2008 Driveline/Axle

Front Drive Axle - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Differential Adjuster Lock Nut Bolt	20 N.m	15 lb ft
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	75 lb ft
Differential Carrier Bracket to Frame Nuts	90 N.m	67 lb ft
Front Differential Carrier Shield Bolts	20 N.m	15 lb ft
Front Drive Axle Actuator	20 N.m	15 lb ft
Inner Shaft Housing to Bracket Nuts	100 N.m	75 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	40 N.m	30 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
Ring Gear Bolts, 8.25 Axle	120 N.m	89 lb ft
Ring Gear Bolts, 9.25 Axle	138 N.m	102 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

SEALERS, ADHESIVES, AND LUBRICANTS

Application	Type of Material	GM 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 (Canadian P/N 10953480) or equivalent
Front Drive Axle (8.25" S4WD Axle)	Lubricant	GM P/N 89021671 (Canadian P/N 10950849) or SAE 80W-90 GL5
Front Drive Axle (8.25" F4WD Axle, 9.25" Axle)	Lubricant	SAE 75W-90 Synthetic Axle Lubricant GM P/N 89021677 (Canadian P/N 89021678) or equivalent meeting GM Specification 9986115
Front Drive Axle Inner Shaft Housing to Differential Carrier Assembly	Sealant	GM P/N 1052942 (Canadian P/N 10953466) or equivalent
Pinion Yoke Splines	Sealant	GM P/N 12346004 (Canadian P/N 10953480) or equivalent

COMPONENT LOCATOR

FRONT DRIVE AXLE DISASSEMBLED VIEWS (9.25 INCH)

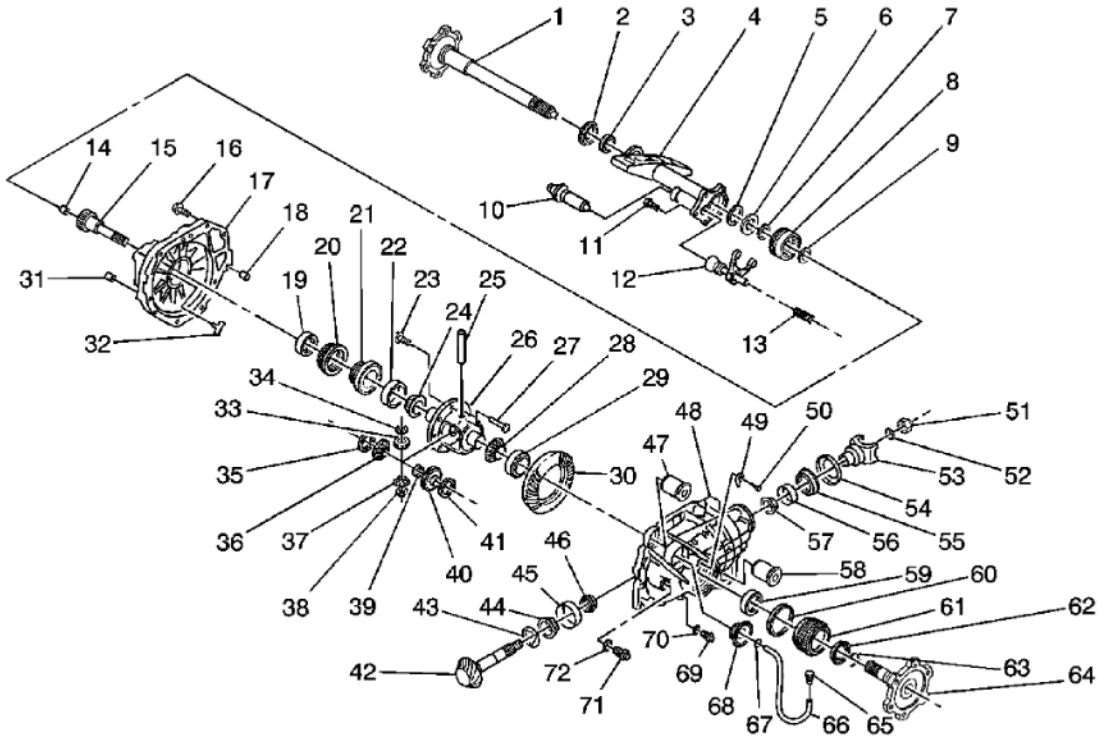


Fig. 1: Front Drive Axle Component View (9.25 inch)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Front Drive Axle Inner Shaft
2	Front Drive Axle Inner Shaft Seal
3	Front Drive Axle Inner Axle Shaft Bearing
4	Front Drive Axle Inner Shaft Housing
5	Front Drive Axle Clutch Gear Thrust Washer
6	Front Drive Axle Clutch Gear
7	Front Drive Axle Inner Shaft Retaining Ring
8	Front Drive Axle Clutch Sleeve
9	Front Drive Axle Clutch Shim
10	Front Drive Axle Actuator
11	Front Drive Axle Inner Shaft Housing Bolt
12	Front Drive Axle Clutch Fork Assembly
13	Front Drive Axle Clutch Fork Inner Spring
14	Front Drive Axle Clutch Shaft Bearing

15	Front Drive Axle Clutch Shaft
16	Front Differential Carrier Bolt
17	Front Differential Carrier
18	Front Differential Carrier Half Location Pin
19	Front Differential Case Bearing
20	Front Differential Bearing Adjuster Nut
21	Front Differential Bearing Adjuster Nut Sleeve
22	Front Differential Side Bearing Cup
23	Differential Ring Gear Bolt
24	Front Differential Side Bearing
25	Front Differential Pinion Gear Shaft
26	Front Differential Case
27	Differential Pinion Gear Shaft Lock Bolt
28	Differential Side Bearing
29	Differential Side Bearing Cup
30	Front Differential Ring Gear
31	Front Differential Half Carrier Location Pin
32	Front Differential Bearing Adjuster Nut Lock
33	Differential Pinion Gear
34	Differential Pinion Gear Thrust Washer
35	Differential Side Gear Thrust Washer
36	Differential Side Gear
37	Differential Pinion Gear
38	Differential Pinion Gear Thrust Washer
39	Front Differential Side Gear Spacer
40	Front Differential Side Gear
41	Front Differential Side Gear Thrust Washer
42	Front Differential Drive Pinion Gear
43	Differential Drive Pinion Gear Bearing Shim
44	Front Differential Drive Pinion Gear Inner Bearing
45	Front Differential Drive Pinion Gear Inner Bearing Cup
46	Front Differential Drive Pinion Gear Bearing Spacer
47	Front Differential Carrier Bushing
48	Front Differential Carrier
49	Front Differential Bearing Adjuster Nut Lock

	Bolt
51	Front Differential Drive Pinion Gear Yoke Nut
52	Front Differential Drive Pinion Gear Thrust Washer
53	Front Differential Drive Pinion Gear Yoke
54	Front Differential Drive Pinion Gear Bearing Dirt Deflector
55	Front Differential Drive Pinion Gear Seal
56	Front Differential Drive Pinion Gear Outer Bearing Cup
57	Front Differential Drive Pinion Gear Outer Bearing
58	Front Differential Carrier Bushing
59	Differential Bearing
60	Front Differential Bearing Adjuster O-Ring Seal
61	Front Differential Bearing Adjuster
62	Front Drive Axle Inner Shaft Seal
63	Front Drive Axle Inner Shaft Retaining Ring
64	Front Drive Axle Inner Shaft
65	Front Differential Carrier Vent
66	Fuel and Oil Resistant Hose
67	Clamp
68	Front Differential Carrier Vent Hose Connector
69	Front Differential Carrier Oil Drain Plug
70	Front Differential Carrier Oil Drain Plug Washer
71	Front Differential Carrier Oil Fill Plug
72	Front Differential Carrier Oil Fill Plug Washer

FRONT DRIVE AXLE DISASSEMBLED VIEWS (8.25 INCH (AWD))

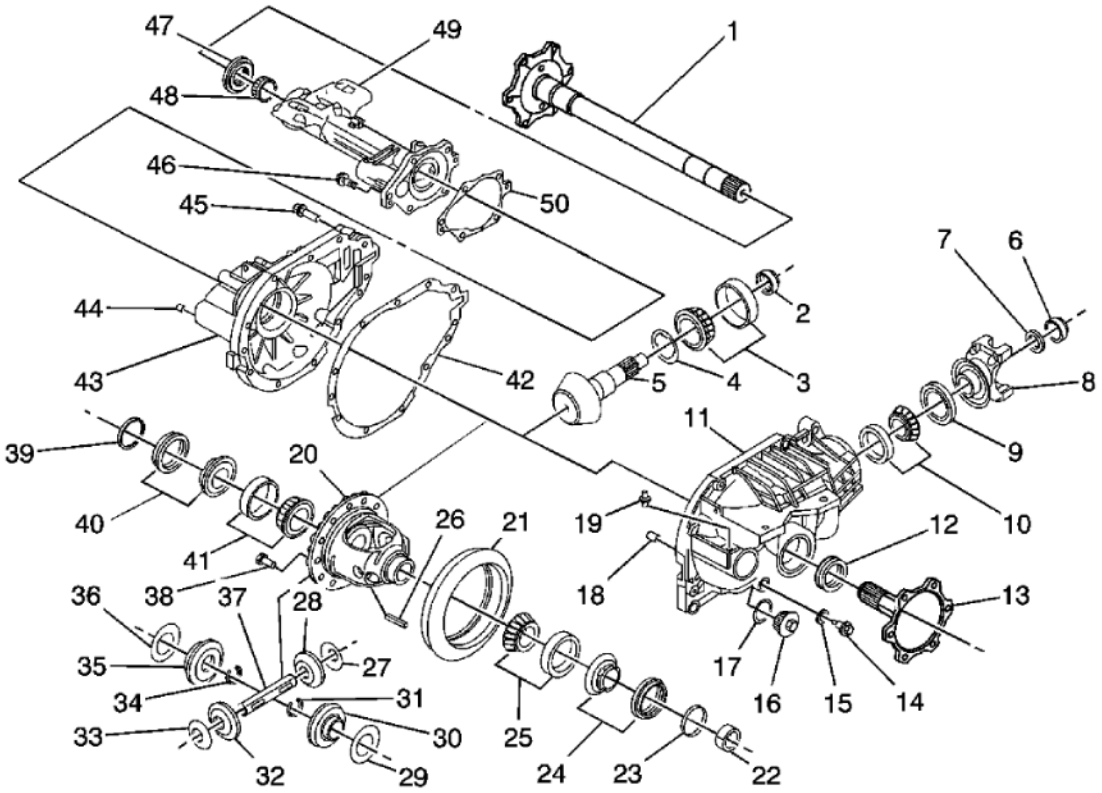


Fig. 2: Front Drive Axle Disassembled Views (8.25 Inch (AWD))
Courtesy of GENERAL MOTORS CORP.

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 Case Bearing Assembly
26	Differential Cross Pin Lock Pin
27	Differential Pinion Thrust Washer
28	Differential Pinion Gear
29	Differential Side Gear Thrust Washer
30	Differential Side Gear
31	Output Shaft Snap Ring
32	Differential Pinion Gear
33	Differential Pinion Thrust Washer
34	Output Shaft Snap Ring
35	Differential Side Gear
36	Differential Side Gear Thrust Washer
37	Differential Cross Pin
38	Ring Gear Bolt
39	8-Point Lock Ring
40	Sleeve and Insert Assembly
41	Differential Case Bearing Assembly
42	Carrier Gasket
43	Carrier Cover
44	Tube Locator Pin
45	Carrier Bolt
46	Tube Bolt
47	Output Shaft Seal
48	Output Shaft Bearing Assembly

	Tube
50	Tube Gasket

FRONT DRIVE AXLE DISASSEMBLED VIEWS (8.25 INCH (4WD/FRONT))

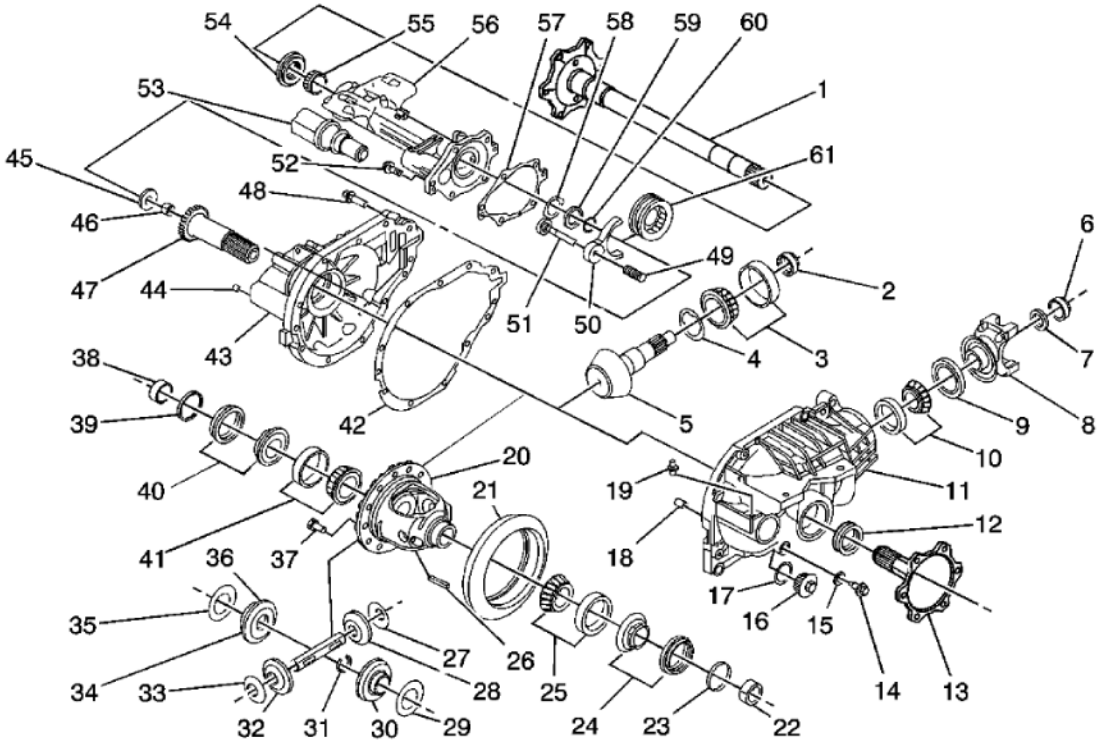


Fig. 3: Front Drive Axle Disassembled Views (8.25 Inch (4WD/Front))
Courtesy of GENERAL MOTORS CORP.

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
42	Carrier Gasket
43	Carrier Cover
44	Tube Locator Pin
45	Inner Output Shaft Thrust Washer

	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

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - FRONT DRIVE AXLE

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

SYMPTOMS - FRONT DRIVE AXLE

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

Noise Diagnosis

Any gear-driven unit produces a certain amount of noise that is normal and that conventional repairs or adjustment cannot eliminate. Slight noise that is heard only at a certain speed or under unusual or remote conditions is acceptable. For example, this noise tends to reach a peak at

speeds from 60-100 km/h (40-60 mph) depending upon road and load conditions, or upon gear ratio and tire size. Noise of this kind does not indicate trouble in the axle assembly.

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

Classifying the Symptom

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

- Leaks
- Noises
- Vibrations

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

Visual/Physical Inspection

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

Symptoms List

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

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

FRONT DRIVE AXLE NOISES

Gear Noise

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

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

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

Bearing Noise

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

Front Wheel Bearing Noise

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

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

Knock at Low Speeds

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

Backlash Clunk

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

- Worn differential pinion shaft
- Worn differential pinion and/or side gear teeth

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

Inspect, adjust or replace the affected components as necessary.

NOISY IN DRIVE

Checks	Action
Excessive pinion to ring gear backlash	Adjust the pinion to ring gear backlash. Refer to **Backlash Inspection and Adjustment**.
Worn pinion and ring gear	Replace the pinion and the ring gear. Perform the following procedures: 1. **Differential Carrier Assembly Disassemble (9.25 Inch Axle)** 2. **Differential Case Assembly Disassemble (8.25 Inch Axle)** or **Differential Case Assembly Disassemble (9.25 Inch Axle)** 3. **Differential Case Assembly Assemble (8.25 Inch Axle)** or **Differential Case Assembly Assemble (9.25 Inch Axle)** 4. **Front Differential Drive Pinion Gear Bearing Cup Installation (9.25 Inch Axle w/J 45754)** or **Front Differential Drive Pinion Gear Bearing Cup Installation (8.25 Inch Axle w/J 45858)** or **Front Differential Drive Pinion Gear Bearing Cup Installation (8.25/9.25 Inch Axles w/J 36598)** 5. **Differential Carrier Assembly Assemble (8.25 Inch Axle Lock Ring Style)** or **Differential Carrier Assembly Assemble (9.25 Inch Axle)**
Worn pinion bearings	Replace the pinion bearings. Perform the following procedures: 1. **Differential Carrier Assembly Disassemble (9.25 Inch Axle)**

	2. **Front Differential Drive Pinion Gear Bearing Cup Installation (9.25 Inch Axle w/J 45754)** or **Front Differential Drive Pinion Gear Bearing Cup Installation (8.25 Inch Axle w/J 45858)** or **Front Differential Drive Pinion Gear Bearing Cup Installation (8.25/9.25 Inch Axles w/J 36598)** 3. **Differential Carrier Assembly Assemble (8.25 Inch Axle Lock Ring Style)** or **Differential Carrier Assembly Assemble (9.25 Inch Axle)**
Loose pinion bearings	Adjust the pinion bearings preload. Perform the following procedures: 1. **Differential Carrier Assembly Disassemble (9.25 Inch Axle)** 2. **Differential Carrier Assembly Assemble (8.25 Inch Axle Lock Ring Style)** or **Differential Carrier Assembly Assemble (9.25 Inch Axle)** 3. **Backlash Inspection and Adjustment**
Excessive pinion end play	Adjust the pinion end play. Refer to **Differential Carrier Assembly Assemble (8.25 Inch Axle Lock Ring Style)** or **Differential Carrier Assembly Assemble (9.25 Inch Axle)**.
Worn differential bearings	Replace the differential bearings. Perform the following procedures: 1. **Differential Carrier Assembly Disassemble (9.25 Inch Axle)** 2. **Differential Case Assembly Disassemble (8.25 Inch Axle)** or **Differential Case Assembly Disassemble (9.25 Inch Axle)** 3. **Differential Case Assembly Assemble (8.25 Inch Axle)** or **Differential Case Assembly Assemble (9.25 Inch Axle)** 4. **Differential Carrier Assembly Assemble (8.25 Inch Axle Lock Ring Style)** or **Differential Carrier Assembly Assemble (9.25 Inch Axle)**
Loose differential bearings	Adjust the differential bearing preload. Perform the following procedures:

	1. **Differential Carrier Assembly Disassemble (9.25 Inch Axle)** 2. **Differential Carrier Assembly Assemble (8.25 Inch Axle Lock Ring Style)** or **Differential Carrier Assembly Assemble (9.25 Inch Axle)**
Excessive ring gear runout	Replace the ring gear. Perform the following procedures: 1. **Differential Carrier Assembly Disassemble (9.25 Inch Axle)** 2. **Differential Carrier Assembly Assemble (8.25 Inch Axle Lock Ring Style)** or **Differential Carrier Assembly 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)**.
Wrong or poor grade oil	Drain and refill the system with the proper lubricant. Refer to **Front Axle Lubricant Replacement**.

NOISY WHEN COASTING

Checks	Action
DEFINITION: Noise is audible when slowing down and disappears when driving.	
Worn pinion and ring gear	Adjust or replace the pinion and the ring gear. Refer to **Differential Carrier Assembly Disassemble (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 **Differential Carrier Assembly Disassemble (9.25 Inch Axle)**.
Loose differential case assembly	Set the differential case assembly to the proper preload and backlash. Refer to **Differential Carrier Assembly Assemble (8.25 Inch Axle Lock Ring Style)** or **Differential Carrier Assembly Assemble (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 **Differential Carrier Assembly Disassemble (9.25 Inch Axle)**.
Flat spot on the pinion bearing	Replace the bearing. Refer to **Differential Carrier Assembly Disassemble (9.25 Inch Axle)**.
Worn pinion splines	Replace the pinion. Refer to **Differential Carrier Assembly 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 **Differential Case Assembly Disassemble (8.25 Inch Axle)** or **Differential Case Assembly Disassemble (9.25 Inch Axle)**.
Worn differential spider	Replace the spine gears. Refer to **Differential Case Assembly Disassemble (8.25 Inch Axle)** or **Differential Case Assembly Disassemble (9.25 Inch Axle)**.
Worn axle shaft splines	Replace the axle shaft. Refer to **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement (8.25 F4WD Axle)** or **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement (8.25 S4WD and 9.25 Axles)**.

FRONT DRIVE AXLE BEARING WEAR (STRAIGHT)

Straight Roller Bearing Diagnosis

Consider the following factors when diagnosing a bearing condition:

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

Wear (Minor)

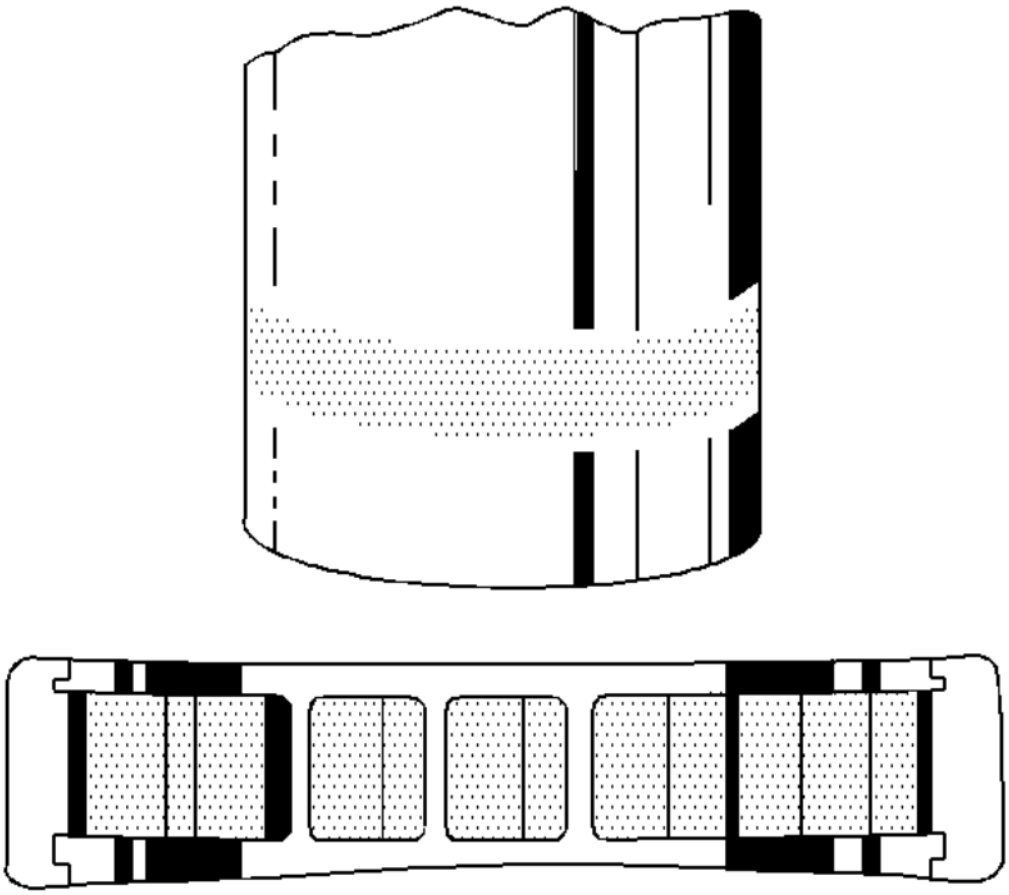


Fig. 4: Identifying Minor Wear
Courtesy of GENERAL MOTORS CORP.

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

Wear (Major)

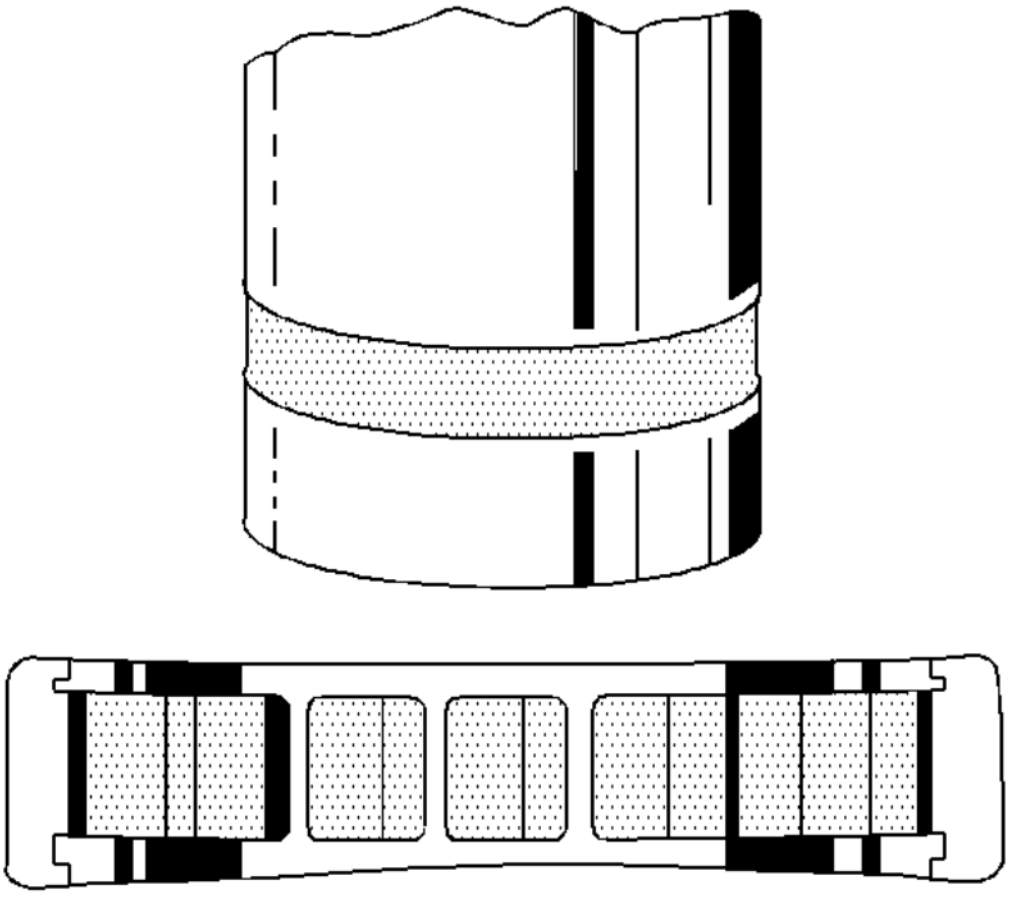


Fig. 5: Identifying Major Wear
Courtesy of GENERAL MOTORS CORP.

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

Brinelling

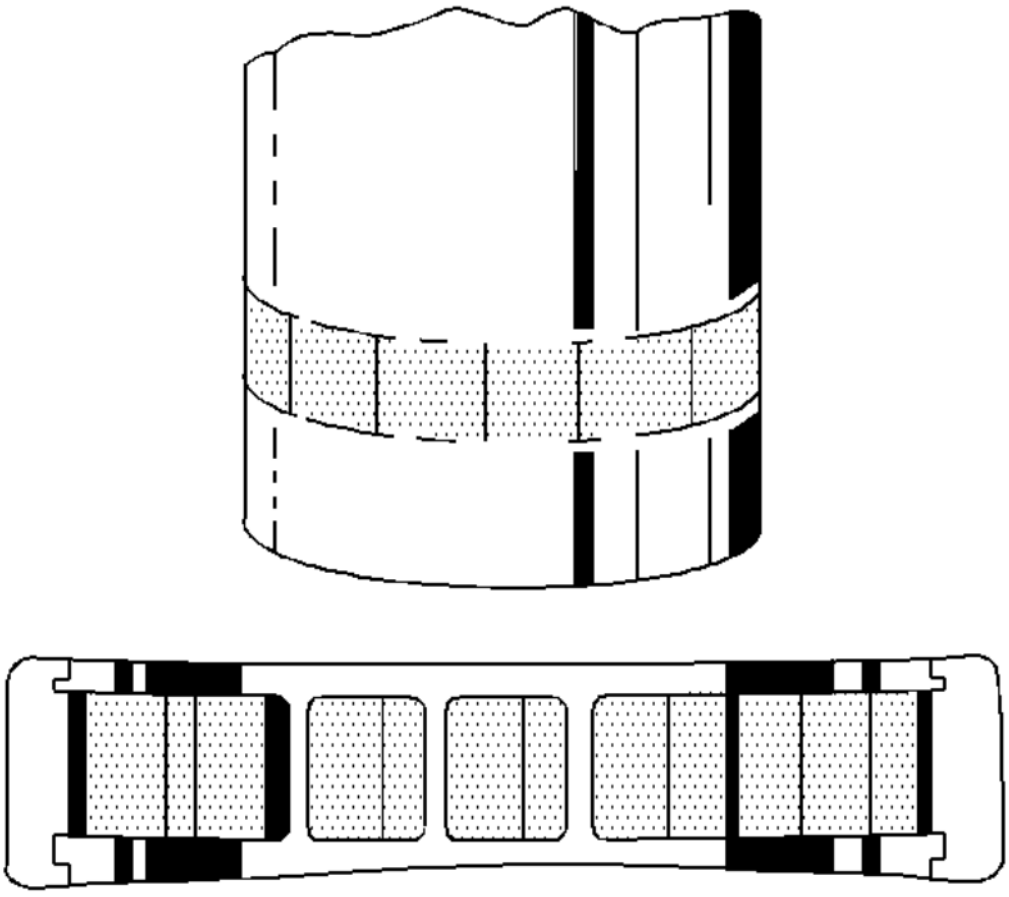


Fig. 6: Identifying Brinelling
Courtesy of GENERAL MOTORS CORP.

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

Indentations

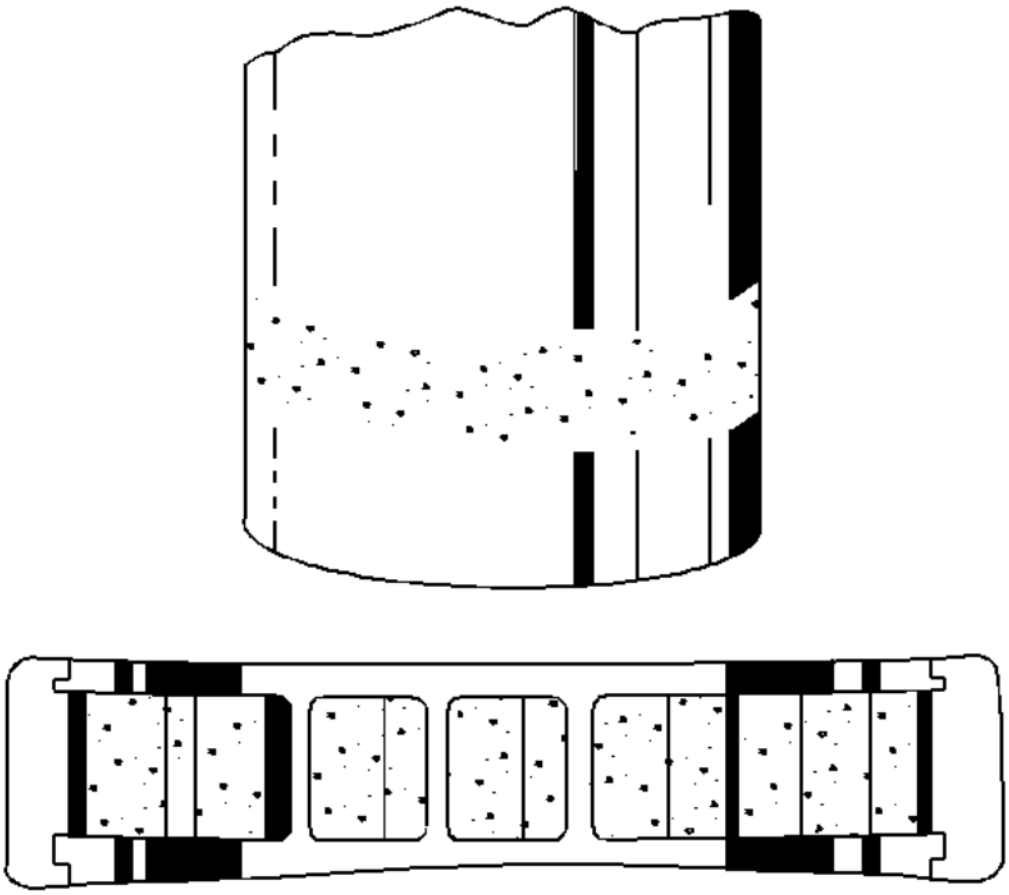


Fig. 7: Identifying Indentations
Courtesy of GENERAL MOTORS CORP.

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

Single Edge Pitting

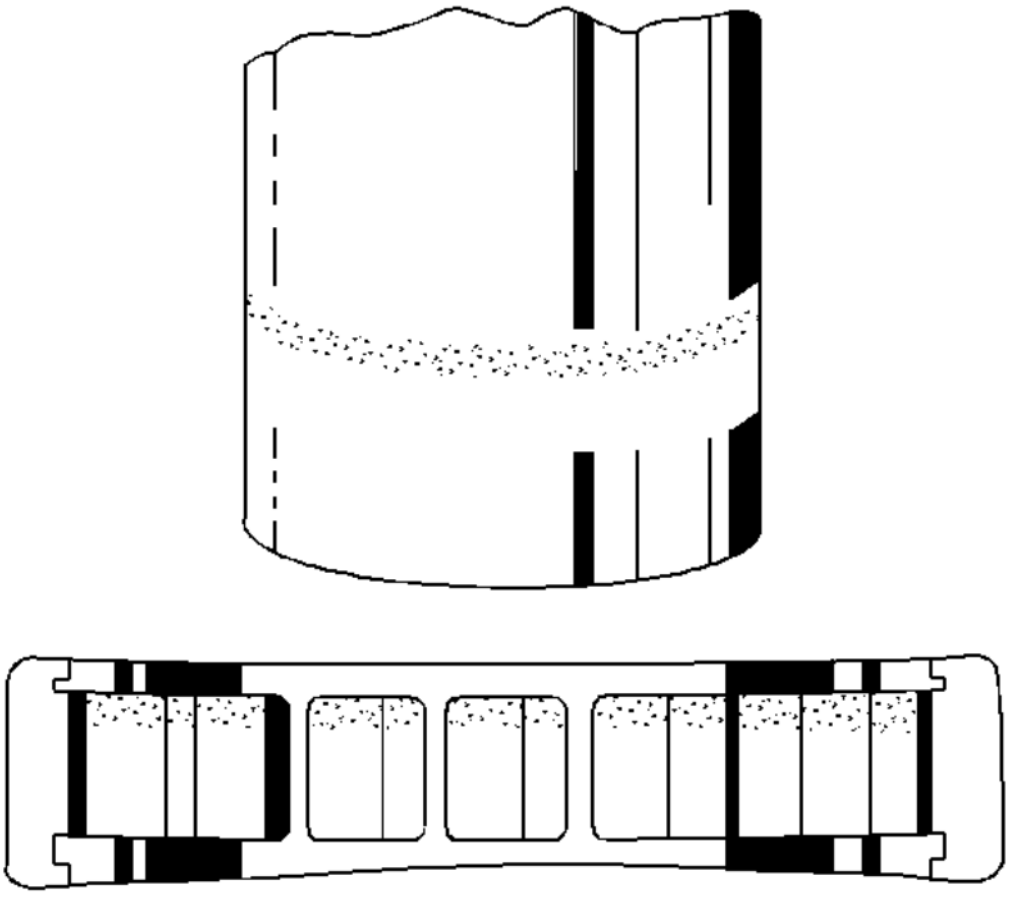


Fig. 8: Identifying Single Edge Pitting
Courtesy of GENERAL MOTORS CORP.

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

Double Edge Pitting

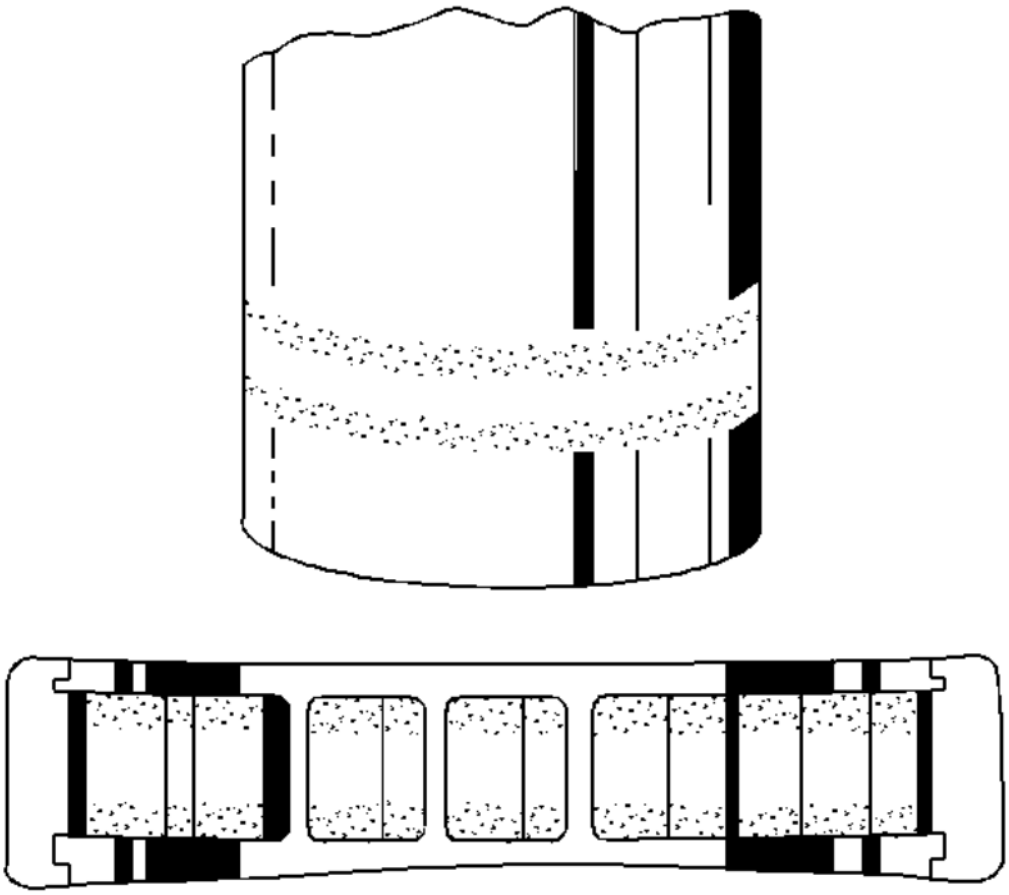


Fig. 9: Identifying Double Edge Pitting
Courtesy of GENERAL MOTORS CORP.

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

Misalignment

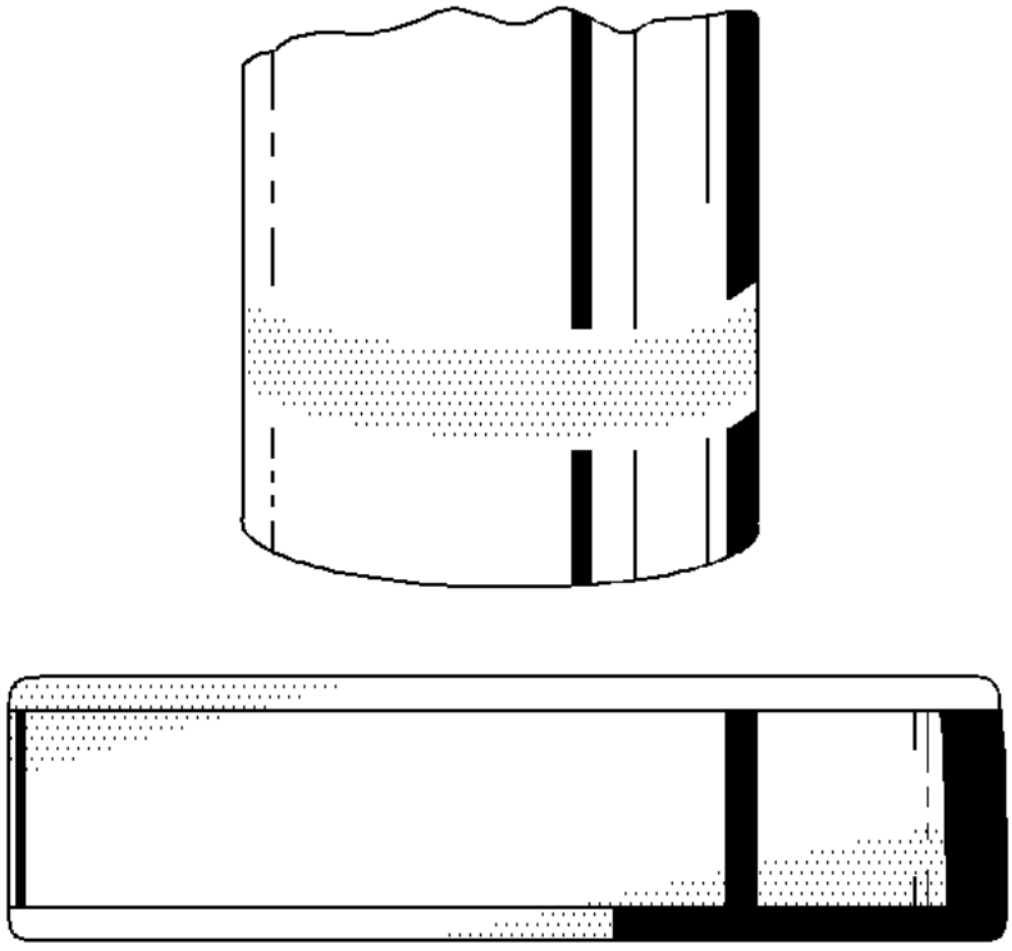


Fig. 10: Identifying Misalignment
Courtesy of GENERAL MOTORS CORP.

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

Frettage

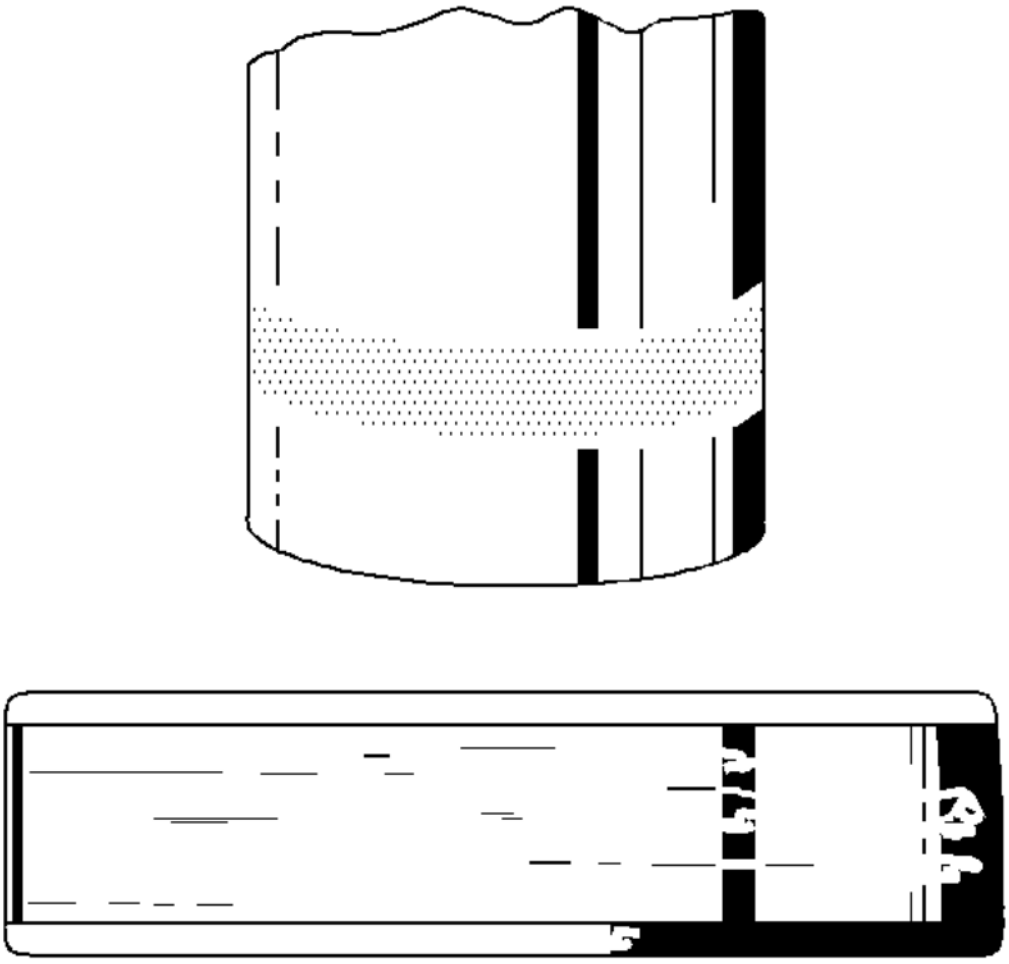


Fig. 11: Identifying Frettage
Courtesy of GENERAL MOTORS CORP.

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

Smears

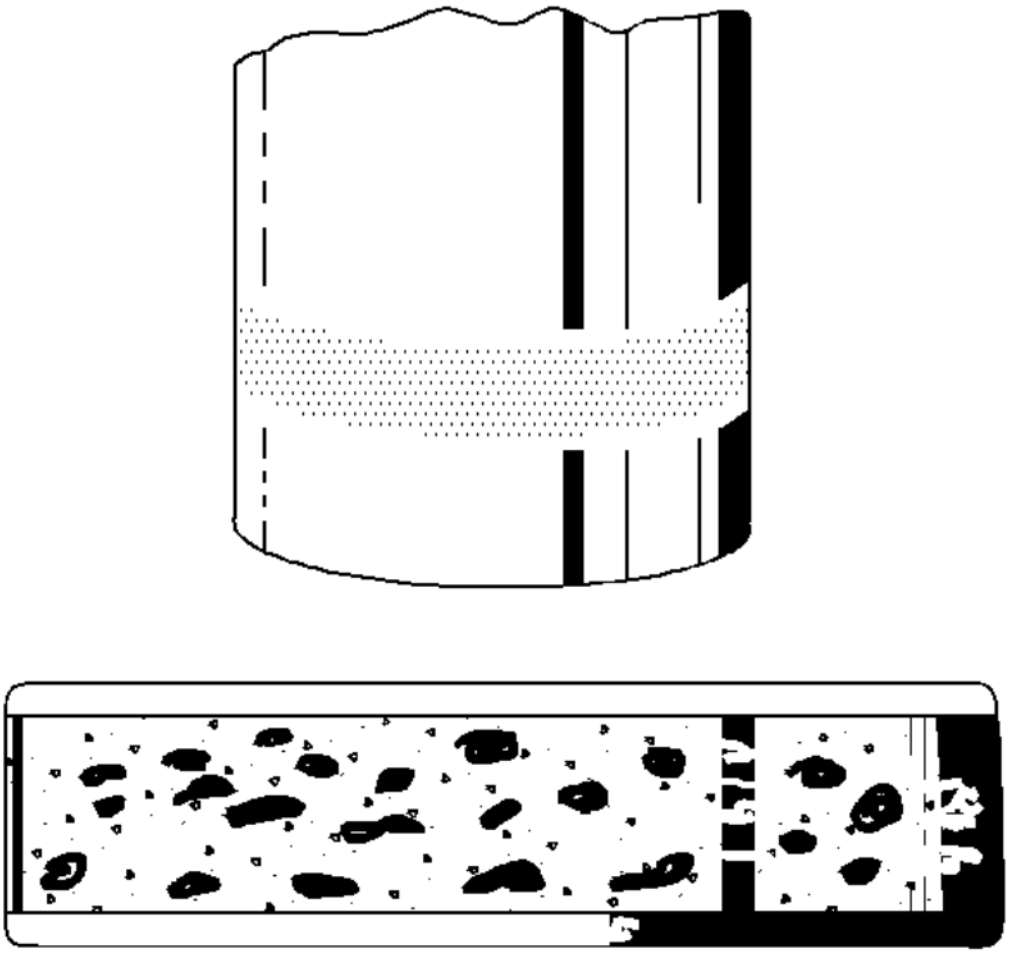


Fig. 12: Identifying Smears
Courtesy of GENERAL MOTORS CORP.

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

FRONT DRIVE AXLE BEARING WEAR (TAPERED)

Tapered Roller Bearing Diagnosis

Consider the following factors when diagnosing bearing condition:

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

Abrasive Roller Wear

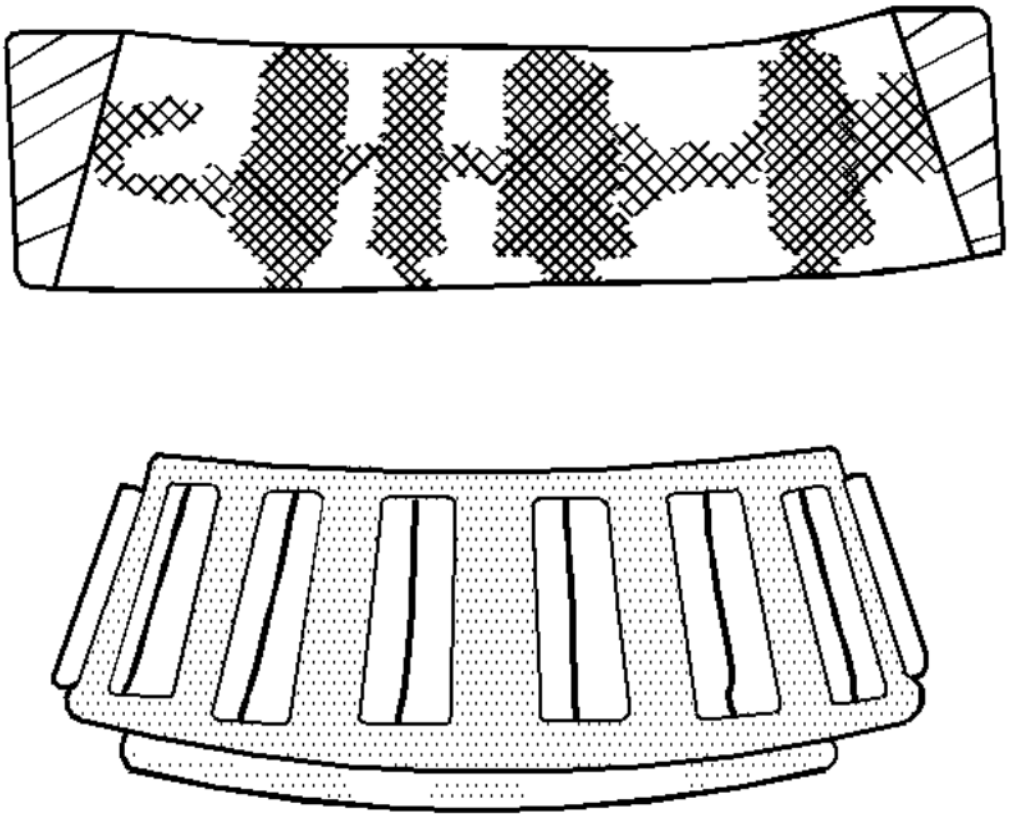


Fig. 13: Identifying Abrasive Roller Wear
Courtesy of GENERAL MOTORS CORP.

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

Abrasive Step Wear

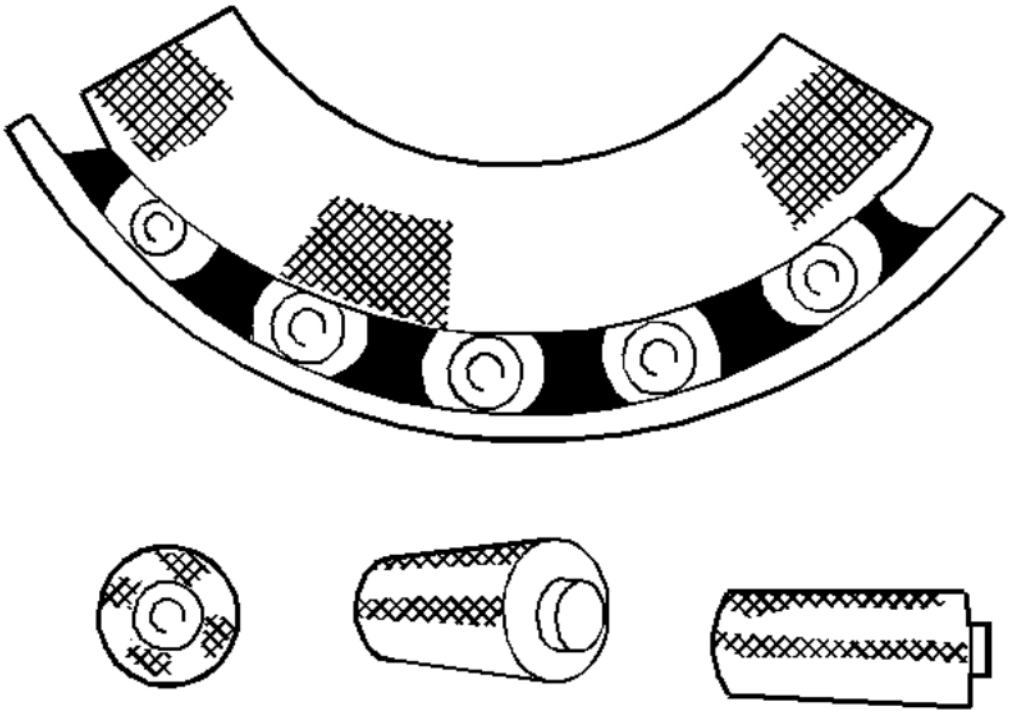


Fig. 14: Identifying Abrasive Step Wear
Courtesy of GENERAL MOTORS CORP.

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

Galling

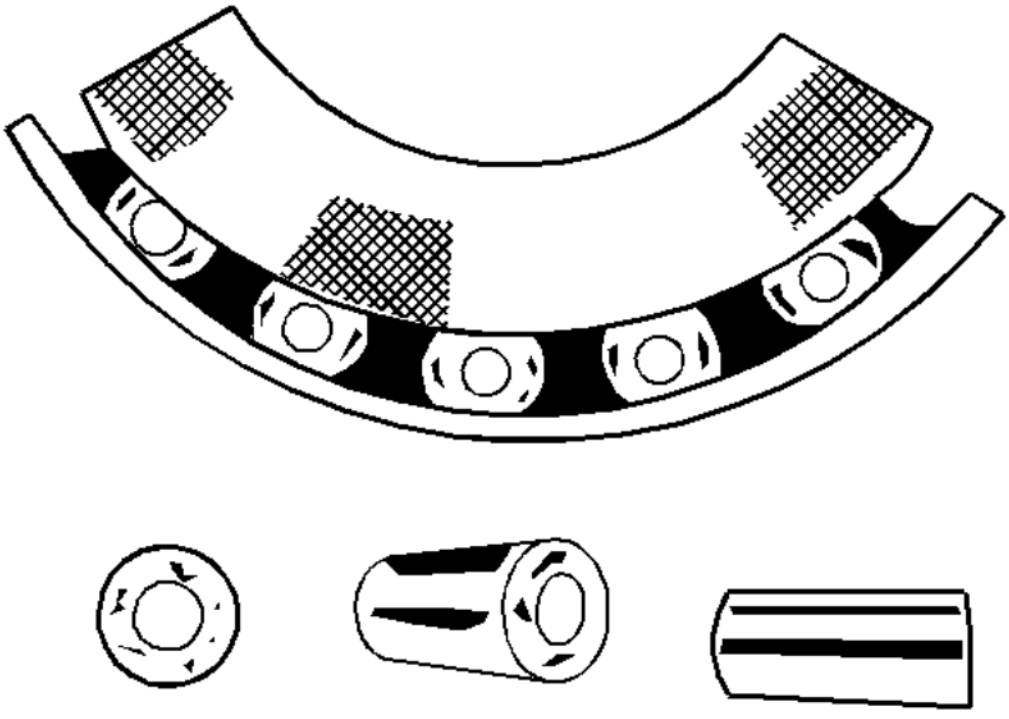


Fig. 15: Identifying Galling
Courtesy of GENERAL MOTORS CORP.

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

Etching

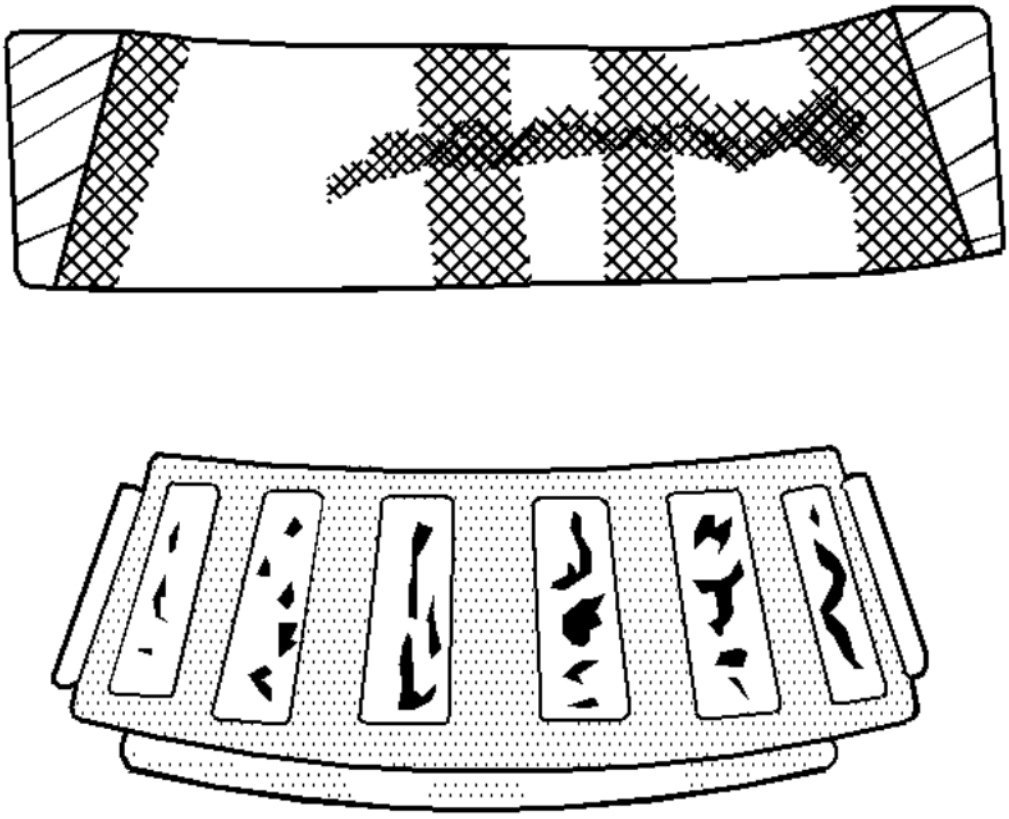


Fig. 16: Identifying Etching
Courtesy of GENERAL MOTORS CORP.

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

Bent Cage

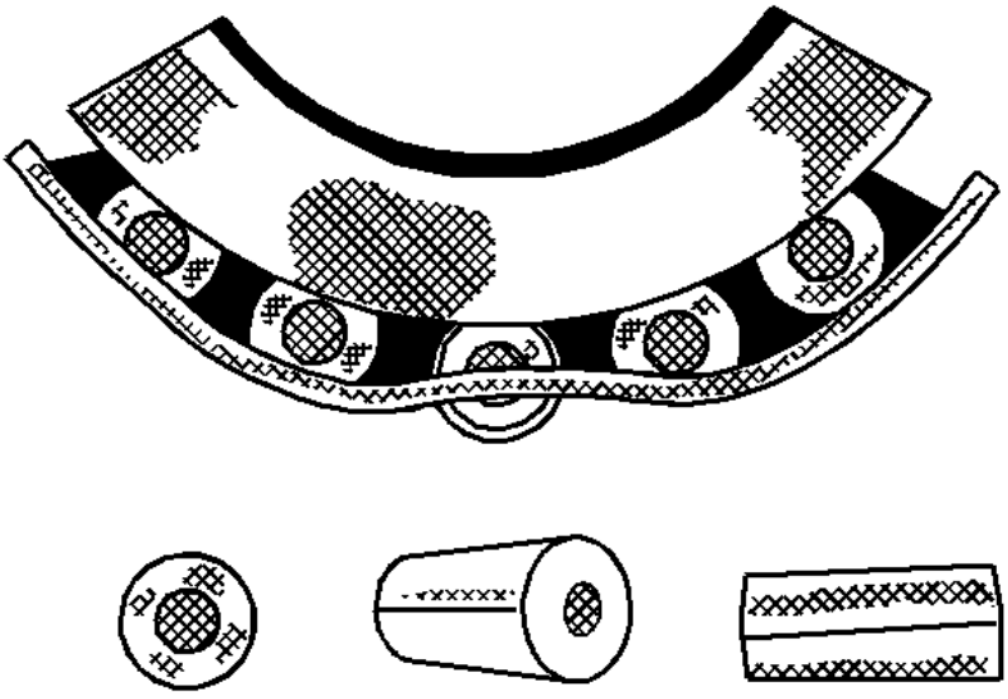


Fig. 17: Identifying Bent Roller Cage
Courtesy of GENERAL MOTORS CORP.

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

Cage Wear

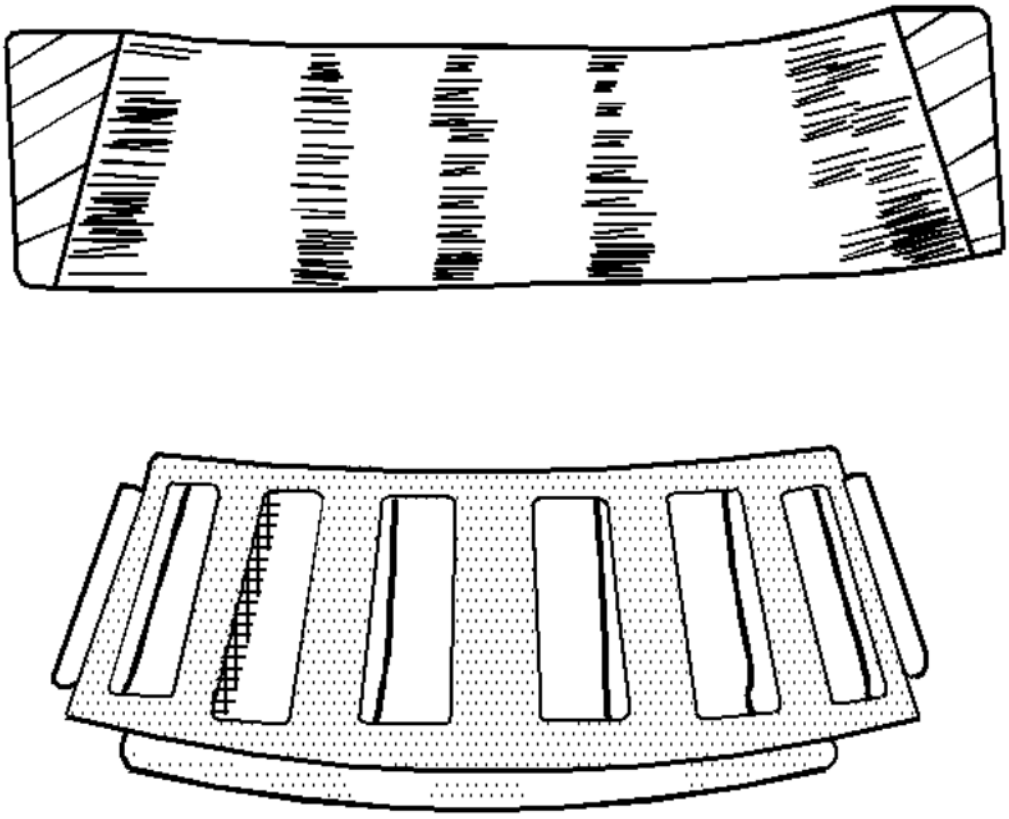


Fig. 18: Identifying Cage Wear
Courtesy of GENERAL MOTORS CORP.

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

Indentations

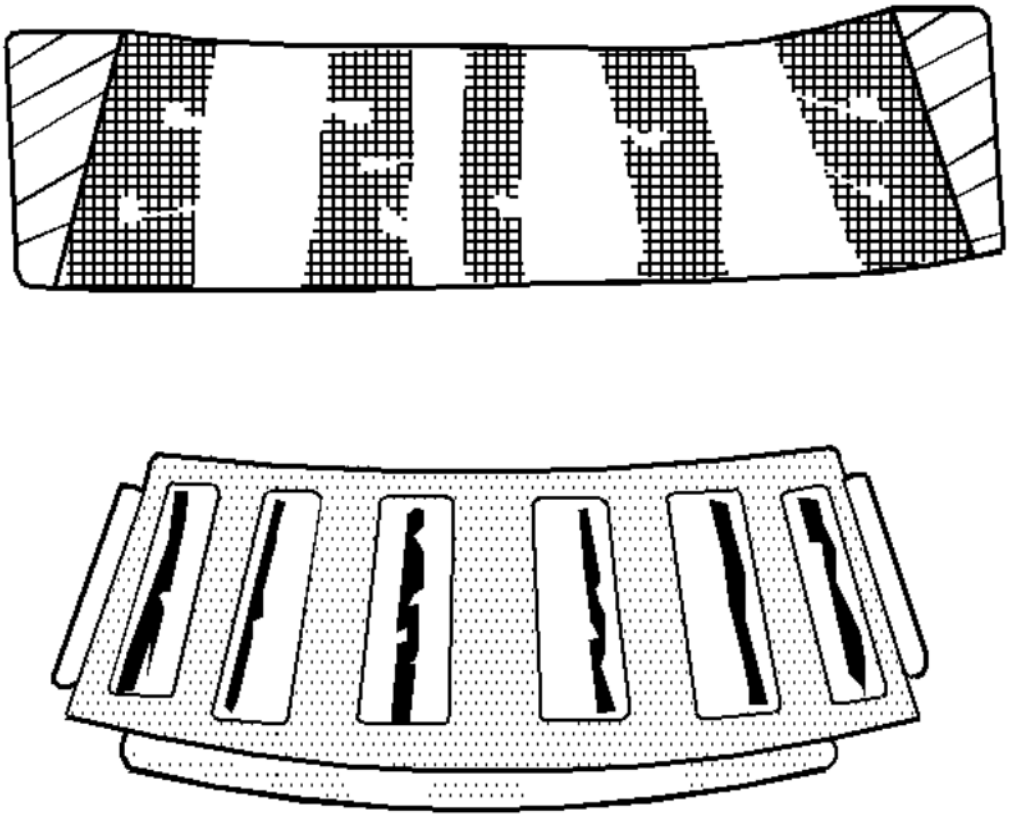


Fig. 19: Inspecting Bearing Rollers & Races For Heat Discoloration
Courtesy of GENERAL MOTORS CORP.

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

Frettage

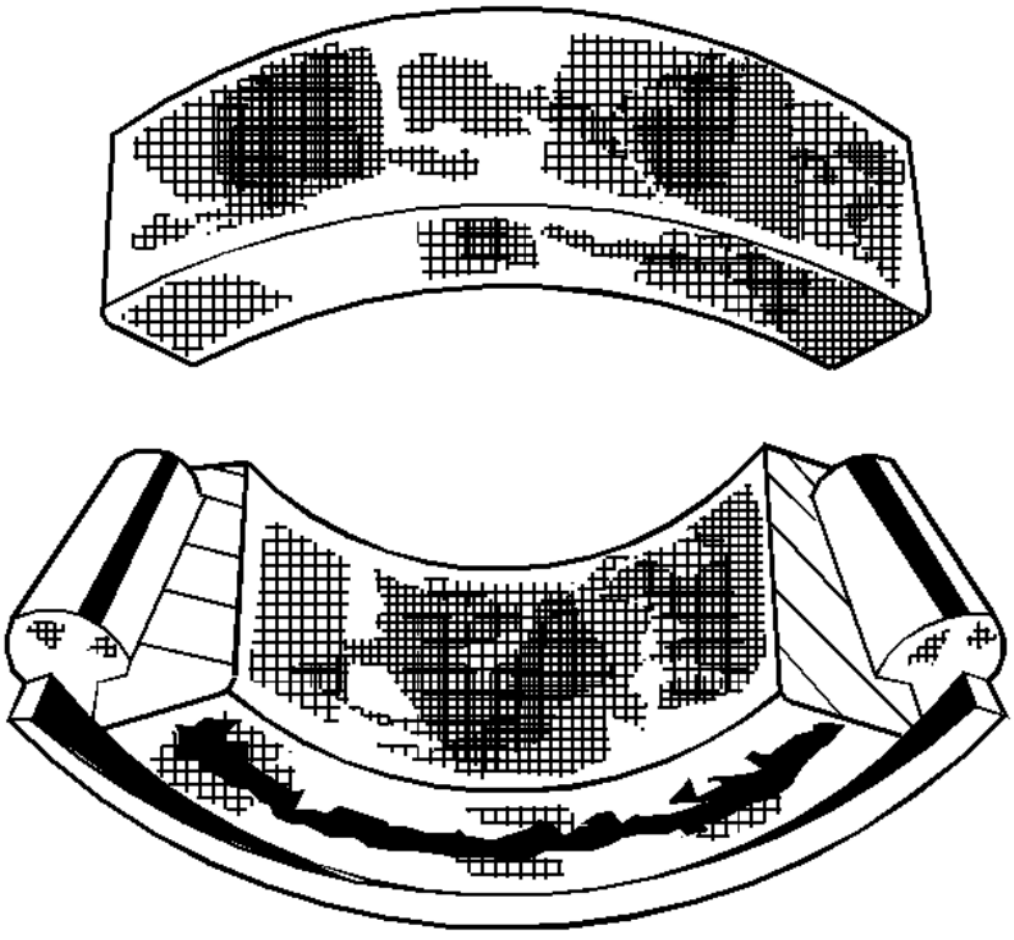


Fig. 20: Identifying Frettage
Courtesy of GENERAL MOTORS CORP.

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

Smears

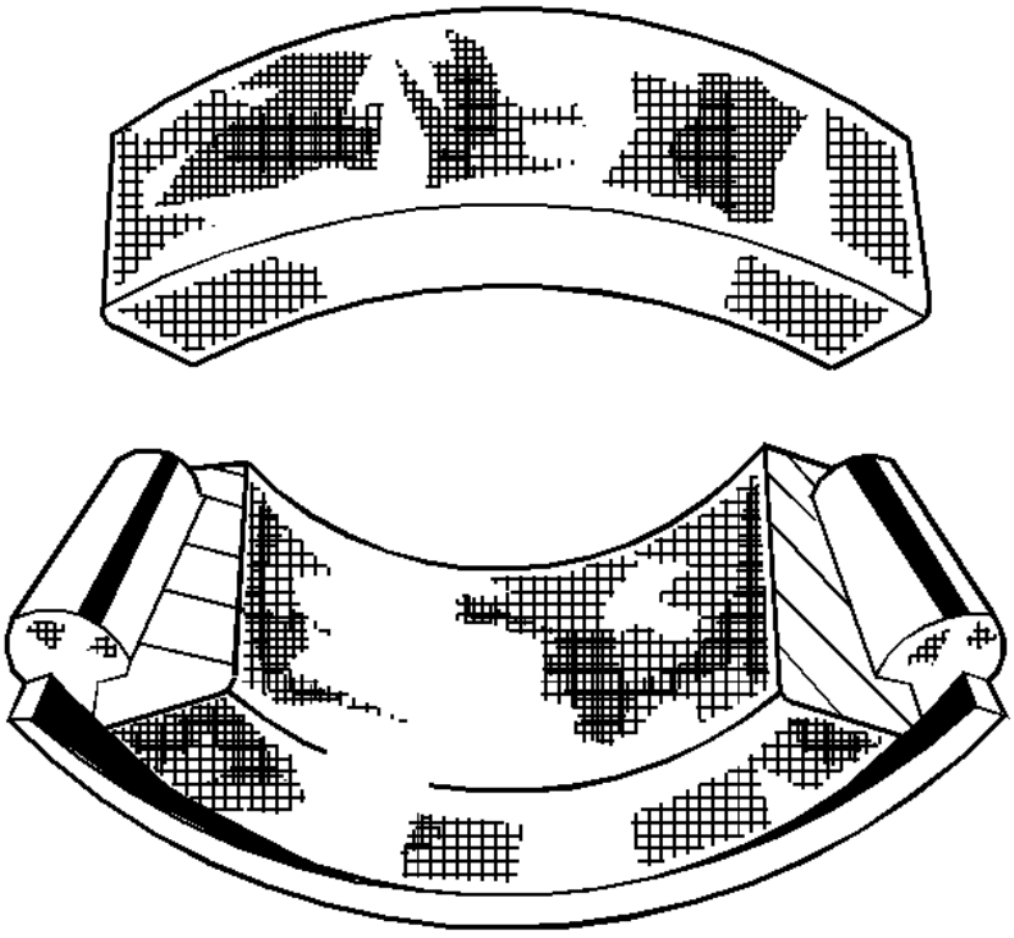


Fig. 21: Identifying Smears
Courtesy of GENERAL MOTORS CORP.

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

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

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

Stain Discoloration

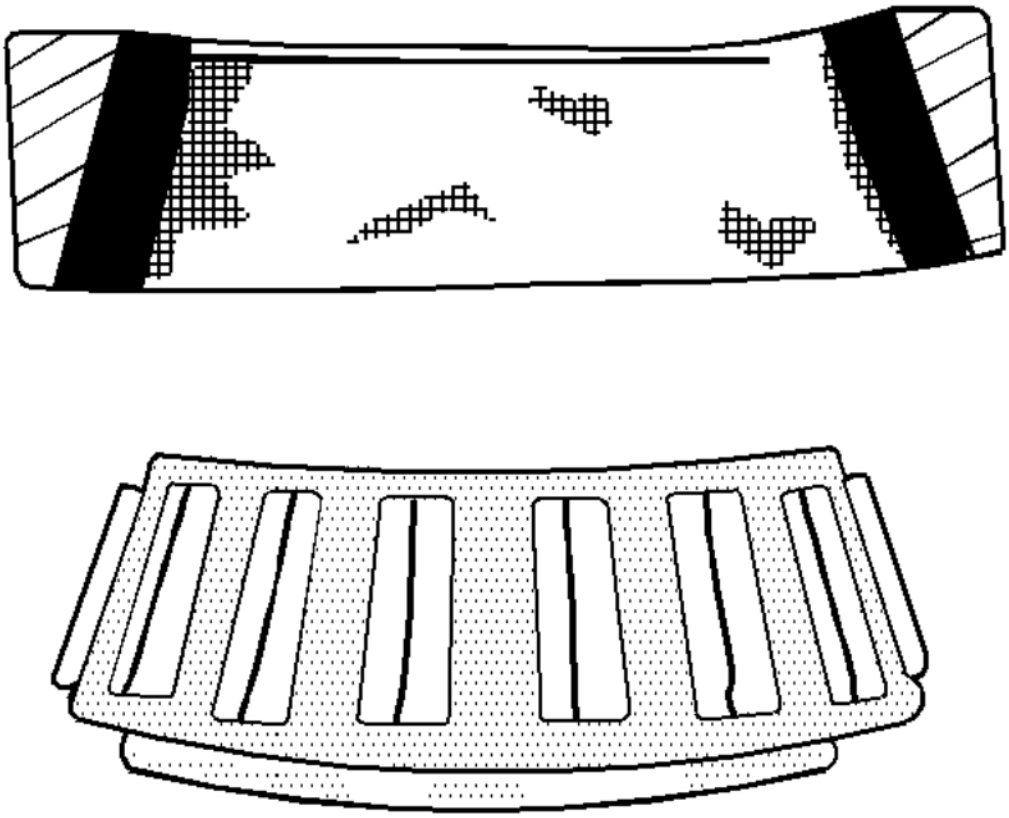


Fig. 22: Identifying Stain Discoloration
Courtesy of GENERAL MOTORS CORP.

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

Heat Discoloration

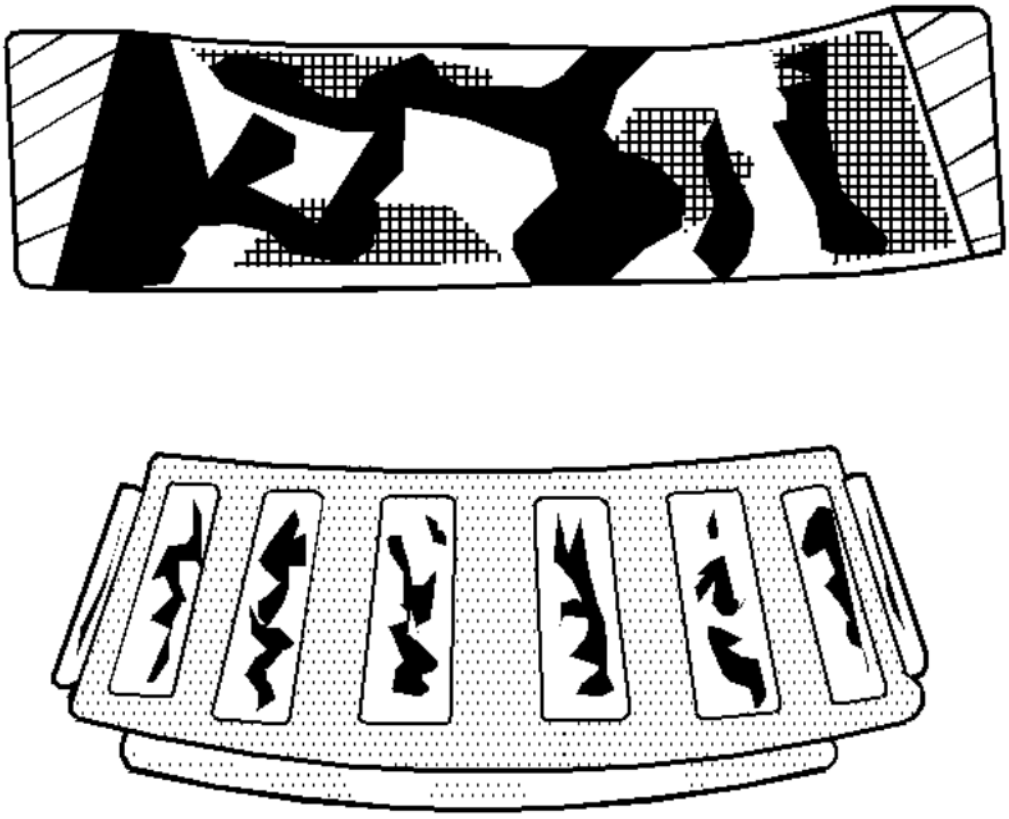


Fig. 23: Identifying Heat Discoloration
Courtesy of GENERAL MOTORS CORP.

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

Misalignment

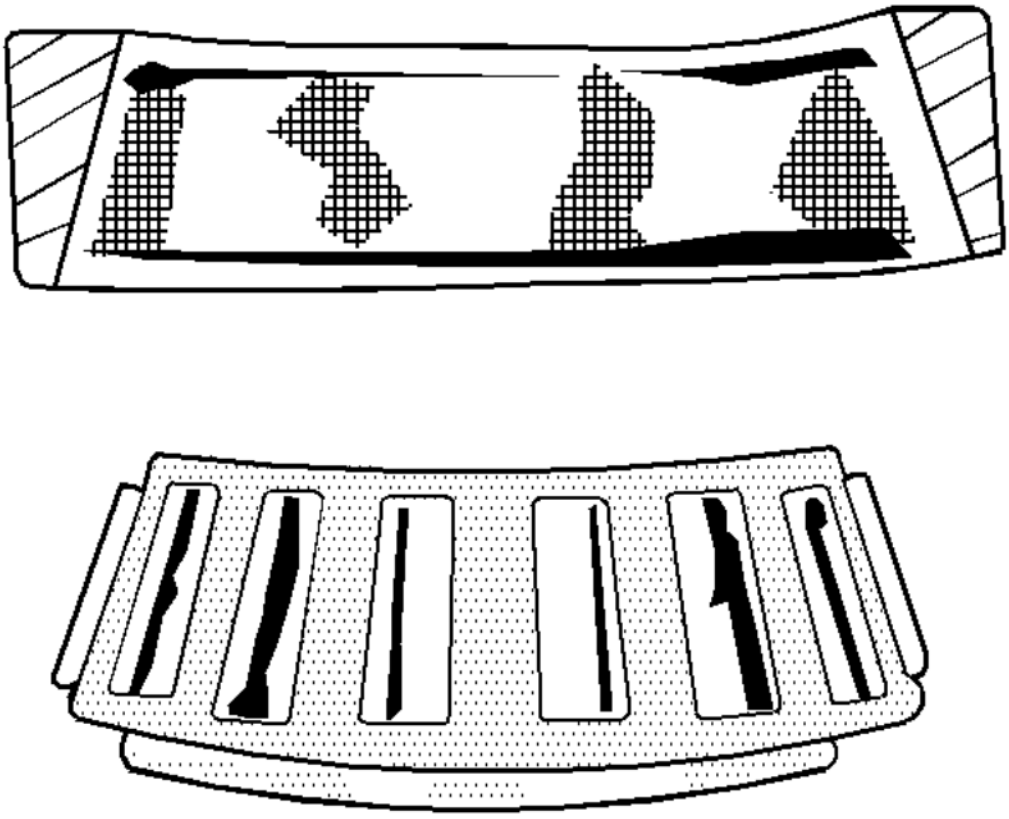


Fig. 24: Identifying Misalignment
Courtesy of GENERAL MOTORS CORP.

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

Cracked Inner Race

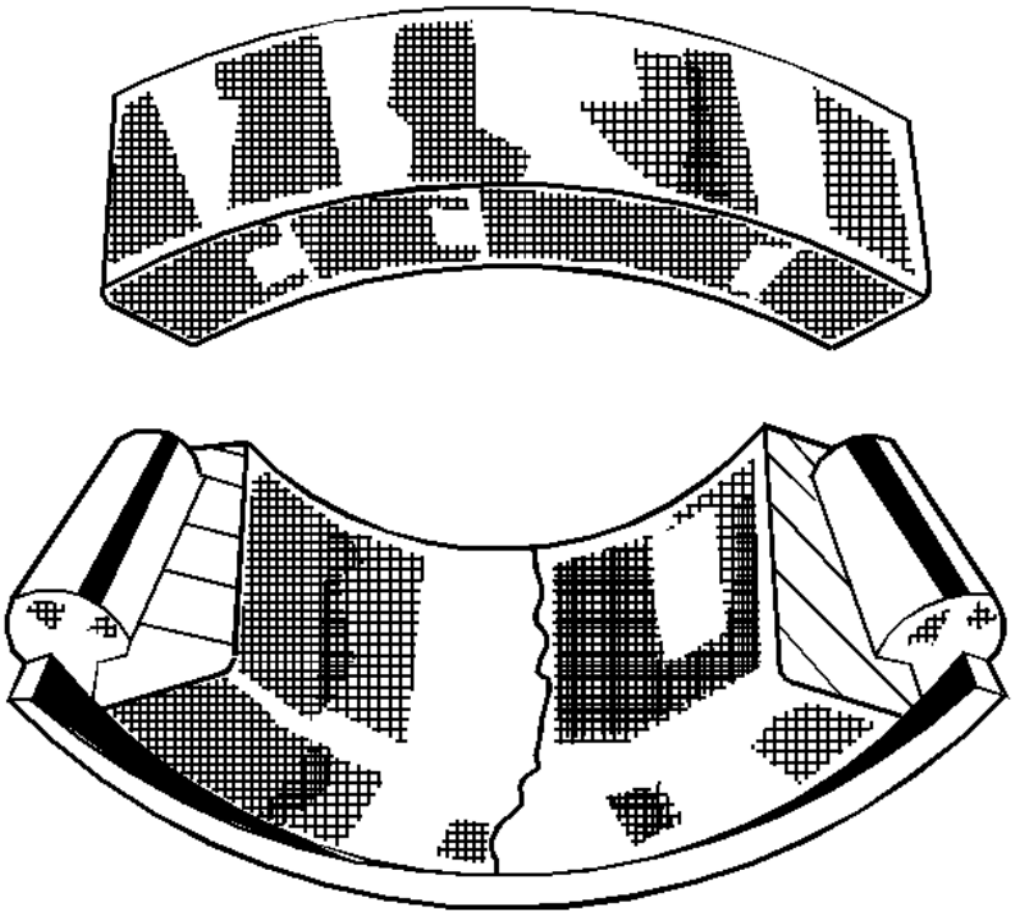


Fig. 25: Identifying Cracked Inner Race
Courtesy of GENERAL MOTORS CORP.

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

Fatigue Spalling

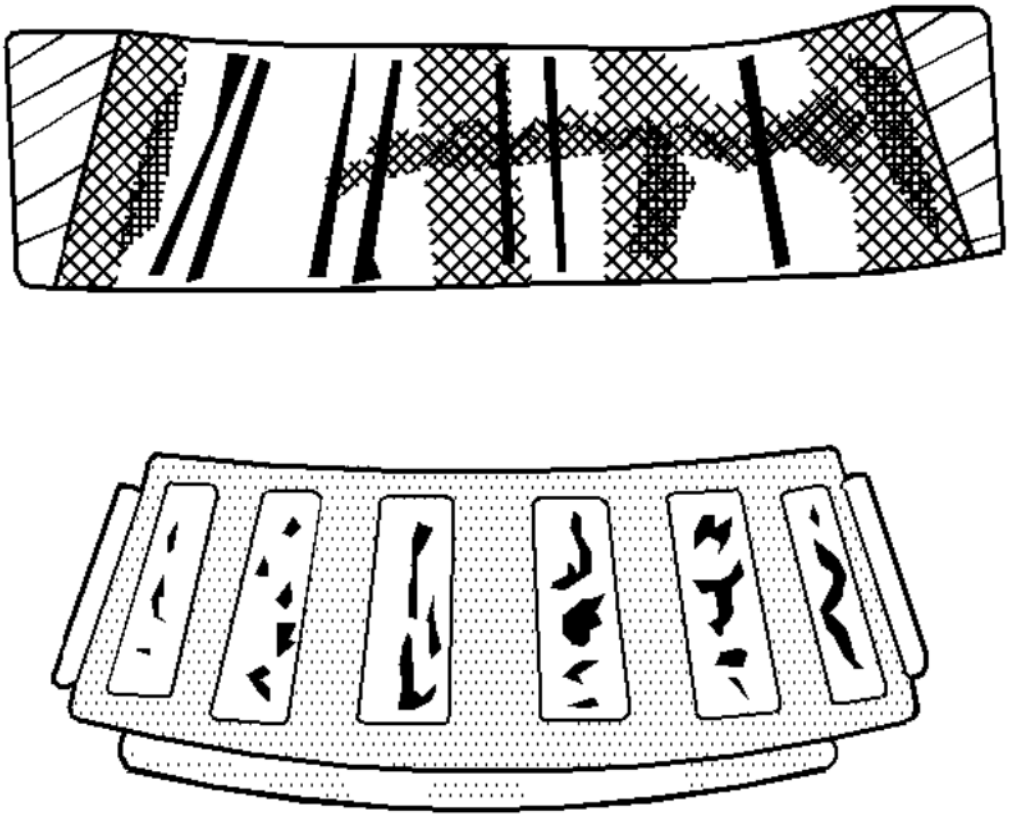


Fig. 26: Inspecting Bearing Rollers & Races For Pitting, Grooves, Spalling & Excessive Wear
Courtesy of GENERAL MOTORS CORP.

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

Brinelling

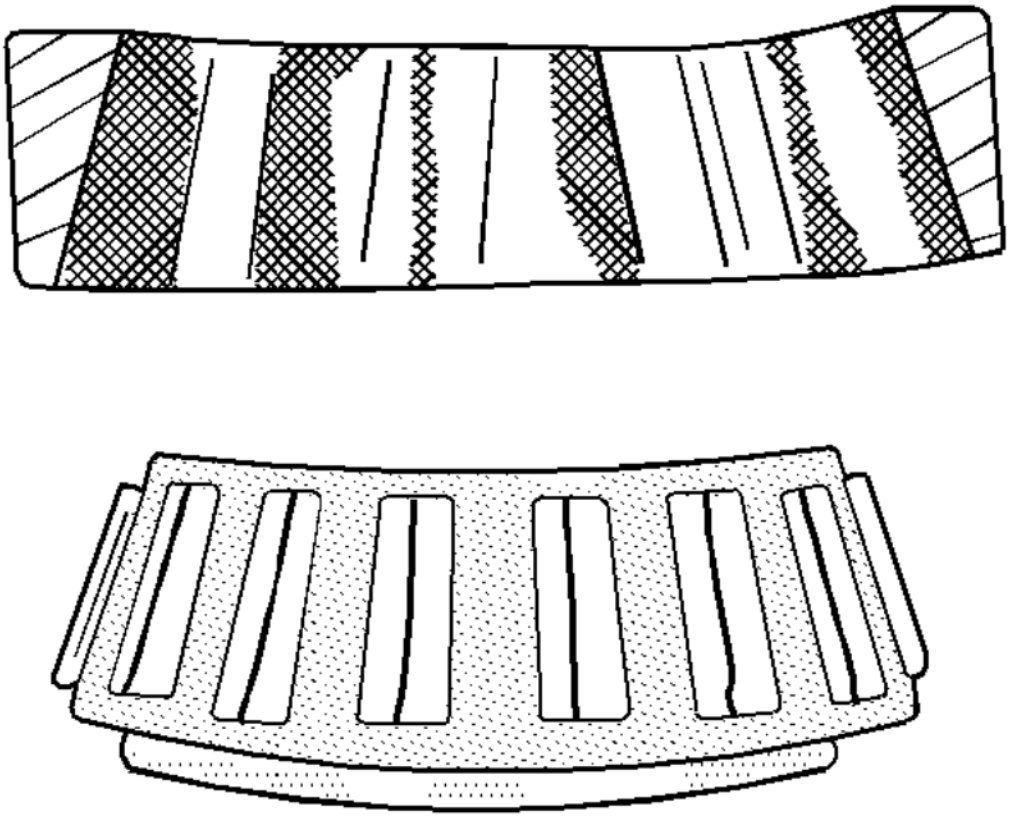


Fig. 27: Identifying Brinelling
Courtesy of GENERAL MOTORS CORP.

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

FOUR-WHEEL DRIVE DOES NOT ENGAGE

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

Step	Action	Yes	No
	Confirm operation of system. Refer to		

1	**Diagnostic Starting Point - Front Drive Axle**. 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**. 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**
3	1. Remove the inner axle shaft and housing assembly. Refer to **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement (8.25 F4WD Axle)** or **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement (8.25 S4WD and 9.25 Axles)**. 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

IMPORTANT: 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 **Diagnostic Starting Point - Front Drive Axle**. 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**. 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**
3	1. Remove the inner axle shaft and housing assembly. Refer to **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement (8.25 F4WD Axle)** or **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement (8.25 S4WD and 9.25 Axles)**. 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 the normal temperature limits for the axle. A seal whose sealing surface has been nicked or cut may indicate that the shaft has a rough, burred, or gouged surface and will need to be inspected before the seal can be replaced.

Sealing Surfaces

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

Differential Carrier Assembly

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

- Drain plug
- Fill plug
- Vent tube

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

REPAIR INSTRUCTIONS

FRONT AXLE LUBRICANT REPLACEMENT

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the engine shield, if equipped. Refer to **Engine Shield Replacement** .
3. Clean the area around the front axle fill plug and the drain plug.
4. Remove the fill plug.

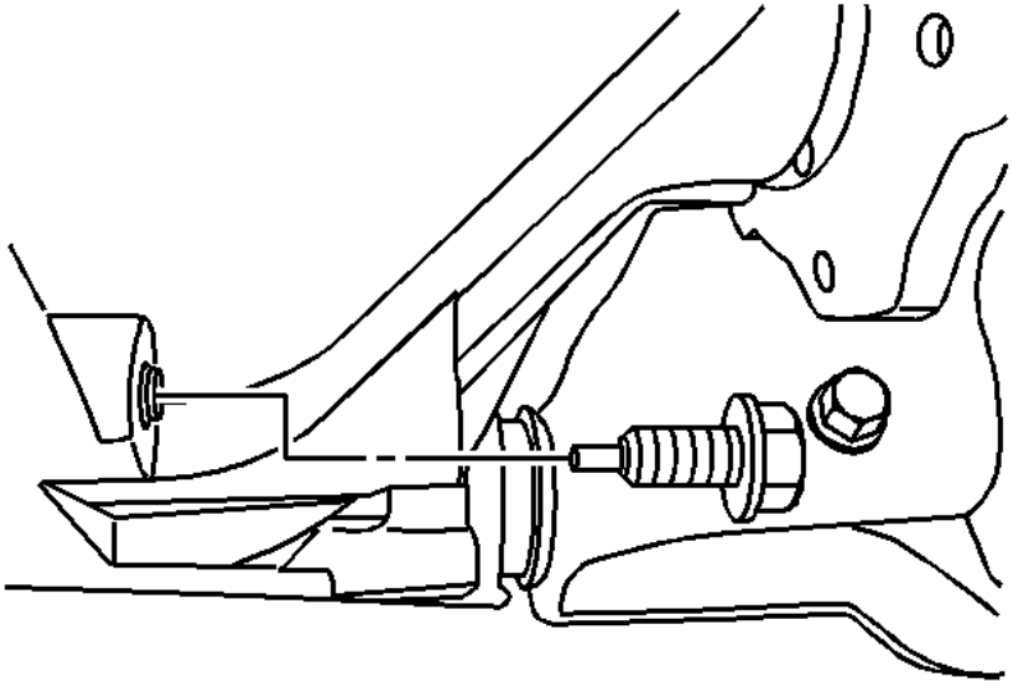


Fig. 28: Front Drive Axle Lubricant Drain Plug
Courtesy of GENERAL MOTORS CORP.

5. Remove the drain plug.
6. Drain the fluid from the front differential carrier assembly.

Installation Procedure

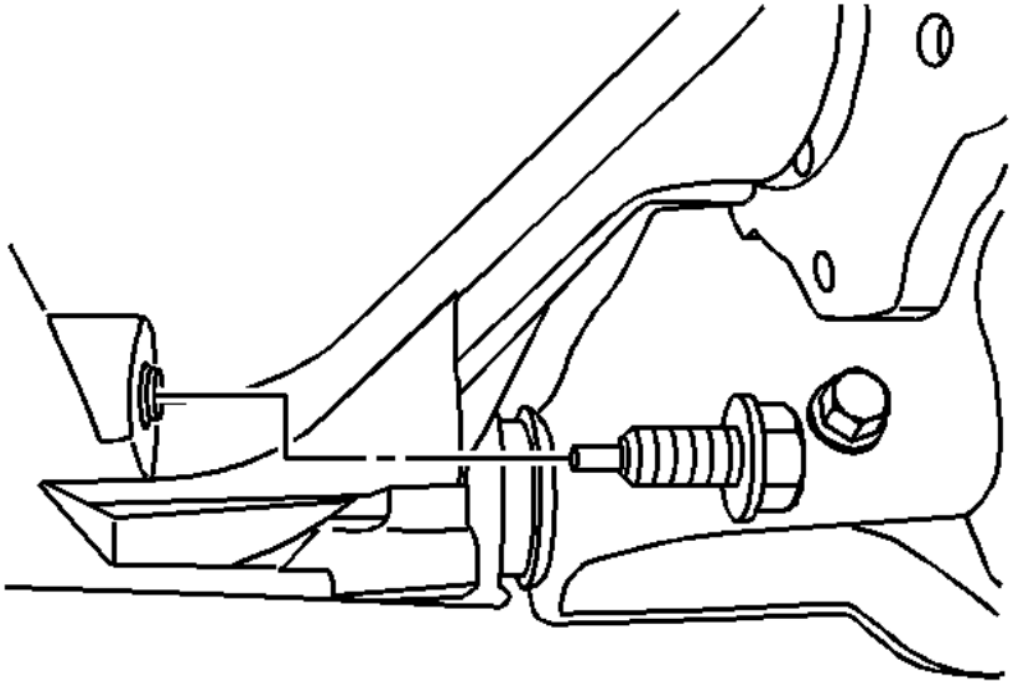


Fig. 29: Front Drive Axle Lubricant Drain Plug
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

1. Install the drain plug.

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

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

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

4. Install the engine shield, if equipped. Refer to **Engine Shield Replacement** .
5. Lower the vehicle.

SHIELD REPLACEMENT

Removal Procedure

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

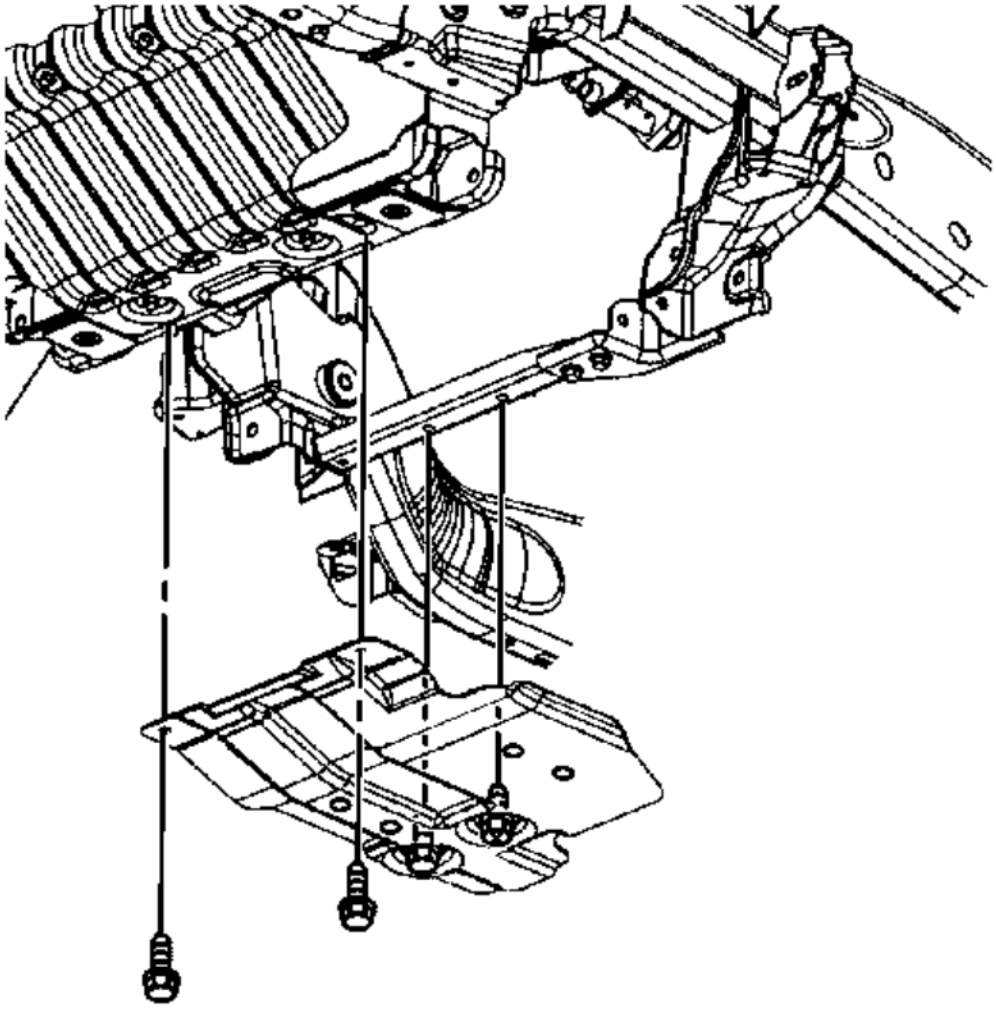


Fig. 30: Differential Carrier Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

2. Remove the front differential carrier shield bolts.

3. Remove the front differential carrier shield.

Installation Procedure

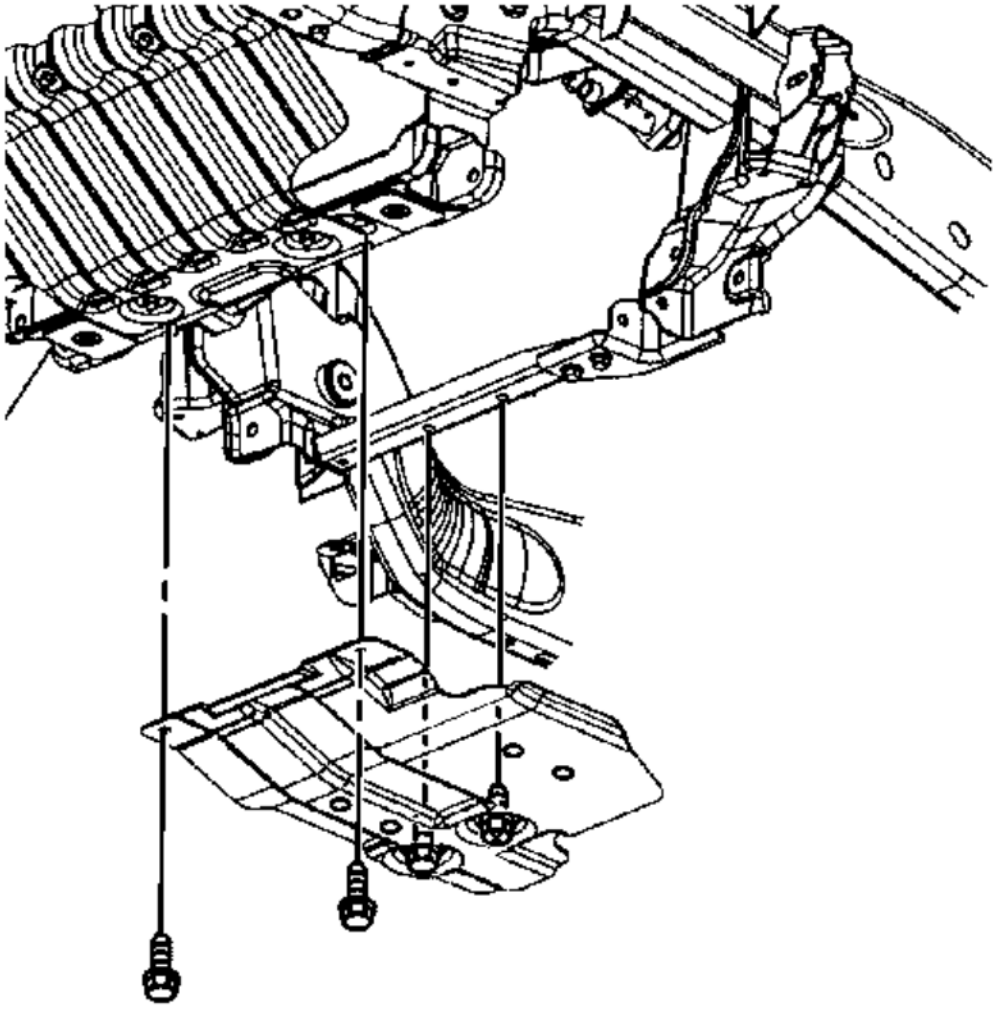


Fig. 31: Differential Carrier Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Install the front differential carrier shield.

NOTE: Refer to Fastener Notice .

2. Install the front differential carrier shield bolts.

   Tighten: Tighten the front differential carrier shield bolts to 20 N.m (15 lb ft).

3. Lower the vehicle.

VENT HOSE REPLACEMENT (8.25 INCH AXLE)

Removal Procedure

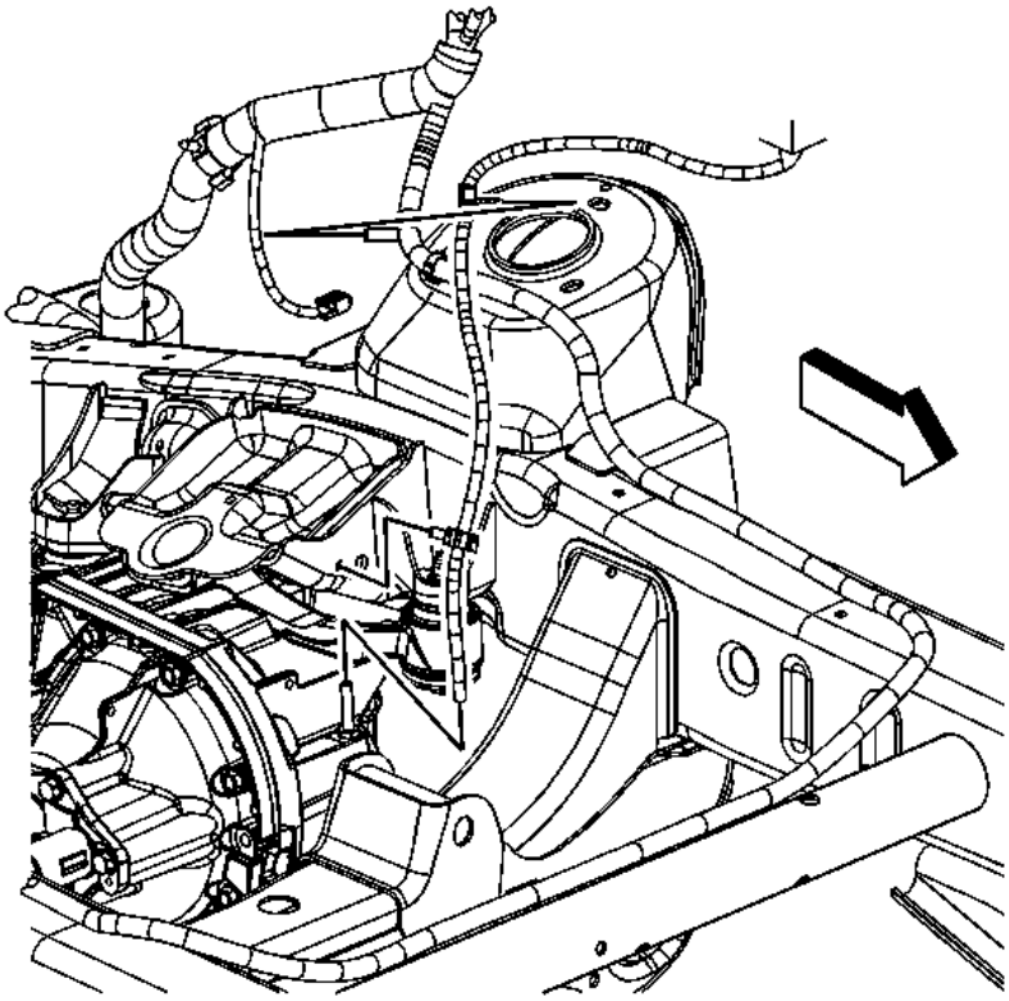


Fig. 32: Locating Vent Hose & Components
Courtesy of GENERAL MOTORS CORP.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the engine shield, if equipped. Refer to **Engine Shield Replacement** .
3. Remove the vent hose the retainers from the frame.
4. Remove the vent hose from the connector.
5. Lower the vehicle.

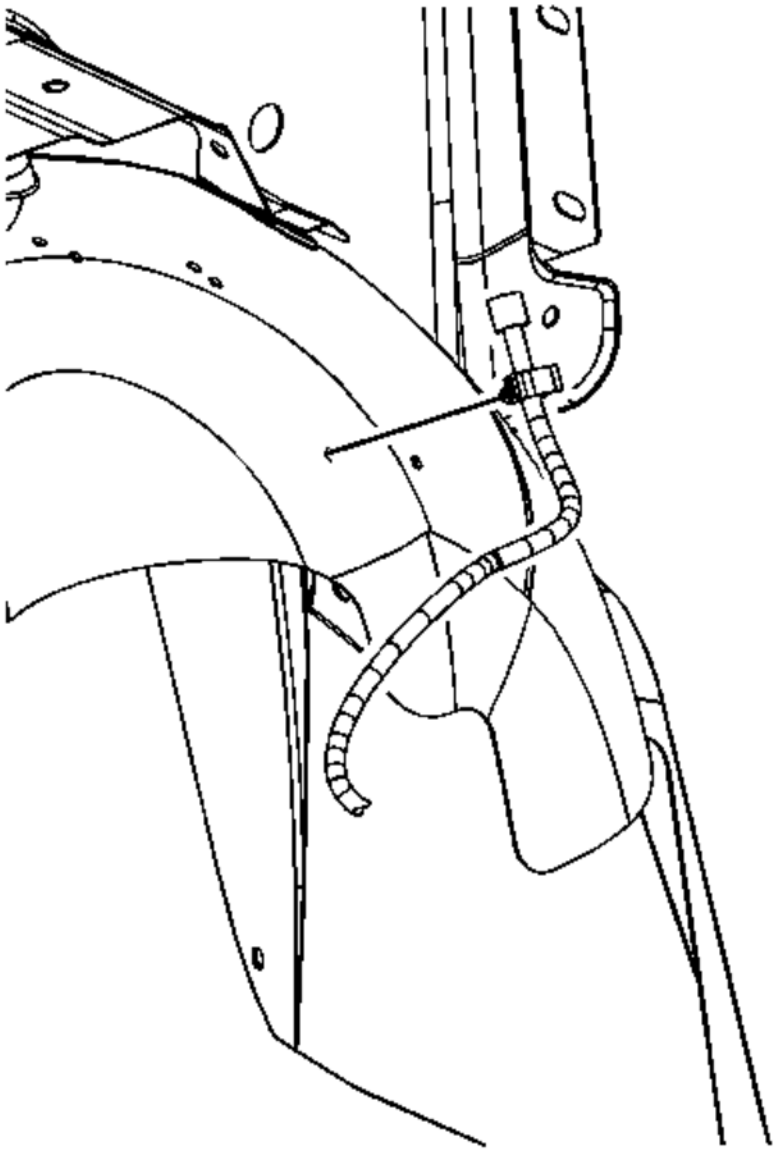


Fig. 33: View Of Vent Hose
Courtesy of GENERAL MOTORS CORP.

6. Remove the vent hose from the inner fender.

Installation Procedure

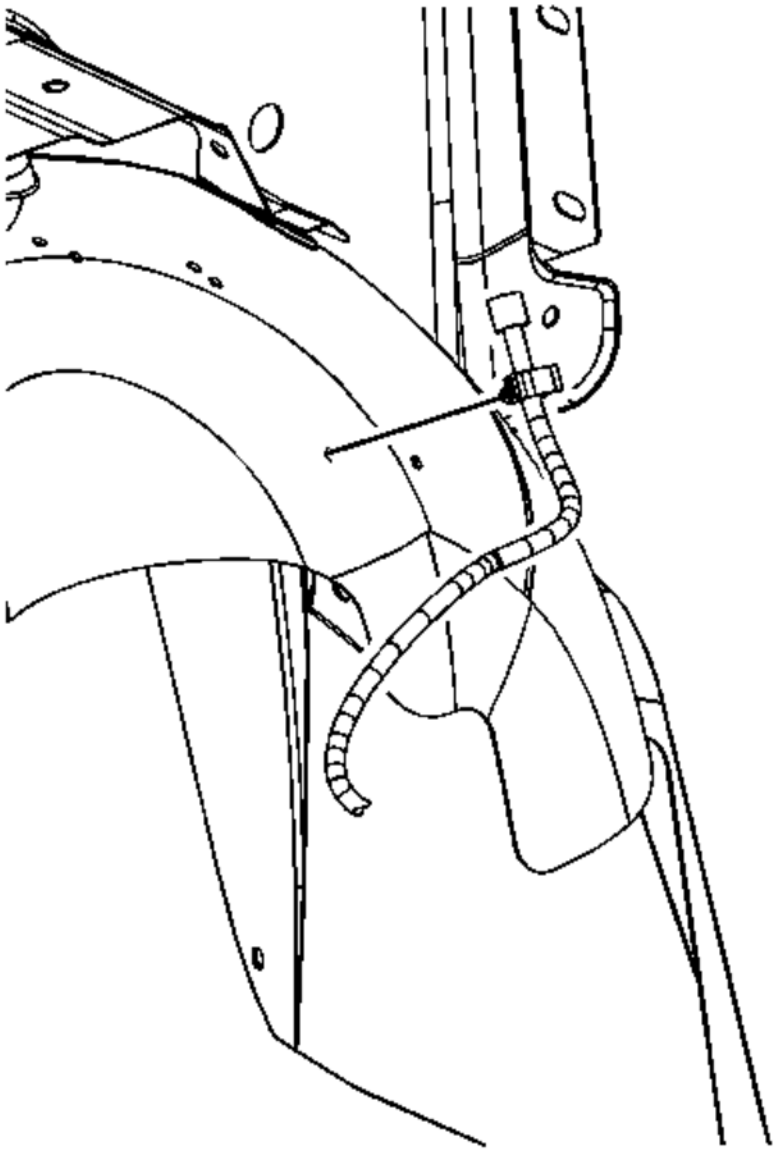


Fig. 34: View Of Vent Hose
Courtesy of GENERAL MOTORS CORP.

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

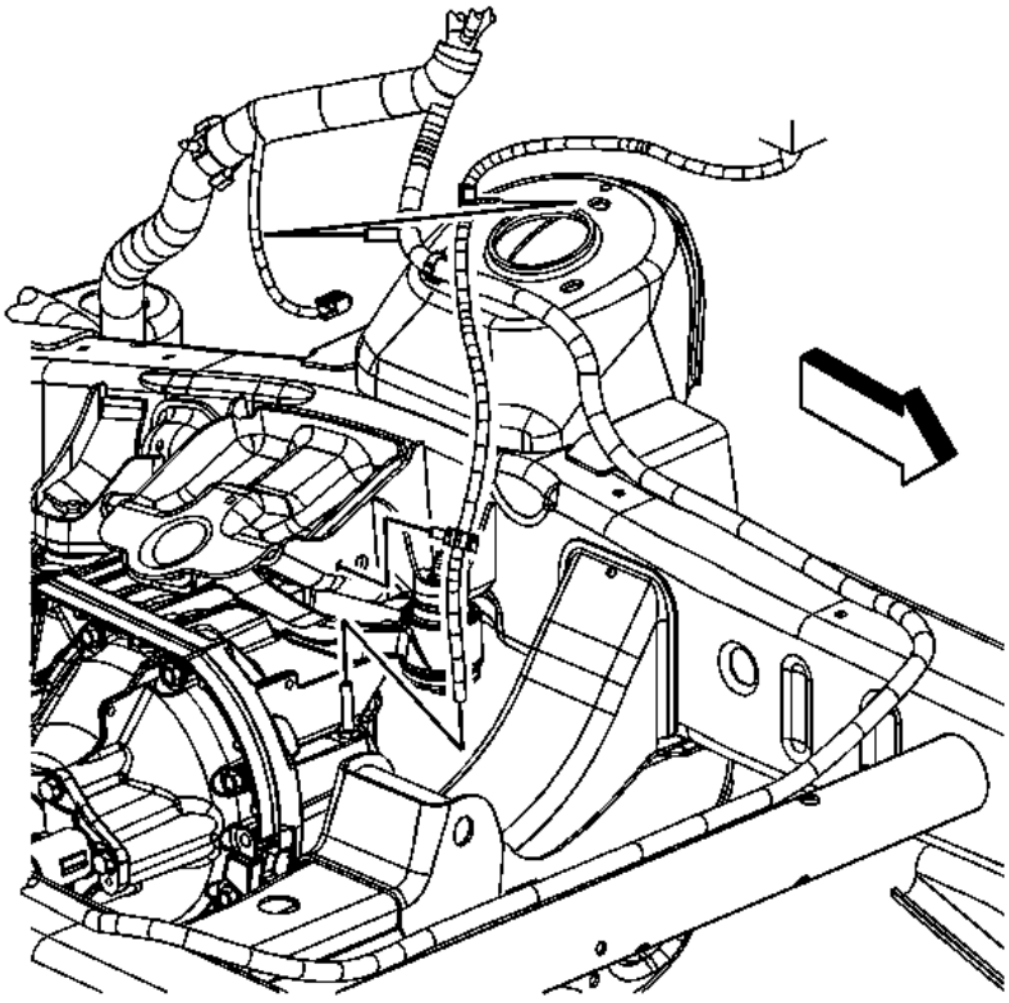


Fig. 35: Locating Vent Hose & Components
Courtesy of GENERAL MOTORS CORP.

3. Install the vent hose retainers to the frame.
4. Install the vent hose to the connector.
5. Install the engine shield, if equipped. Refer to **Engine Shield Replacement** .
6. Lower the vehicle.

VENT HOSE REPLACEMENT (9.25 INCH AXLE)

Removal Procedure

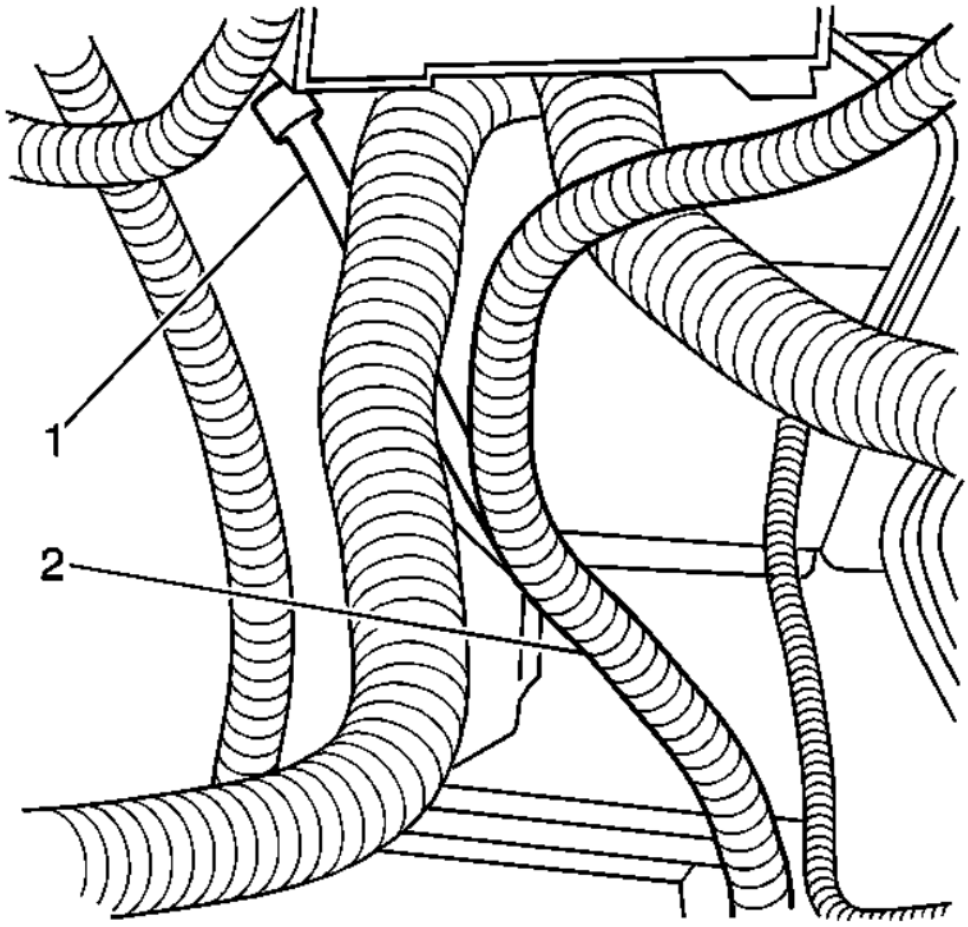


Fig. 36: Vent Hose & Wiring Bundle
Courtesy of GENERAL MOTORS CORP.

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

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

3. Remove the vent hose (1) from the wiring bundle (2), S4WD axles only.
4. Remove the vent hose from the retainer clips, all axles.

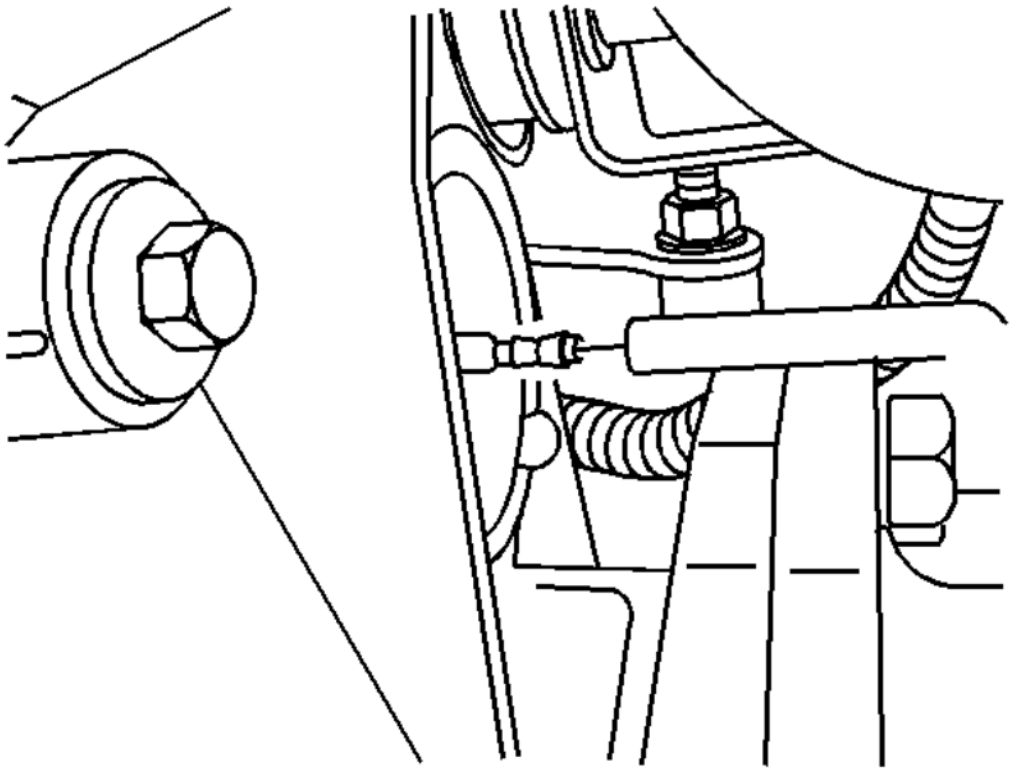


Fig. 37: View Of Vent Hose To Differential Carrier Assembly
Courtesy of GENERAL MOTORS CORP.

5. Remove the vent hose from the differential carrier assembly.
6. Remove the vent hose from the vehicle.

Installation Procedure

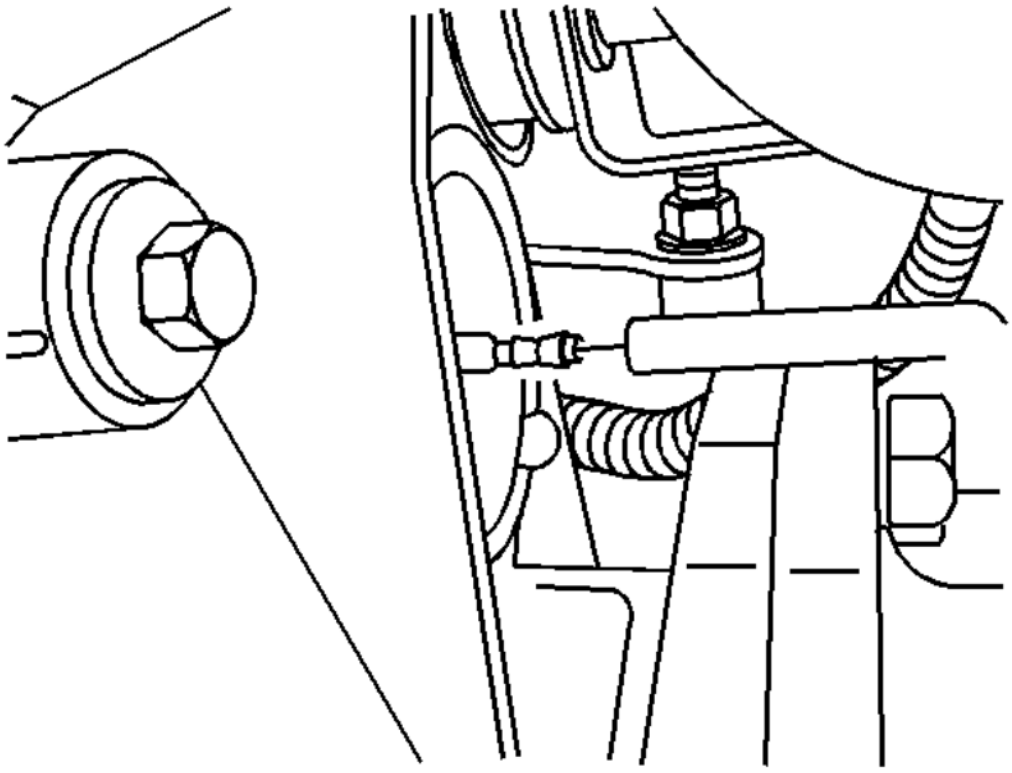


Fig. 38: View Of Vent Hose To Differential Carrier Assembly
Courtesy of GENERAL MOTORS CORP.

1. Install the vent hose to the vehicle.
   - Route the vent hose the same way as when removed.
   - Ensure the hose is free of kinks and routes clear of sharp components.
   - Ensure the vent hose is not plugged.
2. Connect the vent hose to the differential carrier assembly.

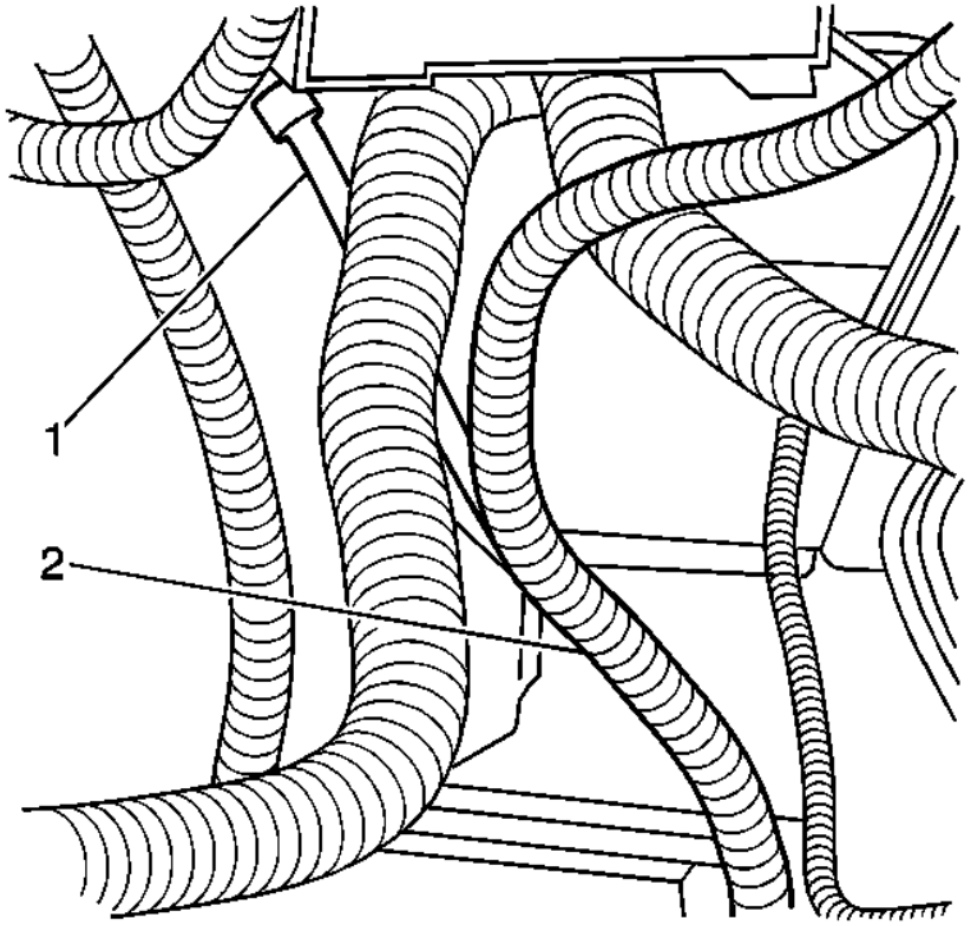


Fig. 39: Vent Hose & Wiring Bundle
Courtesy of GENERAL MOTORS CORP.

3. Install the vent hose (1) to the wiring bundle (2), S4WD axles only.
4. Install the vent hose to the retainer clips, all axles.
5. Install the engine shield, if equipped. Refer to **Engine Shield Replacement** .
6. Lower the vehicle.

FRONT AXLE VENT HOSE CONNECTOR REPLACEMENT

Removal Procedure

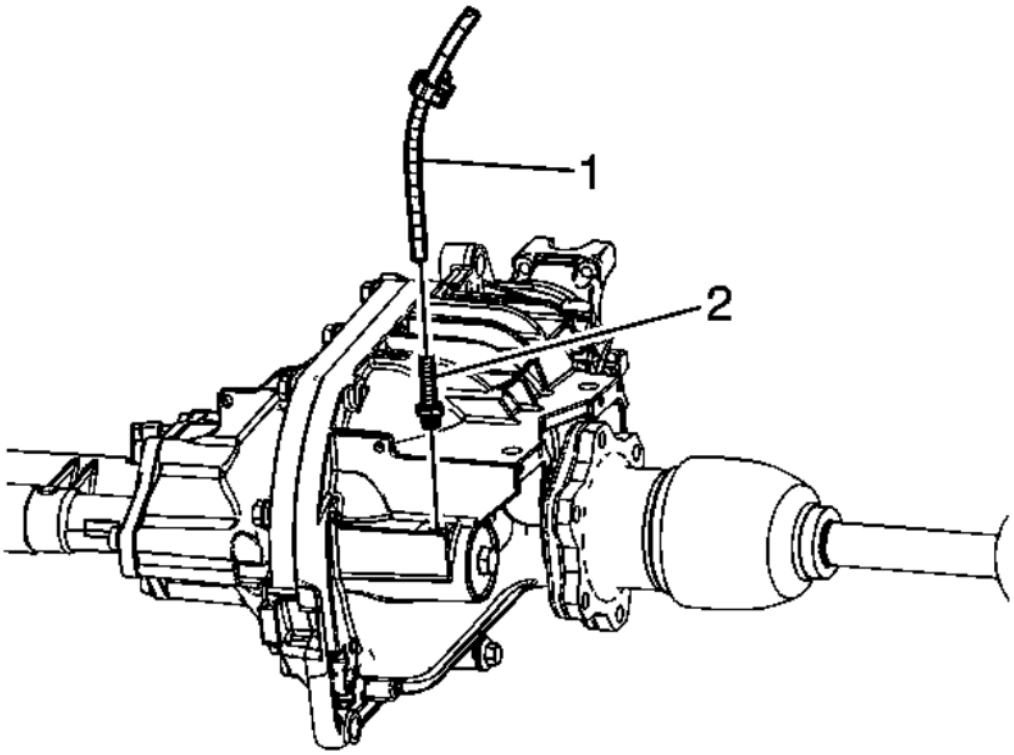


Fig. 40: View Of Vent Hose & Connector
Courtesy of GENERAL MOTORS CORP.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the engine shield, if equipped. Refer to **Engine Shield Replacement** .
3. Remove the vent hose (1).
4. Remove the vent hose connector (2).

Installation Procedure

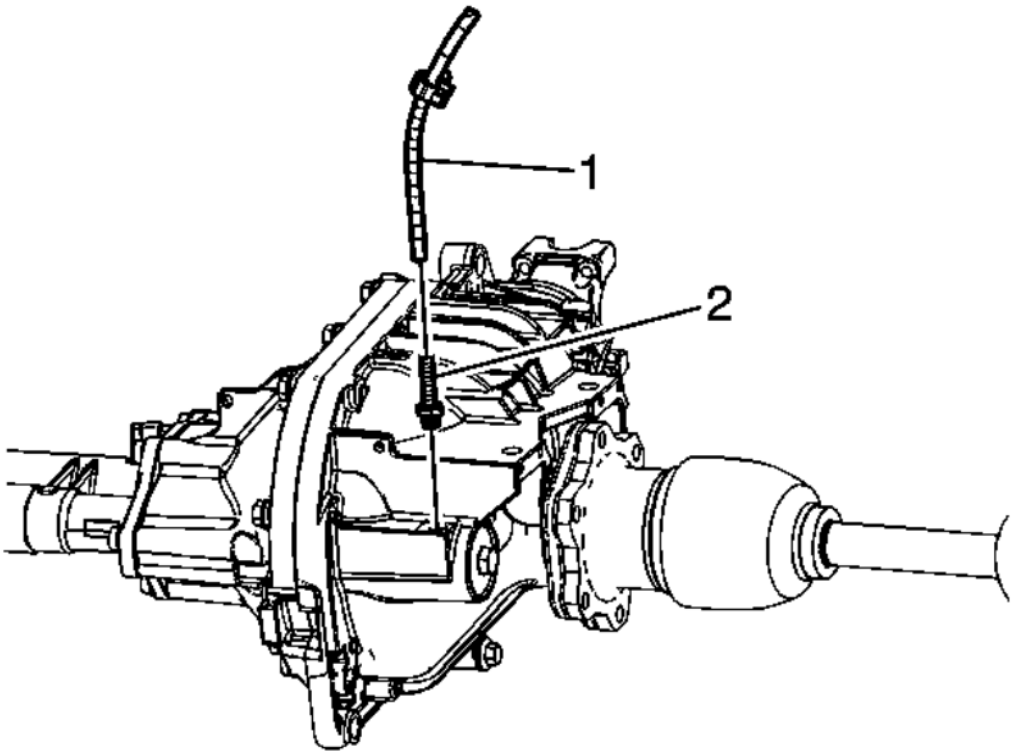


Fig. 41: View Of Vent Hose & Connector
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

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 engine shield, if equipped. Refer to **Engine Shield Replacement** .
4. Lower the vehicle.

FRONT DRIVE AXLE INNER SHAFT AND INNER SHAFT HOUSING REPLACEMENT (8.25 F4WD F4WD AXLE)

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**.

IMPORTANT: If only replacing the right side inner shaft and/or housing, follow the steps below. If only replacing the left side inner shaft, proceed to step 12.

3. Remove the front shock absorber. Refer to **Shock Absorber Replacement (2500 Series)** .

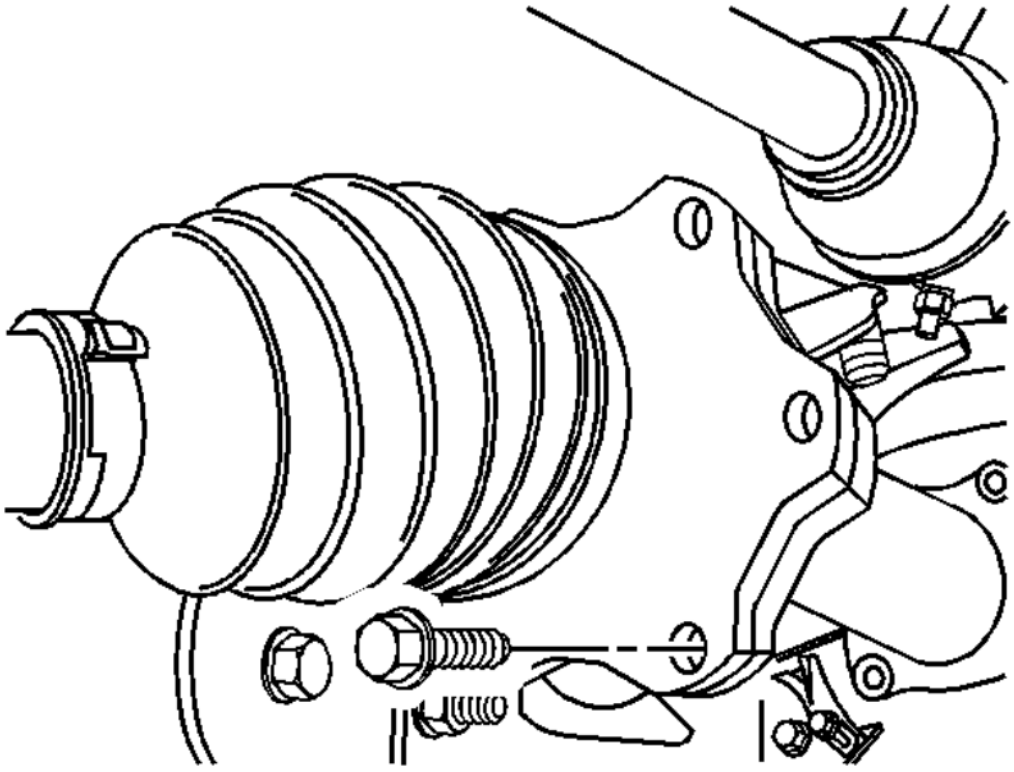


Fig. 42: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

4. Remove the wheel drive shaft inboard flange bolts from the inner axle shaft.

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

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

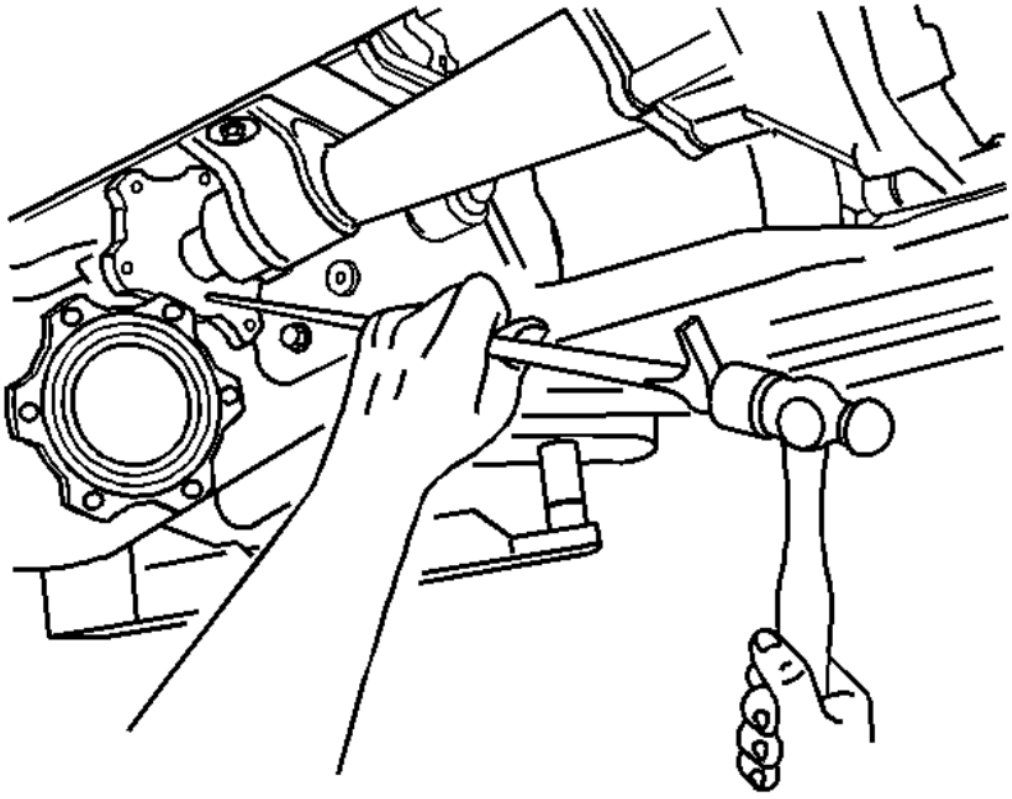


Fig. 43: Disconnecting Inner Axle Shaft - Front Drive Axle (8.25 F4WD Axle)
Courtesy of GENERAL MOTORS CORP.

6. Using a hammer and brass drift, disconnect the inner axle shaft from the differential case side gear.

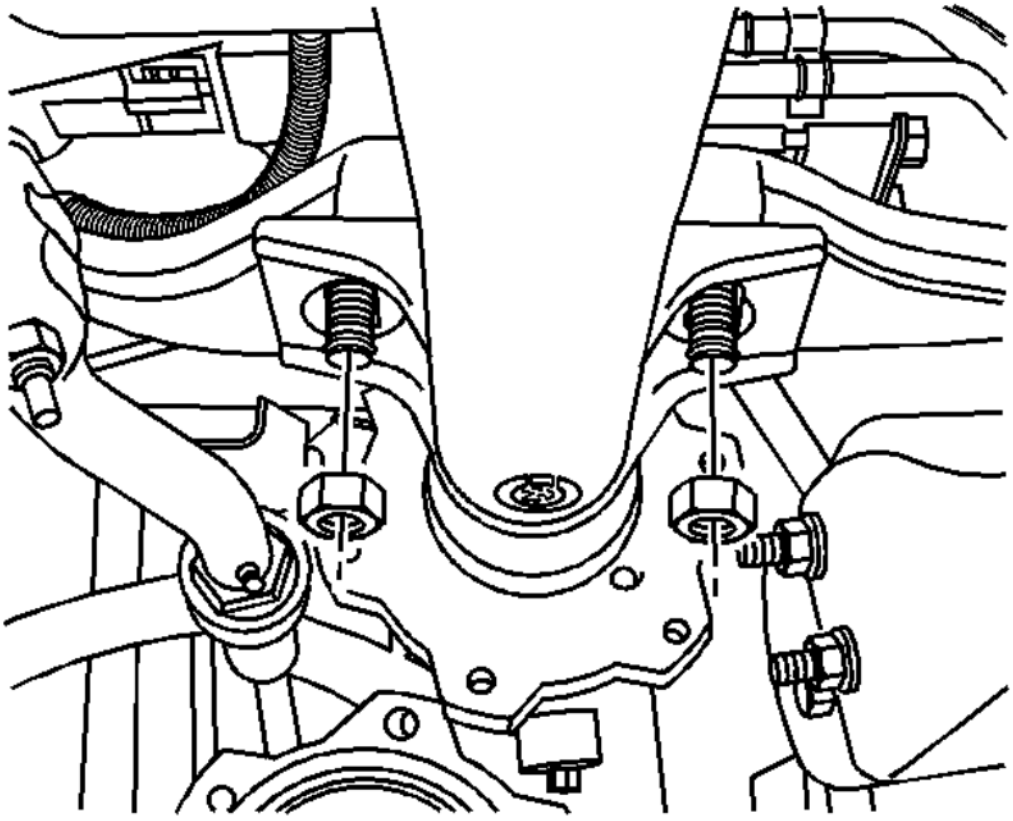


Fig. 44: View Of Inner Axle Shaft Housing Nuts To Bracket (8.25 F4WD Axle)
Courtesy of GENERAL MOTORS CORP.

7. Remove the inner axle shaft housing nuts from the bracket.

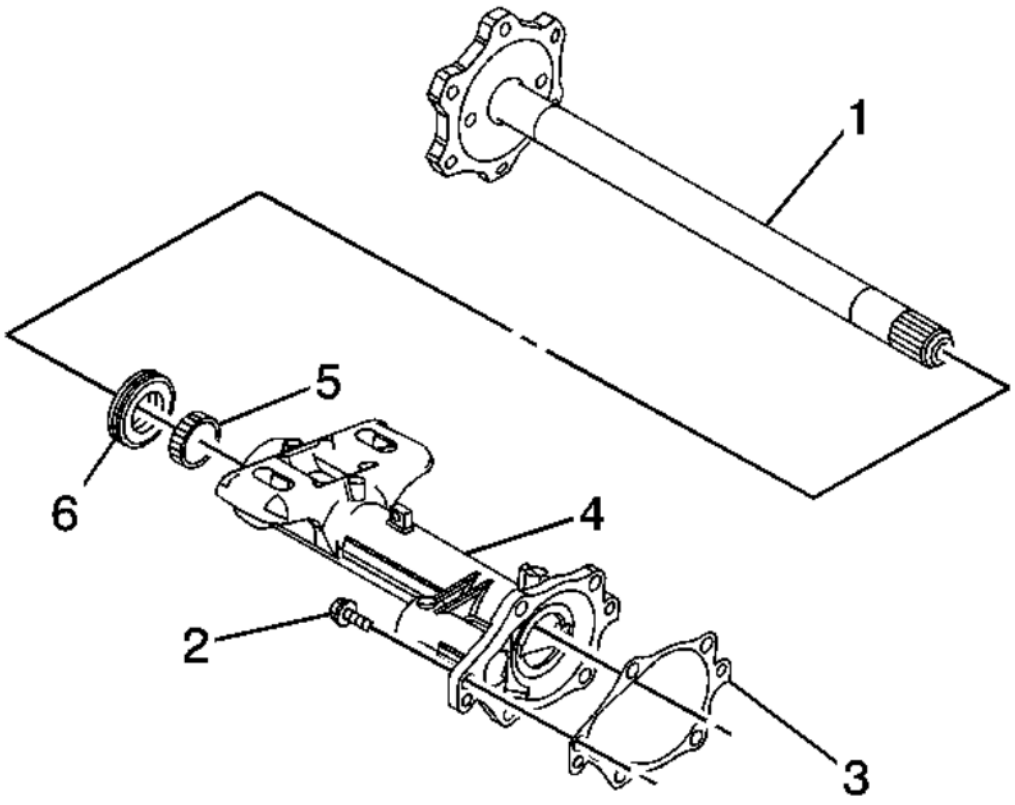


Fig. 45: View Of Inner Axle Shaft & Components
Courtesy of GENERAL MOTORS CORP.

8. Remove the inner axle shaft housing bolts (2) from the differential carrier assembly.
9. Remove the inner axle shaft (1) and inner axle shaft housing (4) from the vehicle.
10. Remove the inner axle shaft housing gasket (3) from the inner axle shaft housing (4).
11. Remove the inner axle shaft seal and the bearing from the inner axle shaft housing. Refer to **Front Drive Axle Inner Shaft Seal and Inner Shaft Bearing Replacement**.

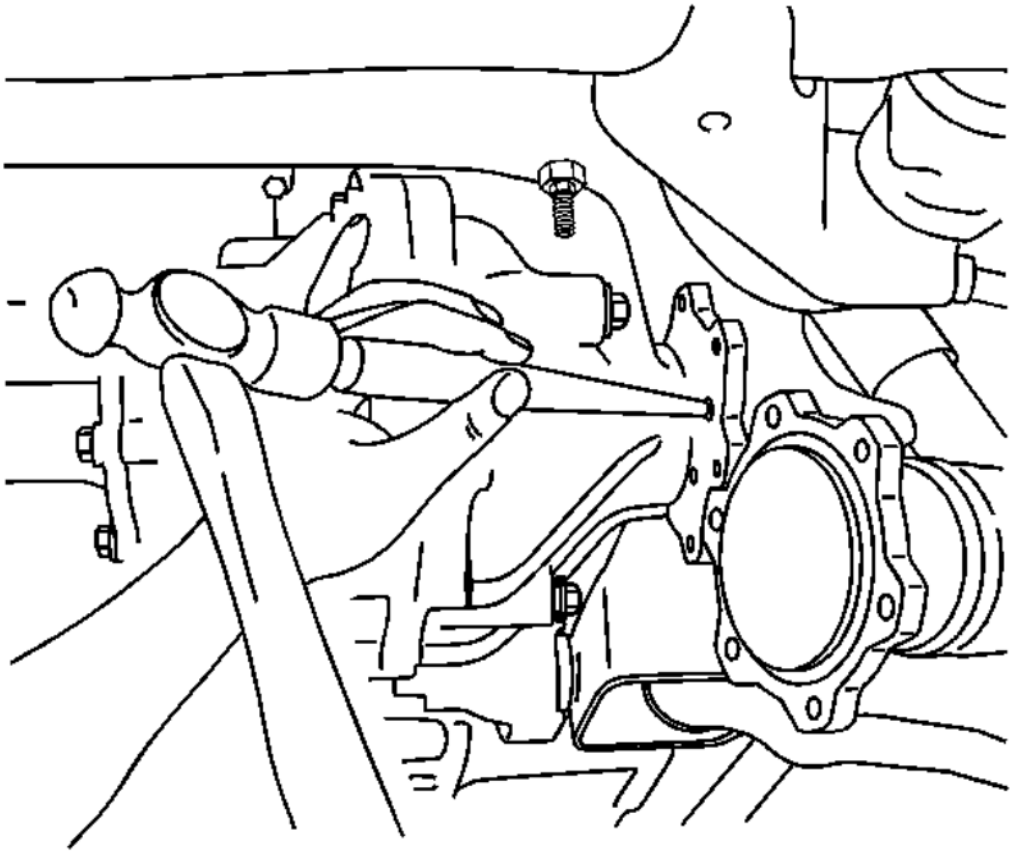


Fig. 46: Identifying Inner Axle Shaft - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

12. If only replacing the left side inner axle shaft, perform the following steps:
    1. Remove the wheel drive shaft inboard flange bolts from the inner axle shaft.
    2. Disconnect the wheel drive shaft from the inner axle shaft.
    3. Support the wheel drive shaft in order to not over flex the CV joint.
    4. Remove the inner axle shaft using a hammer and a brass drift.

Installation Procedure

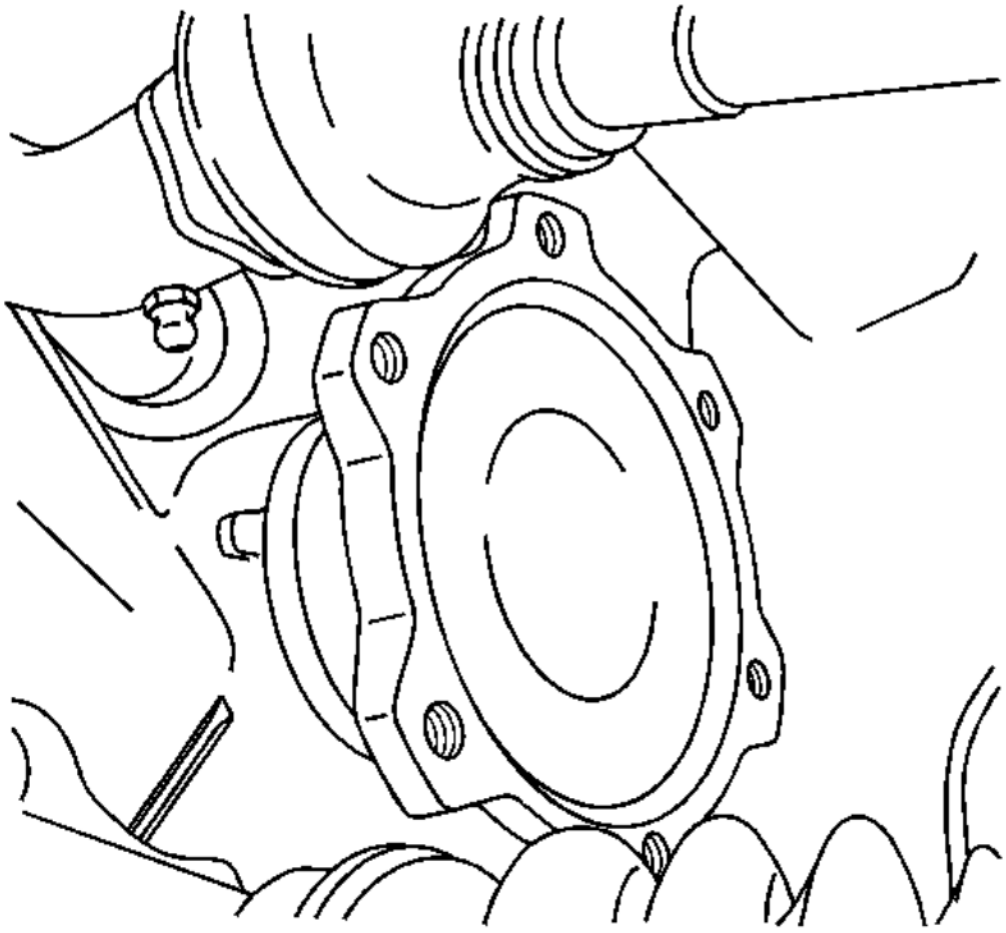


Fig. 47: Axle Shaft Inner Flange - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

1. If only the left side inner axle shaft was removed, install the shaft by performing the following steps:
    1. 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.

2. Connect the wheel drive shaft to the inner axle shaft.
3. Install the wheel drive shaft inboard flange to inner axle shaft bolts.

   Tighten: Tighten the wheel drive shaft inboard flange to inner axle shaft bolts to 79 N.m (58 lb ft).

2. If the right side inner axle shaft and/or housing was removed, install the shaft and/or housing following the steps below.
3. Install the new inner axle shaft bearing and the new seal to the inner axle shaft housing. Refer to **Front Drive Axle Inner Shaft Seal and Inner Shaft Bearing Replacement**.

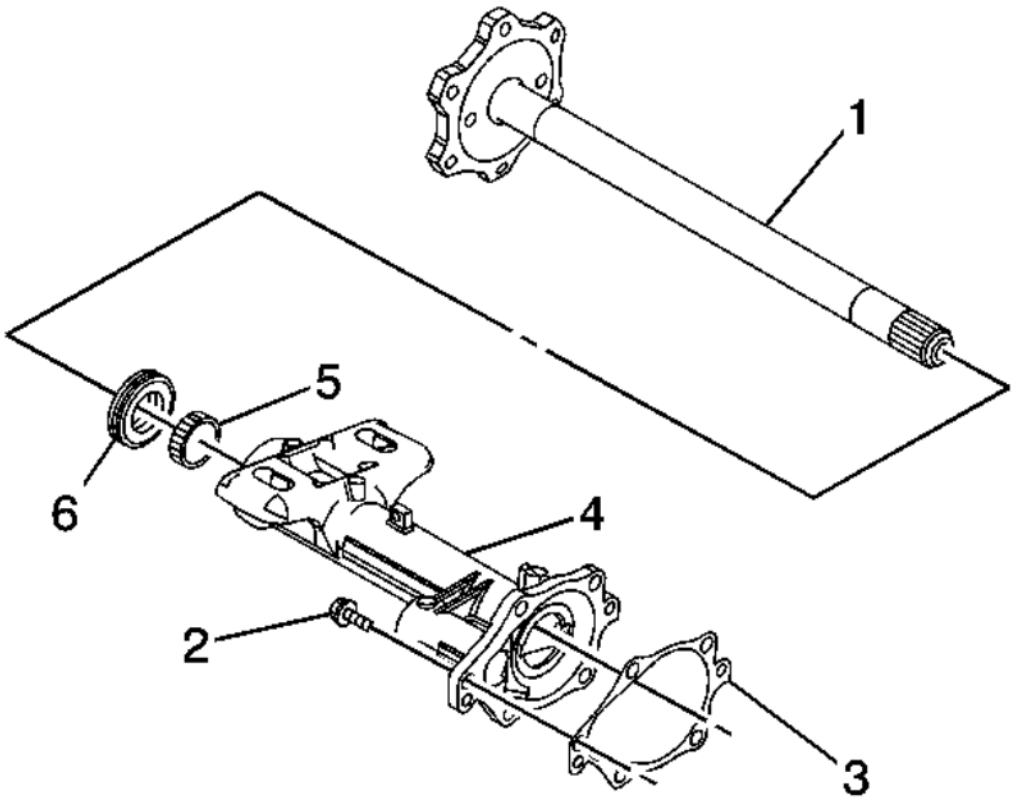


Fig. 48: View Of Inner Axle Shaft & Components
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not install the inner axle shaft completely into the inner

axle shaft housing at this time.

4. Install the inner axle shaft (1) into the inner axle shaft housing (4).
5. Install the new inner axle shaft housing gasket (3).
6. Install the inner axle shaft (1) and the inner axle shaft housing (4) to the differential carrier assembly.
7. Install the inner axle shaft housing bolts (2).

Tighten: Tighten the inner axle shaft housing bolts to 40 N.m (30 lb ft).

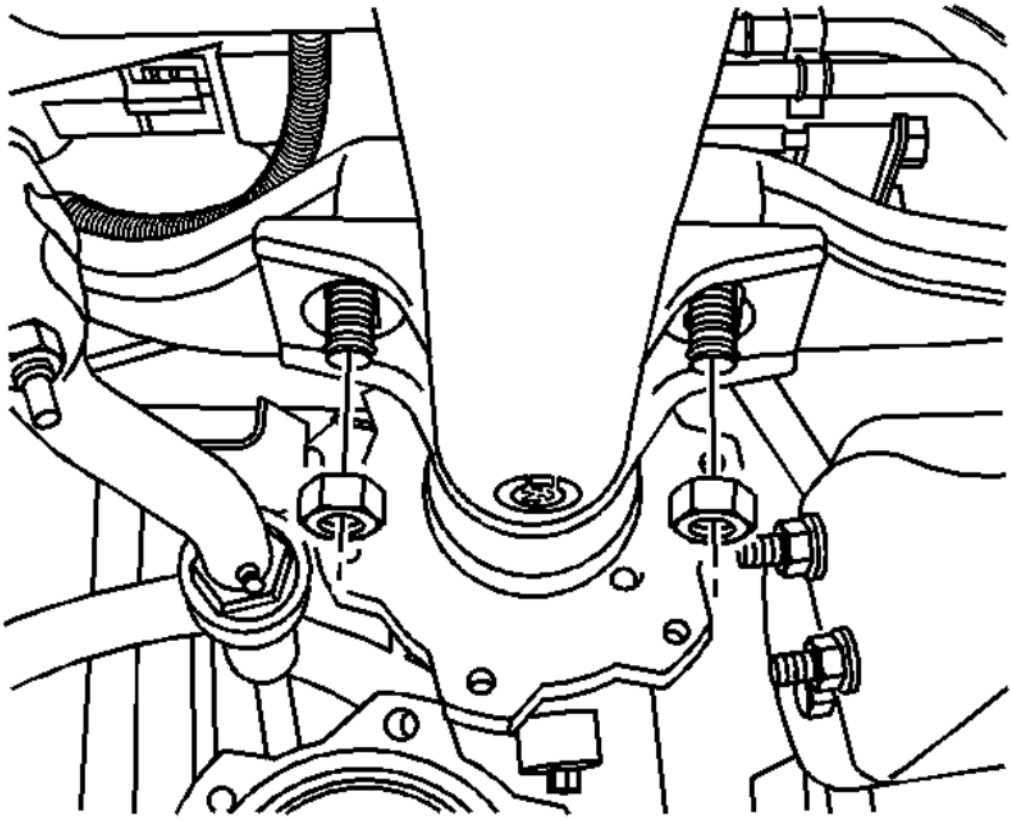


Fig. 49: View Of Inner Axle Shaft Housing Nuts To Bracket (8.25 F4WD Axle)
Courtesy of GENERAL MOTORS CORP.

8. Install the inner axle shaft housing nuts to the bracket.

Tighten: Tighten the inner axle shaft housing nuts to 100 N.m (75 lb ft).

9. Install the inner axle shaft into the differential case side gear by doing the following:
    1. Turn the inner axle shaft and align the splines of the inner axle shaft with the splines on the differential side gear.
    2. 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.
    3. Pull back on the inner axle shaft to ensure that the inner axle shaft is properly retained in the differential case side gear.
10. Install the wheel drive shaft inboard flange to the inner axle shaft.

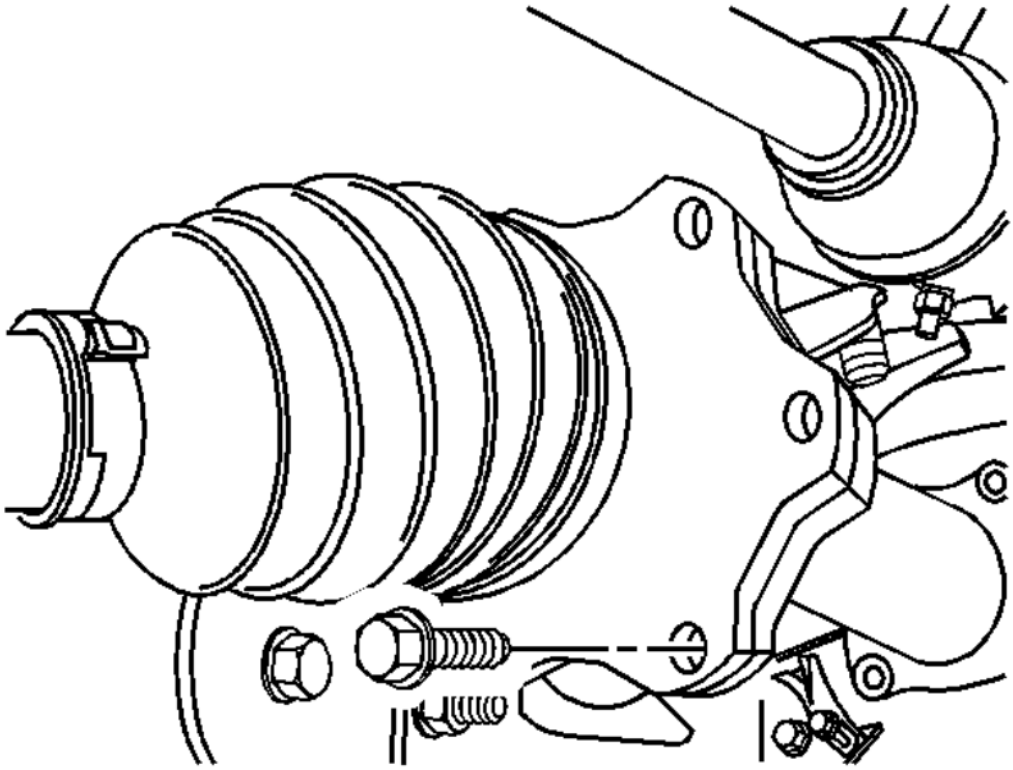


Fig. 50: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

11. Install the wheel drive shaft inboard flange to inner axle shaft bolts.

    Tighten: Tighten the wheel drive shaft inboard flange to inner axle shaft bolts to 79 N.m (58 lb ft).

12. Install the front shock absorber. Refer to **Shock Absorber Replacement (2500 Series)** .
13. With either replacement procedure, fill the differential carrier assembly with axle lubricant. Use the correct fluid. Refer to **Front Axle Lubricant Replacement**.
14. Lower the vehicle.

FRONT DRIVE AXLE INNER SHAFT AND INNER SHAFT HOUSING REPLACEMENT (8.25 S4WD S4WD AND 9.25 AXLES)

Removal Procedure

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

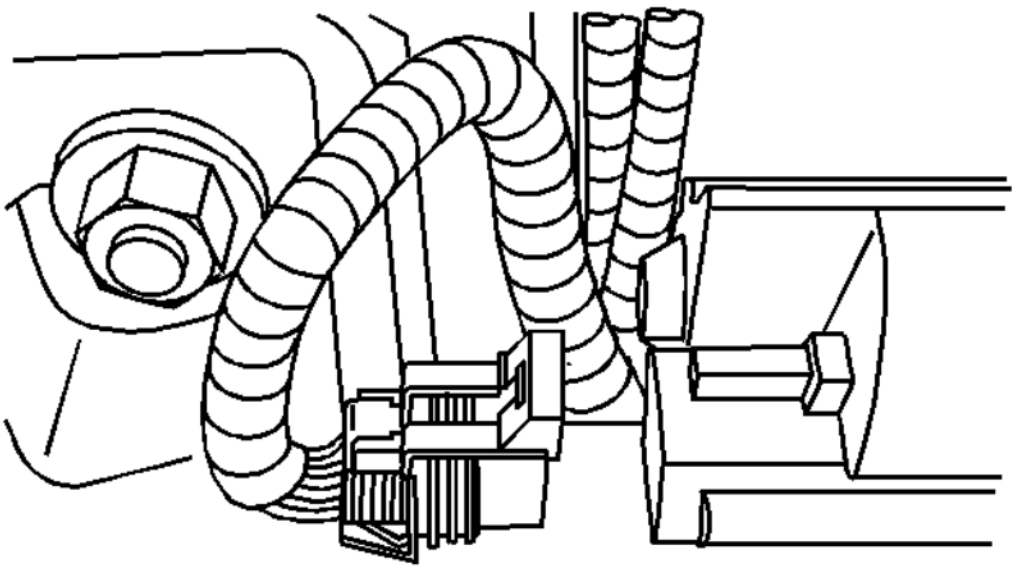


Fig. 51: View Of Front Axle Actuator Electrical Connector
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the actuator electrical connector.
4. If only replacing the right side inner shaft and/or housing, follow the steps below. If only replacing the left side inner shaft, proceed to step 17.

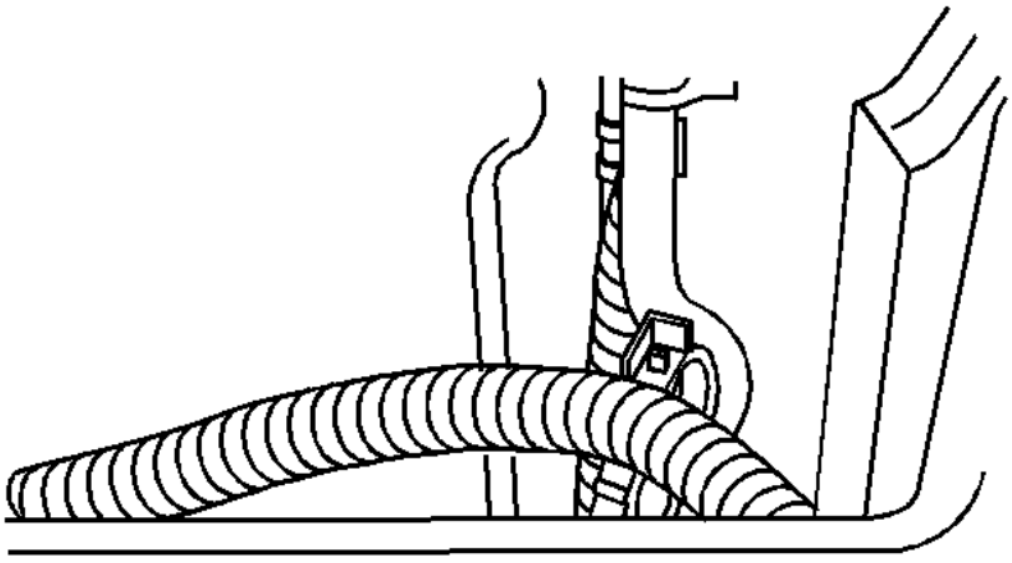


Fig. 52: Inner Axle Shaft Housing Wire Harness - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS CORP.

5. Disconnect the wire harness from the inner axle housing.
6. For vehicles equipped with the 8.25 inch axle, remove the front shock module. Refer to **Shock Absorber and Spring Assembly Replacement** .

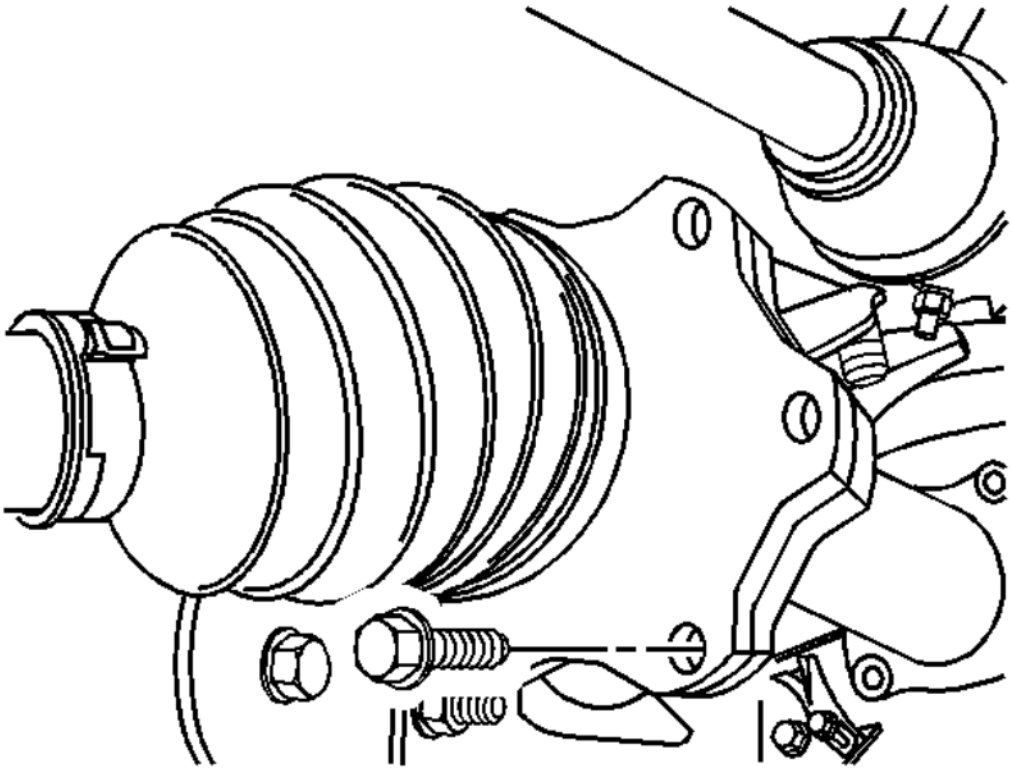


Fig. 53: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

7. Remove the wheel drive shaft flange bolts.

IMPORTANT: 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.

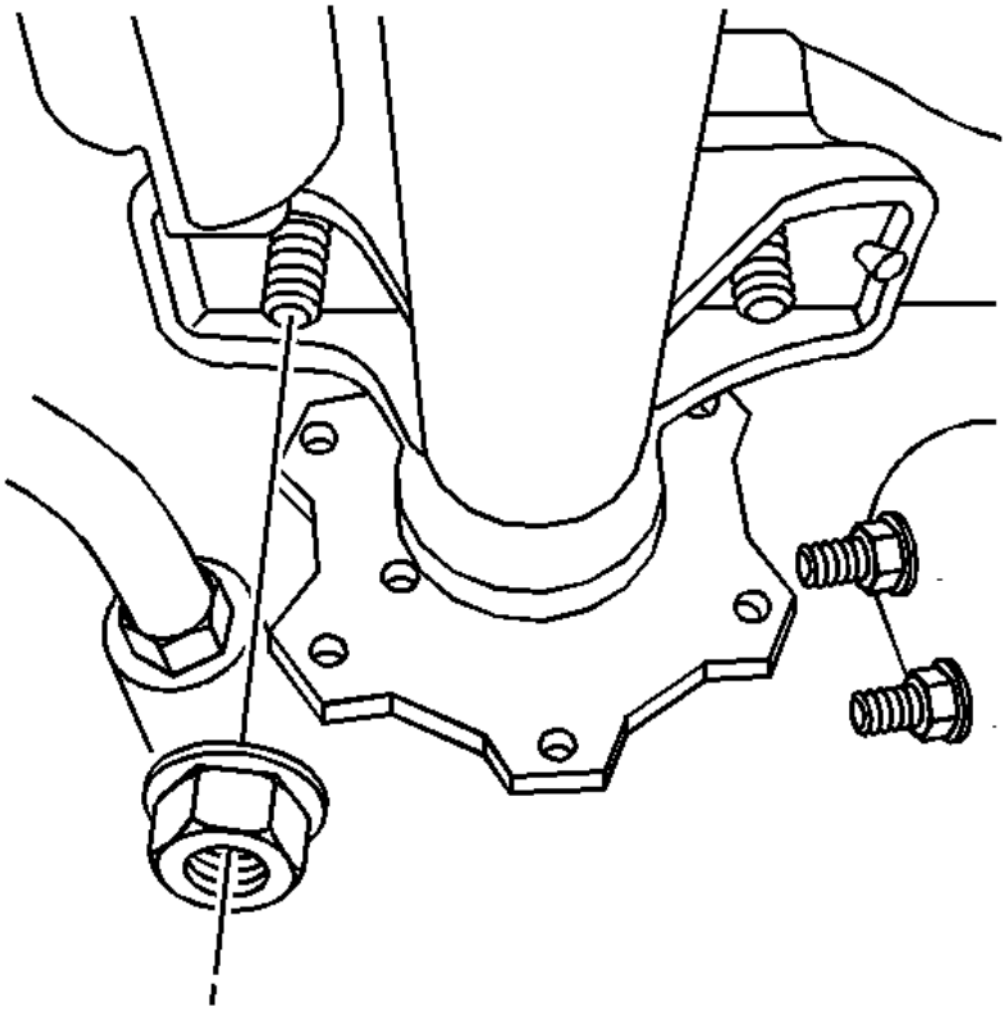


Fig. 54: View Of Inner Axle Housing Nuts
Courtesy of GENERAL MOTORS CORP.

9. Remove the inner axle housing mounting nuts.

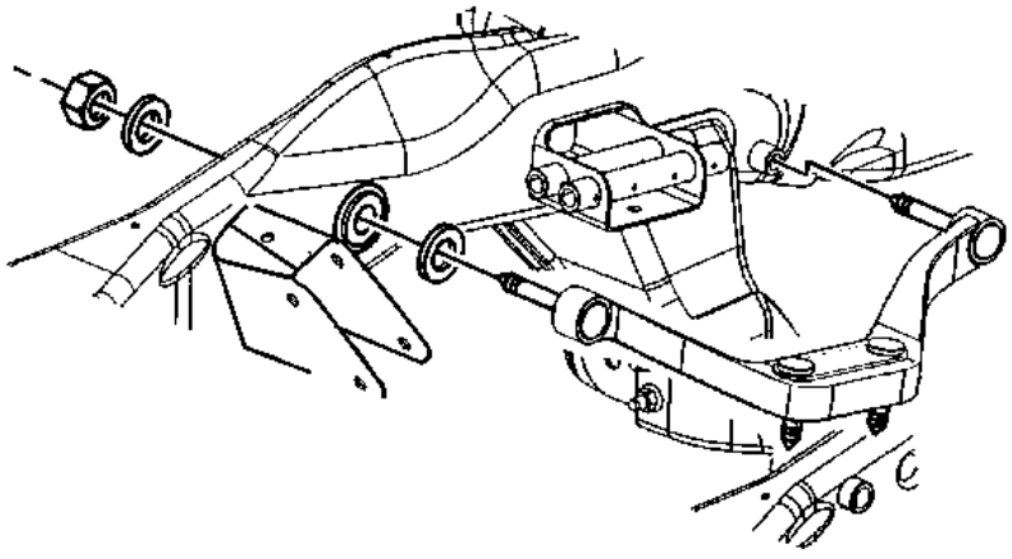


Fig. 55: Front Axle Mounting Bracket - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS CORP.

10. For the 25/35 series vehicles, perform the following steps in order to provide additional clearance so the inner axle housing can be removed from the vehicle.
    1. Remove the front axle mounting bracket to frame nuts.
    2. Slide the front axle mounting bracket towards the engine. It may be necessary to pull down on the inner axle shaft and/or push up on the mounting bracket in order to gain clearance.

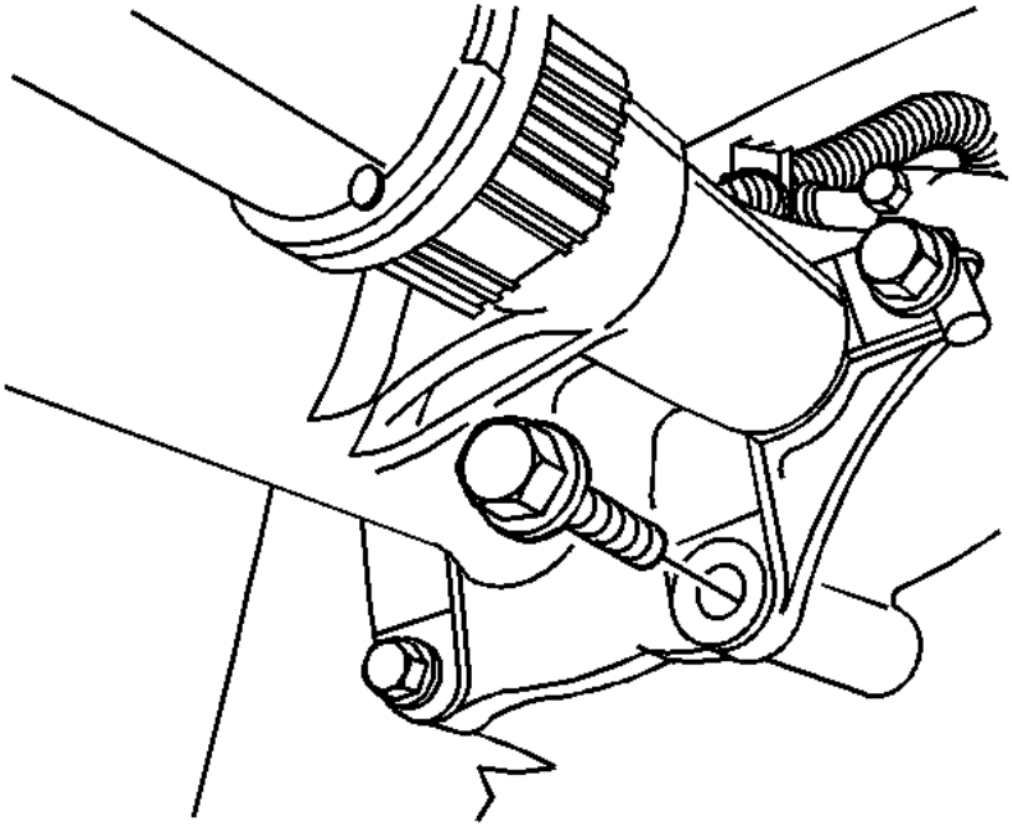


Fig. 56: View Of Inner Axle Shaft Housing Bolts - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS CORP.

11. Remove the inner axle shaft mounting bolts.

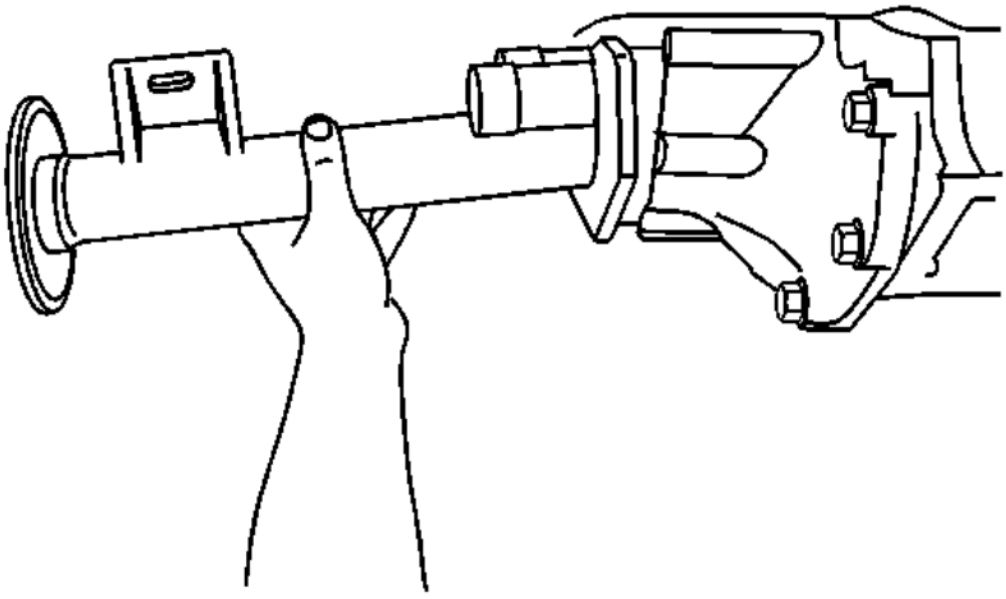


Fig. 57: View Of Inner Axle Shaft Housing Assembly - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS CORP.

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

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

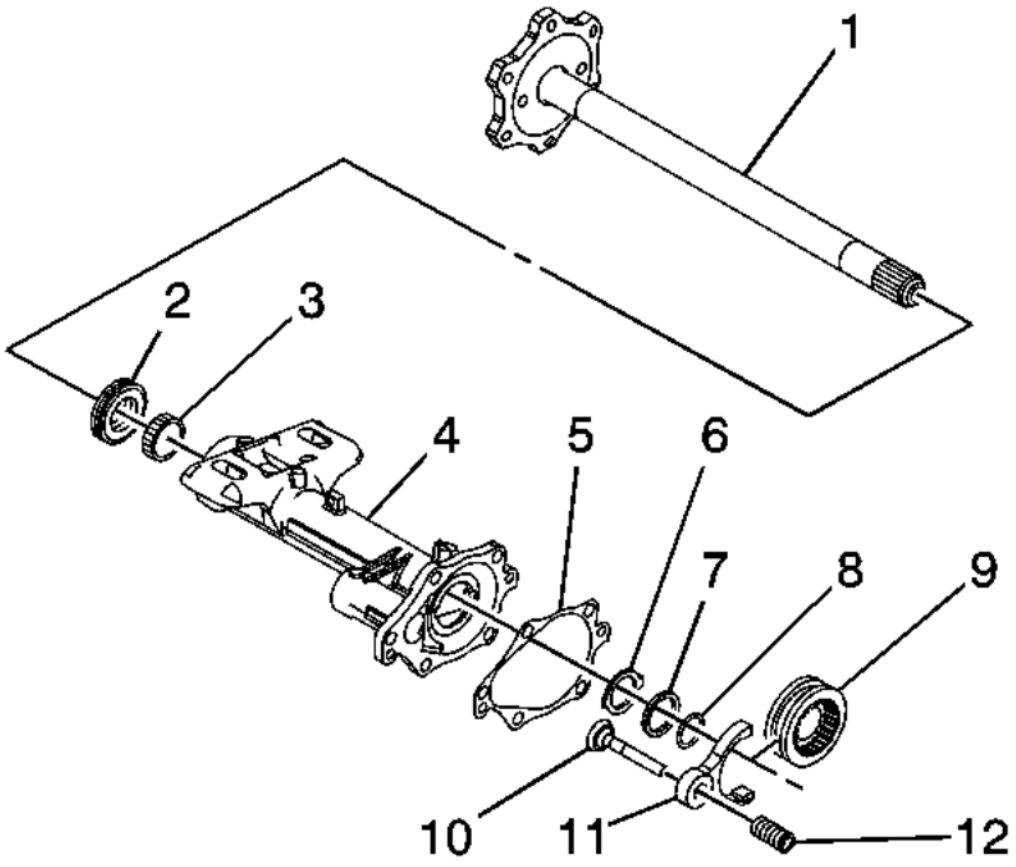


Fig. 58: View Of Inner Axle Shaft & Components
Courtesy of GENERAL MOTORS CORP.

13. For the 8.25 inch axle, 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. The shifter fork spring (12)
    3. The shifter fork (11)
    4. The shifter fork rod (10)
    5. The shifter connector gear (9)
    6. The 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)

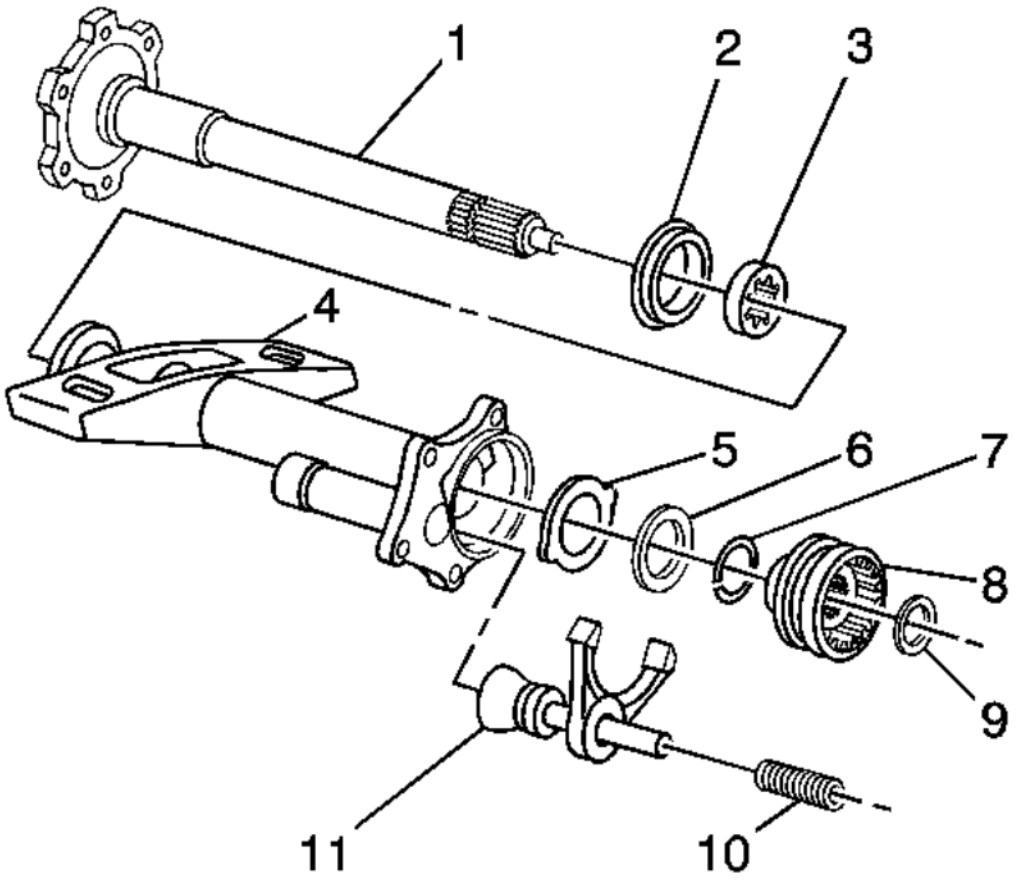


Fig. 59: Inner Axle Shaft Housing Components (9.25 Inch)
Courtesy of GENERAL MOTORS CORP.

14. For the 9.25 inch axle, 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 sleeve (8)
    5. The retainer ring (7)
    6. The thrust washers (5, 6)

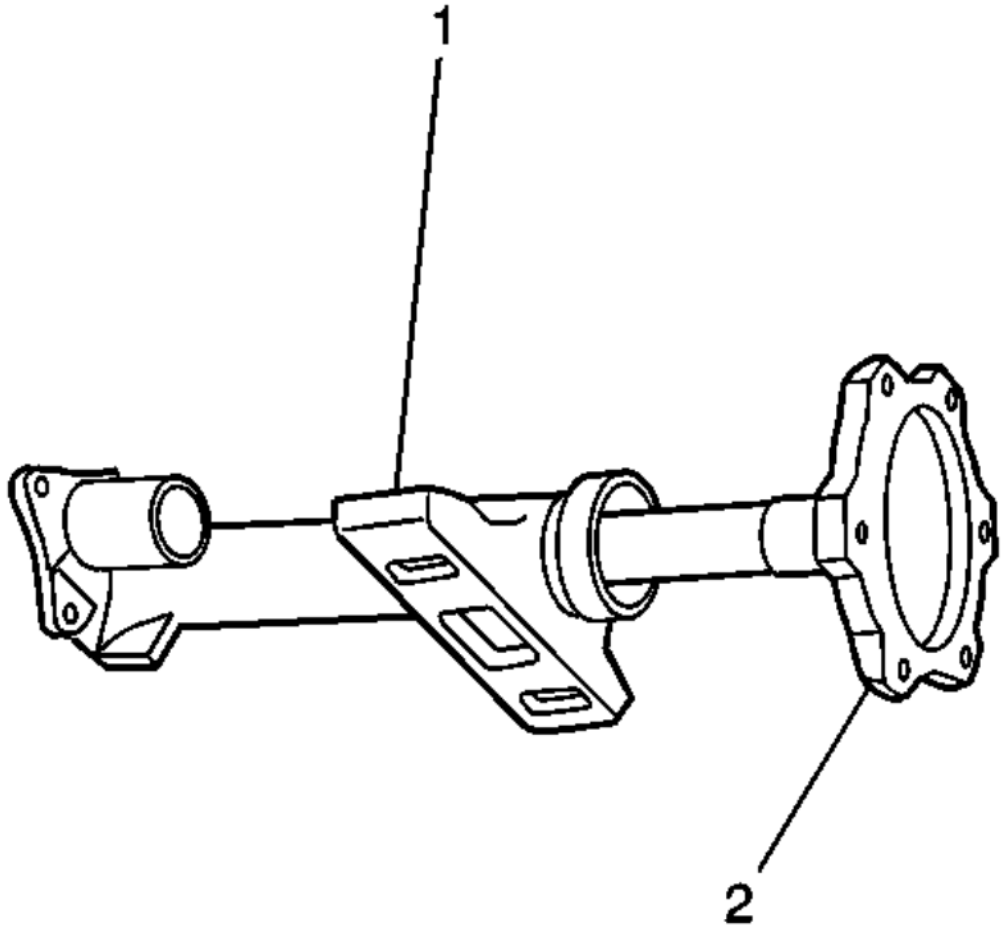


Fig. 60: Axle Shaft & Inner Axle Shaft Housing - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS CORP.

15. Remove the inner axle shaft (2). Tap out the inner axle shaft with a soft-faced mallet, if necessary.
16. Remove the inner axle seal and the bearing from the axle housing. Refer to **Front Drive Axle Inner Shaft Seal and Inner Shaft Bearing Replacement**.

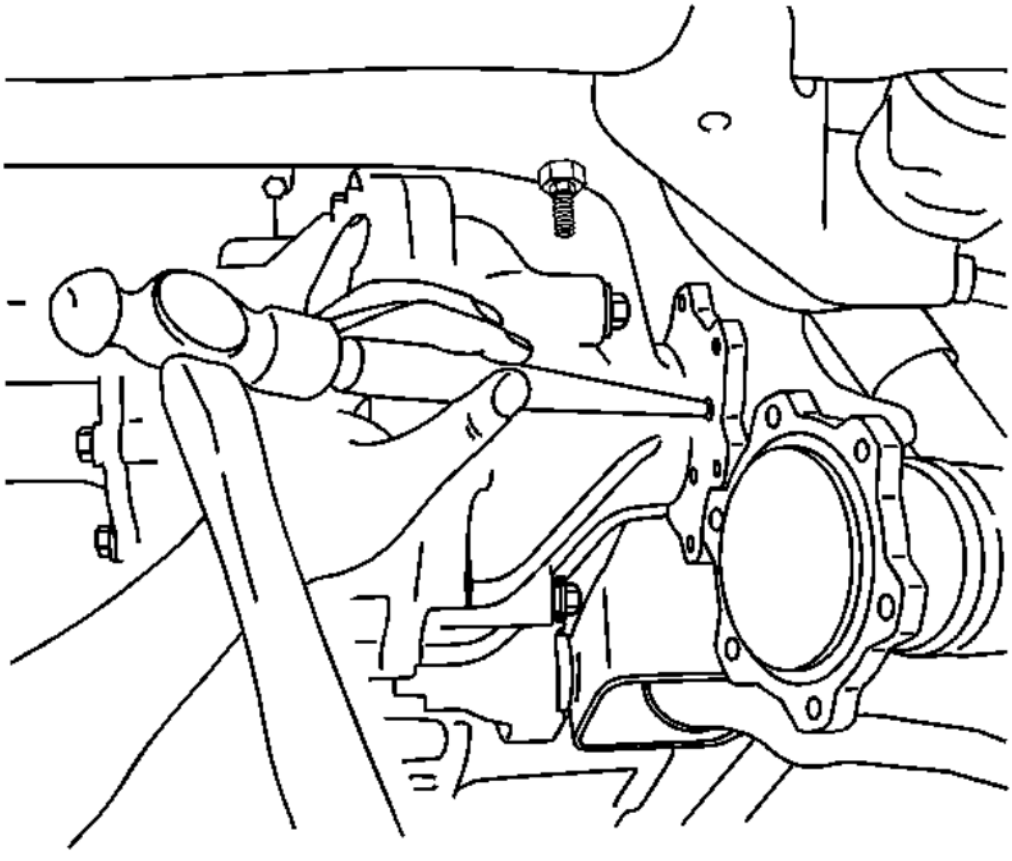


Fig. 61: Identifying Inner Axle Shaft - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

17. If only replacing the left side inner axle shaft, perform the following steps:
    1. Remove the wheel drive shaft inboard flange bolts from the inner axle shaft.
    2. Disconnect the wheel drive shaft from the inner axle shaft.
    3. Remove the inner axle shaft using a hammer and a brass drift.

Installation Procedure

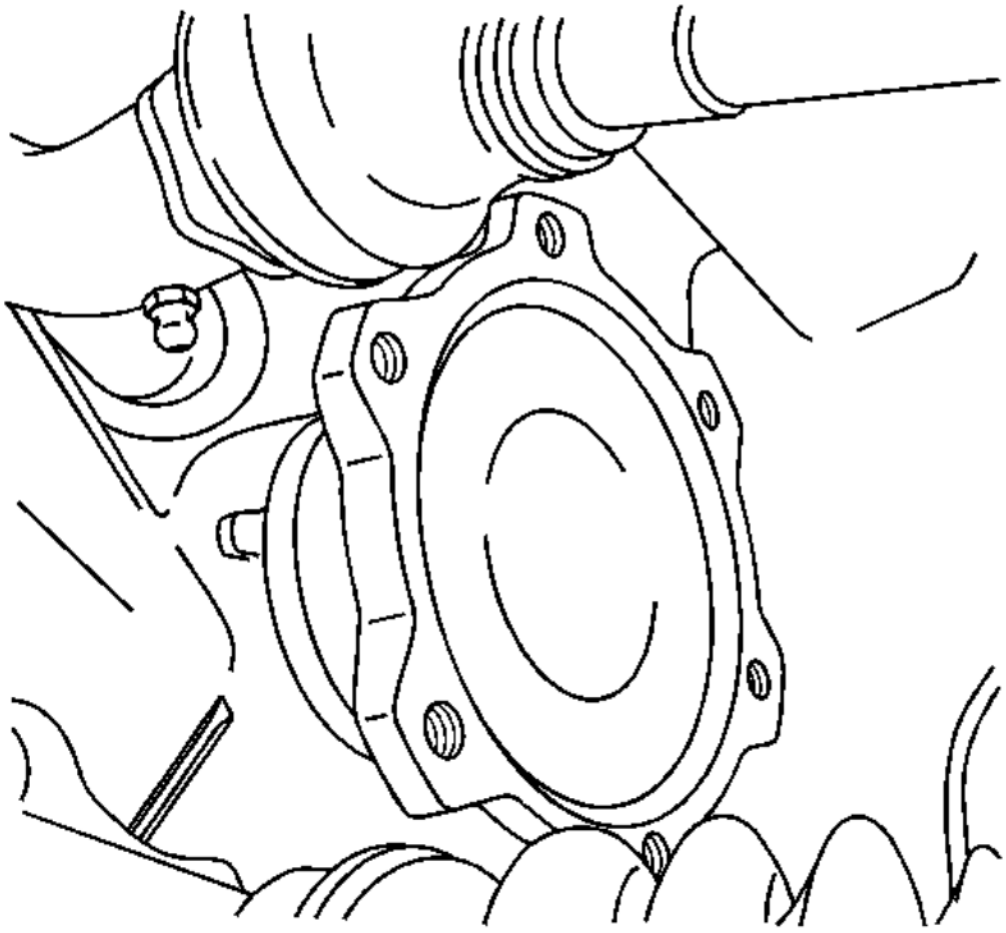


Fig. 62: Axle Shaft Inner Flange - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

1. If only the left side inner axle shaft was removed, install the shaft by performing the following steps:
    1. 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.

2. Connect the wheel drive shaft to the inner axle shaft.
3. Install the wheel drive shaft inboard flange to inner axle shaft bolts.

   Tighten: Tighten the wheel drive shaft inboard flange to inner axle shaft bolts to 79 N.m (58 lb ft).

2. If the right side inner axle shaft and/or housing was removed, install the shaft and/or housing following the steps below.
3. Install the new inner axle shaft bearing and the seal to the axle housing. Refer to **Front Drive Axle Inner Shaft Seal and Inner Shaft Bearing Replacement**.

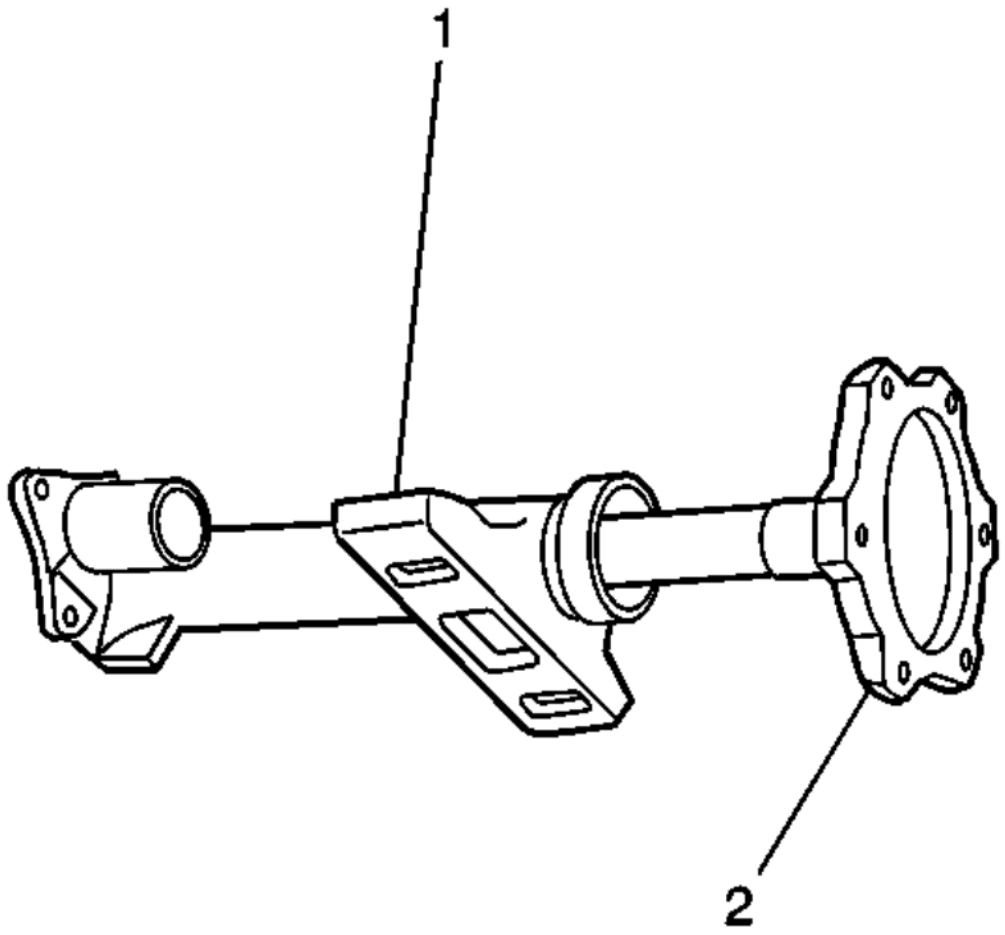


Fig. 63: Axle Shaft & Inner Axle Shaft Housing - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS CORP.

4. Install the inner axle shaft (2) into the inner axle shaft housing (1).

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

5. Place the inner axle shaft housing on end so that the splines of the inner axle shaft is facing up.

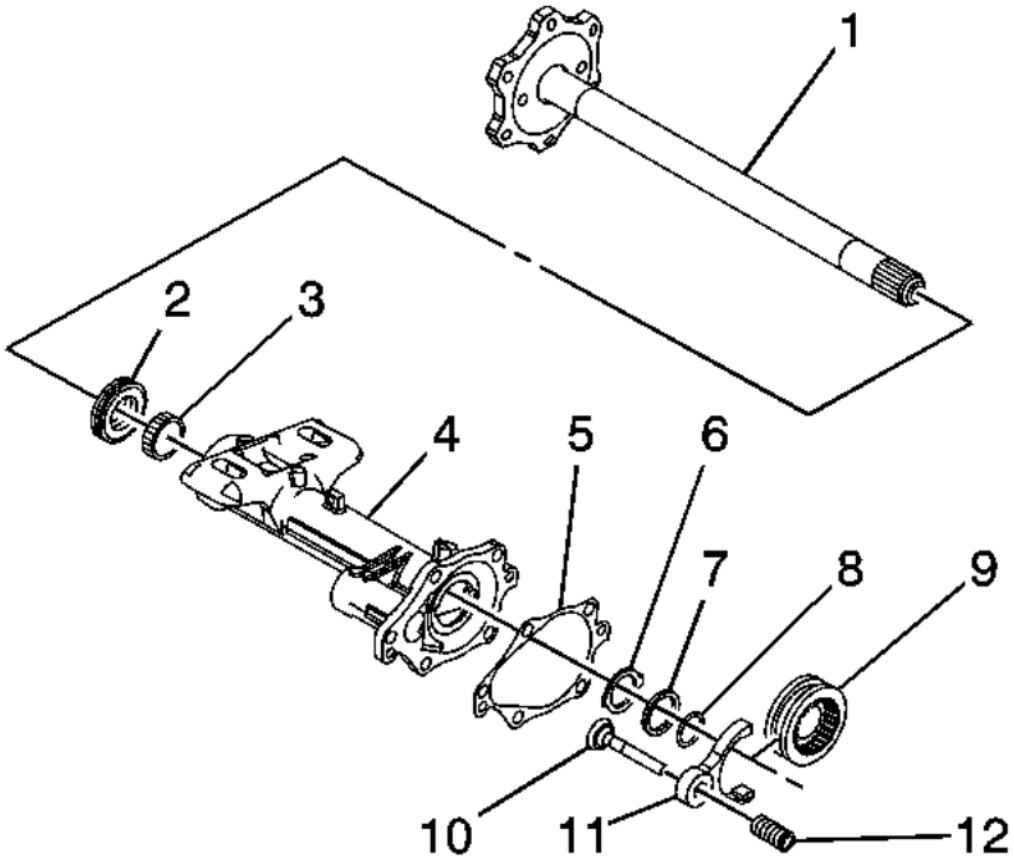


Fig. 64: View Of Inner Axle Shaft & Components
Courtesy of GENERAL MOTORS CORP.

6. For the 8.25 inch axle, 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.

IMPORTANT: 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. The axle shaft snap ring (8)
    5. The shifter connector gear (9)
    6. The shifter fork (11)
    7. The shifter fork rod (10)
    8. The shifter fork spring (12)
    9. Inner axle shaft housing gasket (5)

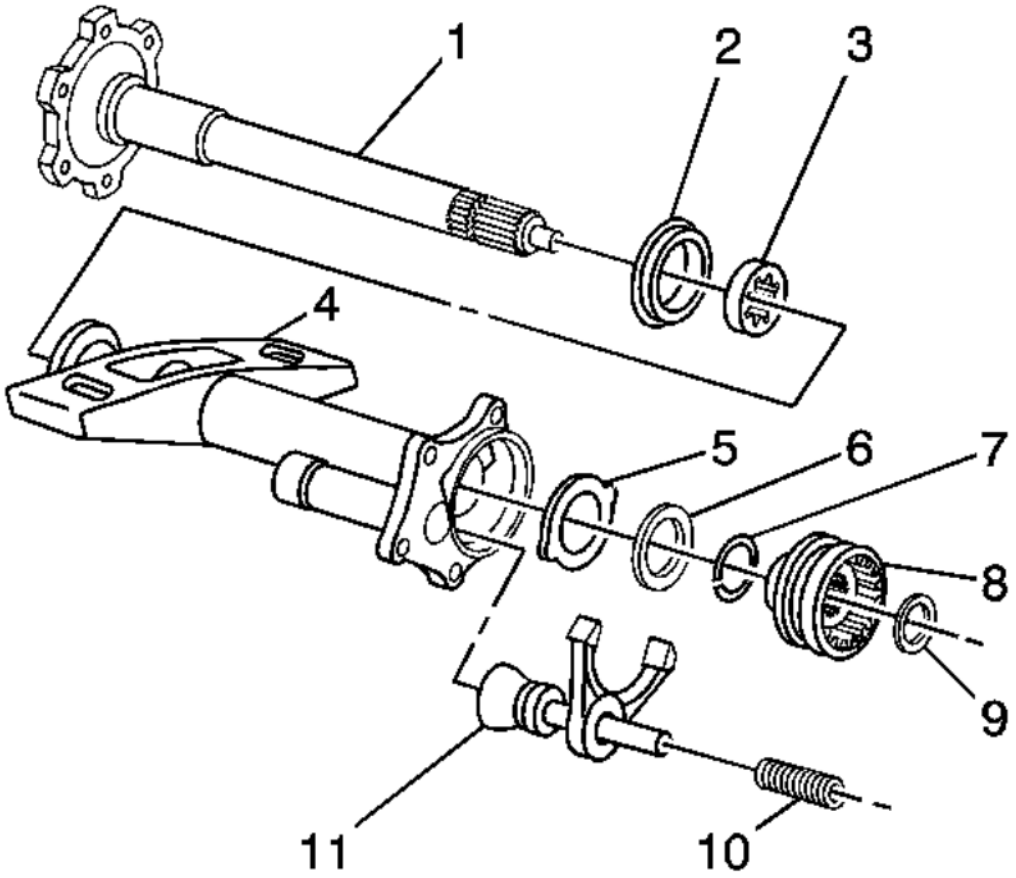


Fig. 65: Inner Axle Shaft Housing Components (9.25 Inch)
Courtesy of GENERAL MOTORS CORP.

7. For the 9.25 inch axle, install the following components into the inner axle shaft housing:

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

1. The thrust washer (5)-Ensure the tabs on the thrust washer are aligned with the slots in the inner axle shaft housing (4).
2. The second thrust washer (6)
3. The retainer ring (7) onto the inner axle shaft (1)

4. Determine the clutch gear shim thickness. Refer to **Inner Axle Shaft Shim Adjustment**.
5. The clutch gear shim (9)
6. The clutch sleeve (8)
7. The clutch fork assembly (11)
8. The clutch fork inner spring (10)

IMPORTANT: The following service procedure is for the 9.25 inch axle ONLY. The 8.25 inch axle uses a gasket.

8. If servicing the 9.25 inch axle, apply sealant to the inner axle housing to differential carrier sealing surface. Use the correct sealant. Refer to **Sealers, Adhesives, and Lubricants**.
9. If servicing the 8.25 inch axle, install the axle housing gasket on to the differential carrier.

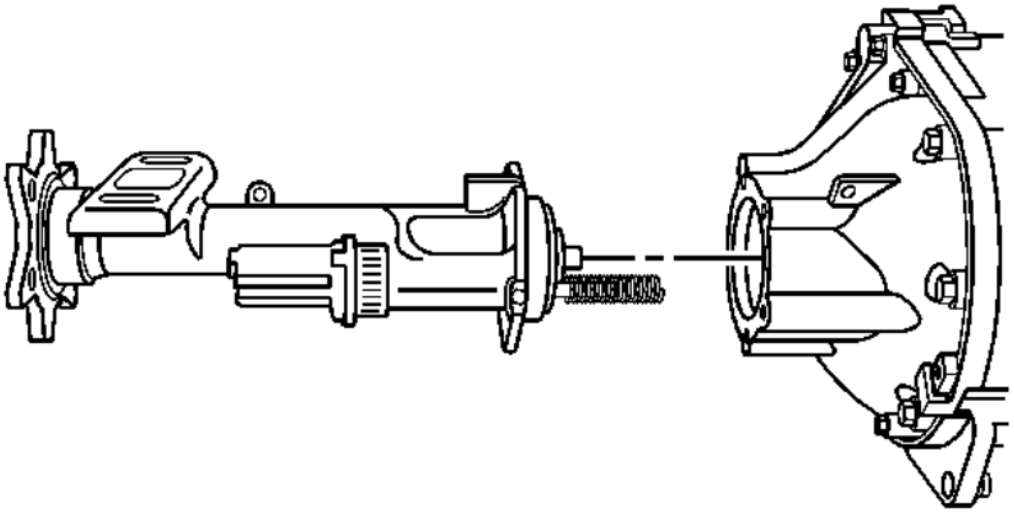


Fig. 66: Identifying Inner Axle Shaft Housing Assembly - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS CORP.

10. Install the inner axle shaft housing assembly to the differential carrier assembly.

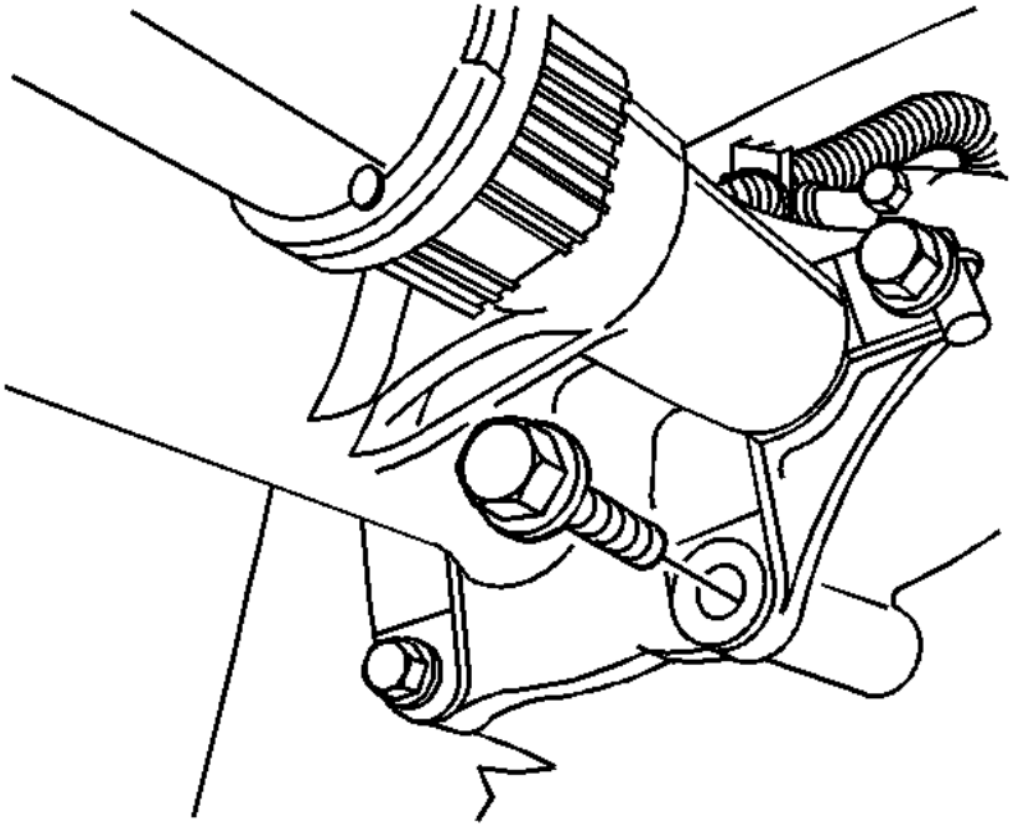


Fig. 67: View Of Inner Axle Shaft Housing Bolts - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS CORP.

11. If servicing the 8.25 inch axle, install the inner axle shaft housing bolts.

    Tighten: Tighten the inner axle shaft housing bolts to 55 N.m (41 lb in).

12. If servicing the 9.25 inch axle, install the inner axle shaft housing bolts.

    Tighten: Tighten the inner axle shaft housing bolts to 40 N.m (30 lb in).

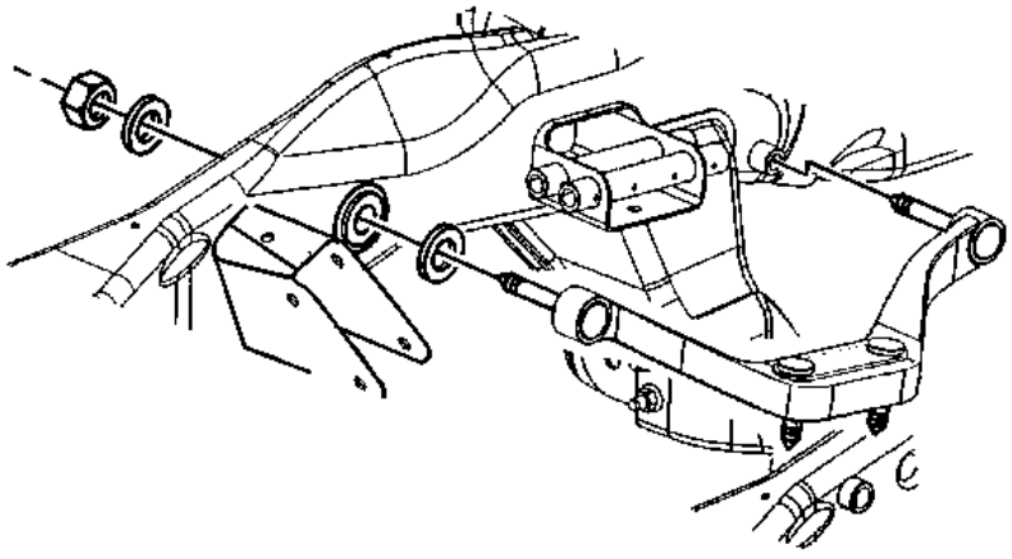


Fig. 68: Front Axle Mounting Bracket - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS CORP.

13. For 25/35 series vehicles, perform the following steps in order to install the front axle mounting bracket to the inner axle shaft housing:
    1. Slide the front axle mounting bracket towards the frame.
    2. Install the front axle mounting bracket studs into the inner shaft housing mounting flange.
    3. It may be necessary to push up on the front axle mounting bracket and/or pull down on the inner axle housing in order to gain enough clearance to install the mounting bracket studs into the inner shaft housing.
    4. Install the front axle mounting bracket to frame nuts.

       Tighten: Tighten the inner axle shaft housing mounting bracket to frame nuts to 90 N.m (67 lb ft).

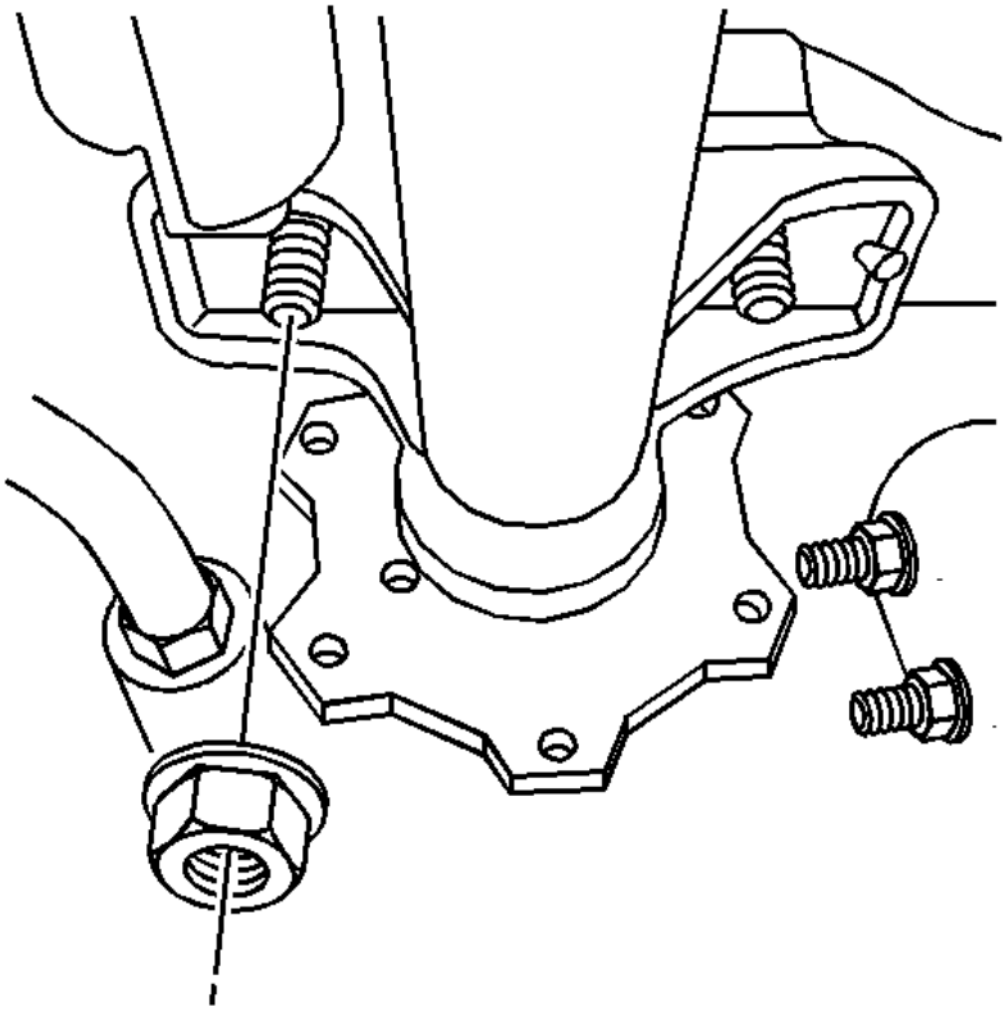


Fig. 69: View Of Inner Axle Housing Nuts
Courtesy of GENERAL MOTORS CORP.

14. Install the inner axle shaft housing washers and nuts to the bracket.

    Tighten: Tighten the inner axle shaft housing nuts to 100 N.m (75 lb ft).

15. Connect the wheel drive shaft inboard flange to the inner axle shaft.

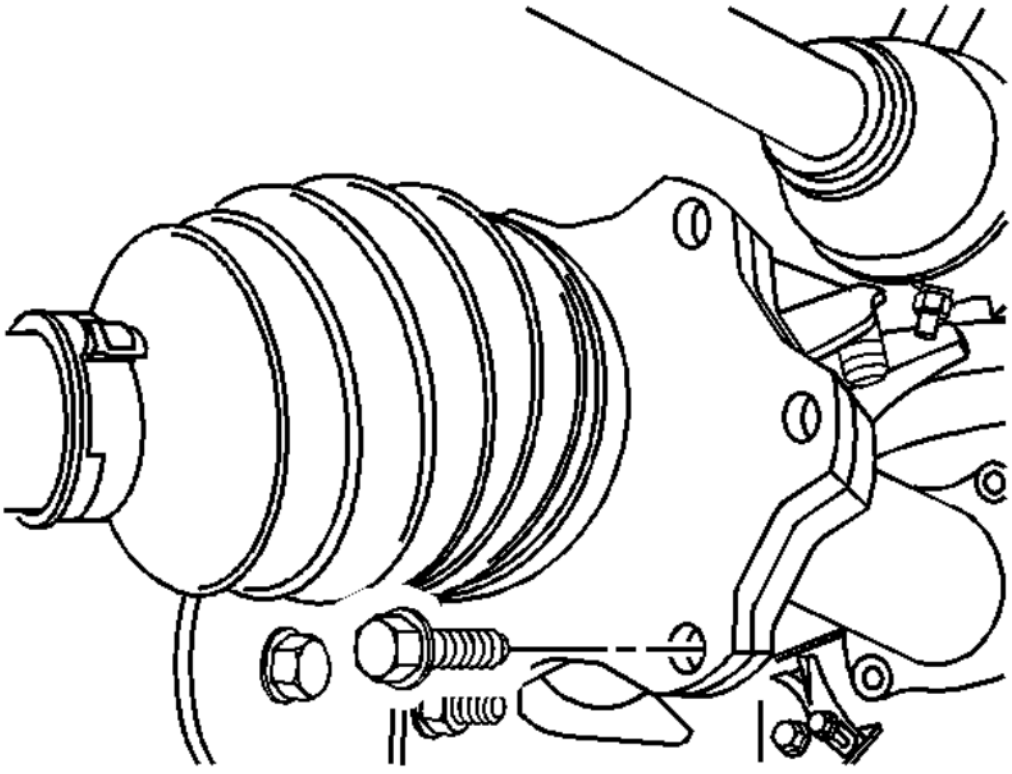


Fig. 70: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

16. Install the wheel drive shaft inboard flange to the inner axle shaft bolts.

    Tighten: Tighten the wheel drive shaft inboard flange to inner axle shaft bolts to 79 N.m (58 lb ft).

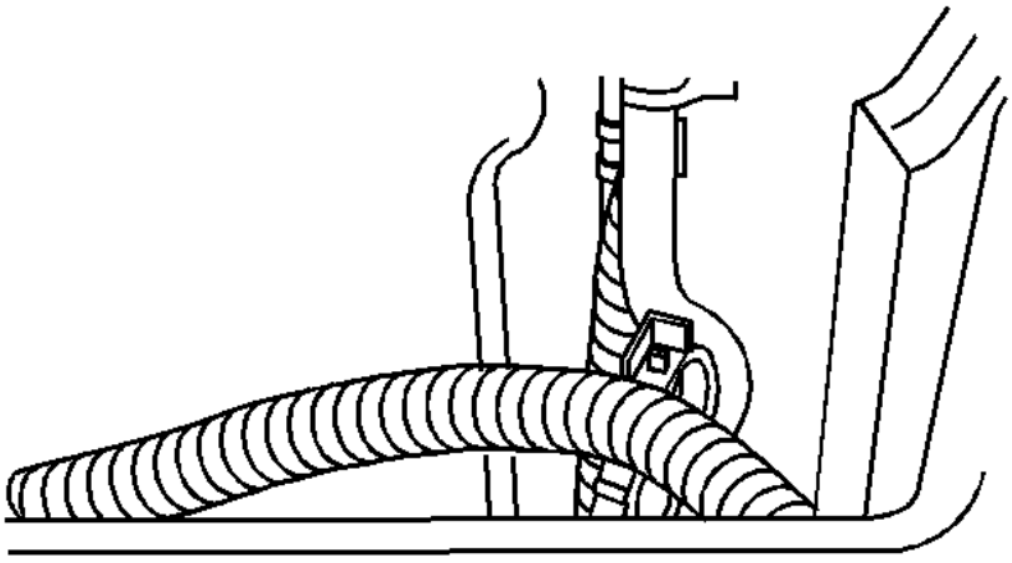


Fig. 71: Inner Axle Shaft Housing Wire Harness - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS CORP.

17. Connect the wire harness to the inner axle shaft housing.

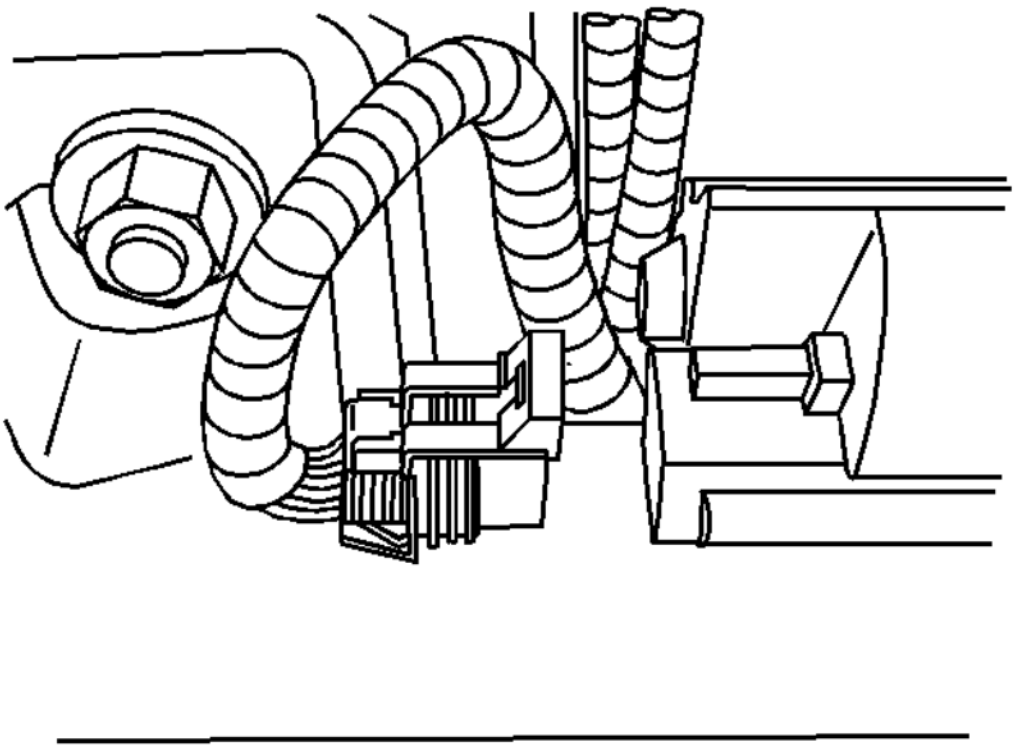


Fig. 72: View Of Front Axle Actuator Electrical Connector
Courtesy of GENERAL MOTORS CORP.

18. Connect the electrical connector to actuator.
19. For vehicles equipped with the 9.25 inch axle, install the stabilizer shaft link. Refer to **Stabilizer Shaft Link Replacement (2500/3500)** or **Stabilizer Shaft Link Replacement (1500)** .
20. For vehicles equipped with the 8.25 inch axle, install the front shock module. Refer to **Shock Absorber and Spring Assembly Replacement** .
21. With either replacement procedure, fill the differential carrier assembly with axle lubricant. Use the correct fluid. Refer to **Front Axle Lubricant Replacement**.
22. Lower the vehicle.

FRONT DRIVE AXLE CLUTCH FORK REPLACEMENT

Removal Procedure

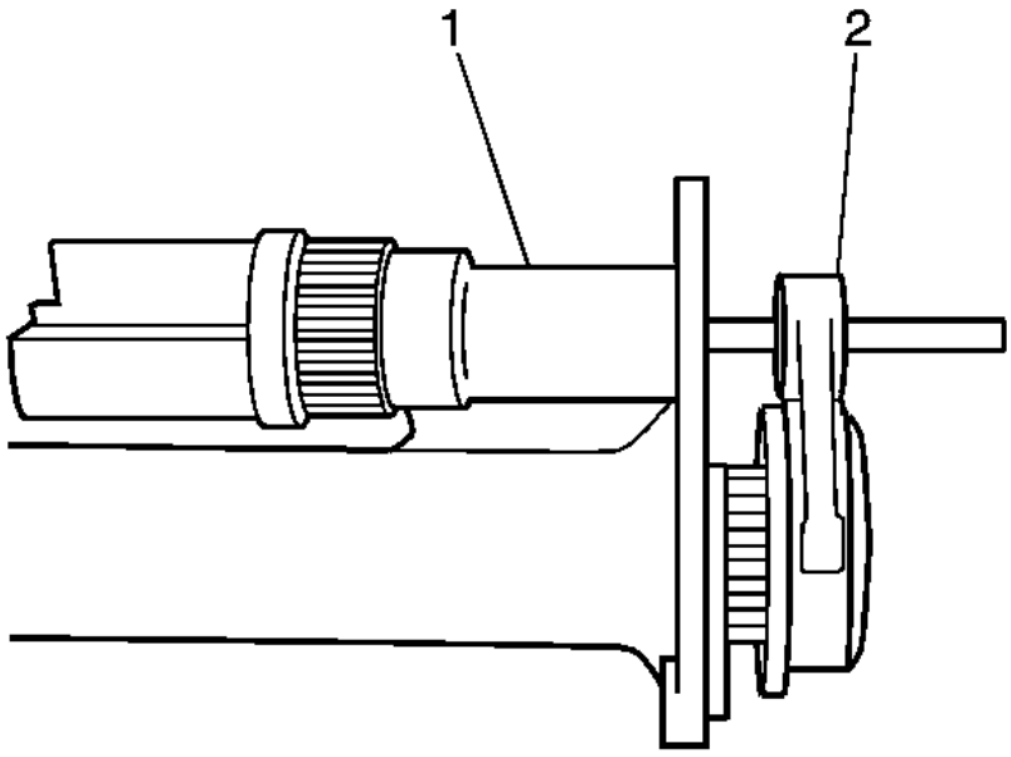


Fig. 73: Inner Axle Shaft Housing & Clutch Fork Assembly - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

1. Remove the inner axle shaft and housing assembly. Refer to **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement (8.25 F4WD Axle)** or **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement (8.25 S4WD and 9.25 Axles)**.
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

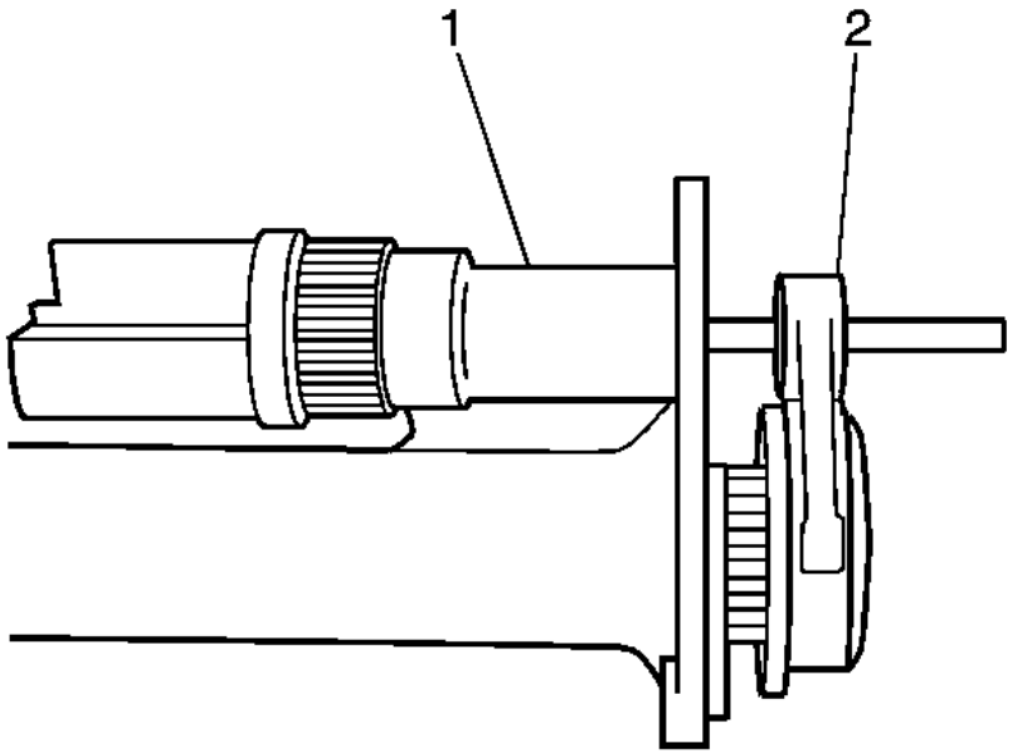


Fig. 74: Inner Axle Shaft Housing & Clutch Fork Assembly - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

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 and Inner Shaft Housing Replacement (8.25 F4WD Axle)** or **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement (8.25 S4WD and 9.25 Axles)**.

FRONT DRIVE AXLE CLUTCH SHAFT BEARING REPLACEMENT

Tools Required

- **J 34011** Pilot Bearing Remover. See **Special Tools**.
- **J 33842** Pilot Bearing Installer. See **Special Tools**.

Removal Procedure

1. Remove the inner axle shaft and housing assembly. Refer to **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement (8.25 F4WD Axle)** or **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement (8.25 S4WD and 9.25 Axles)**.
2. Remove the clutch shaft from the differential carrier assembly.

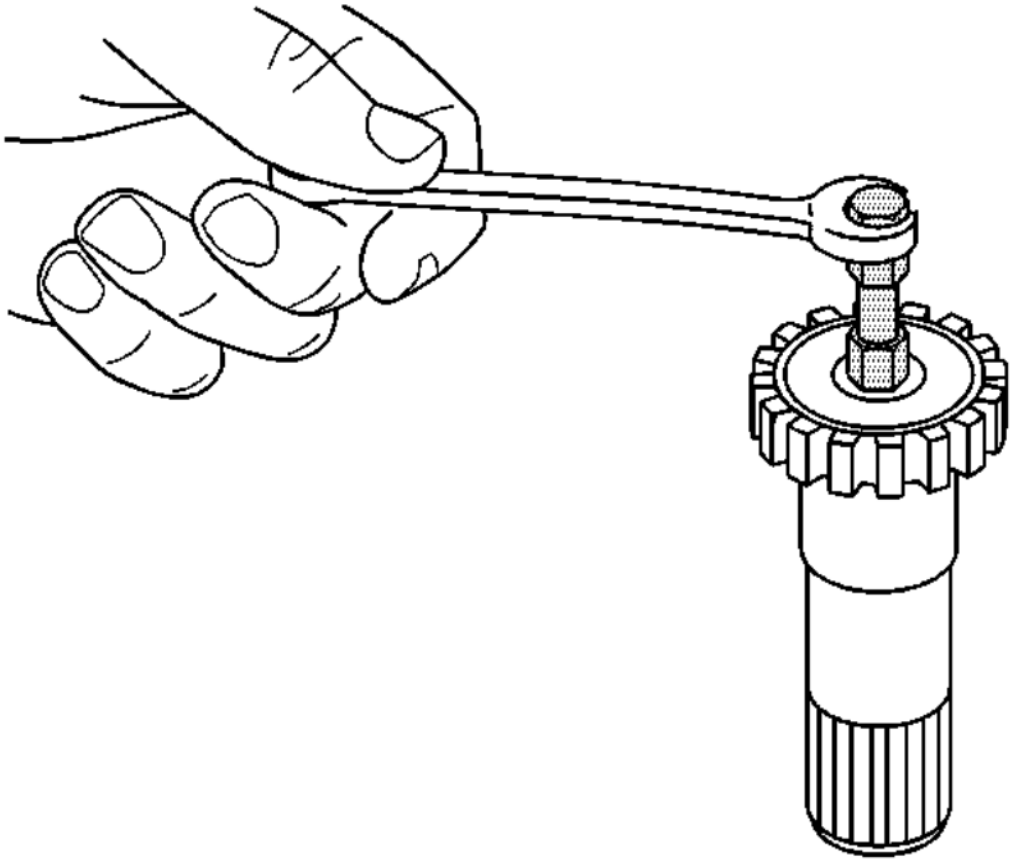


Fig. 75: Removing Clutch Shaft Pilot Bearing - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

3. Remove the clutch shaft pilot bearing using the **J 34011** . See **Special Tools**.

Installation Procedure

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

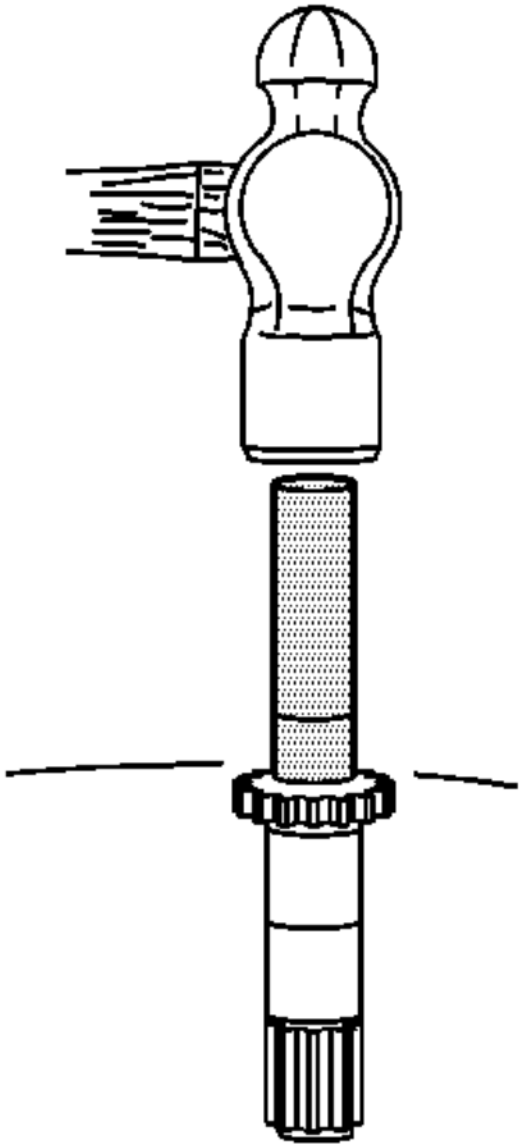


Fig. 76: Installing Clutch Shaft Pilot Bearing - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

2. Install the clutch shaft pilot bearing using the **J 33842** . See **Special Tools**.
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 and Inner Shaft Housing Replacement (8.25 F4WD Axle)** or **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement (8.25 S4WD and 9.25 Axles)**.

FRONT DRIVE AXLE INNER SHAFT SEAL AND INNER SHAFT BEARING REPLA REPLACEMENT

Tools Required

- **J 8092** Universal Driver Handle - 3/4 in - 10
- **J 2619-01** Slide Hammer
- **J 29369-1** Bushing and Bearing Remover. See **Special Tools**.
- **J 29369-2** Bushing and Bearing Remover (2-3 inch). See **Special Tools**.
- **J 36609** Axle Tube Bearing Installer. See **Special Tools**.
- **J 45225** Axle Seal Installer. See **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**.
3. Remove the right side seal and/or 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 and Inner Shaft Housing Replacement (8.25 F4WD Axle)** or **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement (8.25 S4WD and 9.25 Axles)**.
    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 and Inner Shaft Housing Replacement (8.25 F4WD Axle)** or **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement (8.25 S4WD and 9.25 Axles)**.
    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 29369-1** , 8. See **Special Tools**.25 inch axle, or the **J 29369-2** , 9. See **Special Tools**.25 inch axle, behind the inner axle shaft seal or the inner axle shaft bearing as necessary.

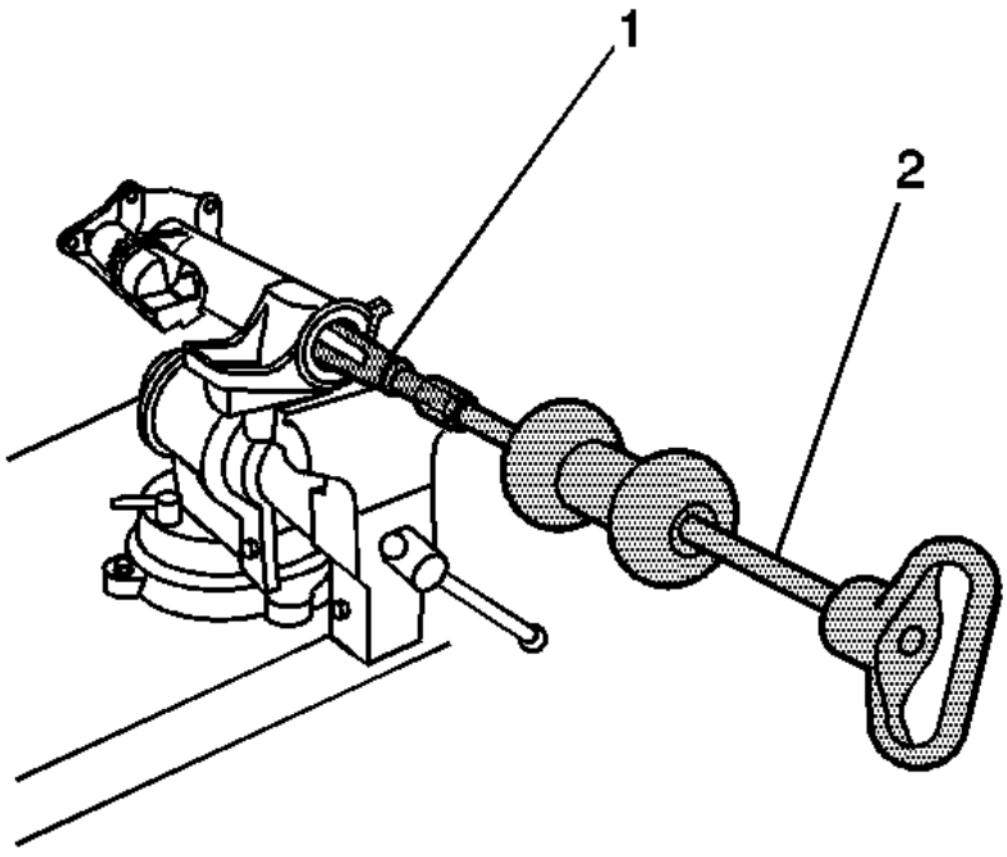


Fig. 77: Inner Axle Shaft Seal And/Or The Inner Axle Shaft Bearing & J 29369-2 & J 2619-01
Courtesy of GENERAL MOTORS CORP.

5. Install the **J 2619-01** (2) to the **J 29369-1** or the **J 29369-2** (1). See **Special Tools**.
6. Remove the inner axle shaft seal and/or the inner axle shaft bearing using the **J 2619-01** .

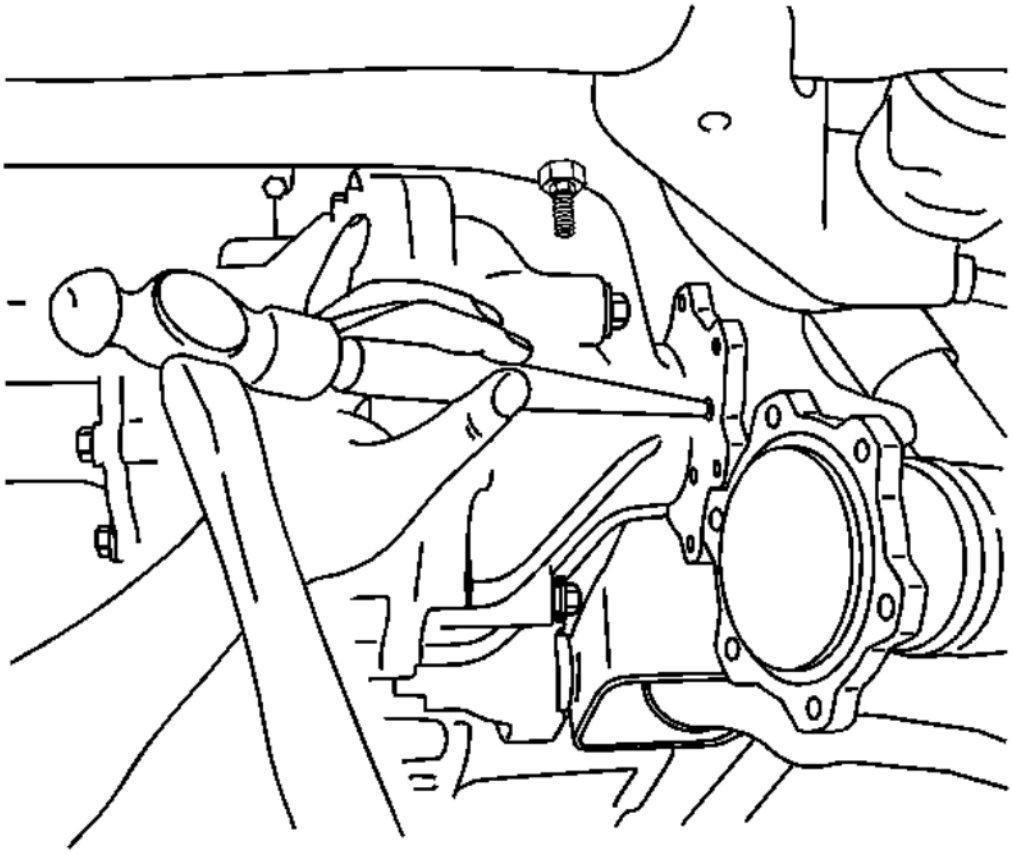


Fig. 78: Identifying Inner Axle Shaft - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Support the wheel drive shaft in order to not over flex the CV joint.

4. If only replacing the left side seal, perform the following steps:
    1. Place an alignment mark between the inner axle shaft and the wheel drive shaft.
    2. If servicing the 8.25 inch axle, remove the shock module. Refer to **Shock Absorber and Spring Assembly Replacement** .
    3. Disconnect the wheel drive shaft from the inner axle shaft.
    4. Remove the inner axle shaft using a hammer and a brass drift.

5. Remove the inner axle shaft seal using a suitable seal remover tool.

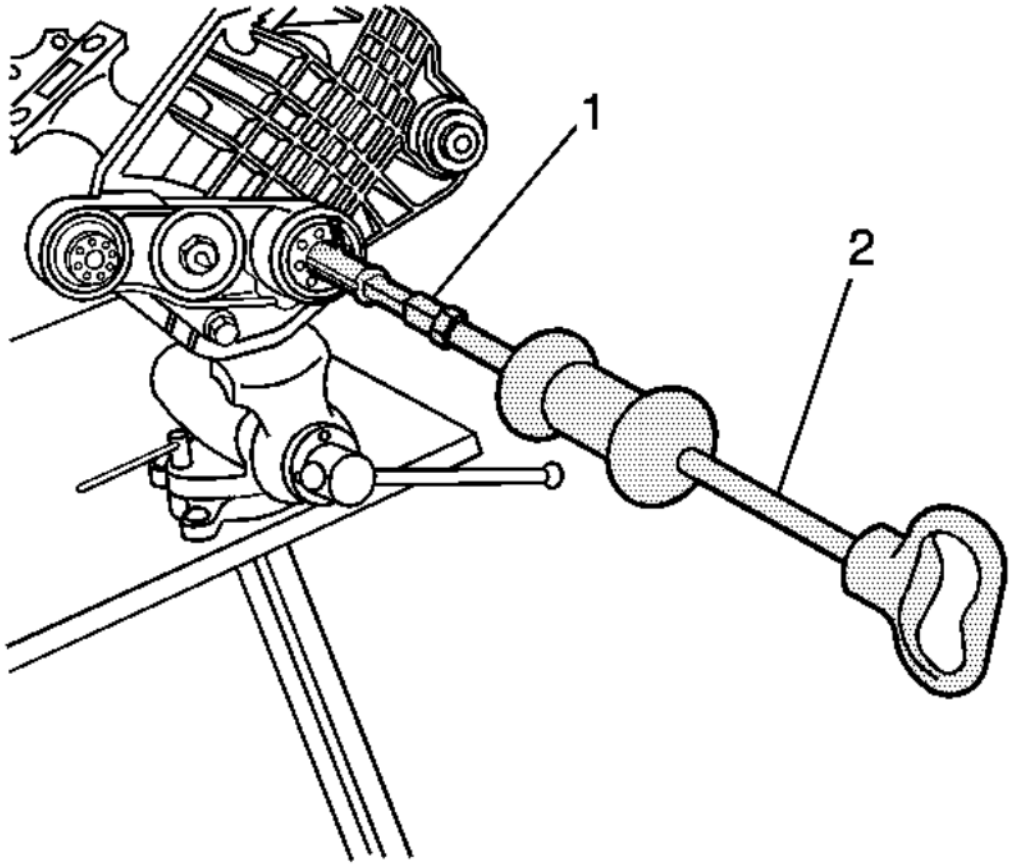


Fig. 79: Inner Axle Shaft Seal/Bearing & J 29369-2 & J 2619-01 - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

5. If replacing both the left side seal and bearing, perform the following steps:
   1. Remove the differential carrier assembly. Refer to **Differential Carrier Assembly Replacement (1500 FWD)** or **Differential Carrier Assembly Replacement (2500 4WD)**.
   2. Place the differential carrier assembly into a vise.

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

3. Remove the inner axle shaft using a hammer and a brass drift.
4. Install the **J 29369-1** , 8. See **Special Tools**.25 inch axle, or the **J 29369-2** , 9. See **Special Tools**.25 inch axle (1), behind the inner axle shaft seal or the inner axle shaft bearing as necessary.
5. Install the **J 2619-01** (2) to the **J 29369-1** or the **J 29369-2** . See **Special Tools**.
6. Remove the inner axle shaft seal and/or the inner axle shaft bearing using the **J 2619-01** .

Installation Procedure

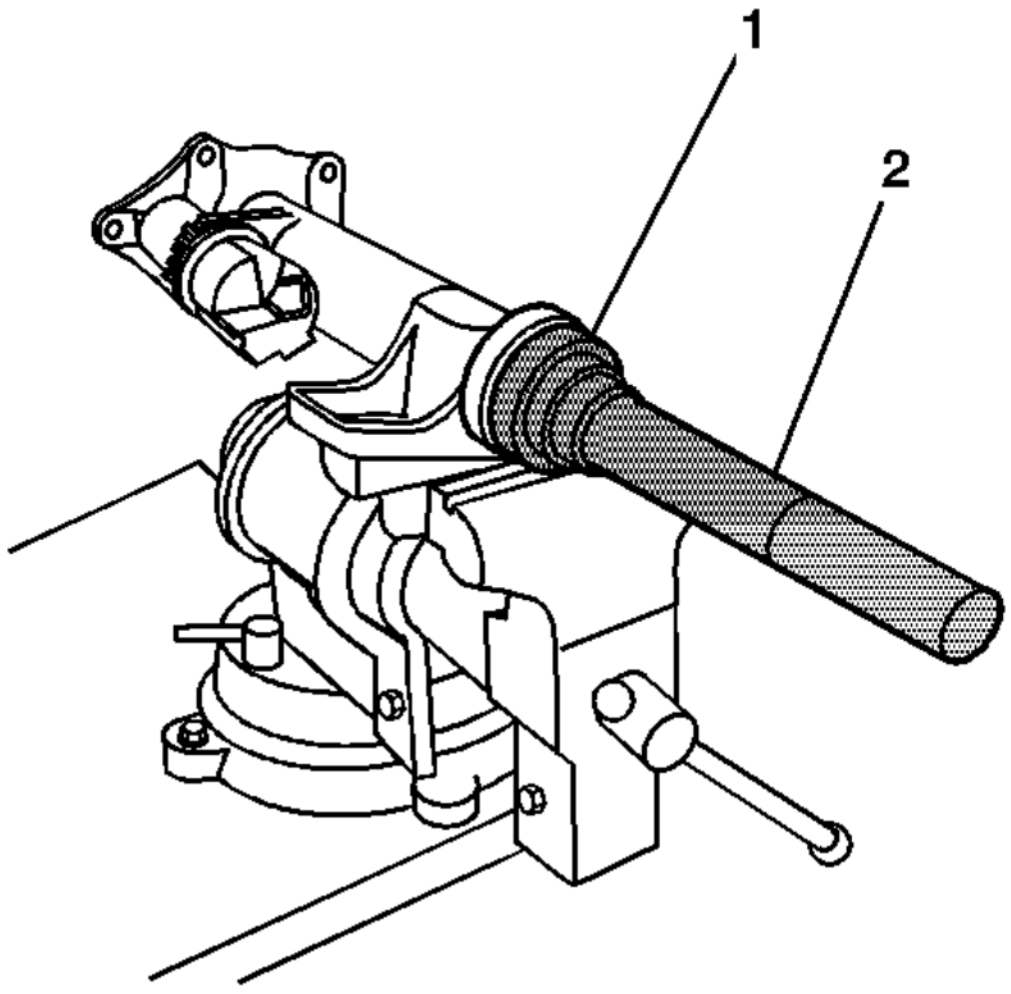


Fig. 80: Installing Side Bearing Using J 36609 & J 8092 - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

1. Install the right side bearing with the square shoulder in using the **J 36609** (1) and the **J 8092** (2). See **Special Tools**.

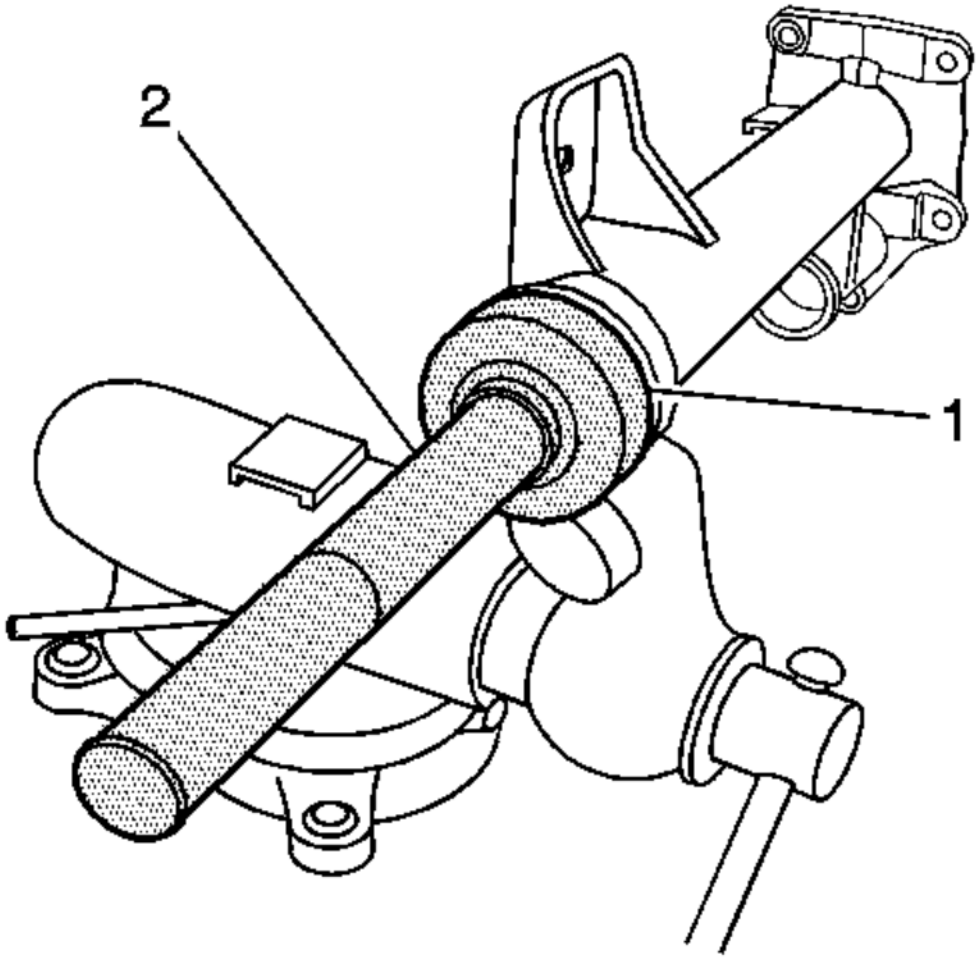


Fig. 81: Installing New Axle Shaft Seal Using J 45225 & J 8092 - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

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

3. Install the inner axle shaft into the inner axle shaft housing.

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

4. Install the inner axle shaft and clutch fork assembly components into the inner shaft housing. Refer to **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement (8.25 F4WD Axle)** or **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement (8.25 S4WD and 9.25 Axles)**.
5. Install the inner axle shaft and housing assembly to the differential carrier case assembly. Refer to **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement (8.25 F4WD Axle)** or **Front Drive Axle Inner Shaft and Inner Shaft Housing Replacement (8.25 S4WD and 9.25 Axles)**.

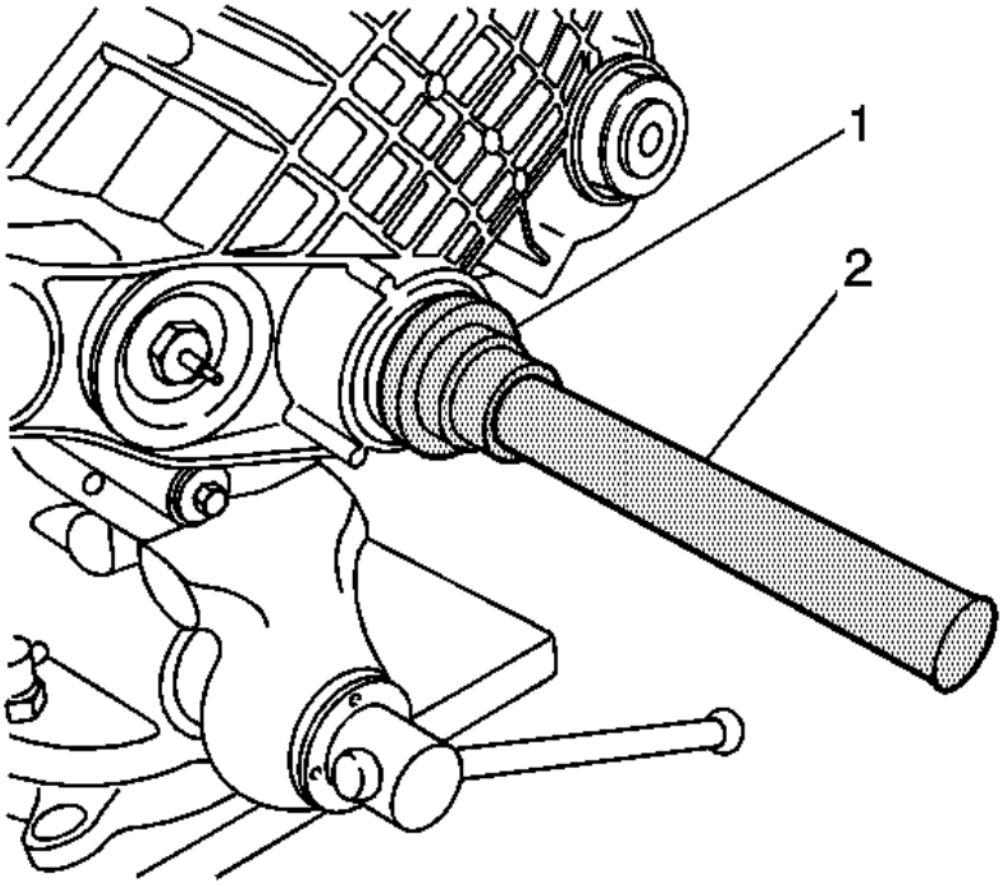


Fig. 82: Install Left Side Bearing Using J 36609 & J 8092 - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

6. If both the left side bearing and seal was removed, perform the following step. Install the left side bearing with the square shoulder in using the **J 36609** (1) and the **J 8092** (2). See **Special Tools**.

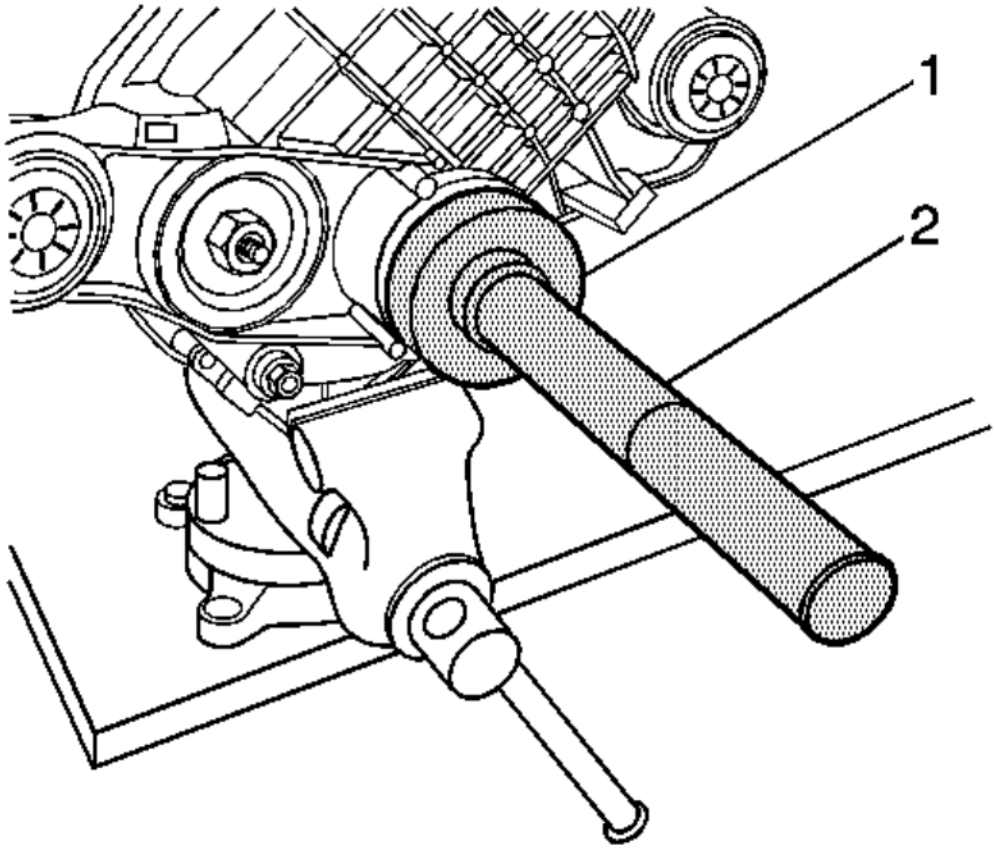


Fig. 83: Install New Axle Shaft Seal Using J 45225 & J 8092 - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

7. If both the left side bearing and seal was removed, perform the following step. Install the new axle shaft seal using the **J 45225** (1) and the **J 8092** (2). See **Special Tools**.
8. If both the left side bearing and seal was removed, perform the following step. 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.

9. If both the left side bearing and seal was removed, perform the following step. Install the front differential carrier assembly. Refer to **Differential Carrier Assembly Replacement (1500 FWD)** or **Differential Carrier Assembly Replacement (2500 4WD)**.

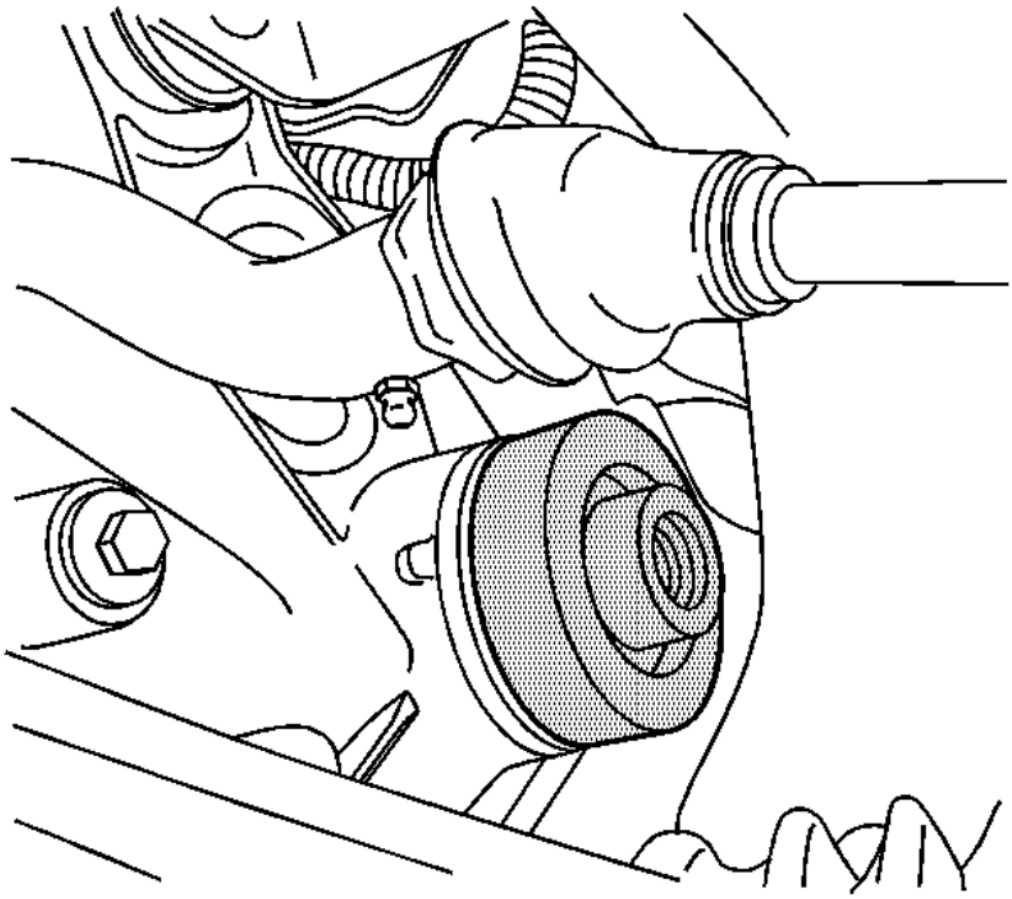


Fig. 84: Installing Seal Using J 45225 - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

10. If only the left side seal was removed, perform the following step. Install the seal using the **J 45225** and a soft-faced mallet. See **Special Tools**.

    Tap only on the center portion of the **J 45225** in order to drive the seal in evenly. See **Special Tools**.

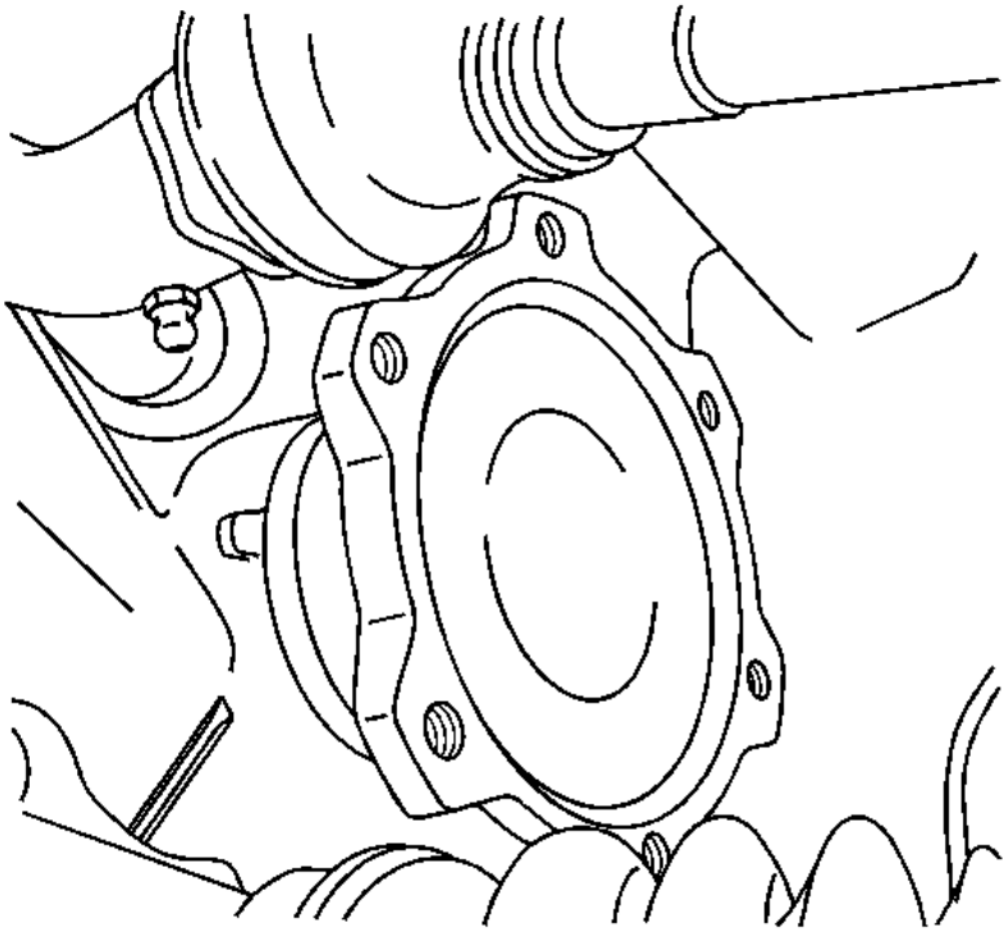


Fig. 85: Axle Shaft Inner Flange - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

11. If only the left side seal was removed, perform the following step. 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.

12. If servicing the 8.25 inch axle, install the shock module. Refer to **Shock Absorber and Spring Assembly Replacement** .
13. If only the left side seal was removed, perform the following step. Install the wheel drive shaft to the inner axle shaft.

NOTE: Refer to Fastener Notice .

14. If only the left side seal was removed, perform the following step. Install the wheel drive shaft to the inner axle shaft bolts.

    Tighten: Tighten the wheel drive shaft to inner axle shaft bolts to 79 N.m (58 lb ft).

15. Fill the differential carrier assembly. Use the correct fluid. Refer to **Front Axle Lubricant Replacement**.
16. Lower the vehicle.

FRONT DRIVE AXLE ACTUATOR REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the engine shield, if equipped. Refer to **Engine Shield Replacement** .
3. Disconnect the electrical connector from the actuator.

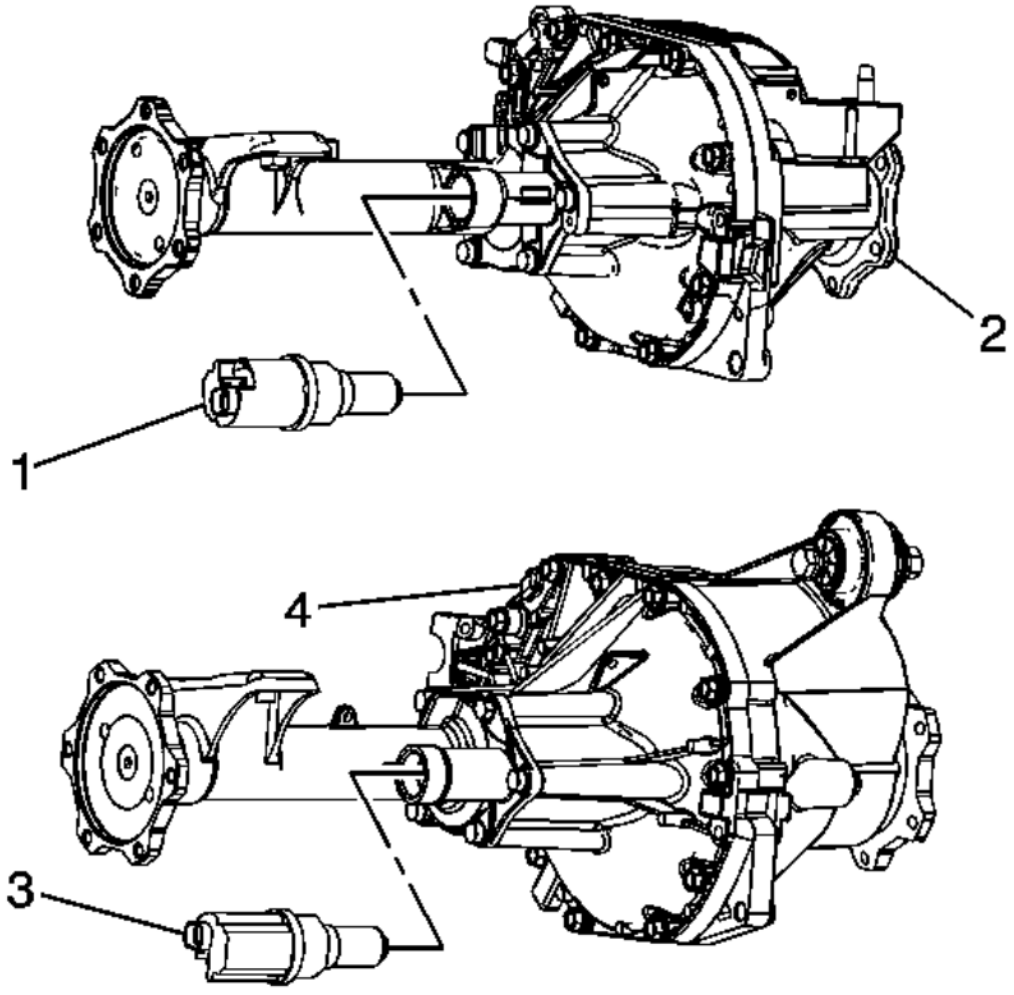


Fig. 86: View Of Actuator & Components
Courtesy of GENERAL MOTORS CORP.

4. Remove the actuator (1) for the 8.25 inch axle (2) or (3) for the 9.5 inch axle (4) by turning the actuator counterclockwise.

Installation Procedure

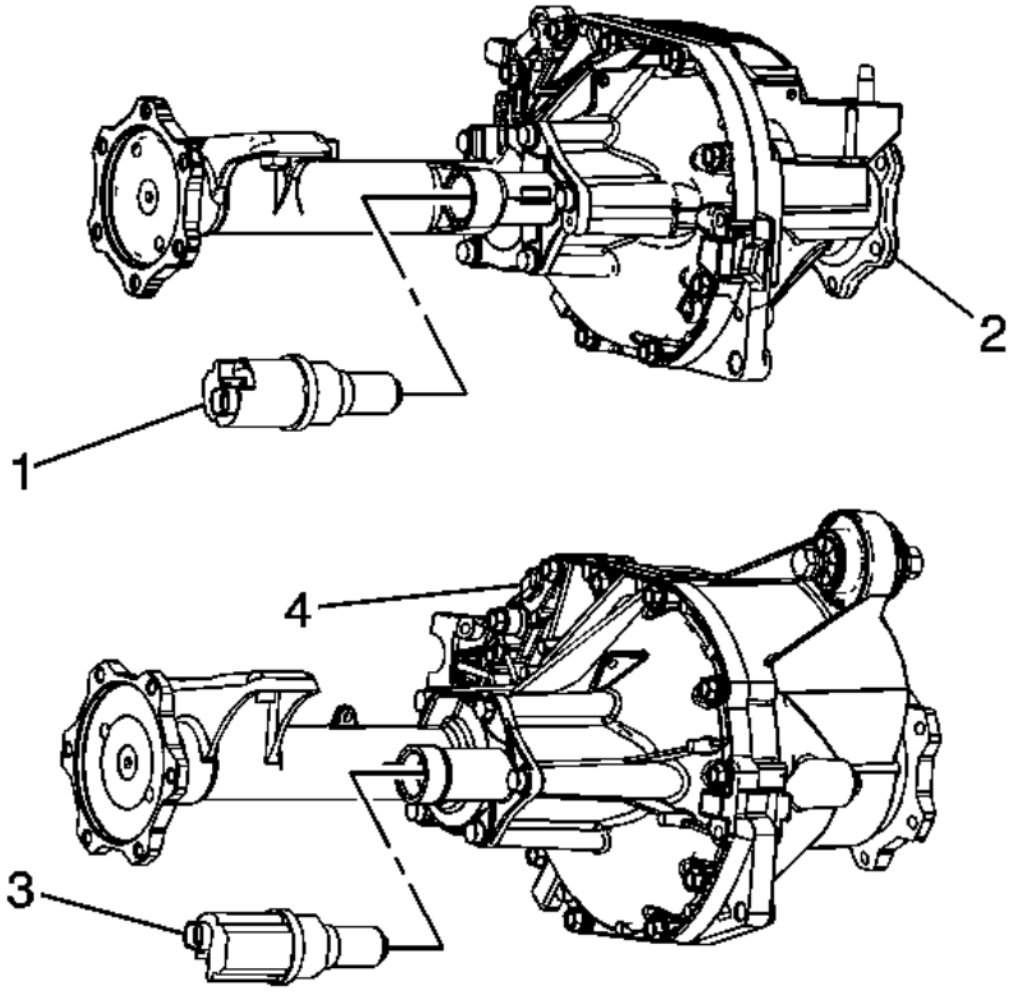


Fig. 87: View Of Actuator & Components
Courtesy of GENERAL MOTORS CORP.

1. Apply sealant to the threads of the actuator (1) for the 8.25 inch axle (2) or (3) for the 9.25 inch axle (4). Use the correct sealant. Refer to Sealers, Adhesives, and Lubricants.

NOTE: Refer to Fastener Notice .

2. Install the actuator (1 or 3).

Tighten: Tighten the actuator to 20 N.m (15 lb ft).

3. Connect the electrical connector to the actuator.
4. Install the engine shield, if equipped. Refer to **Engine Shield Replacement** .
5. Lower the vehicle.

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

Tools Required

- **J 8614-01** Flange and Pulley Holding Tool. See **Special Tools**.
- **J 36366** Pinion Oil Seal Installer

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the drive axle. Refer to **Front Axle Lubricant Replacement**.
3. Remove the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** .
4. Remove the brake calipers. Refer to **Front Brake Caliper Replacement (JH6, JH7)** or **Front Brake Caliper Replacement (JD9, JF3, JF7)** .
5. Remove the engine shield, if equipped. Refer to **Engine Shield Replacement** .
6. Reference mark the relationship of the propeller shaft to the front axle pinon yoke.

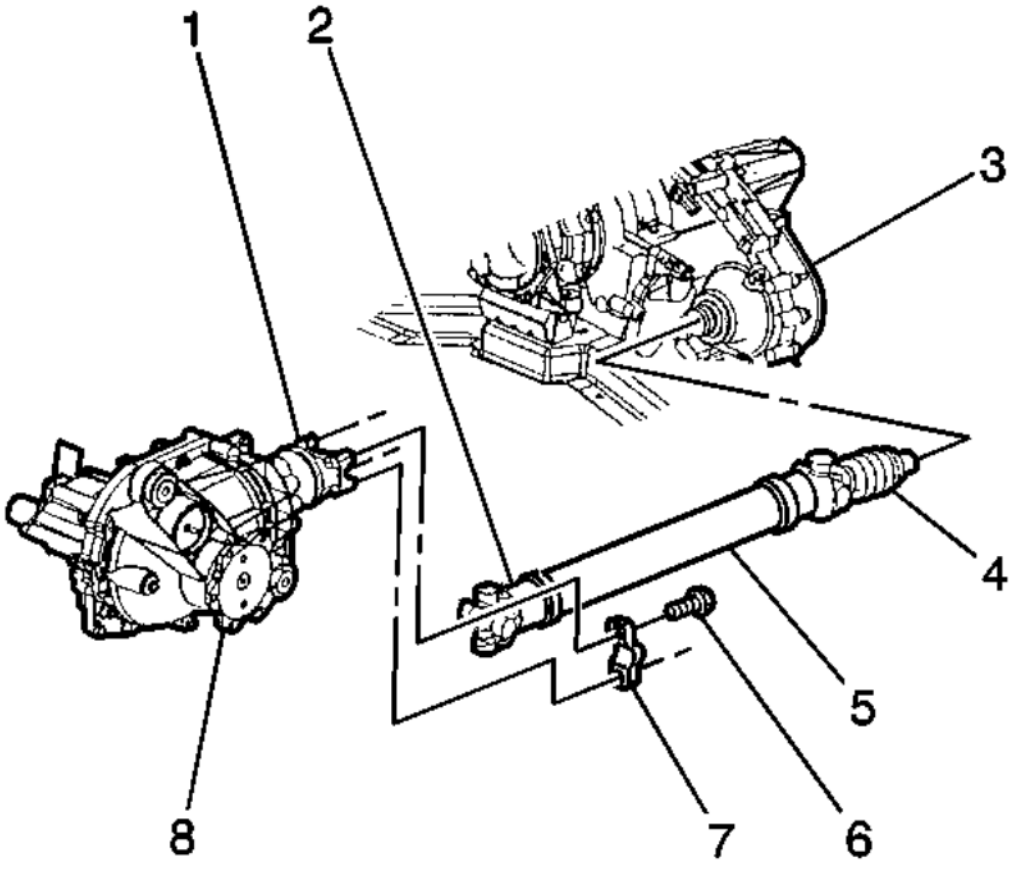


Fig. 88: Front Axle Pinion Yoke, Propeller Shaft Universal Joint, Yoke Retainer & Bolts
Courtesy of GENERAL MOTORS CORP.

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

NOTE: 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.

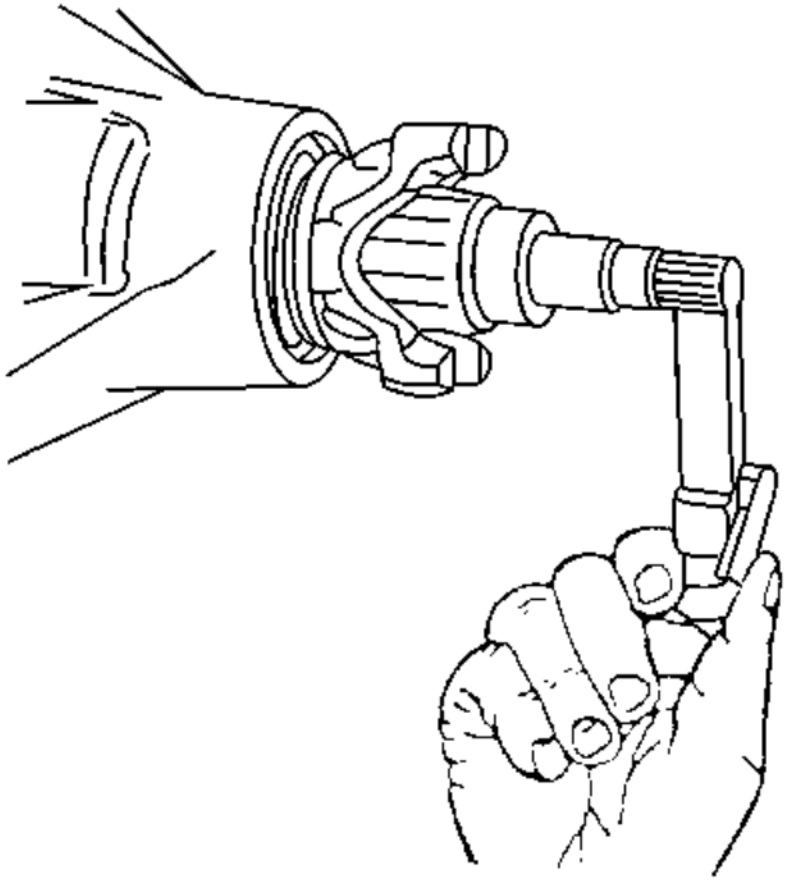


Fig. 89: Measuring Pinion Rotation Torque - Front Axle
Courtesy of GENERAL MOTORS CORP.

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

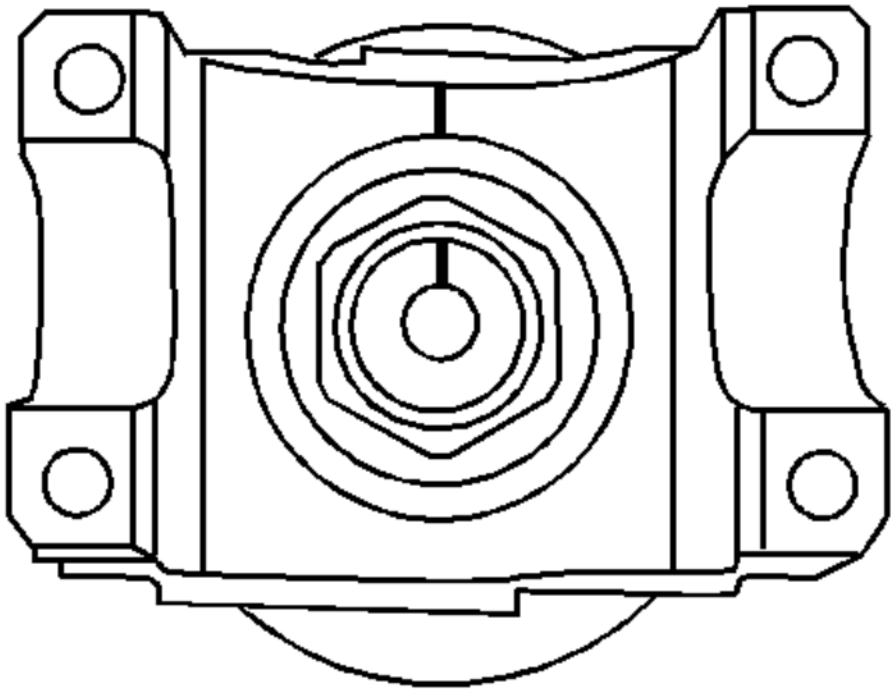


Fig. 90: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS CORP.

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

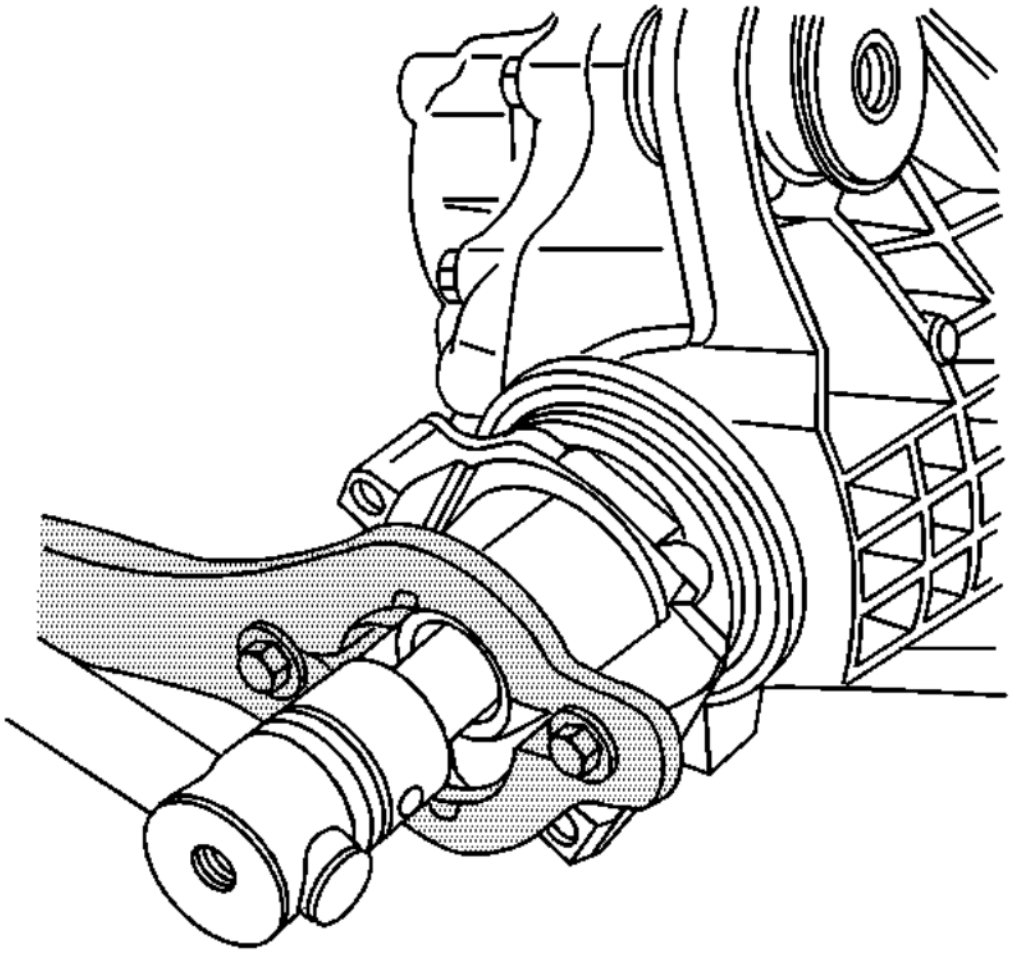


Fig. 91: Holding Pinion Flange Using Special Tool
Courtesy of GENERAL MOTORS CORP.

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

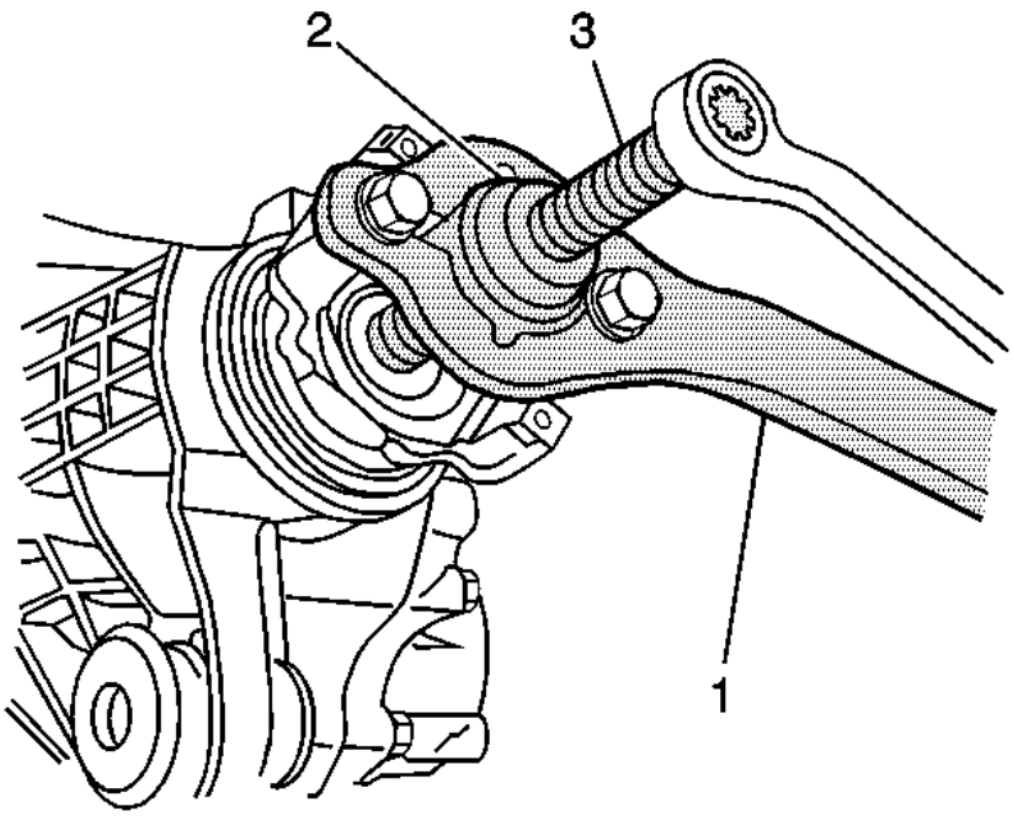


Fig. 92: View Of Pinion Yoke
Courtesy of GENERAL MOTORS CORP.

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

IMPORTANT: Carefully remove the 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

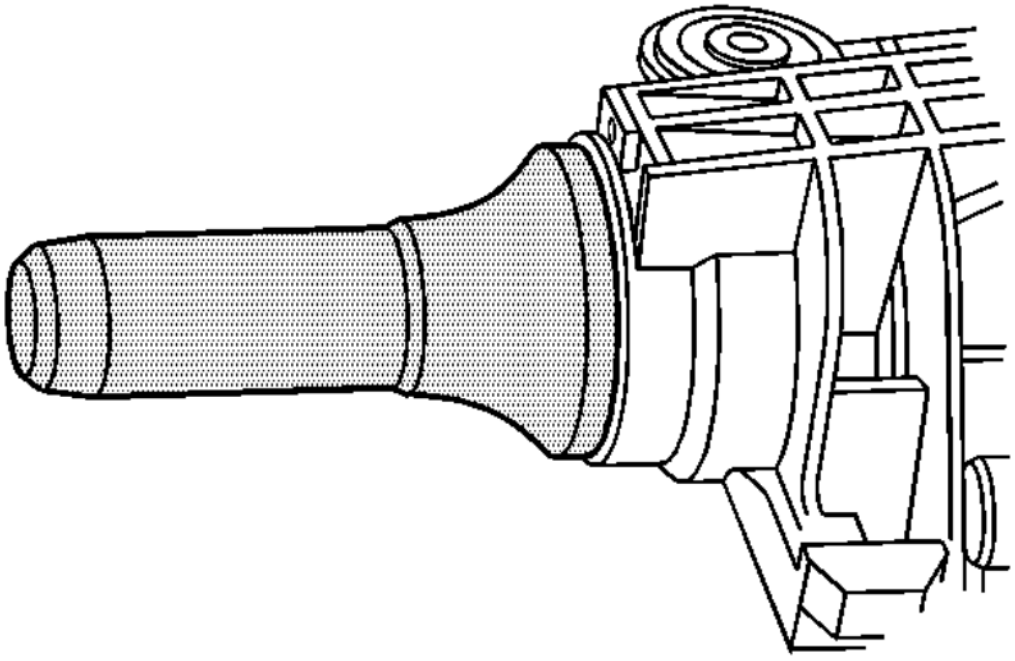


Fig. 93: Installing Oil Seal Using J 36366 - Front Axle
Courtesy of GENERAL MOTORS CORP.

1. Install the oil seal by doing the following:
    1. Position the oil seal over the seal bore.
    2. Install the **J 36366** over the oil seal.
    3. Strike the **J 36366** 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.

NOTE: **Refer to Pinion Flange/Yoke Installation Notice .**

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.

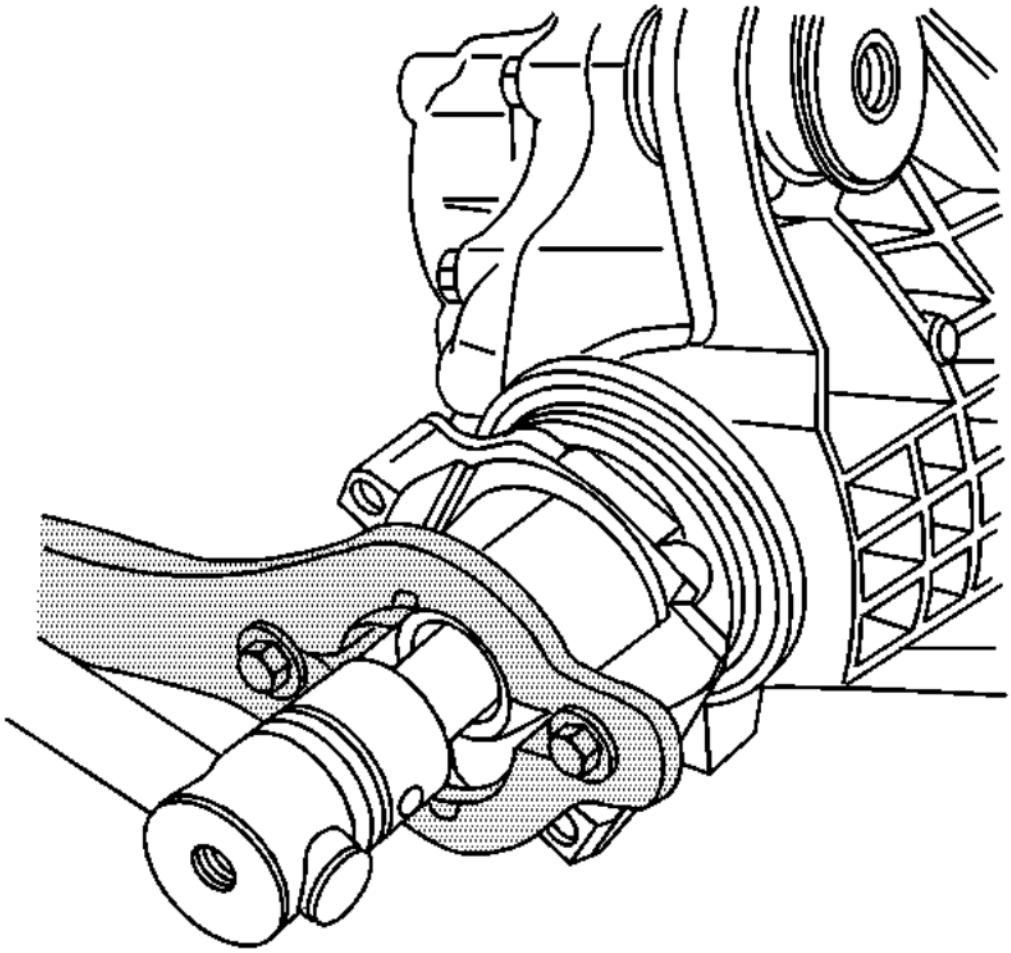


Fig. 94: Holding Pinion Flange Using Special Tool
Courtesy of GENERAL MOTORS CORP.

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

NOTE: Refer to Fastener Notice .

IMPORTANT: If the rotating torque is exceeded, the pinion will have to be

removed and a new collapsible spacer installed.

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

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

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

   Compare the measurement with the rotating torque recorded earlier.

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

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.

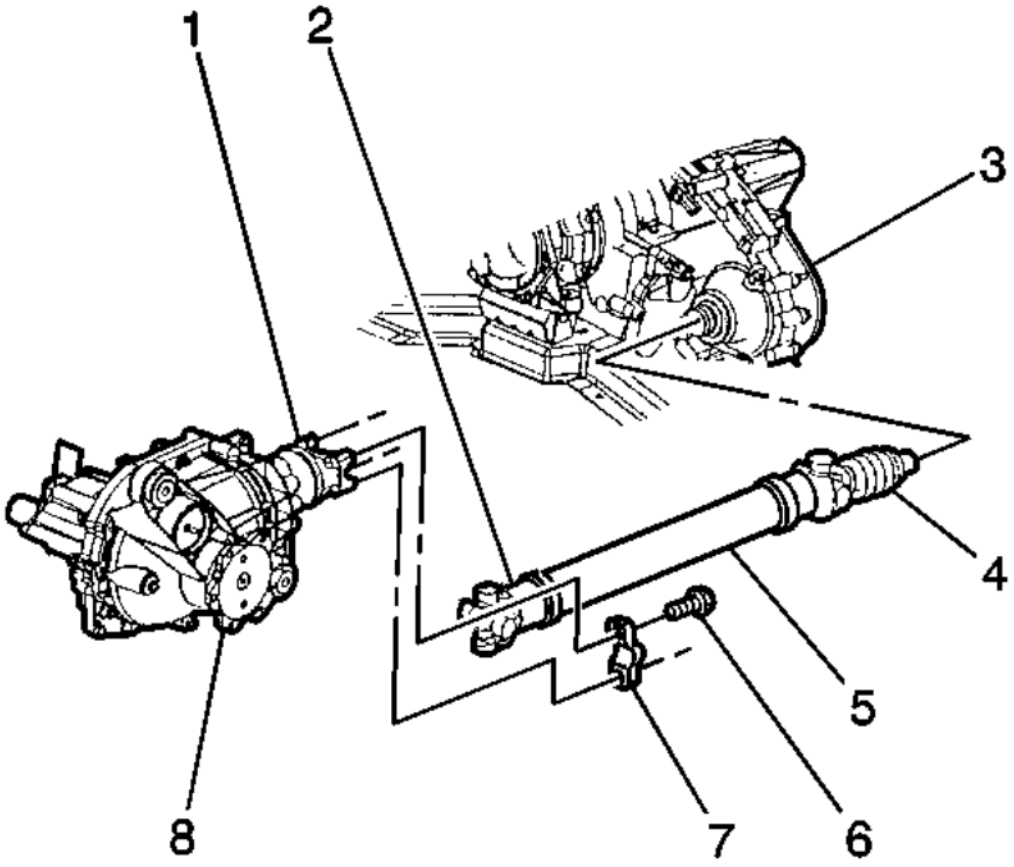


Fig. 95: Front Axle Pinion Yoke, Propeller Shaft Universal Joint, Yoke Retainer & Bolts
Courtesy of GENERAL MOTORS CORP.

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)**.

13. Install the engine shield, if equipped. Refer to **Engine Shield Replacement** .
14. Install the brake calipers. Refer to **Front Brake Caliper Replacement (JH6, JH7)** or **Front Brake Caliper Replacement (JD9, JF3, JF7)** .
15. Fill the drive axle. Refer to **Front Axle Lubricant Replacement**.
16. Install the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** .
17. Lower the vehicle.

DIFFERENTIAL CARRIER ASSEMBLY BUSHING REPLACEMENT

Tools Required

- **J 33791** Carrier Bushing Remover/Installer. See **Special Tools**.
- **J 36616** Axle Mount Bushing Remover/Installer. See **Special Tools**.

Removal Procedure

1. Remove the differential carrier assembly. Refer to **Differential Carrier Assembly Replacement (1500 FWD)** or **Differential Carrier Assembly Replacement (2500 4WD)**.

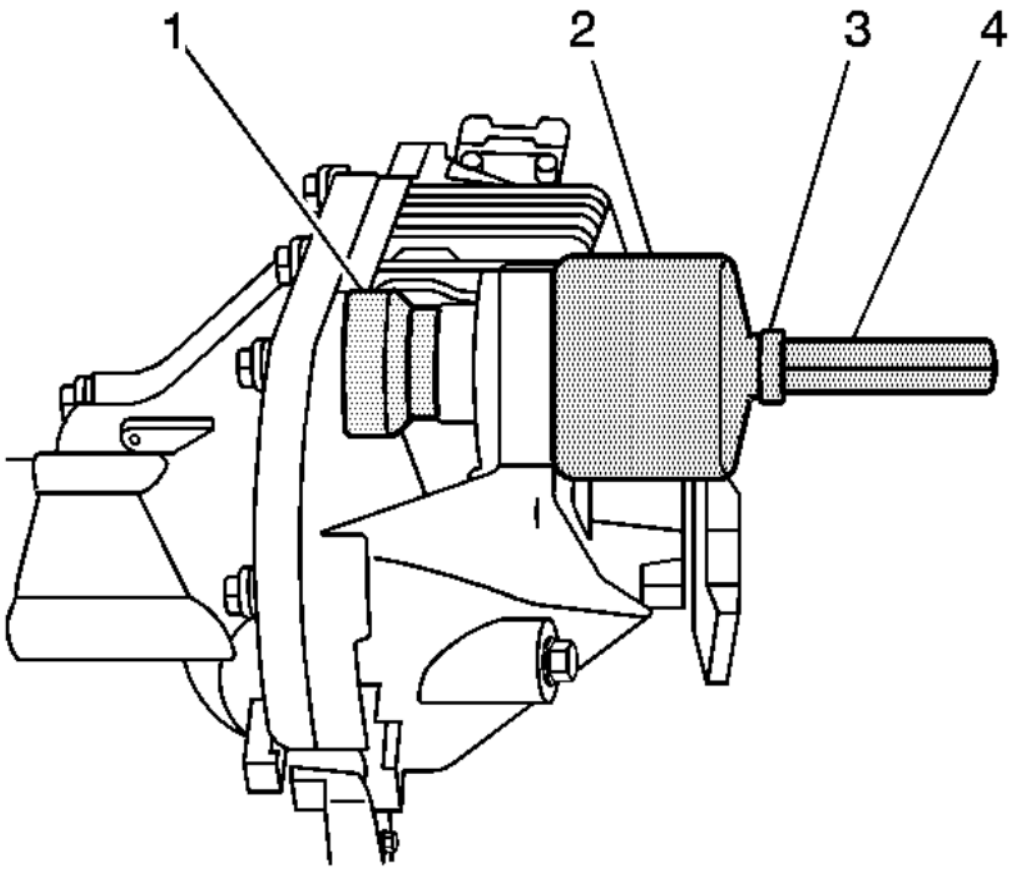


Fig. 96: Remove Upper Differential Carrier Assembly Bushing Using J 36616-2, J 33791-1, Thrust Bearing, J 21474-18 & Forcing Screw
Courtesy of GENERAL MOTORS CORP.

2. Remove the upper differential carrier assembly bushing by performing the following steps:
    1. Install the J 36616-2 (1), the J 33791-1 (2), the thrust bearing (3), the J 21474-18 (4), and the forcing screw as shown.
    2. Remove the upper differential carrier assembly bushing by holding the forcing screw and slowly tightening the J 21474-18.

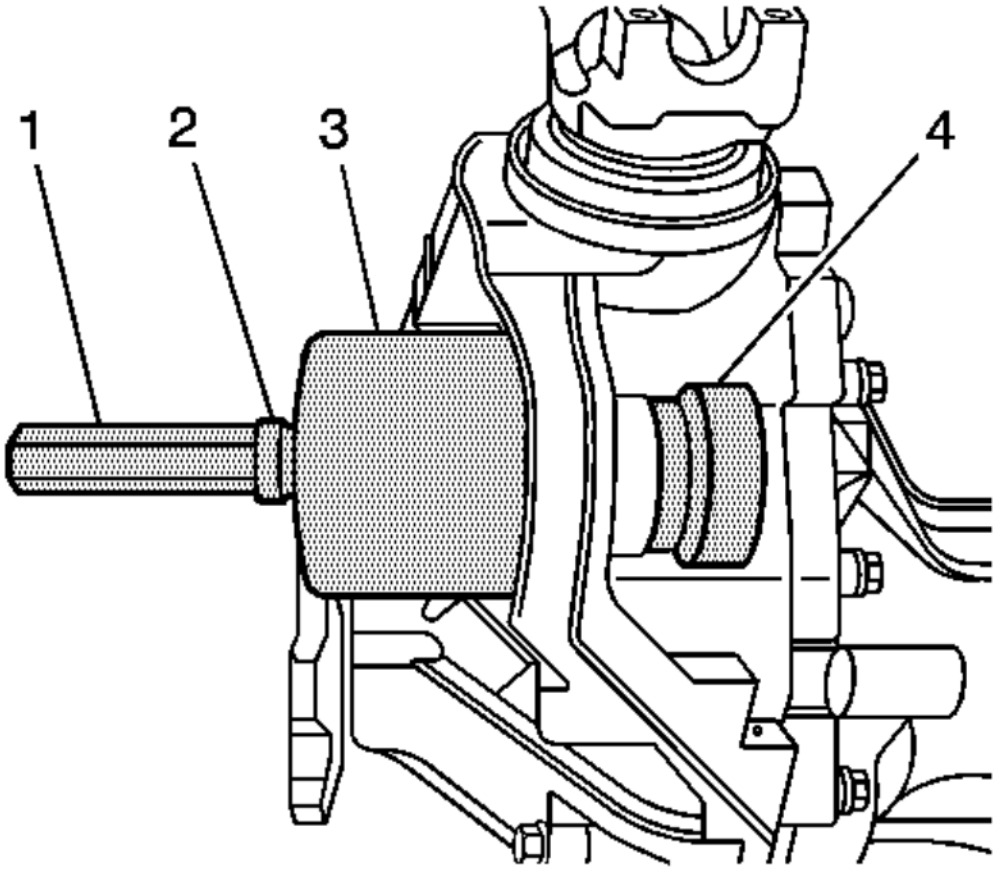


Fig. 97: Removing Lower Differential Carrier Assembly Bushingj 21474-18, Thrust Bearing, J 33791-1, J 36616-2, & Forcing Screw
Courtesy of GENERAL MOTORS CORP.

3. Remove the lower differential carrier assembly bushing by performing the following steps:
    1. Install the J 21474-18 (1), the thrust bearing (2), the J 33791-1 (3), the J 36616-2 (4), and the forcing screw as shown.
    2. Remove the lower differential carrier assembly bushing by holding the forcing screw and slowly tightening the J 21474-18.

Installation Procedure

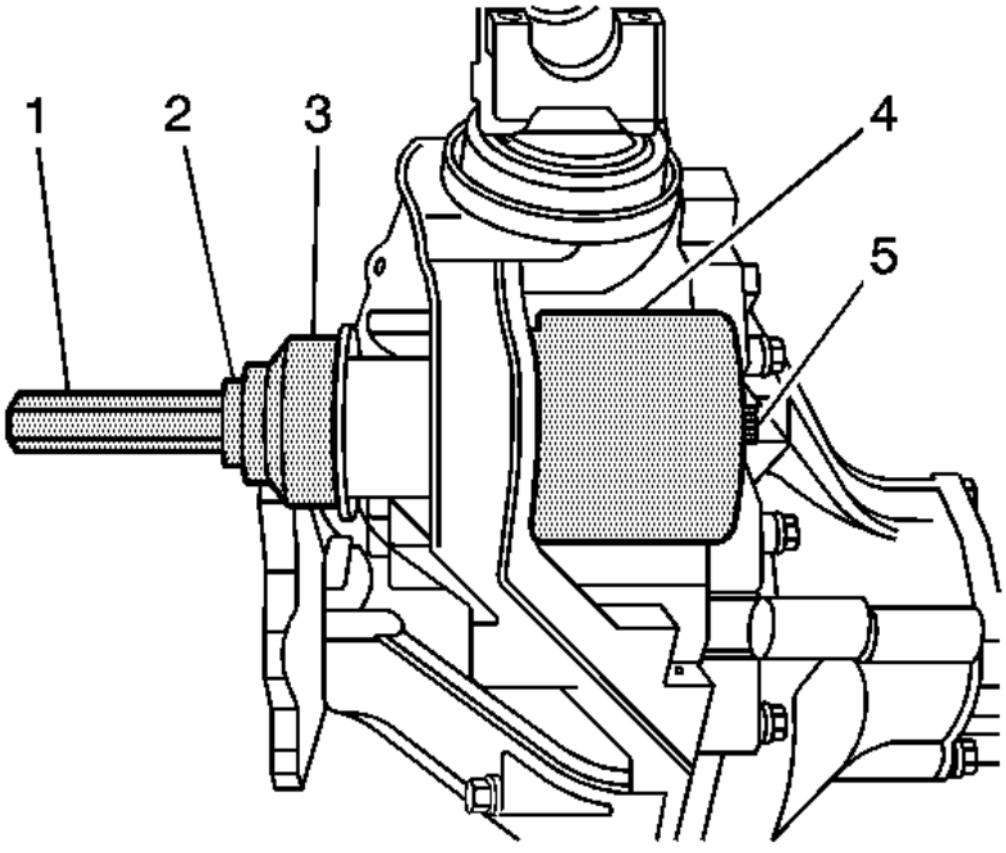


Fig. 98: Installing Lower Differential Carrier Assembly Bushing Using J 21474-18, Thrust Bearing, J 36616-2, J 36616-1, & Forcing Screw
Courtesy of GENERAL MOTORS CORP.

1. Install the lower differential carrier assembly bushing by performing the following steps:
    1. Install the J 21474-18 (1), the thrust bearing (2), the J 36616-2 (3), the J 36616-1 (4), and the forcing screw (5) as shown.
    2. While holding the forcing screw, slowly tighten the J 21474-18 until the bushing has stopped against the step on the bushing and is centered within the differential carrier assembly bushing bore.

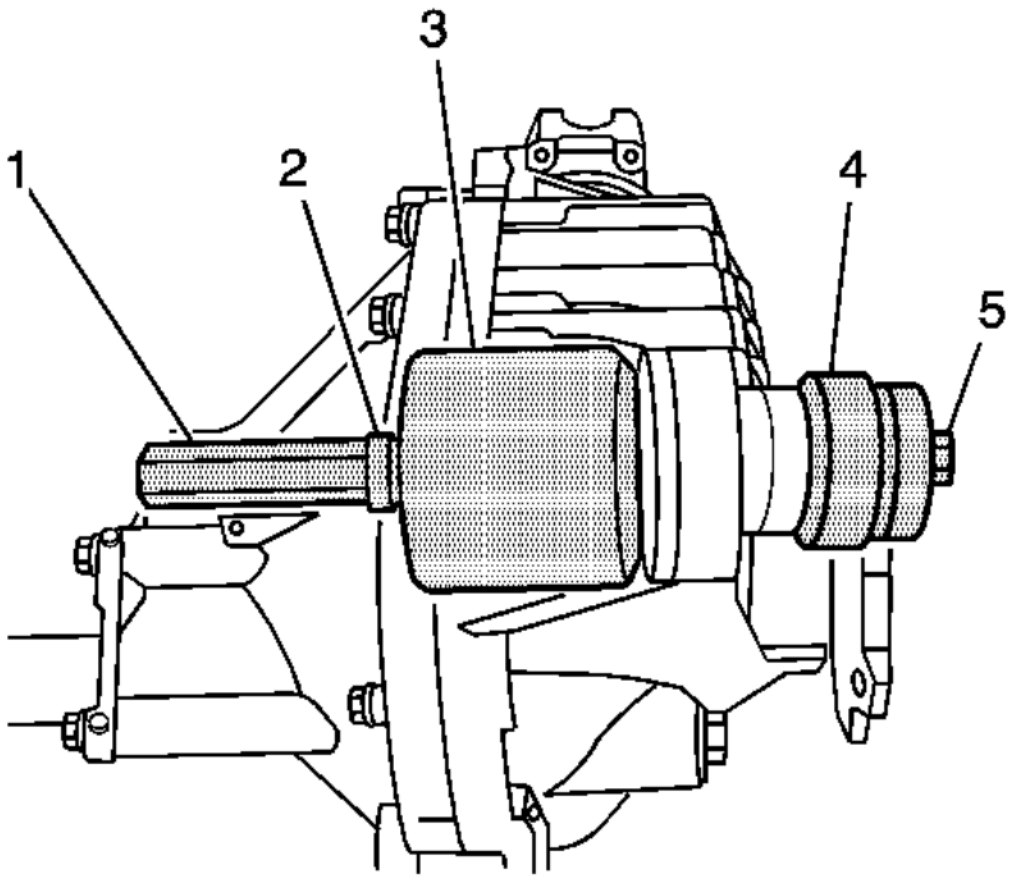


Fig. 99: Installing Upper Differential Carrier Assembly Bushing J 21474-18, Thrust Bearing, J 36616-2, J 36616-1, & Forcing Screw
Courtesy of GENERAL MOTORS CORP.

2. Install the upper differential carrier assembly bushing by performing the following steps:
    1. Install the J 21474-18 (1), the thrust bearing (2), the J 36616-2 (3), the J 36616-1 (4), and the forcing screw (5) as shown.
    2. While holding the forcing screw, slowly tighten the J 21474-18 until the bushing has stopped against the step on the bushing and is centered within the differential carrier assembly bushing bore.
3. Install the differential carrier assembly. Refer to **Differential Carrier Assembly Replacement (1500 FWD)** or **Differential Carrier Assembly Replacement (2500**

4WD).

DIFFERENTIAL CARRIER ASSEMBLY REPLACEMENT (1500 FWD)

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the lower control arm crossmember. Refer to **Drivetrain and Front Suspension Frame Front Crossmember Replacement (1500, 2500 LD)** .

IMPORTANT: 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**.

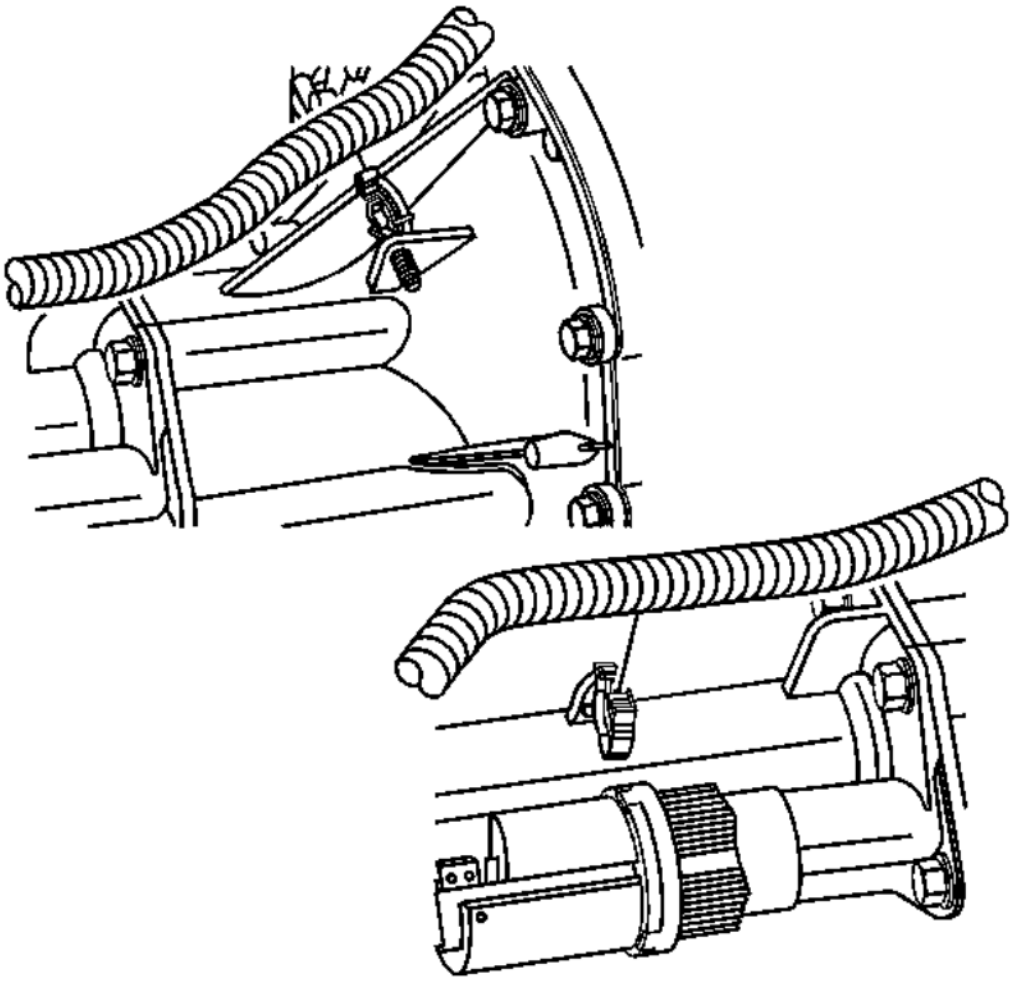


Fig. 100: View Of Differential Carrier Wiring Harness
Courtesy of GENERAL MOTORS CORP.

4. Remove the wiring harness from the differential carrier, if needed.

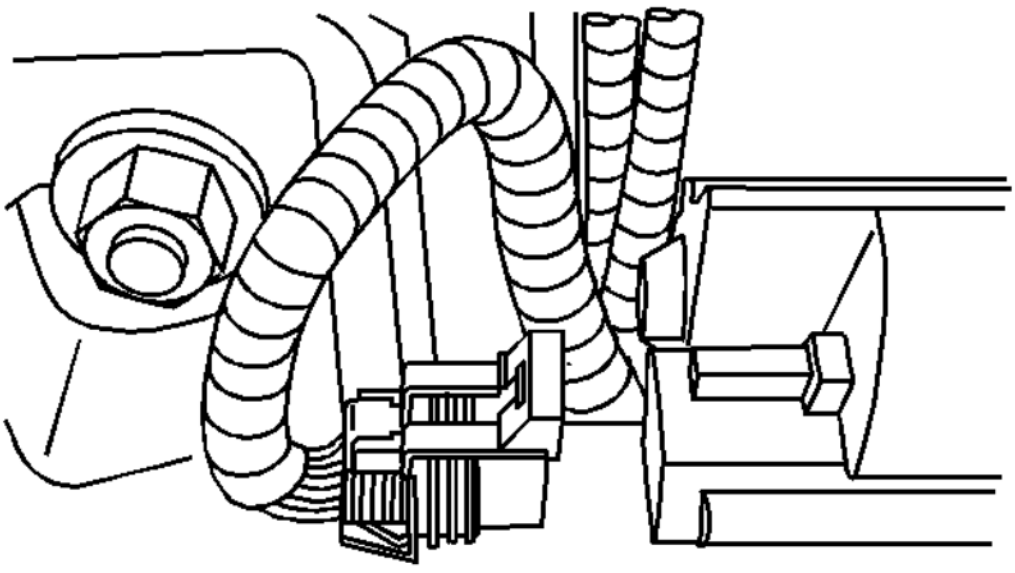


Fig. 101: View Of Front Axle Actuator Electrical Connector
Courtesy of GENERAL MOTORS CORP.

5. Remove the electrical connector from the actuator motor.

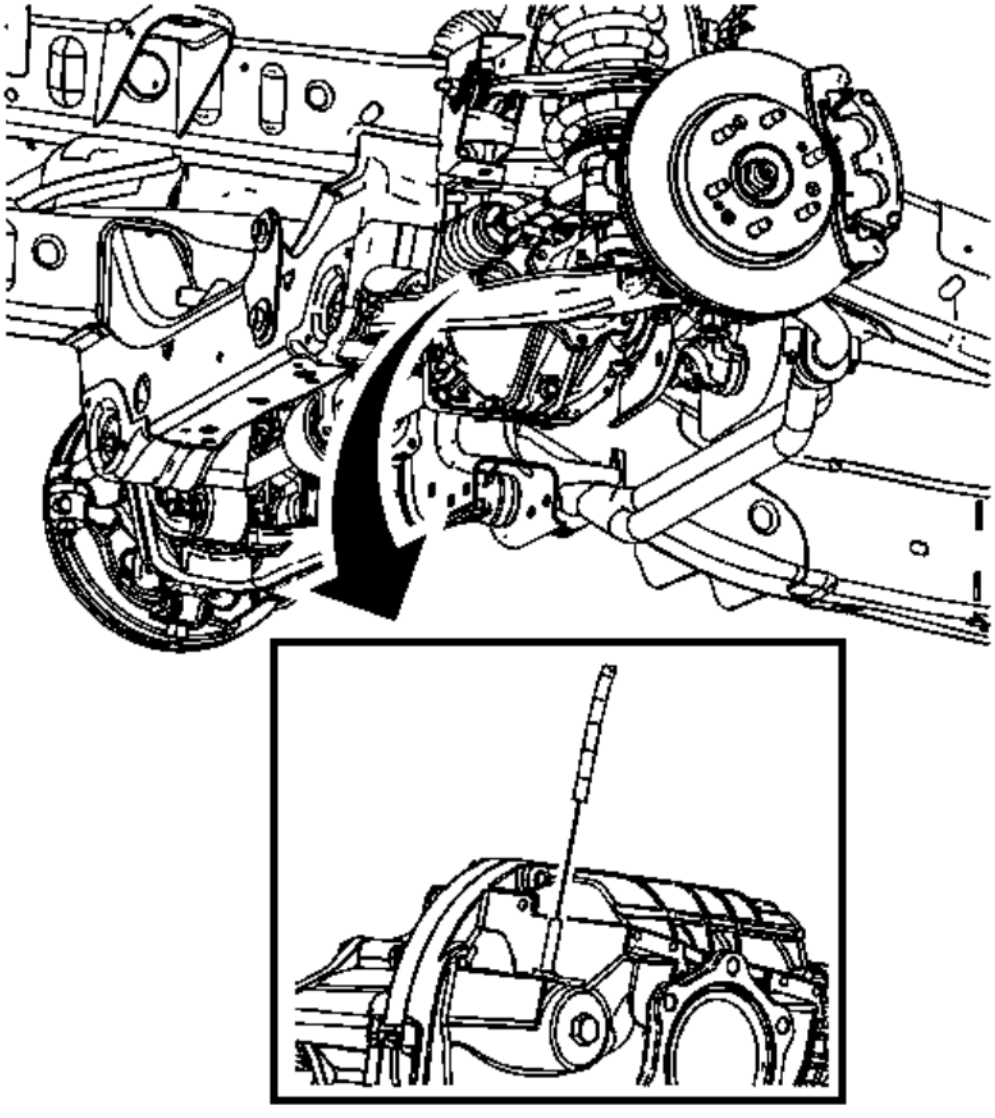


Fig. 102: View Of Differential Carrier Vent Hose
Courtesy of GENERAL MOTORS CORP.

6. Remove the differential carrier vent hose.

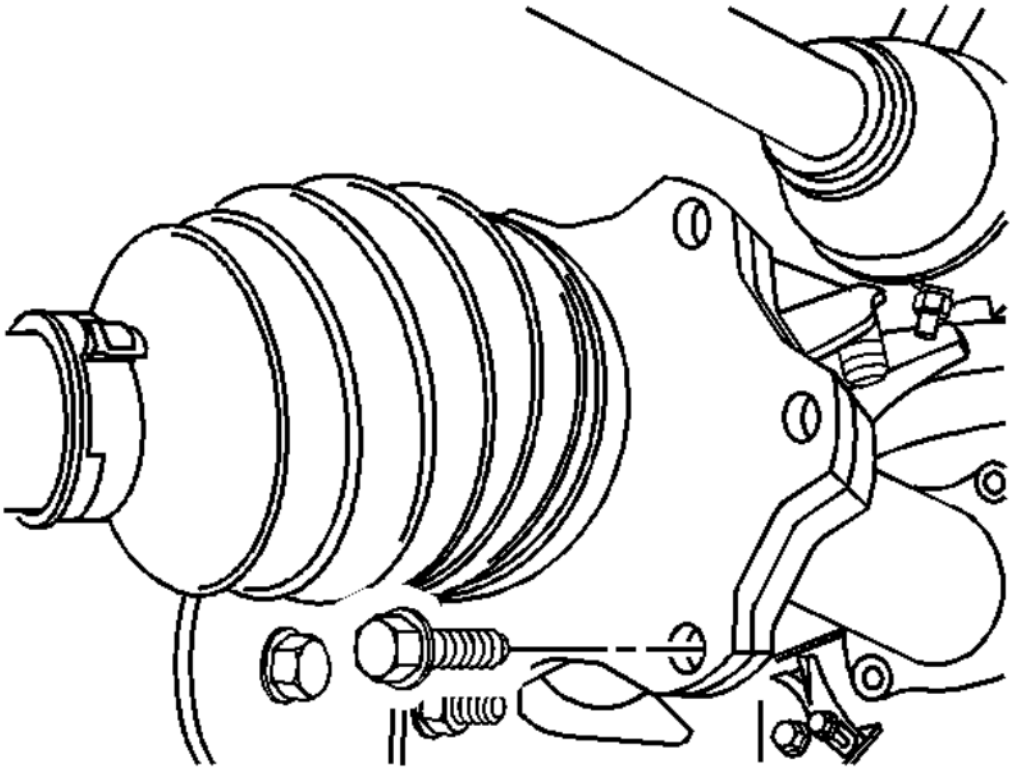


Fig. 103: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

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

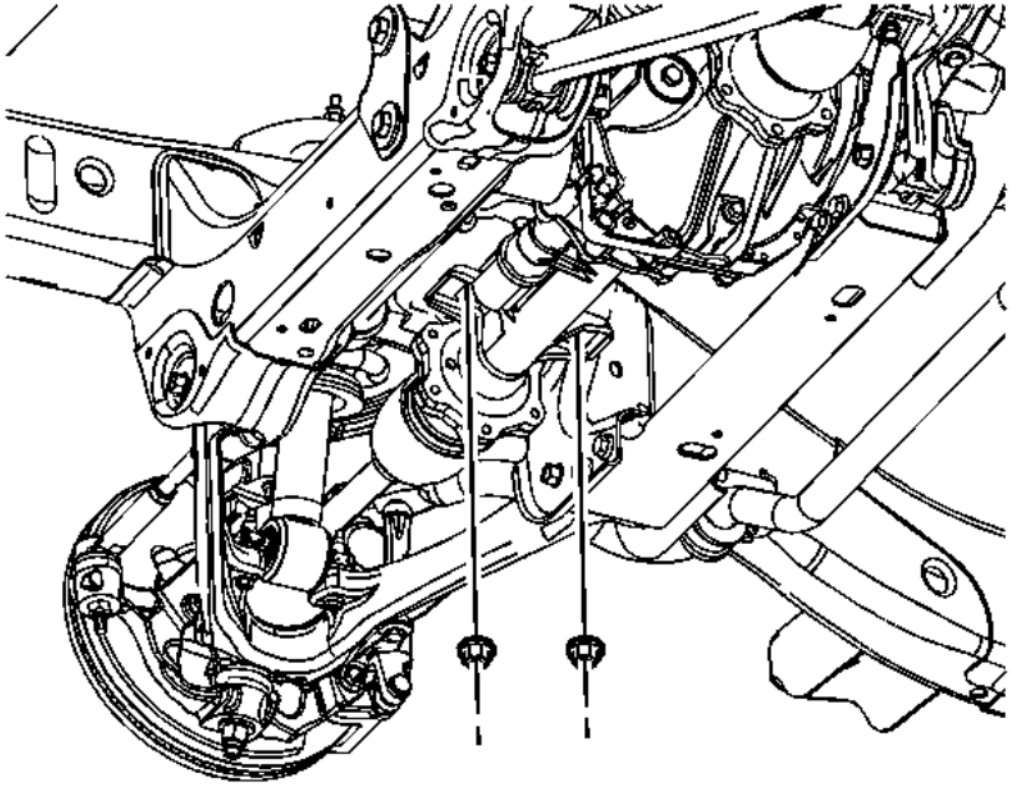


Fig. 104: View Of Right Differential Carrier Mounting Nuts & Washers
Courtesy of GENERAL MOTORS CORP.

10. Remove the right differential carrier mounting nuts and washers.

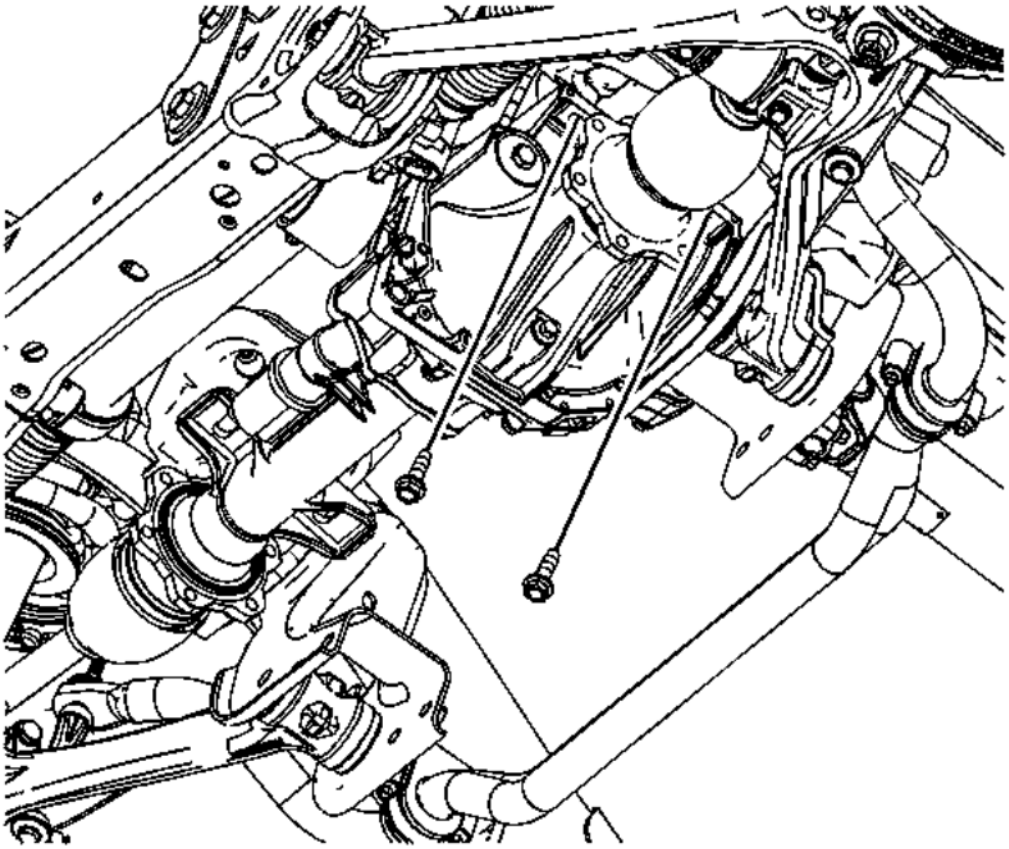


Fig. 105: View Of Left Differential Carrier Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

11. Remove the left differential carrier mounting bolts.

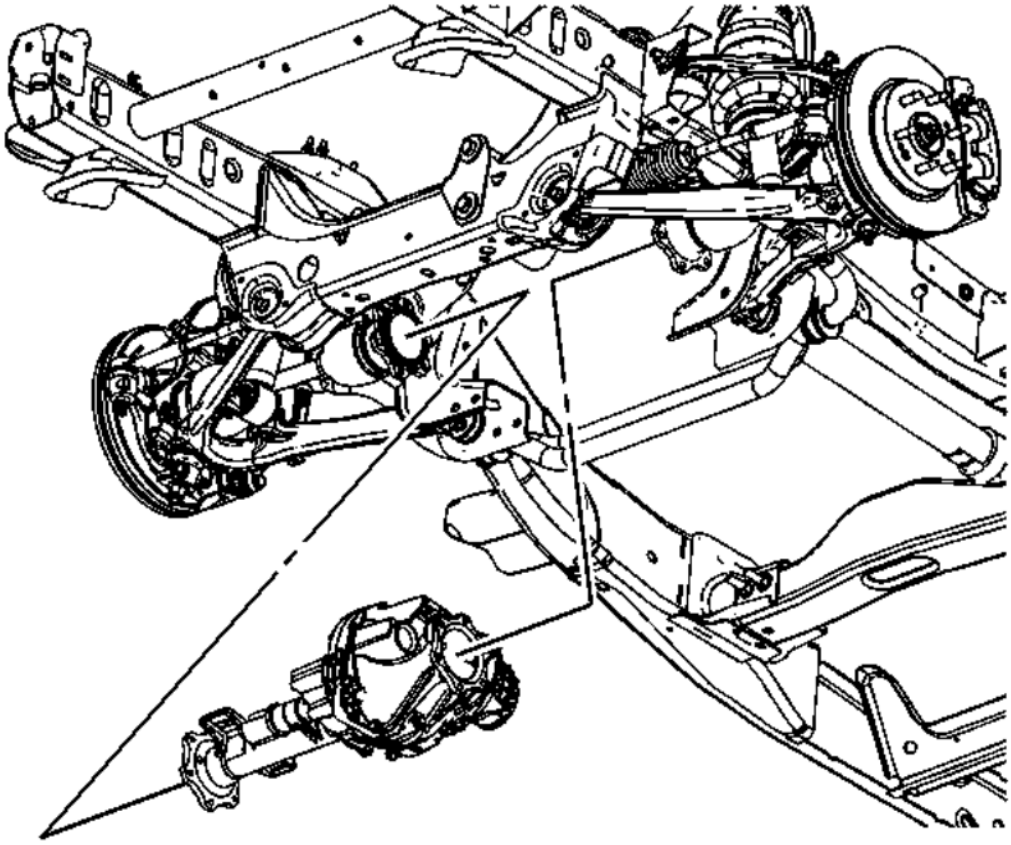


Fig. 106: View Of Differential Carrier Assembly
Courtesy of GENERAL MOTORS CORP.

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

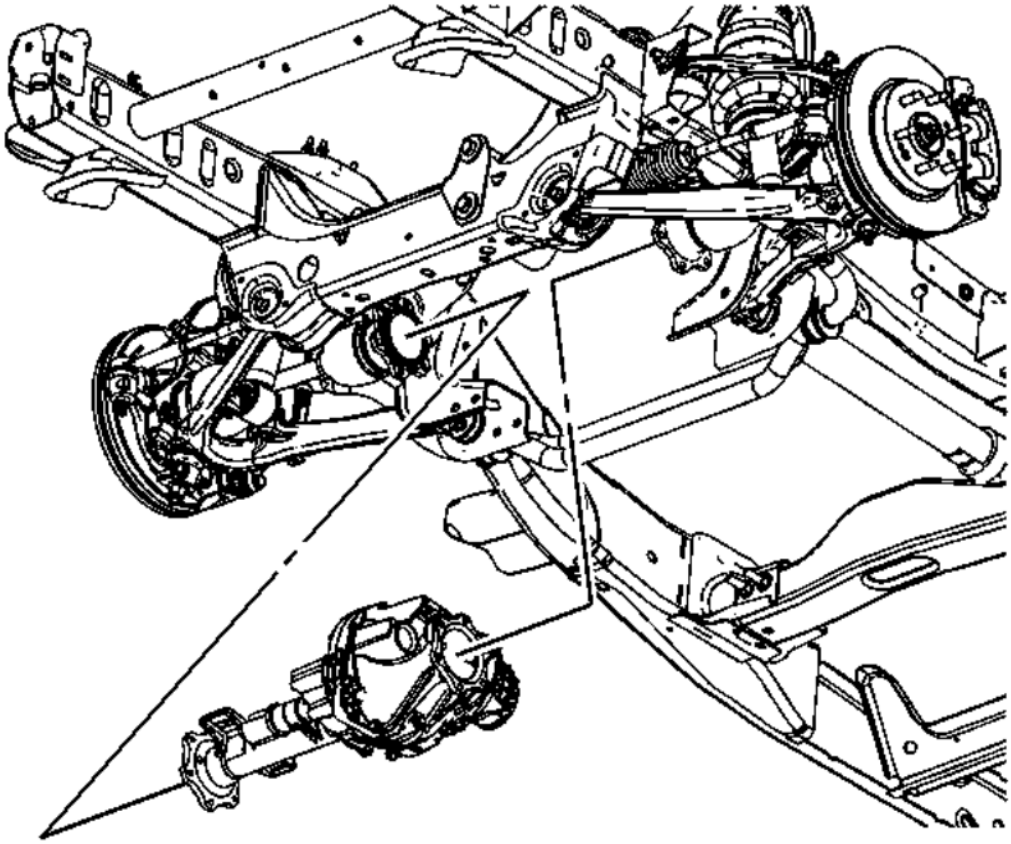


Fig. 107: View Of Differential Carrier Assembly
Courtesy of GENERAL MOTORS CORP.

2. Install the differential carrier assembly.

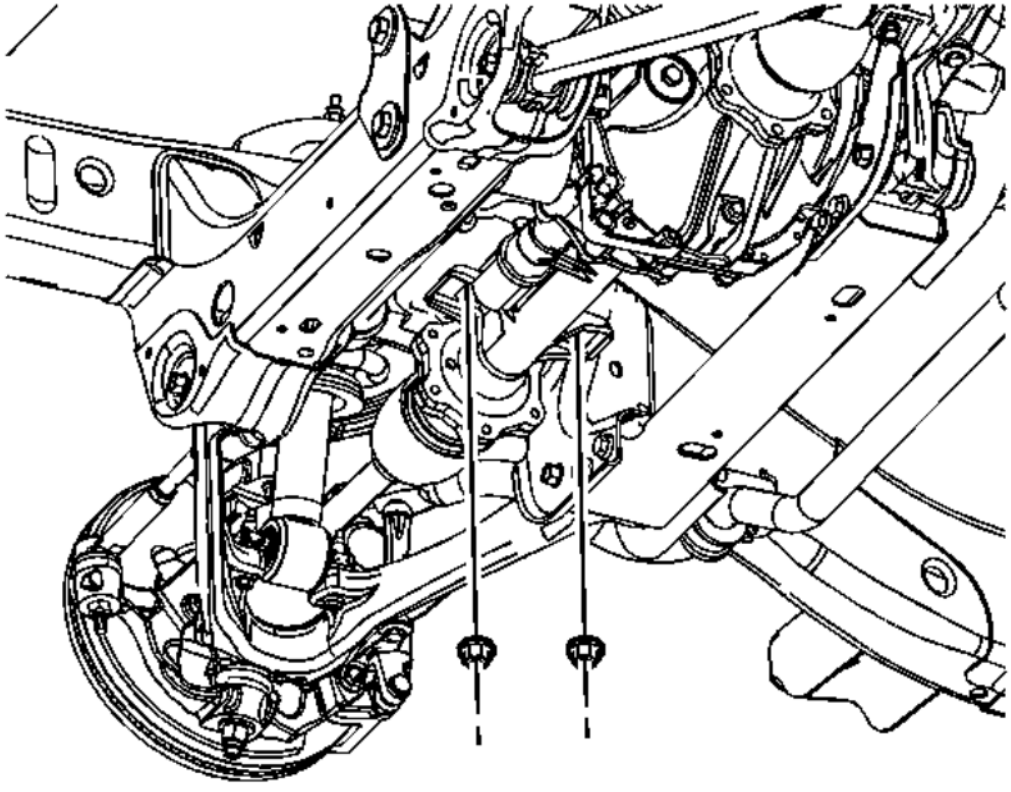


Fig. 108: View Of Right Differential Carrier Mounting Nuts & Washers
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

3. Install the right mounting nuts and washers.

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

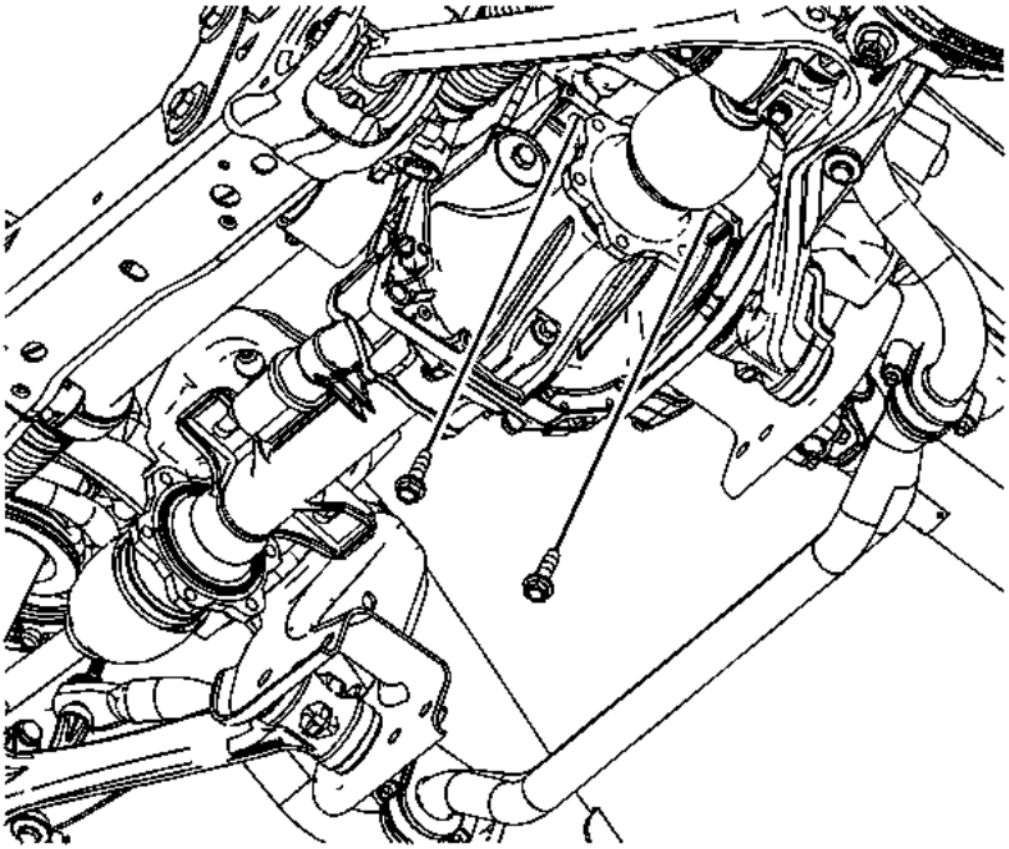


Fig. 109: View Of Left Differential Carrier Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

4. Install the left mounting bolts for the differential carrier.

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

5. Remove the transmission jack stand.

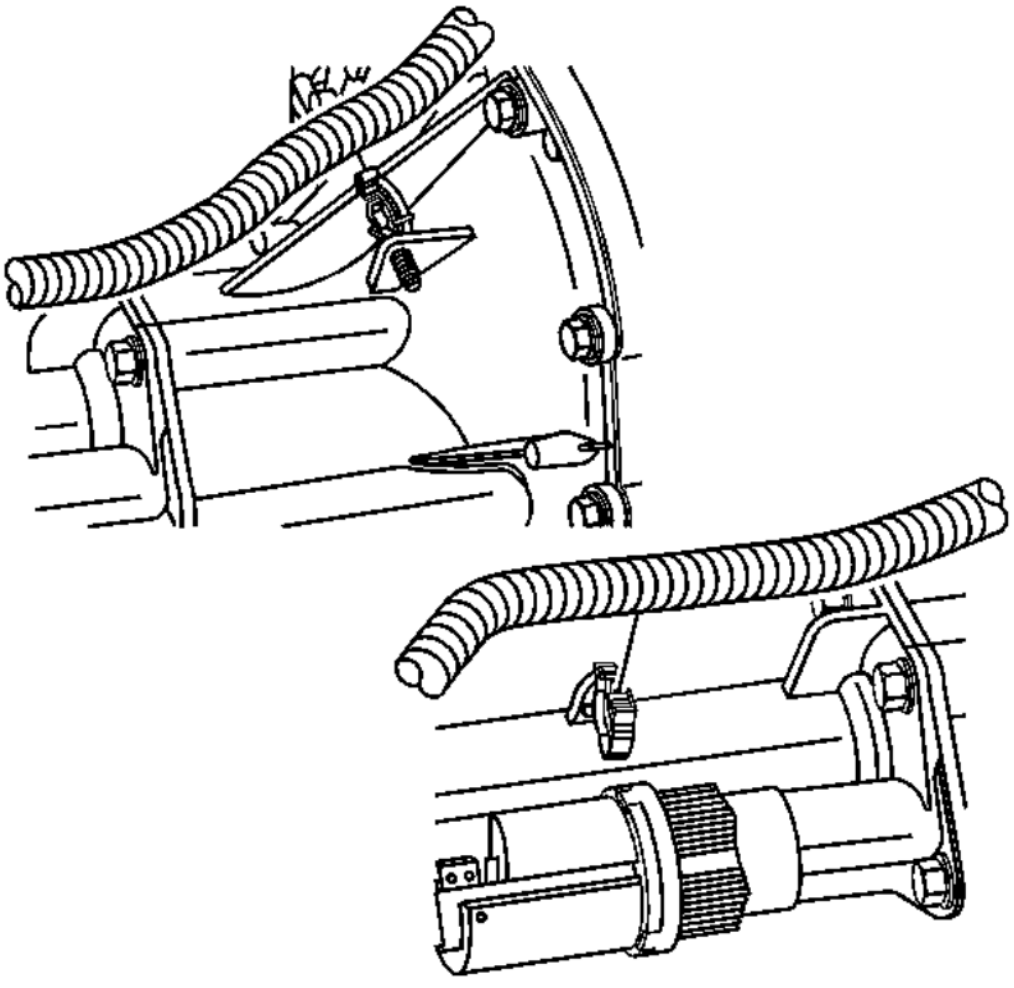


Fig. 110: View Of Differential Carrier Wiring Harness
Courtesy of GENERAL MOTORS CORP.

6. Install the wiring harness on the differential carrier, if needed.

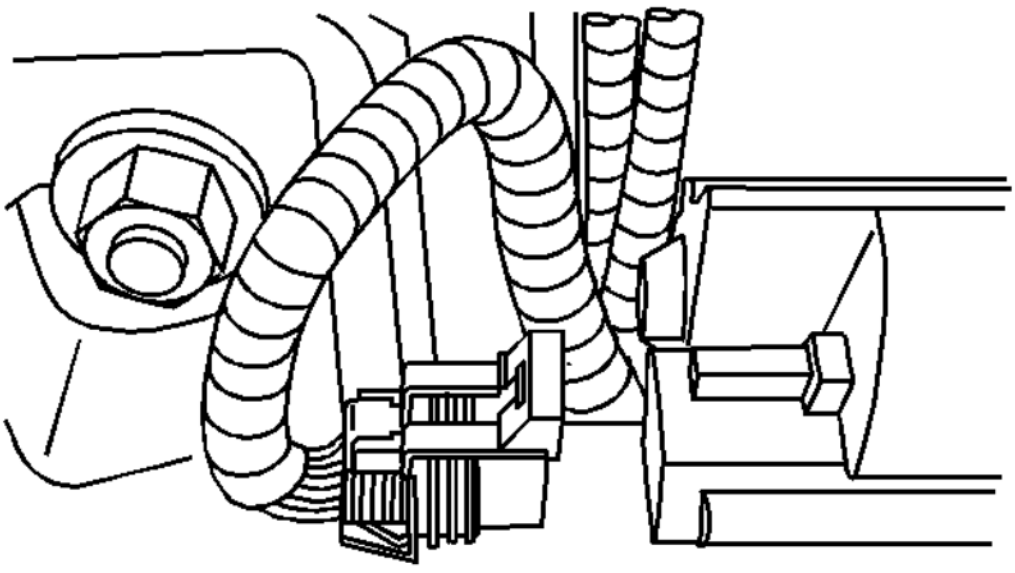


Fig. 111: View Of Front Axle Actuator Electrical Connector
Courtesy of GENERAL MOTORS CORP.

7. Install the electrical connector to the actuator motor, if needed.

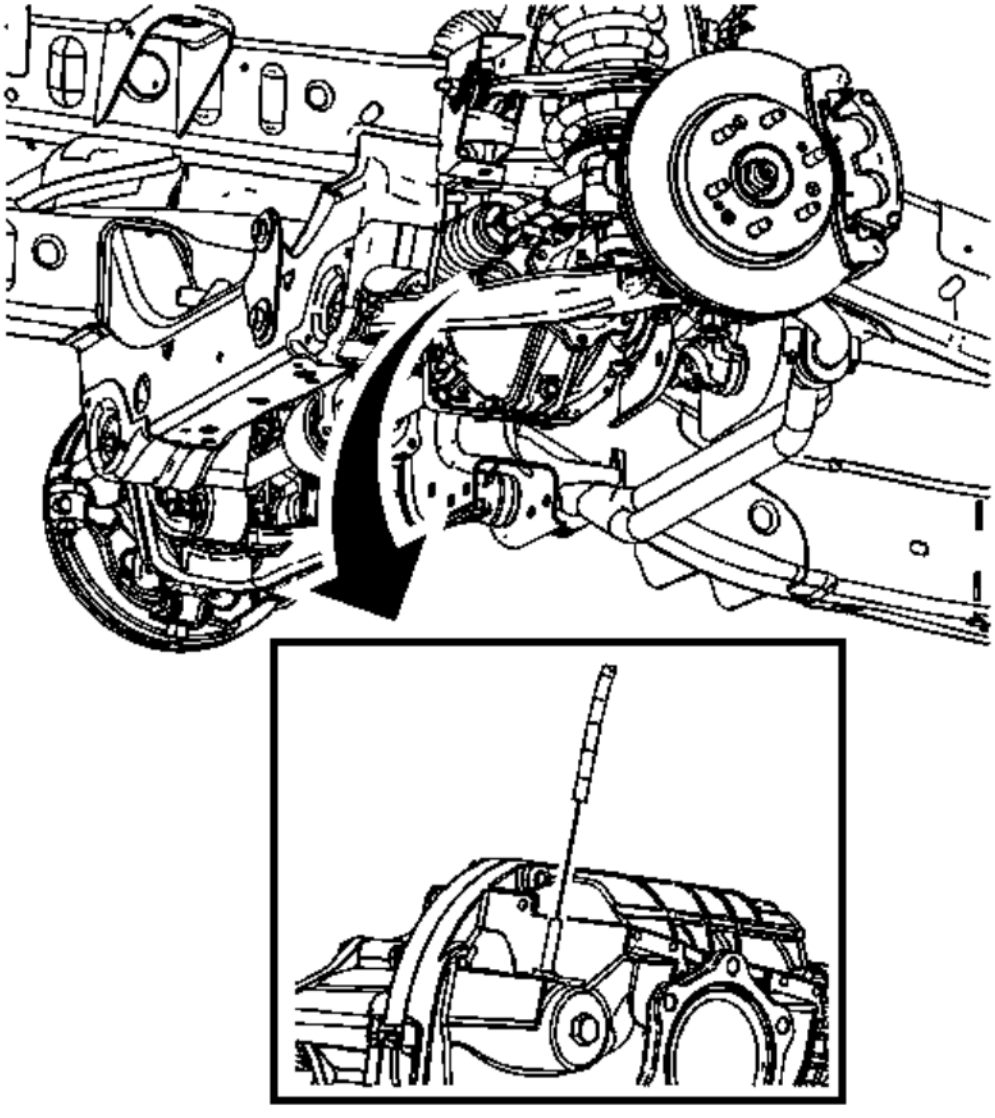


Fig. 112: View Of Differential Carrier Vent Hose
Courtesy of GENERAL MOTORS CORP.

8. Install the differential carrier vent hose.
9. Install the propeller shaft. Refer to **Front Propeller Shaft Replacement** .

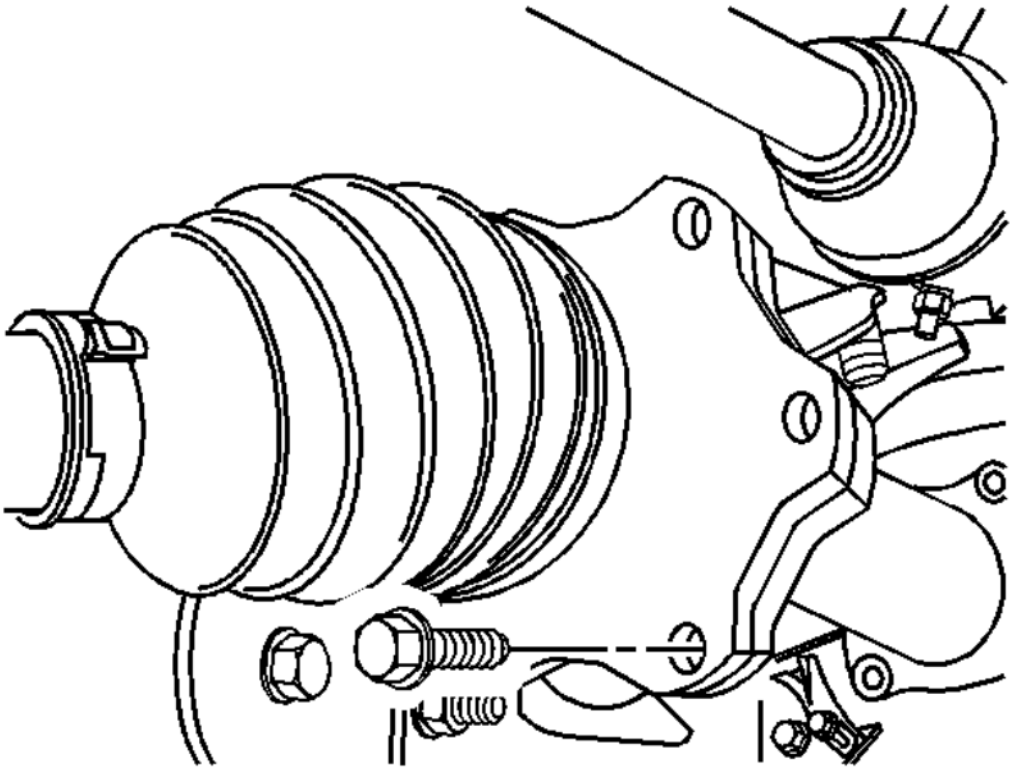


Fig. 113: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

10. Install the wheel drive shaft mounting bolts.

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

11. Install the lower control arm crossmember. Refer to **Drivetrain and Front Suspension Frame Front Crossmember Replacement (1500, 2500 LD)** .
12. Fill the differential carrier. Refer to **Front Axle Lubricant Replacement**.
13. Remove the support and lower the vehicle.

DIFFERENTIAL CARRIER ASSEMBLY REPLACEMENT (2500 4WD)

Removal Procedure

1. Turn the steering wheel all the way to the left.
2. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
3. Place jack or utility stands at the rear end of the vehicle.
4. Remove the engine protection shield. Refer to **Engine Shield Replacement** .
5. Remove the front differential carrier assembly shield, if equipped. Refer to **Shield Replacement**.
6. Drain the differential carrier assembly. Refer to **Front Axle Lubricant Replacement**.
7. Disconnect the front propeller shaft from the differential carrier assembly. Refer to **Front Propeller Shaft Replacement** .
8. Remove the relay rod. Refer to **Relay Rod Replacement** .
9. Support the differential carrier assembly with a transmission jack or equivalent.

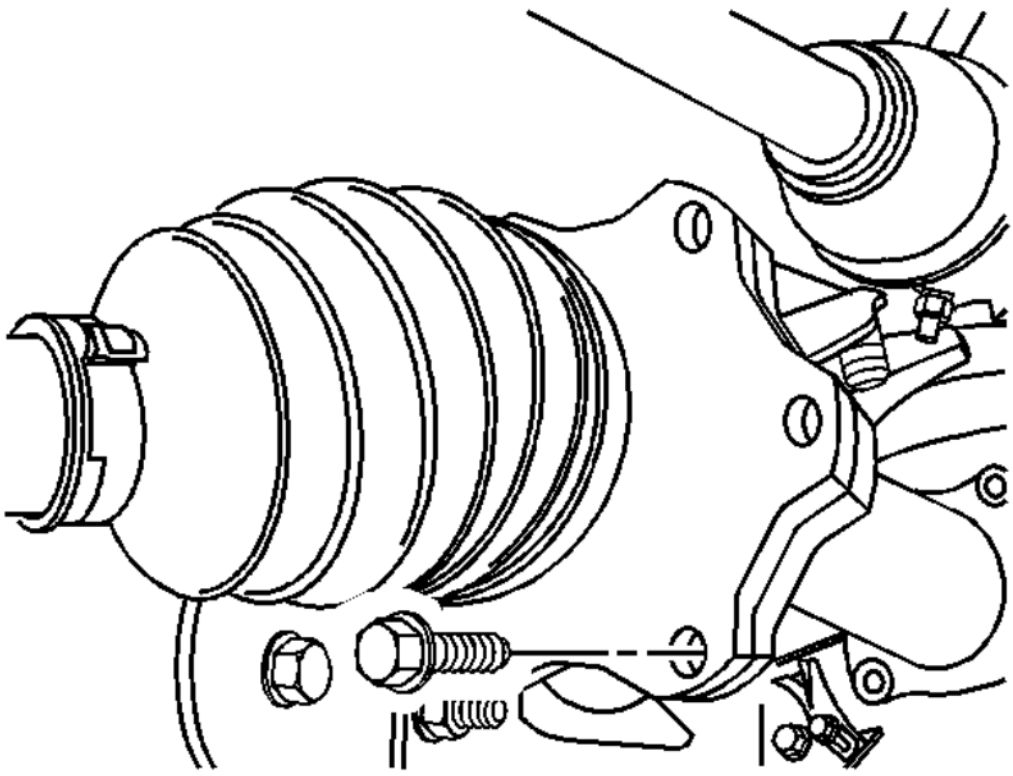


Fig. 114: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

10. Remove the wheel drive shaft inboard flange bolts from the inner axle shaft, both sides.

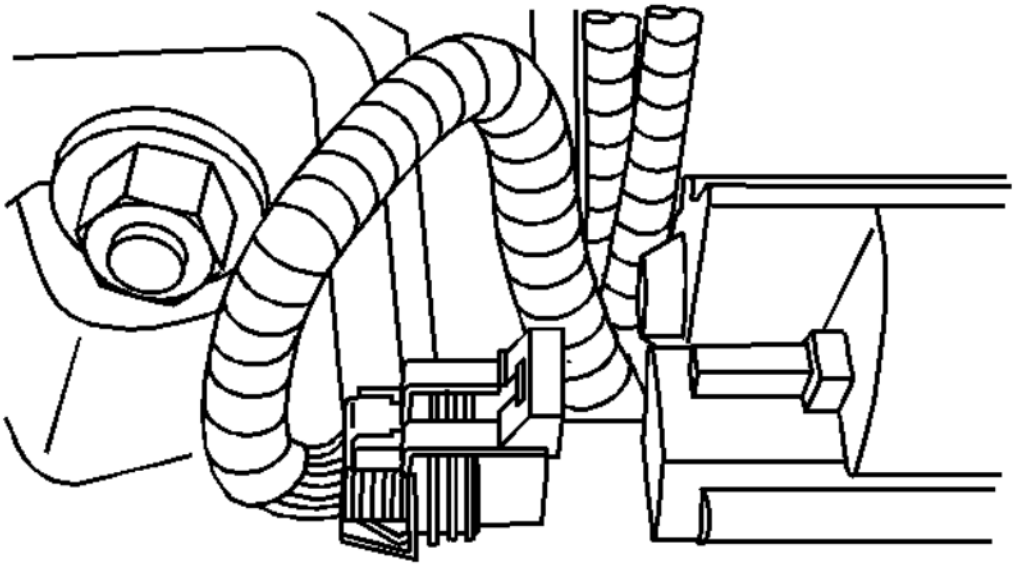


Fig. 115: View Of Front Axle Actuator Electrical Connector
Courtesy of GENERAL MOTORS CORP.

11. Disconnect the electrical connector from the front axle actuator, S4WD axle only.

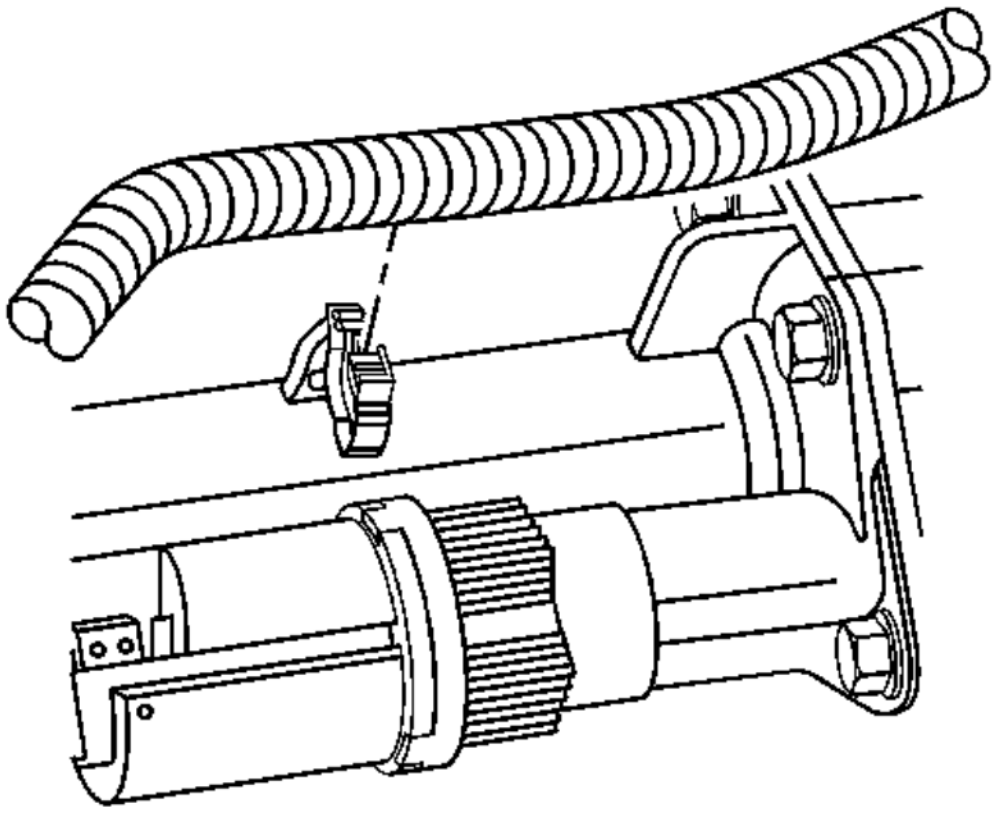


Fig. 116: View Of Wire Harness To Inner Axle Shaft Housing (S4WD)
Courtesy of GENERAL MOTORS CORP.

12. Disconnect the wire harness from the inner axle shaft housing, S4WD axle only.

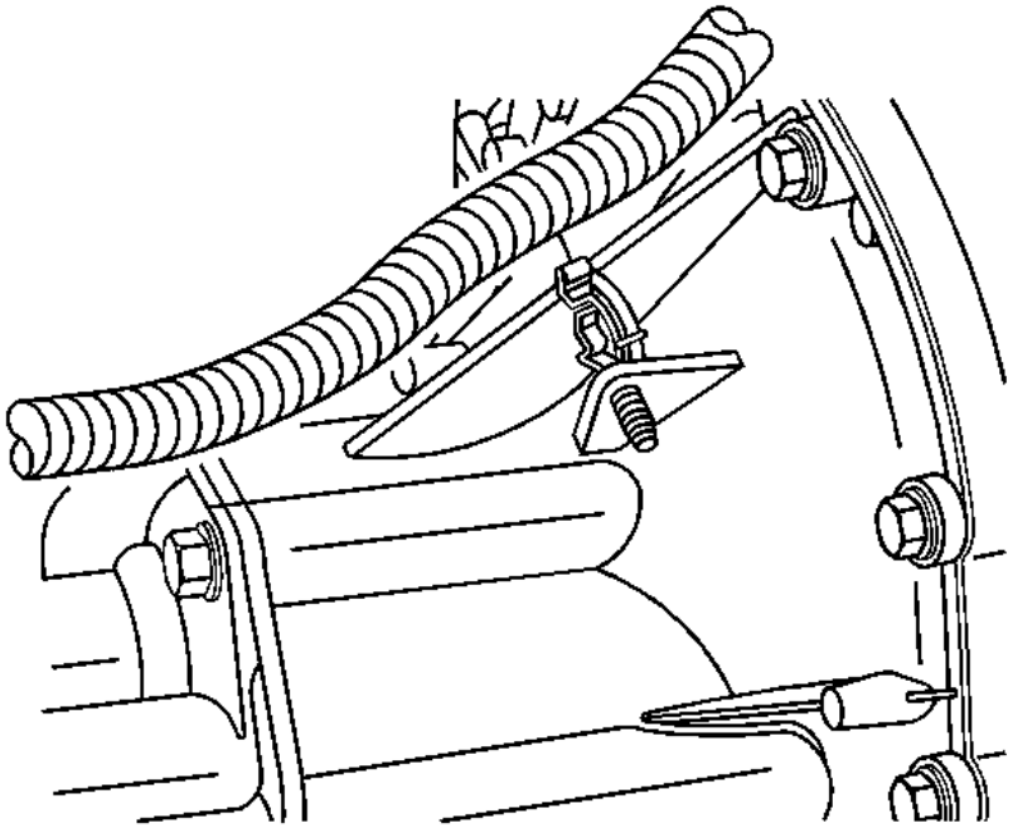


Fig. 117: View Of Wire Harness To Differential Carrier Assembly (S4WD)
Courtesy of GENERAL MOTORS CORP.

13. Disconnect the wire harness from the differential carrier assembly, S4WD axle only.

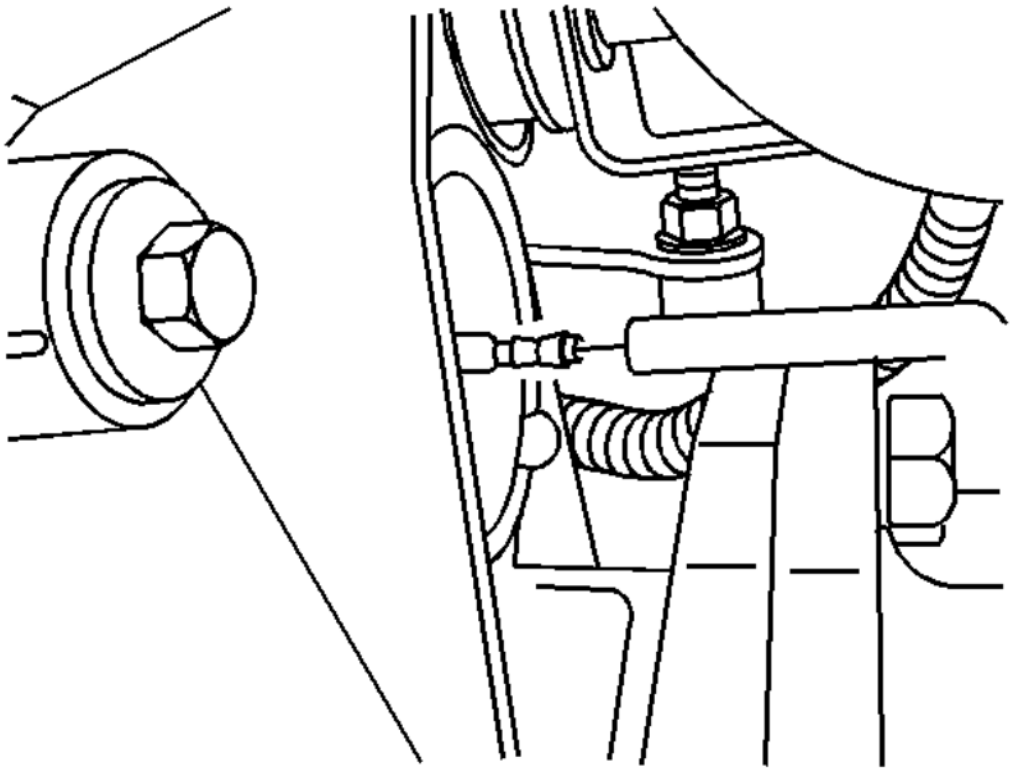


Fig. 118: View Of Vent Hose To Differential Carrier Assembly
Courtesy of GENERAL MOTORS CORP.

14. Disconnect the vent hose from the differential carrier assembly.

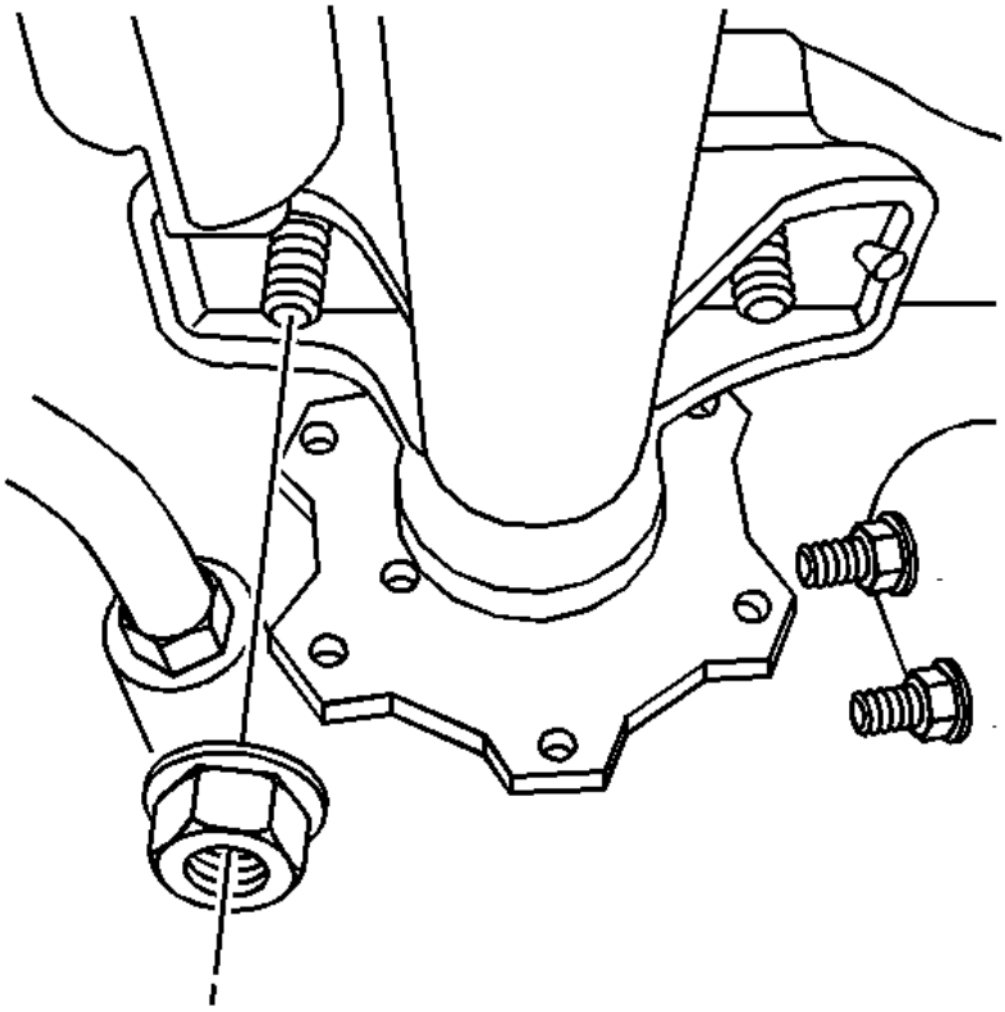


Fig. 119: View Of Inner Axle Housing Nuts
Courtesy of GENERAL MOTORS CORP.

15. Remove the inner axle housing nuts and washers from the bracket.

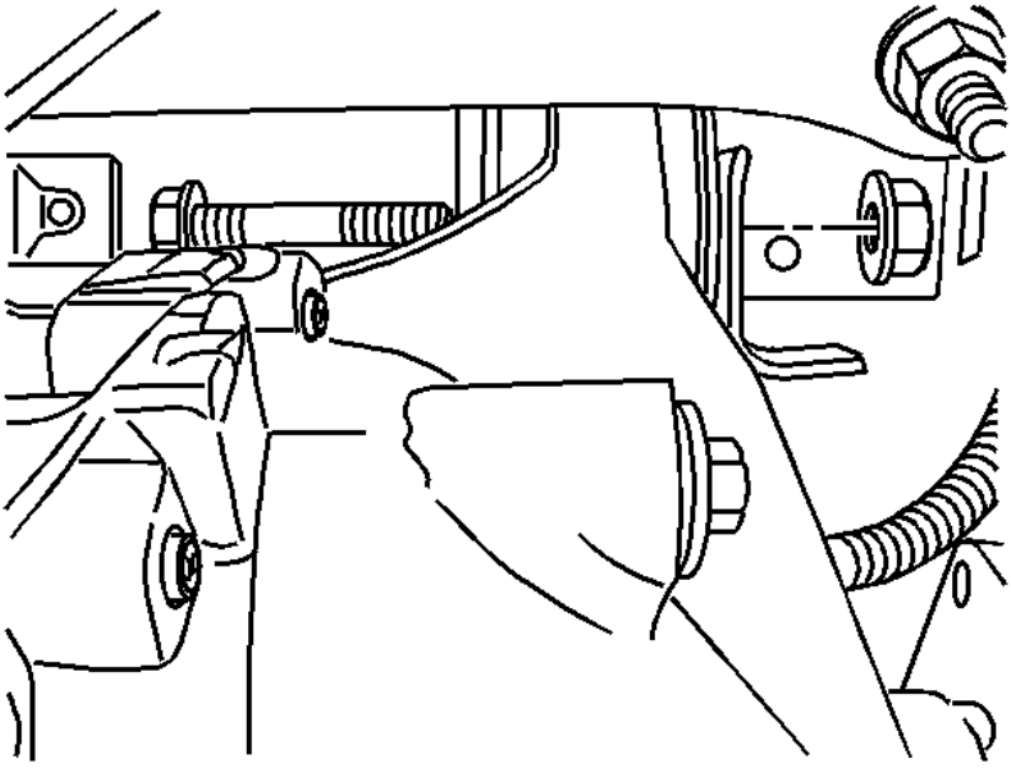


Fig. 120: View Of Differential Carrier Upper Mounting Bolt
Courtesy of GENERAL MOTORS CORP.

16. Remove the differential carrier assembly upper mounting bolt and the nut.
17. Pivot the differential carrier assembly forward and down on the lower mount bolt while it is being supported by the transmission jack.
18. Secure the differential carrier assembly to the jack.

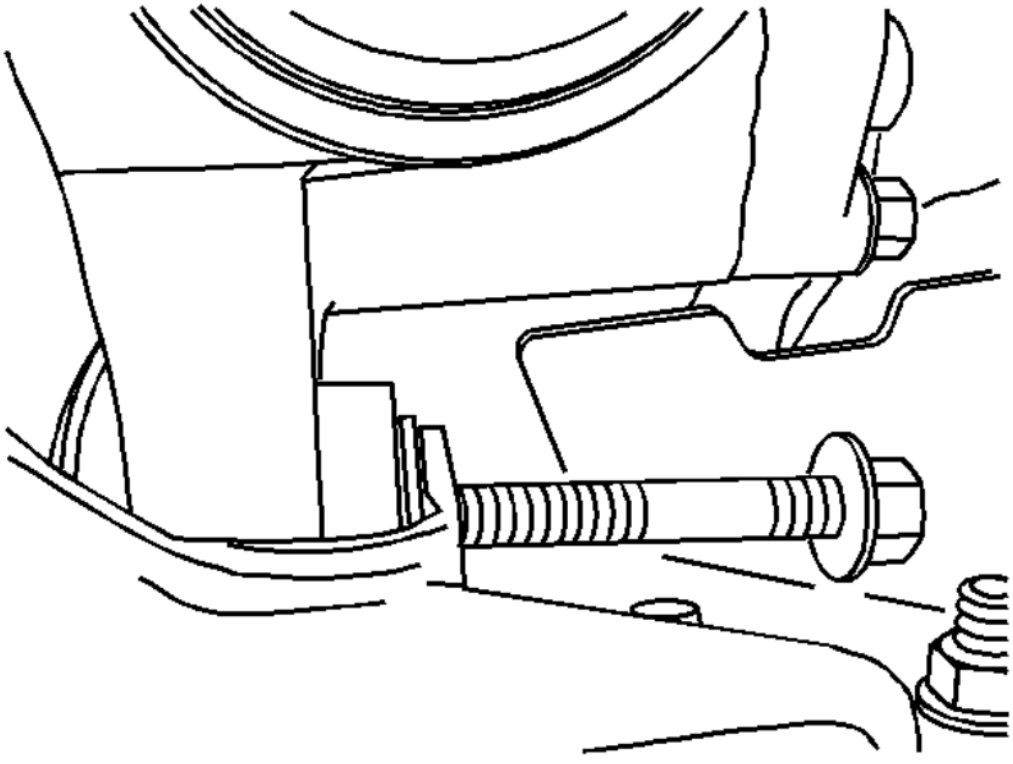


Fig. 121: View Of Differential Carrier Lower Mounting Bolt
Courtesy of GENERAL MOTORS CORP.

19. Remove the differential carrier assembly lower mounting bolt and the nut.
20. Remove the differential carrier assembly.

Installation Procedure

1. Install the differential carrier assembly.

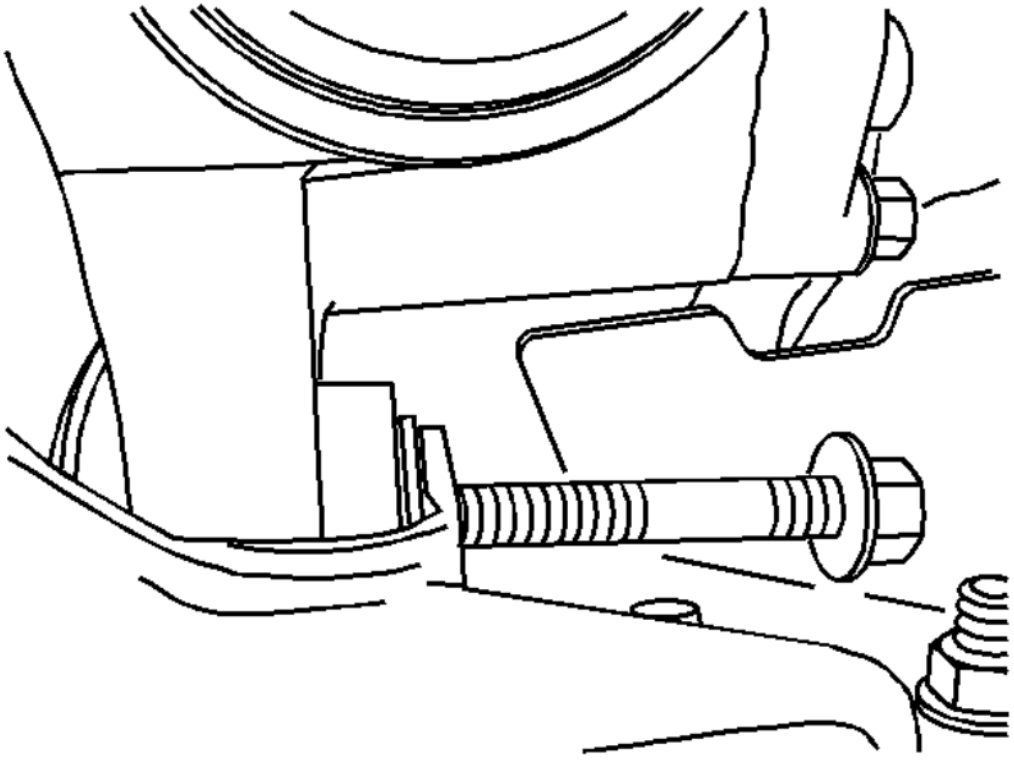


Fig. 122: View Of Differential Carrier Lower Mounting Bolt
Courtesy of GENERAL MOTORS CORP.

2. Install the differential carrier assembly lower mounting bolt and the nut.

   Do not tighten the bolt at this time.

3. Pivot the differential carrier assembly up and back on the lower mount bolt while it is being supported by the transmission jack.

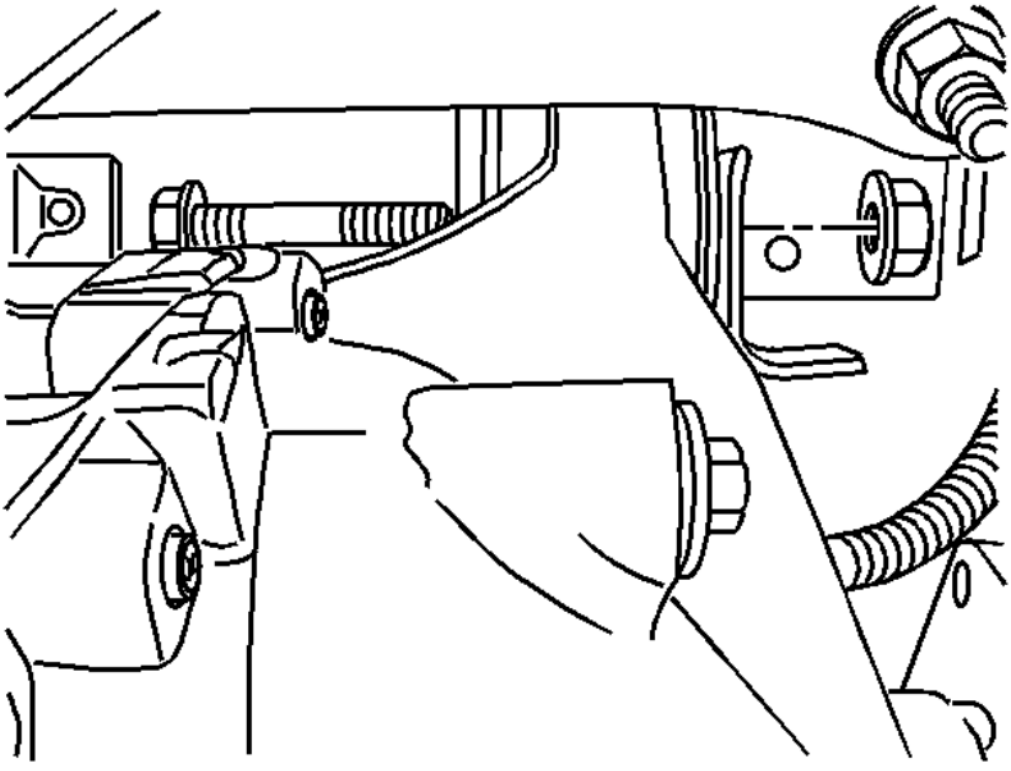


Fig. 123: View Of Differential Carrier Upper Mounting Bolt
Courtesy of GENERAL MOTORS CORP.

4. Install the differential carrier assembly upper mounting bolt and the nut.

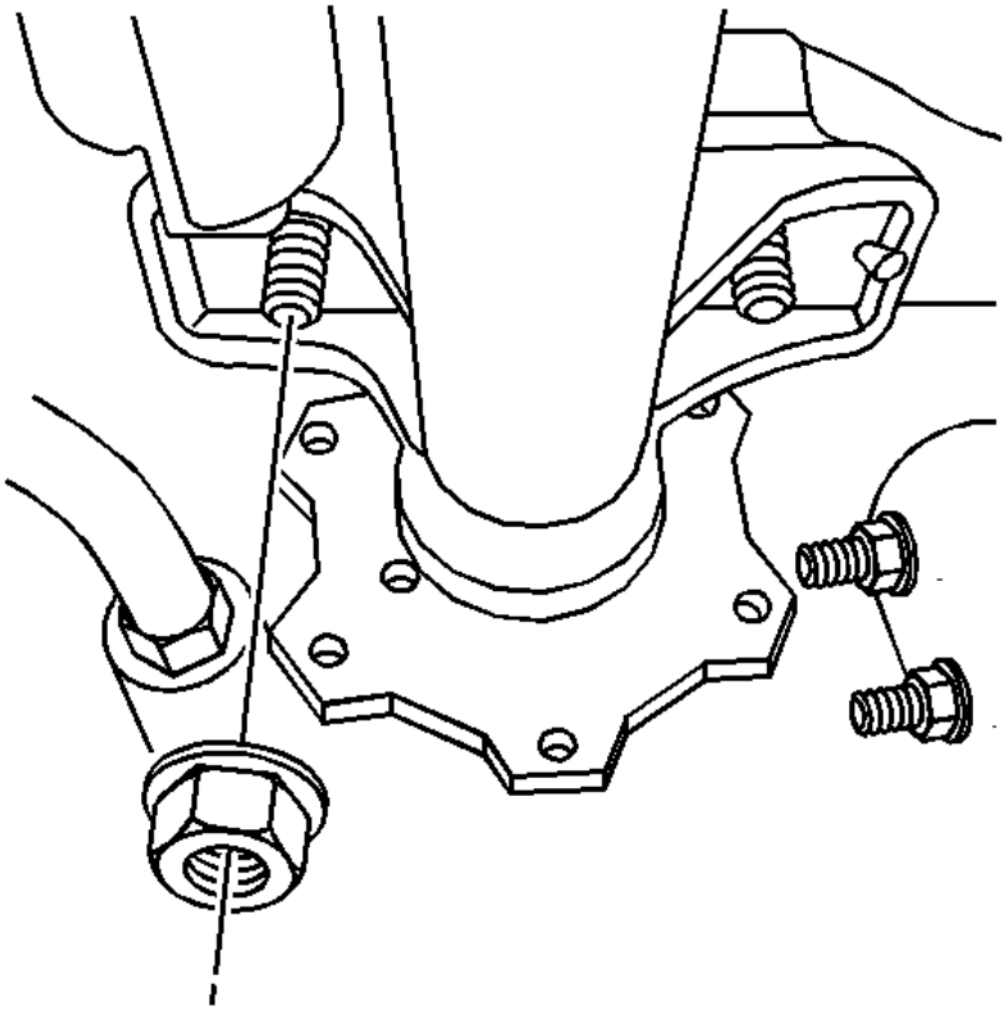


Fig. 124: View Of Inner Axle Housing Nuts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

5. Install the inner axle housing washers and nuts to the bracket.

Tighten:

- Tighten the inner axle housing nuts to 100 N.m (75 lb ft).

- Tighten the upper and the lower differential carrier assembly bolts to 100 N.m (75 lb ft).

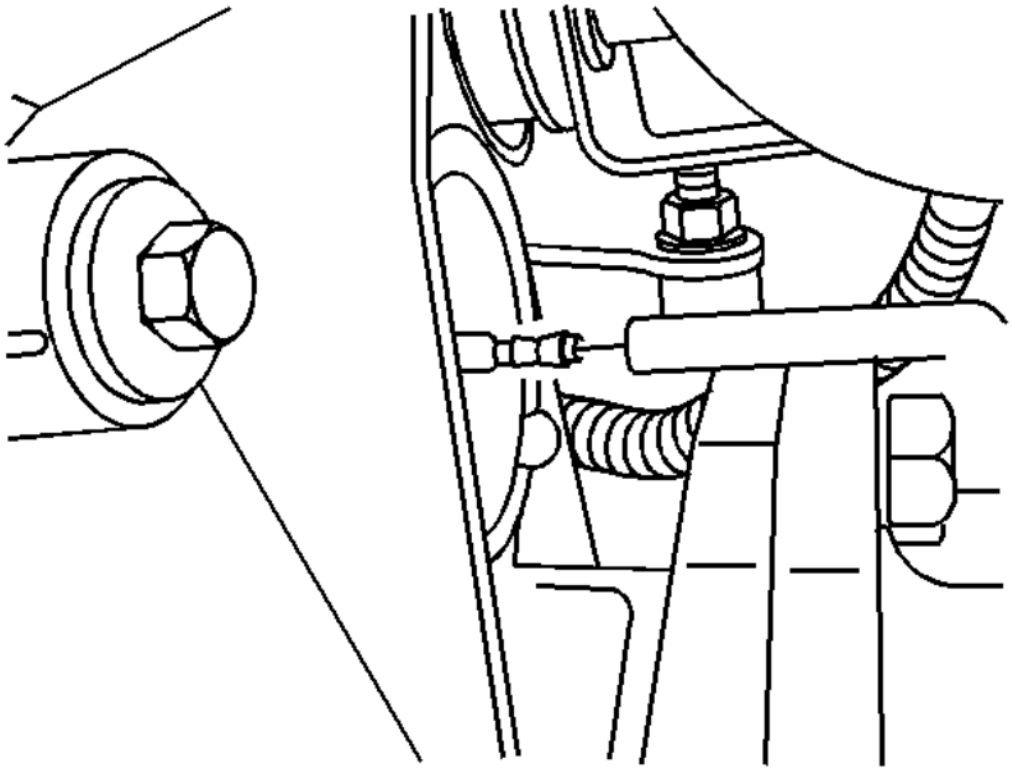


Fig. 125: View Of Vent Hose To Differential Carrier Assembly
Courtesy of GENERAL MOTORS CORP.

6. Connect the vent hose to the differential carrier assembly.
7. Remove the transmission jack.

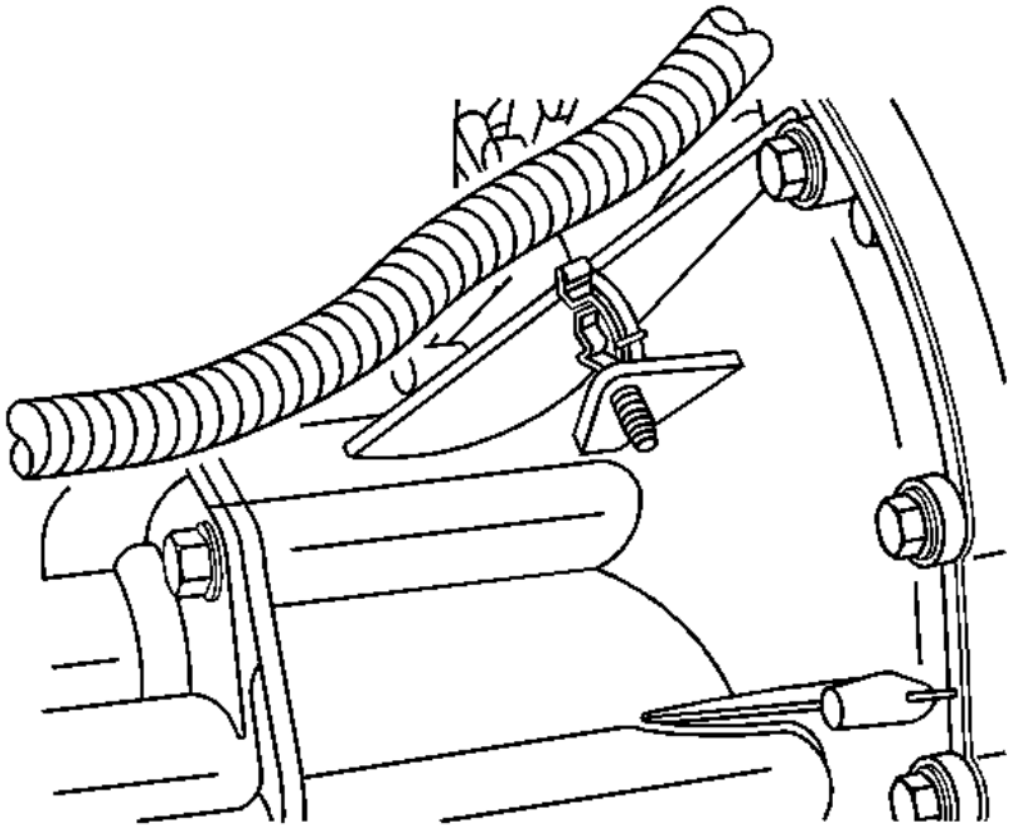


Fig. 126: View Of Wire Harness To Differential Carrier Assembly (S4WD)
Courtesy of GENERAL MOTORS CORP.

8. Connect the wire harness to the differential carrier assembly, S4WD axle only.

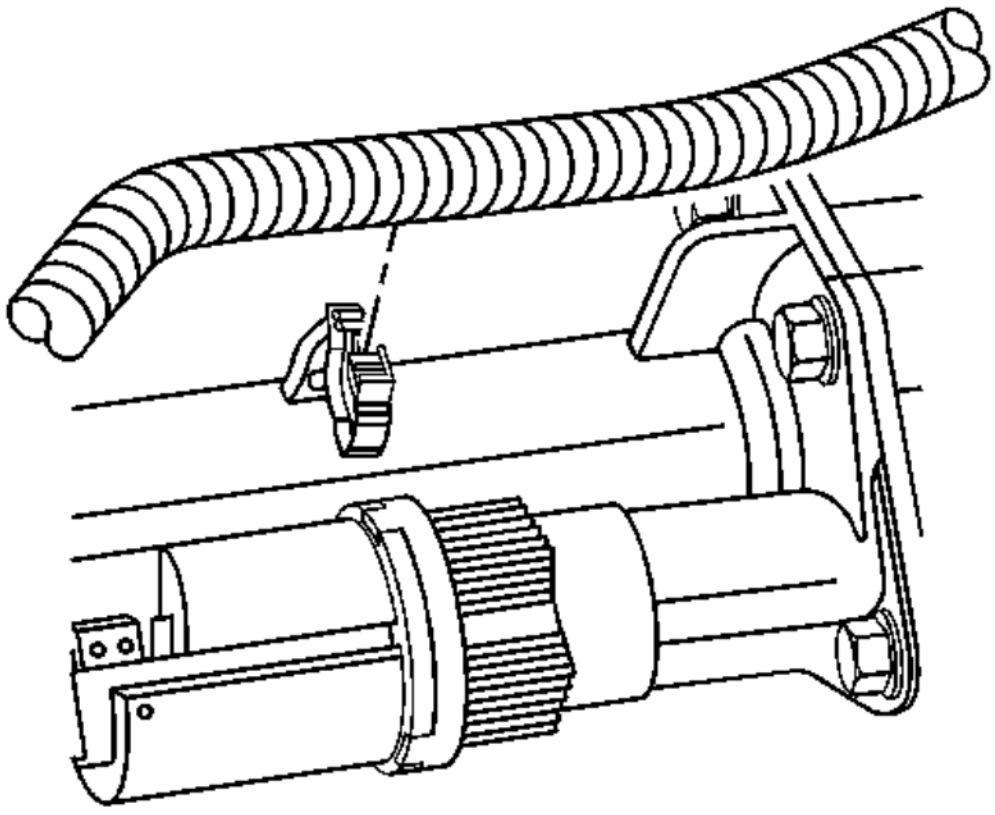


Fig. 127: View Of Wire Harness To Inner Axle Shaft Housing (S4WD)
Courtesy of GENERAL MOTORS CORP.

9. Connect the wire harness to the inner axle shaft housing, S4WD axle only.

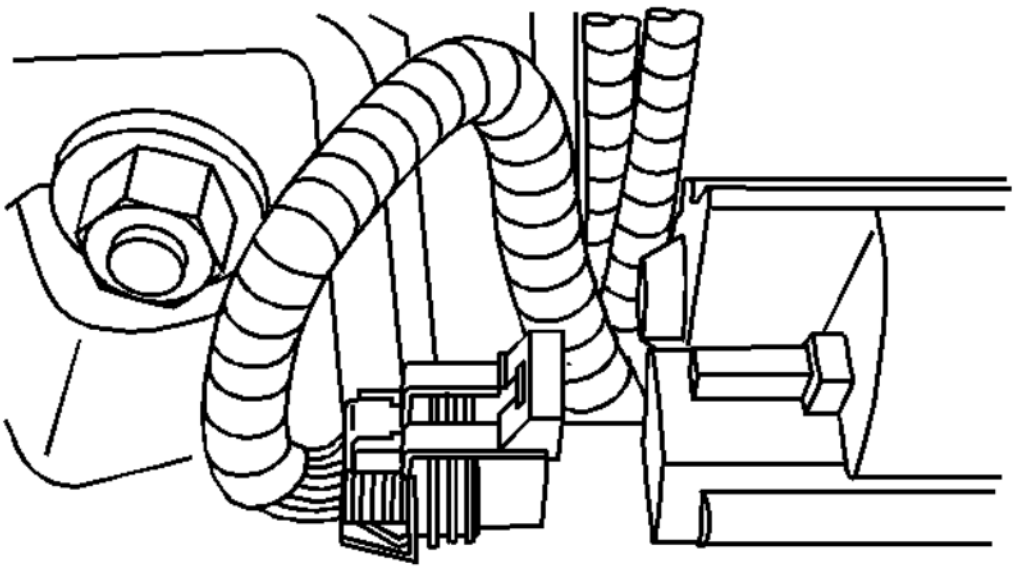


Fig. 128: View Of Front Axle Actuator Electrical Connector
Courtesy of GENERAL MOTORS CORP.

10. Connect the electrical connector to the front axle actuator, S4WD axle only.

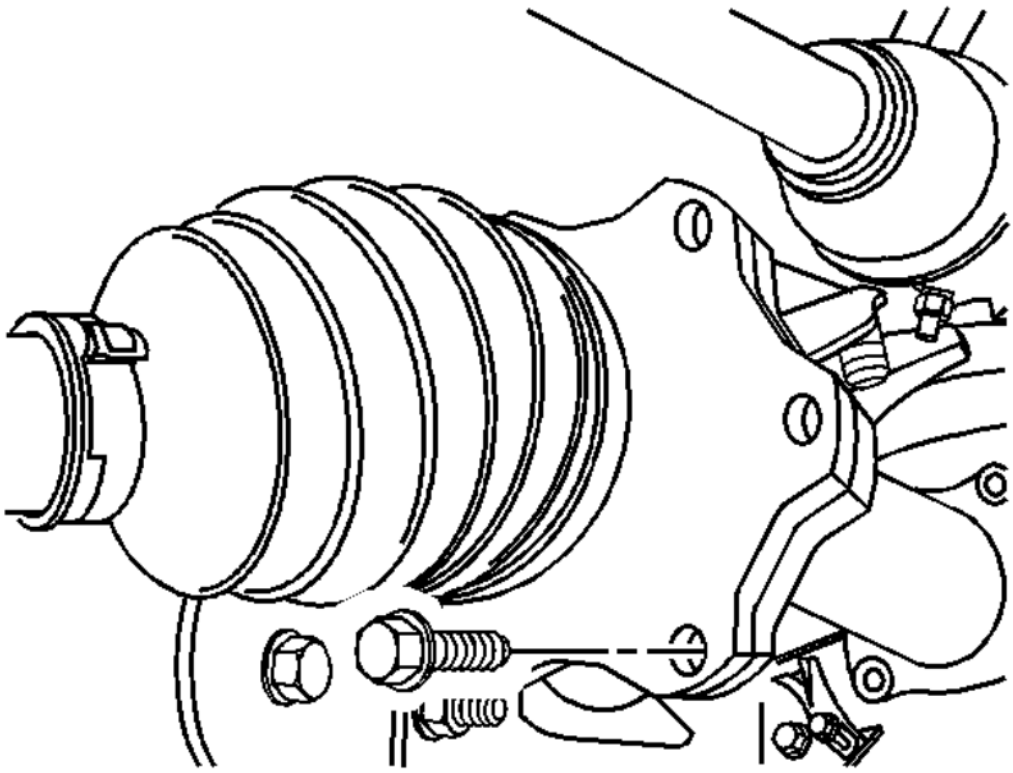


Fig. 129: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

11. Install the wheel drive shaft inboard flange to inner axle shaft bolts, both sides.

    Tighten: Tighten the wheel drive shaft inboard flange to inner axle shaft bolts to 79 N.m (58 lb ft).

12. Install the relay rod. Refer to **Relay Rod Replacement** .
13. Install the front propeller shaft to the differential carrier assembly. Refer to **Front Propeller Shaft Replacement** .
14. Fill the differential carrier assembly. Use the correct fluid. Refer to **Front Axle Lubricant Replacement**.
15. Install the front differential carrier assembly shield, if equipped. Refer to **Shield Replacement**.

16. Install the engine protection shield. Refer to **Engine Shield Replacement** .
17. Remove the utility stands.
18. Lower the vehicle.

BRACKET REPLACEMENT (1500)

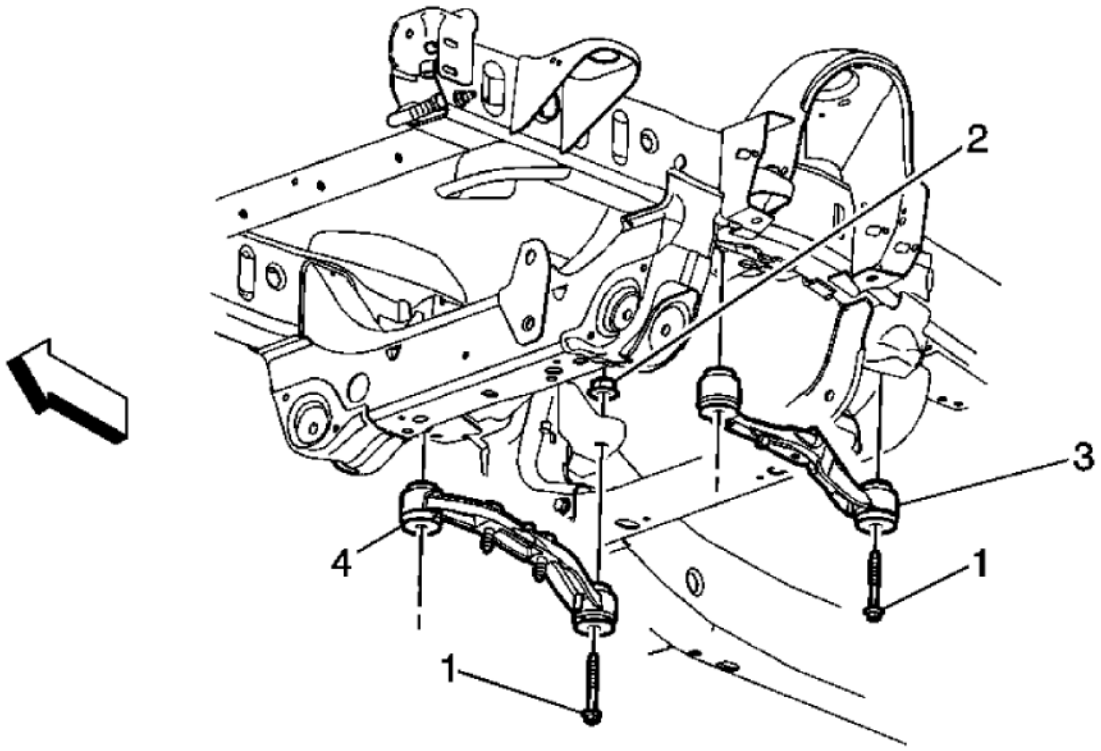


Fig. 130: View Of Front Differential Carrier Mounting Brackets, Nuts & Bolts
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the front differential assembly. Refer to **Differential Carrier Assembly Replacement (1500 FWD)** or **Differential Carrier Assembly Replacement (2500 4WD)**.	
1	Front Differential Carrier Mounting Bracket Bolt (Qty: 4) **NOTE:** **Refer to Fastener Notice .**

	Tighten: 100 N.m (74 lb ft)
2	Front Differential Carrier Mounting Bracket Nut (Qty: 4)
3	Front Differential Carrier Mounting Bracket Left
4	Front Differential Carrier Mounting Bracket Right

BRACKET REPLACEMENT (25, 35 SERIES)

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the differential carrier assembly. Refer to **Differential Carrier Assembly Replacement (1500 FWD)** or **Differential Carrier Assembly Replacement (2500 4WD)**.
3. For the 6.0L engine, remove the air conditioning compressor. Refer to **Air Conditioning Compressor Replacement (LY2, LY5, LH6, L76, L92 and LMG)** or **Air Conditioning Compressor Replacement (LLY/LMM)** or **Air Conditioning Compressor Replacement (LU3)** .

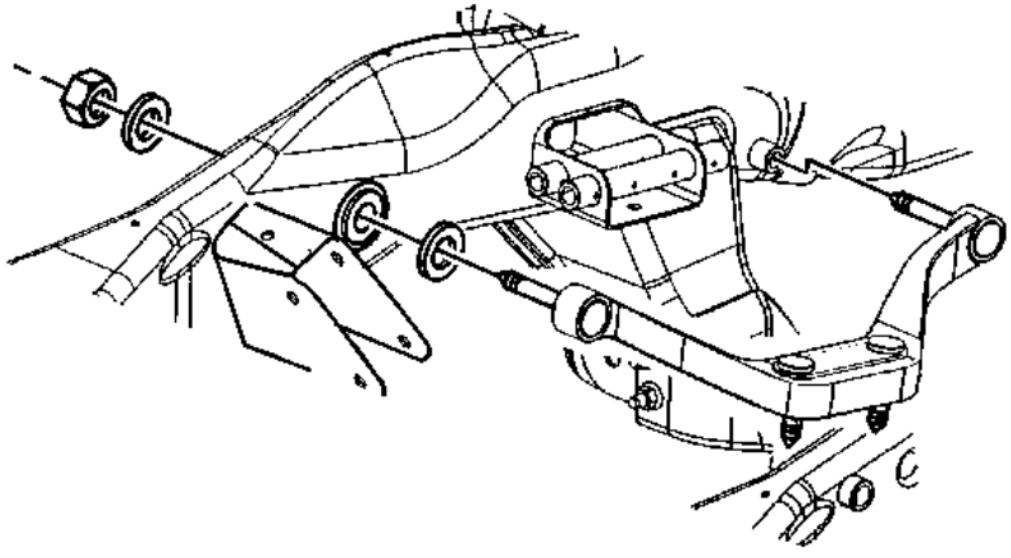


Fig. 131: Front Axle Mounting Bracket - Front Drive Axle (8.25 S4WD and 9.25 Axles)

Courtesy of GENERAL MOTORS CORP.

4. Remove the nuts and the washers from the bracket.
5. Remove the bracket from the vehicle.

Installation Procedure

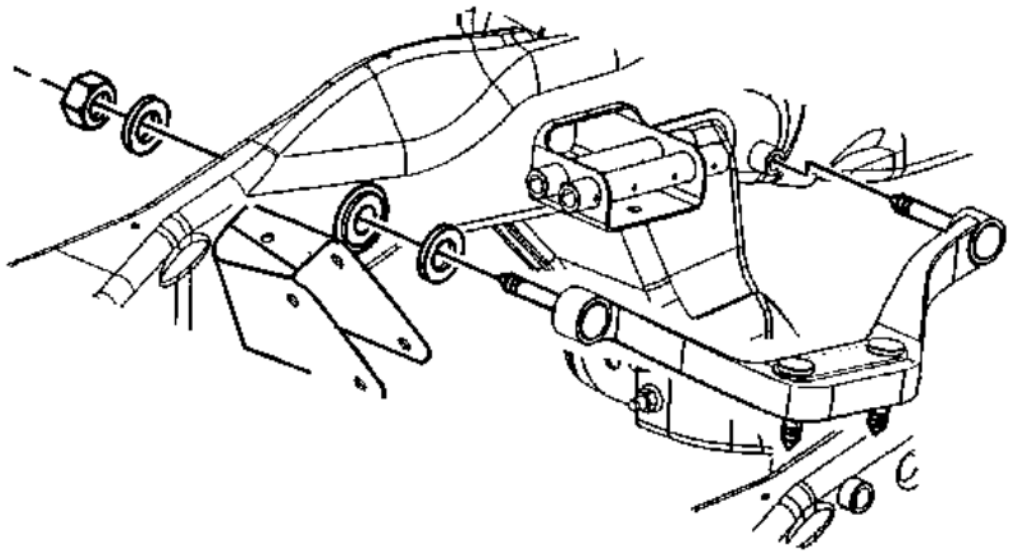


Fig. 132: Front Axle Mounting Bracket - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS CORP.

1. Install the bracket to the vehicle.

NOTE: **Refer to Fastener Notice .**

2. Install the washers and the nuts to the bracket.

   Tighten: Tighten the bracket to frame nuts to 90 N.m (67 lb ft).

3. For the 6.0L engine, install the air conditioning compressor. Refer to **Air Conditioning Compressor Replacement (LY2, LY5, LH6, L76, L92 and LMG)** or **Air Conditioning**

Compressor Replacement (LLY/LMM) or **Air Conditioning Compressor Replacement (LU3)** .

4. Install the differential carrier assembly. Refer to **Differential Carrier Assembly Replacement (1500 FWD)** or **Differential Carrier Assembly Replacement (2500 4WD)**.
5. 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. Repair as necessary.
4. Clean the area around the front axle fill plug.

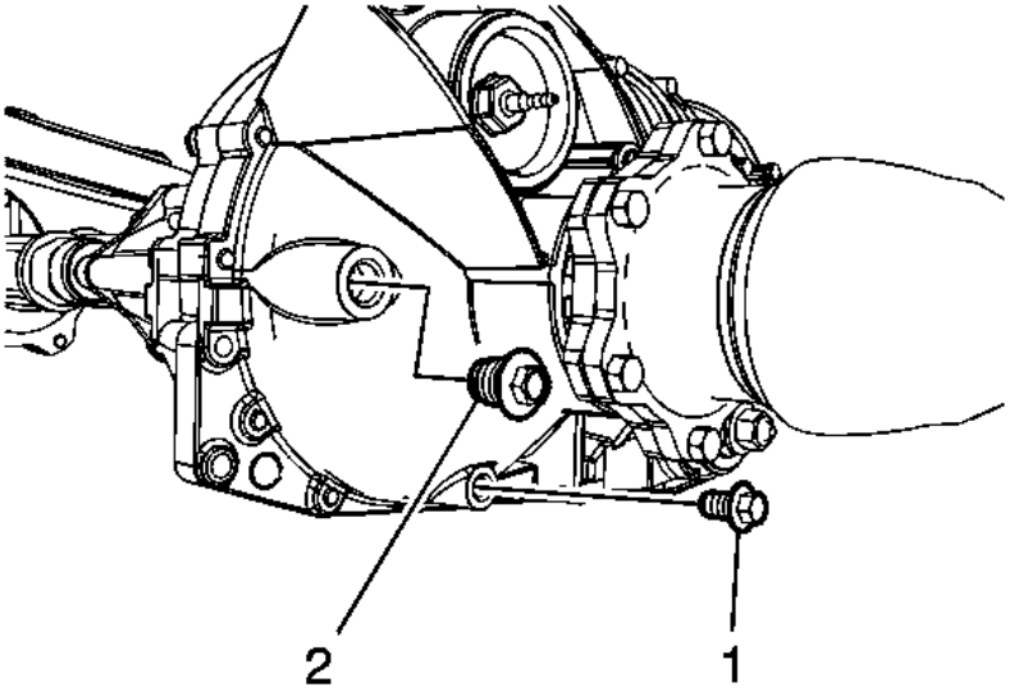


Fig. 133: View Of Front Axle Fill Plug
Courtesy of GENERAL MOTORS CORP.

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

   Specification: The 9.25 inch axle the oil level 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) for the 9.25 inch axle. Use the correct fluid. Refer to **Sealers, Adhesives, and Lubricants**.

   NOTE: Refer to Fastener Notice .

8. Install the fill plug.

   Tighten: Tighten the plug 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.

INNER AXLE SHAFT SHIM ADJUSTMENT

Tools Required

- **J 34672** Depth Micrometer. See **Special Tools**.
- **J 34673** Flat Gage Bar. See **Special Tools**.
- **J 8001** Dial Indicator Set

Adjustment

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
1.27 mm (0.05 in)	1.30 mm (0.05 in)
1.52 mm (0.06 in)	1.52 mm (0.06 in)
1.78 mm (0.07 in)	1.80 mm (0.07 in)
2.03 mm (0.08 in)	2.03 mm (0.08 in)
2.29 mm (0.09 in)	2.30 mm (0.09 in)
2.54 mm (0.10 in)	2.54 mm (0.10 in)
2.70 mm (0.11 in)	2.80 mm (0.11 in)
3.05 mm (0.12 in)	3.05 mm (0.12 in)
3.30 mm (0.13 in)	3.30 mm (0.13 in)
3.56 mm (0.14 in)	3.55 mm (0.14 in)
3.81 mm (0.15 in)	3.80 mm (0.15 in)
-	4.05 mm (0.16 in)
-	4.30 mm (0.17 in)
-	4.55 mm (0.18 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 and Inner Shaft Bearing Replacement**.

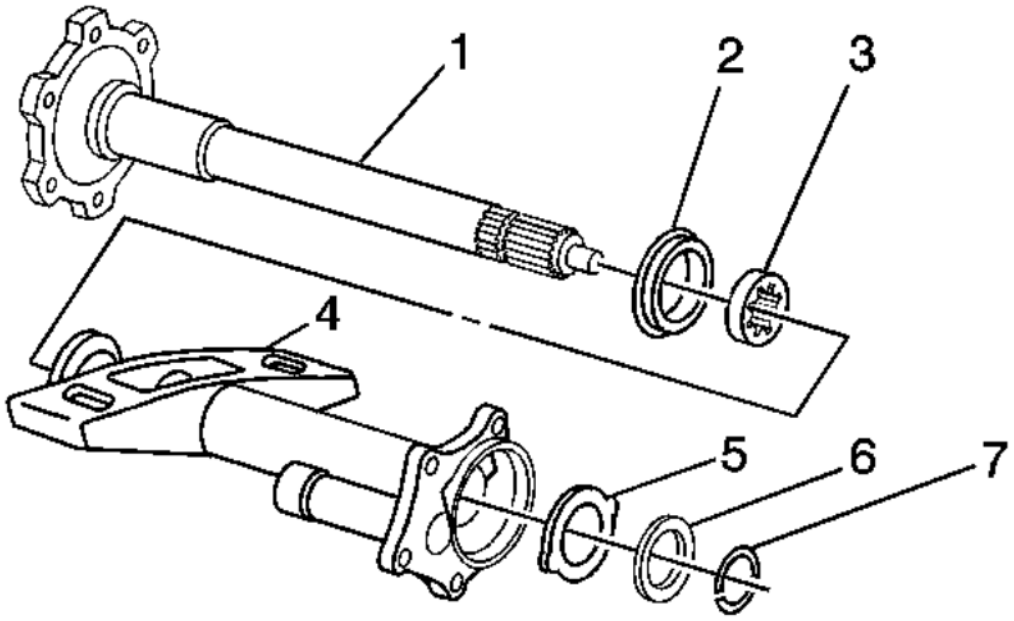


Fig. 134: Front Drive Axle Components
Courtesy of GENERAL MOTORS CORP.

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.

   3. Install the thrust washer (without tabs) (6).
   4. Install the retaining ring (7) 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.

IMPORTANT: 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.

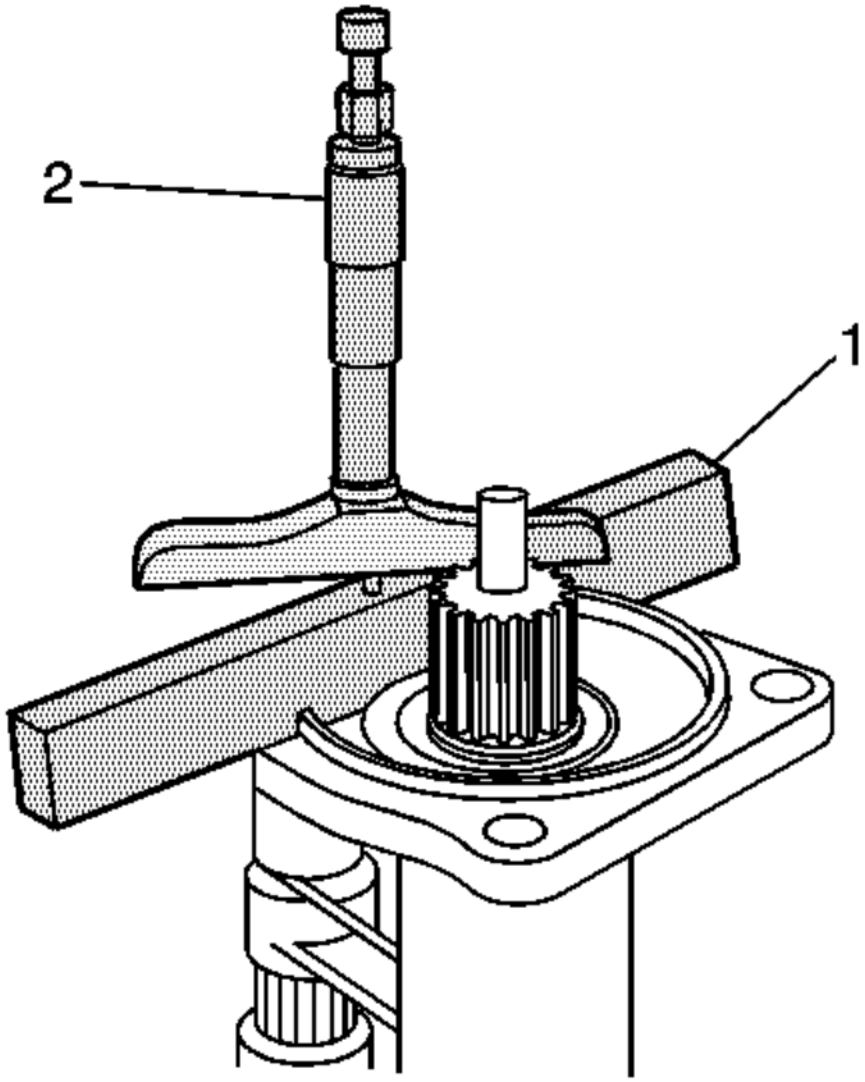


Fig. 135: Using J 34672 To Measure Inner Axle Shaft Distance
Courtesy of GENERAL MOTORS CORP.

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

axle shaft. See **Special Tools**.

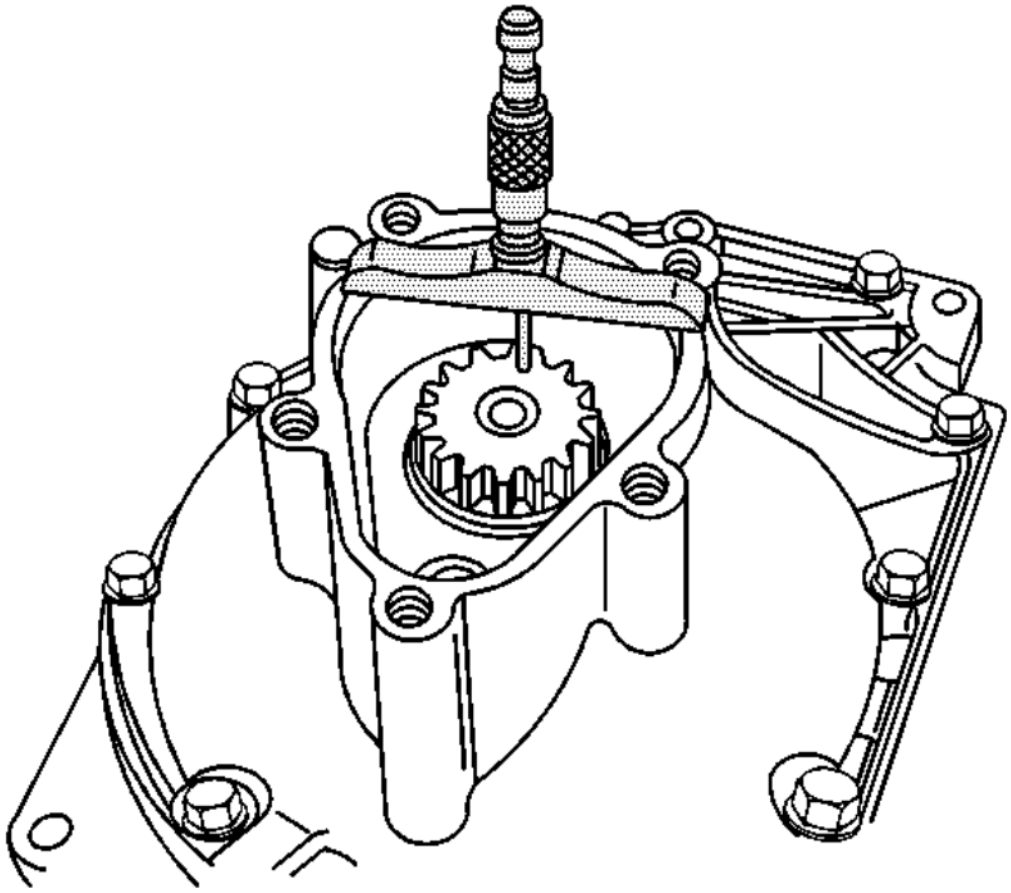


Fig. 136: Measuring Differential Carrier Housing Machined Surface To Front Drive Axle Clutch Shaft Outer Surface
Courtesy of GENERAL MOTORS CORP.

7. Using the **J 34672** , measure the distance from the machined surface of the differential carrier housing to the outer surface of the front drive axle clutch shaft. See **Special Tools**.
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** . See **Special Tools**.

9. Using a micrometer, measure the thickness of the **J 34673** . See **Special Tools**.
10. Subtract the thickness of the **J 34673** , measured in step 9, from the measurement determined in step 8. See **Special Tools**.

    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.
    - 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

IMPORTANT: 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.

   NOTE: Refer to Fastener Notice .

3. Install the bolts.

   Tighten: Tighten the bolts to 40 N.m (30 lb ft).

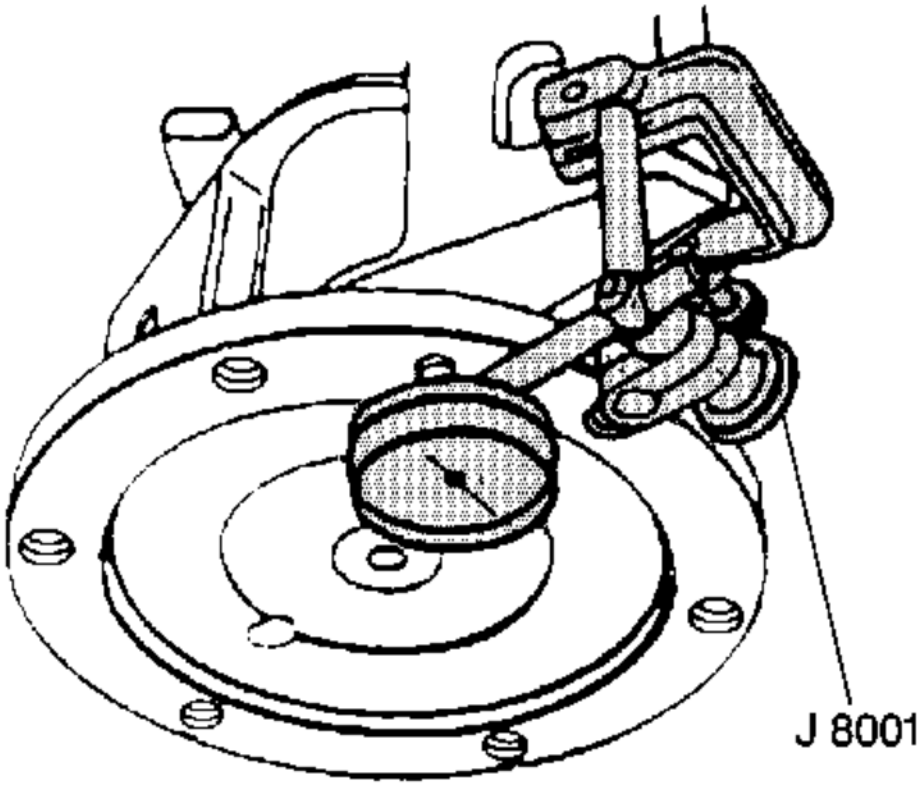


Fig. 137: Measuring Shaft End
Courtesy of GENERAL MOTORS CORP.

4. Measure the shaft end play using the following procedure:
    1. Install the **J 8001** 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.

DIFFERENTIAL CARRIER ASSEMBLY DISASSEMBLE (9.25 INCH AXLE)

Tools Required

- **J 22912-B** Split-Plate Bearing Puller. See **Special Tools**.
- **J 2619-01** Slide Hammer
- **J 29369-2** Bushing and Bearing Remover (2-3 in). See **Special Tools**.
- **J 33791** Carrier Bushing Remover/Installer. See **Special Tools**.
- **J 34011** Pilot Bearing Remover. See **Special Tools**.
- **J 36599-A** Side Bearing Nut Wrench. See **Special Tools**.
- **J 36615** Side Bearing Nut Wrench. See **Special Tools**.
- **J 36616** Axle Mount Bushing Remover/Installer. See **Special Tools**.
- **J 45754** Pinion Bearing Race Remover/Installer - 9. See **Special Tools**.25 inch Axle
- **J 45765** Pinion Remover. See **Special Tools**.
- **J 8614-01** Flange and Pulley Holding Tool. See **Special Tools**.

Inspection Procedure

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

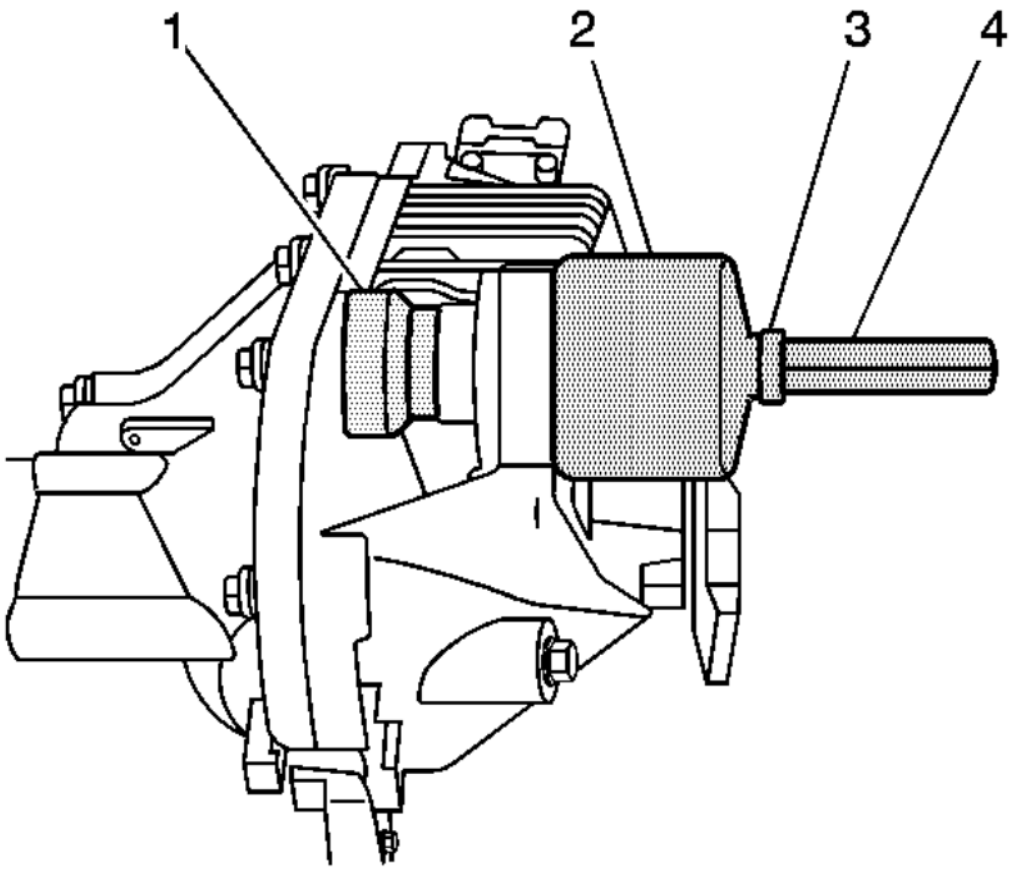


Fig. 138: View Of Special Tools J 36616-2, J 33791-1, Thrust Bearing, J 21474-18 & Forcing Screw
Courtesy of GENERAL MOTORS CORP.

1. Remove the upper differential carrier assembly bushing by performing the following steps:
    1. Install the J 36616-2 (1), the J 33791-1 (2), the thrust bearing (3), the J 21474-18 (4), and the forcing screw as shown.
    2. Remove the upper differential carrier assembly bushing by holding the forcing screw and tightening the J 21474-18.

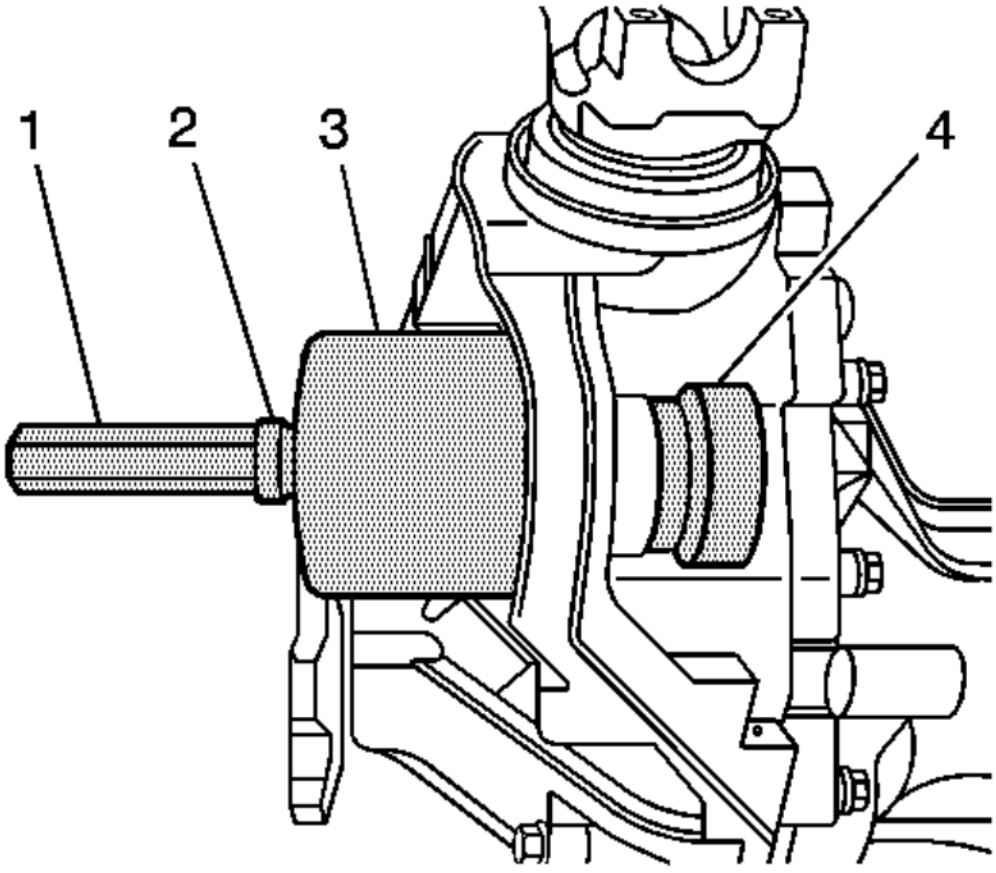


Fig. 139: View Of Special Tools 21474-18, Thrust Bearing, J 33791-1, J 36616-2, & Forcing Screw
Courtesy of GENERAL MOTORS CORP.

2. Remove the lower differential carrier assembly bushing by performing the following steps:
    1. Install the J 21474-18 (1), the thrust bearing (2), the J 33791-1 (3), the J 36616-2 (4), and the forcing screw as shown.
    2. Remove the lower differential carrier assembly bushing by holding the forcing screw and tightening the J 21474-18.

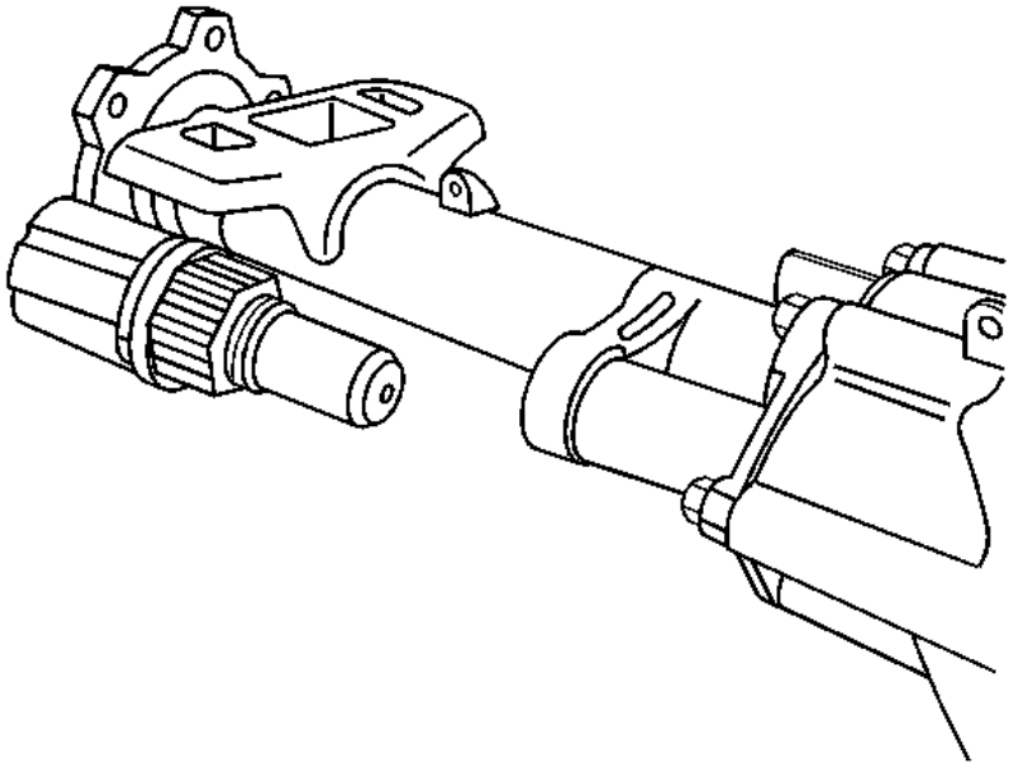


Fig. 140: View Of Front Axle Actuator
Courtesy of GENERAL MOTORS CORP.

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

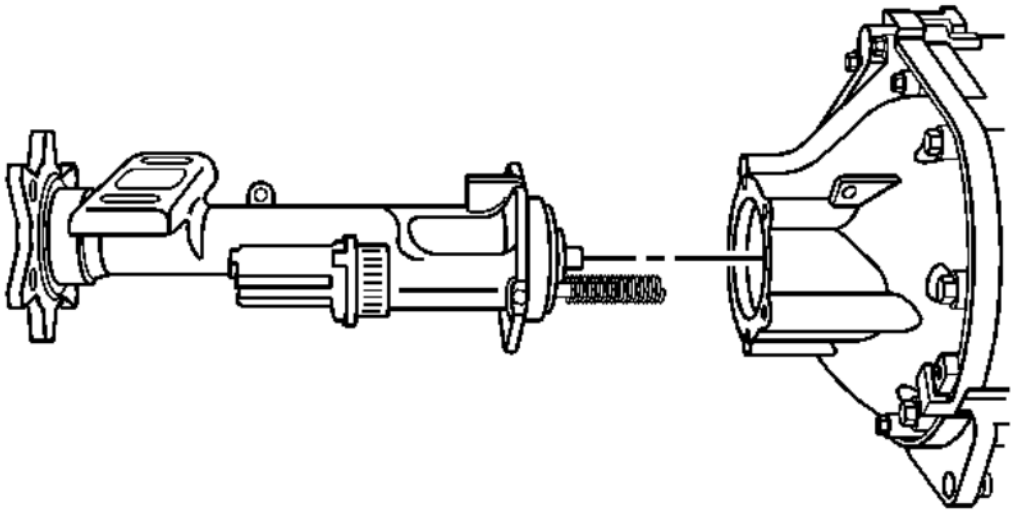


Fig. 141: Identifying Inner Axle Shaft Housing Assembly - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS CORP.

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

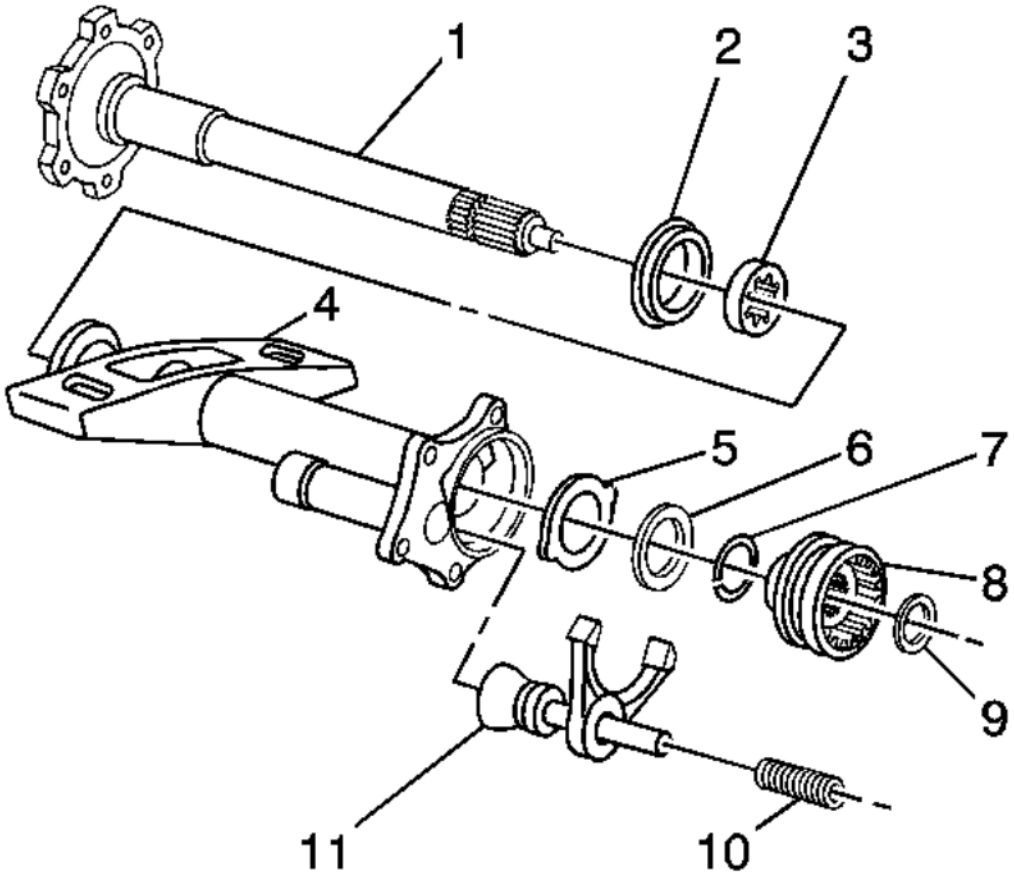


Fig. 142: Inner Axle Shaft Housing Components (9.25 Inch)
Courtesy of GENERAL MOTORS CORP.

6. Remove the following components from the inner axle shaft housing (4):
    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 retainer ring (7)
    6. The thrust washers (5, 6)

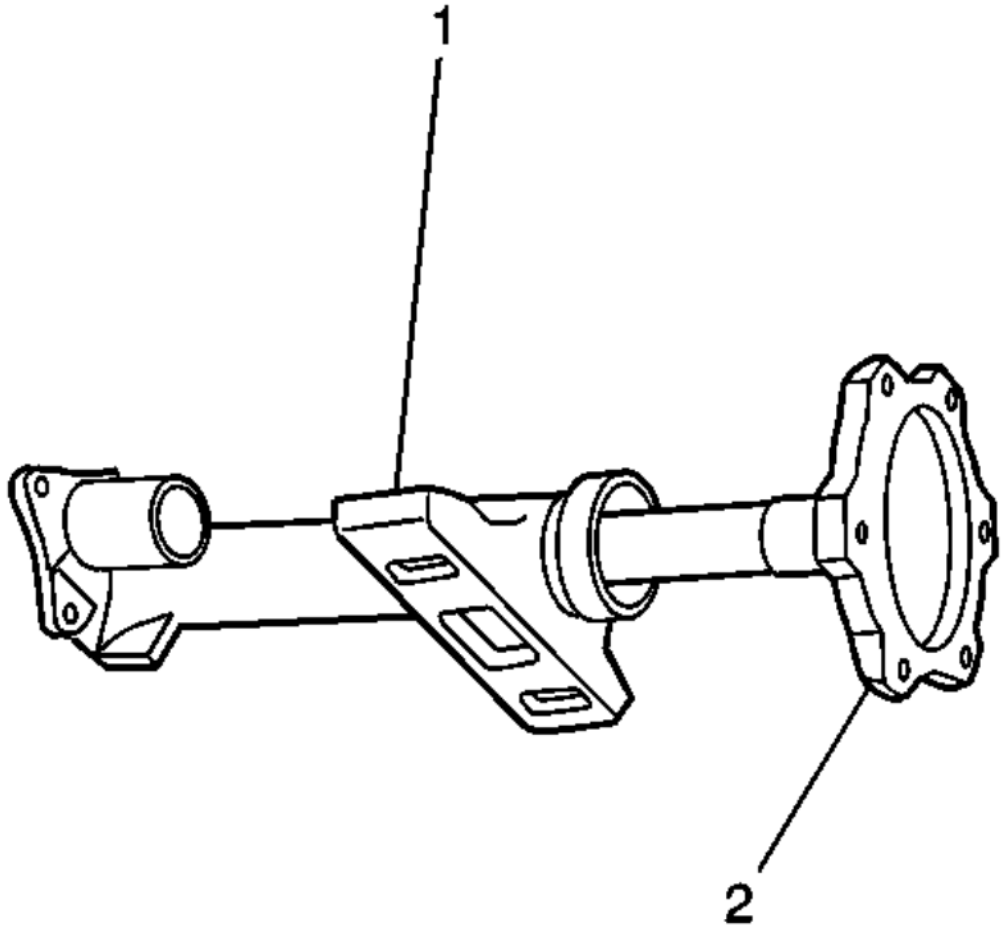


Fig. 143: Axle Shaft & Inner Axle Shaft Housing - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS CORP.

7. Remove the inner axle shaft (2).

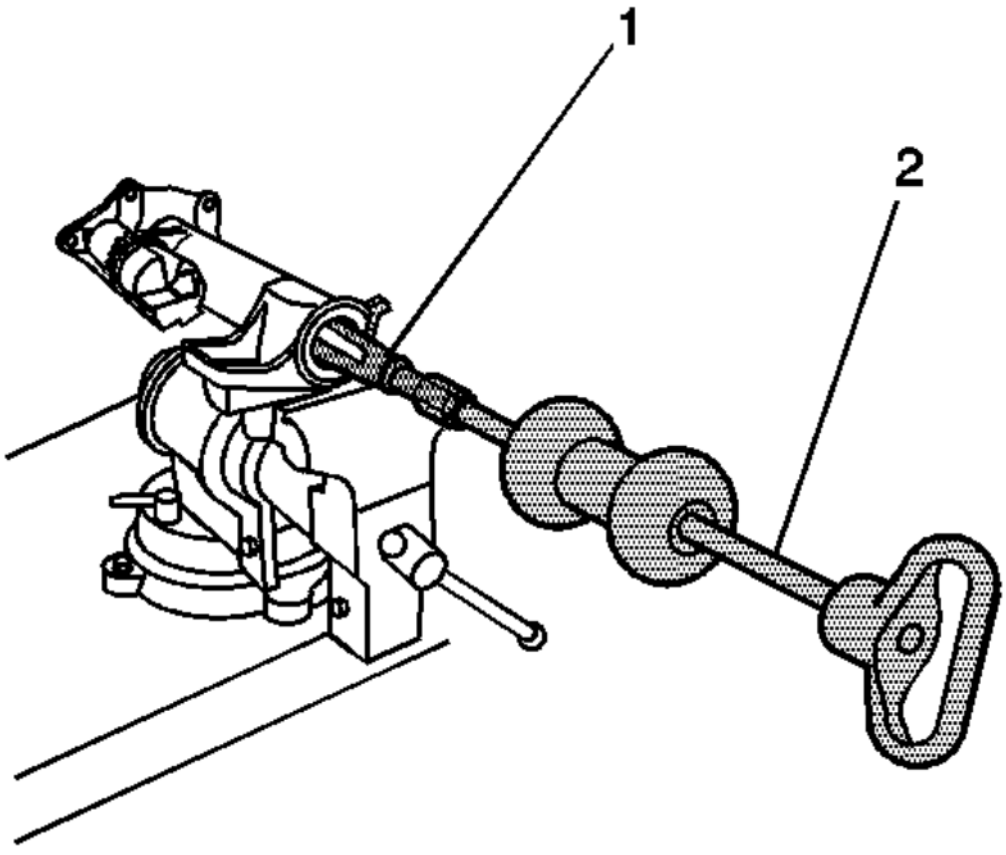


Fig. 144: Removing Inner Axle Shaft Seal And/Or Inner Axle Shaft Bearing Usingj 29369-2 & J 2619-01
Courtesy of GENERAL MOTORS CORP.

8. Remove the inner axle shaft bearing and the inner axle shaft seal by performing the following steps:
    1. Install the inner axle shaft housing into a vise.

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

    2. Install the **J 29369-2** (1) behind the inner axle shaft bearing. See **Special Tools**.
9. Install the **J 2619-01** (2) to the **J 29369-2** (1). See **Special Tools**.
10. Remove the inner axle shaft bearing and the inner axle shaft bearing and the seal using the **J**

2619-01 .

11. Remove the inner axle shaft housing from the vise.
12. Remove the front drive axle clutch shaft.

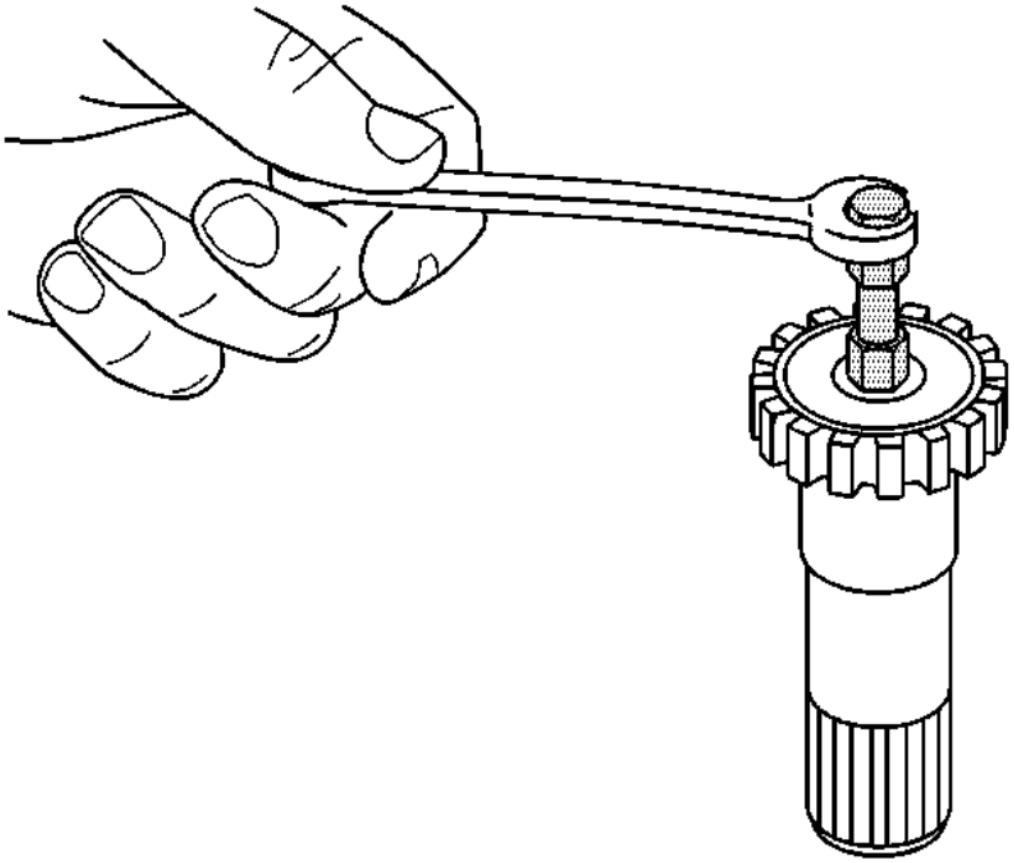


Fig. 145: Removing Clutch Shaft Pilot Bearing - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

13. Use the **J 34011** in order to remove the clutch shaft bearing. See **Special Tools**.

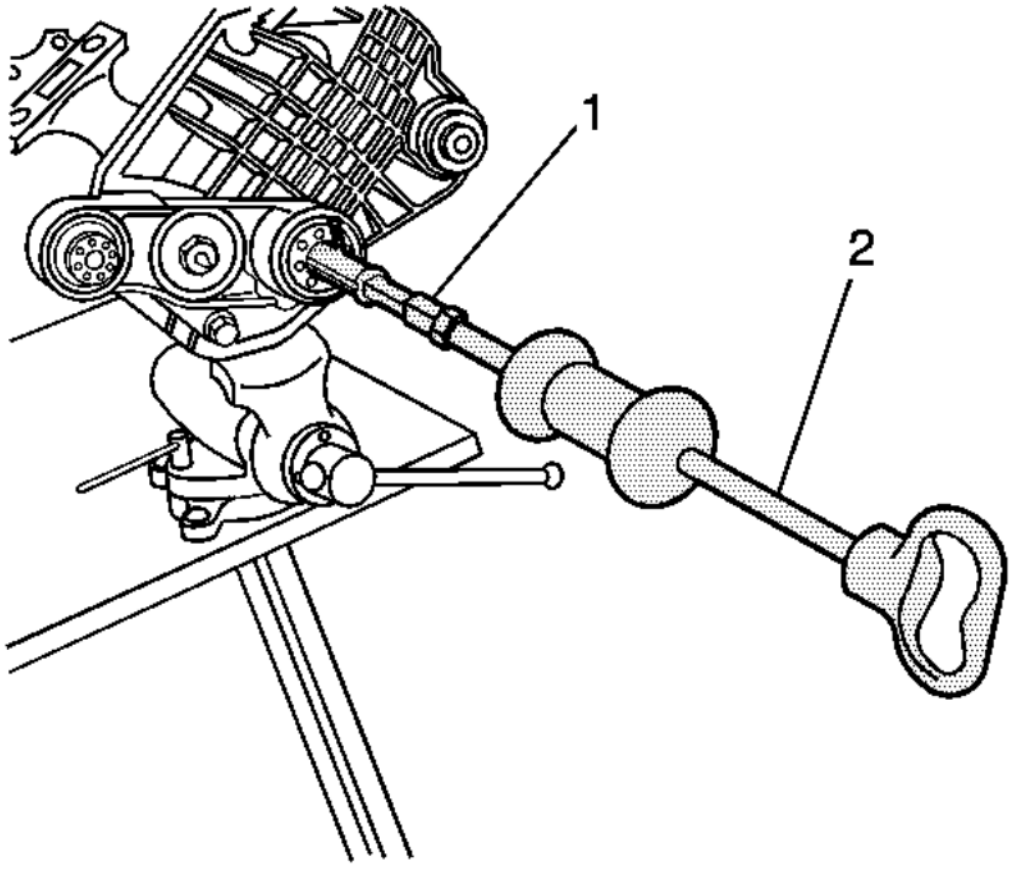


Fig. 146: Inner Axle Shaft Seal/Bearing & J 29369-2 & J 2619-01 - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

14. Place the differential carrier assembly into a vise.

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

15. Remove the inner axle shaft using a hammer and a brass drift.
16. Install the **J 29369-2** (1) behind the inner axle shaft bearing. See **Special Tools**.
17. Install the **J 2619-01** (2) to the **J 29369-2** (1). See **Special Tools**.
18. Remove the inner axle shaft bearing and the inner axle seal bearing and the seal using the **J 2619-01** .
19. Remove the differential carrier assembly from the vise.

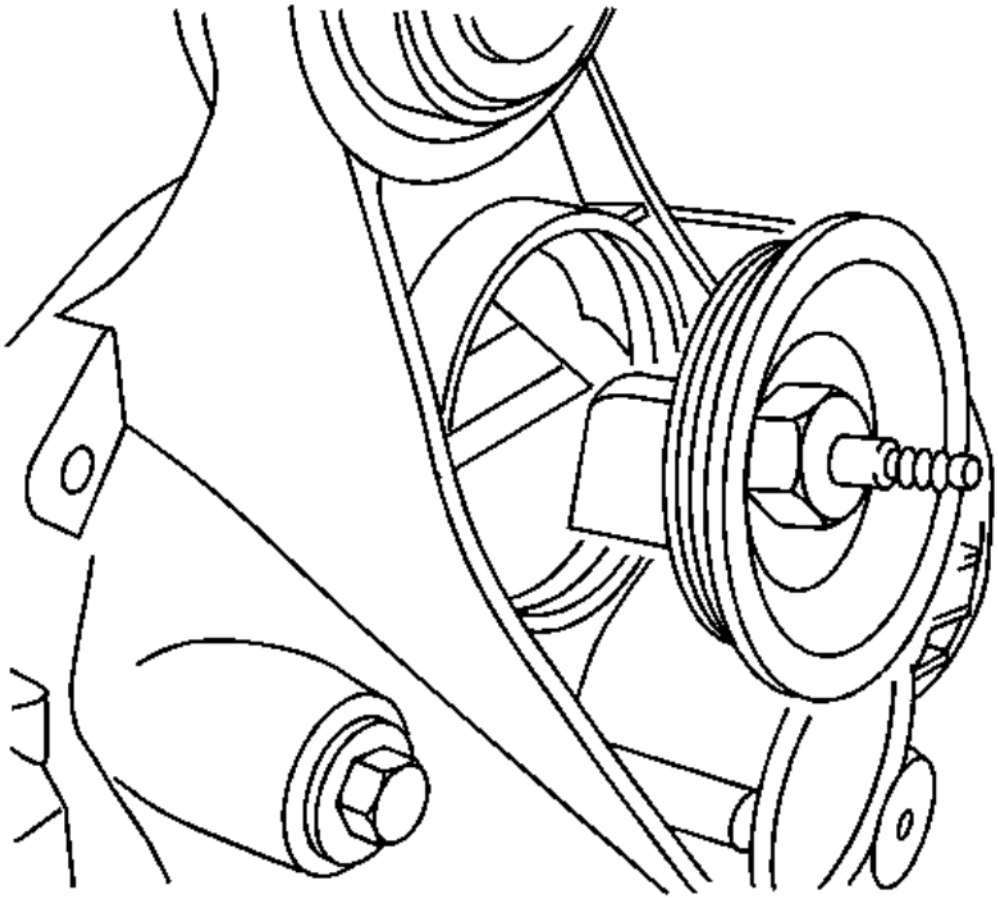


Fig. 147: View Of Vent Hose Connector
Courtesy of GENERAL MOTORS CORP.

20. Remove the vent connector.
21. Remove the differential carrier assembly bolts.

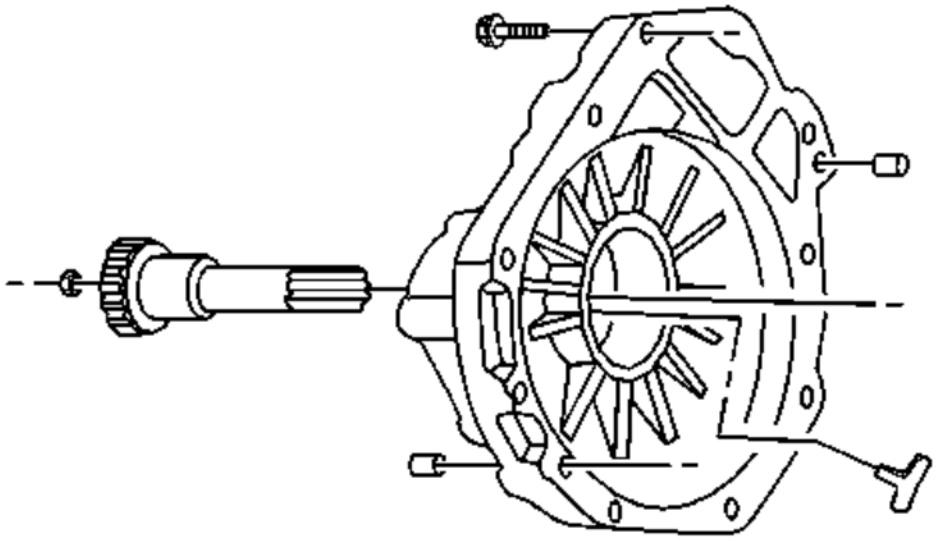


Fig. 148: Identifying Differential Carrier Assembly Bolts (9.25 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

22. Separate the left carrier case half from the right carrier case half by tapping on the on the carrier case with a hammer and a brass drift.
23. Remove the differential case assembly.

Disconnect the right side differential bearing adjuster nut lock from the differential bearing adjuster nut by prying up on the lock.

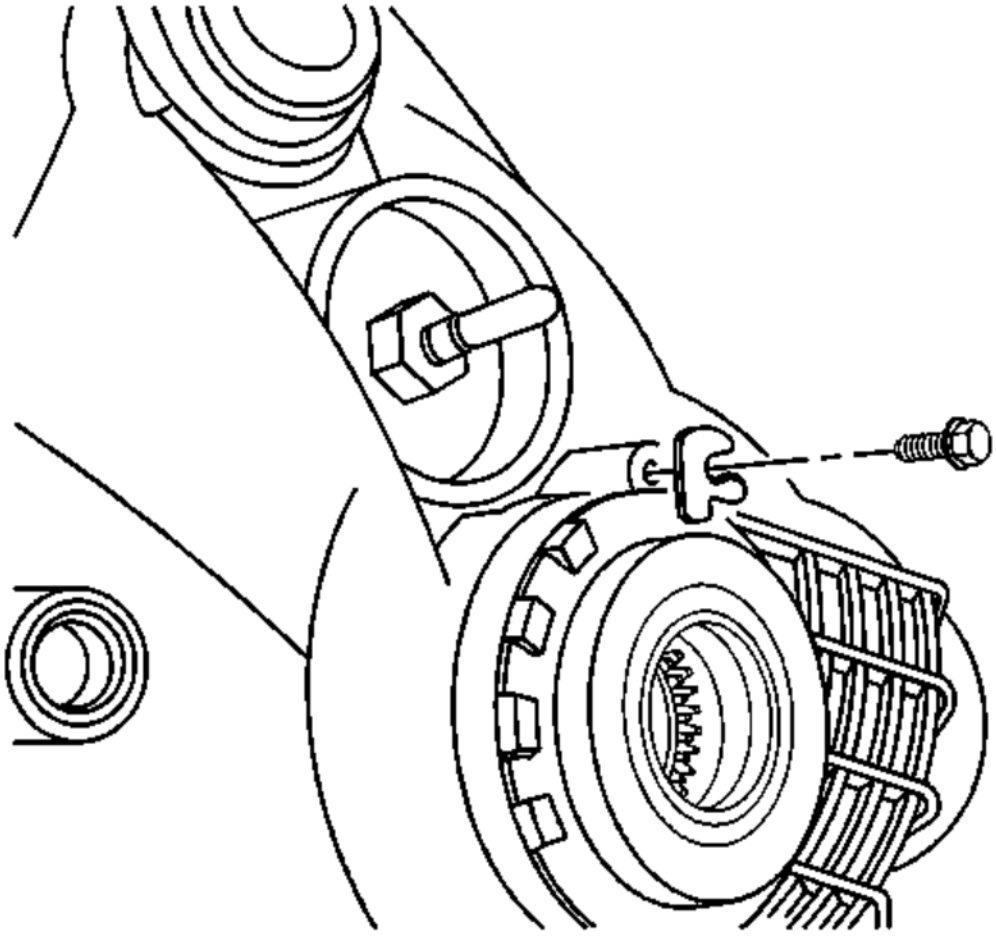


Fig. 149: Left Side Differential Bearing Adjuster Nut Lock & Bolt (9.25 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

24. Remove the left side differential bearing adjuster nut lock and the bolt.

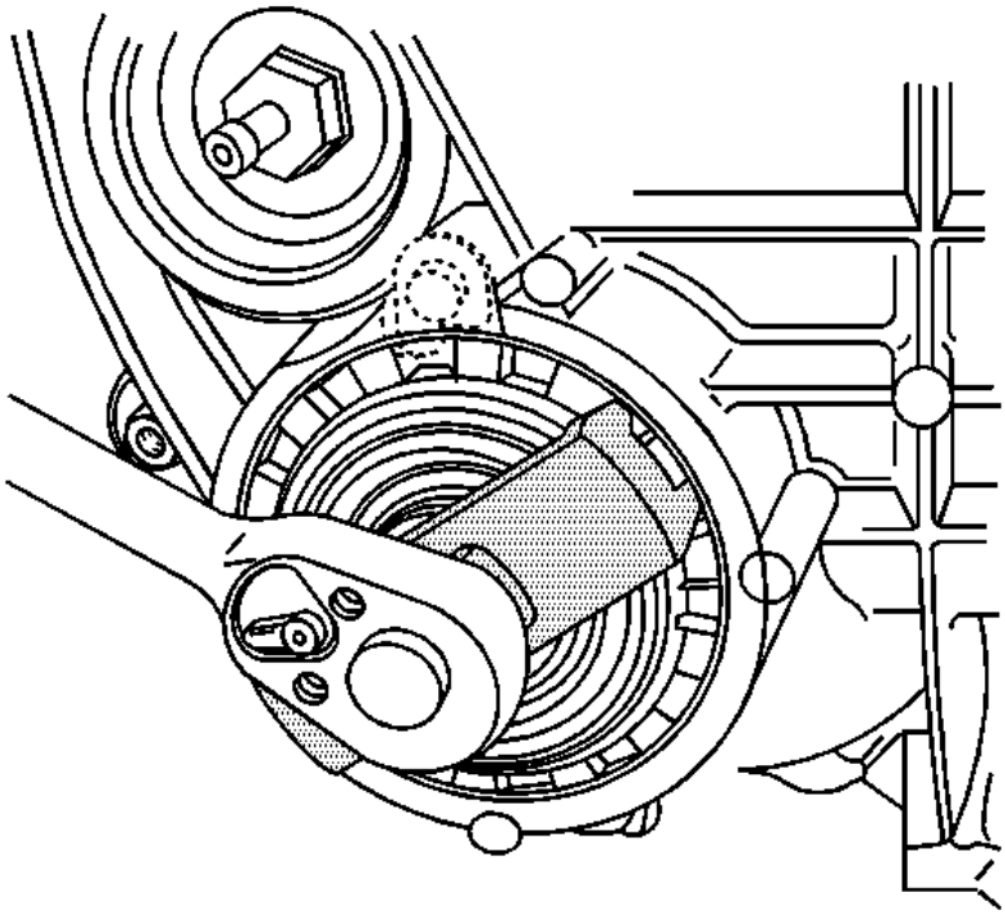


Fig. 150: Removing Left Side Differential Bearing Adjuster (9.25 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

25. Remove the left side differential bearing adjuster by doing the following:
    1. Install the **J 36615** onto the differential bearing adjuster nut as shown. See **Special Tools**.
    2. Turn the **J 36615** counterclockwise in order to remove the differential bearing adjuster nut and the O-ring. See **Special Tools**.

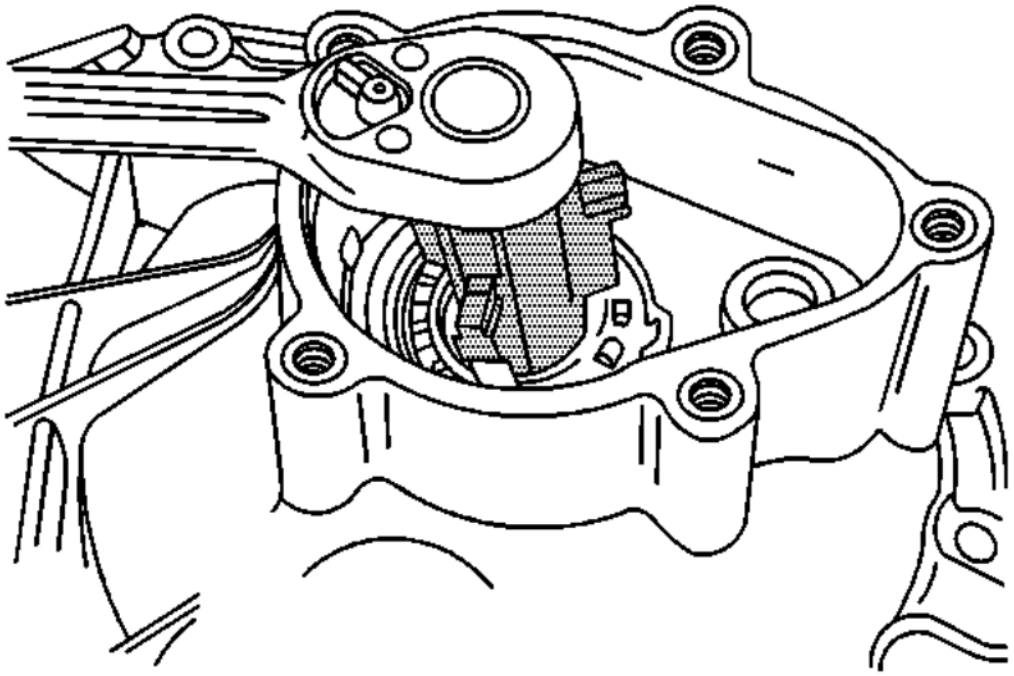


Fig. 151: Differential Bearing Adjuster Nuts & Bearing Cups
Courtesy of GENERAL MOTORS CORP.

26. Remove the right side differential bearing adjuster by doing the following:
    1. Install the **J 36599-A** onto the differential bearing adjuster nut. See **Special Tools**.
    2. Turn the **J 36599-A** clockwise in order to push the bearing cup out of the bore. See **Special Tools**.
27. Remove the right side differential bearing adjuster nut sleeve using a hammer and brass drift.

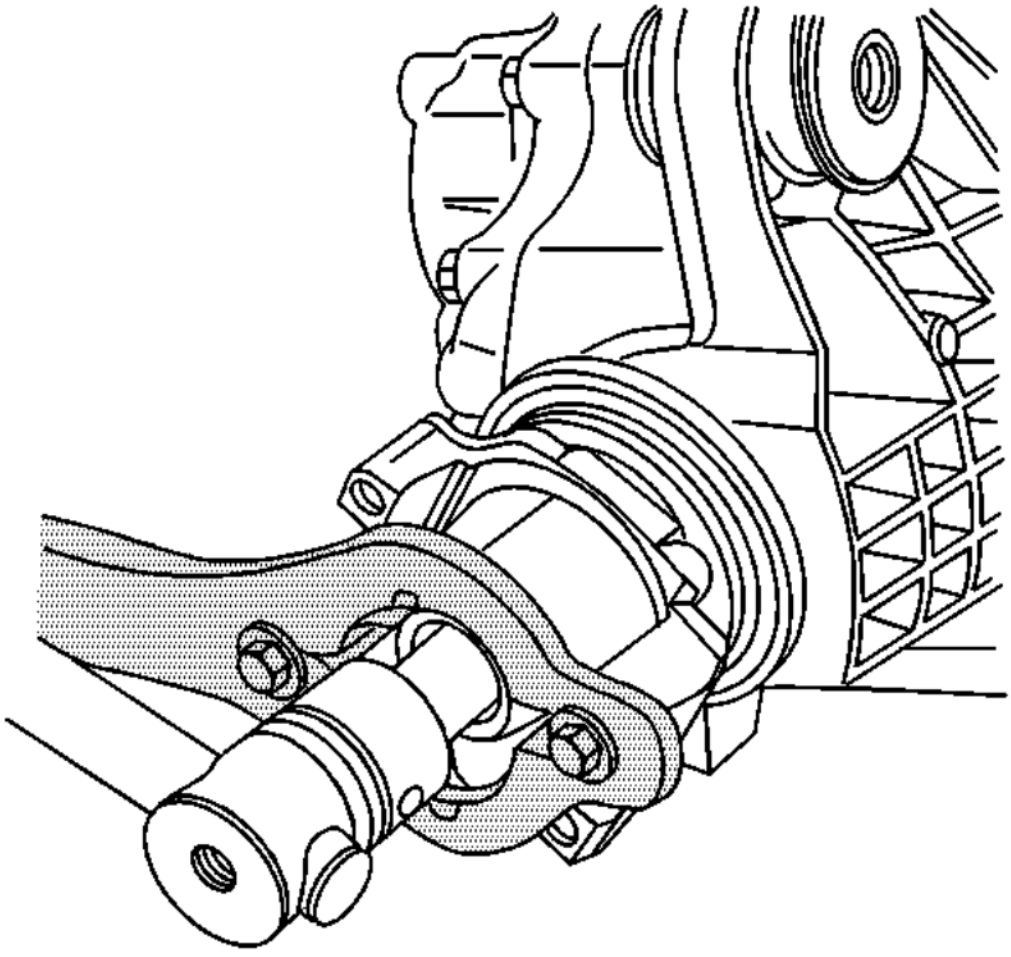


Fig. 152: Holding Pinion Flange Using Special Tool
Courtesy of GENERAL MOTORS CORP.

28. Install the **J 8614-01** as shown. See **Special Tools**.

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

29. Remove the washer.

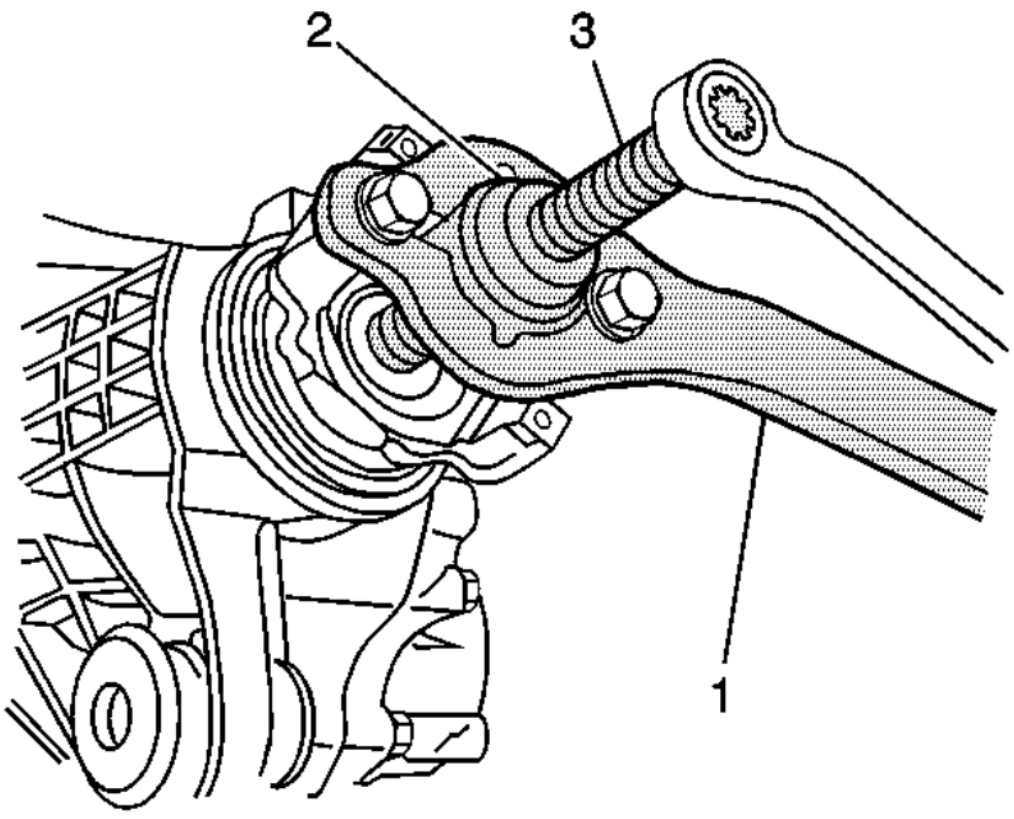


Fig. 153: View Of Pinion Yoke
Courtesy of GENERAL MOTORS CORP.

30. Install the J 8614-2 (2) and the J 8614-3 (3) into the **J 8614-01** (1) as shown. See **Special Tools**.
31. Remove the pinion yoke by turning the J 8614-3 (3) clockwise while holding the **J 8614-01** (1). See **Special Tools**.

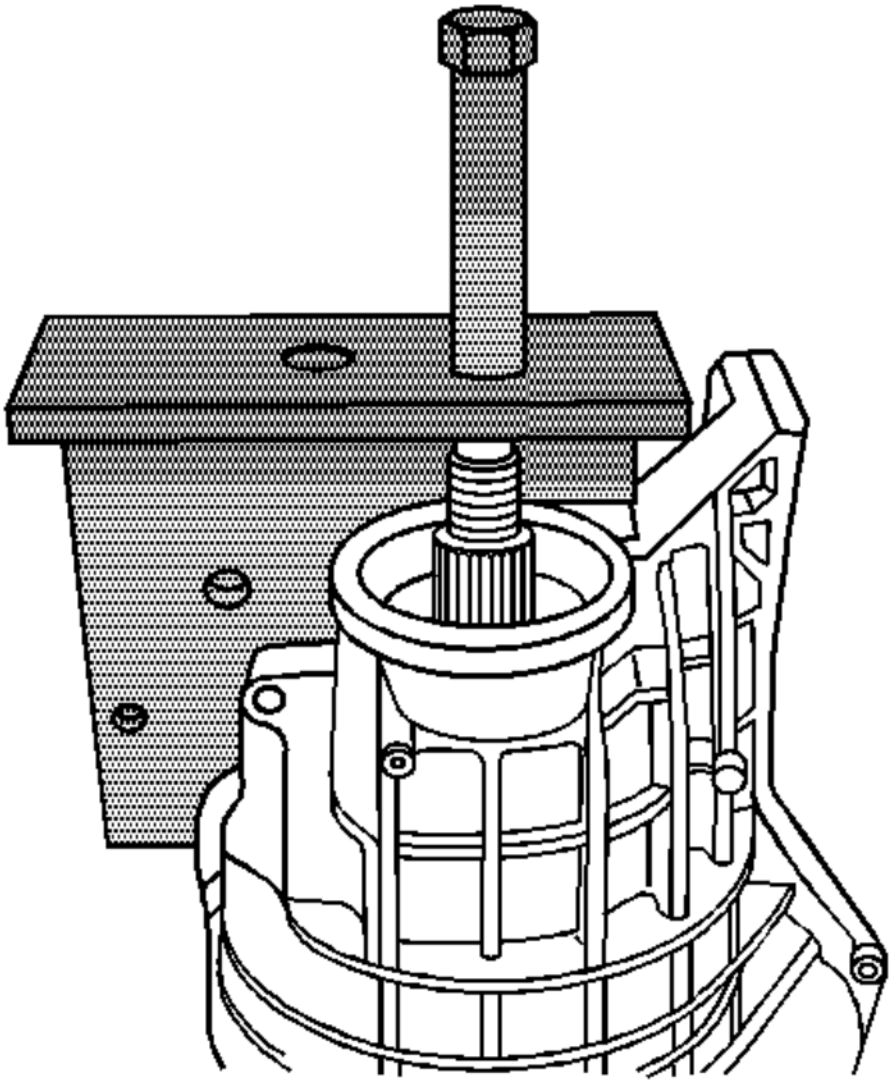


Fig. 154: Installing J 45765 To Left Side Differential Carrier Case (9.25 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

32. Install the **J 45765** to the left side differential carrier case half over the drive pinion as shown. See **Special Tools**.
33. Turn the forcing screw of the **J 45765** clockwise to remove the following components from

the left side differential carrier case half:. See **Special Tools**.

- The drive pinion gear
- The pinion gear selectable shim
- The inner pinion bearing
- The collapsible spacer

34. Remove the drive pinion seal using a suitable seal remover.
35. Remove the outer pinion bearing from the differential carrier case half.

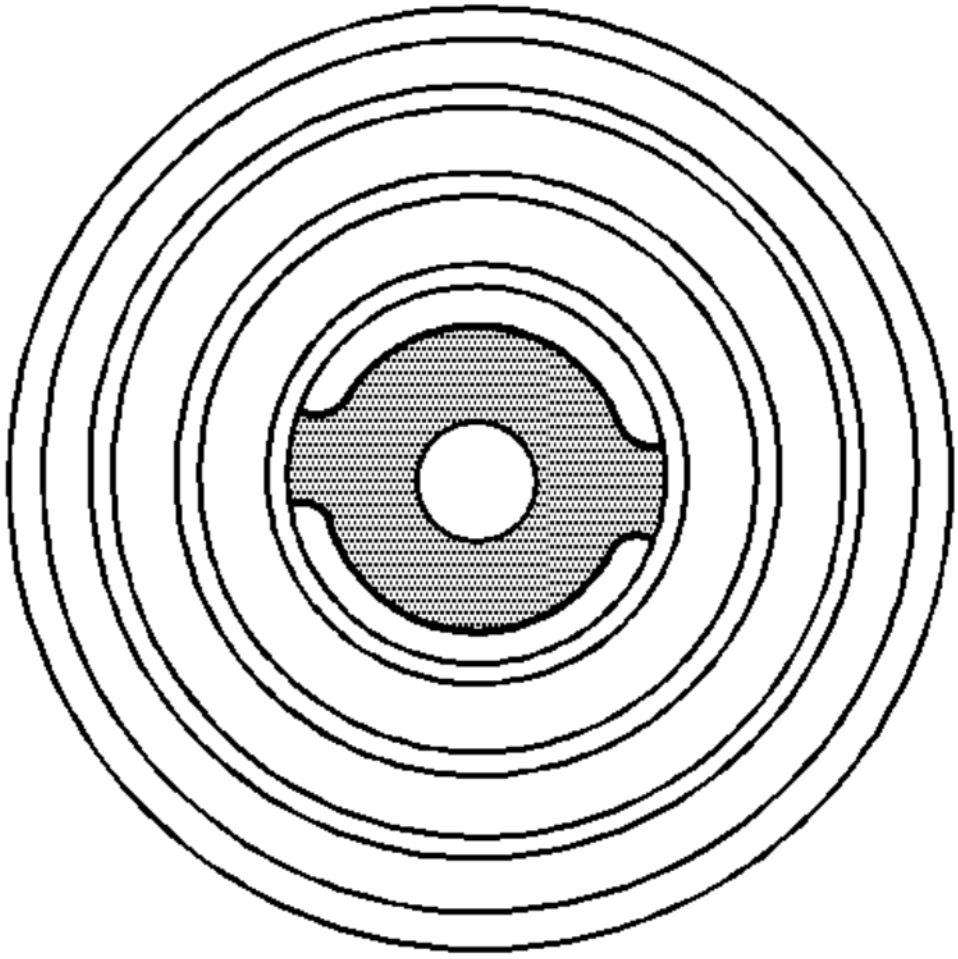


Fig. 155: Installing J 45754-3 Over Inner Pinion Bearing Cup (9.25 Inch Axle)

Courtesy of GENERAL MOTORS CORP.

36. Install the J 45754-3 over the inner pinion bearing cup.

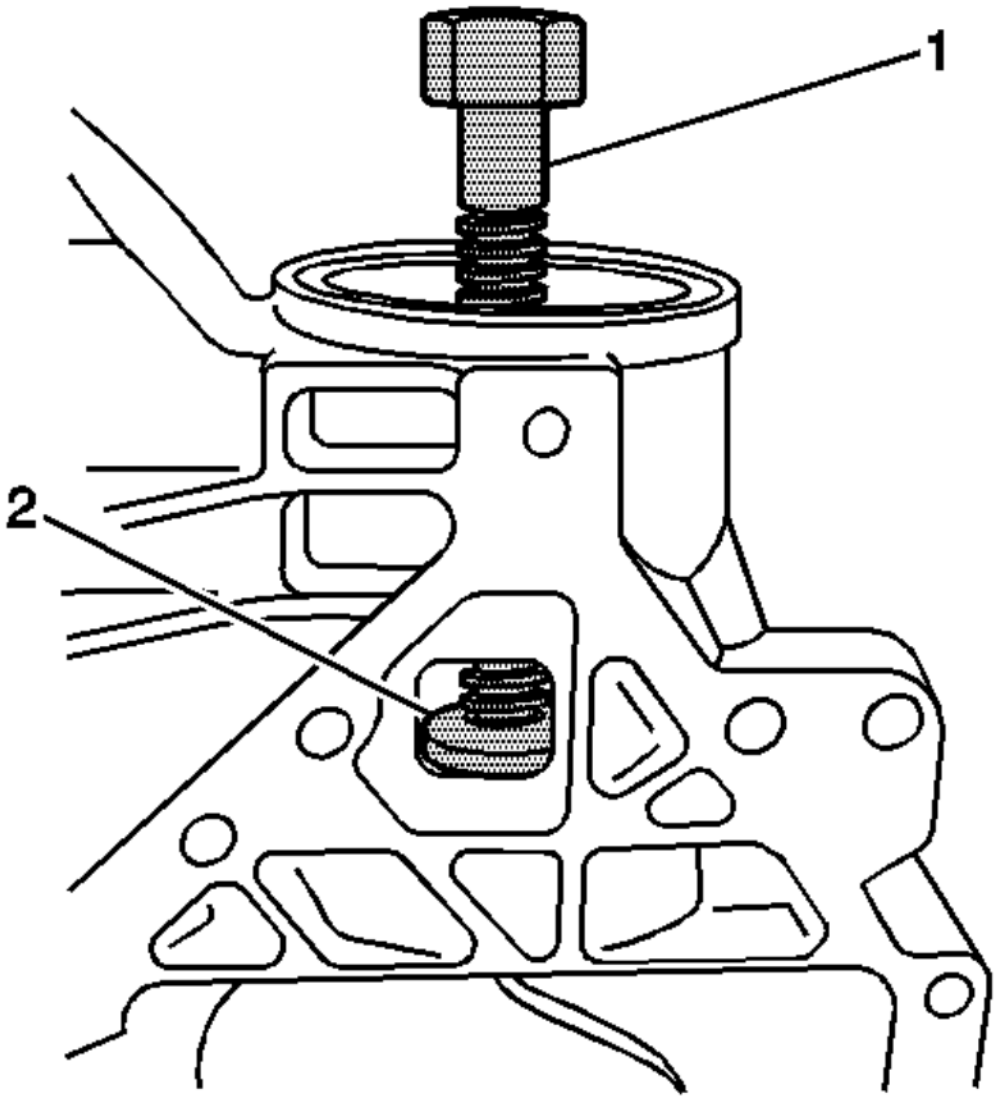


Fig. 156: Installing J 45754 Forcing Screw Into J 45754-3 (9.25 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

37. Install the forcing screw (1) of the **J 45754** into the J 45754-3 (2). See **Special Tools**.
38. Drive out the inner pinion bearing cup by pounding on the forcing screw with a hammer.

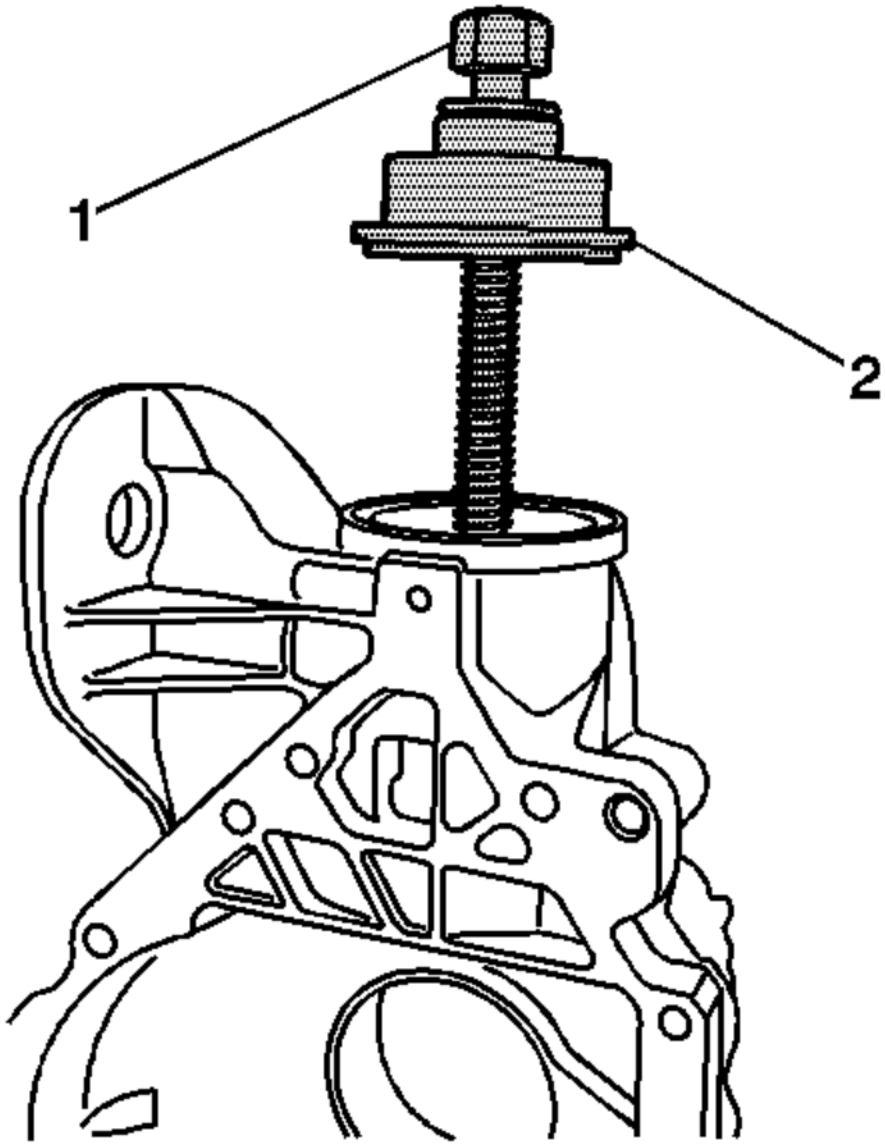


Fig. 157: Installing J 45754-2 & Forcing Screw (9.25 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

39. Install the J 45754-2 (2) and the forcing screw (1) over the outer pinion bearing cup bore.

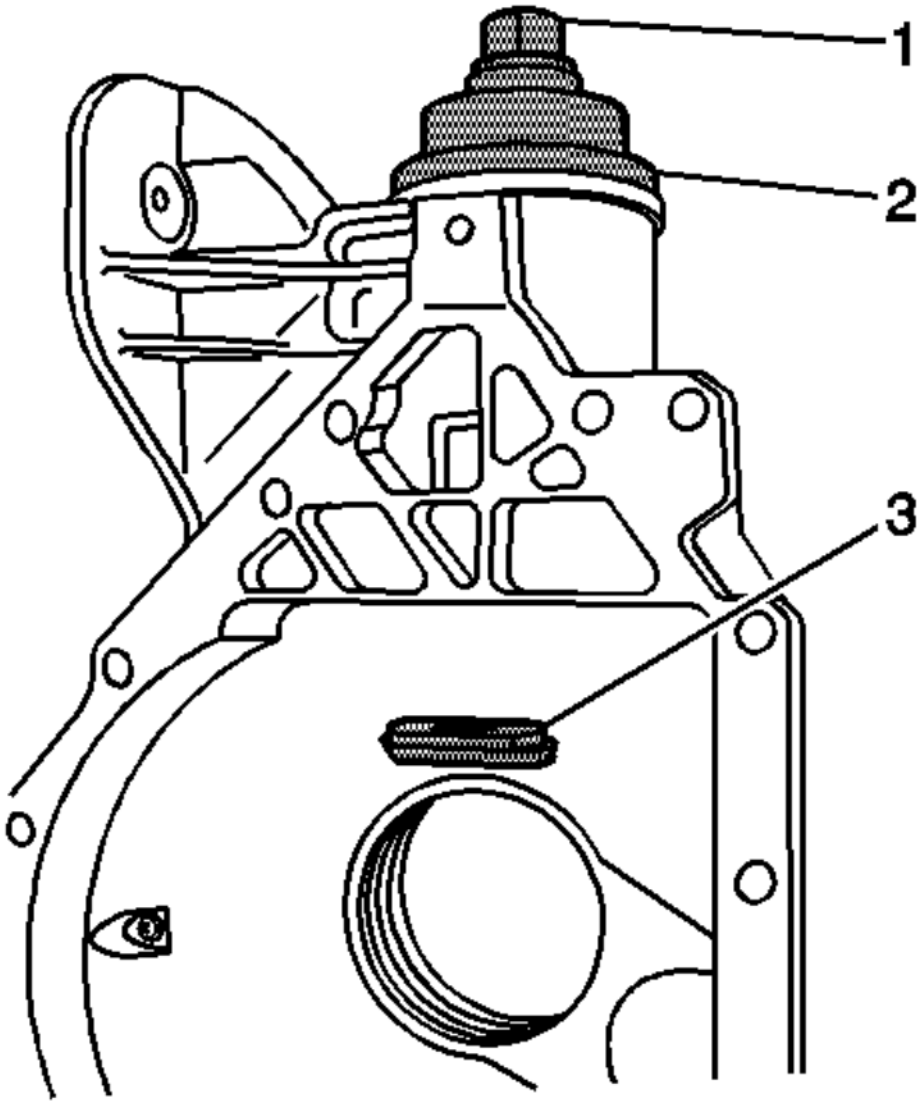


Fig. 158: Forcing Screw, J 45754-2 & J 45754-4 (9.25 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

40. Install the J 45754-4 (3) into the pinion bearing bore behind the outer pinion bearing cup.

Slowly turn the forcing screw (1) until the J 45754-4 is evenly seated behind the outer pinion bearing cup bore and the J 45754-2 (2) is evenly seated over the outer pinion bearing cup bore.

41. Remove the outer pinion bearing cup by turning the forcing screw clockwise.

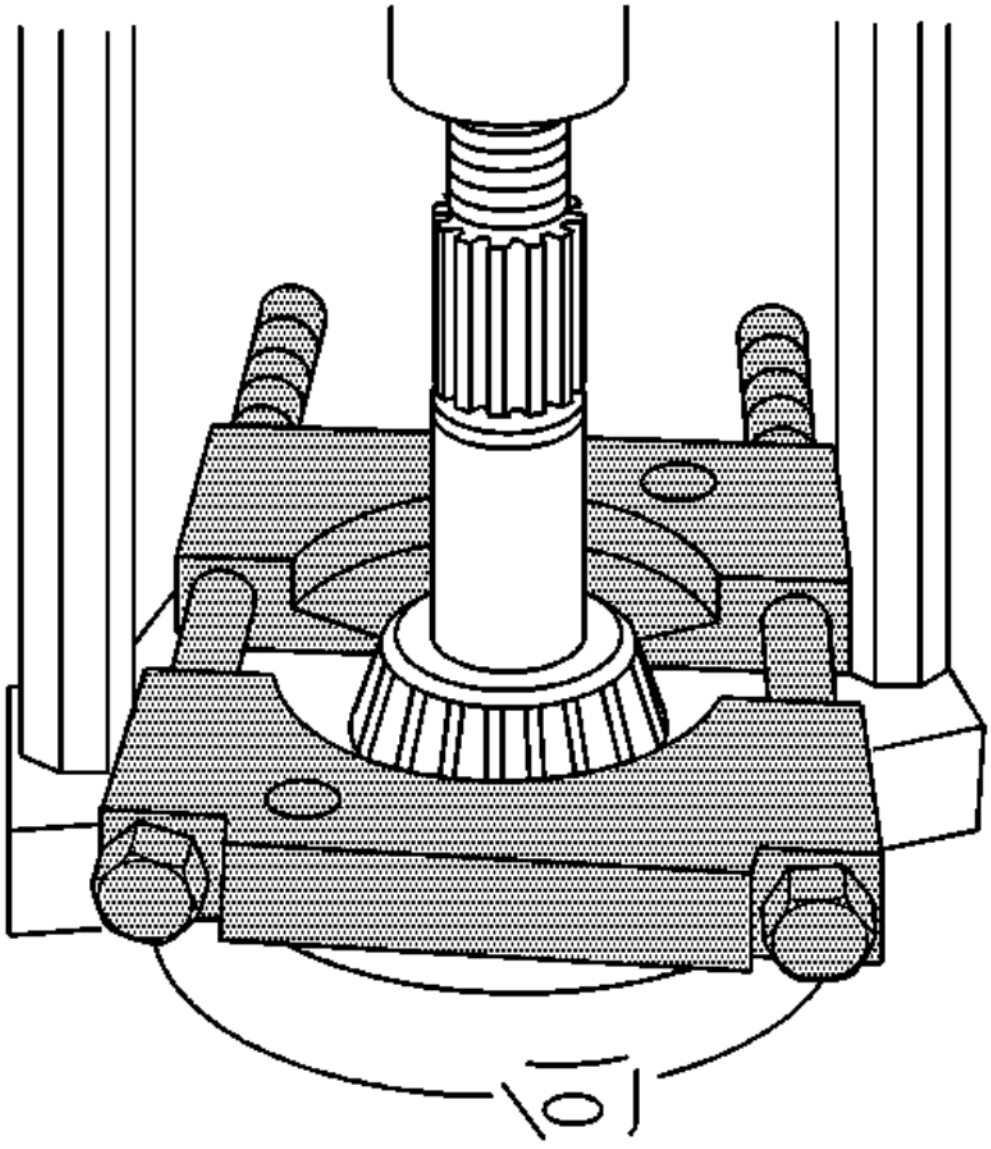


Fig. 159: Removing Inner Pinion Bearing Using Hydraulic Press
Courtesy of GENERAL MOTORS CORP.

42. Install the **J 22912-B** between the pinion bearing and the drive pinion. See **Special Tools**.
43. Remove the inner pinion bearing using the **J 22912-B** and a hydraulic press. See **Special Tools**.
44. Remove the pinion gear selectable shim.

DIFFERENTIAL CASE ASSEMBLY DISASSEMBLE (8.25 INCH AXLE)

Tools Required

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

Disassemble

1. Remove the differential side bearing by performing the following steps:
    1. Place the differential case in a vise.

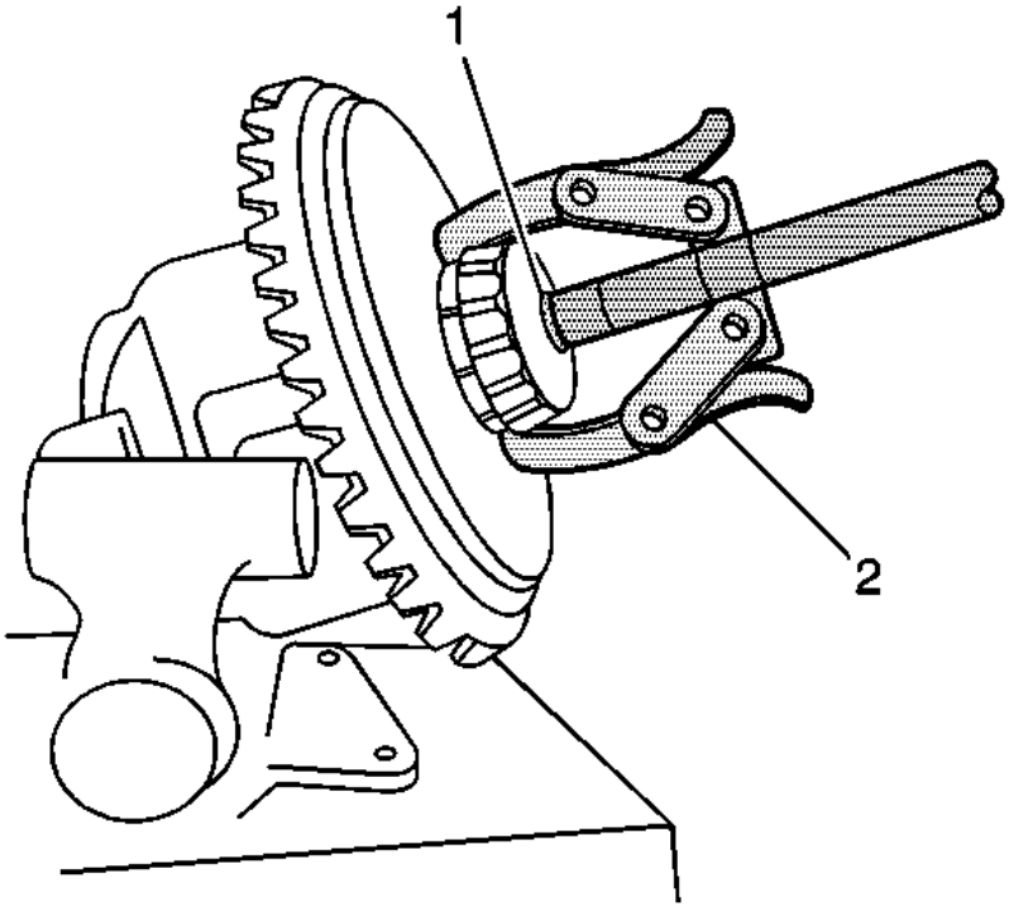


Fig. 160: View Of Differential Side Bearing
Courtesy of GENERAL MOTORS CORP.

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

2. Remove the differential assembly from the vise.

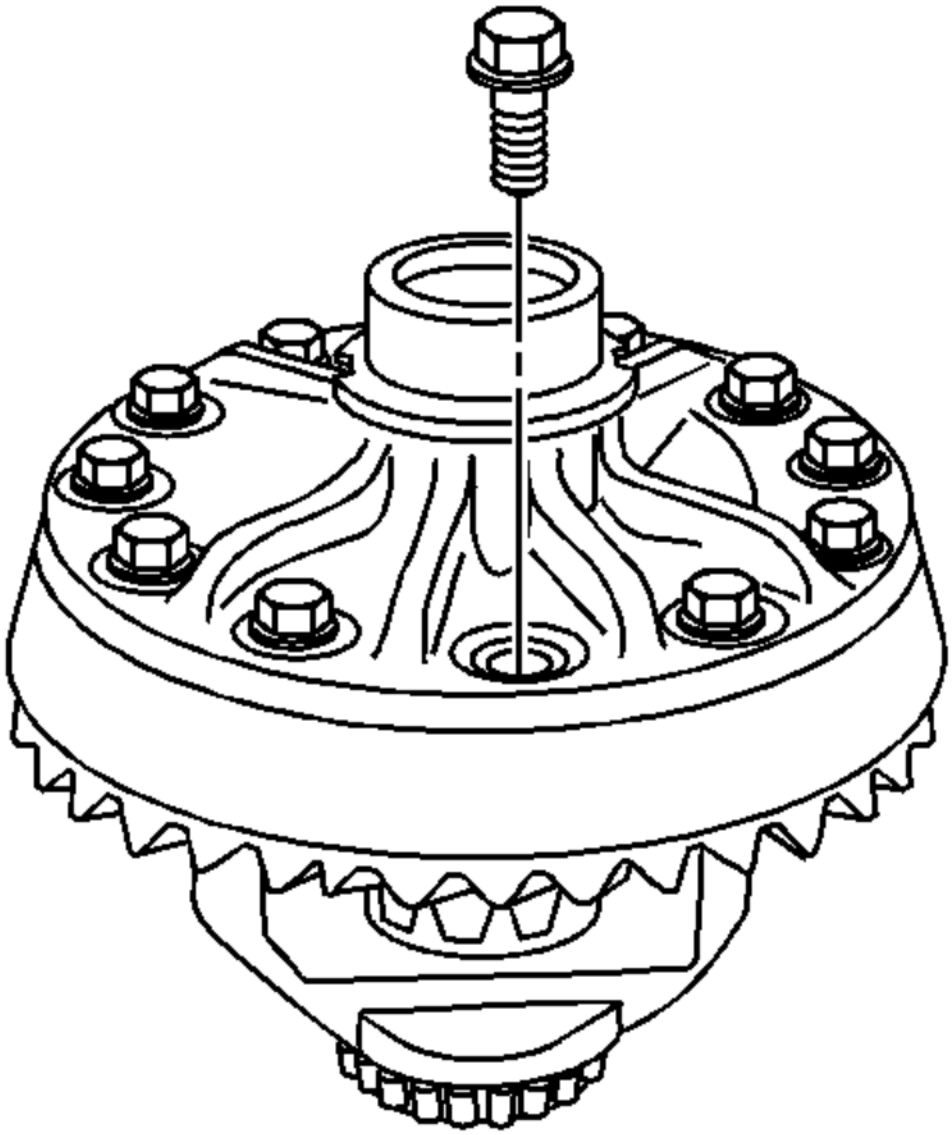


Fig. 161: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

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

3. Remove the ring gear bolts. Discard the bolts.

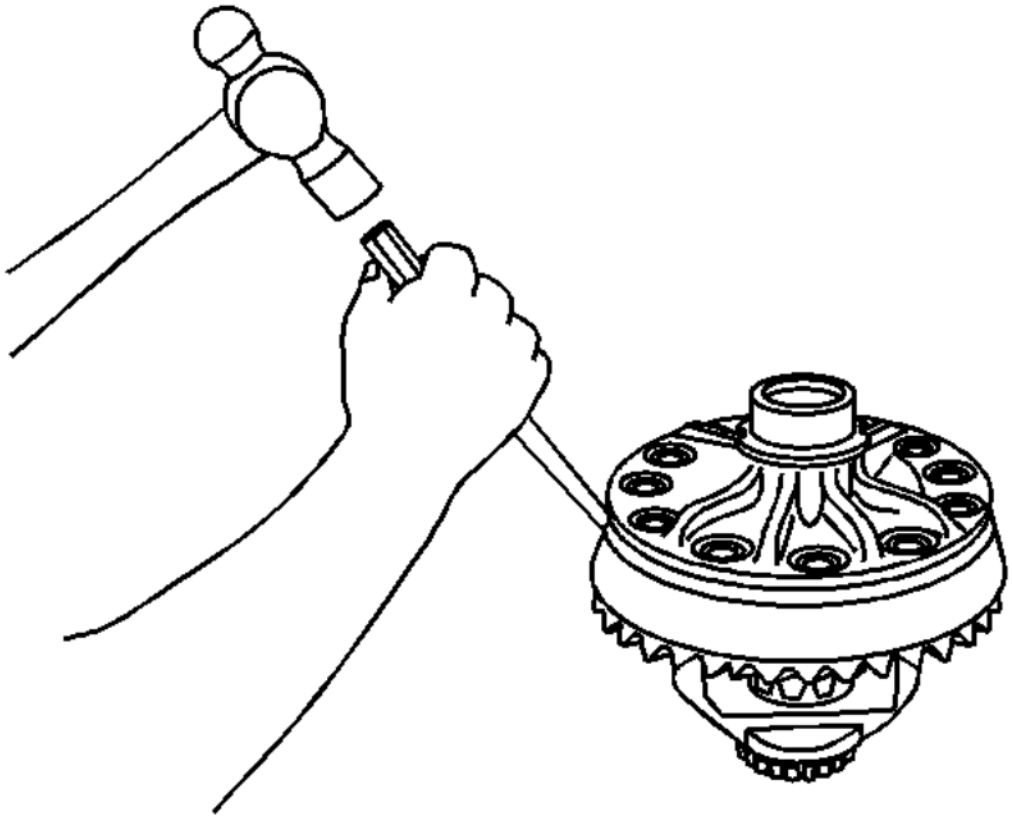


Fig. 162: View Of Ring Gear
Courtesy of GENERAL MOTORS CORP.

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

4. Remove the ring gear from the differential case.

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

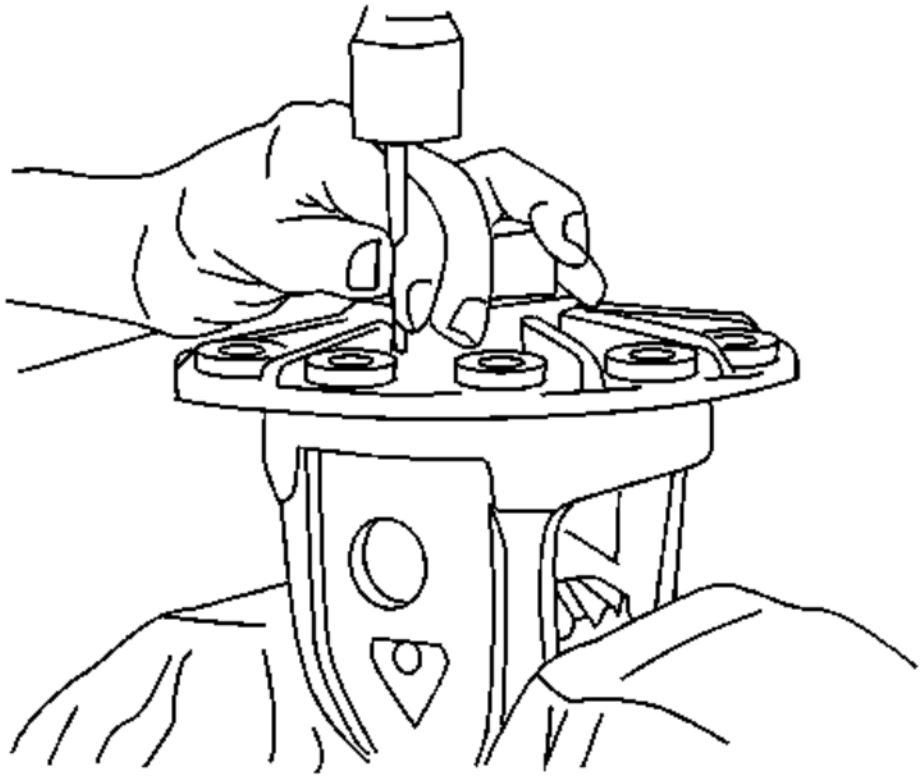


Fig. 163: Driving Out Pinion Shaft Pin (8.25 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

5. Remove the pinion shaft pin.

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

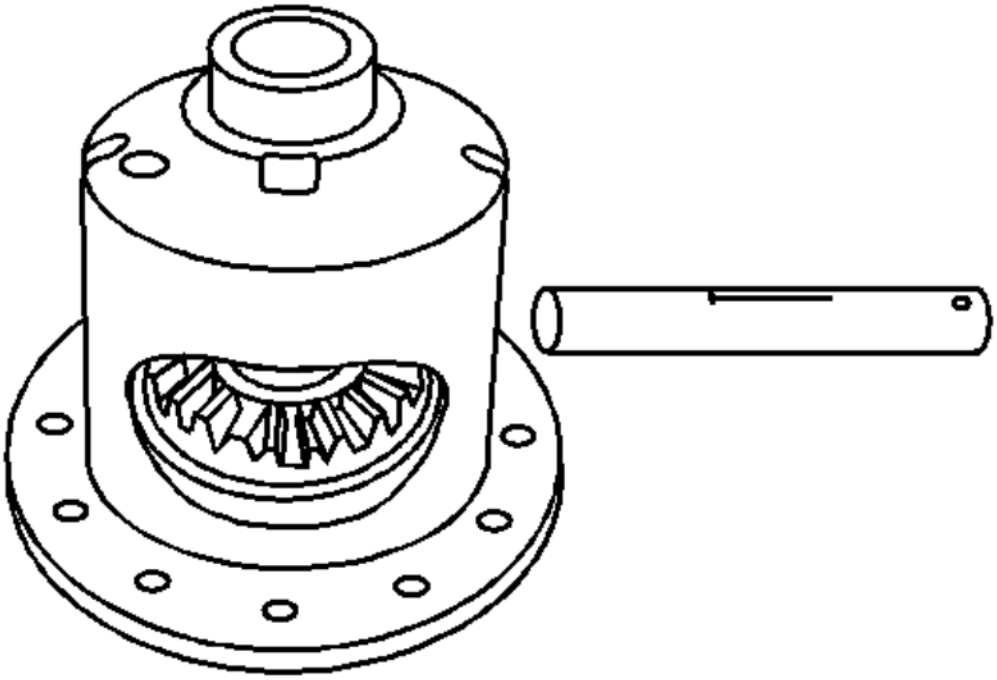


Fig. 164: View Of Differential And Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

6. Remove the pinion shaft.

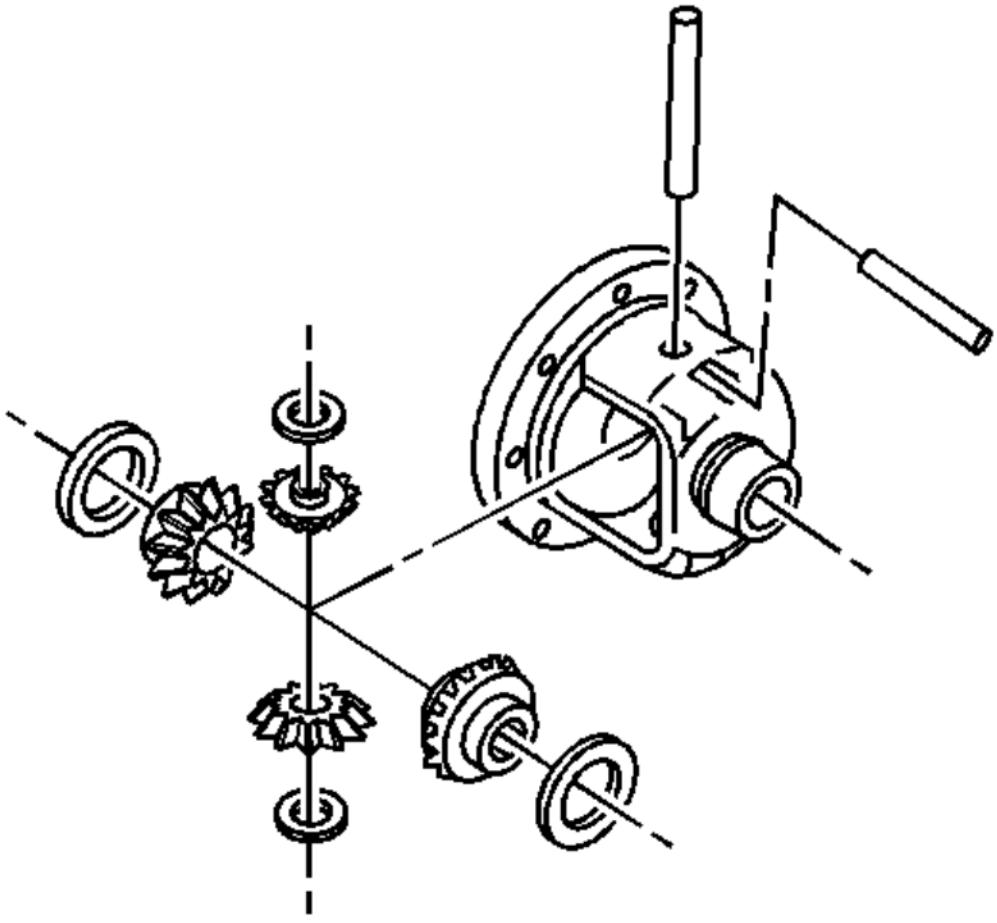


Fig. 165: Exploded View Of Differential Case
Courtesy of GENERAL MOTORS CORP.

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.

DIFFERENTIAL CASE ASSEMBLY DISASSEMBLE (9.25 INCH AXLE)

Tools Required

- **J 22888-D** Side Bearing Remover Kit. See **Special Tools**.
- **J 36597** Side Bearing Puller Pilot - 9. See **Special Tools**.25 in Axle

Disassemble

1. Remove the differential side bearing by performing the following steps:
    1. Place the differential case in a vise.

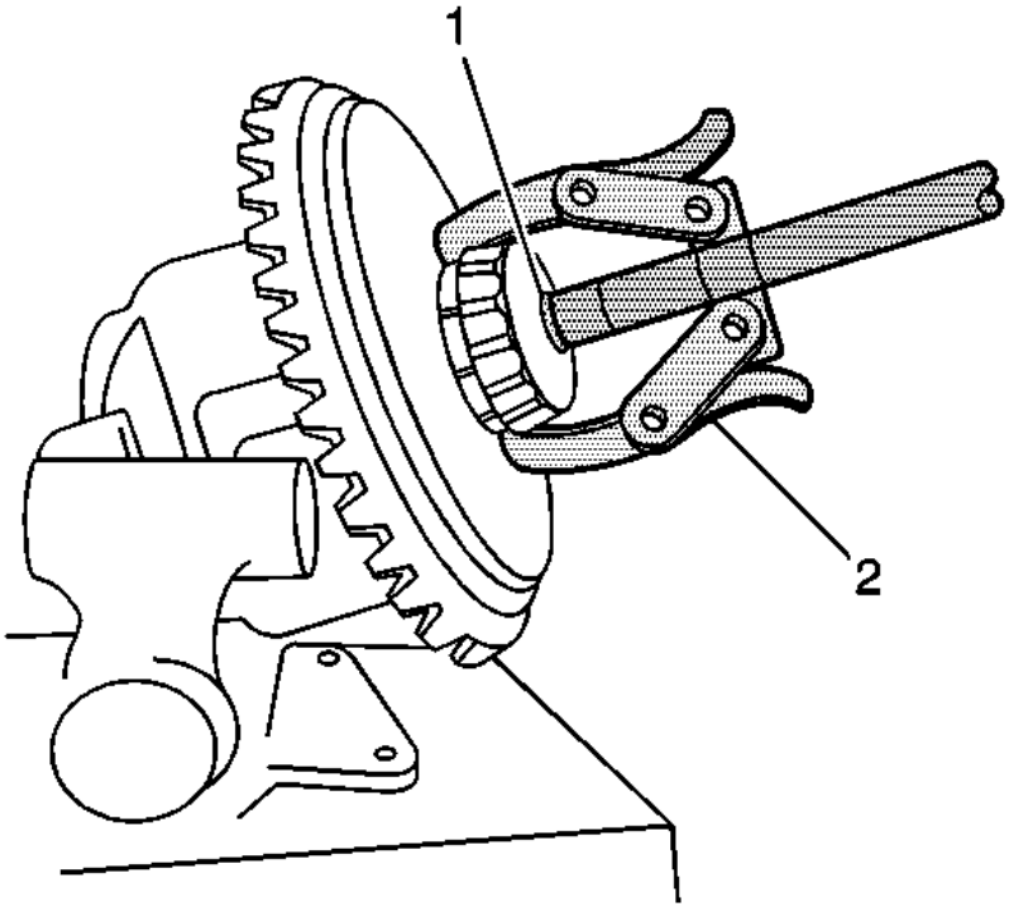


Fig. 166: View Of Differential Side Bearing

Courtesy of GENERAL MOTORS CORP.

2. Install the **J 22888-20A** (2) and the **J 36597** (1) as shown. See **Special Tools**.
3. Remove the differential side bearings using the**J 22888-20A** .

2. Remove the differential assembly from the vise.

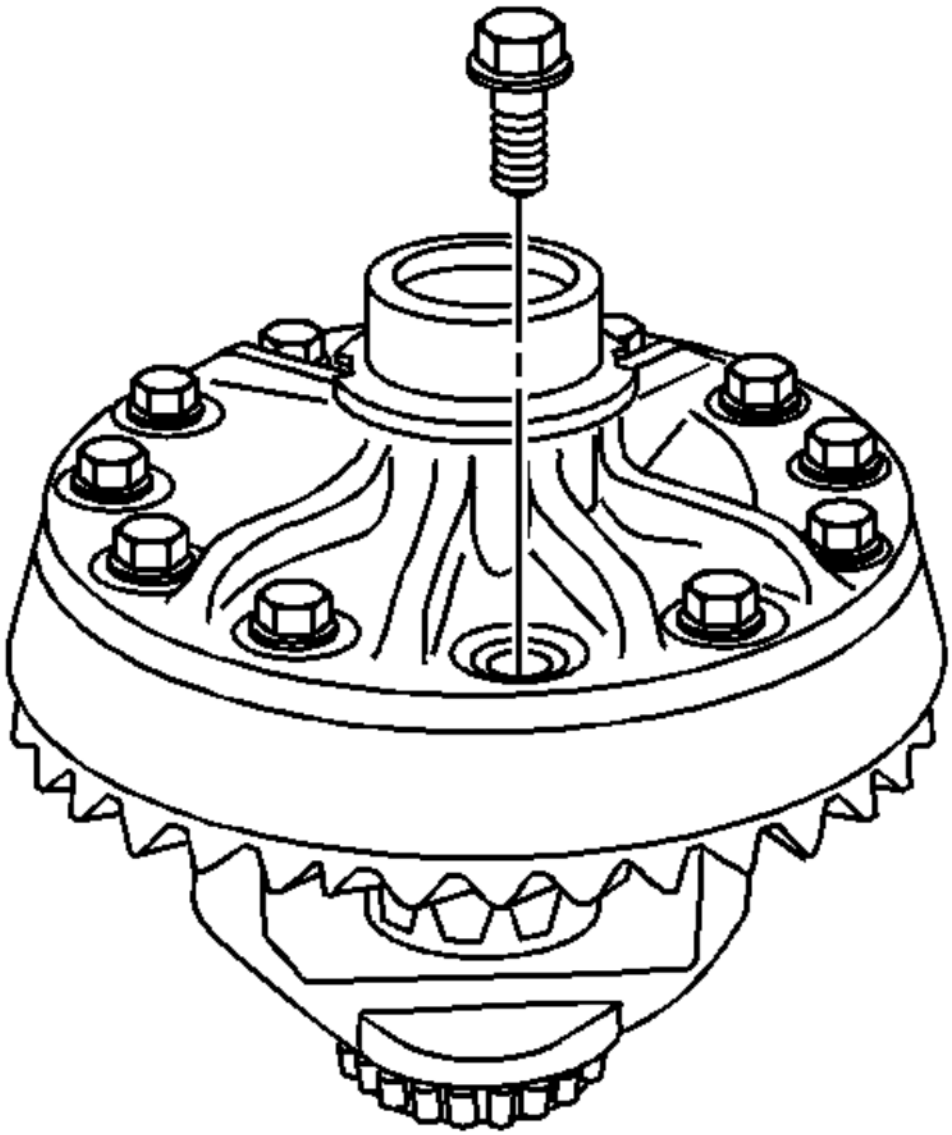


Fig. 167: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

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

3. Remove the ring gear bolts. Discard the bolts.

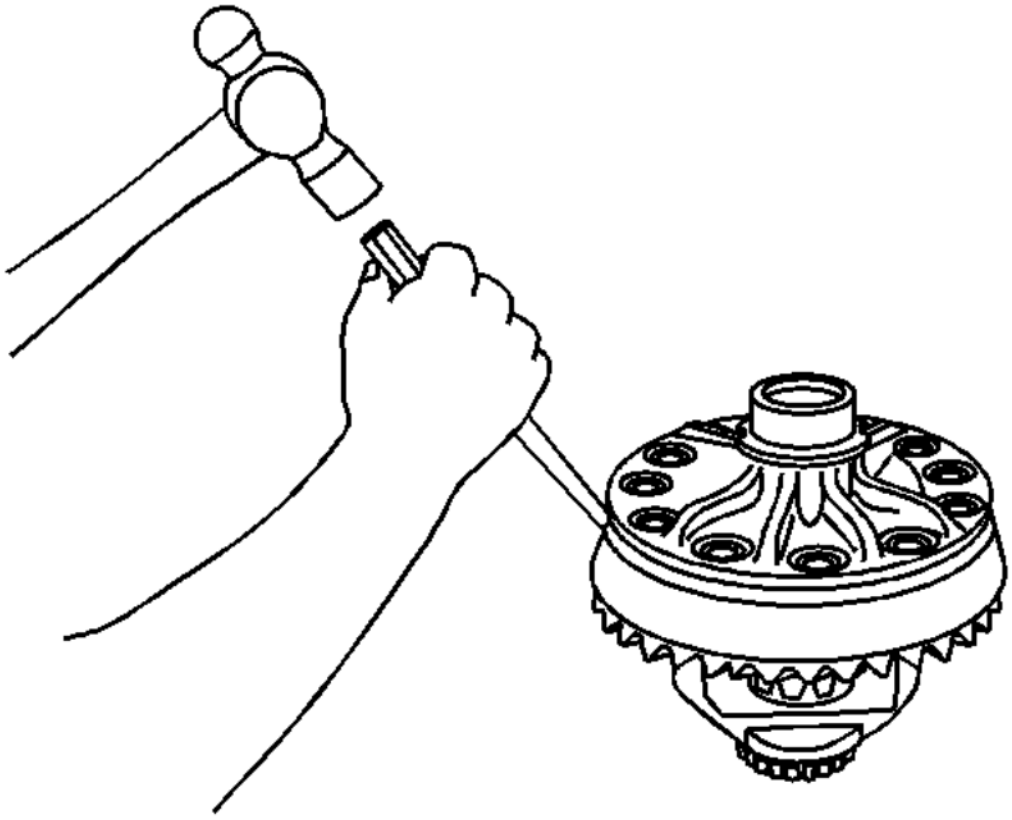


Fig. 168: View Of Ring Gear
Courtesy of GENERAL MOTORS CORP.

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

4. Remove the ring gear from the differential case.

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

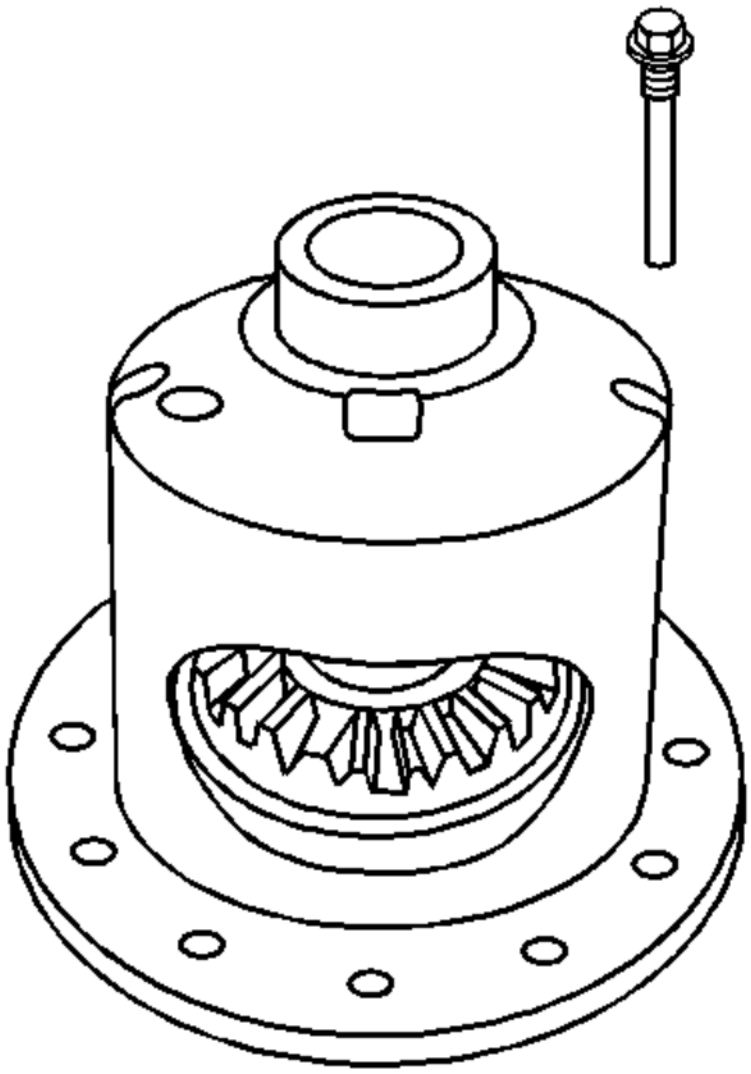


Fig. 169: View Of Pinion Shaft Lock Bolt
Courtesy of GENERAL MOTORS CORP.

5. Remove the pinion shaft lock bolt.

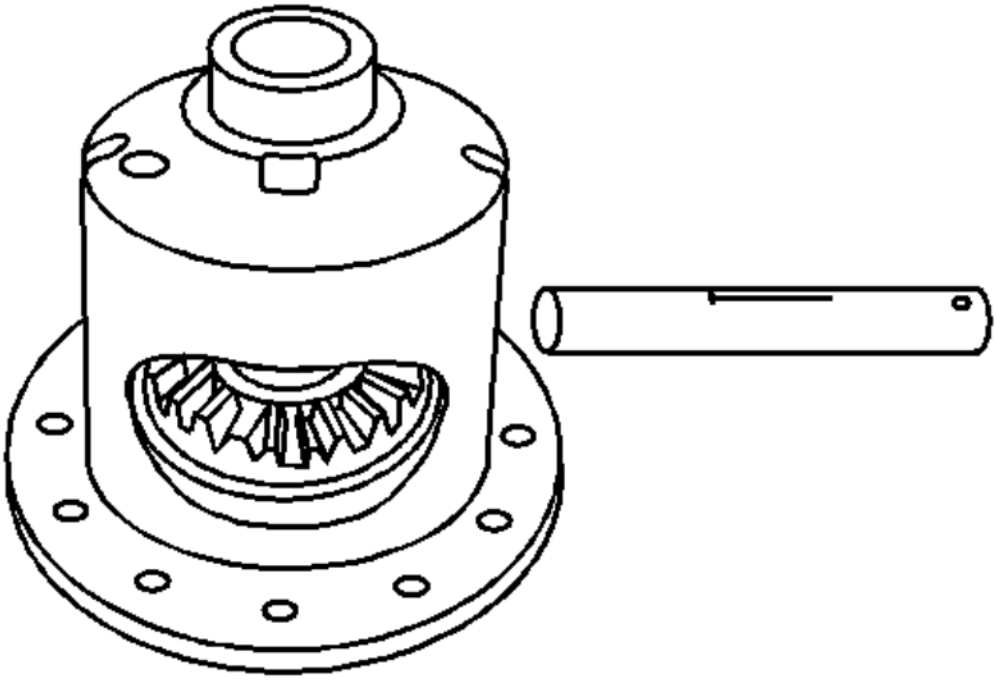


Fig. 170: View Of Differential And Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

6. Remove the pinion shaft.
7. Remove the differential side gear spacers.

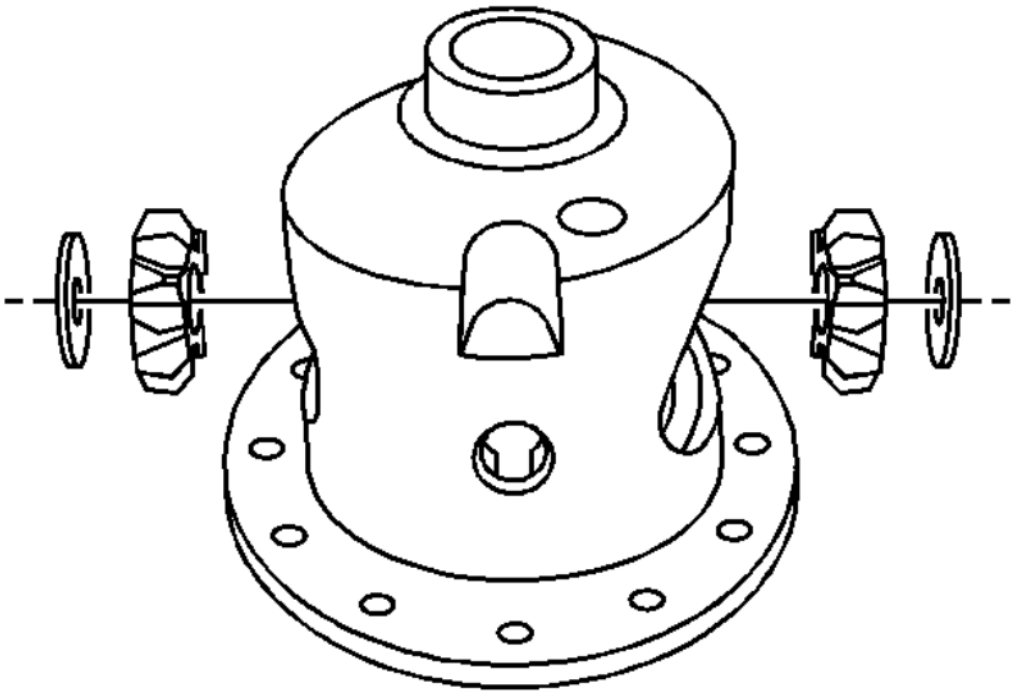


Fig. 171: Identifying Differential Pinion Gears & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

8. Remove the differential pinion gears and thrust washers by performing the following steps:
    1. Drive the pinion gear thrust washers out from the differential case using a hammer and a brass drift.
    2. Roll the differential pinion gears out of the differential case.

    Mark the pinion gears and thrust washers top and bottom.

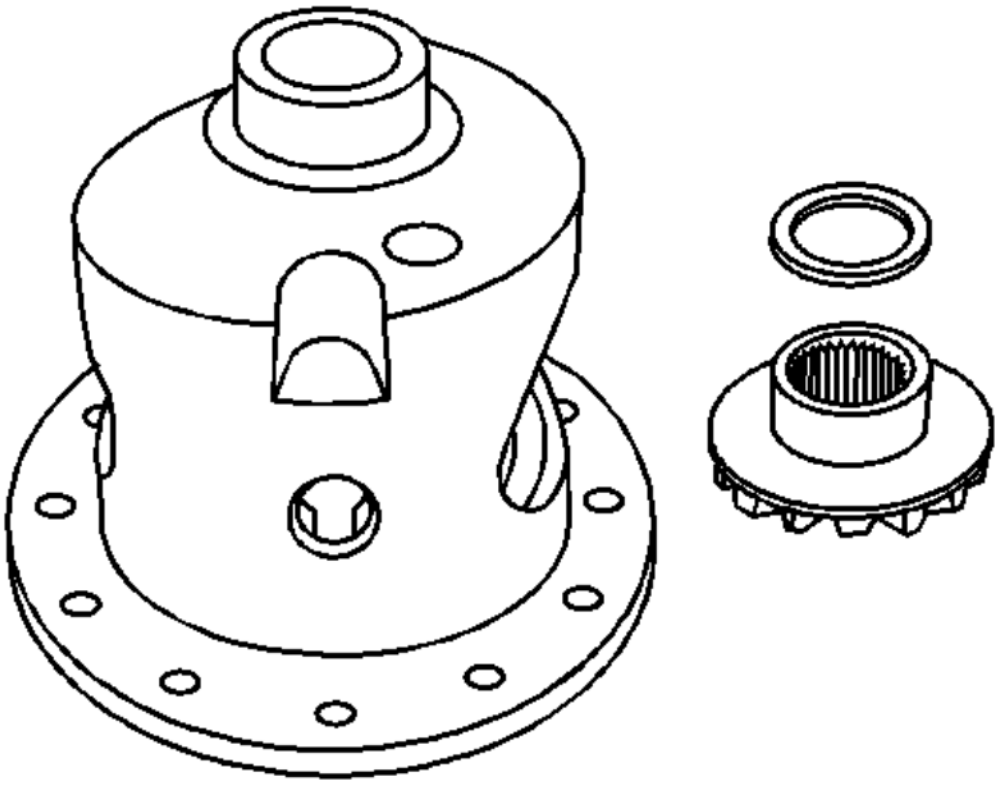


Fig. 172: Differential Side Gears & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

9. Remove the differential side gears and thrust washers.

   Mark the differential side gears and thrust washers left and right.

DIFFERENTIAL CASE BEARINGS INSPECTION

IMPORTANT:

- **When replacing the worn or cracked bearings and the cups, replace the bearings in sets.**
- **The low mileage bearings may have very small scratches and pits on the rollers and the bearing cups from the initial preload.**

Do not replace a bearing for this reason.

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

DIFFERENTIAL CASE AND GEARS INSPECTION

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

PINION AND RING GEAR INSPECTION

1. The ring and pinion gears are matched sets and must be replaced any time a replacement of either is necessary.
2. Inspect the pinion and the ring gear teeth for the following conditions:
   - Cracking
   - Chipping
   - Scoring

- Excessive wear

3. Inspect the pinion gear splines for wear.
4. Inspect the pinion flange splines for wear.
5. Inspect the fit of the pinion flange on the pinion gear.
6. Inspect the sealing surface of the pinion flange for nicks, burrs, or rough tool marks which will damage the inside diameter of the pinion seal and result in an oil leak.
7. Inspect all of the parts for wear and replace as necessary.

THRUST WASHERS, SHIMS, AND ADJUSTER SLEEVES INSPECTION

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

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

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

DIFFERENTIAL CASE ASSEMBLY ASSEMBLE (8.25 INCH AXLE)

Tools Required

- **J 8092** Universal Driver Handle - 3/4 in - 10
- **J 22761** Differential Side Bearing Installer. See **Special Tools**.
- **J 22888-D** Side Bearing Remover Kit. See **Special Tools**.

Assemble

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

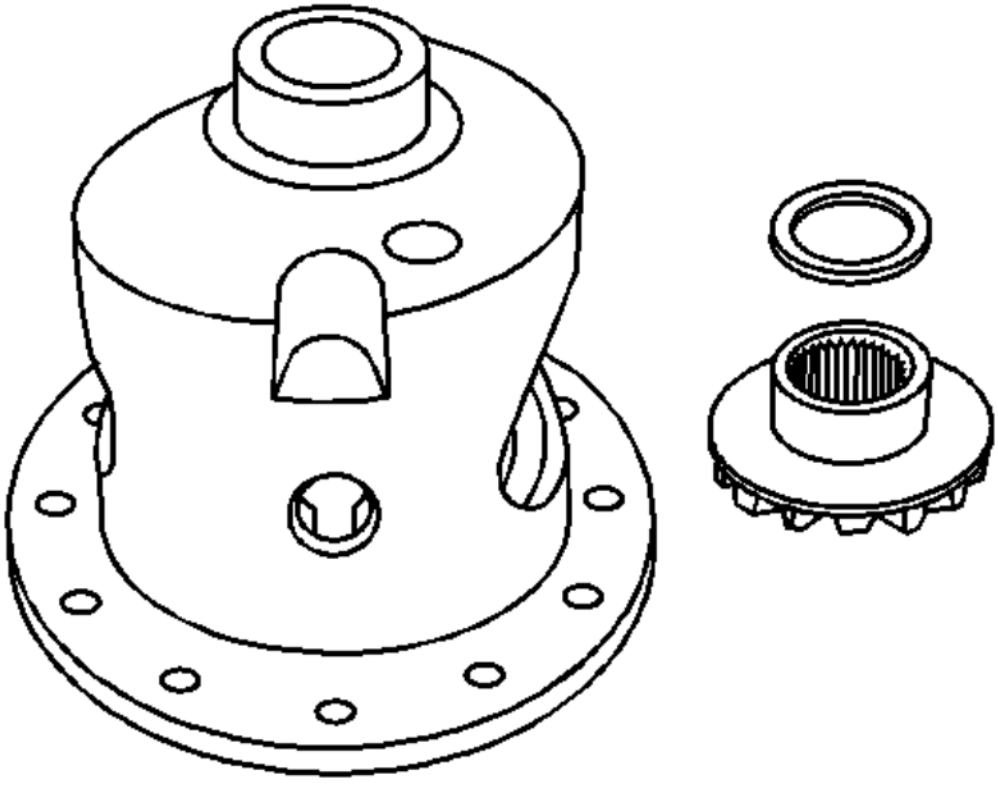


Fig. 173: Differential Side Gears & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

2. Install the thrust washers and the differential side gears 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.

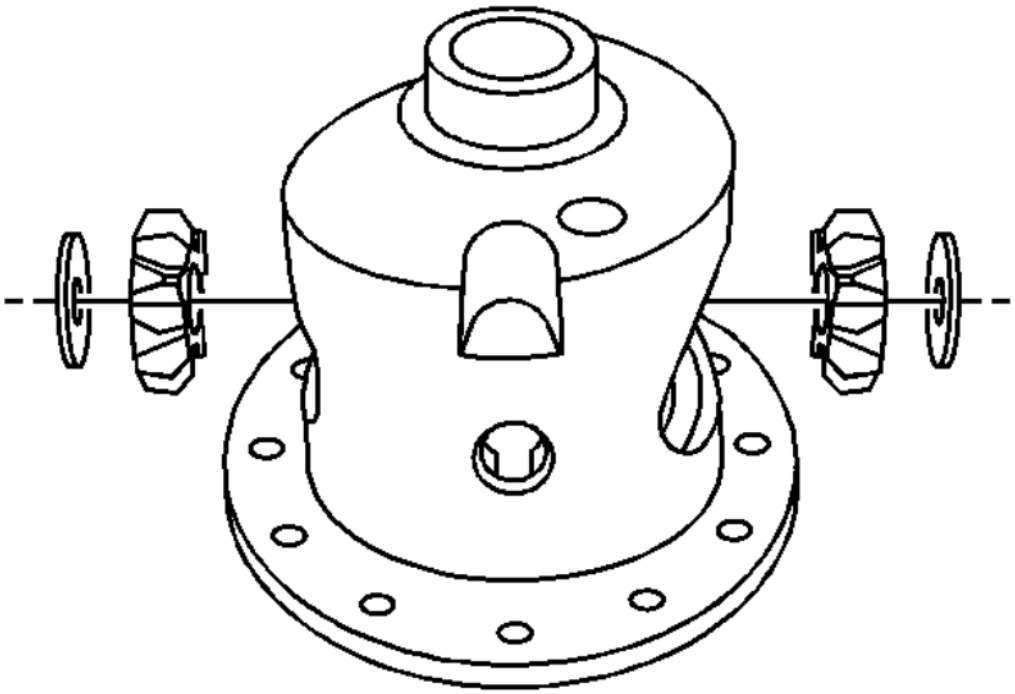


Fig. 174: Identifying Differential Pinion Gears & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

3. Install the differential pinion gears 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.

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

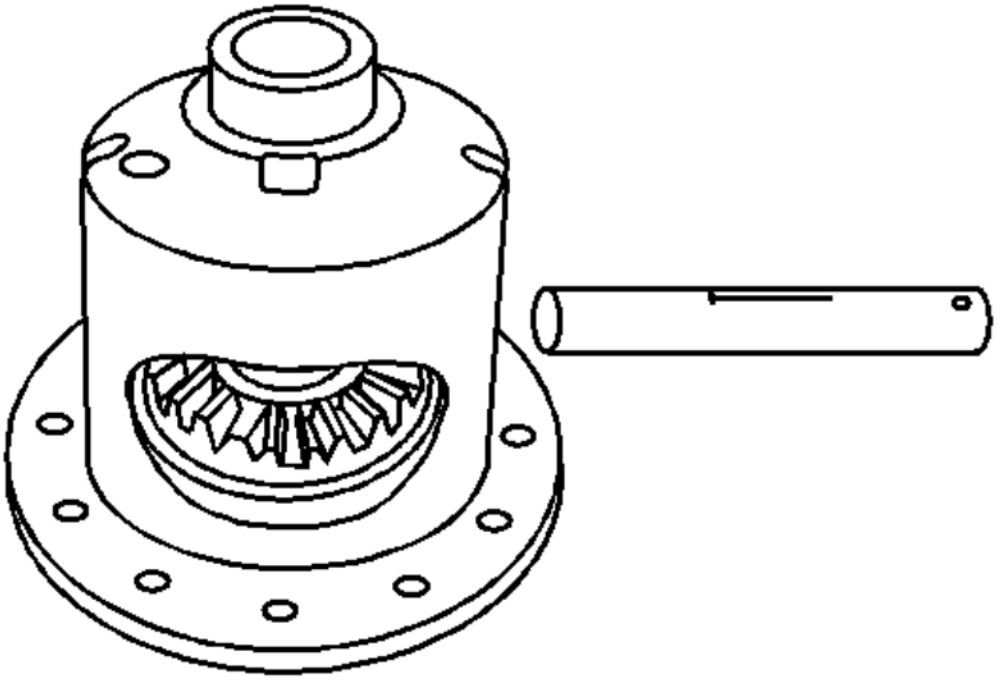


Fig. 175: View Of Differential And Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

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

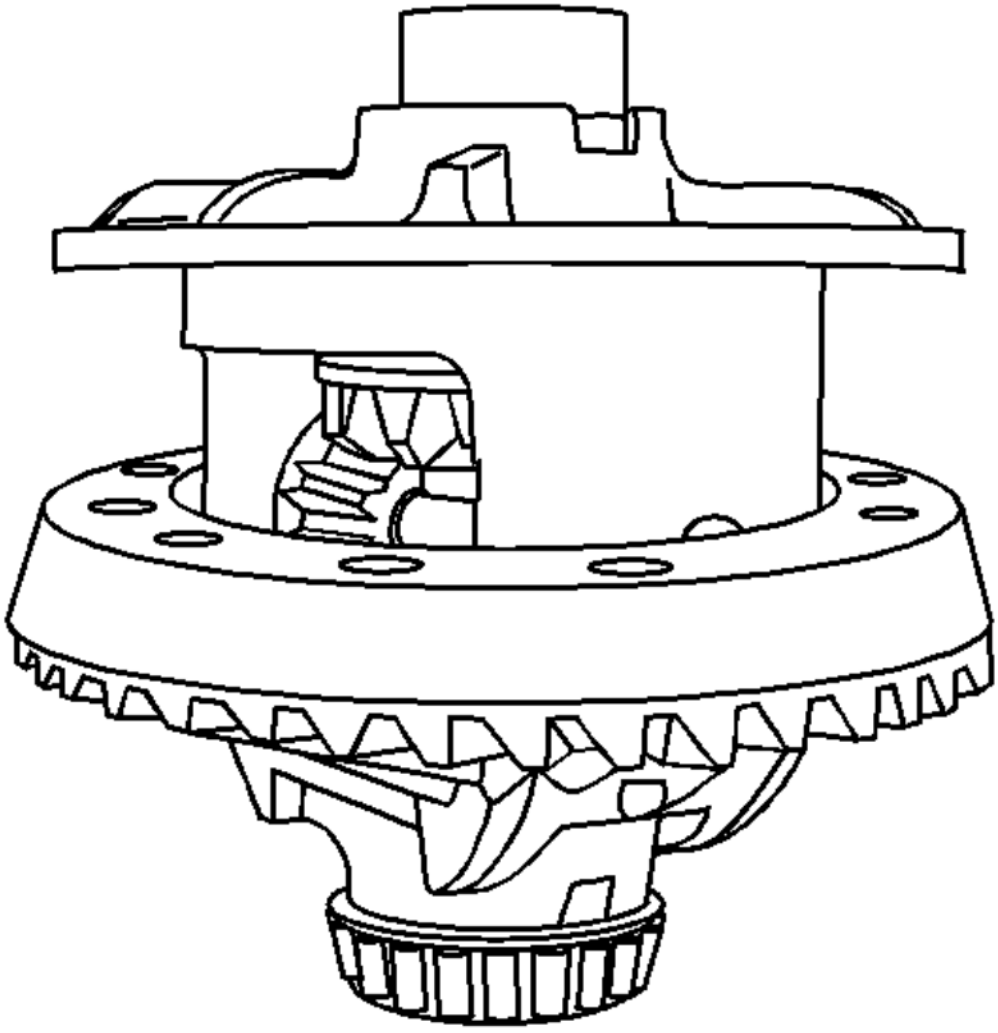


Fig. 176: Ring Gear & Differential Case
Courtesy of GENERAL MOTORS CORP.

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

7. Install the ring gear onto the differential case.

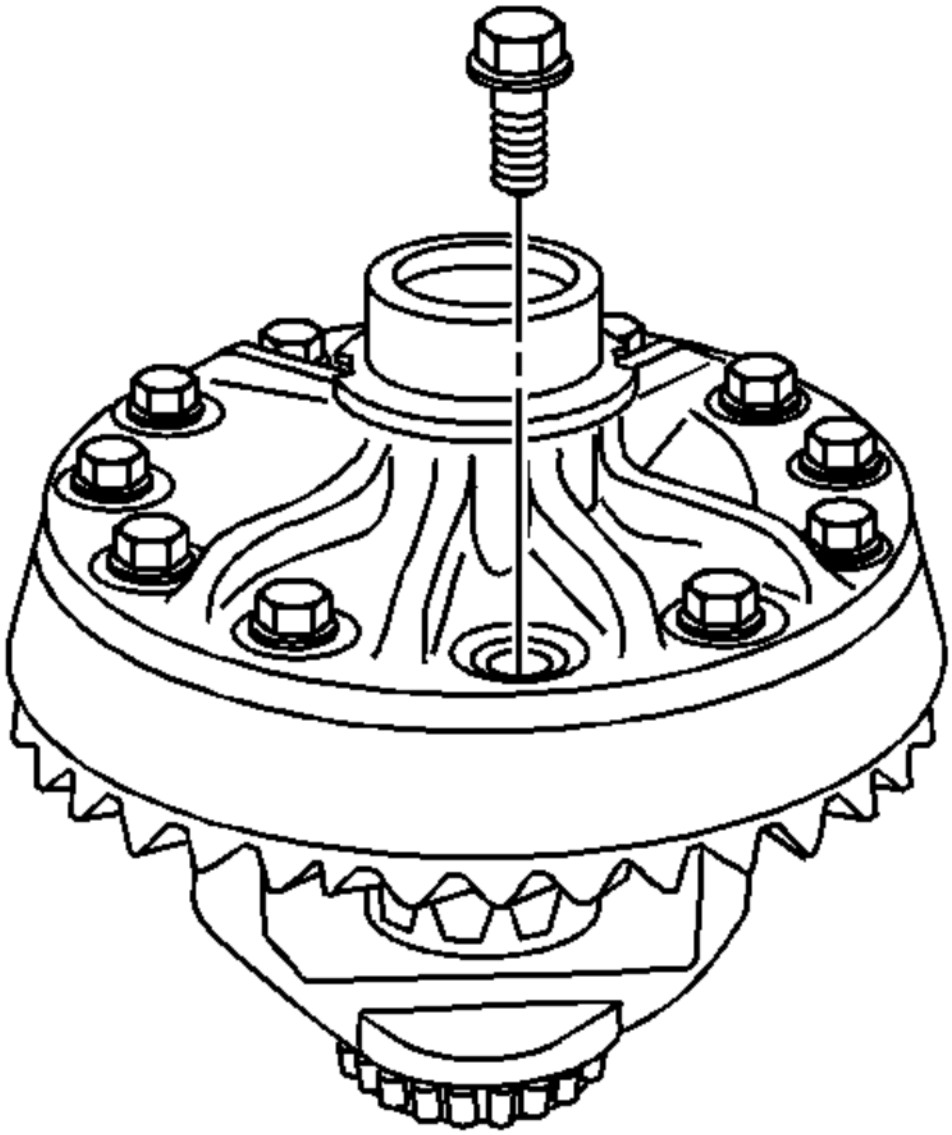


Fig. 177: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

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

8. Install the new ring gear bolts.

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

NOTE: Refer to Fastener Notice .

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

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

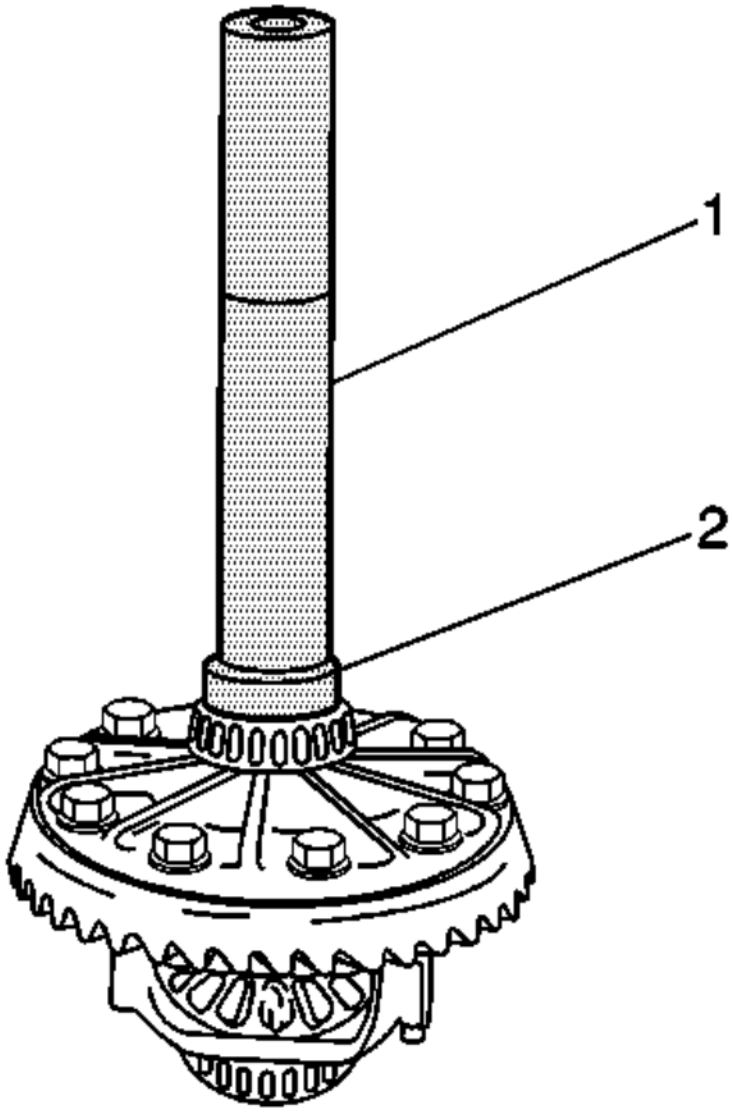


Fig. 178: Identifying Differential Side Bearing Components
Courtesy of GENERAL MOTORS CORP.

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

2. Install the **J 22761** (2) and the **J 8092** (1) onto the differential case bearing as shown. See **Special Tools**.
3. Drive the differential case bearing onto the case using the **J 22761** and the **J 8092** . See **Special Tools**.

DIFFERENTIAL CASE ASSEMBLY ASSEMBLE (9.25 INCH AXLE)

Tools Required

- **J 8092** Universal Driver Handle - 3/4 in - 10
- **J 29710** Differential Side Bearing Installer. See **Special Tools**.
- **J 36597** Side Bearing Puller Pilot - 9. See **Special Tools**.25 in Axle

Assemble

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

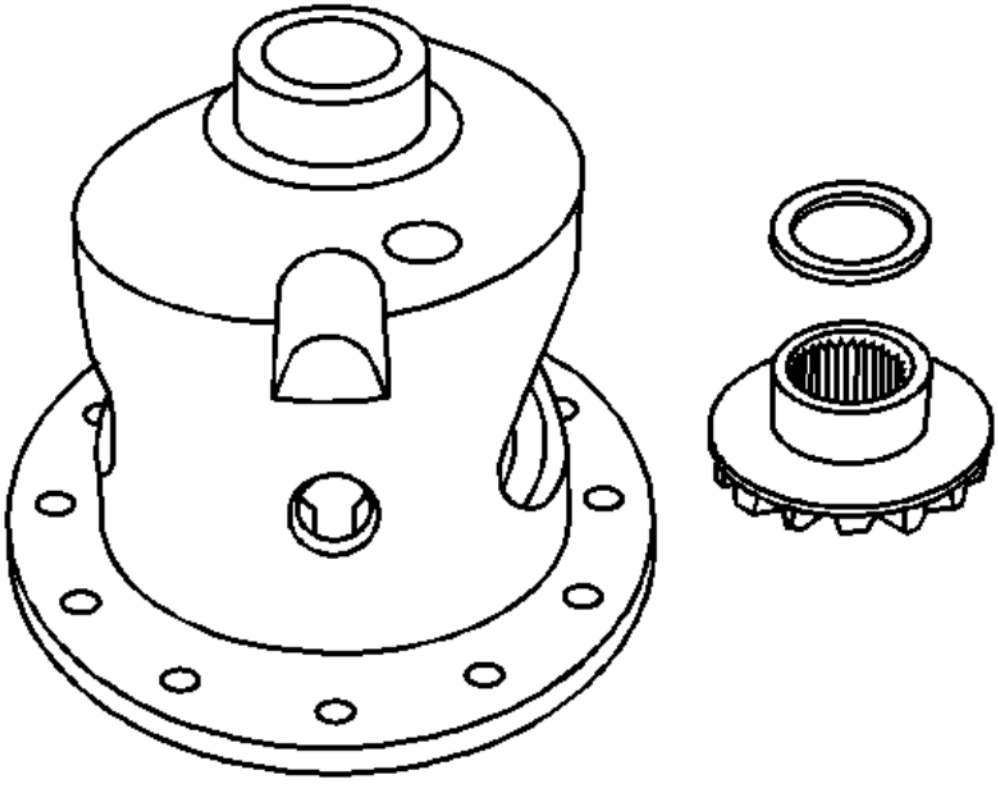


Fig. 179: Differential Side Gears & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

2. Install the thrust washers and the differential side gears 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.

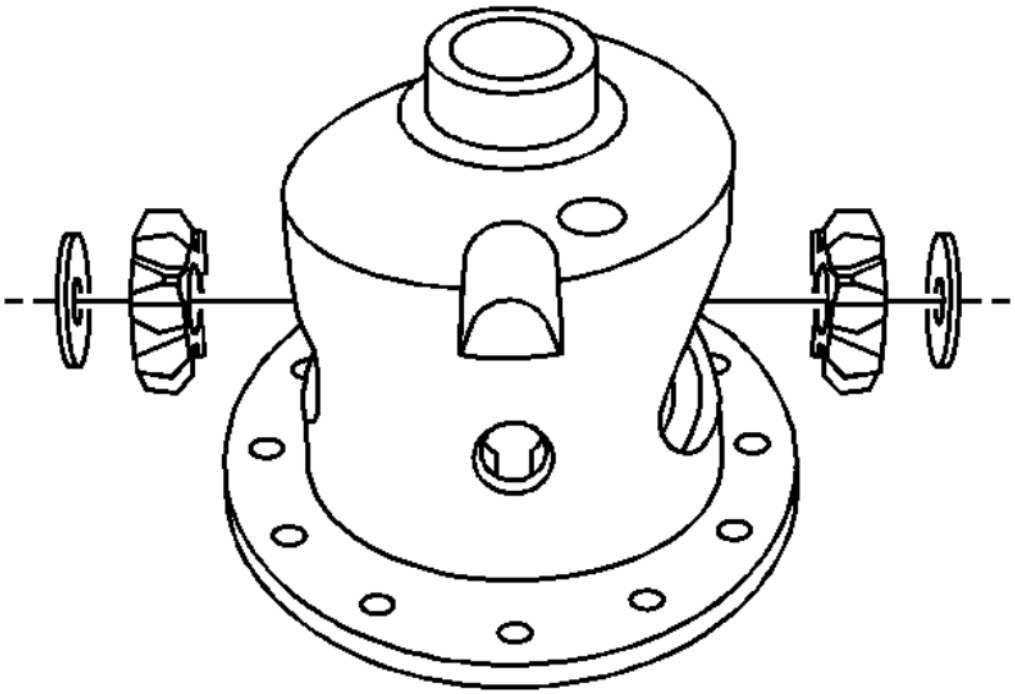


Fig. 180: Identifying Differential Pinion Gears & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

3. Install the differential pinion gears 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 in between the pinion gear and differential case using a hammer and brass drift.
5. Install the differential side gear spacers.

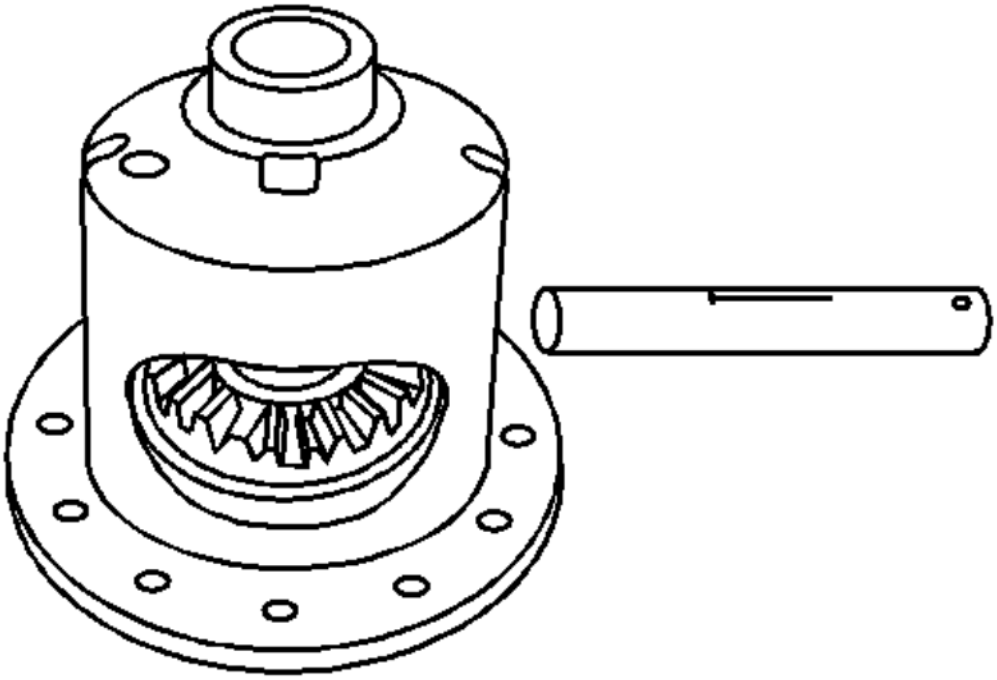


Fig. 181: View Of Differential And Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

6. Install the pinion gear shaft.

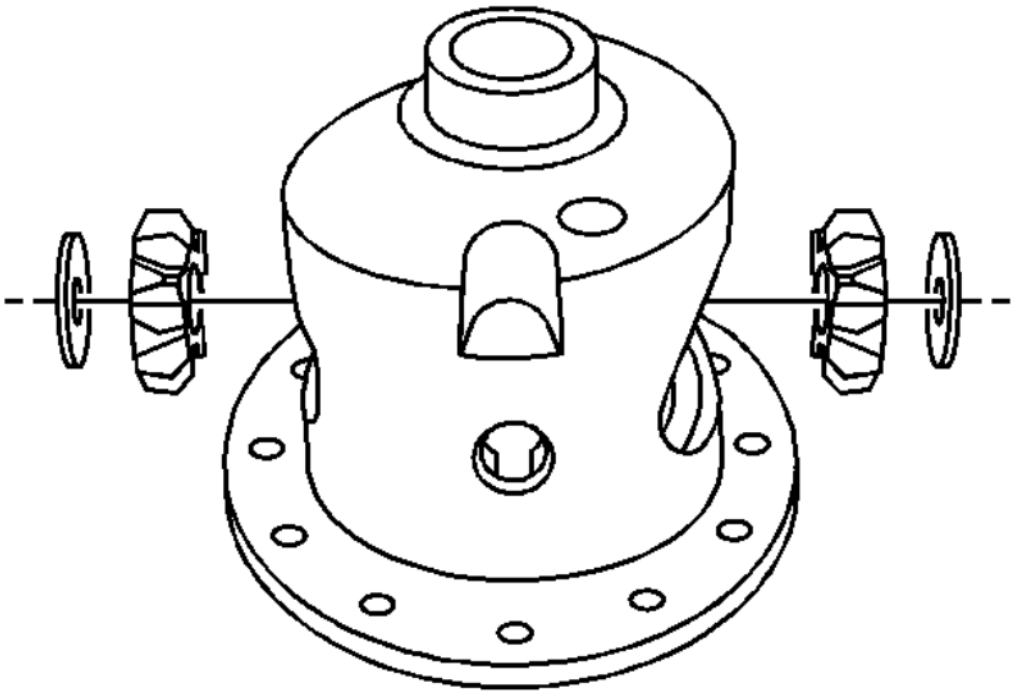


Fig. 182: Identifying Differential Pinion Gears & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

7. Install the pinion shaft lock bolt.

   Tighten: Tighten the pinion shaft lock bolt to 53 N.m (39 lb ft).

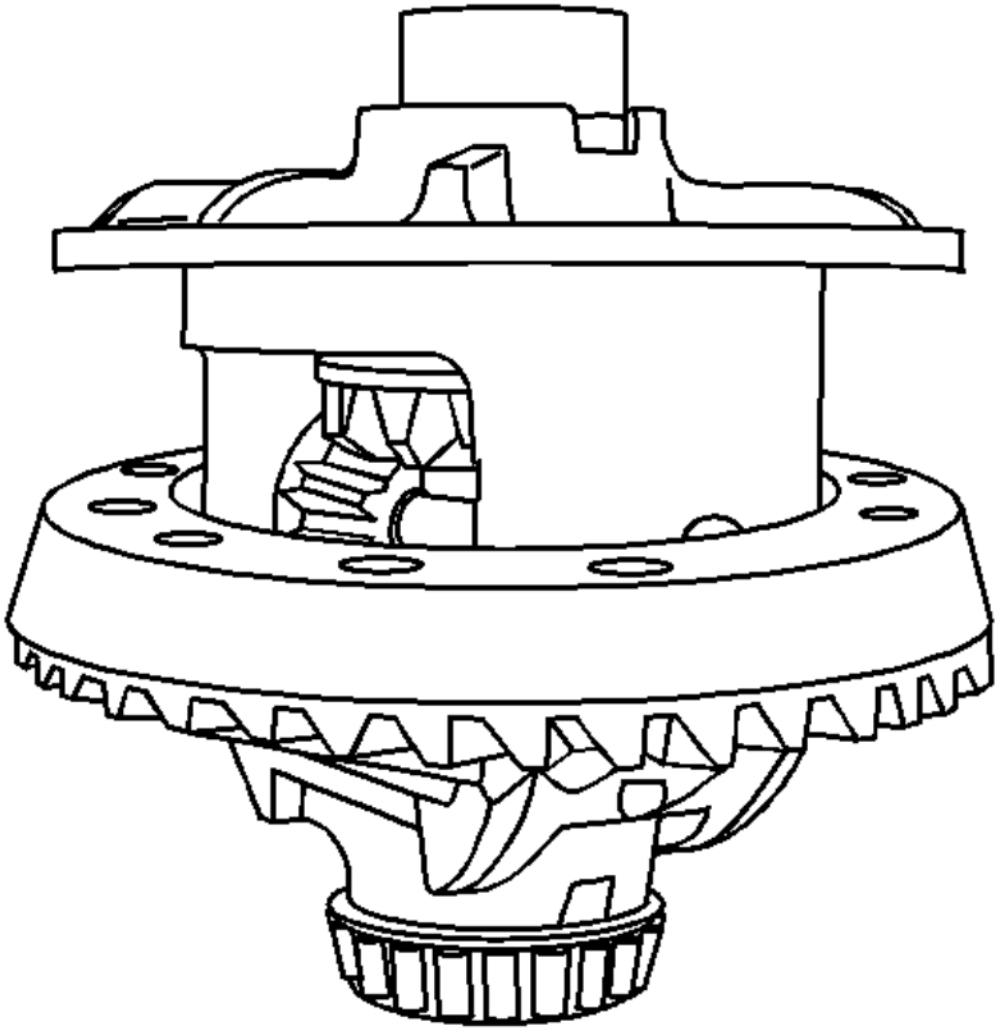


Fig. 183: Ring Gear & Differential Case
Courtesy of GENERAL MOTORS CORP.

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

8. Install the ring gear onto the differential case.

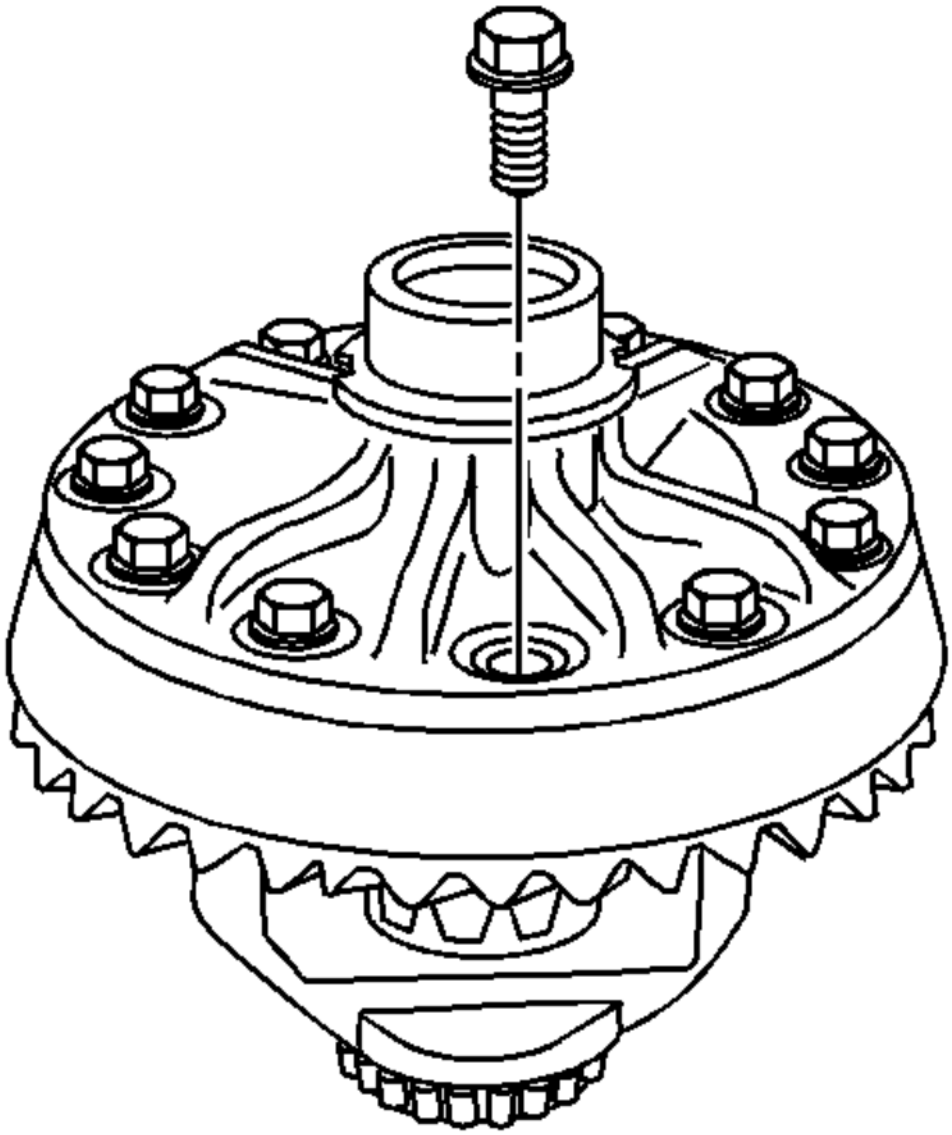


Fig. 184: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

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

9. Install the new ring gear bolts.

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

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

    Tighten: Tighten the ring gear bolts in sequence to 138 N.m (102 lb ft).

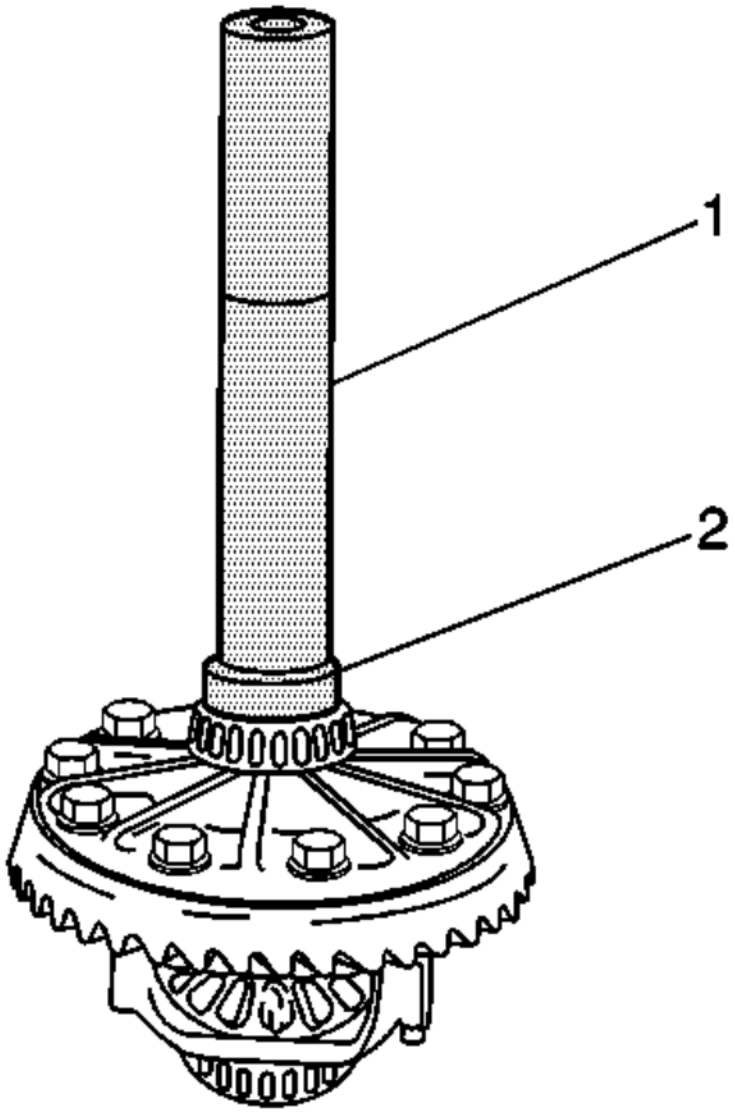


Fig. 185: Identifying Differential Side Bearing Components
Courtesy of GENERAL MOTORS CORP.

11. Install the differential side bearings by performing the following steps:
    1. In order to protect the differential case, install the **J 36597** in the case on the side opposite the bearing installation. See **Special Tools**.
    2. Install the **J 29710** (2) and the **J 8092** (1) onto the differential case bearing as shown. See **Special Tools**.
    3. Drive the differential case bearing onto the case using the **J 29710** and the **J 8092** . See **Special Tools**.

FRONT DIFFERENTIAL DRIVE PINION GEAR BEARING CUP INSTALLATION (9.25 INCH INCH AXLE W/J 45754)

Tools Required

J 45754 Pinion Bearing Race Remover/Installer - 9. See **Special Tools**.25 in Axle

Installation

1. Before assembly, lubricate the following parts with axle lubricant. Use the correct fluid. Refer to **Sealers, Adhesives, and Lubricants**.
    - The pinion bearings
    - The pinion and the differential gears
    - The thrust washers
    - The pinion bearing cups

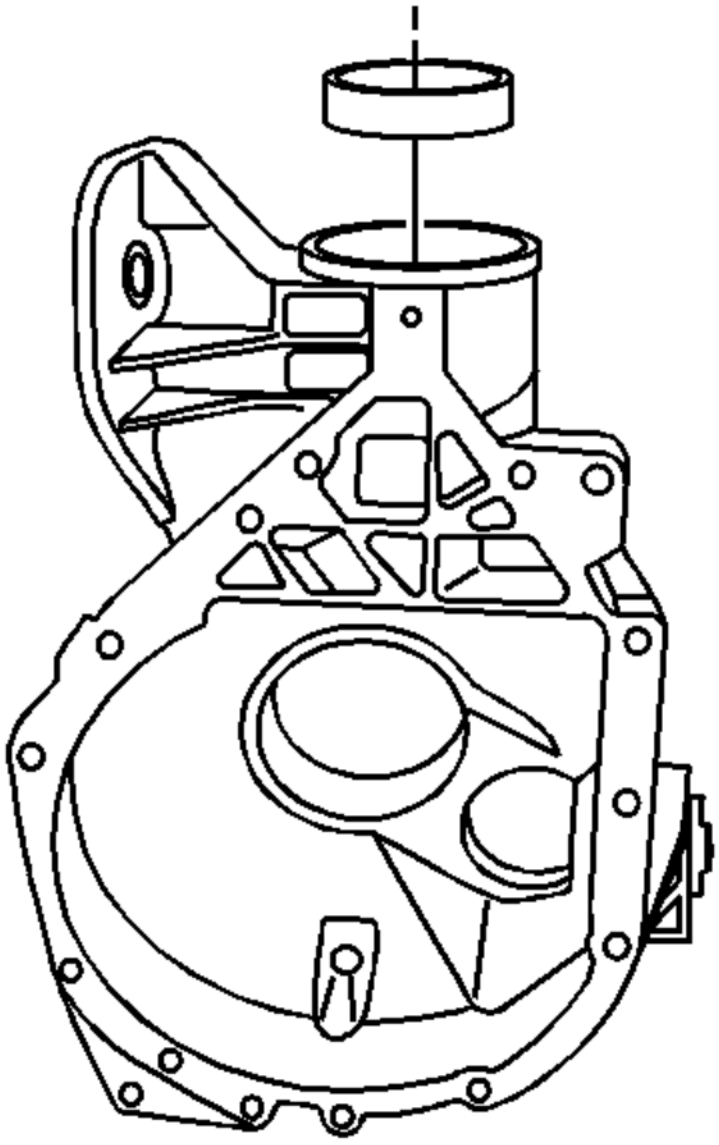


Fig. 186: Installing Outer Pinion Bearing Cup (9.25 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

2. Install the outer pinion bearing cup into the outer pinion bearing cup bore.

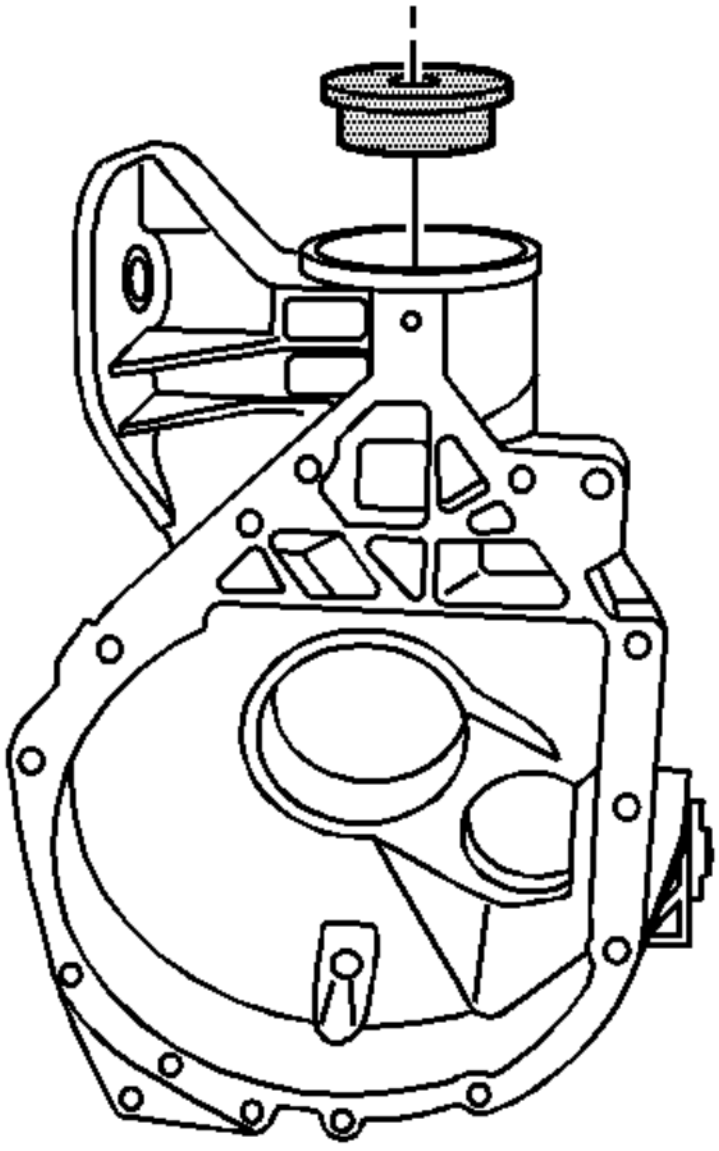


Fig. 187: Installing J 45754-1 Over The Outer Pinion Bearing Cup (9.25 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

3. Install the J 45754-1 over the outer pinion bearing cup.

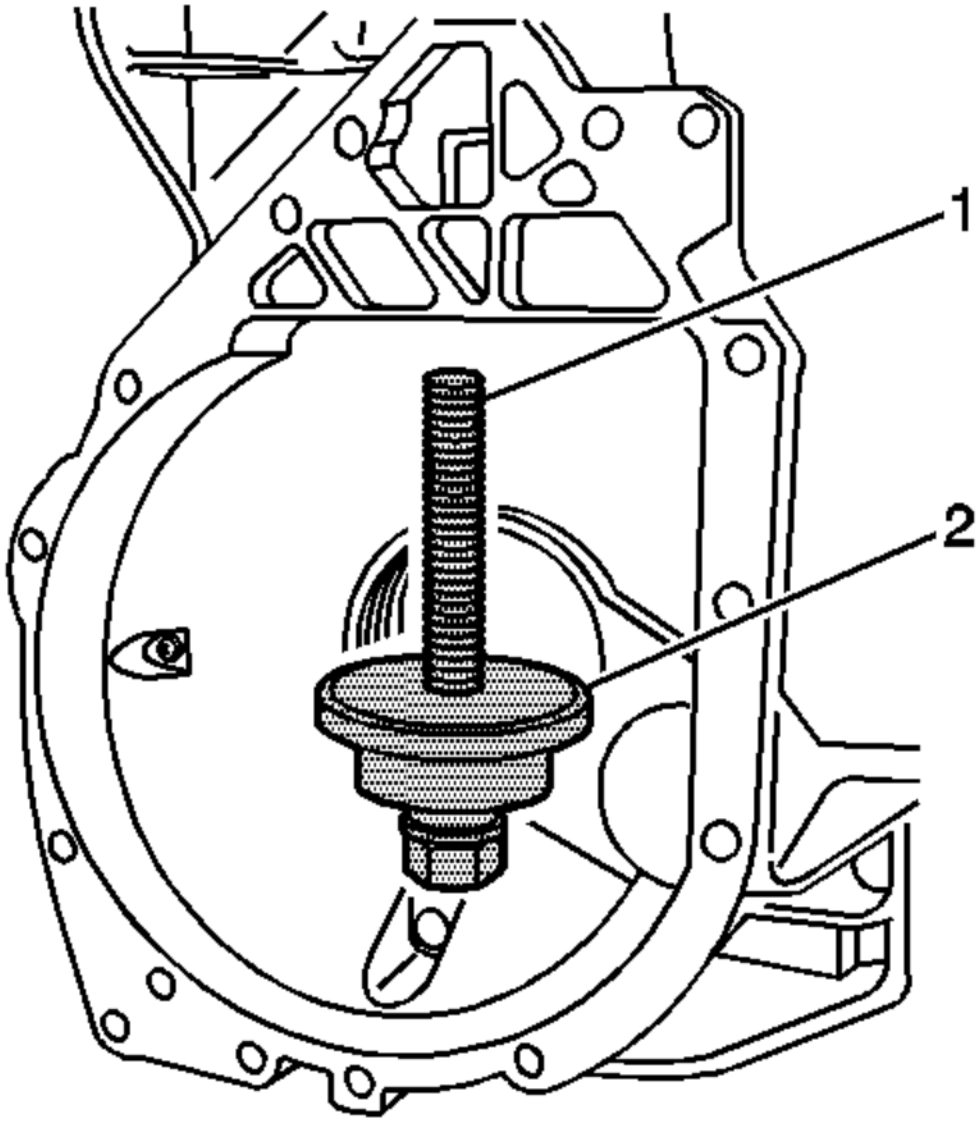


Fig. 188: Installing J 45754-2 Over Inner Pinion Bearing Cup Bore (9.25 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

4. Install the forcing screw (1), the J 45754-2 (2) into the inner pinion bearing cup bore.
5. Attach the forcing screw to the J 45754-1.

Slowly turn the forcing screw until the J 45754-1 is evenly seated over the outer pinion bearing cup bore and the J 45754-2 with the inner pinion bearing cup is evenly seated over the inner pinion bearing cup bore.

6. Turn the forcing screw 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 45754** and the outer pinion bearing cup and reposition the outer pinion bearing cup. See **Special Tools**.

7. Tighten the forcing screw until the outer pinion bearing cup is seated in the outer pinion bearing cup bore.
8. Remove the **J 45754** . See **Special Tools**.

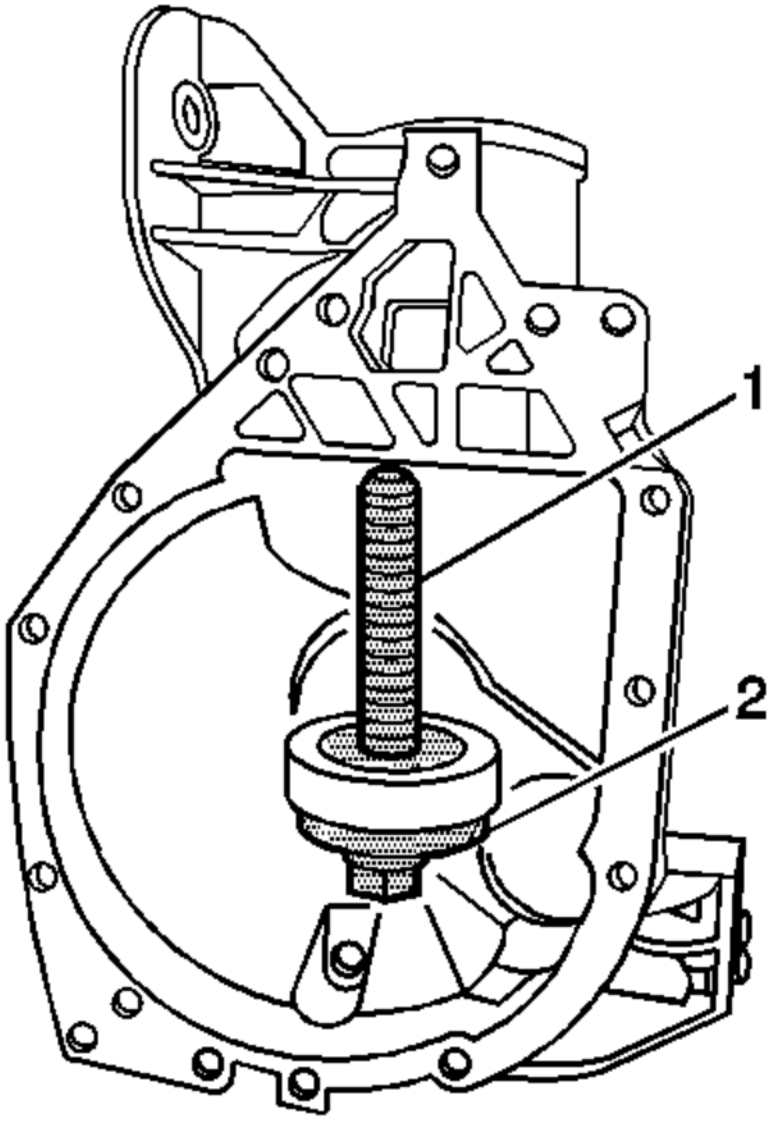


Fig. 189: Installing Inner Pinion Bearing Cup (9.25 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

9. Install the inner pinion bearing cup onto the J 45754-2 (2) and the forcing screw (1).
10. Install the J 45754-2 (2), the forcing screw (1), and the inner pinion bearing cup into the pinion bearing cup bore.

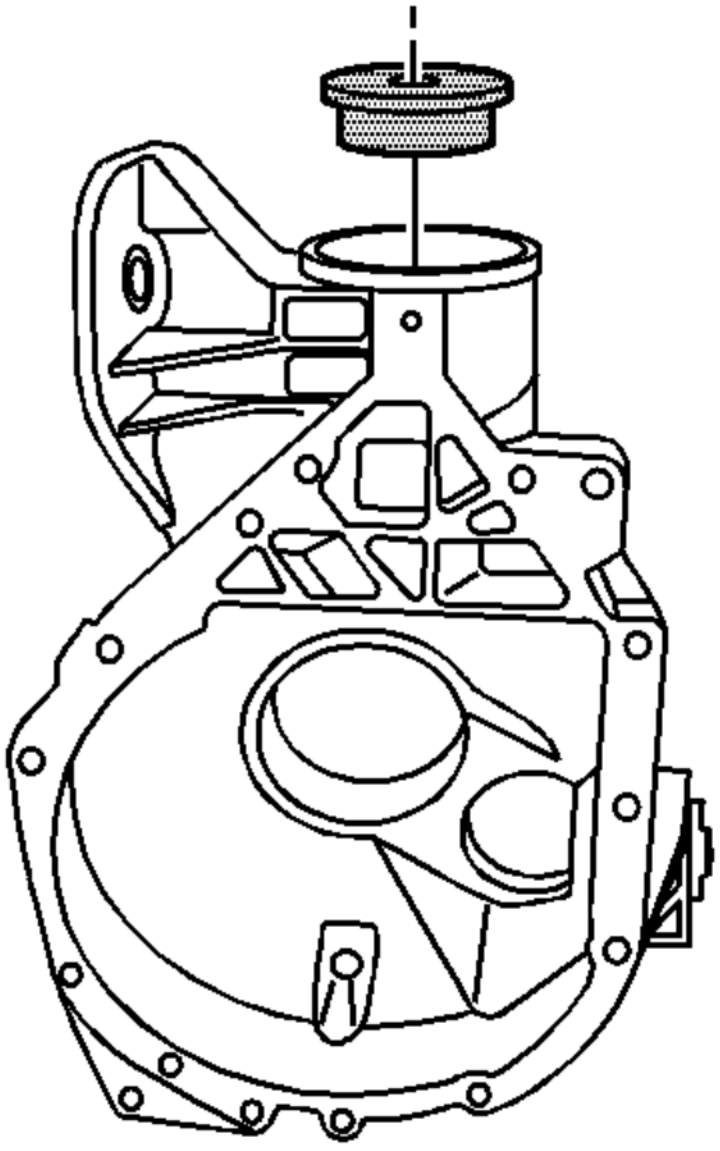


Fig. 190: Installing J 45754-1 Over The Outer Pinion Bearing Cup (9.25 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

11. Install the J 45754-1 over the outer pinion bearing cup.
12. Attach the forcing screw to the J 45754-1.

Slowly turn the forcing screw until the J 45754-1 is evenly seated over the outer pinion bearing cup bore and the J 45754-1 with the inner pinion bearing cup is evenly seated over the inner pinion bearing cup bore.

13. Turn the forcing screw 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 45754** and the inner pinion bearing cup and reposition the inner pinion bearing cup. See **Special Tools**.

14. Tighten the forcing screw clockwise until the inner pinion bearing cup is seated in the inner pinion bearing cup bore.
15. Remove the **J 45754** . See **Special Tools**.
16. Measure the pinion depth and determine the selectable pinion shim thickness. Refer to **Pinion Depth Adjustment**.

FRONT DIFFERENTIAL DRIVE PINION GEAR BEARING CUP INSTALLATION (8.25 INCH INCH AXLE W/J 45858)

Tools Required

J-45858 Pinion Bearing Race Remover/Installer - 8. See **Special Tools**.25 in Axle

Installation

1. Before assembly, lubricate the following parts with axle lubricant. Use the proper fluid. Refer to **Sealers, Adhesives, and Lubricants**.
   - The pinion bearings
   - The pinion and the differential gears
   - The thrust washers
   - The pinion bearing cups

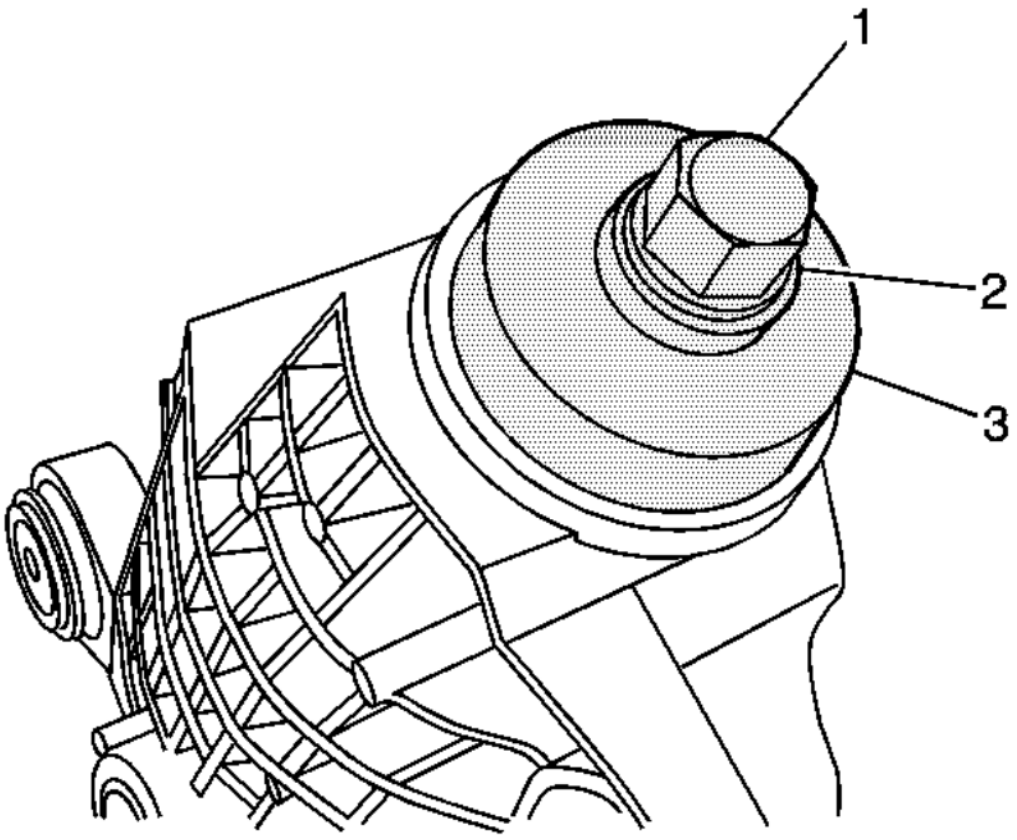


Fig. 191: Installing J 45858-3, Thrust Bearing & Washer, & Forcing Screw (8.25 Inch Axles)
Courtesy of GENERAL MOTORS CORP.

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.

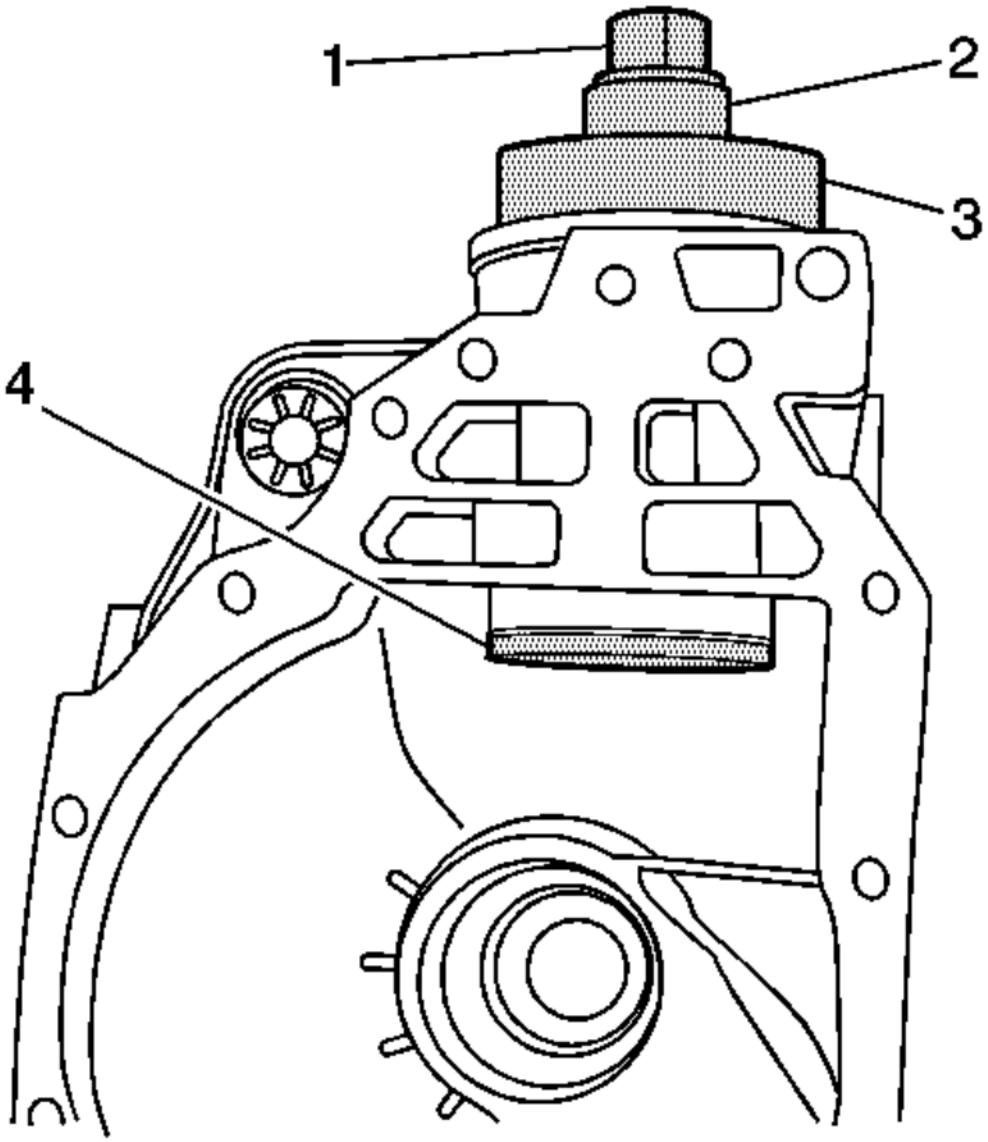


Fig. 192: Installing Inner Pinion Bearing Cup (8.25 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

3. Install the inner pinion bearing cup and the J 45858-2 (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** and the inner pinion bearing cup and reposition the inner pinion bearing cup. See **Special Tools**.

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** . See **Special Tools**.

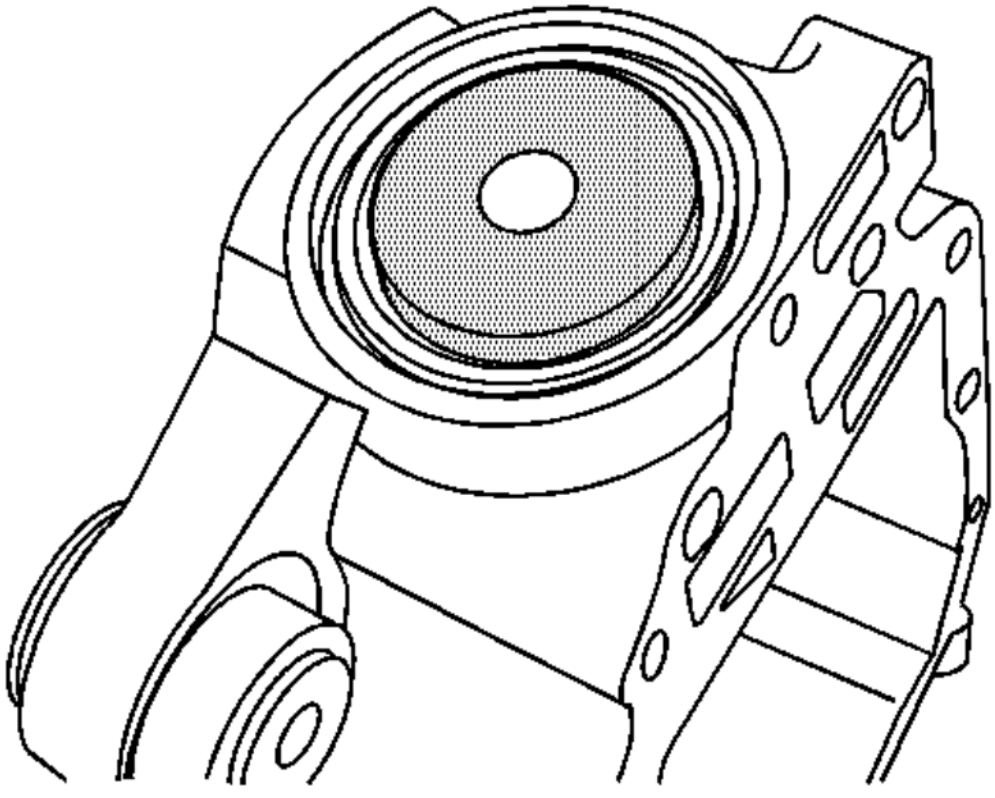


Fig. 193: Installing Outer Pinion Bearing Cup (8.25 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

7. Install the outer pinion bearing cup and the J 45858-1 over the outer pinion bearing cup bore.

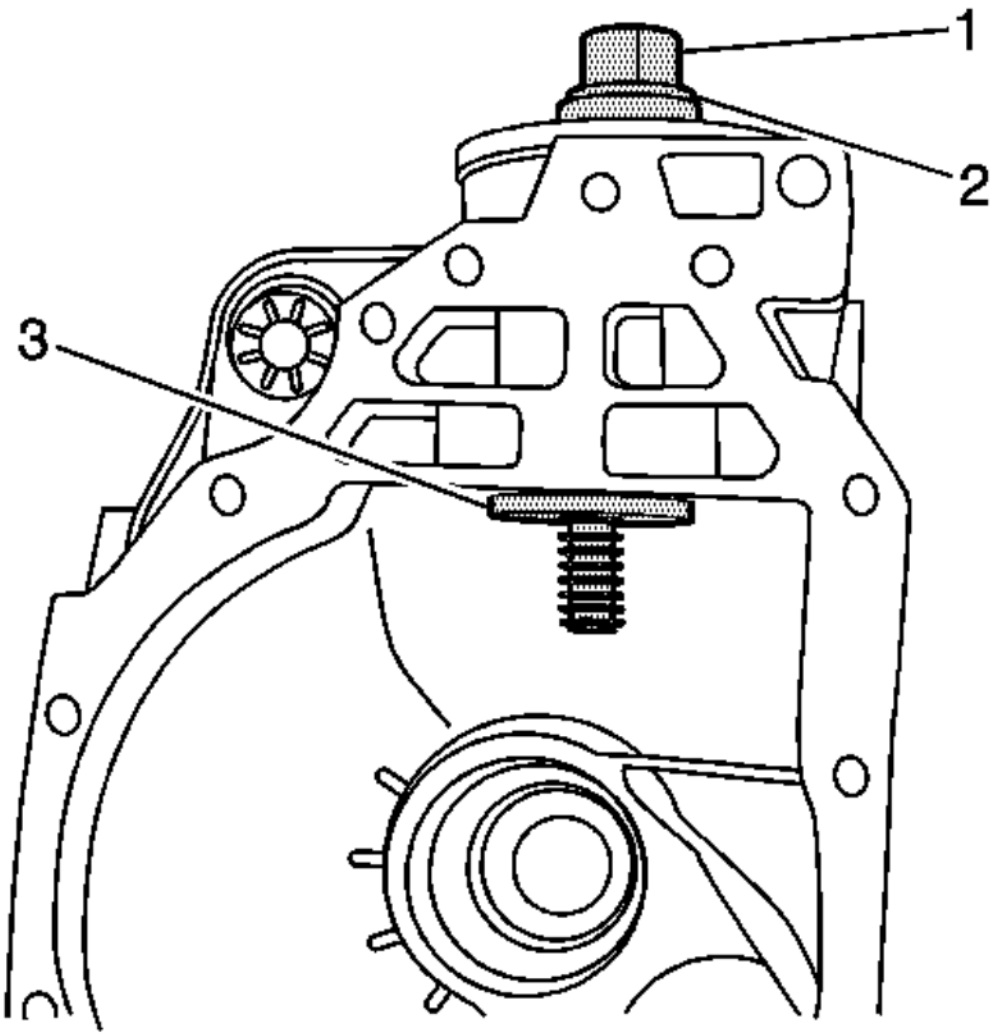


Fig. 194: Installing Thrust Bearing And Washer Using J 45858-6, Thrust Bearing & J 45858-2 (8.25 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

8. Install the thrust bearing and the washer (2), the J 45858-6 (1), and the J 45858-2 (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 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** and the outer pinion bearing cup and reposition the outer pinion bearing cup. See **Special Tools**.

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** . See **Special Tools**.
13. Measure the pinion depth and determine the selectable pinion shim thickness. Refer to **Pinion Depth Adjustment**.

FRONT DIFFERENTIAL DRIVE PINION GEAR BEARING CUP INSTALLATION (8.25/9.25 INCH INCH AXLES W/J 36598)

Tools Required

J 36598 Holding Fixture. See **Special Tools**.

Installation

1. Before assembly, apply axle lubricant to the pinion bearing cups. Refer to **Sealers, Adhesives, and Lubricants**.
2. Install the **J 36598** into a vise. See **Special Tools**.

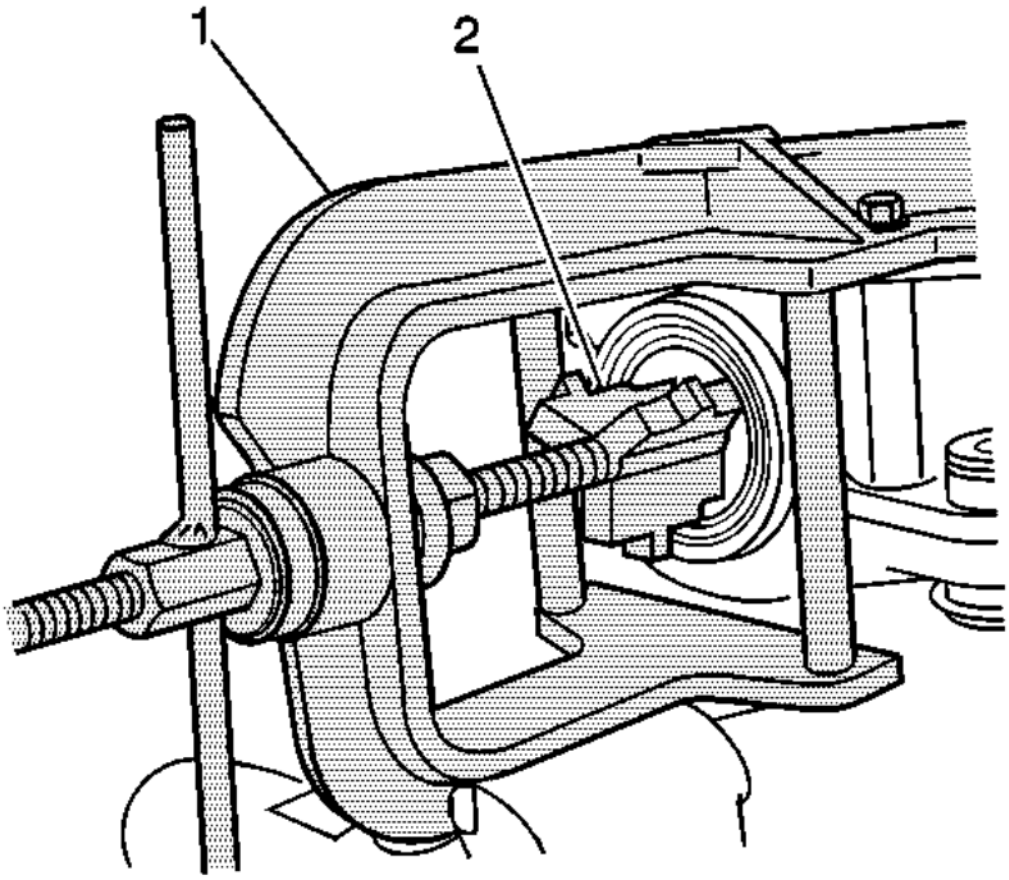


Fig. 195: Seating Outer Pinion Bearing Cup Evenly Within Outer Pinion Bearing Cup Bore J 36598 (8.25/9.25 Inch Axles)
Courtesy of GENERAL MOTORS CORP.

3. Install the left differential carrier case half into the **J 36598** and the J 36598-6, 8. See **Special Tools**.25 inch axle, or the **J 36598** (1), 9. See **Special Tools**.25 inch axle.

   Tighten the attaching bolts securely.

4. Install the J 36598-3, 8.25 inch axle, or the J 36598-4, 9.25 inch axle (2), onto the forcing screw of the **J 36598** . See **Special Tools**.
5. Install the outer pinion bearing cup into the differential carrier case.
6. Install the J 36598-3, 8.25 inch axle, or the J 36598-4, 9.25 inch axle (2) onto the outer

pinion bearing cup.

Rotate the J 36598-3 or the J 36598-4 and the outer pinion bearing cup several time in order to seat the outer pinion bearing cup evenly within the outer pinion bearing cup bore.

7. Install the outer pinion bearing cup into the differential carrier case half by holding the forcing screw of the **J 36598** and turning the handle counterclockwise. See **Special Tools**.

   Inspect the position of the outer pinion bearing cup as it is being installed into the outer pinion bearing cup bore to ensure the bearing cup is being installed evenly. If the pinion bearing cup is not being installed evenly, loosen the **J 36598** and remove the outer pinion bearing cup. See **Special Tools**. Reposition the outer pinion bearing cup over the outer pinion bearing cup bore and re-install.

8. Remove the J 36598-3 or the J 36598-4 from the forcing screw of the **J 36598** . See **Special Tools**.

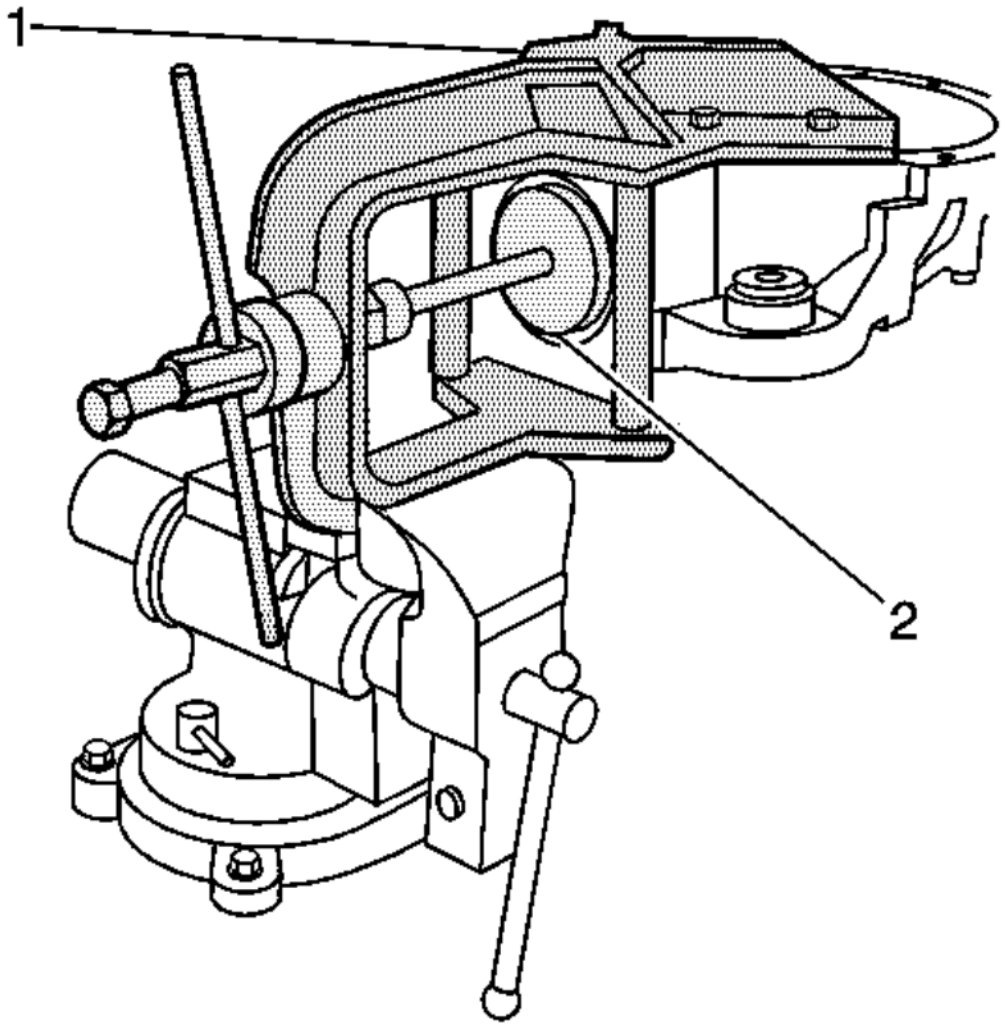


Fig. 196: Installing Inner Pinion Bearing Cup J 36598 & J 36598-4 (8.25/9.25 Inch Axles)
Courtesy of GENERAL MOTORS CORP.

9. Install the J 36598-15 (2) into the outer pinion bearing cup.
10. Install the inner pinion bearing cup into the inner pinion bearing cup bore.

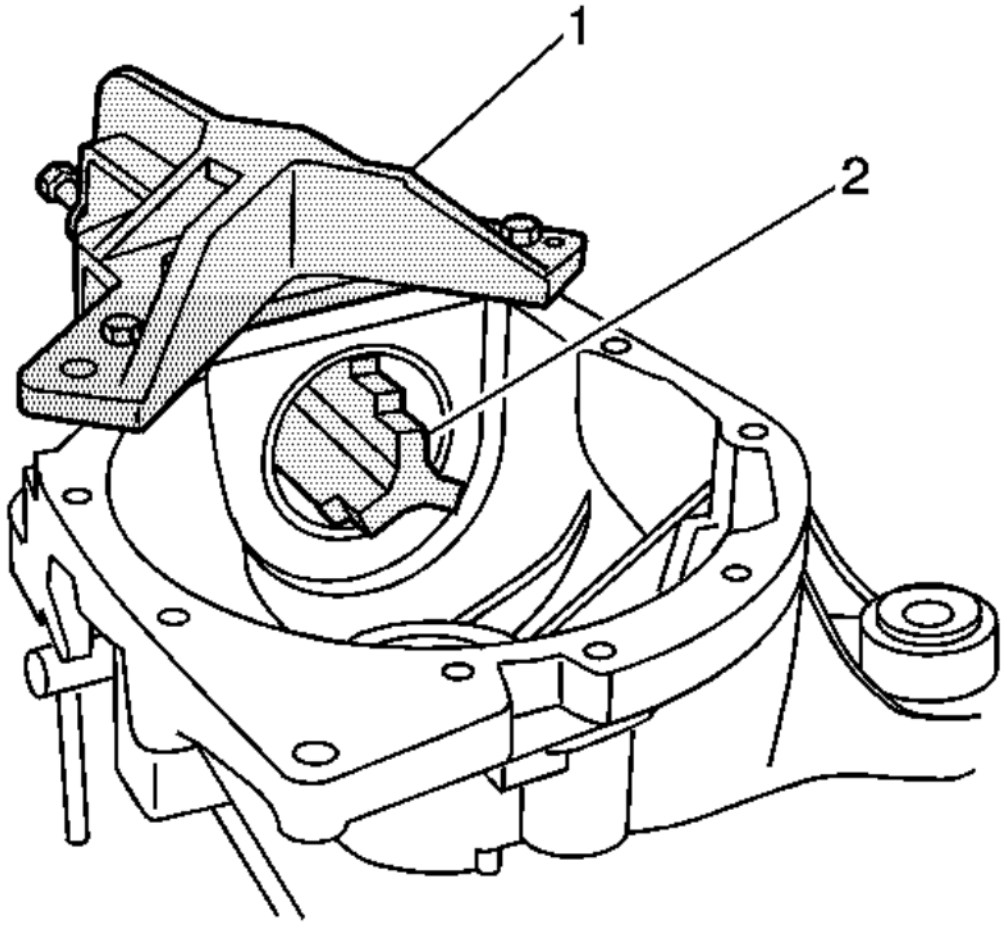


Fig. 197: Installing Inner Pinion Bearing Cup Into Differential Carrier Case J 36598-4 & J 36598-15 (8.25/9.25 Inch Axles)
Courtesy of GENERAL MOTORS CORP.

11. Place the J 36598-3, 8.25 inch axle, or the J 36598-4, 9.25 inch axle (2), over the inner pinion bearing cup.
12. Extend the forcing screw of the **J 36598** (1) through the J 36598-15 and thread it into the J 36598-3 or the J 36598-4 (2) until fully seated.
13. Rotate the J 36598-3 or the J 36598-4 several times in order to ensure the inner pinion bearing cup is evenly seated and not mis-aligned in the bore.
14. Install the inner pinion bearing cup into the differential carrier case half by holding the

forcing screw of the **J 36598** and turning the handle clockwise.

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 installed evenly. If the pinion bearing cup is not being installed evenly, loosen the **J 36598** and remove the inner pinion bearing cup. See **Special Tools**. Reposition the inner pinion bearing cup over the inner pinion bearing cup bore and re-install.

15. Remove the J 36598-3 or the J 36598-4 and the J 36598-15.
16. Remove the differential carrier case.
17. Remove the **J 36598** from the vise.
18. Determine the selective shim thickness for the pinion. Refer to **Pinion Depth Adjustment**.

PINION DEPTH ADJUSTMENT

Tools Required

- **J 36601** Pinion Shim Selector. See **Special Tools**.
- **J 29763** Static Timing Gage. See **Special Tools**.

Adjustment

1. Install the pinion bearing cups into the differential carrier assembly. Refer to **Front Differential Drive Pinion Gear Bearing Cup Installation (9.25 Inch Axle w/J 45754)** or **Front Differential Drive Pinion Gear Bearing Cup Installation (8.25 Inch Axle w/J 45858)** or **Front Differential Drive Pinion Gear Bearing Cup Installation (8.25/9.25 Inch Axles w/J 36598)**.

IMPORTANT: 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 **Sealers, Adhesives, and Lubricants**.

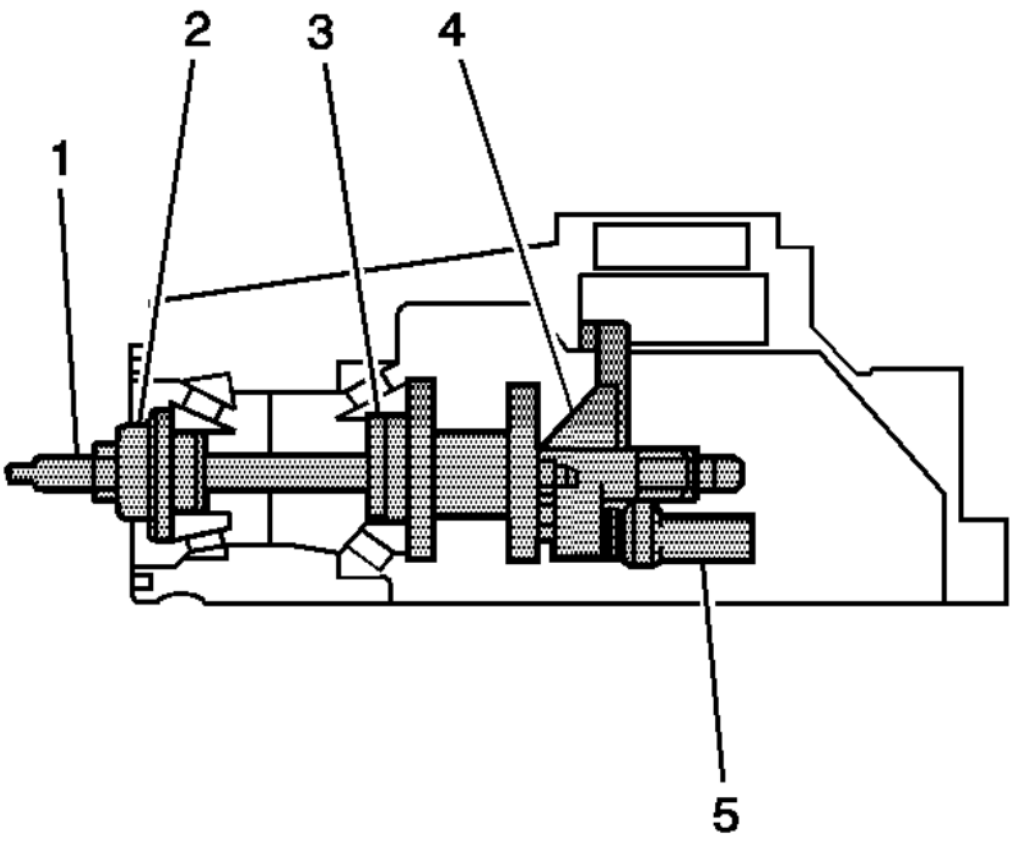


Fig. 198: Using J 36601-7, J 36601-5, J 21777-8 & J 36601-3 To Adjust Pinion Depth
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The J 36601 uses two different measuring arms to measure the pinion depth. See Special Tools. 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.

IMPORTANT: 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.

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).

NOTE: Refer to Fastener Notice .

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** . See **Special Tools**.

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** using an inch-pound torque wrench. See **Special Tools**.

    Specification: The rotating torque of the **J 36601** should be between 1. See **Special Tools**.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.

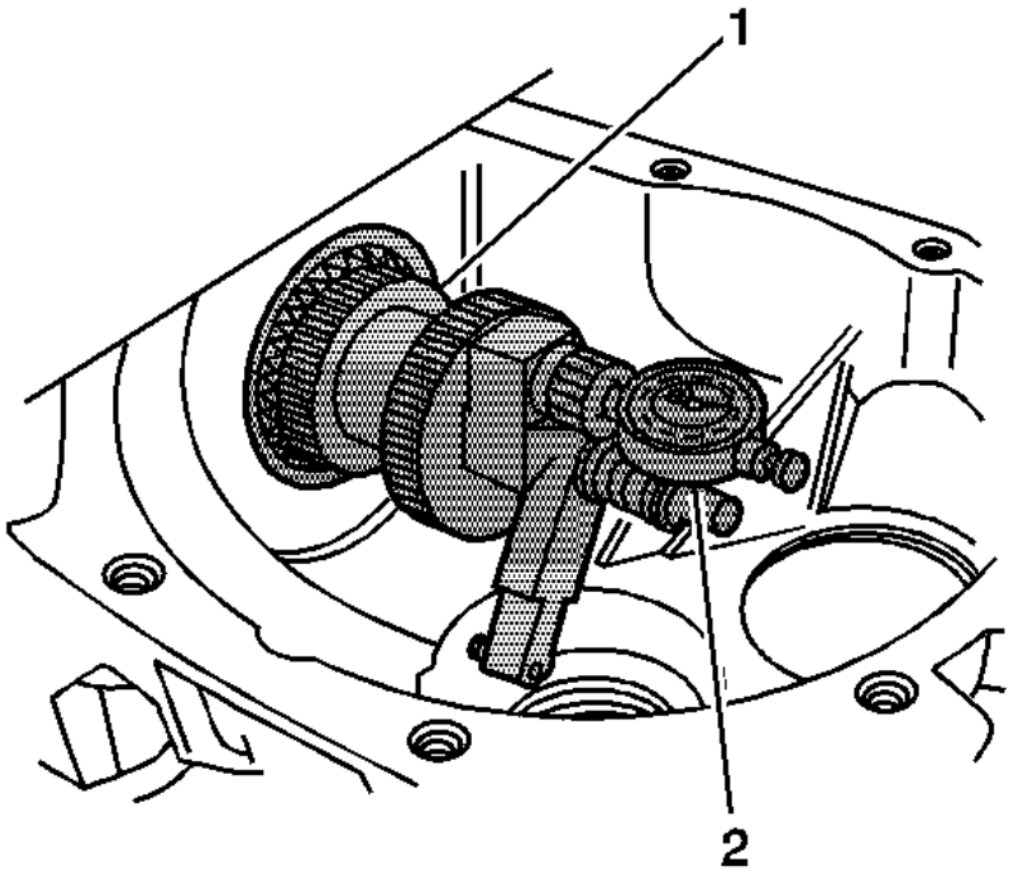


Fig. 199: Using J 36601-3 & J 29763 To Measure Lowest Point In Differential Side Bearing Bore
Courtesy of GENERAL MOTORS CORP.

13. Install the adjustment screw and the lock nut of the**J 29763** (2) to the J 36601-4 or the J 36601-3. See **Special Tools**.
14. Install the **J 29763** to the adjustment screw and lock nut assembly. See **Special Tools**.

    Tighten the lock nut to hold the **J 29763** in place. See **Special Tools**.

IMPORTANT: 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** to the differential bearing bore by doing the following:. See **Special Tools**.
    1. Loosen the lock nut on the **J 29763** . See **Special Tools**.
    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** until the needle of the **J 29763** has turned 3/4 of a turn clockwise. See **Special Tools**.
    4. Tighten the lock nut of the **J 29763** . See **Special Tools**.
17. Rotate the J 36601-4 or the J 36601-3 (1) back and forth until the needle of the **J 29763** (2) indicates the lowest point in the differential side bearing bore. See **Special Tools**.
18. At the lowest point of deflection, move the housing of the **J 29763** until the needle indicates ZERO. See **Special Tools**.
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** as necessary to set the needle to ZERO. See **Special Tools**.

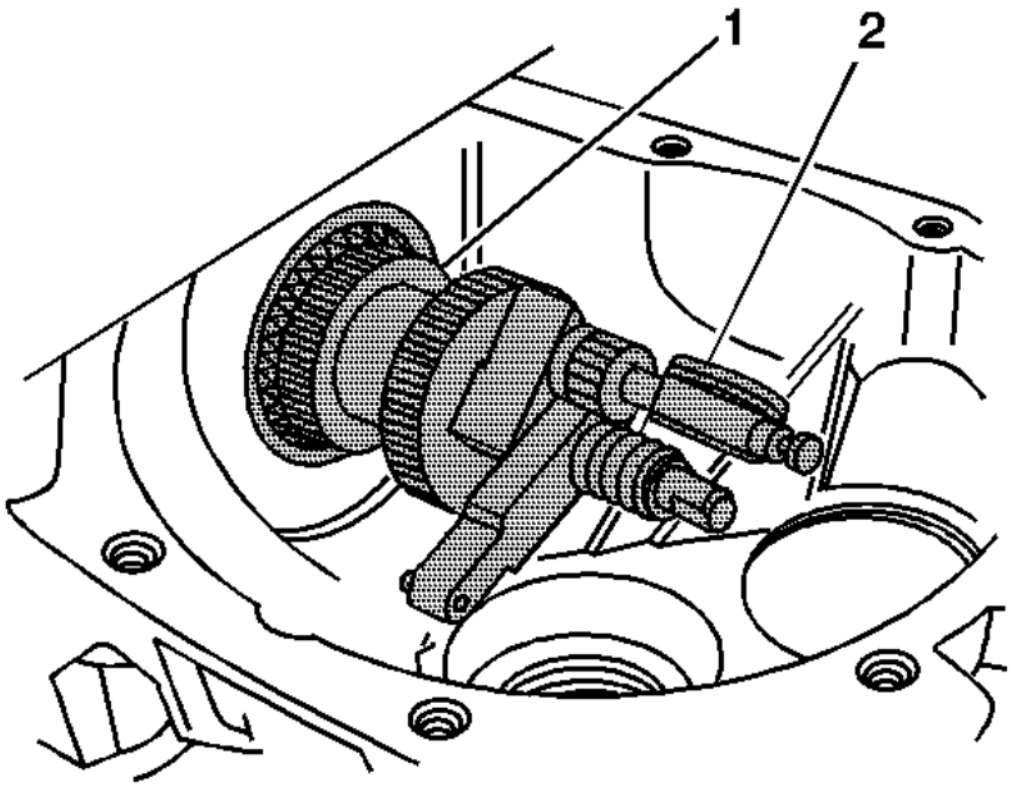


Fig. 200: Using J 36601-3 & J 29763 To Measure Thickness Of Shim Needed In Order To Set Depth Of Pinion
Courtesy of GENERAL MOTORS CORP.

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.

IMPORTANT: The unit of measurement for the J 29763 is in hundredths of a millimeter. See Special Tools.

21. The value indicated on the **J 29763** (2) is the thickness of the shim needed in order to set the depth of the pinion. See **Special Tools**.
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 **Differential Carrier Assembly Assemble (8.25 Inch Axle Lock Ring Style)** or **Differential Carrier Assembly Assemble (9.25 Inch Axle)**.

Differential pinion gear shims are available in the following sizes:

Shim Sizes

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)	-

DIFFERENTIAL CARRIER ASSEMBLY ASSEMBLE (8.25 INCH AXLE LOCK RING STYLE)

Tools Required

- **J 8092** Universal Driver Handle-3/4 in 10
- **J 8614-01** Flange and Pulley Holding Tool. See **Special Tools**.
- **J 35512** Inner Pinion Bearing Installer. See **Special Tools**.
- **J 36614** Pinion Bearing Installer. See **Special Tools**.
- **J 36366** Pinion Oil Seal Installer. See **Special Tools**.
- **J 36599-A** Side Bearing Nut Wrench. See **Special Tools**.
- **J 36603** Side Bearing Cup Installer. See **Special Tools**.
- **J 36609** Axle Tube Bearing Installer. See **Special Tools**.
- **J 36612** Output Shaft Bearing Installer. See **Special Tools**.
- **J 36615** Side Bearing Nut Wrench. See **Special Tools**.
- **J 36616** Adjuster Nut Wrench. See **Special Tools**.

Assemble

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

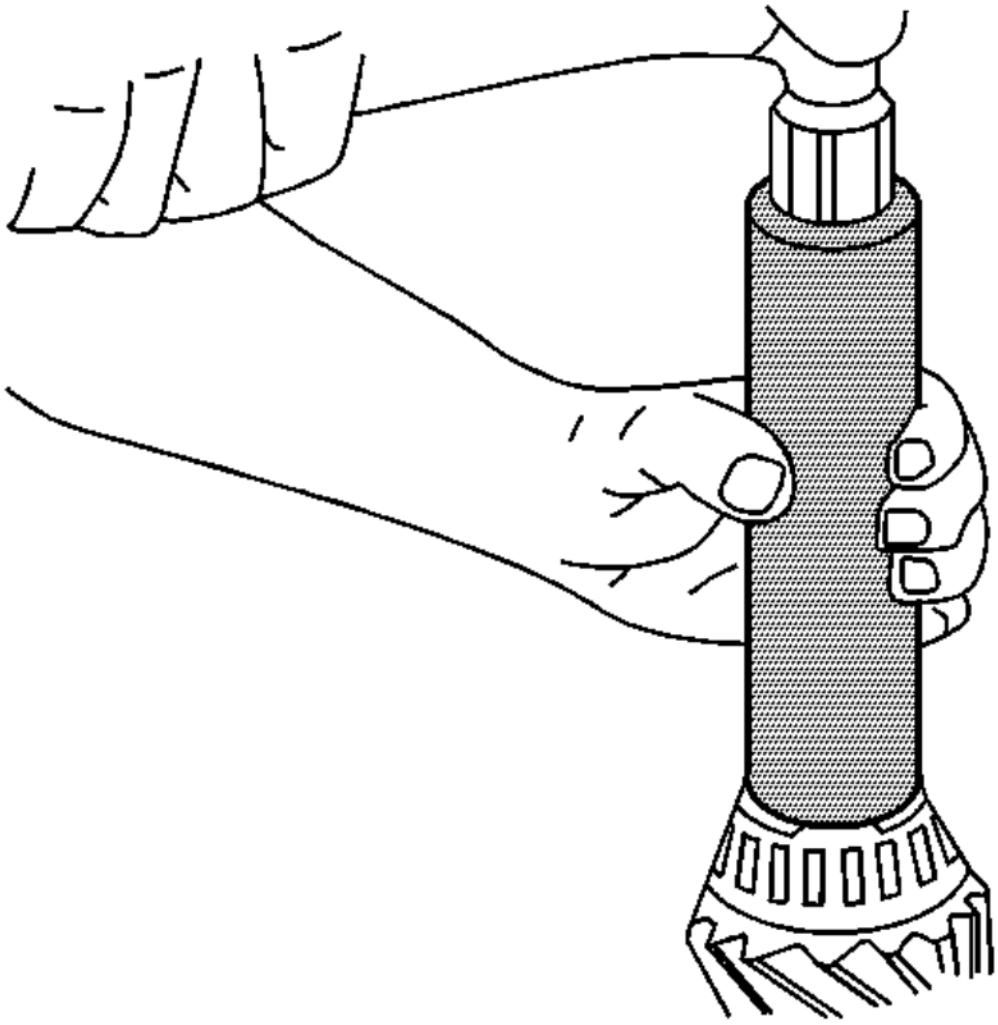


Fig. 201: View Of Inner Pinion Bearing & Pinion Gear
Courtesy of GENERAL MOTORS CORP.

2. Using the **J 35512** , install the inner pinion bearing onto the pinion gear. See **Special Tools**.
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.

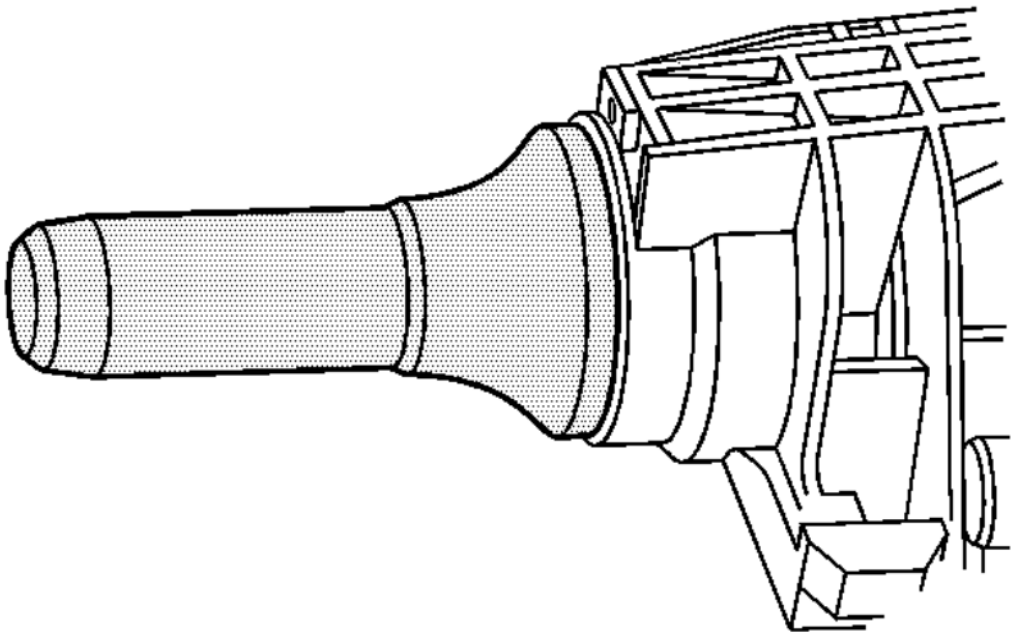


Fig. 202: View Of Special Tool J 36366 Seal Installer
Courtesy of GENERAL MOTORS CORP.

6. Install the oil seal by doing the following:
    1. Install the differential carrier case half into a vise. Place a shop towel in a vise in order to protect the differential case.
    2. Using the **J 36366** , install the seal. See **Special Tools**. Ensure that the seal flange is seated on the axle housing surface
7. Apply sealant to the splines of the pinion yoke. Use the correct sealant. Refer to **Sealers, Adhesives, and Lubricants**.
8. Install the pinion gear, with the inner pinion bearing an the new collapsible spacer, into the left differential carrier case half.
9. Install the pinion yoke.

NOTE: Refer to Pinion Flange/Yoke Installation Notice .

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

11. Install the new pinion nut and the new washer. If the pinion nut cannot be installed, perform the following steps in order to seat the pinion yoke onto the pinion so that the washer and new pinion nut can be installed:
    1. Remove the pinion nut washer.
    2. Install the old pinion nut.
    3. Tighten the nut until a few of the shaft threads show through the nut so that the washer and new pinion nut can be in stalled.
    4. Remove the old pinion nut.
    5. Install the pinion nut washer.
    6. Install the new pinion nut.
12. Install the **J 8614-01** onto the pinion yoke as shown. See **Special Tools**.

NOTE: Refer to Fastener Notice .

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

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

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

14. Remove the **J 8614-01** . See **Special Tools**.
15. Using an inch pound torque wrench, measure the rotating torque of the pinion.

    Specification: The rotating torque of the pinion 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.

16. If the rotating torque measurement is below 1.0 N.m (10 lb in) for used bearings, or 1.7 N.m (15 lb in) for new bearings, reinstall the **J 8614-01** and continue to tighten the pinion nut. See **Special Tools**.

    Specification: The rotating torque of the pinion 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.

17. 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.
18. Remove the **J 8614-01** . See **Special Tools**.

19. Assemble the differential adjuster nut into the differential adjuster nut sleeve until it is fully seated.

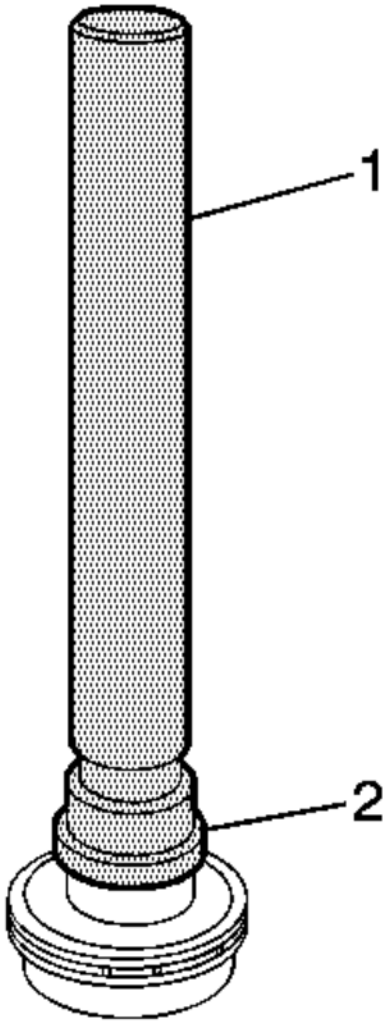


Fig. 203: View Of Special Tools J 36614 & J 8092
Courtesy of GENERAL MOTORS CORP.

20. Using the **J 36614** (2) and the **J 8092** (1), install the inner shaft bearing inner shaft bearing onto the differential bearing adjuster for the 8.25 inch S4WD axle left and right side, 8.25 inch F4WD axle left.

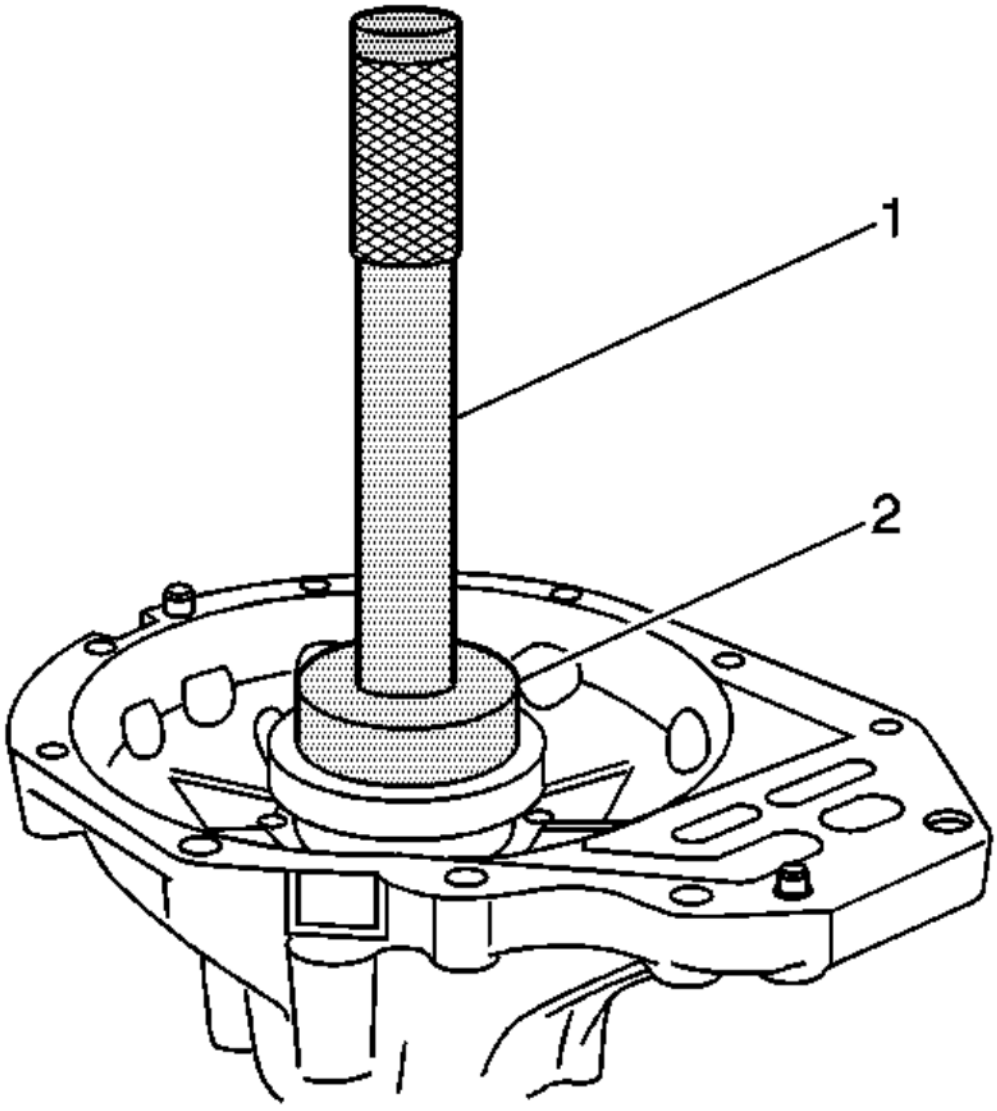


Fig. 204: View Of Differential Case Side Bearing Cups, Differential Carrier Case, J 8092 & J 36603
Courtesy of GENERAL MOTORS CORP.

21. Using the **J 36614** (2) and the **J 8092** (1), install the left and right side differential adjuster nut assembly into the differential carrier case.

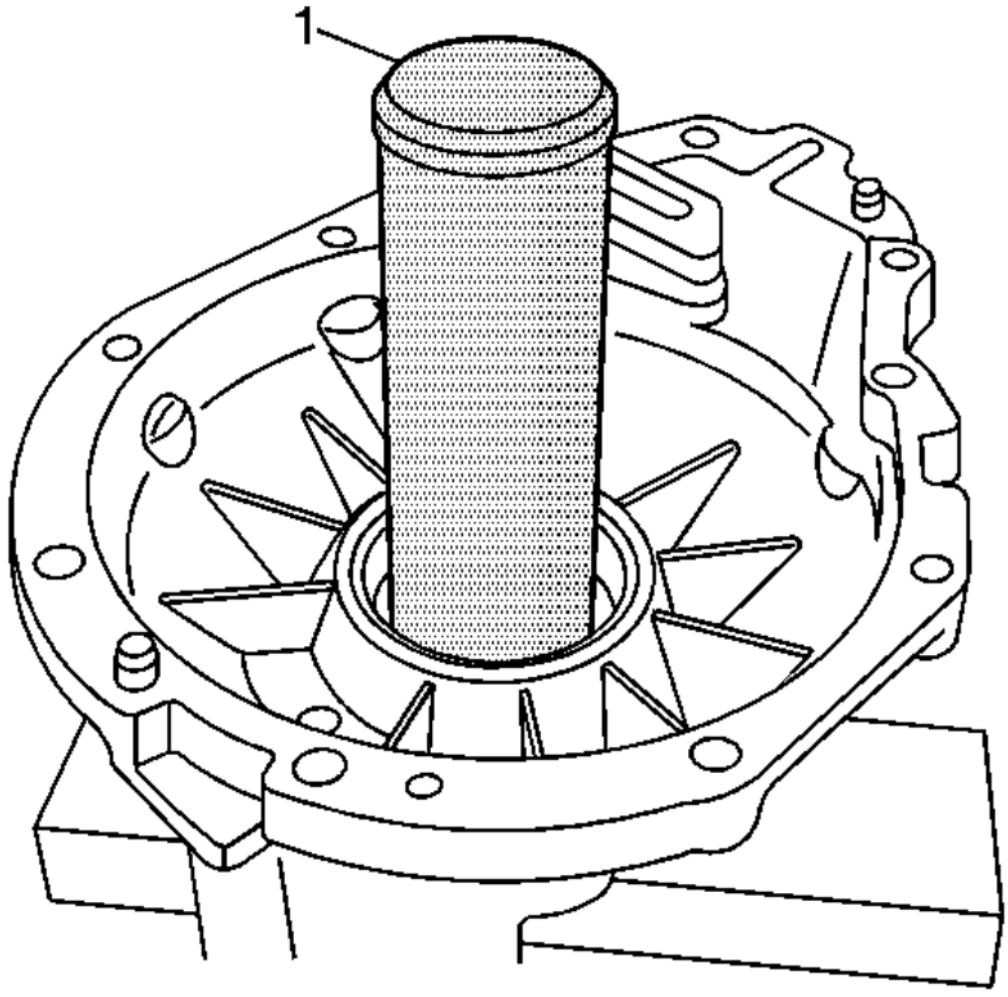


Fig. 205: View Of Special Tool J 8092
Courtesy of GENERAL MOTORS CORP.

22. Using the **J 8092** (1), install the left and right differential case side bearing cups into the differential carrier case.

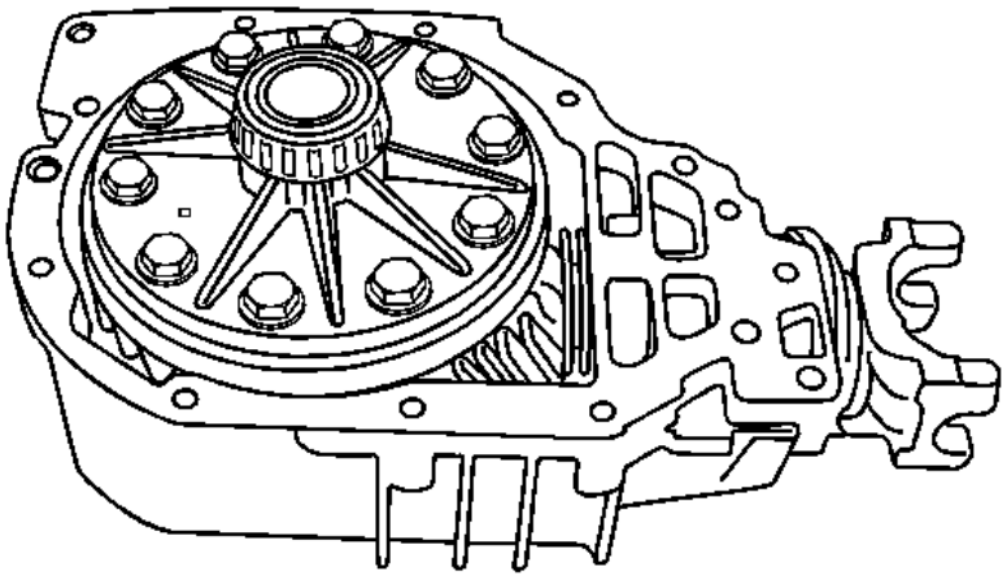


Fig. 206: View Of Differential Case Assembly & Carrier Case Half
Courtesy of GENERAL MOTORS CORP.

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

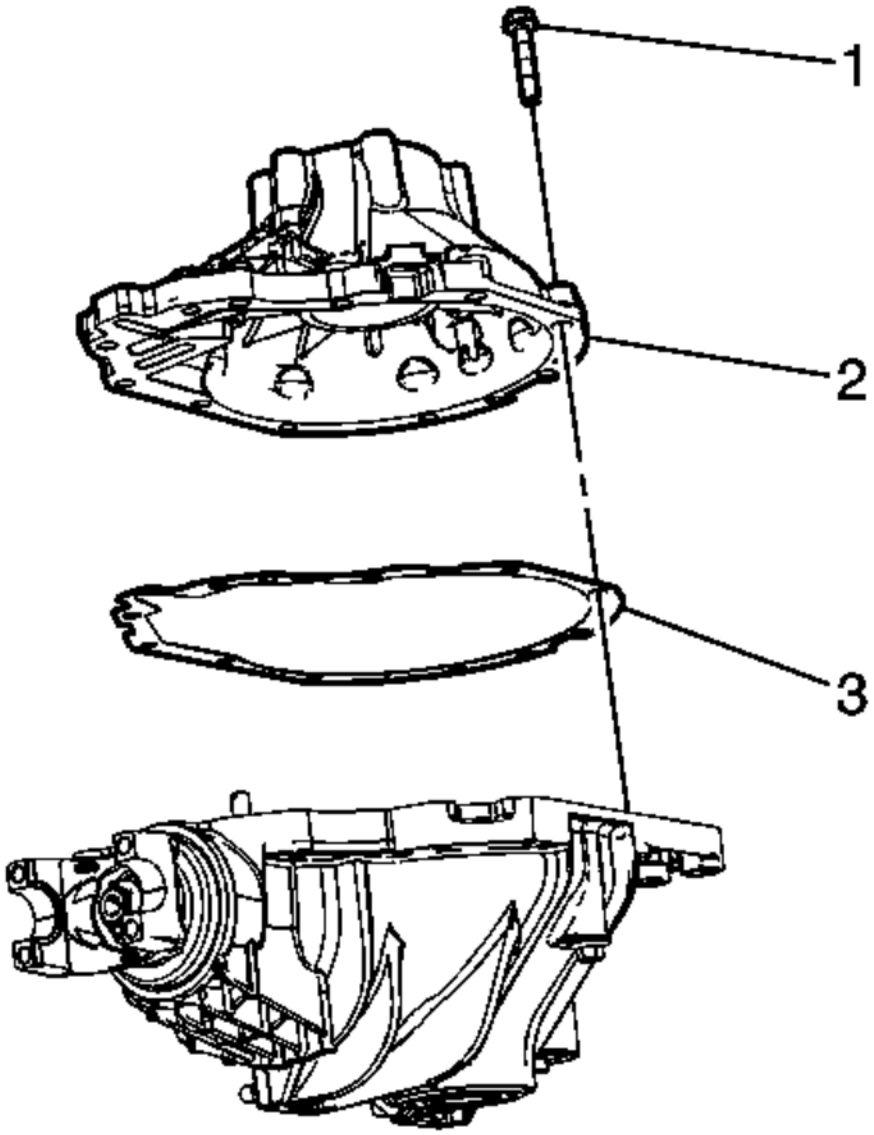


Fig. 207: View Of Differential Carrier Housing, Gasket & Bolts
Courtesy of GENERAL MOTORS CORP.

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

24. Install the differential carrier case gasket (3).
25. 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** in order to back out right differential adjuster nut sleeve until the differential carrier case halves make contact. See **Special Tools**.
26. Install the differential carrier case bolts (1).

    Tighten: Tighten the differential carrier case bolts to 73 N.m (54 lb ft).

27. Install the differential carrier assembly into a vise.
28. While rotating the pinion yoke back and forth, turn he right side differential adjuster nut sleeve clockwise using the **J 36599-A** until 0. See **Special Tools**.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** one notch at a time until the backlash specification can be obtained. See **Special Tools**.

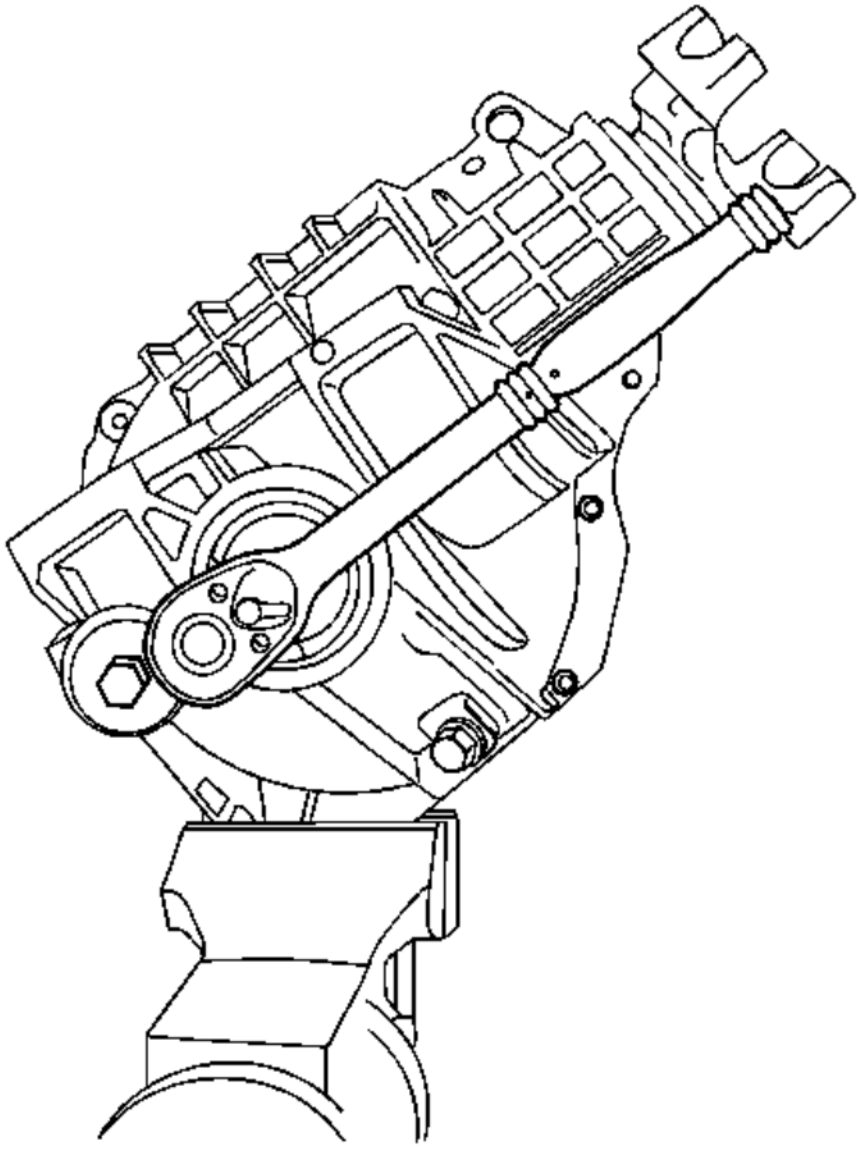


Fig. 208: Tightening Differential Adjuster Nut
Courtesy of GENERAL MOTORS CORP.

29. Using the **J 36599-A** turn the left side differential adjuster nut sleeve clockwise in order to preload the differential side bearings against the differential side bearings cups. See **Special Tools**.

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

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

    Specification: The rotating torque of the pinion and differential assembly should be 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.

32. 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** , turn the left and right side differential adjuster sleeves in or clockwise one notch. See **Special Tools**.
    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 31. If the rotating torque of the pinion and differential assembly is not within specifications, continue to tighten the left and right side differential adjuster nut sleeves one notch on each side until the rotating torque of the pinion and differential assembly is within specifications.
33. 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** or the **J 36615** , turn the left and right side differential adjuster nut sleeve out or clockwise one notch. See **Special Tools**.
    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 31. 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 one notch at a time on each side until the rotating torque of the pinion and differential assembly is within specifications.
34. 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.

35. Measure the drive pinion to the ring gear backlash and adjust, if necessary. Refer to **Backlash Inspection and Adjustment**.
36. 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**.
37. Complete the final assembly of the differential carrier. Refer to **Differential Carrier Assembly Final Assembly (8.25 F4WD Axle)** or **Differential Carrier Assembly Final Assembly (8.25 S4WD and 9.25 Axles)**.

DIFFERENTIAL CARRIER ASSEMBLY ASSEMBLE (9.25 INCH AXLE)

Tools Required

- **J 8092** Universal Driver Handle - 3/4 in - 10
- **J 8614-01** Flange and Pulley Holding Tool. See **Special Tools**.
- **J 35512** Inner Pinion Bearing Installer. See **Special Tools**.
- **J 36366** Pinion Oil Seal Installer. See **Special Tools**.
- **J 36599-A** Side Bearing Nut Wrench. See **Special Tools**.
- **J 36603** Side Bearing Cup Installer. See **Special Tools**.
- **J 36609** Axle Tube Bearing Installer. See **Special Tools**.
- **J 36612** Output Shaft Bearing Installer. See **Special Tools**.
- **J 36614** Inner Pinion Bearing Installer. See **Special Tools**.
- **J 36615** Side Bearing Nut Wrench (9. See **Special Tools**.25 inch axle)

Assemble

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

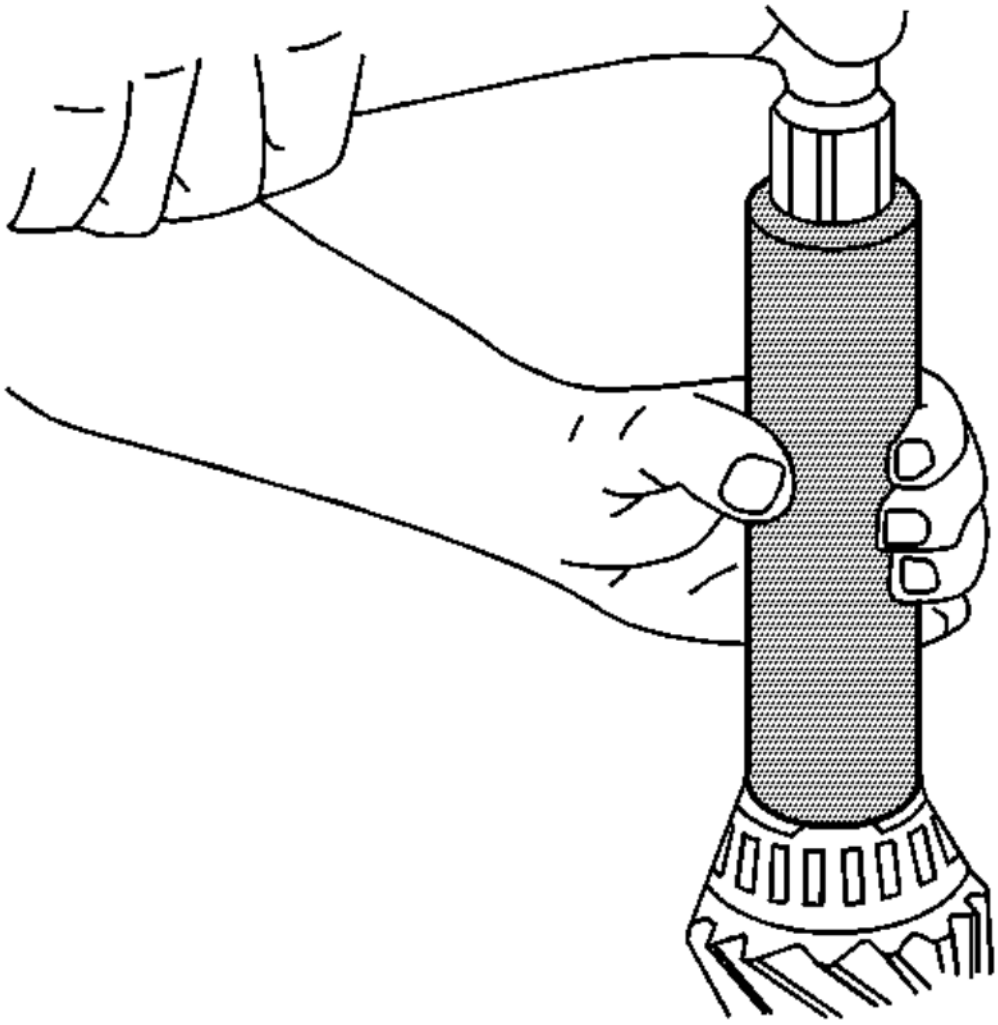


Fig. 209: View Of Inner Pinion Bearing & Pinion Gear
Courtesy of GENERAL MOTORS CORP.

2. Install the inner pinion bearing onto the pinion gear using the **J 35512** . See **Special Tools**.
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.

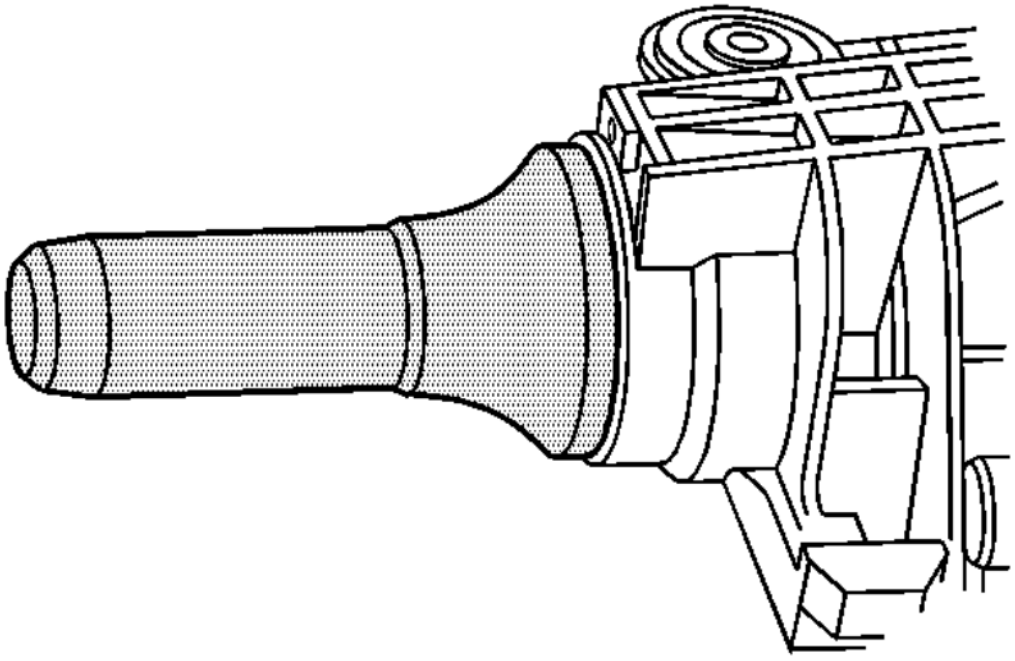


Fig. 210: Installing Oil Seal Using J 36366 - Front Axle
Courtesy of GENERAL MOTORS CORP.

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

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

    2. Install the seal using the **J 36366** . See **Special Tools**. Ensure the seal flange is seated on the axle housing surface.
7. Apply sealant to the splines of the pinion yoke. Use the correct sealant. Refer to **Sealers, Adhesives, and Lubricants**.
8. Install the pinion gear, with the inner pinion bearing and the new collapsible spacer, into the left differential carrier case half.
9. Install the pinion yoke.

NOTE: Refer to Pinion Flange/Yoke Installation Notice .

10. 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.
11. Install the washer and a new pinion nut.

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

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

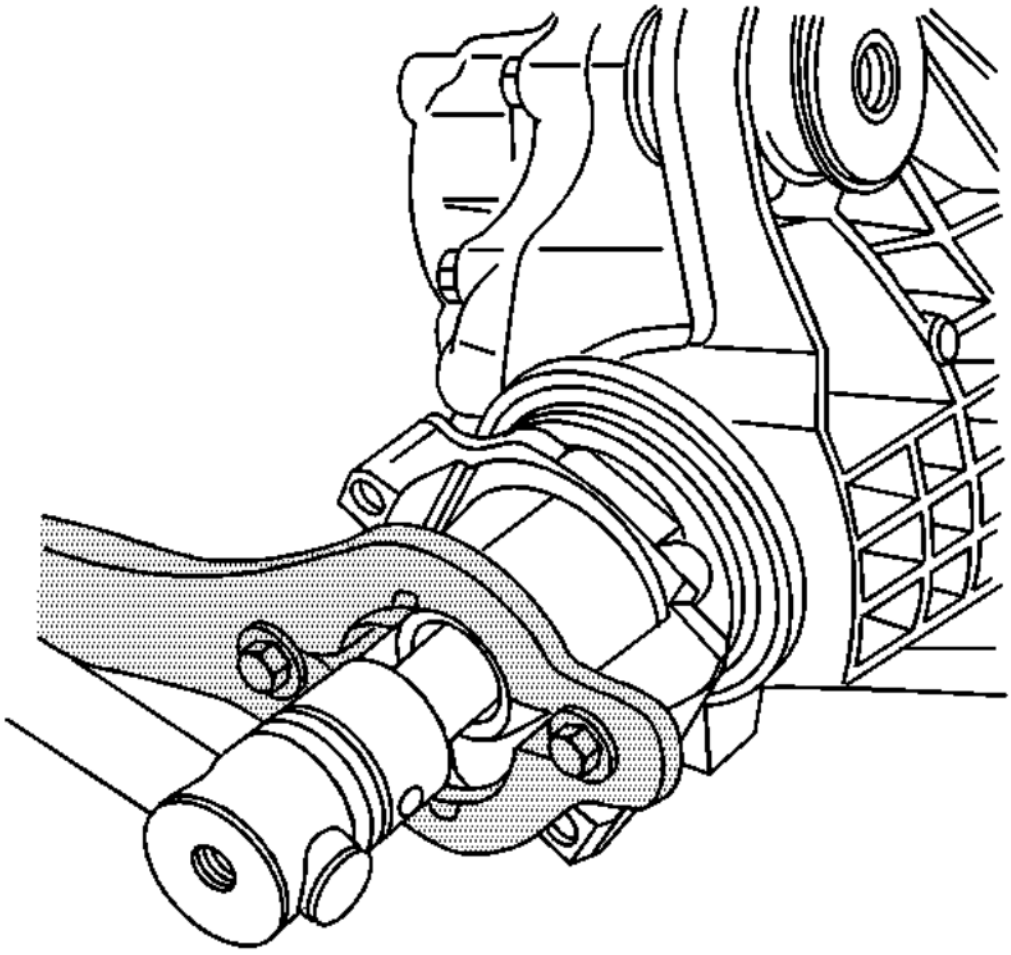


Fig. 211: Holding Pinion Flange Using Special Tool
Courtesy of GENERAL MOTORS CORP.

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

NOTE: **Refer to Fastener Notice .**

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

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

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

14. Remove the **J 8614-01** . See **Special Tools**.
15. Measure the rotating torque of the pinion using an inch-pound torque wrench.

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

16. If the rotating torque measurement is below 1.0 N.m (10 lb in) for used bearings, or 1.7 N.m (15 lb in) for new bearings, reinstall the **J 8614-01** and continue to tighten the pinion nut. See **Special Tools**.

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

17. 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.

18. Remove the **J 8614-01** . See **Special Tools**.
19. Assemble the right side differential adjuster nut into the differential nut sleeve until fully seated.

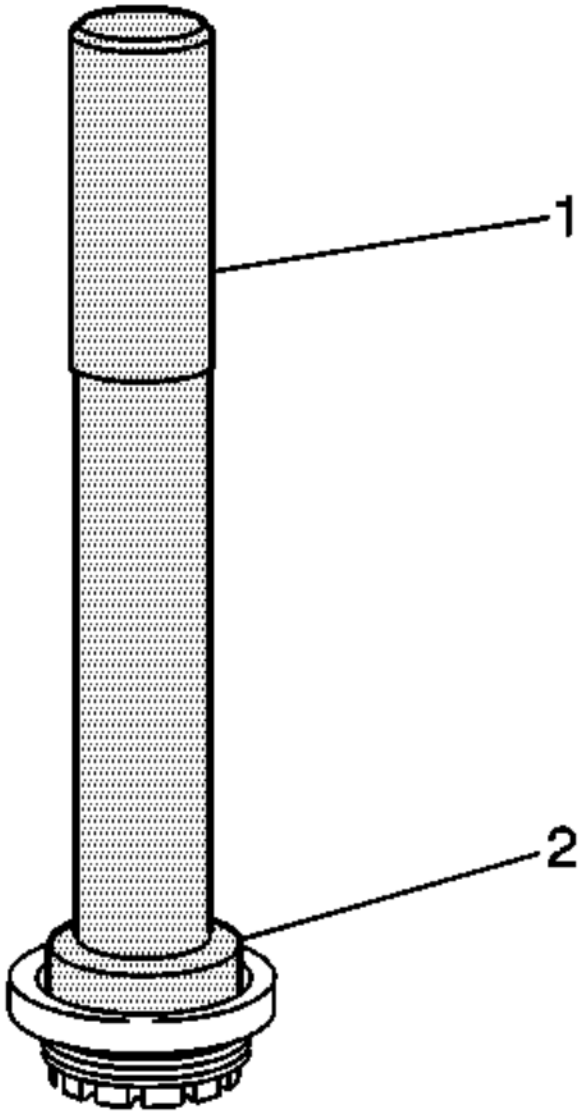


Fig. 212: Installing Axle Shaft Bearings Into Differential Adjuster Nut Sleeve Using J 8092 & J 36612
Courtesy of GENERAL MOTORS CORP.

20. Install the right side axle shaft bearings into the differential adjuster nut sleeve using the **J 36612** (2) and the **J 8092** (1). See **Special Tools**.

21. Install the left side axle shaft bearing into the differential adjuster nut sleeve using the **J 36609** and the **J 8092** . See **Special Tools**.
22. Install the right side differential adjuster nut assembly and new adjuster lock nut tab into the differential carrier case using the **J 36609** and the **J 8092** . See **Special Tools**.
23. Install the left side differential adjuster nut assembly into the differential carrier case.

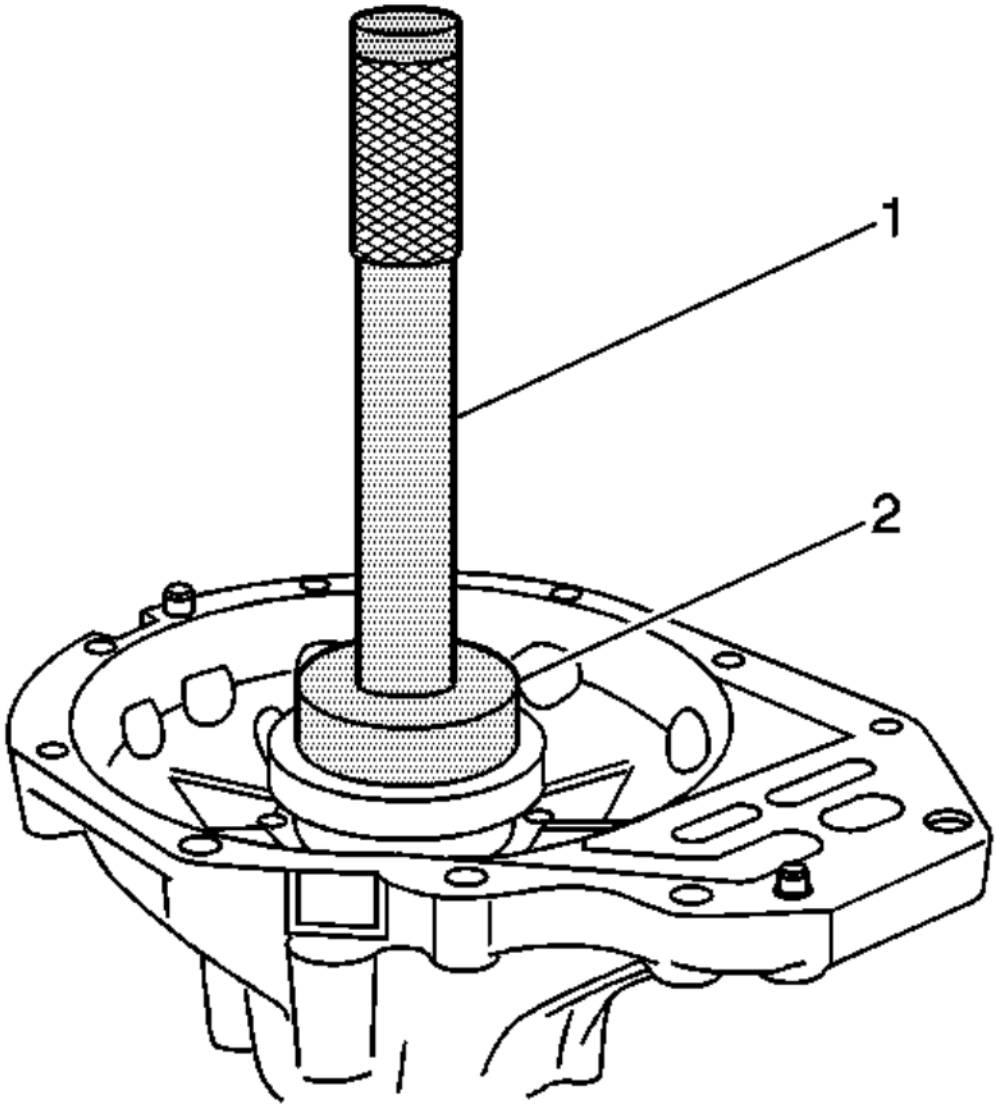


Fig. 213: View Of Differential Case Side Bearing Cups, Differential Carrier Case, J 8092 & J 36603
Courtesy of GENERAL MOTORS CORP.

24. Install the right side differential case side bearing cups to the differential carrier case using the **J 36603** (2) and the **J 8092** (1). See **Special Tools**.

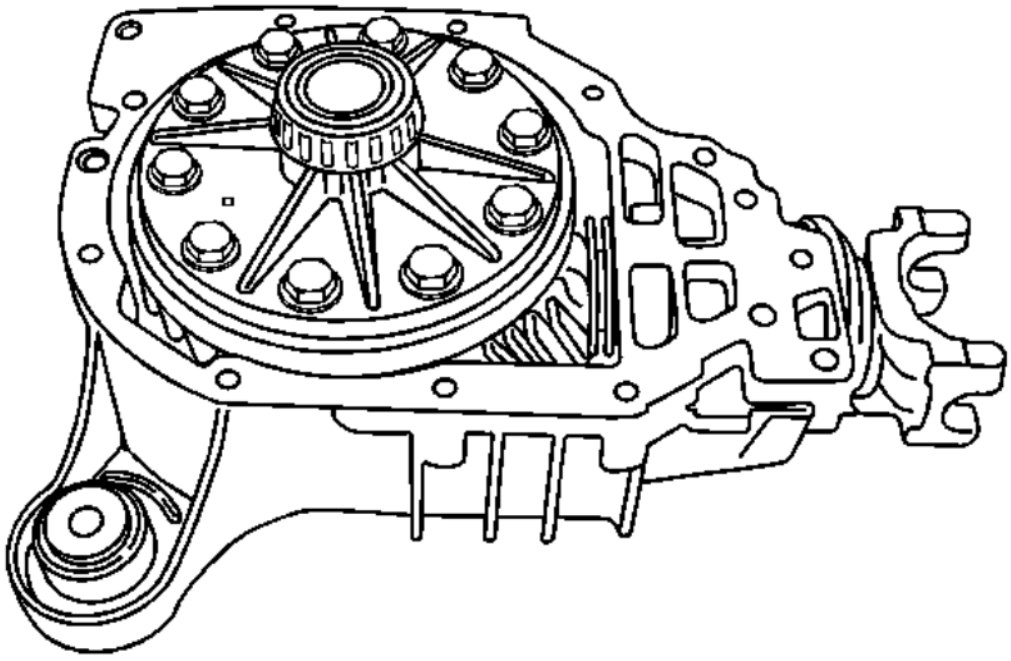


Fig. 214: Installing Differential Case Assembly Into Left Differential Carrier Case Half
Courtesy of GENERAL MOTORS CORP.

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

    The surfaces must be clean of all the grease and the oil.

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

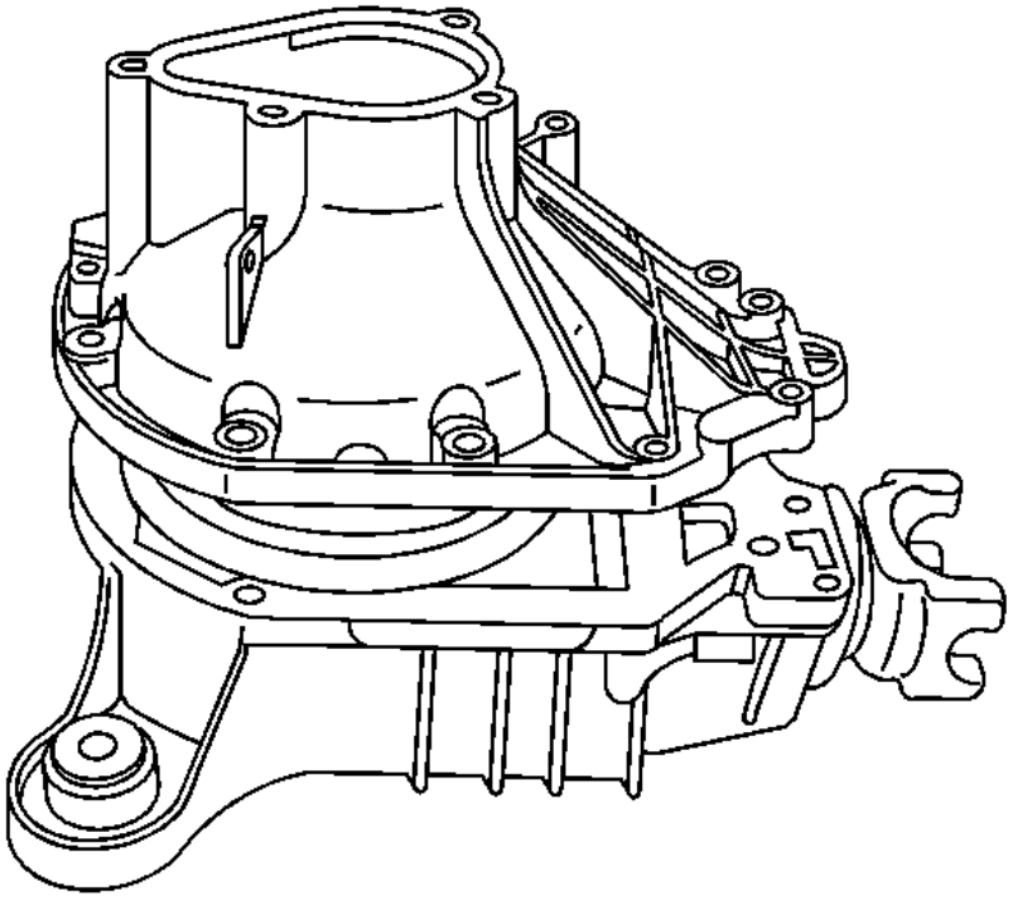


Fig. 215: Differential Case Assembly
Courtesy of GENERAL MOTORS CORP.

28. Install the right differential carrier case half to the left differential carrier case half.

    If the carrier case halves do not make complete contact, use the **J 36599-A** in order to back out the right differential adjuster nut sleeve until the differential carrier case halves make contact. See **Special Tools**.

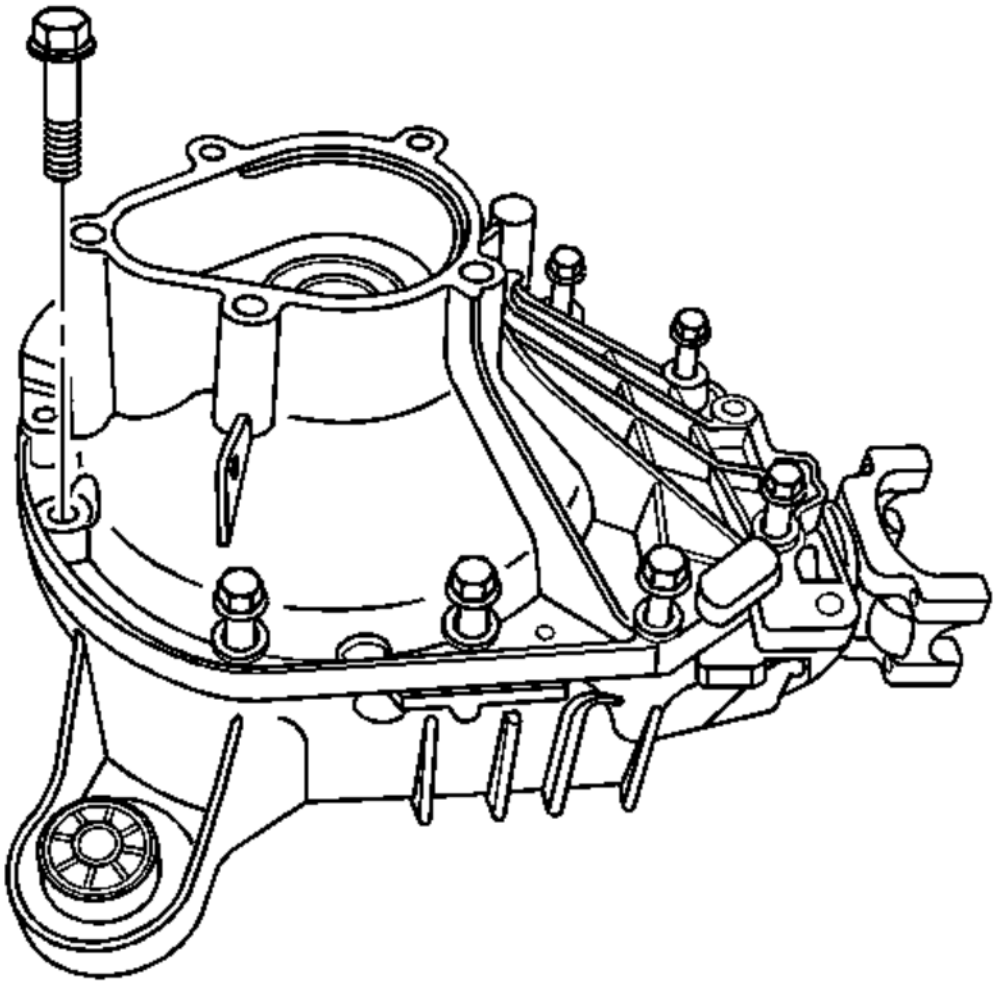


Fig. 216: Differential Carrier Assembly Bolts
Courtesy of GENERAL MOTORS CORP.

29. Install the differential carrier case bolts.

    Tighten: Tighten the differential carrier case bolts to 47 N.m (35 lb ft).

30. Install the differential carrier assembly into a vise.

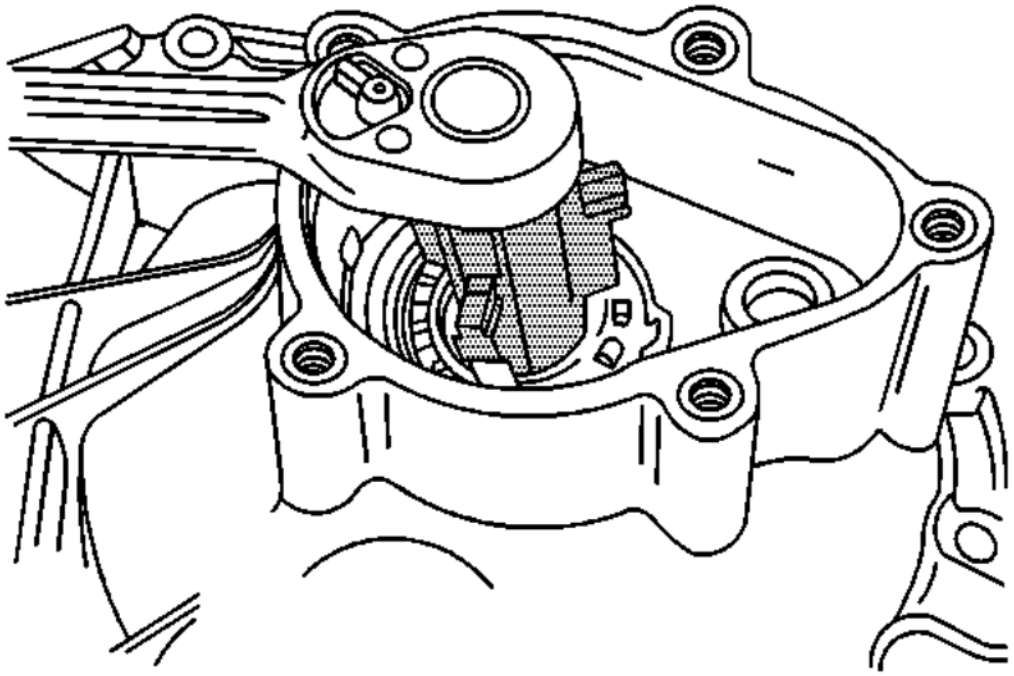


Fig. 217: Removing Differential Bearing Adjuster Nuts & Bearing Cups
Courtesy of GENERAL MOTORS CORP.

31. While rotating the pinion yoke back and forth, turn the right side differential adjuster nut sleeve clockwise using the **J 36599-A** until 0. See **Special Tools**.0254-0.0762 mm (0.001-0.003 in) of backlash can be felt between the ring gear and the drive pinion.

    If the backlash specification cannot be obtained, turn the left side differential adjuster nut sleeve counterclockwise using the **J 36599-A** one notch at a time until the backlash specification can be obtained. See **Special Tools**.

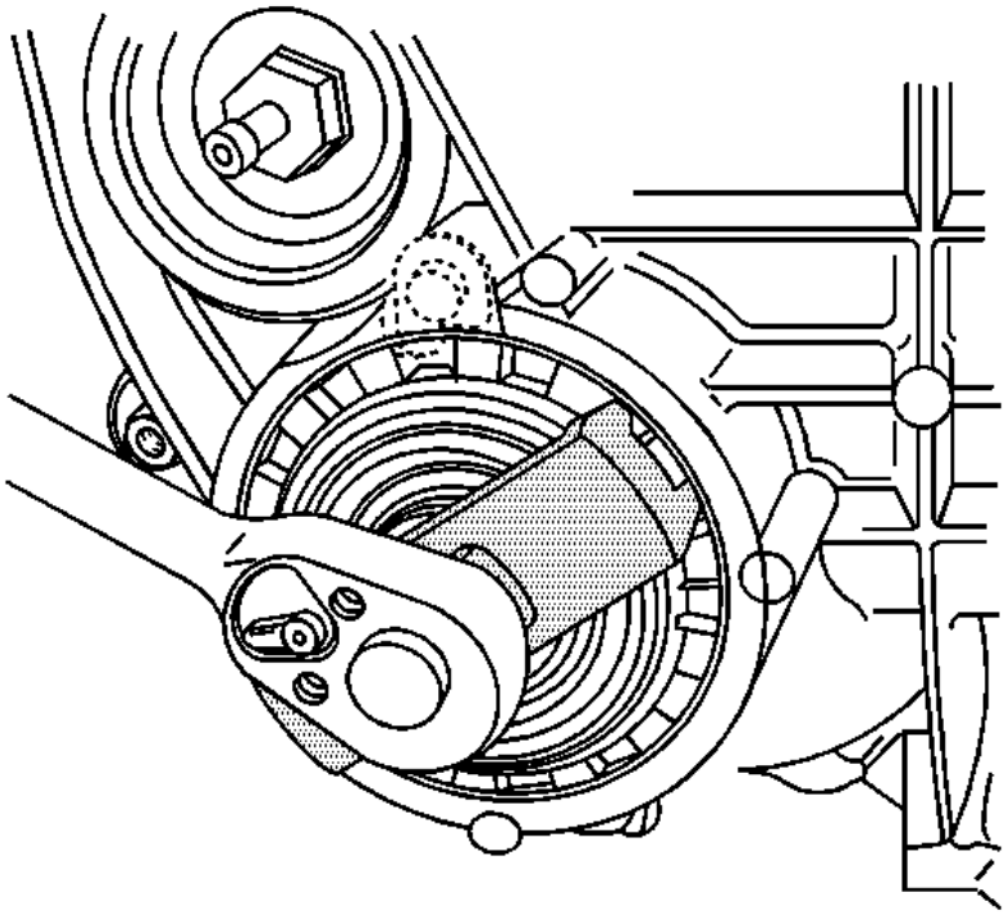


Fig. 218: Removing Left Side Differential Bearing Adjuster
Courtesy of GENERAL MOTORS CORP.

32. Turn the left side differential adjuster nut clockwise using the **J 36615** in order to preload the differential side bearings against the differential side bearing cups. See **Special Tools**.

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

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

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

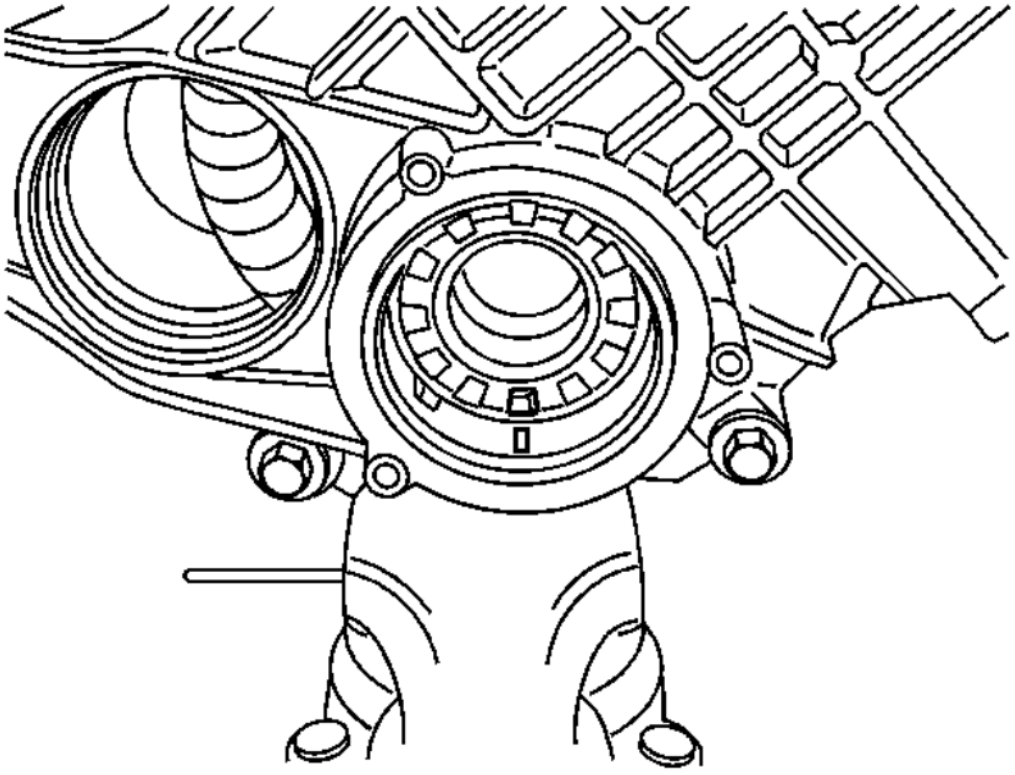


Fig. 219: Alignment Mark Between Differential Adjuster Nut Sleeve & Differential Carrier Case
Courtesy of GENERAL MOTORS CORP.

35. If the rotating torque measurement is below 2.8 N.m (25 lb in) for used bearings, or 3.4 N.m (30 lb in) for new bearings, adjust the differential side bearing preload using the following steps:
    1. Place an alignment mark between the differential adjuster nut sleeve and the differential carrier case, left and right sides.
    2. Using the **J 36599-A** or the **J 36615** , turn the left and the right side differential adjuster nut sleeves in or clockwise one notch. See **Special Tools**.
    3. Measure the rotating torque of the pinion and differential assembly using an inch-

pound torque wrench.

4. Compare the new measurement to the specification listed in step 34. If the rotating torque of the pinion and differential assembly is not within specifications, continue to tighten the left and right side differential adjuster nut sleeves one notch at a time on each side until the rotating torque of the pinion and differential assembly is within specifications.

36. If the rotating torque measurement is above 5.1 N.m (45 lb in) for used bearings, or 6.2 N.m (55 lb in) for new bearings, adjust the differential side bearing preload using the following steps:
    1. Place an alignment mark between the differential adjuster nut sleeve and the differential carrier case, left and right sides.
    2. Using the **J 36599-A** or the **J 36615** , turn the left and the right side differential adjuster nut sleeves out or counterclockwise one notch. See **Special Tools**.
    3. Measure the rotating torque of the pinion and differential assembly using an inch-pound torque wrench.
    4. Compare the new measurement to the specification listed in step 34. If the rotating torque of the pinion and differential assembly is not within specifications, continue to loosen the left and right side differential adjuster nut sleeves one notch at a time on each side until the rotating torque of the pinion and differential assembly is within specifications.
37. Once the specified rotating torque is obtained, rotate the pinion several times to ensure the bearings have seated.

    Recheck the rotating torque and adjust if necessary.

38. Measure the drive pinion to ring gear backlash and adjust, if necessary. Refer to **Backlash Inspection and Adjustment**.
39. 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**.
40. Complete the assembly of the differential carrier. Refer to **Differential Carrier Assembly Final Assembly (8.25 F4WD Axle)** or **Differential Carrier Assembly Final Assembly (8.25 S4WD and 9.25 Axles)**.

BACKLASH INSPECTION AND ADJUSTMENT

Tools Required

- **J 8001** Dial Indicator Set
- **J 36599-A** Side Bearing Nut Wrench. See **Special Tools**.
- **J 36615** Side Bearing Nut Wrench. See **Special Tools**.

Inspection and Adjustment

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

   Ensure that the notches can be counted when turned.

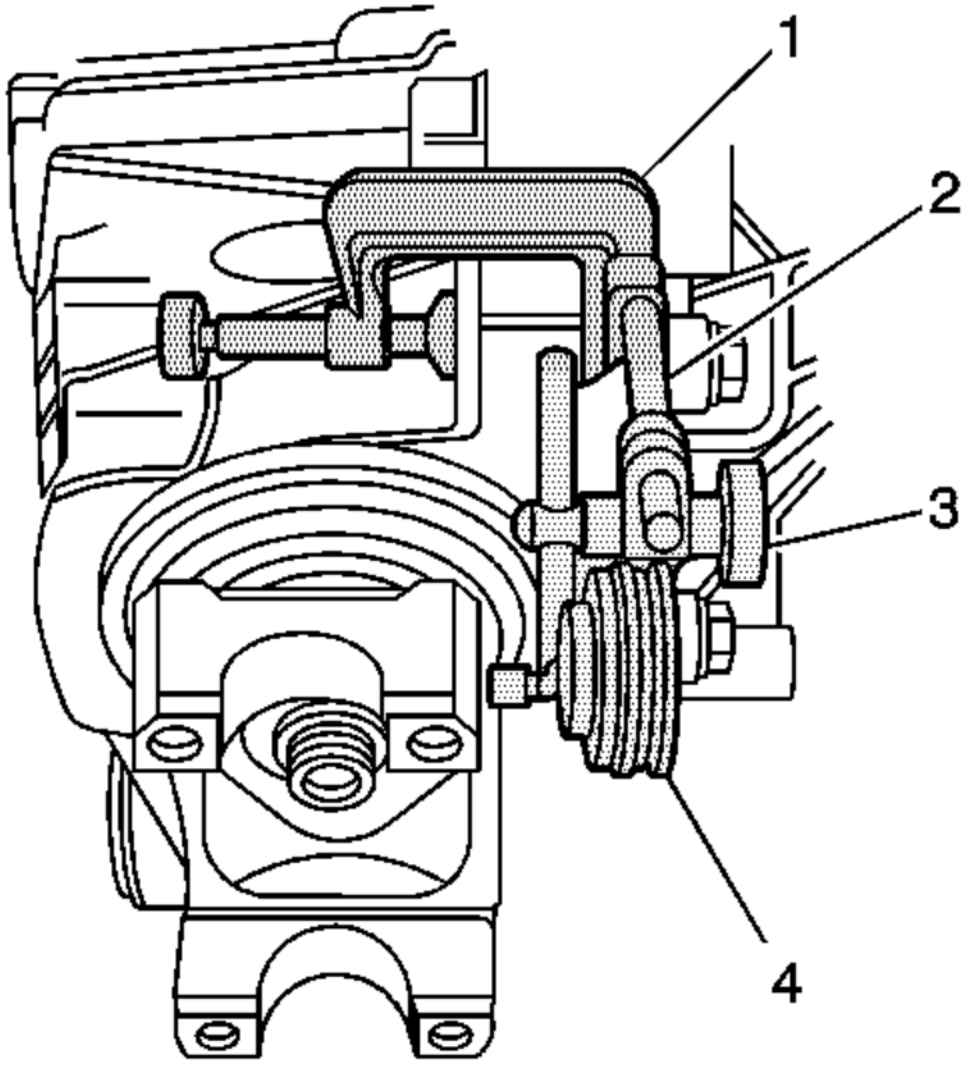


Fig. 220: Installing J 8001-1, J 8001-2 & J 8001-3 To Pinion Yoke
Courtesy of GENERAL MOTORS CORP.

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:

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

6. If the backlash is too small, increase the backlash by turning the right differential adjuster nut sleeve out one notch using the **J 36599-A** , 8. See **Special Tools**.25 inch axle, or the **J 36615** , 9. See **Special Tools**.25 inch axle, and the left differential adjuster nut sleeve in one notch using the **J 36599-A** until the correct backlash is obtained. See **Special Tools**.
7. If the backlash is too large, decrease the backlash by turning the left differential adjuster nut sleeve out one notch using the **J 36599-A** and the right differential adjuster nut sleeve in one notch using the **J 36599-A** , 8. See **Special Tools**.25 inch axle, or the **J 36615** , 9. See **Special Tools**.25 inch axle, until the correct backlash is obtained.
8. Recheck the rotating torque of the pinion and differential assembly and adjust, if necessary. Refer to **Differential Carrier Assembly Assemble (8.25 Inch Axle Lock Ring Style)** or **Differential Carrier Assembly 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 **Differential Carrier Assembly Assemble (8.25 Inch Axle Lock Ring Style)** or **Differential Carrier Assembly Assemble (9.25 Inch Axle)**.

DIFFERENTIAL CARRIER ASSEMBLY FINAL ASSEMBLY (8.25 F4WD AXLE)

Special Tools

- **J 8092** Universal Driver Handle - 3/4 in - 10
- **J 33791** Carrier Bushing Remover/Installer. See **Special Tools**.
- **J 36609** Axle Tube Bearing Installer. See **Special Tools**.
- **J 36616** Axle Mount Bushing Remover/Installer
- **J 45225** Axle Seal Installer. See **Special Tools**.

Assembly

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. Bend the differential adjuster nut lock tabs over the differential adjuster nut sleeves.
3. Install the differential carrier assembly into a vise.

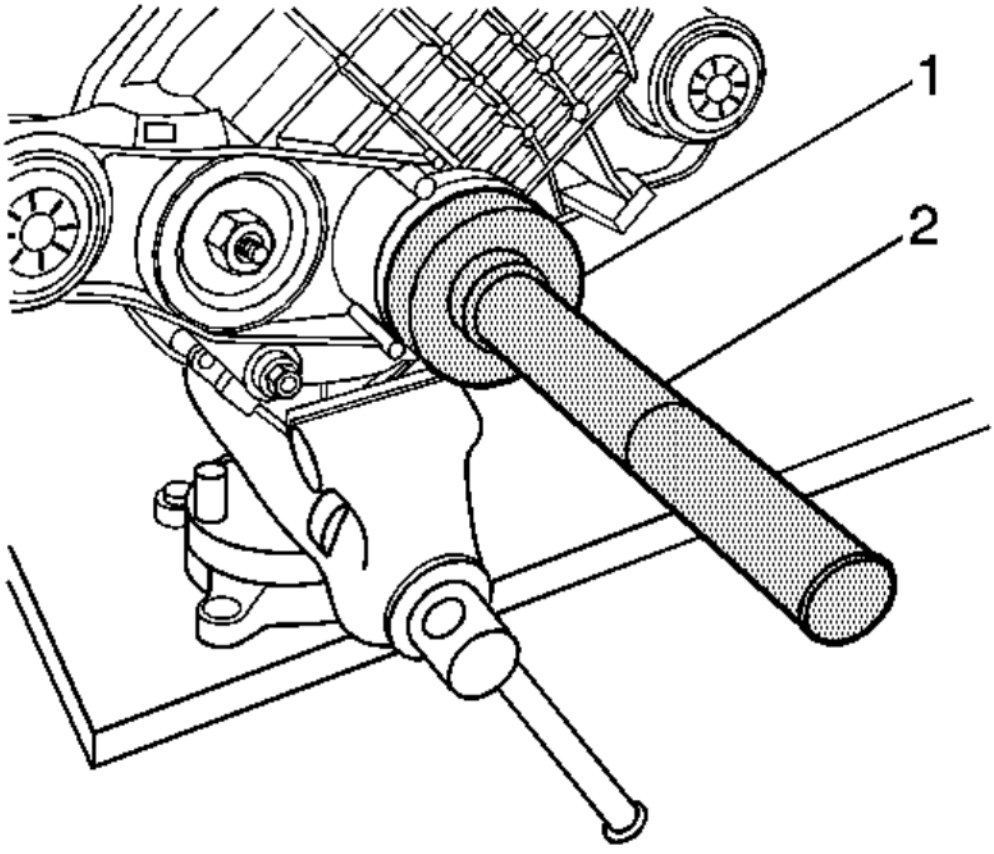


Fig. 221: Install New Axle Shaft Seal Using J 45225 & J 8092 - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

4. Install the new left side axle shaft seal using the **J 45225** (1) and the **J 8092** (2). See **Special Tools**.
5. Install the new left side inner axle shaft retainer ring.

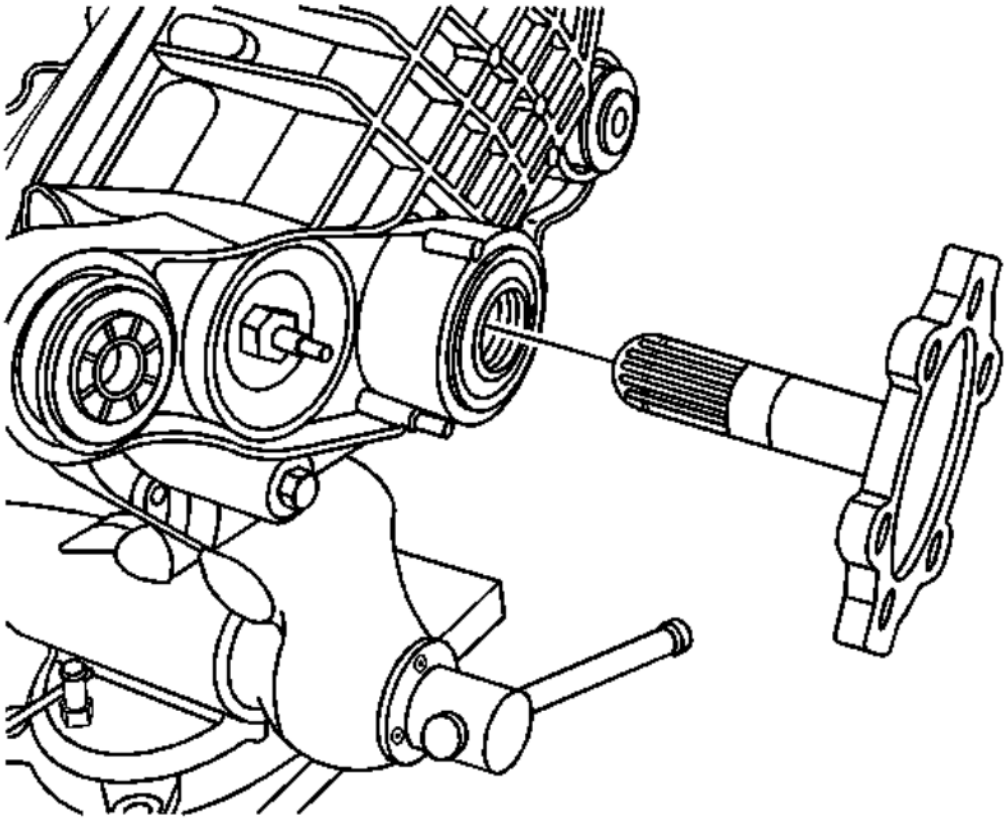


Fig. 222: View Of Left Side Inner Axle Shaft
Courtesy of GENERAL MOTORS CORP.

6. Install the left side inner axle shaft by doing the following:
    1. Install the left side inner shaft into the differential carrier assembly until the inner shaft is seated against the differential side gear.
    2. While 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.
    3. Drive the inner shaft into the differential case side gear using a soft-faced mallet until the retaining ring on the inner shaft is fully seated within the groove in the differential case side gear.
7. Pull back on the inner shaft to ensure that the inner shaft is properly retained in the differential case side gear.

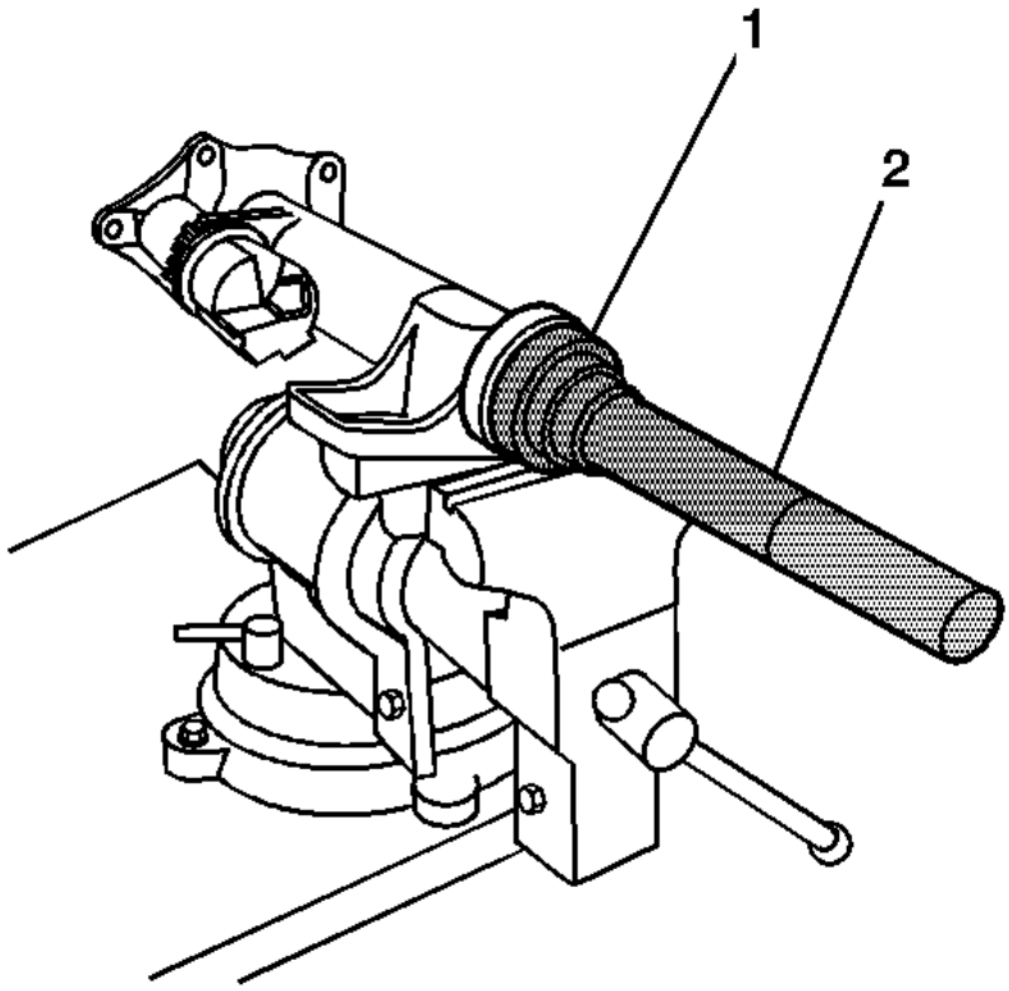


Fig. 223: Installing Side Bearing Using J 36609 & J 8092 - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

8. Install the right side inner shaft bearing into the inner shaft housing by performing the following steps:
    1. Install the inner axle shaft housing into a vise.

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

    2. Install the bearing with the square shoulder in using the **J 36609** (1) and the **J 8092**

(2). See **Special Tools**.

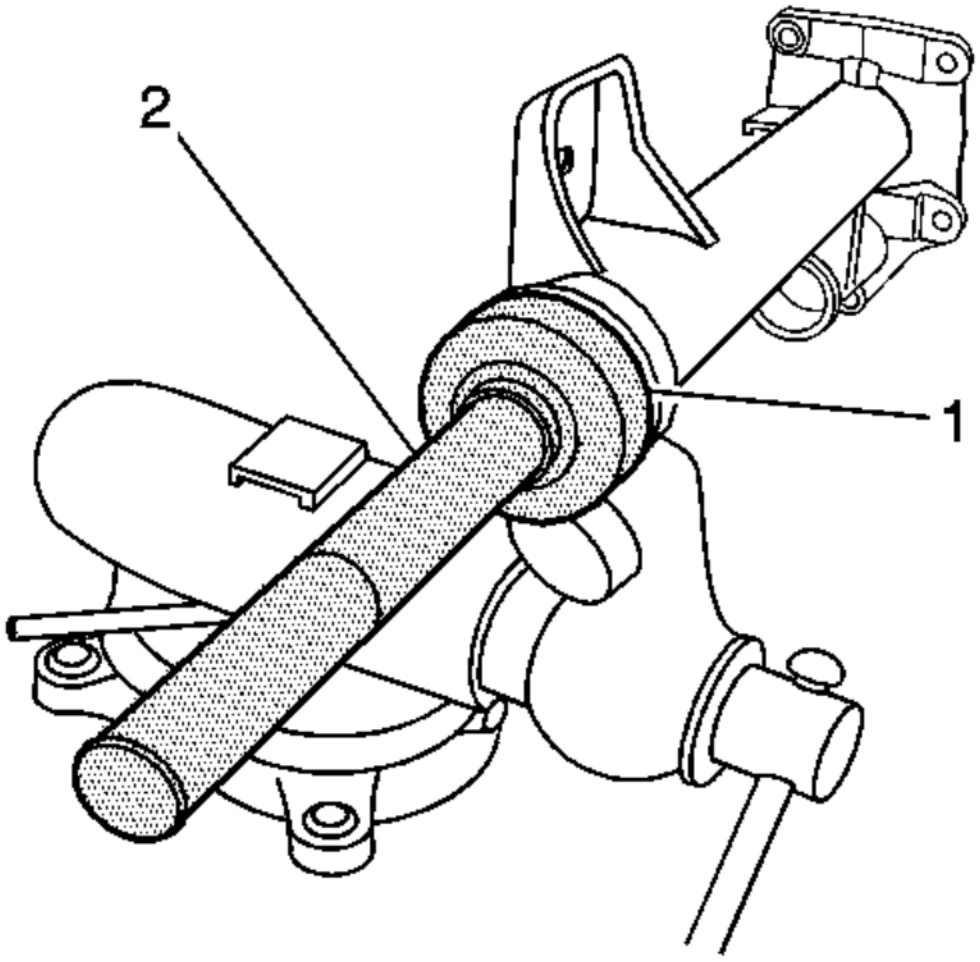


Fig. 224: Installing New Axle Shaft Seal Using J 45225 & J 8092 - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

9. Install the new inner shaft seal using the **J 45225** (1) and the **J 8092** (2). See **Special Tools**.
10. Install the differential axle housing gasket.
11. Install the inner shaft housing to the differential carrier assembly case.

NOTE: Refer to Fastener Notice .

12. Install the inner shaft housing bolts.

    Tighten: Tighten the inner axle shaft housing bolts to 40 N.m (30 lb ft).

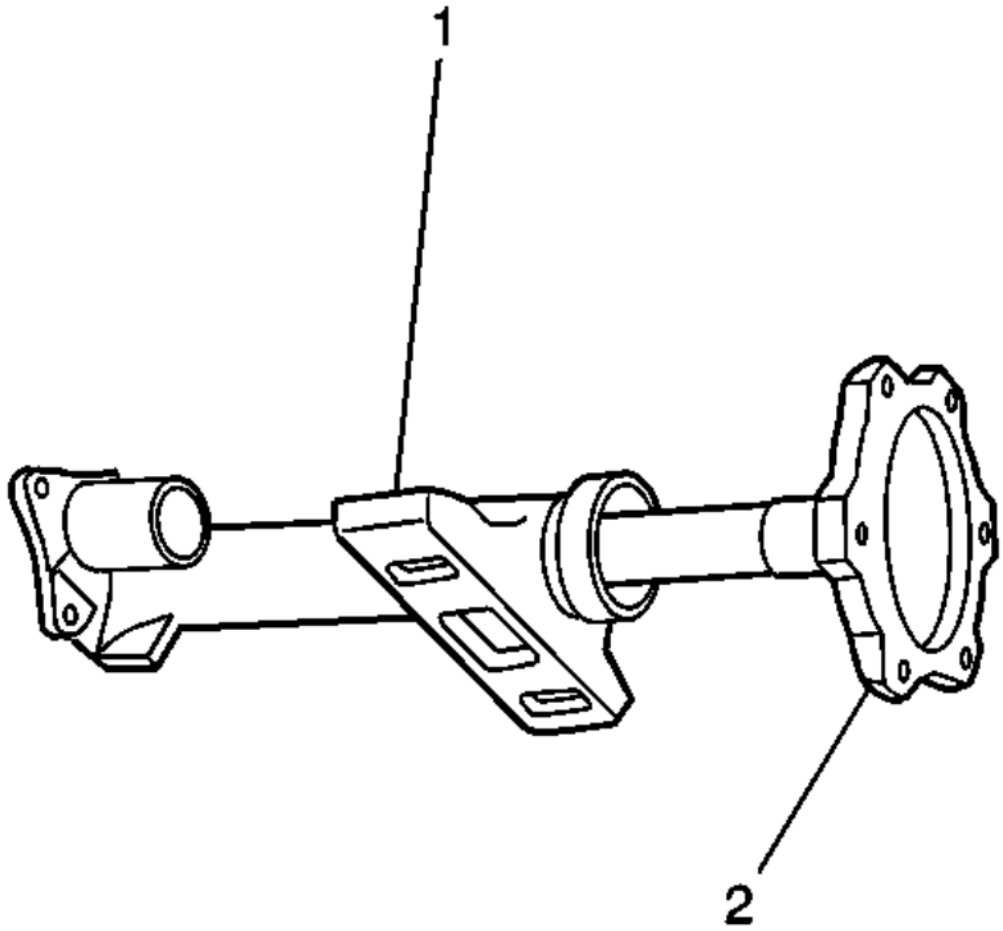


Fig. 225: Axle Shaft & Inner Axle Shaft Housing - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS CORP.

13. Install the inner shaft (2) into the inner shaft housing (1) by doing the following:
    1. Install the inner shaft into the inner axle shaft housing until the inner shaft is seated against the differential side gear.

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

14. Pull back on the inner shaft to ensure that the inner shaft is properly retained in the differential case side gear.
15. Install the drain plug and the washer.
16. Install the fill plug and the washer.

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

17. Install the differential carrier assembly. Refer to **Differential Carrier Assembly Replacement (1500 FWD)** or **Differential Carrier Assembly Replacement (2500 4WD)**.

DIFFERENTIAL CARRIER ASSEMBLY FINAL ASSEMBLY (8.25 S4WD AND 9.25 AXLES)

Special Tools

- **J 8092** Universal Driver Handle - 3/4 in - 10
- **J 33842** Pilot Bearing Installer. See **Special Tools**.
- **J 36609** Axle Tube Bearing Installer. See **Special Tools**.
- **J 36616** Axle Mount Bushing Remover/Installer
- **J 45225** Axle Seal Installer. See **Special Tools**.

Assembly

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. Bend the differential adjuster nut lock tabs over the differential adjuster nut sleeves, 9.25 inch axle - right side.

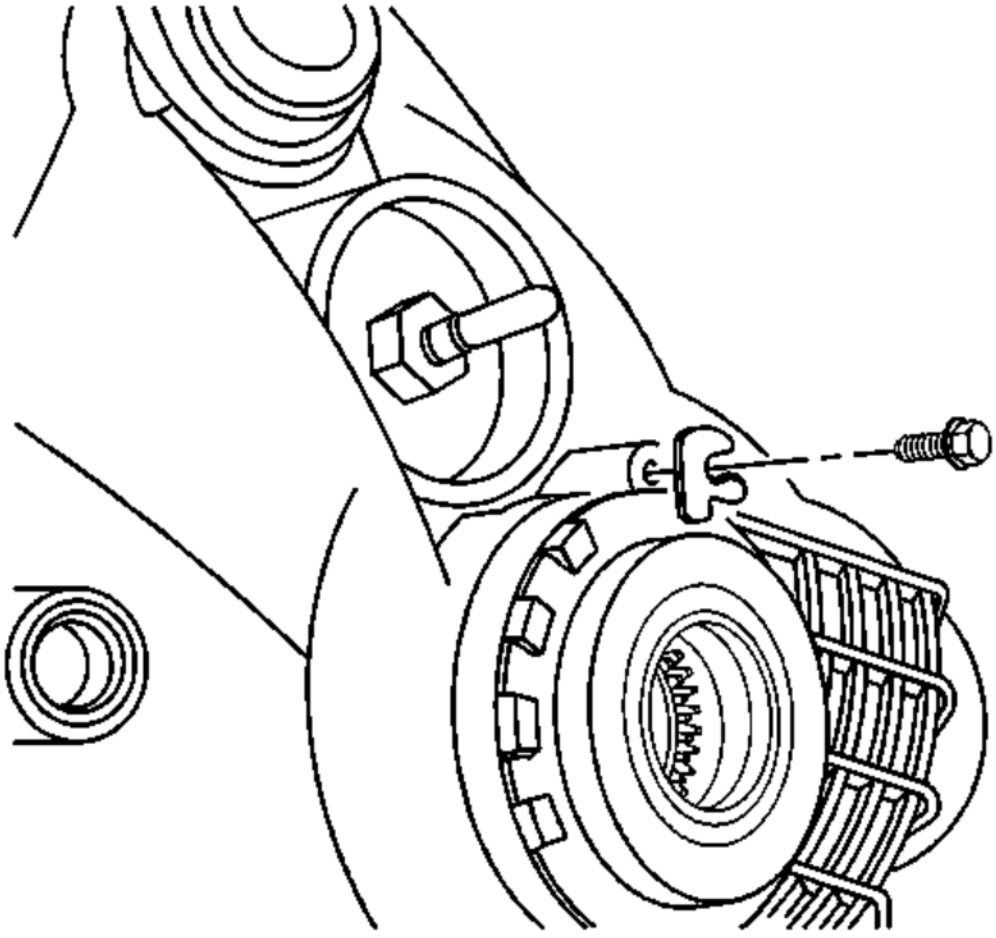


Fig. 226: Left Side Differential Bearing Adjuster Nut Lock & Bolt (9.25 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

3. Install the differential adjuster nut lock, 9.25 inch axle - left side.

NOTE: **Refer to Fastener Notice .**

4. Install the differential adjuster nut lock bolt.

Tighten: Tighten the differential adjuster lock nut bolt to 20 N.m (15 lb ft).

5. Lubricate the clutch shaft pilot bearing with axle lubricant. Use the correct fluid. Refer to **Sealers, Adhesives, and Lubricants**.

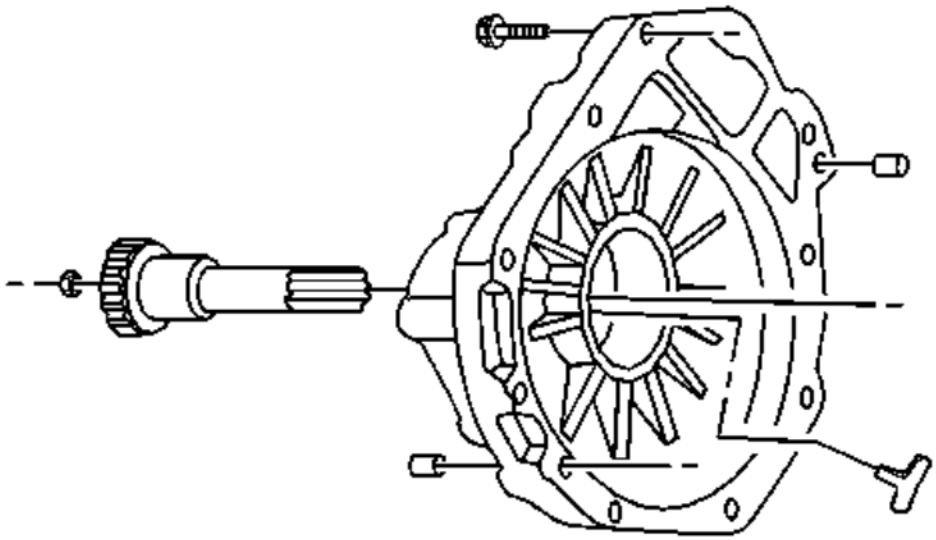


Fig. 227: Identifying Differential Carrier Assembly Bolts
Courtesy of GENERAL MOTORS CORP.

6. Install the clutch shaft to the differential carrier case half.

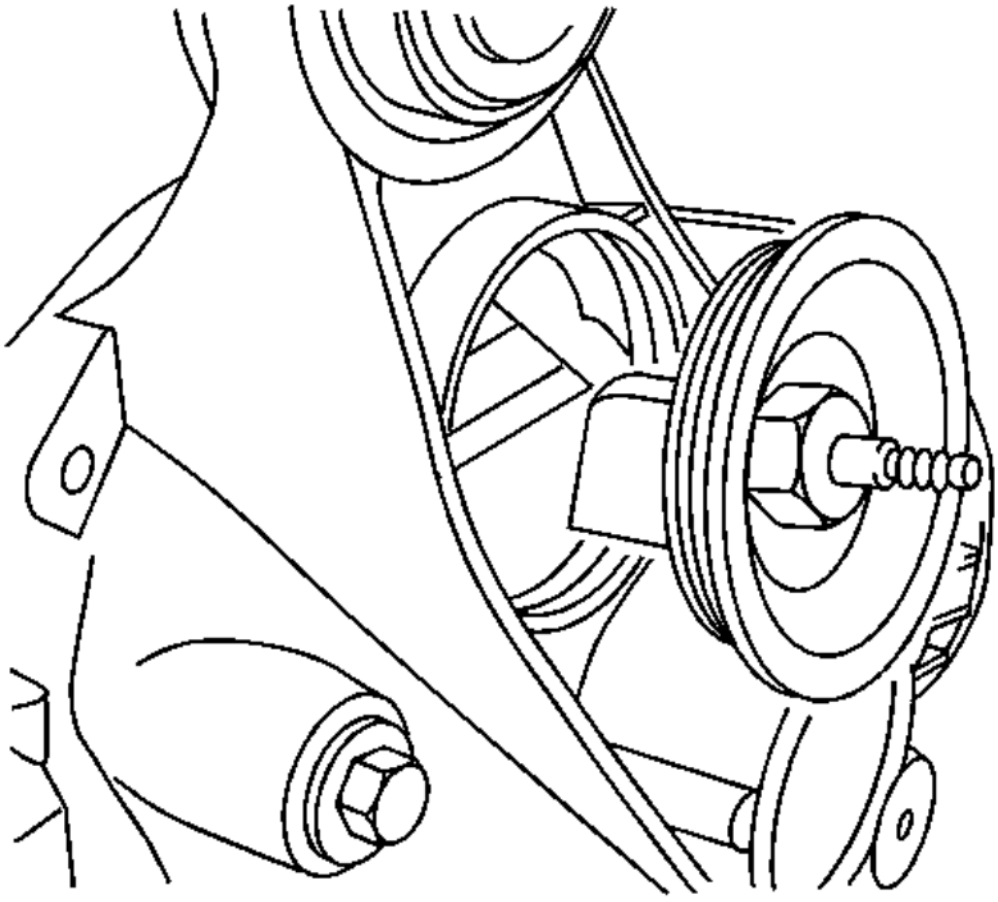


Fig. 228: View Of Vent Hose Connector
Courtesy of GENERAL MOTORS CORP.

7. If servicing the 9.25 inch axle, install the vent hose connector.

   Tighten: Tighten the vent hose connector to 28 N.m (21 lb ft).

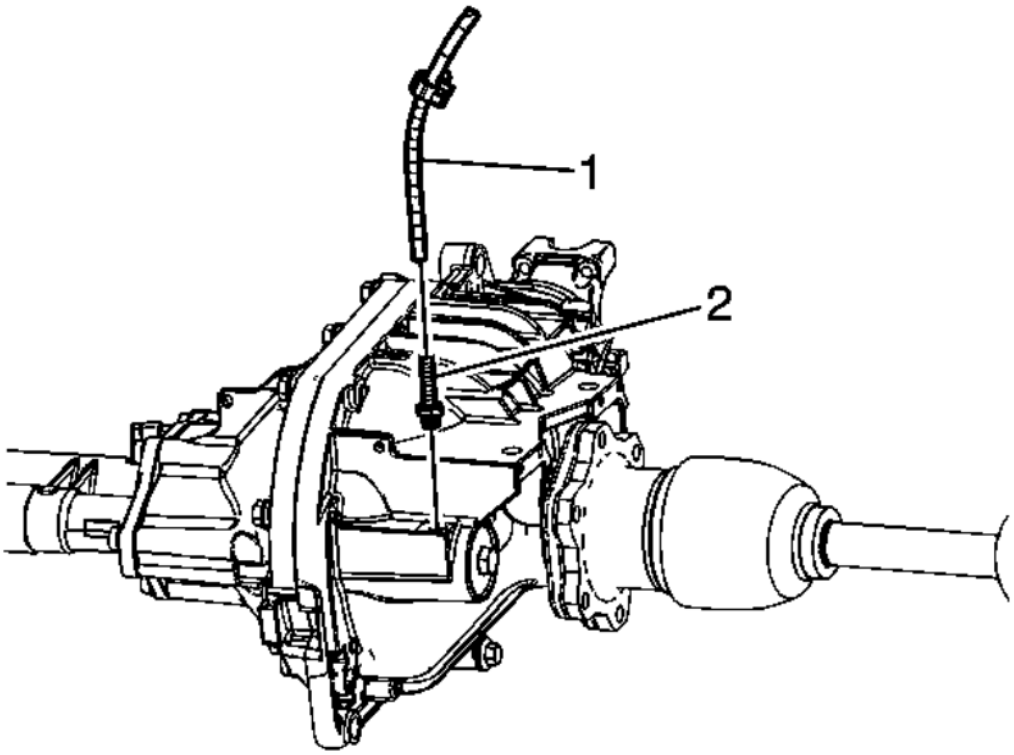


Fig. 229: View Of Vent Hose & Connector
Courtesy of GENERAL MOTORS CORP.

8. If servicing the 8.25 inch axle, install the vent hose (1) to the vent connector (2).

   Tighten: Tighten the vent hose connector (2) to 20 N.m (15 lb ft).

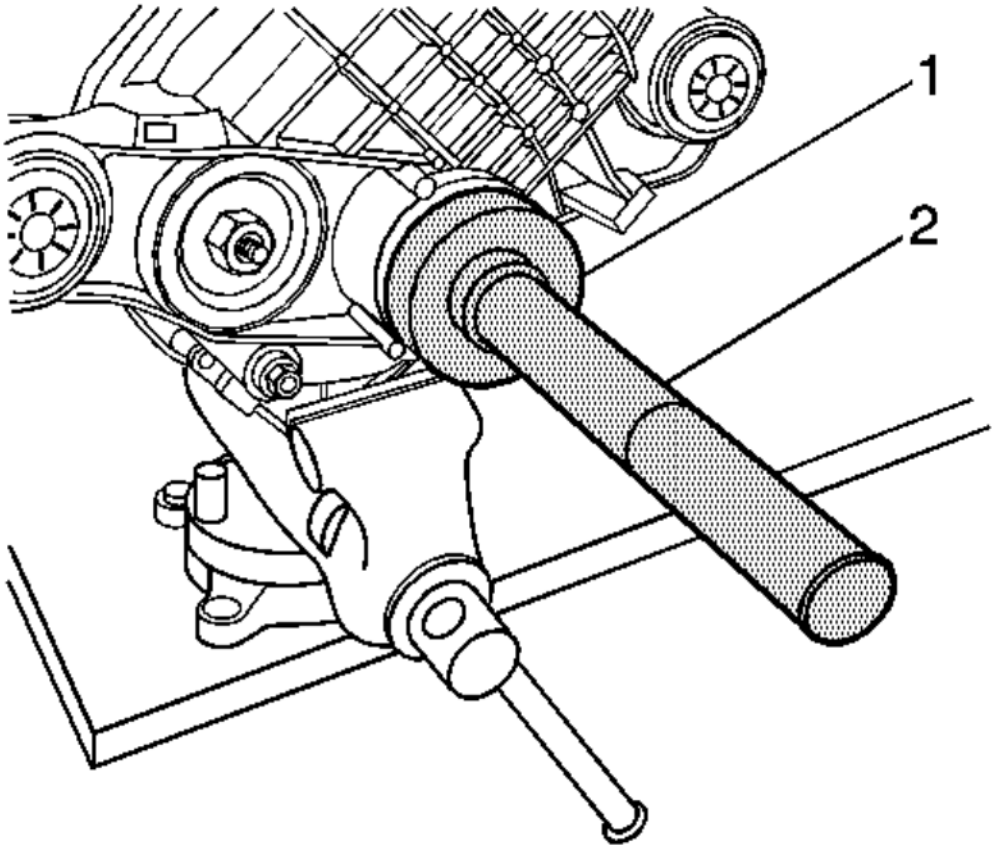


Fig. 230: Install New Axle Shaft Seal Using J 45225 & J 8092 - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

9. Install the new left side axle shaft seal using the **J 45225** (1) and the **J 8092** (2). See **Special Tools**.
10. Install the new left side inner axle shaft retainer ring.

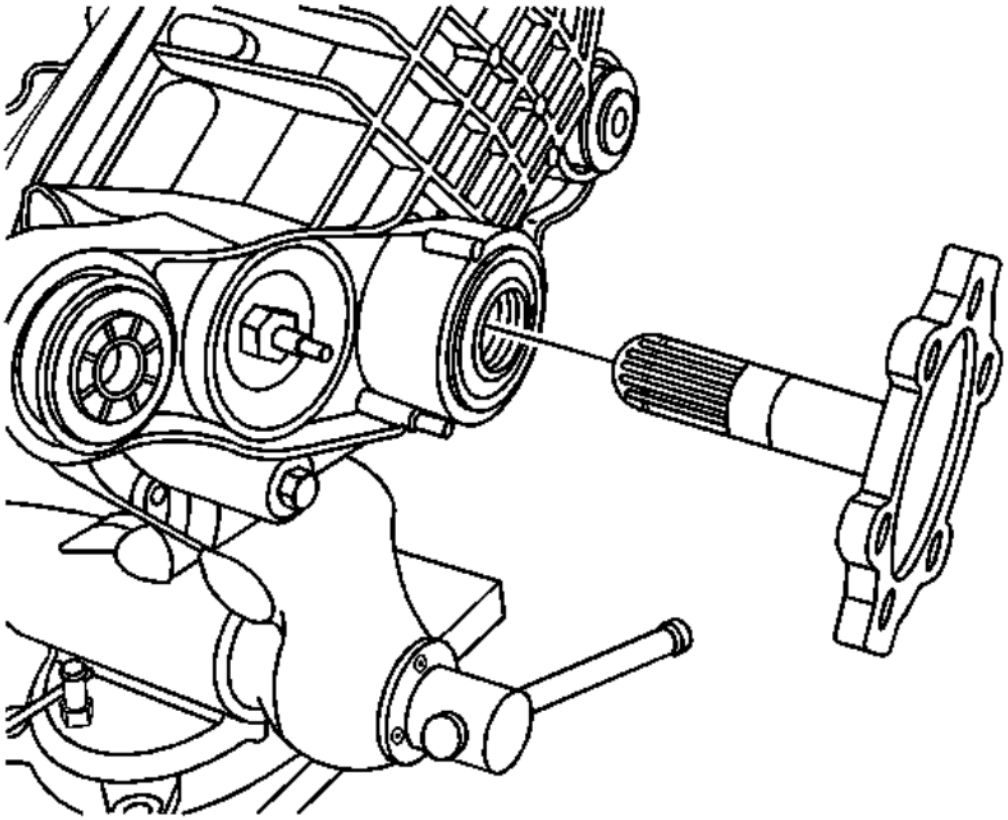


Fig. 231: View Of Left Side Inner Axle Shaft
Courtesy of GENERAL MOTORS CORP.

11. Install the left side inner axle shaft by doing the following:
    1. Install the left side inner shaft into the differential carrier assembly until the inner shaft is seated against the differential side gear.
    2. While 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.
    3. Drive the inner shaft into the differential case side gear using a soft-faced mallet until the retaining ring on the inner shaft is fully seated within the groove in the differential case side gear.
12. Pull back on the inner shaft to ensure that the inner shaft is properly retained in the differential case side gear.

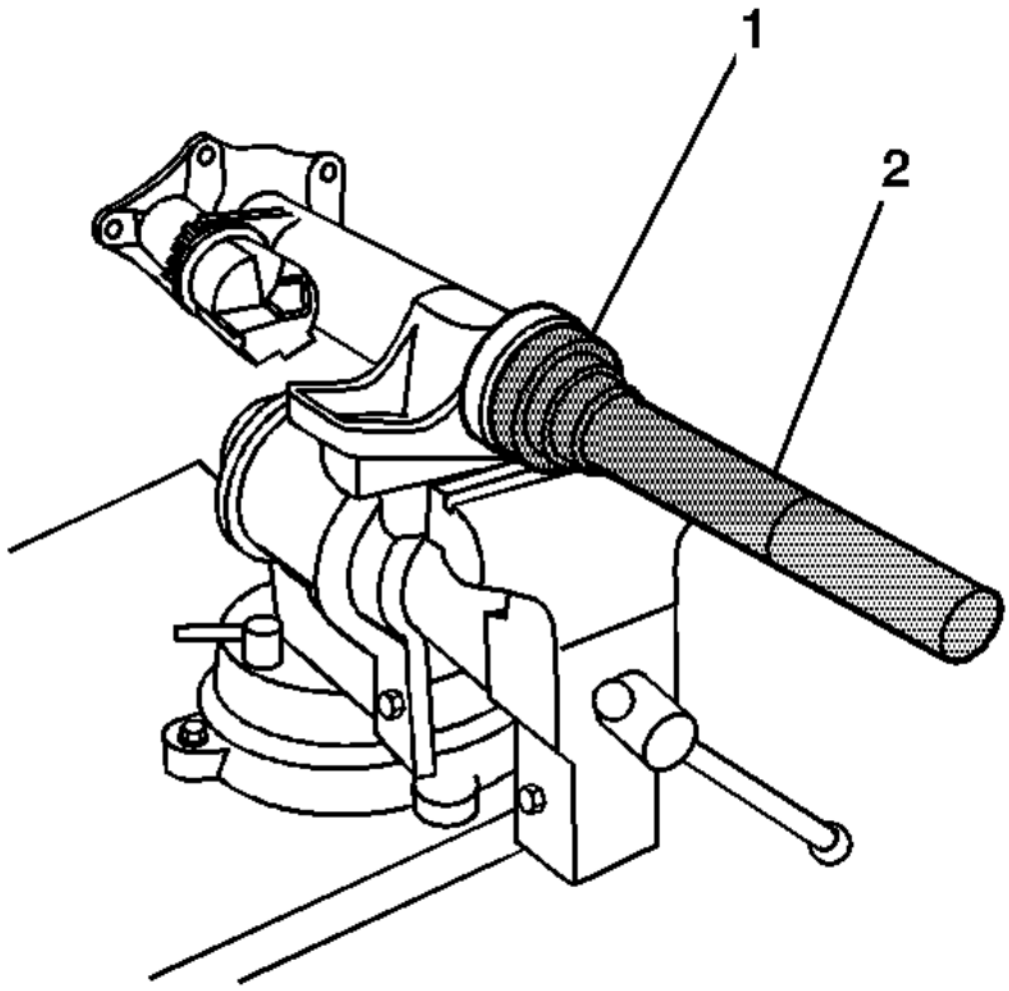


Fig. 232: Installing Side Bearing Using J 36609 & J 8092 - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

13. Install the right side inner shaft bearing into the inner shaft housing by performing the following steps:

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

1. Install the inner axle shaft housing into a vise.

2. Install the bearing with the square shoulder in using the **J 36609** (1) and the **J 8092** (2). See **Special Tools**.

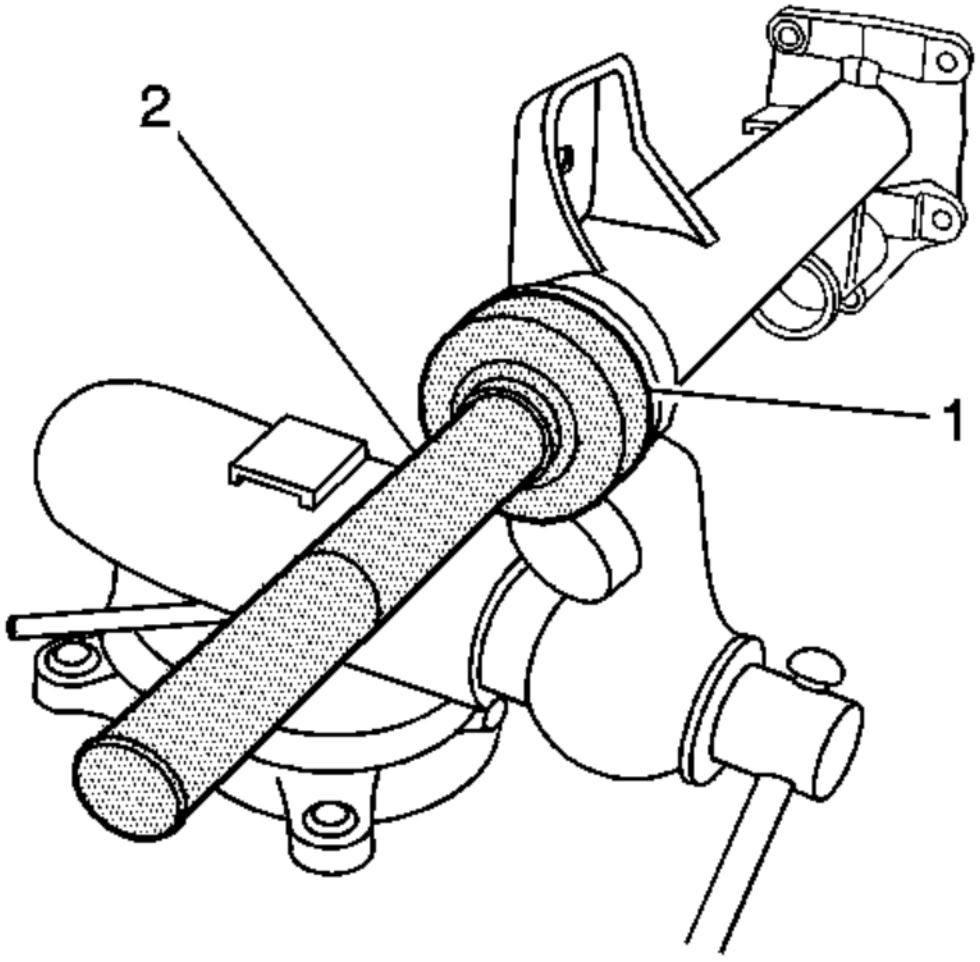


Fig. 233: Installing New Axle Shaft Seal Using J 45225 & J 8092 - Front Drive Axle
Courtesy of GENERAL MOTORS CORP.

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

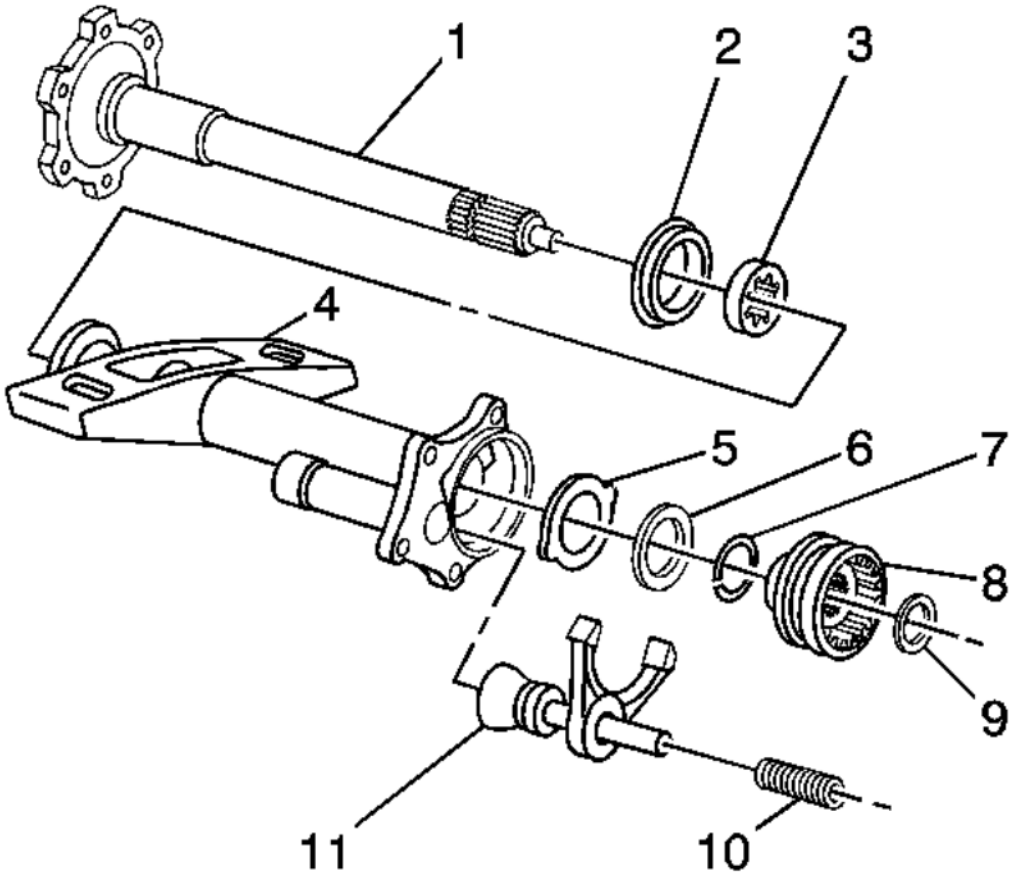


Fig. 234: Inner Axle Shaft Housing Components
Courtesy of GENERAL MOTORS CORP.

15. Install the following components into the inner shaft housing:
    1. The inner axle shaft (1)-Carefully tap the inner axle shaft into place with a soft-faced mallet.

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

    2. The thrust washer, with tabs (5)-Ensure the tabs on the thrust washer are aligned with the slots in the inner shaft housing.
    3. The thrust washer, without tabs (6)

4. The new retainer ring (7) onto the inner axle shaft (1)
5. Determine the clutch gear shim thickness. Refer to **Inner Axle Shaft Shim Adjustment** .
6. The clutch gear shim (9)
7. The clutch sleeve (8)
8. The clutch fork assembly (11)
9. The clutch fork inner spring (10)
10. The inner axle housing gasket

IMPORTANT: The following service procedure is for the 9.25 inch axle ONLY.

16. Apply sealant to the inner shaft housing to differential carrier sealing surface. Use the correct sealant. Refer to **Sealers, Adhesives, and Lubricants**.

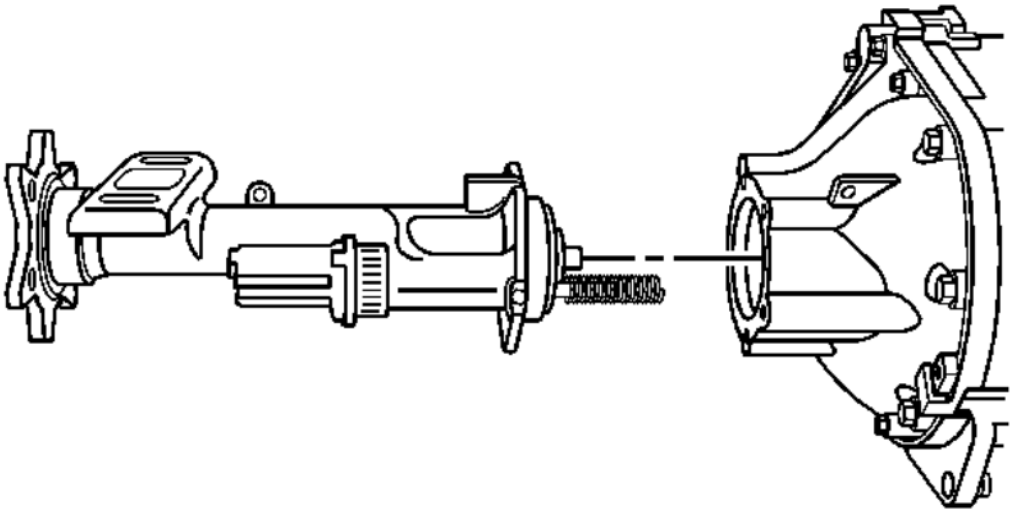


Fig. 235: Identifying Inner Axle Shaft Housing Assembly - Front Drive Axle (8.25 S4WD and 9.25 Axles)
Courtesy of GENERAL MOTORS CORP.

17. Install the inner shaft housing to the differential carrier assembly case.

18. If servicing the 8.25 inch axle, install the inner shaft housing bolts.

    Tighten: Tighten the inner shaft housing bolts to 73 N.m (54 lb ft).

19. If servicing the 9.25 inch axle, install the inner shaft housing bolts.

    Tighten: Tighten the inner shaft housing bolts to 40 N.m (30 lb ft).

20. Install the drain plug and the washer.
21. Install the fill plug and the washer.

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

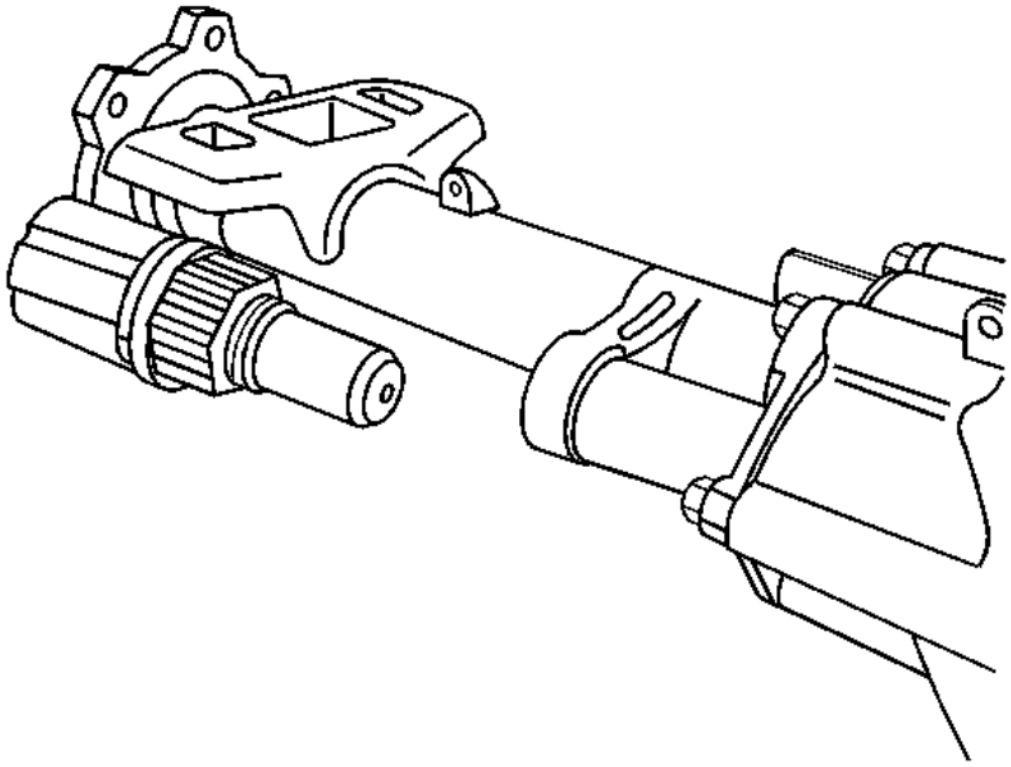


Fig. 236: View Of Front Axle Actuator
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Component Fastener Tightening Notice .

22. Install the front drive axle actuator.

    Apply sealant to the threads of the front axle actuator. Use the correct sealant. Refer to **Sealers, Adhesives, and Lubricants**.

    Tighten: Tighten the front drive axle actuator to 20 N.m (15 lb ft).

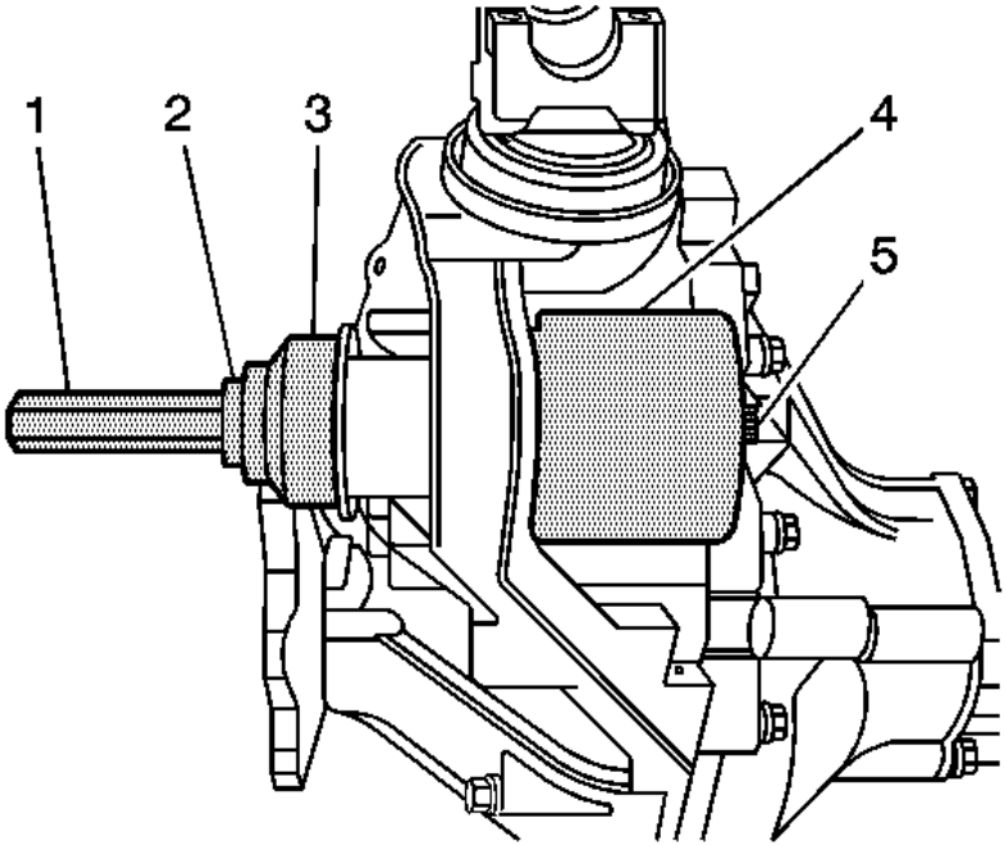


Fig. 237: Installing Lower Differential Carrier Assembly Bushing Using J 21474-18, Thrust Bearing, J 36616-2, J 36616-1, & Forcing Screw
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The following service procedures are for the 9.25 inch axle

ONLY.

23. Install the lower differential carrier assembly bushing by performing the following steps:
    1. Install the J 21474-18 (1), the thrust bearing (2), the J 36616-2 (3), the J 36616-1 (4), and the forcing screw (5) as shown.
    2. While holding the forcing screw, slowly tighten the J 21474-18 until the bushing has stopped against the step on the bushing and is centered within the differential carrier assembly bushing bore.

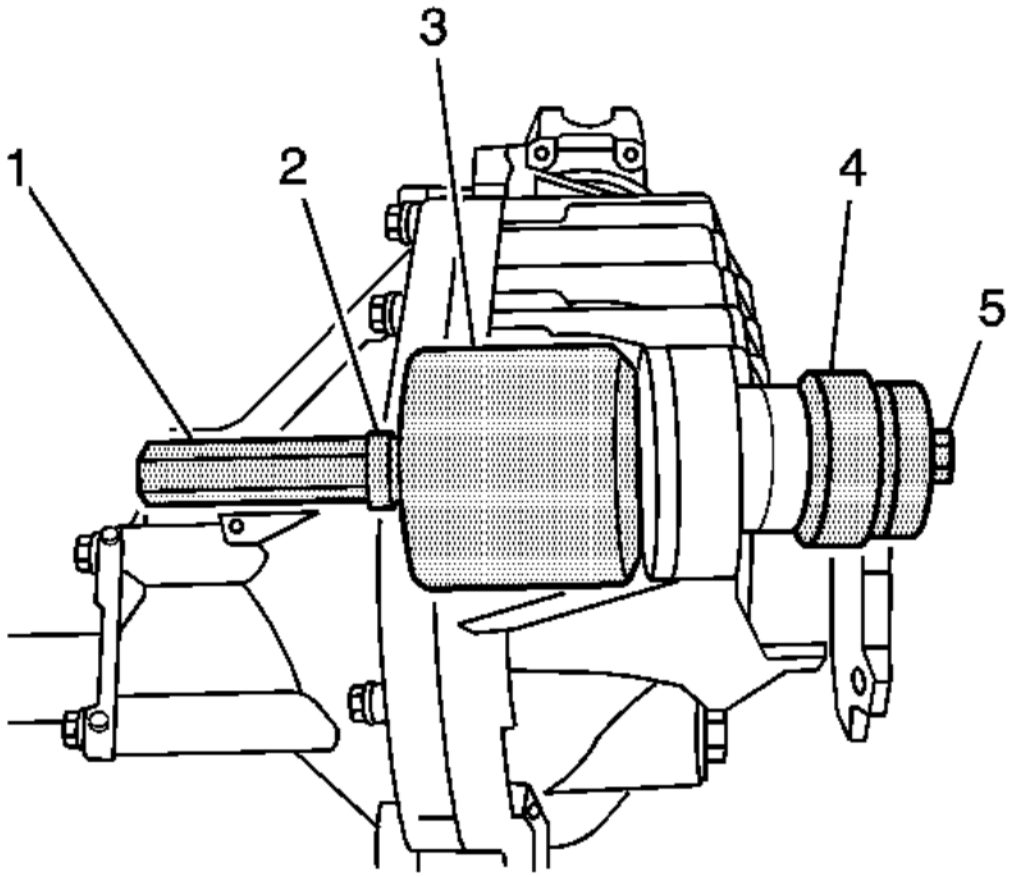


Fig. 238: Installing Upper Differential Carrier Assembly Bushing J 21474-18, Thrust Bearing, J 36616-2, J 36616-1, & Forcing Screw
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The following service procedures are for the 9.25 inch axle ONLY.

24. Install the upper differential carrier assembly bushing by performing the following steps:
    1. Install the J 21474-18 (1), the thrust bearing (2), the J 36616-2 (3), the J 36616-1 (4), and the forcing screw (5) as shown.
    2. While holding the forcing screw, slowly tighten the J 21474-18 until the bushing has stopped against the step on the bushing and is centered within the differential carrier assembly bushing bore.
25. Install the differential carrier assembly. Refer to **Differential Carrier Assembly Replacement (1500 FWD)** or **Differential Carrier Assembly Replacement (2500 4WD)**.

GEAR TOOTH CONTACT PATTERN INSPECTION

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

Gear Tooth Nomenclature

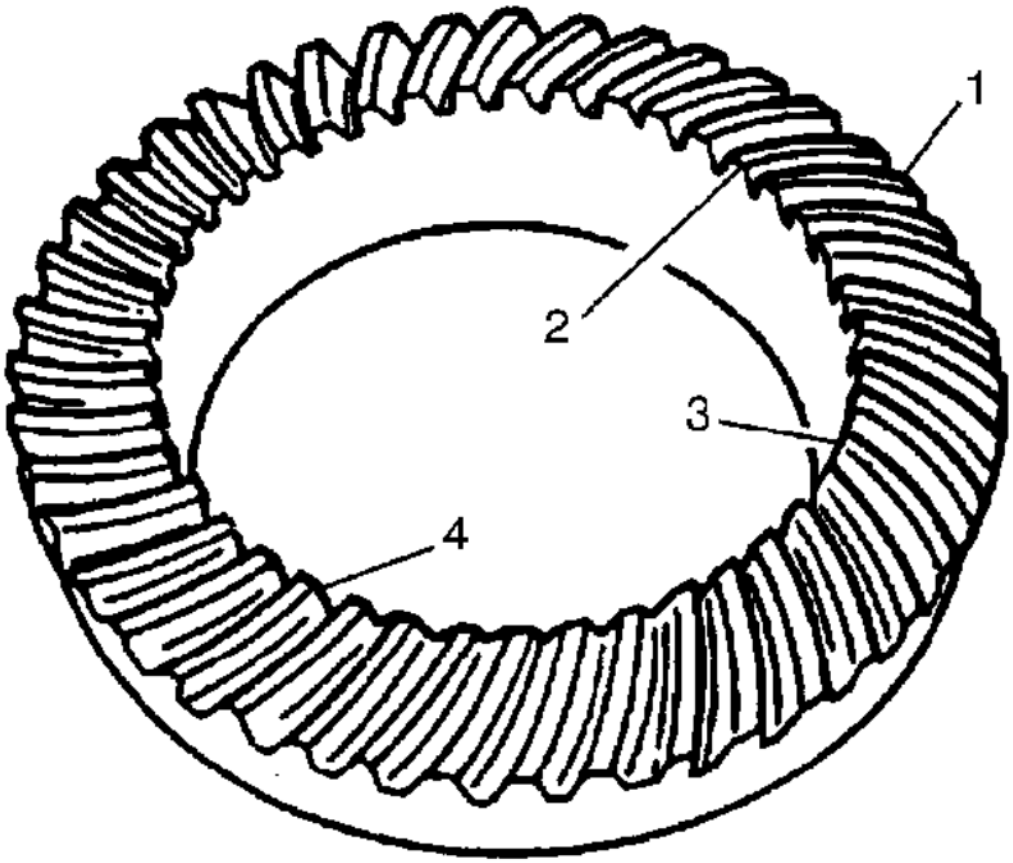


Fig. 239: Defining Gear Tooth Nomenclature
Courtesy of GENERAL MOTORS CORP.

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

Adjustments Affecting Tooth Contact

The following 2 adjustments affect the tooth contact pattern:

- Backlash adjustment
- Pinion depth adjustment

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

Pinion Depth Adjustment

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

Backlash Adjustment

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

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

Testing Procedure

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

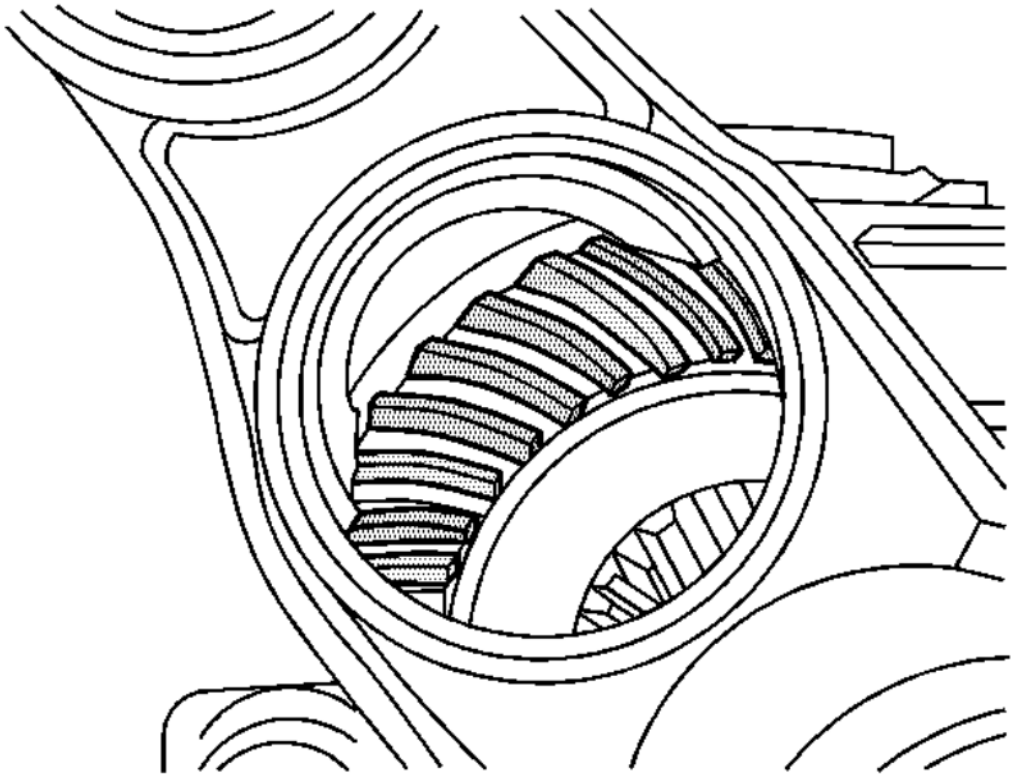


Fig. 240: Ring Gear Teeth Pattern
Courtesy of GENERAL MOTORS CORP.

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

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

Differential Carrier Assembly Assemble (8.25 Inch Axle Lock Ring Style) or **Differential Carrier Assembly Assemble (9.25 Inch Axle)**.

Correct Contact Pattern

Condition

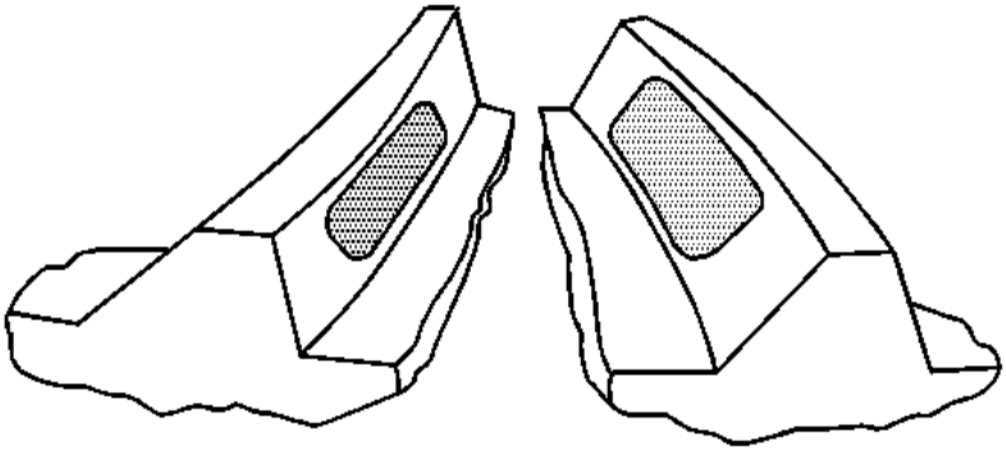


Fig. 241: Identifying Correct Gear Tooth Contact Pattern
Courtesy of GENERAL MOTORS CORP.

The backlash and pinion depth is correct.

Correction

None required.

Service Hints

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

- Total assembly
- Differential case
- Drive pinion

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

Drive Side Heel - Coast Side Toe Contact Pattern

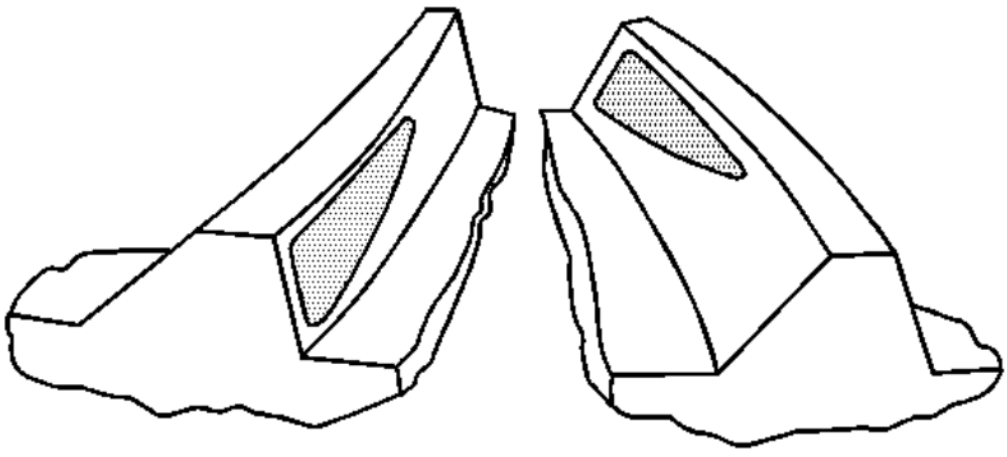


Fig. 242: Identifying Drive Side Heel - Coast Side Toe Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

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

Correction

Adjust the pinion depth of drive pinion. Refer to **Pinion Depth Adjustment**.

Drive Side Toe - Coast Side Heel Contact Pattern

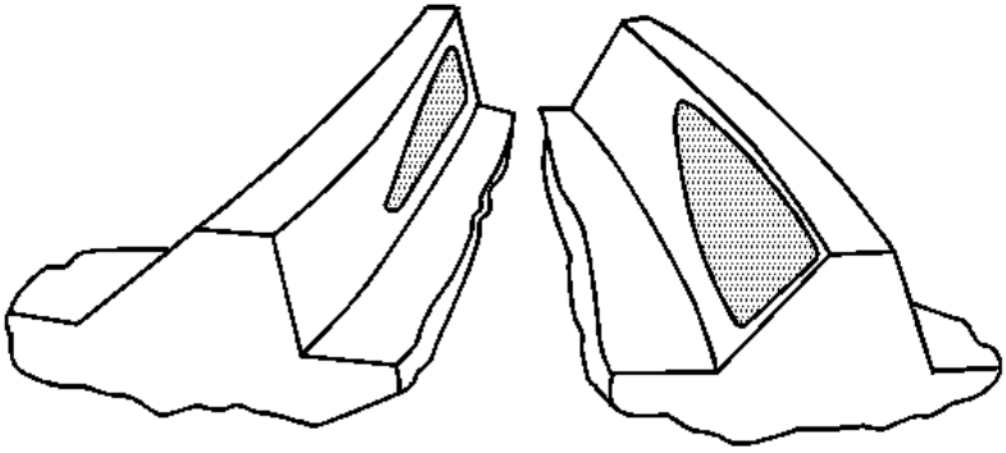


Fig. 243: Identifying Drive Side Toe - Coast Side Heel Contact Pattern
Courtesy of GENERAL MOTORS CORP.

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**.

Drive Side Heel - Coast Side Heel Contact Pattern

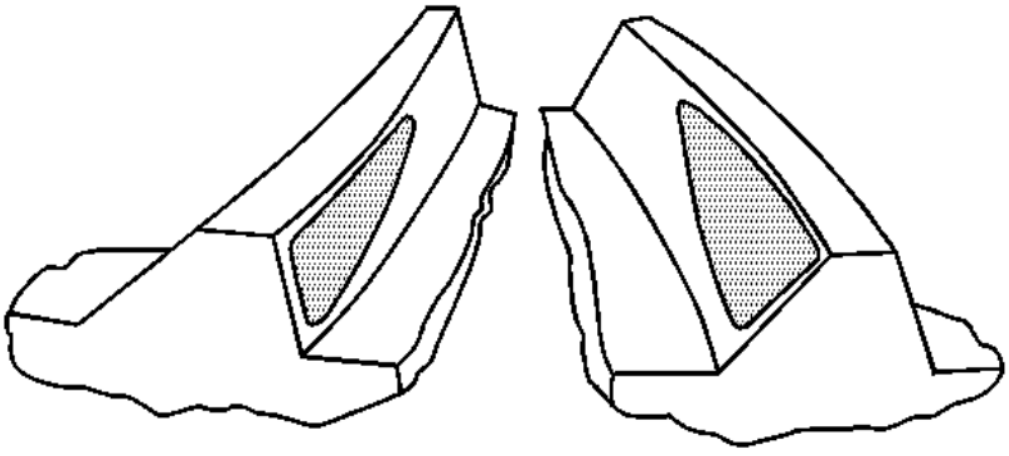


Fig. 244: Identifying Drive Side Heel - Coast Side Heel Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

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

Correction

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

Drive Side Toe - Coast Side Toe Contact Pattern

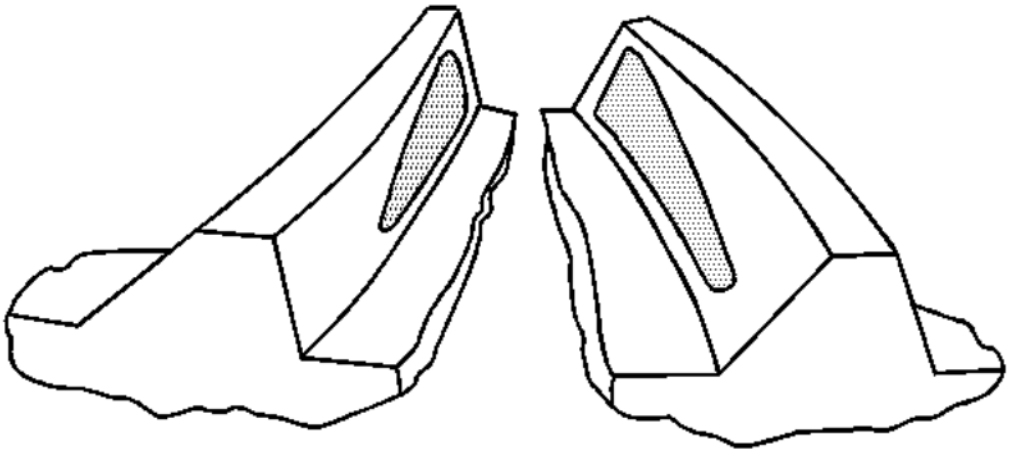


Fig. 245: Identifying Drive Side Toe - Coast Side Toe Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

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

Correction

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

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
- 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.

Full-Time Four Wheel Drive (F4WD) Front Axle Description and Operation

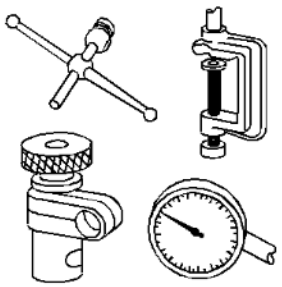
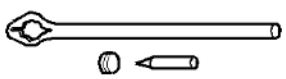
The Full-Time Four Wheel Drive (F4WD) Front Axle consist of the following components:

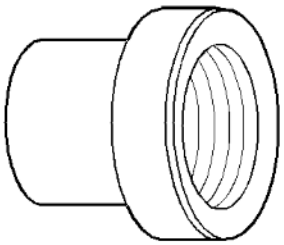
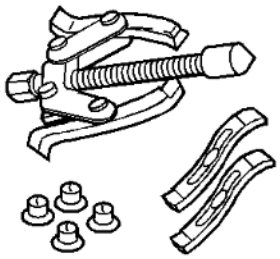
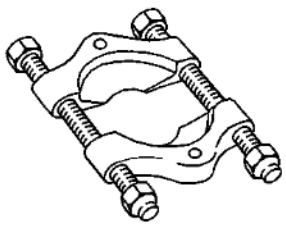
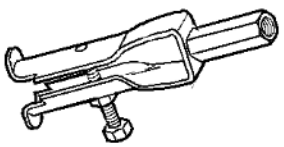
- Differential Carrier Housing
- Differential Assembly
- Output Shaft (Left Side)
- Inner Axle Shaft Housing
- Inner Axle Shaft (Right Side)

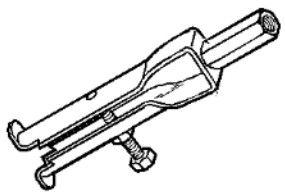
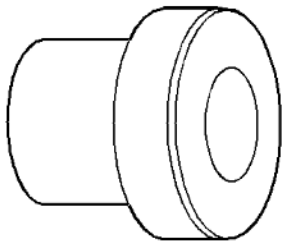
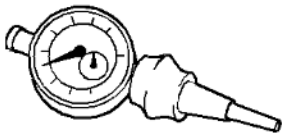
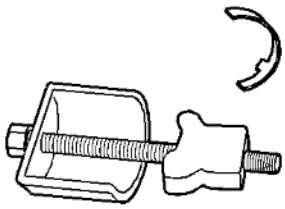
The front axle on Full-Time Four Wheel Drive model vehicles does not have a central disconnect feature in order to engage and disengage the front axle. The left and right axle shafts are connected directly to the differential case assembly. This allows the axle shafts and the propeller shaft to spin continuously. The transfer case controls the amount of torque applied to the front axle. The remaining components are the same as the selectable four wheel drive axle.

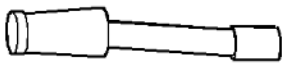
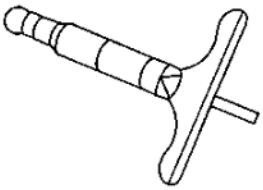
SPECIAL TOOLS AND EQUIPMENT

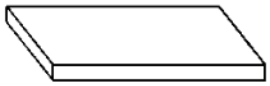
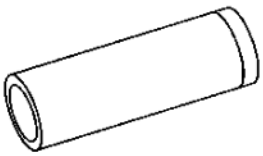
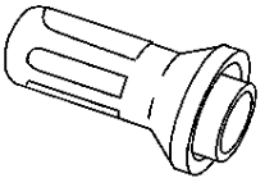
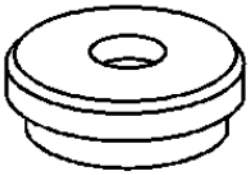
SPECIAL TOOLS

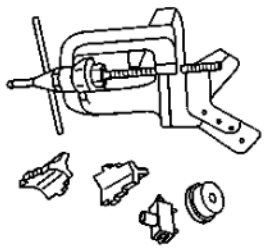
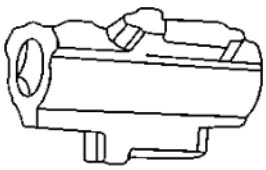
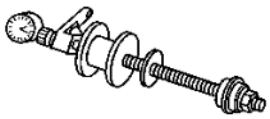
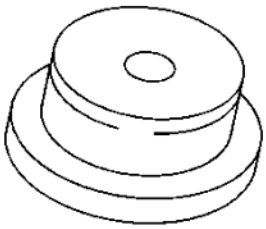
Illustration	Tool Number/ Description
	J 2619-01 Slide Hammer
	J 8001 Dial Indicator Set
	J 8092 Driver Handle
	J 8614-01 Flange and Pulley Holding Tool
	J 22761 Differential Side Bearing Installer

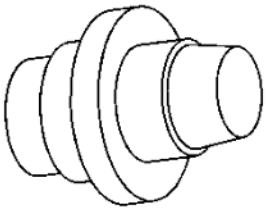
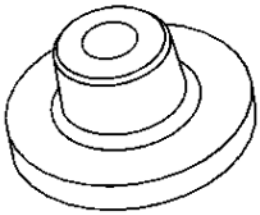
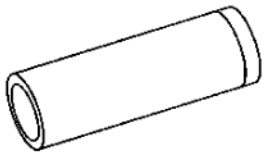
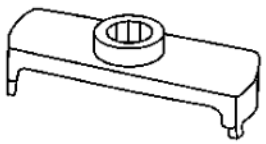
	
	J 22888-D Side Bearing Remover Kit
	J 22912-01 Rear Pinion and Axle Bearing Remover
	J 29369-1 Bushing and Bearing Remover
	J 29369-2 Bushing and Bearing Remover - 2-3 in

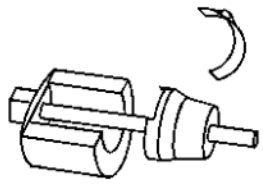
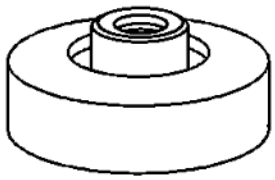
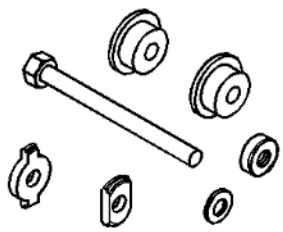
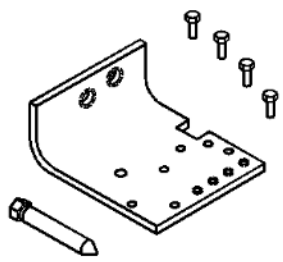
	
	J 29710 Differential Side Bearing Installer
	J 29763 Static Timing Gage
	J 33791 Carrier Bushing Remover/Installer

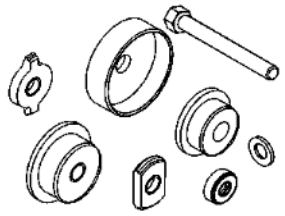
	J 33842 Pilot Bearing Installer
	J 34011 Pilot Bearing Remover
	J 34672 Depth Micrometer

	J 34673 Flat Gage Bar
	J 35512 Inner Pinion Bearing Installer
	J 36366 Pinion Oil Seal Installer
	J 36597 Side Bearing Puller Pilot - 9.25 Inch Axle
	J 36598 Holding Fixture

	
	J 36599-A Side Bearing Nut Wrench
	J 36601 Pinion Shim Selector
	J 36603 Side Bearing Cup Installer
	J 36609 Axle Tube Bearing Installer

	
	J 36612 Output Shaft Bearing Installer
	J 36614 Inner Pinion Bearing Installer
	J 36615 Side Bearing Nut Wrench
	J 36616 Axle Mount Bushing Remover/Installer

	
	J 45225 Axle Seal Installer
	J 45754 Pinion Bearing Race Remover/Installer - 9.25 Inch Axle
	J 45765 Pinion Remover - 8.25 inch/9.25 inch Axles
	J 45858 Pinion Bearing Race Remover/Installer - 8.25

	Inch Axle