERAL MOTORS COMPANY

6. Remove the inner axle housing to differential carrier gasket (1).

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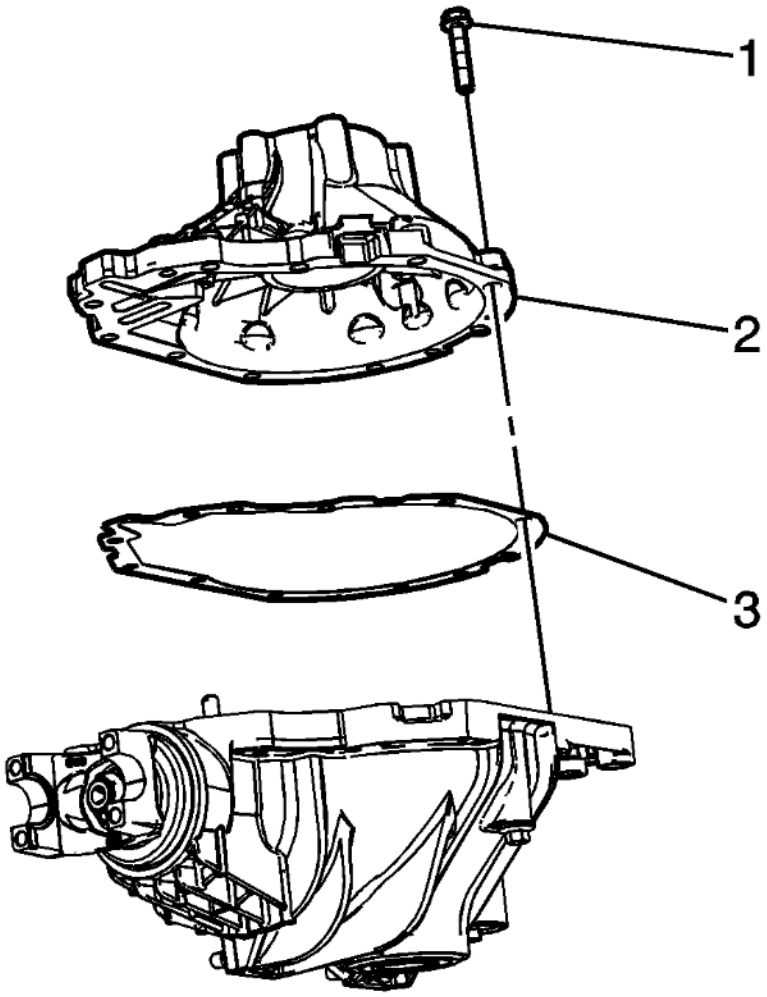


Fig. 261: View Of Differential Carrier Housing, Gasket & Bolts
Courtesy of GENERAL MOTORS COMPANY

7. Remove the differential carrier assembly bolts (1).
8. Separate the left carrier case half from the right carrier case half (2) by tapping on the on the carrier case with a hammer and a brass drift.
9. Remove the differential carrier housing (2) and the differential carrier housing gasket (3).
10. Remove the differential case assembly.
11. Remove the differential side bearing by performing the following steps:
    1. Place the differential case in a vise.

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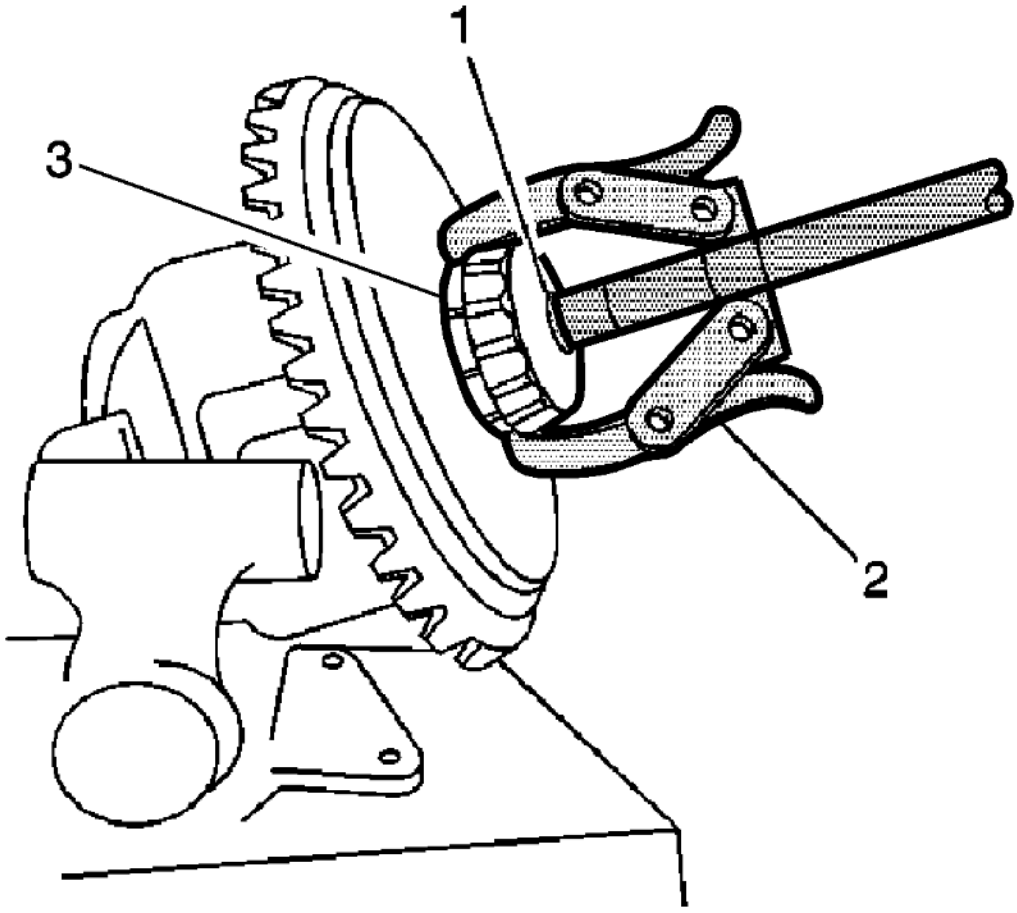


Fig. 262: View Of Differential Side Bearing
Courtesy of GENERAL MOTORS COMPANY

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

12. Remove the differential assembly from the vise.

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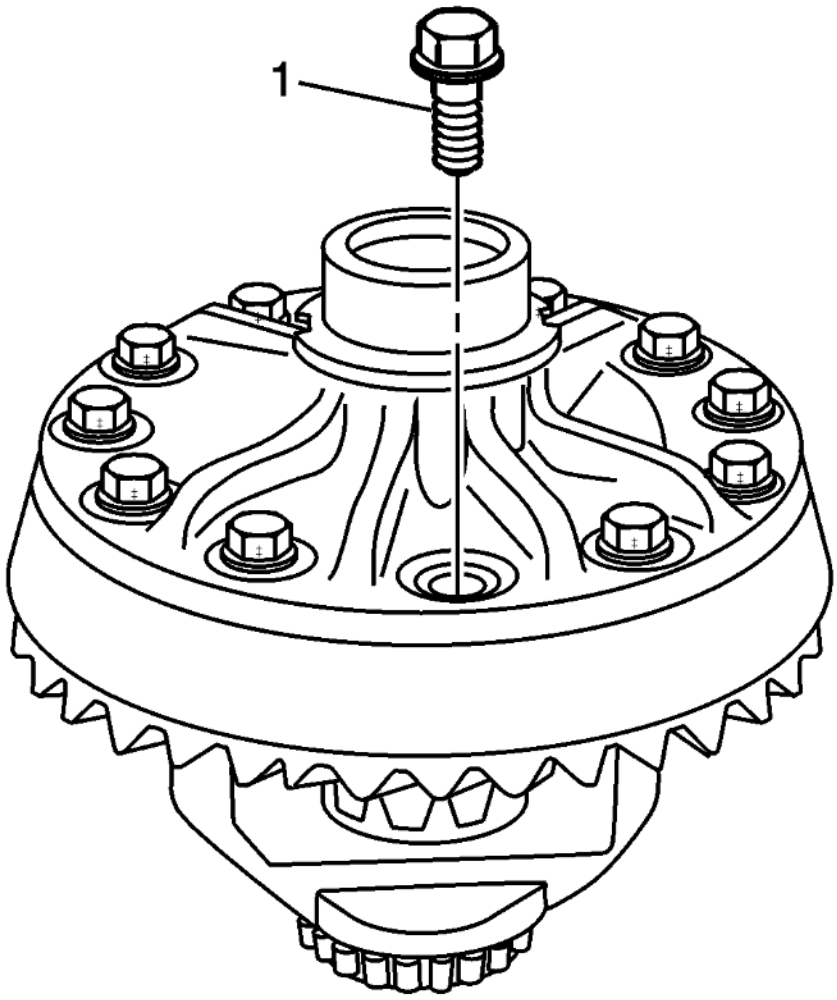


Fig. 263: Ring Gear Bolts Have Left-Hand Threads
Courtesy of GENERAL MOTORS COMPANY

NOTE: **The ring gear bolts have left-hand threads.**

13. Remove the ring gear bolts (1). Discard the bolts.

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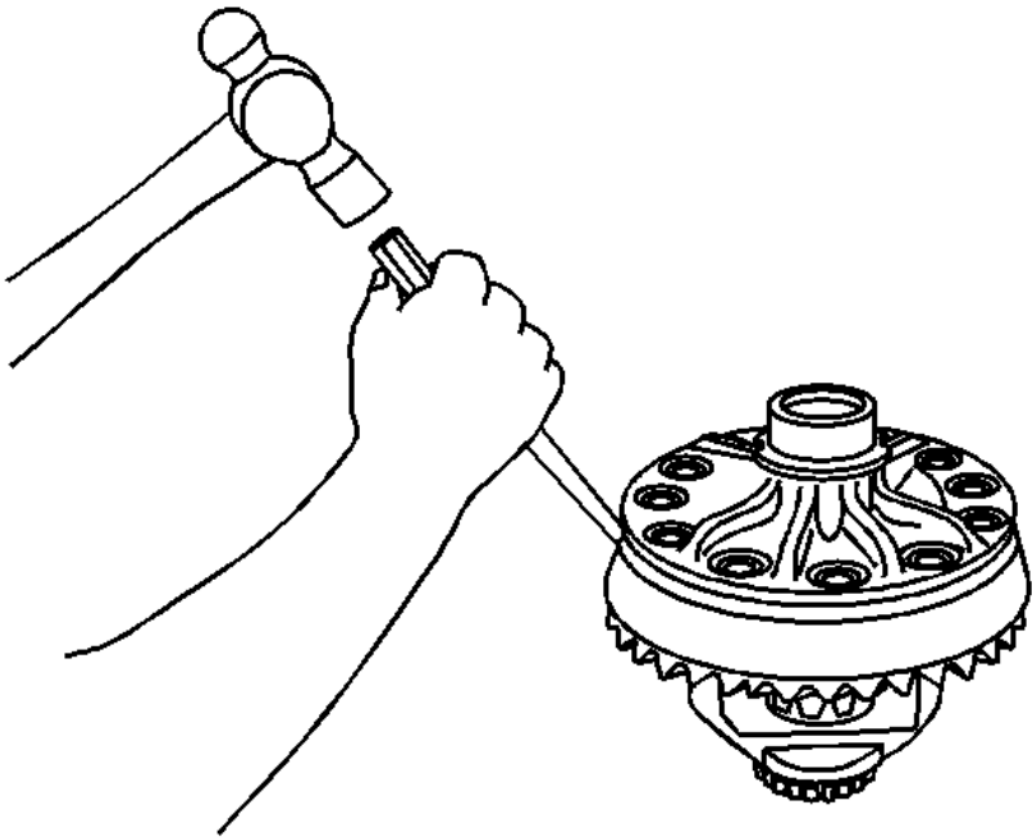


Fig. 264: Removing Ring Gear From Differential
Courtesy of GENERAL MOTORS COMPANY

CAUTION: 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.

14. Remove the ring gear from the differential case.

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

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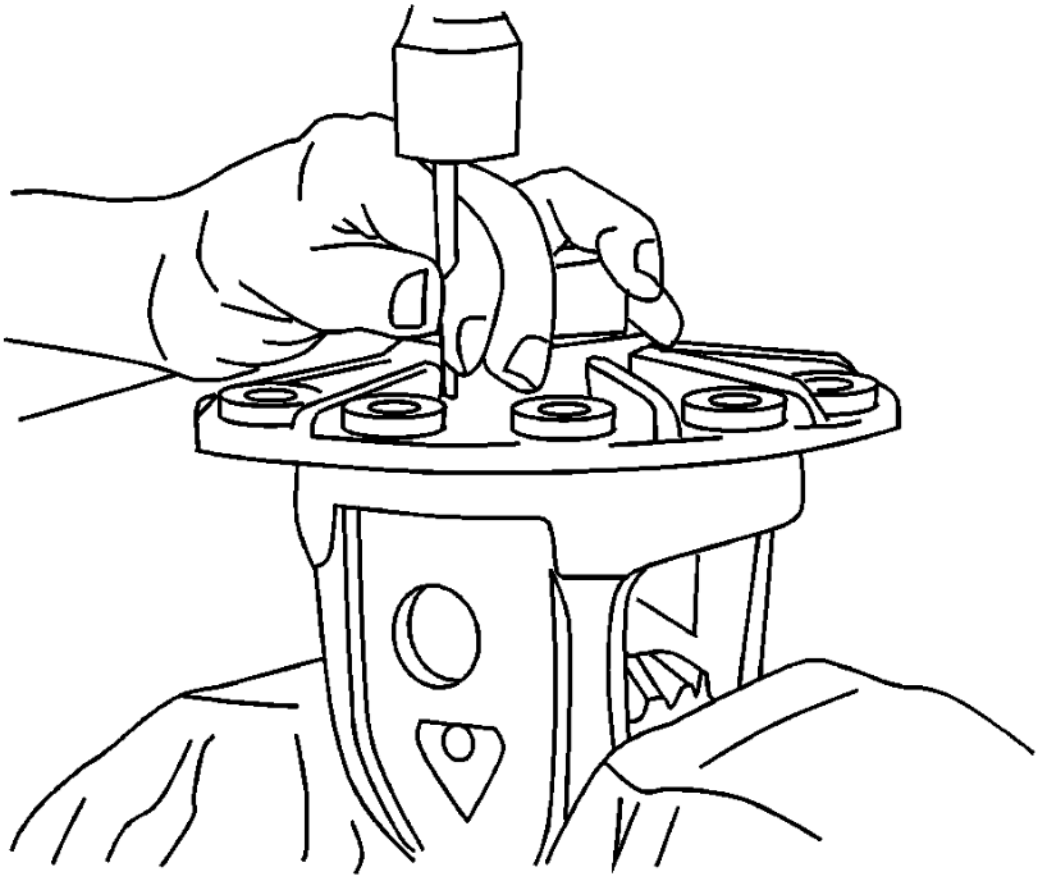


Fig. 265: Driving Out Pinion Shaft Pin (8.25 Inch Axle)
Courtesy of GENERAL MOTORS COMPANY

15. Remove the pinion shaft pin.

    Use a hammer and a drift pin in order to drive out the pin.

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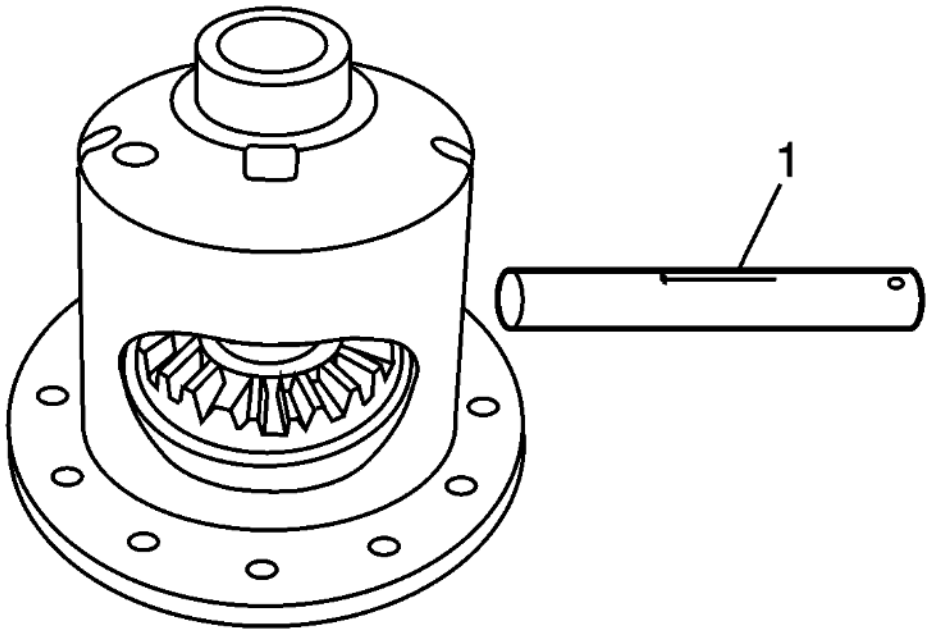


Fig. 266: Pinion Gear Shaft
Courtesy of GENERAL MOTORS COMPANY

16. Remove the pinion shaft (1).

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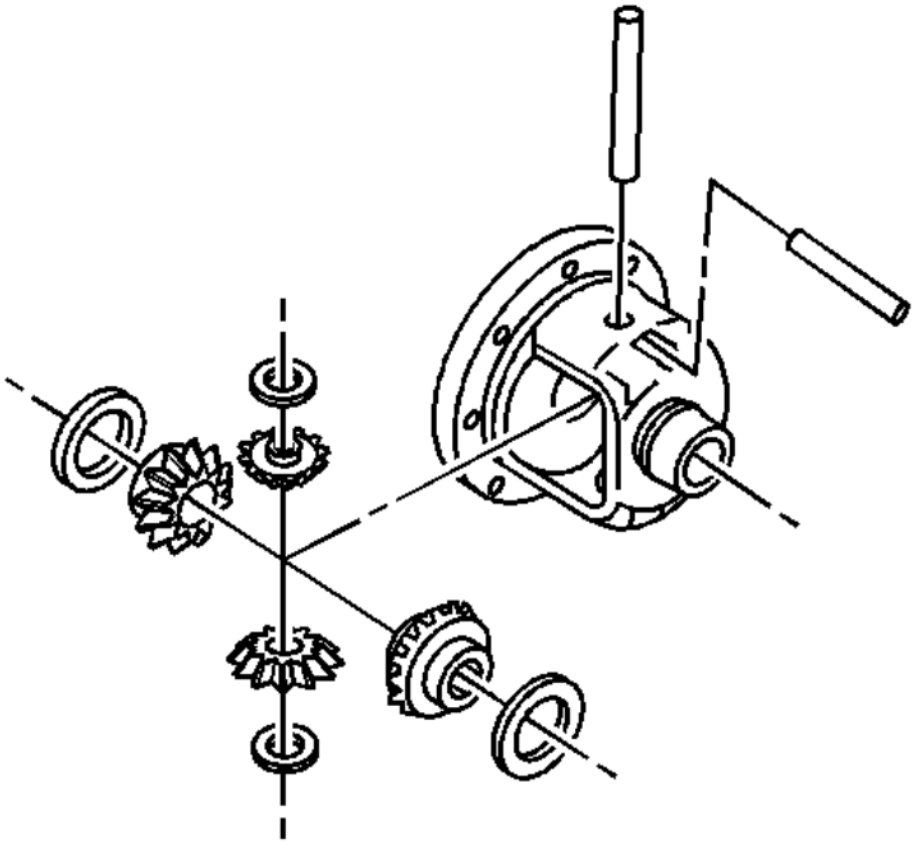


Fig. 267: Exploded View Of Differential Case
Courtesy of GENERAL MOTORS COMPANY

17. Remove the differential pinion gears and the differential side gears by performing the following steps:
    1. Roll the differential pinion gears out of the case with the pinion gear thrust washers.
    2. Remove the differential side gears and the side gear thrust washers.

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

Installation Procedure

1. Lubricate the pinion and side gears using axle lubricant. Use the correct fluid. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

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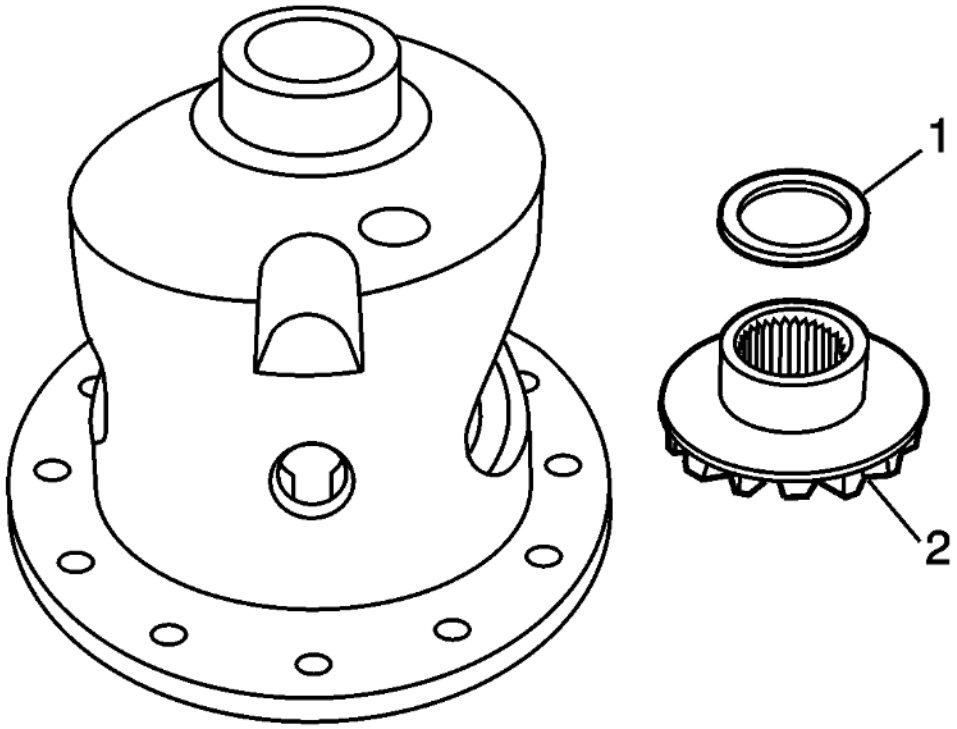


Fig. 268: Thrust Washers And Differential Side Gears
Courtesy of GENERAL MOTORS COMPANY

2. Install the thrust washers (1) and the NEW differential side gears (2) into the differential case.

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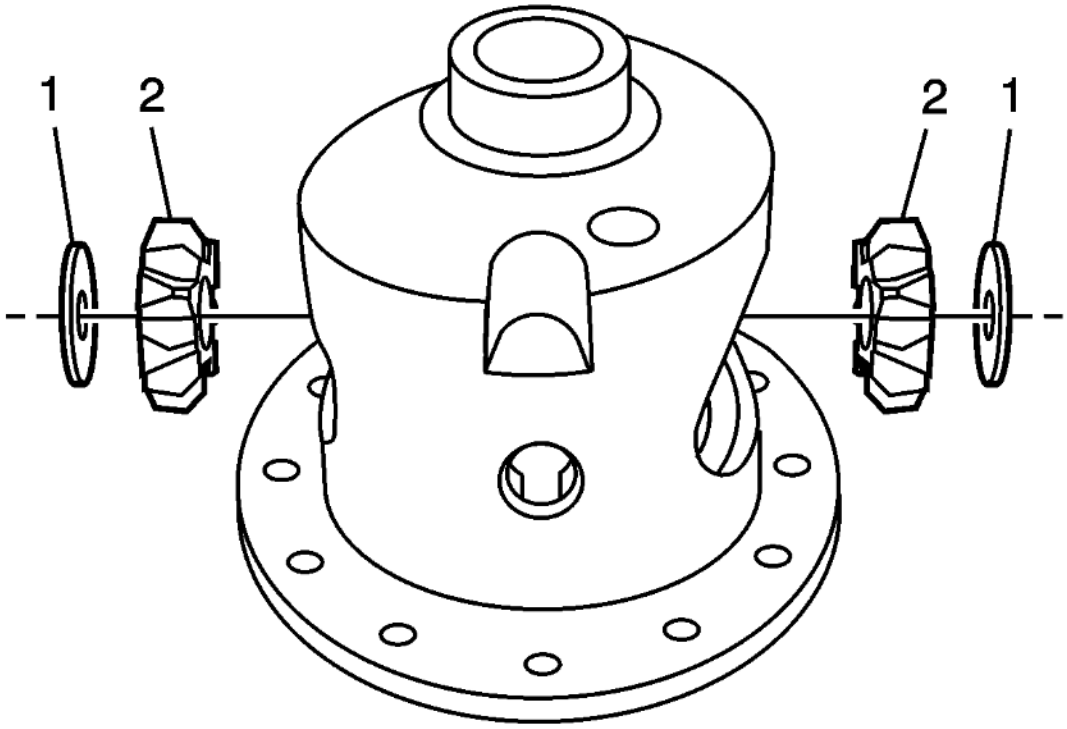


Fig. 269: Differential Pinion Gears
Courtesy of GENERAL MOTORS COMPANY

3. Install the NEW differential pinion gears (2) by performing the following steps:
    1. Position both pinion gears between the differential side gears directly opposite of each other.
    2. Rotate the differential side gears until the pinion gears are opposite the opening in the differential case in line with the pinion shaft opening.
4. Install the thrust washers (1).

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

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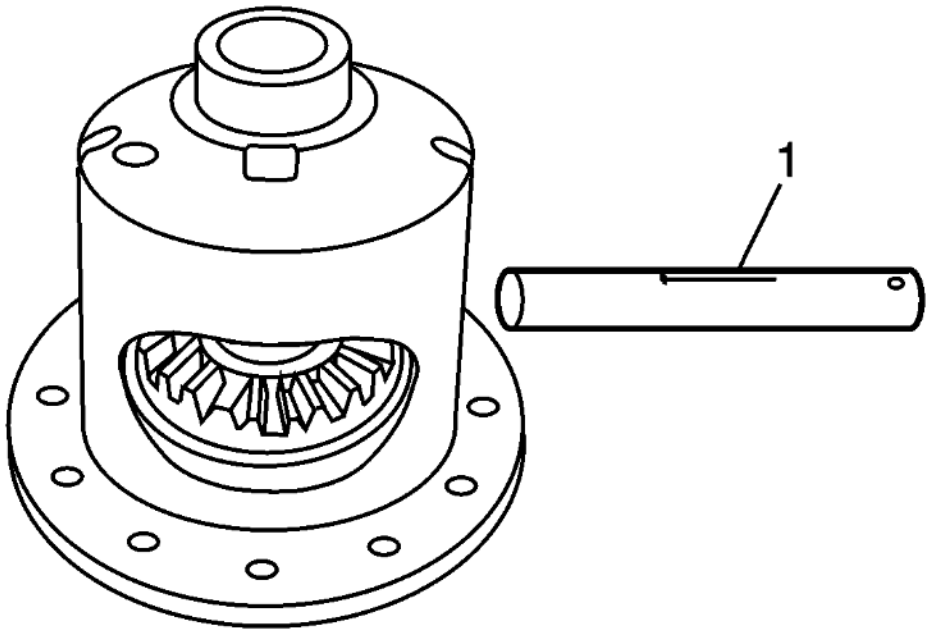


Fig. 270: Pinion Gear Shaft
Courtesy of GENERAL MOTORS COMPANY

5. Install the pinion gear shaft (1).
6. Install the new pinion gear shaft lock pin using a hammer and a brass drift.

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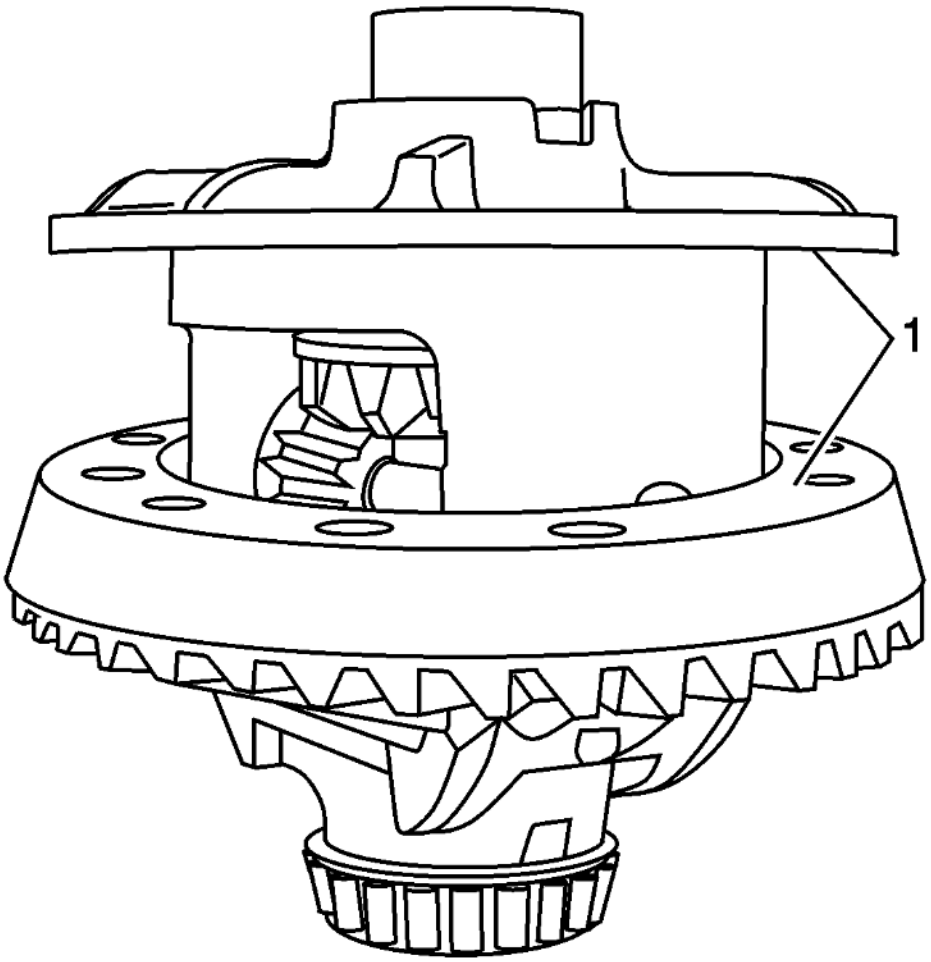


Fig. 271: Mating Surfaces Of Ring Gear And Differential Case
Courtesy of GENERAL MOTORS COMPANY

NOTE: **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.

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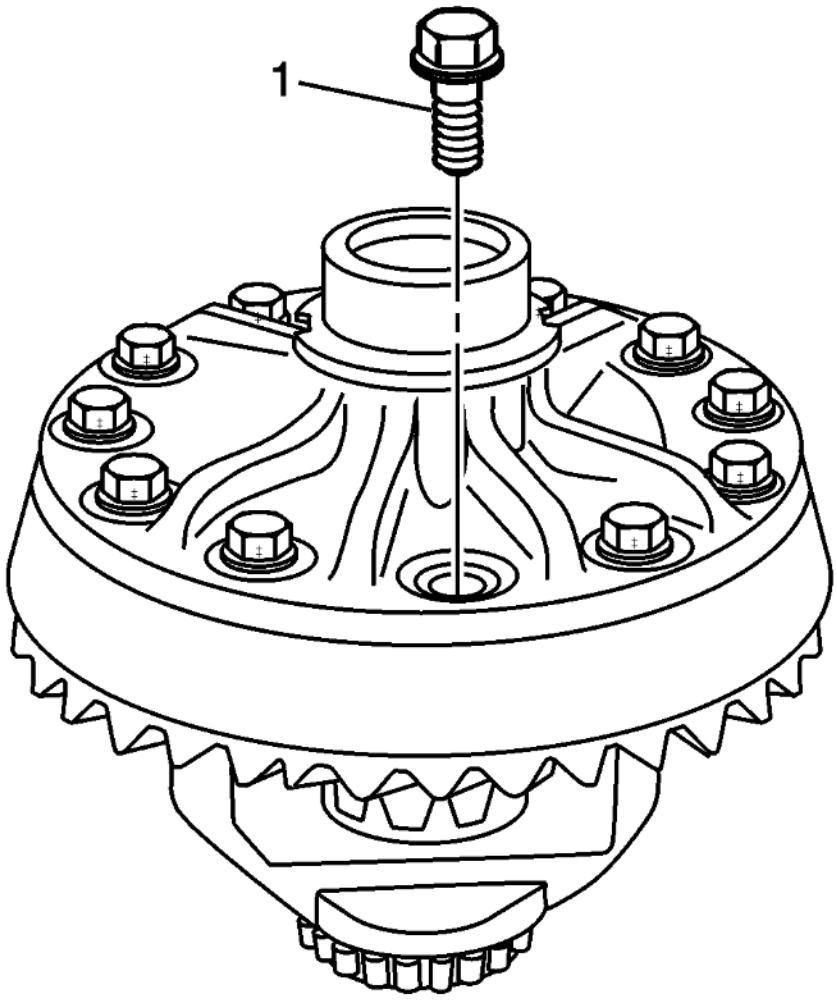


Fig. 272: Ring Gear Bolts Have Left-Hand Threads
Courtesy of GENERAL MOTORS COMPANY

NOTE: **The ring gear bolts have left-hand threads.**

8. Install the new ring gear bolts (1).

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

   CAUTION: **Refer to Fastener Caution .**

9. Install the ring gear bolts. Tighten the ring gear bolts alternately and in stages, gradually pulling the ring gear onto the differential case. Tighten the ring gear bolts in sequence to 120 N.m (89 lb ft).

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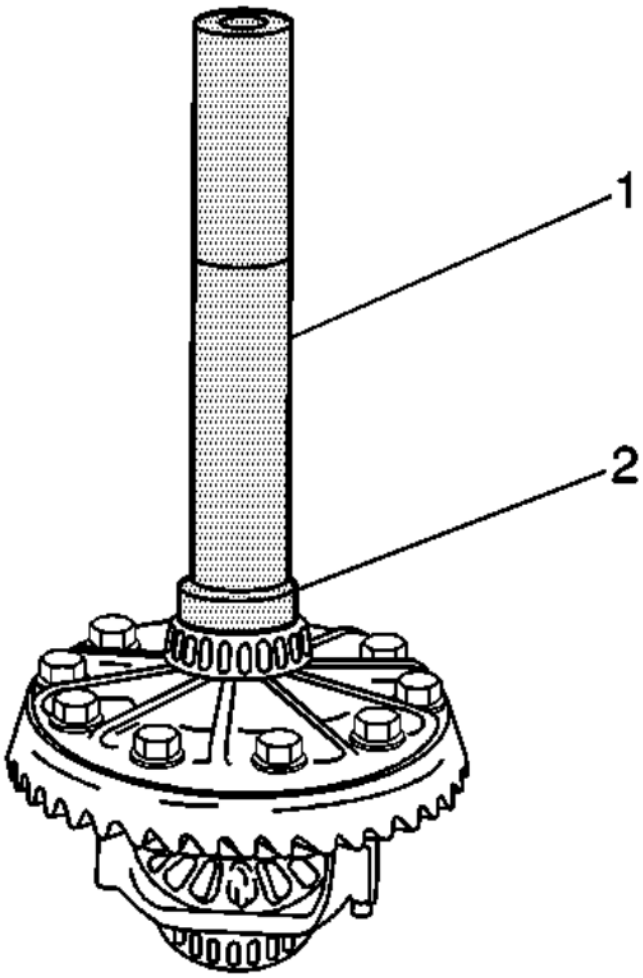


Fig. 273: Installing Differential Side Bearing
Courtesy of GENERAL MOTORS COMPANY

10. Install the differential side bearings by performing the following steps:
    1. In order to protect the differential case, install the **J-8107-2** side bearing puller pilot in the case on the side opposite the bearing installation.
    2. Install the **J-22761** differential side bearing installer (2) and the **GE-8092** driver handle (1) onto the differential case bearing as shown.
    3. Drive the differential case bearing onto the case using the **J-22761** differential side bearing installer and the **GE-8092** driver handle.
11. Install the differential case assembly.

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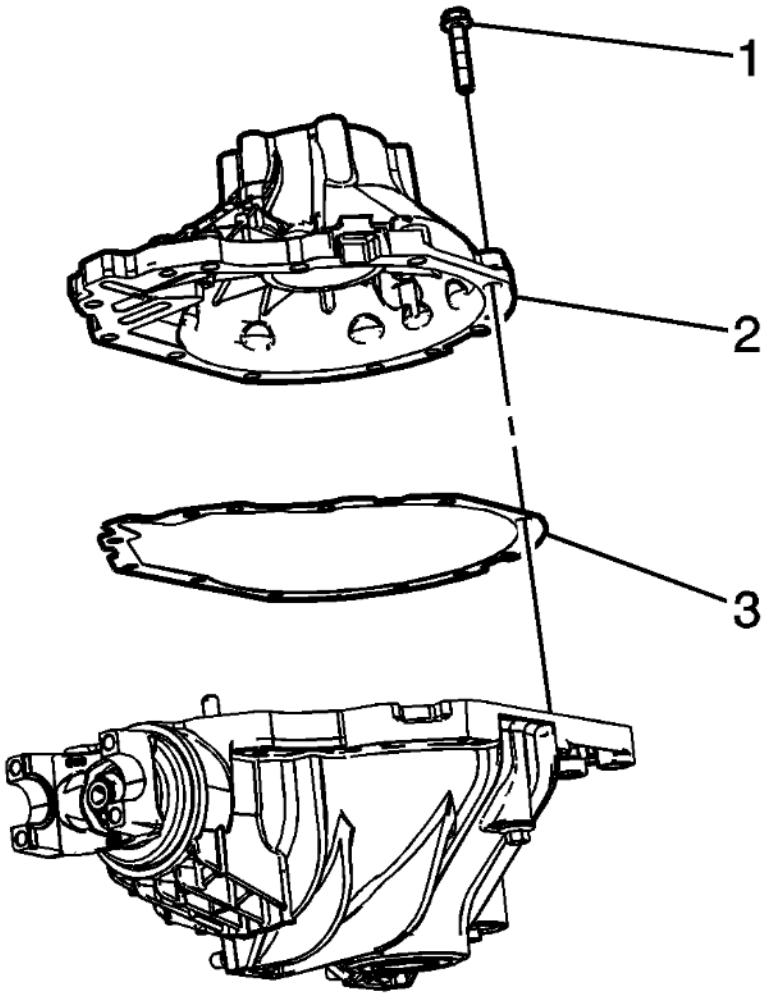


Fig. 274: View Of Differential Carrier Housing, Gasket & Bolts
Courtesy of GENERAL MOTORS COMPANY

12. Install the differential carrier housing gasket (3) and the differential carrier housing (2).

    Install the differential carrier assembly bolts (1) and tighten to 73 N.m (54 lb ft).

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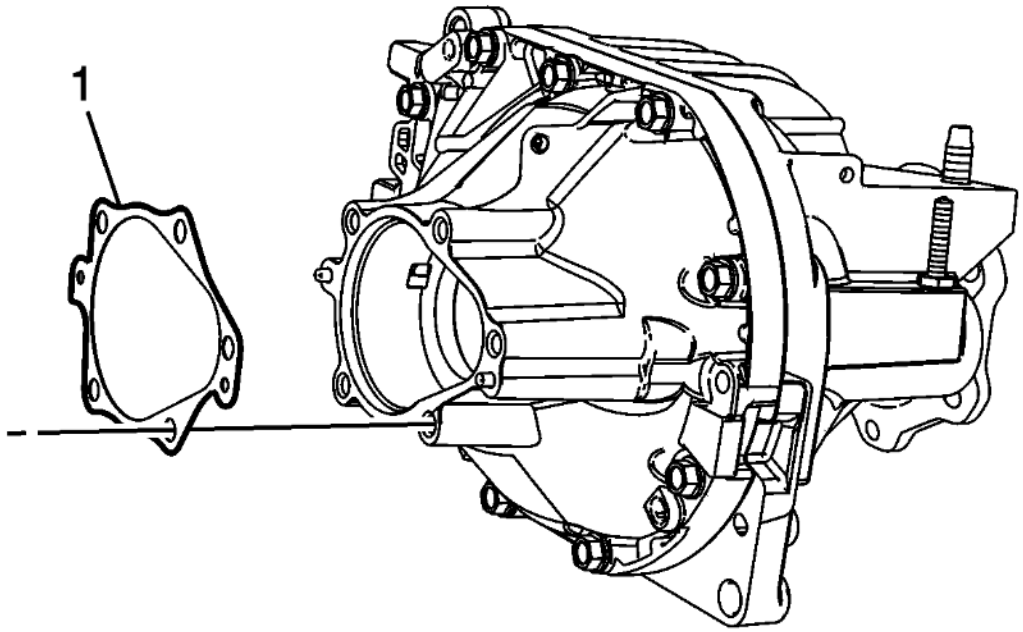


Fig. 275: Inner Axle Housing To Differential Carrier Gasket
Courtesy of GENERAL MOTORS COMPANY

13. Install the inner axle housing to differential carrier gasket (1).

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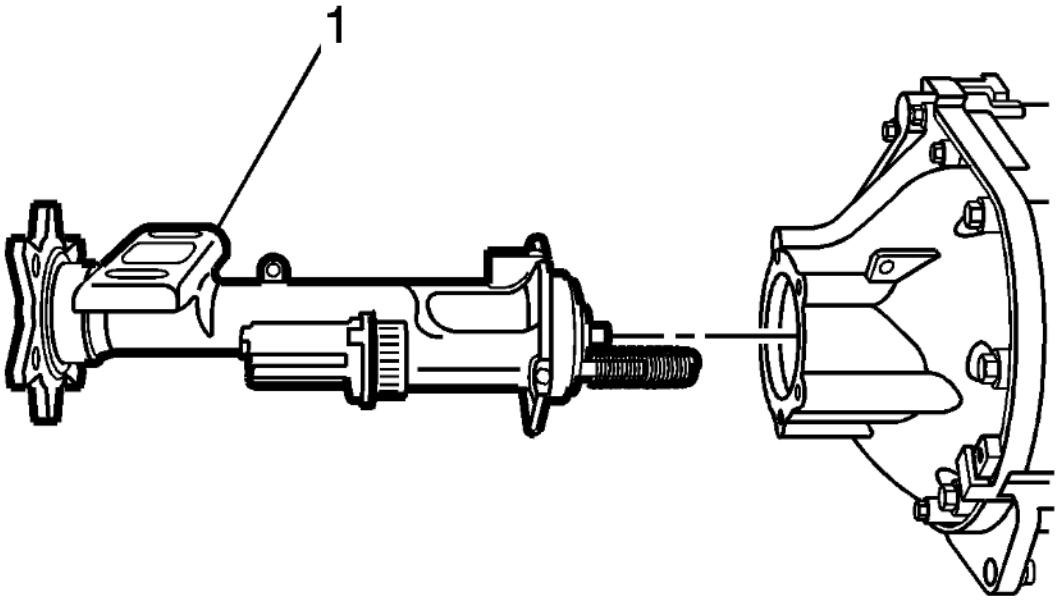


Fig. 276: Installing Inner Axle Shaft Housing Assembly - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

14. Carefully Install the inner axle shaft housing (1) with the inner axle shaft and clutch fork components into the differential carrier assembly.
15. Install the inner axle shaft housing to differential carrier assembly bolts. Tighten to 55 N.m (41 lb ft)

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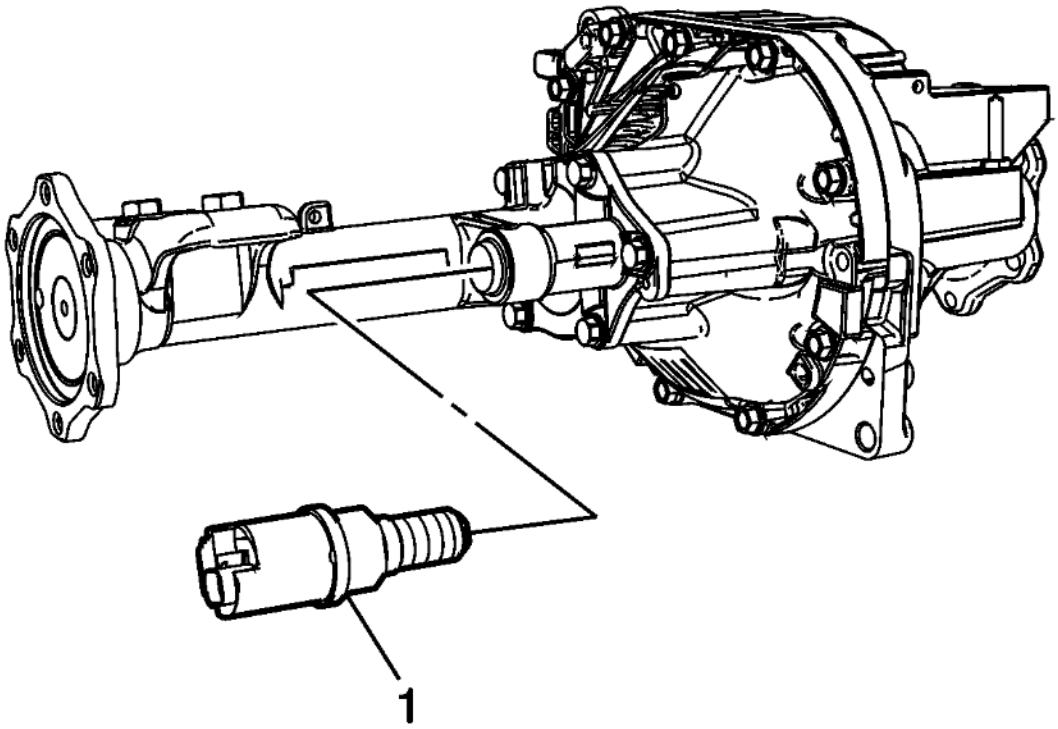


Fig. 277: Front Axle Actuator
Courtesy of GENERAL MOTORS COMPANY

16. Install the front axle actuator (1) and tighten to 20 N.m (15 lb ft)
17. Remove the differential carrier assembly from the vise.
18. Install the differential carrier assembly. Refer to **Front Axle Replacement (8.25 Inch Axle)Front Axle Replacement (9.25 Inch Axle)**.

FRONT DIFFERENTIAL DRIVE PINION GEAR BEARING REPLACEMENT

Special Tools

- **J-22912-B** Split-Plate Bearing Puller
- **J-2619-01** Slide Hammer
- **J-29369-1** Bushing and Bearing Remover
- **J-34011** Pilot Bearing Remover
- **J-36598** Holding Fixture
- **J-36614** Inner Pinion Bearing Installer
- **J-45765** Pinion Remover
- **J-45858** Front Axle Bearing Race Remover/Installer

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- **J-45858-B** Front Axle Bearing Race Remover/Installer
- **J-8614-01** Flange and Pulley Holding Tool
- **J-8107-2** Side Bearing Puller Pilot
- **J-22888-D** Side Bearing Remover Kit
- **GE-8092** Driver Handle
- **J-22761** Differential Side Bearing Installer
- **GE-8092** Driver Handle (Universal Driver Handle-3/4 in 10)
- **J-35512** Inner Pinion Bearing Installer
- **J-36366** Pinion Oil Seal Installer
- **J-36599-A** Side Bearing Nut Wrench
- **J-36615** Side Bearing Nut Wrench

Inspection Procedure

Perform the following before disassembling the axle:

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. Check the ring gear backlash. Refer to **Backlash Inspection and Adjustment**.

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

1. Remove the differential carrier assembly. Refer to **Front Axle Replacement (8.25 Inch Axle)Front Axle Replacement (9.25 Inch Axle)**.
2. Install the differential carrier assembly in a vise.

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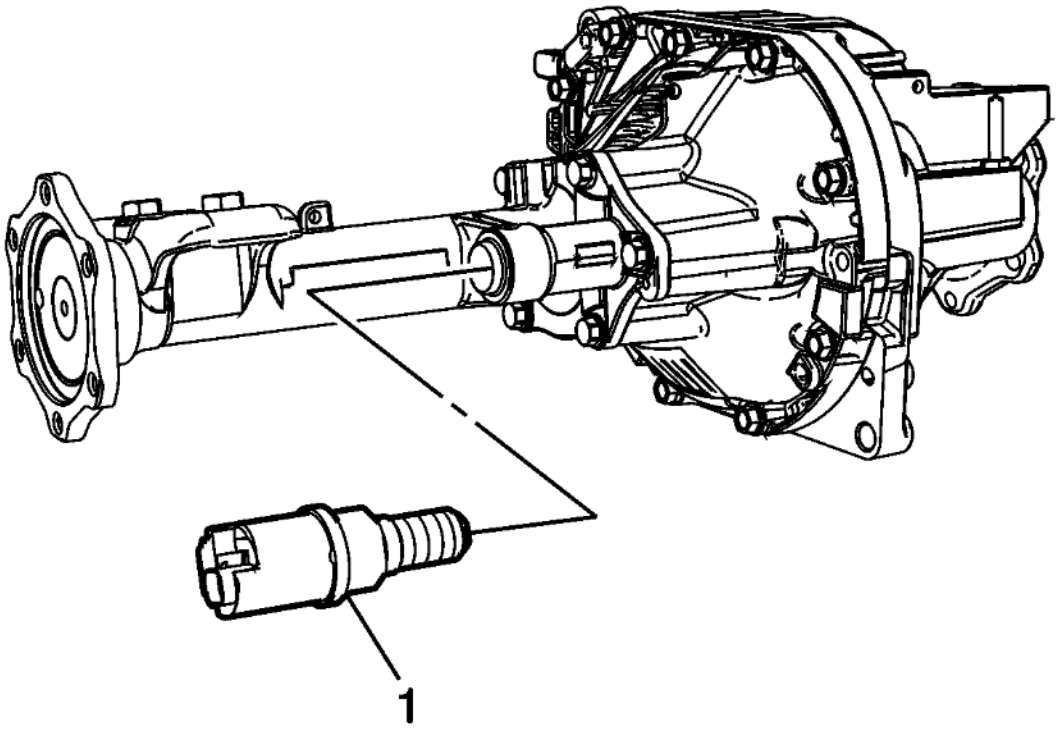


Fig. 278: Front Axle Actuator
Courtesy of GENERAL MOTORS COMPANY

3. Remove the front axle actuator (1).
4. Remove the inner axle shaft housing to differential carrier assembly bolts.

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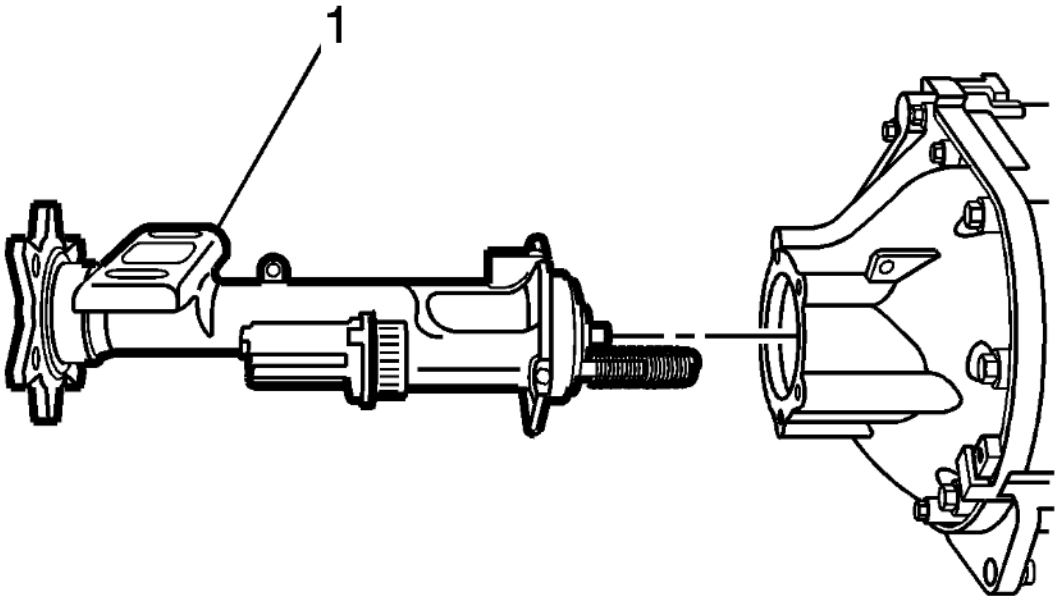


Fig. 279: Installing Inner Axle Shaft Housing Assembly - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

5. Carefully remove the inner axle shaft housing (1) with the inner axle shaft and clutch fork components from the differential carrier assembly.

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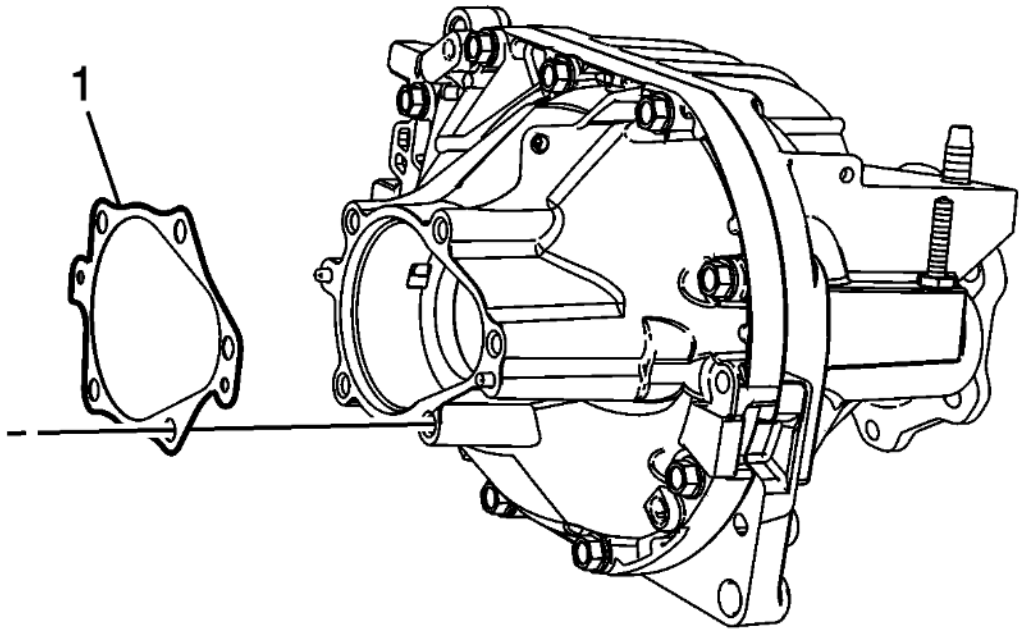


Fig. 280: Inner Axle Housing To Differential Carrier Gasket
Courtesy of GENERAL MOTORS COMPANY

6. Remove the inner axle housing to differential carrier gasket (1).
7. Remove the differential carrier assembly from the vise.
8. Remove the front drive axle clutch shaft.

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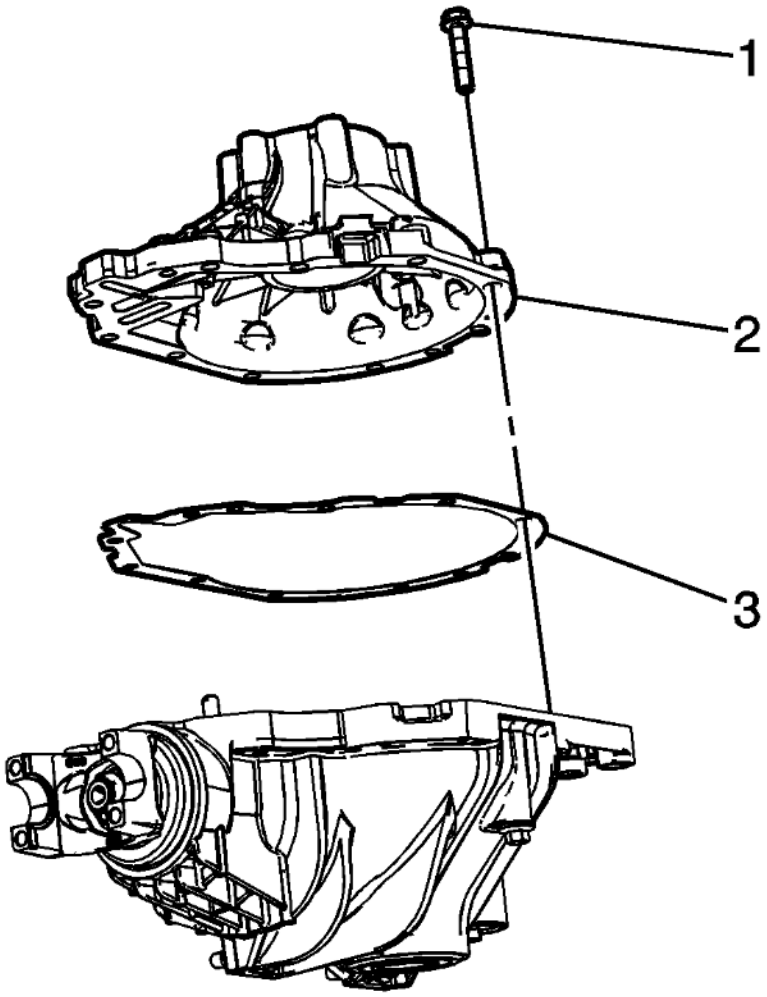


Fig. 281: View Of Differential Carrier Housing, Gasket & Bolts
Courtesy of GENERAL MOTORS COMPANY

9. Remove the differential carrier assembly bolts (1).
10. Separate the left carrier case half from the right carrier case half (2) by tapping on the on the carrier case with a hammer and a brass drift.
11. Remove the differential carrier housing (2) and the differential carrier housing gasket (3).
12. Remove the differential case assembly.

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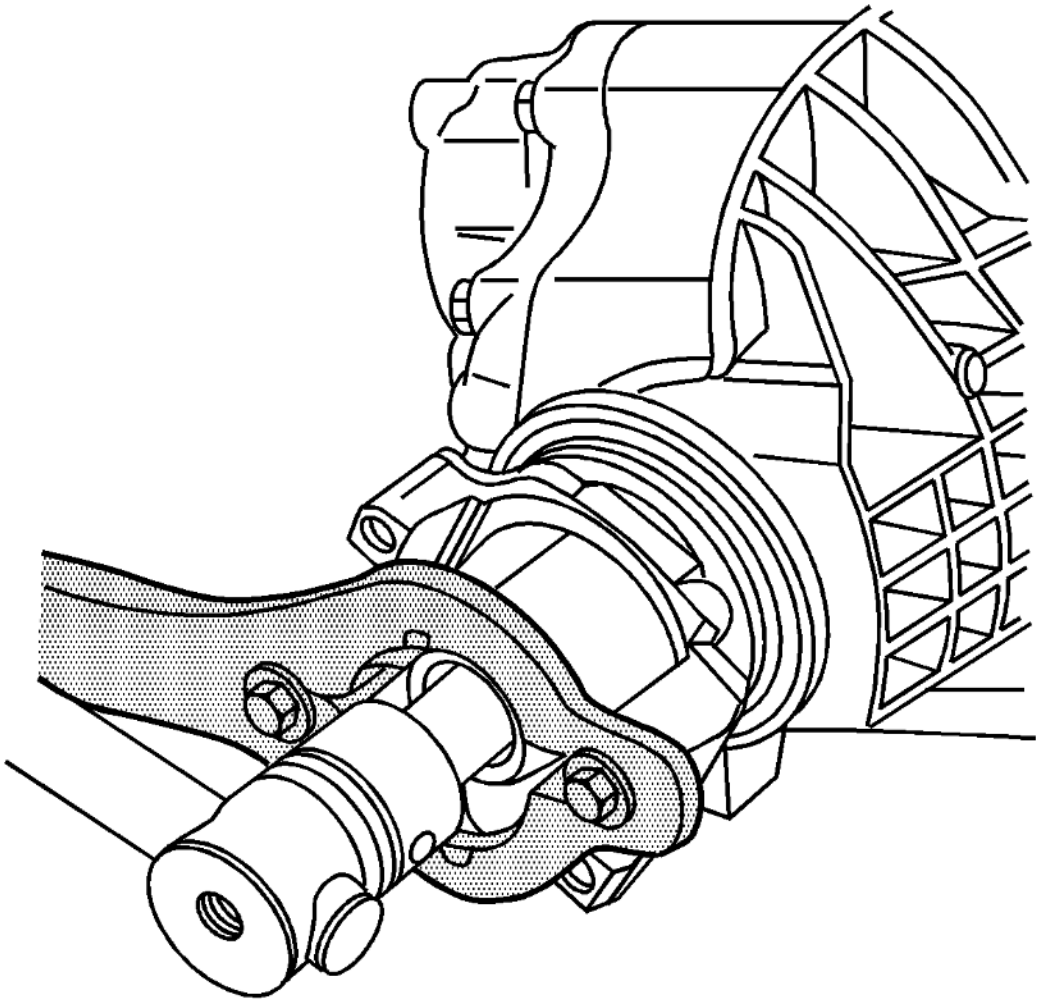


Fig. 282: Flange And Pulley Holding Tool
Courtesy of GENERAL MOTORS COMPANY

13. Install the **J-8614-01** flange and pulley holding tool as shown.

    Remove the pinion nut while holding the **J-8614-01** flange and pulley holding tool.

14. Remove the washer.

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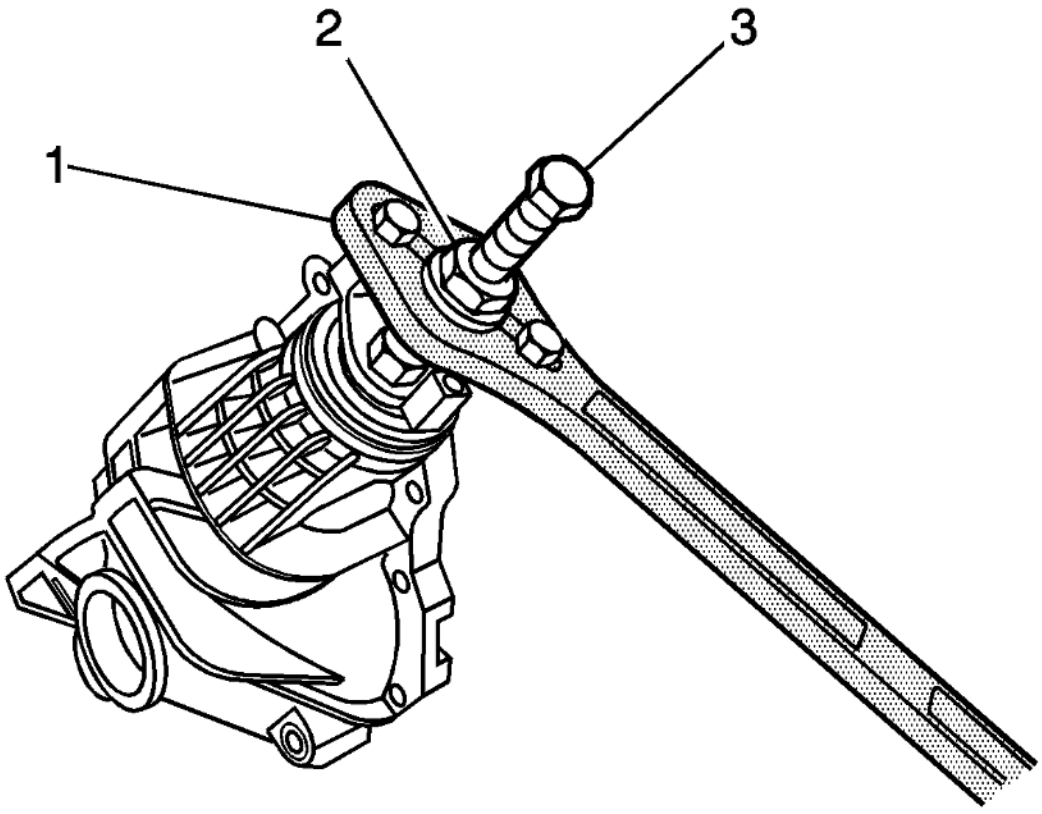


Fig. 283: View Of Pinion Yoke Removal Tools
Courtesy of GENERAL MOTORS COMPANY

15. Install the J 8614-2 (2) and the J 8614-3 (3) into the **J-8614-01** flange and pulley holding tool (1) as shown.
16. Remove the pinion yoke by turning the J 8614-3 (3) clockwise while holding the **J-8614-01** flange and pulley holding tool (1).
17. The steps below explain how to remove the drive pinion and pinion bearing cups using the **J-36598** holding fixture or the **J-45765** pinion remover and the **J-45858** front axle bearing race remover/installer or **J-45858-B** front axle bearing race remover/installer. Follow the appropriate steps depending on what tool is available.
18. Install the **J-36598** holding fixture into a vise.

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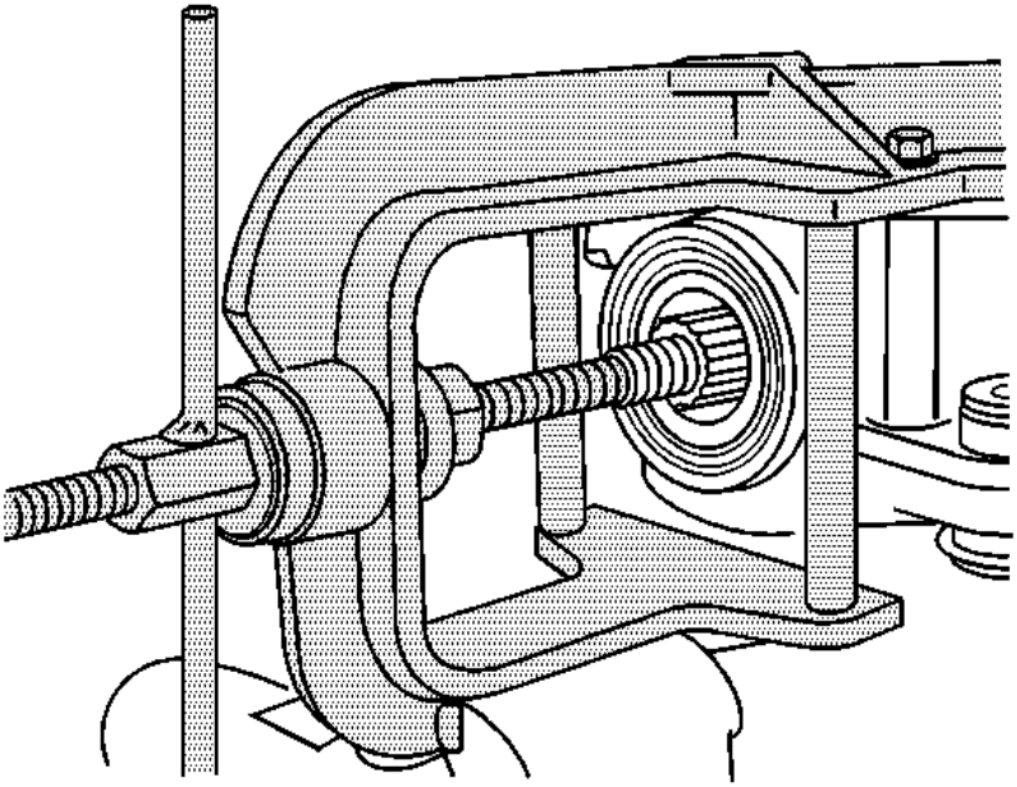


Fig. 284: Removing Pinion
Courtesy of GENERAL MOTORS COMPANY

19. Install the left differential carrier case half onto the **J-36598** holding fixture and the J-36598 - (only 3 of the 4 mounting bolts will be used).
20. While holding the forcing screw of the **J-36598** holding fixture , turn the handle of the **J-36598** holding fixture counterclockwise in order to remove the pinion with the following components:
    - The pinion gear selectable shim
    - The inner pinion bearing
    - The collapsible spacer

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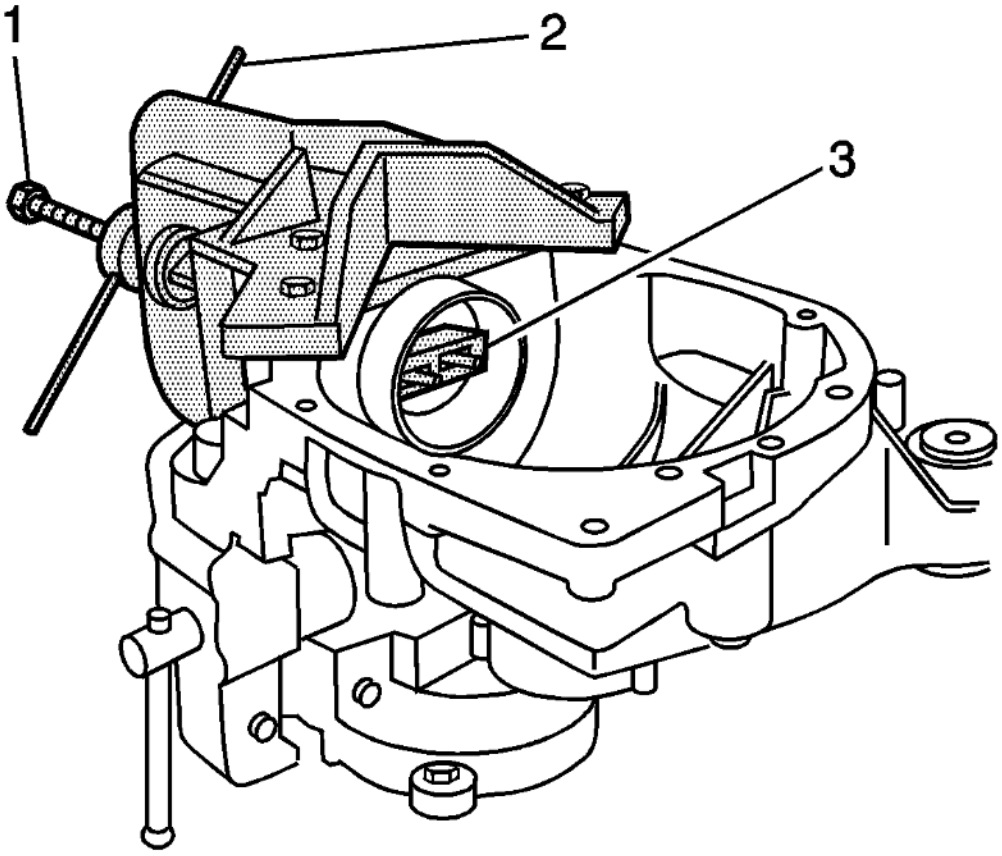


Fig. 285: Pressing Inner Bearing Cup Out From Differential Carrier Case
Courtesy of GENERAL MOTORS COMPANY

21. Install the J 36598-5 (3) behind the inner pinion bearing cup.
22. Thread the forcing screw of the **J-36598** holding fixture (1) onto the J-36598-5 (3) until fully seated.
23. While holding the forcing screw of the **J-36598** holding fixture (1), turn the handle of the **J-36598** holding fixture (2) counterclockwise and press the inner bearing cup out from the differential carrier case.

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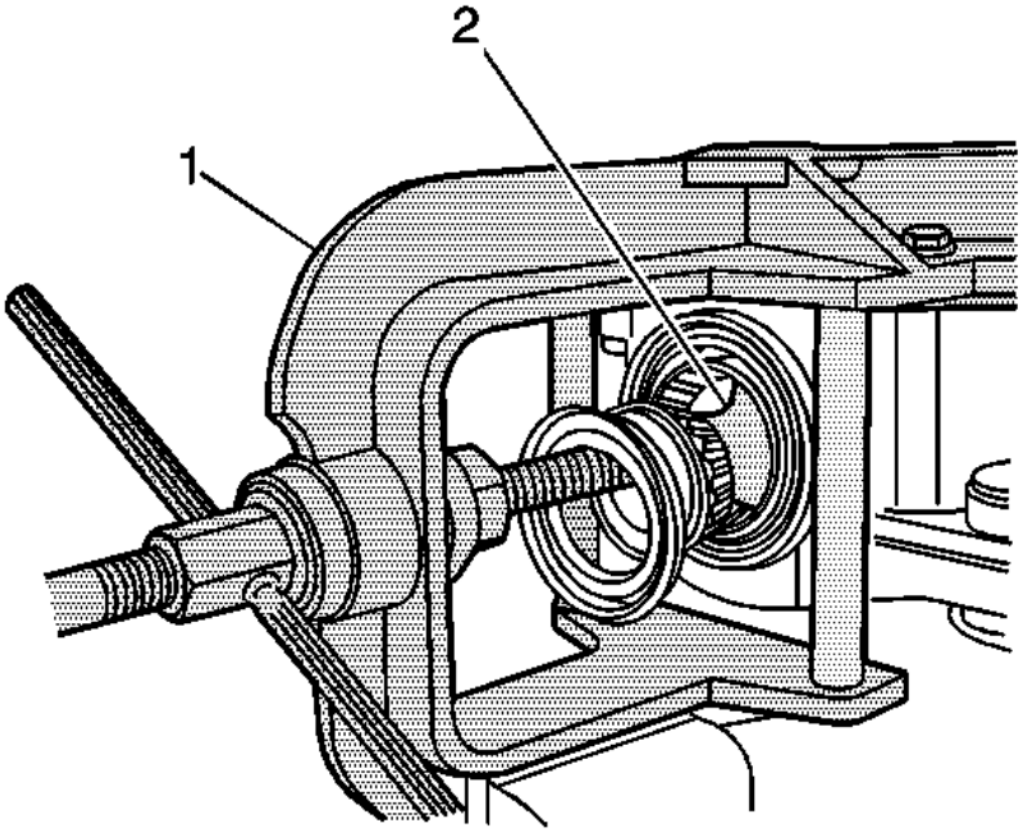


Fig. 286: Removing Pinion Oil Seal & Bearing
Courtesy of GENERAL MOTORS COMPANY

24. Install the J 36598-5 (2) behind the outer pinion bearing cup.
25. Install the forcing screw of the **J-36598** holding fixture (1) to the J 36598-5 (2).
26. While holding the forcing screw of the **J-36598** holding fixture , turn the handle of the **J-36598** holding fixture clockwise in order to remove the following components:
    - The pinion oil seal
    - The pinion outer bearing
    - The pinion outer bearing cup

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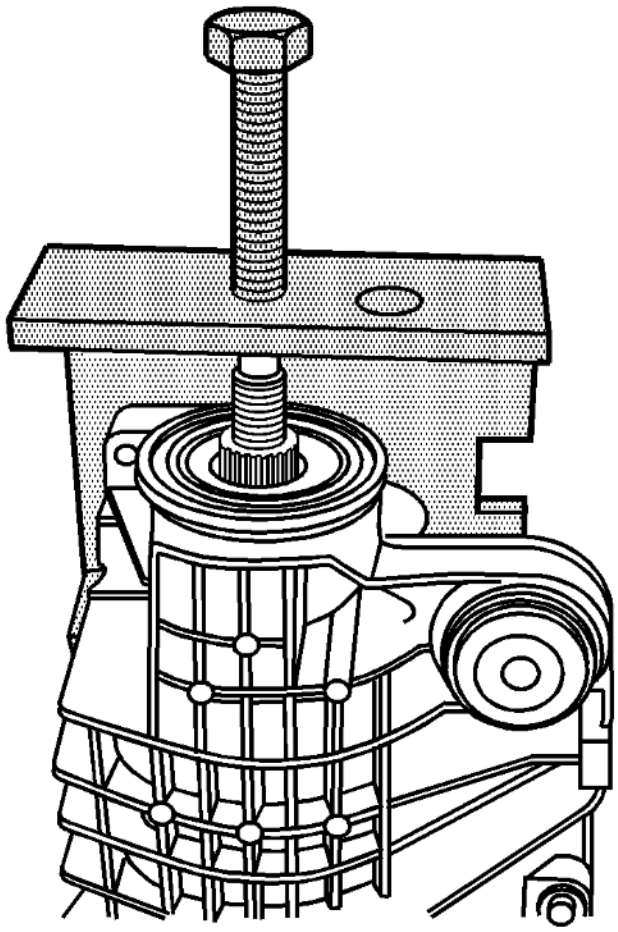


Fig. 287: Removing Pinion Components
Courtesy of GENERAL MOTORS COMPANY

27. Install the **J-45765** pinion remover to the left side differential carrier case half over the drive pinion as shown.
28. Turn the forcing screw of the **J-45765** pinion remover clockwise to remove the following components from the left side differential carrier case half:
    - The drive pinion gear
    - The pinion gear selectable shim
    - The inner pinion bearing
    - The collapsible spacer
29. Remove the drive pinion seal using a suitable seal remover.
30. Remove the outer pinion bearing from the differential carrier case half.

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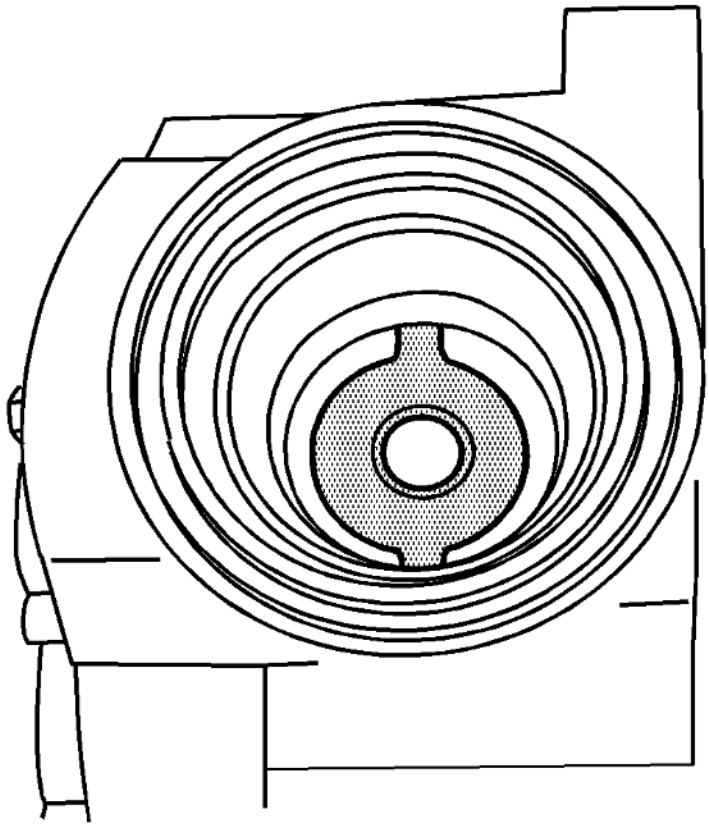


Fig. 288: Installing J 45858-4 Over Inner Pinion Bearing Cup (8.25 Inch Axles)
Courtesy of GENERAL MOTORS COMPANY

31. Install the J 45858-4 over the inner pinion bearing cup.

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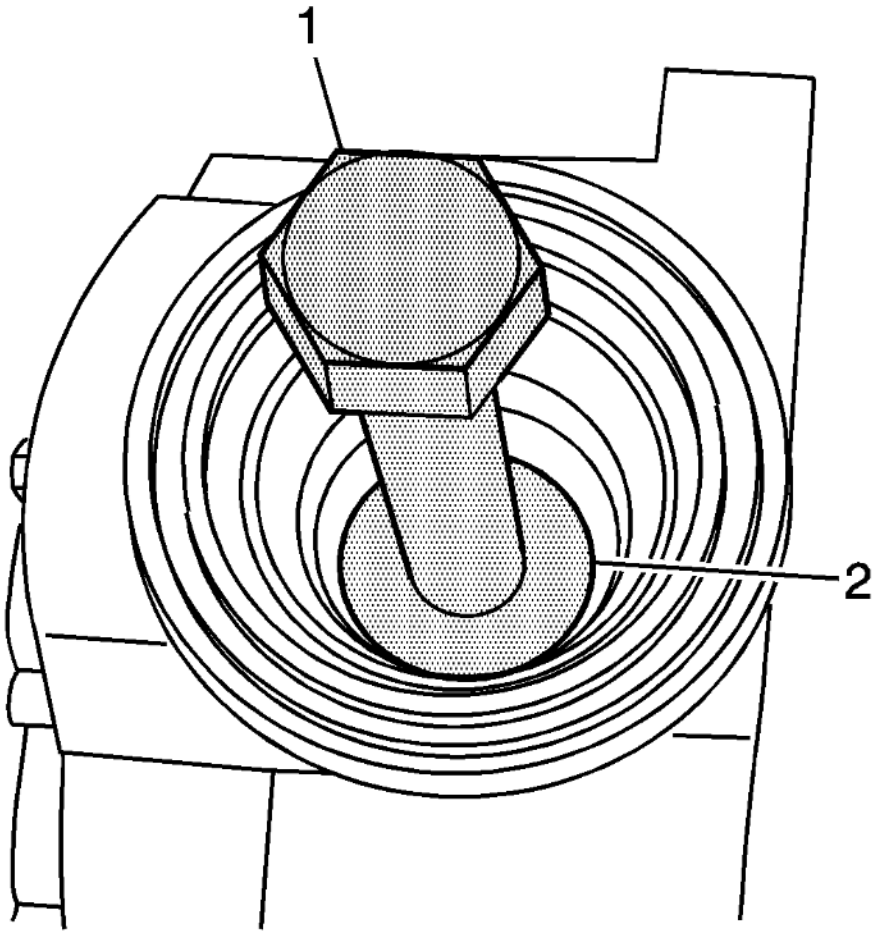


Fig. 289: Installing Forcing Screw Of J 45858 Into J 45858-4 (8.25 Inch Axles)
Courtesy of GENERAL MOTORS COMPANY

32. Install the forcing screw (1) of the **J-45858** front axle bearing race remover/installer or **J-45858-B** front axle bearing race remover/installer into the J-45858-4 (2).
33. Drive out the inner pinion bearing cup by pounding on the forcing screw with a hammer.

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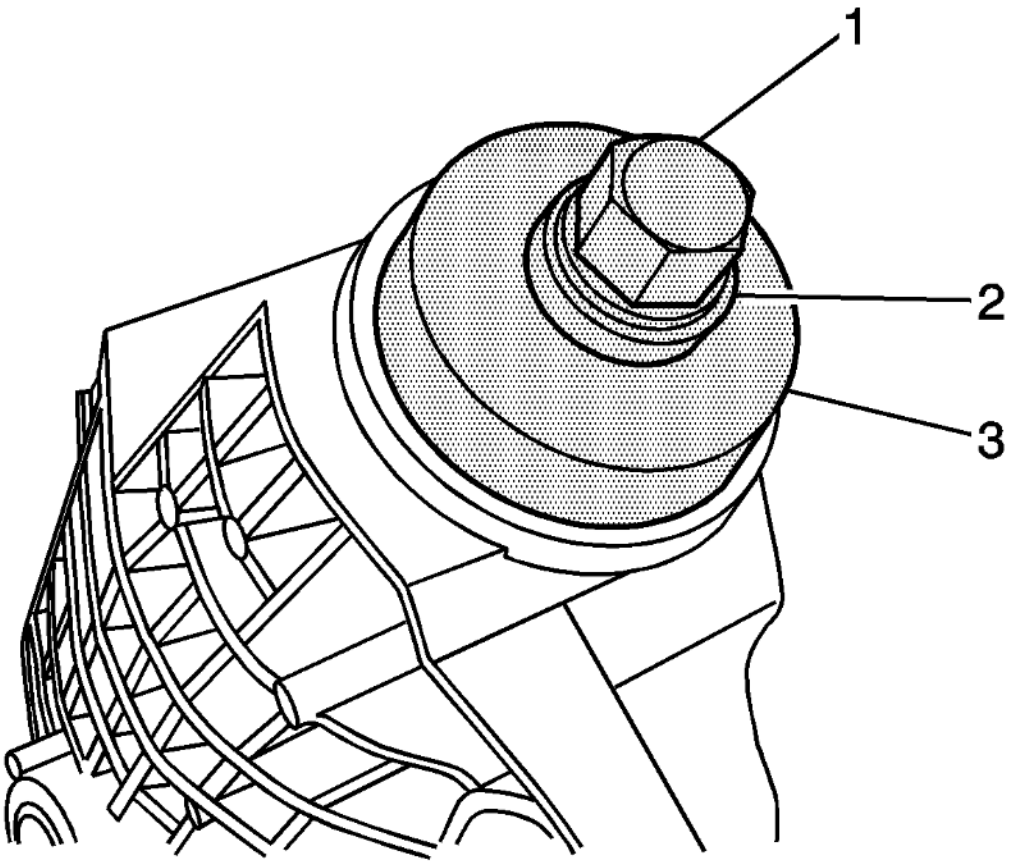


Fig. 290: View Of Thrust Bearing & Washer, Forcing Screw & Special Tool J 45858-3
Courtesy of GENERAL MOTORS COMPANY

34. Install the J-45858-3 (3), the thrust bearing and the washer (2), and the forcing screw (1) over the outer pinion bearing cup bore.

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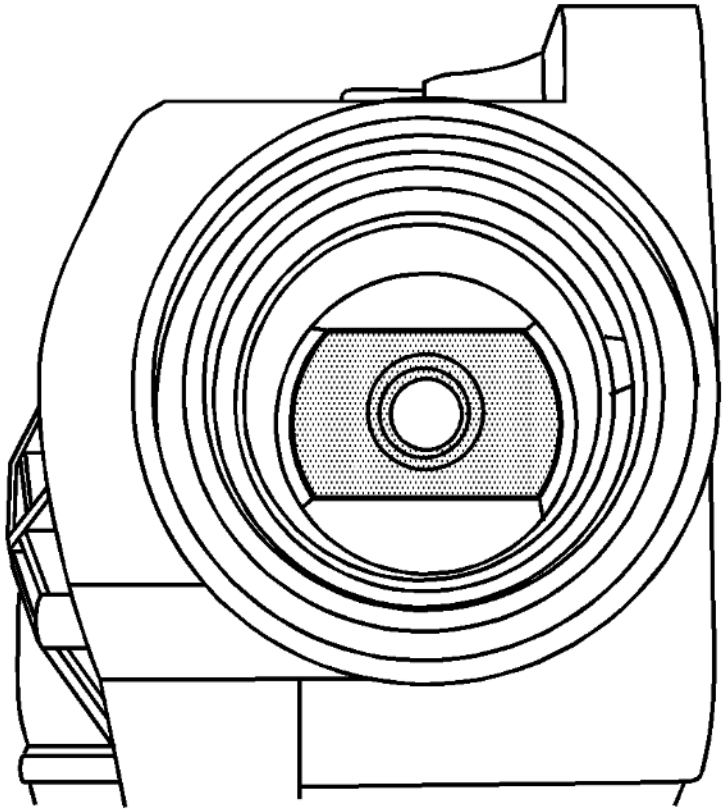


Fig. 291: Installing J 45858-5 Into Pinion Bearing Bore (8.25 Inch Axles)
Courtesy of GENERAL MOTORS COMPANY

35. Install the J-45858-5 into the pinion bearing bore behind the outer pinion bearing cup.

    Slowly turn the forcing screw clockwise until the J-45858-5 is evenly seated behind the outer pinion bearing cup bore and the J-45858-3 is evenly seated over the outer pinion bearing cup bore.

36. Remove the outer pinion bearing cup by turning the forcing screw clockwise.
37. Remove the collapsible spacer from the drive pinion.

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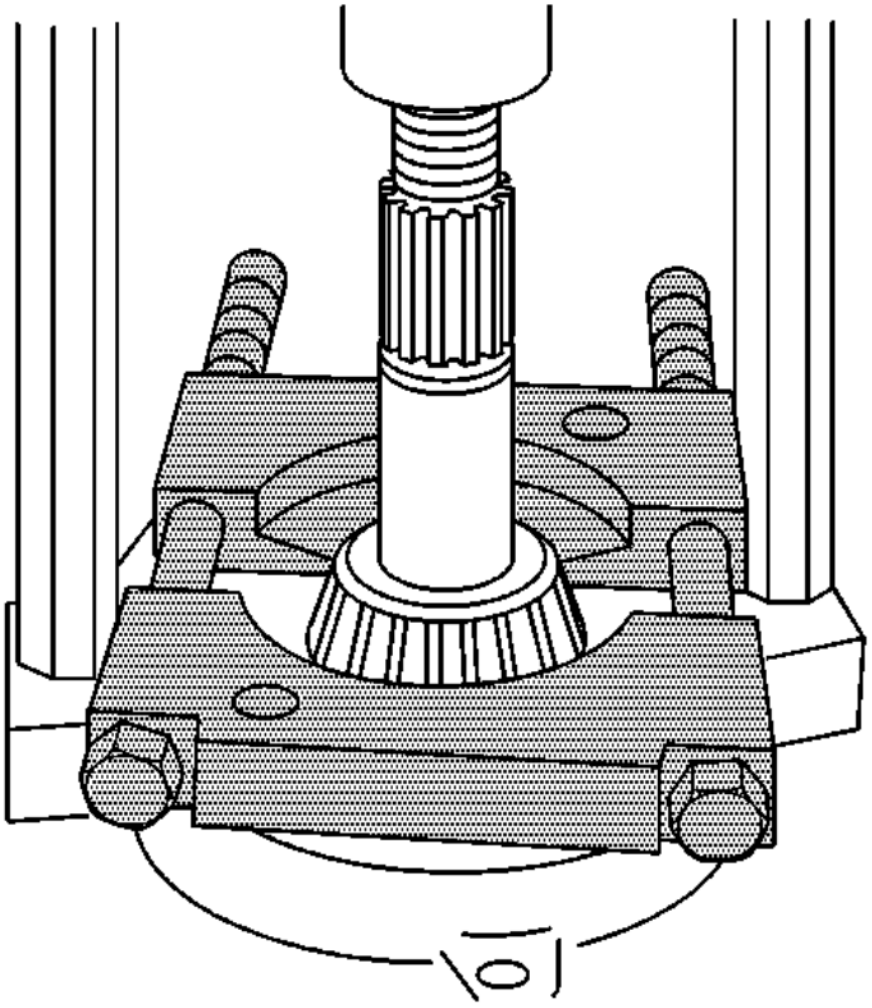


Fig. 292: View Of Inner Pinion Bearing & Hydraulic Press
Courtesy of GENERAL MOTORS COMPANY

38. Install the **J-22912-B** split-plate bearing puller between the pinion bearing and the drive pinion.
39. Using the **J-22912-B** split-plate bearing puller and a hydraulic press, remove the inner pinion bearing
40. Remove the pinion gear selectable shim.

Assembly Procedure

1. Install the selective shim between the inner pinion bearing and the shoulder of the pinion gear.

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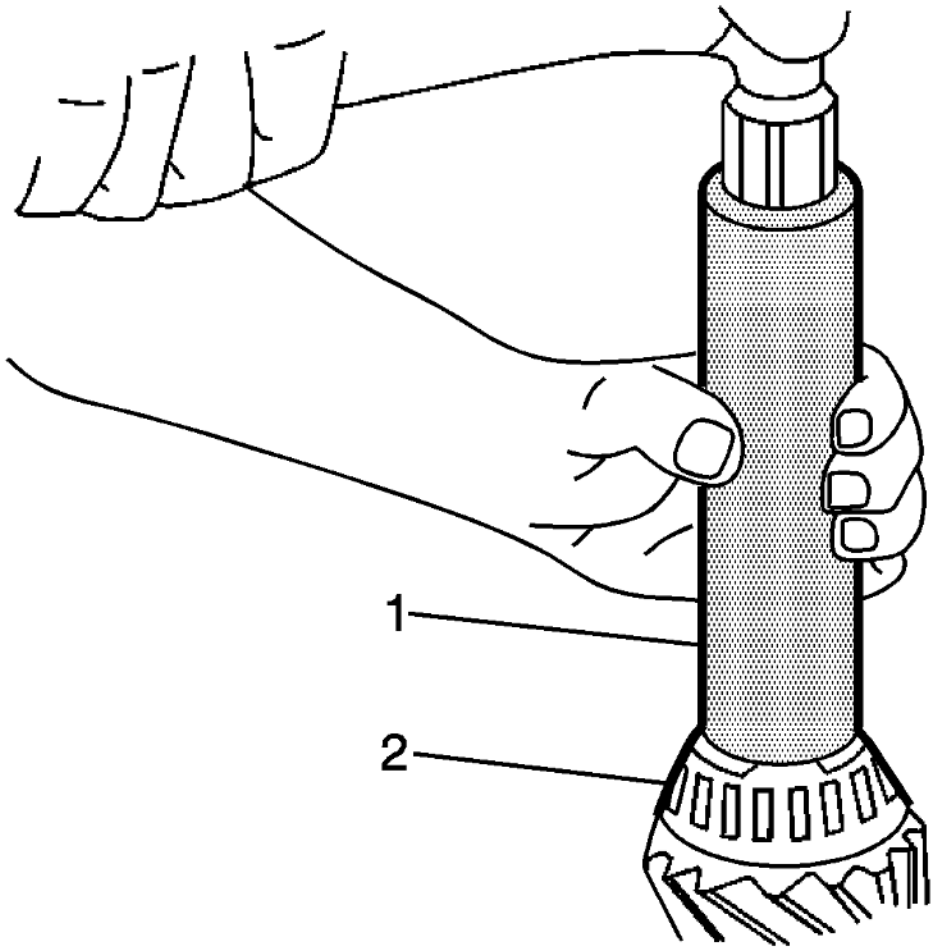


Fig. 293: Installing Inner Pinion Bearing Onto Pinion Gear
Courtesy of GENERAL MOTORS COMPANY

2. Using the **J-35512** inner pinion bearing installer , install the inner pinion bearing onto the pinion gear.
3. Install the new collapsible spacer onto the pinion gear.
4. Install the differential carrier case half into a vise. Place a shop towel in a vise in order to protect the differential case.
5. Before assembly, lubricate the following parts with axle lubricant. Use the proper fluid. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
    - The pinion bearings
    - The pinion and the differential gears
    - The thrust washers
    - The pinion bearing cups

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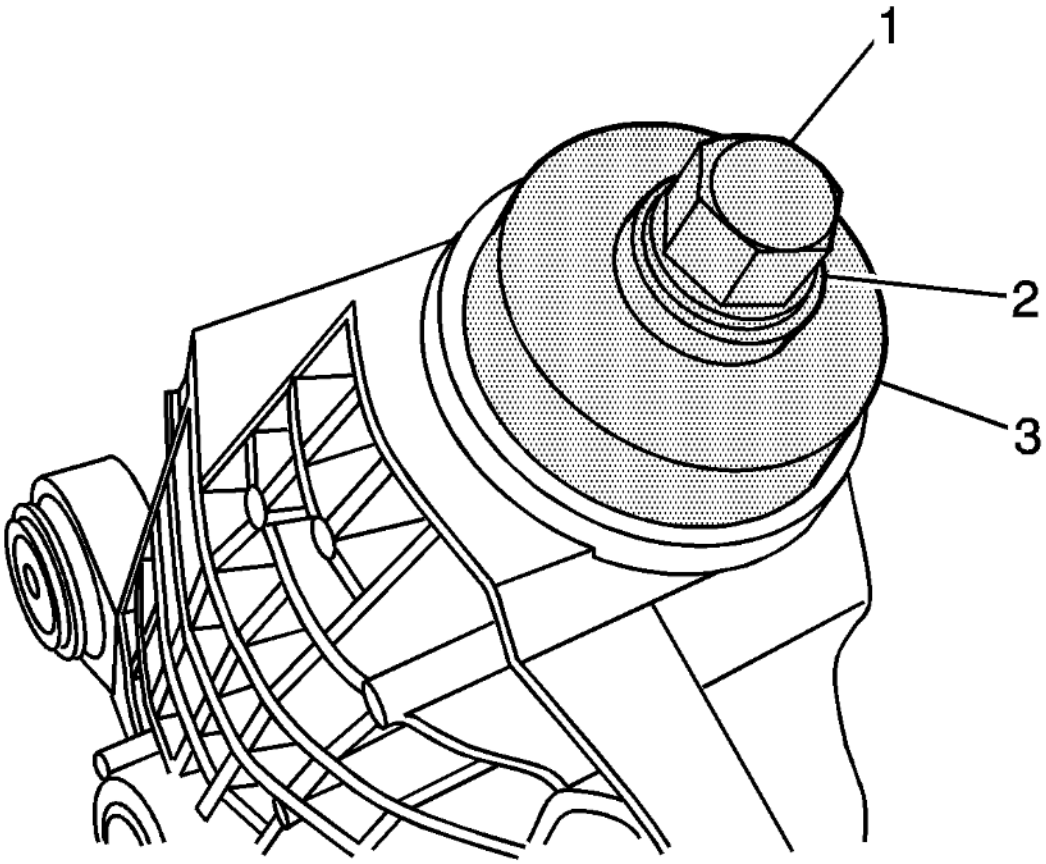


Fig. 294: Installing J 45858-3, Thrust Bearing & Washer, & Forcing Screw (8.25 Inch Axles)
Courtesy of GENERAL MOTORS COMPANY

6. Install the J-45858-3 (3), the thrust bearing and the washer (2), and the J-45858-6 (1) over the outer pinion bearing cup bore.

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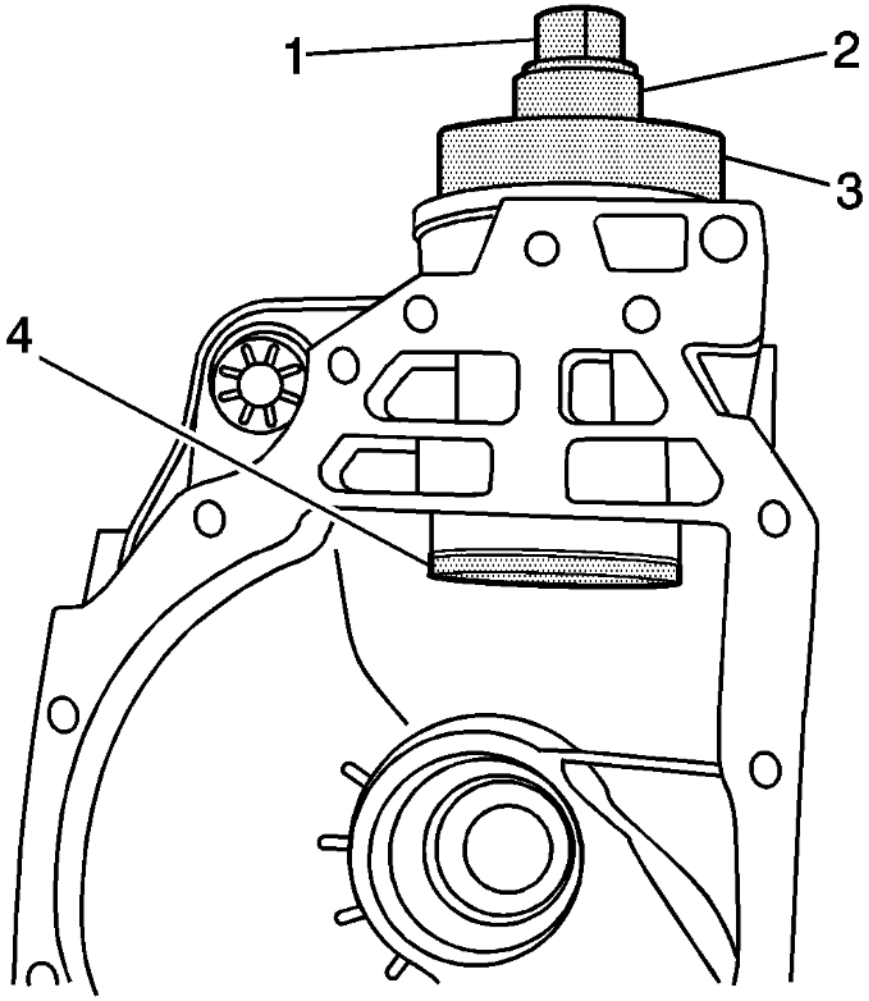


Fig. 295: Installing Inner Pinion Bearing Cup (8.25 Inch Axle)
Courtesy of GENERAL MOTORS COMPANY

7. Install the inner pinion bearing cup and the J-45858 or J-45858-2B (4) to the J-45858-6 (1).

   Slowly turn the J-45858-6 until the inner pinion bearing cup is evenly seated over the inner pinion bearing cup bore.

8. Turn the J-45858-6 clockwise slowly in order to draw the inner pinion bearing cup into the inner pinion bearing cup bore.

   Inspect the position of the inner pinion bearing cup as it is being drawn into the inner 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-45858** pinion bearing race remover/installer or **J-45858-B** pinion bearing race remover/installer and the inner pinion bearing cup and reposition the inner pinion bearing cup.

9. Tighten the J-45858-6 until the inner pinion bearing cup is seated in the inner pinion bearing cup bore.
10. Remove the **J-45858** pinion bearing race remover/installer or **J-45858-B** pinion bearing race remover/installer .

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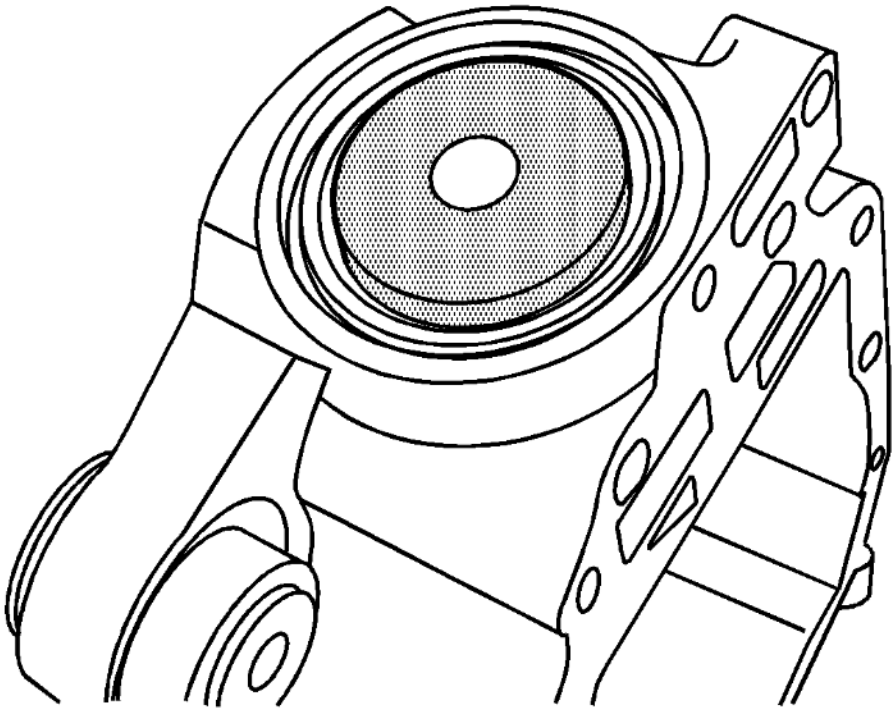


Fig. 296: Installing Outer Pinion Bearing Cup (8.25 Inch Axle)
Courtesy of GENERAL MOTORS COMPANY

11. Install the outer pinion bearing cup and the J-45858-1 or **J-45858-1A** pinion bearing race remover/installer over the outer pinion bearing cup bore.

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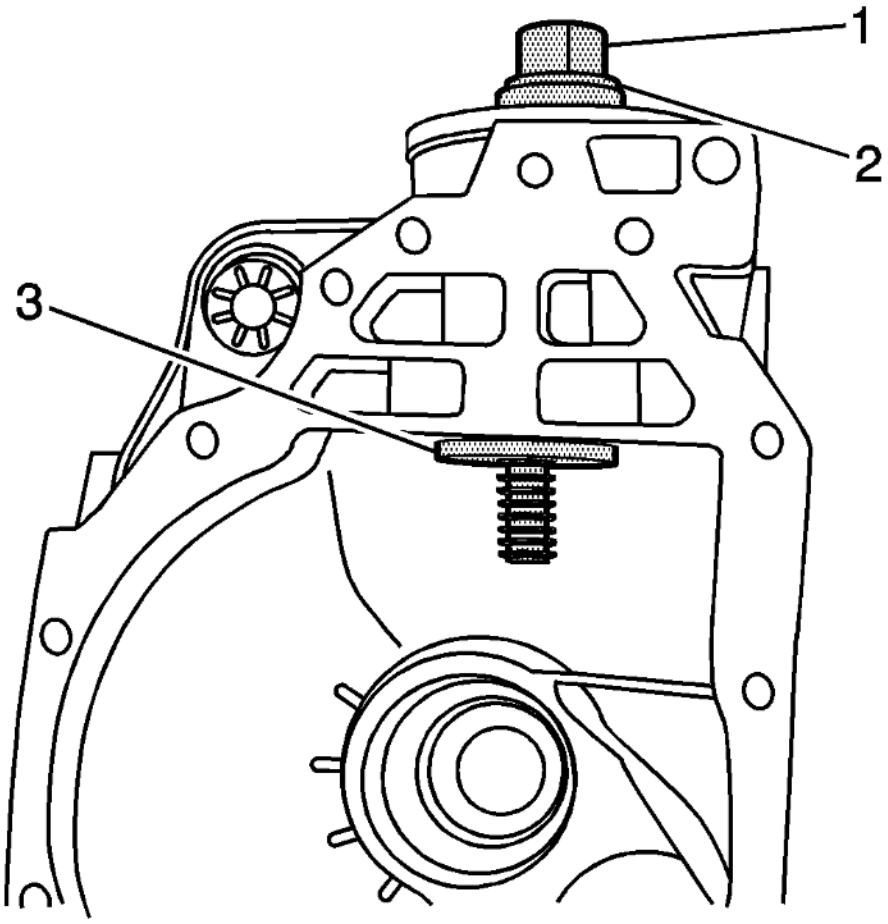


Fig. 297: Installing Thrust Bearing And Washer - 8.25 Inch Axle
Courtesy of GENERAL MOTORS COMPANY

12. Install the thrust bearing and the washer (2), the J-45858-6 (1), and the J-45858-2 or J-45858-2B (3) as shown.
13. Slowly turn the J-45858-6 until the outer pinion bearing cup is evenly seated over the outer pinion bearing cup bore and the J-45858-2 or J-45858-2B is evenly seated within the inner pinion bearing cup.
14. Turn the J-45858-6 clockwise slowly in order to draw the outer pinion bearing cup into the outer pinion bearing cup bore.

    Inspect the position of the outer pinion bearing cup as it is being drawn into the outer 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-45858** pinion bearing race remover/installer or **J-45858-B** pinion bearing race remover/installer and the outer pinion bearing cup and reposition the outer pinion bearing cup.

15. Tighten the forcing screw until the outer pinion bearing cup is seated in the outer pinion bearing cup bore.
16. Remove the **J-45858** pinion bearing race remover/installer ro **J-45858-B** pinion bearing race remover/installer .
17. Measure the pinion depth and determine the selectable pinion shim thickness. Refer to **Pinion Depth Adjustment (9.25 Inch Axle)Pinion Depth Adjustment (8.25 Inch Axle)**.

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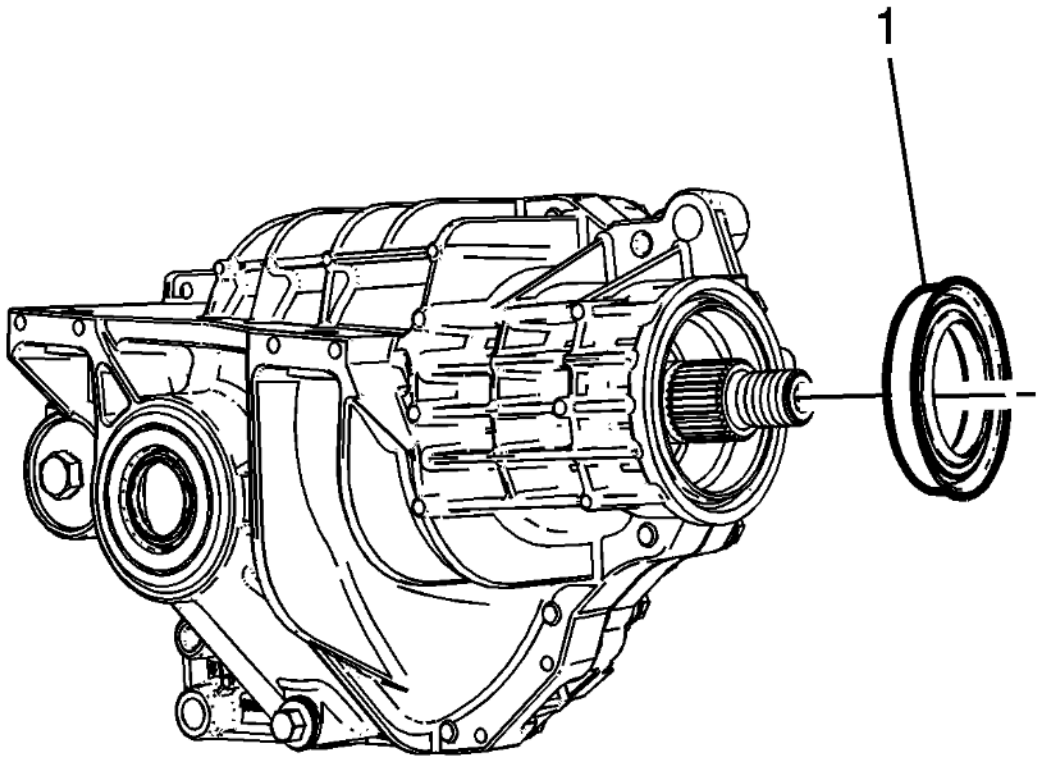


Fig. 298: Pinion Seal
Courtesy of GENERAL MOTORS COMPANY

18. Position the pinion seal (1) in the differential case.

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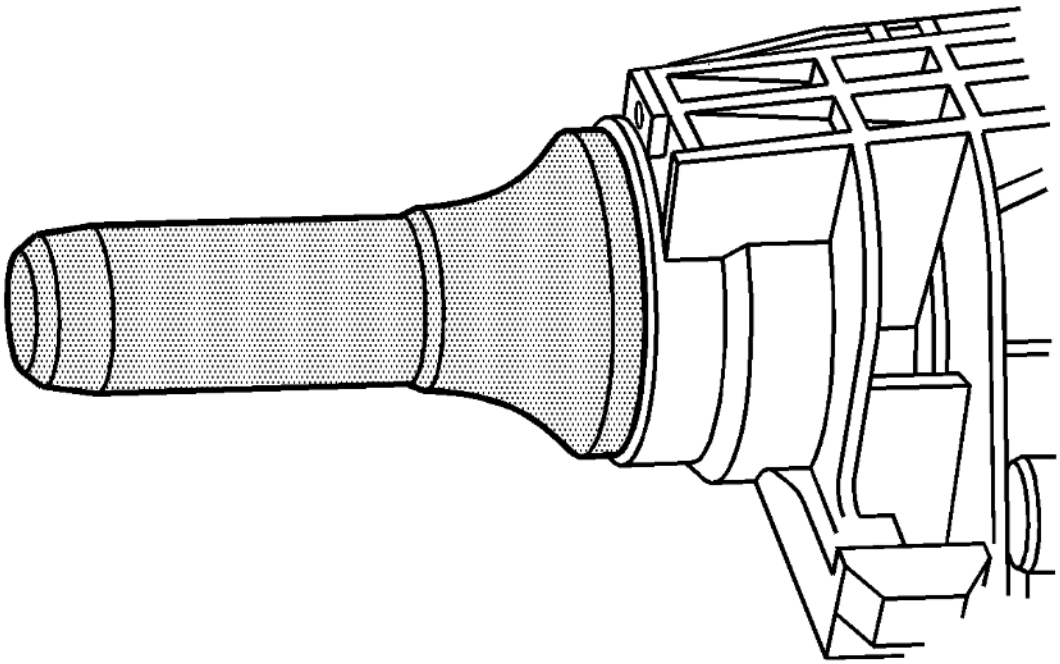


Fig. 299: Seal Installer
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Ensure that the pinion flange seal is seated on the axle housing surface.**

19. Using the **J-36366** pinion oil seal installer , install the pinion flange seal.
20. Using the correct sealant, apply sealant to the splines of the pinion yoke. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
21. Install the pinion gear, with the inner pinion bearing an the new collapsible spacer, into the left differential carrier case half.

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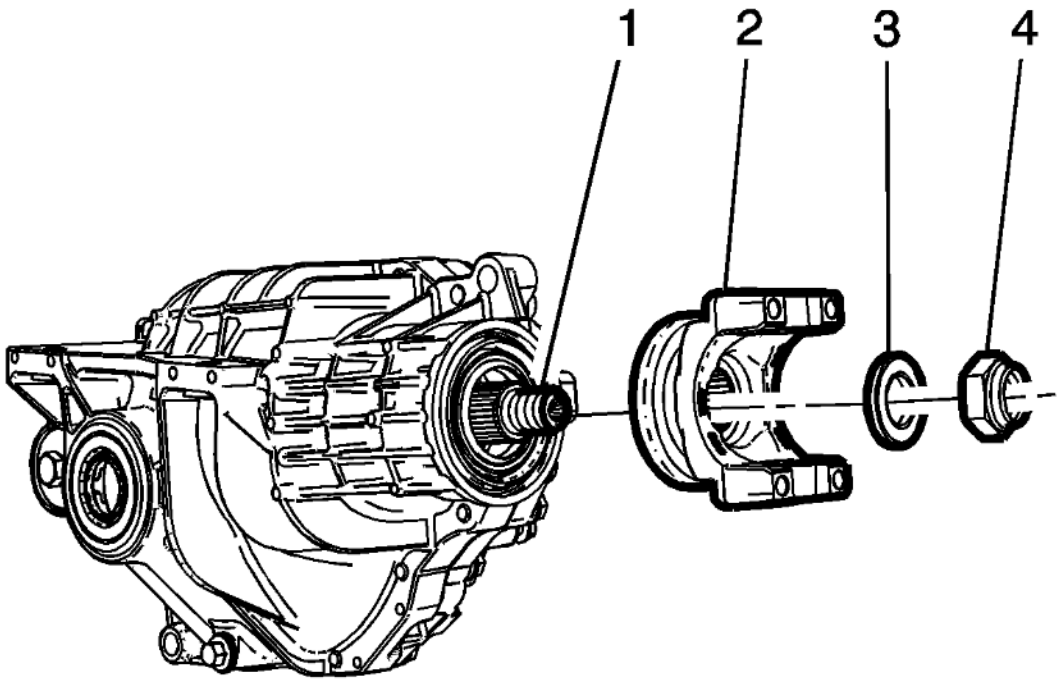


Fig. 300: Pinion Flange/Yoke Assembly Components
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Pinion Flange/Yoke Installation Caution .

22. Position the pinion flange/yoke assembly (2) on the pinion shaft (1).
23. Using a soft faced mallet, tap the on the pinion flange/yoke assembly (2) until a few pinion shaft by threads show through.
24. Install the NEW pinion washer (3) and the nut (4).
25. If the pinion nut cannot be installed, remove the pinion nut washer.
26. Install the old pinion nut and tighten the nut until a few of the shaft threads show through.
27. Remove the old pinion nut.
28. Install the **J-8614-01** flange and pulley holding tool onto the pinion flange/yoke assembly (2).

NOTE: If the rotating torque exceeded, the pinion will be removed and a new collapsible spacer installed.

29. Using the **J-8614-01** flange and pulley holding tool , tighten the pinion nut until the pinion end play is just taken up. Rotating the pinion while tightening the nut will seat the bearings.
30. Remove the **J-8614-01** flange and pulley holding tool.

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31. Using an inch pound torque wrench, measure the rotating torque of the pinion, which should be 1.0-2.3 N.m (10-20 lb in) for used bearings, 1.7-3.4 N.m (15-30 lb in) for new bearings.
32. 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** flange and pulley holding tool and continue to tighten the pinion nut, which should be 1.0-2.3 N.m (10-20 lb in) for used bearings, 1.7-3.4 N.m (15-30 lb in) for new bearings.
33. Once the specified torque is obtained, rotate the pinion several time to ensure the bearings have seated. Recheck the rotating torque and adjust if necessary.
34. Remove the **J-8614-01** flange and pulley holding tool.

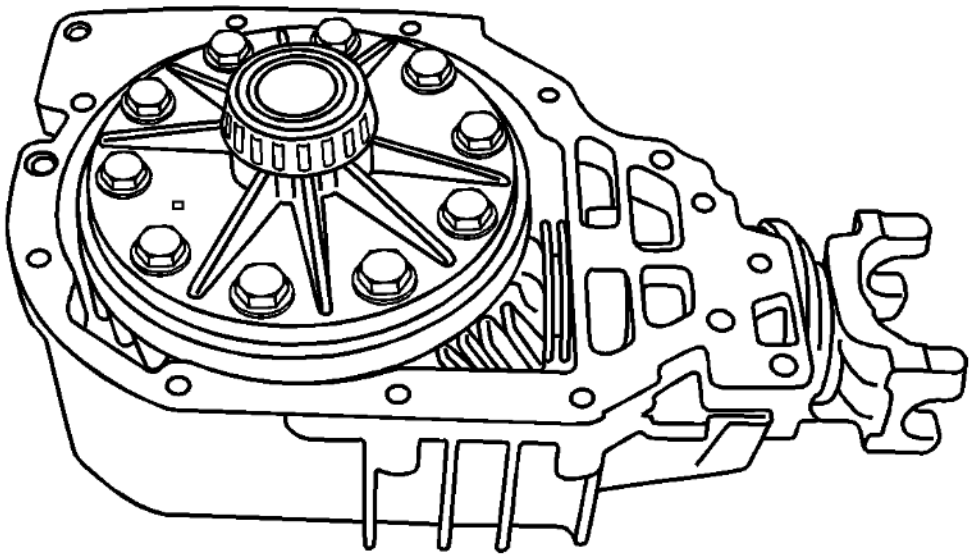


Fig. 301: View Of Differential Case Assembly & Carrier Case Half
Courtesy of GENERAL MOTORS COMPANY

35. Install the differential case assembly into the left differential carrier case half.

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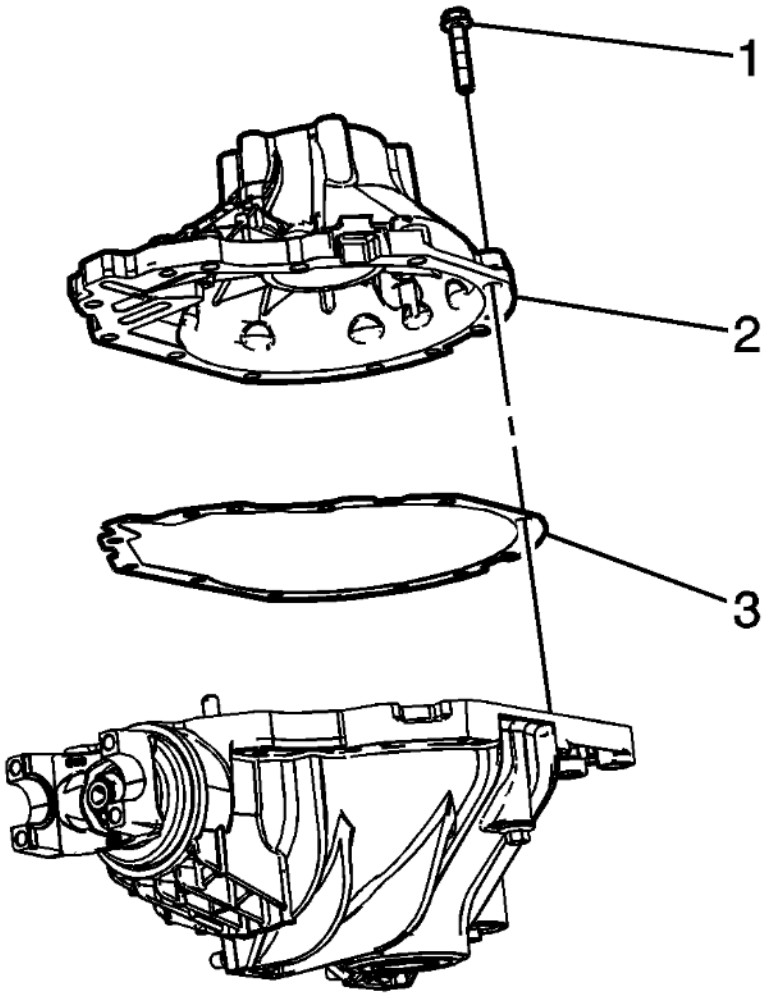


Fig. 302: View Of Differential Carrier Housing, Gasket & Bolts
Courtesy of GENERAL MOTORS COMPANY

NOTE: **The sealing surfaces of the differential carrier halves must be free of grease and oil to ensure that the gasket will seal properly.**

36. Install the differential carrier case gasket (3).
37. Install the differential carrier case (2) half to the left differential carrier case half. If the carrier case halves do not make complete contact, use the **J-36599-A** side bearing nut wrench in order to back out right differential adjuster nut sleeve until the differential carrier case halves make contact.
38. Install the differential carrier case bolts (1) and tighten to 73 N.m (54 lb ft).
39. Install the differential carrier assembly into a vise.
40. While rotating the pinion yoke back and forth, turn the right side differential adjuster nut clockwise using the **J-36599-A** side bearing nut wrench until 0.0254-0.072 mm (0.001-0.003 inch) of backlash can be felt between the ring gear and the drive pinion. If the backlash specification cannot be obtained, turn the left side differential adjuster nut sleeve counter clockwise using the **J-36599-A** side bearing nut wrench in small equal increments until the backlash specification can be obtained.

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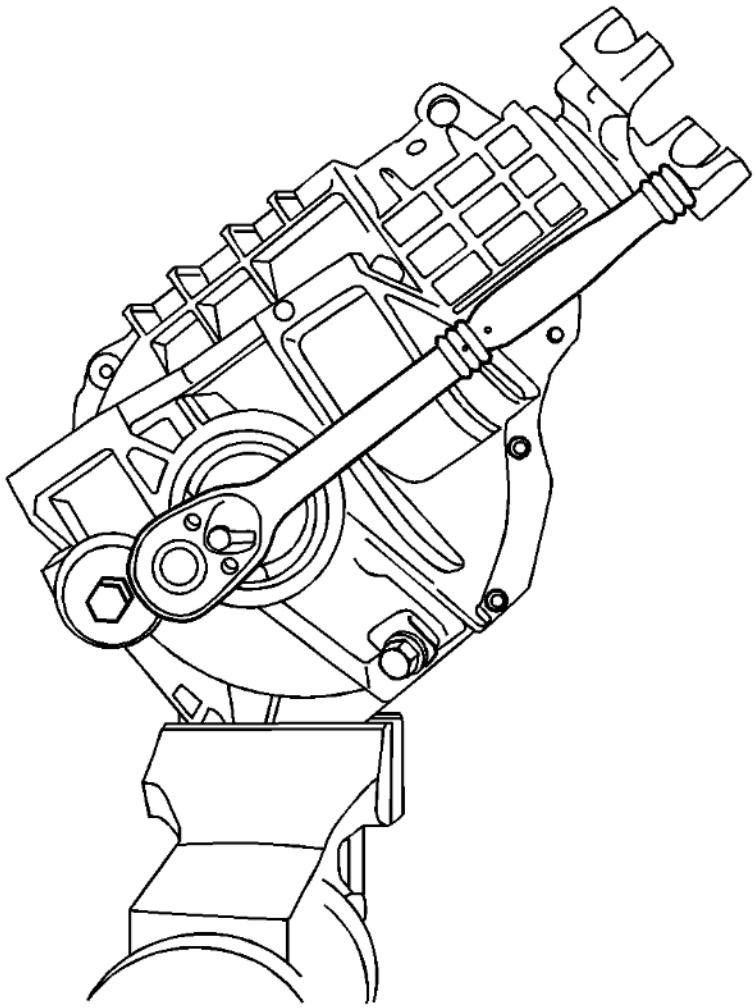


Fig. 303: Tightening Differential Adjuster Nut
Courtesy of GENERAL MOTORS COMPANY

41. Using the **J-36599-A** side bearing nut wrench turn the left side differential adjuster nut clockwise in order to preload the differential side bearings against the differential side bearings cups and tighten the adjuster nut to 75 N.m (55 lb ft).
42. Rotate the pinion several times in order to seat the pinion and differential side bearings.
43. Using an inch-pound torque wrench, measure the rotating torque of the drive pinion and differential assembly, which should be 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.
44. If the rotating torque of the drive pinion and differential assembly is not 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion, 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-36599-A** side bearing nut wrench , turn the left and right side differential adjuster sleeves in or clockwise in small equal increments.
    3. Using an inch pound torque wrench, measure the rotating torque of the pinion and differential assembly.
    4. Compare the new measurement to the specification listed in Step 22. If the rotating torque of the

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pinion and differential assembly is not within specifications, continue to tighten the left and right side differential adjuster nut sleeves in small equal increments on each side until the rotating torque of the pinion and differential assembly is within specifications.

45. If the rotating torque of the drive pinion and differential assembly is more than 1.13 N.m (10 lb in) above the rotating torque of the drive pinion measurement, 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-36599-A** side bearing nut wrench or the **J-36615** side bearing nut wrench , turn the left and right side differential adjuster nut sleeve out or clockwise in small equal increments.
    3. Using a torque wrench, measure the rotating torque of the pinion and differential assembly.
    4. Compare the new measurement to the specification listed in Step 22. 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 sleeve in small equal increments on each side until the rotating torque of the pinion and differential assembly is within specifications.
46. Once the specified rotating is obtained, rotate the pinion several times to ensure the bearings have seated. Recheck the rotating torque and adjust if necessary.
47. Measure the drive pinion to the ring gear backlash and adjust, if necessary. Refer to **Backlash Inspection and Adjustment**.
48. Once the bearing preload and drive pinion to the ring gear backlash is within specifications, perform a gear tooth contact pattern check to ensure proper contact between the pinon and the ring gear. Refer to **Gear Tooth Contact Pattern Inspection**.

DIFFERENTIAL CASE REPLACEMENT

Special Tools

- **J-22912-B** Split-Plate Bearing Puller
- **J-2619-01** Slide Hammer
- **J-29369-1** Bushing and Bearing Remover
- **J-34011** Pilot Bearing Remover
- **J-36598** Holding Fixture
- **J-36614** Inner Pinion Bearing Installer
- **J-45765** Pinion Remover
- **J-45858** Front Axle Bearing Race Remover/Installer
- **J 8614-01** Flange and Pulley Holding Tool
- **J-8107-2** Side Bearing Puller Pilot
- **J-22888-D** Side Bearing Remover Kit
- **GE-8092** Driver Handle
- **J-22761** Differential Side Bearing Installer

Inspection Procedure

Perform the following before disassembling the axle:

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

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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. Check the ring gear backlash. Refer to **Backlash Inspection and Adjustment**.

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.

Removal Procedure

1. Install the differential carrier assembly in a vise.

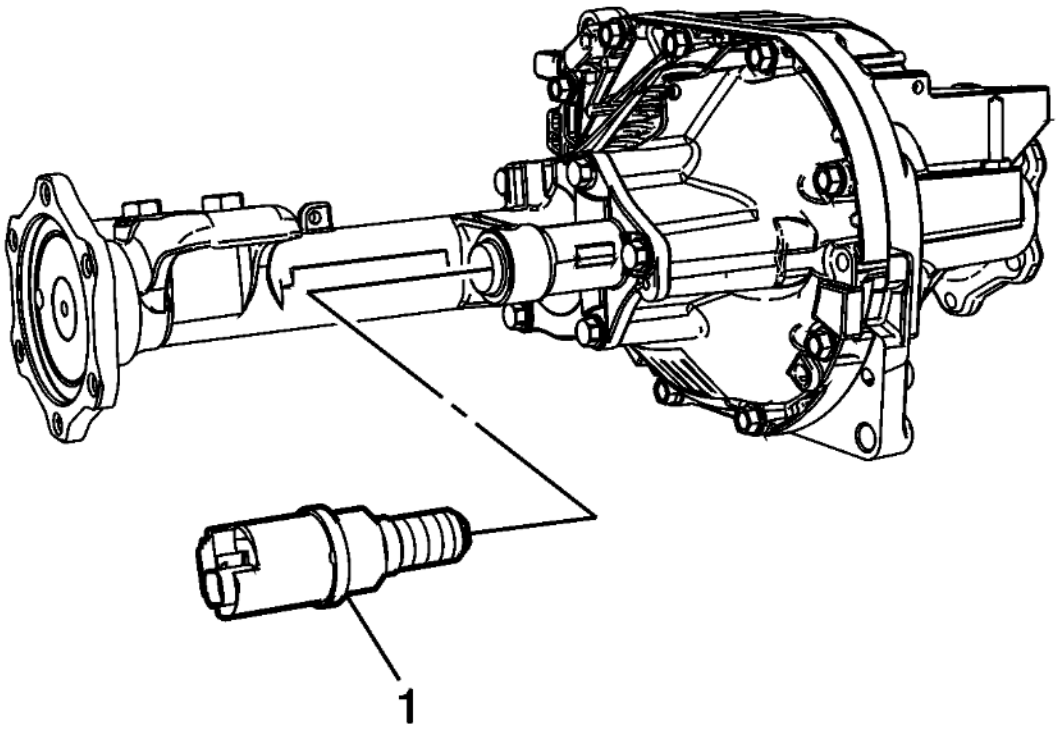


Fig. 304: Front Axle Actuator
Courtesy of GENERAL MOTORS COMPANY

2. Remove the front axle actuator (1).
3. Remove the inner axle shaft housing to differential carrier assembly bolts.

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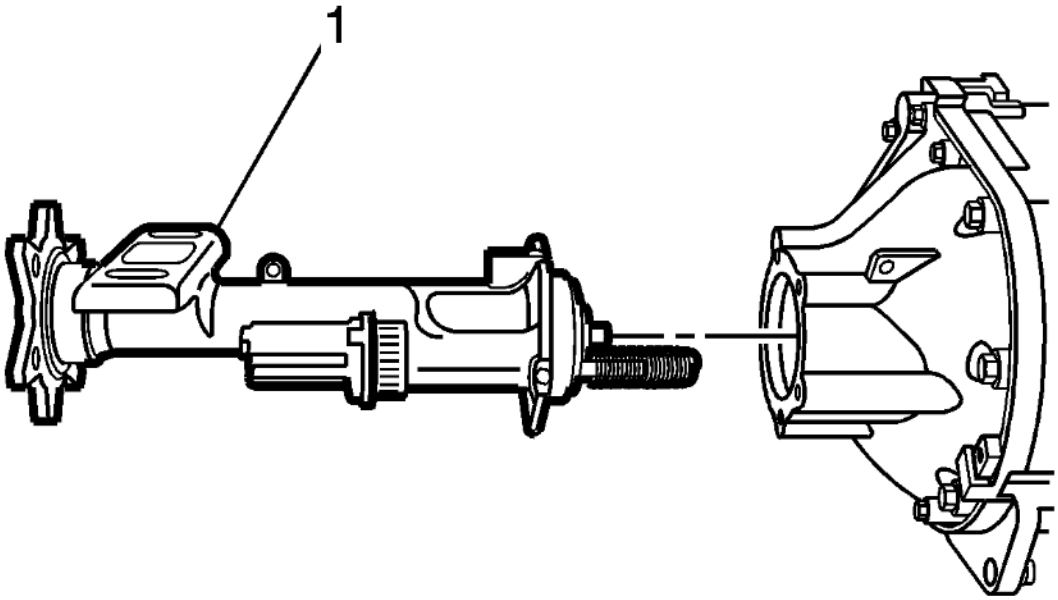


Fig. 305: Installing Inner Axle Shaft Housing Assembly - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

4. Carefully remove the inner axle shaft housing (1) with the inner axle shaft and clutch fork components from the differential carrier assembly.

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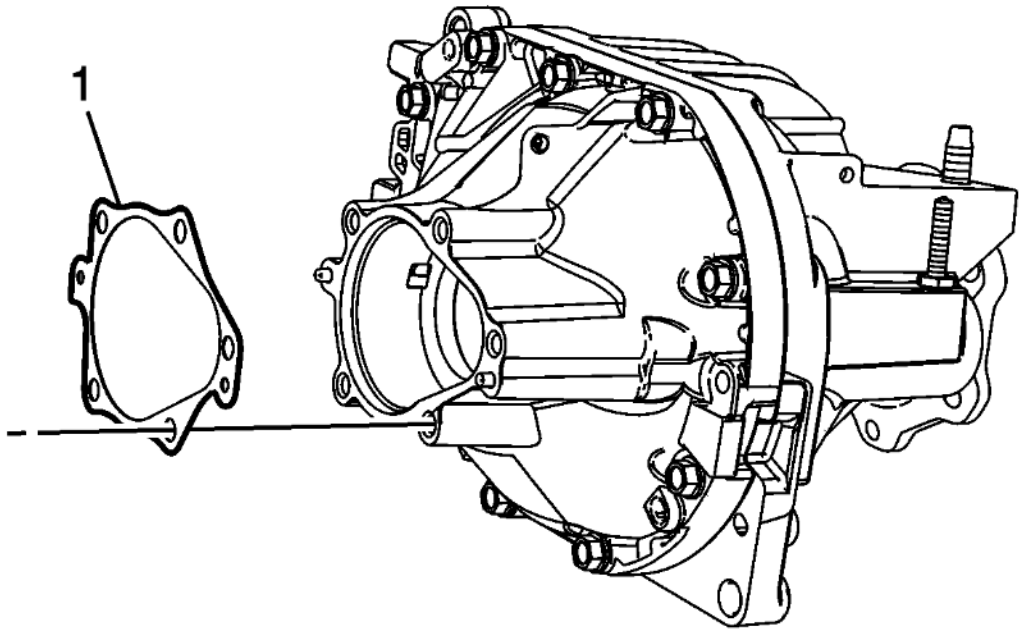


Fig. 306: Inner Axle Housing To Differential Carrier Gasket
Courtesy of GENERAL MOTORS COMPANY

5. Remove the inner axle housing to differential carrier gasket (1).

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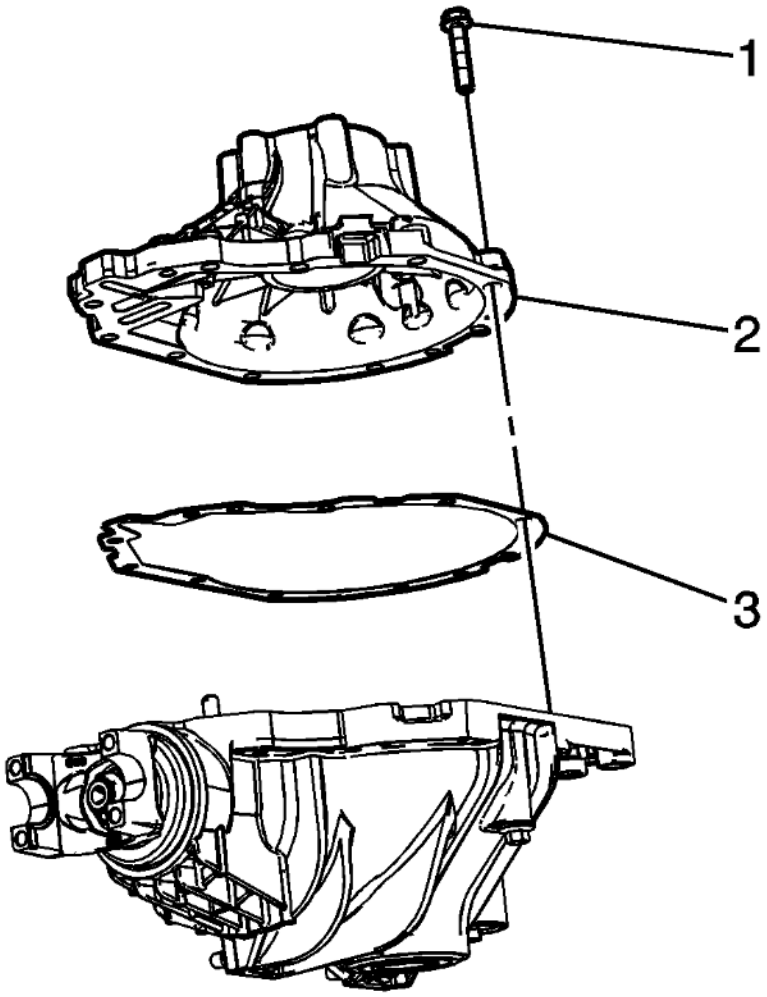


Fig. 307: View Of Differential Carrier Housing, Gasket & Bolts
Courtesy of GENERAL MOTORS COMPANY

6. Remove the differential carrier assembly bolts (1).
7. Separate the left carrier case half from the right carrier case half (2) by tapping on the on the carrier case with a hammer and a brass drift.
8. Remove the differential carrier housing (2) and the differential carrier housing gasket (3).
9. Remove the differential case assembly.
10. Remove the differential side bearing by performing the following steps:
    1. Place the differential case in a vise.

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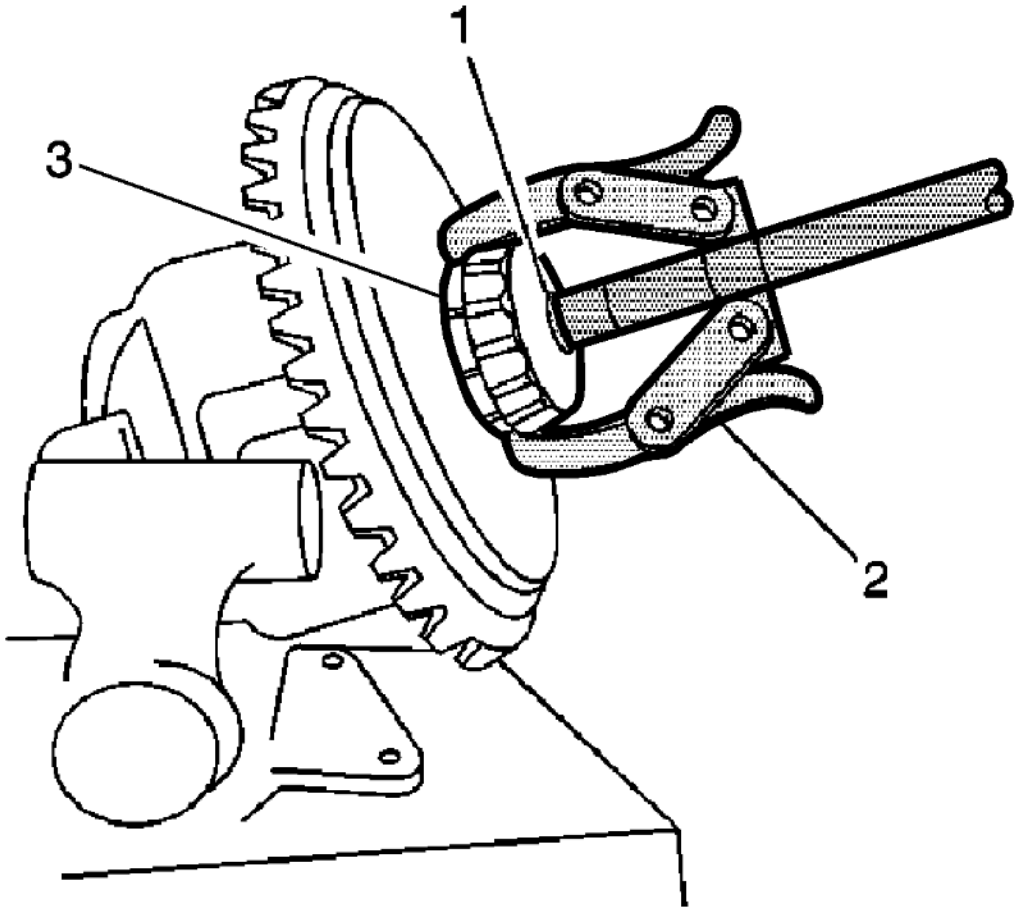


Fig. 308: View Of Differential Side Bearing
Courtesy of GENERAL MOTORS COMPANY

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

11. Remove the differential assembly from the vise.

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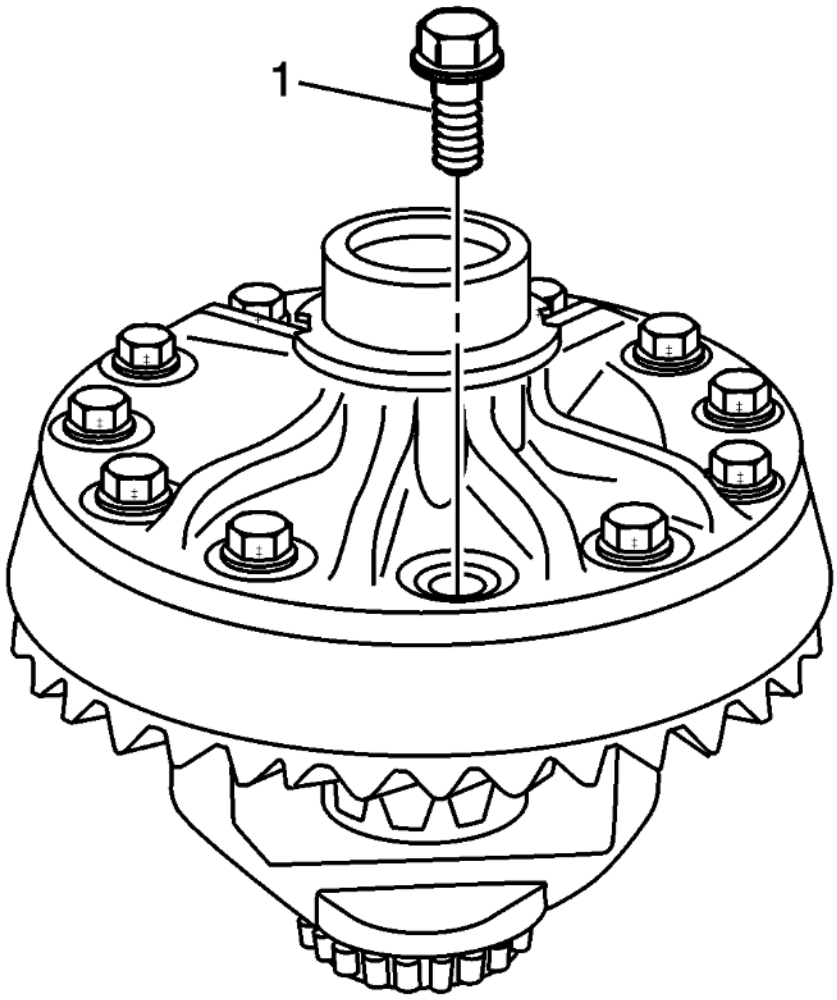


Fig. 309: Ring Gear Bolts Have Left-Hand Threads
Courtesy of GENERAL MOTORS COMPANY

NOTE: **The ring gear bolts have left-hand threads.**

12. Remove the ring gear bolts (1). Discard the bolts.

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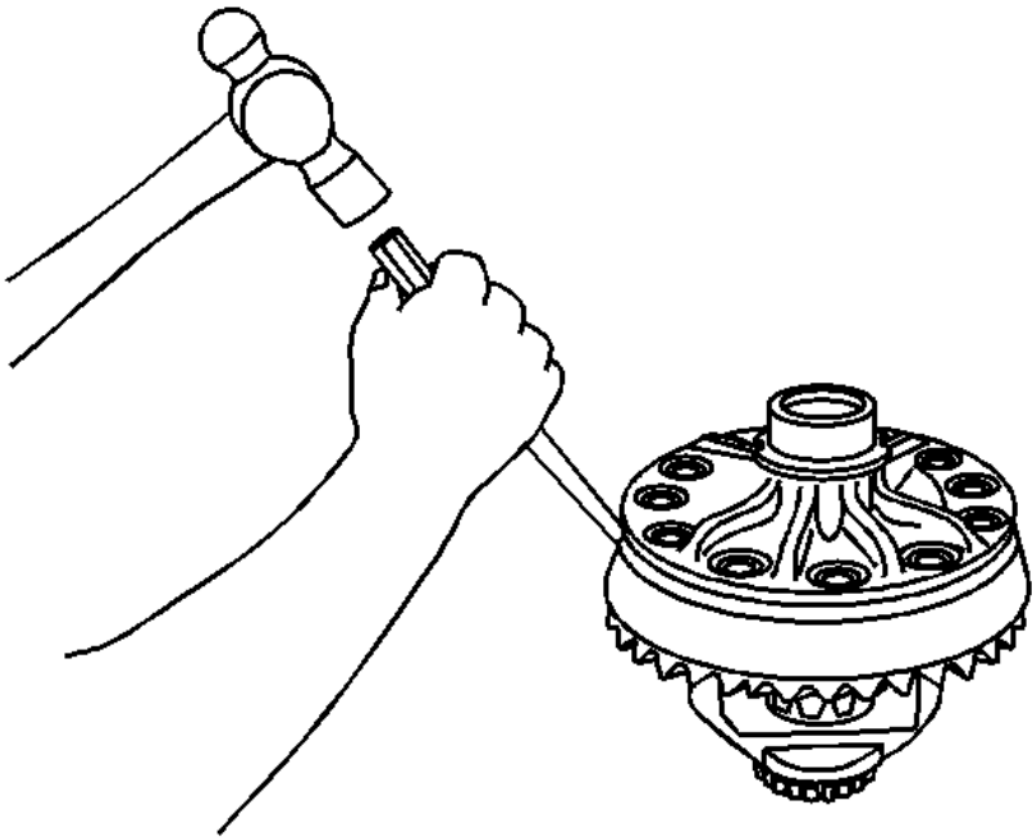


Fig. 310: Removing Ring Gear From Differential
Courtesy of GENERAL MOTORS COMPANY

CAUTION: 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.

13. Remove the ring gear from the differential case.

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

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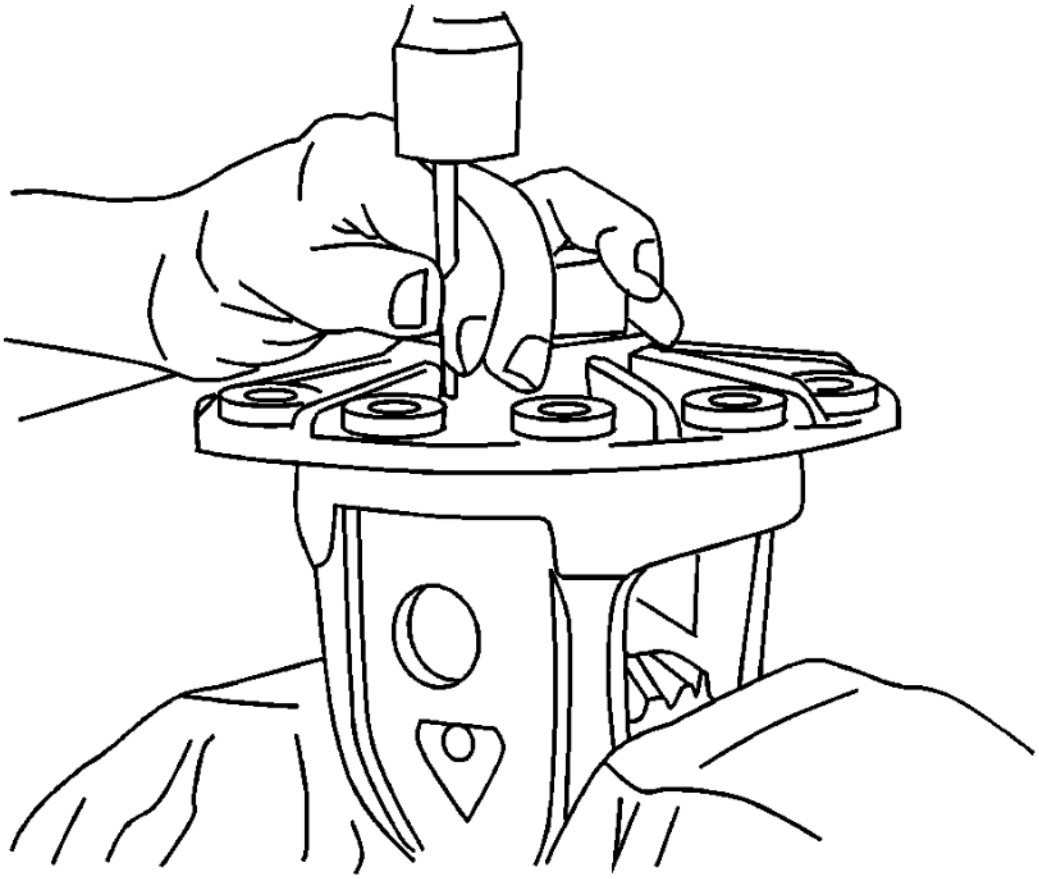


Fig. 311: Driving Out Pinion Shaft Pin (8.25 Inch Axle)
Courtesy of GENERAL MOTORS COMPANY

14. Remove the pinion shaft pin.

    Use a hammer and a drift pin in order to drive out the pin.

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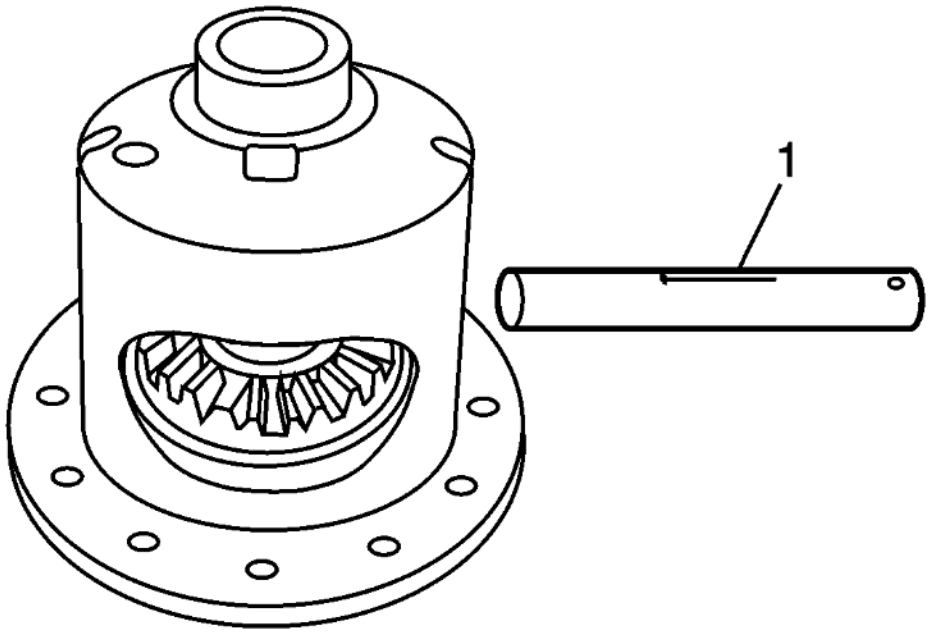


Fig. 312: Pinion Gear Shaft
Courtesy of GENERAL MOTORS COMPANY

15. Remove the pinion shaft (1).

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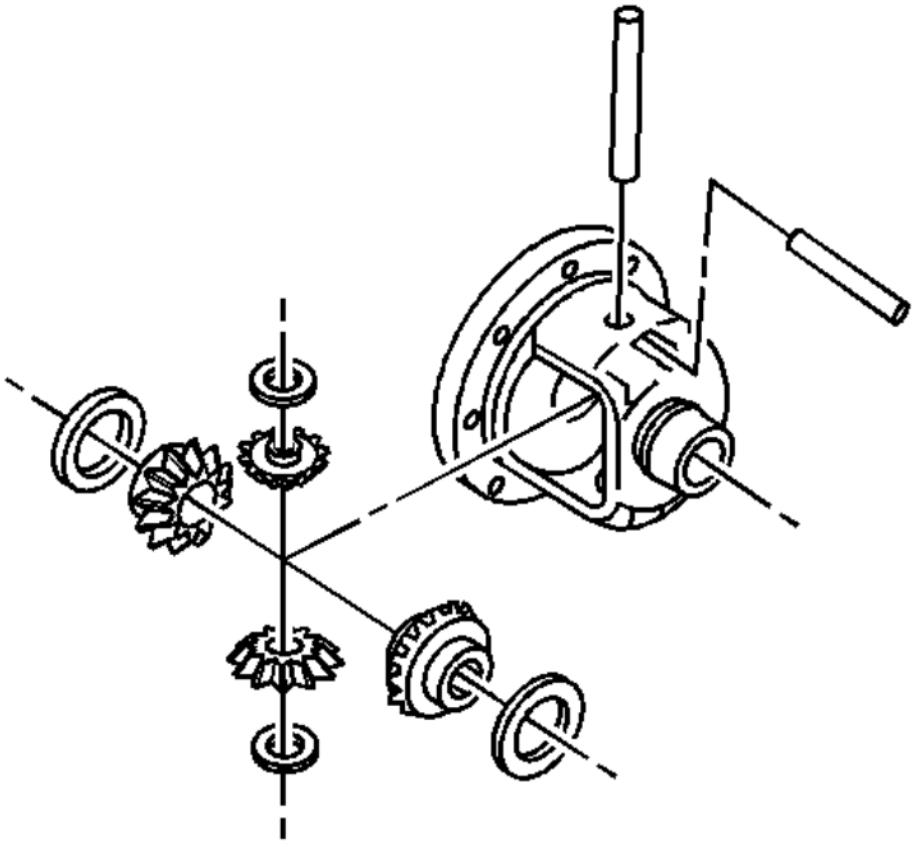


Fig. 313: Exploded View Of Differential Case
Courtesy of GENERAL MOTORS COMPANY

16. Remove the differential pinion gears and the differential side gears by performing the following steps:
    1. Roll the differential pinion gears out of the case with the pinion gear thrust washers.
    2. Remove the differential side gears and the side gear thrust washers.

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

Installation Procedure

1. Lubricate the pinion and side gears using axle lubricant. Use the correct fluid. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

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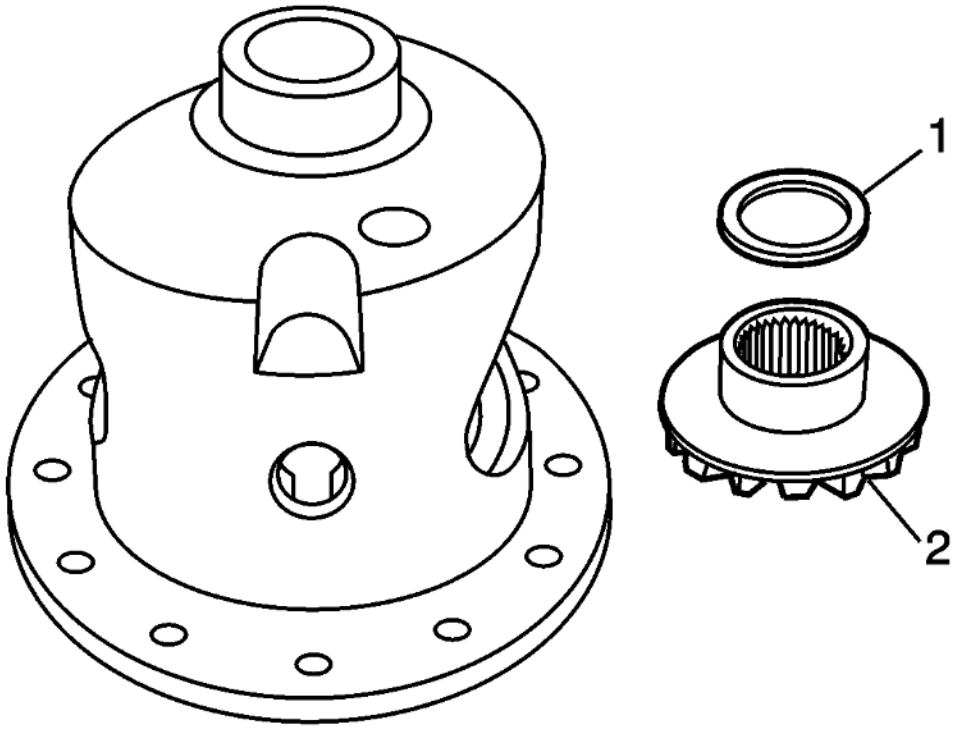


Fig. 314: Thrust Washers And Differential Side Gears
Courtesy of GENERAL MOTORS COMPANY

2. Install the thrust washers (1) and the differential side gears (2) into the NEW differential case.

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

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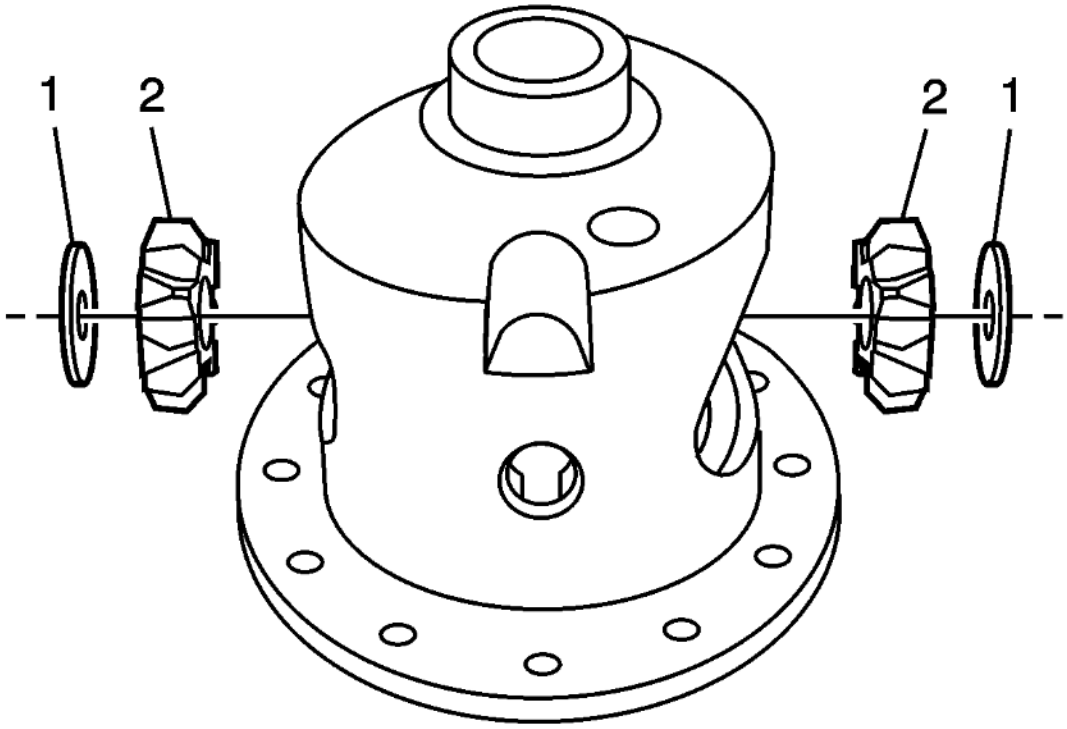


Fig. 315: Differential Pinion Gears
Courtesy of GENERAL MOTORS COMPANY

3. Install the differential pinion gears (2) by performing the following steps:
    1. Position both pinion gears between the differential side gears directly opposite of each other.
    2. Rotate the differential side gears until the pinion gears are opposite the opening in the differential case in line with the pinion shaft opening.
4. Install the thrust washers (1).

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

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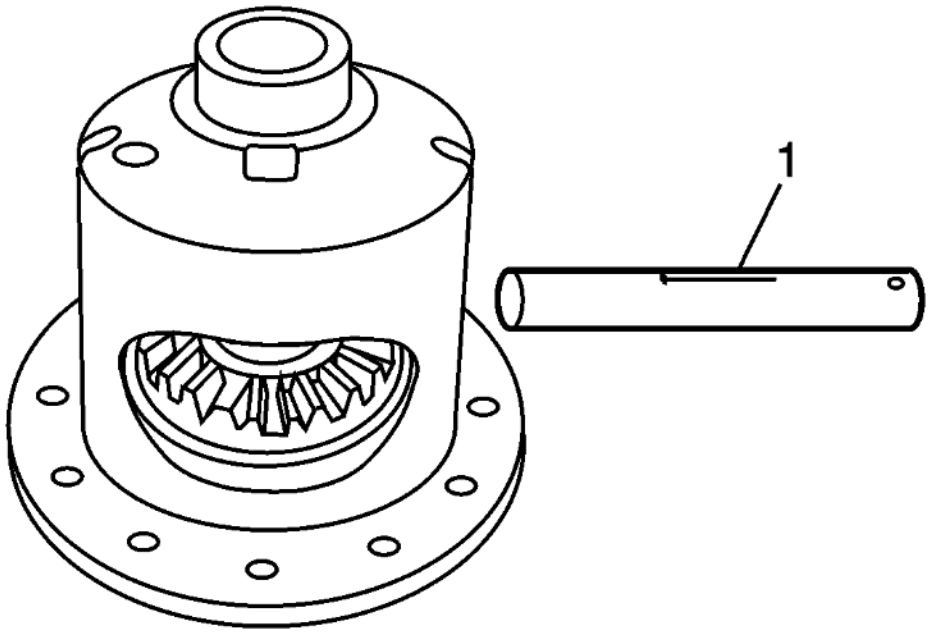


Fig. 316: Pinion Gear Shaft
Courtesy of GENERAL MOTORS COMPANY

5. Install the pinion gear shaft (1).
6. Install the new pinion gear shaft lock pin using a hammer and a brass drift.

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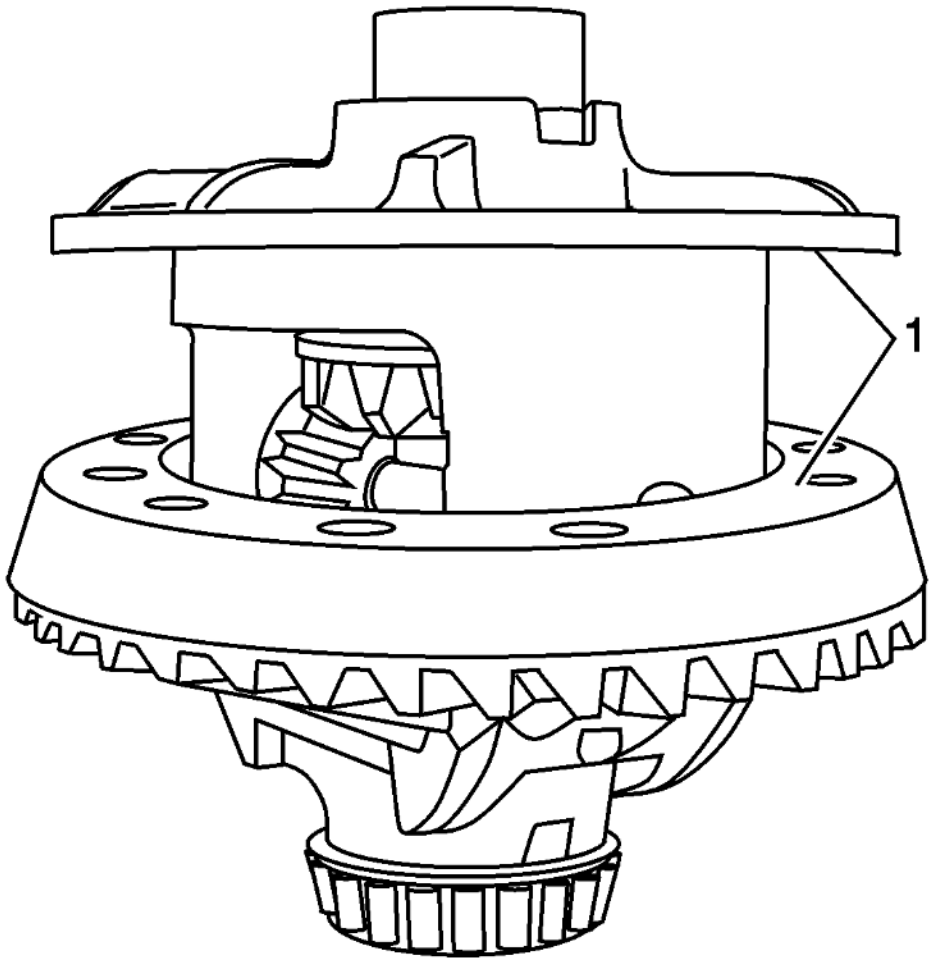


Fig. 317: Mating Surfaces Of Ring Gear And Differential Case
Courtesy of GENERAL MOTORS COMPANY

NOTE: **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.

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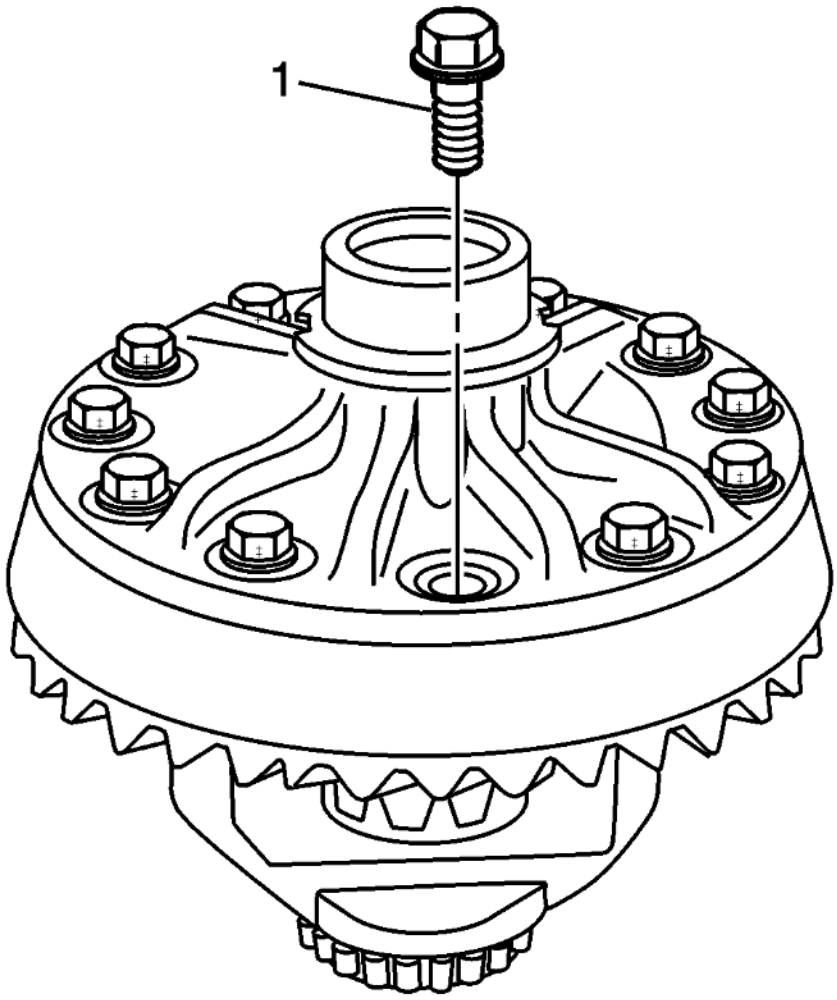


Fig. 318: Ring Gear Bolts Have Left-Hand Threads
Courtesy of GENERAL MOTORS COMPANY

NOTE: **The ring gear bolts have left-hand threads.**

8. Install the new ring gear bolts (1).

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

   CAUTION: **Refer to Fastener Caution .**

9. Install the ring gear bolts. Tighten the ring gear bolts alternately and in stages, gradually pulling the ring gear onto the differential case. Tighten the ring gear bolts in sequence to 120 N.m (89 lb ft).

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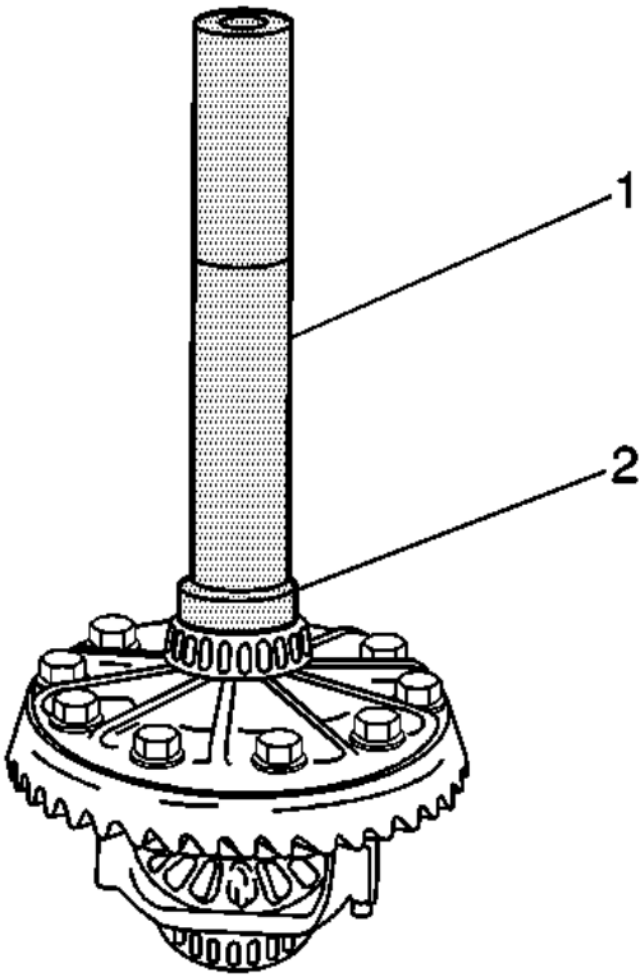


Fig. 319: Installing Differential Side Bearing
Courtesy of GENERAL MOTORS COMPANY

10. Install the differential side bearings by performing the following steps:
    1. In order to protect the differential case, install the **J-8107-2** side bearing puller pilot in the case on the side opposite the bearing installation.
    2. Install the **J-22761** differential side bearing installer (2) and the **GE-8092** driver handle (1) onto the differential case bearing as shown.
    3. Drive the differential case bearing onto the case using the **J-22761** differential side bearing installer and the **GE-8092** driver handle.
11. Install the differential case assembly.

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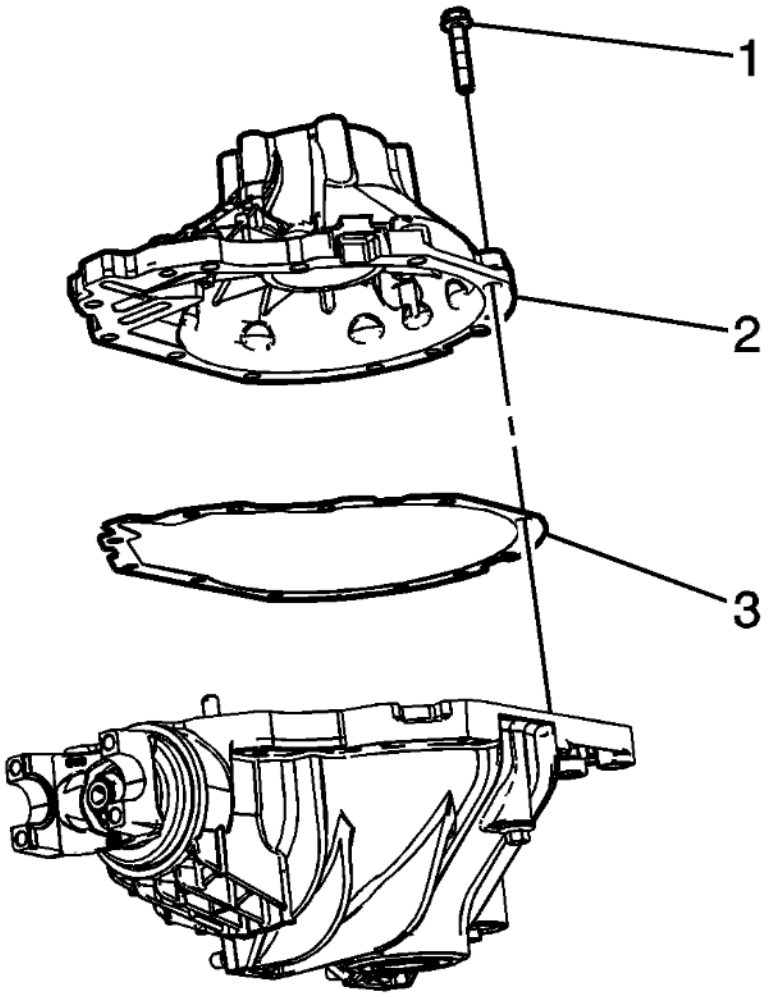


Fig. 320: View Of Differential Carrier Housing, Gasket & Bolts
Courtesy of GENERAL MOTORS COMPANY

12. Install the differential carrier housing gasket (3) and the differential carrier housing (2).

    Install the differential carrier assembly bolts (1) and tighten to 73 N.m (54 lb ft).

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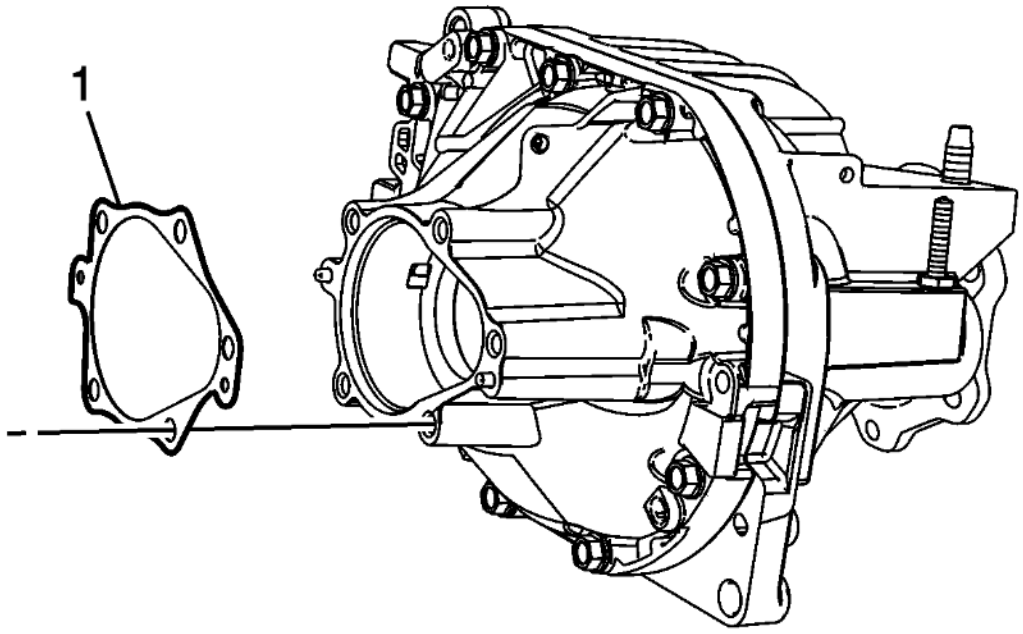


Fig. 321: Inner Axle Housing To Differential Carrier Gasket
Courtesy of GENERAL MOTORS COMPANY

13. Install the inner axle housing to differential carrier gasket (1).

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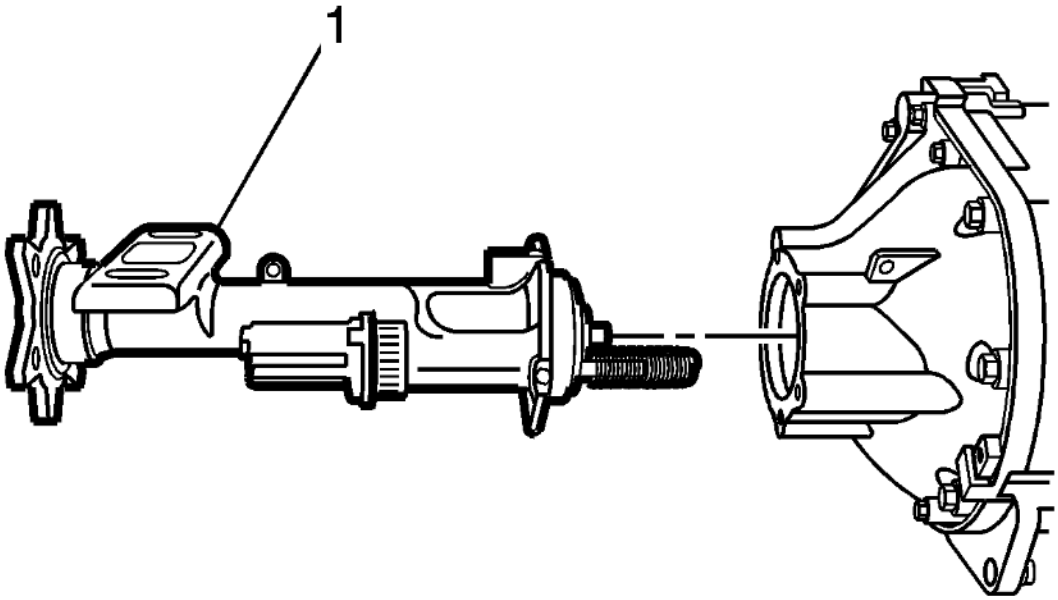


Fig. 322: Installing Inner Axle Shaft Housing Assembly - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

14. Carefully Install the inner axle shaft housing (1) with the inner axle shaft and clutch fork components into the differential carrier assembly.
15. Install the inner axle shaft housing to differential carrier assembly bolts. Tighten to 55 N.m (41 lb ft)

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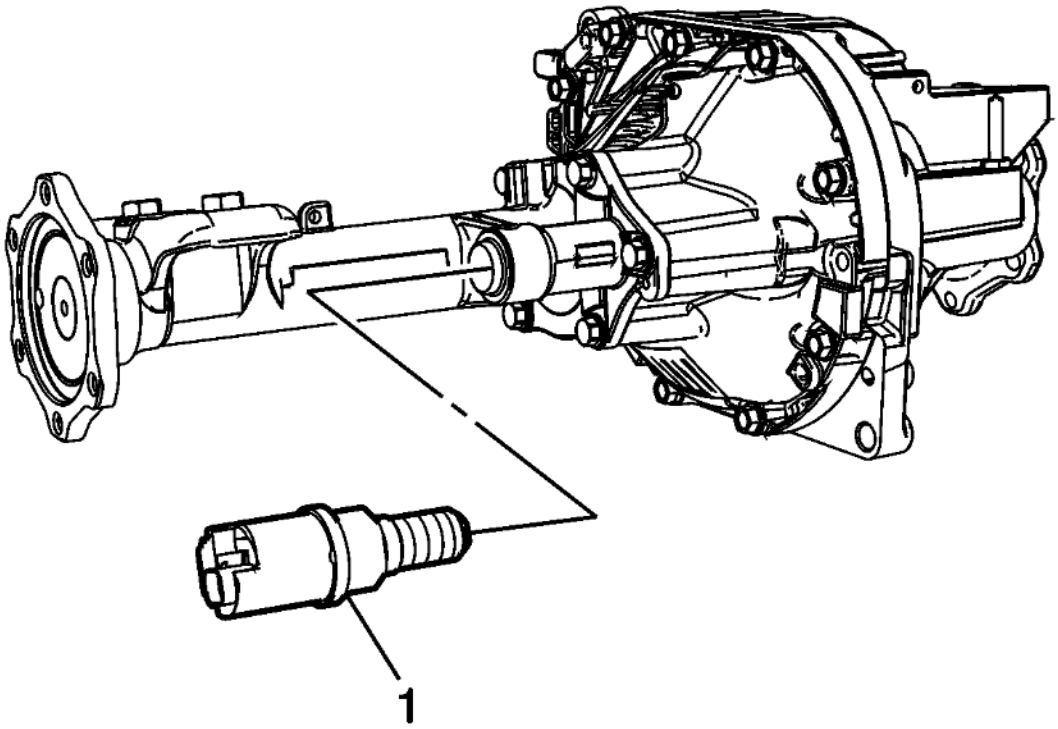


Fig. 323: Front Axle Actuator
Courtesy of GENERAL MOTORS COMPANY

16. Install the front axle actuator (1) and tighten to 20 N.m (15 lb ft)
17. Install the differential carrier assembly in a vise.

FRONT DIFFERENTIAL CASE DISASSEMBLE (9.25 INCH AXLE)

Special Tools

- **J 22888-20A** Gear Puller
- **J 36597** Bearing Cup Installer

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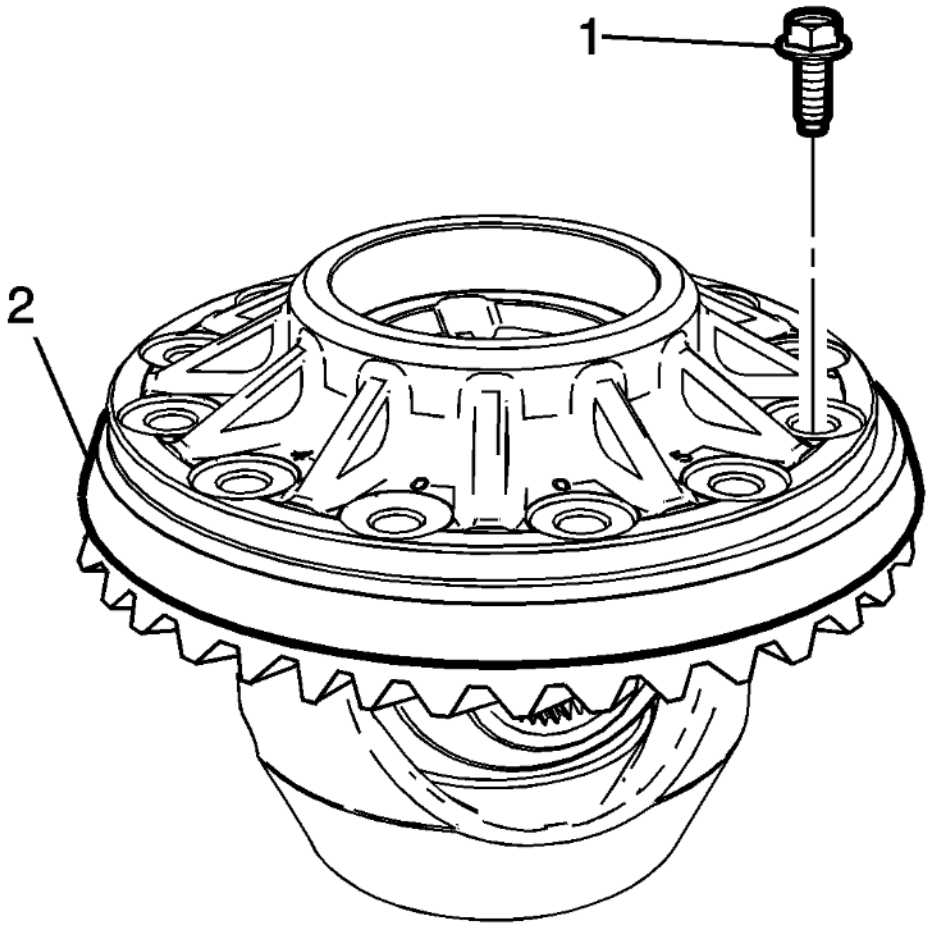


Fig. 324: Ring Gear And Bolts
Courtesy of GENERAL MOTORS COMPANY

NOTE: **The ring gear bolts have left-hand threads.**

1. Remove and discard the 12 ring gear bolts (1). Replace with NEW only.

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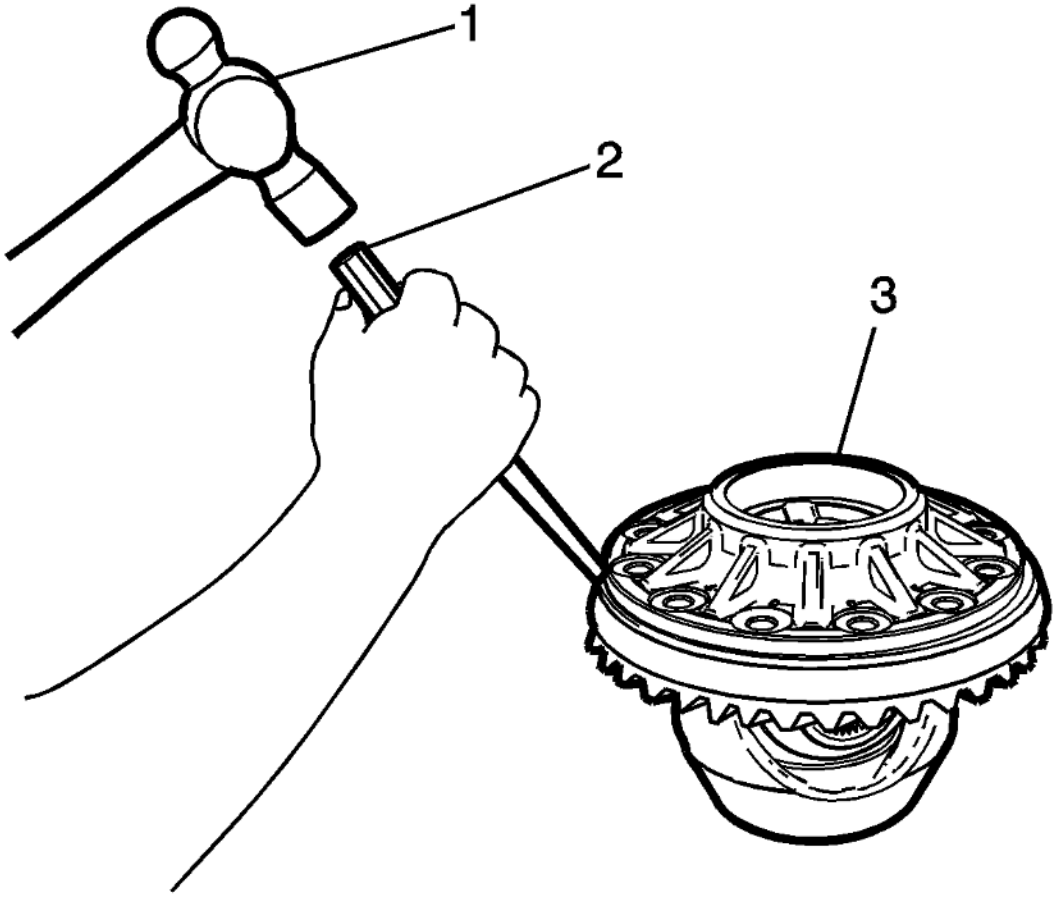


Fig. 325: Identifying Hammer, Brass Drift And Ring Gear
Courtesy of GENERAL MOTORS COMPANY

CAUTION: 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.

2. Using a hammer (1) and a brass drift (2), remove the ring gear (3) from the differential case.

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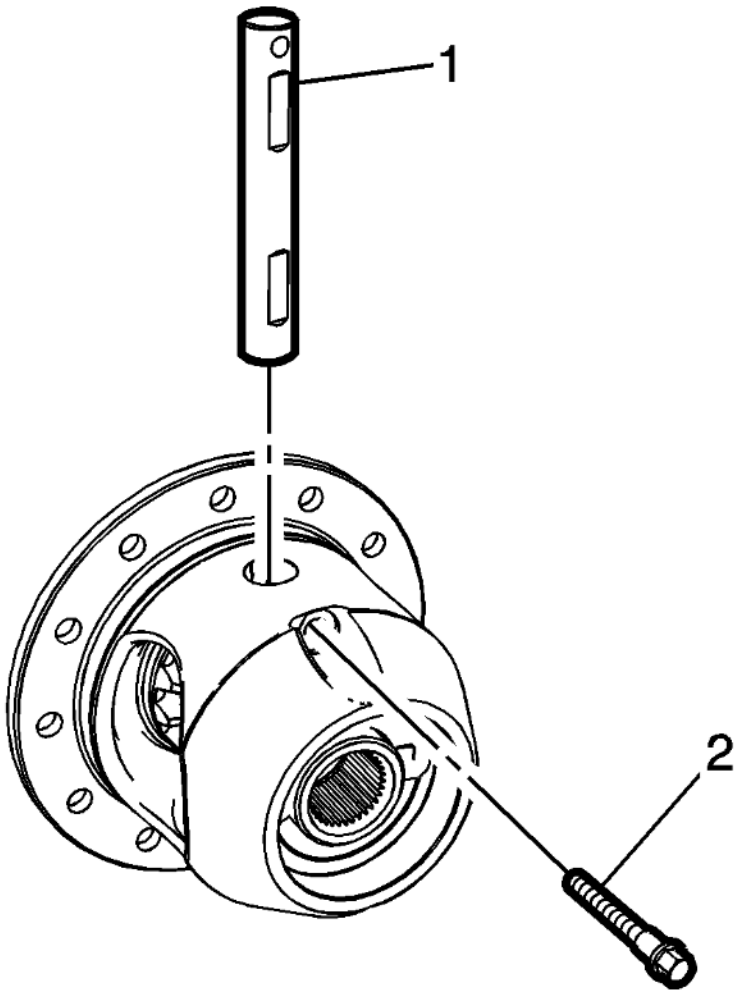


Fig. 326: Identifying Differential Pinion Gear Shaft And Differential Pinion Gear Shaft Lock Bolt
Courtesy of GENERAL MOTORS COMPANY

3. Remove the differential pinion gear shaft lock bolt (2) and the differential pinion gear shaft (1) from the differential case.

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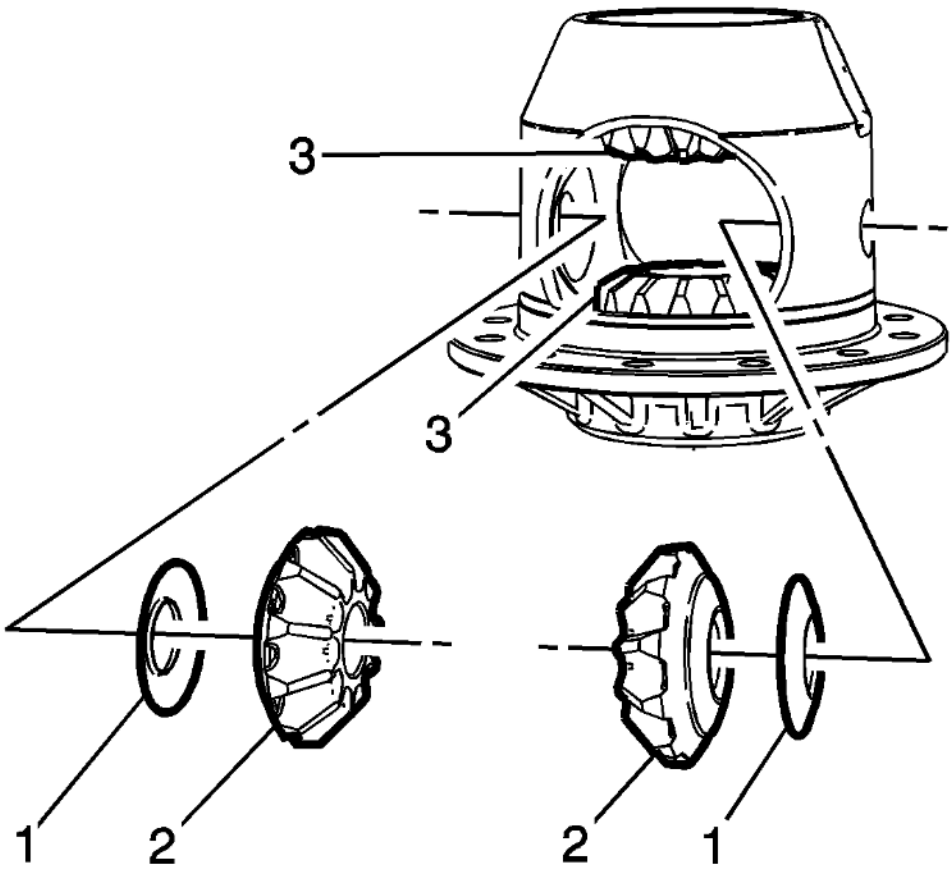


Fig. 327: Identifying Differential Pinion Gears, Washers And Differential Side Gears
Courtesy of GENERAL MOTORS COMPANY

NOTE: **If the differential pinion gears and washer are to be re-used, mark the relationship of the differential pinion gears to the differential case.**

4. Remove the differential pinion gears (2) and the washers (1) by rolling the differential side gears (3).

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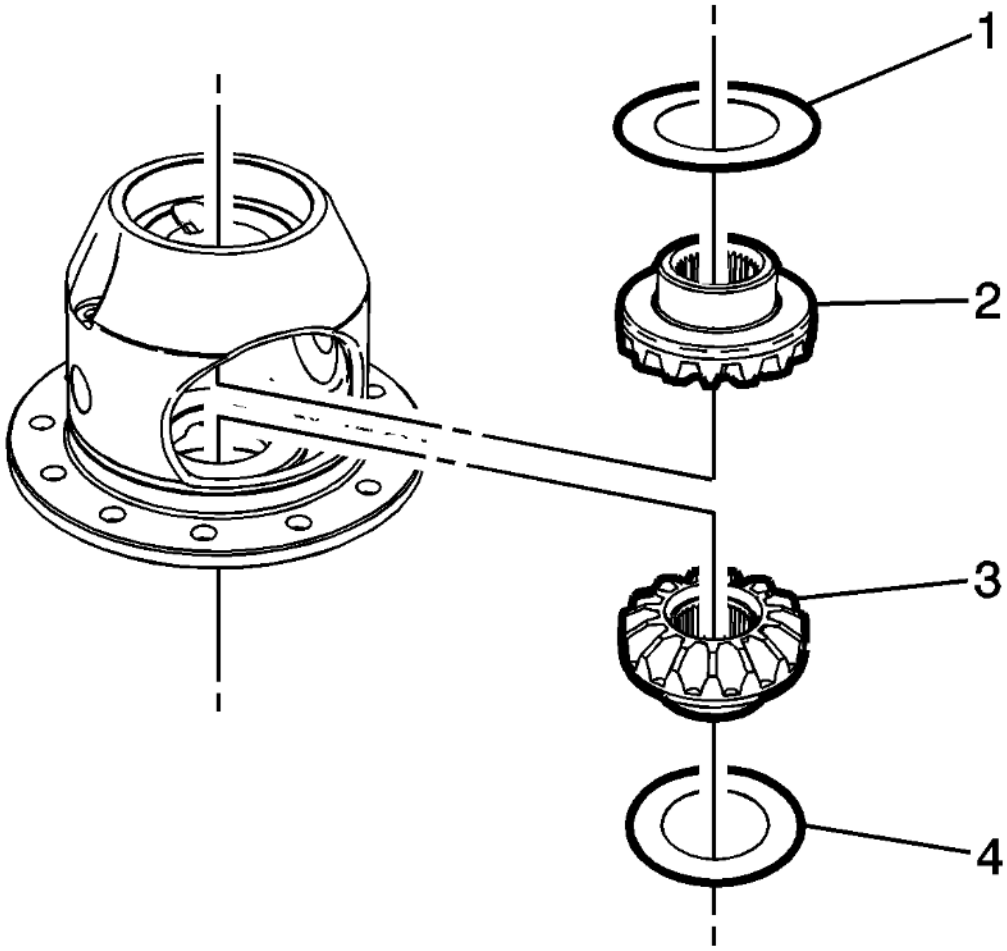


Fig. 328: Identifying Differential Side Gears And Washers
Courtesy of GENERAL MOTORS COMPANY

NOTE: **If re-using the differential side gears and washers, mark the left and right side**

5. Remove the differential side gears (2, 3) and the washers (1, 4) from the differential case.

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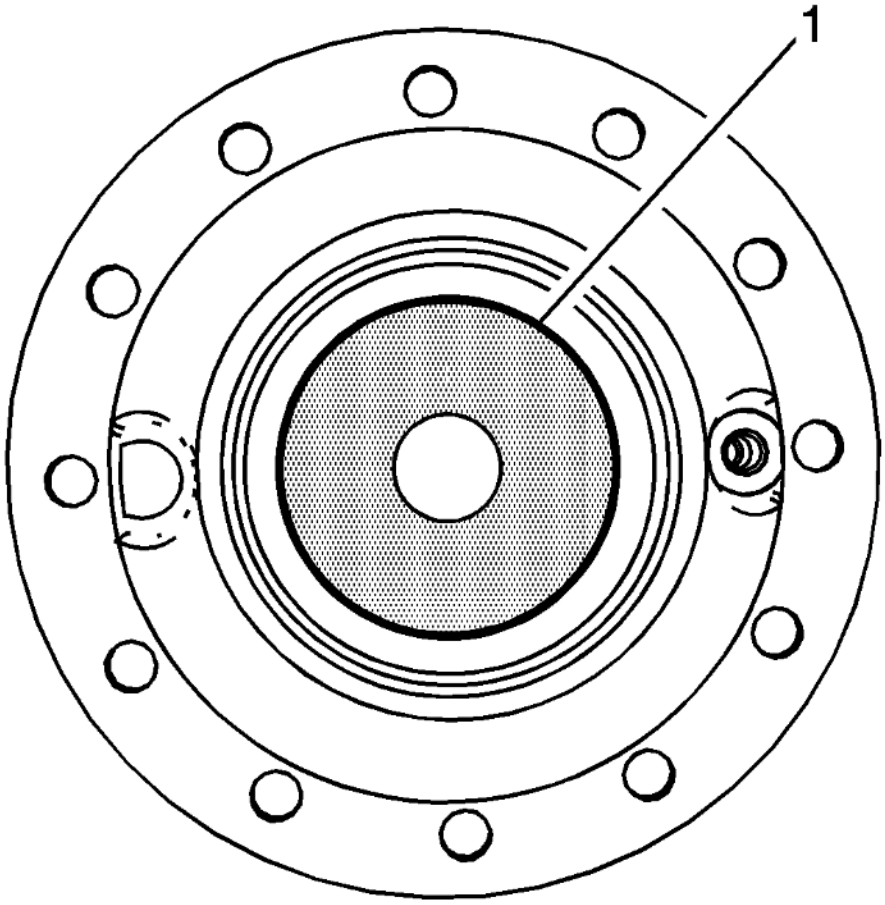


Fig. 329: Special Installer Tool
Courtesy of GENERAL MOTORS COMPANY

6. Position the **J 36597** installer (1) in the bottom of the differential side gear bore.

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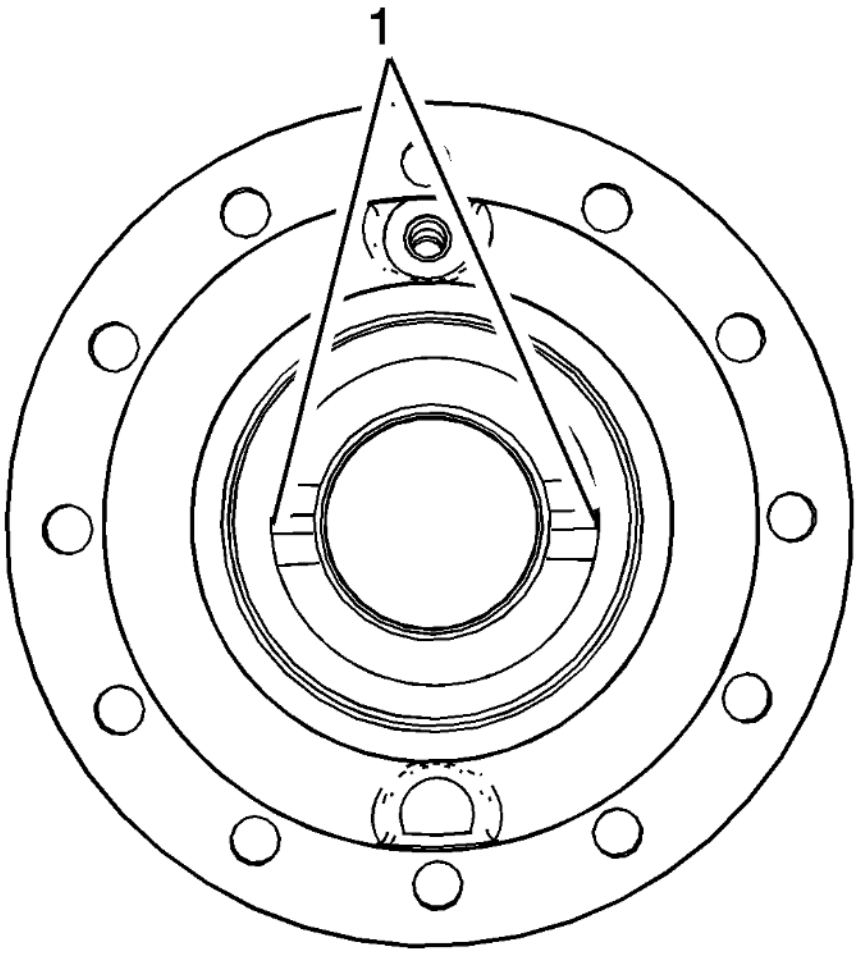


Fig. 330: Slots In Differential Side Gear Bores
Courtesy of GENERAL MOTORS COMPANY

7. There are 2 slots in the differential side gear bores that will be used to remove the differential adjuster/bearing cup from the differential side case.

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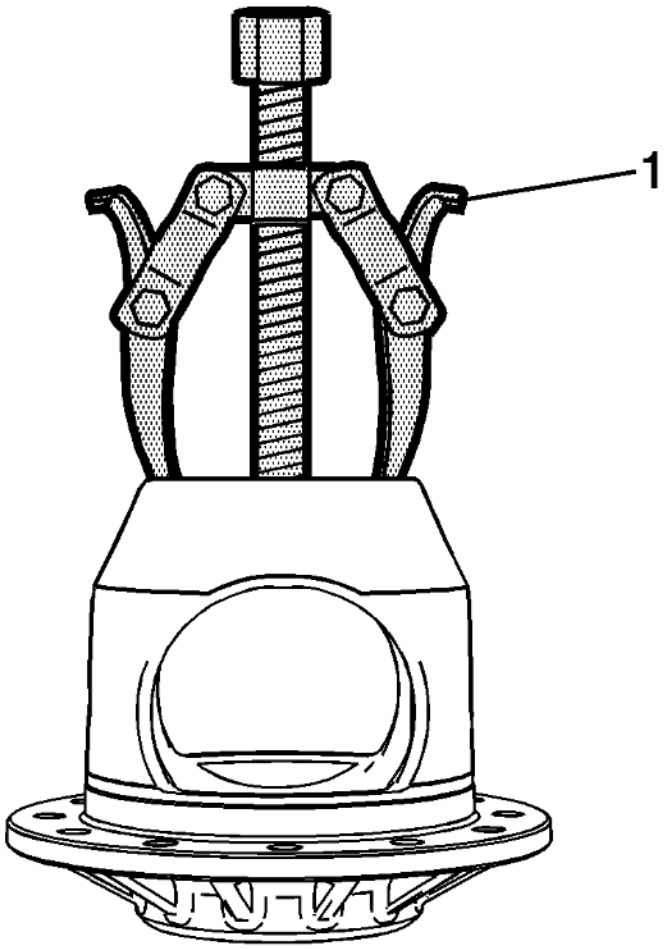


Fig. 331: Special Tool - Puller
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Before using the J 22888-20A, reverse the fingers so the hooks on the end of the fingers are faces outward instead of inward.**

8. Install the fingers of the **J 22888-20A** puller (1) in the slot shown in step 7.
9. Using the **J 22888-20A** puller (1), remove the differential adjuster/bearing cup from the differential case.

FRONT DIFFERENTIAL CASE DISASSEMBLE (8.25 INCH AXLE)

Special Tools

- **J-8107-2** Side Bearing Puller Pilot
- **J-22888-D** Side Bearing Remover Kit

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

1. Remove the differential side bearing by performing the following steps:
    1. Place the differential case in a vise.

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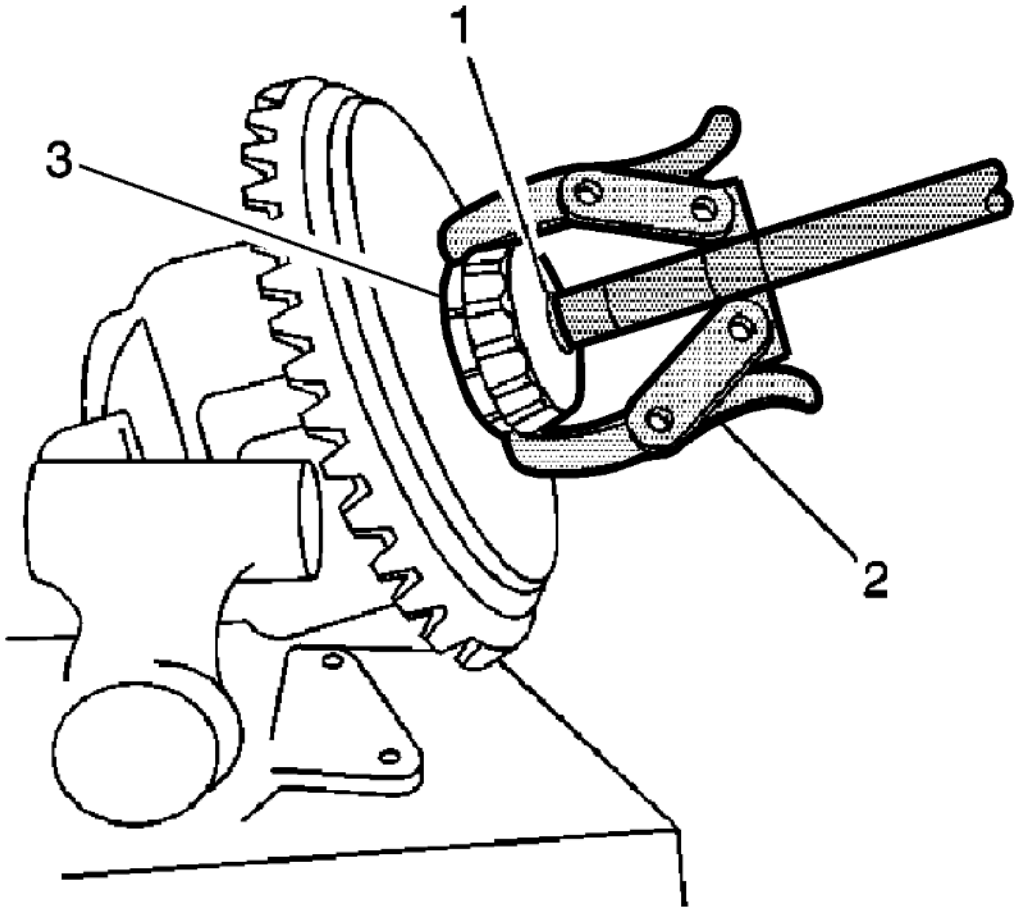


Fig. 332: View Of Differential Side Bearing
Courtesy of GENERAL MOTORS COMPANY

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

2. Remove the differential assembly from the vise.

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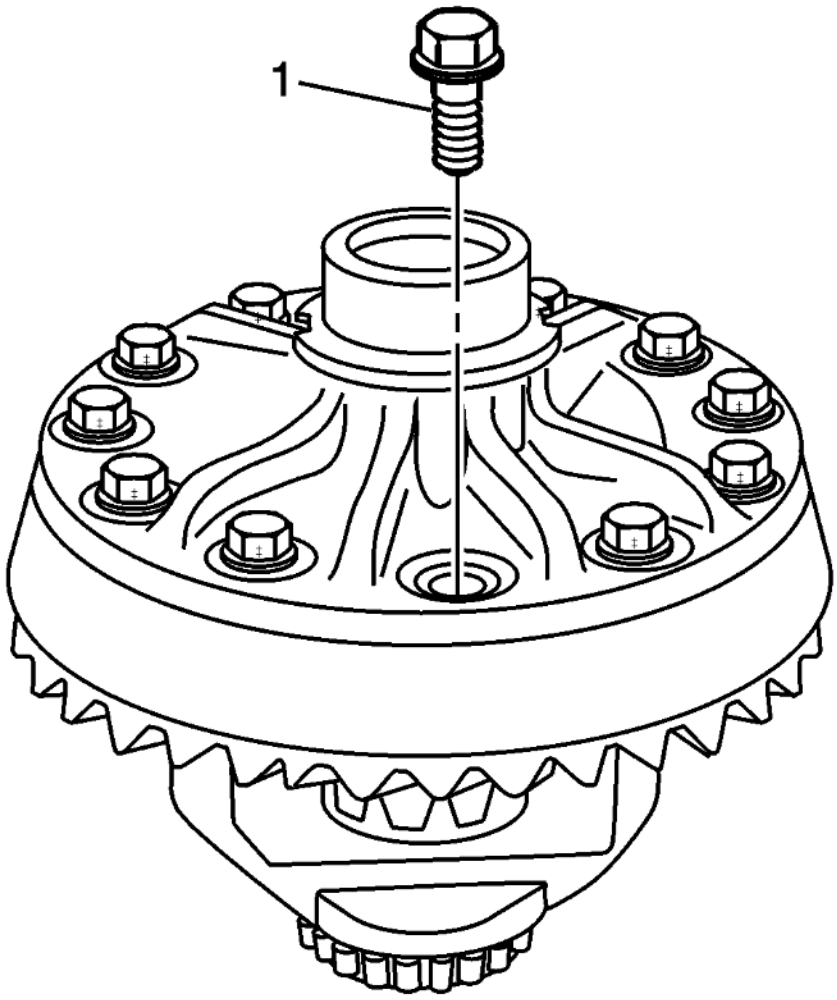


Fig. 333: Ring Gear Bolts Have Left-Hand Threads
Courtesy of GENERAL MOTORS COMPANY

NOTE: **The ring gear bolts have left-hand threads.**

3. Remove the ring gear bolts (1). Discard the bolts.

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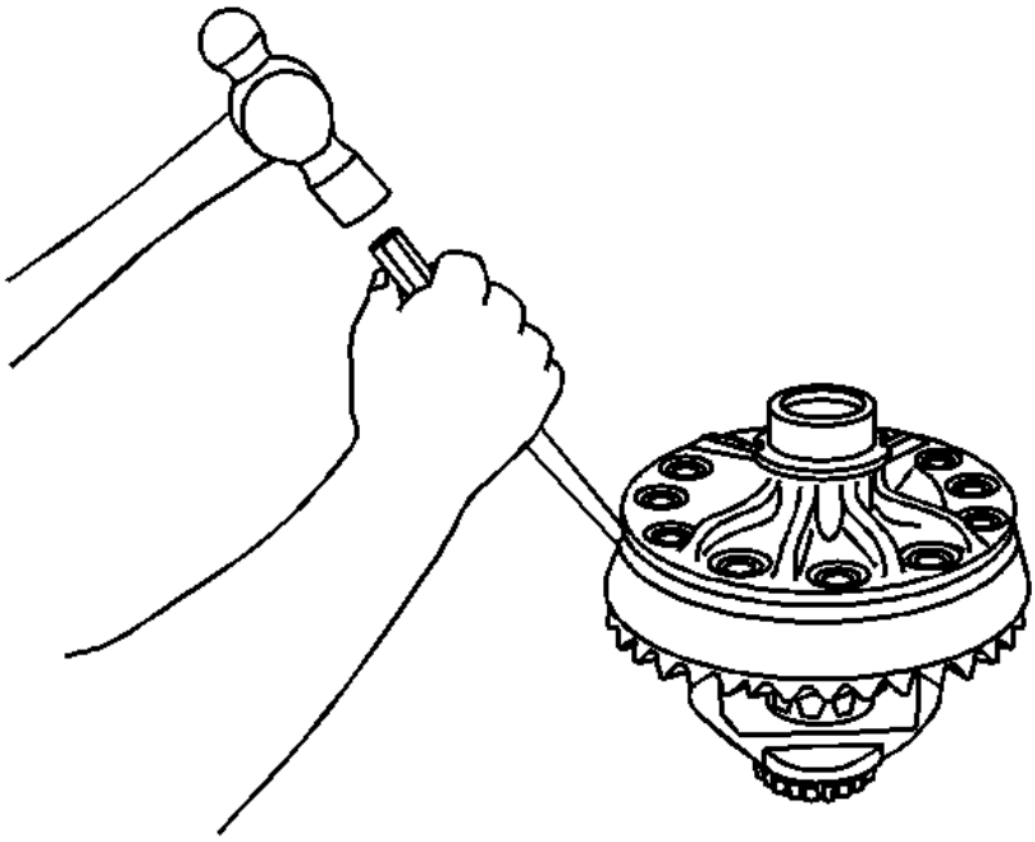


Fig. 334: Removing Ring Gear From Differential
Courtesy of GENERAL MOTORS COMPANY

CAUTION: 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.

4. Remove the ring gear from the differential case.

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

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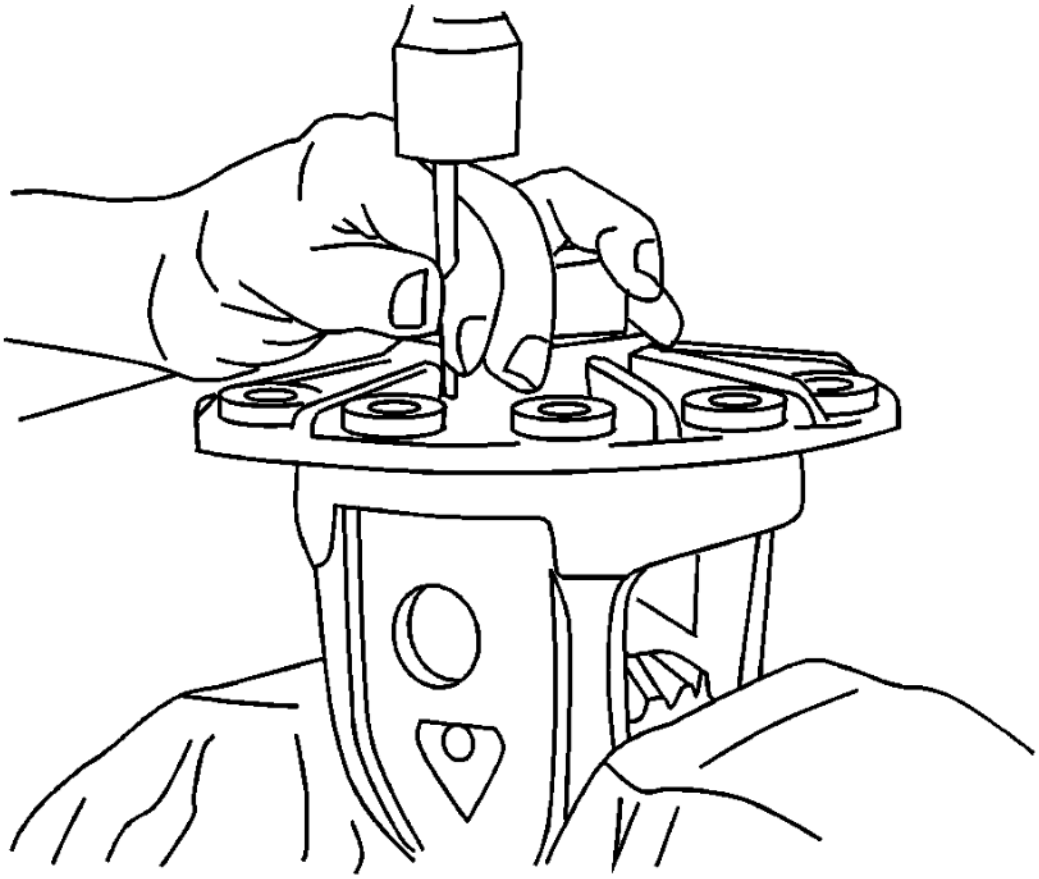


Fig. 335: Driving Out Pinion Shaft Pin (8.25 Inch Axle)
Courtesy of GENERAL MOTORS COMPANY

5. Remove the pinion shaft pin.

   Use a hammer and a drift pin in order to drive out the pin.

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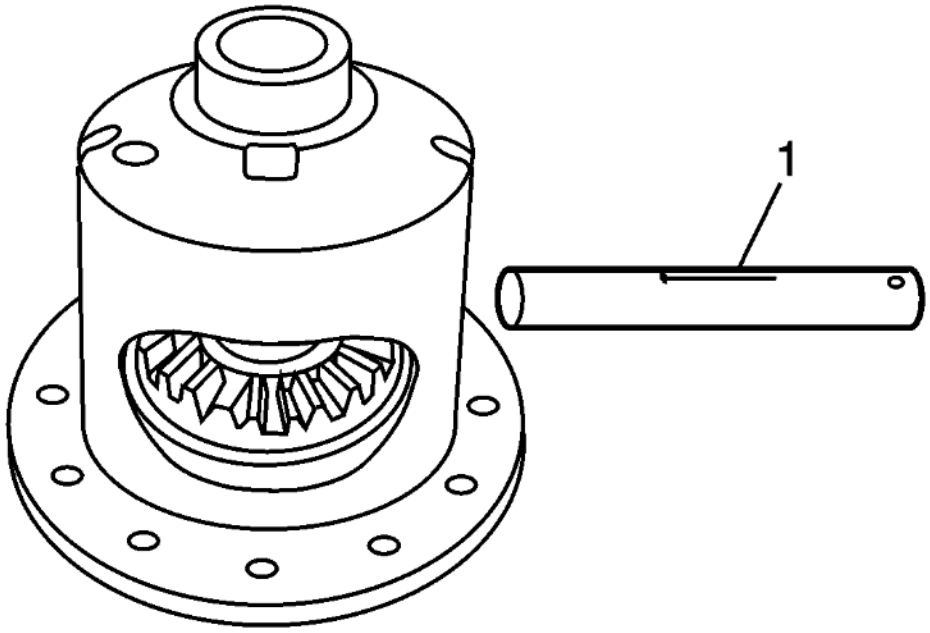


Fig. 336: Pinion Gear Shaft
Courtesy of GENERAL MOTORS COMPANY

6. Remove the pinion shaft (1).

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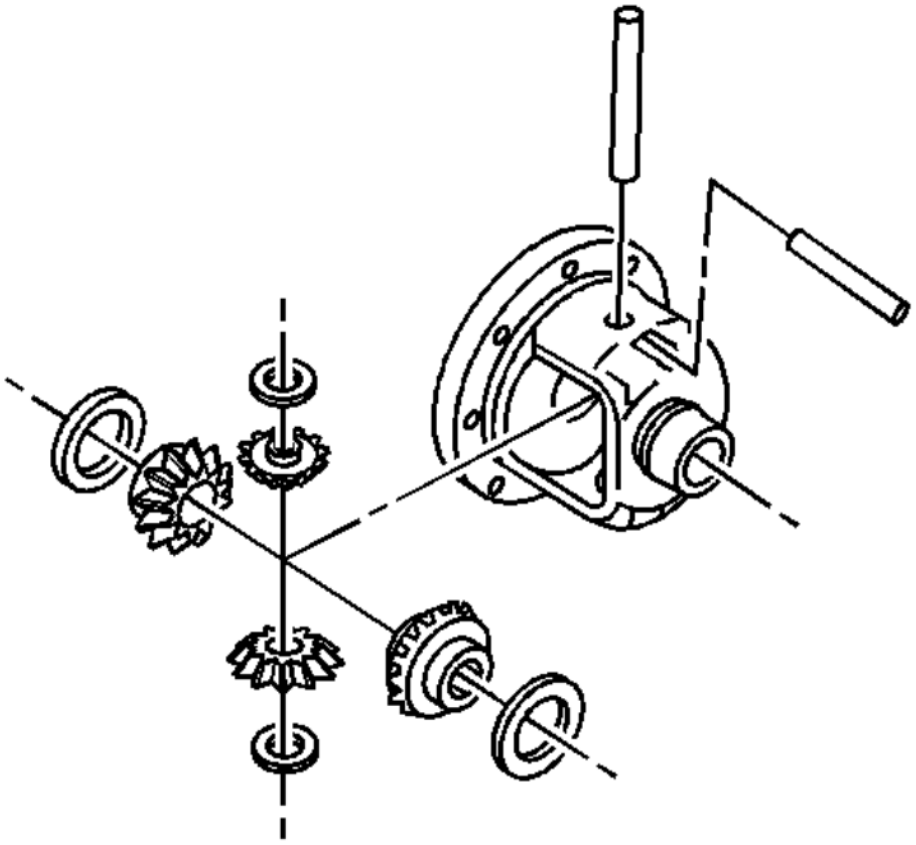


Fig. 337: Exploded View Of Differential Case
Courtesy of GENERAL MOTORS COMPANY

7. Remove the differential pinion gears and the differential side gears by performing the following steps:
    1. Roll the differential pinion gears out of the case with the pinion gear thrust washers.
    2. Remove the differential side gears and the side gear thrust washers.

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

FRONT DRIVE AXLE INNER SHAFT BEARING 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.

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2. Inspect the bearing rollers for wear.
3. Inspect the bearing cups for the following conditions:
    - Wear
    - Cracks
    - Brinelling
    - Scoring

FRONT DIFFERENTIAL CASE AND GEARS INSPECTION

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

FRONT DIFFERENTIAL RING AND DRIVE PINION 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, AND ADJUSTER SLEEVES INSPECTION

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

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

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

FRONT DIFFERENTIAL CASE ASSEMBLE (9.25 INCH AXLE)

Special Tools

- **J 8092** Universal Driver Handle - 3/4 in - 10
- **J 36603** Installer

1. Lubricate the pinion and side gears using axle lubricant. Use the correct fluid. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

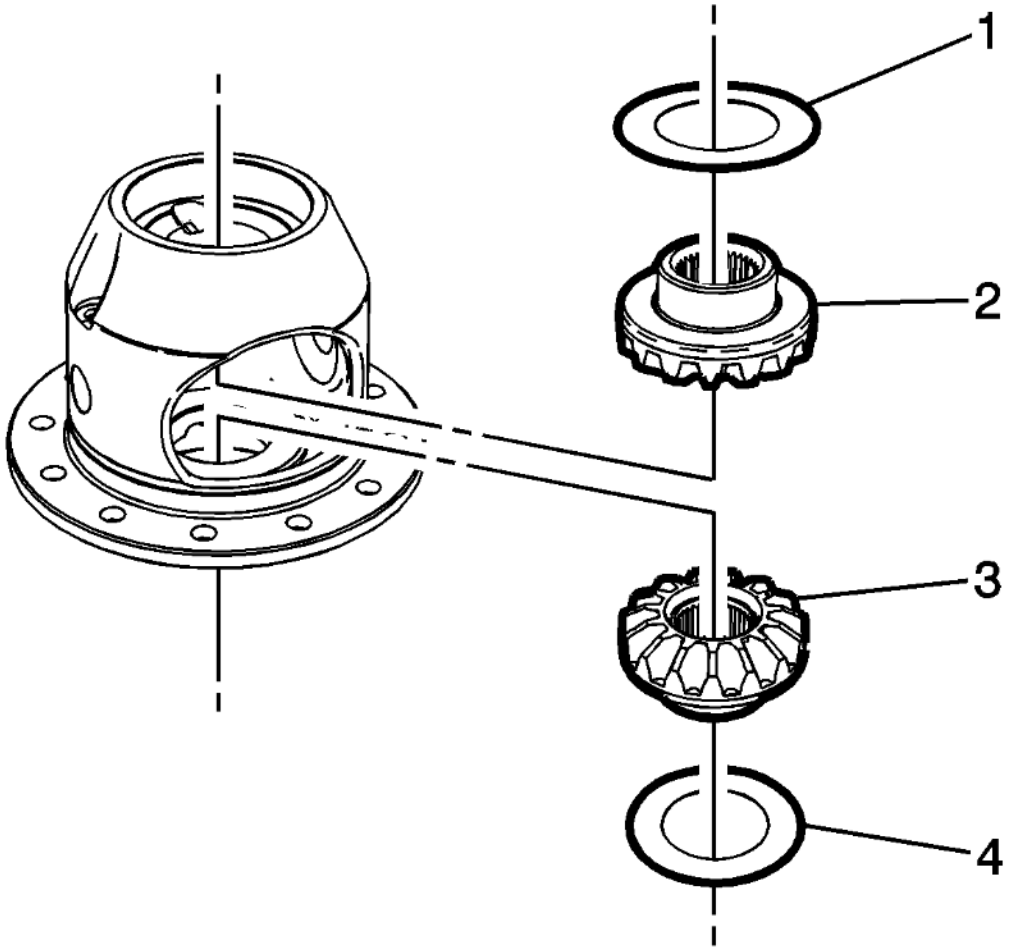


Fig. 338: Identifying Differential Side Gears And Washers
Courtesy of GENERAL MOTORS COMPANY

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

2. Install the thrust washers (1, 4) and the differential side gears (2, 3) into the differential case.

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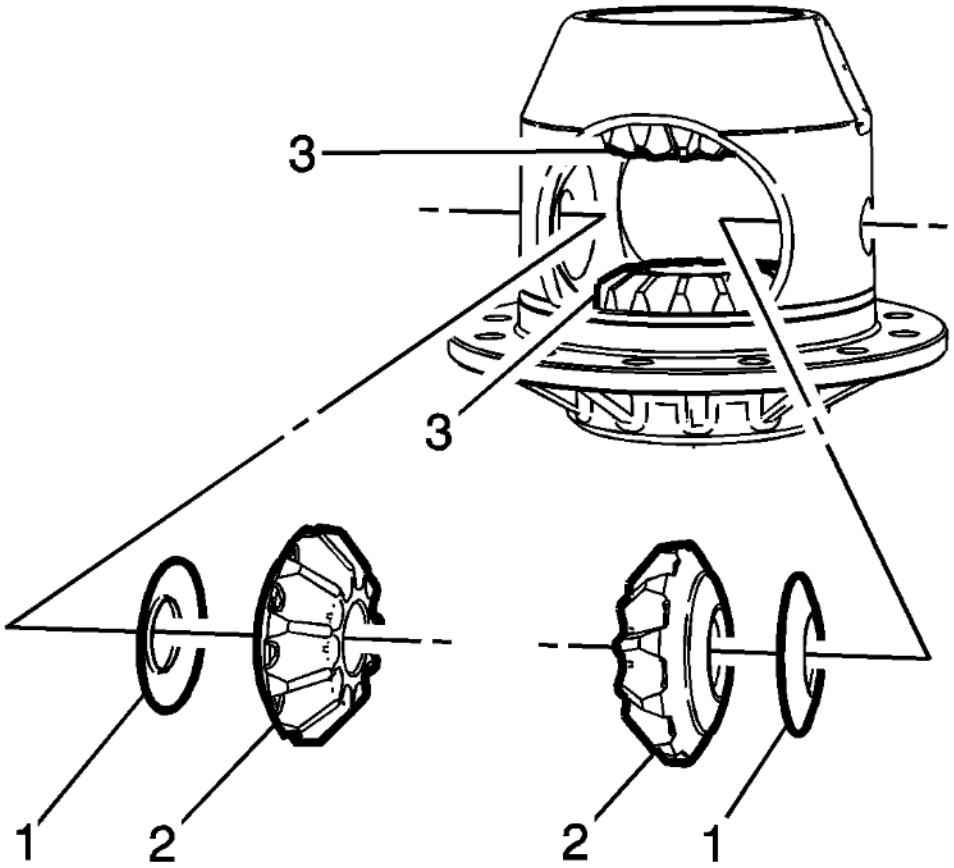


Fig. 339: Identifying Differential Pinion Gears, Washers And Differential Side Gears
Courtesy of GENERAL MOTORS COMPANY

3. Position both pinion gears (2) between the differential side gears directly opposite of each other.
4. Rotate the differential side gears until the pinion gears (3) are aligned with the pinion shaft opening.
5. Install the thrust washers (1) in between the pinion gear and differential case.

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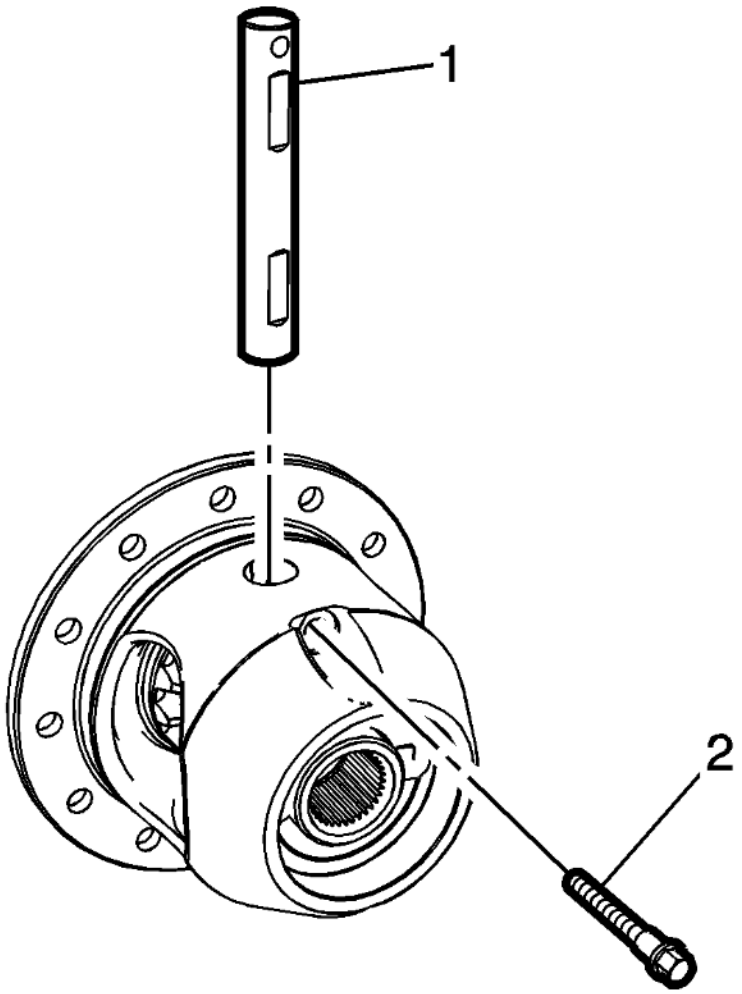


Fig. 340: Identifying Differential Pinion Gear Shaft And Differential Pinion Gear Shaft Lock Bolt
Courtesy of GENERAL MOTORS COMPANY

6. Install the pinion gear shaft (1).

CAUTION: Refer to Fastener Caution .

7. Install the differential pinion gear shaft lock bolt (2) and tighten to 53 N.m (39 lb ft).

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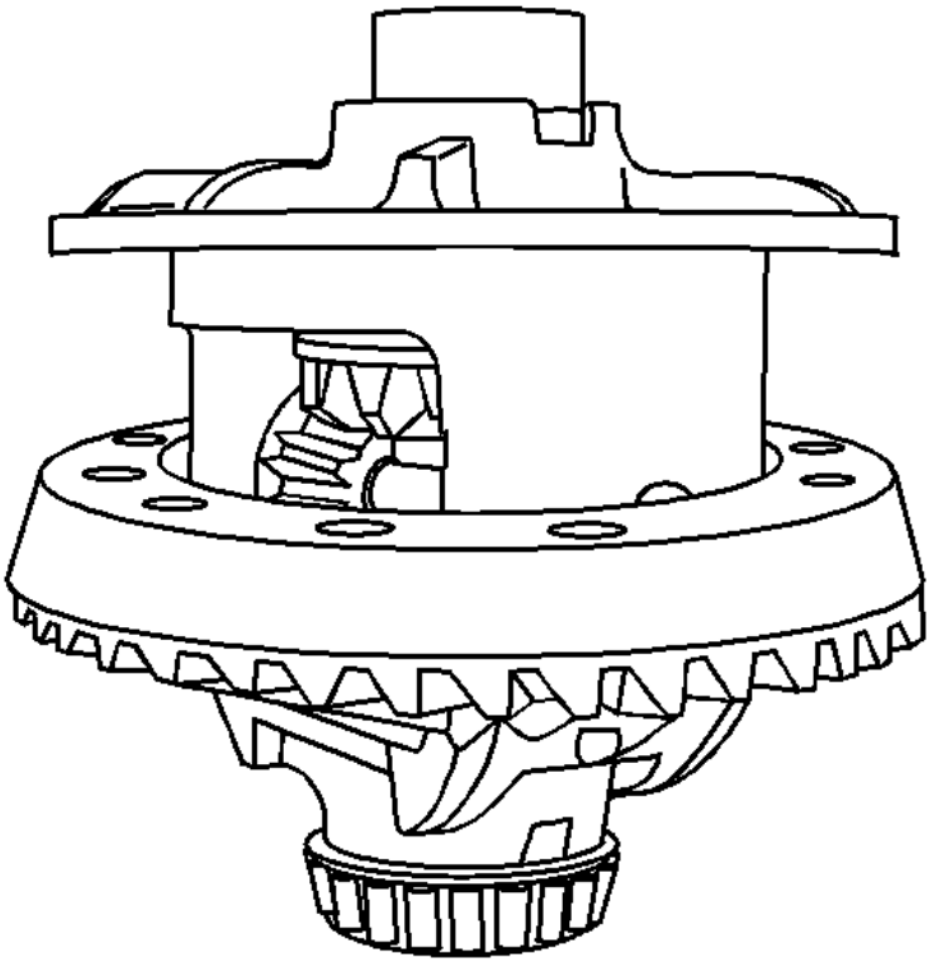


Fig. 341: Ring Gear & Differential Case
Courtesy of GENERAL MOTORS COMPANY

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

8. Install the differential ring gear (2) on the differential case (1).

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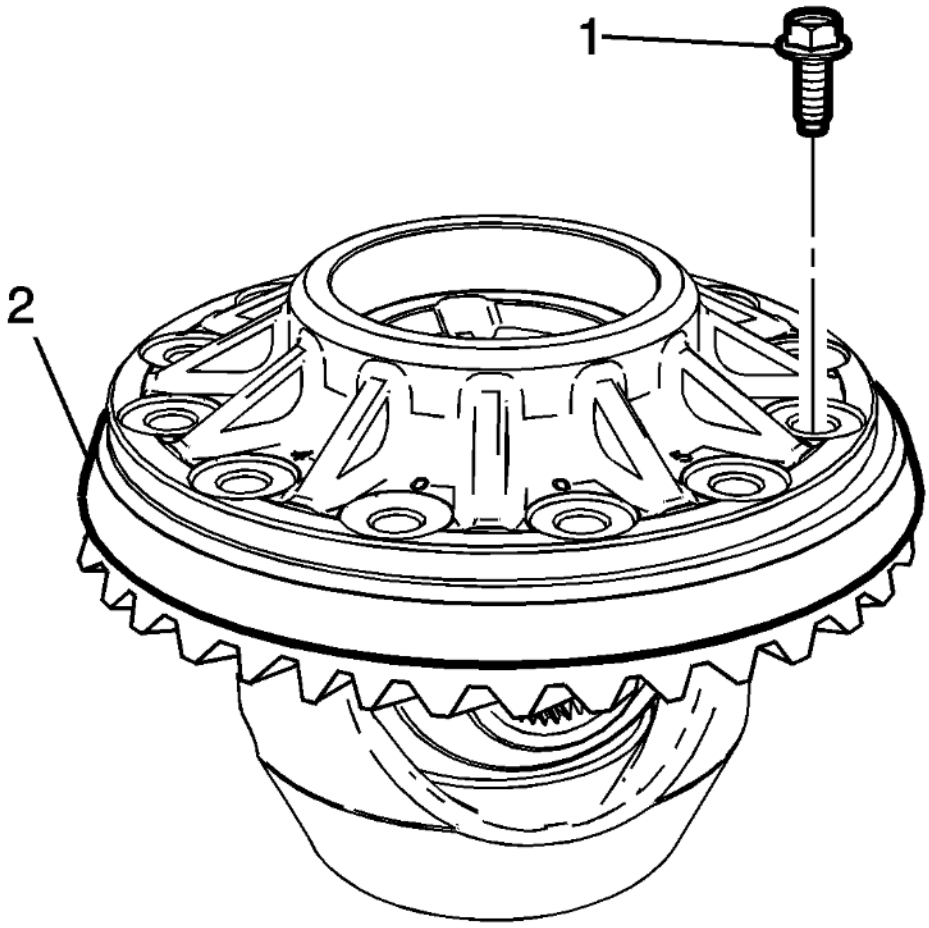


Fig. 342: Ring Gear And Bolts
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **The differential ring gear bolts are left-hand threads.**
- **DO NOT use air tools to tighten the differential ring gear bolts. Hand start each bolt to avoid cross threading the differential ring gear bolts .**

9. Hand start the differential each of the 12 NEW differential ring gear bolts (1).
10. Using hand tools, tighten the differential ring gear bolts alternately and in stages until the differential ring gear is seated against the differential case.
11. Tighten the ring gear bolts in sequence to 138 N.m (102 lb ft).

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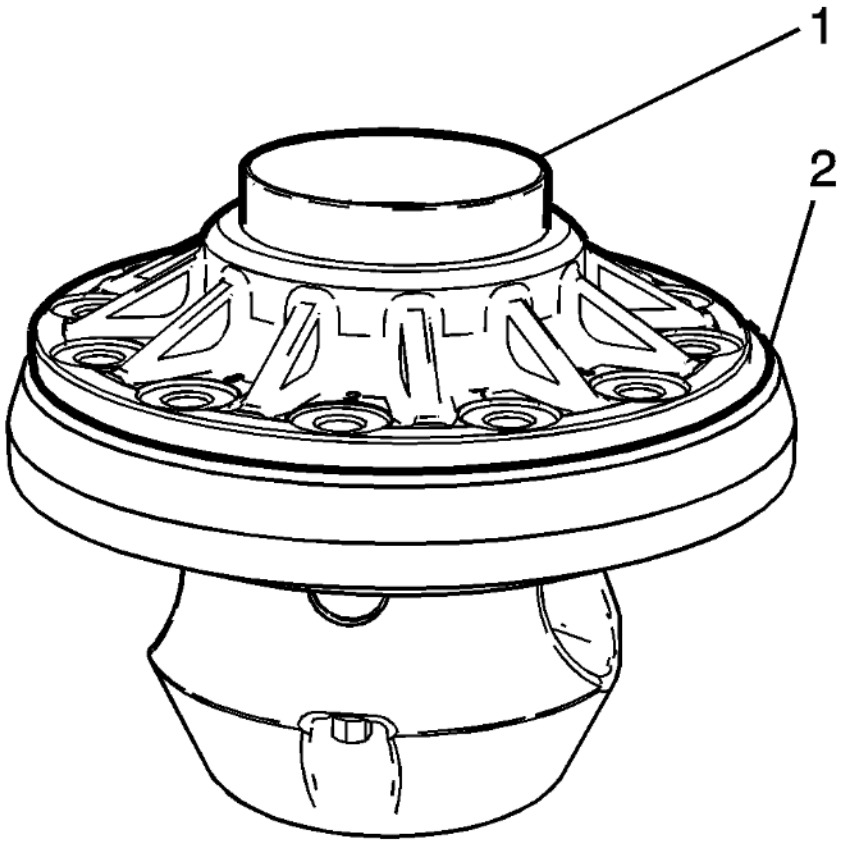


Fig. 343: Identifying Differential Adjuster Bearing Cup And Differential Case
Courtesy of GENERAL MOTORS COMPANY

12. Position the differential adjuster bearing cup (1) so the it is even in the differential case (2).
13. Using the **J 8092** handle (1) and the **J 36603** installer (2), install the differential adjuster bearing cup in the differential case (3).

FRONT DIFFERENTIAL CASE ASSEMBLE (8.25 INCH AXLE)

Special Tools

- **GE-8092** Driver Handle
- **J-8107-2** Side Bearing Puller Pilot
- **J-22761** Differential Side Bearing Installer

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

1. Lubricate the pinion and side gears using axle lubricant. Use the correct fluid. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

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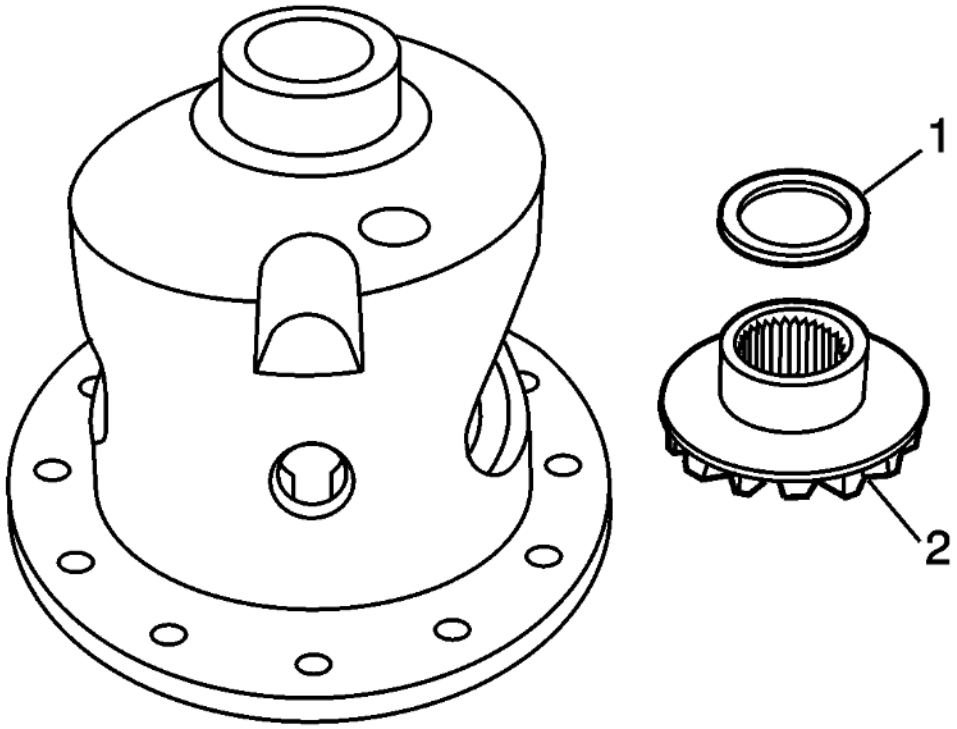


Fig. 344: Thrust Washers And Differential Side Gears
Courtesy of GENERAL MOTORS COMPANY

2. Install the thrust washers (1) and the differential side gears (2) into the differential case.

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

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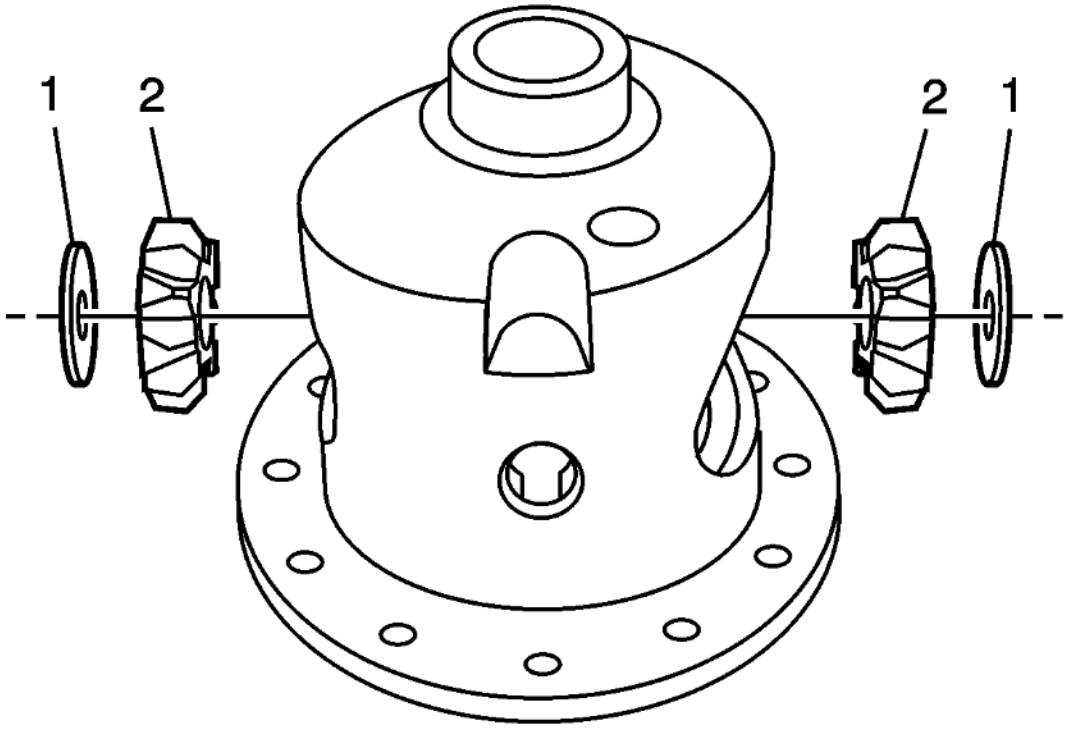


Fig. 345: Differential Pinion Gears
Courtesy of GENERAL MOTORS COMPANY

3. Install the differential pinion gears (2) by performing the following steps:
    1. Position both pinion gears between the differential side gears directly opposite of each other.
    2. Rotate the differential side gears until the pinion gears are opposite the opening in the differential case in line with the pinion shaft opening.
4. Install the thrust washers (1).

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

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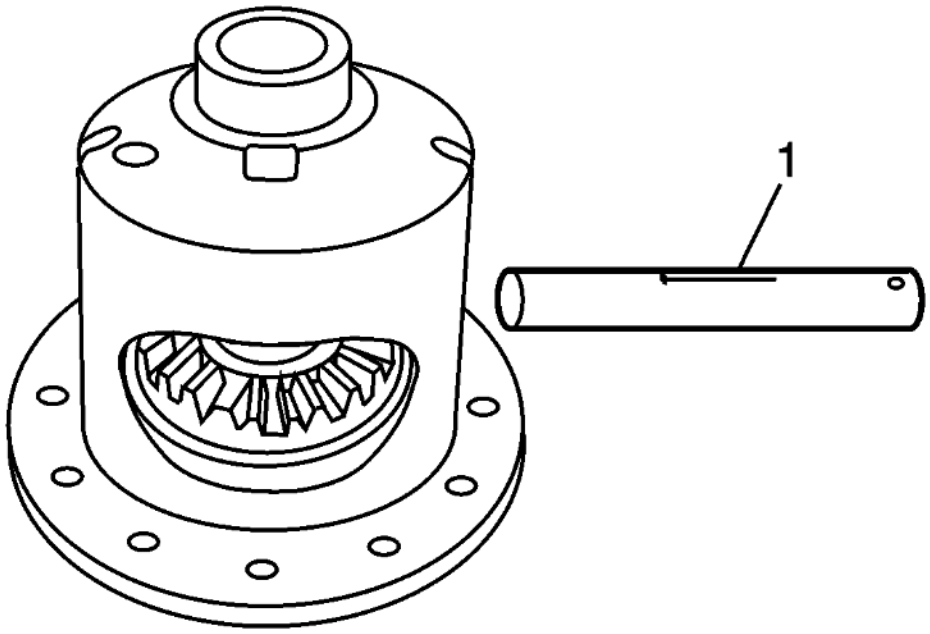


Fig. 346: Pinion Gear Shaft
Courtesy of GENERAL MOTORS COMPANY

5. Install the pinion gear shaft (1).
6. Install the new pinion gear shaft lock pin using a hammer and a brass drift.

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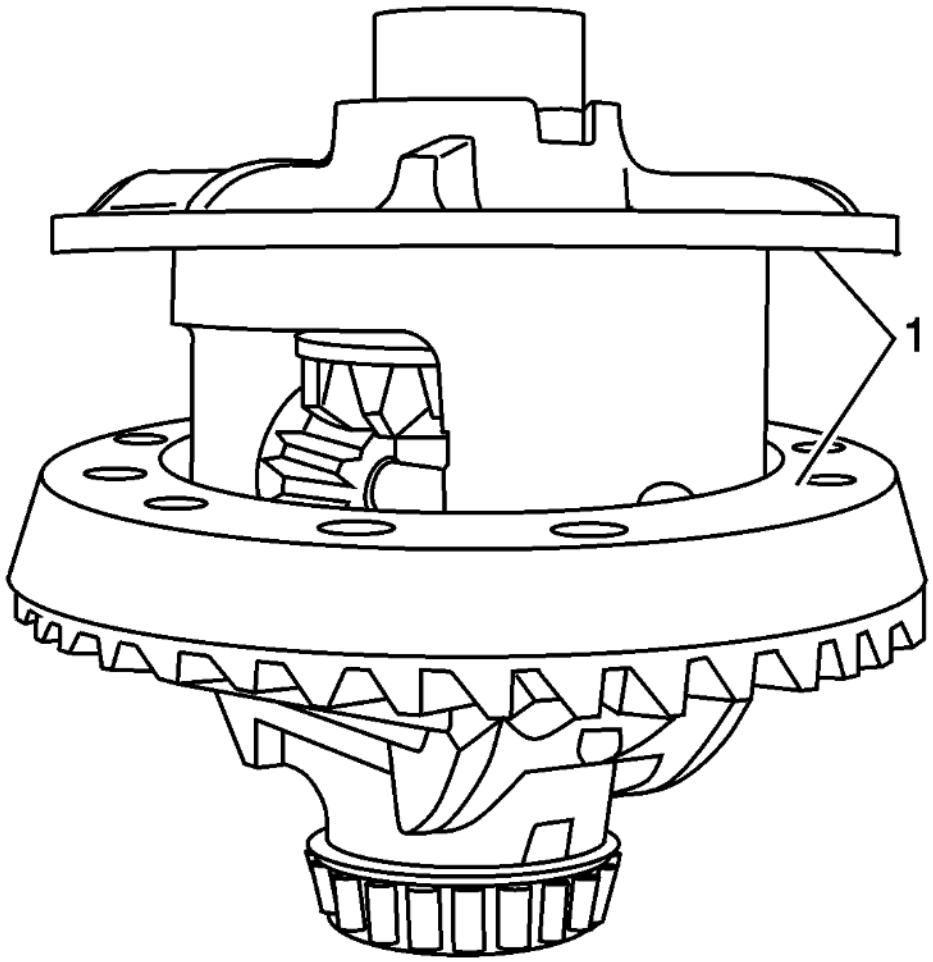


Fig. 347: Mating Surfaces Of Ring Gear And Differential Case
Courtesy of GENERAL MOTORS COMPANY

NOTE: **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.

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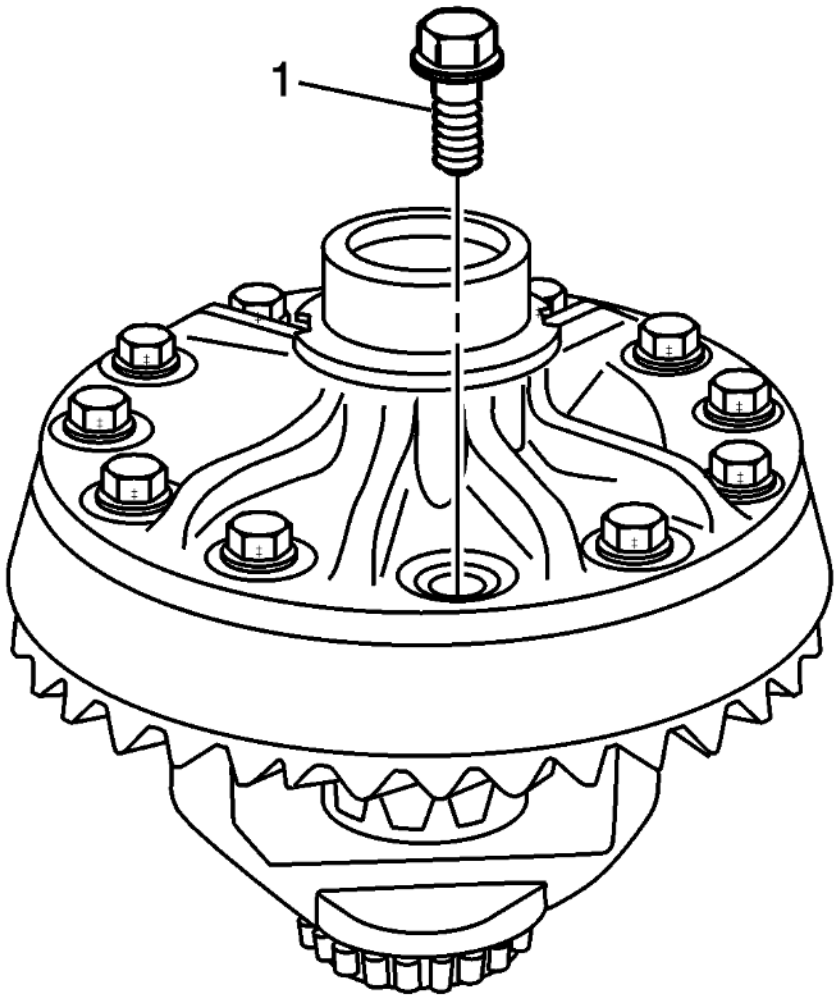


Fig. 348: Ring Gear Bolts Have Left-Hand Threads
Courtesy of GENERAL MOTORS COMPANY

NOTE: **The ring gear bolts have left-hand threads.**

8. Install the new ring gear bolts (1).

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

   CAUTION: **Refer to Fastener Caution .**

9. Install the ring gear bolts. Tighten the ring gear bolts alternately and in stages, gradually pulling the ring gear onto the differential case. Tighten the ring gear bolts in sequence to 120 N.m (89 lb ft).

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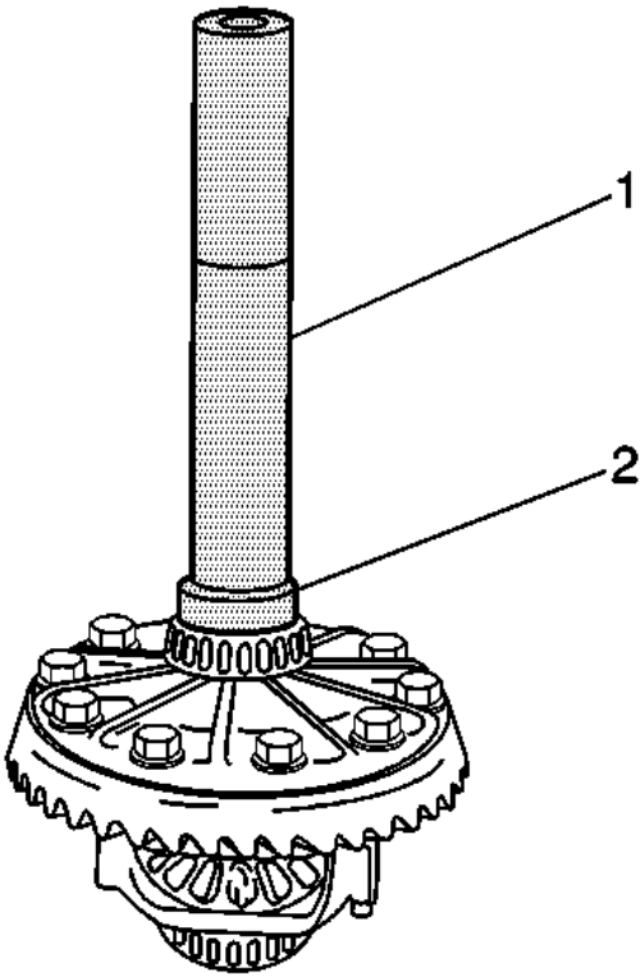


Fig. 349: Installing Differential Side Bearing
Courtesy of GENERAL MOTORS COMPANY

10. Install the differential side bearings by performing the following steps:
    1. In order to protect the differential case, install the **J-8107-2** side bearing puller pilot in the case on the side opposite the bearing installation.
    2. Install the **J-22761** differential side bearing installer (2) and the **GE-8092** driver handle (1) onto the differential case bearing as shown.
    3. Drive the differential case bearing onto the case using the **J-22761** differential side bearing installer and the **GE-8092** driver handle.

FRONT DIFFERENTIAL DRIVE PINION GEAR BEARING CUP INSTALLATION (9.25 INCH AXLE)

Special Tools

J 45754 Pinion Bearing Race Remover/Installer - 9.25 in Axle

1. Before assembly, lubricate the following parts with axle lubricant. Use the correct fluid. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
    - The pinion bearings
    - The pinion and the differential gears

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- The thrust washers
- The pinion bearing cups



Fig. 350: Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Ensure that the outer drive pinion bearing cup is even in the differential housing.**

2. Position the outer pinion bearing cup (1) so that it is even in the differential housing.

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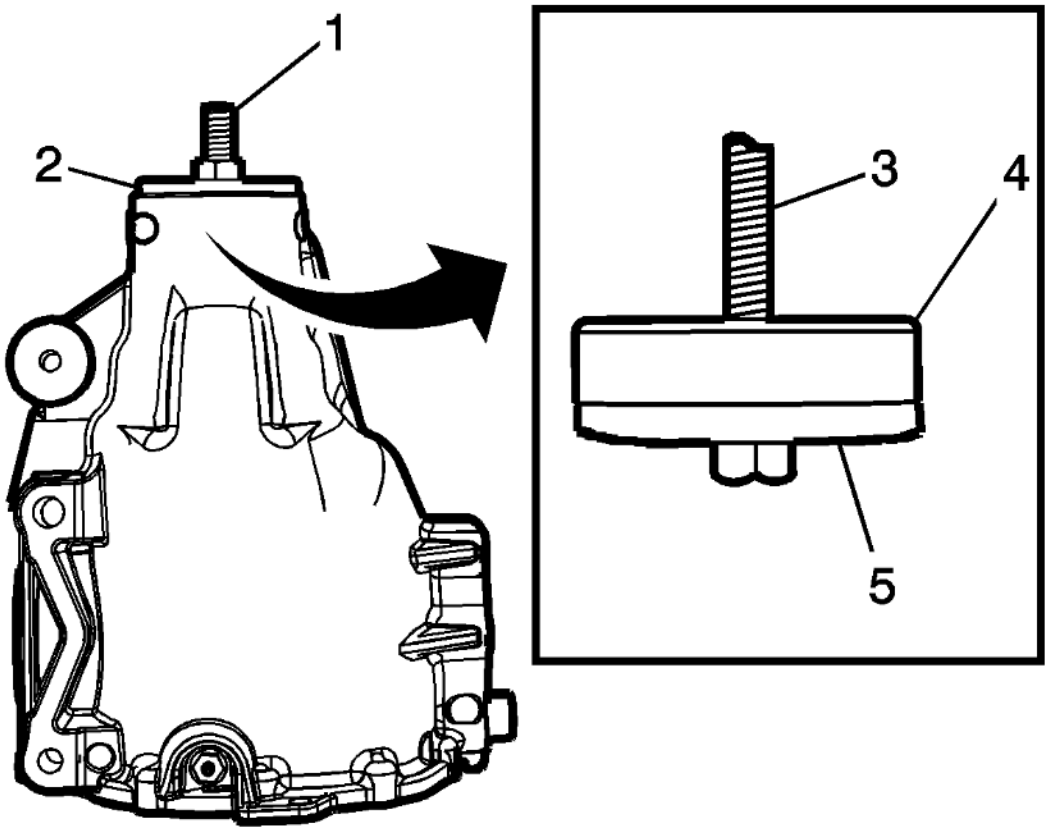


Fig. 351: Outer Drive Pinon Bearing Cup And Differential Housing
Courtesy of GENERAL MOTORS COMPANY

3. Position the **J 45754** remover/installer (1, 2, 3, 4, 5) in the differential housing.

NOTE: **ensure that the outer drive pinon bearing cup in properly seated in the differential housing.**

4. Using the **J 45754** remover/installer (1, 2, 3, 4, 5), install the outer drive pinion bearing cup.
5. Remove the **J 45754** remover/installer (1, 2, 3, 4, 5).
6. Measure the pinion depth and determine the selectable pinion shim thickness. Refer to **Pinion Depth Adjustment (9.25 Inch Axle)Pinion Depth Adjustment (8.25 Inch Axle)**.

FRONT DIFFERENTIAL DRIVE PINION GEAR BEARING CUP INSTALLATION (8.25 INCH AXLE)

Tools Required

J-45858 Pinion Bearing Race Remover/Installer

1. Before assembly, lubricate the following parts with axle lubricant. Use the proper fluid. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
   - The pinion bearings

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- The pinion and the differential gears
- The thrust washers
- The pinion bearing cups

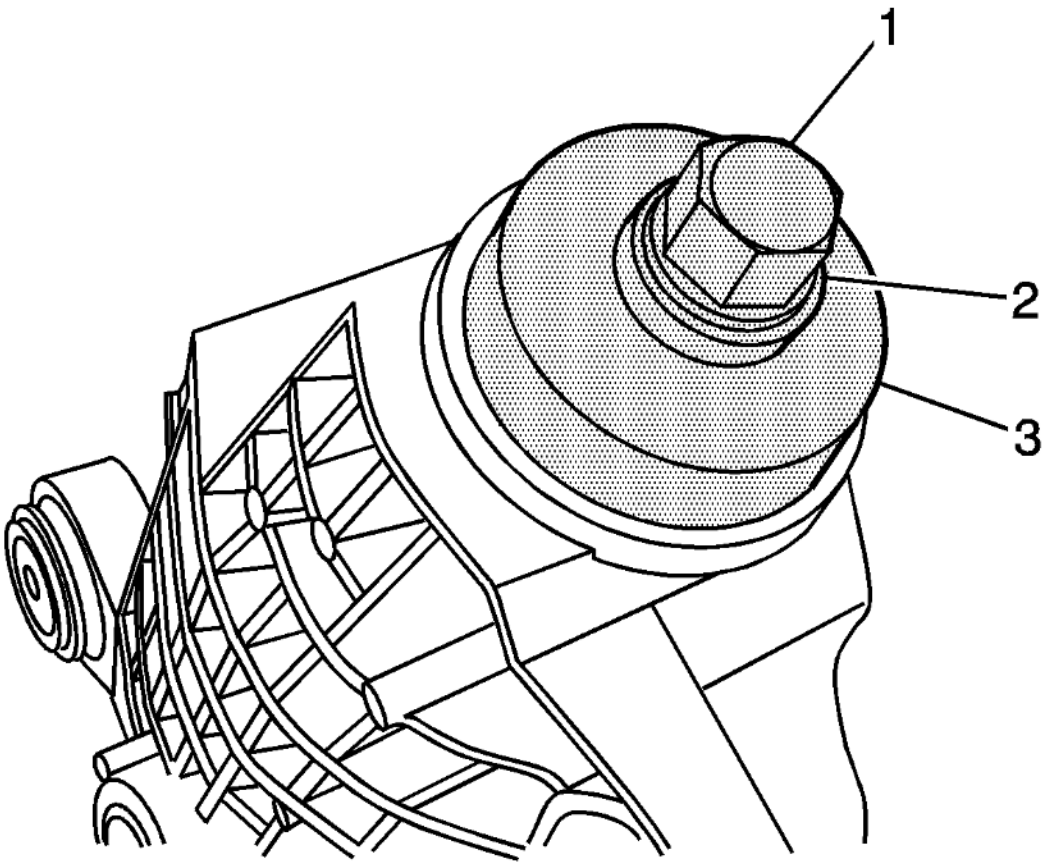


Fig. 352: Installing J 45858-3, Thrust Bearing & Washer, & Forcing Screw (8.25 Inch Axles)
Courtesy of GENERAL MOTORS COMPANY

2. Install the J-45858-3 (3), the thrust bearing and the washer (2), and the J-45858-6 (1) over the outer pinion bearing cup bore.

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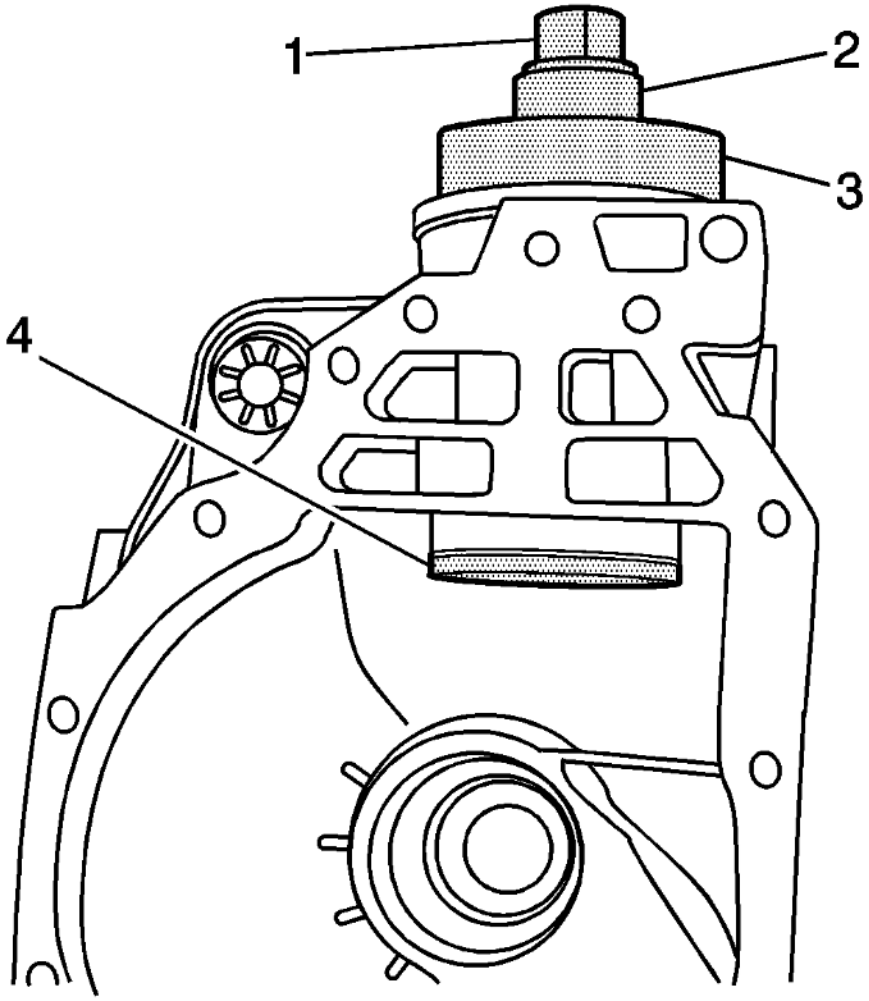


Fig. 353: Installing Inner Pinion Bearing Cup (8.25 Inch Axle)
Courtesy of GENERAL MOTORS COMPANY

3. Install the inner pinion bearing cup and the J-45858-2 or J-45858-2B (4) to the J-45858-6 (1).

   Slowly turn the J-45858-6 until the inner pinion bearing cup is evenly seated over the inner pinion bearing cup bore.

4. Turn the J-45858-6 clockwise slowly in order to draw the inner pinion bearing cup into the inner pinion bearing cup bore.

   Inspect the position of the inner pinion bearing cup as it is being drawn into the inner 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-45858** pinion bearing race remover/installer or **J-45858-B** pinion bearing race remover/installer and the inner pinion bearing cup and reposition the inner pinion bearing cup.

5. Tighten the J-45858-6 until the inner pinion bearing cup is seated in the inner pinion bearing cup bore.
6. Remove the **J-45858** pinion bearing race remover/installer or **J-45858-B** pinion bearing race remover/installer.

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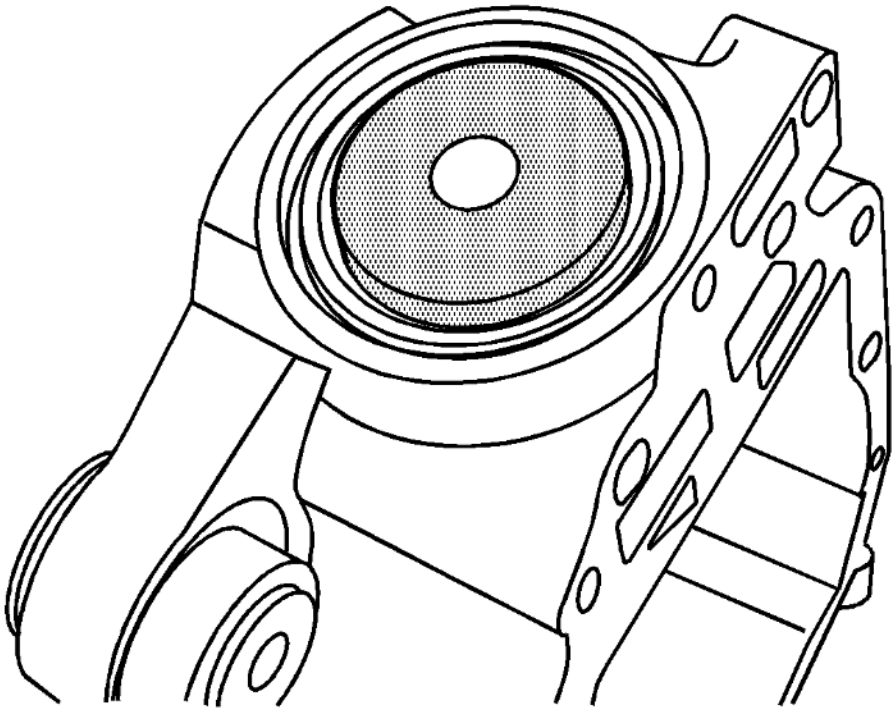


Fig. 354: Installing Outer Pinion Bearing Cup (8.25 Inch Axle)
Courtesy of GENERAL MOTORS COMPANY

7. Install the outer pinion bearing cup and the J-45858-1 or J-45858-1A over the outer pinion bearing cup bore.

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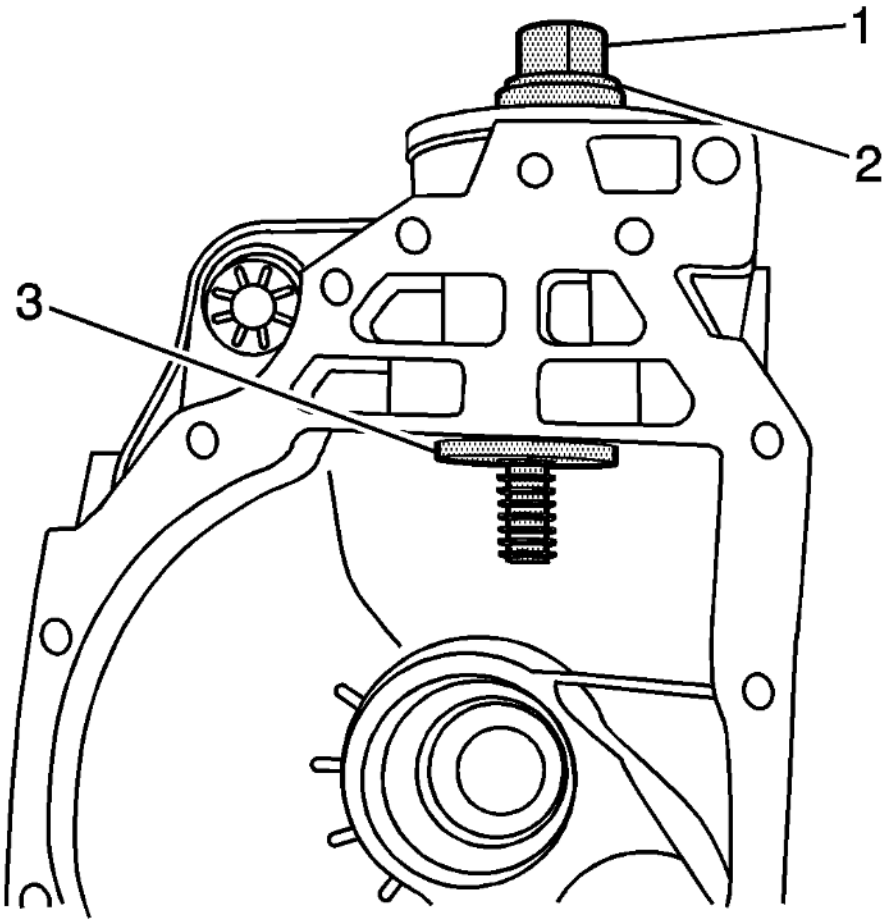


Fig. 355: Installing Thrust Bearing And Washer - 8.25 Inch Axle
Courtesy of GENERAL MOTORS COMPANY

8. Install the thrust bearing and the washer (2), the J-45858-6 (1), and the J-45858-2 or J-45858-2B (3) as shown.
9. Slowly turn the J-45858-6 until the outer pinion bearing cup is evenly seated over the outer pinion bearing cup bore and the J-45858-2 or J-45858-2B is evenly seated within the inner pinion bearing cup.
10. Turn the J-45858-6 clockwise slowly in order to draw the outer pinion bearing cup into the outer pinion bearing cup bore.

    Inspect the position of the outer pinion bearing cup as it is being drawn into the outer 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-45858** pinion bearing race remover/installer or **J-45858-B** pinion bearing race remover/installer and the outer pinion bearing cup and reposition the outer pinion bearing cup.

11. Tighten the forcing screw until the outer pinion bearing cup is seated in the outer pinion bearing cup bore.
12. Remove the **J-45858** pinion bearing race remover/installer or **J-45858-B** pinion bearing race remover/installer.
13. Measure the pinion depth and determine the selectable pinion shim thickness. Refer to **Pinion Depth Adjustment (9.25 Inch Axle)Pinion Depth Adjustment (8.25 Inch Axle)**.

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PINION DEPTH ADJUSTMENT (9.25 INCH AXLE)

Special Tools

- **DT 50487** Gauge Plate
- **DT 50488** Arbor Support
- **J 8001** Dial Indicator Set
- **J 8433-1** Puller
- **J 34925** Pinion Setting Gauge Set
- **J 36579** Side Bearing Remover
- **J 45766** Gauge Plate

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

1. Using the proper axle lubricant, lubricant the differential pinion bearings. Refer to **Fluid and Lubricant Recommendations** .
2. Install the differential pinion bearings into the axle housing.

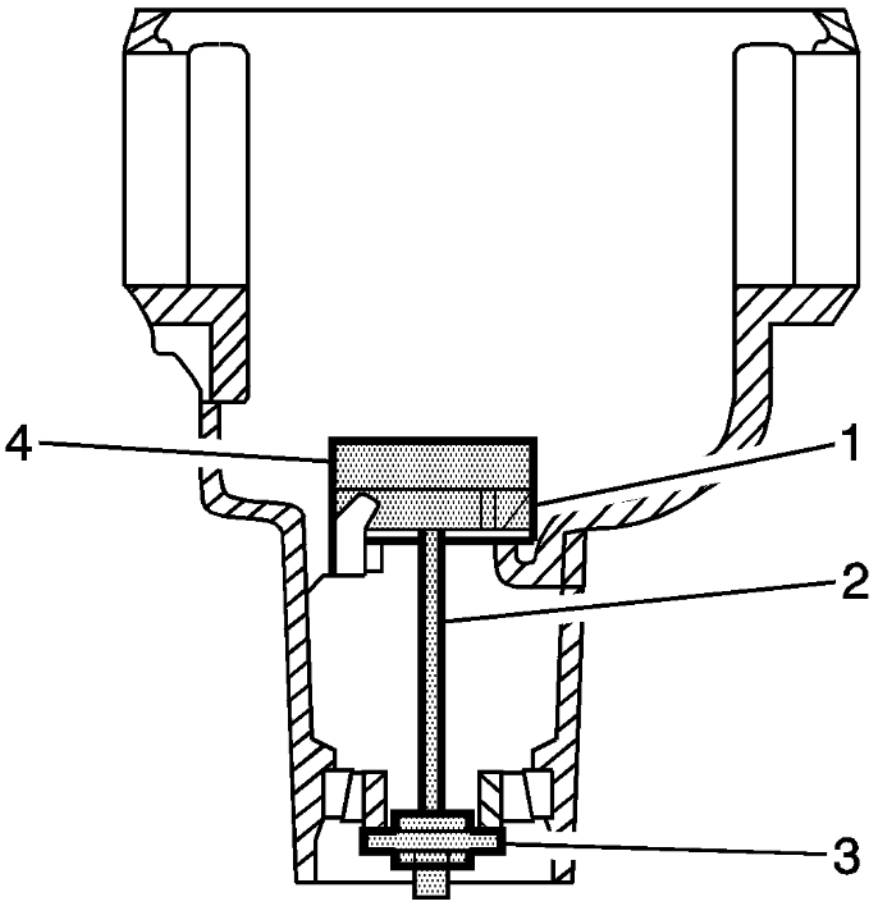


Fig. 356: Special Pinion Bearing Installation Tools

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Courtesy of GENERAL MOTORS COMPANY

3. Install the J 21777-8 (1), J 21777-43 (2), J 21777-42 (3), and the **DT 50487** plate (4).

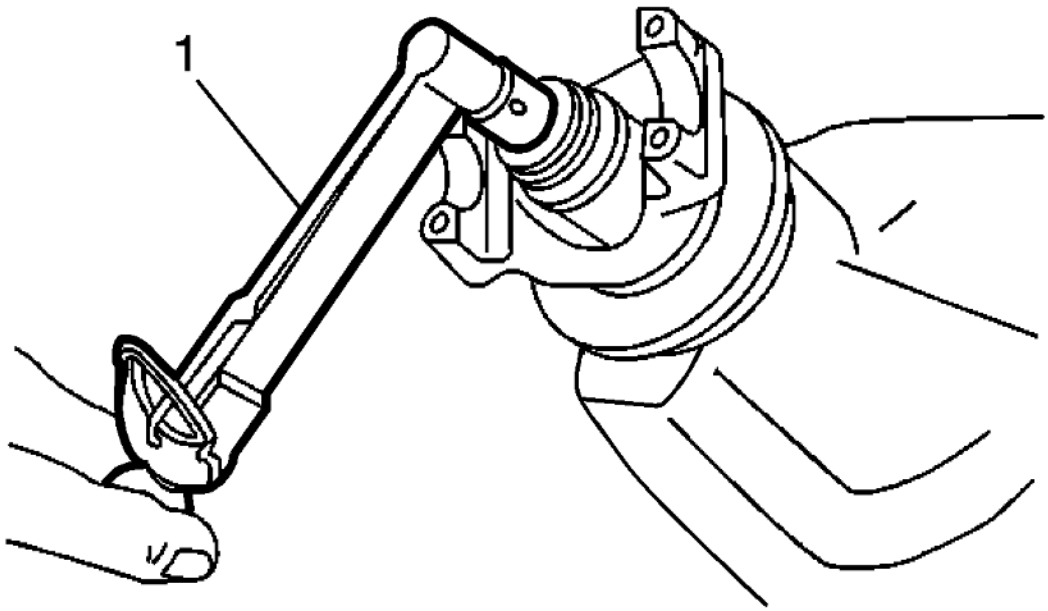


Fig. 357: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **Hold the J 21777-43 stationary while turning the torque wrench.**
- **Rotate the assembly several times in both directions in order to seat the pinion bearings.**

4. Using an inch pound torque wrench (1) and the J 21777-43, tighten the nut until a rotating torque of 1.7 N.m (15 lb in) is obtained.
5. If the torque is less than 1.7 N.m (15 lb in), tighten the nut until a rotating torque of 1.7-2.3 N.m (15-20 lb in) is obtained.

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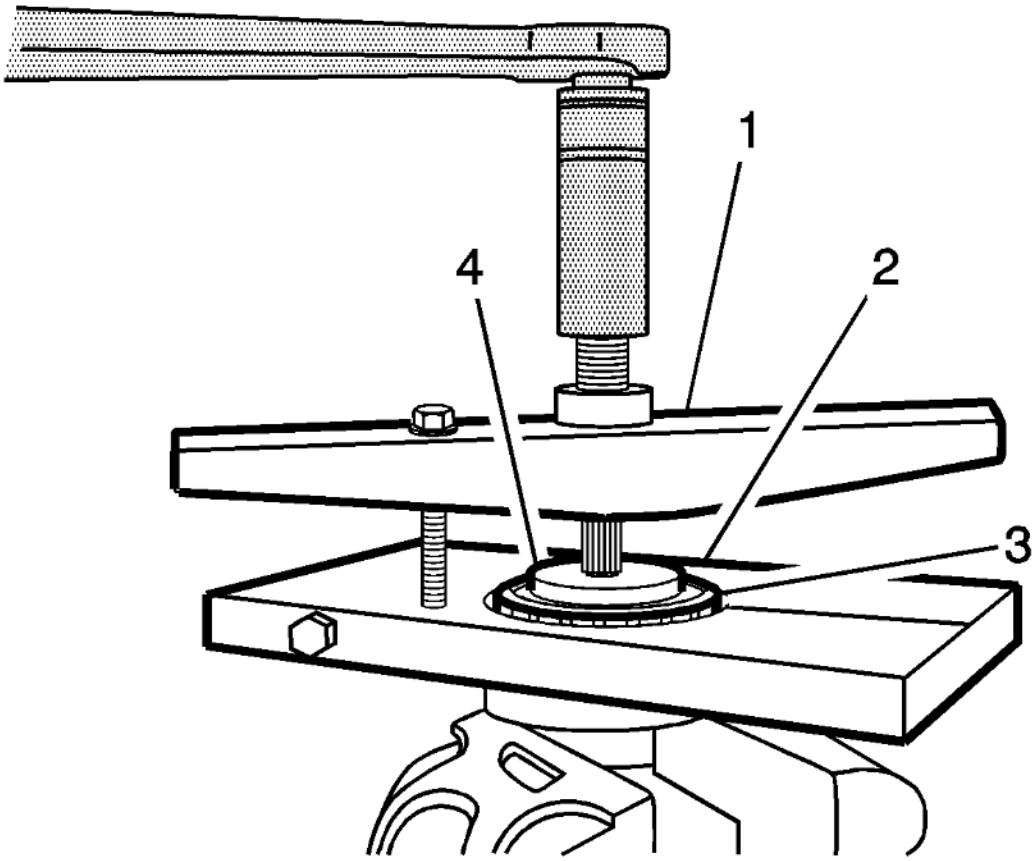


Fig. 358: Removal Tool And Side Bearing
Courtesy of GENERAL MOTORS COMPANY

6. Using the **J 8433-1** puller (1), **J 45766** plate (2), and the **J 36579** remover (4), remove the differential side bearing (3).

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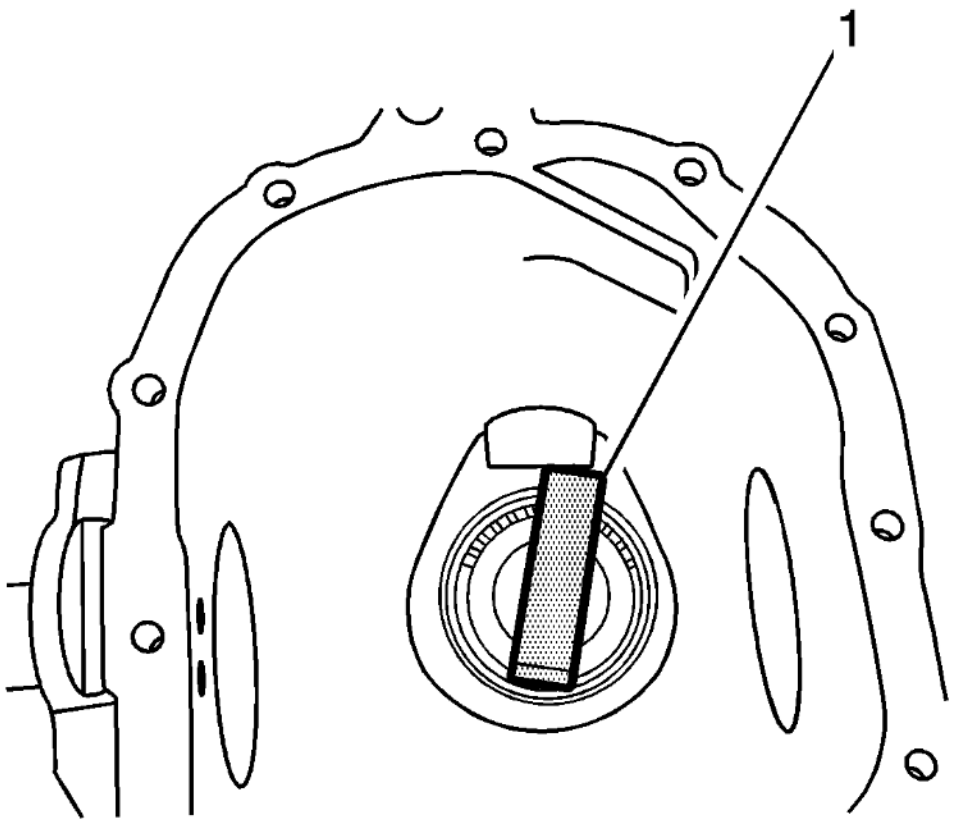


Fig. 359: Special Tool Plate
Courtesy of GENERAL MOTORS COMPANY

7. Install the **DT 50487** plate (1) in the differential housing.

NOTE: **The J 21777-1 must rotate back and forth freely within the discs. If the J 21777-1 does not rotate freely, disassemble the components, inspect for proper seating and/or mis-aligned components and re-assemble. Ensure that the both of the DT 50488's are fully into the differential housing threaded to prevent excessive deflection of arbor/gauging assembly.**

8. Adjust the arbor of the J 21777-1 (1) to the gauge block setting of the **DT 50487** plate.

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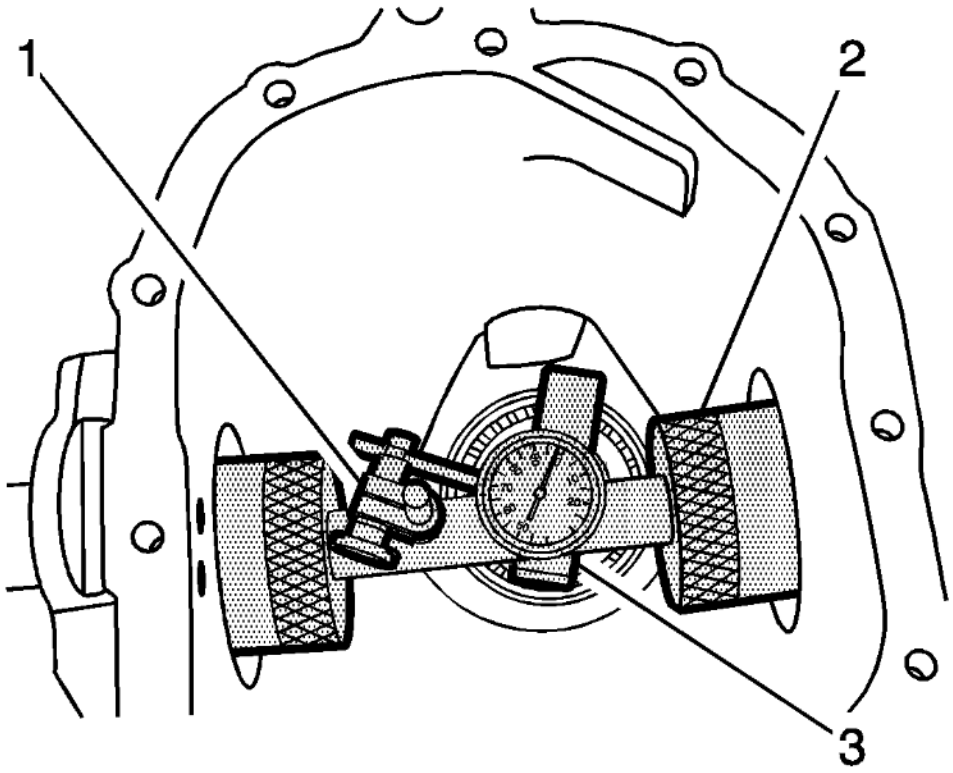


Fig. 360: Special Support, Indicator And Plate Tools
Courtesy of GENERAL MOTORS COMPANY

NOTE: **It may be necessary to install the one of the DT 50488, install the arbor support and then the second DT 50488.**

9. Install two of the **DT 50488** support (3) in the differential housing.
10. Adjust the **J 8001** indicator (1) so that it is just touching the **DT 50487** plate (3).
11. Adjust the **J 8001** indicator (1) so that the gauge read zero.
12. Re-adjust the **J 8001** indicator (1) so that the gauge read 50 or half of turn.

NOTE: **The deflection is the point where the needle changes direction.**

13. Move the plunger of the J 21777-1 back and forth until the needle of the **J 8001** indicator (1) indicates the greatest deflection.
14. At the greatest point of deflection, move the housing of the **J 8001** indicator (1) until the needle indicates zero.
15. Move the plunger of the J 21777-1 back and forth again to verify the zero setting. Adjust the housing of the **J 8001** indicator (1) as necessary to set the needle to zero.
16. Rotate the plunger of the J 21777-1 away from the **DT 50487** plate (3) until it no longer touches the J

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21777-29, the **DT 50487** plate (3).

17. The value indicated on the **J 8001** indicator (1) is the thickness of the shim needed in order to set the depth of the pinion.
18. Select the shim that indicates the proper thickness. Measure the shim with a micrometer in order to verify that the thickness is correct.
19. Remove the pinion depth setting tools.
20. Remove the pinion bearings.
21. Install the pinion shim between the pinion gear and the inner pinion bearing. Refer to **Front Differential Drive Pinion Gear Bearing Replacement**.

PINION DEPTH ADJUSTMENT (8.25 INCH AXLE)

Special Tools

- **J-36601** Pinion Shim Selector
- **J-29763** Static Timing Gauge

1. Install the pinion bearing cups into the differential carrier assembly. Refer to **Front Differential Drive Pinion Gear Bearing Cup Installation (8.25 Inch Axle)**.

   NOTE: **Make sure all of the tools, the pinion bearings, and the pinion bearing cups are clean before proceeding.**

2. Before assembly, lubricate the pinion bearings with axle lubricant. Use the correct fluid. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

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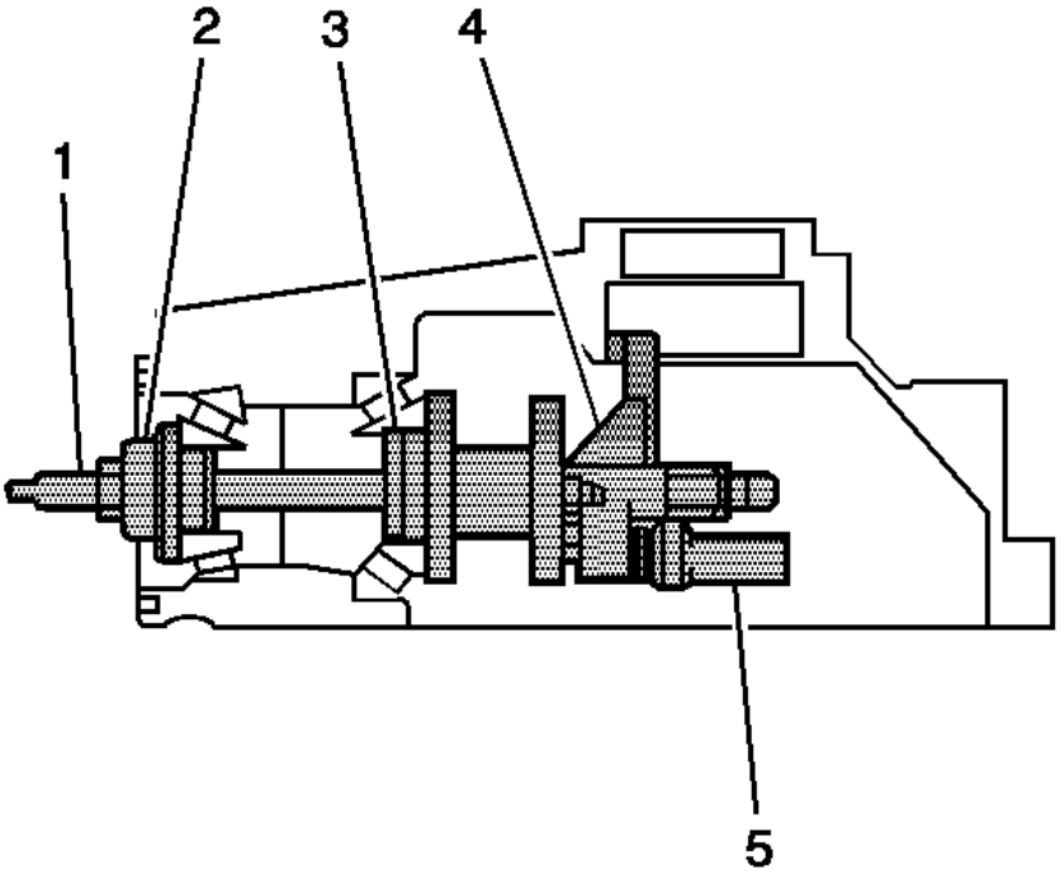


Fig. 361: Adjusting Pinion Depth
Courtesy of GENERAL MOTORS COMPANY

NOTE: **The J-36601 pinion shim selector uses two different measuring arms to measure the pinion depth. The J 36601-4 is used to measure the pinion depth for the 8.25 inch axle and the J 36601-3 is used to measure the pinion depth for the 9.25 inch axle.**

3. Install the J-36601-4 or the J-36601-3 (4) to the J-36601-7 (1).
4. Install the J-21777-35 for the 8.25 inch axle or the J-21777-8 for the 9.25 inch axle (3) to the J-36601-7 (1).
5. Install the inner pinion bearing into the differential carrier case half.
6. Insert the J-36601-7 (1) with the J-21777-35 or the J-21777-8 (3) through the inner pinion bearing and the differential carrier case half.
7. Install the outer pinion bearing.

NOTE: **Each end of the J-36601-5 is sized specifically for the 8.25 inch or the 9.25 inch outer pinion bearing. Ensure the correct end is being used when installing the J-36601-5 into the outer pinion bearing.**

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8. While holding the outer pinion bearing in position, install the J-36601-5 (2), the washer, and the nut to the J-36601-7 (1).

CAUTION: **Refer to Fastener Caution .**

9. While holding the J-36601-7 (1) stationary with a wrench, tighten the nut on the J-36601-7 (1).

Tighten

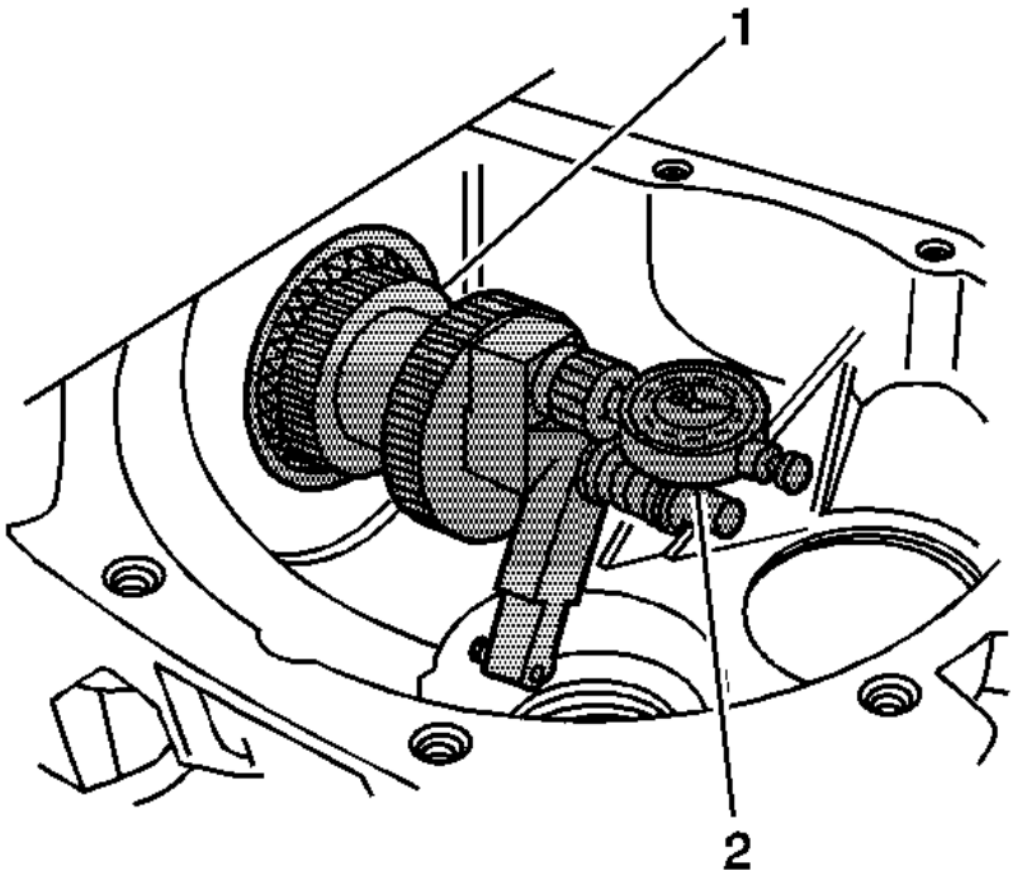
Tighten the nut until all of the end play is removed from the **J-36601** pinion shim selector.

10. Rotate the assembly several times in both directions in order to seat the pinion bearings.
11. While holding the J-36601-4 or the J-36601-3 (4) stationary, measure the rotating torque of the **J-36601** pinion shim selector using an inch-pound torque wrench.

Specification

The rotating torque of the **J-36601** pinion shim selector should be between 1.1-2.3 N.m (10-20 lb in).

12. If the torque is less than 1.0 N.m (10 lb in), continue to tighten the nut on the J-36601-7 until a rotating torque of 1.1-2.3 N.m (10-20 lb in) is obtained.



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Fig. 362: Using Static Timing Gauge To Measure Lowest Point In Differential Side Bearing Bore
Courtesy of GENERAL MOTORS COMPANY

13. Install the adjustment screw and the lock nut of the **J-29763** static timing gauge (2) to the J-36601-4 or the J-36601-3.
14. Install the **J-29763** static timing gauge to the adjustment screw and lock nut assembly.

    Tighten the lock nut to hold the **J-29763** static timing gauge in place.

    NOTE: The left side differential bearing adjuster assembly on the 9.25 inch axle must be removed prior to placing the J 36601-3 in the differential side bearing bore.

15. Place the contact pad of the J-36601-4 or to the J-36601-3 into the differential side bearing bore.
16. Adjust the **J-29763** static timing gauge to the differential bearing bore by doing the following:
    1. Loosen the lock nut on the **J-29763** static timing gauge.
    2. Place the contact pad of the J-36601-4 or the J-36601-3 onto the differential side bearing bore.
    3. With the contact pad of the J-36601-4 or the J-36601-3 touching the differential side bearing bore, push down on the **J-29763** static timing gauge until the needle of the **J-29763** static timing gauge has turned 3/4 of a turn clockwise.
    4. Tighten the lock nut of the **J-29763** static timing gauge.
17. Rotate the J-36601-4 or the J-36601-3 (1) back and forth until the needle of the **J-29763** static timing gauge (2) indicates the lowest point in the differential side bearing bore.
18. At the lowest point of deflection, move the housing of the **J-29763** static timing gauge until the needle indicates ZERO.
19. Move the J-36601-4 or the J-36601-3 back and forth again to verify the zero setting. Adjust the housing of the **J-29763** static timing gauge as necessary to set the needle to ZERO.

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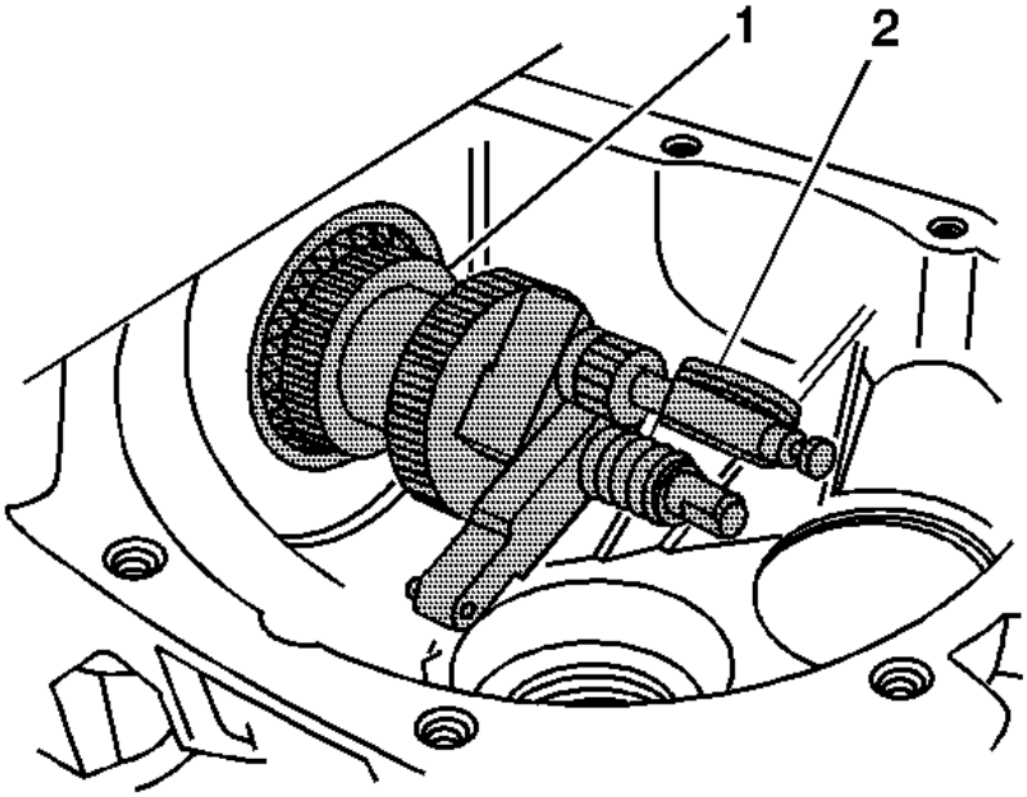


Fig. 363: Measuring Thickness Of Shim Needed In Order To Set Depth Of The Pinion
Courtesy of GENERAL MOTORS COMPANY

20. After the ZERO setting is obtained and verified, grasp the J-36601-4 or the J-36601-3 (1) by the flats and move the J-36601-4 or the J-36601-3 out of the differential side bearing bore.

NOTE: **The unit of measurement for the J-29763 static timing gauge is in hundredths of a millimeter.**

21. The value indicated on the **J-29763** static timing gauge (2) is the thickness of the shim needed in order to set the depth of the pinion.
22. Select the shim that indicates the correct thickness. Measure the shim with a micrometer in order to verify that the thickness is correct.
23. Remove the pinion depth setting tools.
24. Remove the pinion bearings.
25. Install the pinion shim between the drive pinion and the inner pinion bearing and assemble the differential carrier. Refer to **Front Axle Assemble (8.25 Inch Axle)**.

Differential pinion gear shims are available in the following sizes:

Shim Sizes

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8.25 Inch Axle	9.25 Inch Axle
0.508 mm (0.020 in)	0.5131 mm (0.0202 in)
0.533 mm (0.021 in)	0.5395 mm (0.0212 in)
0.559 mm (0.022 in)	0.5639 mm (0.0222 in)
0.584 mm (0.023 in)	0.5893 mm (0.0232 in)
0.610 mm (0.024 in)	0.6147 mm (0.0242 in)
0.635 mm (0.025 in)	0.6401 mm (0.0252 in)
0.660 mm (0.026 in)	0.6655 mm (0.0262 in)
0.686 mm (0.027 in)	0.6909 mm (0.0272 in)
0.711 mm (0.028 in)	0.7163 mm (0.0282 in)
0.737 mm (0.029 in)	0.7417 mm (0.0292 in)
0.762 mm (0.030 in)	0.7671 mm (0.0302 in)
0.787 mm (0.031 in)	0.7925 mm (0.0312 in)
0.813 mm (0.032 in)	0.8179 mm (0.0322 in)
0.838 mm (0.033 in)	0.8433 mm (0.0332 in)
0.864 mm (0.034 in)	0.8687 mm (0.0342 in)
0.889 mm (0.035 in)	0.8941 mm (0.0352 in)
0.914 mm (0.036 in)	0.9195 mm (0.0362 in)
0.940 mm (0.037 in)	0.9449 mm (0.0372 in)
0.965 mm (0.038 in)	-
0.991 mm (0.039 in)	-
1.016 mm (0.040 in)	-
1.041 mm (0.041 in)	-
1.067 mm (0.042 in)	-
1.092 mm (0.043 in)	-
1.118 mm (0.044 in)	-
1.143 mm (0.045 in)	-
1.168 mm (0.046 in)	-
1.194 mm (0.047 in)	-
1.219 mm (0.048 in)	-
1.245 mm (0.049 in)	-
1.270 mm (0.050 in)	-

FRONT AXLE ASSEMBLE (8.25 INCH AXLE)

Special Tools

- **GE-8092** Driver Handle (Universal Driver Handle-3/4 in 10)
- **J-8614-01** Flange and Pulley Holding Tool
- **J-35512** Inner Pinion Bearing Installer
- **J-36366** Pinion Oil Seal Installer
- **J-36599-A** Side Bearing Nut Wrench
- **J-36614** Pinion Bearing Installer
- **J-36615** Side Bearing Nut Wrench
- **J-36603-A** Side Bearing Cup Installer

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

1. Install the selective shim between the inner pinion bearing and the shoulder of the pinion gear.

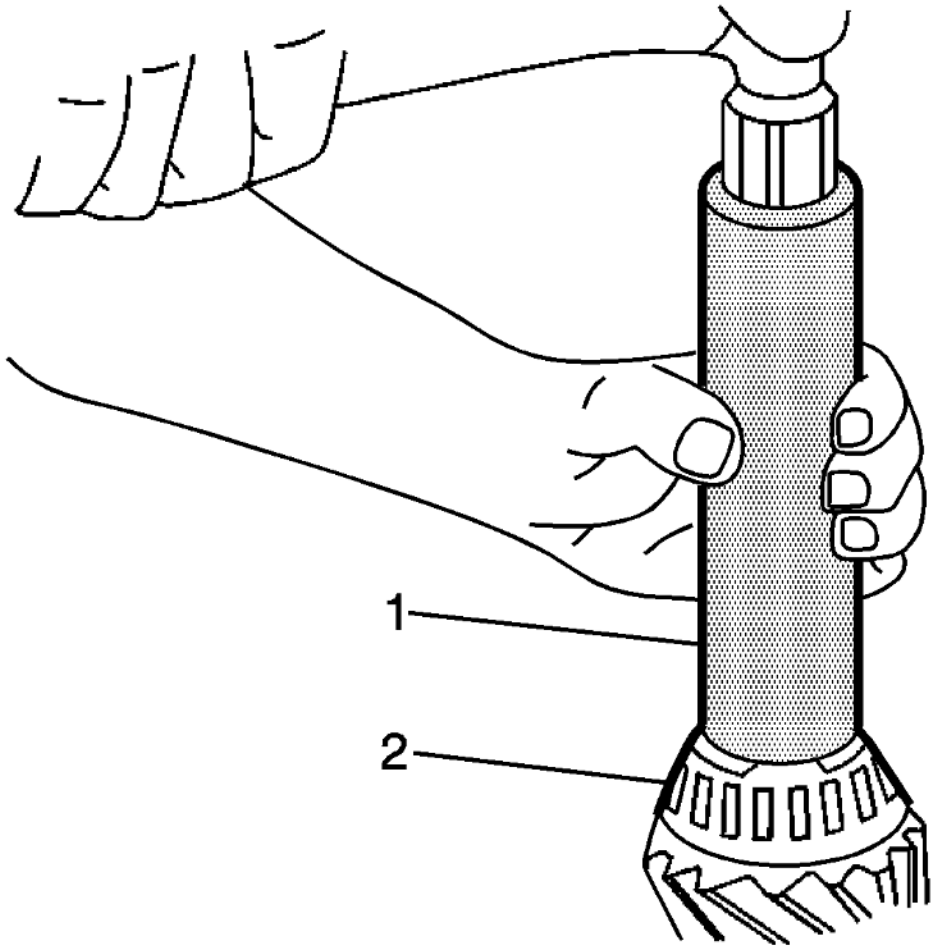


Fig. 364: Installing Inner Pinion Bearing Onto Pinion Gear
Courtesy of GENERAL MOTORS COMPANY

2. Using the **J-35512** inner pinion bearing installer , install the inner pinion bearing onto the pinion gear.
3. Install the new collapsible spacer onto the pinion gear.
4. Lubricate the inner and the outer pinion bearings with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .
5. Install the outer pinion bearing into the differential carrier case half.

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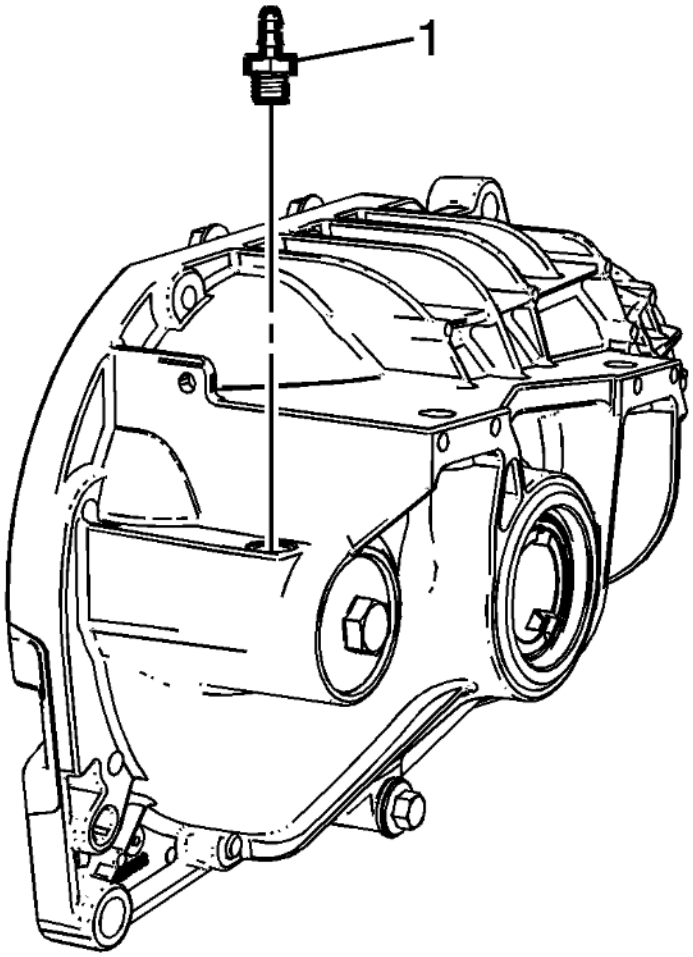


Fig. 365: Vent Hose Connector
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

6. Install the vent hose connector (1) and tighten to 28 N.m (21 lb ft).
7. Install the differential carrier case half into a vise. Place a shop towel in a vise in order to protect the differential case.

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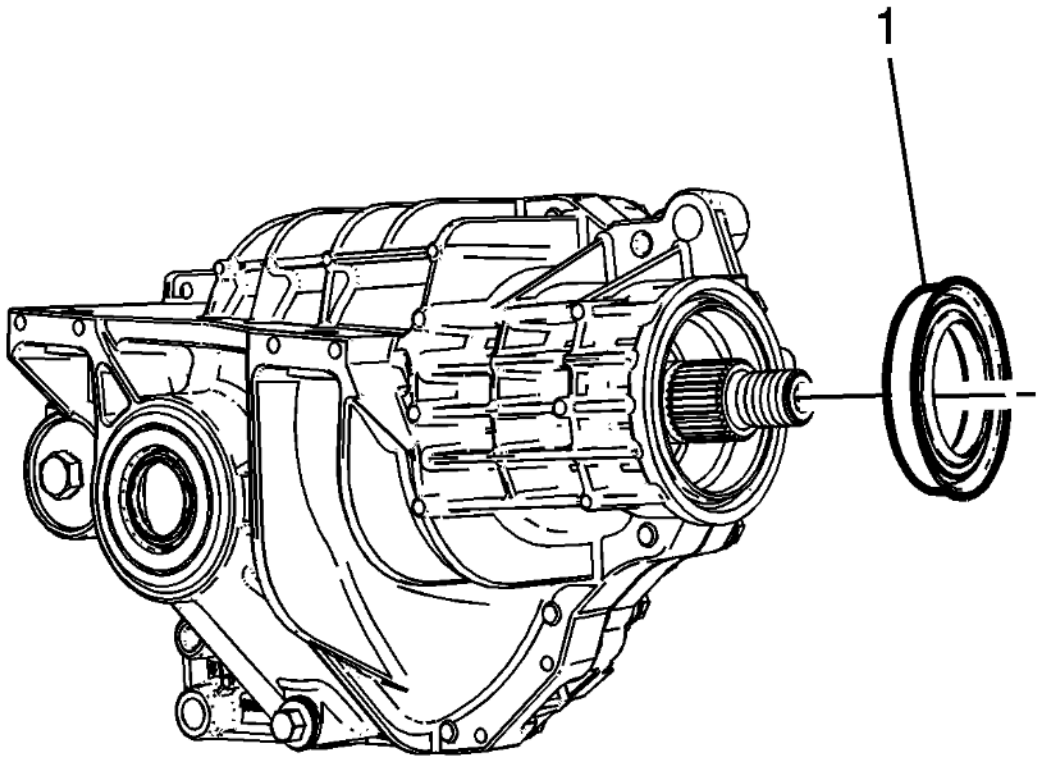


Fig. 366: Pinion Seal
Courtesy of GENERAL MOTORS COMPANY

8. Position the pinion seal (1) in the differential case.

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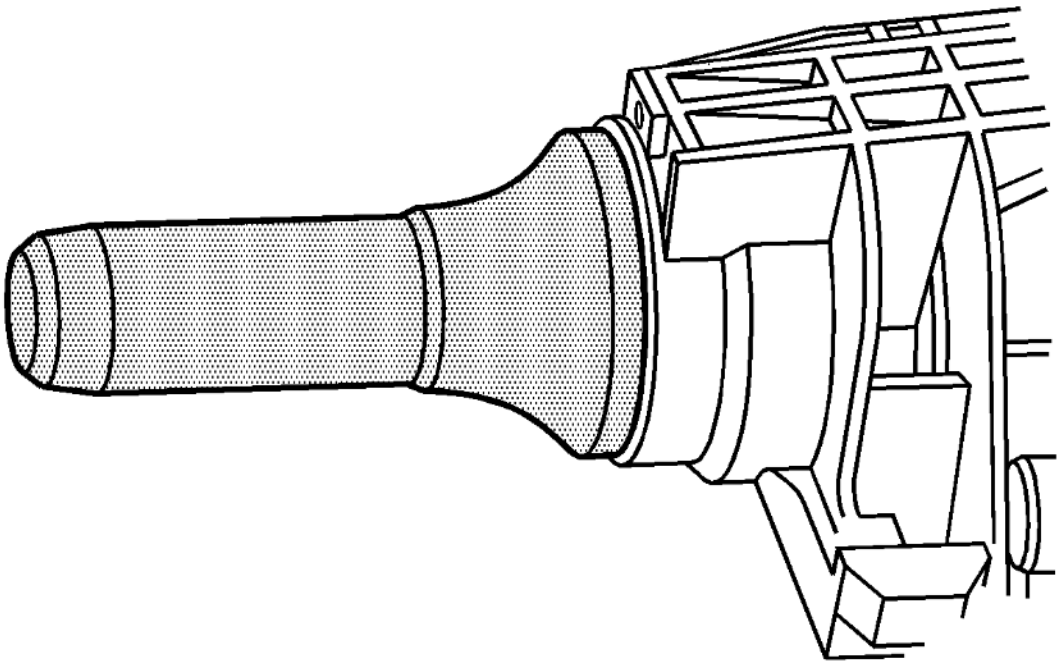


Fig. 367: Seal Installer
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Ensure that the pinion flange seal is seated on the axle housing surface.**

9. Using the **J-36366** pinion oil seal installer , install the pinion flange seal.
10. Using the correct sealant, apply sealant to the splines of the pinion yoke. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
11. Install the pinion gear, with the inner pinion bearing an the new collapsible spacer, into the left differential carrier case half.

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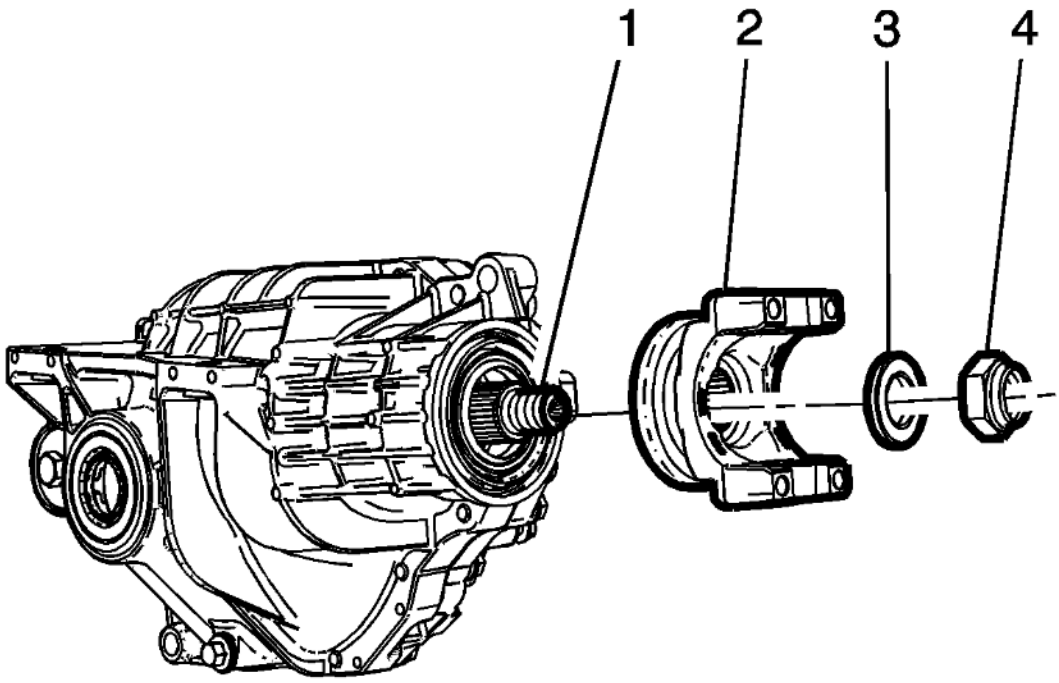


Fig. 368: Pinion Flange/Yoke Assembly Components
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Pinion Flange/Yoke Installation Caution .

12. Position the pinion flange/yoke assembly (2) on the pinion shaft (1).
13. Using a soft faced mallet, tap the on the pinion flange/yoke assembly (2) until a few pinion shaft by threads show through.
14. Install the NEW pinion washer (3) and the nut (4).
15. If the pinion nut cannot be installed, remove the pinion nut washer.
16. Install the old pinion nut and tighten the nut until a few of the shaft threads show through.
17. Remove the old pinion nut.
18. Install the **J-8614-01** flange and pulley holding tool onto the pinion flange/yoke assembly (2).

NOTE: If the rotating torque exceeded, the pinion will be removed and a new collapsible spacer installed.

19. Using the **J-8614-01** flange and pulley holding tool , tighten the pinion nut until the pinion end play is just taken up. Rotating the pinion while tightening the nut will seat the bearings.
20. Remove the **J-8614-01** flange and pulley holding tool.

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21. Using an inch pound torque wrench, measure the rotating torque of the pinion, which should be 1.0-2.3 N.m (10-20 lb in) for used bearings, 1.7-3.4 N.m (15-30 lb in) for new bearings.
22. 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** flange and pulley holding tool and continue to tighten the pinion nut, which should be 1.0-2.3 (10-20 lb in) for used bearings, 1.7-3.4 N.m (15-30 lb in) for new bearings.
23. Once the specified torque is obtained, rotate the pinion several time to ensure the bearings have seated. Recheck the rotating torque and adjust if necessary.
24. Remove the **J-8614-01** flange and pulley holding tool.

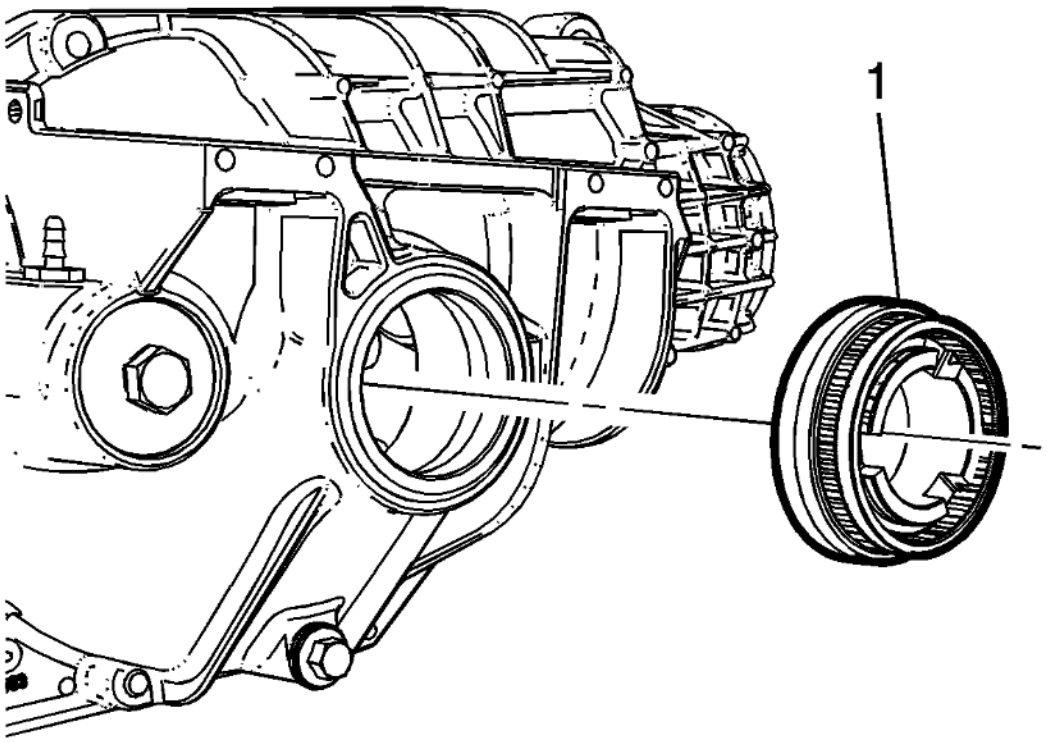


Fig. 369: Identifying Lock Ring
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Ensure that the differential adjuster nut is fully seated in the adjuster nut sleeve.**

25. Position the differential adjuster nut (2) and the lock ring (1) in the differential case halves.

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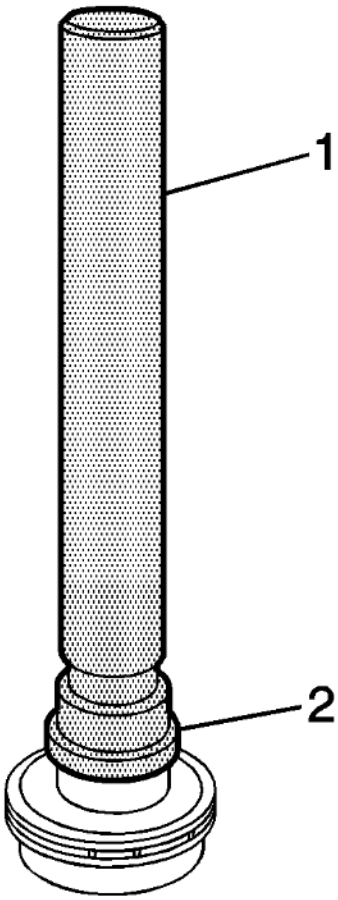


Fig. 370: Special Installer Tools
Courtesy of GENERAL MOTORS COMPANY

26. Using the **J-36614** pinion bearing installer (2) and the **GE-8092** driver handle (1), install the inner shaft bearing onto the differential bearing adjuster for the left and right side.

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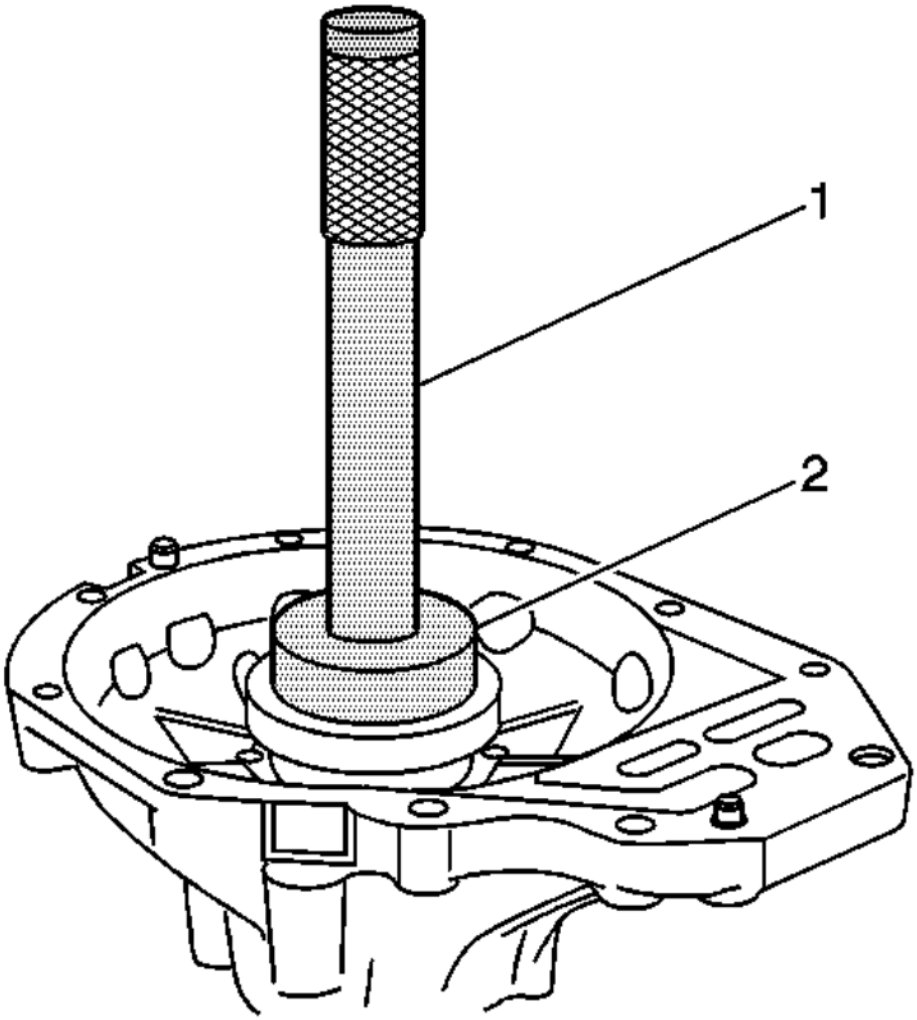


Fig. 371: Installing Differential Case Side Bearing Cups To Differential Carrier Case
Courtesy of GENERAL MOTORS COMPANY

27. Using the **J-36614** pinion bearing installer (2) and the **GE-8092** driver handle (1), install the left and right side differential adjuster nut assembly into the differential carrier case.

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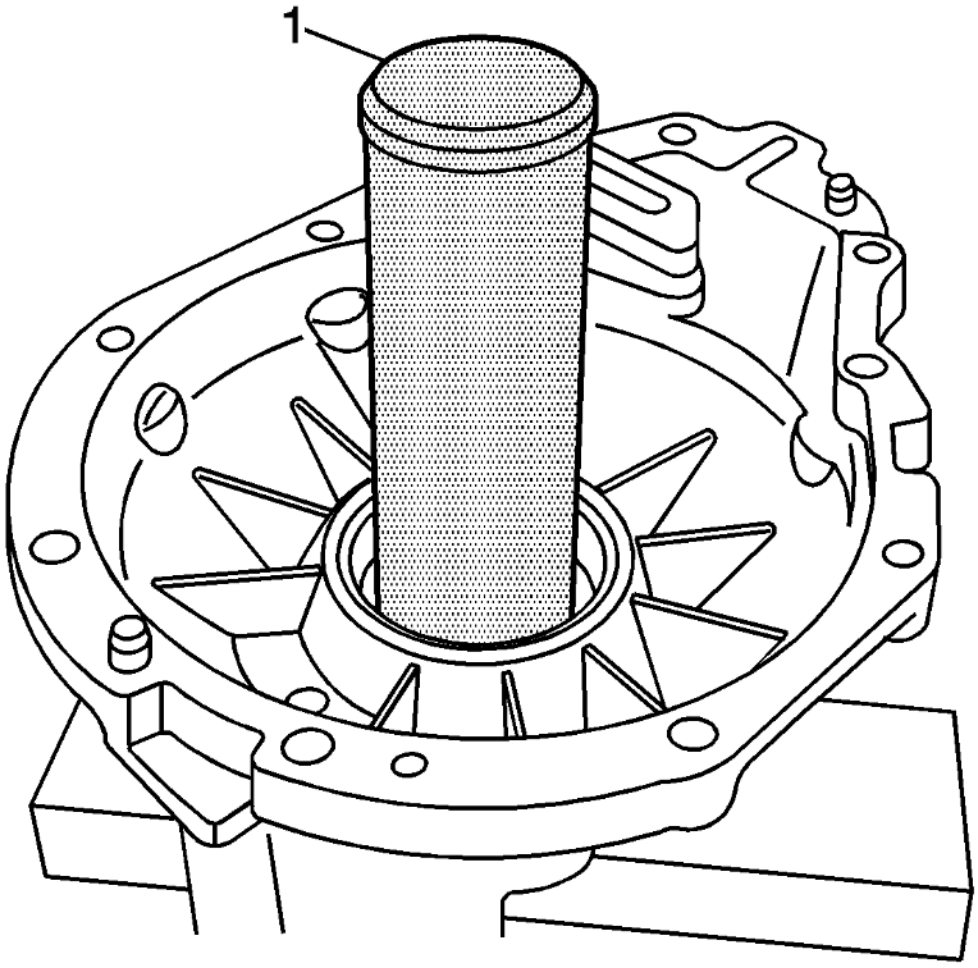


Fig. 372: View Of Special Tool J 8092
Courtesy of GENERAL MOTORS COMPANY

28. Using the **GE-8092** driver handle (1) and **J-36603-A** side bearing cup installer , install the left and right differential case side bearing cups into the differential carrier case.

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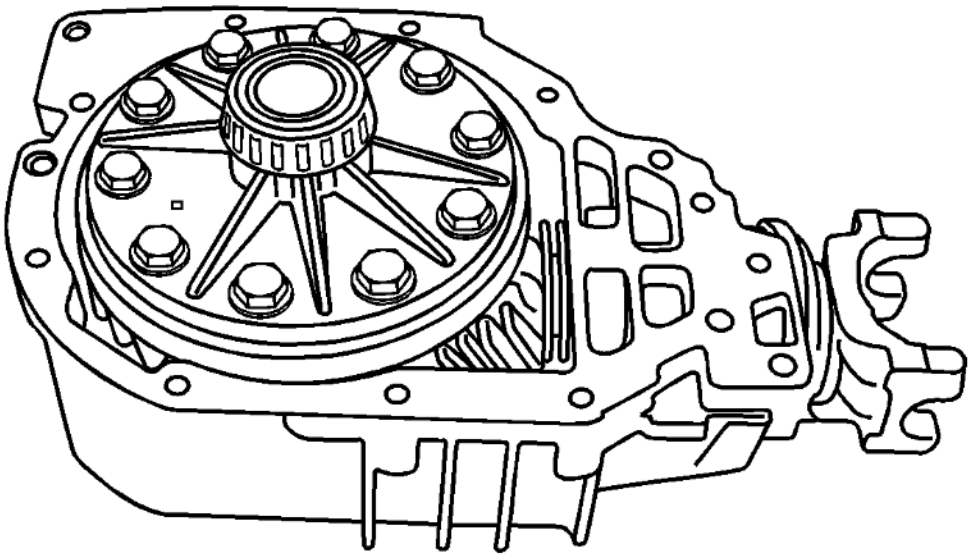


Fig. 373: View Of Differential Case Assembly & Carrier Case Half
Courtesy of GENERAL MOTORS COMPANY

29. Install the differential case assembly into the left differential carrier case half.

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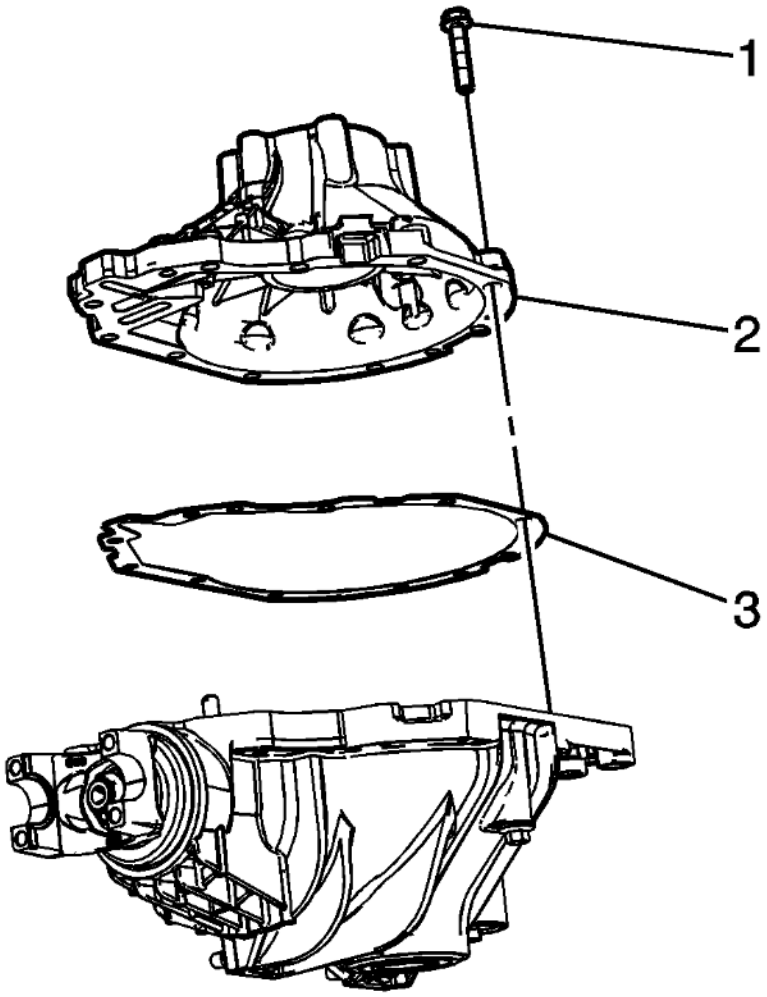


Fig. 374: View Of Differential Carrier Housing, Gasket & Bolts
Courtesy of GENERAL MOTORS COMPANY

NOTE: **The sealing surfaces of the differential carrier halves must be free of grease and oil to ensure that the gasket will seal properly.**

30. Install the differential carrier case gasket (3).
31. Install the differential carrier case (2) half to the left differential carrier case half. If the carrier case halves do not make complete contact, use the **J-36599-A** side bearing nut wrench in order to back out right differential adjuster nut sleeve until the differential carrier case halves make contact.
32. Install the differential carrier case bolts (1) and tighten to 73 N.m (54 lb ft).
33. Install the differential carrier assembly into a vise.
34. While rotating the pinion yoke back and forth, turn he right side differential adjuster nut clockwise using the **J-36599-A** side bearing nut wrench until 0.0254-0.072 mm (0.001-0.003 inch) of backlash can be felt between the ring gear and the drive pinion. If the backlash specification cannot be obtained, turn the left side differential adjuster nut sleeve counter clockwise using the **J-36599-A** side bearing nut wrench in small equal increments until the backlash specification can be obtained.

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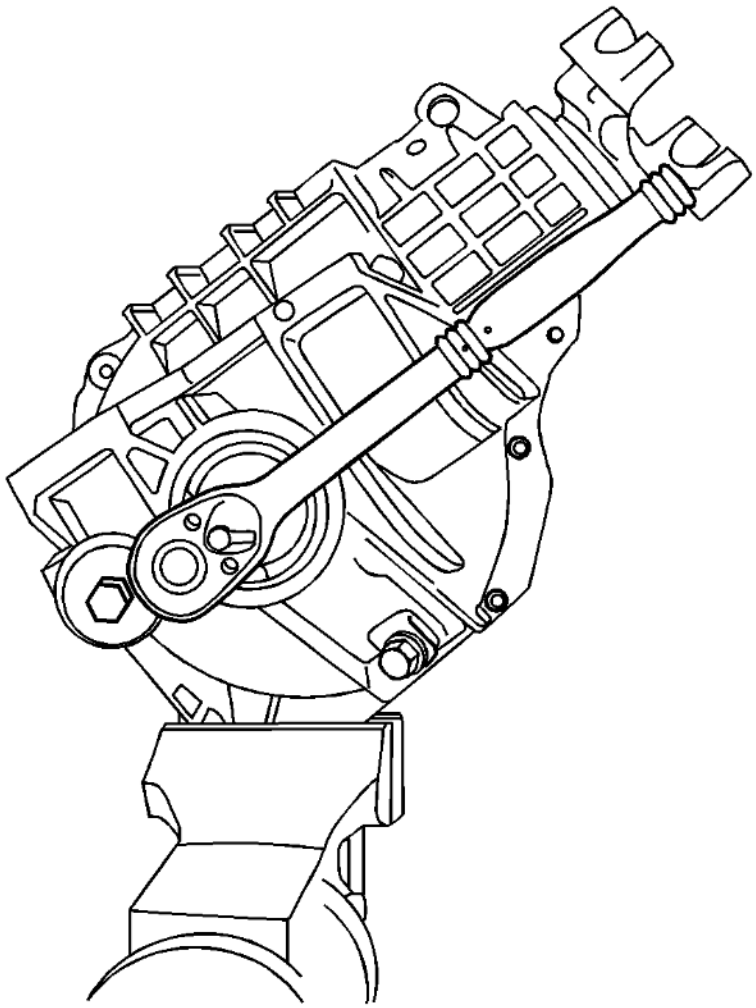


Fig. 375: Tightening Differential Adjuster Nut
Courtesy of GENERAL MOTORS COMPANY

35. Using the **J-36599-A** side bearing nut wrench turn the left side differential adjuster nut clockwise in order to preload the differential side bearings against the differential side bearings cups and tighten the adjuster nut to 75 (55 lb ft).
36. Rotate the pinion several times in order to seat the pinion and differential side bearings.
37. Using an inch-pound torque wrench, measure the rotating torque of the drive pinion and differential assembly, which should be 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.
38. If the rotating torque of the drive pinion and differential assembly is not 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion, 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-36599-A** side bearing nut wrench , turn the left and right side differential adjuster sleeves in or clockwise in small equal increments.
    3. Using an inch pound torque wrench, measure the rotating torque of the pinion and differential assembly.
    4. Compare the new measurement to the specification listed in Step 22. If the rotating torque of the

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pinion and differential assembly is not within specifications, continue to tighten the left and right side differential adjuster nut sleeves in small equal increments on each side until the rotating torque of the pinion and differential assembly is within specifications.

39. If the rotating torque of the drive pinion and differential assembly is more than 1.13 N.m (10 lb in) above the rotating torque of the drive pinion measurement, 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-36599-A** side bearing nut wrench or the **J-36615** side bearing nut wrench , turn the left and right side differential adjuster nut sleeve out or clockwise in small equal increments.
    3. Using a torque wrench, measure the rotating torque of the pinion and differential assembly.
    4. Compare the new measurement to the specification listed in Step 22. 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 sleeve in small equal increments on each side until the rotating torque of the pinion and differential assembly is within specifications.
40. Once the specified rotating is obtained, rotate the pinion several times to ensure the bearings have seated. Recheck the rotating torque and adjust if necessary.
41. Measure the drive pinion to the ring gear backlash and adjust, if necessary. Refer to **Backlash Inspection and Adjustment**.
42. Once the bearing preload and drive pinion to the ring gear backlash is within specifications, perform a gear tooth contact pattern check to ensure proper contact between the pinon and the ring gear. Refer to **Gear Tooth Contact Pattern Inspection**.

FRONT AXLE ASSEMBLE (9.25 INCH AXLE)

Special Tools

- **EN 44215** Installer
- **J 5590** Installer
- **J 8001** Dial Indicator Set
- **J 8614-A** Flange and Pulley Holding Tool
- **J 25025** Guide Pins
- **J 33842** Bearing Installer
- **J 36366-A** Pinion Oil Seal Installer
- **J 36609** Side Bearing Installer
- **J 36614** Inner Pinion Bearing Installer

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

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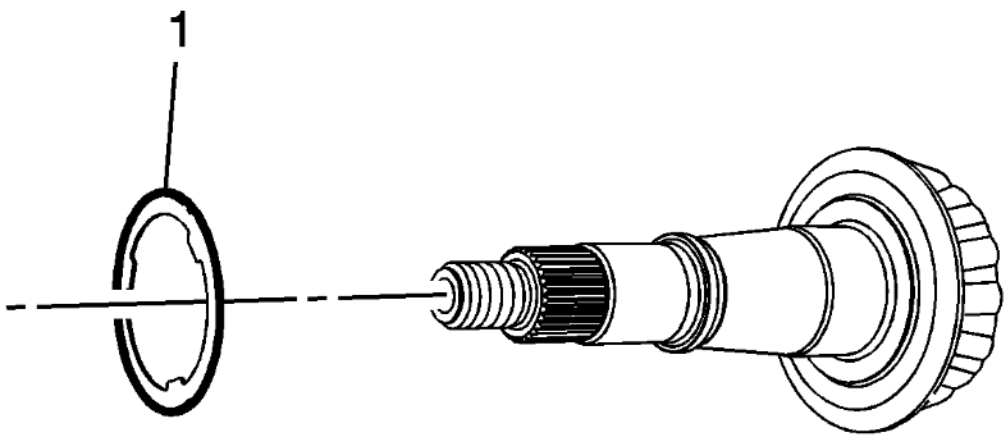


Fig. 376: Pinion Gear Selectable Shim
Courtesy of GENERAL MOTORS COMPANY

1. Install the selective shim (1) on the drive pinion gear.

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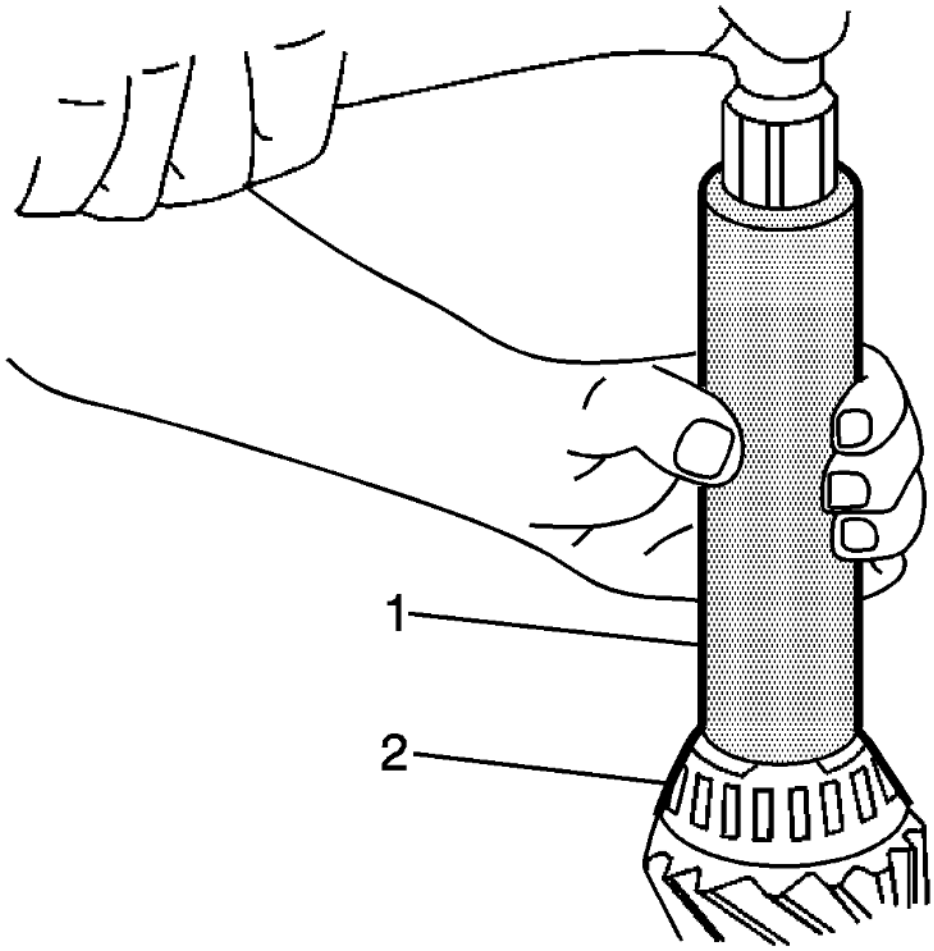


Fig. 377: Installing Inner Pinion Bearing Onto Pinion Gear
Courtesy of GENERAL MOTORS COMPANY

2. Using the **J 36614** installer (1), install the front differential pinion gear bearing (2).

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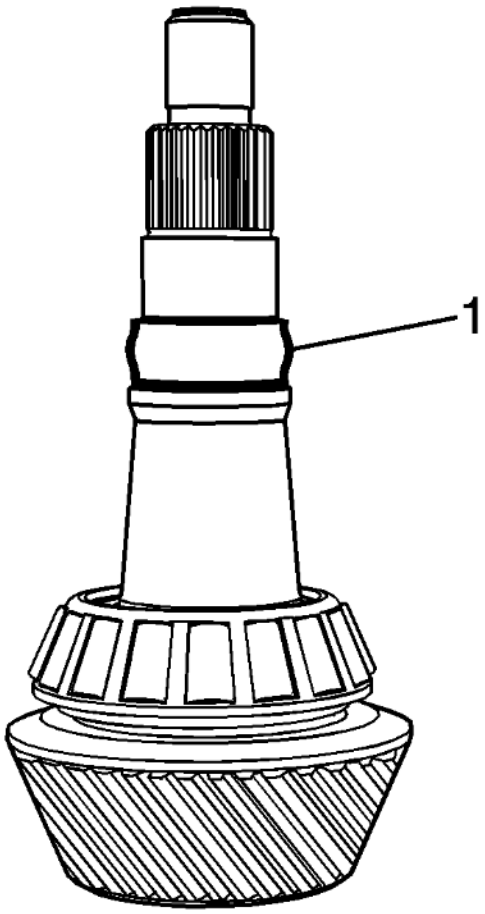


Fig. 378: Identifying Collapsible Spacer
Courtesy of GENERAL MOTORS COMPANY

3. Install the NEW collapsible spacer (1) on the drive pinion gear.
4. Lubricate the inner and the outer pinion bearings with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .
5. Install the outer drive pinion bearing cup into the differential housing. Refer to **Front Differential Drive Pinion Gear Bearing Cup Installation (9.25 Inch Axle)**.

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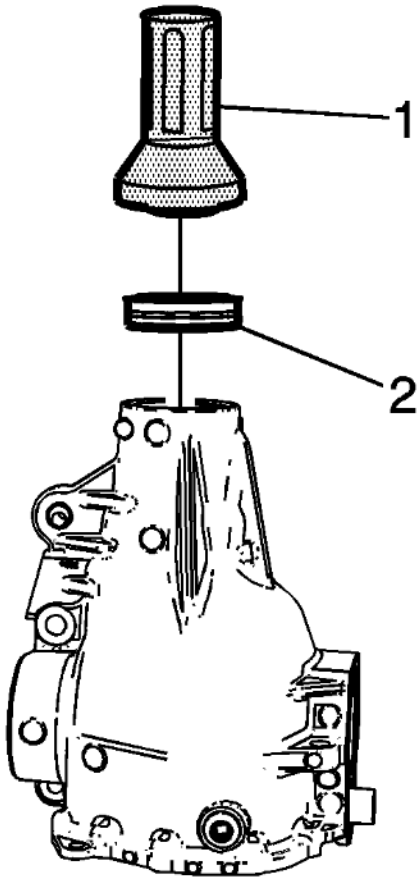


Fig. 379: Front Differential Drive Pinion Gear Seal And Installer
Courtesy of GENERAL MOTORS COMPANY

6. Using the **J 36366-A** installer (1), install the front differential drive pinion gear seal (2).
7. Adjust the drive pinion gear depth. Refer to **Pinion Depth Adjustment (9.25 Inch Axle)**.

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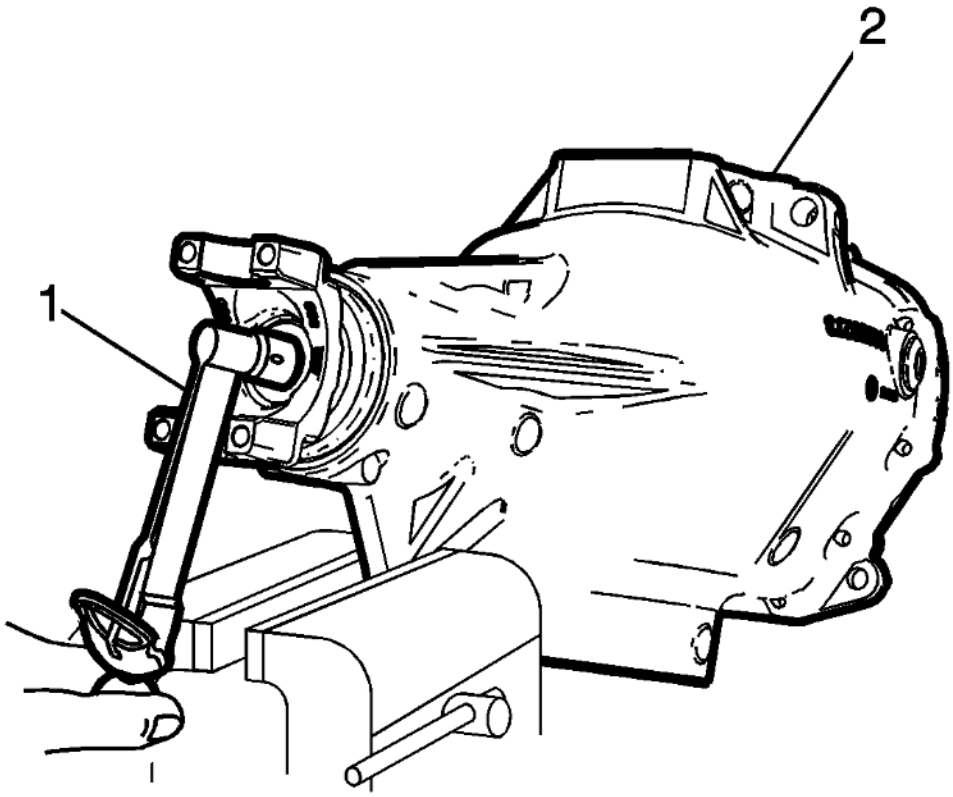


Fig. 380: Identifying Front Differential Housing
Courtesy of GENERAL MOTORS COMPANY

8. Install the front differential housing (2) in a soft jawed vise.

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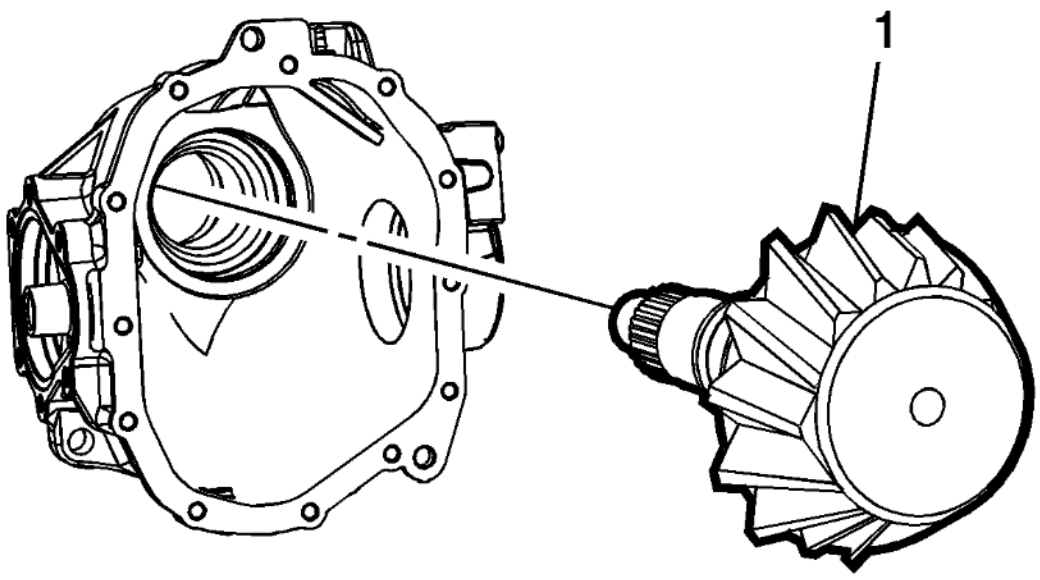


Fig. 381: Identifying Drive Pinion Gear
Courtesy of GENERAL MOTORS COMPANY

9. Install the drive pinion gear (1) in the differential housing.

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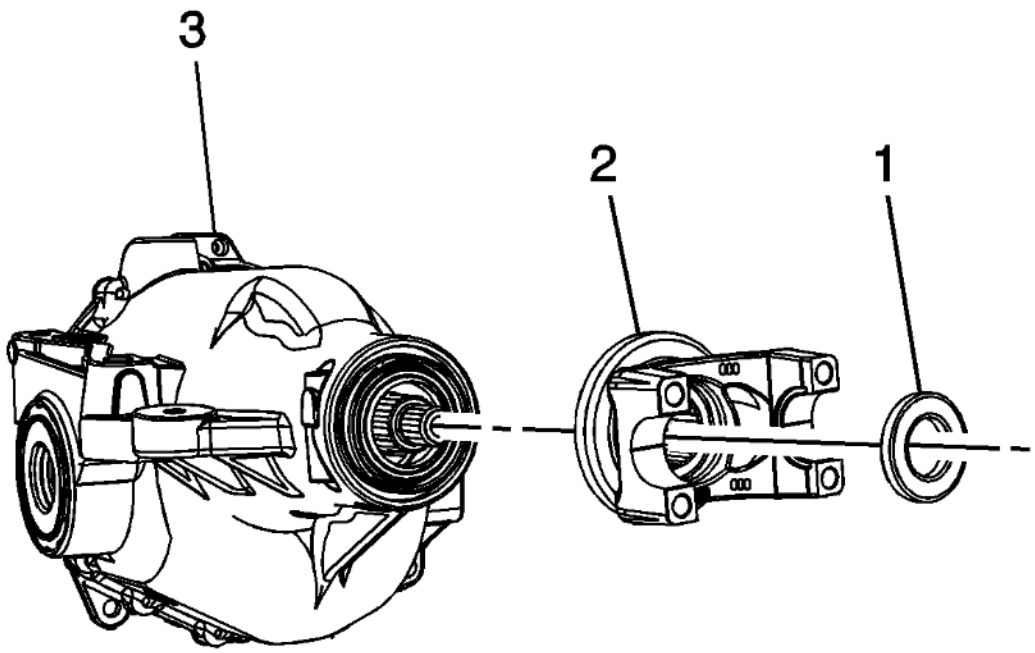


Fig. 382: Washer And Drive Pinion Flange
Courtesy of GENERAL MOTORS COMPANY

10. Using a soft faced hammer and supporting the drive pinion gear from the inside, lightly tap the front differential drive pinion gear yoke (2) until the threads of the drive pinion gear show through.
11. Install the washer (1) on the front drive pinion gear.
12. Install the old drive pinion gear nut.

NOTE: DO NOT use air tools for this procedure. Use ONLY HAND TOOLS.

13. Using the **J 8614-A** holding tool and a ratchet wrench, draw the front differential drive pinion gear yoke 3/4 of the way onto the drive pinion gear.
14. Remove the old drive pinion gear nut and replace with the NEW drive pinion gear nut.

NOTE: Rotate the drive pinion while tightening the drive pinion nut in order to seat the bearings.

15. Tighten the NEW drive pinion nut until the end play is just taken up.

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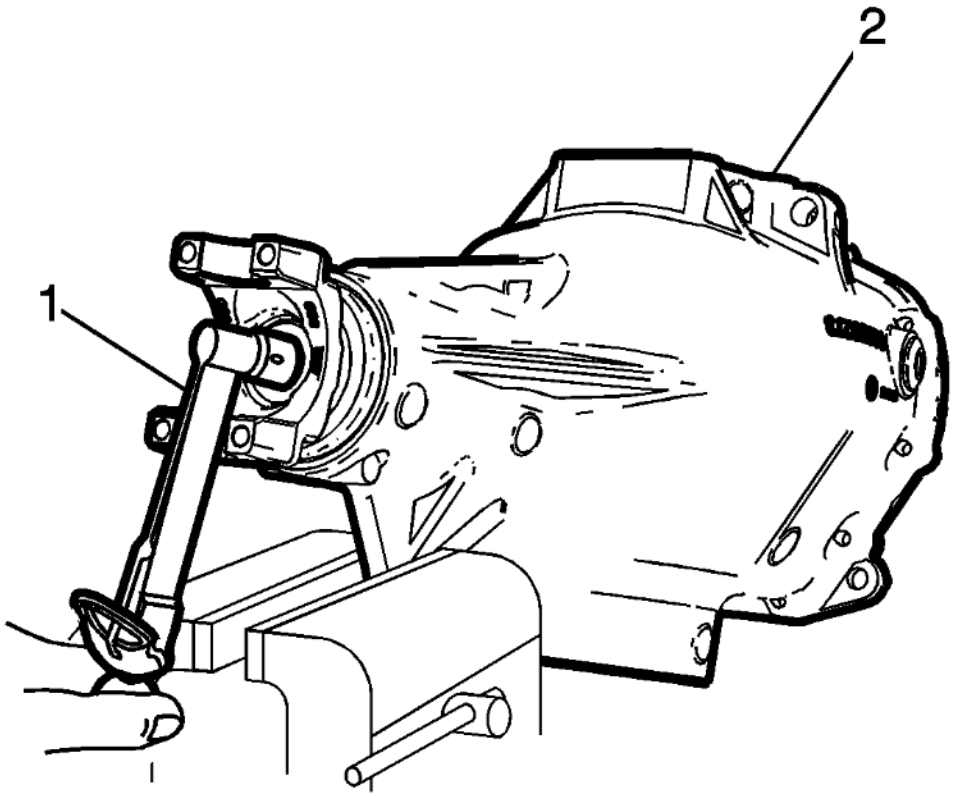


Fig. 383: Identifying Front Differential Housing
Courtesy of GENERAL MOTORS COMPANY

NOTE: **If the rotating torque is greater than the specifications required, the collapsible spacer will have to been replaced.**

16. Using an inch pound torque wrench (1), measure the rotating torque of the drive pinon which 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.
17. If the rotating torque reading is below 1.0 N.m (10 lb in) for used bearing or 1.7 N.m (15 lb in) for the NEW bearings, re-install the **J 8614-A** holding tool and continue to tighten the drive pinion nut until the required specifications are met 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.

NOTE: **Recheck the rotating torque if necessary.**

18. Once the specified torque specifications have been reached, rotate the drive pinon several times to ensure that the drive pinon bearings are seated.

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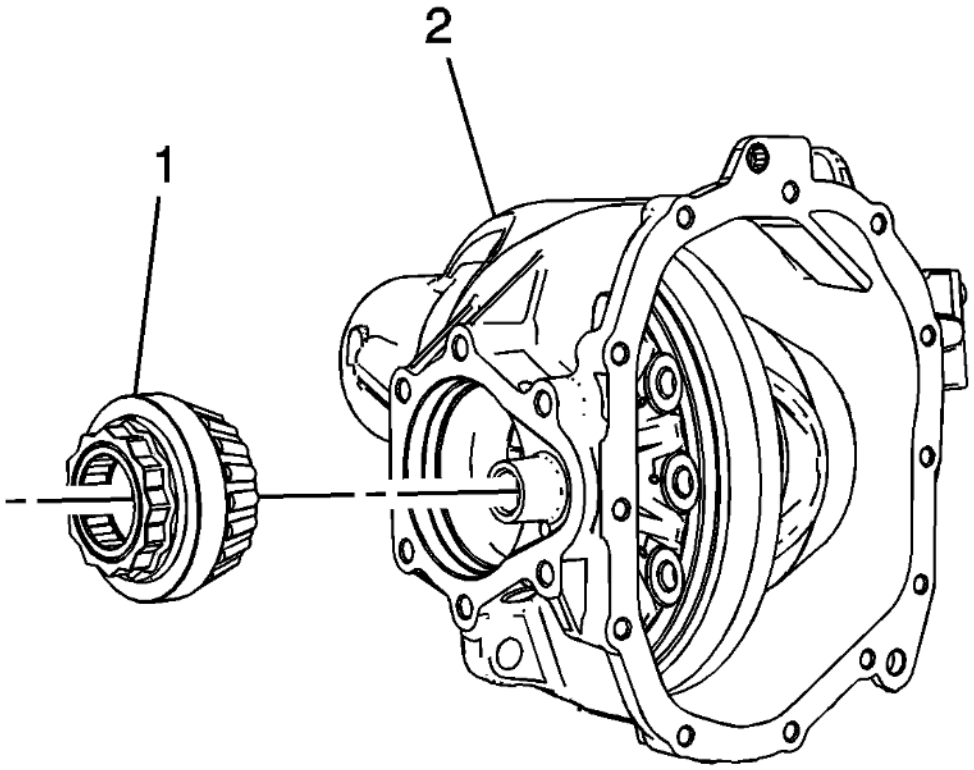


Fig. 384: Identifying Differential Adjuster And Differential Carrier
Courtesy of GENERAL MOTORS COMPANY

19. Install the differential adjuster (1) in the differential carrier (2).

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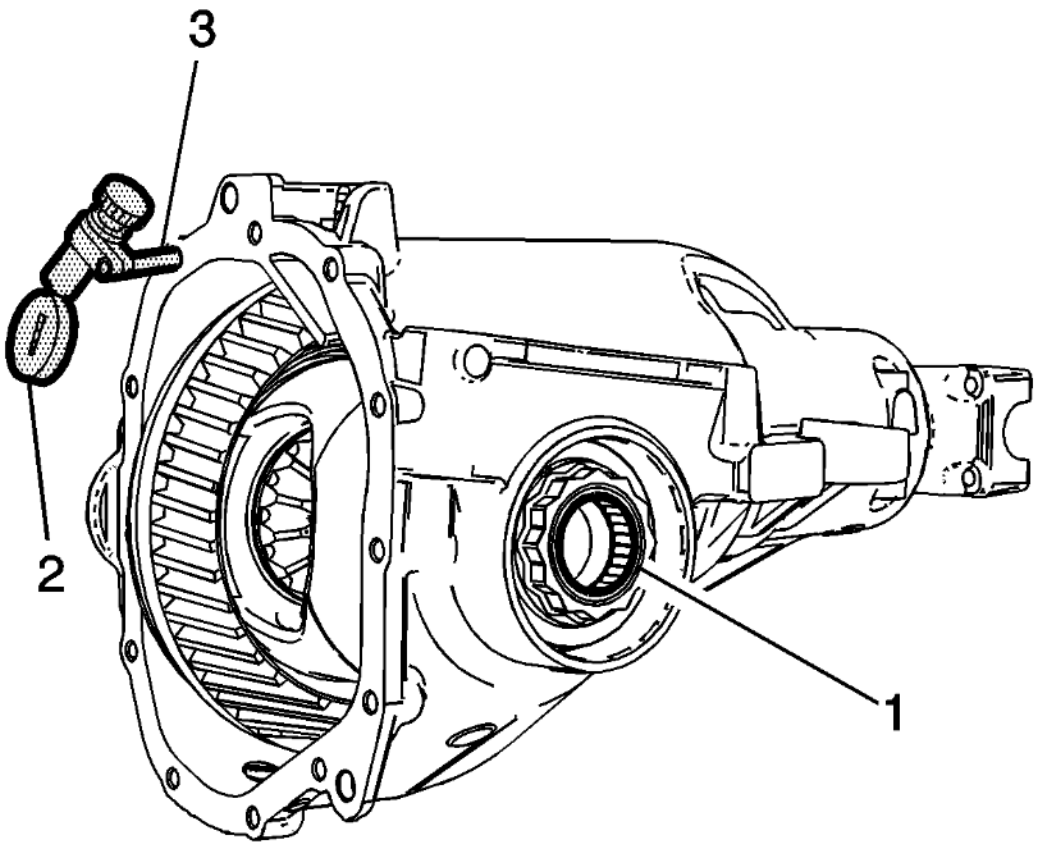


Fig. 385: Indicator And Guide Pins
Courtesy of GENERAL MOTORS COMPANY

20. Position the **J 8001** indicator (2) and the **J 25025** guide pins (3) on the differential housing.

NOTE: **Ensure that the gauge is aligned with the gear rotation and square to the tooth angle.**

21. Preload the **J 8001** indicator (2) approximately 1/2 turn and zero the gauge.

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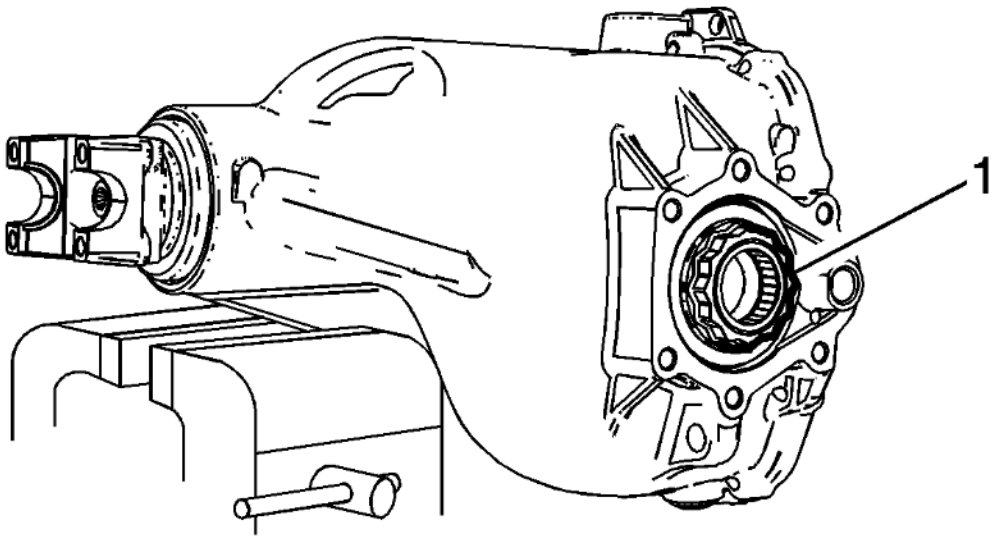


Fig. 386: Right Side Differential Adjuster
Courtesy of GENERAL MOTORS COMPANY

22. Using a 57 mm 12 point socket, turn the right side differential adjuster (1) clockwise until 0.0254-0.0762 mm (0.001-0.003 in) of backlash can be measured on the ring gear and the drive pinon gear.

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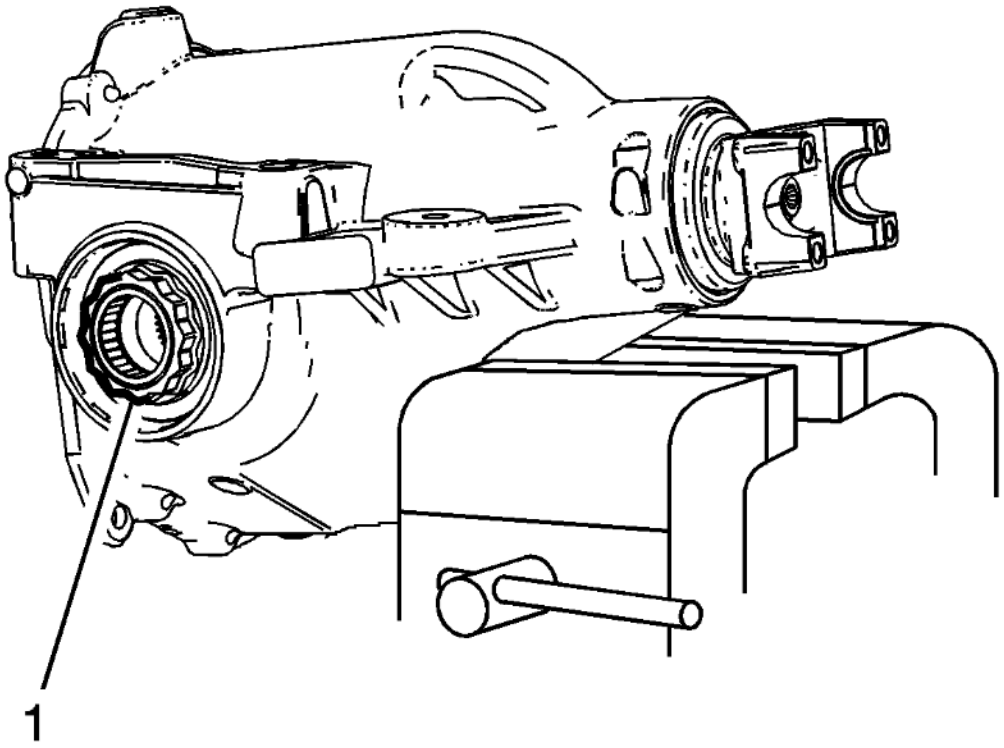


Fig. 387: Left Side Differential Adjuster
Courtesy of GENERAL MOTORS COMPANY

23. Using a 57 mm 12 point socket, turn the left differential adjuster (1) to preload the adjuster bearings against the differential bearing cups.
24. Tighten the differential adjuster nut obtain a total torque to rotate of the SUM of the 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.
25. Rotate the drive pinion several times in order to seat the drive pinion and differential adjuster bearings.
26. Using a inch pound torque wrench and measure the rotating torque of the differential assembly which should be 1.99-4.2 N.m (17-37 lb in) for NEW bearings and 1.29-3.1 N.m (11-27 lb in) for used bearings.
27. If the rotating torque measurement is below 1.29-3.1 N.m (11-27 lb in) for used bearings or 1.99-4.2 N.m (17-37 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 and the differential carrier case for the left and right sides.
    2. Turn the differential adjuster in or clockwise.
    3. Using a inch pound torque wrench, measure the rotating torque of the differential assembly.
    4. Compare the new measurement to the specifications in step 8. If the rotating torque of the differential assembly is not within specifications, continue to tighten the left and right differential adjusters until the rotating torque of the differential assembly is within specifications.

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28. If the rotating torque measurement is above 3.1 N.m (27 lb in) for used bearings or 4.2 N.m (37 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 and the differential carrier case for the left and right sides.
    2. Turn the differential adjuster out or counter clockwise.
    3. Using a inch pound torque wrench, measure the rotating torque of the differential assembly.
    4. Compare the new measurement to the specifications in step 8. If the rotating torque of the differential assembly is not within specifications, continue to tighten the left and right differential adjusters until the rotating torque of the differential assembly is within specifications.

NOTE: **Recheck the rotating torque and adjust if necessary.**

29. Once the specified rotating torque is obtained, rotate the differential assembly several times to ensure that the bearings have seated.
30. 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**.

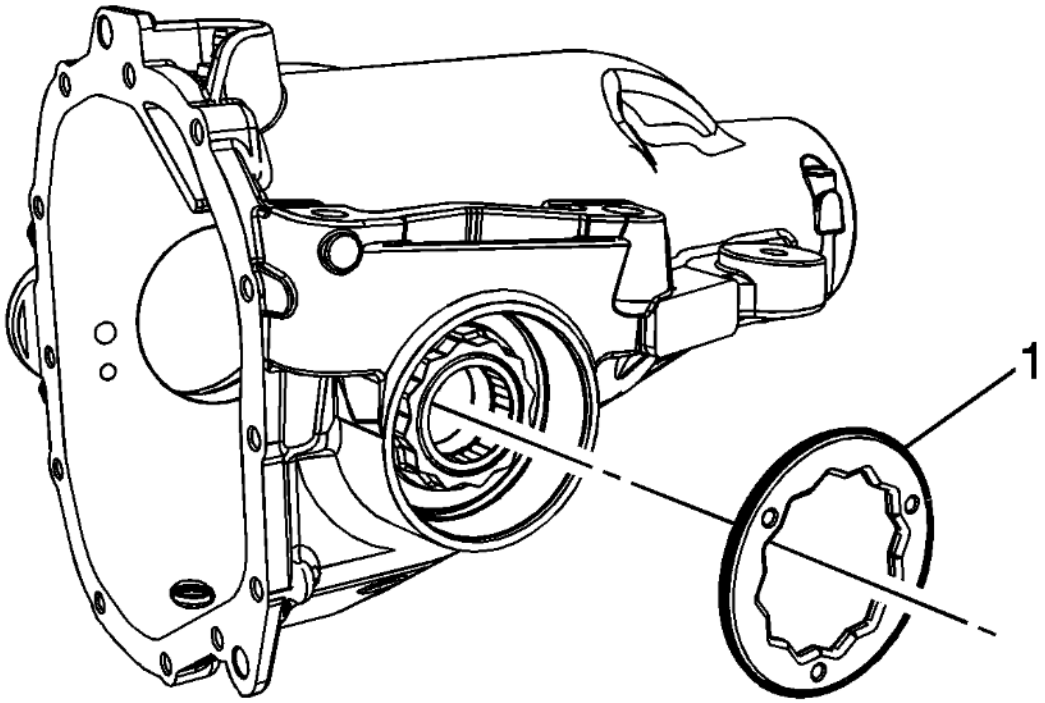


Fig. 388: Identifying Differential Adjuster Lock Ring
Courtesy of GENERAL MOTORS COMPANY

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31. Install the differential adjuster lock ring (1) flush with differential housing.

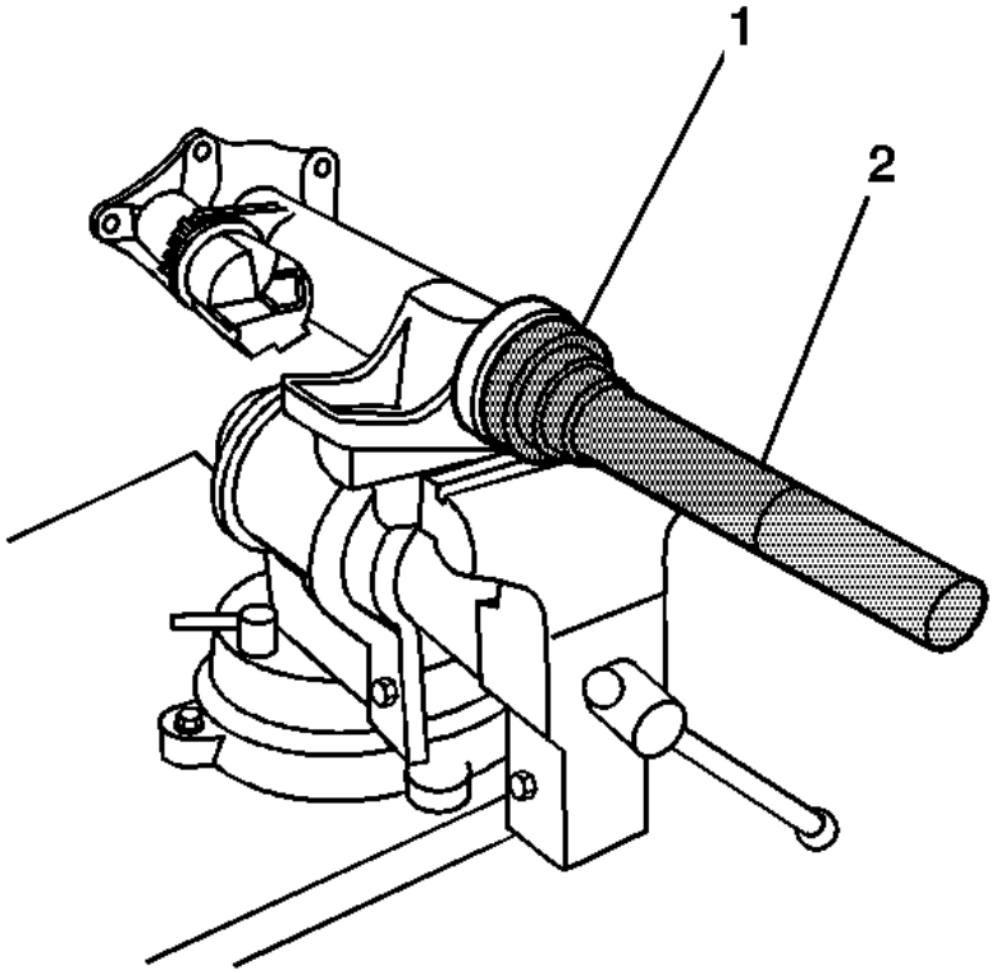


Fig. 389: Installing Side Bearing - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

32. Install the inner axle shaft in a vise.
33. Using the **J 36609** installer (1) and the **J 8092** handle (2), install the inner bearing.

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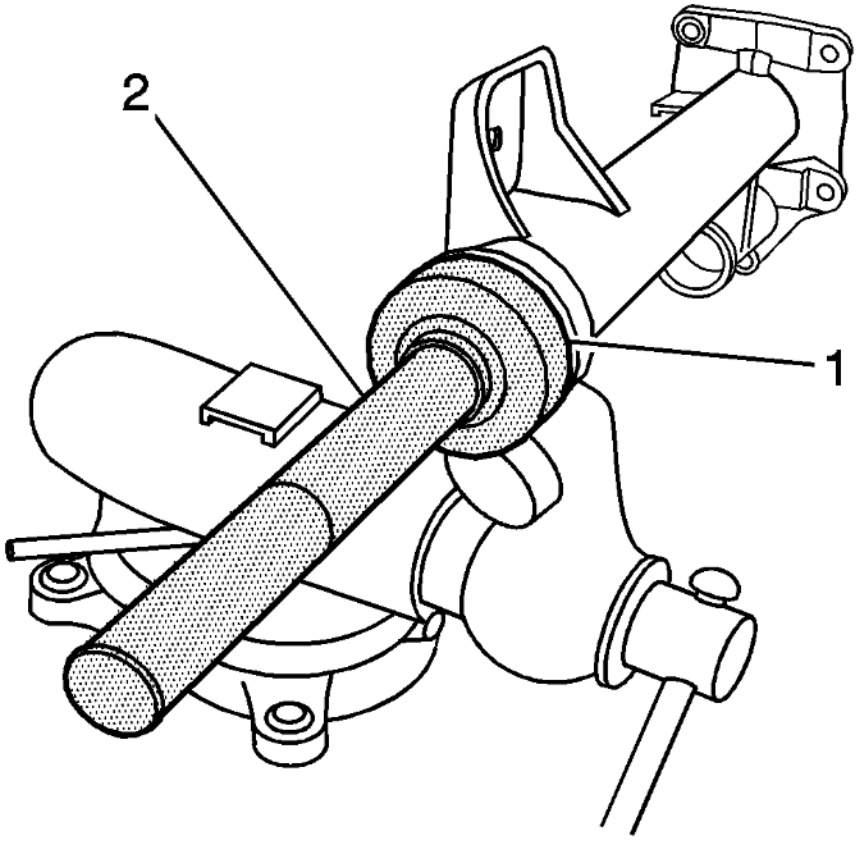


Fig. 390: Installing New Axle Shaft Seal - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

34. Using the **EN 44215** installer (1) and the **J 8092** handle (2), install the inner axle shaft seal.

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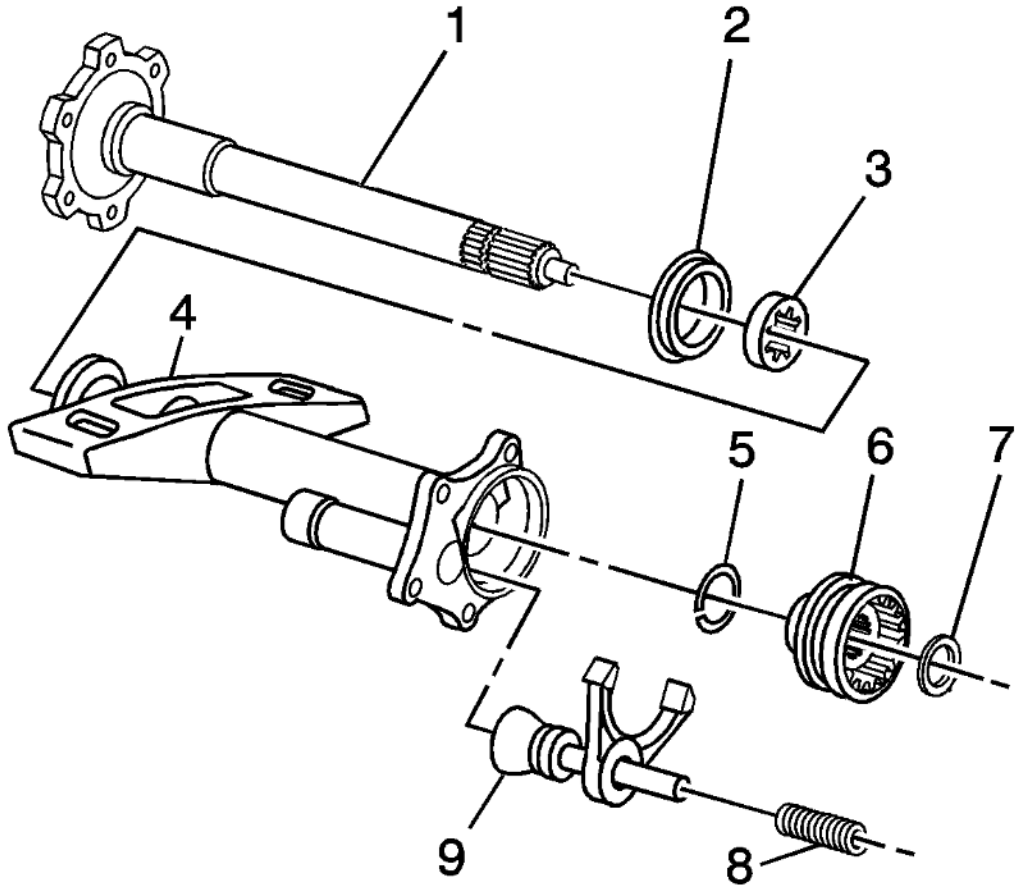


Fig. 391: Inner Axle Shaft, Inner Axle Shaft Housing, Thrust Washer With Tabs And Retaining Ring
Courtesy of GENERAL MOTORS COMPANY

35. Using a soft face mallet, install the inner axle shaft (1).
36. Install the thrust washer (5), NEW retaining ring (6), on the inner axle shaft (1).
37. Determine the clutch gear shim thickness. Refer to **Front Drive Axle Clutch Gear Shim Adjustment**.
38. Install the correct clutch gear shim (8), clutch sleeve (7), clutch fork assembly (10), and the clutch fork inner spring (9) in the inner axle housing.

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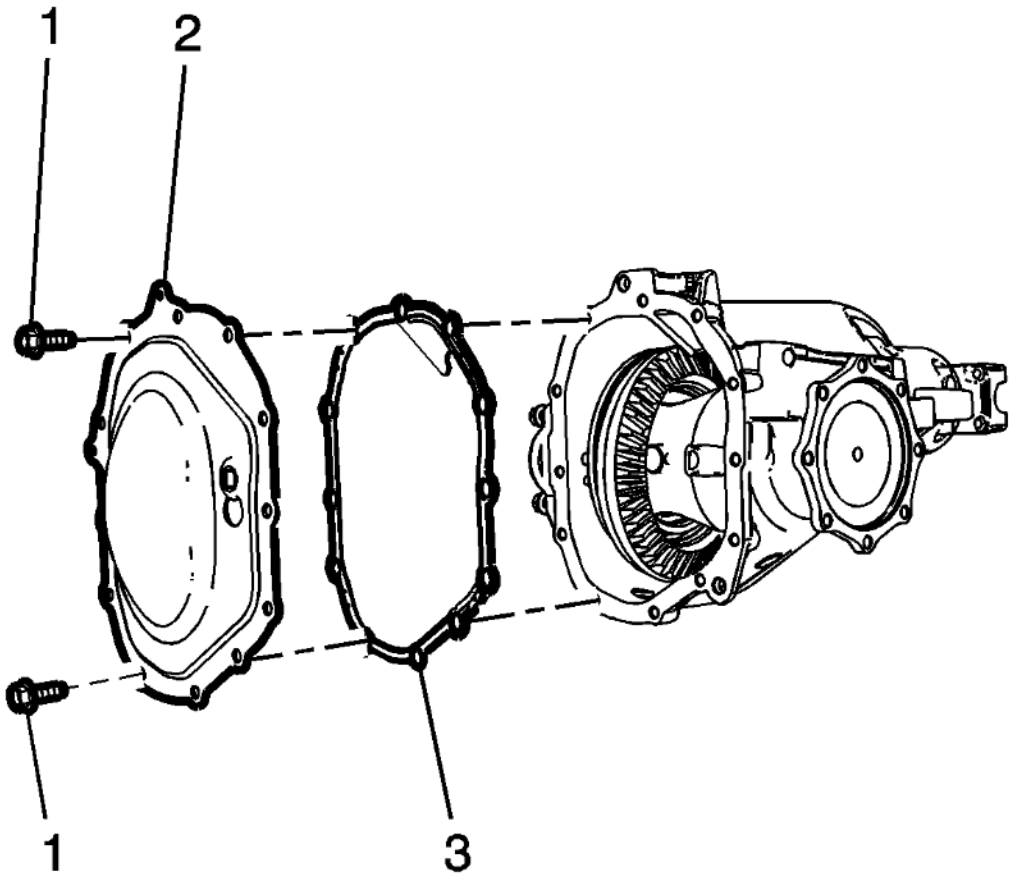


Fig. 392: Rear Axle Housing Cover Gasket, Rear Axle Housing Cover And Bolts
Courtesy of GENERAL MOTORS COMPANY

39. Install the rear axle housing cover gasket (3), rear axle housing cover (2).

CAUTION: Refer to Fastener Caution .

40. Install the rear axle housing covers bolts (1) and tighten to 40 N.m (30 lb ft).

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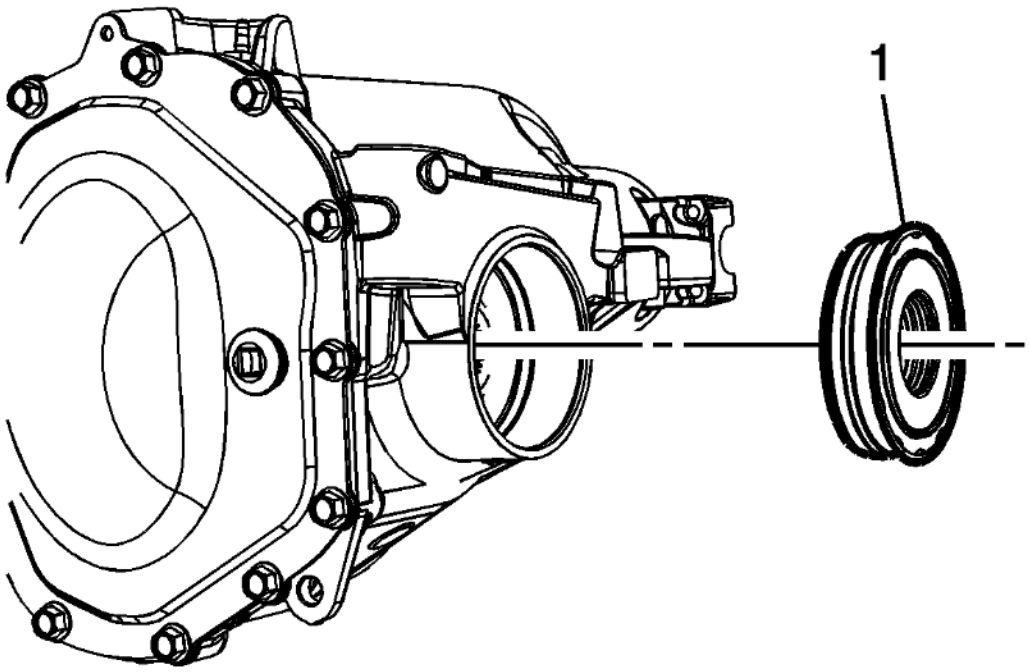


Fig. 393: Seal Deflector
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Ensure that the axle shaft seal is evenly positioned in the rear differential housing.**

41. Position the rear axle shaft seal (1) in the rear differently housing.

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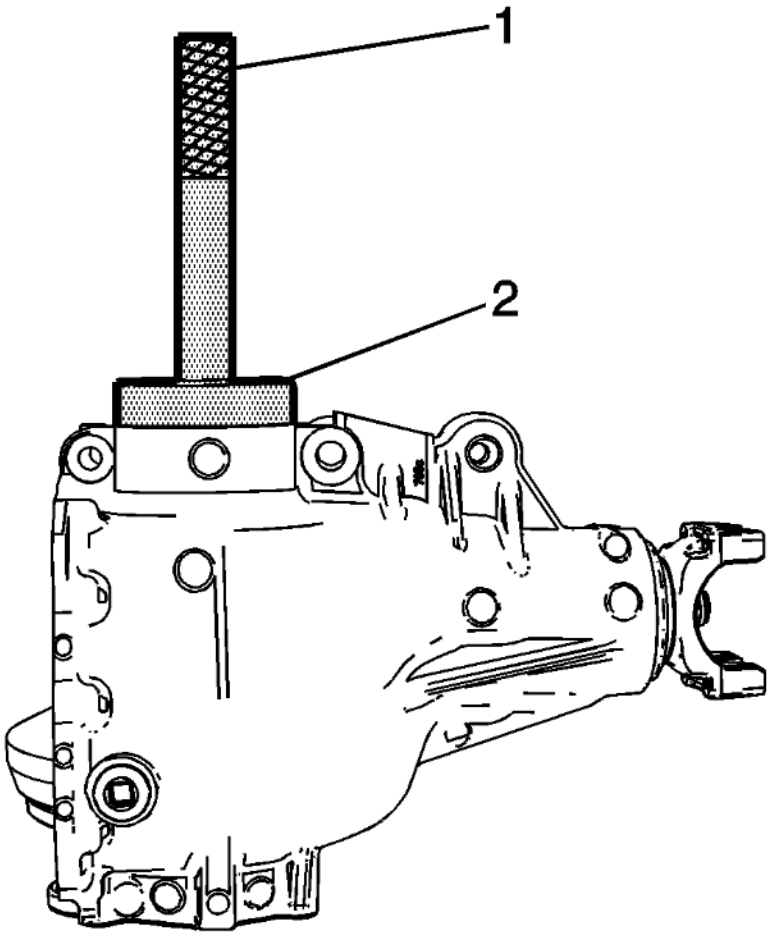


Fig. 394: Installer And Handle
Courtesy of GENERAL MOTORS COMPANY

42. Using the **EN 44215** installer (2) and the **J 8092** handle (1), install the rear axle shaft seal.

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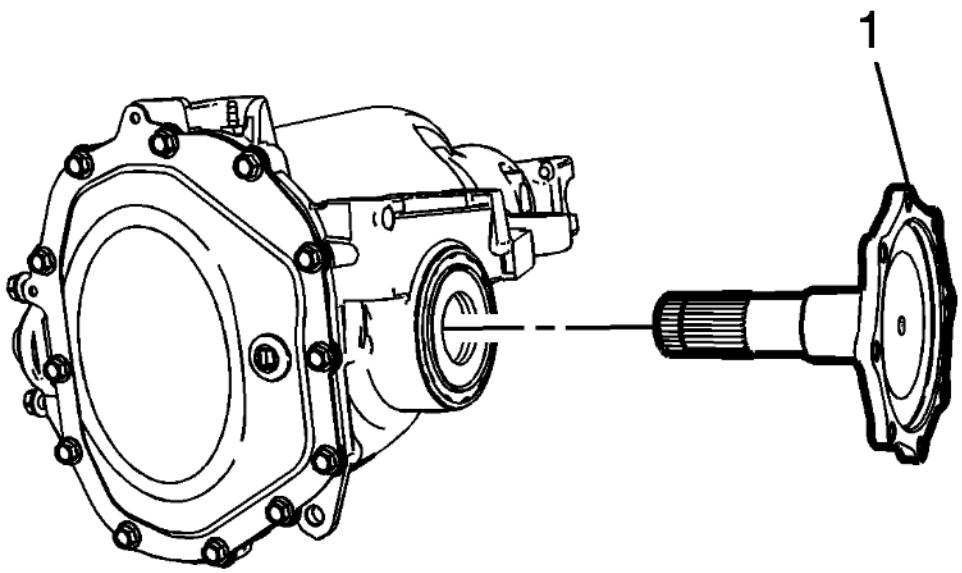


Fig. 395: Identifying Front Drive Axle Inner Shaft
Courtesy of GENERAL MOTORS COMPANY

43. Install the front drive axle inner shaft (1).

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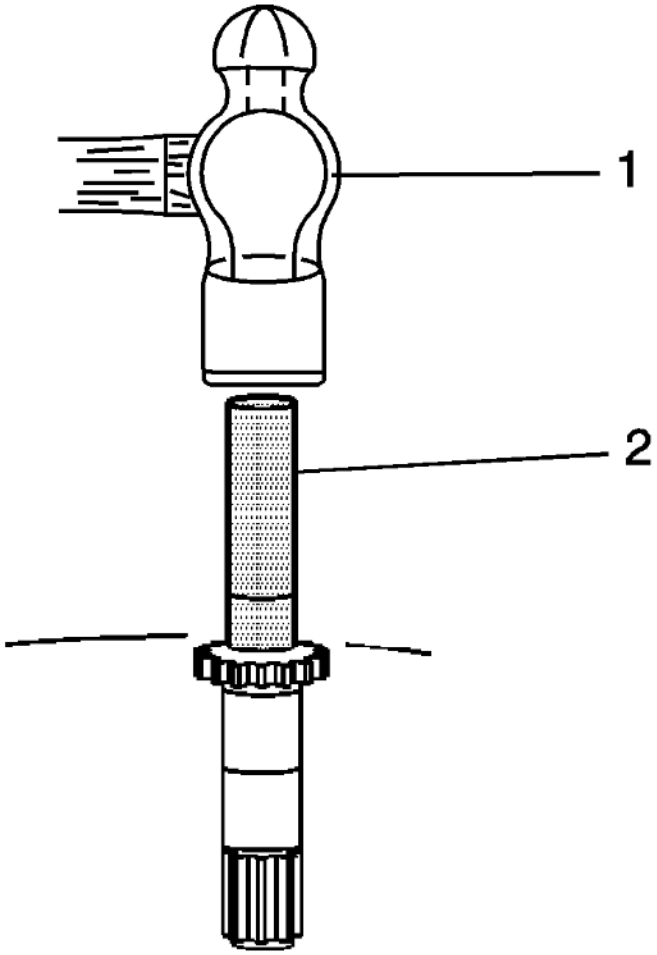


Fig. 396: Installer And Hammer
Courtesy of GENERAL MOTORS COMPANY

44. Using the **J 33842** installer (2) and a hammer (1), install the front drive axle clutch shaft bearing.

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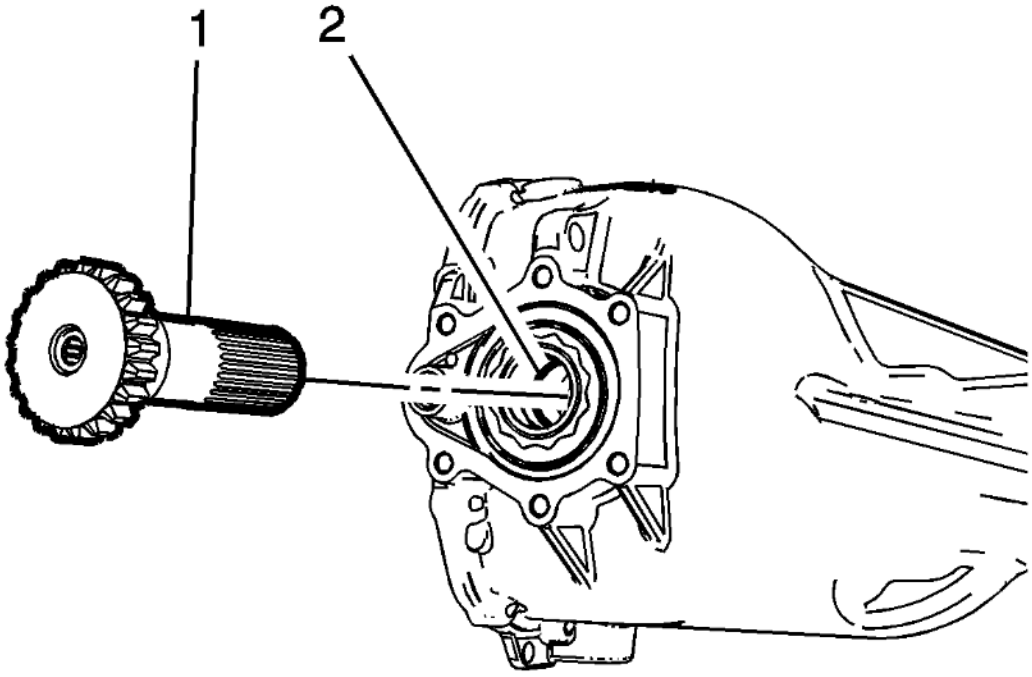


Fig. 397: Identifying Front Drive Axle Clutch Shaft And Differential Side Gear
Courtesy of GENERAL MOTORS COMPANY

45. Install the front drive axle clutch shaft (1) into the differential side gear (2).

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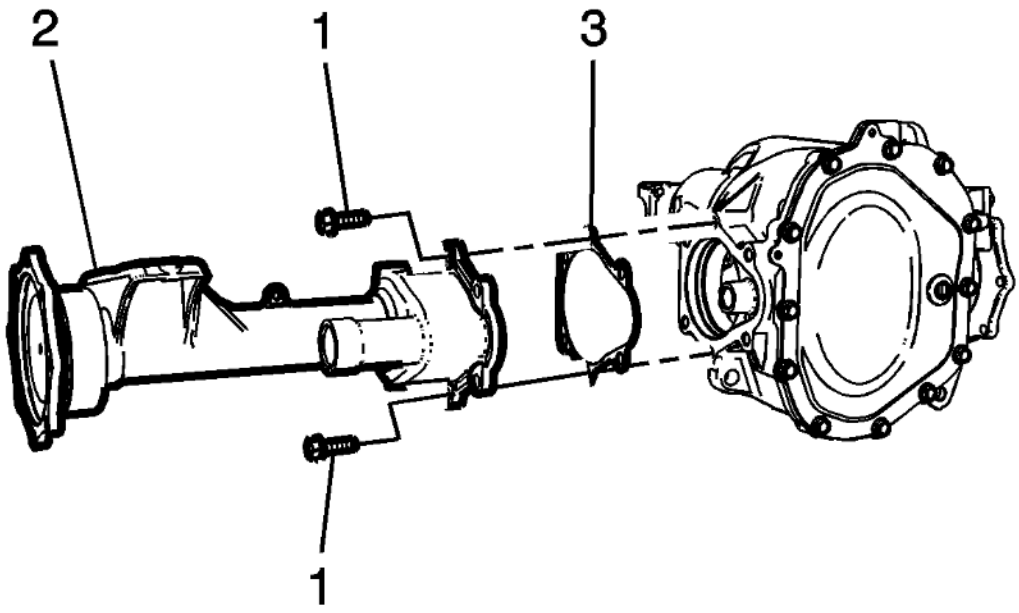


Fig. 398: Identifying Front Drive Axle Inner Axle Assembly, Gasket And Bolts
Courtesy of GENERAL MOTORS COMPANY

46. Install the front drive axle inner axle assembly (2), gasket (3), the bolts (1).
47. Tighten the bolts (1) to 65 N.m (48 lb ft).

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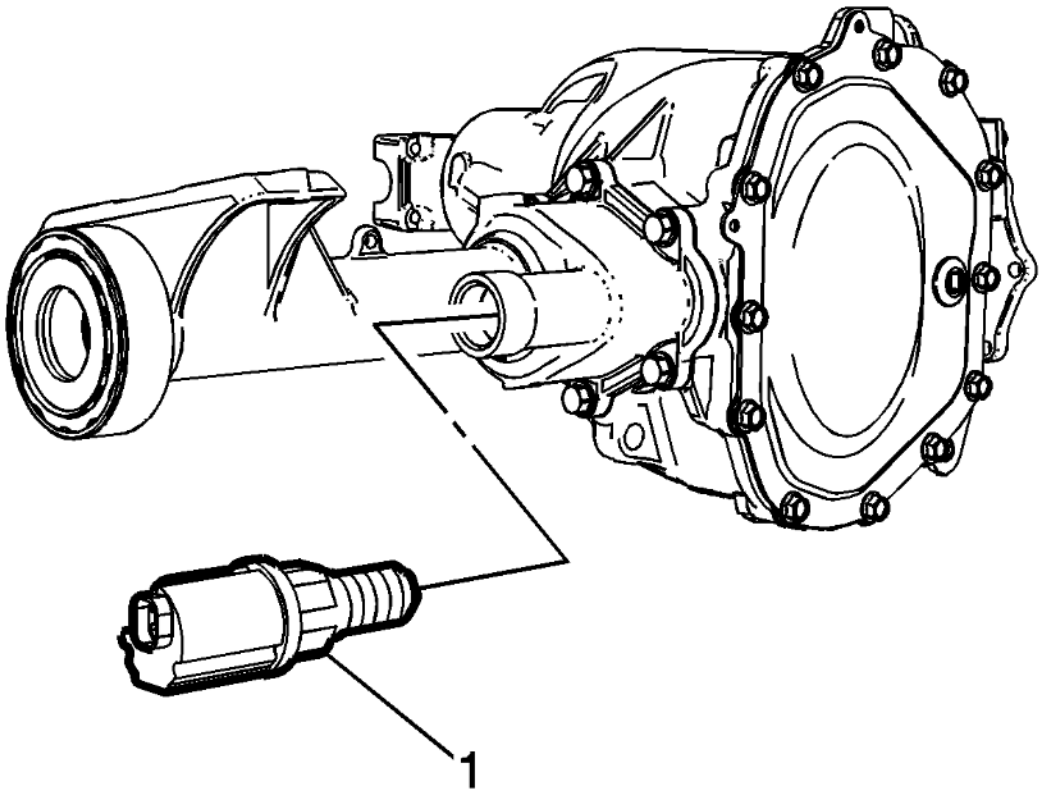


Fig. 399: Identifying Front Drive Axle Actuator
Courtesy of GENERAL MOTORS COMPANY

48. Apply a small amount of the correct sealant to the threads of the actuator (1). Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
49. Install the front drive axle actuator (1) and tighten to 30 N.m (22 lb ft).

BACKLASH INSPECTION AND ADJUSTMENT

Tools Required

- **J-8001** Dial Indicator Set
- **J-36599-A** Side Bearing Nut Wrench

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.

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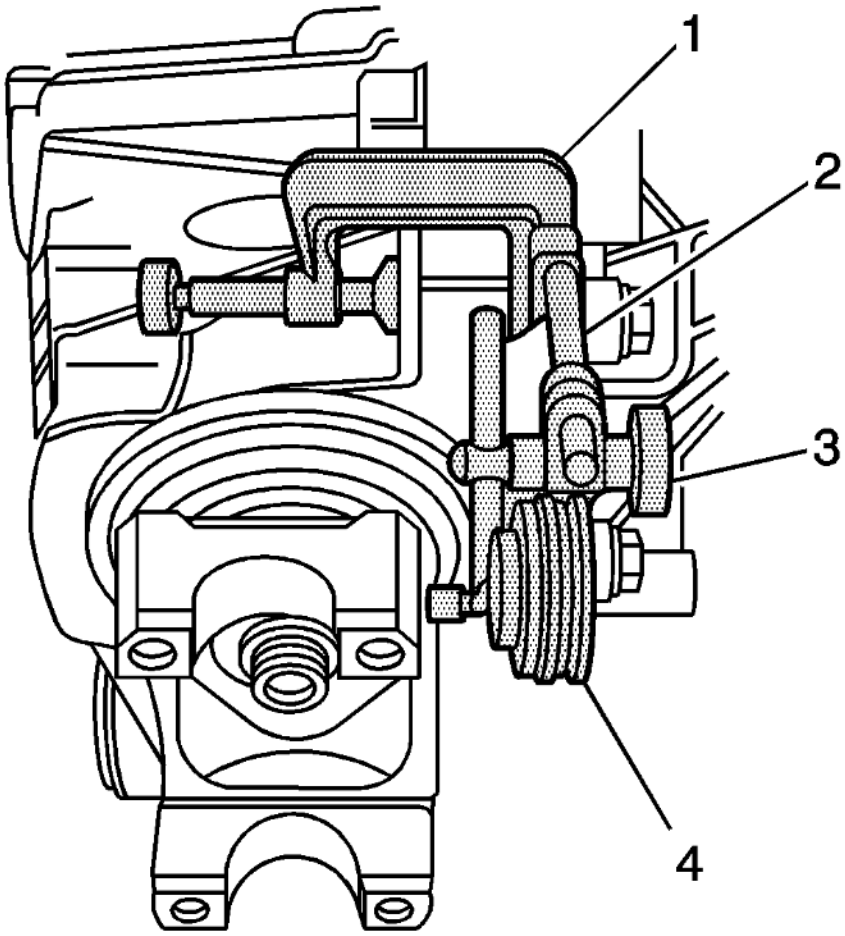


Fig. 400: Measuring Ring Gear Backlash
Courtesy of GENERAL MOTORS COMPANY

2. Install the J-8001-1 (1, 2), the J-8001-2 (3), and the J-8001-3 (4) as shown.

   Ensure that the button contacts 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:

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- 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 out using the **J-36599-A** side bearing nut wrench and the left differential adjuster nut using the **J-36599-A** side bearing nut wrench until the correct backlash is obtained. For the late 8.25 "LOCK RING" design front axle, turn out the right differential adjuster nut in small increments using the **J-36599-A** side bearing nut wrench and the left differential adjuster nut in small increments until the correct backlash is obtained.
7. If the backlash is too large, decrease the backlash by turning the left differential adjuster nut out using the **J-36599-A** side bearing nut wrench and the right differential adjuster nut in using the **J-36599-A** side bearing nut wrench until the correct backlash is obtained. For the late 8.25 "LOCK RING" design front axle, turn out the left differential adjuster nut out in small increments using the **J-36599-A** side bearing nut wrench and the right differential adjuster nut in small increments until the correct backlash is obtained.
8. Recheck the rotating torque of the pinion and differential assembly and adjust, if necessary. Refer to **Front Axle Assemble (8.25 Inch Axle)Front Axle Assemble (9.25 Inch Axle)**.
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 **Front Axle Assemble (8.25 Inch Axle)Front Axle Assemble (9.25 Inch Axle)**.

DIFFERENTIAL CARRIER ASSEMBLY FINAL ASSEMBLY (8.25 INCH AXLE)

Special Tools

- **J-8092** Universal Driver Handle - 3/4 in - 10
- **J-21474-18** Long Nut
- **J-33791** Carrier Bushing Remover/Installer
- **J-33842** Pilot Bearing Installer
- **J-36609** Axle Tube Bearing Installer
- **J-36616** Axle Mount Bushing Remover/Installer
- **J-45225** Axle Seal Installer

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.
2. Install the differential carrier assembly into a vise.

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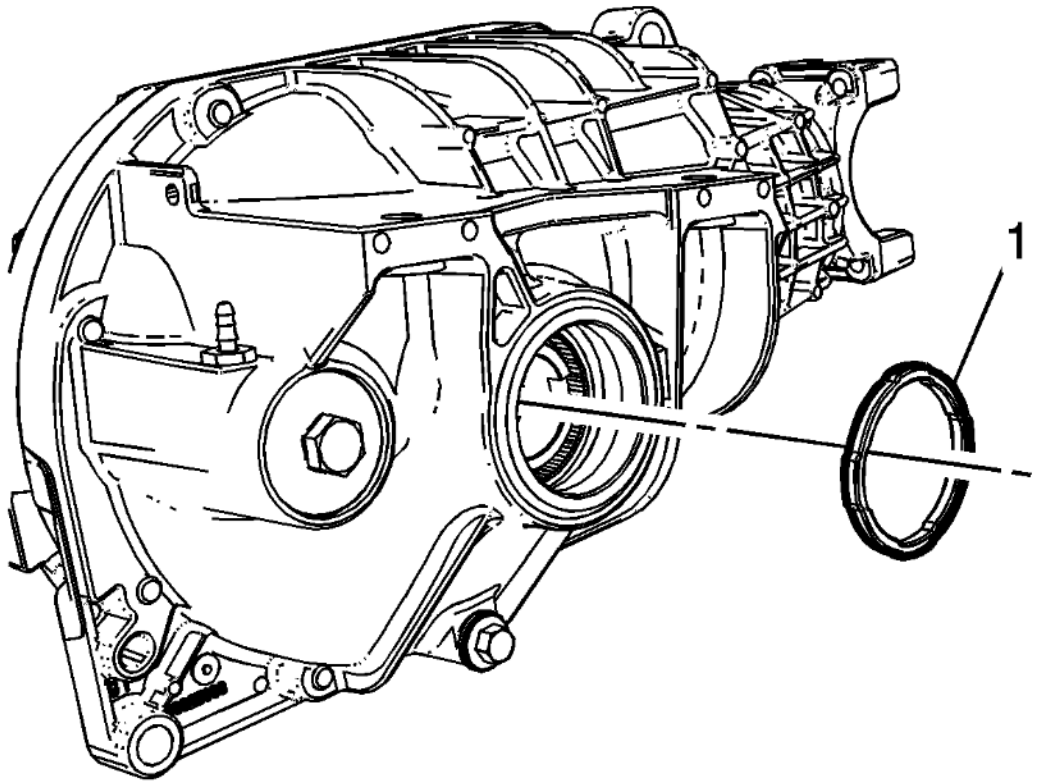


Fig. 401: Identifying Differential Adjuster Nut Lock Ring
Courtesy of GENERAL MOTORS COMPANY

3. Using a suitable size socket, install the NEW differential adjuster nut lock ring (1).
4. Using the correct fluid, lubricate the clutch shaft pilot bearing with axle lubricant. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

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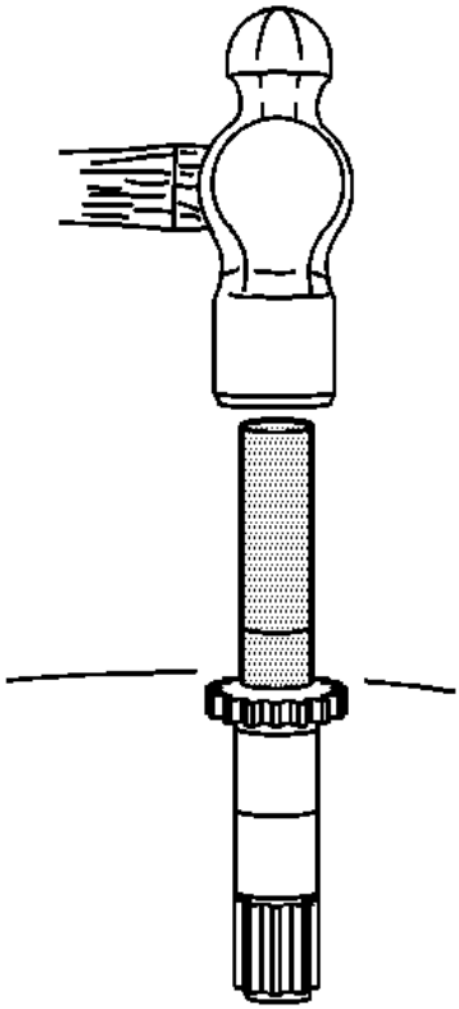


Fig. 402: Installing Clutch Shaft Pilot Bearing - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

5. Using the **J-33842** installer , install the clutch shaft pilot bearing.

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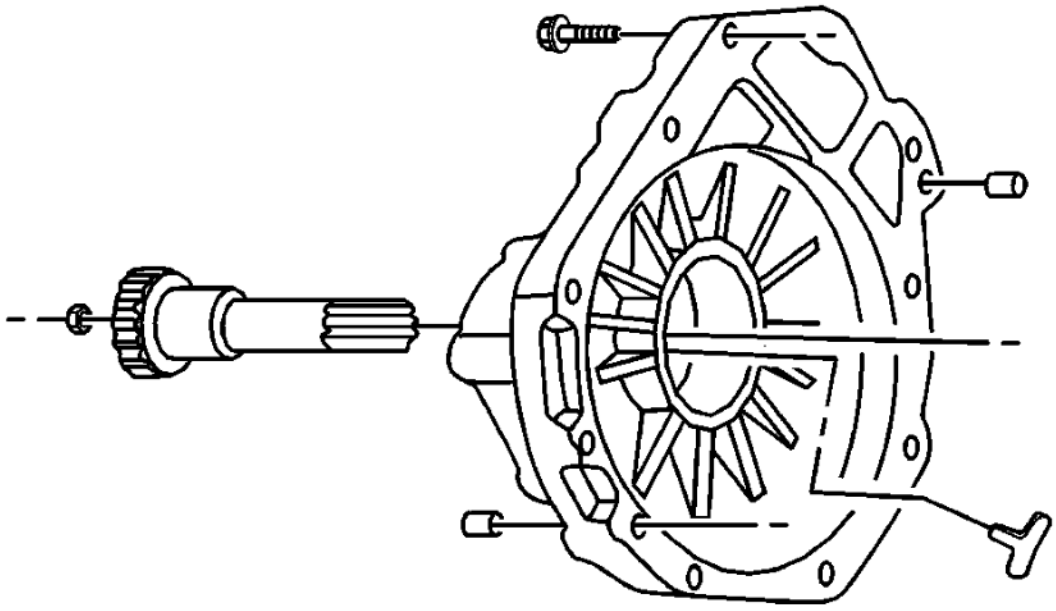


Fig. 403: Removing Differential Carrier Assembly Bolts
Courtesy of GENERAL MOTORS COMPANY

6. Install the clutch shaft to the differential carrier case half.

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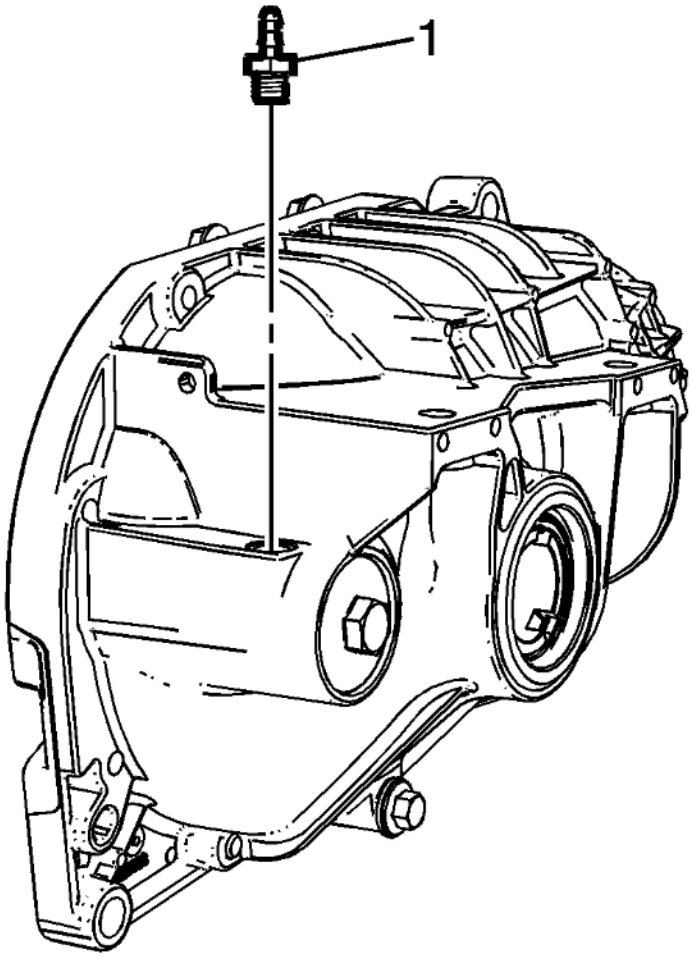


Fig. 404: Vent Hose Connector
Courtesy of GENERAL MOTORS COMPANY

CAUTION: **Refer to Fastener Caution .**

7. Install the vent connector (1) and tighten to 20 N.m (15 lb ft).

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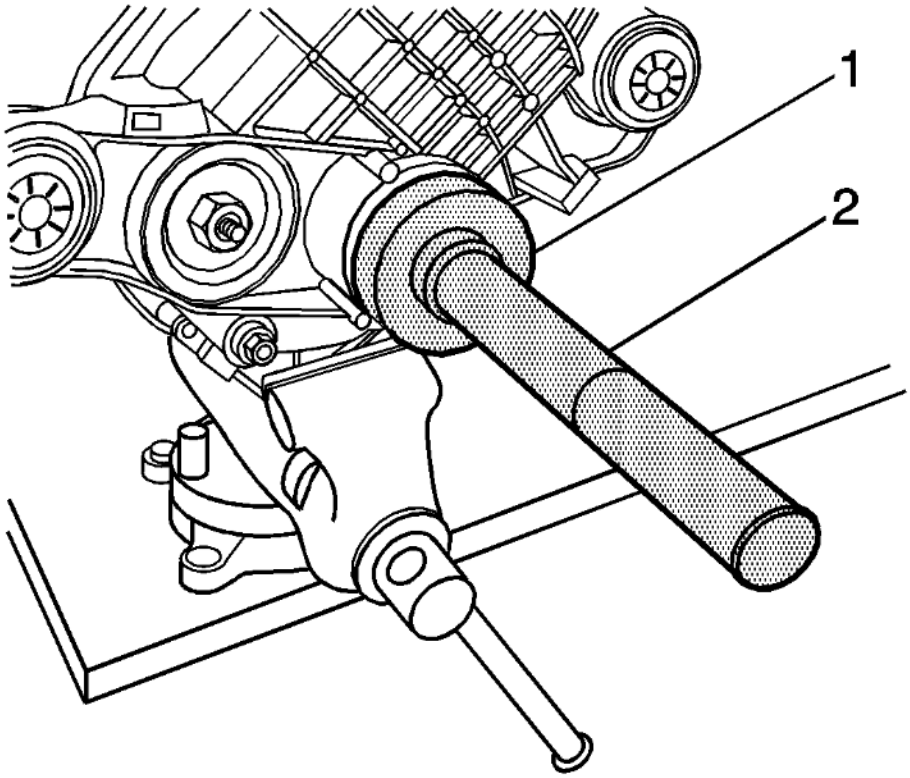


Fig. 405: Installing Axle Shaft Seal
Courtesy of GENERAL MOTORS COMPANY

8. Using the **J-45225** installer (1) and the **J-8092** handle (2), install the new left side axle shaft seal.
9. Install the new left side inner axle shaft retainer ring.
10. Install the left side inner shaft into the differential carrier assembly until the inner shaft is seated against the differential side gear.

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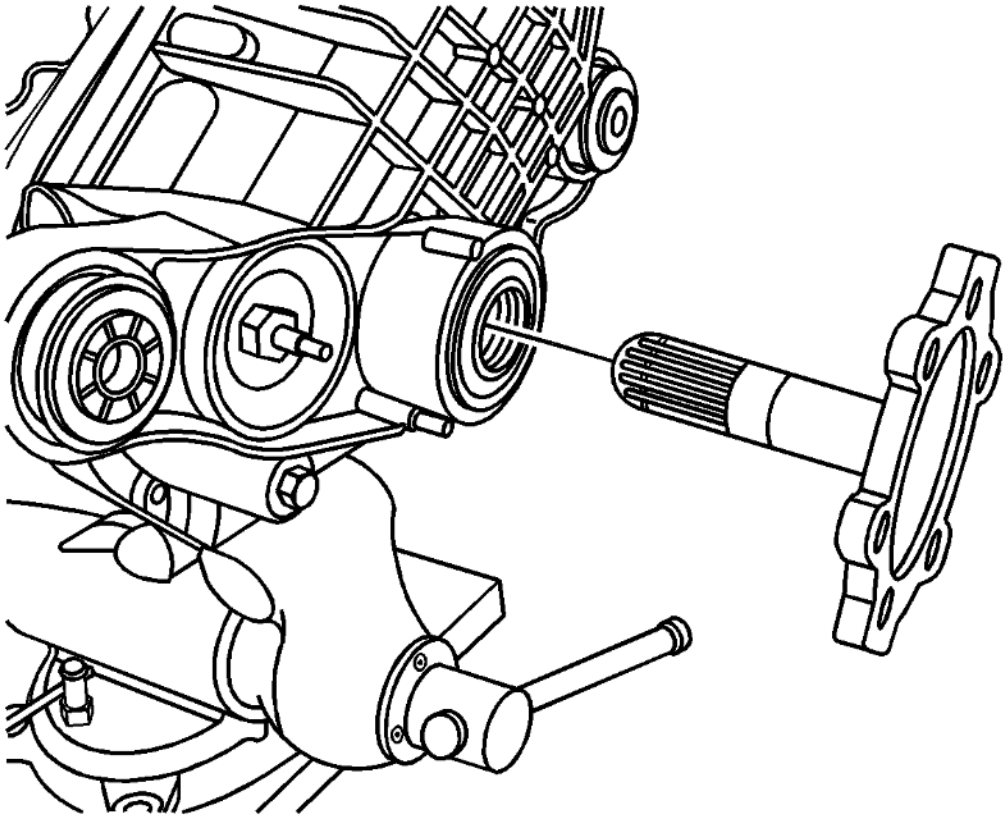


Fig. 406: Installing Left Side Inner Axle Shaft
Courtesy of GENERAL MOTORS COMPANY

11. Holding the inner shaft against the differential side gear, turn the inner shaft in order to align the splines of the inner shaft with the splines on the differential side gear.
12. Using a soft-faced mallet, drive the inner shaft into the differential case side gear until the retaining ring on the inner shaft is fully seated within the groove in the differential case side gear.
13. Pull back on the inner shaft to ensure that the inner shaft is properly retained in the differential case side gear.

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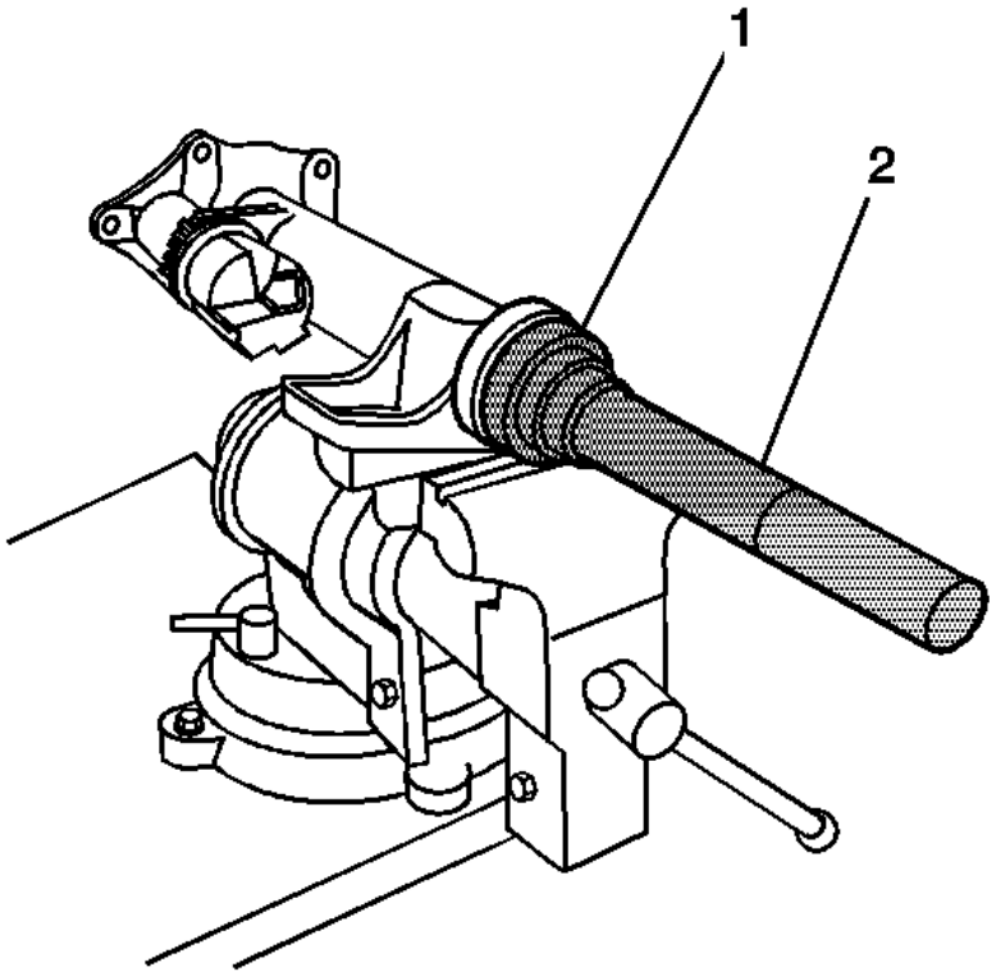


Fig. 407: Installing Side Bearing - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Clamp only on the mounting flange of the inner axle shaft housing.**

14. Install the inner axle shaft housing into a vise.
15. Using the **J-36609** installer (1) and the **J-8092** handle (2), install the bearing with the square shoulder.

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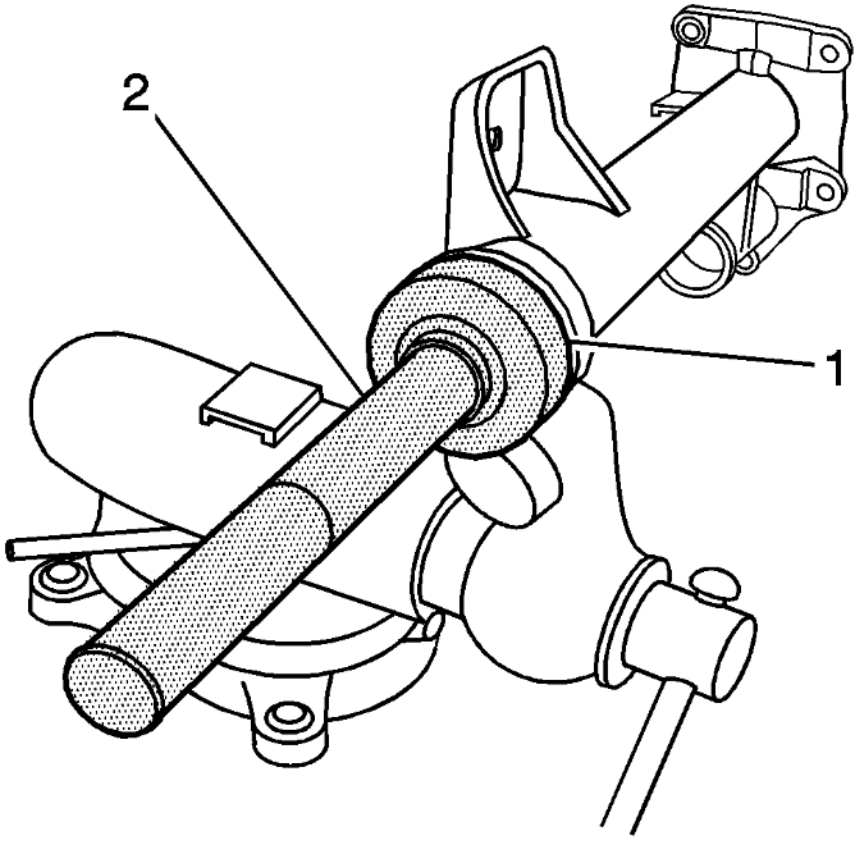


Fig. 408: Installing New Axle Shaft Seal - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

16. Using the **J-45225** installer (1) and the **J-8092** handle (2), install the new inner shaft seal.
17. Install the differential axle housing gasket.

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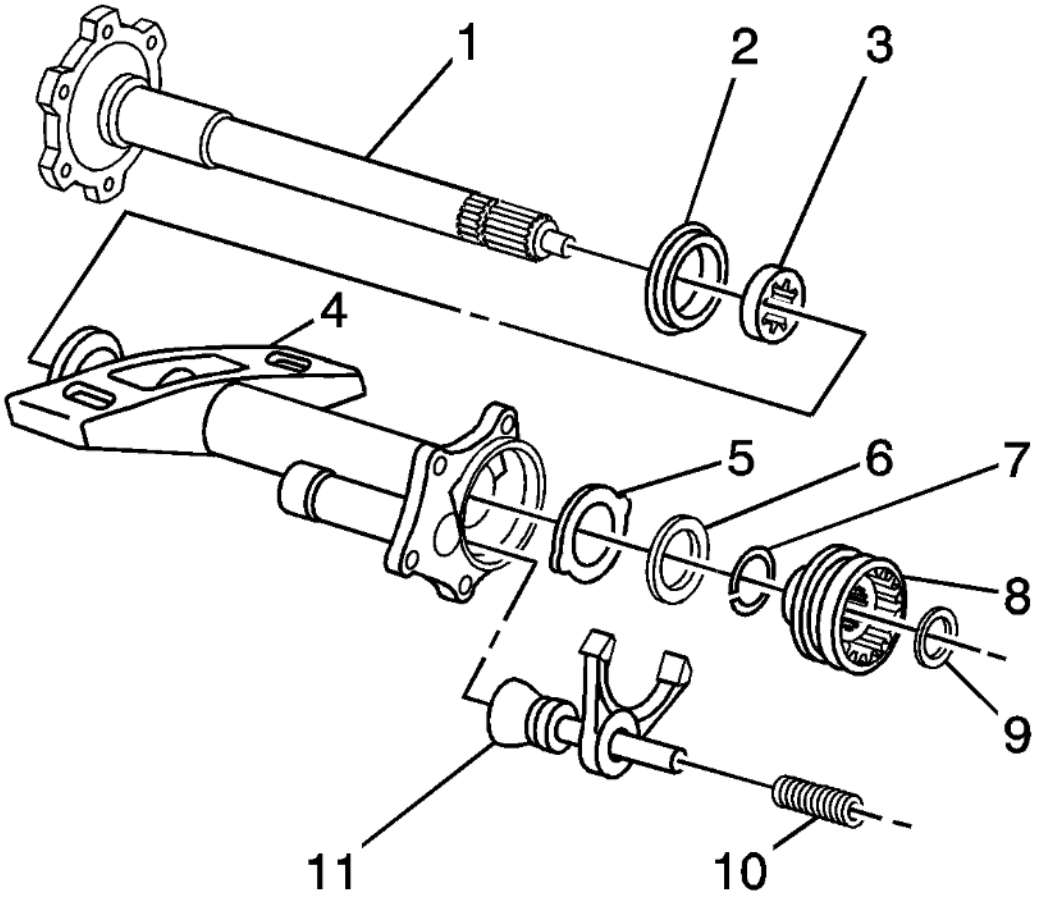


Fig. 409: Inner Axle Shaft Housing Components
Courtesy of GENERAL MOTORS COMPANY

18. Using a soft face mallet, install the inner axle shaft (1) in the axle shaft housing (4).

NOTE: **Apply a small amount of clean grease to hold the thrust washer in place.**

19. Align the tabs on the thrust washer (with tabs) (5) with the slots in the inner shaft housing.
20. Install the NEW retainer ring (7) on the inner axle shaft (1).
21. Determine the clutch gear shim thickness. Refer to **Front Drive Axle Clutch Gear Shim Adjustment**.
22. Install the clutch sleeve (9).
23. Install the clutch fork (11).
24. Install the clutch fork inner spring (10).
25. Apply sealant to the surface between the inner shaft housing and the differential carrier. For the correct sealant, refer to **Adhesives, Fluids, Lubricants, and Sealers**.

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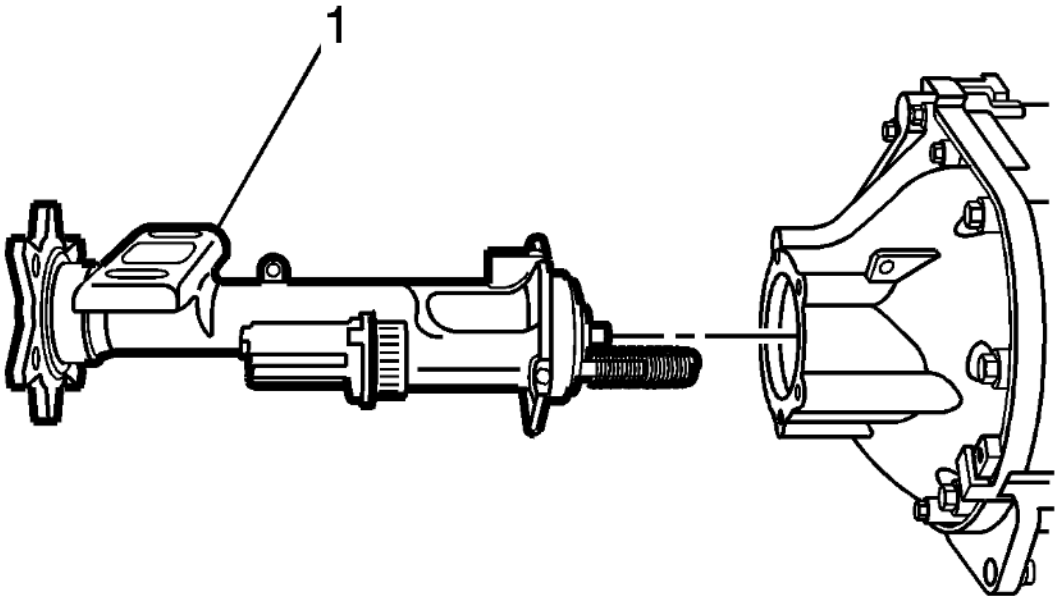


Fig. 410: Installing Inner Axle Shaft Housing Assembly - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS COMPANY

26. Install the inner shaft housing to the differential carrier assembly case.
27. Install the inner shaft housing bolts and tighten to 40 N.m (30 lb ft).
28. Install the washer and the drain plug. Tighten the drain plug to 33 N.m (24 lb ft).
29. Install the washer and fill plug. Tighten the fill plug to 33 N.m (24 lb ft).

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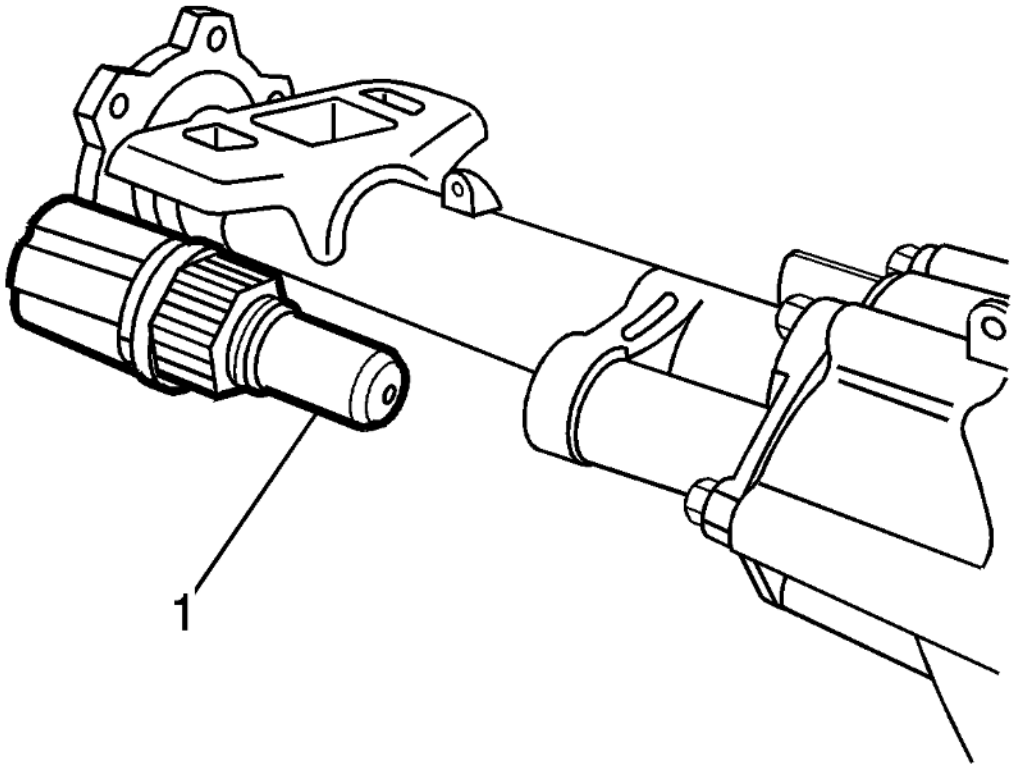


Fig. 411: Removing Inner Axle Shaft (8.25 Inch Axles)
Courtesy of GENERAL MOTORS COMPANY

30. Apply the correct thread sealant to the threads of the front drive actuator. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
31. Install the front drive actuator and tighten to 20 N.m (15 lb ft).

NOTE: **Ensure that the lower bushing is centered in the bore before installation.**

32. Using the **J-36616** remover/installer (2, 3, 4, 5) and the **J-21474-18** nut (1), install the lower differential carrier bushing.

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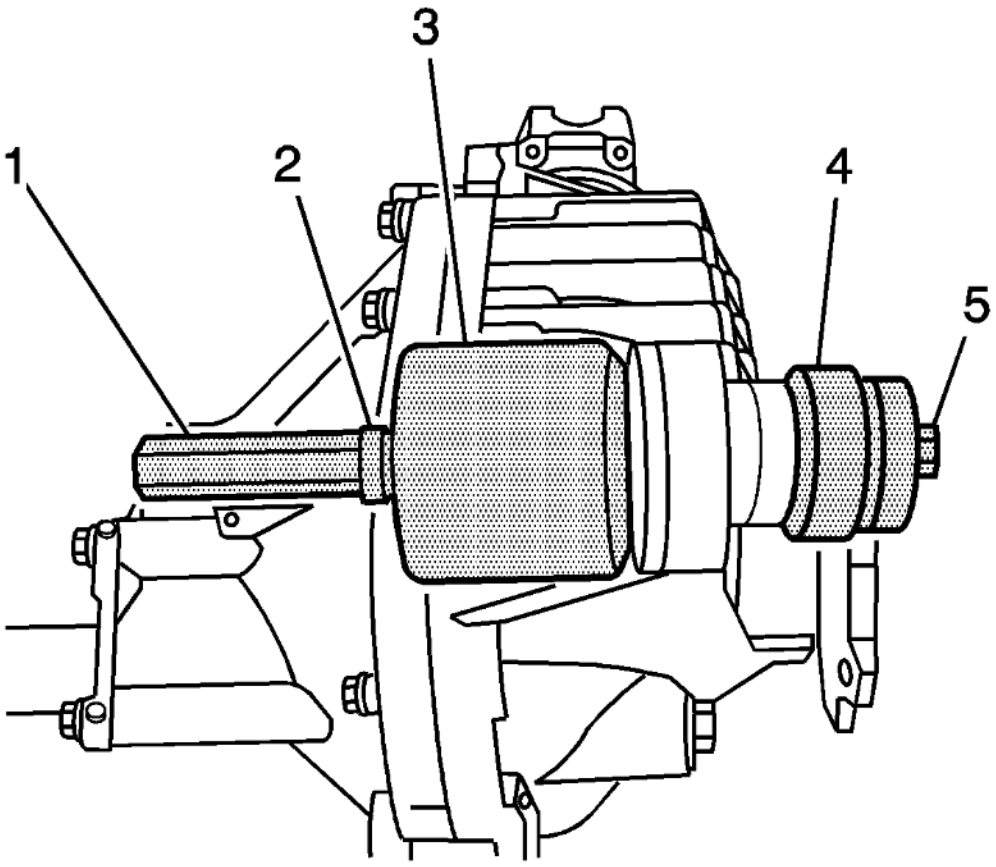


Fig. 412: Installing Upper Differential Carrier Assembly Bushing, Thrust Bearing Forcing Screw
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Ensure that the lower bushing is centered in the bore before installation.**

33. Using the **J-36616** remover/installer (2, 3, 4, 5) and the **J-21474-18** nut (1), install the upper differential carrier bushing.
34. Install the differential carrier assembly. Refer to **Front Axle Replacement (8.25 Inch Axle)**.

DIFFERENTIAL CARRIER ASSEMBLY FINAL ASSEMBLY (9.25 INCH AXLE)

Special Tools

- **EN 44215** Installer
- **J 5590** Installer
- **J 8001** Dial Indicator Set
- **J 8614-A** Flange and Pulley Holding Tool
- **J 25025** Guide Pins
- **J 33842** Bearing Installer
- **J 36366-A** Pinion Oil Seal Installer

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- **J 36609** Side Bearing Installer
- **J 36614** Inner Pinion Bearing Installer

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

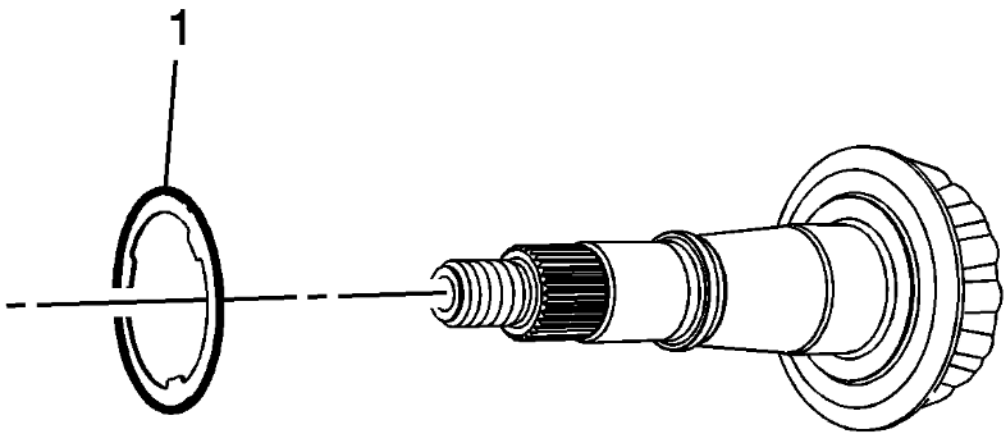


Fig. 413: Pinion Gear Selectable Shim
Courtesy of GENERAL MOTORS COMPANY

1. Install the selective shim (1) on the drive pinion gear.

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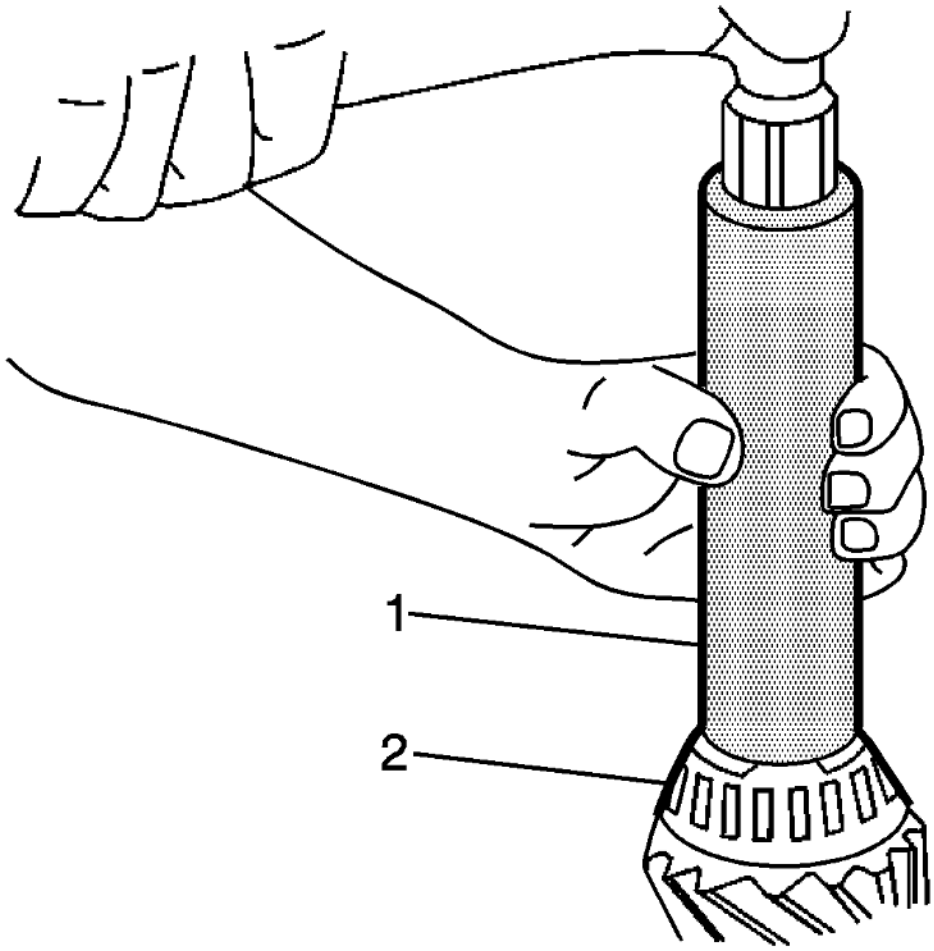


Fig. 414: Installing Inner Pinion Bearing Onto Pinion Gear
Courtesy of GENERAL MOTORS COMPANY

2. Using the **J 36614** installer (1), install the front differential pinion gear bearing (2).

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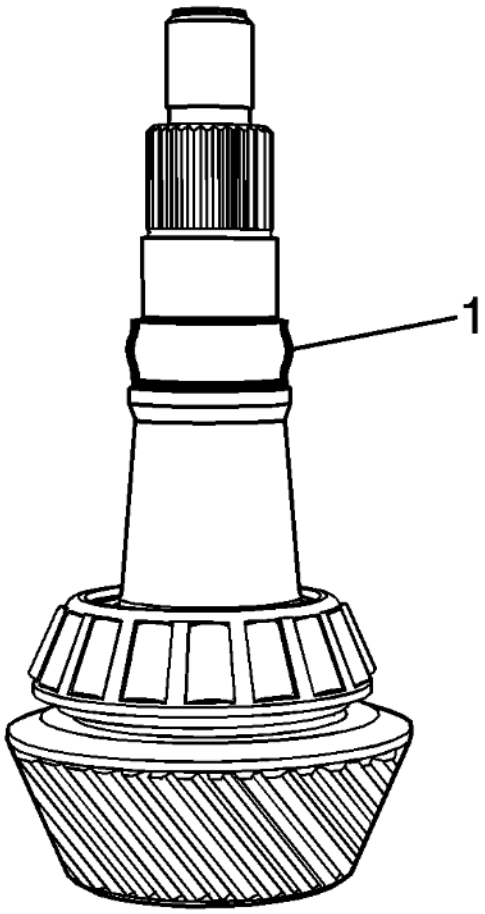


Fig. 415: Identifying Collapsible Spacer
Courtesy of GENERAL MOTORS COMPANY

3. Install the NEW collapsible spacer (1) on the drive pinion gear.
4. Lubricate the inner and the outer pinion bearings with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .
5. Install the outer drive pinion bearing cup into the differential housing. Refer to **Front Differential Drive Pinion Gear Bearing Cup Installation (9.25 Inch Axle)**.

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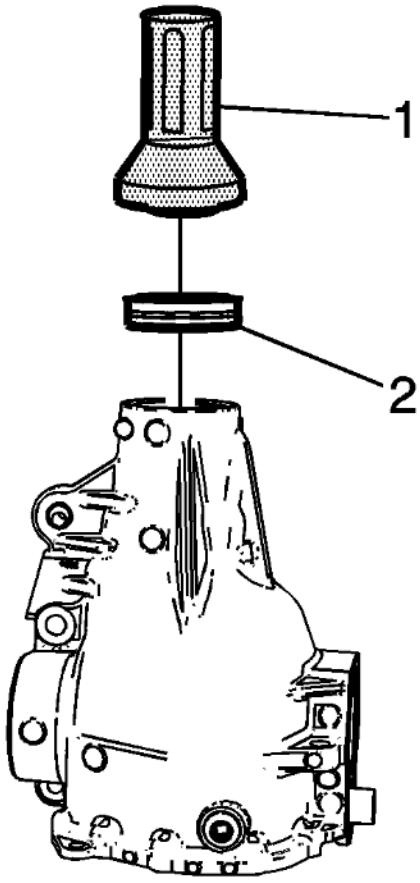


Fig. 416: Front Differential Drive Pinion Gear Seal And Installer
Courtesy of GENERAL MOTORS COMPANY

6. Using the **J 36366-A** installer (1), install the front differential drive pinion gear seal (2).
7. Adjust the drive pinion gear depth. Refer to **Pinion Depth Adjustment (9.25 Inch Axle)**.

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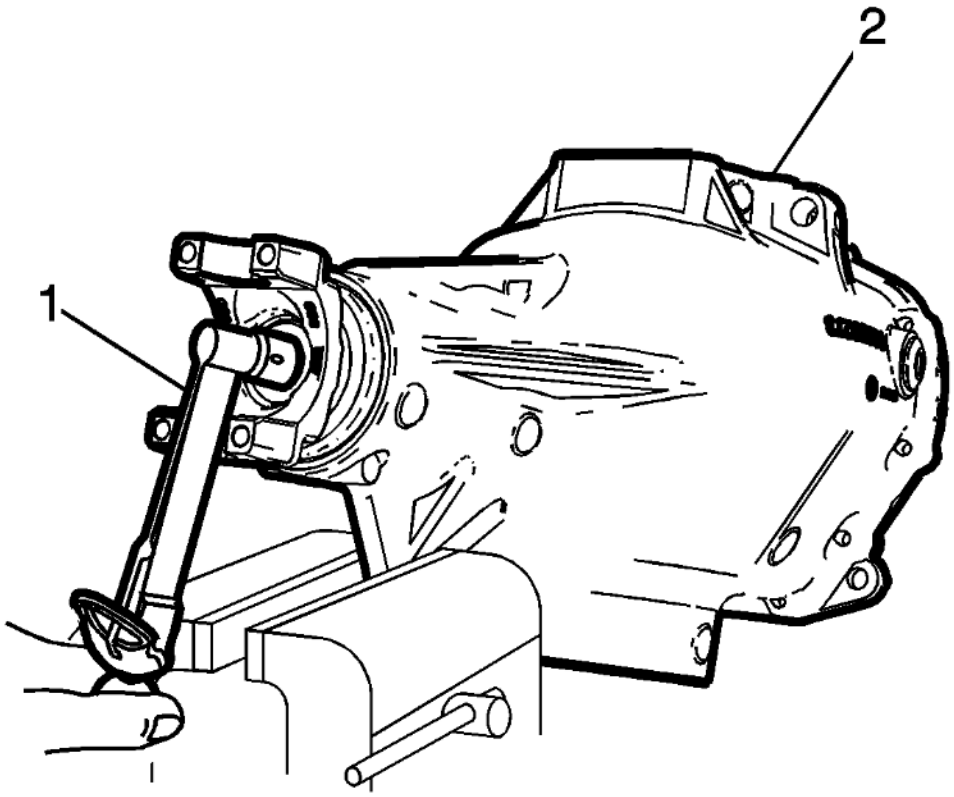


Fig. 417: Identifying Front Differential Housing
Courtesy of GENERAL MOTORS COMPANY

8. Install the front differential housing (2) in a soft jawed vise.

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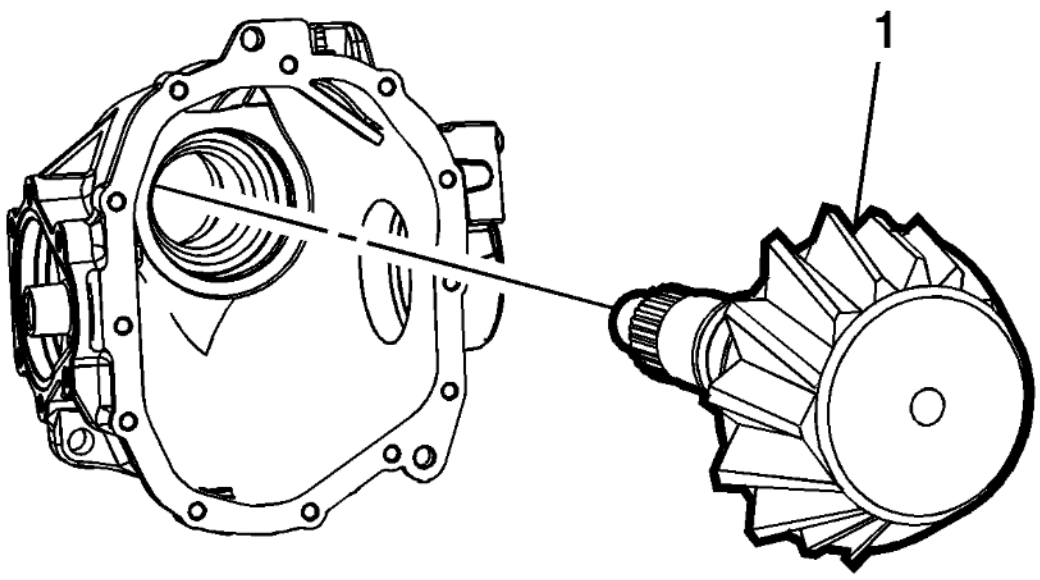


Fig. 418: Identifying Drive Pinion Gear
Courtesy of GENERAL MOTORS COMPANY

9. Install the drive pinion gear (1) in the differential housing.

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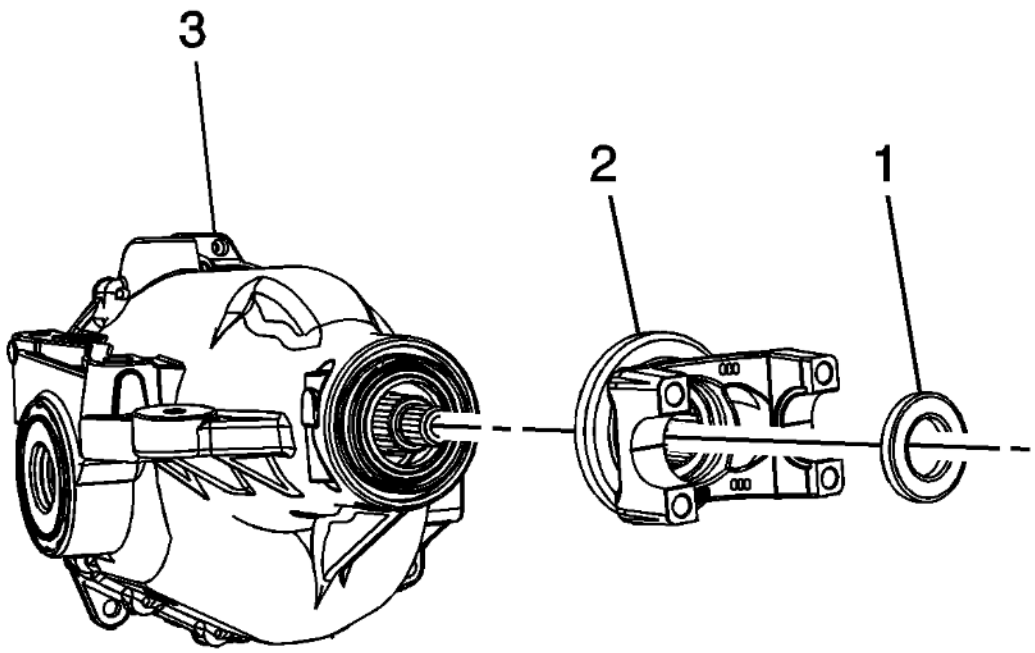


Fig. 419: Washer And Drive Pinion Flange
Courtesy of GENERAL MOTORS COMPANY

10. Using a soft faced hammer and supporting the drive pinion gear from the inside, lightly tap the front differential drive pinion gear yoke (2) until the threads of the drive pinion gear show through.
11. Install the washer (1) on the front drive pinion gear.
12. Install the old drive pinion gear nut.

NOTE: DO NOT use air tools for this procedure. Use ONLY HAND TOOLS.

13. Using the **J 8614-A** holding tool and a ratchet wrench, draw the front differential drive pinion gear yoke 3/4 of the way onto the drive pinion gear.
14. Remove the old drive pinion gear nut and replace with the NEW drive pinion gear nut.

NOTE: Rotate the drive pinion while tightening the drive pinion nut in order to seat the bearings.

15. Tighten the NEW drive pinion nut until the end play is just taken up.

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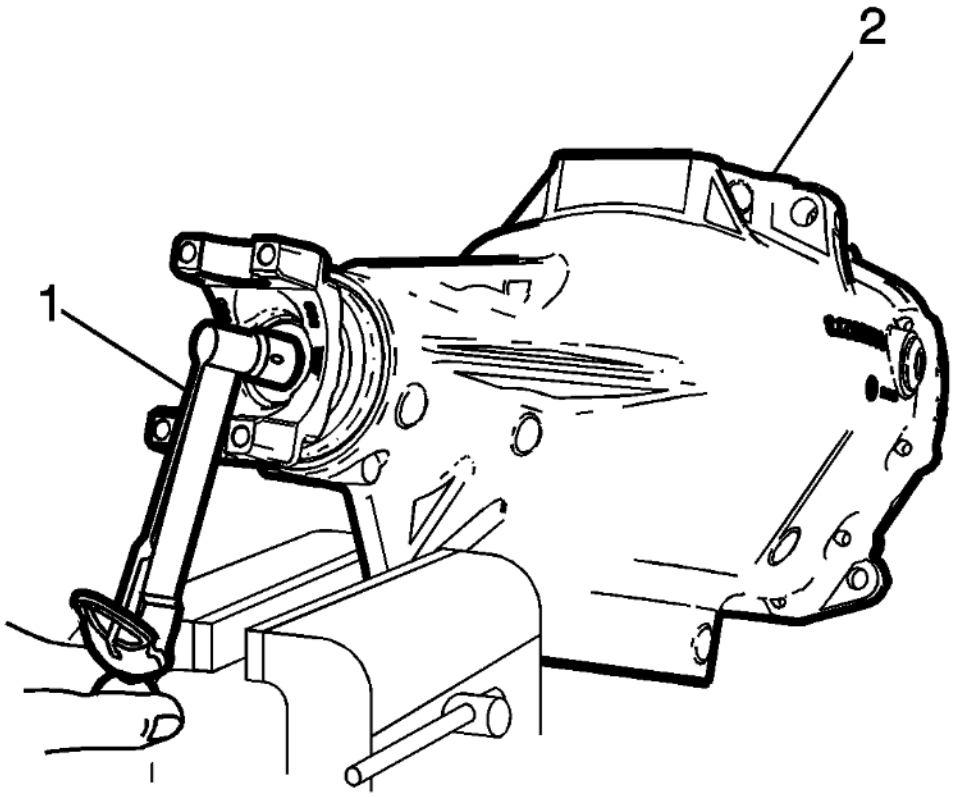


Fig. 420: Identifying Front Differential Housing
Courtesy of GENERAL MOTORS COMPANY

NOTE: **If the rotating torque is greater than the specifications required, the collapsible spacer will have to been replaced.**

16. Using an inch pound torque wrench (1), measure the rotating torque of the drive pinon which 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.
17. If the rotating torque reading is below 1.0 N.m (10 lb in) for used bearing or 1.7 N.m (15 lb in) for the NEW bearings, re-install the **J 8614-A** holding tool and continue to tighten the drive pinion nut until the required specifications are met 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.

NOTE: **Recheck the rotating torque if necessary.**

18. Once the specified torque specifications have been reached, rotate the drive pinon several times to ensure that the drive pinon bearings are seated.

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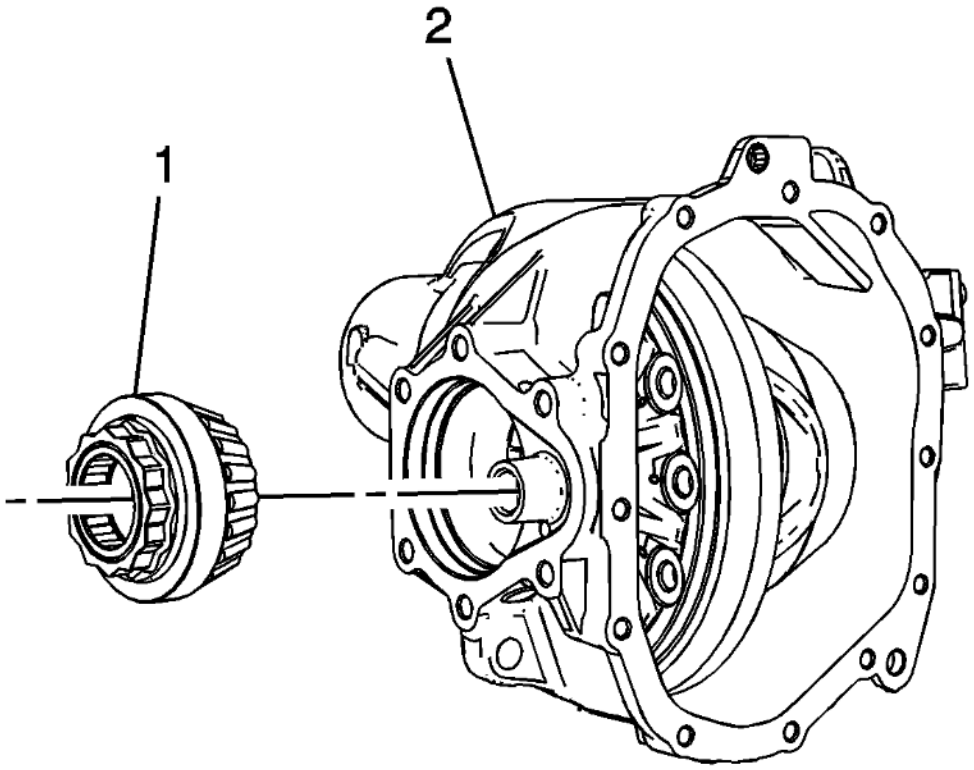


Fig. 421: Identifying Differential Adjuster And Differential Carrier
Courtesy of GENERAL MOTORS COMPANY

19. Install the differential adjuster (1) in the differential carrier (2).

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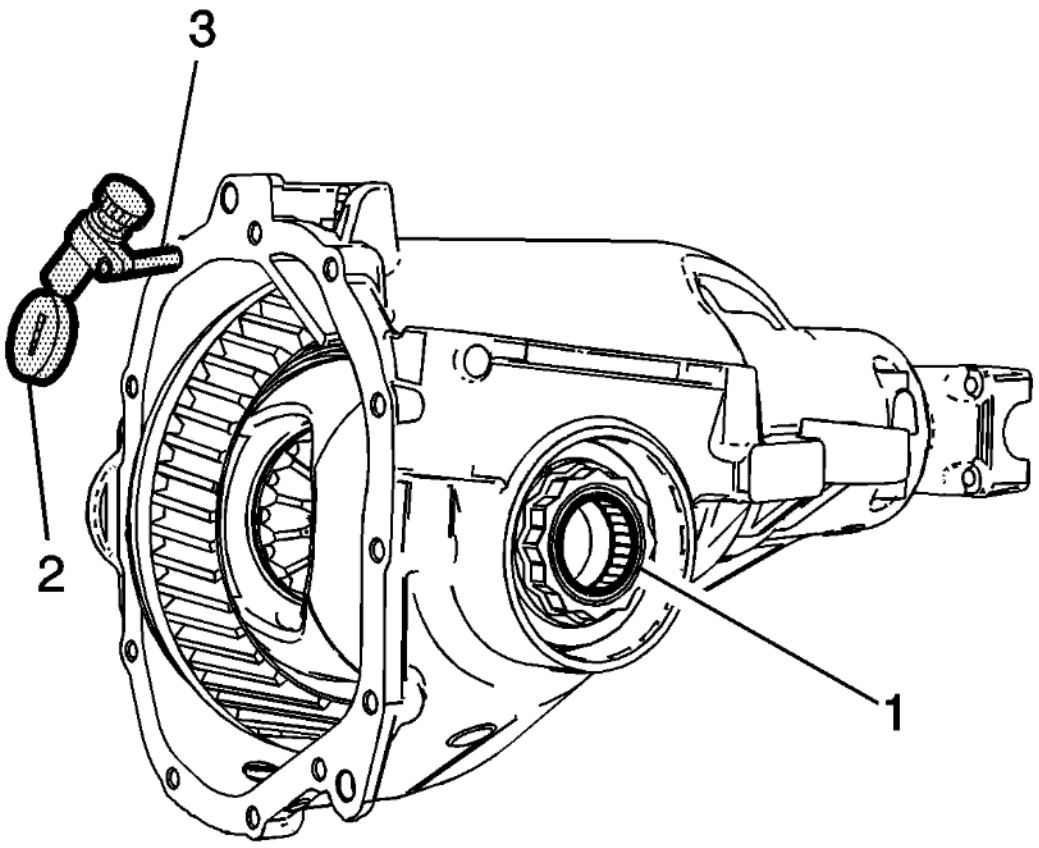


Fig. 422: Indicator And Guide Pins
Courtesy of GENERAL MOTORS COMPANY

20. Position the **J 8001** indicator (2) and the **J 25025** guide pins (3) on the differential housing.

NOTE: **Ensure that the gauge is aligned with the gear rotation and square to the tooth angle.**

21. Preload the **J 8001** indicator (2) approximately 1/2 turn and zero the gauge.

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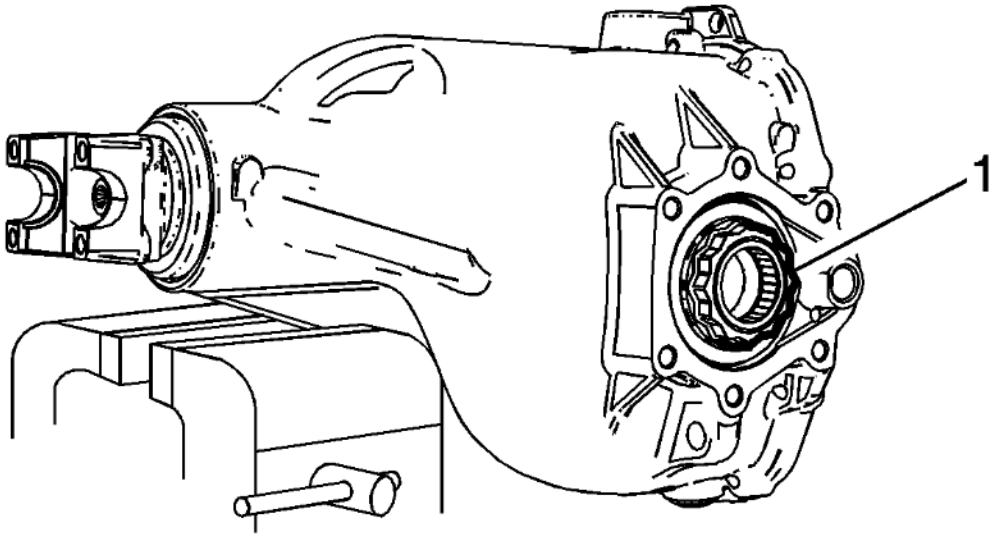


Fig. 423: Right Side Differential Adjuster
Courtesy of GENERAL MOTORS COMPANY

22. Using a 57 mm 12 point socket, turn the right side differential adjuster (1) clockwise until 0.0254-0.0762 mm (0.001-0.003 in) of backlash can be measured on the ring gear and the drive pinon gear.

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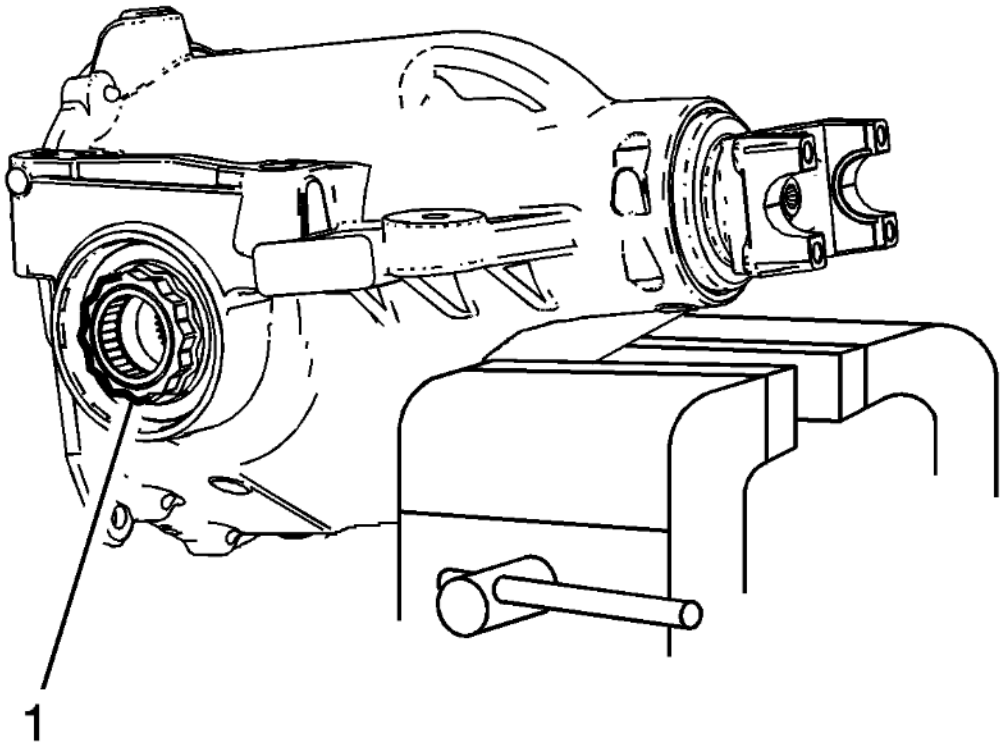


Fig. 424: Left Side Differential Adjuster
Courtesy of GENERAL MOTORS COMPANY

23. Using a 57 mm 12 point socket, turn the left differential adjuster (1) to preload the adjuster bearings against the differential bearing cups.
24. Tighten the differential adjuster nut obtain a total torque to rotate of the SUM of the 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.
25. Rotate the drive pinion several times in order to seat the drive pinion and differential adjuster bearings.
26. Using a inch pound torque wrench and measure the rotating torque of the differential assembly which should be 1.99-4.2 N.m (17-37 lb in) for NEW bearings and 1.29-3.1 N.m (11-27 lb in) for used bearings.
27. If the rotating torque measurement is below 1.29-3.1 N.m (11-27 lb in) for used bearings or 1.99-4.2 N.m (17-37 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 and the differential carrier case for the left and right sides.
    2. Turn the differential adjuster in or clockwise.
    3. Using a inch pound torque wrench, measure the rotating torque of the differential assembly.
    4. Compare the new measurement to the specifications in step 8. If the rotating torque of the differential assembly is not within specifications, continue to tighten the left and right differential adjusters until the rotating torque of the differential assembly is within specifications.

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28. If the rotating torque measurement is above 3.1 N.m (27 lb in) for used bearings or 4.2 N.m (37 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 and the differential carrier case for the left and right sides.
    2. Turn the differential adjuster out or counter clockwise.
    3. Using a inch pound torque wrench, measure the rotating torque of the differential assembly.
    4. Compare the new measurement to the specifications in step 8. If the rotating torque of the differential assembly is not within specifications, continue to tighten the left and right differential adjusters until the rotating torque of the differential assembly is within specifications.

NOTE: **Recheck the rotating torque and adjust if necessary.**

29. Once the specified rotating torque is obtained, rotate the differential assembly several times to ensure that the bearings have seated.
30. 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**.

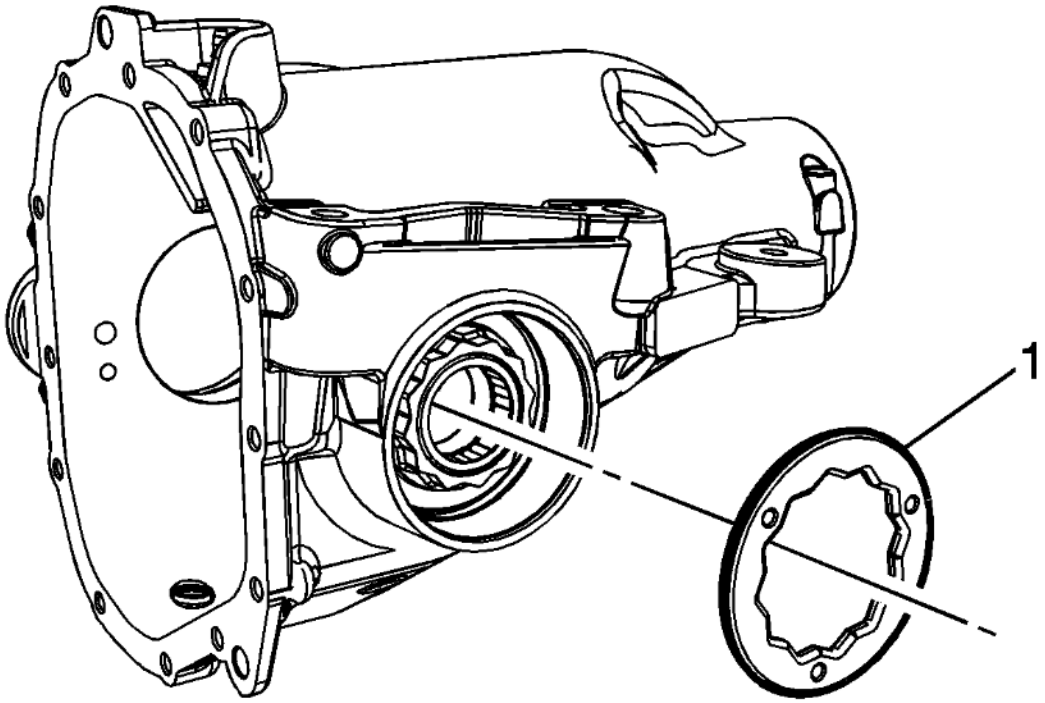


Fig. 425: Identifying Differential Adjuster Lock Ring
Courtesy of GENERAL MOTORS COMPANY

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31. Install the differential adjuster lock ring (1) flush with differential housing.

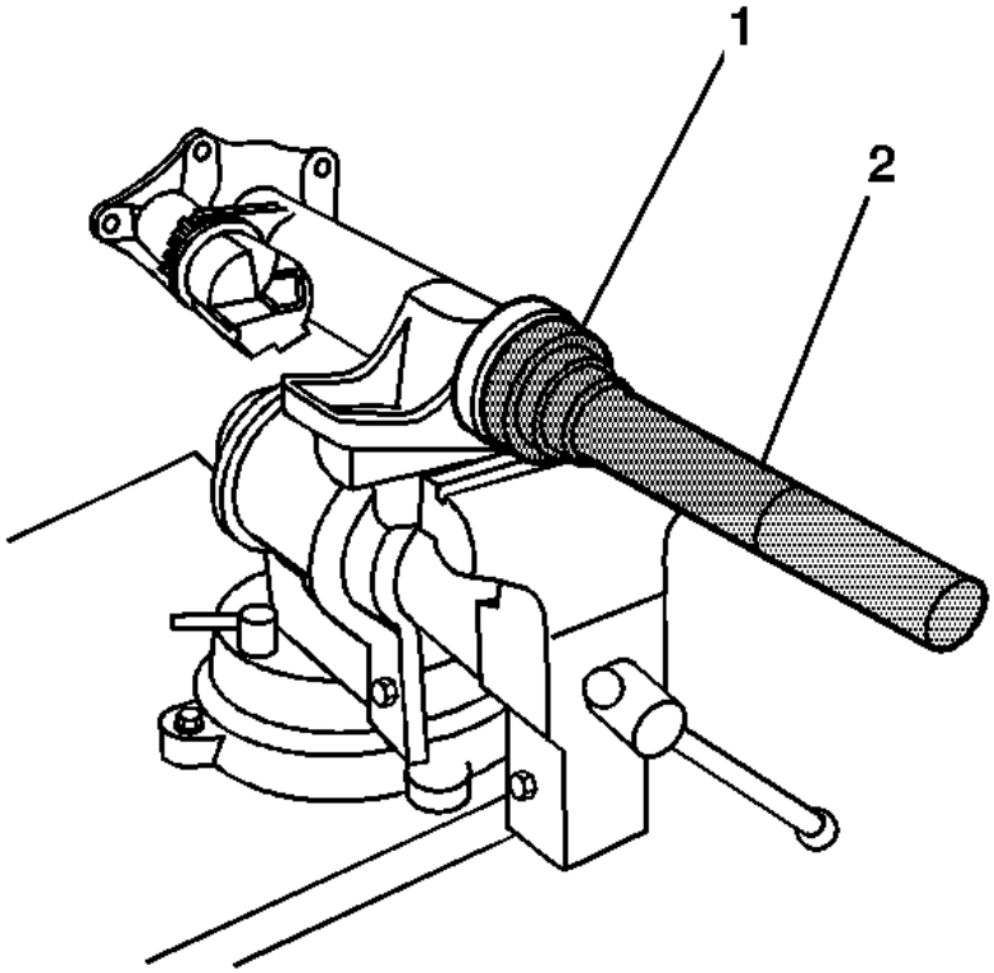


Fig. 426: Installing Side Bearing - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

32. Install the inner axle shaft in a vise.
33. Using the **J 36609** installer (1) and the **J 8092** handle (2), install the inner bearing.

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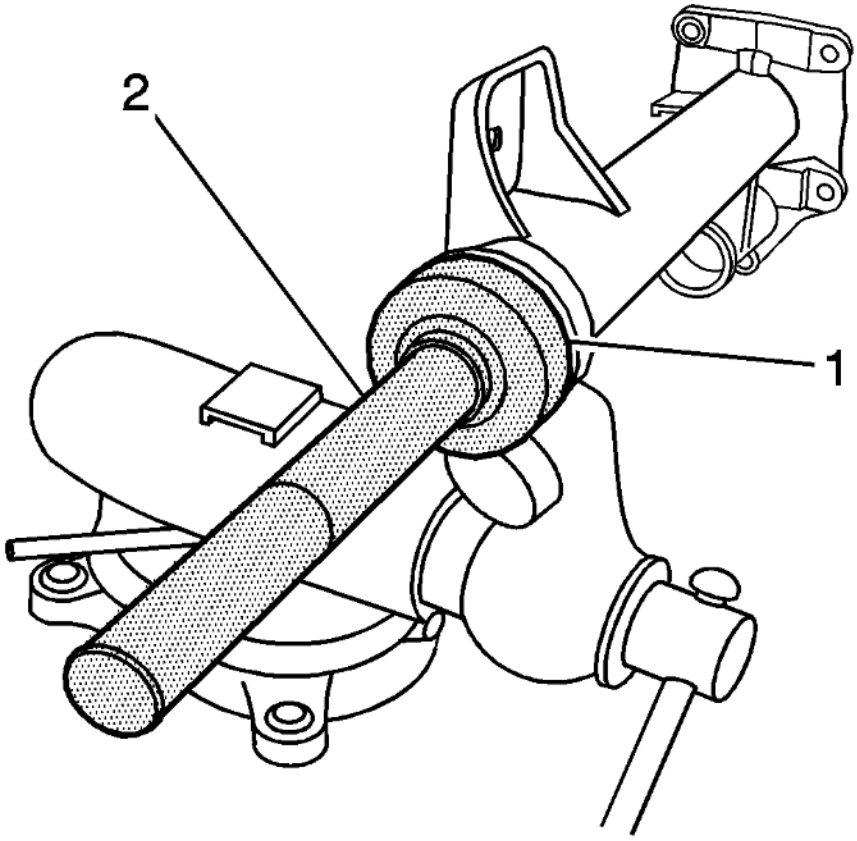


Fig. 427: Installing New Axle Shaft Seal - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

34. Using the **EN 44215** installer (1) and the **J 8092** handle (2), install the inner axle shaft seal.

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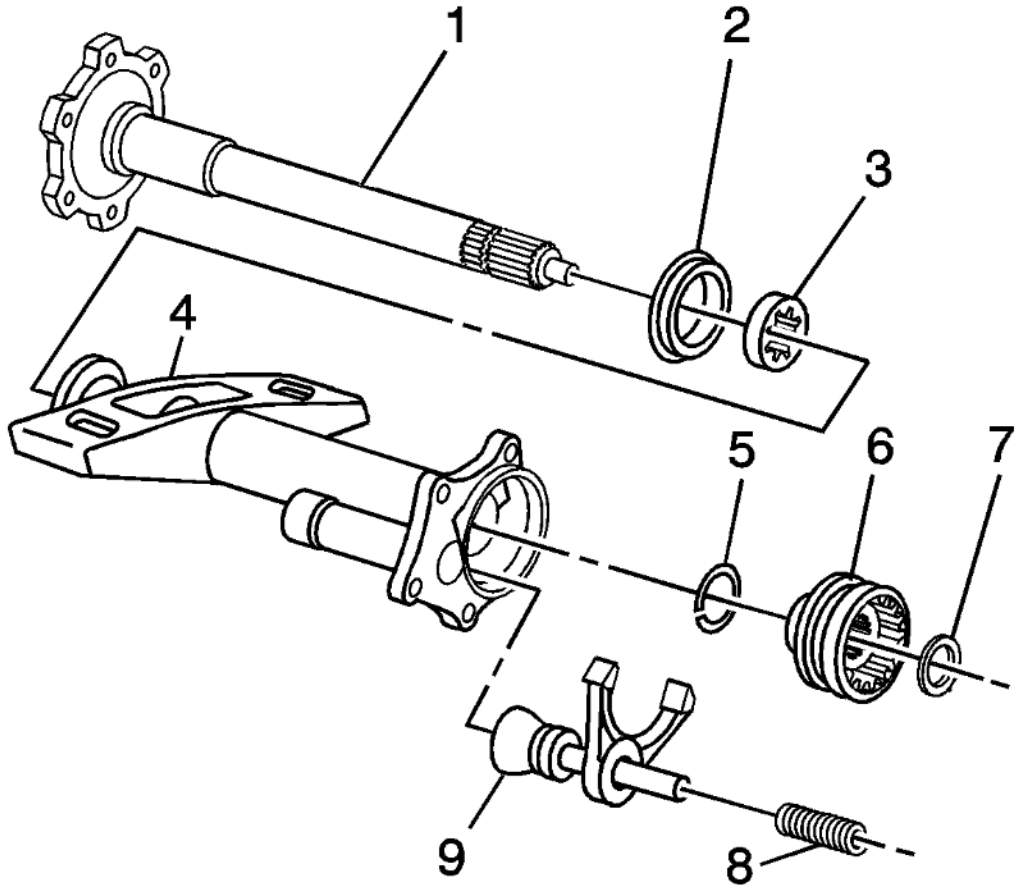


Fig. 428: Inner Axle Shaft, Inner Axle Shaft Housing, Thrust Washer With Tabs And Retaining Ring
Courtesy of GENERAL MOTORS COMPANY

35. Using a soft face mallet, install the inner axle shaft (1).
36. Install the thrust washer (5), NEW retaining ring (6), on the inner axle shaft (1).
37. Determine the clutch gear shim thickness. Refer to **Front Drive Axle Clutch Gear Shim Adjustment**.
38. Install the correct clutch gear shim (8), clutch sleeve (7), clutch fork assembly (10), and the clutch fork inner spring (9) in the inner axle housing.

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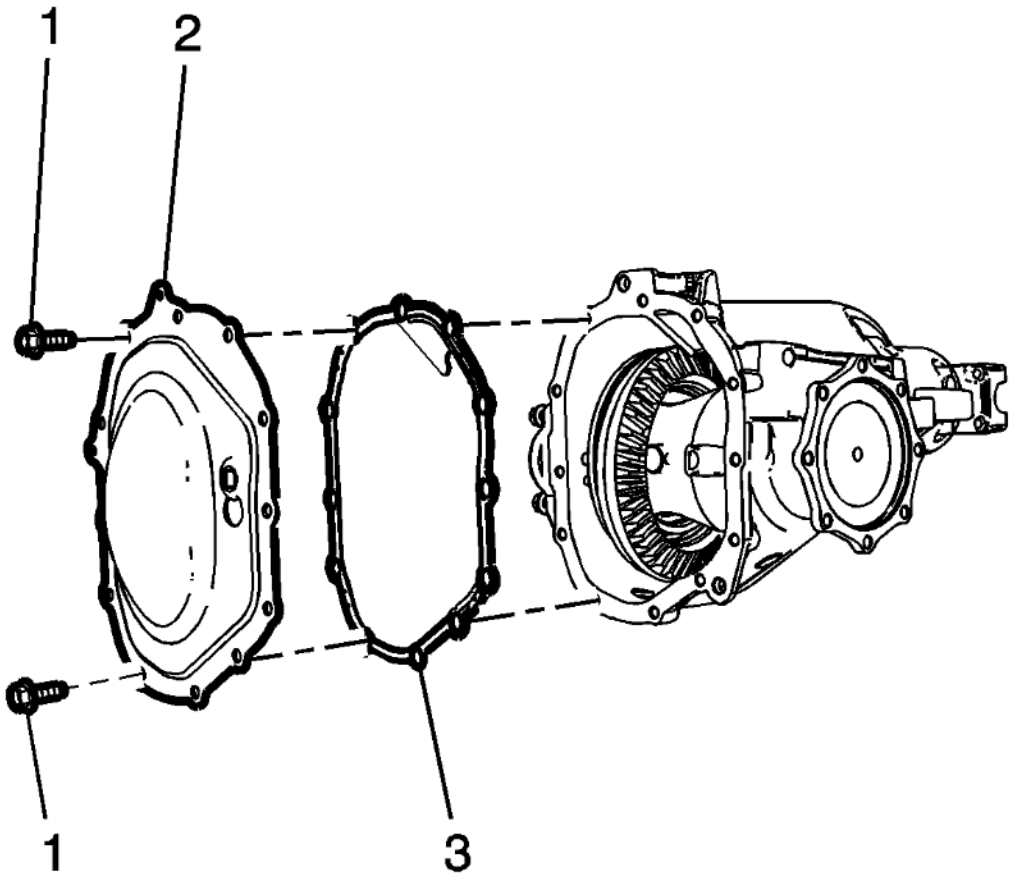


Fig. 429: Rear Axle Housing Cover Gasket, Rear Axle Housing Cover And Bolts
Courtesy of GENERAL MOTORS COMPANY

39. Install the axle housing cover gasket (3), axle housing cover (2).

CAUTION: Refer to Fastener Caution .

40. Install the axle housing covers bolts (1) and tighten to 40 N.m (30 lb ft).

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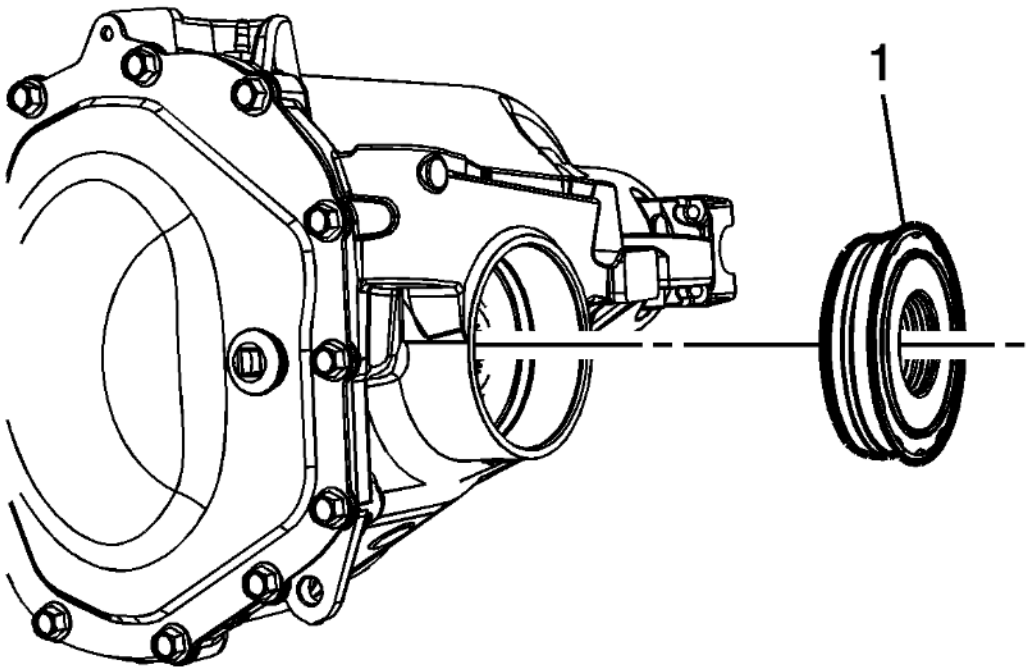


Fig. 430: Seal Deflector
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Ensure that the axle shaft seal is evenly positioned in the rear differential housing.**

41. Position the axle shaft seal (1) in the differential housing.

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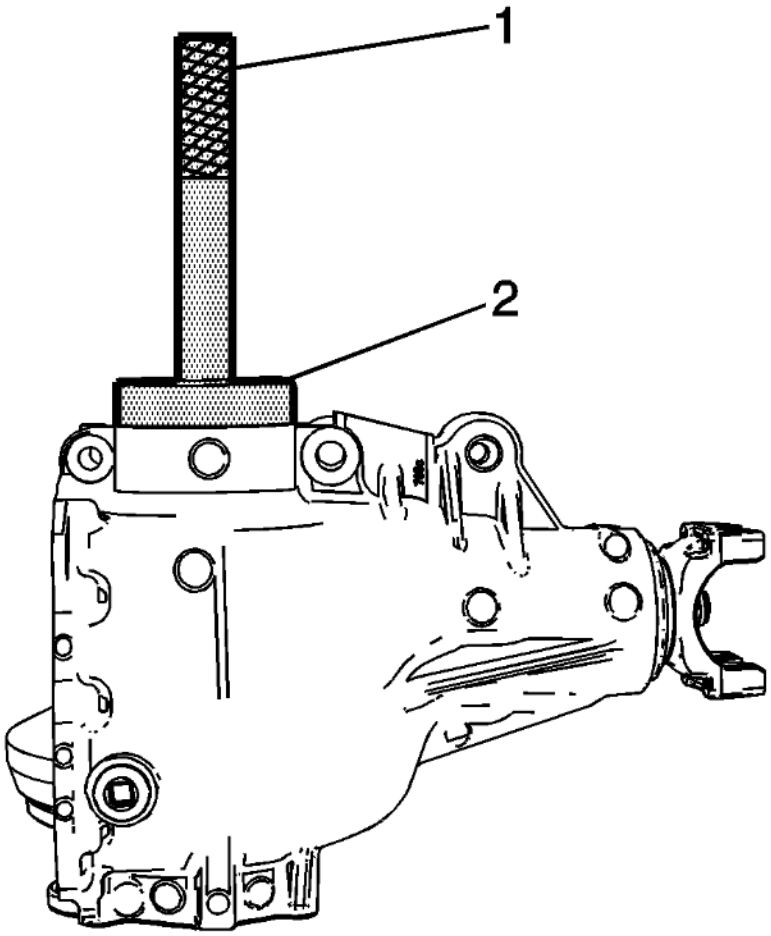


Fig. 431: Installer And Handle
Courtesy of GENERAL MOTORS COMPANY

42. Using the **EN 44215** installer (2) and the **J 8092** handle (1), install the axle shaft seal.

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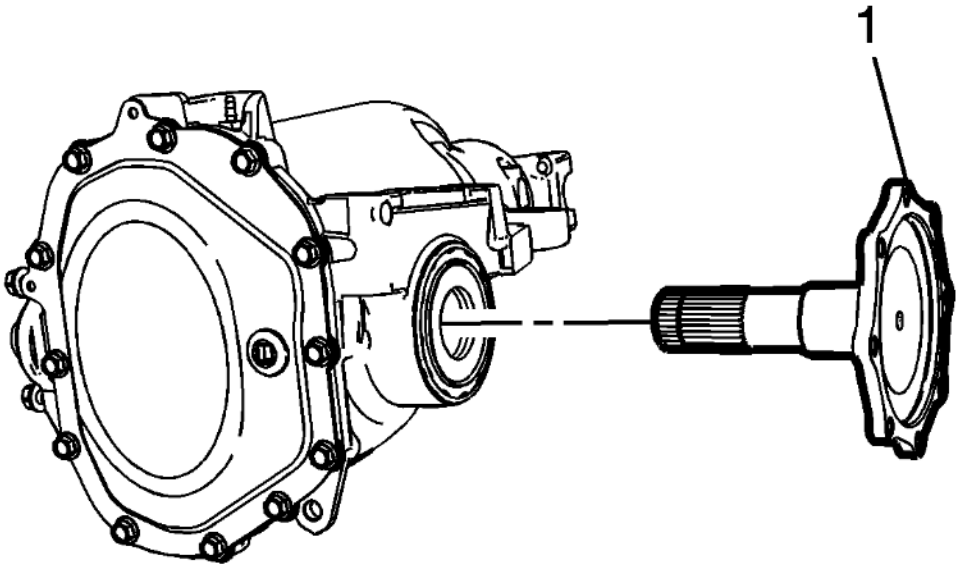


Fig. 432: Identifying Front Drive Axle Inner Shaft
Courtesy of GENERAL MOTORS COMPANY

43. Install the front drive axle inner shaft (1).

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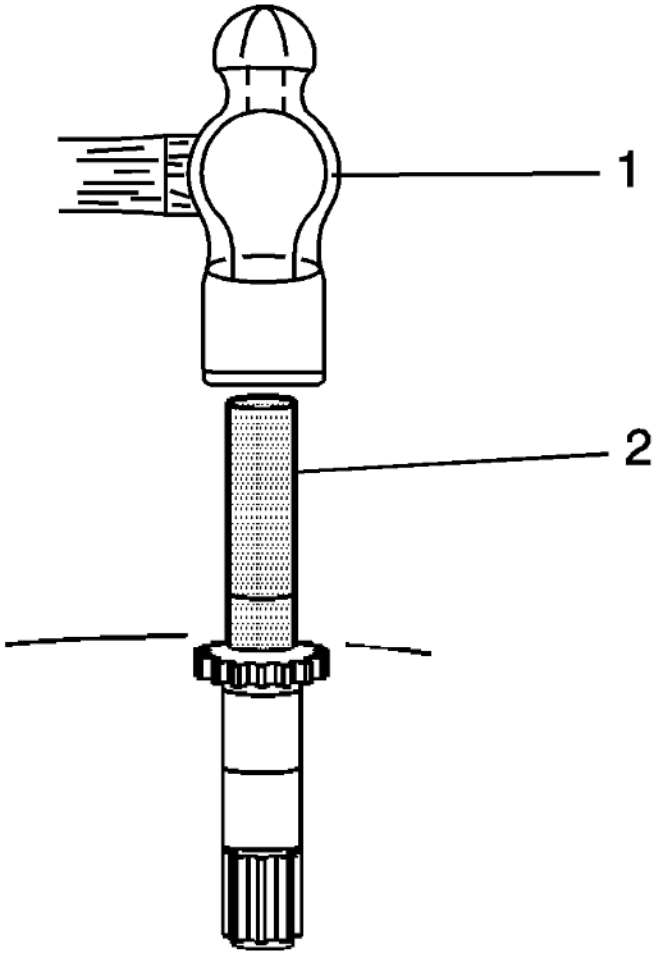


Fig. 433: Installer And Hammer
Courtesy of GENERAL MOTORS COMPANY

44. Using the **J 33842** installer (2) and a hammer (1), install the front drive axle clutch shaft bearing.

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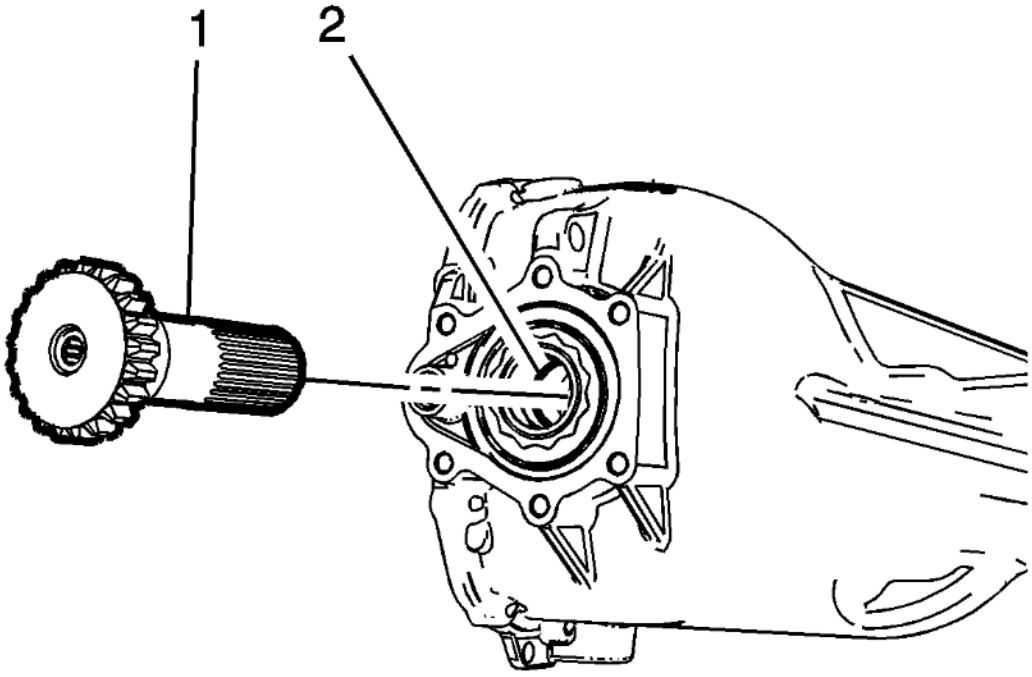


Fig. 434: Identifying Front Drive Axle Clutch Shaft And Differential Side Gear
Courtesy of GENERAL MOTORS COMPANY

45. Install the front drive axle clutch shaft (1) into the differential side gear (2).

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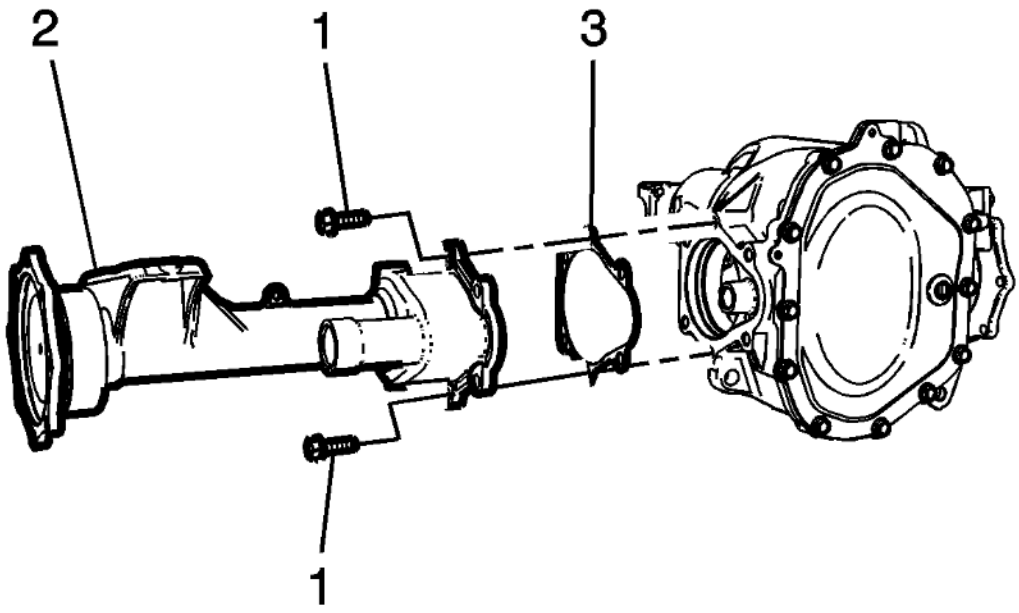


Fig. 435: Identifying Front Drive Axle Inner Axle Assembly, Gasket And Bolts
Courtesy of GENERAL MOTORS COMPANY

46. Install the front drive axle inner axle assembly (2), gasket (3), the bolts (1).
47. Tighten the bolts (1) to 65 N.m (48 lb ft).

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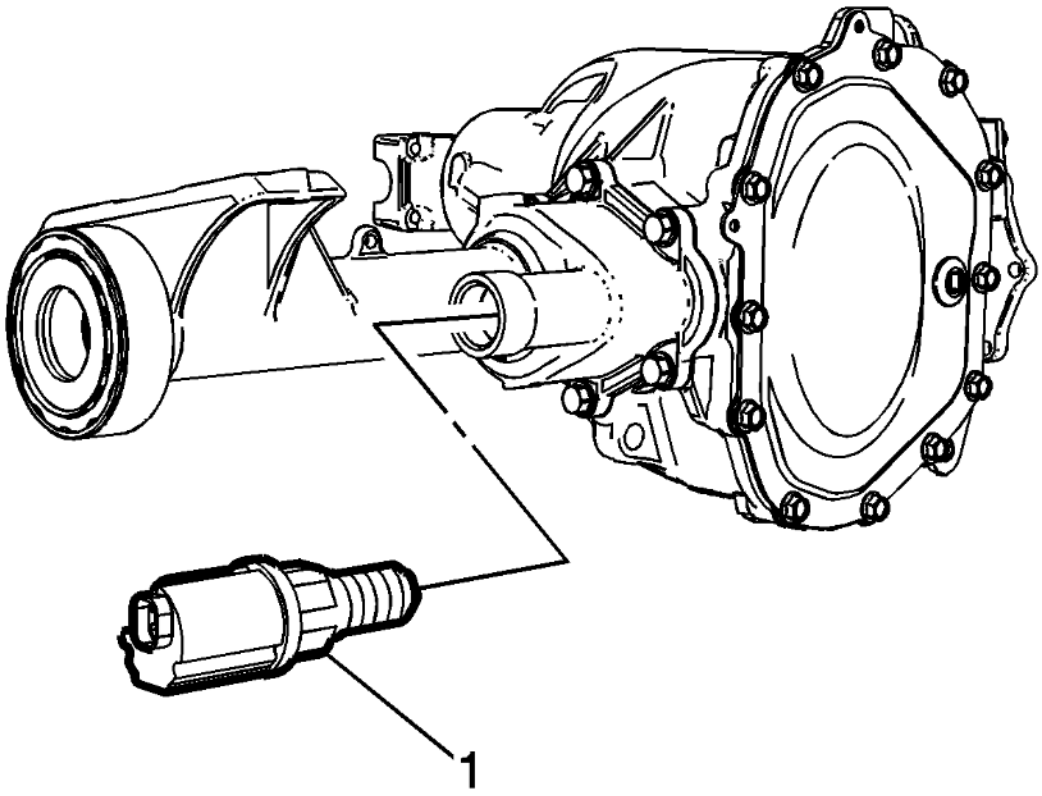


Fig. 436: Identifying Front Drive Axle Actuator
Courtesy of GENERAL MOTORS COMPANY

48. Apply a small amount of the correct sealant to the threads of the actuator (1). Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
49. Install the front drive axle actuator (1) and tighten to 30 N.m (22 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

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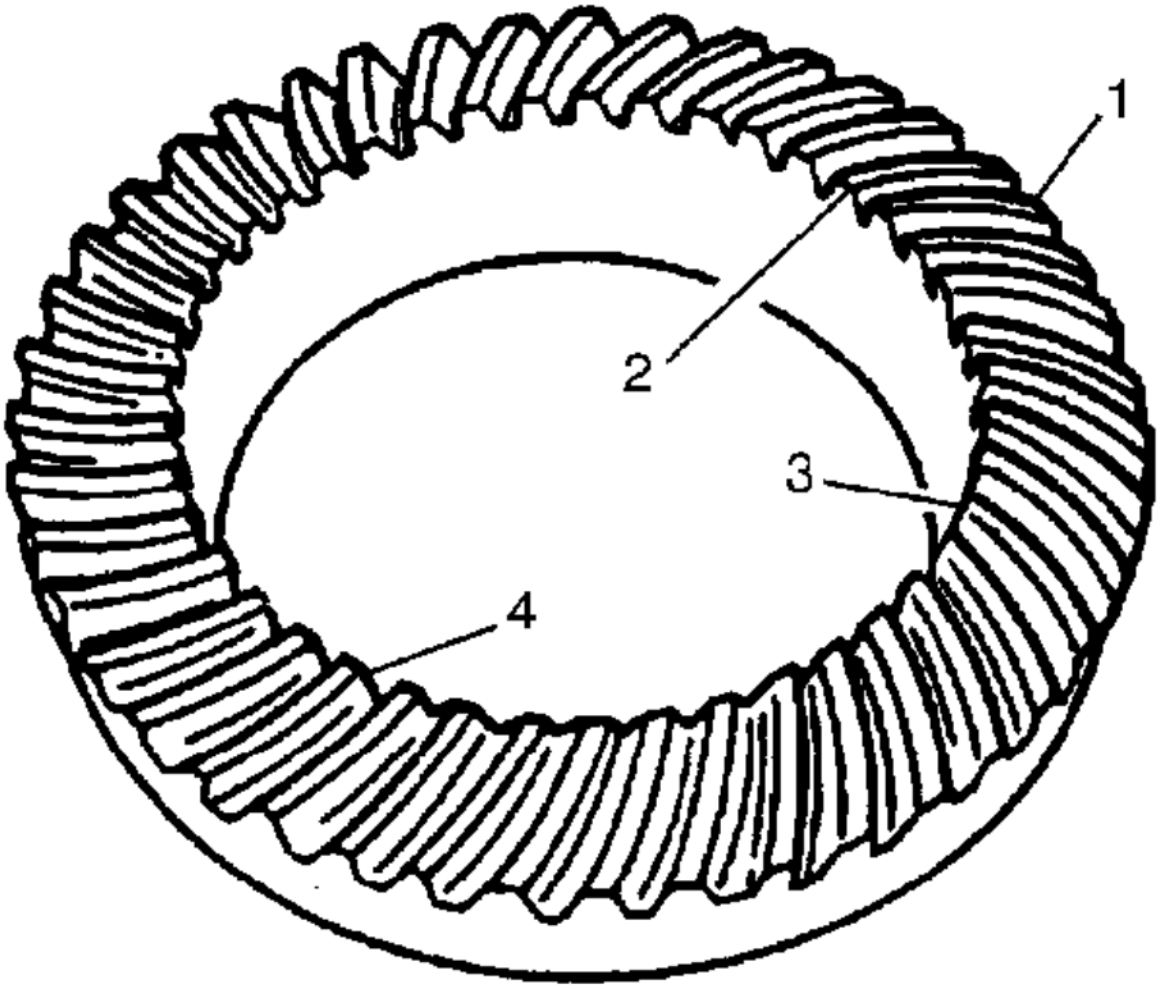


Fig. 437: Defining Gear Tooth Nomenclature
Courtesy of GENERAL MOTORS COMPANY

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

Adjustments Affecting Tooth Contact

The following 2 adjustments affect the tooth contact pattern:

- Backlash adjustment
- Pinion depth adjustment

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

Pinion Depth Adjustment

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

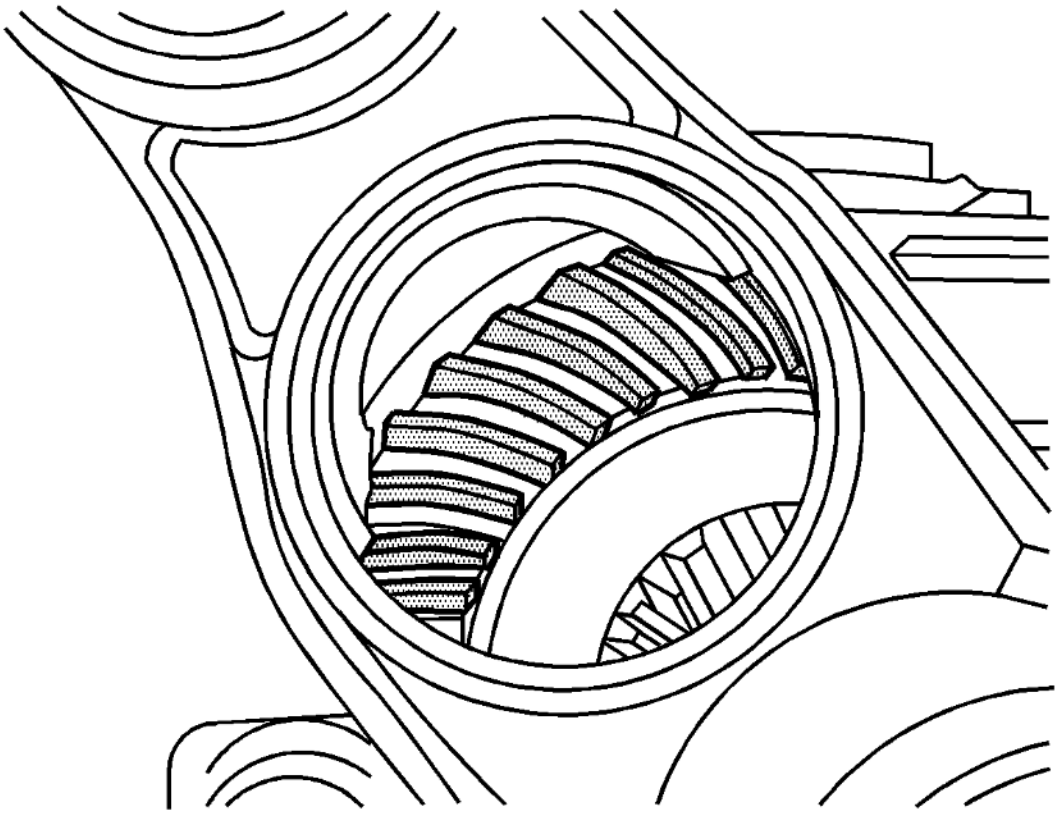


Fig. 438: Ring Gear Teeth Pattern
Courtesy of GENERAL MOTORS COMPANY

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

   IMPORTANT: Avoid turning the ring gear excessively.

3. Using a wrench, turn the drive pinion flange/yoke so that the ring gear rotates at least 3 full revolutions.
4. 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.
5. Observe the pattern on the ring gear teeth. Compare the pattern with the following illustrations.
6. Once the proper pattern is obtained, continue the assembly of differential carrier. Refer to **Front Axle Assemble (8.25 Inch Axle)Front Axle Assemble (9.25 Inch Axle)**.

Correct Contact Pattern

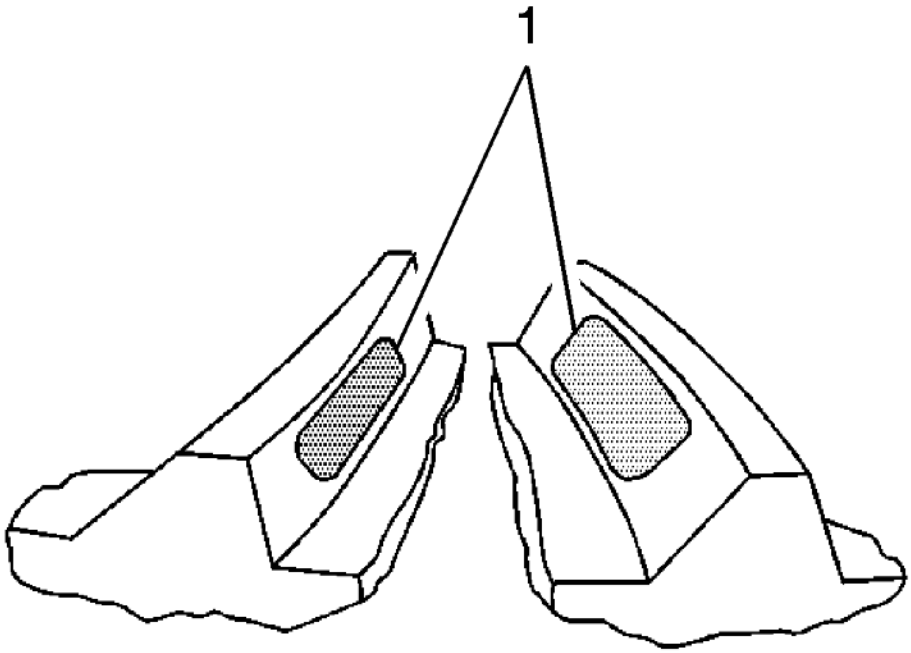


Fig. 439: Identifying Correct Gear Tooth Contact Pattern
Courtesy of GENERAL MOTORS COMPANY

Condition

The backlash and pinion depth is correct.

Correction

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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

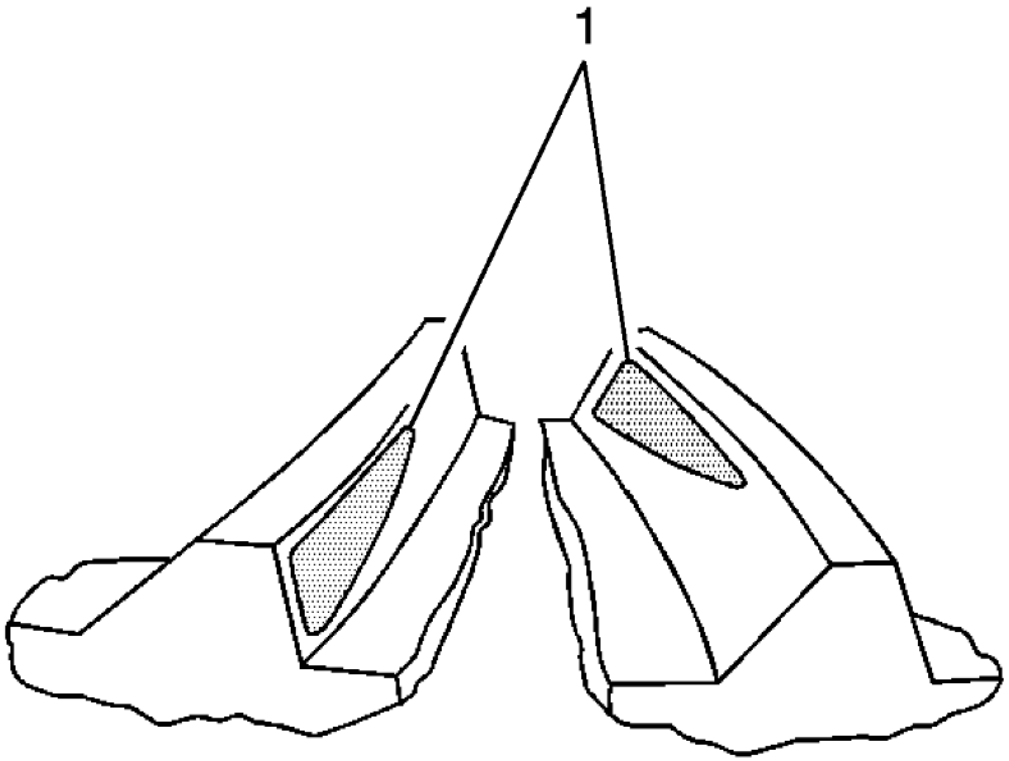


Fig. 440: Identifying Drive Side Heel - Coast Side Toe Contact Pattern
Courtesy of GENERAL MOTORS COMPANY

Condition

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

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Correction

Adjust the pinion depth of drive pinion. Refer to **Pinion Depth Adjustment (9.25 Inch Axle)Pinion Depth Adjustment (8.25 Inch Axle)**.

Drive Side Toe - Coast Side Heel Contact Pattern

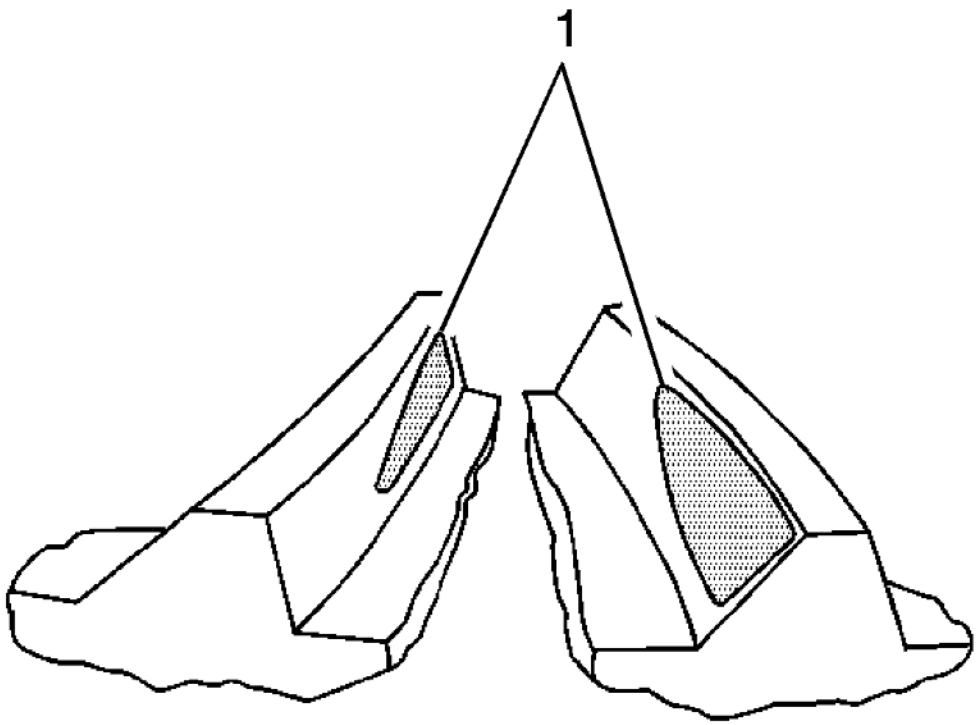


Fig. 441: Identifying Drive Side Toe - Coast Side Heel Contact Pattern
Courtesy of GENERAL MOTORS COMPANY

Condition

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

Correction

Adjust the pinion depth of drive pinion. Refer to **Pinion Depth Adjustment (9.25 Inch Axle)Pinion Depth Adjustment (8.25 Inch Axle)**.

Drive Side Heel - Coast Side Heel Contact Pattern

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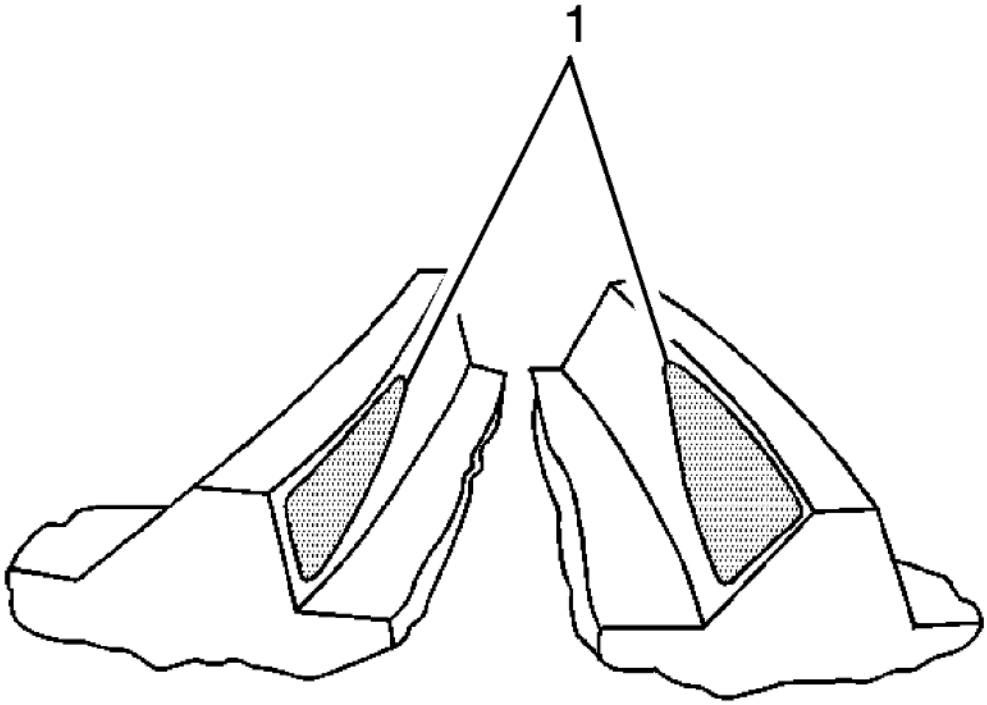


Fig. 442: Identifying Drive Side Heel - Coast Side Heel Contact Pattern
Courtesy of GENERAL MOTORS COMPANY

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

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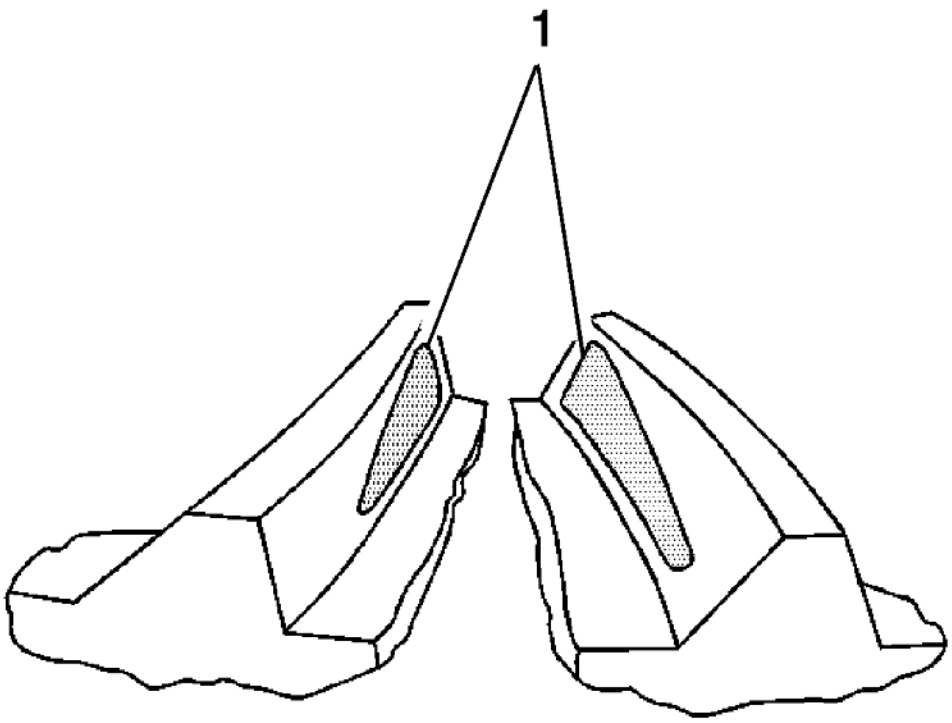


Fig. 443: Identifying Drive Side Toe - Coast Side Toe Contact Pattern
Courtesy of GENERAL MOTORS COMPANY

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**.

DESCRIPTION AND OPERATION

FRONT DRIVE AXLE DESCRIPTION AND OPERATION

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

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

- Differential Carrier Housing
- Differential Assembly

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- Output Shafts (Left and Right Side)
- Inner Axle Shaft Housing
- Inner Axle Shaft (Right Side)
- Clutch Fork
- Clutch Fork Sleeve
- Electric Motor Actuator

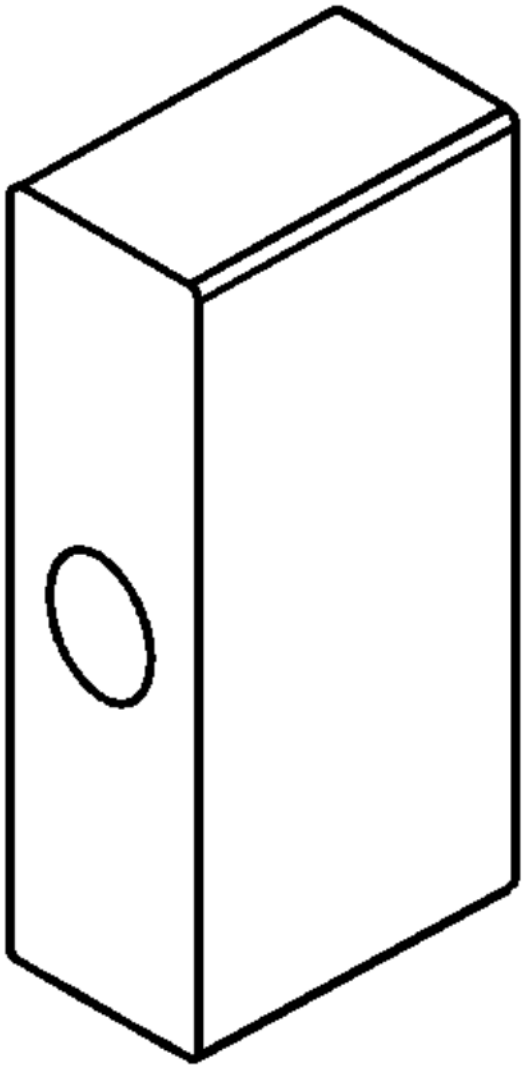
The front axle on Selectable Four Wheel Drive model vehicles uses a central disconnect feature in order to engage and disengage the front axle. When the driver engages the 4WD system, the Transfer Case Control Module sends a signal to the electric motor actuator to energize and extend the plunger inside. The extended plunger moves the clutch fork and clutch fork sleeve across the inner axle shaft and the clutch fork shaft and locks the two shafts together. The locking of the two shafts 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 drive axles are completely flexible assemblies consisting of inner and outer constant velocity CV joints protected by thermoplastic boots and connected by a wheel drive shaft.

SPECIAL TOOLS AND EQUIPMENT

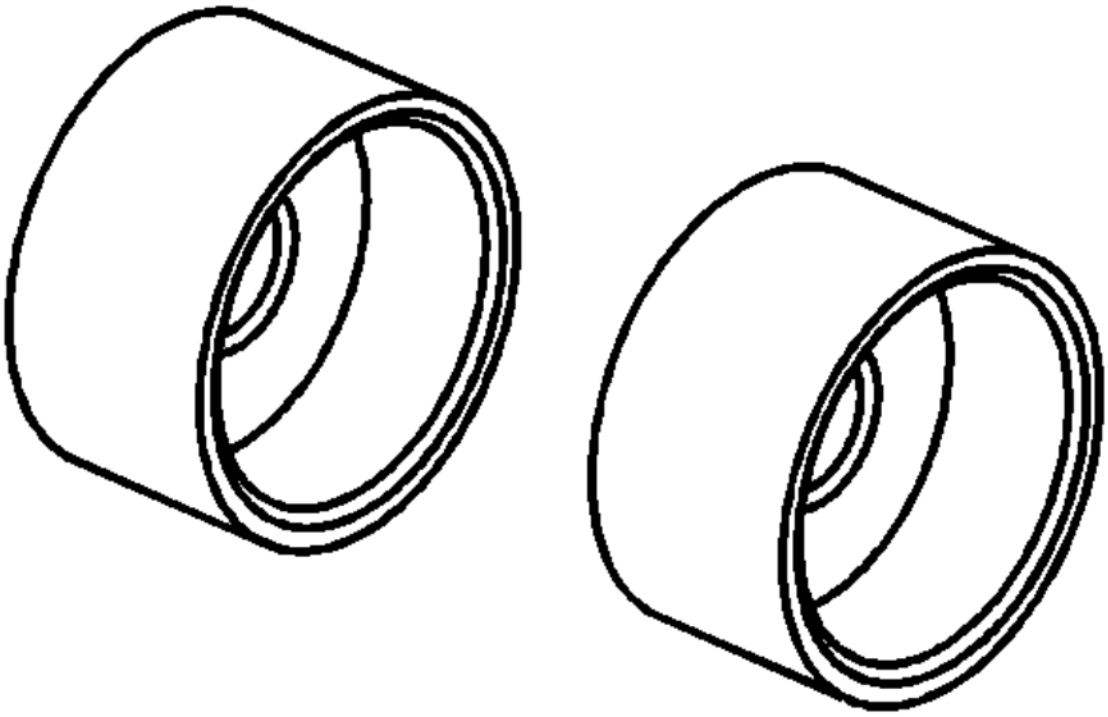
SPECIAL TOOLS

Illustration	Tool Number/ Description

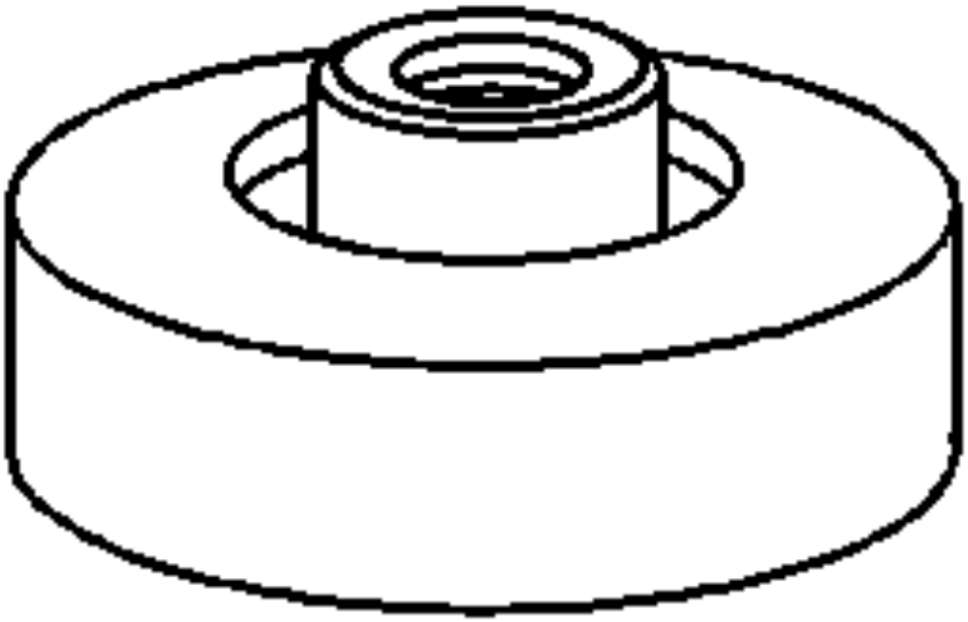
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Illustration	Tool Number/ Description
	DT-50487 Gauge Plate

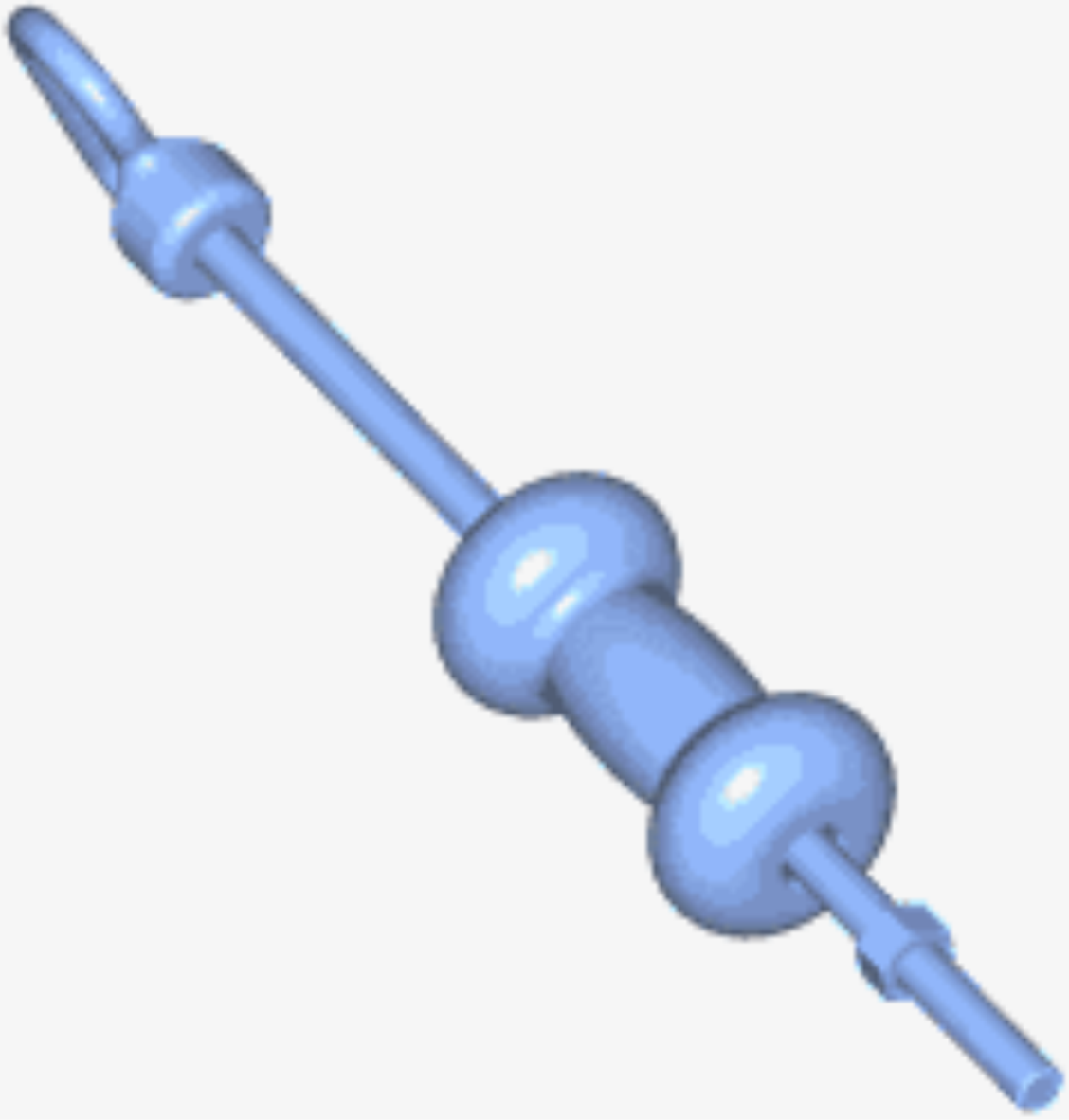
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Illustration	Tool Number/ Description
	DT-50488 Arbor Plate

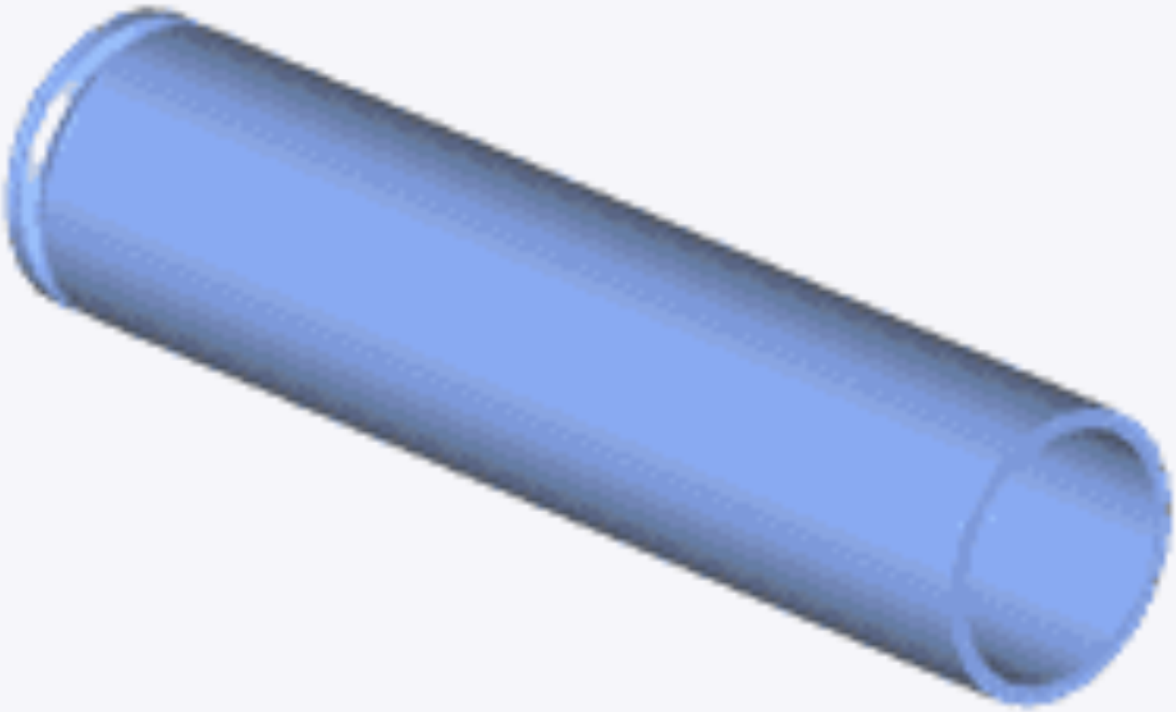
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Illustration	Tool Number/ Description
	EN-44215 J-44215 Seal Installer

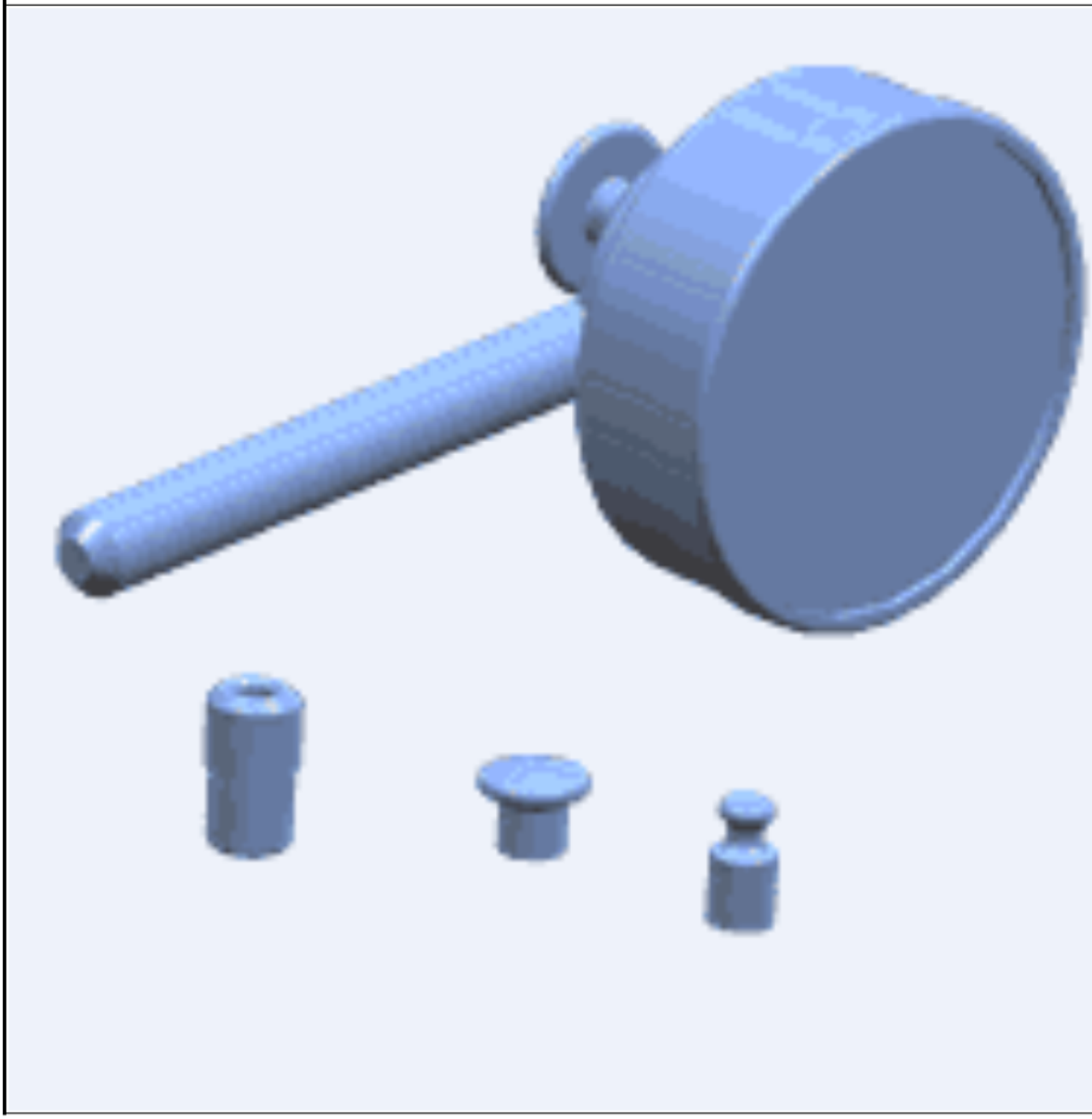
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Illustration	Tool Number/ Description
	J-2619-01 Slide Hammer

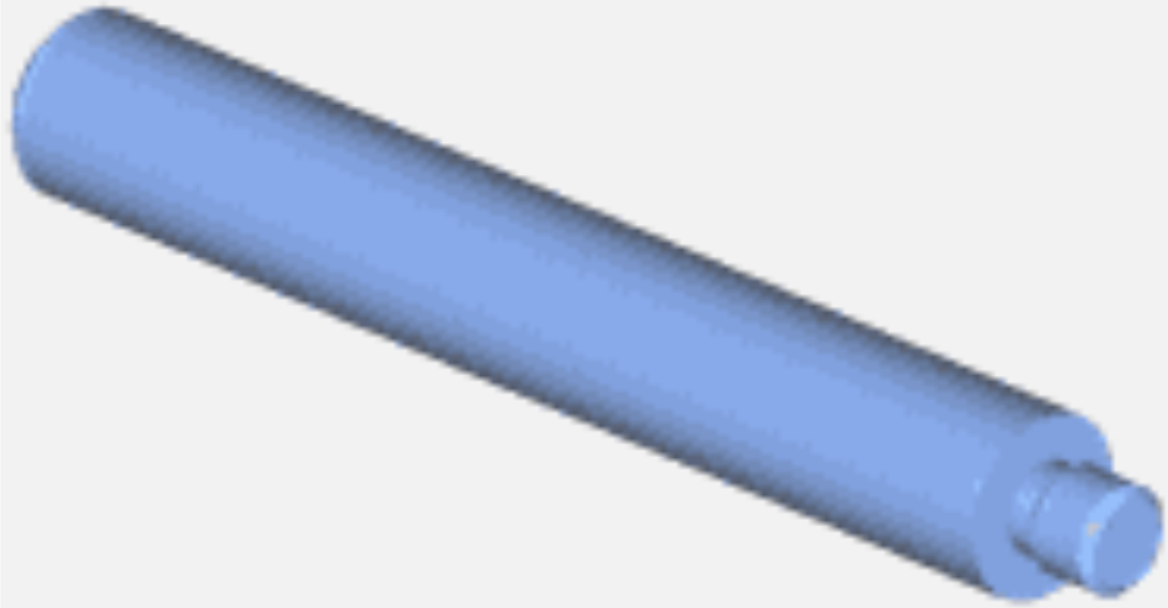
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Illustration	Tool Number/ Description
	J-5590 Installer

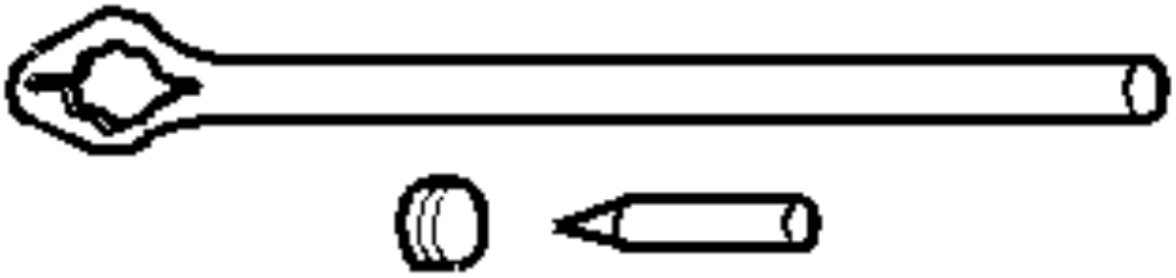
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Illustration	Tool Number/ Description
	GE-8001 J-8001 Dial Indicator Set

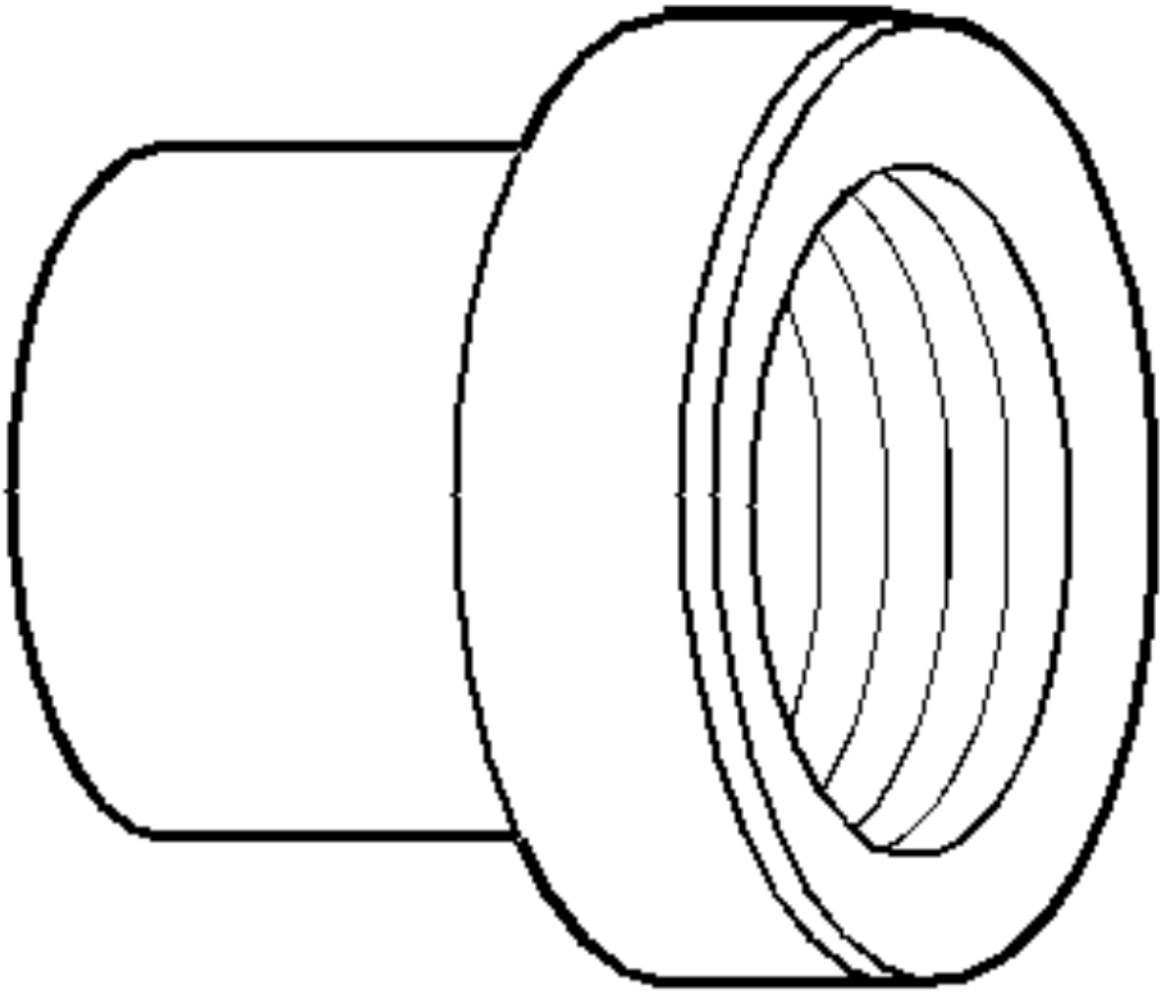
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Illustration	Tool Number/ Description
	GE-8092 J-8092 Driver Handle

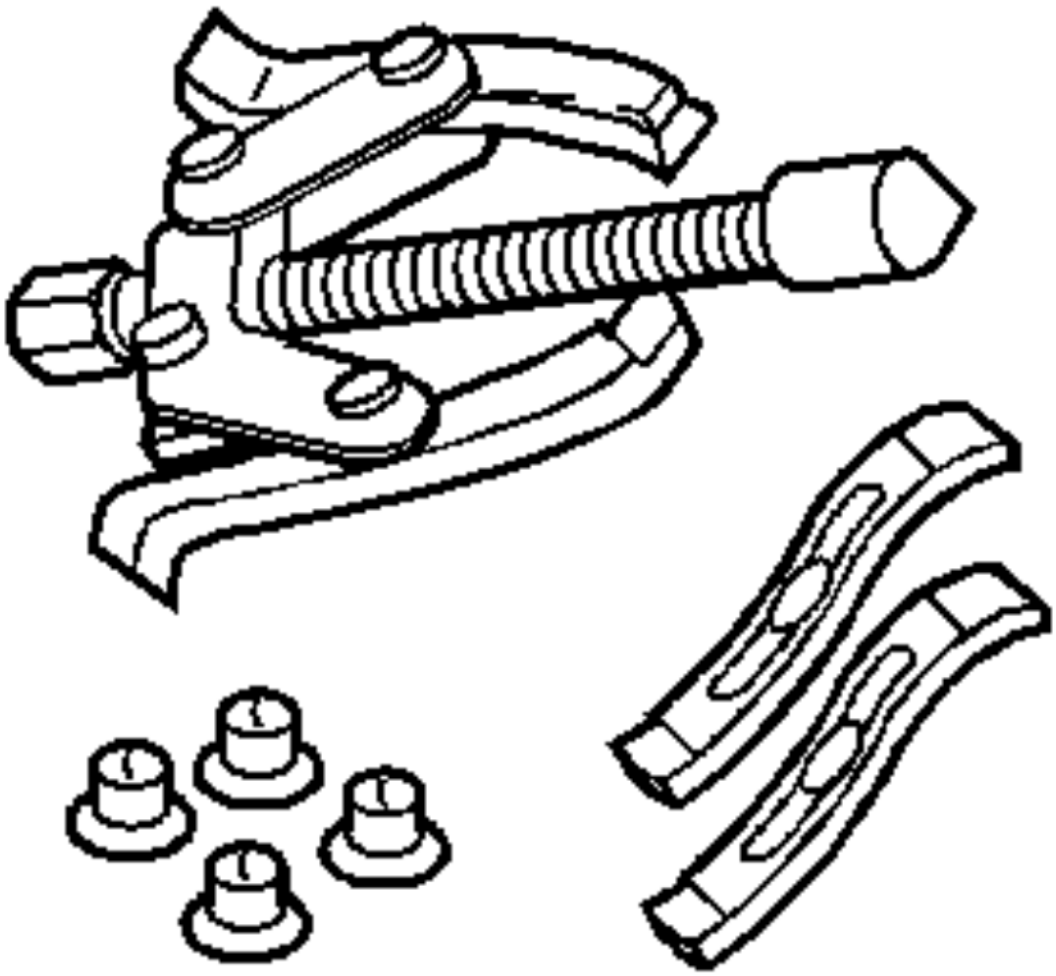
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Illustration	Tool Number/ Description
	J-8614-01 Flange and Pulley Holding Tool

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Illustration	Tool Number/ Description
	J-22761 Differential Side Bearing Installer

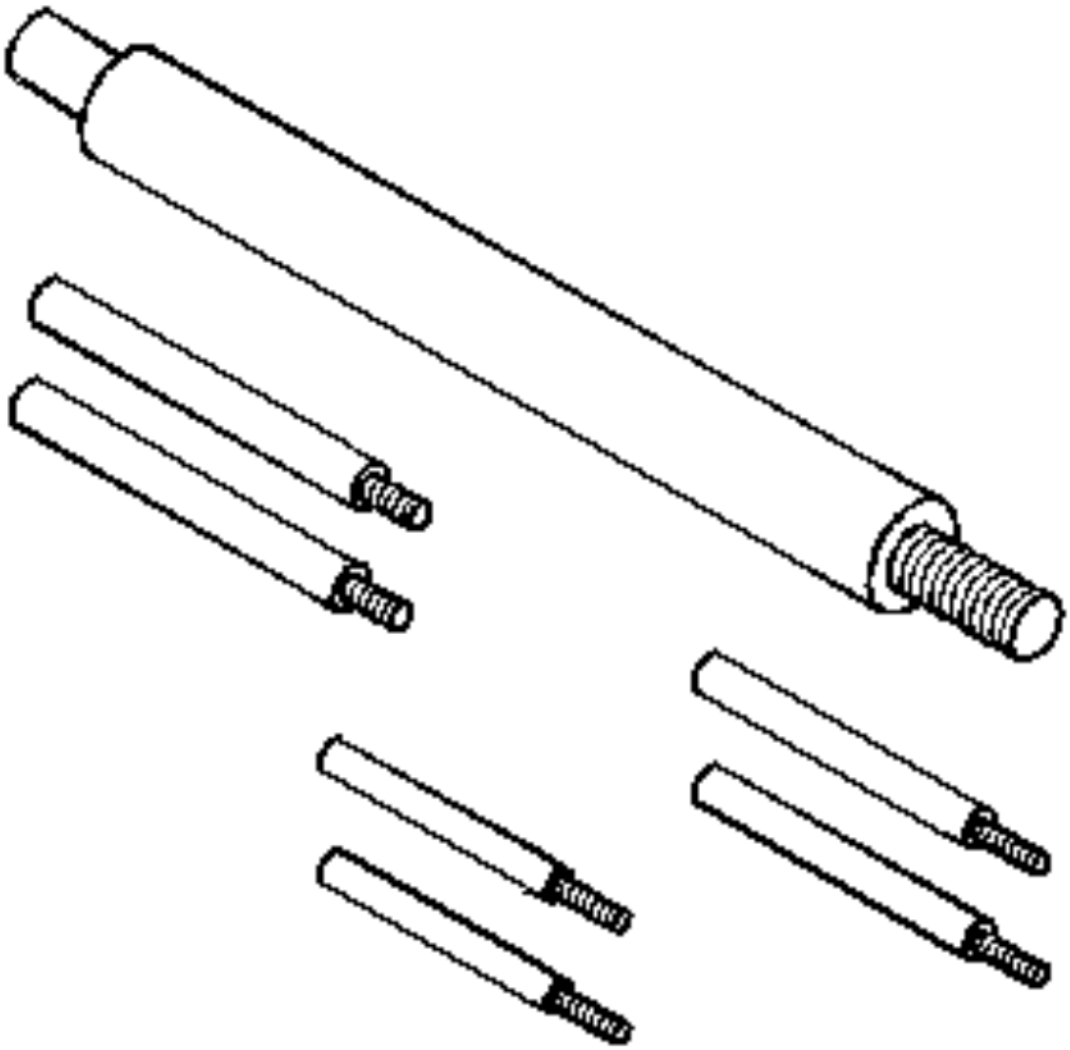
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Illustration	Tool Number/ Description
	DT-22888-D J-22888-D Side Bearing Remover Kit

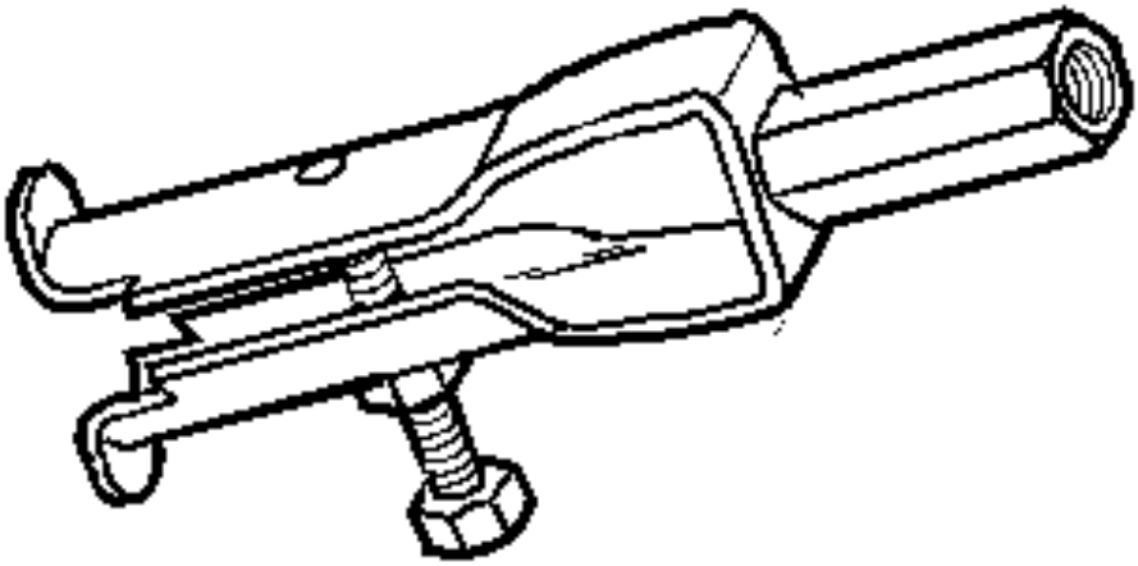
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Illustration	Tool Number/ Description
	DT-22912-01 J-22912-01 Rear Pinion and Axle Bearing Remover

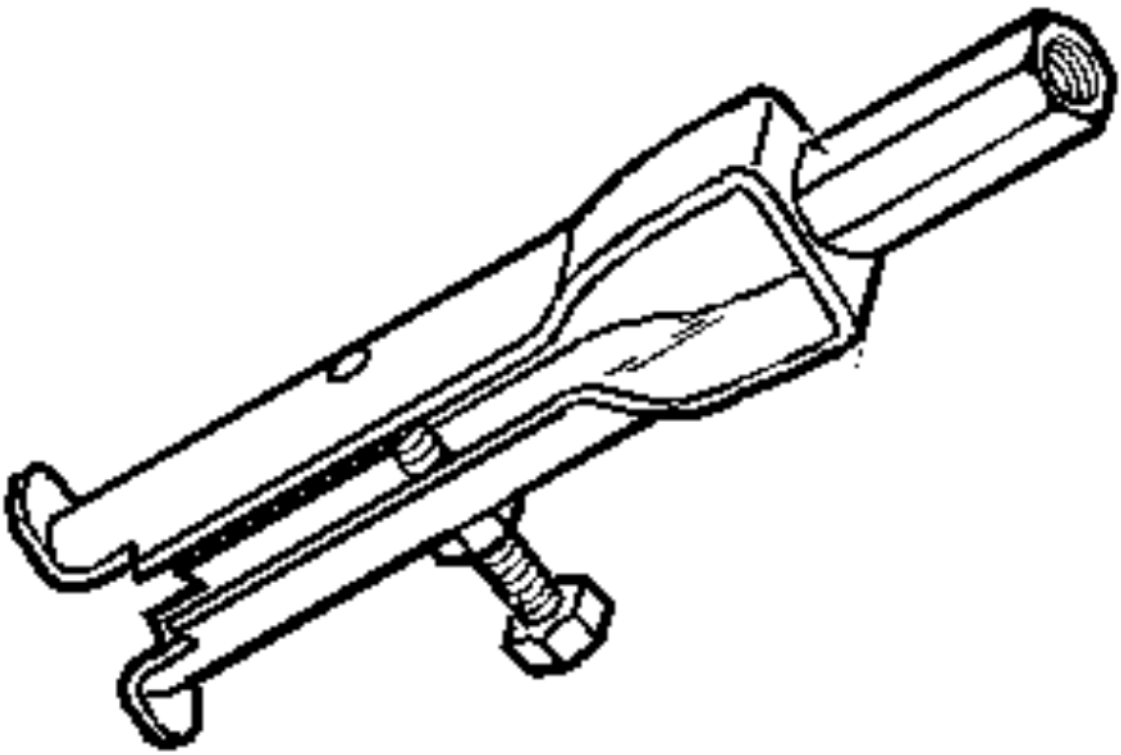
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Illustration	Tool Number/ Description
	GE-25025-B J-25025-B Guide Pin set

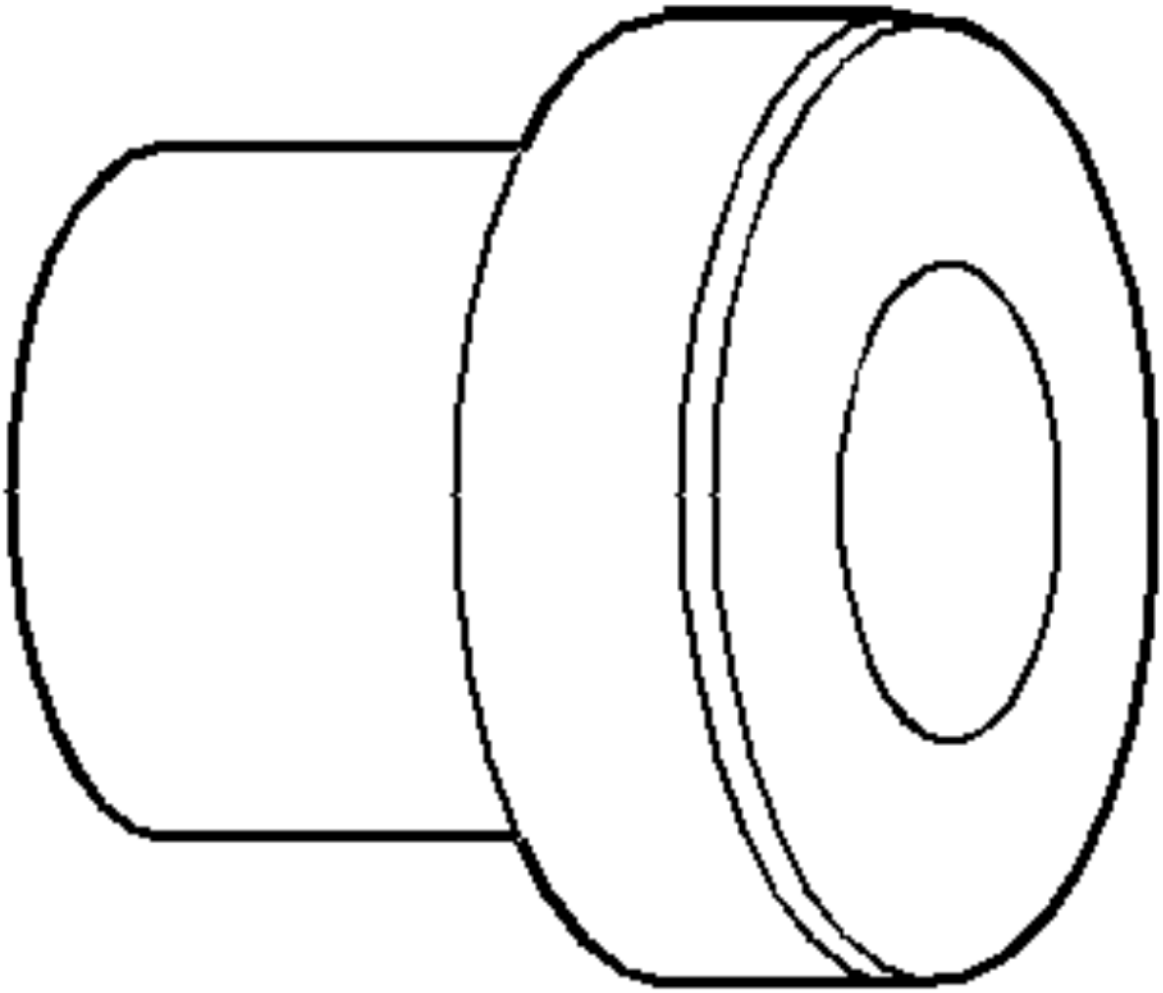
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Illustration	Tool Number/ Description
	DT-29369-1 J-29369-1 Bushing and Bearing Remover

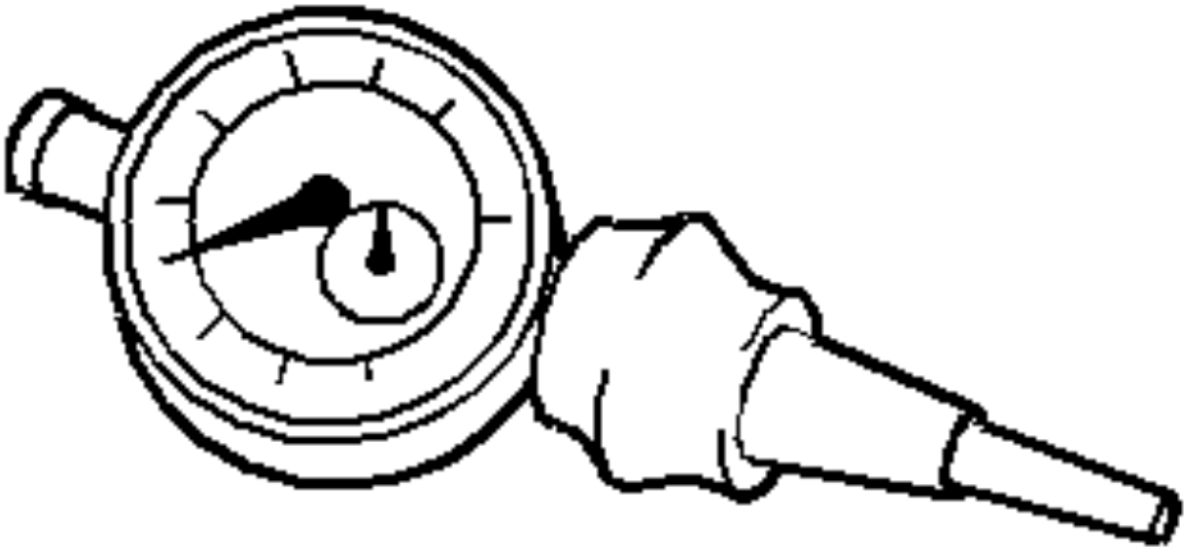
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Illustration	Tool Number/ Description
	DT-29369-2 J-29369-2 Bushing and Bearing Remover - 2-3 in

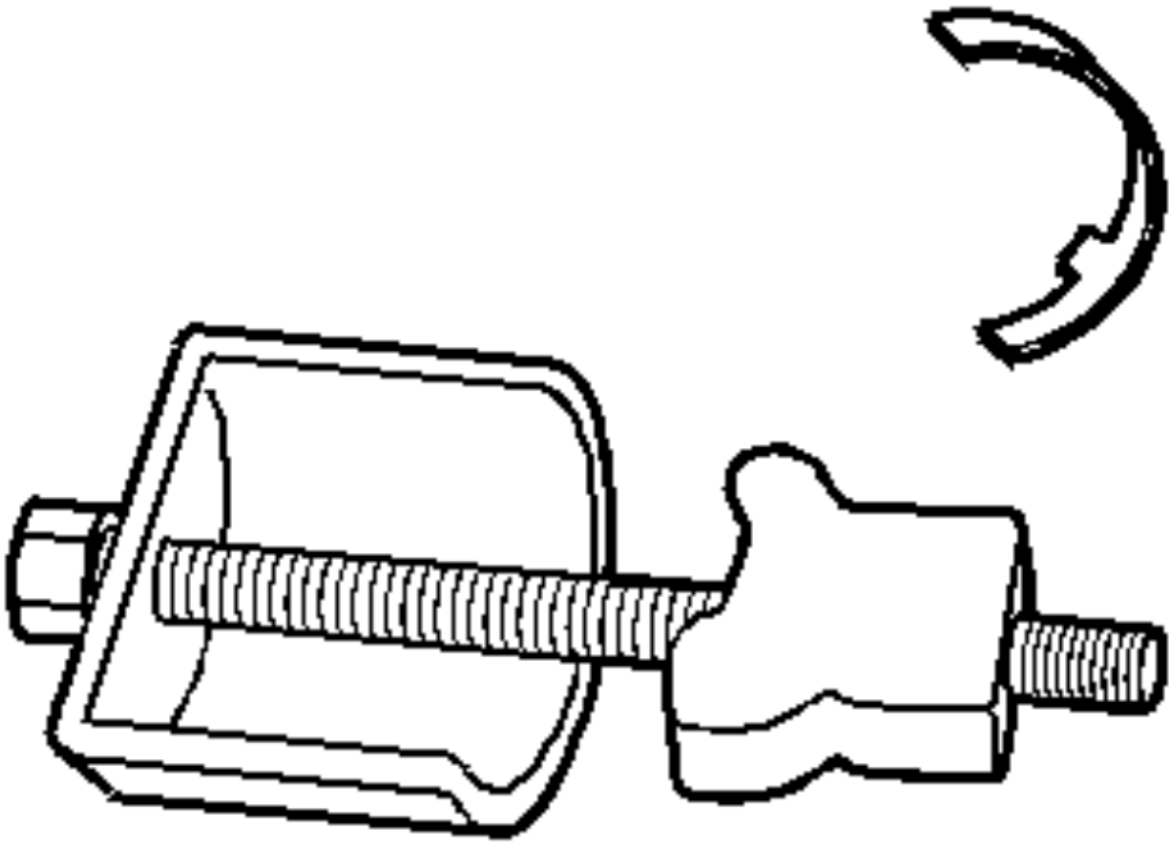
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Illustration	Tool Number/ Description
	J-29710 Differential Side Bearing Installer

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Illustration	Tool Number/ Description
	J-29763 Static Timing Gauge

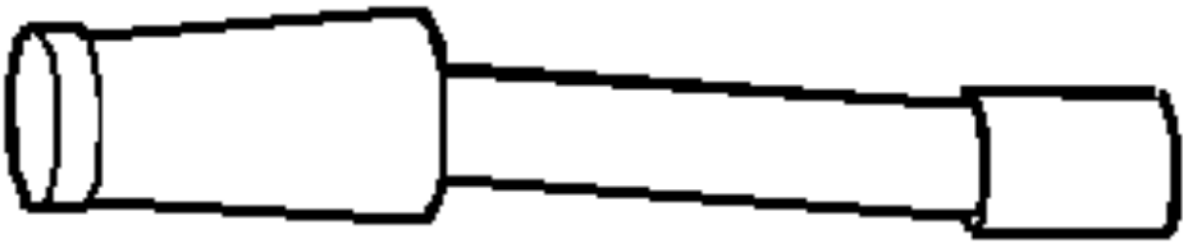
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Illustration	Tool Number/ Description
	J-33791 Carrier Bushing Remover/Installer

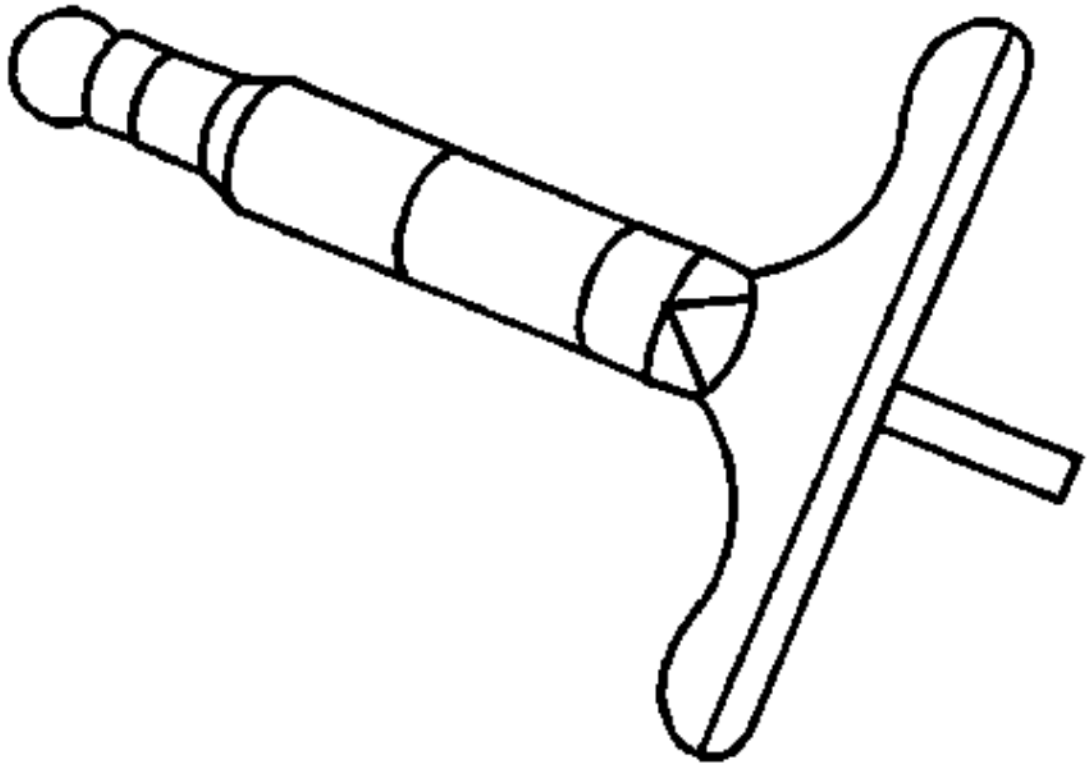
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Illustration	Tool Number/ Description
	J-33842 Pilot Bearing Installer

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Illustration	Tool Number/ Description
	J-34011 Pilot Bearing Remover

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Illustration	Tool Number/ Description
	GE-34672 J-34672 Depth Micrometer

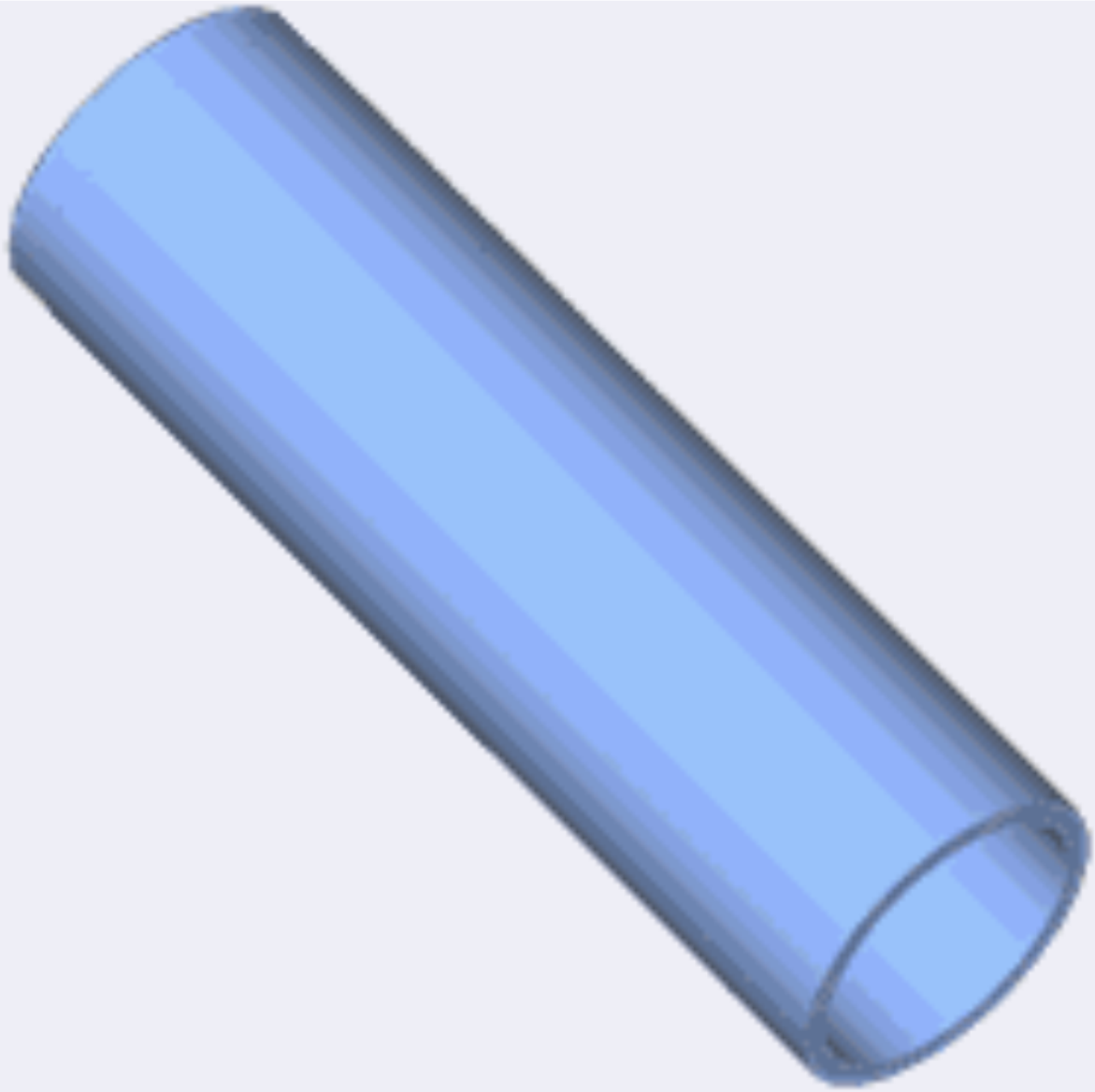
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Illustration	Tool Number/ Description
	GE-34673 J-34673 Flat Gauge Bar

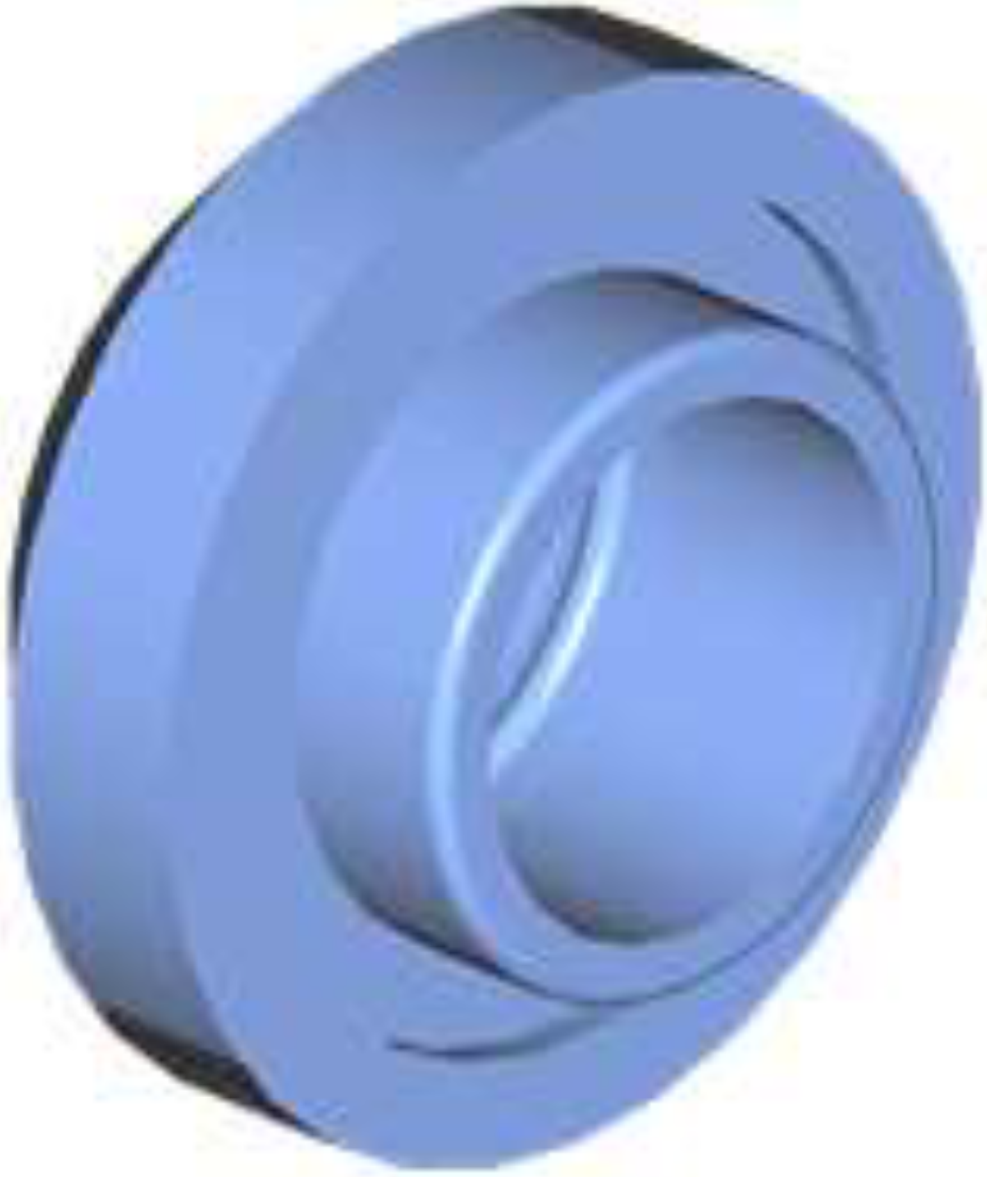
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Illustration	Tool Number/ Description
	DT-34925 J-34925 Pinion Setting Gauge Set

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Illustration	Tool Number/ Description
	DT-35512 J-35512 Inner Pinion Bearing Installer

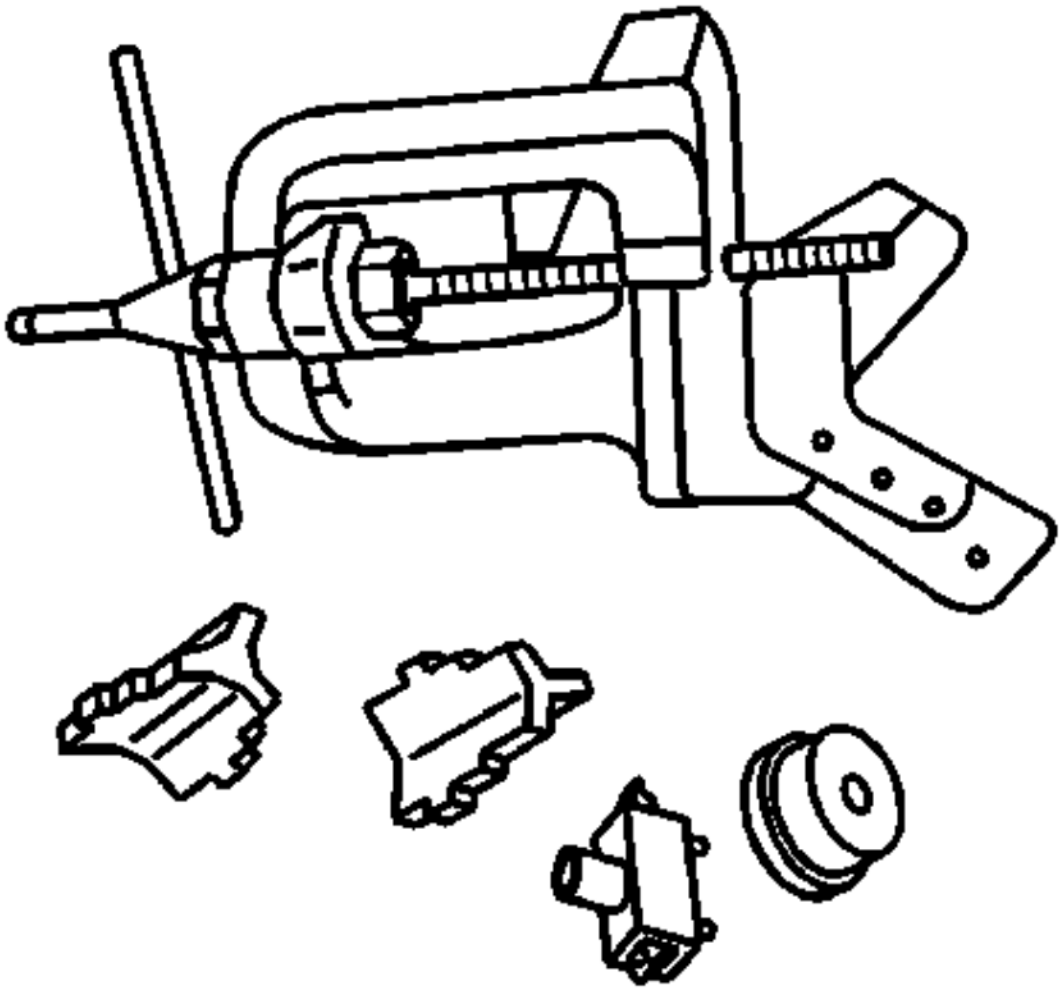
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Illustration	Tool Number/ Description
	J 36366 Pinion Oil Seal Installer

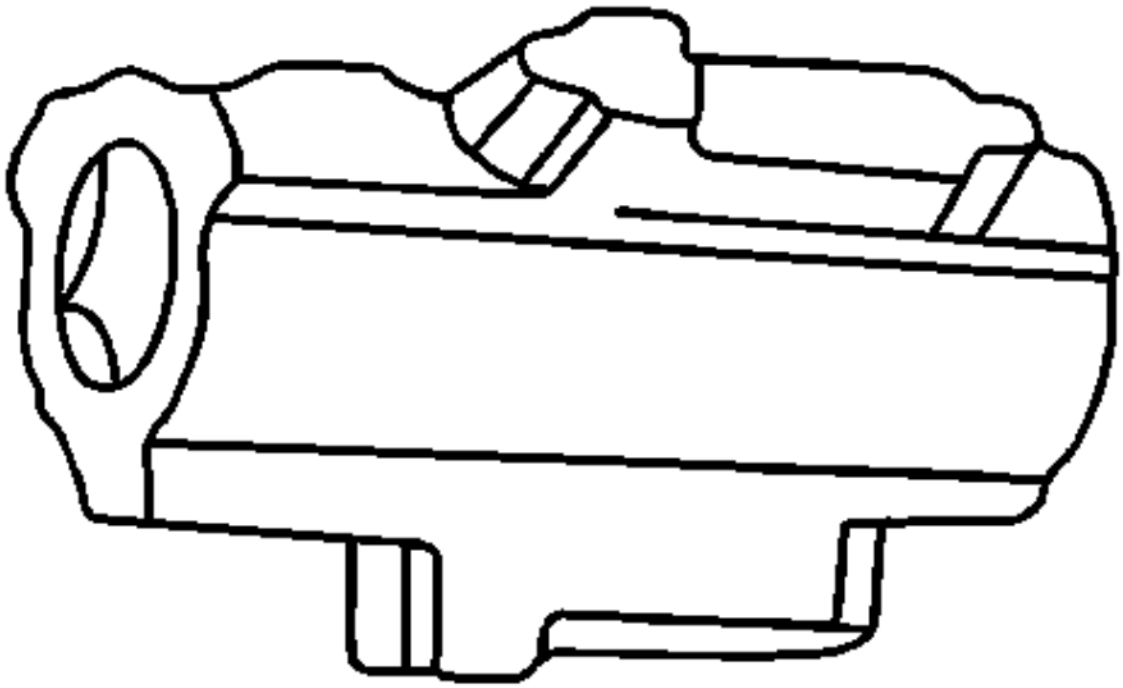
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Illustration	Tool Number/ Description
	J-36597 Side Bearing Puller Pilot - 9.25 Inch Axle

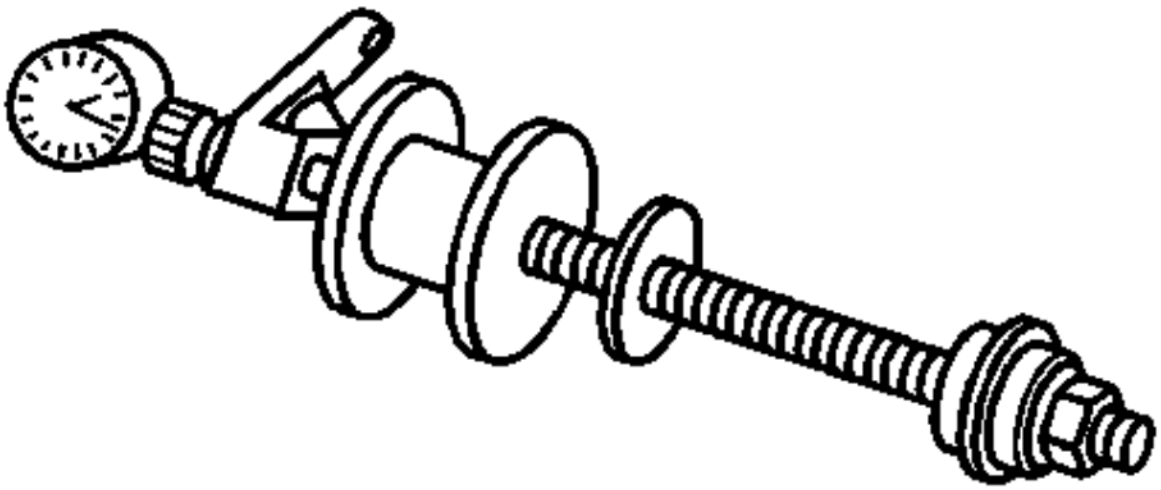
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Illustration	Tool Number/ Description
	J-36598 Holding Fixture

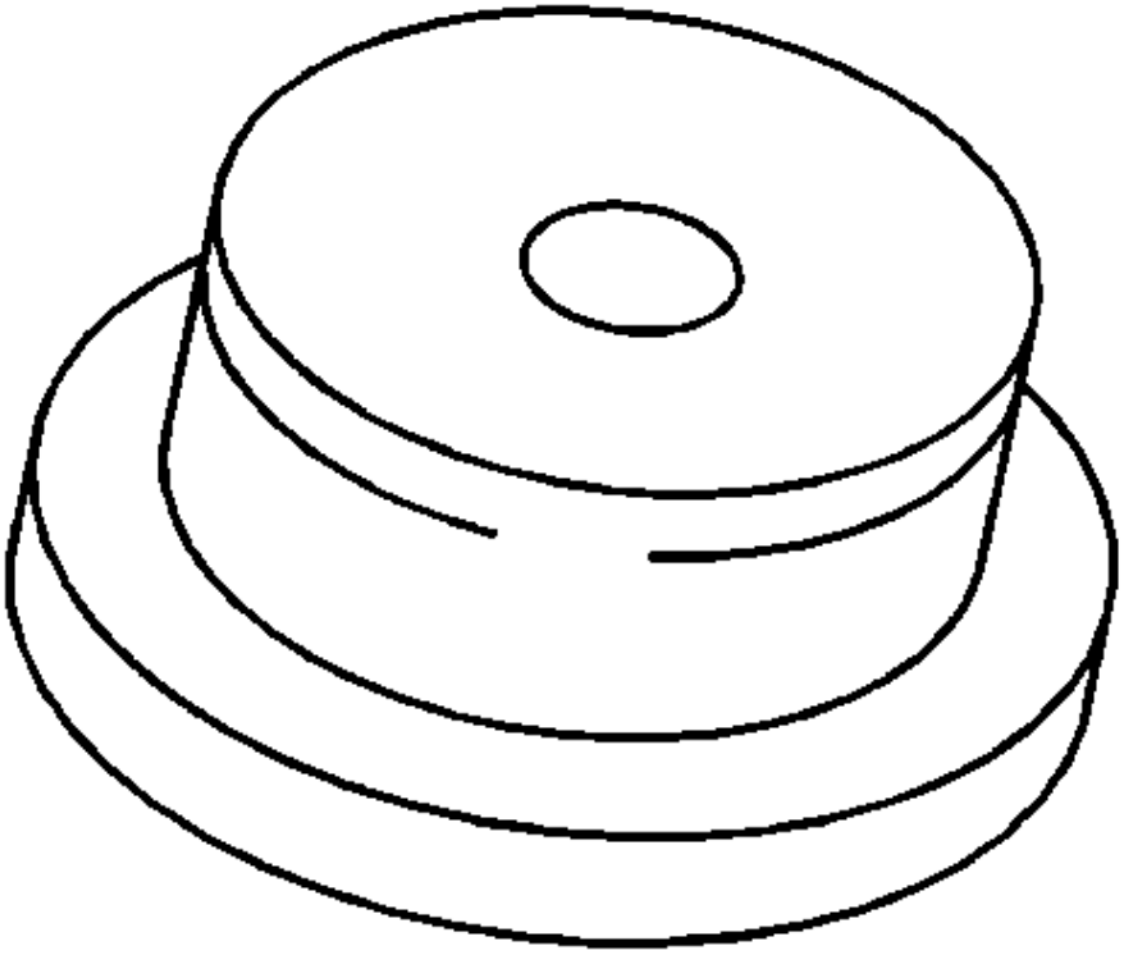
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Illustration	Tool Number/ Description
	J-36599-A Side Bearing Nut Wrench

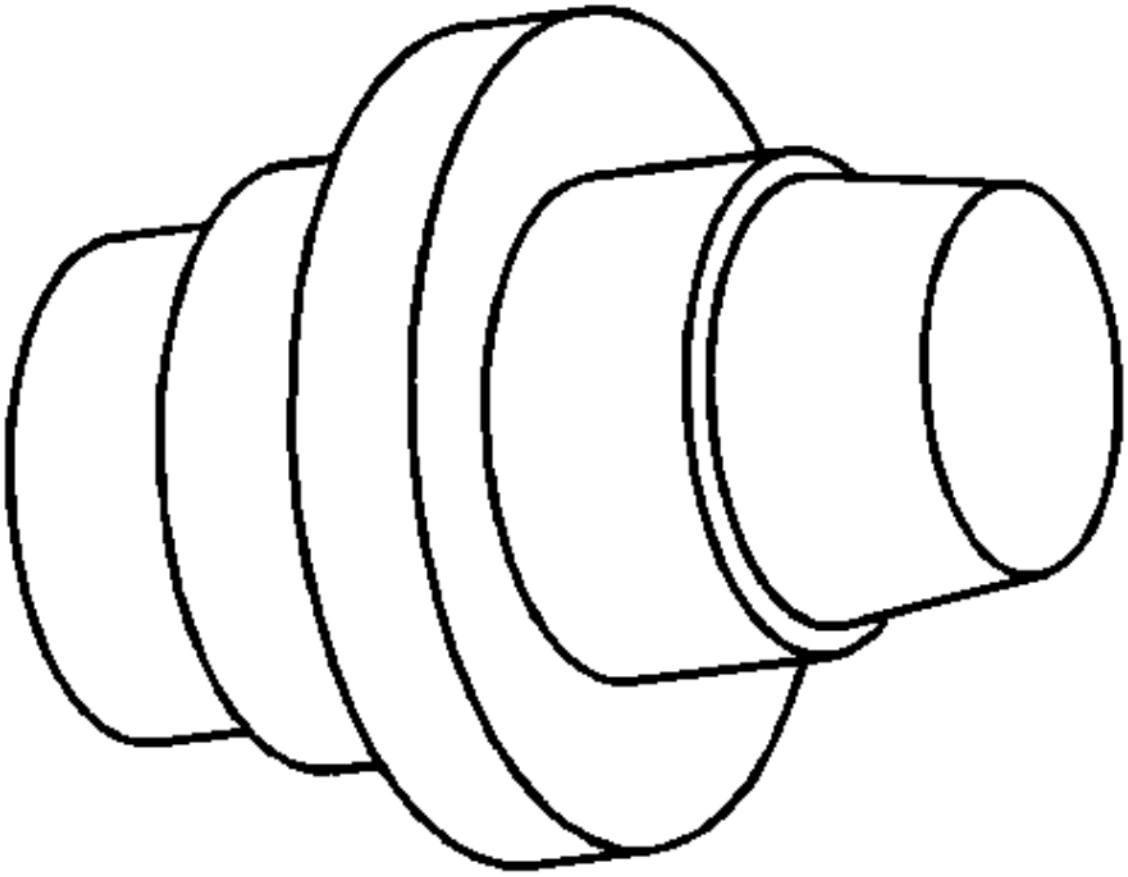
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Illustration	Tool Number/ Description
	J-36601 Pinion Shim Selector

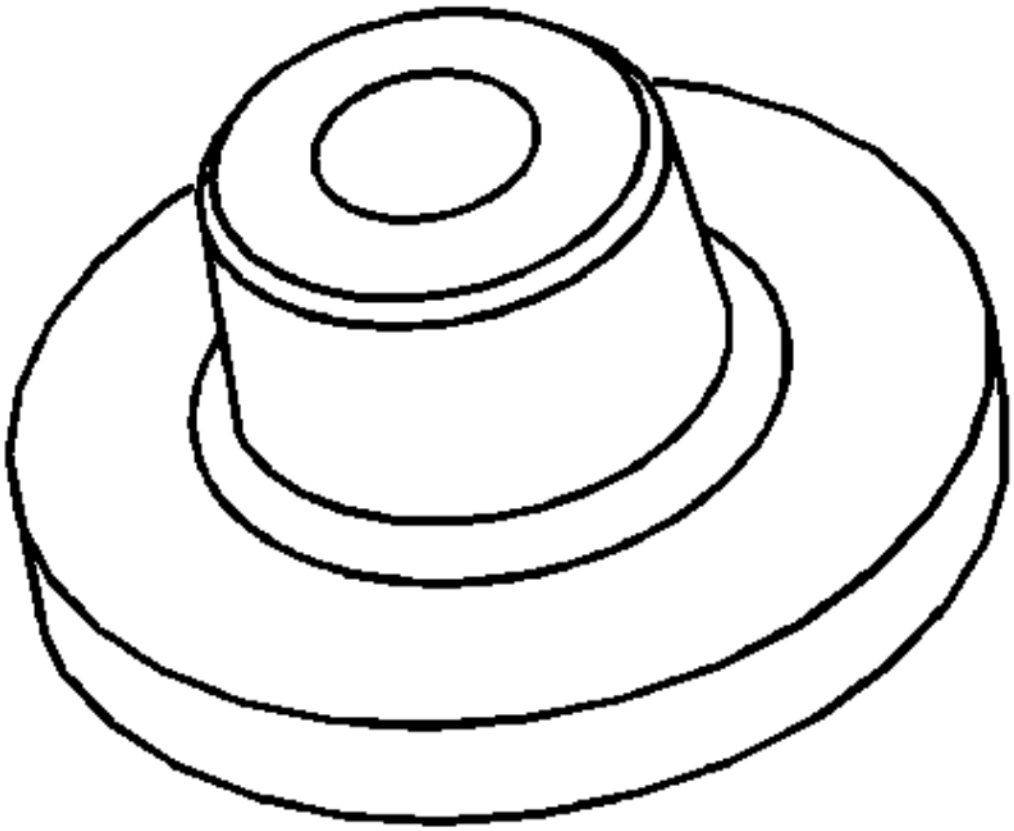
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Illustration	Tool Number/ Description
	J 36603 Side Bearing Cup Installer

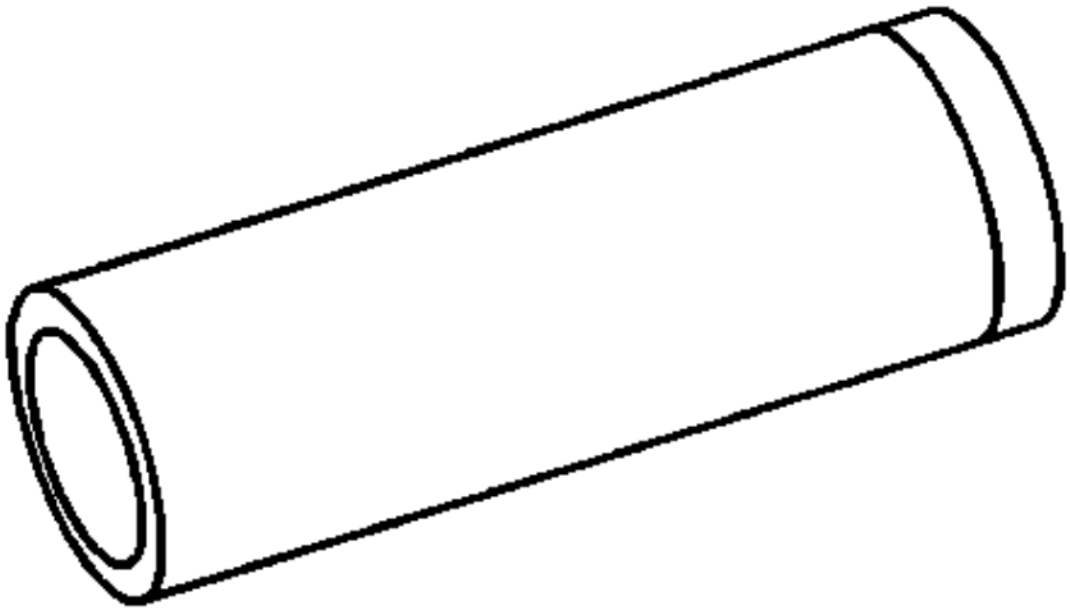
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Illustration	Tool Number/ Description
	J-36609 Axle Tube Bearing Installer

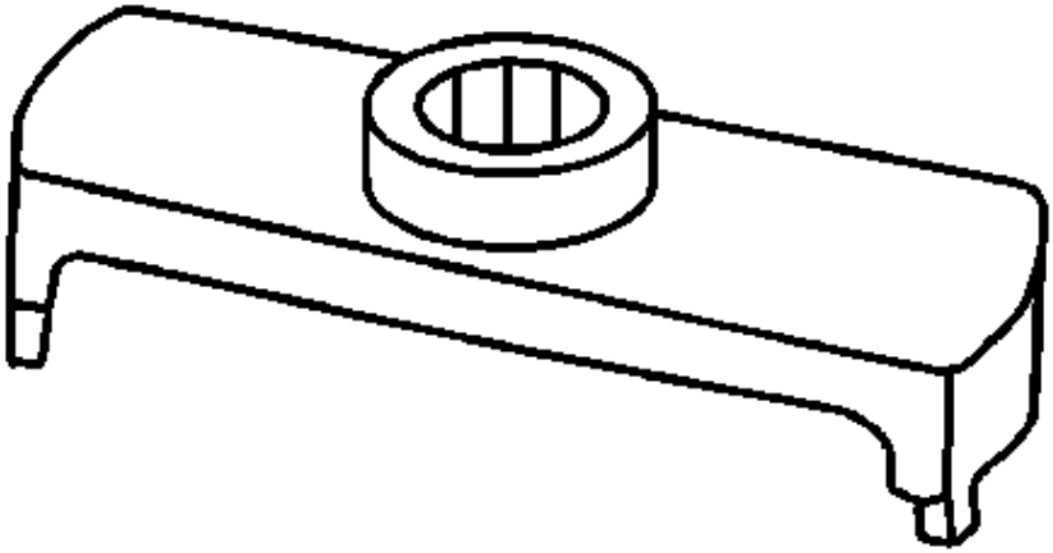
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Illustration	Tool Number/ Description
	J-36612 Output Shaft Bearing Installer

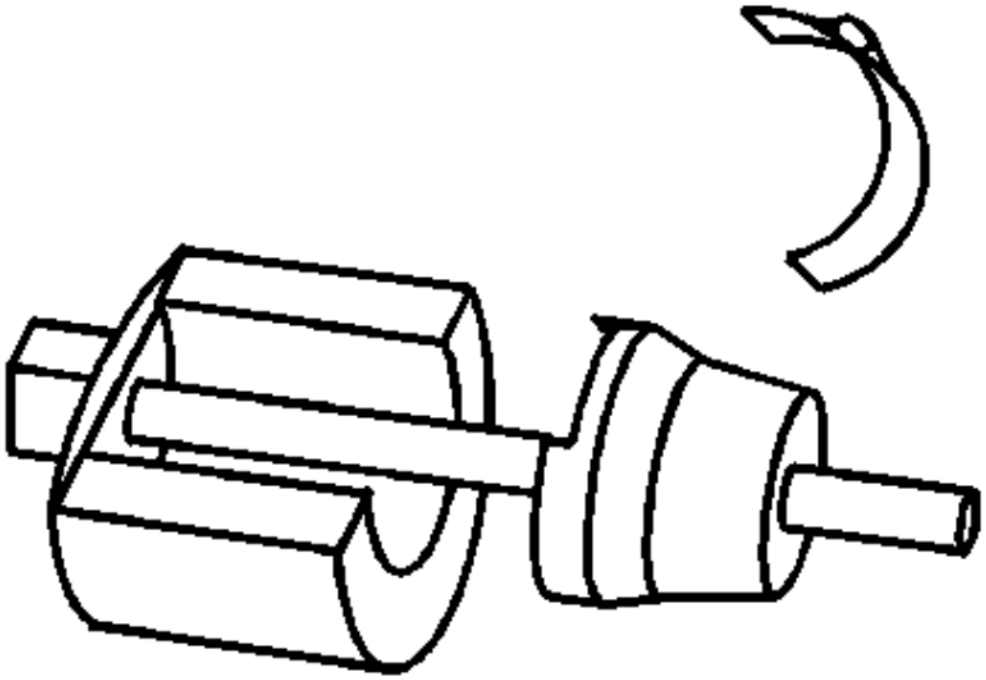
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Illustration	Tool Number/ Description
	J-36614 Inner Pinion Bearing Installer

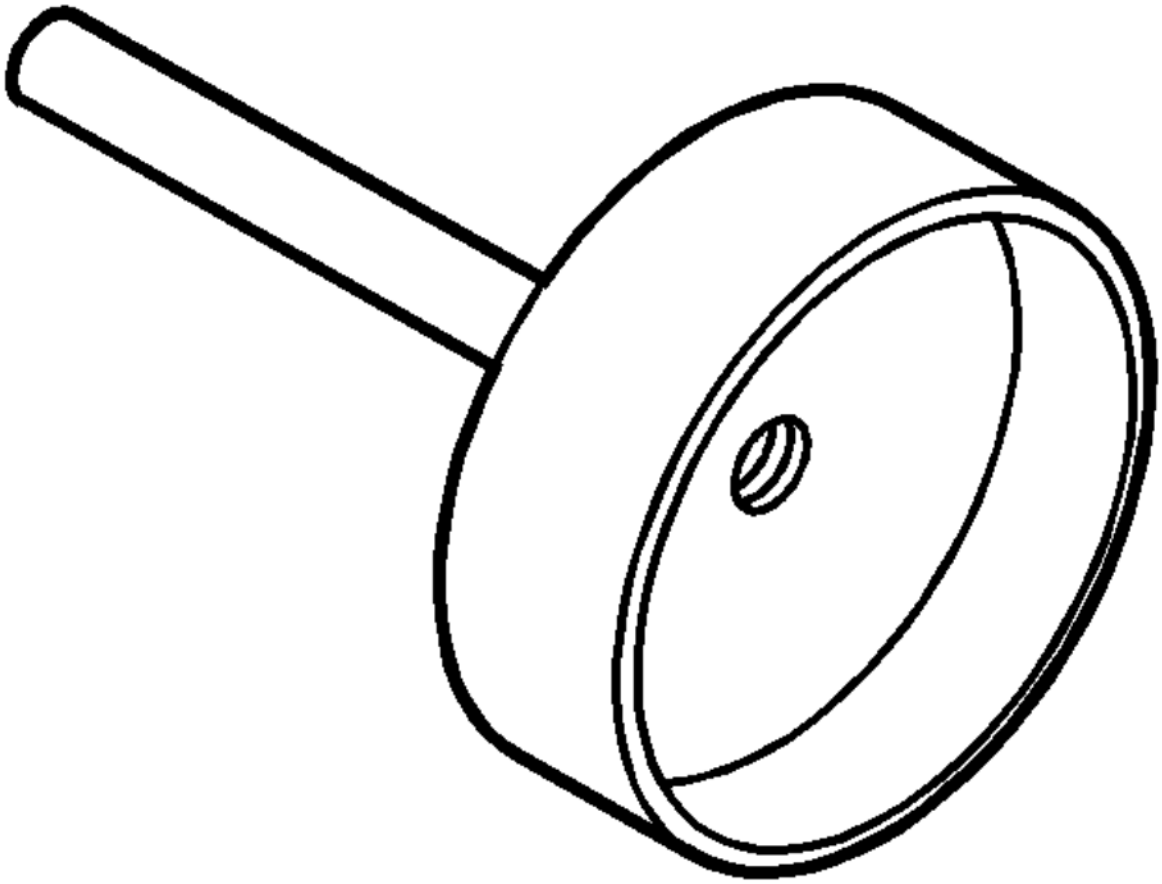
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Illustration	Tool Number/ Description
	J-36615 Side Bearing Nut Wrench

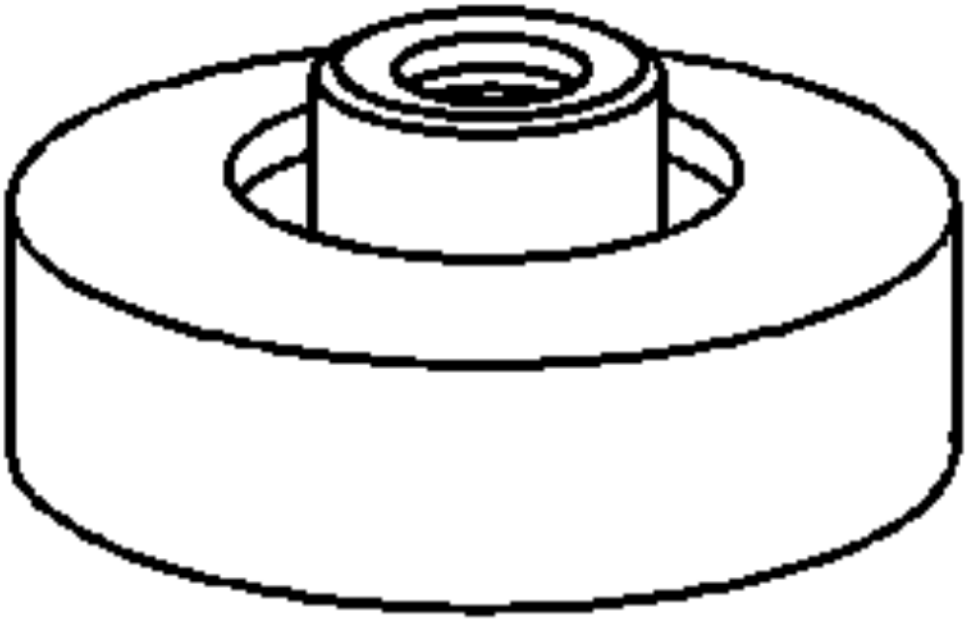
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Illustration	Tool Number/ Description
	J-36616 Axle Mount Bushing Remover/Installer

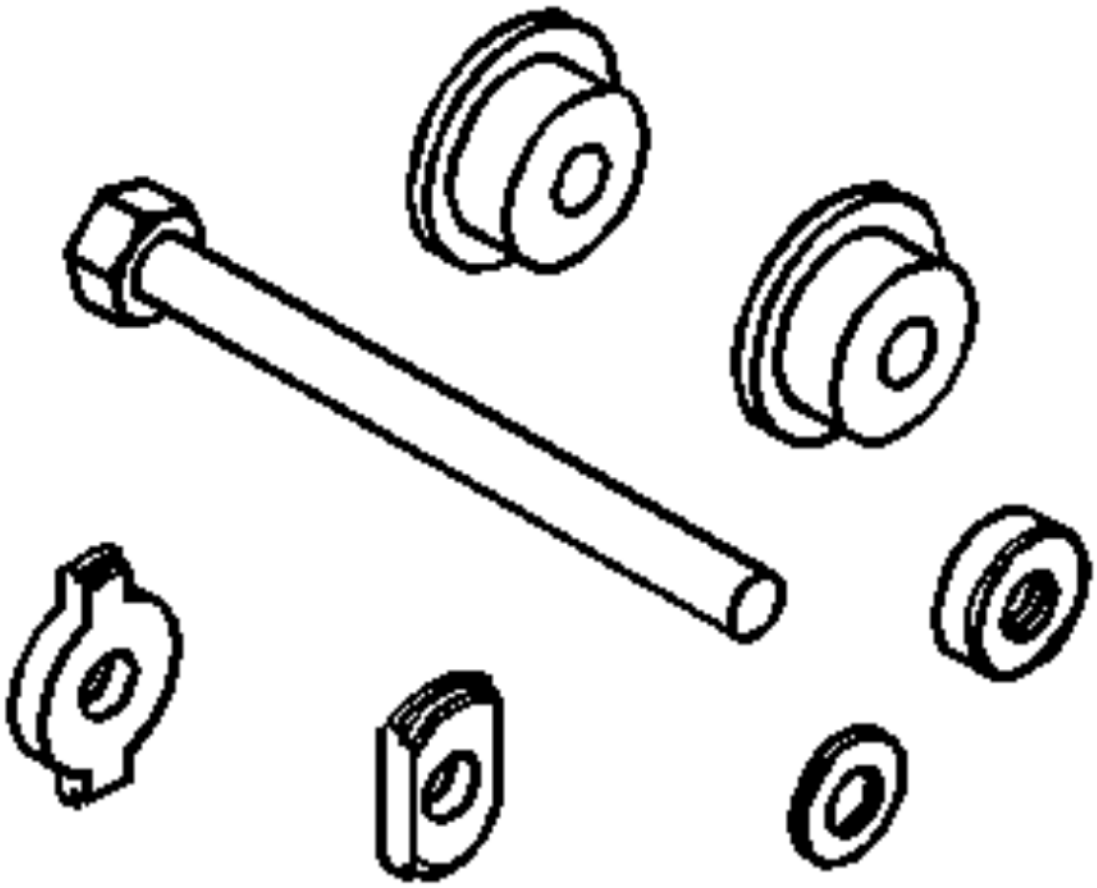
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Illustration	Tool Number/ Description
	DT-44215 J-44215 Rear Seal Installer

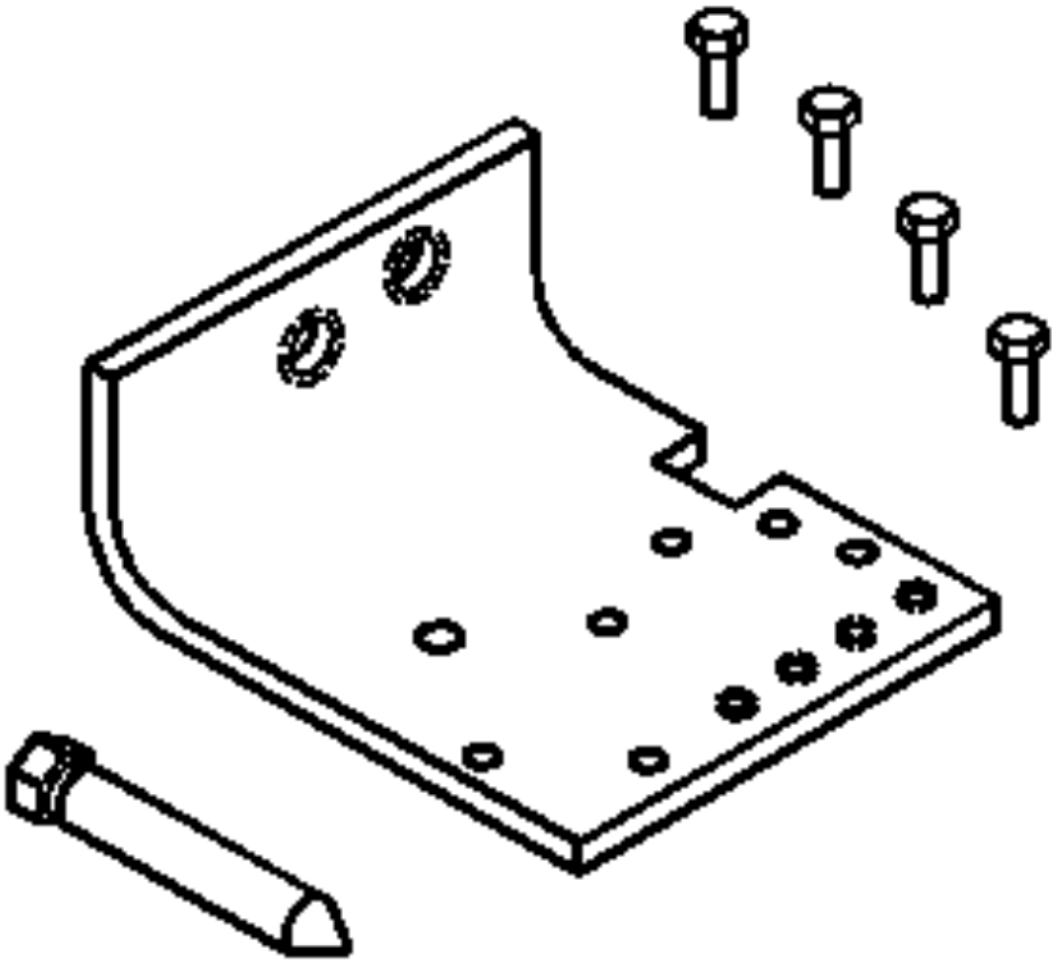
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Illustration	Tool Number/ Description
	DT-45225 J-45225 Axle Seal Installer

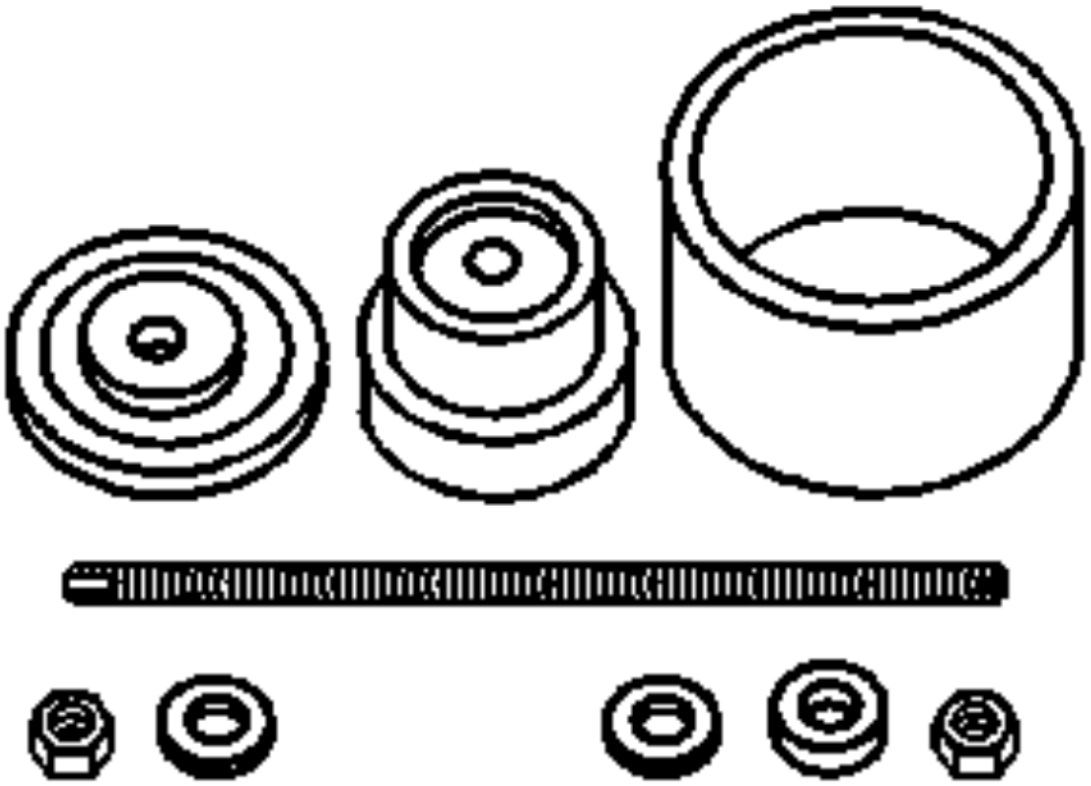
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Illustration	Tool Number/ Description
	J-45754 Pinion Bearing Race Remover/Installer - 9.25 Inch Axle

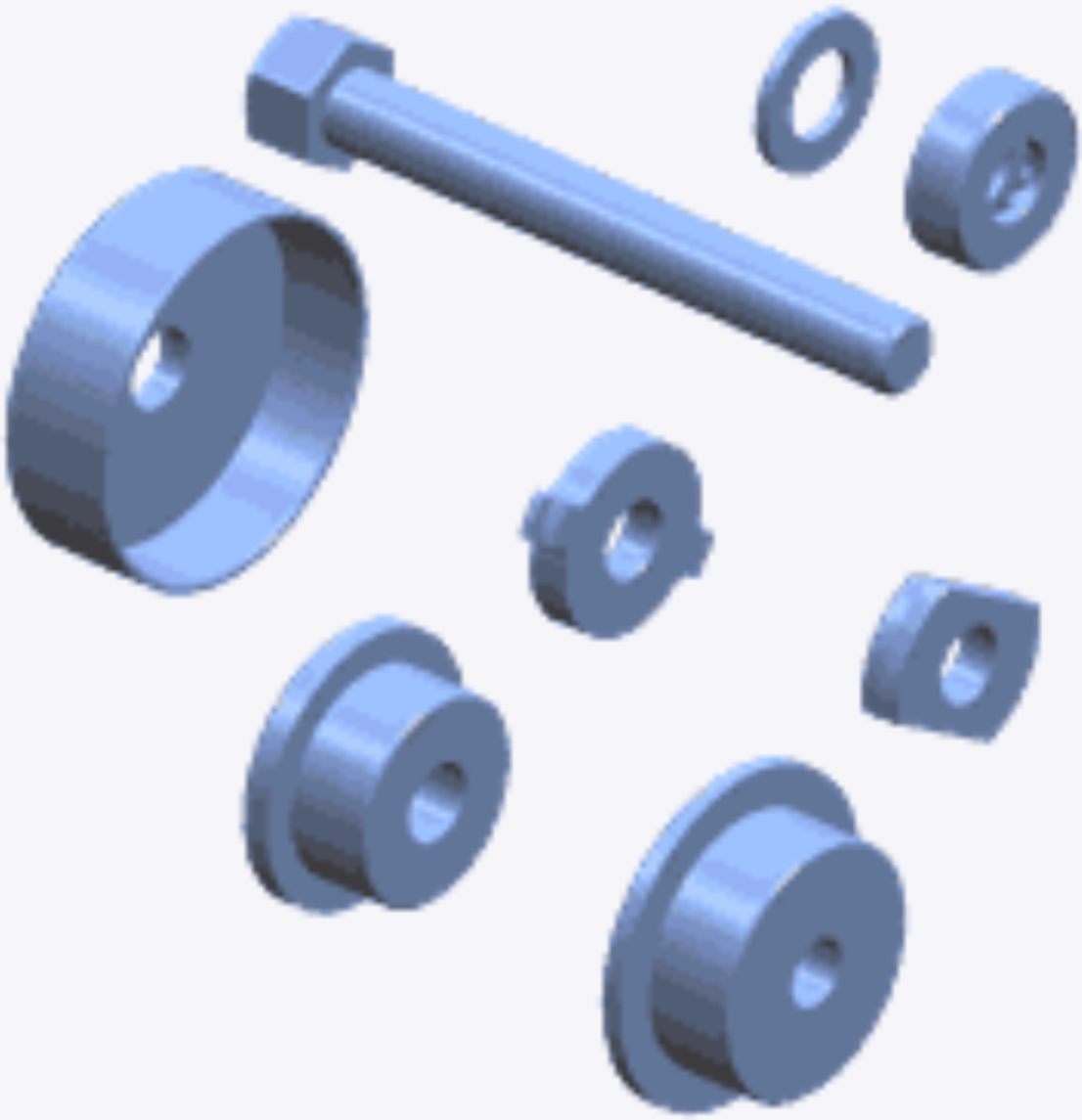
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Illustration	Tool Number/ Description
	J-45765 Pinion Remover - 8.25 inch/9.25 inch Axles

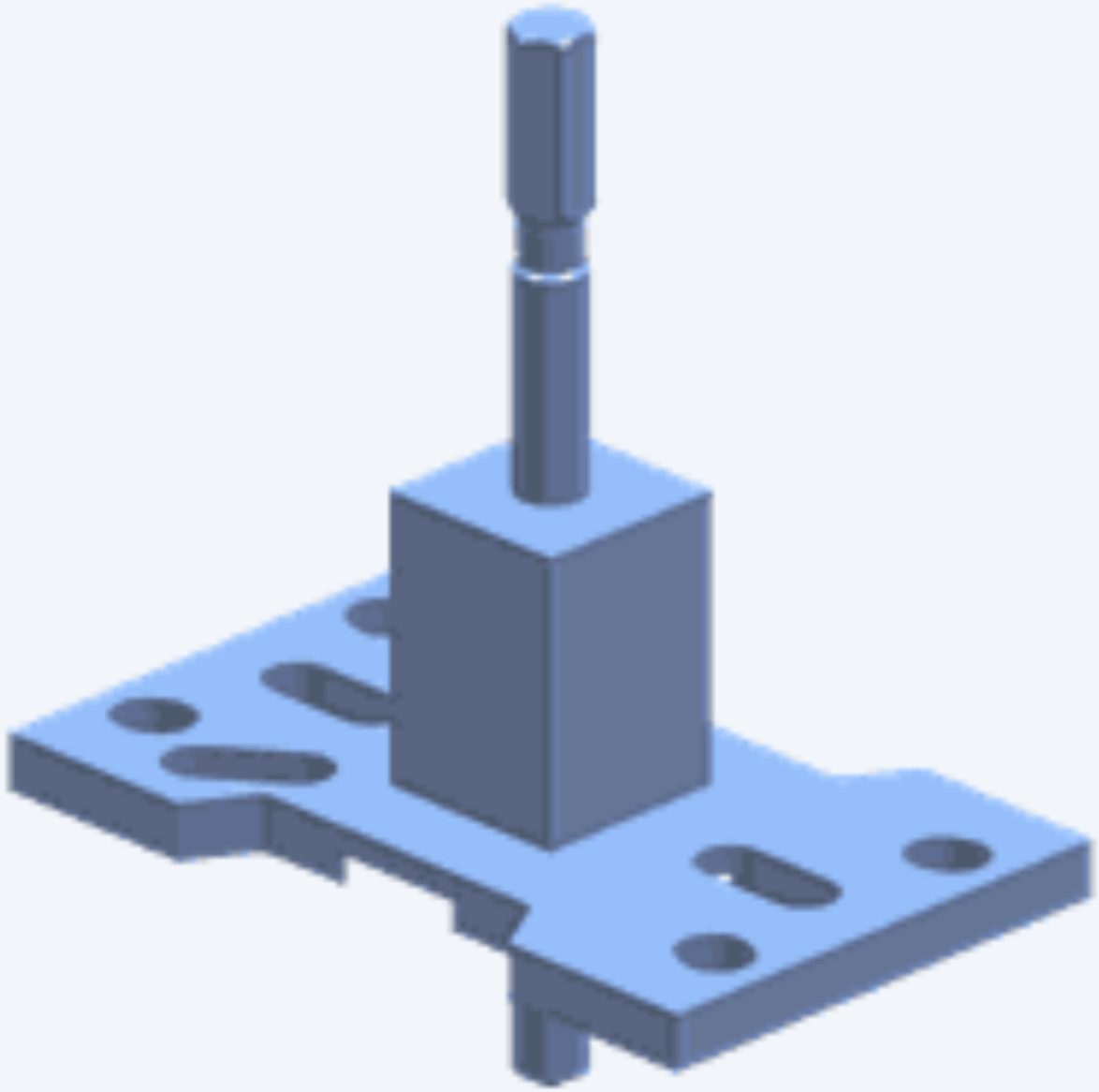
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Illustration	Tool Number/ Description
	J-45766 Frame Mount Installer/Receiver

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Illustration	Tool Number/ Description
	J-45858 Pinion Bearing Race Remover/Installer - 8.25 Inch Axle

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Illustration	Tool Number/ Description
	J-45859 Axle Shaft Remover

Article GUID: A00854517

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