

DRIVELINE/AXLE**Front Drive Axle - Escalade, Suburban, Tahoe, Yukon - Escalade, Suburban, Tahoe, Yukon****SPECIFICATIONS****FASTENER SPECIFICATIONS**

Application	Specification	
	Metric	English
Differential Adjuster Lock Nut Bolt	75 N.m	55 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	100 N.m	75 lb ft
Front Differential Carrier Shield Bolts	20 N.m	15 lb ft
Front Drive Axle Actuator	30 N.m	22 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)	65 N.m	48 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
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	Metric	English
Backlash	0.08-0.25 mm	0.003-0.010 in
Backlash (Preferred)	0.13-0.18 mm	0.005-0.007 in
Pinion Bearing Preload, New Bearings	1.7-3.4 N.m	15-30 lb in
Pinion Bearing Preload, Used Bearings	1.1-2.3 N.m	10-20 lb in
Pinion and Differential Case Bearing Preload, New Bearings	3.4-6.2 N.m	30-55 lb in
Pinion and Differential Case Bearing Preload, Used Bearings	2.8-5.1 N.m	25-45 lb in

APPROXIMATE FLUID CAPACITIES

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

Application	Specifications	
	Metric	US English
Axe Capacities		
• Front Axle 1000 Series (8.25")	1.43 liters	1.51 quarts
• Front Axle 2000 Series (9.25")	1.73 liters	1.83 quarts

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

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

COMPONENT LOCATOR

FRONT DRIVE AXLE DISASSEMBLED VIEWS (8.25 INCH AXLE)

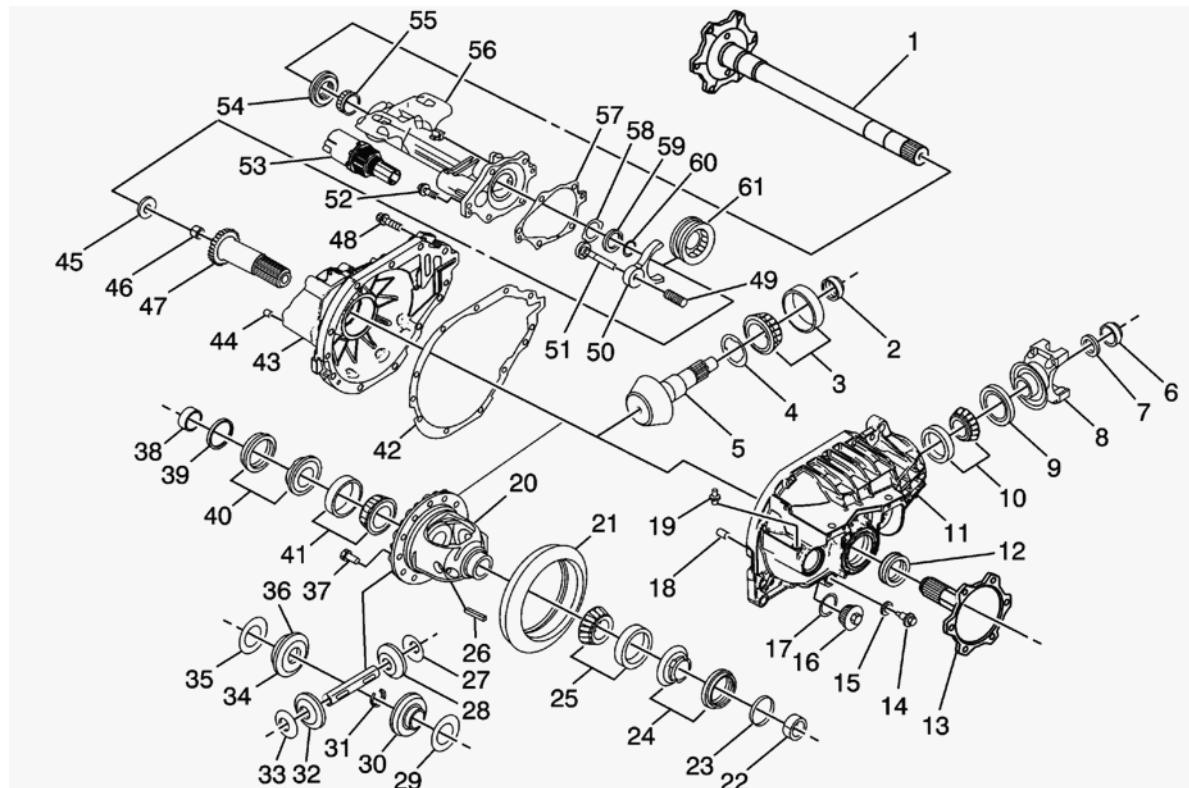


Fig. 1: Front Drive Axle Disassembled Views (8.25 Inch Axle)

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Output Shaft
2	Pinion Bearing Spacer
3	Pinion Head Bearing Assembly
4	Pinion Shim
5	Stem Pinion
6	Pinion Flange Nut

Callout	Component Name
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

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

DIAGNOSTIC INFORMATION AND PROCEDURES

SYMPTOMS - FRONT DRIVE AXLE

Before beginning diagnosis, review the system description and operation in order to familiarize yourself with the system functions. Refer to [Front](#)

Drive Axle Description and Operation.

Noise Diagnosis

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

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

Classifying the Symptom

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

- Leaks
- Noises
- Vibrations

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

Visual/Physical Inspection

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

Symptoms List

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

- [Front Drive Axle Noises](#)
- [Noisy in Drive](#)
- [Noisy When Coasting](#)
- [Intermittent Noise](#)

- Constant Noise
- Noisy on Turns
- Front Axle Lubricant Leak Diagnosis

FRONT DRIVE AXLE NOISES

Gear Noise

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

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

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

Bearing Noise

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

Front Wheel Bearing Noise

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

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

Knock at Low Speeds

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

Backlash Clunk

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

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

Inspect, adjust or replace the affected components as necessary.

NOISY IN DRIVE

Checks	Action
Excessive pinion to ring gear backlash	Adjust the pinion to ring gear backlash. Refer to Backlash Inspection and Adjustment (8.25 Inch LD Axle) Backlash Inspection and Adjustment (9.25 Inch HD Axle) .
Worn pinion and ring gear	Replace the pinion and the ring gear. Perform the following procedures: <ol style="list-style-type: none"> 1. Front Axle Disassemble (8.25 Inch LD Axle)Front Axle Disassemble (9.25 Inch HD Axle) 2. Front Differential Case Disassemble (8.25 Inch LD Axle)Front Differential Case Disassemble (9.25 Inch HD Axle) 3. Front Differential Case Assemble (8.25 Inch LD Axle)Front Differential Case Assemble (9.25 Inch HD Axle) 4. Front Differential Drive Pinion Gear Bearing Cup Installation (8.25 Inch LD Axle)Front Differential Drive Pinion Gear Bearing Cup Installation (9.25 Inch LD Axle) 5. Front Axle Assemble (8.25 Inch LD Axle)Front Axle Assemble (9.25 Inch HD Axle)
Worn pinion bearings	Replace the pinion bearings. Perform the following procedures: <ol style="list-style-type: none"> 1. Front Axle Disassemble (8.25 Inch LD Axle)Front Axle Disassemble (9.25 Inch HD Axle) 2. Front Differential Drive Pinion Gear Bearing Cup Installation (8.25 Inch LD Axle)

Checks	Action
	<p><u>Axle)Front Differential Drive Pinion Gear Bearing Cup Installation (9.25 Inch LD Axle)</u></p> <p>3. <u>Front Axle Assemble (8.25 Inch LD Axle)Front Axle Assemble (9.25 Inch HD Axle)</u></p>
Loose pinion bearings	<p>Adjust the pinion bearings preload. Perform the following procedures:</p> <ol style="list-style-type: none"> 1. <u>Front Axle Disassemble (8.25 Inch LD Axle)Front Axle Disassemble (9.25 Inch HD Axle)</u> 2. <u>Front Axle Assemble (8.25 Inch LD Axle)Front Axle Assemble (9.25 Inch HD Axle)</u> 3. <u>Backlash Inspection and Adjustment (8.25 Inch LD Axle)Backlash Inspection and Adjustment (9.25 Inch HD Axle)</u>
Excessive pinion end play	<p>Adjust the pinion end play. Refer to <u>Front Axle Assemble (8.25 Inch LD Axle)Front Axle Assemble (9.25 Inch HD Axle)</u>.</p>
Worn differential bearings	<p>Replace the differential bearings. Perform the following procedures:</p> <ol style="list-style-type: none"> 1. <u>Front Axle Disassemble (8.25 Inch LD Axle)Front Axle Disassemble (9.25 Inch HD Axle)</u> 2. <u>Front Differential Case Disassemble (8.25 Inch LD Axle)Front Differential Case Disassemble (9.25 Inch HD Axle)</u> 3. <u>Front Differential Case Assemble (8.25 Inch LD Axle)Front Differential Case Assemble (9.25 Inch HD Axle)</u> 4. <u>Front Axle Assemble (8.25 Inch LD Axle)Front Axle Assemble (9.25 Inch HD Axle)</u>
Loose differential bearings	<p>Adjust the differential bearing preload. Perform the following procedures:</p> <ol style="list-style-type: none"> 1. <u>Front Axle Disassemble (8.25 Inch LD Axle)Front Axle Disassemble (9.25 Inch HD Axle)</u> 2. <u>Front Axle Assemble (8.25 Inch LD Axle)Front Axle Assemble (9.25 Inch HD Axle)</u>
Excessive ring gear runout	<p>Replace the ring gear. Perform the following procedures:</p> <ol style="list-style-type: none"> 1. <u>Front Axle Disassemble (8.25 Inch LD Axle)Front Axle Disassemble (9.25 Inch HD Axle)</u>

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

NOISY WHEN COASTING

Checks	Action
DEFINITION: Noise is audible when slowing down and disappears when driving.	
Worn pinion and ring gear	Adjust or replace the pinion and the ring gear. Refer to <u>Front Axle Disassemble (8.25 Inch LD Axe)</u> <u>Front Axle Disassemble (9.25 Inch HD Axe)</u> .
Pinion and ring gear too tight	Adjust the pinion and the ring gear backlash. Refer to <u>Backlash Inspection and Adjustment (8.25 Inch LD Axe)</u> <u>Backlash Inspection and Adjustment (9.25 Inch HD Axe)</u> .

INTERMITTENT NOISE

Checks	Action
Warped ring gear	Replace the ring gear. Refer to <u>Front Axle Disassemble (8.25 Inch LD Axe)</u> <u>Front Axle Disassemble (9.25 Inch HD Axe)</u> .
Loose differential case assembly	Set the differential case assembly to the proper preload and backlash. Refer to <u>Front Axle Disassemble (8.25 Inch LD Axe)</u> <u>Front Axle Disassemble (9.25 Inch HD Axe)</u> , and <u>Backlash Inspection and Adjustment (8.25 Inch LD Axe)</u> <u>Backlash Inspection and Adjustment (9.25 Inch HD Axe)</u> .

CONSTANT NOISE

Checks	Action
Flat spot on the pinion or the ring gear teeth	Replace the pinion and the ring gear. Refer to <u>Front Axle Disassemble (8.25 Inch LD Axe)</u> <u>Front Axle Disassemble (9.25 Inch HD Axe)</u> .

Checks	Action
Flat spot on the pinion bearing	Replace the bearing. Refer to Front Axle Disassemble (8.25 Inch LD Axle) Front Axle Disassemble (9.25 Inch HD Axle) .
Worn pinion splines	Replace the pinion. Refer to Front Axle Disassemble (8.25 Inch LD Axle) Front Axle Disassemble (9.25 Inch HD Axle) .

NOISY ON TURNS

Checks	Action
Worn differential side gears and pinions	Replace the differential side gears and pinions. Refer to Front Differential Case Disassemble (8.25 Inch LD Axle) Front Differential Case Disassemble (9.25 Inch HD Axle) .
Worn differential spider	Replace the spine gears. Refer to Front Differential Case Disassemble (8.25 Inch LD Axle) Front Differential Case Disassemble (9.25 Inch HD Axle) .
Worn axle shaft splines	Replace the axle shaft. Refer to Front Drive Axle Inner Shaft Replacement (Left Side) Front Drive Axle Inner Shaft Replacement (Right Side) .

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)

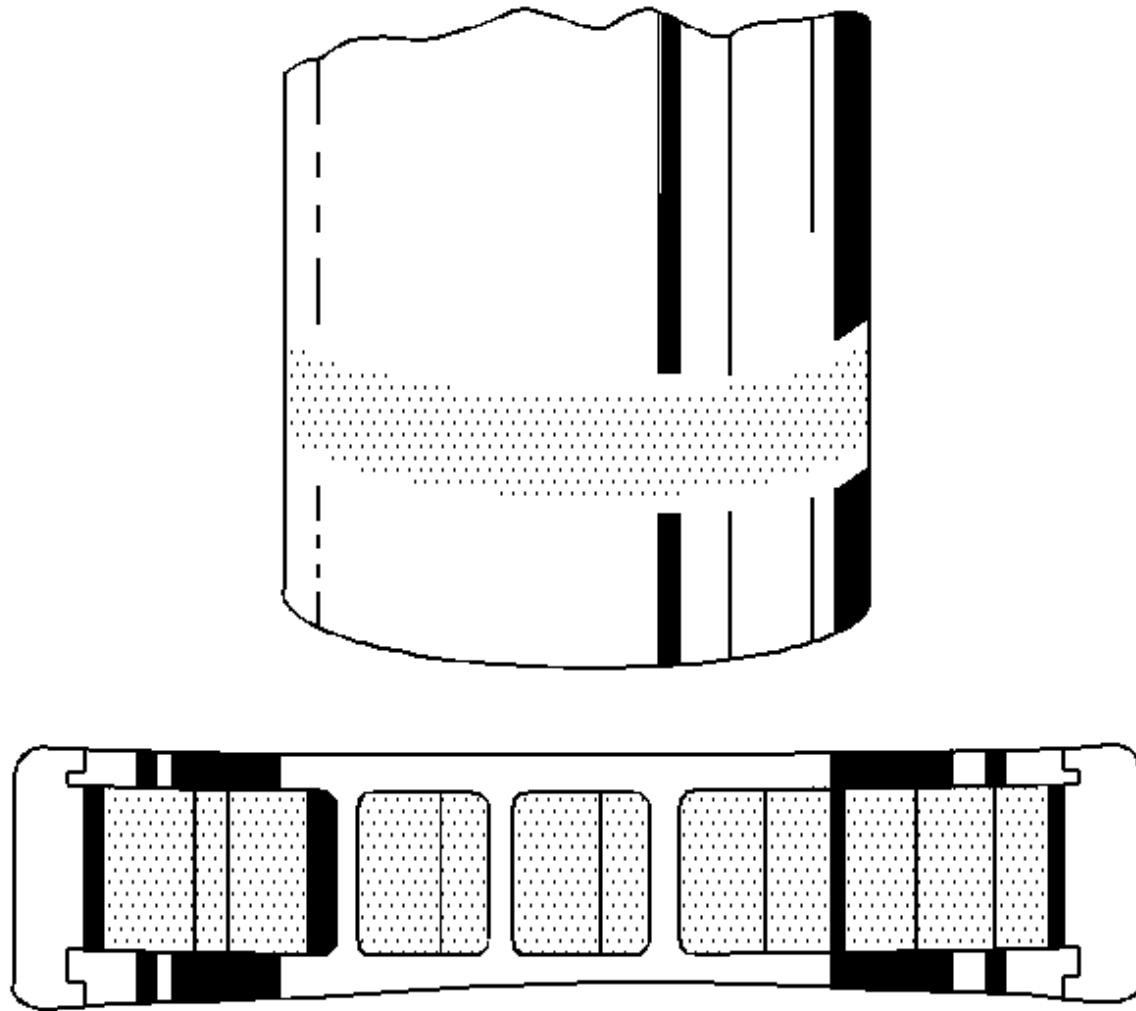


Fig. 2: Identifying Minor Wear

Courtesy of **GENERAL MOTORS COMPANY**

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

Wear (Major)

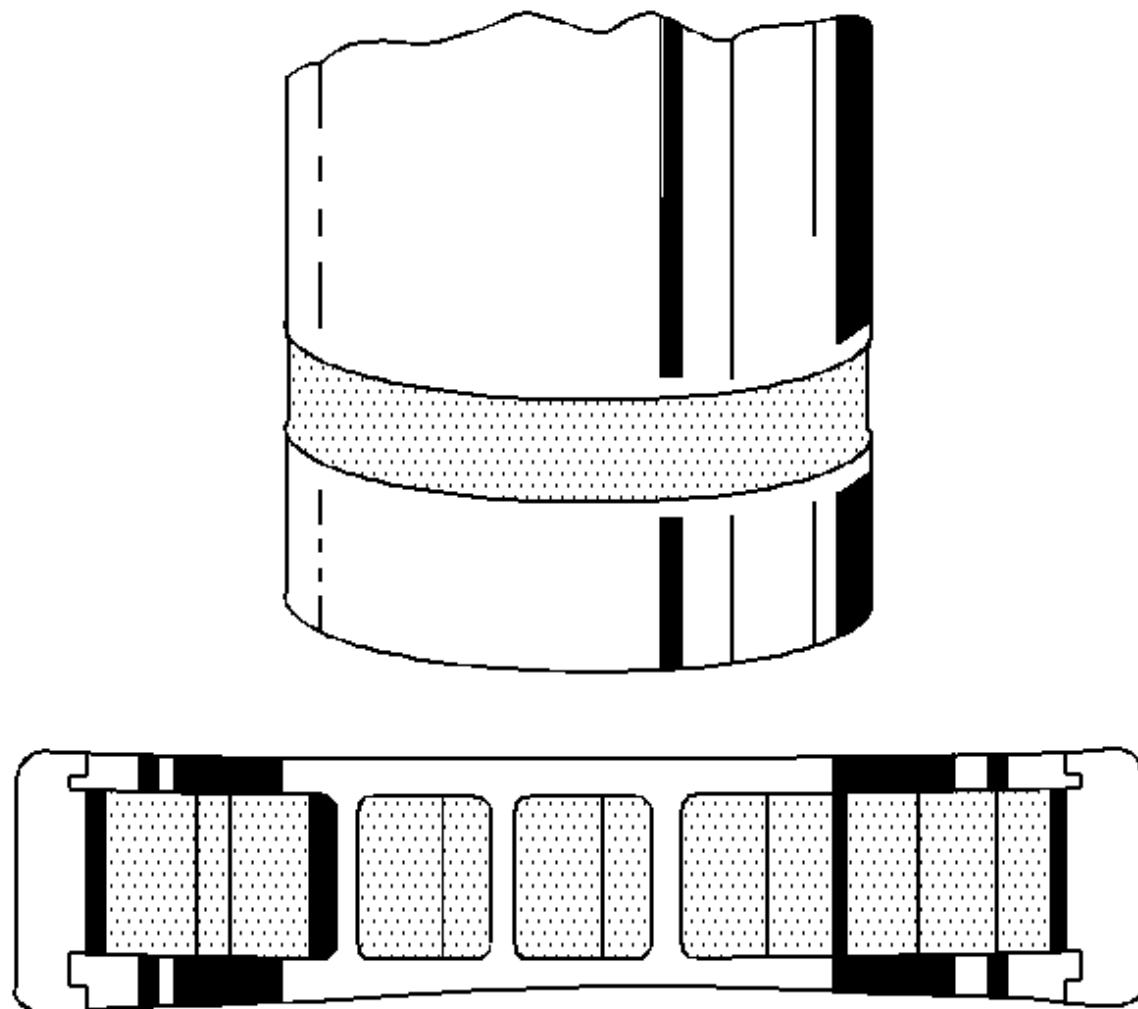


Fig. 3: Identifying Major Wear

Courtesy of GENERAL MOTORS COMPANY

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

Brinelling

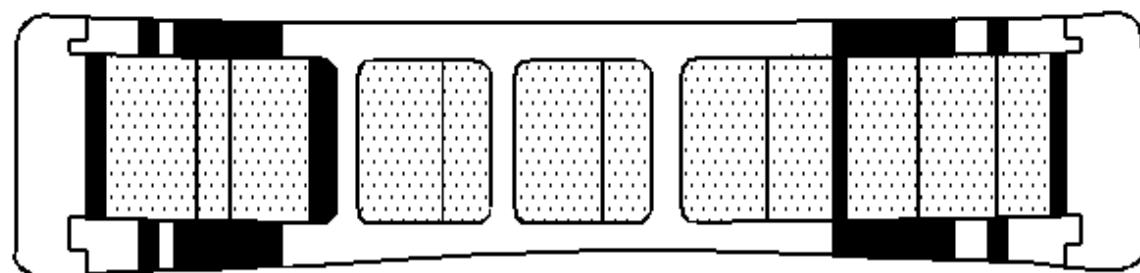
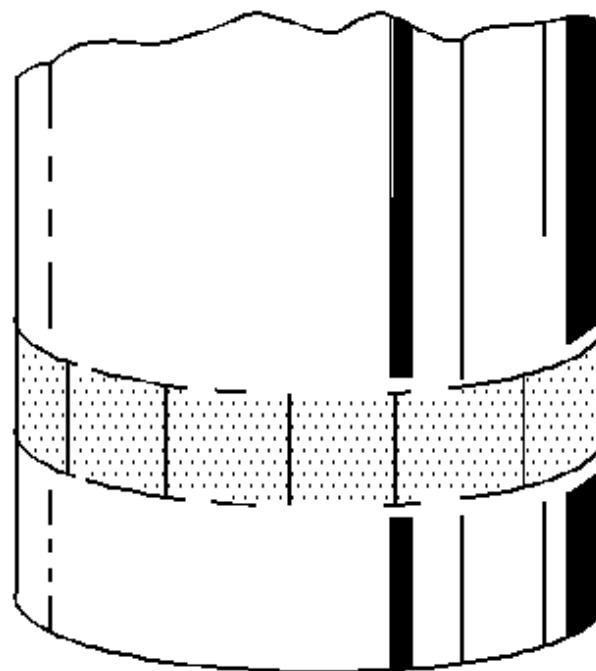


Fig. 4: Identifying Brinelling

Courtesy of GENERAL MOTORS COMPANY

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

Indentations

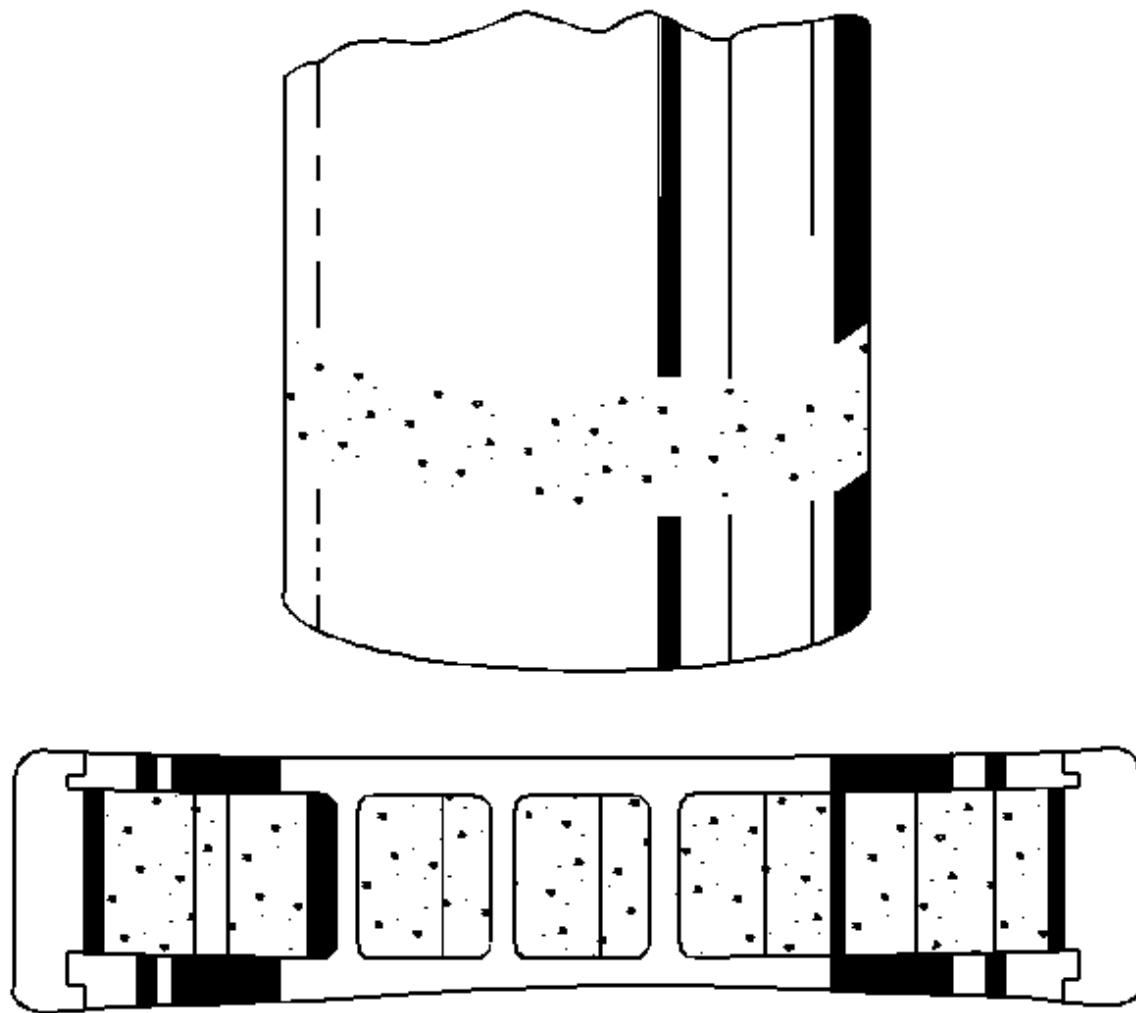


Fig. 5: Identifying Indentations

Courtesy of **GENERAL MOTORS COMPANY**

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

Single Edge Pitting

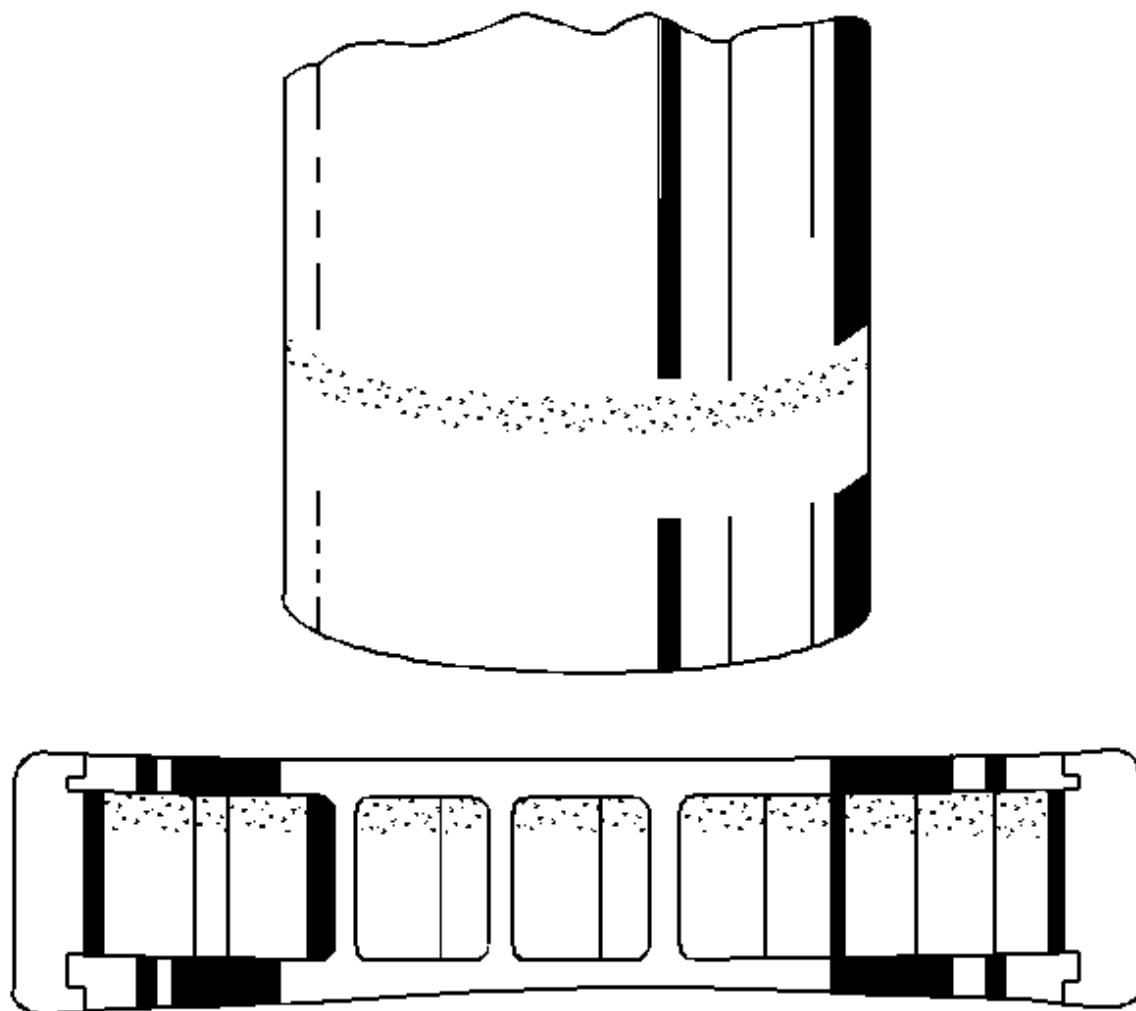


Fig. 6: Identifying Single Edge Pitting

Courtesy of GENERAL MOTORS COMPANY

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

Double Edge Pitting

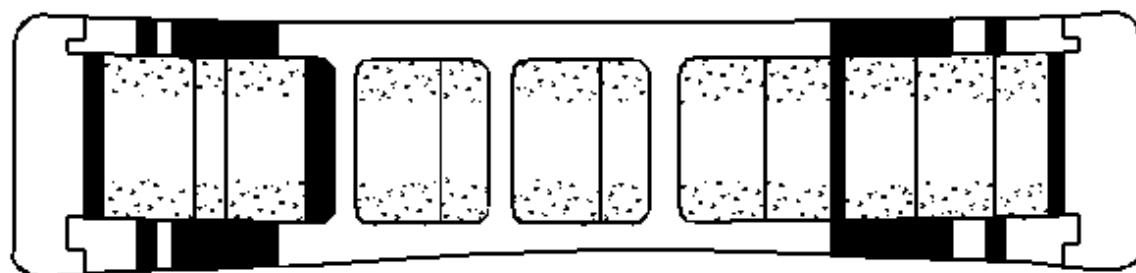
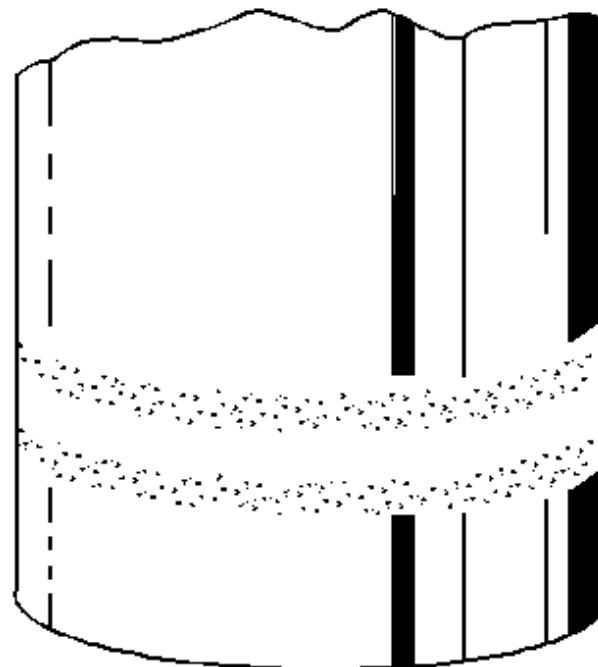


Fig. 7: Identifying Double Edge Pitting
Courtesy of GENERAL MOTORS COMPANY

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

Misalignment

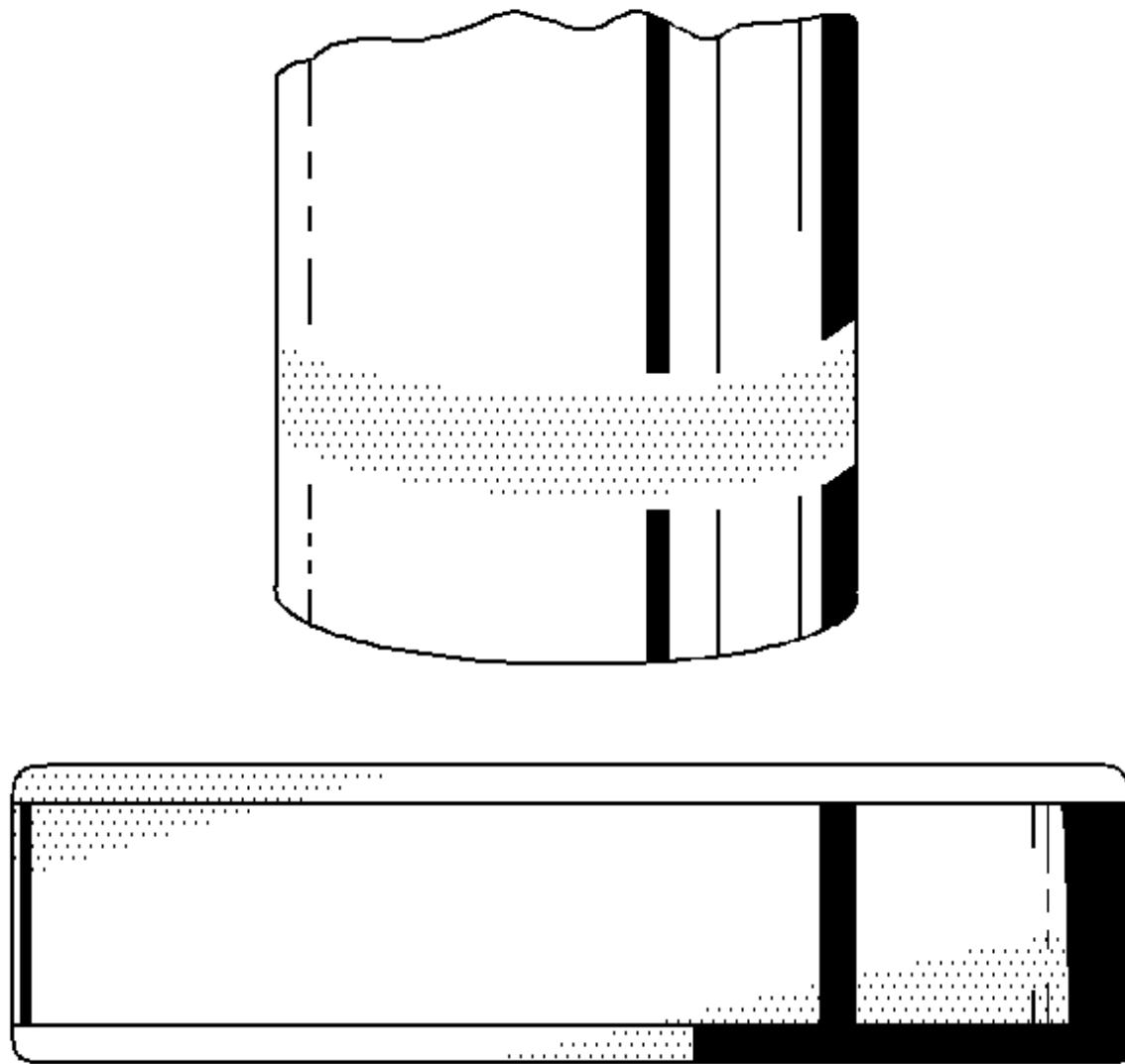


Fig. 8: Identifying Misalignment

Courtesy of GENERAL MOTORS COMPANY

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

Frettag

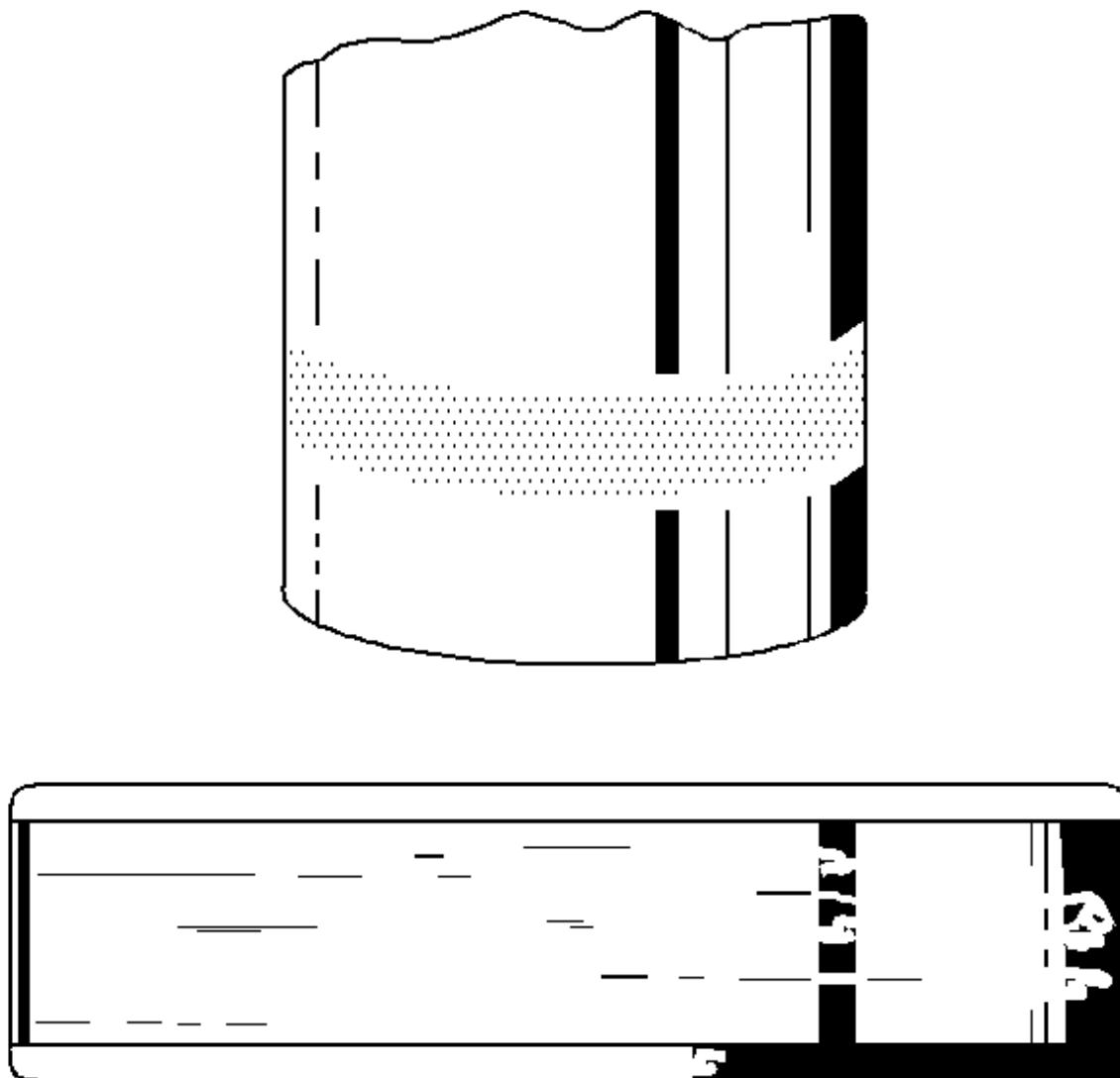


Fig. 9: Identifying Frettag

Courtesy of GENERAL MOTORS COMPANY

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

Smears

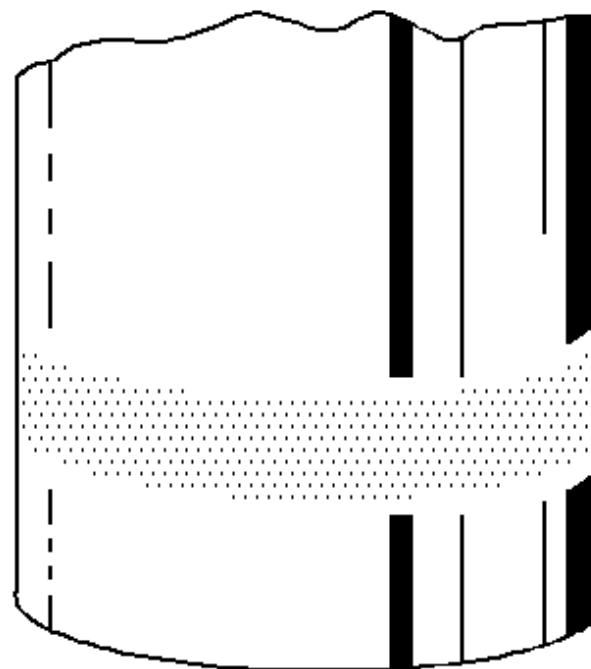


Fig. 10: Identifying Smears

Courtesy of GENERAL MOTORS COMPANY

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

FRONT DRIVE AXLE BEARING WEAR (TAPERED)

Tapered Roller Bearing Diagnosis

Consider the following factors when diagnosing bearing condition:

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

Abrasive Roller Wear

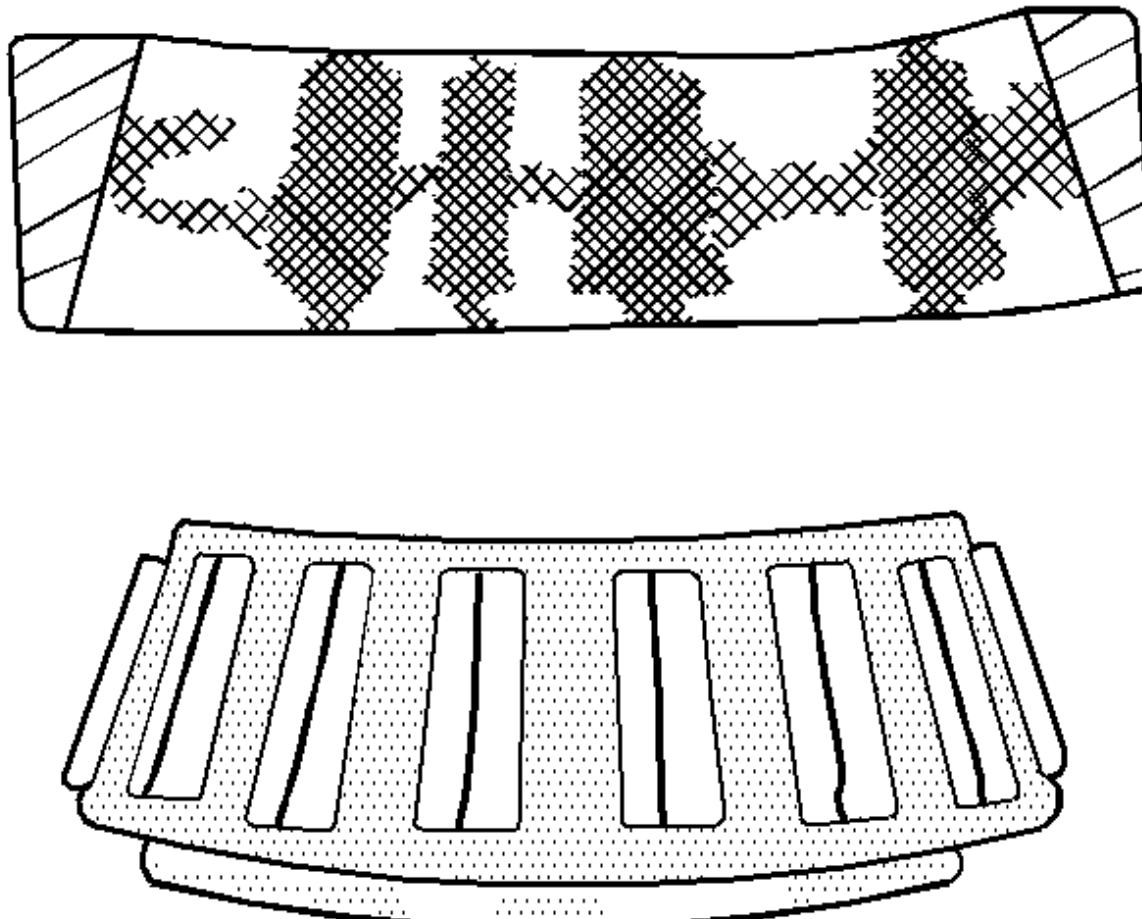


Fig. 11: Identifying Abrasive Roller Wear

Courtesy of GENERAL MOTORS COMPANY

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

Abrasive Step Wear

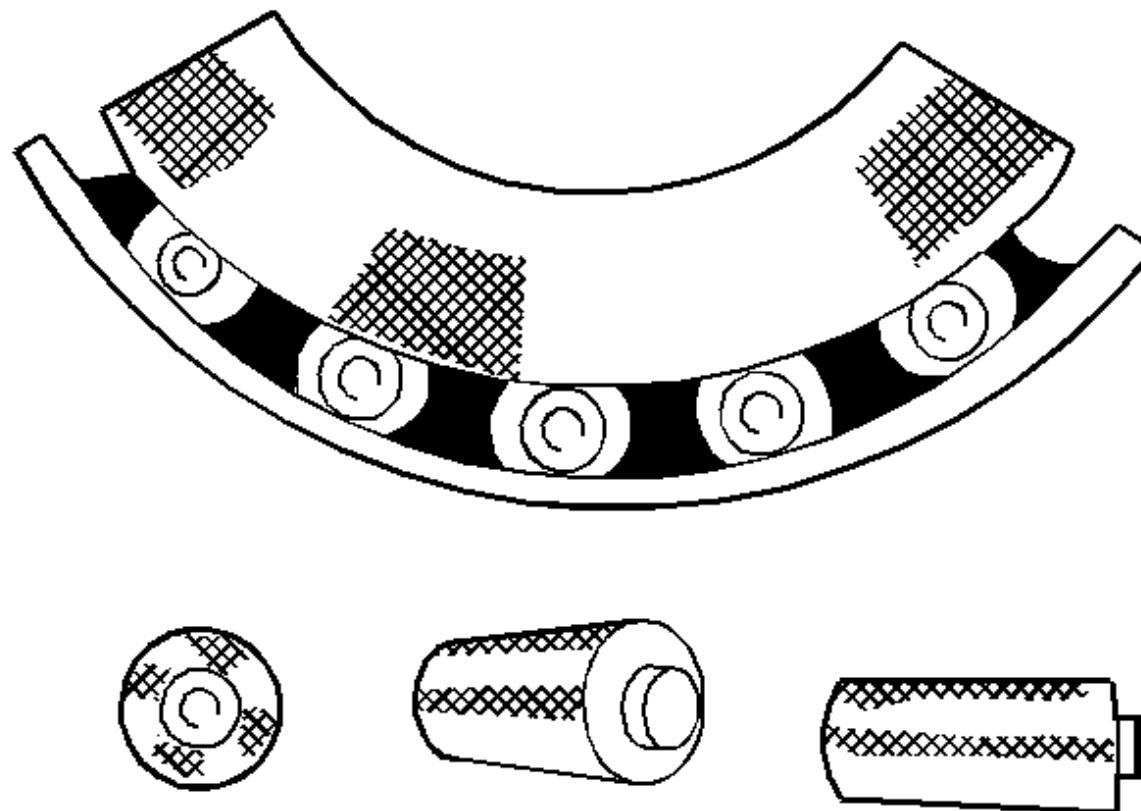


Fig. 12: Identifying Abrasive Step Wear
Courtesy of GENERAL MOTORS COMPANY

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

Galling

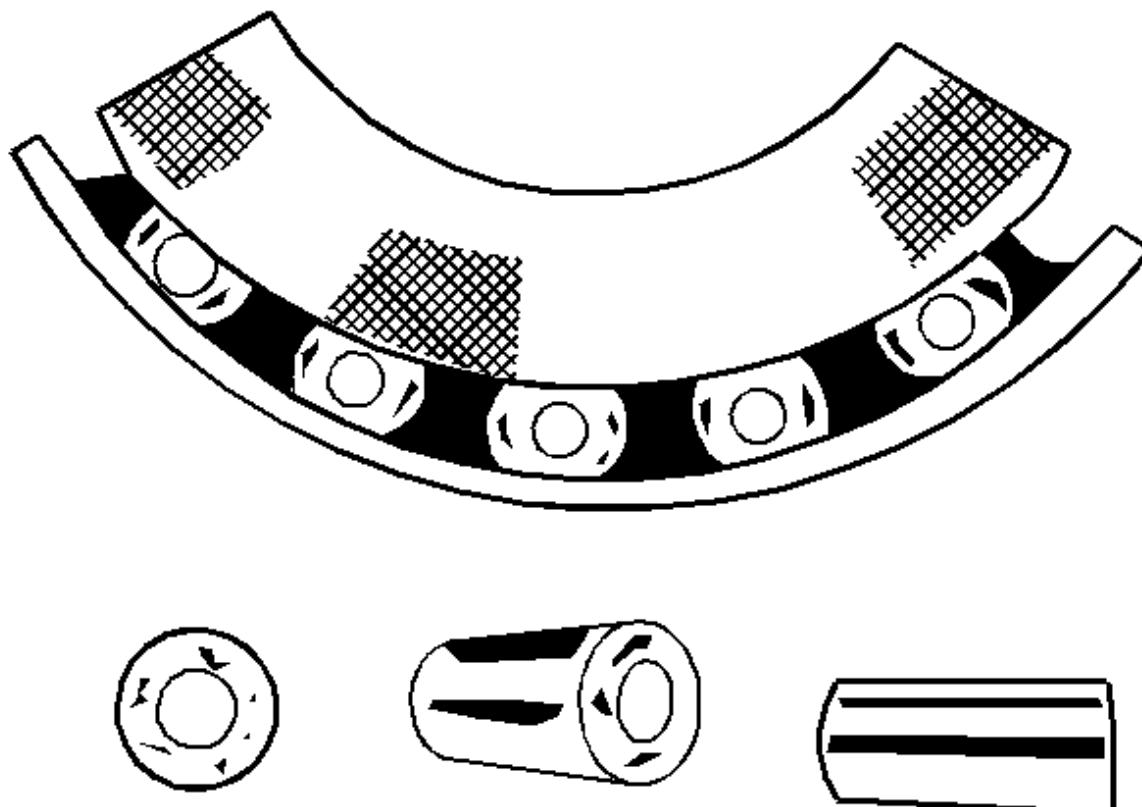


Fig. 13: Identifying Galling

Courtesy of GENERAL MOTORS COMPANY

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

Etching

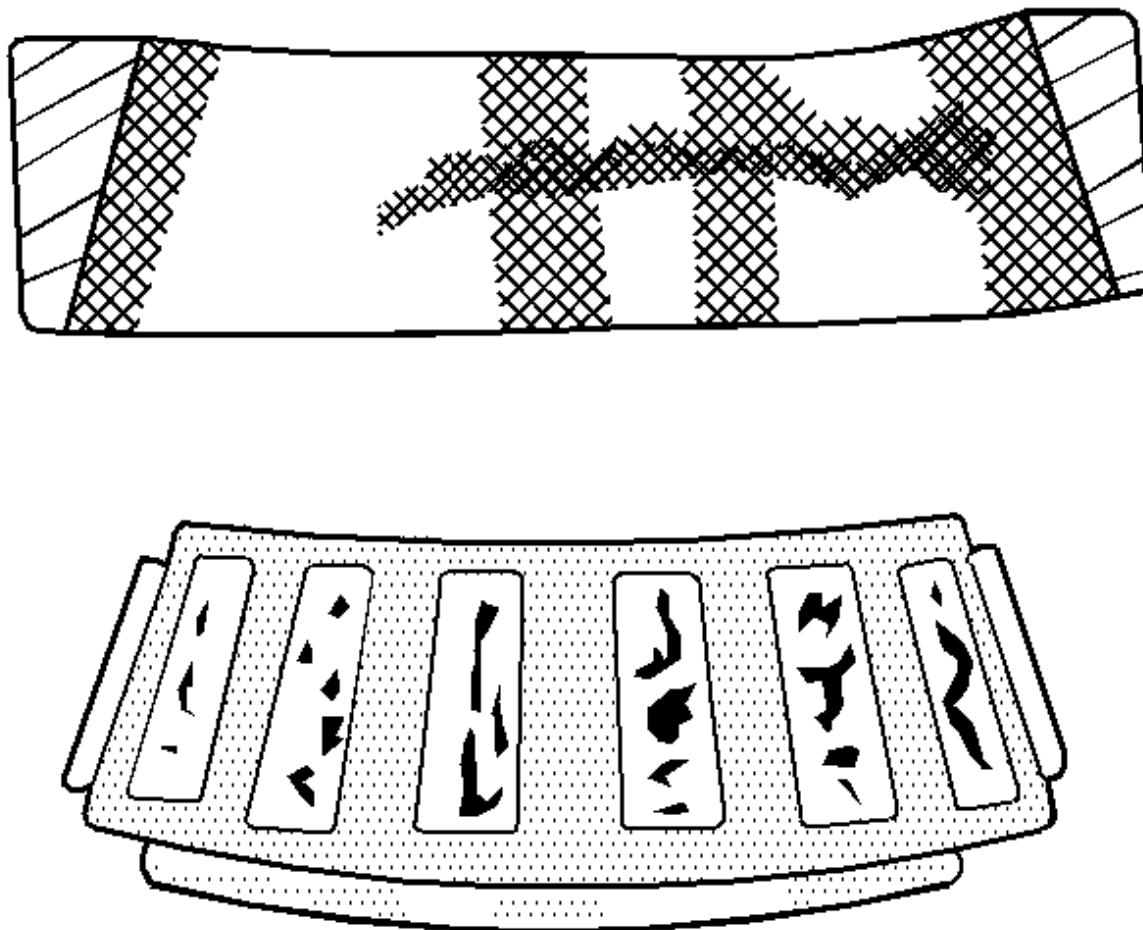


Fig. 14: Identifying Etching

Courtesy of **GENERAL MOTORS COMPANY**

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

Bent Cage

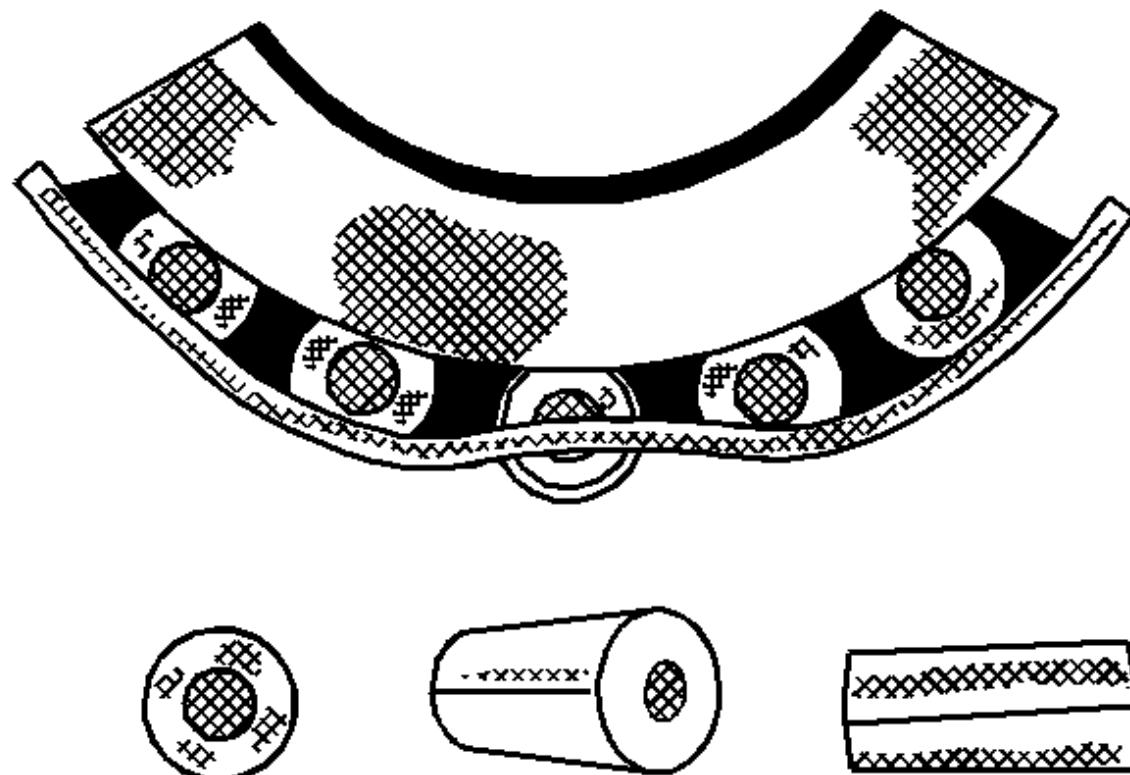
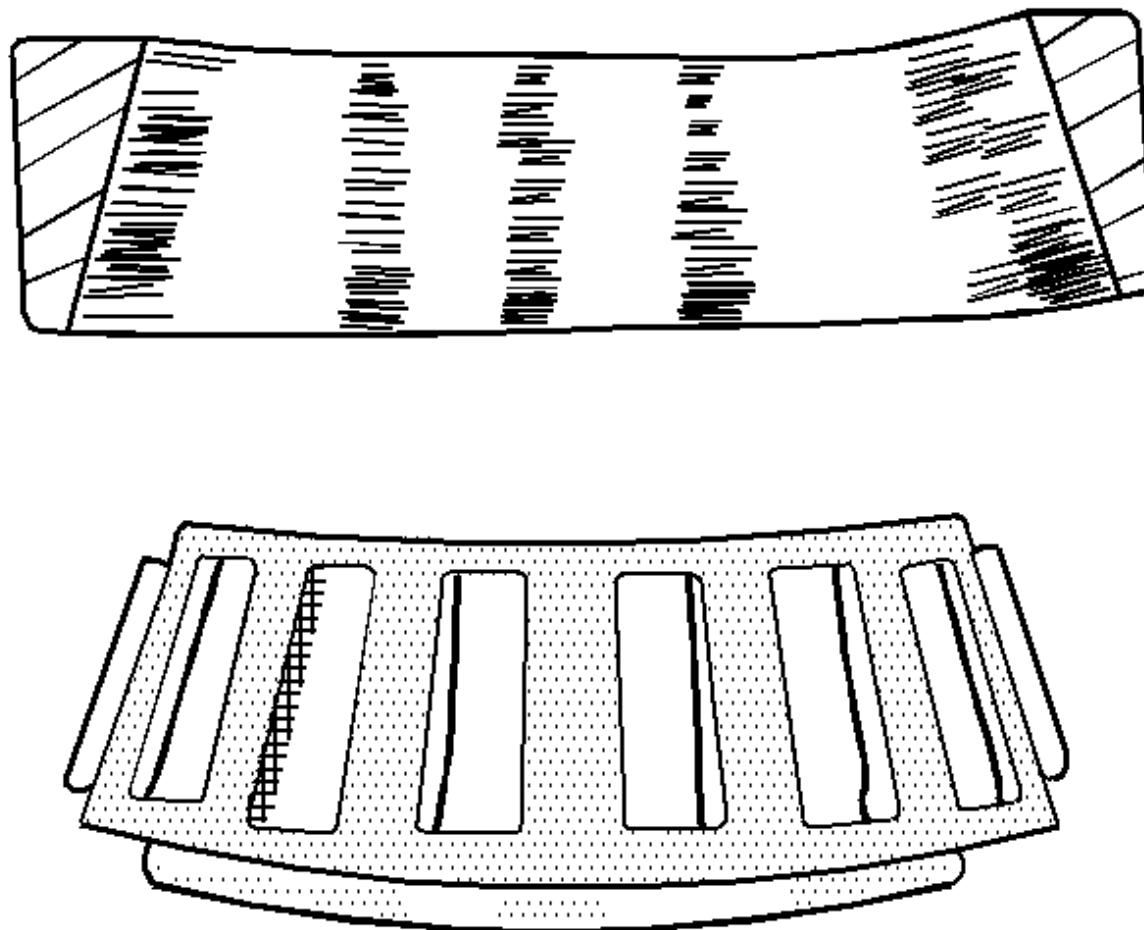


Fig. 15: Identifying Bent Roller Cage

Courtesy of GENERAL MOTORS COMPANY

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

Cage Wear



[Fig. 16: Identifying Cage Wear](#)

Courtesy of GENERAL MOTORS COMPANY

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

Indentations

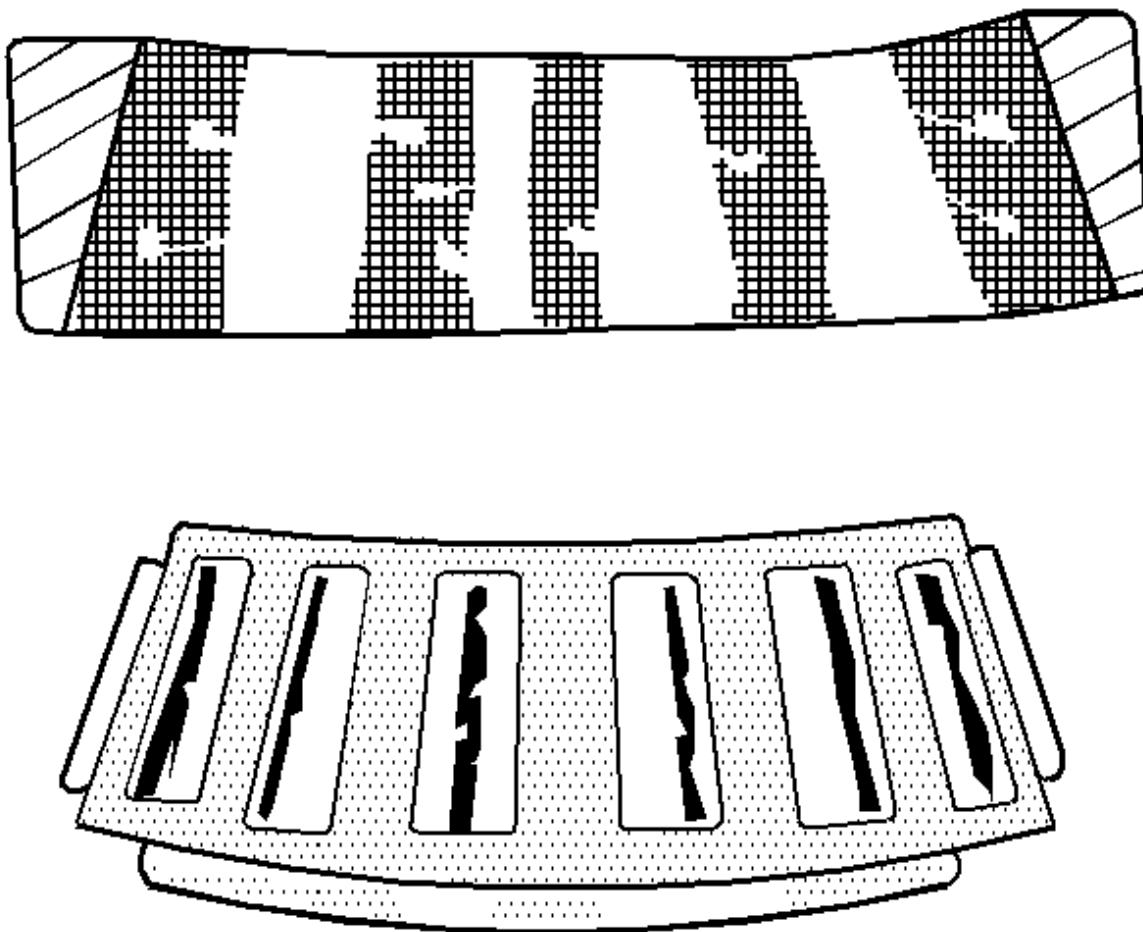


Fig. 17: Inspecting Bearing Rollers & Races For Heat Discoloration

Courtesy of GENERAL MOTORS COMPANY

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

Frettag

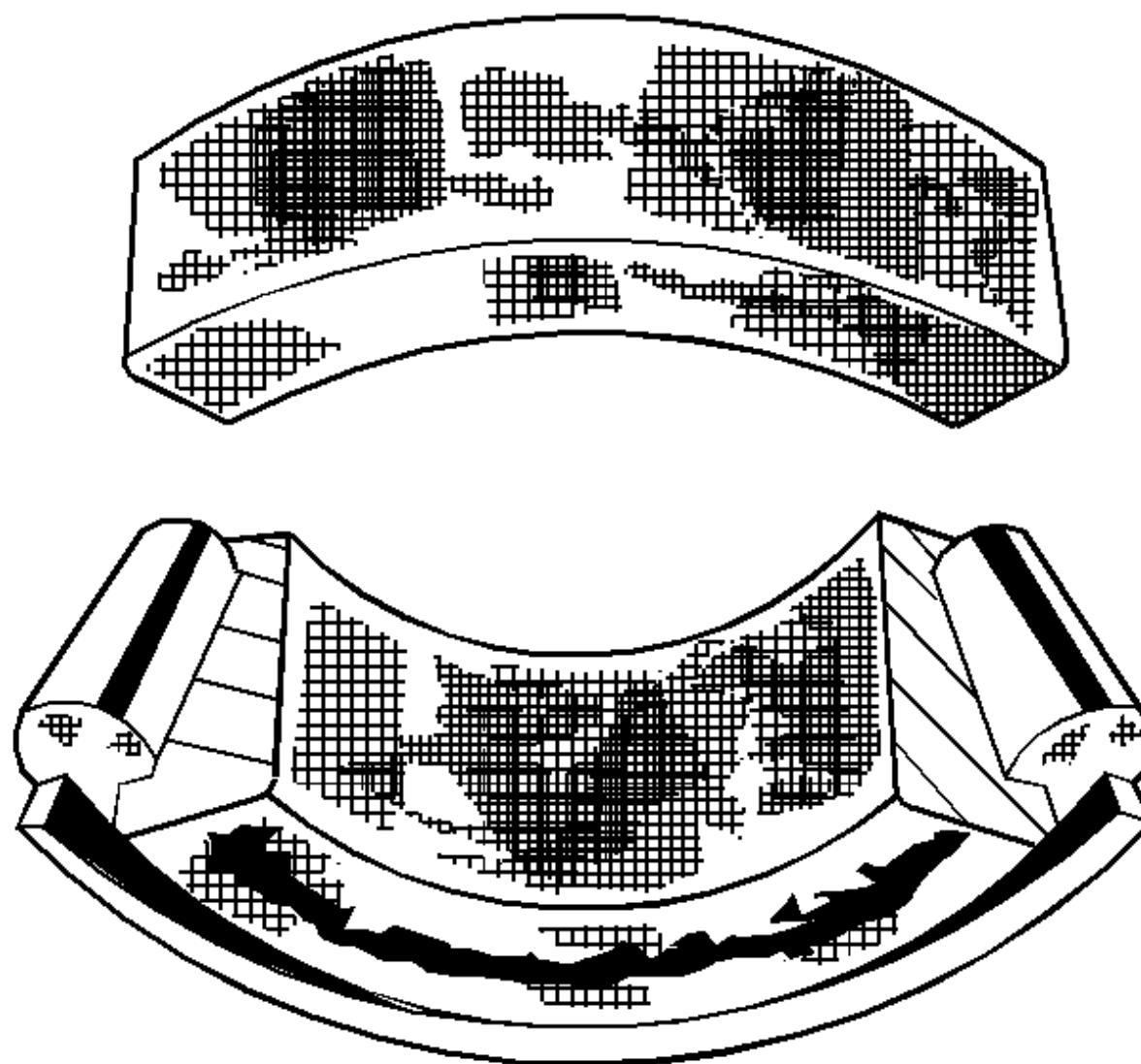


Fig. 18: Identifying Frettag

Courtesy of GENERAL MOTORS COMPANY

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

Smears

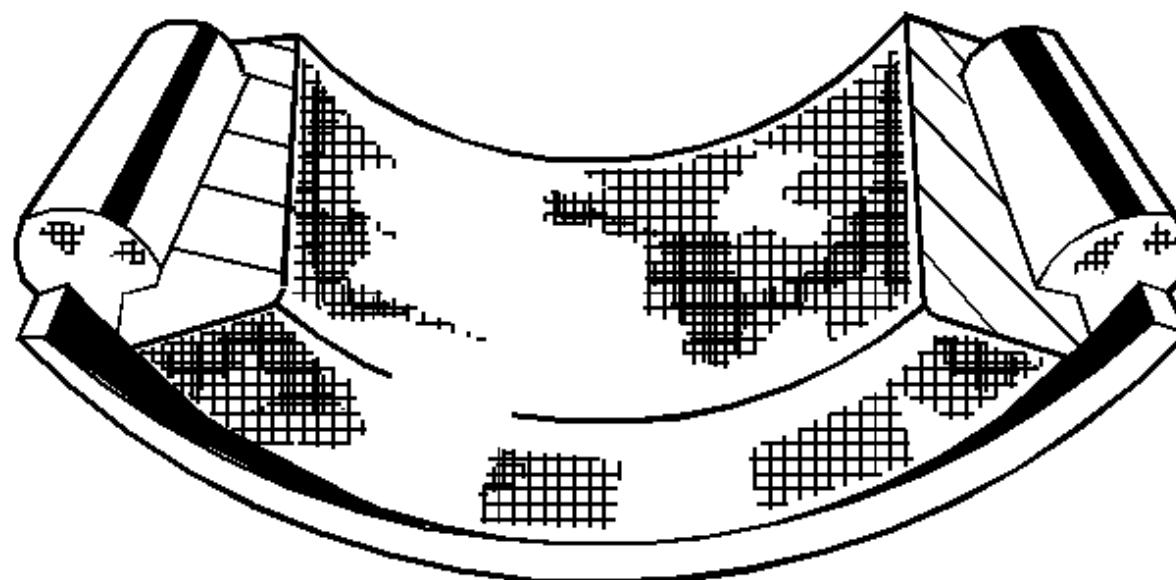
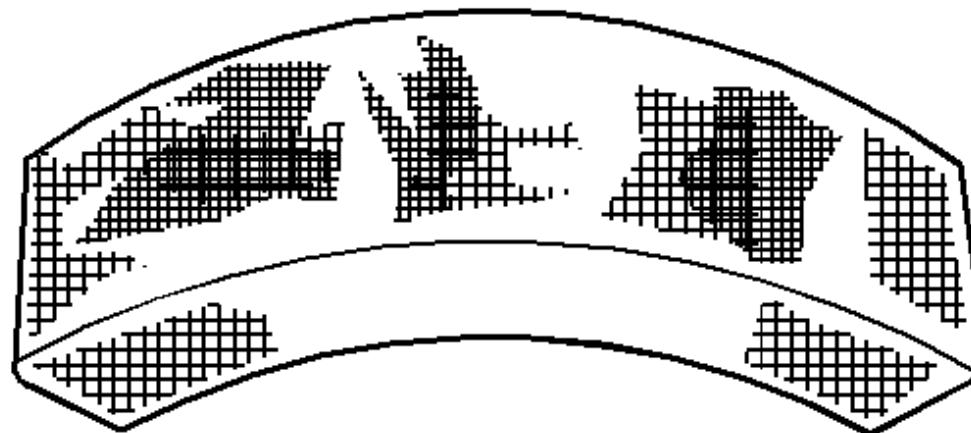


Fig. 19: Identifying Smears

Courtesy of GENERAL MOTORS COMPANY

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

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

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

Stain Discoloration

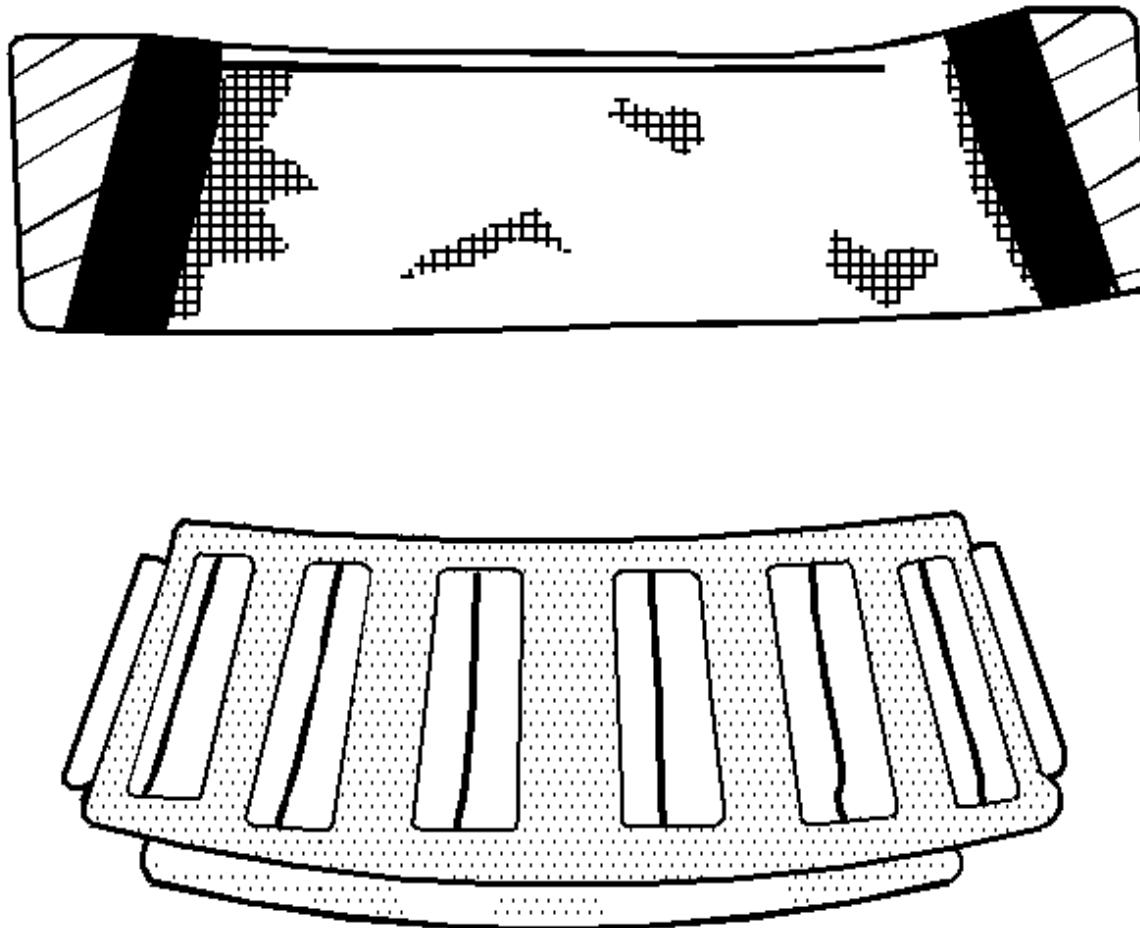


Fig. 20: Identifying Stain Discoloration
Courtesy of GENERAL MOTORS COMPANY

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

Heat Discoloration

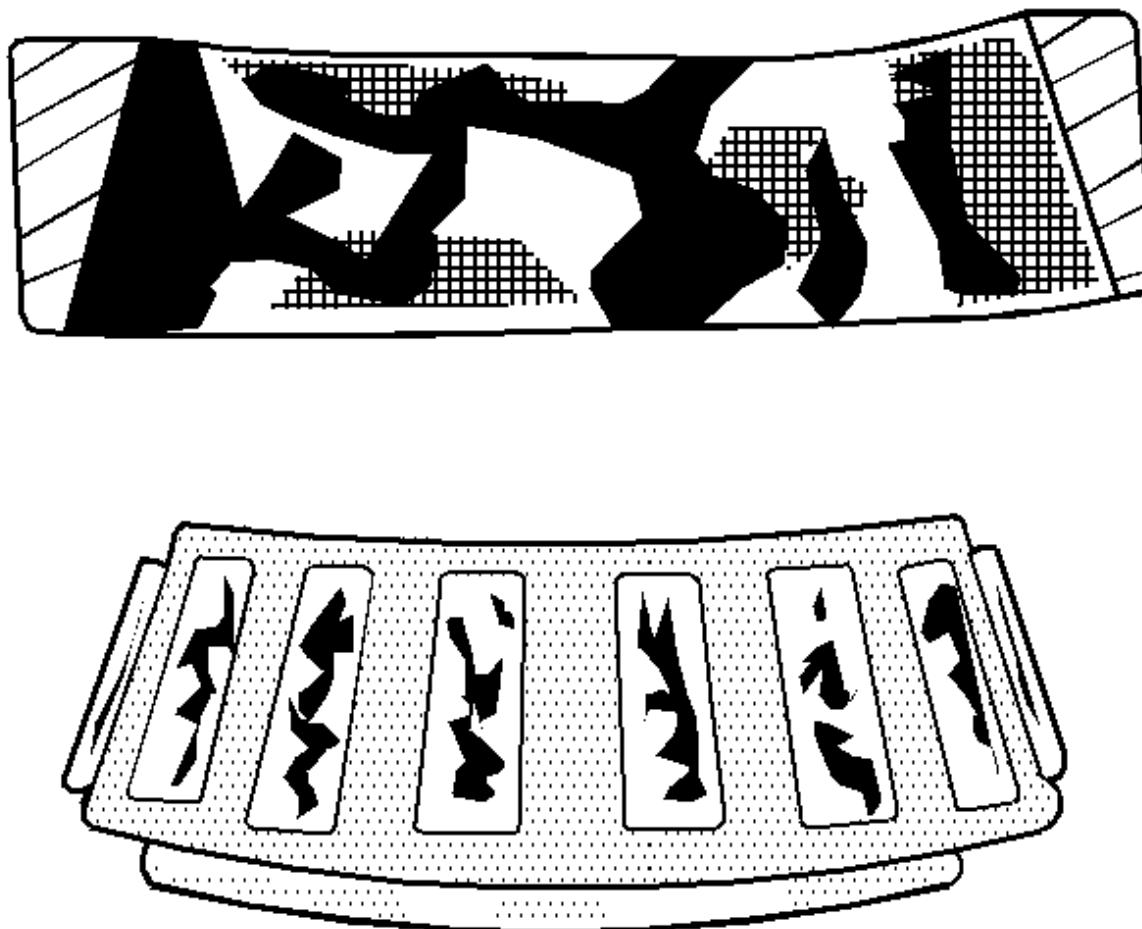


Fig. 21: Identifying Heat Discoloration
Courtesy of GENERAL MOTORS COMPANY

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

Misalignment

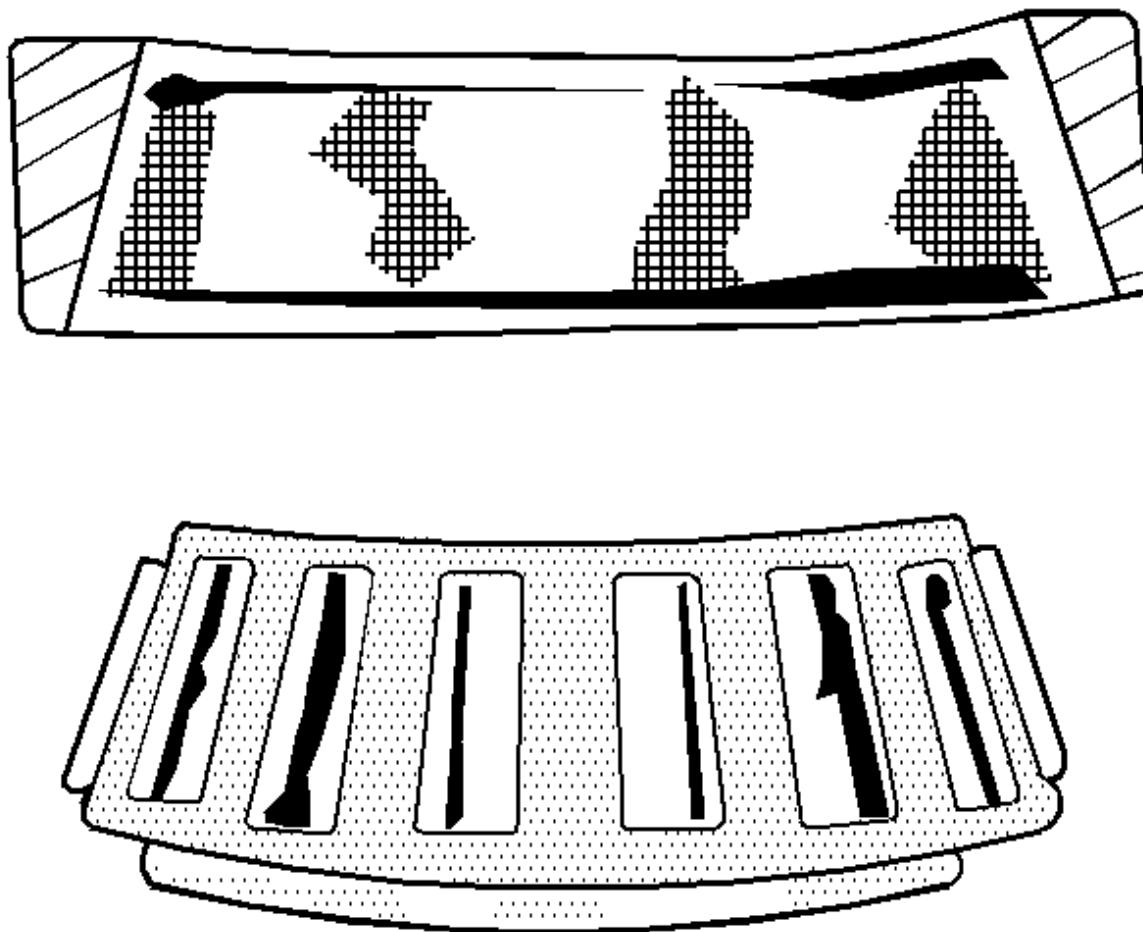


Fig. 22: Identifying Misalignment

Courtesy of GENERAL MOTORS COMPANY

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

Cracked Inner Race

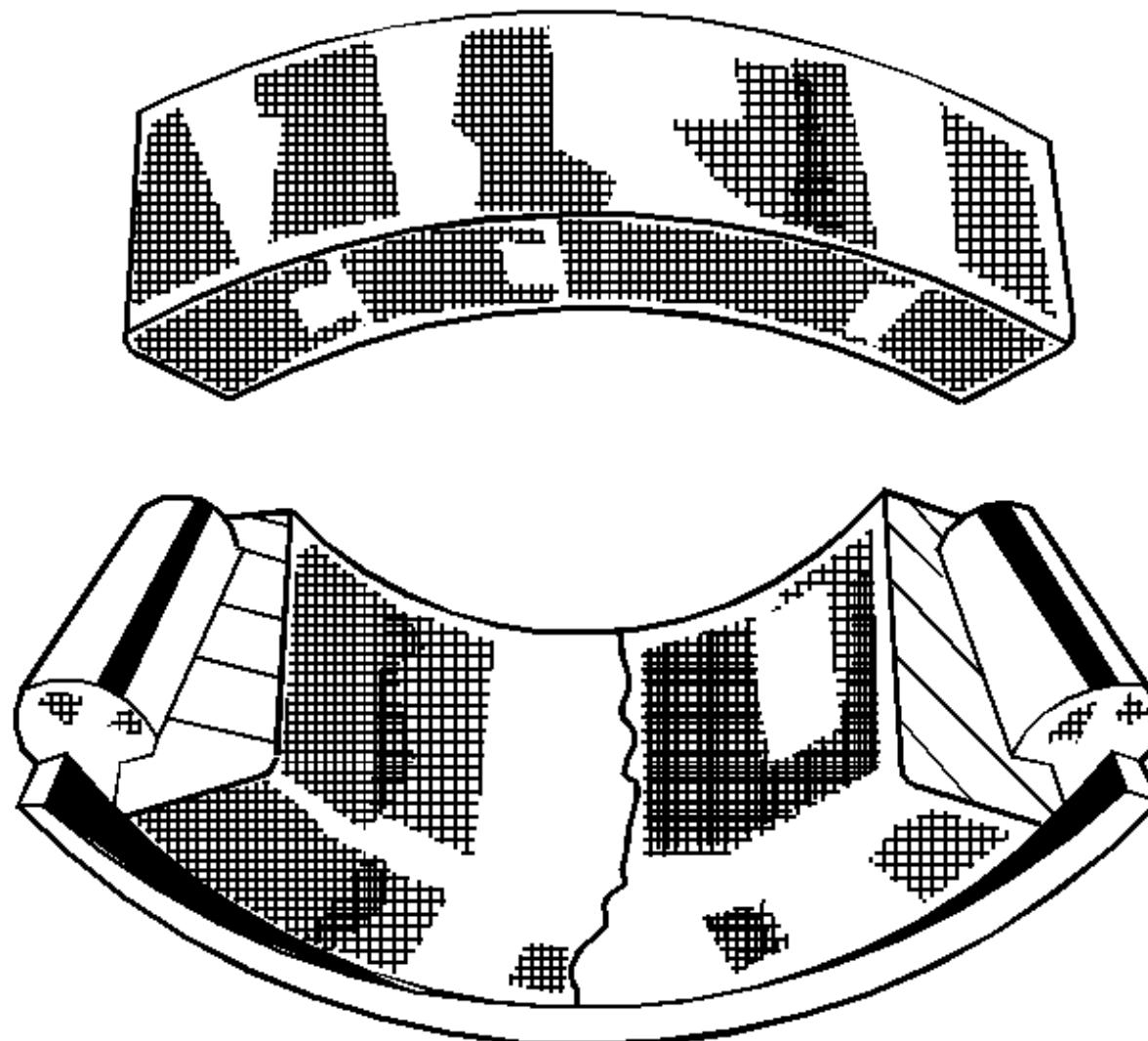


Fig. 23: Identifying Cracked Inner Race
Courtesy of GENERAL MOTORS COMPANY

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

Fatigue Spalling

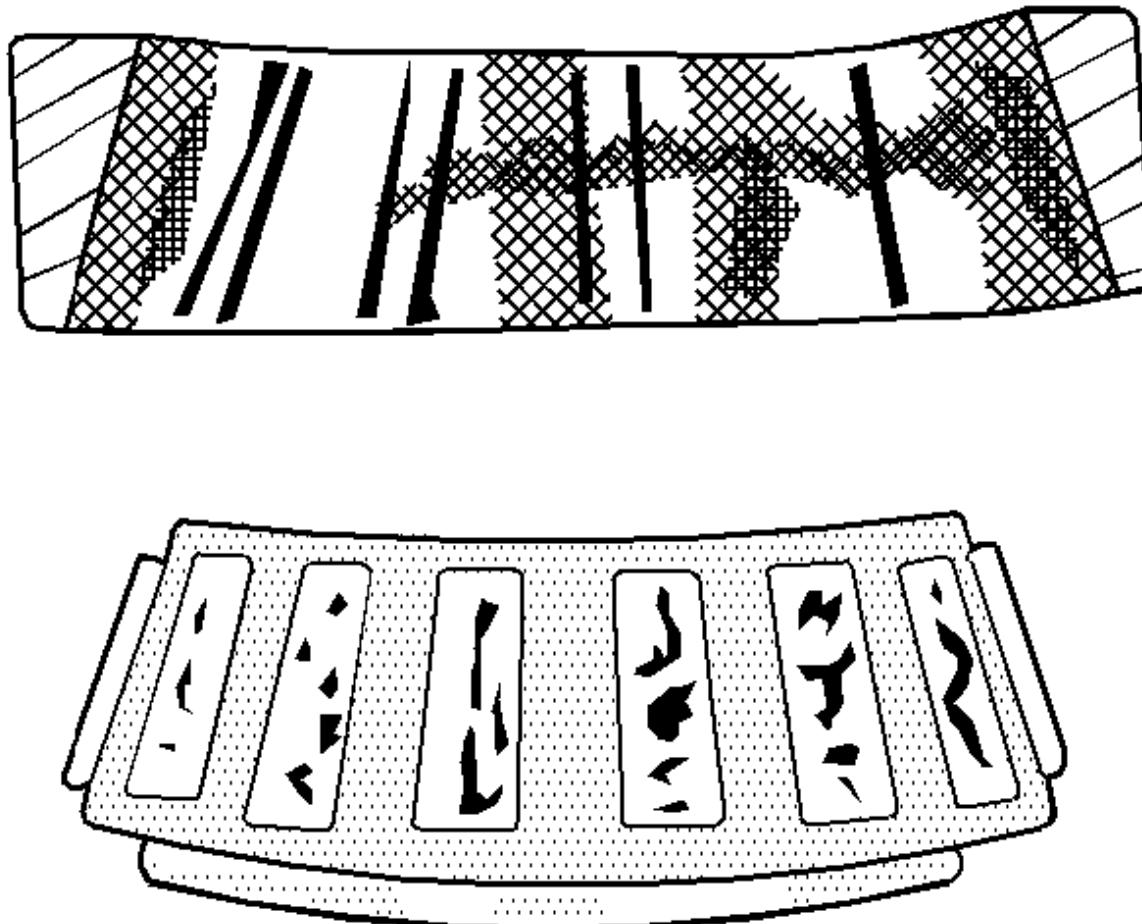


Fig. 24: Inspecting Bearing Rollers & Races For Pitting, Grooves, Spalling & Excessive Wear

Courtesy of **GENERAL MOTORS COMPANY**

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

Brinelling

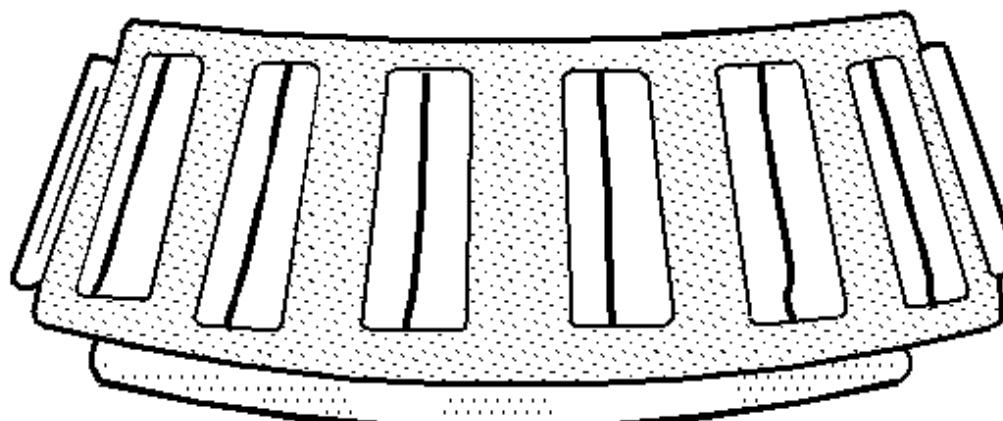
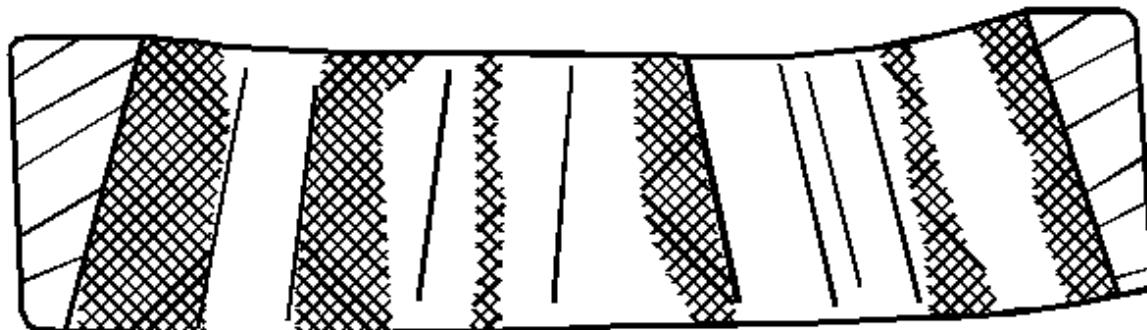


Fig. 25: Identifying Brinelling

Courtesy of GENERAL MOTORS COMPANY

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

FOUR-WHEEL DRIVE DOES NOT ENGAGE

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

Step	Action	Yes	No
1	<p>Confirm operation of system. Refer to Front Drive Axle Description and Operation.</p> <p>Is the system operating properly?</p>	Test the system	Go to Step 2
2	<p>1. Raise the vehicle. Refer to Lifting and Jacking the Vehicle .</p> <p>2. Remove the actuator motor. Refer to Front Drive Axle Actuator Replacement (8.25 Inch LD Axle)Front Drive Axle Actuator Replacement (9.25 Inch HD Axle).</p> <p>3. Using a brass drift, apply pressure to the clutch fork.</p> <p>4. Turn the right wheel to align the clutch gears.</p> <p>While turning the right wheel, does the left wheel turn in the opposite direction?</p>	Test the system	Go to Step 3
3	<p>1. Remove the inner axle shaft and housing assembly. Refer to Front Drive Axle Inner Shaft Housing Replacement (8.25 Inch LD Axle)Front Drive Axle Inner Shaft Housing Replacement (9.25 Inch HD Axle).</p> <p>2. Inspect the following:</p> <ul style="list-style-type: none"> • Clutch Fork • Clutch Sleeve • Clutch Gear • Clutch Return Spring 	Test the system	System OK

Step	Action	Yes	No
	Repair as needed. Did you complete the repair?		

FOUR-WHEEL DRIVE DOES NOT DISENGAGE

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

Step	Action	Yes	No
1	Confirm operation of system. Refer to Front Drive Axle Description and Operation . Is the system operating properly?	Test the system	Go to Step 2
2	1. Raise the vehicle. Refer to Lifting and Jacking the Vehicle . 2. Remove the actuator motor. Refer to Front Drive Axle Actuator Replacement (8.25 Inch LD Axle) Front Drive Axle Actuator Replacement (9.25 Inch HD Axle) . 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 Housing Replacement (8.25 Inch LD Axle) Front Drive Axle Inner Shaft Housing Replacement (9.25 Inch HD Axle) . 2. Inspect the following: <ul style="list-style-type: none"> • Clutch Fork • Clutch Sleeve • Clutch Gear • Clutch Return Spring 	Test the system	System OK

Step	Action	Yes	No
	Repair as needed. Did you complete the repair?		

FRONT AXLE LUBRICANT LEAK DIAGNOSIS

Front axle lubricant leaks can occur at the following locations:

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

Determining the Cause

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

Oil Seals

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

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

To determine the actual cause of the leak, clean the area around the leak. Observe the area of the leak and determine if the seal or another component is causing the leak. A worn seal surface will cause a leak at the sealing lip while a misaligned seal or a seal installed into a housing with an excessive

bore will cause the seal to leak at the outside surface of the seal. Hardened or cracked seal lips usually indicate the axle is operating beyond the normal temperature limits for the axle. A seal whose sealing surface has been nicked or cut may indicate that the shaft has a rough, burred, or gouged surface and will need to be inspected before the seal can be replaced.

Sealing Surfaces

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

Differential Carrier Assembly

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

- Drain plug
- Fill plug
- Vent tube

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

REPAIR INSTRUCTIONS

FRONT AXLE LUBRICANT REPLACEMENT (8.25 INCH LD AXLE)

Removal Procedure

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

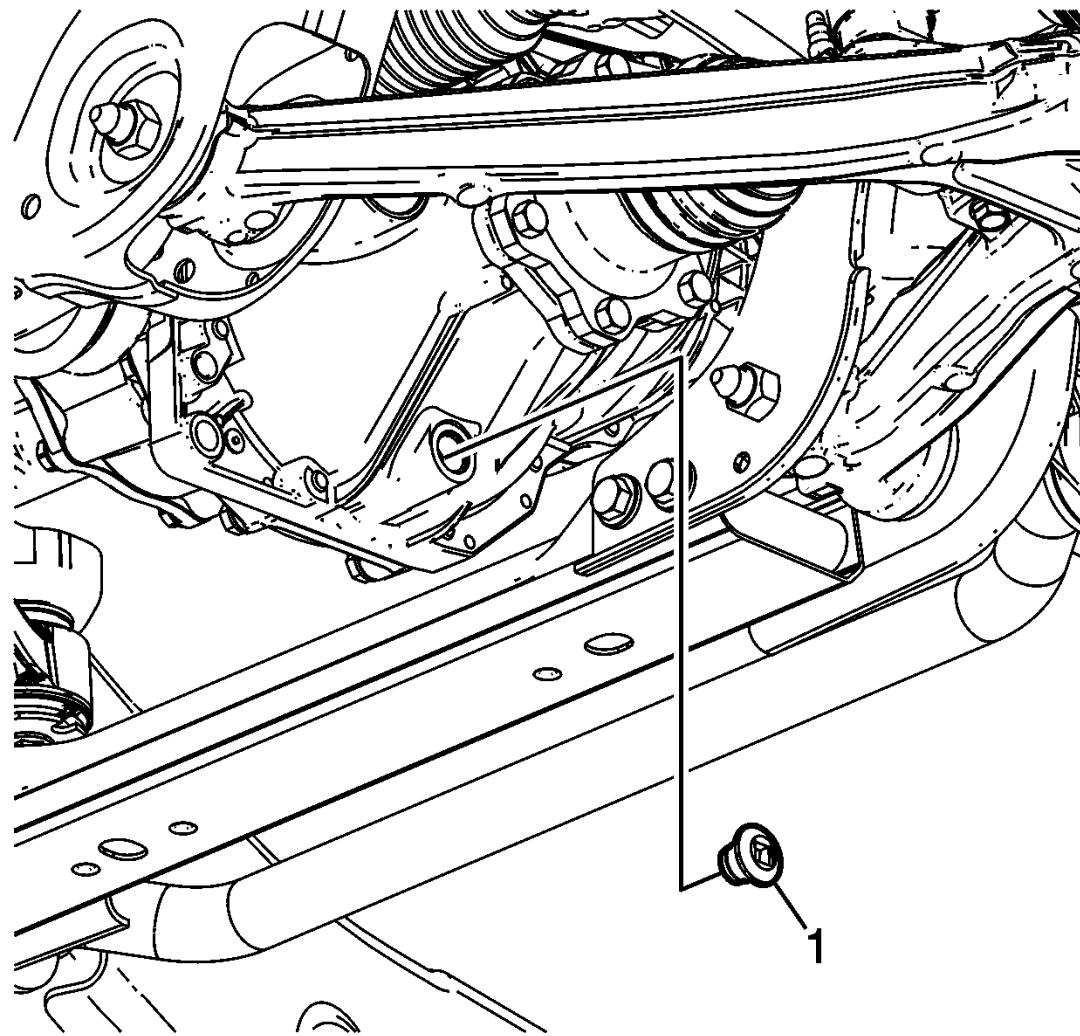


Fig. 26: Front Axle Drain Plug

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

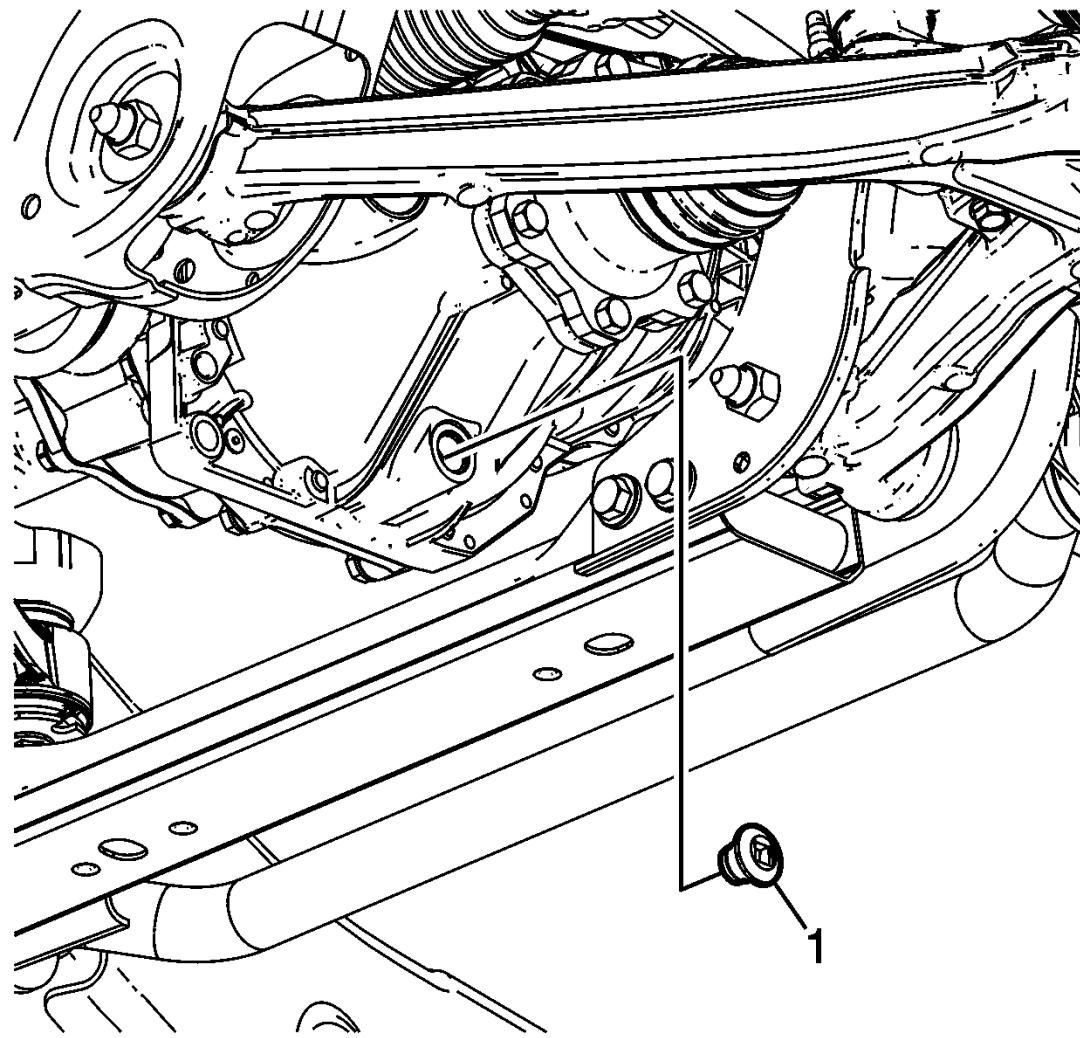


Fig. 27: Front Axle Drain Plug

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

1. Install the drain plug (1).

Tighten

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

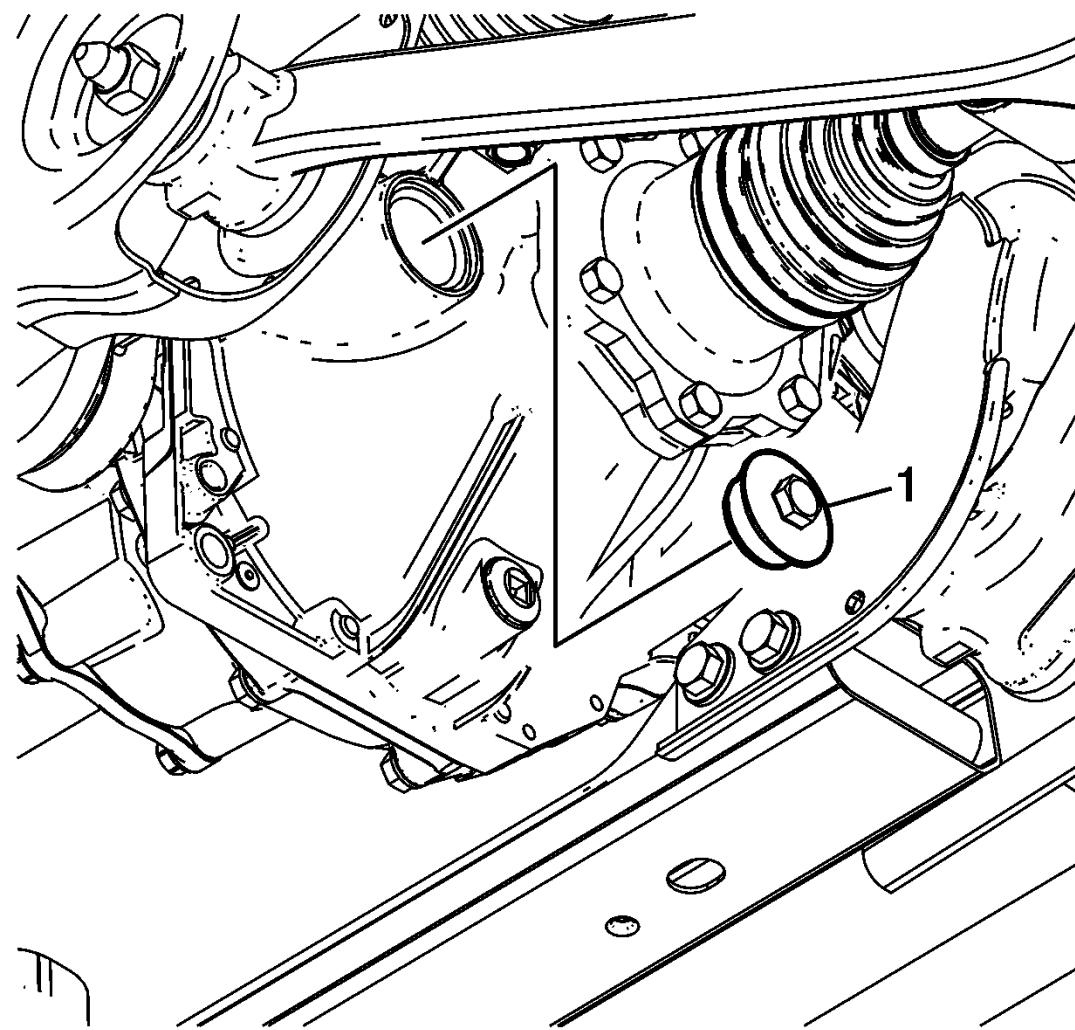


Fig. 28: Front Axle Fill Plug

Courtesy of GENERAL MOTORS COMPANY

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

4. Install the fill plug (1).

Tighten

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

5. Install the steering gear skid shield, if equipped. Refer to [Steering Gear Skid Shield Replacement](#).
6. Lower the vehicle.

FRONT AXLE LUBRICANT REPLACEMENT (9.25 INCH HD AXLE)

Removal Procedure

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

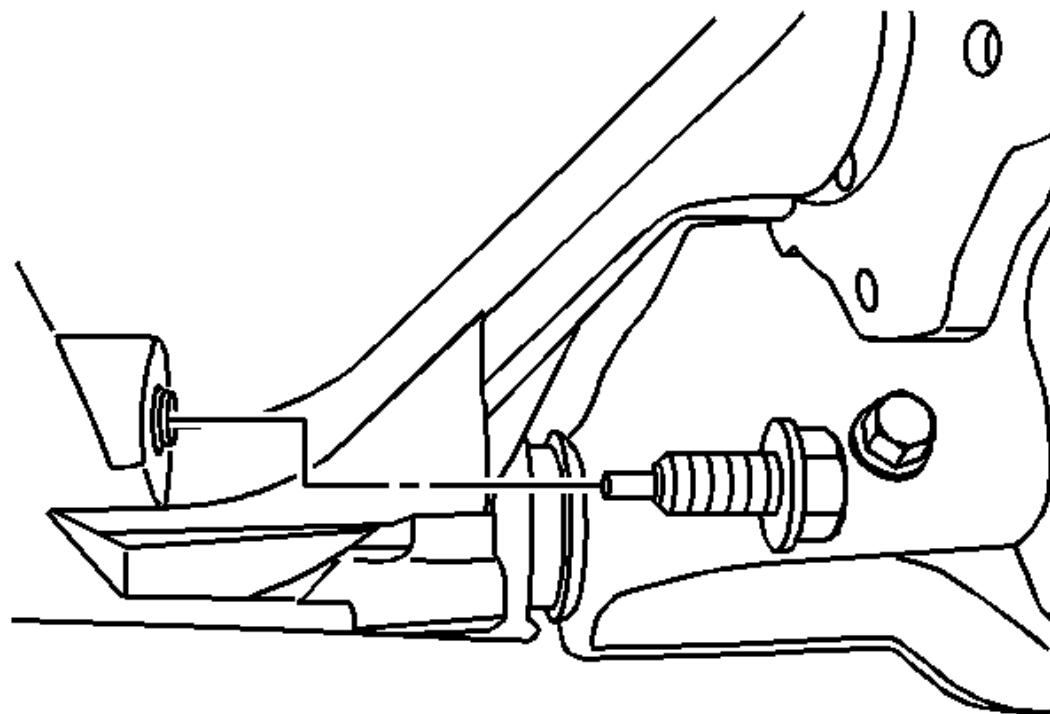


Fig. 29: Front Drive Axle Lubricant Drain Plug

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

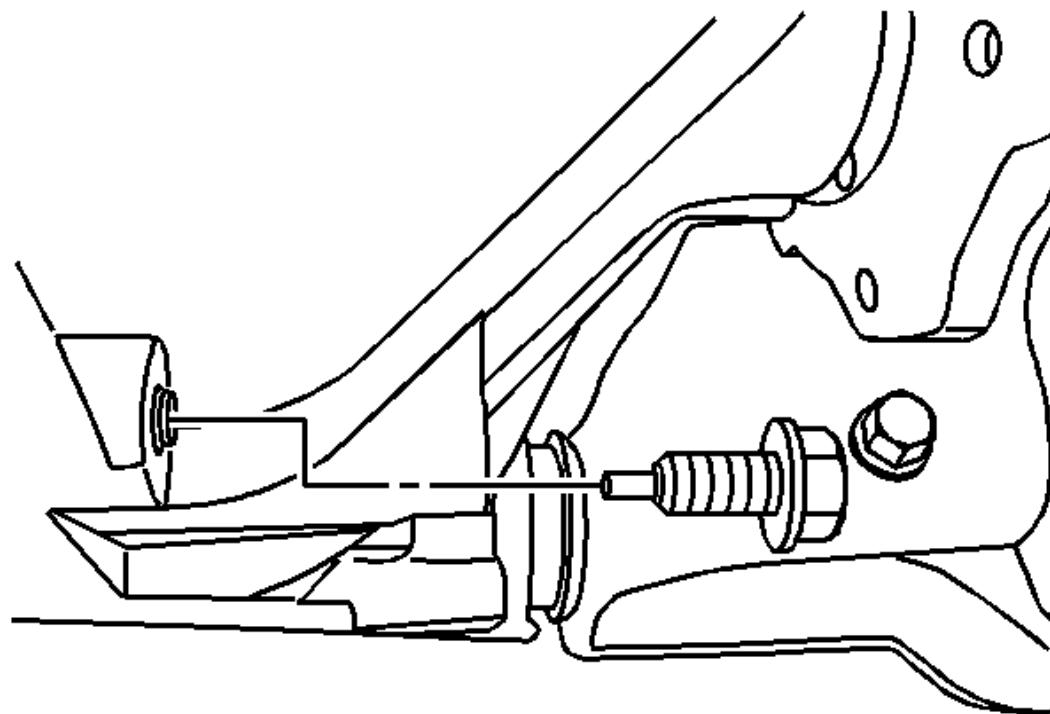


Fig. 30: Front Drive Axle Lubricant Drain Plug

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

1. Install the drain plug and tighten 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 . Adhesives, Fluids, Lubricants, and Sealers.

3. Install the fill plug and tighten to 33 N.m (24 lb ft).
4. Install the steering gear skid shield, if equipped. Refer to [**Steering Gear Skid Shield Replacement**](#).
5. Lower the vehicle.

VENT HOSE REPLACEMENT (9.25 INCH HD AXLE)

Removal Procedure

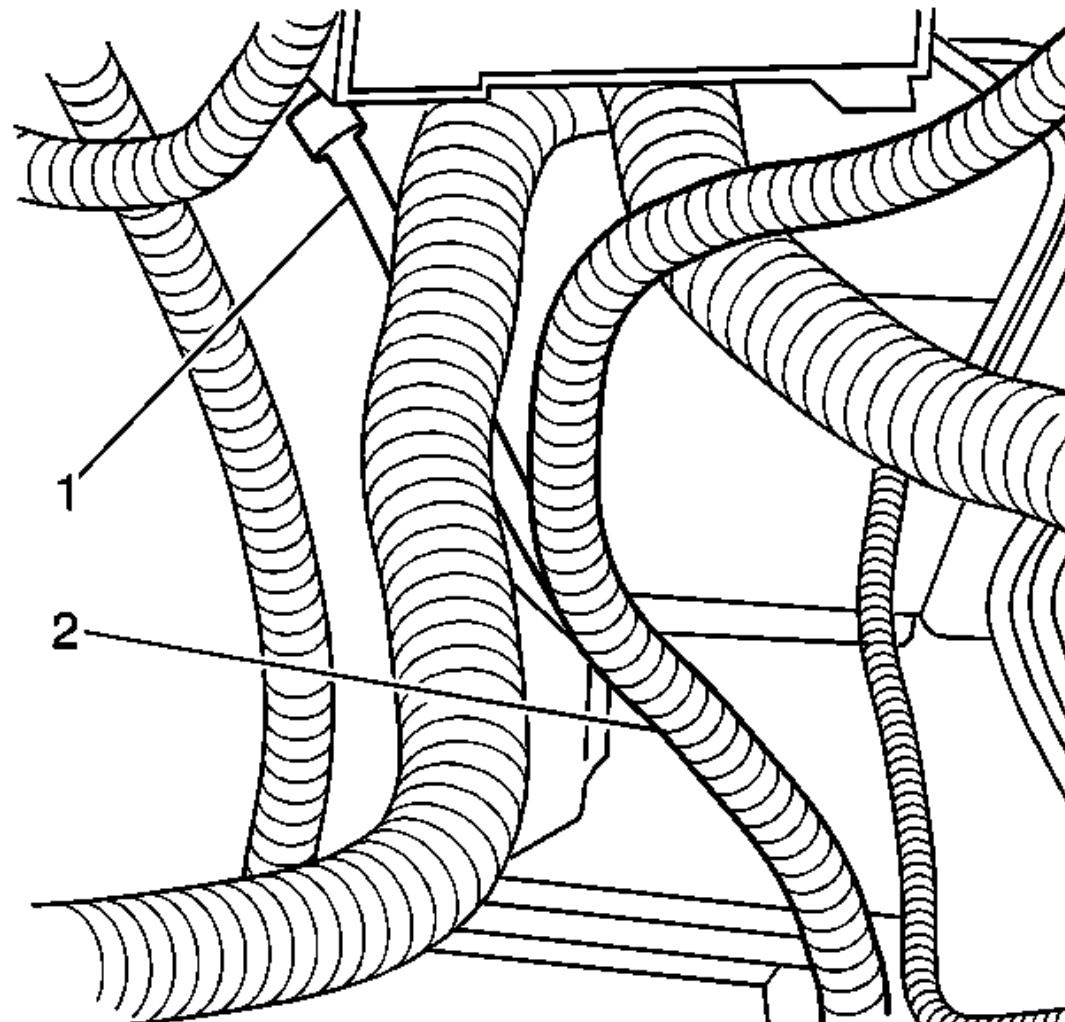


Fig. 31: Vent Hose & Wiring Bundle

Courtesy of GENERAL MOTORS COMPANY

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

NOTE: **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.

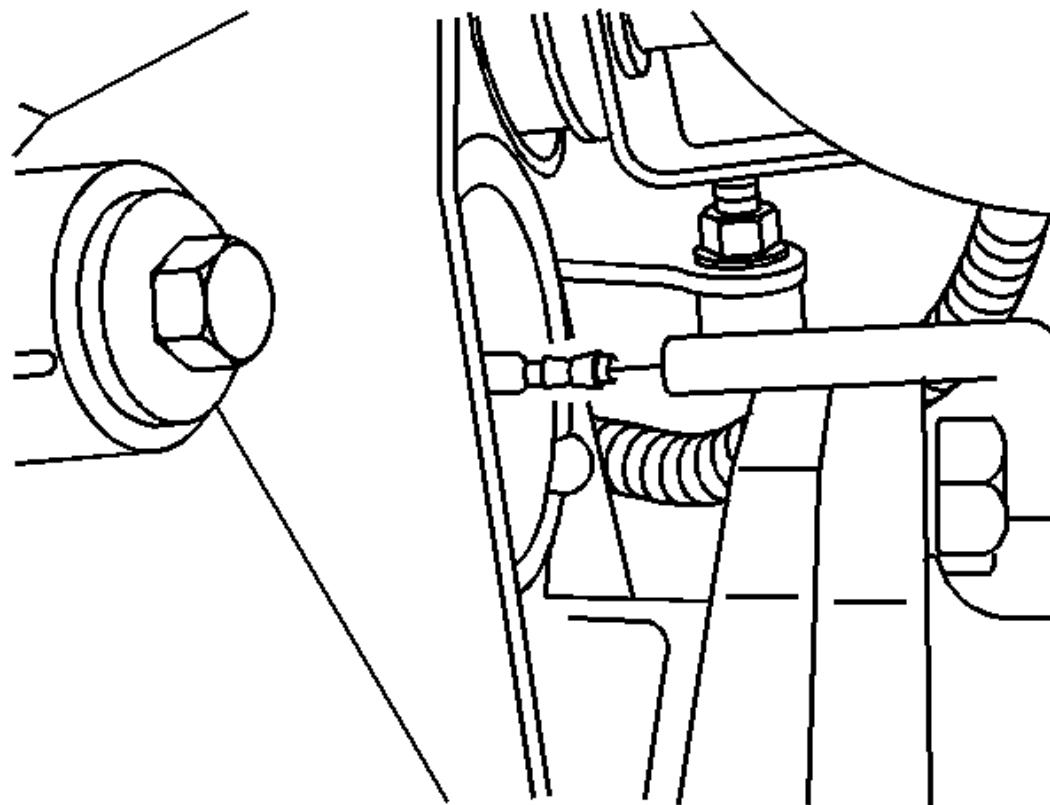


Fig. 32: View Of Vent Hose To Differential Carrier Assembly

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

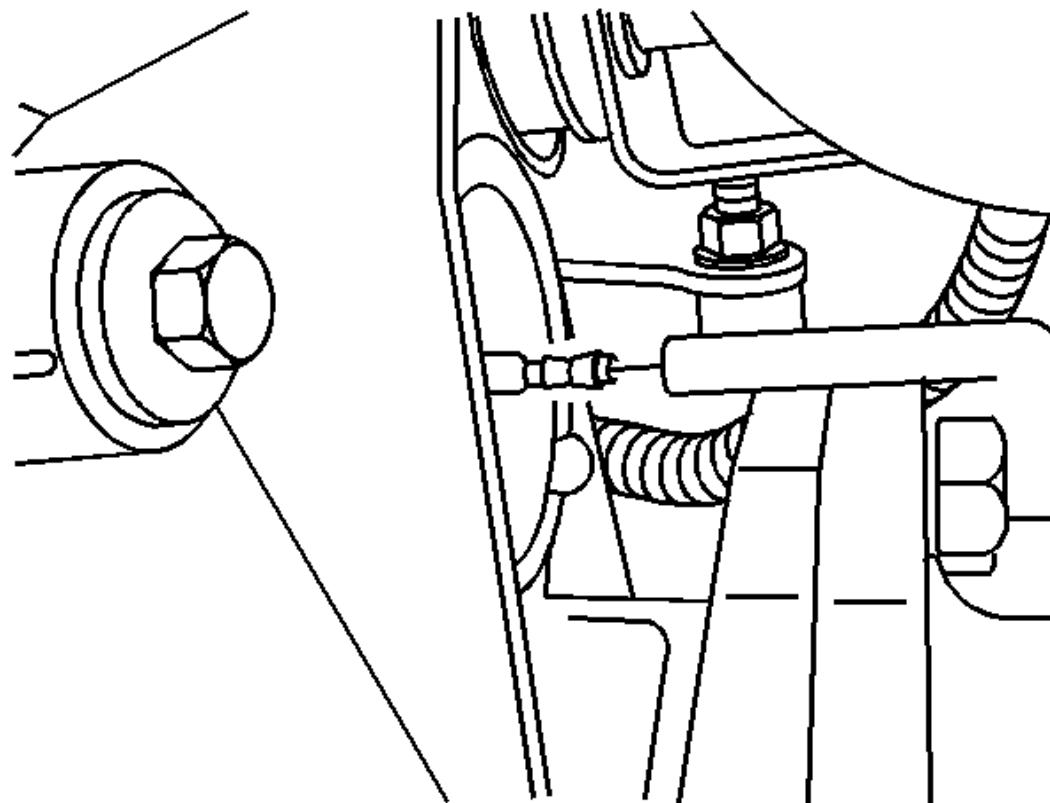


Fig. 33: View Of Vent Hose To Differential Carrier Assembly

Courtesy of GENERAL MOTORS COMPANY

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.

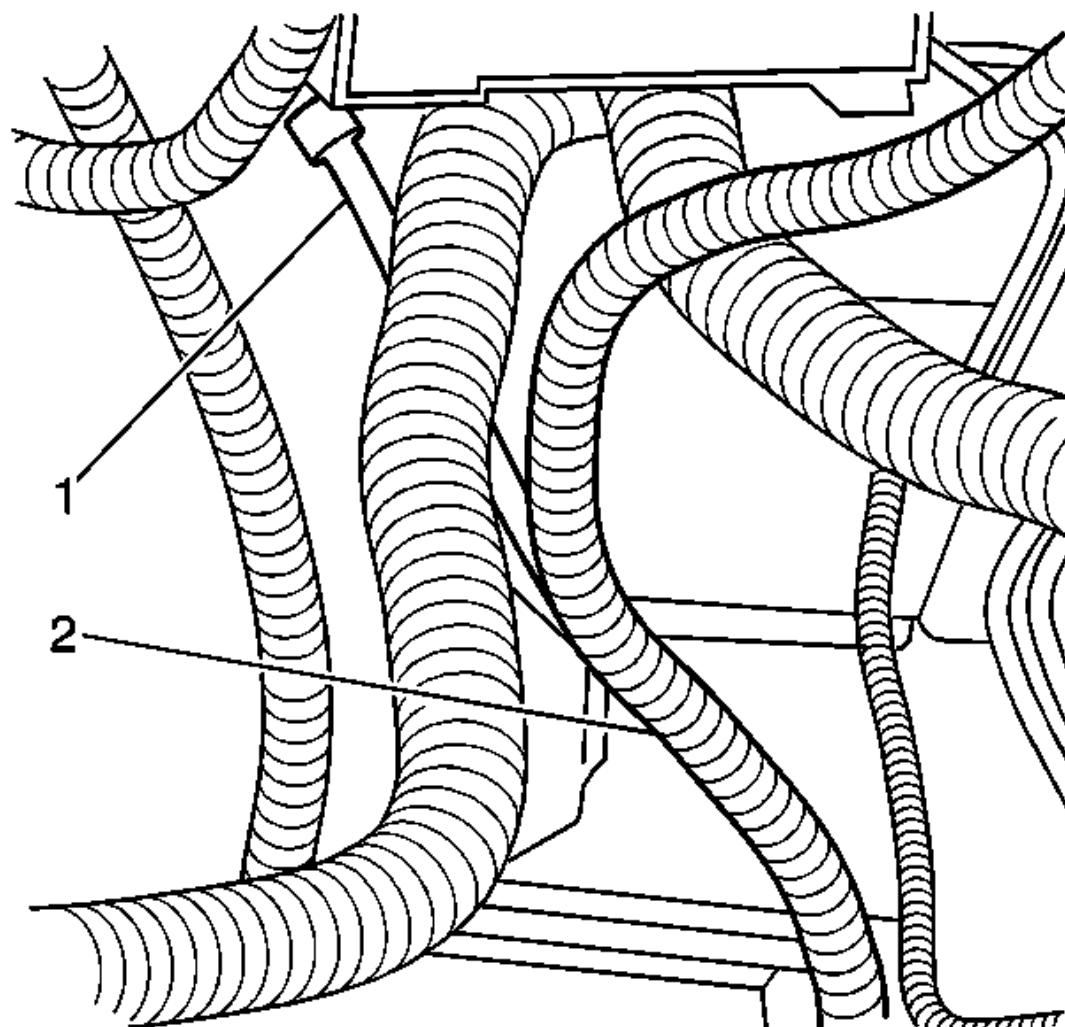


Fig. 34: Vent Hose & Wiring Bundle

Courtesy of **GENERAL MOTORS COMPANY**

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 steering gear skid shield, if equipped. Refer to [Steering Gear Skid Shield Replacement](#) .
6. Lower the vehicle.

FRONT AXLE VENT HOSE CONNECTOR REPLACEMENT (9.25 INCH HD AXLE)

Removal Procedure

1. Raise the vehicle. Refer [Lifting and Jacking the Vehicle](#) .

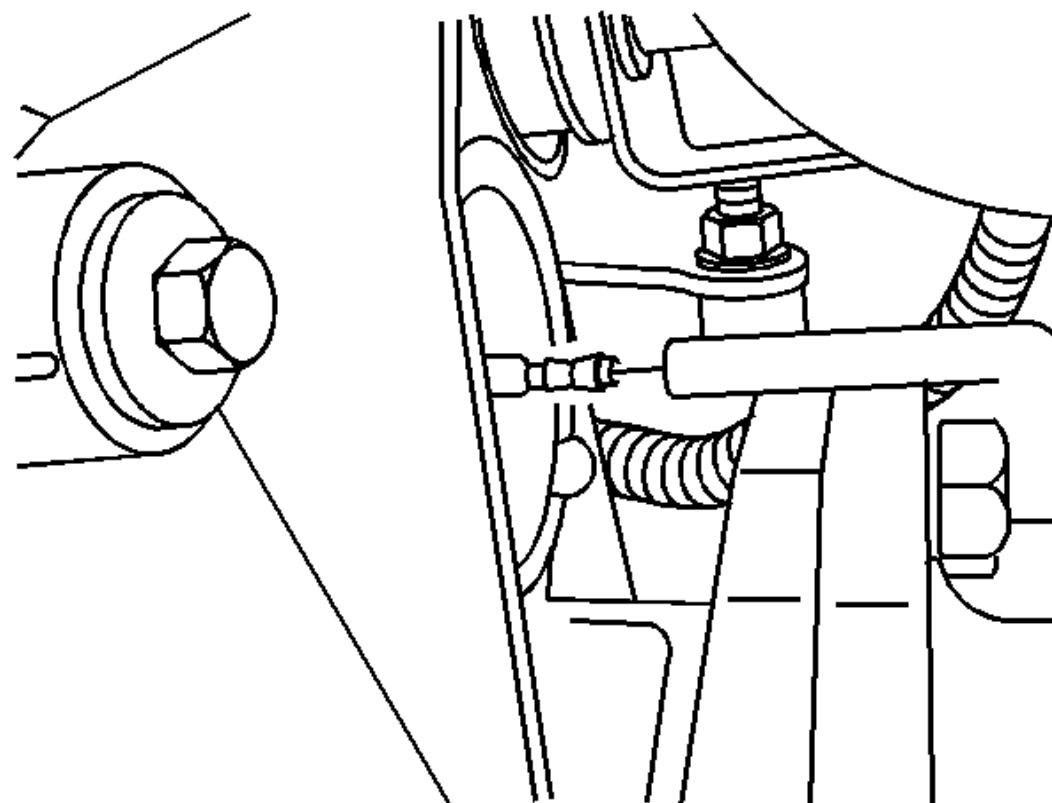


Fig. 35: View Of Vent Hose To Differential Carrier Assembly

Courtesy of GENERAL MOTORS COMPANY

2. Disconnect the vent hose from the vent hose connector.

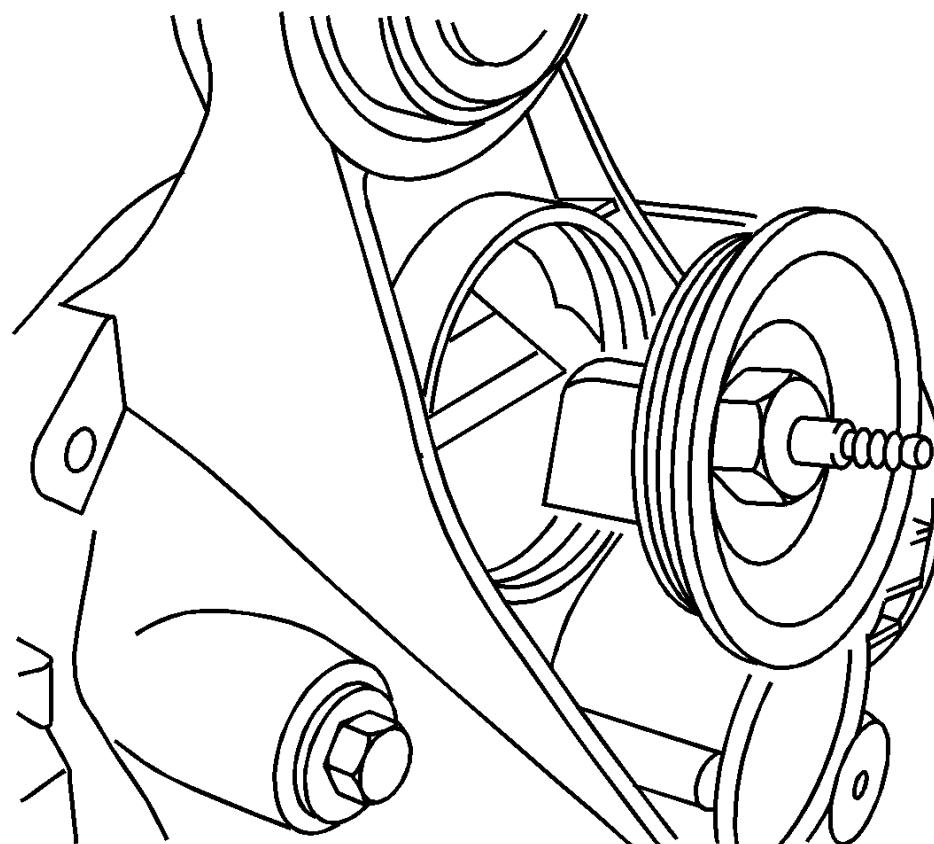


Fig. 36: View Of Vent Hose Connector

Courtesy of GENERAL MOTORS COMPANY

3. Remove the vent hose connector from the differential carrier assembly.

Installation Procedure

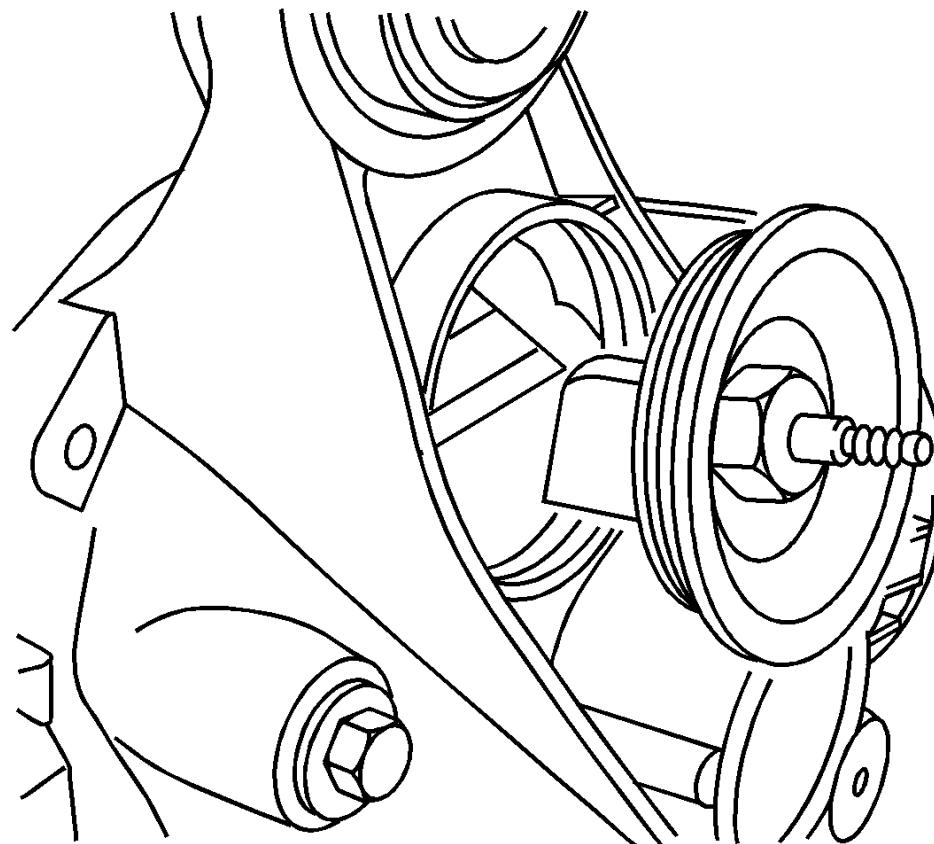


Fig. 37: View Of Vent Hose Connector

Courtesy of GENERAL MOTORS COMPANY

1. Install the vent hose connector into the differential carrier assembly.

Apply a small amount of sealer GM P/N 12346004 (Canadian P/N 10953480) or equivalent onto the threads.

CAUTION: Refer to Fastener Caution .

2. Install the vent hose connector and tighten to 28 N.m (21 lb ft).

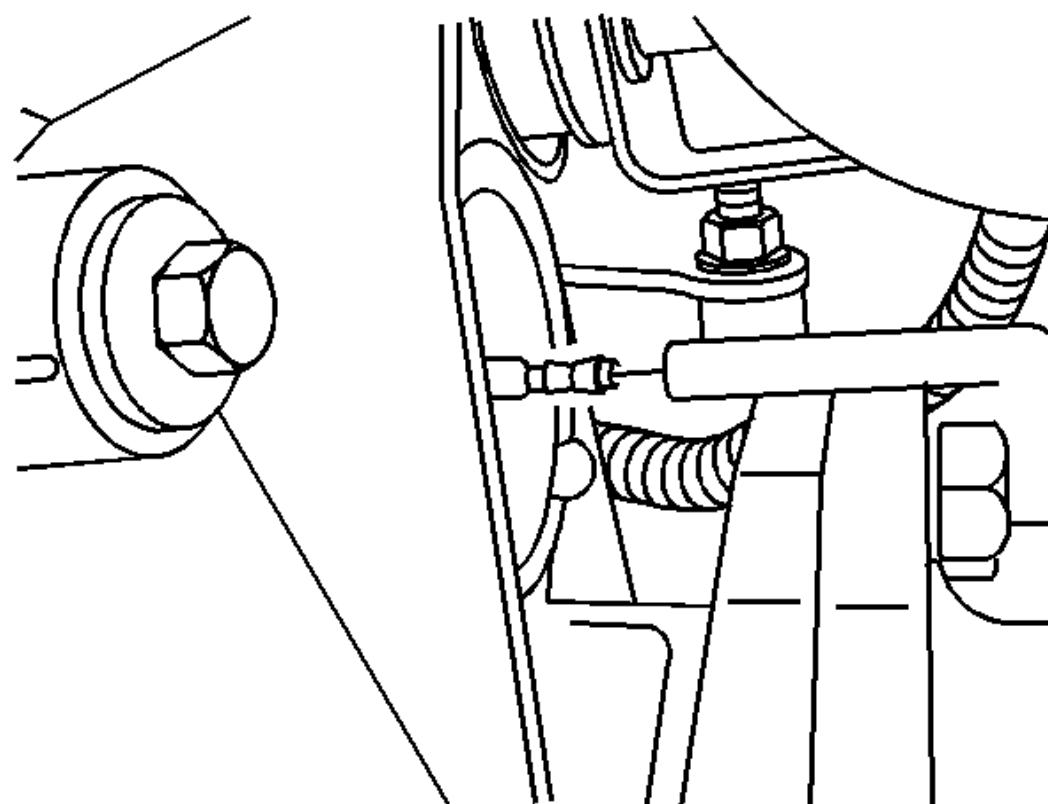


Fig. 38: View Of Vent Hose To Differential Carrier Assembly
Courtesy of GENERAL MOTORS COMPANY

3. Connect the vent hose to the vent hose connector.
4. Lower the vehicle.

FRONT AXLE VENT HOSE CONNECTOR REPLACEMENT (8.25 INCH LD AXLE)

Removal Procedure

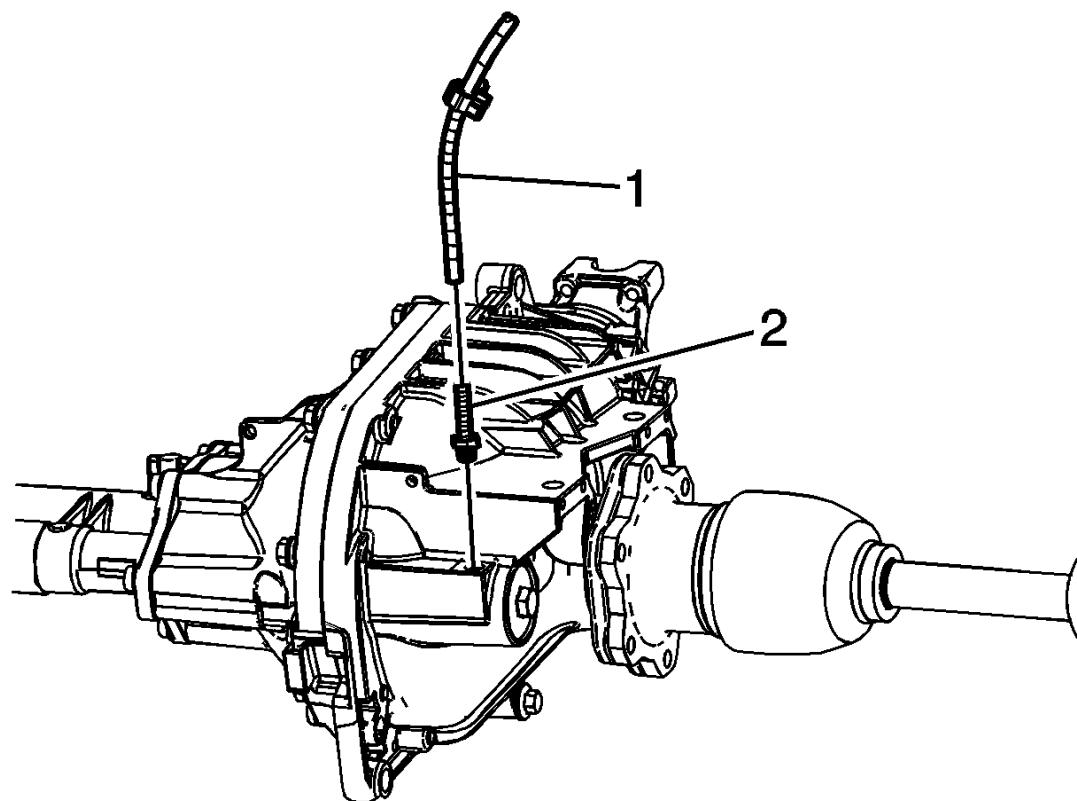


Fig. 39: View Of Vent Hose & Connector

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

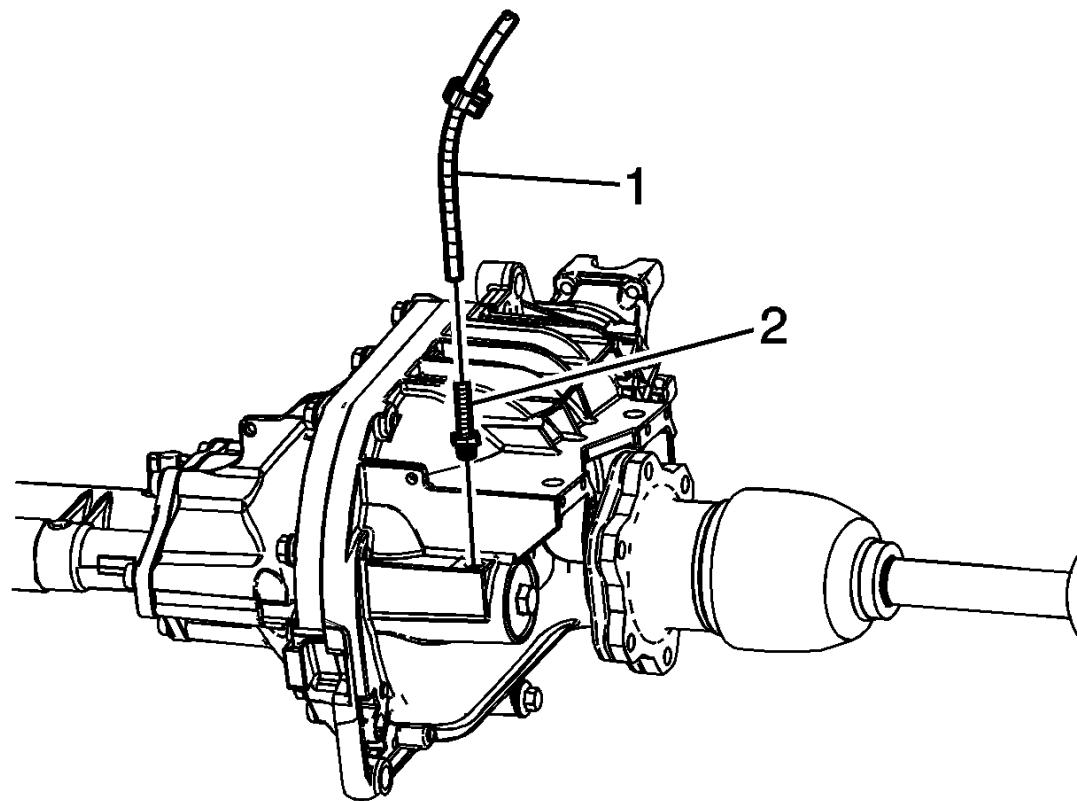


Fig. 40: View Of Vent Hose & Connector

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

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

Tighten

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

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

FRONT DRIVE AXLE INNER SHAFT REPLACEMENT (LEFT SIDE)

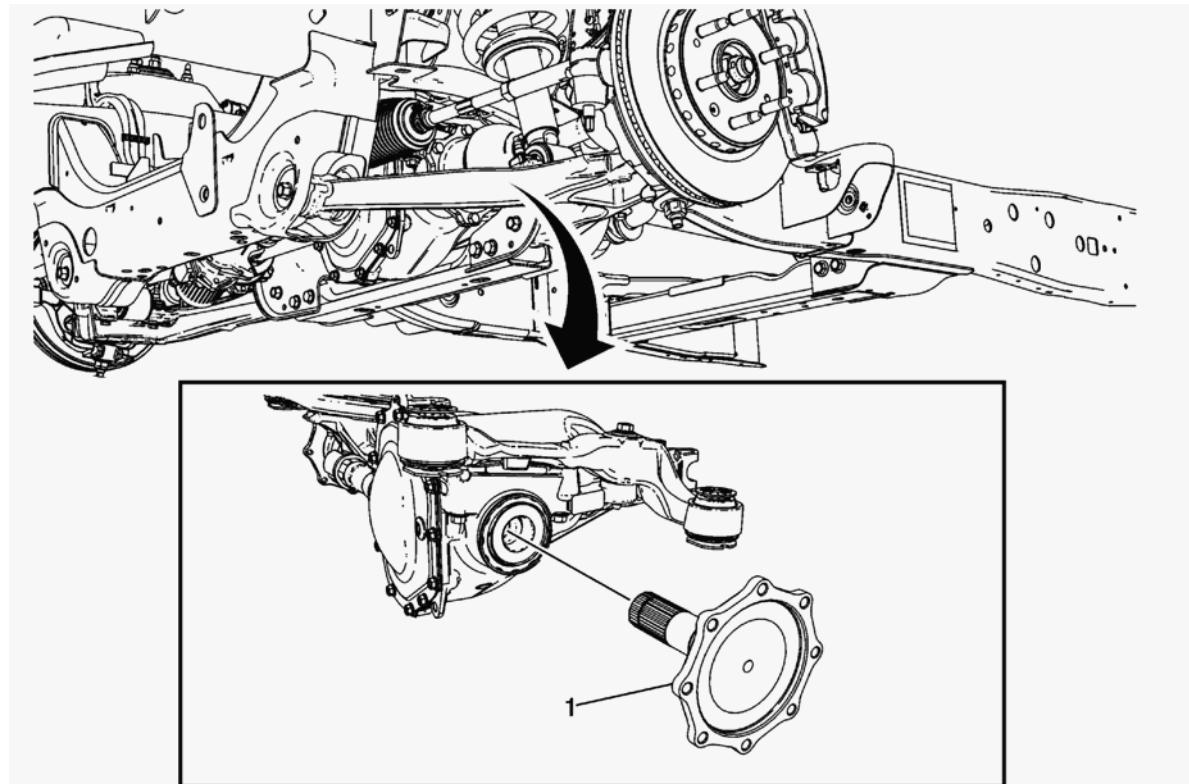


Fig. 41: Front Drive Axle Inner Shaft (Left Side)

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures	
<ol style="list-style-type: none"> 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle . 	

Callout	Component Name
2.	<p>Remove the wheel drive shaft. Refer to Front Wheel Drive Shaft Replacement - Left Side (1500) Front Wheel Drive Shaft Replacement - Left Side (Heavy Duty).</p>
1	<p>Front Drive Axle Inner Shaft</p> <p>Procedure</p> <p>NOTE:</p> <p>It maybe necessary to have the aid of an assistant to hold the steering knuckle assembly to side in order to have enough access to the front drive axle inner shaft.</p> <p>1. Using the J-45859 puller and the J-2619-4 slide hammer, remove the front drive axle inner shaft.</p> <p>NOTE:</p> <p>In some rare cases, it may be difficult to remove the left front axle shaft from the</p>

Callout	Component Name
	<p>front axle assembly when replacing the axle seal. To ease removal, the left front axle shaft C-clip needs to be centered in the retaining groove.</p> <p>2. If the left hand inner axle shaft does not come out using moderate force follow steps below.</p> <ol style="list-style-type: none"> 1. Remove the front axle assembly from the vehicle. 2. Position the front axle assembly straight up and down so the left hand inner axle shaft is facing upward. If required, secure in a large bench vise. 3. Using a ball peen hammer, or preferably a brass hammer, tap the left inner axle shaft flange up and down repeatedly until the stub shaft separates from the axle assembly. This step centers the C-clip in the retaining groove of the stub shaft. Take care not to damage the machined face of the axle shaft. 4. Inspect the C-clip and replace if necessary. <p>Special Tools</p> <ul style="list-style-type: none"> • J-2619-4 Slide Hammer • J-45225 Seal Installer • J-45859 Puller <p>For equivalent regional tools, refer to Special Tools.</p>

FRONT DRIVE AXLE INNER SHAFT REPLACEMENT (RIGHT SIDE)

Removal Procedure

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

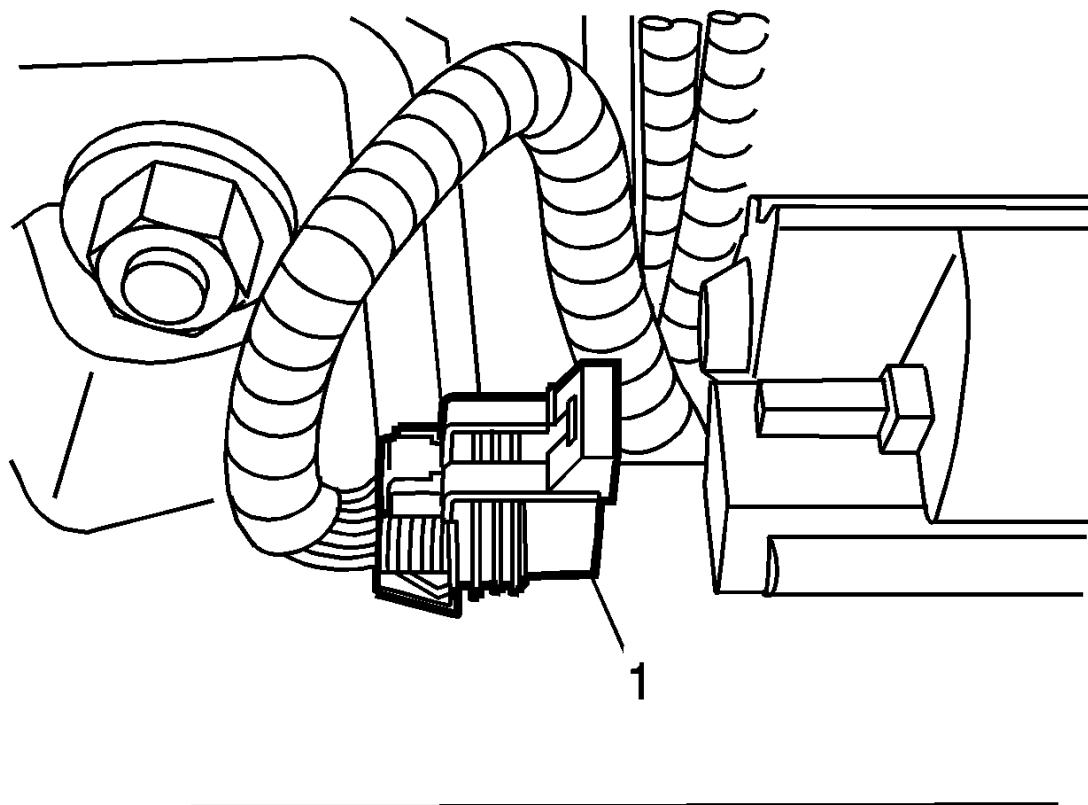


Fig. 42: Axle Actuator Electrical Connector

Courtesy of GENERAL MOTORS COMPANY

4. Disconnect the actuator electrical connector (1).

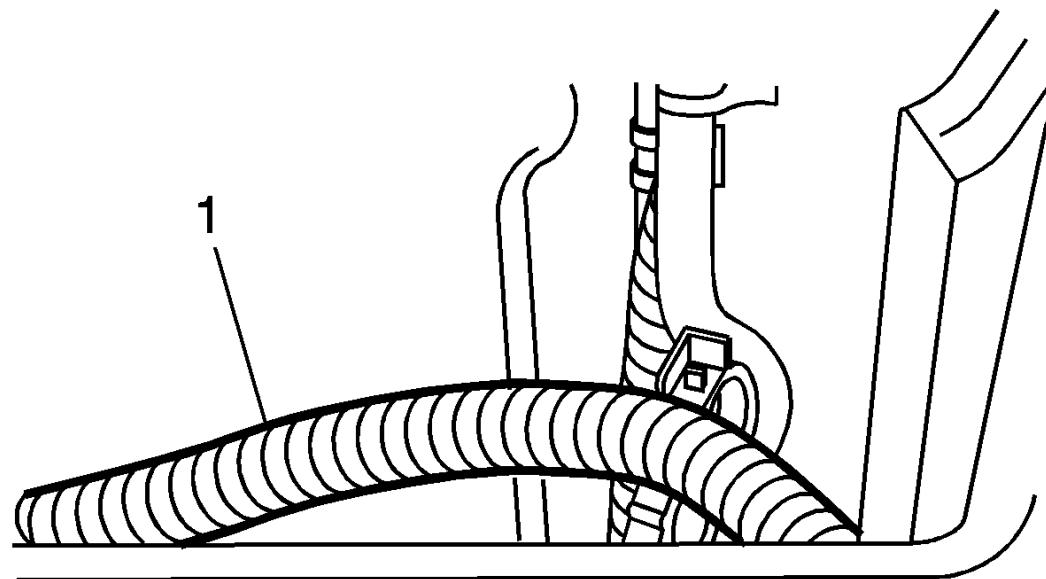


Fig. 43: Inner Axle Shaft Housing Wire Harness

Courtesy of GENERAL MOTORS COMPANY

5. Disconnect the wire harness (1) from the inner axle housing.

6. Remove the front shock module. [Shock Absorber and Spring Removal and Installation \(Light Duty, With Z85/Z95\)](#) [Shock Absorber and Spring Removal and Installation \(Light Duty, Without Z85/Z95\)](#)

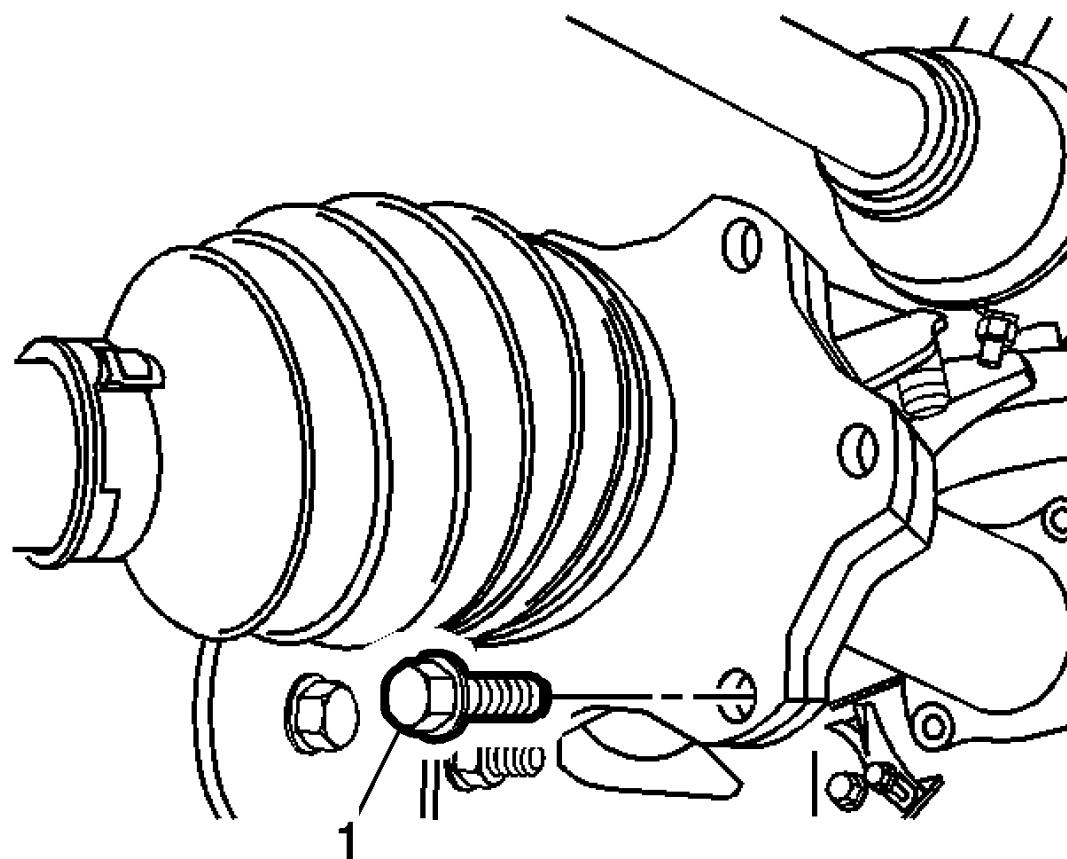


Fig. 44: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle
Courtesy of GENERAL MOTORS COMPANY

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

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

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

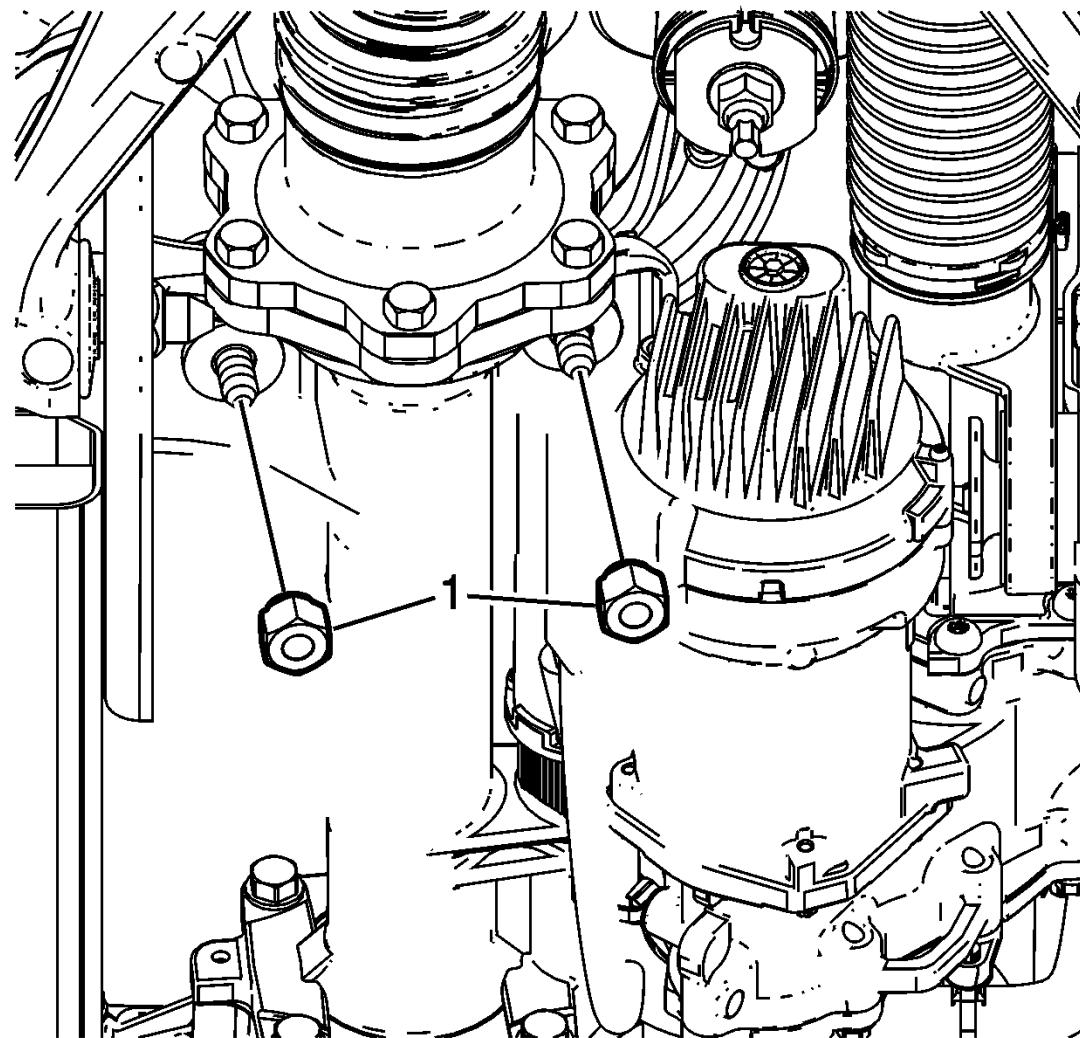


Fig. 45: Inner Axle Shaft Housing Washers And Nuts

Courtesy of GENERAL MOTORS COMPANY

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

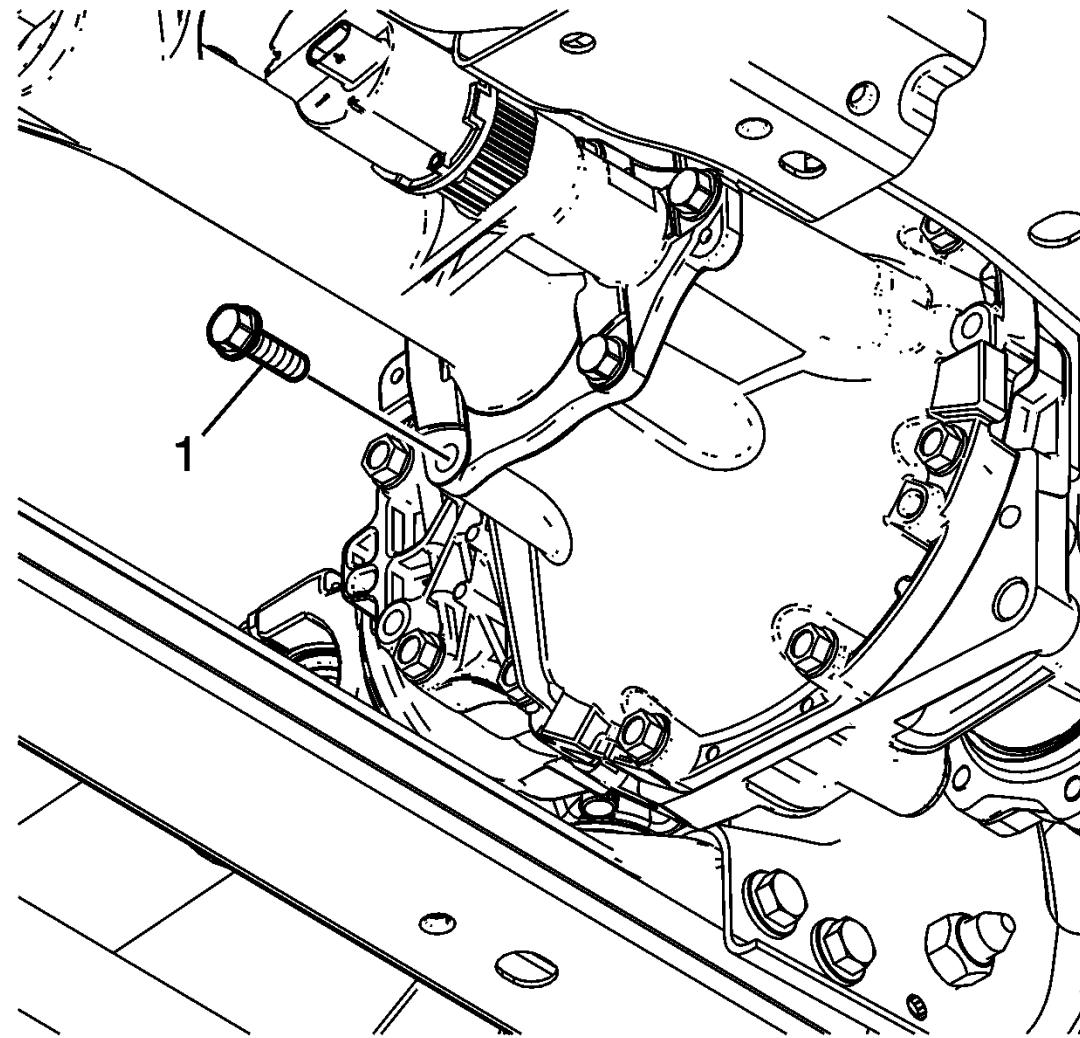


Fig. 46: Inner Axle Shaft Housing Bolts

Courtesy of GENERAL MOTORS COMPANY

10. Remove the inner axle shaft mounting bolts.

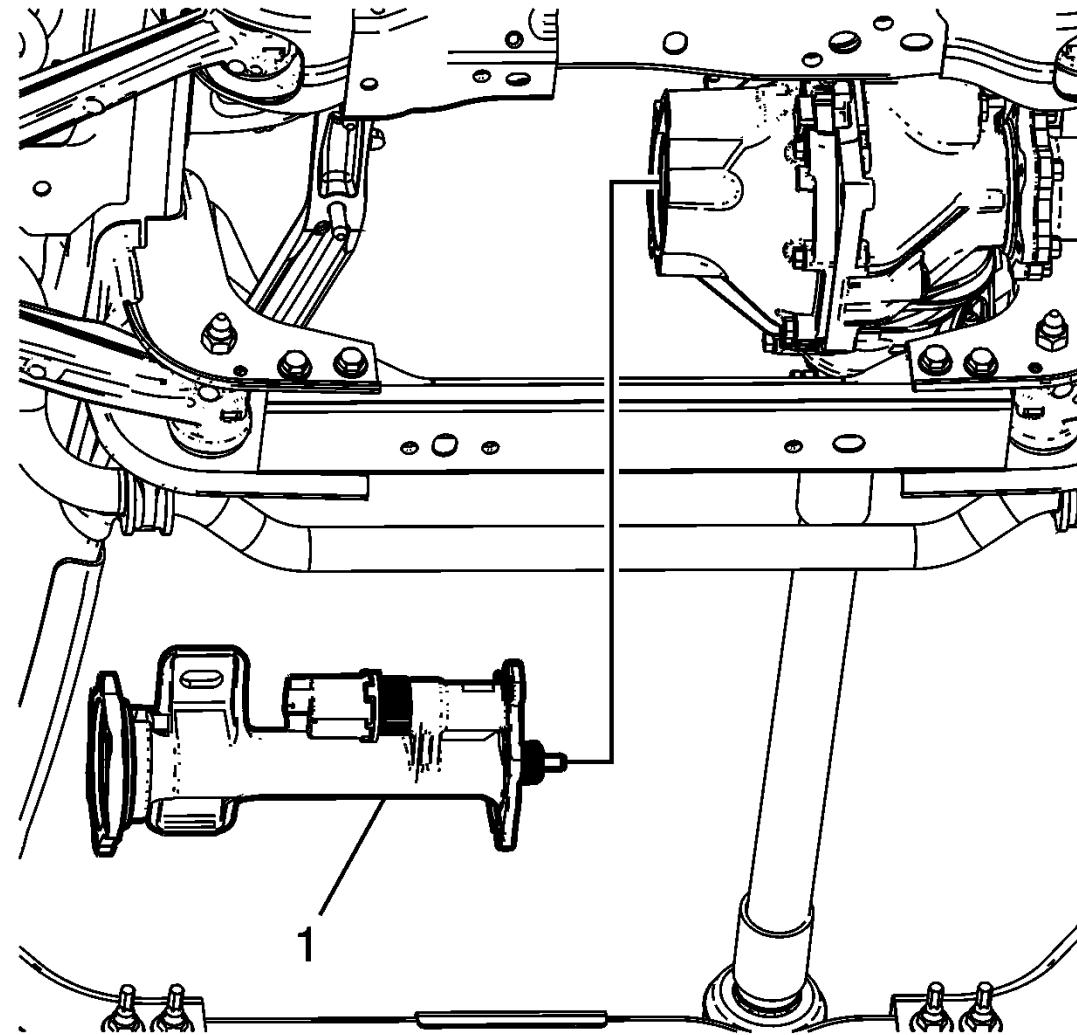


Fig. 47: Inner Axle Shaft Housing Assembly

Courtesy of GENERAL MOTORS COMPANY

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

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

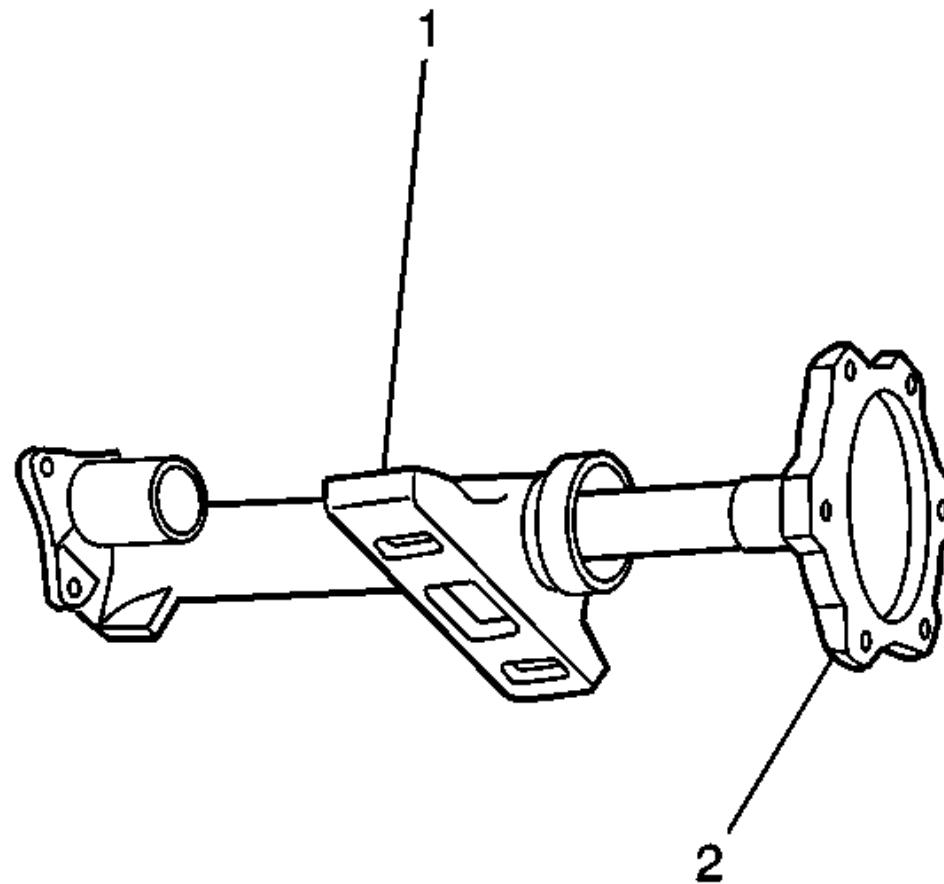


Fig. 48: Inner Axle Shaft And Housing

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

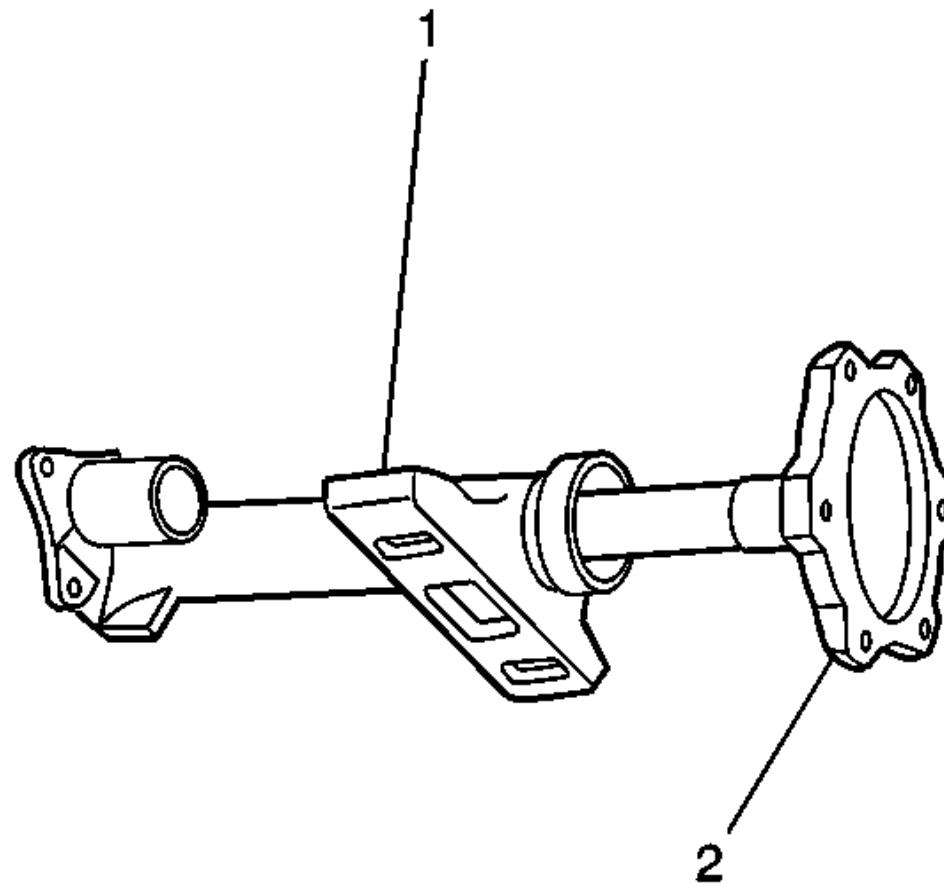


Fig. 49: Inner Axle Shaft And Housing

Courtesy of GENERAL MOTORS COMPANY

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

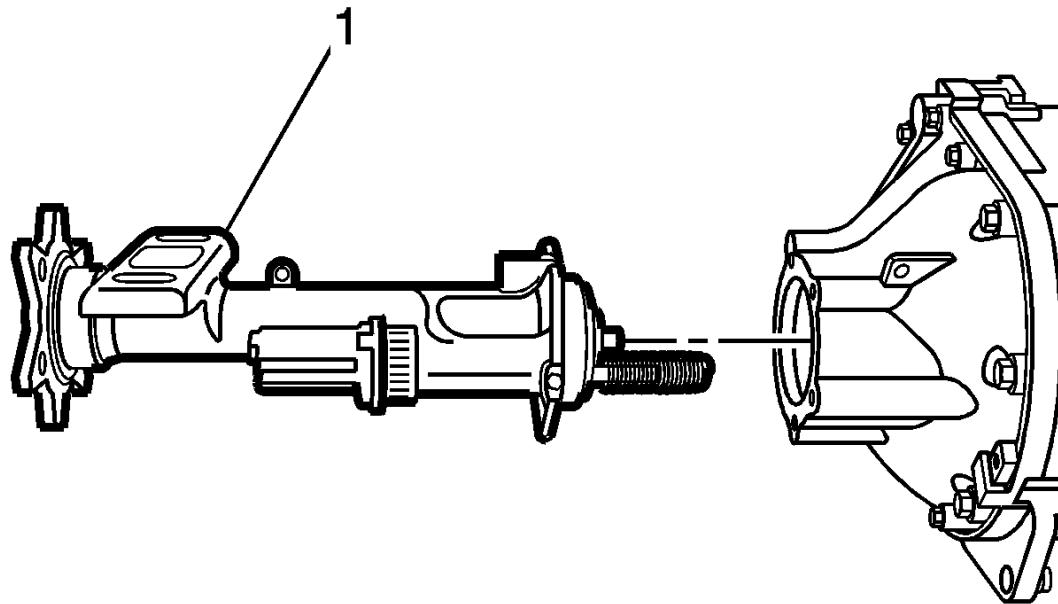


Fig. 50: Inner Axle Shaft Housing Assembly

Courtesy of GENERAL MOTORS COMPANY

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

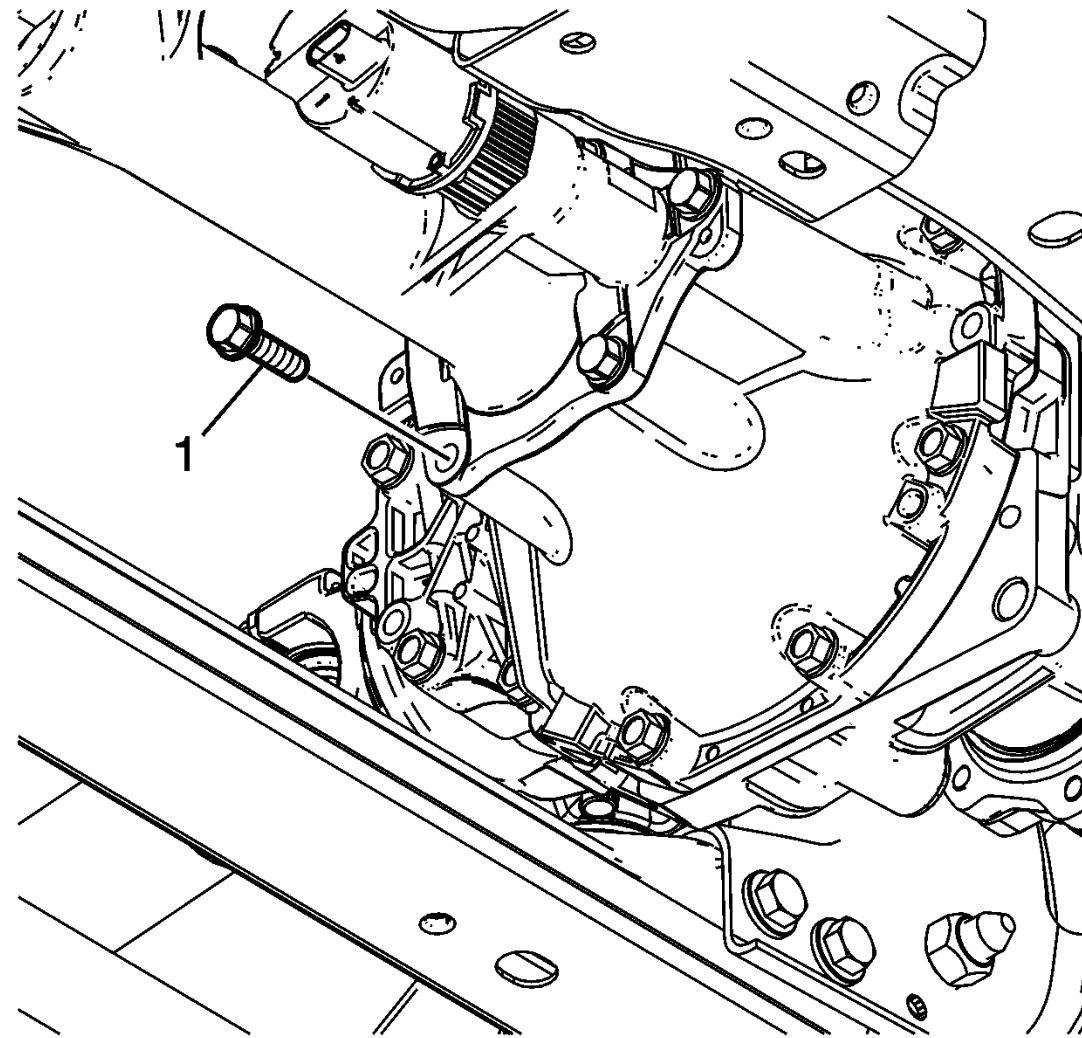


Fig. 51: Inner Axle Shaft Housing Bolts

Courtesy of GENERAL MOTORS COMPANY

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

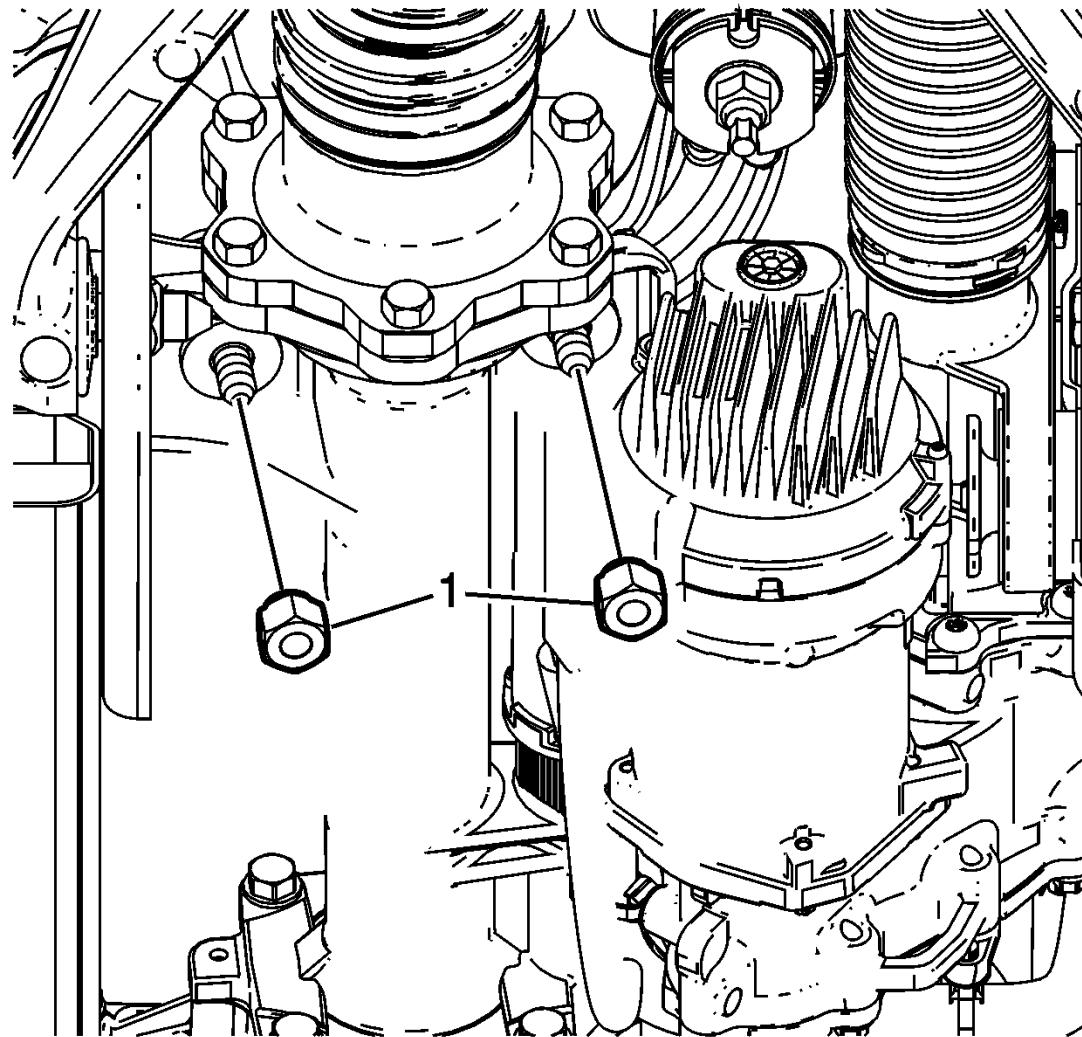


Fig. 52: Inner Axle Shaft Housing Washers And Nuts

Courtesy of GENERAL MOTORS COMPANY

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

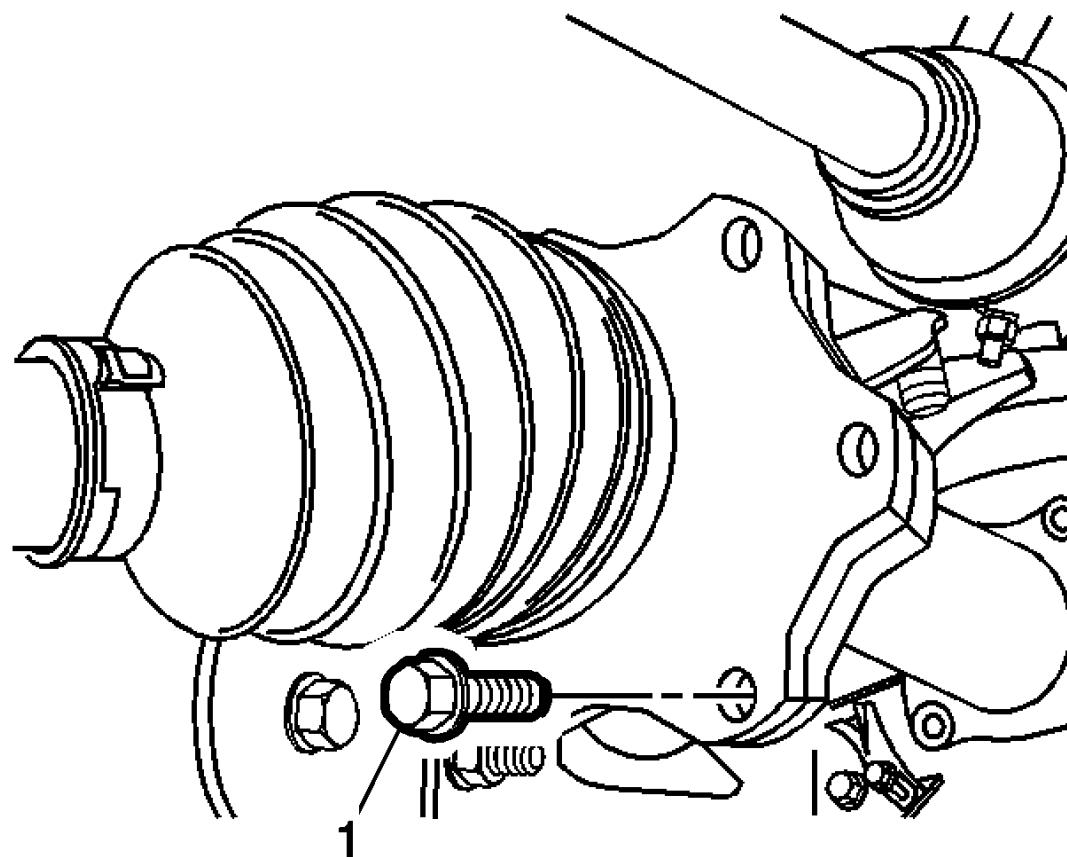


Fig. 53: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

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

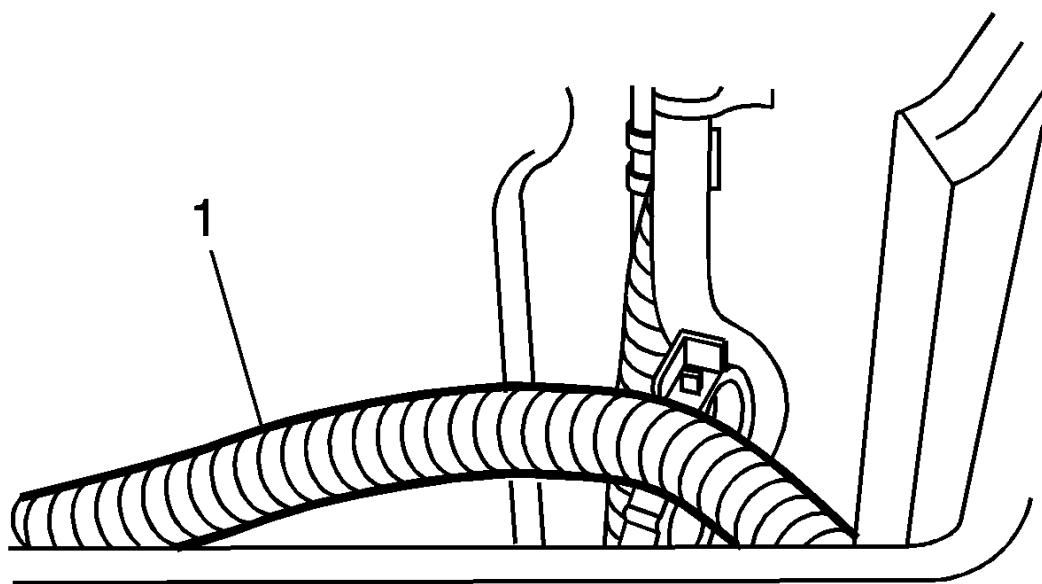


Fig. 54: Inner Axle Shaft Housing Wire Harness
Courtesy of GENERAL MOTORS COMPANY

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

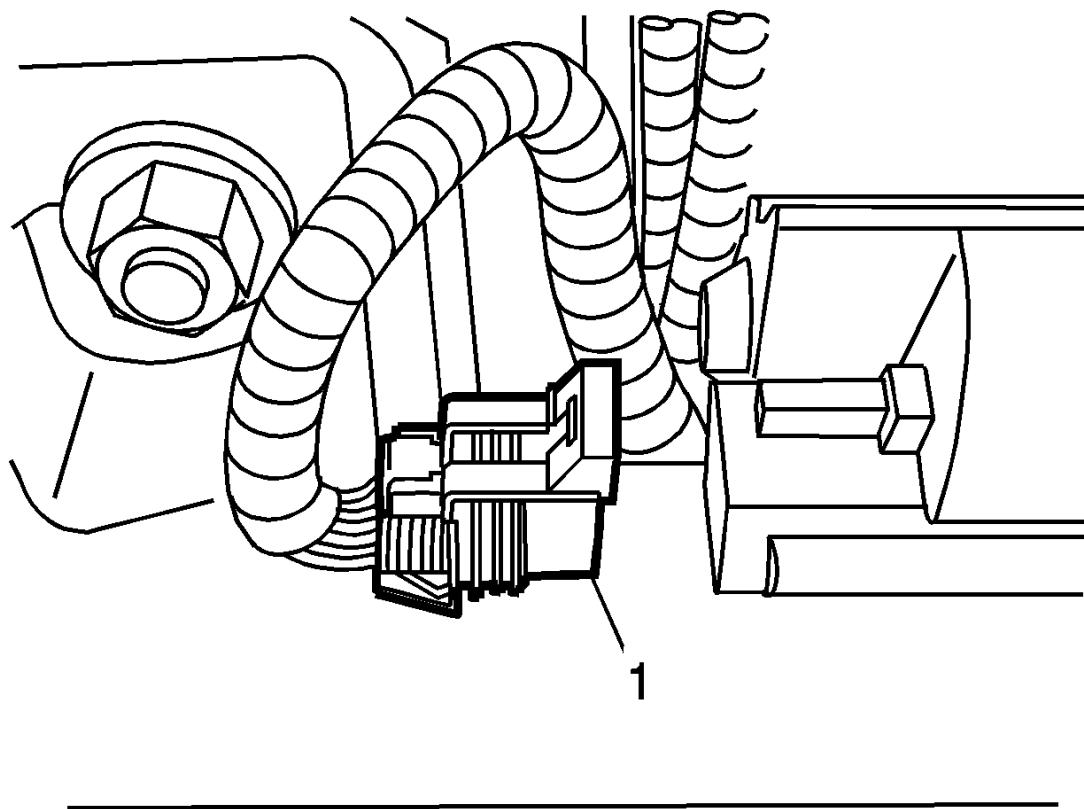


Fig. 55: Axle Actuator Electrical Connector

Courtesy of GENERAL MOTORS COMPANY

10. Connect the electrical connector (1) to actuator.
11. Install the front shock module. [Shock Absorber and Spring Removal and Installation \(Light Duty, With Z85/Z95\)](#) [Shock Absorber and Spring Removal and Installation \(Light Duty, Without Z85/Z95\)](#)
12. Install the power steering assist motor. [Power Steering Assist Motor Replacement \(Light Duty\)](#)

13. With either replacement procedure, fill the differential carrier assembly with axle lubricant. Use the correct fluid. [Front Axle Lubricant Replacement \(8.25 Inch LD Axle\)](#)[Front Axle Lubricant Replacement \(9.25 Inch HD Axle\)](#)
14. Lower the vehicle.

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

Special Tools

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

For equivalent regional tools, refer to [Special Tools](#).

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the front drive axle inner shaft from the inner shaft housing. Refer to [Front Drive Axle Inner Shaft Replacement \(Left Side\)](#)[Front Drive Axle Inner Shaft Replacement \(Right Side\)](#).

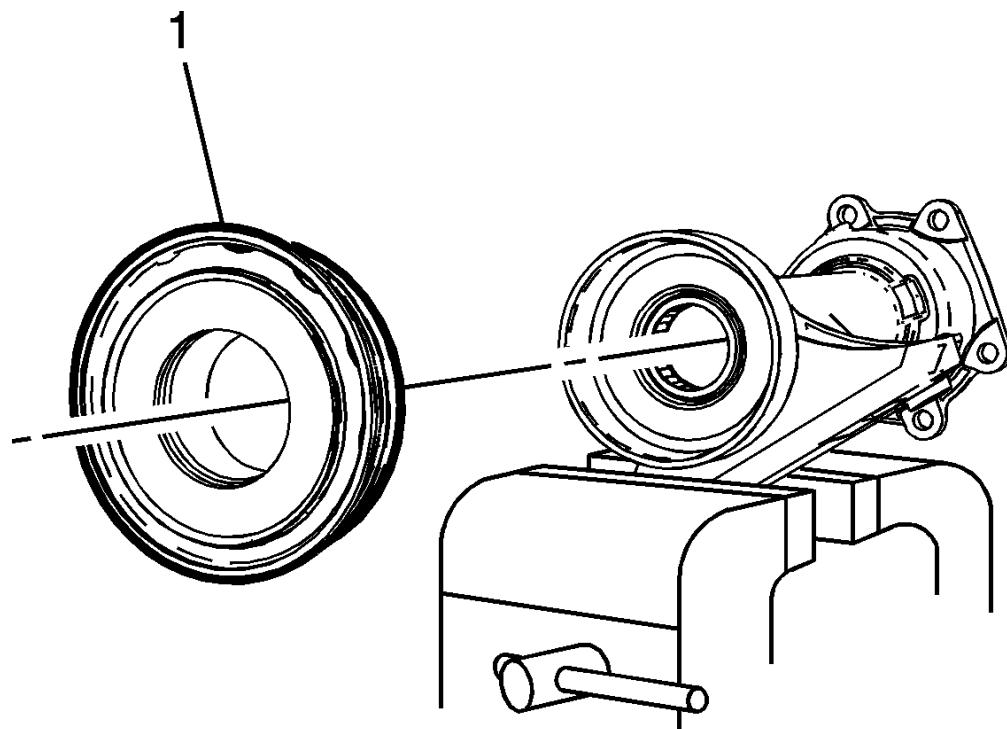


Fig. 56: Front Drive Axle Inner Shaft Seal

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

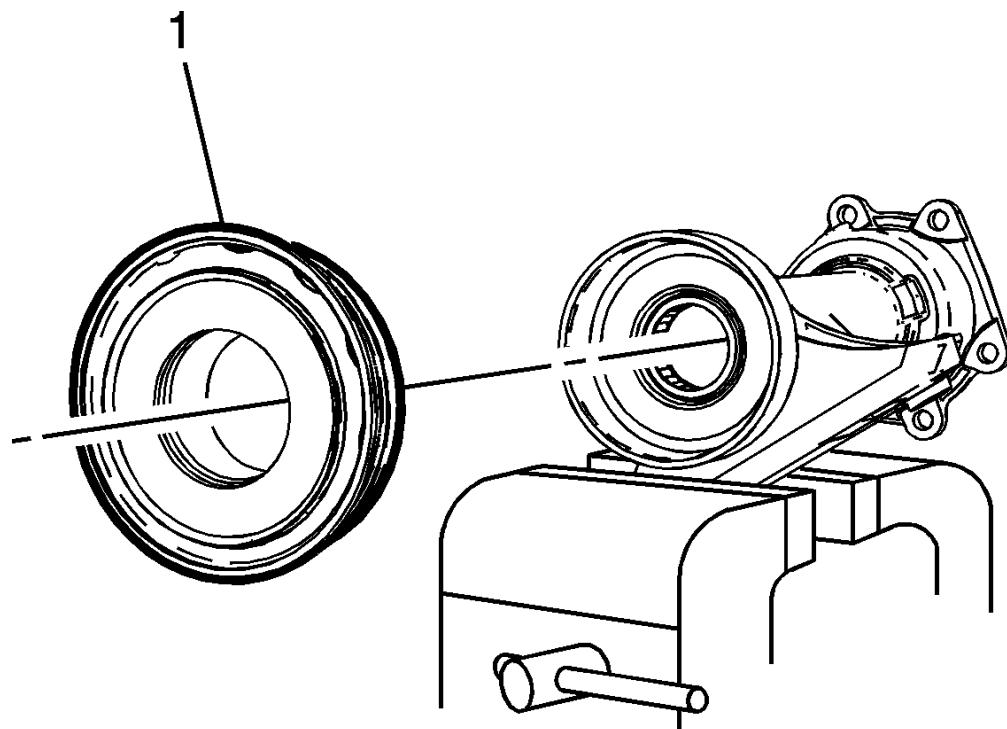


Fig. 57: Front Drive Axle Inner Shaft Seal

Courtesy of GENERAL MOTORS COMPANY

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

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

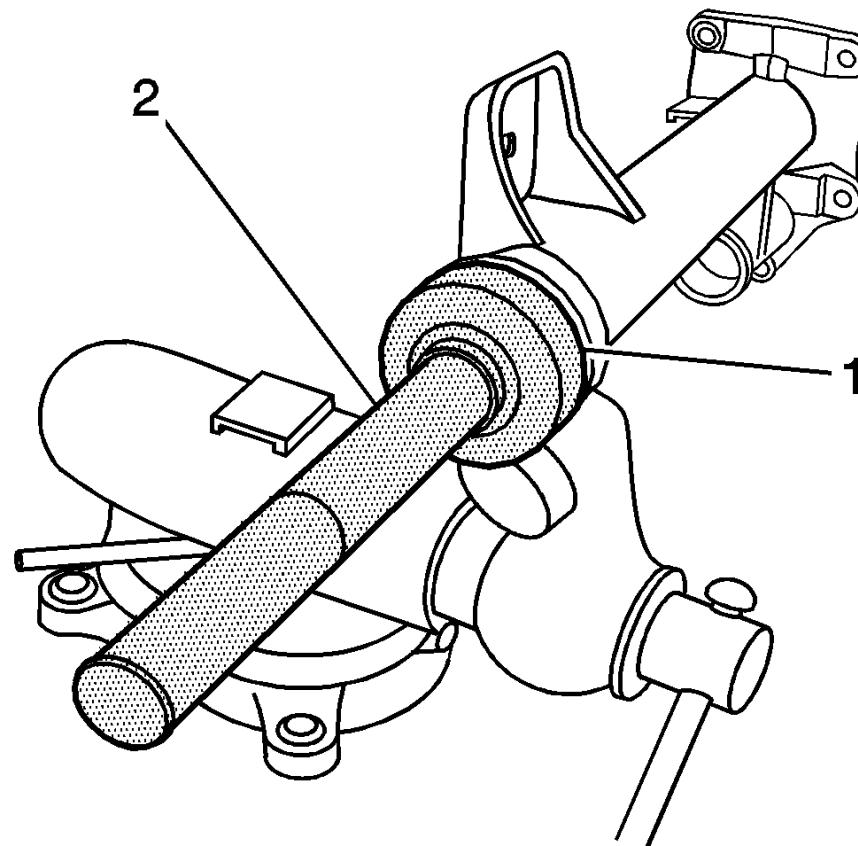


Fig. 58: New Axle Shaft Seal - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

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

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

Special Tools

- **J 8092** Universal Driver Handle
- **J 44215** Rear Seal Installer

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Remove the front drive axle inner shaft from the inner shaft housing. Refer to [Front Drive Axle Inner Shaft Replacement \(Left Side\)](#)[Front Drive Axle Inner Shaft Replacement \(Right Side\)](#).

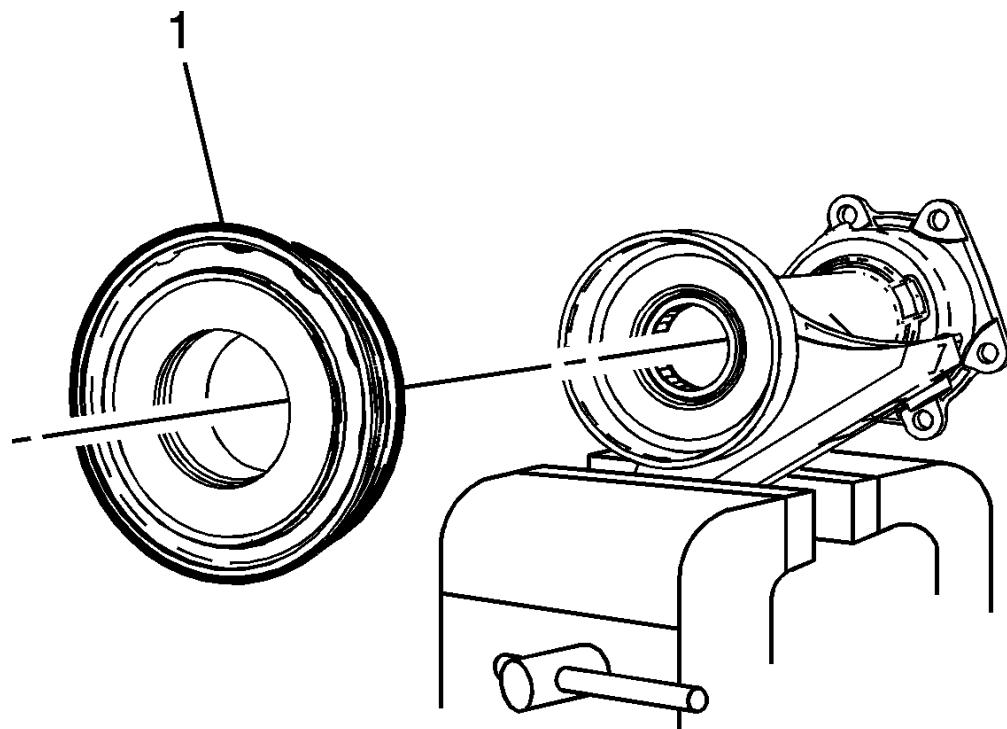


Fig. 59: Front Drive Axle Inner Shaft Seal

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

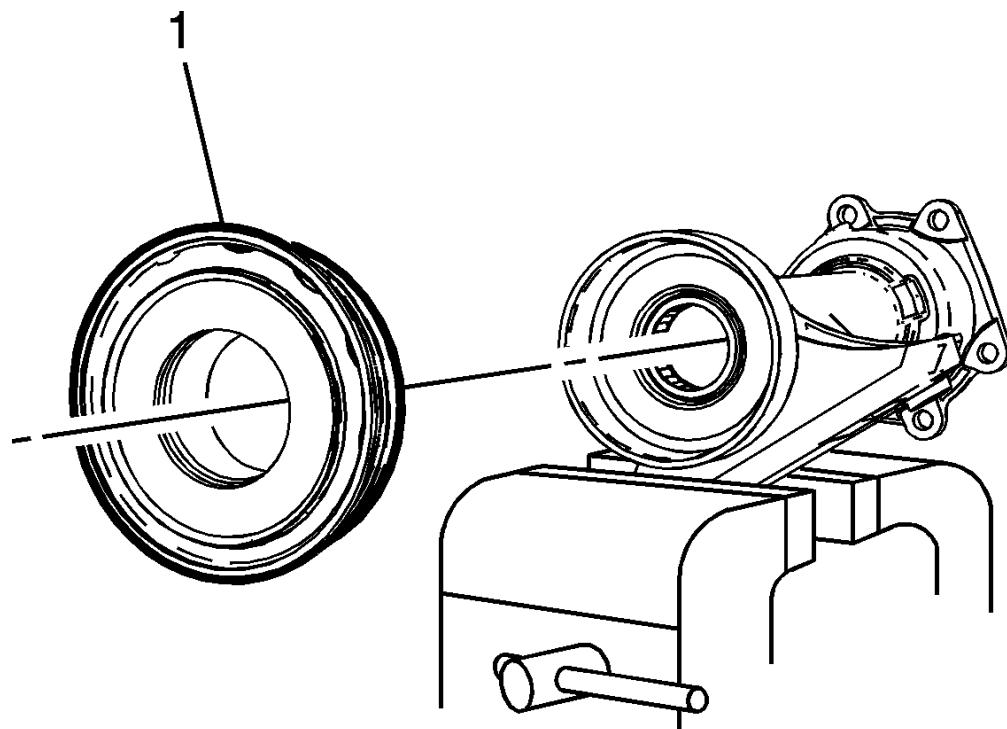


Fig. 60: Front Drive Axle Inner Shaft Seal

Courtesy of GENERAL MOTORS COMPANY

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

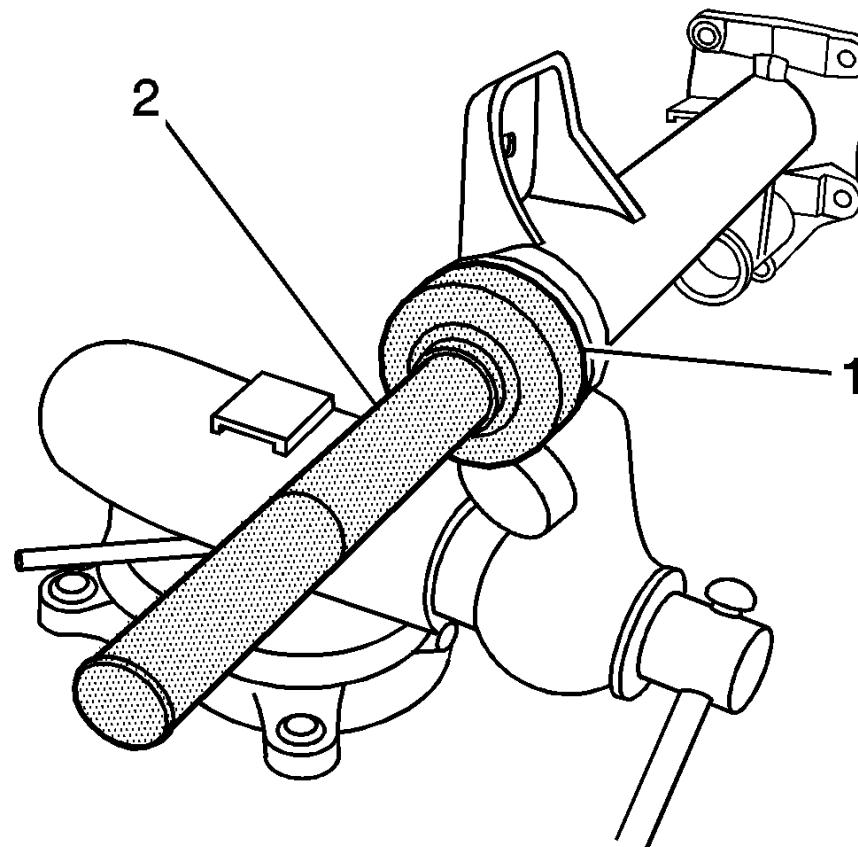


Fig. 61: New Axle Shaft Seal - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

2. Using the **J 44215** installer and the **J 8092** universal driver handle, install the front drive axle inner seal.
3. Install the front drive axle inner shaft in the inner shaft housing. Refer to [**Front Drive Axle Inner Shaft Replacement \(Left Side\)**](#)
[**Front Drive Axle Inner Shaft Replacement \(Right Side\)**](#).
4. Remove the support and lower the vehicle.

FRONT DRIVE AXLE INNER SHAFT SEAL REPLACEMENT - LEFT SIDE (8.25 INCH LD AXLE)

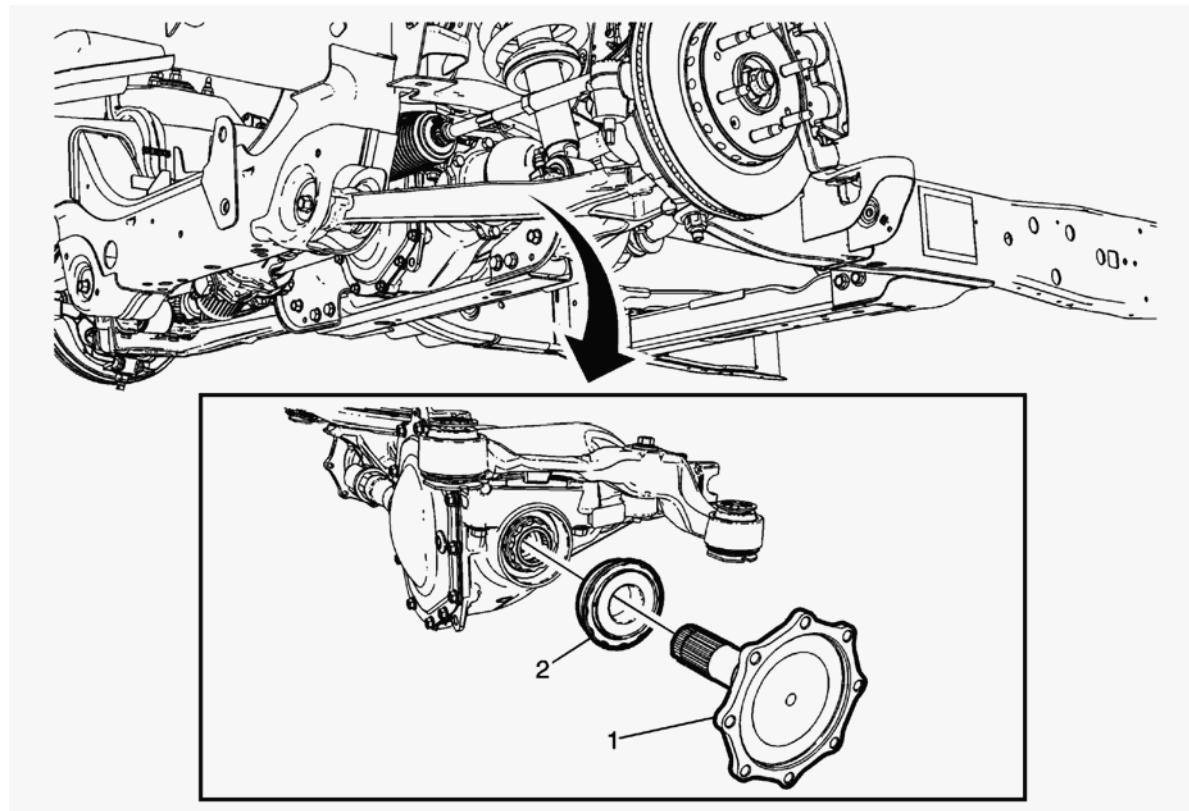


Fig. 62: Identifying Front Drive Axle Inner Shaft And Seal

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures	
	<ol style="list-style-type: none"> 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle . 2. Remove the wheel drive shaft. Refer to Front Wheel Drive Shaft Replacement - Left Side (1500) Front Wheel Drive Shaft Replacement - Left Side (Heavy Duty) .
1	Front Drive Axle Inner Shaft Procedure

Callout	Component Name
	<p>NOTE: It maybe necessary to have the aid of an assistant to hold the steering knuckle assembly to side in order to have enough access to the front drive axle inner shaft.</p> <p>1. Using the J-45859 puller and the J-2619-4 slide hammer, remove the front drive axle inner shaft.</p> <p>NOTE: In some rare cases, it may be difficult to remove the left front axle shaft from the front axle assembly when replacing the axle seal. To ease removal, the</p>

Callout	Component Name
	<p>left front axle shaft C-clip needs to be centered in the retaining groove.</p> <p>2. If the left hand inner axle shaft does not come out using moderate force follow steps below.</p> <ol style="list-style-type: none"> 1. Remove the front axle assembly from the vehicle. 2. Position the front axle assembly straight up and down so the left hand inner axle shaft is facing upward. If required, secure in a large bench vise. 3. Using a ball peen hammer, or preferably a brass hammer, tap the left inner axle shaft flange up and down repeatedly until the stub shaft separates from the axle assembly. This step centers the C-clip in the retaining groove of the stub shaft. Take care not to damage the machined face of the axle shaft. 4. Inspect the C-clip and replace if necessary. <p>Special Tools</p> <ul style="list-style-type: none"> • J-2619-4 Slide Hammer • J-45225 Seal Installer • J-45859 Puller <p>For equivalent regional tools, refer to Special Tools.</p>
2	<p>Front Drive Axle Inner Shaft Seal</p> <p>Procedure</p> <p>Using the J-45225 installer and a soft face mallet, install the front drive axle inner shaft seal.</p> <p>NOTE: An old style seal had a polymer</p>

Callout	Component Name
	<p>coated surface oriented outward to air side. A new seal will have a metal surface oriented outward to air side, and is marked "AIR SIDE" on the seal itself. Be sure to install seal with correct orientation.</p> <p>Special Tools J-45225 Installer For equivalent regional tools, refer to Special Tools.</p>

FRONT DRIVE AXLE INNER SHAFT SEAL REPLACEMENT - LEFT SIDE (9.25 INCH HD AXLE)

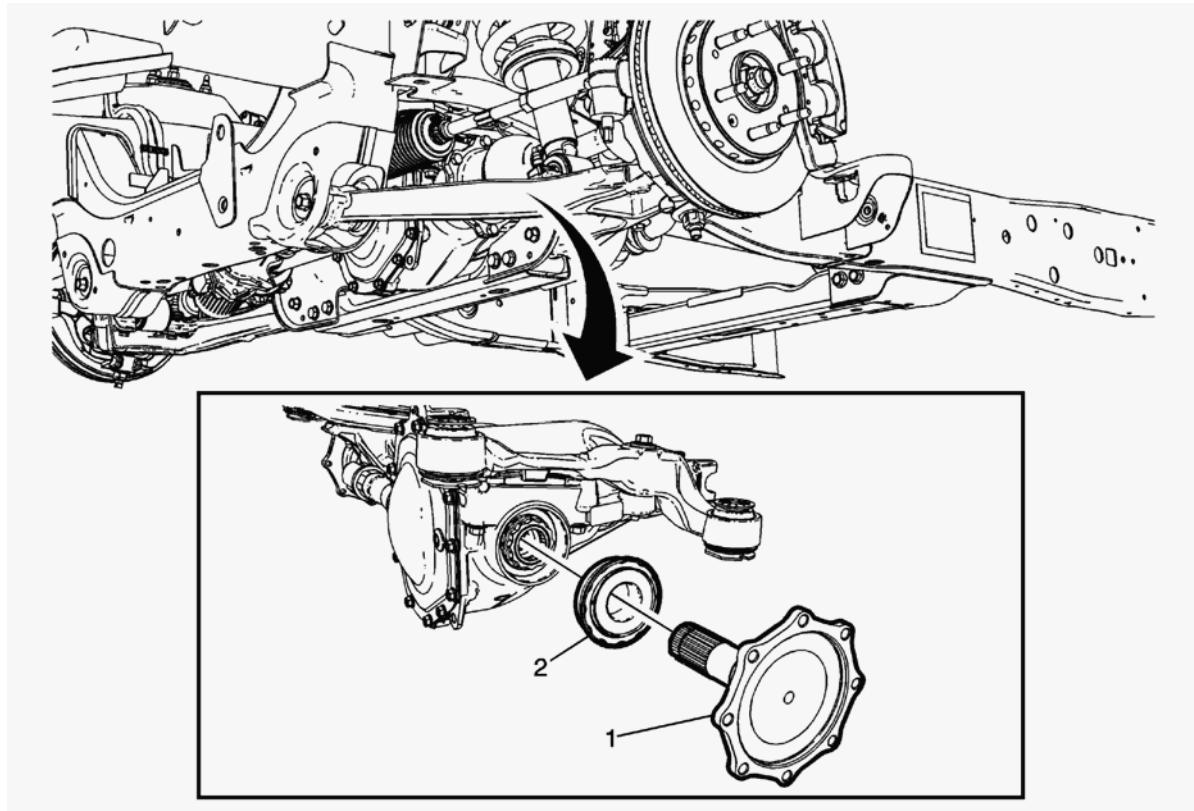


Fig. 63: Identifying Front Drive Axle Inner Shaft And Seal

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures	
<ol style="list-style-type: none"> 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle . 2. Remove the wheel drive shaft. Refer to Front Wheel Drive Shaft Replacement - Left Side (1500) Front Wheel Drive Shaft Replacement - Left Side (Heavy Duty) . 	
1	<p>Front Drive Axle Inner Shaft</p> <p>Procedure</p> <ol style="list-style-type: none"> 1. Using the J 45859 puller and the J 2619-4 slide hammer, remove the front drive axle inner shaft.

Callout	Component Name
	<p>2. If the left hand inner axle shaft does not come out using moderate force follow steps below.</p> <ol style="list-style-type: none"> 1. Remove the front axle assembly from the vehicle. 2. Position the front axle assembly straight up and down so the left hand inner axle shaft is facing upward. If required, secure in a large bench vise. 3. Using a ball peen hammer, or preferably a brass hammer, tap the left inner axle shaft flange up and down repeatedly until the stub shaft separates from the axle assembly. This step centers the C-clip in the retaining groove of the stub shaft. Take care not to damage the machined face of the axle shaft. 4. Inspect the C-clip and replace if necessary. <p>NOTE:</p> <p>It maybe necessary to have the aid of an assistant to hold the steering knuckle assembly to side in order to have enough access to the front drive axle inner shaft.</p> <p>NOTE:</p> <p>In some rare cases, it may be difficult to remove the left front</p>

Callout	Component Name
	<p>axle shaft from the front axle assembly when replacing the axle seal. To ease removal, the left front axle shaft C-clip needs to be centered in the retaining grove.</p> <p>Special Tools</p> <ul style="list-style-type: none"> • J 2619-4 Slide Hammer • J 44215 Rear Seal Installer <p>For equivalent regional tools, refer to Special Tools .</p>
2	<p>Front Drive Axle Inner Shaft Seal</p> <p>Procedure</p> <p>Using the J 44215 installer, and a soft face mallet, install the front drive axle inner shaft seal.</p> <p>Special Tools</p> <p>J 45859 Puller</p>

FRONT DRIVE AXLE INNER SHAFT BEARING REPLACEMENT (8.25 INCH LD AXLE - LEFT SIDE)

Special Tools

- **GE-8092** Universal Driver Handle

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

For equivalent regional tools, refer to [**Special Tools**](#).

Removal Procedure

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

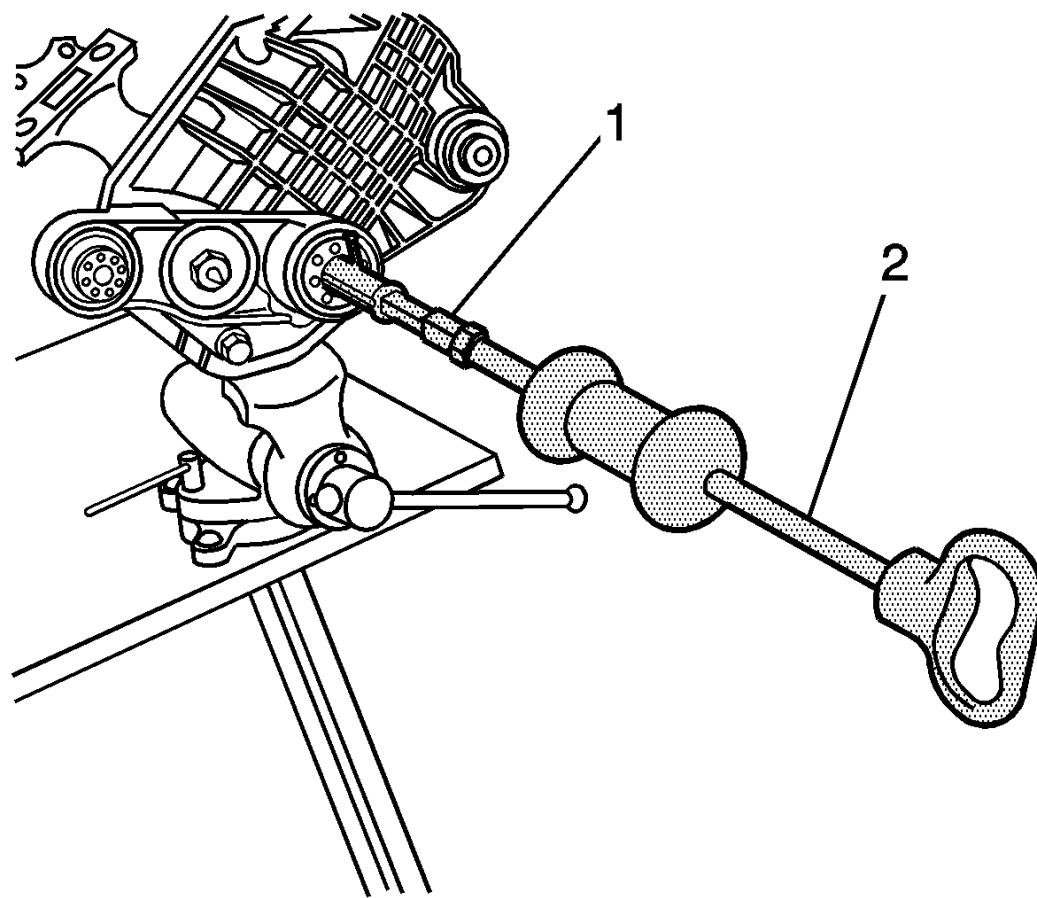


Fig. 64: Inner Axle Shaft/Seal/Bearing - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

3. Remove the Front Axle Assembly. Refer to [Front Axle Replacement \(8.25 Inch LD Axle\)](#).

1. Place the differential carrier assembly into a vise.

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

2. Remove the inner axle shaft using a hammer and a brass drift.
3. Remove the inner axle shaft seal. Refer to [**Front Drive Axle Inner Shaft Seal Replacement - Left Side \(8.25 Inch LD Axle\)**](#).
4. Install the **J-29369-1** bushing and bearing remover behind the inner axle shaft bearing as necessary.
5. Install the **J-2619-01** slide hammer (2) to the **J-29369-1** bushing and bearing remover (1).
6. Remove the inner axle shaft bearing using the **J-2619-01** slide hammer (2).

Installation Procedure

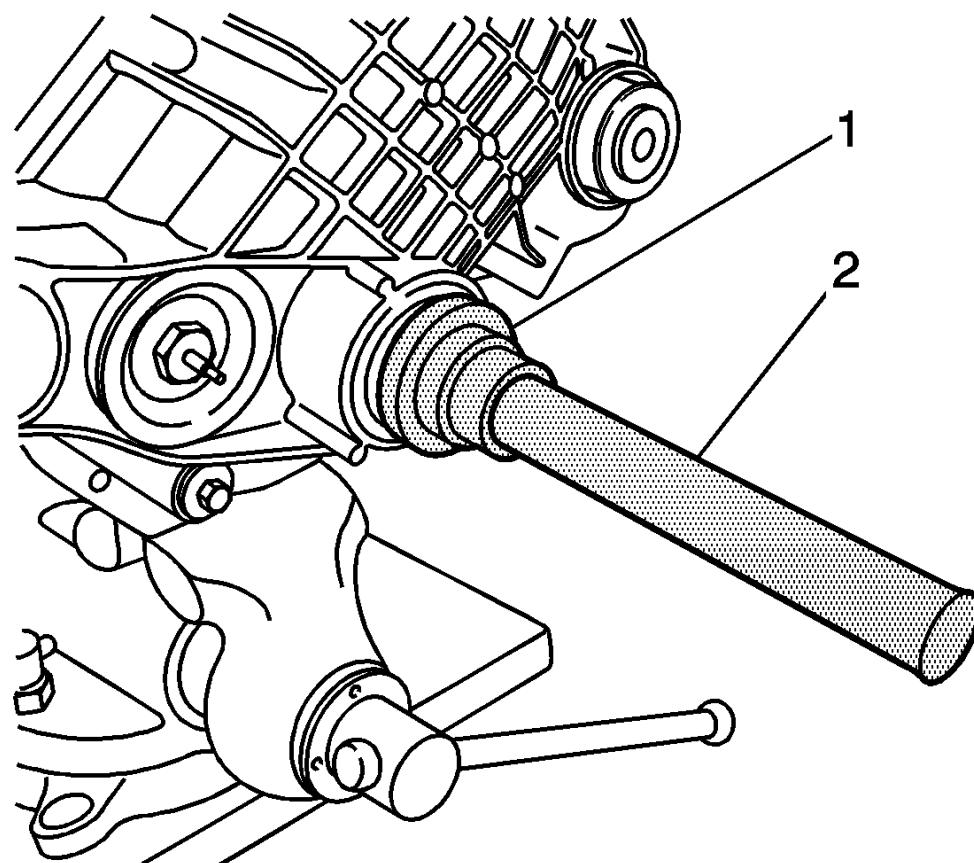


Fig. 65: Left Front Drive Axle Bearing And Special Tools

Courtesy of GENERAL MOTORS COMPANY

1. Install the left side bearing with the square shoulder in using the **J-36609** axle tube bearing installer (1) and the **GE-8092** universal driver handle (2).
2. Install the inner axle shaft seal. Refer to [**Front Drive Axle Inner Shaft Seal Replacement - Left Side \(8.25 Inch LD Axle\)**](#).

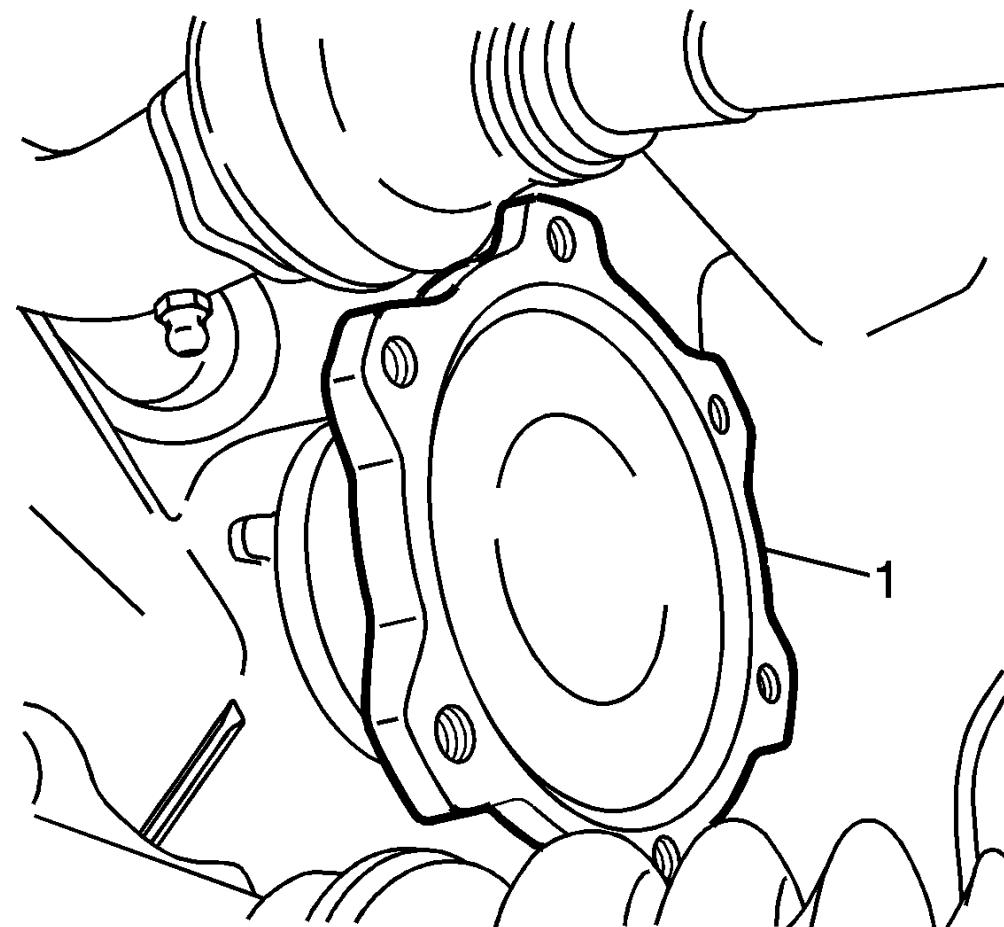


Fig. 66: Axle Shaft Inner Flange - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

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

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

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

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

Special Tools

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

For equivalent or regional tools, refer to [**Special Tools**](#).

Removal Procedure

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

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

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

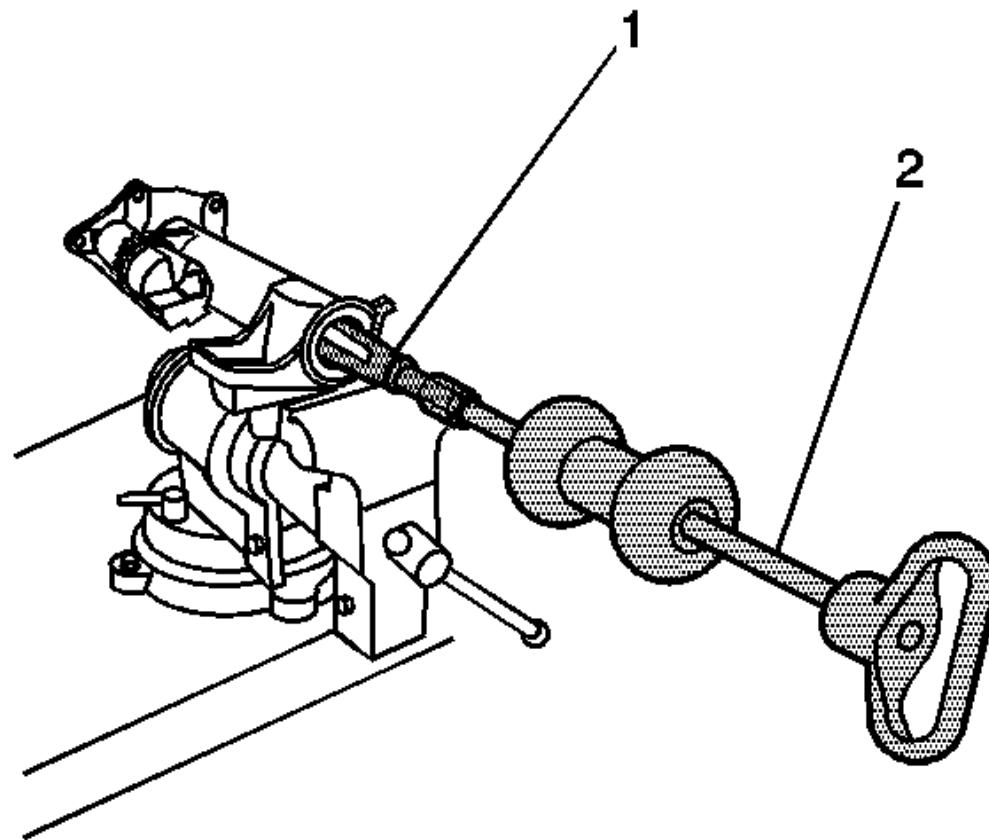


Fig. 67: Inner Axle Shaft Bearing And Special Tools

Courtesy of GENERAL MOTORS COMPANY

5. Install the **J-2619-01** slide hammer (2) to the **J-29369-1** bushing and bearing remover (1).

6. Remove the inner axle shaft bearing using the **J-2619-01** slide hammer.

Installation Procedure

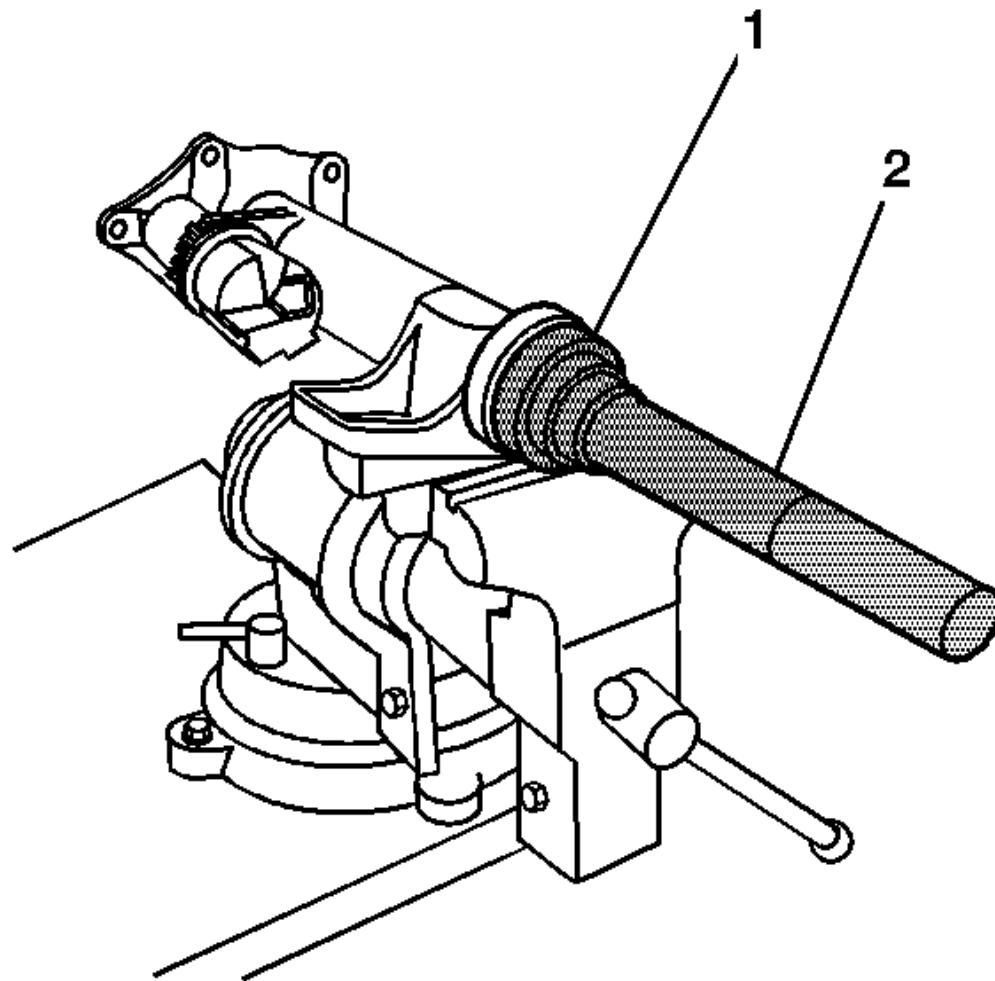


Fig. 68: Side Bearing - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

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

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

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

3. Install the inner axle shaft and clutch fork assembly components into the inner shaft housing. Refer to [**Front Drive Axle Inner Shaft Housing Replacement \(8.25 Inch LD Axle\)**](#).

4. Install the inner axle shaft and housing assembly to the differential carrier case assembly. Refer to [**Front Drive Axle Inner Shaft Housing Replacement \(8.25 Inch LD Axle\)**](#).

5. Install the shock module. Refer to [**Shock Absorber and Spring Removal and Installation \(Light Duty, With Z85/Z95\) Shock Absorber and Spring Removal and Installation \(Light Duty, Without Z85/Z95\)**](#).

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

7. Fill the differential carrier assembly. Use the correct fluid. Refer to [**Front Axle Lubricant Replacement \(8.25 Inch LD Axle\)**](#).

8. Lower the vehicle.

FRONT DRIVE AXLE INNER SHAFT BEARING REPLACEMENT (9.25 INCH HD AXLE - LEFT SIDE)

Special Tools

- **GE-8092** Universal Driver Handle - 3/4 in - 10
- **J-2619-01** Slide Hammer
- **J-29369-2** Bushing and Bearing Remover (2-3 inch)
- **J-36609** Axle Tube Bearing Installer
- **J-44215** Rear Seal Installer
- **J-45225** Axle Seal Installer

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 \(9.25 Inch HD Axle\)**](#).

3. Remove the left side front wheel drive shaft. Refer to [**Front Wheel Drive Shaft Replacement - Left Side \(1500\) Front Wheel Drive Shaft Replacement - Left Side \(Heavy Duty\)**](#).

4. Remove the left side front drive axle inner shaft seal. Refer to [**Front Drive Axle Inner Shaft Seal Replacement - Left Side \(9.25 Inch HD Axle\)**](#).

5. Remove the differential carrier assembly. Refer to [**Front Axle Replacement \(9.25 Inch HD Axle\)**](#).

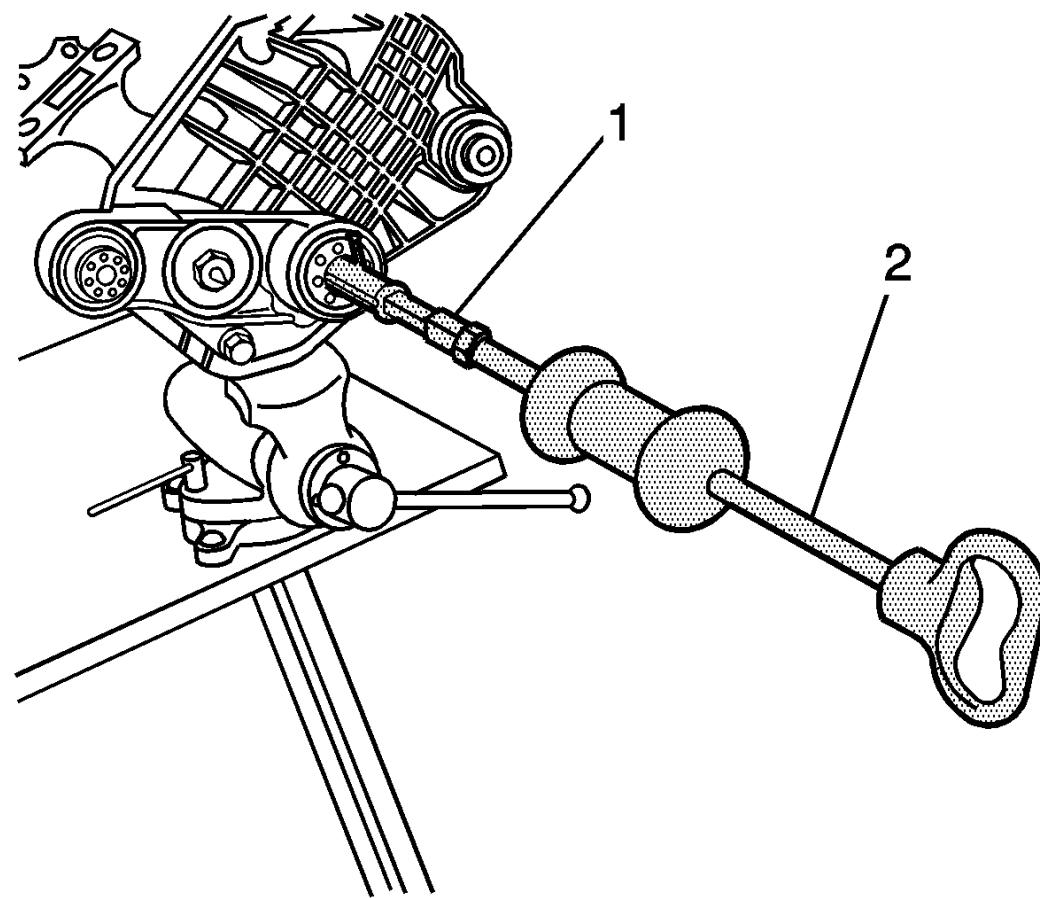


Fig. 69: Inner Axle Shaft/Seal - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

6. Place the differential carrier assembly into a vise.
7. Clamp only on the mounting flange of the differential carrier assembly case.
8. Remove the inner axle shaft using a hammer and a brass drift.
9. Install the **J-29369-2** bushing and bearing remover (1), behind the inner axle shaft bearing.

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

Installation Procedure

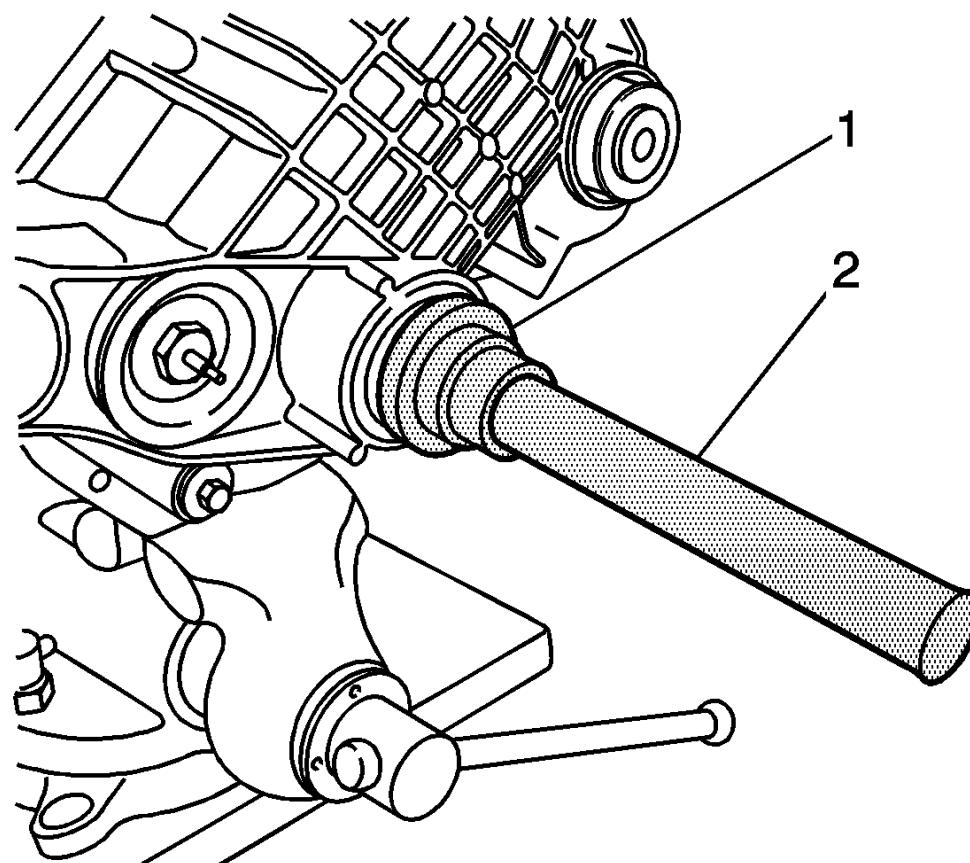


Fig. 70: Left Front Drive Axle Bearing And Special Tools

Courtesy of GENERAL MOTORS COMPANY

1. Install the left side bearing with the square shoulder in using the **J-36609** axle tube bearing installer (1) and the **GE-8092** universal driver handle (2).

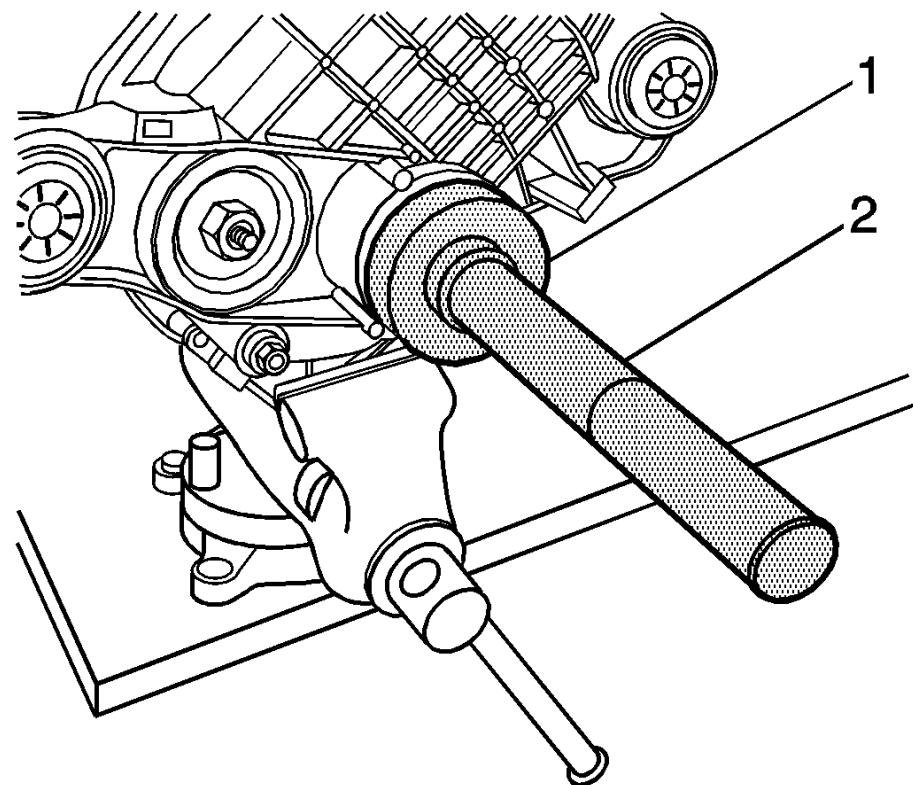


Fig. 71: Installing Axle Shaft Seal

Courtesy of GENERAL MOTORS COMPANY

2. Install the new axle shaft seal using the **J-44215** rear seal installer (1) and the **GE-8092** universal driver handle (2).
3. Install the front differential carrier assembly. Refer to [**Front Axle Replacement \(9.25 Inch HD Axle\)**](#).

4. Install the left side front drive axle inner shaft seal. Refer to [Front Drive Axle Inner Shaft Seal Replacement - Left Side \(9.25 Inch HD Axle\)](#).
5. Install the left side front wheel drive shaft. Refer to [Front Wheel Drive Shaft Replacement - Left Side \(1500\) Front Wheel Drive Shaft Replacement - Left Side \(Heavy Duty\)](#).

CAUTION: Refer to Fastener Caution .

6. If only the left side seal was removed, perform the following step. Install the wheel drive shaft to the inner axle shaft bolts and tighten to 79 N.m (58 lb ft).
7. Fill the differential carrier assembly. Use the correct fluid. Refer to [Front Axle Lubricant Replacement \(9.25 Inch HD Axle\)](#).
8. Lower the vehicle.

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

Special Tools

- **GE-8092** Universal Driver Handle - 3/4 in - 10
- **J-2619-01** Slide Hammer
- **J-29369-2** Bushing and Bearing Remover (2-3 inch)
- **J-36609** Axle Tube Bearing Installer
- **J-44215** Rear Seal Installer

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 \(9.25 Inch HD Axle\)](#).
3. Remove the right side front wheel drive shaft. Refer to [Front Wheel Drive Shaft Replacement - Right Side \(1500\) Front Wheel Drive Shaft Replacement - Right Side \(Heavy Duty\)](#) .
4. Remove the right side front drive axle inner shaft seal. Refer to [Front Drive Axle Inner Shaft Seal Replacement - Right Side \(9.25 Inch HD Axle\)](#).
5. Remove the front drive axle inner shaft housing. Refer to [Front Drive Axle Inner Shaft Housing Replacement \(9.25 Inch HD Axle\)](#).
6. Remove the right side seal and/or bearing by performing the following steps:
7. Remove the clutch fork assembly components and the inner axle shaft from the inner axle shaft housing. Refer to [Front Drive Axle Clutch Fork Replacement](#).

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

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

9. Install the **J-29369-2** bushing and bearing remover behind the inner axle shaft bearing.

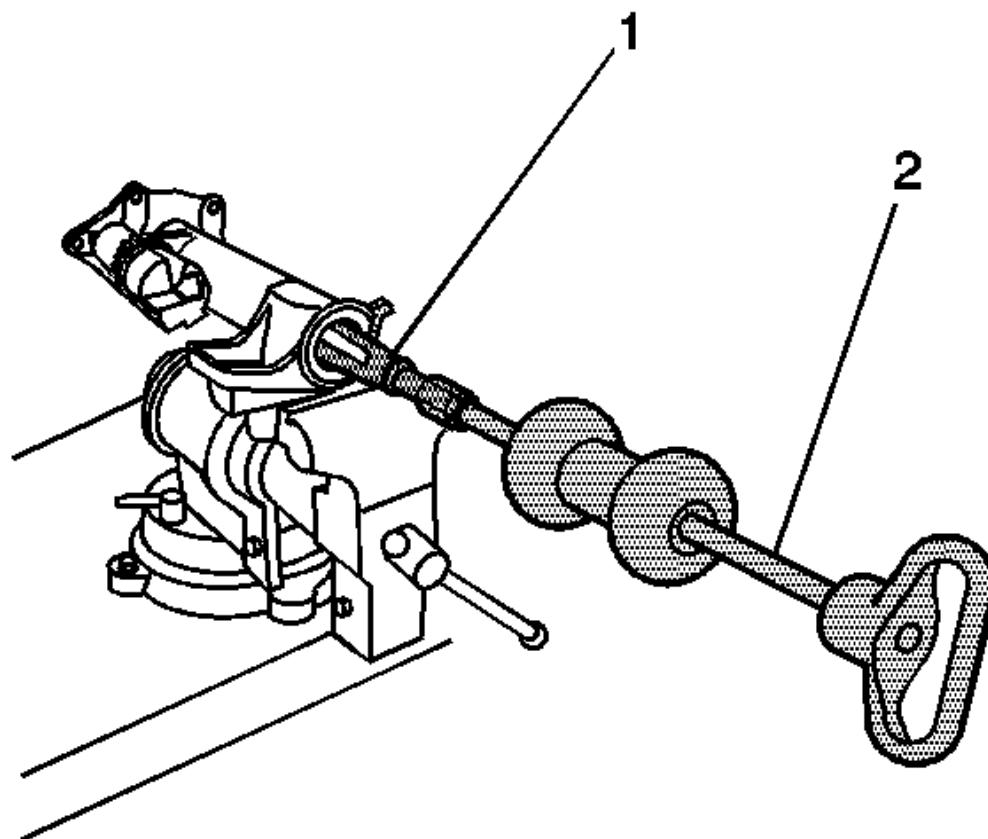


Fig. 72: Inner Axle Shaft Bearing And Special Tools

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

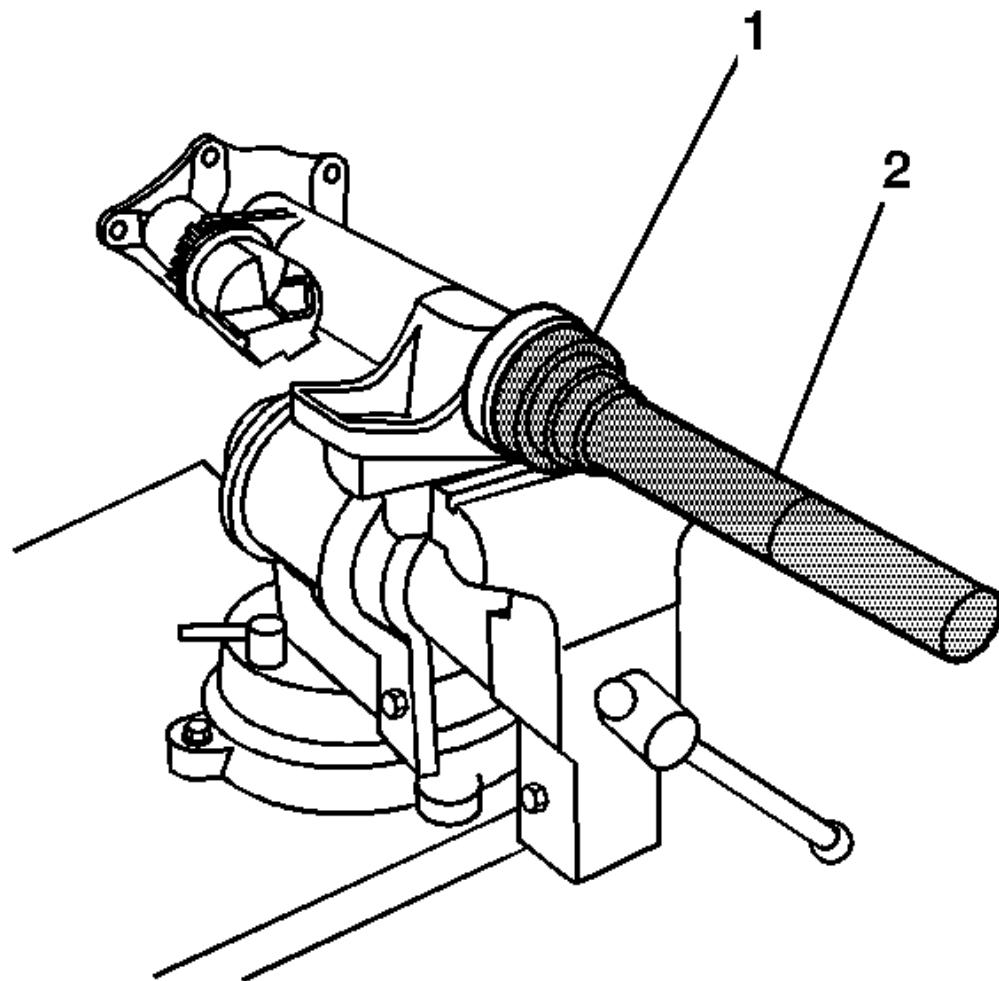


Fig. 73: Side Bearing - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

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

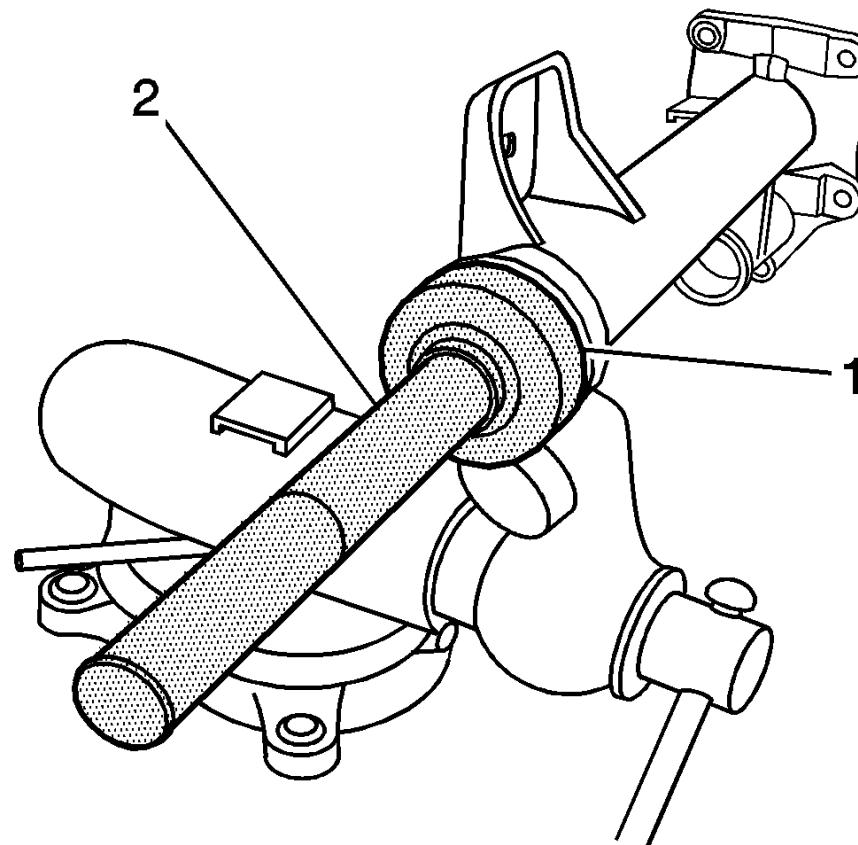


Fig. 74: New Axle Shaft Seal - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

2. Install the new axle shaft seal using the **J-44215** rear seal installer (1) and the **GE-8092** universal driver handle (2).
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 Housing Replacement \(9.25 Inch HD Axle\)**](#).
5. Install the inner axle shaft and housing assembly to the differential carrier case assembly. Refer to [**Front Drive Axle Inner Shaft Housing Replacement \(9.25 Inch HD Axle\)**](#).
6. Install the right side front wheel drive shaft. Refer to [**Front Wheel Drive Shaft Replacement - Right Side \(1500\) Front Wheel Drive Shaft Replacement - Right Side \(Heavy Duty\)**](#).
7. Fill the differential carrier assembly. Use the correct fluid. Refer to [**Front Axle Lubricant Replacement \(9.25 Inch HD Axle\)**](#).
8. Lower the vehicle.

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

Removal Procedure

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

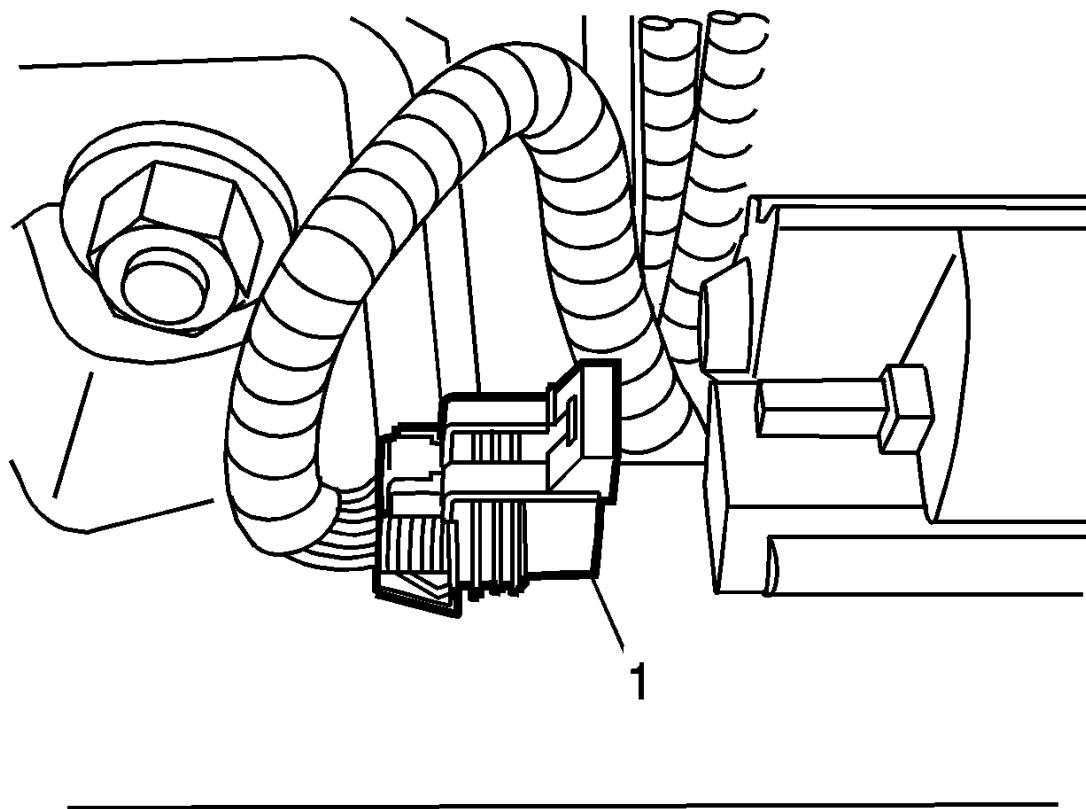


Fig. 75: Axle Actuator Electrical Connector

Courtesy of GENERAL MOTORS COMPANY

4. Disconnect the actuator electrical connector (1).

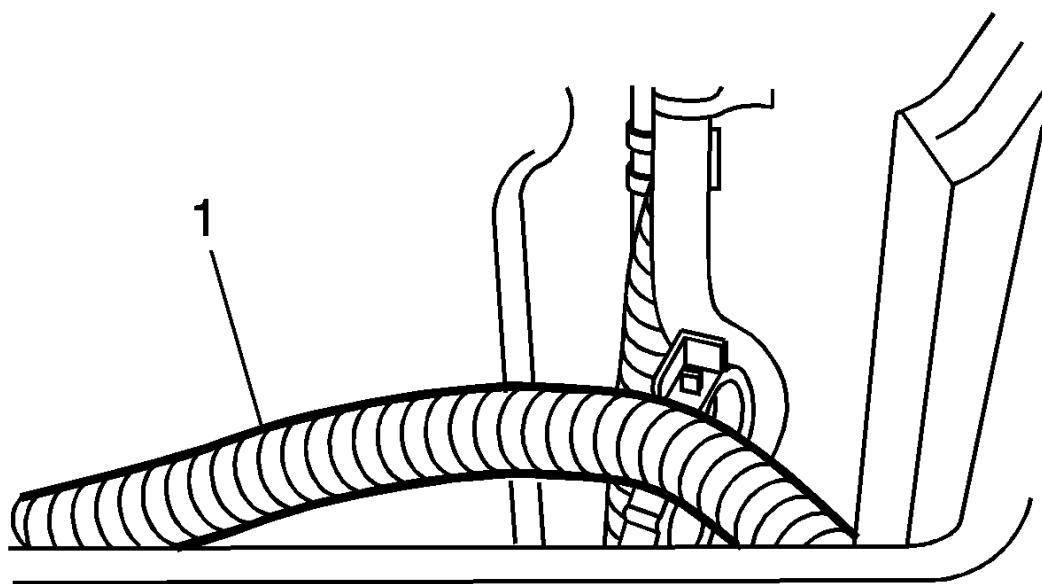


Fig. 76: Inner Axle Shaft Housing Wire Harness

Courtesy of GENERAL MOTORS COMPANY

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

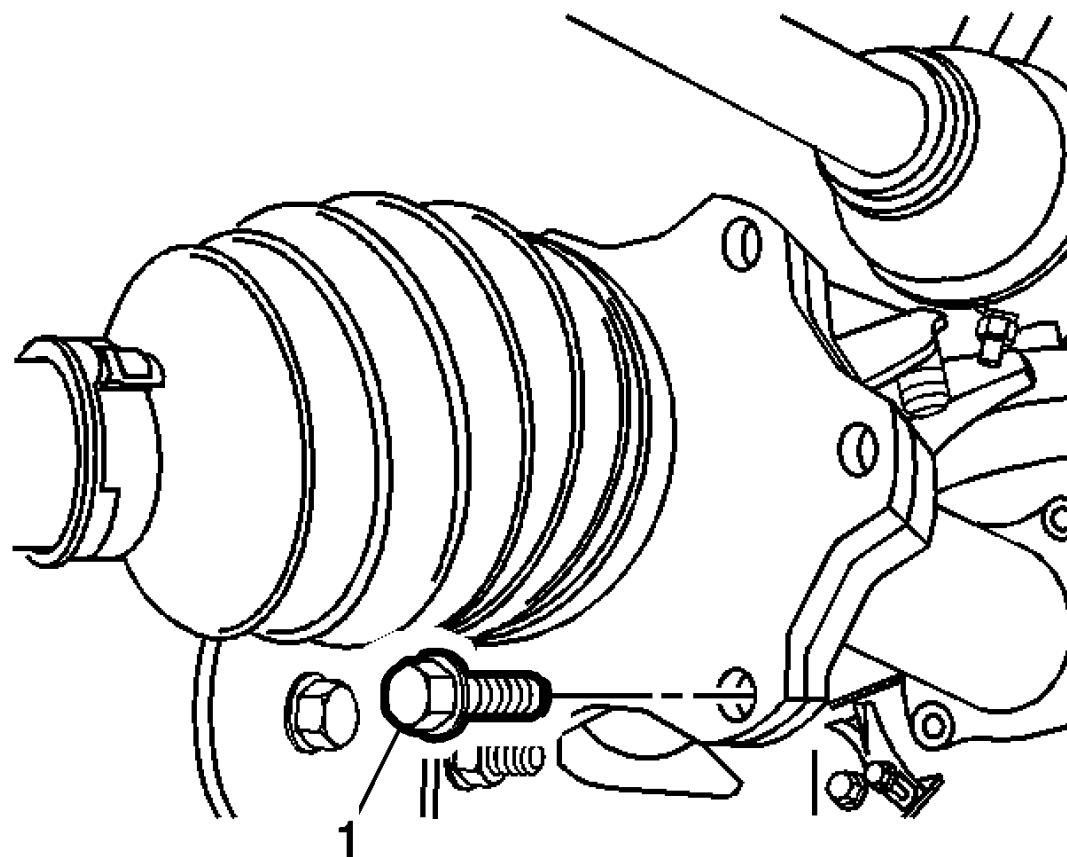


Fig. 77: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

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

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

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

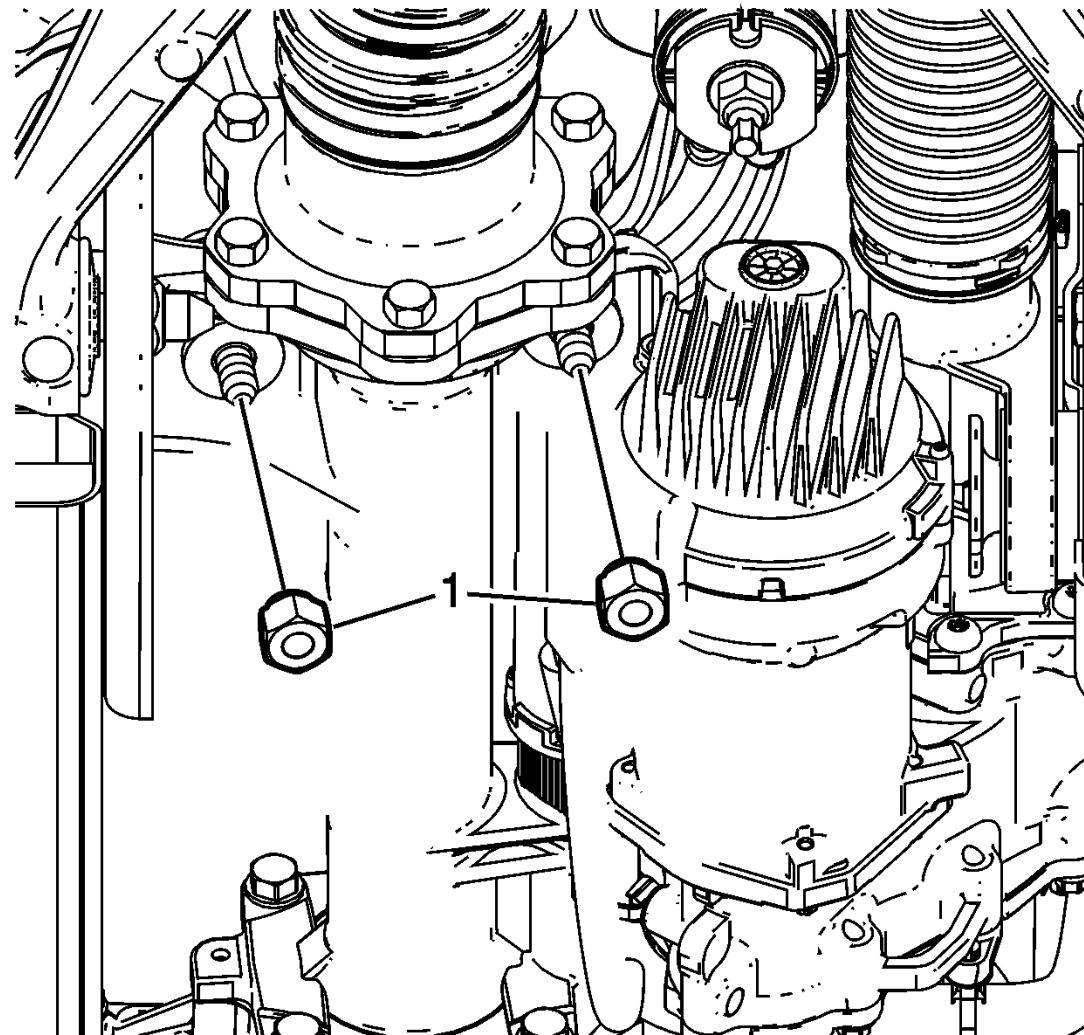


Fig. 78: Inner Axle Shaft Housing Washers And Nuts

Courtesy of GENERAL MOTORS COMPANY

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

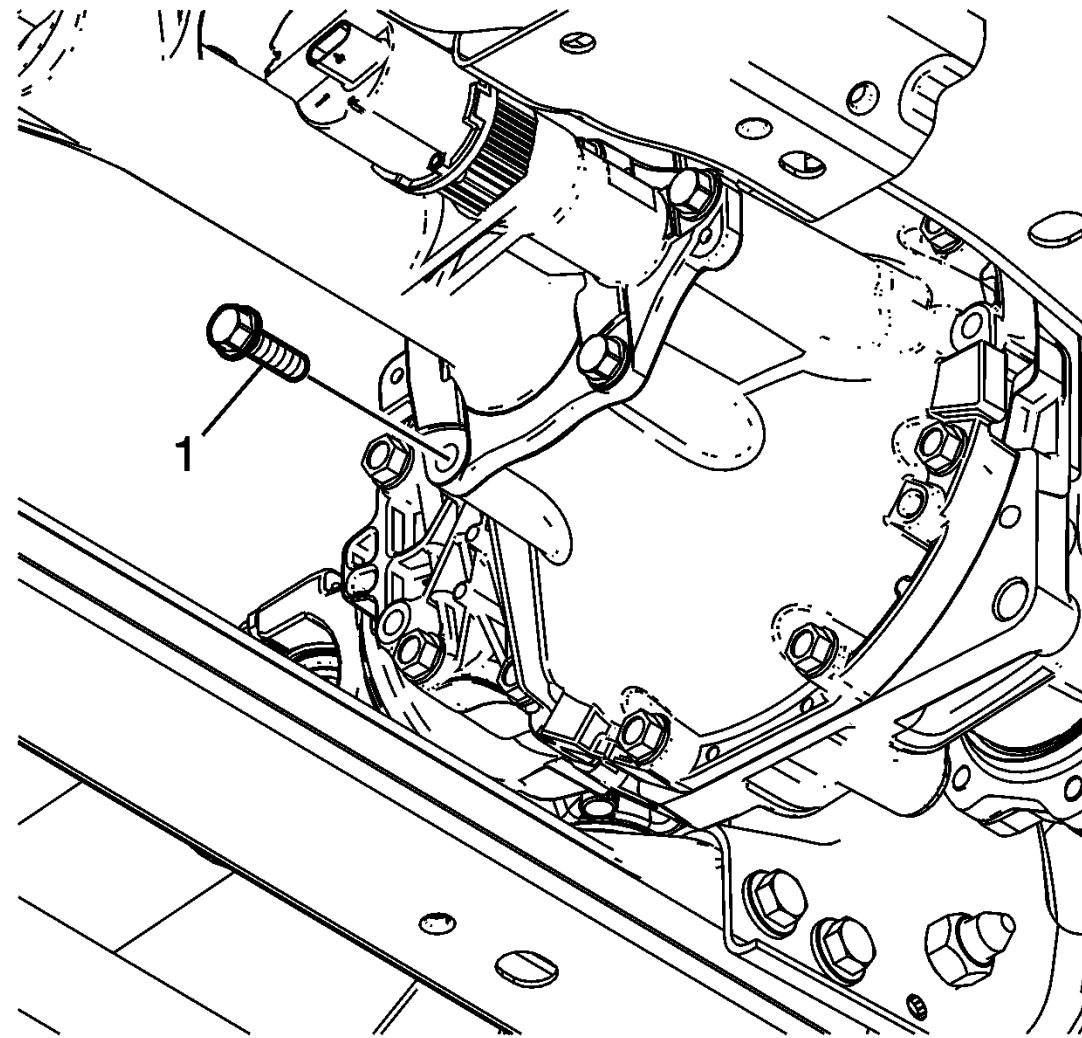


Fig. 79: Inner Axle Shaft Housing Bolts

Courtesy of GENERAL MOTORS COMPANY

10. Remove the inner axle shaft mounting bolts.

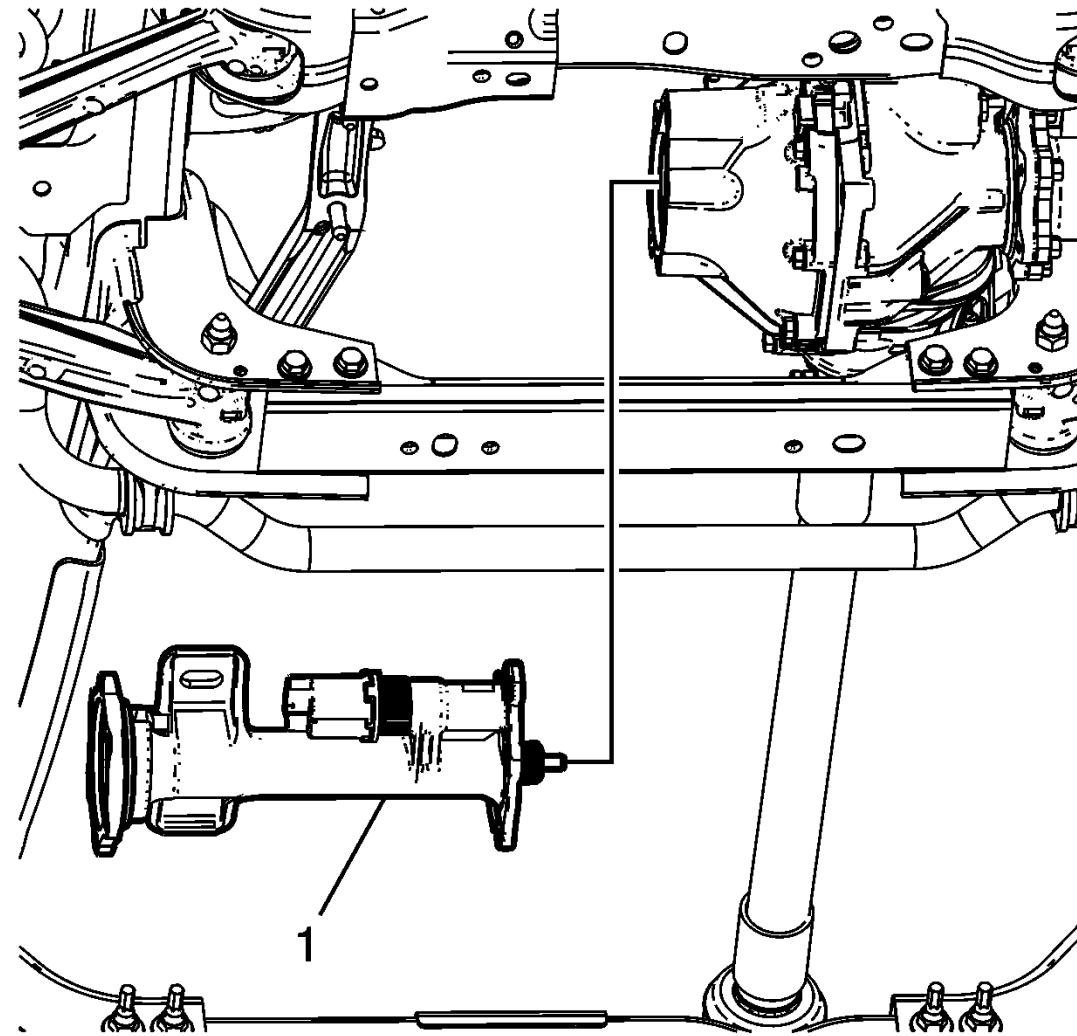


Fig. 80: Inner Axle Shaft Housing Assembly

Courtesy of GENERAL MOTORS COMPANY

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

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

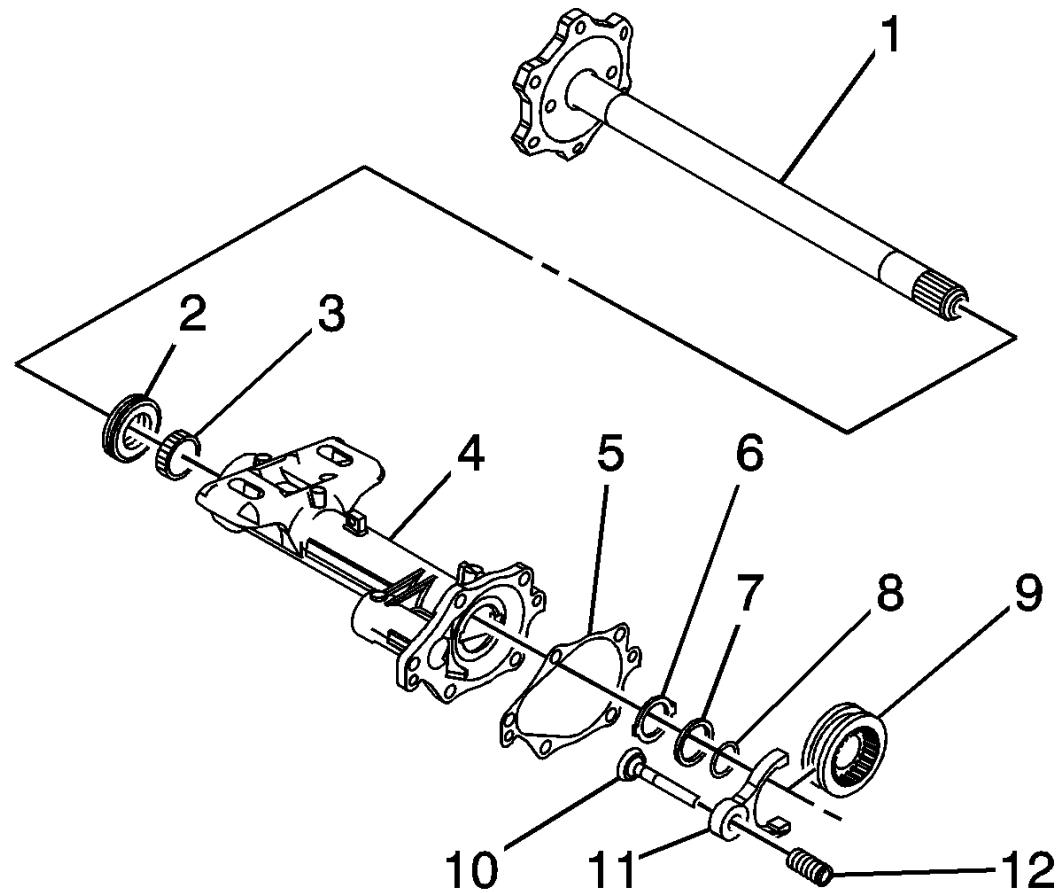


Fig. 81: View Of Inner Axle Shaft & Components

Courtesy of GENERAL MOTORS COMPANY

12. Remove the following components from the inner axle housing:

1. Clamp the inner axle shaft housing (4) in a vise. Clamp only on the mounting flange.
2. Shifter fork spring (12)
3. Shifter fork (11)

4. Shifter fork rod (10)
5. Shifter connector gear (9)
6. Axle shaft snap ring (8)
7. Axle shaft thrust washer (7)
8. Axle shaft tabbed thrust washer (6)
9. Inner axle shaft housing gasket (5)

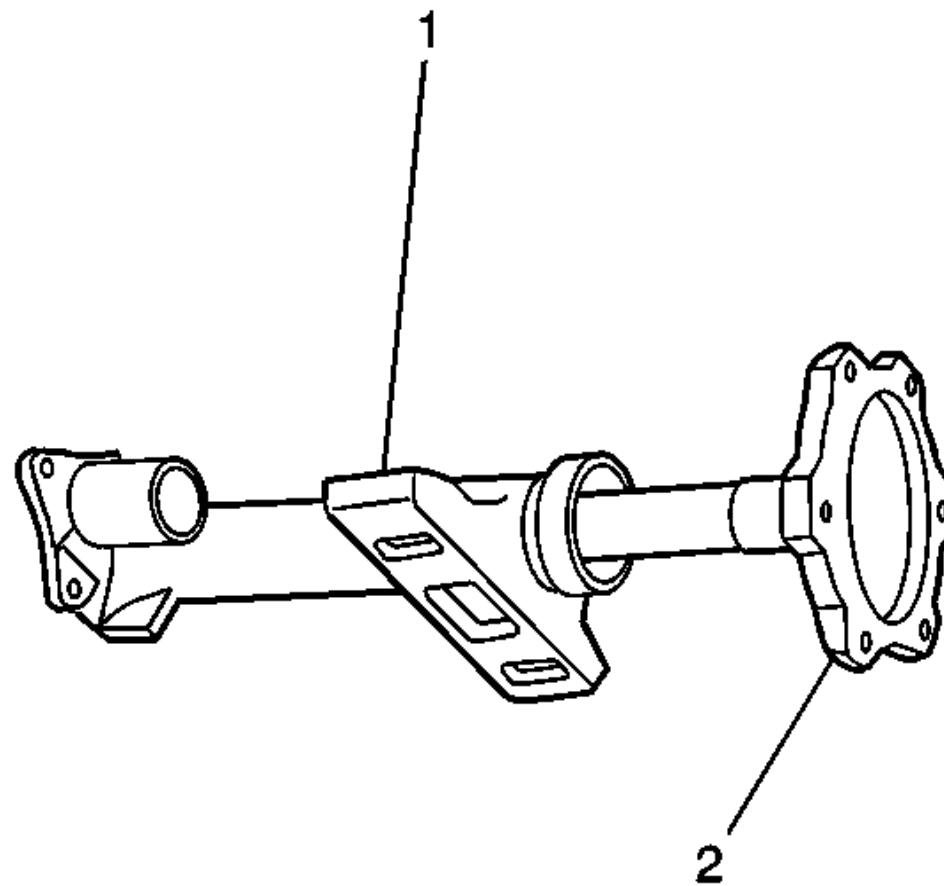


Fig. 82: Inner Axle Shaft And Housing

Courtesy of GENERAL MOTORS COMPANY

13. Using a soft-faced mallet (if necessary), remove the inner axle shaft (2).
14. Remove the inner axle seal and the bearing from the axle housing. [Front Drive Axle Inner Shaft Seal Replacement - Right Side \(8.25 Inch LD Axle\)](#), [Front Drive Axle Inner Shaft Bearing Replacement \(8.25 Inch LD Axle - Left Side\)](#)[Front Drive Axle Inner Shaft Bearing Replacement \(8.25 Inch LD Axle - Right Side\)](#)

Installation Procedure

1. Install the new inner axle shaft bearing and the seal to the axle housing. [Front Drive Axle Inner Shaft Seal Replacement - Right Side \(8.25 Inch LD Axle\)](#), [Front Drive Axle Inner Shaft Bearing Replacement \(8.25 Inch LD Axle - Left Side\)](#)[Front Drive Axle Inner Shaft Bearing Replacement \(8.25 Inch LD Axle - Right Side\)](#)

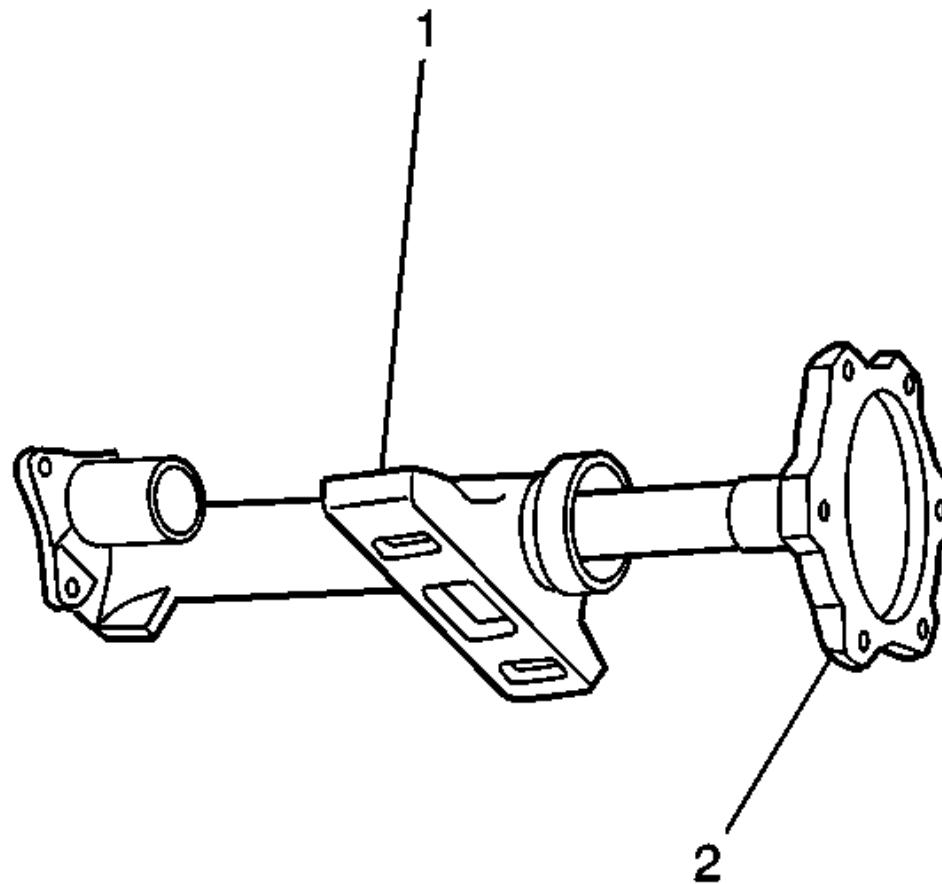


Fig. 83: Inner Axle Shaft And Housing

Courtesy of GENERAL MOTORS COMPANY

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

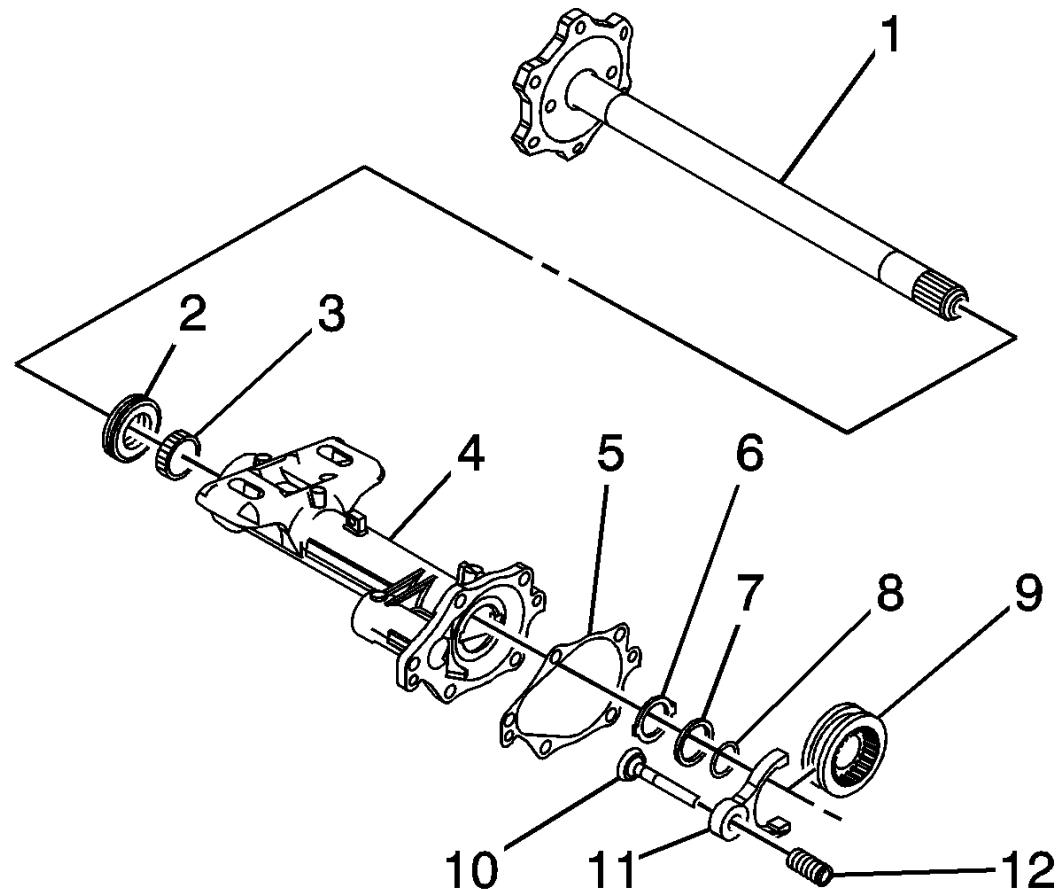


Fig. 84: View Of Inner Axle Shaft & Components

Courtesy of GENERAL MOTORS COMPANY

4. Install the following components into the inner axle housing:

1. Clamp the inner axle shaft housing (4) in a vise. Clamp only on the mounting flange.

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

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

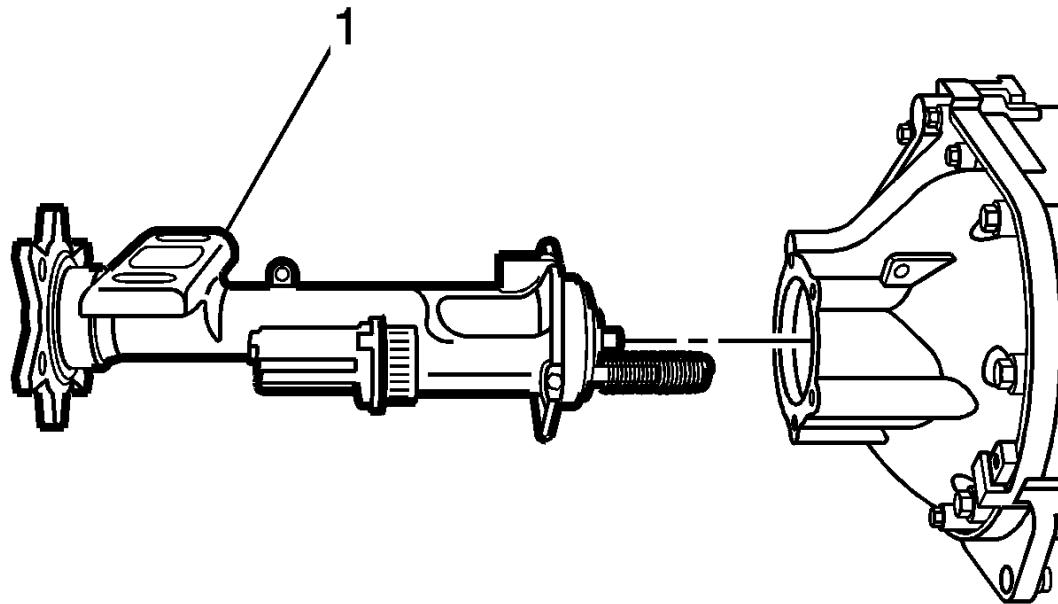


Fig. 85: Inner Axle Shaft Housing Assembly

Courtesy of GENERAL MOTORS COMPANY

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

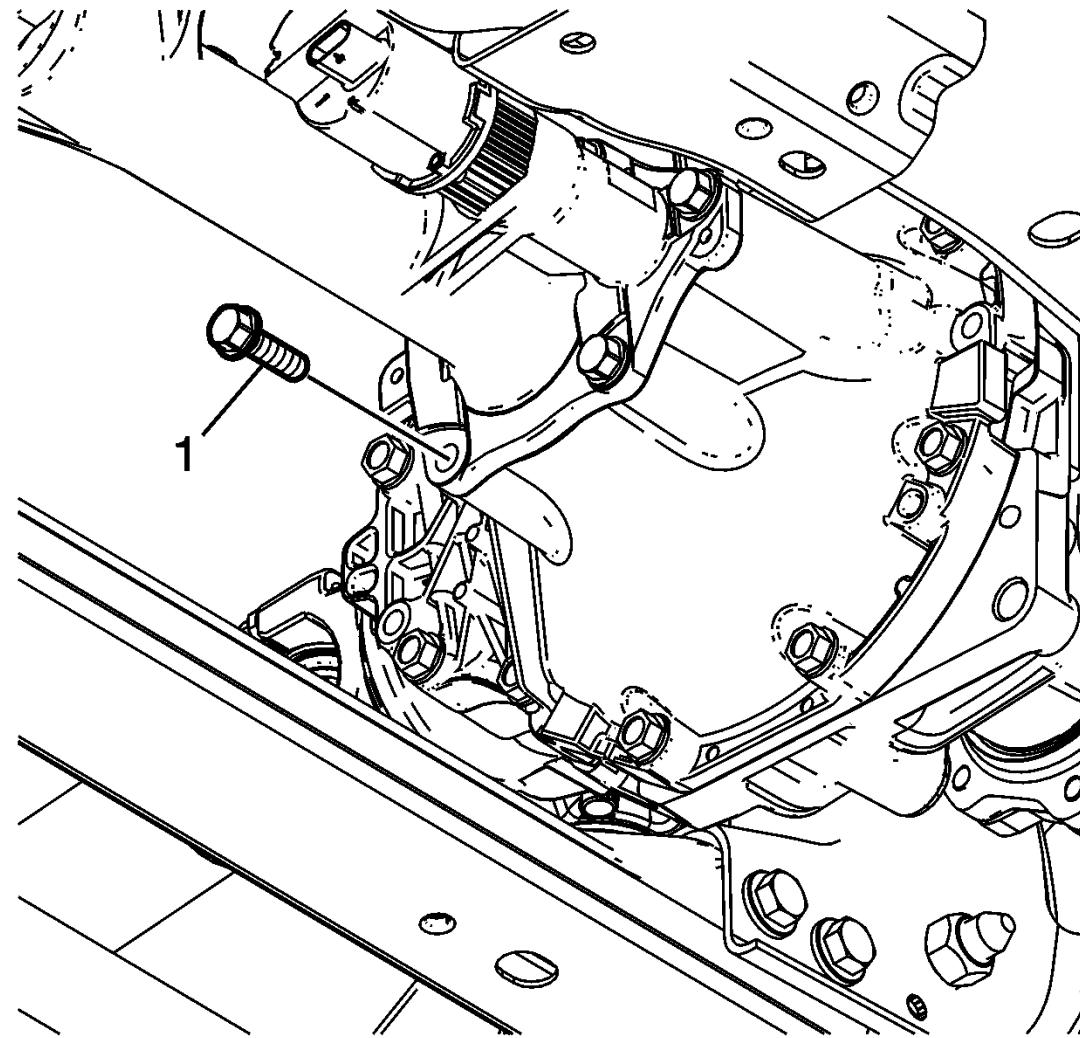


Fig. 86: Inner Axle Shaft Housing Bolts

Courtesy of GENERAL MOTORS COMPANY

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

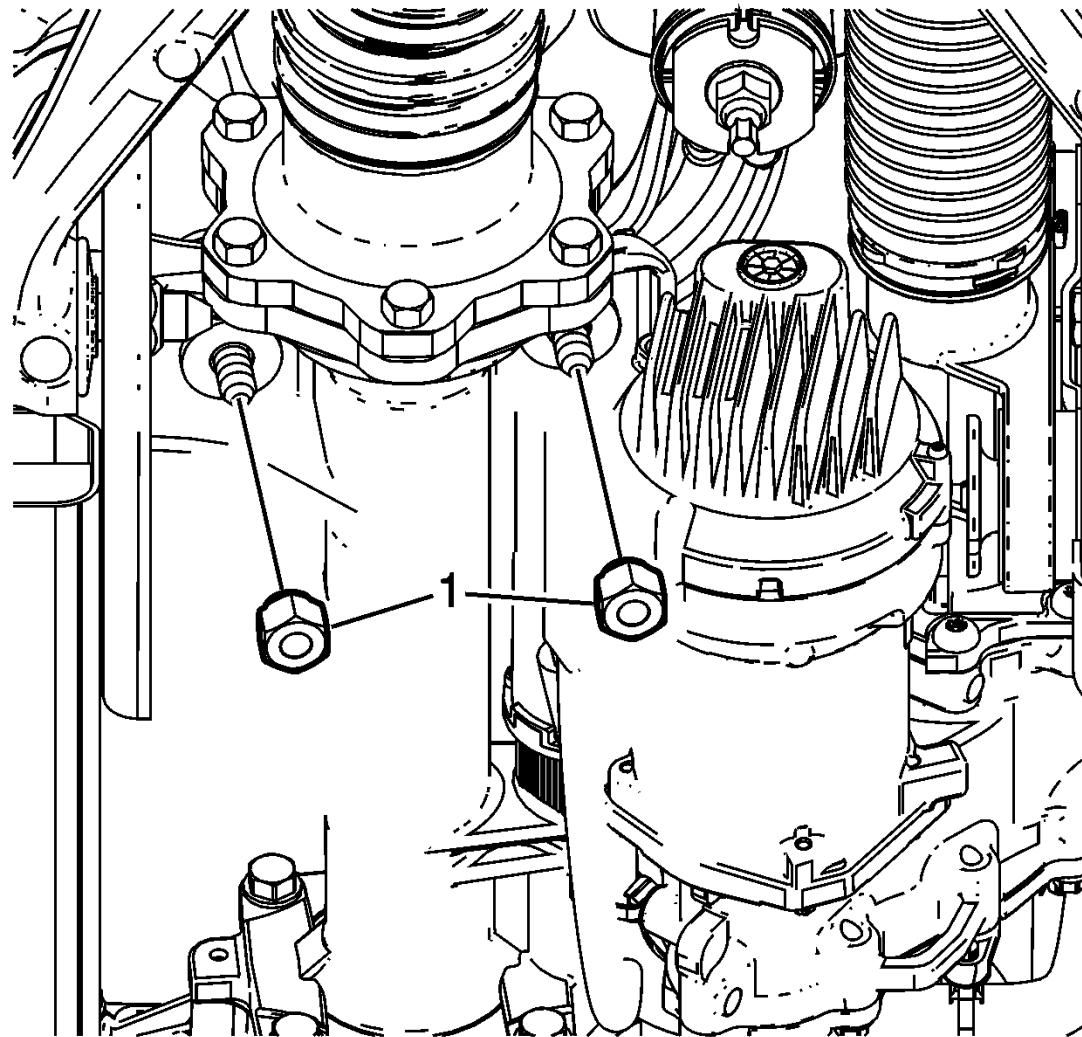


Fig. 87: Inner Axle Shaft Housing Washers And Nuts

Courtesy of GENERAL MOTORS COMPANY

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

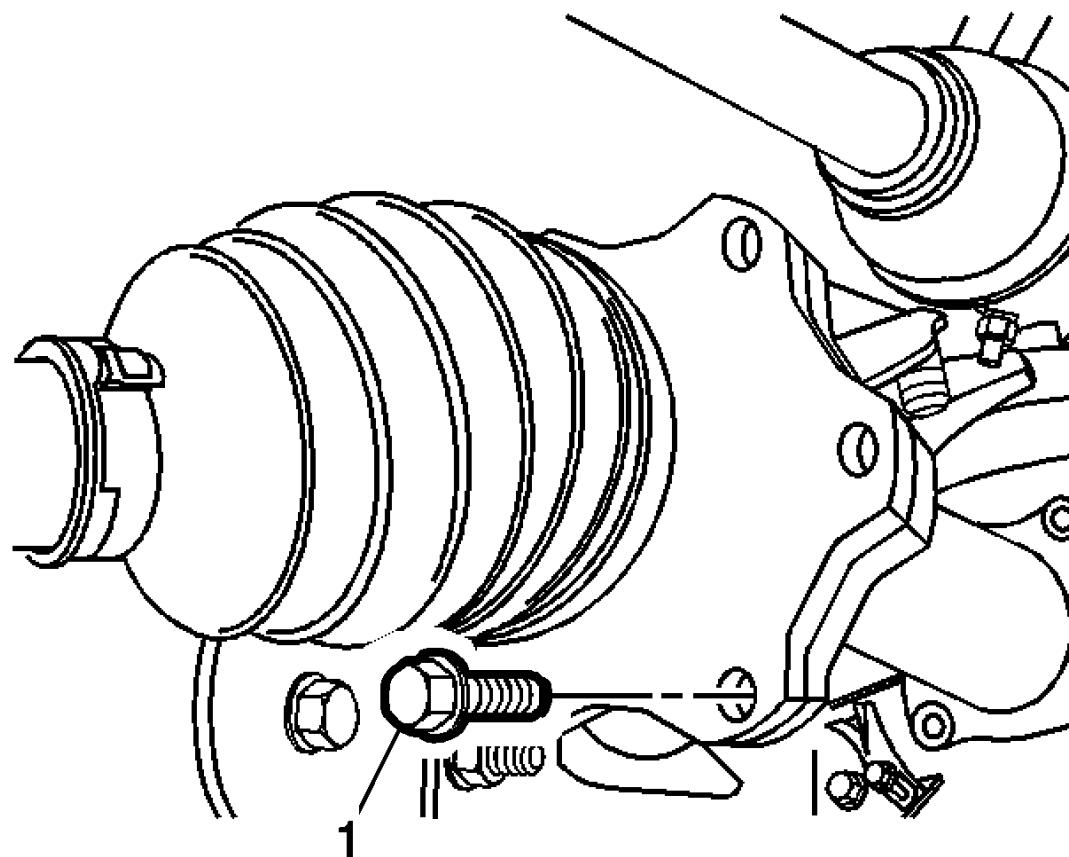


Fig. 88: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

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

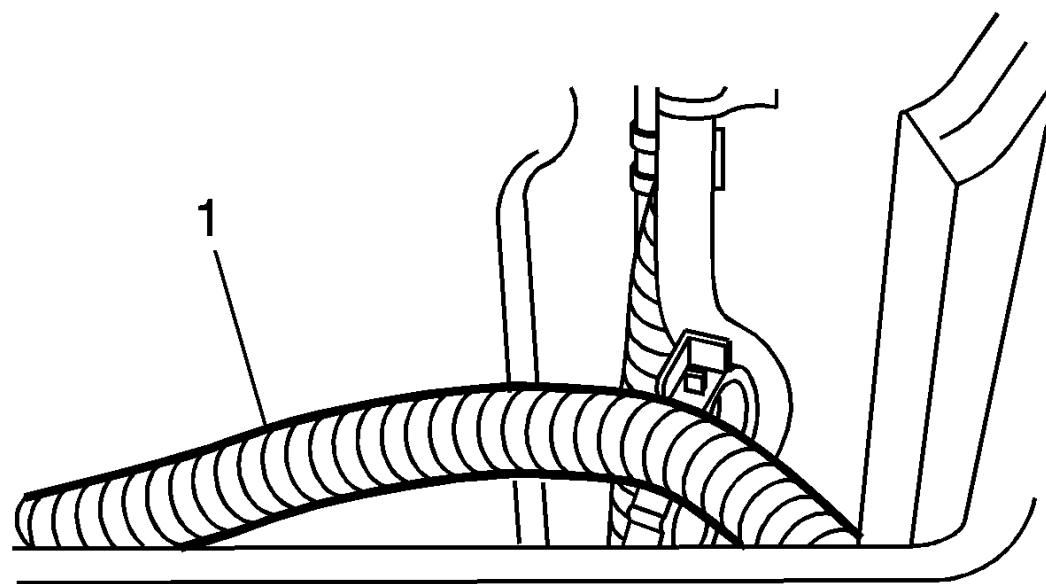


Fig. 89: Inner Axle Shaft Housing Wire Harness

Courtesy of GENERAL MOTORS COMPANY

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

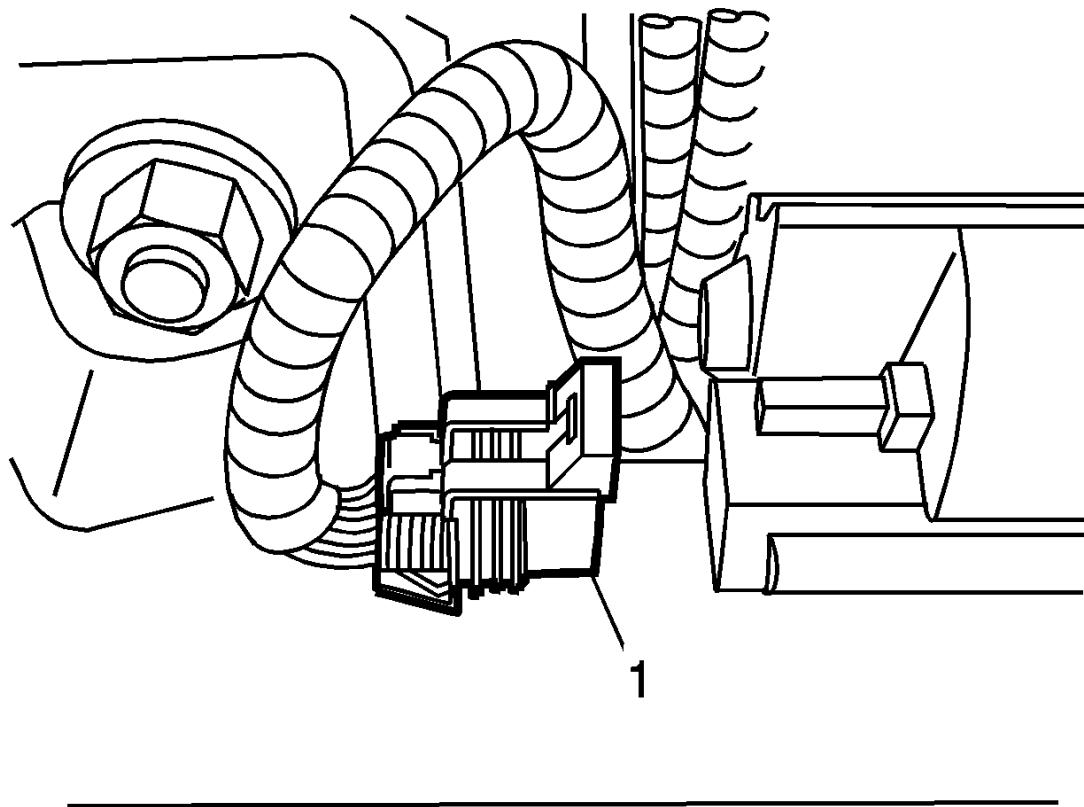


Fig. 90: Axle Actuator Electrical Connector

Courtesy of GENERAL MOTORS COMPANY

12. Connect the electrical connector (1) to actuator.
13. Install the front shock module. [Shock Absorber and Spring Removal and Installation \(Light Duty, With Z85/Z95\)](#) [Shock Absorber and Spring Removal and Installation \(Light Duty, Without Z85/Z95\)](#)
14. Install the power steering assist motor. [Power Steering Assist Motor Replacement \(Light Duty\)](#)

15. With either replacement procedure, fill the differential carrier assembly with axle lubricant. Use the correct fluid. [**Front Axle Lubricant Replacement \(8.25 Inch LD Axle\)**](#)
16. Lower the vehicle.

FRONT DRIVE AXLE INNER SHAFT HOUSING REPLACEMENT (9.25 INCH HD 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 \(9.25 Inch HD Axle\)**](#).
3. Remove the wheel drive shaft. Refer to [**Front Wheel Drive Shaft Replacement - Right Side \(1500\)**](#) [**Front Wheel Drive Shaft Replacement - Right Side \(Heavy Duty\)**](#) .

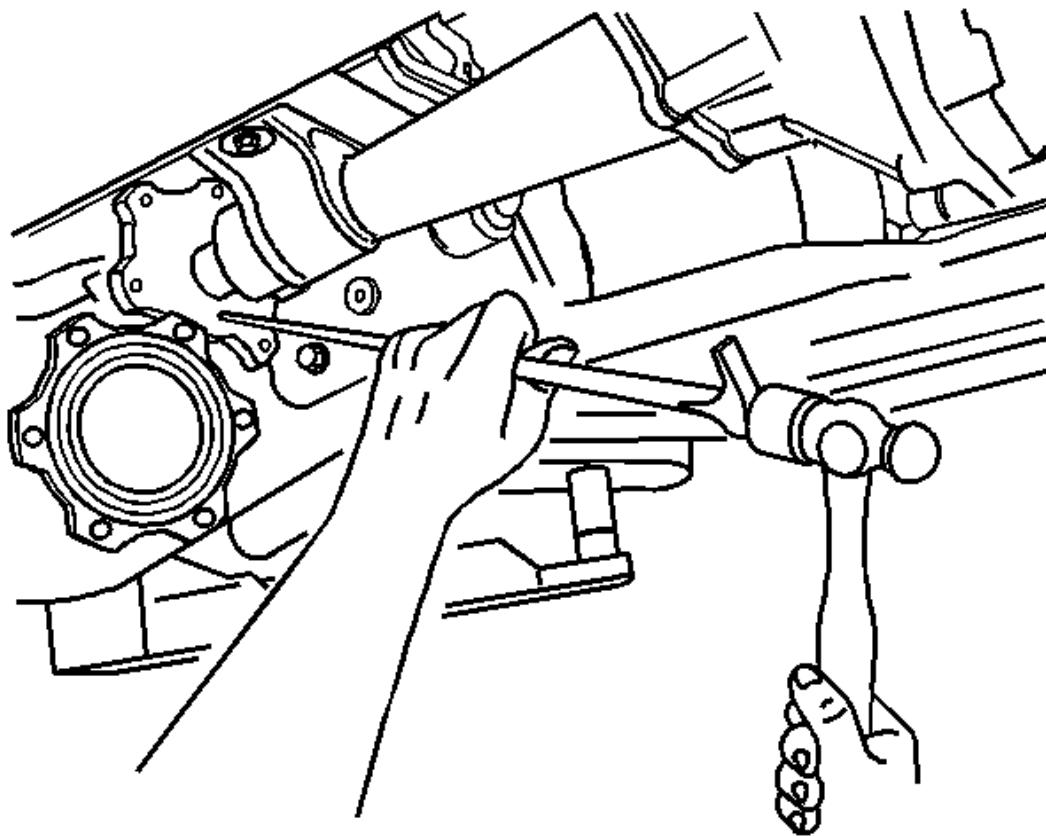


Fig. 91: Disconnecting Inner Axle Shaft

Courtesy of GENERAL MOTORS COMPANY

NOTE: 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 10.

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

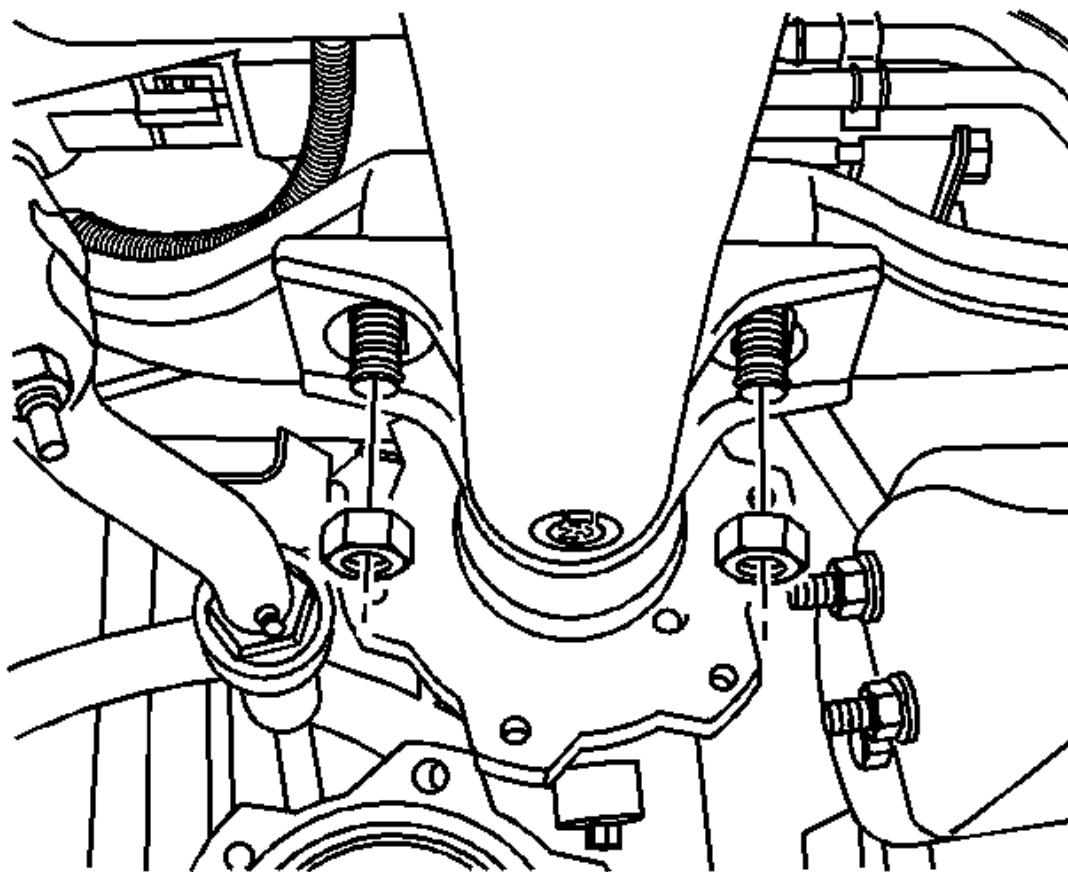


Fig. 92: Front Drive Inner Axle Shaft Housing Nuts

Courtesy of GENERAL MOTORS COMPANY

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

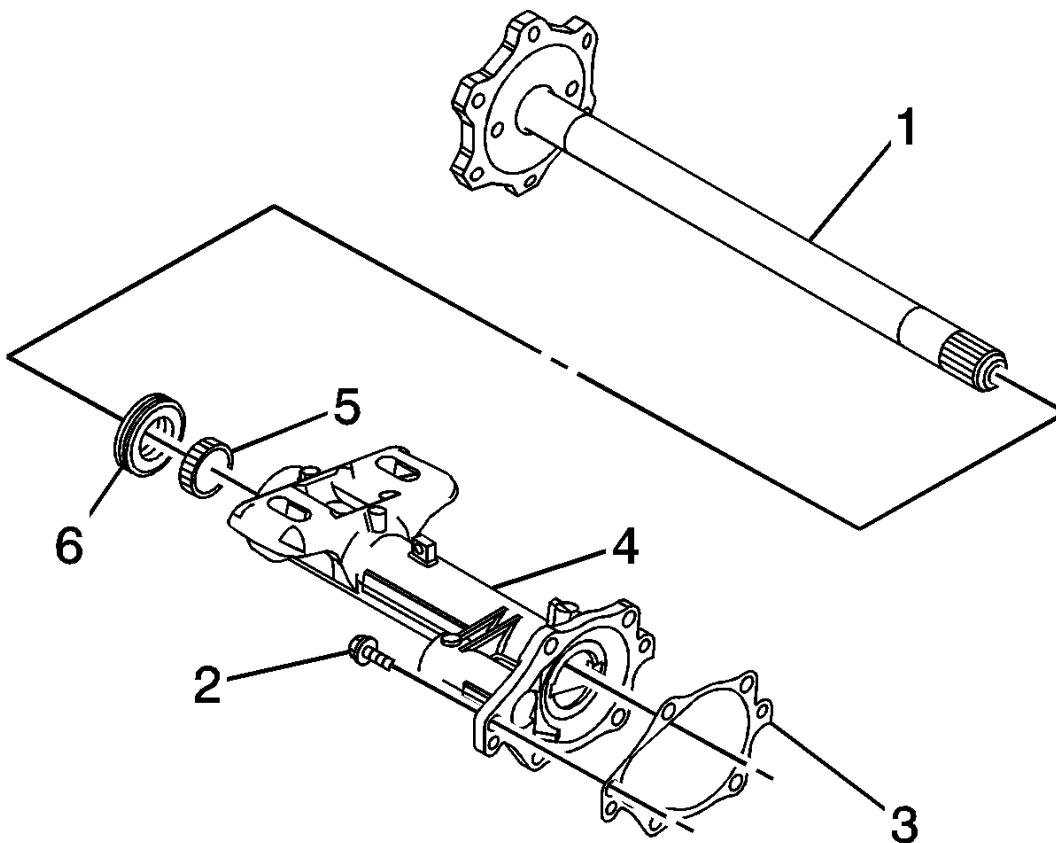


Fig. 93: View Of Inner Axle Shaft & Components

Courtesy of GENERAL MOTORS COMPANY

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

[- Right Side \(9.25 Inch HD Axle\)](#), and [Front Drive Axle Inner Shaft Bearing Replacement \(9.25 Inch HD Axle - Left Side\)](#)[Front Drive Axle Inner Shaft Bearing Replacement \(9.25 Inch HD Axle - Right Side\)](#).

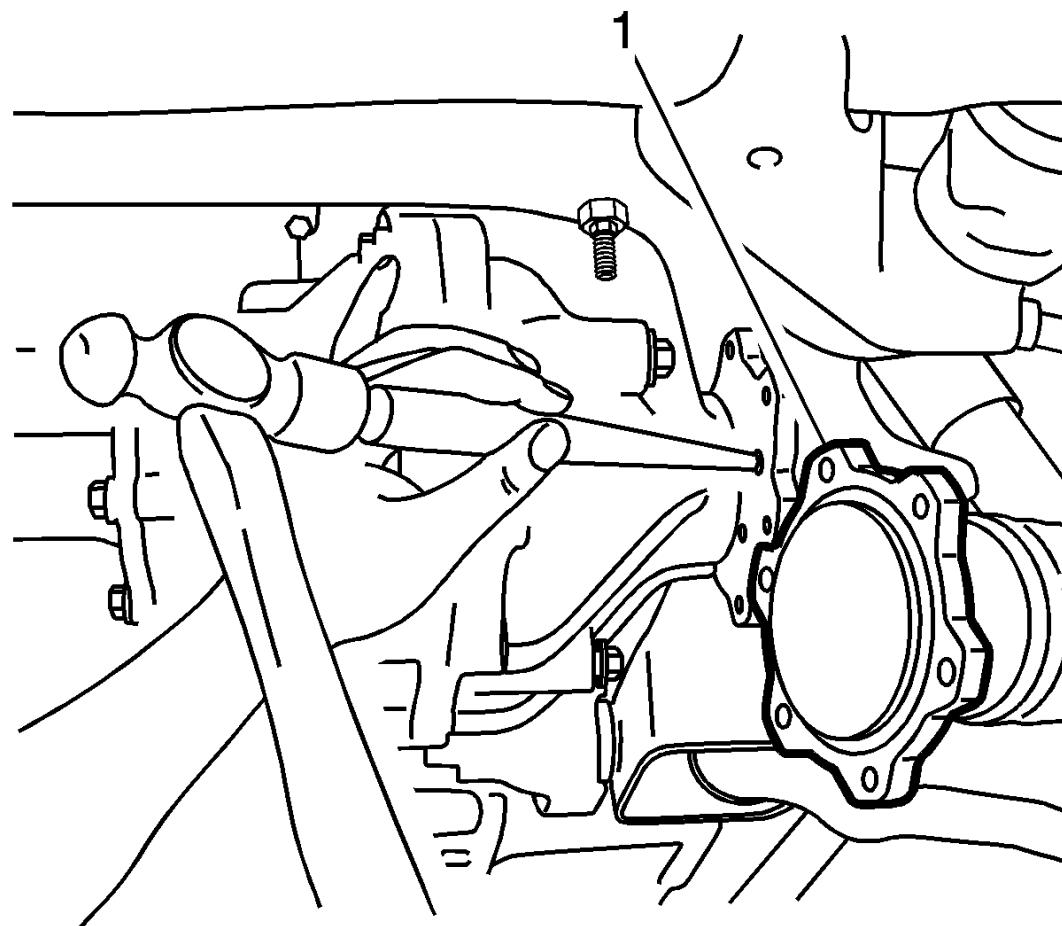


Fig. 94: Inner Axle Shaft

Courtesy of GENERAL MOTORS COMPANY

10. Using a hammer and a brass drift, remove the inner axle shaft.

Installation Procedure

NOTE: Align the splines on the inner axle shaft with those of the differential side gear before installing the inner axle shafts.

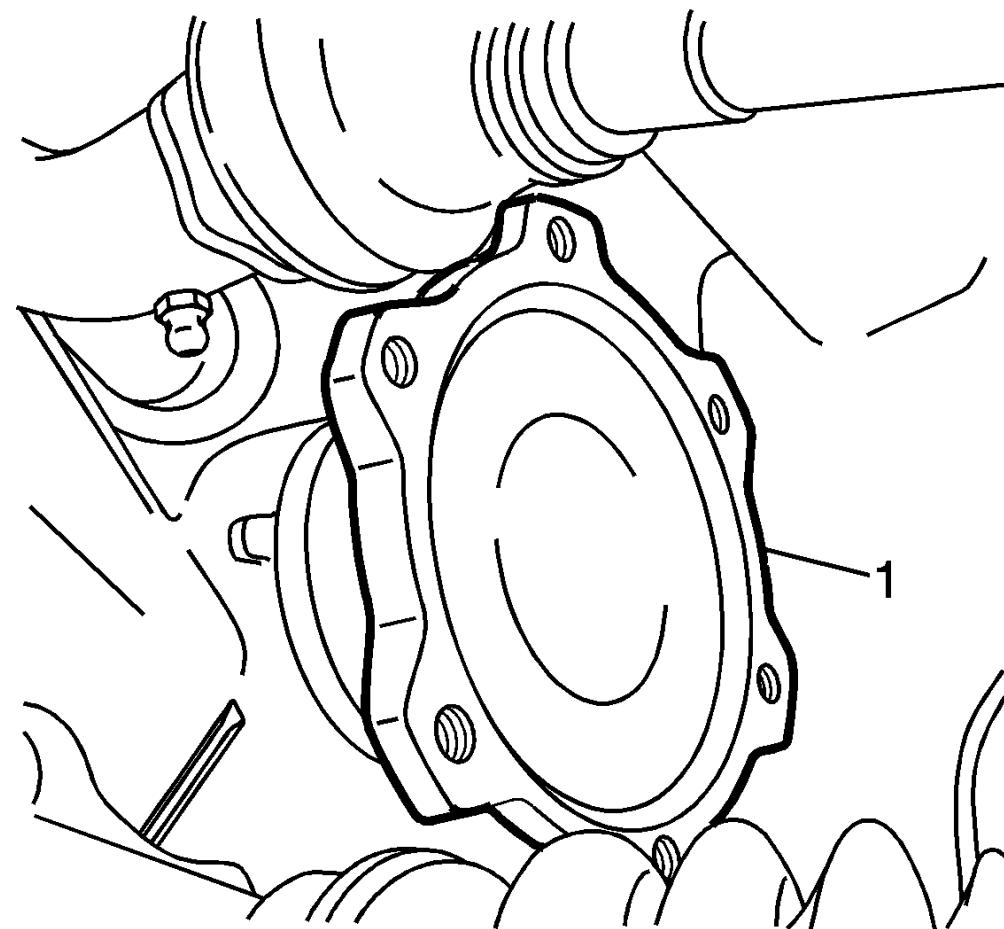


Fig. 95: Axle Shaft Inner Flange - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

NOTE: Ensure that the inner axle shaft is properly retained in the differential

1. Using a soft-faced mallet, install the inner axle shaft.
2. Install the right side NEW inner axle shaft bearing and the new seal to the inner axle shaft housing. Refer to [Front Drive Axle Inner Shaft Seal Replacement - Right Side \(9.25 Inch HD Axle\)](#), and [Front Drive Axle Inner Shaft Bearing Replacement \(9.25 Inch HD Axle - Left Side\)](#)[Front Drive Axle Inner Shaft Bearing Replacement \(9.25 Inch HD Axle - Right Side\)](#).

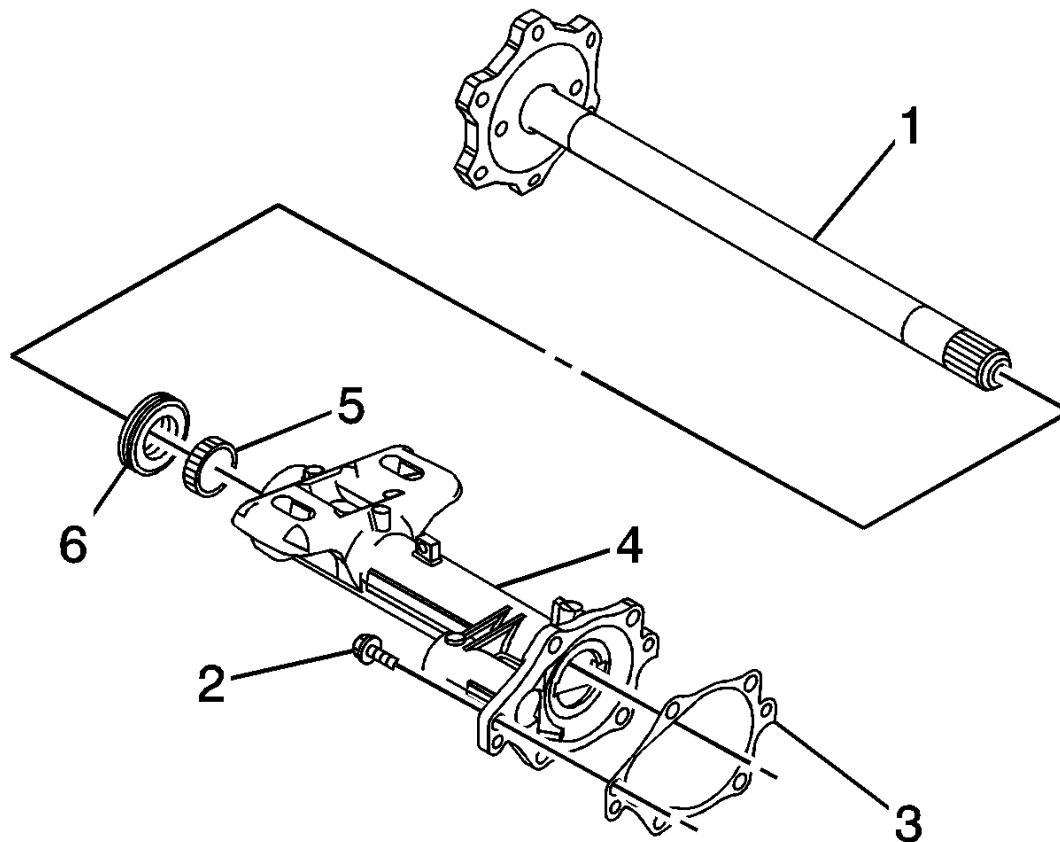


Fig. 96: View Of Inner Axle Shaft & Components

Courtesy of GENERAL MOTORS COMPANY

NOTE: Do not install the inner axle shaft completely into the inner axle shaft housing at this time.

3. Install the inner axle shaft (1) into the inner axle shaft housing (4).
4. Install the NEW inner axle shaft housing gasket (3).
5. Install the inner axle shaft (1) and the inner axle shaft housing (4) to the differential carrier assembly.
6. Install the inner axle shaft housing bolts (2) and tighten to 65 N.m (48 lb ft).

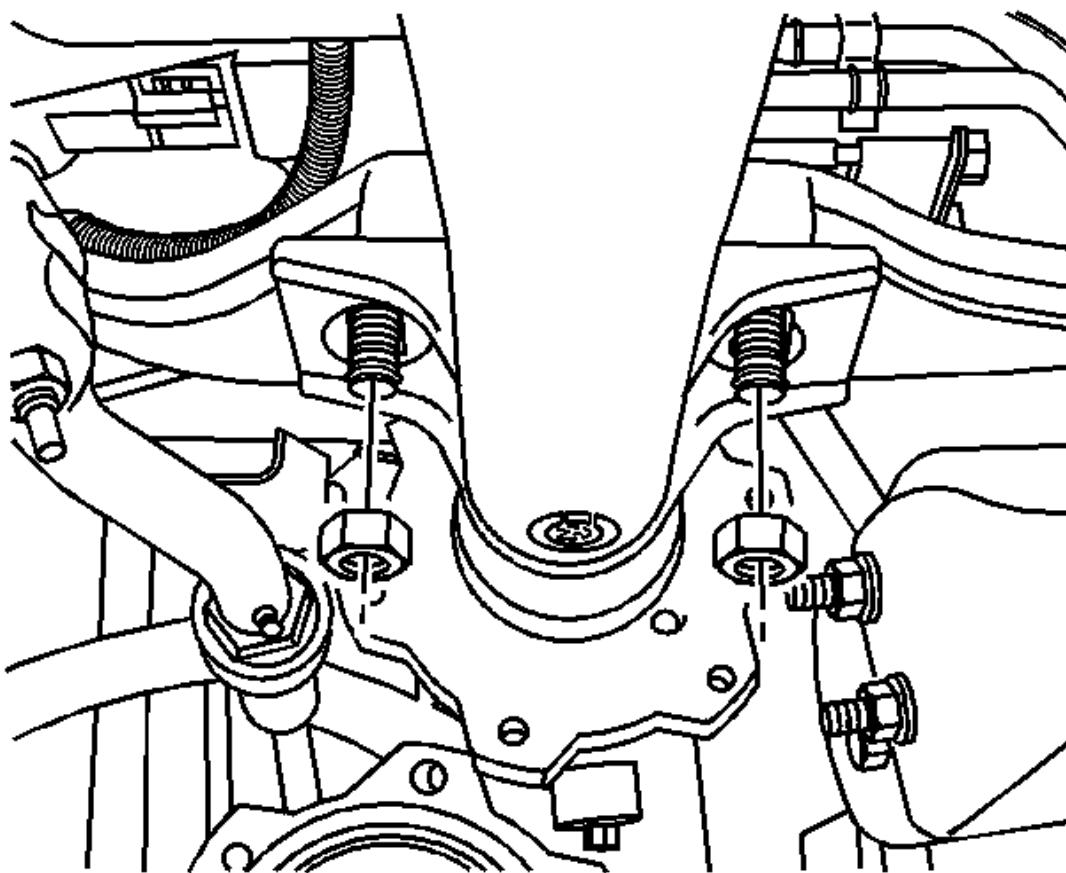


Fig. 97: Front Drive Inner Axle Shaft Housing Nuts

Courtesy of GENERAL MOTORS COMPANY

7. Install the inner axle shaft housing nuts to the bracket and tighten to 100 N.m (75 lb ft).

NOTE: Ensure that the inner axle shaft is properly retained in the differential.

8. Using a soft-faced mallet, install the inner axle shaft.

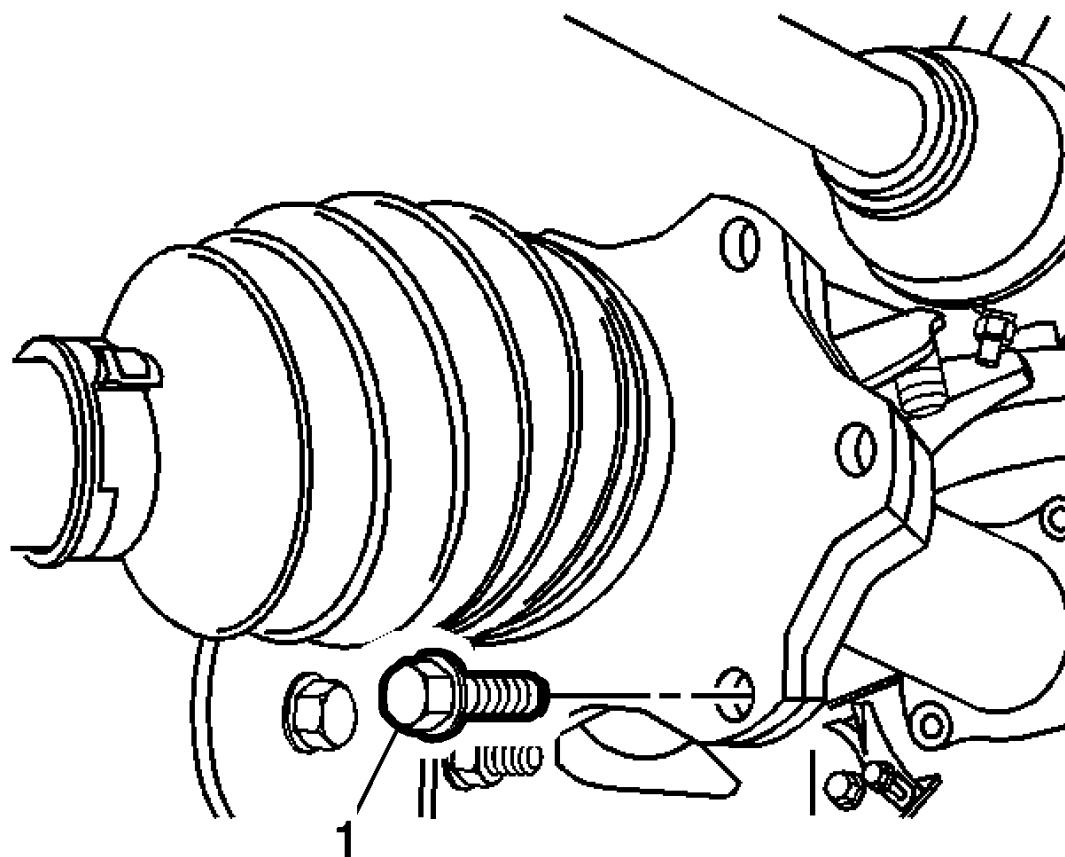


Fig. 98: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

9. Install the wheel drive shaft. Refer to [Front Wheel Drive Shaft Replacement - Right Side \(1500\) Front Wheel Drive Shaft Replacement - Right Side \(Heavy Duty\)](#).
10. Using the correct fluid, fill the differential carrier assembly with axle lubricant. Refer to [Front Axle Lubricant Replacement \(9.25 Inch HD Axle\)](#).

11. Lower the vehicle.

FRONT DRIVE AXLE CLUTCH FORK REPLACEMENT

Removal Procedure

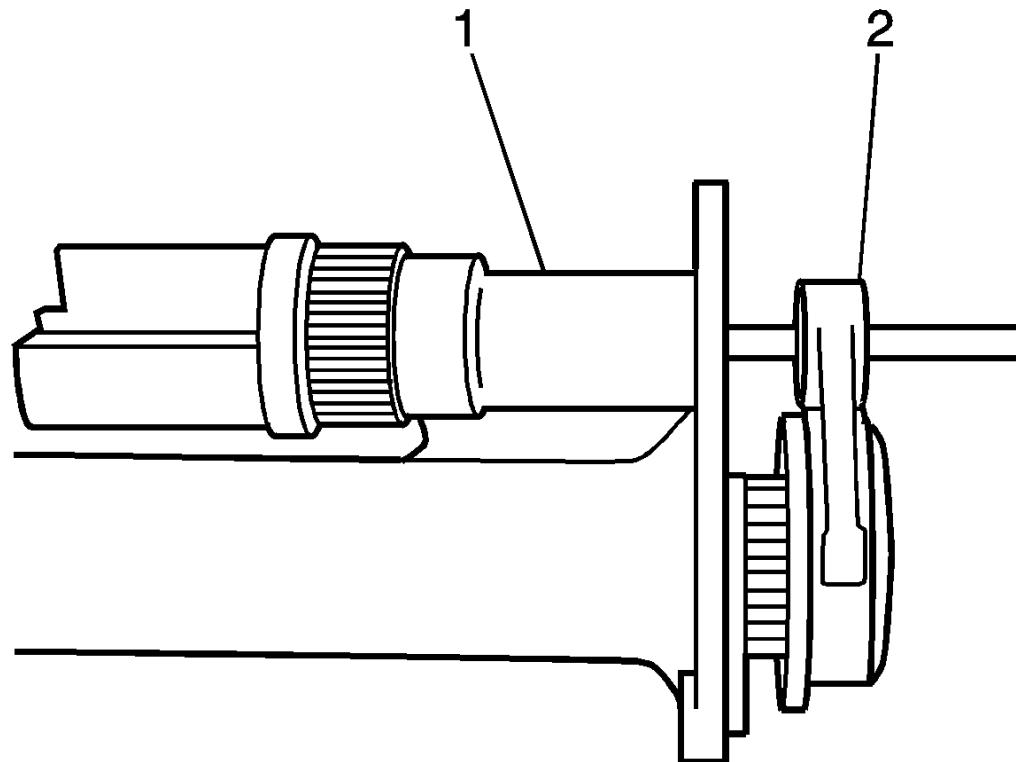


Fig. 99: Inner Axle Shaft Housing & Clutch Fork Assembly - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

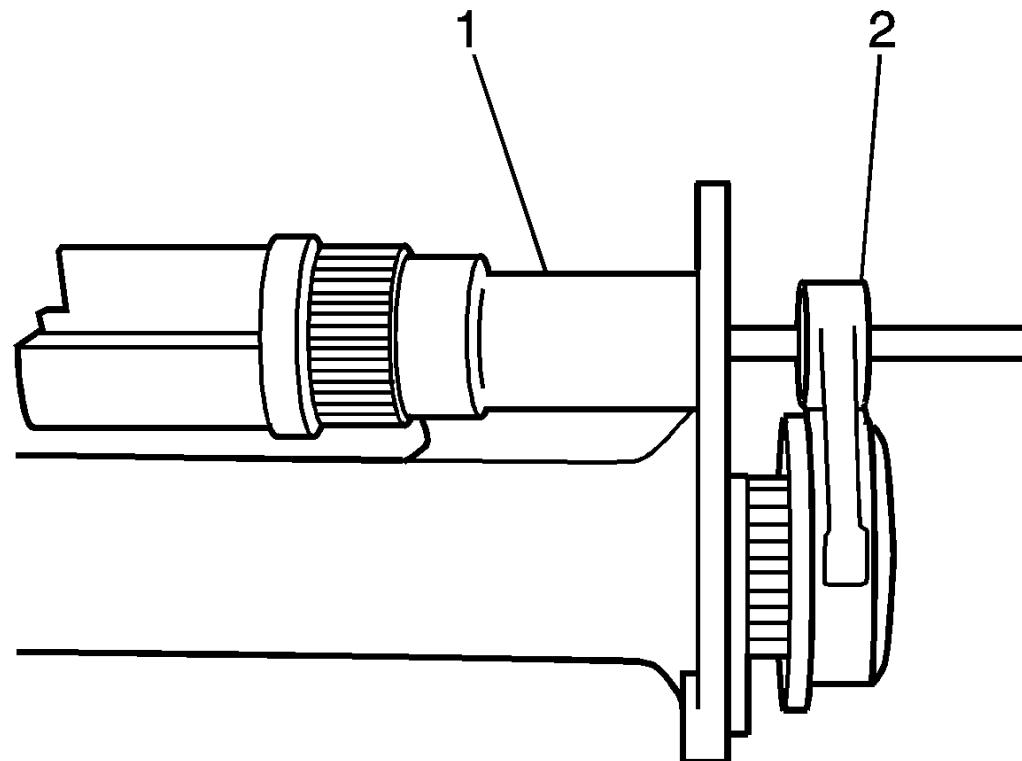


Fig. 100: Inner Axle Shaft Housing & Clutch Fork Assembly - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

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

FRONT DRIVE AXLE CLUTCH SHAFT BEARING REPLACEMENT

Tools Required

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

For equivalent regional tools, refer to [Special Tools](#).

Removal Procedure

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

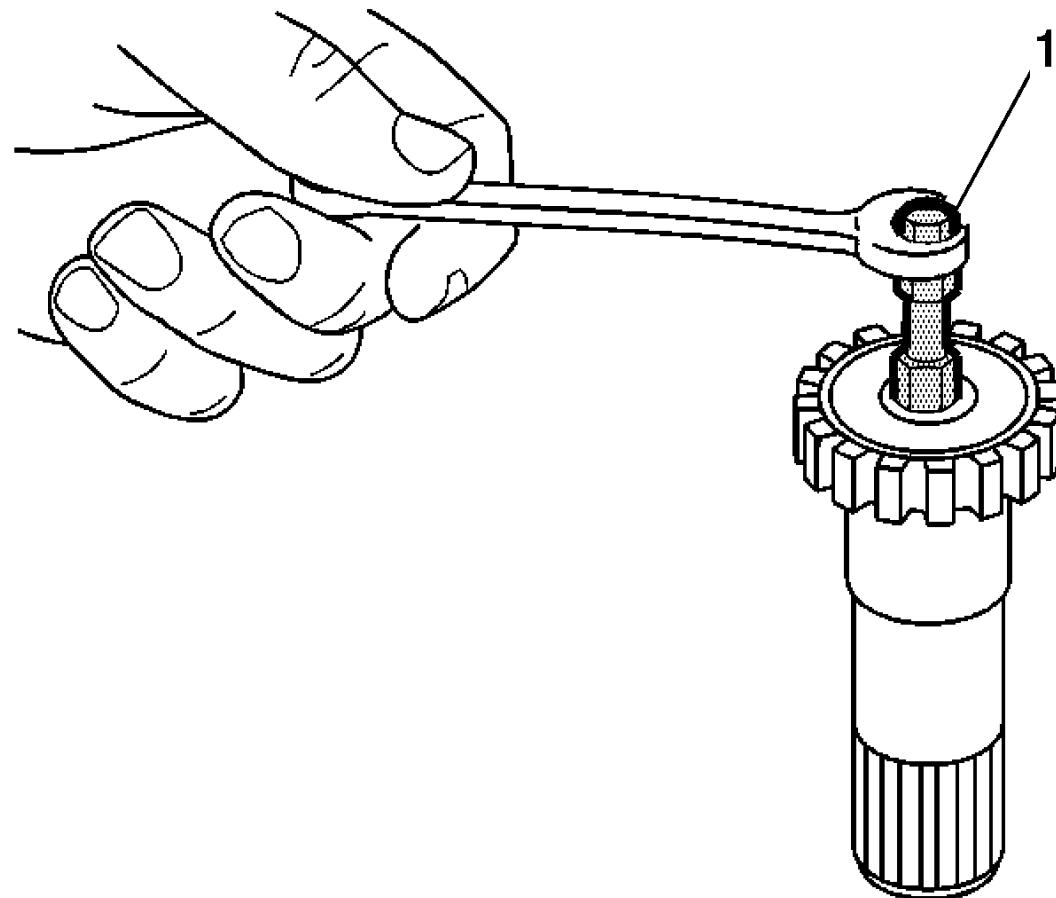


Fig. 101: Clutch Shaft Pilot Bearing - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

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

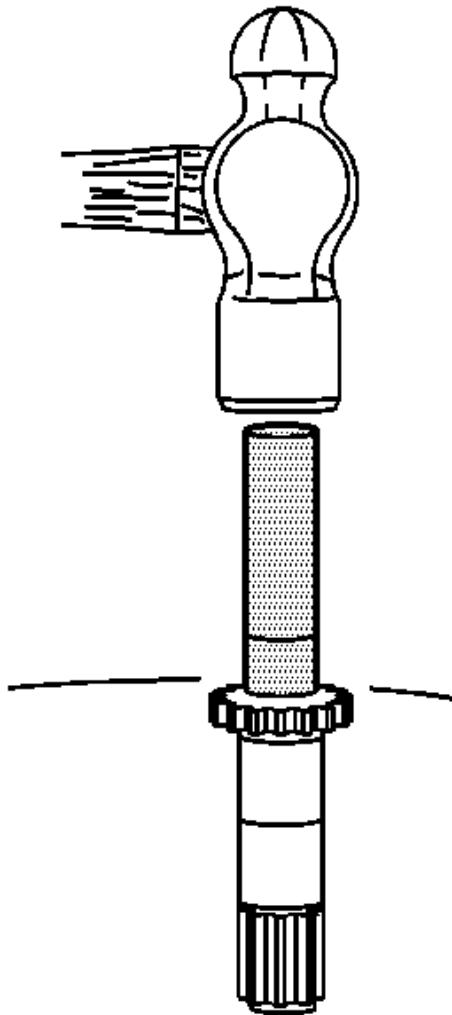


Fig. 102: Clutch Shaft Pilot Bearing

Courtesy of GENERAL MOTORS COMPANY

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

FRONT DIFFERENTIAL CARRIER GASKET REPLACEMENT

Inspection Procedure

Perform the following before disassembling the axle:

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

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

4. Check the ring gear backlash. Refer to [**Backlash Inspection and Adjustment \(8.25 Inch LD Axle\)**](#)
[**Backlash Inspection and Adjustment \(9.25 Inch HD Axle\)**](#).

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

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

Removal Procedure

1. Install the differential carrier assembly in a vise.

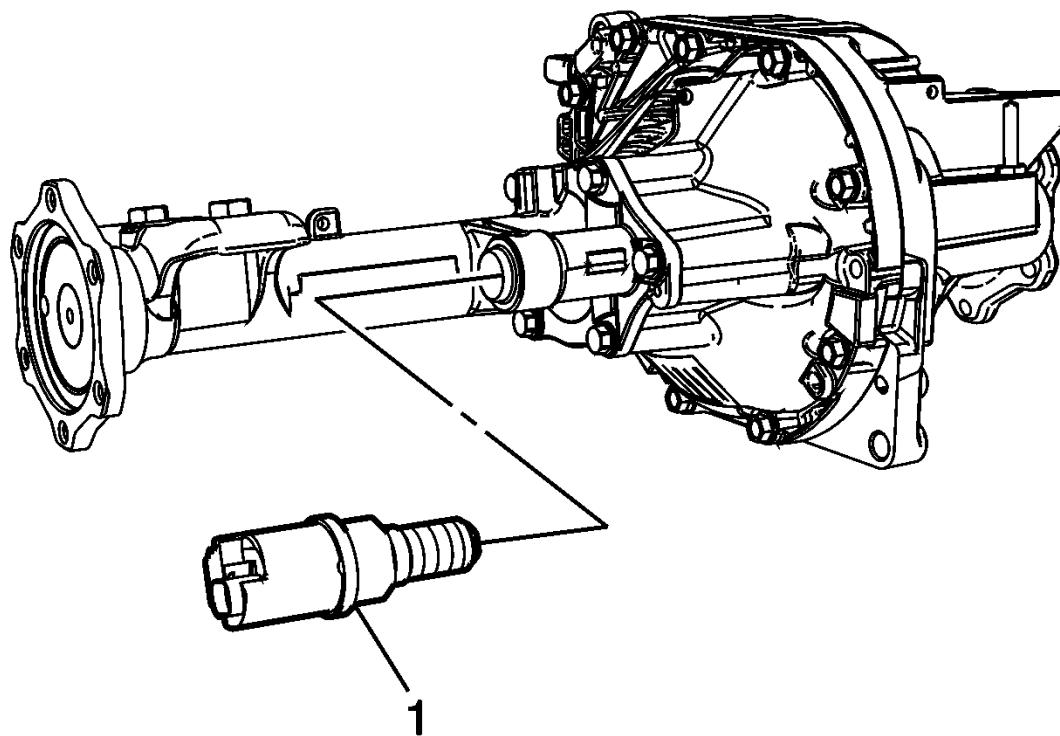


Fig. 103: Front Axle Actuator

Courtesy of GENERAL MOTORS COMPANY

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

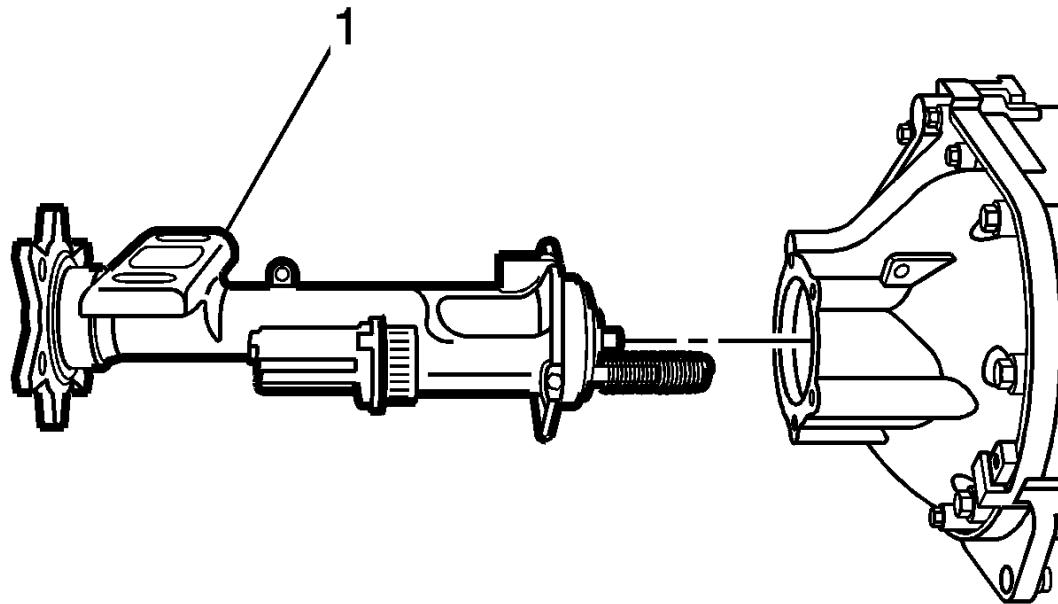


Fig. 104: Inner Axle Shaft Housing Assembly

Courtesy of GENERAL MOTORS COMPANY

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

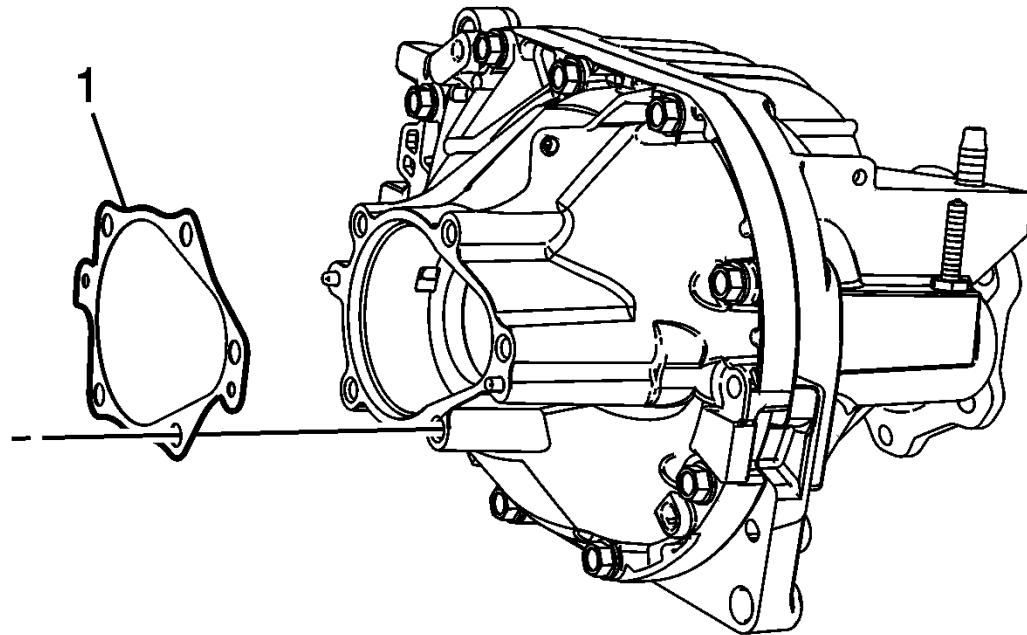


Fig. 105: Inner Axle Housing To Differential Carrier Gasket

Courtesy of GENERAL MOTORS COMPANY

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

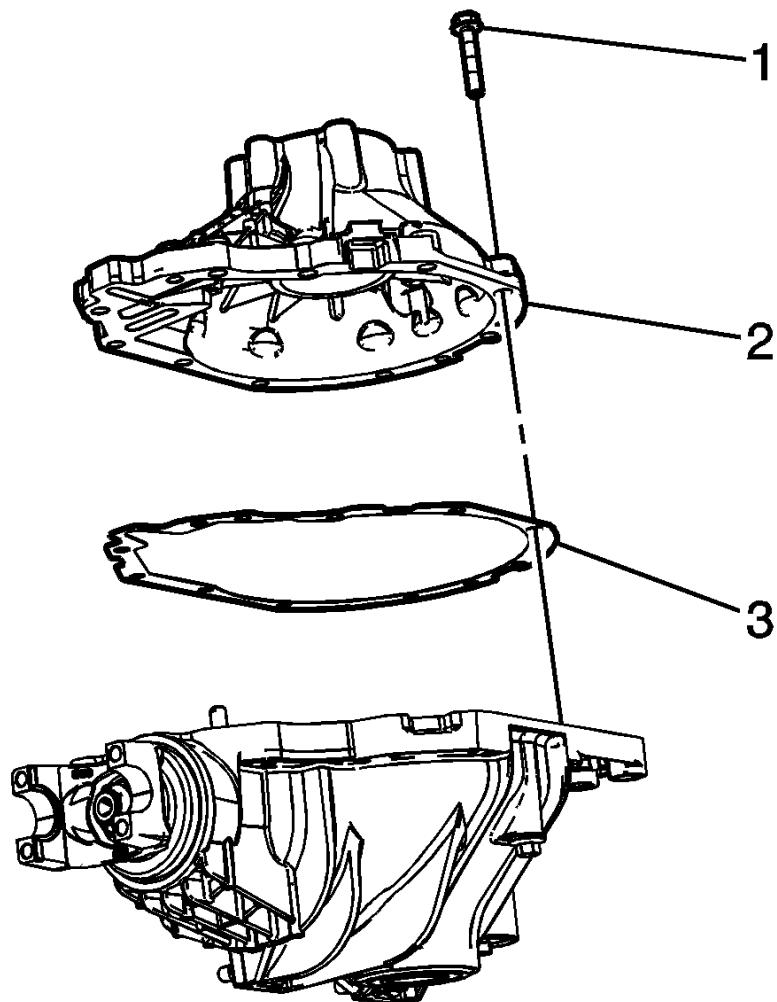


Fig. 106: View Of Differential Carrier Housing, Gasket & Bolts

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

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

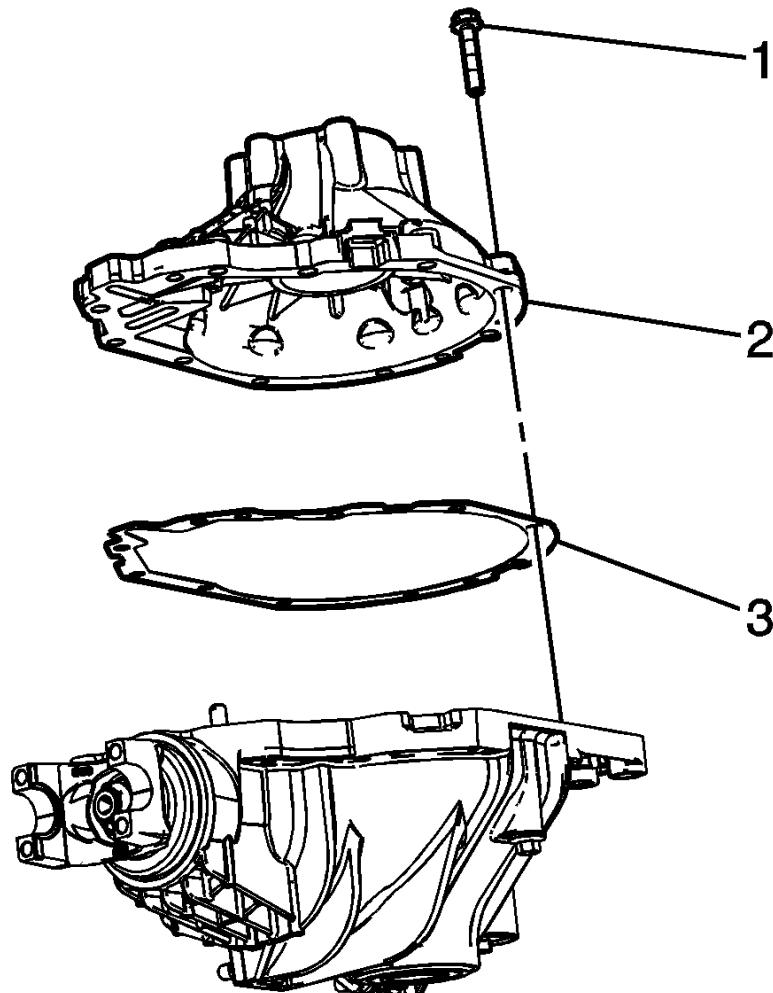


Fig. 107: View Of Differential Carrier Housing, Gasket & Bolts

Courtesy of GENERAL MOTORS COMPANY

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

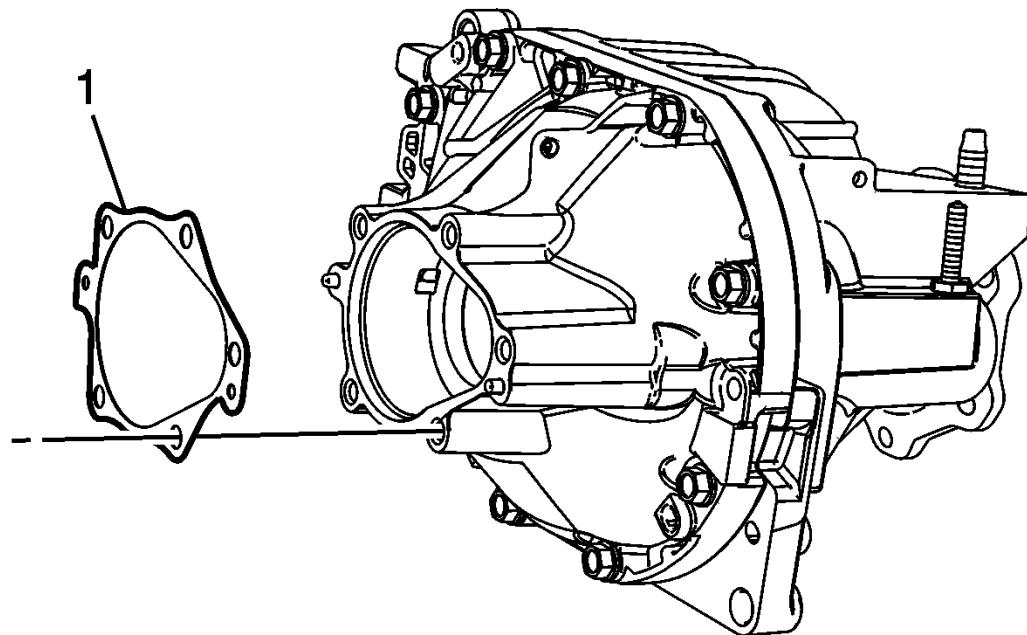


Fig. 108: Inner Axle Housing To Differential Carrier Gasket

Courtesy of GENERAL MOTORS COMPANY

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

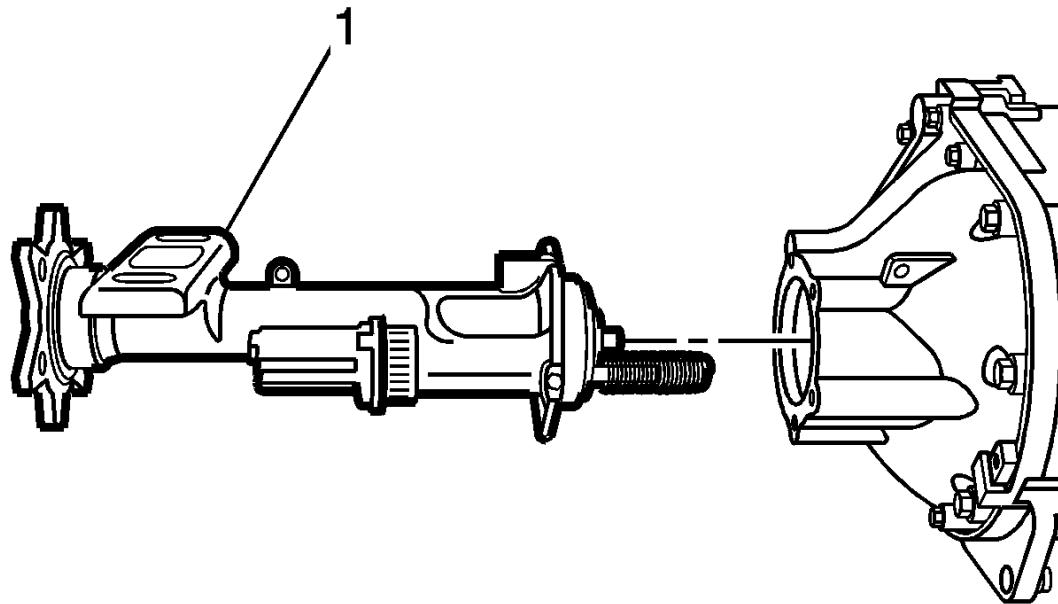


Fig. 109: Inner Axle Shaft Housing Assembly

Courtesy of GENERAL MOTORS COMPANY

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

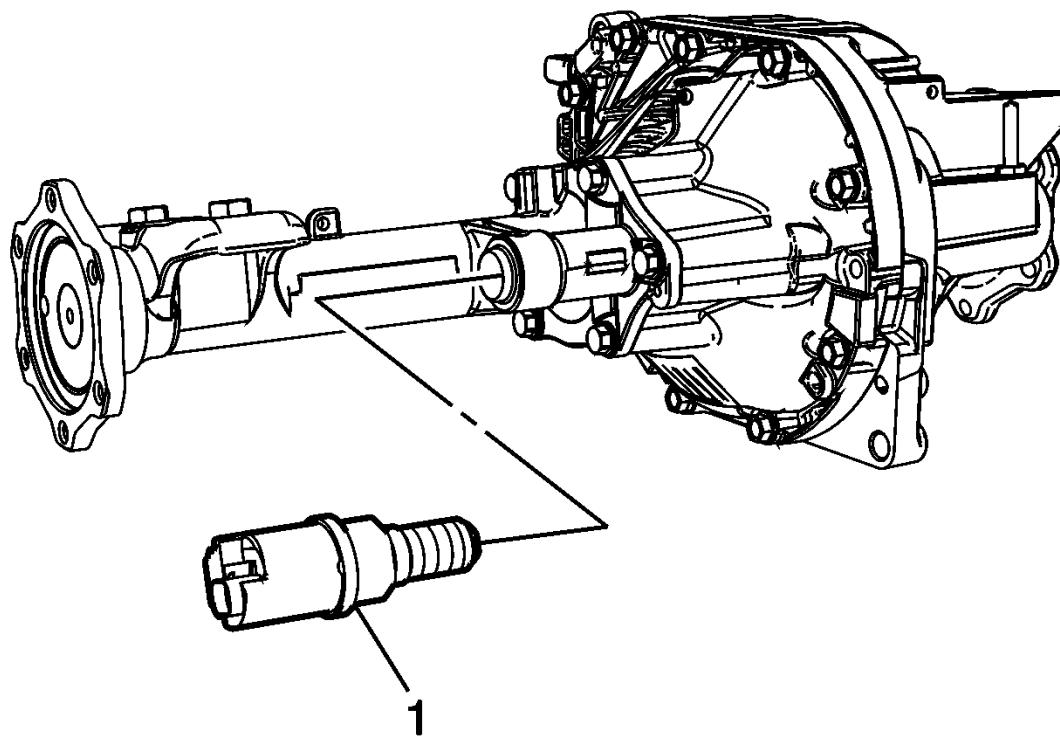


Fig. 110: Front Axle Actuator

Courtesy of GENERAL MOTORS COMPANY

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

FRONT DRIVE AXLE ACTUATOR REPLACEMENT (8.25 INCH LD AXLE)

Removal Procedure

1. Remove the underbody skid shield. [Underbody Skid Shield Replacement](#) .
2. Disconnect the electrical connector from the actuator.

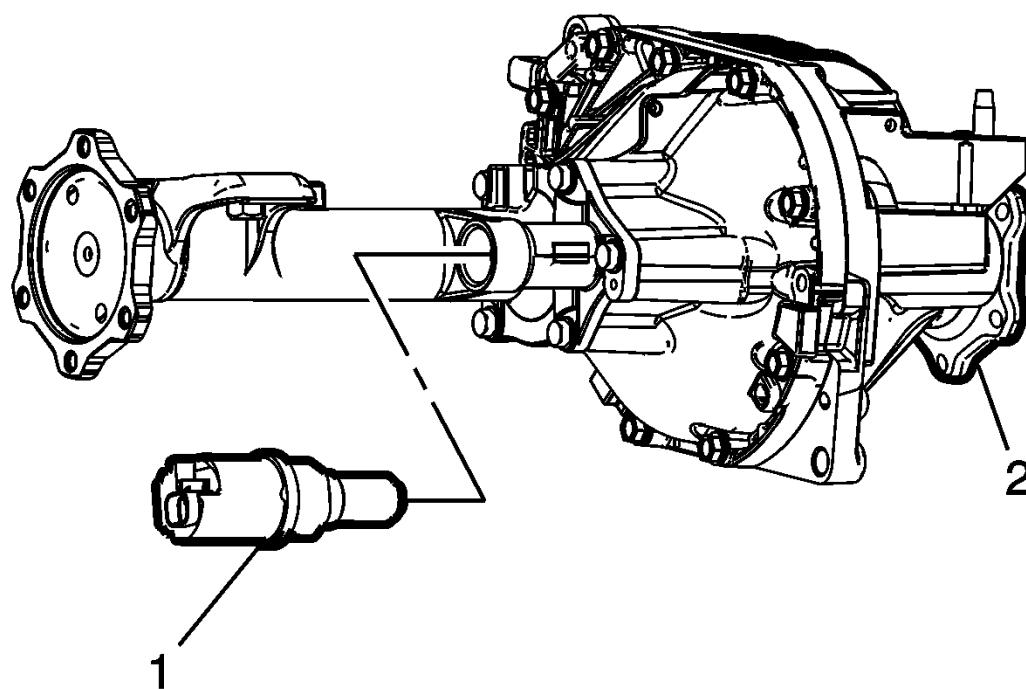


Fig. 111: Front Drive Axle Actuator

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

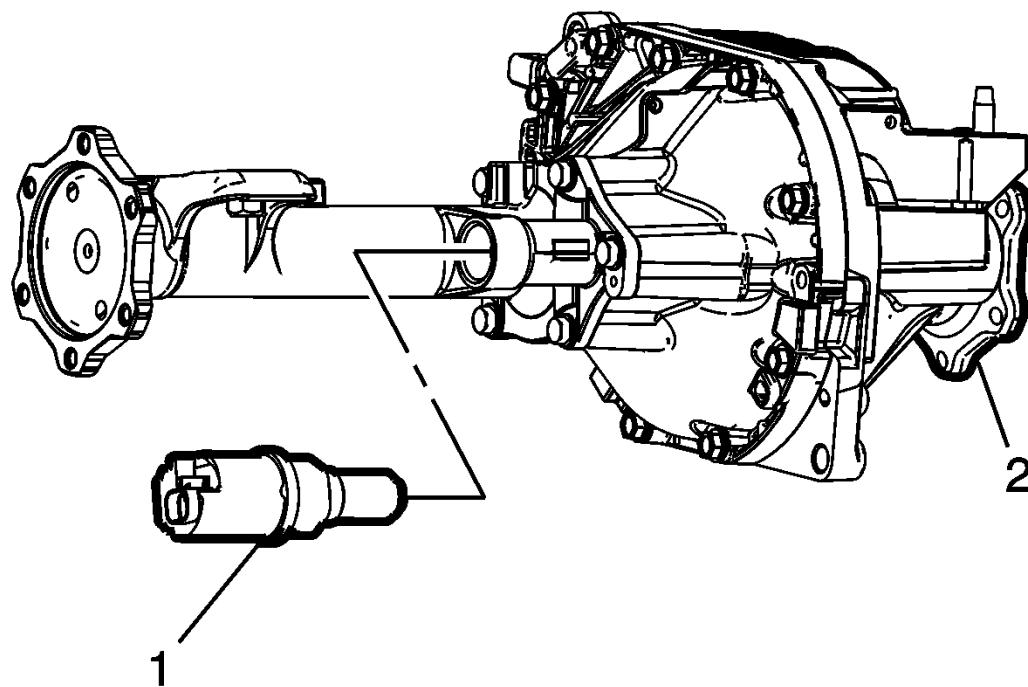


Fig. 112: Front Drive Axle Actuator

Courtesy of GENERAL MOTORS COMPANY

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

CAUTION: Refer to Fastener Caution .

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

FRONT DRIVE AXLE ACTUATOR REPLACEMENT (9.25 INCH HD AXLE)

Removal Procedure

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

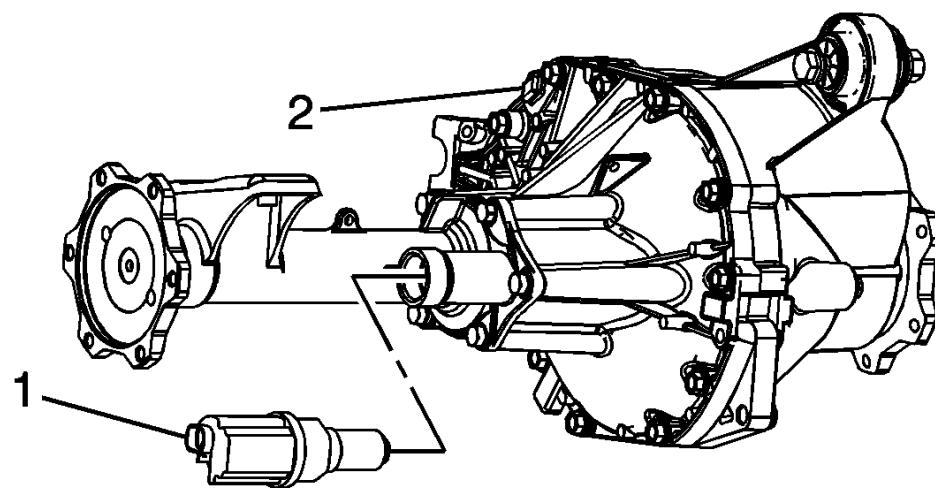


Fig. 113: Actuator And Axle

Courtesy of **GENERAL MOTORS COMPANY**

4. Remove the actuator (1) from the axle (2) by turning the actuator counterclockwise.

Installation Procedure

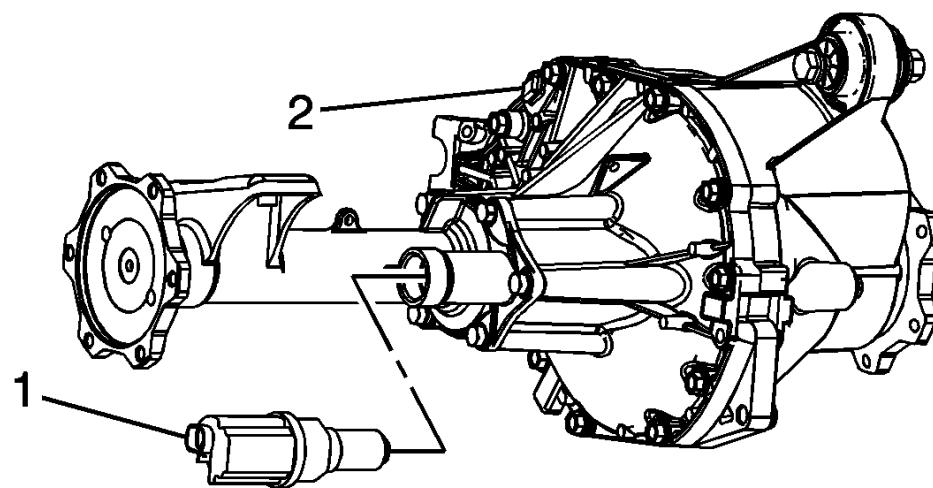


Fig. 114: Actuator And Axle

Courtesy of GENERAL MOTORS COMPANY

1. Apply sealant to the threads of the actuator (1). Use the correct sealant. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).

CAUTION: Refer to [Fastener Caution](#) .

2. Install the actuator (1) and tighten to 30 N.m (22 lb ft).

3. Connect the electrical connector to the actuator.
4. Install the steering gear skid shield, if equipped. Refer to [**Steering Gear Skid Shield Replacement**](#).
5. Lower the vehicle.

FRONT DIFFERENTIAL DRIVE PINION GEAR YOKE REPLACEMENT

Special Tools

J-8614-01 Flange and Pulley Holding Tool

For equivalent regional tools, refer to [**Special Tools**](#).

Removal Procedure

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

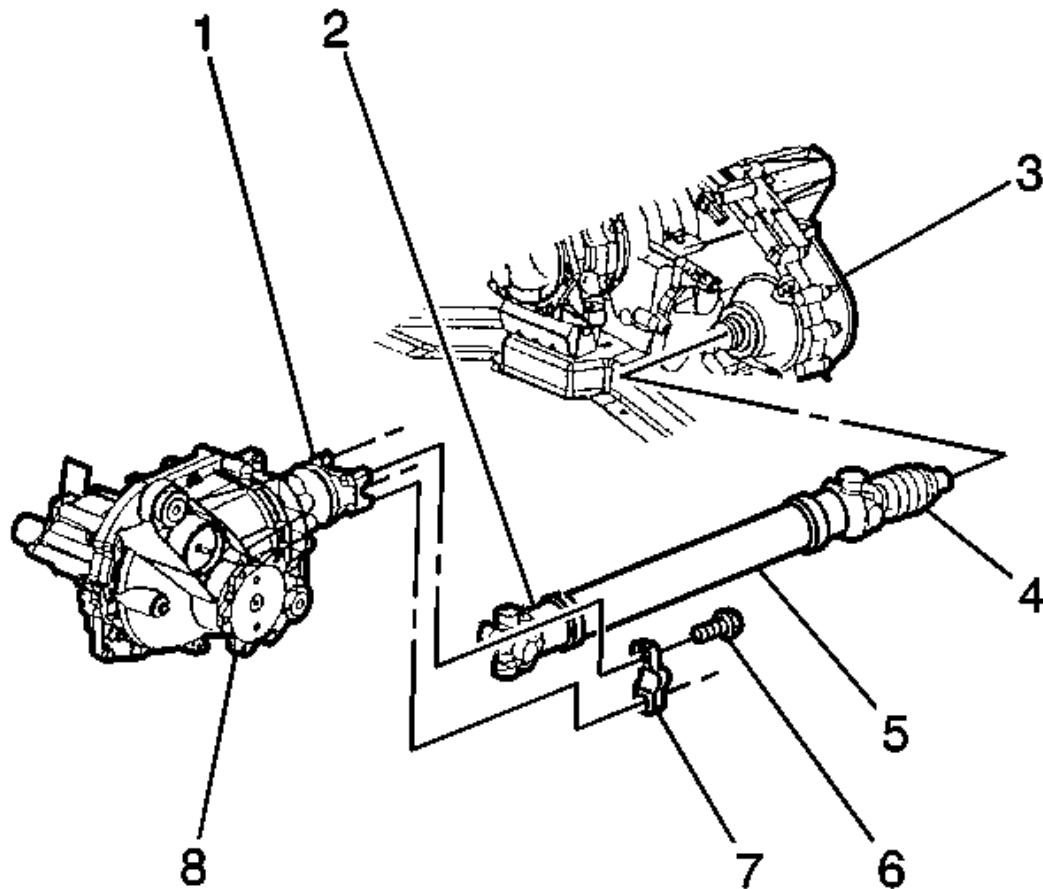


Fig. 115: Front Axle Pinion Yoke, Propeller Shaft Universal Joint, Yoke Retainer & Bolts

Courtesy of GENERAL MOTORS COMPANY

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

CAUTION: When removing the propeller shaft, do not attempt to remove the shaft by pounding on the yoke ears or using a tool between the yoke and the universal joint. If the propeller shaft is removed by using such

means, the injection joints may fracture and lead to premature failure of the joint.

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

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

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

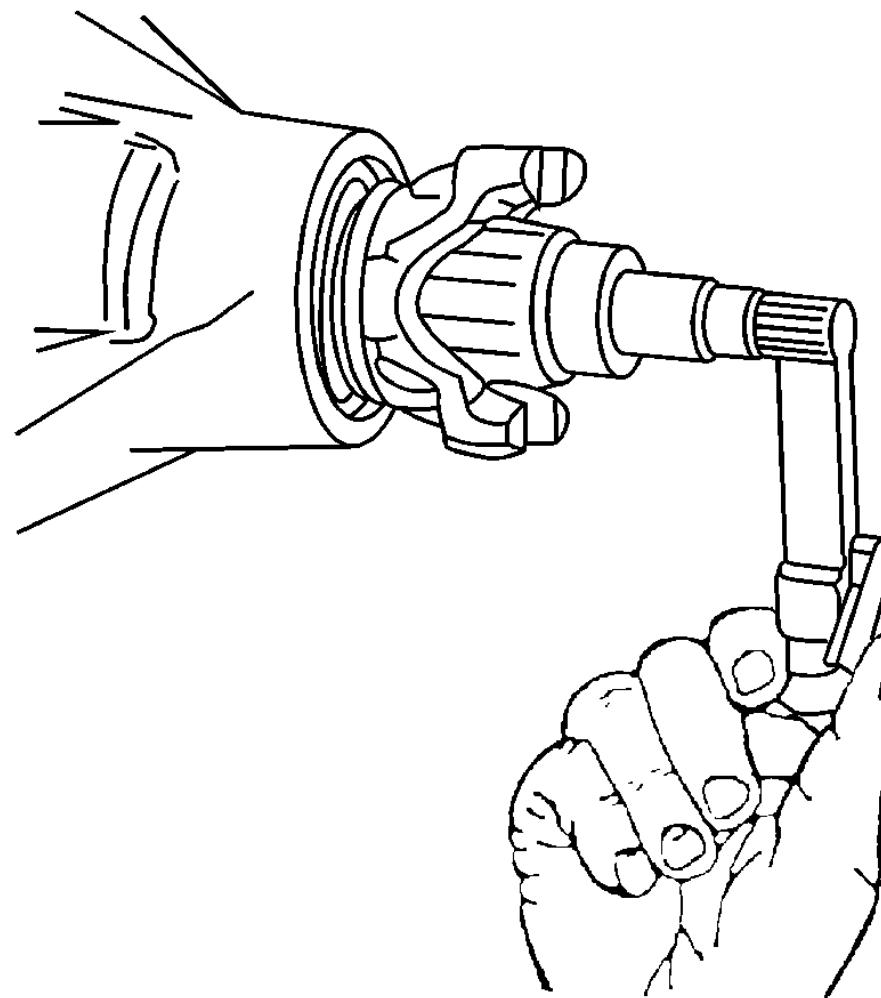


Fig. 116: Measuring Pinion Rotation Torque - Front Axle

Courtesy of GENERAL MOTORS COMPANY

10. Measure the torque required in order to rotate the pinion. Use an inch-pound torque wrench. Record the torque value for reassembly. This will give the combined preload for the following components:

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

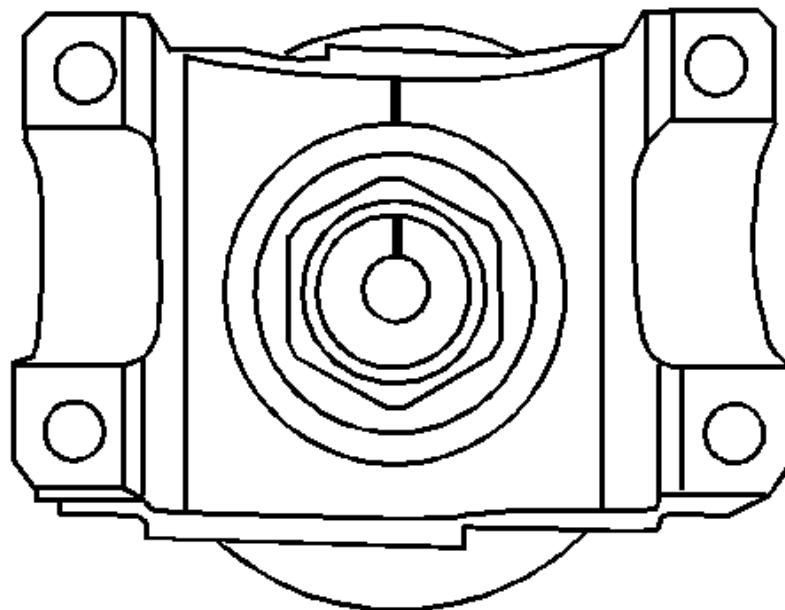


Fig. 117: View Of Pinion Shaft & Pinion Yoke Alignment Marks

Courtesy of GENERAL MOTORS COMPANY

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

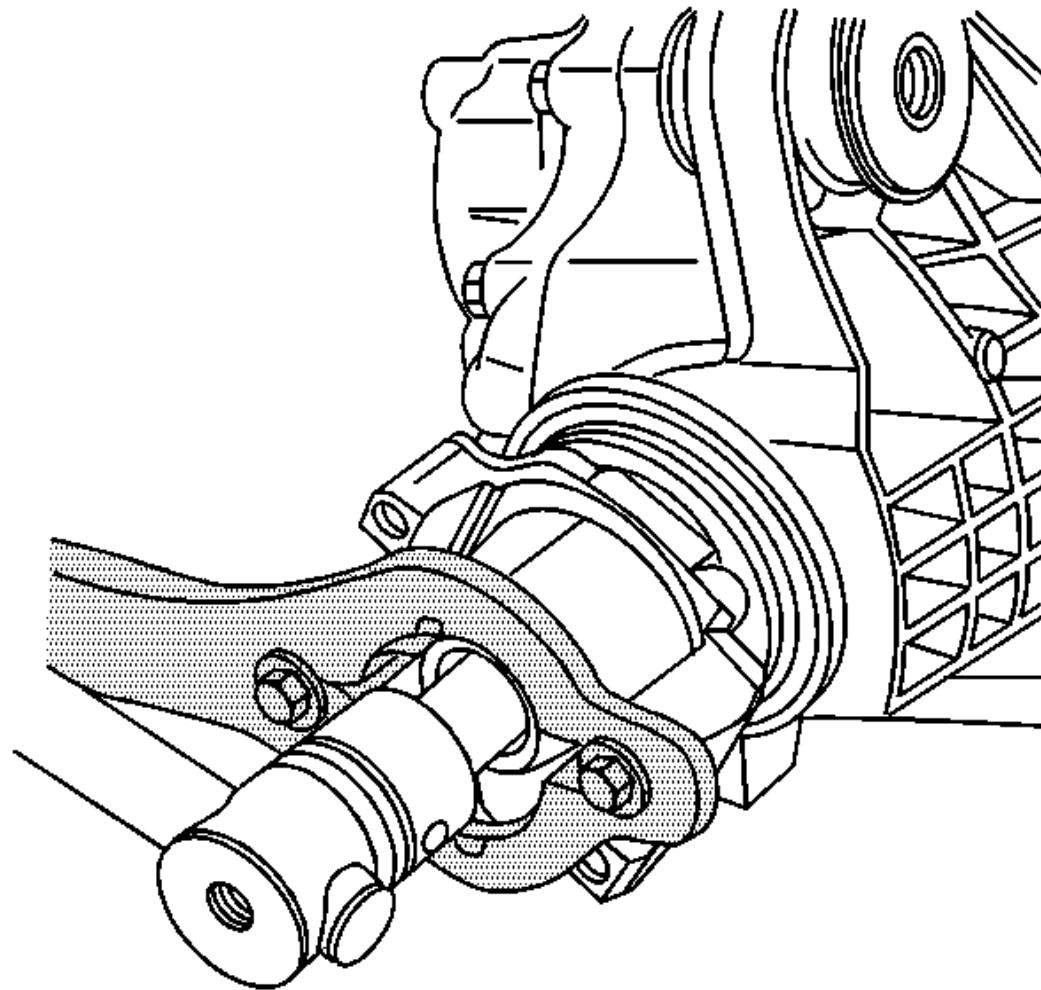


Fig. 118: Holding Pinion Flange Using Special Tool

Courtesy of GENERAL MOTORS COMPANY

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

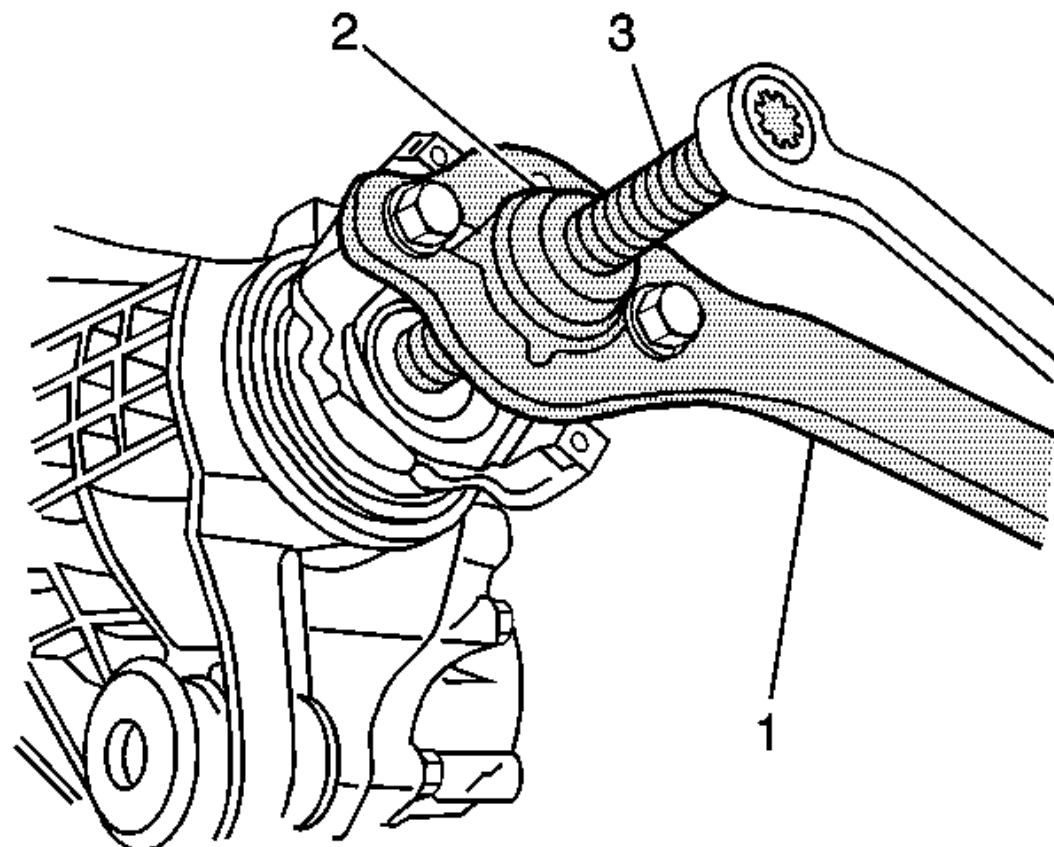


Fig. 119: Removing Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

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

Align the reference marks made during removal.

CAUTION: Refer to Pinion Flange/Yoke Installation Caution .

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

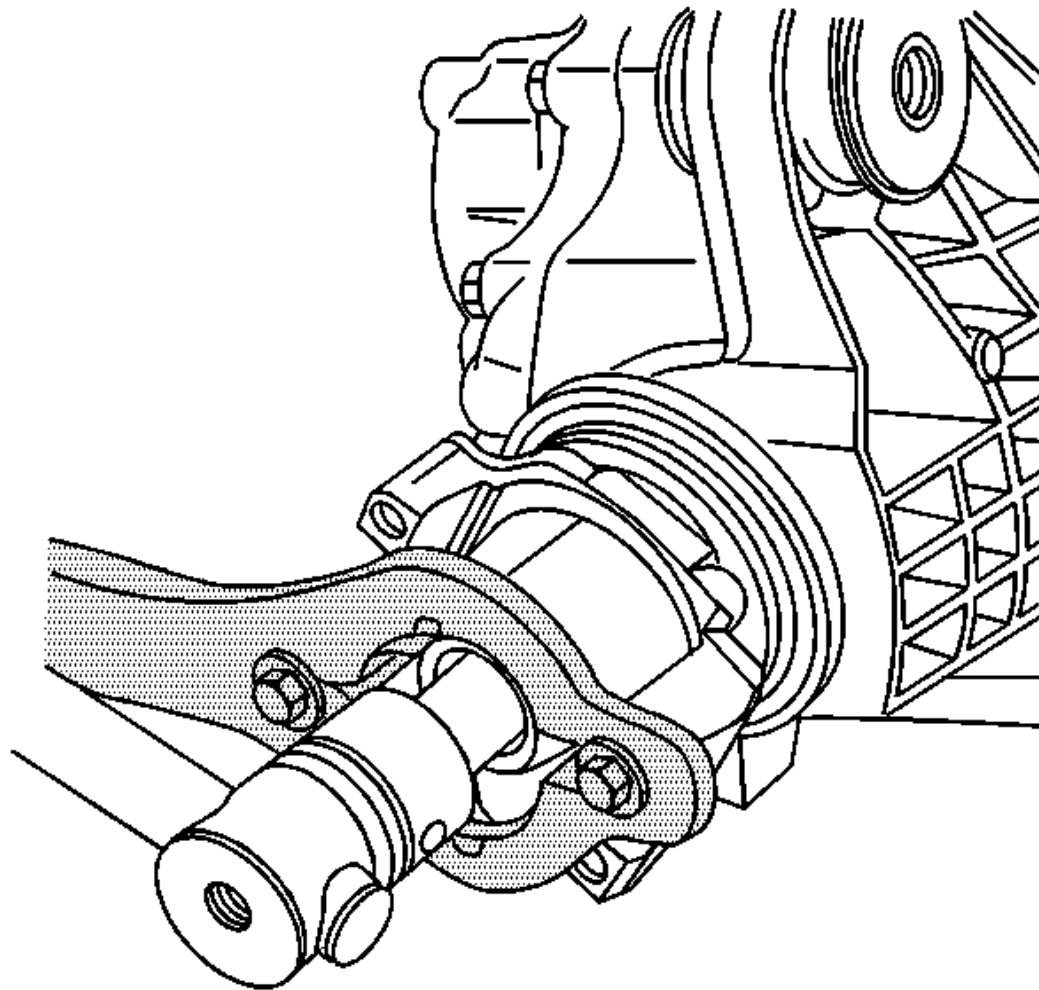


Fig. 120: Holding Pinion Flange Using Special Tool

Courtesy of GENERAL MOTORS COMPANY

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

CAUTION: Refer to Fastener Caution .

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

installed.

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

Tighten

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

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

Compare the measurement with the rotating torque recorded earlier.

Tighten

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

8. Once the specified torque is obtained, rotate the pinion several times to ensure the bearings have seated. Recheck the rotating torque and adjust if necessary.

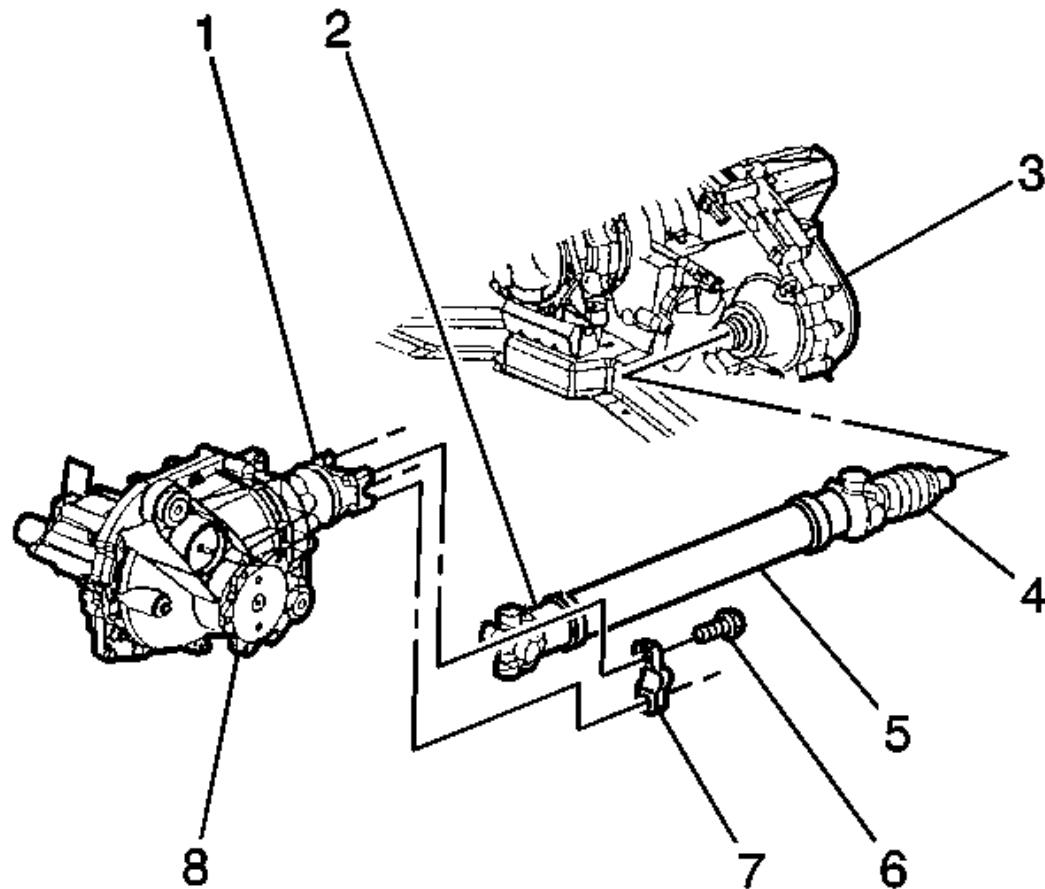


Fig. 121: Front Axle Pinion Yoke, Propeller Shaft Universal Joint, Yoke Retainer & Bolts
Courtesy of GENERAL MOTORS COMPANY

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

Align the reference marks made during removal.

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

Tighten

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

11. Inspect the axle lubricant level, and add, if necessary. Refer to [Front Axle Lubricant Level Inspection \(8.25 Inch LD Axle\)](#)[Front Axle Lubricant Level Inspection \(9.25 Inch HD Axle\)](#).

12. Install the steering gear skid shield, if equipped. Refer to [Steering Gear Skid Shield Replacement](#).

13. Install the brake calipers. Refer to [Front Brake Caliper Replacement \(JD9\)](#) [Front Brake Caliper Replacement \(J95\)](#).

14. Fill the drive axle. Refer to [Front Axle Lubricant Replacement \(8.25 Inch LD Axle\)](#)[Front Axle Lubricant Replacement \(9.25 Inch HD Axle\)](#).

15. Install the tire and wheel assemblies. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#).

16. Lower the vehicle.

FRONT DIFFERENTIAL DRIVE PINION GEAR SEAL REPLACEMENT

Special Tools

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

Removal Procedure

1. Raise the vehicle. Refer to [Lifting and Jacking the Vehicle](#).

2. Drain the drive axle. Refer to [Front Axle Lubricant Replacement \(8.25 Inch LD Axle\)](#)[Front Axle Lubricant Replacement \(9.25 Inch HD Axle\)](#).

3. Remove the tire and wheel assemblies. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#).

4. Remove the brake calipers. Refer to [Front Brake Caliper Replacement \(JD9\)](#) [Front Brake Caliper Replacement \(J95\)](#).

5. Remove the steering gear skid shield, if equipped. Refer to [Steering Gear Skid Shield Replacement](#).

6. Reference mark the relationship of the propeller shaft to the front axle pinion yoke.

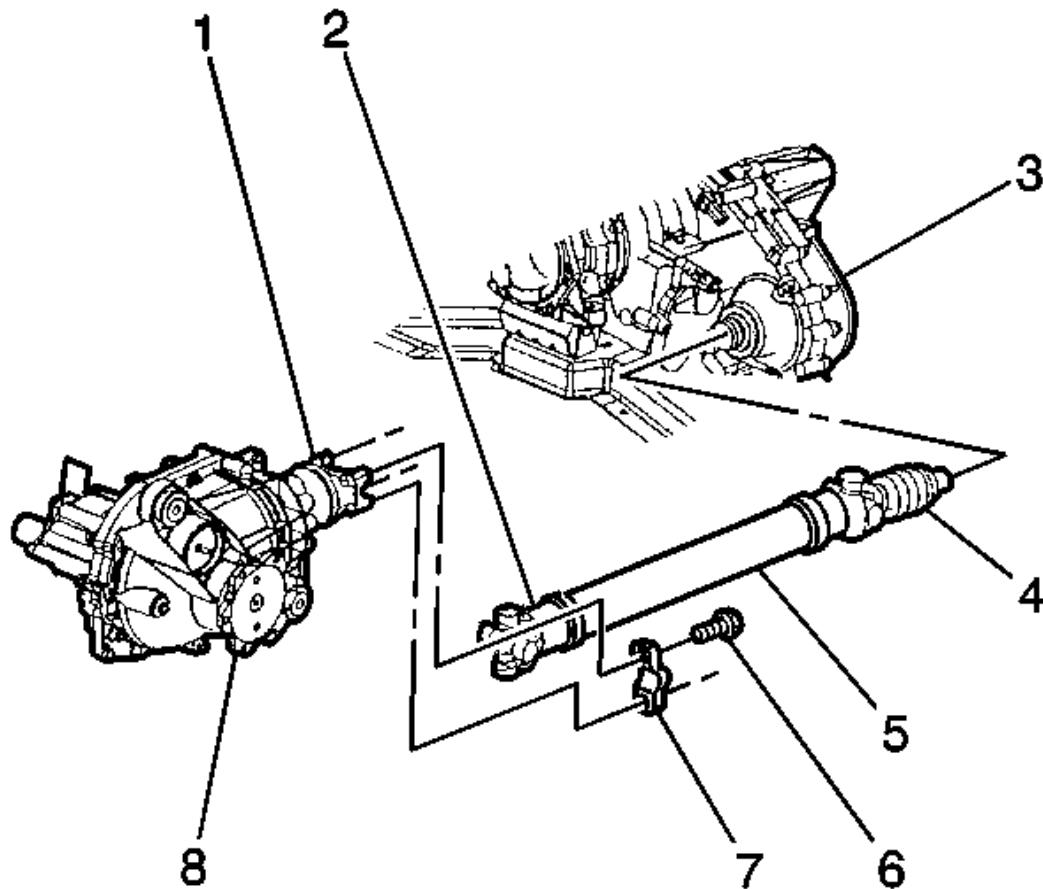


Fig. 122: Front Axle Pinion Yoke, Propeller Shaft Universal Joint, Yoke Retainer & Bolts

Courtesy of GENERAL MOTORS COMPANY

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

CAUTION: When removing the propeller shaft, do not attempt to remove the shaft by pounding on the yoke ears or using a tool between the yoke and the universal joint. If the propeller shaft is removed by using such

means, the injection joints may fracture and lead to premature failure of the joint.

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

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

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

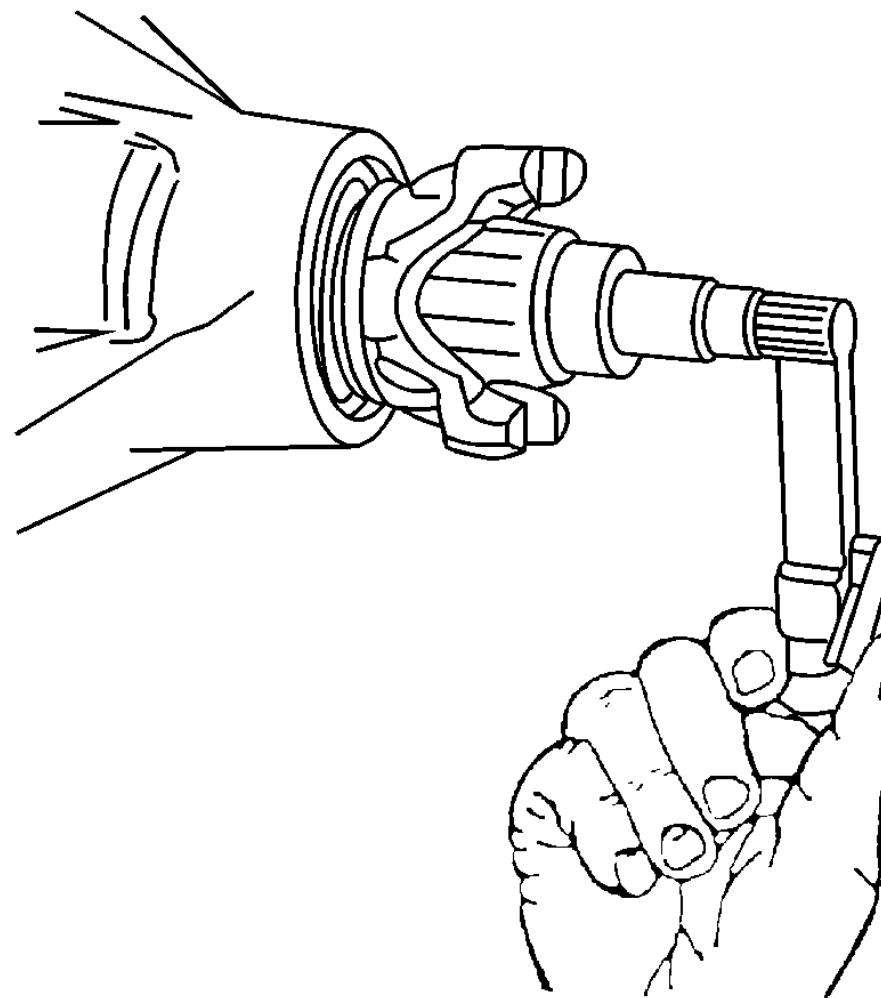


Fig. 123: Measuring Pinion Rotation Torque - Front Axle

Courtesy of GENERAL MOTORS COMPANY

10. Measure the torque required in order to rotate the pinion. Use an inch-pound torque wrench. Record the torque value for reassembly. This will give the combined preload for the following components:

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

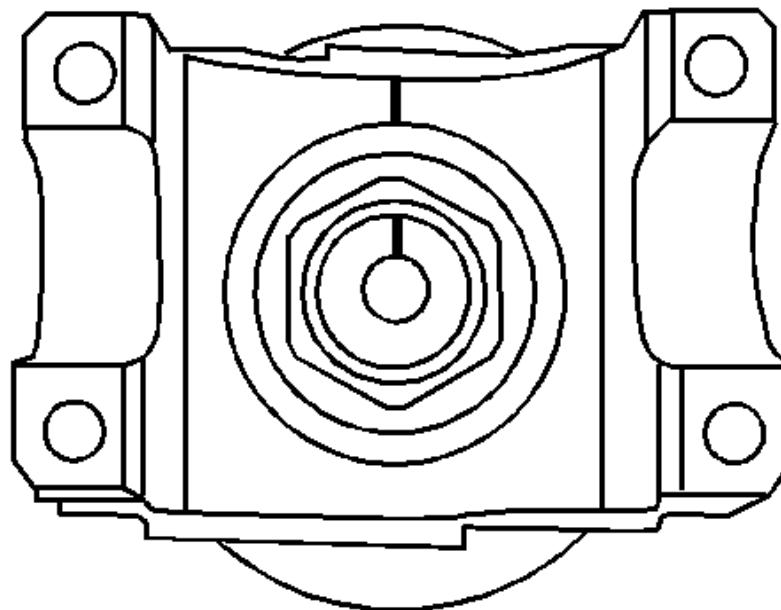


Fig. 124: View Of Pinion Shaft & Pinion Yoke Alignment Marks

Courtesy of GENERAL MOTORS COMPANY

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

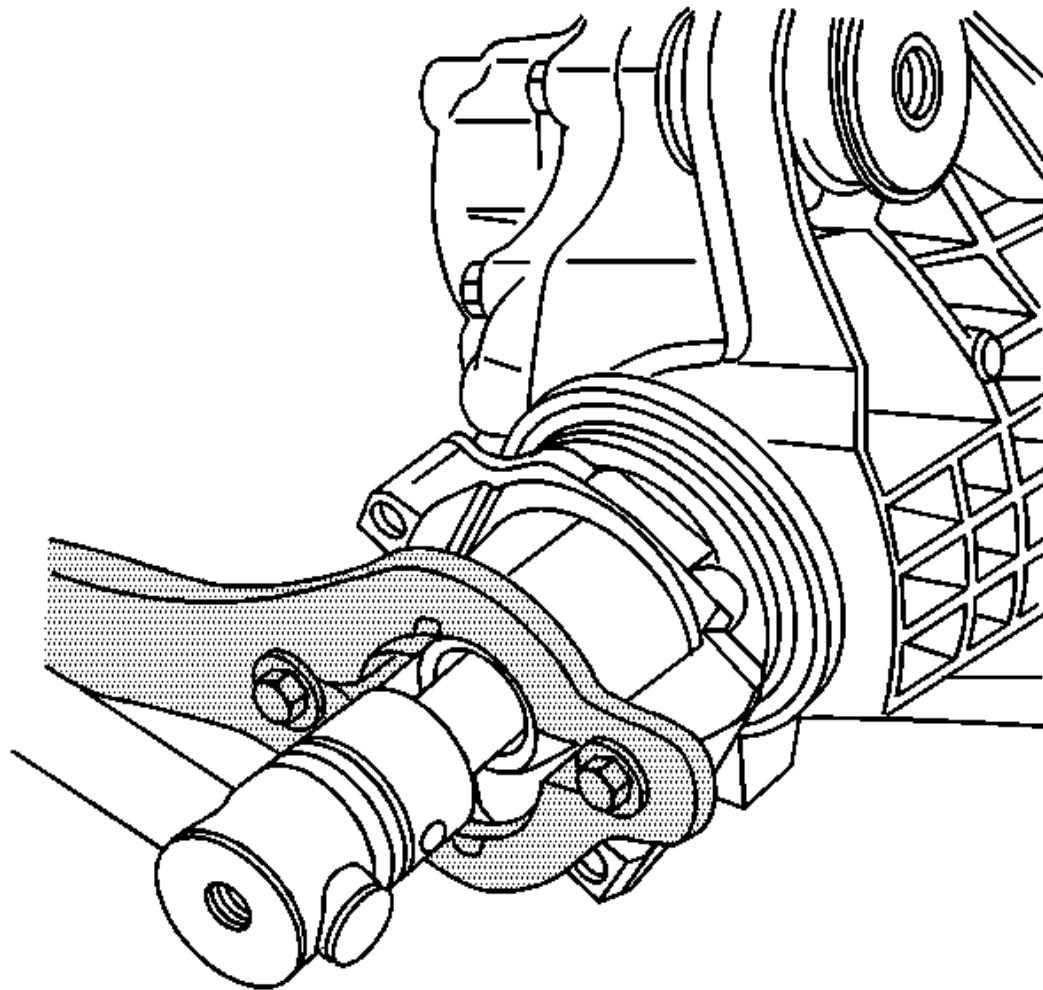


Fig. 125: Holding Pinion Flange Using Special Tool

Courtesy of GENERAL MOTORS COMPANY

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

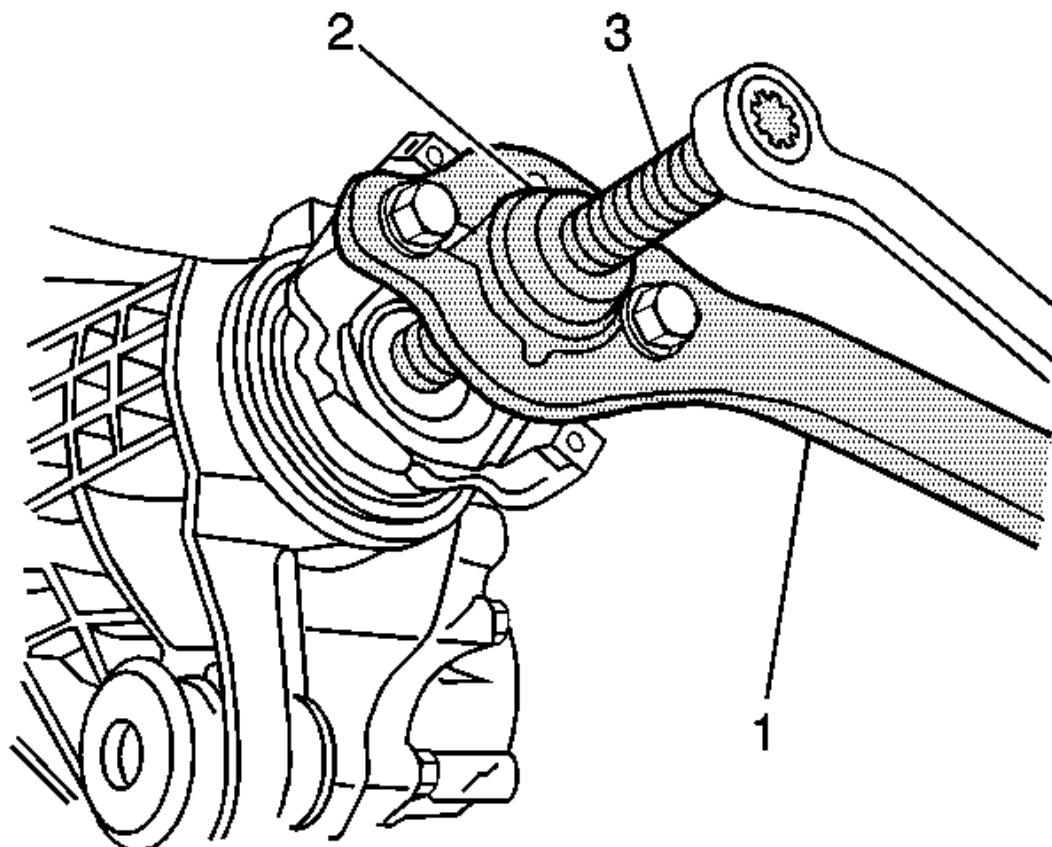


Fig. 126: Removing Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

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

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

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

Installation Procedure

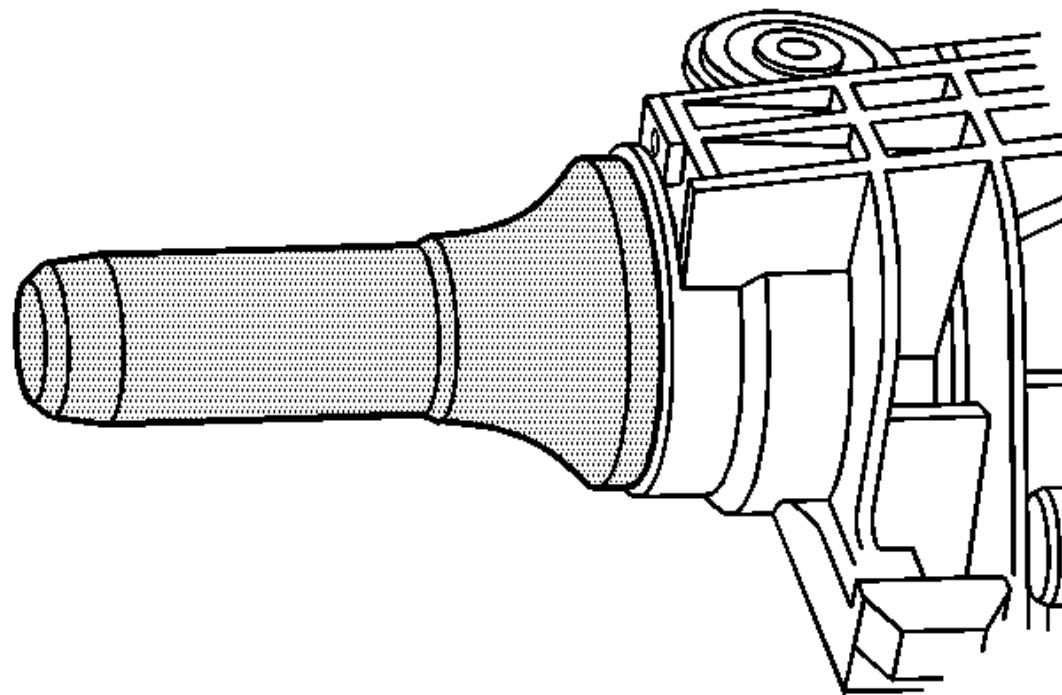


Fig. 127: View Of Oil Seal - Front Axle

Courtesy of GENERAL MOTORS COMPANY

1. Install the oil seal by doing the following:

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

Align the reference marks made during removal.

CAUTION: Refer to Pinion Flange/Yoke Installation Caution .

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

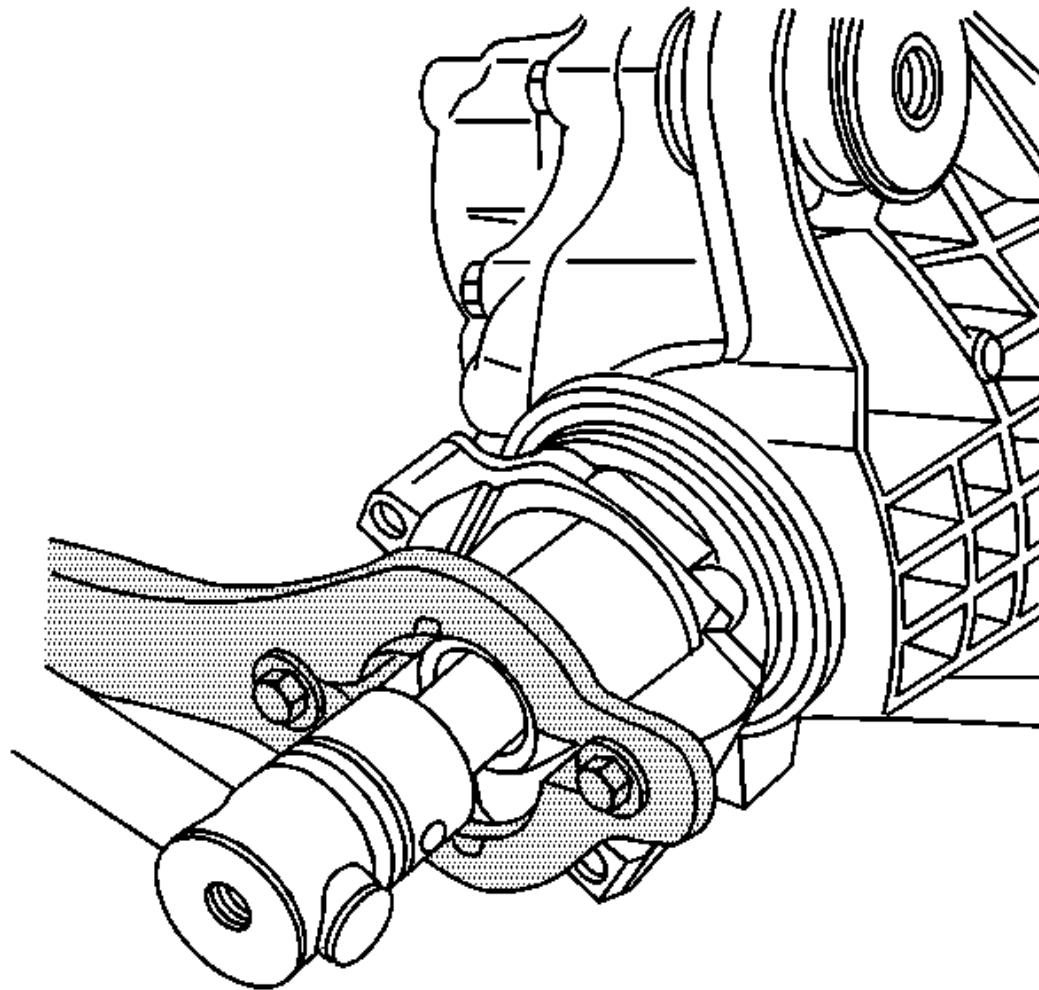


Fig. 128: Holding Pinion Flange Using Special Tool

Courtesy of GENERAL MOTORS COMPANY

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

CAUTION: Refer to Fastener Caution .

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

installed.

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

Tighten

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

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

Compare the measurement with the rotating torque recorded earlier.

Tighten

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.

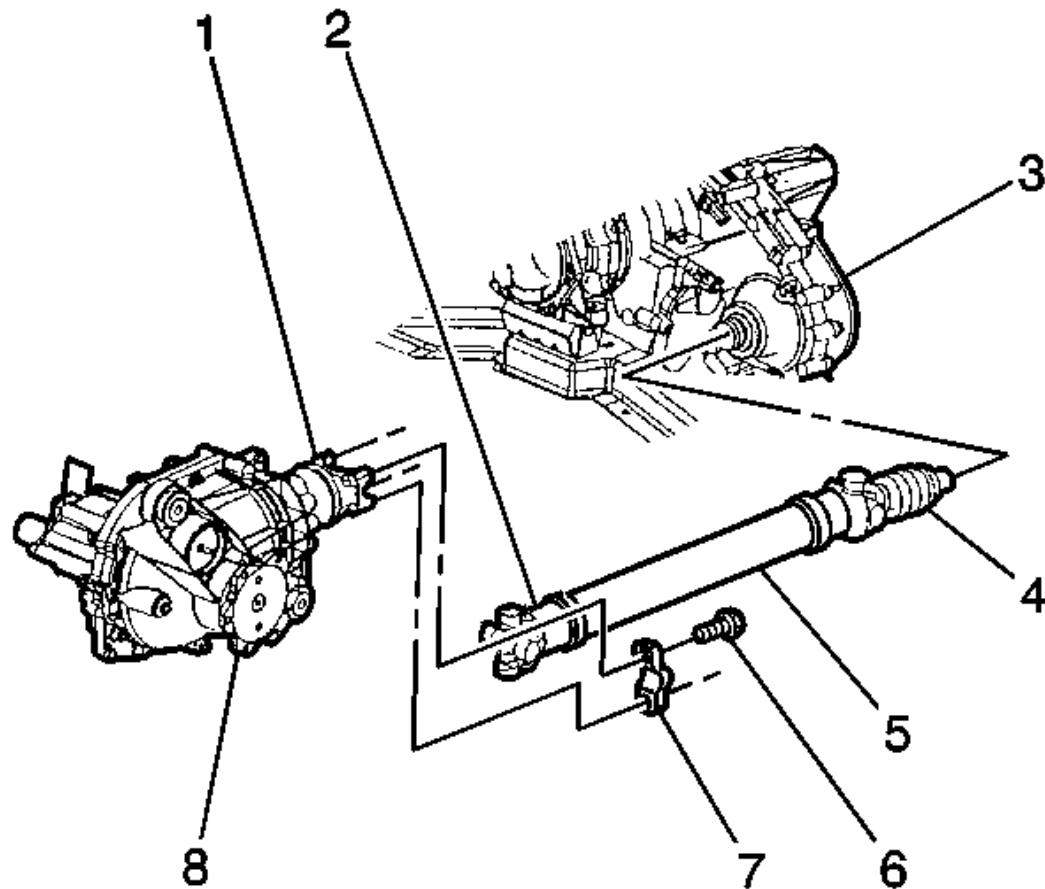


Fig. 129: Front Axle Pinion Yoke, Propeller Shaft Universal Joint, Yoke Retainer & Bolts
Courtesy of GENERAL MOTORS COMPANY

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

Align the reference marks made during removal.

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

Tighten

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

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

13. Install the steering gear skid shield, if equipped. Refer to [**Steering Gear Skid Shield Replacement**](#).

14. Install the brake calipers. Refer to [**Front Brake Caliper Replacement \(JD9\)**](#) [**Front Brake Caliper Replacement \(J95\)**](#).

15. Fill the drive axle. Refer to [**Front Axle Lubricant Replacement \(8.25 Inch LD Axle\)**](#)[**Front Axle Lubricant Replacement \(9.25 Inch HD Axle\)**](#).

16. Install the tire and wheel assemblies. Refer to [**Tire and Wheel Removal and Installation \(6-Lug Wheel\)**](#) [**Tire and Wheel Removal and Installation \(8-Lug Wheel\)**](#).

17. Lower the vehicle.

DIFFERENTIAL CARRIER BUSHING REPLACEMENT (9.25 INCH HD AXLE)

Tools Required

- **J-33791** Carrier Bushing Remover/Installer
- **J-36616** Axle Mount Bushing Remover/Installer

Removal Procedure

1. Remove the differential carrier assembly. Refer to [**Front Axle Replacement \(9.25 Inch HD Axle\)**](#).

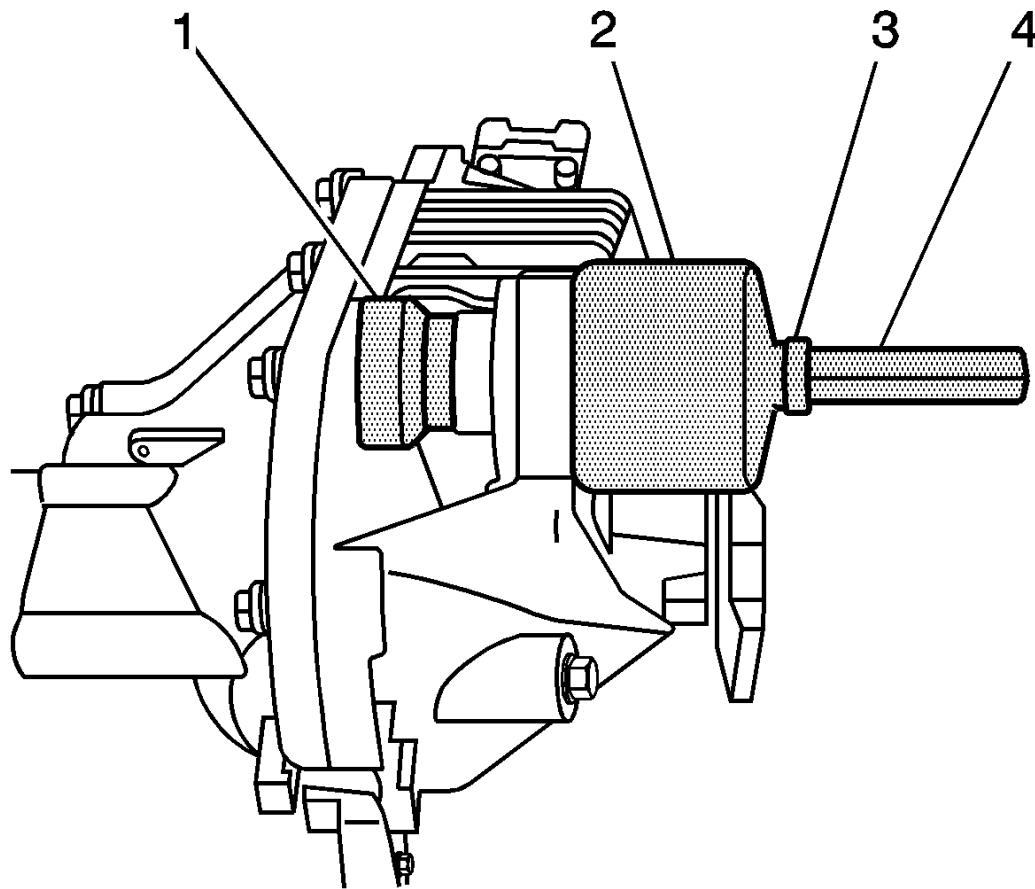


Fig. 130: Upper Differential Carrier Assembly Bushing And Special Tool

Courtesy of GENERAL MOTORS COMPANY

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.

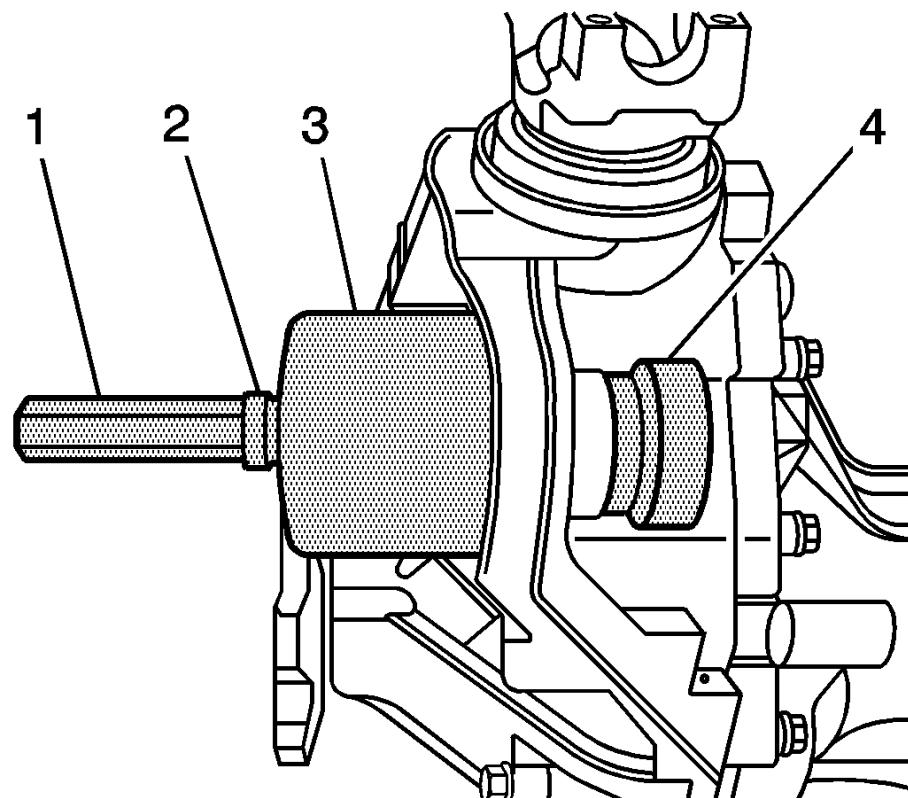


Fig. 131: Lower Differential Carrier Assembly Bushing And Remover

Courtesy of GENERAL MOTORS COMPANY

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

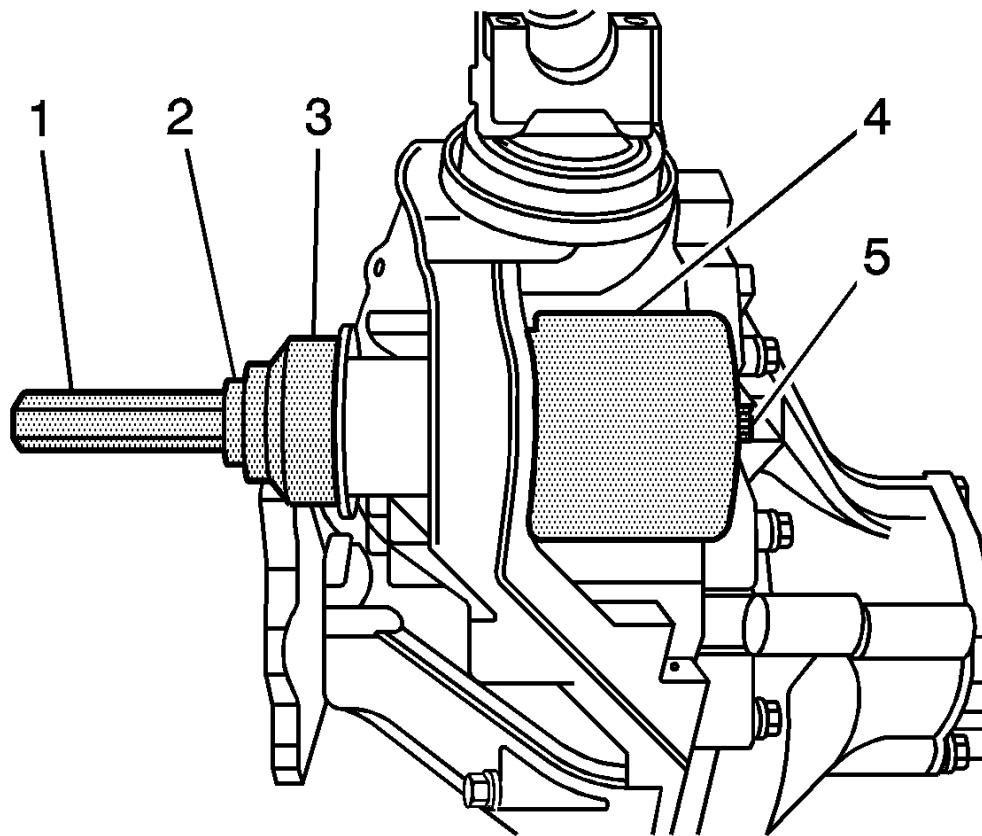


Fig. 132: Lower Differential Carrier Assembly Bushing And Installer

Courtesy of GENERAL MOTORS COMPANY

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.

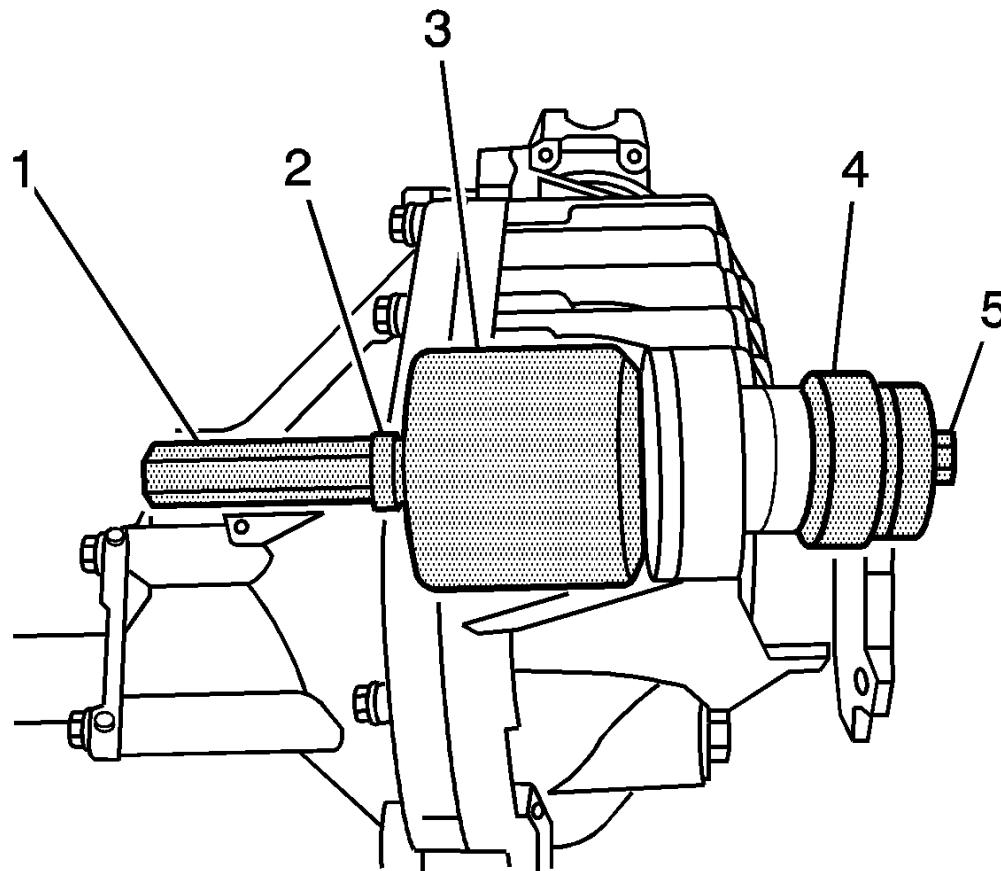


Fig. 133: View Of Special Tools J 21474-18, Thrust Bearing, J 36616-2, J 36616-1, & Forcing Screw
Courtesy of GENERAL MOTORS COMPANY

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 [**Front Axle Replacement \(9.25 Inch HD Axle\)**](#).

FRONT AXLE REPLACEMENT (8.25 INCH LD AXLE)

Removal Procedure

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

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

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

3. Drain the differential carrier. Refer to [**Front Axle Lubricant Replacement \(8.25 Inch LD Axle\)**](#).

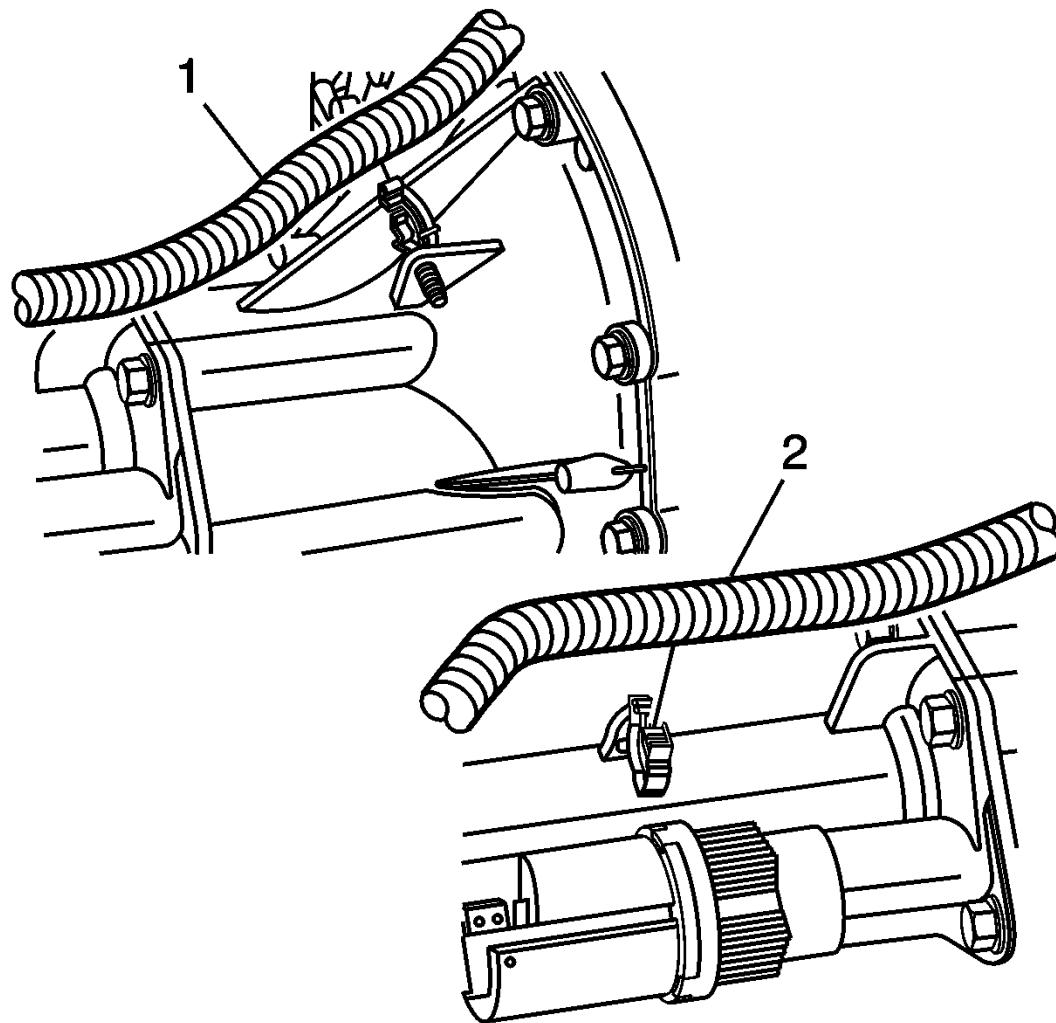


Fig. 134: Wiring Harness From Differential Carrier

Courtesy of GENERAL MOTORS COMPANY

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

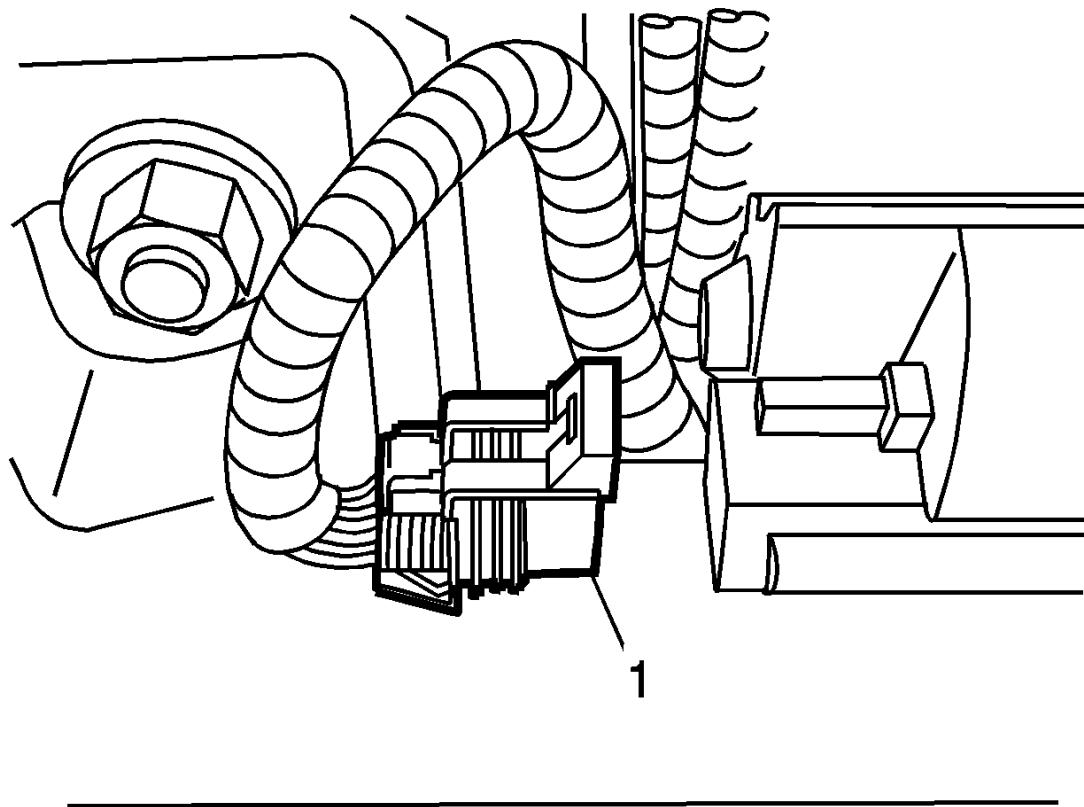


Fig. 135: Axle Actuator Electrical Connector

Courtesy of GENERAL MOTORS COMPANY

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

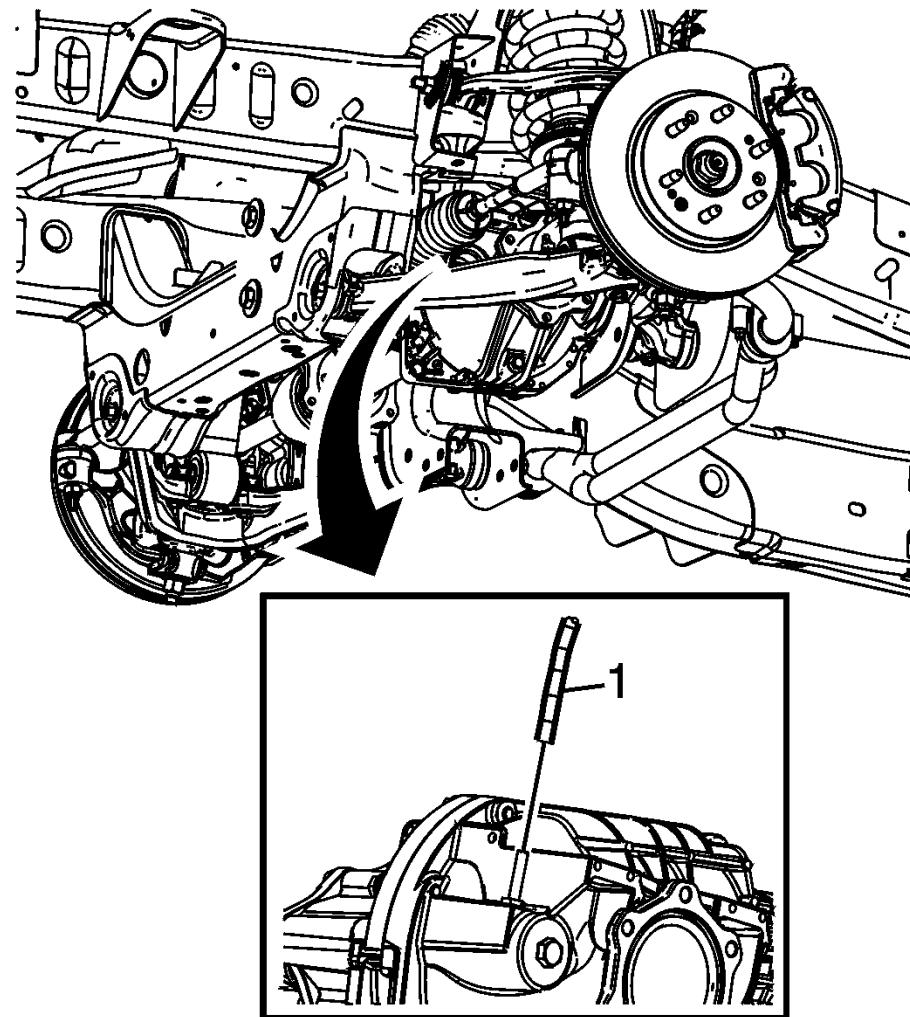


Fig. 136: Differential Carrier Vent Hose
Courtesy of GENERAL MOTORS COMPANY

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

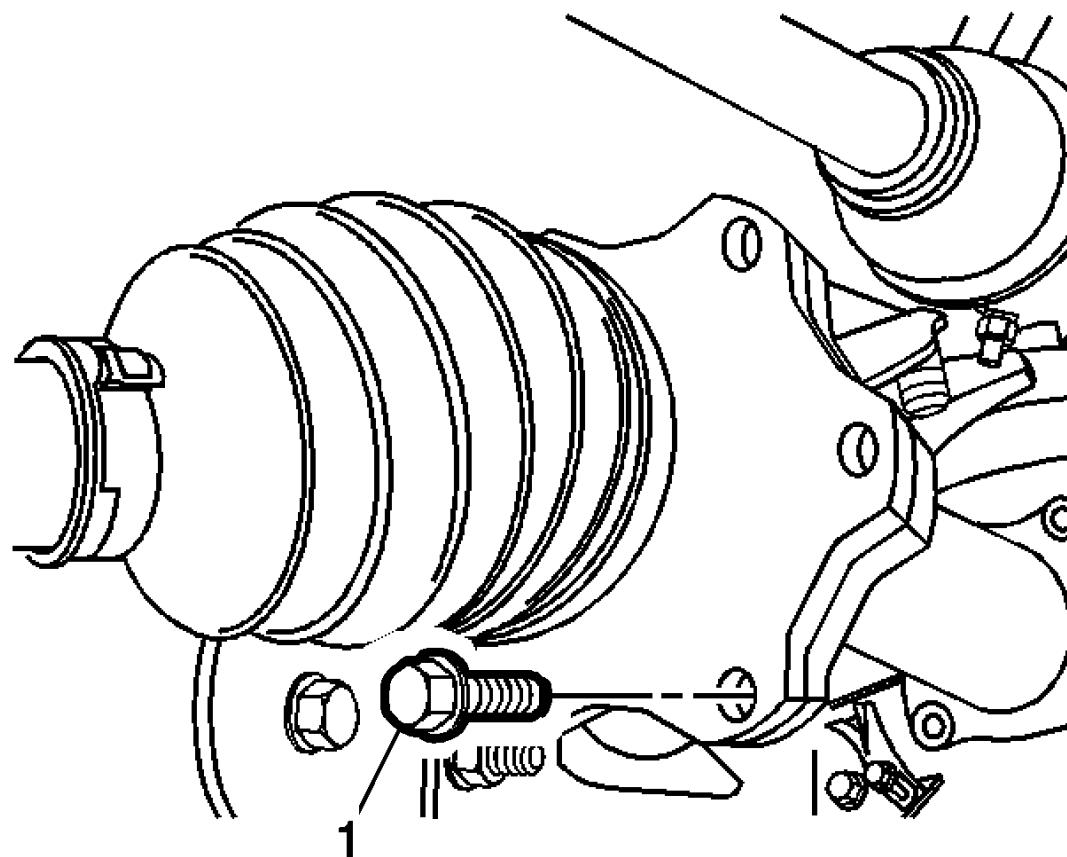


Fig. 137: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

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

NOTE: Loosen the upper steering rack bolts.

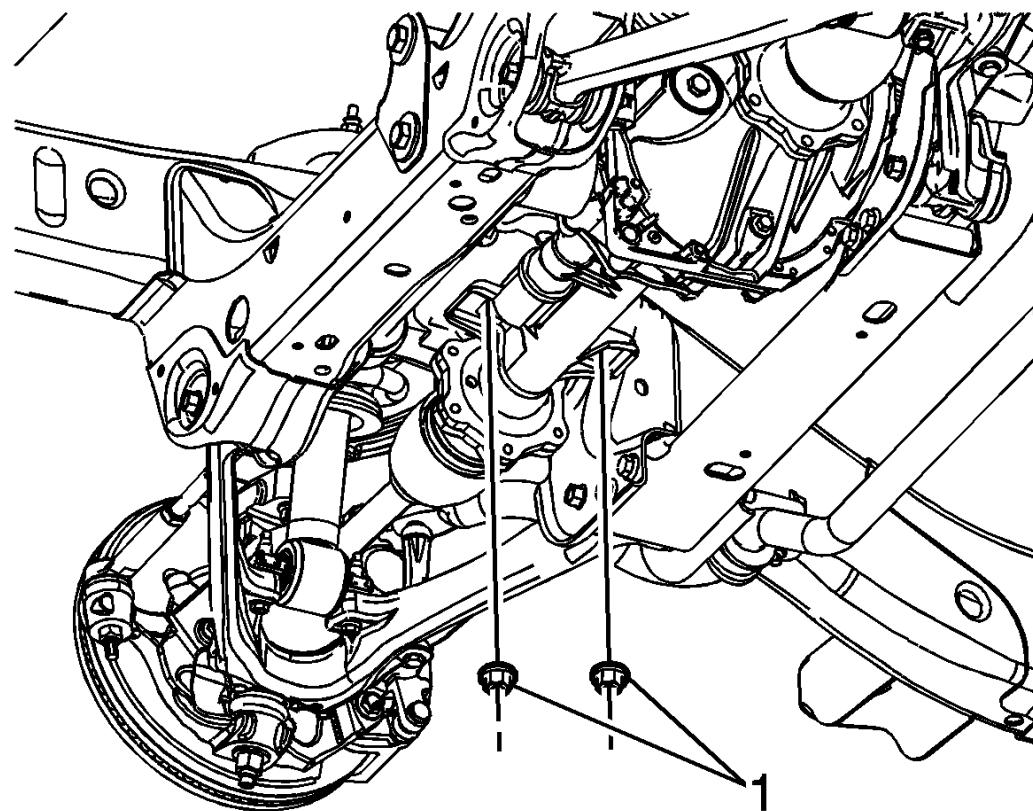


Fig. 138: View Of Right Differential Carrier Mounting Nuts & Washers
Courtesy of GENERAL MOTORS COMPANY

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

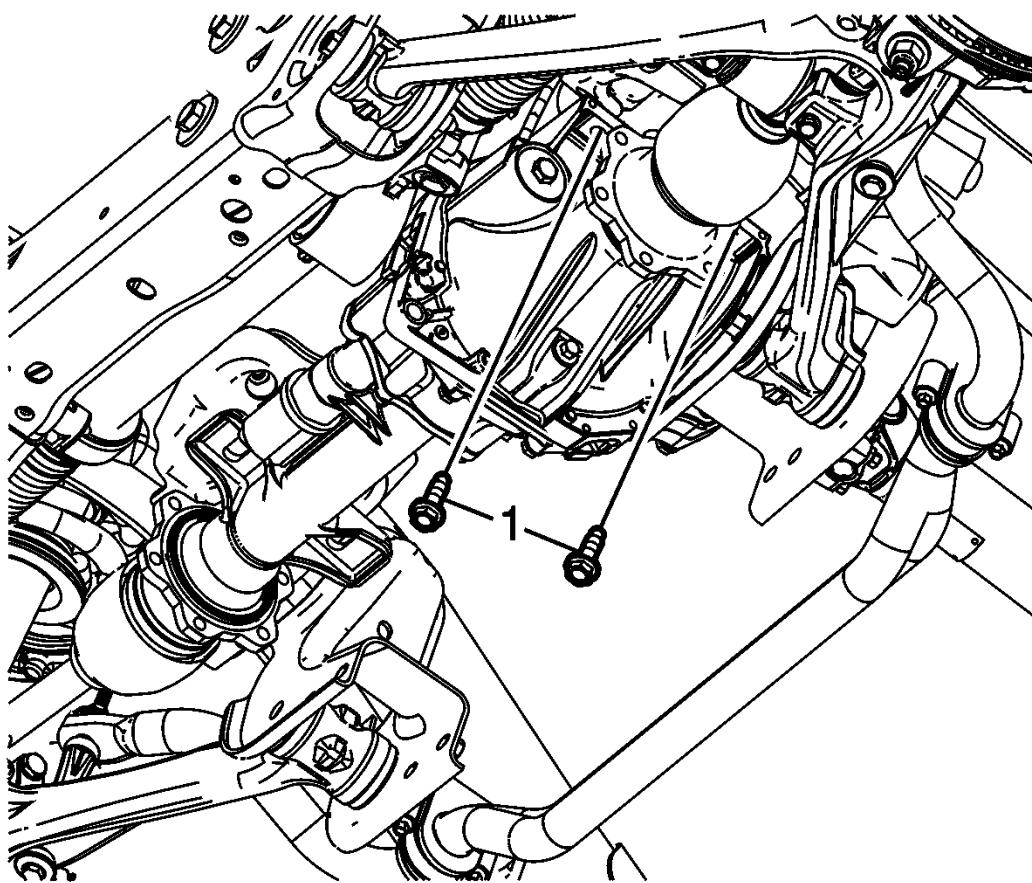


Fig. 139: Left Side Differential Carrier Mounting Bolts

Courtesy of GENERAL MOTORS COMPANY

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

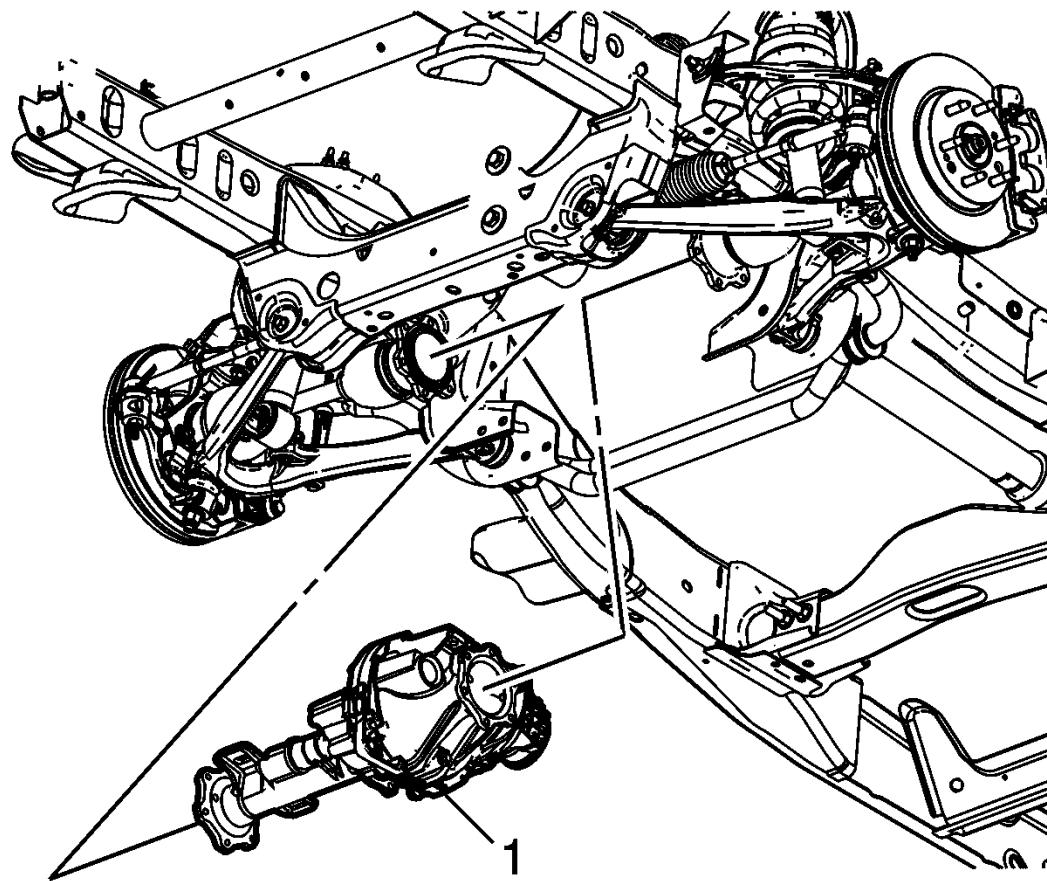


Fig. 140: Differential Carrier Assembly

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

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

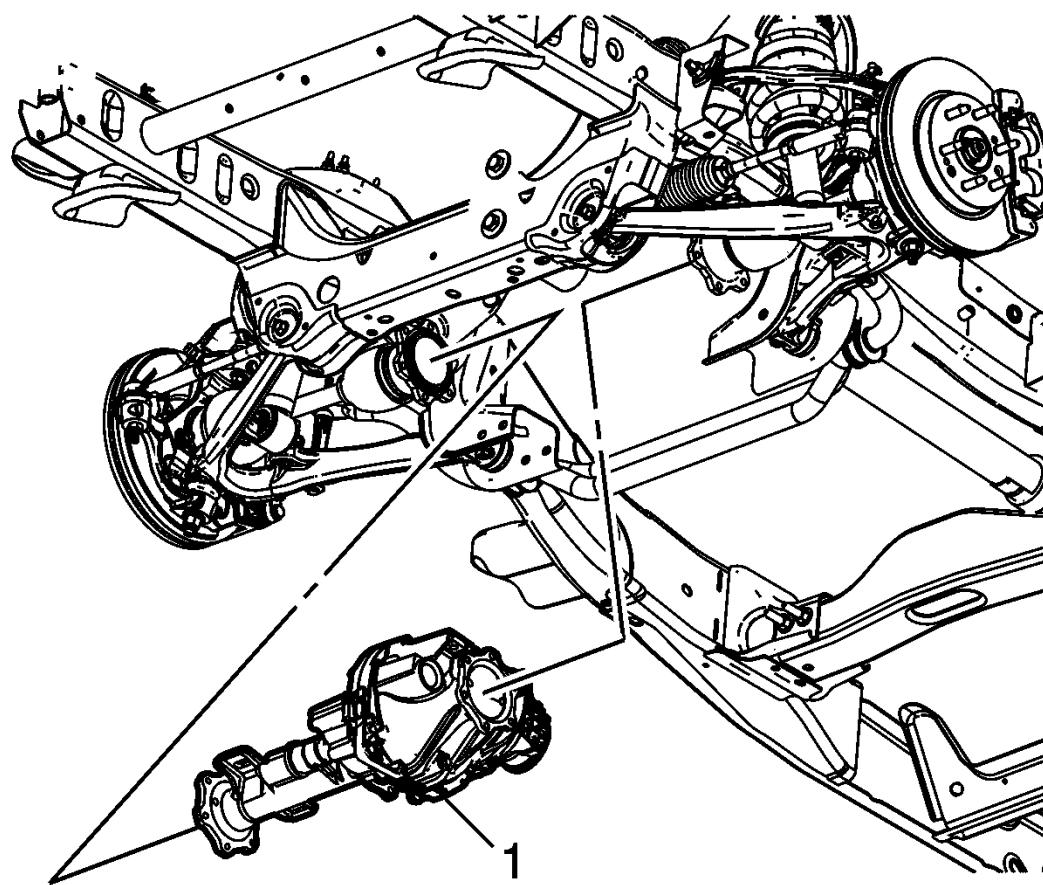


Fig. 141: Differential Carrier Assembly

Courtesy of GENERAL MOTORS COMPANY

2. Install the differential carrier assembly (1).

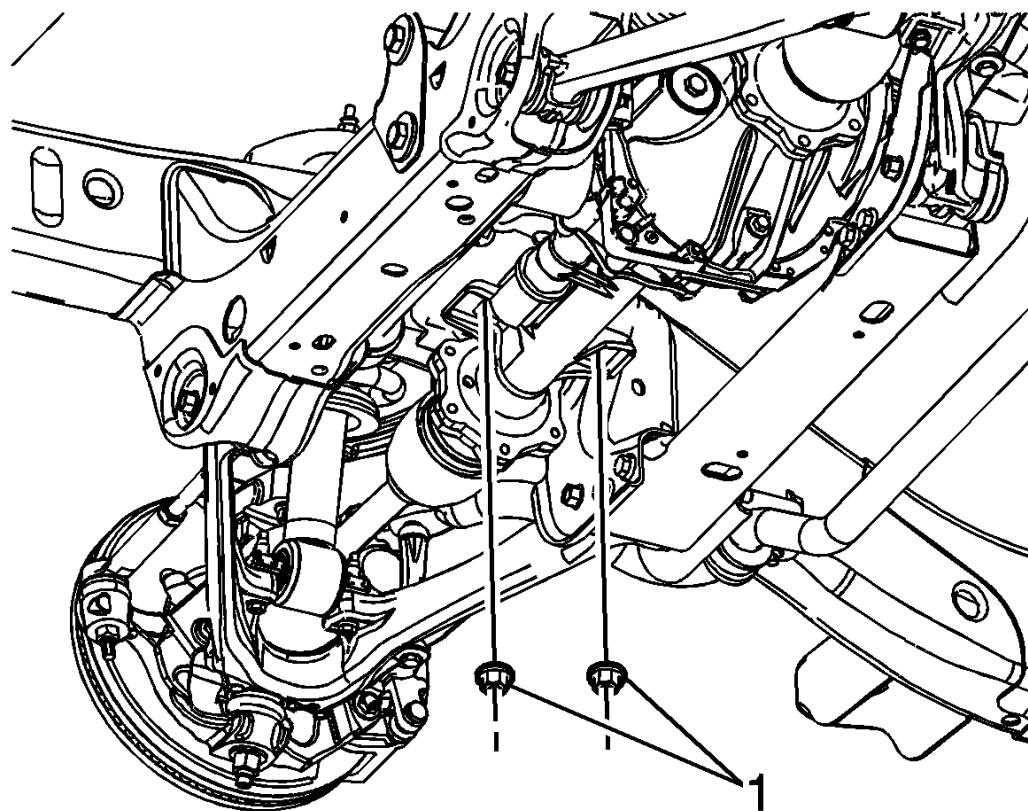


Fig. 142: View Of Right Differential Carrier Mounting Nuts & Washers

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

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

Tighten

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

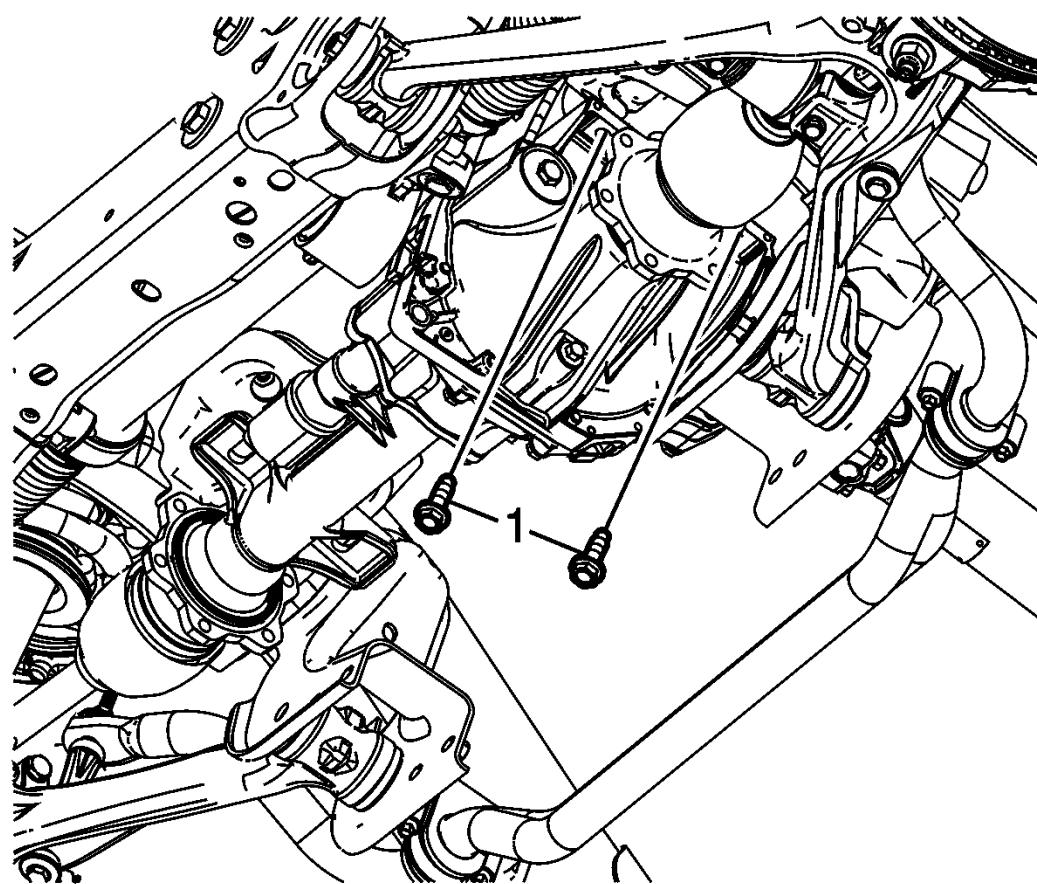


Fig. 143: Left Side Differential Carrier Mounting Bolts

Courtesy of GENERAL MOTORS COMPANY

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

Tighten

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

5. Remove the transmission jack stand.
6. Install the propeller shaft. Refer to [**Front Axle Propeller Shaft Replacement \(NPO\)**](#) [**Front Axle Propeller Shaft Replacement \(NQH\)**](#) [**Front Axle Propeller Shaft Replacement \(Heavy Duty\)**](#) .

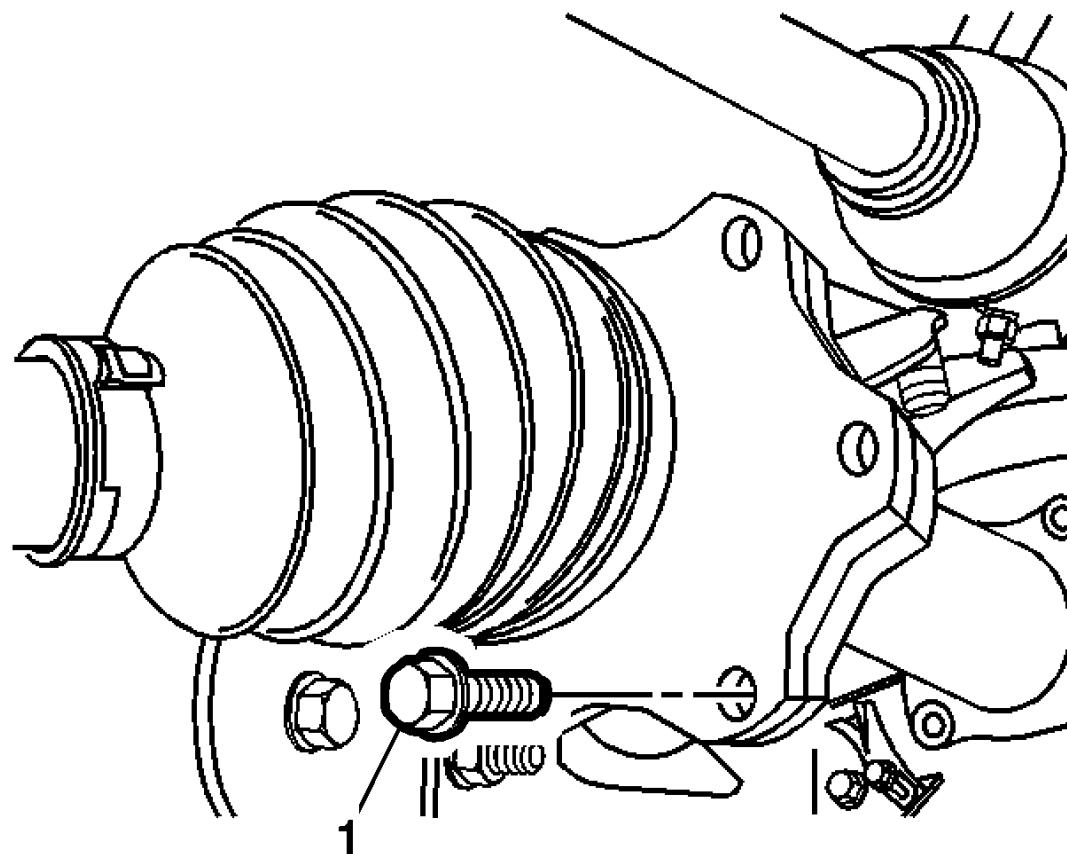


Fig. 144: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

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

Tighten

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

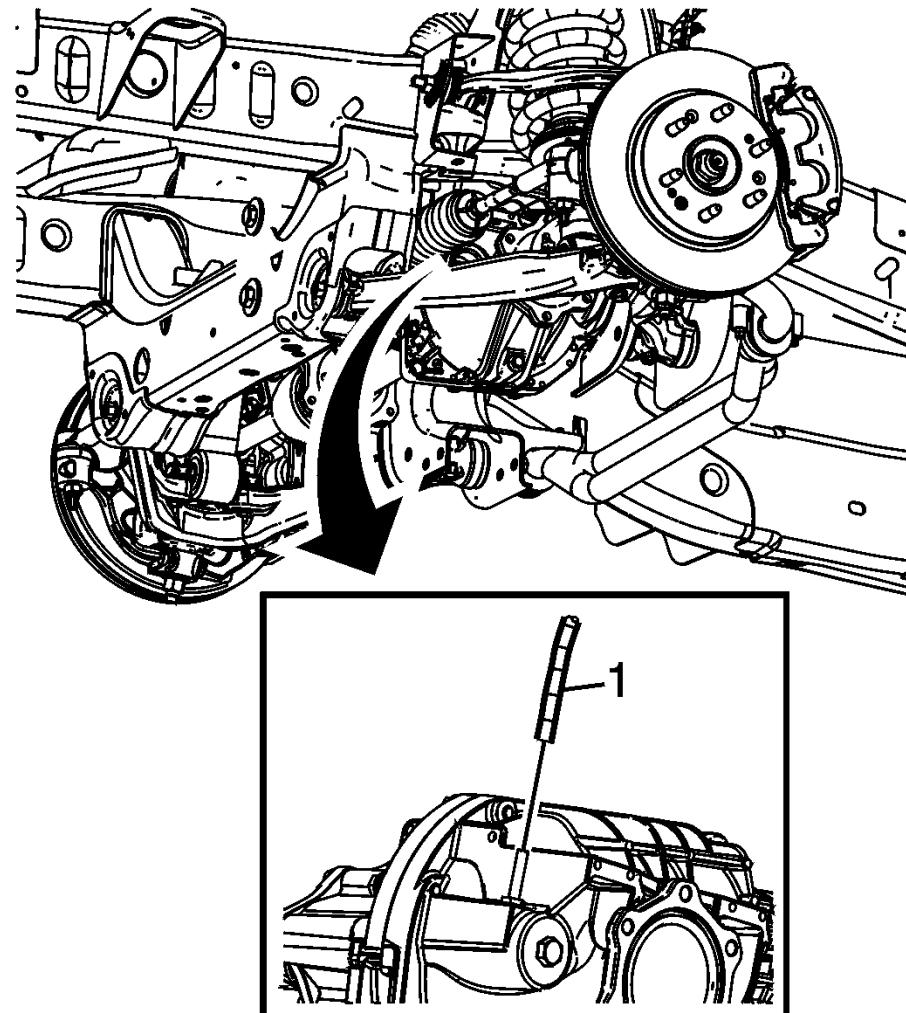


Fig. 145: Differential Carrier Vent Hose

Courtesy of GENERAL MOTORS COMPANY

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

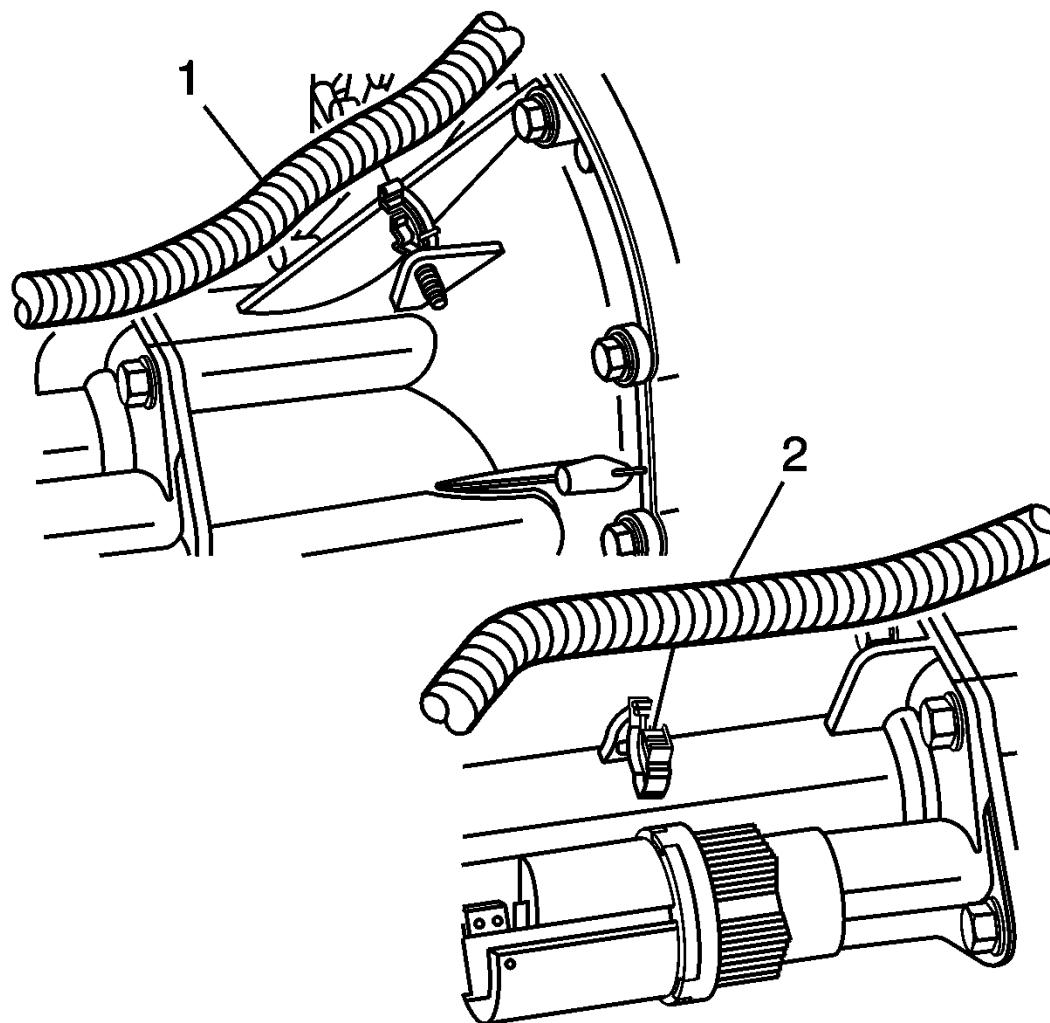


Fig. 146: Wiring Harness From Differential Carrier

Courtesy of GENERAL MOTORS COMPANY

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

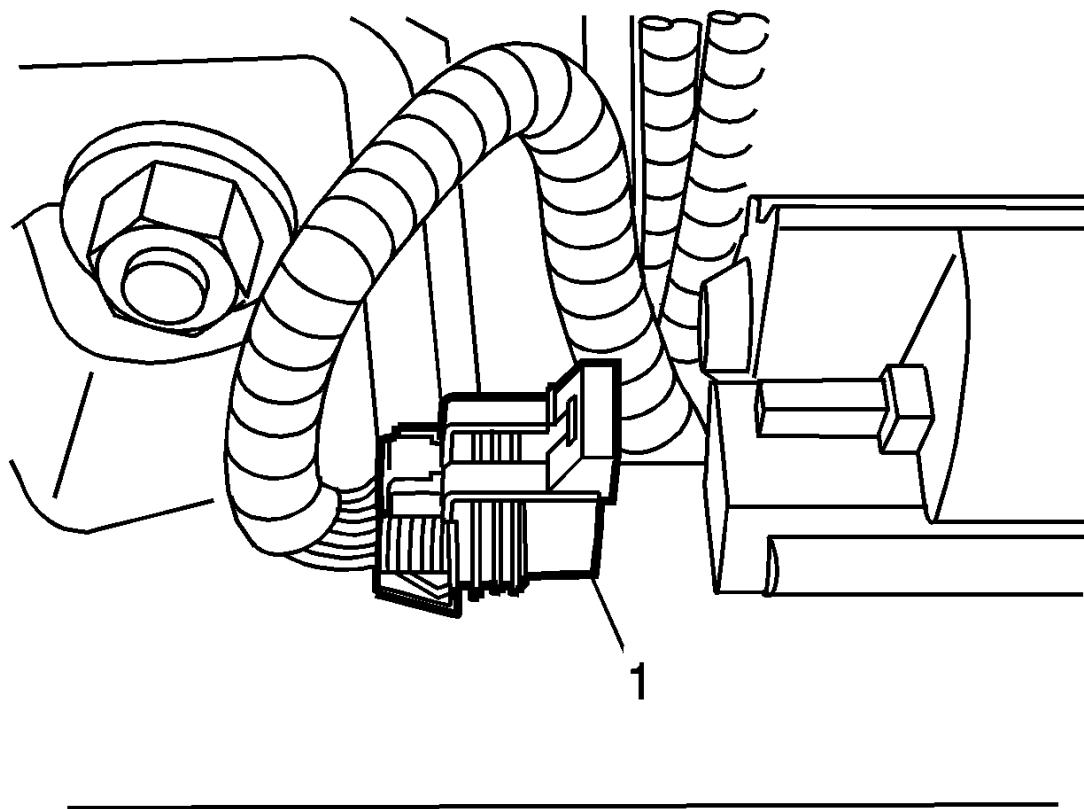


Fig. 147: Axle Actuator Electrical Connector

Courtesy of GENERAL MOTORS COMPANY

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

FRONT AXLE REPLACEMENT (9.25 INCH HD AXLE)

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 steering gear skid shield, if necessary. Refer to [Steering Gear Skid Shield Replacement](#) .
5. Drain the differential carrier assembly. Refer to [Front Axle Lubricant Replacement \(9.25 Inch HD Axle\)](#).
6. Disconnect the front propeller shaft from the differential carrier assembly. Refer to [Front Axle Propeller Shaft Replacement \(NPO\) Front Axle Propeller Shaft Replacement \(NQH\) Front Axle Propeller Shaft Replacement \(Heavy Duty\)](#) .
7. Remove the relay rod. Refer to [Relay Rod Replacement \(Heavy Duty\)](#) .

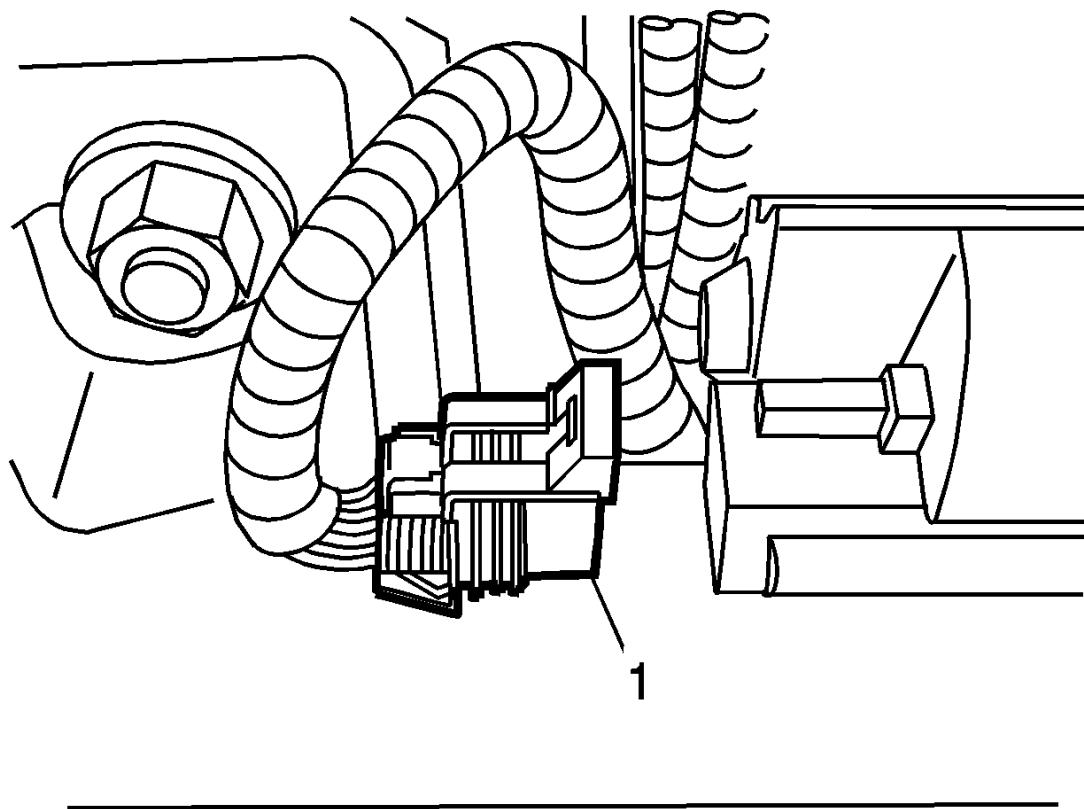


Fig. 148: Axle Actuator Electrical Connector

Courtesy of GENERAL MOTORS COMPANY

8. Disconnect the electrical connector from the front axle actuator.

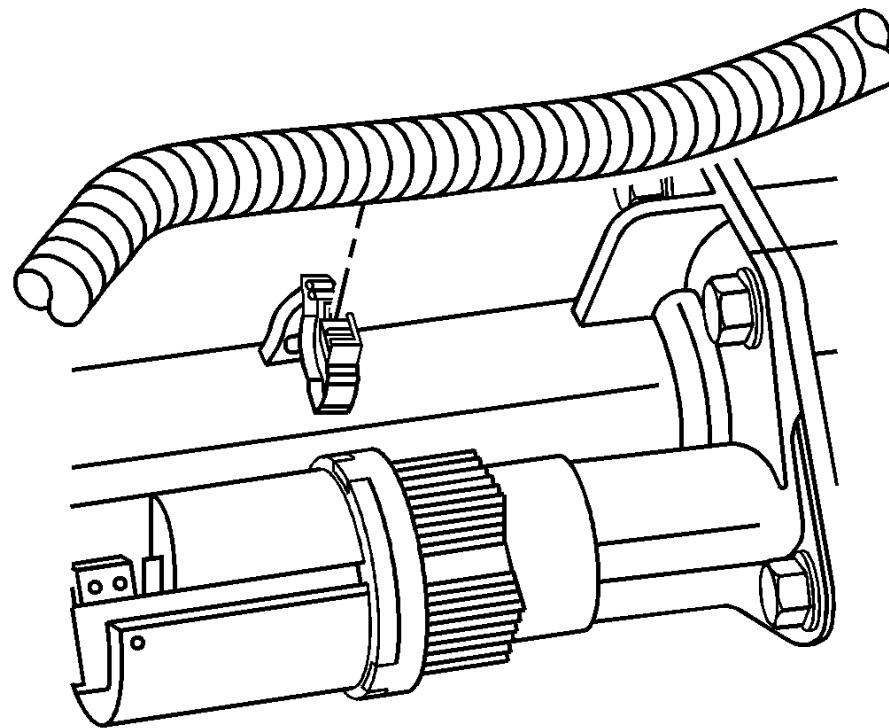


Fig. 149: Disconnecting Wire Harness From Inner Axle Shaft Housing (S4WD Axle Only)

Courtesy of GENERAL MOTORS COMPANY

9. Disconnect the wire harness from the inner axle shaft housing.

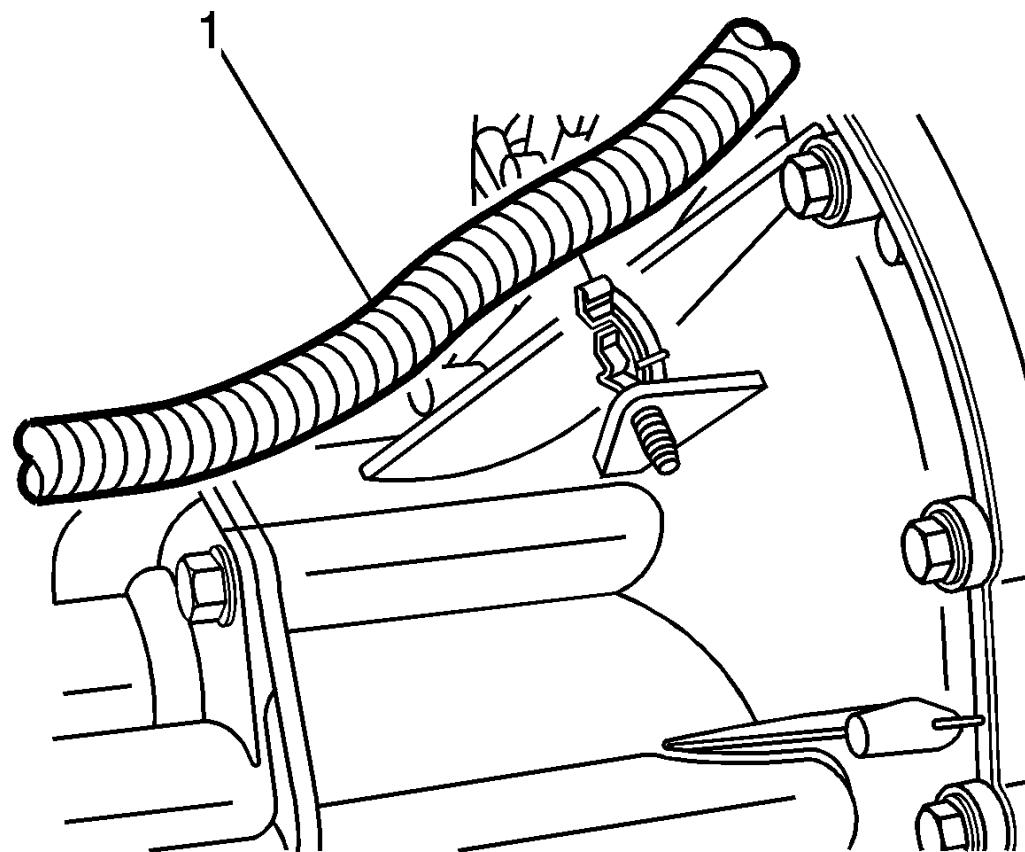


Fig. 150: Disconnecting Wire Harness From Differential Carrier Assembly (S4WD Axle Only)

Courtesy of GENERAL MOTORS COMPANY

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

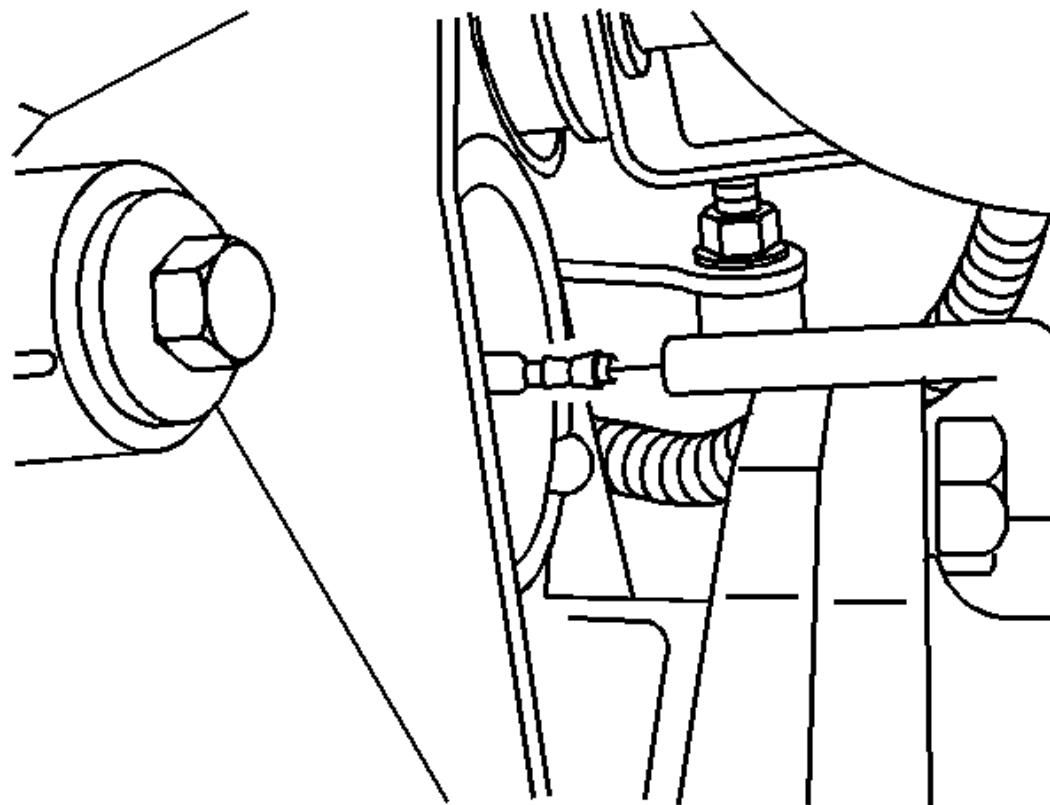


Fig. 151: View Of Vent Hose To Differential Carrier Assembly

Courtesy of GENERAL MOTORS COMPANY

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

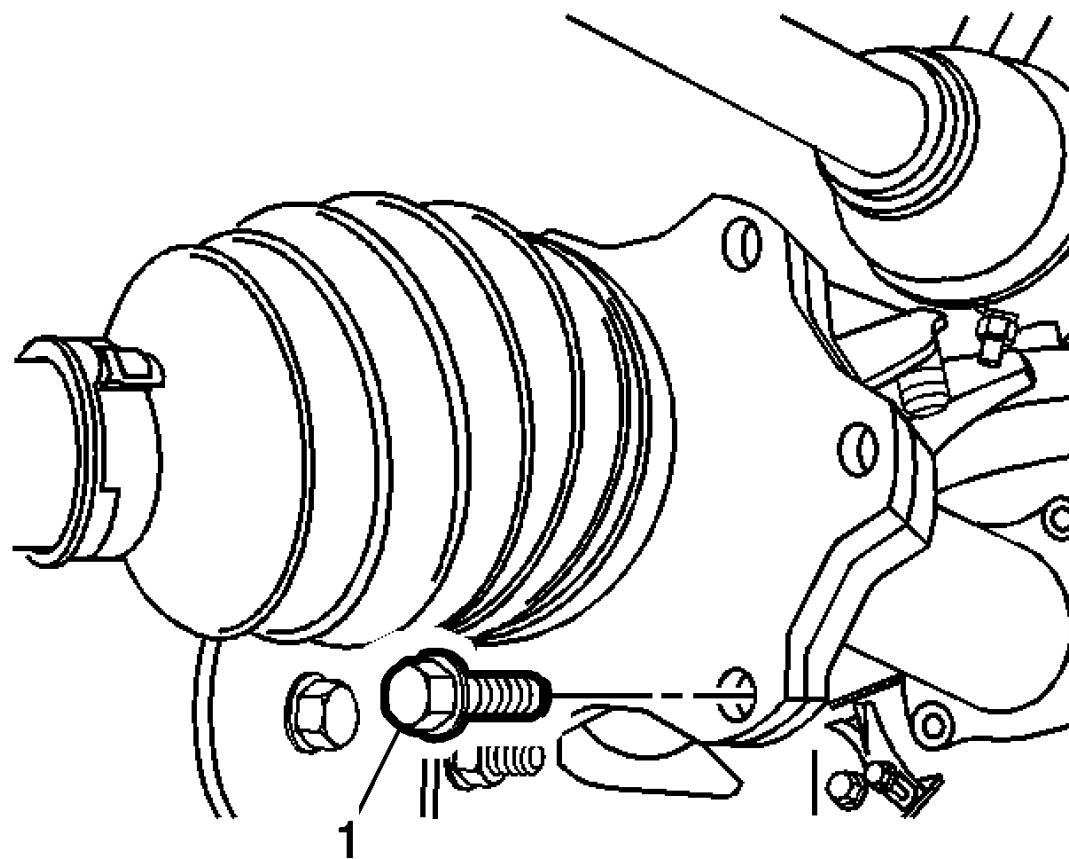


Fig. 152: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

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

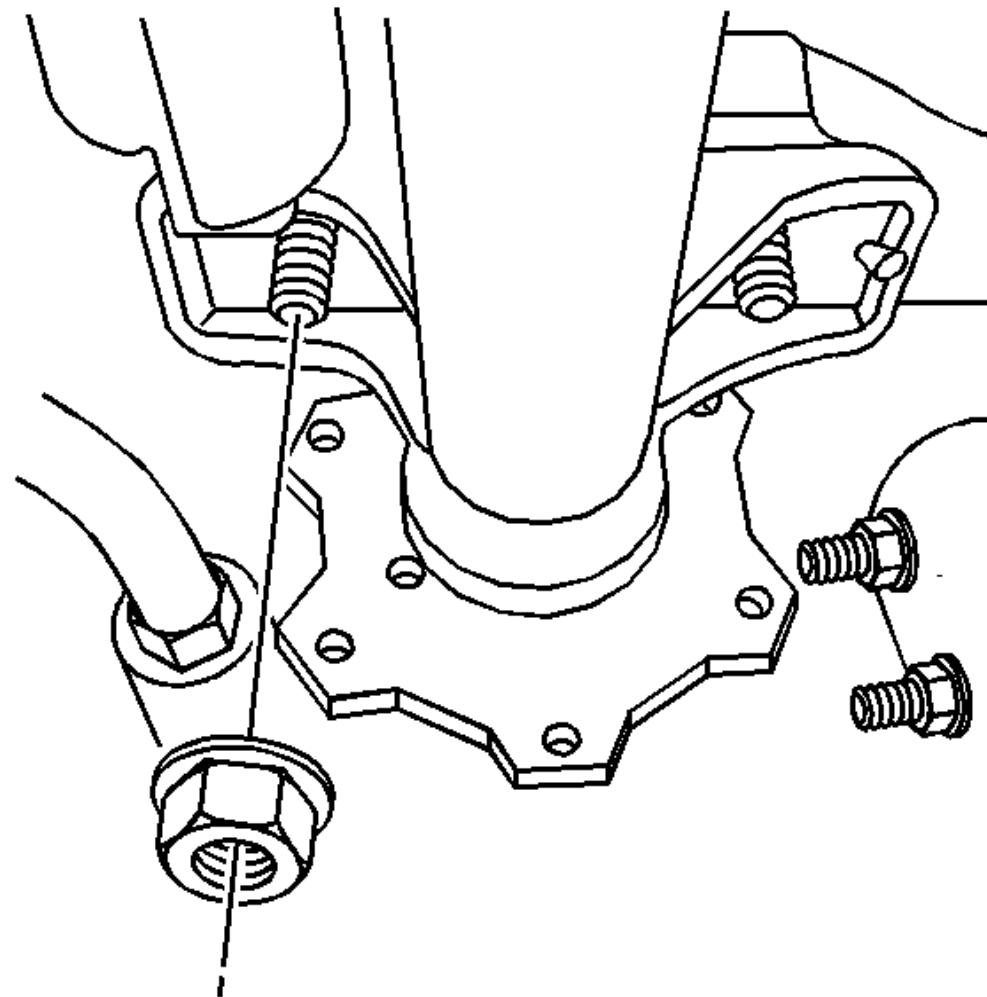


Fig. 153: View Of Inner Axle Housing Nuts

Courtesy of GENERAL MOTORS COMPANY

13. Remove the inner axle housing nuts and washers from the bracket.
14. Support the differential carrier assembly with a transmission jack or equivalent.

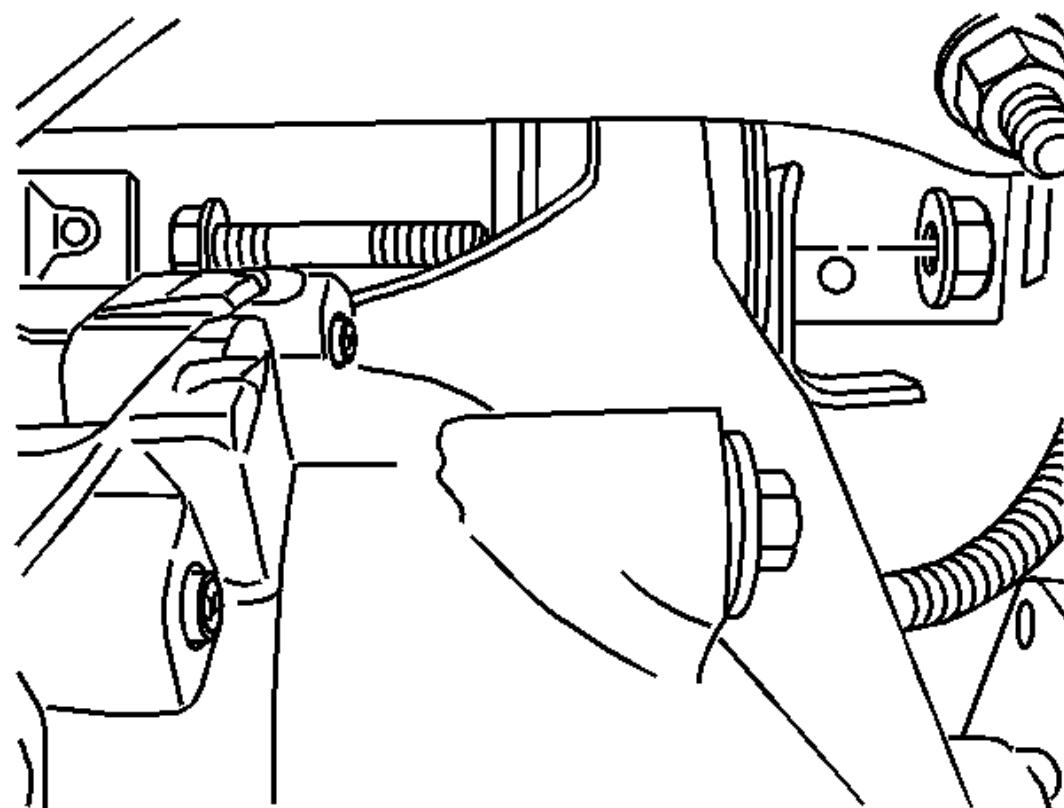


Fig. 154: View Of Differential Carrier Upper Mounting Bolt

Courtesy of GENERAL MOTORS COMPANY

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

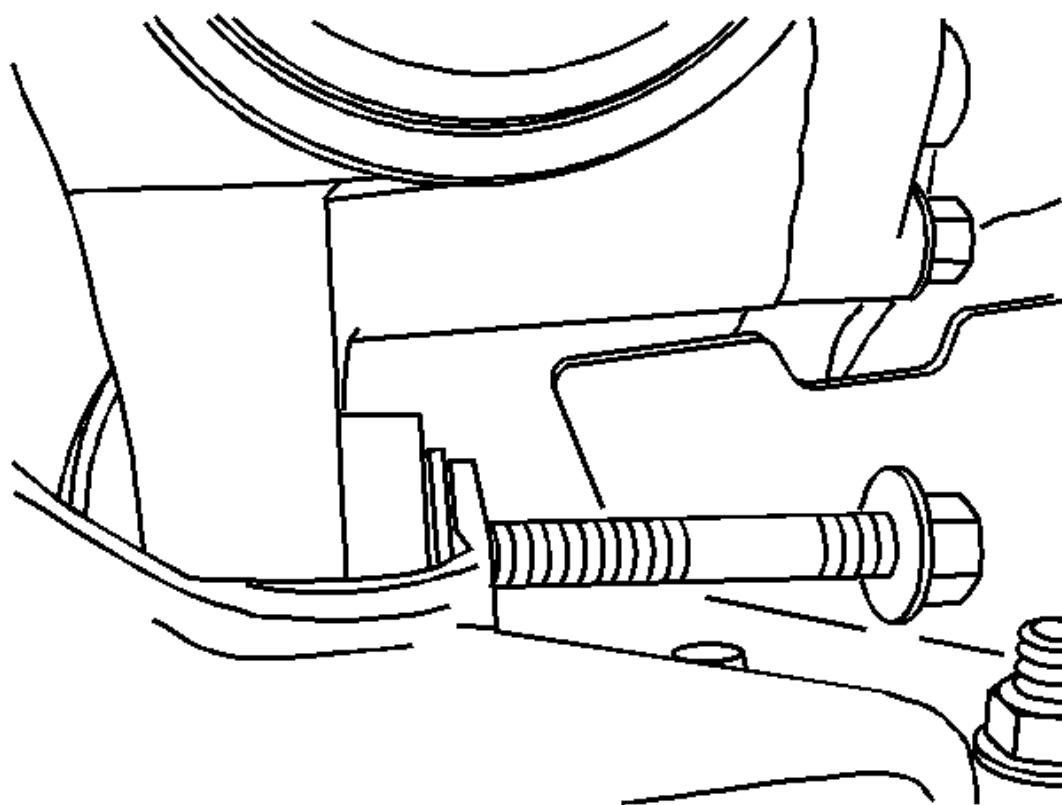


Fig. 155: View Of Differential Carrier Lower Mounting Bolt

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

1. Install the differential carrier assembly.

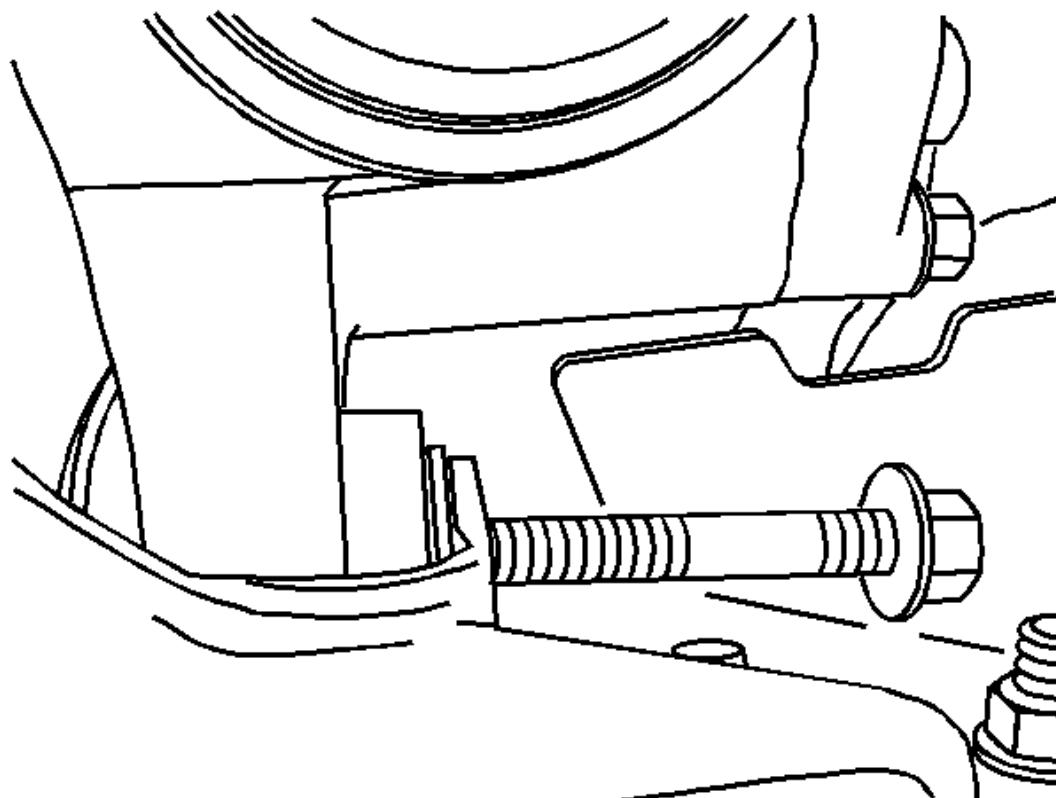


Fig. 156: View Of Differential Carrier Lower Mounting Bolt

Courtesy of GENERAL MOTORS COMPANY

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.

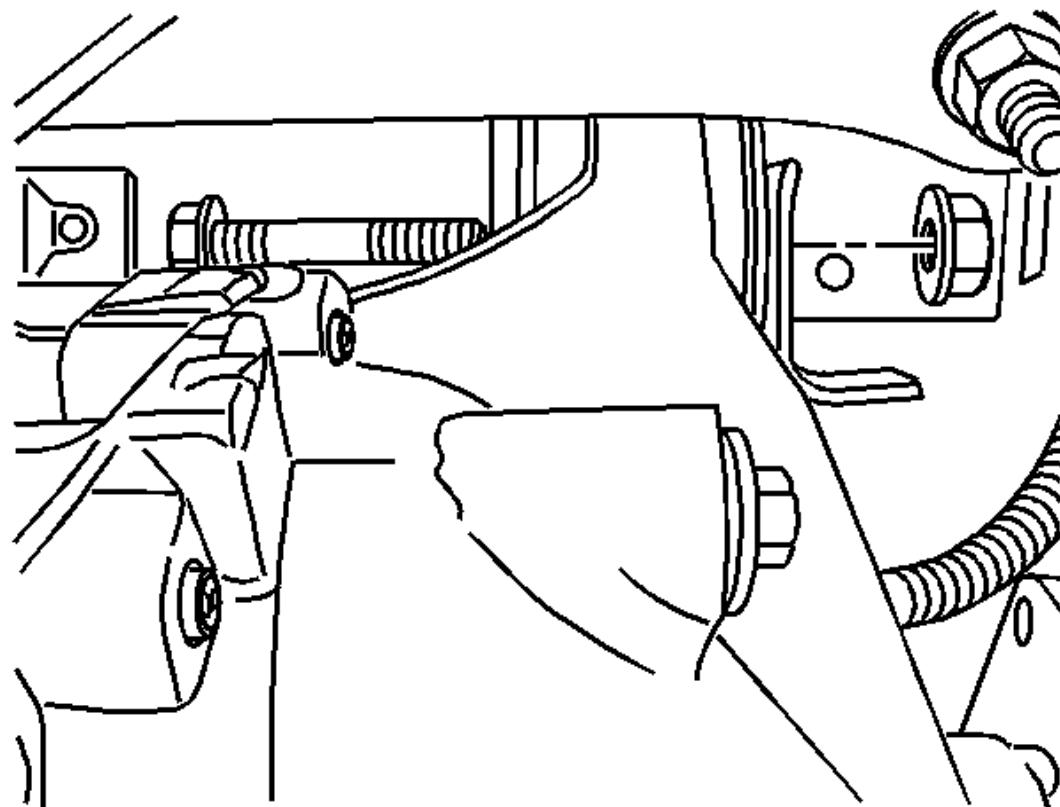


Fig. 157: View Of Differential Carrier Upper Mounting Bolt

Courtesy of GENERAL MOTORS COMPANY

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

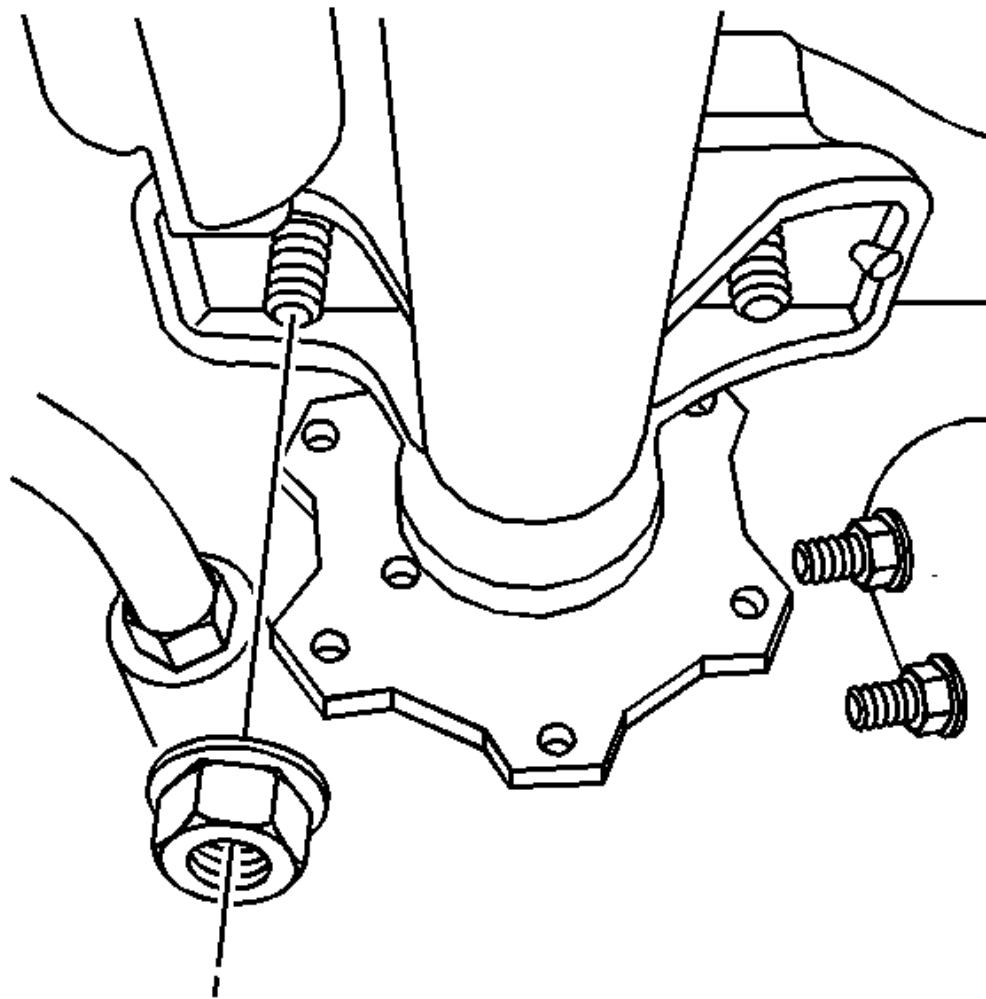


Fig. 158: View Of Inner Axle Housing Nuts

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

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

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

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

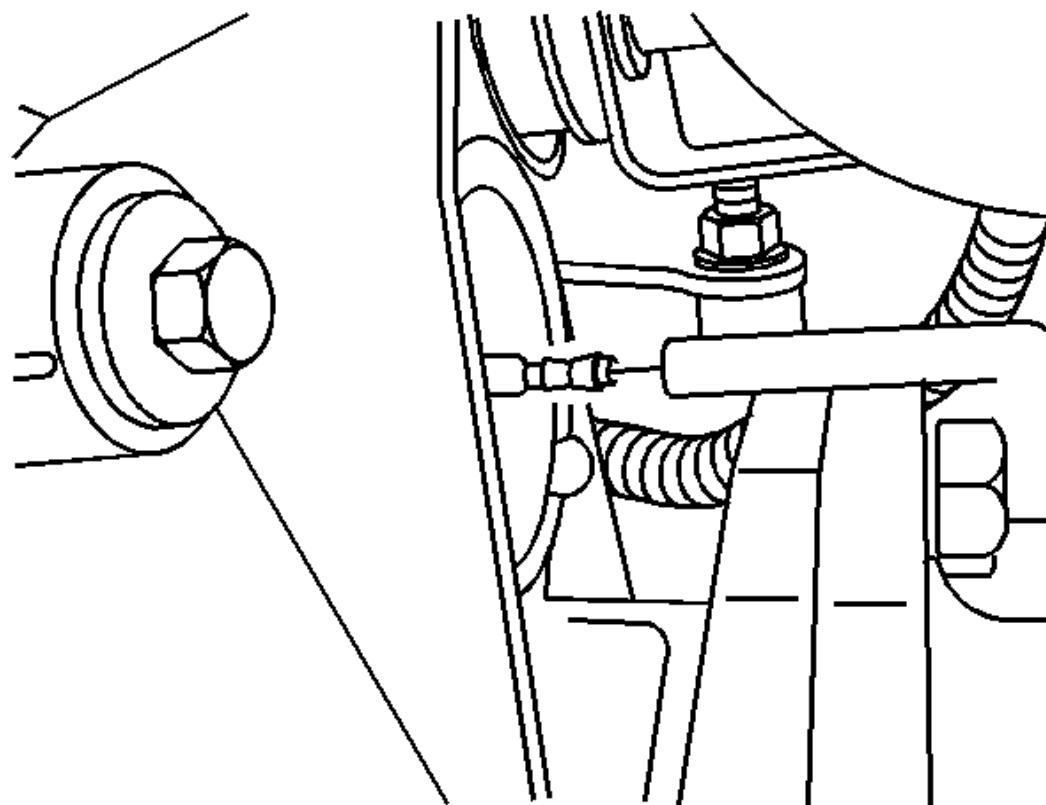


Fig. 159: View Of Vent Hose To Differential Carrier Assembly

Courtesy of GENERAL MOTORS COMPANY

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

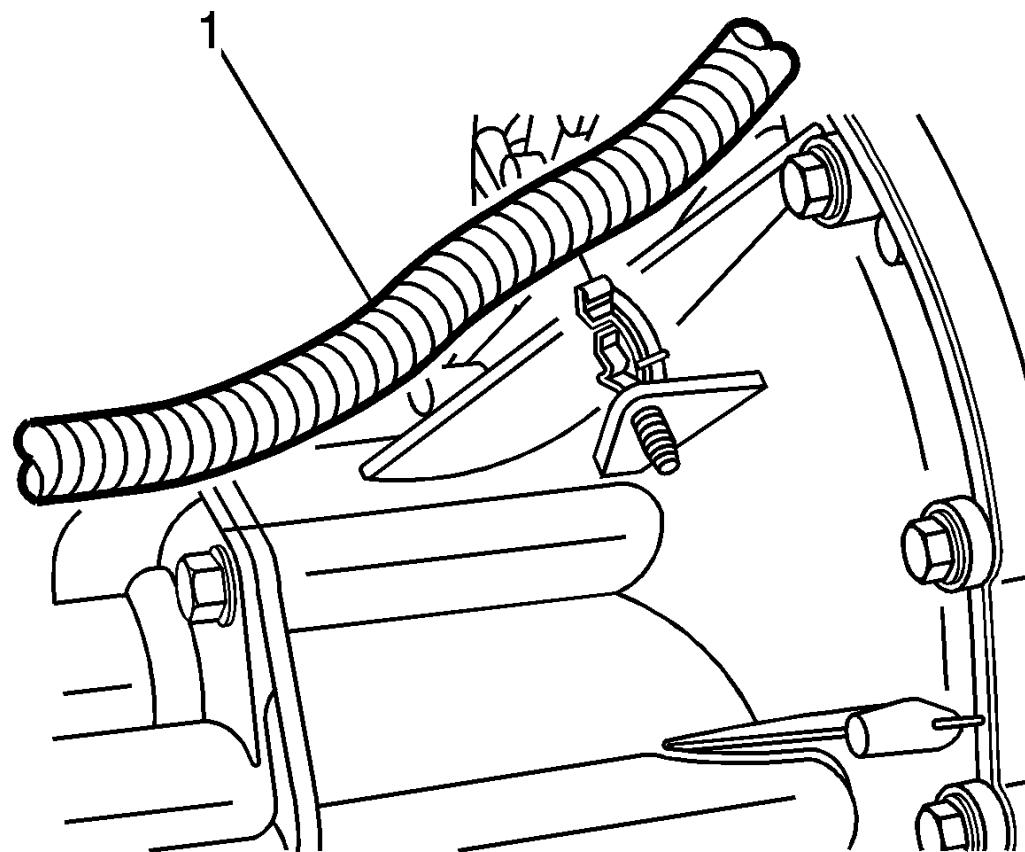


Fig. 160: Disconnecting Wire Harness From Differential Carrier Assembly (S4WD Axle Only)
Courtesy of GENERAL MOTORS COMPANY

8. Connect the wire harness to the differential carrier assembly.

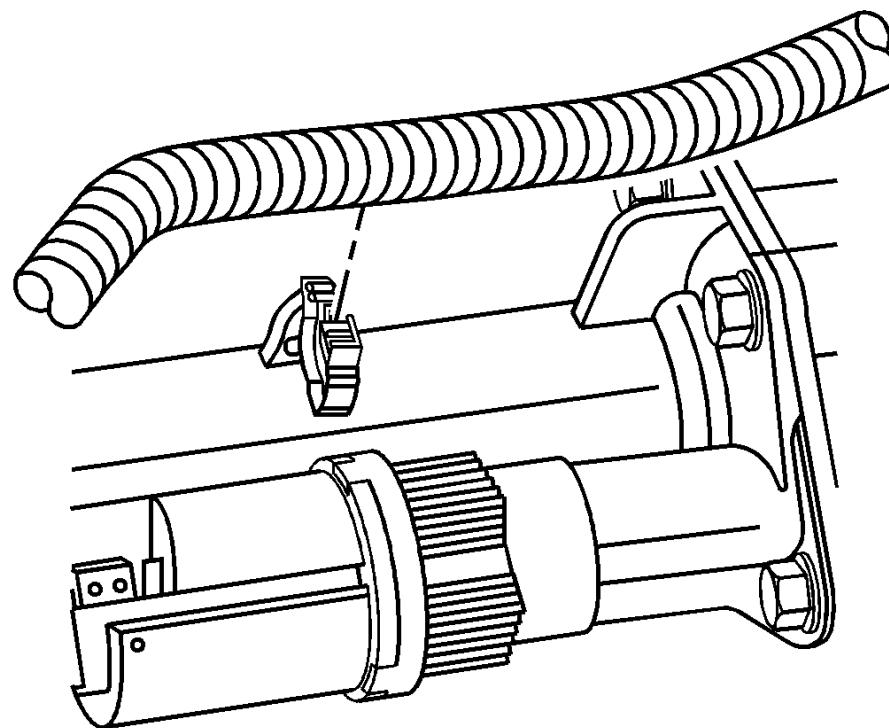


Fig. 161: Disconnecting Wire Harness From Inner Axle Shaft Housing (S4WD Axle Only)
Courtesy of GENERAL MOTORS COMPANY

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

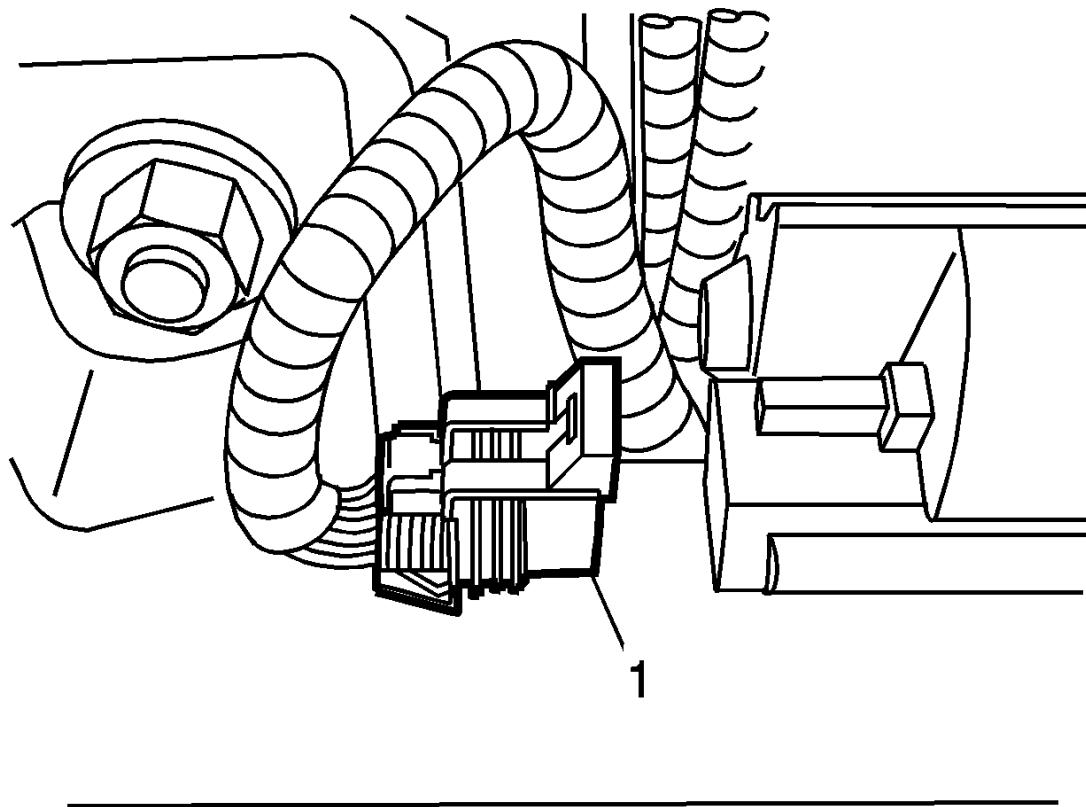


Fig. 162: Axle Actuator Electrical Connector

Courtesy of GENERAL MOTORS COMPANY

10. Connect the electrical connector to the front axle actuator.

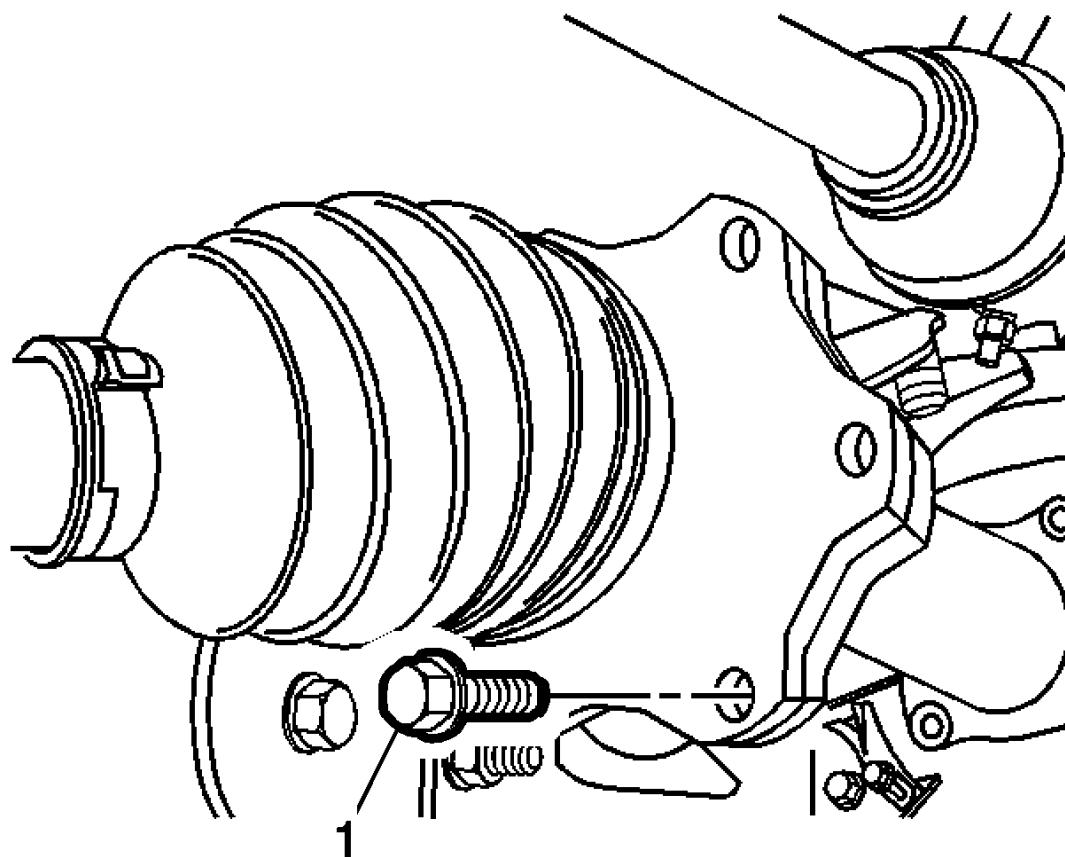


Fig. 163: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

11. Install the wheel drive shaft inboard flange to inner axle shaft bolts, both sides, and tighten to 79 N.m (58 lb ft).
12. Install the relay rod. Refer to [**Relay Rod Replacement \(Heavy Duty\)**](#) .
13. Install the front propeller shaft to the differential carrier assembly. Refer to [**Front Axle Propeller Shaft Replacement \(NPO\) Front Axle Propeller Shaft Replacement \(NQH\) Front Axle Propeller Shaft Replacement \(Heavy Duty\)**](#) .

14. Fill the differential carrier assembly. Use the correct fluid. Refer to [**Front Axle Lubricant Replacement \(8.25 Inch LD Axle\)**](#)[**Front Axle Lubricant Replacement \(9.25 Inch HD Axle\)**](#).
15. Install the steering gear skid shield, if necessary. Refer to [**Steering Gear Skid Shield Replacement**](#).
16. Remove the utility stands.
17. Lower the vehicle.

FRONT DIFFERENTIAL CARRIER BRACKET REPLACEMENT (9.25 INCH HD AXLE)

Removal Procedure

1. Raise the vehicle. Refer to [**Lifting and Jacking the Vehicle**](#).
2. Remove the differential carrier assembly. Refer to [**Front Axle Replacement \(9.25 Inch HD Axle\)**](#).
3. Remove the air conditioning compressor, if necessary. Refer to [**Air Conditioning Compressor Replacement \(L83 L86\)**](#)[**Air Conditioning Compressor Replacement \(L96\)**](#).

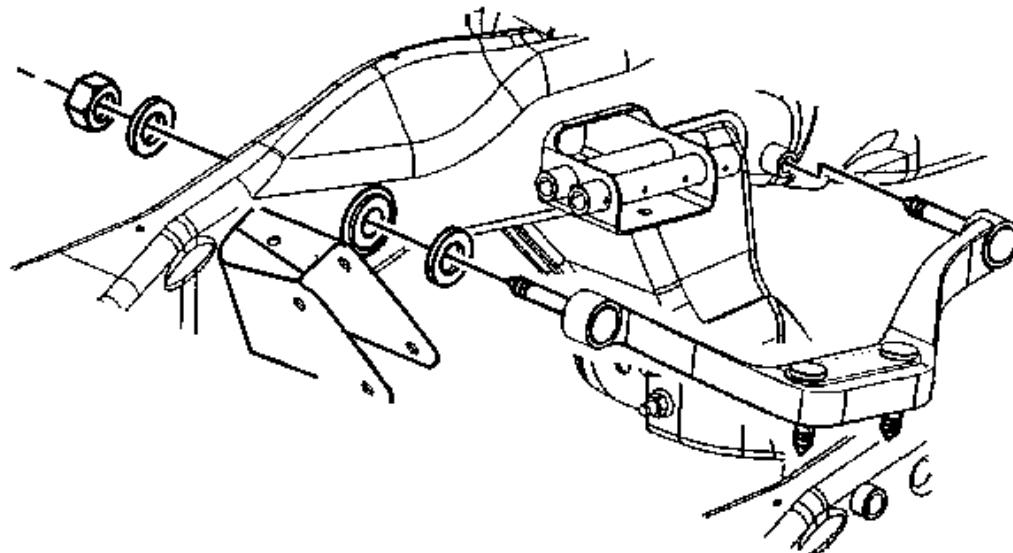


Fig. 164: Front Axle Mounting Bracket

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

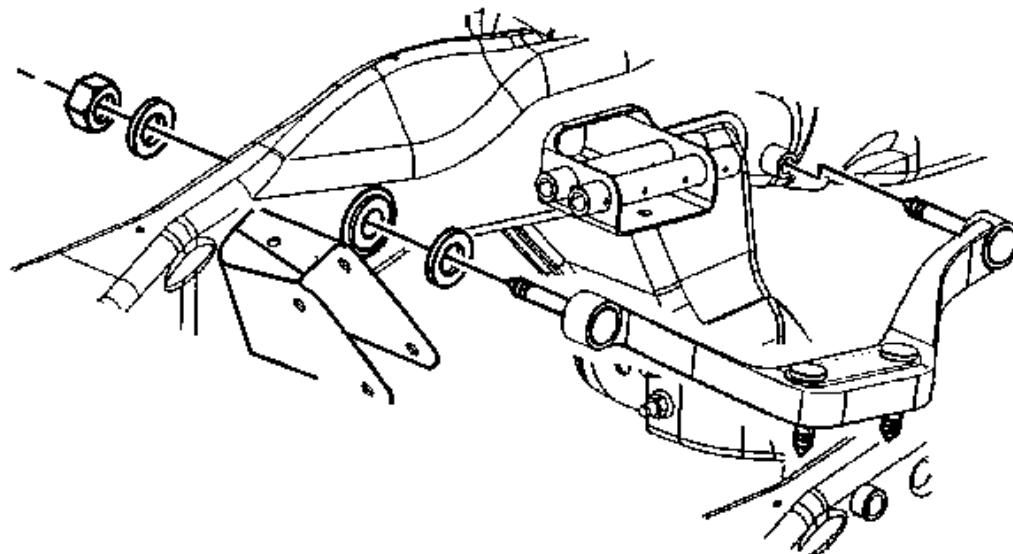


Fig. 165: Front Axle Mounting Bracket

Courtesy of GENERAL MOTORS COMPANY

1. Install the bracket to the vehicle.

CAUTION: Refer to Fastener Caution .

2. Install the washers and the nuts to the bracket and tighten to 90 N.m (67 lb ft).
3. Install the air conditioning compressor, if necessary. Refer to [Air Conditioning Compressor Replacement \(L83 L86\) Air Conditioning Compressor Replacement \(L96\)](#).
4. Install the differential carrier assembly. Refer to [Front Axle Replacement \(9.25 Inch HD Axle\)](#).
5. Lower the vehicle.

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

Removal Procedure

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

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

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

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

7. Loosen the left front differential carrier bracket bolts.

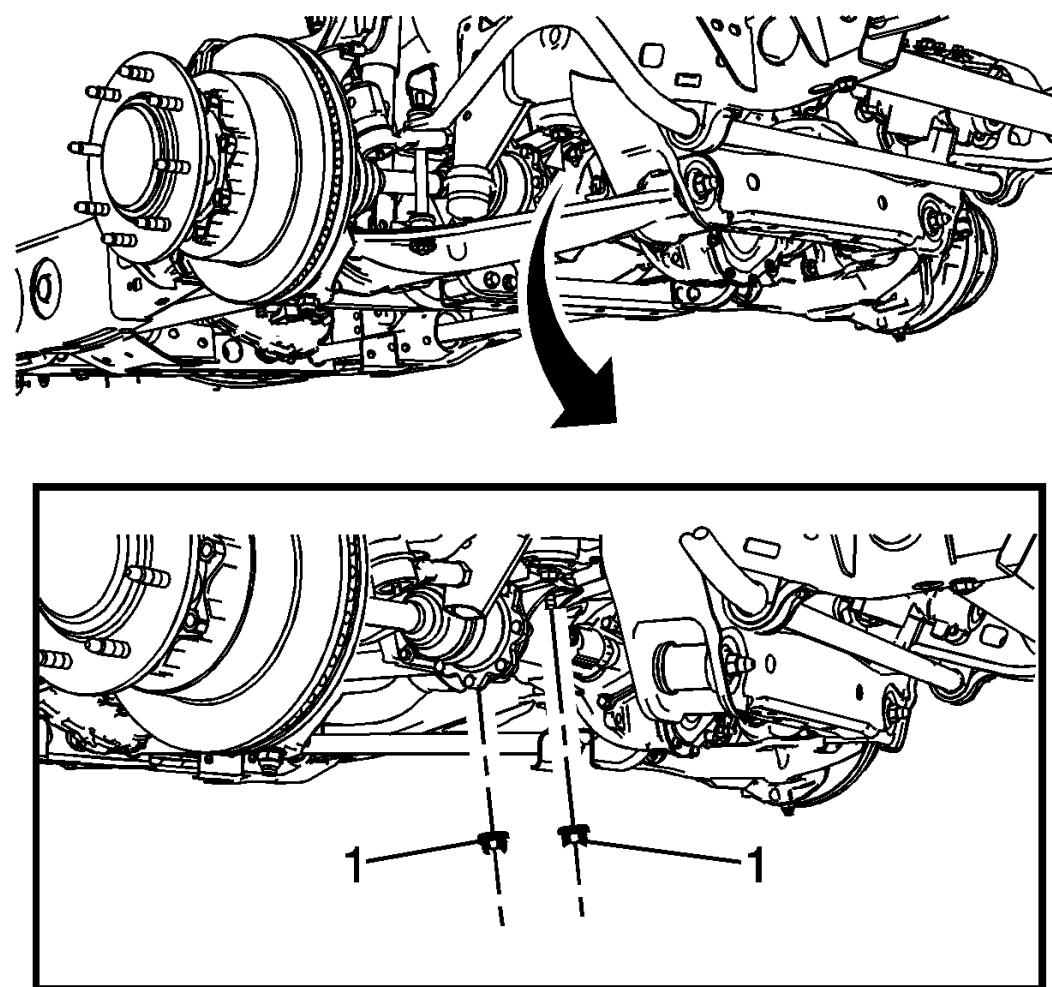


Fig. 166: Front Differential Carrier Bracket Nuts

Courtesy of GENERAL MOTORS COMPANY

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

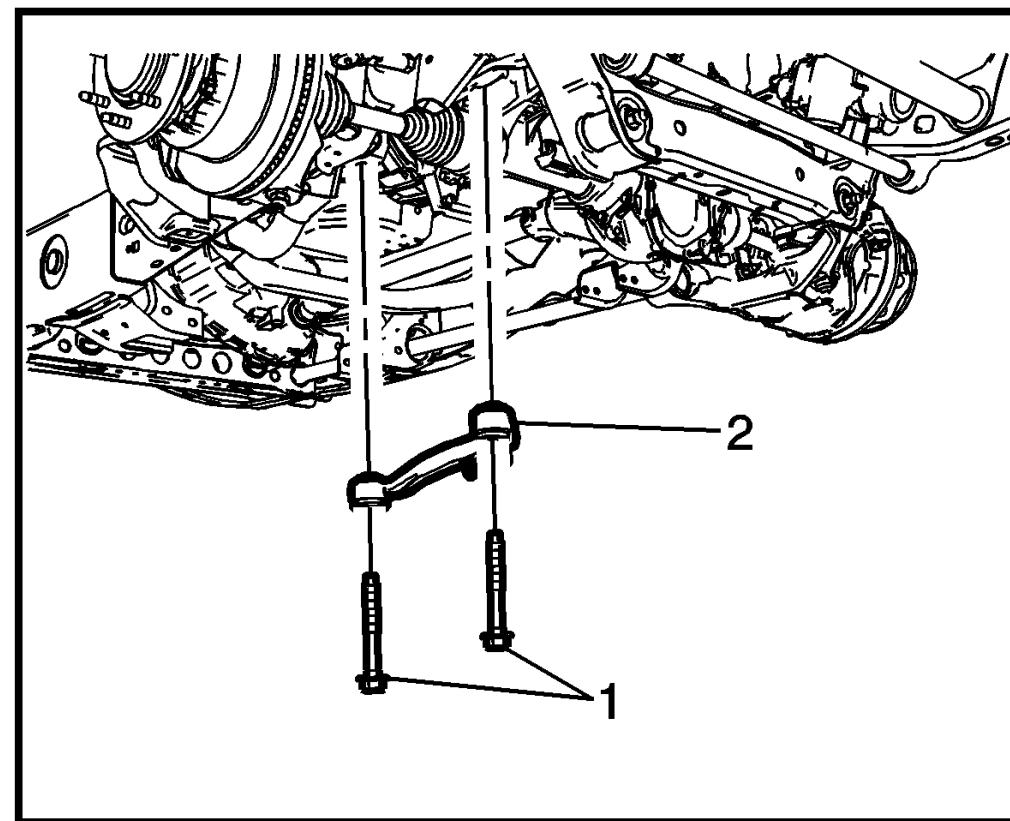
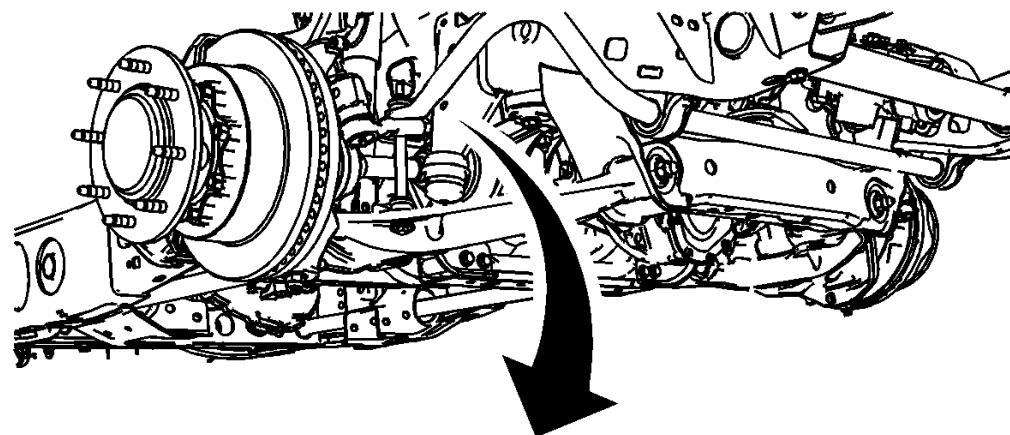


Fig. 167: Front Differential Carrier Bracket Bolts And Bracket

Courtesy of GENERAL MOTORS COMPANY

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

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

Installation Procedure

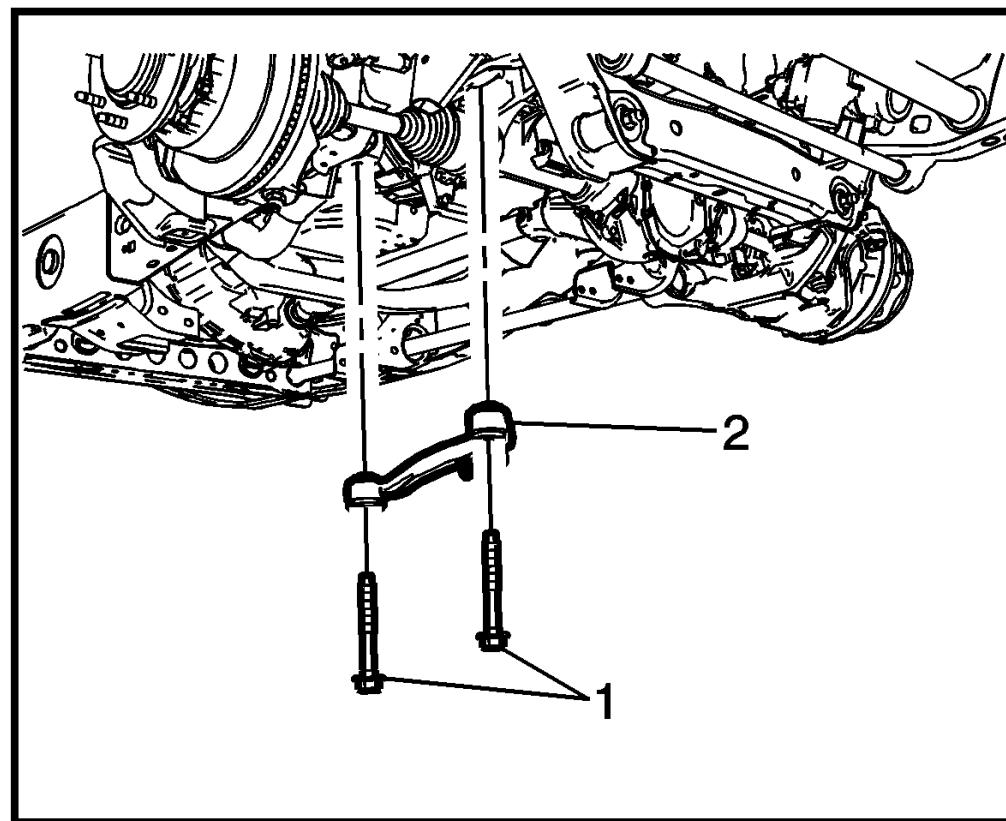
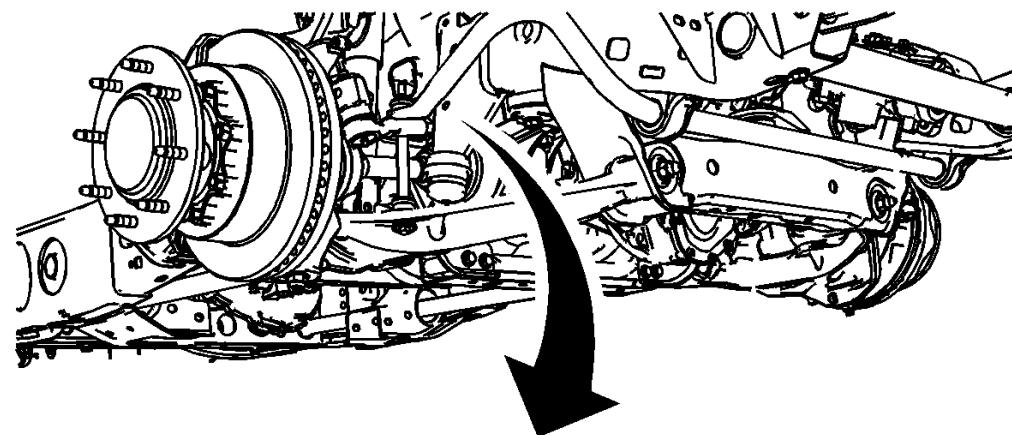


Fig. 168: Front Differential Carrier Bracket Bolts And Bracket

Courtesy of GENERAL MOTORS COMPANY

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

CAUTION: Refer to Fastener Caution .

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

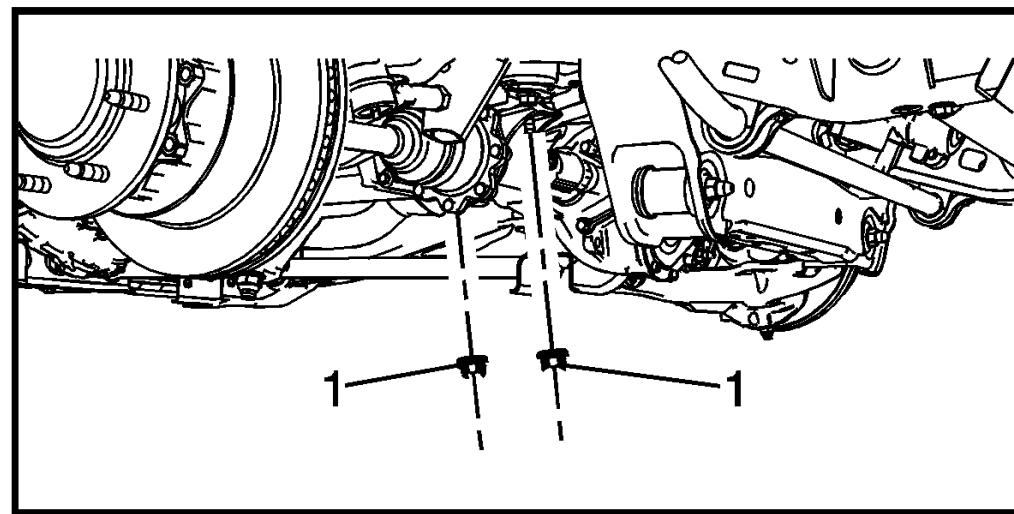
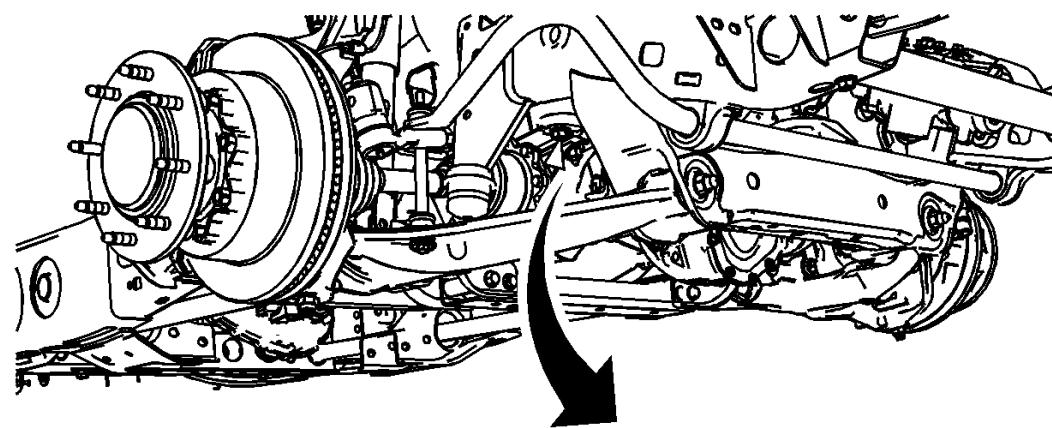


Fig. 169: Front Differential Carrier Bracket Nuts

Courtesy of GENERAL MOTORS COMPANY

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

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

Removal Procedure

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

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

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

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

7. Loosen the left front differential carrier bracket bolts.

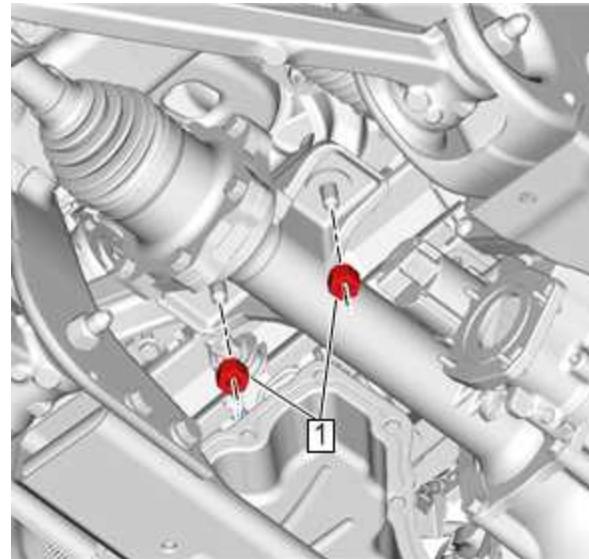


Fig. 170: Front Differential Carrier Bracket Nuts

Courtesy of GENERAL MOTORS COMPANY

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

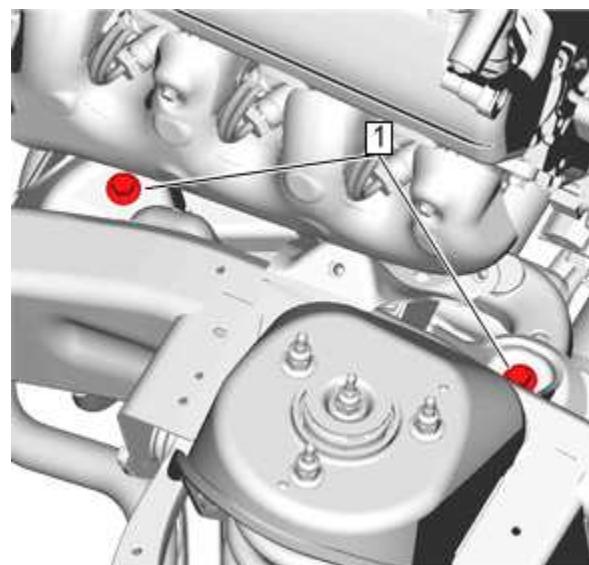


Fig. 171: Upper Differential Carrier Bracket Bolts

Courtesy of GENERAL MOTORS COMPANY

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

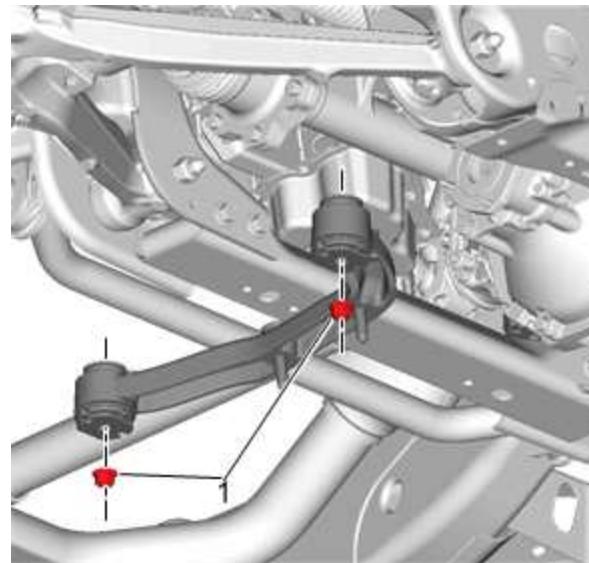


Fig. 172: Front Differential Carrier Bracket Nuts

Courtesy of GENERAL MOTORS COMPANY

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

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

Installation Procedure

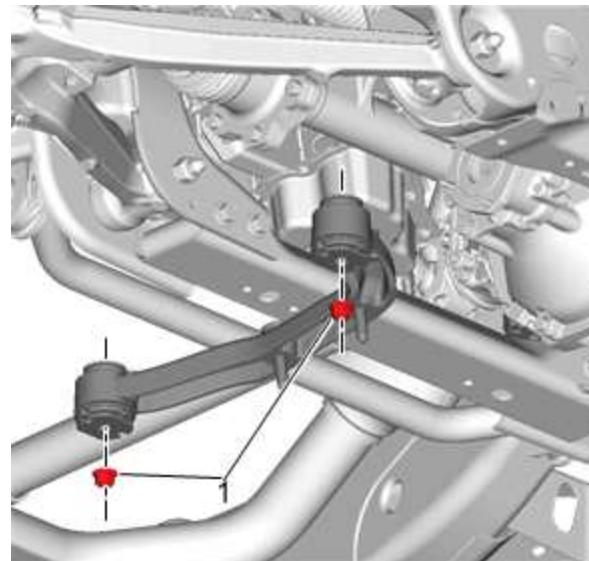


Fig. 173: Front Differential Carrier Bracket Nuts

Courtesy of GENERAL MOTORS COMPANY

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

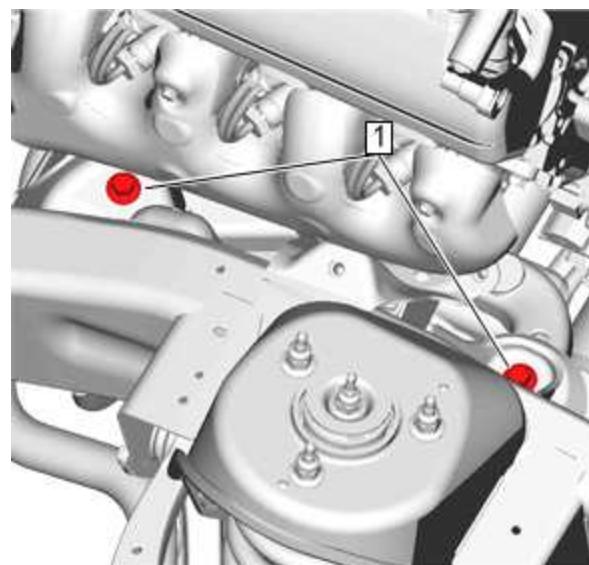


Fig. 174: Upper Differential Carrier Bracket Bolts

Courtesy of GENERAL MOTORS COMPANY

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

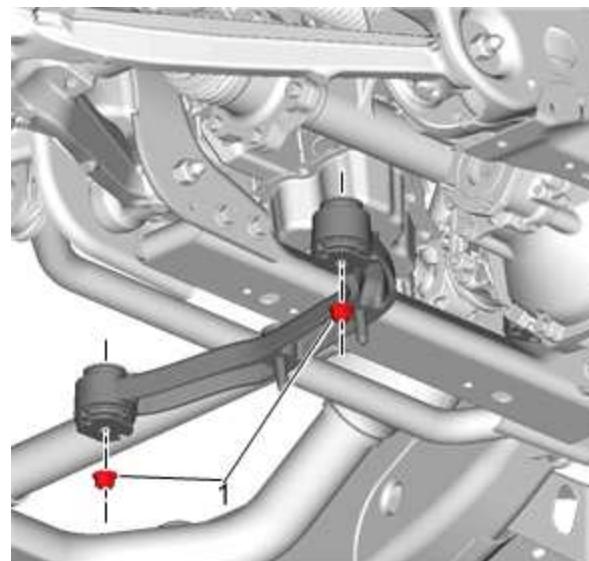


Fig. 175: Front Differential Carrier Bracket Nuts

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

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

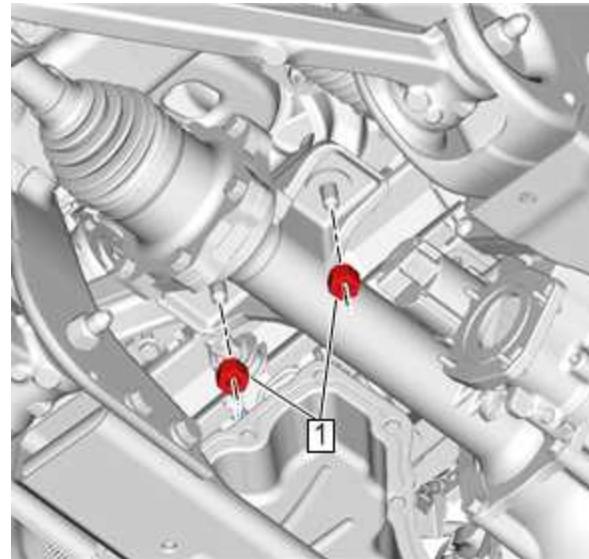


Fig. 176: Front Differential Carrier Bracket Nuts

Courtesy of GENERAL MOTORS COMPANY

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

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

Removal Procedure

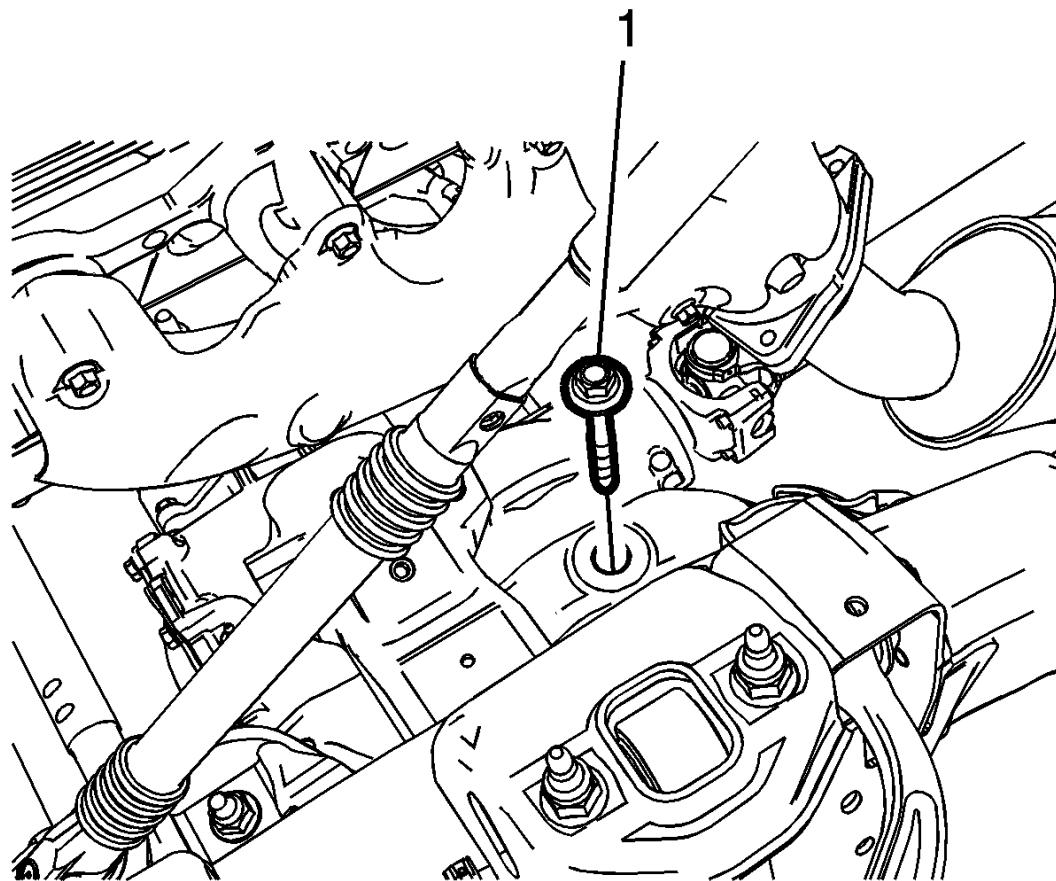


Fig. 177: Front Differential Bracket Upper Rear Bolt

Courtesy of GENERAL MOTORS COMPANY

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

5. Remove the wiring harness for the front drive axle actuator from the front differential carrier.

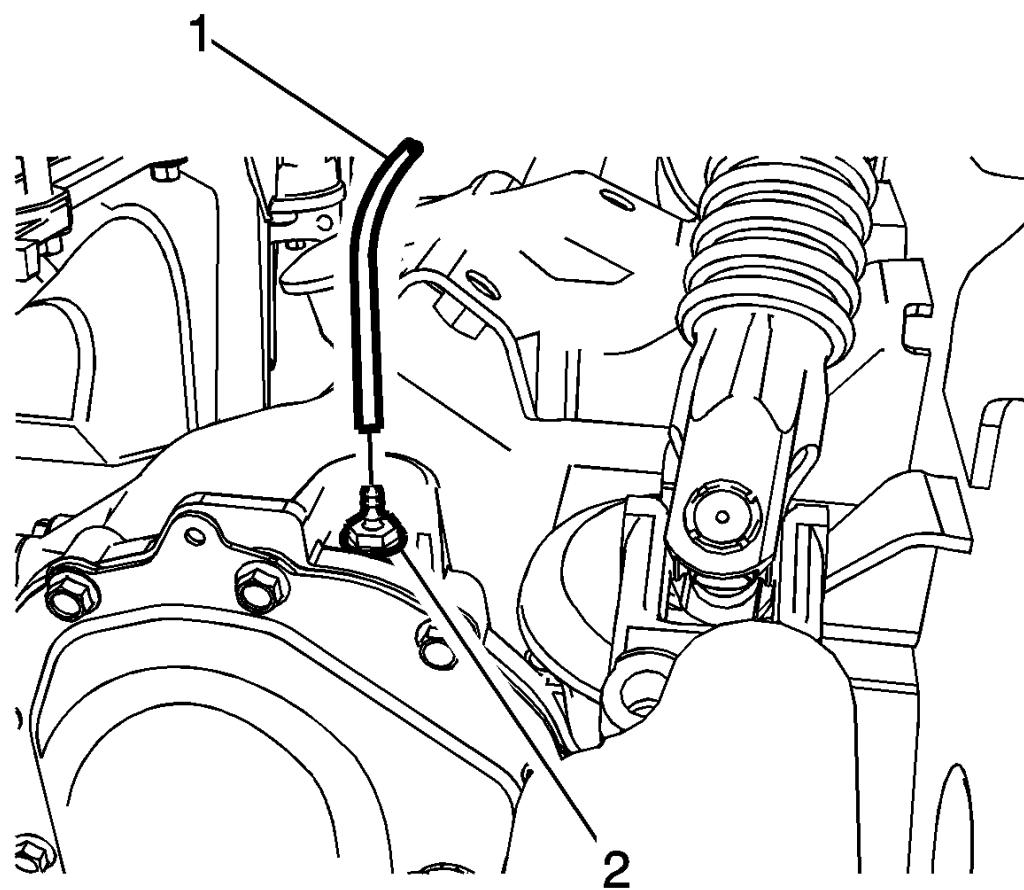


Fig. 178: Differential Carrier Vent And Hose

Courtesy of GENERAL MOTORS COMPANY

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

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

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

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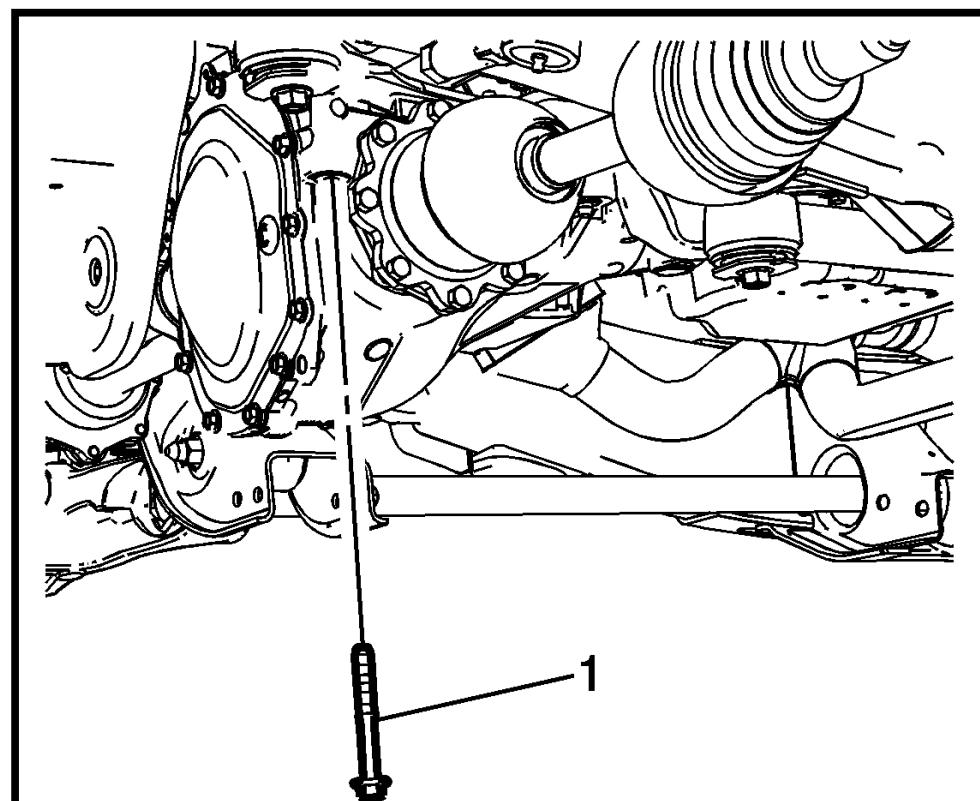
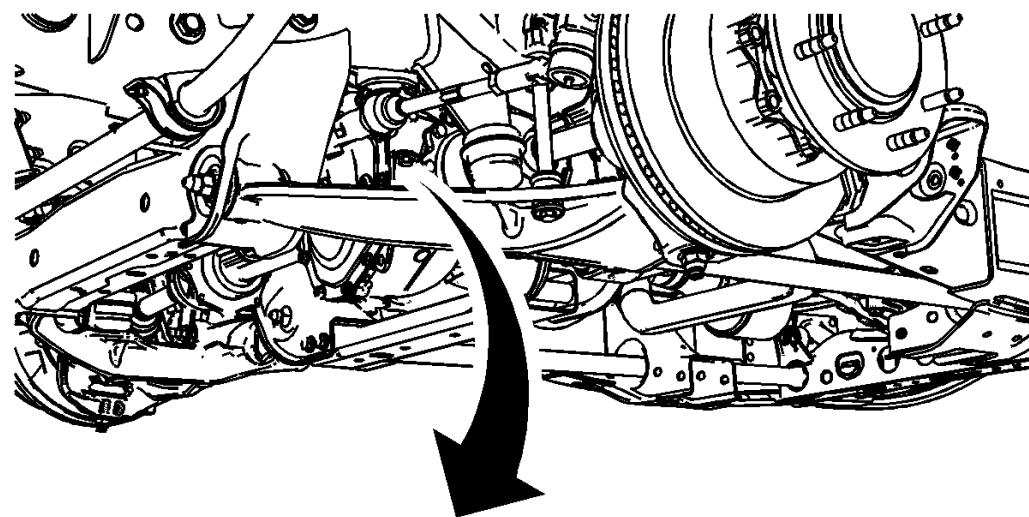


Fig. 179: Differential Carrier Bracket Bolt

Courtesy of GENERAL MOTORS COMPANY

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

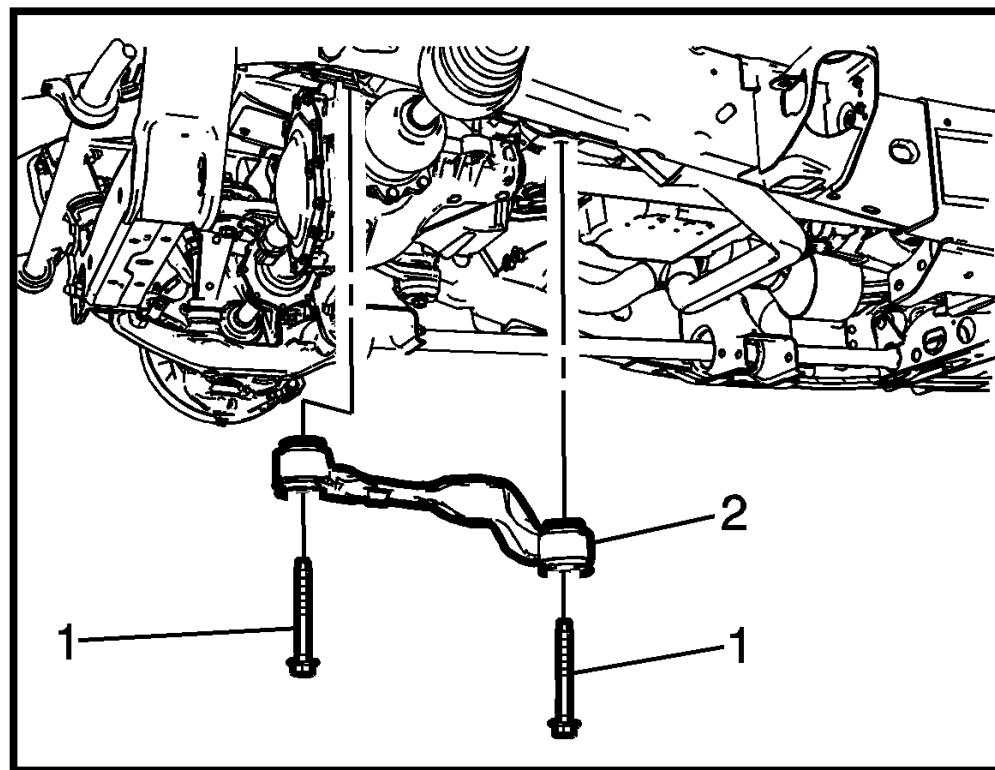
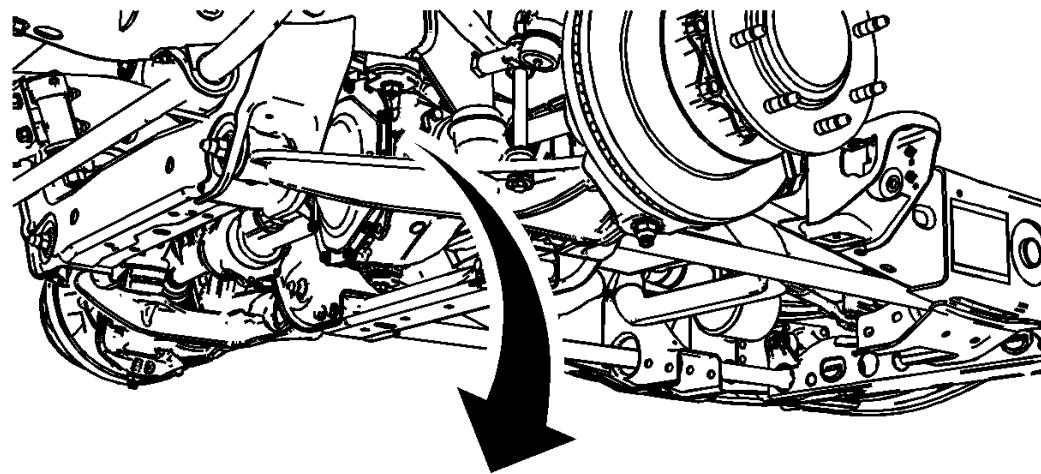


Fig. 180: Differential Carrier Bracket And Bolts

Courtesy of GENERAL MOTORS COMPANY

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

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

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

Installation Procedure

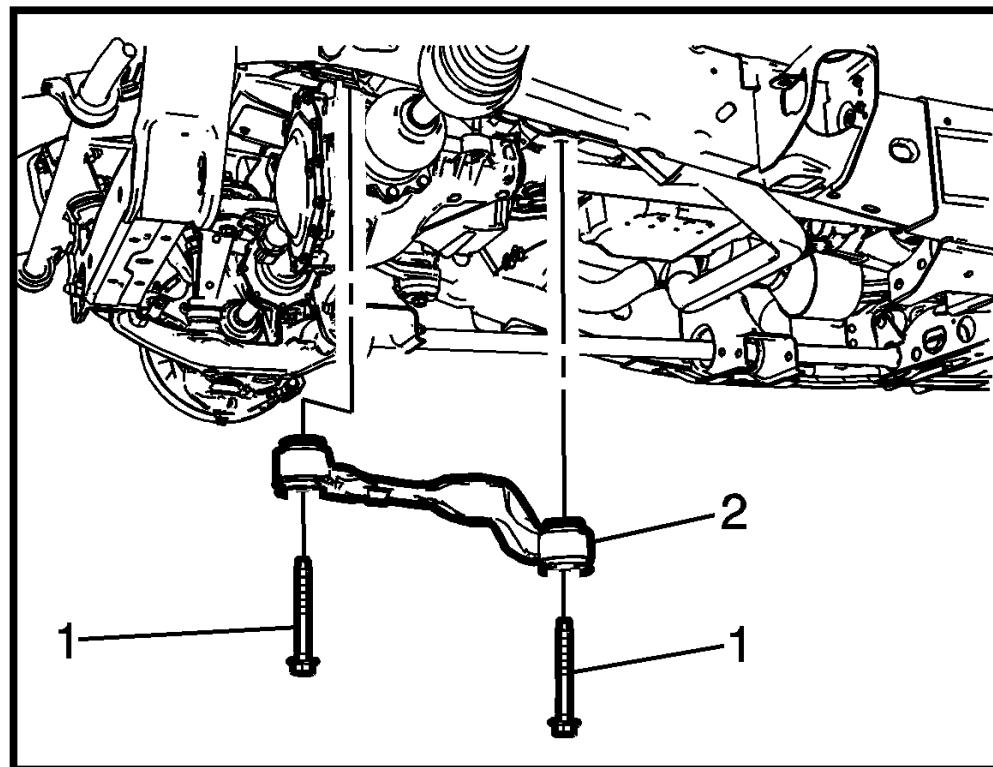
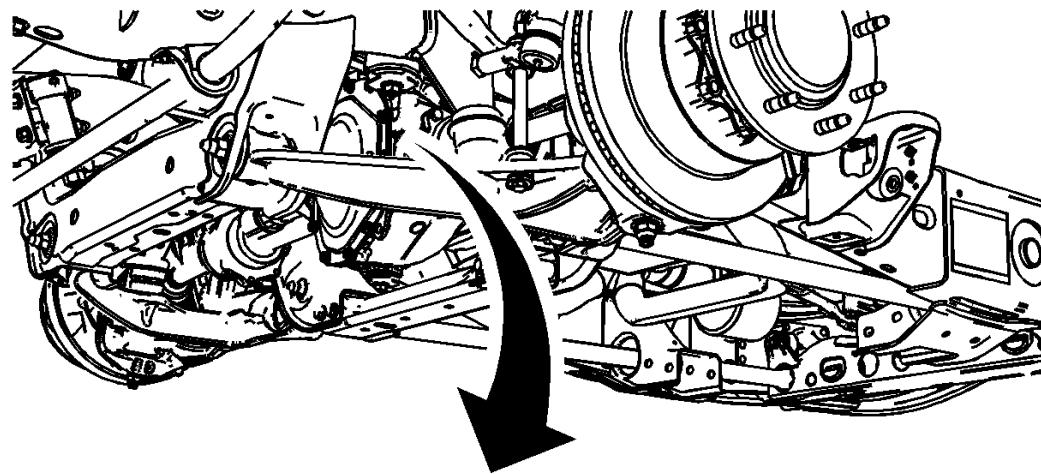


Fig. 181: Differential Carrier Bracket And Bolts

Courtesy of GENERAL MOTORS COMPANY

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

CAUTION: Refer to Fastener Caution .

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

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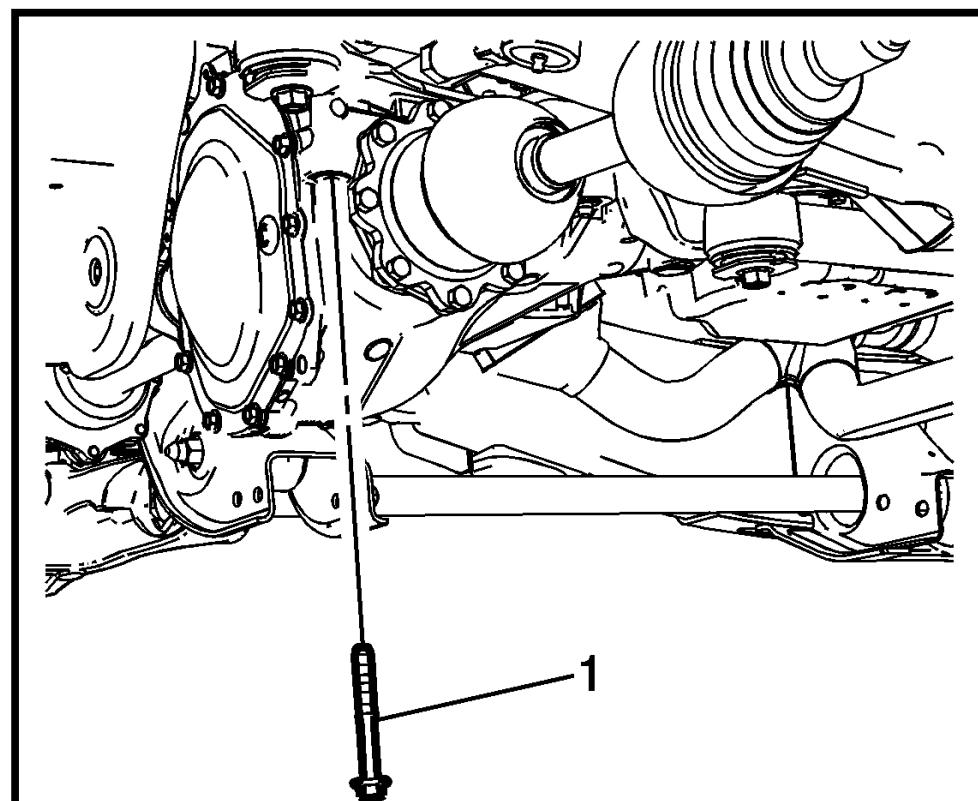
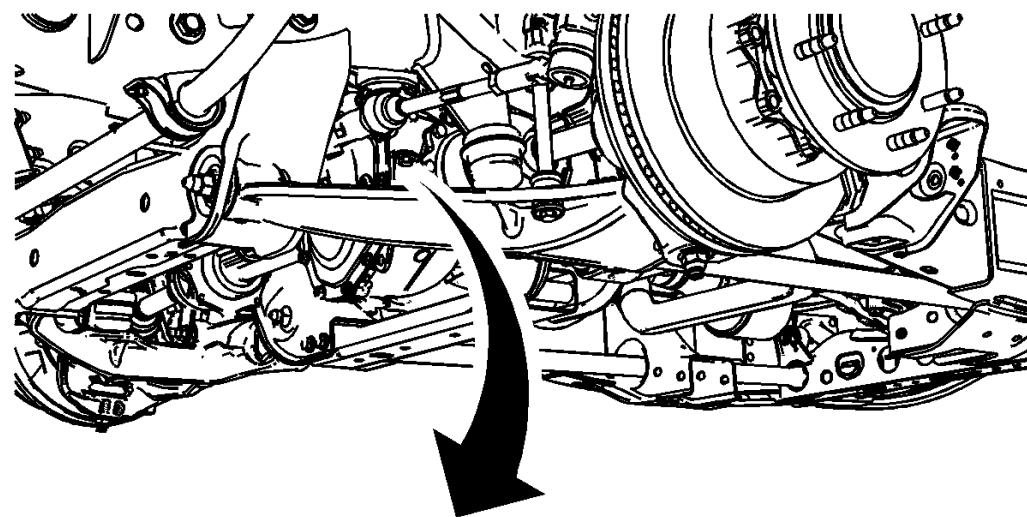


Fig. 182: Differential Carrier Bracket Bolt

Courtesy of GENERAL MOTORS COMPANY

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

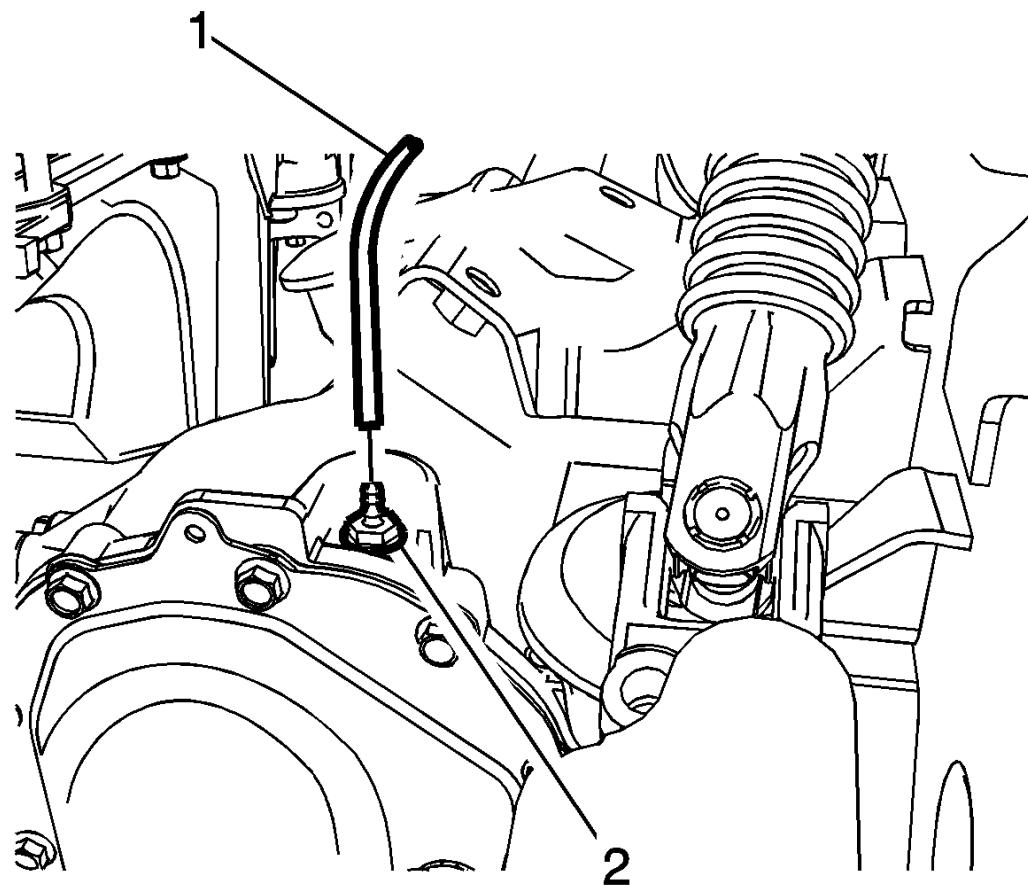


Fig. 183: Differential Carrier Vent And Hose

Courtesy of GENERAL MOTORS COMPANY

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

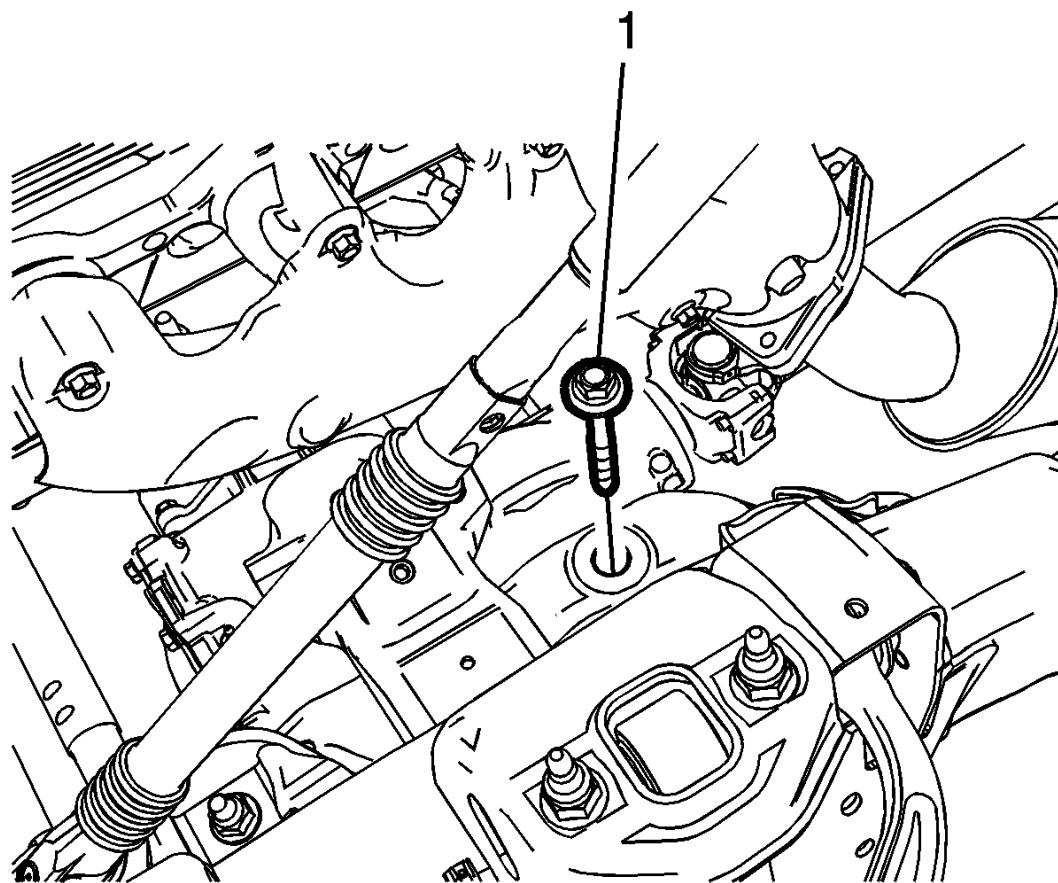


Fig. 184: Front Differential Bracket Upper Rear Bolt

Courtesy of GENERAL MOTORS COMPANY

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

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

Removal Procedure

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

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

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

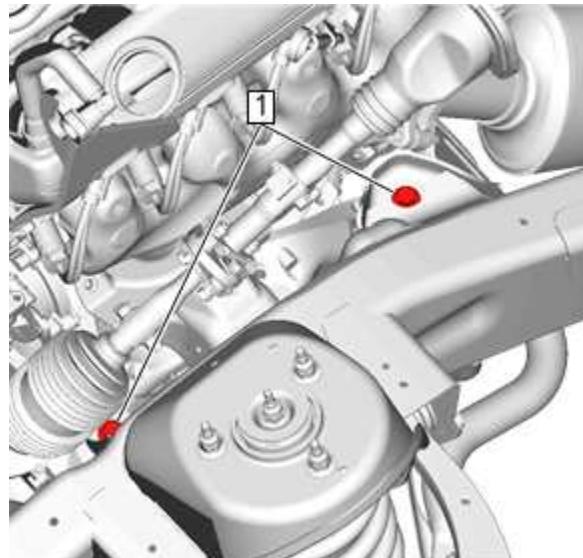


Fig. 185: Front Differential Bracket Upper Bolts

Courtesy of GENERAL MOTORS COMPANY

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

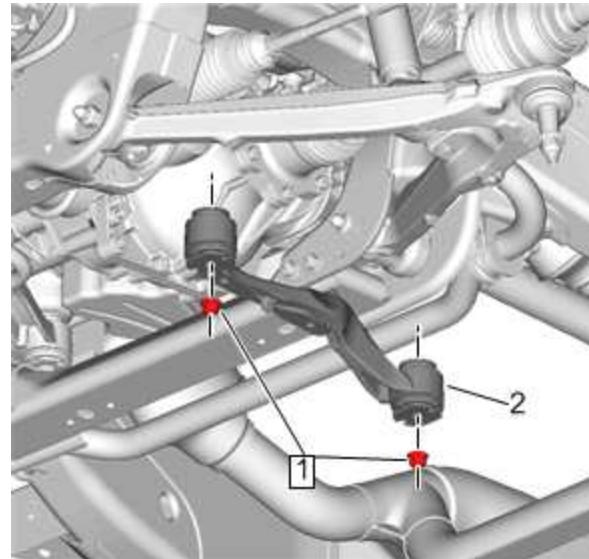


Fig. 186: Differential Carrier Bracket Nuts

Courtesy of GENERAL MOTORS COMPANY

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

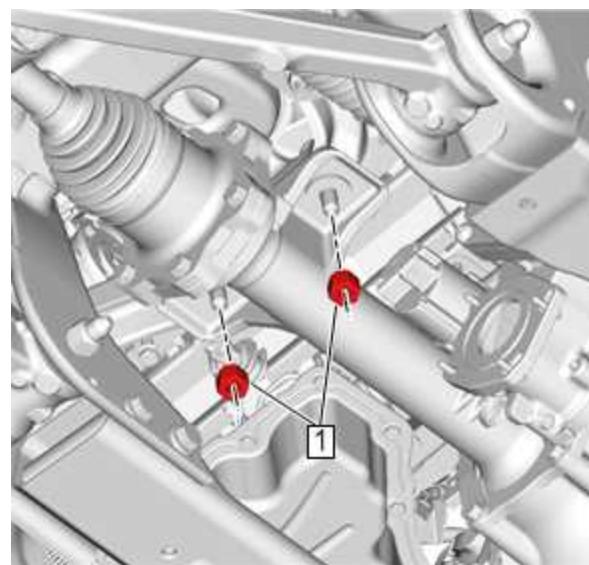


Fig. 187: Front Differential Carrier Bracket Nuts

Courtesy of GENERAL MOTORS COMPANY

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

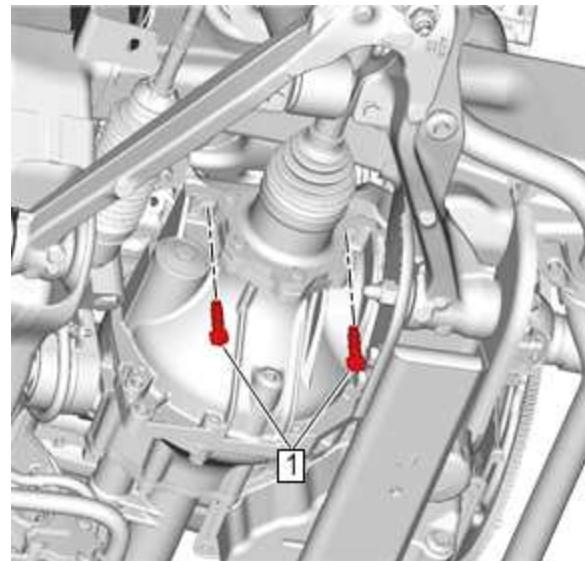


Fig. 188: Front Differential Carrier Bracket Bolts

Courtesy of GENERAL MOTORS COMPANY

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

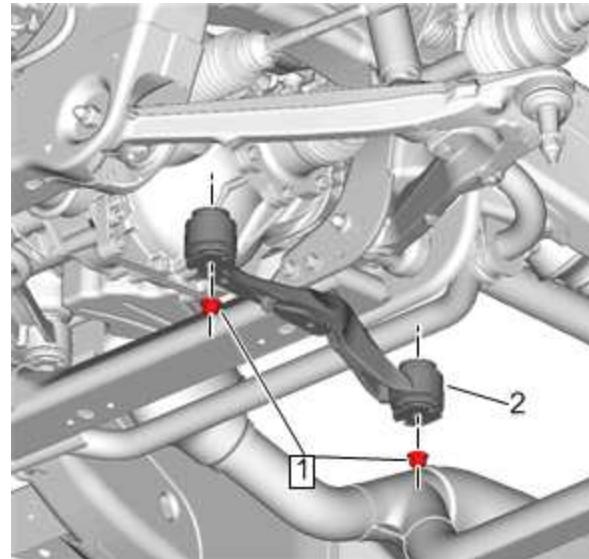


Fig. 189: Differential Carrier Bracket Nuts

Courtesy of GENERAL MOTORS COMPANY

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

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

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

Installation Procedure

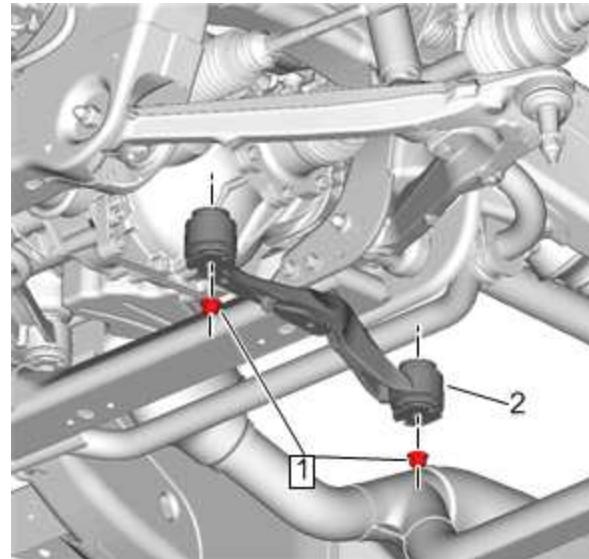


Fig. 190: Differential Carrier Bracket Nuts

Courtesy of GENERAL MOTORS COMPANY

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

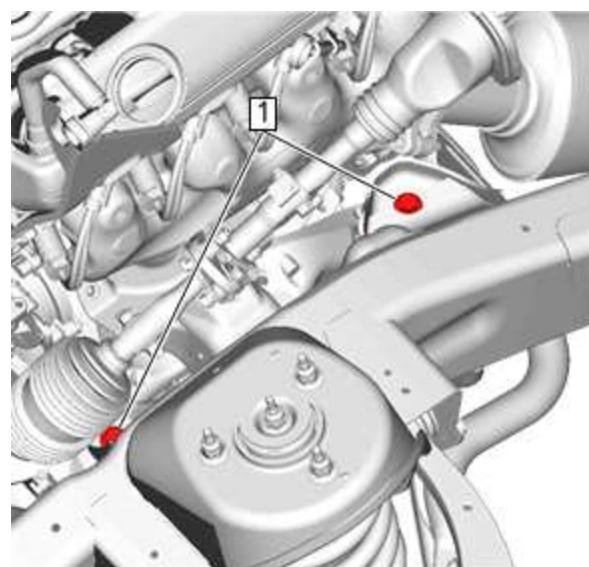


Fig. 191: Front Differential Bracket Upper Bolts

Courtesy of GENERAL MOTORS COMPANY

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

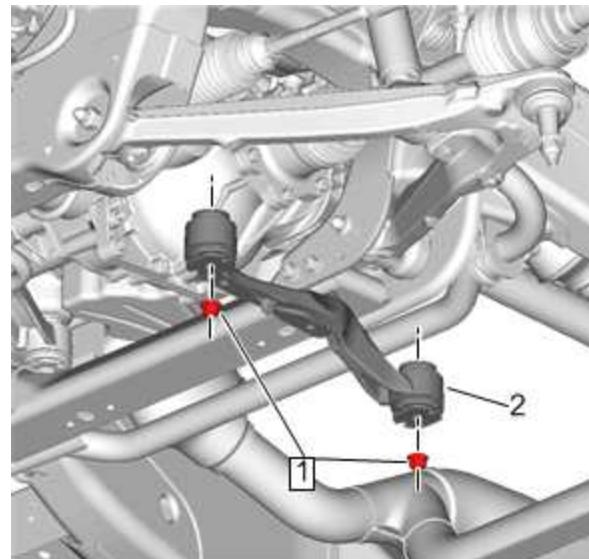


Fig. 192: Differential Carrier Bracket Nuts

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

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

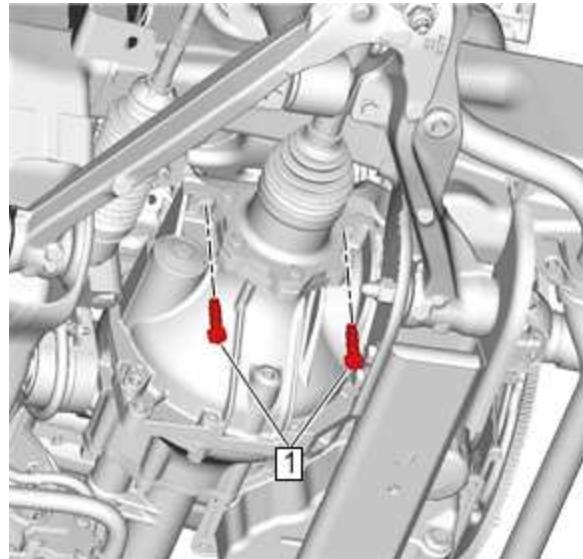


Fig. 193: Front Differential Carrier Bracket Bolts

Courtesy of GENERAL MOTORS COMPANY

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

FRONT AXLE LUBRICANT LEVEL INSPECTION (8.25 INCH LD 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.

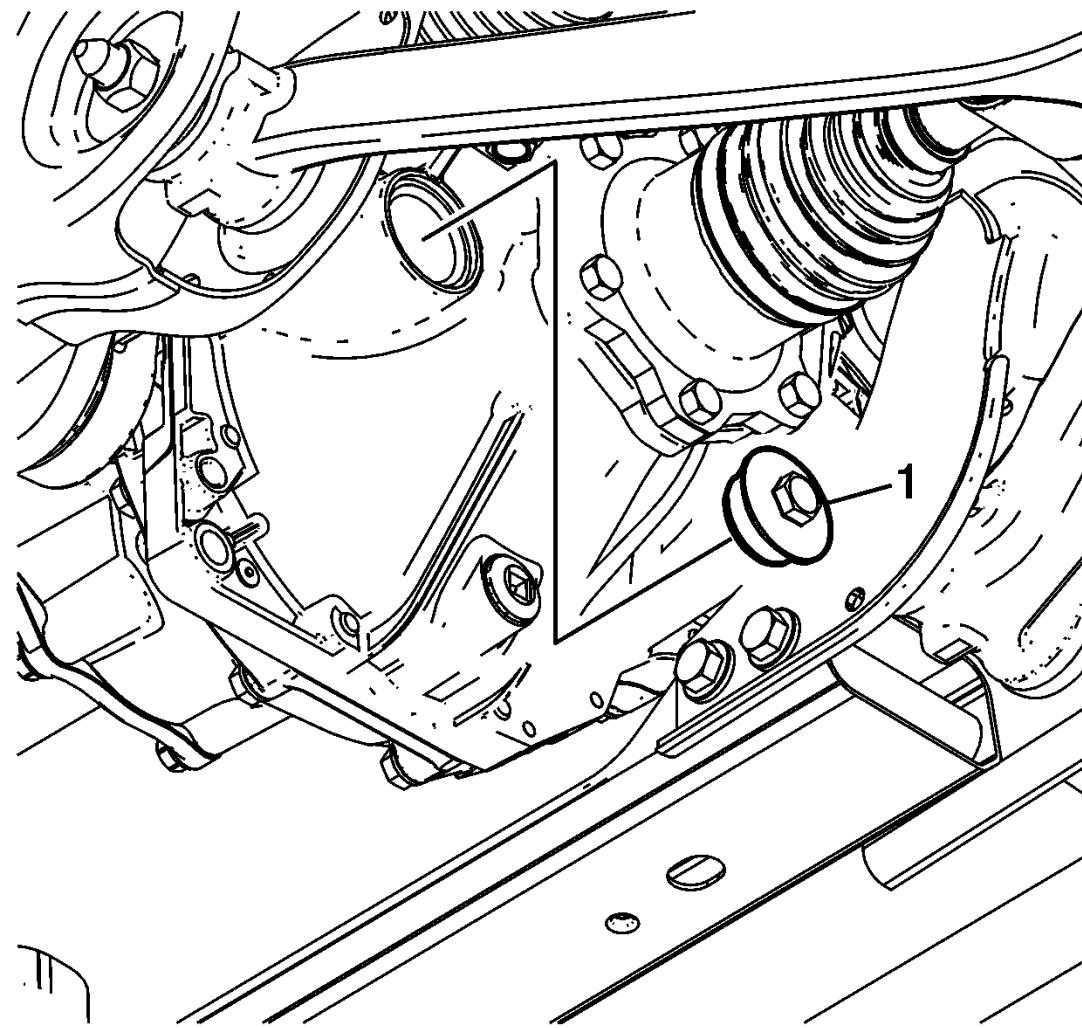


Fig. 194: Front Axle Fill Plug

Courtesy of GENERAL MOTORS COMPANY

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

Specification

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

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

CAUTION: Refer to [Fastener Caution](#).

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

9. Lower the vehicle.

FRONT AXLE LUBRICANT LEVEL INSPECTION (9.25 INCH HD 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.

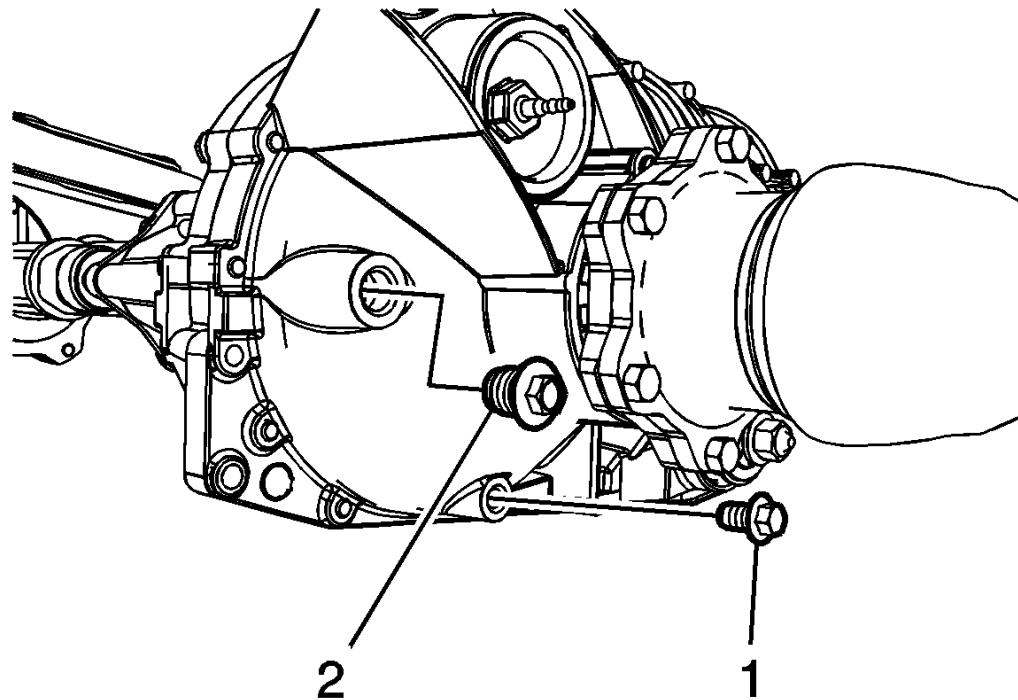


Fig. 195: View Of Front Axle Fill Plug

Courtesy of GENERAL MOTORS COMPANY

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 [Adhesives, Fluids, Lubricants, and Sealers](#).

CAUTION: Refer to [Fastener Caution](#) .

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

9. Lower the vehicle.

FRONT DRIVE AXLE CLUTCH FORK INSPECTION

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

FRONT DRIVE AXLE CLUTCH GEAR SHIM ADJUSTMENT

Special Tools

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

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

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

- The differential bearings
- The carrier connector

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

8.25 Inch Axle	9.25 Inch Axle
1.30 mm (0.05 in)	1.30 mm (0.05 in)
1.52 mm (0.06 in)	1.52 mm (0.06 in)
1.80 mm (0.07 in)	1.80 mm (0.07 in)
2.03 mm (0.08 in)	2.03 mm (0.08 in)
2.30 mm (0.09 in)	2.30 mm (0.09 in)
2.54 mm (0.10 in)	2.54 mm (0.10 in)
2.80 mm (0.11 in)	2.80 mm (0.11 in)
3.05 mm (0.12 in)	3.05 mm (0.12 in)
3.30 mm (0.13 in)	3.30 mm (0.13 in)
3.55 mm (0.14 in)	3.55 mm (0.14 in)
3.80 mm (0.15 in)	3.80 mm (0.15 in)
4.05 mm (0.16 in)	4.05 mm (0.16 in)
4.30 mm (0.17 in)	4.30 mm (0.17 in)
4.55 mm (0.18 in)	4.55 mm (0.18 in)
4.80 mm (0.19 in)	4.80 mm (0.19 in)

1. Install the inner axle bearing and the inner axle seal, if necessary. Refer to [Front Drive Axle Inner Shaft Seal Replacement - Right Side \(8.25 Inch LD Axle\)](#) [Front Drive Axle Inner Shaft Seal Replacement - Right Side \(9.25 Inch HD Axle\)](#), [Front Drive Axle Inner Shaft Seal Replacement - Left Side \(8.25 Inch LD Axle\)](#) [Front Drive Axle Inner Shaft Seal Replacement - Left Side \(9.25 Inch HD Axle\)](#), and [Front Drive Axle Inner Shaft Bearing Replacement \(8.25 Inch LD Axle - Left Side\)](#) [Front Drive Axle Inner Shaft Bearing Replacement \(8.25 Inch LD Axle - Right Side\)](#) [Front Drive Axle Inner Shaft Bearing Replacement \(9.25 Inch HD Axle - Left Side\)](#) [Front Drive Axle Inner Shaft Bearing Replacement \(9.25 Inch HD Axle - Right Side\)](#).

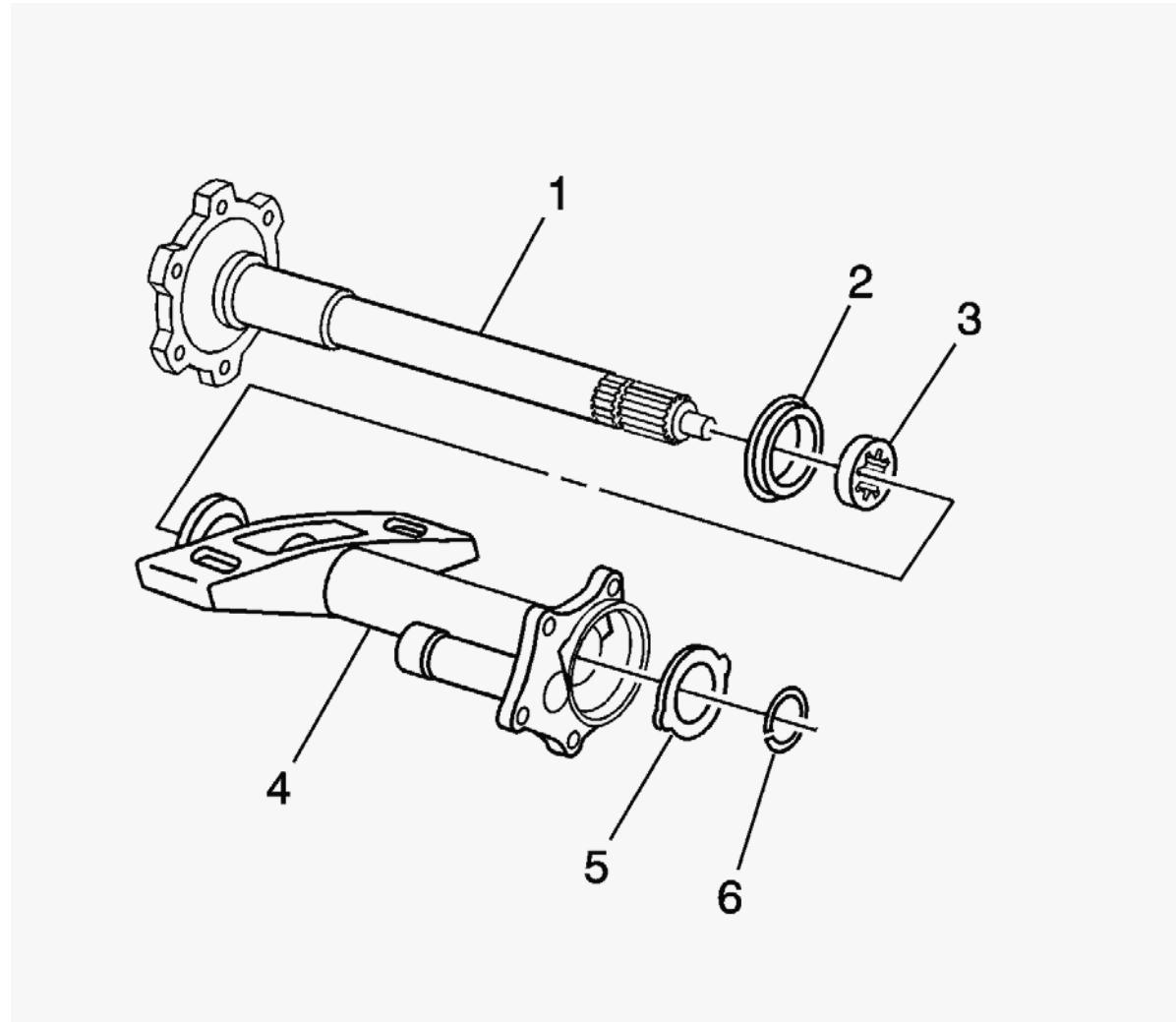


Fig. 196: Inner Axle Shaft Housing Components

Courtesy of GENERAL MOTORS COMPANY

2. Install the following components into the inner axle shaft housing:

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

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

3. Install the retaining ring (6) into the inner axle shaft (1).
3. Install the inner axle shaft housing into a vise. Clamp only on the mounting flange of the inner axle shaft housing.

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

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

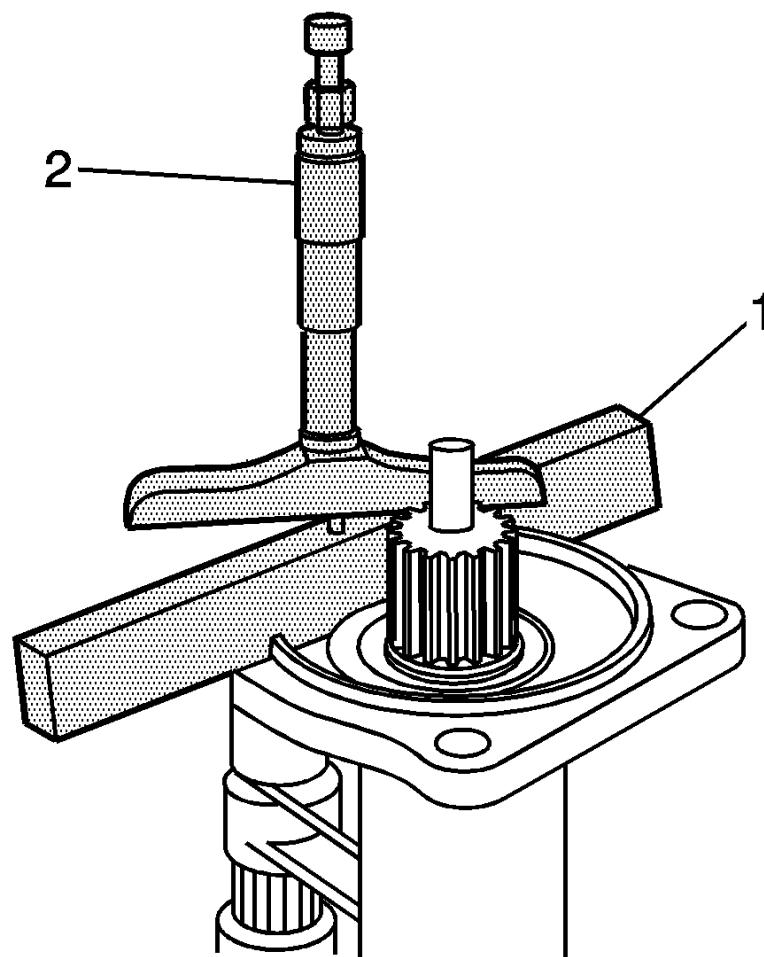


Fig. 197: Measuring Inner Axle Shaft Distance

Courtesy of GENERAL MOTORS COMPANY

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

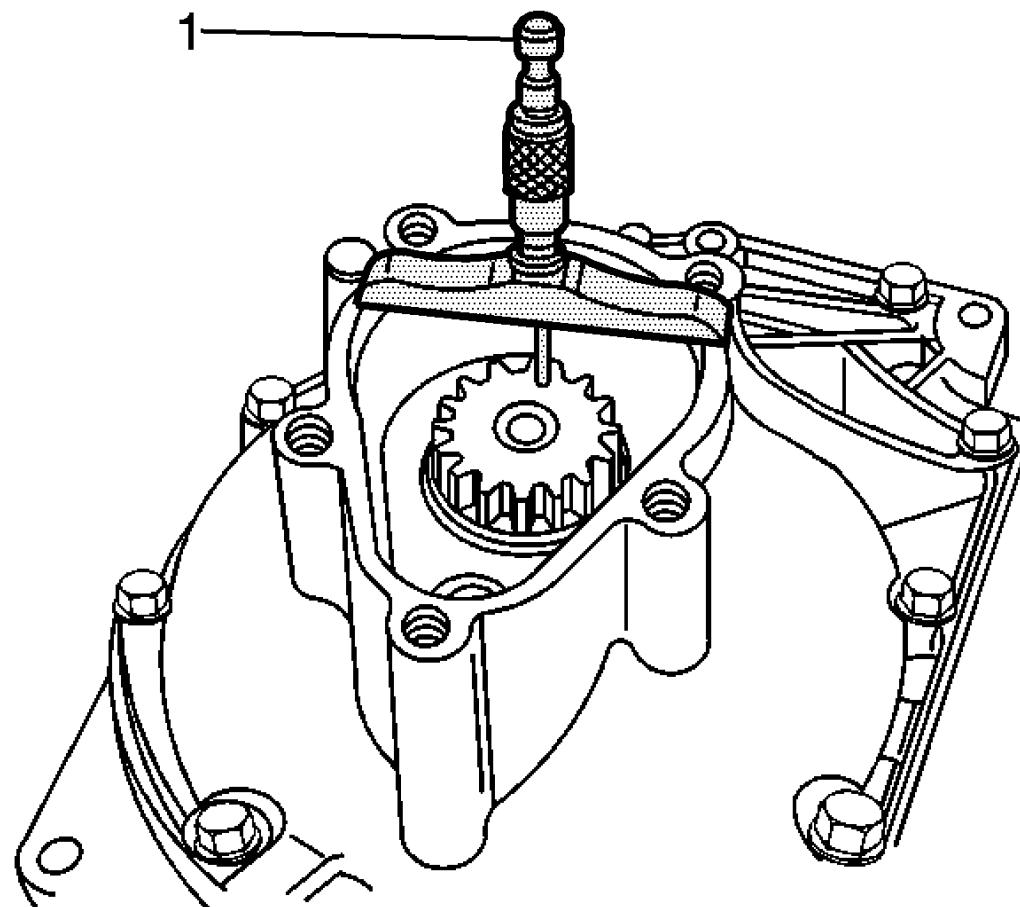


Fig. 198: Measuring Differential Carrier Housing Machined Surface To Front Drive Axle Clutch Shaft Outer Surface

Courtesy of GENERAL MOTORS COMPANY

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

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

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

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

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

Note the following examples:

- If the figure obtained in step 8 was 3.53 mm (0.139 in), use a 3.30 mm (0.130 in) shim.
- If the figure obtained in step 8 was 3.30 mm (0.130 in), use a 3.05 mm (0.120 in) shim.

Alternate Adjustment Method

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

1. Install the original shim to the shaft.

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

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

Do not use sealer at this time.

CAUTION: Refer to Fastener Caution.

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

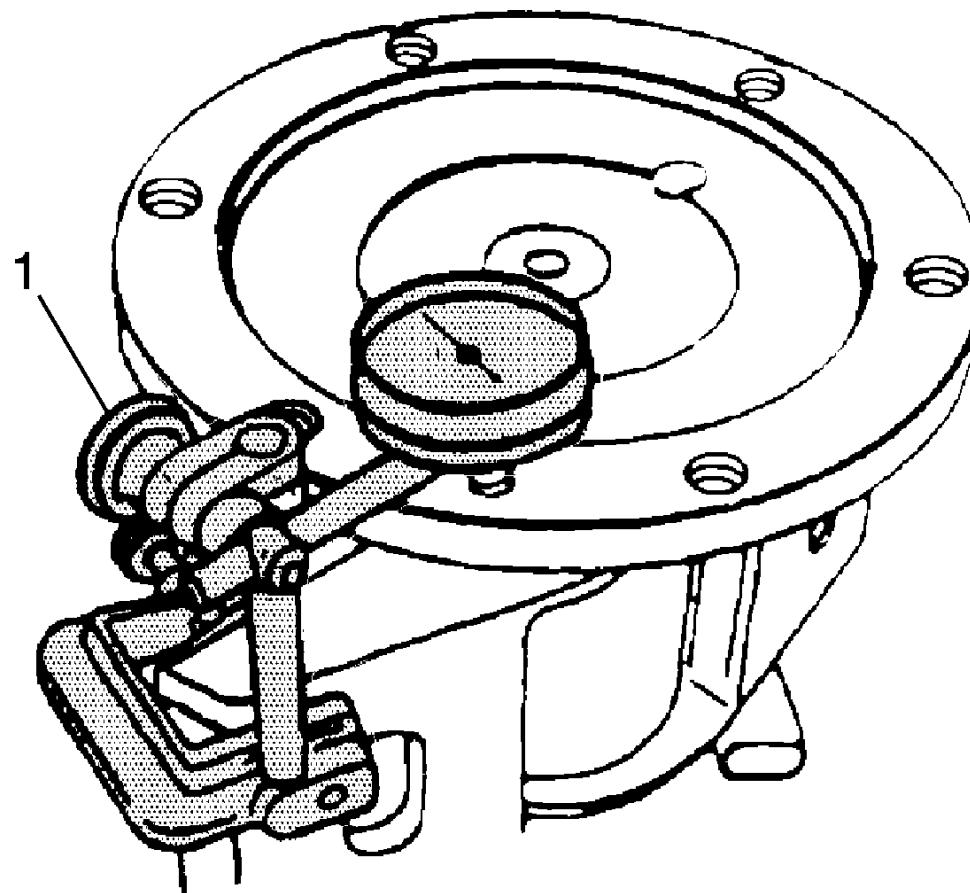


Fig. 199: Measuring Shaft End

Courtesy of GENERAL MOTORS COMPANY

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

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

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

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

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

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

FRONT AXLE DISASSEMBLE (8.25 INCH LD AXLE)

Special Tools

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

Inspection Procedure

Perform the following before disassembling the axle:

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

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

4. Check the ring gear backlash. Refer to [**Backlash Inspection and Adjustment \(8.25 Inch LD Axle\)**](#).

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

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

Disassembly Procedure

1. Install the differential carrier assembly in a vise.

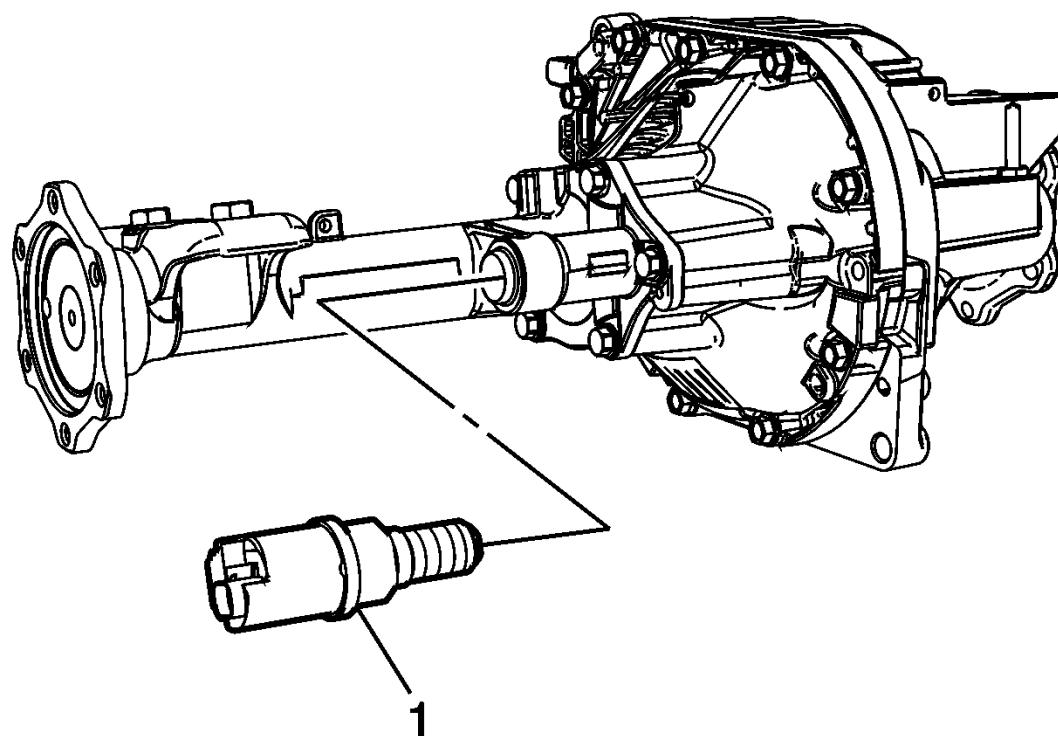


Fig. 200: Front Axle Actuator

Courtesy of GENERAL MOTORS COMPANY

2. Remove the front axle actuator (1).

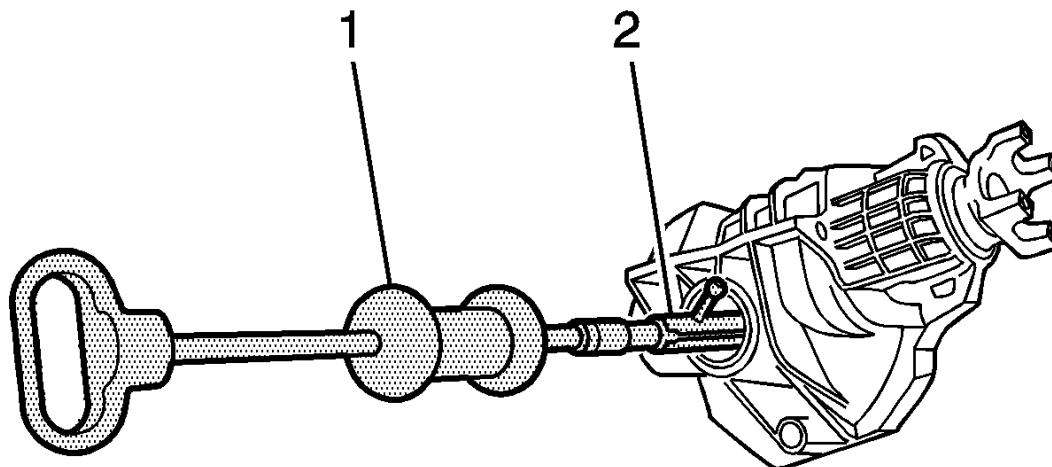


Fig. 201: View Of Differential Carrier Assembly Special Tools

Courtesy of GENERAL MOTORS COMPANY

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

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

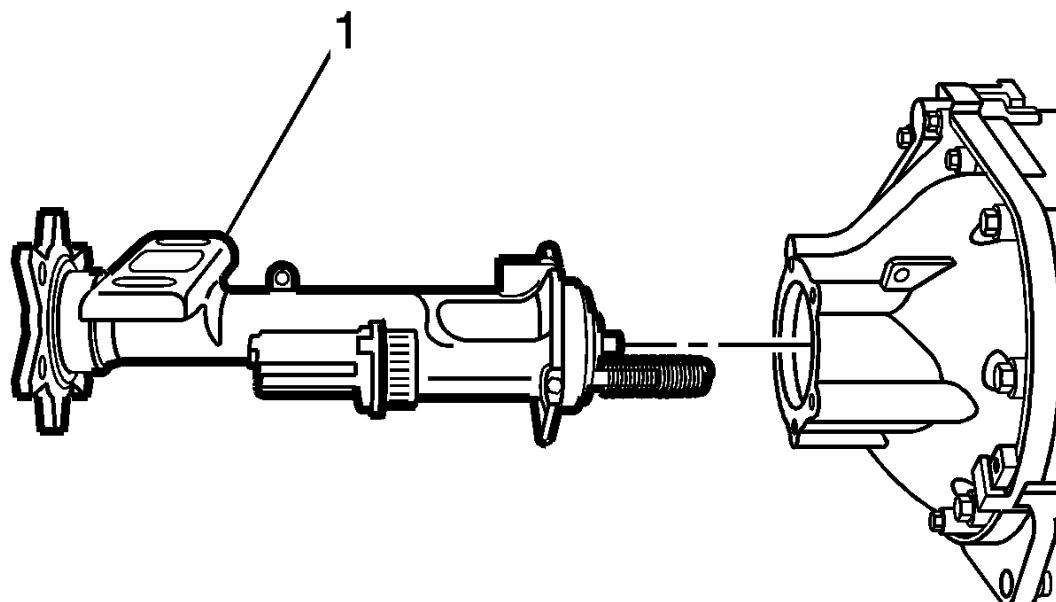


Fig. 202: Inner Axle Shaft Housing Assembly
Courtesy of GENERAL MOTORS COMPANY

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

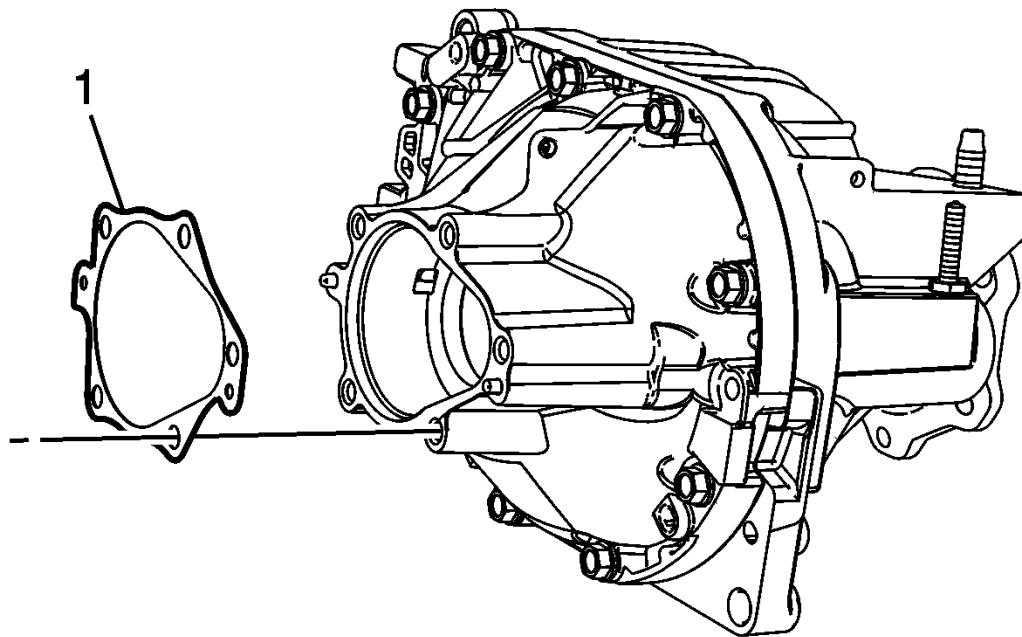


Fig. 203: Inner Axle Housing To Differential Carrier Gasket

Courtesy of GENERAL MOTORS COMPANY

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

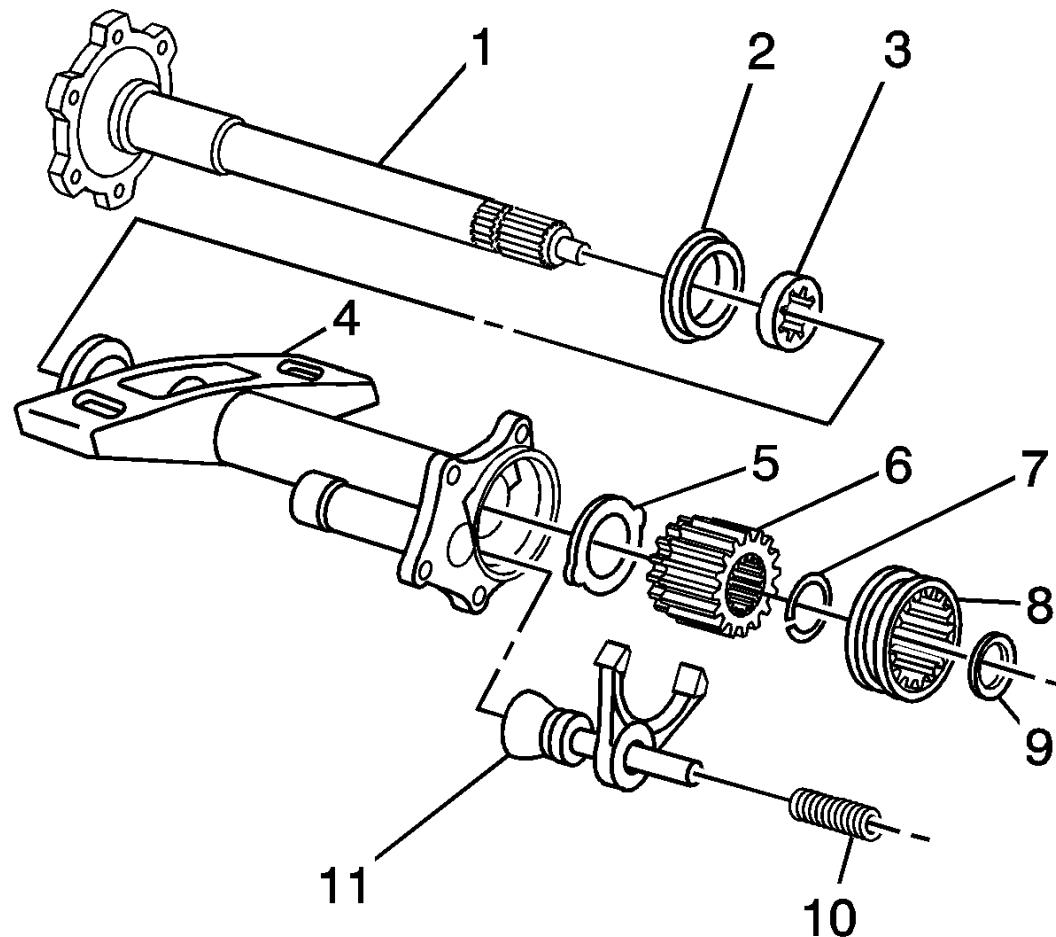


Fig. 204: Inner Axle Shaft Housing Components (8.25 Inch)

Courtesy of GENERAL MOTORS COMPANY

7. Remove the following components from the inner axle shaft housing:

1. The clutch fork inner spring (10)
2. The clutch fork assembly (11)
3. The clutch shaft shim (9)

4. The clutch shaft sleeve (8)
5. The front drive axle clutch gear (6) by doing the following:
 1. Clamp the inner axle shaft housing (4) in a vise.

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

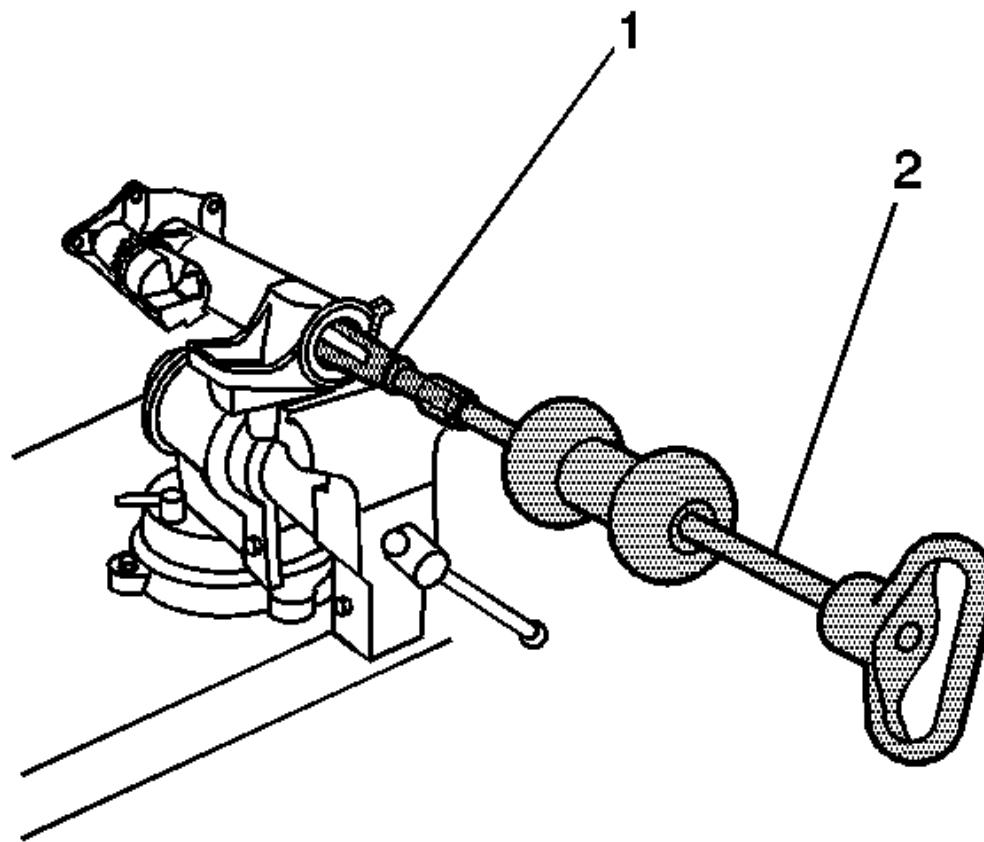


Fig. 205: Inner Axle Shaft Bearing And Special Tools

Courtesy of GENERAL MOTORS COMPANY

8. Remove the right side inner axle shaft bearing and the inner axle shaft seal by performing the following steps:

1. Place the differential carrier assembly into a vise.

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

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

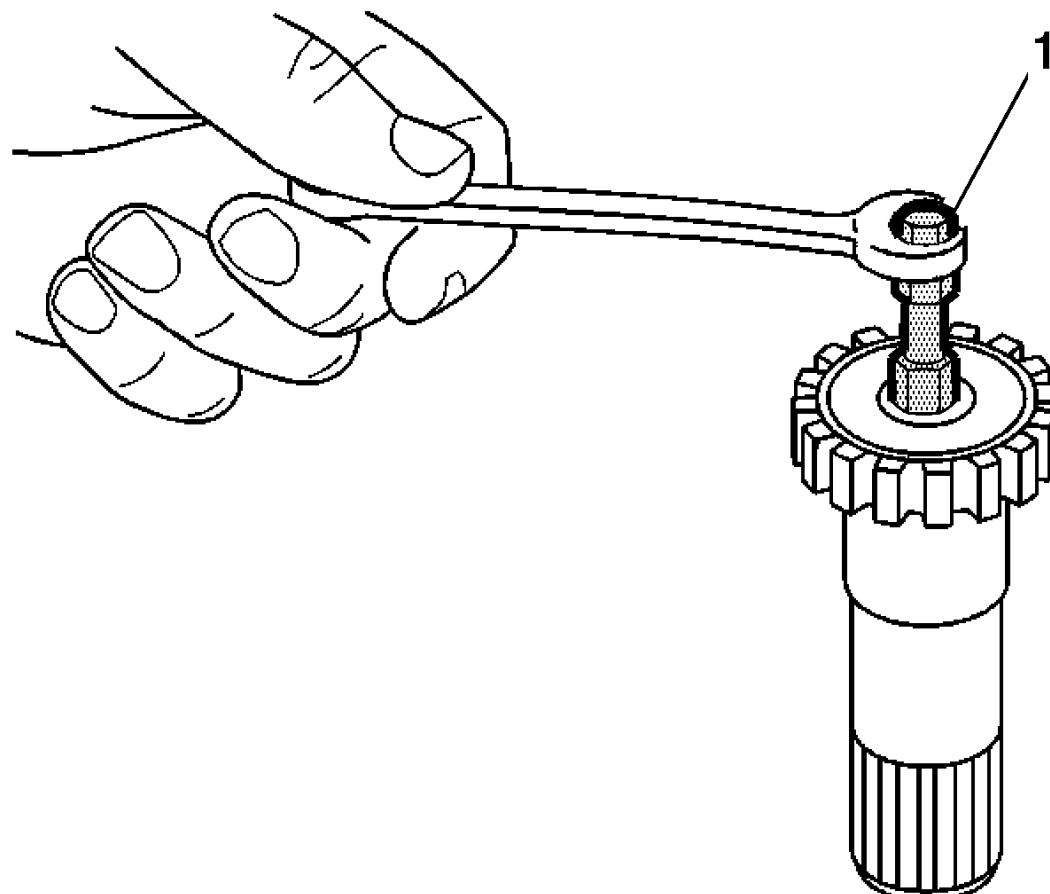
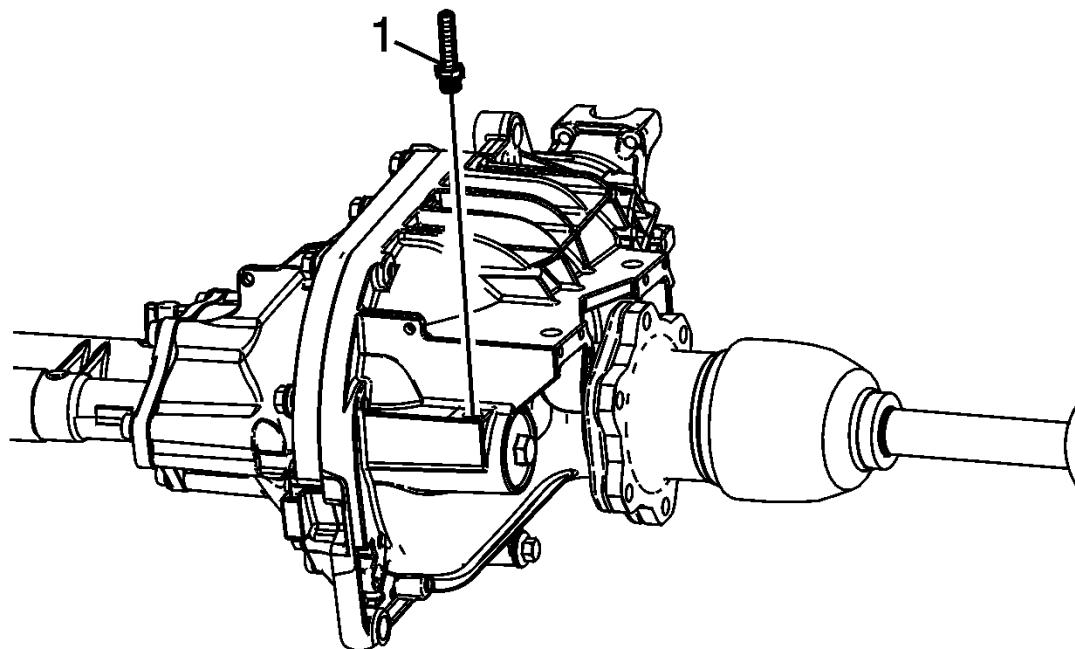


Fig. 206: Clutch Shaft Pilot Bearing - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

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



[Fig. 207: Vent Connector](#)

Courtesy of GENERAL MOTORS COMPANY

12. Remove the vent connector (1).

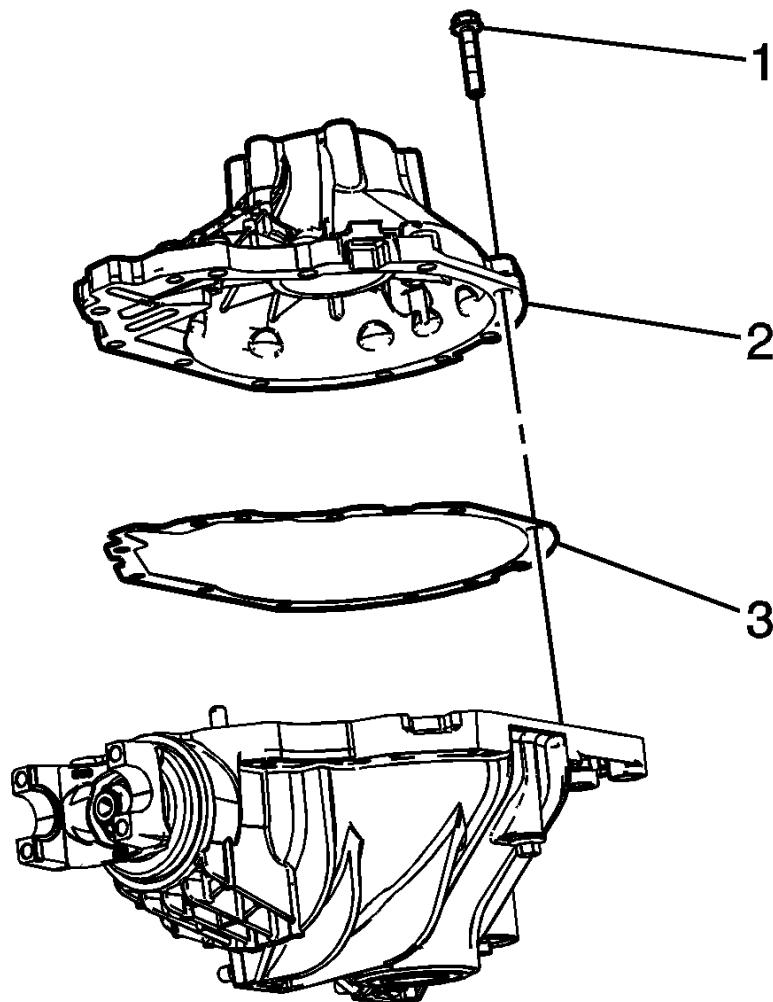


Fig. 208: View Of Differential Carrier Housing, Gasket & Bolts

Courtesy of GENERAL MOTORS COMPANY

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

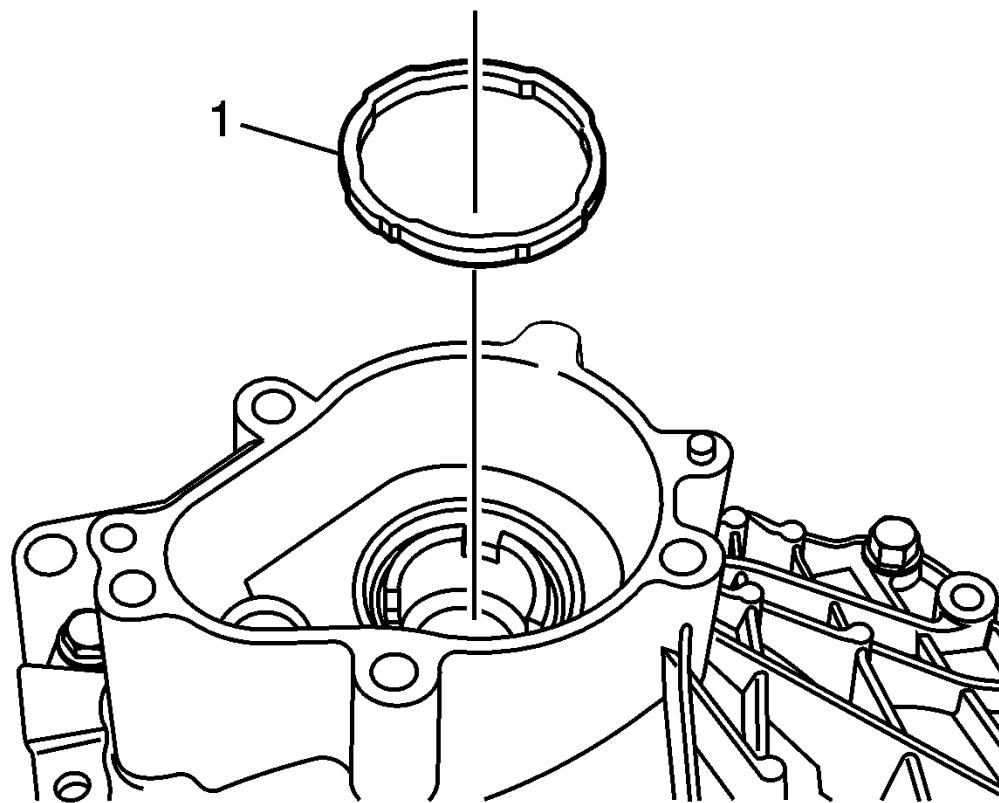


Fig. 209: Differential Bearing Adjuster Nut Locks

Courtesy of GENERAL MOTORS COMPANY

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

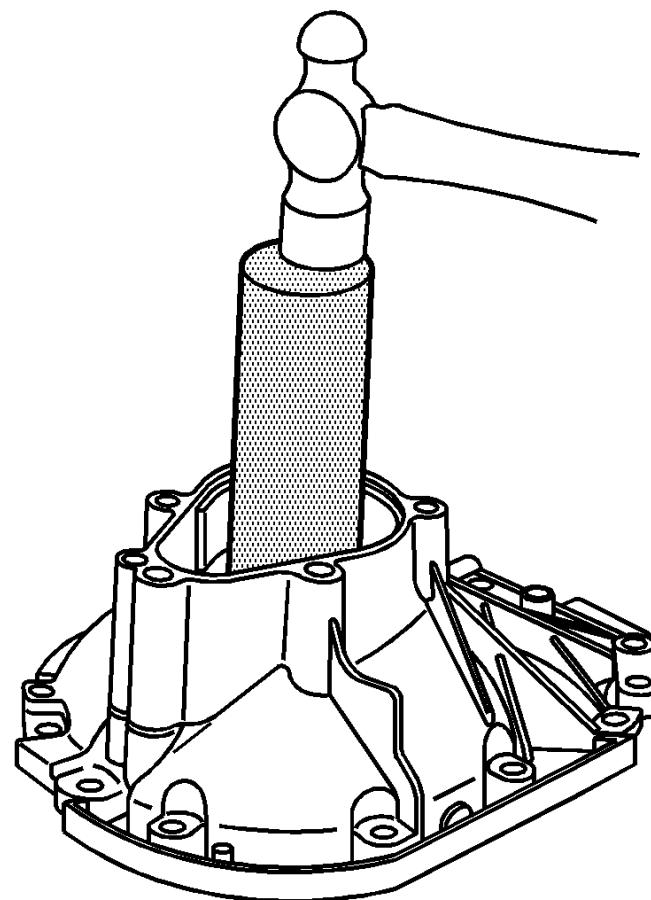


Fig. 210: View Of J 36614

Courtesy of GENERAL MOTORS COMPANY

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

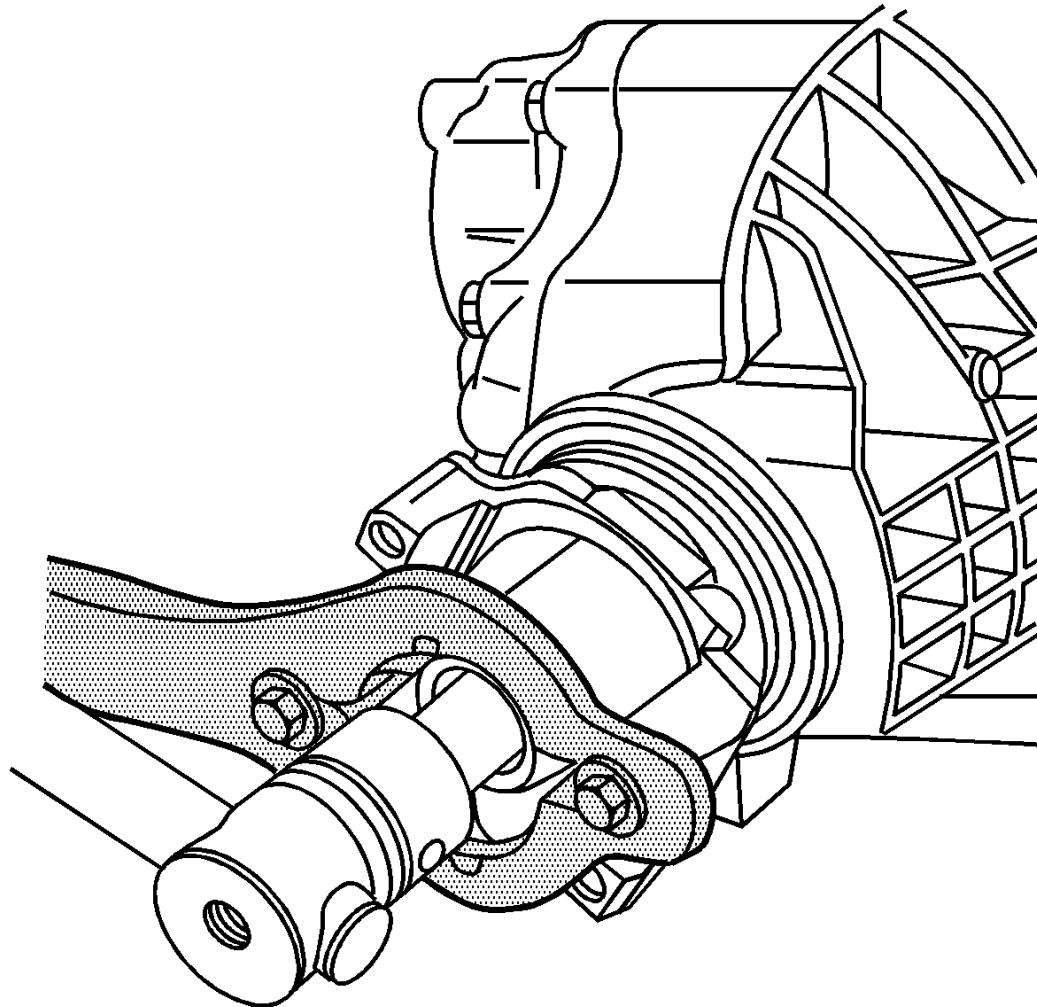


Fig. 211: View Of J 8614-01

Courtesy of GENERAL MOTORS COMPANY

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

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

20. Remove the washer.

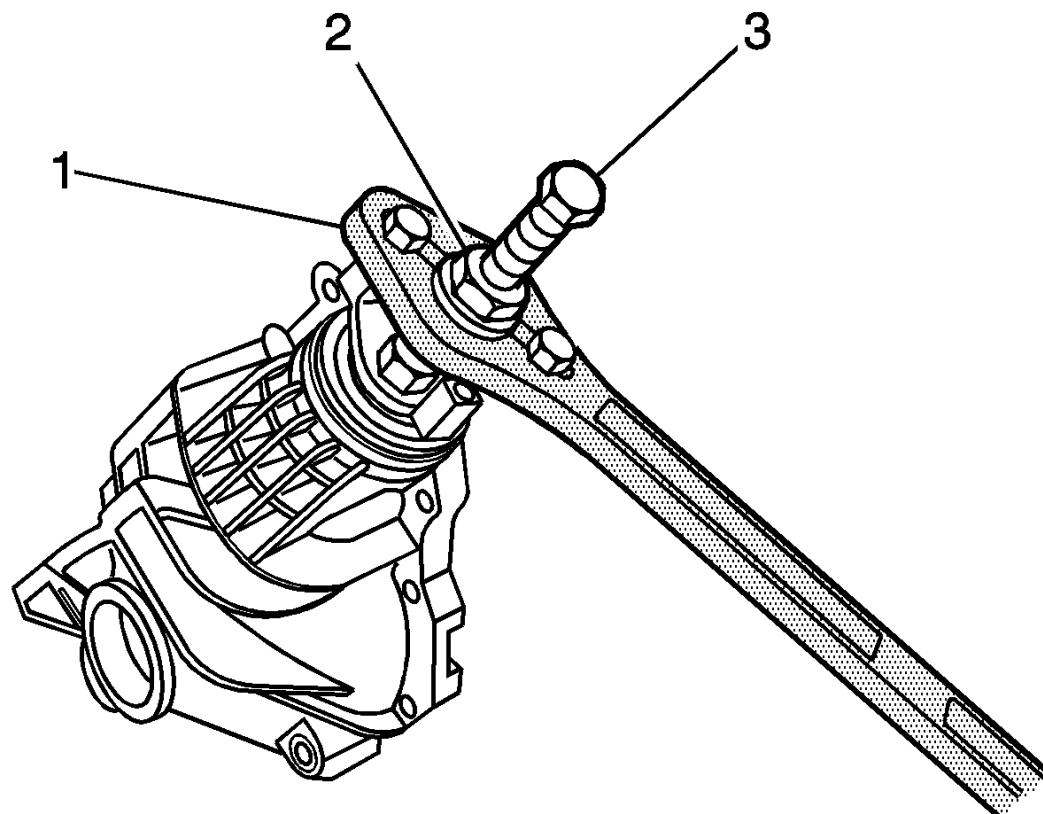


Fig. 212: View Of Pinion Yoke Removal Tools

Courtesy of GENERAL MOTORS COMPANY

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

24. Install the **J-36598** holding fixture into a vise.

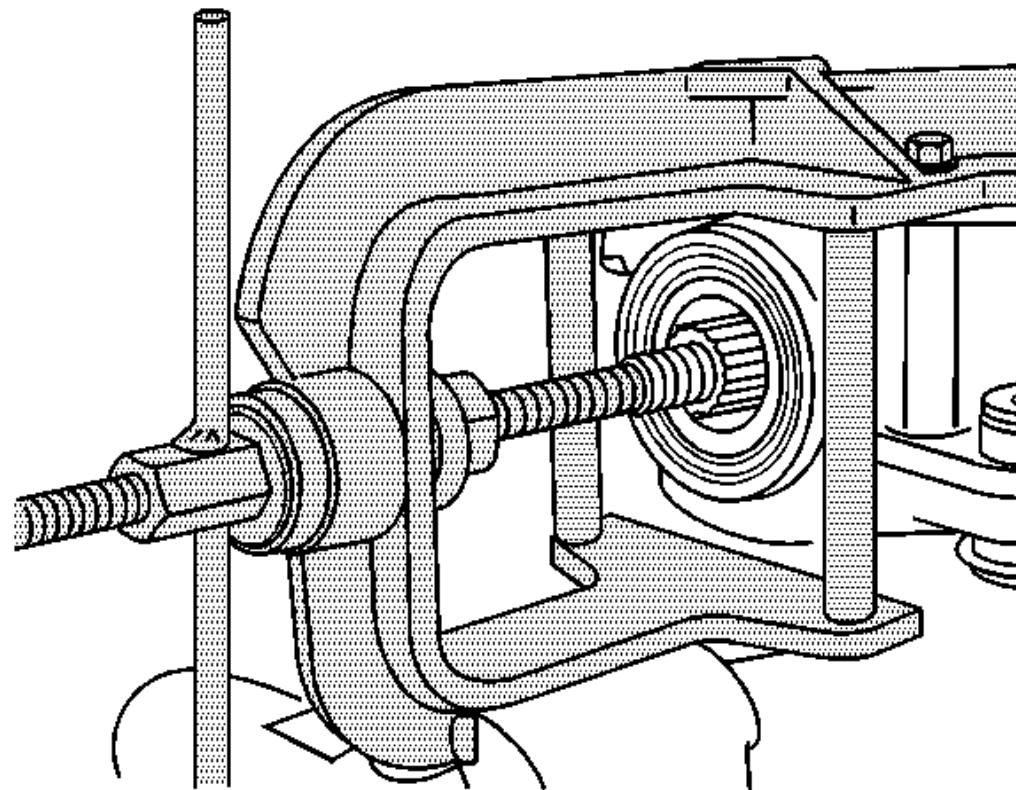


Fig. 213: Holding Fixture & Pinion Tool J 36598

Courtesy of GENERAL MOTORS COMPANY

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

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

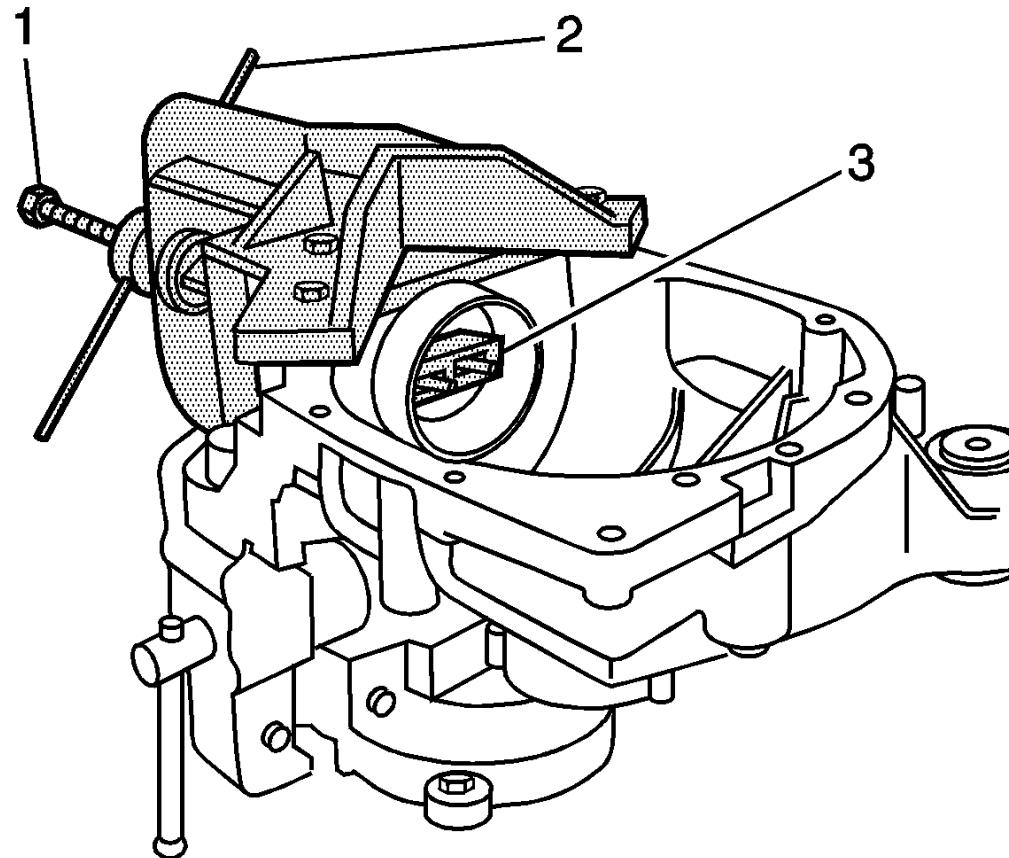


Fig. 214: Pressing Inner Bearing Cup Out From Differential Carrier Case

Courtesy of GENERAL MOTORS COMPANY

27. Install the J 36598-5 (3) behind the inner pinion bearing cup.

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

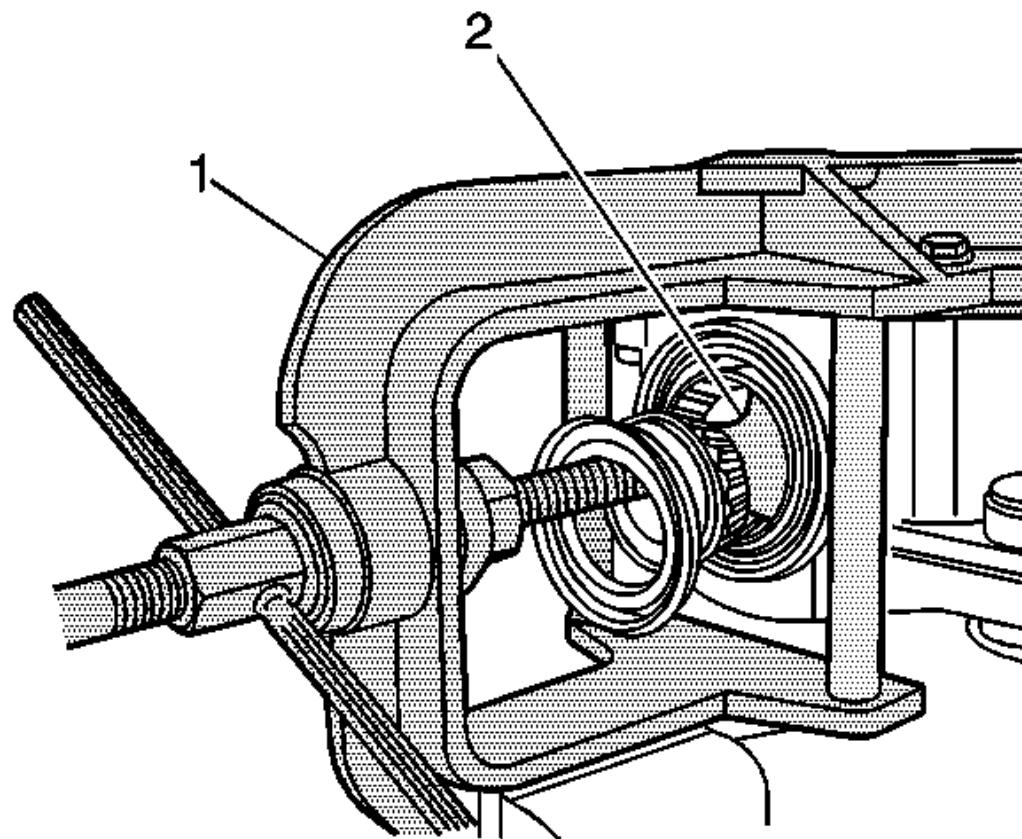


Fig. 215: Pinion Oil Seal & Bearing Using Forcing Screw J 36598 To J 36598-5
Courtesy of GENERAL MOTORS COMPANY

30. Install the J 36598-5 (2) behind the outer pinion bearing cup.

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

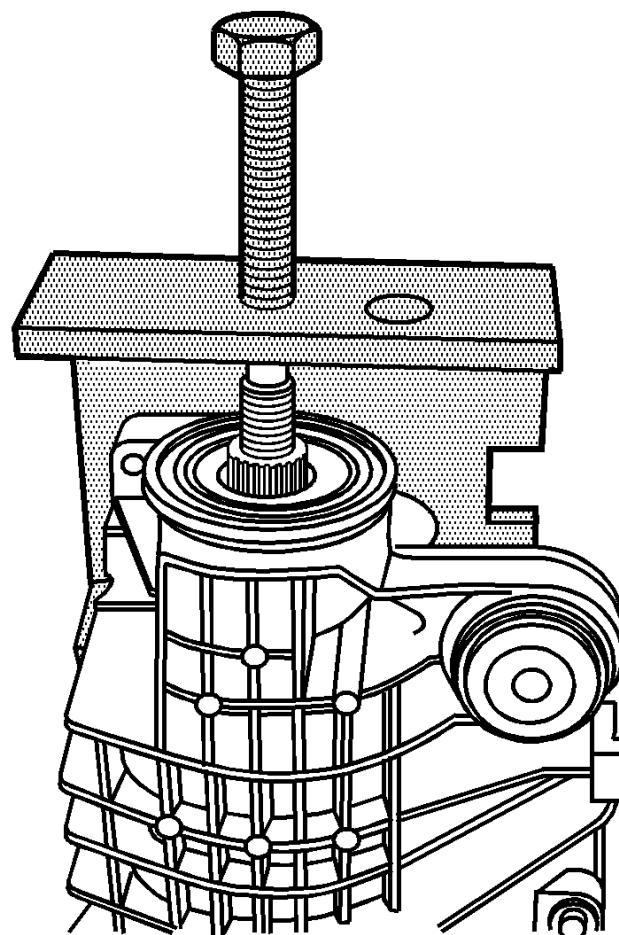


Fig. 216: Pinion Components Using J 45765

Courtesy of GENERAL MOTORS COMPANY

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

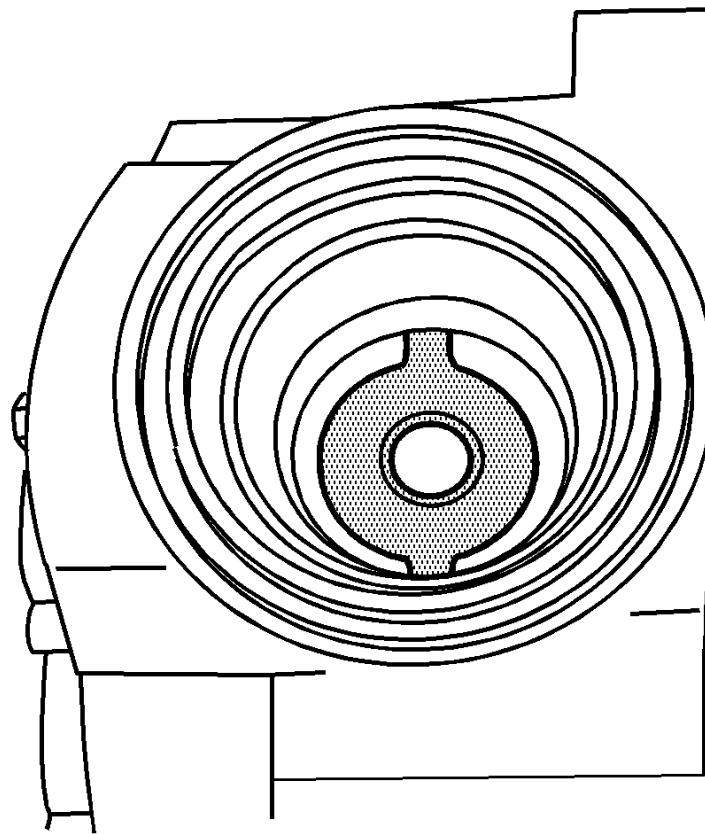


Fig. 217: J 45858-4 Over Inner Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

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

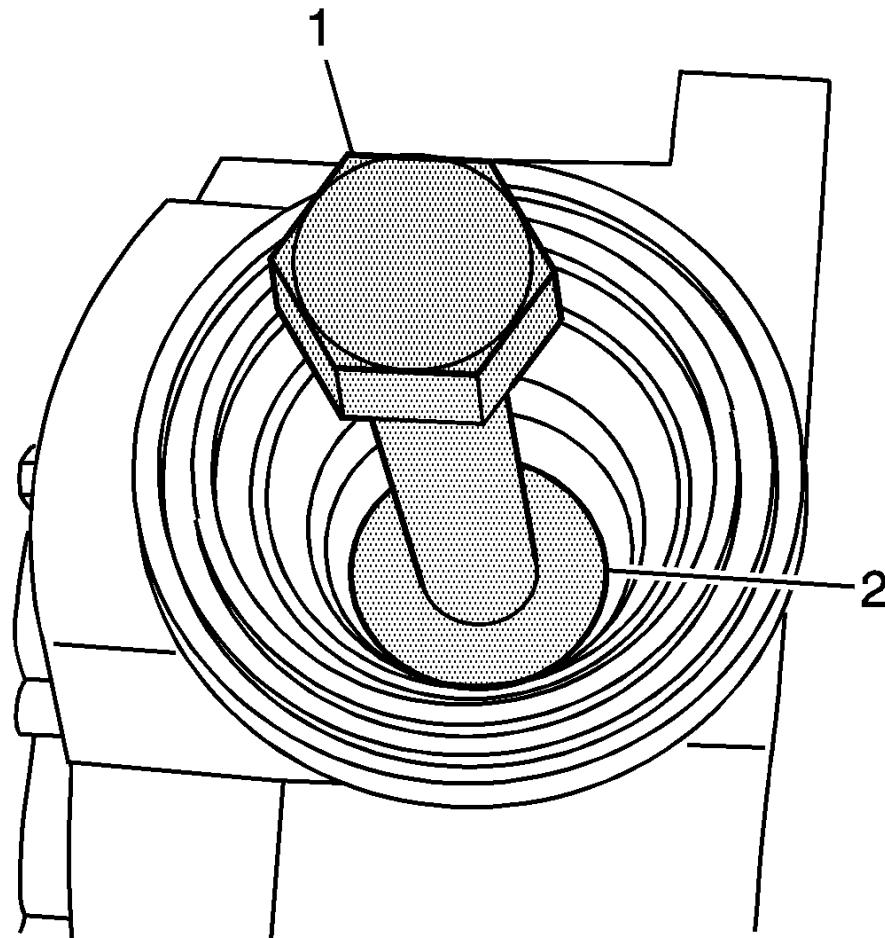


Fig. 218: Forcing Screw Of J 45858

Courtesy of GENERAL MOTORS COMPANY

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

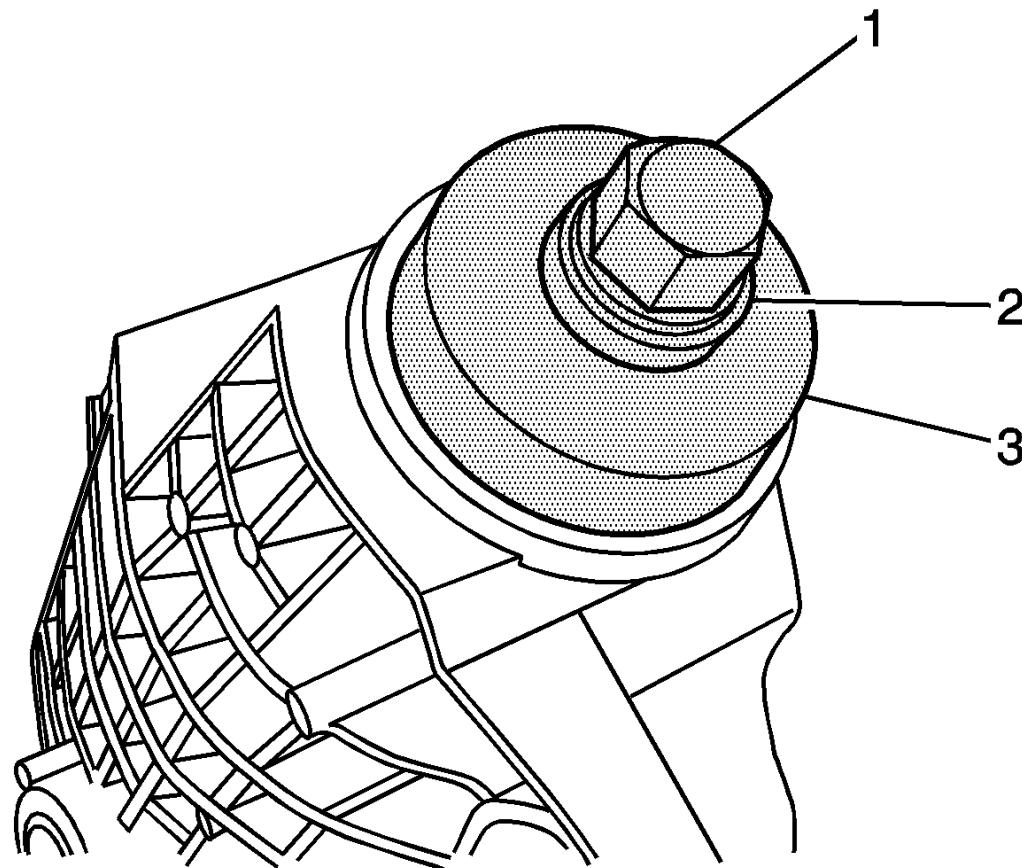


Fig. 219: View Of Thrust Bearing & Washer, Forcing Screw & Special Tool J 45858-3

Courtesy of GENERAL MOTORS COMPANY

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

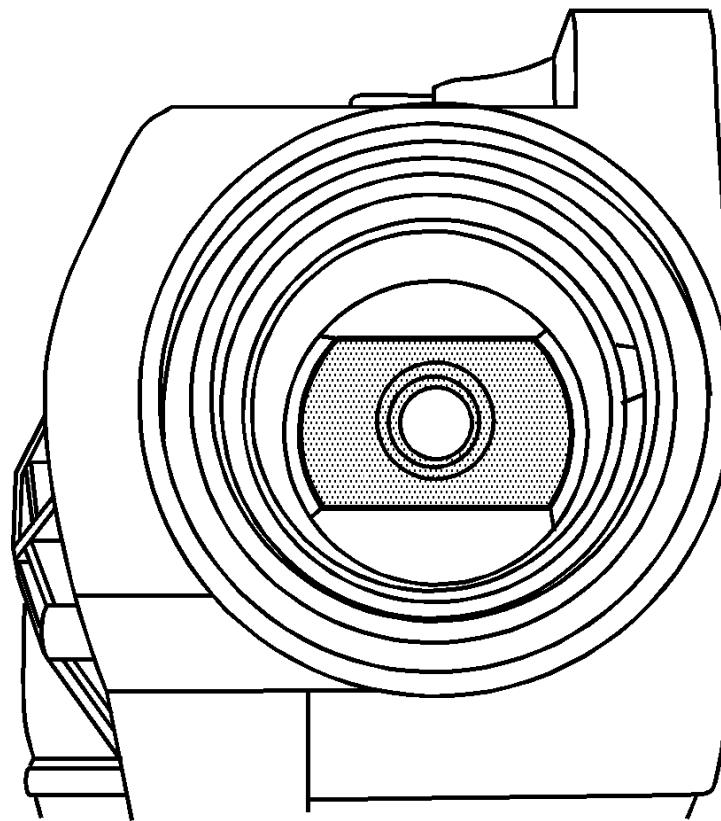


Fig. 220: J 45858-5 Into Pinion Bearing Bore

Courtesy of GENERAL MOTORS COMPANY

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

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

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

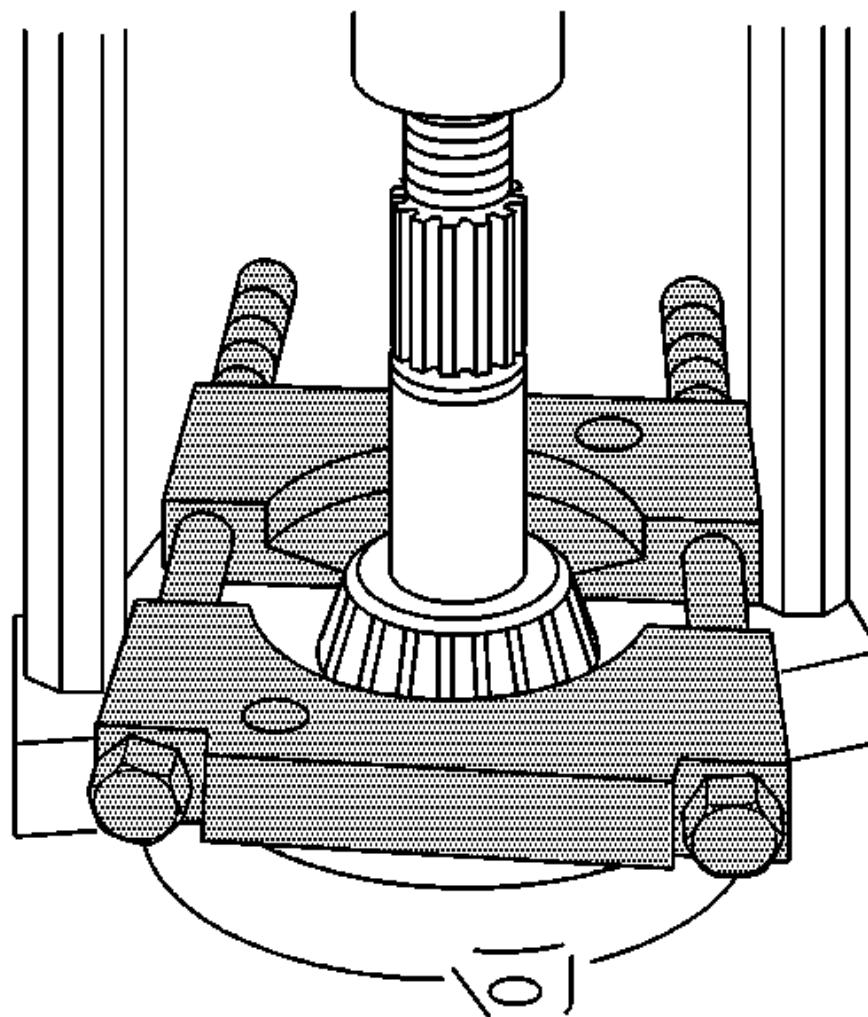


Fig. 221: View Of Inner Pinion Bearing & Hydraulic Press

Courtesy of GENERAL MOTORS COMPANY

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

46. Remove the pinion gear selectable shim.

FRONT AXLE DISASSEMBLE (9.25 INCH HD AXLE)

Tools Required

- **J-22912-B** Split-Plate Bearing Puller
- **J-2619-01** Slide Hammer
- **J-29369-2** Bushing and Bearing Remover (2-3 in)
- **J-33791** Carrier Bushing Remover/Installer
- **J-34011** Pilot Bearing Remover
- **J-36599-A** Side Bearing Nut Wrench
- **J-36615** Side Bearing Nut Wrench
- **J-36616** Axle Mount Bushing Remover/Installer
- **J-45754** Pinion Bearing Race Remover/Installer - 9.25 inch Axle
- **J-45765** Pinion Remover
- **J-8614-01** Flange and Pulley Holding Tool

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 \(9.25 Inch HD Axle\)**](#).

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

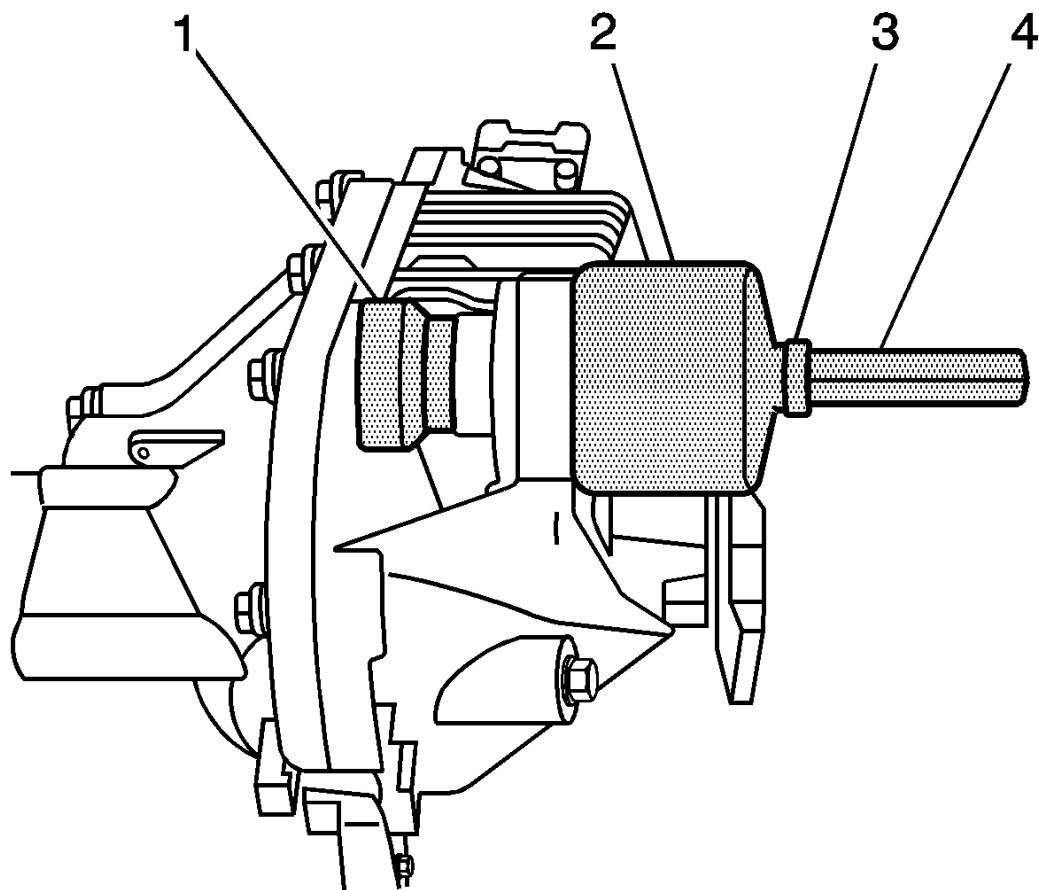


Fig. 222: Upper Differential Carrier Assembly Bushing And Special Tool

Courtesy of GENERAL MOTORS COMPANY

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.

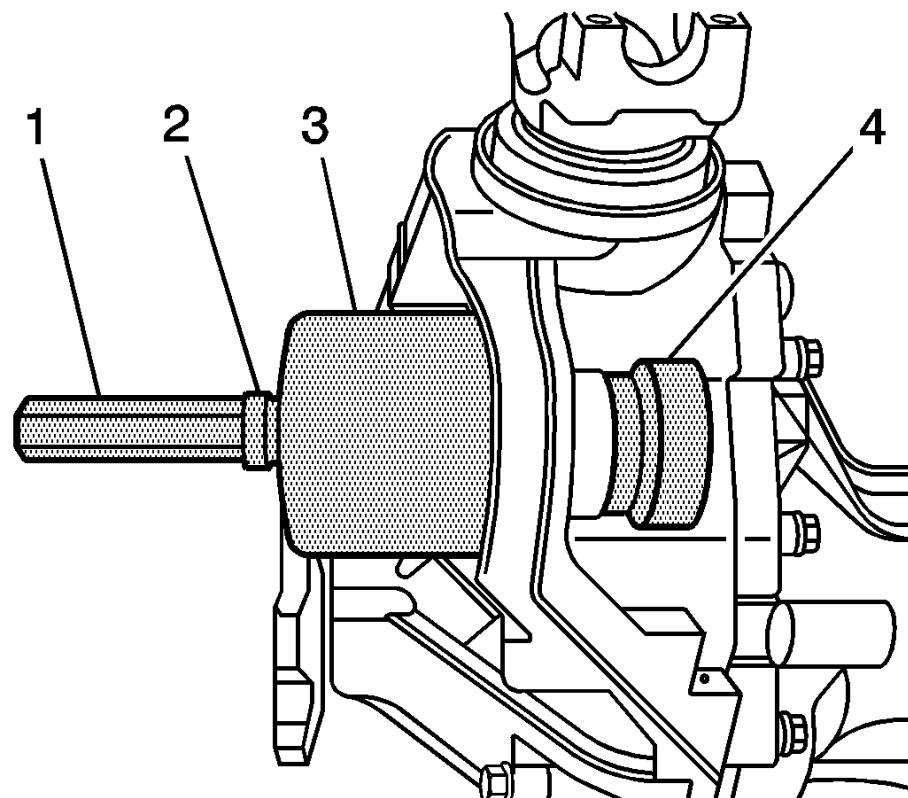


Fig. 223: Lower Differential Carrier Assembly Bushing And Remover

Courtesy of GENERAL MOTORS COMPANY

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.

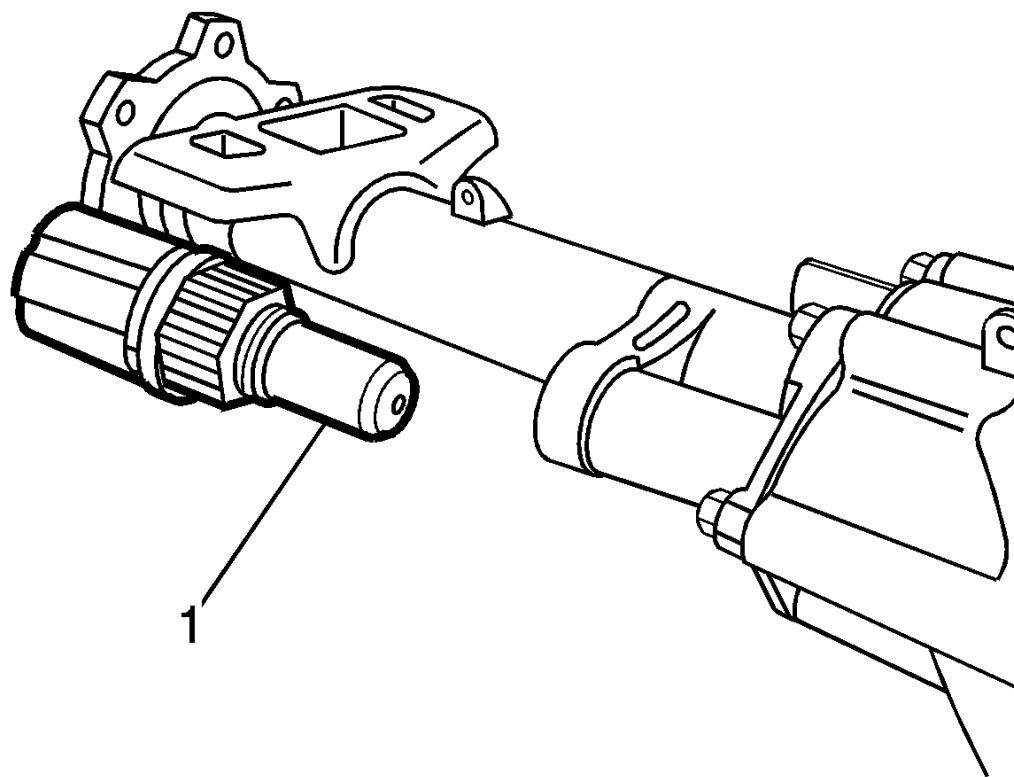


Fig. 224: Inner Axle Shaft

Courtesy of GENERAL MOTORS COMPANY

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

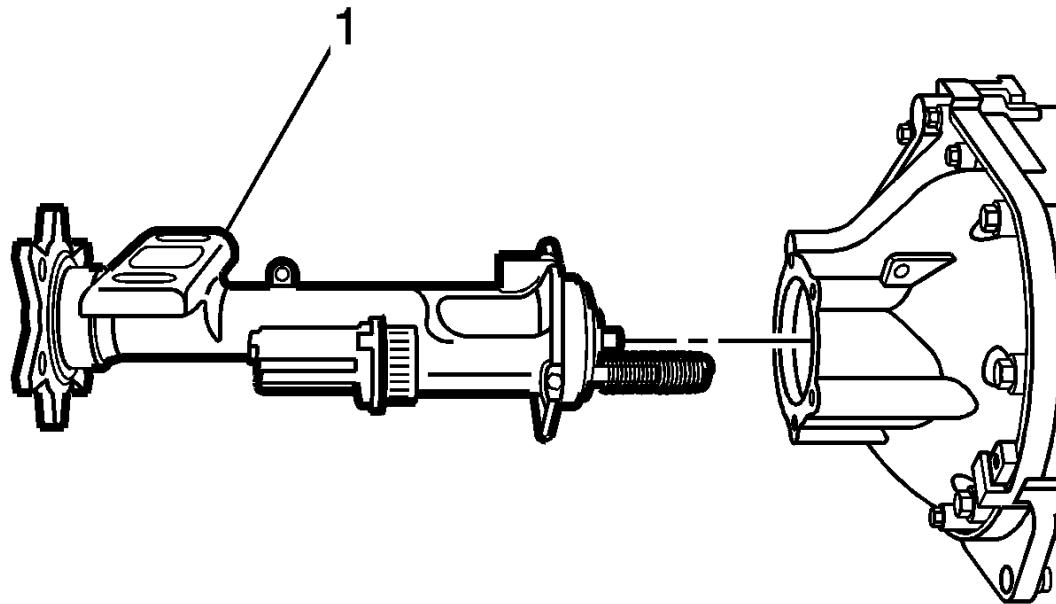


Fig. 225: Inner Axle Shaft Housing Assembly

Courtesy of GENERAL MOTORS COMPANY

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

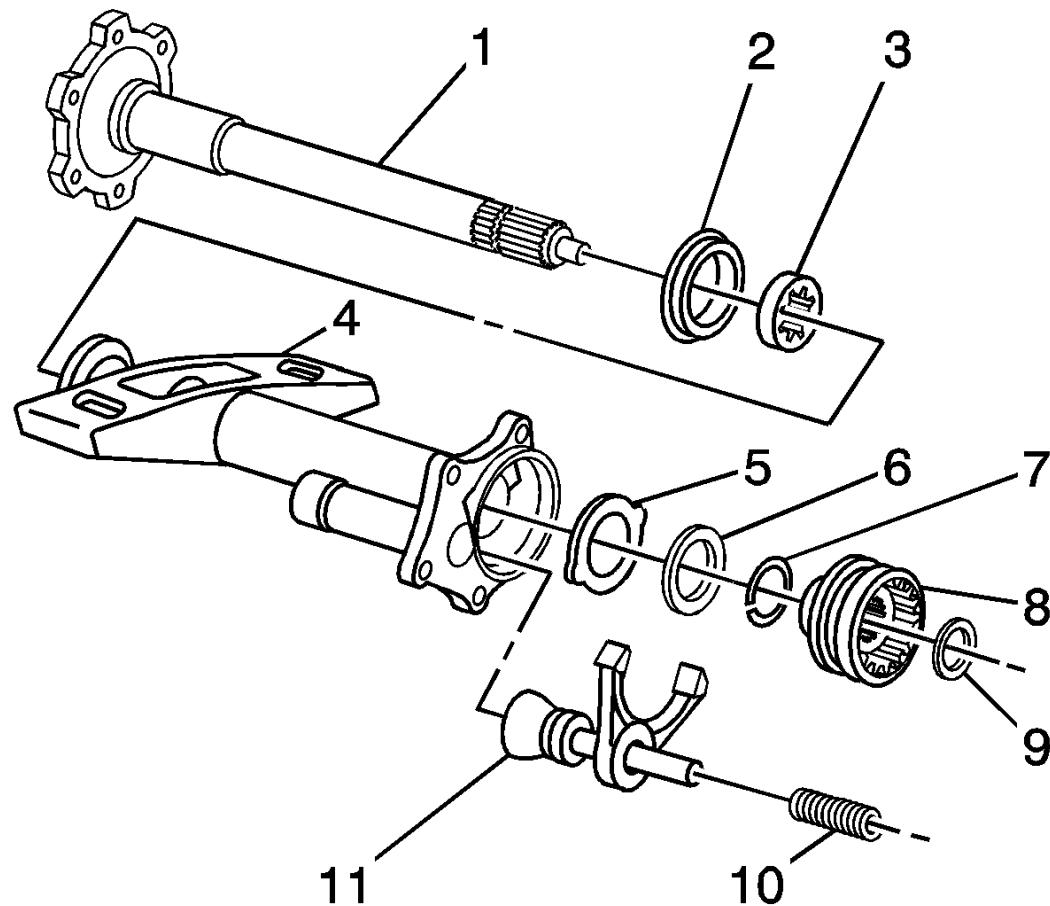


Fig. 226: Inner Axle Shaft Housing Components

Courtesy of GENERAL MOTORS COMPANY

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)

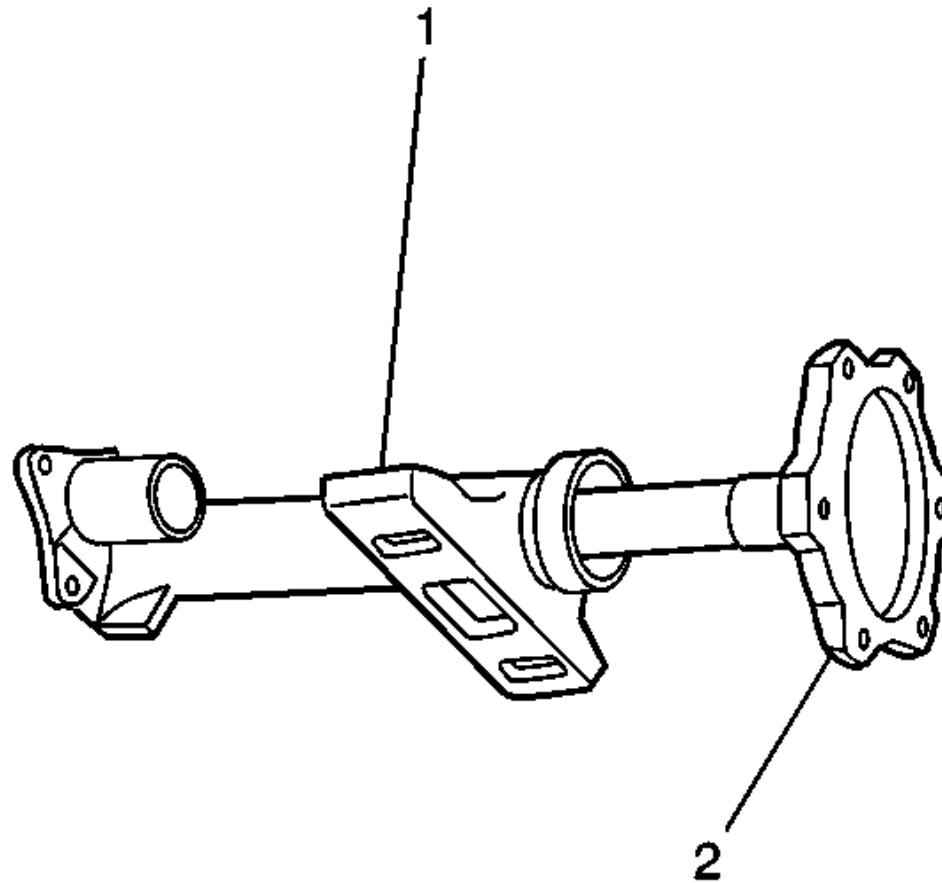


Fig. 227: Inner Axle Shaft And Housing
Courtesy of GENERAL MOTORS COMPANY

7. Remove the inner axle shaft (2).

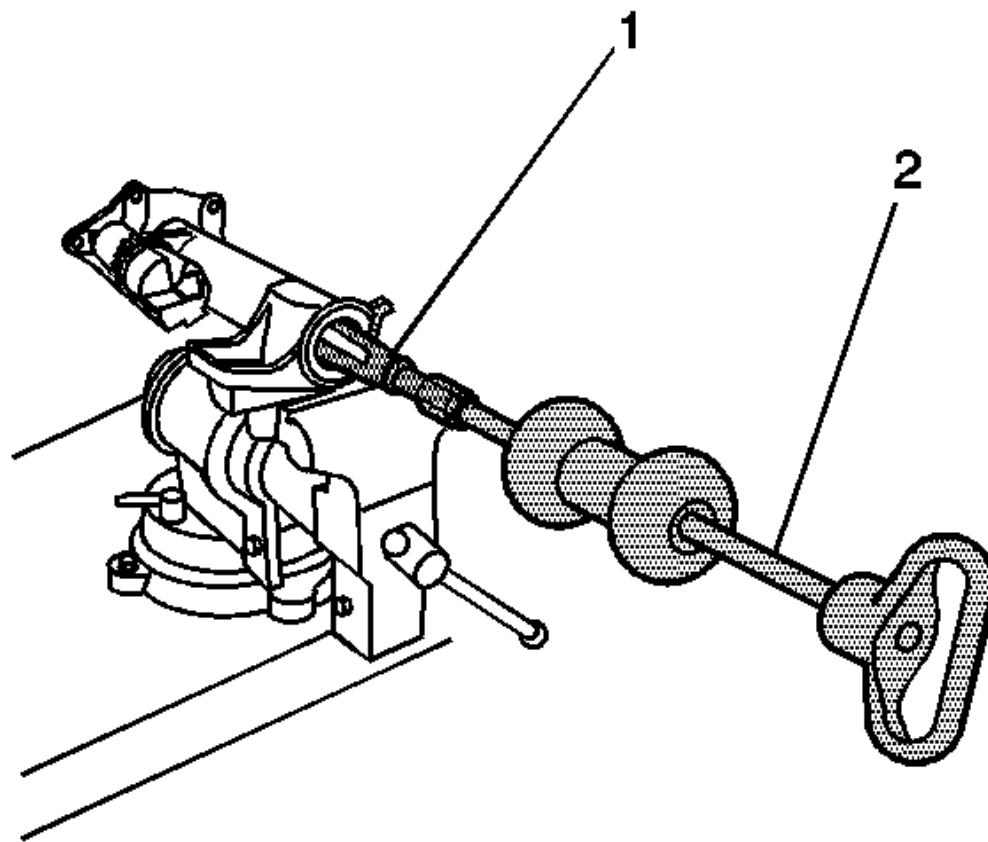


Fig. 228: Inner Axle Shaft Bearing And Special Tools

Courtesy of GENERAL MOTORS COMPANY

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** bushing and bearing remover (1) behind the inner axle shaft bearing.
9. Install the **J-2619-01** slide hammer (2) to the **J-29369-2** bushing and bearing remover (1).
10. Remove the inner axle shaft bearing and the inner axle shaft bearing and the seal using the **J-2619-01** slide hammer.
11. Remove the inner axle shaft housing from the vise.
12. Remove the front drive axle clutch shaft.

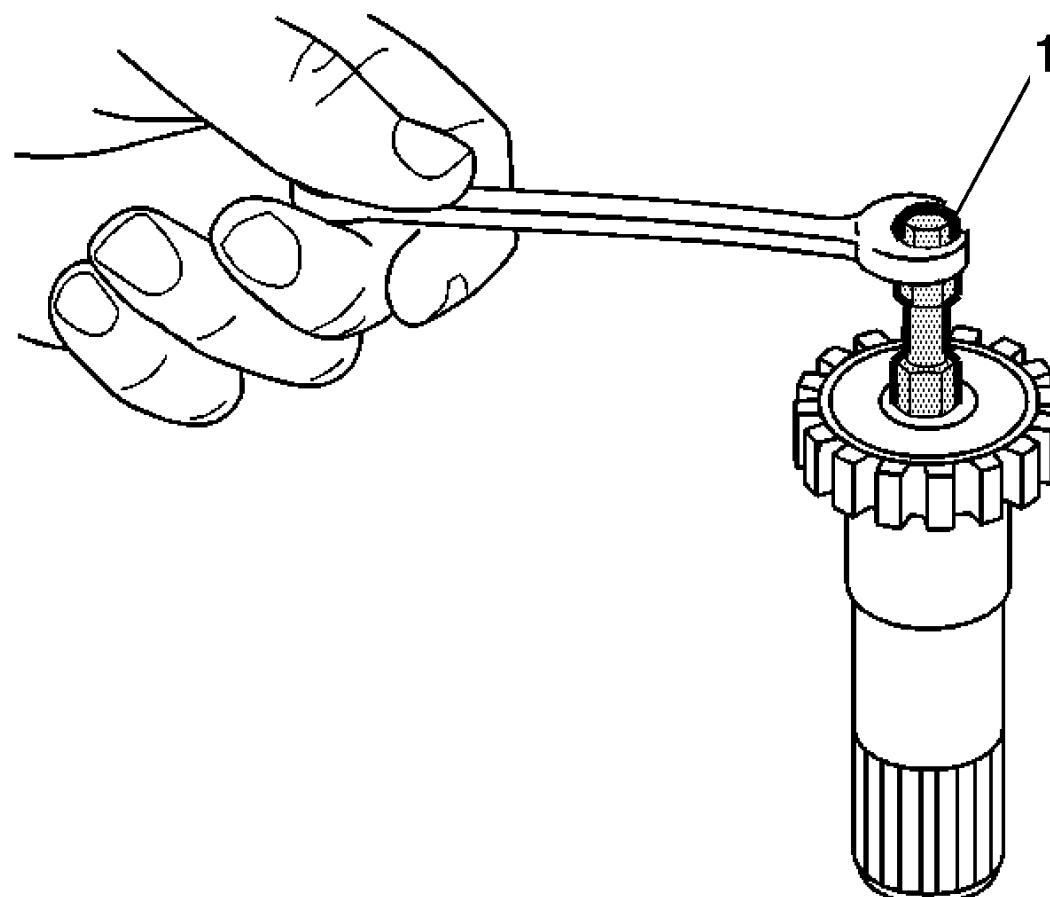


Fig. 229: Clutch Shaft Pilot Bearing - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

13. Use the **J-34011** pilot bearing remover in order to remove the clutch shaft bearing.

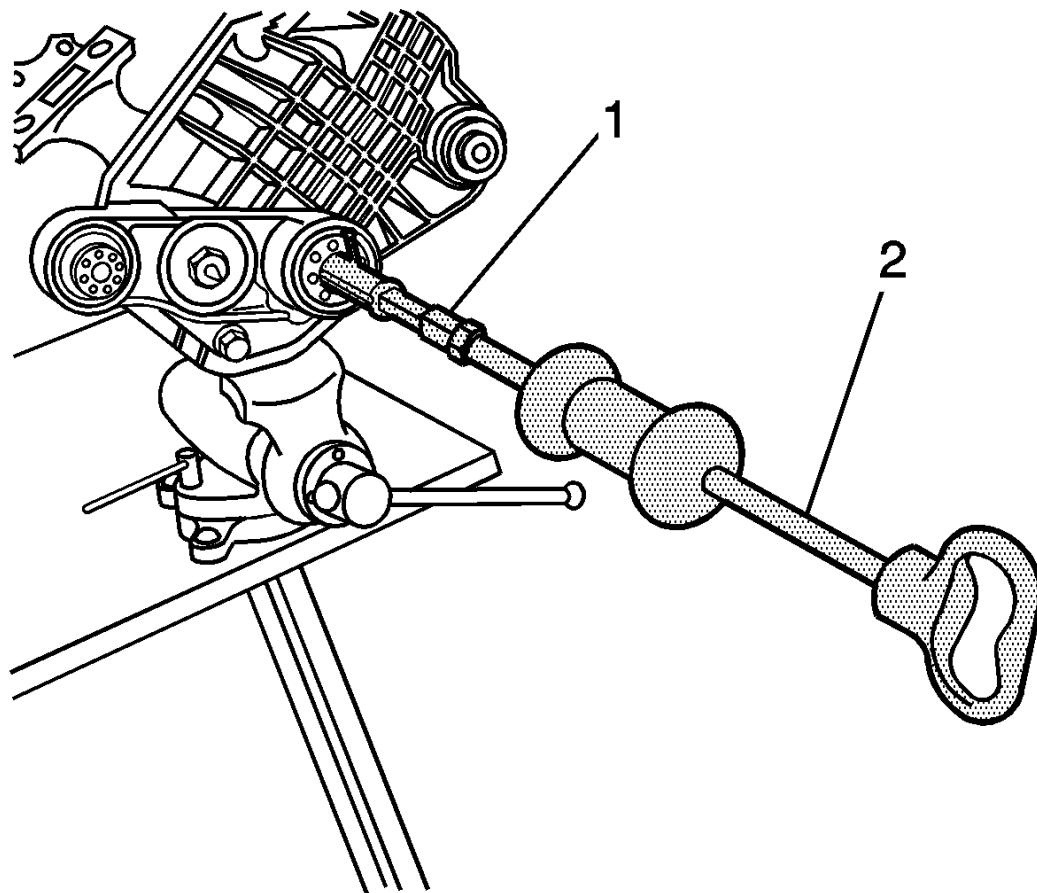


Fig. 230: Inner Axle Shaft Seal/Bearing - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

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** bushing and bearing remover (1) behind the inner axle shaft bearing.
17. Install the **J-2619-01** slide hammer (2) to the **J-29369-2** bushing and bearing remover (1).
18. Remove the inner axle shaft bearing and the inner axle seal bearing and the seal using the **J-2619-01** slide hammer.
19. Remove the differential carrier assembly from the vise.

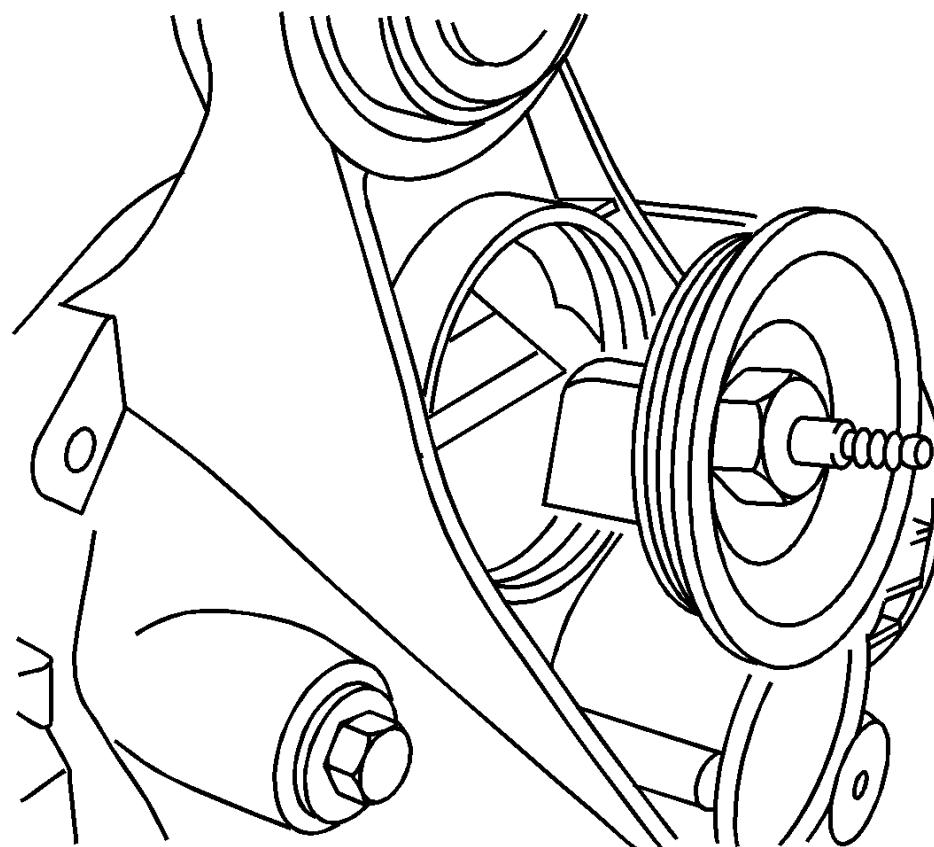


Fig. 231: View Of Vent Hose Connector
Courtesy of GENERAL MOTORS COMPANY

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

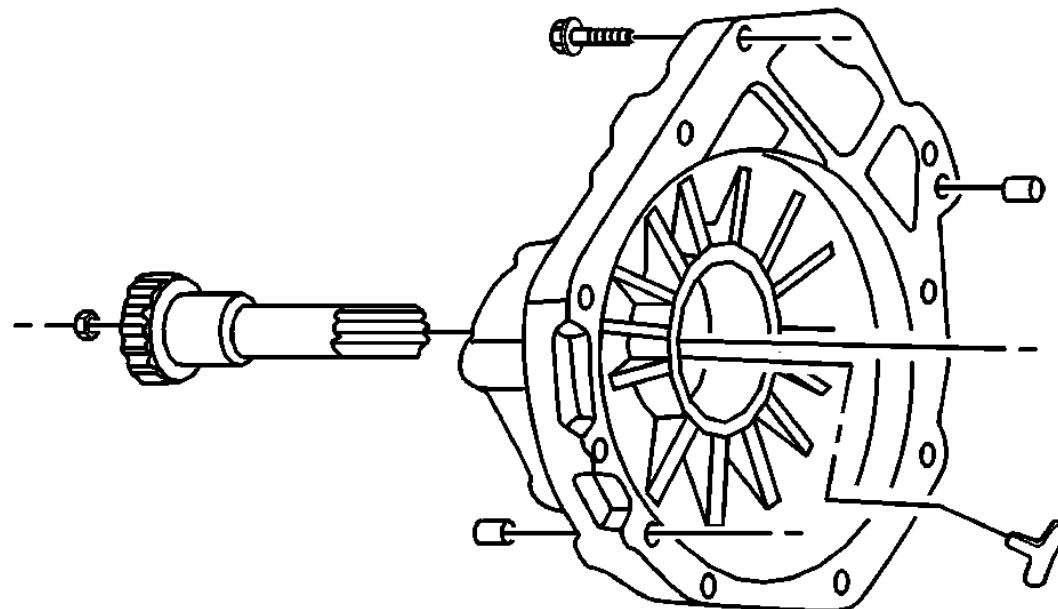


Fig. 232: Differential Carrier Assembly Bolts

Courtesy of **GENERAL MOTORS COMPANY**

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.

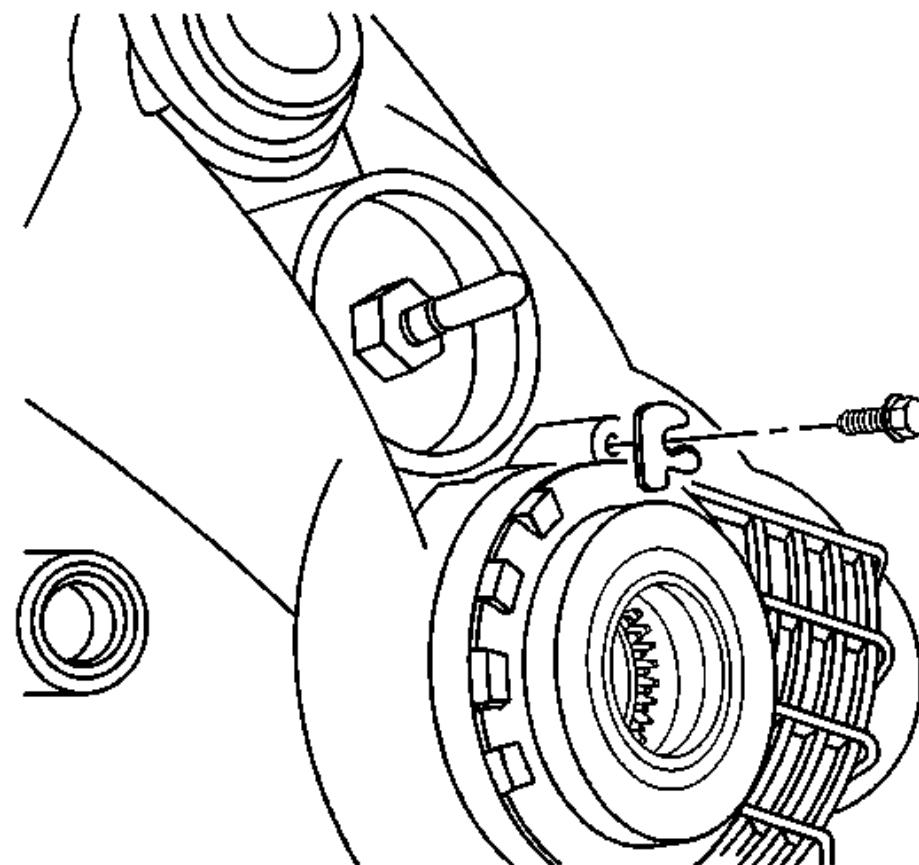


Fig. 233: Left Side Differential Bearing Adjuster Nut Lock & Bolt

Courtesy of GENERAL MOTORS COMPANY

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

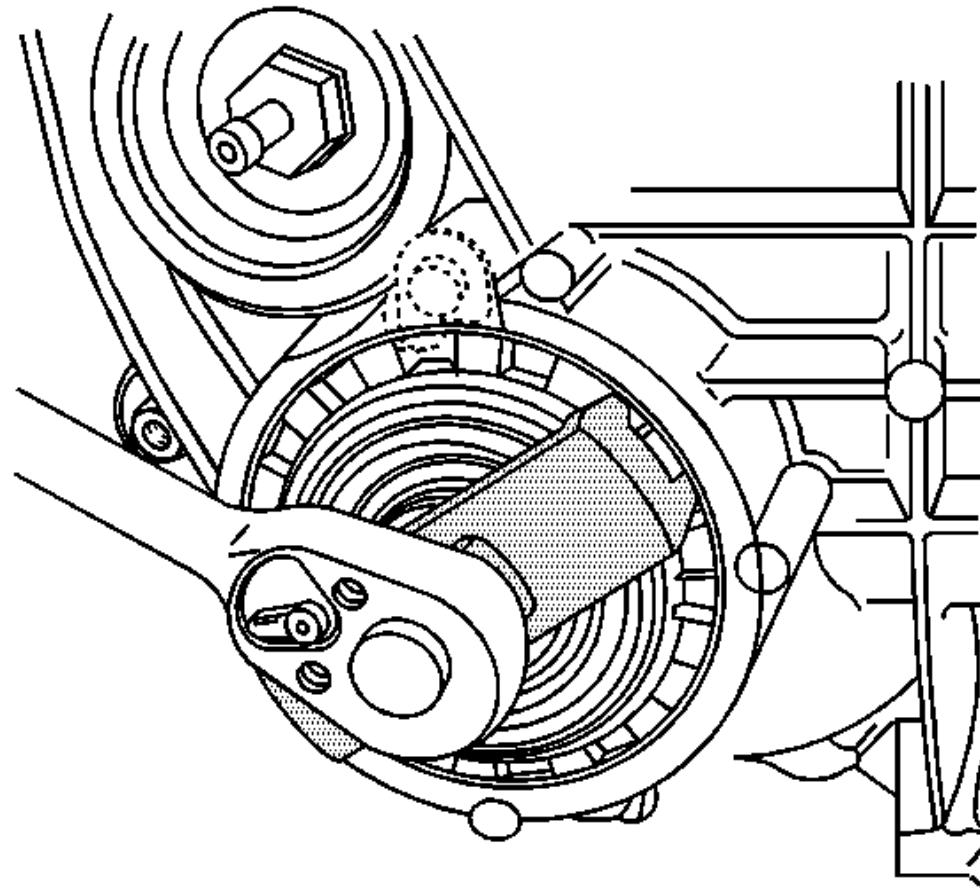


Fig. 234: Left Side Differential Bearing Adjuster Nut

Courtesy of GENERAL MOTORS COMPANY

25. Remove the left side differential bearing adjuster by doing the following:

1. Install the **J-36615** side bearing nut wrench onto the differential bearing adjuster nut as shown.
2. Turn the **J-36615** side bearing nut wrench counterclockwise in order to remove the differential bearing adjuster nut and the O-ring.

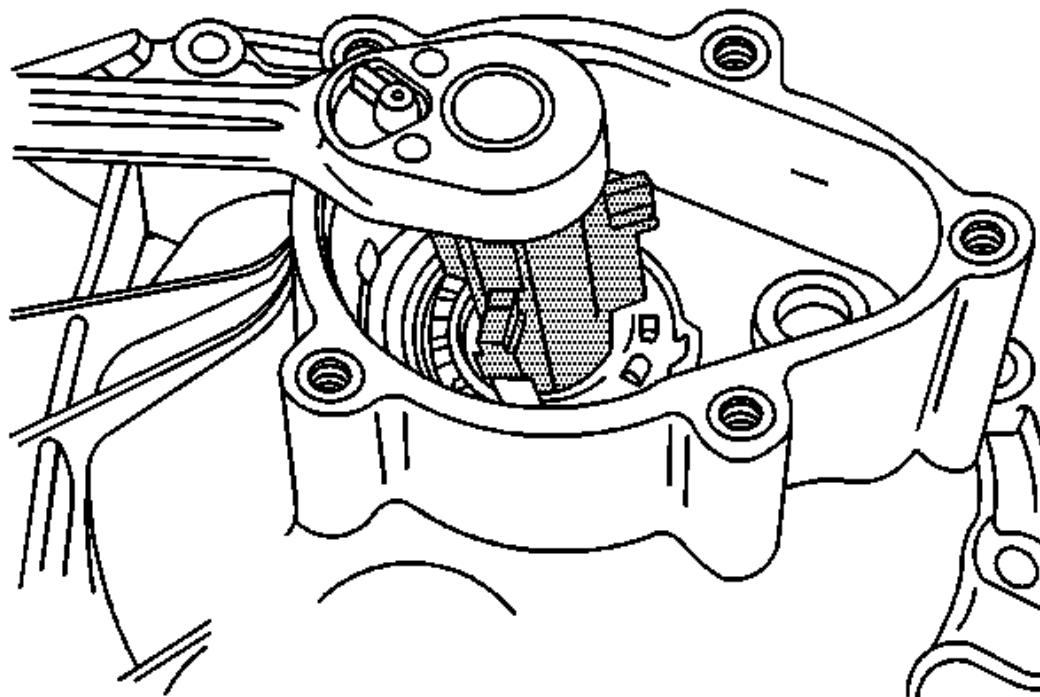


Fig. 235: Differential Bearing Adjuster Nuts & Bearing Cups

Courtesy of **GENERAL MOTORS COMPANY**

26. Remove the right side differential bearing adjuster by doing the following:

1. Install the **J-36599-A** side bearing nut wrench onto the differential bearing adjuster nut.

2. Turn the **J-36599-A** side bearing nut wrench clockwise in order to push the bearing cup out of the bore.
27. Remove the right side differential bearing adjuster nut sleeve using a hammer and brass drift.

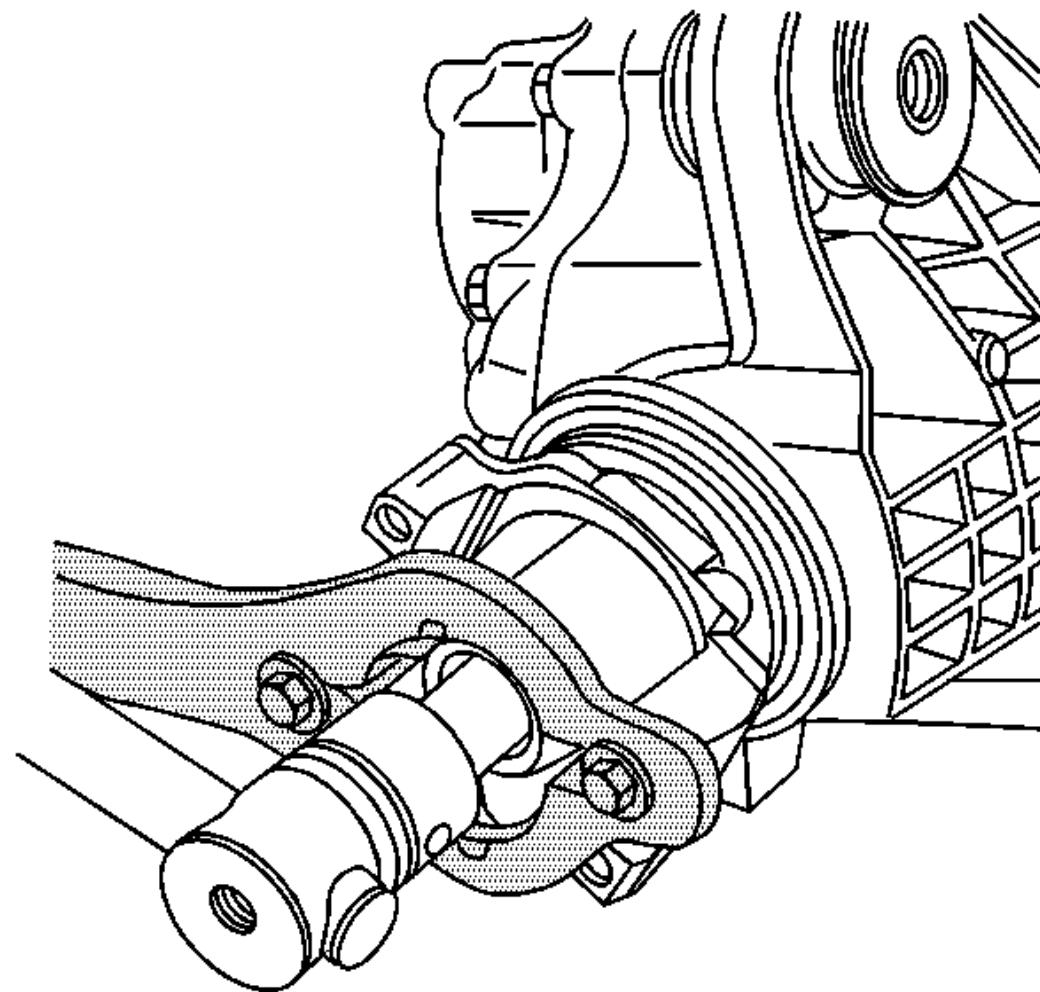


Fig. 236: Holding Pinion Flange Using Special Tool

Courtesy of GENERAL MOTORS COMPANY

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

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

29. Remove the washer.

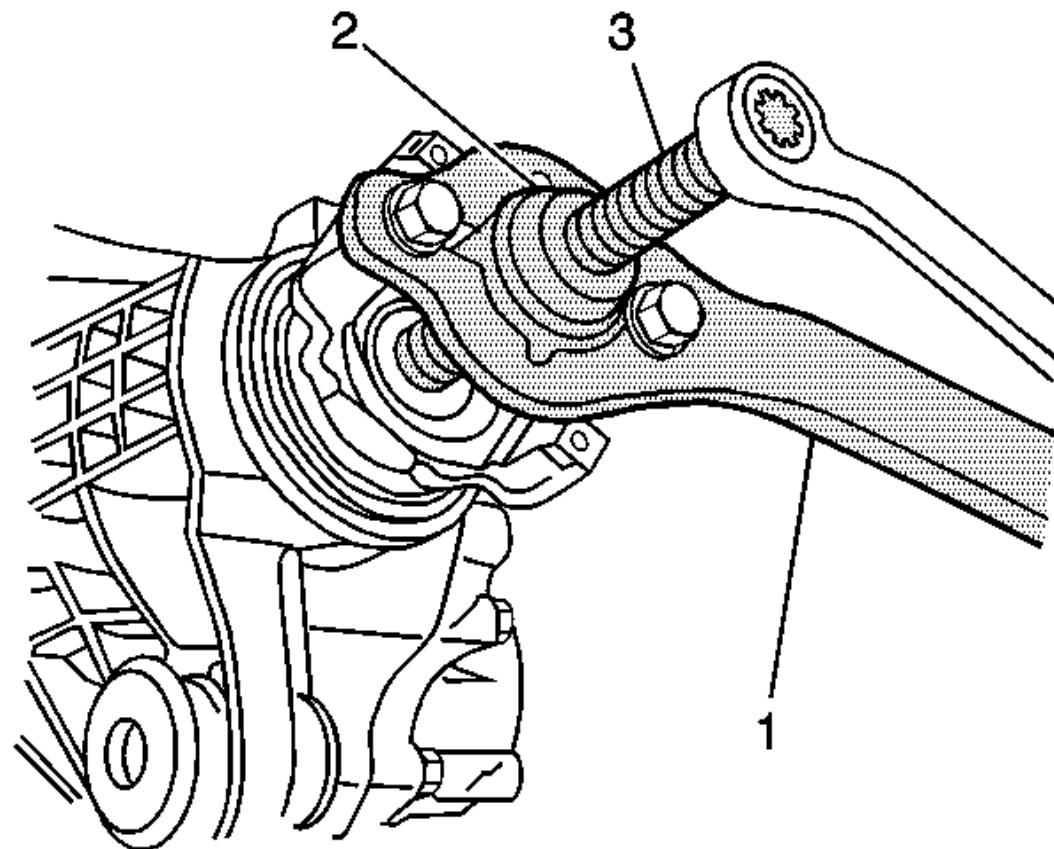


Fig. 237: Removing Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

30. Install the J-8614-2 (2) and the J-8614-3 (3) into the **J-8614-01** flange and pulley holding tool (1) as shown.

31. Remove the pinion yoke by turning the J-8614-3 (3) clockwise while holding the **J-8614-01** flange and pulley holding tool (1).

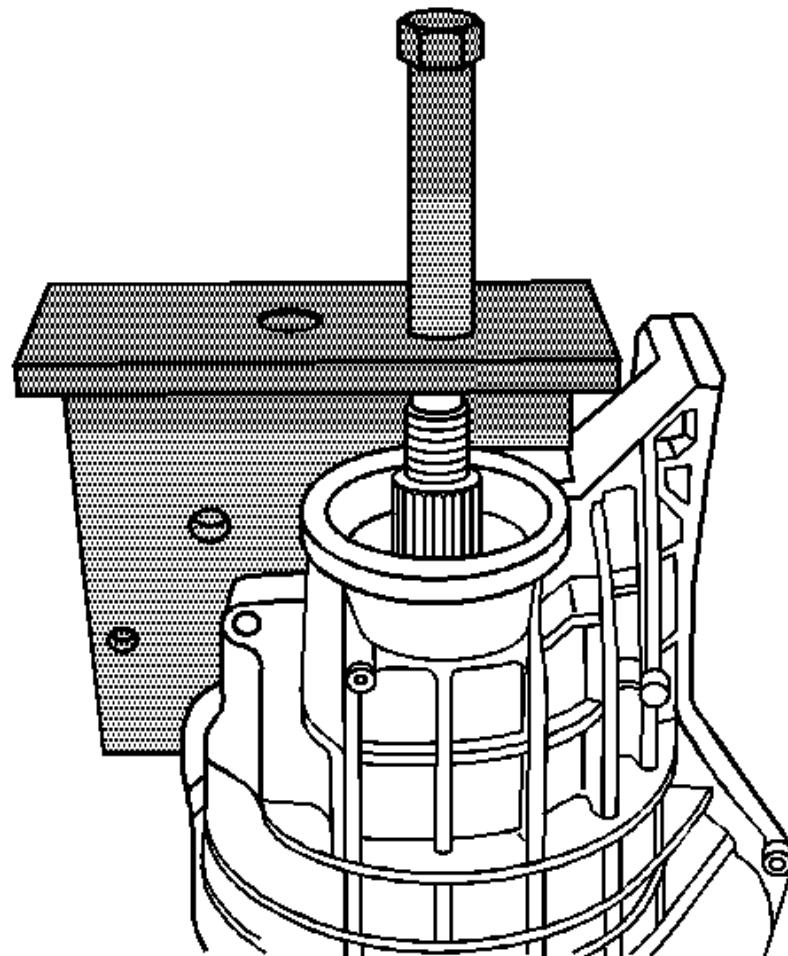


Fig. 238: View Of J 45765 Installed To Left Side Differential Carrier Case Half

Courtesy of GENERAL MOTORS COMPANY

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

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

34. Remove the drive pinion seal using a suitable seal remover.

35. Remove the outer pinion bearing from the differential carrier case half.

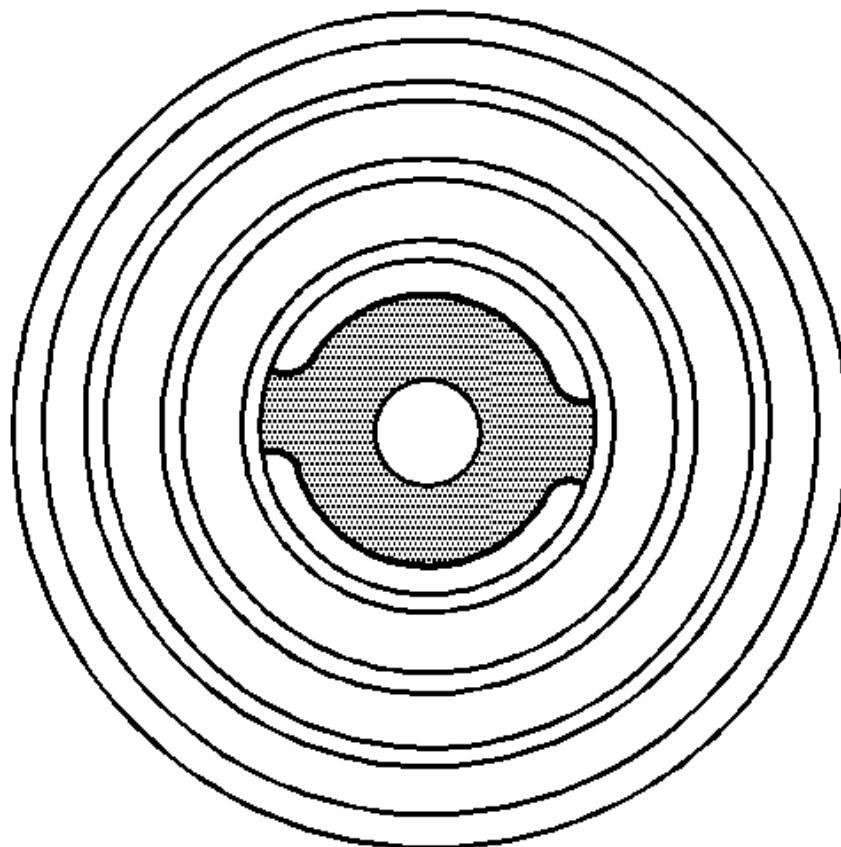


Fig. 239: View Of J 45754-3 Over Inner Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

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

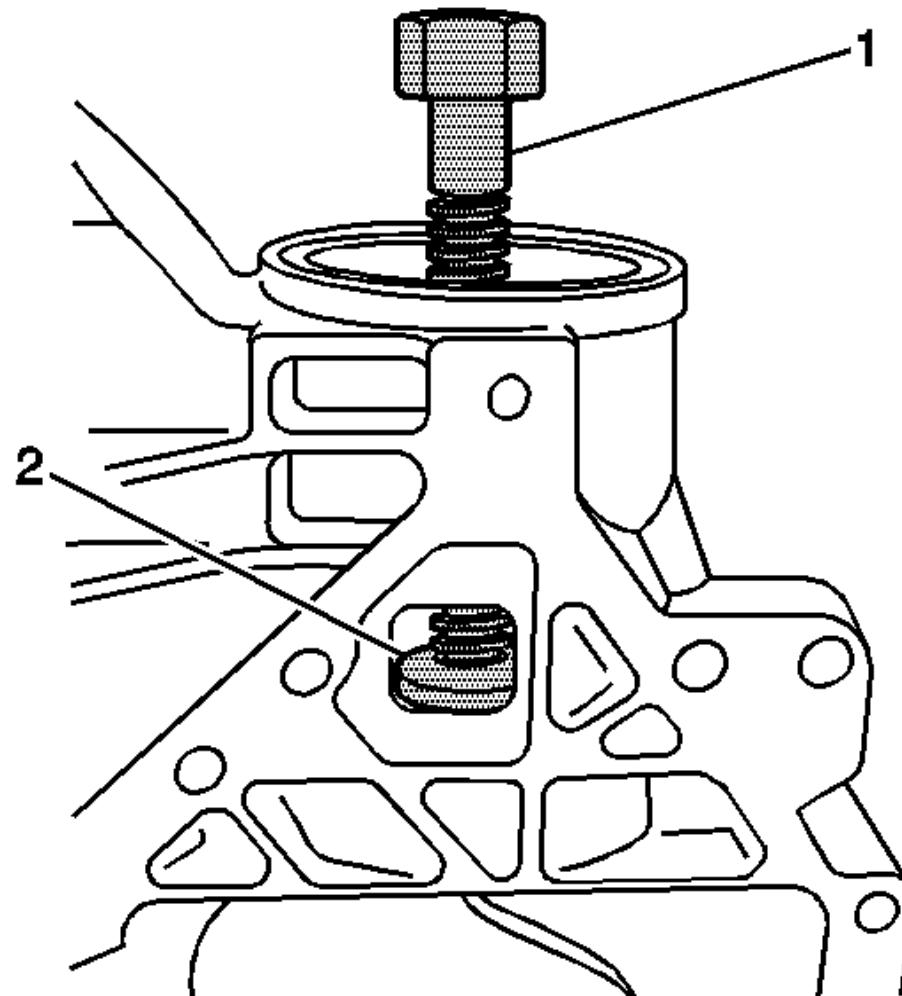


Fig. 240: View Of J 45754 Forcing Screw Into J 45754-3

Courtesy of GENERAL MOTORS COMPANY

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

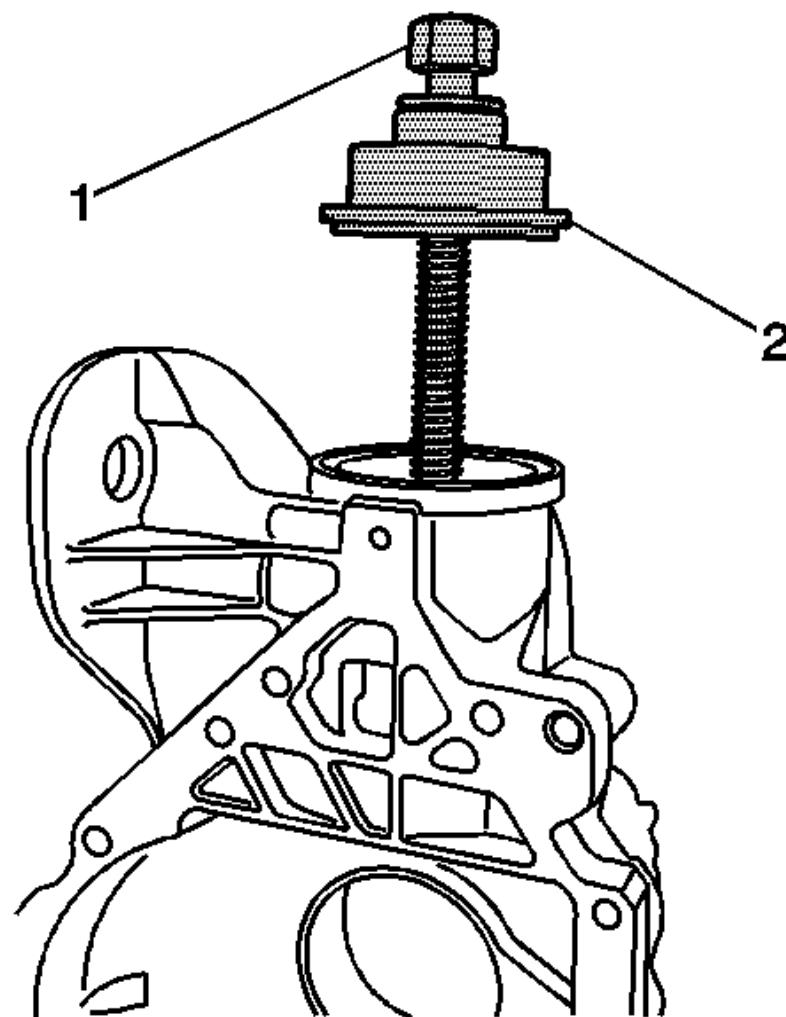


Fig. 241: Identifying J 45754-2 & Forcing Screw
Courtesy of GENERAL MOTORS COMPANY

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

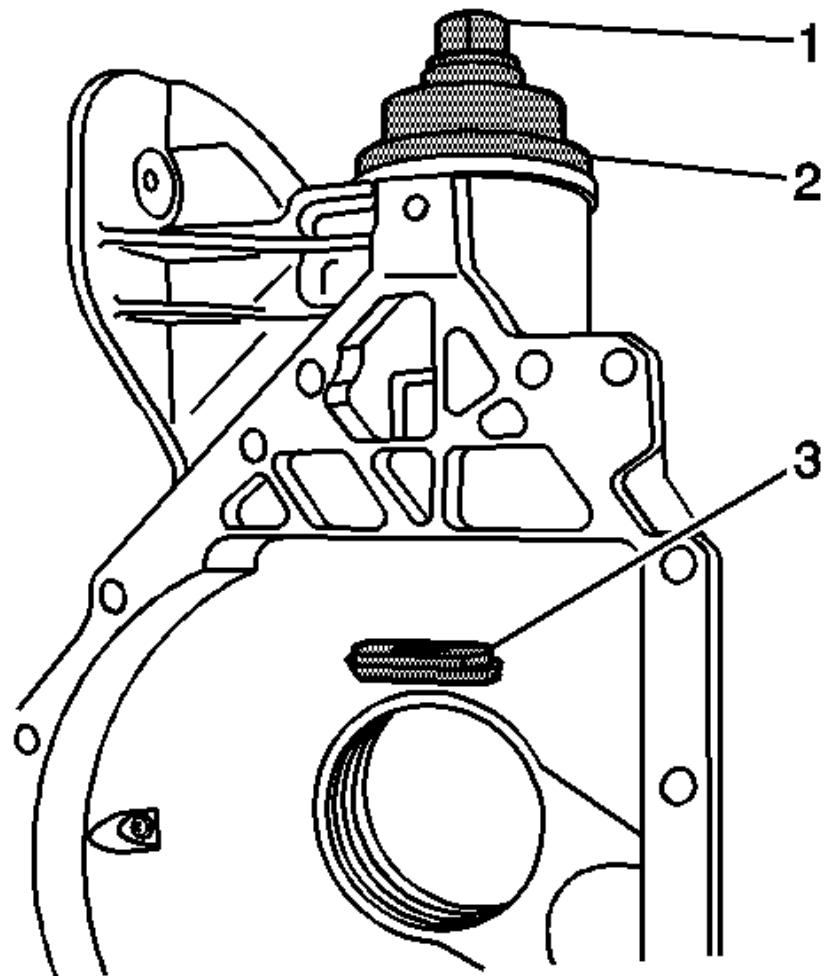


Fig. 242: Forcing Screw, J 45754-2 & J 45754-4
Courtesy of GENERAL MOTORS COMPANY

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.

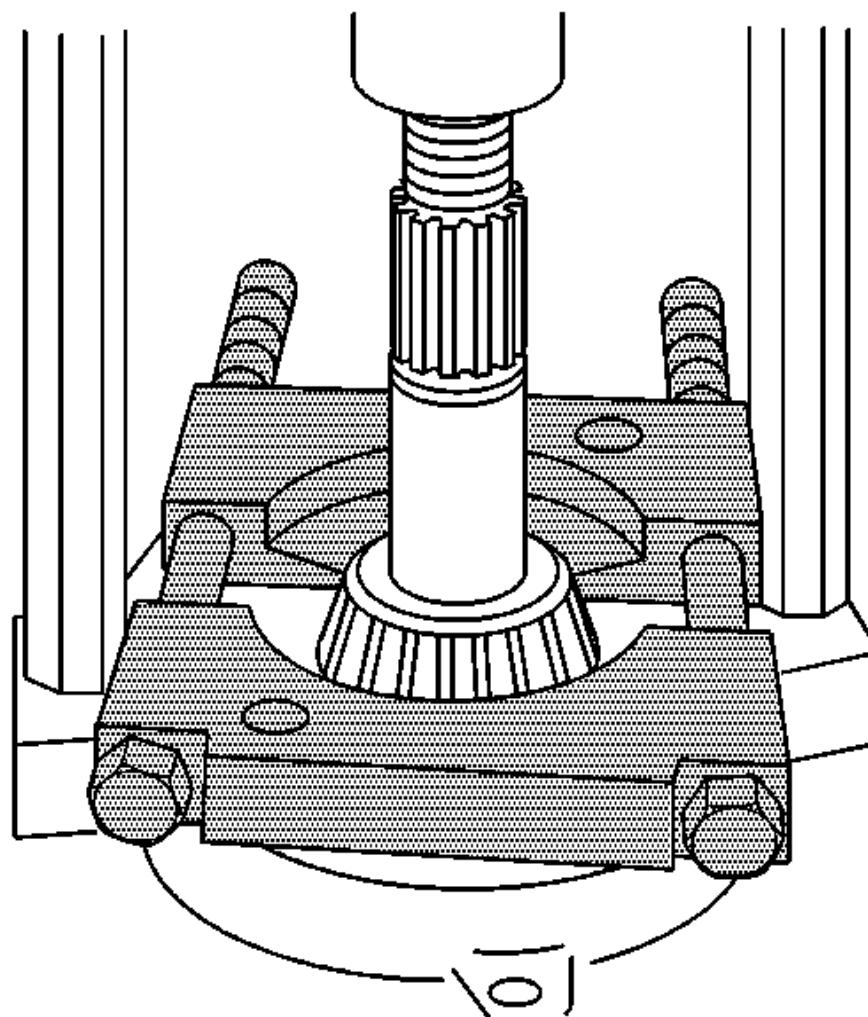


Fig. 243: View Of Inner Pinion Bearing & Hydraulic Press

Courtesy of GENERAL MOTORS COMPANY

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

DRIVE PINION AND RING GEAR REPLACEMENT

Special Tools

- **J-22912-B** Split-Plate Bearing Puller
- **J-2619-01** Slide Hammer
- **J-29369-1** Bushing and Bearing Remover
- **J-34011** Pilot Bearing Remover
- **J-36598** Holding Fixture
- **J-36614** Inner Pinion Bearing Installer
- **J-45765** Pinion Remover
- **J-45858** Front Axle Bearing Race Remover/Installer
- **J-8614-01** Flange and Pulley Holding Tool
- **J-8107-2** Side Bearing Puller Pilot
- **J-22888-D** Side Bearing Remover Kit
- **GE-8092** Driver Handle
- **J-22761** Differential Side Bearing Installer
- **GE-8092** Driver Handle (Universal Driver Handle-3/4 in 10)
- **J-35512** Inner Pinion Bearing Installer
- **J-36366** Pinion Oil Seal Installer
- **J-36599-A** Side Bearing Nut Wrench
- **J-36615** Side Bearing Nut Wrench

Inspection Procedure

Perform the following before disassembling the axle:

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

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

4. Check the ring gear backlash. Refer to [**Backlash Inspection and Adjustment \(8.25 Inch LD Axle\)**](#)
[**Backlash Inspection and Adjustment \(9.25 Inch HD Axle\)**](#).

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

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

Disassembly Procedure

1. Remove the differential carrier assembly. Refer to [**Front Axle Replacement \(8.25 Inch LD Axle\)**](#)
[**Front Axle Replacement \(9.25 Inch HD Axle\)**](#).
2. Install the differential carrier assembly in a vise.

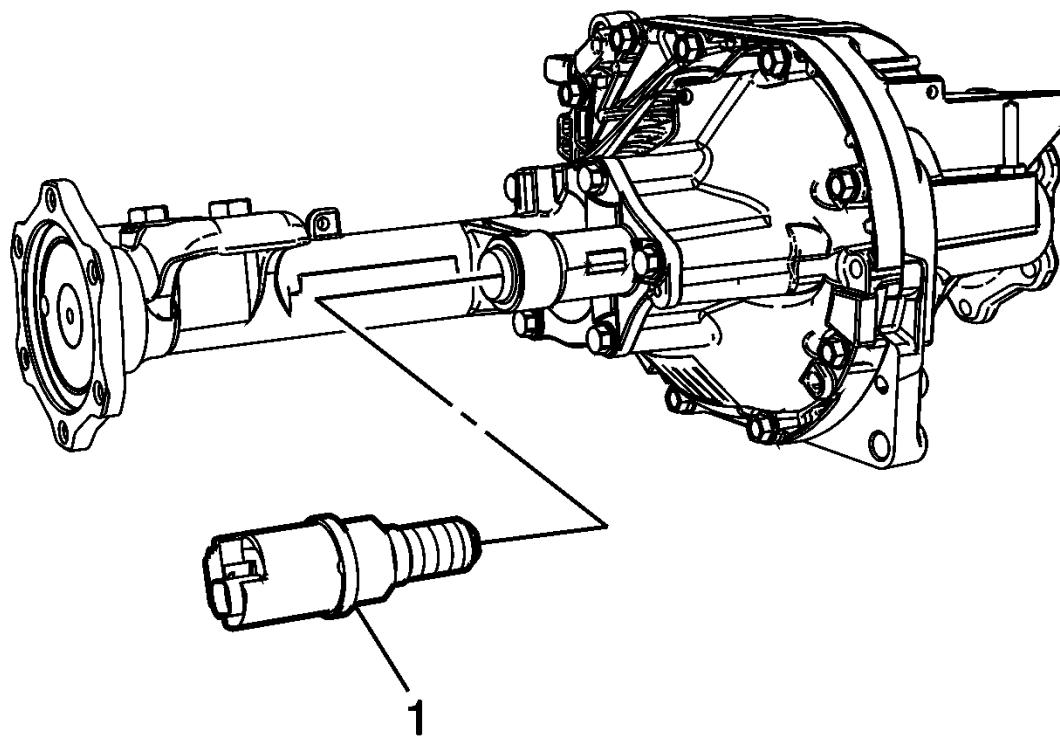


Fig. 244: Front Axle Actuator

Courtesy of GENERAL MOTORS COMPANY

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

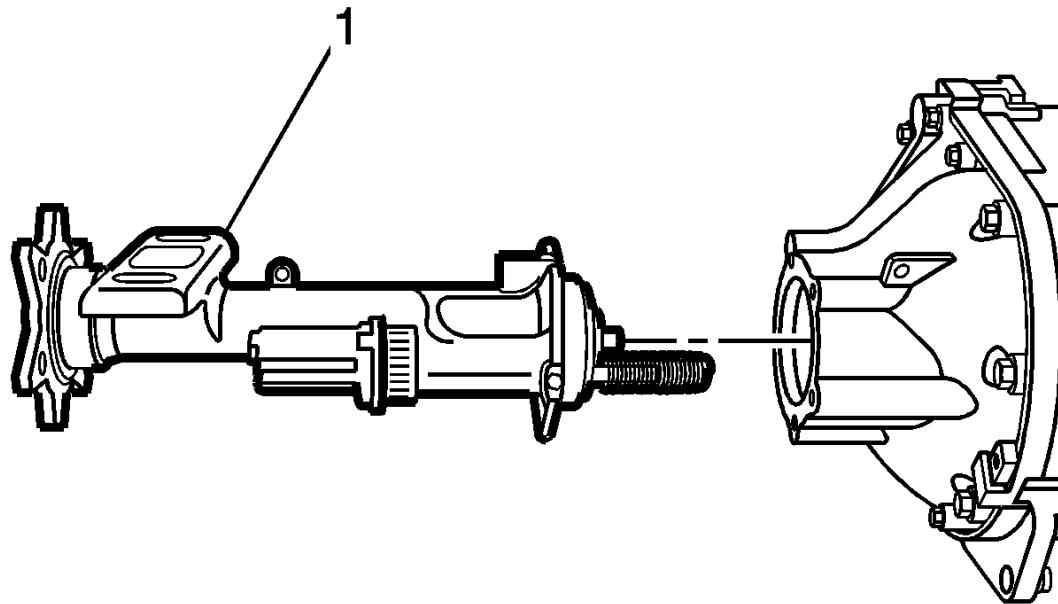


Fig. 245: Inner Axle Shaft Housing Assembly

Courtesy of GENERAL MOTORS COMPANY

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

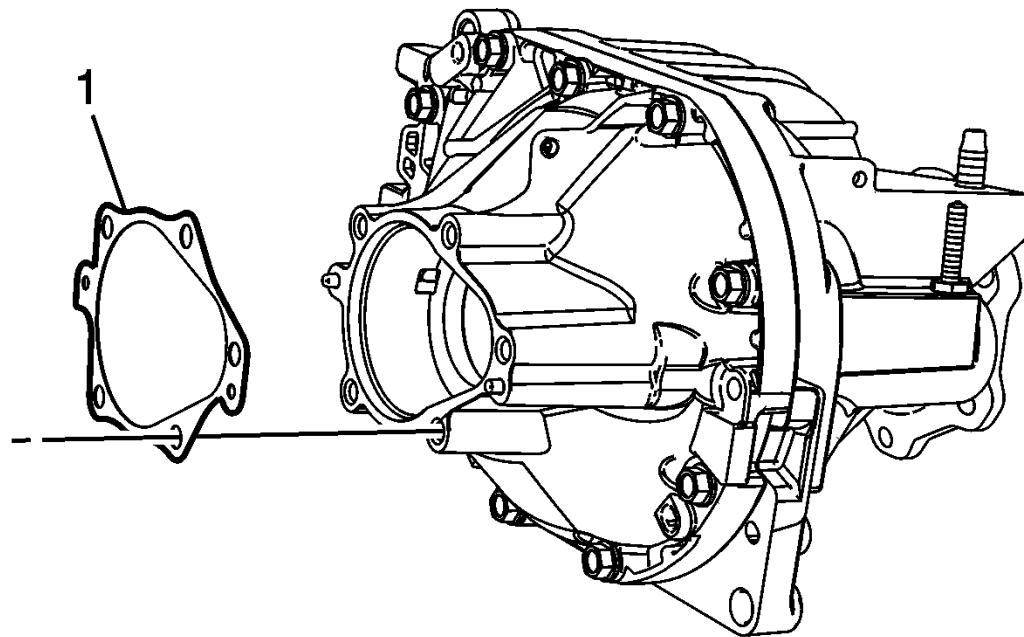


Fig. 246: Inner Axle Housing To Differential Carrier Gasket

Courtesy of GENERAL MOTORS COMPANY

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

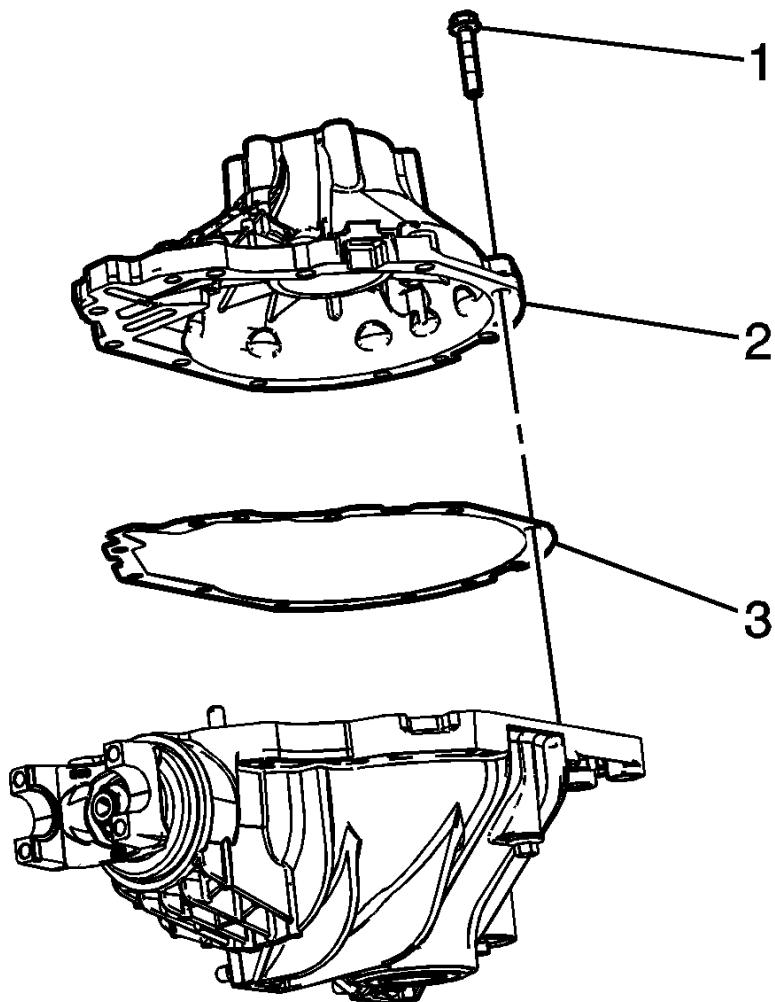


Fig. 247: View Of Differential Carrier Housing, Gasket & Bolts

Courtesy of GENERAL MOTORS COMPANY

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

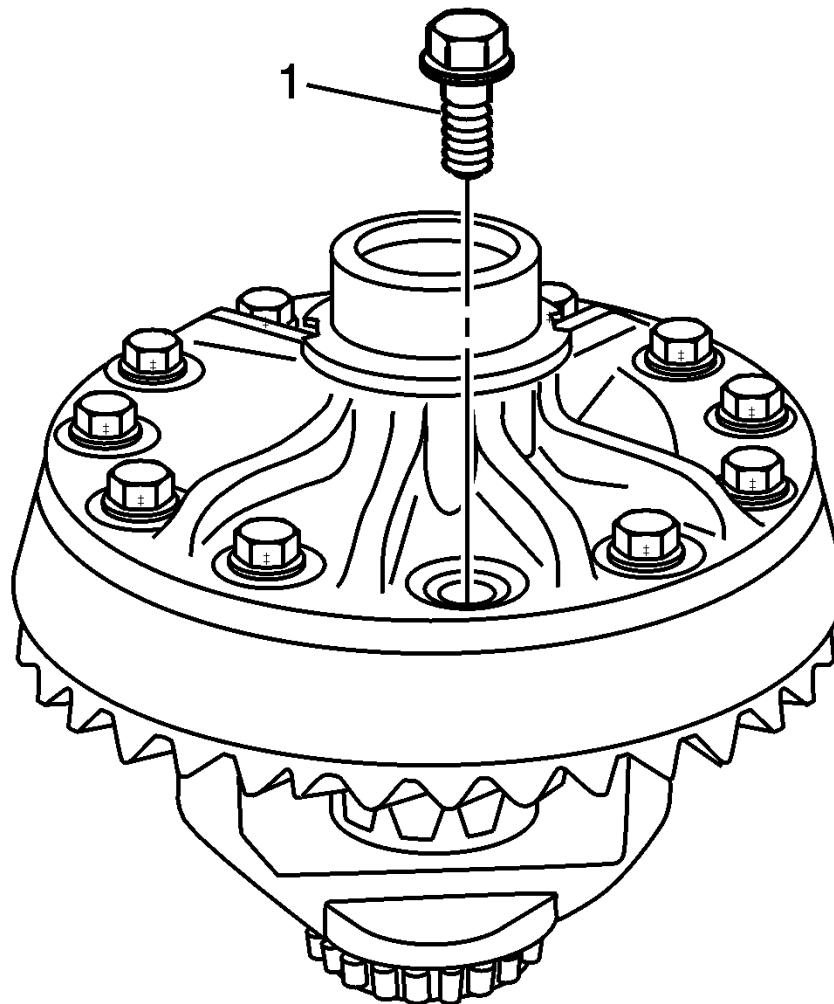


Fig. 248: Ring Gear Bolts Have Left-Hand Threads

Courtesy of GENERAL MOTORS COMPANY

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

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

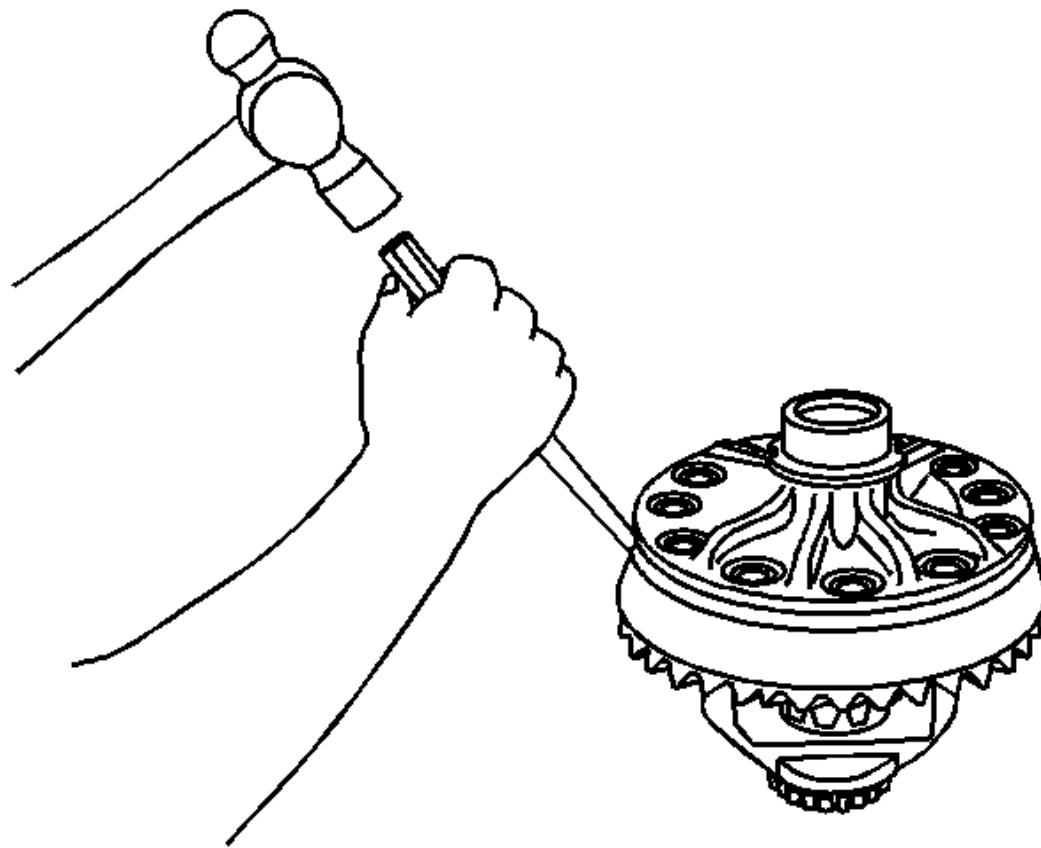


Fig. 249: Removing Ring Gear From Differential

Courtesy of GENERAL MOTORS COMPANY

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

14. Remove the ring gear from the differential case.

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

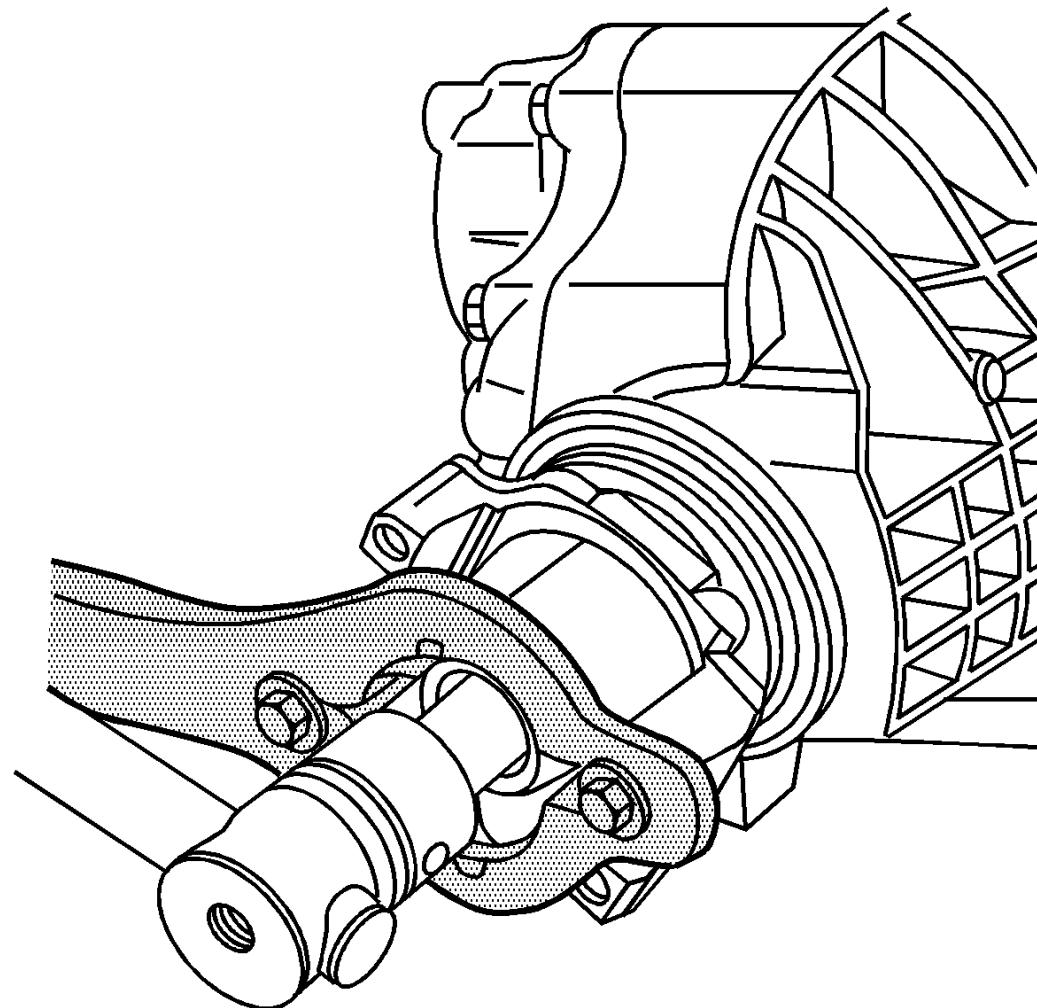


Fig. 250: View Of J 8614-01

Courtesy of GENERAL MOTORS COMPANY

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

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

16. Remove the washer.

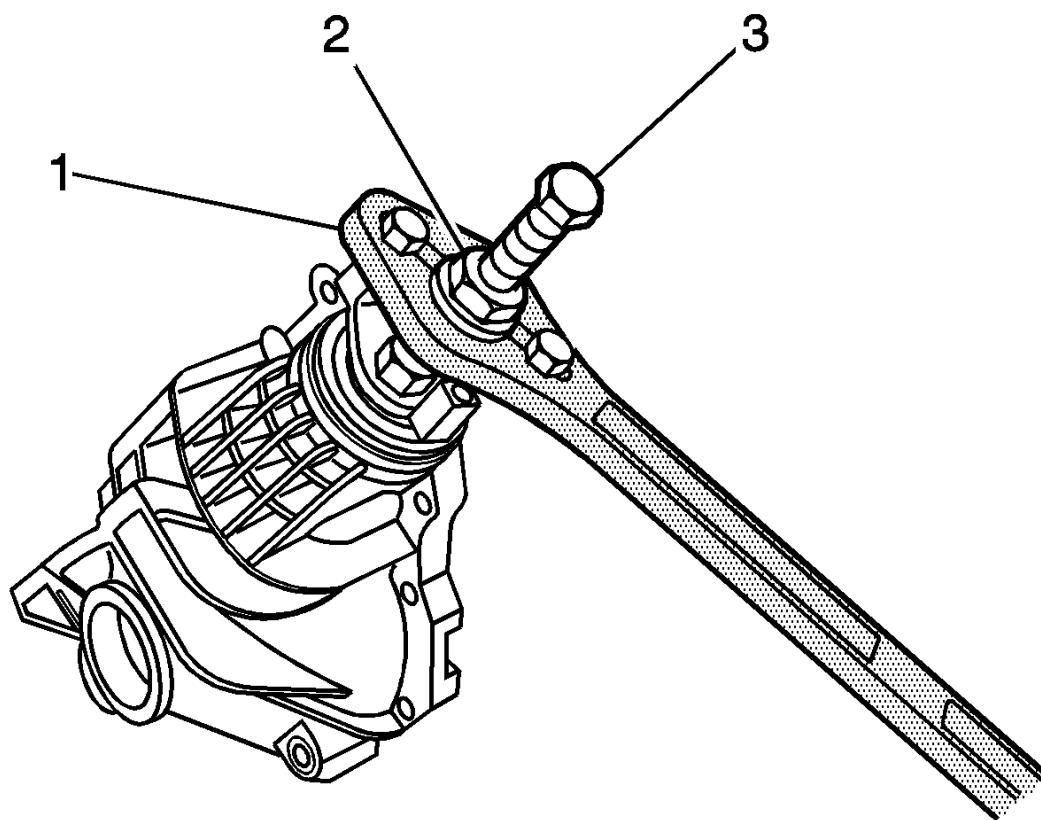


Fig. 251: View Of Pinion Yoke Removal Tools

Courtesy of GENERAL MOTORS COMPANY

17. Install the J 8614-2 (2) and the J 8614-3 (3) into the **J-8614-01** flange and pulley holding tool (1) as shown.

18. Remove the pinion yoke by turning the J 8614-3 (3) clockwise while holding the **J-8614-01** flange and pulley holding tool (1).

19. The steps below explain how to remove the drive pinion and pinion bearing cups using the **J-36598** holding fixture or the **J-45765** pinion

- remover and the **J-45858** front axle bearing race remover/installer. Follow the appropriate steps depending on what tool is available.
20. Install the **J-36598** holding fixture into a vise.

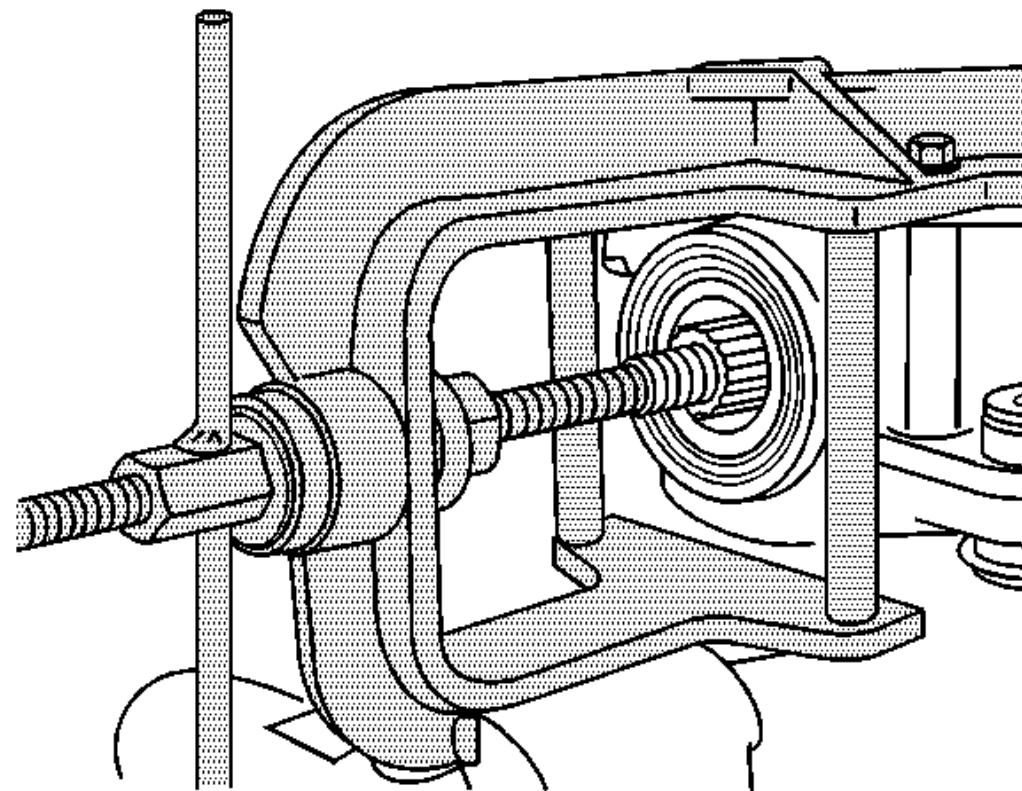


Fig. 252: Holding Fixture & Pinion Tool J 36598
Courtesy of GENERAL MOTORS COMPANY

21. Install the left differential carrier case half onto the **J-36598** holding fixture and the J-36598 - (only 3 of the 4 mounting bolts will be used).
22. While holding the forcing screw of the **J-36598** holding fixture, turn the handle of the **J-36598** holding fixture counterclockwise in order to

remove the pinion with the following components:

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

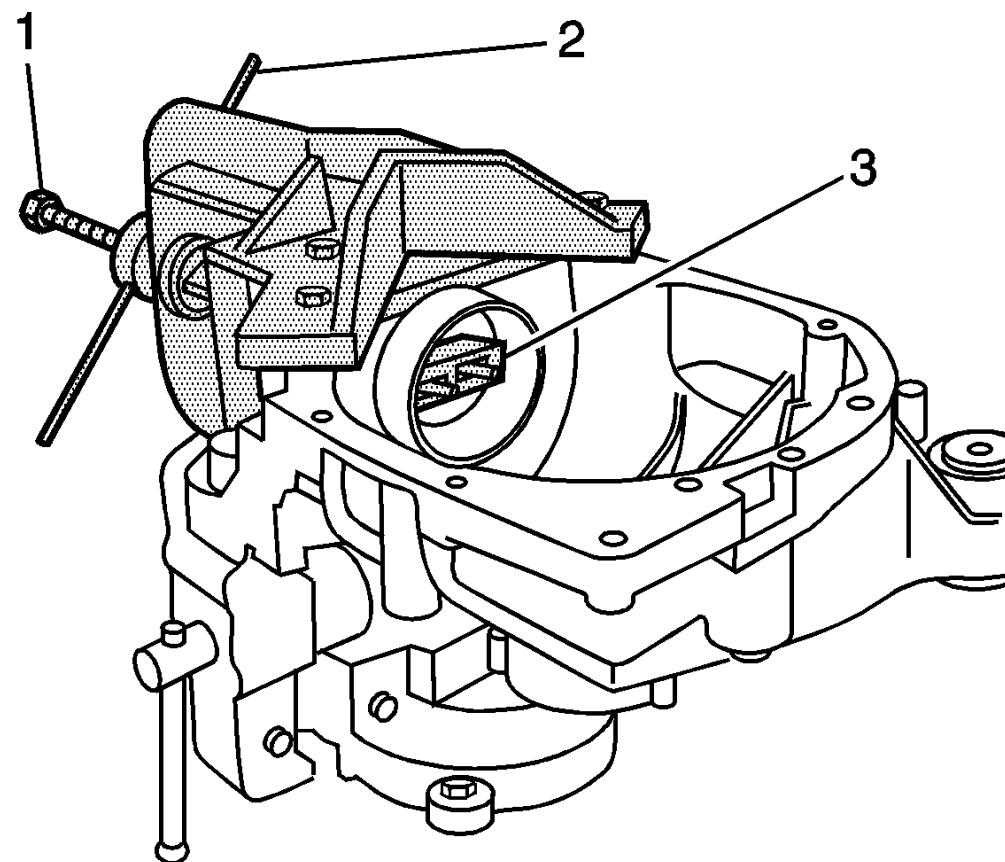


Fig. 253: Pressing Inner Bearing Cup Out From Differential Carrier Case
Courtesy of GENERAL MOTORS COMPANY

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

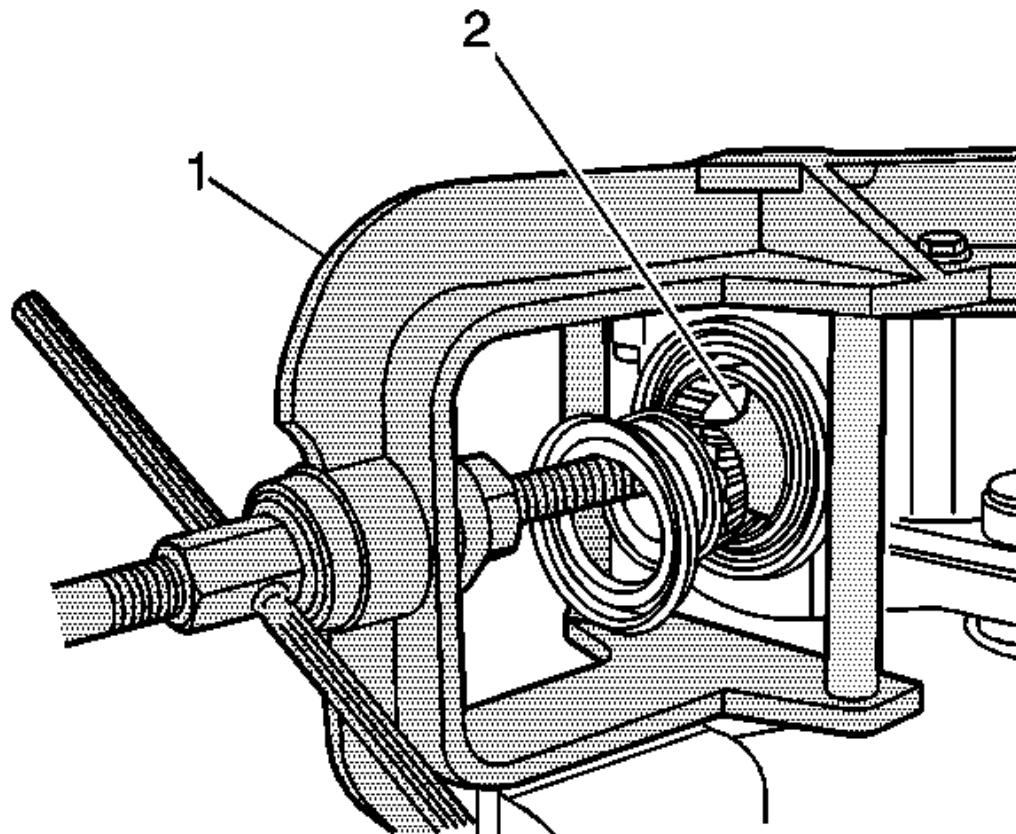


Fig. 254: Pinion Oil Seal & Bearing Using Forcing Screw J 36598 To J 36598-5

Courtesy of GENERAL MOTORS COMPANY

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

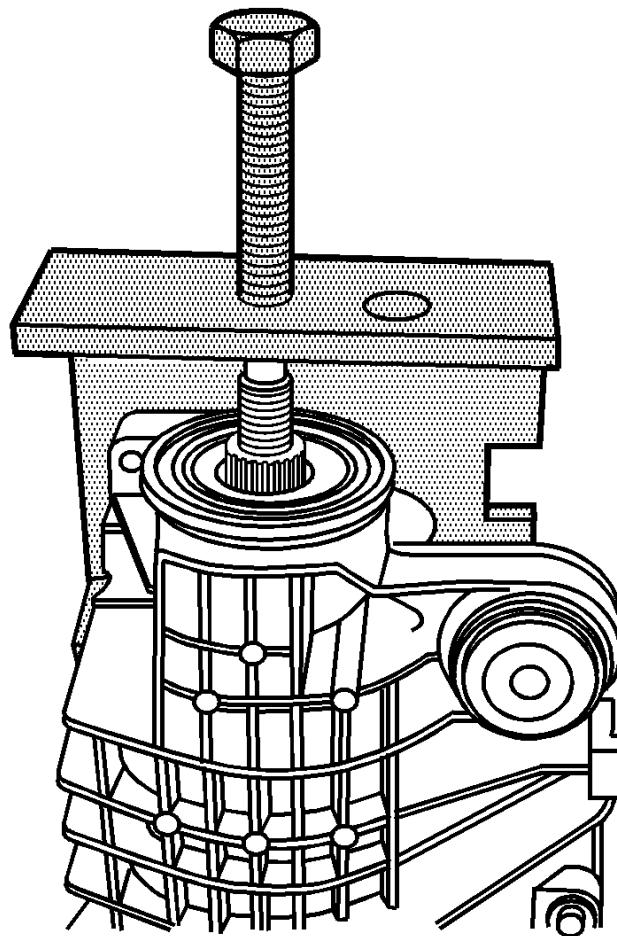


Fig. 255: Pinion Components Using J 45765

Courtesy of GENERAL MOTORS COMPANY

29. Install the **J-45765** pinion remover to the left side differential carrier case half over the drive pinion as shown.
30. Turn the forcing screw of the **J-45765** pinion remover clockwise to remove the following components from the left side differential carrier case half:
 - The drive pinion gear

- The pinion gear selectable shim
 - The inner pinion bearing
 - The collapsible spacer
31. Remove the drive pinion seal using a suitable seal remover.
32. Remove the outer pinion bearing from the differential carrier case half.

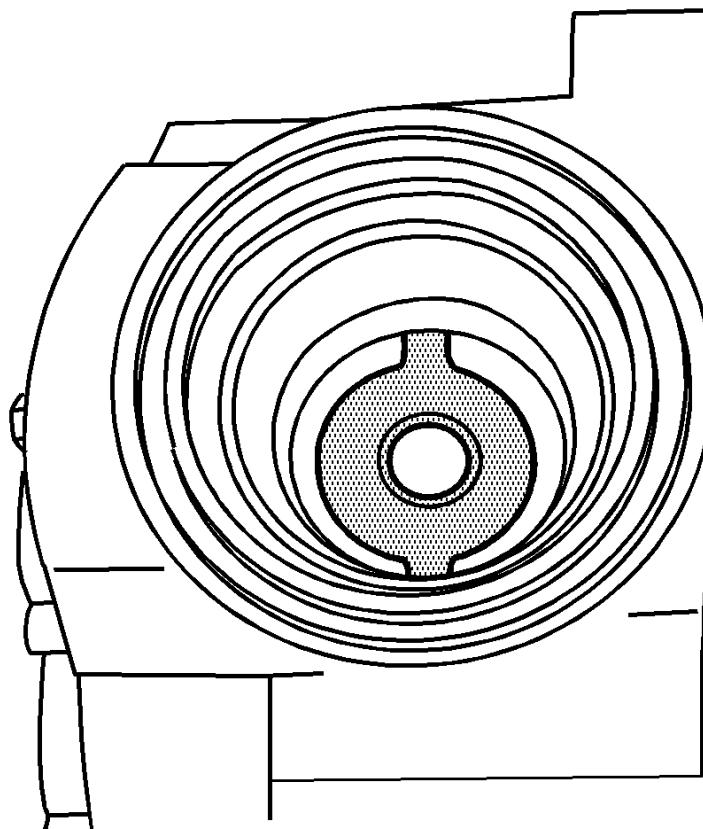


Fig. 256: J 45858-4 Over Inner Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

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

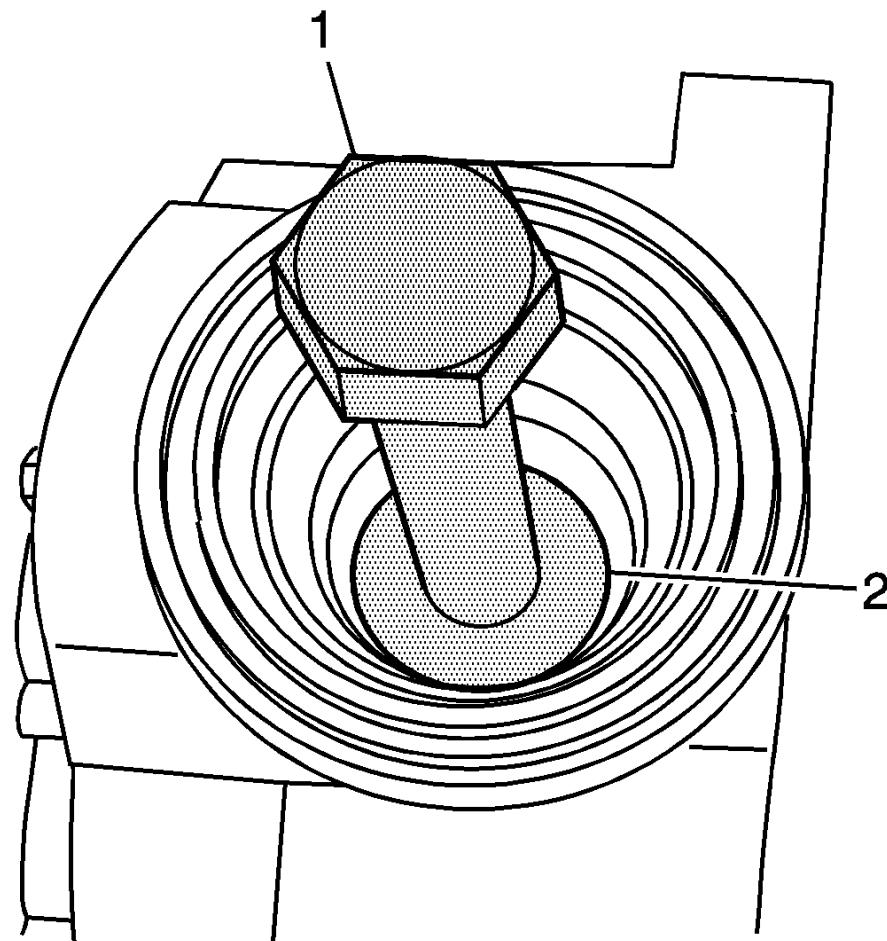


Fig. 257: Forcing Screw Of J 45858

Courtesy of GENERAL MOTORS COMPANY

34. Install the forcing screw (1) of the **J-45858** front axle bearing race remover/installer into the J-45858-4 (2).

35. Drive out the inner pinion bearing cup by pounding on the forcing screw with a hammer.

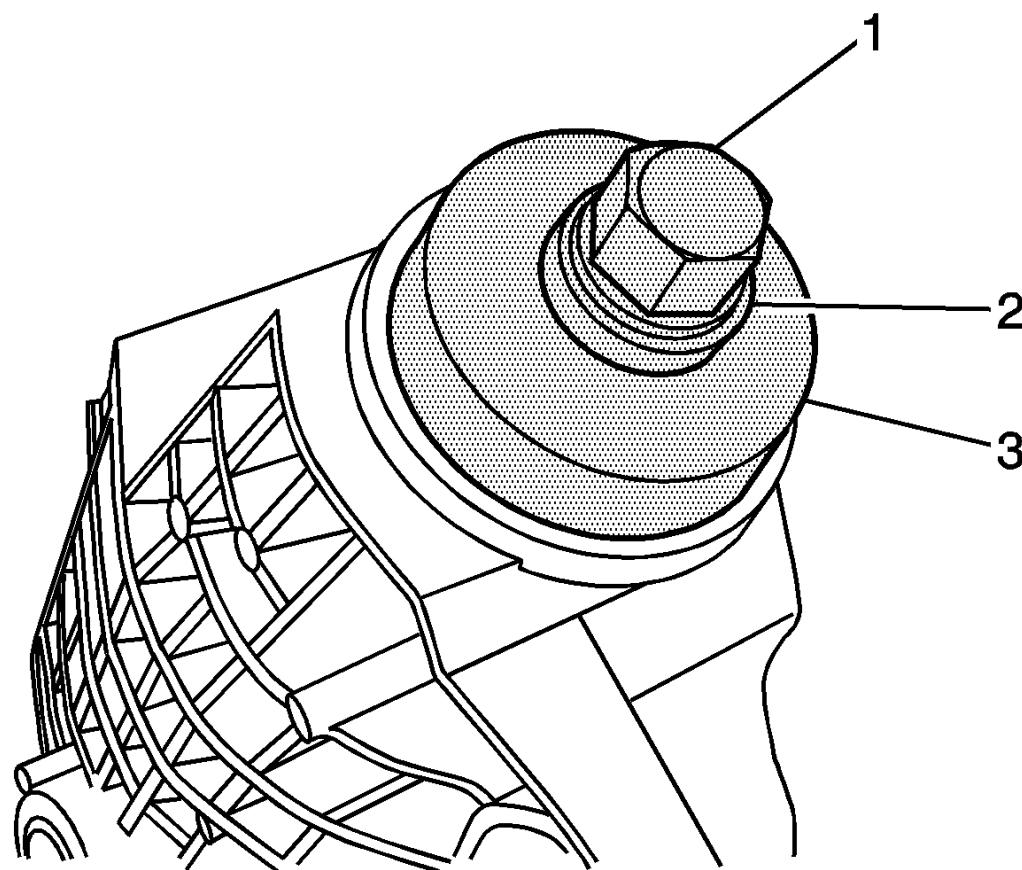


Fig. 258: View Of Thrust Bearing & Washer, Forcing Screw & Special Tool J 45858-3

Courtesy of GENERAL MOTORS COMPANY

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

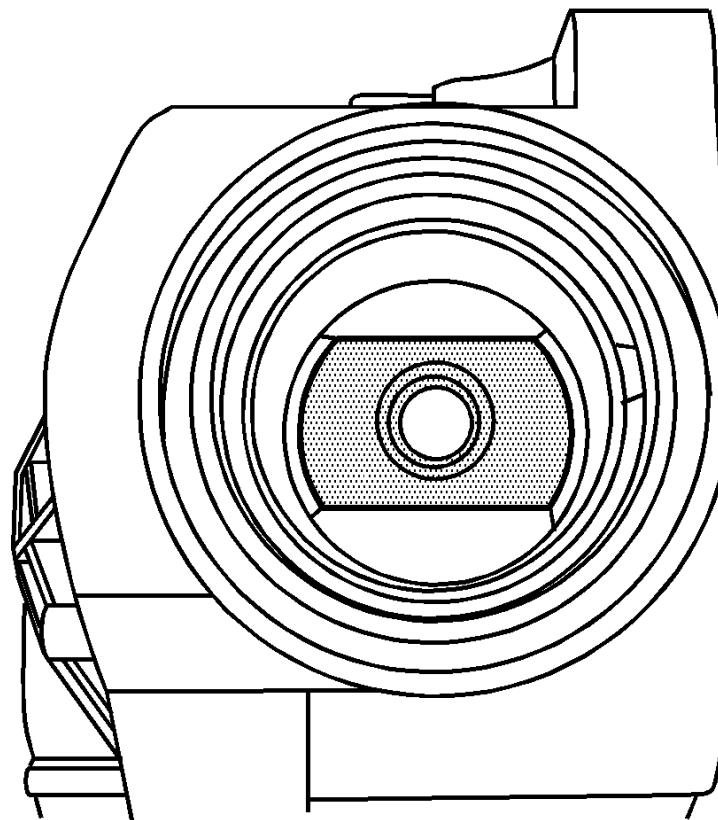


Fig. 259: J 45858-5 Into Pinion Bearing Bore

Courtesy of GENERAL MOTORS COMPANY

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

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

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

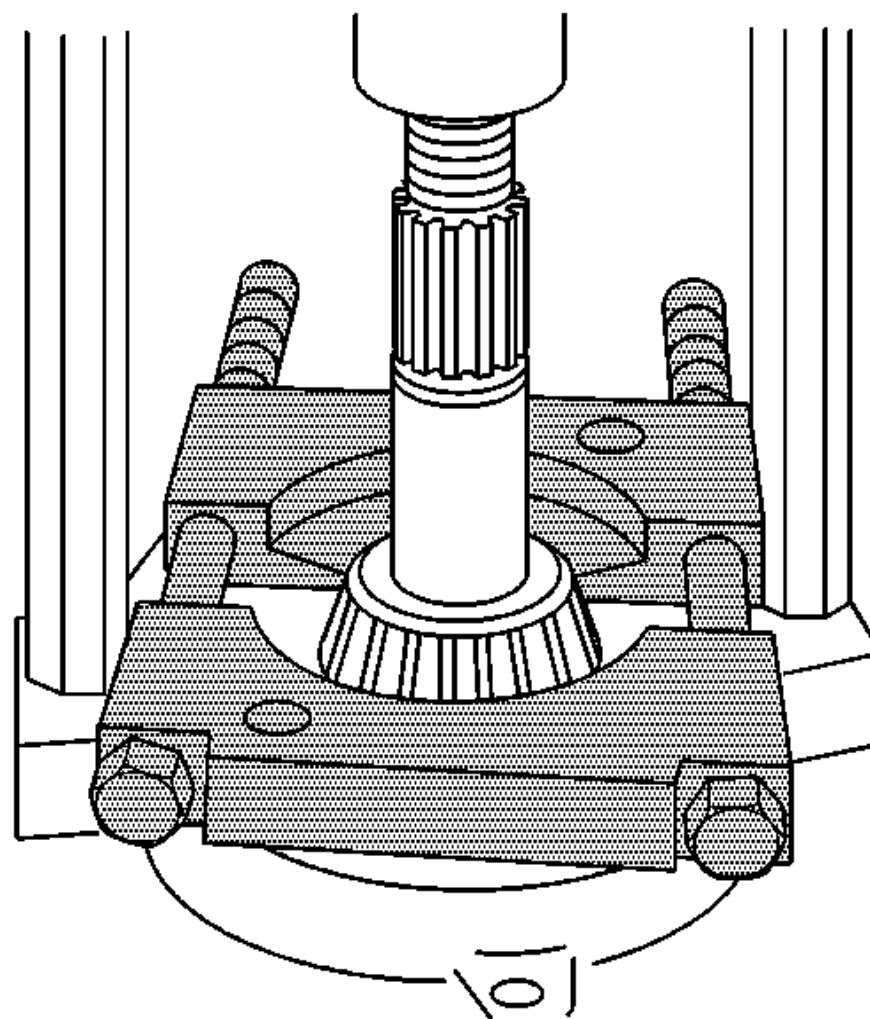


Fig. 260: View Of Inner Pinion Bearing & Hydraulic Press

Courtesy of GENERAL MOTORS COMPANY

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

42. Remove the pinion gear selectable shim.

Assembly Procedure

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

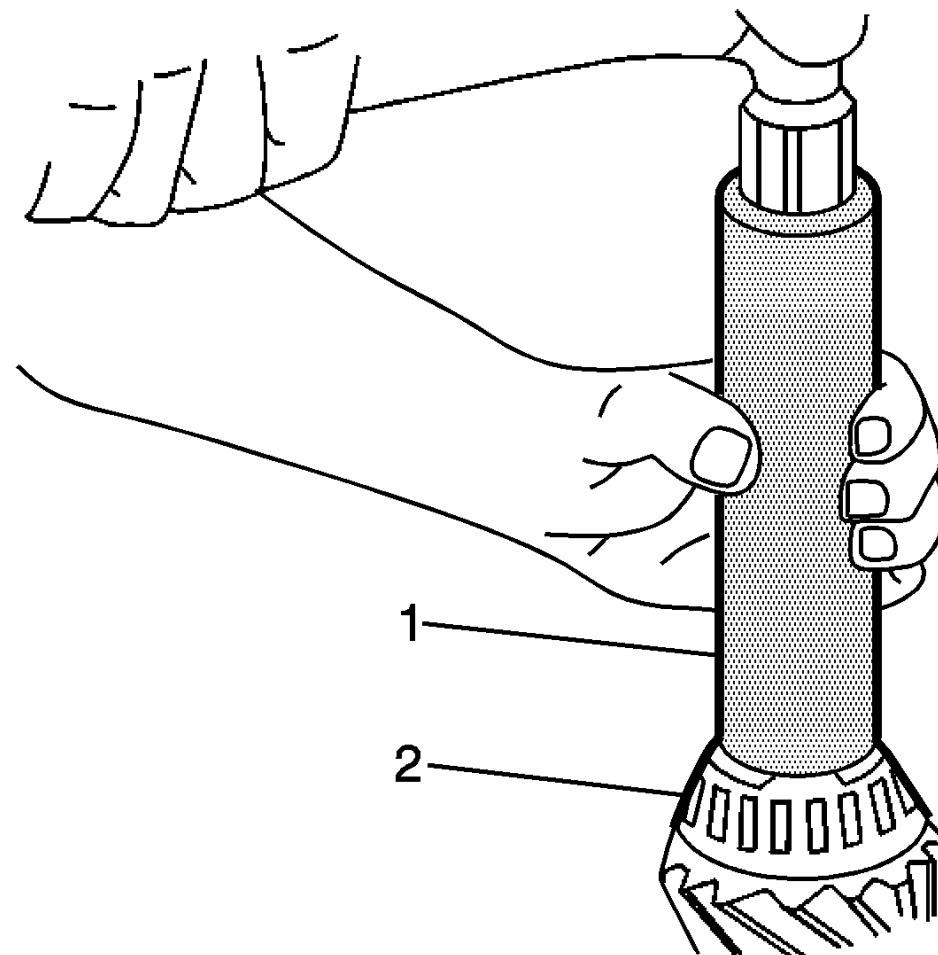


Fig. 261: Inner Pinion Bearing And Pinion Gear

Courtesy of GENERAL MOTORS COMPANY

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

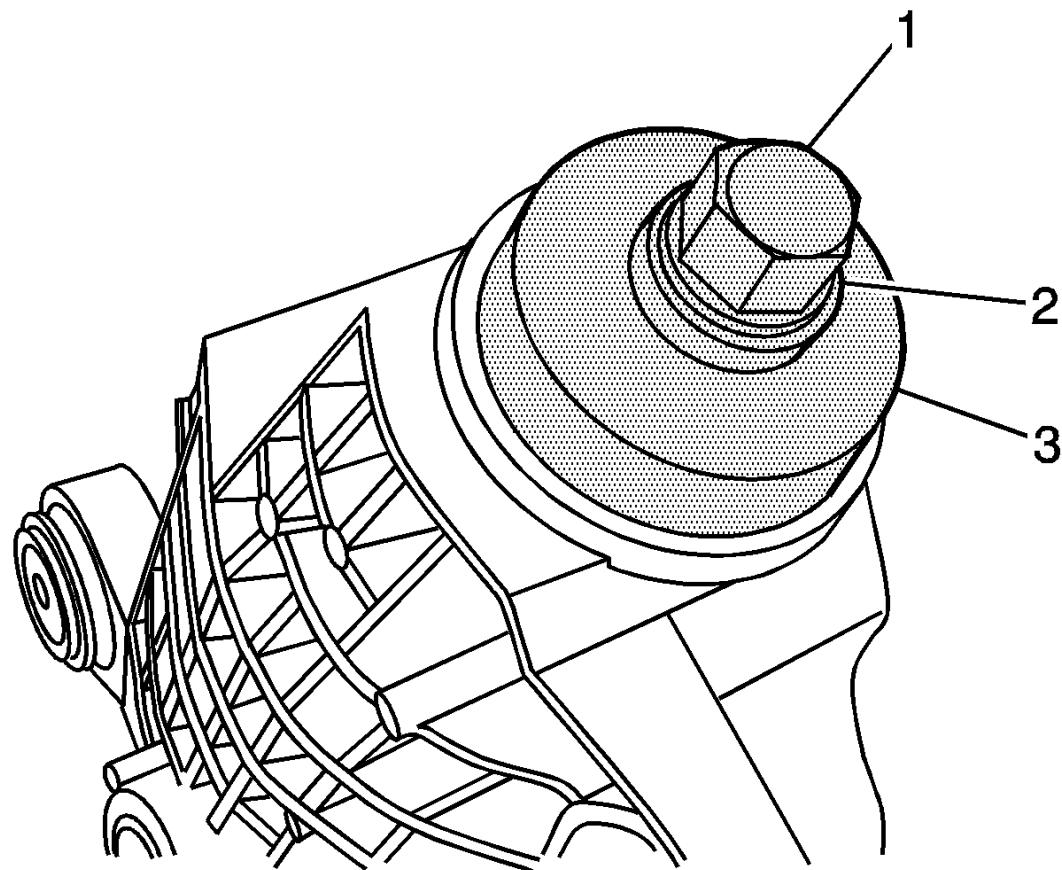


Fig. 262: Thrust Bearing, Washer & Forcing Screw

Courtesy of GENERAL MOTORS COMPANY

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

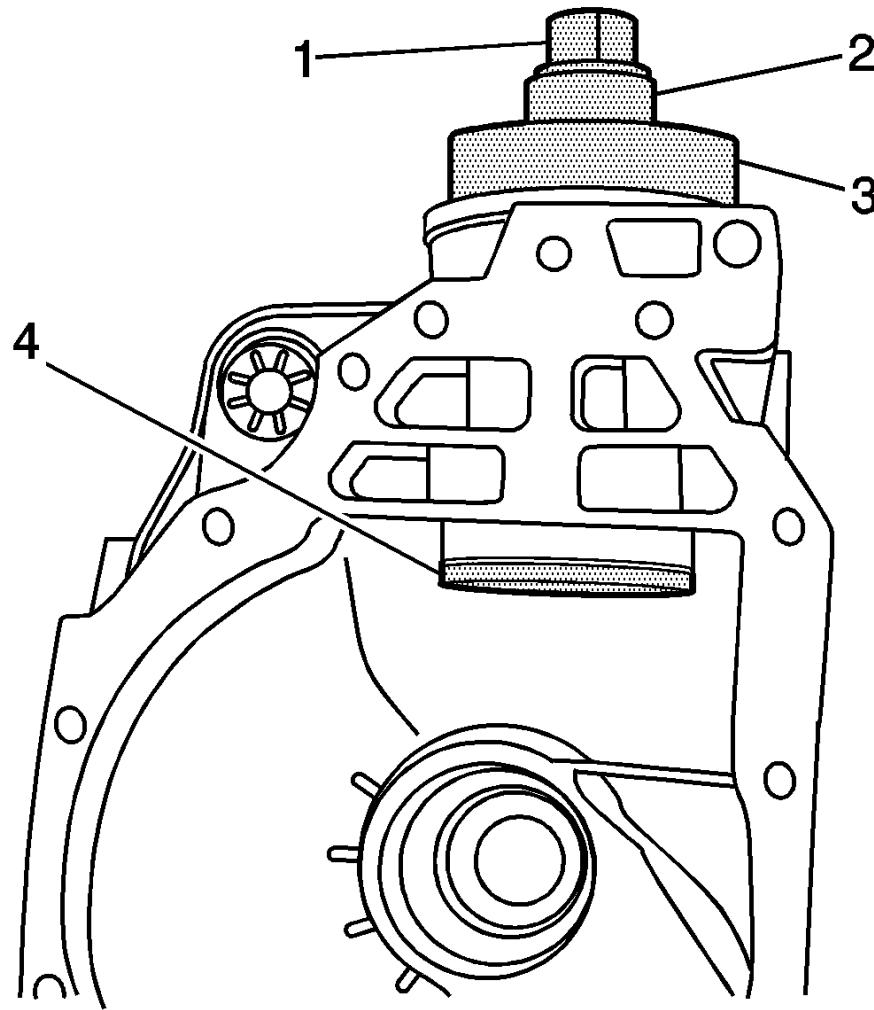


Fig. 263: Inner Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

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

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

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

Inspect the position of the inner pinion bearing cup as it is being drawn into the inner pinion bearing cup bore to ensure the bearing cup is being pulled straight into the pinion bearing cup bore. If the pinion bearing cup is not being pulled straight into the bearing cup bore, remove the **J-45858** pinion bearing race remover/installer or **J-45858-B** pinion bearing race remover/installer and the inner pinion bearing cup and reposition the inner pinion bearing cup.

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

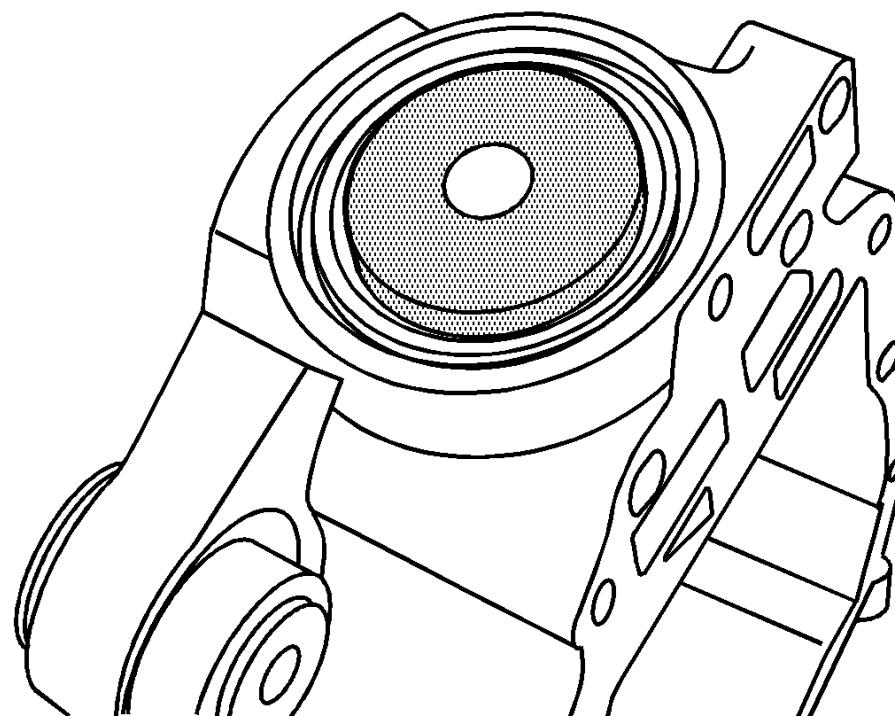


Fig. 264: Outer Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

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

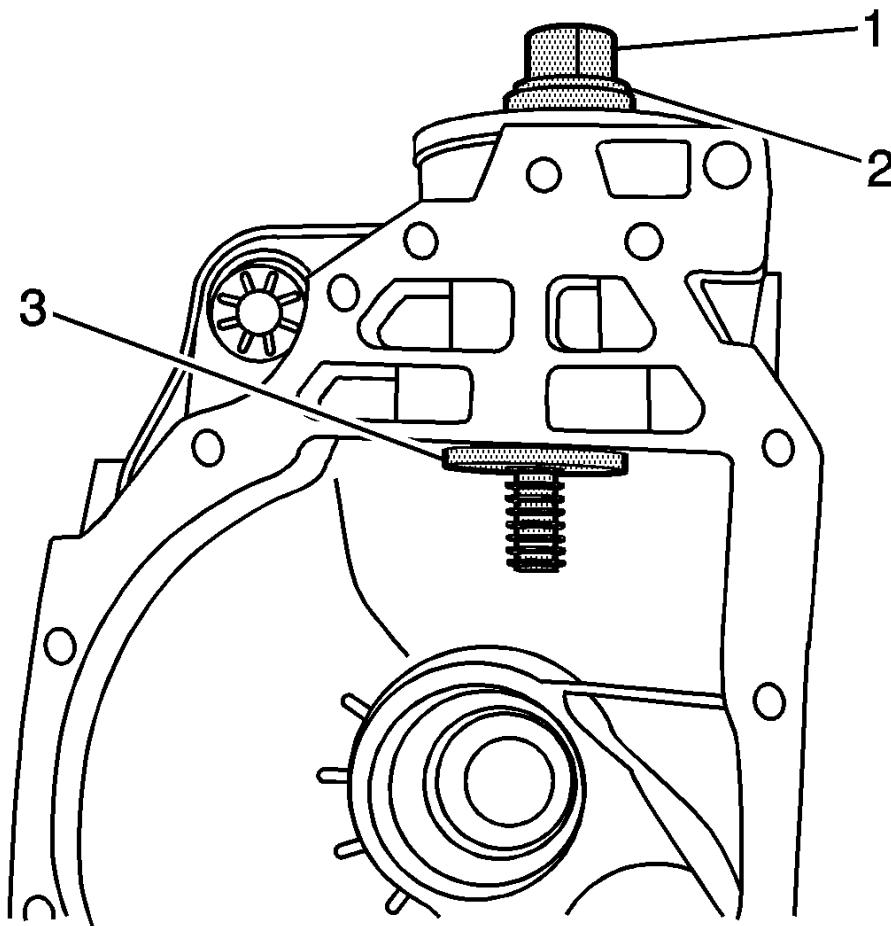


Fig. 265: Thrust Bearing And Washer

Courtesy of GENERAL MOTORS COMPANY

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

Inspect the position of the outer pinion bearing cup as it is being drawn into the outer pinion bearing cup bore to ensure the bearing cup is being pulled straight into the pinion bearing cup bore. If the pinion bearing cup is not being pulled straight into the bearing cup bore, remove the **J-45858** pinion bearing race remover/installer or **J-45858-B** pinion bearing race remover/installer and the outer pinion bearing cup and reposition the outer pinion bearing cup.

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

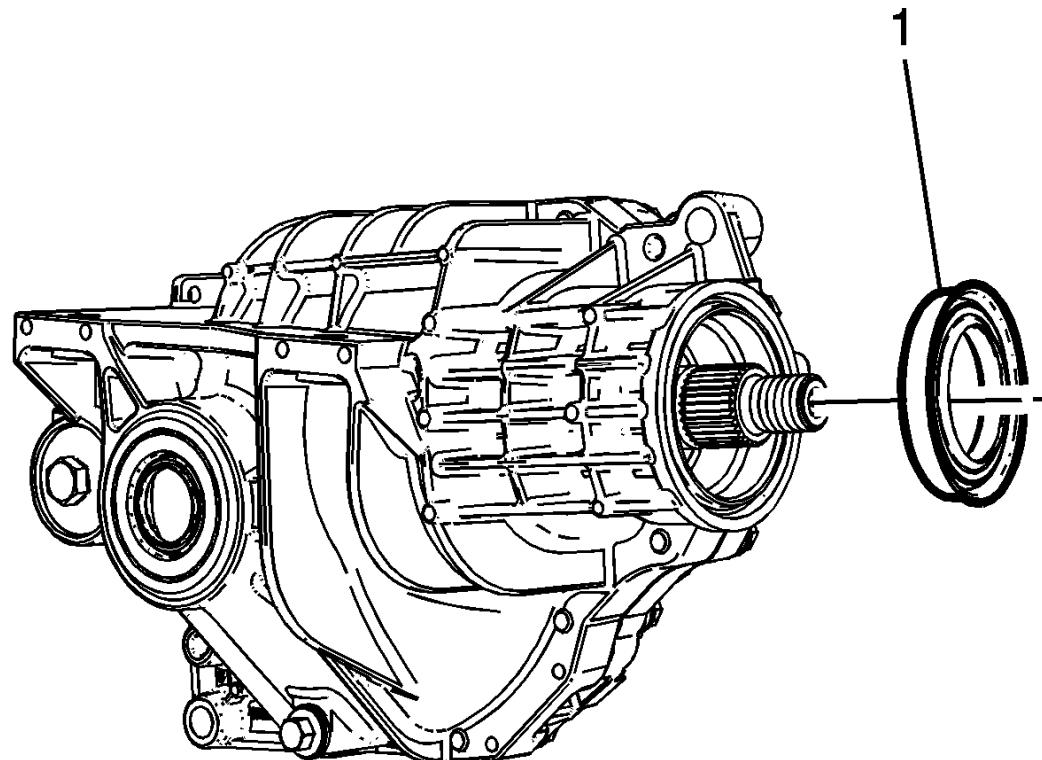


Fig. 266: Pinion Seal

Courtesy of GENERAL MOTORS COMPANY

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

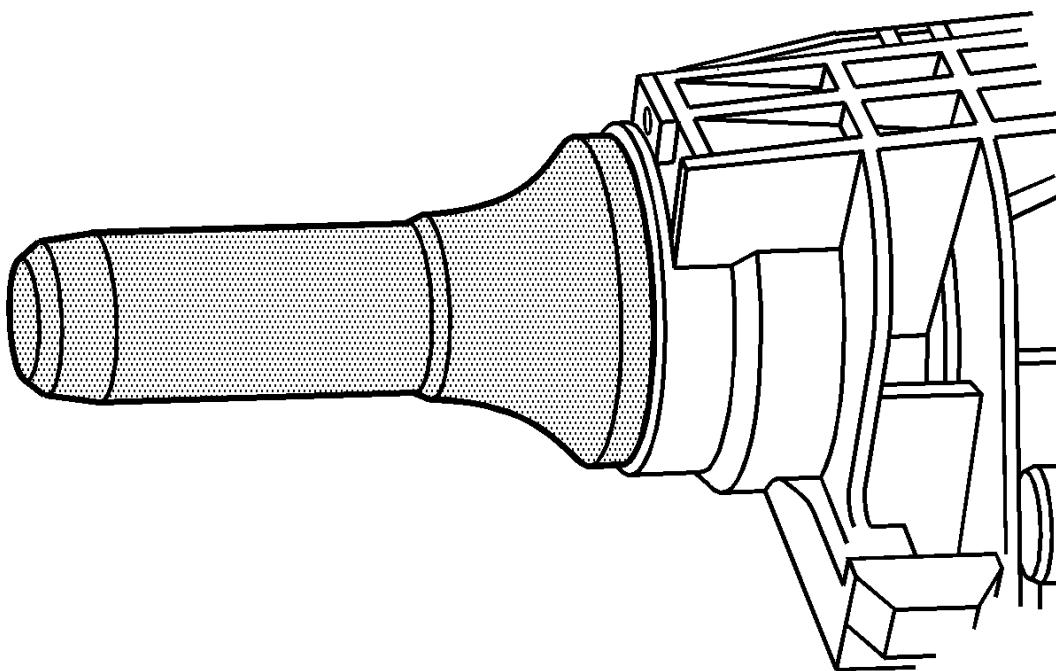


Fig. 267: View Of Special Tool J 36366 Seal Installer

Courtesy of GENERAL MOTORS COMPANY

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

21. Using the **J-36366** pinion oil seal installer, install the pinion flange seal.
22. Using the correct sealant, apply sealant to the splines of the pinion yoke. Refer to [**Adhesives, Fluids, Lubricants, and Sealers**](#).

23. Install the pinion gear, with the inner pinion bearing and the new collapsible spacer, into the left differential carrier case half.

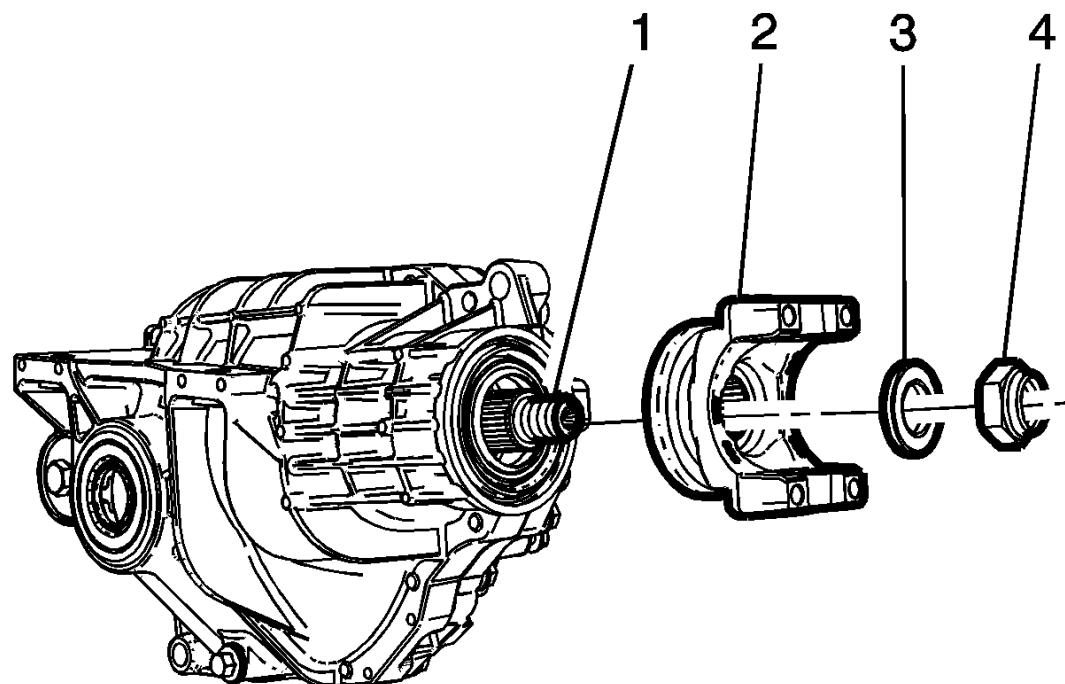


Fig. 268: Pinion Flange/Yoke Assembly Components

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Pinion Flange/Yoke Installation Caution .

24. Position the pinion flange/yoke assembly (2) on the pinion shaft (1).

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

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

31. Using the **J-8614-01** flange and pulley holding tool, tighten the pinion nut until the pinion end play is just taken up. Rotating the pinion while tightening the nut will seat the bearings.
32. Remove the **J-8614-01** flange and pulley holding tool.
33. Using an inch pound torque wrench, measure the rotating torque of the pinion, which should be 1.0-2.3 N.m (10-20 lb in) for used bearings, 1.7-3.4 N.m (15-30 lb in) for new bearings.
34. If the rotating torque measurement is below 1.0 N.m (10 lb in) for used bearings, or 1.7 N.m (15 lb in) for new bearings, reinstall the **J-8614-01** flange and pulley holding tool and continue to tighten the pinion nut, which should be 1.0-2.3 N.m (10-20 lb in) for used bearings, 1.7-3.4 N.m (15-30 lb in) for new bearings.
35. Once the specified torque is obtained, rotate the pinion several time to ensure the bearings have seated. Recheck the rotating torque and adjust if necessary.
36. Remove the **J-8614-01** flange and pulley holding tool.

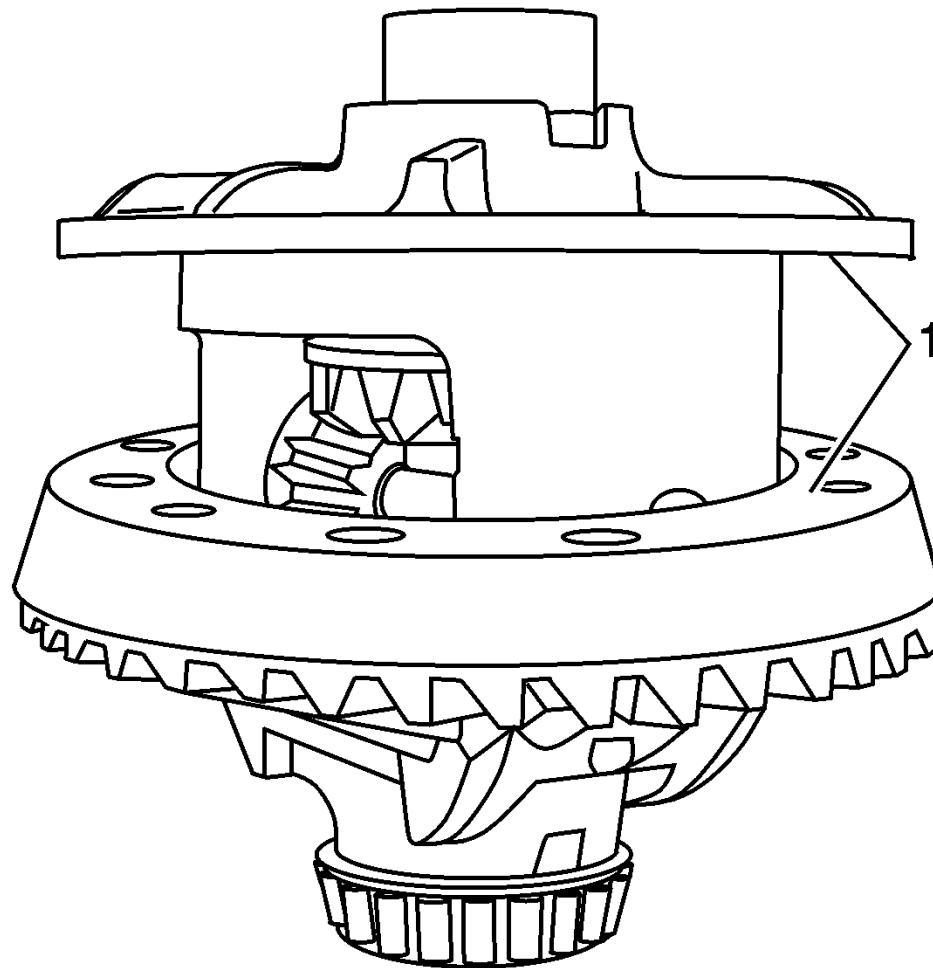


Fig. 269: Mating Surfaces Of Ring Gear And Differential Case

Courtesy of GENERAL MOTORS COMPANY

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

37. Install the ring gear onto the differential case.

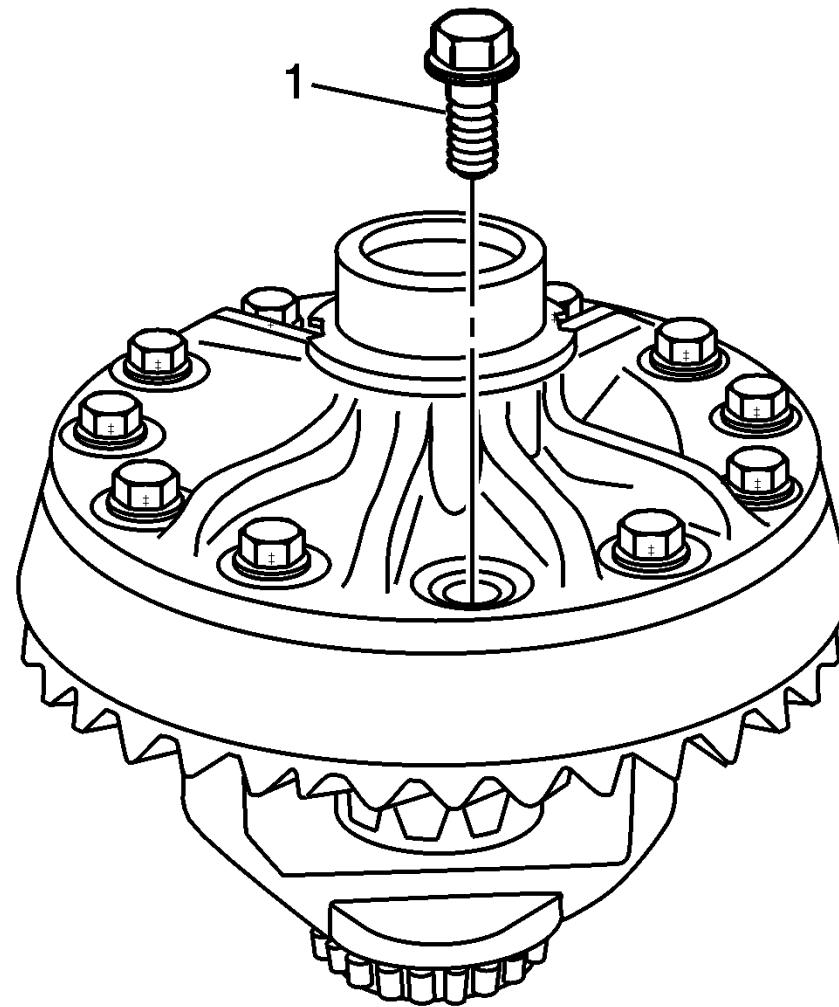


Fig. 270: Ring Gear Bolts Have Left-Hand Threads

Courtesy of GENERAL MOTORS COMPANY

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

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

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

CAUTION: Refer to [Fastener Caution](#) .

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

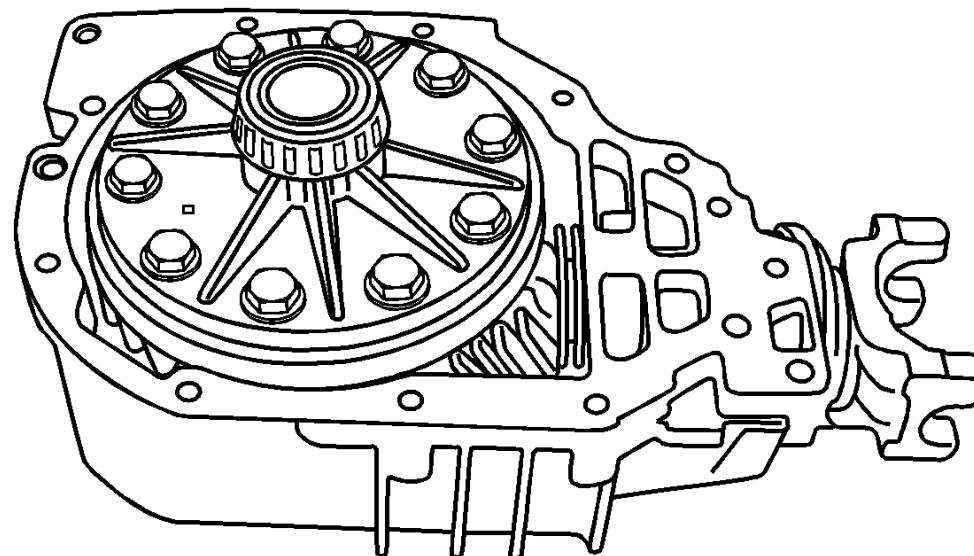


Fig. 271: View Of Differential Case Assembly & Carrier Case Half

Courtesy of GENERAL MOTORS COMPANY

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

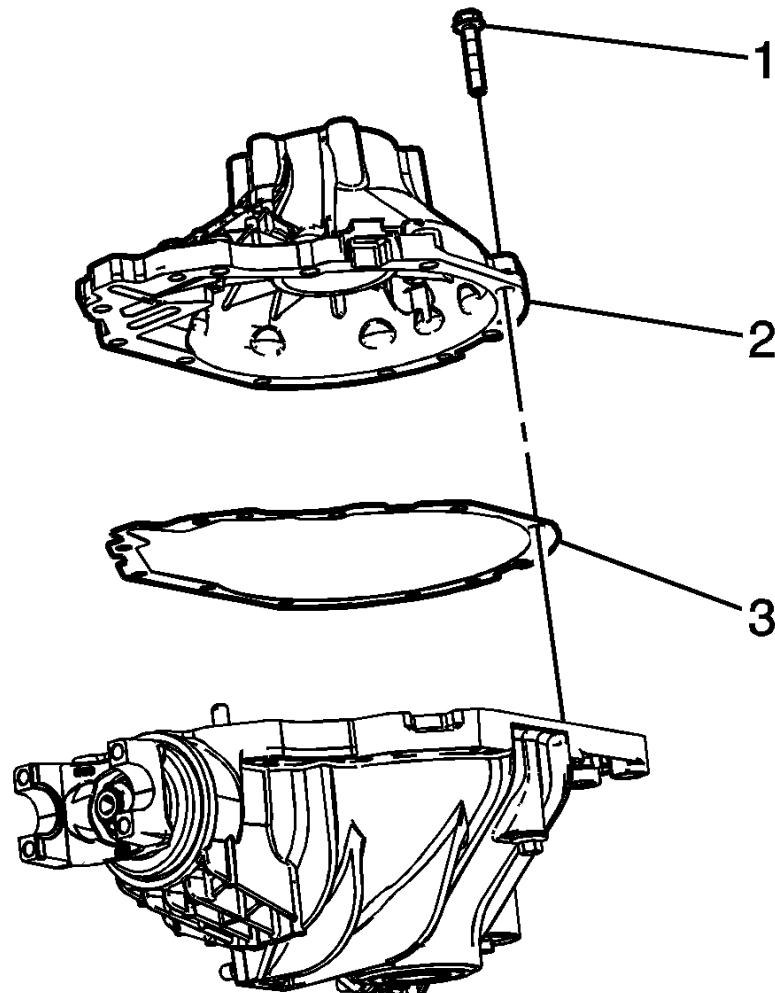


Fig. 272: View Of Differential Carrier Housing, Gasket & Bolts

Courtesy of GENERAL MOTORS COMPANY

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

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

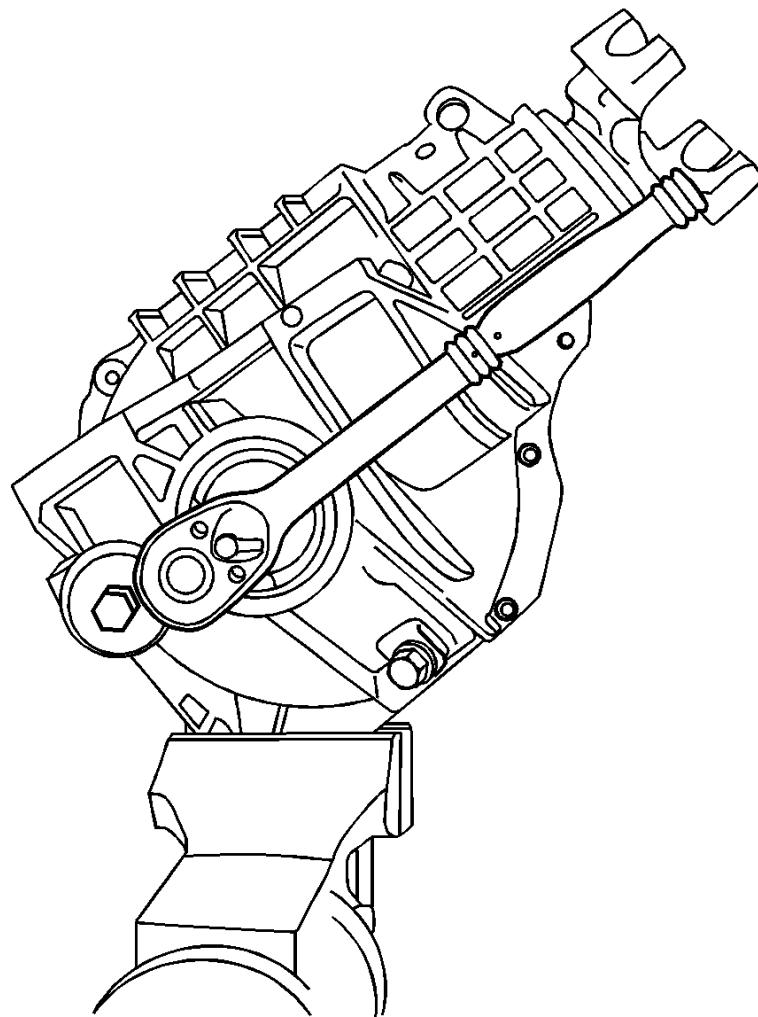


Fig. 273: Tightening Differential Adjuster Nut

Courtesy of GENERAL MOTORS COMPANY

46. Using the **J-36599-A** side bearing nut wrench turn the left side differential adjuster nut clockwise in order to preload the differential side bearings against the differential side bearings cups and tighten the adjuster nut to 75 N.m (55 lb ft).
47. Rotate the pinion several times in order to seat the pinion and differential side bearings.
48. Using an inch-pound torque wrench, measure the rotating torque of the drive pinion and differential assembly, which should be 0.57-1.13 N.m

- (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.
49. If the rotating torque of the drive pinion and differential assembly is not 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion, adjust the differential side bearing preload using the following steps:
1. Place an alignment mark between the differential adjuster nut sleeve and the differential carrier case, left and right sides.
 2. Using the **J-36599-A** side bearing nut wrench, turn the left and right side differential adjuster sleeves in or clockwise in small equal increments.
 3. Using an inch pound torque wrench, measure the rotating torque of the pinion and differential assembly.
 4. Compare the new measurement to the specification listed in Step 22. If the rotating torque of the pinion and differential assembly is not within specifications, continue to tighten the left and right side differential adjuster nut sleeves in small equal increments on each side until the rotating torque of the pinion and differential assembly is within specifications.
50. If the rotating torque of the drive pinion and differential assembly is more than 1.13 N.m (10 lb in) above the rotating torque of the drive pinion measurement, adjust the differential side bearing preload using the following steps:
1. Place an alignment mark between the differential adjuster nut sleeve and the differential carrier case, left and right sides.
 2. Using the **J-36599-A** side bearing nut wrench or the **J-36615** side bearing nut wrench, turn the left and right side differential adjuster nut sleeve out or clockwise in small equal increments.
 3. Using a torque wrench, measure the rotating torque of the pinion and differential assembly.
 4. Compare the new measurement to the specification listed in Step 22. If the rotating torque of the pinion and differential assembly is not within specifications, continue to loosen the left and right side differential adjuster nut sleeve in small equal increments on each side until the rotating torque of the pinion and differential assembly is within specifications.
51. Once the specified rotating is obtained, rotate the pinion several times to ensure the bearings have seated. Recheck the rotating torque and adjust if necessary.
52. Measure the drive pinion to the ring gear backlash and adjust, if necessary. Refer to [**Backlash Inspection and Adjustment \(8.25 Inch LD Axle\)**](#)
[**Backlash Inspection and Adjustment \(9.25 Inch HD Axle\)**](#).
53. Once the bearing preload and drive pinion to the ring gear backlash is within specifications, perform a gear tooth contact pattern check to ensure proper contact between the pinion and the ring gear. Refer to [**Gear Tooth Contact Pattern Inspection**](#).

FRONT DIFFERENTIAL SIDE AND PINION GEAR REPLACEMENT

Special Tools

- **J-22912-B** Split-Plate Bearing Puller
- **J-2619-01** Slide Hammer
- **J-29369-1** Bushing and Bearing Remover

- **J-34011** Pilot Bearing Remover
- **J-36598** Holding Fixture
- **J-36614** Inner Pinion Bearing Installer
- **J-45765** Pinion Remover
- **J-45858** Front Axle Bearing Race Remover/Installer
- **J-8614-01** Flange and Pulley Holding Tool
- **J-8107-2** Side Bearing Puller Pilot
- **J-22888-D** Side Bearing Remover Kit
- **GE-8092** Driver Handle
- **J-22761** Differential Side Bearing Installer

Inspection Procedure

Perform the following before disassembling the axle:

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

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

4. Check the ring gear backlash. Refer to [**Backlash Inspection and Adjustment \(8.25 Inch LD Axle\)**](#)
[**Backlash Inspection and Adjustment \(9.25 Inch HD Axle\)**](#).

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

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

Removal Procedure

1. Remove the differential carrier assembly. Refer to [**Front Axle Replacement \(8.25 Inch LD Axle\)**](#)
[**Front Axle Replacement \(9.25 Inch HD Axle\)**](#).
2. Install the differential carrier assembly in a vise.

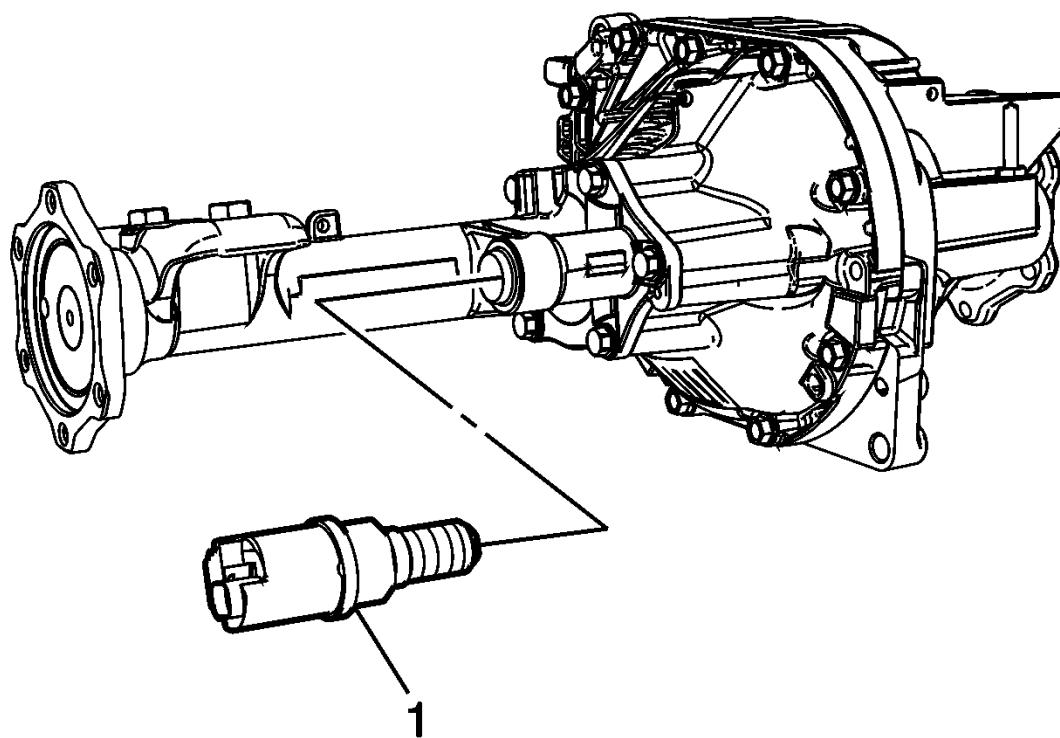


Fig. 274: Front Axle Actuator

Courtesy of GENERAL MOTORS COMPANY

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

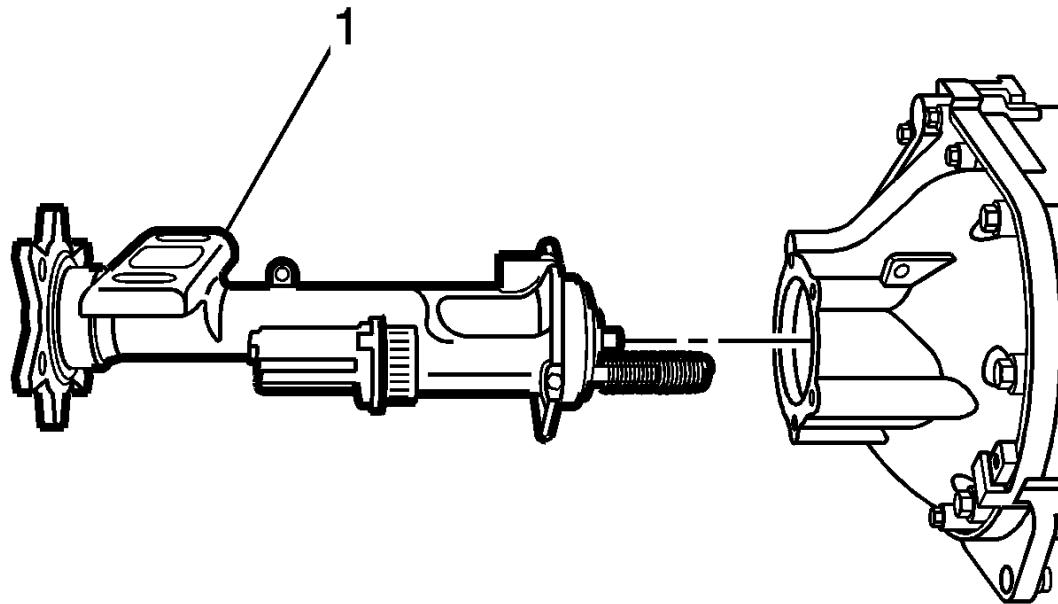


Fig. 275: Inner Axle Shaft Housing Assembly

Courtesy of GENERAL MOTORS COMPANY

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

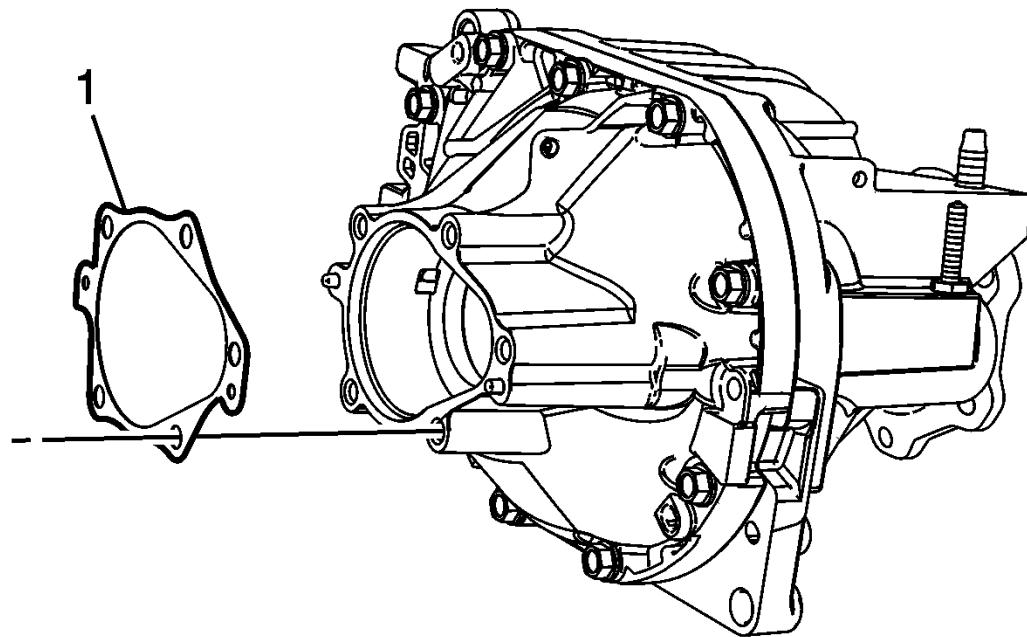


Fig. 276: Inner Axle Housing To Differential Carrier Gasket

Courtesy of GENERAL MOTORS COMPANY

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

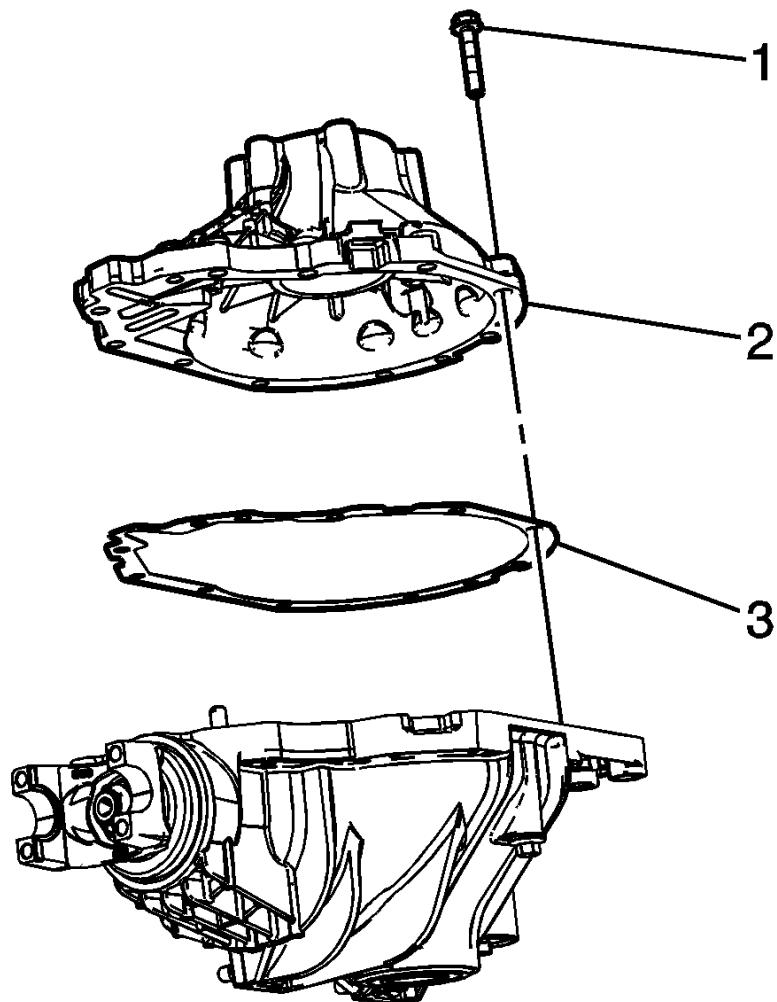


Fig. 277: View Of Differential Carrier Housing, Gasket & Bolts

Courtesy of GENERAL MOTORS COMPANY

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

11. Remove the differential side bearing by performing the following steps:

1. Place the differential case in a vise.

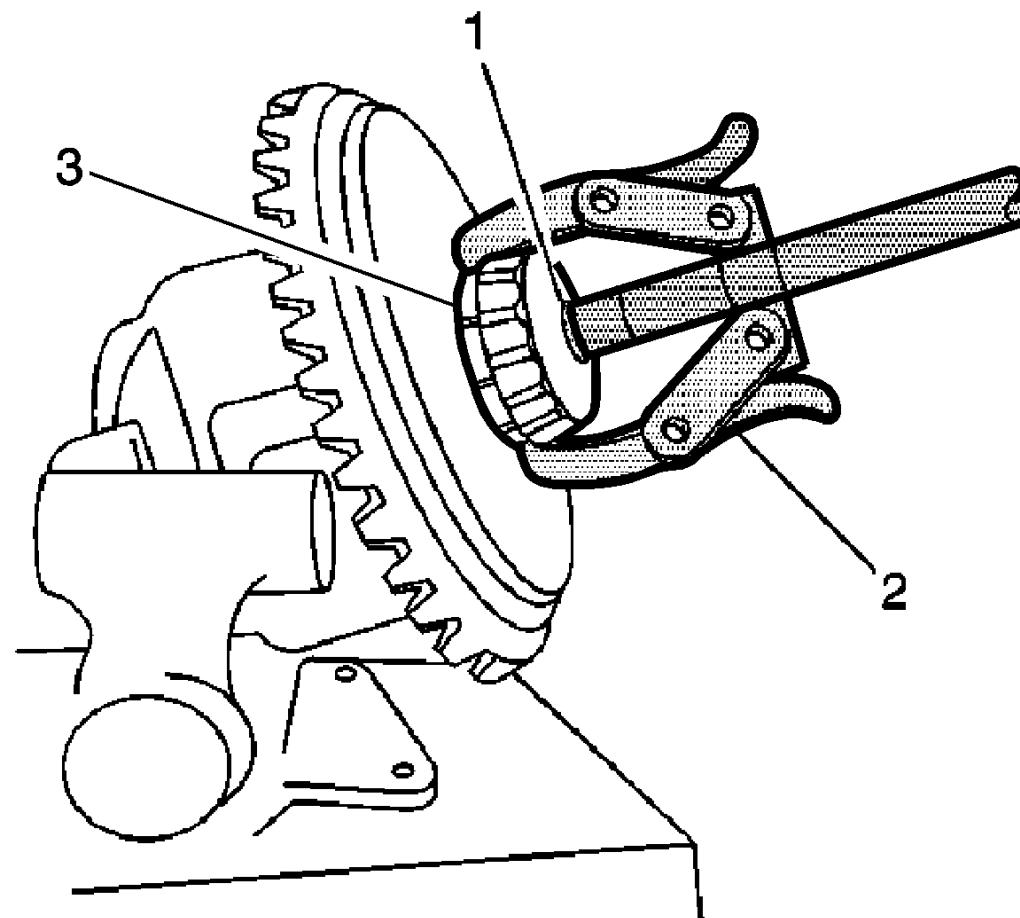


Fig. 278: View Of Differential Side Bearing
Courtesy of GENERAL MOTORS COMPANY

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

12. Remove the differential assembly from the vise.

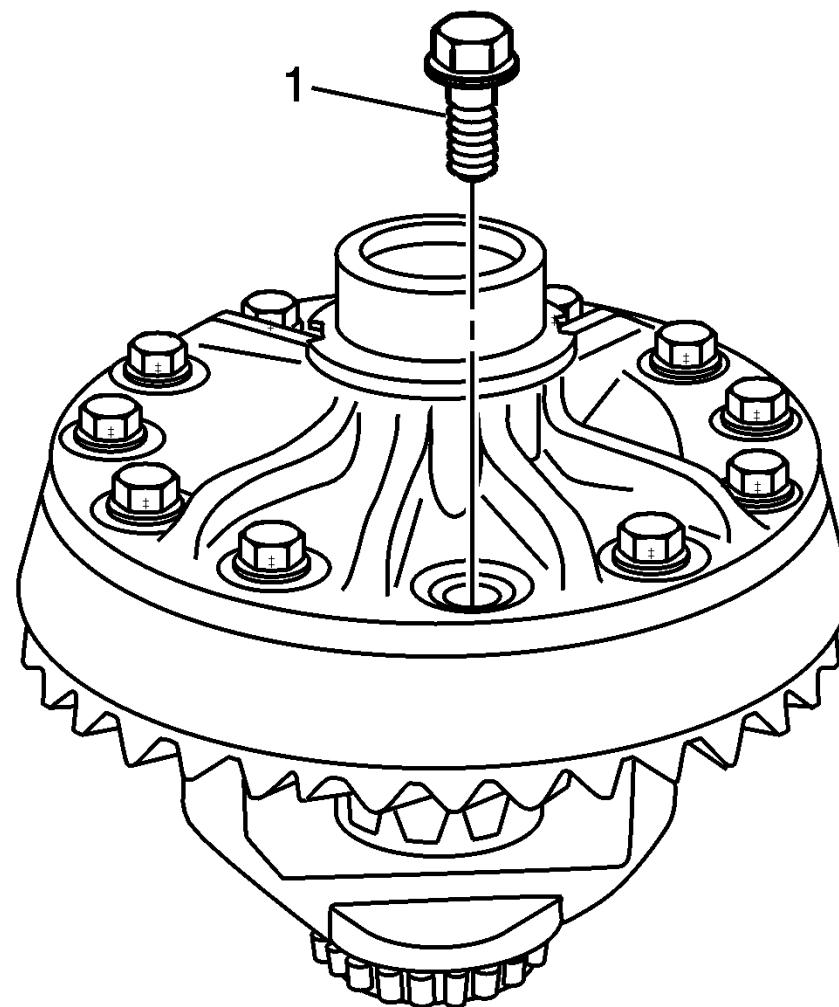


Fig. 279: Ring Gear Bolts Have Left-Hand Threads

Courtesy of GENERAL MOTORS COMPANY

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

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

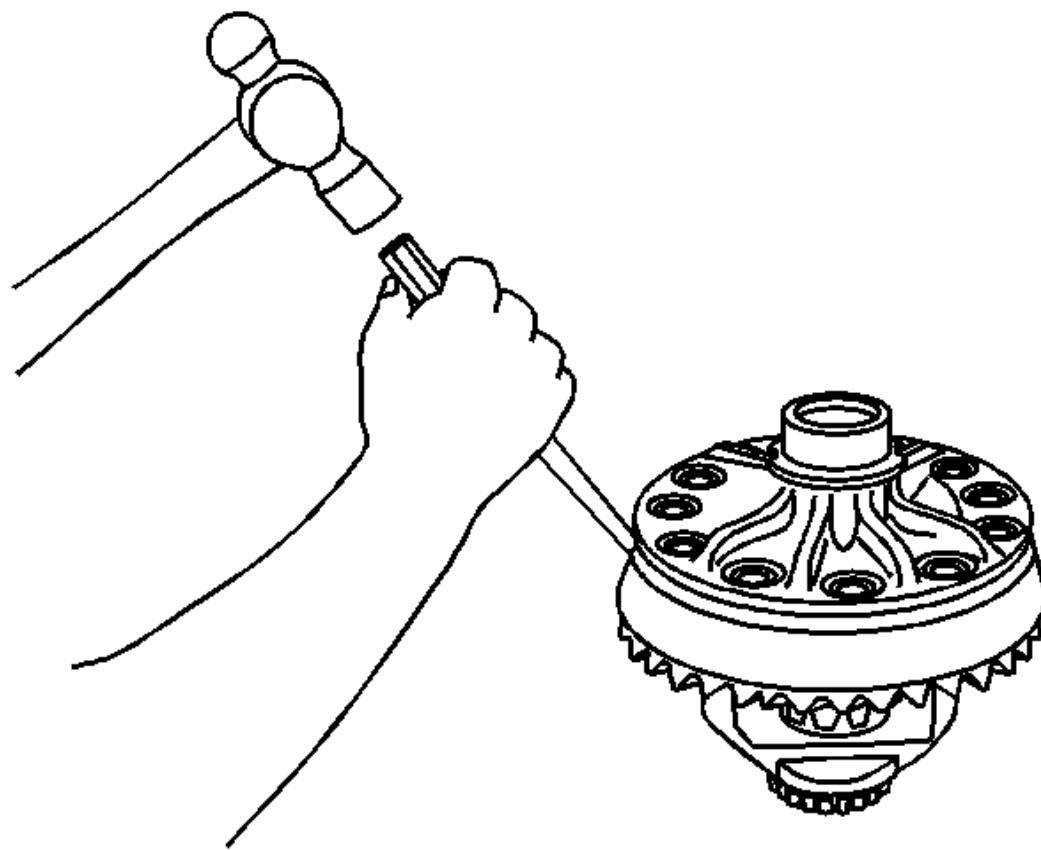


Fig. 280: Removing Ring Gear From Differential

Courtesy of GENERAL MOTORS COMPANY

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

14. Remove the ring gear from the differential case.

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

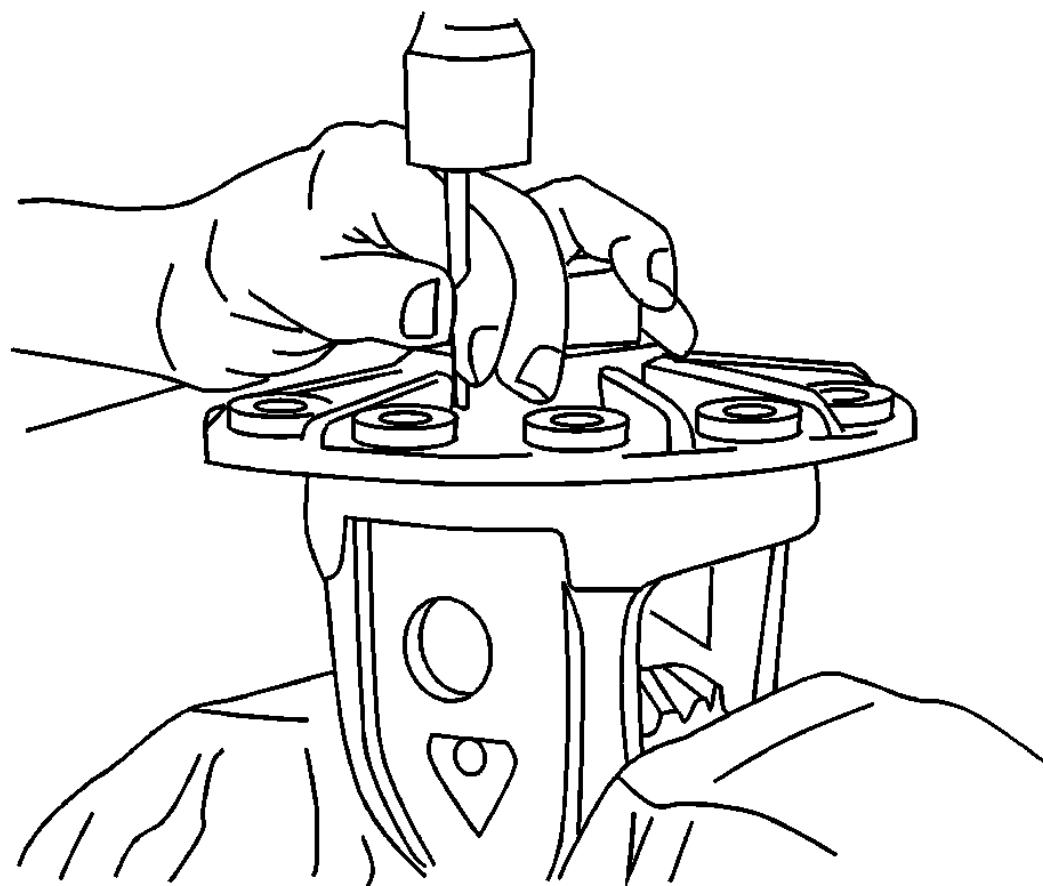


Fig. 281: Driving Out Pinion Shaft Pin
Courtesy of GENERAL MOTORS COMPANY

15. Remove the pinion shaft pin.

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

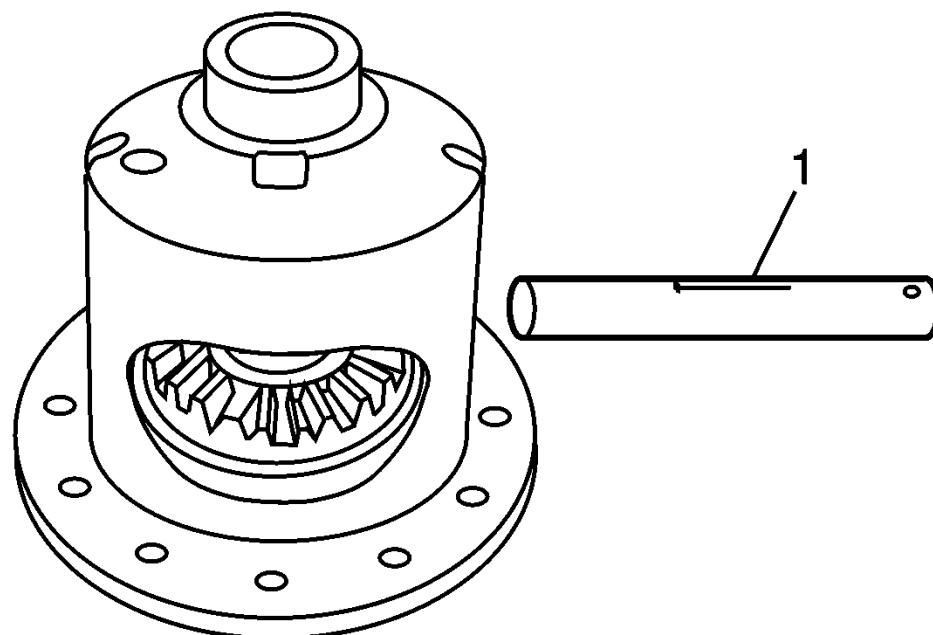


Fig. 282: Pinion Gear Shaft

Courtesy of GENERAL MOTORS COMPANY

16. Remove the pinion shaft (1).

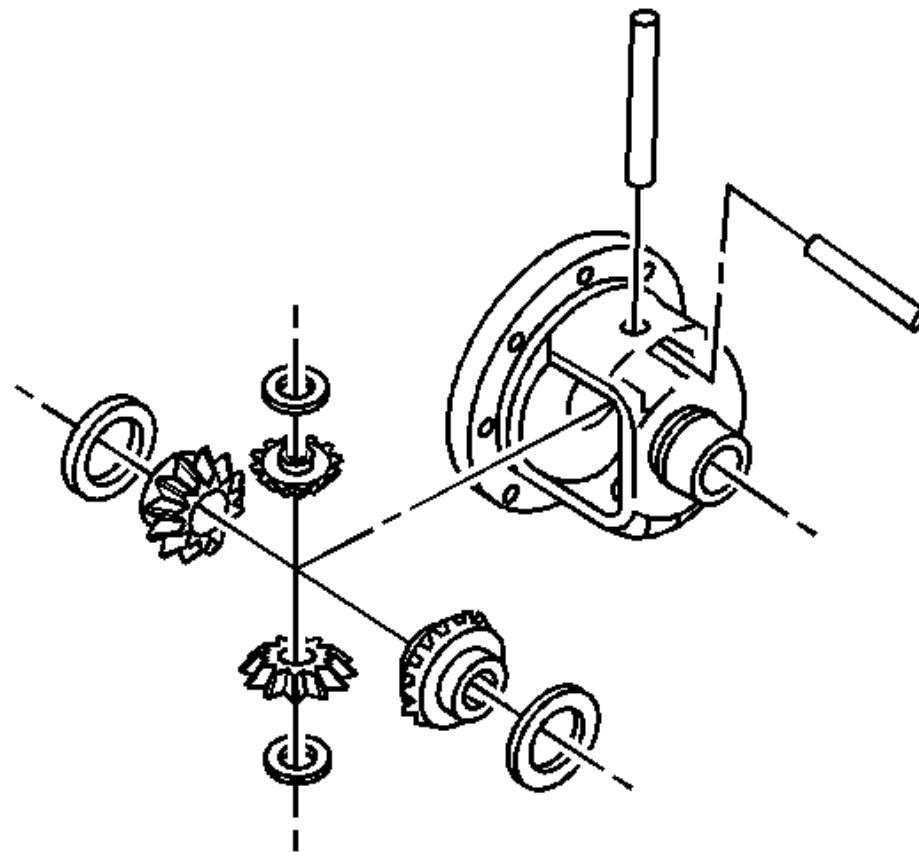


Fig. 283: Exploded View Of Differential Case

Courtesy of GENERAL MOTORS COMPANY

17. Remove the differential pinion gears and the differential side gears by performing the following steps:

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

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

Installation Procedure

1. Lubricate the pinion and side gears using axle lubricant. Use the correct fluid. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).

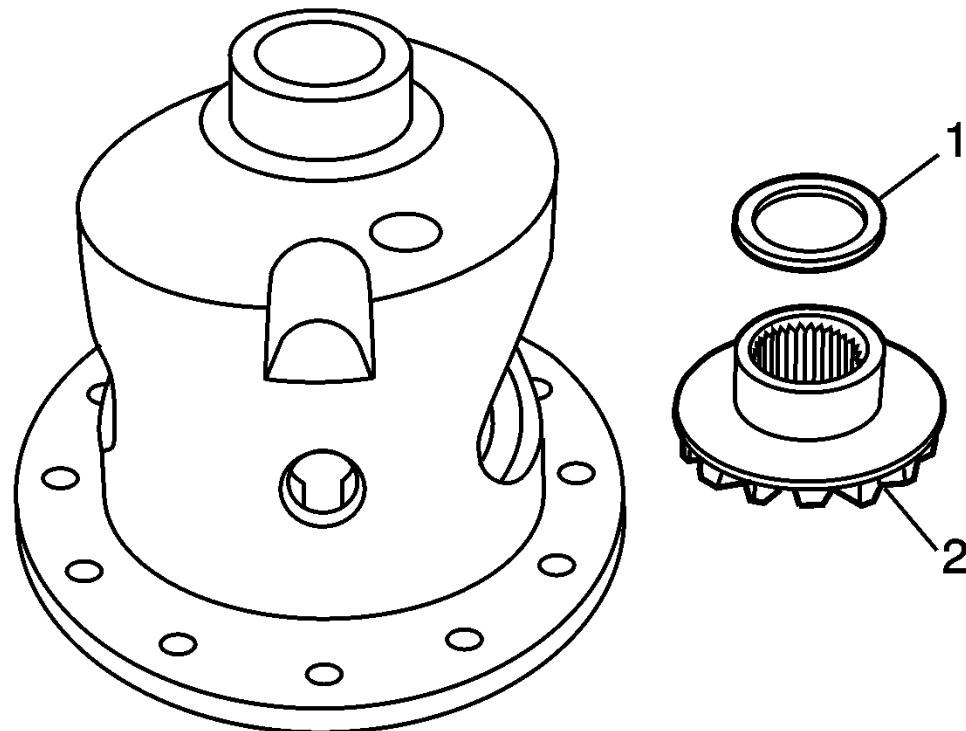


Fig. 284: Thrust Washers And Differential Side Gears

Courtesy of GENERAL MOTORS COMPANY

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

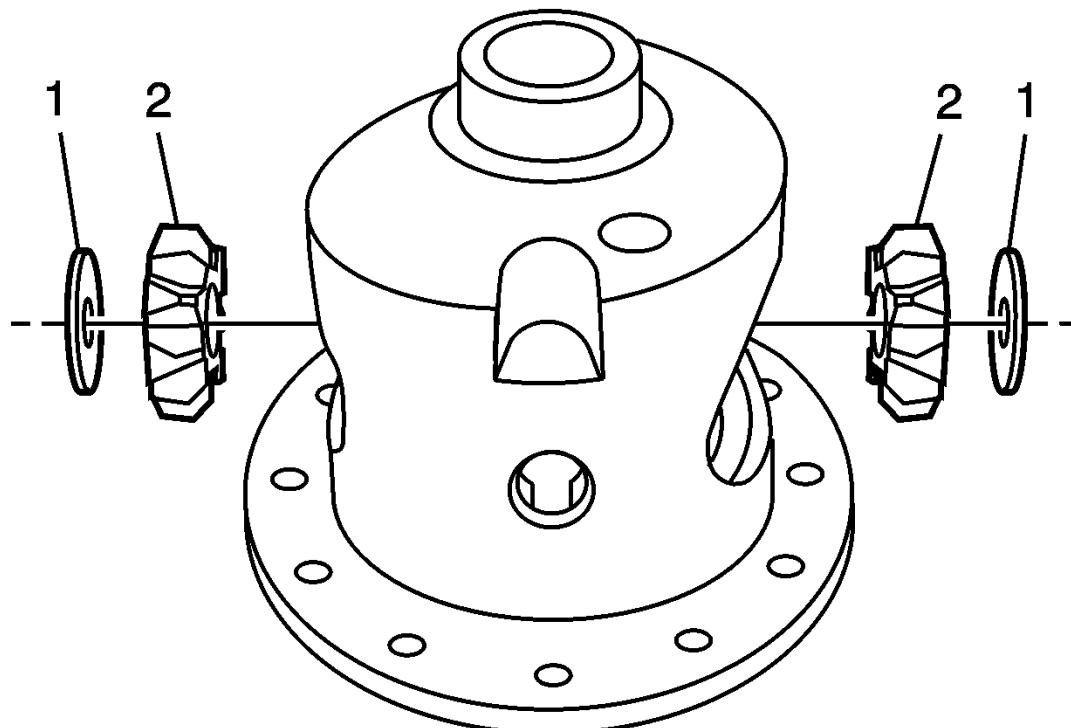


Fig. 285: Differential Pinion Gears

Courtesy of GENERAL MOTORS COMPANY

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

4. Install the thrust washers (1).

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

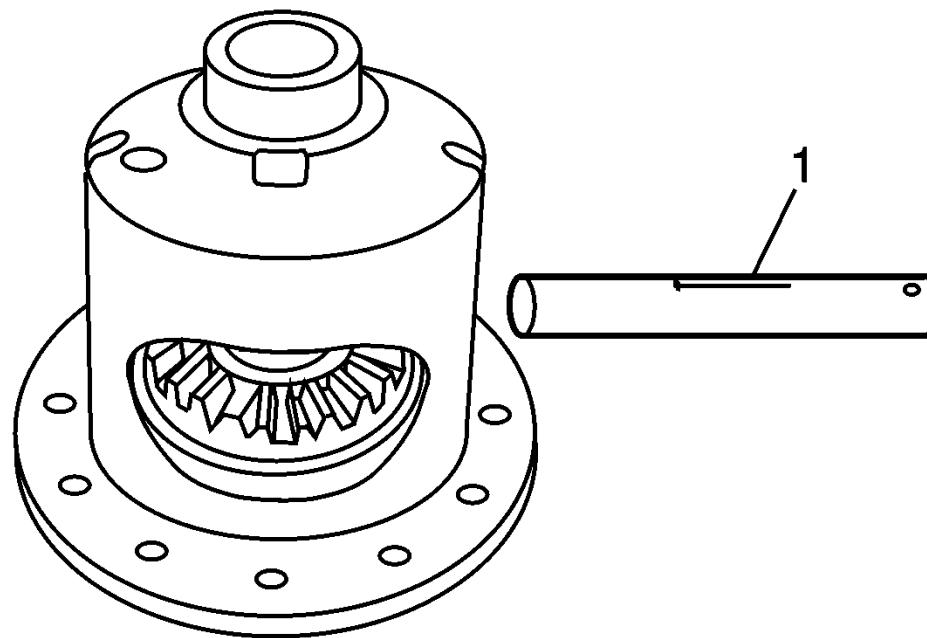


Fig. 286: Pinion Gear Shaft

Courtesy of GENERAL MOTORS COMPANY

5. Install the pinion gear shaft (1).

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

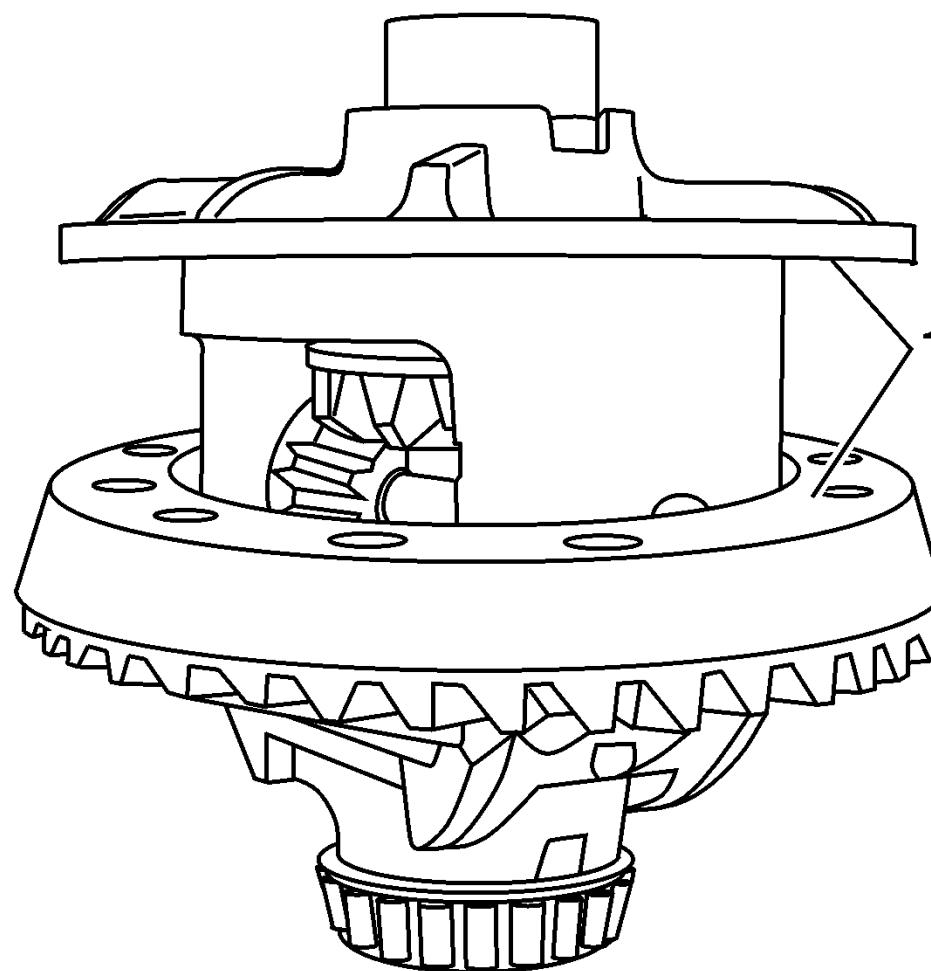


Fig. 287: Mating Surfaces Of Ring Gear And Differential Case

Courtesy of GENERAL MOTORS COMPANY

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

7. Install the ring gear onto the differential case.

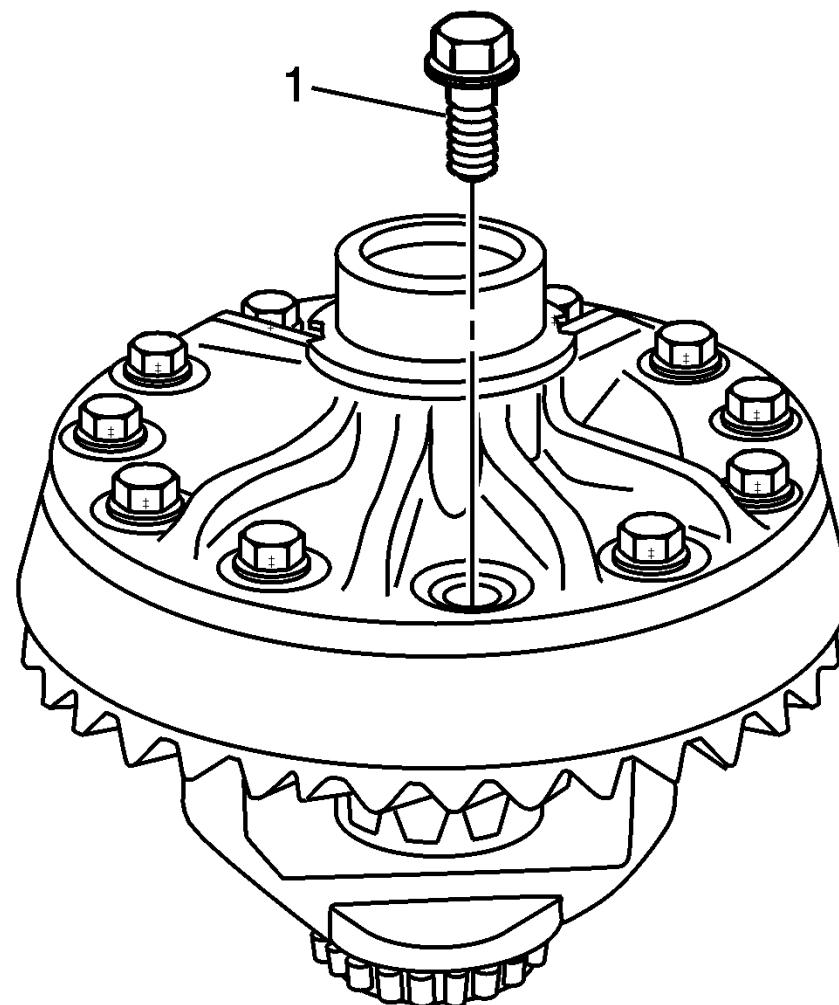


Fig. 288: Ring Gear Bolts Have Left-Hand Threads

Courtesy of GENERAL MOTORS COMPANY

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

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

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

CAUTION: Refer to Fastener Caution .

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

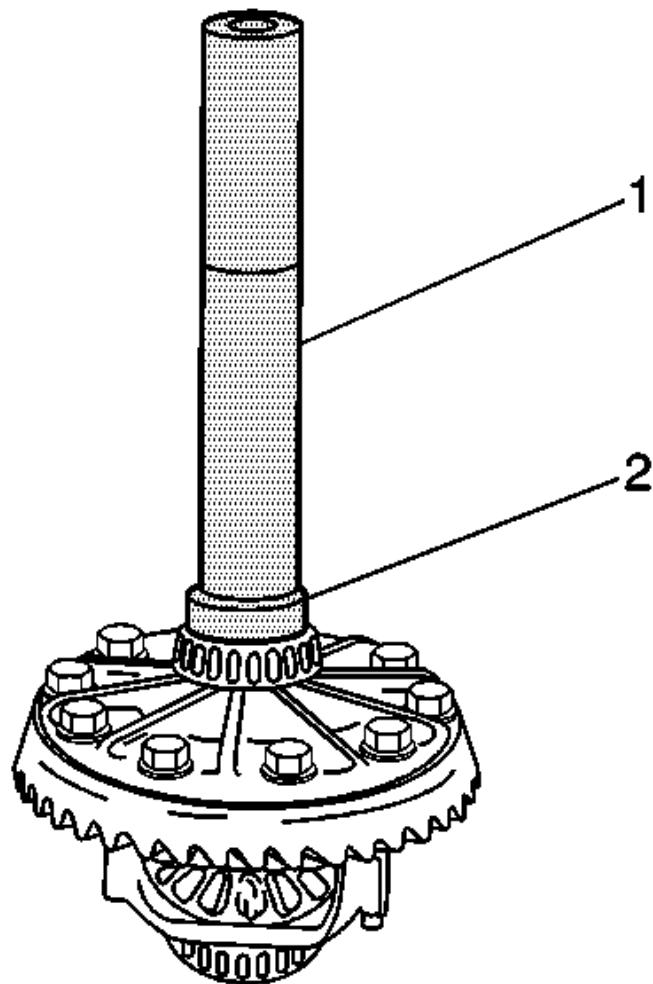


Fig. 289: Differential Side Bearing

Courtesy of GENERAL MOTORS COMPANY

10. Install the differential side bearings by performing the following steps:

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

11. Install the differential case assembly.

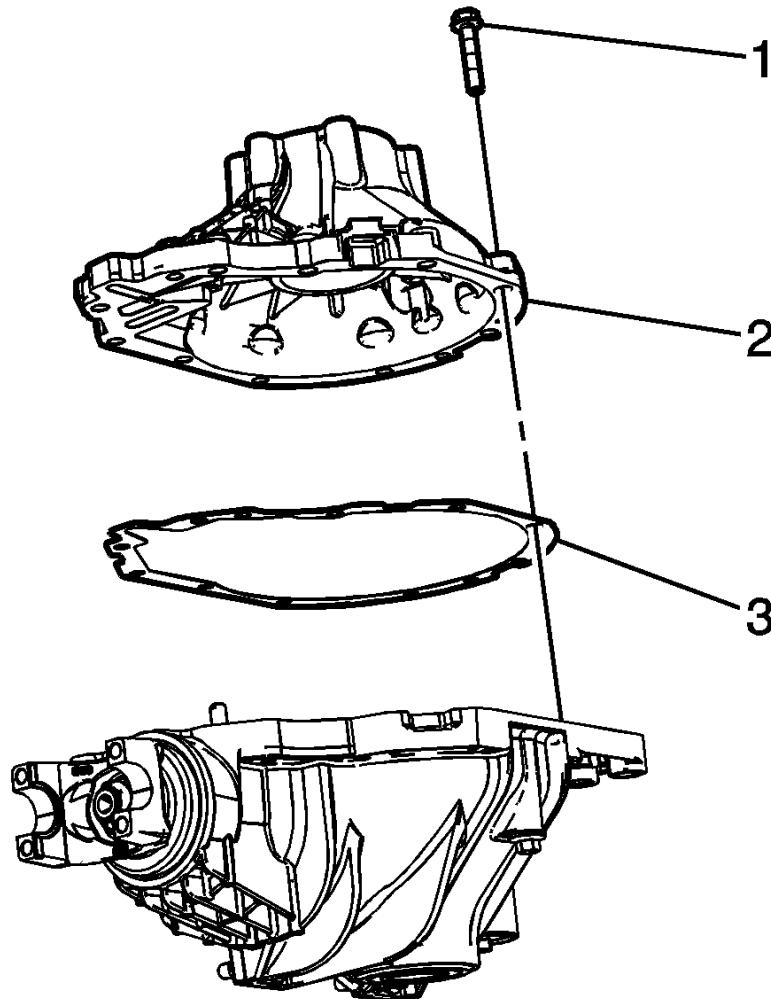


Fig. 290: View Of Differential Carrier Housing, Gasket & Bolts

Courtesy of GENERAL MOTORS COMPANY

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

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

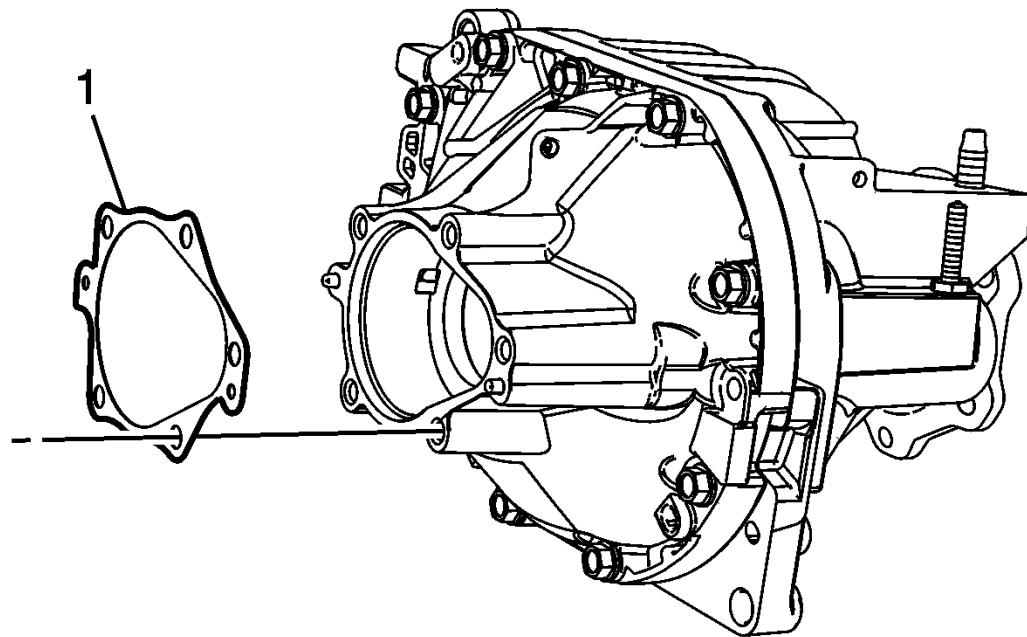


Fig. 291: Inner Axle Housing To Differential Carrier Gasket

Courtesy of GENERAL MOTORS COMPANY

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

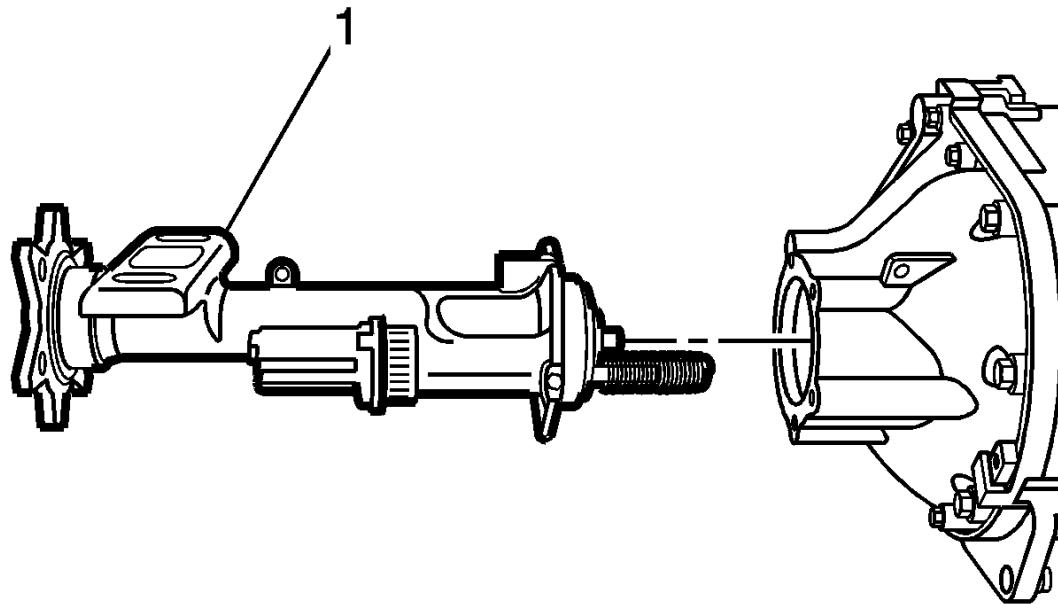


Fig. 292: Inner Axle Shaft Housing Assembly

Courtesy of GENERAL MOTORS COMPANY

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

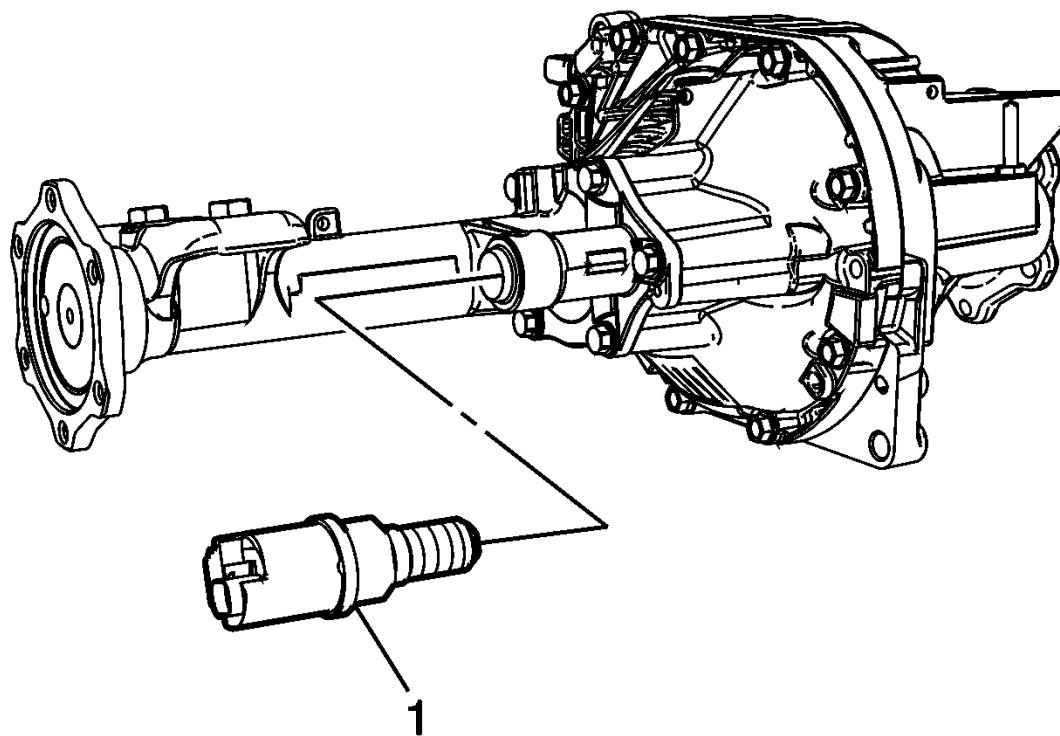


Fig. 293: Front Axle Actuator

Courtesy of GENERAL MOTORS COMPANY

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

FRONT DIFFERENTIAL DRIVE PINION GEAR BEARING REPLACEMENT

Special Tools

- **J-22912-B** Split-Plate Bearing Puller
- **J-2619-01** Slide Hammer
- **J-29369-1** Bushing and Bearing Remover
- **J-34011** Pilot Bearing Remover
- **J-36598** Holding Fixture
- **J-36614** Inner Pinion Bearing Installer
- **J-45765** Pinion Remover
- **J-45858** Front Axle Bearing Race Remover/Installer
- **J-45858-B** Front Axle Bearing Race Remover/Installer
- **J-8614-01** Flange and Pulley Holding Tool
- **J-8107-2** Side Bearing Puller Pilot
- **J-22888-D** Side Bearing Remover Kit
- **GE-8092** Driver Handle
- **J-22761** Differential Side Bearing Installer
- **GE-8092** Driver Handle (Universal Driver Handle-3/4 in 10)
- **J-35512** Inner Pinion Bearing Installer
- **J-36366** Pinion Oil Seal Installer
- **J-36599-A** Side Bearing Nut Wrench
- **J-36615** Side Bearing Nut Wrench

Inspection Procedure

Perform the following before disassembling the axle:

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

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

4. Check the ring gear backlash. Refer to [**Backlash Inspection and Adjustment \(8.25 Inch LD Axle\)**](#)
[**Backlash Inspection and Adjustment \(9.25 Inch HD Axle\)**](#).

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

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

Disassembly Procedure

1. Remove the differential carrier assembly. Refer to [**Front Axle Replacement \(8.25 Inch LD Axle\)**](#)
[**Front Axle Replacement \(9.25 Inch HD Axle\)**](#).
2. Install the differential carrier assembly in a vise.

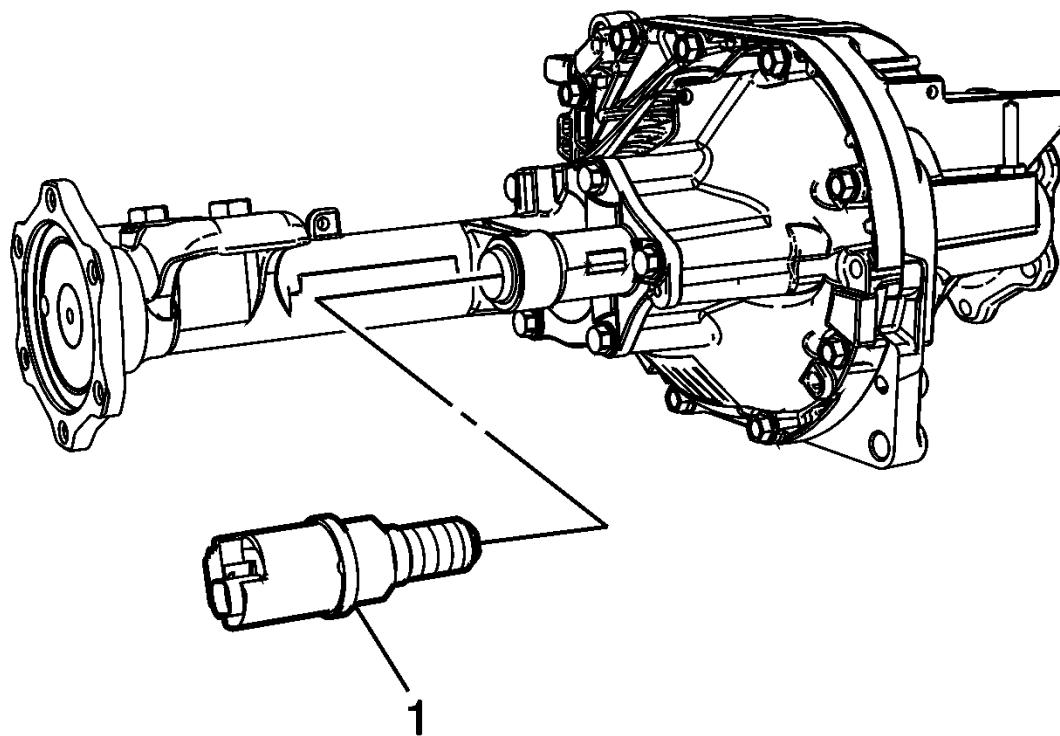


Fig. 294: Front Axle Actuator

Courtesy of GENERAL MOTORS COMPANY

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

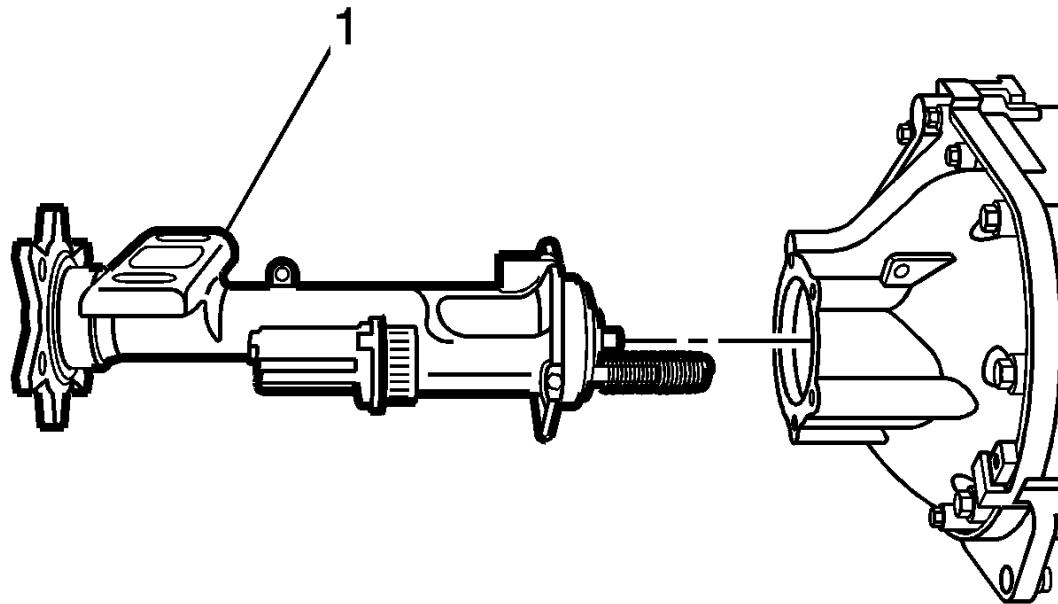


Fig. 295: Inner Axle Shaft Housing Assembly

Courtesy of GENERAL MOTORS COMPANY

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

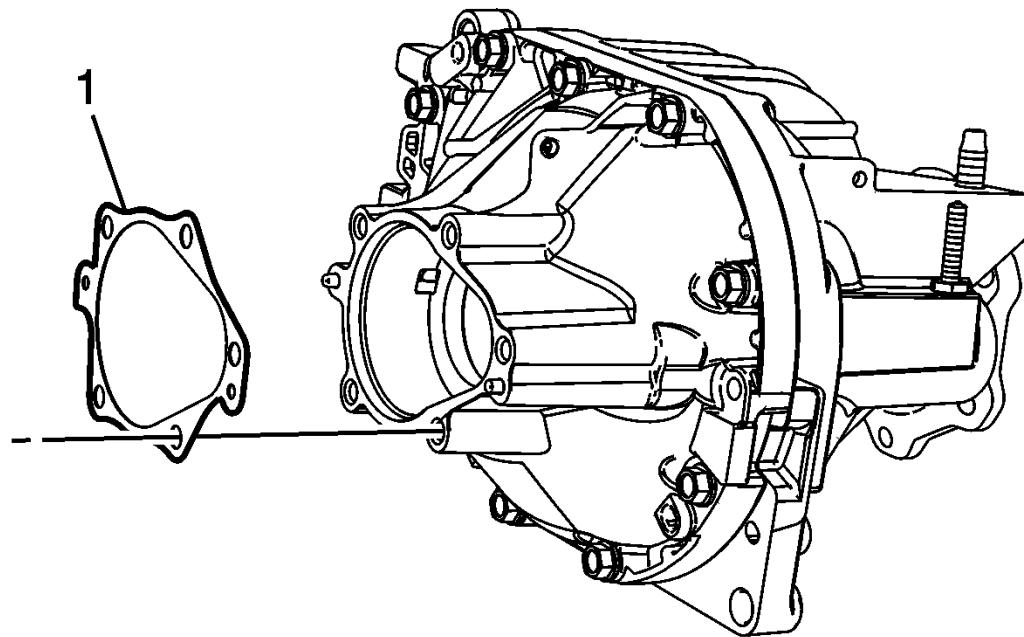


Fig. 296: Inner Axle Housing To Differential Carrier Gasket

Courtesy of GENERAL MOTORS COMPANY

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

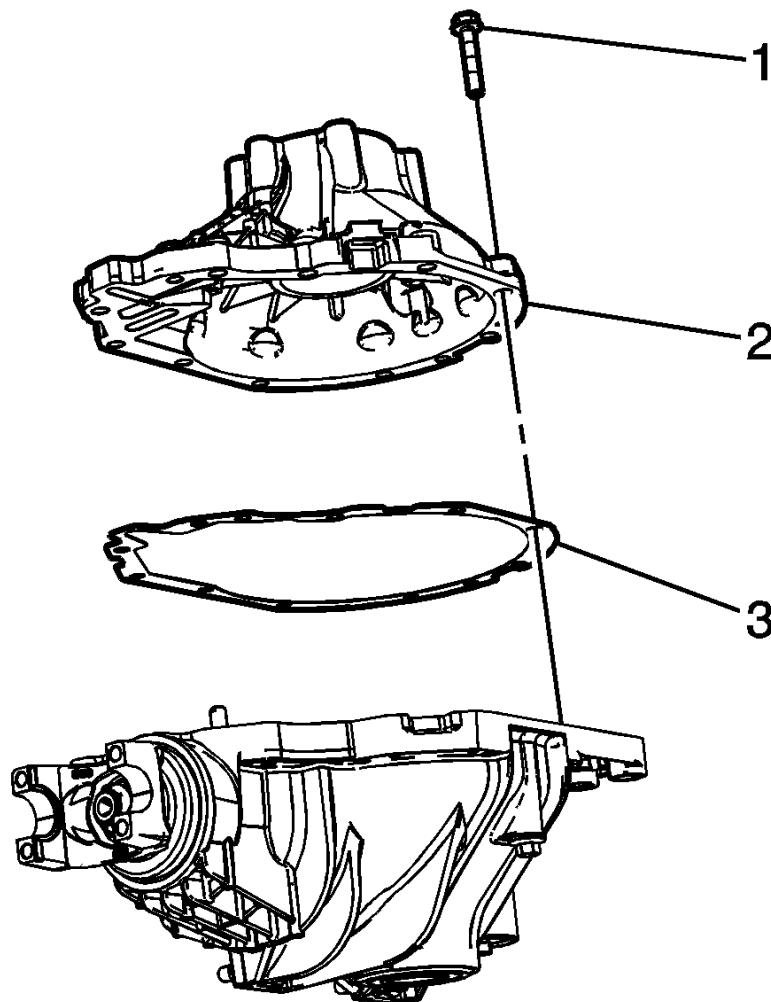


Fig. 297: View Of Differential Carrier Housing, Gasket & Bolts

Courtesy of GENERAL MOTORS COMPANY

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

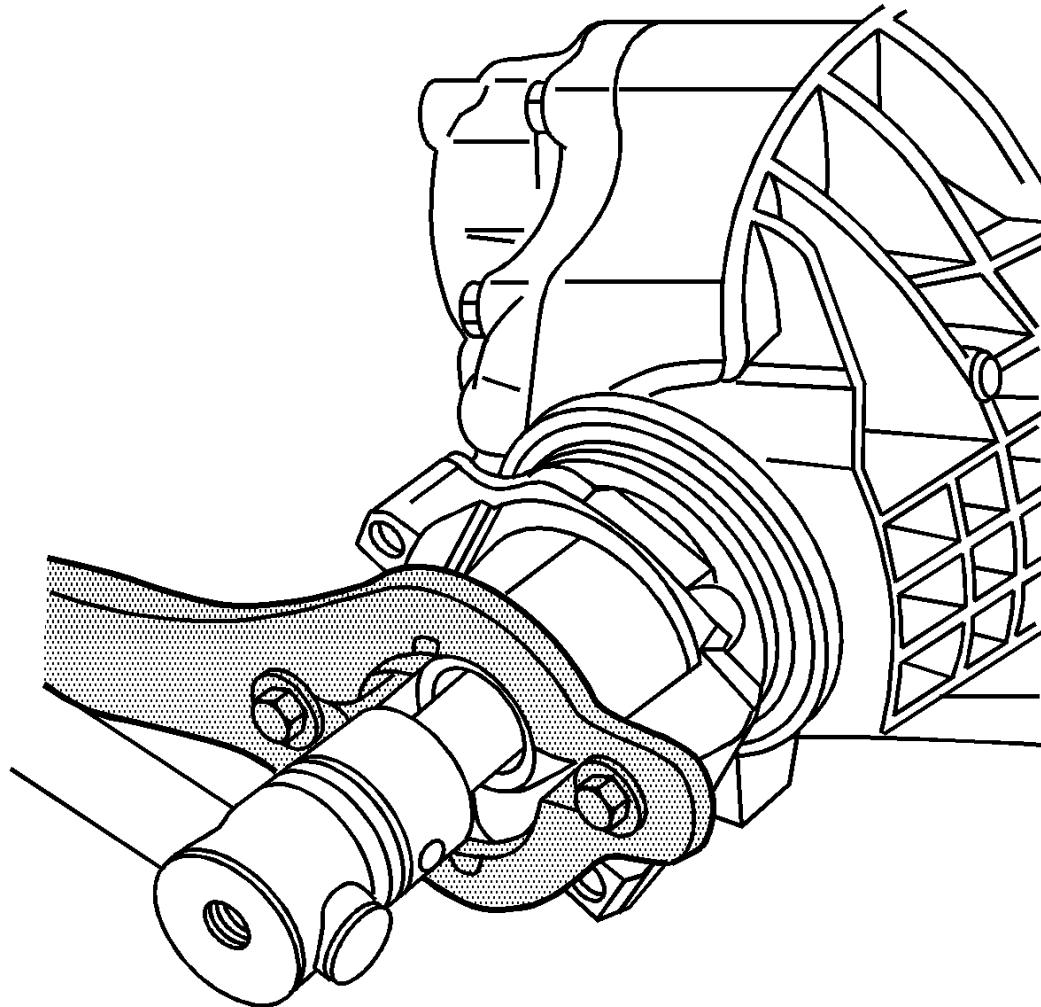


Fig. 298: View Of J 8614-01

Courtesy of GENERAL MOTORS COMPANY

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

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

14. Remove the washer.

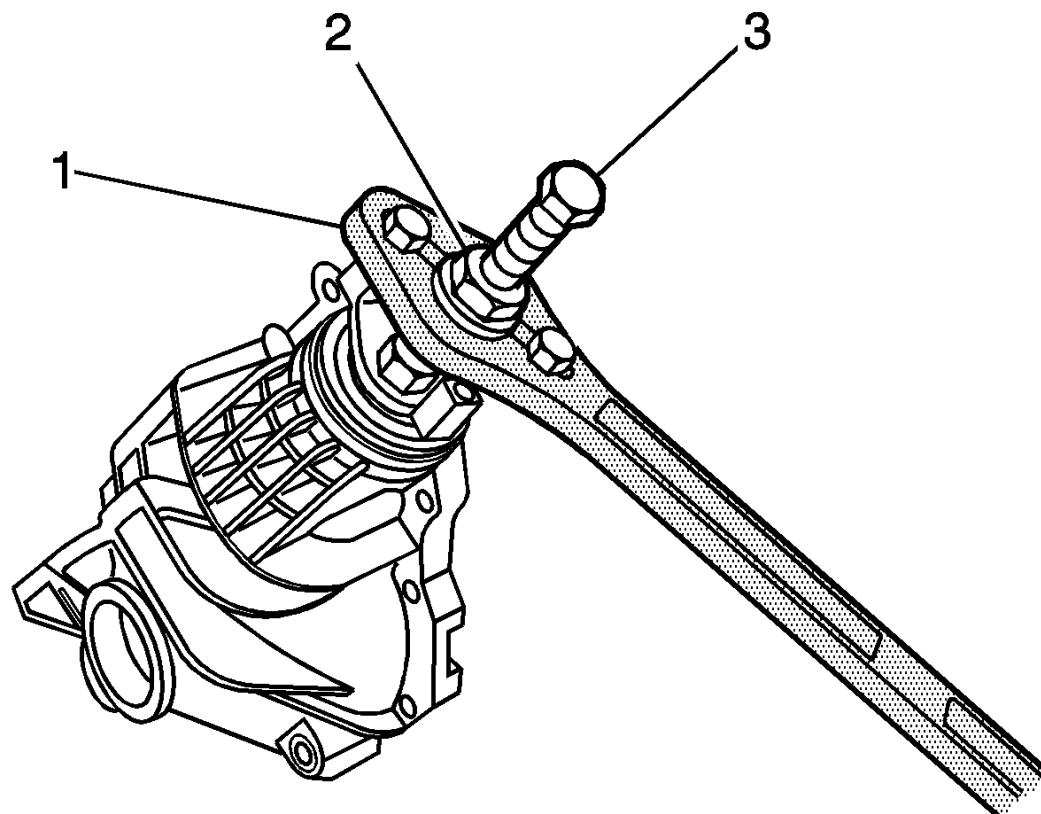


Fig. 299: View Of Pinion Yoke Removal Tools

Courtesy of GENERAL MOTORS COMPANY

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

appropriate steps depending on what tool is available.

18. Install the **J-36598** holding fixture into a vise.

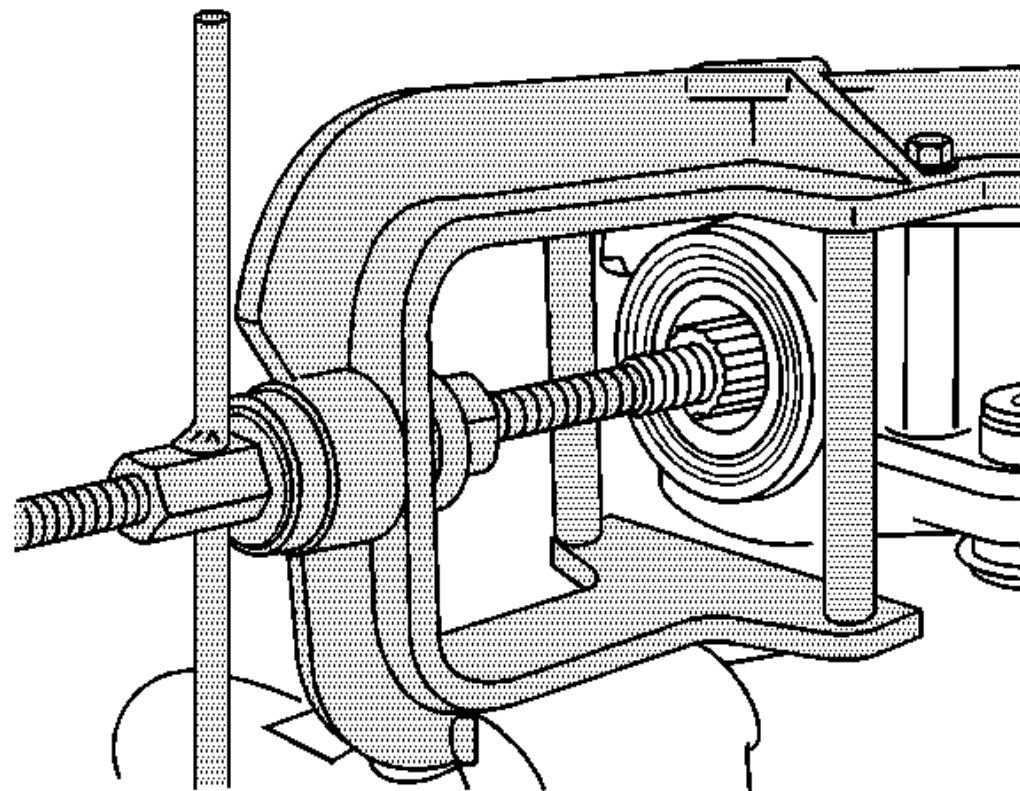


Fig. 300: Holding Fixture & Pinion Tool J 36598

Courtesy of GENERAL MOTORS COMPANY

19. Install the left differential carrier case half onto the **J-36598** holding fixture and the J-36598 - (only 3 of the 4 mounting bolts will be used).
20. While holding the forcing screw of the **J-36598** holding fixture, turn the handle of the **J-36598** holding fixture counterclockwise in order to

remove the pinion with the following components:

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

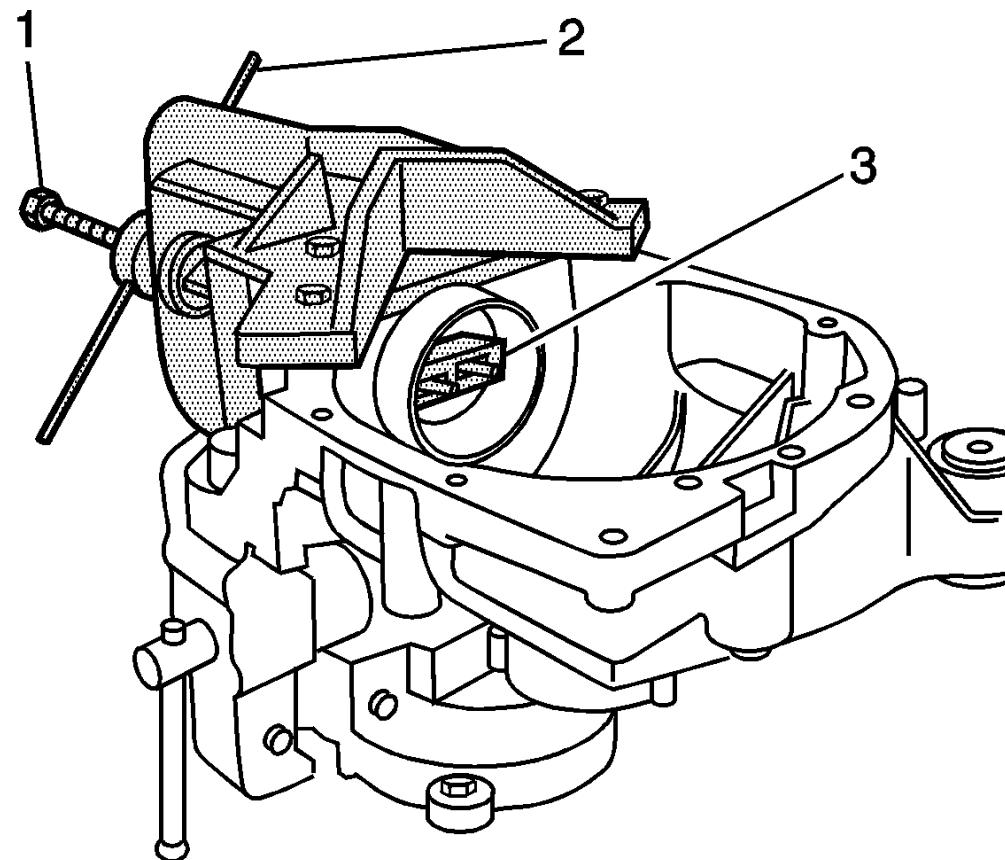


Fig. 301: Pressing Inner Bearing Cup Out From Differential Carrier Case

Courtesy of GENERAL MOTORS COMPANY

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

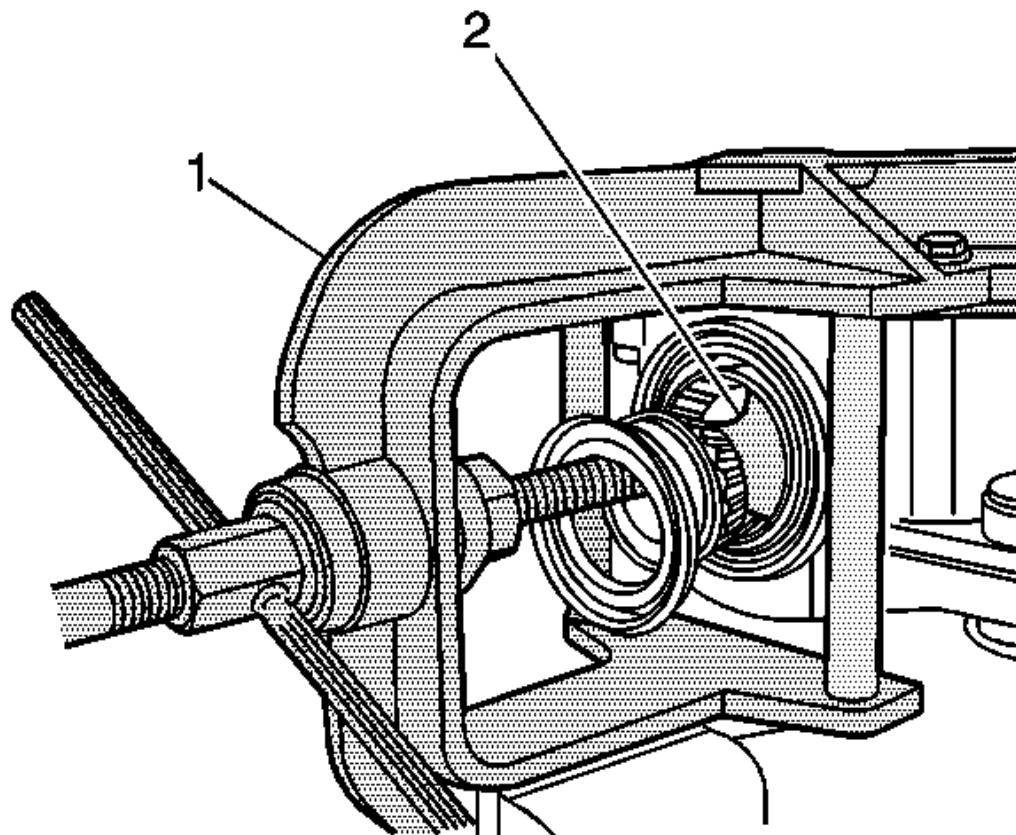


Fig. 302: Pinion Oil Seal & Bearing Using Forcing Screw J 36598 To J 36598-5

Courtesy of GENERAL MOTORS COMPANY

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

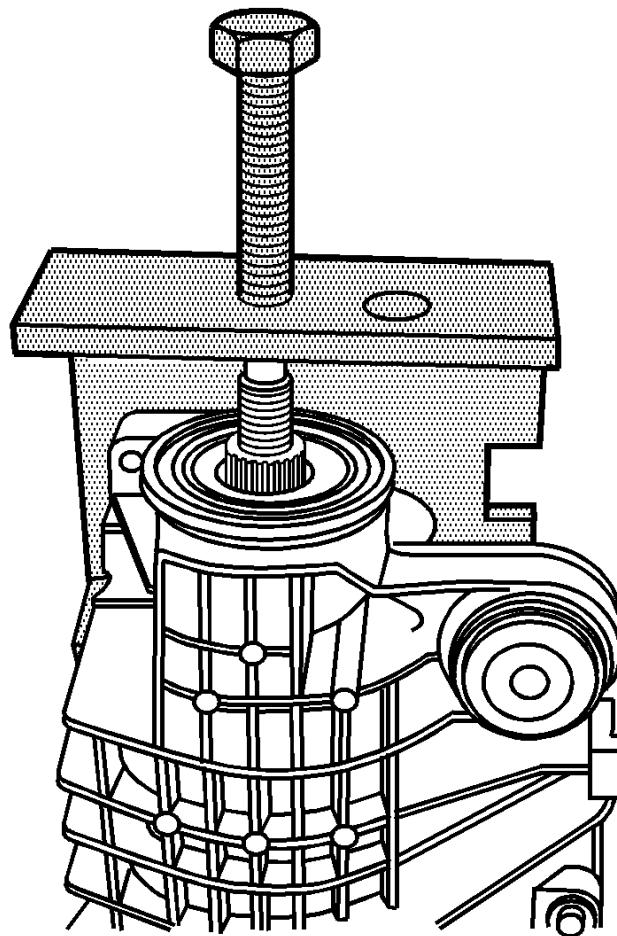


Fig. 303: Pinion Components Using J 45765

Courtesy of GENERAL MOTORS COMPANY

27. Install the **J-45765** pinion remover to the left side differential carrier case half over the drive pinion as shown.
28. Turn the forcing screw of the **J-45765** pinion remover clockwise to remove the following components from the left side differential carrier case half:
 - The drive pinion gear

- The pinion gear selectable shim
 - The inner pinion bearing
 - The collapsible spacer
29. Remove the drive pinion seal using a suitable seal remover.
30. Remove the outer pinion bearing from the differential carrier case half.

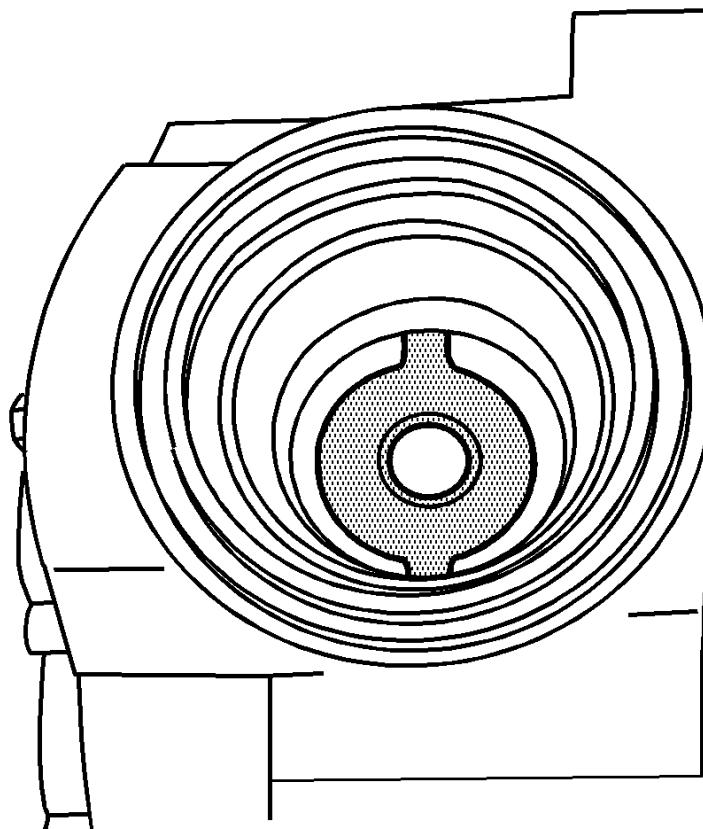


Fig. 304: J 45858-4 Over Inner Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

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

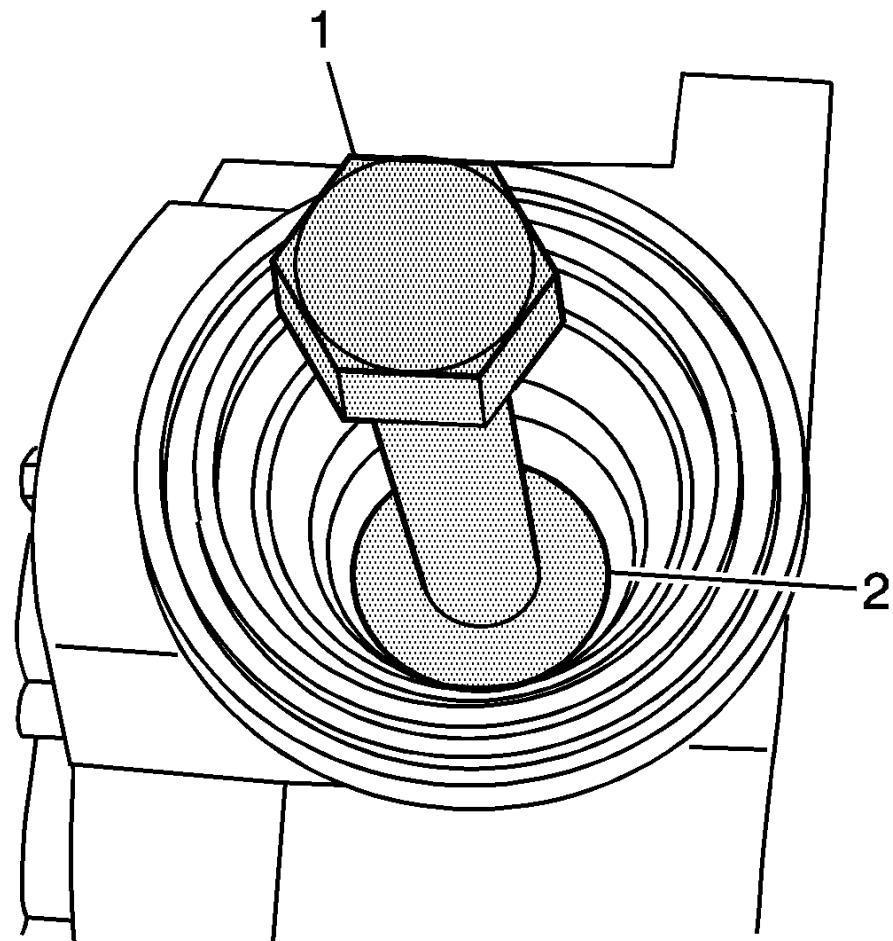


Fig. 305: Forcing Screw Of J 45858

Courtesy of GENERAL MOTORS COMPANY

32. Install the forcing screw (1) of the **J-45858** front axle bearing race remover/installer or **J-45858-B** front axle bearing race remover/installer into

the J-45858-4 (2).

33. Drive out the inner pinion bearing cup by pounding on the forcing screw with a hammer.

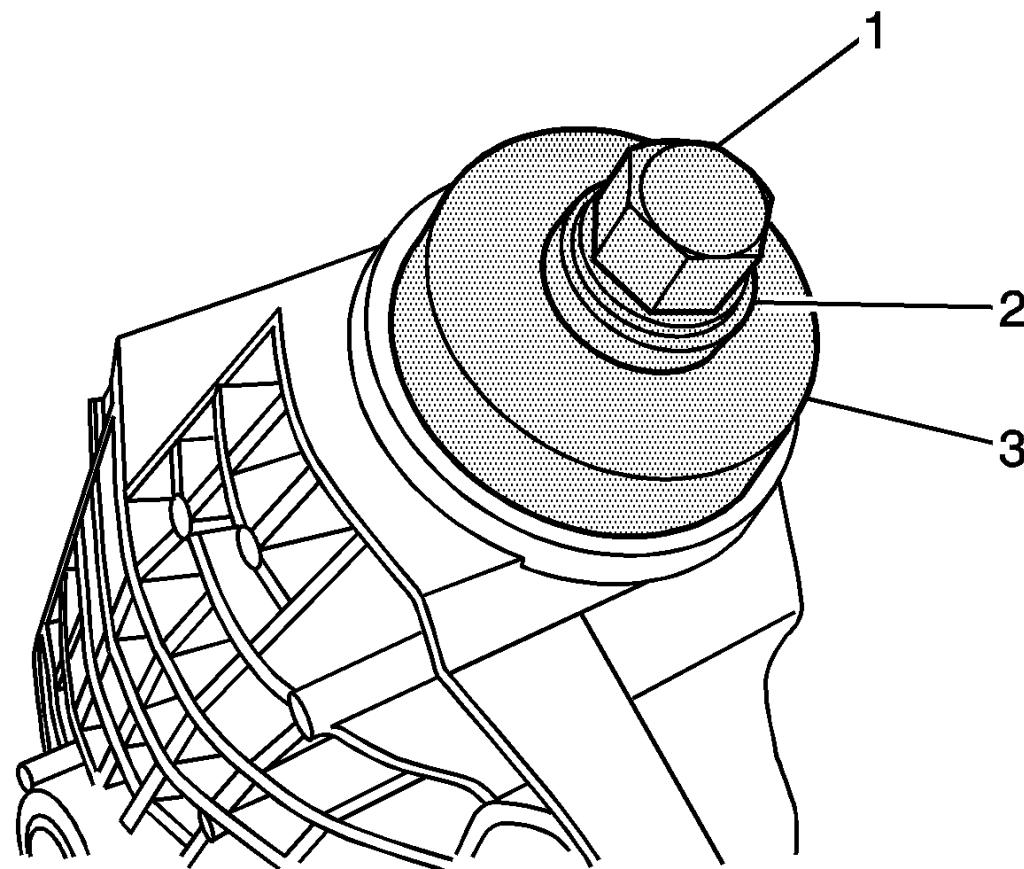


Fig. 306: View Of Thrust Bearing & Washer, Forcing Screw & Special Tool J 45858-3

Courtesy of GENERAL MOTORS COMPANY

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

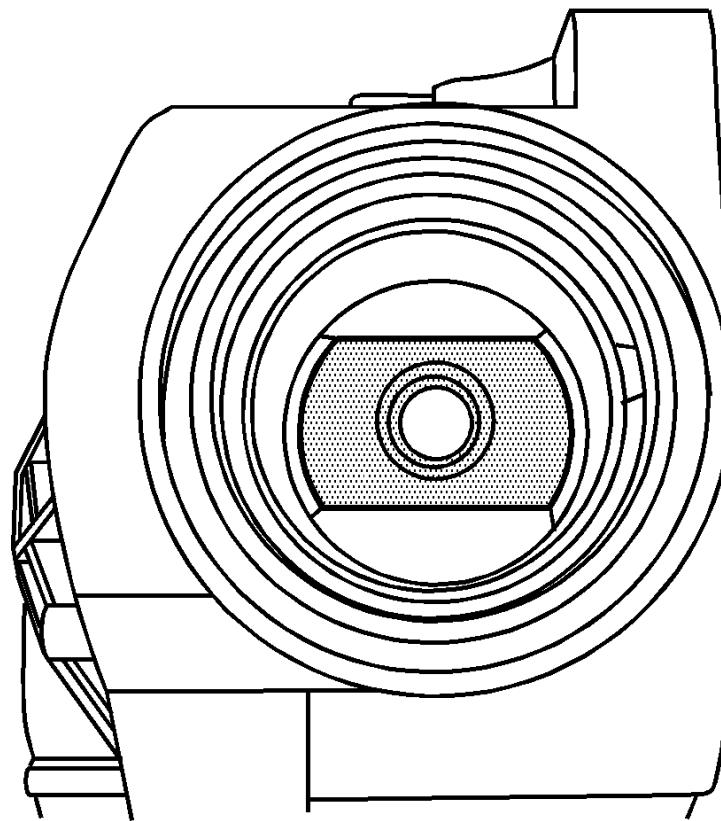


Fig. 307: J 45858-5 Into Pinion Bearing Bore

Courtesy of GENERAL MOTORS COMPANY

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

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

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

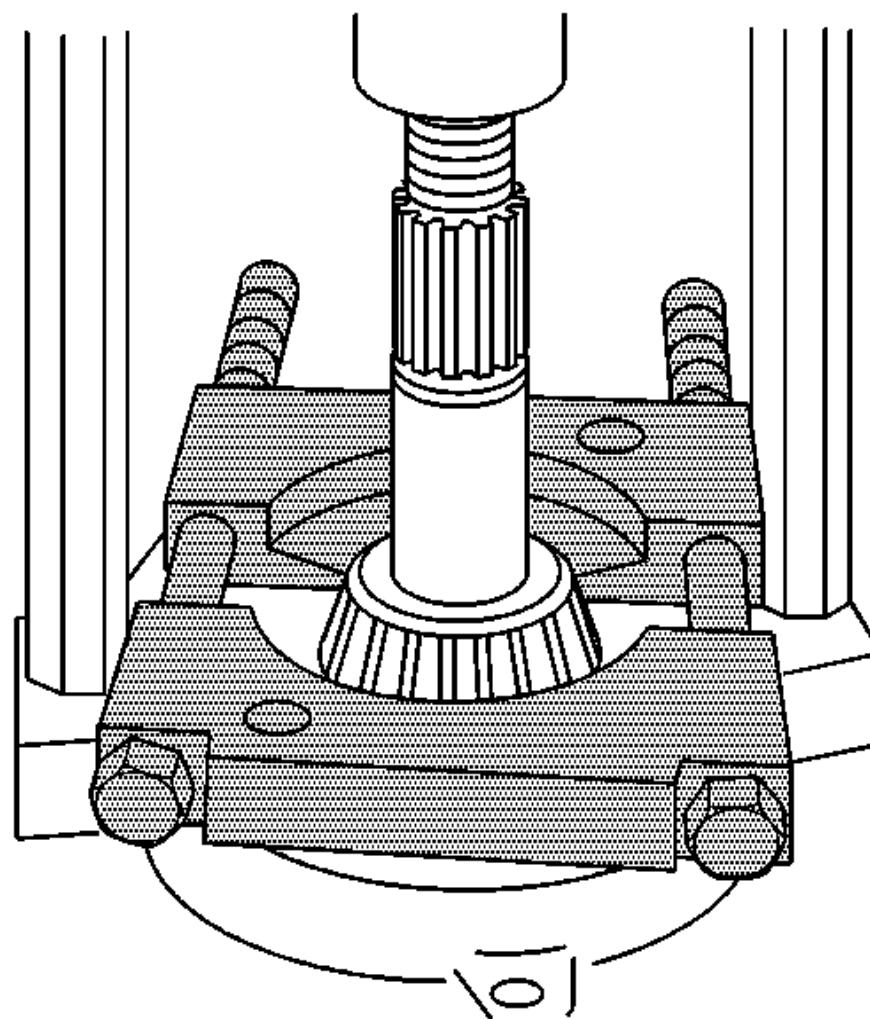


Fig. 308: View Of Inner Pinion Bearing & Hydraulic Press

Courtesy of GENERAL MOTORS COMPANY

38. Install the **J-22912-B** split-plate bearing puller between the pinion bearing and the drive pinion.
39. Using the **J-22912-B** split-plate bearing puller and a hydraulic press, remove the inner pinion bearing

40. Remove the pinion gear selectable shim.

Assembly Procedure

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

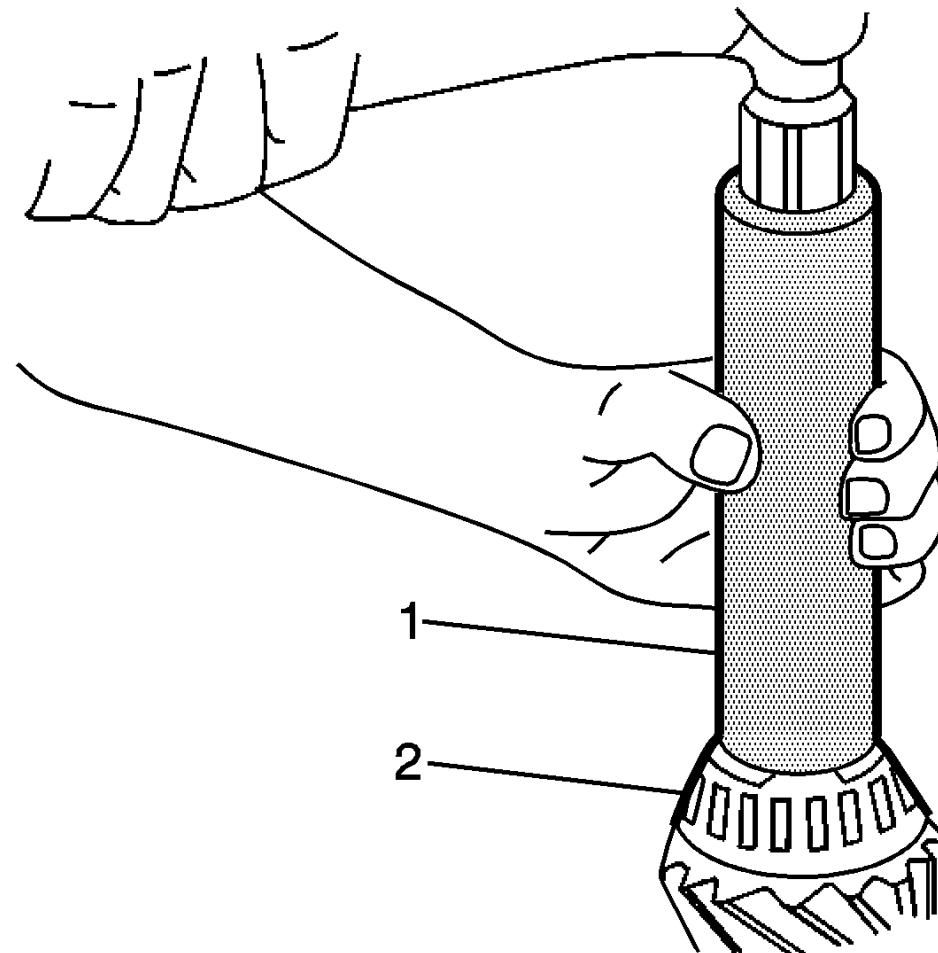


Fig. 309: Inner Pinion Bearing And Pinion Gear

Courtesy of GENERAL MOTORS COMPANY

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

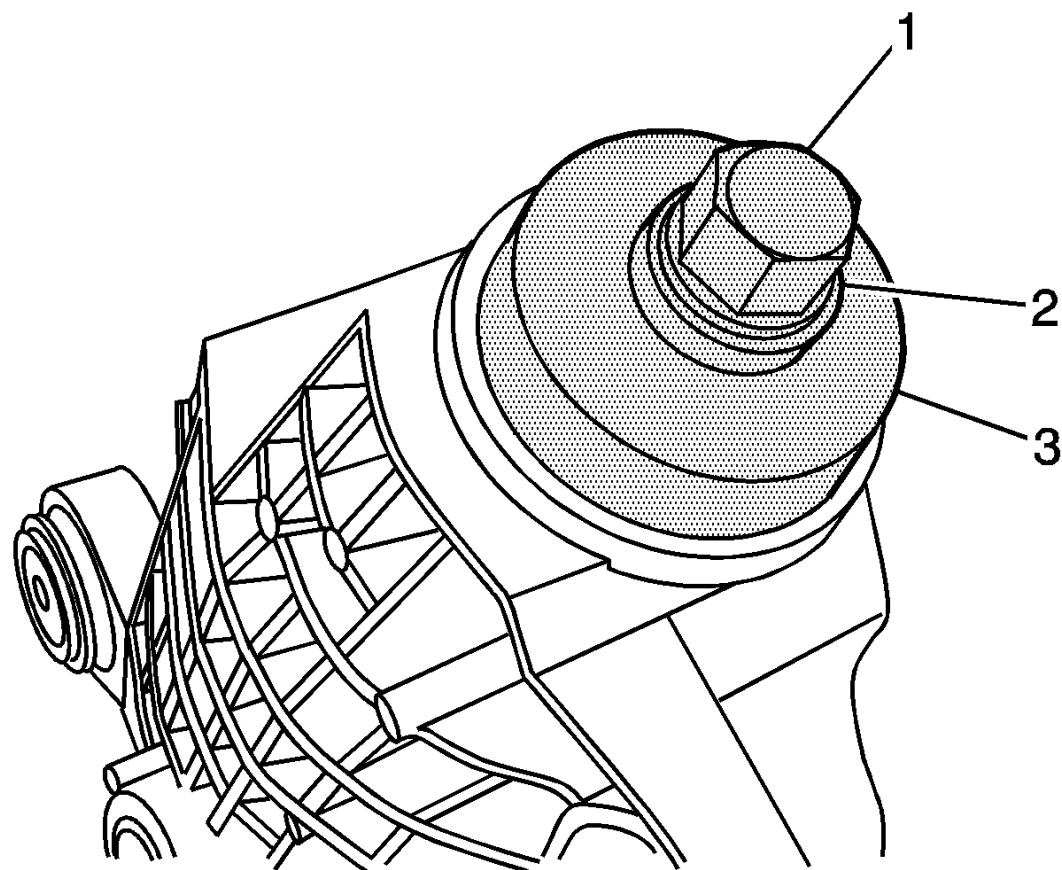


Fig. 310: Thrust Bearing, Washer & Forcing Screw

Courtesy of GENERAL MOTORS COMPANY

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

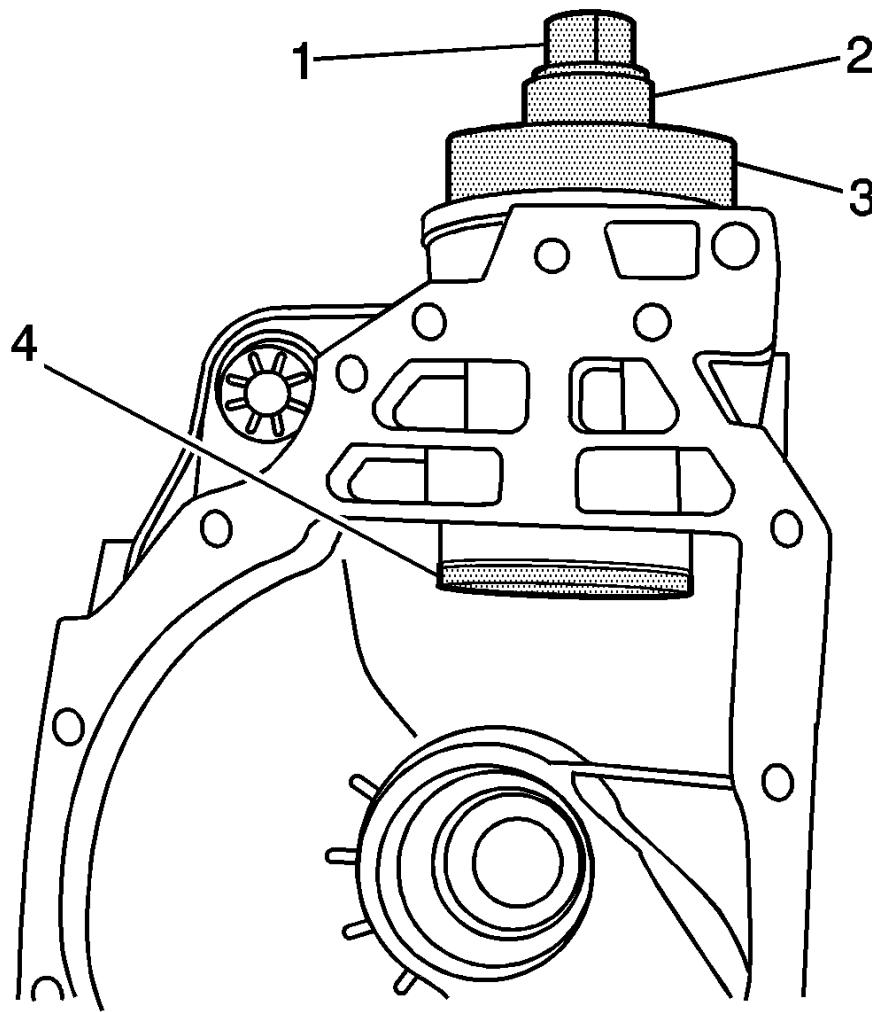


Fig. 311: Inner Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

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

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

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

Inspect the position of the inner pinion bearing cup as it is being drawn into the inner pinion bearing cup bore to ensure the bearing cup is being pulled straight into the pinion bearing cup bore. If the pinion bearing cup is not being pulled straight into the bearing cup bore, remove the **J-45858** pinion bearing race remover/installer or **J-45858-B** pinion bearing race remover/installer and the inner pinion bearing cup and reposition the inner pinion bearing cup.

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

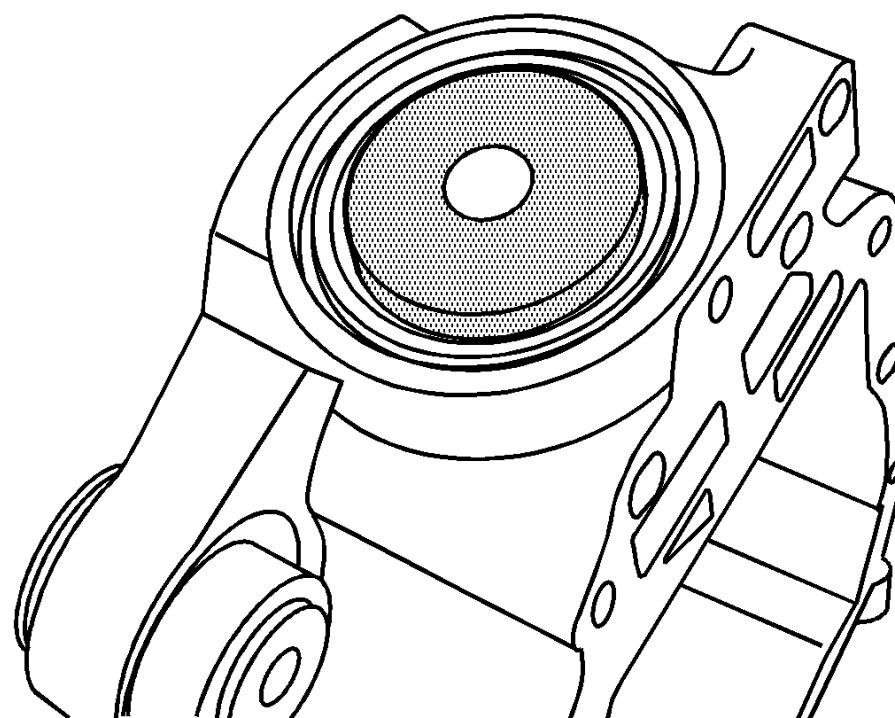


Fig. 312: Outer Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

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

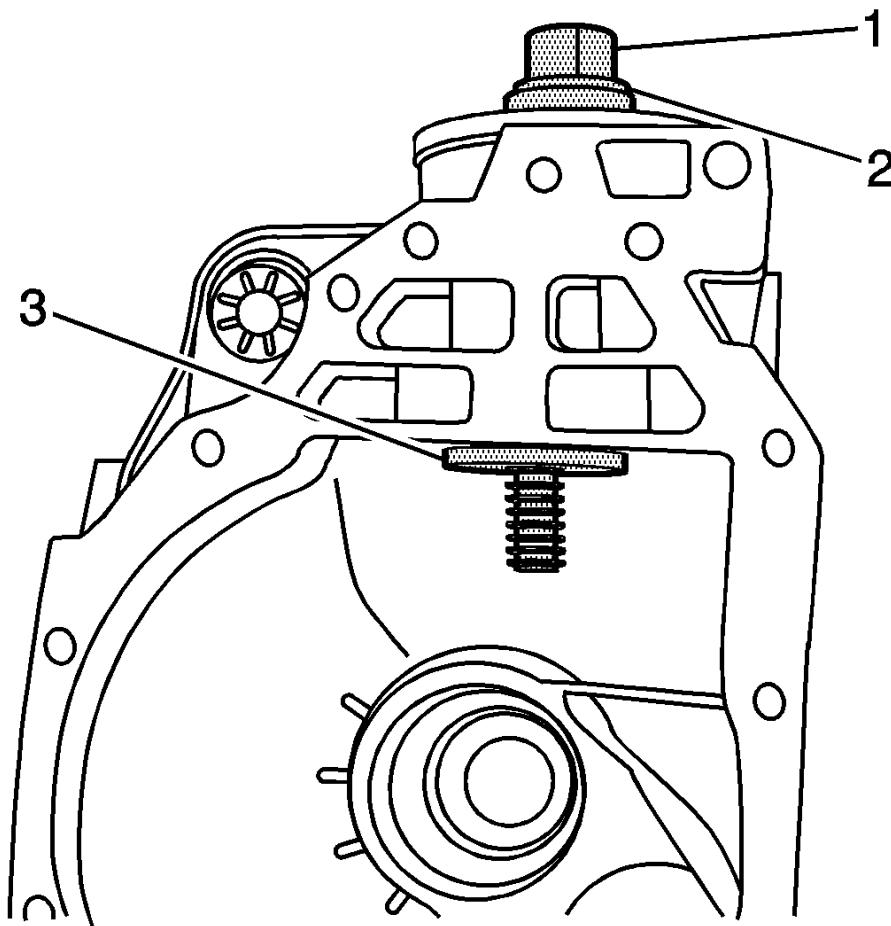


Fig. 313: Thrust Bearing And Washer

Courtesy of GENERAL MOTORS COMPANY

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

Inspect the position of the outer pinion bearing cup as it is being drawn into the outer pinion bearing cup bore to ensure the bearing cup is being pulled straight into the pinion bearing cup bore. If the pinion bearing cup is not being pulled straight into the bearing cup bore, remove the **J-45858** pinion bearing race remover/installer or **J-45858-B** pinion bearing race remover/installer and the outer pinion bearing cup and reposition the outer pinion bearing cup.

15. Tighten the forcing screw until the outer pinion bearing cup is seated in the outer pinion bearing cup bore.
16. Remove the **J-45858** pinion bearing race remover/installer ro **J-45858-B** pinion bearing race remover/installer.
17. Measure the pinion depth and determine the selectable pinion shim thickness. Refer to [**Pinion Depth Adjustment**](#).

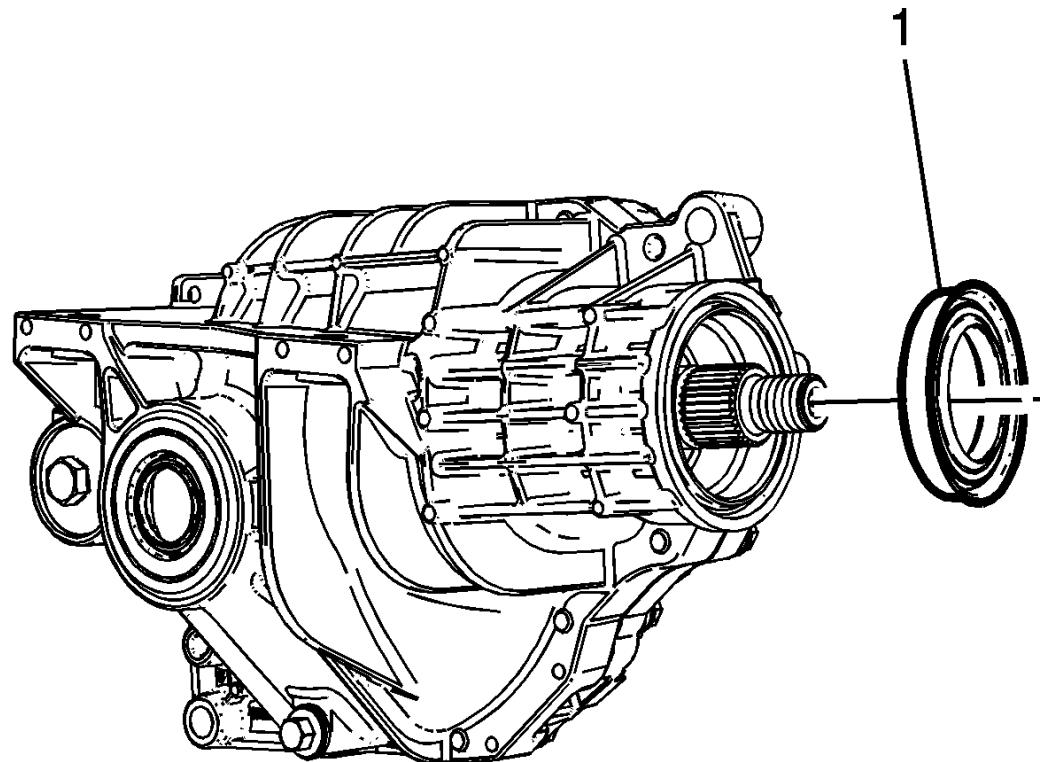


Fig. 314: Pinion Seal

Courtesy of GENERAL MOTORS COMPANY

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

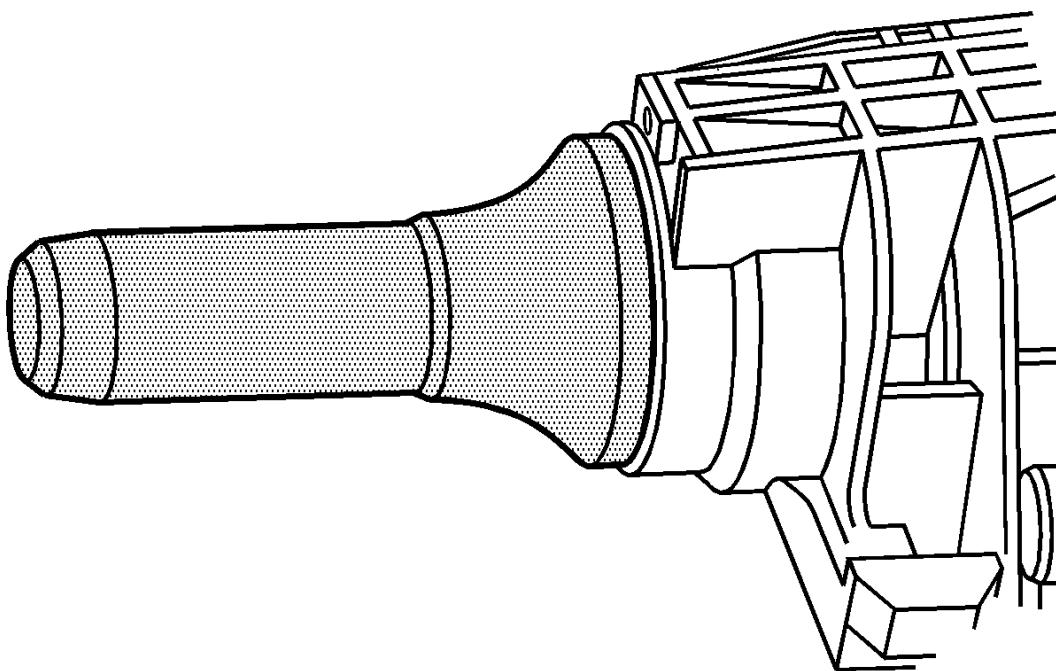


Fig. 315: View Of Special Tool J 36366 Seal Installer

Courtesy of GENERAL MOTORS COMPANY

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

19. Using the **J-36366** pinion oil seal installer, install the pinion flange seal.
20. Using the correct sealant, apply sealant to the splines of the pinion yoke. Refer to [**Adhesives, Fluids, Lubricants, and Sealers**](#).

21. Install the pinion gear, with the inner pinion bearing an the new collapsible spacer, into the left differential carrier case half.

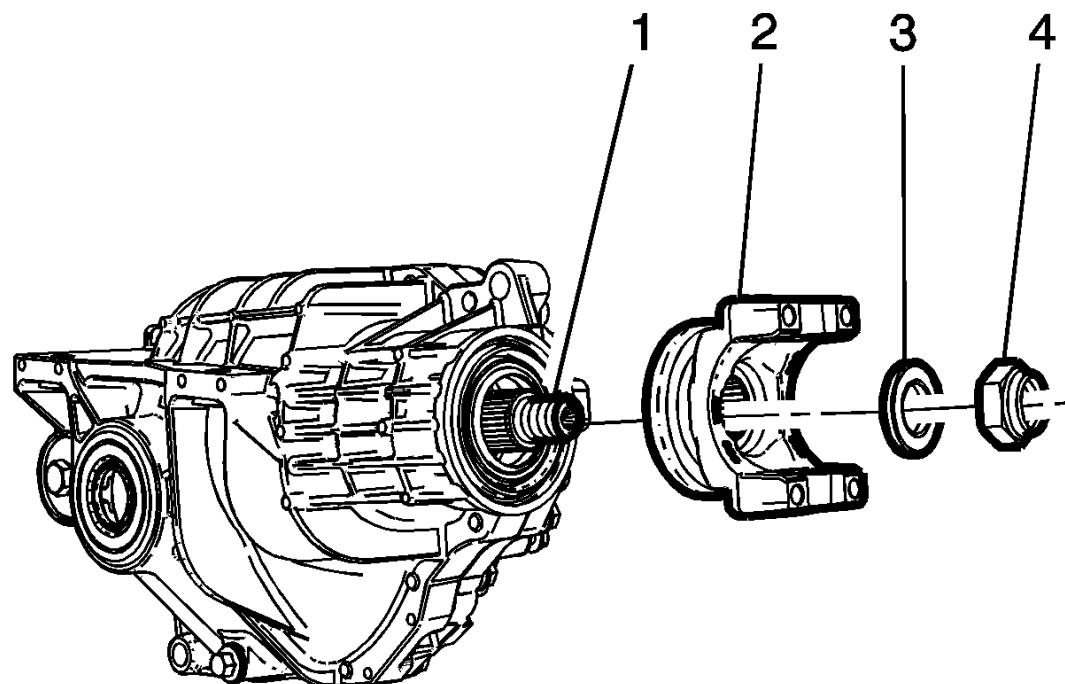


Fig. 316: Pinion Flange/Yoke Assembly Components

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Pinion Flange/Yoke Installation Caution .

22. Position the pinion flange/yoke assembly (2) on the pinion shaft (1).

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

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

29. Using the **J-8614-01** flange and pulley holding tool, tighten the pinion nut until the pinion end play is just taken up. Rotating the pinion while tightening the nut will seat the bearings.
30. Remove the **J-8614-01** flange and pulley holding tool.
31. Using an inch pound torque wrench, measure the rotating torque of the pinion, which should be 1.0-2.3 N.m (10-20 lb in) for used bearings, 1.7-3.4 N.m (15-30 lb in) for new bearings.
32. If the rotating torque measurement is below 1.0 N.m (10 lb in) for used bearings, or 1.7 N.m (15 lb in) for new bearings, reinstall the **J-8614-01** flange and pulley holding tool and continue to tighten the pinion nut, which should be 1.0-2.3 N.m (10-20 lb in) for used bearings, 1.7-3.4 N.m (15-30 lb in) for new bearings.
33. Once the specified torque is obtained, rotate the pinion several time to ensure the bearings have seated. Recheck the rotating torque and adjust if necessary.
34. Remove the **J-8614-01** flange and pulley holding tool.

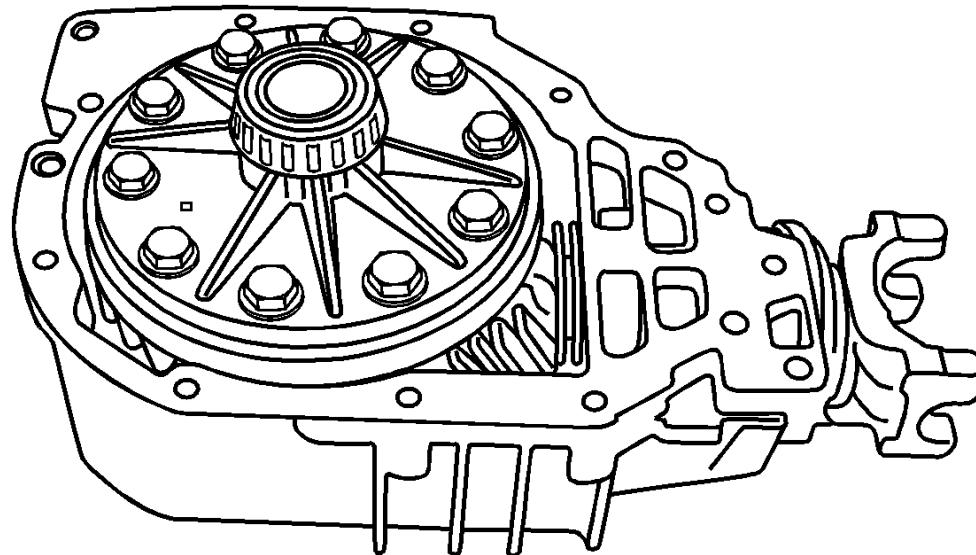


Fig. 317: View Of Differential Case Assembly & Carrier Case Half

Courtesy of GENERAL MOTORS COMPANY

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

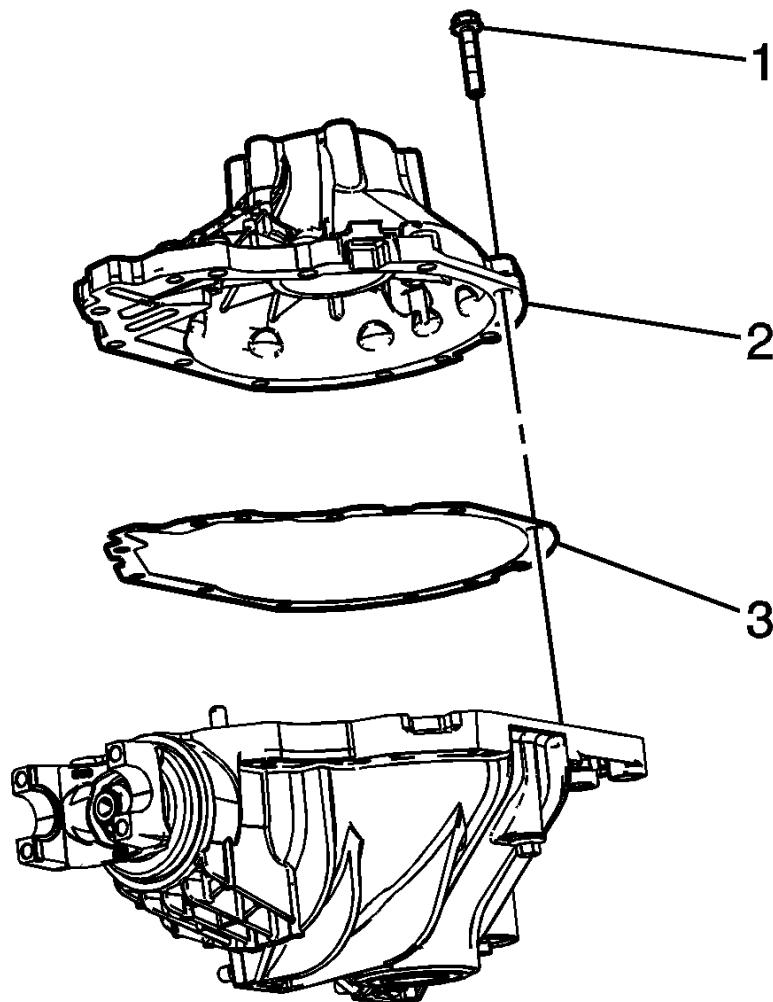


Fig. 318: View Of Differential Carrier Housing, Gasket & Bolts

Courtesy of GENERAL MOTORS COMPANY

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

36. Install the differential carrier case gasket (3).
37. Install the differential carrier case (2) half to the left differential carrier case half. If the carrier case halves do not make complete contact, use

the **J-36599-A** side bearing nut wrench in order to back out right differential adjuster nut sleeve until the differential carrier case halves make contact.

38. Install the differential carrier case bolts (1) and tighten to 73 N.m (54 lb ft).
39. Install the differential carrier assembly into a vise.
40. While rotating the pinion yoke back and forth, turn the right side differential adjuster nut clockwise using the **J-36599-A** side bearing nut wrench until 0.0254-0.072 mm (0.001-0.003 inch) of backlash can be felt between the ring gear and the drive pinion. If the backlash specification cannot be obtained, turn the left side differential adjuster nut sleeve counter clockwise using the **J-36599-A** side bearing nut wrench in small equal increments until the backlash specification can be obtained.

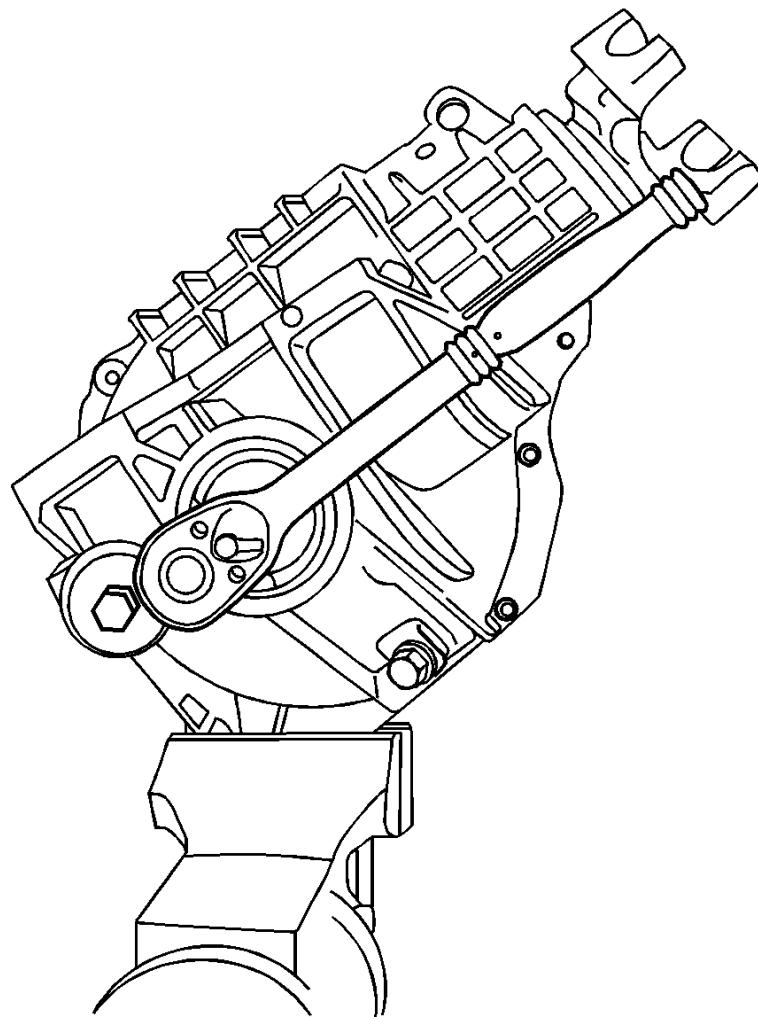


Fig. 319: Tightening Differential Adjuster Nut

Courtesy of GENERAL MOTORS COMPANY

41. Using the **J-36599-A** side bearing nut wrench turn the left side differential adjuster nut clockwise in order to preload the differential side bearings against the differential side bearings cups and tighten the adjuster nut to 75 N.m (55 lb ft).
42. Rotate the pinion several times in order to seat the pinion and differential side bearings.
43. Using an inch-pound torque wrench, measure the rotating torque of the drive pinion and differential assembly, which should be 0.57-1.13 N.m

- (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.
44. If the rotating torque of the drive pinion and differential assembly is not 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion, adjust the differential side bearing preload using the following steps:
1. Place an alignment mark between the differential adjuster nut sleeve and the differential carrier case, left and right sides.
 2. Using the **J-36599-A** side bearing nut wrench, turn the left and right side differential adjuster sleeves in or clockwise in small equal increments.
 3. Using an inch pound torque wrench, measure the rotating torque of the pinion and differential assembly.
 4. Compare the new measurement to the specification listed in Step 22. If the rotating torque of the pinion and differential assembly is not within specifications, continue to tighten the left and right side differential adjuster nut sleeves in small equal increments on each side until the rotating torque of the pinion and differential assembly is within specifications.
45. If the rotating torque of the drive pinion and differential assembly is more than 1.13 N.m (10 lb in) above the rotating torque of the drive pinion measurement, adjust the differential side bearing preload using the following steps:
1. Place an alignment mark between the differential adjuster nut sleeve and the differential carrier case, left and right sides.
 2. Using the **J-36599-A** side bearing nut wrench or the **J-36615** side bearing nut wrench, turn the left and right side differential adjuster nut sleeve out or clockwise in small equal increments.
 3. Using a torque wrench, measure the rotating torque of the pinion and differential assembly.
 4. Compare the new measurement to the specification listed in Step 22. If the rotating torque of the pinion and differential assembly is not within specifications, continue to loosen the left and right side differential adjuster nut sleeve in small equal increments on each side until the rotating torque of the pinion and differential assembly is within specifications.
46. Once the specified rotating is obtained, rotate the pinion several times to ensure the bearings have seated. Recheck the rotating torque and adjust if necessary.
47. Measure the drive pinion to the ring gear backlash and adjust, if necessary. Refer to [**Backlash Inspection and Adjustment \(8.25 Inch LD Axle\)**](#)
[**Backlash Inspection and Adjustment \(9.25 Inch HD Axle\)**](#).
48. Once the bearing preload and drive pinion to the ring gear backlash is within specifications, perform a gear tooth contact pattern check to ensure proper contact between the pinion and the ring gear. Refer to [**Gear Tooth Contact Pattern Inspection**](#).

DIFFERENTIAL CASE REPLACEMENT

Special Tools

- **J-22912-B** Split-Plate Bearing Puller
- **J-2619-01** Slide Hammer
- **J-29369-1** Bushing and Bearing Remover

- **J-34011** Pilot Bearing Remover
- **J-36598** Holding Fixture
- **J-36614** Inner Pinion Bearing Installer
- **J-45765** Pinion Remover
- **J-45858** Front Axle Bearing Race Remover/Installer
- **J 8614-01** Flange and Pulley Holding Tool
- **J-8107-2** Side Bearing Puller Pilot
- **J-22888-D** Side Bearing Remover Kit
- **GE-8092** Driver Handle
- **J-22761** Differential Side Bearing Installer

Inspection Procedure

Perform the following before disassembling the axle:

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

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

4. Check the ring gear backlash. Refer to **Backlash Inspection and Adjustment (8.25 Inch LD Axle)**
Backlash Inspection and Adjustment (9.25 Inch HD Axle).

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

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

Removal Procedure

1. Install the differential carrier assembly in a vise.

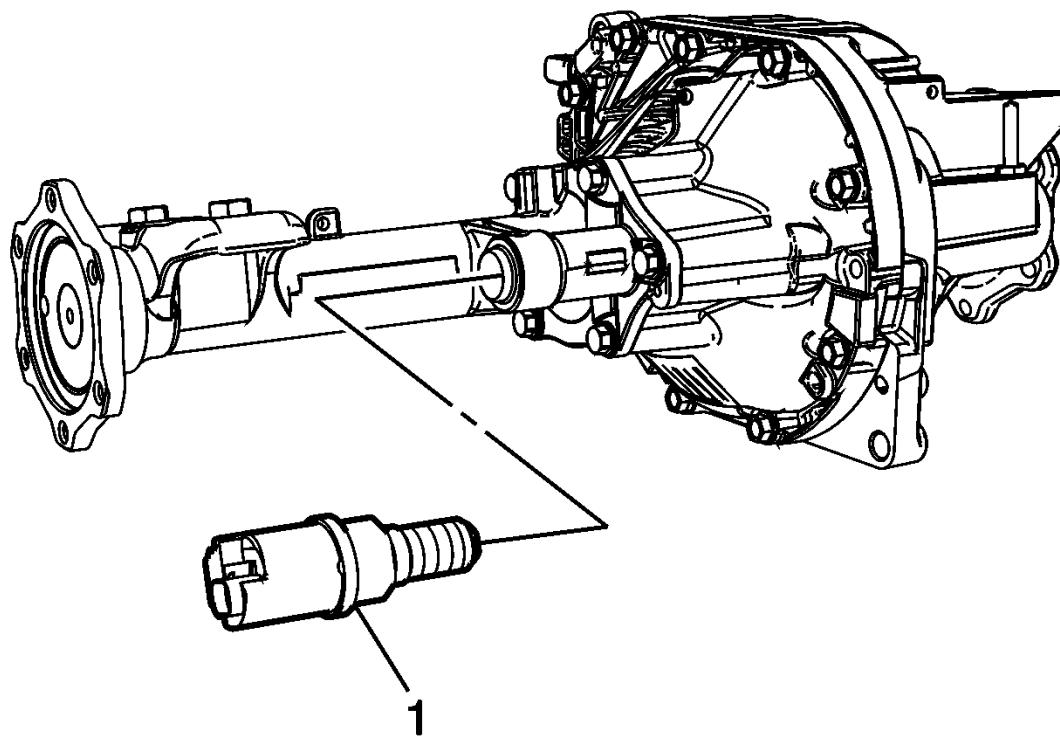


Fig. 320: Front Axle Actuator

Courtesy of GENERAL MOTORS COMPANY

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

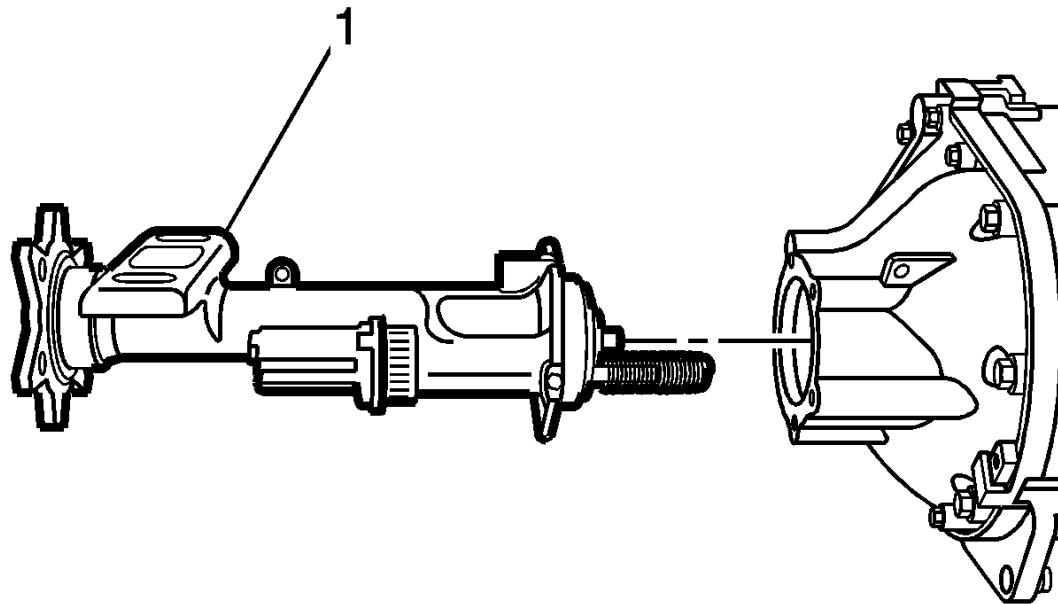


Fig. 321: Inner Axle Shaft Housing Assembly

Courtesy of GENERAL MOTORS COMPANY

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

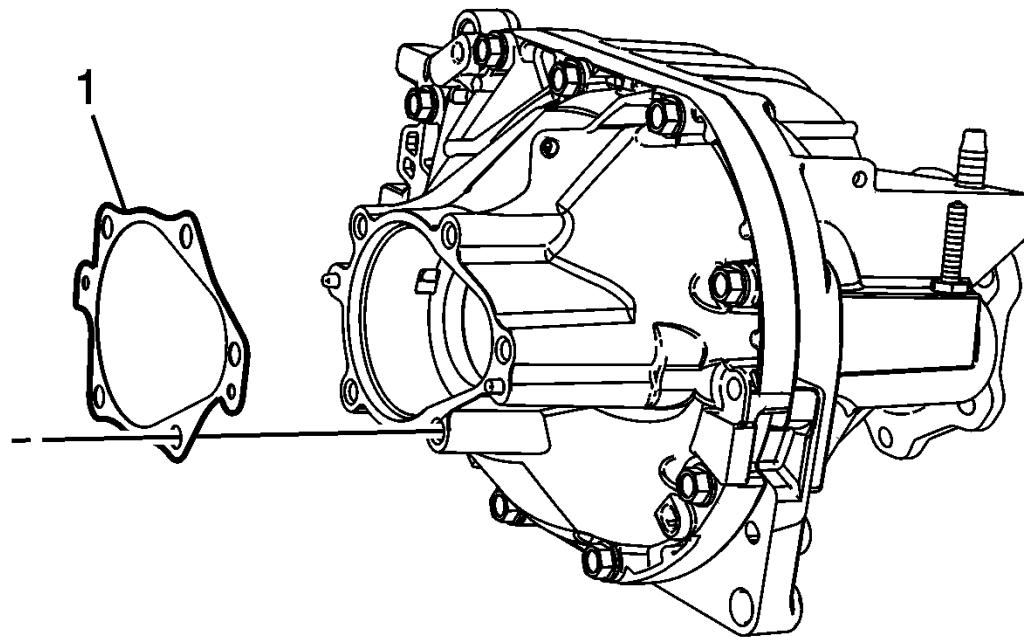


Fig. 322: Inner Axle Housing To Differential Carrier Gasket

Courtesy of GENERAL MOTORS COMPANY

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

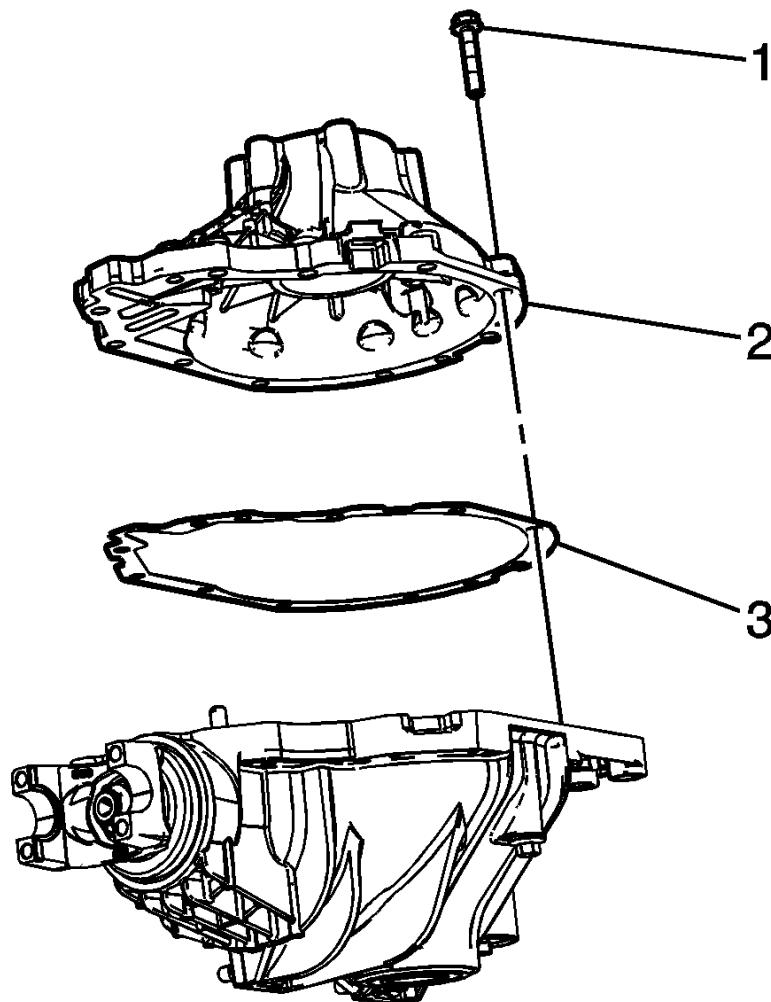


Fig. 323: View Of Differential Carrier Housing, Gasket & Bolts

Courtesy of GENERAL MOTORS COMPANY

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

10. Remove the differential side bearing by performing the following steps:

1. Place the differential case in a vise.

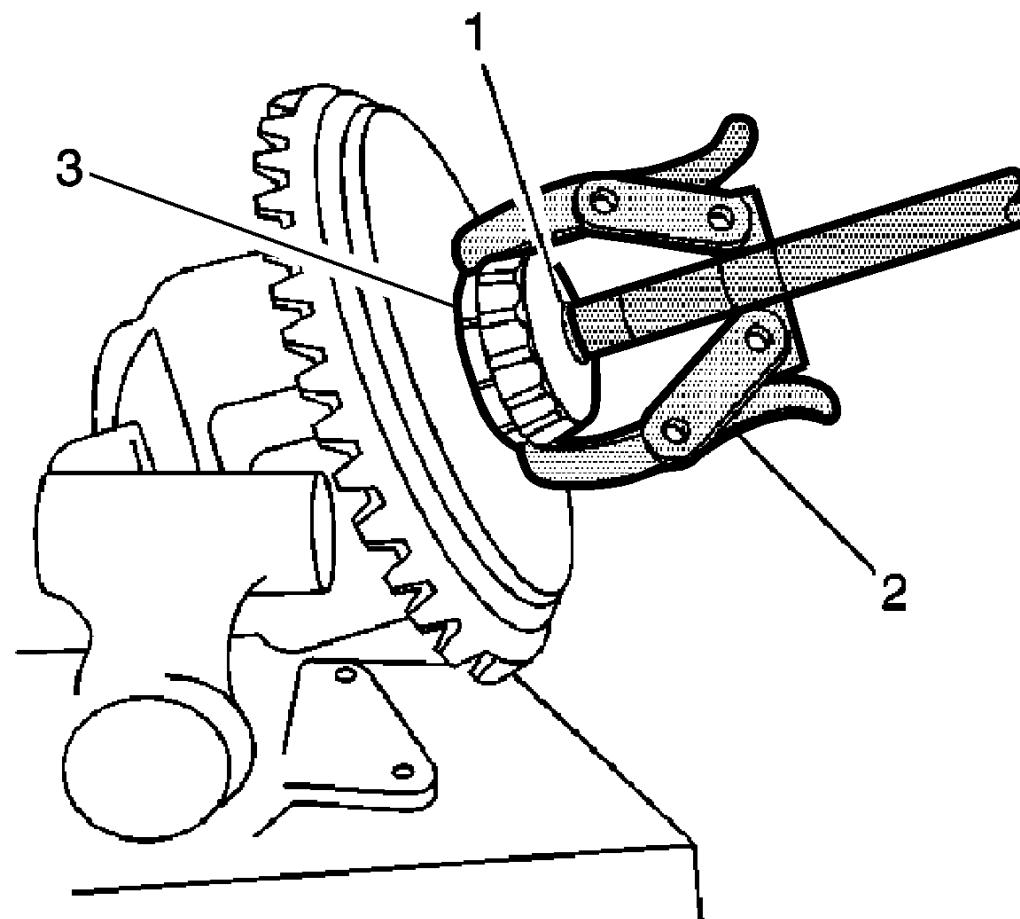


Fig. 324: View Of Differential Side Bearing
Courtesy of GENERAL MOTORS COMPANY

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

11. Remove the differential assembly from the vise.

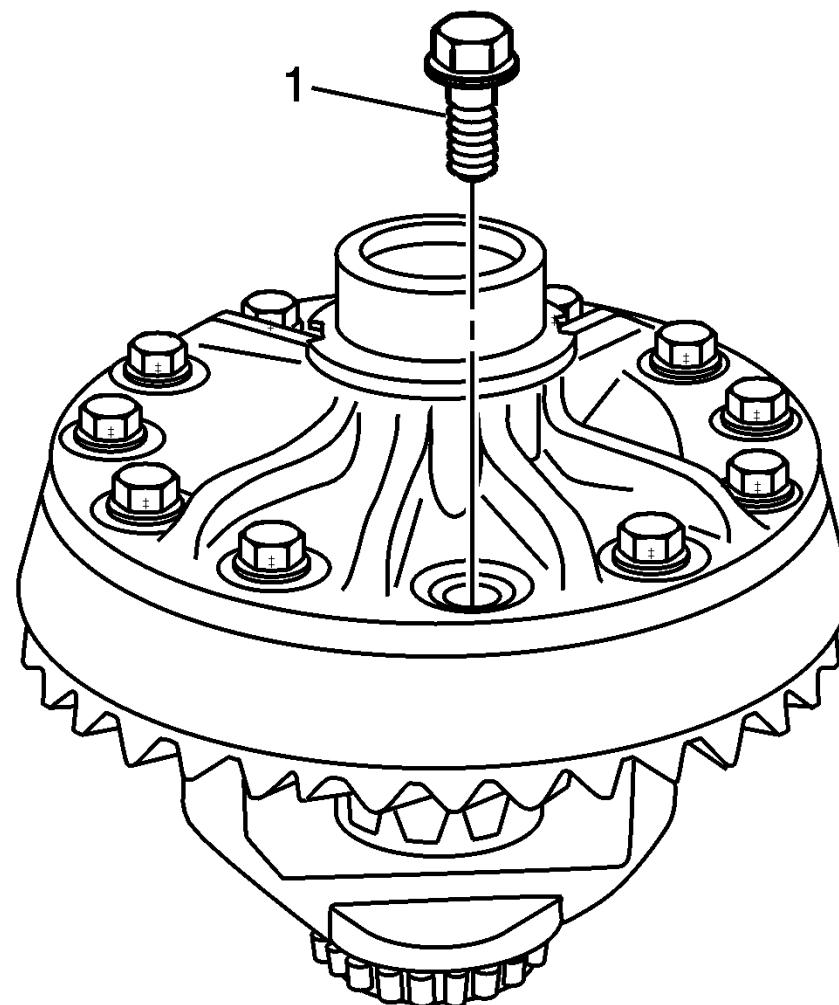


Fig. 325: Ring Gear Bolts Have Left-Hand Threads

Courtesy of GENERAL MOTORS COMPANY

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

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

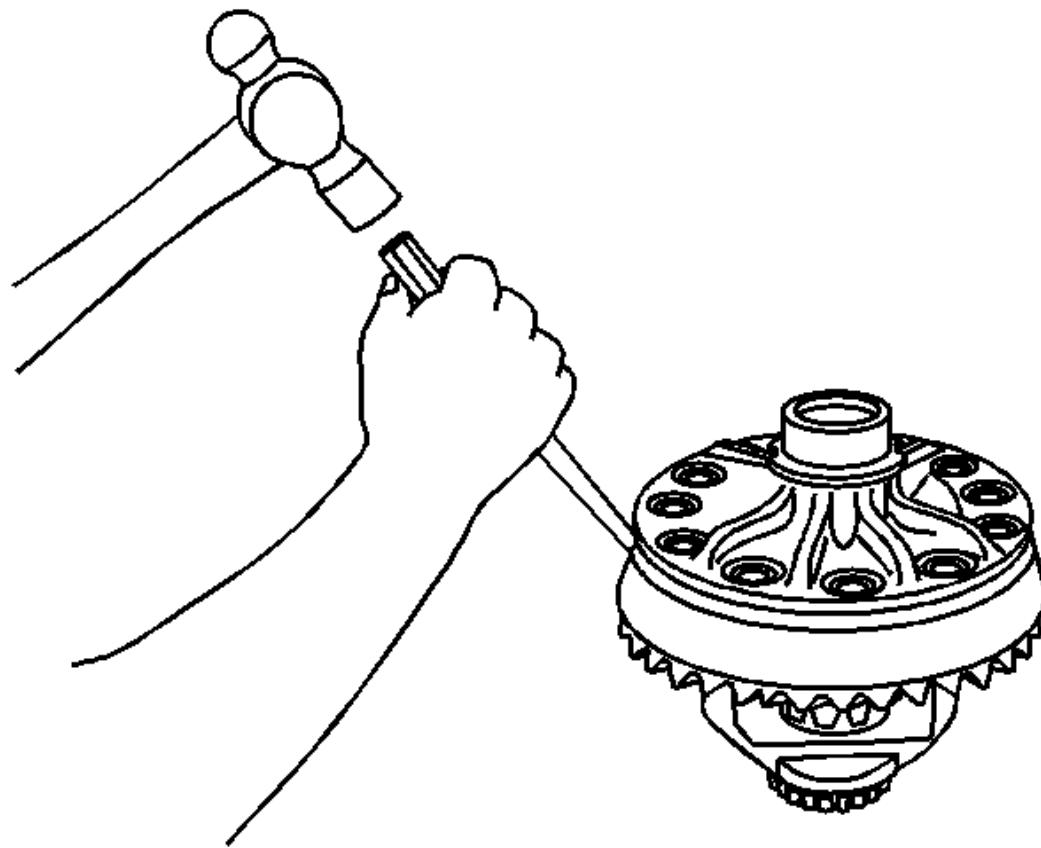


Fig. 326: Removing Ring Gear From Differential

Courtesy of GENERAL MOTORS COMPANY

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

13. Remove the ring gear from the differential case.

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

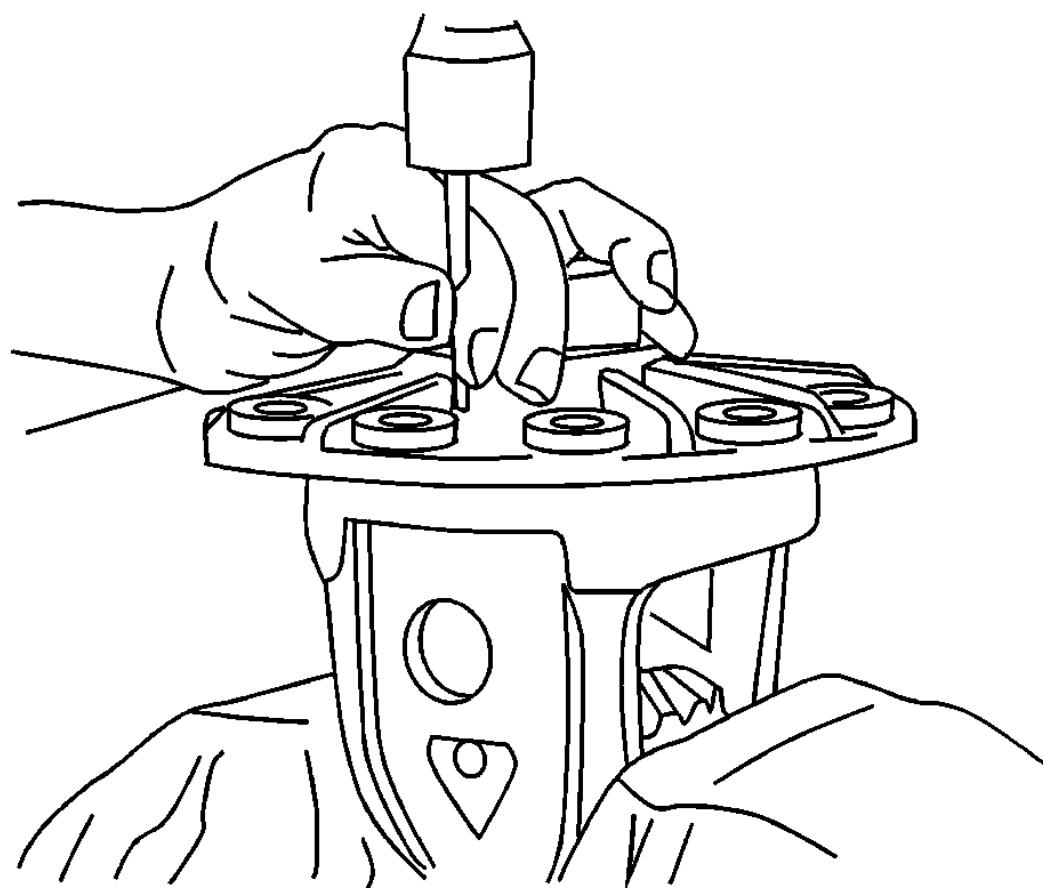


Fig. 327: Driving Out Pinion Shaft Pin
Courtesy of GENERAL MOTORS COMPANY

14. Remove the pinion shaft pin.

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

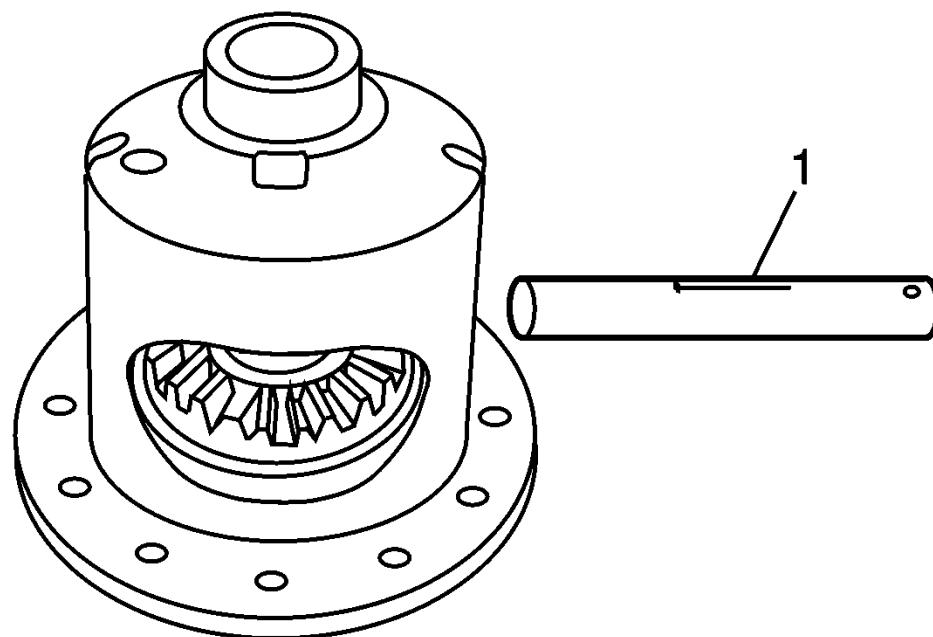


Fig. 328: Pinion Gear Shaft

Courtesy of GENERAL MOTORS COMPANY

15. Remove the pinion shaft (1).

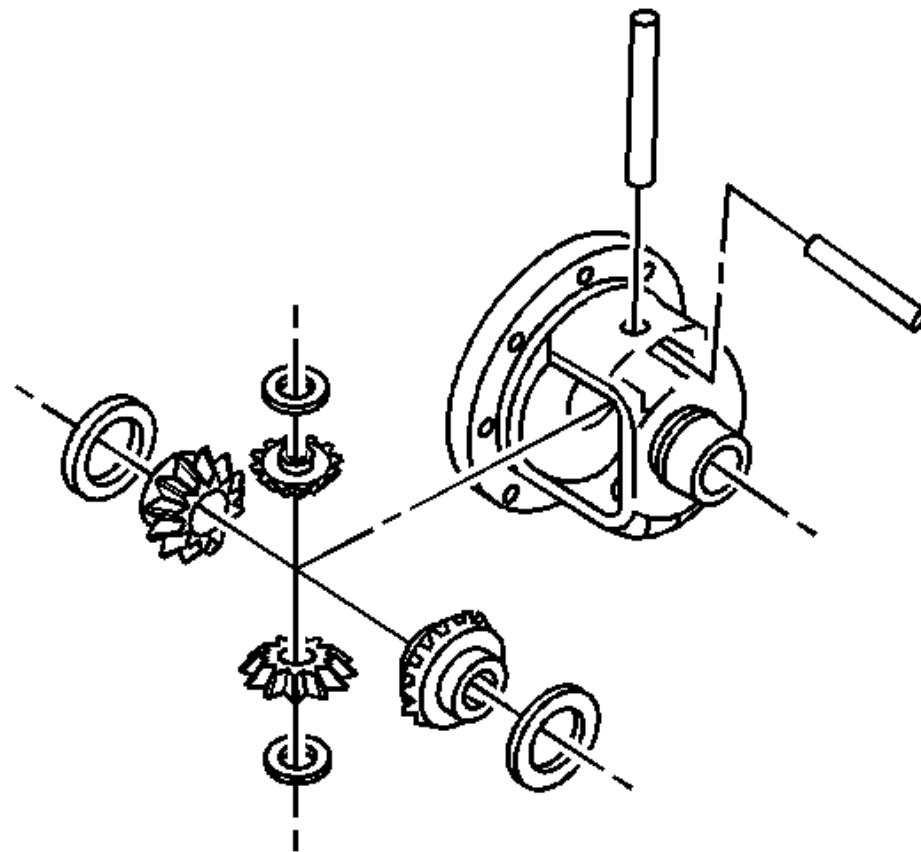


Fig. 329: Exploded View Of Differential Case

Courtesy of GENERAL MOTORS COMPANY

16. Remove the differential pinion gears and the differential side gears by performing the following steps:

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

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

Installation Procedure

1. Lubricate the pinion and side gears using axle lubricant. Use the correct fluid. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).

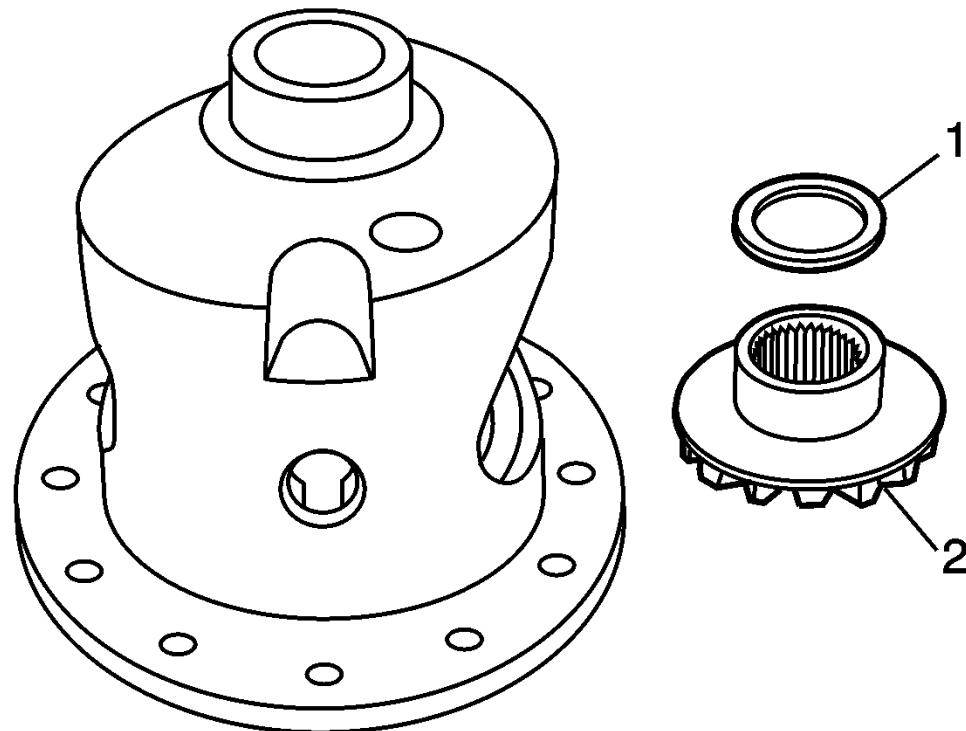


Fig. 330: Thrust Washers And Differential Side Gears

Courtesy of GENERAL MOTORS COMPANY

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

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

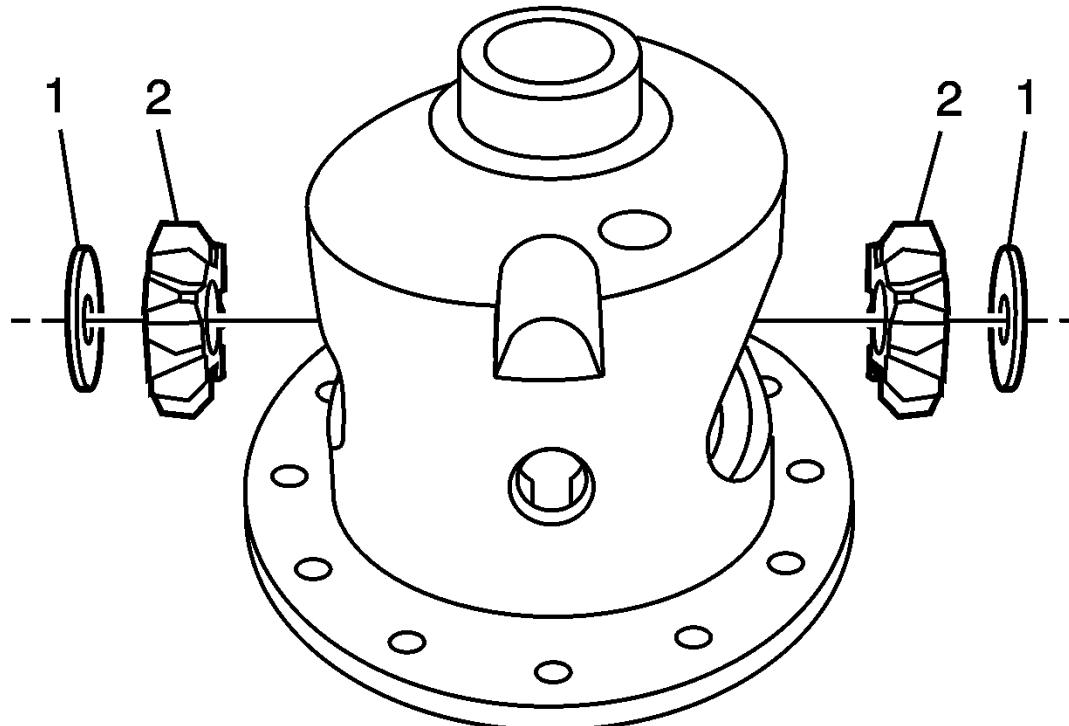


Fig. 331: Differential Pinion Gears

Courtesy of GENERAL MOTORS COMPANY

3. Install the differential pinion gears (2) by performing the following steps:

1. Position both pinion gears between the differential side gears directly opposite of each other.
2. Rotate the differential side gears until the pinion gears are opposite the opening in the differential case in line with the pinion shaft

opening.

4. Install the thrust washers (1).

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

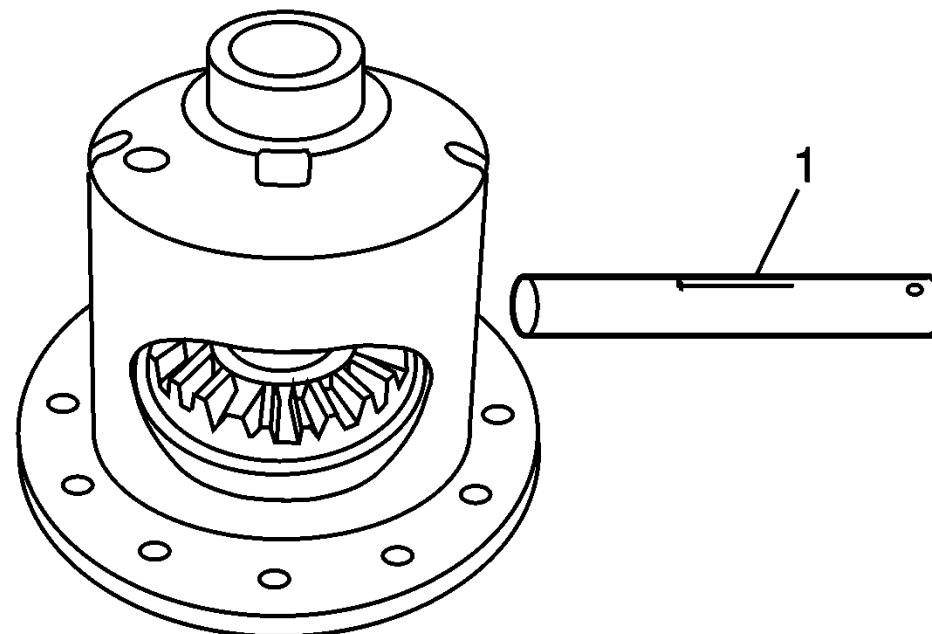


Fig. 332: Pinion Gear Shaft

Courtesy of GENERAL MOTORS COMPANY

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

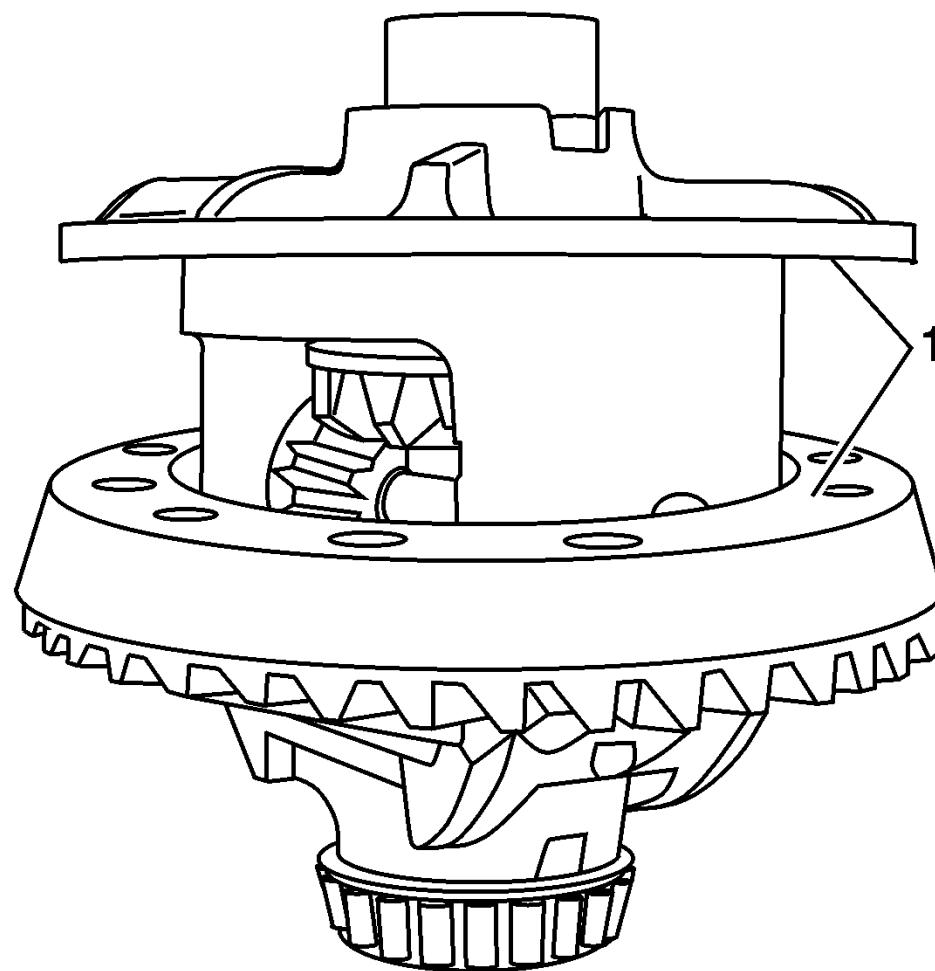


Fig. 333: Mating Surfaces Of Ring Gear And Differential Case

Courtesy of GENERAL MOTORS COMPANY

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

7. Install the ring gear onto the differential case.

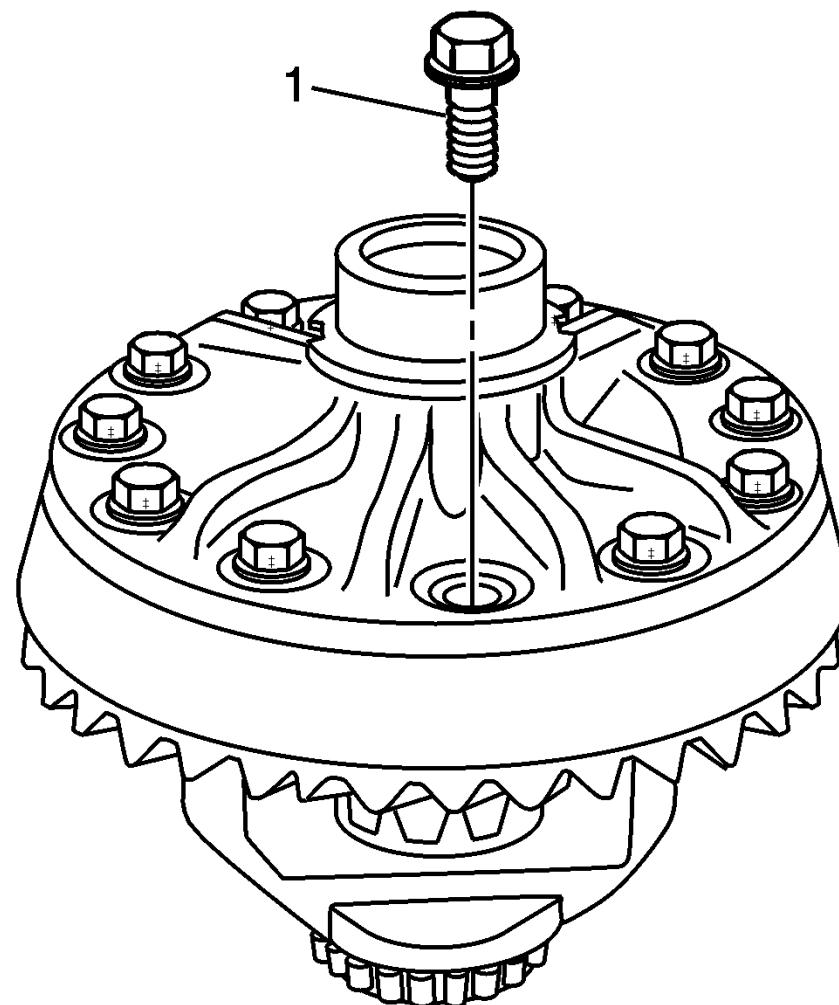


Fig. 334: Ring Gear Bolts Have Left-Hand Threads

Courtesy of GENERAL MOTORS COMPANY

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

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

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

CAUTION: Refer to Fastener Caution .

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

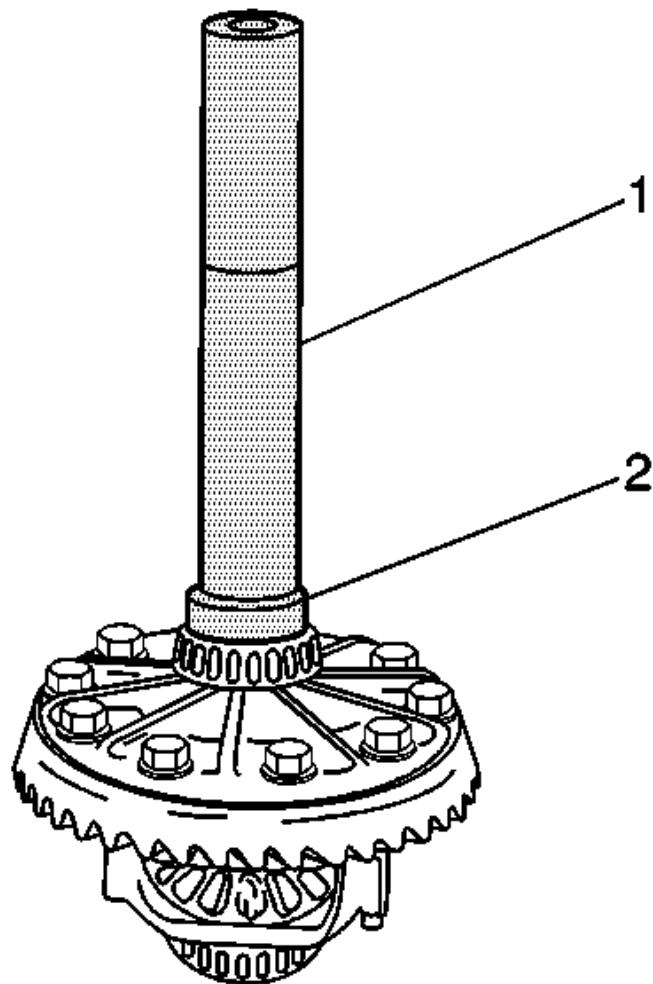


Fig. 335: Differential Side Bearing

Courtesy of GENERAL MOTORS COMPANY

10. Install the differential side bearings by performing the following steps:

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

11. Install the differential case assembly.

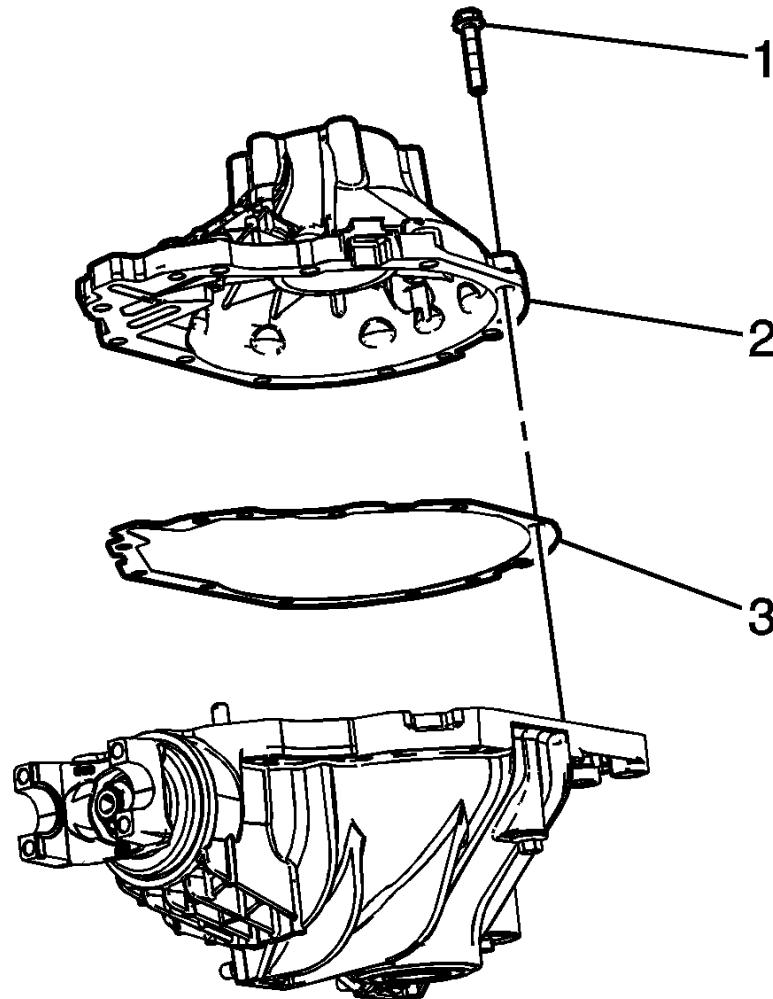


Fig. 336: View Of Differential Carrier Housing, Gasket & Bolts

Courtesy of GENERAL MOTORS COMPANY

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

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

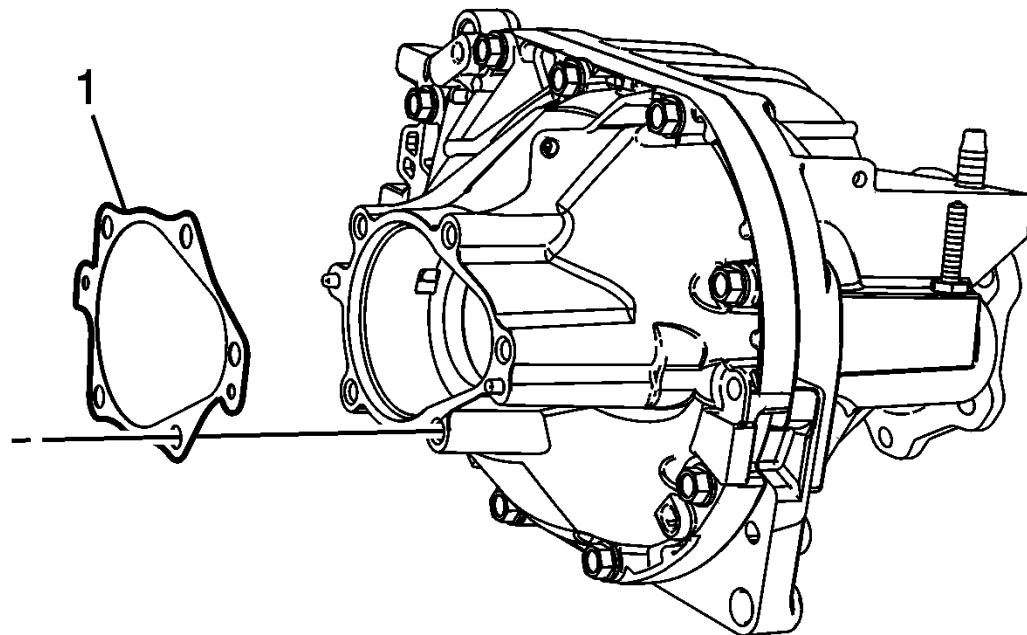


Fig. 337: Inner Axle Housing To Differential Carrier Gasket

Courtesy of GENERAL MOTORS COMPANY

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

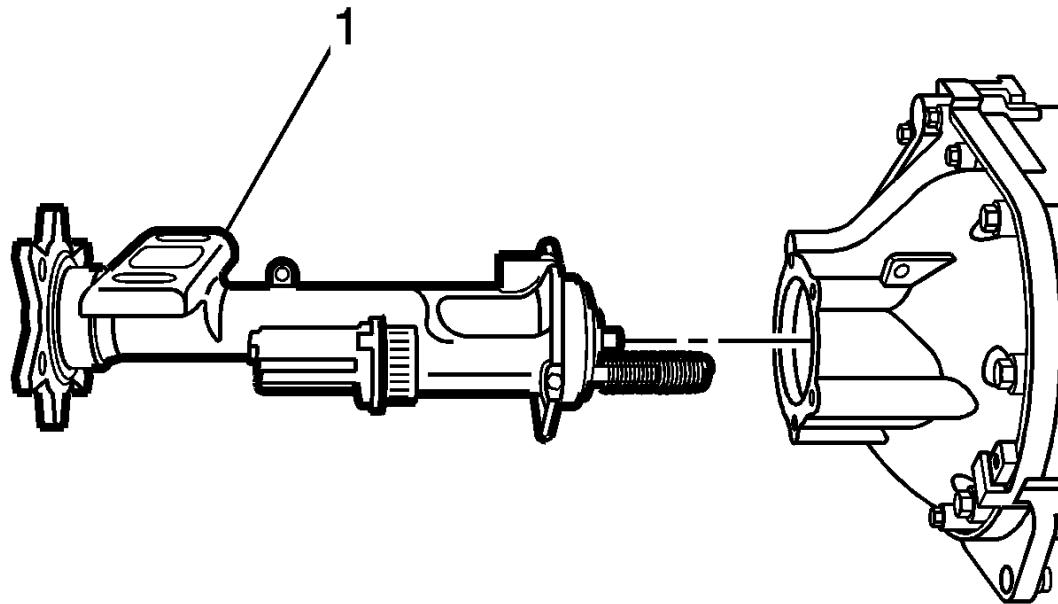


Fig. 338: Inner Axle Shaft Housing Assembly

Courtesy of GENERAL MOTORS COMPANY

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

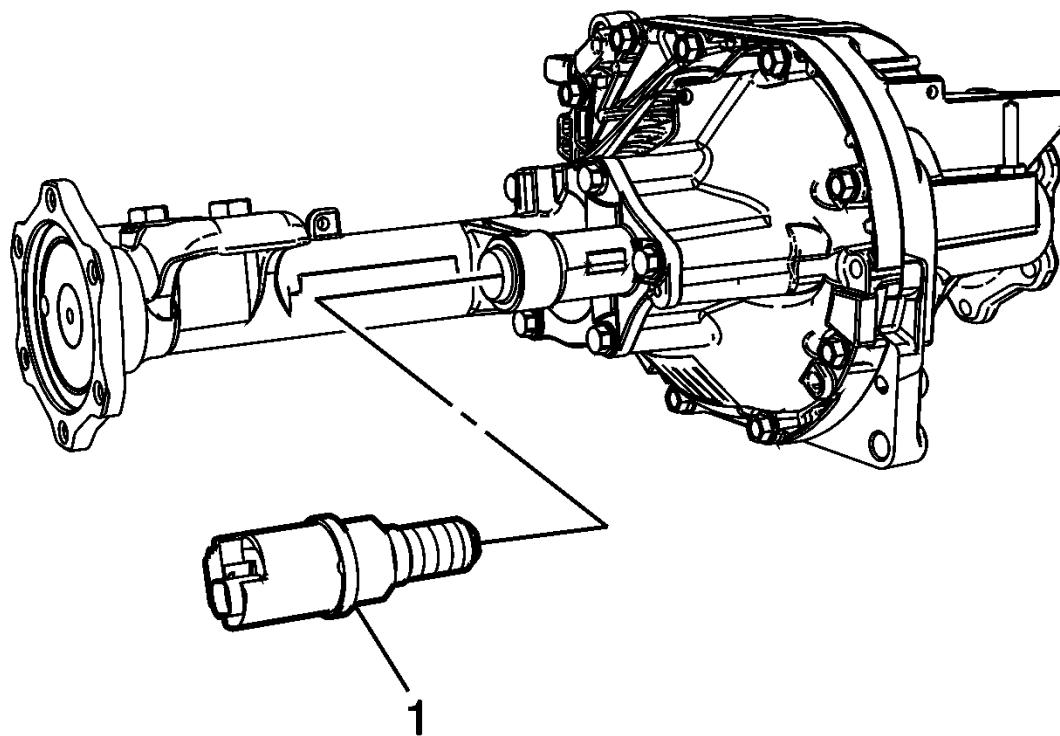


Fig. 339: Front Axle Actuator

Courtesy of GENERAL MOTORS COMPANY

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

FRONT DIFFERENTIAL CASE DISASSEMBLE (8.25 INCH LD AXLE)

Special Tools

- **J-8107-2** Side Bearing Puller Pilot
- **J-22888-D** Side Bearing Remover Kit

For equivalent regional tools, refer to [**Special Tools**](#).

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

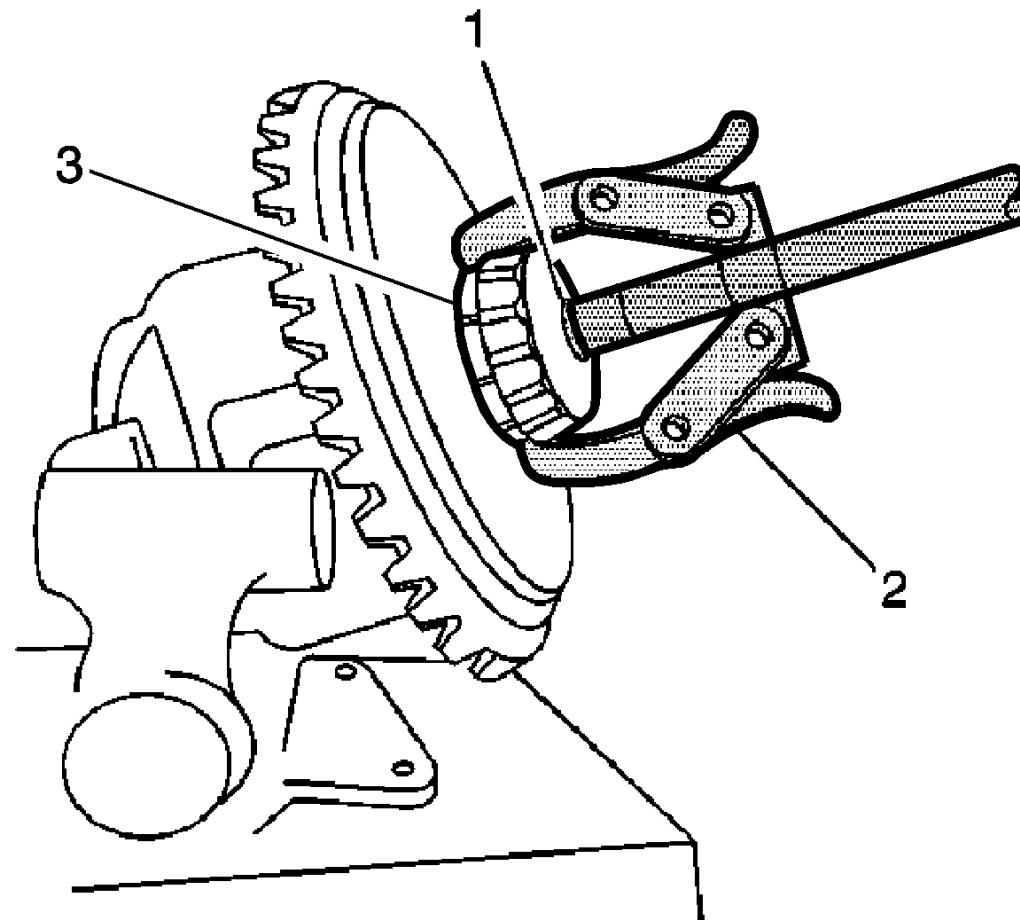


Fig. 340: View Of Differential Side Bearing

Courtesy of GENERAL MOTORS COMPANY

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

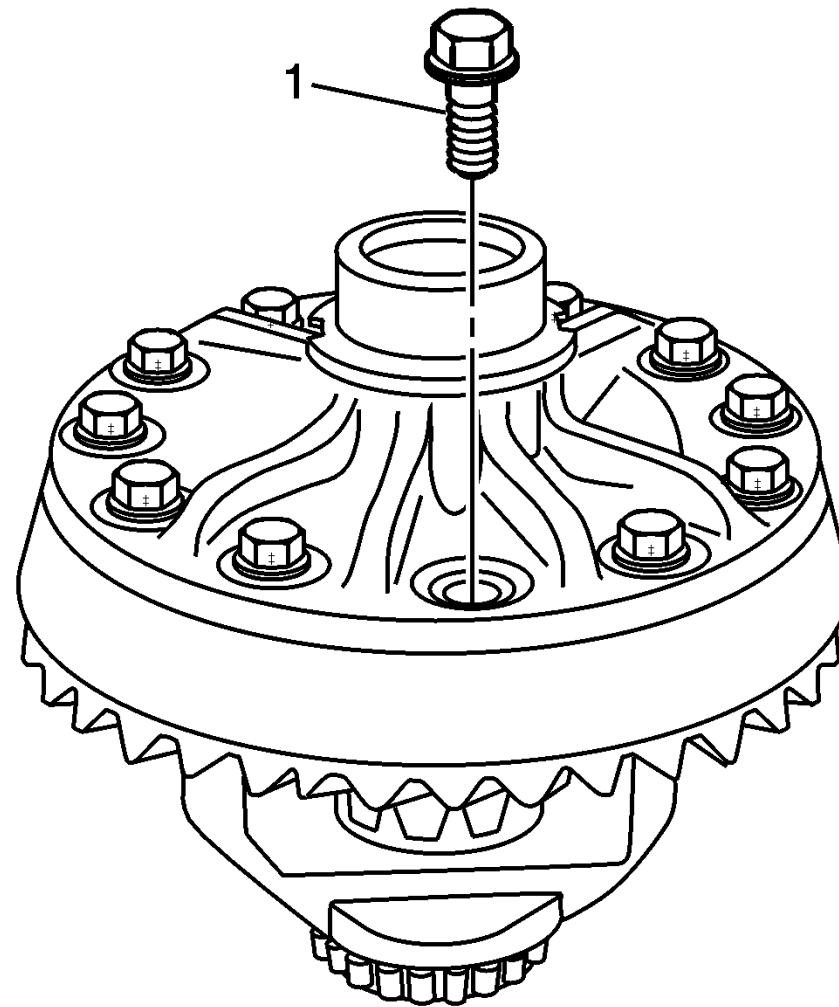


Fig. 341: Ring Gear Bolts Have Left-Hand Threads

Courtesy of GENERAL MOTORS COMPANY

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

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

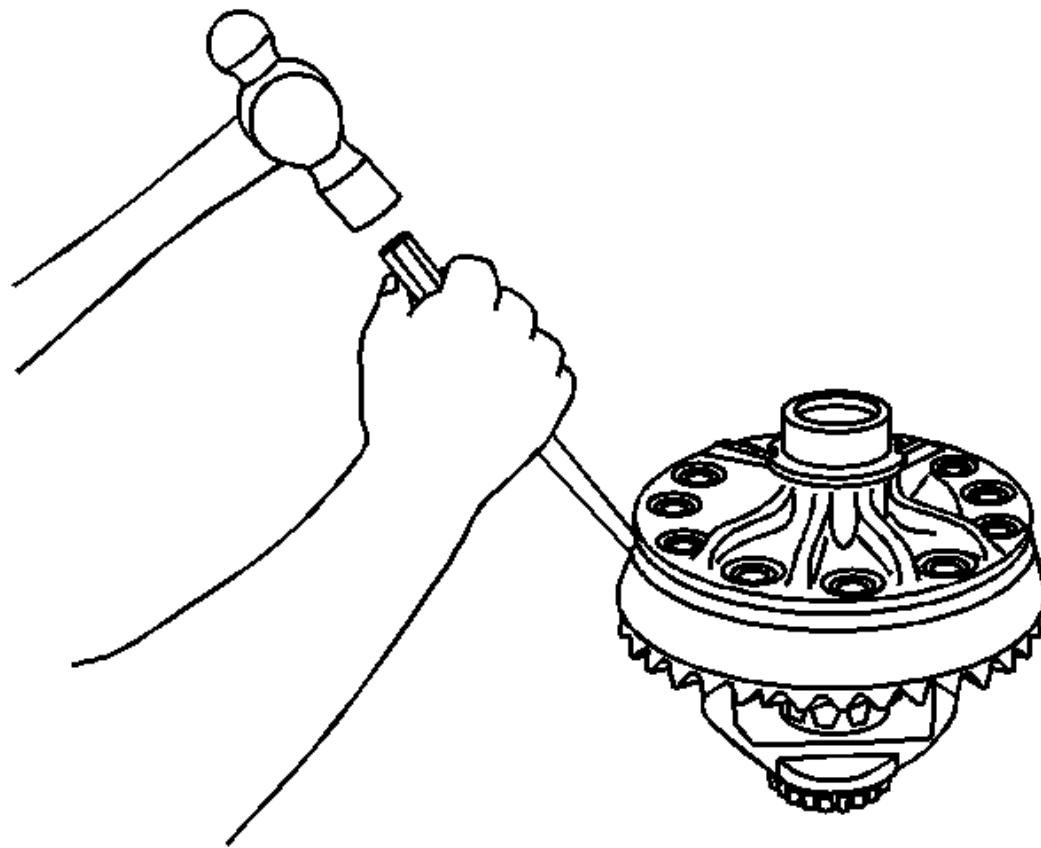


Fig. 342: Removing Ring Gear From Differential

Courtesy of GENERAL MOTORS COMPANY

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

4. Remove the ring gear from the differential case.

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

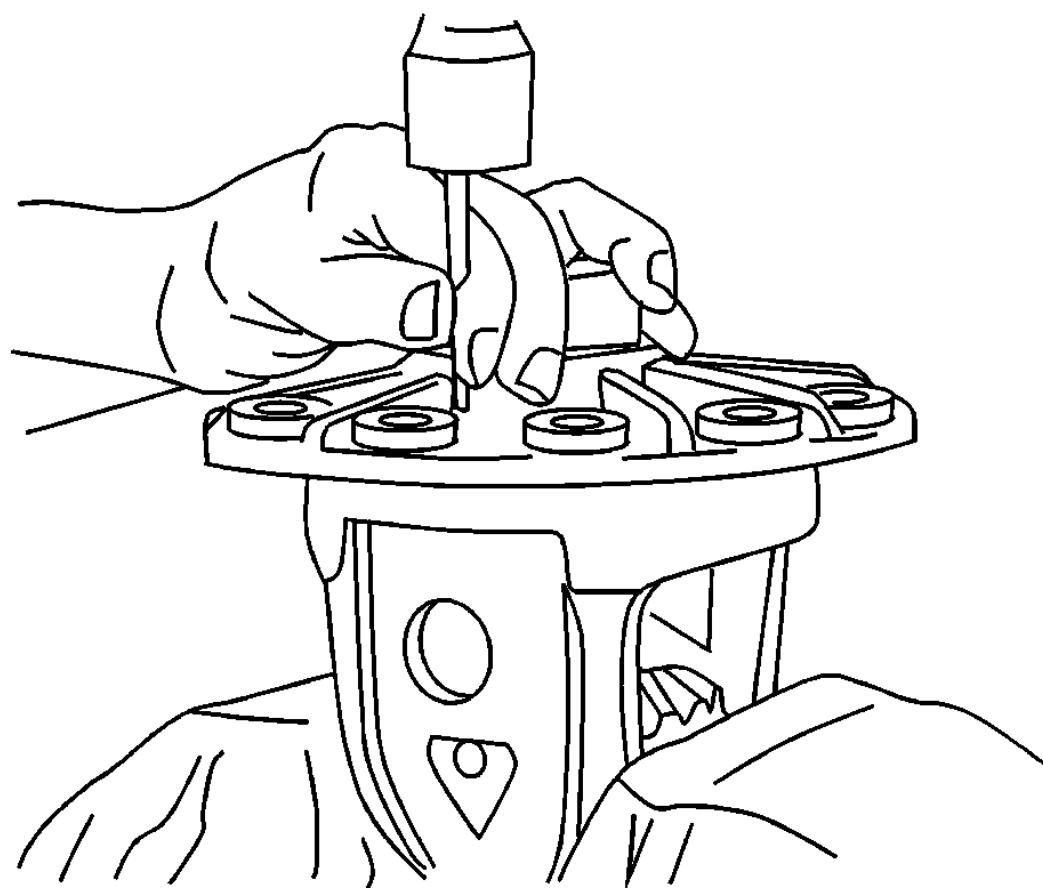


Fig. 343: Driving Out Pinion Shaft Pin
Courtesy of GENERAL MOTORS COMPANY

5. Remove the pinion shaft pin.

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

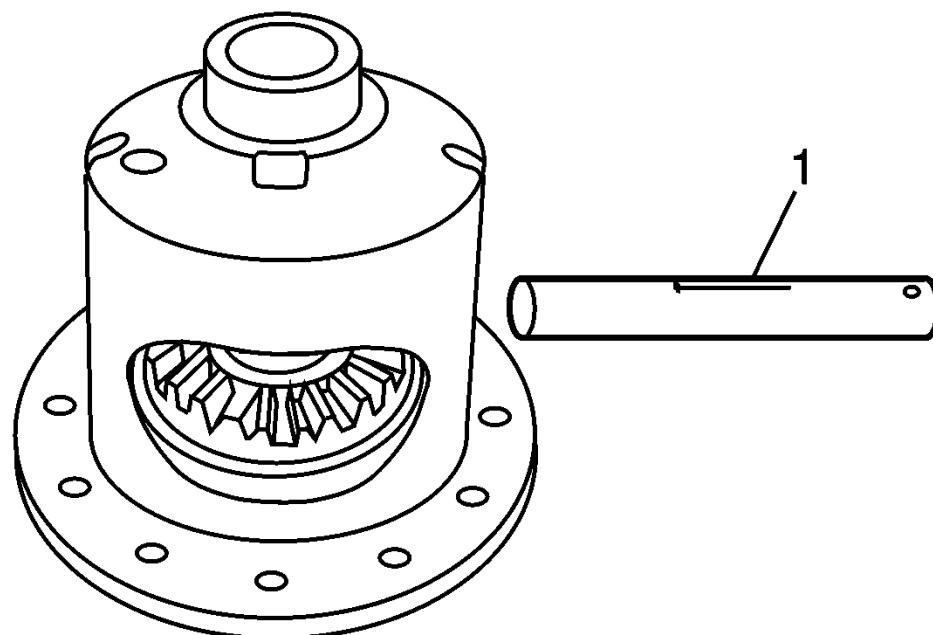


Fig. 344: Pinion Gear Shaft

Courtesy of GENERAL MOTORS COMPANY

6. Remove the pinion shaft (1).

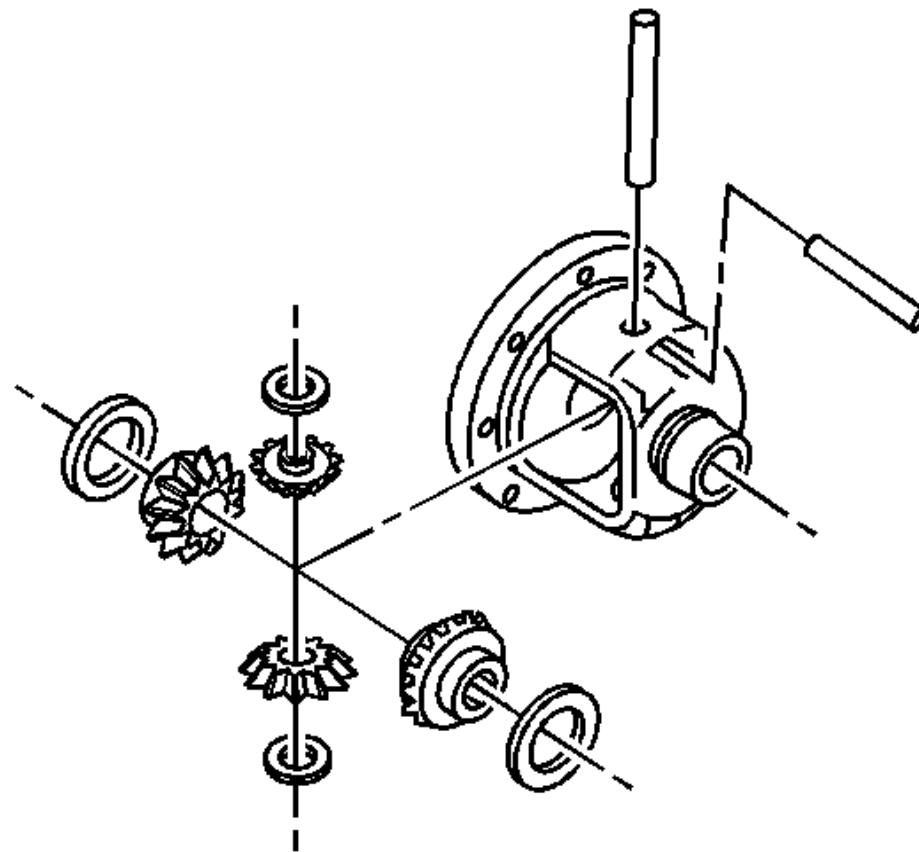


Fig. 345: Exploded View Of Differential Case

Courtesy of GENERAL MOTORS COMPANY

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

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

FRONT DIFFERENTIAL CASE DISASSEMBLE (9.25 INCH HD AXLE)

Special Tools

- **J-22888-D** Side Bearing Remover Kit
- **J-36597** Side Bearing Puller Pilot - 9.25 in Axle

1. Remove the differential side bearing by performing the following steps:

1. Place the differential case in a vise.

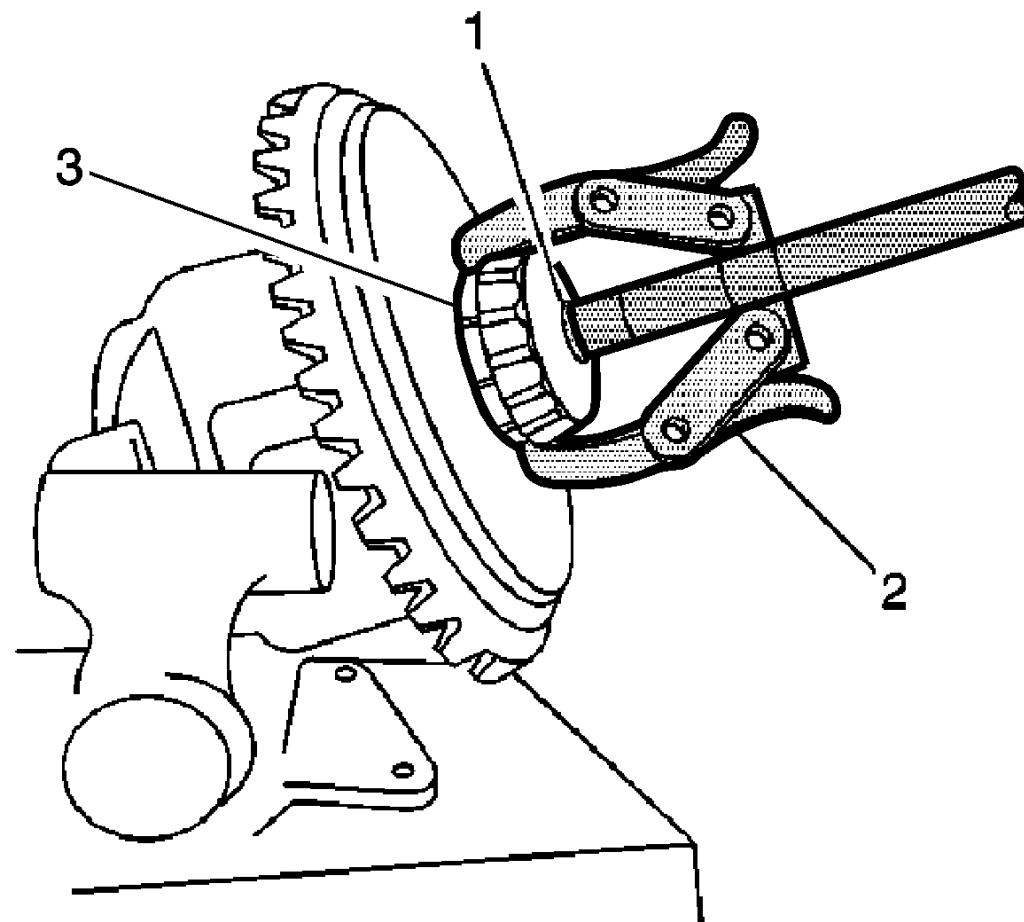


Fig. 346: View Of Differential Side Bearing

Courtesy of GENERAL MOTORS COMPANY

2. Install the J-22888-20A (2) and the **J-36597** side bearing puller pilot (1) as shown.
3. Remove the differential side bearings using the J-22888-20A.
2. Remove the differential assembly from the vise.

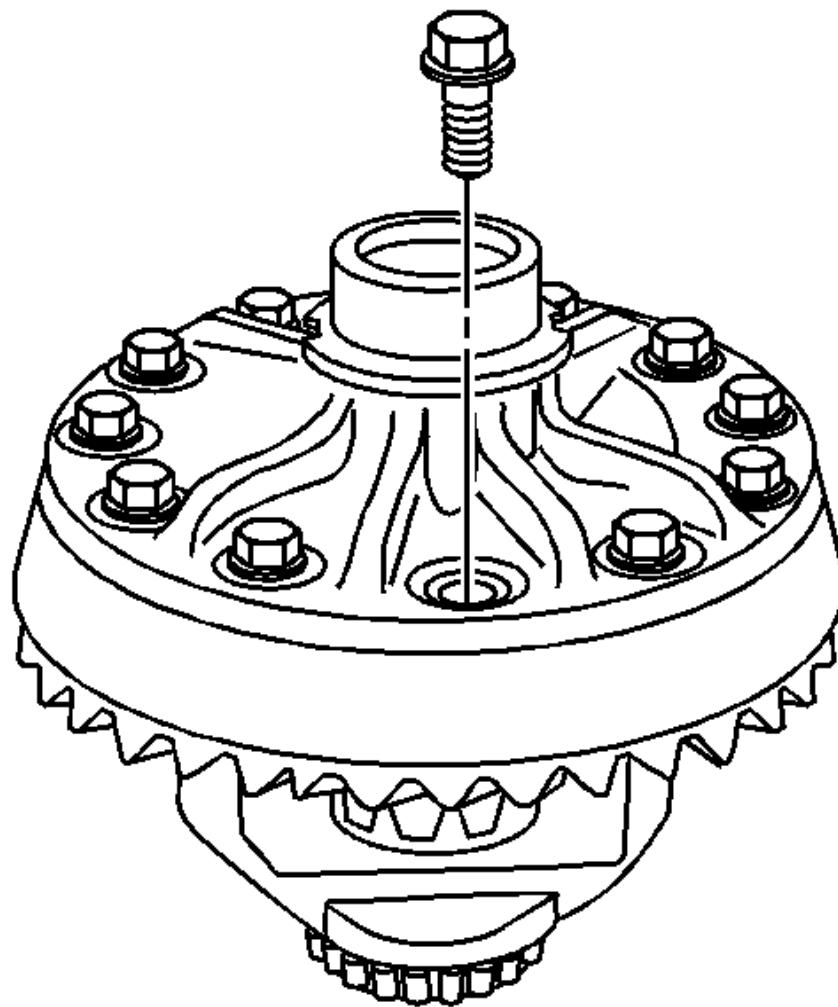


Fig. 347: Identifying Ring Gear Bolts

Courtesy of GENERAL MOTORS COMPANY

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

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

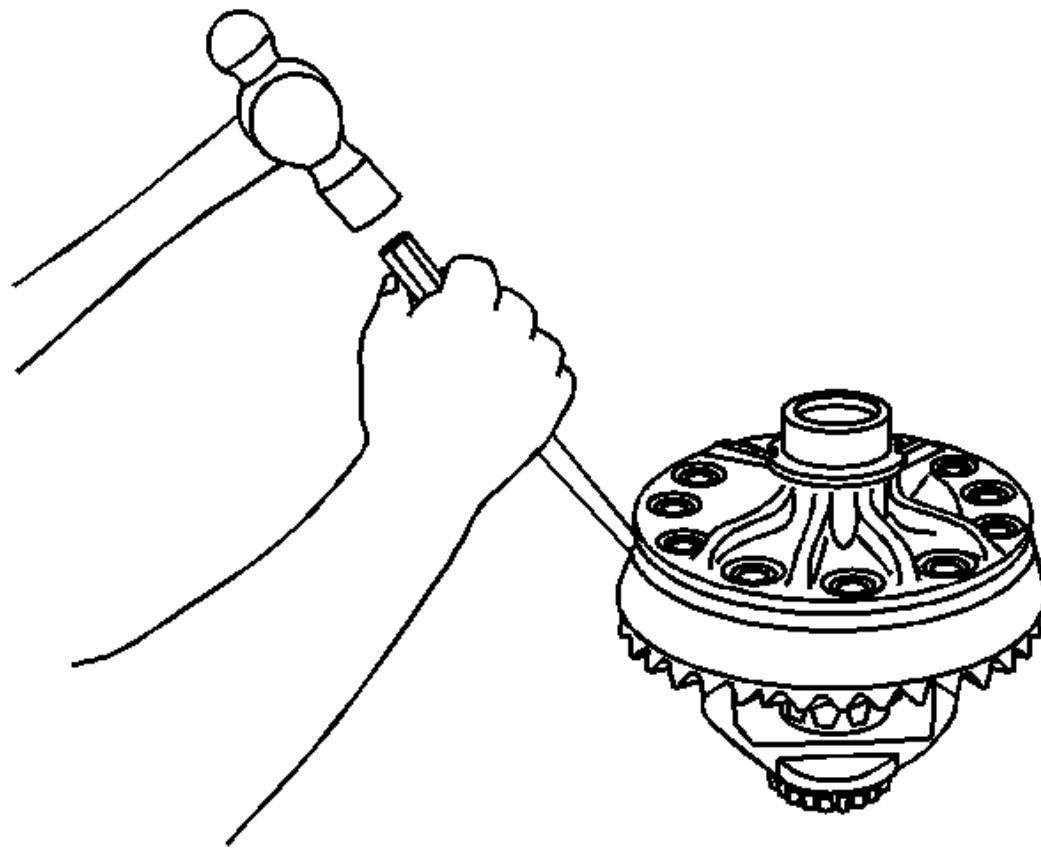


Fig. 348: Removing Ring Gear From Differential

Courtesy of GENERAL MOTORS COMPANY

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

4. Remove the ring gear from the differential case.

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

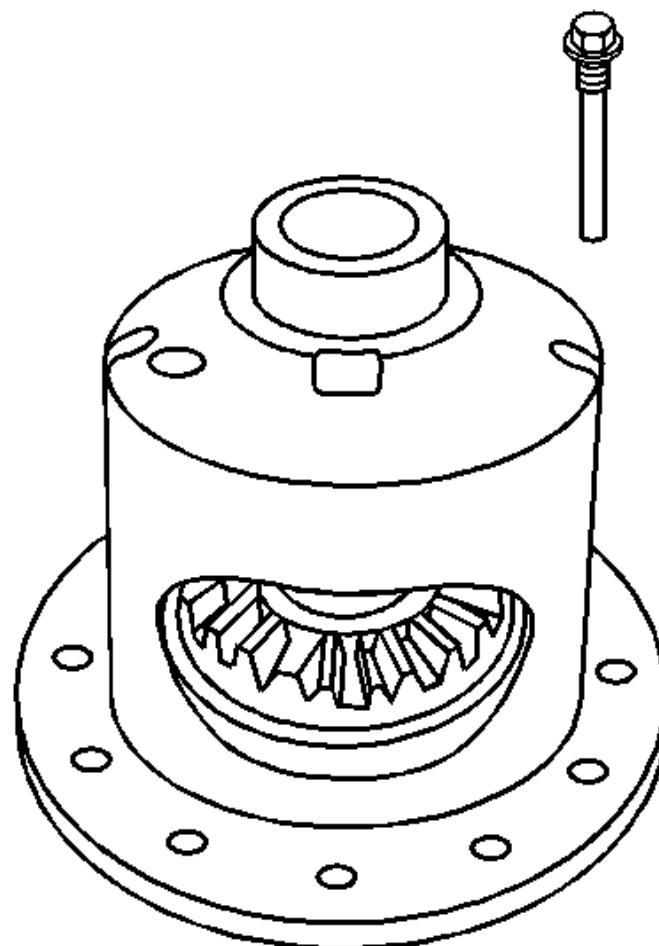


Fig. 349: View Of Pinion Shaft Lock Bolt

Courtesy of GENERAL MOTORS COMPANY

5. Remove the pinion shaft lock bolt.

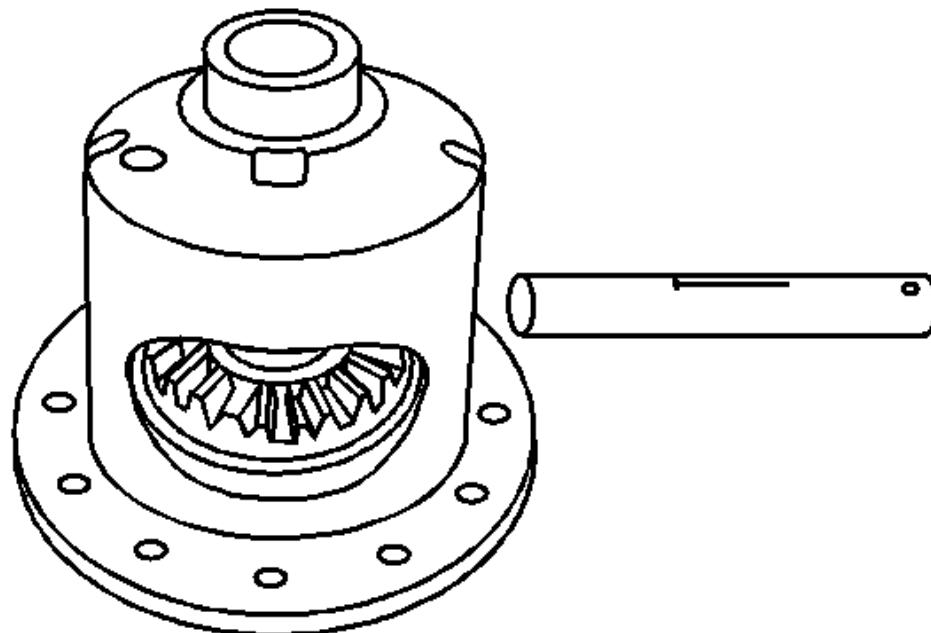


Fig. 350: View Of Differential And Pinion Shaft

Courtesy of GENERAL MOTORS COMPANY

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

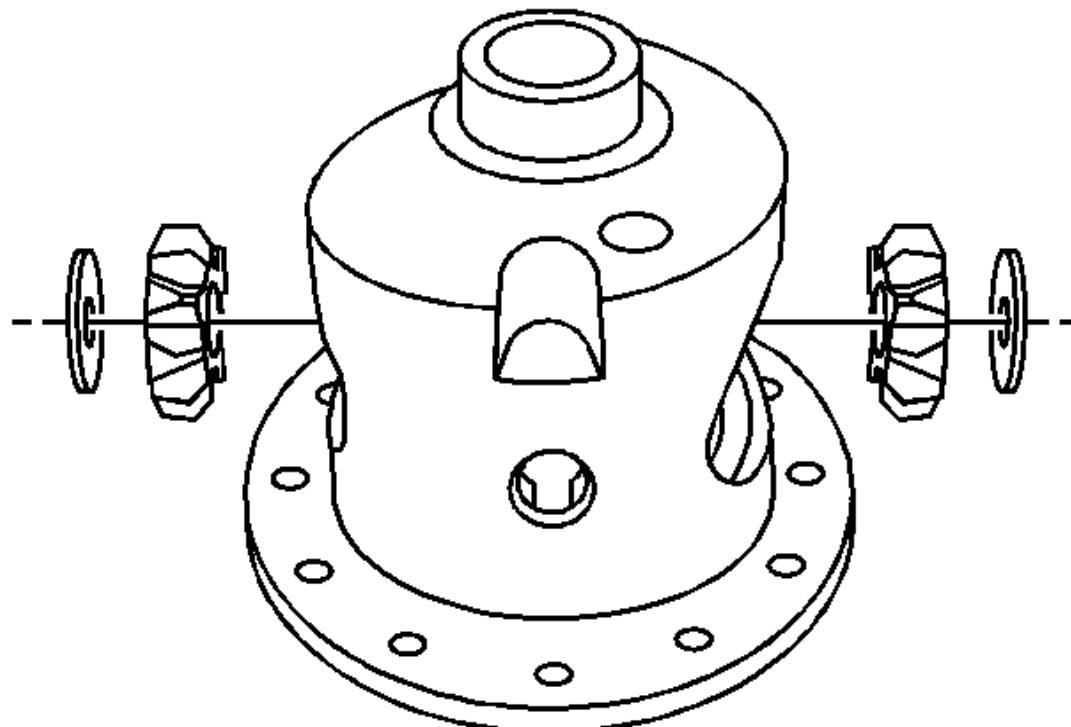


Fig. 351: Identifying Differential Pinion Gears & Thrust Washers

Courtesy of GENERAL MOTORS COMPANY

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.

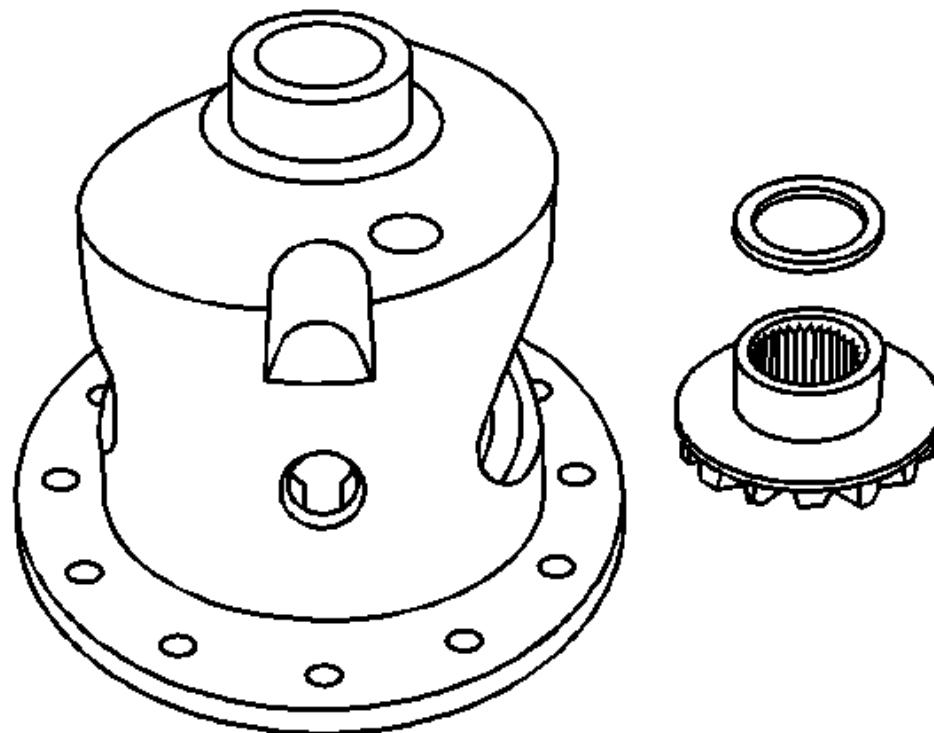


Fig. 352: Differential Side Gears & Thrust Washers

Courtesy of GENERAL MOTORS COMPANY

9. Remove the differential side gears and thrust washers.

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

FRONT DRIVE AXLE INNER SHAFT BEARING INSPECTION

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

Do not replace a bearing for this reason.

1. Inspect the bearings for smooth rotation after oiling.
2. Inspect the bearing rollers for wear.
3. Inspect the bearing cups for the following conditions:

- Wear
- Cracks
- Brinelling
- Scoring

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

FRONT DIFFERENTIAL CASE AND GEARS INSPECTION

1. Inspect the following components for excessive wear and/or fit:

- The pinion gear shaft
- The thrust washers
- The differential case for wear, cracks and scoring
- The fit of the pinion gear shaft in the differential case
- The fit of the differential side gears in the differential case
- The fit of the side gears on the axle shafts

2. Inspect the teeth of the pinion gears and the differential side gears for the following conditions:

- Wear
- Cracks
- Scoring
- Spalling

3. Replace any worn or poor fitting components as necessary.

FRONT DIFFERENTIAL RING AND DRIVE PINION GEAR INSPECTION

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

2. Inspect the pinion and the ring gear teeth for the following conditions:

- Cracking
- Chipping
- Scoring
- Excessive wear

3. Inspect the pinion gear splines for wear.

4. Inspect the pinion flange splines for wear.

5. Inspect the fit of the pinion flange on the pinion gear.

6. Inspect the sealing surface of the pinion flange for nicks, burrs, or rough tool marks which will damage the inside diameter of the pinion seal and result in an oil leak.

7. Inspect all of the parts for wear and replace as necessary.

THRUST WASHERS, SHIMS, AND ADJUSTER SLEEVES INSPECTION

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

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

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

FRONT DIFFERENTIAL CASE ASSEMBLE (8.25 INCH LD AXLE)

Special Tools

- **GE-8092** Driver Handle
- **J-8107-2** Side Bearing Puller Pilot
- **J-22761** Differential Side Bearing Installer

For equivalent regional tools, refer to [**Special Tools**](#).

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

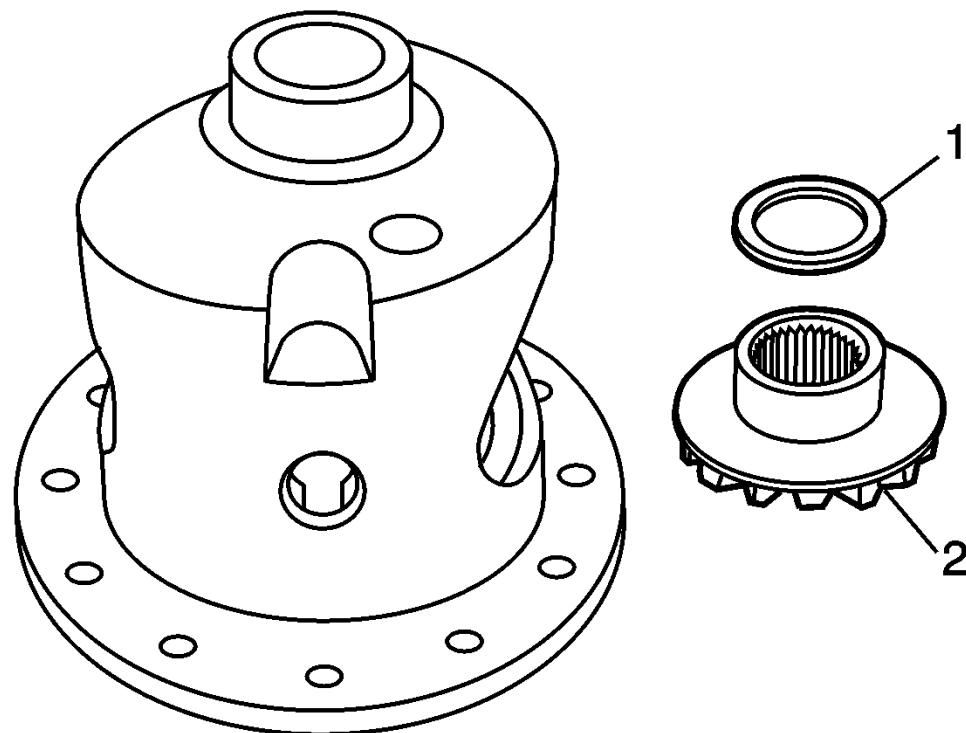


Fig. 353: Thrust Washers And Differential Side Gears

Courtesy of GENERAL MOTORS COMPANY

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

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

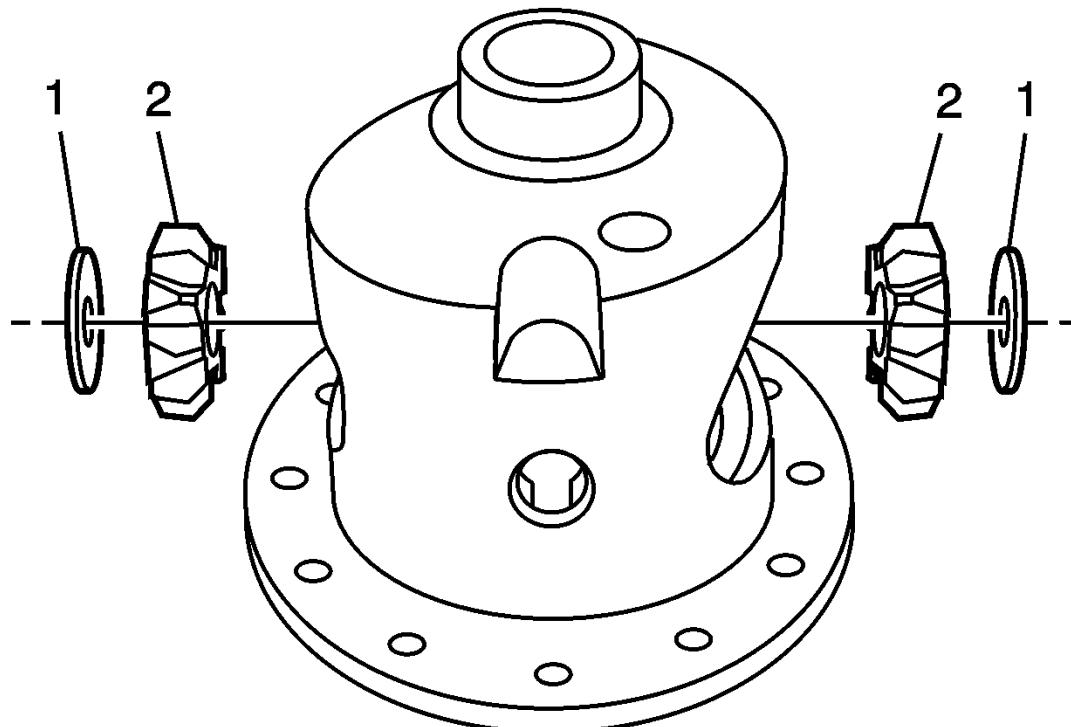


Fig. 354: Differential Pinion Gears

Courtesy of GENERAL MOTORS COMPANY

3. Install the differential pinion gears (2) by performing the following steps:

1. Position both pinion gears between the differential side gears directly opposite of each other.
2. Rotate the differential side gears until the pinion gears are opposite the opening in the differential case in line with the pinion shaft opening.

4. Install the thrust washers (1).

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

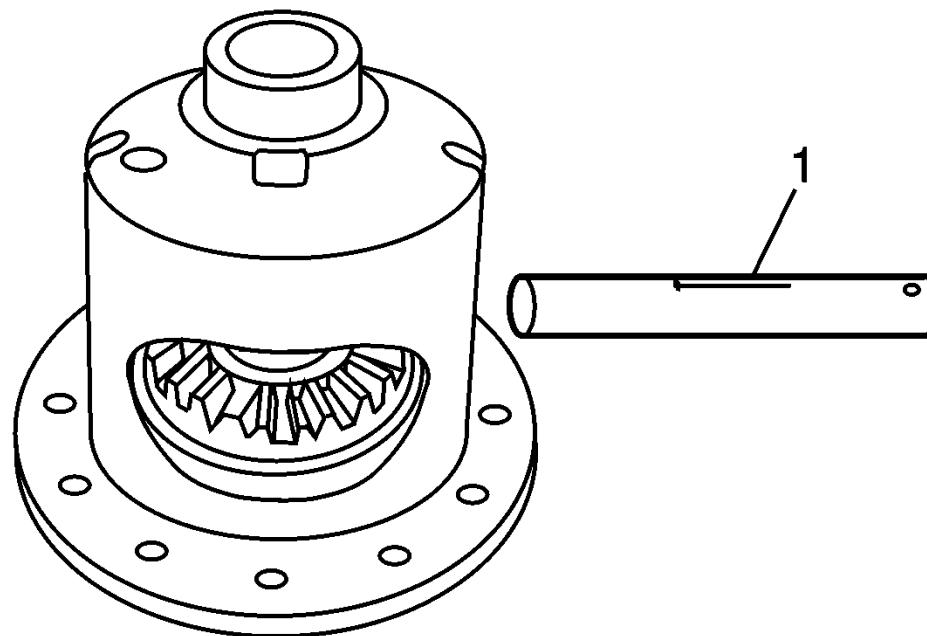


Fig. 355: Pinion Gear Shaft

Courtesy of GENERAL MOTORS COMPANY

5. Install the pinion gear shaft (1).

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

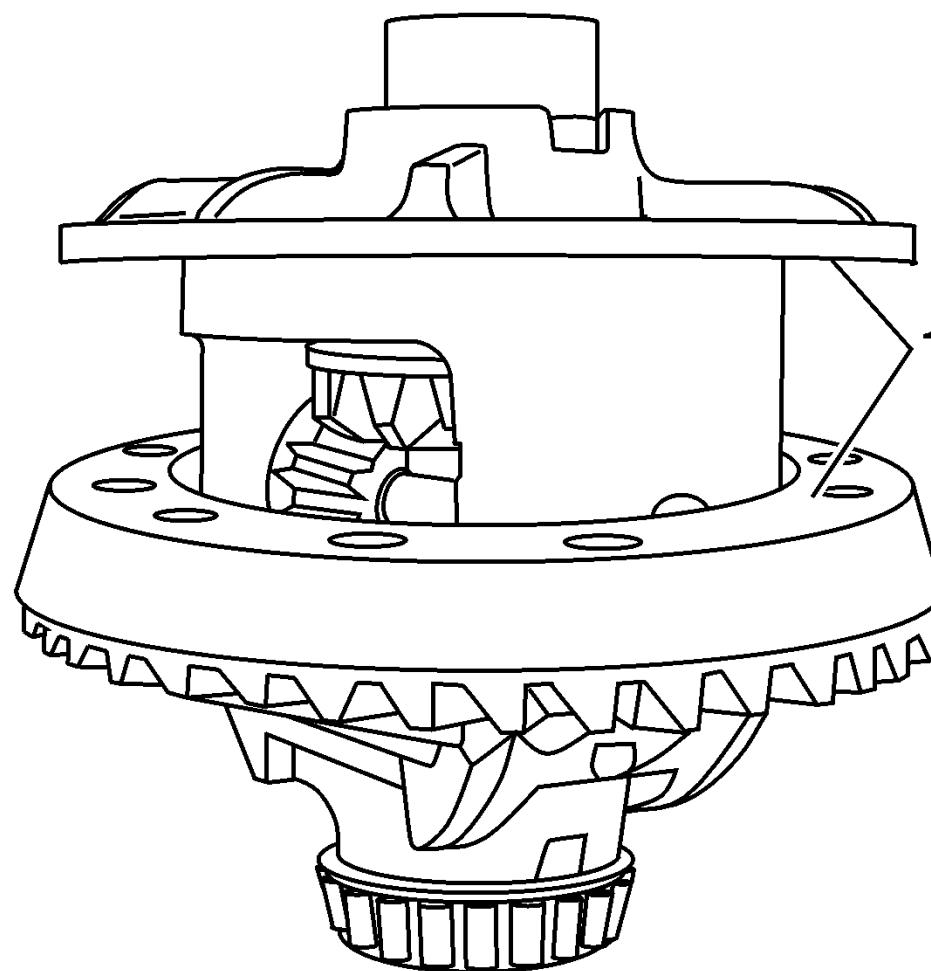


Fig. 356: Mating Surfaces Of Ring Gear And Differential Case

Courtesy of GENERAL MOTORS COMPANY

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

7. Install the ring gear onto the differential case.

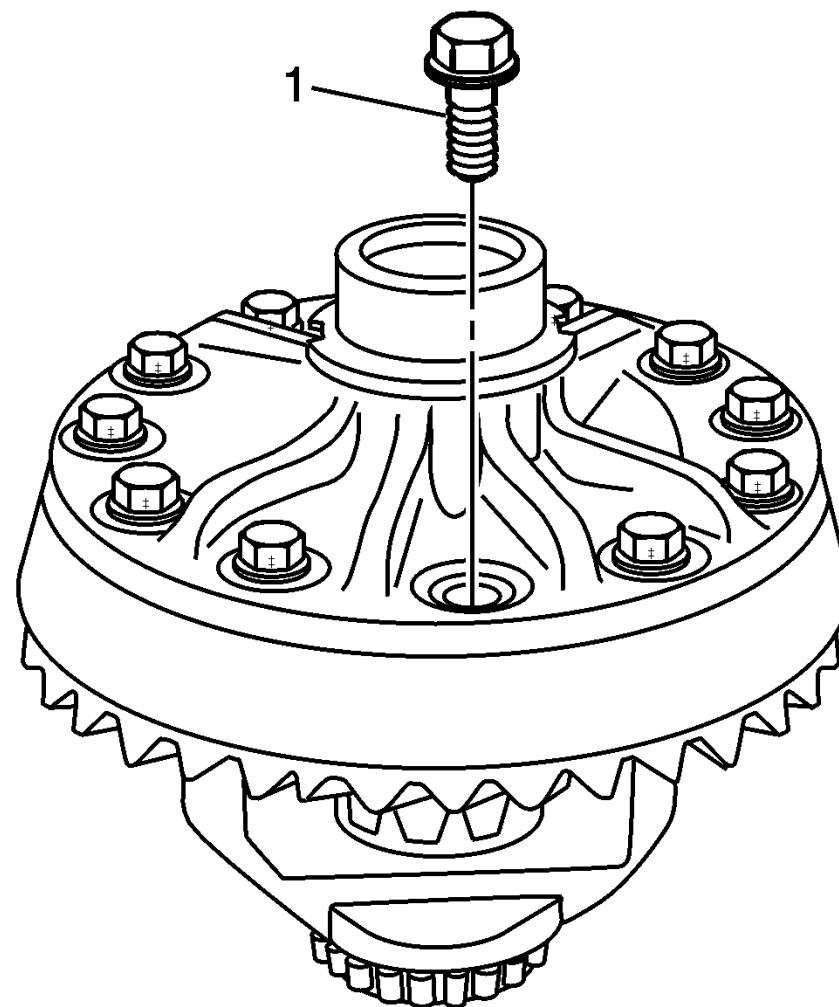


Fig. 357: Ring Gear Bolts Have Left-Hand Threads

Courtesy of GENERAL MOTORS COMPANY

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

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

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

CAUTION: Refer to Fastener Caution .

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

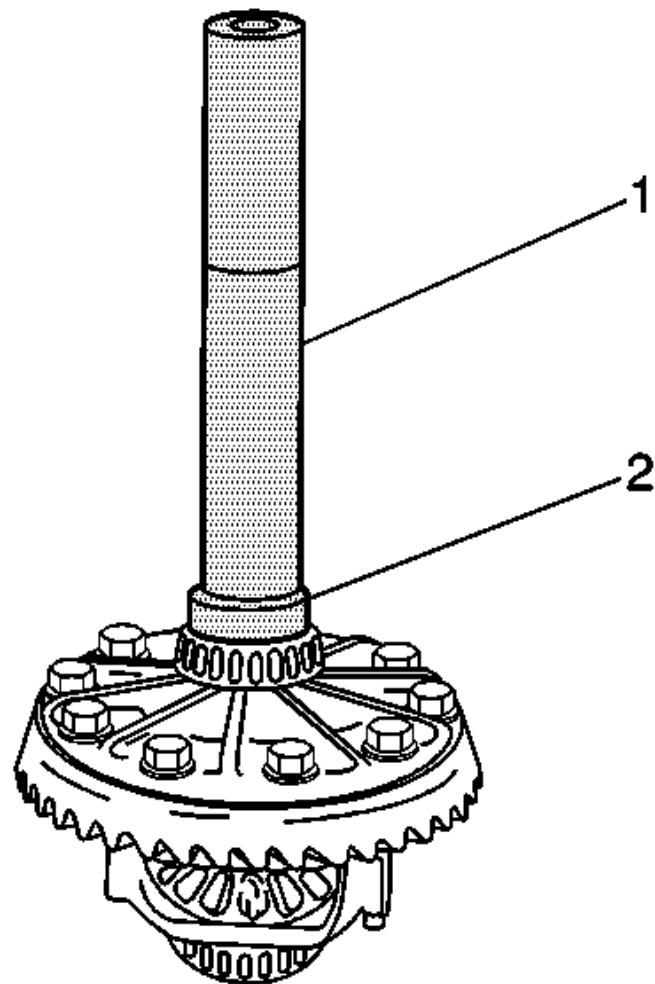


Fig. 358: Differential Side Bearing

Courtesy of GENERAL MOTORS COMPANY

10. Install the differential side bearings by performing the following steps:

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

FRONT DIFFERENTIAL CASE ASSEMBLE (9.25 INCH HD AXLE)

Special Tools

- **GE-8092** Universal Driver Handle - 3/4 in - 10
- **J-29710** Differential Side Bearing Installer
- **J-36597** Side Bearing Puller Pilot - 9.25 in Axle

1. Lubricate the pinion and side gears using axle lubricant. Use the correct fluid. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).

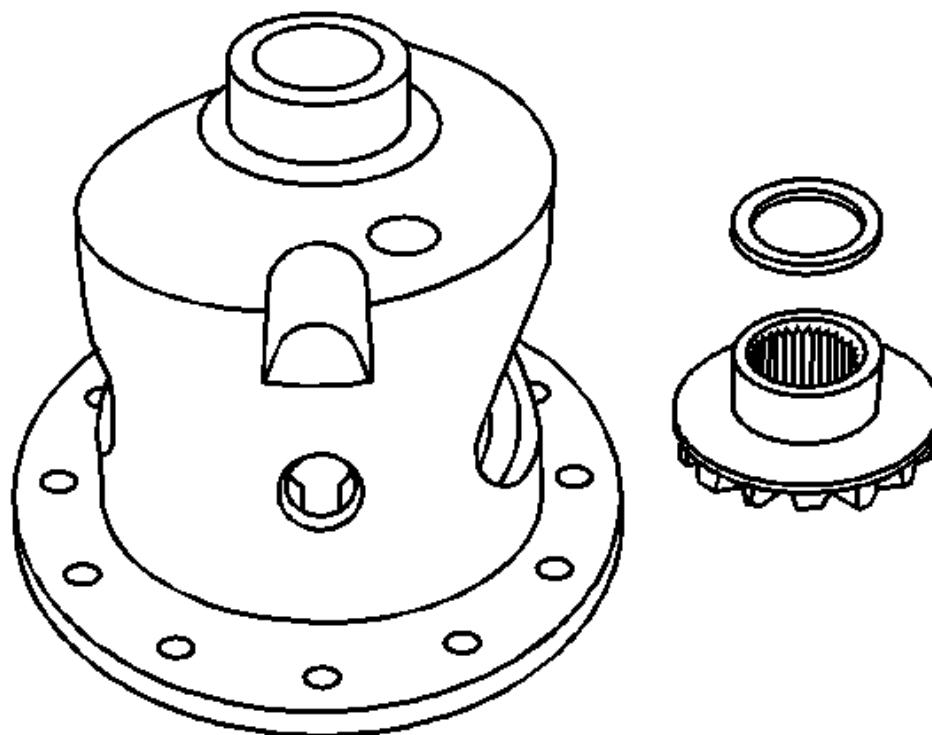


Fig. 359: Differential Side Gears & Thrust Washers

Courtesy of GENERAL MOTORS COMPANY

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.

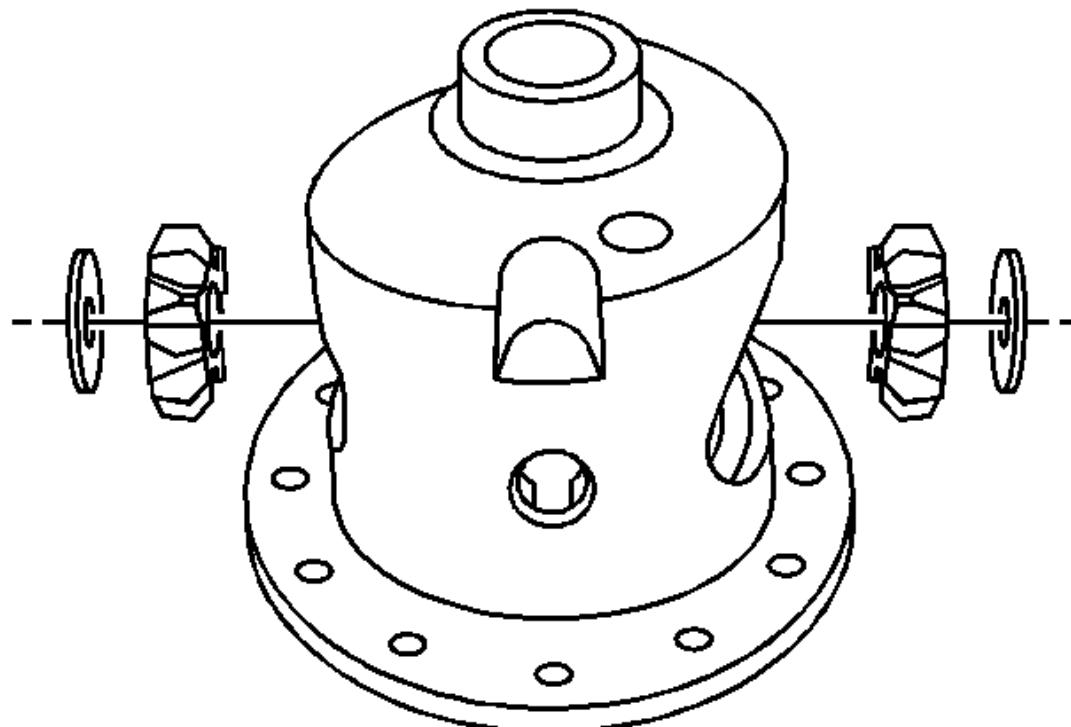


Fig. 360: Identifying Differential Pinion Gears & Thrust Washers

Courtesy of GENERAL MOTORS COMPANY

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.

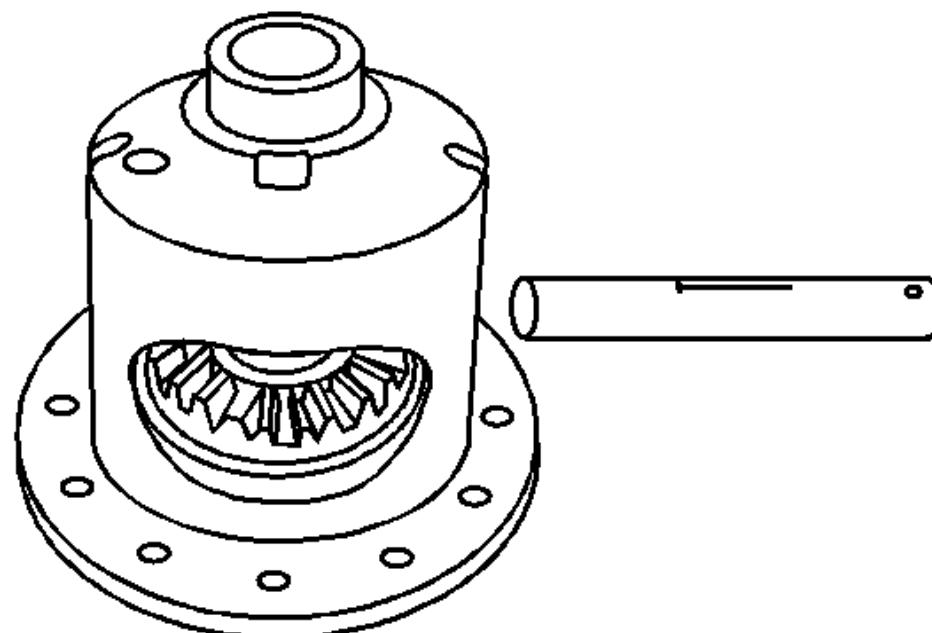


Fig. 361: View Of Differential And Pinion Shaft
Courtesy of GENERAL MOTORS COMPANY

6. Install the pinion gear shaft.

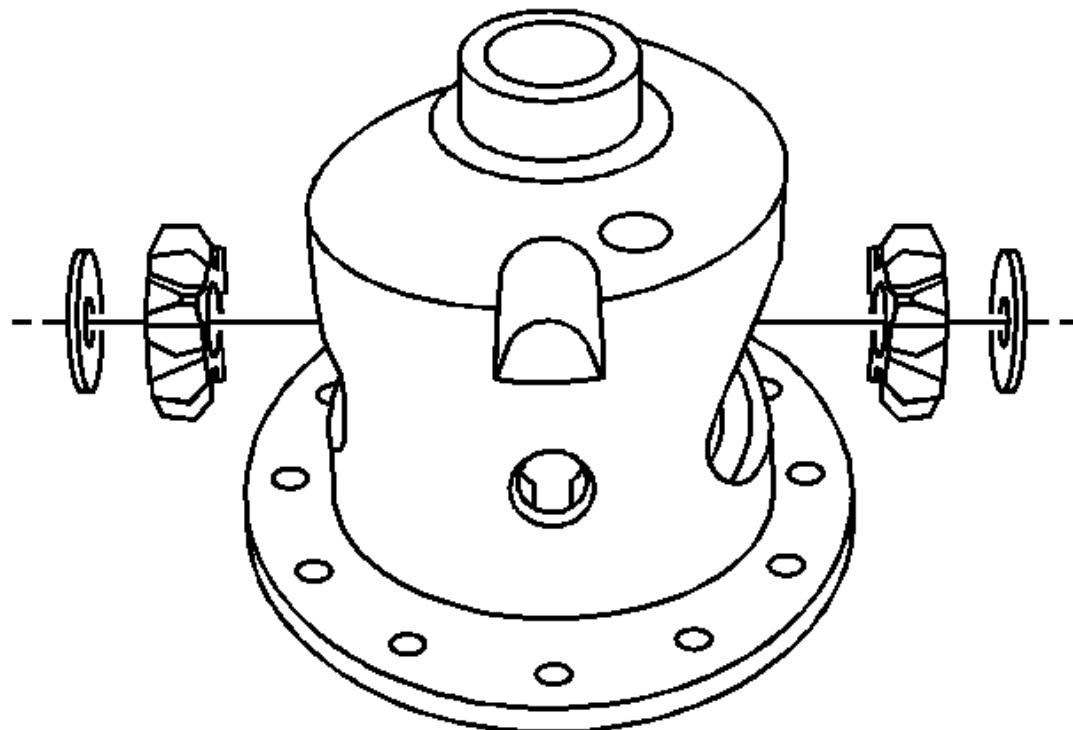


Fig. 362: Identifying Differential Pinion Gears & Thrust Washers

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

7. Install the pinion shaft lock bolt and tighten to 53 N.m (39 lb ft).

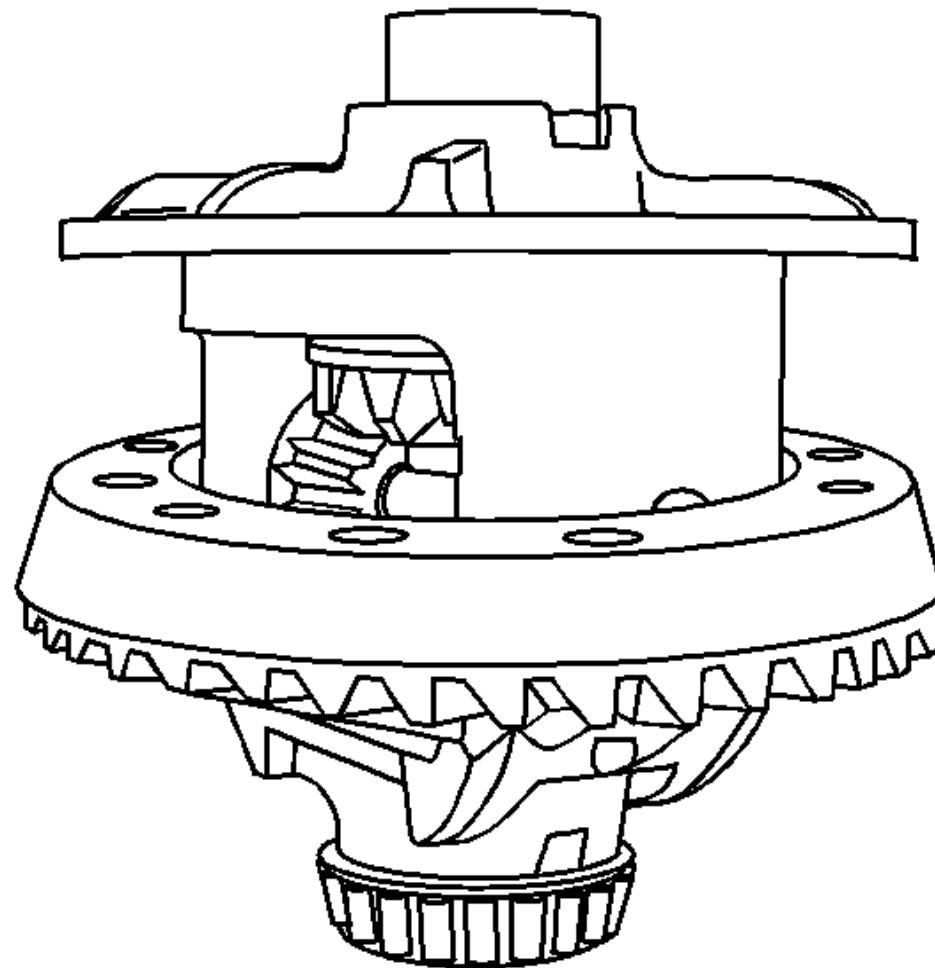


Fig. 363: Ring Gear & Differential Case

Courtesy of GENERAL MOTORS COMPANY

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

8. Install the ring gear onto the differential case.

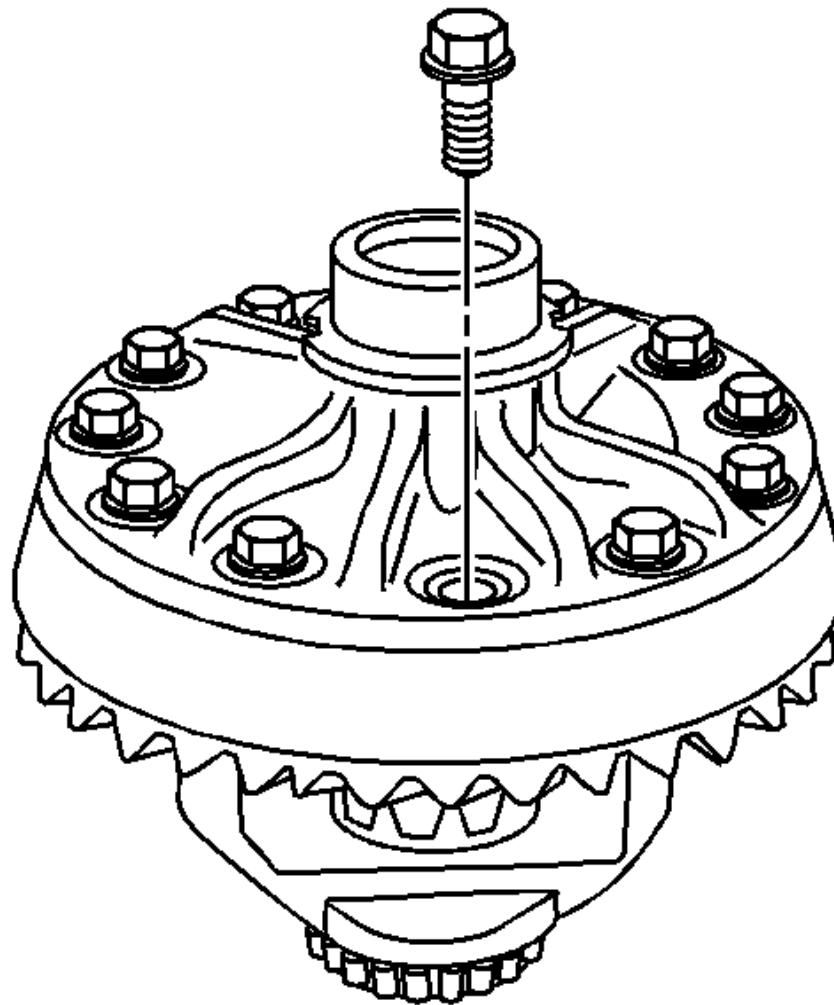


Fig. 364: Identifying Ring Gear Bolts

Courtesy of GENERAL MOTORS COMPANY

NOTE: 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. Install the new ring gear bolts. Tighten the ring gear bolts alternately and in stages, gradually pulling the ring gear onto the differential case. Tighten the ring gear bolts in sequence to 138 N.m (102 lb ft).

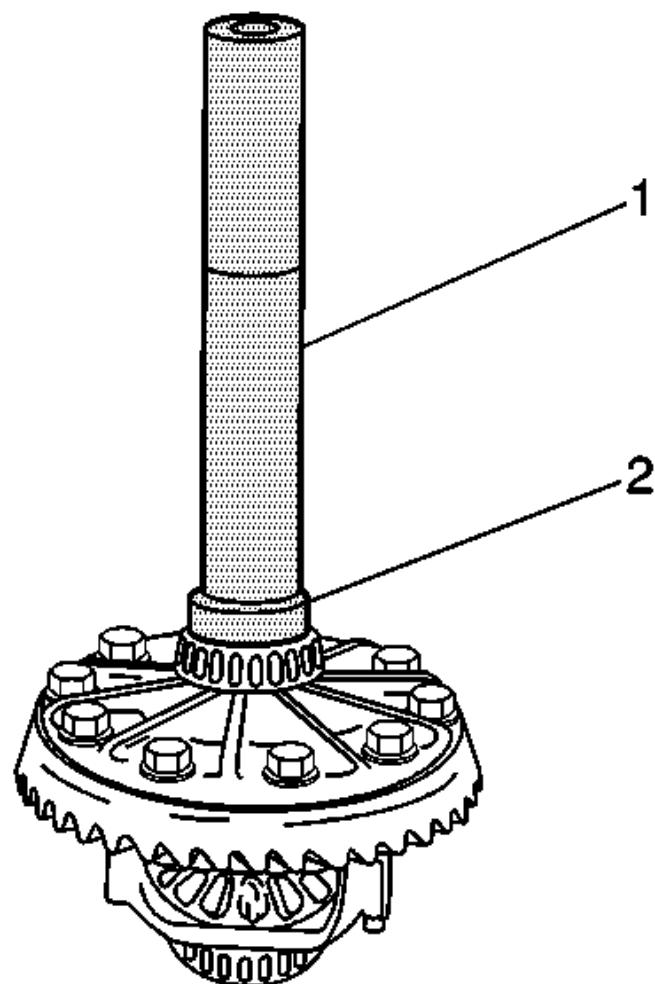


Fig. 365: Differential Side Bearing

Courtesy of GENERAL MOTORS COMPANY

11. Install the differential side bearings by performing the following steps:

1. In order to protect the differential case, install the **J-36597** side bearing puller pilot in the case on the side opposite the bearing

installation.

2. Install the **J-29710** differential side bearing installer (2) and the **GE-8092** universal driver handle (1) onto the differential case bearing as shown.
3. Drive the differential case bearing onto the case using the **J-29710** differential side bearing installer and the **GE-8092** universal driver handle.

FRONT DIFFERENTIAL DRIVE PINION GEAR BEARING CUP INSTALLATION (8.25 INCH LD AXLE)

Tools Required

J-45858 Pinion Bearing Race Remover/Installer

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

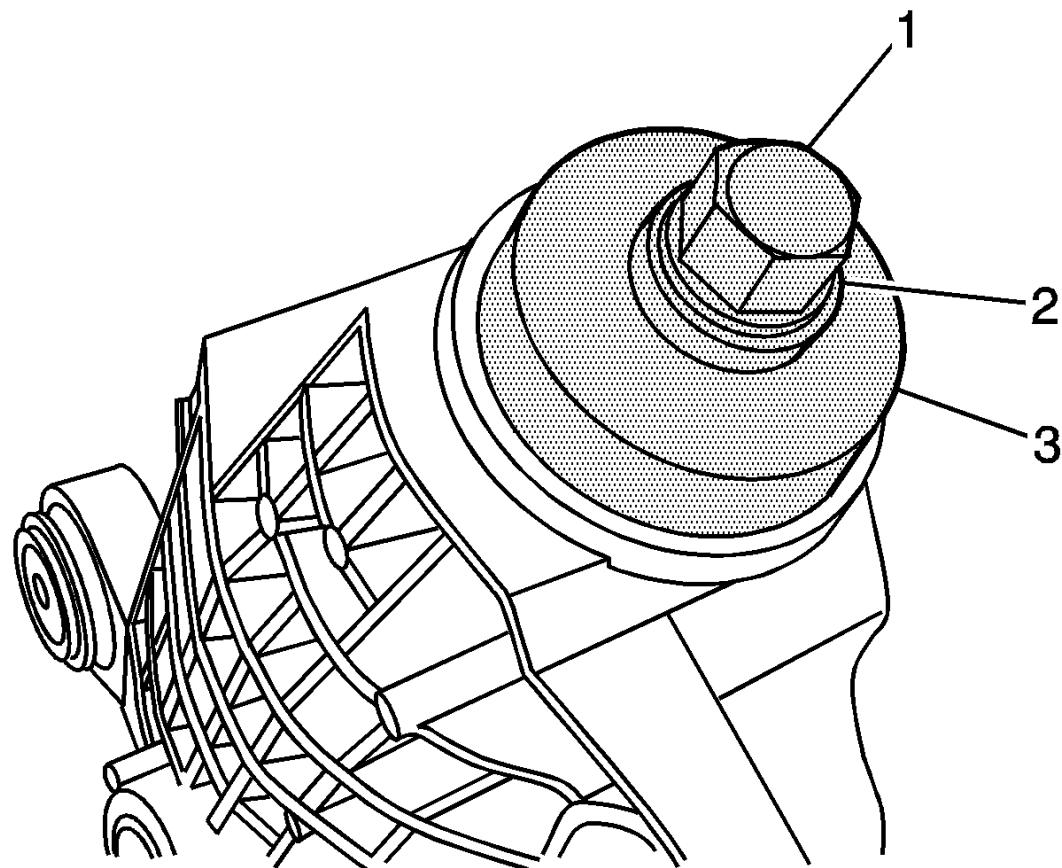


Fig. 366: Thrust Bearing, Washer & Forcing Screw

Courtesy of GENERAL MOTORS COMPANY

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

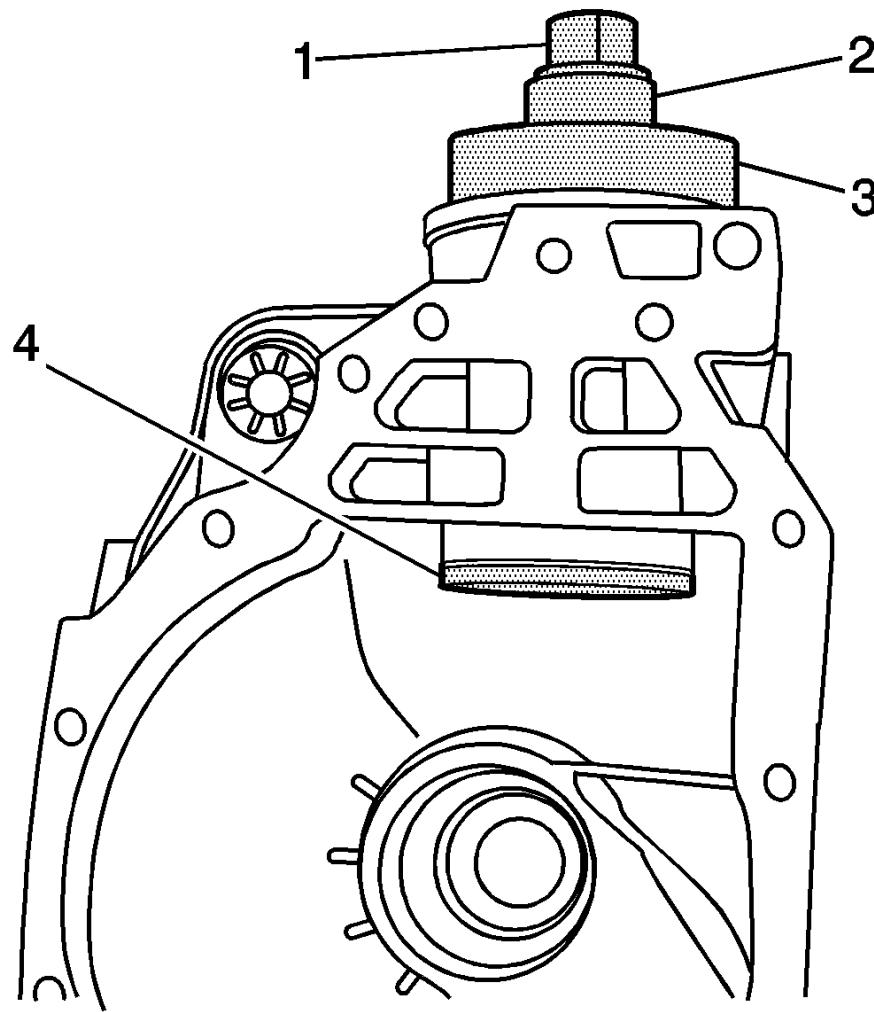


Fig. 367: Inner Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

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

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

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

Inspect the position of the inner pinion bearing cup as it is being drawn into the inner pinion bearing cup bore to ensure the bearing cup is being pulled straight into the pinion bearing cup bore. If the pinion bearing cup is not being pulled straight into the bearing cup bore, remove the **J-45858** pinion bearing race remover/installer or **J-45858-B** pinion bearing race remover/installer and the inner pinion bearing cup and reposition the inner pinion bearing cup.

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

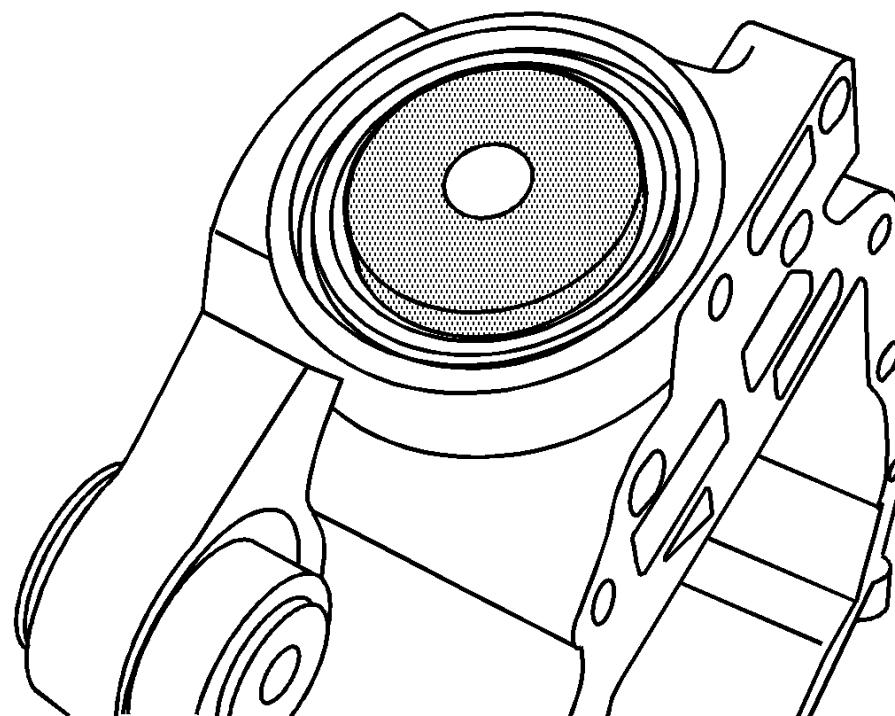


Fig. 368: Outer Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

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

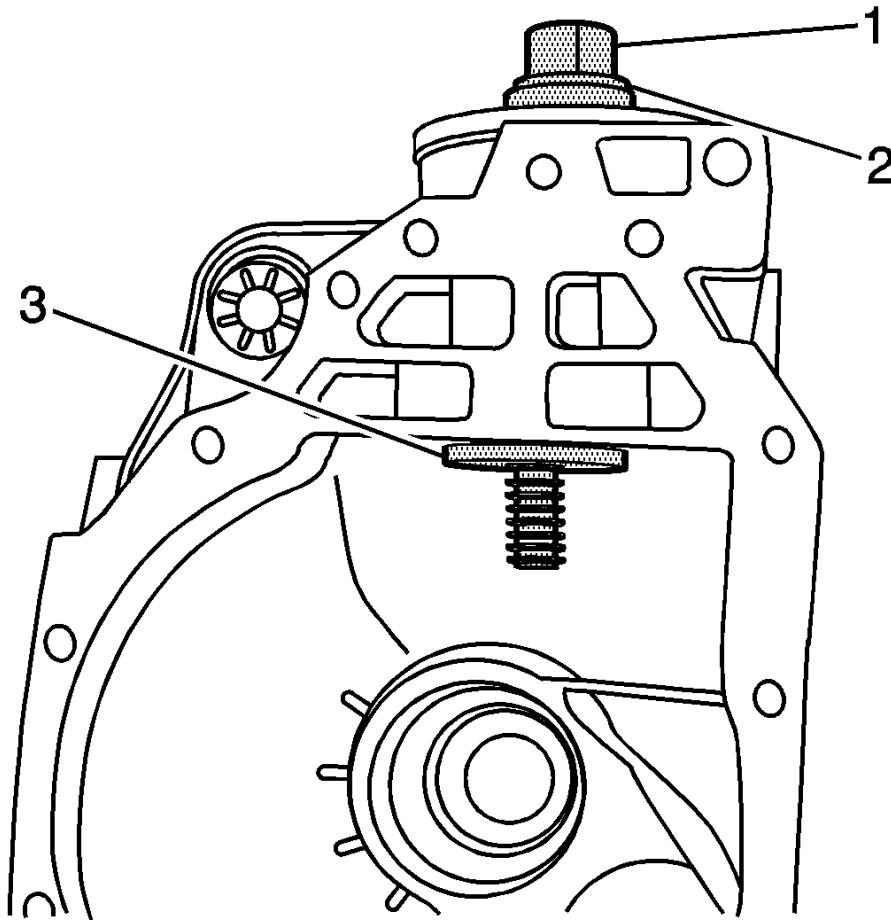


Fig. 369: Thrust Bearing And Washer

Courtesy of GENERAL MOTORS COMPANY

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

Inspect the position of the outer pinion bearing cup as it is being drawn into the outer pinion bearing cup bore to ensure the bearing cup is being pulled straight into the pinion bearing cup bore. If the pinion bearing cup is not being pulled straight into the bearing cup bore, remove the **J-45858** pinion bearing race remover/installer or **J-45858-B** pinion bearing race remover/installer and the outer pinion bearing cup and reposition the outer pinion bearing cup.

11. Tighten the forcing screw until the outer pinion bearing cup is seated in the outer pinion bearing cup bore.
12. Remove the **J-45858** pinion bearing race remover/installer or **J-45858-B** pinion bearing race remover/installer.
13. Measure the pinion depth and determine the selectable pinion shim thickness. Refer to [**Front Differential Ring and Drive Pinion Gear Adjustment**](#).

FRONT DIFFERENTIAL DRIVE PINION GEAR BEARING CUP INSTALLATION (9.25 INCH LD AXLE)

Tools Required

J-45754 Pinion Bearing Race Remover/Installer - 9.25 in Axle

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

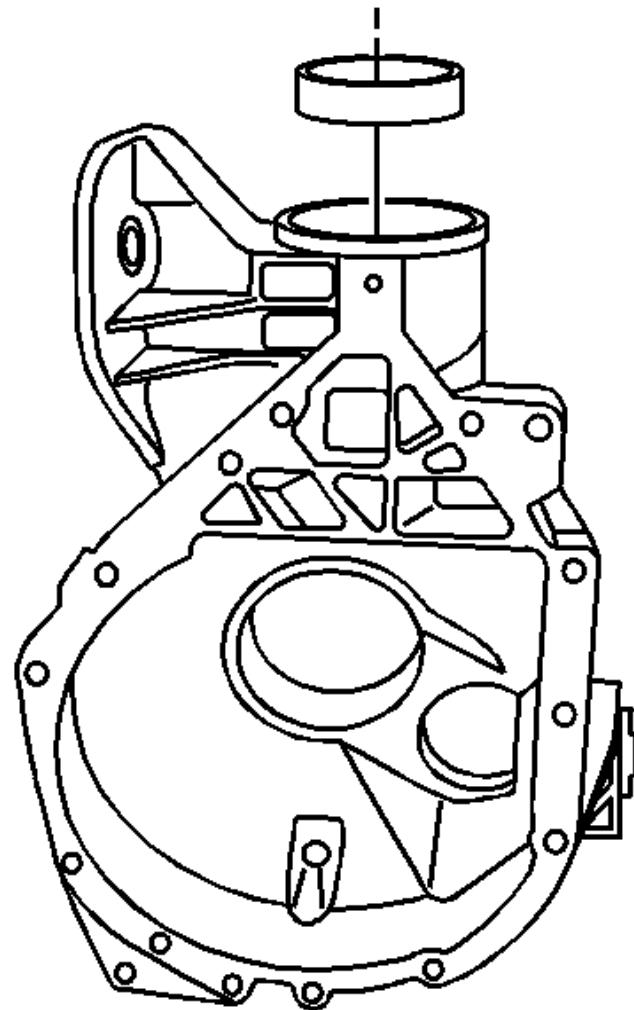


Fig. 370: View Of Outer Pinion Bearing Cup & Bore

Courtesy of GENERAL MOTORS COMPANY

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

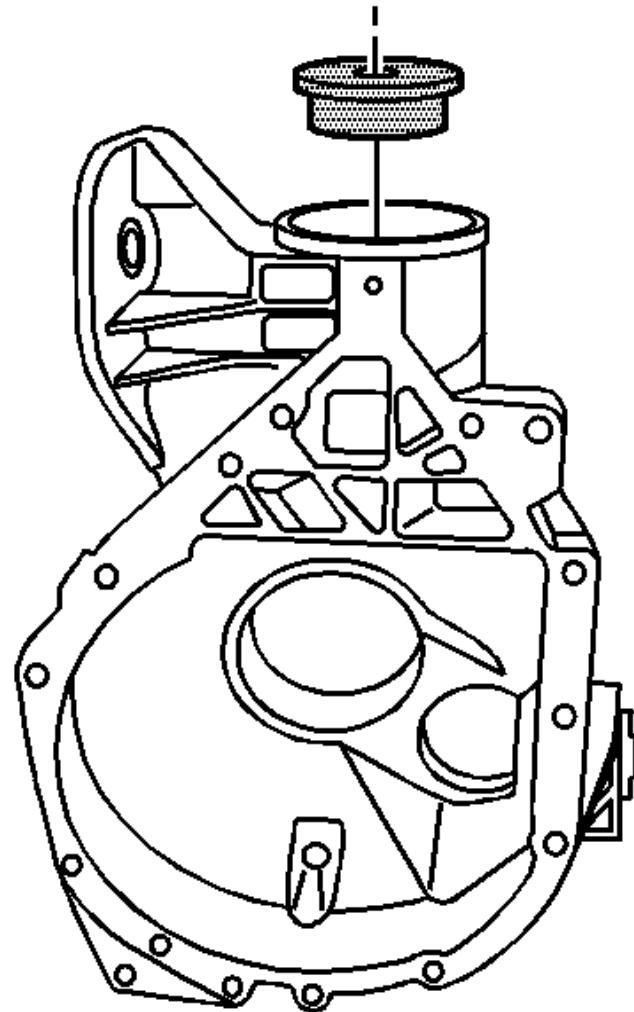


Fig. 371: Outer Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

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

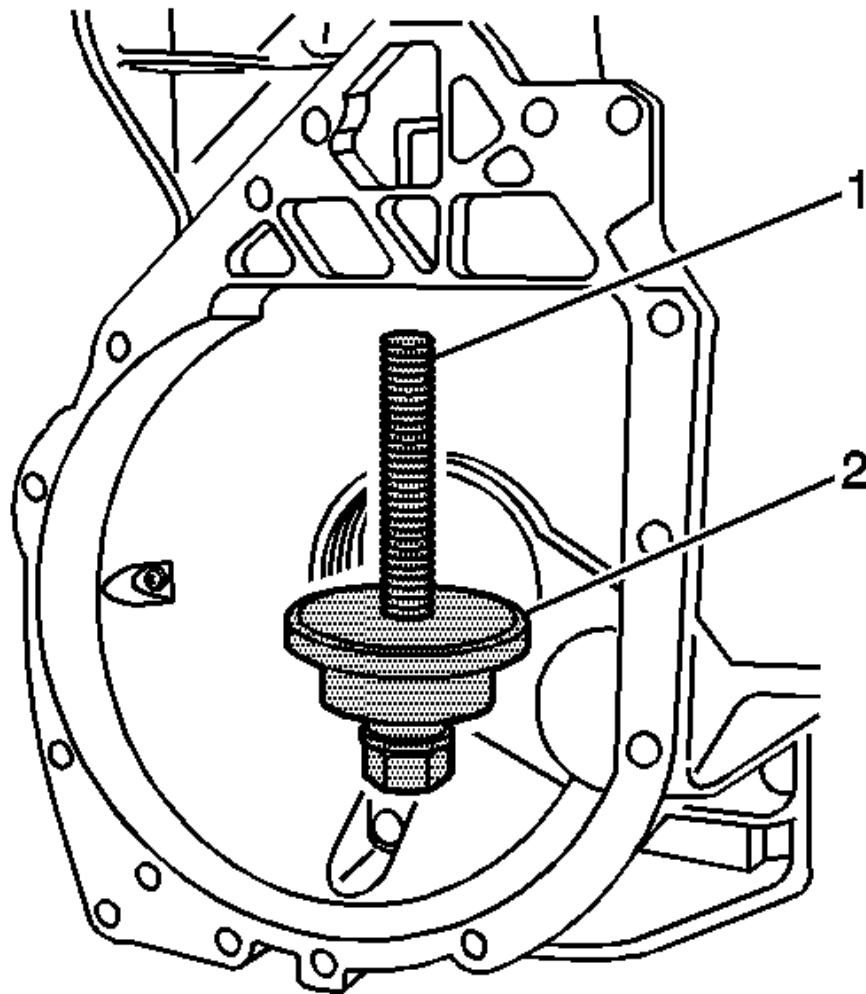


Fig. 372: Over Inner Pinion Bearing Cup Bore

Courtesy of GENERAL MOTORS COMPANY

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** pinion bearing race remover/installer and the outer pinion bearing cup and reposition the outer pinion bearing cup.

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** pinion bearing race remover/installer.

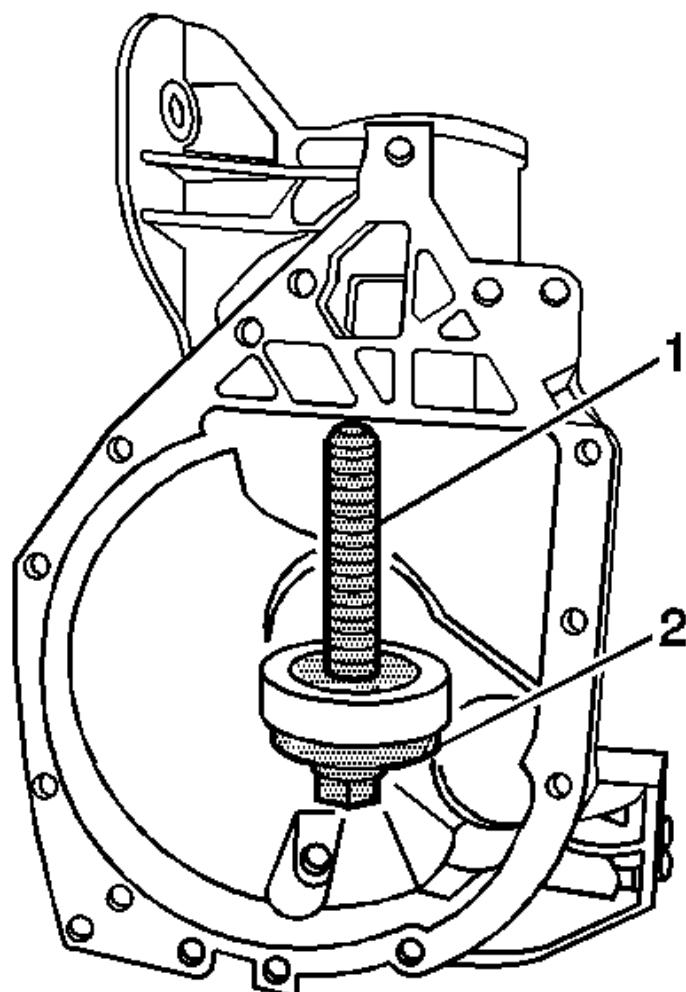


Fig. 373: Inner Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

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.

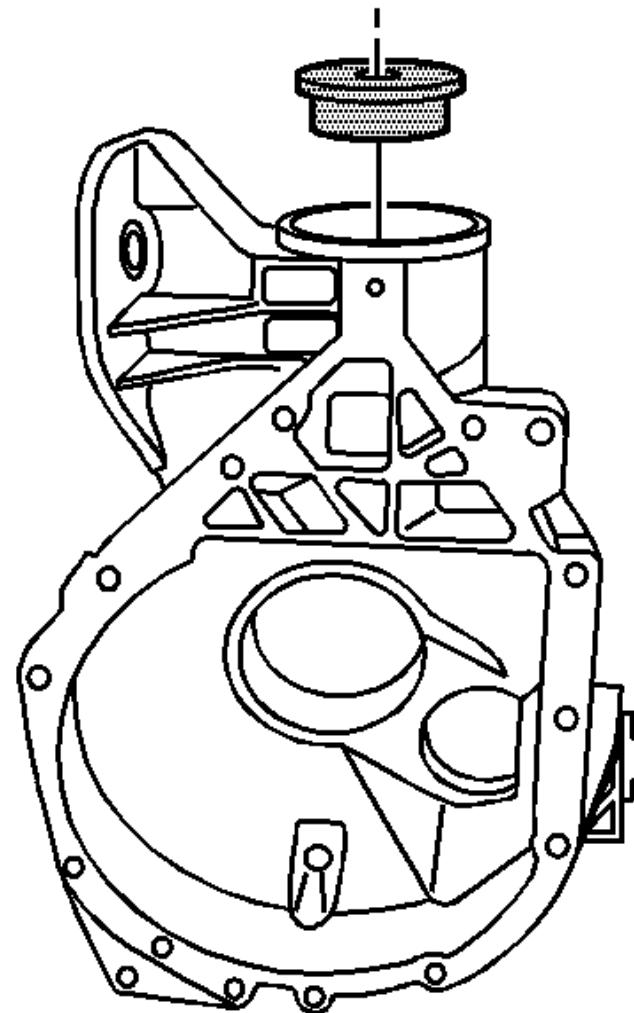


Fig. 374: Outer Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

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** pinion bearing race remover/installer and the inner pinion bearing cup and reposition the inner pinion bearing cup.

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** pinion bearing race remover/installer.
16. Measure the pinion depth and determine the selectable pinion shim thickness. Refer to [**Pinion Depth Adjustment**](#).

FRONT DIFFERENTIAL RING AND DRIVE PINION GEAR ADJUSTMENT

Special Tools

- **J-36601** Pinion Shim Selector
- **J-29763** Static Timing Gauge
- **J-21777-35** Rear Bearing Pilot

1. Install the pinion bearing cups into the differential carrier assembly. Refer to [**Front Differential Drive Pinion Gear Bearing Cup Installation \(8.25 Inch LD Axle\)**](#)[**Front Differential Drive Pinion Gear Bearing Cup Installation \(9.25 Inch LD Axle\)**](#).

NOTE: Make sure all of the tools, the pinion bearings, and the pinion bearing cups are clean before proceeding.

2. Before assembly, lubricate the pinion bearings with axle lubricant. Use the correct fluid. Refer to [**Adhesives, Fluids, Lubricants, and Sealers**](#).

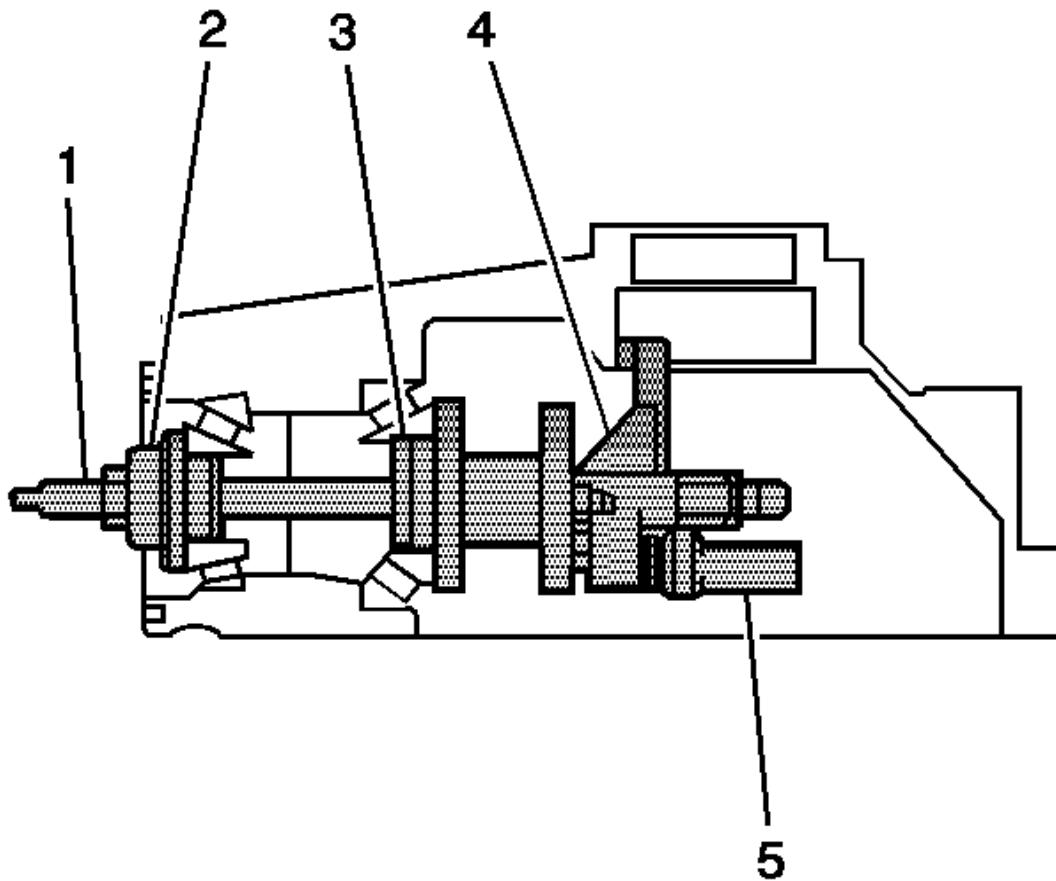


Fig. 375: Using J 36601-7, J 36601-5, J 21777-8 & J 36601-3 To Adjust Pinion Depth

Courtesy of GENERAL MOTORS COMPANY

3. Install the J-36601-4 to the J-36601-7 (1).
4. Install the J-21777-35 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 through the inner pinion bearing and the differential carrier case half.

7. Install the outer pinion bearing.

NOTE: **Each end of the J-36601-5 is sized specifically for the 8.25 inch or the 9.25 inch outer pinion bearing. Ensure the correct end is being used when installing the J-36601-5 into the outer pinion bearing.**

8. While holding the outer pinion bearing in position, install the J-36601-5 (2), the washer, and the nut to the J-36601-7 (1).

CAUTION: **Refer to Fastener Caution .**

9. While holding the J-36601-7 (1) stationary with a wrench, tighten the nut on the J-36601-7 (1).

Tighten

Tighten the nut until all of the end play is removed from the **J-36601** pinion shim selector.

10. Rotate the assembly several times in both directions in order to seat the pinion bearings.

11. While holding the J-36601-4 (4) stationary, measure the rotating torque of the **J-36601** pinion shim selector using an inch-pound torque wrench.

Specification

The rotating torque of the **J-36601** pinion shim selector should be between 1.1-2.3 N.m (10-20 lb in).

12. If the torque is less than 1.0 N.m (10 lb in), continue to tighten the nut on the J-36601-7 until a rotating torque of 1.1-2.3 N.m (10-20 lb in) is obtained.

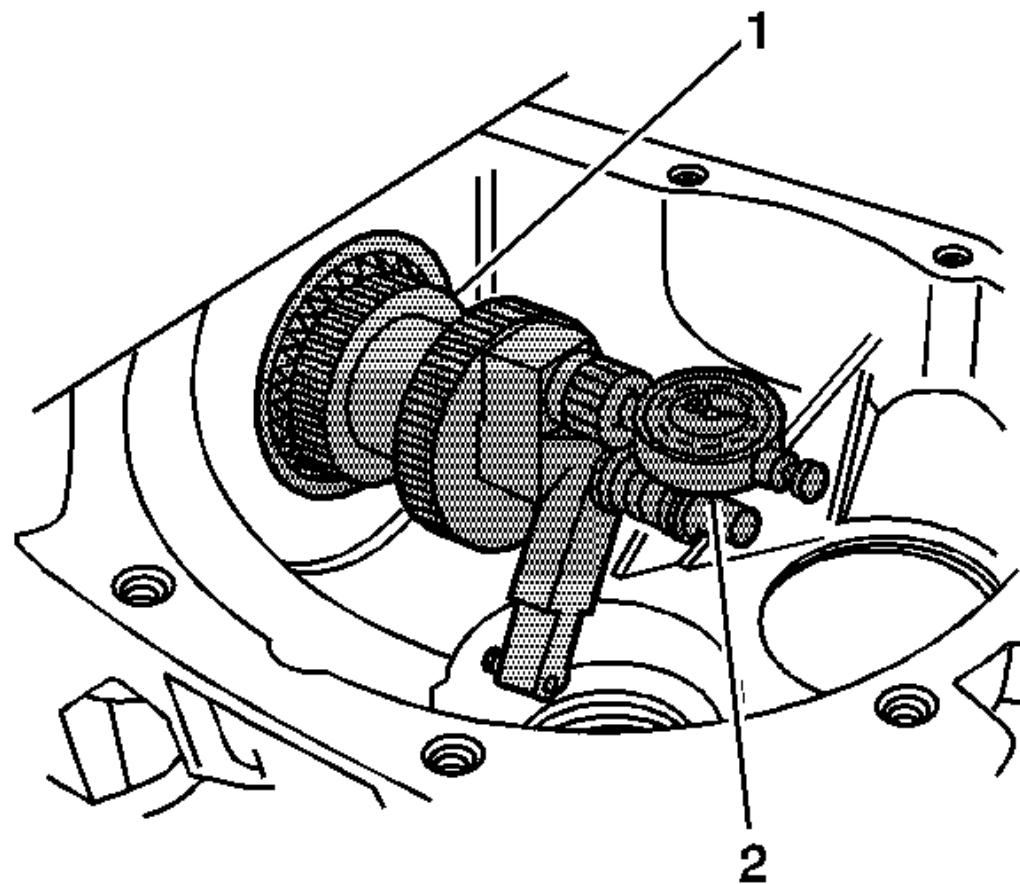


Fig. 376: View Of J 36601-3 & J 29763 In Differential Side Bearing Bore

Courtesy of GENERAL MOTORS COMPANY

13. Install the adjustment screw and the lock nut of the **J-29763** static timing gauge (2) to the J-36601-4.
14. Install the **J-29763** static timing gauge to the adjustment screw and lock nut assembly.

Tighten the lock nut to hold the **J-29763** static timing gauge in place.

15. Place the contact pad of the J-36601-4 into the differential side bearing bore.
16. Adjust the **J-29763** static timing gauge to the differential bearing bore by doing the following:
 1. Loosen the lock nut on the **J-29763** static timing gauge.
 2. Place the contact pad of the J-36601-4 onto the differential side bearing bore.
 3. With the contact pad of the J-36601-4 touching the differential side bearing bore, push down on the **J-29763** static timing gauge until the needle of the **J-29763** static timing gauge has turned 3/4 of a turn clockwise.
 4. Tighten the lock nut of the **J-29763** static timing gauge.
17. Rotate the J-36601-4 (1) back and forth until the needle of the **J-29763** static timing gauge (2) indicates the lowest point in the differential side bearing bore.
18. At the lowest point of deflection, move the housing of the **J-29763** static timing gauge until the needle indicates ZERO.
19. Move the J-36601-4 back and forth again to verify the zero setting. Adjust the housing of the **J-29763** static timing gauge as necessary to set the needle to ZERO.

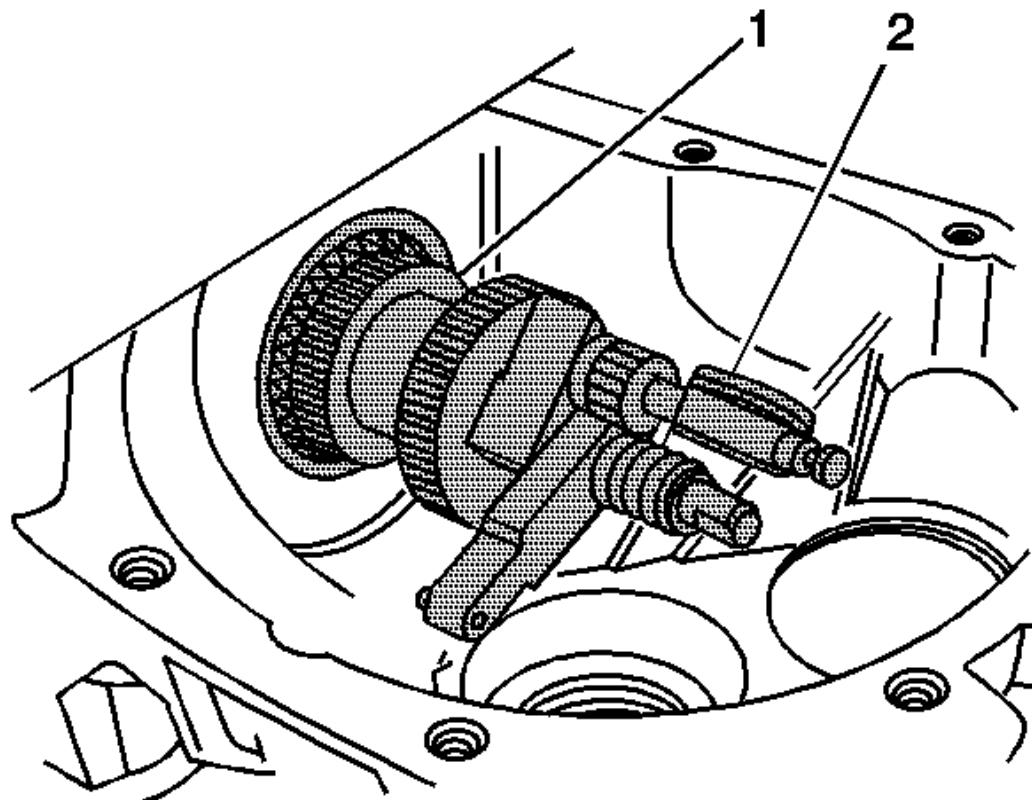


Fig. 377: Using J 36601-3 & J 29763 To Measure Thickness Of Shim Needed In Order To Set Depth Of Pinion
Courtesy of GENERAL MOTORS COMPANY

20. After the ZERO setting is obtained and verified, grasp the J-36601-4 (1) by the flats and move the J-36601-4 out of the differential side bearing bore.

NOTE: The unit of measurement for the J-29763 static timing gauge is in hundredths of a millimeter.

21. The value indicated on the **J-29763** static timing gauge (2) is the thickness of the shim needed in order to set the depth of the pinion.
22. Select the shim that indicates the correct thickness. Measure the shim with a micrometer in order to verify that the thickness is correct.
23. Remove the pinion depth setting tools.
24. Remove the pinion bearings.
25. Install the pinion shim between the drive pinion and the inner pinion bearing and assemble the differential carrier. Refer to [**Front Axle Assemble \(8.25 Inch LD Axle\)Front Axle Assemble \(9.25 Inch HD Axle\)**](#).

Differential pinion gear shims are available in the following sizes:

Shim Sizes

Metric	Specification	English
0.508 mm		0.020 in
0.533 mm		0.021 in
0.559 mm		0.022 in
0.584 mm		0.023 in
0.610 mm		0.024 in
0.635 mm		0.025 in
0.660 mm		0.026 in
0.686 mm		0.027 in
0.711 mm		0.028 in
0.737 mm		0.029 in
0.762 mm		0.030 in
0.787 mm		0.031 in
0.813 mm		0.032 in
0.838 mm		0.033 in
0.864 mm		0.034 in
0.889 mm		0.035 in
0.914 mm		0.036 in
0.940 mm		0.037 in
0.965 mm		0.038 in
0.991 mm		0.039 in

Specification	
Metric	English
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

PINION DEPTH ADJUSTMENT

Special Tools

- **J-36601** Pinion Shim Selector
- **J-29763** Static Timing Gauge

1. Install the pinion bearing cups into the differential carrier assembly. Refer to [**Front Differential Drive Pinion Gear Bearing Cup Installation \(8.25 Inch LD Axle\)**](#)[**Front Differential Drive Pinion Gear Bearing Cup Installation \(9.25 Inch LD Axle\)**](#).

NOTE: Make sure all of the tools, the pinion bearings, and the pinion bearing cups are clean before proceeding.

2. Before assembly, lubricate the pinion bearings with axle lubricant. Use the correct fluid. Refer to [**Adhesives, Fluids, Lubricants, and Sealers**](#).

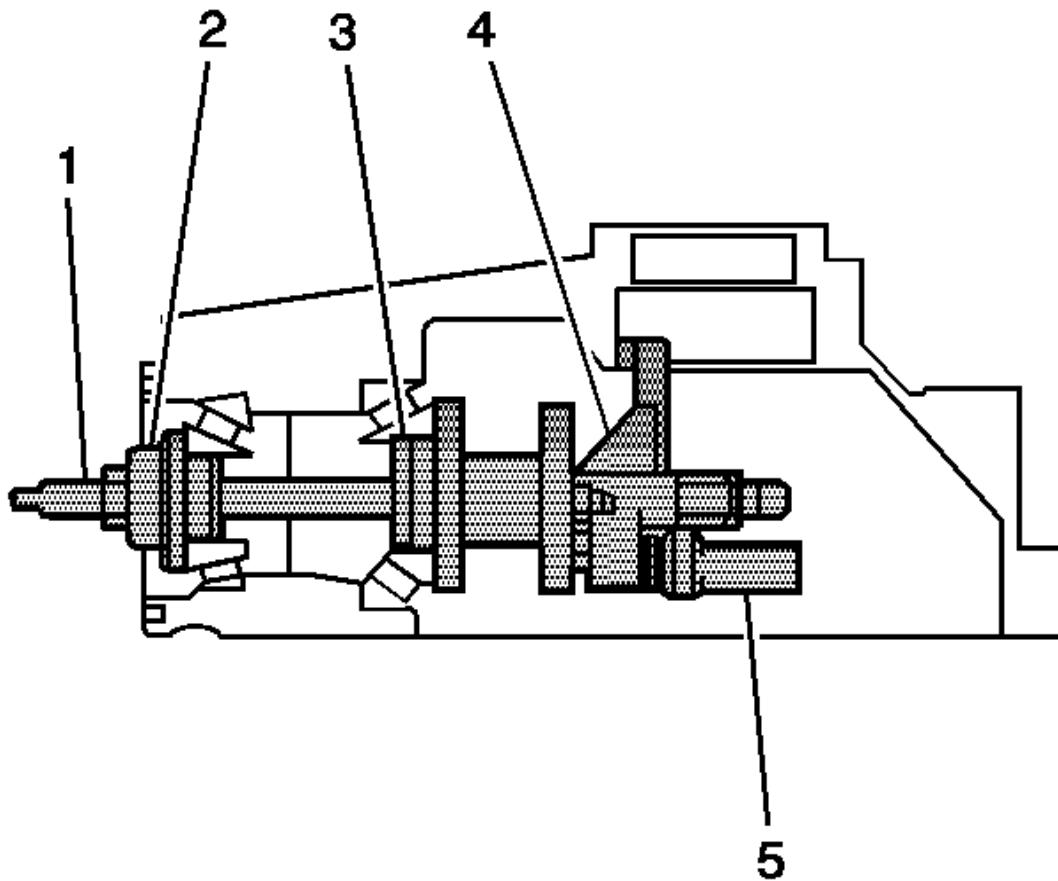


Fig. 378: Using J 36601-7, J 36601-5, J 21777-8 & J 36601-3 To Adjust Pinion Depth

Courtesy of GENERAL MOTORS COMPANY

NOTE: The J-36601 pinion shim selector uses two different measuring arms to measure the pinion depth. The J 36601-4 is used to measure the pinion depth for the 8.25 inch axle and the J 36601-3 is used to measure the pinion depth for the 9.25 inch axle.

3. Install the J-36601-4 or the J-36601-3 (4) to the J-36601-7 (1).

4. Install the J-21777-35 for the 8.25 inch axle or the J-21777-8 for the 9.25 inch axle (3) to the J-36601-7 (1).
5. Install the inner pinion bearing into the differential carrier case half.
6. Insert the J-36601-7 (1) with the J-21777-35 or the J-21777-8 (3) through the inner pinion bearing and the differential carrier case half.
7. Install the outer pinion bearing.

NOTE: **Each end of the J-36601-5 is sized specifically for the 8.25 inch or the 9.25 inch outer pinion bearing. Ensure the correct end is being used when installing the J-36601-5 into the outer pinion bearing.**

8. While holding the outer pinion bearing in position, install the J-36601-5 (2), the washer, and the nut to the J-36601-7 (1).

CAUTION: **Refer to Fastener Caution .**

9. While holding the J-36601-7 (1) stationary with a wrench, tighten the nut on the J-36601-7 (1).

Tighten

Tighten the nut until all of the end play is removed from the **J-36601** pinion shim selector.

10. Rotate the assembly several times in both directions in order to seat the pinion bearings.
11. While holding the J-36601-4 or the J-36601-3 (4) stationary, measure the rotating torque of the **J-36601** pinion shim selector using an inch-pound torque wrench.

Specification

The rotating torque of the **J-36601** pinion shim selector should be between 1.1-2.3 N.m (10-20 lb in).

12. If the torque is less than 1.0 N.m (10 lb in), continue to tighten the nut on the J-36601-7 until a rotating torque of 1.1-2.3 N.m (10-20 lb in) is obtained.

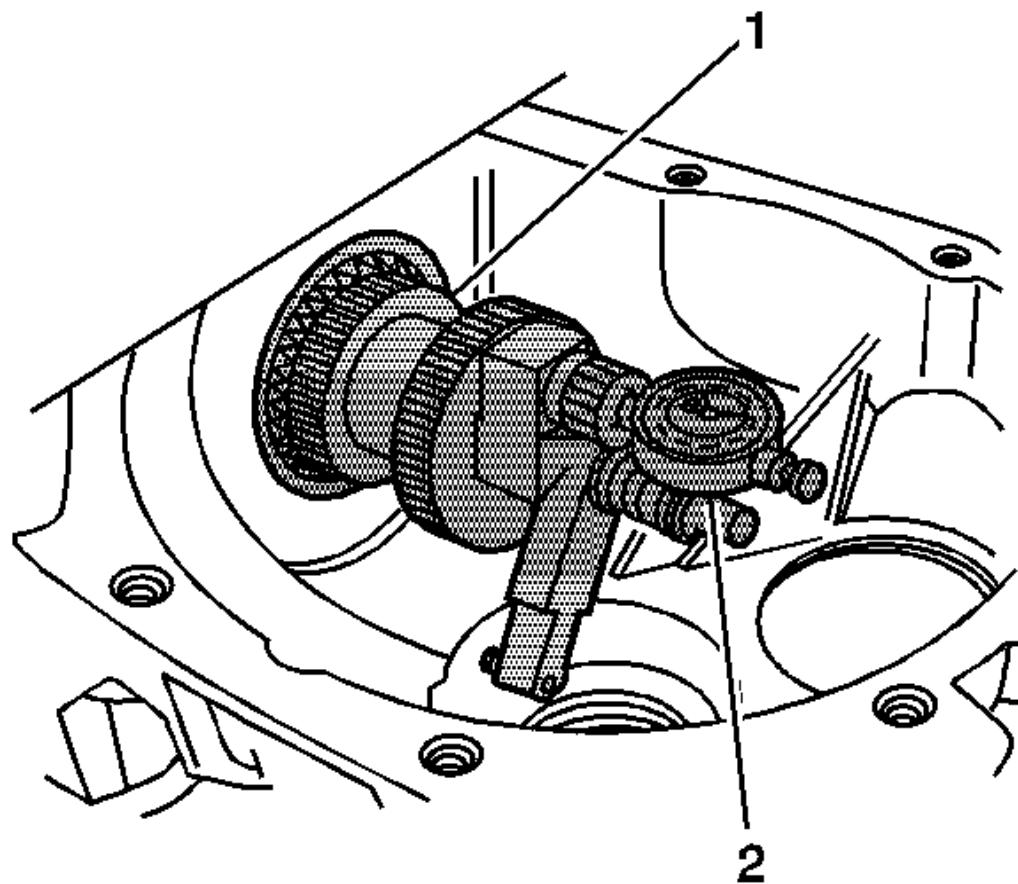


Fig. 379: View Of J 36601-3 & J 29763 In Differential Side Bearing Bore

Courtesy of GENERAL MOTORS COMPANY

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

Tighten the lock nut to hold the **J-29763** static timing gauge in place.

NOTE: **The left side differential bearing adjuster assembly on the 9.25 inch axle must be removed prior to placing the J 36601-3 in the differential side bearing bore.**

15. Place the contact pad of the J-36601-4 or to the J-36601-3 into the differential side bearing bore.
16. Adjust the **J-29763** static timing gauge to the differential bearing bore by doing the following:
 1. Loosen the lock nut on the **J-29763** static timing gauge.
 2. Place the contact pad of the J-36601-4 or the J-36601-3 onto the differential side bearing bore.
 3. With the contact pad of the J-36601-4 or the J-36601-3 touching the differential side bearing bore, push down on the **J-29763** static timing gauge until the needle of the **J-29763** static timing gauge has turned 3/4 of a turn clockwise.
 4. Tighten the lock nut of the **J-29763** static timing gauge.
17. Rotate the J-36601-4 or the J-36601-3 (1) back and forth until the needle of the **J-29763** static timing gauge (2) indicates the lowest point in the differential side bearing bore.
18. At the lowest point of deflection, move the housing of the **J-29763** static timing gauge until the needle indicates ZERO.
19. Move the J-36601-4 or the J-36601-3 back and forth again to verify the zero setting. Adjust the housing of the **J-29763** static timing gauge as necessary to set the needle to ZERO.

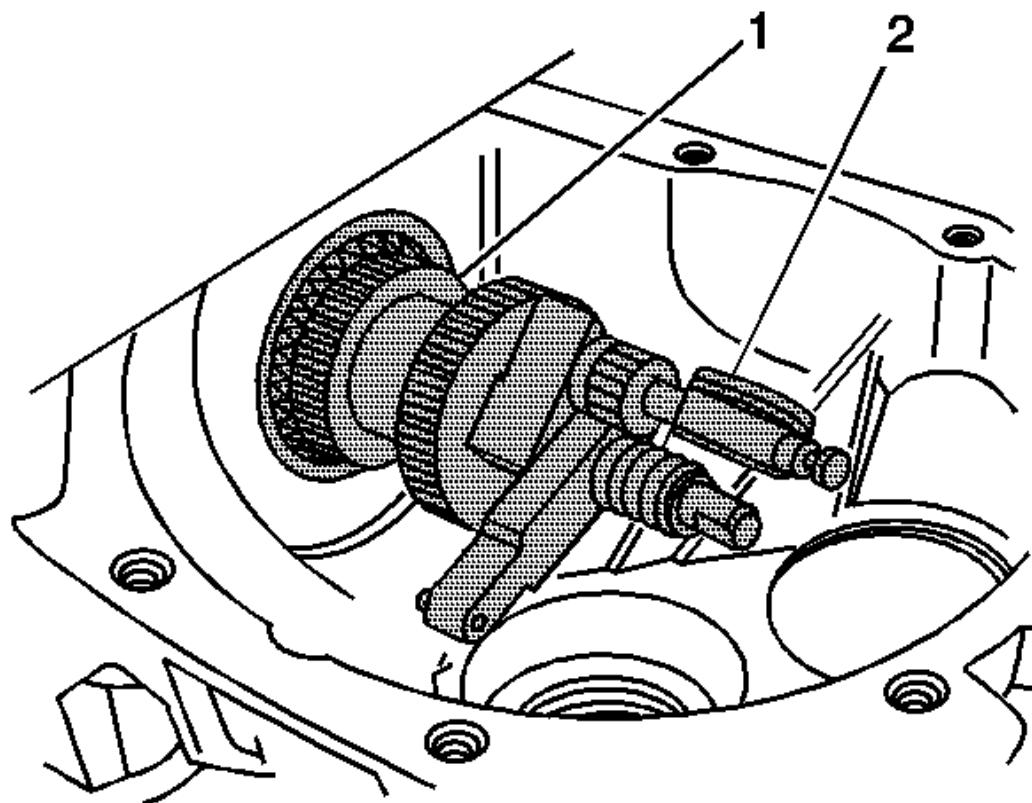


Fig. 380: Using J 36601-3 & J 29763 To Measure Thickness Of Shim Needed In Order To Set Depth Of Pinion
Courtesy of GENERAL MOTORS COMPANY

20. After the ZERO setting is obtained and verified, grasp the J-36601-4 or the J-36601-3 (1) by the flats and move the J-36601-4 or the J-36601-3 out of the differential side bearing bore.

NOTE: The unit of measurement for the J-29763 static timing gauge is in hundredths of a millimeter.

21. The value indicated on the **J-29763** static timing gauge (2) is the thickness of the shim needed in order to set the depth of the pinion.
22. Select the shim that indicates the correct thickness. Measure the shim with a micrometer in order to verify that the thickness is correct.
23. Remove the pinion depth setting tools.
24. Remove the pinion bearings.
25. Install the pinion shim between the drive pinion and the inner pinion bearing and assemble the differential carrier. Refer to [**Front Axle Assemble \(8.25 Inch LD Axle\)Front Axle Assemble \(9.25 Inch HD Axle\)**](#).

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)	-

8.25 Inch Axle	9.25 Inch Axle
1.041 mm (0.041 in)	-
1.067 mm (0.042 in)	-
1.092 mm (0.043 in)	-
1.118 mm (0.044 in)	-
1.143 mm (0.045 in)	-
1.168 mm (0.046 in)	-
1.194 mm (0.047 in)	-
1.219 mm (0.048 in)	-
1.245 mm (0.049 in)	-
1.270 mm (0.050 in)	-

FRONT AXLE ASSEMBLE (8.25 INCH LD AXLE)

Special Tools

- **GE-8092** Driver Handle (Universal Driver Handle-3/4 in 10)
- **J-8614-01** Flange and Pulley Holding Tool
- **J-35512** Inner Pinion Bearing Installer
- **J-36366** Pinion Oil Seal Installer
- **J-36599-A** Side Bearing Nut Wrench
- **J-36614** Pinion Bearing Installer
- **J-36615** Side Bearing Nut Wrench
- **J-36603-A** Side Bearing Cup Installer

For equivalent regional tools, refer to [**Special Tools**](#).

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

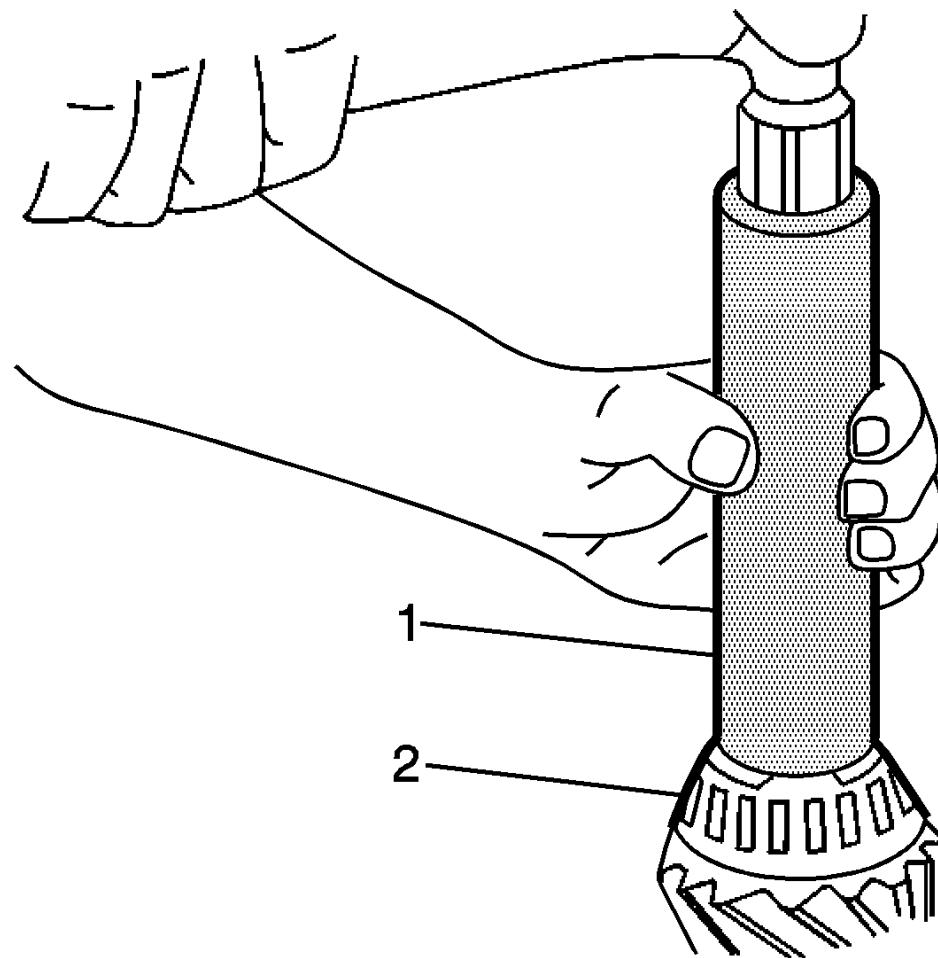


Fig. 381: Inner Pinion Bearing And Pinion Gear

Courtesy of GENERAL MOTORS COMPANY

2. Using the **J-35512** inner pinion bearing installer, install the inner pinion bearing onto the pinion gear.
3. Install the new collapsible spacer onto the pinion gear.
4. Lubricate the inner and the outer pinion bearings with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .
5. Install the outer pinion bearing into the differential carrier case half.

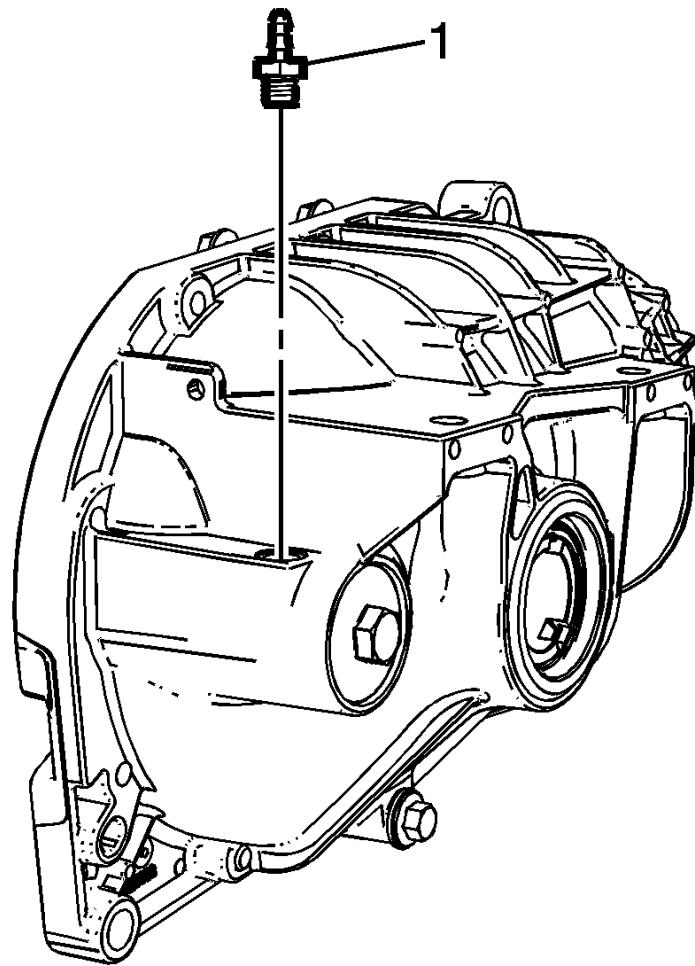


Fig. 382: Vent Hose Connector

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

6. Install the vent hose connector (1) and tighten to 28 N.m (21 lb ft).
7. Install the differential carrier case half into a vise. Place a shop towel in a vise in order to protect the differential case.

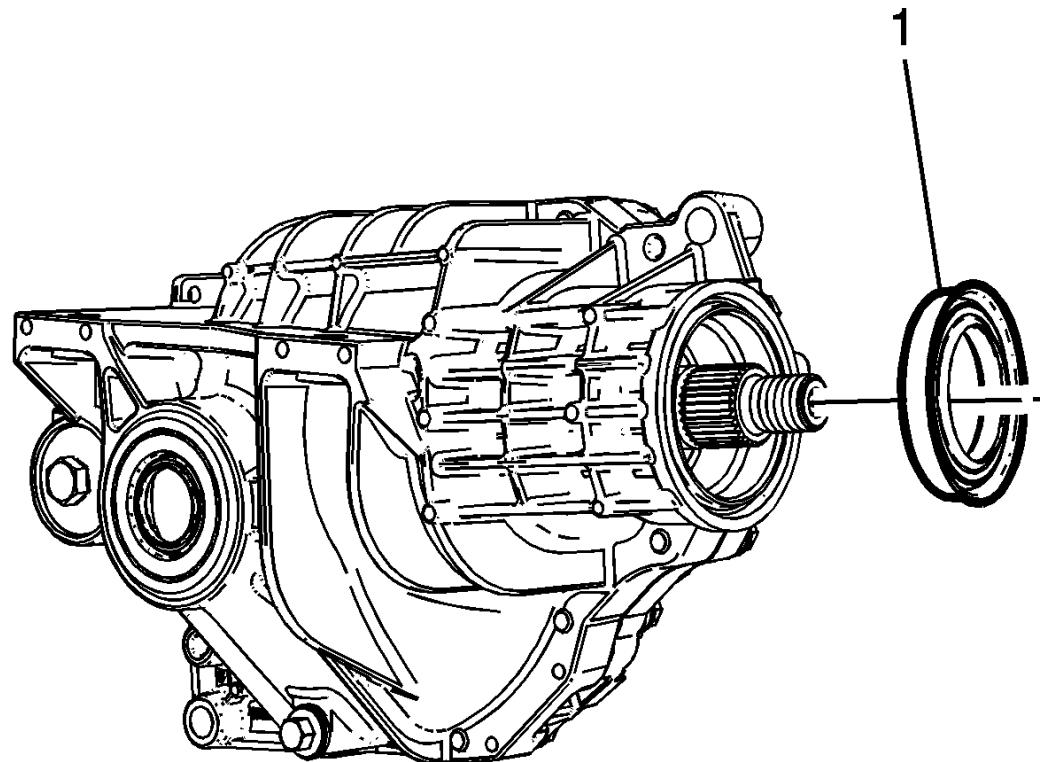


Fig. 383: Pinion Seal

Courtesy of GENERAL MOTORS COMPANY

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

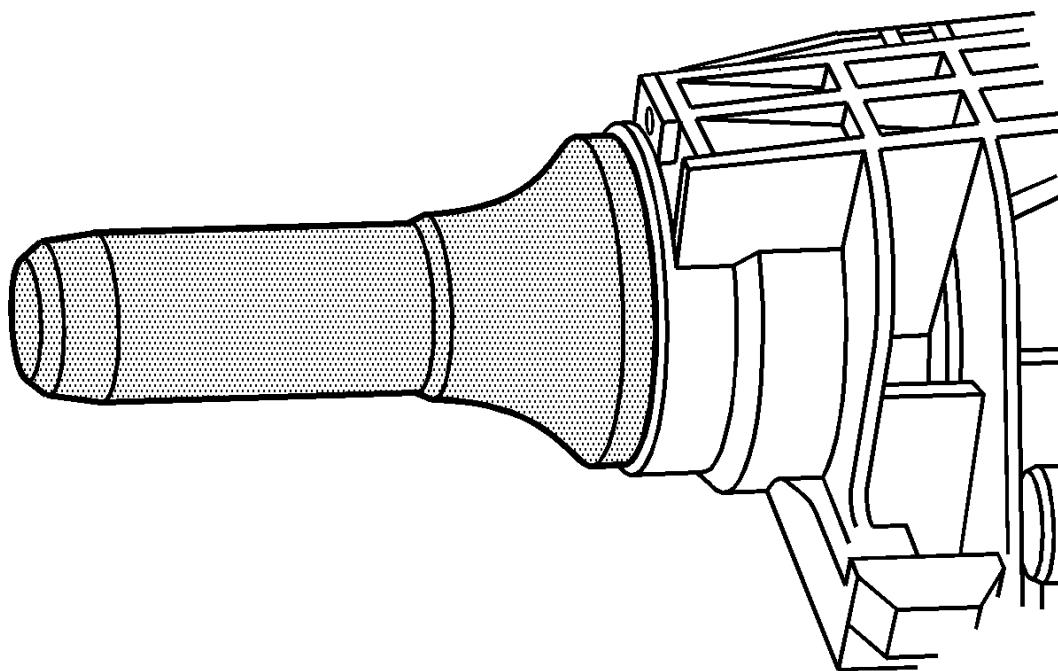


Fig. 384: View Of Special Tool J 36366 Seal Installer

Courtesy of GENERAL MOTORS COMPANY

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

9. Using the **J-36366** pinion oil seal installer, install the pinion flange seal.
10. Using the correct sealant, apply sealant to the splines of the pinion yoke. Refer to [**Adhesives, Fluids, Lubricants, and Sealers**](#).

11. Install the pinion gear, with the inner pinion bearing an the new collapsible spacer, into the left differential carrier case half.

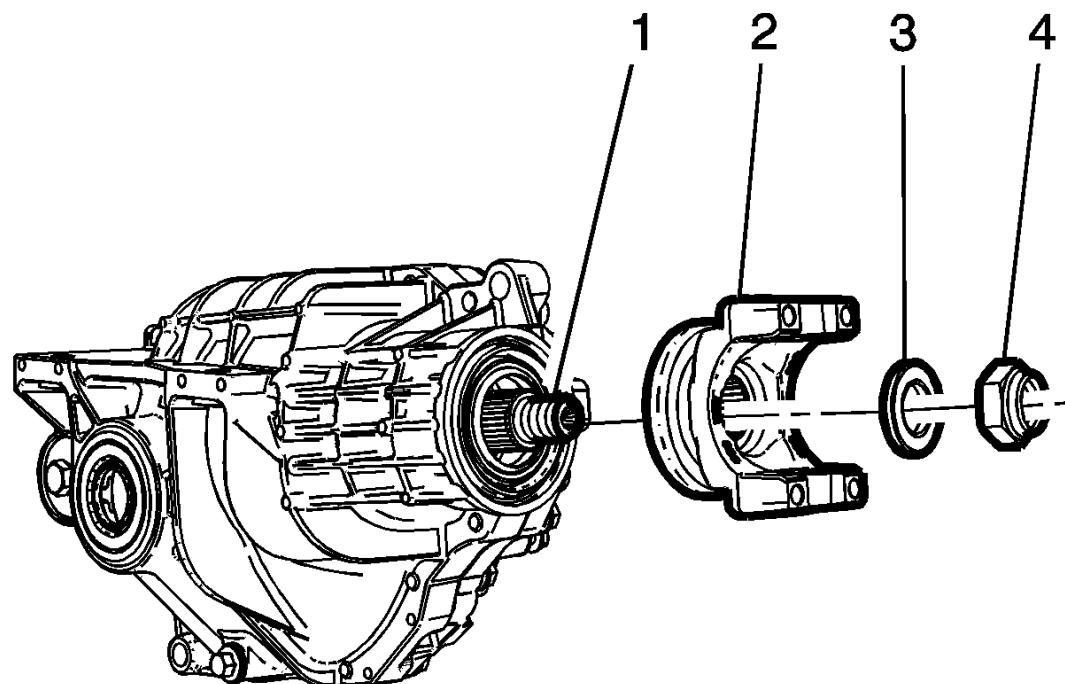


Fig. 385: Pinion Flange/Yoke Assembly Components

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Pinion Flange/Yoke Installation Caution .

12. Position the pinion flange/yoke assembly (2) on the pinion shaft (1).

13. Using a soft faced mallet, tap the on the pinion flange/yoke assembly (2) until a few pinion shaft by threads show through.
14. Install the NEW pinion washer (3) and the nut (4).
15. If the pinion nut cannot be installed, remove the pinion nut washer.
16. Install the old pinion nut and tighten the nut until a few of the shaft threads show through.
17. Remove the old pinion nut.
18. Install the **J-8614-01** flange and pulley holding tool onto the pinion flange/yoke assembly (2).

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

19. Using the **J-8614-01** flange and pulley holding tool, tighten the pinion nut until the pinion end play is just taken up. Rotating the pinion while tightening the nut will seat the bearings.
20. Remove the **J-8614-01** flange and pulley holding tool.
21. Using an inch pound torque wrench, measure the rotating torque of the pinion, which should be 1.0-2.3 N.m (10-20 lb in) for used bearings, 1.7-3.4 N.m (15-30 lb in) for new bearings.
22. If the rotating torque measurement is below 1.0 N.m (10 lb in) for used bearings, or 1.7 N.m (15 lb in) for new bearings, reinstall the **J-8614-01** flange and pulley holding tool and continue to tighten the pinion nut, which should be 1.0-2.3 N.m (10-20 lb in) for used bearings, 1.7-3.4 N.m (15-30 lb in) for new bearings.
23. Once the specified torque is obtained, rotate the pinion several time to ensure the bearings have seated. Recheck the rotating torque and adjust if necessary.
24. Remove the **J-8614-01** flange and pulley holding tool.

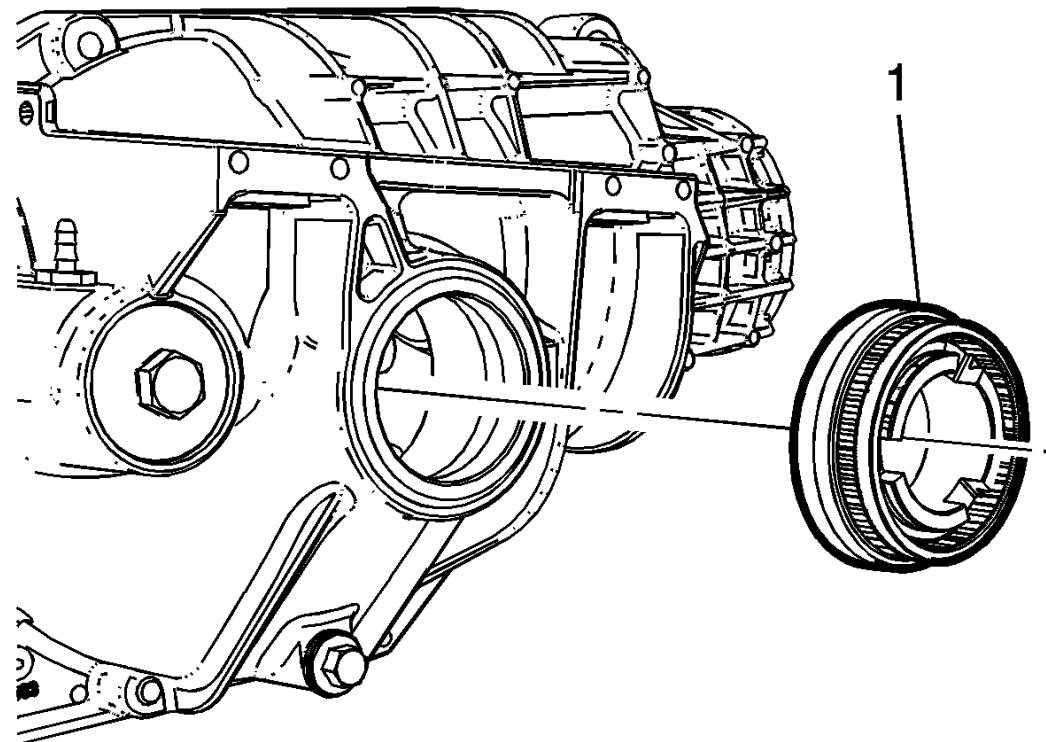


Fig. 386: Identifying Lock Ring

Courtesy of GENERAL MOTORS COMPANY

NOTE: Ensure that the differential adjuster nut is fully seated in the adjuster nut sleeve.

25. Position the differential adjuster nut (2) and the lock ring (1) in the differential case halves.

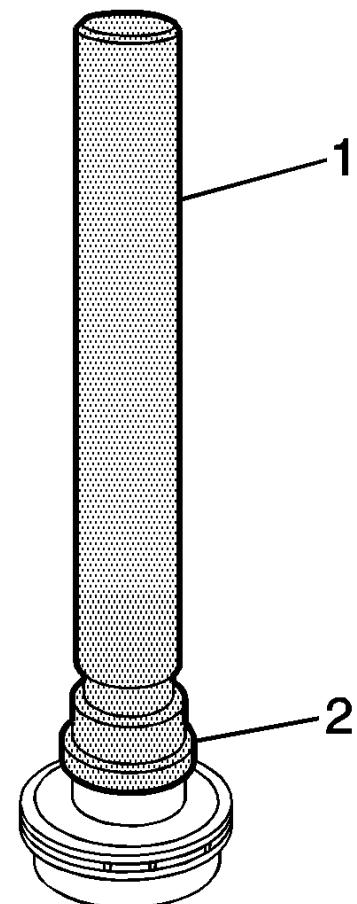


Fig. 387: View Of Special Tools J 36614 & J 8092

Courtesy of GENERAL MOTORS COMPANY

26. Using the **J-36614** pinion bearing installer (2) and the **GE-8092** driver handle (1), install the inner shaft bearing onto the differential bearing adjuster for the left and right side.

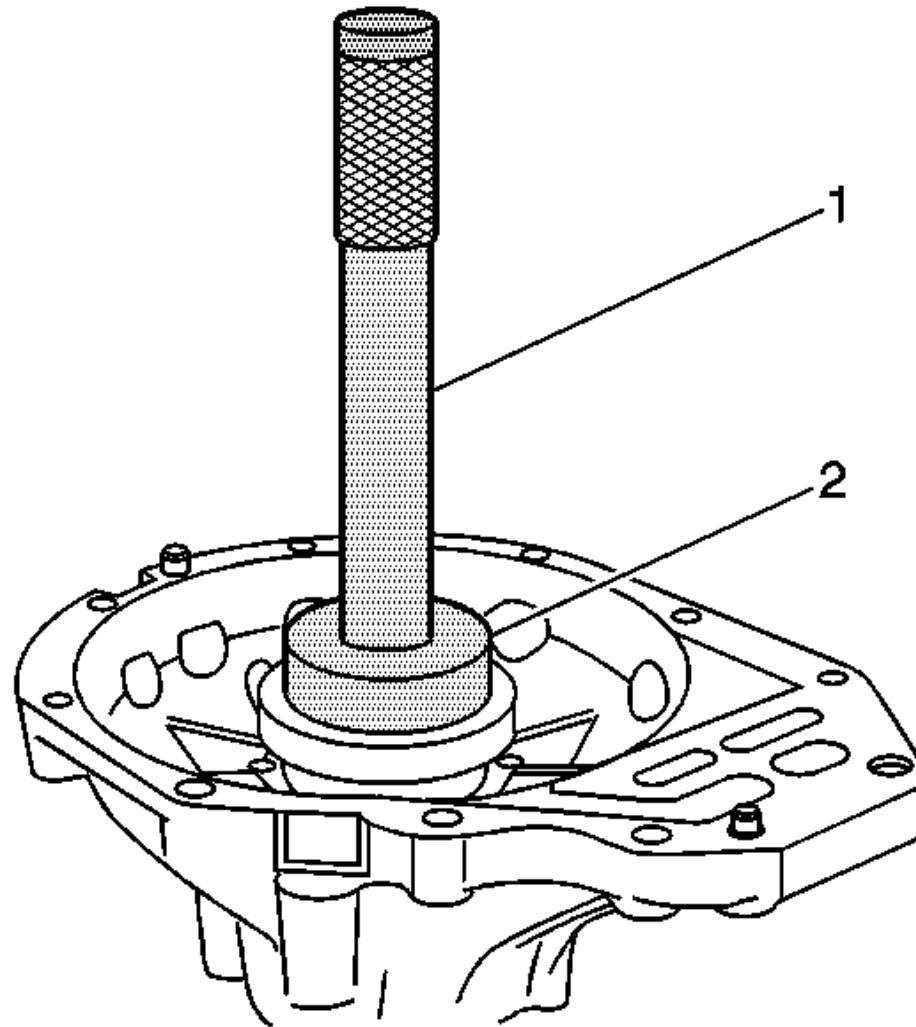


Fig. 388: Differential Case Side Bearing Cups

Courtesy of GENERAL MOTORS COMPANY

27. Using the **J-36614** pinion bearing installer (2) and the **GE-8092** driver handle (1), install the left and right side differential adjuster nut assembly into the differential carrier case.

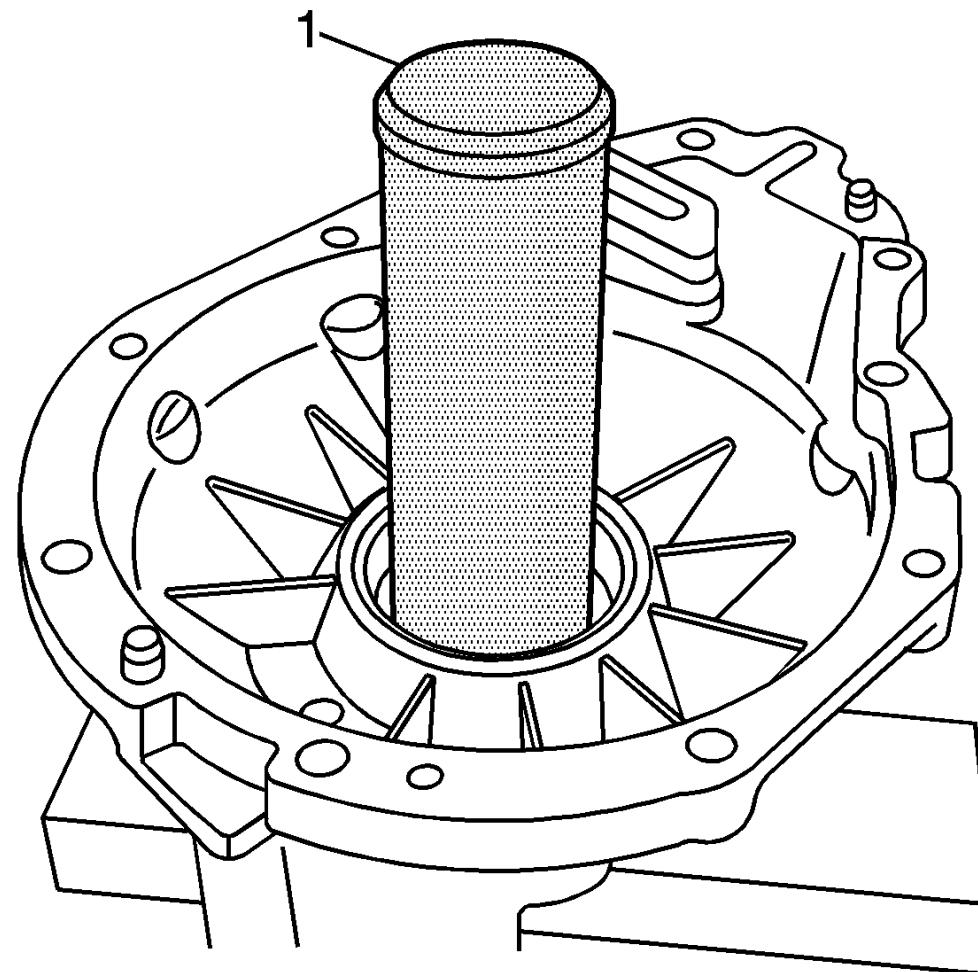


Fig. 389: View Of Special Tool J 8092

Courtesy of GENERAL MOTORS COMPANY

28. Using the **GE-8092** driver handle (1) and **J-36603-A** side bearing cup installer, install the left and right differential case side bearing cups into the differential carrier case.

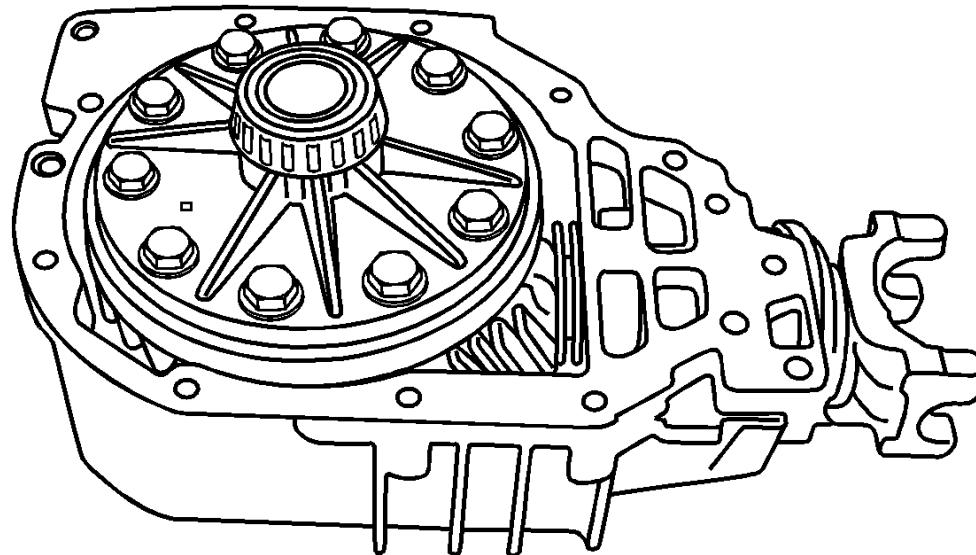


Fig. 390: View Of Differential Case Assembly & Carrier Case Half

Courtesy of GENERAL MOTORS COMPANY

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

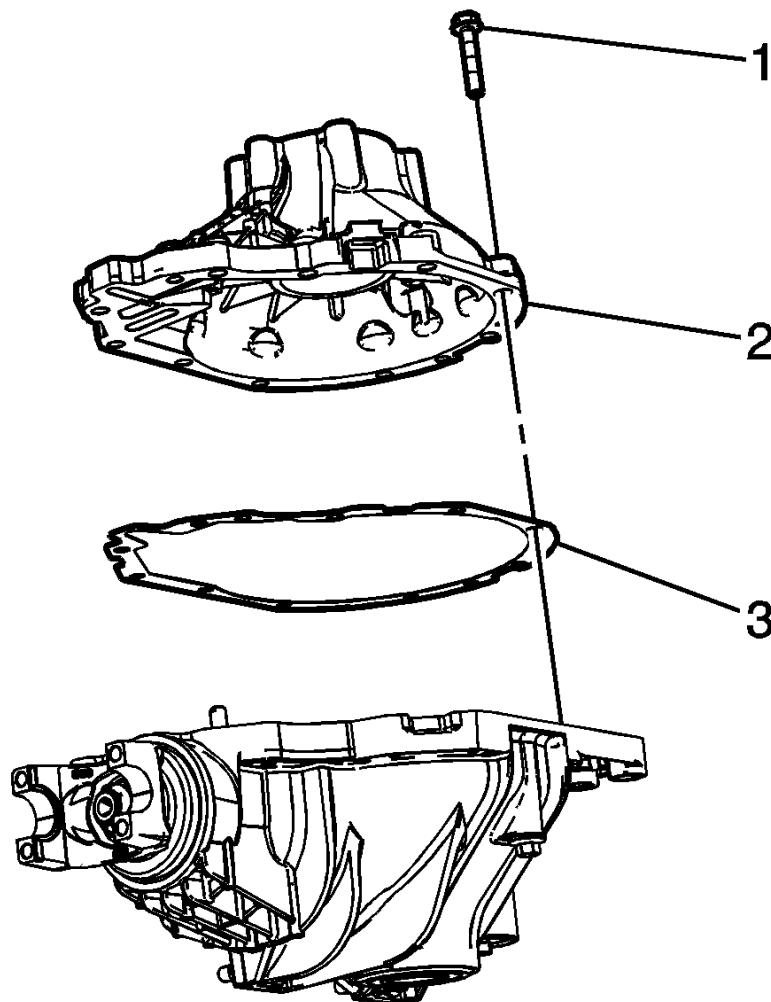


Fig. 391: View Of Differential Carrier Housing, Gasket & Bolts

Courtesy of GENERAL MOTORS COMPANY

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

30. Install the differential carrier case gasket (3).
31. Install the differential carrier case (2) half to the left differential carrier case half. If the carrier case halves do not make complete contact, use

the **J-36599-A** side bearing nut wrench in order to back out right differential adjuster nut sleeve until the differential carrier case halves make contact.

32. Install the differential carrier case bolts (1) and tighten to 73 N.m (54 lb ft).
33. Install the differential carrier assembly into a vise.
34. While rotating the pinion yoke back and forth, turn the right side differential adjuster nut clockwise using the **J-36599-A** side bearing nut wrench until 0.0254-0.072 mm (0.001-0.003 inch) of backlash can be felt between the ring gear and the drive pinion. If the backlash specification cannot be obtained, turn the left side differential adjuster nut sleeve counter clockwise using the **J-36599-A** side bearing nut wrench in small equal increments until the backlash specification can be obtained.

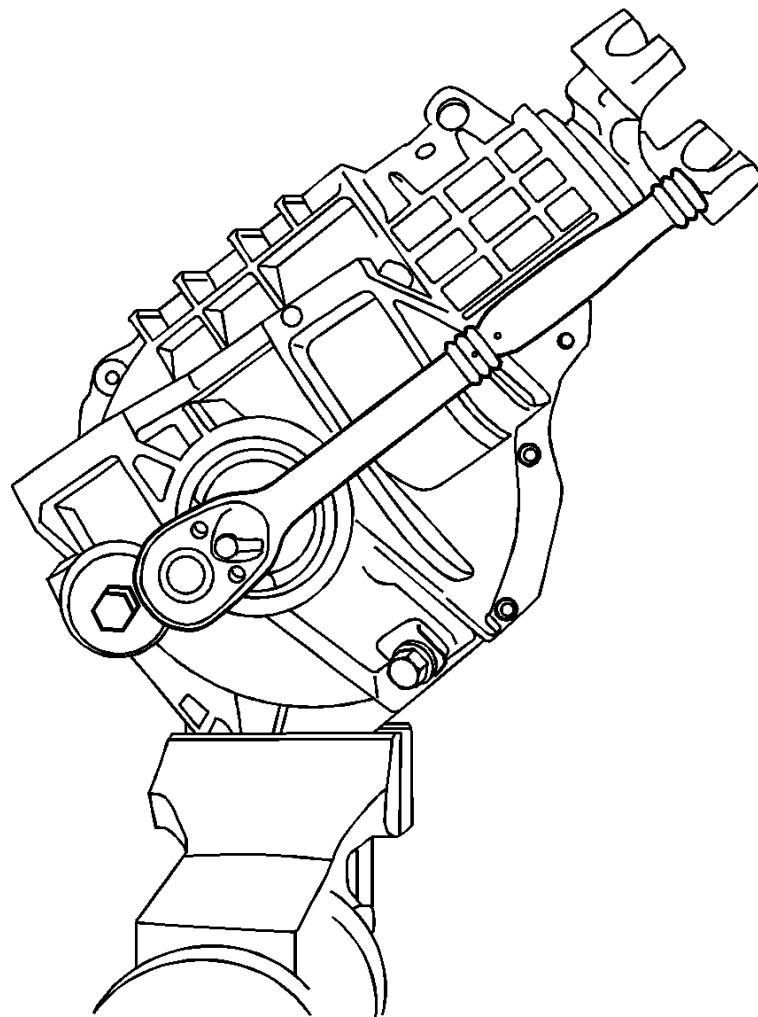


Fig. 392: Tightening Differential Adjuster Nut

Courtesy of GENERAL MOTORS COMPANY

35. Using the **J-36599-A** side bearing nut wrench turn the left side differential adjuster nut clockwise in order to preload the differential side bearings against the differential side bearings cups and tighten the adjuster nut to 75 N.m (55 lb ft).
36. Rotate the pinion several times in order to seat the pinion and differential side bearings.
37. Using an inch-pound torque wrench, measure the rotating torque of the drive pinion and differential assembly, which should be 0.57-1.13 N.m

- (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.
38. If the rotating torque of the drive pinion and differential assembly is not 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion, adjust the differential side bearing preload using the following steps:
1. Place an alignment mark between the differential adjuster nut sleeve and the differential carrier case, left and right sides.
 2. Using the **J-36599-A** side bearing nut wrench, turn the left and right side differential adjuster sleeves in or clockwise in small equal increments.
 3. Using an inch pound torque wrench, measure the rotating torque of the pinion and differential assembly.
 4. Compare the new measurement to the specification listed in Step 22. If the rotating torque of the pinion and differential assembly is not within specifications, continue to tighten the left and right side differential adjuster nut sleeves in small equal increments on each side until the rotating torque of the pinion and differential assembly is within specifications.
39. If the rotating torque of the drive pinion and differential assembly is more than 1.13 N.m (10 lb in) above the rotating torque of the drive pinion measurement, adjust the differential side bearing preload using the following steps:
1. Place an alignment mark between the differential adjuster nut sleeve and the differential carrier case, left and right sides.
 2. Using the **J-36599-A** side bearing nut wrench or the **J-36615** side bearing nut wrench, turn the left and right side differential adjuster nut sleeve out or clockwise in small equal increments.
 3. Using a torque wrench, measure the rotating torque of the pinion and differential assembly.
 4. Compare the new measurement to the specification listed in Step 22. If the rotating torque of the pinion and differential assembly is not within specifications, continue to loosen the left and right side differential adjuster nut sleeve in small equal increments on each side until the rotating torque of the pinion and differential assembly is within specifications.
40. Once the specified rotating is obtained, rotate the pinion several times to ensure the bearings have seated. Recheck the rotating torque and adjust if necessary.
41. Measure the drive pinion to the ring gear backlash and adjust, if necessary. Refer to [**Backlash Inspection and Adjustment \(8.25 Inch LD Axle\)**](#)
[**Backlash Inspection and Adjustment \(9.25 Inch HD Axle\)**](#).
42. Once the bearing preload and drive pinion to the ring gear backlash is within specifications, perform a gear tooth contact pattern check to ensure proper contact between the pinion and the ring gear. Refer to [**Gear Tooth Contact Pattern Inspection**](#).

FRONT AXLE ASSEMBLE (9.25 INCH HD AXLE)

Special Tools

- **GE-8092** Universal Driver Handle - 3/4 in - 10
- **J-8614-01** Flange and Pulley Holding Tool

- **J-36366** Pinion Oil Seal Installer
- **J-36599-A** Side Bearing Nut Wrench
- **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 (9.25 inch axle)

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

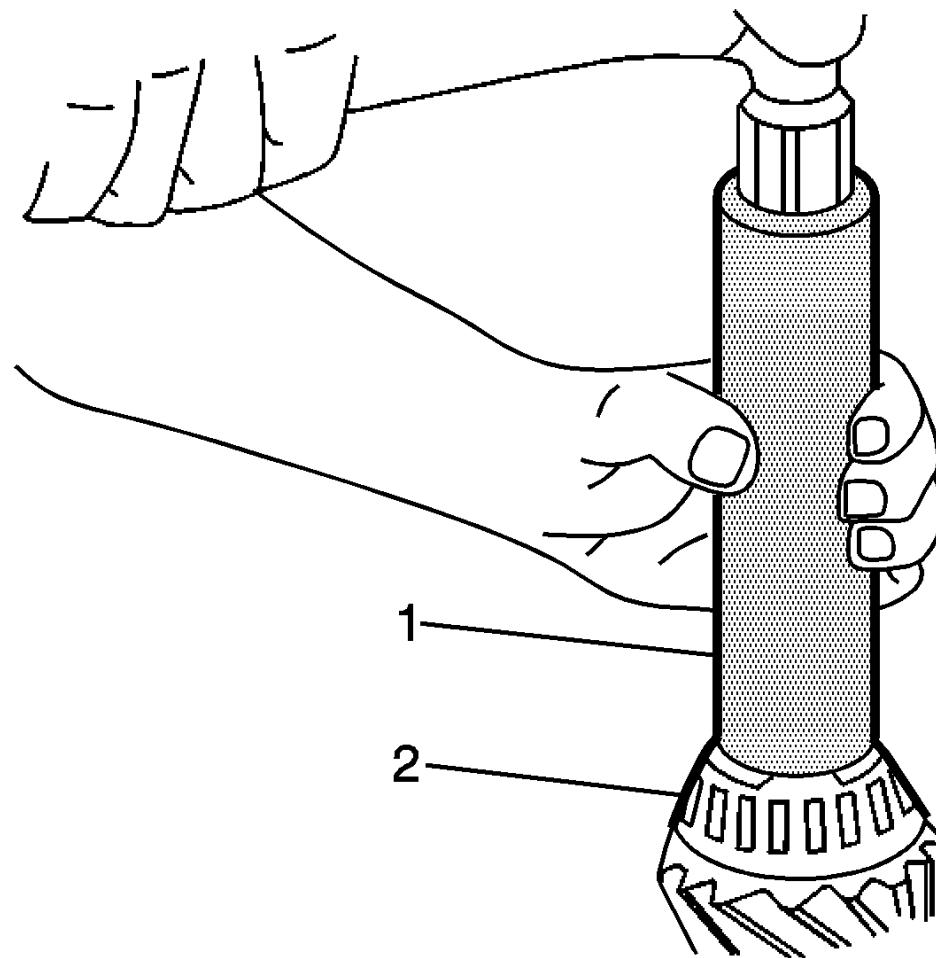


Fig. 393: Inner Pinion Bearing And Pinion Gear

Courtesy of GENERAL MOTORS COMPANY

2. Using the **J-36614** inner pinion bearing installer (1), install the inner pinion bearing (2) onto the pinion gear.
3. Install the new collapsible spacer onto the pinion gear.
4. Lubricate the inner and the outer pinion bearings with axle lubricant. Use the proper fluid. Refer to [**Fluid and Lubricant Recommendations**](#).
5. Install the outer pinion bearing into the differential carrier case half.

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

6. Install the differential carrier case half into a vise.

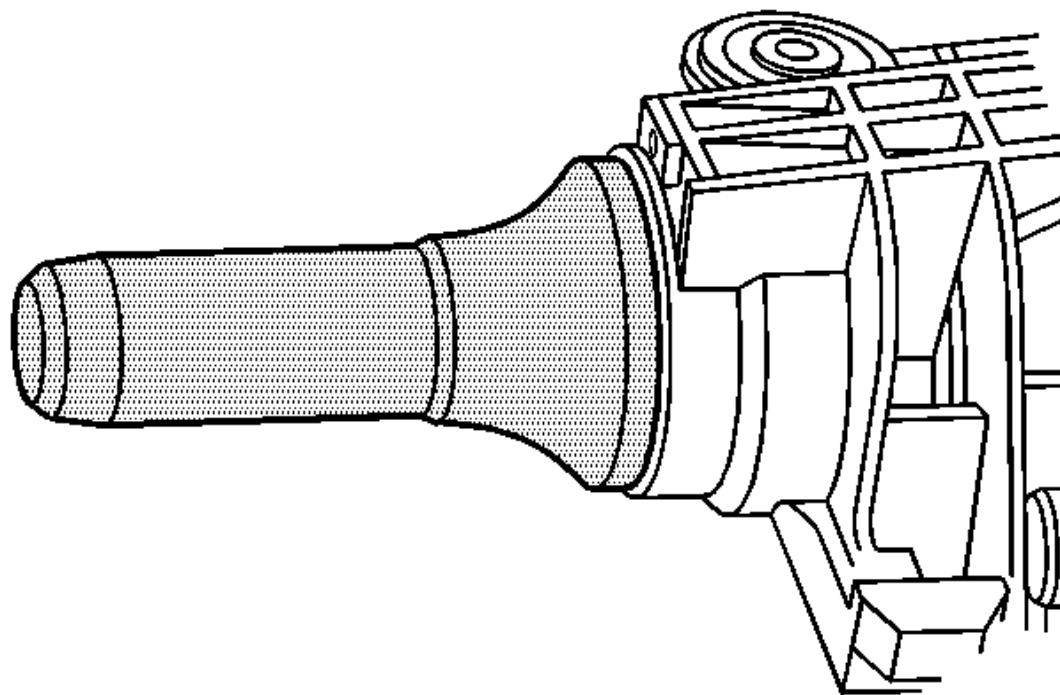


Fig. 394: View Of Oil Seal - Front Axle

Courtesy of GENERAL MOTORS COMPANY

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

7. Using the **J-36366** pinion oil seal installer, install the seal.
8. Apply sealant to the splines of the pinion yoke. Use the correct sealant. Refer to [**Adhesives, Fluids, Lubricants, and Sealers**](#).
9. Install the pinion gear, with the inner pinion bearing and the new collapsible spacer, into the left differential carrier case half.
10. Install the pinion yoke.

CAUTION: Refer to [Pinion Flange/Yoke Installation Caution**](#) .**

11. 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.
12. 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 pinion nut.
5. Install the pinion nut washer.
6. Install the new pinion nut.

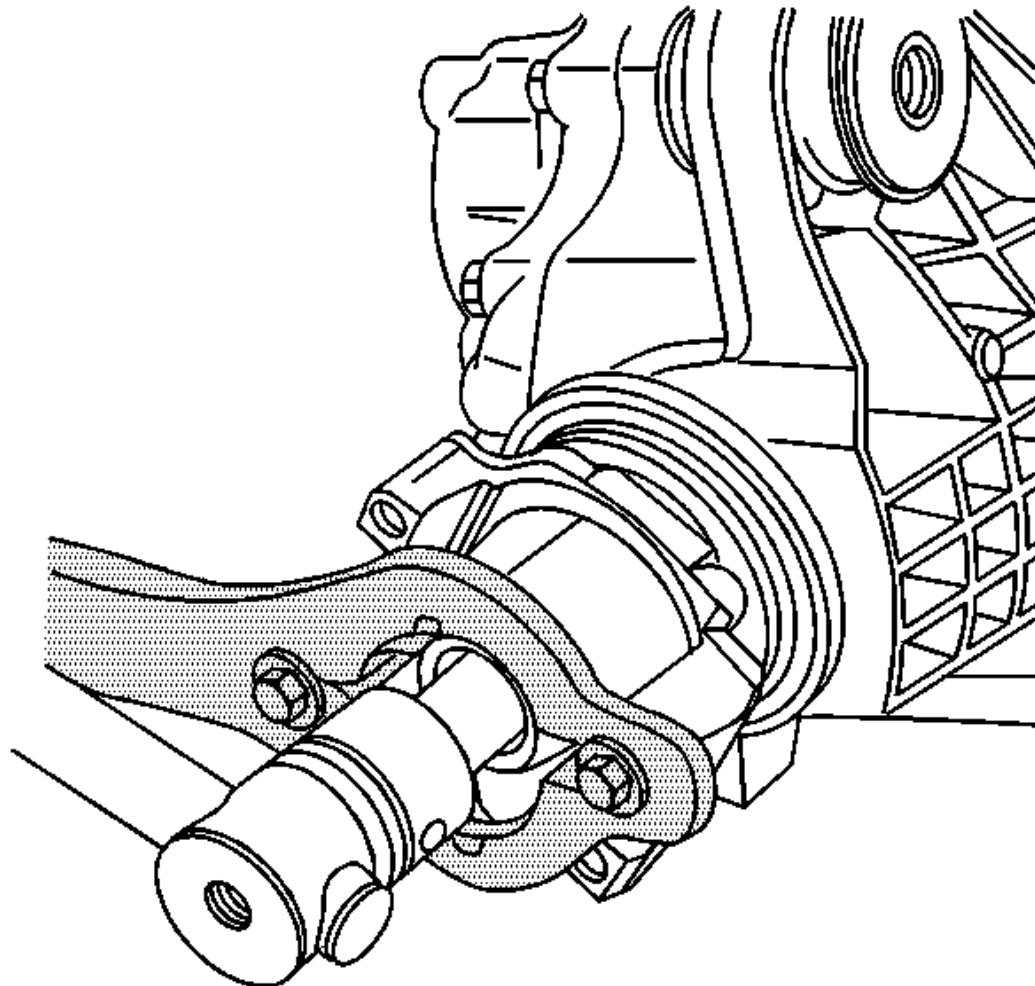


Fig. 395: Holding Pinion Flange Using Special Tool

Courtesy of GENERAL MOTORS COMPANY

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

CAUTION: Refer to Fastener Caution .

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

installed.

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

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.

15. Remove the **J-8614-01** flange and pulley holding tool.
16. 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.

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

Specification

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

18. 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.

19. Remove the **J-8614-01** flange and pulley holding tool.
20. Assemble the right side differential adjuster nut into the differential nut sleeve until fully seated.

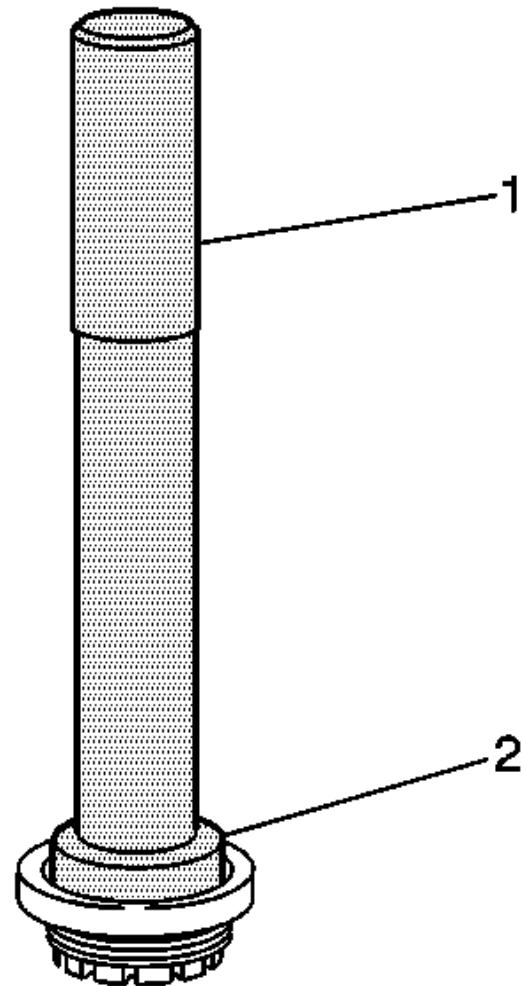


Fig. 396: Bearings, Differential Adjuster Nut Sleeve And Installer

Courtesy of GENERAL MOTORS COMPANY

21. Apply a small amount of lubricant on the right adjuster threads. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).
22. Install the right side axle shaft bearings into the differential adjuster nut sleeve using the **J-36612** output shaft bearing installer (2) and the **GE-8092** universal driver handle (1).
23. Apply a small amount of lubricant on the left adjuster threads. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).

24. Install the left side axle shaft bearing into the differential adjuster nut sleeve using the **J-36609** axle tube bearing installer and the **GE-8092** universal driver handle.
25. Install the right side differential adjuster nut assembly and new adjuster lock nut tab into the differential carrier case using the **J-36609** axle tube bearing installer and the **GE-8092** universal driver handle.
26. Install the left side differential adjuster nut assembly into the differential carrier case.

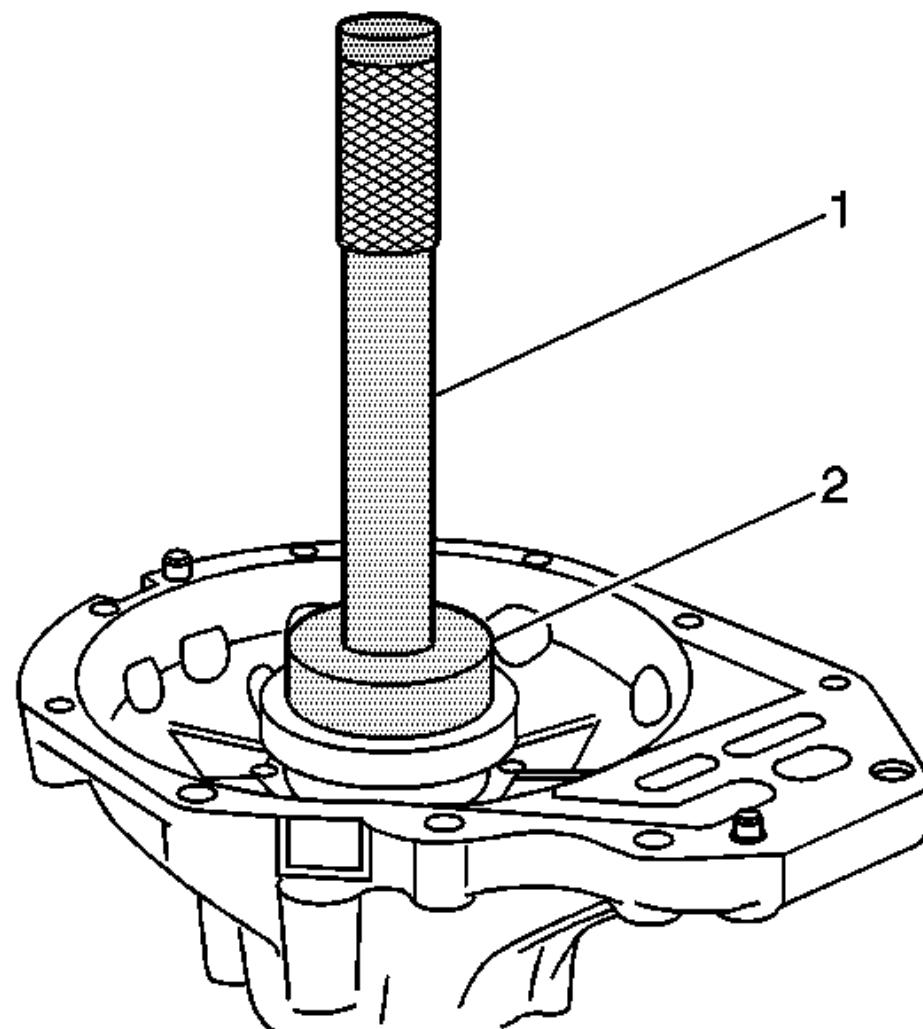
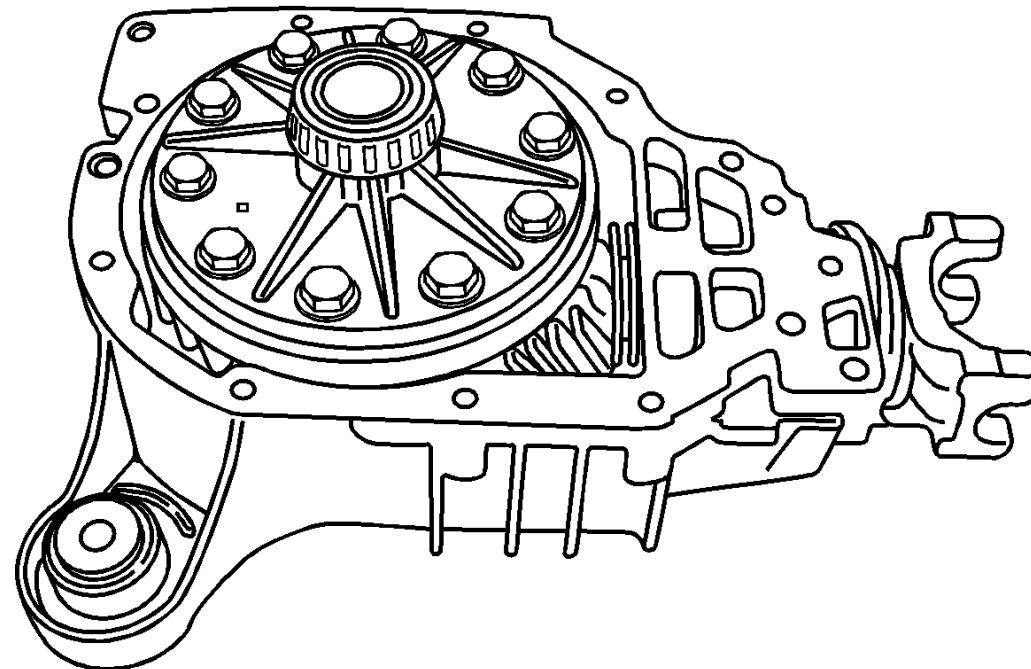


Fig. 397: Differential Case Side Bearing Cups

Courtesy of GENERAL MOTORS COMPANY

27. Install the right side differential case side bearing cups to the differential carrier case using the **J-36603** side bearing cup installer (2) and the **GE-8092** universal driver handle (1).



[Fig. 398: Differential Case Assembly](#)

Courtesy of GENERAL MOTORS COMPANY

28. Install the differential case assembly into the left differential carrier case half.
29. 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.

30. Apply a bead of sealer to one differential carrier case half sealing surface. Use the correct sealer. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).

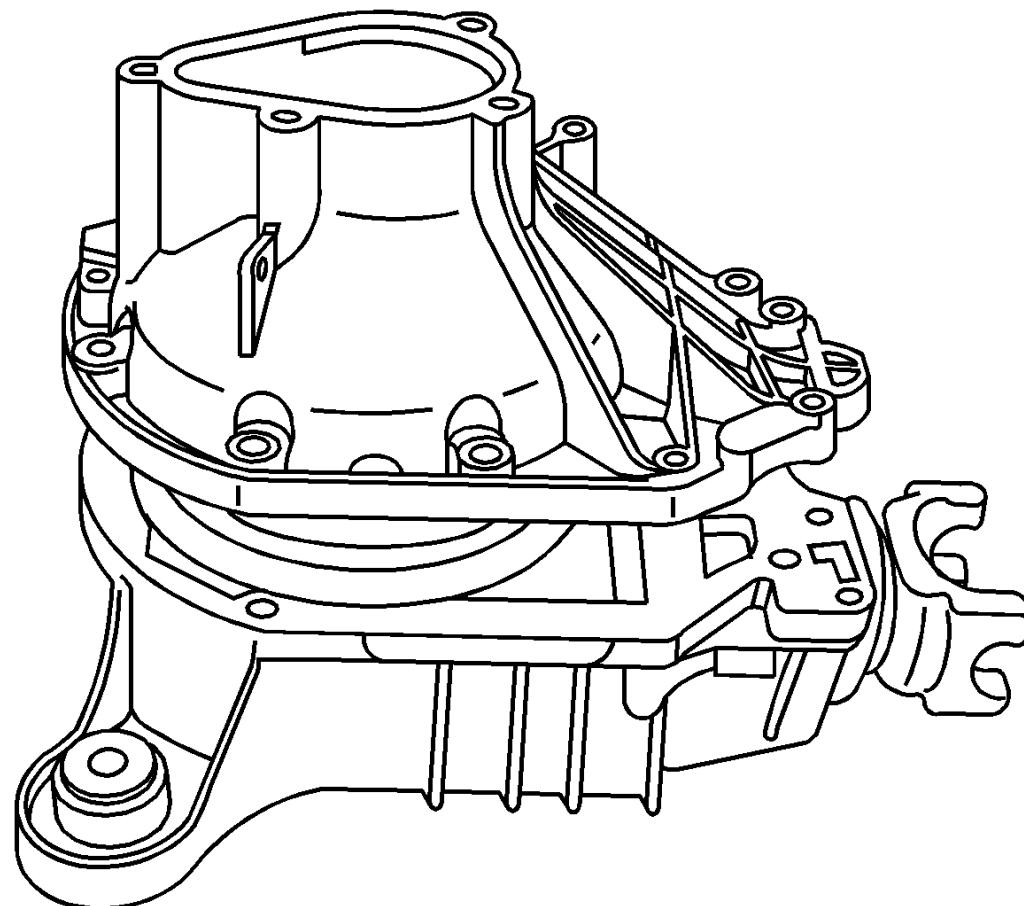


Fig. 399: Differential Case Assembly

Courtesy of GENERAL MOTORS COMPANY

31. 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** side bearing nut wrench in order to back out the right differential adjuster nut sleeve until the differential carrier case halves make contact.

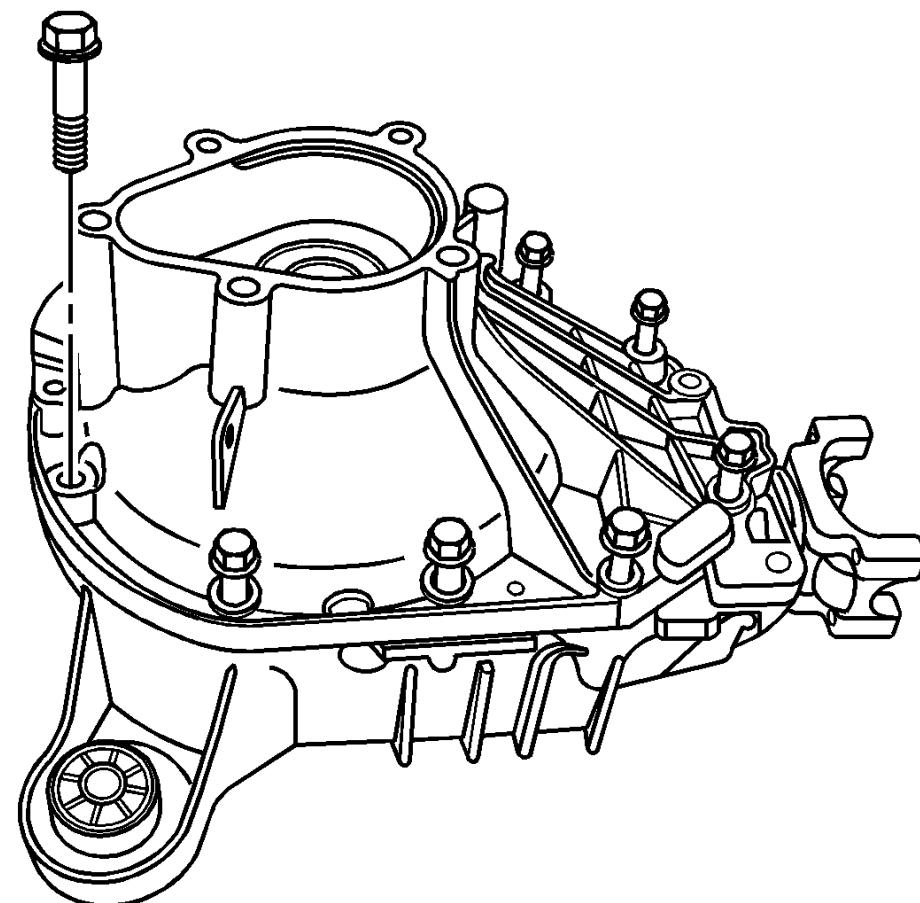


Fig. 400: Differential Carrier Assembly Bolts
Courtesy of GENERAL MOTORS COMPANY

32. Install the differential carrier case bolts.

Tighten

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

33. Install the differential carrier assembly into a vise.

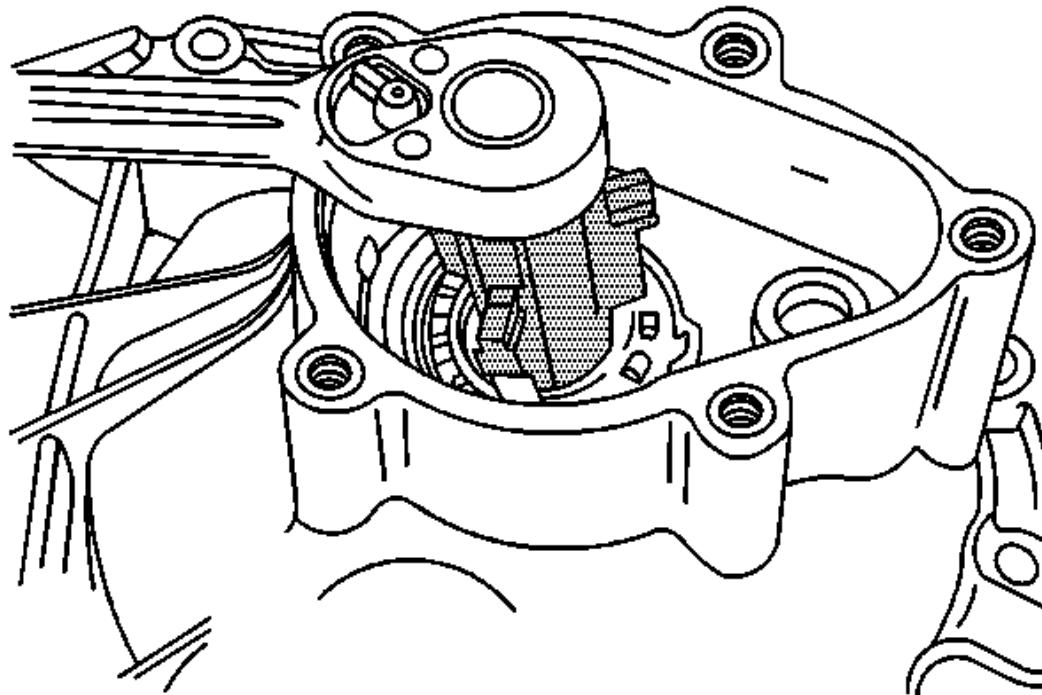


Fig. 401: Differential Bearing Adjuster Nuts & Bearing Cups

Courtesy of GENERAL MOTORS COMPANY

34. While rotating the pinion yoke back and forth, turn the right side differential adjuster nut sleeve clockwise using the **J-36599-A** side bearing nut wrench until 0.0254-0.0762 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** side bearing nut wrench one notch at a time until the backlash specification can be obtained.

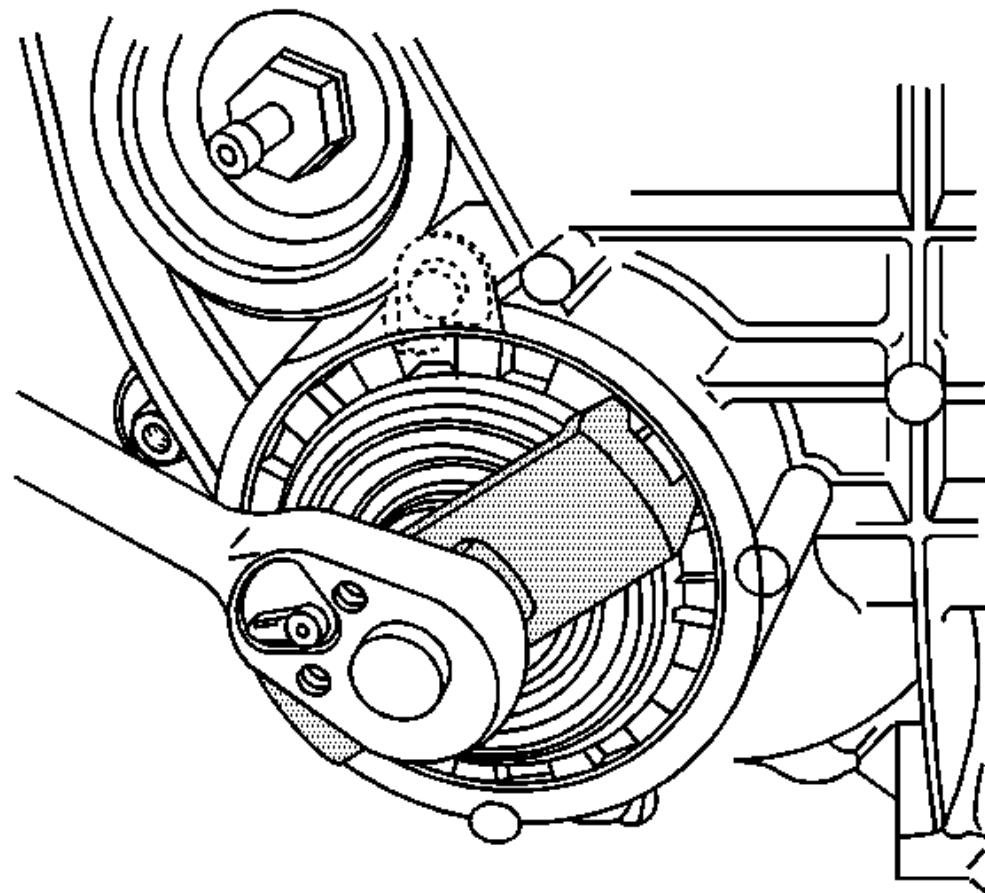


Fig. 402: Left Side Differential Bearing Adjuster Nut

Courtesy of GENERAL MOTORS COMPANY

35. Turn the left side differential adjuster nut clockwise using the **J-36615** side bearing nut wrench in order to preload the differential side bearings against the differential side bearing cups.

Tighten

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

36. Rotate the pinion several times in order to seat the pinion and differential side bearings.
37. Using an inch-pound torque wrench, measure the rotating torque of the drive pinion.

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.

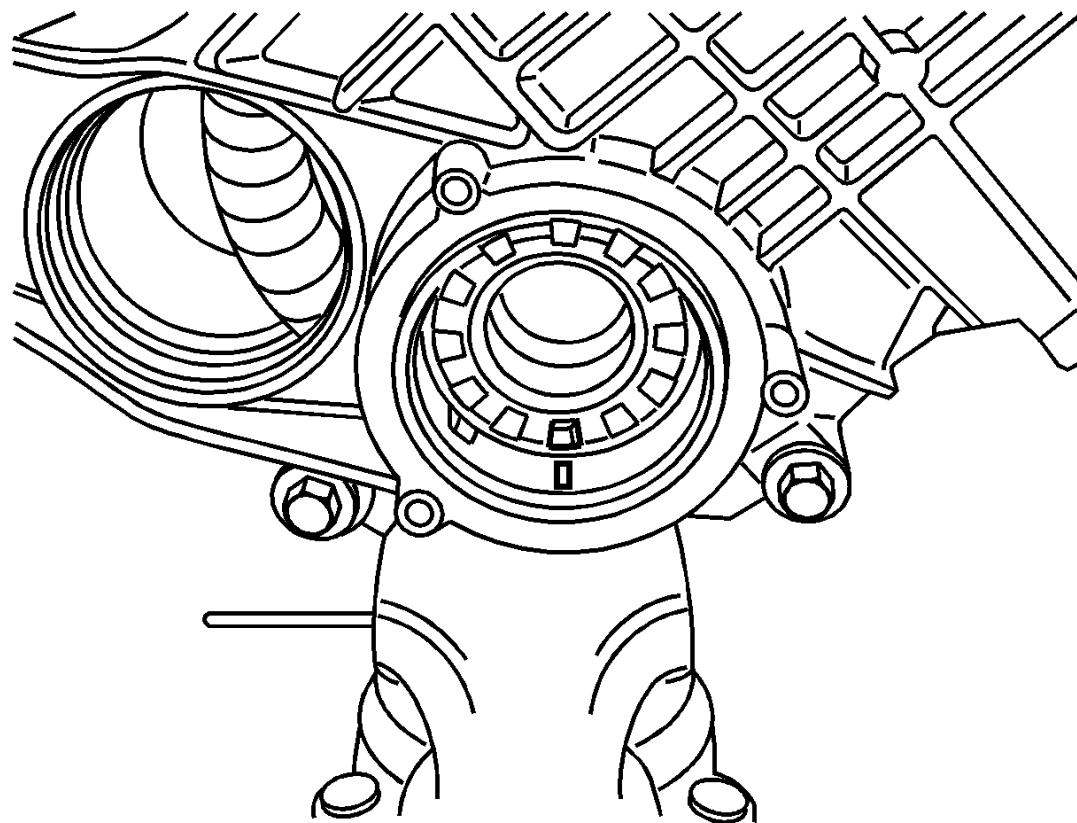


Fig. 403: Alignment Mark Between Differential Adjuster Nut Sleeve & Differential Carrier Case

Courtesy of GENERAL MOTORS COMPANY

38. 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** side bearing nut wrench or the **J-36615** side bearing nut wrench, turn the left and the right side differential adjuster

nut sleeves in or clockwise one notch.

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.
39. 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** side bearing nut wrench or the **J-36615** side bearing nut wrench, turn the left and the right side differential adjuster nut sleeves out or counterclockwise one notch.
 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.
40. 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.

41. Measure the drive pinion to ring gear backlash and adjust, if necessary. Refer to [**Backlash Inspection and Adjustment \(9.25 Inch HD Axle\)**](#).
42. 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**](#).

BACKLASH INSPECTION AND ADJUSTMENT (8.25 INCH LD AXLE)

Tools Required

- **J-8001** Dial Indicator Set
- **J-36599-A** Side Bearing Nut Wrench

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

Ensure that the notches can be counted when turned.

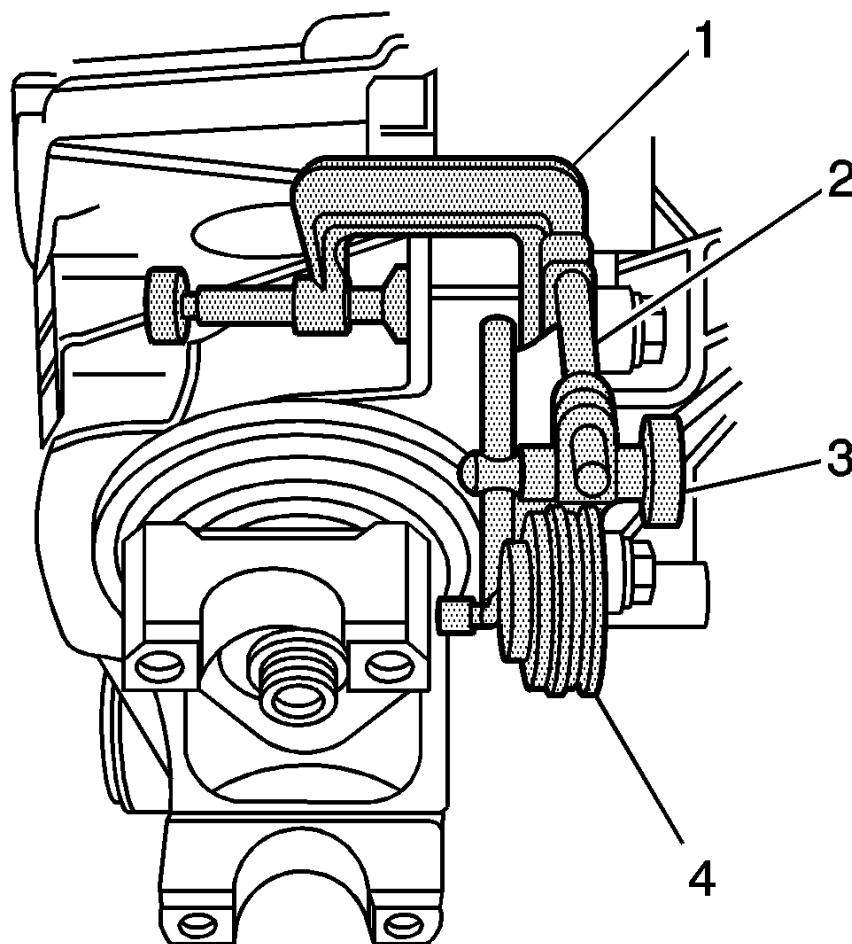


Fig. 404: Measuring Ring Gear Backlash

Courtesy of GENERAL MOTORS COMPANY

2. Install the J-8001-1 (1, 2), the J-8001-2 (3), and the J-8001-3 (4) as shown.

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

3. Move the pinion yoke back and forth through the pinion yoke's free play while not allowing the ring gear to move.

4. Record the dial indicator reading.
5. To determine the actual backlash, divide the dial indicator reading by 2.

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

Specification

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

When adjusting the backlash, observe the following:

IMPORTANT:

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

6. If the backlash is too small, increase the backlash by turning the right differential adjuster nut out using the **J-36599-A** side bearing nut wrench and the left differential adjuster nut using the **J-36599-A** side bearing nut wrench until the correct backlash is obtained. For the late 8.25 "LOCK RING" design front axle, turn out the right differential adjuster nut in small increments using the **J-36599-A** side bearing nut wrench and the left differential adjuster nut in small increments until the correct backlash is obtained.
7. If the backlash is too large, decrease the backlash by turning the left differential adjuster nut out using the **J-36599-A** side bearing nut wrench and the right differential adjuster nut in using the **J-36599-A** side bearing nut wrench until the correct backlash is obtained. For the late 8.25 "LOCK RING" design front axle, turn out the left differential adjuster nut out in small increments using the **J-36599-A** side bearing nut wrench and the right differential adjuster nut in small increments until the correct backlash is obtained.
8. Recheck the rotating torque of the pinion and differential assembly and adjust, if necessary. Refer to [**Front Axle Assemble \(8.25 Inch LD Axle\)**](#).
9. Once the backlash and bearing preload is within specifications, remove the alignment markings and place new alignment marks between the differential bearing adjuster nut and the differential carrier assembly case.
10. Continue the assembly of the differential carrier. Refer to [**Front Axle Assemble \(8.25 Inch LD Axle\)**](#).

BACKLASH INSPECTION AND ADJUSTMENT (9.25 INCH HD AXLE)

Tools Required

- **J-8001** Dial Indicator Set
- **J-36615** Side Bearing Nut Wrench

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

Ensure that the notches can be counted when turned.

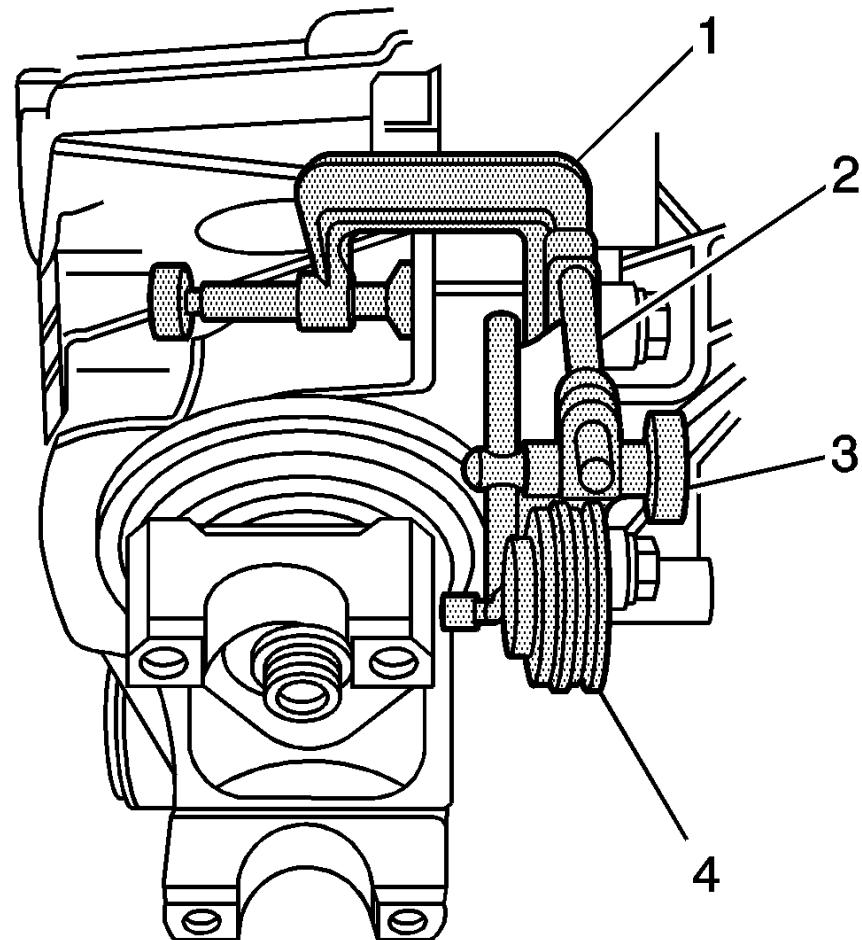


Fig. 405: Measuring Ring Gear Backlash

Courtesy of GENERAL MOTORS COMPANY

2. Install the J-8001-1 (1, 2), the J-8001-2 (3), and the J-8001-3 (4) as shown.

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

3. Move the pinion yoke back and forth through the pinion yoke's free play while not allowing the ring gear to move.

4. Record the dial indicator reading.

5. To determine the actual backlash, divide the dial indicator reading by 2.

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

Specification

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

When adjusting the backlash, observe the following:

IMPORTANT:

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

6. If the backlash is too small, increase the backlash by turning the right differential adjuster nut out using the **J-36615** side bearing nut wrench, 9.25 inch axle, and the left differential adjuster nut using the **J-36599-A** side bearing nut wrench until the correct backlash is obtained. For the late 8.25 "LOCK RING" design front axle, turn out the right differential adjuster nut in small increments using the **J-36599-A** side bearing nut wrench and the left differential adjuster nut in small increments until the correct backlash is obtained.

7. If the backlash is too large, decrease the backlash by turning the left differential adjuster nut out using the **J-36615** side bearing nut wrench, 9.25 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 **Front Axle Assemble (9.25 Inch HD Axle)**.

9. Once the backlash and bearing preload is within specifications, remove the alignment markings and place new alignment marks between the differential bearing adjuster nut and the differential carrier assembly case.

10. Continue the assembly of the differential carrier. Refer to **Front Axle Assemble (9.25 Inch HD Axle)**.

DIFFERENTIAL CARRIER ASSEMBLY FINAL ASSEMBLY (9.25 INCH HD AXLE)

Special Tools

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

1. Inspect the alignment mark between the differential bearing adjuster and the differential carrier assembly case. If the line between the differential bearing adjuster and the differential carrier assembly case is not aligned, re-align the 2 components as necessary.
2. Bend the differential adjuster nut lock tabs over the differential adjuster nut sleeves, 9.25 inch axle - right side.

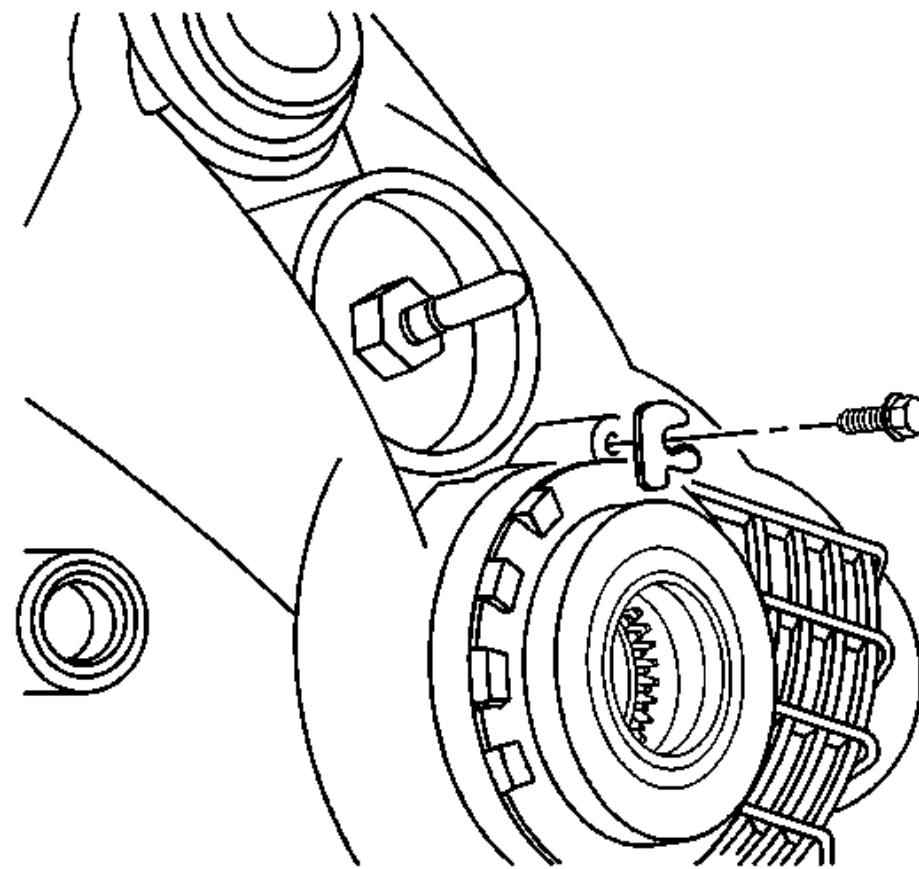


Fig. 406: Left Side Differential Bearing Adjuster Nut Lock & Bolt

Courtesy of GENERAL MOTORS COMPANY

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

CAUTION: Refer to Fastener Caution .

4. Install the differential adjuster nut lock bolt and tighten to 20 N.m (15 lb ft).

- Using the correct fluid, lubricate the clutch shaft pilot bearing with axle lubricant. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).

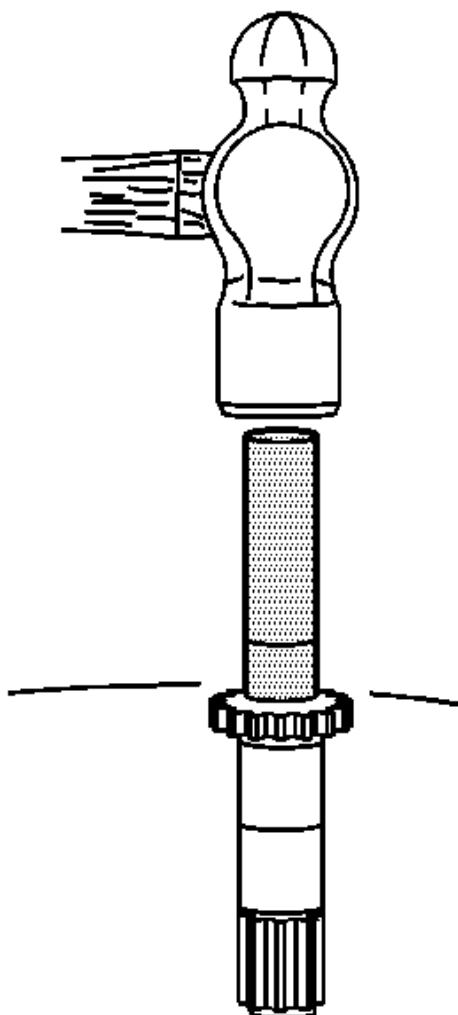


Fig. 407: Clutch Shaft Pilot Bearing

Courtesy of GENERAL MOTORS COMPANY

- Using the **J 33842** installer, install the clutch shaft pilot bearing.

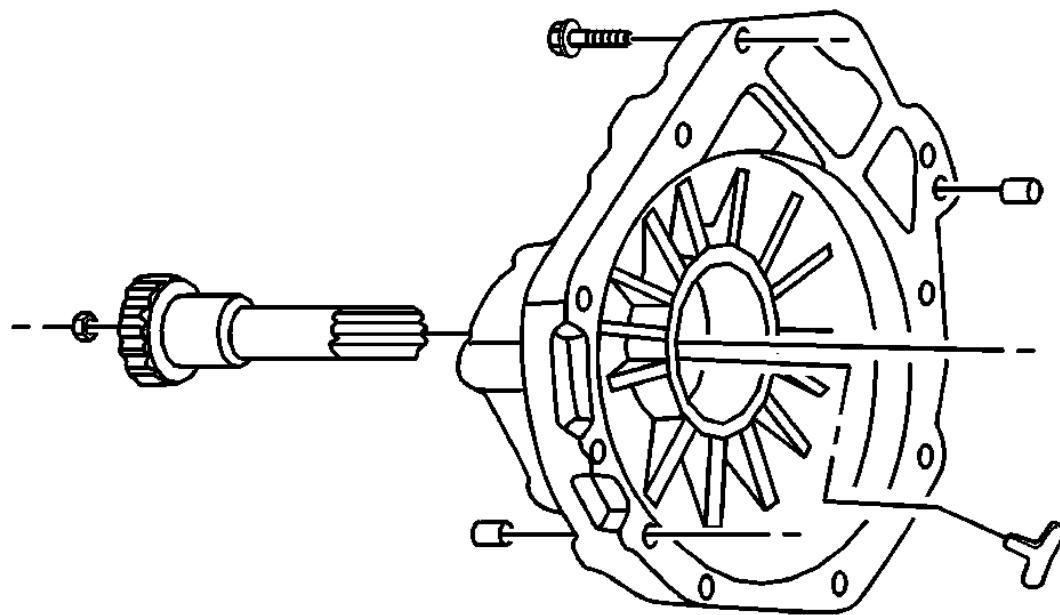


Fig. 408: Differential Carrier Assembly Bolts
Courtesy of GENERAL MOTORS COMPANY

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

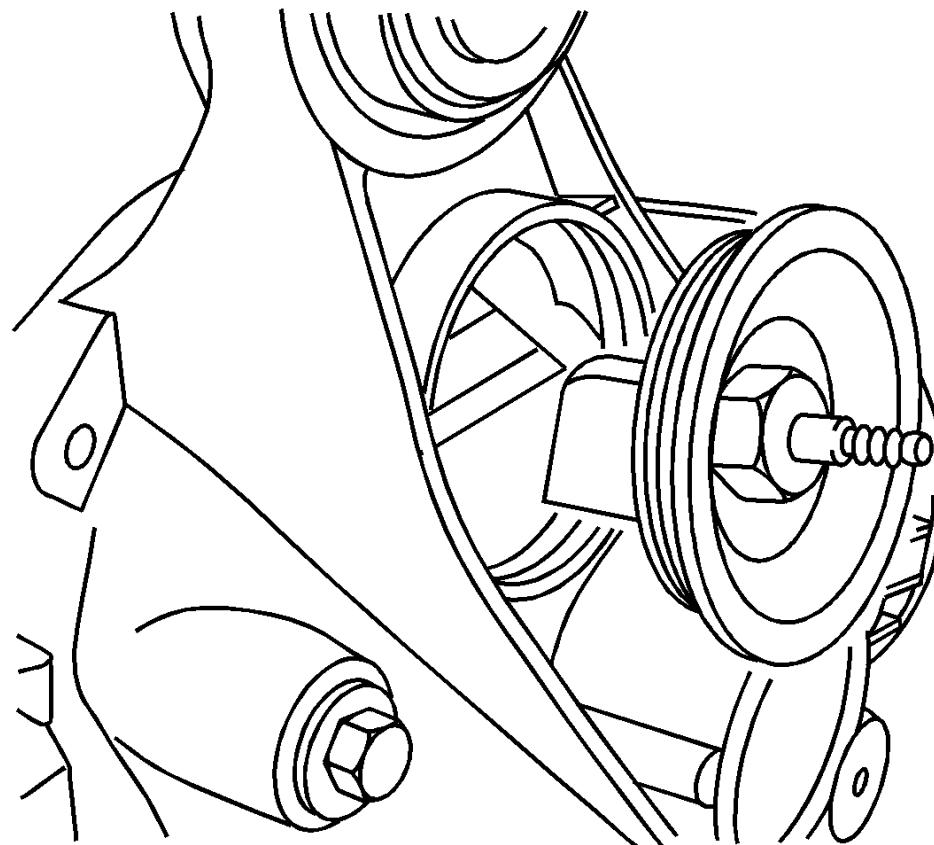


Fig. 409: View Of Vent Hose Connector

Courtesy of GENERAL MOTORS COMPANY

8. If servicing the 9.25 inch axle, install the vent hose connector and tighten to 28 N.m (21 lb ft).

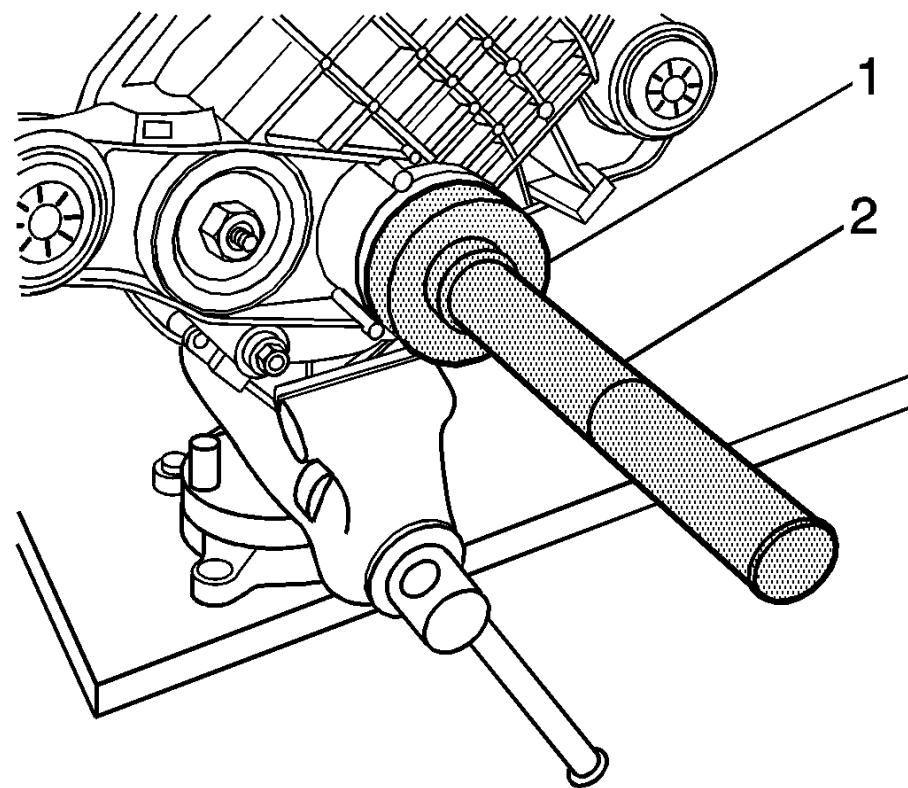


Fig. 410: Installing Axle Shaft Seal

Courtesy of GENERAL MOTORS COMPANY

9. Using the **J 45225** installer (1) and the **J 8092** handle (2), install the new left side axle shaft seal.
10. Install the new left side inner axle shaft retainer ring.

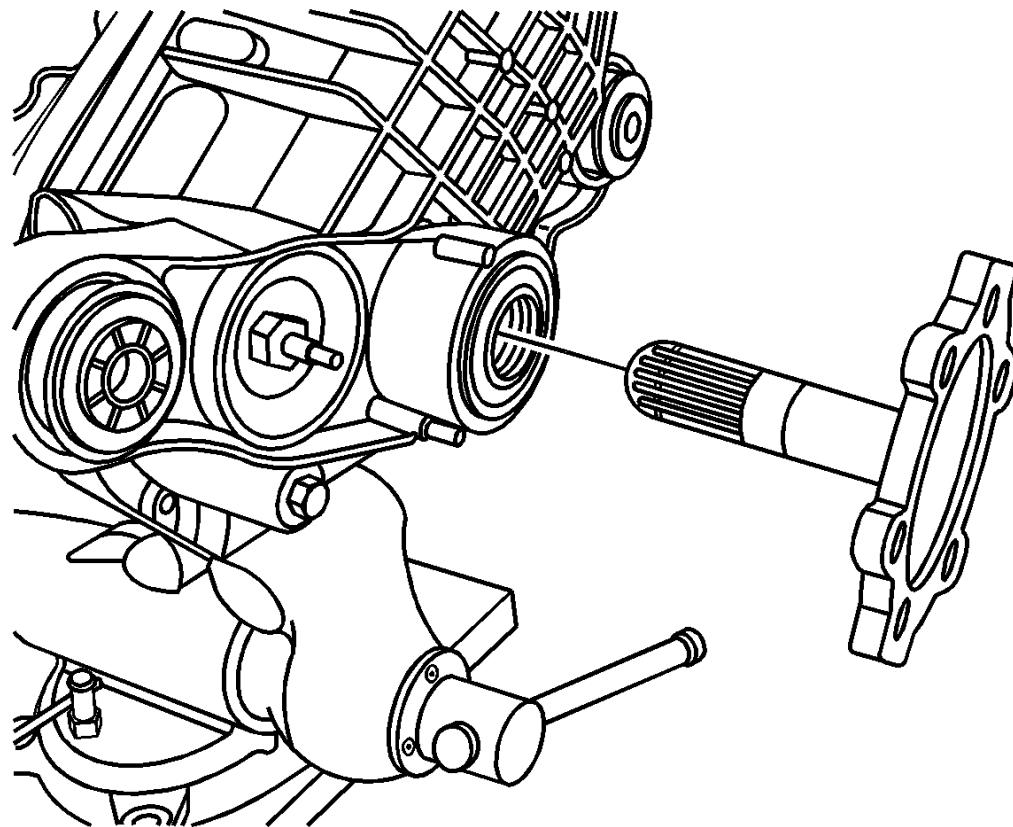


Fig. 411: Installing Left Side Inner Axle Shaft

Courtesy of GENERAL MOTORS COMPANY

11. Install the left side inner shaft into the differential carrier assembly until the inner shaft is seated against the differential side gear.
12. Hold 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.
13. Using a soft-faced mallet, drive the inner shaft into the differential case side gear until the retaining ring on the inner shaft is fully seated within

the groove in the differential case side gear.

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

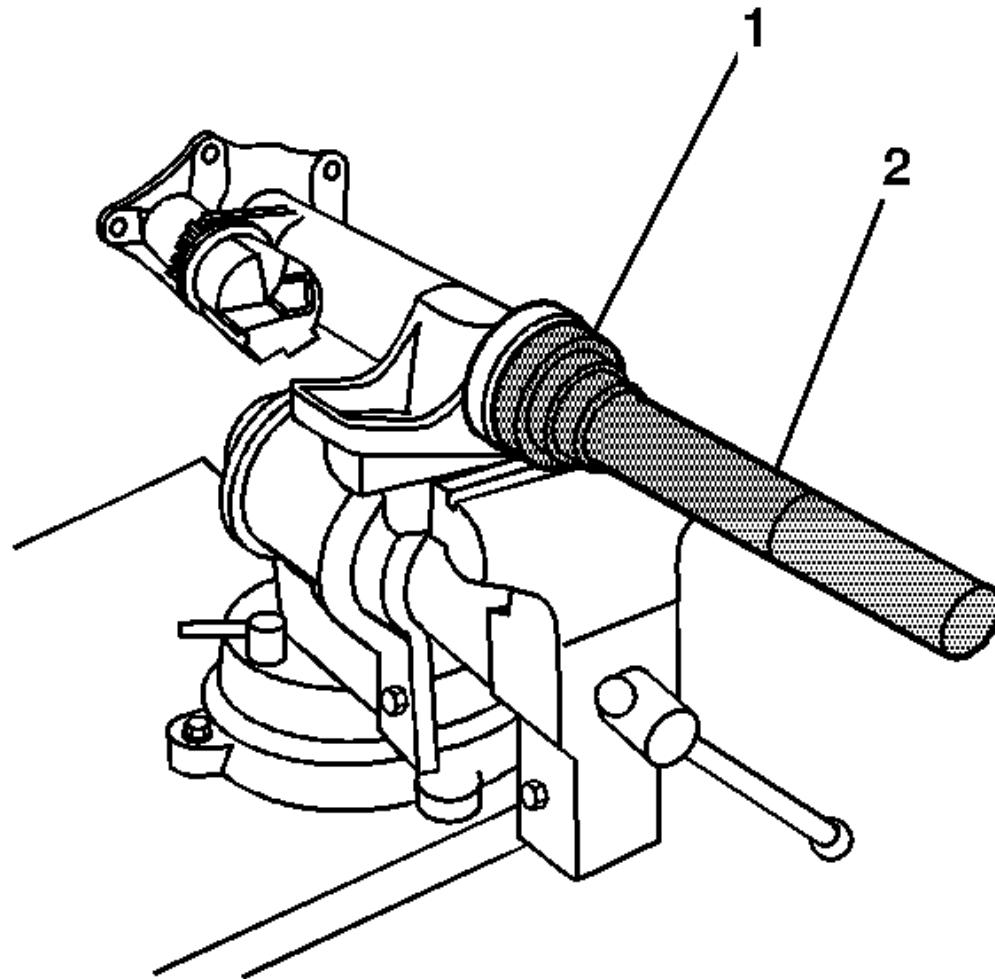


Fig. 412: Side Bearing - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

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

17. Using the **J 36609** installer (1) and the **J 8092** handle (2), install the bearing.

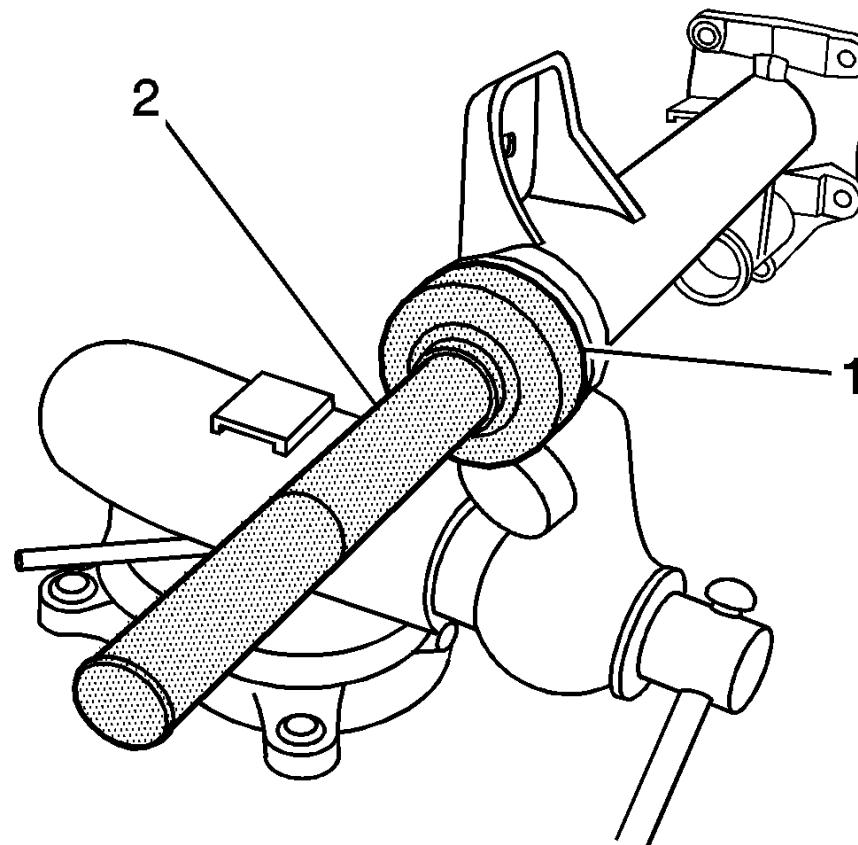


Fig. 413: New Axle Shaft Seal - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

18. Using the **J 45225** installer (1) and the **J 8092** handle (2), install the new right side inner axle shaft seal.

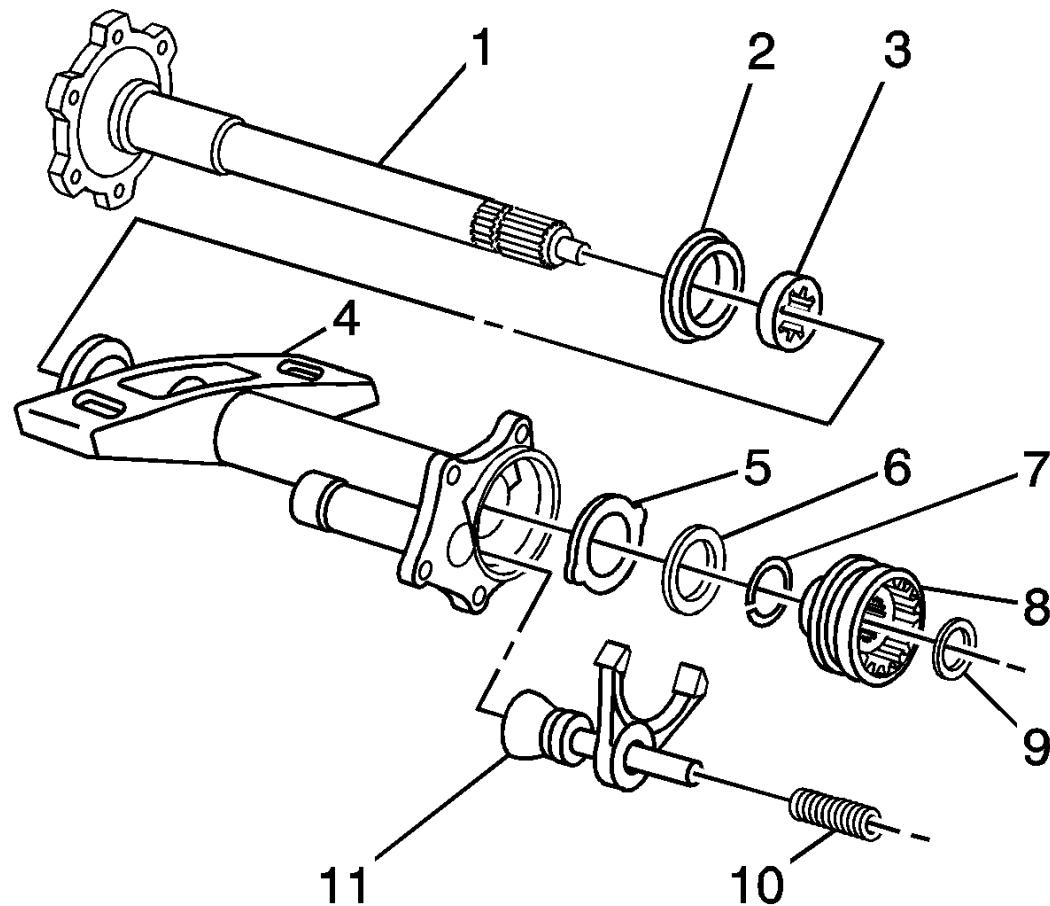


Fig. 414: Inner Axle Shaft Housing Components

Courtesy of GENERAL MOTORS COMPANY

19. Using a soft faced mallet, install the inner axle shaft (1).

NOTE:

- Use chassis grease in order to hold the thrust washer in place.
- Ensure the tabs on the thrust washer are aligned with the slots in the inner shaft housing.

20. Install the thrust washer (with tabs) (5).
21. Install the thrust washer (without tabs) (6).
22. Install the new retainer ring (7) onto the inner axle shaft (1).
23. Determine the clutch gear shim thickness. Refer to [**Front Drive Axle Clutch Gear Shim Adjustment**](#).
24. Install the clutch gear shim (9).
25. Install the clutch sleeve (8).
26. Install the clutch fork assembly (11).
27. Install the clutch fork inner spring (10).
28. Install the inner axle housing gasket.
29. Using the correct sealant, apply sealant to the inner shaft housing to differential carrier sealing surface. Refer to [**Adhesives, Fluids, Lubricants, and Sealers**](#).

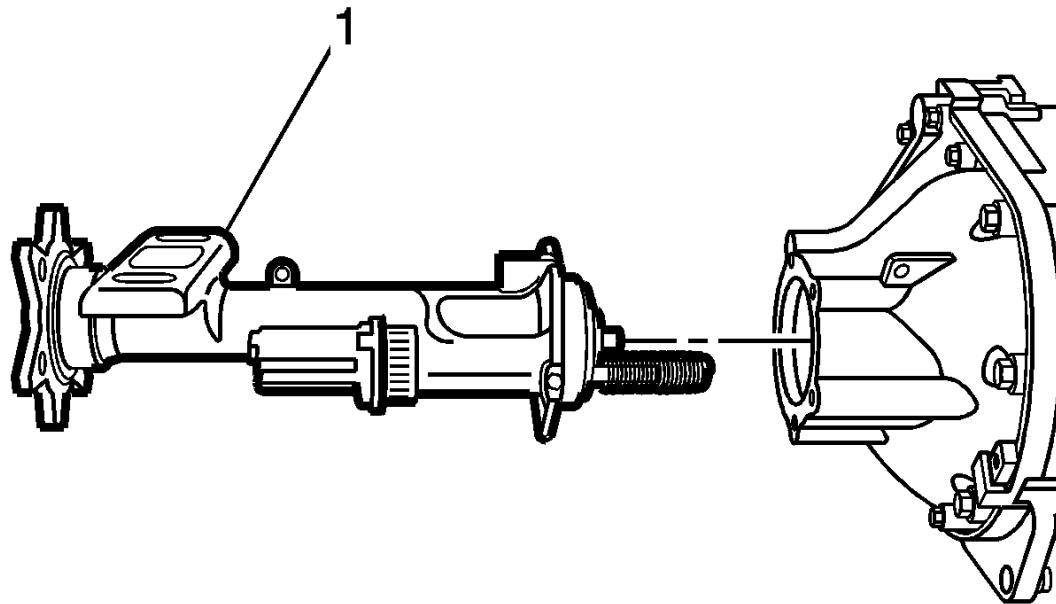


Fig. 415: Inner Axle Shaft Housing Assembly

Courtesy of GENERAL MOTORS COMPANY

30. Install the inner shaft housing to the differential carrier assembly case.
31. Install the inner shaft housing bolts and tighten to 40 N.m (30 lb ft).
32. Install the drain plug and the washer.
33. Install the fill plug and the washer and tighten to 33 N.m (24 lb ft).

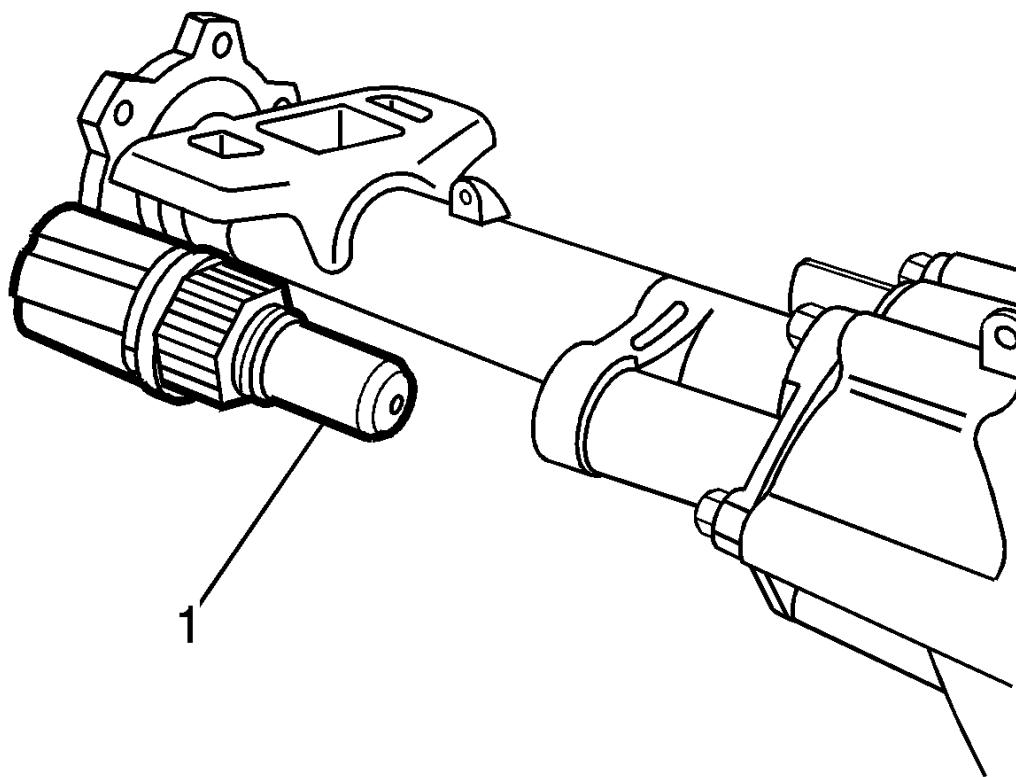


Fig. 416: Inner Axle Shaft

Courtesy of GENERAL MOTORS COMPANY

34. Apply sealant to the threads of the front axle actuator. Use the correct sealant. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).
35. Install the front drive axle actuator and tighten to 20 N.m (15 lb ft).

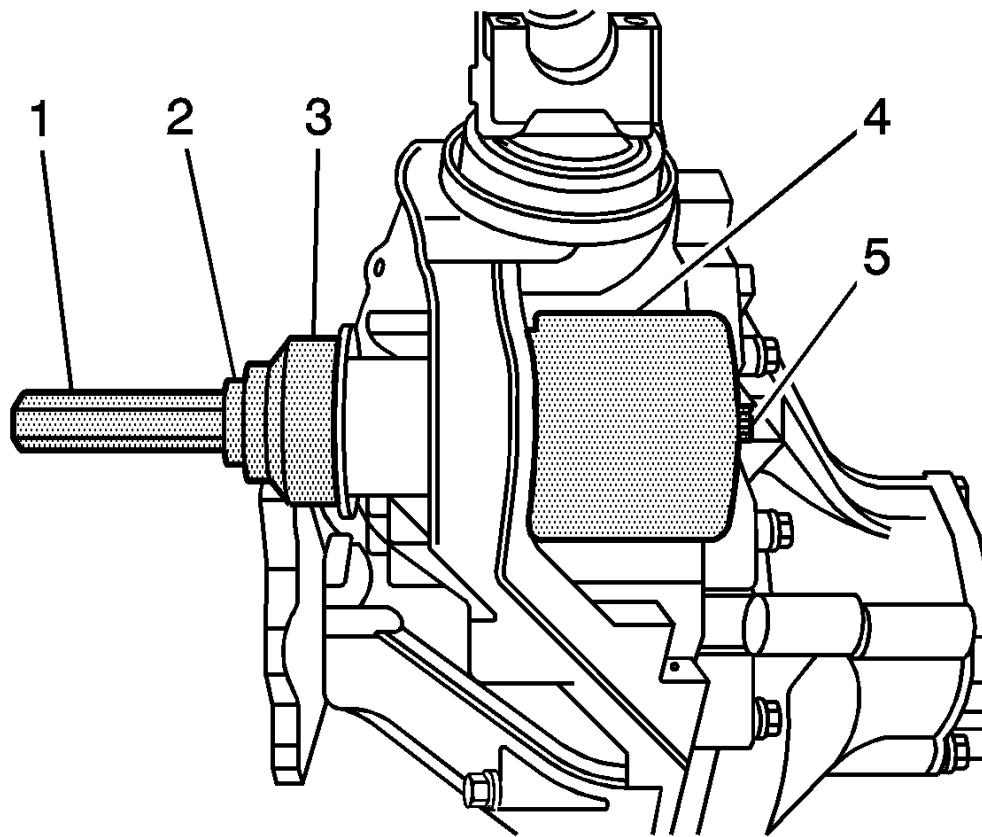


Fig. 417: Lower Differential Carrier Assembly Bushing And Installer

Courtesy of GENERAL MOTORS COMPANY

36. 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).
37. 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.

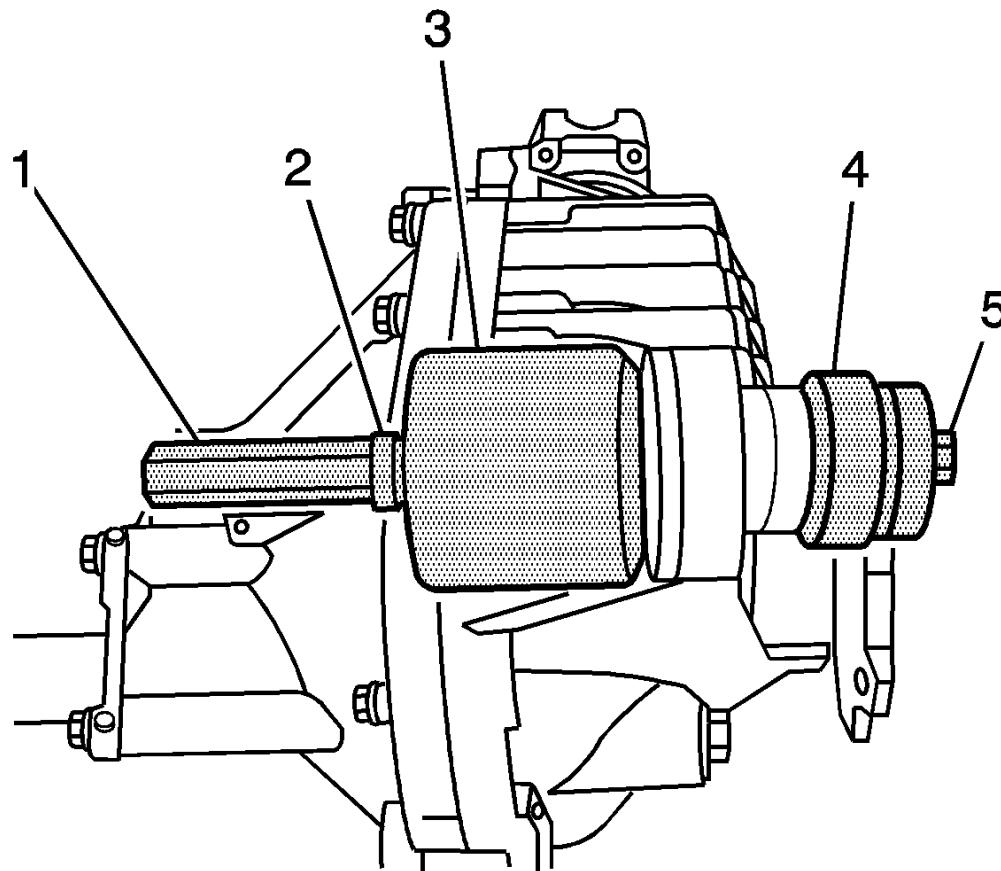


Fig. 418: View Of Special Tools J 21474-18, Thrust Bearing, J 36616-2, J 36616-1, & Forcing Screw
Courtesy of GENERAL MOTORS COMPANY

38. 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.
39. 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.
40. Install the differential carrier assembly. Refer to [**Front Axle Replacement \(9.25 Inch HD Axle\)**](#).

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

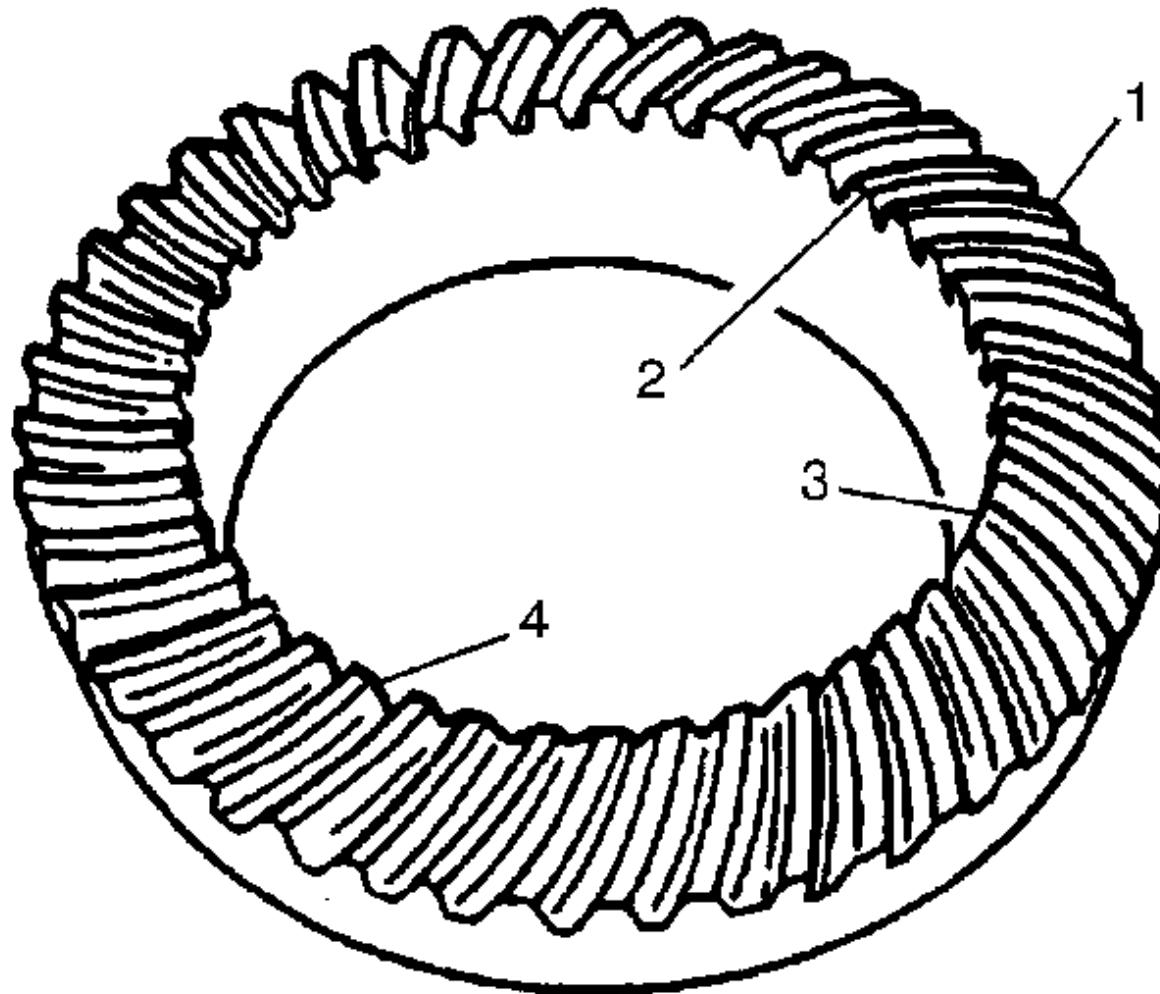


Fig. 419: Defining Gear Tooth Nomenclature

Courtesy of GENERAL MOTORS COMPANY

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

Adjustments Affecting Tooth Contact

The following 2 adjustments affect the tooth contact pattern:

- Backlash adjustment
- Pinion depth adjustment

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

Pinion Depth Adjustment

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.

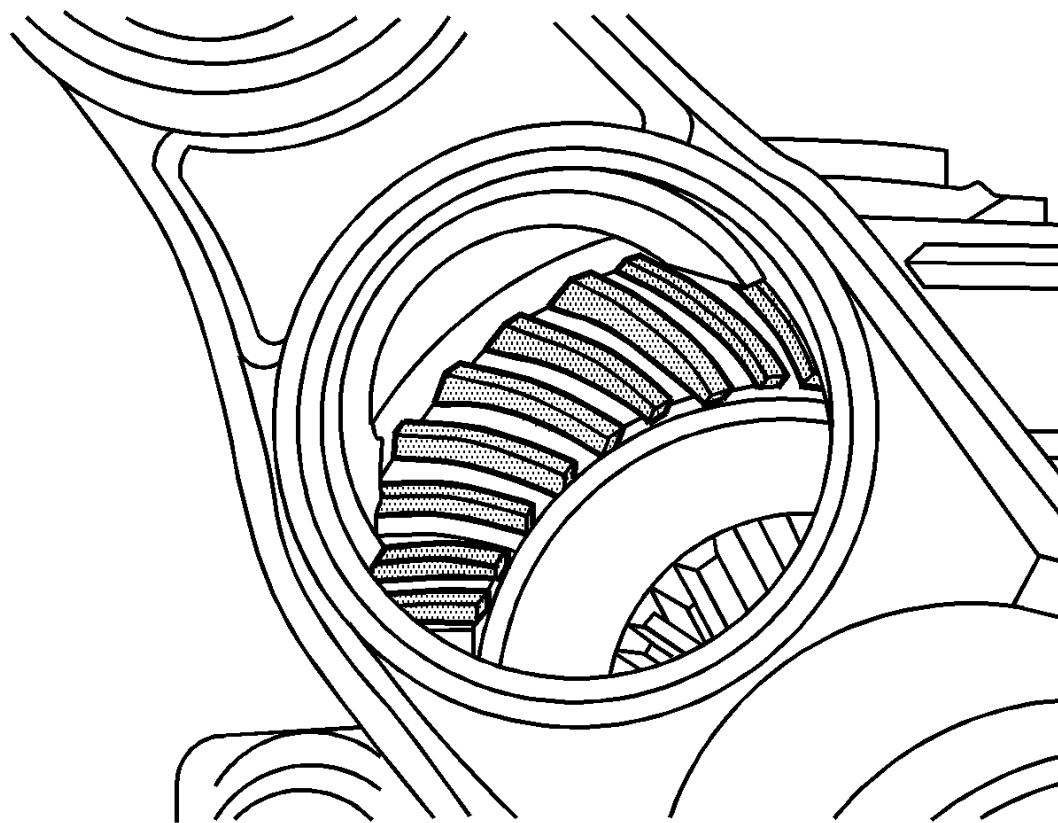


Fig. 420: Ring Gear Teeth Pattern

Courtesy of GENERAL MOTORS COMPANY

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

IMPORTANT: Avoid turning the ring gear excessively.

3. Using a wrench, turn the drive pinion flange/yoke so that the ring gear rotates at least 3 full revolutions.
4. Turn the drive pinion flange/yoke in the opposite direction so that the ring gear rotates at least 3 full revolutions in the opposite direction.
5. Observe the pattern on the ring gear teeth. Compare the pattern with the following illustrations.
6. Once the proper pattern is obtained, continue the assembly of differential carrier. Refer to [**Front Axle Assemble \(8.25 Inch LD Axle\)Front Axle Assemble \(9.25 Inch HD Axle\)**](#).

Correct Contact Pattern

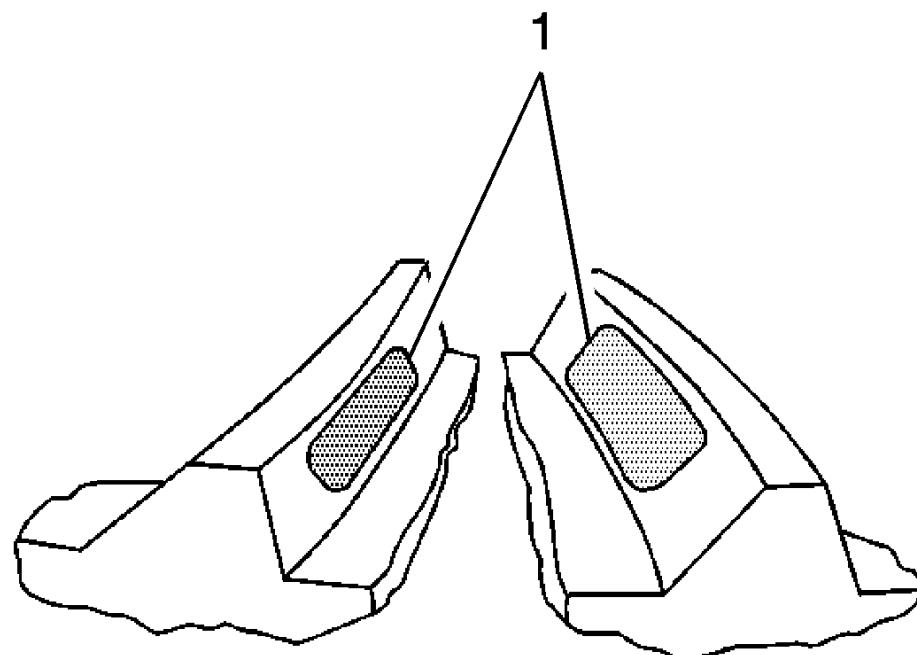


Fig. 421: Identifying Correct Gear Tooth Contact Pattern

Courtesy of GENERAL MOTORS COMPANY

Condition

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

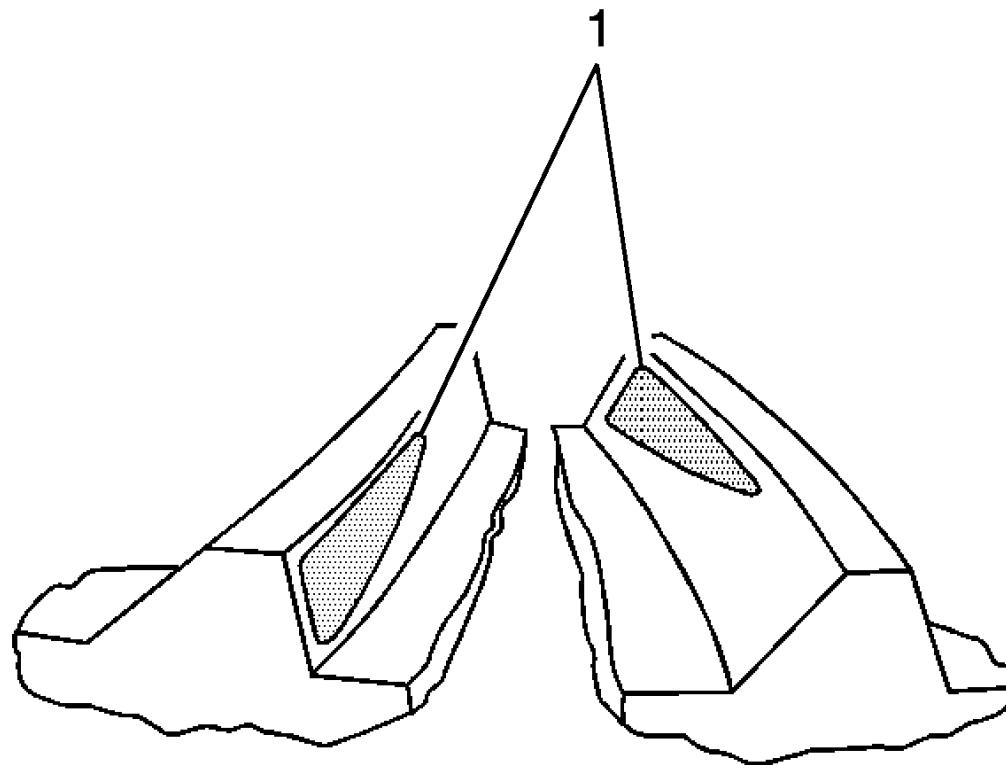


Fig. 422: Identifying Drive Side Heel - Coast Side Toe Contact Pattern

Courtesy of GENERAL MOTORS COMPANY

Condition

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

Correction

Adjust the pinion depth of drive pinion. Refer to [Front Differential Ring and Drive Pinion Gear Adjustment](#).

Drive Side Toe - Coast Side Heel Contact Pattern

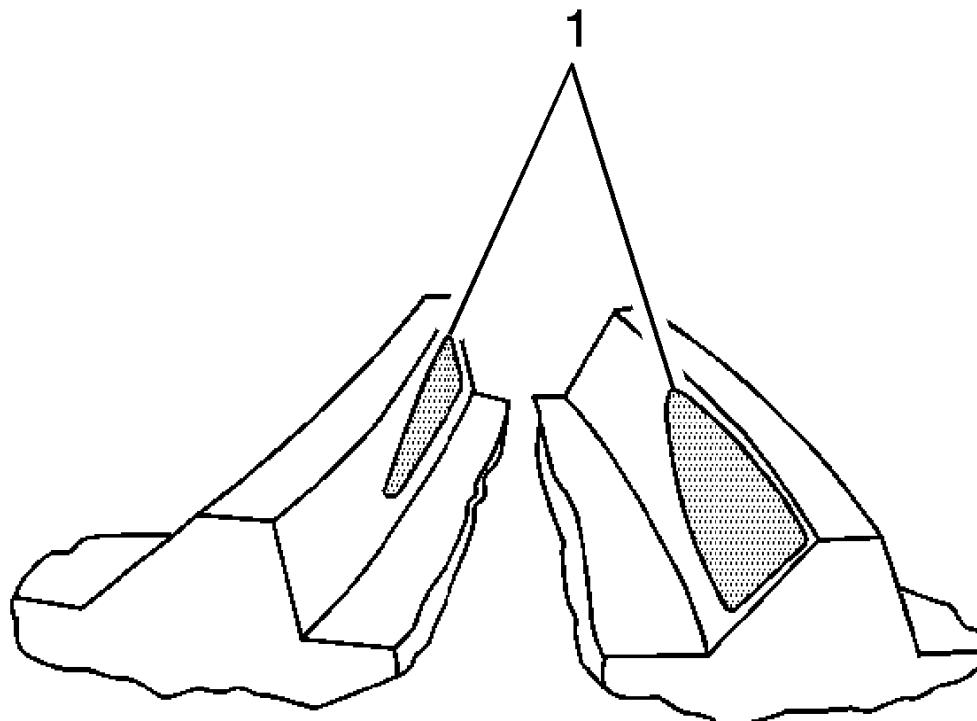


Fig. 423: Identifying Drive Side Toe - Coast Side Heel Contact Pattern

Courtesy of GENERAL MOTORS COMPANY

Condition

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

Correction

Adjust the pinion depth of drive pinion. Refer to [**Front Differential Ring and Drive Pinion Gear Adjustment**](#).

Drive Side Heel - Coast Side Heel Contact Pattern

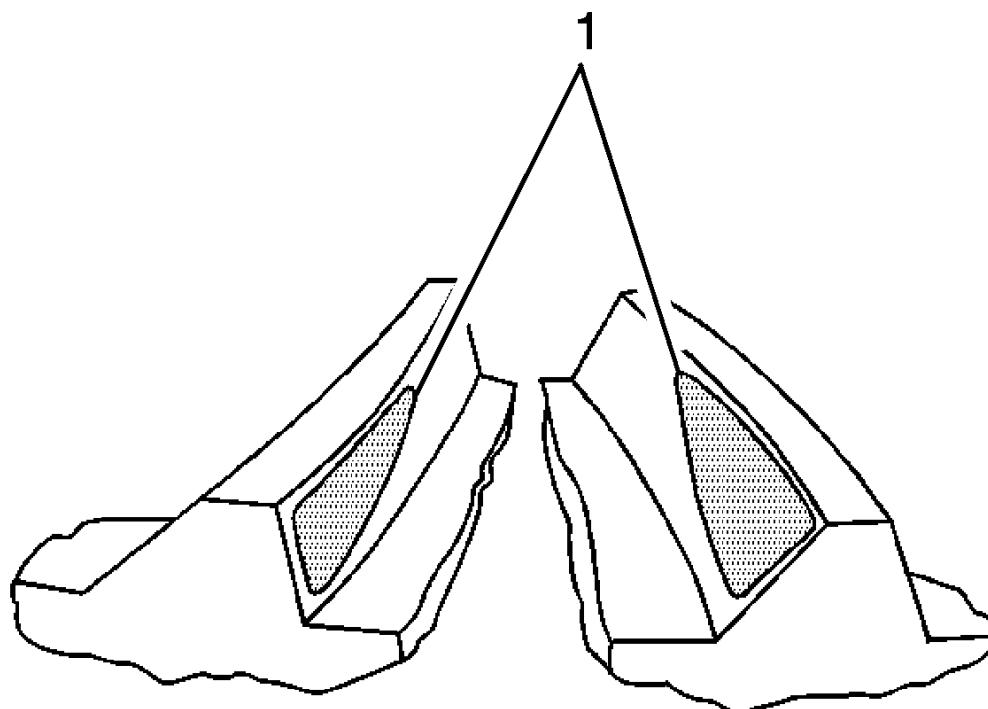


Fig. 424: Identifying Drive Side Heel - Coast Side Heel Contact Pattern

Courtesy of GENERAL MOTORS COMPANY

Condition

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

Correction

Decrease the backlash. Move the ring gear closer to the drive pinion by adjusting the side bearing adjuster sleeves. Refer to [**Backlash Inspection and Adjustment \(8.25 Inch LD Axle\)**](#)[**Backlash Inspection and Adjustment \(9.25 Inch HD Axle\)**](#).

Drive Side Toe - Coast Side Toe Contact Pattern

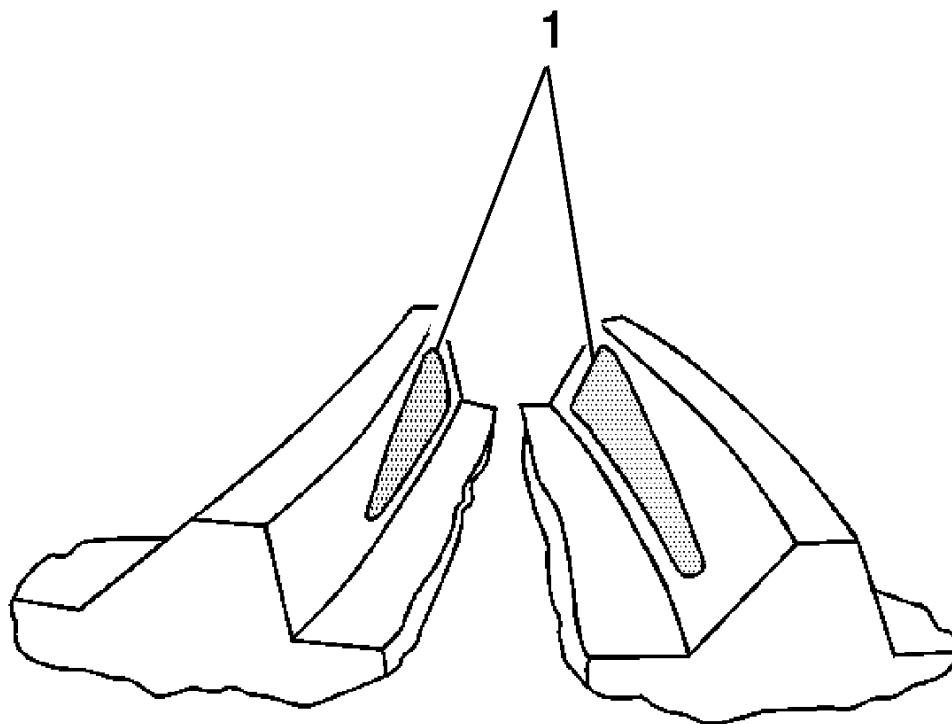


Fig. 425: Identifying Drive Side Toe - Coast Side Toe Contact Pattern

Courtesy of GENERAL MOTORS COMPANY

Condition

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

Correction

Increase the backlash. Move the ring gear away from the drive pinion by adjusting the side bearing adjuster sleeves. Refer to [**Backlash Inspection and Adjustment \(8.25 Inch LD Axle\)**](#)[**Backlash Inspection and Adjustment \(9.25 Inch HD Axle\)**](#).

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.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

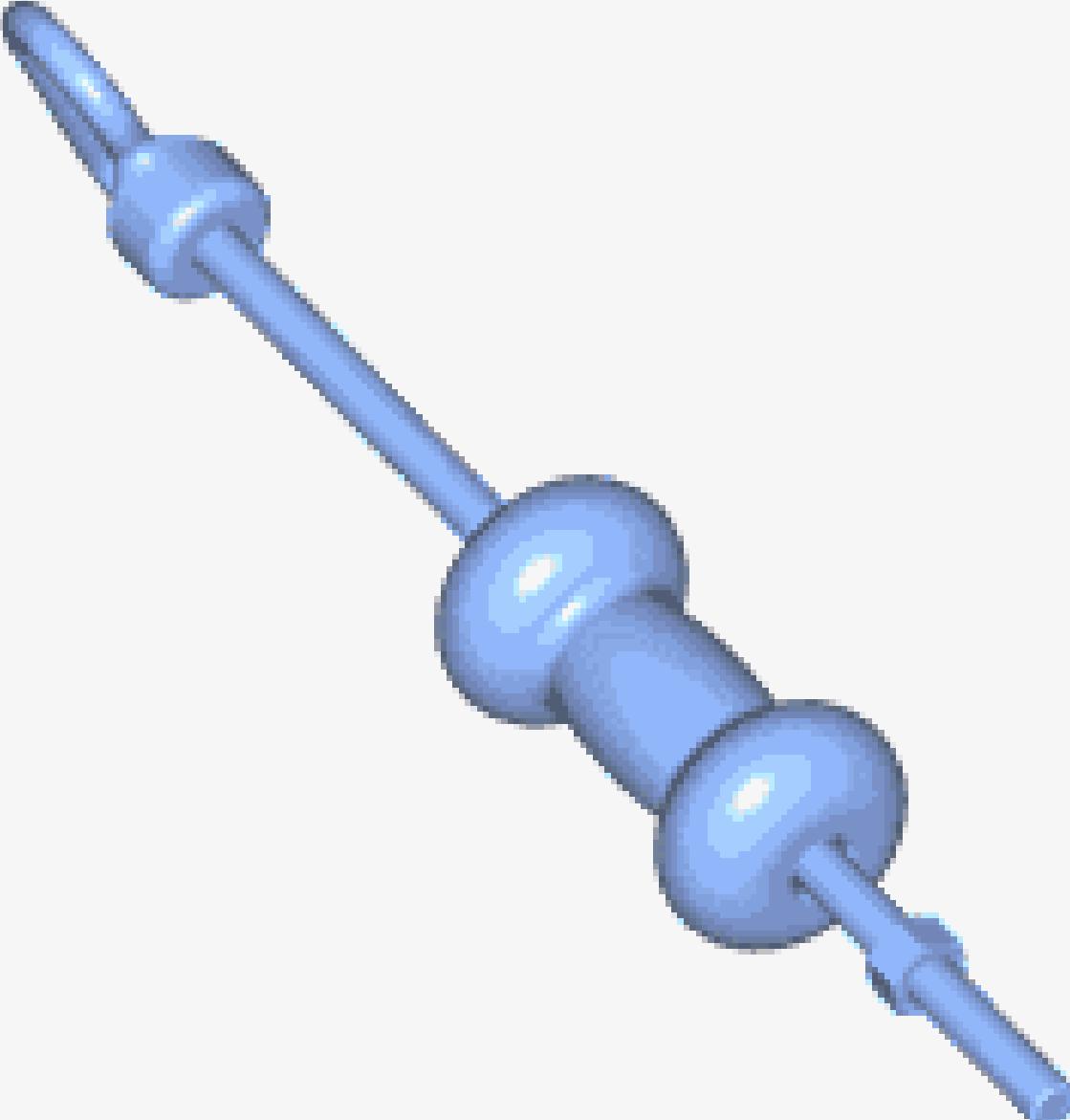
Illustration	Tool Number/ Description
	<p>J-2619-01 Slide Hammer</p>

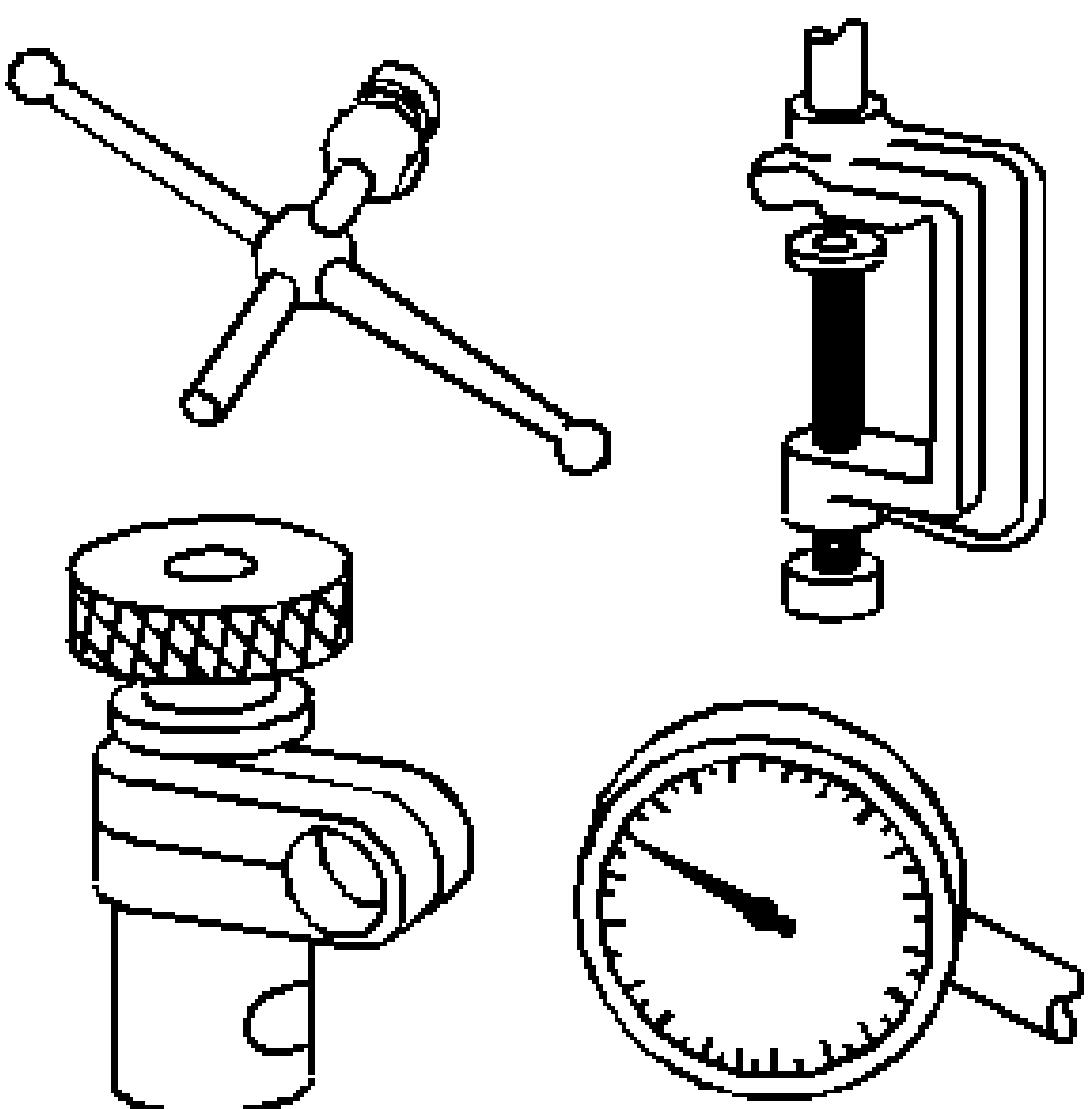
Illustration	Tool Number/ Description
 A technical line drawing of a dial indicator set. It includes a dial gauge with a circular scale and a needle, a long probe with a spherical tip, a base, and a handle with a cross-shaped wrench. The probe is shown inserted into a cylindrical component.	<p>GE-8001 J-8001 Dial Indicator Set</p>

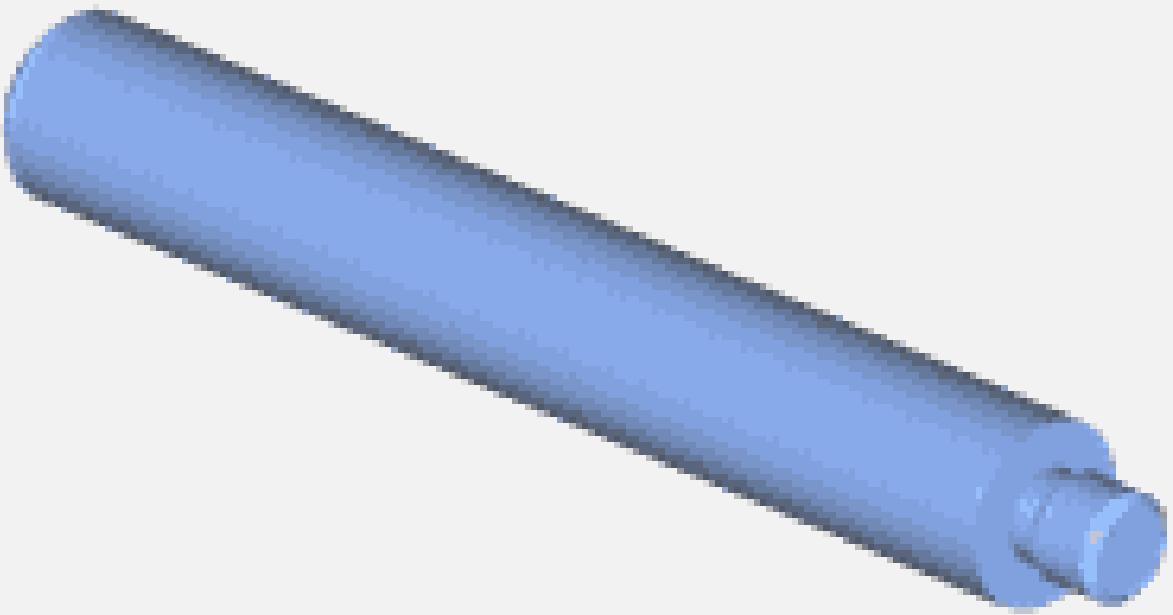
Illustration	Tool Number/ Description
 A 3D rendering of a blue cylindrical object, representing a driver handle. The handle is oriented diagonally, with the rounded end pointing towards the top-left and the flat end towards the bottom-right. The surface has a slight texture and a light blue color.	<p>GE-8092 J-8092 Driver Handle</p>

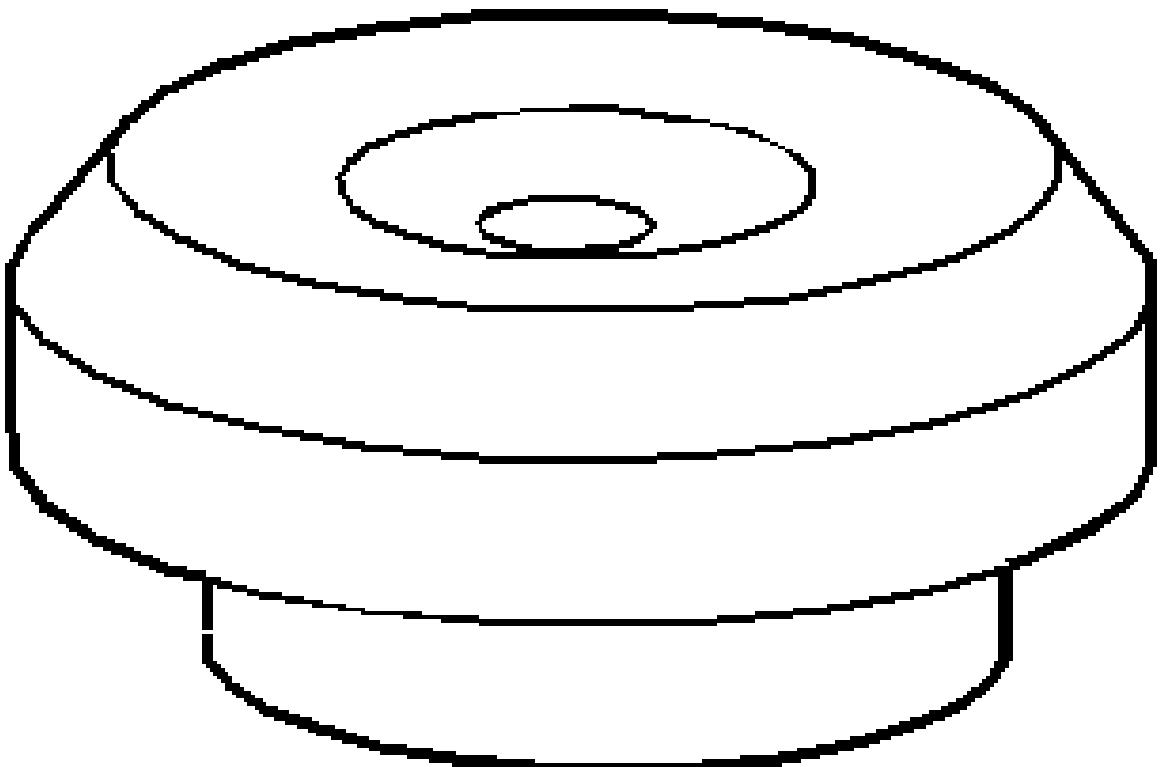
Illustration	Tool Number/ Description
	<p>DT-8107-2 J-8107-2 Side Bearing Puller Pilot</p>

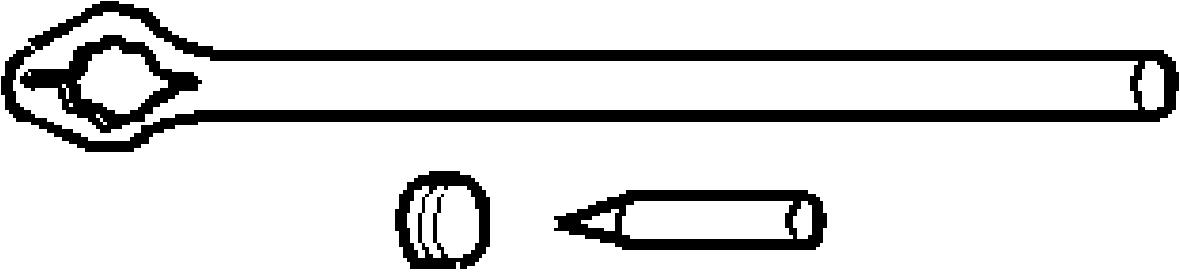
Illustration	Tool Number/ Description
	<p>J-8614-01 Flange and Pulley Holding Tool</p>

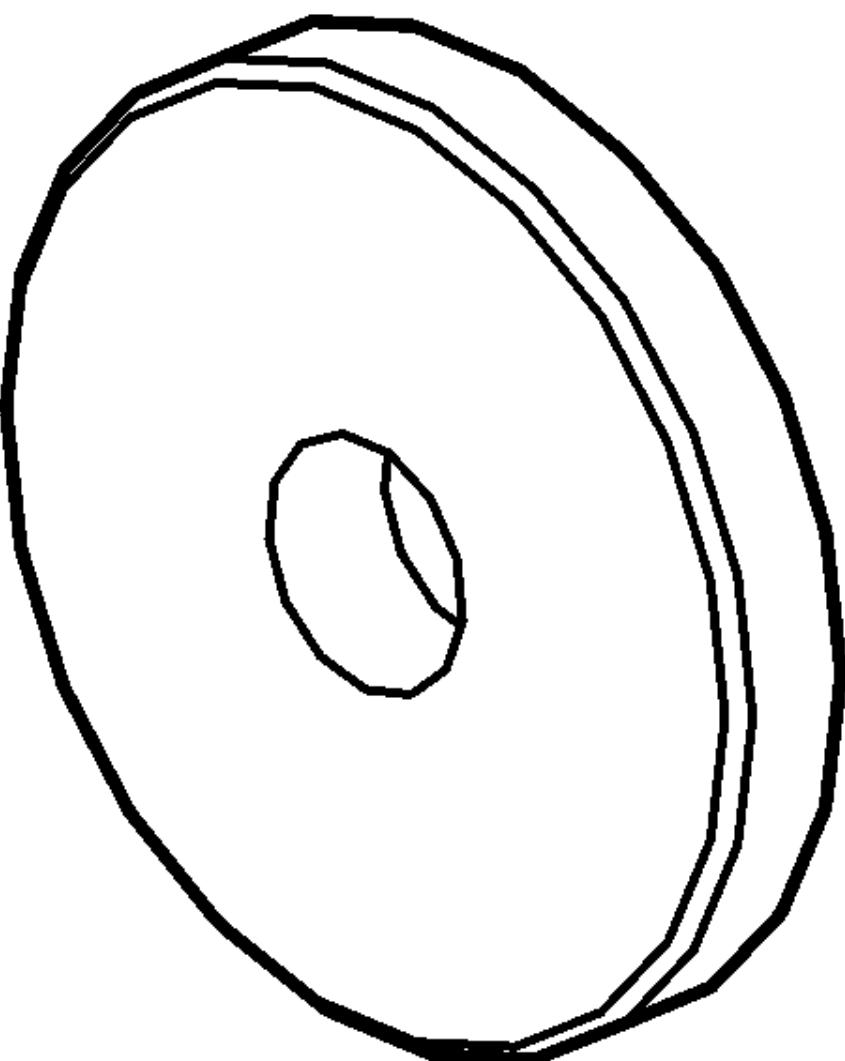
Illustration	Tool Number/ Description
	<p>DT-21777-35 J-21777-35 Rear Bearing Pilot</p>

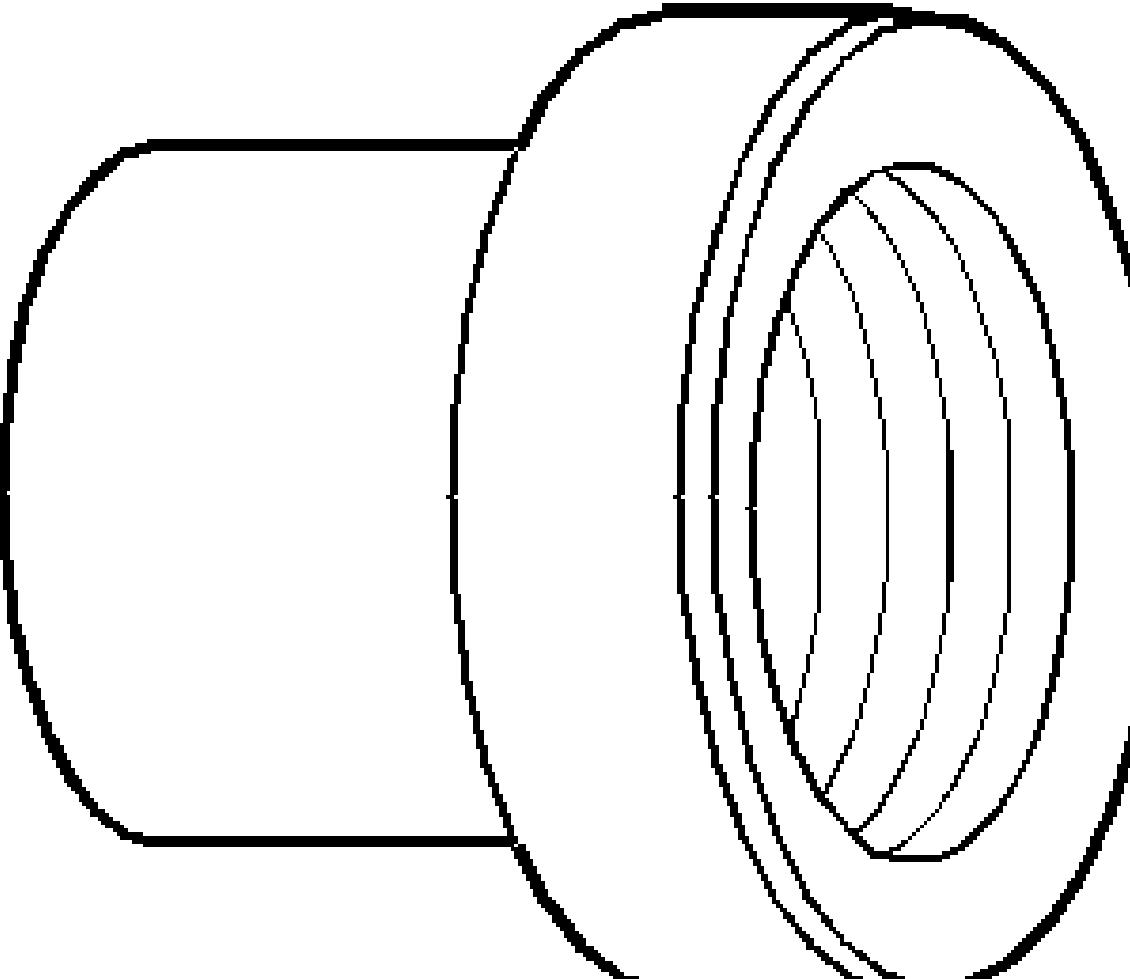
Illustration	Tool Number/ Description
	<p>J-22761 Differential Side Bearing Installer</p>

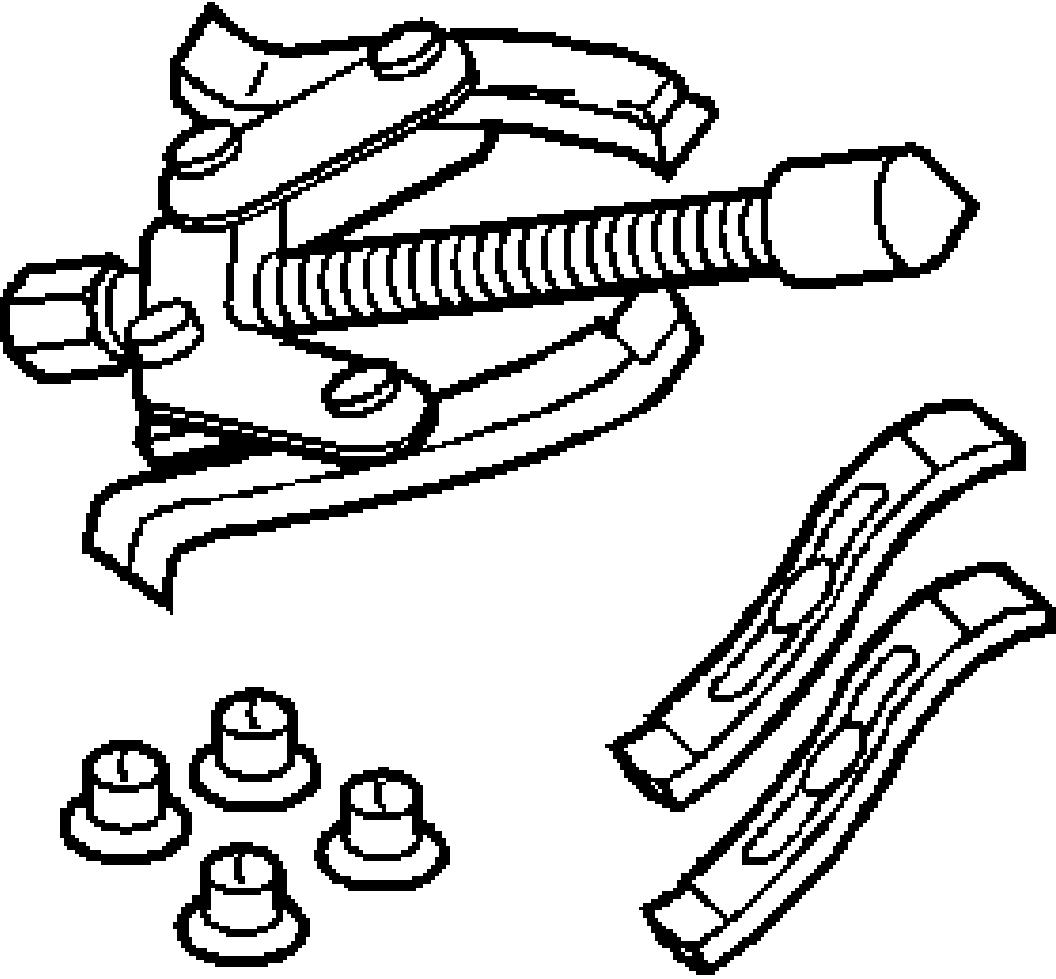
Illustration	Tool Number/ Description
	<p>DT-22888-D J-22888-D Side Bearing Remover Kit</p>

Illustration	Tool Number/ Description
 A photograph of a blue rear pinion and axle bearing remover tool. The tool is a large, U-shaped metal component with a central slot for a bearing. It has two long, tapered arms extending downwards and outwards. The central slot is designed to fit over a bearing, and the tapered arms are used to apply pressure to remove it from a housing. The tool is shown against a white background.	<p>DT-22912-01</p> <p>J-22912-01</p> <p>Rear Pinion and Axle Bearing Remover</p>

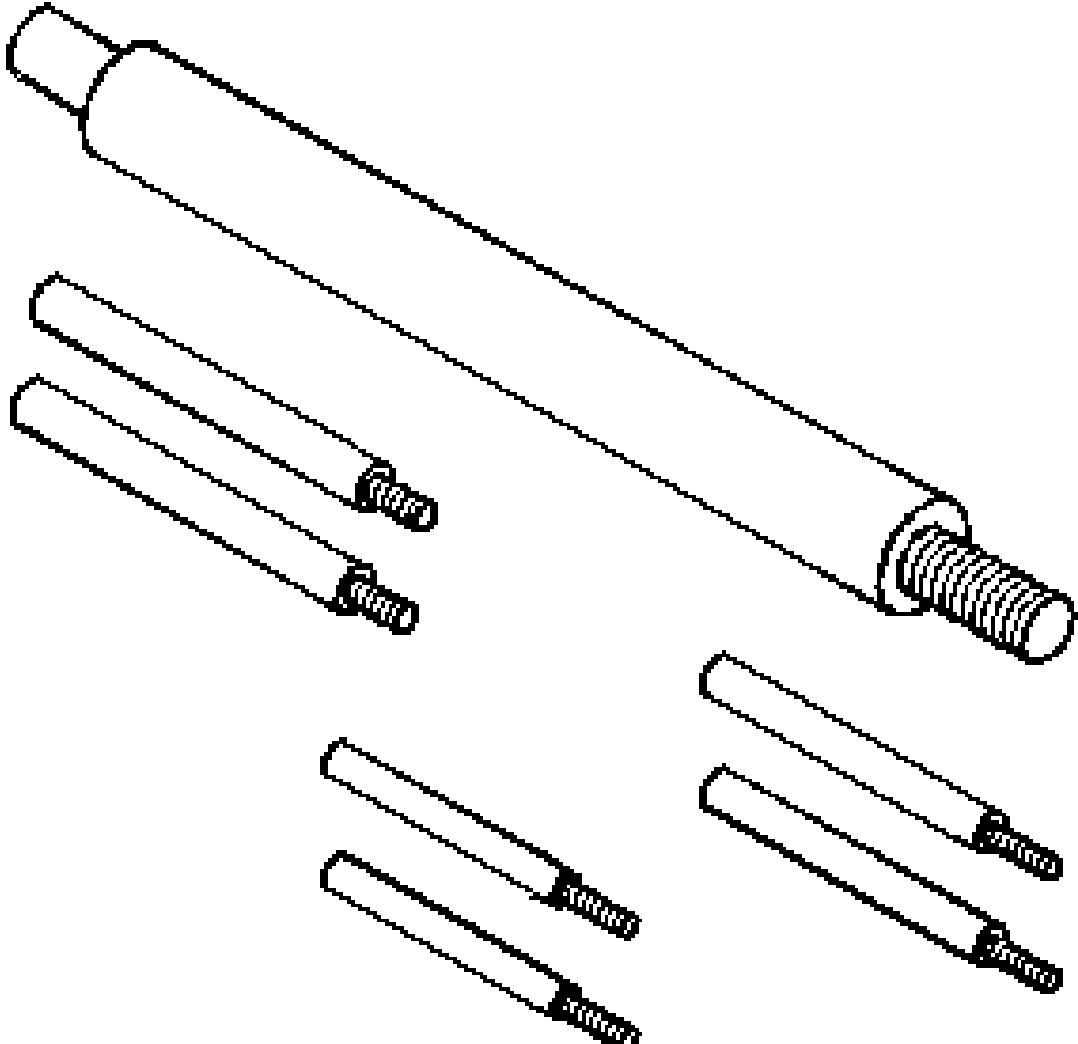
Illustration	Tool Number/ Description
	<p>GE-25025-B J-25025-B Guide Pin set</p>

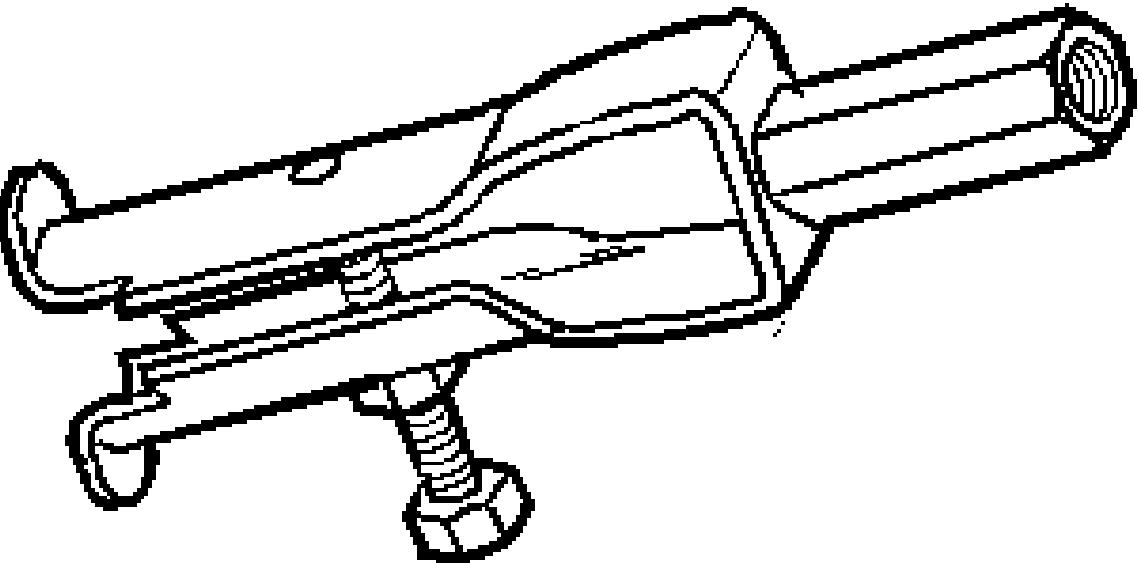
Illustration	Tool Number/ Description
	<p>DT-29369-1 J-29369-1 Bearing and Seal Remover</p>

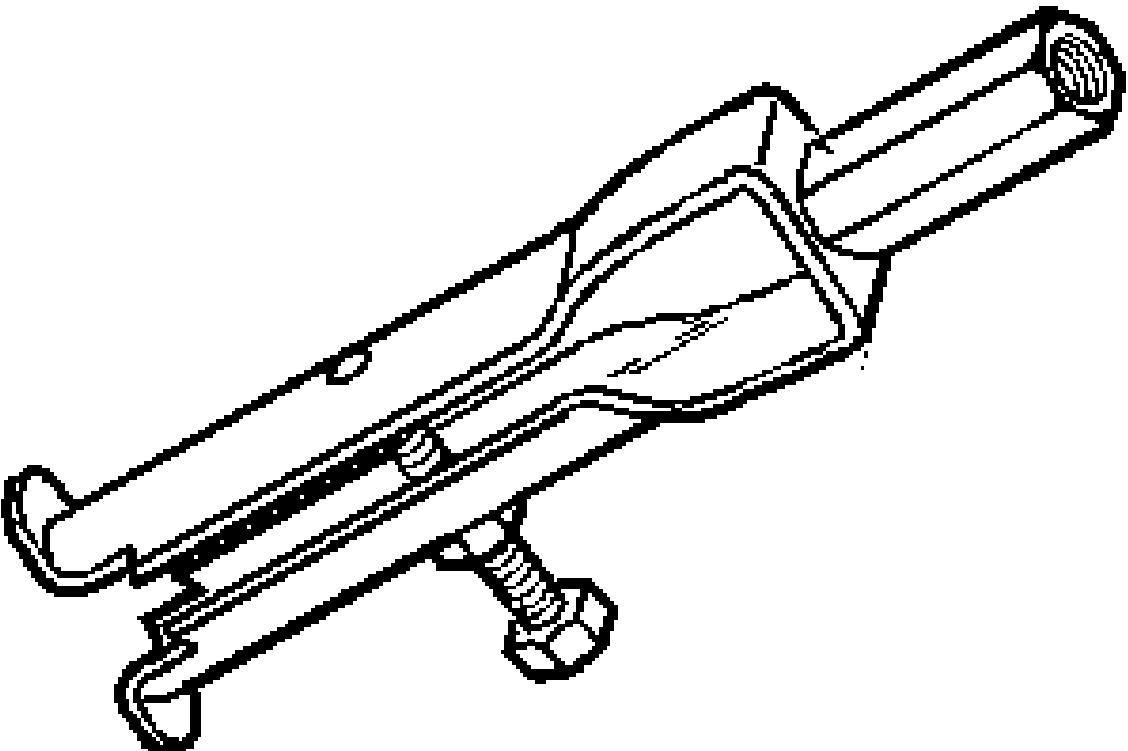
Illustration	Tool Number/ Description
	<p>DT-29369-2</p> <p>J-29369-2</p> <p>Bushing and Bearing Remover - 2-3 in</p>

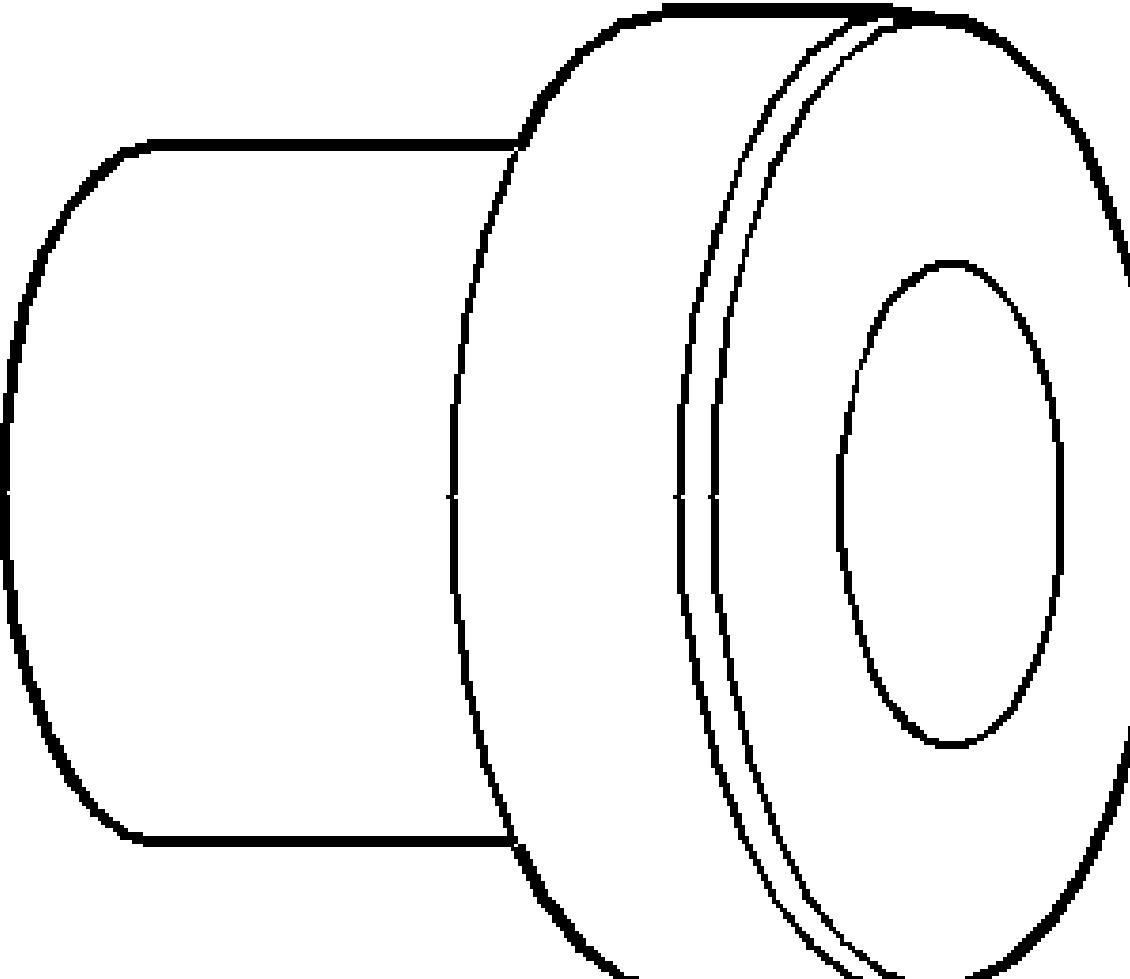
Illustration	Tool Number/ Description
	<p>J-29710 Differential Side Bearing Installer</p>

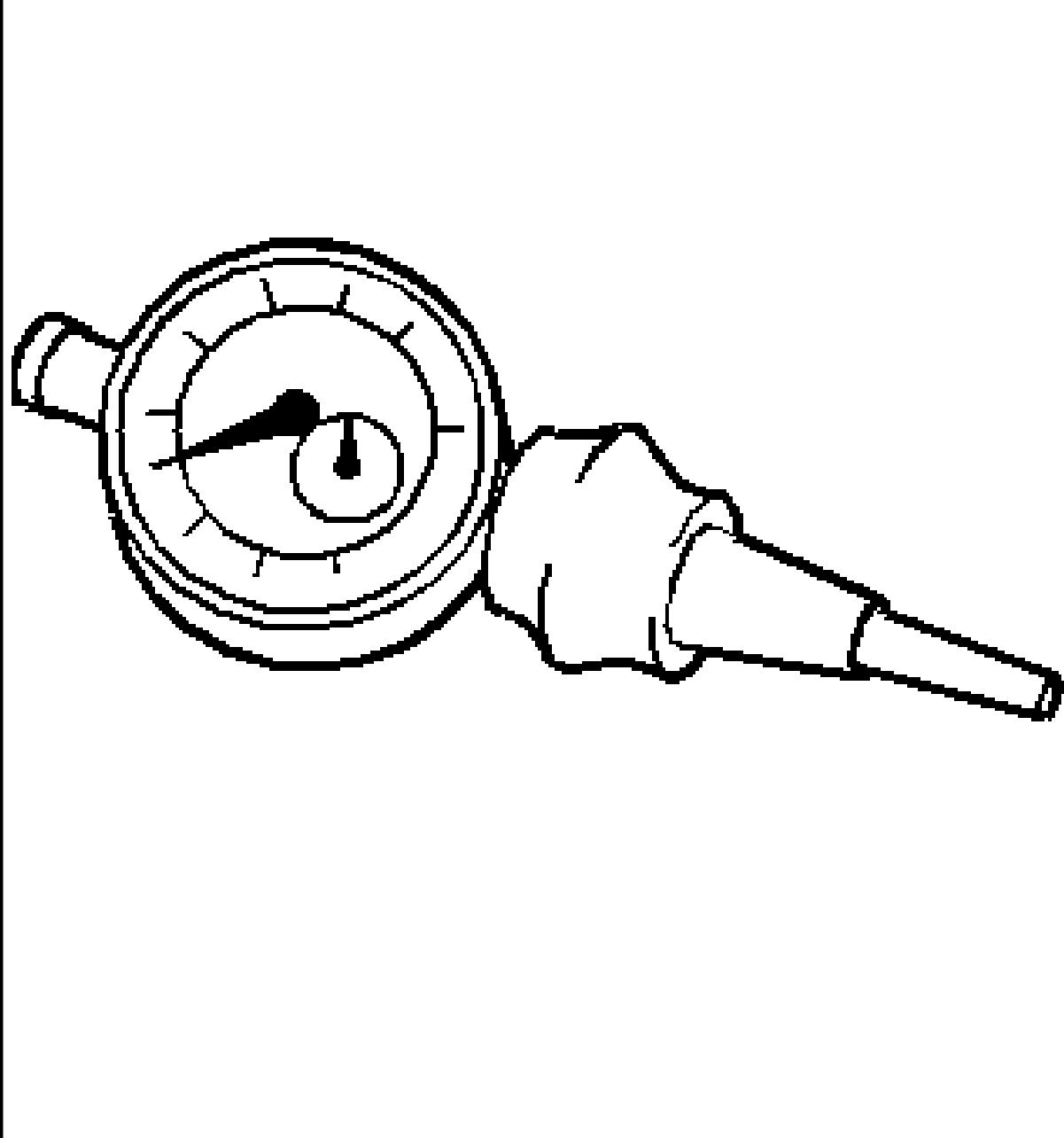
Illustration	Tool Number/ Description
	<p>J-29763 Static Timing Gauge</p>

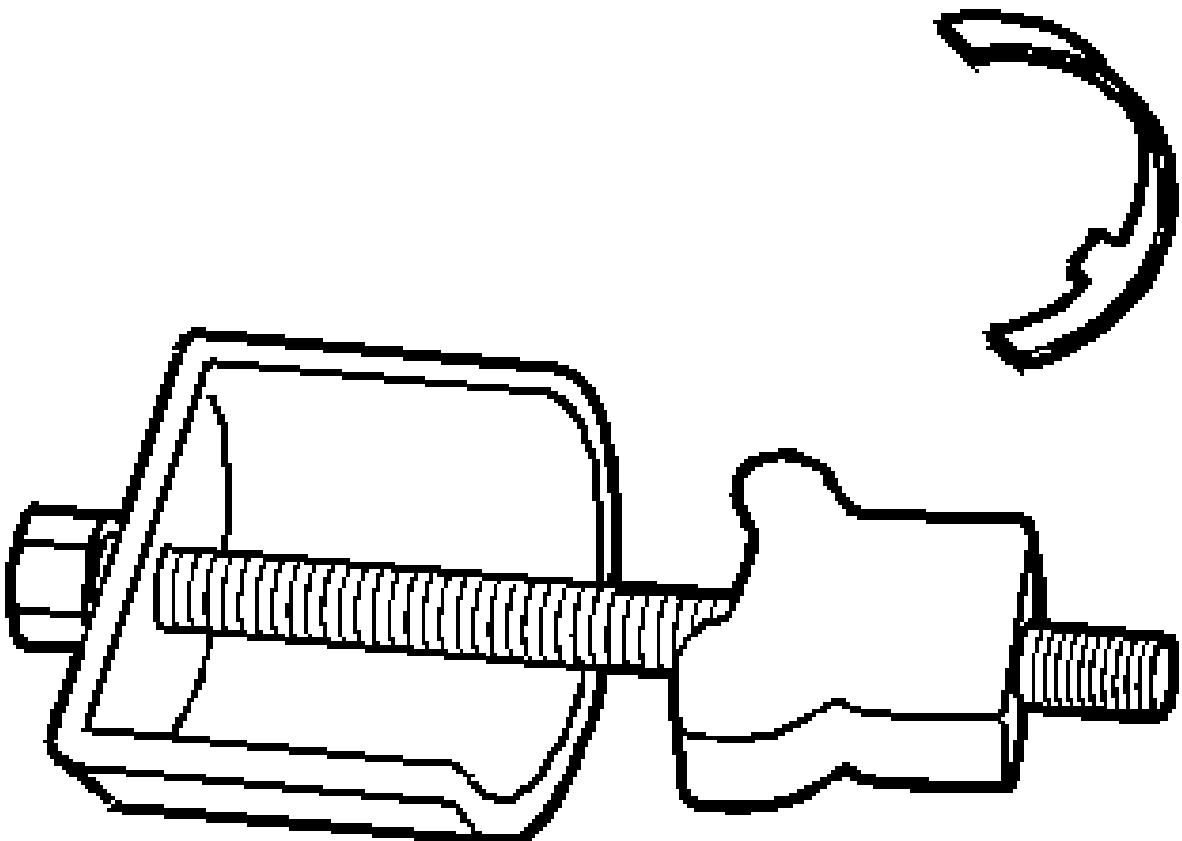
Illustration	Tool Number/ Description
	<p>J-33791 Carrier Bushing Remover/Installer</p>

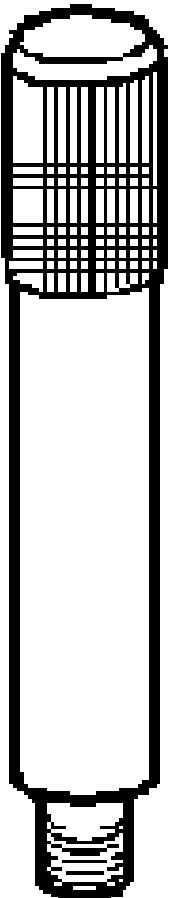
Illustration	Tool Number/ Description
	<p>J-33842 Pilot Bearing Installer</p>

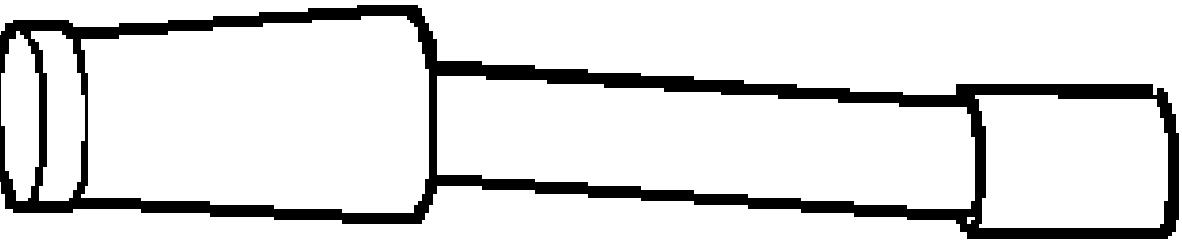
Illustration	Tool Number/ Description
	<p>J-34011 Pilot Bearing Remover</p>

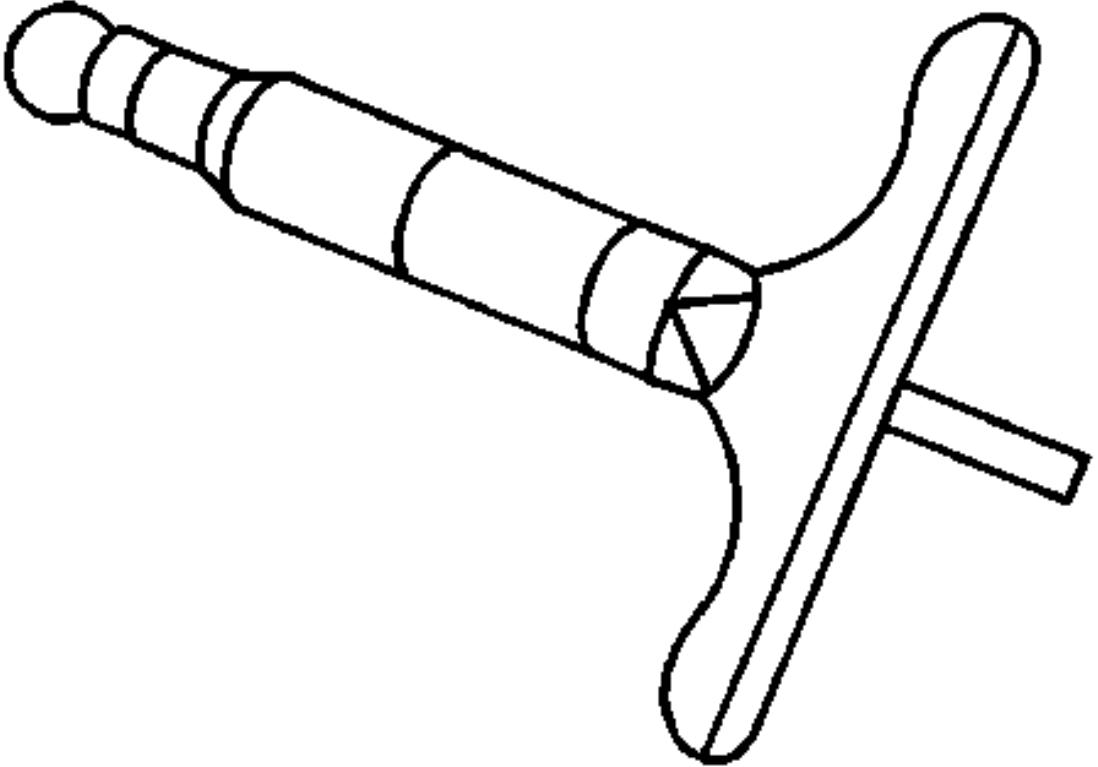
Illustration	Tool Number/ Description
	<p>GE-34672 J-34672 Depth Micrometer</p>

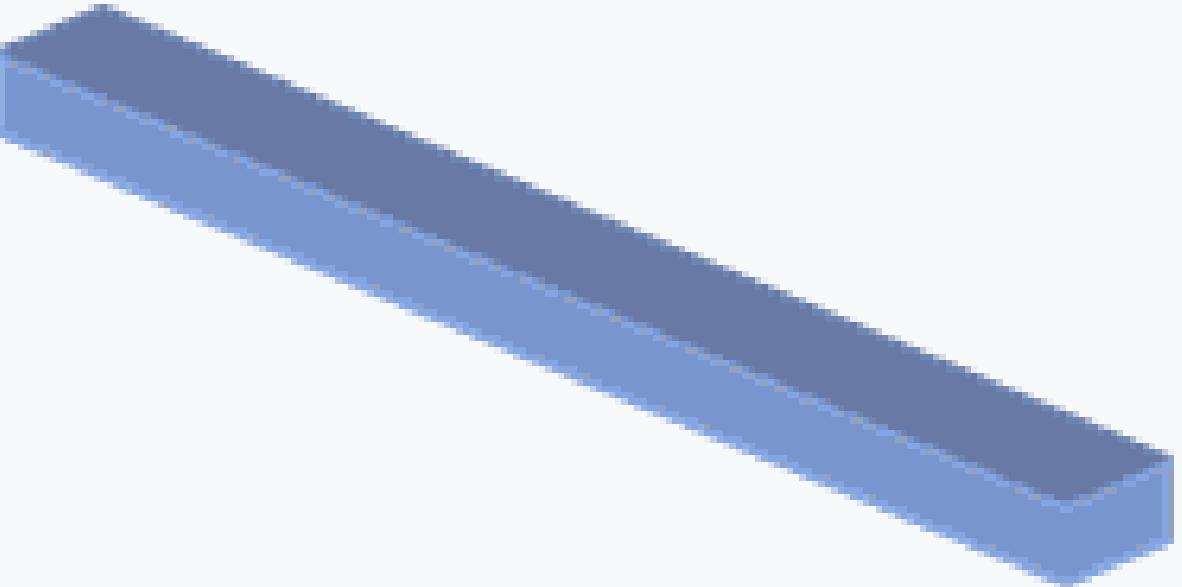
Illustration	Tool Number/ Description
	<p>GE-34673 J-34673 Flat Gauge Bar</p>

Illustration	Tool Number/ Description
 A black and white line drawing of a pinion setting gauge set. The set is contained within a rectangular carrying case with a hinged lid. The lid is propped open, revealing the interior which is divided into compartments holding various gauge blocks and precision tools. The case has a handle on top and a latch mechanism.	<p>DT-34925</p> <p>J-34925</p> <p>Pinion Setting Gauge Set</p>

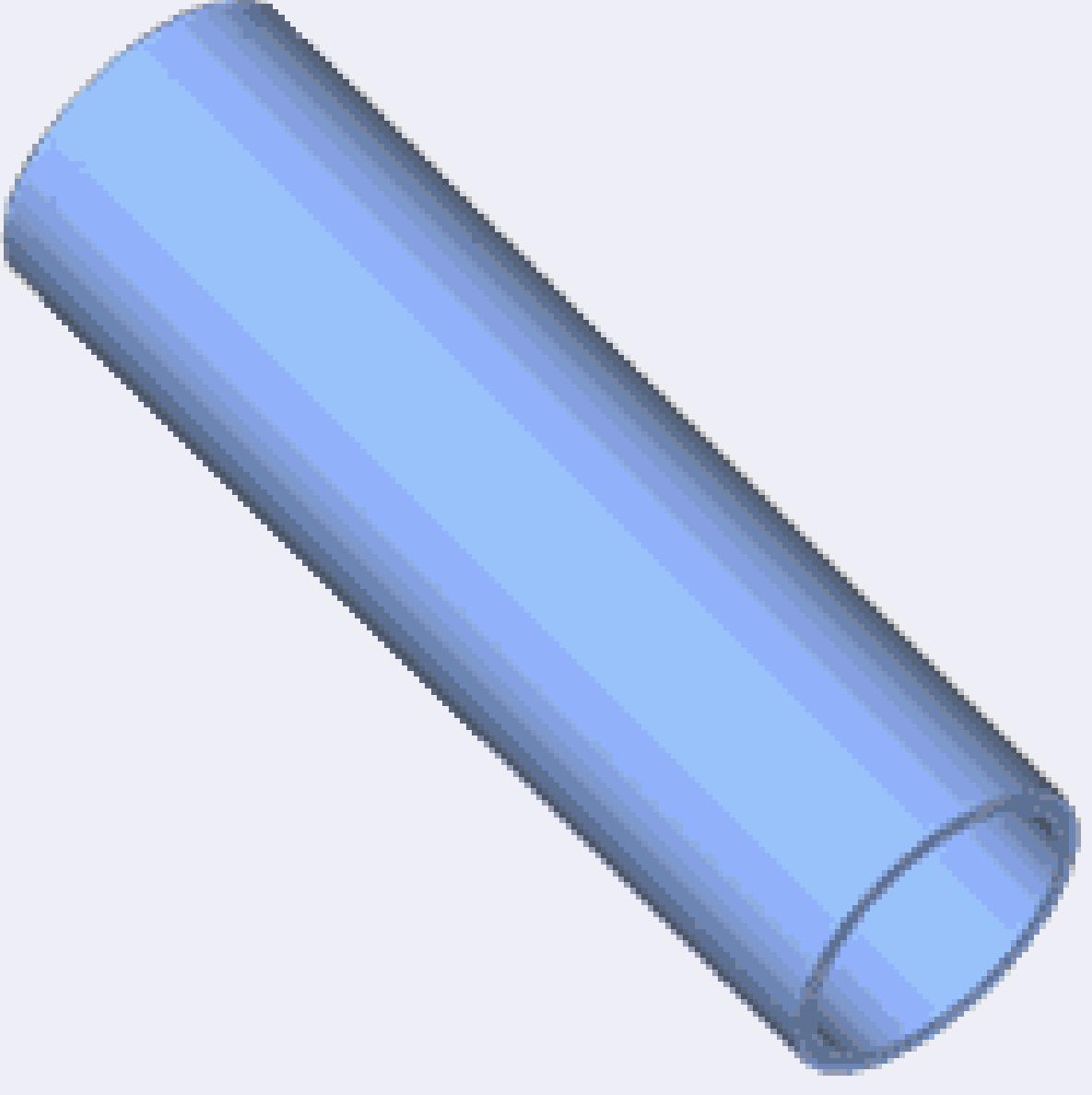
Illustration	Tool Number/ Description
	<p>DT-35512 J-35512 Inner Pinion Bearing Installer</p>

Illustration	Tool Number/ Description
	<p>J-36366 Pinion Oil Seal Installer</p>

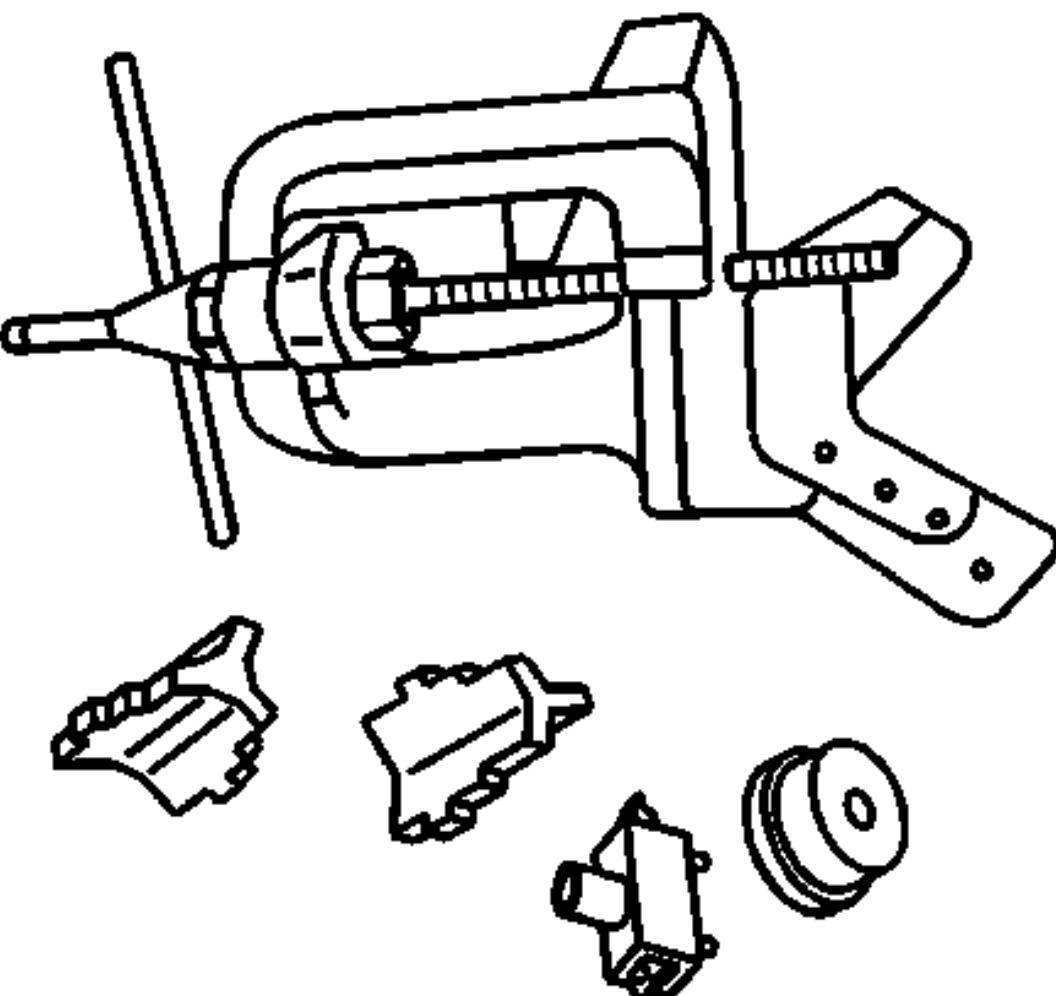
Illustration	Tool Number/ Description
 A line drawing of a holding fixture assembly. The main fixture is a rectangular base with a central vertical slot. A horizontal rod is inserted into this slot, secured by a lock nut. A vertical handle is attached to the side of the fixture. Below the fixture, four smaller components are shown: a pair of jaws, a base plate, a circular base, and a handle assembly.	<p>J-36598 Holding Fixture</p>

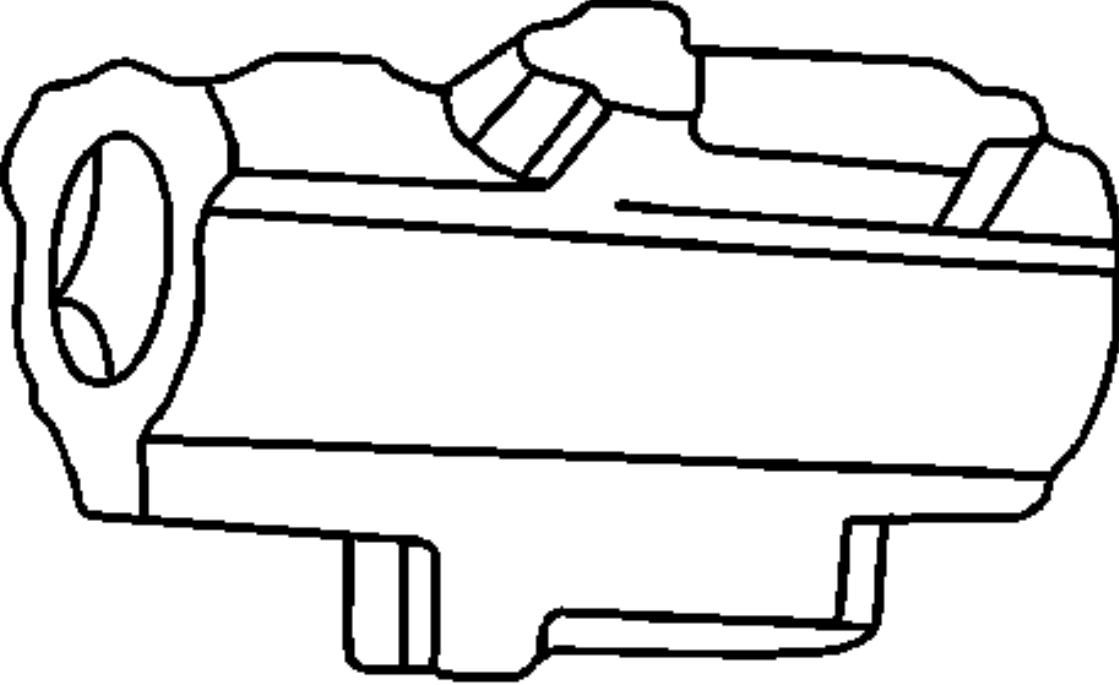
Illustration	Tool Number/ Description
	<p>J-36599-A Side Bearing Nut Wrench</p>

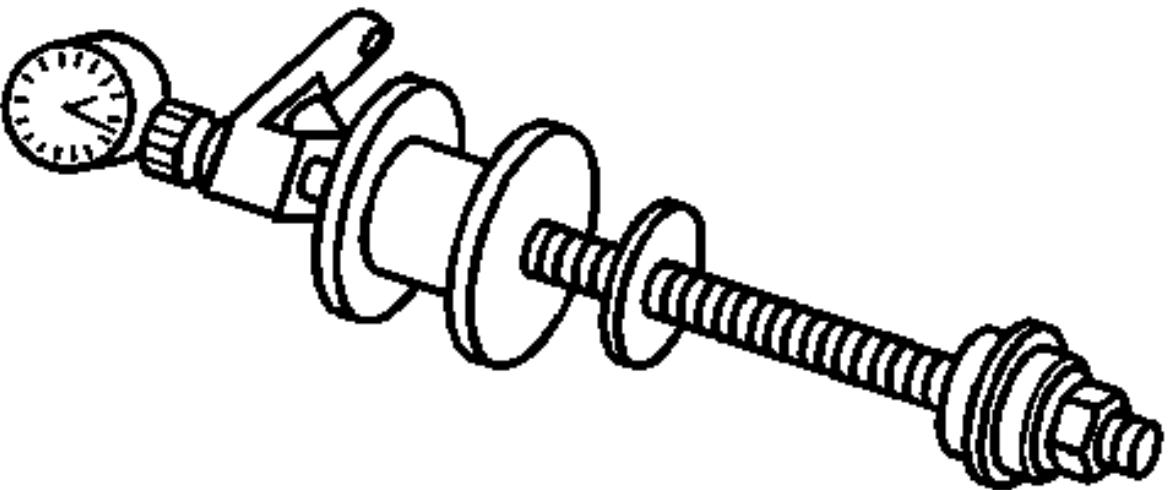
Illustration	Tool Number/ Description
	<p>J-36601 Pinion Shim Selector</p>

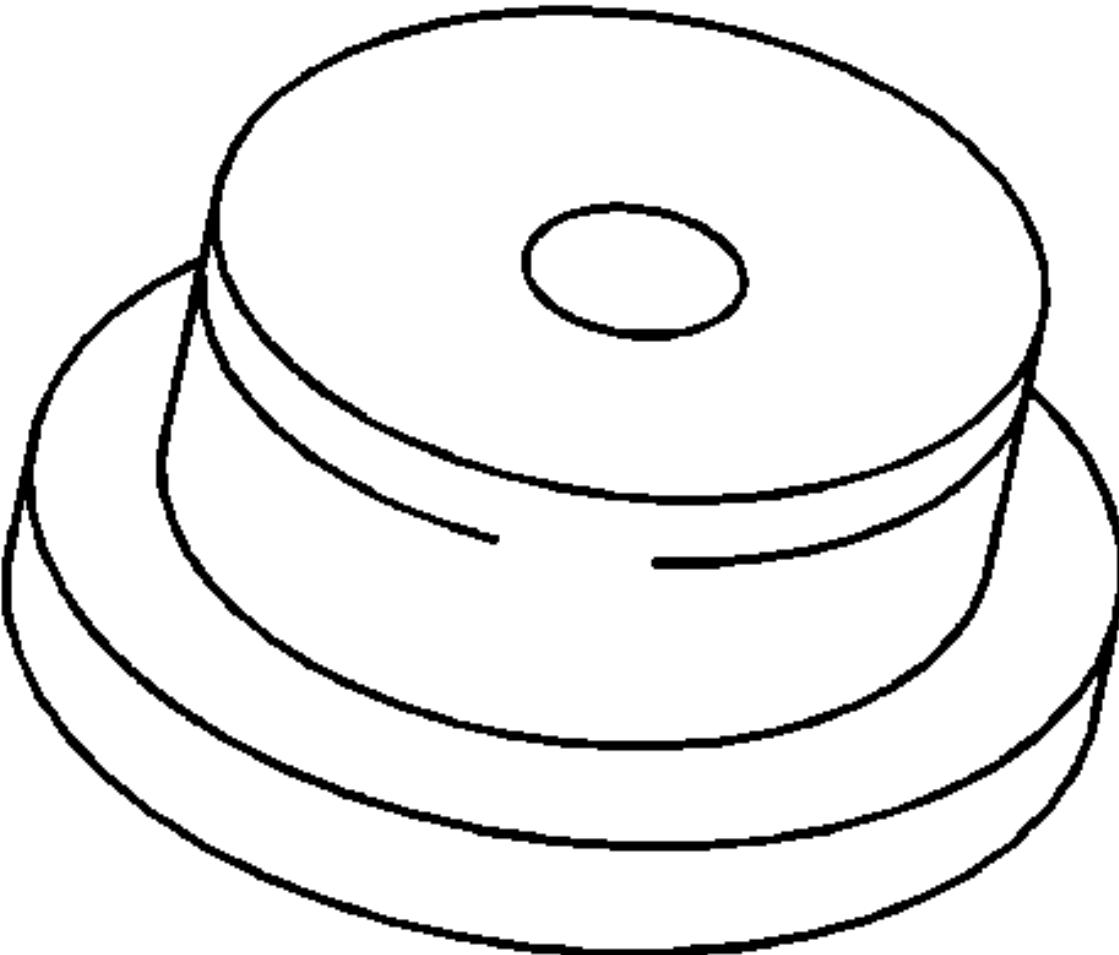
Illustration	Tool Number/ Description
	<p>J-36603 Side Bearing Cup Installer</p>

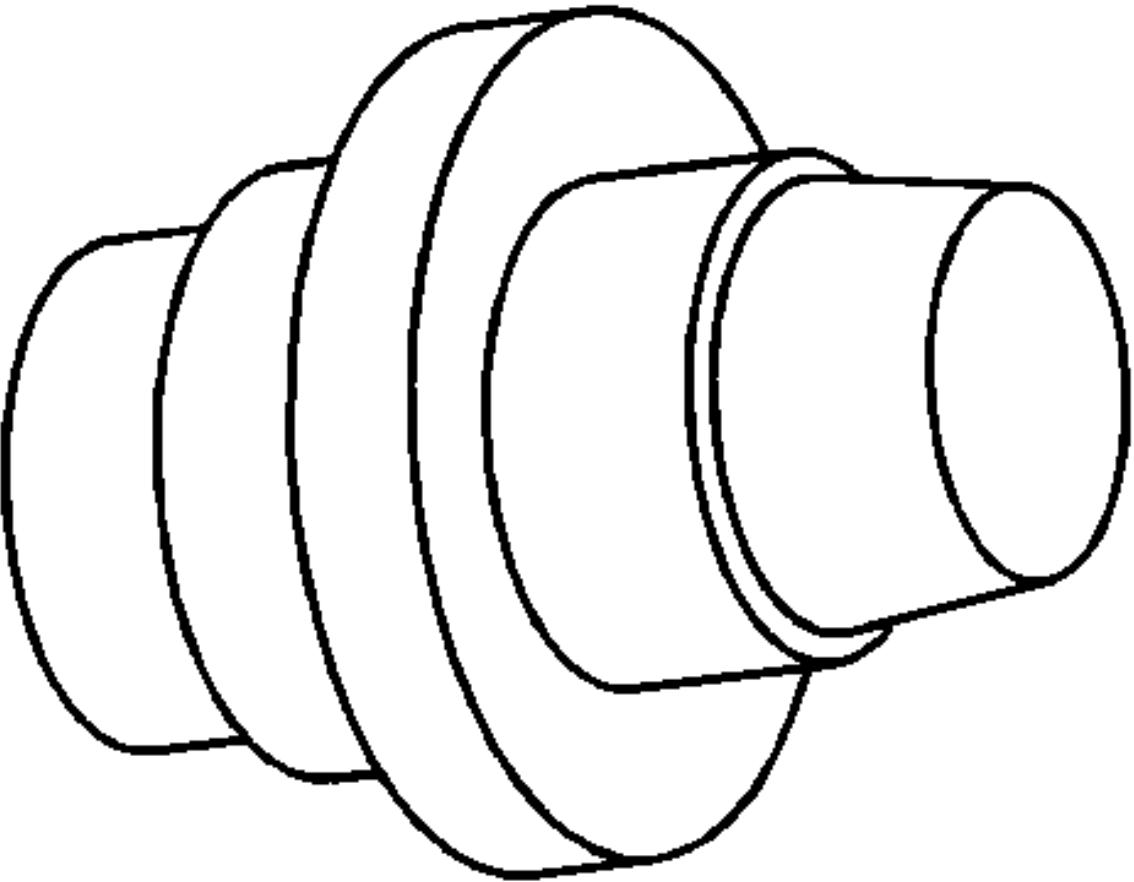
Illustration	Tool Number/ Description
	<p>J-36609 Axe Tube Bearing Installer</p>

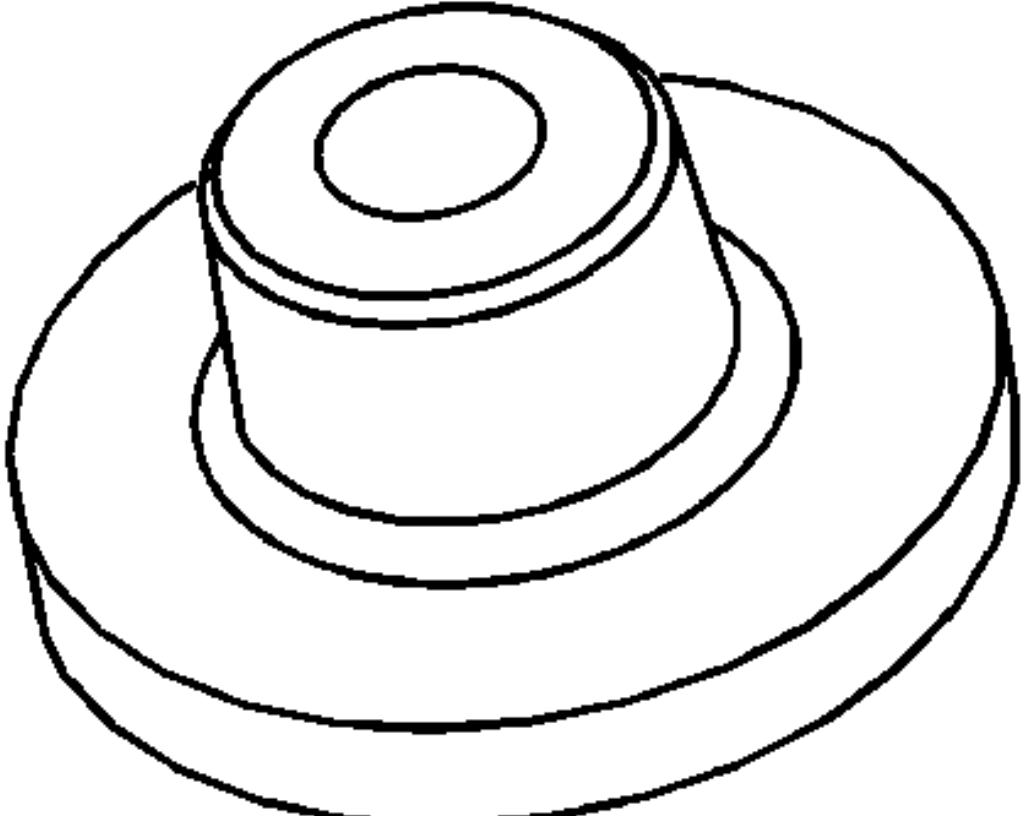
Illustration	Tool Number/ Description
	<p>J-36612 Output Shaft Bearing Installer</p>

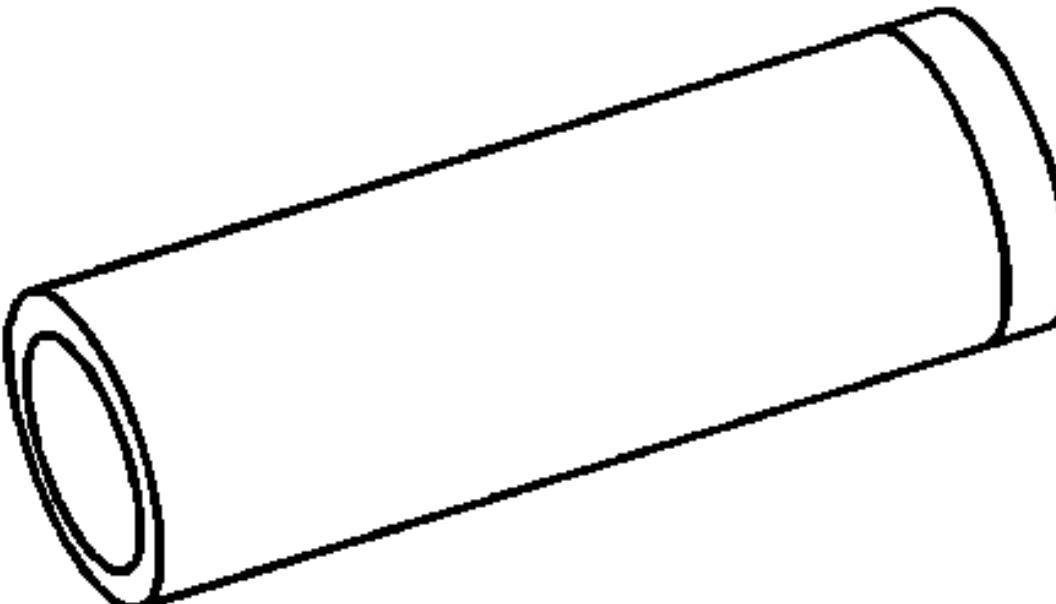
Illustration	Tool Number/ Description
	<p>J-36614 Inner Pinion Bearing Installer</p>

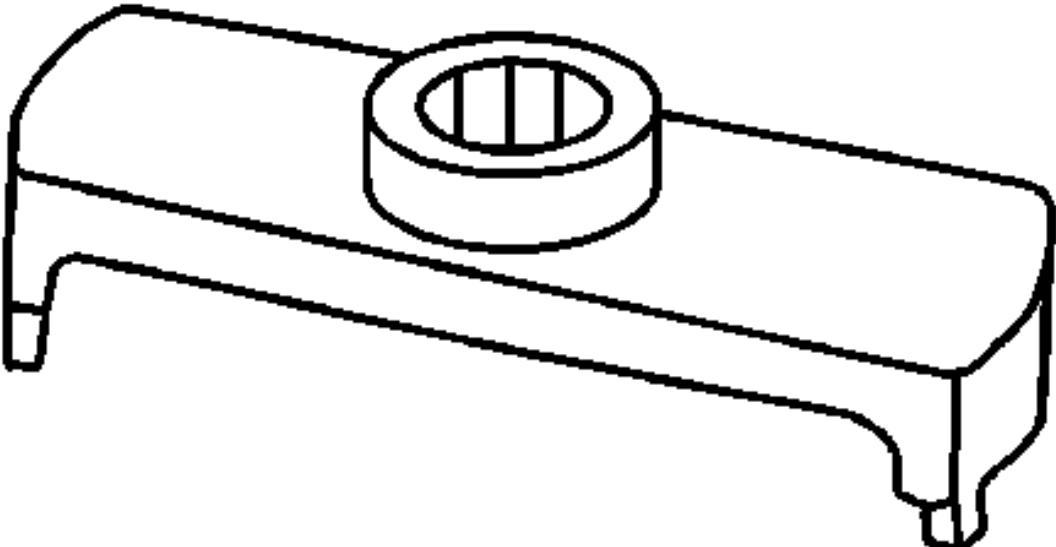
Illustration	Tool Number/ Description
	<p>J-36615 Side Bearing Nut Wrench</p>

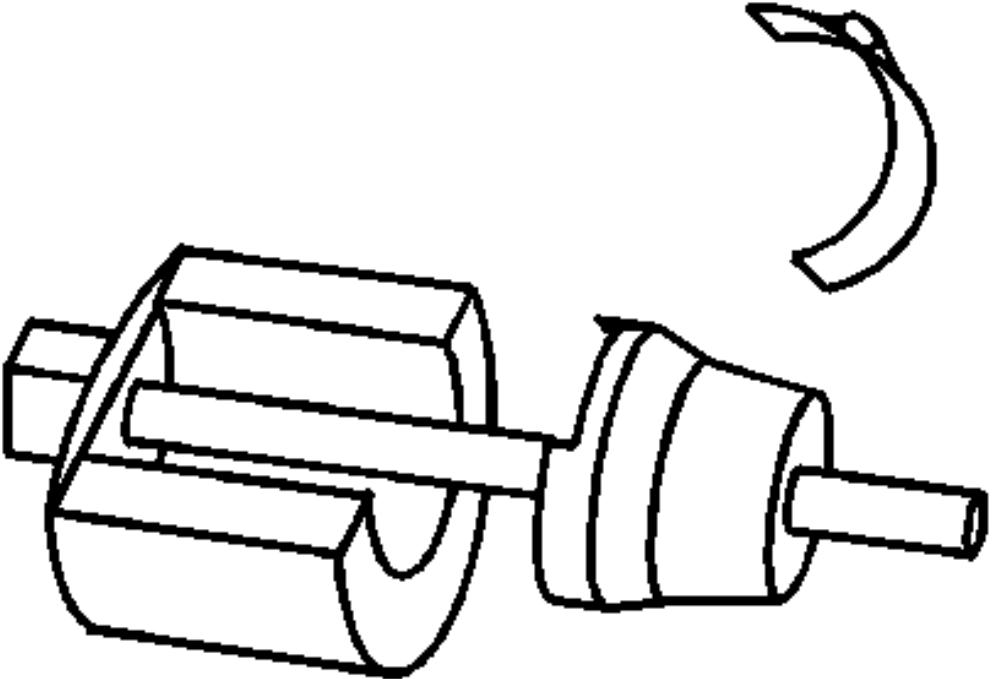
Illustration	Tool Number/ Description
	<p>J-36616 Axe Mount Bushing Remover/Installer</p>

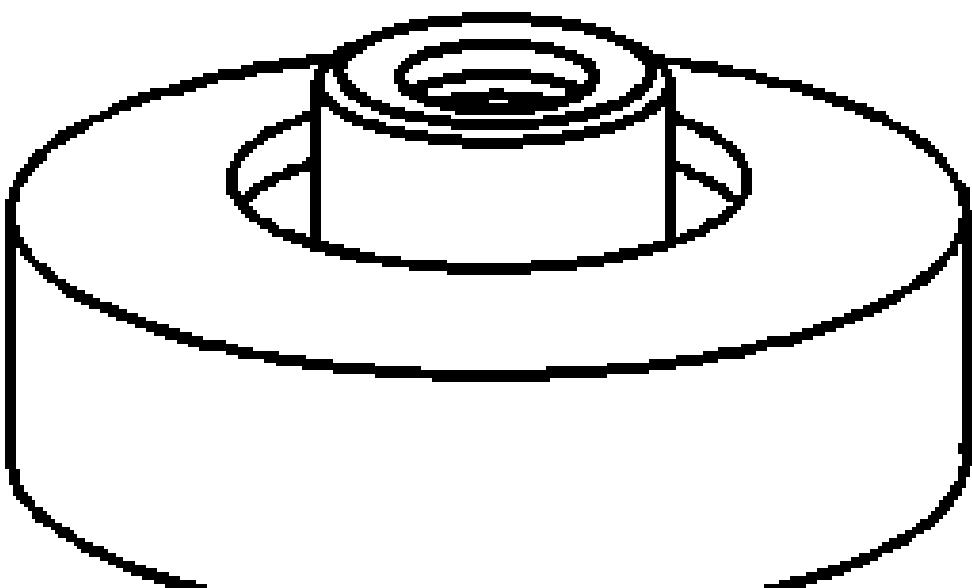
Illustration	Tool Number/ Description
	<p>DT-45225 J-45225 Axe Seal Installer</p>

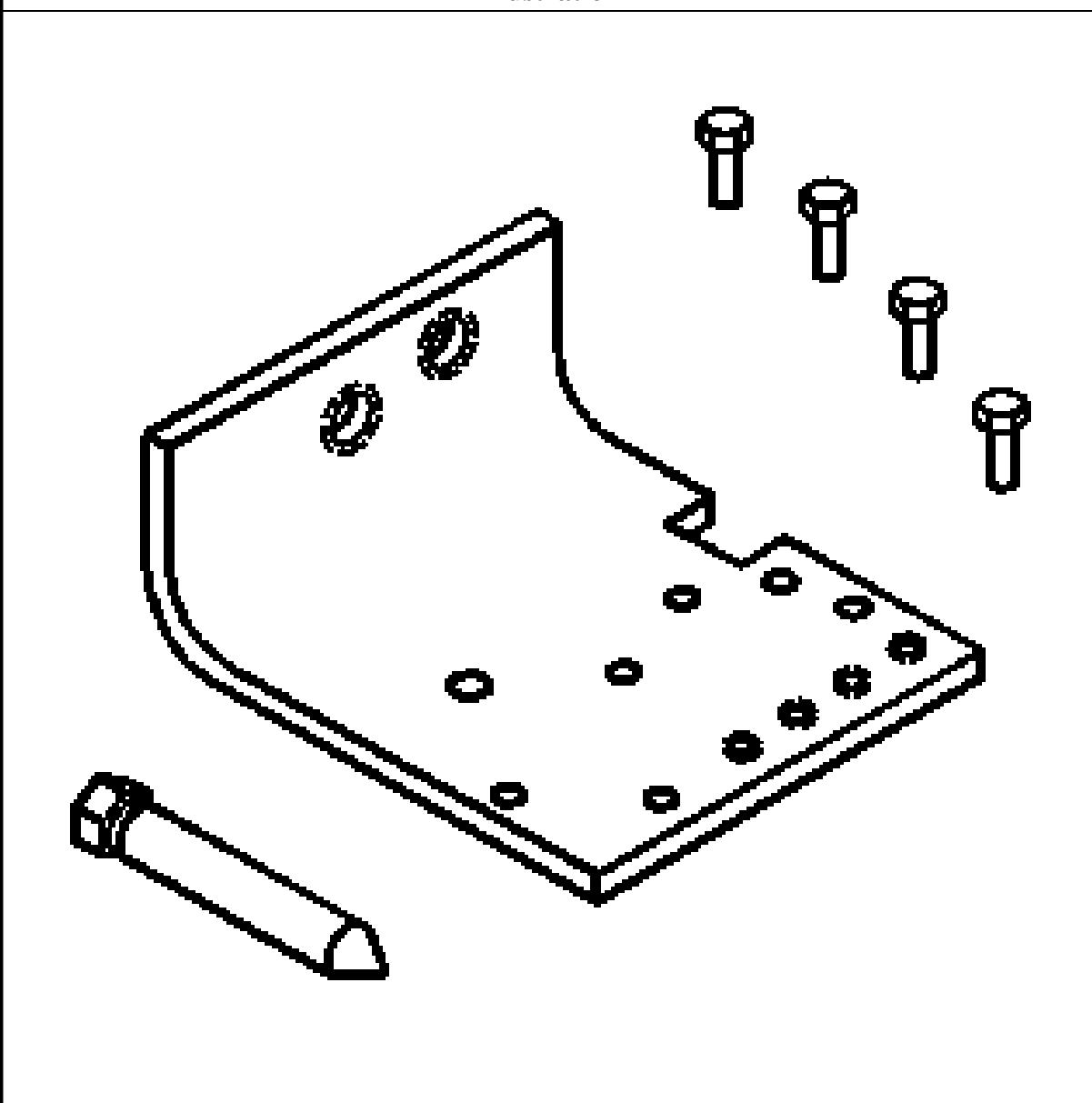
Illustration	Tool Number/ Description
 A technical line drawing of the J-45765 Pinion Remover. The main component is a rectangular base plate with a central U-shaped slot. The base plate has several circular features: two circular holes near the top edge, a central circular hole, and a row of four circular holes along the bottom edge. A long, thin, tapered rod extends from the left side of the base plate. Above the base plate, four cylindrical bolts are shown, with one bolt positioned above the central hole and three others aligned with the bottom row of holes.	<p>Tool Number/ Description</p> <p>J-45765 Pinion Remover</p>

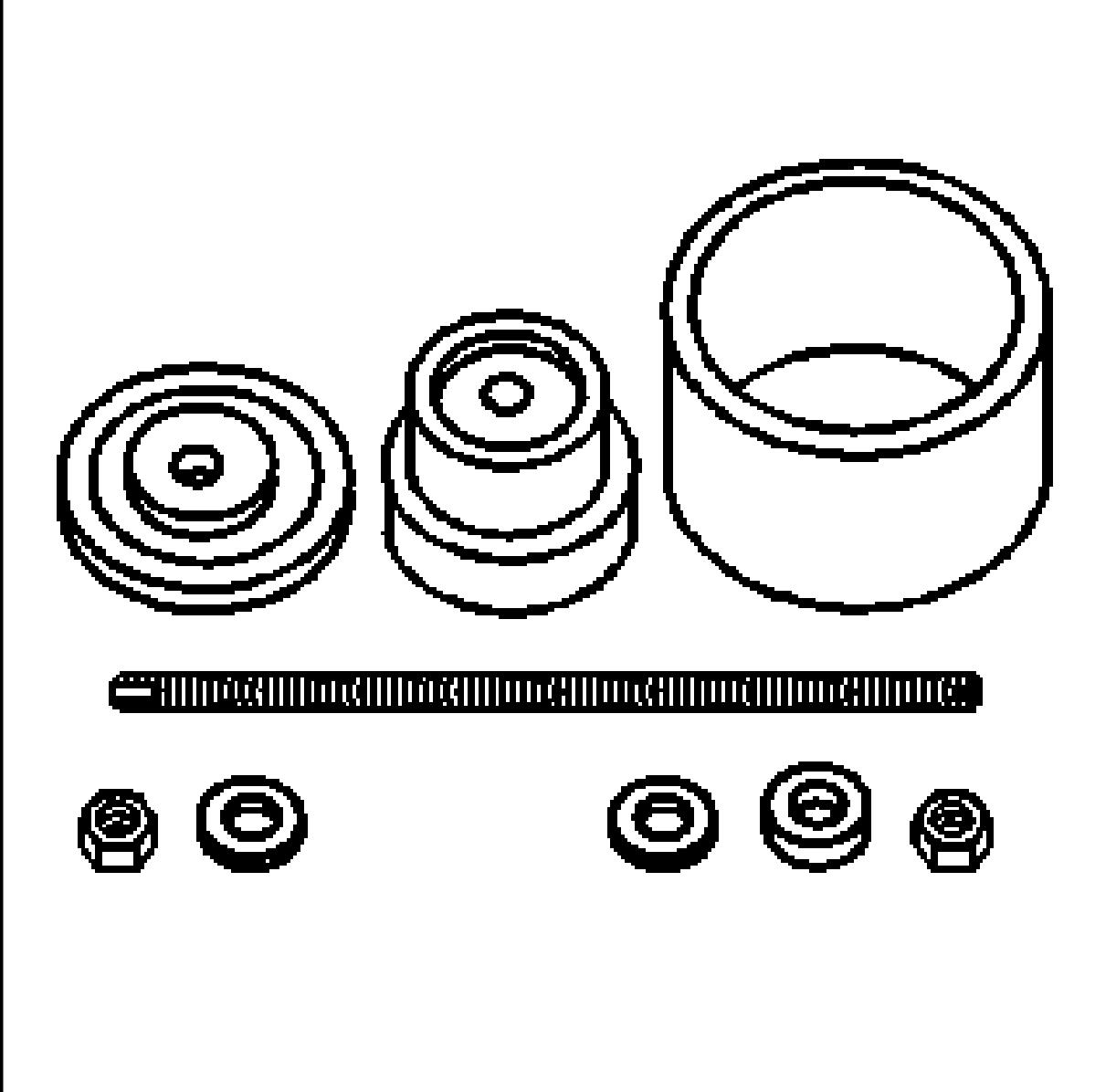
Illustration	Tool Number/ Description
 The illustration shows the J-45766 Frame Mount Installer/Receiver tool and its components. At the top, there are three circular components: a large outer ring, a smaller inner ring, and a central circular part. Below these is a long, thin, rectangular component with a series of small, circular features along its length. At the bottom, there are three smaller circular components, likely washers or nuts.	<p>J-45766 Frame Mount Installer/Receiver</p>

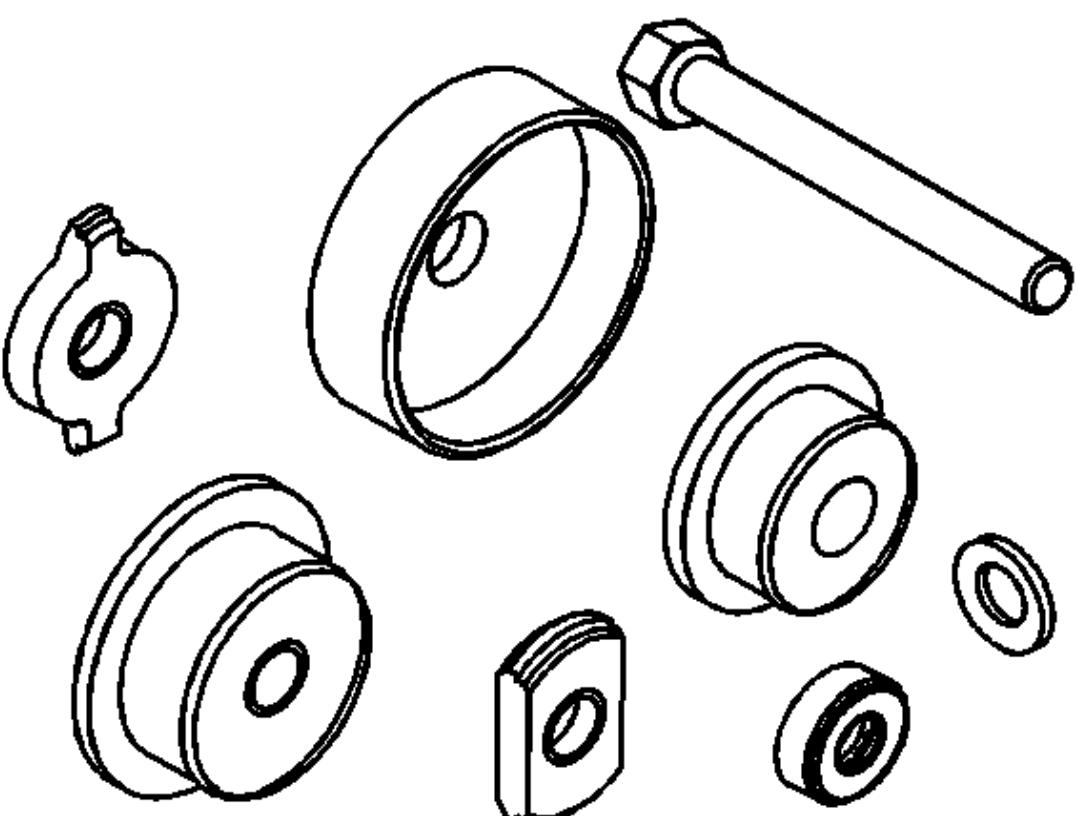
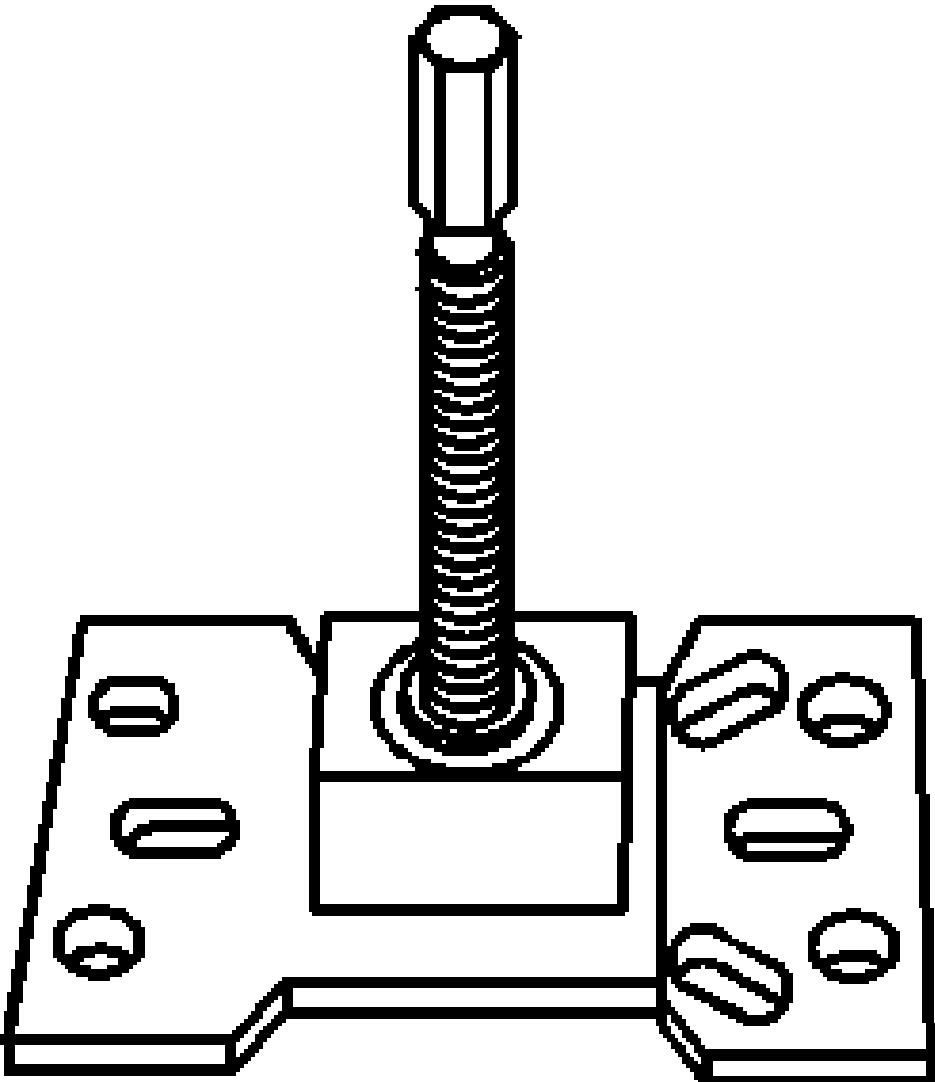
Illustration	Tool Number/ Description
 A technical line drawing showing a Pinion Bearing Race Remover/Installer tool. The tool has a long, thin cylindrical body with a hexagonal nut at the top. Several bearing components are shown around the tool: a large outer ring, a smaller inner ring, a flat washer, and two small bearing balls.	<p>J-45858 Pinion Bearing Race Remover/Installer</p>

Illustration	Tool Number/ Description
 <p>J-45859 Axe Shaft Remover</p>	

DRIVELINE/AXLE

Rear Drive Axle - Escalade, Suburban, Tahoe, Yukon

SPECIFICATIONS

FASTENER SPECIFICATIONS

Application	Specification	
	Metric	English
Axle Flange Bolt (10.5 Inch Axle)	231 N.m	170 lb ft
Bearing Cap Bolt (8.6 Inch Axle)	75 N.m	55 lb ft
Bearing Cap Bolt (9.5/9.5 Inch LD Axles)		
• First Pass	60 N.m	44 lb ft
• Final Pass	30 degrees	
Bearing Cap Bolt (10.5 Inch Axle)	185 N.m	136 lb ft
Brake Backing Plate Bolt	135 N.m	100 lb ft
Brake Hose Bracket Bolt	22 N.m	16 lb ft
Brake Pipe Bracket to Rear Axle Bolt	22 N.m	16 lb ft
Brake Pipe Bracket to Rear Axle Nut	13 N.m	115 lb in
Brake Pipe Junction Block Bolt	22 N.m	16 lb ft
Differential Bearing Adjuster Nut Lock Bolt (9.5/9.5 Inch LD Axles)	26 N.m	19 lb ft
Differential Bearing Adjuster Nut Lock Bolt (10.5 Inch Axle)	34 N.m	25 lb ft
Drain Plug (10.5 Inch Axle)	33 N.m	24 lb ft
Fill Plug (8.6/9.5 LD Inch Axles)	33 N.m	24 lb ft
Fill Plug (10.5 Inch Axle)	75 N.m	55 lb ft
Flex Hose Bracket Bolt	12 N.m	106 lb in
Pinion Gear Bearing Retainer Bolt (10.5 Inch Axle)	88 N.m	65 lb ft
Pinion Shaft Lock Bolt (8.6 Inch Axle)	36 N.m	27 lb ft
Pinion Shaft Lock Bolt (9.5/9.5 Inch LD Axles)	50 N.m	37 lb ft
Propeller Shaft Yoke Retainer Bolt	25 N.m	18 lb ft
Rear Axle Housing Cover Bolt (8.6/9.5/9.76 Inch Axles)		
• First Pass	20 N.m	15 lb ft
• Final Pass	20 degrees	
Rear Axle Housing Cover Bolt (10.5/11.5 Inch Axles)	40 N.m	30 lb ft
Ring Gear Bolt (8.6 Inch Axle)	120 N.m	89 lb ft
Ring Gear Bolt (9.5/9.5 Inch LD Axle)		
• First Pass	50 N.m	37 lb ft
• Final Pass	30 degrees	
Ring Gear Bolt (10.5 Inch Axle)	165 N.m	122 lb ft

Application	Specification	
	Metric	English
Shock Absorber Nut - Lower	95 N.m	70 lb ft
Stabilizer Shaft Link Bolt	95 N.m	70 lb ft
Stabilizer Shaft U-bolt Nut	32 N.m	24 lb ft
U-bolt Nut	95 N.m	70 lb ft
U-bolt Nut (25 Series)	150 N.m	110 lb ft
Wheel Hub Nut (10.5 Inch Axles)	70 N.m	52 lb ft

APPROXIMATE FLUID CAPACITIES

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

Application	Specifications	
	Metric	US English
Axe Capacities		
• Rear Axle 1000 Series without RPO AXN (8.6")	2.03 liters	2.15 quarts
• Rear Axle 1000 Series (9.5" LD)	2.6 liters	2.75 quarts
• Rear Axle 1000 Series (9.76" LD)	2.6 liters	2.75 quarts
• Rear Axle 2000 Series (10.5" HD)	2.6 liters	2.75 quarts

AXLE PRELOAD AND BACKLASH SPECIFICATIONS

Application	Specification	
	Metric	English
Axle Shaft Flange Lateral Runout ¹	+/-.04 mm ¹	+/-.0016 in ¹
Axle Shaft Endplay/Lash (axial lash) per side, max	0.31 mm	0.012 in
Axle Shaft Radial Lash (up and down)	0.051 mm	0.002-0.003 in
Axle Shaft Wheel Pilot Diameter Tolerance Variation	77.81-77.76 mm	3.063-3.061 in
Backlash, NEW Gear Set	0.08-0.13 mm	0.003-0.005 in
Backlash, Gear Set, General Range	0.08-0.25 mm	0.003-0.010 in
Backlash, Used/Broken-In Gear Set, Preferred	0.13-0.18 mm	0.005-0.007 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
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

1. Measure axle shaft flange machined face while holding axle shaft inboard against differential cross pin.

DIFFERENTIAL ADJUSTMENT SHIM SPECIFICATIONS

8.6 Inch Axe Differential Adjustment Shims Specifications

Number of Notches	Specification

Inside	Outside	Metric	English
0	3	1.02 mm	0.040"
0	4	1.07 mm	0.042"
0	5	1.12 mm	0.044"
1	1	1.17 mm	0.046"
1	2	1.22 mm	0.048"
1	3	1.27 mm	0.050"
1	4	1.32 mm	0.052"
1	5	1.37 mm	0.054"
2	1	1.42 mm	0.056"
2	2	1.47 mm	0.058"
2	3	1.52 mm	0.060"
2	4	1.58 mm	0.062"
2	5	1.63 mm	0.064"
3	1	1.68 mm	0.066"
3	2	1.73 mm	0.068"
3	3	1.78 mm	0.070"
3	4	1.83 mm	0.072"
3	5	1.88 mm	0.074"
4	1	1.93 mm	0.076"
4	2	1.98 mm	0.078"
4	3	2.03 mm	0.080"
4	4	2.08 mm	0.082"
4	5	2.13 mm	0.084"
5	1	2.18 mm	0.086"
5	2	2.24 mm	0.088"
5	3	2.29 mm	0.090"
5	4	2.34 mm	0.092"
5	5	2.39 mm	0.094"
6	1	2.38 mm	0.096"
6	2	2.49 mm	0.098"
6	3	2.54 mm	0.100"

9.5/9.76 Inch Axle Differential Adjustment Shims Specifications

GM Part #	Specification	
	Metric	English
22835250	1.016 mm	.040"
22835249	1.067 mm	.042"
22835248	1.118 mm	.044"
22835247	1.168 mm	.046"
22835246	1.219 mm	.048"
22835245	1.27 mm	.050"
22835244	1.321 mm	.052"
22835243	1.372 mm	.054"
22835242	1.422 mm	.056"

GM Part #	Specification	
	Metric	English
22835241	1.473 mm	.058"
22835240	1.524 mm	.060"
22835239	1.575 mm	.060"
22835238	1.626 mm	.064"
22835237	1.676 mm	.066"
22835236	1.727 mm	.068"
22835235	1.778 mm	.070"
22835234	1.829 mm	.072"
22835233	1.88 mm	.074"
22835232	1.93 mm	.076"

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

Application	Type of Material	GM Part Number	Canadian Part Number
Locking Differential Guides	Chassis Lubricant	12377985 or equivalent	88901242 or equivalent
Rear Locking Differential Clutch (friction disc) Disc	SAE 75W85 Synthetic Gear Oil	19300457 or equivalent meeting GM Specification 9986375	19300458 or equivalent
Rear Axle (8.6/9.5/9.76 inch axles)	SAE 75W85 Synthetic Gear Oil	19300457 or equivalent meeting GM Specification 9986375	19300458 or equivalent
Rear Axle (10.5, 11.5 inch axles)	SAE 75W90	88900401 or equivalent meeting GM Specification 9986115	89021678 or equivalent
Ring Gear	Marking Compound	1052351 or equivalent	10953497 or equivalent
Pinion Gear Bearing Retainer	Sealant	1052943 or equivalent	10953491 or equivalent
Pinion Yoke Splines	Sealant	12346004 or equivalent	10953480 or equivalent

LOCKING DIFFERENTIAL THRUST BLOCK SIZES

Color Code	8.6" Axle	9.5/9.76" Axle	10.5" Axle	11.5" Axle
Blue	34.290 mm (1.350")	40.49 mm (1.594")	40.488 mm (1.594")	46.055 mm (1.813")
Purple	33.578 mm (1.322")	40.59 mm (1.598")	40.589 mm (1.598")	46.155 mm (1.817")
White	33.680 mm (1.326")	40.69 mm (1.602")	40.691 mm (1.602")	46.255 mm (1.821")
Brown	33.782 mm (1.330")	40.79 mm (1.606")	40.792 mm (1.606")	46.355 mm (1.825")
Yellow	33.883 mm (1.334")	40.89 mm (1.610")	40.894 mm (1.610")	46.455 mm (1.829")
Orange	33.985 mm (1.338")	41.00 mm (1.614")	40.996 mm (1.614")	46.555 mm (1.833")
Pink	34.087 mm (1.342")	41.10 mm (1.618")	41.097 mm (1.618")	46.655 mm (1.837")
Green	34.188 mm (1.346")	41.20 mm (1.622")	41.199 mm (1.622")	46.755 mm (1.841")

COMPONENT LOCATOR

LOCKING DIFFERENTIAL DISASSEMBLED VIEWS

8.6 Inch Locking Differential

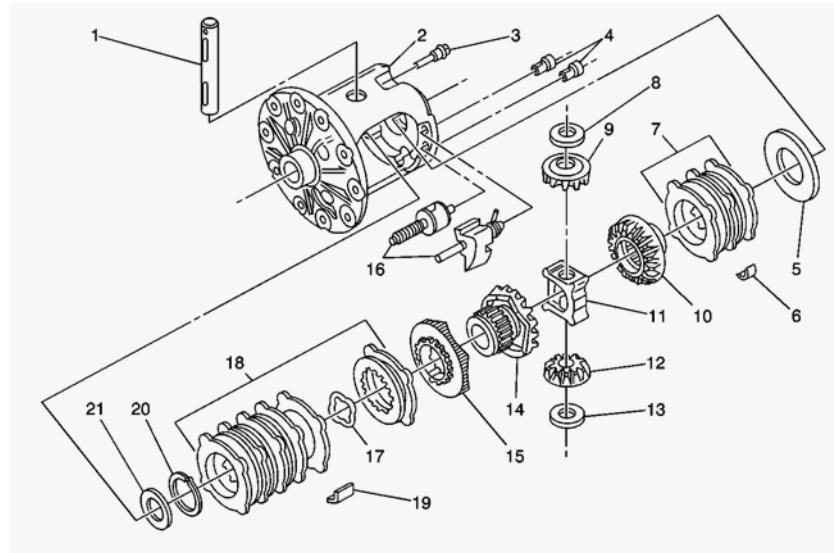


Fig. 1: 8.6 Locking Differential Disassembled View

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Differential Pinion Gear Shaft
2	Differential Case
3	Differential Pinion Gear Shaft Lock Bolt
4	Locking Differential Lockout Bushings
5	Locking Differential Clutch Disc Thrust Washer
6	Locking Differential Clutch Disc Guide
7	Locking Differential Clutch Disc Set
8	Differential Pinion Gear Thrust Washer
9	Differential Pinion Gear
10	Locking Differential Side Gear
11	Locking Differential Thrust Block
12	Differential Pinion Gear
13	Differential Pinion Gear Thrust Washer
14	Locking Differential Side Gear, Cam-Faced
15	Locking Differential Cam
16	Locking Differential Governor
17	Wave Washer
18	Locking Differential Clutch Disc Set
19	Locking Differential Clutch Disc Guide
20	Locking Differential Snap Ring Retainer
21	Locking Differential Clutch Disc Thrust Washer

9.5/9.76 Inch Locking Differential

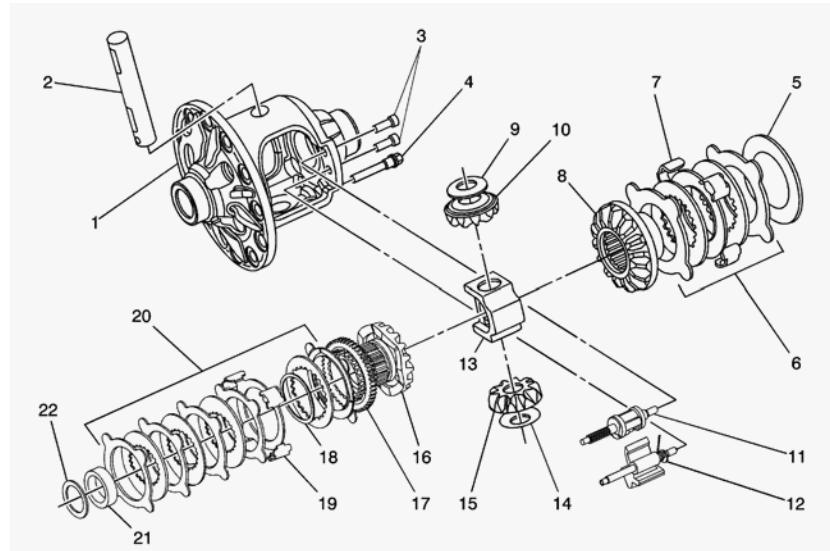


Fig. 2: 9.5/9.76 Locking Differential Disassembled View

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Differential Case
2	Differential Pinion Gear Shaft
3	Locking Differential Lockout Bushing
4	Differential Pinion Gear Shaft Lock Bolt
5	Locking Differential Clutch Disc Thrust Washer
6	Locking Differential Clutch Disc Set
7	Locking Differential Clutch Disc Guide
8	Locking Differential Side Gear
9	Differential Pinion Gear Thrust Washer
10	Differential Pinion Gear
11	Locking Differential Governor
12	Locking Differential Latching Bracket
13	Locking Differential Thrust Block
14	Differential Pinion Gear Thrust Washer
15	Differential Pinion Gear
16	Locking Differential Side Gear, Cam-Faced
17	Locking Differential Cam
18	Wave Washer
19	Locking Differential Clutch Disc Guide
20	Locking Differential Clutch Disc Set
21	Locking Differential Side Gear Thrust Sleeve
22	Differential Side Gear Shim

10.5 Locking Differential

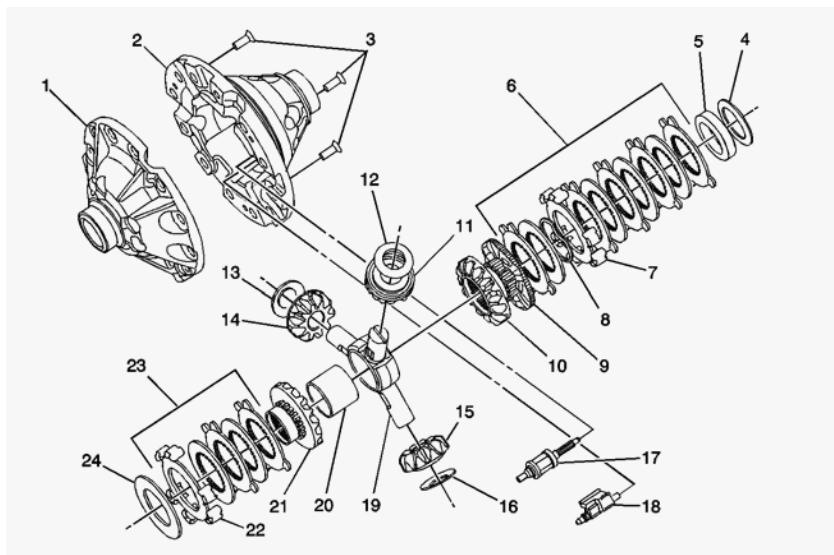


Fig. 3: 10.5 Locking Differential Disassembled View

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Differential Case - Left Side
2	Differential Case - Right Side
3	Differential Case Screws
4	Locking Differential Clutch Disc Thrust Washer
5	Locking Differential Side Gear Thrust Sleeve
6	Locking Differential Clutch Disc Set
7	Locking Differential Clutch Disc Guide
8	Wave Washer
9	Locking Differential Cam
10	Locking Differential Side Gear - Cam Faced
11	Differential Pinion Gear
12	Differential Pinion Gear Thrust Washer
13	Differential Pinion Gear Thrust Washer
14	Differential Pinion Gear
15	Differential Pinion Gear
16	Differential Pinion Gear Thrust Washer
17	Locking Differential Governor
18	Locking Differential Latching Bracket and Spring
19	Locking Differential Spider
20	Locking Differential Thrust Block
21	Locking Differential Side Gear

Callout	Component Name
22	Locking Differential Clutch Disc Guide
23	Locking Differential Clutch Disc Set
24	Differential Side Gear Shim

REAR AXLE DISASSEMBLED VIEWS

9.5/9.76 Inch Rear Axle

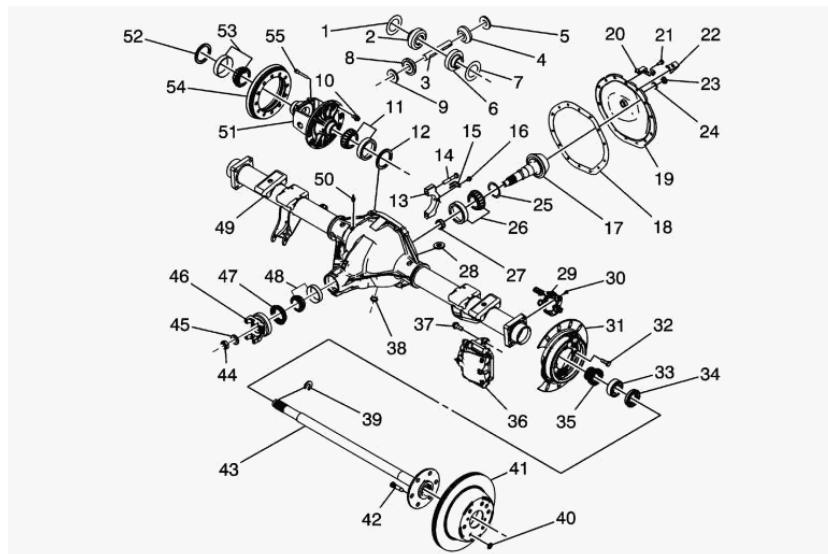


Fig. 4: 9.5/9.76 Rear Axle Disassembled View

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Axle Housing Assembly
2	Vent Hose Connector
3	Ring Gear Bolt
4	Differential Case
5	Differential Case Bearing Shim
6	Differential Case Bearing Assembly
7	Ring Gear
8	Differential Cross Shaft Lock Screw
9	Differential Side Gear Thrust Washer
10	Differential Side Gear
11	Differential Cross Shaft
12	Differential Pinion Gear
13	Differential Pinion Gear Thrust Washer
14	Differential Side Gear Thrust Washer
15	Differential Side Gear

Callout	Component Name
16	Differential Pinion Gear
17	Differential Pinion Gear Thrust Washer
18	Differential Case Bearing Assembly
19	Differential Case Bearing Shim
20	Differential Bearing Cap
21	Differential Bearing Cap Bolt
22	Pinion Bearing Spacer
23	Brake Line Bracket
24	Rear Axle Housing Cover Bolt
25	Fill Plug
26	Fill Plug Washer
27	Rear Axle Housing Cover
28	Rear Axle Housing Cover Gasket
29	Drive Pinion
30	Pinion Bearing Shim
31	Pinion Inner Bearing Assembly
32	Park Brake Assembly
33	Park Brake Attachment Bolt
34	VSES Exciter Ring Assembly
35	Axle Shaft Bearing Assembly
36	Axle Shaft Seal Assembly
37	VSES Sensor Assembly
38	VSES Sensor Bolt
39	Brake Rotor
40	Wheel Stud
41	Axle Shaft
42	Axle Shaft C-Lock
43	Caliper Assembly
44	Caliper Bolt
45	Pinion Flange Nut
46	Pinion Flange Assembly
47	Flange Seal Assembly
48	Pinion Outer Bearing Assembly

8.6 Inch Rear Axle

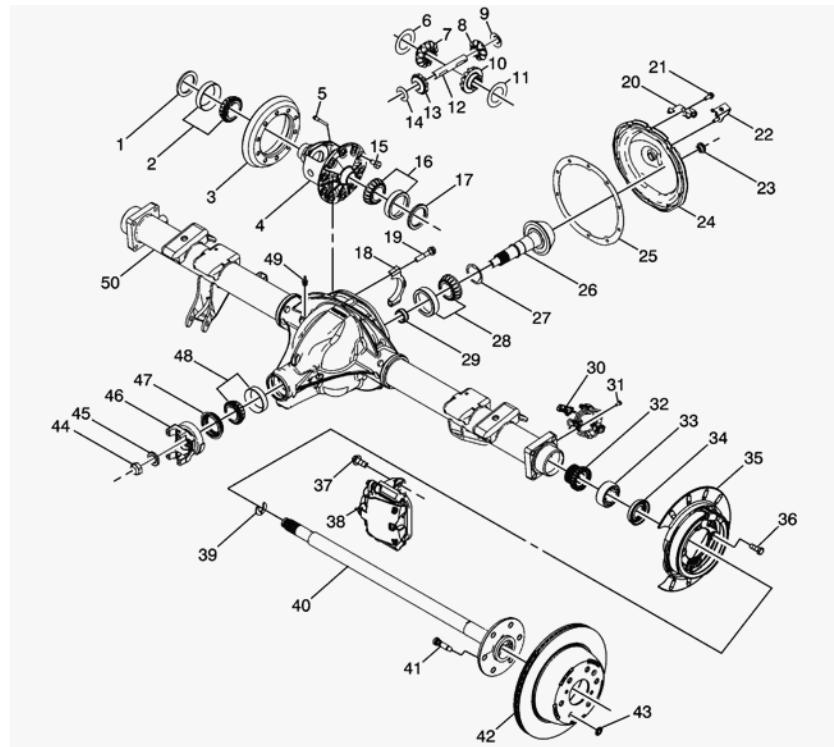


Fig. 5: 8.6 Rear Axle Disassembled View

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Differential Case Bearing Shim
2	Differential Case Bearing Assembly
3	Ring Gear
4	Differential Case
5	Differential Cross Pin Lock Screw
6	Differential Side Gear Thrust Washer
7	Differential Side Gear
8	Differential Pinion Gear
9	Differential Pinion Thrust Washer
10	Differential Side Gear
11	Differential Side Gear Thrust Washer
12	Differential Cross Pin
13	Differential Pinion Gear
14	Differential Pinion Gear Thrust Washer
15	Ring Gear Bolt
16	Differential Case Bearing Assembly
17	Differential Case Bearing Shim

Callout	Component Name
18	Carrier Bearing Cap
19	Carrier Bearing Cap Bolt
20	Cover Pan Clip
21	Cover Pan Bolt
22	Cover Pan Bracket Assembly
23	Fill Plug Assembly
24	Cover Pan
25	Cover Pan Gasket
26	Drive Pinion
27	Drive Pinion Bearing Shim
28	Drive Pinion Head Bearing Assembly
29	Drive Pinion Bearing Spacer
30	VSES Sensor Assembly
31	VSES Sensor Bolt
32	VSES Exciter Ring Assembly
33	Axle Shaft Bearing Assembly
34	Axle Shaft Seal Assembly
35	Park Brake Assembly
36	Park Brake Attachment Bolt
37	Caliper Bolt
38	Caliper Assembly
39	Axle Shaft C-Lock
40	Axle Shaft
41	Wheel Stud
42	Brake Rotor
43	Push Nut
44	Pinion Flange Nut
45	Pinion Flange Washer
46	Pinion Flange Assembly
47	Pinion Flange Seal Assembly
48	Drive Pinion Tail Bearing Assembly
49	Vent Connector
50	Axle Housing Assembly

DIAGNOSTIC INFORMATION AND PROCEDURES

SYMPTOMS - LOCKING/LIMITED SLIP REAR AXLE

Review the system and operation in order to familiarize yourself with the system functions. Refer to [Locking Differential Description and Operation](#).

Visual/Physical Inspection

- Inspect the system for the following:
 - Loose or missing fasteners
 - Obvious damage or conditions which may cause the symptom.

- Check the system for proper operation. Refer to [Locking Differential Diagnosis](#).

Symptom List

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

- [Locking Rear Axle Does Not Lock](#)
- [Locking Rear Axle Locks in Turns](#)
- [Locking Rear Drive Axle Chatters in Turns](#)
- [Noise in Addition to Normal Clutch Engagement](#)

SYMPTOMS - REAR DRIVE AXLE

Review the system and operation in order to familiarize yourself with the system functions. Refer to [Rear Drive Axle Description and Operation](#).

Rear Axle Noise

The proper diagnosis is an important part of rear axle repair. In axle work, one of the most difficult conditions to diagnose is noise. Locating a broken axle shaft or broken differential gear presents little or no problems, but locating and isolating axle noise can be an entirely different matter.

Any gear driven unit, especially an automotive drive axle where the engine torque multiplication occurs at a 90 degree turn in the driveline, produces a certain amount of noise. Therefore, an interpretation must be made for each vehicle in order to determine where the noise is normal or if a problem actually exists. A certain amount of noise must be expected and cannot be eliminated by conventional repairs or adjustment.

Normal axle noise can be described as a slight noise heard only at a certain speed or under unusual or remote conditions. For example, the noise tends to reach a peak at speeds from 60-100 km/h (40-60 mph) depending on road and load conditions, or on gear ratio and tire size. This slight noise is in no way indicative of trouble in the axle assembly.

Driveline noises may confuse even the best technician. Vehicle noises coming from tires, transmission, propeller shaft, universal joints, and front or rear wheel bearings are often mistaken for axle noise.

Visual/Physical Inspection

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

Symptom List

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

- [Rear Drive Axle Noises](#)
- [Noisy in Drive](#)
- [Noisy When Coasting](#)
- [Intermittent Noise](#)
- [Constant Noise](#)
- [Noisy on Turns](#)

REAR 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 either ring and pinion gear replacement or adjustment, depending on the mileage of the gearset.

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 rear axle side bearing. This noise can be confused with rear wheel bearing noise. Inspect and replace the bearings and the affected components as required.

Rear Wheel Bearing Noise

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

A rough/noisy rear wheel bearing can be heard by spinning the rear 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 differential case and replace the components as necessary.

Backlash Clunk

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

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

Inspect, adjust or replace the affected components as necessary.

NOISY IN DRIVE

Cause	Correction
DEFINITION: A noise heard during acceleration load.	
Excessive pinion to ring gear backlash	Adjust the pinion to ring gear backlash. Refer to Backlash Adjustment (9.5/9.76 Inch Axle) Backlash Adjustment (8.6 Inch Axle) Backlash Adjustment (10.5 Inch Axle) .
Worn pinion and ring gear	Replace the pinion and the ring gear. Refer to Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle) Drive Pinion and Ring Gear Replacement (10.5 Inch Axle) .
Worn pinion bearings	Replace the pinion bearings. Refer to Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles) Differential Drive Pinion Gear Bearing Replacement (10.5 Inch Axle) .
Loose pinion bearings	Adjust the pinion bearings preload. Refer to Pinion Depth Adjustment (8.6 Inch Axle) Pinion Depth Adjustment (10.5 Inch Axle) Pinion Depth Adjustment (9.5 Inch Axle) Pinion Depth Adjustment (9.76 Inch Axle) .
Excessive pinion end play	Adjust the pinion end play. Refer to Pinion Depth Adjustment (8.6 Inch Axle) Pinion Depth Adjustment (10.5 Inch Axle) Pinion Depth Adjustment (9.5 Inch Axle) Pinion Depth Adjustment (9.76 Inch Axle) .
Worn differential bearings	Replace the differential bearings. Refer to Differential Bearing Replacement .

Cause	Correction
Loose differential bearings	Adjust the differential bearing preload. Refer to Differential Carrier Bearing Preload Adjustment (9.5/9.76 Inch Axle) Differential Carrier Bearing Preload Adjustment (8.6 Inch Axle) Differential Carrier Bearing Preload Adjustment (10.5 Inch Axle) .
Excessive ring gear runout	Replace the ring gear. Refer to Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle) Drive Pinion and Ring Gear Replacement (10.5 Inch Axle) .
Low oil level	Fill the fluid level to specifications with the proper lubricant. Refer to Rear Axle Lubricant Level Inspection (8.6, 9.5/9.76 Inch Axle) Rear Axle Lubricant Level Inspection (10.5 Inch Axle) .
Wrong or poor grade oil	Drain and refill the system with the proper lubricant. Refer to Differential Oil Replacement (8.6 Inch Axle) Differential Oil Replacement (9.5/9.76 Inch Axle) Differential Oil Replacement (10.5 Inch Axle) .
Bent axle housing	Replace the axle housing. Refer to Rear Axle Replacement (10.5 Inch Axle) Rear Axle Replacement (8.6/9.5/9.76 Inch Axles) .

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 Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle) Drive Pinion and Ring Gear Replacement (10.5 Inch Axle) .
Pinion and ring gear too tight	Adjust the pinion and the ring gear backlash. Refer to Backlash Adjustment (9.5/9.76 Inch Axle) Backlash Adjustment (8.6 Inch Axle) Backlash Adjustment (10.5 Inch Axle) .

INTERMITTENT NOISE

Checks	Action
Warped ring gear	Replace the ring gear. Refer to Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle) Drive Pinion and Ring Gear Replacement (10.5 Inch Axle) .
Loose differential case bolts	Tighten differential case bolts to specifications. Refer to Fastener Specifications .

CONSTANT NOISE

Cause	Correction
DEFINITION: A noise heard in the rear axle during all driving conditions. This noise may increase or decrease in volume based on different driving maneuvers and speeds.	
Flat spot on the pinion or the ring gear teeth	Replace the pinion and the ring gear. Refer to Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle) Drive Pinion and Ring Gear Replacement (10.5 Inch Axle) .
Flat spot on the pinion bearing	Replace the bearing. Refer to Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles) Differential Drive Pinion Gear Bearing Replacement (10.5 Inch Axle) .
Worn pinion splines	Replace the pinion. Refer to Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle) Drive Pinion and Ring Gear Replacement (10.5 Inch Axle) .
Low oil level	Fill the fluid level to specifications with the proper lubricant. Refer to Rear Axle Lubricant Level Inspection (8.6, 9.5/9.76 Inch Axle) Rear Axle Lubricant Level Inspection (10.5 Inch Axle) .
Wrong or poor grade oil	Drain and refill the system with the proper lubricant. Refer to Differential Oil Replacement (8.6 Inch Axle) Differential Oil Replacement (9.5/9.76 Inch Axle) Differential Oil Replacement (10.5 Inch Axle) .
Excessive pinion to ring gear backlash	Adjust the pinion to ring gear backlash. Refer to Backlash Adjustment (9.5/9.76 Inch Axle) Backlash Adjustment (8.6 Inch Axle) Backlash Adjustment (10.5 Inch Axle) .
Loose pinion bearings	Adjust the pinion bearings preload. Refer to Pinion Depth Adjustment (8.6 Inch Axle) Pinion Depth Adjustment (10.5 Inch Axle) Pinion Depth Adjustment (9.5 Inch Axle) Pinion Depth Adjustment (9.76 Inch Axle) .
Excessive pinion end play	Adjust the pinion end play. Refer to Pinion Depth Adjustment (8.6 Inch Axle) Pinion Depth Adjustment (10.5 Inch Axle) Pinion Depth Adjustment (9.5 Inch Axle) Pinion Depth Adjustment (9.76 Inch Axle) .

Cause	Correction
Incorrect differential bearing preload	Adjust the differential bearing preload. Refer to Differential Carrier Bearing Preload Adjustment (9.5/9.76 Inch Axle) Differential Carrier Bearing Preload Adjustment (8.6 Inch Axle) Differential Carrier Bearing Preload Adjustment (10.5 Inch Axle) .
Incorrect backlash	Adjust the pinion and ring gear backlash. Refer to Backlash Adjustment (9.5/9.76 Inch Axle) Backlash Adjustment (8.6 Inch Axle) Backlash Adjustment (10.5 Inch Axle) .
Worn pinion bearings	Replace the pinion bearings. Refer to Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles) Differential Drive Pinion Gear Bearing Replacement (10.5 Inch Axle) .
Worn differential bearings	Replace the differential bearings. Refer to Differential Bearing Replacement .
Worn pinion and ring gear	Replace the pinion and ring gear. Refer to Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle) Drive Pinion and Ring Gear Replacement (10.5 Inch Axle) .
Excessive ring gear runout	Replace the ring gear. Refer to Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle) Drive Pinion and Ring Gear Replacement (10.5 Inch Axle) .
Bent axle housing	Replace the axle housing. Refer to Rear Axle Replacement (10.5 Inch Axle) Rear Axle Replacement (8.6/9.5/9.76 Inch Axles) .
Worn axle shaft dowel holes	Replace the axle shaft. Refer to Rear Axle Shaft Replacement .
Worn hub studs	Replace the wheel studs. Refer to Wheel Stud Replacement (1500) Wheel Stud Replacement (Heavy Duty) .
Bent axle shaft	Replace the axle shaft. Refer to Rear Axle Shaft Replacement .

NOISY ON TURNS

Checks	Action
Worn differential side gears and pinions	Replace the differential side gears and pinions. Refer to Differential Overhaul (8.6/9.5/9.76 Inch Axles) Differential Overhaul (10.5 Inch Axle) .
Worn differential spider gears	Replace the spider gears. Refer to Differential Overhaul (8.6/9.5/9.76 Inch Axles) Differential Overhaul (10.5 Inch Axle) .
Worn axle shaft splines	Replace the axle shaft. Refer to Rear Axle Shaft Replacement .

WHEEL BEARING WEAR - REAR DRIVE AXLE (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)

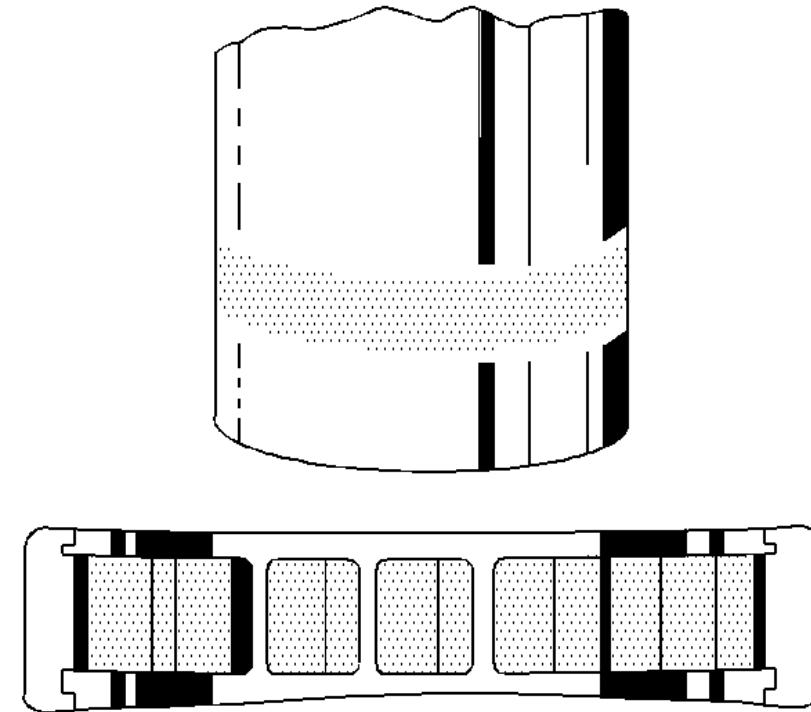


Fig. 6: Identifying Minor Wear

Courtesy of GENERAL MOTORS COMPANY

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

Wear (Major)

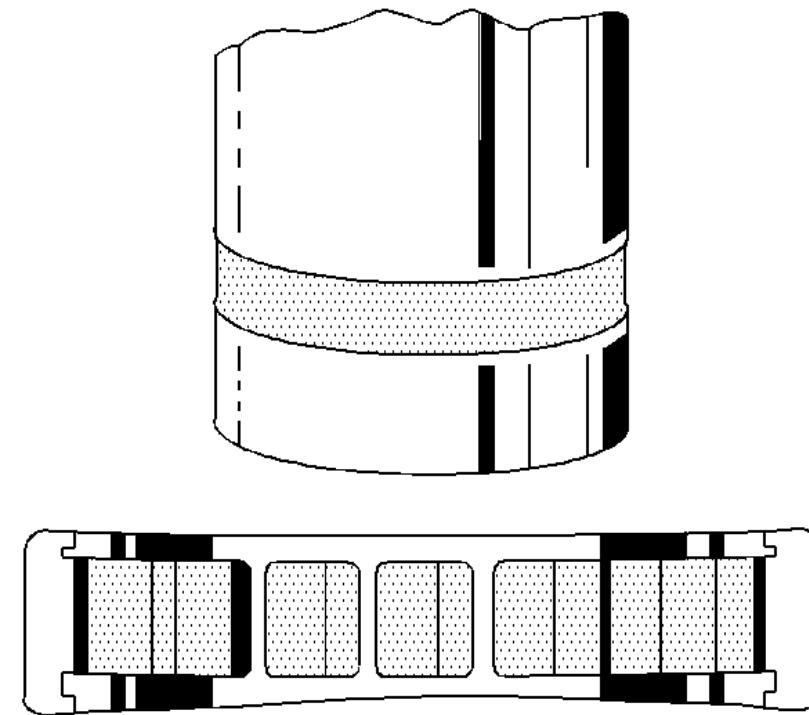


Fig. 7: Identifying Major Wear

Courtesy of GENERAL MOTORS COMPANY

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

Brinelling

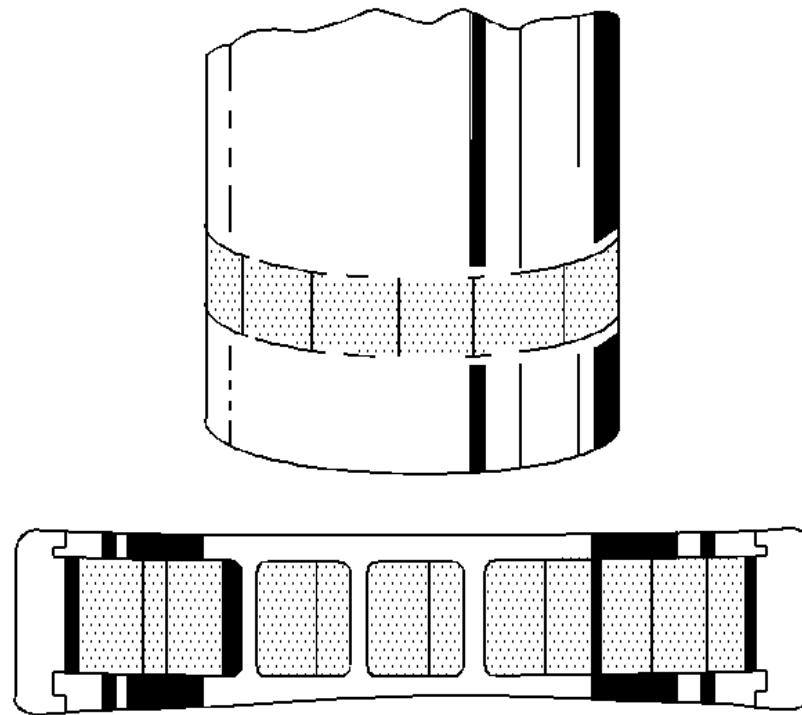


Fig. 8: Identifying Brinelling

Courtesy of GENERAL MOTORS COMPANY

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

Indentations

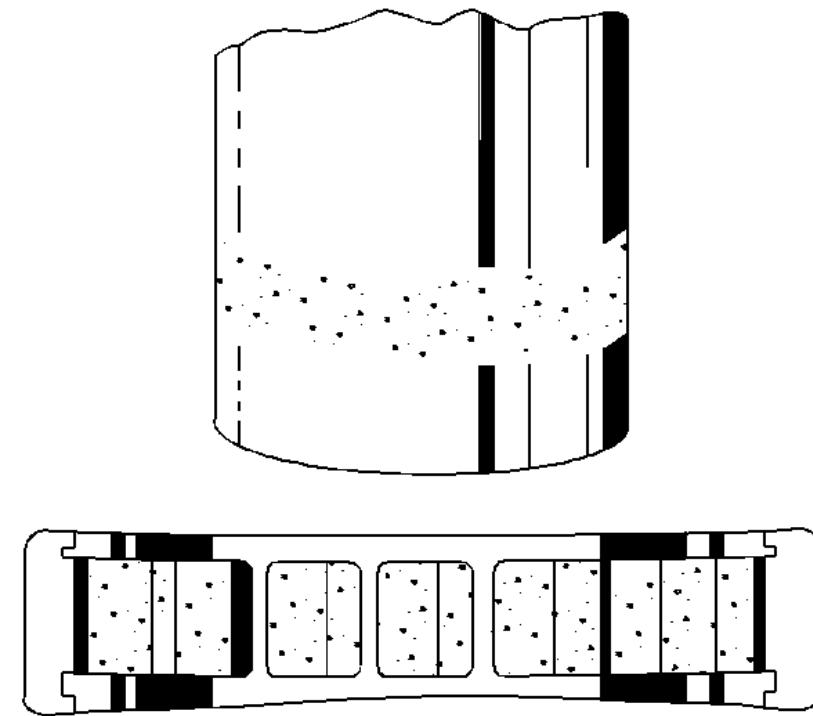


Fig. 9: Identifying Indentations

Courtesy of GENERAL MOTORS COMPANY

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

Single Edge Pitting

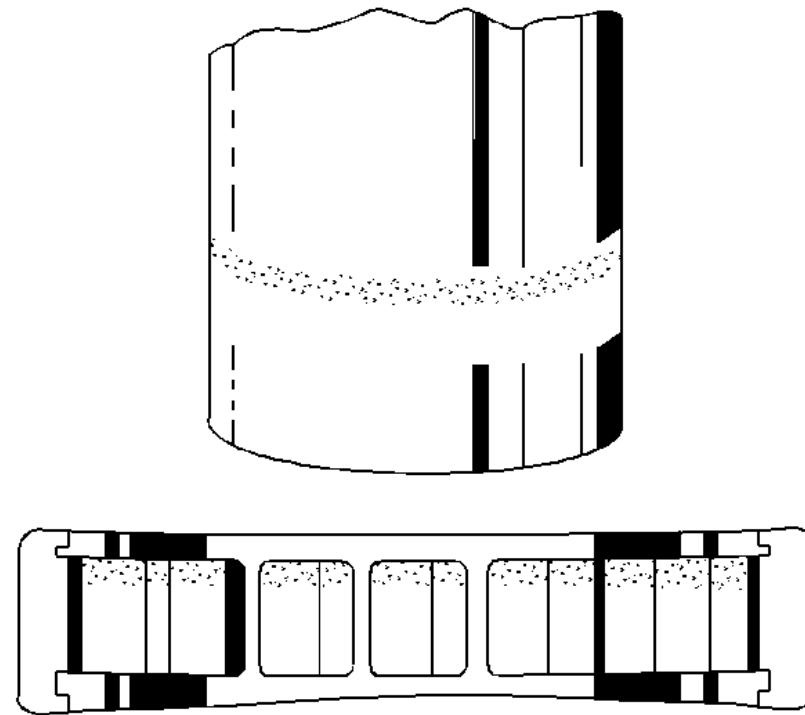


Fig. 10: Identifying Single Edge Pitting

Courtesy of GENERAL MOTORS COMPANY

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

Double Edge Pitting

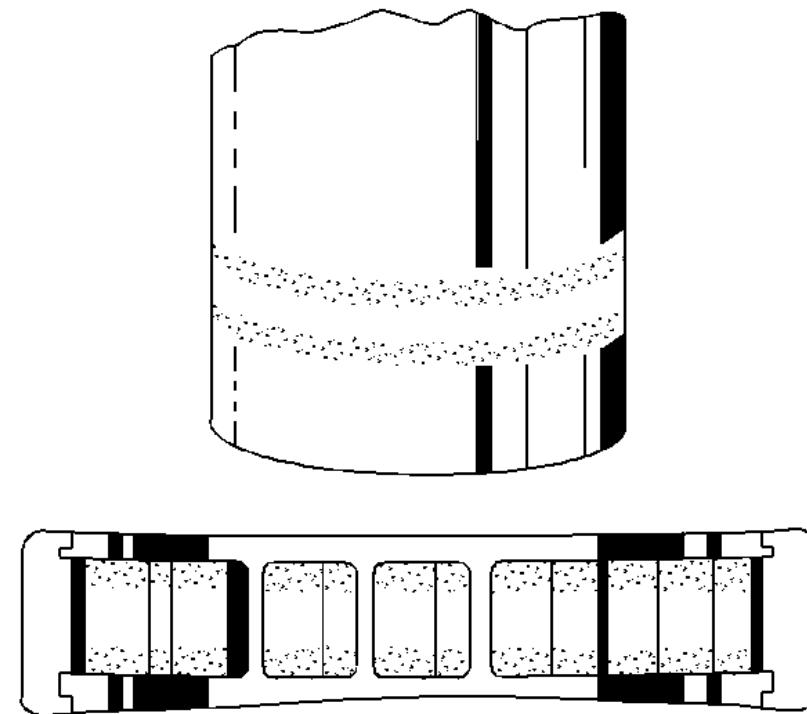


Fig. 11: Identifying Double Edge Pitting

Courtesy of GENERAL MOTORS COMPANY

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

Misalignment

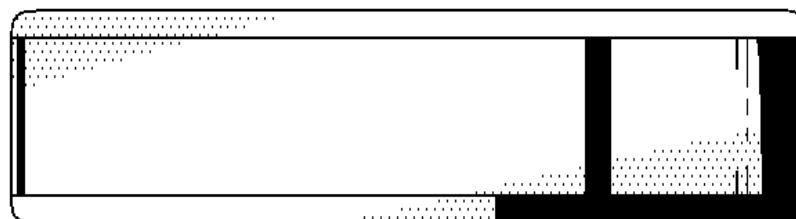
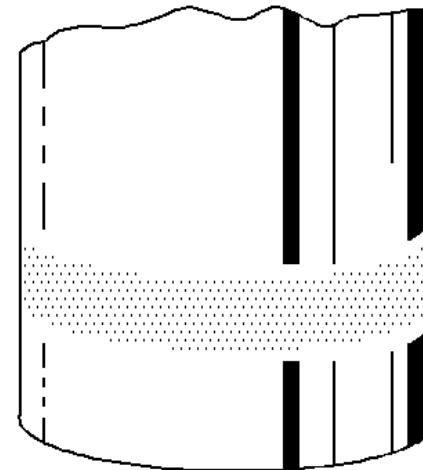


Fig. 12: Identifying Misalignment

Courtesy of GENERAL MOTORS COMPANY

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

Frettagge

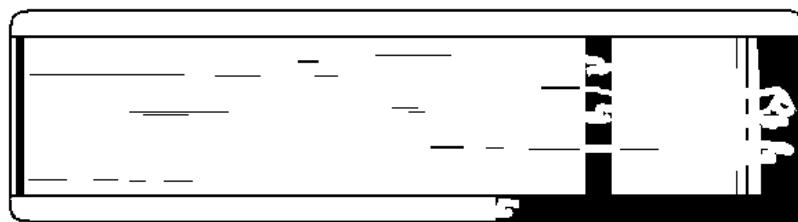
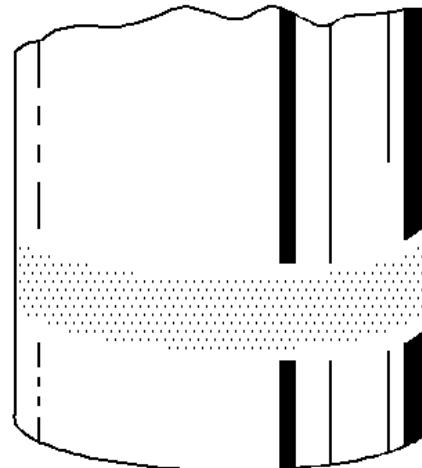


Fig. 13: Identifying Fretting

Courtesy of GENERAL MOTORS COMPANY

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

Smears

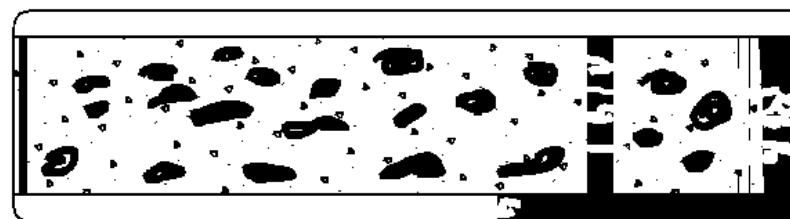
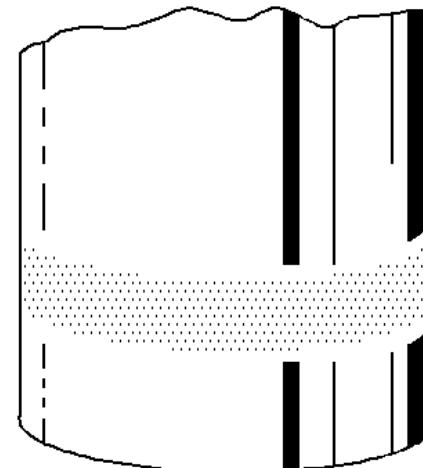


Fig. 14: Identifying Smears

Courtesy of GENERAL MOTORS COMPANY

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

WHEEL BEARING WEAR - REAR DRIVE AXLE (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

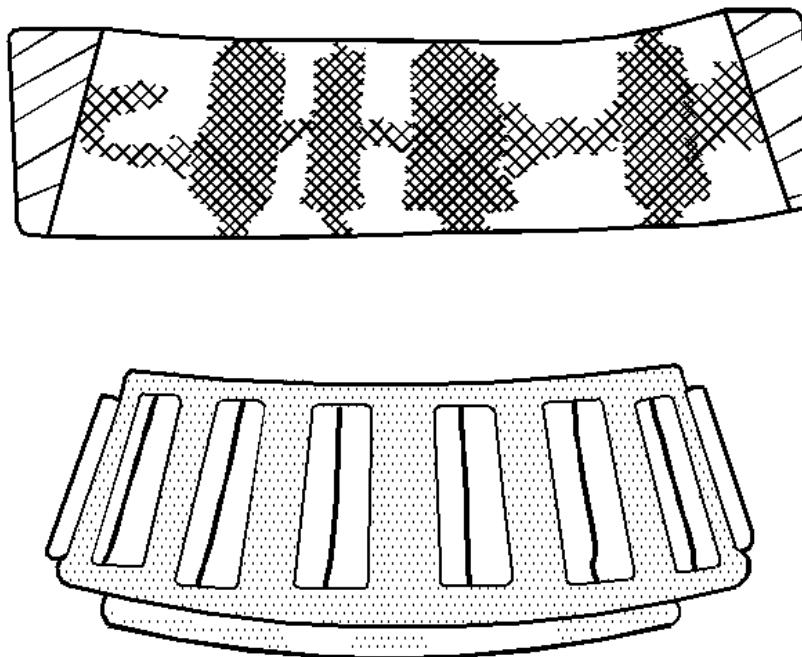


Fig. 15: Identifying Abrasive Roller Wear

Courtesy of GENERAL MOTORS COMPANY

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

Abrasive Step Wear

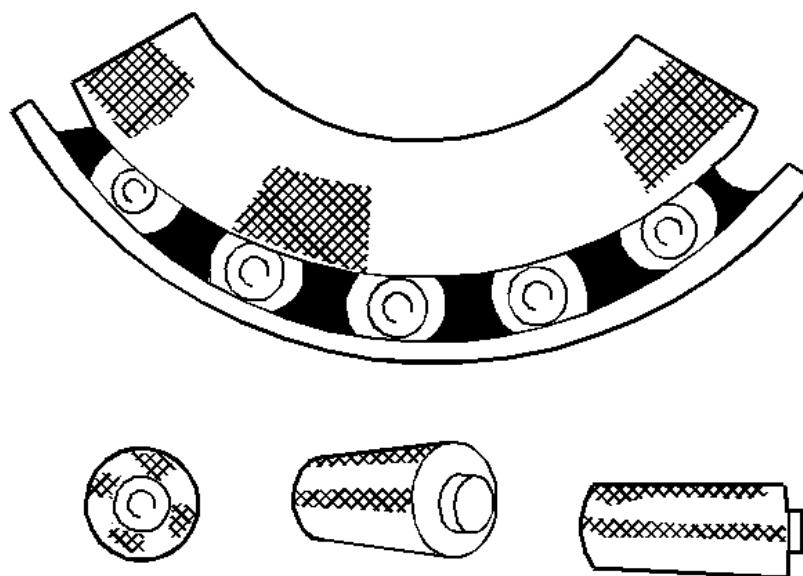


Fig. 16: Identifying Abrasive Step Wear

Courtesy of GENERAL MOTORS COMPANY

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

Galling

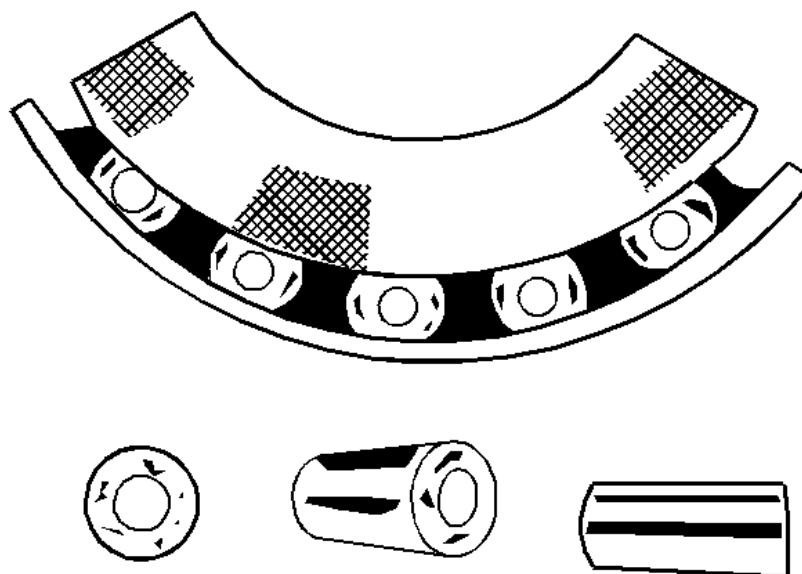


Fig. 17: Identifying Galling

Courtesy of GENERAL MOTORS COMPANY

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

Etching

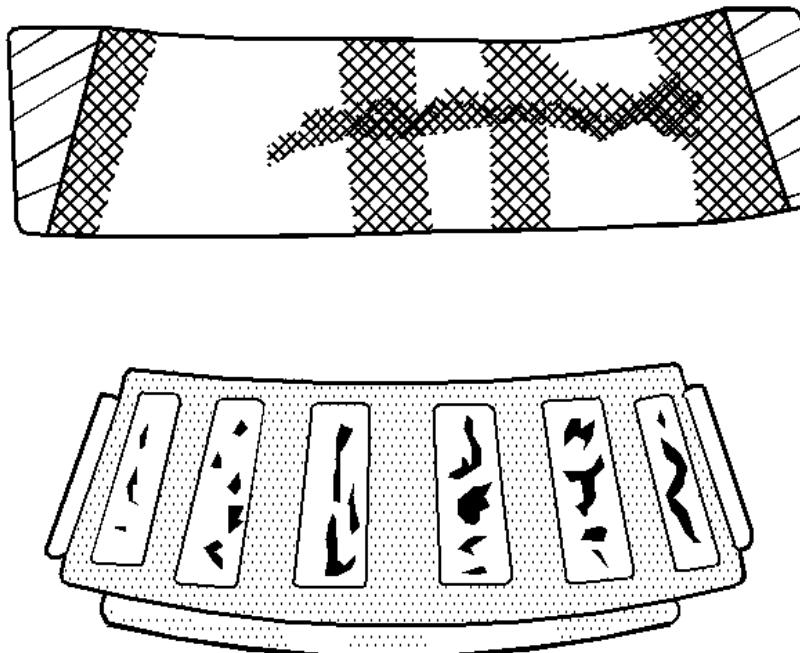


Fig. 18: Identifying Etching

Courtesy of GENERAL MOTORS COMPANY

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

Bent Cage

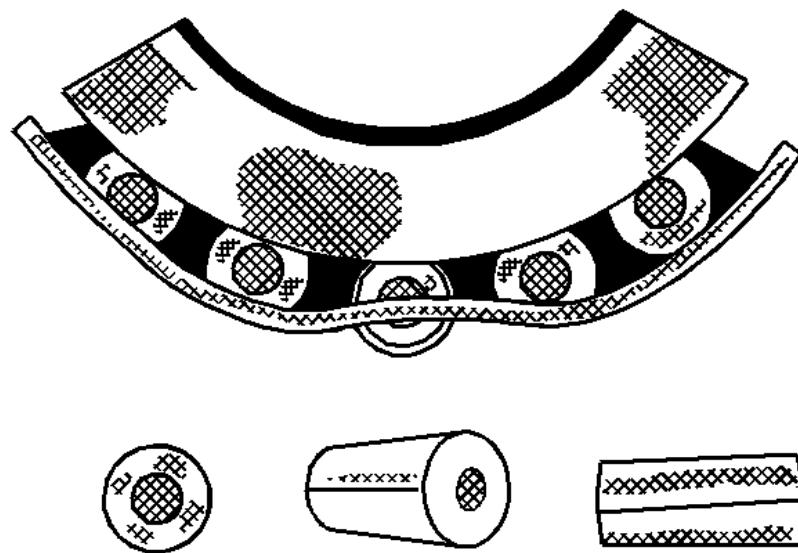


Fig. 19: Identifying Bent Cage

Courtesy of GENERAL MOTORS COMPANY

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

Cage Wear

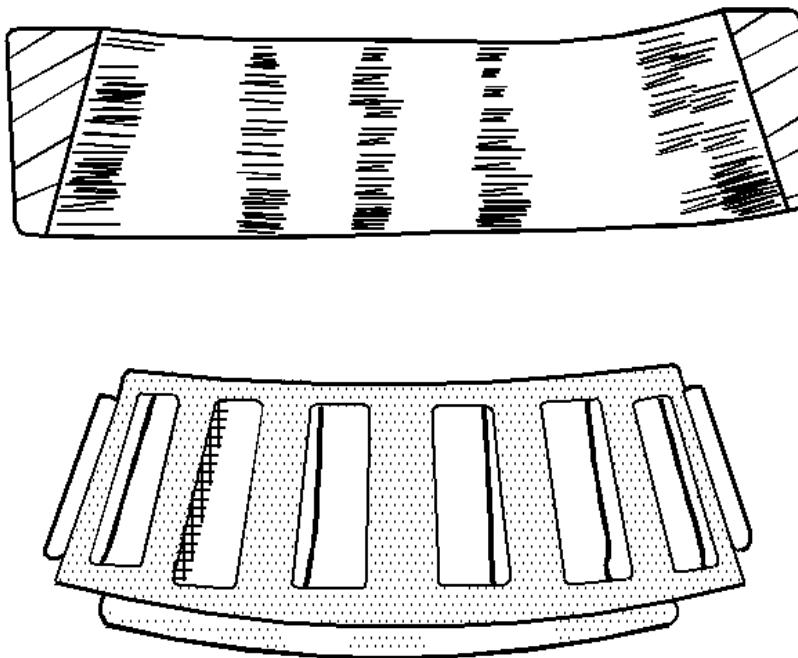


Fig. 20: Identifying Cage Wear

Courtesy of GENERAL MOTORS COMPANY

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

Indentations

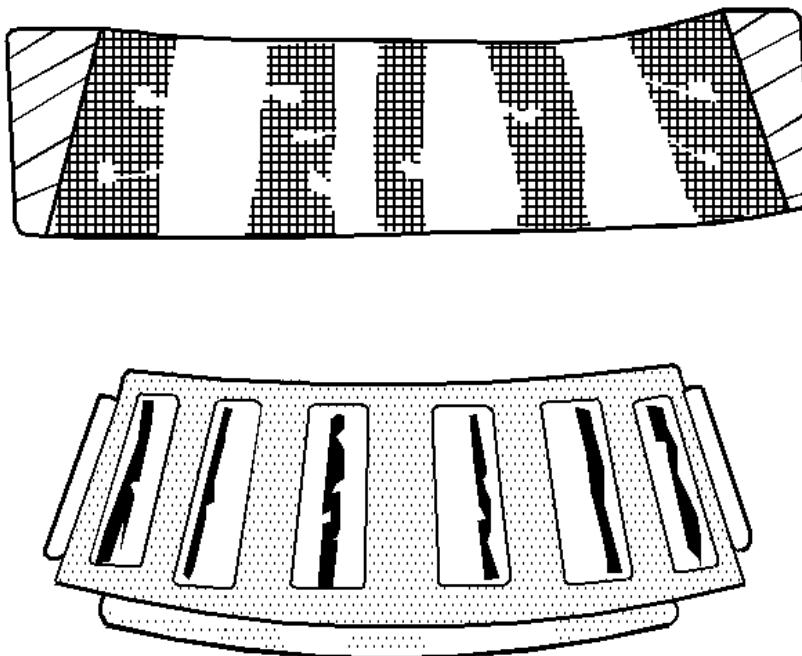


Fig. 21: Identifying Indentations

Courtesy of GENERAL MOTORS COMPANY

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

Fretting

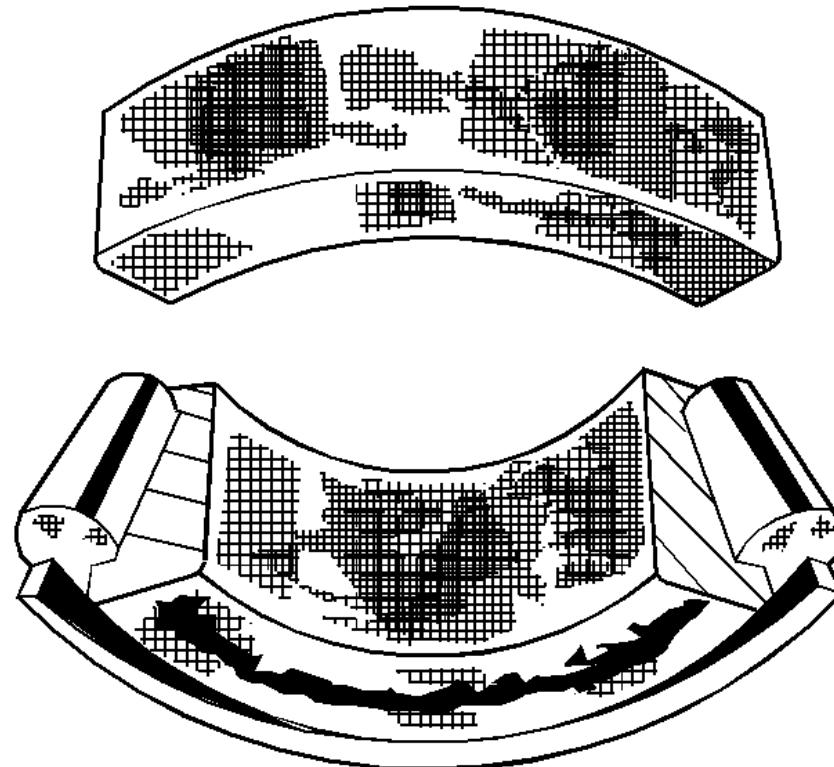


Fig. 22: Identifying Fretting

Courtesy of GENERAL MOTORS COMPANY

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

Smears

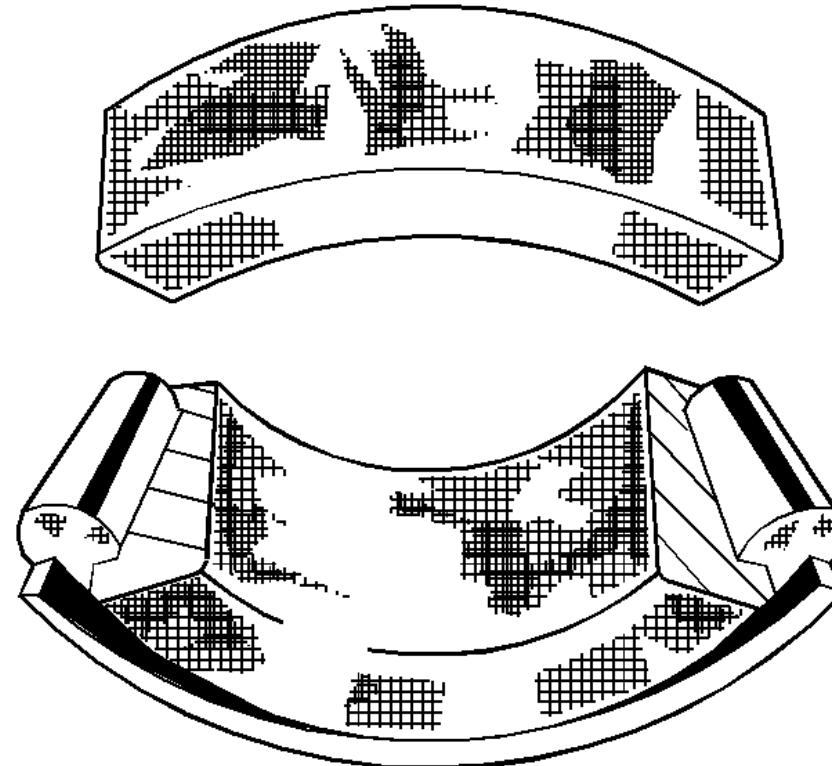


Fig. 23: Identifying Smears

Courtesy of GENERAL MOTORS COMPANY

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

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

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

Stain Discoloration

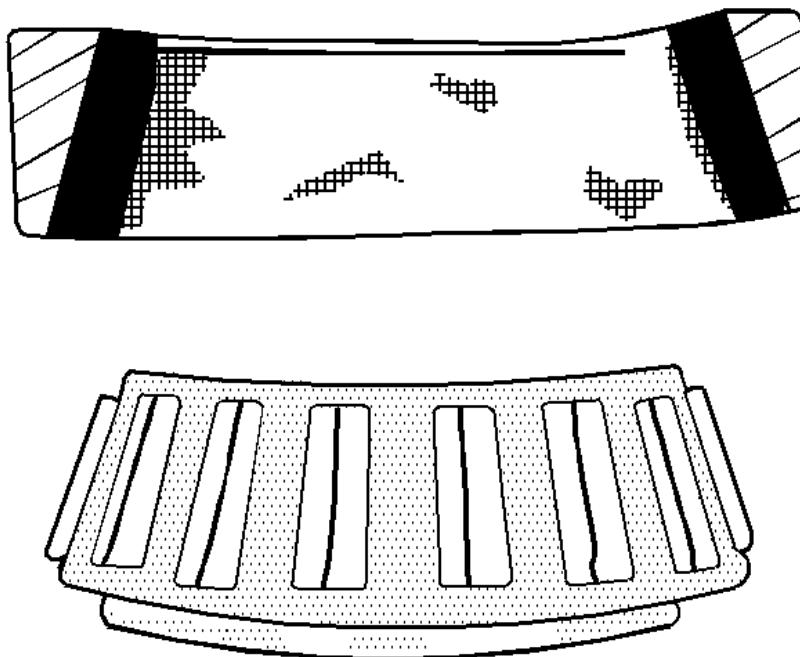


Fig. 24: Identifying Stain Discoloration

Courtesy of GENERAL MOTORS COMPANY

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

Heat Discoloration

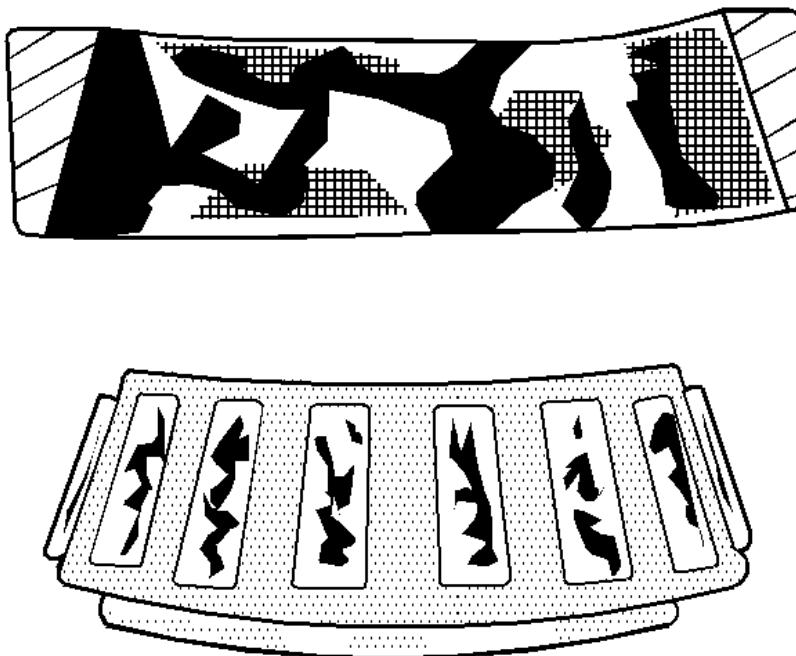


Fig. 25: Identifying Heat Discoloration

Courtesy of GENERAL MOTORS COMPANY

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

Misalignment

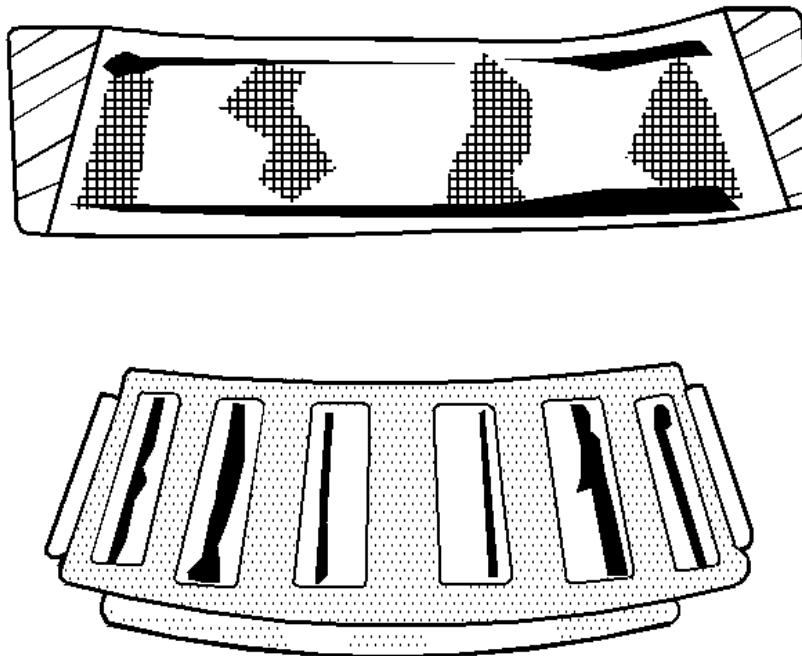


Fig. 26: Identifying Misalignment

Courtesy of GENERAL MOTORS COMPANY

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

Cracked Inner Race

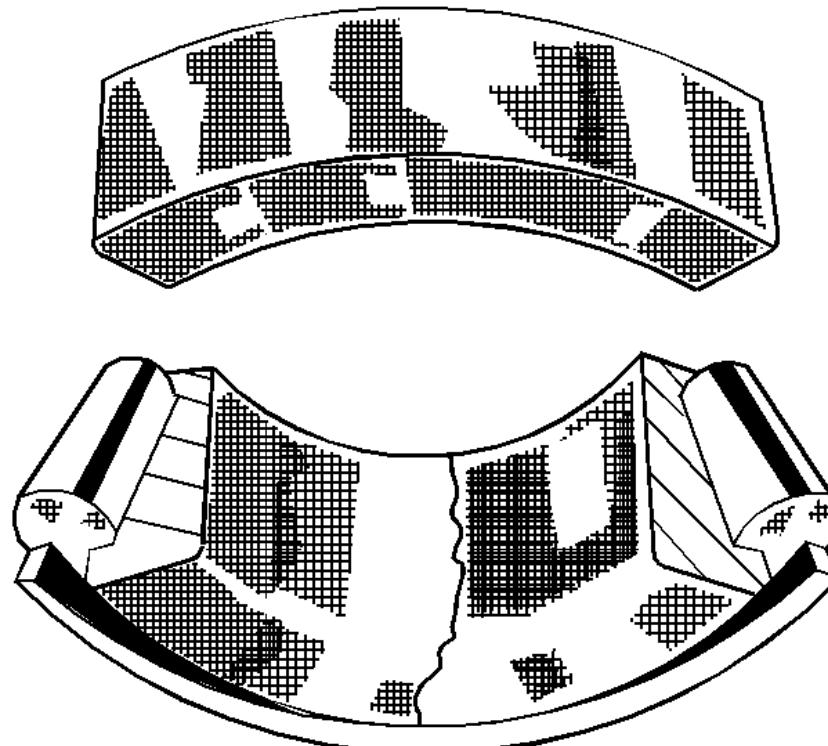


Fig. 27: Identifying Cracked Inner Race

Courtesy of GENERAL MOTORS COMPANY

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

Fatigue Spalling

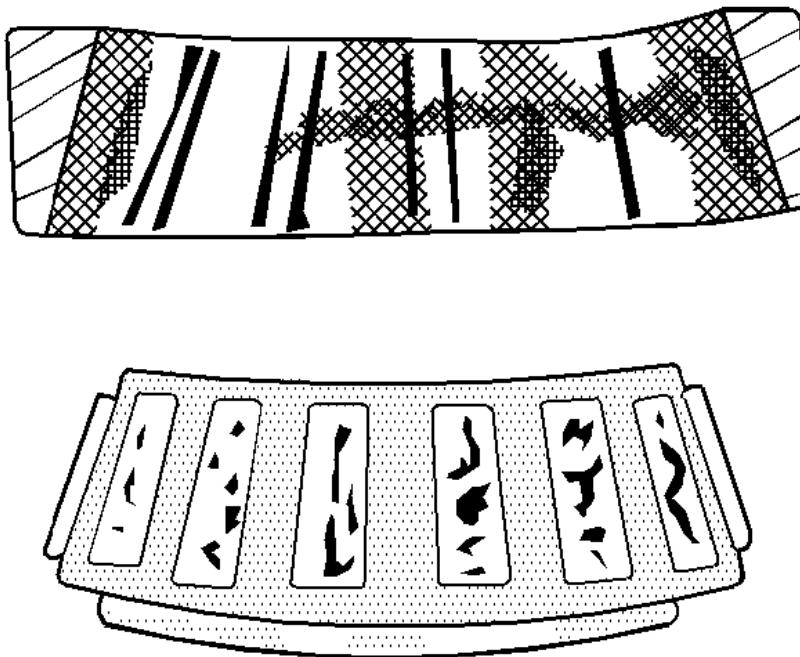


Fig. 28: Identifying Fatigue Spalling

Courtesy of GENERAL MOTORS COMPANY

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

Brinelling

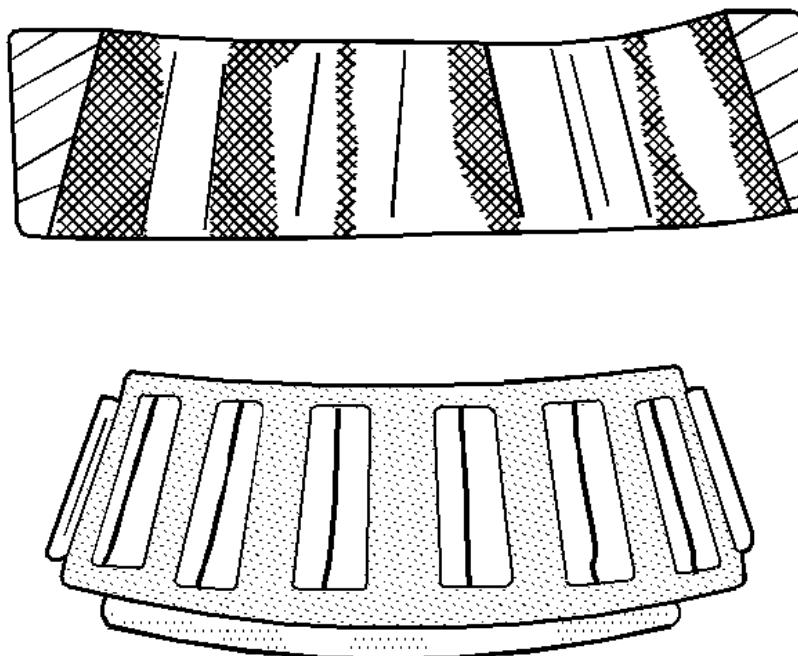


Fig. 29: Identifying Brinelling

Courtesy of GENERAL MOTORS COMPANY

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

REAR AXLE LUBRICANT LEAK DIAGNOSIS

Rear axle lubricant leaks can occur at the following locations:

- Axle tube to differential carrier housing joint
- Axle shaft oil seal
- Axle housing porosity
- Differential housing cover gasket
- Drain plug
- Fill plug
- Pinion yoke oil seal
- Vent tube

Determining the Cause

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

Oil Seals

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

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

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

Gaskets

A leak at a gasket is usually caused by a poor fit of the components on each side of the gasket surface. Inspect each component for distortion and for nicks or gouges that may prohibit the gasket from sealing properly.

Rear Axle Housing

Rear axle housing lubricant leaks usually occur at the following locations:

- Drain Plug
- Fill Plug

Drain and fill plug leaks are usually caused by a loose plug. These leaks can be repaired by either tightening the plug or by using an approved sealer on the threads on the plug.

Other leaks such as axle tube to differential carrier housing or porosity leaks require the replacement of the rear axle housing.

LIMITED SLIP DIFFERENTIAL DIAGNOSIS

Limited Slip Differential Diagnosis

Step	Action	Values	Yes	No
1	Did you review the general description and perform the necessary inspections?	-	Go to Step 2	Go to Locking Differential Description and Operation
2	<p>Measure the rotational force of the axle using the following procedure:</p> <ol style="list-style-type: none"> 1. Block the front wheels. 2. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle. 3. Remove the tire and wheel. Refer to Tire and Wheel Removal and Installation (6-Lug Wheel) Tire and Wheel Removal and Installation (8-Lug Wheel). 4. Using the J 42129 Wheel Hub Remover, measure the rotational force of the axle. 5. Repeat the procedure for the other axle. <p>Does the force measure outside the specified range?</p>	22-271 N.m (30-200 lb ft)		System OK
			Go to Step 3	

Step	Action	Values	Yes	No
3	Repair the rear axle. Did you complete the repair?	-	Go to Step 4	-
4	Operate the system in order to verify the repair. Did you correct the condition?	-	Go to Step 2	System OK

LOCKING DIFFERENTIAL DIAGNOSIS

1. Place the vehicle on a frame-contact hoist, allowing free rotation of the rear wheels.
2. Hold 1 wheel stationary. Slowly rotate the other wheel approximately 1/2 revolution per second in both the forward and reversed directions. The wheel should rotate freely. The differential is locking and is broken if both wheels attempt to turn together.
3. Raise the hoist to maximum height with 1 person in the vehicle.
4. Start the engine. Ensure that the engine is operating at low idle speed (warm engine).
5. Apply the service brake. Place the automatic transmission in drive. Depress the clutch and place the transmission in first gear with a manual transmission.
6. Lock 1 rear wheel by pulling one parking brake cable from under the vehicle with the aid of an assistant.
7. Release the service brakes or disengage the clutch slowly enough to start the free wheel turning. The locked rear wheel remains stationary.
8. Increase the speed of the free wheel. The differential will lock, causing the rotating wheel to stop or both wheels to turn at the same speed. The engine, if equipped with manual transmission, may stall. In order to cause the differential to lock, you may need to accelerate the engine until approximately 16 km/h (10 mph) is indicated on the vehicle speedometer. If the indicated speed can be increased beyond 32 km/h (20 mph) without causing the differential to lock, the unit is not functioning properly. Rapid release of the brakes or clutch, or rapid acceleration of the engine, will invalidate the test.
9. Lock the opposite rear wheel and repeat the procedure.

LOCKING REAR AXLE DOES NOT LOCK

Checks	Action
Little or no preload on the latching bracket	Replace the governor assembly and the latching bracket. Refer to Locking Differential Disassemble (8.6/9.5/9.76 Inch Axles) Locking Differential Disassemble (10.5 Inch Axle) , and Locking Differential Cam Unit Disassemble (8.6 Inch Axle) Locking Differential Cam Unit Disassemble (9.5/9.76 Inch Axle) Locking Differential Cam Unit Disassemble (10.5 Inch Axle) .
Flyweights in the governor assembly are stuck closed	Replace the governor assembly and the latching bracket. Refer to Locking Differential Assemble (8.6/9.5/9.76 Inch Axles) Locking Differential Assemble (10.5 Inch Axle) .
The drive teeth on the governor or cam gear assembly are broken	Replace the cam plate, the governor assembly, and the latching bracket. Refer to the following: <ul style="list-style-type: none"> • Locking Differential Disassemble (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemble (10.5 Inch Axle) • Locking Differential Cam Unit Disassemble (8.6 Inch Axle)Locking Differential Cam Unit Disassemble (9.5/9.76 Inch Axle)Locking Differential Cam Unit Disassemble (10.5 Inch Axle) • Locking Differential Cleaning and Inspection • Locking Differential Cam Unit Assemble (9.5/9.76 Inch Axle)Locking Differential Cam Unit Assemble (8.6 Inch Axle)Locking Differential Cam Unit Assemble (10.5 Inch Axle) • Locking Differential Adjustment (8.6/9.5/9.76 Inch Axles)Locking Differential Adjustment (10.5 Inch Axle) • Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axle)
Broken clutch plates	Replace the clutch plates and the wave spring. Refer to the following: <ul style="list-style-type: none"> • Locking Differential Disassemble (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemble (10.5 Inch Axle) • Locking Differential Cam Unit Disassemble (8.6 Inch Axle)Locking Differential Cam Unit Disassemble (9.5/9.76 Inch Axle)Locking Differential Cam Unit Disassemble (10.5 Inch Axle) • Locking Differential Cleaning and Inspection • Locking Differential Cam Unit Assemble (9.5/9.76 Inch Axle)Locking Differential Cam Unit Assemble (8.6 Inch Axle)

Checks	Action
	<p>Axe)Locking Differential Cam Unit Assemble (10.5 Inch Axe)</p> <ul style="list-style-type: none"> • Locking Differential Adjustment (8.6/9.5/9.76 Inch Axles)Locking Differential Adjustment (10.5 Inch Axe) • Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axe)

LOCKING REAR AXLE LOCKS IN TURNS

Checks	Action
The governor assembly is tight in the case	Free up the governor assembly. Refer to Locking Differential Disassemle (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemle (10.5 Inch Axe) , and Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axe) .
Broken or weak governor flyweight spring	Replace the governor assembly and the latching bracket. Refer to Locking Differential Disassemle (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemle (10.5 Inch Axe) , and Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axe) .
The flyweight in the governor assembly is stuck open	Replace the governor assembly and the latching bracket. Refer to Locking Differential Disassemle (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemle (10.5 Inch Axe) , and Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axe) .
The cam plate or the governor drive teeth are broken	Replace the cam plate, the governor assembly, and the latching bracket. Refer to the following: <ul style="list-style-type: none"> • Locking Differential Disassemle (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemle (10.5 Inch Axe) • Locking Differential Cam Unit Disassemle (8.6 Inch Axe)Locking Differential Cam Unit Disassemle (9.5/9.76 Inch Axe)Locking Differential Cam Unit Disassemle (10.5 Inch Axe) • Locking Differential Cleaning and Inspection • Locking Differential Cam Unit Assemble (9.5/9.76 Inch Axe)Locking Differential Cam Unit Assemble (8.6 Inch Axe)Locking Differential Cam Unit Assemble (10.5 Inch Axe) • Locking Differential Adjustment (8.6/9.5/9.76 Inch Axles)Locking Differential Adjustment (10.5 Inch Axe) • Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axe)

LOCKING REAR DRIVE AXLE CHATTERS IN TURNS

Checks	Action
Lubricant is contaminated	Drain and flush the axle housing thoroughly. Refill with the correct lubricant. Refer to Differential Oil Replacement (8.6 Inch Axe)Differential Oil Replacement (9.5/9.76 Inch Axe)Differential Oil Replacement (10.5 Inch Axe) .
The clutch plates are deteriorated	Replace the clutch plates. Refer to Locking Differential Cam Unit Disassemle (8.6 Inch Axe)Locking Differential Cam Unit Disassemle (9.5/9.76 Inch Axe)Locking Differential Cam Unit Disassemle (10.5 Inch Axe) , and Symptoms - Locking/Limited Slip Rear Axe .

NOISE IN ADDITION TO NORMAL CLUTCH ENGAGEMENT

Checks	Action
The clutch plates are broken	Replace the clutch plates. Refer to the following: <ul style="list-style-type: none"> • Locking Differential Disassemle (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemle (10.5 Inch Axe) • Locking Differential Cam Unit Disassemle (8.6 Inch Axe)Locking Differential Cam Unit Disassemle (9.5/9.76 Inch Axe)Locking Differential Cam Unit Disassemle (10.5 Inch Axe) • Locking Differential Cleaning and Inspection • Locking Differential Cam Unit Assemble (9.5/9.76 Inch Axe)Locking Differential Cam Unit Assemble (8.6 Inch Axe)

Checks	Action
	<p>Axe)Locking Differential Cam Unit Assemble (10.5 Inch Axe)</p> <ul style="list-style-type: none"> • Locking Differential Adjustment (8.6/9.5/9.76 Inch Axles)Locking Differential Adjustment (10.5 Inch Axe) • Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axe)
The thrust block is broken	Replace the thrust block with a block of identical thickness. Check closely for other damage. Refer to Locking Differential Disassemle (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemle (10.5 Inch Axe) , and Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axe) .
The case is damaged	Replace the unit. Refer to Differential Replacement (8.6/9.5/9.76 Inch Axles)Differential Replacement (10.5 Inch Axe) .
The differential gears are broken	<p>Replace the gears. Refer to the following:</p> <ul style="list-style-type: none"> • Locking Differential Disassemle (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemle (10.5 Inch Axe) • Locking Differential Cam Unit Disassemle (8.6 Inch Axe)Locking Differential Cam Unit Disassemle (9.5/9.76 Inch Axe)Locking Differential Cam Unit Disassemle (10.5 Inch Axe) • Locking Differential Cleaning and Inspection • Locking Differential Cam Unit Assemle (9.5/9.76 Inch Axe)Locking Differential Cam Unit Assemle (8.6 Inch Axe)Locking Differential Cam Unit Assemle (10.5 Inch Axe) • Locking Differential Adjustment (8.6/9.5/9.76 Inch Axles)Locking Differential Adjustment (10.5 Inch Axe) • Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axe)

REPAIR INSTRUCTIONS

REAR AXLE LUBRICANT LEVEL INSPECTION (8.6/9.5/9.76 INCH AXLE)

NOTE: All axle assemblies are filled by volume of fluid during production. They are not filled to reach a certain level. When checking the fluid level on any axle, variations in the readings can be caused by factory fill differences between the minimum and the maximum fluid volume. Also, if a vehicle has just been driven before checking the fluid level, it may appear lower than normal because the fluid has traveled out along the axle tubes and has not drained back to the sump area. Therefore, a reading taken five minutes after the vehicle has been driven will appear to have a lower fluid level than a vehicle that has been stationary for an hour or two. Remember that the rear axle assembly must be supported to get a true reading.

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Ensure the vehicle is level.
3. Inspect the rear axle for leaks. Repair as necessary.
4. Clean the area around the rear axle fill plug.

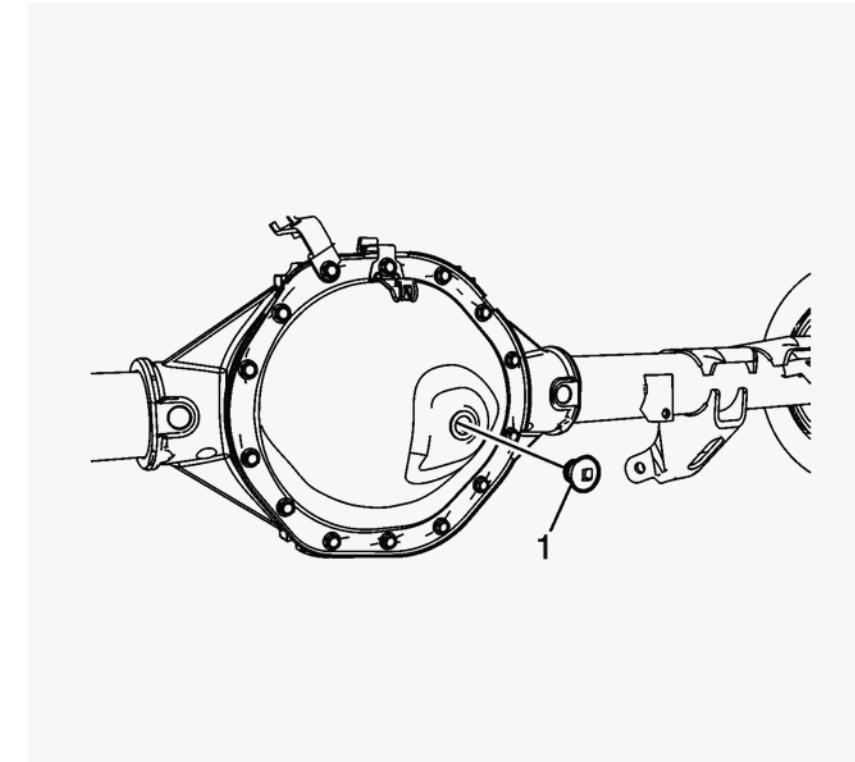


Fig. 30: Rear Axle Fill Plug

Courtesy of GENERAL MOTORS COMPANY

5. Remove the rear axle fill plug (1).

6. Inspect the lubricant level:

- **Specification**

The lubricant level should be between 1-19 mm (0.04-0.75 in) below the fill plug opening for the 8.6 inch axle.

- **Specification**

The lubricant level should be between 15-40 mm (0.59-1.57 in) below the fill plug opening for the 9.5/9.76 inch LD axle.

NOTE: The axle lube, refer to [Adhesives, Fluids, Lubricants, and Sealers](#), that is used may appear dark in color and may leave a dark film on the internal components. This darkened color does not affect the durability of the lube nor will it adversely affect the oil from providing the necessary lubrication it was designed to do. This darkened oil does not need to be replaced unless there is a strong burnt oil smell to the lube. If the oil has a strong burnt oil smell, then all components would need to be visually inspected and any parts that are damaged would then need to be replaced along with the oil.

7. If the level is low, add lubricant until the level is even with the bottom edge of the fill plug opening. Use the proper fluid. Refer to [Fluid and Lubricant Recommendations](#).

CAUTION: Refer to [Fastener Caution](#).

8. Install the rear axle fill plug and tighten to 33 N.m (24 lb ft).

9. Lower the vehicle.

REAR AXLE LUBRICANT LEVEL INSPECTION (10.5 INCH AXLE)

NOTE: All axle assemblies are filled by volume of fluid during production. They are not filled to reach a certain level. When checking the fluid level on any axle, variations in the readings can be caused by factory fill differences between the minimum and maximum fluid volume. Also, if a vehicle has just been driven before checking the fluid level, it may appear lower than normal because the fluid has traveled out along the axle tubes and has not drained back to the sump area. Therefore, a reading taken five minutes after the vehicle has been driven will appear to have lower fluid level than a vehicle that has been stationary for an hour or two. Remember that the rear axle assembly must be supported to get a true reading.

1. Raise the vehicle. Refer to [Lifting and Jacking the Vehicle](#).

2. Make sure the vehicle is level.

3. Inspect the rear axle for leaks. Repair as necessary.

4. Clean the area around the rear axle fill plug.

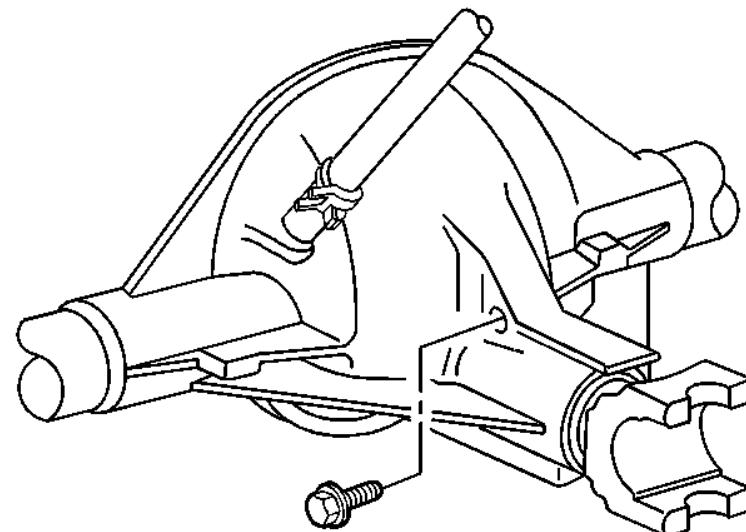


Fig. 31: Rear Axle Fill Plug

Courtesy of GENERAL MOTORS COMPANY

5. Remove the rear axle fill plug.

6. Inspect the lubricant level.

Specification

The lubricant level should be between 0-10 mm (0-0.4 in) below the fill plug opening.

7. If the level is low, add lubricant until the level is even with the bottom edge of the fill plug opening. Use the proper fluid. Refer to [Fluid and Lubricant Recommendations](#).

CAUTION: Refer to [Fastener Caution](#).

8. Install the rear axle fill plug.

Tighten

Tighten the rear axle fill plug to 75 N.m (55 lb ft).

9. Lower the vehicle.

DIFFERENTIAL OIL REPLACEMENT (8.6 INCH AXLE)

Removal Procedure

1. Raise the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Clean the area around the rear axle fill plug.
3. Remove the rear axle fill plug.
4. Remove the rear axle cover. Refer to [Rear Axle Housing Cover Replacement \(8.6/9.5/9.7 Inch Axle\)](#).

NOTE: The axle lube, refer to [Adhesives, Fluids, Lubricants, and Sealers](#), that is used may appear dark in color and may leave a dark film on the internal components. This darkened color does not affect the durability of the lube nor will it adversely affect the oil from providing the necessary lubrication it was designed to do. This darkened oil does not need to be replaced unless there is a strong burnt oil smell to the lube. If the oil has a strong burnt oil smell, then all components would need to be visually inspected and any parts that are damaged would then need to be replaced along with the oil.

5. Drain the lubricant into a suitable container.

Installation Procedure

1. Install the rear axle cover. Refer to [Rear Axle Housing Cover Replacement \(8.6/9.5/9.7 Inch Axle\)](#).
2. Fill the rear axle with axle lubricant. Use the proper fluid. Refer to [Approximate Fluid Capacities](#), and [Adhesives, Fluids, Lubricants, and Sealers](#).

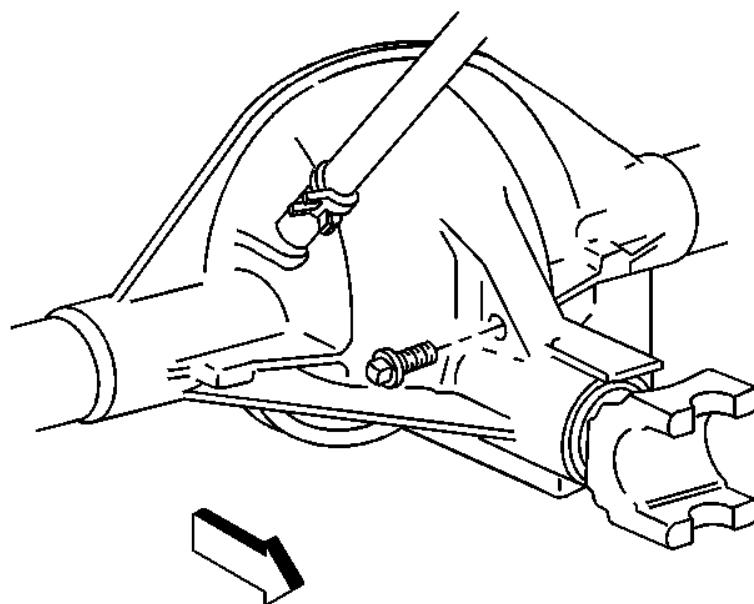


Fig. 32: Rear Axle Fill Plug

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to [Fastener Caution](#).

3. Install the rear axle fill plug and tighten to 33 N.m (24 lb ft).
4. Lower the vehicle.

DIFFERENTIAL OIL REPLACEMENT (9.5/9.76 INCH AXLE)

Removal Procedure

1. Raise the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Clean the area around the rear axle fill plug.

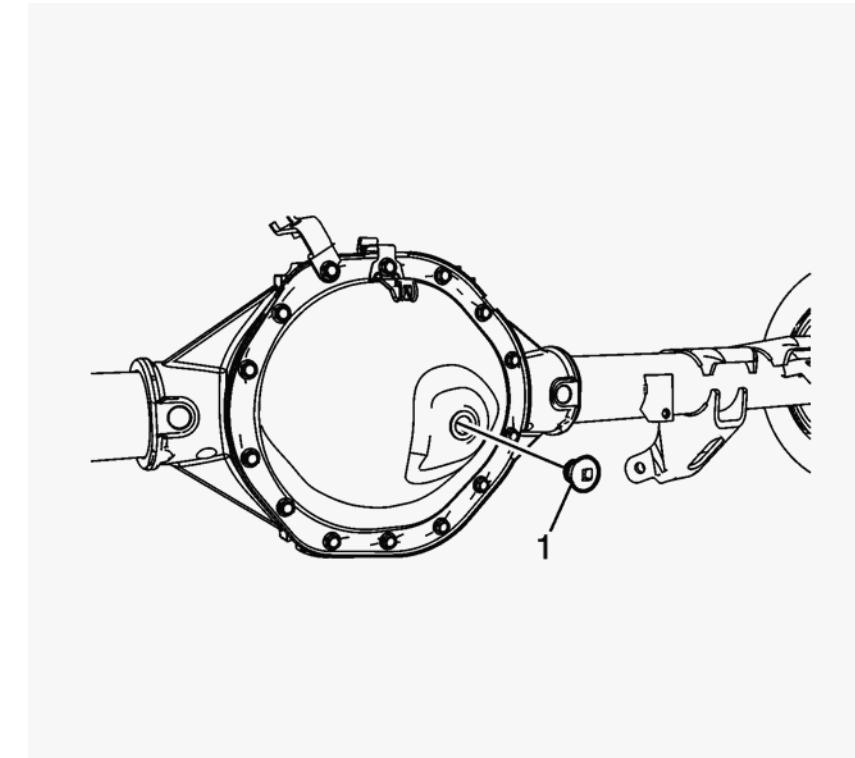


Fig. 33: Rear Axle Fill Plug

Courtesy of GENERAL MOTORS COMPANY

3. Remove the fill plug (1).
4. Remove the rear axle cover. Refer to [Rear Axle Housing Cover Replacement \(8.6/9.5/9.7 Inch Axle\)](#).

NOTE: The axle lube that is used may appear dark in color and may leave a dark film on the internal components. This darkened color does not affect the durability of the lube nor will it adversely affect the oil from providing the necessary lubrication it was designed to do. This darkened oil does not need to be replaced unless there is a strong burnt oil smell to the lube. If the oil has a strong burnt oil smell, then all components would need to be visually inspected and any parts that are damaged would then need to be replaced along with the oil.

5. Drain the lubricant into a suitable container.

Installation Procedure

1. Install the rear axle cover. Refer to [Rear Axle Housing Cover Replacement \(8.6/9.5/9.7 Inch Axle\)](#).
2. Fill the rear drive axle with lubricant. Use the proper fluid, refer to [Approximate Fluid Capacities](#), and [Adhesives, Fluids, Lubricants, and Sealers](#).

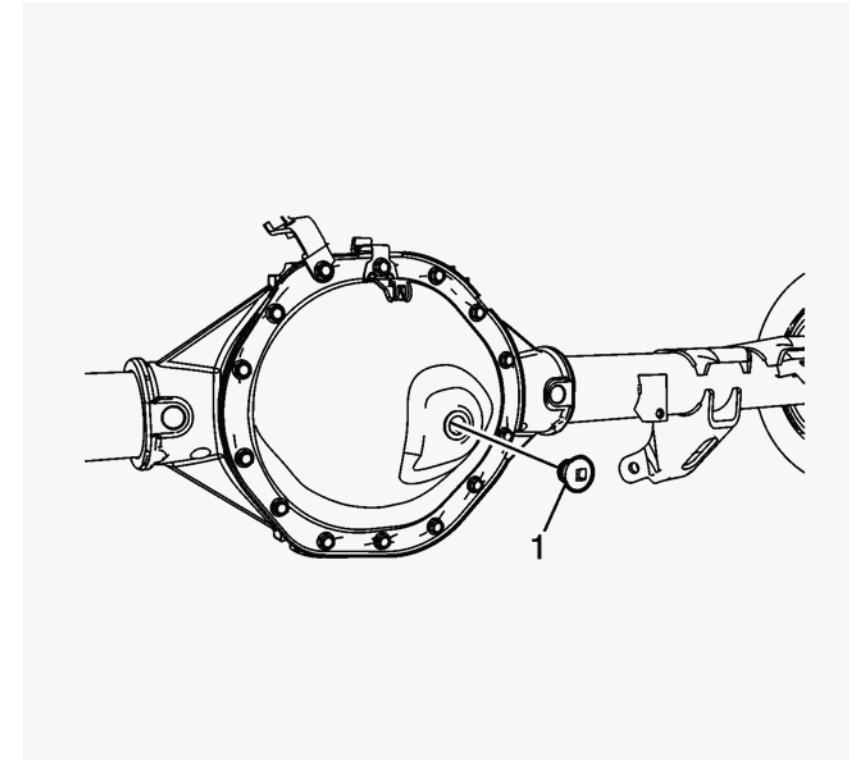


Fig. 34: Rear Axle Fill Plug

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

3. Install the fill plug (1) and tighten to 33 N.m (24 lb ft).
4. Remove the support and lower the vehicle.

DIFFERENTIAL OIL REPLACEMENT (10.5 INCH AXLE)

Removal Procedure

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

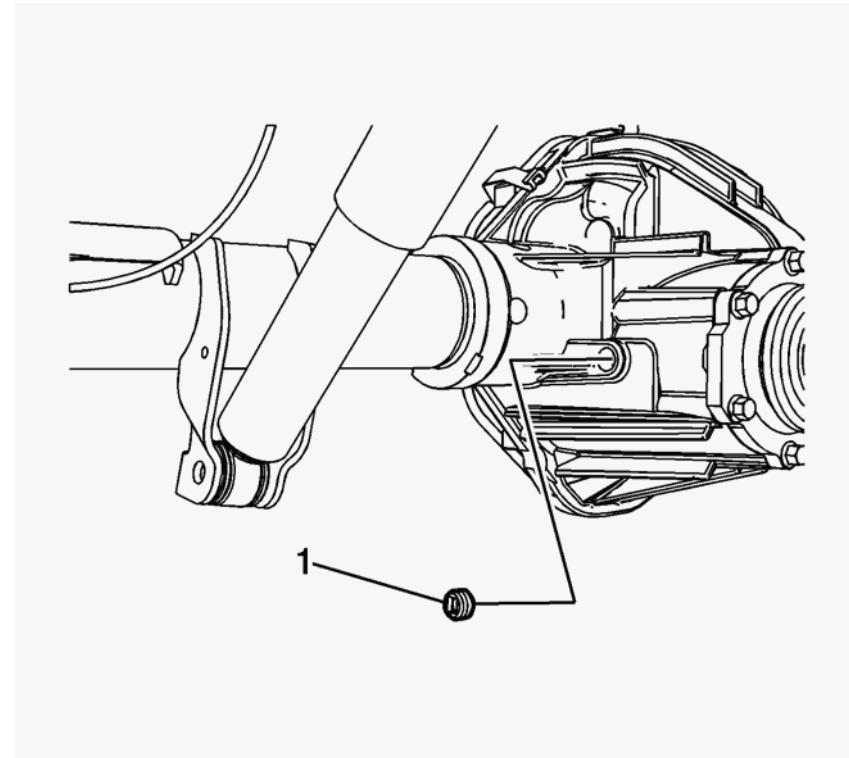


Fig. 35: Axle Fill Plug

Courtesy of GENERAL MOTORS COMPANY

2. Remove the fill plug (1).

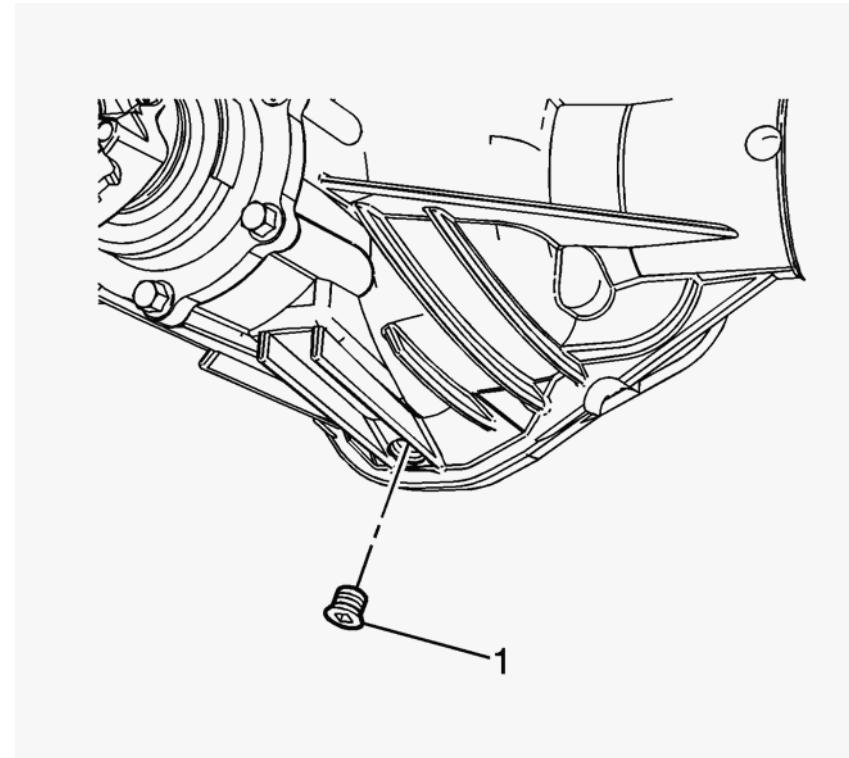


Fig. 36: Axle Drain Plug

Courtesy of GENERAL MOTORS COMPANY

3. Remove the rear axle drain plug (1).
4. Drain the lubricant into a suitable container.

Installation Procedure

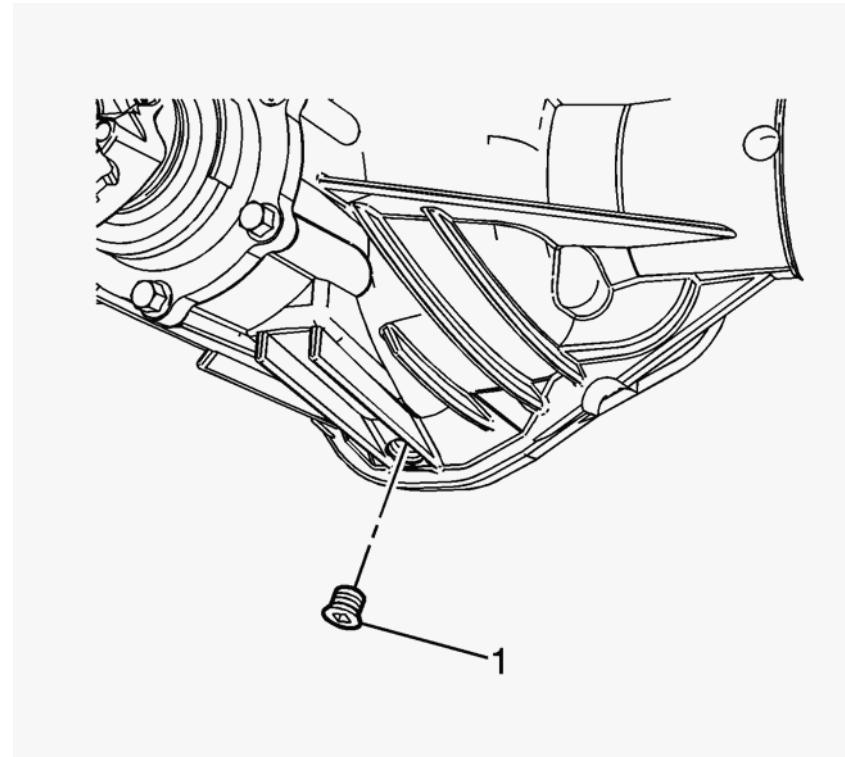


Fig. 37: Axle Drain Plug

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

1. Install the rear axle drain plug (1) and tighten to 33 N.m (24 lb ft).
2. Fill the rear axle with the proper fluid. Refer to [Approximate Fluid Capacities](#), and [Fluid and Lubricant Recommendations](#) .

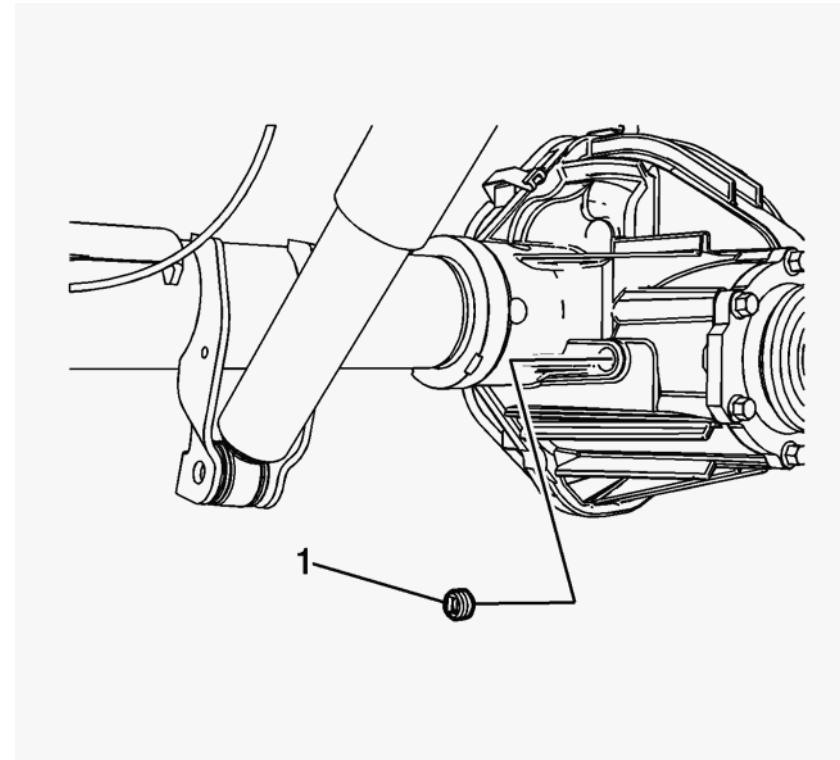


Fig. 38: Axle Fill Plug

Courtesy of GENERAL MOTORS COMPANY

3. Install the fill plug (1) and tighten to 75 N.m (55 lb ft).
4. Remove the support and lower the vehicle.

VENT HOSE REPLACEMENT

Removal Procedure

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

1. Raise and support the vehicle.

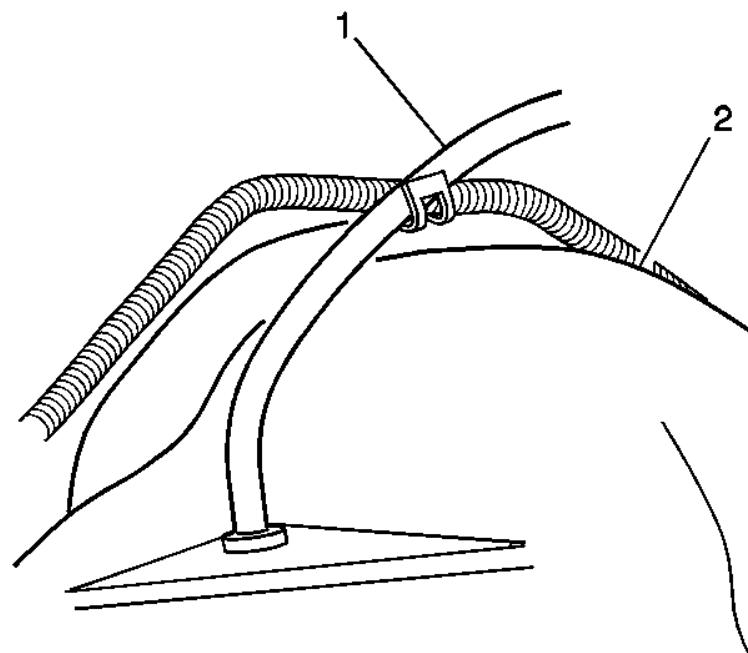


Fig. 39: Vent Hose & Rear Axle

Courtesy of GENERAL MOTORS COMPANY

2. Remove the vent hose (1) from the top of the rear axle (2).

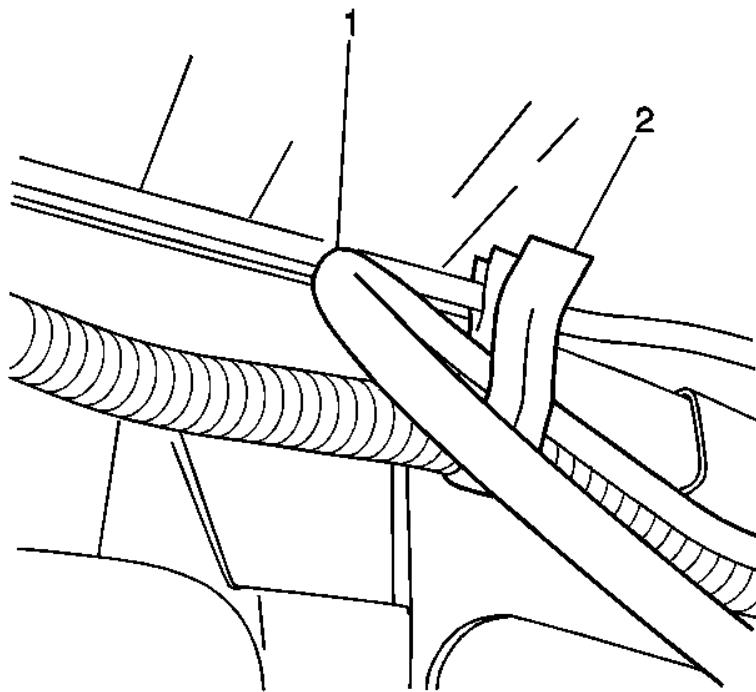


Fig. 40: Vent Hose & Frame Clip

Courtesy of GENERAL MOTORS COMPANY

3. Remove the vent hose (1) from the clip (2) on the frame.

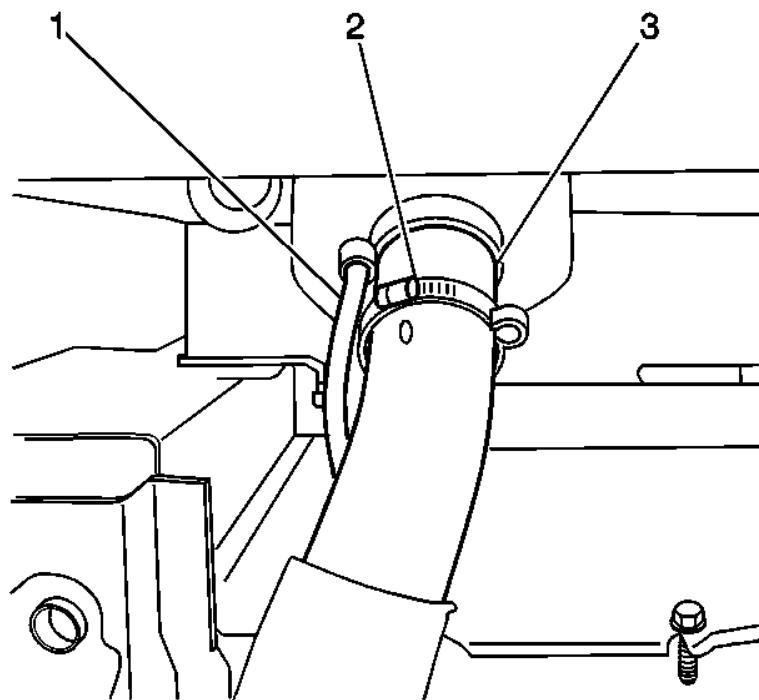


Fig. 41: Vent Hose & Filler Hose Clamp

Courtesy of GENERAL MOTORS COMPANY

4. Remove the vent hose (1) from the clamp (2) on the filler hose.

Installation Procedure

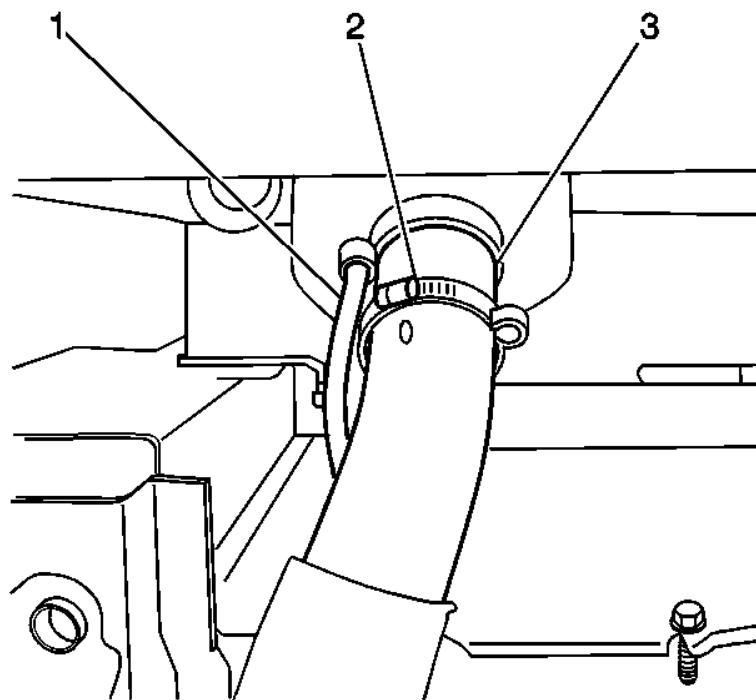


Fig. 42: Vent Hose & Filler Hose Clamp

Courtesy of GENERAL MOTORS COMPANY

1. Install the vent hose (1) to the clamp (2) on the filler hose (3).

- Route the same way as when removed.
- Ensure that the hose is free of kinks and is routed clear of sharp objects.
- Ensure that the vent is not plugged.

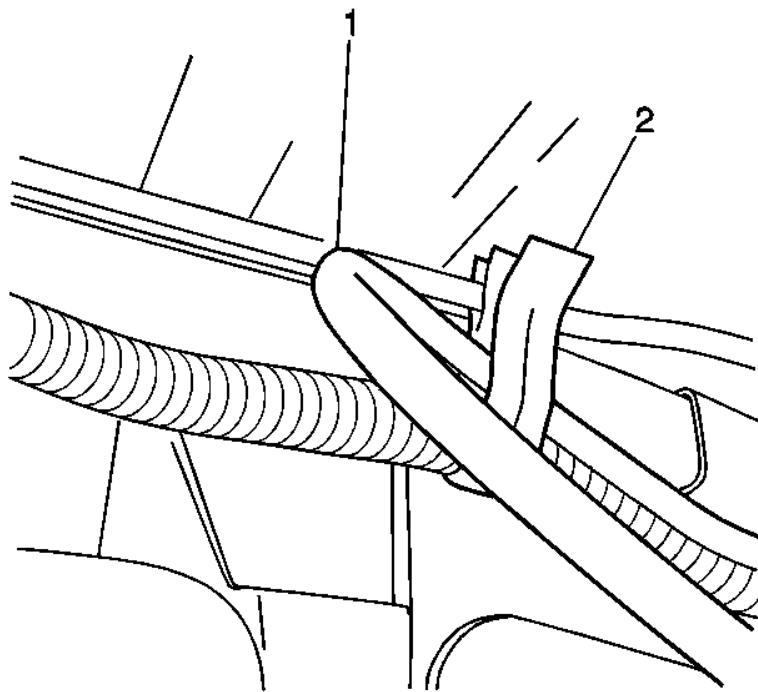


Fig. 43: Vent Hose & Frame Clip

Courtesy of GENERAL MOTORS COMPANY

2. Install the vent hose (1) in the clip (2) on the frame.

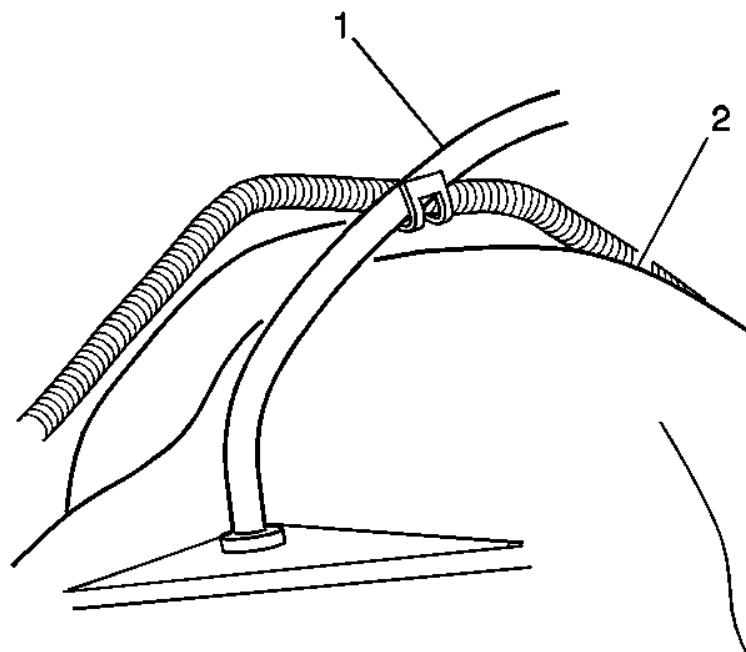


Fig. 44: Vent Hose & Rear Axle

Courtesy of GENERAL MOTORS COMPANY

3. Install the vent hose (1) to the top of the rear axle (2).
4. Remove the supports and lower the vehicle.

REAR AXLE HOUSING COVER REPLACEMENT (8.6/9.5/9.7 INCH AXLE)

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Drain the rear axle. Refer to [Differential Oil Replacement \(8.6 Inch Axle\)](#)[Differential Oil Replacement \(9.5/9.76 Inch Axle\)](#).

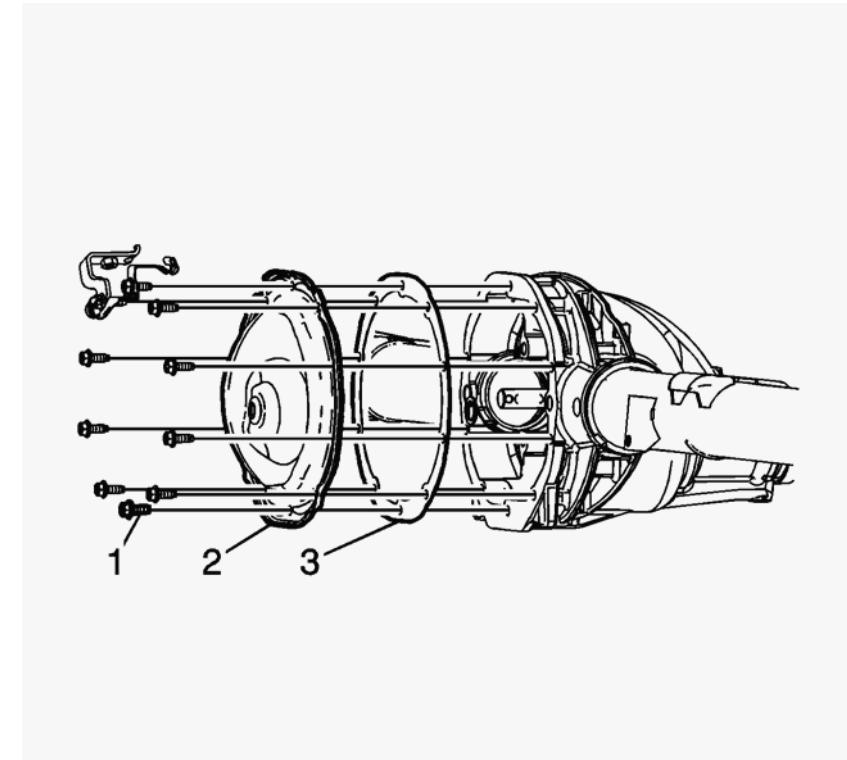


Fig. 45: Rear Axle Cover And Bolts

Courtesy of GENERAL MOTORS COMPANY

3. Remove the rear axle housing cover bolts (1).

NOTE: DO NOT nick or cut the rear axle housing cover gasket.

4. Remove the rear axle housing cover (2) and the gasket (3) from the axle housing.
5. If the rear axle housing cover gasket is found to be damaged, DO NOT re-use. Replace with NEW.
6. Drain the remaining axle lubricant into a suitable container.

Installation Procedure

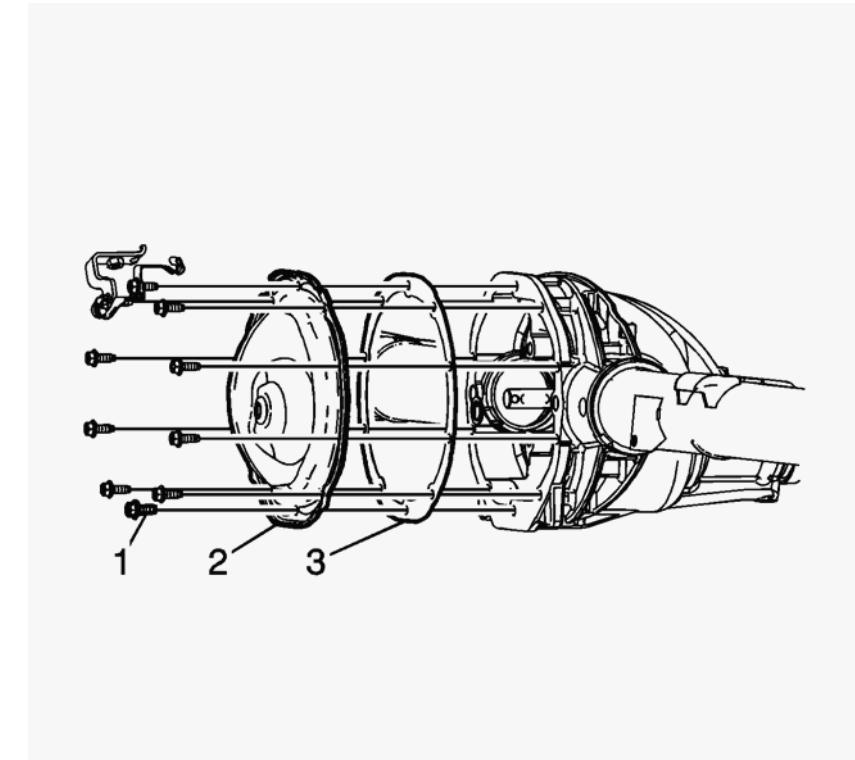


Fig. 46: Rear Axle Cover And Bolts

Courtesy of GENERAL MOTORS COMPANY

1. If the gasket is to be re-used, clean the sealing surfaces of the rear axle housing and the rear axle cover with a suitable cleaner.
2. Install the rear axle housing cover gasket (3) and the NEW rear axle housing cover (2) to the rear axle housing.

CAUTION: Refer to Fastener Caution .

3. Install the rear axle housing cover bolts (1) and tighten to 20 N.m (15 lb ft) + 20 degrees.
4. Install the drain plug for the 9.5/9.76 inch axle. Refer to Differential Oil Replacement (9.5/9.76 Inch Axle).
5. Fill the rear axle with the proper axle lubricant. Refer to Rear Axle Lubricant Level Inspection (8.6, 9.5/9.76 Inch Axle).
6. Remove the support and lower the vehicle.

REAR AXLE HOUSING COVER REPLACEMENT (10.5 INCH AXLE)

Removal Procedure

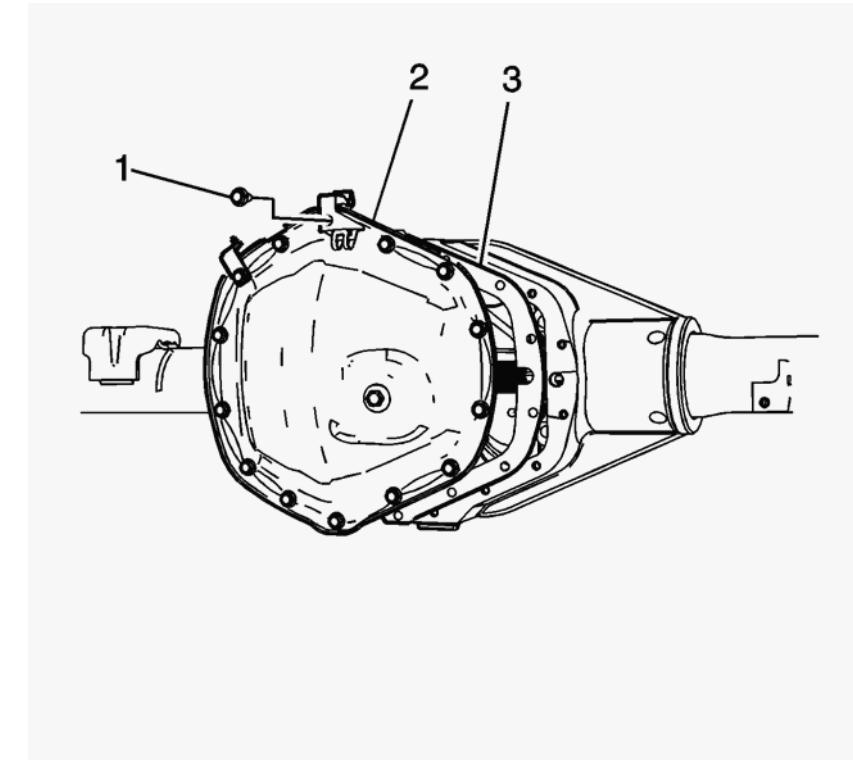


Fig. 47: Rear Axle Cover Bolts, Cover And Gasket

Courtesy of GENERAL MOTORS COMPANY

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Drain the rear axle. Refer to [Differential Oil Replacement \(10.5 Inch Axle\)](#).

NOTE: **Discard the axle housing cover bolts. Use NEW only.**

3. Remove the rear axle cover bolts (1) and cover (2).

Installation Procedure

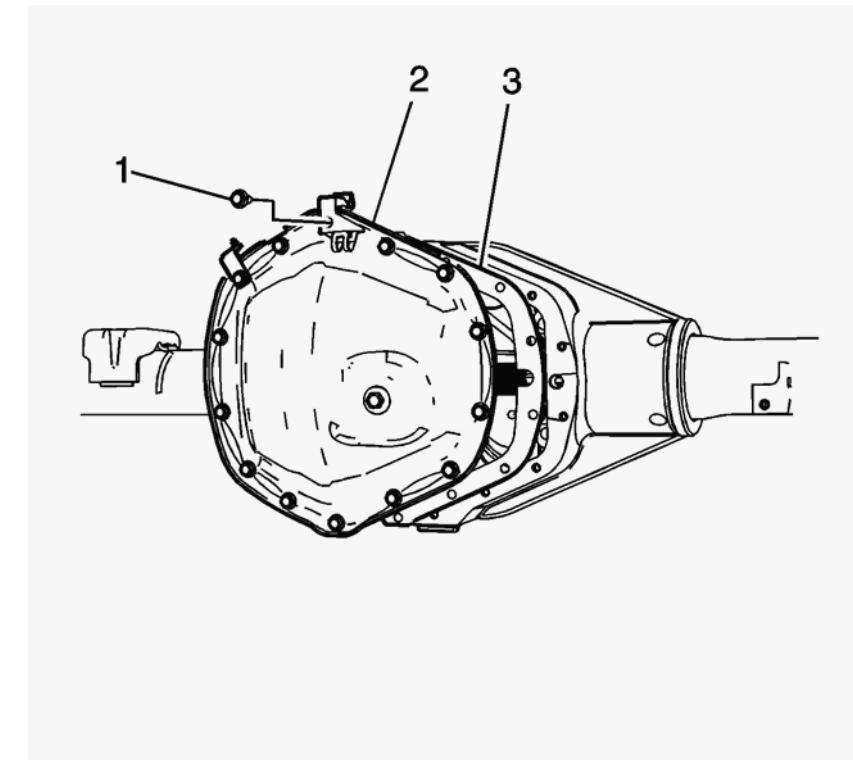


Fig. 48: Rear Axle Cover Bolts, Cover And Gasket
Courtesy of GENERAL MOTORS COMPANY

1. Position the axle housing cover (2) onto the rear axle.

CAUTION: Refer to Fastener Caution .

2. Install the NEW axle housing cover bolts (1) and tighten to 40 N.m (30 lb ft).
3. Fill the rear drive axle with the proper fluid. Refer to [Differential Oil Replacement \(10.5 Inch Axle\)](#).
4. Remove the support and lower the vehicle.

REAR AXLE HOUSING COVER GASKET REPLACEMENT (8.6/9.5/9.76 INCH AXLE)

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Drain the rear axle. Refer to [Differential Oil Replacement \(8.6 Inch Axle\)](#)[Differential Oil Replacement \(9.5/9.76 Inch Axle\)](#).

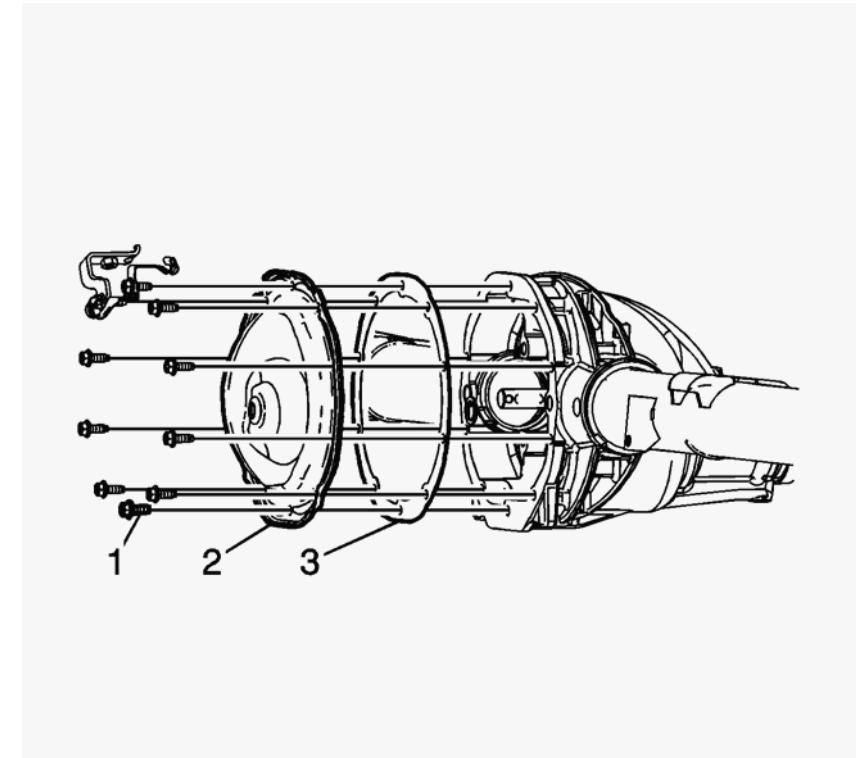


Fig. 49: Rear Axle Cover And Bolts

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

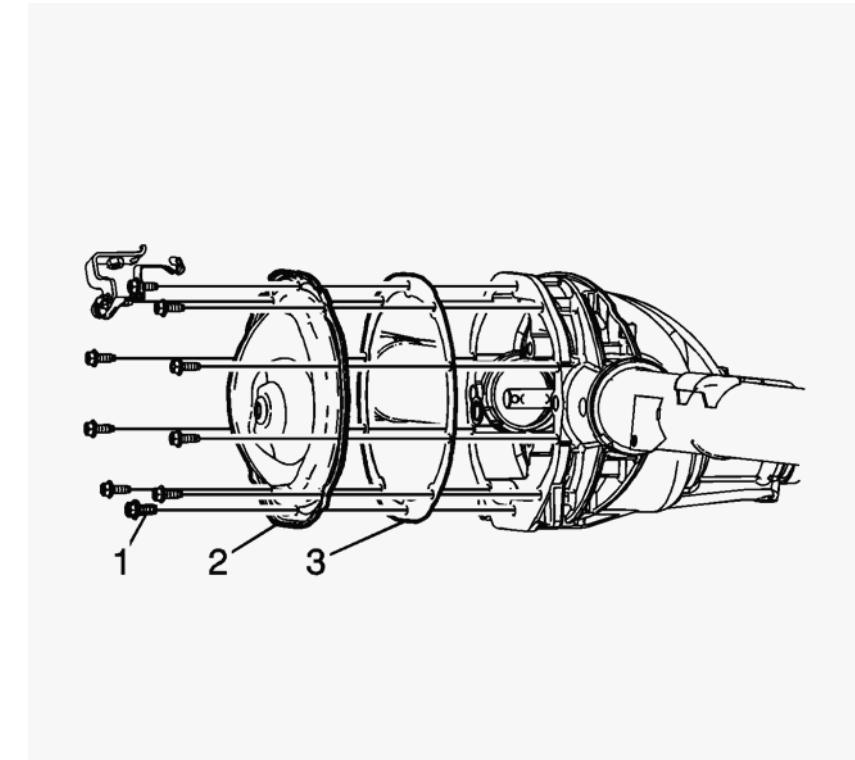


Fig. 50: Rear Axle Cover And Bolts

Courtesy of GENERAL MOTORS COMPANY

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

CAUTION: Refer to Fastener Caution .

3. Install the rear axle housing cover bolts (1) and tighten to 30 N.m (20 lb ft).
4. Install the drain plug for the 9.5/9.76 inch axle. Refer to [Differential Oil Replacement \(9.5/9.76 Inch Axle\)](#).
5. Fill the rear axle with the proper axle lubricant. Refer to [Rear Axle Lubricant Level Inspection \(8.6, 9.5/9.76 Inch Axle\)](#).
6. Remove the support and lower the vehicle.

REAR AXLE HOUSING COVER GASKET REPLACEMENT (10.5 INCH AXLE)

Removal Procedure

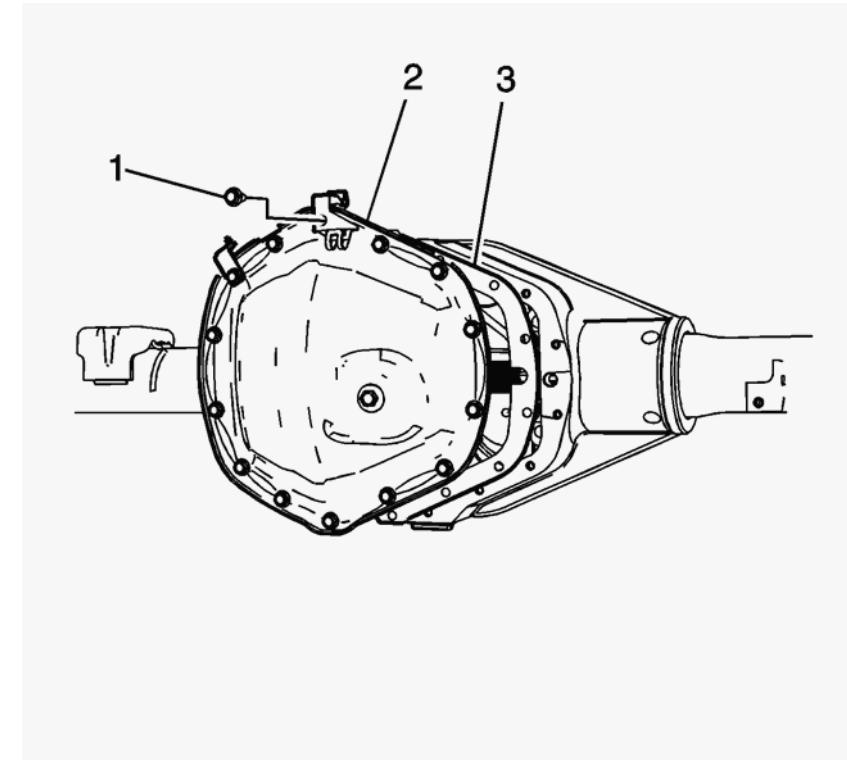


Fig. 51: Rear Axle Cover Bolts, Cover And Gasket

Courtesy of GENERAL MOTORS COMPANY

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Drain the rear axle. Refer to [Differential Oil Replacement \(10.5 Inch Axle\)](#).

NOTE: **Discard the axle housing cover bolts. Use NEW only.**

3. Remove the rear axle cover bolts (1), cover (2), and the gasket (3).
4. Remove any gasket material from the rear axle housing and/or axle housing cover.

Installation Procedure

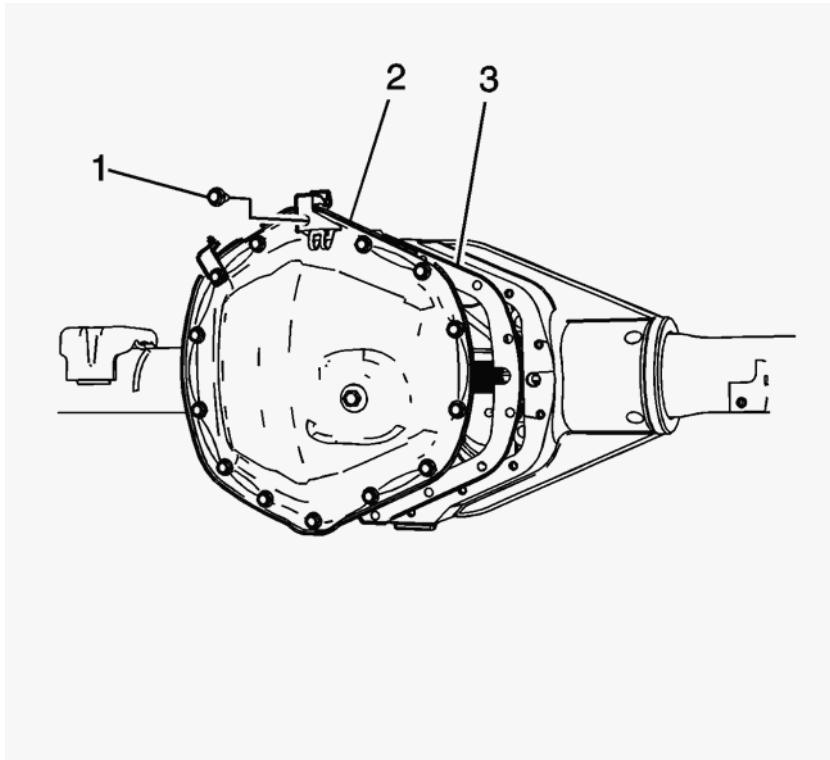


Fig. 52: Rear Axle Cover Bolts, Cover And Gasket

Courtesy of GENERAL MOTORS COMPANY

1. Position the axle housing cover (2) and the gasket (3) on the rear axle.

CAUTION: Refer to [Fastener Caution](#) .

2. Install the NEW axle housing cover bolts (1) and tighten to 40 N.m (30 lb ft).
3. Fill the rear drive axle with the proper fluid. Refer to [Differential Oil Replacement \(10.5 Inch Axle\)](#).
4. Remove the support and lower the vehicle.

REAR AXLE SHAFT REPLACEMENT

Special Tools

- **J-2619-01** Slide Hammer W/ 1/2 x 13 Adapter
- **J-45859** Axle Shaft Remover/Installer

For equivalent regional tools, refer to [Special Tools](#).

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#) .

3. Remove the wheel speed sensor. Refer to [Rear Wheel Speed Sensor Replacement](#).
4. Remove the brake caliper mounting bracket, if equipped. Refer to [Rear Brake Caliper Bracket Replacement \(JD9\) Rear Brake Caliper Bracket Replacement \(J95\)](#).
5. Remove the rear axle housing cover and gasket. Refer to [Rear Axle Housing Cover Replacement \(8.6/9.5/9.7 Inch Axle\)Rear Axle Housing Cover Replacement \(10.5 Inch Axle\)](#).

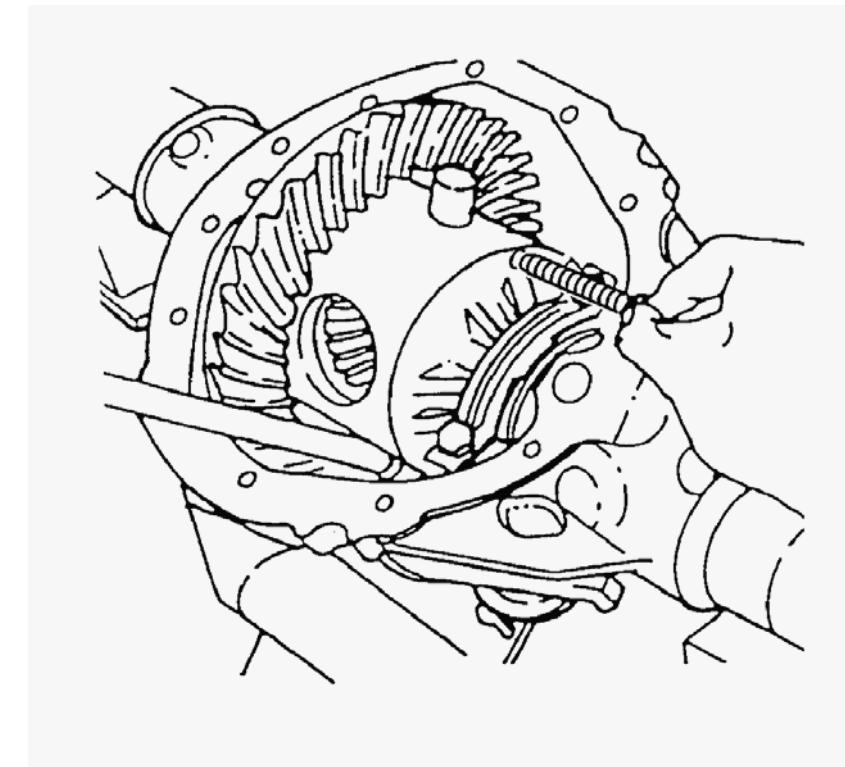


Fig. 53: Pinion Shaft Locking Bolt

Courtesy of GENERAL MOTORS COMPANY

6. Remove the and discard differential pinion gear shaft bolt.

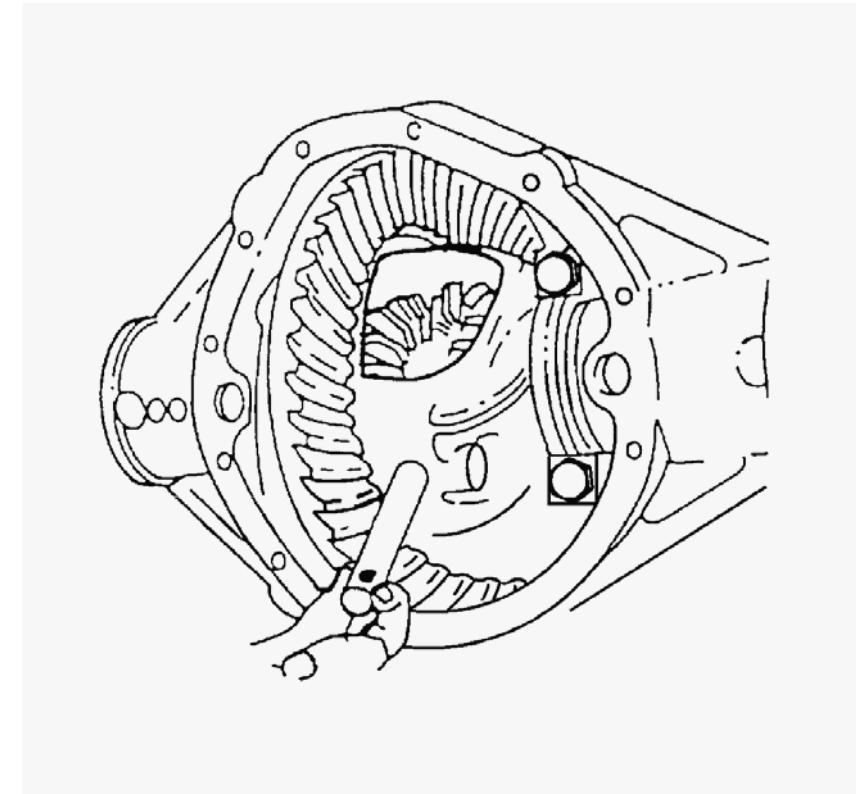


Fig. 54: Pinion Shaft

Courtesy of GENERAL MOTORS COMPANY

NOTE: For those vehicles NOT equipped with the locking differential proceed to step 8. If the vehicle is equipped WITH the locking differential, proceed to step 9 and 10.

7. Remove the differential pinion gear shaft.

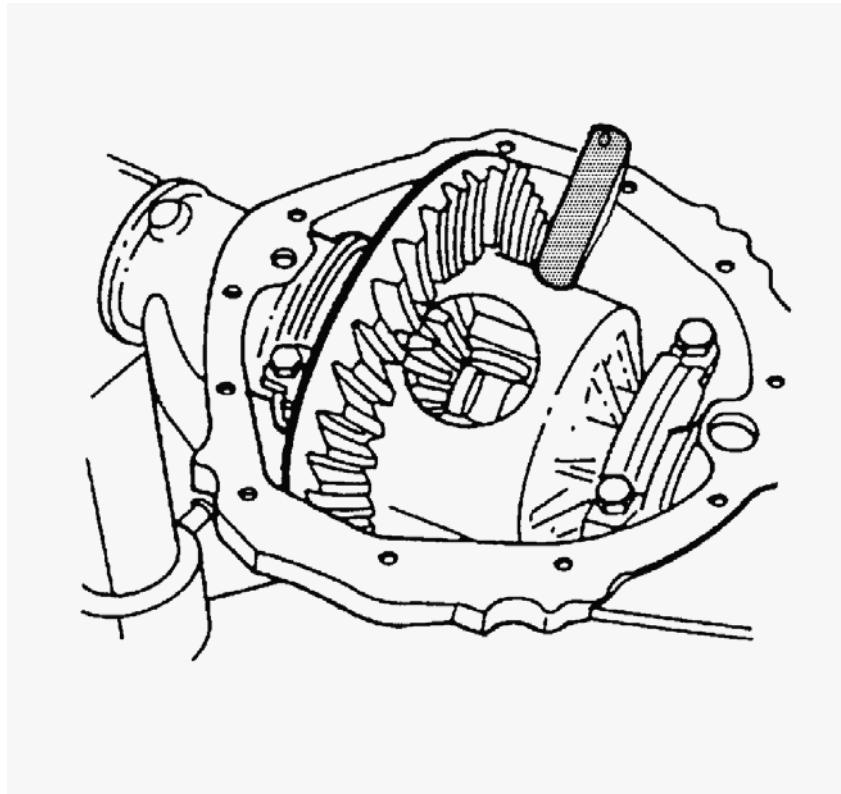


Fig. 55: Pinion Shaft Touching Housing

Courtesy of GENERAL MOTORS COMPANY

NOTE: Rotate the differential case until the differential pinion shaft just touches the rear axle housing.

8. Remove the differential pinion gear shaft part way from the differential case.

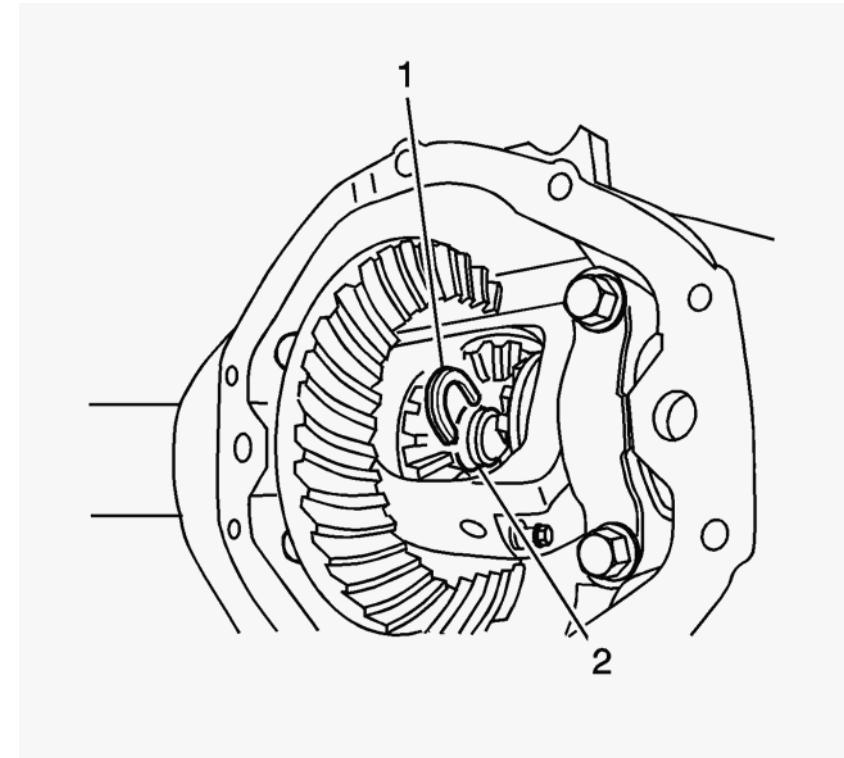


Fig. 56: Rear Axle Lock Ring

Courtesy of GENERAL MOTORS COMPANY

9. Use a screw driver, or similar tool to rotate the lock (1) until the lock (1) aligns with the thrust block.
10. Push in on the rear axle shaft (2) and remove the lock (1).

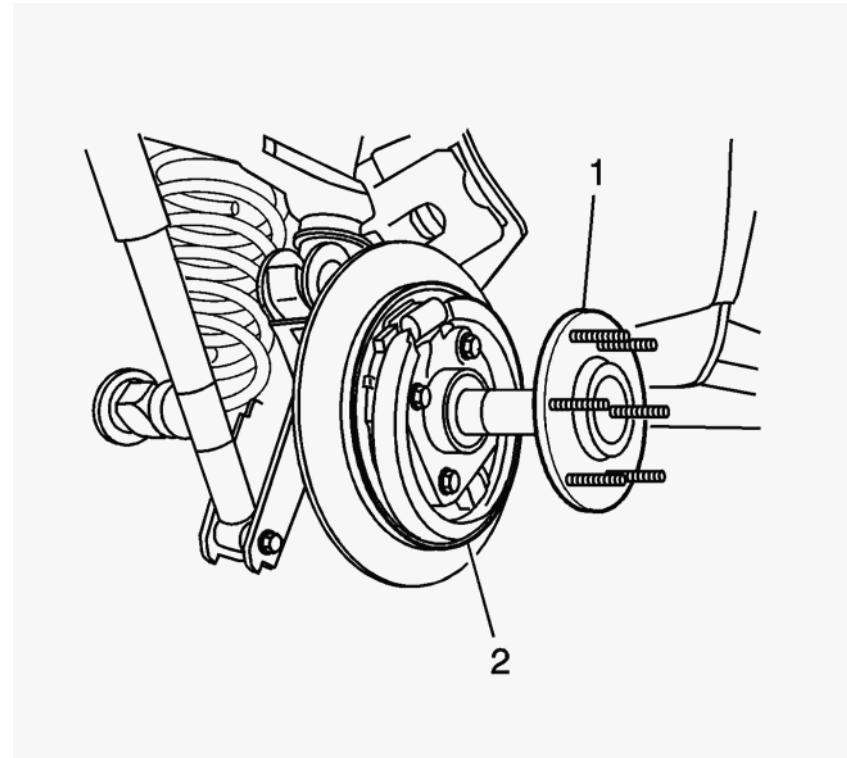


Fig. 57: Rear Axle Shaft And Brake Assembly

Courtesy of GENERAL MOTORS COMPANY

NOTE: If the rear axle shaft is difficult to remove, proceed to step 12.

11. Remove the rear disc brake axle shaft (1) from the rear axle assembly (2), if equipped

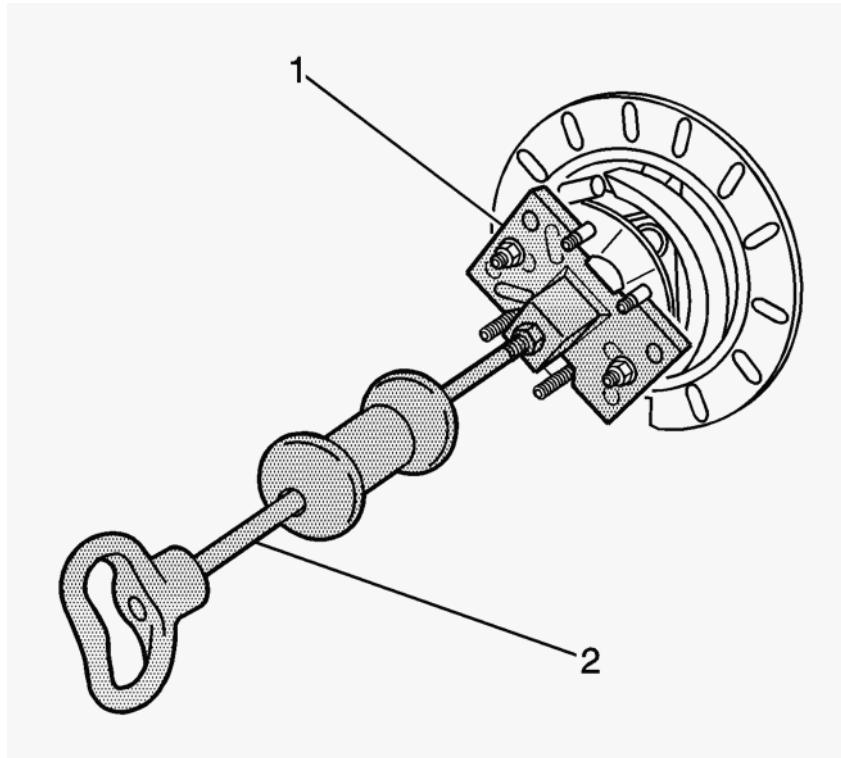


Fig. 58: Removing Axle Shaft

Courtesy of GENERAL MOTORS COMPANY

12. Using the **J-2619-01** hammer (2) and the **J-45859** remover/installer (1), remove the rear axle shaft from the rear axle assembly.
13. Replace the rear axle shaft seal and or bearing, if needed. Refer to [Rear Axle Shaft Seal Replacement](#), and or [Rear Axle Shaft Bearing Replacement](#).

Installation Procedure

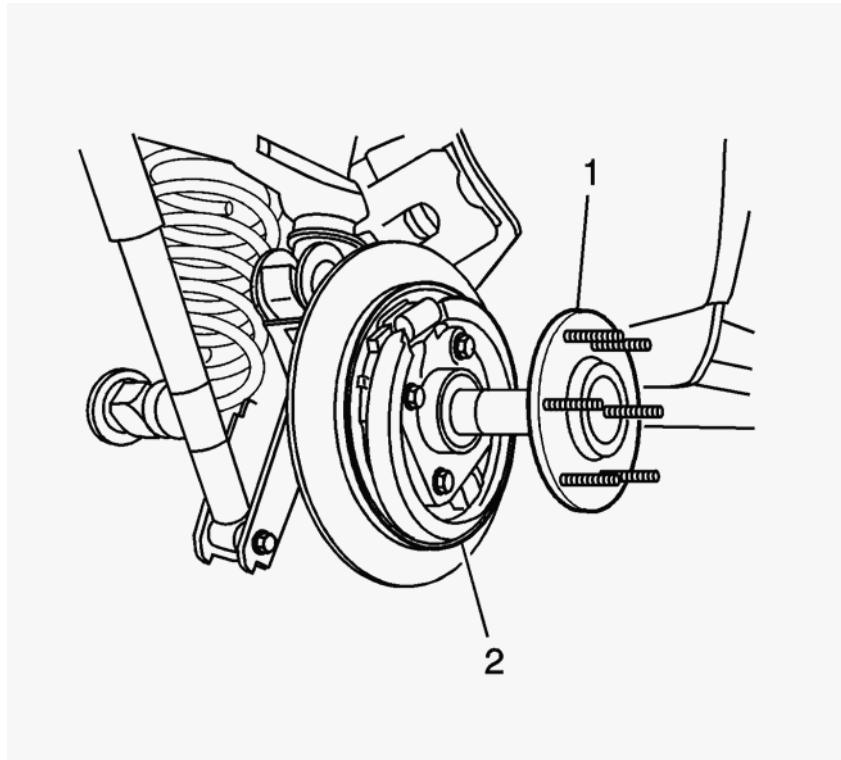


Fig. 59: Rear Axle Shaft And Brake Assembly

Courtesy of GENERAL MOTORS COMPANY

NOTE: When installing the rear axle shaft, ensure that the seal is not damaged.

1. Install the disc brake axle shaft (1) in the rear axle assembly (2), if equipped.

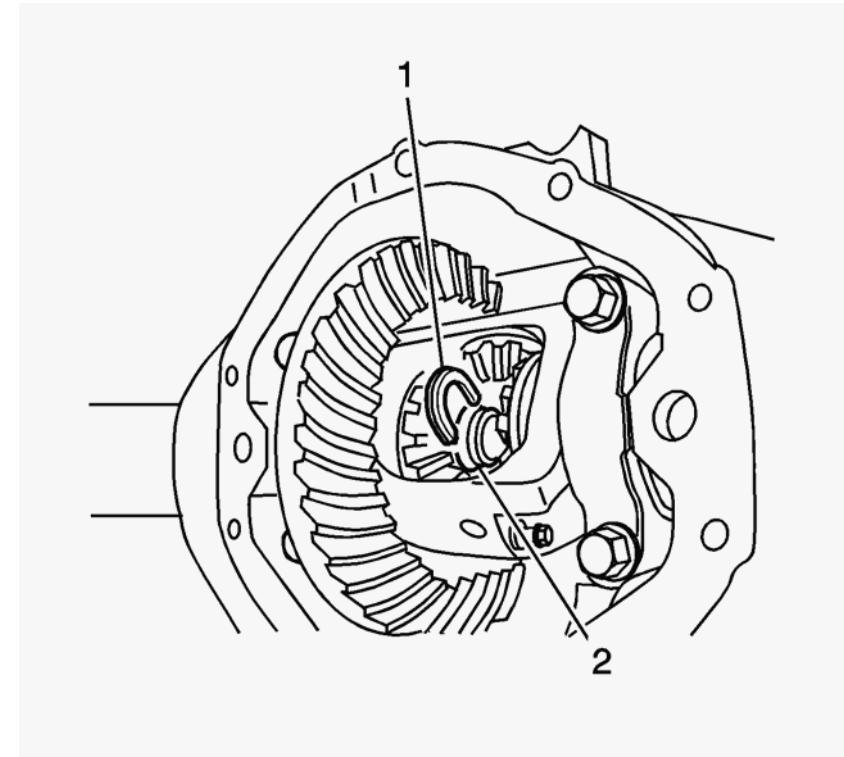


Fig. 60: Rear Axle Lock Ring

Courtesy of GENERAL MOTORS COMPANY

NOTE: In steps 3 and 4, pull out on the axle shaft after the lock has been installed to ensure that the lock is seated properly.

2. Install the lock (1) in the rear axle (2), without a locking differential.

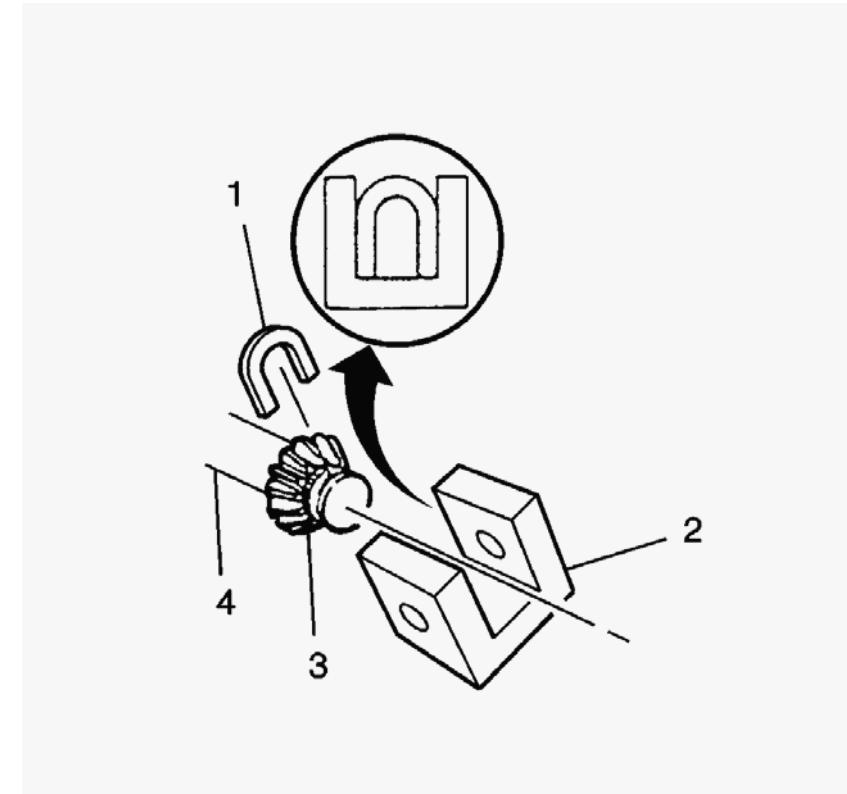


Fig. 61: Axle Shaft, Lock And Thrust Block

Courtesy of GENERAL MOTORS COMPANY

3. Install the lock (1) on the rear axle shaft (3), with a locking differential.

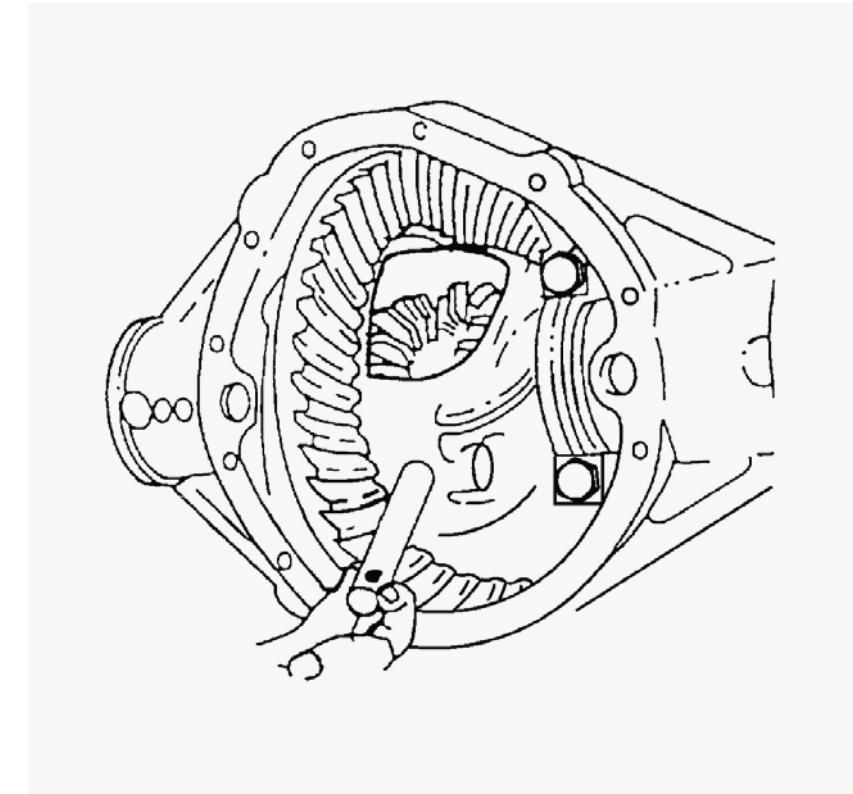


Fig. 62: Pinion Shaft

Courtesy of GENERAL MOTORS COMPANY

NOTE: On axles with a locking differential, keep the differential pinion shaft slightly withdrawn.

4. Install the differential pinion gear shaft.

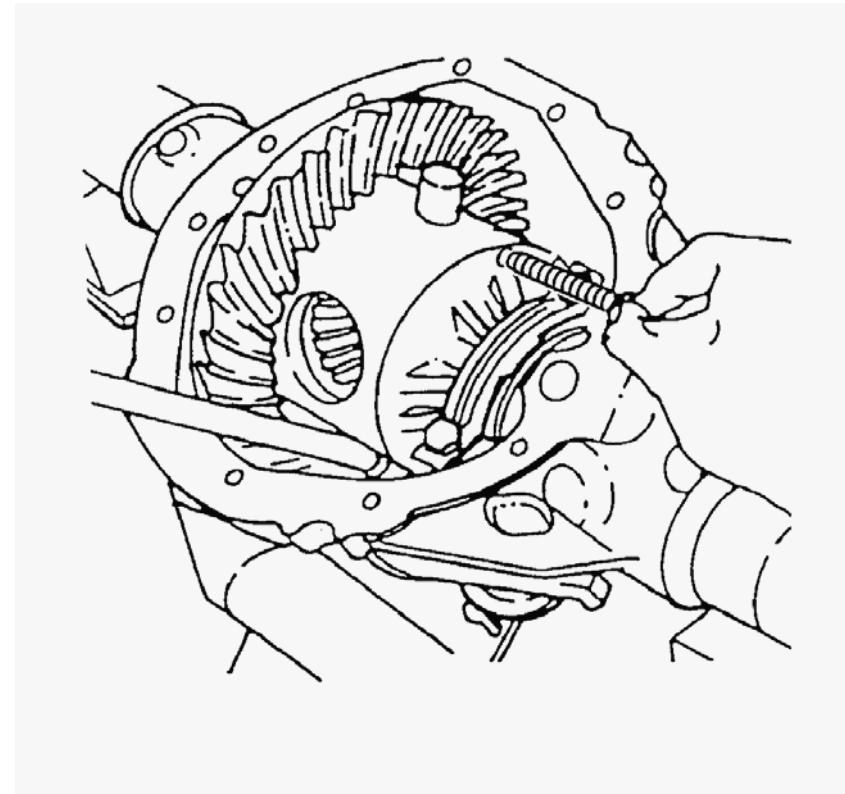


Fig. 63: Pinion Shaft Locking Bolt

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to [Fastener Caution](#).

5. Install the NEW differential pinion gear shaft bolt and tighten to 34 N.m (25 lb ft) for the 8.6 inch axle and 50 N.m (37 lb ft) for the 9.5 inch axle.

NOTE: End play is the in and out movement of the rear axle shaft. Radial play is the up and down movement in the rear axle shaft.

6. Check the rear axle shaft end play and the radial play. The rear axle shaft end play should be 0.012 inch per side and the radial play should be 0.002-0.003 inch. If the rear axle shaft is NOT within the specifications, replace any excessively worn parts.

7. Install the rear axle housing cover and gasket. Refer to [Rear Axle Housing Cover Replacement \(8.6/9.5/9.7 Inch Axle\)](#)[Rear Axle Housing Cover Replacement \(10.5 Inch Axle\)](#).

8. Install the wheel speed sensor. Refer to [Rear Wheel Speed Sensor Replacement](#).

9. Install the brake caliper mounting bracket, if equipped. Refer to [Rear Brake Caliper Bracket Replacement \(JD9\)](#)[Rear Brake Caliper Bracket Replacement \(J95\)](#).

10. Install the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#)[Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#).

11. Remove the support and lower the vehicle. Refer to [Lifting and Jacking the Vehicle](#).

REAR AXLE SHAFT SEAL REPLACEMENT

Special Tools

- **J-2619-01** Slide Hammer W 1/2 x 13 Adapter
- **J-21128** Axle Pinion Oil Seal Installer
- **J-29713** Oil Seal Installer
- **J-44685** Rear Axle Seal and Bearing Remover
- **J-29712** Axle Bearing Remover
- **J-45857** VSES Wheel Bearing Remover

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#).
3. Remove the rear axle housing cover. Refer to [Rear Axle Housing Cover Replacement \(8.6/9.5/9.7 Inch Axle\)](#) [Rear Axle Housing Cover Replacement \(10.5 Inch Axle\)](#).
4. Remove the axle shaft. Refer to [Rear Axle Shaft Replacement](#).

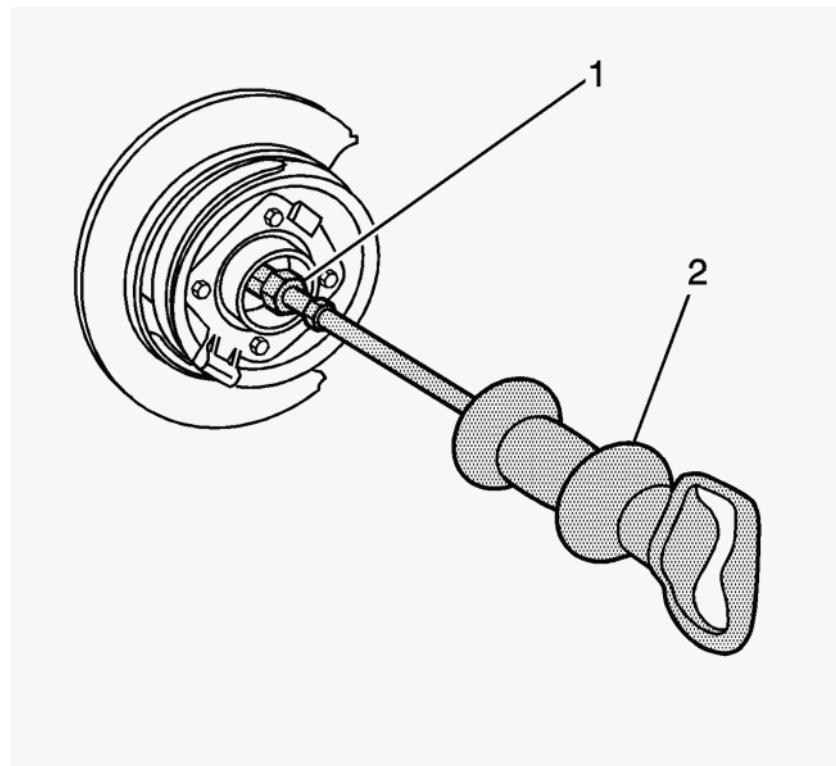


Fig. 64: Removing Axle Shaft Seal

Courtesy of GENERAL MOTORS COMPANY

5. Using the **J-45857** remover (1) and the **J-2619-01** hammer (2), remove axle shaft seal.

Installation Procedure

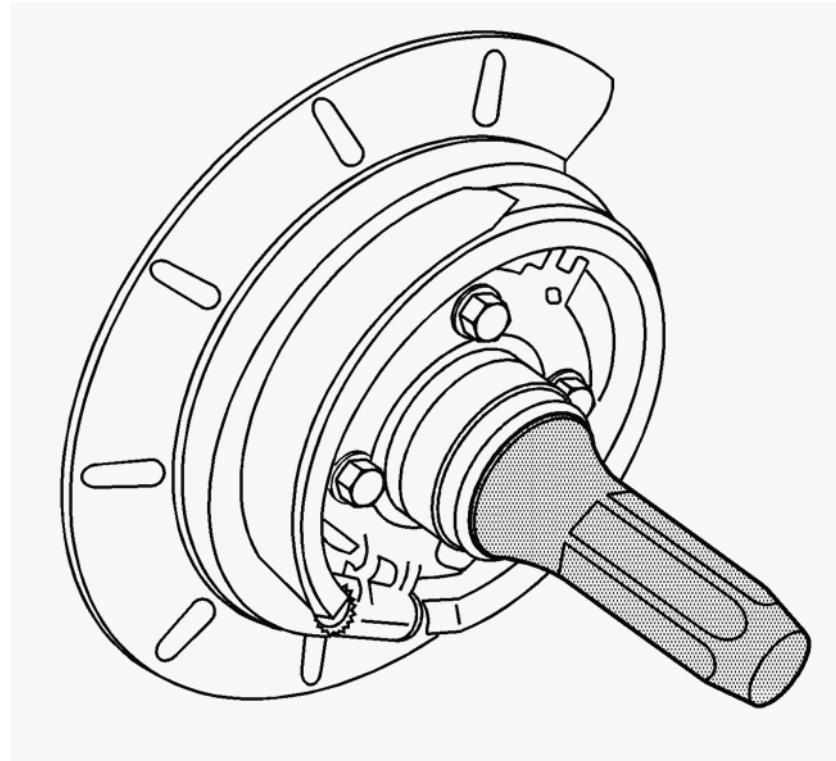


Fig. 65: Installing Axle Shaft Seal

Courtesy of GENERAL MOTORS COMPANY

1. Using the **J-21128** installer, 8.6 and 9.5/9.76 inch axle, or the **J-29173** installer, 9.5 inch axle, install the axle shaft seal.
2. Drive the tool into the bore until the axle shaft seal bottoms flush with the tube.
3. Install the rear axle shaft. Refer to [Rear Axle Shaft Replacement](#).
4. Install the rear axle housing cover. Refer to [Rear Axle Housing Cover Replacement \(8.6/9.5/9.7 Inch Axle\)](#)[Rear Axle Housing Cover Replacement \(10.5 Inch Axle\)](#).
5. Install the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#)[Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#).
6. Fill the rear axle. Refer to [Differential Oil Replacement \(8.6 Inch Axle\)](#)[Differential Oil Replacement \(9.5/9.76 Inch Axle\)](#)[Differential Oil Replacement \(10.5 Inch Axle\)](#).
7. Remove the support and lower the vehicle.

REAR AXLE SHAFT BEARING REPLACEMENT

Special Tools

- **J-2619-01** Slide Hammer W 1/2 x 13 Adapter
- **J-8092** Universal Driver Handle 3/4 x 10 inch
- **J-21128** Axle Pinion Oil Seal Installer
- **J-29713** Oil Seal Installer
- **J-23690** Axle Bearing Installer
- **J-44685** Rear Axle Seal and Bearing Remover

- **J-29712** Axle Bearing Remover
- **J-45857** VSES Wheel Bearing Remover
- **J-45860** Tone Ring Installer

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#).
3. Remove the rear axle housing cover. Refer to [Rear Axle Housing Cover Replacement \(8.6/9.5/9.7 Inch Axle\)](#) [Rear Axle Housing Cover Replacement \(10.5 Inch Axle\)](#).
4. Remove the axle shaft. Refer to [Rear Axle Shaft Replacement](#).

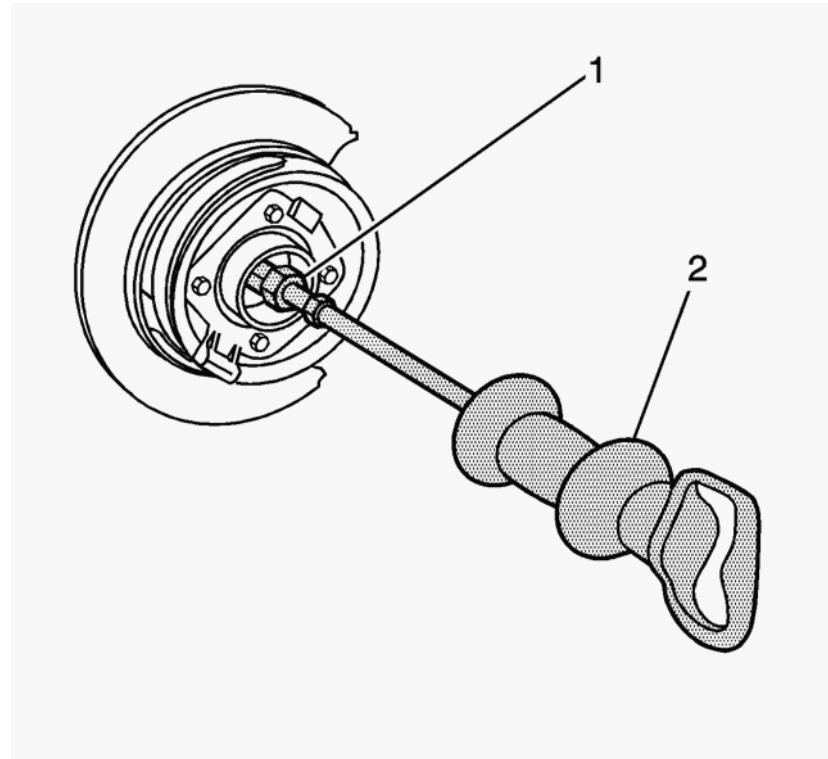


Fig. 66: Removing Rear Axle Shaft Seal, Bearing And Wheel Speed Sensor Reluctor Ring

Courtesy of GENERAL MOTORS COMPANY

5. Using the **J-45857** remover (1) and the **J-2619-01** hammer (2), remove axle shaft seal and bearing first, then follow with removal of reluctor/wheel speed sensor ring.

Installation Procedure

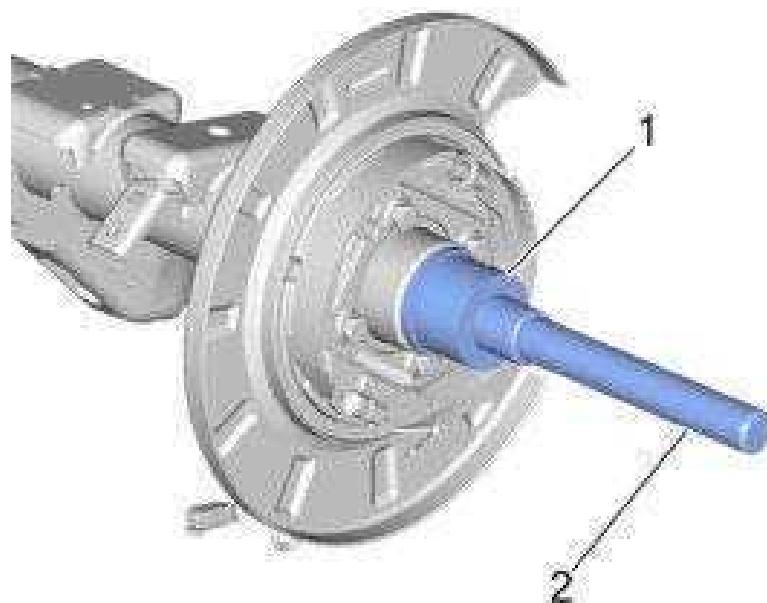


Fig. 67: Installing Rear Wheel Speed Sensor/Reluctor Ring

Courtesy of GENERAL MOTORS COMPANY

1. Install the rear wheel speed sensor/reluctor ring, using **J-45860** ring installer (1) and the **J-8092** driver (2). Refer to [Wheel Speed Sensor Reluctor Ring Replacement](#).

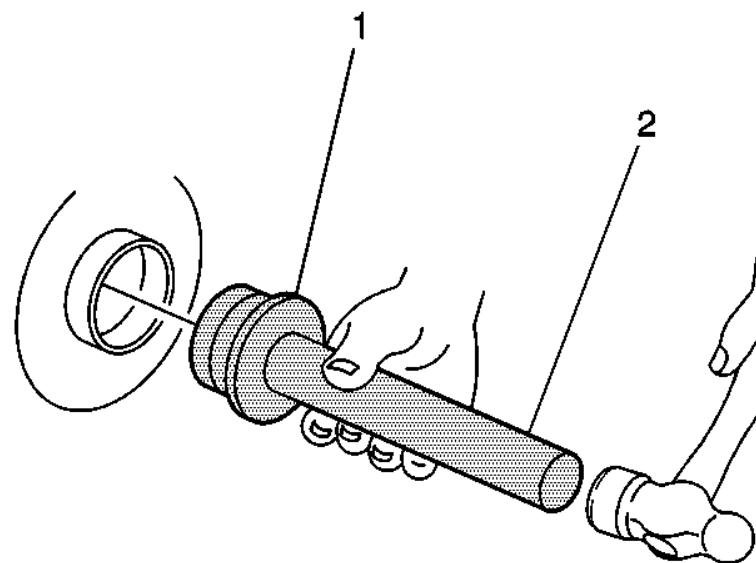


Fig. 68: Installing Axle Shaft Bearing

Courtesy of GENERAL MOTORS COMPANY

NOTE: Ensure that the axle shaft bearing is fully seated in the rear axle shaft housing.

2. Using the **J-23690** installer (1) and the **J-8092** driver (2), install the axle shaft bearing.

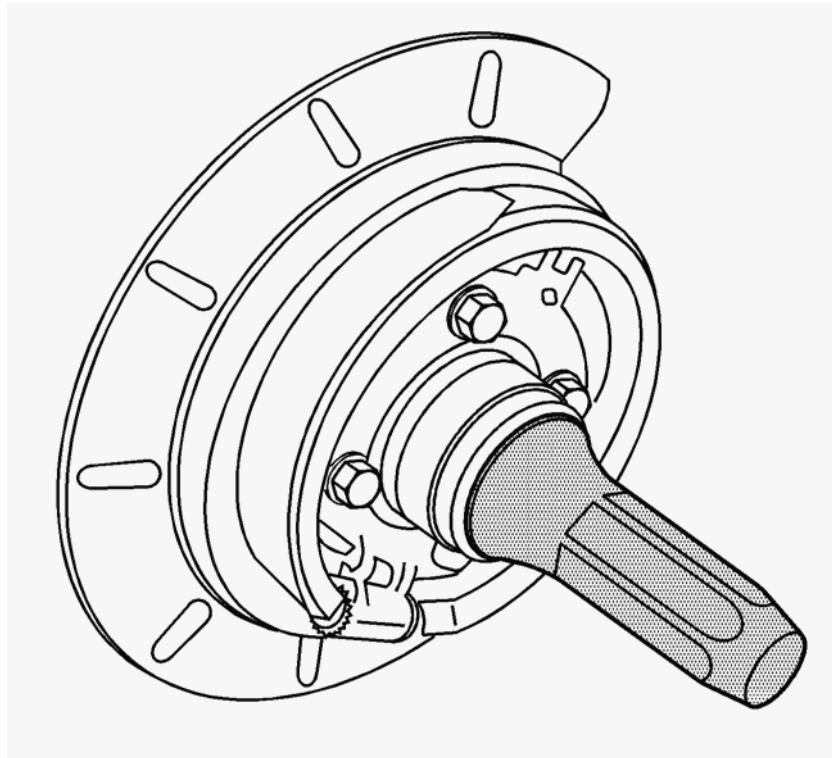


Fig. 69: Installing Axle Shaft Seal

Courtesy of GENERAL MOTORS COMPANY

3. Using the **J-21128** installer, 8.6 and 9.5/9.76 inch axle, or the **J-29173** installer, 9.5 inch axle, install the axle shaft seal.
4. Drive the tool into the bore until the axle shaft seal bottoms flush with the tube.
5. Install the rear axle shaft. Refer to [Rear Axle Shaft Replacement](#).
6. Install the rear axle housing cover. Refer to [Rear Axle Housing Cover Replacement \(8.6/9.5/9.7 Inch Axle\)](#)[Rear Axle Housing Cover Replacement \(10.5 Inch Axle\)](#).
7. Install the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#)[Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#).
8. Fill the rear axle. Refer to [Differential Oil Replacement \(8.6 Inch Axle\)](#)[Differential Oil Replacement \(9.5/9.76 Inch Axle\)](#)[Differential Oil Replacement \(10.5 Inch Axle\)](#).
9. Remove the support and lower the vehicle.

REAR AXLE SHAFT AND GASKET REPLACEMENT (10.5 INCH AXLE)

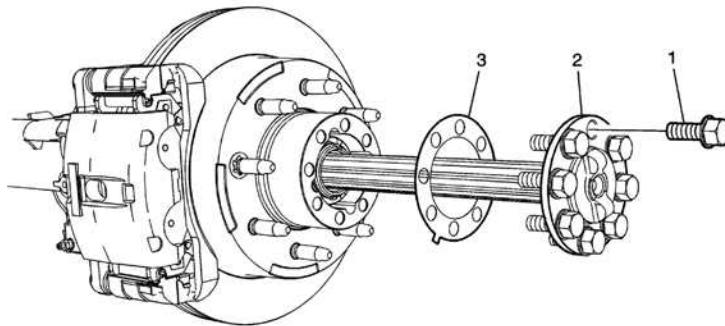


Fig. 70: Rear Axle Shaft And/Or Gasket (10.5 Inch Axle)

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure	
1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle . 2. Remove the tire and wheel. Refer to Tire and Wheel Removal and Installation (6-Lug Wheel) Tire and Wheel Removal and Installation (8-Lug Wheel) .	
1	<p>Axle Shaft Bolt (Qty: 8)</p> <p>CAUTION: Refer to Fastener Caution .</p> <p>Tighten 225 N.m (167 lb ft)</p>
2	Rear Axle Shaft
3	<p>Rear Axle Shaft Gasket</p> <p>NOTE:</p> <ul style="list-style-type: none"> • When installing the NEW gasket, apply a small amount of clean grease to hold the gasket in place while

Callout	Component Name
	<p aligning="" and="" axle="" hole="" hub.<="" in="" mounting="" p="" shaft="" the=""> <ul style="list-style-type: none"> • HD 11.5 Dual Rear Wheel Axle ONLY - When installing axle shaft, use caution and proceed slowly when aligning shaft during insertion through the inboard mounted rear wheel speed sensor tone ring splines on dual rear wheel HD models. • Slowly insert the axle shaft through the spindle and tube until the shaft stops against the inboard tone ring. </p>

Callout	Component Name
	<ul style="list-style-type: none"> • Carefully lift the inboard end of the axle shaft by pivoting the axle shaft on the spindle while grasping the outboard end of the axle shaft. • Slowly insert the axle shaft spline into the tone ring. If the tone ring and axle shaft splines to do not at first fully engage, rotate the axle shaft slightly and re-attempt to engage tone ring splines. • Once wheel speed sensor tone ring splines have been engaged by axle shaft, the axle shaft will have

Callout	Component Name
	<p>to be carefully aligned again when inserting the shaft finally into the splines of the differential side gears</p> <ul style="list-style-type: none"> • Failure to use caution regarding the rear wheel speed sensor ring could result in damage to sensor ring and/or sensor ring retainer. If sensor ring and or retainer are damaged they must be replaced.

REAR WHEEL HUB REPLACEMENT (10.5 INCH AXLE)

Special Tools

- **CH 49794** Axle Hub Nut Socket
- **CH-50636** Axle Hub Nut Socket
- **DT 50289** Differential Bearing and Hub Seal Installer
- **DT 50290** Wheel Bearing Installer Outer Bearing Cup
- **DT 50291** Wheel Bearing Race Installer - Outer
- **DT 50292** Wheel Bearing Race Installer - Inner

- J 8092 Universal Driver Handle-3/4 x 10 inch

For equivalent regional tools, refer to [Special Tools](#).

Removal Procedure

- NOTE:**
- The wheel speed sensor ring is NOT serviced separately. The hub and wheel speed sensor ring are serviced as an assembly.
 - The wheel hub seal must be replaced anytime the wheel hub assembly is removed from the axle housing.

1. Raise the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#).

- NOTE:** In the following service procedure, it is not necessary to remove the brake caliper from the bracket.

3. Remove the brake caliper bracket. Refer to [Rear Brake Caliper Bracket Replacement \(JD9\)](#) [Rear Brake Caliper Bracket Replacement \(J95\)](#).
4. Remove the axle shaft. Refer to [Rear Axle Shaft and Gasket Replacement \(10.5 Inch Axle\)](#).

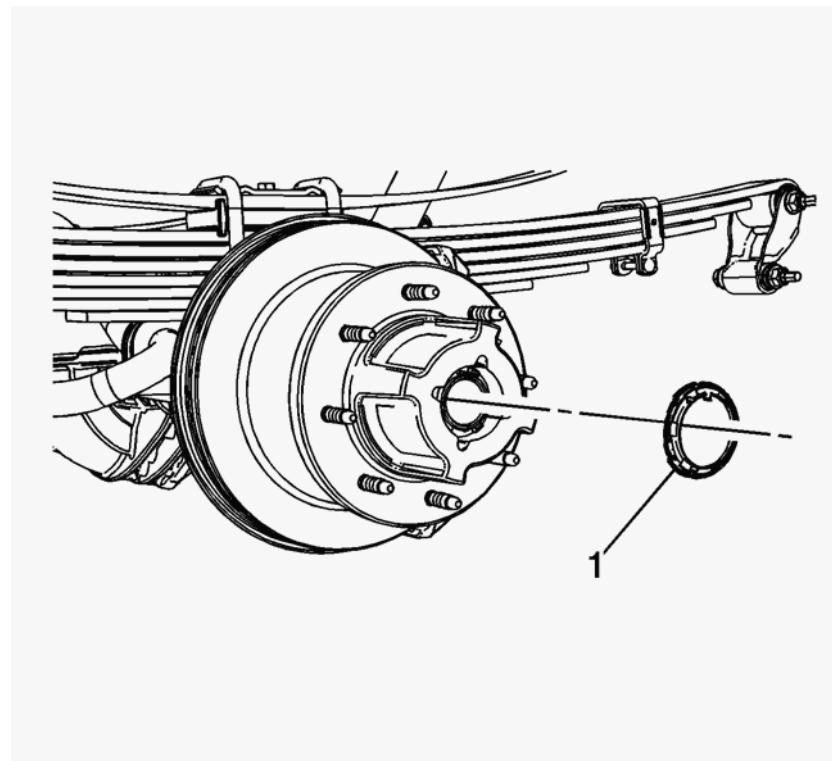


Fig. 71: Adjuster Nut Retainer

Courtesy of GENERAL MOTORS COMPANY

5. Remove the adjuster nut retainer (1).

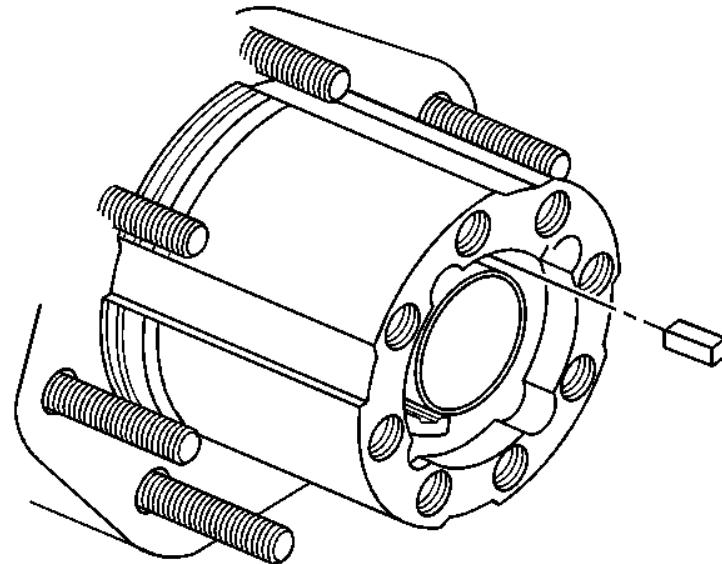


Fig. 72: Removing Key

Courtesy of GENERAL MOTORS COMPANY

6. Remove the key.

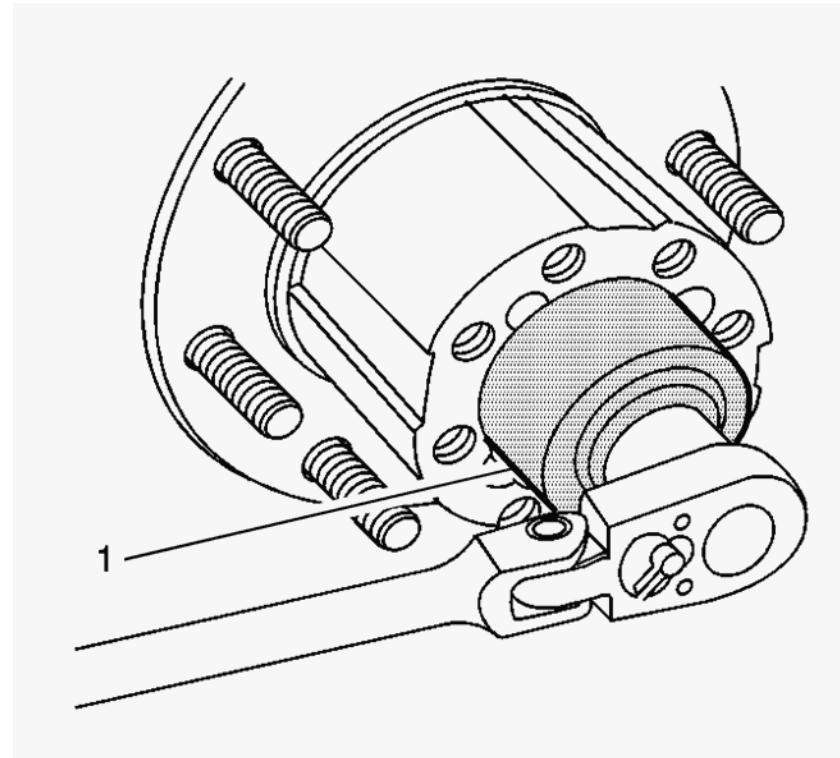


Fig. 73: Adjusting Nut And Special Tool

Courtesy of GENERAL MOTORS COMPANY

7. Using the **CH 49794** socket or the **CH 50636** socket (1), loosen the adjusting nut.

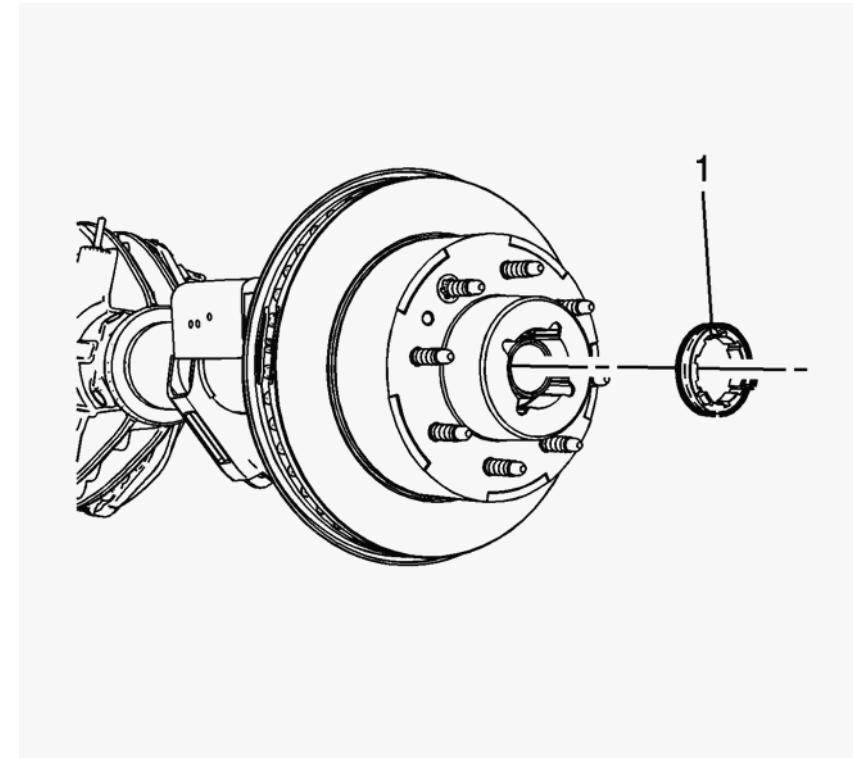


Fig. 74: Adjuster Nut

Courtesy of GENERAL MOTORS COMPANY

8. Remove the adjusting nut.

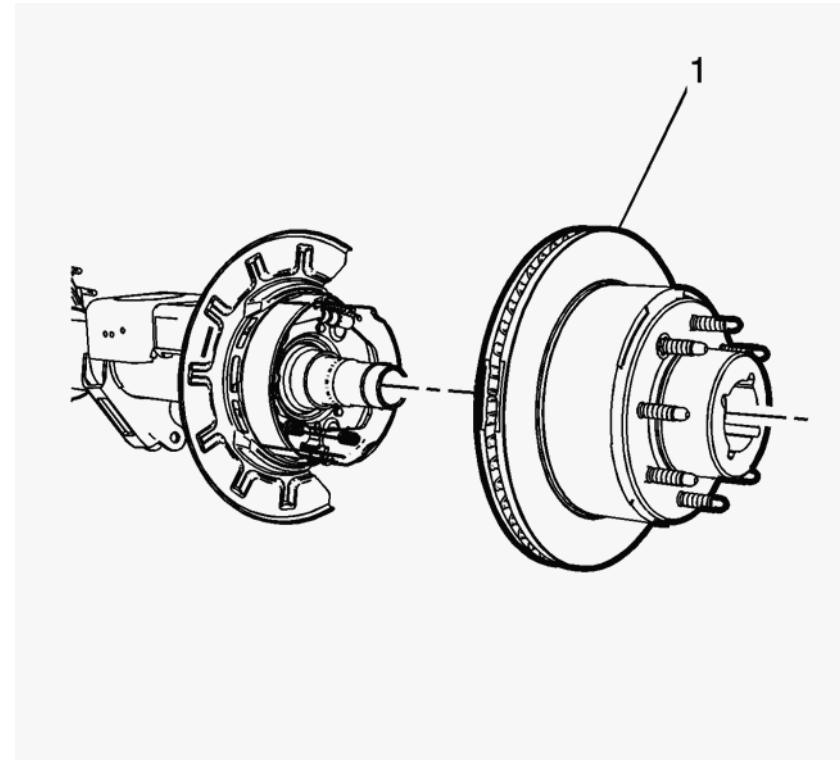


Fig. 75: Wheel Hub/Brake Rotor Assembly

Courtesy of GENERAL MOTORS COMPANY

NOTE: If the oil seal remains on the axle hub, remove the seal using a suitable seal removal tool.

9. Remove the wheel hub/brake rotor assembly (1) from the axle housing.
10. Remove the rotor, if necessary. Refer to [Rear Brake Rotor Replacement \(JD9\)](#) [Rear Brake Rotor Replacement \(J95\)](#) .
11. Using a suitable seal removal tool, remove the oil seal from the wheel hub.

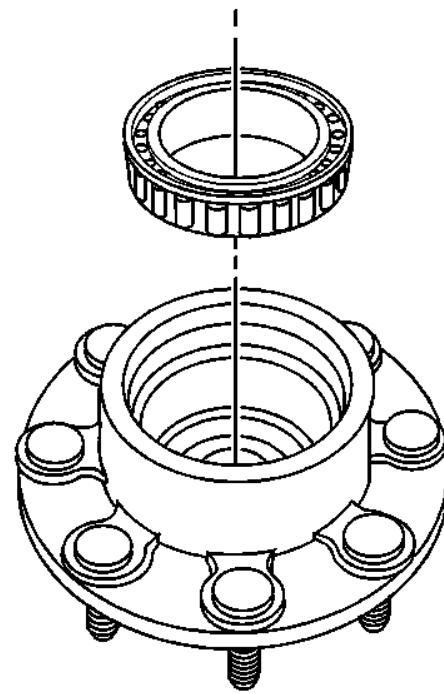


Fig. 76: Inner Hub Bearing

Courtesy of GENERAL MOTORS COMPANY

12. Remove the inner hub bearing.

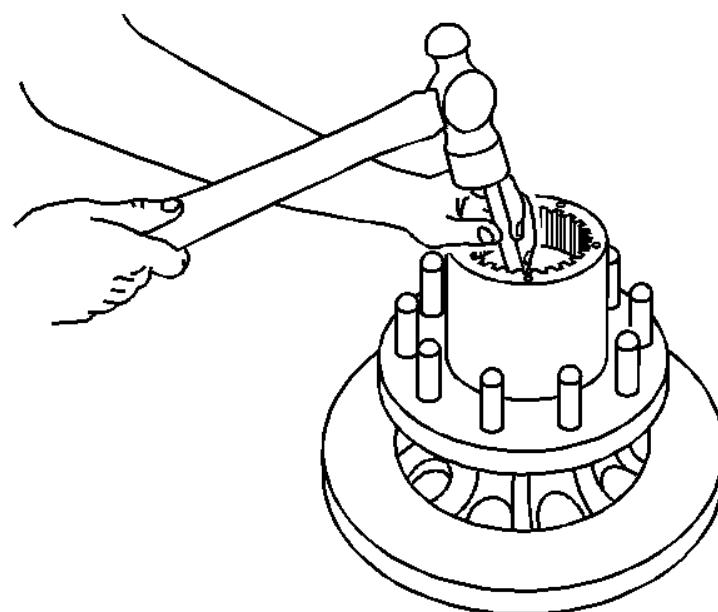


Fig. 77: Removing Inner Hub Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

13. Using a brass drift and a hammer, remove the inner hub bearing cup.

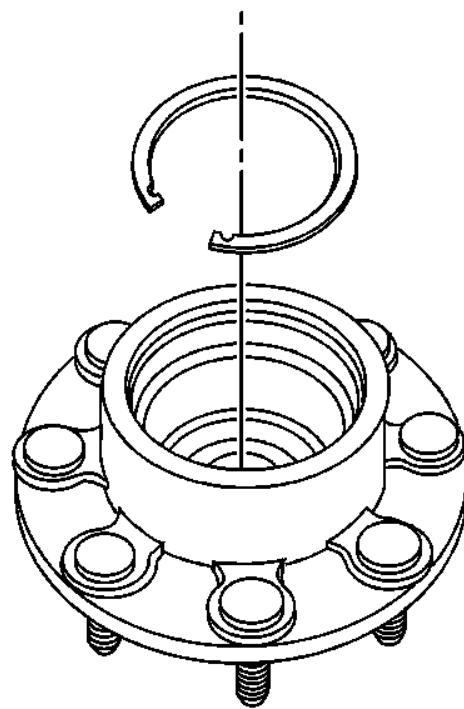


Fig. 78: Wheel Hub Retaining Ring

Courtesy of GENERAL MOTORS COMPANY

14. Remove the retaining ring from the wheel hub.

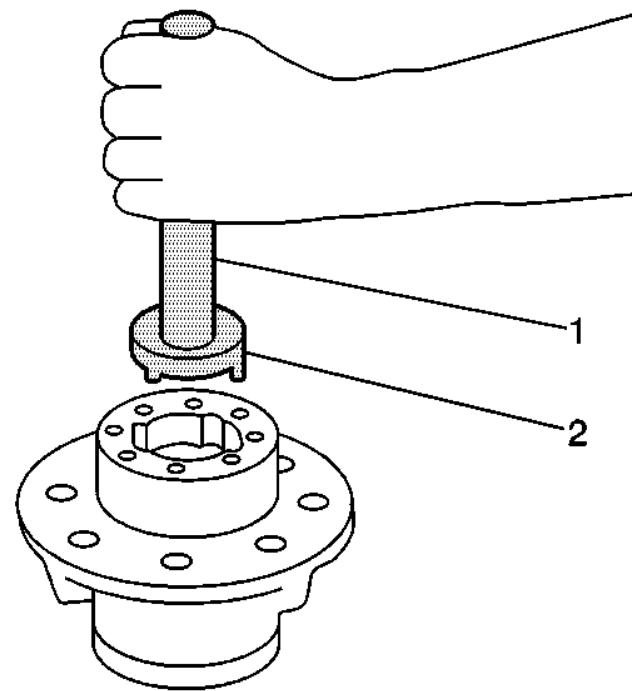


Fig. 79: Outer Hub Bearing & Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

15. Using the **DT 50291** installer (2) and the **J 8092** handle (1), remove the outer hub bearing and bearing cup.

Installation Procedure

1. Lubricate the following with a light coat of high melting point EP bearing lubricant:

- The outer wheel bearing
- The inner wheel bearing
- The outer wheel bearing cup
- The inner wheel bearing cup
- The axle hub spindle

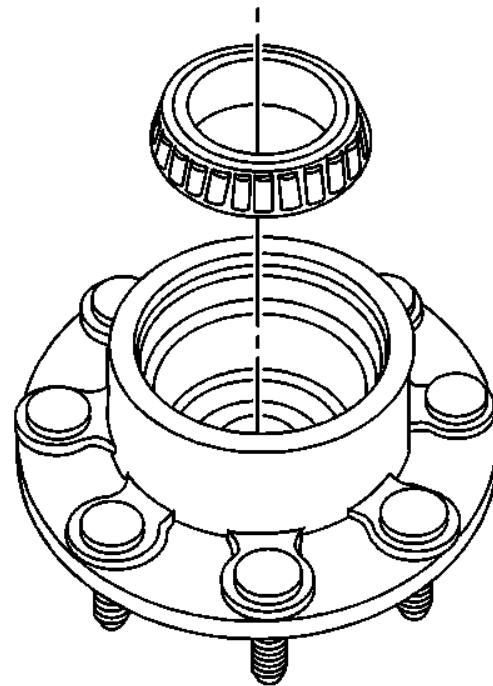


Fig. 80: Wheel Hub Outer Bearing

Courtesy of GENERAL MOTORS COMPANY

2. Install the outer bearing into the NEW wheel hub.

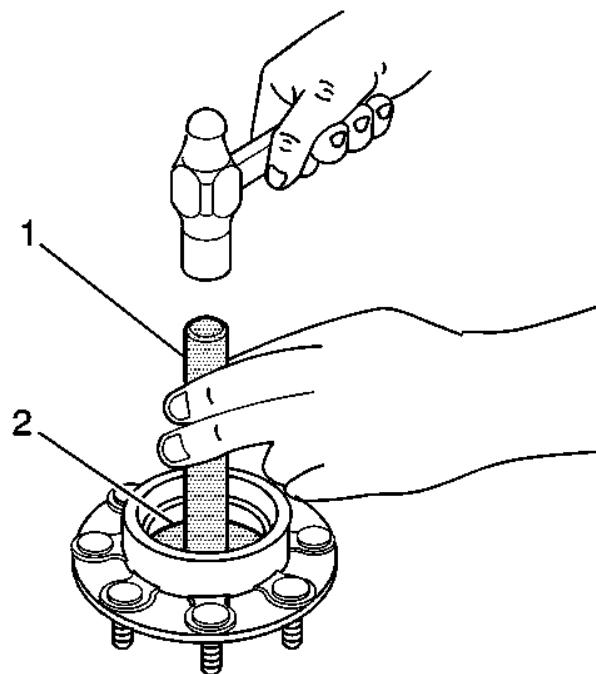


Fig. 81: Driving Bearing Cup Into Wheel Hub

Courtesy of GENERAL MOTORS COMPANY

NOTE: Drive the outer bearing cup into the wheel hub until it is just past the retaining ring groove. Do not bottom out the bearing assembly in the bore.

3. Using the **DT 50290** installer (2) and the **J 8092** handle (1), install the outer bearing cup into the wheel hub.

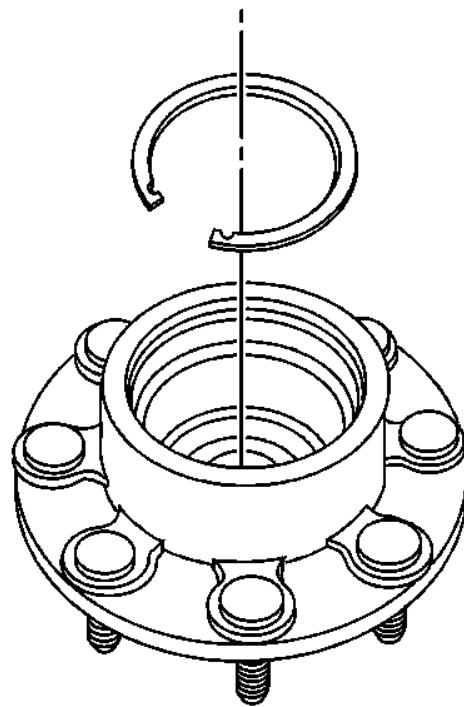


Fig. 82: Wheel Hub Retaining Ring

Courtesy of GENERAL MOTORS COMPANY

NOTE: Ensure that the retaining ring is fully and evenly seated in the groove.

4. Install the retaining ring into the groove.

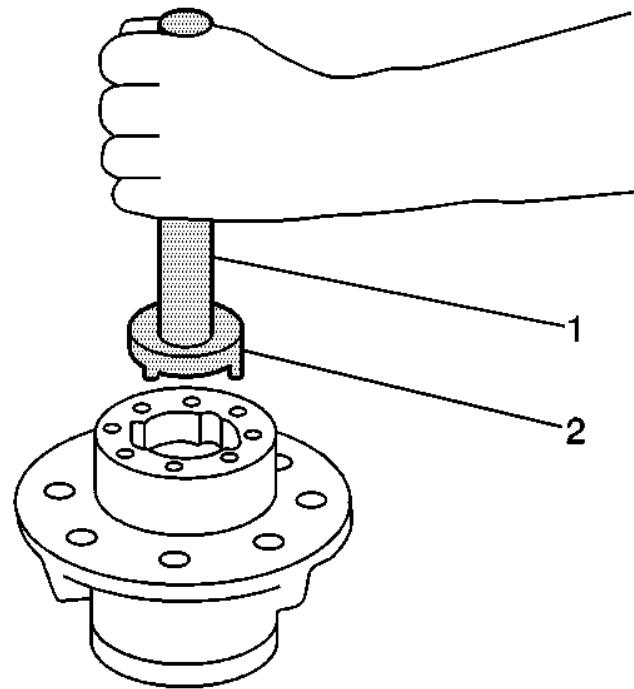


Fig. 83: Outer Hub Bearing & Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

NOTE: Ensure that the outer bearing assembly rotates freely in the hub

5. Using the **DT 50291** installer (2) and the **J 8092** handle (1), turn the wheel hub over and seat the outer bearing assembly against the retaining ring.

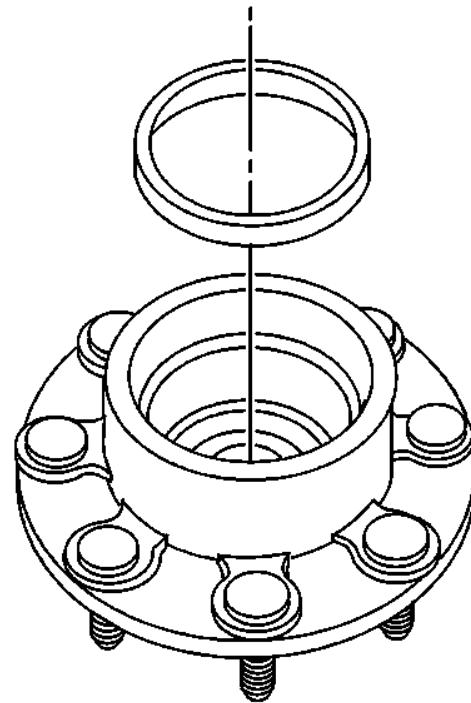


Fig. 84: Wheel Hub Inner Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

6. Turn the wheel hub over and install the inner bearing cup.

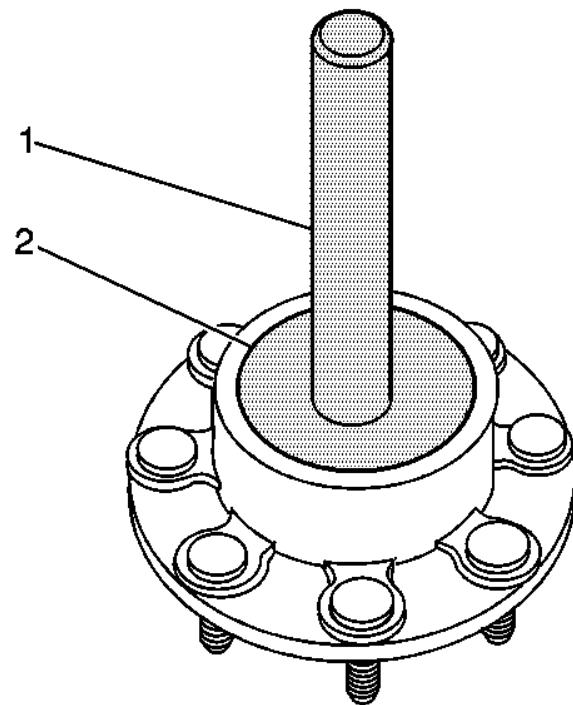


Fig. 85: Driving Inner Bearing Cup Into Wheel Hub

Courtesy of GENERAL MOTORS COMPANY

7. Using the **DT 50292** installer (2) and the **J 8092** handle (1), install the inner bearing cup into the wheel hub.

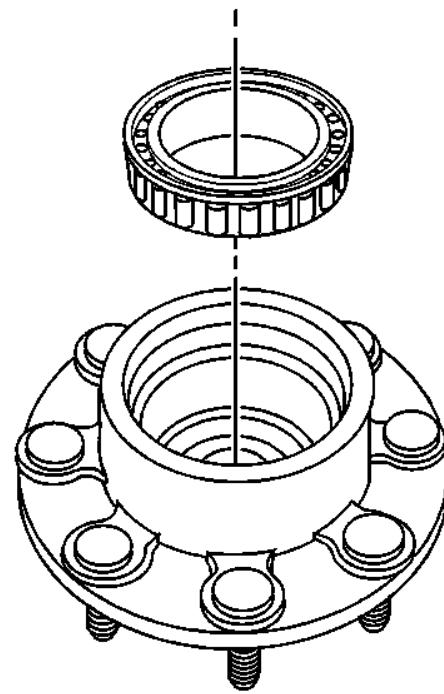


Fig. 86: Inner Hub Bearing

Courtesy of GENERAL MOTORS COMPANY

8. Install the inner bearing.

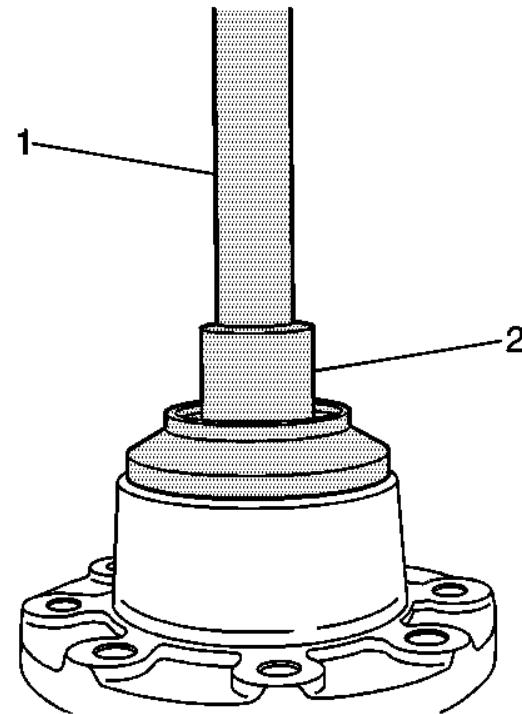


Fig. 87: Installing Oil Seal Using Special Tools

Courtesy of GENERAL MOTORS COMPANY

NOTE: Ensure the seal is fully seated in the hub bore.

9. Using the **DT 50289** installer (2) and the **J 8092** handle (1), install the new oil seal.
10. Install the rotor, if necessary. Refer to [**Rear Brake Rotor Replacement \(JD9\)**](#) [**Rear Brake Rotor Replacement \(J95\)**](#).
11. Apply a light coat of high melting point EP bearing lubricant to the axle housing spindle.

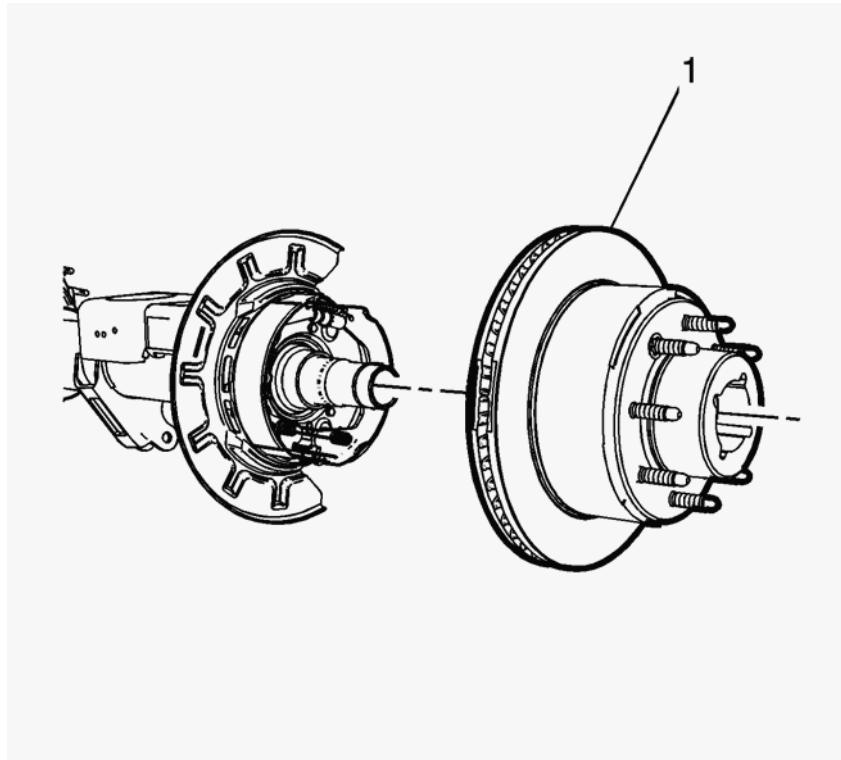


Fig. 88: Wheel Hub/Brake Rotor Assembly

Courtesy of GENERAL MOTORS COMPANY

NOTE: If the wheel hub assembly does not fully seat itself onto the axle shaft spindle and is removed, the wheel hub seal must be replaced.

12. Install the wheel hub assembly on the axle housing.

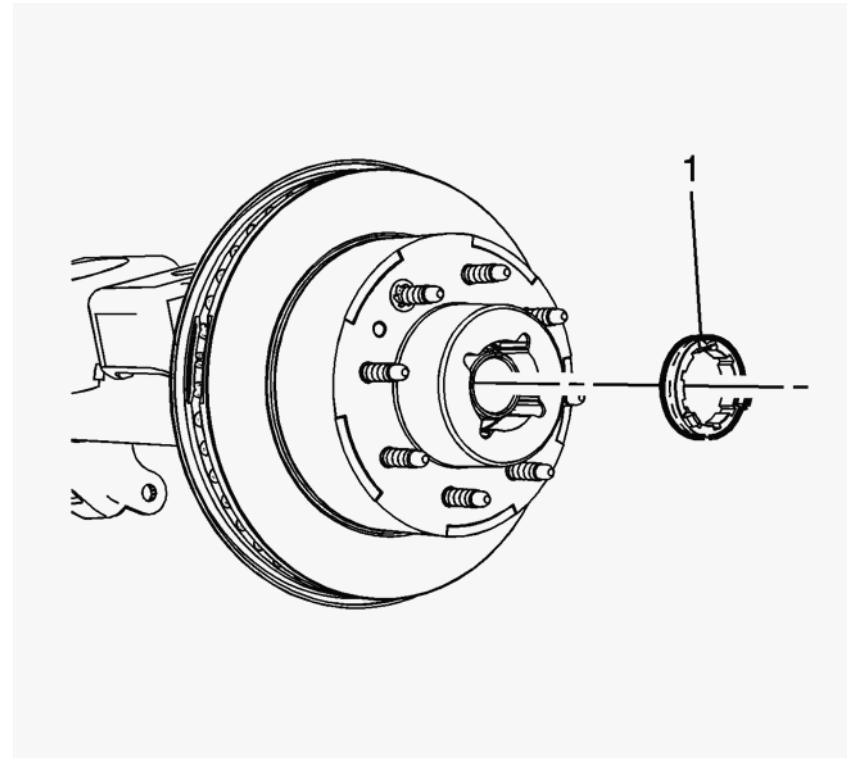


Fig. 89: Rear Axle Adjuster Nut

Courtesy of GENERAL MOTORS COMPANY

13. Install the rear axle adjuster nut (1).

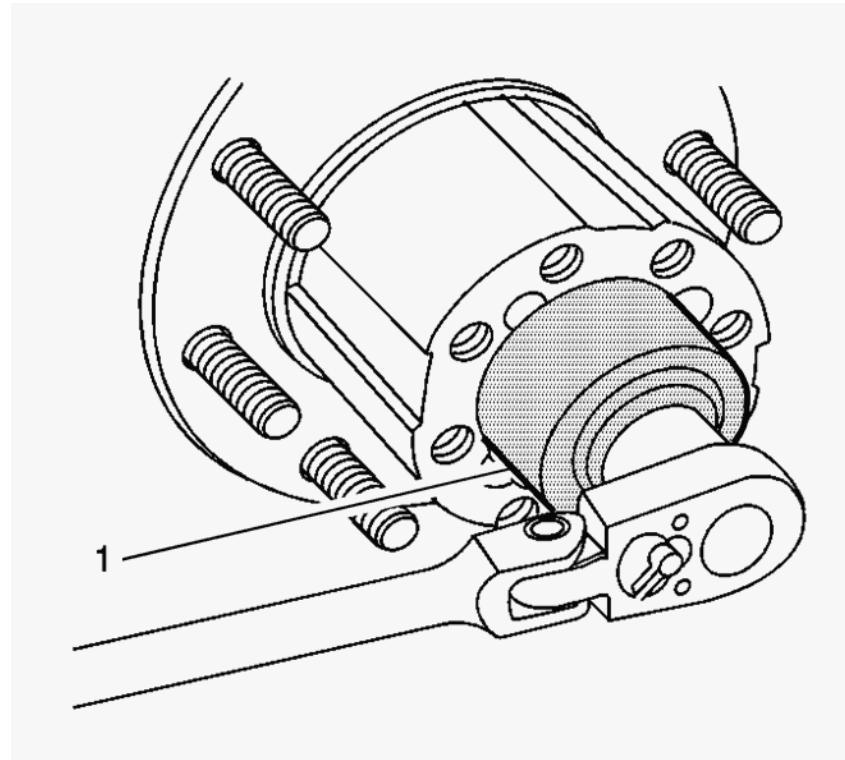


Fig. 90: Adjusting Nut And Special Tool

Courtesy of GENERAL MOTORS COMPANY

14. Using the **CH 49794** socket or the **CH 50636** socket (1), install the adjusting nut to the hub.
15. Adjust the wheel bearings. Refer to [Wheel Bearing Adjustment \(10.5 Inch Axle\)](#).

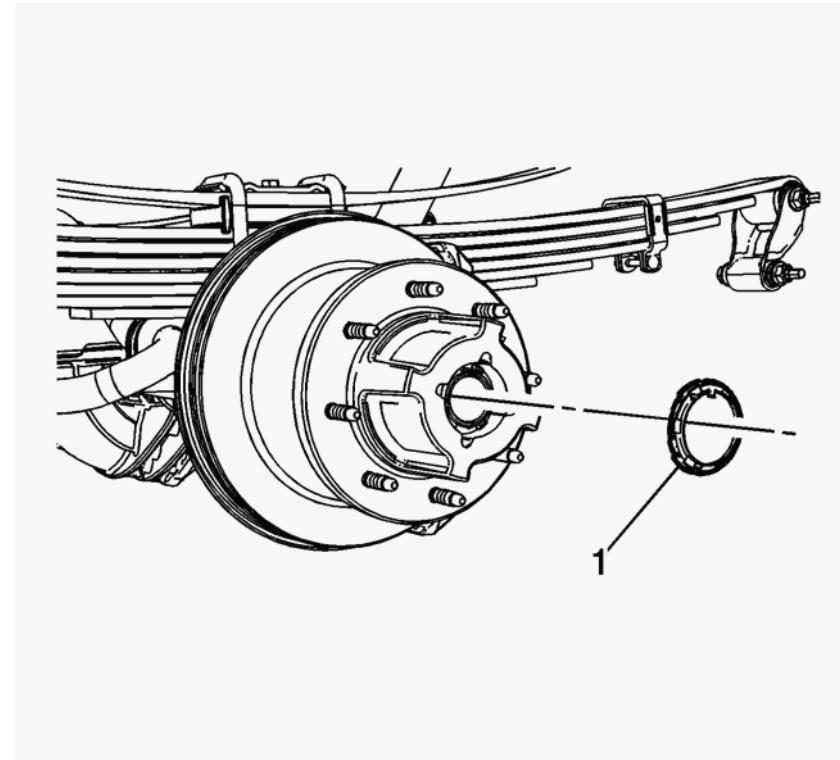


Fig. 91: Adjuster Nut Retainer

Courtesy of GENERAL MOTORS COMPANY

16. Install the adjuster nut retainer (1).
17. Install the axle shaft. Refer to [Rear Axle Shaft and Gasket Replacement \(10.5 Inch Axle\)](#).
18. Install the brake caliper bracket. Refer to [Rear Brake Caliper Bracket Replacement \(JD9\) Rear Brake Caliper Bracket Replacement \(J95\)](#).
19. Install the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#).
20. Inspect and add axle lubricant to the axle housing, if necessary. Refer to [Rear Axle Lubricant Level Inspection \(10.5 Inch Axle\)](#).
21. Lower the vehicle.

REAR WHEEL INNER AND OUTER BEARING REPLACEMENT (10.5 INCH AXLE)

Special Tools

- **CH 49794** Axle Hub Nut Socket
- **CH-50636** Axle Hub Nut Socket
- **DT 50289** Differential Bearing and Hub Seal Installer
- **DT 50290** Wheel Bearing Installer Outer Bearing Cup
- **DT 50291** Wheel Bearing Race Installer - Outer
- **DT 50292** Wheel Bearing Race Installer - Inner
- **J 8092** Universal Driver Handle-3/4 x 10 inch

For equivalent regional tools, refer to [Special Tools](#).

Removal Procedure

- NOTE:**
- The wheel speed sensor ring is NOT serviced separately. The hub and wheel speed sensor ring are serviced as an assembly.
 - The wheel hub seal must be replaced anytime the wheel hub assembly is removed from the axle housing.

1. Raise the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#).

NOTE: In the following service procedure, it is not necessary to remove the brake caliper from the bracket.

3. Remove the brake caliper bracket. Refer to [Rear Brake Caliper Bracket Replacement \(JD9\)](#) [Rear Brake Caliper Bracket Replacement \(J95\)](#).
4. Remove the axle shaft. Refer to [Rear Axle Shaft and Gasket Replacement \(10.5 Inch Axle\)](#).

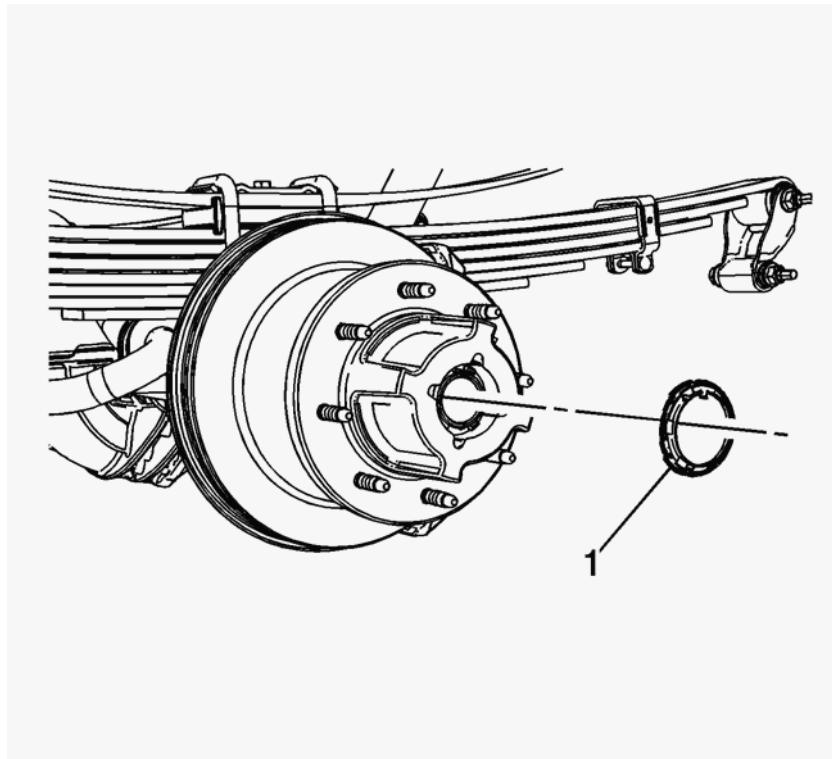


Fig. 92: Adjuster Nut Retainer

Courtesy of GENERAL MOTORS COMPANY

5. Remove the adjuster nut retainer (1).

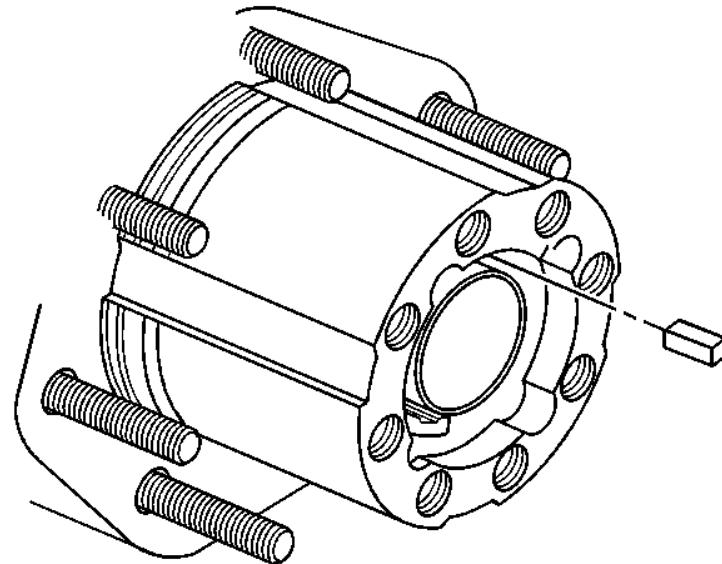


Fig. 93: Removing Key

Courtesy of GENERAL MOTORS COMPANY

6. Remove the key.

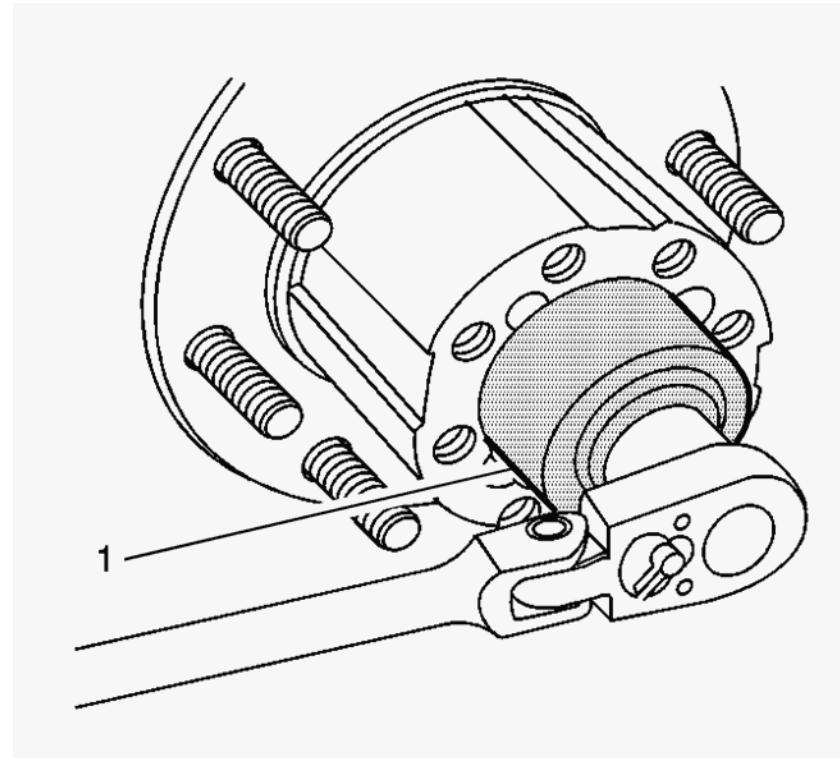


Fig. 94: Adjusting Nut And Special Tool

Courtesy of GENERAL MOTORS COMPANY

7. Using the **CH 49794** socket or the **CH 50636** socket (1), loosen the adjusting nut.

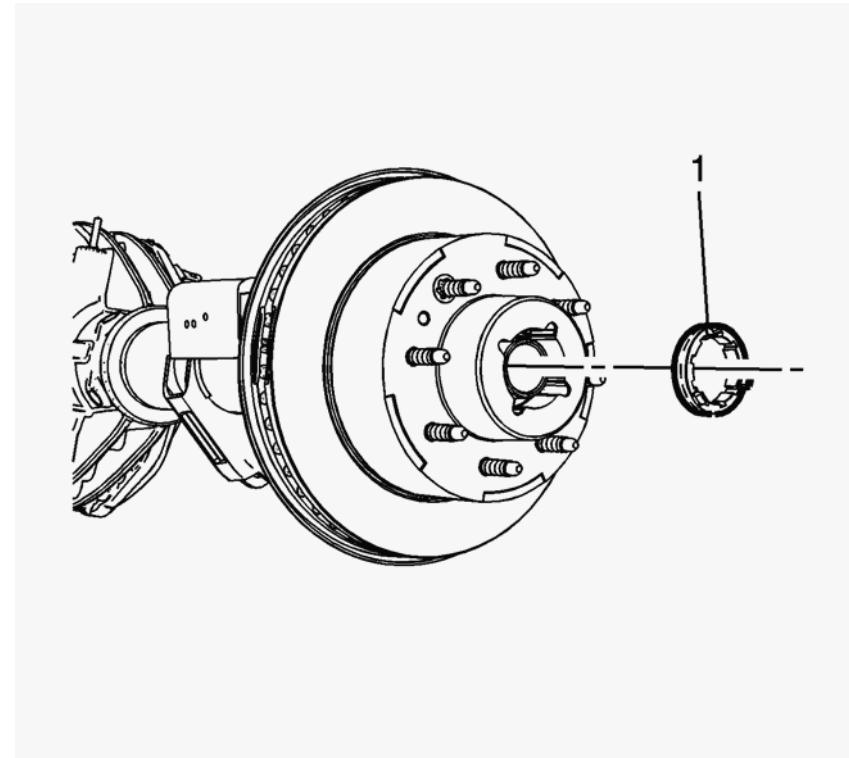


Fig. 95: Adjuster Nut

Courtesy of GENERAL MOTORS COMPANY

8. Remove the adjusting nut.

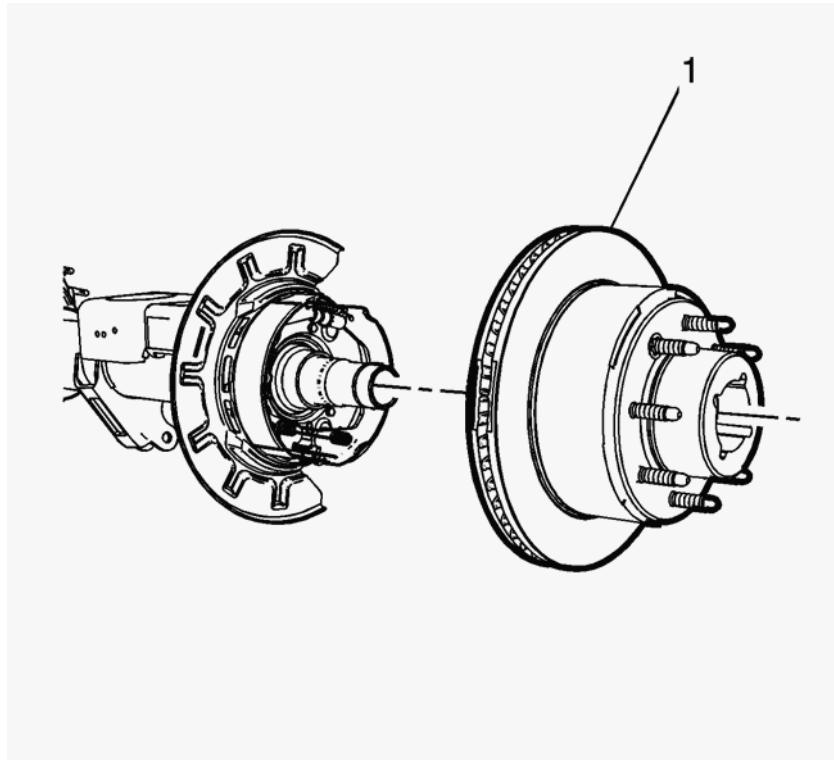


Fig. 96: Wheel Hub/Brake Rotor Assembly

Courtesy of GENERAL MOTORS COMPANY

NOTE: If the oil seal remains on the axle hub, remove the seal using a suitable seal removal tool.

9. Remove the wheel hub/brake rotor assembly (1) from the axle housing.
10. Remove the rotor, if necessary. Refer to [Rear Brake Rotor Replacement \(JD9\)](#) [Rear Brake Rotor Replacement \(J95\)](#) .
11. Using a suitable seal removal tool, remove the oil seal from the wheel hub.

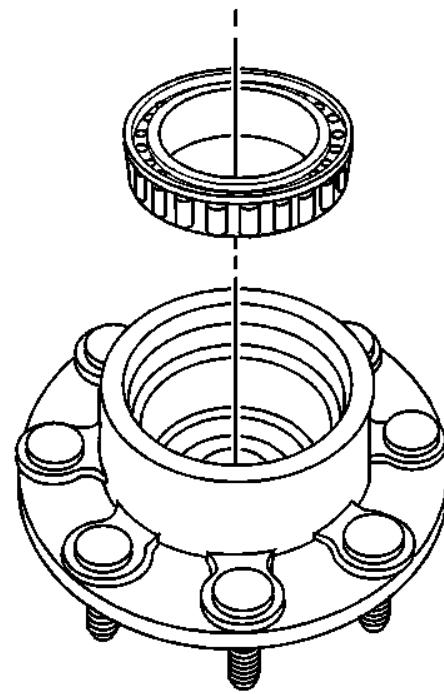


Fig. 97: Inner Hub Bearing

Courtesy of GENERAL MOTORS COMPANY

12. Remove and discard the inner hub bearing.

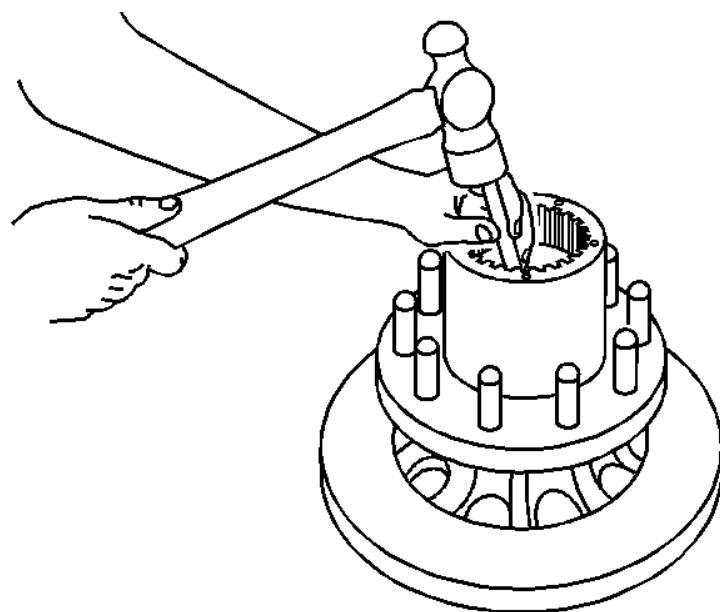


Fig. 98: Removing Inner Hub Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

13. Using a brass drift and a hammer, remove and discard the inner hub bearing cup.

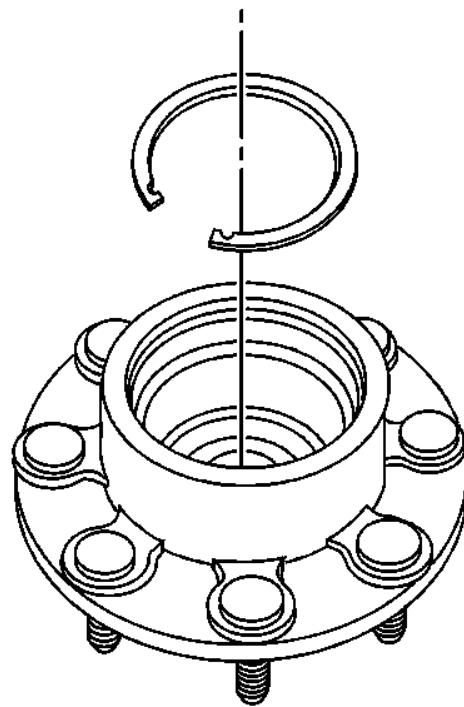


Fig. 99: Wheel Hub Retaining Ring

Courtesy of GENERAL MOTORS COMPANY

14. Remove the retaining ring from the wheel hub.

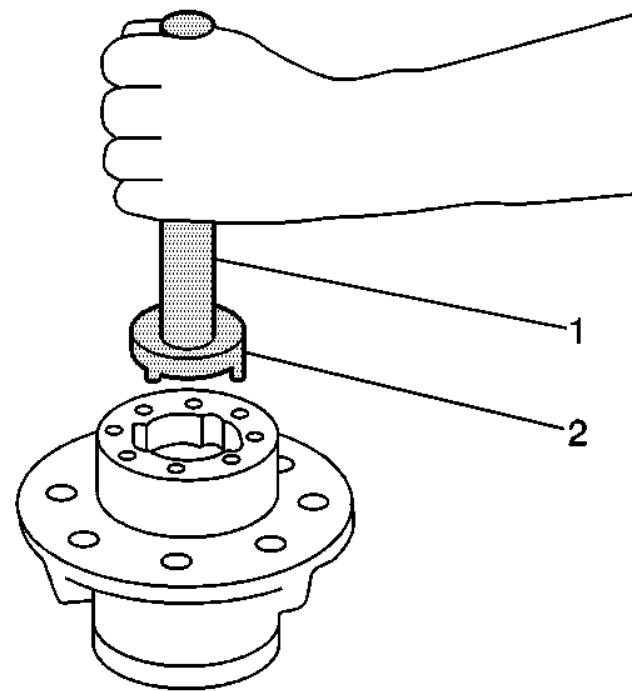


Fig. 100: Outer Hub Bearing & Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

15. Using the **DT 50291** installer (2) and the **J 8092** handle (1), remove and discard the outer hub bearing and bearing cup.

Installation Procedure

1. Lubricate the following with a light coat of high melting point EP bearing lubricant:

- The NEW outer wheel bearing
- The NEW inner wheel bearing
- The NEW outer wheel bearing cup
- The NEW inner wheel bearing cup
- The axle hub spindle

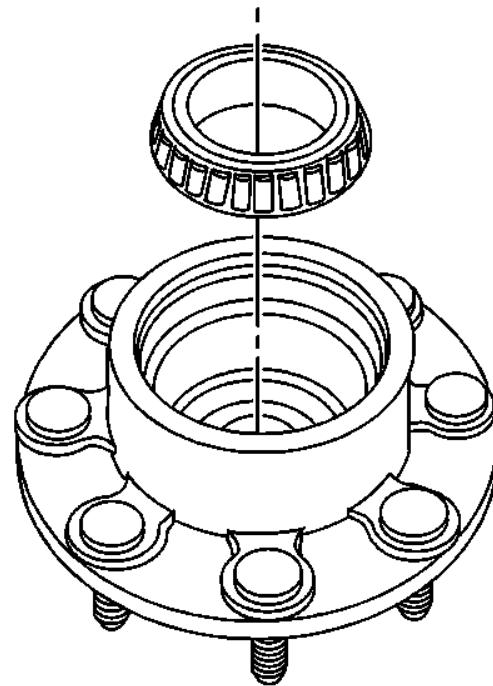


Fig. 101: Wheel Hub Outer Bearing

Courtesy of GENERAL MOTORS COMPANY

2. Install the NEW outer bearing into the wheel hub.

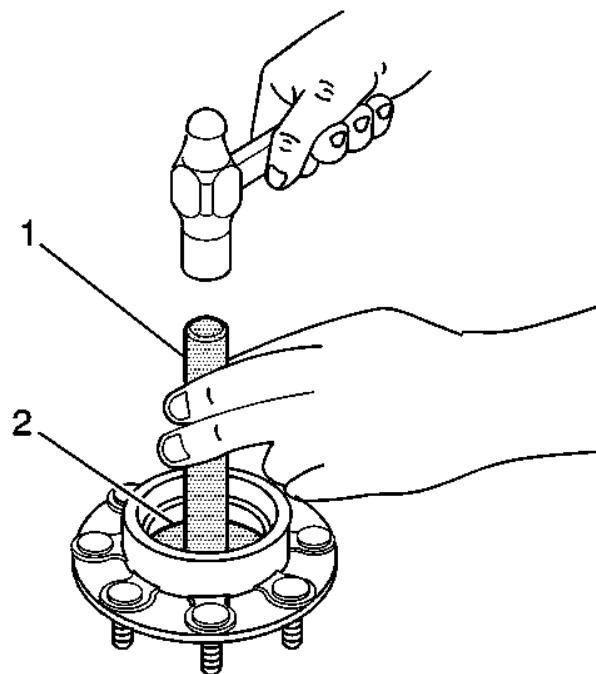


Fig. 102: Driving Bearing Cup Into Wheel Hub

Courtesy of GENERAL MOTORS COMPANY

NOTE: Drive the outer bearing cup into the wheel hub until it is just past the retaining ring groove. Do not bottom out the bearing assembly in the bore.

3. Using the **DT 50290** installer (2) and the **J 8092** handle (1), install the NEW outer bearing cup into the wheel hub.

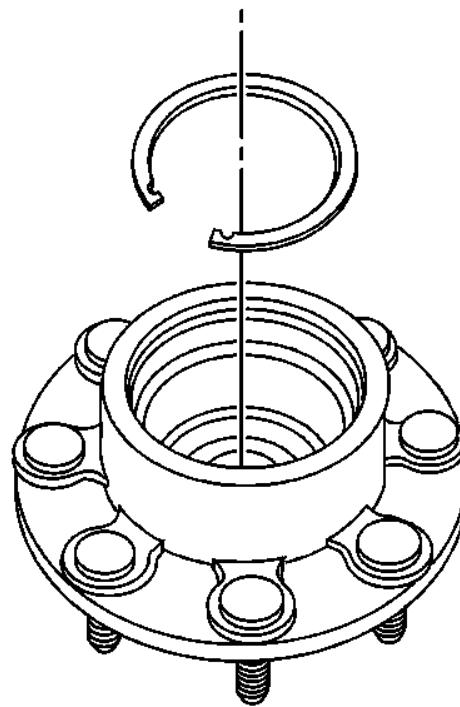


Fig. 103: Wheel Hub Retaining Ring

Courtesy of GENERAL MOTORS COMPANY

NOTE: Ensure that the retaining ring is fully and evenly seated in the groove.

4. Install the retaining ring into the groove.

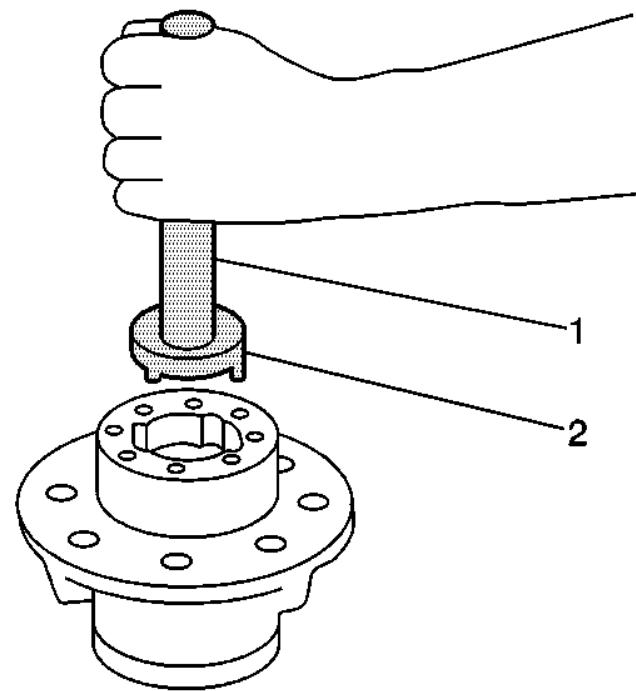


Fig. 104: Outer Hub Bearing & Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

NOTE: Ensure that the outer bearing assembly rotates freely in the hub

5. Using the **DT 50291** installer (2) and the **J 8092** handle (1), turn the wheel hub over and seat the outer bearing assembly against the retaining ring.

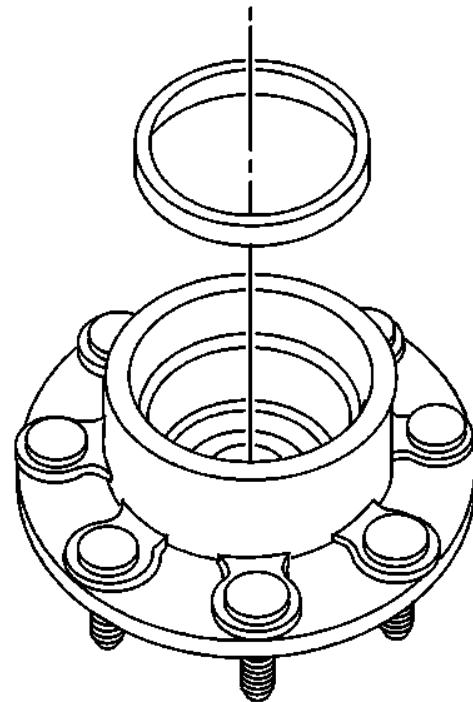


Fig. 105: Wheel Hub Inner Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

6. Turn the wheel hub over and install the NEW inner bearing cup.

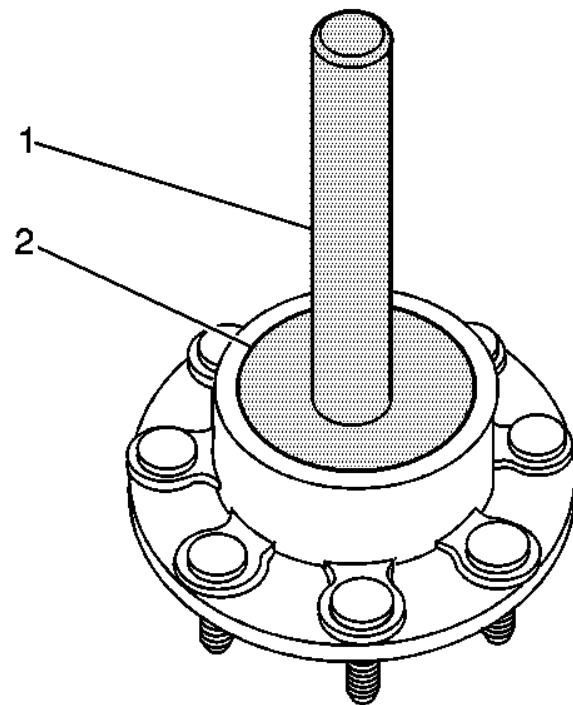


Fig. 106: Driving Inner Bearing Cup Into Wheel Hub

Courtesy of GENERAL MOTORS COMPANY

7. Using the **DT 50292** installer (2) and the **J 8092** handle (1), install the NEW inner bearing cup into the wheel hub.

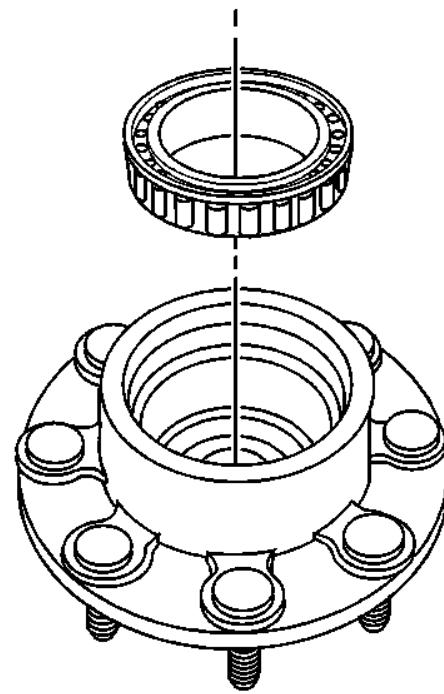


Fig. 107: Inner Hub Bearing

Courtesy of GENERAL MOTORS COMPANY

8. Install the NEW inner bearing.

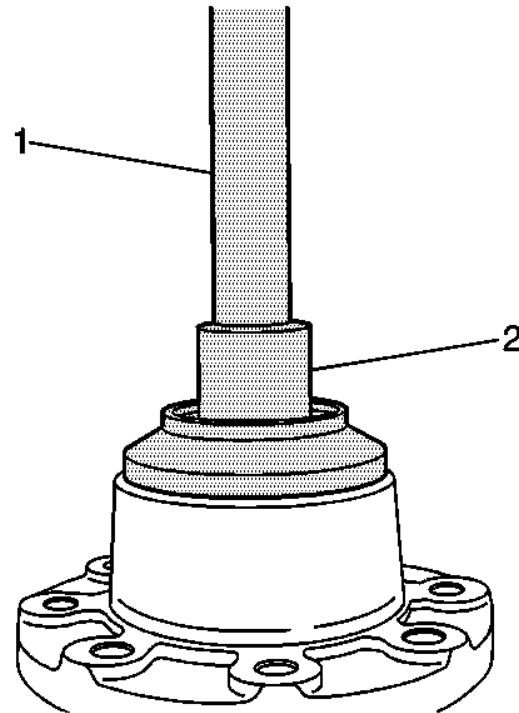


Fig. 108: Installing Oil Seal Using Special Tools

Courtesy of GENERAL MOTORS COMPANY

NOTE: Ensure the seal is fully seated in the hub bore.

9. Using the **DT 50289** installer (2) and the **J 8092** handle (1), install the new oil seal.
10. Install the rotor, if necessary. Refer to [**Rear Brake Rotor Replacement \(JD9\)**](#) [**Rear Brake Rotor Replacement \(J95\)**](#).
11. Apply a light coat of high melting point EP bearing lubricant to the axle housing spindle.

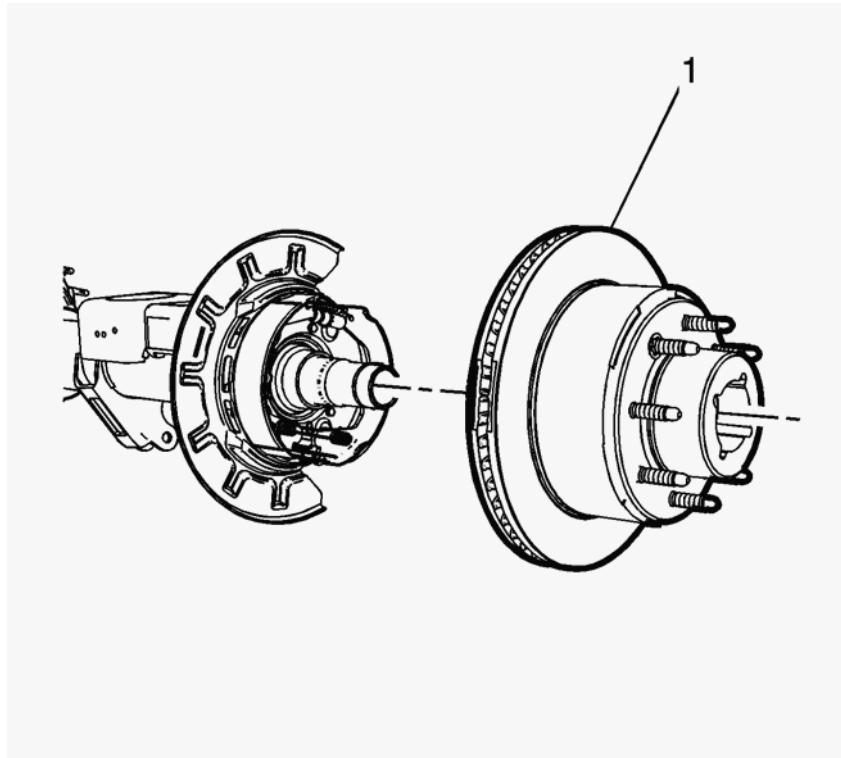


Fig. 109: Wheel Hub/Brake Rotor Assembly

Courtesy of GENERAL MOTORS COMPANY

NOTE: If the wheel hub assembly does not fully seat itself onto the axle shaft spindle and is removed, the wheel hub seal must be replaced.

12. Install the wheel hub assembly on the axle housing.

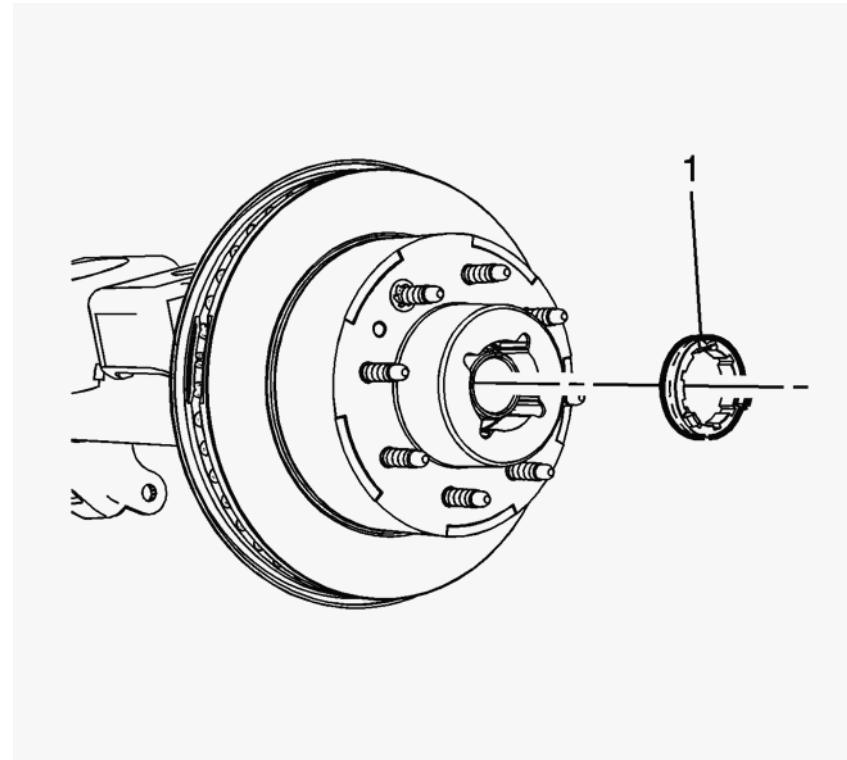


Fig. 110: Rear Axle Adjuster Nut

Courtesy of GENERAL MOTORS COMPANY

13. Install the rear axle adjuster nut (1).

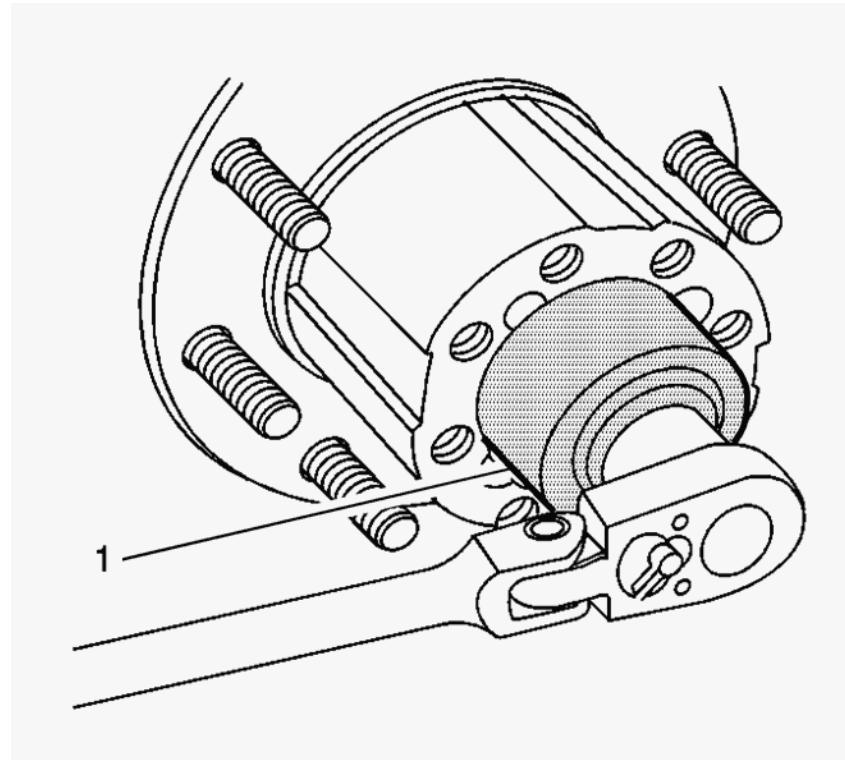


Fig. 111: Adjusting Nut And Special Tool

Courtesy of GENERAL MOTORS COMPANY

14. Using the **CH 49794** socket or the **CH 50636** socket (1), install the adjusting nut to the hub.
15. Adjust the wheel bearings. Refer to [Wheel Bearing Adjustment \(10.5 Inch Axle\)](#).

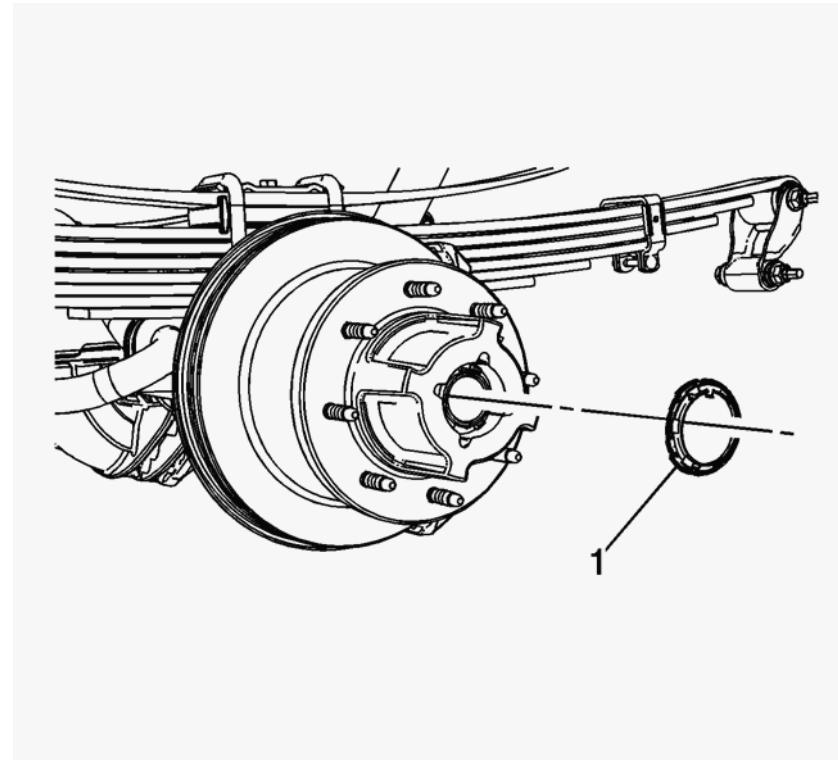


Fig. 112: Adjuster Nut Retainer

Courtesy of GENERAL MOTORS COMPANY

16. Install the adjuster nut retainer (1).
17. Install the axle shaft. Refer to [Rear Axle Shaft and Gasket Replacement \(10.5 Inch Axle\)](#).
18. Install the brake caliper bracket. Refer to [Rear Brake Caliper Bracket Replacement \(JD9\) Rear Brake Caliper Bracket Replacement \(J95\)](#).
19. Install the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#).
20. Inspect and add axle lubricant to the axle housing, if necessary. Refer to [Rear Axle Lubricant Level Inspection \(10.5 Inch Axle\)](#).
21. Lower the vehicle.

DIFFERENTIAL DRIVE PINION GEAR BEARING RETAINER REPLACEMENT (10.5 INCH AXLE)

Special Tools

- **GE-8092** Driver Handle
- **J-8092** Universal Driver Handle 3/4 x 10 inch
- **J-8608** Pinion Bearing Cup Installer
- **J-24433** Pinion Bearing Installer
- **J-37624** Pinion Bearing Installer
- **J 3/4 44414** Pinion Oil Seal Installer

Removal Procedure

NOTE: Observe and mark the positions of all the driveline components, relative to the propeller shaft and the axles, prior to disassembly. These components include the propeller shafts, drive axles, pinion flanges, output shafts, etc. Reassemble all the components in the exact places in which you removed the parts. Follow any specifications, torque values, and any measurements made prior to disassembly.

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#)
2. Drain the axle lubricant. Refer to [Differential Oil Replacement \(10.5 Inch Axle\)](#)
3. Remove the rear axle shafts. Refer to [Rear Axle Shaft and Gasket Replacement \(10.5 Inch Axle\)](#)
4. Remove the rear propeller shaft. Refer to [Rear Propeller Shaft Replacement \(Heavy Duty\) Rear Propeller Shaft Replacement \(M5U, 2WD\)](#)
5. Remove the drive pinion flange/yoke and/or oil seal. Refer to [Differential Drive Pinion Gear Yoke Replacement \(10.5 Inch Axle\)](#), [Differential Drive Pinion Gear Seal Replacement \(10.5 Inch Axle\)](#)

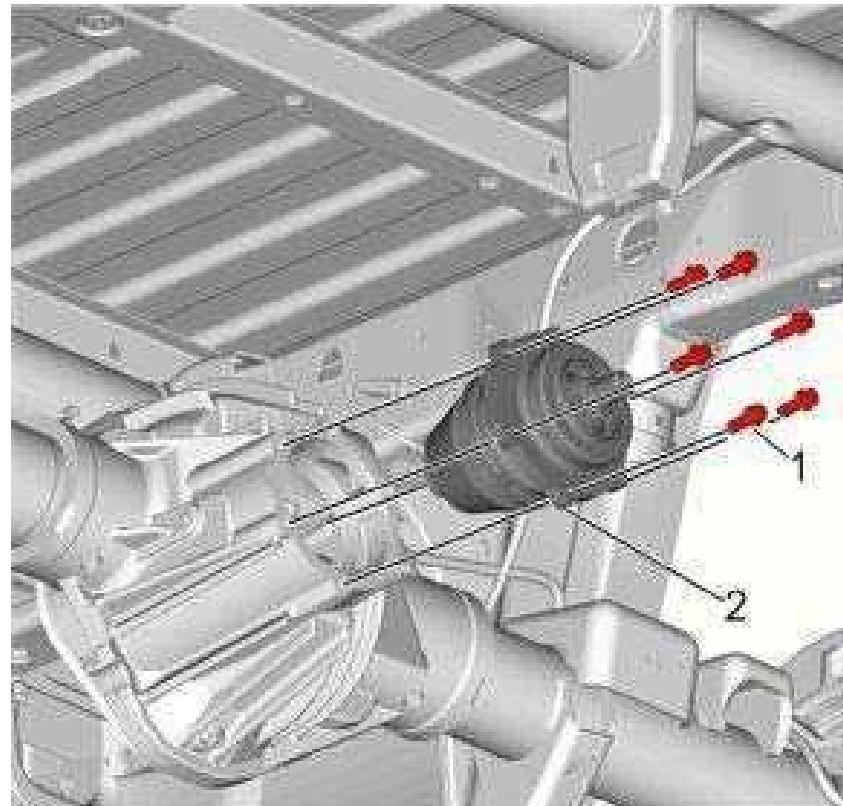


Fig. 113: Differential Drive Pinion Gear Bearing Retainer Bolts

Courtesy of GENERAL MOTORS COMPANY

6. Remove the differential drive pinion gear bearing retainer bolts (1) and the differential drive pinion gear bearing retainer (2).

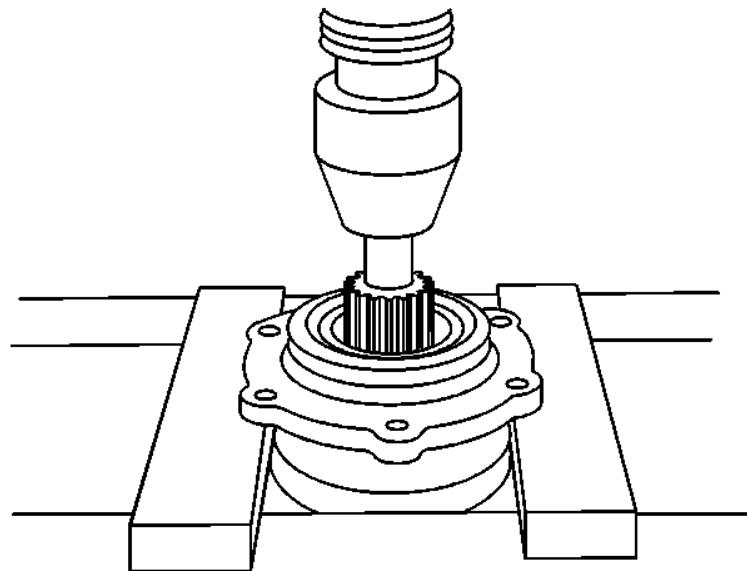


Fig. 114: Removing Pinion

Courtesy of GENERAL MOTORS COMPANY

7. Using a hydraulic press and an appropriate tool, remove the pinion.

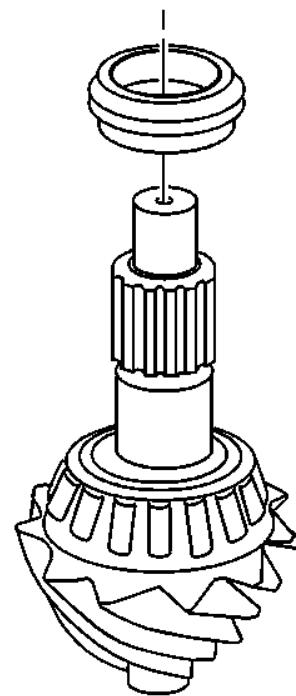


Fig. 115: Removing Collapsible Spacer

Courtesy of GENERAL MOTORS COMPANY

8. Remove the collapsible spacer.

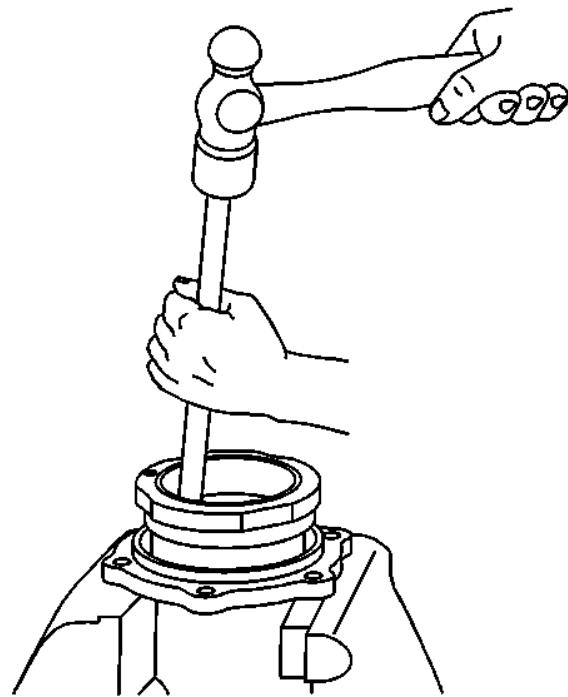


Fig. 116: Removing Outer Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

NOTE: When performing the following service procedure, move the drift back and forth between one side of the cup and the other in order to work the cups out of the retainer evenly.

9. Using a hammer and a brass drift in the slots provided, remove the outer pinion bearing cup.

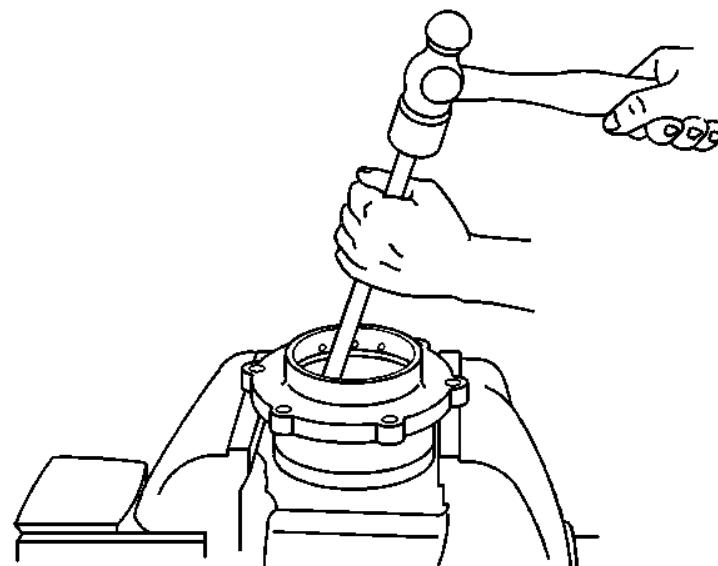


Fig. 117: Removing Inner Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

NOTE: When performing the following service procedure, move the drift back and forth between one side of the cup and the other in order to work the cups out of the retainer evenly.

10. Using a hammer and a brass drift in the slots provided, remove the inner pinion bearing cup.

Installation Procedure

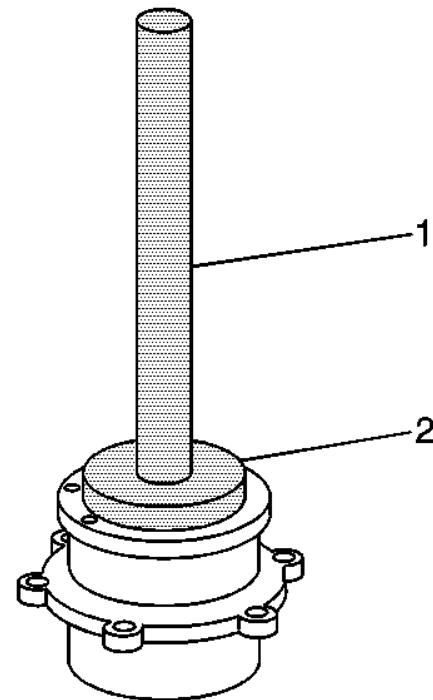


Fig. 118: Installing Inner Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

1. Using the **J-37624** pinion bearing installer (2) and the **GE-8092** driver handle (1), Install the inner pinion bearing cup into the pinion gear bearing retainer.

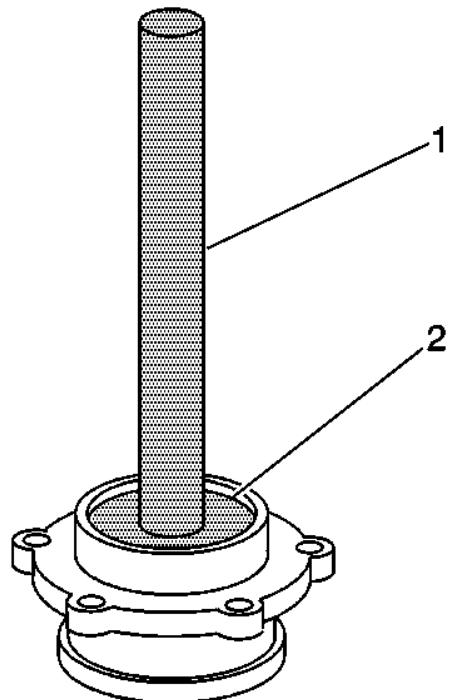


Fig. 119: Installing Outer Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

2. Using the **J-8608** pinion bearing cup installer (2) and the **GE-8092** driver handle (1), install the outer pinion bearing cup into the pinion gear bearing retainer.
3. Apply sealant to surface of the selective shim. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#)

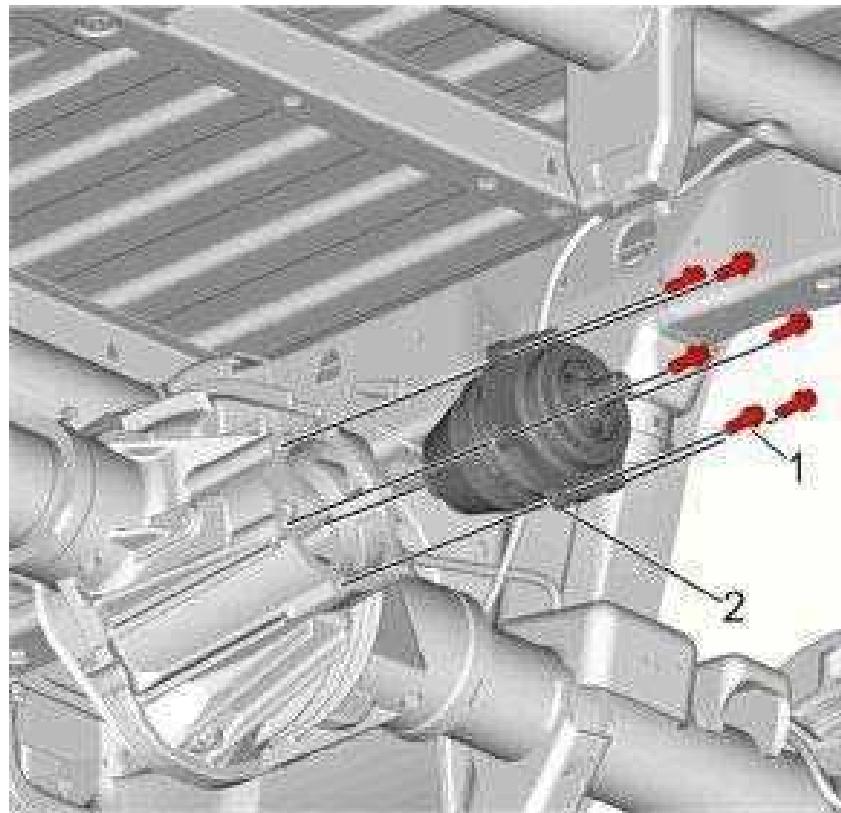


Fig. 120: Differential Drive Pinion Gear Bearing Retainer Bolts

Courtesy of GENERAL MOTORS COMPANY

4. Install the differential drive pinion gear bearing retainer (2) and the differential drive pinion gear bearing retainer bolts (1).

CAUTION: Refer to Fastener Caution .

5. Tighten the differential drive pinion gear bearing retainer bolts (1) to 88 N.m (65 lb ft).
6. Install the drive pinion flange/yoke and/or oil seal. Refer to [Differential Drive Pinion Gear Yoke Replacement \(10.5 Inch Axle\)](#), [Differential Drive Pinion Gear Seal Replacement \(10.5 Inch Axle\)](#)
7. Install the propeller shaft. Refer to [Rear Propeller Shaft Replacement \(Heavy Duty\)](#) [Rear Propeller Shaft Replacement \(MSU, 2WD\)](#)
8. Install the rear axle shafts. Refer to [Rear Axle Shaft and Gasket Replacement \(10.5 Inch Axle\)](#)
9. Fill the axle with axle lubricant. Refer to [Differential Oil Replacement \(10.5 Inch Axle\)](#)
10. Remove the support and lower the vehicle.

DRIVE PINION AND RING GEAR REPLACEMENT (8.6/9.5/9.76 INCH AXLE)

Special Tools

J-22536 Pinion Remover

For equivalent regional tools, refer to [Special Tools](#).

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the differential case assembly. Refer to [Differential Replacement \(8.6/9.5/9.76 Inch Axles\)](#).
3. Remove the differential pinion yoke and the oil seal. Refer to [Differential Drive Pinion Gear Yoke Replacement \(8.6/9.5/9.76 Inch Axles\)](#), and [Differential Drive Pinion Gear Seal Replacement \(8.6/9.5/9.76 Inch Axles\)](#).

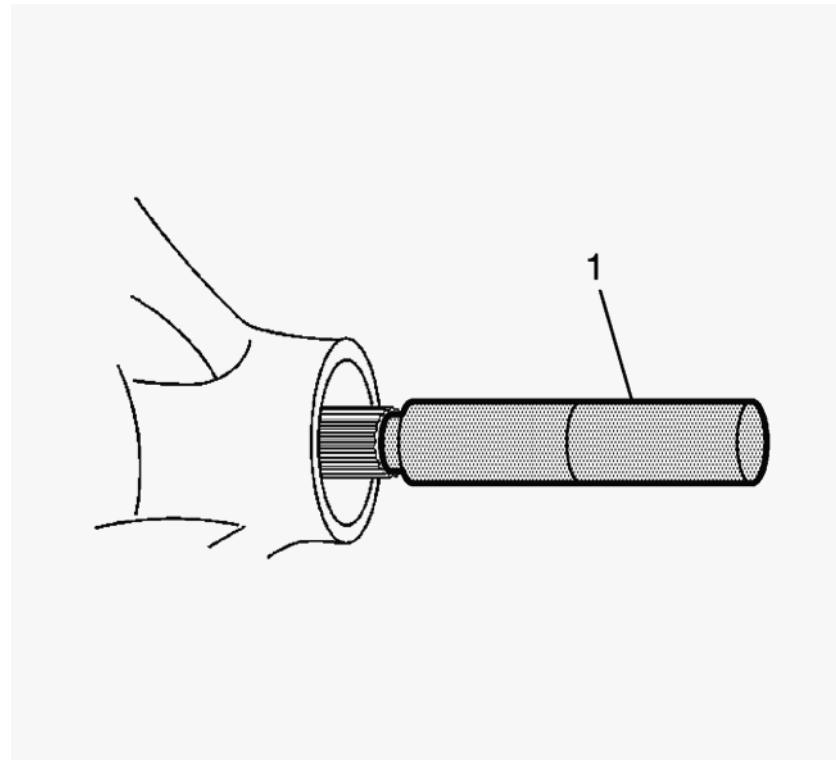


Fig. 121: Special Tool On Pinion

Courtesy of GENERAL MOTORS COMPANY

NOTE:

- Ensure that the J-22536 remover is firmly seated on the differential pinion gear for 8.6 inch axle.
- When removing the differential pinion gear, DO NOT let the differential pinion gear fall out of the axle housing.
- Use brass drift only and hammer when removing differential pinion gear from the 9.5/9.76 axle

4. Using the **J-22536** remover for the 8.6 inch axle, or a brass drift and hammer for 9.5/9.76 axle, remove the differential pinion gear from the axle housing.

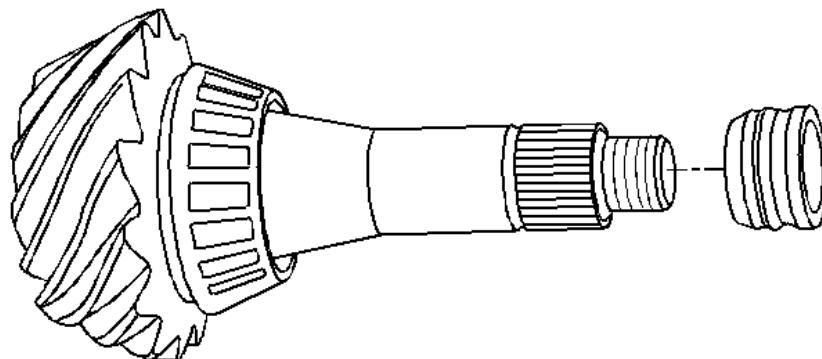


Fig. 122: Collapsible Spacer And Pinion

Courtesy of GENERAL MOTORS COMPANY

5. Remove and discard the collapsible spacer from the pinion.
6. Remove the differential pinion bearings and the cups. Refer to [Differential Drive Pinion Gear Bearing Replacement \(8.6/9.5/9.76 Inch Axles\)](#).

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

7. Remove and discard the differential gear bolts. Replace with NEW only.

CAUTION: Refer to [Ring Gear Removal Caution](#).

NOTE: It maybe necessary to use a brass drift and a hammer to remove the differential ring gear from the differential case.

8. Remove the differential ring gear from the differential case.

Installation Procedure

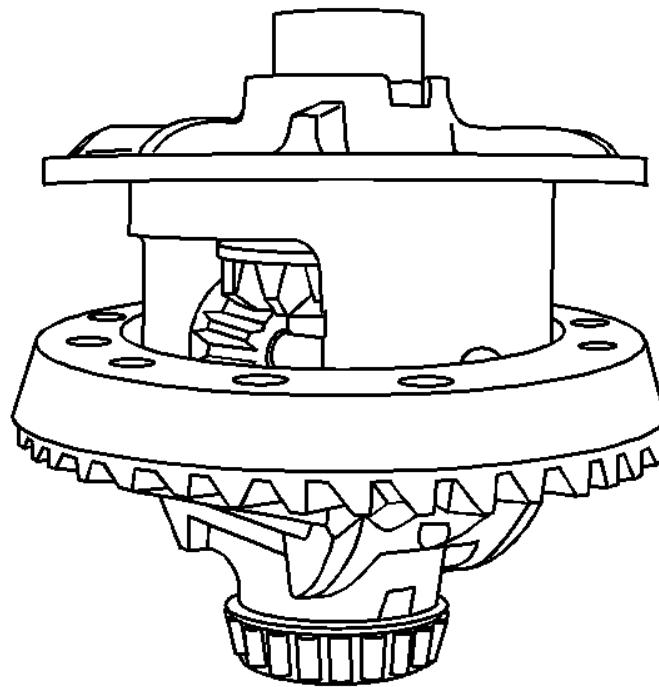


Fig. 123: Ring Gear And Differential Case

Courtesy of GENERAL MOTORS COMPANY

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

1. Install the differential ring gear to the differential case.

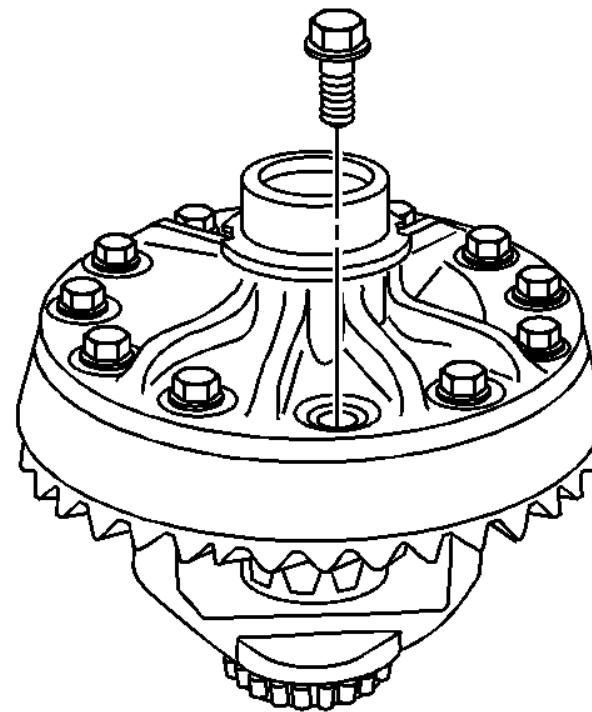


Fig. 124: Ring Gear Bolts

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to [Fastener Caution](#).

NOTE:

- The differential ring gear bolts have left-hand threads.
- Hand start each bolt to ensure that the ring gear is properly installed to the differential case.
- Tighten the differential ring gear bolts alternately and in stages, gradually pulling the ring gear onto the differential case.

2. Install the NEW differential ring gear bolts and tighten in sequence to 120 N.m (89 lb ft). for the 8.6 inch axle and 50 N.m (37 lb ft) + 30 degrees for 9.5/9.76 inch axles.
3. Install the pinion bearing cups. Refer to [Differential Drive Pinion Gear Bearing Replacement \(8.6/9.5/9.76 Inch Axles\)](#).
4. Determine and install the selective shim thickness for the pinion gear. Refer to [Pinion Depth Adjustment \(8.6 Inch Axle\)](#)[Pinion Depth Adjustment \(9.5 Inch Axle\)](#)[Pinion Depth Adjustment \(9.76 Inch Axle\)](#).
5. Install the inner pinion bearing to the pinion. Refer to [Differential Drive Pinion Gear Bearing Replacement \(8.6/9.5/9.76 Inch Axles\)](#).
6. Install a new collapsible spacer.
7. Lubricate the pinion bearings with axle lubricant. Refer to [Fluid and Lubricant Recommendations](#).
8. Install the outer differential pinion bearing, the NEW differential pinion oil seal and the differential yoke into the axle housing. Refer to [Differential Drive Pinion Gear Yoke Replacement \(8.6/9.5/9.76 Inch Axles\)](#), and [Differential Drive Pinion Gear Seal Replacement \(8.6/9.5/9.76 Inch Axles\)](#).
9. Install the differential case assembly. Refer to [Differential Replacement \(8.6/9.5/9.76 Inch Axles\)](#).
10. Fill the axle with lubricant. Use the proper fluid. Refer to [Differential Oil Replacement \(8.6 Inch Axle\)](#)[Differential Oil Replacement \(9.5/9.76 Inch Axle\)](#).

11. Remove the support and lower the vehicle.

DRIVE PINION AND RING GEAR REPLACEMENT (10.5 INCH AXLE)

Removal Procedure

1. Raise the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the differential case assembly. Refer to [Differential Replacement \(10.5 Inch Axle\)](#).
3. Remove the drive pinion housing assembly. Refer to [Differential Drive Pinion Gear Bearing Retainer Replacement \(10.5 Inch Axle\)](#).

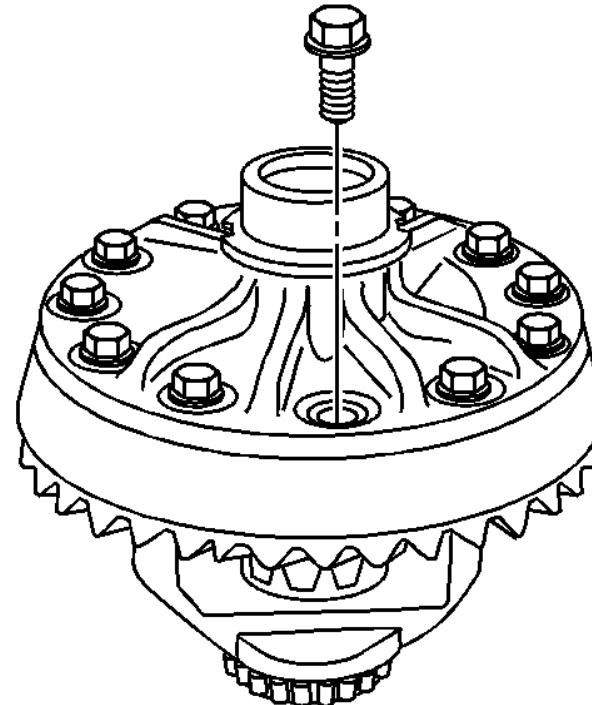


Fig. 125: Ring Gear Bolts

Courtesy of GENERAL MOTORS COMPANY

4. Remove and discard the gear bolts. Replace with NEW only.

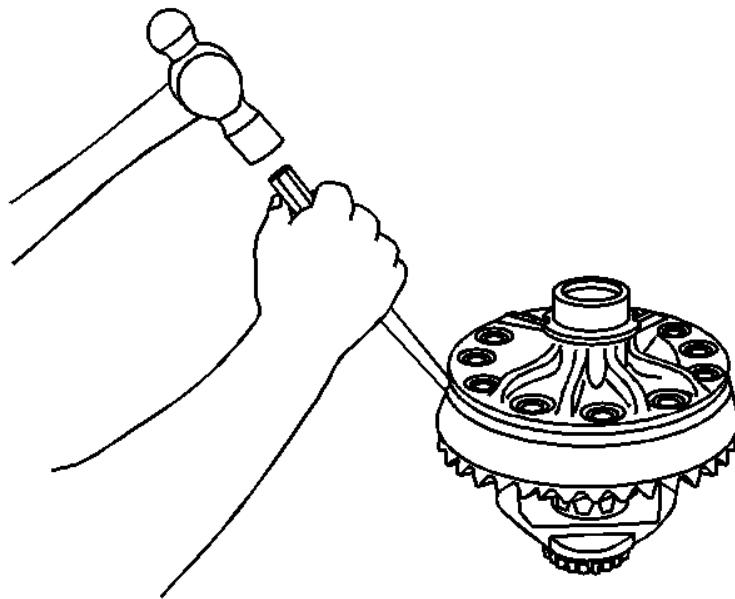


Fig. 126: Removing Ring Gear From Differential

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to [Ring Gear Removal Caution](#) .

5. Using a brass drift and a hammer, remove the ring gear from the differential case.

Installation Procedure

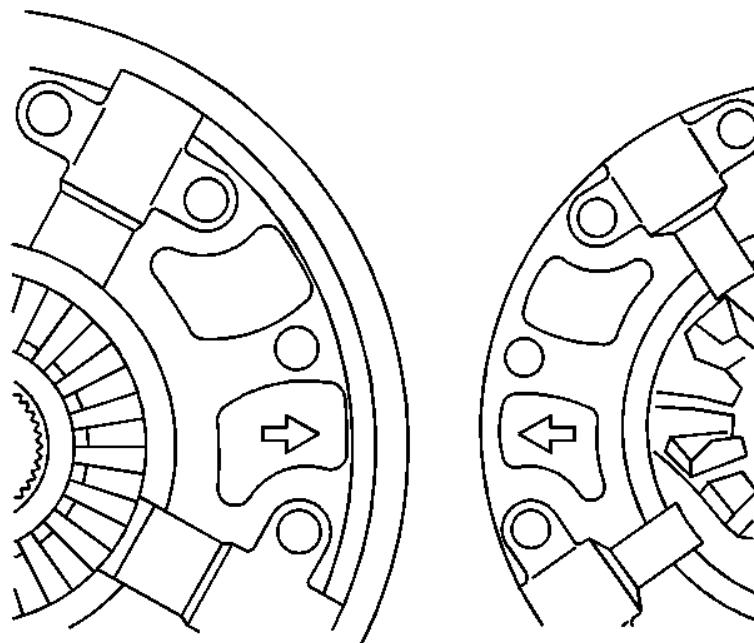


Fig. 127: Aligning Differential Case Arrows

Courtesy of GENERAL MOTORS COMPANY

1. If the differential case has become separated, assemble the differential case by aligning the two arrows inside the differential case.

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

2. Install the ring gear to the differential case.

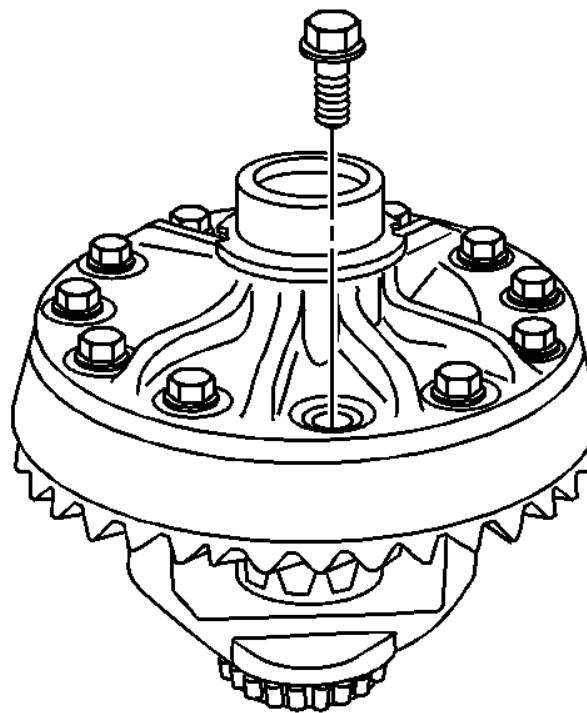


Fig. 128: Ring Gear Bolts

Courtesy of GENERAL MOTORS COMPANY

NOTE: Use hand tools ONLY. DO NOT use power tools for the following procedure.

3. Hand tighten the new ring gear bolts.

CAUTION: Refer to [Fastener Caution](#) .

4. Install the NEW ring gear bolts and tighten to 165 N.m (122 lb ft) in a crisscross pattern to draw and seat the ring gear and the on the differential case.

5. Install the drive pinion housing assembly. Refer to [Differential Drive Pinion Gear Bearing Retainer Replacement \(10.5 Inch Axle\)](#).

6. Install the differential assembly. Refer to [Differential Replacement \(10.5 Inch Axle\)](#).

7. Fill the axle with the proper lubricant. Refer to [Differential Oil Replacement \(10.5 Inch Axle\)](#).

8. Remove the support and lower the vehicle.

DIFFERENTIAL DRIVE PINION GEAR BEARING REPLACEMENT (8.6/9.5/9.76 INCH AXLES)

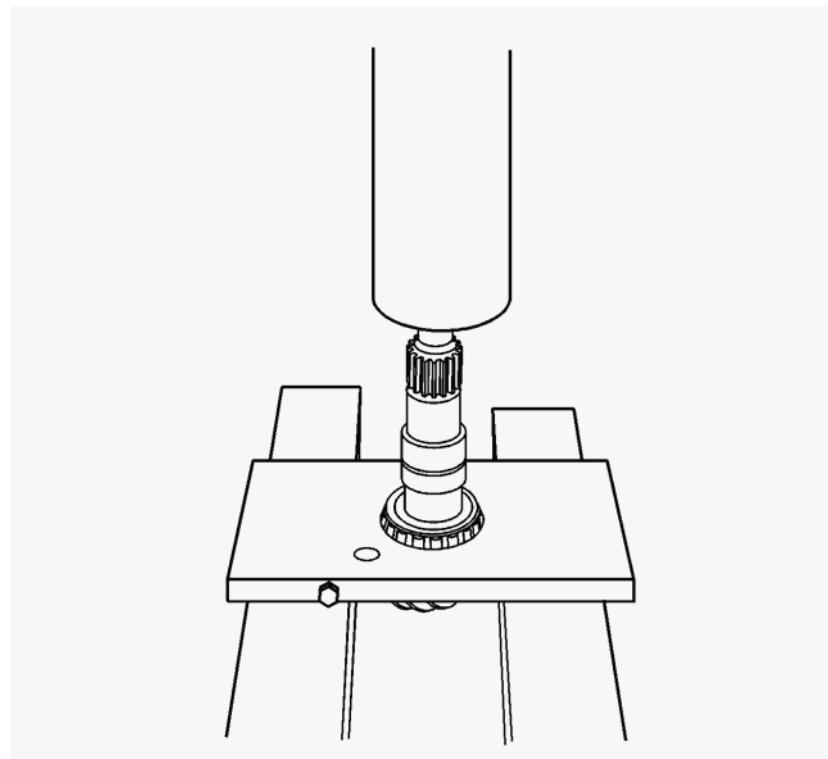
Special Tools

- **DT-47688** Pinion Bearing Remover
- **DT-49032** Inner Pinion Bearing Race Installer
- **J-7818** Inner Bearing Race Installer

- **J-26909** Outer Bearing Race Installer
- **J-8092** Universal Driver Handle 3/4 - 10
- **J-8592** Universal Driver Handle 3/4 - 10
- **J-8608** Pinion Bearing Cup Installer
- **J-8611-01** Pinion Bearing Cup Installer
- **J-8614-01** Flange Holder and Remover
- **J-22306** Bearing Race Installer
- **J-45240** Inner Pinion Bearing Race Installer
- **J-22828** Input Shaft Gear Installer
- **J-22912** Bearing Remover
- **J-49275** Inner Pinion Bearing Remover
- **J-36614** Inner Pinion Bearing Installer

Disassemble Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the differential assembly. Refer to [Differential Replacement \(8.6/9.5/9.76 Inch Axles\)](#).
3. Remove the drive pinion from the axle. Refer to [Drive Pinion and Ring Gear Replacement \(8.6/9.5/9.76 Inch Axle\)](#).



[Fig. 129: Removing Bearing From Drive Pinion](#)

Courtesy of GENERAL MOTORS COMPANY

NOTE: Step 4 is for those vehicles equipped with the 8.6 inch axle.

4. Using the **DT-47688** remover or **DT-49275** remover and a press, remove the bearing from the drive pinion.

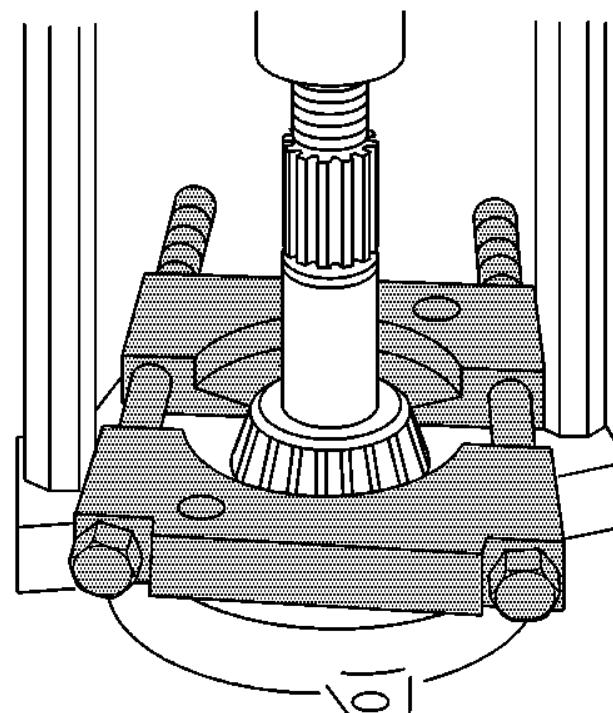


Fig. 130: Pressing Bearing Off Pinion

Courtesy of GENERAL MOTORS COMPANY

NOTE: Step 5 is for those vehicles equipped with the 9.5 and 9.76 inch axle.

5. Using the **J 22912** remover and a press, remove the differential pinion bearing.

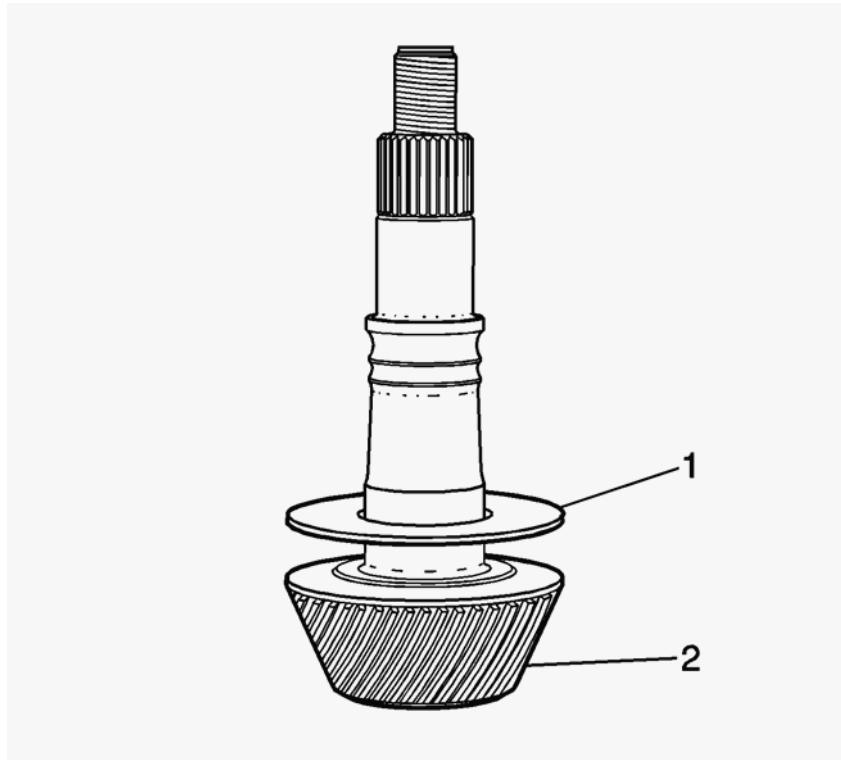


Fig. 131: Selective Pinion Spacer And Pinion Gear
Courtesy of GENERAL MOTORS COMPANY

6. Remove the shim (1).

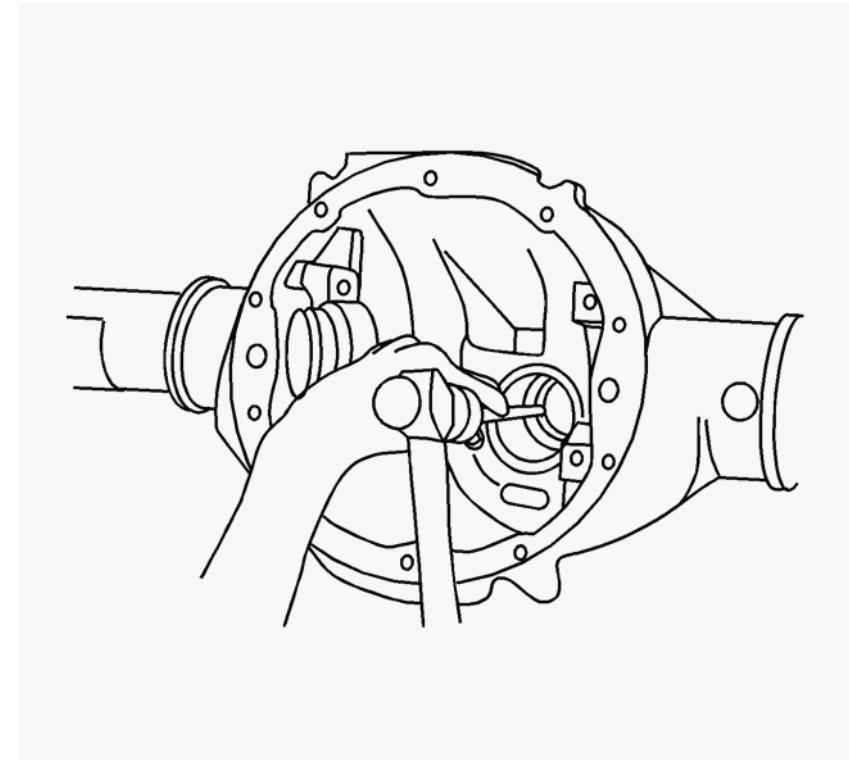


Fig. 132: Removing Outer Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

NOTE: Move the drift back and forth between one side of the cup and the other in order to work the cups out of the housing evenly.

7. Using a hammer and a brass drift in the slots provided, remove the outer pinion bearing cup from the axle housing.

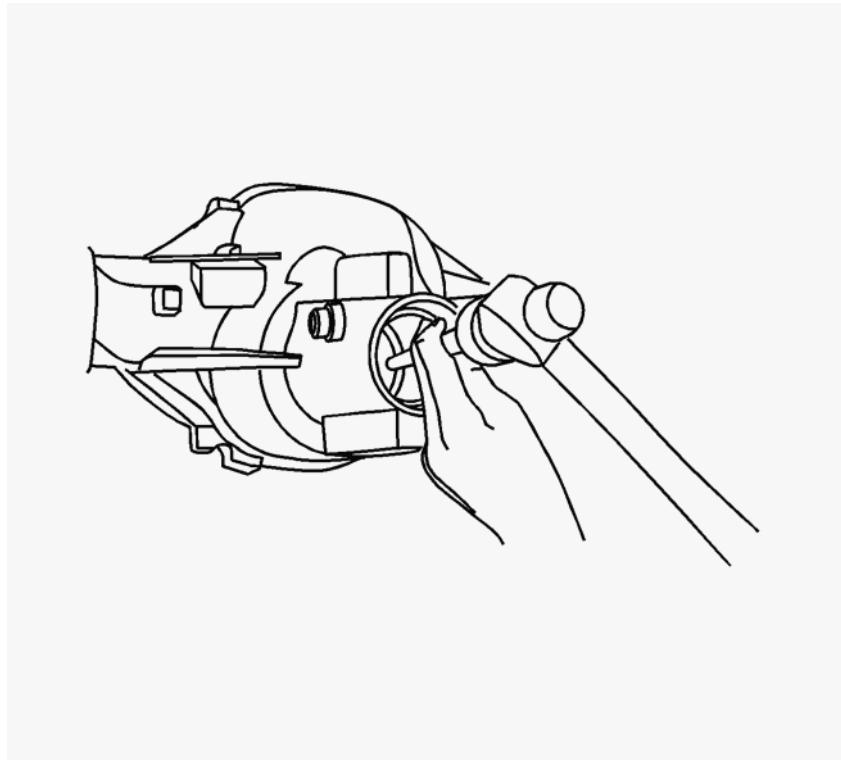


Fig. 133: Removing Inner Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

NOTE: Move the drift back and forth between one side of the cup and the other in order to work the cups out of the housing evenly.

8. Using a hammer and a brass drift in the slots provided, remove the inner pinion bearing cup from the axle housing.

Assemble Procedure

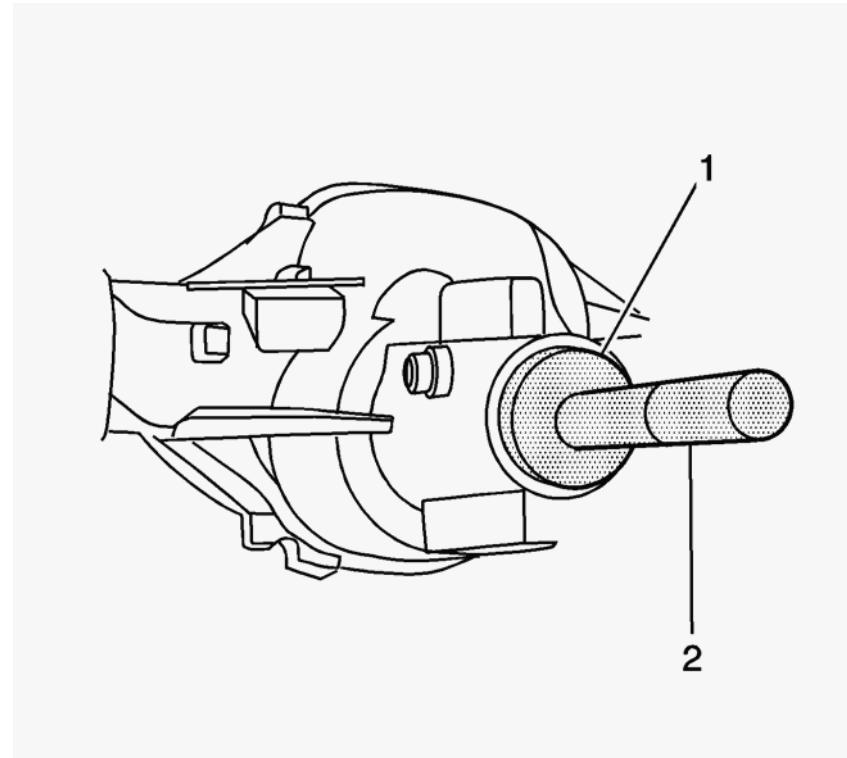


Fig. 134: Installing Outer Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

1. Using the **J-8611-01** installer (1), 8.6 inch axle, or the **J-7818** installer (1), 9.5 inch axle, or the **J-29609** installer (1), 9.76 inch axle and the **J-8092** handle (2), install the outer pinion bearing cup.

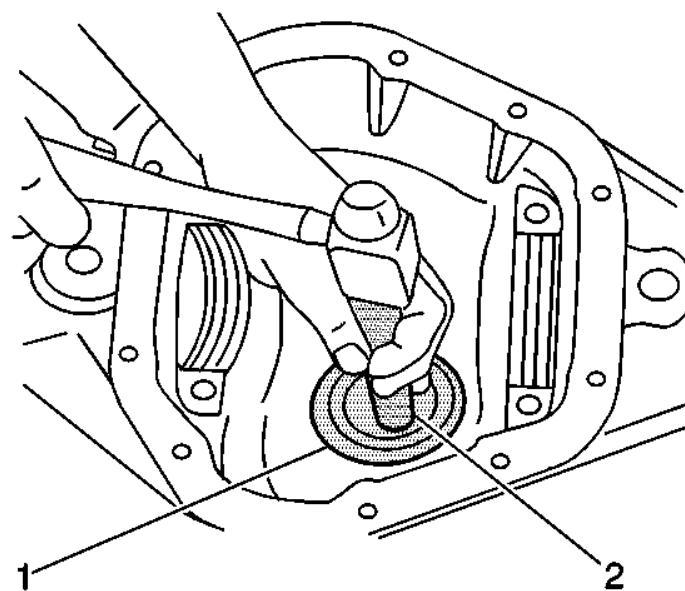


Fig. 135: Installing Inner Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

2. Using the **DT-49032** installer (1), 8.6 inch axle, or the **J-22306** installer (1), 9.5 inch axle, **J-45240** Installer (1), 9.76 inch axle and the **J-8592** handle (2), install the inner pinion bearing cup.
3. Determine the selective shim thickness for the drive pinion. Refer to [Pinion Depth Adjustment \(8.6 Inch Axle\)](#)[Pinion Depth Adjustment \(9.5 Inch Axle\)](#)[Pinion Depth Adjustment \(9.76 Inch Axle\)](#).

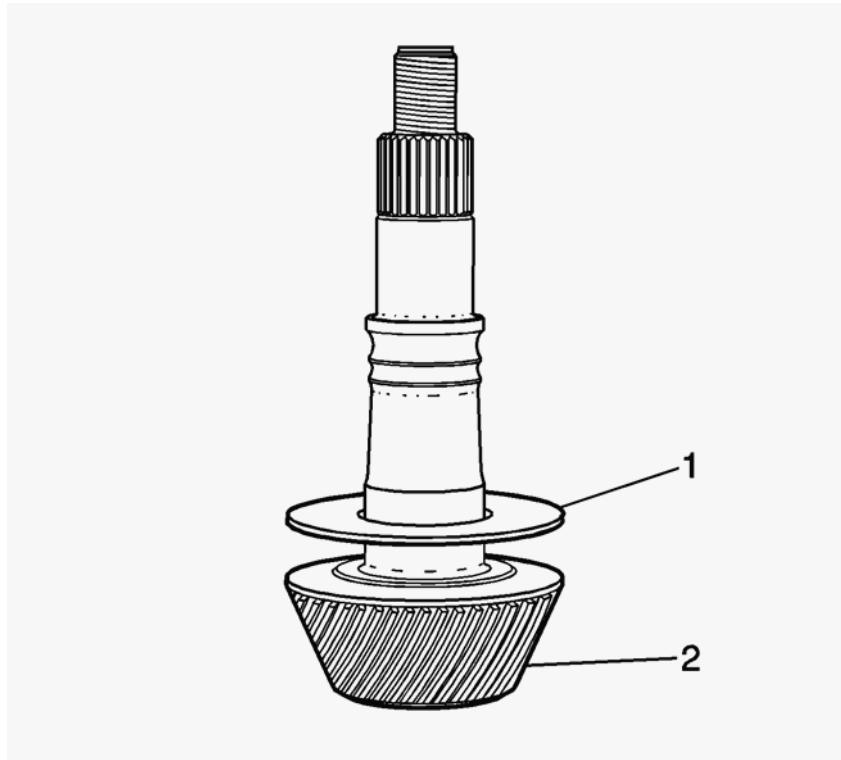


Fig. 136: Selective Pinion Spacer And Pinion Gear

Courtesy of GENERAL MOTORS COMPANY

4. Install the selective shim (1) on the shoulder on the differential pinion gear (2).

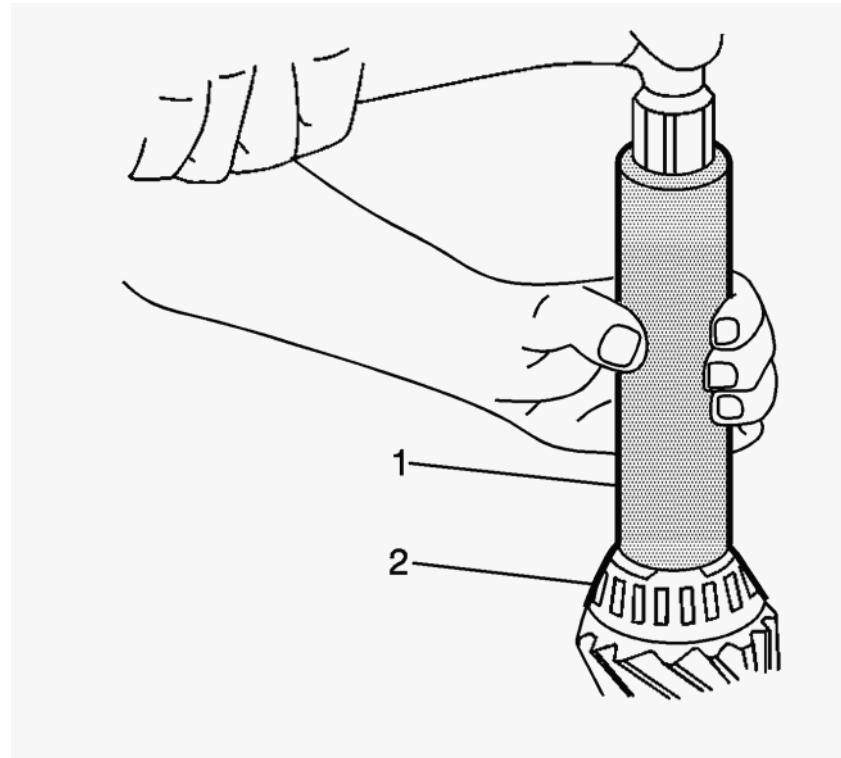


Fig. 137: Installing Inner Pinion Bearing Onto Pinion Gear

Courtesy of GENERAL MOTORS COMPANY

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

5. Using the **J-22828** installer (1), 8.6 inch axle, or the **J-36614** installer (1), 9.5 inch LD axle, **J-44412** Installer (1), 9.76 inch axle, install the inner pinion bearing (2).

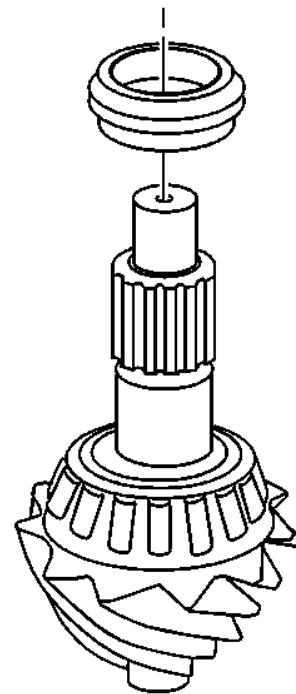


Fig. 138: Collapsible Spacer

Courtesy of GENERAL MOTORS COMPANY

6. Install a new collapsible spacer.
7. Lubricate the pinion bearings with axle lubricant. Use the proper fluid. Refer to [Fluid and Lubricant Recommendations](#) .
8. Install the outer pinion bearing into the axle housing.
9. Install the differential pinion gear into the axle housing.

NOTE: **DO NOT re-use the old pinion nut, replace with NEW only.**

10. Install the NEW differential pinion oil seal, flange/yoke, and the NEW nut and washer. Refer to [Differential Drive Pinion Gear Yoke Replacement \(8.6/9.5/9.76 Inch Axles\)](#), and [Differential Drive Pinion Gear Seal Replacement \(8.6/9.5/9.76 Inch Axles\)](#).

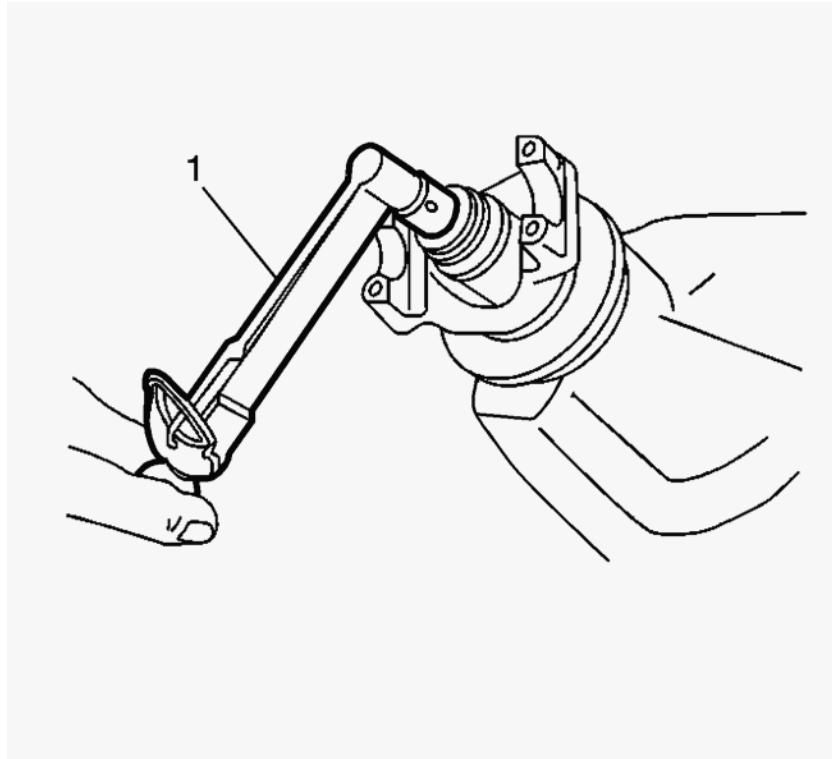


Fig. 139: Measuring Pinion Rotating Torque

Courtesy of GENERAL MOTORS COMPANY

11. Using an inch-pound torque wrench, measure the rotating torque of the pinion should be between 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.
12. If the rotating torque measurement is below 1.0 N.m (10 lb in) for used bearings, or 1.7 N.m (15 lb in) for new bearings, continue to tighten the pinion nut in small increments, until the torque required in order to rotate the pinion is between 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.
13. Once the specified torque is obtained, rotate the pinion several times to ensure the bearings have seated.
14. Recheck the rotating torque of the pinion bearing and adjust if necessary.
15. Install the differential assembly. Refer to [Differential Replacement \(8.6/9.5/9.76 Inch Axles\)](#).
16. Fill the axle with lubricant. Use the proper fluid. Refer to [Differential Oil Replacement \(8.6 Inch Axle\)](#)[Differential Oil Replacement \(9.5/9.76 Inch Axle\)](#).
17. Remove the support and lower the vehicle.

DIFFERENTIAL DRIVE PINION GEAR BEARING REPLACEMENT (10.5 INCH AXLE)

Special Tools

- **J 8092** Universal Driver Handle - 3/4 in - 10
- **J 8608** Pinion Bearing Cup Installer
- **J 8614-01** Flange Holder and Remover
- **J 22761** Side Bearing Installer
- **J 22912-B** Bearing Remove

- **J 24433** Pinion Bearing Installer
- **J 37624** Pinion Bearing Installer
- **J 44414** Pinion Oil Seal Installer

For equivalent regional tools, refer to [Special Tools](#).

Removal Procedure

1. Raise the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the differential assembly. Refer to [Differential Replacement \(10.5 Inch Axle\)](#).
3. Remove the pinion gear bearing retainer. Refer to [Differential Drive Pinion Gear Bearing Replacement \(10.5 Inch Axle\)](#).
4. Remove the pinion yoke and the oil seal. Refer to [Differential Drive Pinion Gear Seal Replacement \(10.5 Inch Axle\)](#).
5. Remove the outer pinion bearing.

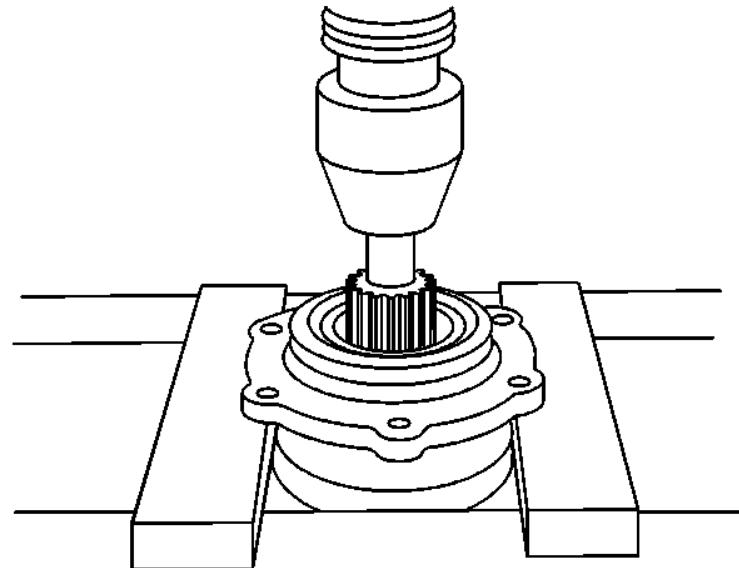


Fig. 140: Removing Pinion

Courtesy of GENERAL MOTORS COMPANY

6. Using an hydraulic press and the appropriate supports, remove the differential pinion gear.

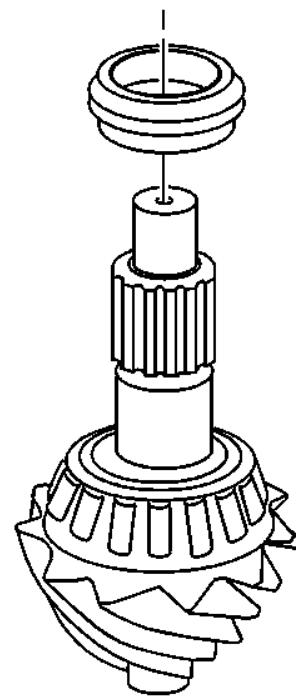


Fig. 141: Removing Collapsible Spacer

Courtesy of GENERAL MOTORS COMPANY

7. Remove the collapsible spacer.

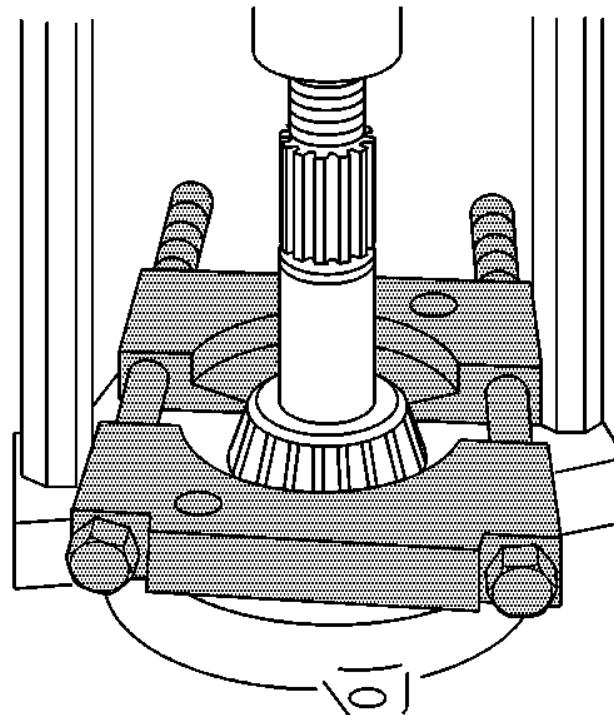


Fig. 142: Inner Pinion Bearing And Hydraulic Press

Courtesy of GENERAL MOTORS COMPANY

8. Using the **J 22912-B** remover and a hydraulic press, remove the inner pinion bearing from the differential pinion gear.

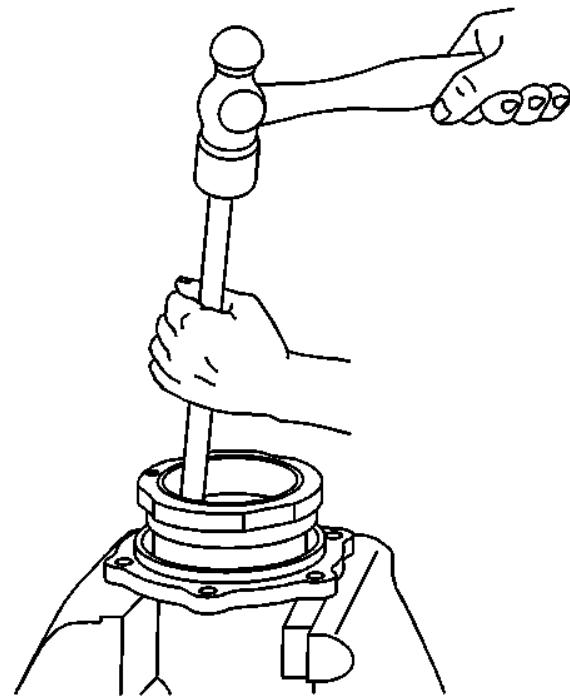


Fig. 143: Removing Outer Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

NOTE:

- Insert the brass drift in the slots to remove the bearing cup.
- Move the drift back and forth between one side of the cup and the other in order to work the cups out of the retainer evenly.

9. Using a hammer and a brass drift, remove the outer pinion bearing cup.

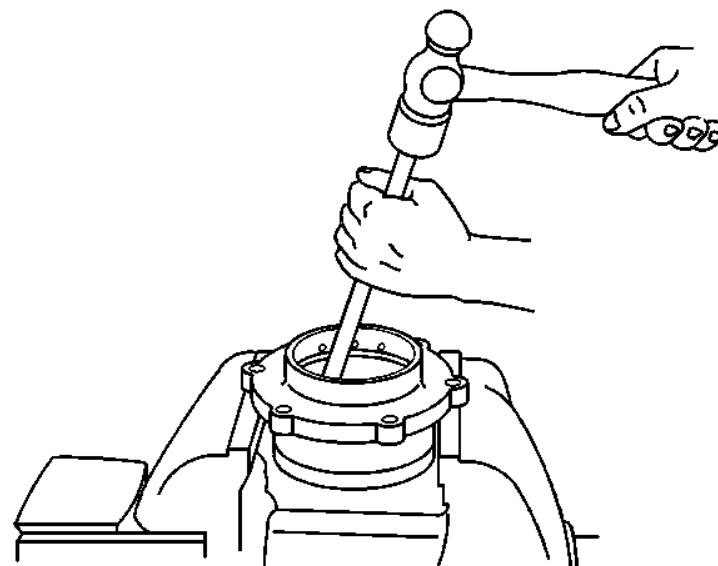


Fig. 144: Removing Inner Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

NOTE:

- Insert the brass drift in the slots to remove the bearing cup.
- Move the drift back and forth between one side of the cup and the other in order to work the cups out of the retainer evenly.

10. Using a hammer and a brass drift, remove the inner pinion bearing cup.

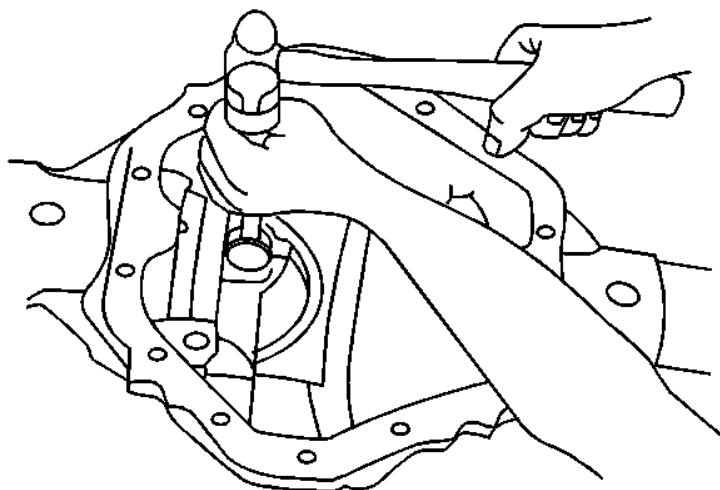


Fig. 145: Removing Pinion Gear Pilot Bearing

Courtesy of GENERAL MOTORS COMPANY

11. Using a brass drift and a hammer, remove the pinion gear pilot bearing.

Installation Procedure

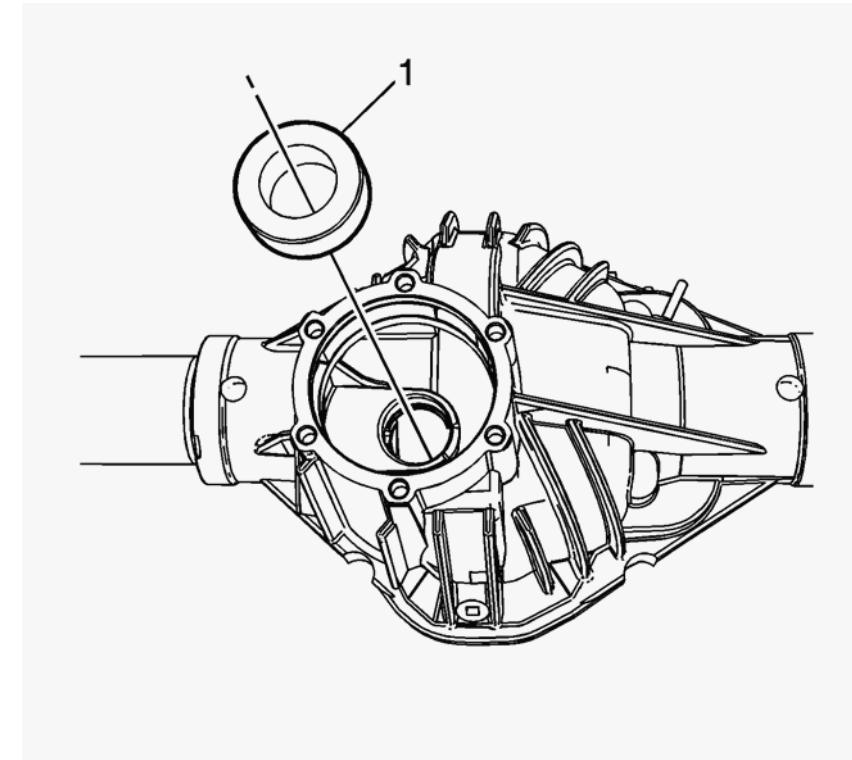


Fig. 146: Pinion Pilot Gear Bearing

Courtesy of GENERAL MOTORS COMPANY

1. Position the drive pinion pilot gear bearing (1) in the differential housing.

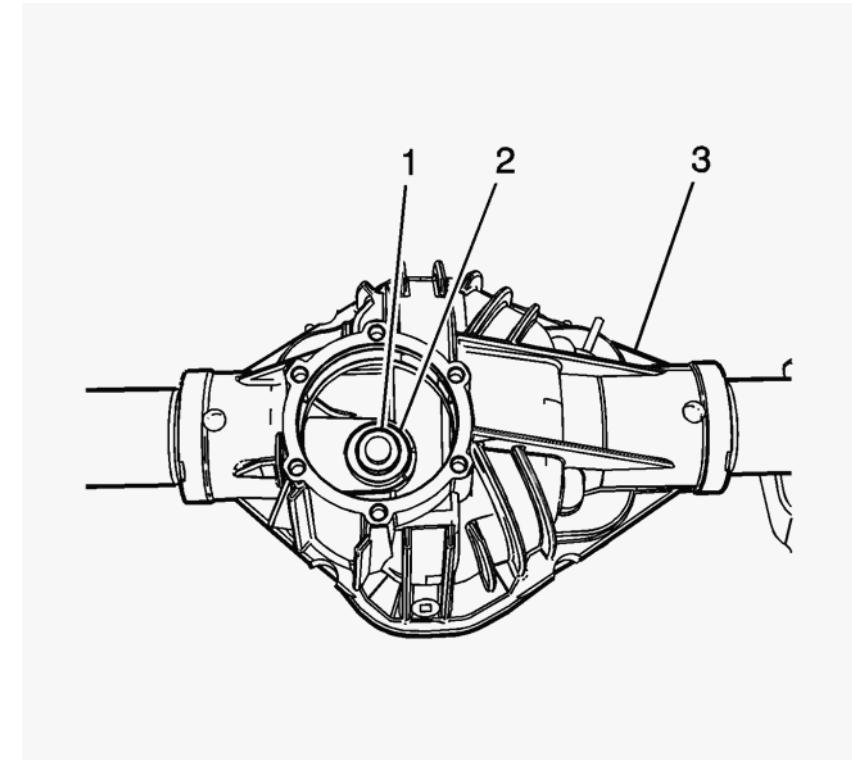


Fig. 147: Differential Housing And Special Tools

Courtesy of GENERAL MOTORS COMPANY

2. Using the **J 22761** installer (1) and the **J 8092** driver (2), install the drive pinion gear pilot bearing in the differential housing (3).

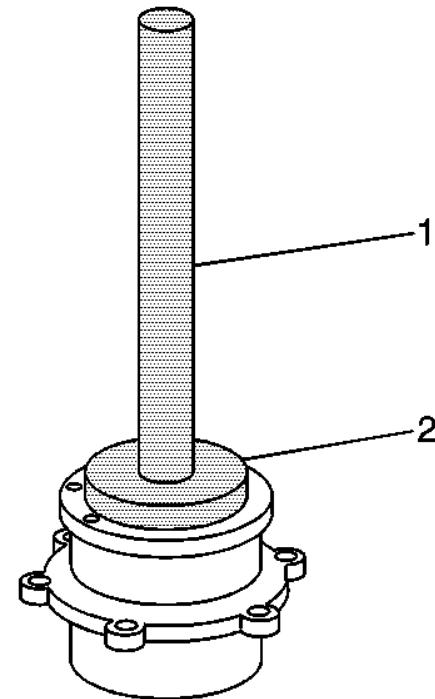


Fig. 148: Installing Inner Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

3. Using the **J 37624** installer (2) and the **J 8092** driver (1), install the inner pinion bearing cup in the pinion gear bearing retainer.

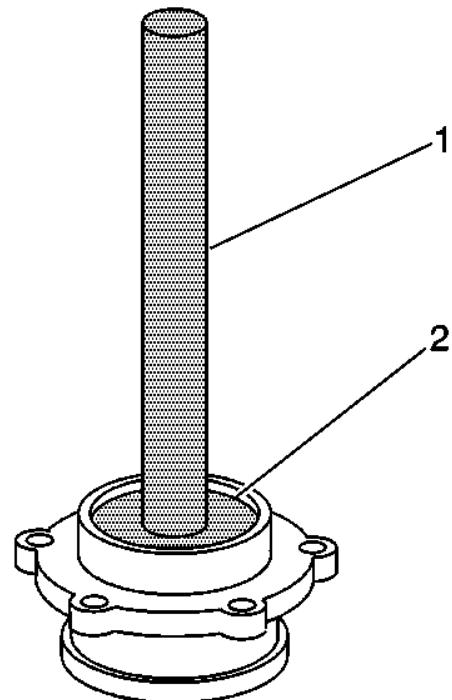


Fig. 149: Installing Outer Pinion Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

4. Using the **J 8608** installer (2) and the **J 8092** driver (1), install the outer pinion bearing cup in the pinion gear bearing retainer.

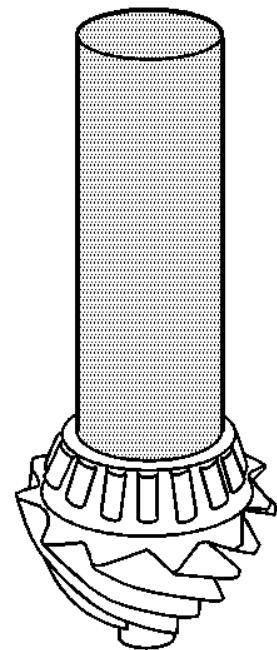


Fig. 150: Installing Inner Pinion Bearing

Courtesy of GENERAL MOTORS COMPANY

NOTE: Press the bearing on until the cone seats on the pinion.

5. Using the **J 24433** installer and a hydraulic press, install the inner pinion bearing.

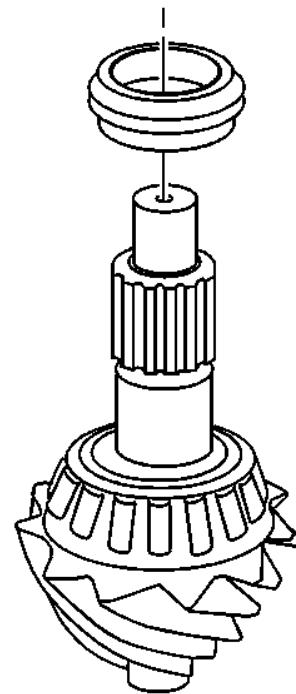


Fig. 151: Collapsible Spacer

Courtesy of GENERAL MOTORS COMPANY

6. Install the new collapsible spacer.
7. Lubricate the pinion bearings with axle lubricant. Refer to [Fluid and Lubricant Recommendations](#) .
8. Install the outer pinion bearing into the pinion bearing retainer.
9. Using the **J 44414** installer, install the new pinion oil seal.

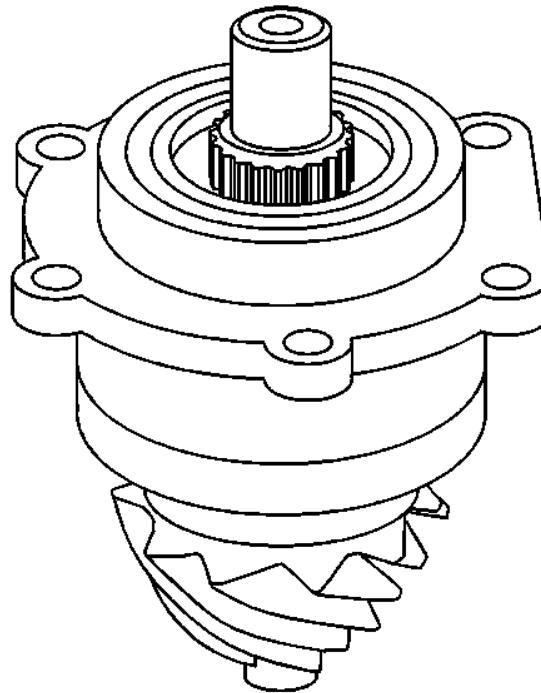


Fig. 152: Installing Pinion Into Pinion Gear Bearing Retainer

Courtesy of GENERAL MOTORS COMPANY

10. Install the pinion in the pinion gear bearing retainer.
11. Install the drive pinion flange/yoke. Refer to [Differential Drive Pinion Gear Seal Replacement \(10.5 Inch Axle\)](#).

NOTE: **Do not apply sealant to the pinion gear bearing retainer at this time.**

12. Install the original shim to the pinion bearing retainer. If the original shim is not available, install a 0.41 mm (0.016 in) shim to build pinion depth.
13. Install the pinion gear bearing retainer to the axle housing.

CAUTION: **Refer to [Fastener Caution](#) .**

14. Install the pinion bearing retainer bolts and tighten to 88 N.m (65 lb ft).

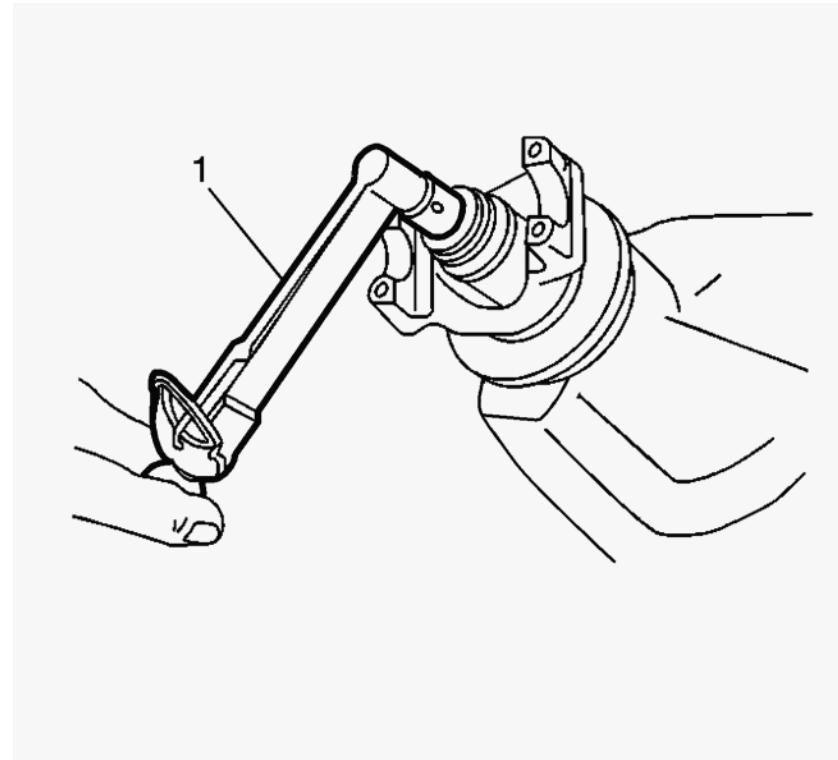


Fig. 153: Measuring Pinion Rotating Torque

Courtesy of GENERAL MOTORS COMPANY

15. Using an inch-pound torque wrench, measure the rotational torque of the pinion it should be between 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, use the **J 8614-01** remover and continue to tighten the pinion nut in small increments until the rotational torque is between 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. Install the differential assembly. Refer to [**Differential Replacement \(10.5 Inch Axle\)**](#).
 19. Adjust the differential side bearing preload. Refer to [**Differential Carrier Bearing Preload Adjustment \(10.5 Inch Axle\)**](#).
 20. Determine the selective shim thickness for the drive pinion. Refer to [**Pinion Depth Adjustment \(10.5 Inch Axle\)**](#).
 21. Adjust the backlash. Refer to [**Backlash Adjustment \(10.5 Inch Axle\)**](#).
 22. Fill the axle with lubricant. Refer to [**Differential Oil Replacement \(10.5 Inch Axle\)**](#).
 23. Remove the support and lower the vehicle.

DIFFERENTIAL REPLACEMENT (8.6/9.5/9.76 INCH AXLES)

Removal Procedure

NOTE: Group and mark the shims together as originally removed. If you remove or replace the differential ring and pinion gear set, perform the bearing preload, backlash,

and gear tooth contact pattern check in order to ensure proper contact of the gears. If you reinstall or replace the differential carrier without replacing any other of the components (pinion and ring gear set, bearings, etc.) then you may reinstall the differential carrier with the original shims in their original locations. **ALWAYS** perform a gear tooth contact pattern check, even when you remove only the differential carrier.

1. Raise the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the axle shafts. Refer to [Rear Axle Shaft Replacement](#).

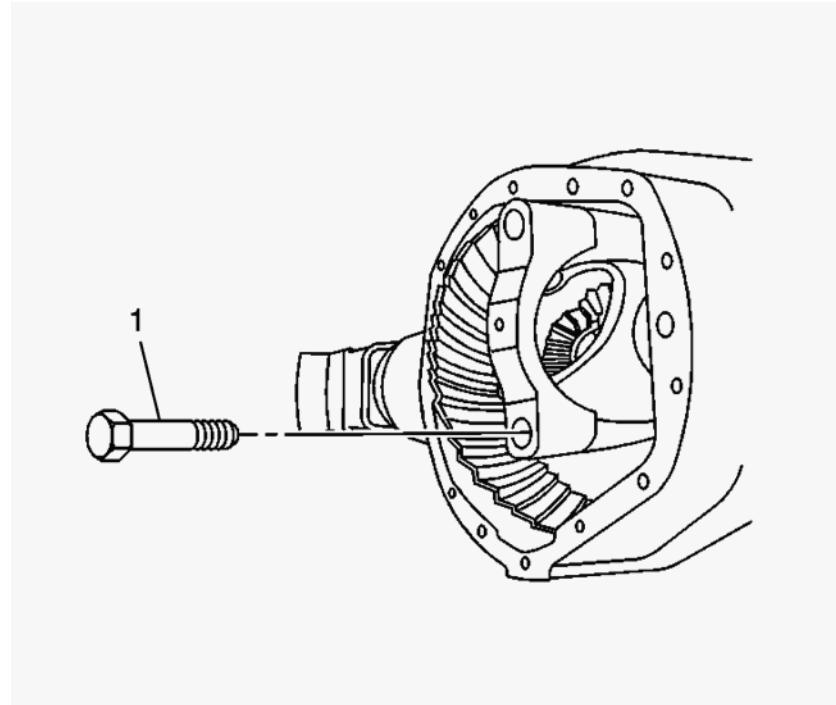


Fig. 154: Bearing Cap Bolts

Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to [Differential Case Removal Warning](#).

NOTE: Mark the bearing caps left and right before removing.

3. Remove the bearing cap bolts (1) and caps.

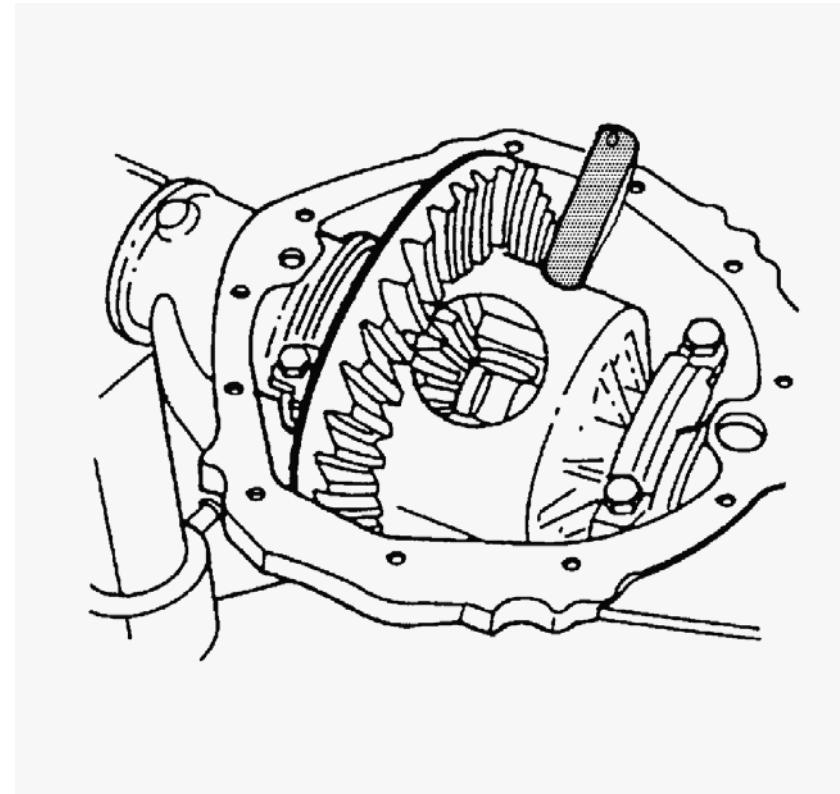


Fig. 155: Pinion Shaft Touching Housing

Courtesy of GENERAL MOTORS COMPANY

4. Install the pinion shaft into the differential case part way and rotate the differential assembly until the pinion shaft contact the top of the axle housing.

CAUTION: Refer to Differential Housing Cover and Gasket Removal Caution .

5. Rotate the drive pinion clockwise in order to force the differential assembly out of the axle housing.
6. Remove the differential assembly.
7. Remove the bearing cups, the shims, and the spacers as necessary.
8. Remove the differential side bearings. Refer to Differential Bearing Replacement.
9. Remove the differential ring gear. Refer to Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle).

Installation Procedure

1. Install the differential ring gear. Refer to Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle).
2. Install the differential side bearings. Refer to Differential Bearing Replacement.
3. Using the proper axle lubricant, lubricate the differential side bearings. Refer to Fluid and Lubricant Recommendations .

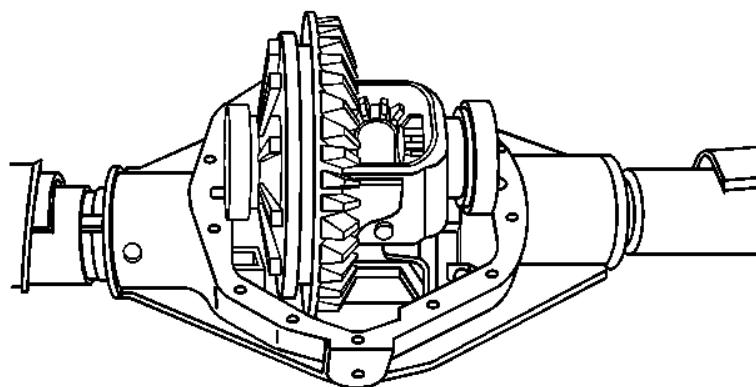


Fig. 156: Differential Case And Axle Housing

Courtesy of GENERAL MOTORS COMPANY

NOTE: Support the case in order to keep the case from falling out of the axle housing.

4. Place the differential case, with the bearing cups installed, into the axle housing.

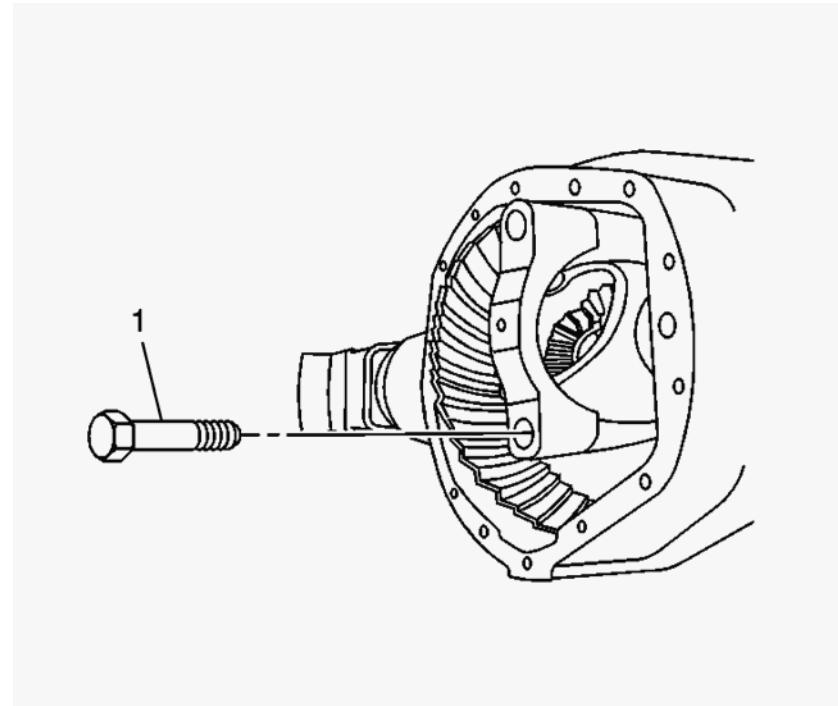


Fig. 157: Bearing Cap Bolts

Courtesy of GENERAL MOTORS COMPANY

NOTE: DO NOT torque the bearing cap bolts at this time.

5. Install the bearing caps and the bolts (1).
6. Adjust the differential side bearing preload. Refer to [Differential Carrier Bearing Preload Adjustment \(9.5/9.76 Inch Axle\)](#)[Differential Carrier Bearing Preload Adjustment \(8.6 Inch Axle\)](#).
7. Adjust the backlash. Refer to [Backlash Adjustment \(9.5/9.76 Inch Axle\)](#)[Backlash Adjustment \(8.6 Inch Axle\)](#).
8. Perform a gear tooth contact pattern check. Refer to [Gear Tooth Contact Pattern Inspection](#).

CAUTION: Refer to [Fastener Caution](#).

9. Tighten the bearing cap bolts to 75 N.m (55 lb ft) for the 8.6 inch axle or 60 N.m (44 lb ft) + 30 degrees for the 9.5/9.76 inch axle.
10. Install the axle shafts. Refer to [Rear Axle Shaft Replacement](#).
11. Fill the axle with the proper lubricant. Refer to [Differential Oil Replacement \(8.6 Inch Axle\)](#)[Differential Oil Replacement \(9.5/9.76 Inch Axle\)](#).
12. Lower the vehicle.

DIFFERENTIAL REPLACEMENT (10.5 INCH AXLE)

Special Tools

J 24429 Side Bearing Backlash Spanner

Removal Procedure

1. Raise and support the vehicle the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the axle shafts. Refer to [Rear Axle Shaft and Gasket Replacement \(10.5 Inch Axle\)](#).
3. Remove the rear axle housing cover and the gasket. Refer to [Rear Axle Housing Cover Replacement \(10.5 Inch Axle\)](#), and [Rear Axle Housing Cover Gasket Replacement \(10.5 Inch Axle\)](#).

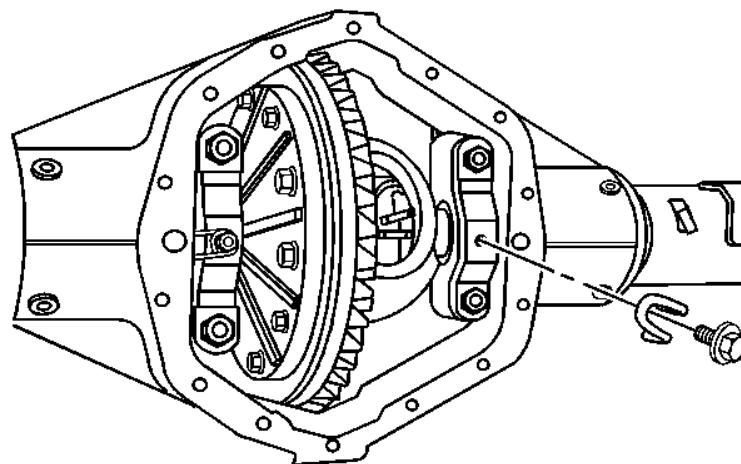


Fig. 158: Removing Differential Bearing Adjuster Nut Retainers

Courtesy of GENERAL MOTORS COMPANY

4. Remove the differential bearing adjuster nut retainers.

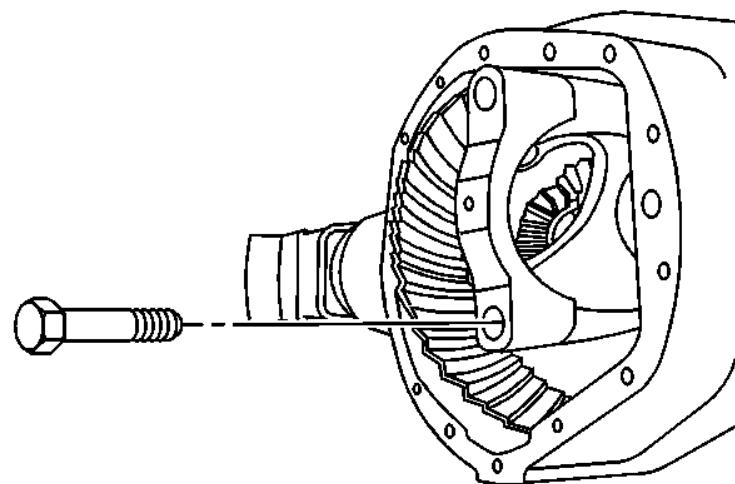


Fig. 159: Bearing Cap Bolt

Courtesy of GENERAL MOTORS COMPANY

NOTE: Mark the bearing caps left and right.

5. Remove the bearing caps and bolts.

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

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

6. Using the **J 24429** spanner, loosen the adjusters.

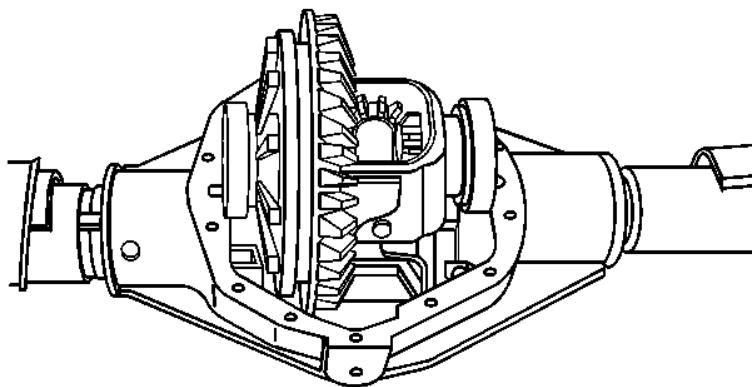


Fig. 160: Differential Case And Axle Housing

Courtesy of GENERAL MOTORS COMPANY

7. Remove the differential assembly.

NOTE: **Mark the cups left and right. Place the cups with the bearing caps.**

8. Remove the bearing cups.
9. Remove the differential side bearings, if necessary. Refer to [Differential Bearing Replacement](#).
10. Remove the differential ring gear, if necessary. Refer to [Drive Pinion and Ring Gear Replacement \(10.5 Inch Axle\)](#).

Installation Procedure

1. Install the differential ring gear, if necessary. Refer to [Drive Pinion and Ring Gear Replacement \(10.5 Inch Axle\)](#).
2. Install the differential side bearings, if necessary. Refer to [Differential Bearing Replacement](#).
3. Lubricate the differential side bearings with axle lubricant. Use the proper fluid. Refer to [Fluid and Lubricant Recommendations](#).

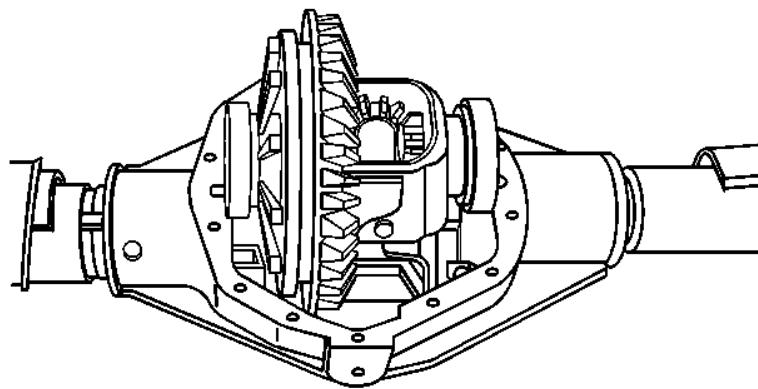


Fig. 161: Differential Case And Axle Housing

Courtesy of GENERAL MOTORS COMPANY

NOTE: Support the differential case in order to keep the differential case from falling out of the axle housing.

4. Place the case, with the bearing cups installed, into the axle housing.

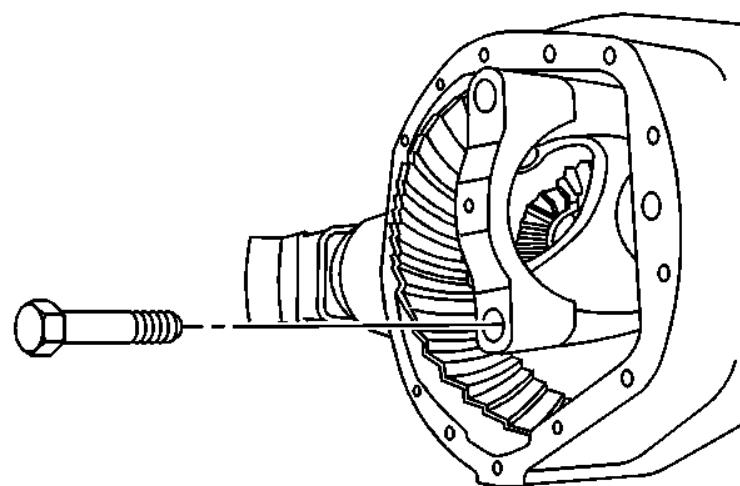


Fig. 162: Bearing Cap Bolt

Courtesy of GENERAL MOTORS COMPANY

NOTE: DO NOT torque the bearing cap bolts at this time.

5. Install the bearing caps and the bolts.

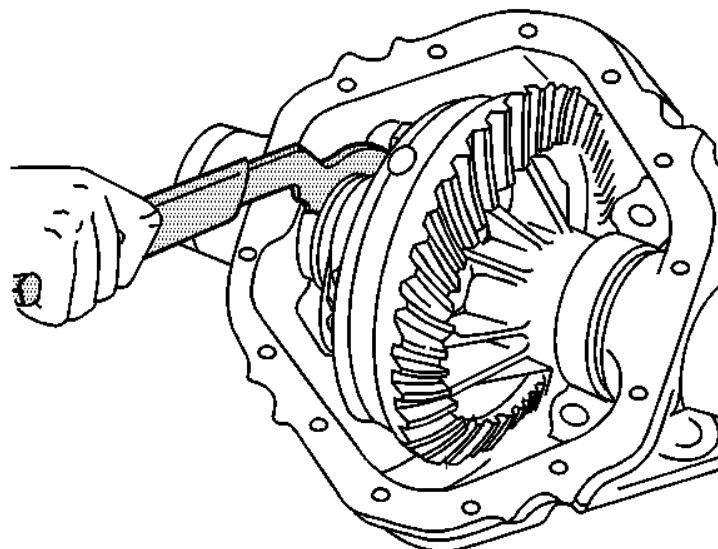


Fig. 163: Turning Adjusters

Courtesy of GENERAL MOTORS COMPANY

6. Using the **J 24429** spanner, turn the adjusters evenly on each side until snug against the differential.
7. Adjust the differential side bearing preload. Refer to [Differential Carrier Bearing Preload Adjustment \(10.5 Inch Axle\)](#).
8. Adjust the backlash. Refer to [Backlash Adjustment \(10.5 Inch Axle\)](#).
9. Perform a gear tooth contact pattern check. Refer to [Gear Tooth Contact Pattern Inspection](#).

CAUTION: Refer to [Fastener Caution](#).

10. Tighten the bearing cap bolts to 185 N.m (136 lb ft) for the 10.5 inch axle, or 282 N.m (208 lb ft) for the 11.5 inch axle.

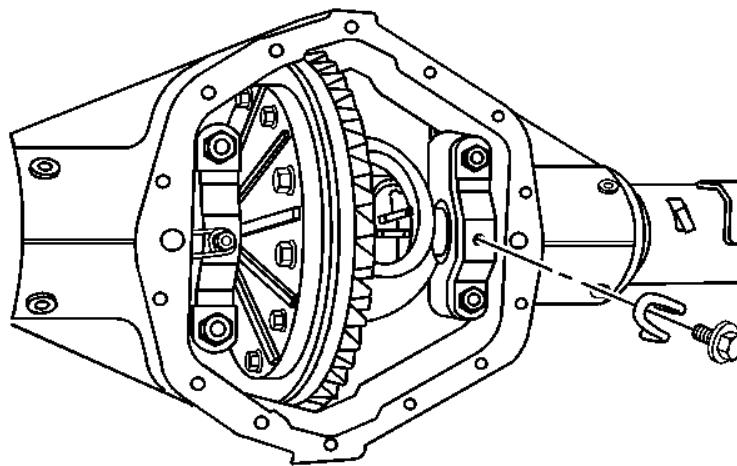


Fig. 164: Differential Bearing Adjuster Nut Retainers
Courtesy of GENERAL MOTORS COMPANY

11. Install the differential bearing adjuster nut retainers.

Tighten to 34 N.m (25 lb ft) for the 10.5 Inch Axle.

Tighten to 27 N.m (20 lb ft) for the 11.5 Inch Axle.

12. Install the axle shafts and new gaskets. Refer to [Rear Axle Shaft and Gasket Replacement \(10.5 Inch Axle\)](#).

13. Install the rear axle housing cover and a new gasket. Refer to [Rear Axle Housing Cover Replacement \(10.5 Inch Axle\)](#), and [Rear Axle Housing Cover Gasket Replacement \(10.5 Inch Axle\)](#).

14. Fill the axle with lubricant. Use the proper fluid. Refer to [Approximate Fluid Capacities](#), and [Fluid and Lubricant Recommendations](#).

15. Remove the support and lower the vehicle.

DIFFERENTIAL BEARING REPLACEMENT

Special Tools

- **J-8092** Universal Driver Handle - 3/4 in - 10
- **J-8107-4** Side Bearing Remover Plug
- **J-8107-5** Side Bearing Remover Plug
- **J-21784** Side Bearing Installer
- **J-22888-D** Side Bearing Puller Set

- **J-22888-20 A** Side Bearing Puller
- **J-29710** Differential Side Bearing Installer
- **J-36597** Side Bearing Remover Pilot
- **J-44420** Differential Bearing Installer

Removal Procedure

1. Remove the differential assembly. Refer to [Differential Replacement \(8.6/9.5/9.76 Inch Axles\)](#)[Differential Replacement \(10.5 Inch Axle\)](#).

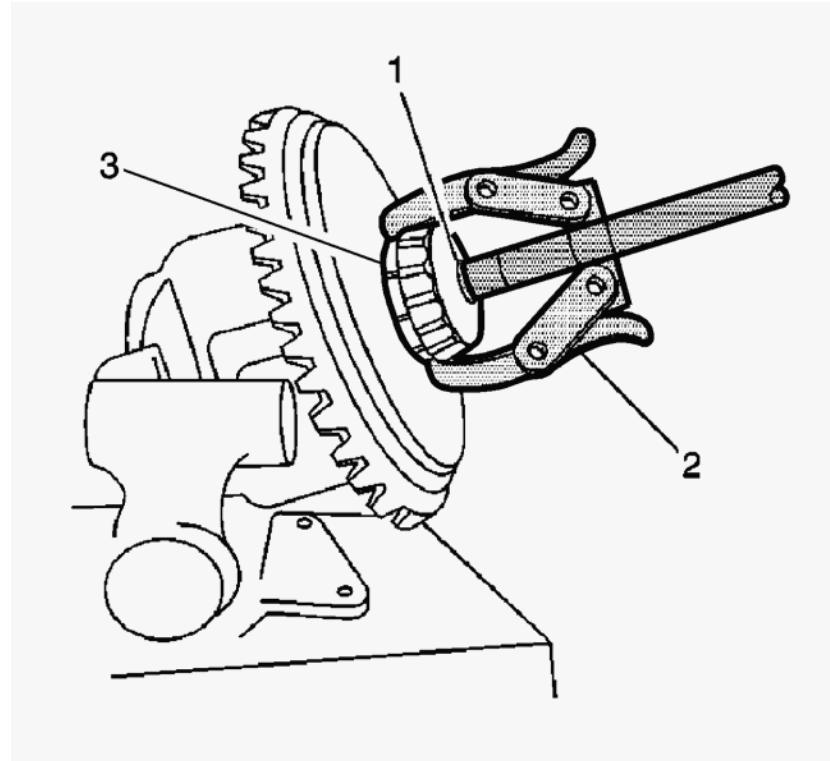


Fig. 165: Differential Side Bearings And Special Tool

Courtesy of GENERAL MOTORS COMPANY

2. Install the 8.6, 9.5, and the 11.5 inch differential assembly into a vise.

NOTE: Place a block of wood on each side of the differential assembly.

3. Install the 10.5 inch differential assembly into a vise.

NOTE: Step 4 is for the 8.6 inch axle.

4. Using the **J22888-20 A** puller (2) and the **J-8107-4** plug (1), remove the differential side bearing.

NOTE: Step 5 is for the 9.5/10.5 inch axles.

5. Using the **J-22888-20 A** puller (2) and the **J-36597** pilot (1), remove the differential side bearing.

NOTE: Step 6 is for the 11.5 inch axle.

6. Using the **J-22888-20 A** puller (2) and the **J-8107-5** plug (1), remove the differential side bearing.

Installation Procedure

NOTE: In order to protect the differential case, install the following special tools on the opposite side of the differential case of the bearing being installed:

-
- For the 8.6 inch axle, install the **J-8107-4** plug
- For the 9.5/10.5 inch axles, install the **J-36597** pilot
- For the 11.5 inch axle, install the **J-8107-5** plug

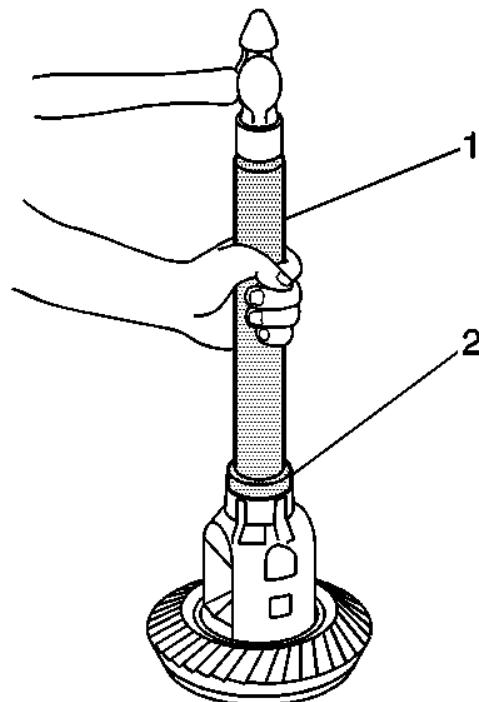


Fig. 166: Driving Differential Side Bearing Into Position

Courtesy of GENERAL MOTORS COMPANY

NOTE: Step 1, is for the 8.6 inch axle.

1. Using the **J-8092** driver (1), **J-21784** installer (2) and a hammer, install the differential side bearing.

NOTE: Step 2, is for the 9.5/10.5 inch axles.

2. Using the **J-8092** handle (1), **J-29710** installer (2) and a hammer, install the differential side bearing.

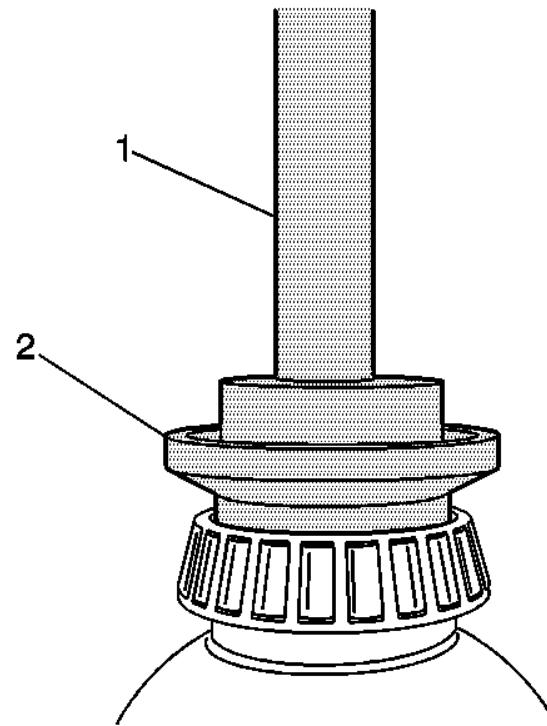


Fig. 167: Installing Differential Side Bearings (11.5 Inch Axles)

Courtesy of GENERAL MOTORS COMPANY

NOTE: Step 3, is for the 11.5 inch axle.

3. Using the **J-8092** handle (1) **J-44420** installer (2) and a hammer, install the differential side bearing.
 4. Install the differential assembly. Refer to [Differential Replacement \(8.6/9.5/9.76 Inch Axles\)](#)[Differential Replacement \(10.5 Inch Axle\)](#).

REAR AXLE REPLACEMENT (10.5 INCH AXLE)

Removal Procedure

NOTE: Observe and accurately reference mark all driveline components relative to the propeller shaft and axles before disassembly. These components include the propeller shafts, the drive axles, the pinion flanges, the output shafts, etc. All components must be reassembled in the exact relationship to each other as they were when removed. In addition, published specifications and torque values, as well as any measurements made prior to disassembly must be followed.

1. Raise the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Place jack or utility stands (such as GMDE 123-B67313) at the front end of the vehicle.
3. Support the axle with jack stands.
4. Remove the tire and wheel assemblies. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#).

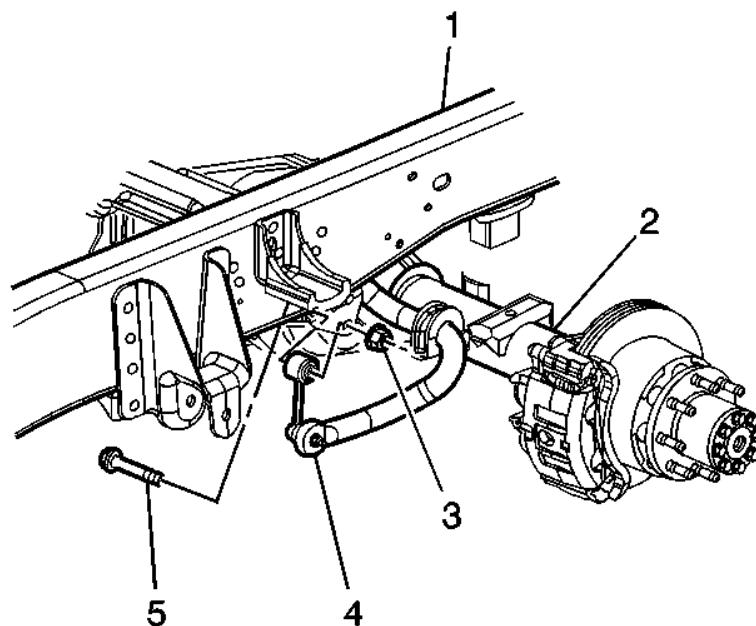


Fig. 168: Stabilizer Shaft Link, Bolt & Nut

Courtesy of GENERAL MOTORS COMPANY

5. Remove the stabilizer shaft link bolt (5) and the nut (3).
6. Disconnect the upper stabilizer shaft link (4) from the frame.

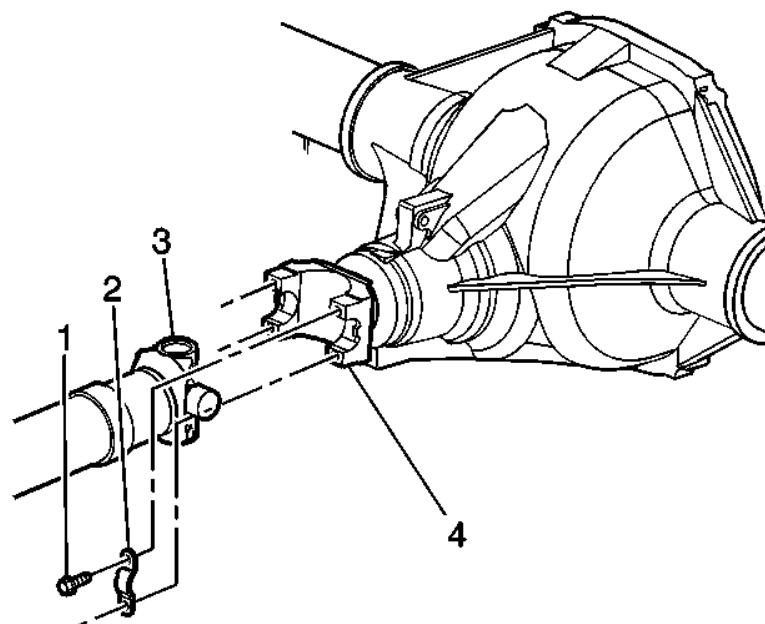


Fig. 169: Propeller Shaft, Rear Axle Pinion Yoke, Yoke Retainers And Bolts

Courtesy of GENERAL MOTORS COMPANY

7. Reference mark the rear propeller shaft (3) to the rear axle pinion yoke (4).
8. Disconnect the propeller shaft from the axle.

Support the propeller shaft as necessary.

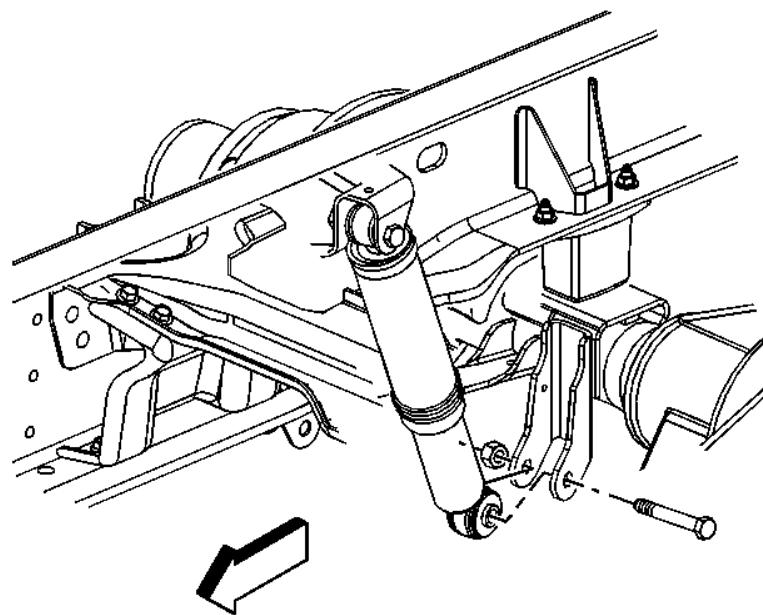


Fig. 170: Shock Absorber Lower Mount

Courtesy of GENERAL MOTORS COMPANY

9. Disconnect the lower mount of the shock absorbers.

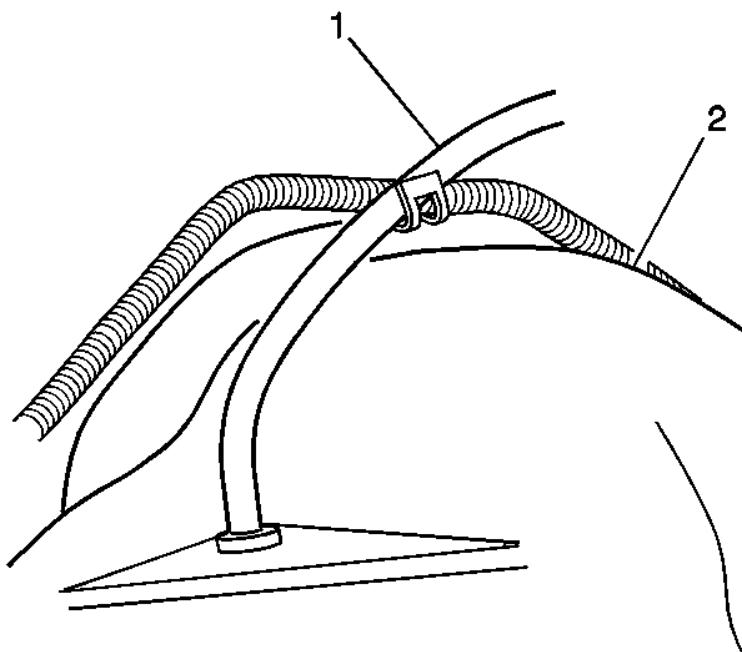


Fig. 171: Vent Hose And Rear Axle

Courtesy of GENERAL MOTORS COMPANY

10. Disconnect the vent hose (1).
11. Disconnect the wheel speed sensors. Refer to [Rear Wheel Speed Sensor Replacement](#).
12. Disconnect the park brake cables. Refer to [Parking Brake Rear Cable Replacement - Left Side \(J95\)](#) [Parking Brake Rear Cable Replacement - Left Side \(JD9 Without J71\)](#) [Parking Brake Rear Cable Replacement - Left Side \(JD9 With J71\)](#), and [Parking Brake Rear Cable Replacement - Right Side \(J95\)](#) [Parking Brake Rear Cable Replacement - Right Side \(JD9 Without J71\)](#) [Parking Brake Rear Cable Replacement - Right Side \(JD9 With J71\)](#).

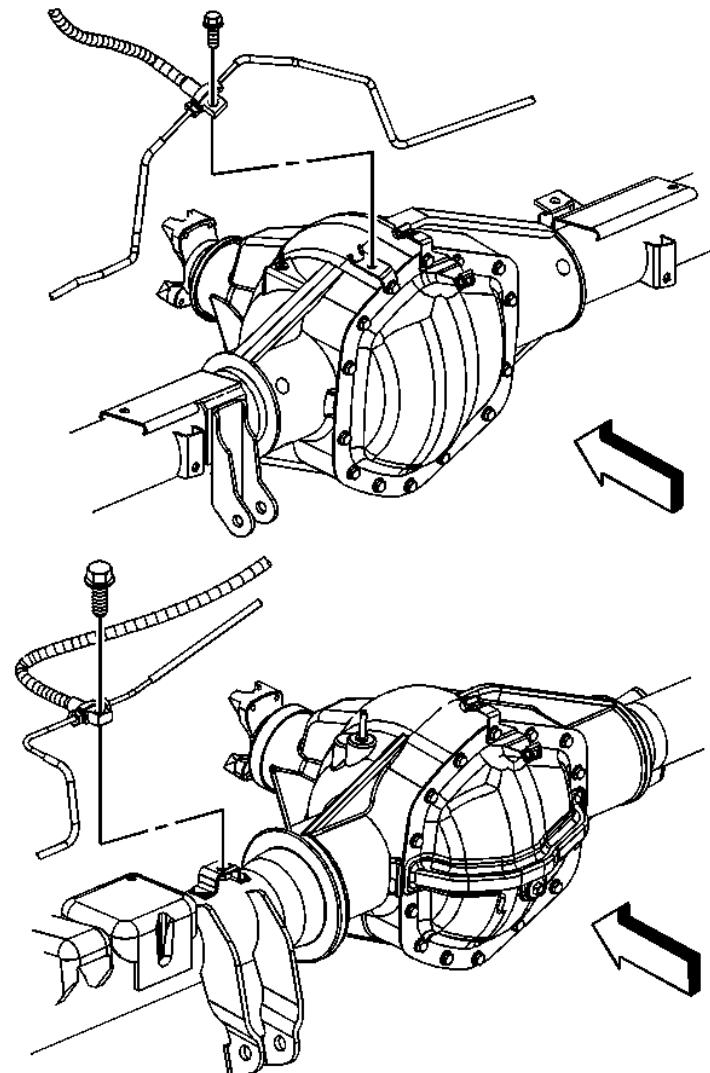


Fig. 172: Disconnecting Junction Block

Courtesy of GENERAL MOTORS COMPANY

13. Disconnect the junction block.

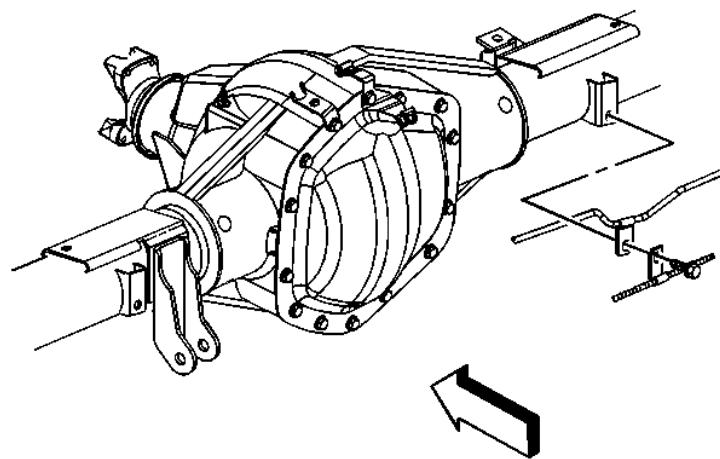
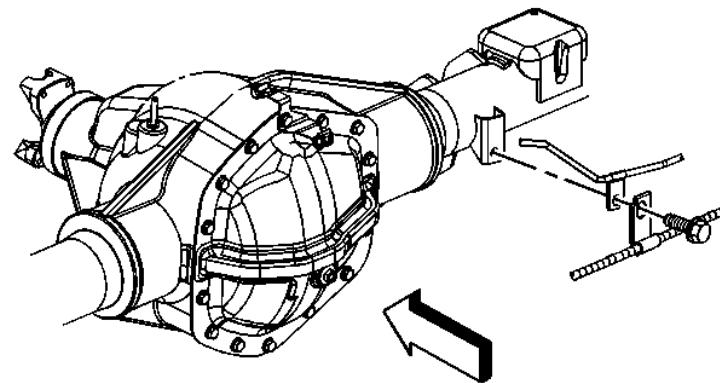


Fig. 173: Disconnecting Brake Pipe

Courtesy of GENERAL MOTORS COMPANY

14. Disconnect the brake pipe.

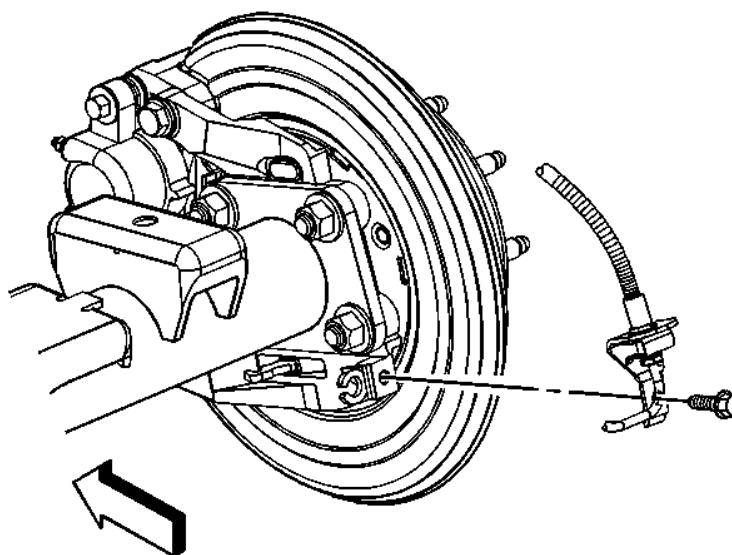


Fig. 174: Disconnecting Brake Pipe Fitting Bracket From Brake Assembly

Courtesy of GENERAL MOTORS COMPANY

15. Disconnect the brake pipe fitting bracket from the brake assembly.

16. Remove the brake calipers. Refer to [Rear Brake Caliper Replacement \(JD9\)](#) [Rear Brake Caliper Replacement \(J95\)](#) .

CAUTION: **Support the brake caliper with heavy mechanic wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.**

17. Support the calipers from the frame using a heavy gauge mechanics wire.

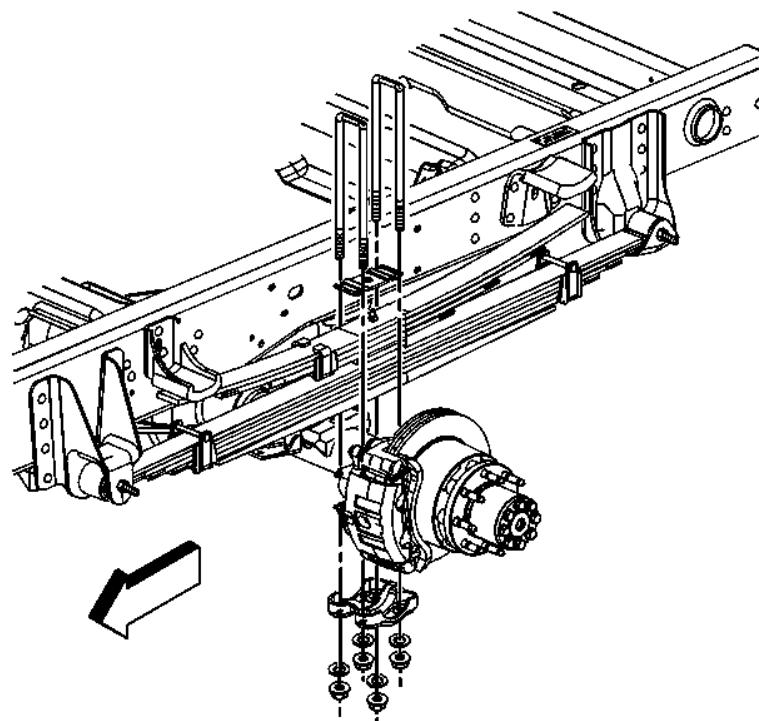


Fig. 175: Removing U-Bolts

Courtesy of GENERAL MOTORS COMPANY

18. Remove the nuts and the washers from the spring assembly U-bolts.
19. Remove the U-bolts, the anchor plates and the spacers from the axle.
20. Remove the axle with the aid of a hydraulic assist.

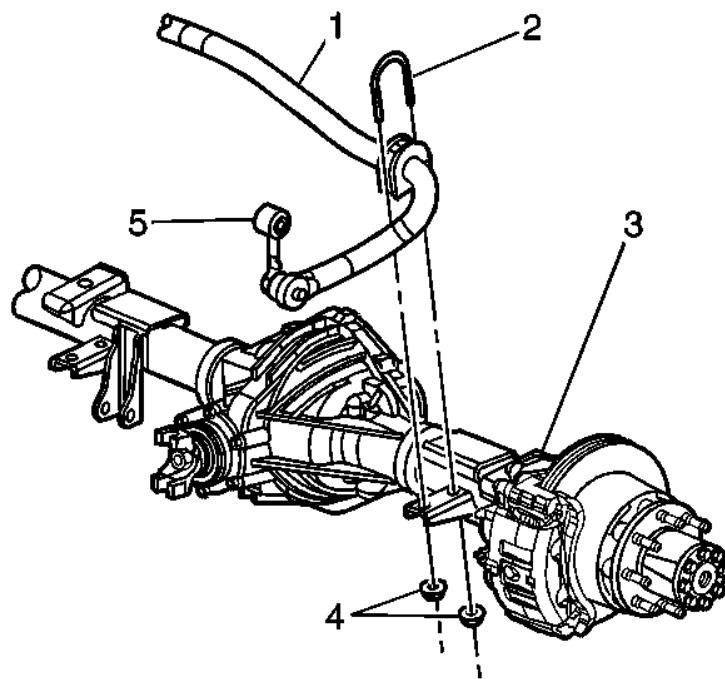


Fig. 176: Stabilizer Shaft, U-Bolts, Nuts & Axle

Courtesy of GENERAL MOTORS COMPANY

21. Remove the stabilizer shaft U-bolt nuts (4) and the U-bolts (2) from the axle (3) (if necessary).
22. Remove the stabilizer shaft (1) from the axle (if necessary).

Installation Procedure

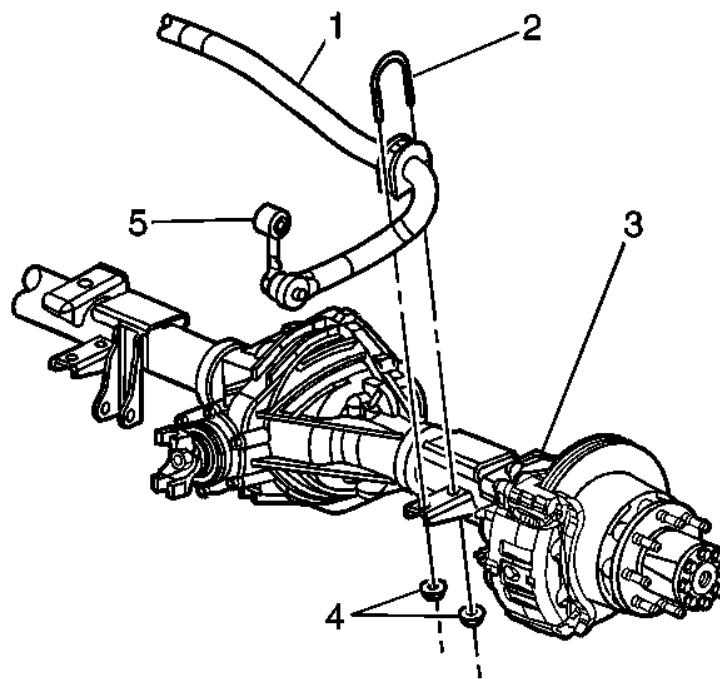


Fig. 177: Stabilizer Shaft, U-Bolts, Nuts & Axle

Courtesy of GENERAL MOTORS COMPANY

1. Install the stabilizer shaft (1) to the axle (3) (if necessary).
2. Install the stabilizer shaft clamps, the U-bolts (2), and the nuts (4) (if necessary).

Do not torque the stabilizer shaft U-bolt nuts at this time.

3. Place the axle under the vehicle.
4. Raise the axle to the springs with the aid of a hydraulic assist.

Align the axle with the springs.

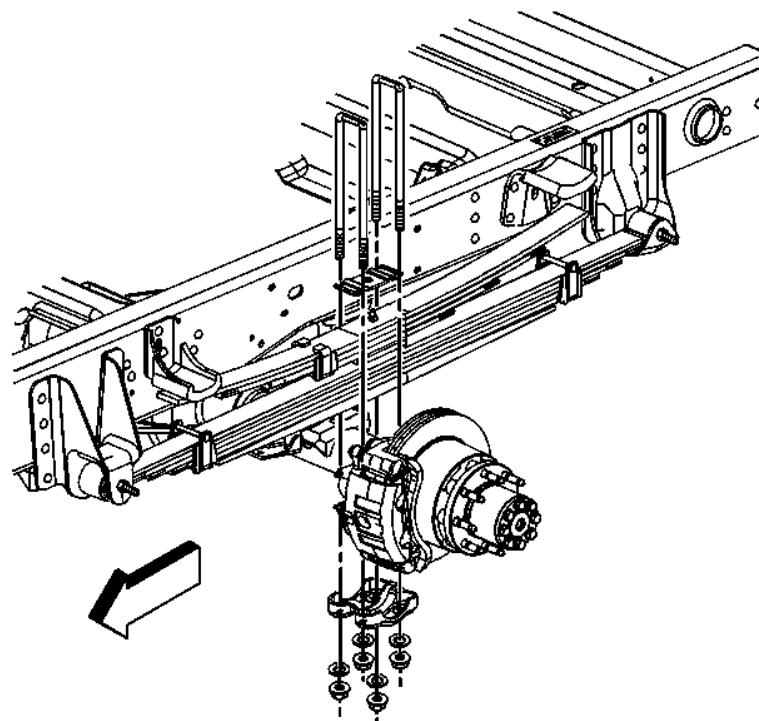


Fig. 178: Installing U-Bolts

Courtesy of GENERAL MOTORS COMPANY

5. Install the spacers, the anchor plates and the U-bolts.

CAUTION: Refer to [Fastener Caution](#) .

6. Install the washers if equipped and the nuts to the U-bolts.

Tighten

Tighten the nuts in a criss cross pattern to 150 N.m (110 lb ft).

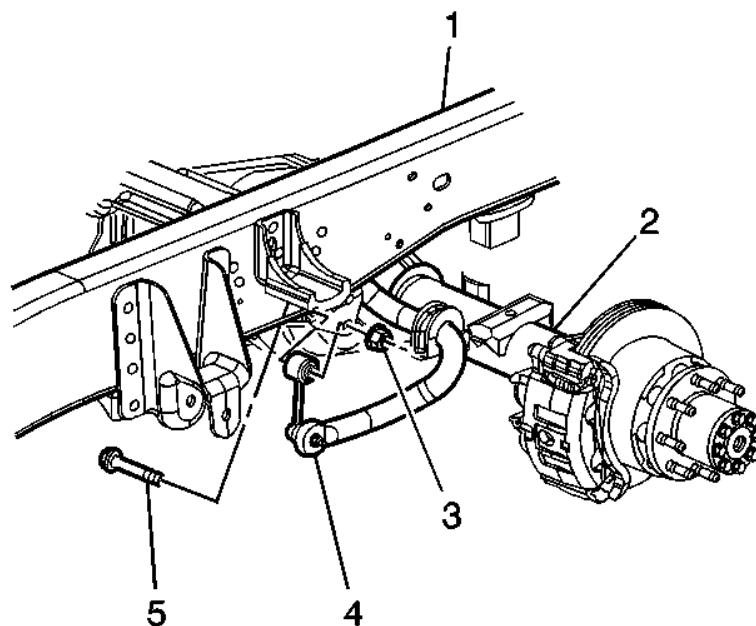


Fig. 179: Stabilizer Shaft Link, Bolt & Nut

Courtesy of GENERAL MOTORS COMPANY

7. Install the stabilizer shaft link to the frame (1) (if necessary).
8. Install the stabilizer shaft link bolt (5) and the nut (3) (if necessary).

Tighten

1. Tighten the stabilizer shaft link bolts to 95 N.m (70 lb ft).
 2. Tighten the stabilizer shaft U-bolt nuts to 32 N.m (24 lb ft).
9. Install the brake calipers. Refer to [Rear Brake Caliper Replacement \(JD9\)](#) [Rear Brake Caliper Replacement \(J95\)](#) .

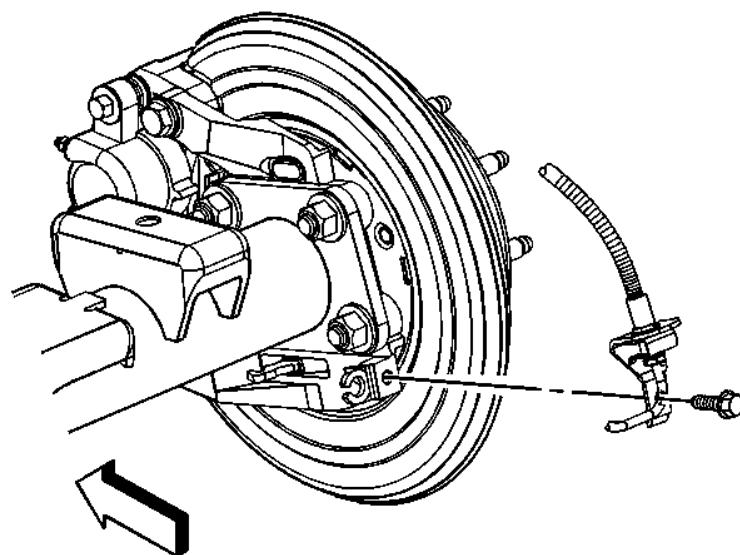


Fig. 180: Installing Brake Pipe Fitting Brackets
Courtesy of GENERAL MOTORS COMPANY

10. Install the brake pipe fitting brackets.
11. Install the brake pipe fitting bracket bolts.

Tighten

Tighten the bolts to 22 N.m (16 lb ft).

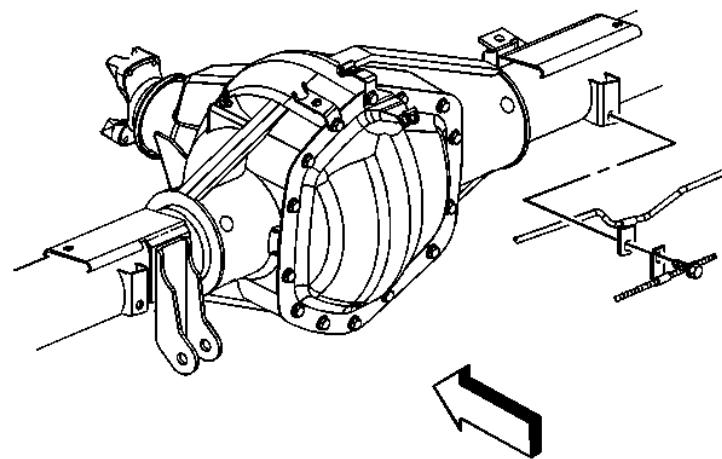
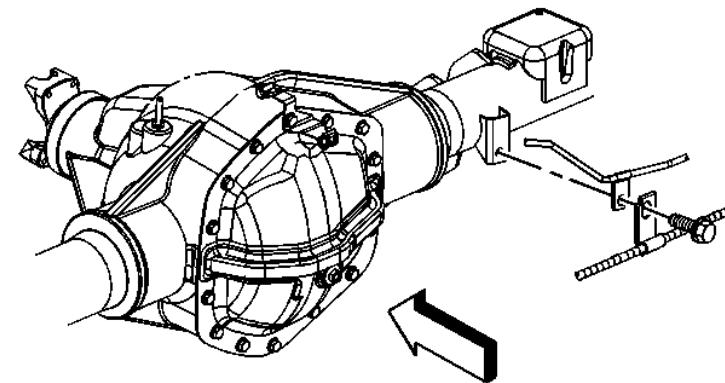


Fig. 181: Installing Brake Pipe

Courtesy of GENERAL MOTORS COMPANY

12. Install the brake pipe.
13. Install the brake pipe bolts.

Tighten

Tighten the bolts to 22 N.m (16 lb ft).

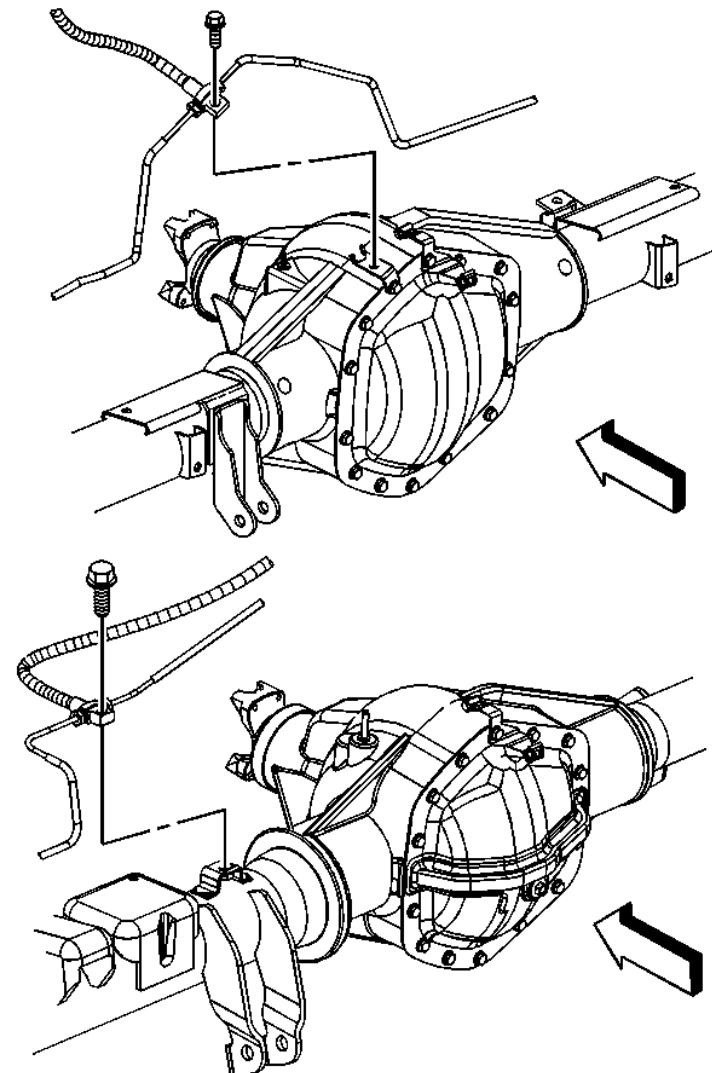


Fig. 182: Installing Brake Pipe Junction Block

Courtesy of GENERAL MOTORS COMPANY

14. Install the brake pipe junction block.
15. Install the brake pipe junction block bolt.

Tighten

Tighten the brake pipe junction block bolt to 22 N.m (16 lb ft).

16. Connect the park brake cables. Refer to [Parking Brake Rear Cable Replacement - Left Side \(J95\)](#) [Parking Brake Rear Cable Replacement - Left Side \(JD9 Without J71\)](#) [Parking Brake Rear Cable Replacement - Left Side \(JD9 With J71\)](#), and [Parking Brake Rear Cable Replacement - Right Side \(J95\)](#) [Parking Brake Rear Cable Replacement - Right Side \(JD9 Without J71\)](#) [Parking Brake Rear Cable Replacement - Right Side \(JD9 With J71\)](#).

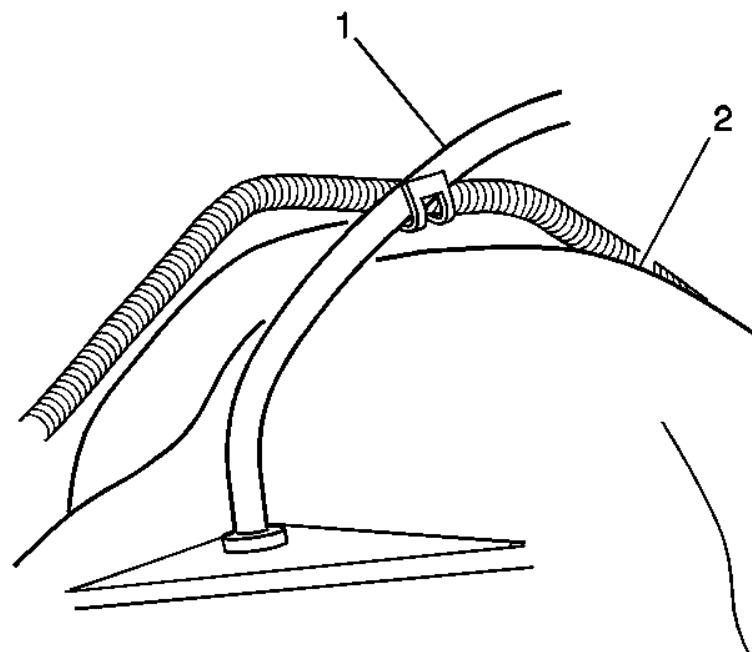


Fig. 183: Vent Hose And Rear Axle

Courtesy of GENERAL MOTORS COMPANY

17. Connect the vent hose (1) to the axle vent fitting.

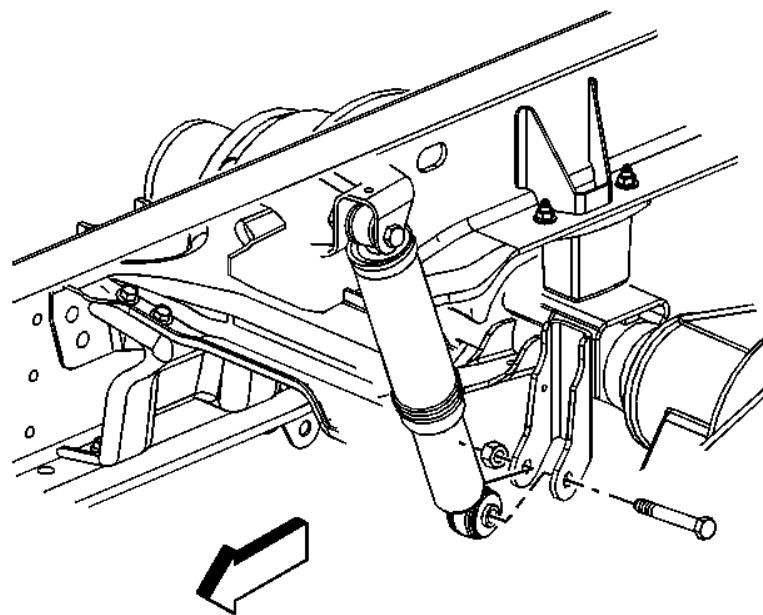


Fig. 184: Shock Absorber Lower Mount

Courtesy of GENERAL MOTORS COMPANY

18. Install the shock absorbers to the lower mount bracket.
19. Install the shock absorber bolts and the nuts.

Tighten

Tighten the shock absorber nuts to 95 N.m (70 lb ft).

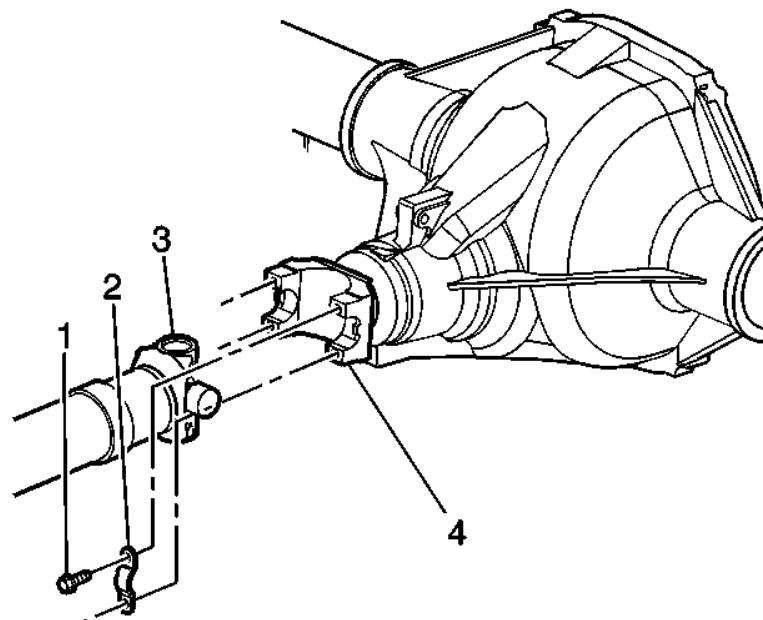


Fig. 185: Propeller Shaft, Rear Axle Pinion Yoke, Yoke Retainers And Bolts

Courtesy of GENERAL MOTORS COMPANY

20. Install the propeller shaft (3) to the pinion yoke (4).

Align the reference marks made during removal.

21. Install the propeller shaft yoke retaining clamps (2) and the bolts (1).

Tighten

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

22. Install the tire and wheel assemblies. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#).

23. Fill the axle with lubricant. Use the proper fluid. Refer to [Approximate Fluid Capacities](#), and [Fluid and Lubricant Recommendations](#).

24. Remove the jack and utility stands.

25. Lower the vehicle.

REAR AXLE REPLACEMENT (8.6/9.5/9.76 INCH AXLES)

Removal Procedure

1. If equipped with J71, release the park brake tension. Refer to [Parking Brake Cable Adjuster Disabling \(Without J71\)](#) [Parking Brake Cable Adjuster Disabling \(With J71\)](#).

2. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).

3. Remove the rear tires and wheels. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#).

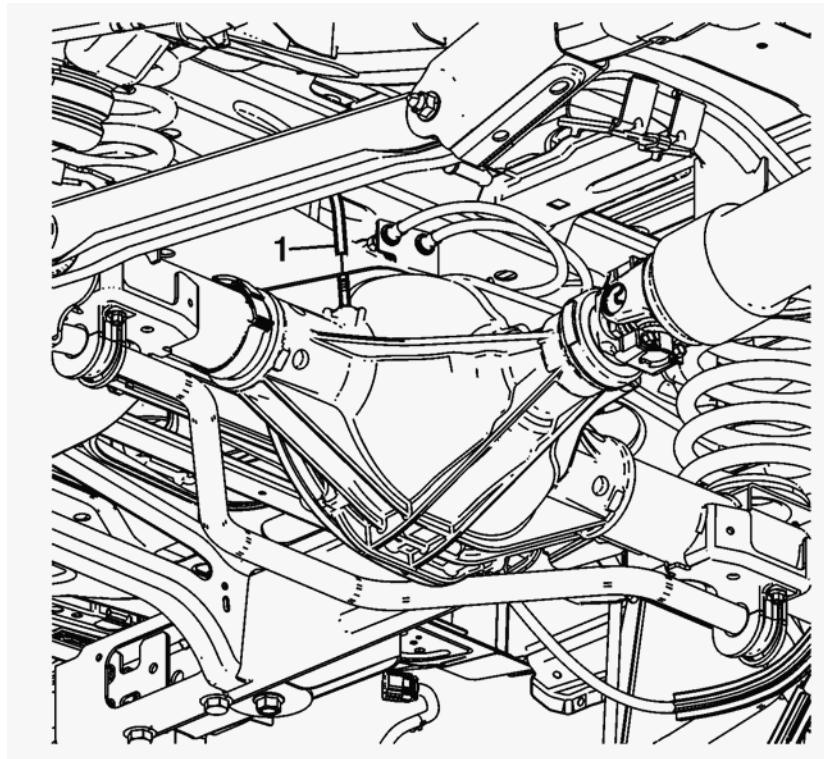


Fig. 186: Vent Hose And Rear Drive Axle

Courtesy of GENERAL MOTORS COMPANY

4. Remove the vent hose (1) from the rear drive axle.

5. Remove the electronic suspension control sensor, if equipped.

- For the left side, refer to [Electronic Suspension Rear Position Sensor Replacement - Left Side](#).
- For the right side, refer to [Electronic Suspension Rear Position Sensor Replacement - Right Side](#).

6. Remove the rear wheel speed sensors from the rear drive axle. Refer to [Rear Wheel Speed Sensor Replacement](#).

7. Remove the rear brake calipers, and relocate to the side. Refer to [Rear Brake Caliper Replacement \(JD9\)](#) [Rear Brake Caliper Replacement \(J95\)](#).

8. Drain the rear axle. Refer to [Differential Oil Replacement \(8.6 Inch Axle\)](#) [Differential Oil Replacement \(9.5/9.76 Inch Axle\)](#).

9. Remove the propeller shaft. Refer to [Rear Propeller Shaft Replacement \(1500\)](#) [Rear Propeller Shaft Replacement \(Heavy Duty\)](#) [Rear Propeller Shaft Replacement \(MSU, 2WD\)](#).

NOTE: The stabilizer shaft links do not have to be removed in the following procedure. Rotate the links upward toward the frame and out of the way.

10. Remove the rear stabilizer shaft, if equipped. Refer to [Stabilizer Shaft Replacement](#).

11. Remove the rear axle lateral link. Refer to [Rear Suspension Lateral Link Replacement](#).

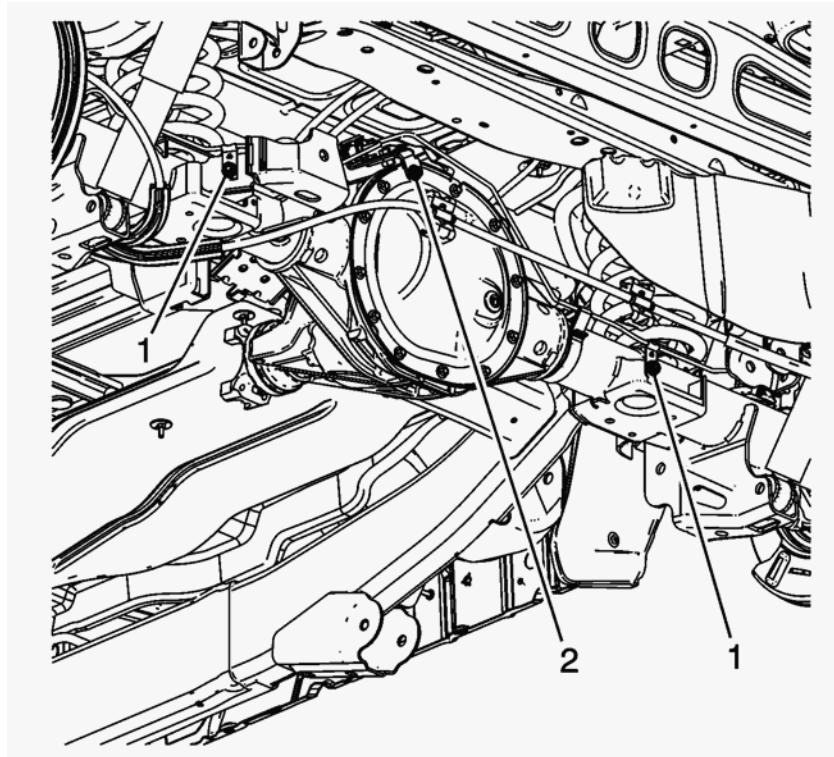


Fig. 187: Rear Brake Pipe Retaining Bracket Bolt

Courtesy of GENERAL MOTORS COMPANY

12. Remove the rear brake pipe retaining bracket bolt (1).
13. Remove the rear brake junction block retaining bolt (2) at the rear axle cover.
14. Secure the rear brake pipes to the frame with mechanics wire or equivalent.

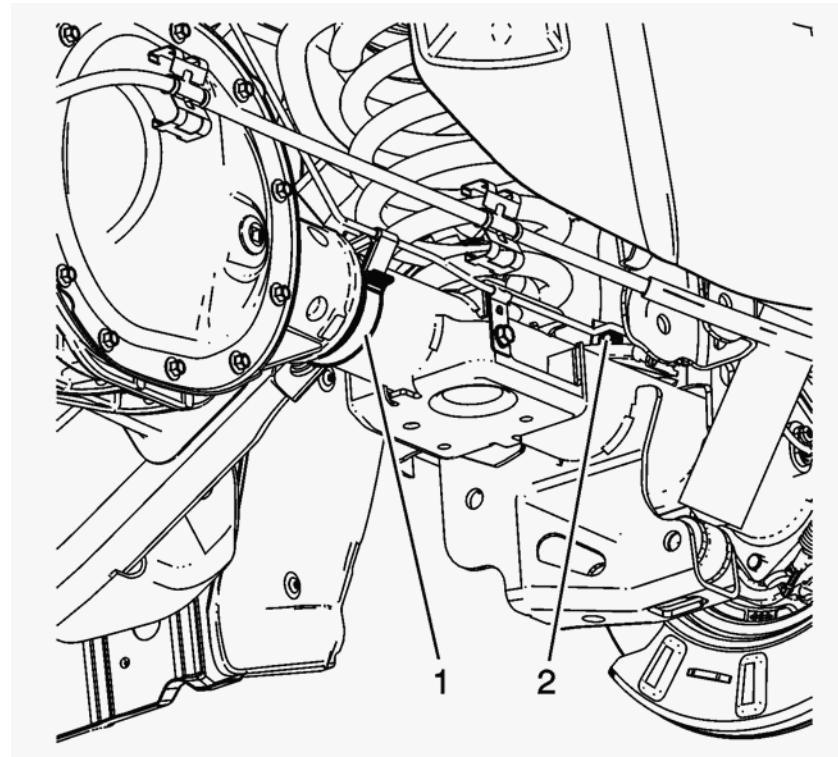


Fig. 188: Rear Brake Pipe And Retaining Strap

Courtesy of GENERAL MOTORS COMPANY

15. Remove the rear brake pipe from the retaining strap (1).
16. Remove the brake pipe retaining bracket bolt (2).

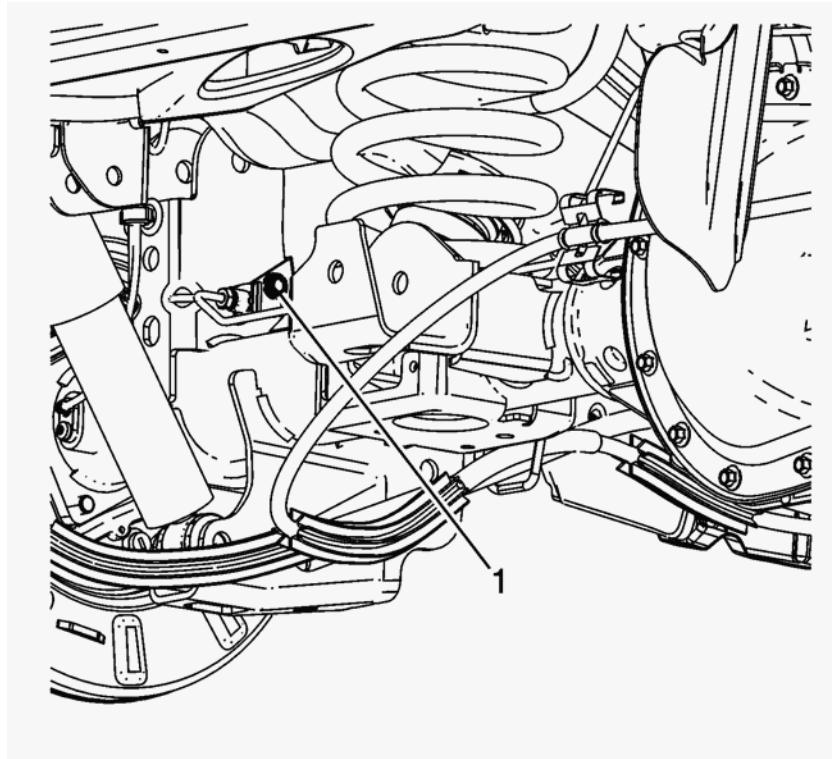


Fig. 189: Brake Pipe Retaining Bracket Bolt

Courtesy of GENERAL MOTORS COMPANY

17. Remove the brake pipe retaining bracket bolt from the other side (1).
18. If the vehicle is not equipped with J71, disable the parking brake cables. Refer to [Parking Brake Cable Adjuster Disabling \(Without J71\)](#).
19. Disconnect the rear parking brake cables from the parking brake actuator levers on both sides. Refer to [Parking Brake Rear Cable Replacement - Left Side \(J95\)](#) [Parking Brake Rear Cable Replacement - Left Side \(JD9 Without J71\)](#) [Parking Brake Rear Cable Replacement - Left Side \(JD9 With J71\)](#), or [Parking Brake Rear Cable Replacement - Right Side \(J95\)](#) [Parking Brake Rear Cable Replacement - Right Side \(JD9 Without J71\)](#) [Parking Brake Rear Cable Replacement - Right Side \(JD9 With J71\)](#).
20. Release both parking brake cables from the rear brake anchor plates. Refer to [Parking Brake Rear Cable Replacement - Left Side \(J95\)](#) [Parking Brake Rear Cable Replacement - Left Side \(JD9 Without J71\)](#) [Parking Brake Rear Cable Replacement - Left Side \(JD9 With J71\)](#), or [Parking Brake Rear Cable Replacement - Right Side \(J95\)](#) [Parking Brake Rear Cable Replacement - Right Side \(JD9 Without J71\)](#) [Parking Brake Rear Cable Replacement - Right Side \(JD9 With J71\)](#).

NOTE: Ensure that the rear drive axle is properly secured to the jack stand.

21. Support the rear drive axle with a hydraulic jack stand.

NOTE: In steps 17 and 18, it is not necessary to remove the control arms. Secure the control arms to the frame with the use of mechanics wire or equivalent.

22. Remove the lower control arm bolts from the rear the drive axle. Refer to [Lower Control Arm Replacement](#).
23. Remove the upper trailing link bolts from the rear drive axle. Refer to [Rear Suspension Upper Trailing Link Replacement](#).
24. With the aid of an assistant, lower the drive axle.
25. Remove the rear coil springs.

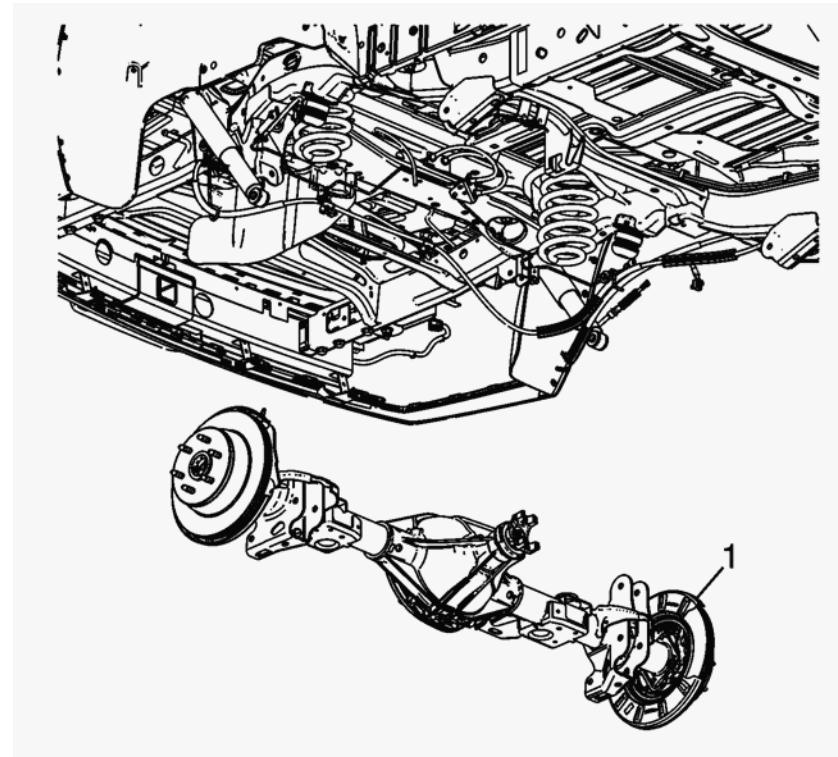


Fig. 190: Rear Drive Axle Assembly

Courtesy of GENERAL MOTORS COMPANY

26. Lower the rear drive axle assembly.
27. Transfer parts, if needed.

Installation Procedure

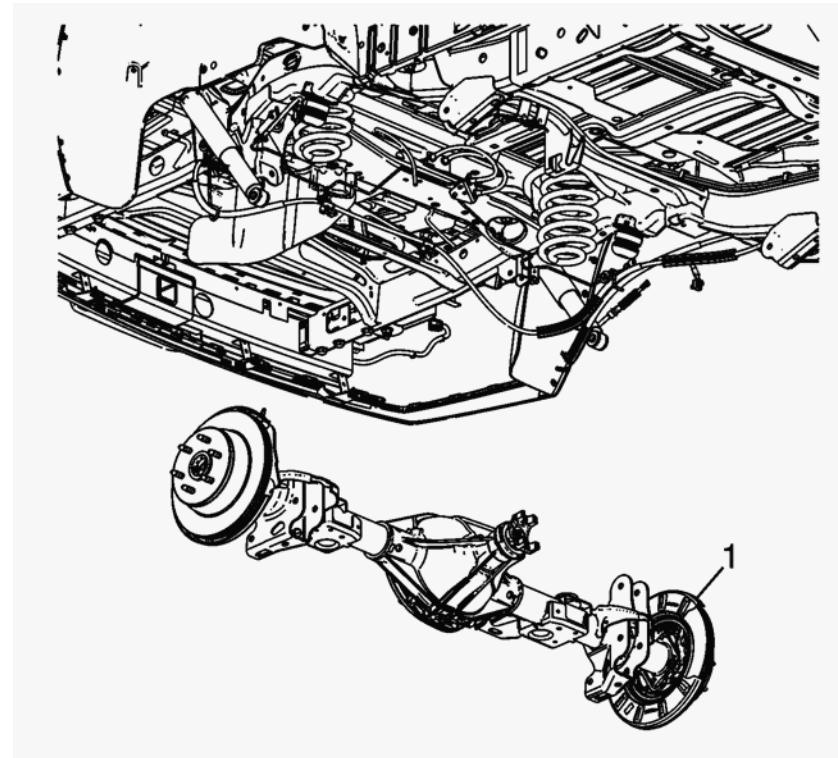


Fig. 191: Rear Drive Axle Assembly

Courtesy of GENERAL MOTORS COMPANY

1. Position the rear drive axle assembly under the vehicle.
2. With the aide of an assistant, raise the rear drive axle into place.
3. Install the rear coil springs on the rear drive axle.
4. Install the upper trailing links to the rear drive axle. Refer to [Rear Suspension Upper Trailing Link Replacement](#) .
5. Install the lower control arms to the rear drive axle. Refer to [Lower Control Arm Replacement](#) .
6. Install the lower shock absorber bolts to the rear drive axle. Refer to [Shock Absorber Replacement \(Z56, Z71, ZW7\) Shock Absorber Replacement \(Heavy Duty\)](#) .
7. Remove the hydraulic jack stand from the rear drive axle assembly.

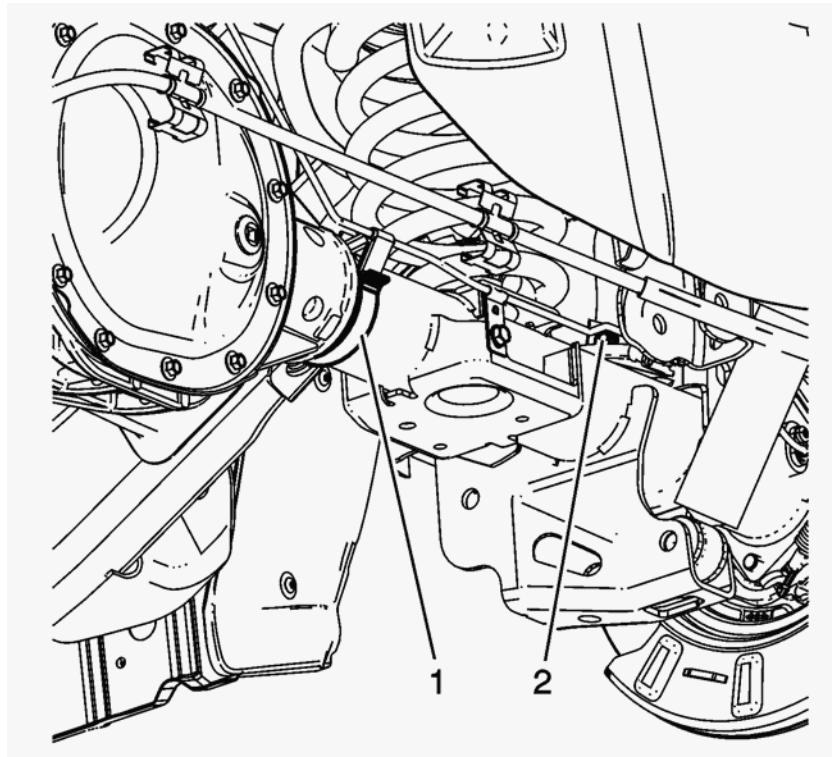


Fig. 192: Rear Brake Pipe And Retaining Strap
Courtesy of GENERAL MOTORS COMPANY

8. Install the rear brake pipe to the retaining strap (1).
9. Install the brake pipe retaining bracket bolt (2).
10. Install both parking brake cables to the rear brake anchor plates. Refer to [Parking Brake Rear Cable Replacement - Left Side \(J95\)](#) [Parking Brake Rear Cable Replacement - Left Side \(JD9 Without J71\)](#) [Parking Brake Rear Cable Replacement - Left Side \(JD9 With J71\)](#), or [Parking Brake Rear Cable Replacement - Right Side \(J95\)](#) [Parking Brake Rear Cable Replacement - Right Side \(JD9 Without J71\)](#) [Parking Brake Rear Cable Replacement - Right Side \(JD9 With J71\)](#).
11. Connect the rear parking brake cables from the parking brake actuator levers on both sides. Refer to [Parking Brake Rear Cable Replacement - Left Side \(J95\)](#) [Parking Brake Rear Cable Replacement - Left Side \(JD9 Without J71\)](#) [Parking Brake Rear Cable Replacement - Left Side \(JD9 With J71\)](#), or [Parking Brake Rear Cable Replacement - Right Side \(J95\)](#) [Parking Brake Rear Cable Replacement - Right Side \(JD9 Without J71\)](#) [Parking Brake Rear Cable Replacement - Right Side \(JD9 With J71\)](#).

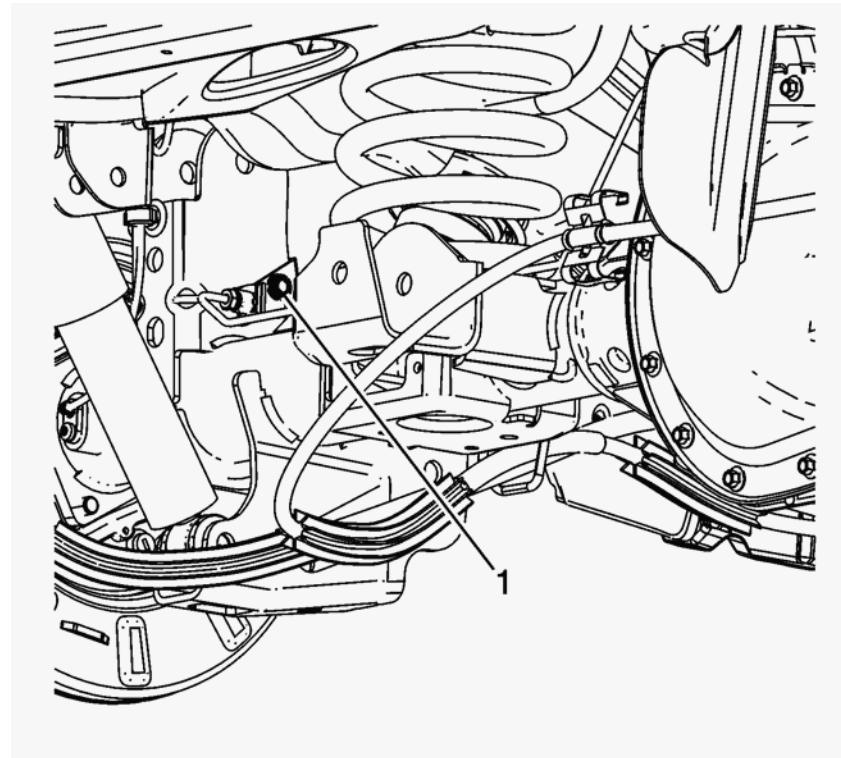


Fig. 193: Brake Pipe Retaining Bracket Bolt

Courtesy of GENERAL MOTORS COMPANY

12. Install the brake pipe retaining bracket bolt to the other side (1).

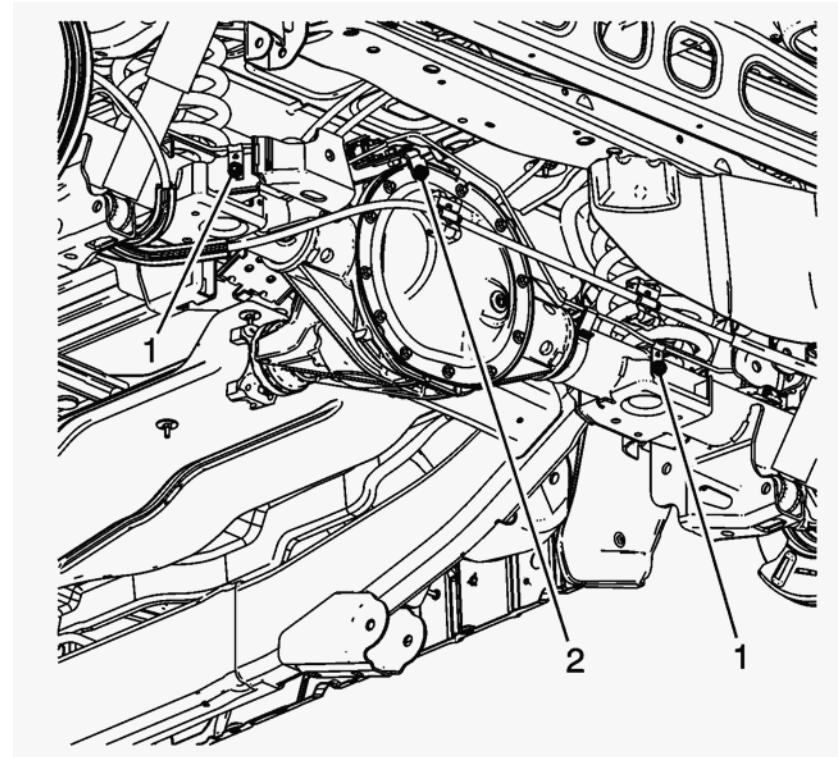


Fig. 194: Rear Brake Pipe Retaining Bracket Bolt

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

13. Install the rear brake pipe retaining bracket bolt (1) and tighten to 20 N.m (15 lb ft).
14. Install the rear brake junction block retaining bolt (2) at the rear axle cover and tighten to 20 N.m (15 lb ft).

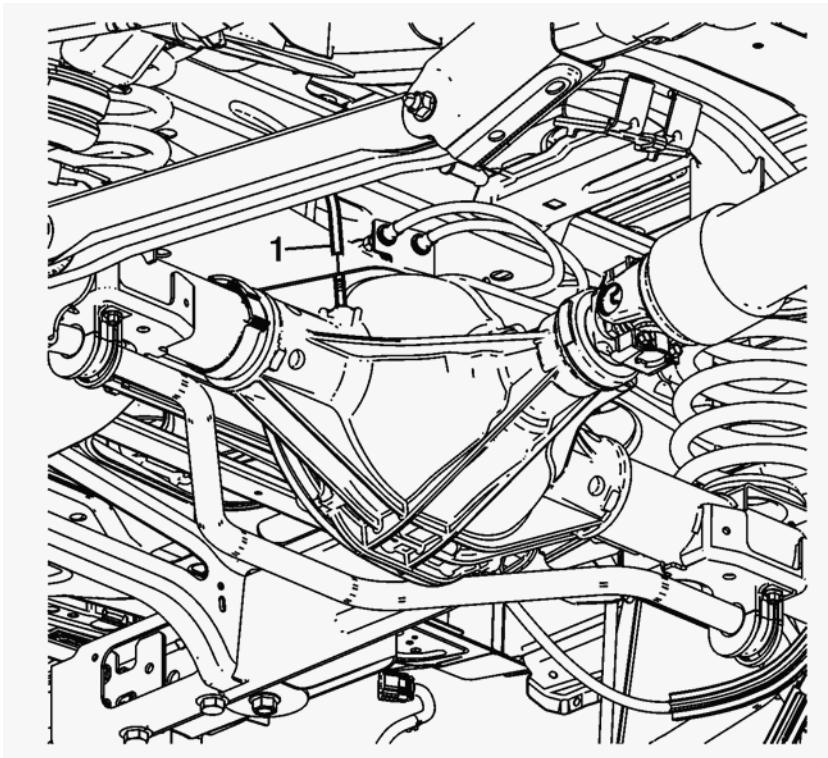


Fig. 195: Vent Hose And Rear Drive Axle

Courtesy of GENERAL MOTORS COMPANY

15. Install rear drive axle the vent hose.
 16. Install the rear wheel speed sensors. Refer to [Rear Wheel Speed Sensor Replacement](#).
 17. Install the rear axle lateral link. Refer to [Rear Suspension Lateral Link Replacement](#).
- NOTE:** **Rotate the stabilizer shaft links down into position to install them.**
18. Install the rear stabilizer shaft, if equipped. Refer to [Stabilizer Shaft Replacement](#).
 19. Install the rear brake calipers. Refer to [Rear Brake Caliper Replacement \(JD9\)](#) [Rear Brake Caliper Replacement \(J95\)](#).
 20. Install the rear propeller shaft. Refer to [Rear Propeller Shaft Replacement \(1500\)](#) [Rear Propeller Shaft Replacement \(Heavy Duty\)](#) [Rear Propeller Shaft Replacement \(M5U, 2WD\)](#).
 21. Install the air level sensors.
 - For the left side, refer to [Electronic Suspension Rear Position Sensor Replacement - Left Side](#).
 - For the right side, refer to [Electronic Suspension Rear Position Sensor Replacement - Right Side](#).
 22. Fill the rear drive axle with fluid. Refer to [Differential Oil Replacement \(8.6 Inch Axle\)](#) [Differential Oil Replacement \(9.5/9.76 Inch Axle\)](#).
 23. Install the rear tires and wheels. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#).
 24. Remove the supports and lower the vehicle.
 25. Calibrate the air level control, if needed. Refer to [Suspension Position Calibration \(With Z95\)](#) [Suspension Position Calibration \(With Z85\)](#).

REAR AXLE HOUSING REPLACEMENT

Removal Procedure

1. Remove the rear axle. Refer to [Rear Axle Replacement \(10.5 Inch Axle\)](#)[Rear Axle Replacement \(8.6/9.5/9.76 Inch Axles\)](#).
2. Remove the rear axle cover housing and gasket. Refer to [Rear Axle Housing Cover Gasket Replacement \(8.6/9.5/9.76 Inch Axle\)](#)[Rear Axle Housing Cover Gasket Replacement \(10.5 Inch Axle\)](#).
3. Remove the rear wheel speed sensor. Refer to [Rear Wheel Speed Sensor Replacement](#).
4. Remove the axle shafts. Refer to [Rear Axle Shaft Replacement](#).

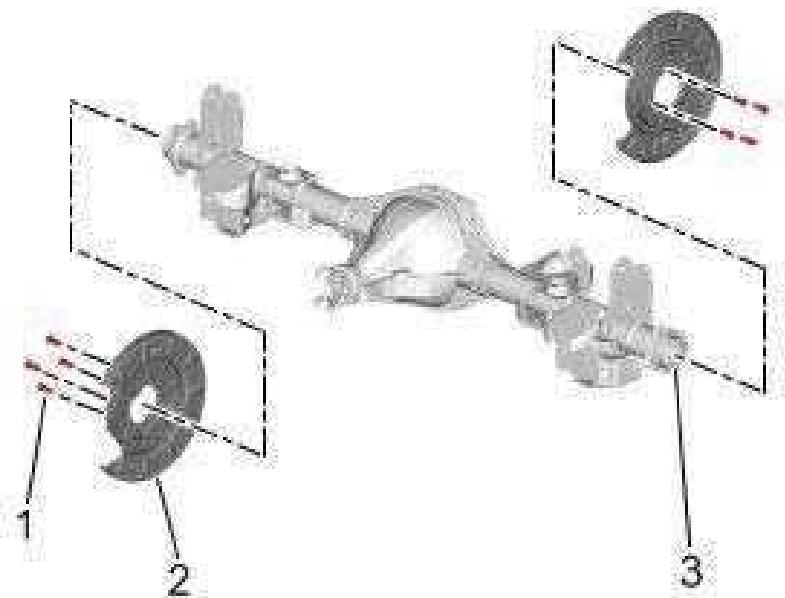


Fig. 196: Rear Brake Backing Plate

Courtesy of GENERAL MOTORS COMPANY

5. Remove the rear brake backing plate assembly bolts (1).
6. Remove the rear brake backing plate assemblies (2).
7. Remove the rear axle shaft oil seals and bearings (3). Refer to [Rear Axle Shaft Bearing Replacement](#).
8. Remove the drive pinion shaft yoke and oil seal. Refer to [Differential Drive Pinion Gear Seal Replacement \(8.6/9.5/9.76 Inch Axles\)](#)[Differential Drive Pinion Gear Seal Replacement \(10.5 Inch Axle\)](#).
9. Remove the differential assembly. Refer to [Differential Replacement \(8.6/9.5/9.76 Inch Axles\)](#)[Differential Replacement \(10.5 Inch Axle\)](#).
10. Remove the drive pinion and the inner pinion bearing. Refer to [Drive Pinion and Ring Gear Replacement \(8.6/9.5/9.76 Inch Axle\)](#)[Drive Pinion and Ring Gear Replacement \(10.5 Inch Axle\)](#).
11. Remove the pinion bearing cups. Refer to [Differential Drive Pinion Gear Bearing Replacement \(8.6/9.5/9.76 Inch Axles\)](#)[Differential Drive Pinion Gear Bearing Replacement \(10.5 Inch Axle\)](#).
12. Remove the rear wheel speed sensor ring. Refer to [Wheel Speed Sensor Reluctor Ring Replacement](#).

Installation Procedure

1. Install the pinion bearing cups. Refer to [Differential Drive Pinion Gear Bearing Replacement \(8.6/9.5/9.76 Inch Axles\)](#)[Differential Drive Pinion Gear Bearing Replacement \(10.5 Inch Axle\)](#).
2. Install the drive pinion oil seal. Refer to [Differential Drive Pinion Gear Seal Replacement \(8.6/9.5/9.76 Inch Axles\)](#)[Differential Drive Pinion Gear Seal Replacement \(10.5 Inch Axle\)](#).
3. Determine the selective shim thickness for the drive pinion. Refer to [Pinion Depth Adjustment \(8.6 Inch Axle\)](#)[Pinion Depth Adjustment \(10.5 Inch Axle\)](#)[Pinion Depth Adjustment \(9.5 Inch Axle\)](#)[Pinion Depth Adjustment \(9.76 Inch Axle\)](#).
4. Install the inner pinion bearing onto the drive pinion. Refer to [Differential Drive Pinion Gear Bearing Replacement \(8.6/9.5/9.76 Inch Axles\)](#)[Differential Drive Pinion Gear Bearing Replacement \(10.5 Inch Axle\)](#).
5. Install the drive pinion. Refer to [Drive Pinion and Ring Gear Replacement \(8.6/9.5/9.76 Inch Axle\)](#)[Drive Pinion and Ring Gear Replacement \(10.5 Inch Axle\)](#).
6. Install the pinion yoke. Refer to [Differential Drive Pinion Gear Seal Replacement \(8.6/9.5/9.76 Inch Axles\)](#)[Differential Drive Pinion Gear Seal Replacement \(10.5 Inch Axle\)](#).
7. Install the differential assembly. Refer to [Differential Replacement \(8.6/9.5/9.76 Inch Axles\)](#)[Differential Replacement \(10.5 Inch Axle\)](#).
8. Adjust the differential side bearing preload. Refer to [Differential Carrier Bearing Preload Adjustment \(9.5/9.76 Inch Axle\)](#)[Differential Carrier Bearing Preload Adjustment \(8.6 Inch Axle\)](#)[Differential Carrier Bearing Preload Adjustment \(10.5 Inch Axle\)](#).
9. Adjust the drive pinion to ring gear backlash. Refer to [Backlash Adjustment \(9.5/9.76 Inch Axle\)](#)[Backlash Adjustment \(8.6 Inch Axle\)](#)[Backlash Adjustment \(10.5 Inch Axle\)](#).
10. Perform a gear tooth contact pattern check. Refer to [Gear Tooth Contact Pattern Inspection](#).

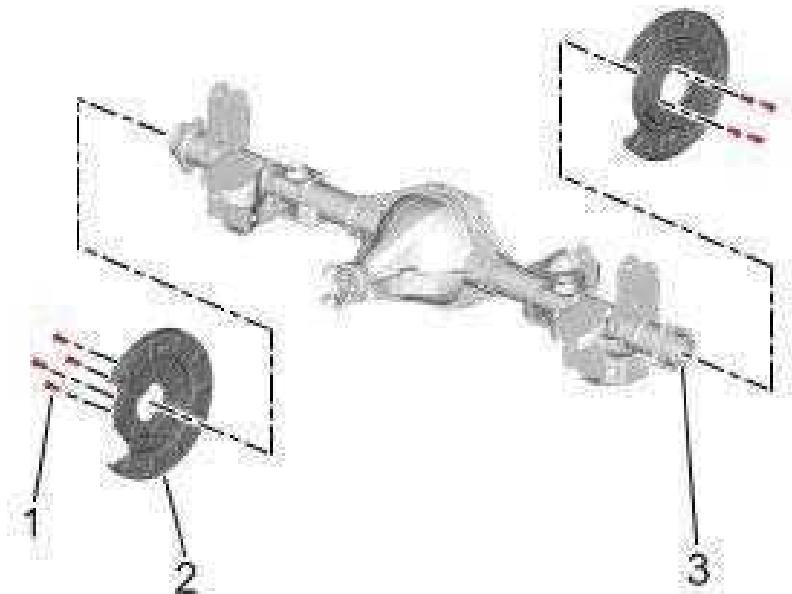


Fig. 197: Rear Brake Backing Plate

Courtesy of GENERAL MOTORS COMPANY

11. Install the rear axle shaft oil seals and bearings (3). Refer to [Rear Axle Shaft Bearing Replacement](#).
12. Install the rear brake backing plate assemblies (2).

CAUTION: Refer to [Fastener Caution](#) .

13. Install the rear brake backing plate assembly bolts (1) and tighten to 135 N.m (100 lb ft).
14. Install the axle shafts. Refer to [Rear Axle Shaft Replacement](#).
15. Install the rear axle cover housing and gasket. Refer to [Rear Axle Housing Cover Gasket Replacement \(8.6/9.5/9.76 Inch Axle\)](#)[Rear Axle Housing Cover Gasket Replacement \(10.5 Inch Axle\)](#).
16. Install the rear axle. Refer to [Rear Axle Replacement \(10.5 Inch Axle\)](#)[Rear Axle Replacement \(8.6/9.5/9.76 Inch Axles\)](#).
17. Install the rear wheel speed sensor. Refer to [Rear Wheel Speed Sensor Replacement](#).
18. Install the rear wheel speed sensor ring. Refer to [Wheel Speed Sensor Reluctor Ring Replacement](#).

DIFFERENTIAL DRIVE PINION GEAR SEAL REPLACEMENT (8.6/9.5/9.76 INCH AXLES)

Special Tools

- **J-8614-01** Flange Holder and Remover
- **J-38694** Pinion Oil Seal Installer
- **DT-50871** Pinion Oil Seal Installer

For equivalent regional tools, refer to [Special Tools](#).

Removal Procedure

NOTE: Observe and mark the positions of all the driveline components, relative to the propeller shaft and the axles, prior to disassembly. These components include the propeller shafts, drive axles, pinion flanges, output shafts, etc. Reassemble all the components in the exact places in which you removed the parts. Follow any specifications, torque values, and any measurements made prior to disassembly.

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Remove the rear tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#)[Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#) .
3. Remove the rear disc brake rotor, if equipped. Refer to [Rear Brake Rotor Replacement \(JD9\)](#)[Rear Brake Rotor Replacement \(J95\)](#) .

NOTE: Reference mark the rear propeller shaft to the rear axle pinion yoke.

4. Remove the propeller shaft. Refer to: [Rear Propeller Shaft Replacement \(1500\)](#)[Rear Propeller Shaft Replacement \(Heavy Duty\)](#)[Rear Propeller Shaft Replacement \(M5U, 2WD\)](#) .

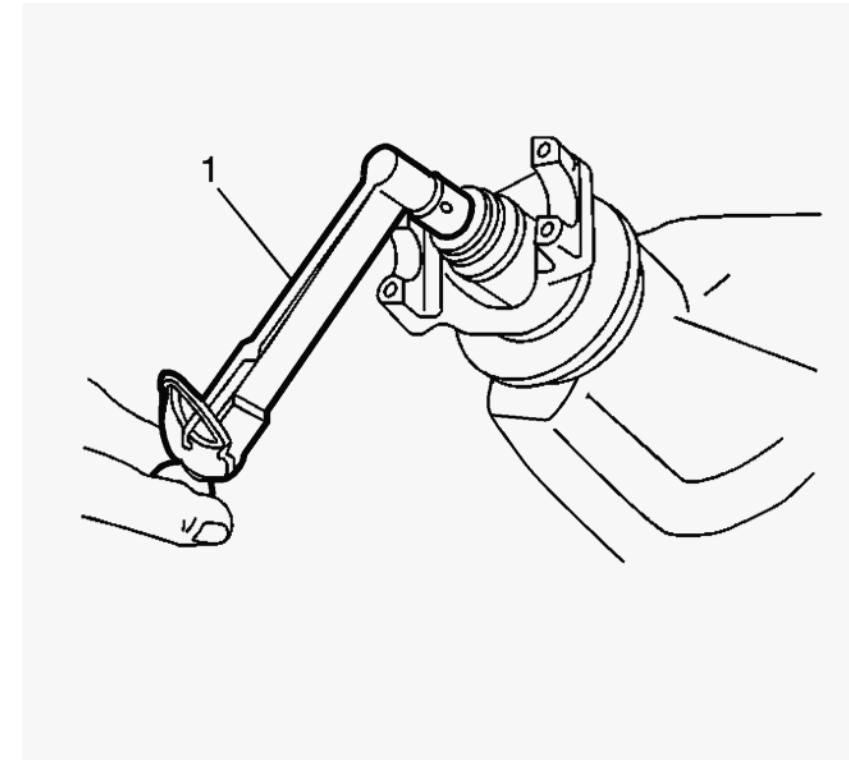


Fig. 198: Measuring Pinion Rotating Torque

Courtesy of GENERAL MOTORS COMPANY

NOTE: Record this measurement for reassembly.

5. Using an inch-pound torque wrench, measure the rotational torque of the differential ring and pinion gear and related components.

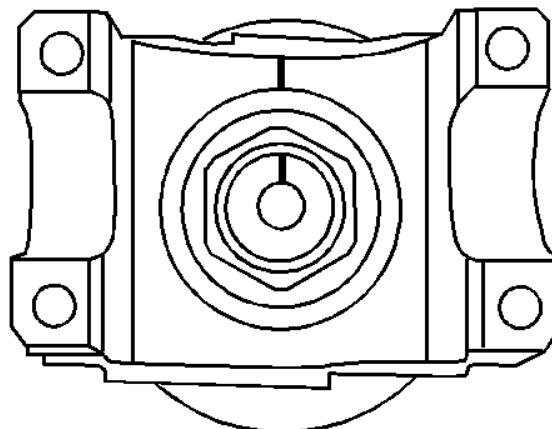


Fig. 199: Pinion Shaft And Pinion Yoke Alignment Marks

Courtesy of GENERAL MOTORS COMPANY

6. Place an alignment mark between the pinion and the pinion yoke.

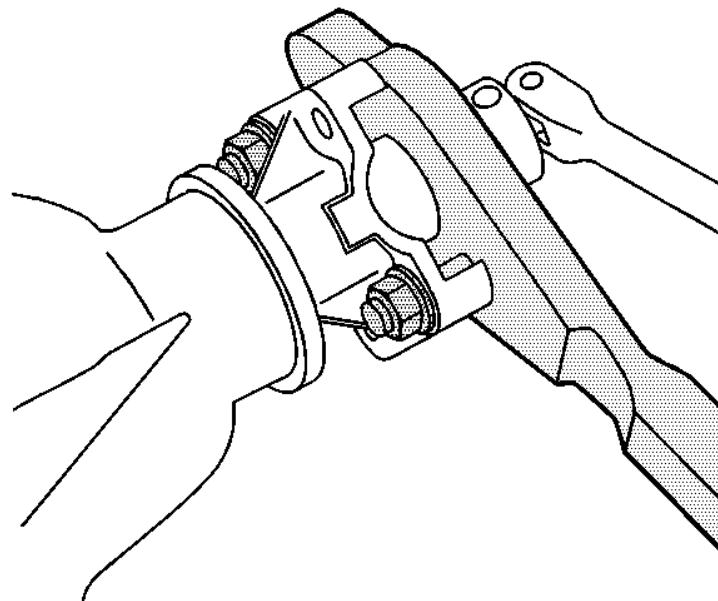


Fig. 200: Holding Pinion Yoke With Special Tool

Courtesy of GENERAL MOTORS COMPANY

NOTE:

- DO NOT reuse the pinion nut, replace with NEW.
- 9.5/9.76 axle pinion nut may require increased effort to break the nut staking loose before nut can be easily removed.

7. Using the **J-8614-01** holder and remover or the J-34826 socket, remove and discard the pinion nut.

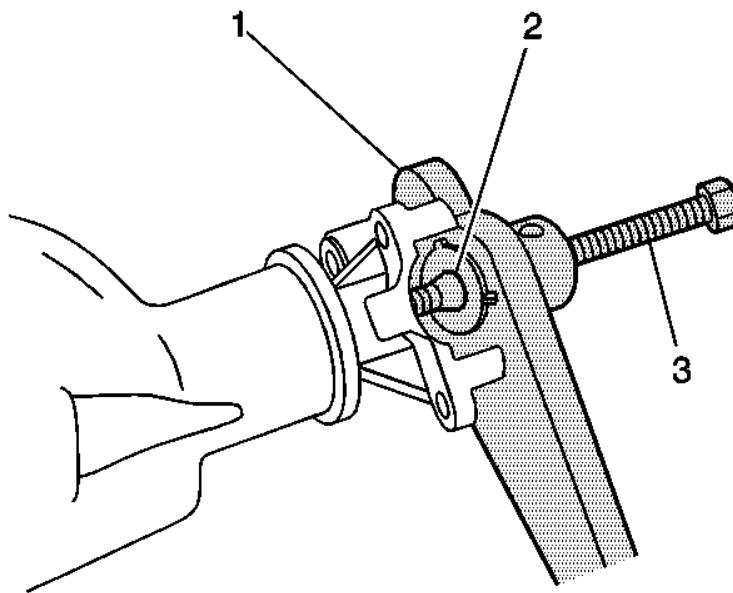


Fig. 201: Removing Pinion Yoke Using Special Tools

Courtesy of GENERAL MOTORS COMPANY

NOTE: Remove the pinion yoke by turning the J 8614-3 (3) clockwise.

8. Using the J-8614-2 (2), J-8614-3 (3) and the **J-8614-01** remover (1), remove the pinion yoke.

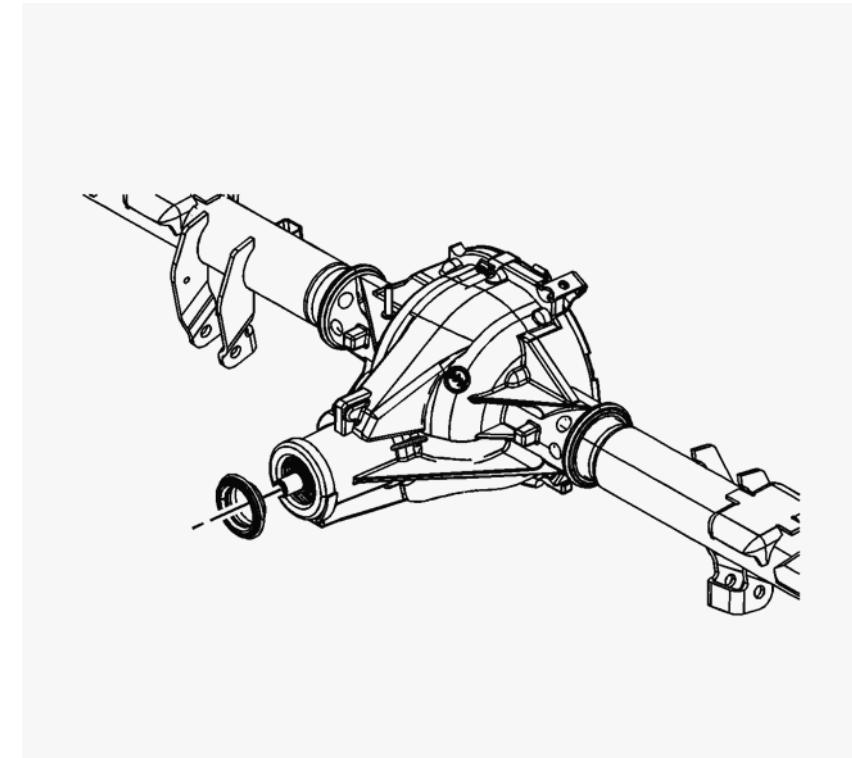


Fig. 202: Pinion Oil Seal

Courtesy of GENERAL MOTORS COMPANY

NOTE: DO NOT damage the axle housing.

9. Using a suitable tool, remove the pinion oil seal.

Installation Procedure

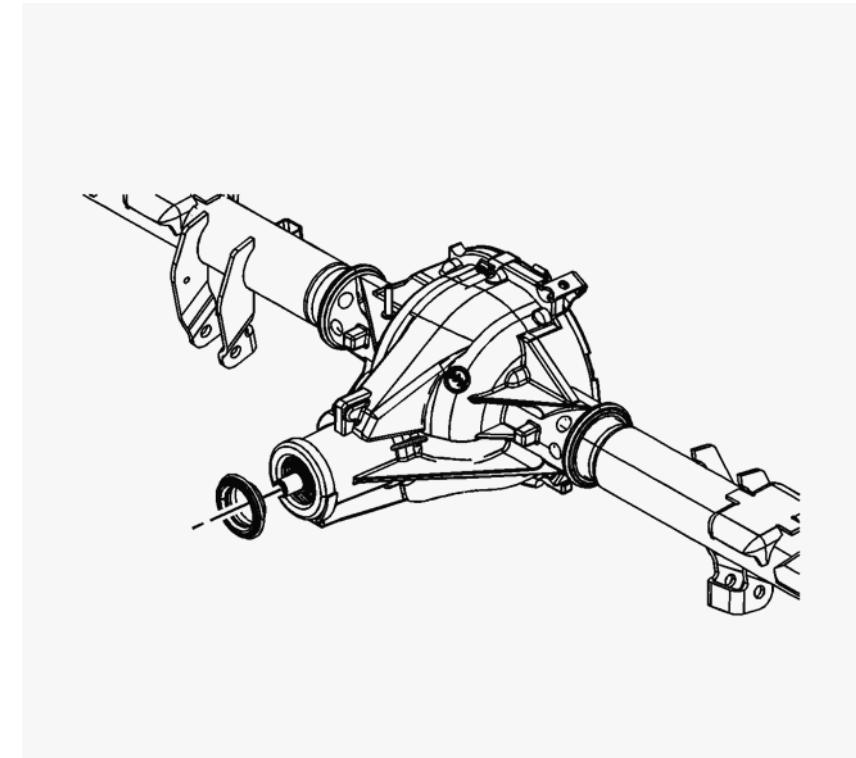


Fig. 203: Pinion Oil Seal

Courtesy of GENERAL MOTORS COMPANY

NOTE: Check pinion seal bore and inside of carrier to make sure both are clean and free of debris, corrosion, and/or burrs.

1. Using the **J-38694** installer, 8.6 inch axle, or the **DT-50871** installer, 9.5/9.76 inch axle, install the new pinion oil seal.

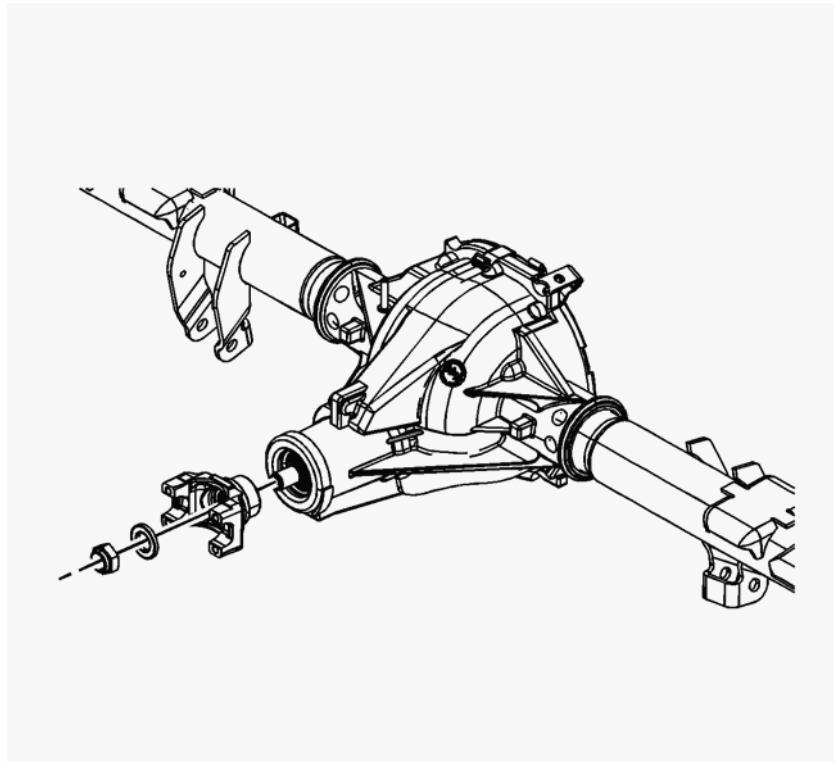


Fig. 204: Installing Pinion Yoke, Nut And Washer

Courtesy of GENERAL MOTORS COMPANY

NOTE: Do not apply excessive amounts of sealant to pinion yoke.

2. Apply the proper sealant to the splines of the pinion yoke. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).
3. Align the reference marks and install the pinion yoke.

CAUTION: Refer to [Pinion Flange/Yoke Installation Caution](#) .

4. Using a soft faced hammer, seat the pinion yoke onto the pinion shaft until a few threads are visible.
5. Install the washer (if applicable) and a NEW pinion nut.

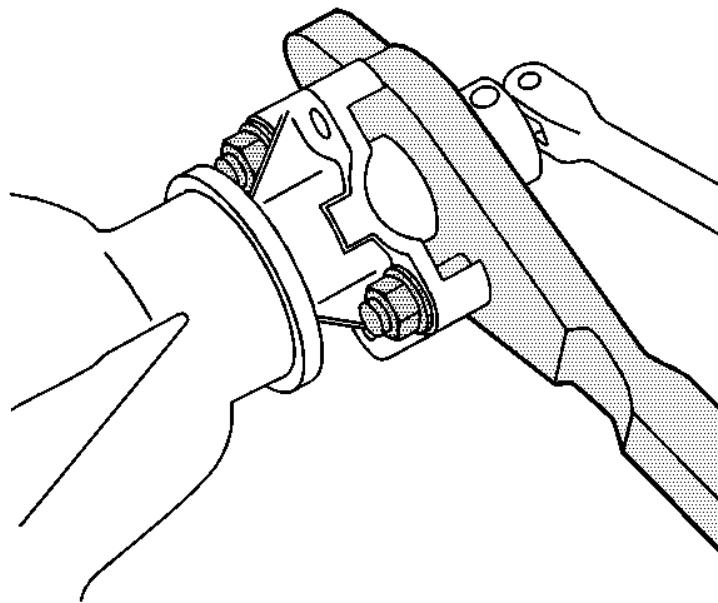


Fig. 205: Holding Pinion Yoke With Special Tool

Courtesy of GENERAL MOTORS COMPANY

NOTE: If the target rotating torque is exceeded during reassembly, the pinion flange assembly will have to be removed and a new collapsible spacer installed.

6. Holding the **J-8614-01** holder, tighten the pinion nut until the pinion end play is just taken up.
7. Frequently rotate the pinion while tightening the nut to seat the bearings.

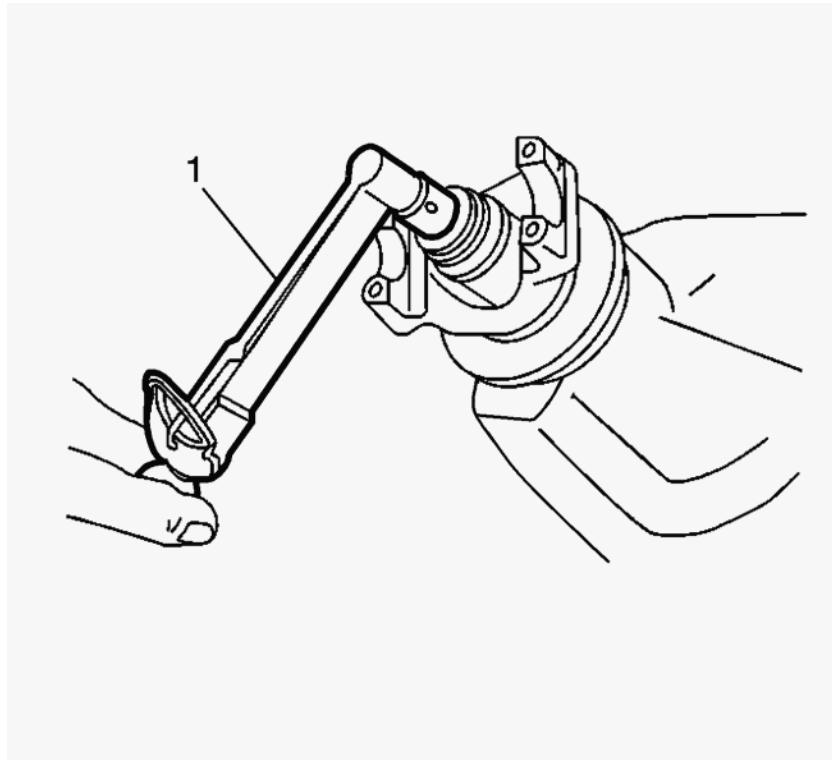


Fig. 206: Measuring Pinion Rotating Torque

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to [Fastener Caution](#).

NOTE: Compare this measurement with the rotating torque recorded during removal.

8. Using an inch pound torque wrench and tightening in small increments, measure the rotating torque of the pinion until the reading 0.40-0.57 N.m (3-5 lb in) greater than the rotational torque noted at removal.

NOTE:

- Recheck the rotating torque and adjust if necessary.
- **9.5 and 9.76 Axle** - Use a hammer and punch to stake two sides of the drive pinion nut lip to the corresponding grooves in the drive pinion gear.
- Take care to not split the nut lip which could affect nut torque retention. If nut lip is split, use new nut.

9. Once the specified torque is obtained, rotate the pinion several times to seat the bearings.

NOTE: Realign the reference marks on the rear propeller shaft and the rear axle pinion yoke.

10. Install the propeller shaft. Refer to: [Rear Propeller Shaft Replacement \(1500\)](#) [Rear Propeller Shaft Replacement \(Heavy Duty\)](#) [Rear Propeller Shaft Replacement \(M5U, 2WD\)](#).

11. Install the rear disc brake rotor, if equipped. Refer to [Rear Brake Rotor Replacement \(JD9\)](#) [Rear Brake Rotor Replacement \(J95\)](#).

12. Install the rear tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#).

13. Inspect and add axle lubricant to the axle housing, if necessary. Refer to [Rear Axle Lubricant Level Inspection \(8.6, 9.5/9.76 Inch Axle\)](#).

14. Remove the support and lower the vehicle.

DIFFERENTIAL DRIVE PINION GEAR SEAL REPLACEMENT (10.5 INCH AXLE)

Special Tools

- **J-8614-01** Flange Holder and Remover
- **J-44414** Pinion Oil Seal Installer
- **J-34826** Hub Nut Socket - 36 mm

Equivalent regional tools: [Special Tools](#)

Removal Procedure

NOTE: Observe and mark the positions of all the driveline components, relative to the propeller shaft and the axles, prior to disassembly. These components include the propeller shafts, drive axles, pinion flanges, output shafts, etc. Reassemble all the components in the exact places in which you removed the parts. Follow any specifications, torque values, and any measurements made prior to disassembly.

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#)
2. Remove the rear tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#)
3. Remove the rear disc brake rotor, if equipped. Refer to [Rear Brake Rotor Replacement \(JD9\)](#) [Rear Brake Rotor Replacement \(J95\)](#)
4. Remove the rear axle shafts. Refer to [Rear Axle Shaft and Gasket Replacement \(10.5 Inch Axle\)](#)

NOTE: Reference mark the rear propeller shaft to the rear axle pinion yoke.

5. Remove the propeller shaft. Refer to [Rear Propeller Shaft Replacement \(Heavy Duty\)](#) [Rear Propeller Shaft Replacement \(M5U, 2WD\)](#)

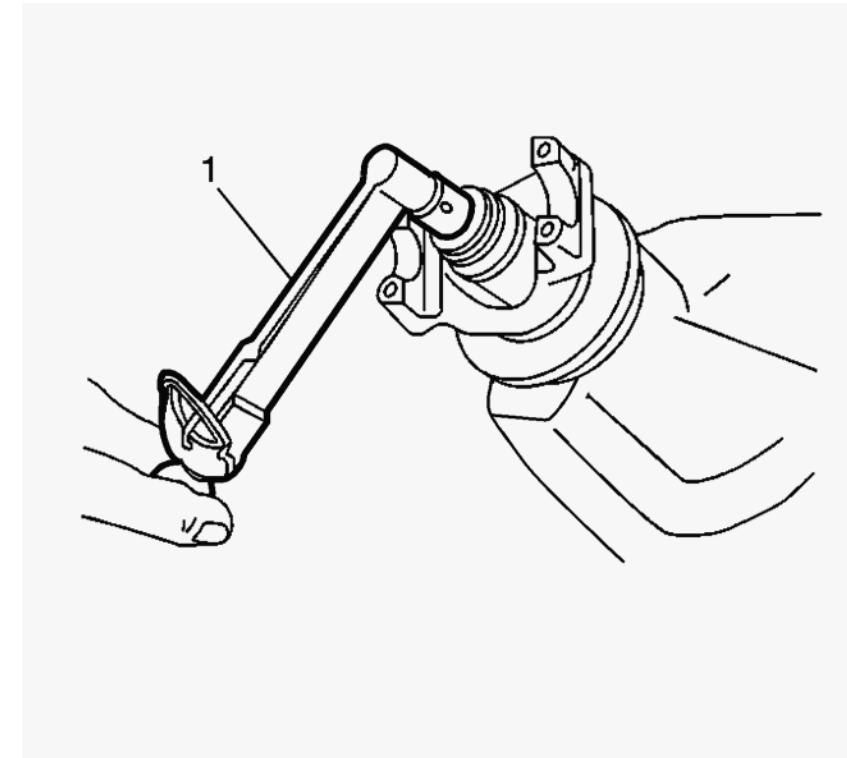


Fig. 207: Measuring Pinion Rotating Torque

Courtesy of GENERAL MOTORS COMPANY

NOTE: Record this measurement for reassembly.

6. Using an inch-pound torque wrench, measure the rotational torque of the differential ring and pinion gear and related components.

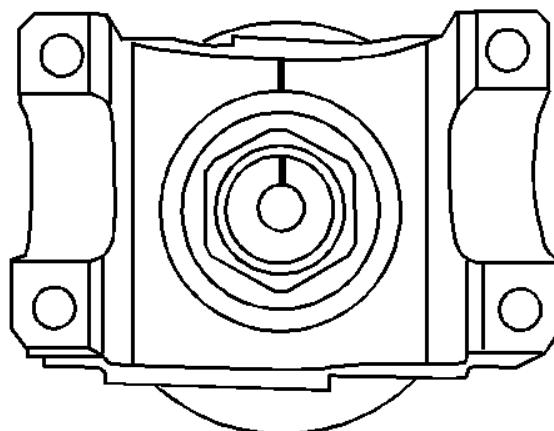


Fig. 208: Pinion Shaft And Pinion Yoke Alignment Marks

Courtesy of GENERAL MOTORS COMPANY

7. Place an alignment mark between the pinion and the pinion yoke.

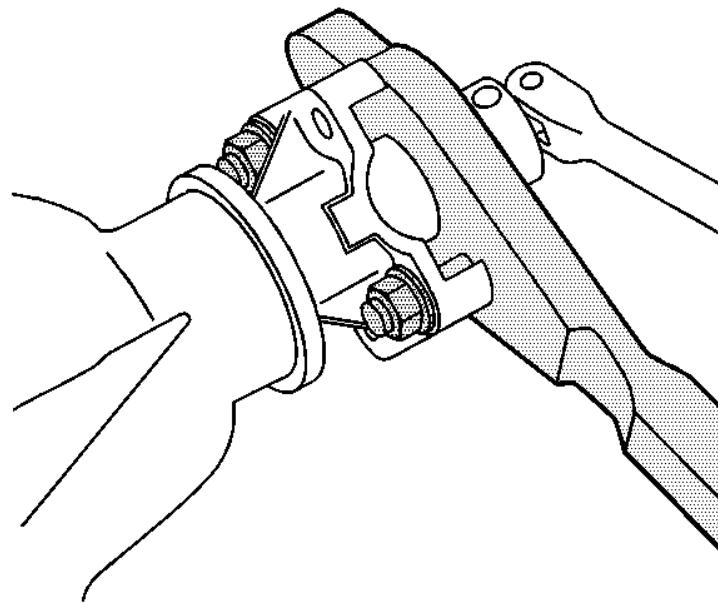


Fig. 209: Holding Pinion Yoke With Special Tool

Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **DO NOT reuse the pinion nut, replace with NEW.**
- **For the 11.5 inch axle, use J-34826 socket.**

8. Using the **J-8614-01** holder and remover or the **J-34826** socket, remove and discard the pinion the pinion nut.

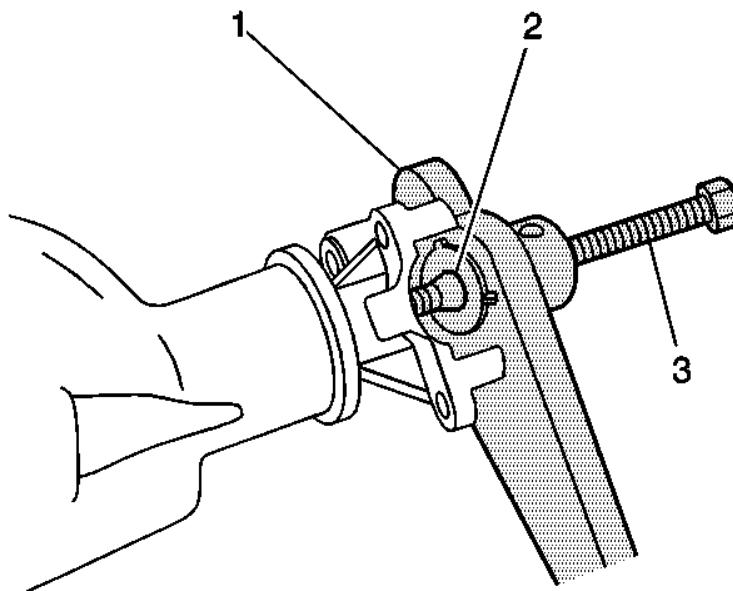


Fig. 210: Removing Pinion Yoke Using Special Tools

Courtesy of GENERAL MOTORS COMPANY

NOTE: Remove the pinion yoke by turning the J-8614-3 (3) clockwise.

9. Using the J-8614-2 (2), J-8614-3 (3) and the J-8614-01 remover (1), remove the pinion yoke.

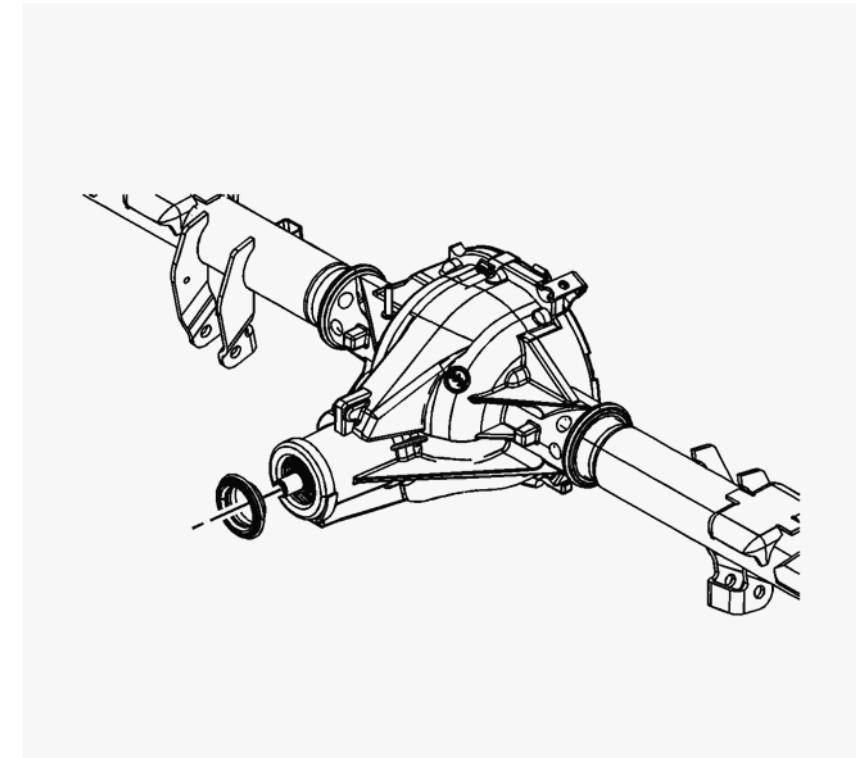


Fig. 211: Pinion Oil Seal

Courtesy of GENERAL MOTORS COMPANY

NOTE: DO NOT damage the axle housing.

10. Using a suitable tool, remove the pinion oil seal.

Installation Procedure

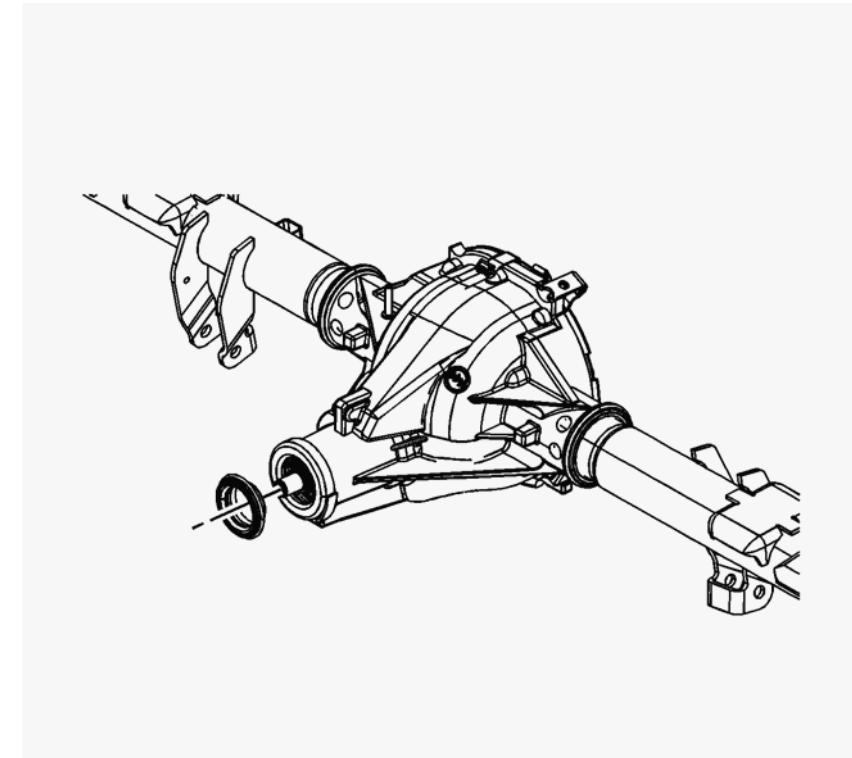


Fig. 212: Pinion Oil Seal

Courtesy of GENERAL MOTORS COMPANY

1. Using the **J-44414** pinion oil seal installer, install the new pinion oil seal.

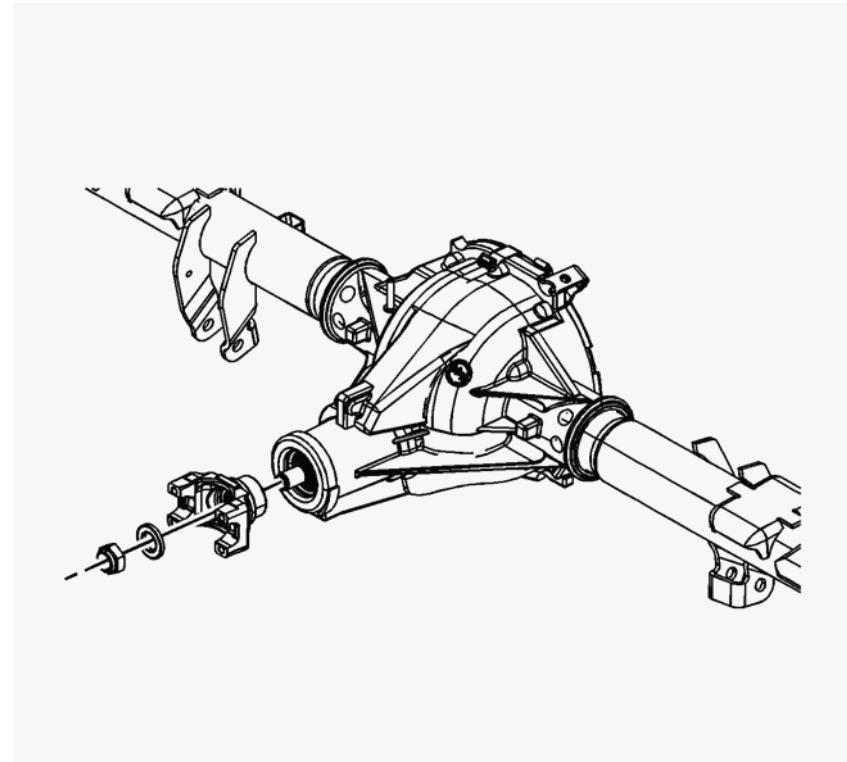


Fig. 213: Installing Pinion Yoke, Nut And Washer

Courtesy of GENERAL MOTORS COMPANY

2. Apply the proper sealant to the splines of the pinion yoke. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#)
3. Align the reference marks and install the pinion yoke.

CAUTION: Refer to [Pinion Flange/Yoke Installation Caution](#) .

NOTE: Tap the pinion yoke until a few threads show through the pinion yoke.

4. Using a soft faced hammer, seat the pinion yoke onto the pinion shaft.
5. Install the washer and a NEW pinion nut.

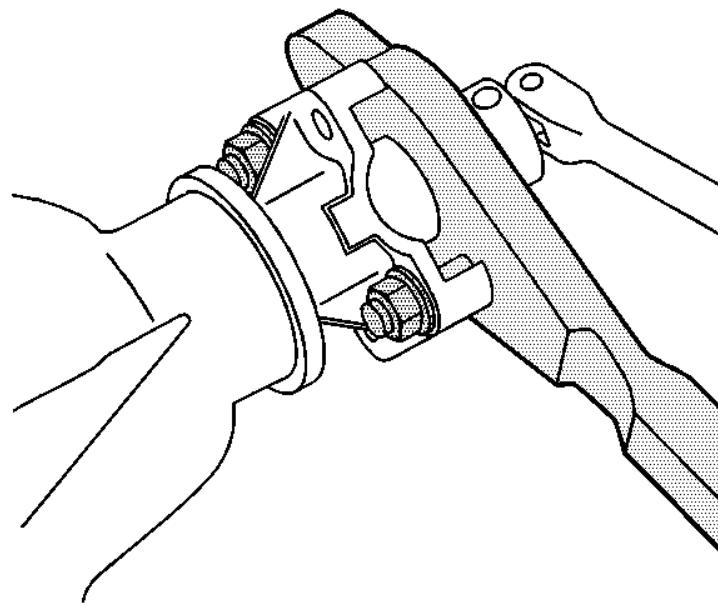


Fig. 214: Holding Pinion Yoke With Special Tool

Courtesy of GENERAL MOTORS COMPANY

NOTE:

- If the rotating torque is exceeded, the pinion will have to be removed and a new collapsible spacer installed.
- For the 11.5 inch axle, use J-34826 socket.

6. Holding the **J 8614-01** holder or the **J-34826** socket, tighten the pinion nut until the pinion end play is just taken up.

7. Rotate the pinion while tightening the nut to seat the bearings.

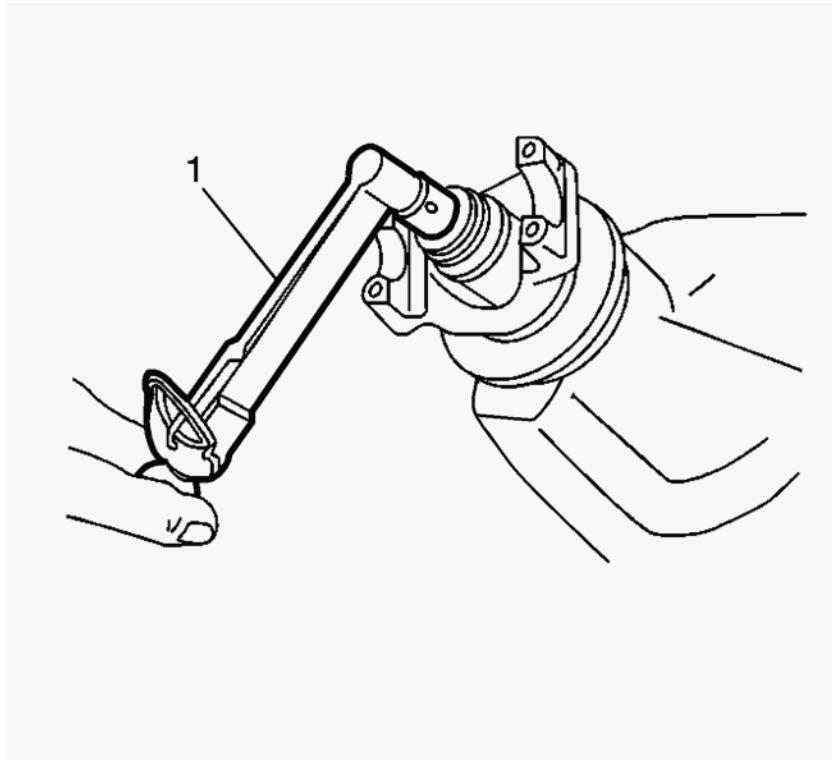


Fig. 215: Measuring Pinion Rotating Torque

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to [Fastener Caution](#).

NOTE: Compare this measurement with the rotating torque recorded during removal.

8. Using an inch pound torque wrench and tightening in small increments, measure the rotating torque of the pinion until the reading is greater than 0.40-0.57 N.m (3-5 lb in), the rotational torque noted at removal.

NOTE: Recheck the rotating torque and adjust if necessary.

9. Once the specified torque is obtained, rotate the pinion several times to seat the bearings.

NOTE: Reference mark the rear propeller shaft to the rear axle pinion yoke.

10. Install the propeller shaft. Refer to [Rear Propeller Shaft Replacement \(Heavy Duty\) Rear Propeller Shaft Replacement \(M5U, 2WD\)](#)

11. Install the rear axle shafts. Refer to [Rear Axle Shaft and Gasket Replacement \(10.5 Inch Axle\)](#)

12. Install the rear disc brake rotor, if equipped. Refer to [Rear Brake Rotor Replacement \(JD9\) Rear Brake Rotor Replacement \(J95\)](#)

13. Install the rear tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\) Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#)

14. Inspect and add axle lubricant to the axle housing, if necessary. Refer to [Rear Axle Lubricant Level Inspection \(10.5 Inch Axle\)](#)

15. Remove the support and lower the vehicle.

DIFFERENTIAL DRIVE PINION GEAR YOKE REPLACEMENT (8.6/9.5/9.76 INCH AXLES)

Special Tools

J-8614-01 Flange Holder and Remover

For equivalent regional tools, refer to [Special Tools](#).

Removal Procedure

NOTE: Observe and mark the positions of all the driveline components, relative to the propeller shaft and the axles, prior to disassembly. These components include the propeller shafts, drive axles, pinion flanges, output shafts, etc. Reassemble all the components in the exact places in which you removed the parts. Follow any specifications, torque values, and any measurements made prior to disassembly.

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the rear tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#).
3. Remove the rear disc brake rotor, if equipped. Refer to [Rear Brake Rotor Replacement \(JD9\)](#) [Rear Brake Rotor Replacement \(J95\)](#).
4. Remove the propeller shaft. Refer to: [Rear Propeller Shaft Replacement \(1500\)](#) [Rear Propeller Shaft Replacement \(Heavy Duty\)](#) [Rear Propeller Shaft Replacement \(M5U, 2WD\)](#).

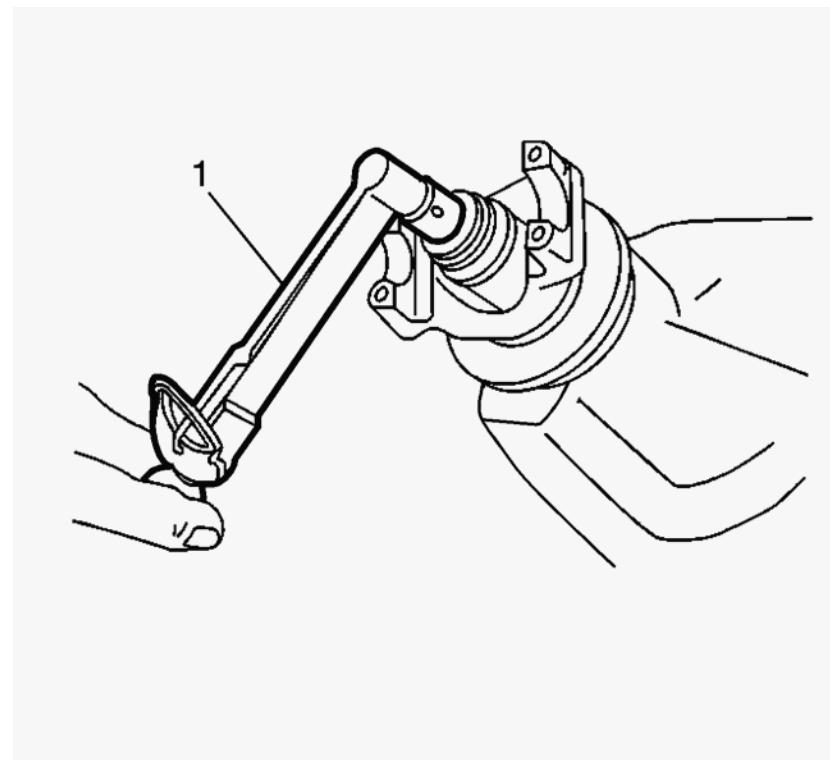


Fig. 216: Measuring Pinion Rotating Torque

Courtesy of GENERAL MOTORS COMPANY

NOTE: Record this measurement for reassembly.

- Using an inch-pound torque wrench, measure the rotational torque of the differential ring and pinion gear and related components.

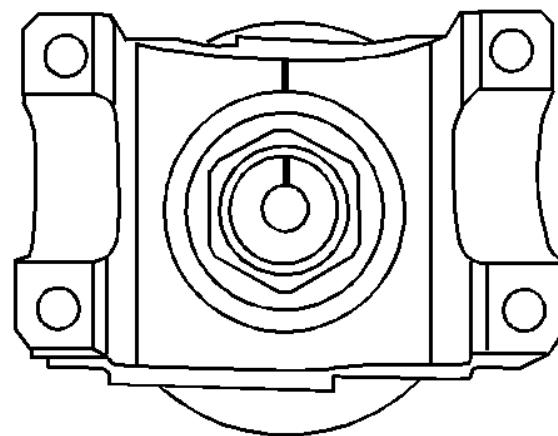


Fig. 217: Pinion Shaft And Pinion Yoke Alignment Marks

Courtesy of GENERAL MOTORS COMPANY

- Place an alignment mark between the pinion and the pinion yoke.

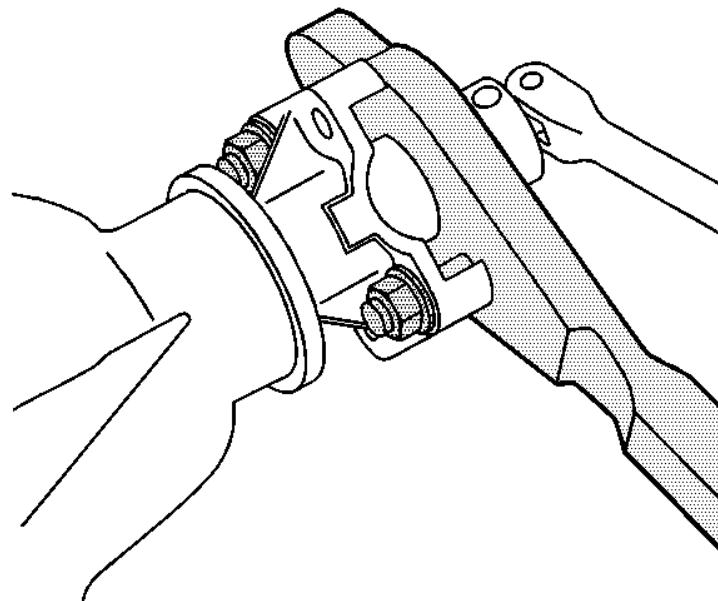


Fig. 218: Holding Pinion Yoke With Special Tool

Courtesy of GENERAL MOTORS COMPANY

NOTE:

- DO NOT reuse the pinion nut, replace with NEW.
- 9.5/9.76 axle pinion nut may require increased effort to break the nut staking loose before nut can be easily removed.

7. Using the **J-8614-01** holder and remover or the **J-34826** socket, remove and discard the pinion nut.

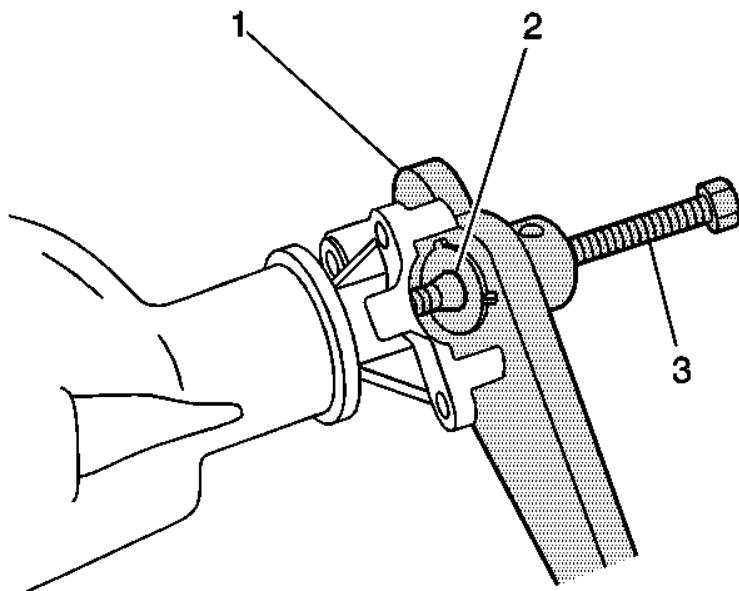


Fig. 219: Removing Pinion Yoke Using Special Tools

Courtesy of GENERAL MOTORS COMPANY

8. Using the J-8614-2 (2), J-8614-3 (3) and the **J-8614-01** remover (1), remove the pinion yoke. Remove the pinion yoke by turning the J-8614-3 (3) clockwise.

Installation Procedure

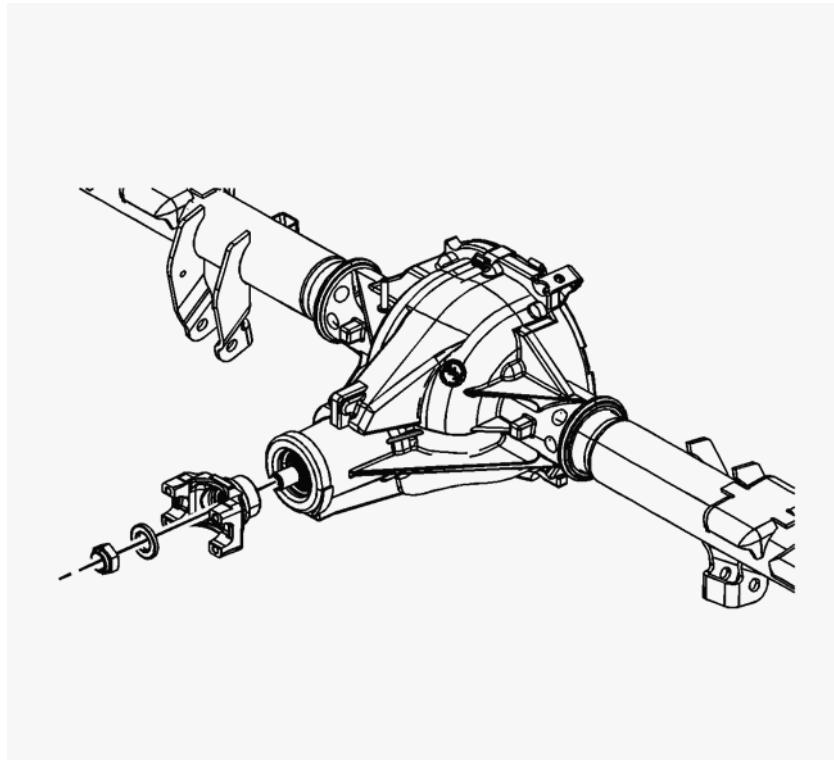


Fig. 220: Installing Pinion Yoke, Nut And Washer

Courtesy of GENERAL MOTORS COMPANY

NOTE: Do not apply excessive amounts of sealant to pinion yoke.

1. Apply the proper sealant to the splines of the pinion yoke. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).
2. Align the reference marks and install the pinion yoke.

CAUTION: Refer to [Pinion Flange/Yoke Installation Caution](#) .

3. Using a soft faced hammer, seat the pinion yoke onto the pinion shaft until a few threads are visible.
4. Install the washer (if applicable) and a NEW pinion nut.

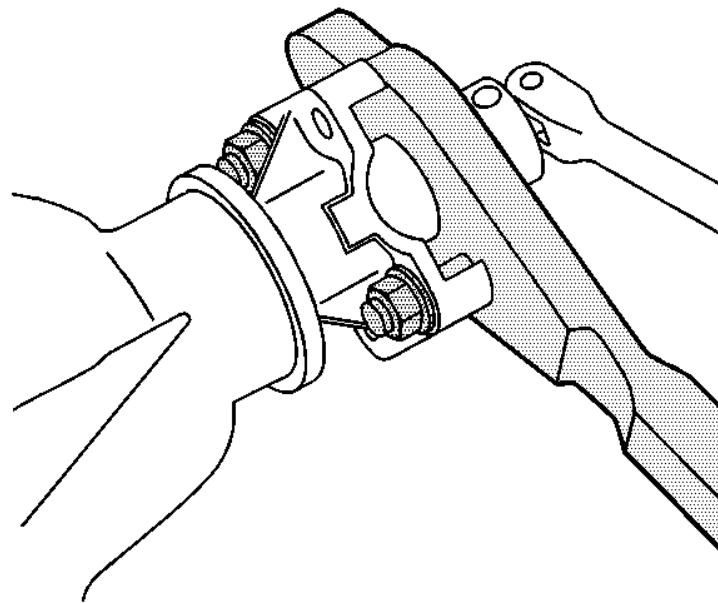


Fig. 221: Holding Pinion Yoke With Special Tool

Courtesy of GENERAL MOTORS COMPANY

NOTE: If the target rotating torque is exceeded during reassembly, the pinion flange assembly will have to be removed and a new collapsible spacer installed.

5. Holding the **J-8614-01** holder, tighten the pinion nut until the pinion end play is just taken up.
6. Frequently rotate the pinion while tightening the nut to seat the bearings.

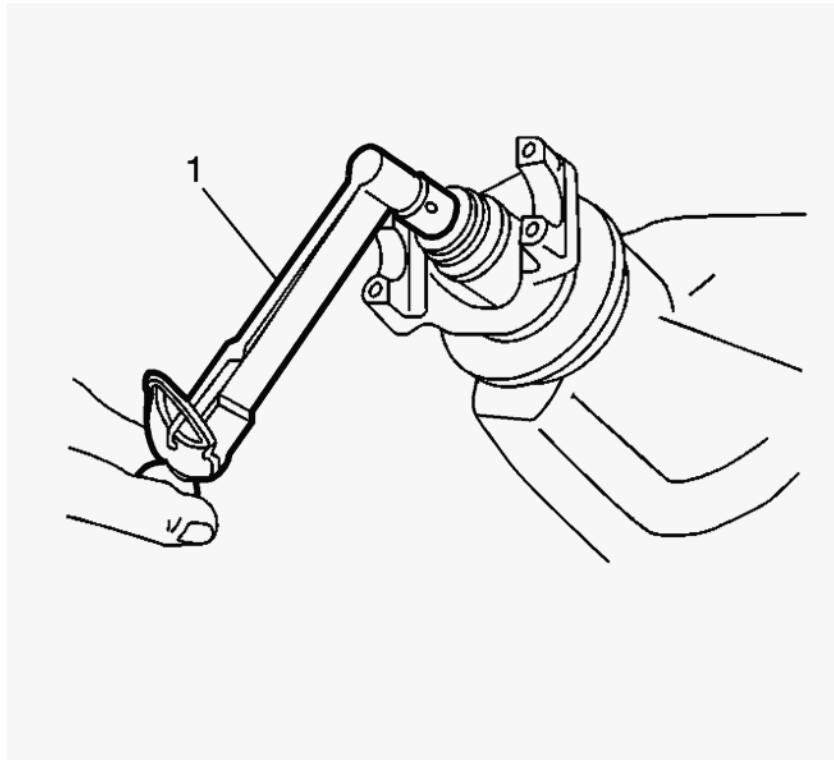


Fig. 222: Measuring Pinion Rotating Torque

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to [Fastener Caution](#) .

NOTE: Compare this measurement with the rotating torque recorded during removal.

7. Using an inch pound torque wrench and tightening in small increments, measure the rotating torque of the pinion until the reading 0.40-0.57 N.m (3-5 lb in) greater than the rotational torque noted at removal.

NOTE:

- Recheck the rotating torque and adjust if necessary.
- **9.5 and 9.76 Axle** - Use a hammer and punch to stake two sides of the drive pinion nut lip to the corresponding grooves in the drive pinion gear.
- Take care to not split the nut lip which could affect nut torque retention. If nut lip is split, use new nut.

8. Once the specified torque is obtained, rotate the pinion several times to seat the bearings.

NOTE: Realign the reference marks on the rear propeller shaft and the rear axle pinion yoke.

9. Install the propeller shaft. Refer to: [Rear Propeller Shaft Replacement \(1500\)](#) [Rear Propeller Shaft Replacement \(Heavy Duty\)](#) [Rear Propeller Shaft Replacement \(M5U, 2WD\)](#) .

10. Install the rear disc brake rotor, if equipped. Refer to [Rear Brake Rotor Replacement \(JD9\)](#) [Rear Brake Rotor Replacement \(J95\)](#) .

11. Install the rear tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#) .

12. Inspect and add axle lubricant to the axle housing, if necessary. Refer to [Rear Axle Lubricant Level Inspection \(8.6, 9.5/9.76 Inch Axle\)](#).

13. Remove the support and lower the vehicle.

DIFFERENTIAL DRIVE PINION GEAR YOKE REPLACEMENT (10.5 INCH AXLE)

Special Tools

- **J-8614-01** Flange Holder and Remover
- **J-22388** Pinion Oil Seal Installer
- **J-34826** Hub Nut Socket - 36 mm

Equivalent regional tools: [Special Tools](#)

Removal Procedure

NOTE: Observe and mark the positions of all the driveline components, relative to the propeller shaft and the axles, prior to disassembly. These components include the propeller shafts, drive axles, pinion flanges, output shafts, etc. Reassemble all the components in the exact places in which you removed the parts. Follow any specifications, torque values, and any measurements made prior to disassembly.

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#)
2. Remove the rear tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#)
3. Remove the rear disc brake rotor, if equipped. Refer to [Rear Brake Rotor Replacement \(JD9\)](#) [Rear Brake Rotor Replacement \(J95\)](#)
4. Remove the rear axle shafts. Refer to [Rear Axle Shaft and Gasket Replacement \(10.5 Inch Axle\)](#)

NOTE: Reference mark the rear propeller shaft to the rear axle pinion yoke.

5. Remove the propeller shaft. Refer to [Rear Propeller Shaft Replacement \(Heavy Duty\)](#) [Rear Propeller Shaft Replacement \(M5U, 2WD\)](#)

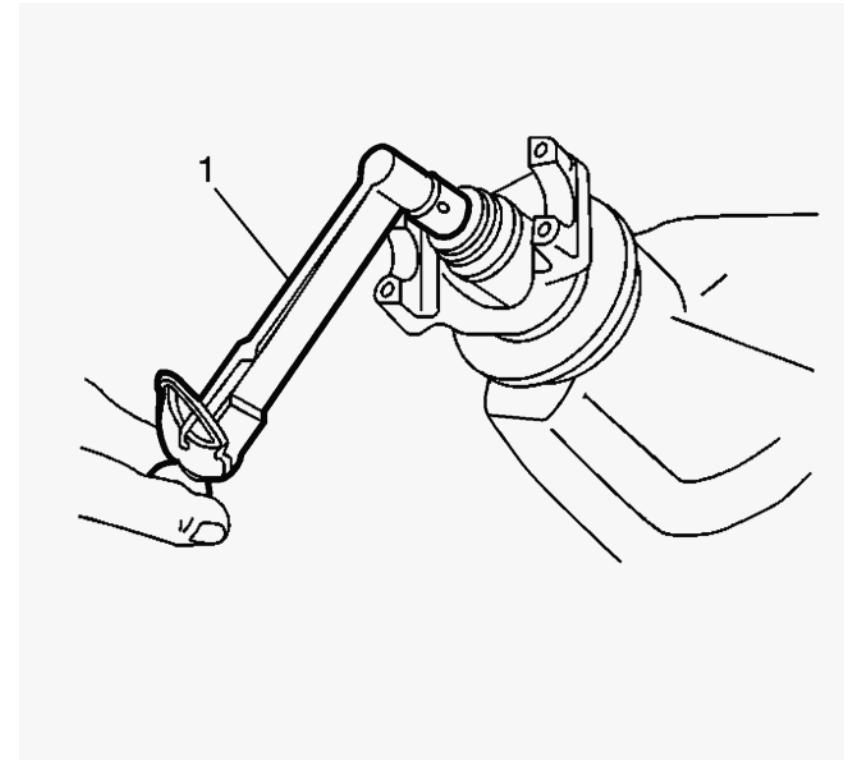


Fig. 223: Measuring Pinion Rotating Torque

Courtesy of GENERAL MOTORS COMPANY

NOTE: Record this measurement for reassembly.

6. Using an inch-pound torque wrench, measure the rotational torque of the differential ring and pinion gear and related components.

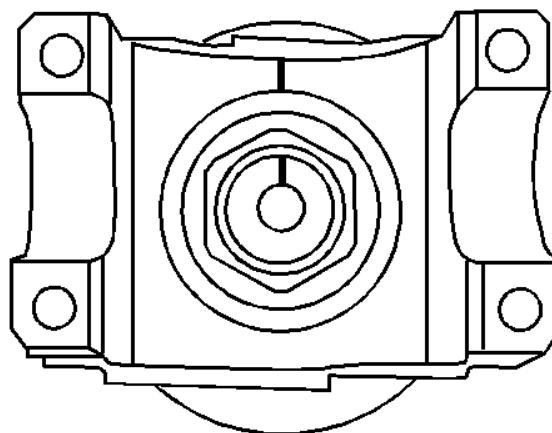


Fig. 224: Pinion Shaft And Pinion Yoke Alignment Marks

Courtesy of GENERAL MOTORS COMPANY

7. Place an alignment mark between the pinion and the pinion yoke.

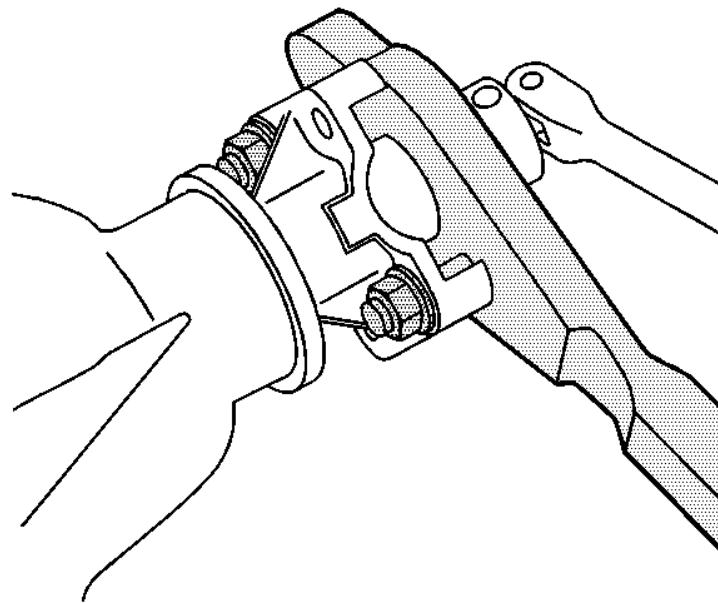


Fig. 225: Holding Pinion Yoke With Special Tool

Courtesy of GENERAL MOTORS COMPANY

- NOTE:**
- DO NOT reuse the pinion nut, replace with NEW.
 - For the 11.5 inch axle, use J-34826 socket.

8. Using the **J-8614-01** holder and remover or the **J-34826** socket, remove and discard the pinion the pinion nut.

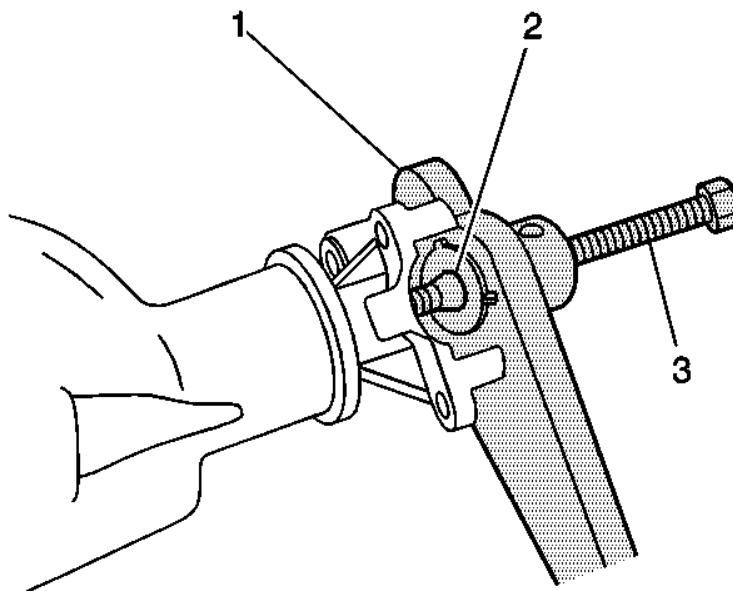


Fig. 226: Removing Pinion Yoke Using Special Tools

Courtesy of GENERAL MOTORS COMPANY

NOTE: Remove the pinion yoke by turning the J-8614-3 (3) clockwise.

9. Using the J-8614-2 (2), J-8614-3 (3) and the J-8614-01 remover (1), remove the pinion yoke.

Installation Procedure

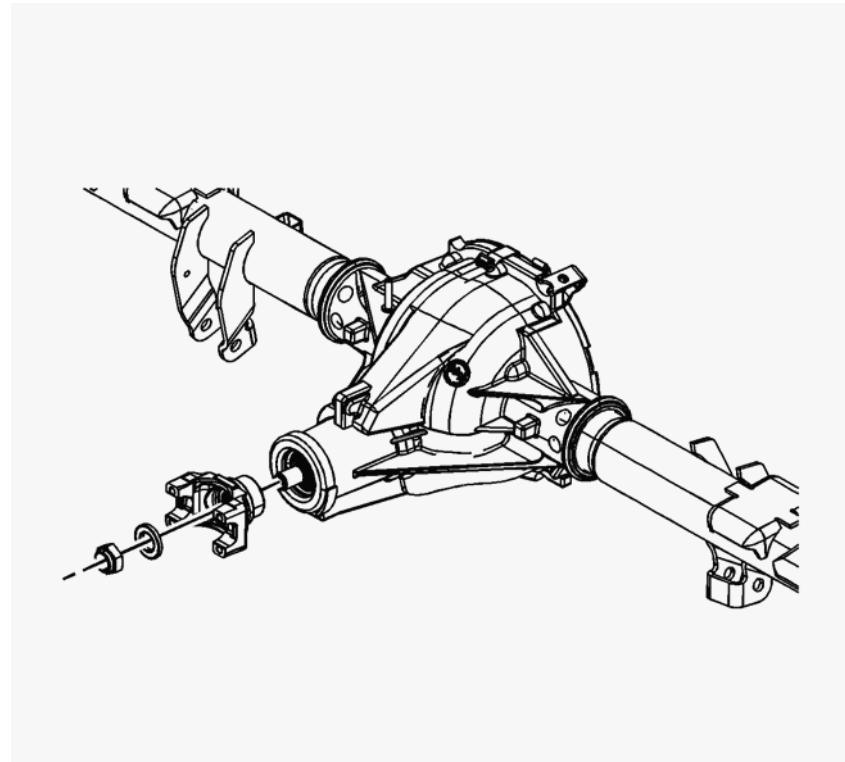


Fig. 227: Installing Pinion Yoke, Nut And Washer

Courtesy of GENERAL MOTORS COMPANY

1. Apply the proper sealant to the splines of the pinion yoke. [Adhesives, Fluids, Lubricants, and Sealers](#)
2. Align the reference marks and install the pinion yoke.

CAUTION: Refer to [Pinion Flange/Yoke Installation Caution](#) .

NOTE: Tap the pinion yoke until a few threads show through the pinion yoke.

3. Using a soft faced hammer, seat the pinion yoke onto the pinion shaft.
4. Install the washer and a NEW pinion nut.

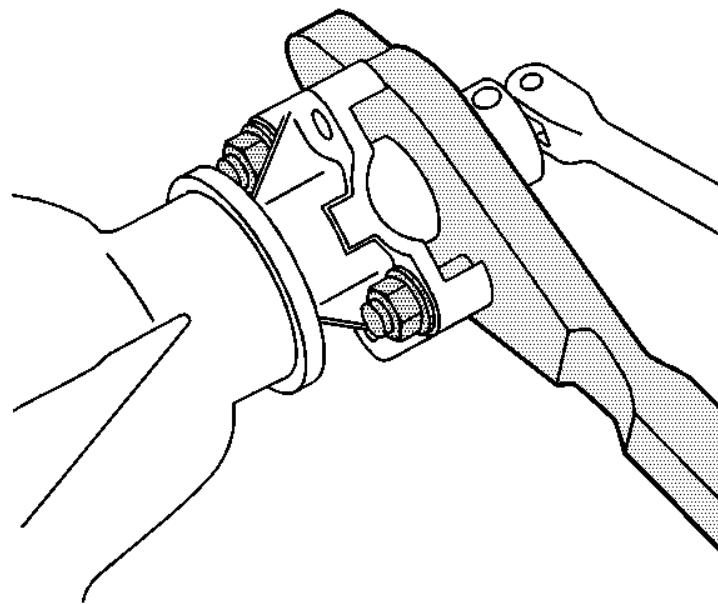


Fig. 228: Holding Pinion Yoke With Special Tool

Courtesy of GENERAL MOTORS COMPANY

NOTE:

- If the rotating torque is exceeded, the pinion will have to be removed and a new collapsible spacer installed.
- For the 11.5 inch axle, use J-34826 socket.

5. Holding the **J 8614-01** holder or the **J-34826** socket, tighten the pinion nut until the pinion end play is just taken up.

6. Rotate the pinion while tightening the nut to seat the bearings.

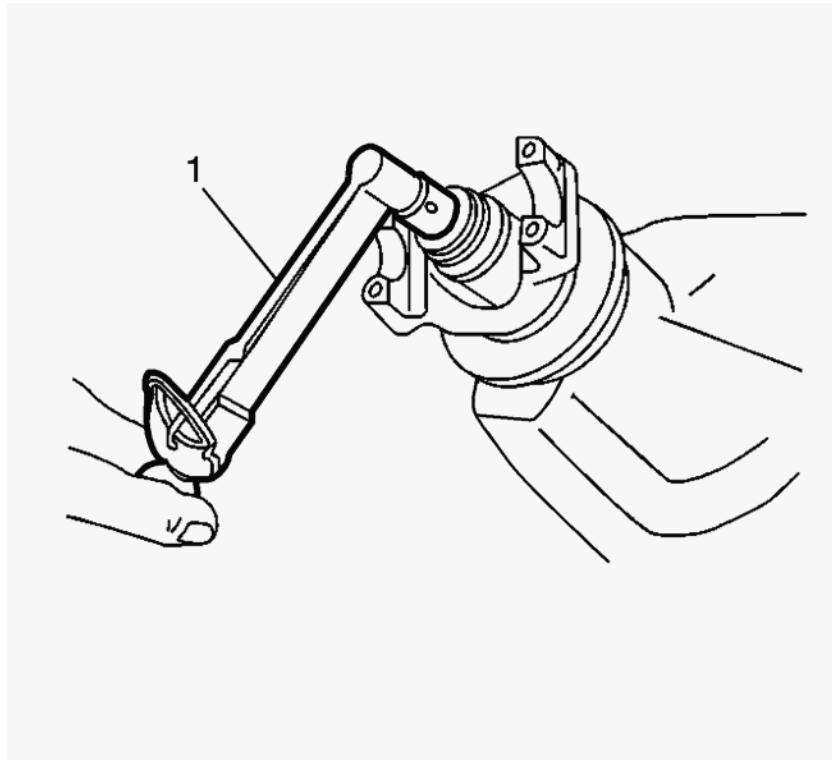


Fig. 229: Measuring Pinion Rotating Torque

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to [Fastener Caution](#).

NOTE: Compare this measurement with the rotating torque recorded during removal.

7. Using an inch pound torque wrench and tightening in small increments, measure the rotating torque of the pinion until the reading is greater than 0.40-0.57 N.m (3-5 lb in), the rotational torque noted at removal.

NOTE: Recheck the rotating torque and adjust if necessary.

8. Once the specified torque is obtained, rotate the pinion several times to seat the bearings.

NOTE: Reference mark the rear propeller shaft to the rear axle pinion yoke.

9. Install the propeller shaft. Refer to [Rear Propeller Shaft Replacement \(Heavy Duty\) Rear Propeller Shaft Replacement \(M5U, 2WD\)](#)

10. Install the rear axle shafts. Refer to [Rear Axle Shaft and Gasket Replacement \(10.5 Inch Axle\)](#).

11. Install the rear disc brake rotor, if equipped. Refer to [Rear Brake Rotor Replacement \(JD9\) Rear Brake Rotor Replacement \(J95\)](#)

12. Install the rear tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation \(6-Lug Wheel\) Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#)

13. Inspect and add axle lubricant to the axle housing, if necessary. Refer to [Rear Axle Lubricant Level Inspection \(10.5 Inch Axle\)](#)

14. Remove the support and lower the vehicle.

DIFFERENTIAL OVERHAUL (8.6/9.5/9.76 INCH AXLES)

Disassembly Procedure

1. Remove the differential ring gear. Refer to [Drive Pinion and Ring Gear Replacement \(8.6/9.5/9.76 Inch Axle\)](#)
2. Remove the differential side bearings. Refer to [Differential Bearing Replacement](#).

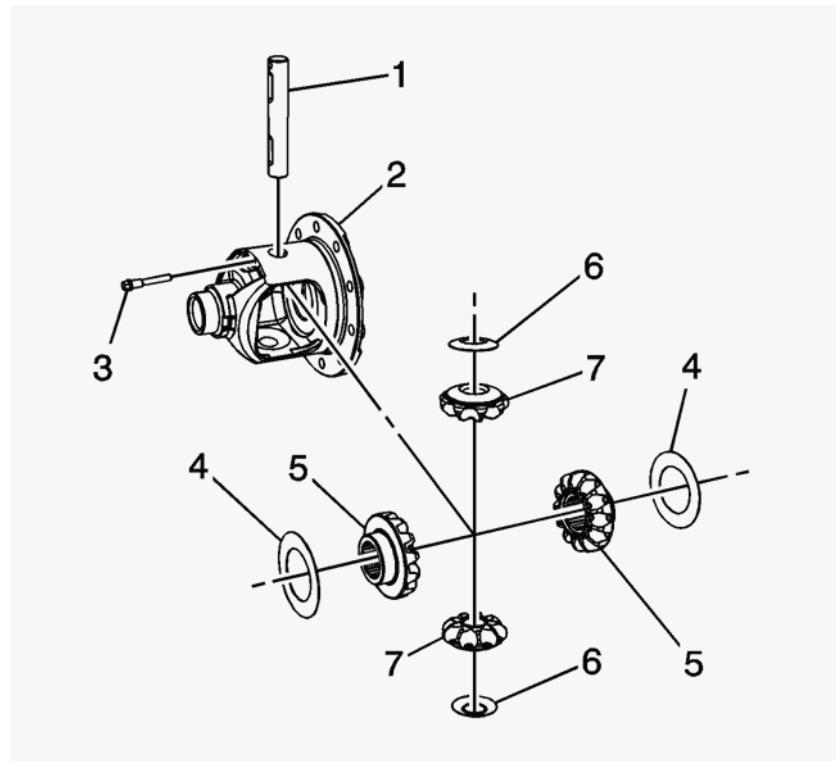


Fig. 230: Side Gears, Pinion Gears And Attached Components

Courtesy of GENERAL MOTORS COMPANY

3. Remove and discard the differential pinion gear shaft lock bolt (3). Replace with NEW only.
4. Remove the differential pinion gear shaft (1).

NOTE: **Mark the top and bottom differential pinion gears and thrust washers, if reusing.**

5. Roll the differential pinion gears (7) and the thrust washers (6) out of the differential case (2).

NOTE: **Mark the left and right side differential side gears and the thrust washers, if reusing.**

6. Remove the differential side gears (5) and the thrust washers (4).

Assembly Procedure

1. Lubricate the pinion and side gears and washers using the proper axle lubricant. Refer to [Fluid and Lubricant Recommendations](#).

2. Install the differential side gear thrust washers (4) to the differential side gears (5).

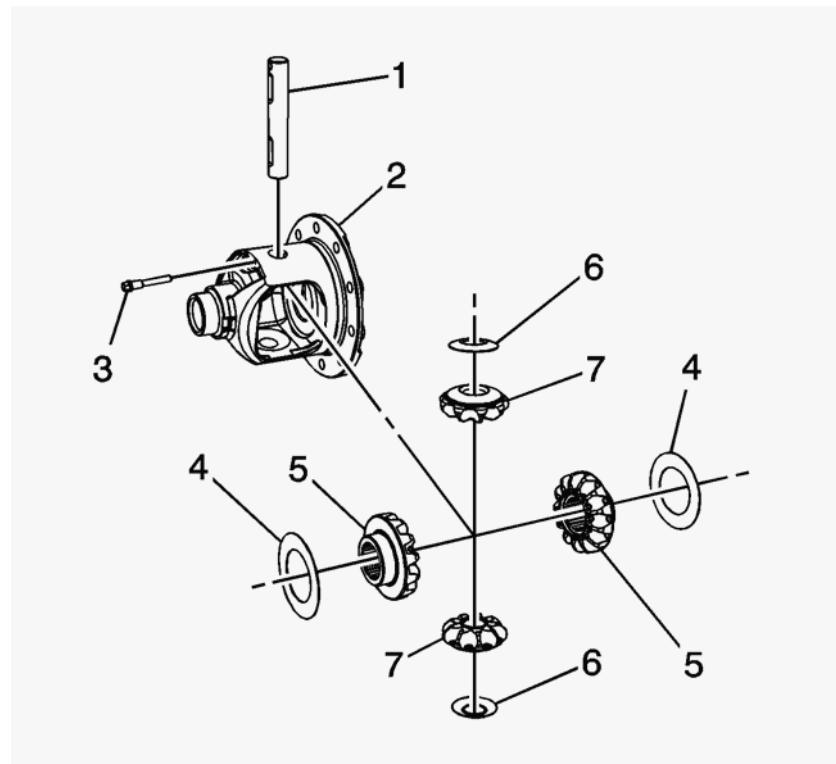


Fig. 231: Side Gears, Pinion Gears And Attached Components

Courtesy of GENERAL MOTORS COMPANY

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

3. Install the differential side gears (5) and thrust washers (4) into the differential case (2).
4. Position one pinion gear (7) between the differential side gears (5).
5. Position the second pinion gear (7) between the differential side gears (5).
6. Rotate the differential side gears (5) until the pinion gears (7) are directly opposite the opening in the differential case (2).
7. Rotate the pinion gears (7) toward the differential opening.
8. Install the thrust washers (6) on the pinion gears (5).
9. Rotate the pinion gears until they are aligned with the holes in the differential case (2) for the pinion shaft (1).
10. Install the pinion shaft (1).

CAUTION: Refer to [Fastener Caution](#).

11. Install the NEW differential pinion gear shaft locking bolt and tighten to:

- For the 8.6 inch axle, tighten the pinion shaft bolt (3) to 36 N.m (27 lb ft).
- For the 9.5/9.76 inch axle, tighten the pinion shaft bolt (3) to 50 N.m (37 lb ft).

12. Install the differential ring gear to the differential case. Refer to [Drive Pinion and Ring Gear Replacement \(8.6/9.5/9.76 Inch Axle\)](#).

13. Install the differential side bearings. Refer to [Differential Bearing Replacement](#).

DIFFERENTIAL OVERHAUL (10.5 INCH AXLE)

Disassemble Procedure

1. Remove the differential side bearings. Refer to [Differential Bearing Replacement](#).

2. Remove the differential ring gear. Refer to [Drive Pinion and Ring Gear Replacement \(10.5 Inch Axle\)](#).

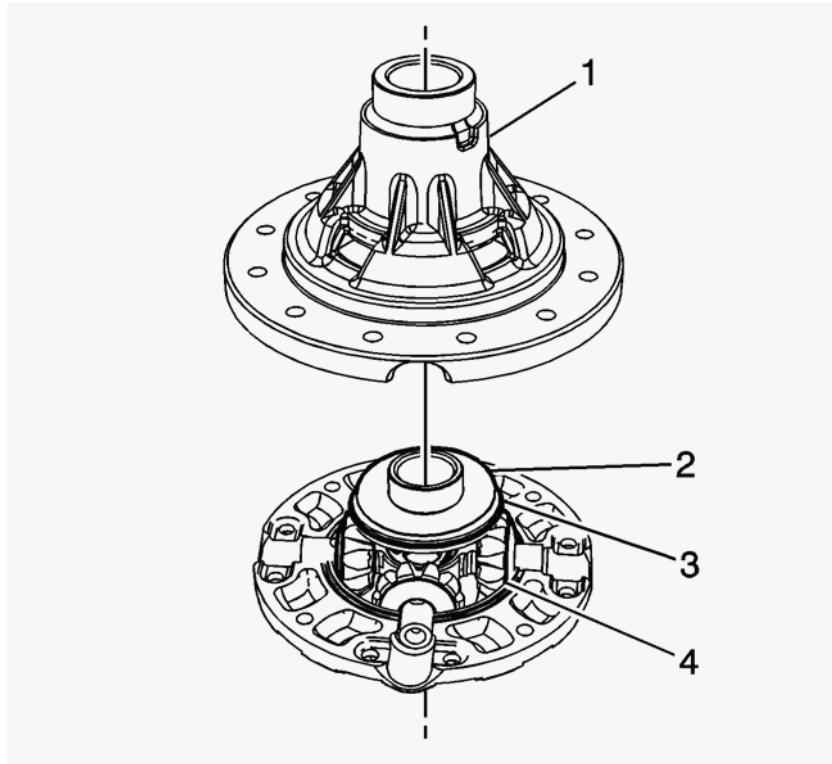


Fig. 232: Differential Side Gear, Thrust Washer And Differential Pinion Gears

Courtesy of GENERAL MOTORS COMPANY

3. Separate the differential case (1).

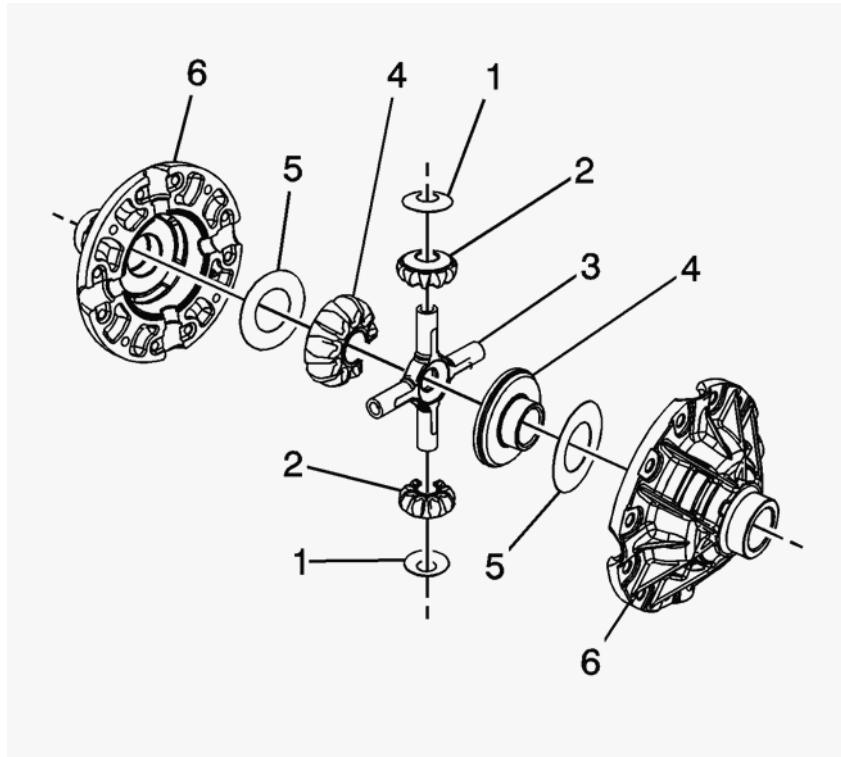


Fig. 233: Exploded View Of Differential Assembly

Courtesy of GENERAL MOTORS COMPANY

NOTE: If the differential pinion gears, the differential side and the thrust washers are going to be reused, mark the components so they can be re-installed in their original location in the differential case.

4. Remove the pinion gears (2), thrust washers (1) and the differential spider (3) from the differential case (6).
5. Remove the differential side gears (4) and the thrust washers (5) from the differential case (5).

Assemble Procedure

1. Apply a small amount of the proper gear lubricant to the differential side gears and the differential pinion gears. Refer to [Fluid and Lubricant Recommendations](#).

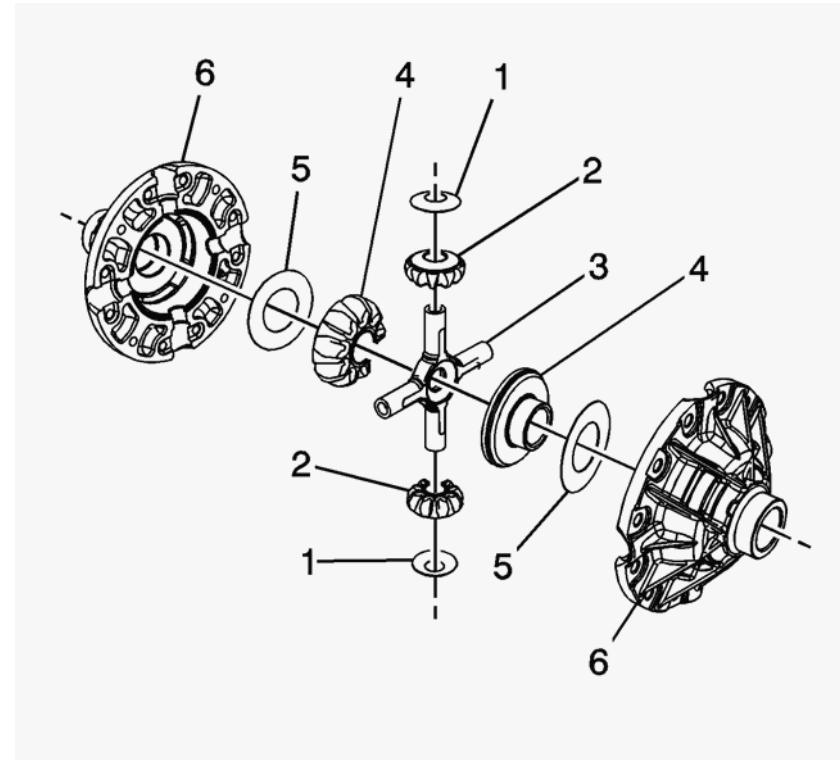


Fig. 234: Exploded View Of Differential Assembly

Courtesy of GENERAL MOTORS COMPANY

NOTE: If reusing the differential side and pinion gears, install them in the original position.

2. Install the thrust washers (5) differential side gears (4) into the differential case (6).
3. Install the differential pinion gears (2), thrust washer (1) on the differential spider (3).
4. Position the differential thrust washers (1), pinion gears (2) and the spider (3) in the differential case (5).

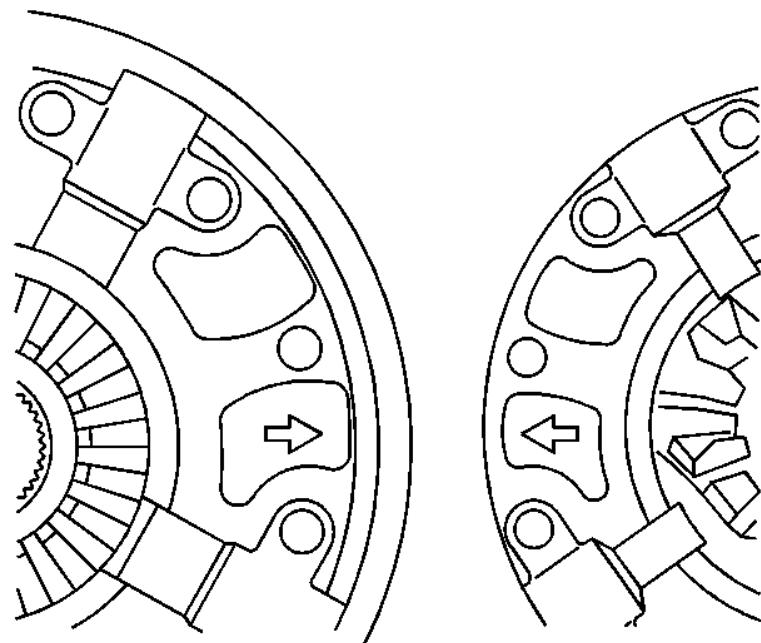


Fig. 235: Aligning Differential Case Arrows

Courtesy of GENERAL MOTORS COMPANY

5. Align the arrows on the differential case halves.

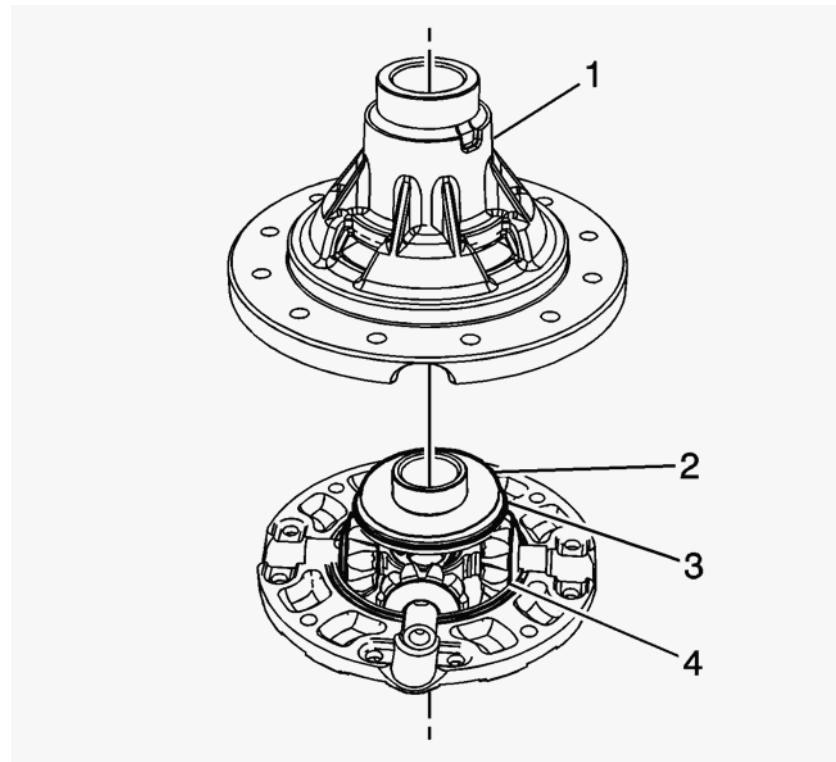


Fig. 236: Differential Side Gear, Thrust Washer And Differential Pinion Gears

Courtesy of GENERAL MOTORS COMPANY

6. Position the differential side gear (3) and the thrust washer (3) on the differential pinion gears (4).
7. Install the differential case half (1).
8. Install the differential ring gear. Refer to [Drive Pinion and Ring Gear Replacement \(10.5 Inch Axle\)](#).
9. Install the differential side bearings. Refer to [Differential Bearing Replacement](#).

BEARINGS INSPECTION

Carefully and thoroughly inspect all drive unit parts before assembly. Thorough inspection of the drive parts for wear or stress with subsequent replacement of worn parts eliminates costly drive component repair after assembly.

IMPORTANT: The differential bearings and the bearing cups are matched sets. Replace both the bearing and the cup when either part requires replacement.

- Lubricate the bearings with axle lubricant. Inspect the bearings for smooth rotation.
- Inspect the bearing rollers for wear.
- Inspect the bearing cups for wear, cracks, brinelling, and scoring.

DIFFERENTIAL INSPECTION

- Check the pinion gear shaft for unusual wear.

- Check the pinion and the side gear teeth for wear, cracks, scoring and spalling.
- Check the thrust washers for wear.
- Check the fit of the side gears in the differential case and on the axle shafts.
- Check the differential case for cracks and scoring and replace all of the worn parts as necessary.

PINION AND RING GEAR INSPECTION

Ring and pinion gears are matched sets. When replacement of one or the other is necessary, both the ring and pinion gear must be replaced.

- Check the pinion and ring gear teeth for cracking, chipping, scoring, or excessive wear.
- Check the pinion gear splines for wear.
- Check the pinion flange/yoke splines for wear.
- Check the fit of the pinion gear splines on the pinion flange/yoke.
- Check the sealing surface of the pinion flange/yoke for nicks, burrs or rough tool marks that could damage the seal and cause an oil leak.
- Check for worn or broken parts and replace as necessary.

REAR AXLE HOUSING INSPECTION

Carefully and thoroughly inspect all drive unit parts before assembly. Thorough inspection of the drive parts for wear or stress with subsequent replacement of worn parts eliminates costly drive component repair after assembly.

- Inspect for nicks or burrs that could prevent the outer diameter of the pinion seal from sealing. Remove any burrs.
- Inspect the bearing cup bores for nicks or burrs. Remove any burrs that are found.
- Inspect the housing for cracks. Replace the housing if any cracks are found.
- Inspect the housing for foreign material such as metal chips, dirt, or rust.

SHIMS INSPECTION

- NOTE:**
- **8.6 Rear Axle:** The original cast iron production shims cannot be re-used and must be replaced with steel service shims if the differential or any production shim(s) is/are removed.
 - **9.5/10.5/11.5 Rear Axle:** The original cast iron production shims can be carefully removed and re-used. If the cast iron shims show any signs of excessive wear or damage, they must be replaced with service shims and spacers.
 - If service shims were previously installed, the shims can be reused.

NOTE: Carefully inspect the shims for cracks, chips or other damage. Replace any damaged shims with NEW steel service shims only.

PINION DEPTH ADJUSTMENT (8.6 INCH AXLE)

Special Tools

- **GE-8001** Dial Indicator Set
- **J-21777** Side Bearing Disc Set
- **J-34925** Pinion Setting Gauge Set

For equivalent regional tools, refer to [Special Tools](#).

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

1. Using the proper axle lubricant, lubricant the differential pinion bearings. Refer to [Fluid and Lubricant Recommendations](#) .

2. Install the differential pinion bearings into the axle housing.

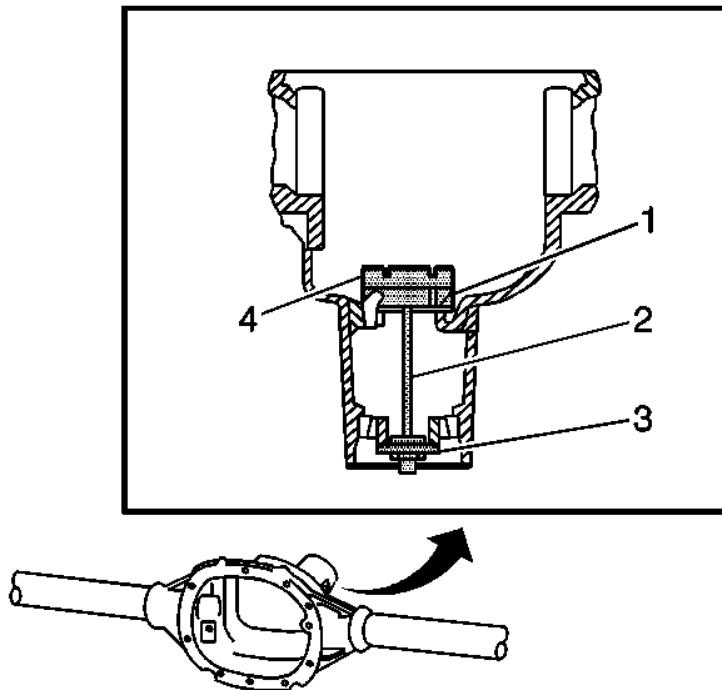


Fig. 237: Assembling Special Tools In Axle Housing

Courtesy of GENERAL MOTORS COMPANY

3. Install the **J-21777-35** (1), **J-21777-43** (2), **J-21777-42** (3), and the **J-21777-29** into the axle housing.

Hold the **J-21777-43** stationary while turning the torque wrench.

Rotate the assembly several times in both directions in order to seat the pinion bearings.

4. Using an inch pound torque wrench and the **J-21777-43** , tighten the nut until a rotating torque of 1.7 N.m (15 lb in) is obtained.

5. If the torque is less than 1.7 N.m (15 lb in), tighten the nut until a rotating torque of 1.7-2.3 N.m (15-20 lb in) is obtained.

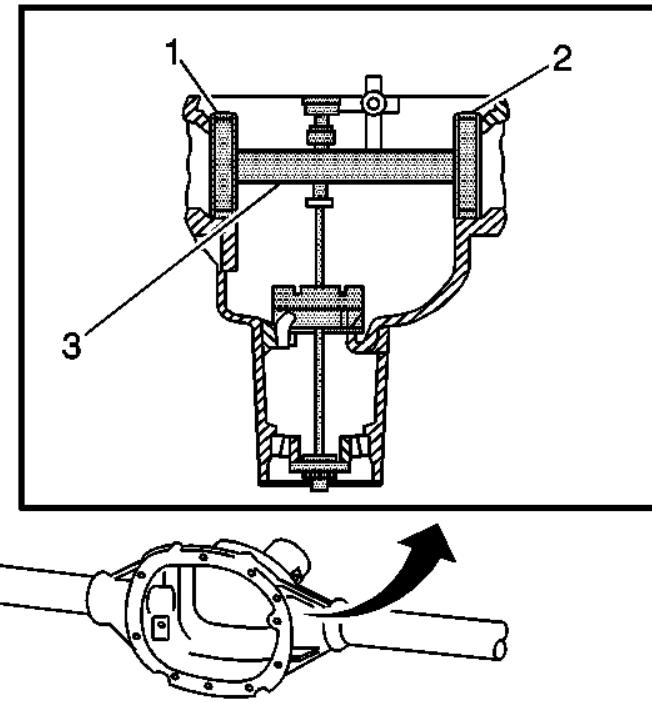


Fig. 238: Assembling Special Tools In Differential Carrier Bore

Courtesy of GENERAL MOTORS COMPANY

6. Install the **J-21777-45** (1 and 2) to the **J-21777-1** (3) into the differential carrier bores.
7. Install the bearing caps.

CAUTION: Refer to [Fastener Caution](#).

8. Install the bearing cap bolts and tighten to 75 N.m (55 lb ft).
9. Rotate the **J-21777-1** within the **J-21777-45**.

The **J-21777-1** must rotate back and forth freely within the discs. If the **J-21777-1** does not rotate freely, disassemble the components, inspect for proper seating and/or mis-aligned components and re-assemble.

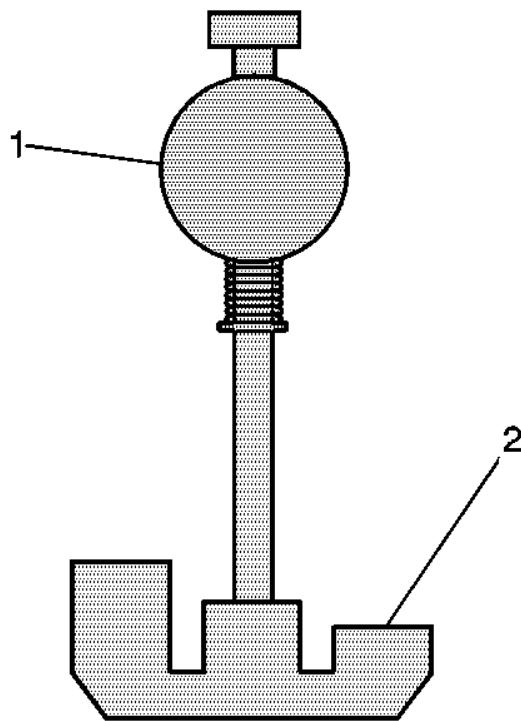


Fig. 239: Pinion Setting Gauge Set

Courtesy of GENERAL MOTORS COMPANY

10. Adjust the arbor of the **J-21777-1** (1) to the gauge block setting of the **J-21777-29**

11. Install the **GE-8001** indicator to the **J-21777-1** as follows:

1. Loosely clamp the **GE-8001** indicator onto the stem on the **J-21777-1** .
2. Place the contact pad of the **GE-8001** indicator onto the mounting post of the **J-21777-1** .
3. With the contact pad of the **GE-8001** indicator touching the mounting post of the **J-21777-1** , loosen the lock nut on the **GE 8001** indicator and push down on the **J 8001** indicator until the needle the **GE-8001** indicator has turned 3/4 of a turn clockwise.
4. Tighten the clamp on the **GE-8001** indicator finger tight.

NOTE: The deflection is the point where the needle changes direction.

12. Move the plunger of the **J-21777-1** back and forth until the needle of the **GE-8001** indicator indicates the greatest deflection.

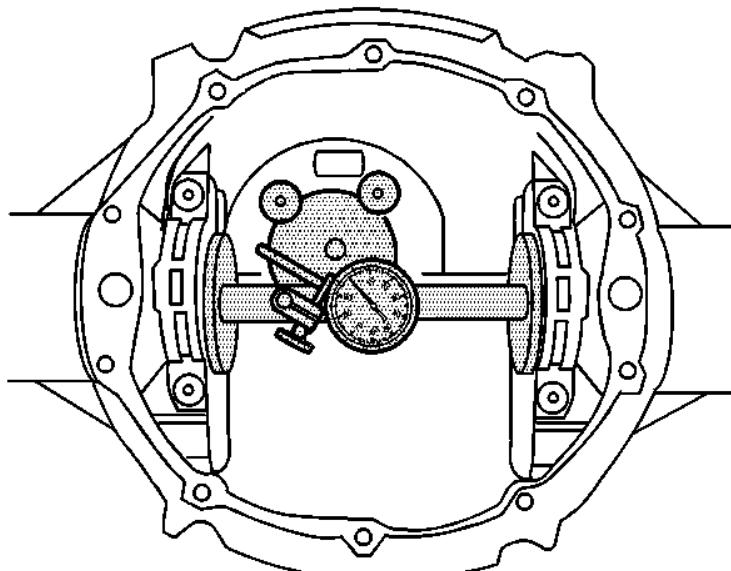


Fig. 240: Measuring Necessary Shim Thickness

Courtesy of GENERAL MOTORS COMPANY

13. At the greatest point of deflection, move the housing of the **GE-8001** indicator until the needle indicates zero.
14. Move the plunger of the **J-21777-1** back and forth again to verify the zero setting. Adjust the housing of the **GE 8001** Dial Indicator Set as necessary to set the needle to zero.
15. Rotate the plunger of the **J-21777-1** away from the **J-21777-29**.
16. The value indicated on the **GE-8001** indicator is the thickness of the shim needed in order to set the depth of the pinion.
17. Select the shim that indicates the proper thickness. Measure the shim with a micrometer in order to verify that the thickness is correct.
18. Remove the pinion depth setting tools.
19. Remove the pinion bearings.
20. Install the pinion shim between the pinion gear and the inner pinion bearing. Refer to [Differential Drive Pinion Gear Bearing Replacement \(8.6/9.5/9.76 Inch Axles\)](#).

PINION DEPTH ADJUSTMENT (10.5 INCH AXLE)

1. Install the differential, if necessary. Refer to [Differential Replacement \(10.5 Inch Axle\)](#).

NOTE: **Measure and record the thickness of the pinion gear bearing retainer shim before any service procedures are performed to the pinion gear bearing retainer assembly.**

2. Install the original shim to the pinion bearing retainer. If the original shim is not available, install a 0.41 mm (0.016 in) shim to build pinion depth.

NOTE: **Do not apply sealant to the pinion gear bearing retainer at this time.**

3. Install the pinion gear bearing retainer.

CAUTION: Refer to [Fastener Caution](#) .

4. Install the pinion gear bearing retainer bolts and tighten to 88 N.m (65 lb ft).

5. Adjust the backlash. Refer to [Backlash Adjustment \(10.5 Inch Axle\)](#).

6. Perform a gear tooth pattern check on the pinion and the ring gear. Refer to [Gear Tooth Contact Pattern Inspection](#).

7. If the gear tooth contact pattern indicates a high or a low flank contact pattern, adjust the pinion depth by doing the following:

1. Remove the pinion gear bearing retainer bolts.
2. Remove the pinion gear bearing retainer.
3. Remove the shim.
 - If the gear tooth contact pattern shows a high flank contact pattern, install a shim one size larger.
 - If the gear tooth contact pattern shows a low flank contact pattern, install a shim one size smaller.

4. Install the new shim to the pinion gear bearing retainer.

5. Install pinion gear bearing retainer.

6. Install pinion gear bearing retainer bolts and tighten to 88 N.m (65 lb ft).

7. Inspect the gear tooth contact pattern of the pinion and the ring gear. Refer to [Gear Tooth Contact Pattern Inspection](#).

8. If the gear tooth pattern is still incorrect, adjust the shim thickness as necessary and recheck the gear tooth pattern of the pinion and the ring gear.

8. Inspect the backlash between the pinion and the ring gear and adjust, if necessary. Refer to [Backlash Adjustment \(10.5 Inch Axle\)](#).

The pinion shims are available in the following sizes:

Shim Sizes

- 0.15 mm (0.006 in)
- 0.18 mm (0.007 in)
- 0.20 mm (0.008 in)
- 0.23 mm (0.009 in)
- 0.25 mm (0.010 in)
- 0.28 mm (0.011 in)
- 0.30 mm (0.012 in)
- 0.33 mm (0.013 in)
- 0.36 mm (0.014 in)
- 0.38 mm (0.015 in)
- 0.41 mm (0.016 in)
- 0.43 mm (0.017 in)
- 0.46 mm (0.018 in)
- 0.48 mm (0.019 in)
- 0.51 mm (0.020 in)
- 0.53 mm (0.021 in)
- 0.56 mm (0.022 in)
- 0.58 mm (0.023 in)
- 0.61 mm (0.024 in)

PINION DEPTH ADJUSTMENT (9.5 INCH AXLE)

Special Tools

- GE-8001 Dial Indicator Set
- J-34925 Pinion Setting Gauge Set
- J-45108 Gauge Plate

For equivalent regional tools, refer to [Special Tools](#).

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

1. Using the proper axle lubricant, lubricate the differential pinion bearings. Refer to [Fluid and Lubricant Recommendations](#).

2. Install the differential pinion bearings into the axle housing.

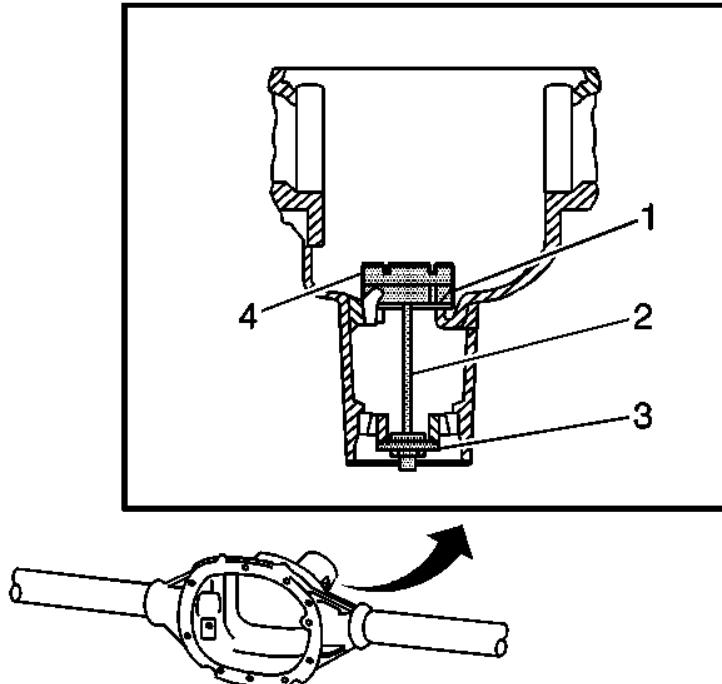


Fig. 241: Assembling Special Tools In Axle Housing

Courtesy of GENERAL MOTORS COMPANY

3. Install the **J-21777-8** (1), **J-21777-43** (2), **J-21777-42** (3), and the **J-45108** plate (4) into the axle housing.

Hold the **J-21777-43** (2) stationary while turning the torque wrench.

Rotate the assembly several times in both directions in order to seat the pinion bearings.

4. Using an inch pound torque wrench and the **J-21777-43** (2), tighten the nut until a rotating torque of 1.7 N.m (15 lb in) is obtained.

5. If the torque is less than 1.7 N.m (15 lb in), tighten the nut until a rotating torque of 1.7-2.3 N.m (15-20 lb in) is obtained.

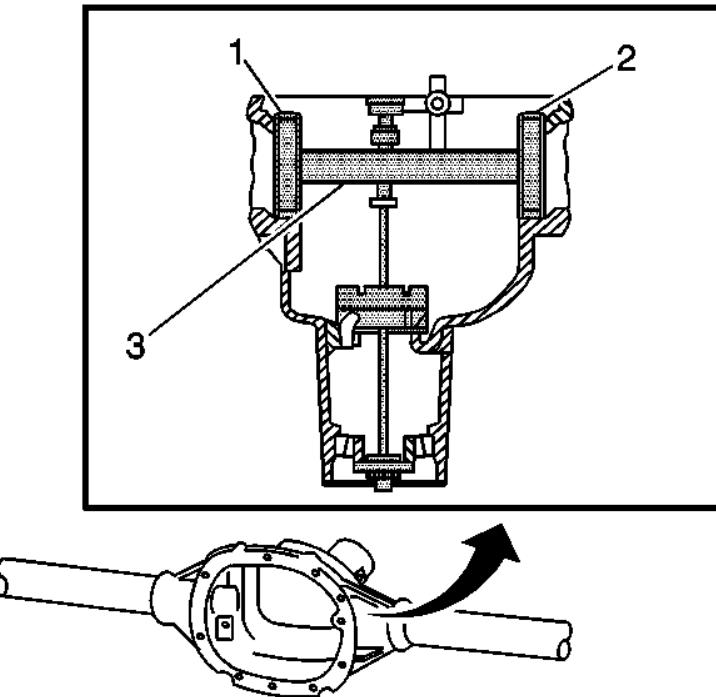


Fig. 242: Assembling Special Tools In Differential Carrier Bore

Courtesy of GENERAL MOTORS COMPANY

6. Install the **J-21777-86** (1 and 2) to the **J-21777-1** (3) in the differential carrier bores.

7. Install the bearing caps.

CAUTION: Refer to Fastener Caution .

8. Install the bearing cap bolts and tighten to 75 N.m (55 lb ft).

9. Rotate the **J-21777-1** within the **J-21777-86**

The **J-21777-1** must rotate back and forth freely within the discs. If the **J-21777-1** does not rotate freely, disassemble the components, inspect for proper seating and/or mis-aligned components and re-assemble.

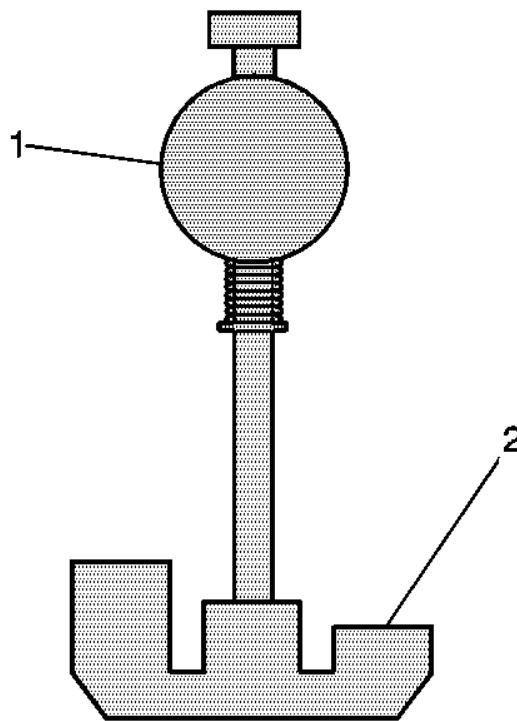


Fig. 243: Pinion Setting Gauge Set

Courtesy of GENERAL MOTORS COMPANY

10. Adjust the arbor of the **J-21777-1** (1) to the gauge block setting of the **J-45108** plate,

11. Install the **GE-8001** indicator to the **J-21777-1** as follows:

1. Loosely clamp the **GE-8001** indicator onto the stem on the **J-21777-1** .
2. Place the contact pad of the **GE-8001** indicator onto the mounting post of the **J-21777-1** .
3. With the contact pad of the **GE-8001** indicator touching the mounting post of the **J-21777-1** , loosen the lock nut on the **GE-8001** indicator and push down on the **GE-8001** indicator until the needle of the **GE-8001** indicator has turned 3/4 of a turn clockwise.
4. Tighten the clamp on the **GE-8001** indicator finger tight.

NOTE: The deflection is the point where the needle changes direction.

12. Move the plunger of the **J-21777-1** back and forth until the needle of the **GE-8001** indicator indicates the greatest deflection.

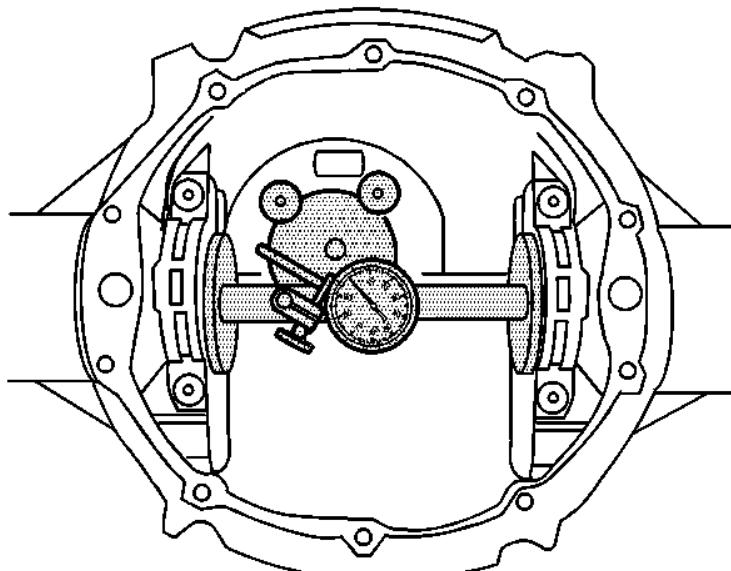


Fig. 244: Measuring Necessary Shim Thickness

Courtesy of GENERAL MOTORS COMPANY

13. At the greatest point of deflection, move the housing of the **GE-8001** indicator until the needle indicates zero.
14. Move the plunger of the **J-21777-1** back and forth again to verify the zero setting. Adjust the housing of the **GE-8001** Dial Indicator Set as necessary to set the needle to zero.
15. Rotate the plunger of the **J-21777-1** away from the **J-45108** gauge plate.
16. The value indicated on the **GE-8001** indicator is the thickness of the shim needed in order to set the depth of the pinion.
17. Select the shim that indicates the proper thickness. Measure the shim with a micrometer in order to verify that the thickness is correct.
18. Remove the pinion depth setting tools.
19. Remove the pinion bearings.
20. Install the pinion shim between the pinion gear and the inner pinion bearing. Refer to [Differential Drive Pinion Gear Bearing Replacement \(8.6/9.5/9.76 Inch Axles\)](#).

PINION DEPTH ADJUSTMENT (9.76 INCH AXLE)

Special Tools

- **J 8001** Dial Indicator Set
- **J 34925** Pinion Setting Gauge Set
- **DT 51173** Gauge Plate

For equivalent regional tools, refer to [Special Tools](#).

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

1. Using the proper axle lubricant, lubricant the differential pinion bearings. Refer to [Fluid and Lubricant Recommendations](#).
2. Install the differential pinion bearings into the axle housing.

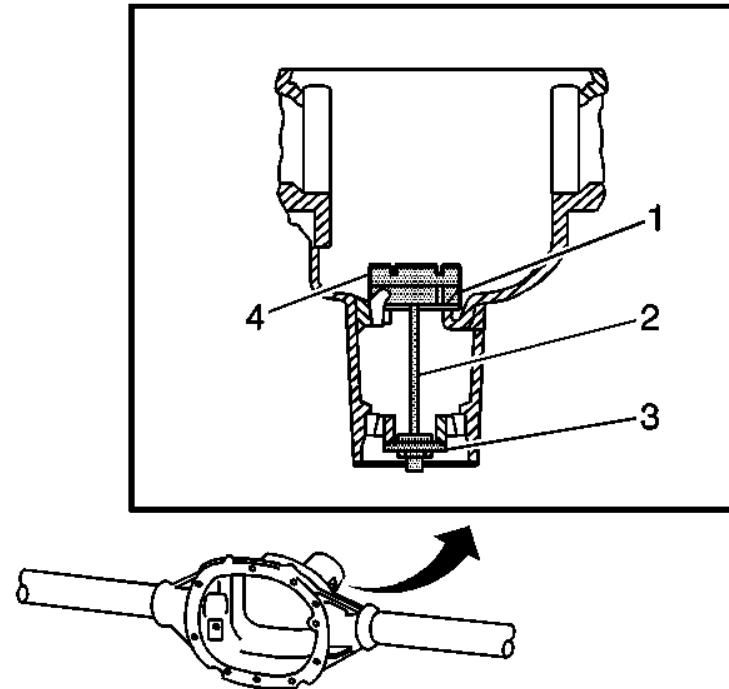


Fig. 245: Assembling Special Tools In Axle Housing

Courtesy of GENERAL MOTORS COMPANY

3. Install the **DT-51173-2** (1), the **J-21777-43** (2), the **DT-51173-3** (3), and the **DT 51173** plate (4) into the axle housing.

Hold the **J-21777-43** stationary while turning the torque wrench.

Rotate the assembly several times in both directions in order to seat the pinion bearings.

4. If the torque is less than 1.7 N.m (15 lb in), tighten the nut until a rotating torque of 1.7-2.3 N.m (15-20 lb in) is obtained.

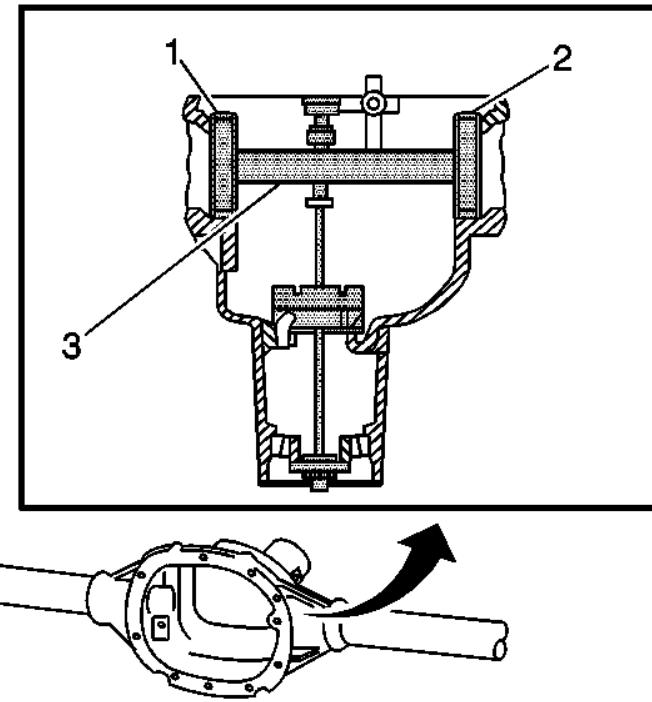


Fig. 246: Assembling Special Tools In Differential Carrier Bore

Courtesy of GENERAL MOTORS COMPANY

5. Install the **J-21777-86** (1 and 2) to the **J-21777-1** (3) in the differential carrier bores.
6. Install the bearing caps.

CAUTION: Refer to [Fastener Caution](#).

7. Install the bearing cap bolts and tighten to 75 N.m (55 lb ft).
8. Rotate the **J-21777-1** within the **J-21777-86**.

The **J-21777-1** must rotate back and forth freely within the discs. If the **J-21777-1** does not rotate freely, disassemble the components, inspect for proper seating and/or mis-aligned components and re-assemble.

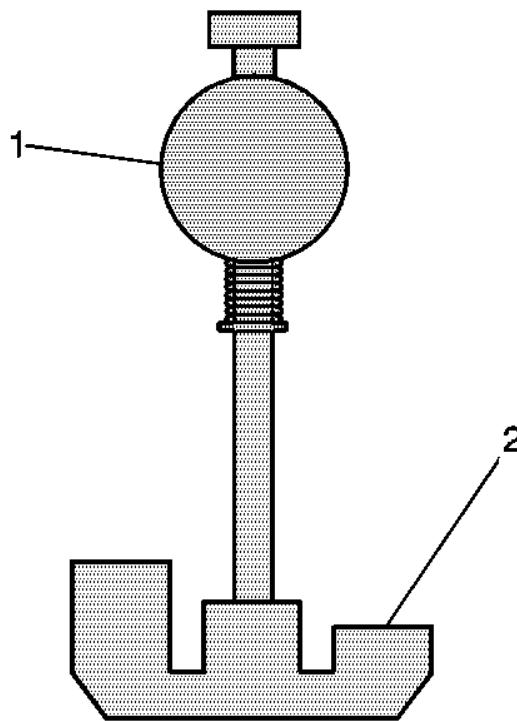


Fig. 247: Pinion Setting Gauge Set

Courtesy of GENERAL MOTORS COMPANY

9. Adjust the arbor of the **J-21777-1** (1) to the gauge block setting of the **DT-51173** plate.

10. Install the **GE-8001** indicator to the **J-21777-1** as follows:

1. Loosely clamp the **GE-8001** indicator onto the stem on the **J-21777-1** .
2. Place the contact pad of the **GE-8001** indicator onto the mounting post of the **J-21777-1** .
3. With the contact pad of the **GE-8001** indicator touching the mounting post of the **J-21777-1** , loosen the lock nut on the **GE-8001** indicator and push down on the **GE-8001** indicator until the needle of the **GE-8001** indicator has turned 3/4 of a turn clockwise.
4. Tighten the clamp on the **GE-8001** indicator finger tight.

NOTE: The deflection is the point where the needle changes direction.

11. Move the plunger of the **J-21777-1** back and forth until the needle of the **GE-8001** indicator indicates the greatest deflection.

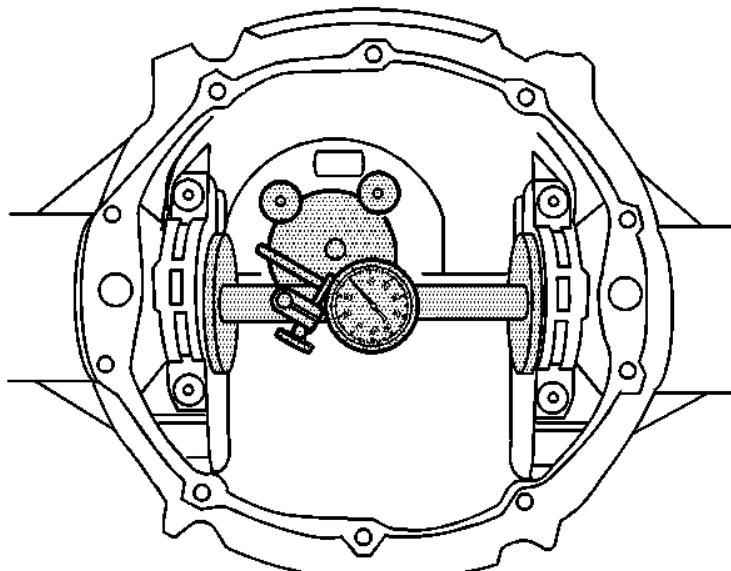


Fig. 248: Measuring Necessary Shim Thickness

Courtesy of GENERAL MOTORS COMPANY

12. At the greatest point of deflection, move the housing of the **GE-8001** indicator until the needle indicates zero.
13. Move the plunger of the **J-21777-1** back and forth again to verify the zero setting. Adjust the housing of the **J 8001** Dial Indicator Set as necessary to set the needle to zero.
14. Rotate the plunger of the **J-21777-1** away from the **DT-51173** gauge plate, until it no longer touches the **DT-51173** plate.
15. The value indicated on the **GE-8001** indicator is the thickness of the shim needed in order to set the depth of the pinion.
16. Select the shim that indicates the proper thickness. Measure the shim with a micrometer in order to verify that the thickness is correct.
17. Remove the pinion depth setting tools.
18. Remove the pinion bearings.
19. Install the pinion shim between the pinion gear and the inner pinion bearing. Refer to [Differential Drive Pinion Gear Bearing Replacement \(8.6/9.5/9.76 Inch Axles\)](#).

DIFFERENTIAL CARRIER BEARING PRELOAD ADJUSTMENT (9.5/9.76 INCH AXLE)

Wedge Method

Special Tools

J-22779 Side Bearing Shim/Backlash Gauge

NOTE:

1. Ensure that the side bearing surfaces in the axle housing are clean and free of burrs. If the original bearings are to be reused, the original bearing cups must also be used.

2. The drive pinion bearing preload must be within specifications before the differential side bearing preload adjustment can be performed.
3. The differential side bearings must be initially preloaded in order to determine the backlash of the gear set. After the backlash is set, the final bearing preload is set.
 - In order to maintain the original backlash, adjust the differential case side bearing preload by changing the thickness of the left and the right side shim packs equally.
 - Measure the service shims and the spacers one at a time. Add the measurements together in order to obtain the total thickness of the left or the right side shim pack.
 - Do not use or reuse the original cast iron production shims. Use service shims and spacers instead.

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

1. Remove the differential assembly, if necessary.
2. Using an inch-pound torque wrench, measure the rotating torque of the drive pinion bearing. should be 1.7-3.4 N.m (15-30 lb in) for new bearings and 1.1-2.3 N.m (10-20 lb in) for used bearings.
3. If the rotating torque of the drive pinion is less than: 1.7 N.m (15 lb in) for new bearings or 1.1 N.m (10 lb in) for used bearings, tighten the pinion in small increments until the specified rotating torque is obtained.
4. If the rotating torque of the drive pinion is greater than 3.4 N.m (30 lb in) for new bearings or 2.3 N.m (20 lb in) for used bearings, replace the collapsible spacer. Refer to [Differential Drive Pinion Gear Bearing Replacement \(8.6/9.5/9.76 Inch Axles\)](#).
5. Install the differential assembly, if necessary.
6. Support the differential assembly in order to prevent the differential assembly from falling out of the axle housing.

NOTE: DO NOT force the ring gear into contact with the drive pinion.

7. Slide the differential case assembly towards the right side axle housing until the ring gear contacts the drive pinion. This is the ZERO backlash point.
8. Install the differential assembly with the differential side bearings and differential side bearing cups into the axle housing.
9. Insert one 4.318 mm (0.170 in) thick service spacer into the left side of the axle housing.
10. Side the differential assembly towards the service spacer in order to hold the spacer in place.

NOTE: The J-22779 gauge must be installed between the service spacer and the differential side bearing cup.

11. Install the J-22779 gauge into the right side of the axle housing.

NOTE: Over-tightening of the J-22779 gauge may spread the housing and result in incorrect shim selection.

12. Tighten the knob on the J-25588 installer until there is moderate drag when the J-22779 gauge is moved.
13. Remove the J-22779 gauge.
14. Remove the service spacer.

NOTE: Record the measurement.

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

NOTE: Record the measurement.

16. Using a micrometer, measure the thickness of the J-22779 gauge in 3 locations. Calculate the average of the 3 measurements.
17. Add the thickness of the service spacer, measured in step 11 to the average thickness of the J-22779 gauge, measured in step 12. The resulting value is the total service shim thickness without preload for the axle.

18. Insert one BENT 1.016 mm (0.040 in) service shim between the right side differential side bearing cup and the axle housing. The service shim must be installed between the service spacer and the differential side bearing cup.
19. Install the **J 22779** gauge into the left side of the axle housing. The **J 22779** gauge must be installed between the service spacer and the differential side bearing cup.
20. While rotating the ring gear back and forth, tighten the knob on the **J-22779** gauge until there is approximately 0.025-0.051 mm (0.001-0.002 in) of backlash between the ring gear and the drive pinion.
21. Once the correct amount of backlash is obtained, remove the **J -22779** gauge.
22. Remove the differential assembly with the differential side bearings and the differential side bearing cups.
23. Remove the BENT service shim.
24. Using a micrometer, measure the thickness of the **J-22779** gauge in 3 locations. Calculate the average of the 3 measurements. This value is the left side service shim thickness without preload.
25. In order to determine the right side service shim thickness, subtract the service shim thickness for the left side of the axle, calculated in step 17, from the total service shim thickness, calculated in step 13. This value is the service shim thickness for the right side of the axle without preload.
26. In order to preload of the differential side bearings and set the backlash to approximately 0.127-0.223 mm (0.005-0.009 in), take the value determined in step 21 and add 0.203 mm (0.008 in) service shim thickness to this amount.
27. Assemble the left side shim pack using one 4.318 mm (0.170 in) service spacer and the appropriate amount of service shims equaling the thickness determined in step 24. Measure the service spacer and the service shims separately. Add the measurements together in order to determine the total shim pack thickness.
28. Assemble the right side shim pack using one 4.318 mm (0.170 in) service spacer and the appropriate amount of service shims equaling the thickness determined in step 26. Measure the service spacer and the service shims separately. Add the measurements together in order to determine the total shim pack thickness.
29. Install the differential assembly with the differential side bearings and the differential side bearing cups.
30. Install the left side service spacer and service shim into the axle housing. The service shim must be installed between the service spacer and the differential side bearing cup.
31. Install the right side service spacer between the axle housing and the differential side bearing cup.
32. Install the right side service spacer into the axle housing using the a brass drift or rod. The service shim must then be installed between the service spacer and the differential side bearing cup.

CAUTION: Refer to [Fastener Caution](#) .

33. Install the differential bearing caps and the bolts and tighten to 85 N.m (63 lb ft).
34. Rotate the pinion several times to ensure the drive pinion and differential side bearings have seated.

NOTE: Record the measurement.

35. Using an inch pound torque wrench, measure the rotating torque of the drive pinion and differential side bearings which should be 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.
36. Calculate the differential side bearing preload by subtracting the drive pinion preload, measured in step 2, from the drive pinion and differential case bearing preload, measured in step 31. Multiply the value obtained by the axle ratio. The differential side bearing preload should be 1.7-4.0 N.m (15-35 lb in).
37. If the differential side bearing preload is not within specifications, add or subtract shim thickness equally from each shim pack as necessary in order to increase/decrease the side bearing preload.
38. Once the differential side bearing preload is correct, measure the backlash and adjust, if necessary. Refer to [Backlash Adjustment \(9.5/9.76 Inch Axle\)](#).
39. Once the differential side bearing preload and backlash is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to [Gear Tooth Contact Pattern Inspection](#).

Shim Method

- NOTE:**
- The differential side bearings must have preload before the backlash adjustment can be started.
 - In order to maintain the original backlash, adjust the differential case side bearing preload by changing the thickness of the left and the right side shim packs equally.
 - Measure the service shims and the service spacers one at a time. Add the measurements together in order to obtain the total thickness of the left or the right side shim pack.
 - Do not use or reuse the original cast iron production shims. Use service shims and service spacers instead.

1. Install the drive pinion, if necessary. Refer to [Drive Pinion and Ring Gear Replacement \(8.6/9.5/9.76 Inch Axle\)](#).

NOTE: **Record the measurement.**

2. Using an inch pound torque wrench, measure the rotating torque of the drive pinion which should be 1.7-3.4 N.m (15-30 lb in) for new bearings or 1.1-2.3 N.m (10-20 lb in) for used bearings.

3. If the rotating torque for the drive pinion bearings is not within specifications, adjust as necessary. Refer to [Drive Pinion and Ring Gear Replacement \(8.6/9.5/9.76 Inch Axle\)](#).

NOTE: **Before installation of the case assembly, ensure that the side bearing surfaces in the axle housing are clean and free of burrs. If the original bearings are to be reused, the original bearing cups must also be used.**

4. Install the differential assembly with the differential side bearings and bearing cups into the axle housing.

5. Insert one BENT 1.016 mm (0.040 in) thick service shim into the right side axle housing. Side the differential assembly towards the bent service shim in order to hold the shim in place.

6. While holding the differential assembly against the bent service shim, install one 4.575 mm (0.180 in) thick SERVICE SPACER into the left side axle housing.

7. Move the differential assembly to the right until the ring gear contacts the drive pinion. Once the ring gear contacts the drive pinion, continue to move the ring gear towards the drive pinion to until all backlash is removed.

8. While holding the ring gear against the drive pinion, insert progressively larger service shims between the service spacer and the differential side bearing cup until a moderate resistance can be felt.

9. Once the largest service shim has been determined, measure the thickness of the shim using a micrometer. Measure the service shim in 3 locations. Calculate the average of the 3 measurements. Use the average as the thickness for the shim. Record the measurement.

10. Install the service shim that was just measured back into the left side of the axle housing. The service shim must be installed between the service spacer and the differential side bearing cup.

11. Remove the BENT shim from the right side of the axle housing.

12. Insert one 4.575 mm (0.180 in) thick SERVICE SPACER into the right side axle housing.

13. Move the differential assembly towards the left side of the axle housing. While holding the differential assembly against the left side shim pack, insert progressively larger service shims between the service spacer and the differential side bearing cup until a moderate resistance can be felt.

14. Once the largest service shim has been determined, measure the thickness of the shim using a micrometer. Verify the thickness of the service shim. Measure the service shim in 3 locations. Calculate the average of the 3 measurements. Use the average as the thickness for the shim. Record the measurement.

15. In order to preload the differential side bearing and set the initial backlash to approximately 0.127 mm (0.005 in), adjust the thickness of left and right side shims by doing the following:

1. Subtract 0.152 mm (0.006 in) from the measurement recorded for the left side shim in step 9. Record the measurement.

2. Add 0.356 mm (0.014 in) to the measurement recorded for the right side shim in step 14.

NOTE: **Using a micrometer, verify the thickness of the service shim. Measure the service shim in 3 locations.**

16. Select the correct service shim thickness for each side corresponding to the measurements determined above. Calculate the average of the 3 measurements. Use the average as the thickness for the shim.

NOTE: **The service shim must be installed between the service spacer and the differential side bearing cup.**

17. Install the left side service spacer and shim into the axle housing.

18. Move the differential assembly towards the left side of the axle housing.

19. Install the right side service shim.

1. Using a brass drift or rod, install the right side service spacer into the axle housing.

CAUTION: **Refer to [Fastener Caution](#) .**

20. Install the differential bearing caps and bolts and tighten to 85 N.m (63 lb ft).

21. Rotate the pinion several times to ensure the bearings have seated.

22. Using an inch-pound torque wrench, measure the rotating torque of drive pinion and differential case side bearings which should be 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.

23. Calculate the differential side bearing preload by subtracting the drive pinion preload, measured in Step 2, from the drive pinion and the differential case bearing preload, measured in Step 22. Multiply the value obtained by the axle ratio. The differential side bearing preload should be 1.7-4.0 N.m (15-35 lb in).
24. If the differential side bearing preload is not within specifications, add or subtract shim thickness equally from each shim pack as necessary in order to increase/decrease the side bearing preload.
25. Once the differential side bearing preload is within specifications, measure the backlash between the ring gear and the drive pinion and adjust, if necessary. Refer to [Backlash Adjustment \(9.5/9.76 Inch Axle\)](#).
26. Once backlash and differential side bearing preload is within specifications, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to [Gear Tooth Contact Pattern Inspection](#).

Part Name	Metric Width	Tolerance	English Width	Tolerance
â	â	Plus/Minus	â	Plus/Minus
Spacer	4.575 mm	2.5 mm	0.180 in	0.0098 in
Shim	1.016 mm	0.013 mm	0.040 in	0.0005 in
Shim	1.067 mm	0.013 mm	0.042 in	0.0005 in
Shim	1.118 mm	0.013 mm	0.044 in	0.0005 in
Shim	1.168 mm	0.013 mm	0.046 in	0.0005 in
Shim	1.219 mm	0.013 mm	0.048 in	0.0005 in
Shim	1.27 mm	0.013 mm	0.050 in	0.0005 in
Shim	1.321 mm	0.013 mm	0.052 in	0.0005 in
Shim	1.372 mm	0.013 mm	0.054 in	0.0005 in
Shim	1.422 mm	0.013 mm	0.056 in	0.0005 in
Spacer	4.575 mm	2.5 mm	0.180 in	0.0098 in
Shim	1.473 mm	0.013 mm	0.058 in	0.0005 in
Shim	1.524 mm	0.013 mm	0.060 in	0.0005 in
Shim	1.575 mm	0.013 mm	0.062 in	0.0005 in
Shim	1.626 mm	0.013 mm	0.064 in	0.0005 in
Shim	1.676 mm	0.013 mm	0.066 in	0.0005 in
Shim	1.727 mm	0.013 mm	0.068 in	0.0005 in
Shim	1.778 mm	0.013 mm	0.070 in	0.0005 in
Shim	1.829 mm	0.013 mm	0.072 in	0.0005 in
Shim	1.88 mm	0.013 mm	0.074 in	0.0005 in
Shim	1.93 mm	0.013 mm	0.076 in	0.0005 in

DIFFERENTIAL CARRIER BEARING PRELOAD ADJUSTMENT (8.6 INCH AXLE)

Wedge Method

Special Tools

- **J 25588** Side Bearing Shim Installer
- **J 22779** Side Bearing Backlash Gauge

NOTE:

- The differential side bearing preload adjustment must be completed before the backlash adjustment can be started.
- In order to maintain the original backlash, adjust the differential case side bearing preload by changing the thickness of the left and the right side shim packs equally.
- Measure the service shims and the spacers one at a time. Add the measurements together in order to obtain the total thickness of the left or the right side shim pack.
- Do not use or reuse the original cast iron production shims. Use service shims and spacers instead.

1. Install the drive pinion, if necessary. Refer to [Drive Pinion and Ring Gear Replacement \(8.6/9.5/9.76 Inch Axle\)](#).

NOTE: **Record the measurement for re-assembly.**

2. Using an inch pound torque wrench, measure the rotating torque of the drive pinion, it should be 1.7-3.4 N.m (15-30 lb in) for new bearings or 1.1-2.3 N.m (10-20 lb in) for used bearings.

3. If the rotating torque for the drive pinion bearings is not within specifications, adjust as necessary. Refer to [Drive Pinion and Ring Gear Replacement \(8.6/9.5/9.76 Inch Axle\)](#).

NOTE: **Before installation of the differential assembly, ensure that the differential side bearing surfaces in the axle housing are clean and free of burrs. If the original differential side bearings are to be reused, the original differential side bearing cups must also be used.**

4. Install the differential assembly with the differential side bearings and differential side bearing cups into the axle housing.

5. Insert one 4.318 mm (0.170 in) thick service spacer into the left side of the axle housing.

6. Side the differential assembly towards the service spacer in order to hold the spacer in place.

NOTE: **The J 22779 gauge must be installed between the service spacer and the differential side bearing cup.**

7. Install the **J 22779** gauge into the right side of the axle housing.

NOTE: **Over-tightening of the J 22779 gauge may spread the housing and result in incorrect shim selection.**

8. Tighten the knob on the **J 25588** installer until there is moderate drag when the **J 22779** gauge is moved.

9. Remove the **J 22779** gauge.

10. Remove the service spacer.

NOTE: **Record the measurement.**

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

NOTE: **Record the measurement.**

12. Using a micrometer, measure the thickness of the **J 22779** gauge in 3 locations. Calculate the average of the 3 measurements.

13. Add the thickness of the service spacer, measured in step 11 to the average thickness of the **J 22779** gauge, measured in step 12. The resulting value is the total service shim thickness without preload for the axle.

14. Insert one BENT 1.016 mm (0.040 in) service shim between the right side differential side bearing cup and the axle housing. The service shim must be installed between the service spacer and the differential side bearing cup.

15. Install the **J 22779** gauge into the left side of the axle housing. The **J 22779** gauge must be installed between the service spacer and the differential side bearing cup.

16. While rotating the ring gear back and forth, tighten the knob on the **J 22779** gauge until there is approximately 0.025-0.051 mm (0.001-0.002 in) of backlash between the ring gear and the drive pinion.

17. Once the correct amount of backlash is obtained, remove the **J 22779** gauge.

18. Remove the differential assembly with the differential side bearings and the differential side bearing cups.

19. Remove the BENT service shim.

20. Using a micrometer, measure the thickness of the **J 22779** gauge in 3 locations. Calculate the average of the 3 measurements. This value is the left side service shim thickness without preload.

21. In order to determine the right side service shim thickness, subtract the service shim thickness for the left side of the axle, calculated in step 20, from the total service shim thickness, calculated in step 13. This value is the service shim thickness for the right side of the axle without preload.

22. In order to preload of the differential side bearings and set the backlash to approximately 0.127-0.223 mm (0.005-0.009 in), take the value determined in step 21 and add 0.203 mm (0.008 in) service shim thickness to this amount.

23. Assemble the left side shim pack using one 4.318 mm (0.170 in) service spacer and the appropriate amount of service shims equaling the thickness determined in step 20. Measure the service spacer and the service shims separately. Add the measurements together in order to determine the total shim pack thickness.

24. Assemble the right side shim pack using one 4.318 mm (0.170 in) service spacer and the appropriate amount of service shims equaling the thickness determined in step 22. Measure the service spacer and the service shims separately. Add the measurements together in order to determine the total shim pack thickness.
25. Install the differential assembly with the differential side bearings and the differential side bearing cups.
26. Install the left side service spacer and service shim into the axle housing. The service shim must be installed between the service spacer and the differential side bearing cup.
27. Install the right side service spacer between the axle housing and the differential side bearing cup.
28. Install the right side service shim into the axle housing using the **J 25588** installer, if necessary. The service shim must be installed between the service spacer and the differential side bearing cup.

CAUTION: Refer to [Fastener Caution](#) .

29. Install the differential bearing caps and the bolts and tighten to 75 N.m (55 lb ft).
30. Rotate the pinion several times to ensure the drive pinion and differential side bearings have seated.

NOTE: Record the measurement.

31. Using an inch pound torque wrench, measure the rotating torque of the drive pinion and differential side bearings which should be 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.
32. Calculate the differential side bearing preload by subtracting the drive pinion preload, measured in step 2, from the drive pinion and differential case bearing preload, measured in step 31. Multiply the value obtained by the axle ratio. The differential side bearing preload should be 1.7-4.0 N.m (15-35 lb in).
33. If the differential side bearing preload is not within specifications, add or subtract shim thickness equally from each shim pack as necessary in order to increase/decrease the side bearing preload.
34. Once the differential side bearing preload is correct, measure the backlash and adjust, if necessary. Refer to [Backlash Adjustment \(8.6 Inch Axle\)](#).
35. Once the differential side bearing preload and backlash is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to [Gear Tooth Contact Pattern Inspection](#).

Shim Method

Special Tools

J 25588 Side Bearing Shim Installer

- NOTE:**
- The differential side bearings must have preload before the backlash adjustment can be started.
 - In order to maintain the original backlash, adjust the differential case side bearing preload by changing the thickness of the left and the right side shim packs equally.
 - Measure the service shims and the service spacers one at a time. Add the measurements together in order to obtain the total thickness of the left or the right side shim pack.
 - Do not use or reuse the original cast iron production shims. Use service shims and service spacers instead.

1. Install the drive pinion, if necessary. Refer to [Drive Pinion and Ring Gear Replacement \(8.6/9.5/9.76 Inch Axle\)](#).

NOTE: Record the measurement.

2. Using an inch pound torque wrench, measure the rotating torque of the drive pinion which should be 1.7-3.4 N.m (15-30 lb in) for new bearings or 1.1-2.3 N.m (10-20 lb in) for used bearings.
3. If the rotating torque for the drive pinion bearings is not within specifications, adjust as necessary. Refer to [Drive Pinion and Ring Gear Replacement \(8.6/9.5/9.76 Inch Axle\)](#).

NOTE: Before installation of the case assembly, ensure that the side bearing surfaces in the axle housing are clean and free of burrs. If the original bearings are to be reused, the original bearing cups must also be used.

4. Install the differential assembly with the differential side bearings and bearing cups into the axle housing.
5. Insert one BENT 1.016 mm (0.040 in) thick service shim into the right side axle housing. Side the differential assembly towards the bent service shim in order to hold the shim in place.

6. While holding the differential assembly against the bent service shim, install one 4.318 mm (0.170 in) thick service spacer into the left side axle housing.
7. Move the differential assembly to the right until the ring gear contacts the drive pinion. Once the ring gear contacts the drive pinion, continue to move the ring gear towards the drive pinion to until all backlash is removed.
8. While holding the ring gear against the drive pinion, insert progressively larger service shims between the service spacer and the differential side bearing cup until a moderate resistance can be felt.
9. Once the largest service shim has been determined, measure the thickness of the shim using a micrometer. Measure the service shim in 3 locations. Calculate the average of the 3 measurements. Use the average as the thickness for the shim. Record the measurement.
10. Install the service shim that was just measured back into the left side of the axle housing. The service shim must be installed between the service spacer and the differential side bearing cup.
11. Remove the BENT shim from the right side of the axle housing.
12. Insert one 4.318 mm (0.170 in) thick service spacer into the right side axle housing.
13. Move the differential assembly towards the left side of the axle housing. While holding the differential assembly against the left side shim pack, insert progressively larger service shims between the service spacer and the differential side bearing cup until a moderate resistance can be felt.
14. Once the largest service shim has been determined, measure the thickness of the shim using a micrometer. Verify the thickness of the service shim. Measure the service shim in 3 locations. Calculate the average of the 3 measurements. Use the average as the thickness for the shim. Record the measurement.
15. In order to preload the differential side bearing and set the initial backlash to approximately 0.127 mm (0.005 in), adjust the thickness of left and right side shims by doing the following:
 1. Subtract 0.152 mm (0.006 in) from the measurement recorded for the left side shim in step 9. Record the measurement.
 2. Add 0.356 mm (0.014 in) to the measurement recorded for the right side shim in step 14.

NOTE: **Using a micrometer, verify the thickness of the service shim. Measure the service shim in 3 locations.**

16. Select the correct service shim thickness for each side corresponding to the measurements determined above. Calculate the average of the 3 measurements. Use the average as the thickness for the shim.

NOTE: **The service shim must be installed between the service spacer and the differential side bearing cup.**

17. Install the left side service shim into the axle housing.
18. Move the differential assembly towards the left side of the axle housing.

NOTE: **The service shim must be installed between the service spacer and the differential side bearing cup**

19. Using the **J 25588** installer, install the right side service shim into the axle housing..

CAUTION: **Refer to Fastener Caution .**

20. Install the differential bearing caps and bolts and tighten to 75 N.m (55 lb ft).
21. Rotate the pinion several times to ensure the bearings have seated.
22. Using an inch-pound torque wrench, measure the rotating torque of drive pinion and differential case side bearings which should be 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.
23. Calculate the differential side bearing preload by subtracting the drive pinion preload, measured in Step 2, from the drive pinion and the differential case bearing preload, measured in Step 23. Multiply the value obtained by the axle ratio. The differential side bearing preload should be 1.7-4.0 N.m (15-35 lb in).
24. If the differential side bearing preload is not within specifications, add or subtract shim thickness equally from each shim pack as necessary in order to increase/decrease the side bearing preload.
25. Once the differential side bearing preload is within specifications, measure the backlash between the ring gear and the drive pinion and adjust, if necessary. Refer to **Backlash Adjustment (8.6 Inch Axle)**.
26. Once backlash and differential side bearing preload is within specifications, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to **Gear Tooth Contact Pattern Inspection**.

DIFFERENTIAL CARRIER BEARING PRELOAD ADJUSTMENT (10.5 INCH AXLE)

Special Tools

J-24429 Side Bearing Backlash Spanner**NOTE:**

- The differential side bearing preload is adjusted by the 2 adjusting nuts in the bearing bore. The bore and the bearing cap provide the mating threads for the bearing nut.
- The differential must be initially preloaded in order to determine the backlash of the gear set. After the backlash is set, the final bearing preload is set.
- The rotating torque of the drive pinion must be within specifications before the pinion gear bearing retainer can be installed.

1. Install the pinion gear bearing retainer or the drive pinion, for the 10.5. Refer to [Differential Drive Pinion Gear Bearing Retainer Replacement \(10.5 Inch Axle\)](#).
2. Install the differential drive pinion. Refer to [Drive Pinion and Ring Gear Replacement \(10.5 Inch Axle\)](#).
3. Install the differential side bearings, if necessary. Refer to [Differential Bearing Replacement](#).
4. Install the differential side bearing adjuster nuts.

NOTE: Before installation of the differential case assembly, ensure that the side bearing surfaces in the carrier are clean and free of burrs. If the original bearings are to be reused, the original bearing cups must also be used.

NOTE: If the differential case assembly cannot be installed, turn the differential side bearing adjuster nuts into the axle housing until the differential case assembly can be installed.

5. Install the differential case assembly.

NOTE: Tighten the bearing cap bolt finger-tight. DO NOT torque the bearing cap bolts at this time.

6. Install the differential bearing caps and bolts.

NOTE: Do not force the differential ring gear into contact with the drive pinion.

NOTE: If the zero backlash cannot be obtained, turn the right side differential bearing adjuster nut in towards the rear axle housing until the differential ring gear fully contacts the drive pinion to obtain the zero backlash.

7. To establish the zero backlash point, slide the differential case assembly towards the right side axle housing until the ring gear contact the pinion.
8. Using the **J-24429** spanner and holding the holding the differential ring gear against the drive pinion, turn the left differential bearing adjuster nut out from the axle housing until it contacts the differential side bearing.
9. Using the **J-24429** spanner, turn the right differential bearing adjuster nut out from the axle housing until it contacts the differential side bearing.
10. Using the **J-24429** spanner, back off the left adjusting nut approximately 2 slots in order to obtain the initial backlash adjustment.

NOTE: Do not torque the adjuster lock bolt at this time.

11. Install the left adjuster nut lock and the adjuster nut lock bolt.
12. Using the **J-24429** spanner, firmly tighten the right differential bearing adjuster nut in order to force the differential case assembly into solid contact with the left differential adjuster nut.
13. Rotate the pinion several times in order to seat the bearings.
14. Using the **J-24429** spanner, loosen the right differential bearing adjuster nut until the nut is free from the differential side bearing.
15. Using the **J-24429** spanner, tighten the right differential bearing adjuster nut until the differential bearing adjuster nut contacts the bearing.
16. Once the right differential bearing adjuster contacts the differential bearing, tighten the differential bearing adjuster nut. using the **J-24429** spanner the following additional amounts:
17. Using the **J-24429** spanner, tighten the differential bearing adjuster nut an additional 2 slots for used bearings or an additional 3 slots for new bearings.
18. Install the right differential bearing adjuster nut lock.

NOTE: Do not torque the bolt at this time.

19. Install the right differential bearing adjuster nut lock bolt.

CAUTION: Refer to [Fastener Caution](#).

20. Tighten the bearing cap bolts to 185 N.m (136 lb ft). for the 8.6 inch axle or 207 N.m (153 lb ft) for the 11.5 inch axle.

21. Tighten differential bearing adjuster nut lock bolts to 27 N.m (20 lb ft).

22. Measure the ring gear to pinion backlash and adjust, if necessary. Refer to [Backlash Adjustment \(10.5 Inch Axle\)](#).

WHEEL BEARING ADJUSTMENT (10.5 INCH AXLE)

Preliminary Inspection

NOTE: The preceding information is a General Inspection Procedure. If there are hub seal leaks, brake related noise, vibration or wear issues, the wheel bearing end play should be measured to ensure it is within the acceptable range as noted below.

NOTE: Ensure the brakes are fully released and do not drag.

Pull or push the tire at the top back and forth in order to test the wheel bearing play.

- Use a pry bar under the tire as an alternative.
- If the wheel bearing adjustment is correct, the movement will be barely noticeable.
- If the movement is excessive, adjust the bearings.

Adjustment Procedure

NOTE: There are two different style of wheel bearing nut wrenches to match the different style of adjusting nuts and they are NOT interchangeable. Use the correct wrench when adjusting the wheel bearing.

Special Tools

- **CH 49794** Wheel Bearing Nut Wrench
- **CH 50636** Wheel Bearing Nut Wrench

For equivalent regional tools, refer to [Special Tools](#).

1. Raise the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the axle shaft. Refer to [Rear Axle Shaft and Gasket Replacement \(10.5 Inch Axle\)](#).

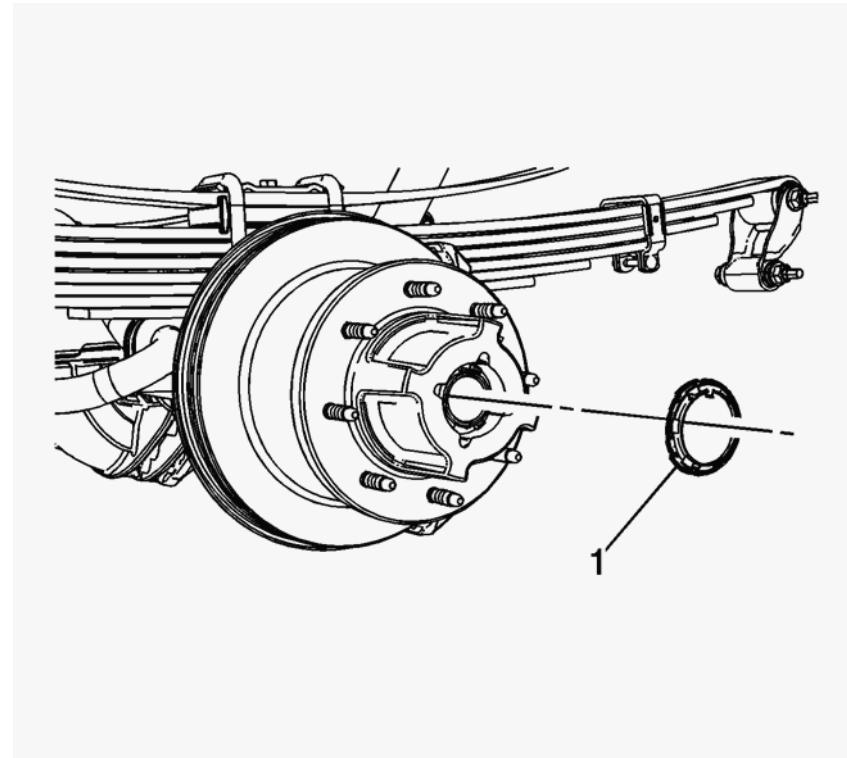


Fig. 249: Adjuster Nut Retainer

Courtesy of GENERAL MOTORS COMPANY

3. Remove the adjuster nut retainer (1).

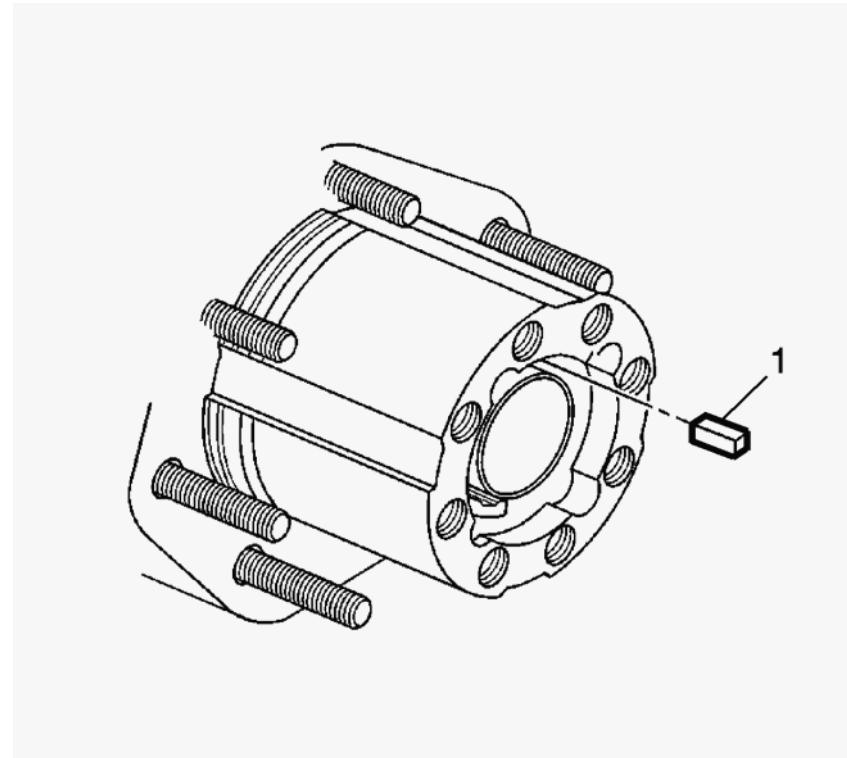


Fig. 250: Adjuster Nut Lock Key

Courtesy of GENERAL MOTORS COMPANY

4. Remove the adjuster nut lock key (1).

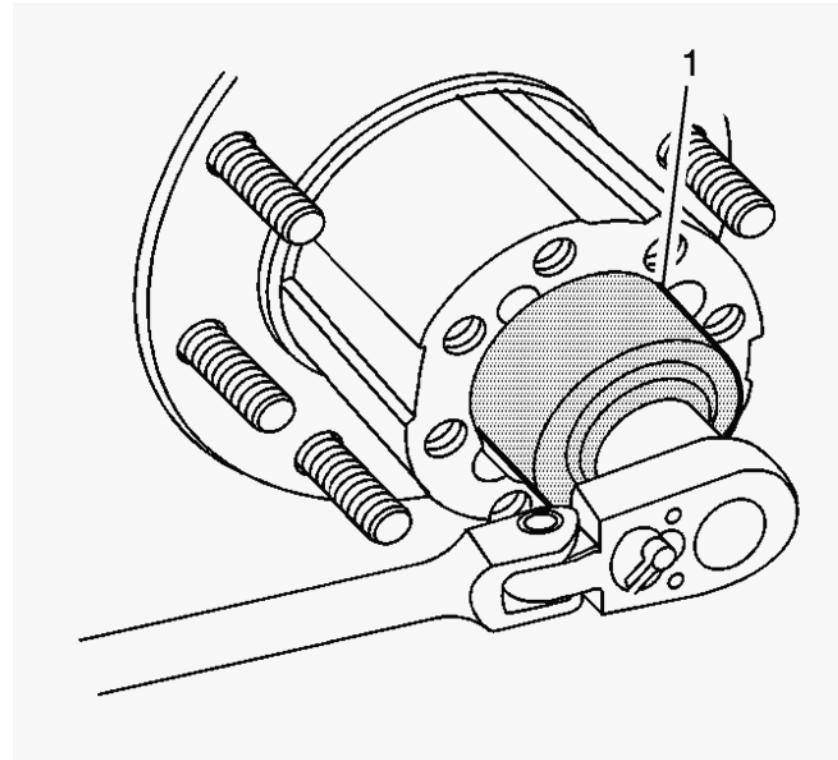


Fig. 251: Wheel Hub Assembly And Special Tool

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to [Fastener Caution](#).

NOTE: If the wheel hub assembly DOES NOT fully seat itself onto the axle shaft and is removed, the wheel hub seal must be replaced.

5. Using the **CH 49794** wrench or the **CH 50636** wrench (1), tighten the wheel bearing adjusting nut:

- Rotate the hub in the opposite direction to the way the adjuster nut is turning.
- Ensure that the inner bearing and the seal are completely seated against the axle shoulder.
- Tighten the adjusting nut to 70 N.m (52 lb ft).

6. Using the **CH 49794** wrench or the **CH 50636** wrench (1), turn the adjusting nut counterclockwise until the nut is loose.

NOTE: **Torque on the nut must be zero to finger tight.**

7. Turn the adjusting nut clockwise until the nut contacts the bearing cone.

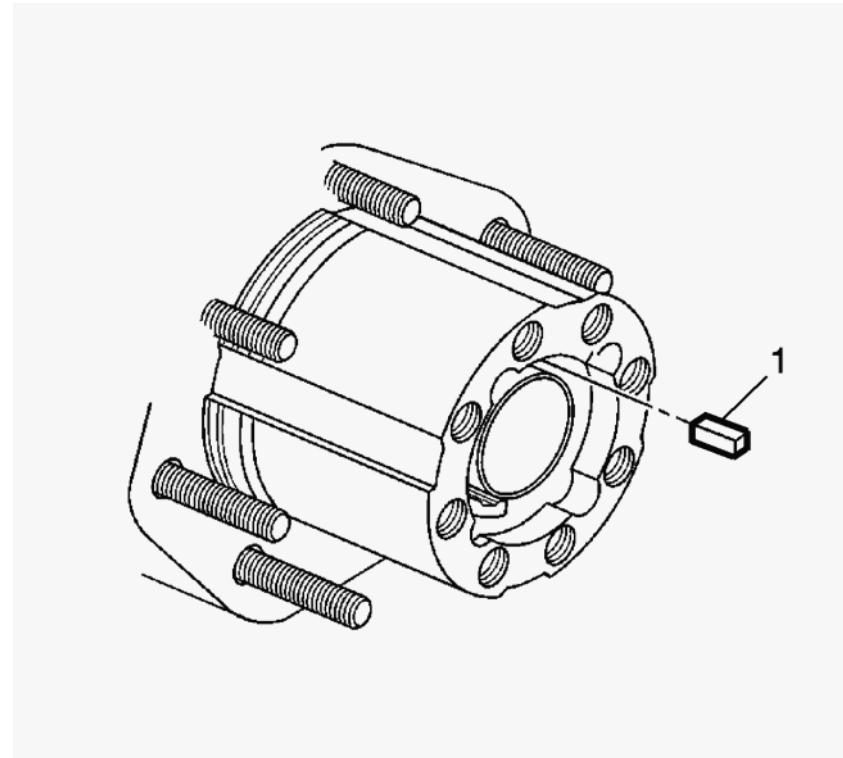


Fig. 252: Adjuster Nut Lock Key

Courtesy of GENERAL MOTORS COMPANY

8. Install the rear wheel bearing adjusting nut key (1).

NOTE: Do not turn the adjusting nut more than one slot counterclockwise to align the adjusting nut slot with the keyway in the axle.

9. If the rear wheel bearing adjusting nut key (1) can not be installed, turn the rear wheel bearing adjusting nut (1) counterclockwise until the rear wheel bearing adjusting nut (1) and the keyway in the axle are aligned.

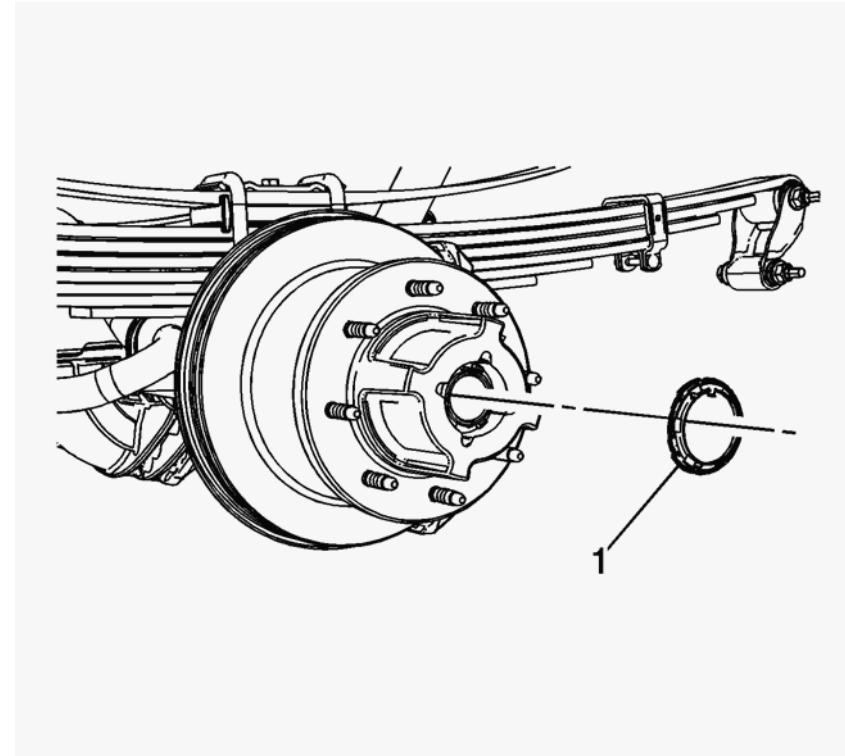


Fig. 253: Adjuster Nut Retainer

Courtesy of GENERAL MOTORS COMPANY

10. Install the adjuster nut retainer (1).

NOTE: A magnetic dial indicator base can be mounted on the end of the axle spindle tube and still allow the hub to rotate. A dial indicator can be positioned against the face of the axle shaft mounting flange on the rear wheel hub. The indicator probe must be positioned perpendicular (i.e. 90 degrees to the hub face) to obtain accurate readings. Alternately, the dial indicator magnetic base can be mounted on the axle shaft mounting flange of the rear wheel hub and the dial indicator probe can be positioned against the end of the axle spindle tube. Either way is acceptable and both methods can be used to measure hub endplay. When pushing and pulling axially on the hub to measure the endplay, it is helpful if the hub is rotated several degrees clockwise and counterclockwise to ensure that the bearings are being properly seated and seal friction is minimized. It is necessary to provide a relatively high amount of force, by hand, to the hub when pushing and pulling to ensure that the load on the hub overcomes the effects of the weight of the hub and the friction in the inner bearing seal. Rocking the hub using a pry bar does not properly load the hub and provides an inaccurate reading of endplay. The dial indicator base and indicator probe must be positioned as close to the centerline of the rear axle spindle and hub as possible to minimize any effects caused by tilting of the hub when pushing or pulling axially on the hub to obtain measurements.

11. Use appropriate tool setup to measure hub endplay. Bearing should be adjusted for clearance between 0.025-0.25 mm (0.001-0.010 in).
12. Install the rear axle shaft. Refer to [Rear Axle Shaft and Gasket Replacement \(10.5 Inch Axle\)](#).
13. Inspect the lubricant level and add, if necessary. Refer to [Rear Axle Lubricant Level Inspection \(10.5 Inch Axle\)](#).
14. Lower the vehicle.

BACKLASH ADJUSTMENT (9.5/9.76 INCH AXLE)

Special Tools

- J 8001 Dial Indicator Set
- J 25025 Guide Pins

NOTE:

- Ensure that the side bearing surfaces in the axle housing are clean and free of burrs. If the original bearings are to be reused, the original bearing cups must also be used.
- The differential side bearings must be initially preloaded in order to determine the backlash of the gear set. After the backlash is set, the final bearing preload is set.
- Mark the bearing caps left or right sides

1. Measure the rotating torque of the drive pinion and differential assembly. Refer to [Differential Drive Pinion Gear Bearing Replacement \(8.6/9.5/9.76 Inch Axles\)](#).

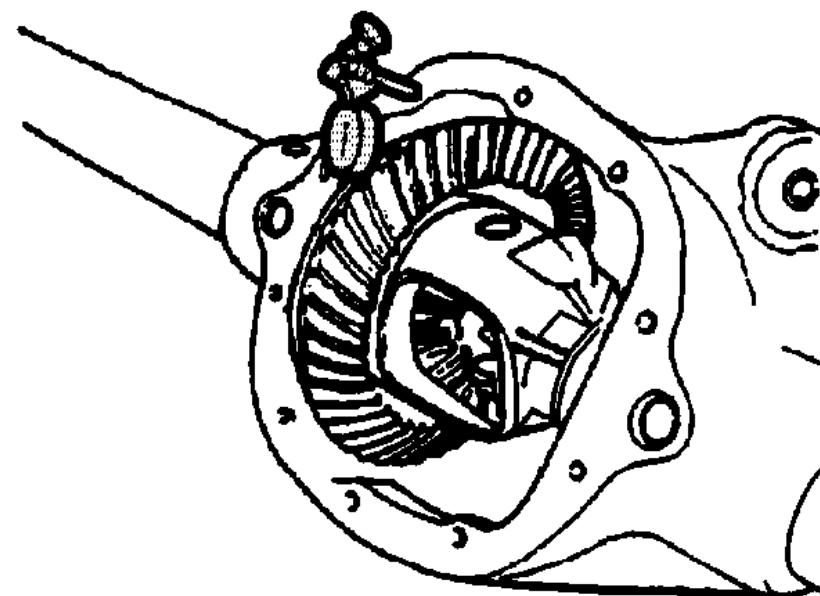


Fig. 254: Measuring Ring Gear Backlash

Courtesy of GENERAL MOTORS COMPANY

2. Install the J 25025 pins and the J 8001 indicator to the axle housing.

NOTE: Preload the dial of the J 8001-3 indicator approximately 3/4 of a turn and zero the gauge.

3. Set the **J 8001-3** indicator so that the stem is aligned with the gear rotation and square to the tooth angle.
4. Hold the drive pinion stationary, move the ring gear back and forth.
5. Repeat the measuring procedure at eight points around the ring gear.
6. The difference between the backlash at all of the measuring points should not vary by more than 0.05 mm (0.002 in).
7. If the difference between the backlash at all of the measuring points varies by more than 0.05 mm (0.002 in), inspect for burrs, a distorted case flange or uneven bolting.
8. If the difference between all the measuring points is within specifications, the backlash at the minimum lash point measured should be 0.08-0.25 mm (0.003-0.010 in) with a preferred backlash of 0.13-0.18 mm (0.005-0.007 in).

NOTE: **Increasing or decreasing the shim thickness by 0.05 mm (0.002 in) will change the backlash adjustment approximately 0.03 mm (0.001 in).**

9. Calculate the average of the 3 measurements.

NOTE:

- If the backlash is less than, select a smaller shim than the one that was removed. For example, to INCREASE the backlash by 0.05 mm (0.002 in), select a shim that is 0.10 mm (0.004 in) thinner than the shim that was removed.
- If the backlash is larger than, select a larger shim than the one that was removed. For example, to DECREASE the backlash by 0.05 mm (0.002 in), select a shim that is 0.10 mm (0.004 in) thicker than the shim that was removed.

10. Install the selected shim.

CAUTION: **Refer to Fastener Caution .**

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

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

NOTE: **Mark the bearing cups and the shims left or right.**

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

NOTE:

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

3. Measure the thickness of left side shim pack.

NOTE:

- Add the average of each of the shim measurements together.
- Record the measurement. This is the thickness for the left side shim pack

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

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

5. Assemble a new left side shim pack by decreasing the appropriate amount of thickness from the original left side shim pack.

NOTE: **Measure each shim separately.**

6. Measure the thickness of right side shim or the shim and service spacer in 3 locations.

NOTE:

- Add the average of each of the shim measurements together.

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

7. Calculate the average of the 3 measurements for each shim.
8. Assemble a new right side shim pack by increasing the appropriate amount of thickness to the original right side shim pack. If the original shim is cast iron production shim, assemble the shim pack using a service spacer and service shims. For example, to increase the backlash by 0.05 mm (0.002 in), add 0.10 mm (0.004 in) of thickness to the right side shim pack.
12. Use the following procedure to decrease the backlash if the backlash is too large:
 1. Remove the bearing cap bolts and the bearing caps.

NOTE: **Mark the bearing cups and the shims left or right.**

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

NOTE:

- **Measure the production shim or the shim and service spacer in 3 locations.**
- **Measure each shim separately.**

3. Measure the thickness of left side shim pack.

NOTE:

- **Add the average of each of the shim measurements together.**
- **Record the measurement. This is the thickness for the left side shim pack.**

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

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

NOTE:

- **Measure the shim or the shim and service spacer in 3 locations.**
- **Measure each shim separately.**

6. Measure the thickness of right side shim pack.

NOTE:

- **Add the average of each of the shim measurements together.**
- **Record the measurement. This is the thickness for the right side shim pack.**

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

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

13. Install the differential case assembly with the bearing cups.

14. Install the left side service shims between the axle housing and the differential case.

15. Install the right side service shims between the axle housing and the differential case.

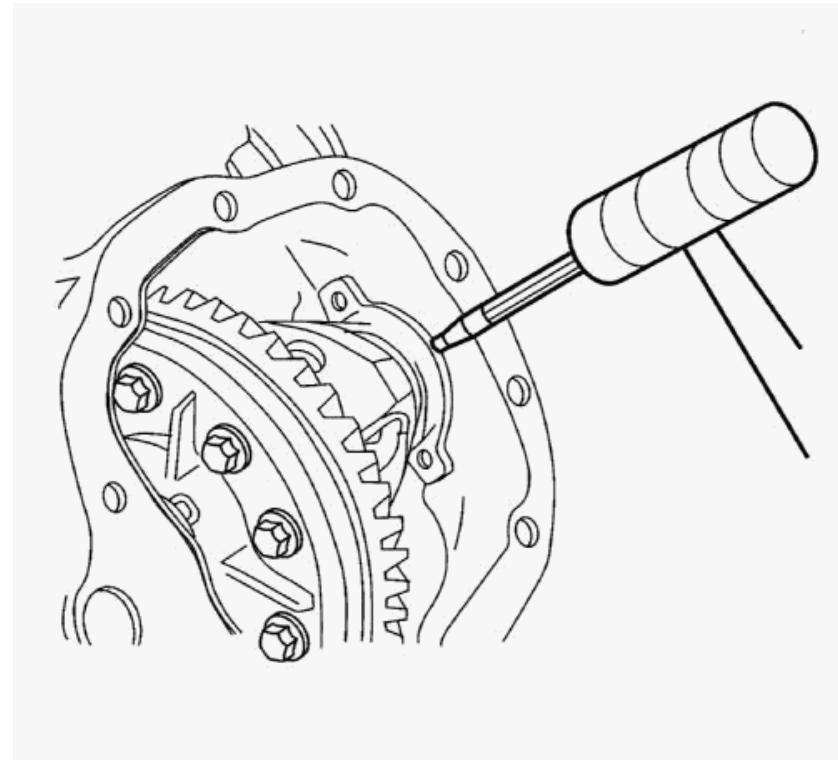


Fig. 255: Install Service Spacers Using Brass Drift

Courtesy of GENERAL MOTORS COMPANY

NOTE: The service spacers must be installed between the service shim (s) and the axle housing.

16. Using the brass drift for 9.5/9.76 axle, install the left side service spacer
17. Using the brass drift for 9.5/9.76 axle, install the right side service spacer
18. Install the bearing caps and bolts and tighten to 85 N.m (63 lb ft).
19. Recheck the backlash and adjust, if necessary.
20. Once backlash is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to [Gear Tooth Contact Pattern Inspection](#).

NOTE: Recheck the backlash following the steps above to verify that the backlash is within specifications.

21. Tighten the differential bearing cap bolts to 85 N.m (63 lb ft).
22. Measure the drive pinion and differential case side bearing preload and adjust, if necessary following the steps above.
23. Once the backlash and bearing preload is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to [Gear Tooth Contact Pattern Inspection](#).

BACKLASH ADJUSTMENT (8.6 INCH AXLE)

Special Tools

- **J 8001** Dial Indicator Set
- **J 25025-1** Guide Pins
- **J 25588** Side Bearing Shim Installer

- NOTE:**
- Ensure that the side bearing surfaces in the axle housing are clean and free of burrs. If the original bearings are to be reused, the original bearing cups must also be used.
 - The differential side bearings must be initially preloaded in order to determine the backlash of the gear set. After the backlash is set, the final bearing preload is set.

1. Measure the rotating torque of the drive pinion and differential assembly. Refer to [Differential Drive Pinion Gear Bearing Replacement \(8.6/9.5/9.76 Inch Axles\)](#).

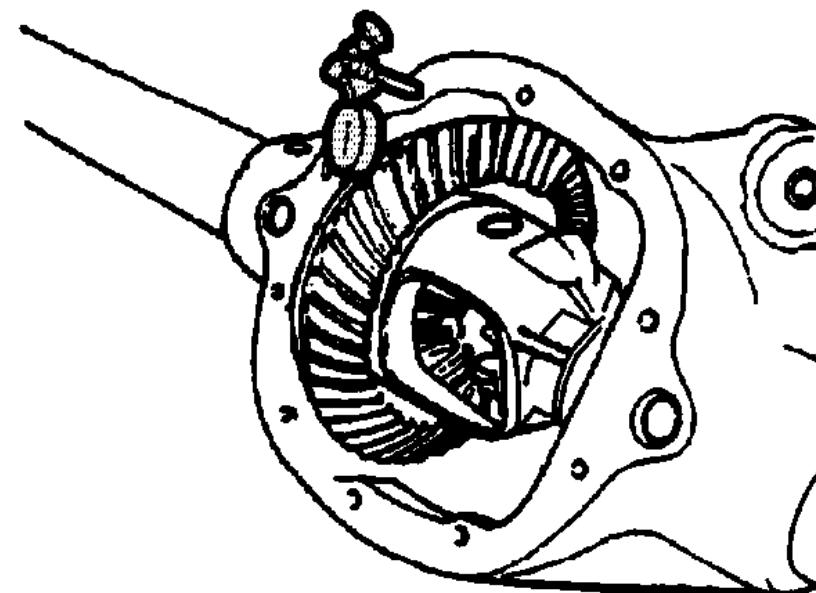


Fig. 256: Measuring Ring Gear Backlash

Courtesy of GENERAL MOTORS COMPANY

2. Install the **J 25025** pins and the **J 8001** indicator to the axle housing.

- NOTE:** **Preload the dial of the approximately 3/4 of a turn and zero the gauge.**

3. Set the **J 8001** indicator so that the stem is aligned with the gear rotation and square to the tooth angle.

4. Hold the drive pinion stationary, move the ring gear back and forth.
5. Repeat the measuring procedure at eight points around the ring gear.
6. The difference between the backlash at all of the measuring points should not vary by more than 0.05 mm (0.002 in).
7. If the difference between the backlash at all of the measuring points varies by more than 0.05 mm (0.002 in), inspect for burrs, a distorted case flange or uneven bolting.
8. If the difference between all the measuring points is within specifications, the backlash at the minimum lash point measured should be 0.08-0.25 mm (0.003-0.010 in) with a preferred backlash of 0.13-0.18 mm (0.005-0.007 in).

NOTE:

- Do not use the original cast iron production shims to adjust the backlash. Use service shims and spacers instead.
- Adjust the thickness of the shim pack on each side of the differential in equal amounts. This will maintain the correct axle side bearing preload.
- Moving 0.05 mm (0.002 in) of shim thickness from one side of the differential to the other will change the backlash adjustment approximately 0.03 mm (0.001 in).

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

NOTE:

- Mark the bearing caps left or right.

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

NOTE:

- Mark the bearing cups and the shims left or right.

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

NOTE:

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

3. Measure the thickness of left side shim pack.

NOTE:

- Add the average of each of the shim measurements together.
- Record the measurement. This is the thickness for the left side shim pack.

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

NOTE:

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

5. Assemble a new left side shim pack by decreasing the appropriate amount of thickness from the original left side shim pack.

NOTE:

- Measure each shim separately.

6. Measure the thickness of right side shim or the shim and service spacer in 3 locations.

NOTE:

- Add the average of each of the shim measurements together.
- Record the measurement. This is the thickness for the right side shim pack.

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

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

10. Use the following procedure to decrease the backlash if the backlash is too large:

NOTE: **Mark the bearing caps left or right.**

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

NOTE: **Mark the bearing cups and the shims left or right.**

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

NOTE:

- **Measure the production shim or the shim and service spacer in 3 locations.**
- **Measure each shim separately.**

3. Measure the thickness of left side shim pack.

NOTE:

- **Add the average of each of the shim measurements together.**
- **Record the measurement. This is the thickness for the left side shim pack.**

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

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

NOTE:

- **Measure the shim or the shim and service spacer in 3 locations.**
- **Measure each shim separately.**

6. Measure the thickness of right side shim pack.

NOTE:

- **Add the average of each of the shim measurements together.**
- **Record the measurement. This is the thickness for the right side shim pack.**

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

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

11. Install the differential case assembly with the bearing cups.

12. Install the left side service spacer between the axle housing and the differential case.

13. Install the right side service spacer between the axle housing and the differential case.

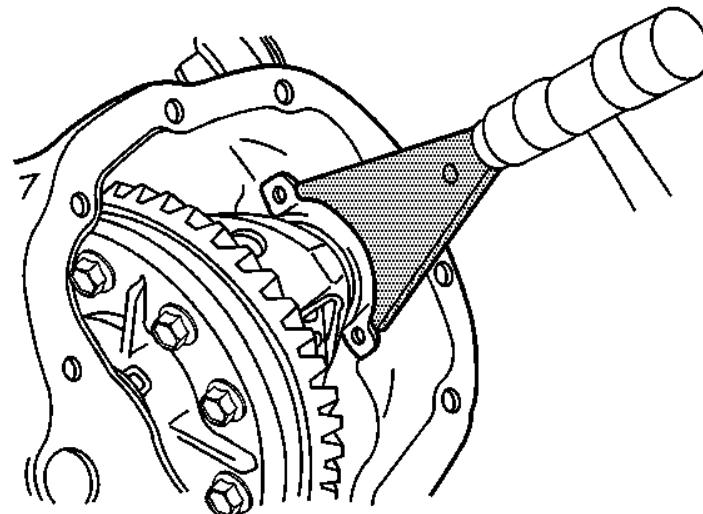


Fig. 257: Installing Service Shim

Courtesy of GENERAL MOTORS COMPANY

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

14. Using the **J 25588** installer, install the left side service shim or shims.

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

15. Using the **J 25588** installer, install the right side service shim or shims.

CAUTION: Refer to [Fastener Caution](#).

16. Install the bearing caps and bolts and tighten to 75 N.m (55 lb ft).

17. Recheck the backlash and adjust, if necessary.

18. Once backlash is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to [Gear Tooth Contact Pattern Inspection](#).

BACKLASH ADJUSTMENT (10.5 INCH AXLE)

Special Tools

- **J 8001** Dial Indicator Set
- **J 24429** Side Bearing Backlash Spanner

- J 25025 Guide Pins

NOTE:

- Ensure that the side bearing surfaces in the axle housing are clean and free of burrs. If the original bearings are to be reused, the original bearing cups must also be used.
- The differential side bearings must be initially preloaded in order to determine the backlash of the gear set. After the backlash is set, the final bearing preload is set.

1. Measure the rotating torque of the drive pinion and differential assembly. Refer to [Differential Drive Pinion Gear Bearing Replacement \(10.5 Inch Axle\)](#).

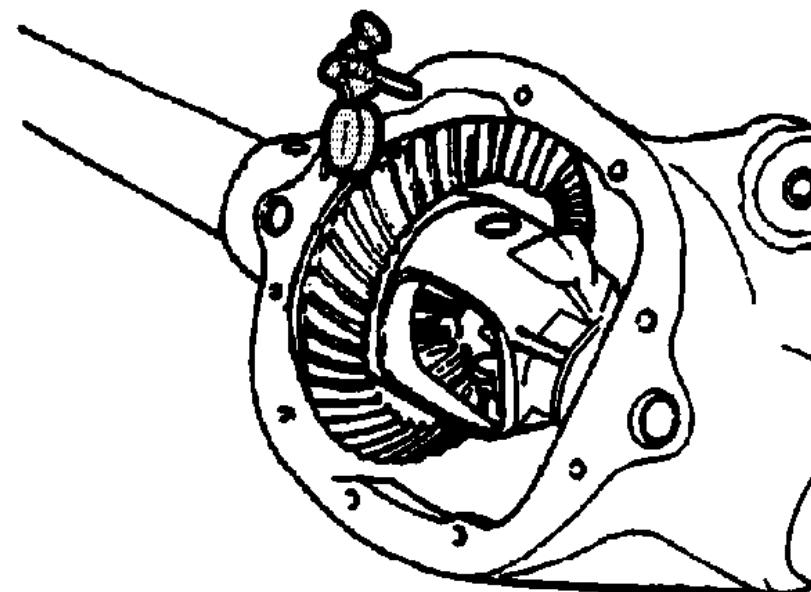


Fig. 258: Measuring Ring Gear Backlash

Courtesy of GENERAL MOTORS COMPANY

2. Install the **J 8001** indicator and the **J 25025** pins to the axle housing.
3. Place the indicator stem of the **J 8001** indicator at the heel end of a gear tooth.

NOTE: **Preload the dial of the J 8001 indicator approximately a turn and zero the gauge.**

4. Set the **J 8001** indicator so that the stem is aligned with the gear rotation and square to the tooth angle.
5. Hold the drive pinion stationary, move the ring gear back and forth.

6. Repeat the measuring procedure at eight points around the ring gear.
7. The difference between the backlash at all of the measuring points should not vary by more than 0.05 mm (0.002 in).
8. If the difference between the backlash at all of the measuring points varies by more than 0.05 mm (0.002 in), inspect for burrs, distorted case flange or uneven bolting.
9. If the difference between all the measuring points is within specifications, the backlash at the between the ring gear and the drive pinion should be between 0.08-0.25 mm (0.003-0.010 in) with a preferred backlash of 0.13-0.18 mm (0.005-0.007 in) at the minimum lash point.

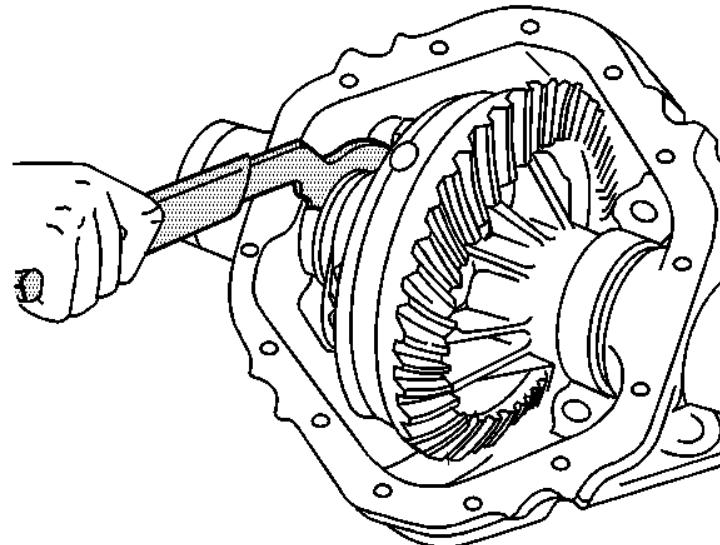


Fig. 259: Turning Adjusters

Courtesy of GENERAL MOTORS COMPANY

10. If the backlash is not within specifications, remove the differential bearing adjuster nut retainers bolts.
11. Remove the differential bearing adjuster nut retainers.
12. Remove the bearing cap bolts.

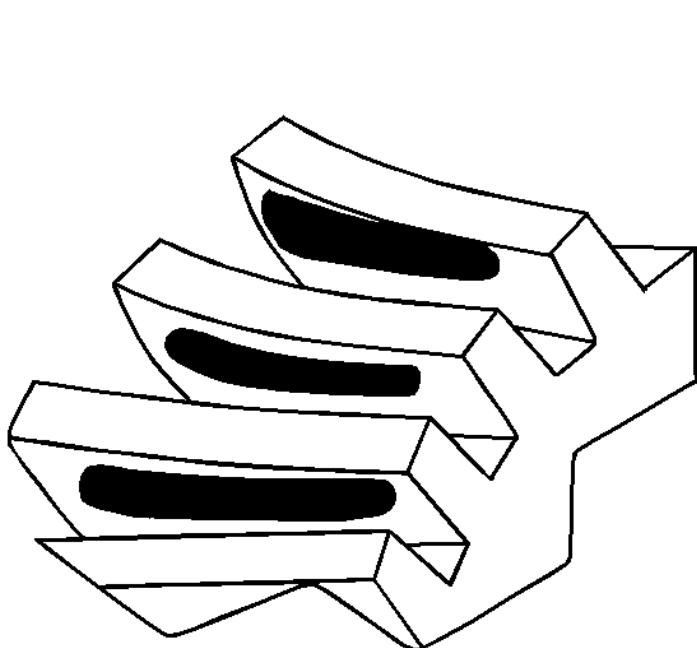
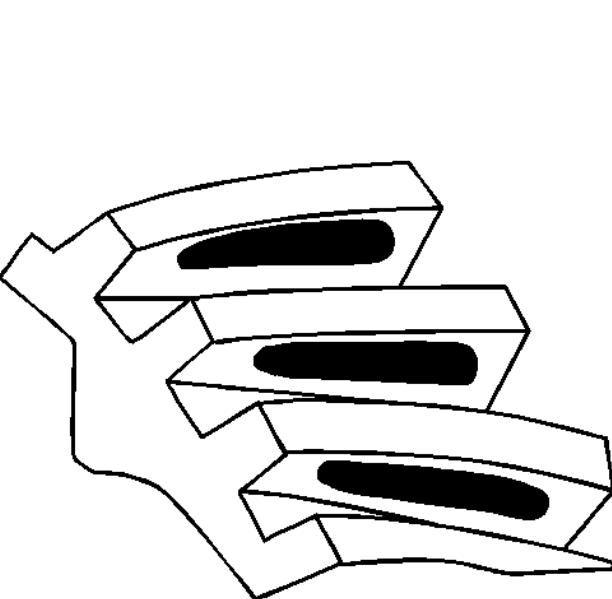
NOTE: Before removing the bearing caps, mark the bearing caps left and right.

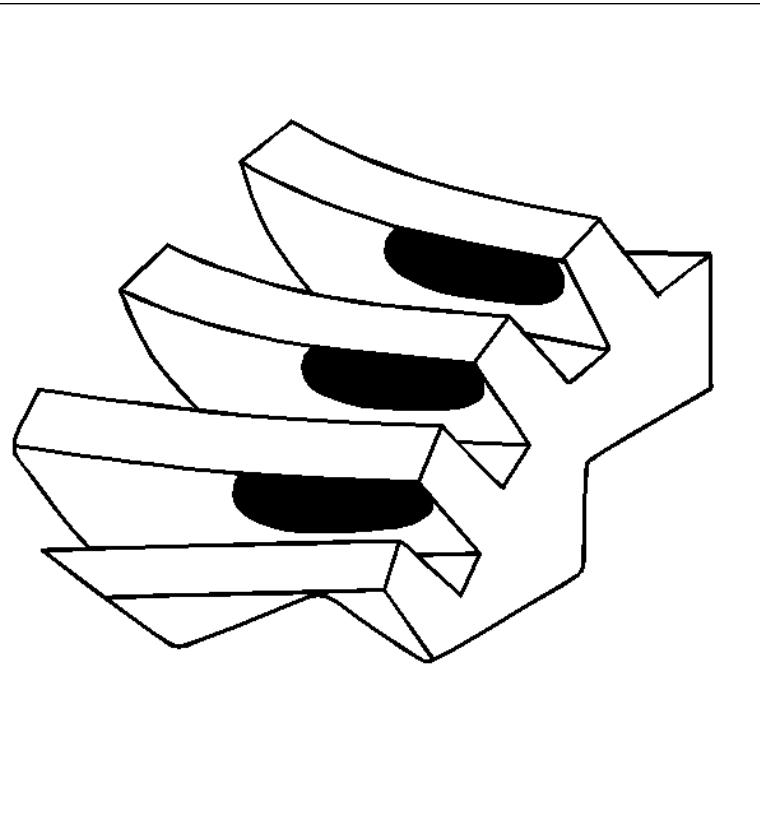
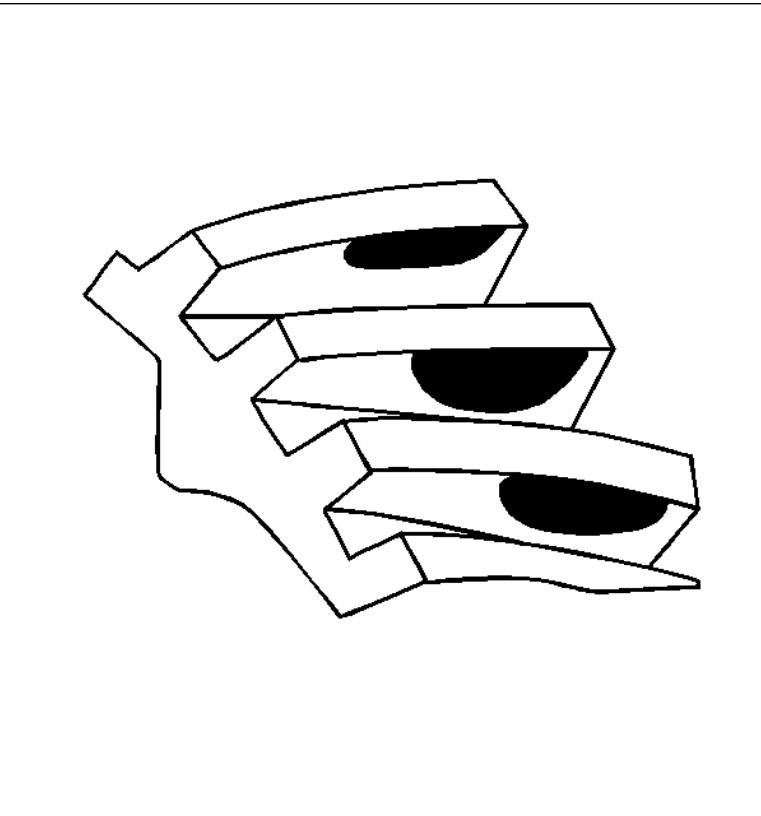
13. Remove the bearing caps.
14. If the backlash is less than, use the **J 24429** spanner to increase the backlash by turning the left differential bearing adjuster in one slot and the right differential bearing adjuster out one slot until the correct backlash is obtained.
15. If the backlash is greater than, use the **J 24429** spanner to decrease the backlash by turning the right differential bearing adjuster in one slot and the left differential bearing adjuster out one slot until the correct backlash is obtained.
16. Install the bearing caps.

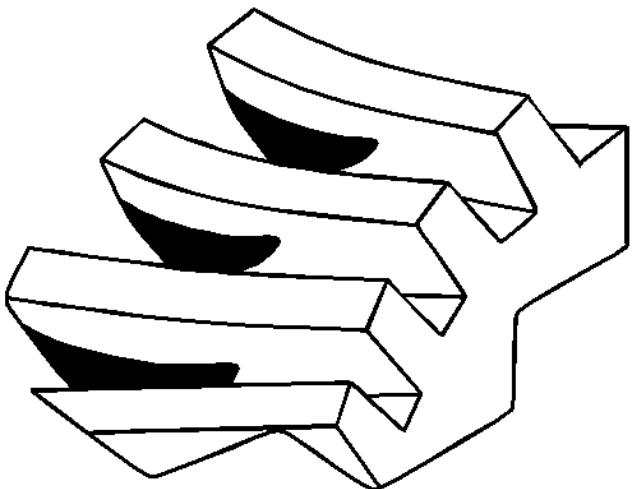
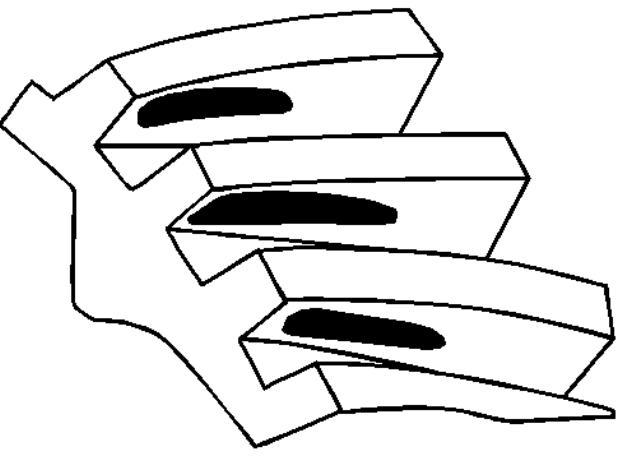
CAUTION: Refer to [Fastener Caution](#) .

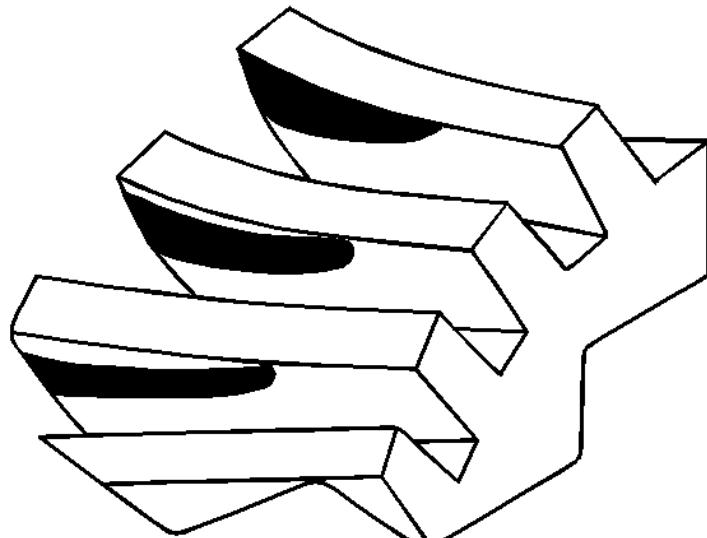
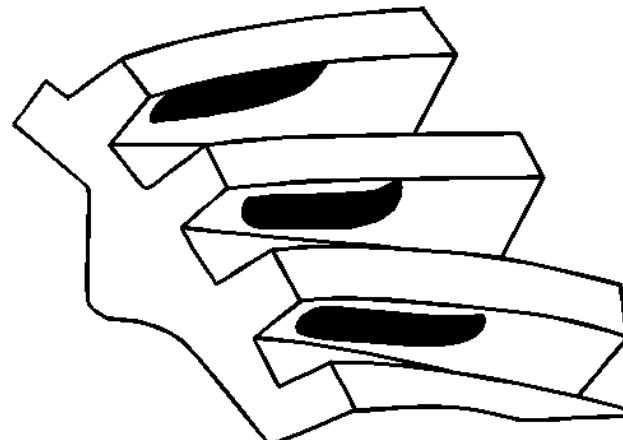
17. Install the bearing cap bolts and tighten to 185 N.m (136 lb ft) for the 10.5 inch axle, or 207 N.m (153 lb ft) for the 11.5 inch axle.
18. Recheck the backlash following the steps above to verify that the backlash is within specifications.
19. Install the differential bearing adjuster nut retainers.
20. Install the differential bearing adjuster nut retainer bolts to tighten to 27 N.m (20 lb ft).
21. Measure the drive pinion and differential case side bearing preload and adjust, if necessary following the steps above.
22. Once the backlash and bearing preload is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to [Gear Tooth Contact Pattern Inspection](#).

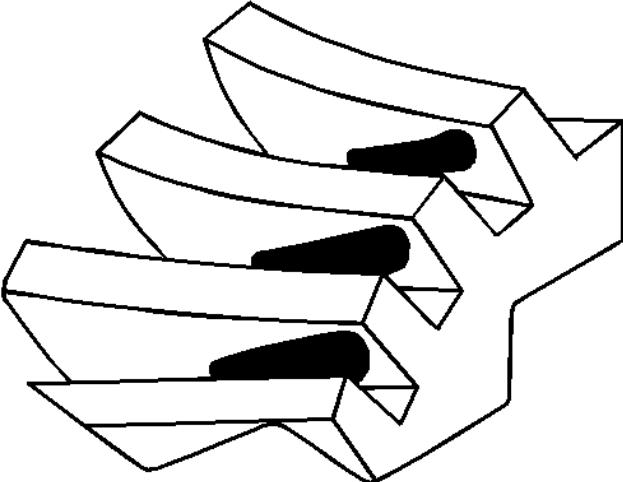
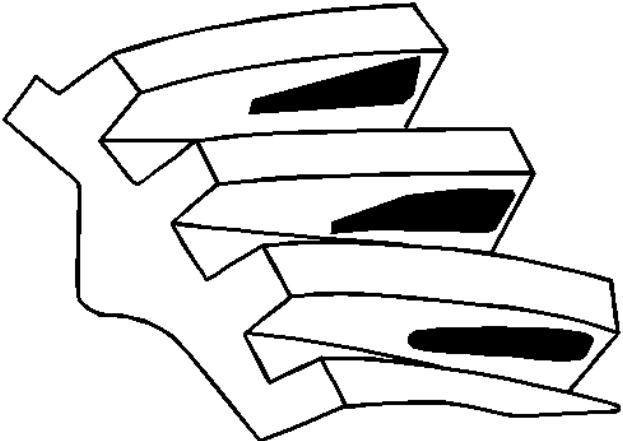
GEAR TOOTH CONTACT PATTERN INSPECTION**Pattern Evaluation (Ring Gear)**

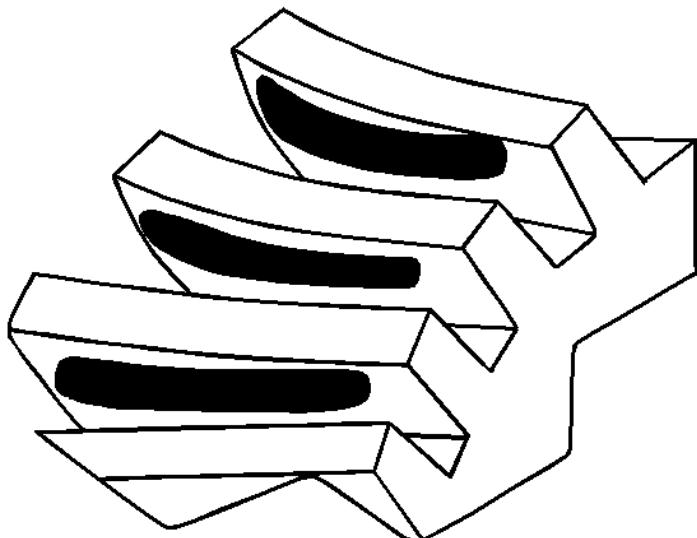
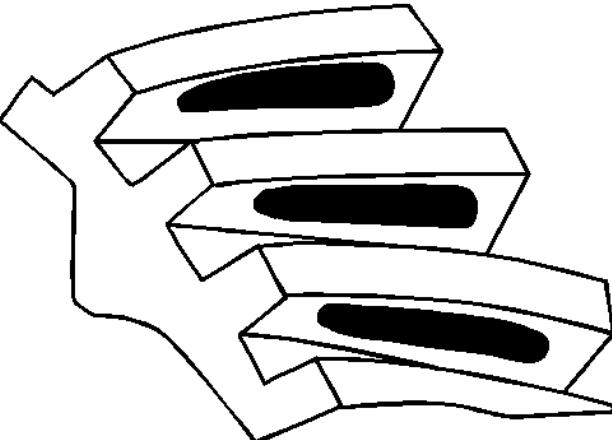
Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
<ul style="list-style-type: none"> • If the pinion depth needs to be adjusted, refer to Pinion Depth Adjustment (8.6 Inch Axle)Pinion Depth Adjustment (10.5 Inch Axle)Pinion Depth Adjustment (9.5 Inch Axle)Pinion Depth Adjustment (9.76 Inch Axle). • If the backlash needs to be adjusted, refer to Backlash Adjustment (9.5/9.76 Inch Axle)Backlash Adjustment (8.6 Inch Axle)Backlash Adjustment (10.5 Inch Axle). • For the ring gear to pinion gear wear pattern test and the proper identification of the 2-Cut and 5-Cut, refer to Differential Drive Pinion Gear and Ring Gear Description and Operation. 			
		Drive Side Centered Coast Side Centered	No correction required.

Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
Drive Pinion Issue - 2-Cut Gearset			
		Drive Side Low Heel Contact - Coast Side High Heel Contact	<ol style="list-style-type: none"> 1. Inspect the backlash to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in) 2. If backlash is correct, move the drive pinion closer to the ring gear by increasing the thickness of the pinion shim on a one-piece axle housing or by decreasing the thickness of the pinion shim on the 10.5 inch two-piece axle housing.

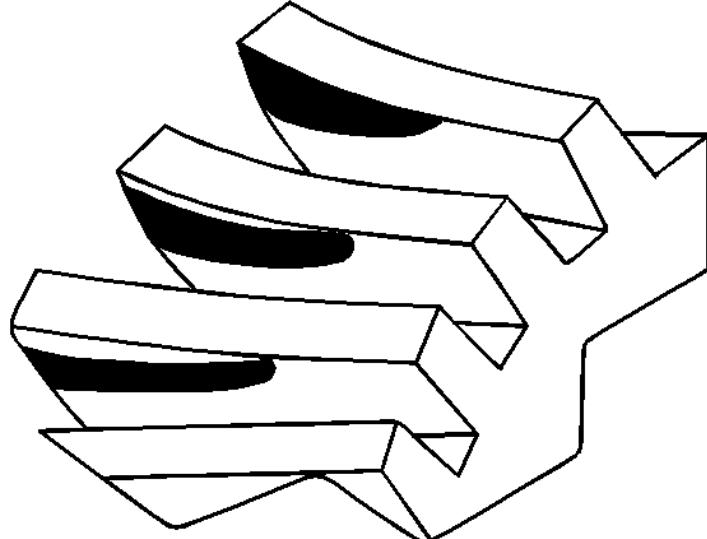
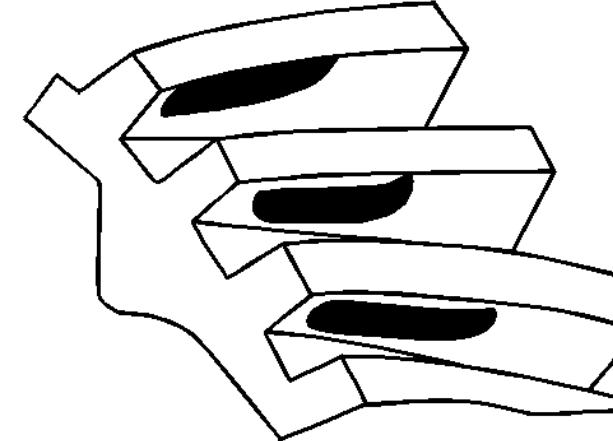
Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
		Drive Side Low Heel Contact - Coast Side Low Toe Contact	<ol style="list-style-type: none"> 1. Inspect the backlash to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in) 2. If backlash is correct, move the drive pinion away from the ring gear by decreasing the thickness of the pinion shim on a one-piece axle housing or by increasing the thickness of the pinion shim on the 10.5 inch two-piece axle housing.
Backlash Issue			

Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
		Drive Side High Heel Contact - Coast Side High Toe Contact	<p>Backlash incorrect. The ring gear is too far away from the drive pinion. Inspect and adjust the backlash as necessary to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in).</p>

Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
		Drive Side Low Toe Contact - Coast Side Low Heel Contact	Backlash incorrect. The ring gear is too close to the drive pinion. Inspect and adjust the backlash as necessary to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in).

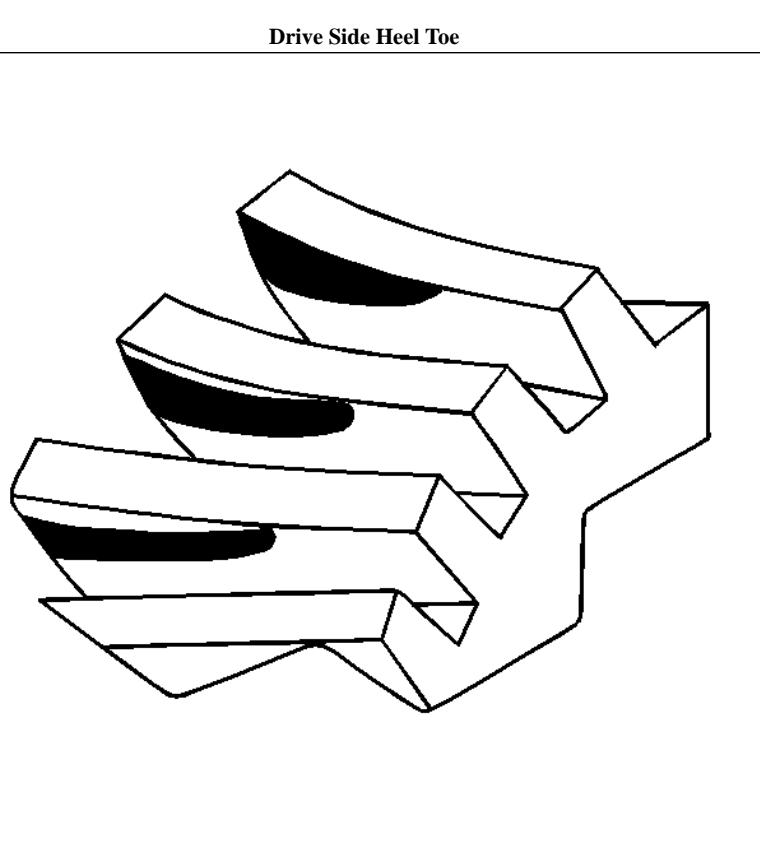
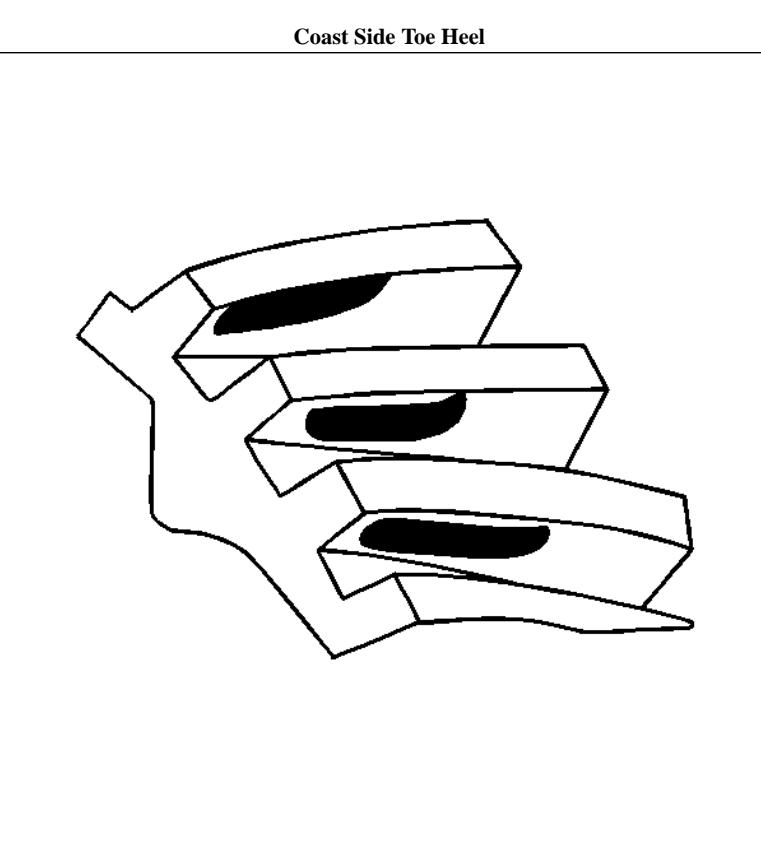
Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
		Drive Side Centered - Coast Side Centered	No correction required.

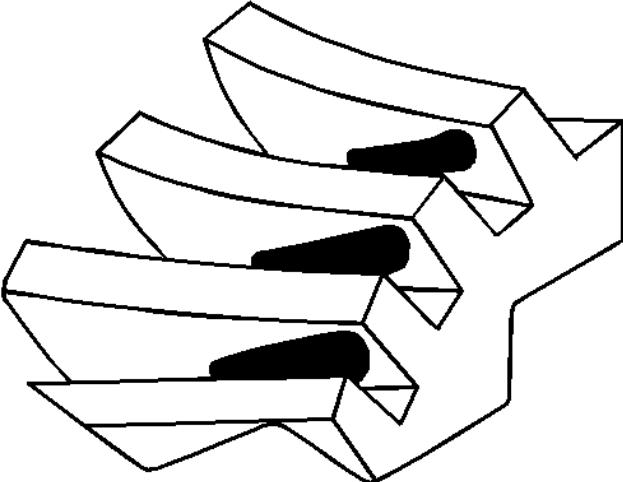
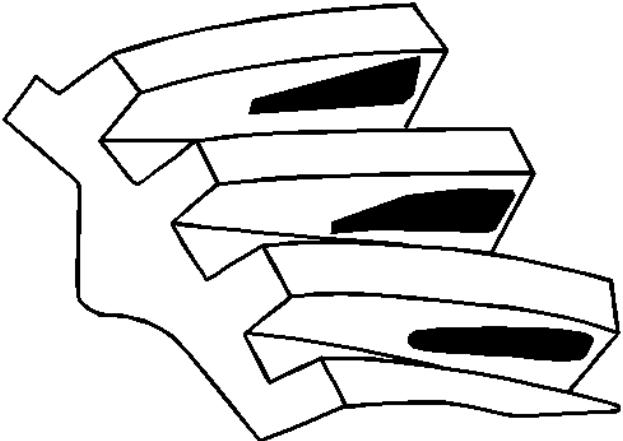
Drive Pinion Issue - 5-Cut Gearset

Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
		Drive Side High and Slightly Heel Contact - Coast Side High and Slightly Toe Contact	<ol style="list-style-type: none"> 1. Inspect the backlash to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in) 2. If backlash is correct, move the drive pinion closer to the ring gear by increasing the thickness of the pinion shim on a one-piece axle housing or by decreasing the thickness of the pinion shim on the 10.5 inch two-piece axle housing.

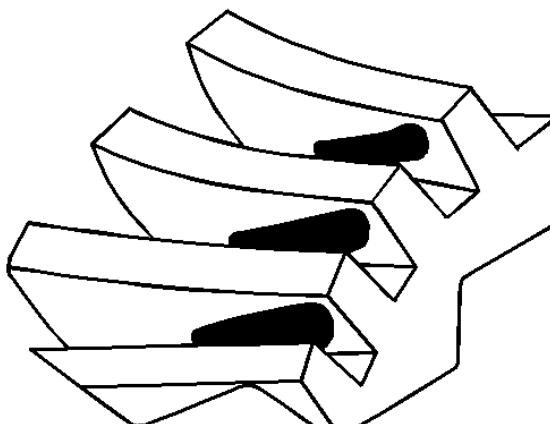
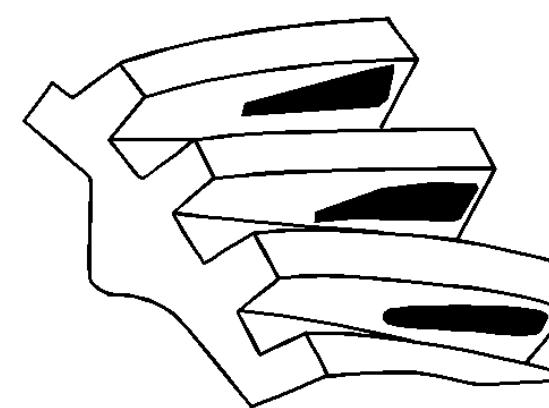
Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
		Drive Side Low and Slightly Heel Contact - Coast Side High and Slightly Toe Contact	<ol style="list-style-type: none"> 1. Inspect the backlash to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in) 2. If backlash is correct, move the drive pinion away from the ring gear by decreasing the thickness of the pinion shim on a one-piece axle housing or by increasing the thickness of the pinion shim on the 10.5 inch two-piece axle housing.

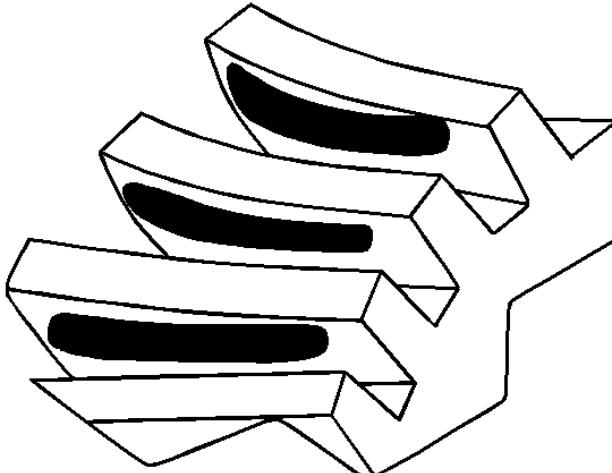
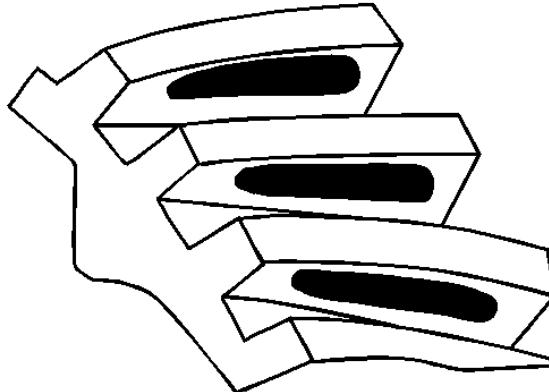
Backlash Issue

Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
		Drive Side Heel Contact - Coast Side Toe Contact	<p>Backlash incorrect. The ring gear is too far away from the drive pinion. Inspect and adjust the backlash as necessary to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in).</p>

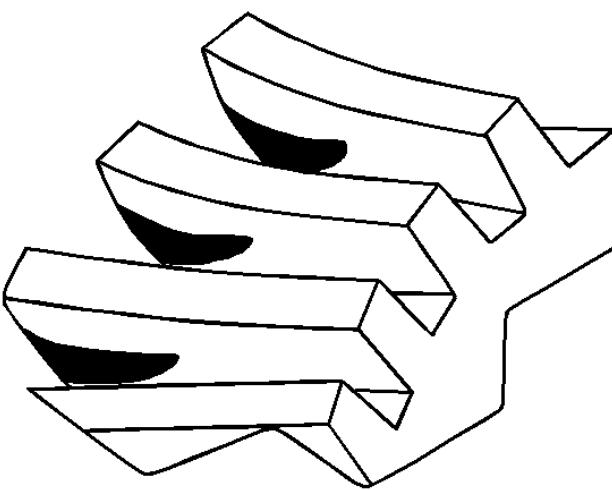
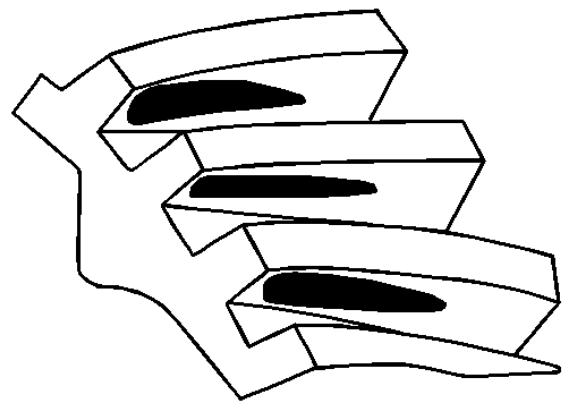
Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
		Drive Side Toe Contact - Coast Side Heel Contact	Backlash incorrect. The ring gear is too close to the drive pinion. Inspect and adjust the backlash as necessary to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in).

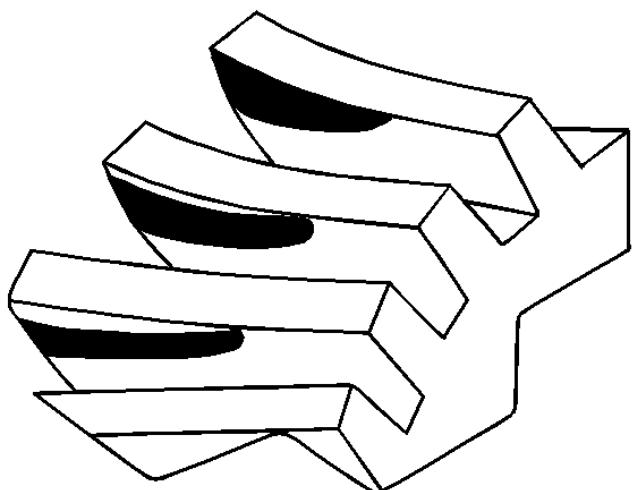
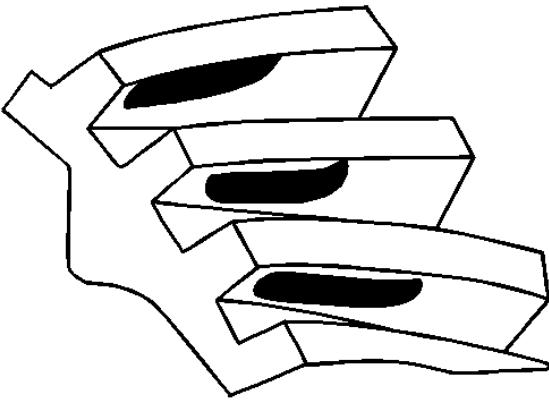
Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
Face Hobbing				

Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Toe Contact		Heel Contact	Pinion shim correct. Increase backlash.

Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Desirable Pattern - Drive pattern should be centered on tooth		Desirable Pattern - Coast pattern should be center to slightly toe on tooth	No correction required.

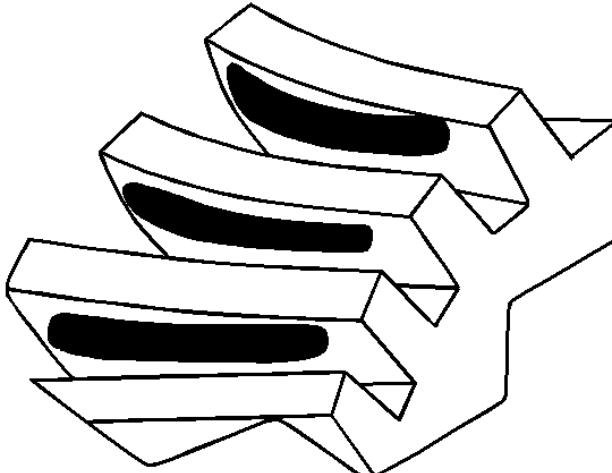
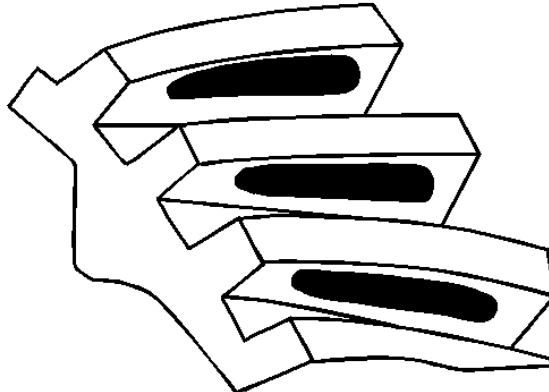
Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Top Toe Contact		Top Heel Contact	Backlash correct. Increase in pinion shim.

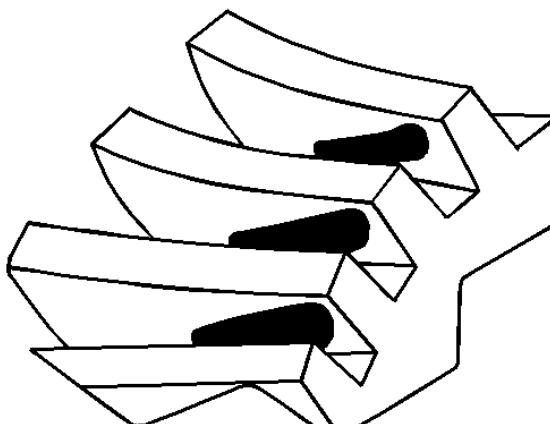
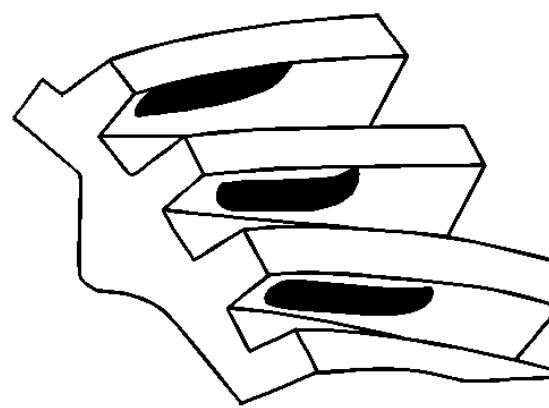
Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Root Heel Contact		Root Toe Contact	Backlash correct. Decrease in pinion shim.

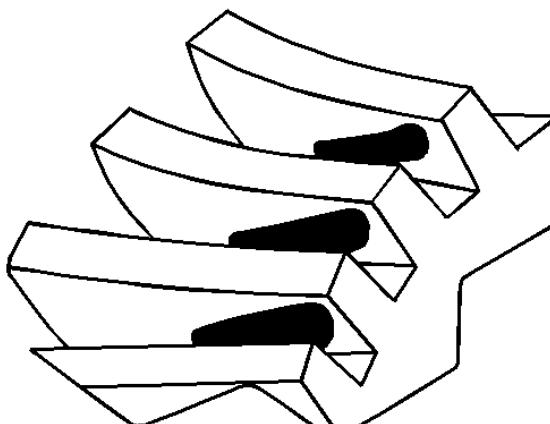
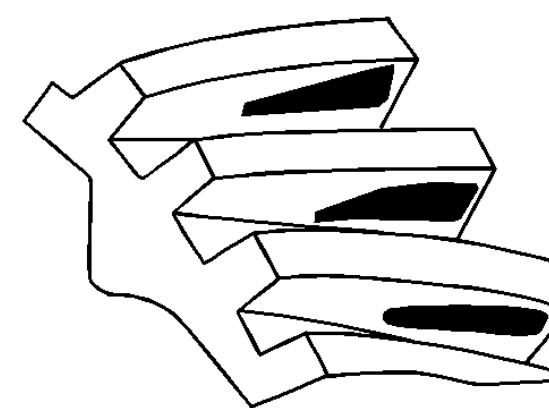
Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Top Heel Contact		Top Toe Contact	Pinion shim correct. Decrease backlash.

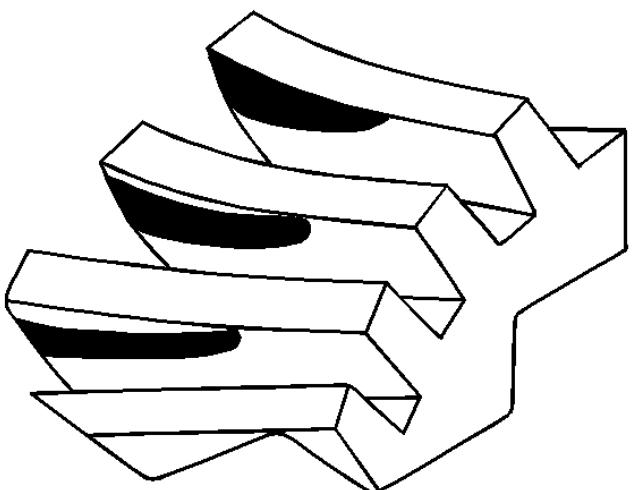
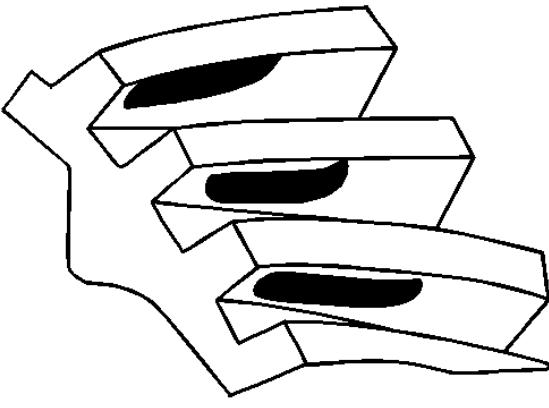
Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Root Toe Contact		Root Heel Contact	Pinion shim correct. Increase backlash.

Face Milling

Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Desirable Pattern - Drive pattern should be centered on tooth		Desirable Pattern - Coast pattern should be center to slightly toe on tooth	No correction required.

Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Top and Slightly Heel Contact		Top and Slightly Toe Contact	Backlash correct. Increase in pinion shim.

Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Root and Slightly Toe Contact		Root and Slightly Heel Contact	Backlash correct. Decrease in pinion shim.

Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Heel Contact		Toe Contact	Pinion shim correct. Decrease backlash.

LOCKING DIFFERENTIAL DISASSEMBLE (8.6/9.5/9.76 INCH AXLES)

Special Tools

J-26252 Bushing Remover

1. Remove the ring gear if needed. Refer to [Differential Drive Pinion Gear Bearing Replacement \(8.6/9.5/9.76 Inch Axles\)](#).

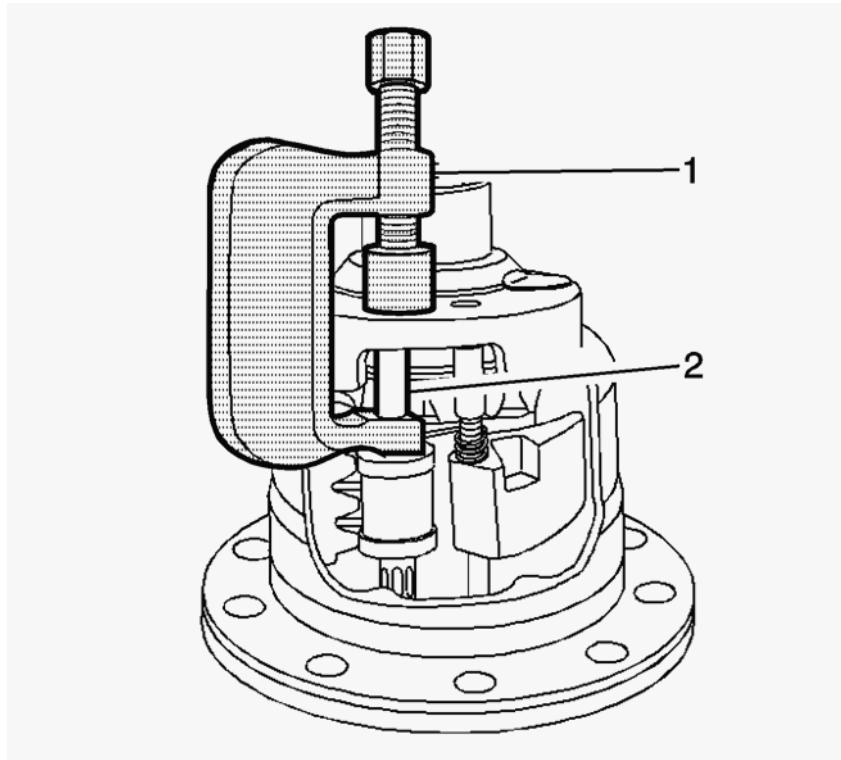


Fig. 260: Governor Bushing And Special Tool

Courtesy of GENERAL MOTORS COMPANY

NOTE: Rotate the side gears in order to position the governor assembly between the two side gears before removing.

2. Using the **J-26252** remover (1), remove the governor bushing (2).

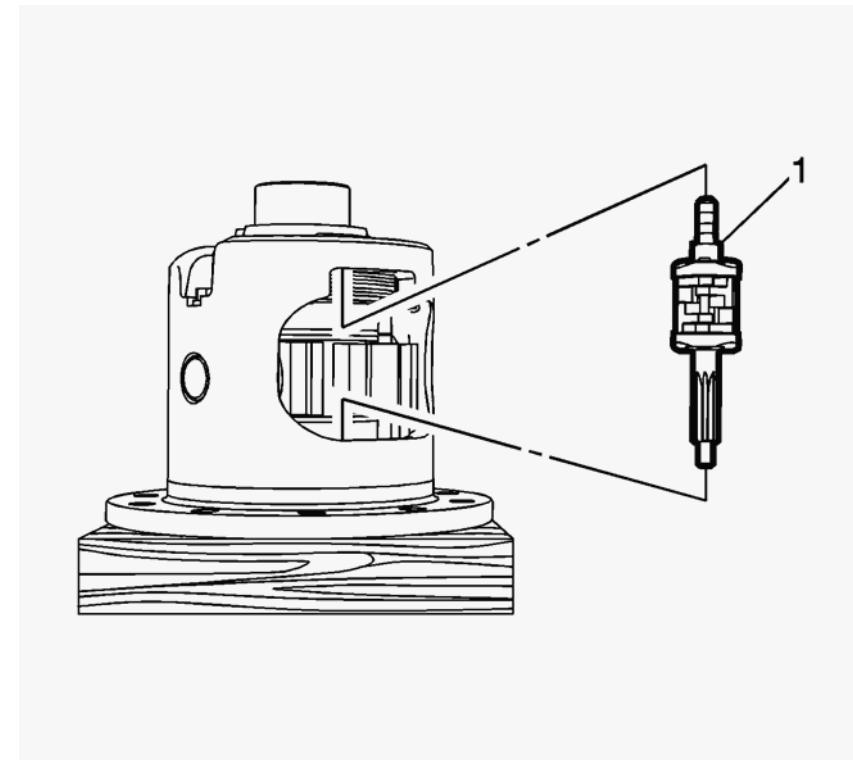


Fig. 261: Locking Differential Governor

Courtesy of GENERAL MOTORS COMPANY

3. Remove the locking differential governor (1).

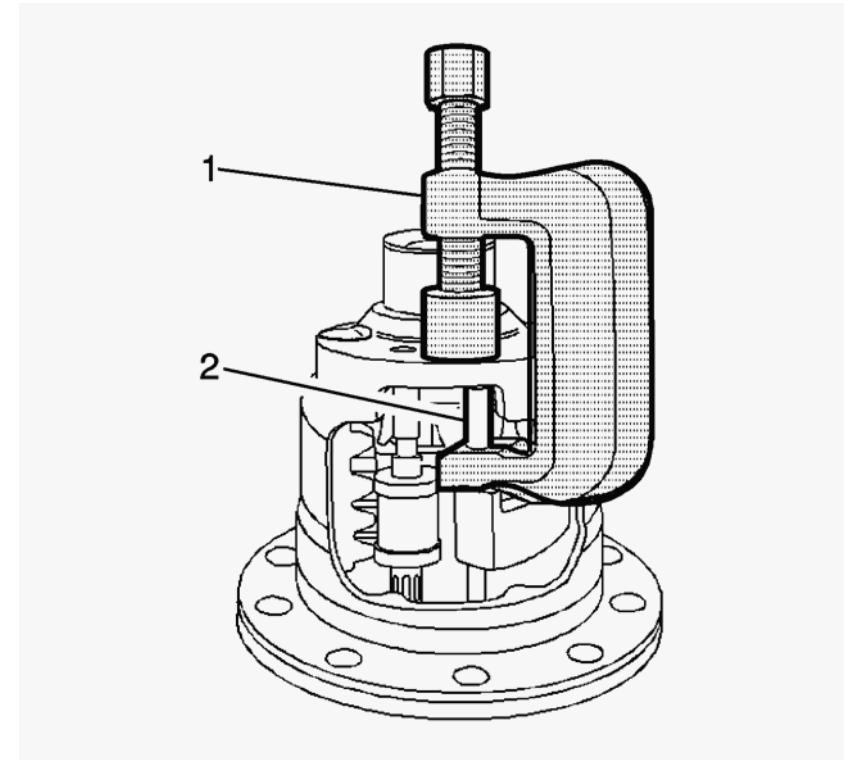


Fig. 262: Latching Bracket Assembly Bushing And Special Tool

Courtesy of GENERAL MOTORS COMPANY

NOTE: Rotate the side gears in order to position the locking differential latching bracket between the two side gears before removing.

4. Using the **J-26252** remover (1), remove the latching bracket bushing (2).

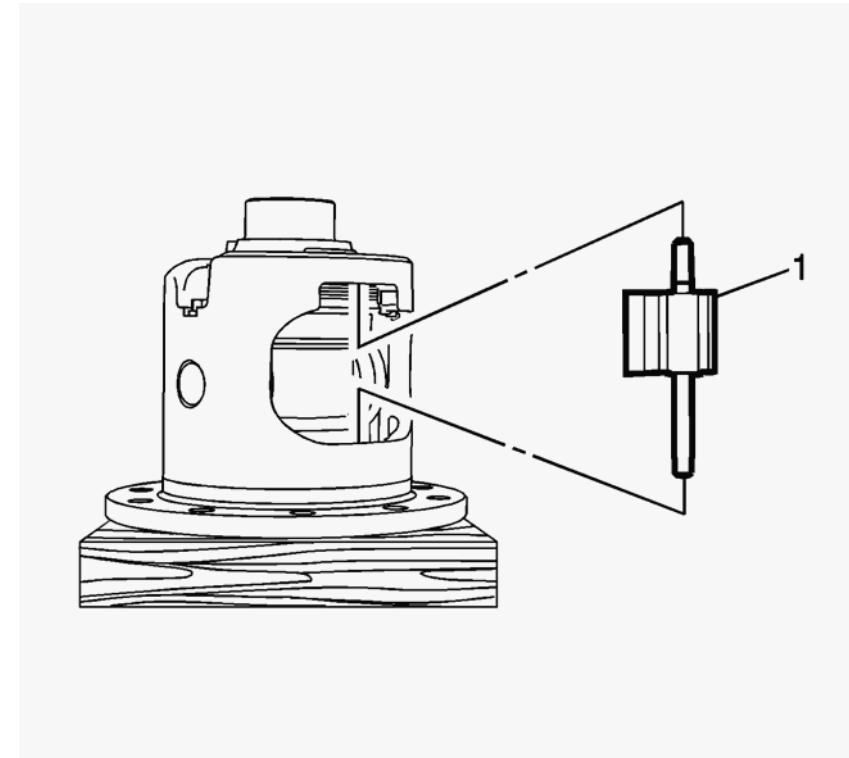


Fig. 263: Locking Differential Latching Bracket
Courtesy of GENERAL MOTORS COMPANY

5. Remove the locking differential latching bracket (1).

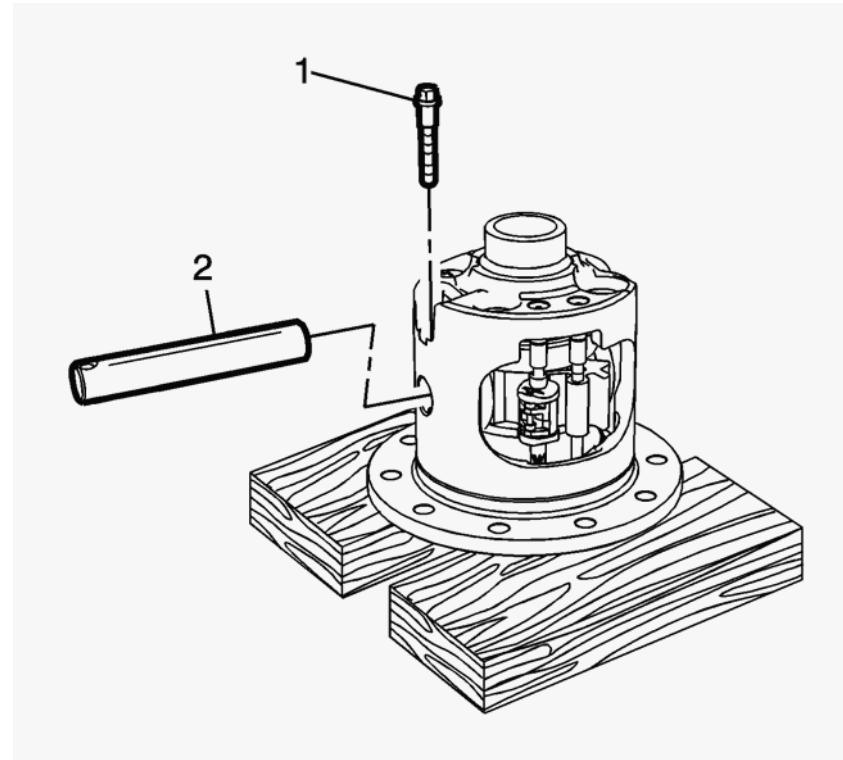


Fig. 264: Differential Pinion Gear Shaft And Bolt

Courtesy of GENERAL MOTORS COMPANY

6. Remove the pinion differential pinion gear shaft bolt (1).
7. Remove the differential pinion gear shaft (2).

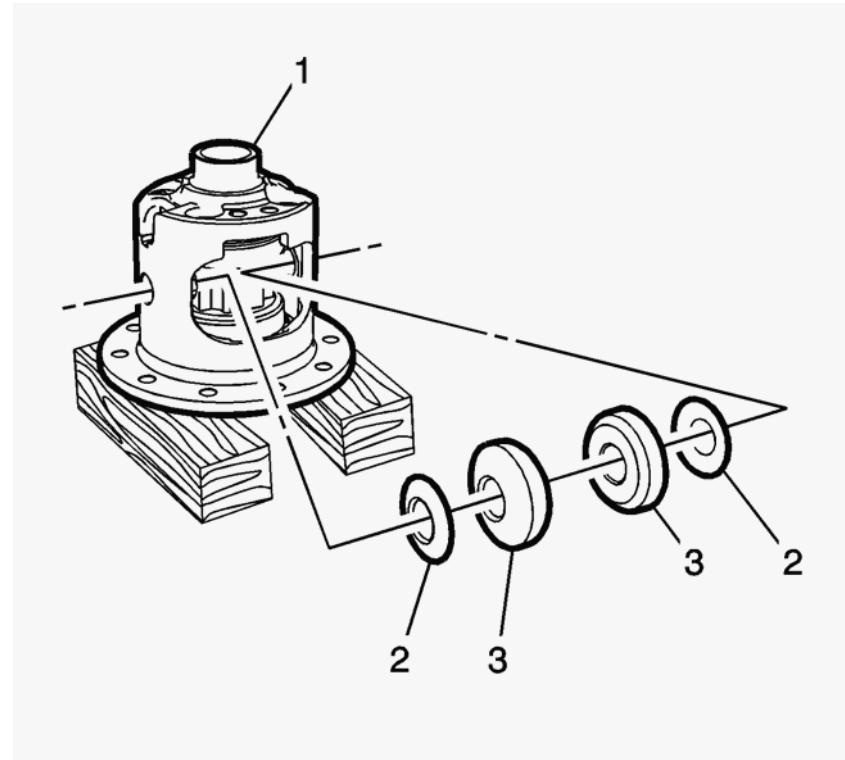


Fig. 265: Differential Side Gears And Thrust Washers

Courtesy of GENERAL MOTORS COMPANY

8. Rotate the differential side gears to remove the differential gears (3) and thrust washers (2).

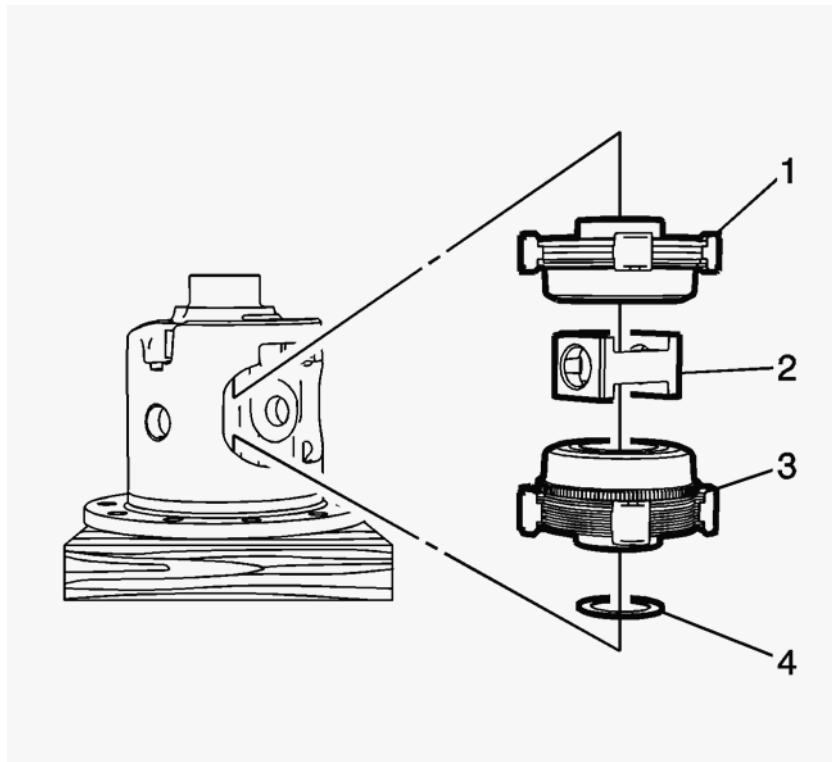


Fig. 266: Right Clutch Pack And Thrust Block

Courtesy of GENERAL MOTORS COMPANY

NOTE:

- The left differential clutch pack is next to the ring gear. The right differential clutch pack is opposite the ring gear.
- Hold the right clutch pack while removing the thrust block.

9. Remove the locking differential thrust block (2).

10. Remove the right locking differential clutch disc pack and side gear (1).

11. Remove the left locking differential clutch disc and side gear (3).

12. Remove the washer (4).

LOCKING DIFFERENTIAL DISASSEMBLE (10.5 INCH AXLE)

1. Remove the differential case assembly. Refer to [Differential Replacement \(10.5 Inch Axle\)](#).

2. Remove the differential ring gear. Refer to [Drive Pinion and Ring Gear Replacement \(10.5 Inch Axle\)](#).

3. Remove the differential side bearings. Refer to [Differential Bearing Replacement](#).

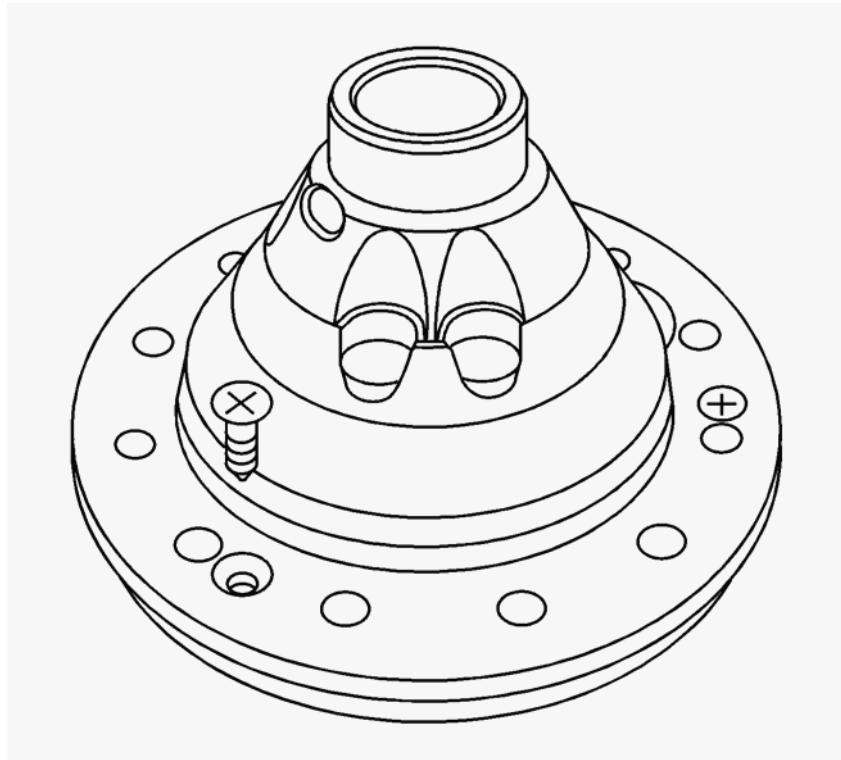


Fig. 267: Removing Differential Case Screws
Courtesy of GENERAL MOTORS COMPANY

4. Remove the differential case screws.

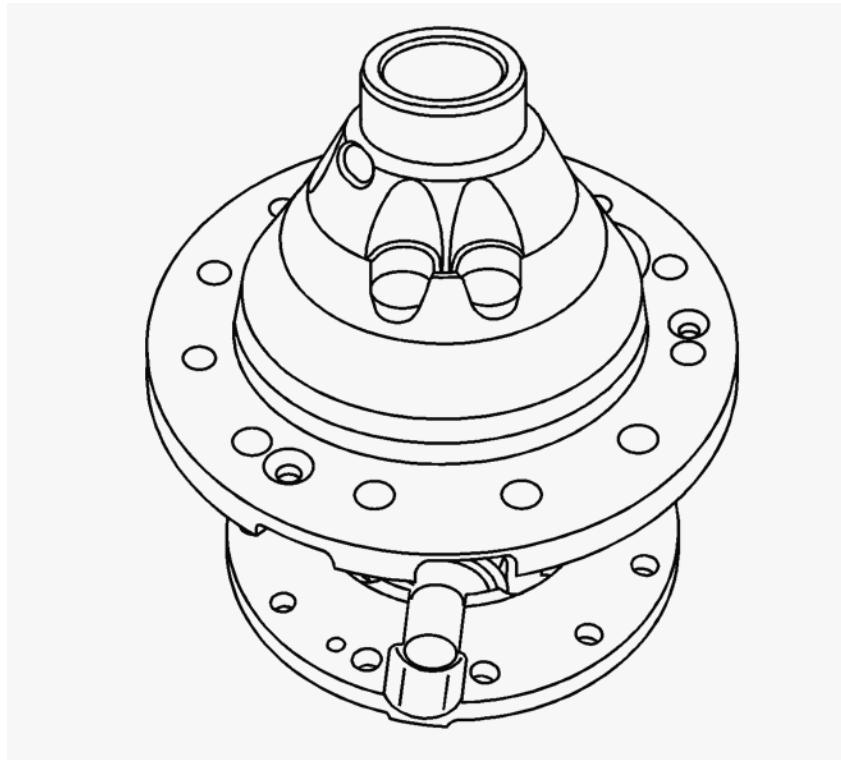


Fig. 268: Separating Case Halves

Courtesy of GENERAL MOTORS COMPANY

5. Use the yoke hole location to pry and separate the differential case halves.
6. Hold the locking differential cam, side gear, and the clutch plate assembly in the right side case half.

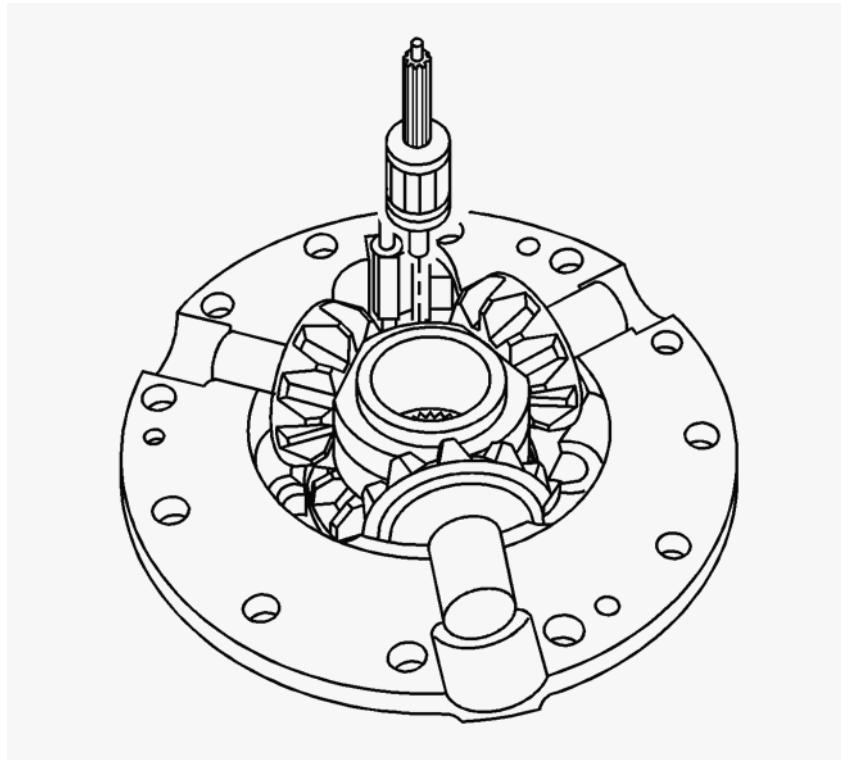


Fig. 269: Governor Assembly

Courtesy of GENERAL MOTORS COMPANY

7. Remove the differential governor.

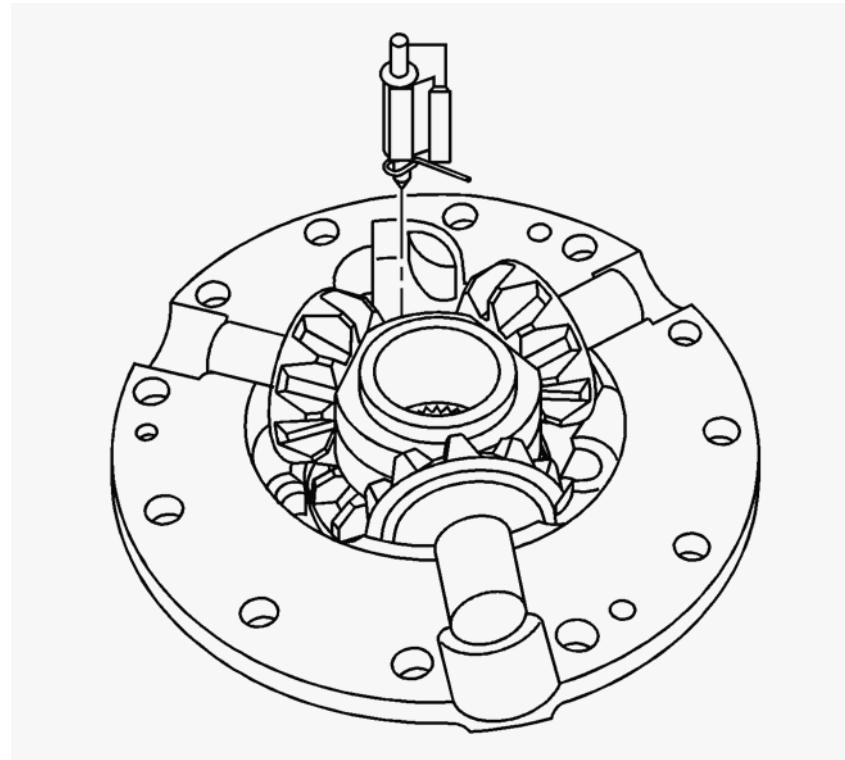


Fig. 270: Differential Governor Lock

Courtesy of GENERAL MOTORS COMPANY

8. Remove the differential governor lock.

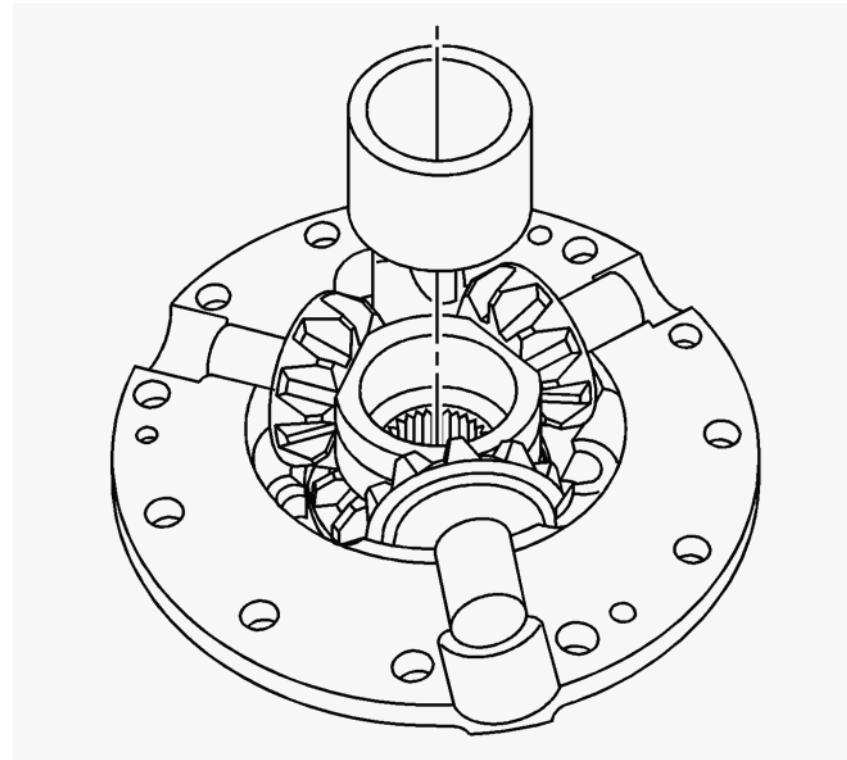


Fig. 271: Thrust Block

Courtesy of GENERAL MOTORS COMPANY

9. Remove the locking differential thrust block.

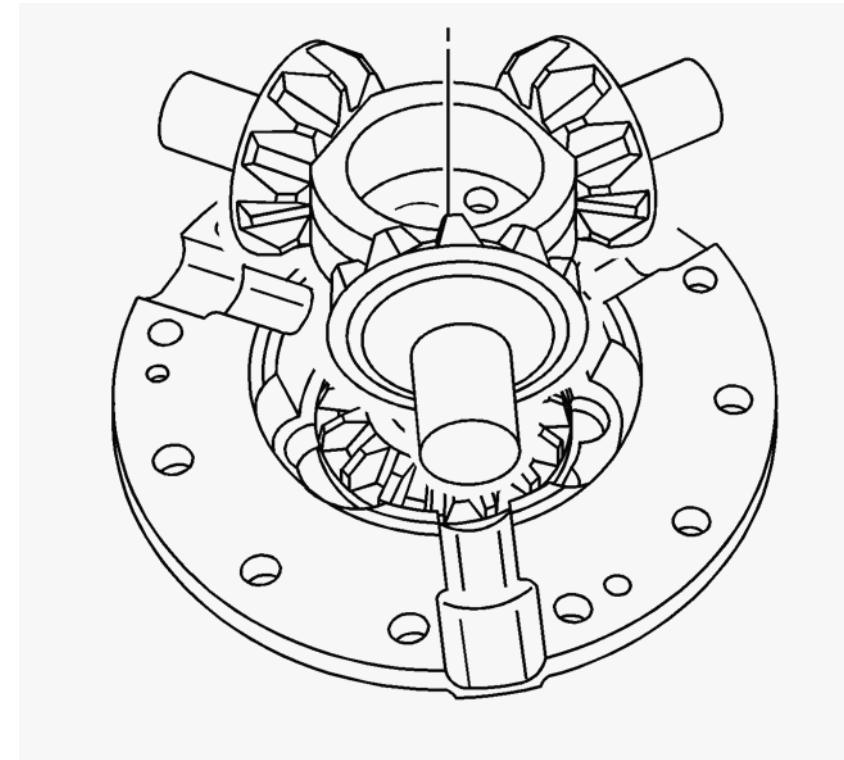


Fig. 272: Removing Differential Case Components

Courtesy of GENERAL MOTORS COMPANY

NOTE: Mark the differential spider, the differential pinion gears and the differential pinion gears accordingly in order to re-assemble the components correctly into the differential case.

10. Remove the locking differential spider, pinion gears and the thrust washers.

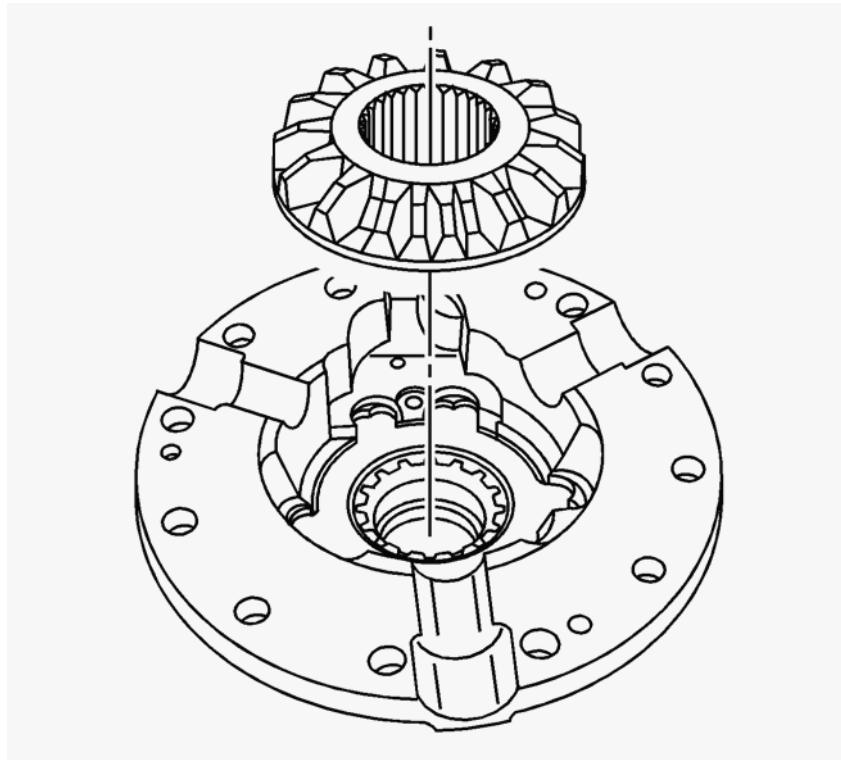


Fig. 273: Removing Locking Differential Side Gear
Courtesy of GENERAL MOTORS COMPANY

11. Remove the locking differential side gear.

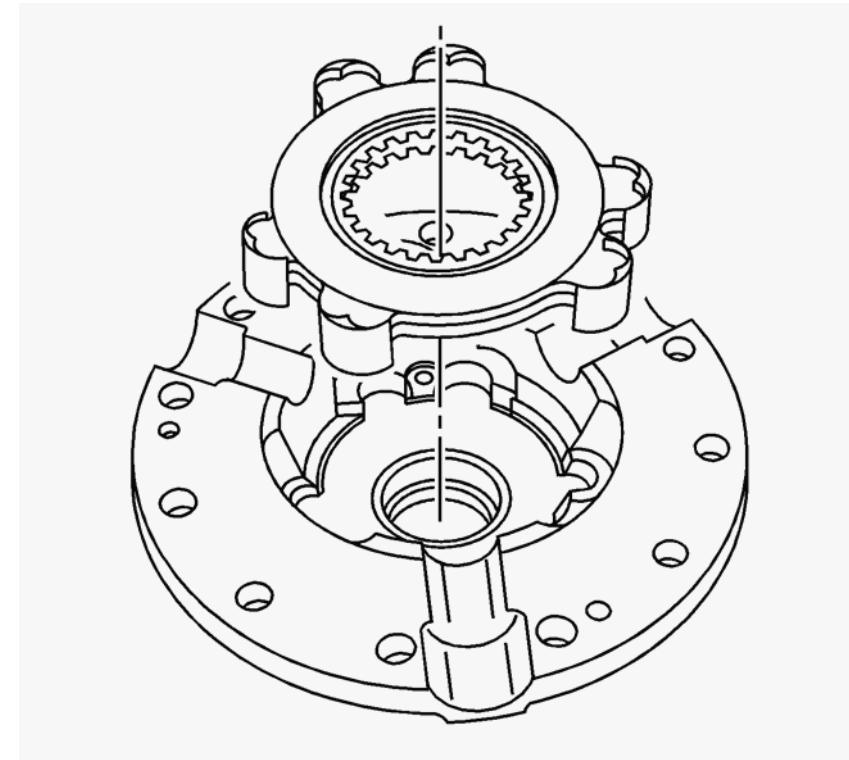


Fig. 274: Left Side Clutch Plates And Guide Clips
Courtesy of GENERAL MOTORS COMPANY

12. Remove the left side clutch plates and the guide clips.

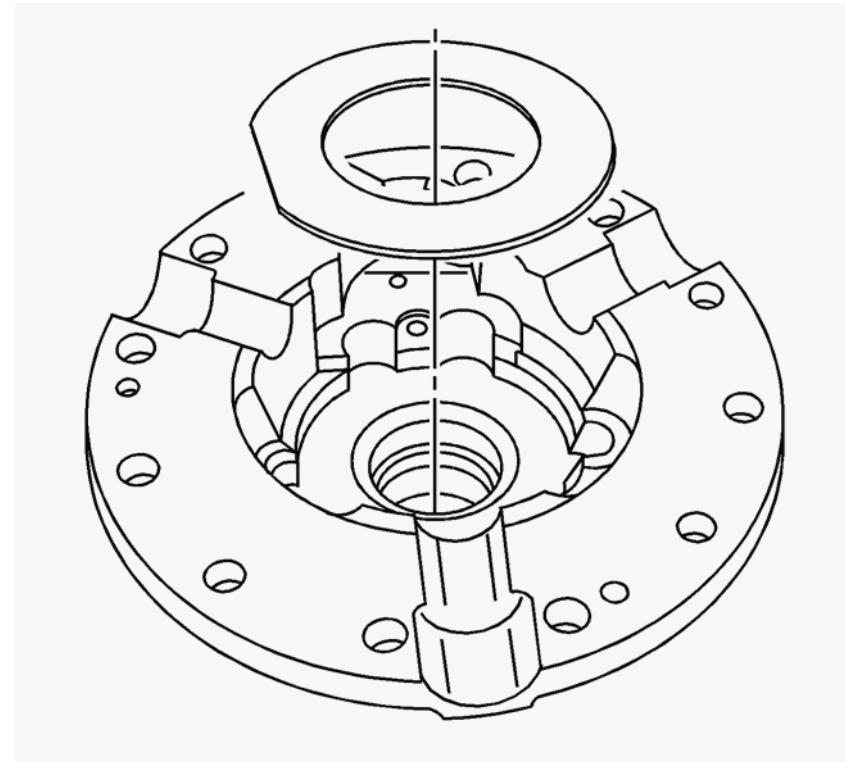


Fig. 275: Removing Left Side Gear Thrust Washer

Courtesy of GENERAL MOTORS COMPANY

13. Remove the left side gear thrust washer.

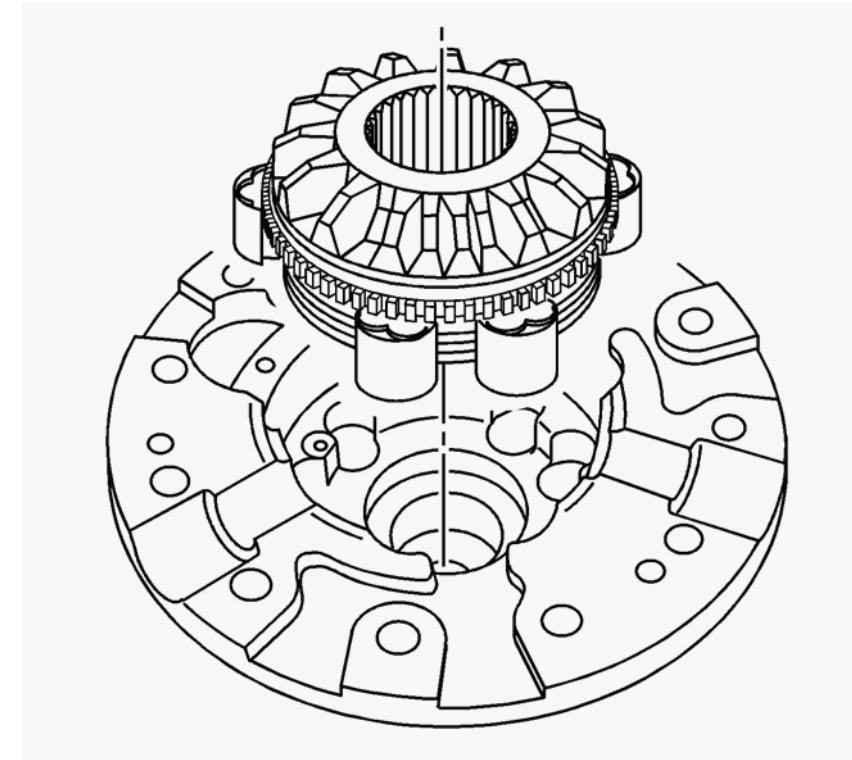


Fig. 276: Right Side Cam Unit And Clutch Plate Assembly

Courtesy of GENERAL MOTORS COMPANY

14. Remove the right side cam unit and clutch plate assembly.

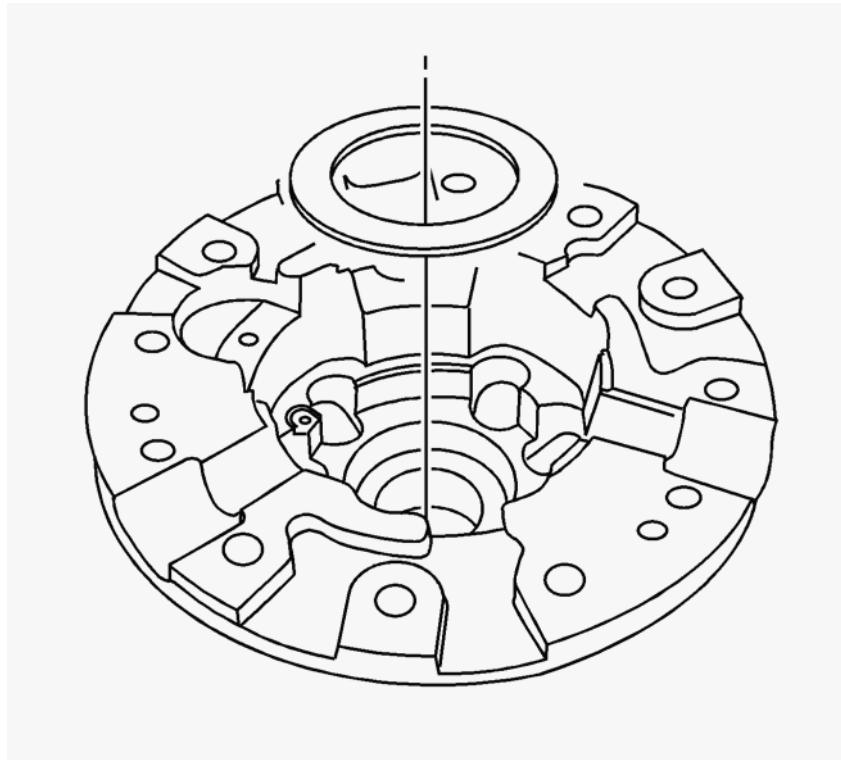


Fig. 277: Removing Right Side Locking Differential Clutch Disc Thrust Washer

Courtesy of GENERAL MOTORS COMPANY

15. Remove the right side locking differential clutch disc thrust washer.
16. Disassemble the left side differential side gear and clutch disc assembly. Refer to [Locking Differential Clutch Disc Assembly Disassemble \(10.5 Inch Axle\)](#).
17. Disassemble the right side locking differential side gear cam unit and clutch disc assembly. Refer to [Locking Differential Cam Unit Disassemble \(10.5 Inch Axle\)](#).

LOCKING DIFFERENTIAL CLUTCH DISC ASSEMBLY DISASSEMBLE (9.5/9.76 INCH AXLE)

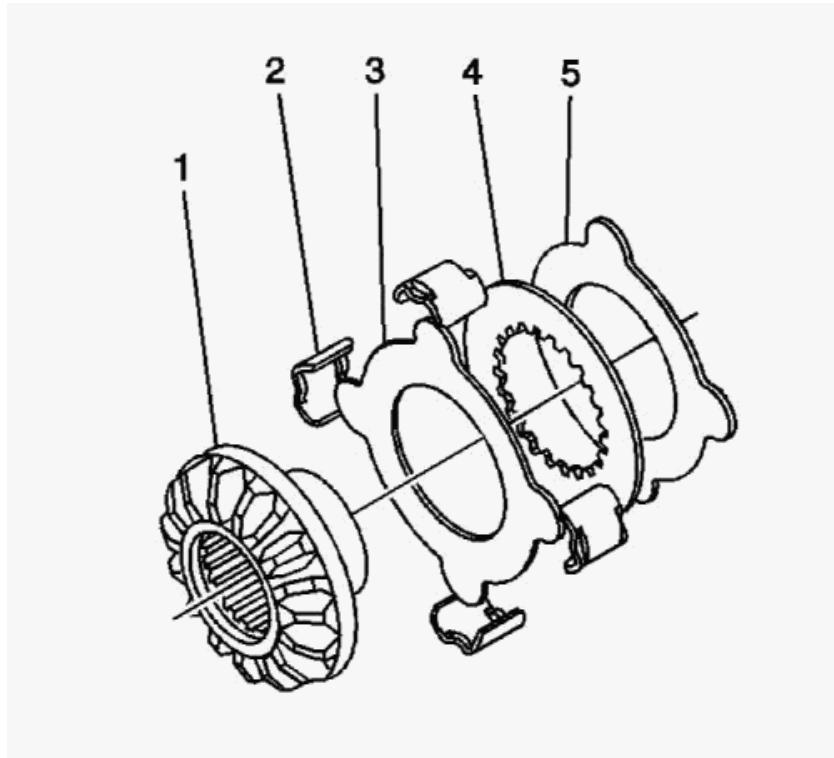


Fig. 278: Guide Clips, Clutch Discs And Splined Discs

Courtesy of GENERAL MOTORS COMPANY

1. Remove the guide clips (2).
2. Remove the clutch discs and the splined discs (3-5) from the locking differential side gear (1).

LOCKING DIFFERENTIAL CLUTCH DISC ASSEMBLY DISASSEMBLE (10.5 INCH AXLE)

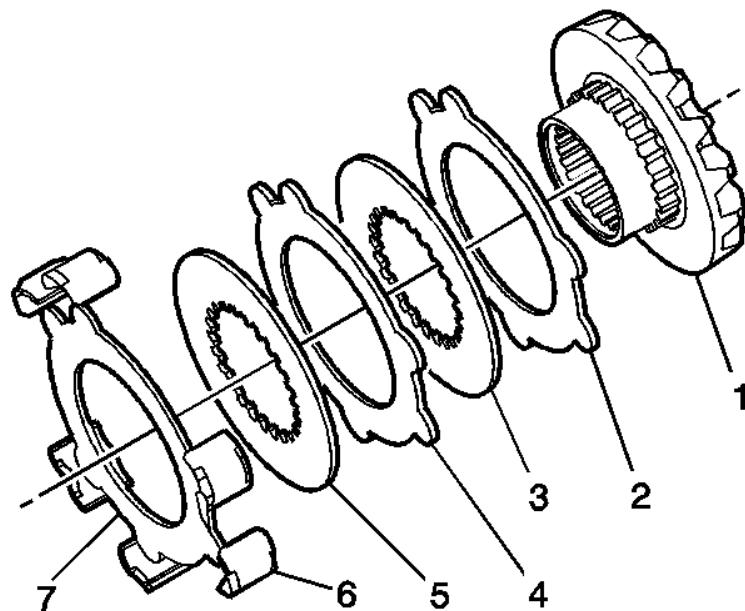


Fig. 279: Removing Locking Differential Clutch Disc Assembly (10.5 Inch Axle)

Courtesy of GENERAL MOTORS COMPANY

1. Remove the guide clips (6).
2. Remove the clutch discs and the splined discs (2-5, 7) from the locking differential side gear (1).

LOCKING DIFFERENTIAL CLUTCH DISC ASSEMBLY DISASSEMBLE (8.6 INCH AXLE)

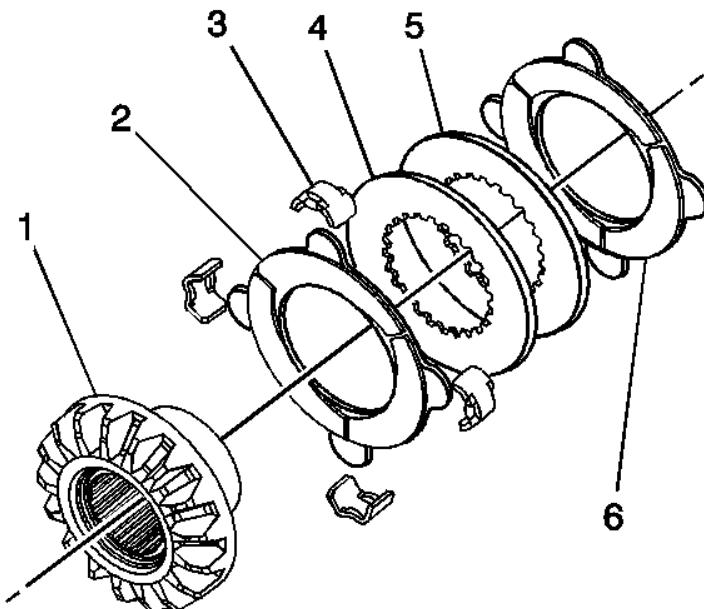


Fig. 280: Removing Locking Differential Clutch Disc Assembly (8.6 Inch Axle)

Courtesy of GENERAL MOTORS COMPANY

1. Remove the guide clips (3).
2. Remove the clutch discs and the splined discs (2, 4-6) from the locking differential side gear (1).

LOCKING DIFFERENTIAL CAM UNIT DISASSEMBLE (8.6 INCH AXLE)

1. Remove the locking differential clutch disc thrust washer.

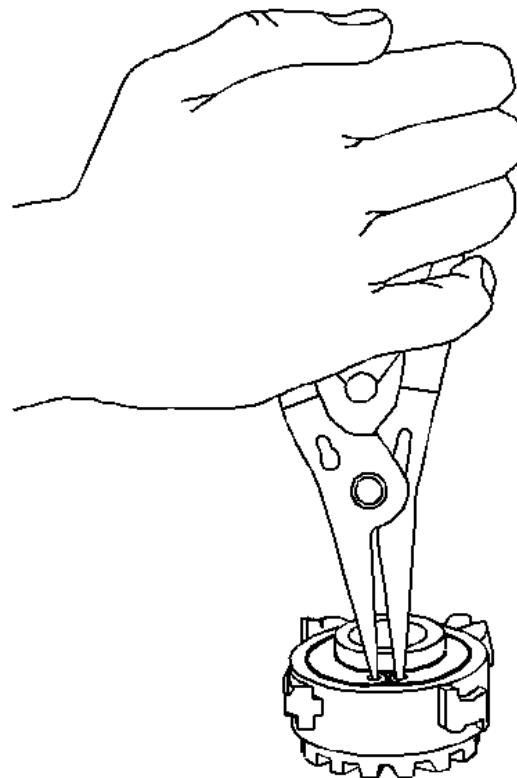


Fig. 281: Removing Locking Differential Retaining Ring (8.6 Inch Axle)

Courtesy of GENERAL MOTORS COMPANY

2. Using the appropriate tool, remove the external snap ring retainer.

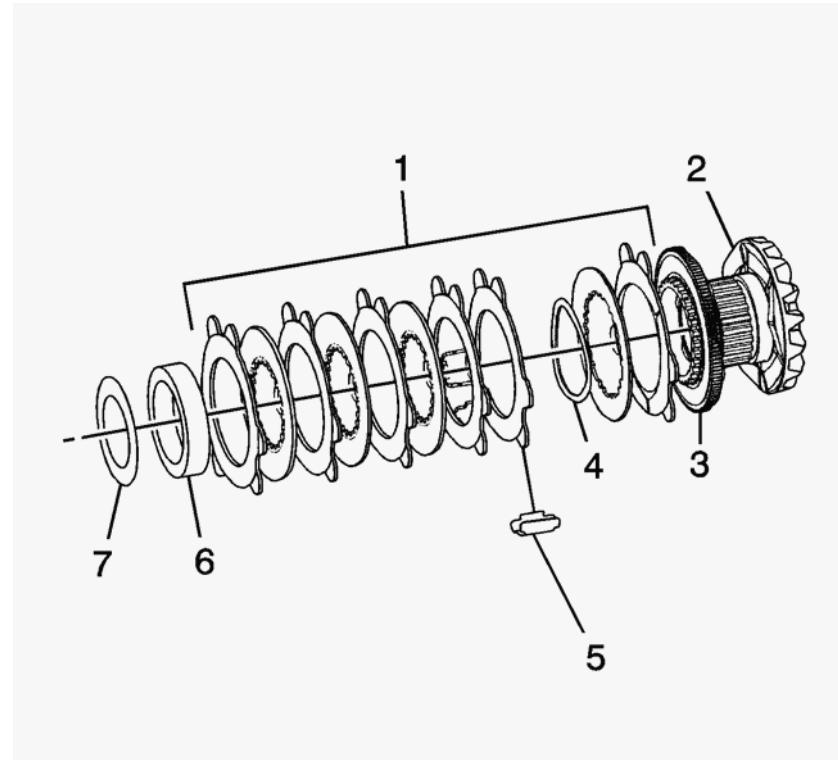


Fig. 282: Disassembled View Of Locking Differential Clutch Disc Set

Courtesy of GENERAL MOTORS COMPANY

3. Remove and disassemble the locking differential clutch disc set (1).

NOTE: The locking differential clutch disc thrust washer is NOT serviced separately. It is serviced with the locking differential clutch disc set.

4. Remove the locking differential clutch disc thrust washer (4).

NOTE: The locking differential clutch disc guide is NOT serviced separately. It is serviced with the locking differential clutch disc set.

5. Remove the locking differential clutch disc guide (5).

6. Remove the locking differential cam (3).

LOCKING DIFFERENTIAL CAM UNIT DISASSEMBLE (9.5/9.76 INCH AXLE)

Special Tools

- **J-22912-01** Split Plate Bearing Puller
- **J-45232** Adjuster Bearing Replacer (Left Side)

1. Measure and record the overall length of the locking differential side gear assembly from the front of the locking differential side locking differential side gear to thrust washer.

2. Remove the guide clips.

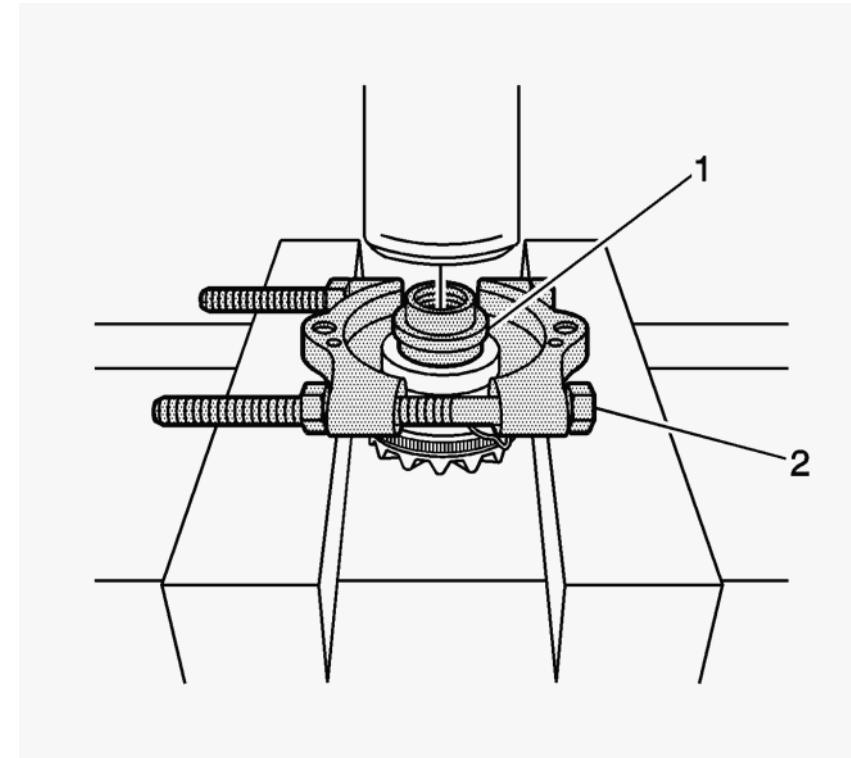


Fig. 283: Removing Thrust Sleeve

Courtesy of GENERAL MOTORS COMPANY

3. Using the **J-22912-01** puller (2), **J-45232** replacer (1) and a hydraulic press, remove the locking differential side gear thrust sleeve.

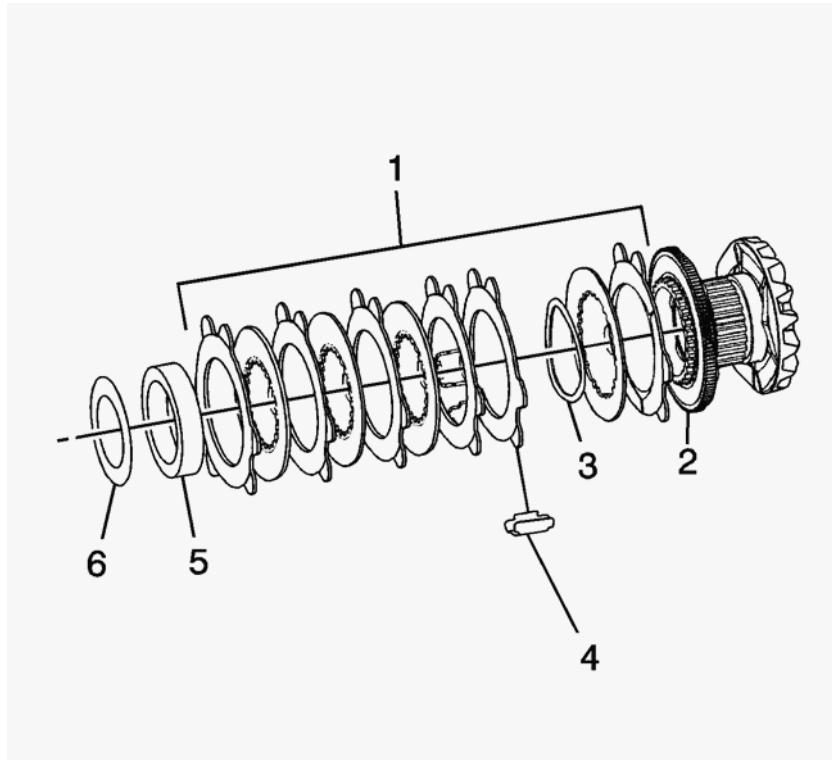


Fig. 284: Disassembled View Of Locking Differential Side Gear Components

Courtesy of GENERAL MOTORS COMPANY

4. Remove the locking differential clutch disc thrust washer (6).
5. Remove the locking differential side gear thrust sleeve (5).
6. Remove the locking differential clutch disc set (1).

NOTE: The locking differential clutch disc guide is NOT serviced separately. It is serviced with the locking differential clutch disc assembly.

7. Remove the locking differential clutch disc guide.
8. Disassemble the locking differential clutch disc assembly (1).

LOCKING DIFFERENTIAL CAM UNIT DISASSEMBLE (10.5 INCH AXLE)

Special Tools

- **J 22912-01** Split Plate Bearing Puller
- **J 45232** Adjuster Bearing Replacer (Left Side)

1. Measure and record the overall length of the locking differential cam, side gear and clutch plate assembly from the front of the gear to the back of the thrust sleeve, including the locking differential clutch disc thrust washer.
2. Remove the guide clips.

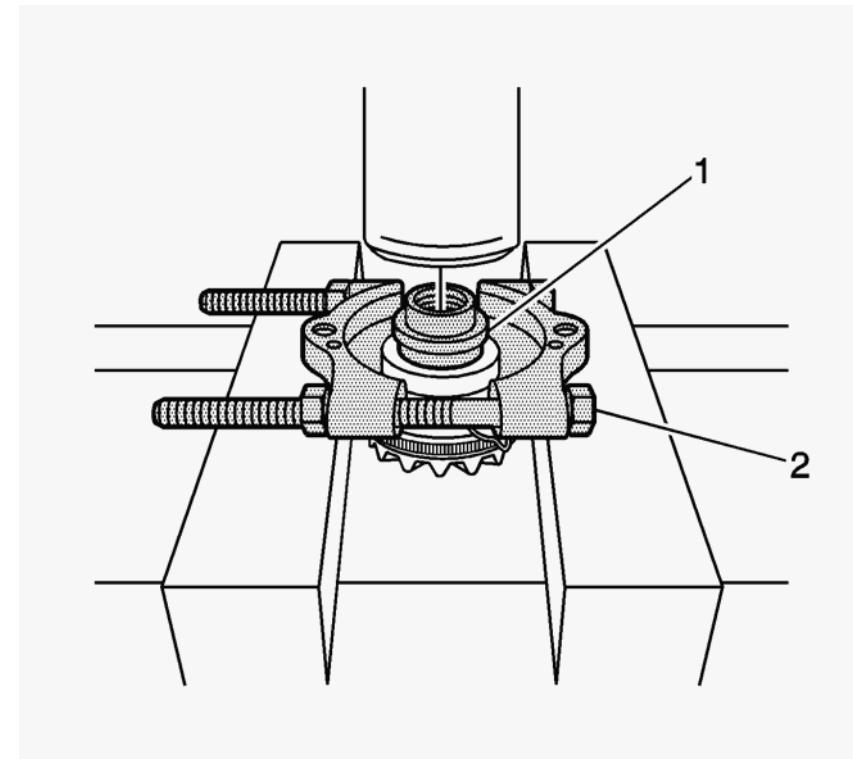


Fig. 285: Removing Thrust Sleeve

Courtesy of GENERAL MOTORS COMPANY

3. Using a hydraulic press, the **J 22912-01** puller (2) and the **J 45232** replacer (1), remove the thrust sleeve.

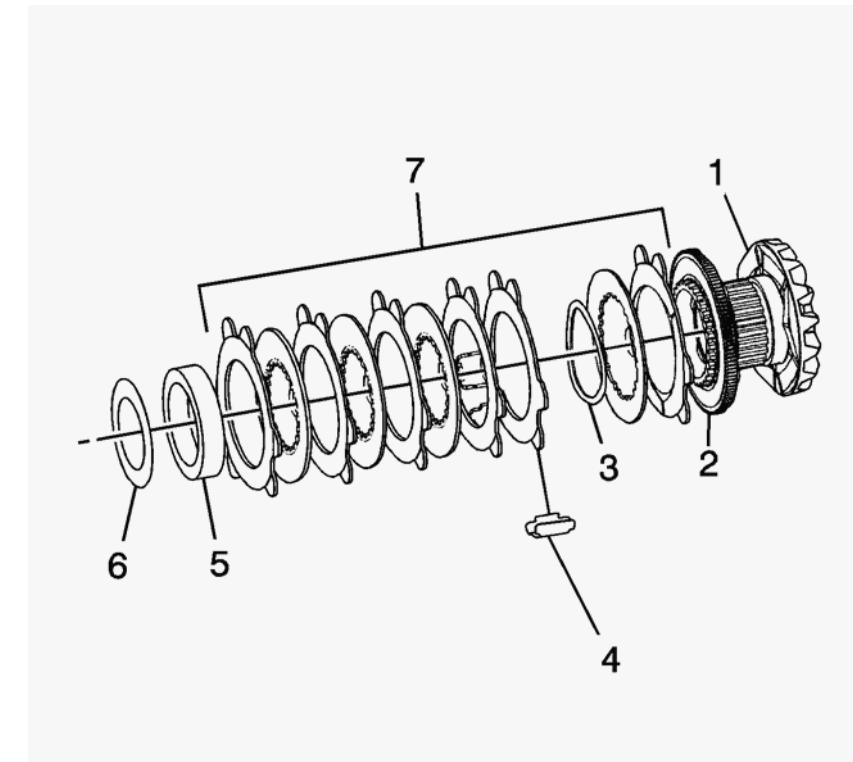


Fig. 286: Disassembled View Of Locking Differential Cam & Locking Differential Side Gear

Courtesy of GENERAL MOTORS COMPANY

4. Remove the differential side gear shim (6).
5. Remove the locking differential side gear thrust sleeve (5).
6. Remove and disassemble the locking differential clutch disc set (7).

NOTE: The locking differential clutch disc thrust washer is not serviced separately. It is serviced with the locking differential clutch disc set.

7. Remove the locking differential clutch disc thrust washer (3).

NOTE: The locking differential clutch disc guide is not serviced separately. It is serviced with the locking differential clutch disc set.

8. Remove the locking differential clutch disc guide (4).
9. Remove the locking differential cam (2).

LOCKING DIFFERENTIAL CLEANING AND INSPECTION

1. Clean all the parts with an approved solvent.
2. Visually inspect all the parts for excessive wear or breakage. Replace the parts if necessary.
3. Inspect the pinion gear and the side gear teeth for any the following conditions:
 - Wear

- Cracks
- Scoring
- Spalling

4. Inspect the thrust washers for wear.
5. Inspect the fit of the side gears on the axle shafts.
6. Inspect the differential case for cracks and scoring.

IMPORTANT: Do not replace the thrust sleeve unless it is necessary.

7. Inspect the thrust sleeve for excessive wear.
8. Inspect the side gear bore for scoring. If scoring is present, replace the entire differential.
9. Replace the differential if you find any damage to the case.

LOCKING DIFFERENTIAL CAM UNIT ASSEMBLE (9.5/9.76 INCH AXLE)

Special Tools

J-29710 Differential Side Bearing Installer

1. Apply axle lubricant to each of the locking differential clutch (friction disc) contact area. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).

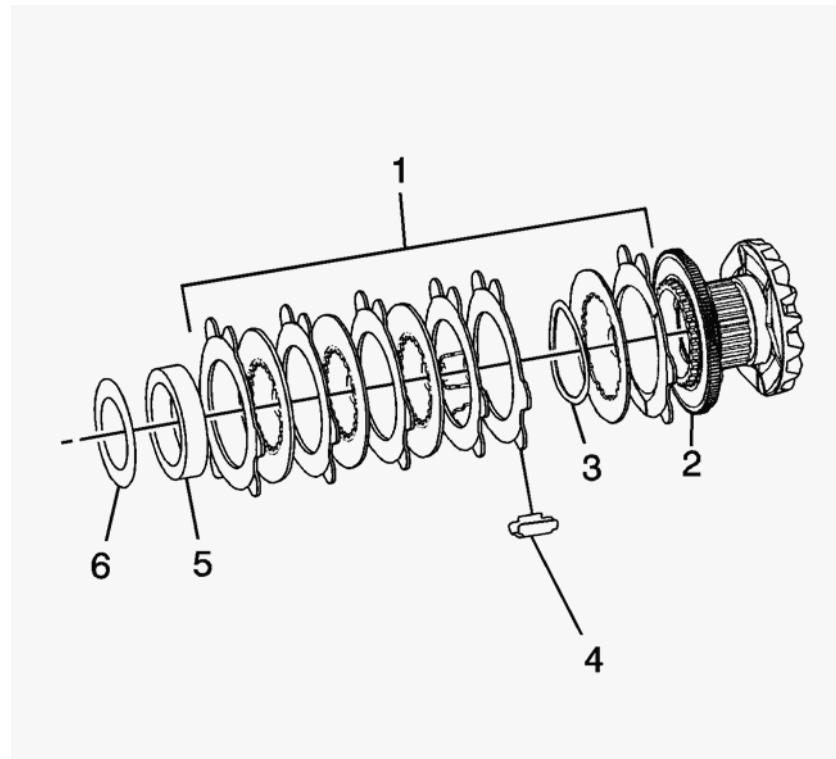


Fig. 287: Disassembled View Of Locking Differential Side Gear Components

Courtesy of GENERAL MOTORS COMPANY

2. Install the locking differential cam (3) on the locking differential side gear (2).

NOTE: When installing the locking differential clutch disc set, align the splined discs with the teeth on the cam in order to compress the clutch disc assembly.

3. Install the locking differential clutch disc set (1) on the locking differential side gear (2).

4. Position the locking differential side gear thrust sleeve (5).

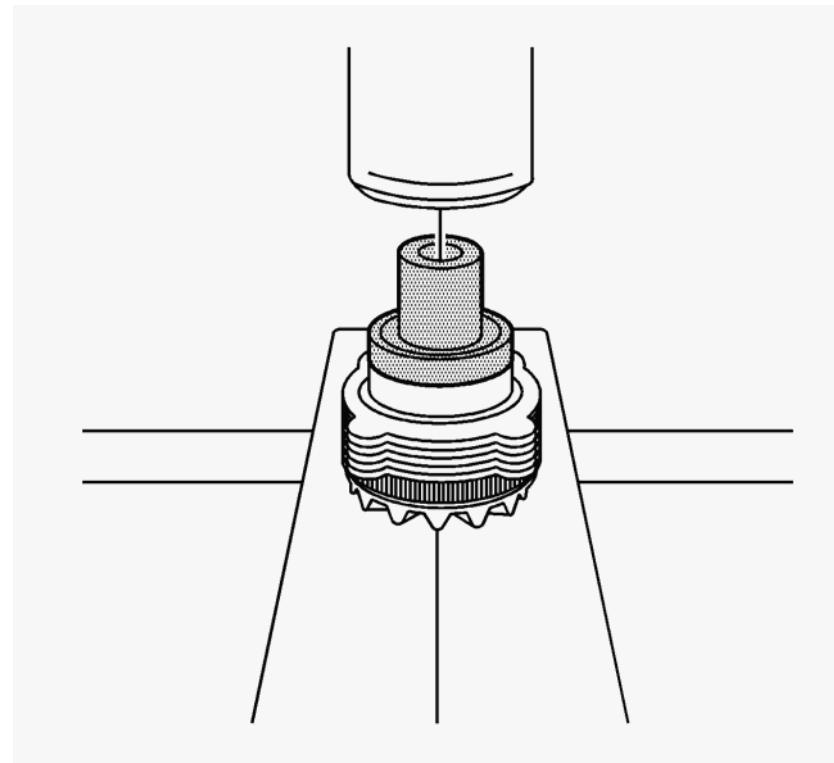


Fig. 288: Installing Thrust Sleeve Onto Cam Side Gear

Courtesy of GENERAL MOTORS COMPANY

NOTE: If reusing the locking differential side gear thrust sleeve, proceed to step 5. If replacing the locking differential side gear thrust sleeve, proceed to step 6.

5. Using the **J-29710** installer and a hydraulic press, install the locking differential side gear thrust sleeve until it is fully seated on the locking differential side gear.

6. If the locking differential cam side gear or the locking differential thrust sleeve has been replaced, measure the overall length of the gear assembly by doing the following:

1. Place the locking differential clutch disc thrust washer on top of the thrust sleeve.
 2. Measure the overall length of the gear assembly from the front of the cam side gear to the back of the locking differential clutch disc thrust washer.
 3. Compare this measurement to the measurement obtained during disassembly.
 4. If the new reading is more than 0.762 mm (0.003 in) higher or lower than the original, select a locking differential clutch disc thrust washer that will return the reading closest to the original reading.
7. Align the ears of all the clutch discs.

NOTE: Applying a small amount of grease on the locking differential guides will hold them in place during the installation procedure.

8. Install the guide clips to the clutch disc assembly and apply chassis grease to the locking differential guides. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).

LOCKING DIFFERENTIAL CAM UNIT ASSEMBLE (8.6 INCH AXLE)

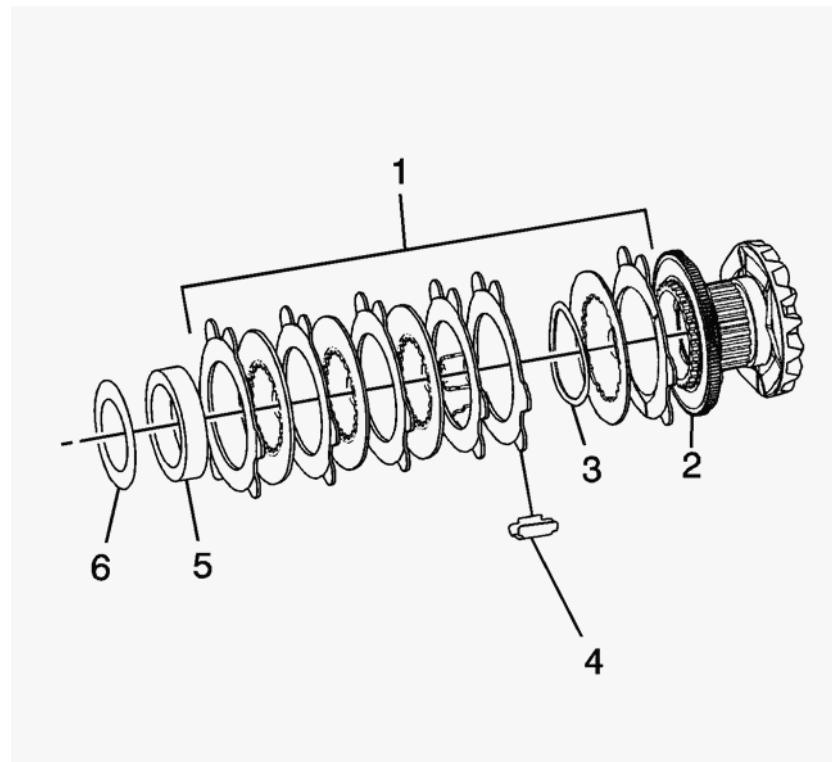


Fig. 289: Disassembled View Of Locking Differential Side Gear Components

Courtesy of GENERAL MOTORS COMPANY

1. Apply axle lubricant to the locking differential clutch (friction disc) contact area. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).
2. Install the locking differential cam (3) on the locking differential side gear (2).
3. Install the locking differential clutch disc set (1) on the locking differential side gear (2).
4. Compress the locking differential clutch disc set assembly.

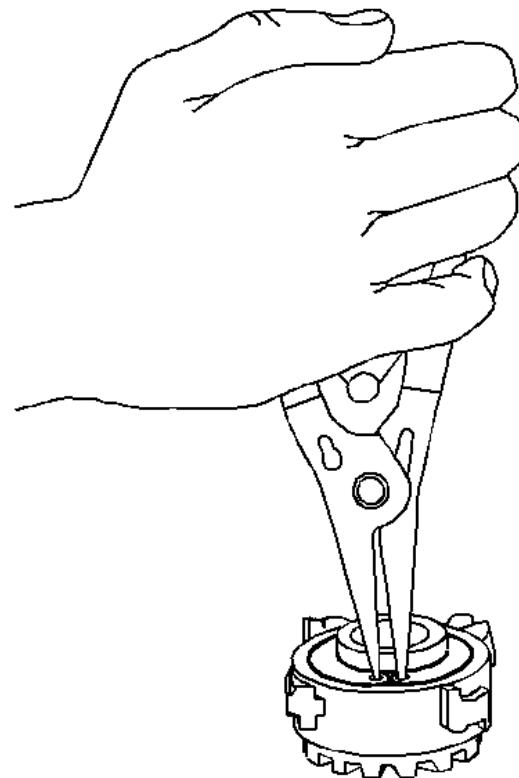


Fig. 290: External Snap Ring Retainer

Courtesy of GENERAL MOTORS COMPANY

5. Using the appropriate tool, install the external span ring retainer.

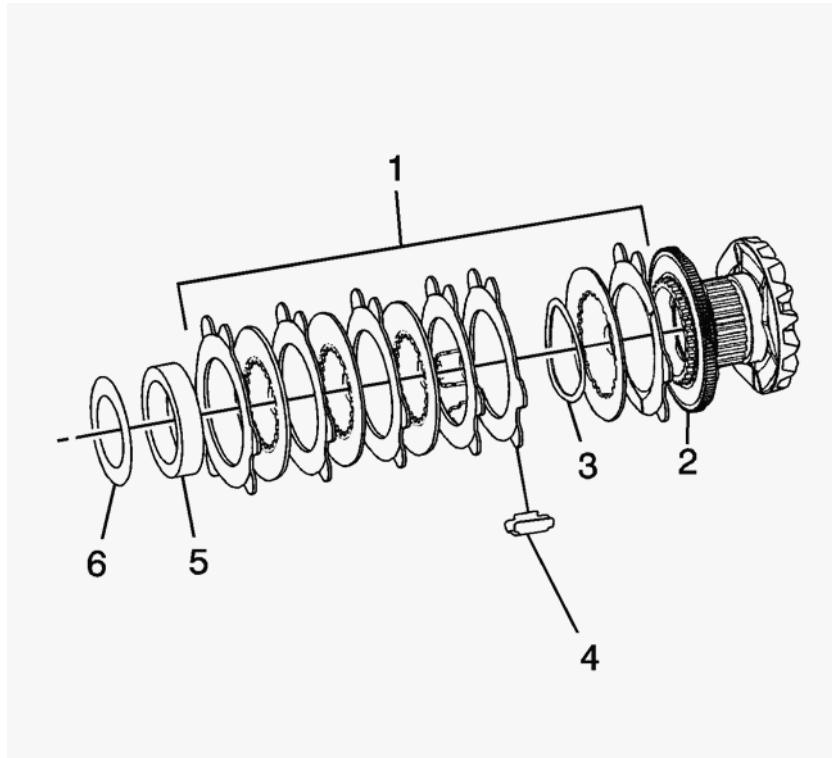


Fig. 291: Disassembled View Of Locking Differential Side Gear Components

Courtesy of GENERAL MOTORS COMPANY

NOTE: Applying a small amount of grease to the locking differential guides will hold them in place during the installation procedure.

6. Apply a small amount of chassis grease to hold the locking differential clutch disc guide (5). Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).

LOCKING DIFFERENTIAL CAM UNIT ASSEMBLE (10.5 INCH AXLE)

Special Tools

J 29710 Differential Side Bearing Installer Differential Side Bearing Installer

1. Apply axle lubricant to each of the locking differential clutch (friction disc) contact area. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#)

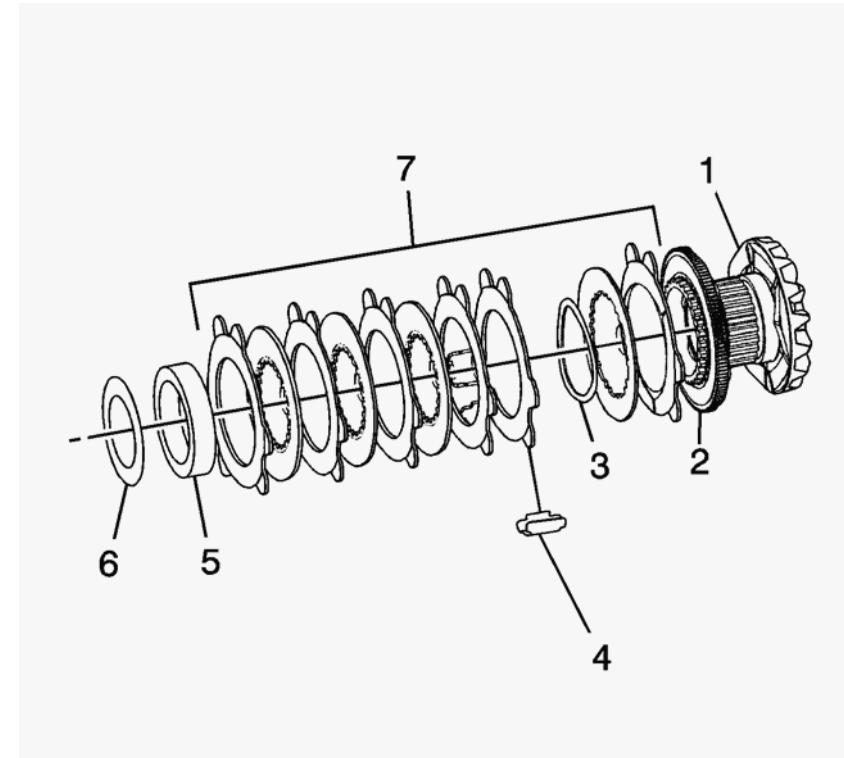


Fig. 292: Disassembled View Of Locking Differential Cam & Locking Differential Side Gear

Courtesy of GENERAL MOTORS COMPANY

2. Install the locking differential cam (2) on the locking differential side gear (1).
3. Install the locking differential clutch disc set (7).
4. Position the locking differential side gear thrust sleeve (5) on the locking differential side gear (1).

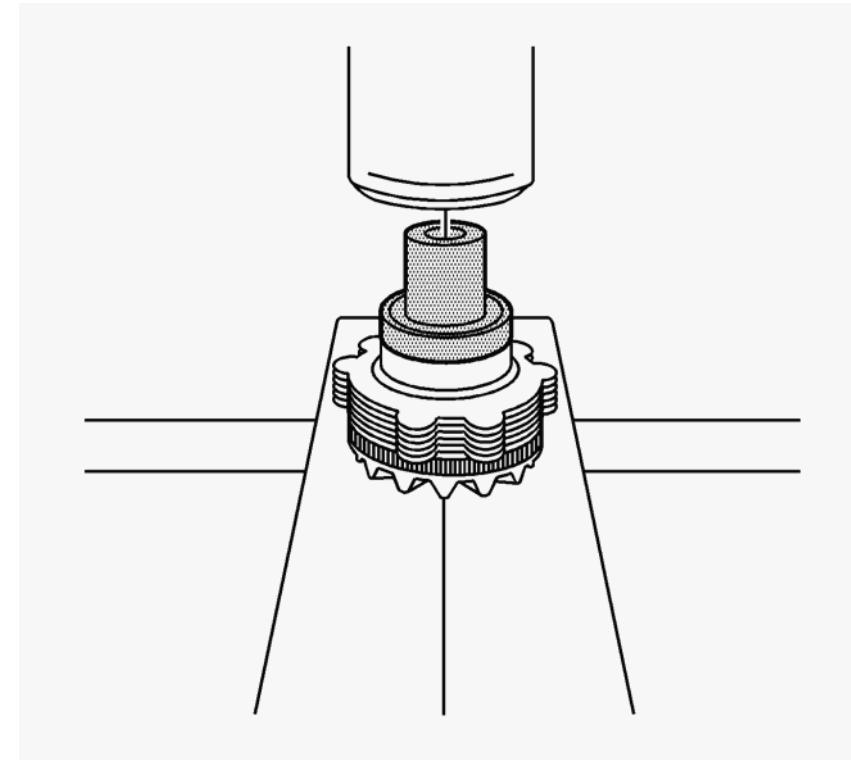


Fig. 293: Installing Thrust Sleeve Onto Cam Side Gear (10.5 Inch Axle)

Courtesy of GENERAL MOTORS COMPANY

NOTE: If reusing locking differential side gear thrust sleeve, proceed to step 5. If replacing the locking differential side gear thrust sleeve, proceed to step 6.

5. Using the **J 29710** installer and a hydraulic press, install the locking differential side gear thrust sleeve until it is fully seated on the locking differential side gear.
6. If the cam side gear or the thrust sleeve has been replaced, measure the overall length of the gear assembly by doing the following:
 1. Place the locking differential clutch disc thrust washer on top of the thrust sleeve.
 2. Measure the overall length of the gear assembly from the front of the cam side gear to the back of the locking differential clutch disc thrust washer.
 3. Compare this measurement to the measurement obtained during disassembly.
 4. If the new reading is more than 0.762 mm (0.003 in) greater than or less than the original, select a locking differential clutch disc thrust washer that will return the reading closest to the original reading.
7. Align the locking differential clutch disc set.

NOTE: Applying a small amount of chassis grease to the locking differential guides will hold them in place during the installation procedure.

8. Install the and apply a small amount of chassis grease to the locking differential guides. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).

LOCKING DIFFERENTIAL CLUTCH DISC ASSEMBLY ASSEMBLE (8.6 INCH AXLE)

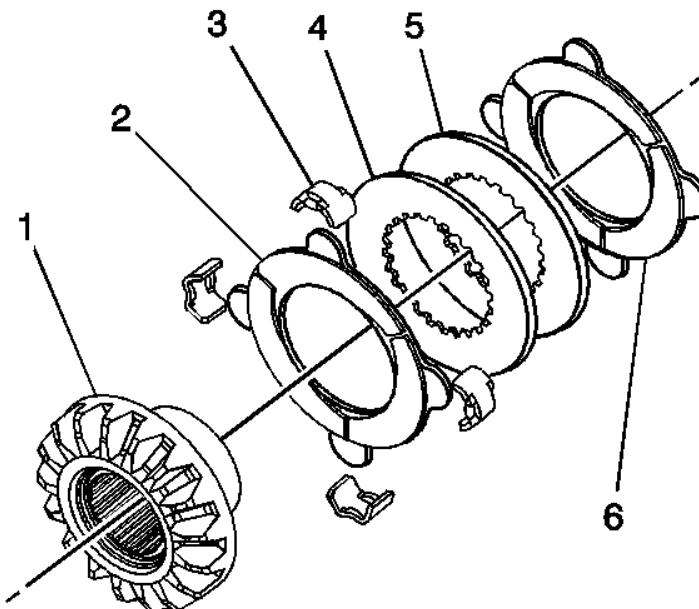


Fig. 294: Locking Differential Clutch Disc Assembly (8.6 Inch Axle)

Courtesy of GENERAL MOTORS COMPANY

1. Apply axle lubricant, GM P/N 12378261 (Canadian P/N 10953455) or equivalent meeting GM Specification 9986115, to the surface of each disc.
2. Assemble the right side or bell-end side clutch disc assembly as follows:
 1. Install the two-sided carbon eared disc (2) to the side gear (1).
 2. Install the 1st splined disc (4).
 3. Install the 2nd splined disc (5).
 4. Install the one-sided carbon eared disc (6).
 5. Install the guide clips (3) to the clutch discs (2, 4-6).

Apply chassis grease, GM P/N 12377985 (Canadian P/N 88901242) or equivalent, to the guide clips in order to hold the clips in place on the disc ears.

LOCKING DIFFERENTIAL CLUTCH DISC ASSEMBLY ASSEMBLE (9.5/9.76 INCH AXLE)

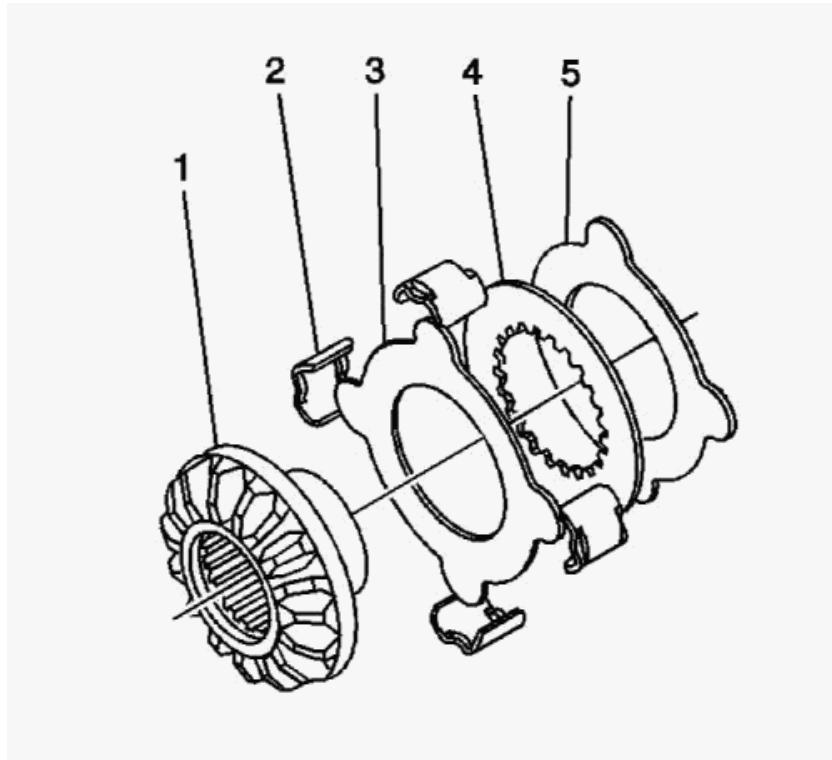


Fig. 295: Guide Clips, Clutch Discs And Splined Discs

Courtesy of GENERAL MOTORS COMPANY

1. Apply proper axle lubricant to the surface of each disc. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).
2. Assemble the right side or bell-end side clutch disc assembly as follows:
 1. Install the double sided carbon eared disc (3) to the side gear (1).
 2. Install the 1st splined disc (4).
 3. Install the single sided carbon eared disc (5).
 4. Install the guide clips (2) to the clutch discs (3-5).

Apply chassis grease to the guide clips in order to hold the clips in place on the disc ears. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).

LOCKING DIFFERENTIAL CLUTCH DISC ASSEMBLY ASSEMBLE (10.5 INCH AXLE)

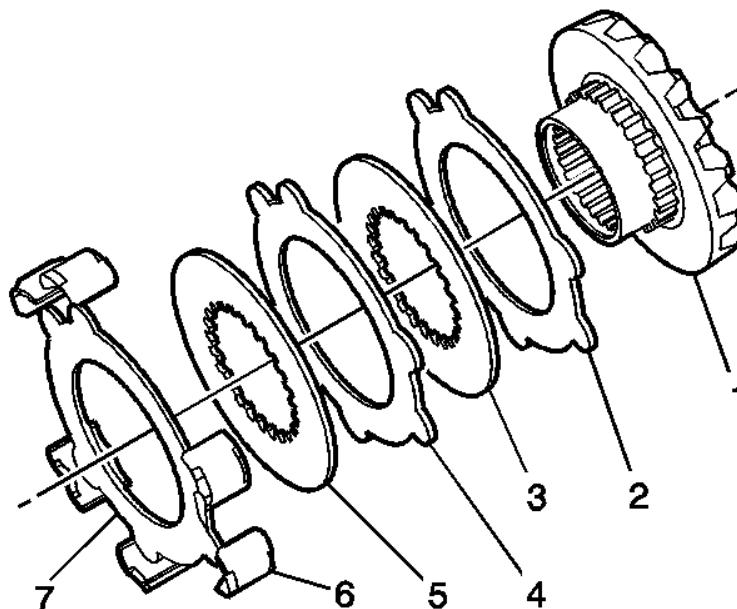


Fig. 296: Locking Differential Clutch Disc Assembly (10.5 Inch Axle)

Courtesy of GENERAL MOTORS COMPANY

1. Apply the proper axle lubricant to the surface of each disc. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).
2. Assemble the left side clutch disc assembly as follows:
 1. Install the 1st non-carbon eared disc (2) to the side gear (1).
 2. Install the 1st splined disc (3).
 3. Install the 2nd non-carbon eared disc (4).
 4. Install the 2nd splined disc (5).
 5. Install the 3rd non-carbon eared disc (7).
 6. Align the ears of all the clutch discs.
 7. Install the guide clips (6) to the clutch discs (2-5, 7).

Apply the proper chassis grease to the guide clips in order to hold the clips in place on the disc ears. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).

LOCKING DIFFERENTIAL ADJUSTMENT (8.6/9.5/9.76 INCH AXLES)

Special Tools

- **J 7872** Magnetic Base Indicator Set
- **J 8001** Dial Indicator Set

Adjustment of the Differential

NOTE: If it is necessary to replace the left side locking differential side gear cam unit and clutch disc assembly, the right side locking differential side gear and clutch disc assembly, or the thrust block, the entire differential must be adjusted. The differential is adjusted using selective thickness thrust washers between the clutch disc assemblies and the case and/or different selective thickness thrust blocks. When adjusting the differential, note the following:

NOTE: Proper clearance between parts is critical to the operation of the unit.

- Assemble the clutch disc assemblies properly.
- Adjust the backlash and thrust block clearance in the following order:
 1. The left side gear backlash
 2. The right side gear backlash
 3. The thrust block clearance

Left Side Gear Backlash Adjustment

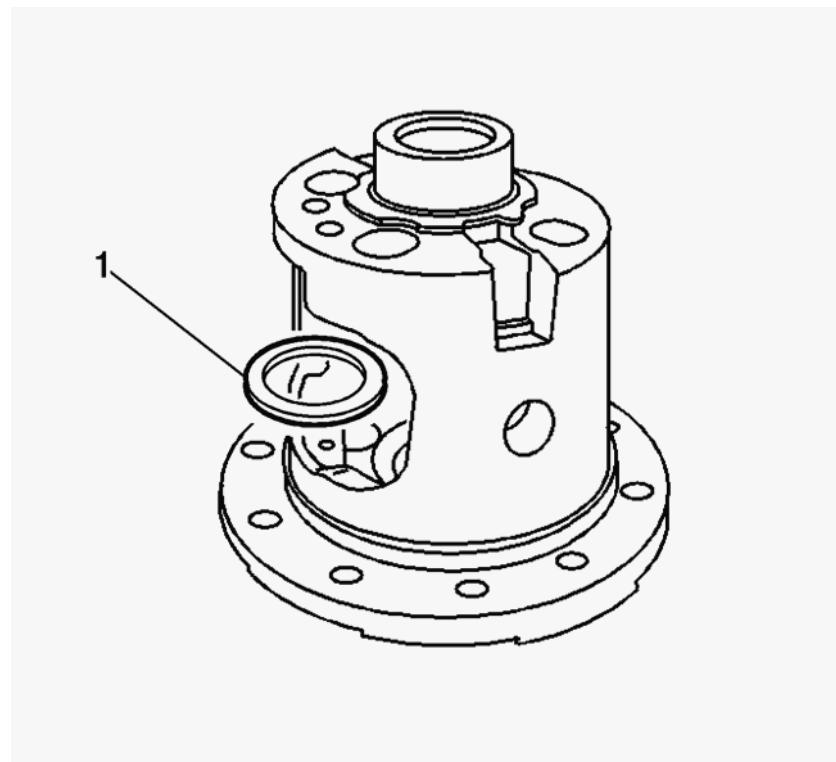


Fig. 297: Left Side Gear Thrust Washer

Courtesy of GENERAL MOTORS COMPANY

1. Install the new locking differential clutch disc thrust washer.

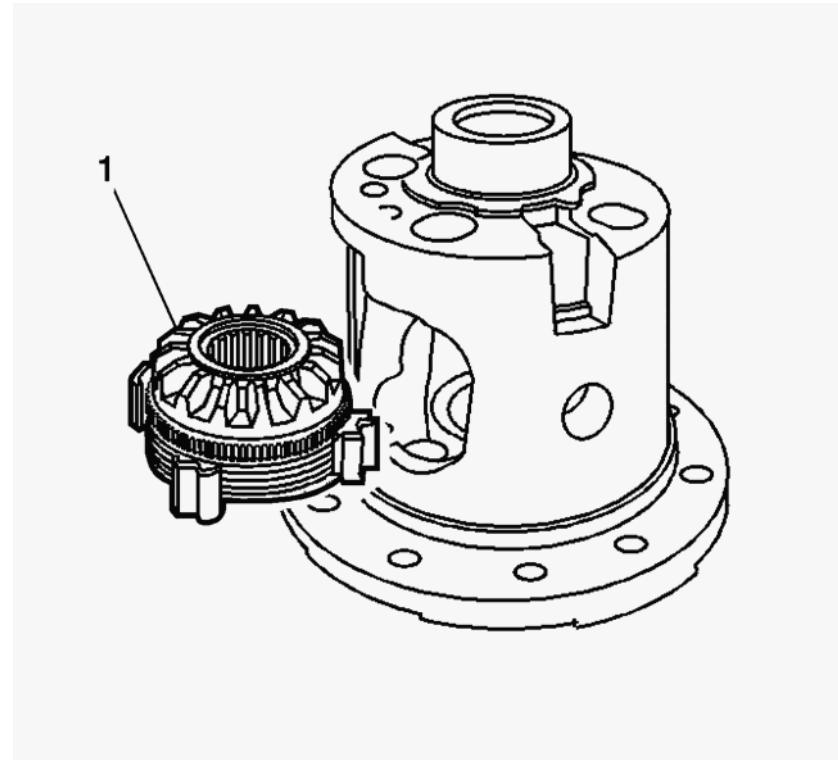


Fig. 298: Left Side Gear Cam Unit And Clutch Disc Assembly

Courtesy of GENERAL MOTORS COMPANY

2. Install the locking differential side gear cam unit and clutch disc assembly.

NOTE: Align the openings of the differential pinion gears and the differential pinion gear thrust washer to the pinion shaft opening in the differential case.

3. Install the differential pinion gears with the differential pinion gear thrust washers into the differential case.

NOTE:

- It may be necessary to press down on the locking differential side gear cam unit in order to align the pinion gear shaft opening with the pinion shaft opening in the differential case.
- If the pinion shaft cannot be installed after pressing on the locking differential side gear cam unit, replace the locking differential clutch disc gear thrust washer with a thinner washer.
- Tighten the pinion shaft lock bolt finger tight.

4. Install the pinion shaft and the bolt.

5. Rotate the pinion gear closest to the lock bolt so that one of the teeth is pointing downward, square to the ring gear flange.

6. Install a brass drift between the locking differential side gear cam unit and the pinion shaft.

7. Press the brass drift in far enough in order to compress the clutch discs.

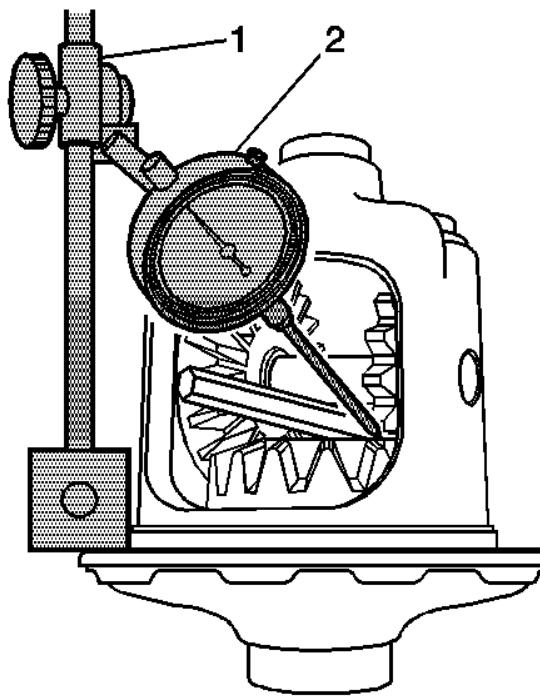


Fig. 299: Measuring Backlash Of Differential Pinion Gear & Side Gear

Courtesy of GENERAL MOTORS COMPANY

8. Measure the backlash of the differential pinion gear and the locking differential side gear cam unit by doing the following:

1. Install the **J 7872** base (1) and the **J 8001** indicator (2) to the ring gear flange.
2. Place the contact pad of the **J 8001** indicator (2) on one of the teeth of the pinion gear closest to the pinion shaft lock bolt and zero the gauge.
3. Pull the pinion gear firmly into the differential case seat.
4. Rotate the pinion gear back and forth.

NOTE:

- If the backlash is greater than, install a thicker locking differential clutch disc thrust washer and recheck the backlash.
- If the backlash is less than, install a thinner locking differential clutch disc thrust washer and recheck the backlash

5. The backlash between the differential pinion gear and the locking differential side gear cam unit should be:

- For the 8.6 inch axle, 0.254-0.406 mm (0.010-0.016 in).
- For the 9.5/9.76 LD axle, 0.279-0.432 mm (0.011-0.017 in).

9. Locking differential clutch disc thrust washers are available in the following sizes:

Washer Sizes

- 0.559 mm (0.022 in)
- 0.686 mm (0.027 in)

- 0.813 mm (0.032 in)
- 0.914 mm (0.036 in)
- 1.016 mm (0.040 in)
- 1.118 mm (0.044 in)
- 1.219 mm (0.048 in)
- 1.321 mm (0.052 in)

Right Side Gear Backlash Adjustment

1. If necessary, remove the following from the differential case:

1. The pinion lock shaft bolt
2. The pinion shaft
3. The differential pinion gears
4. The differential pinion gear thrust washers
5. The left side locking differential side gear cam unit and clutch disc assembly

2. Install the differential side gear shim into the right side of the differential case.

3. Install the locking differential side gear and clutch disc assembly.

4. Align the openings of the differential pinion gears and the differential pinion gear thrust washers to the pinion shaft opening in the differential case.

NOTE:

- Press down on the locking differential side gear and install the pinion shaft.
- If the side gear cannot be pressed down far enough to install the pinion shaft, replace the side gear shim with a thinner shim.

5. Install the differential pinion gears with the differential pinion thrust washers into the differential case.

NOTE: **Tighten the pinion shaft lock bolt finger tight.**

6. Install the pinion shaft lock and the bolt.

7. Rotate the differential pinion gear so that one of the teeth is pointing downward, square to the ring gear flange.

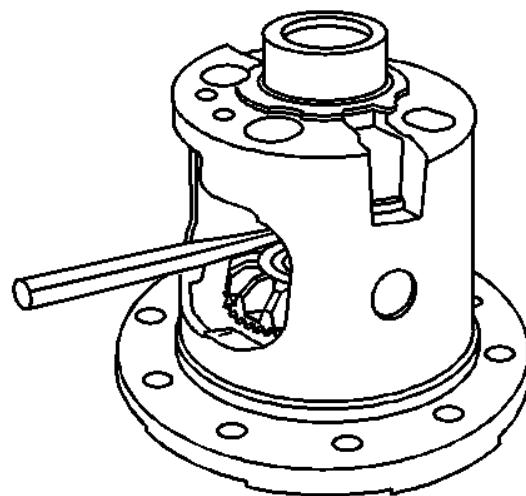


Fig. 300: Installing Brass Drift Between Locking Differential Side Gear & Pinion Shaft

Courtesy of GENERAL MOTORS COMPANY

8. Install a brass drift between the locking differential side gear and the pinion shaft.
9. Press the brass drift in enough in order to compress the clutch discs.

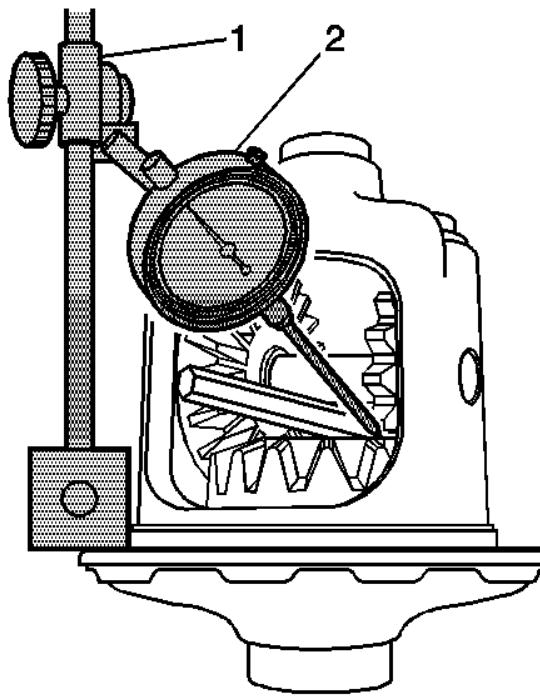


Fig. 301: Measuring Backlash Of Differential Pinion Gear & Side Gear

Courtesy of GENERAL MOTORS COMPANY

10. Measure the backlash of the pinion gear and the right side gear by doing the following:

1. Install the **J 7872** base (1) and the **J 8001** indicator (2) to the ring gear flange.
2. Place the contact pad of the **J 8001** indicator (2) on one of the teeth of the pinion gear closest to the pinion shaft lock bolt and zero the gauge.
3. Pull the pinion gear firmly into the differential case seat.
4. Rotate the pinion gear back and forth.

NOTE:

- If the backlash is greater than, install a thicker locking differential clutch disc thrust washer and recheck the backlash.
- If the backlash is less than, install a thinner locking differential clutch disc thrust washer and recheck the backlash.

5. The backlash between the differential pinion gear and the locking differential side gear cam unit should be:

- For the 8.6 inch axle 0.076-0.229 mm (0.003-0.009 in).
- For the 9.5/9.76 LD axle 0.051-0.203 mm (0.002-0.008 in).

Differential side gear shims are available in the following sizes:

Shim Sizes

- 0.254 mm (0.010 in)

- 0.381 mm (0.015 in)
- 0.508 mm (0.020 in)
- 0.635 mm (0.025 in)
- 0.762 mm (0.030 in)
- 0.889 mm (0.035 in)
- 1.016 mm (0.040 in)
- 1.143 mm (0.045 in)

Thrust Block Clearance Adjustment

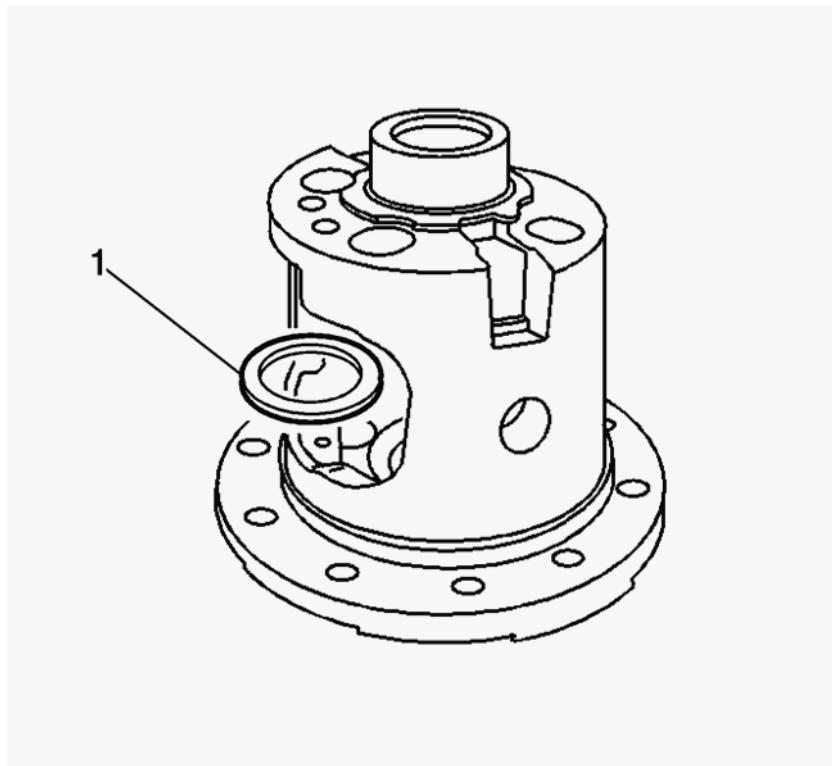


Fig. 302: Left Side Gear Thrust Washer

Courtesy of GENERAL MOTORS COMPANY

NOTE: The left and right side gear backlash measurements must be done before the thrust block measurement can be completed.

1. Install the locking differential clutch disc thrust washer into the left side or flange-end of the differential case.

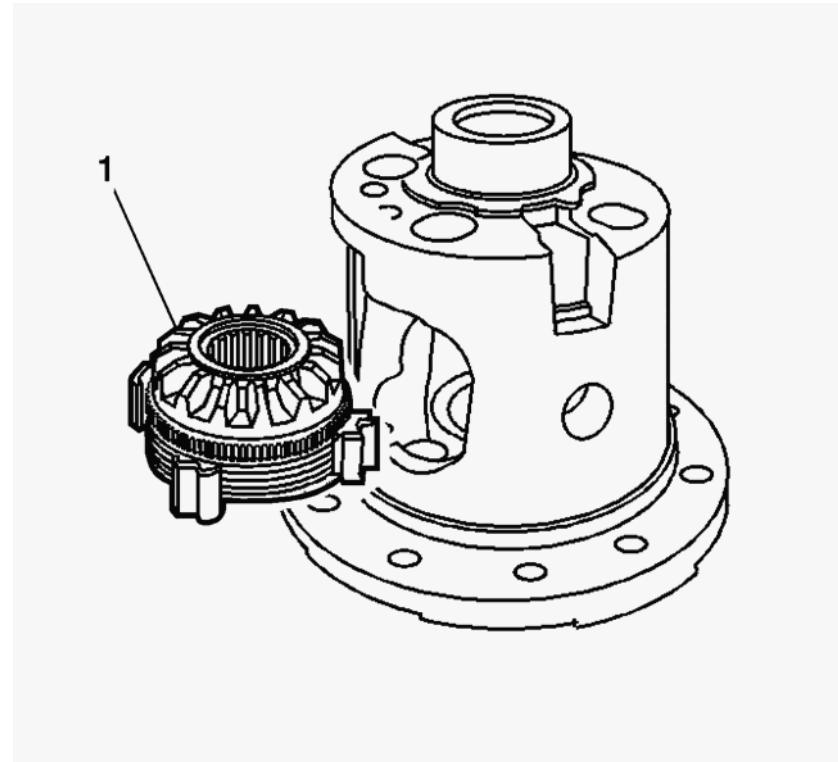


Fig. 303: Left Side Gear Cam Unit And Clutch Disc Assembly

Courtesy of GENERAL MOTORS COMPANY

2. Install the locking differential side gear cam unit and clutch disc assembly into the left side or flange-end of the differential case.
3. Install the differential side gear shim into the right side of the differential case.
4. Install the locking differential side gear and clutch disc assembly into the right side of the differential case.

NOTE: Tighten the pinion shaft bolt finger tight.

5. Install the pinion shaft and the bolt.

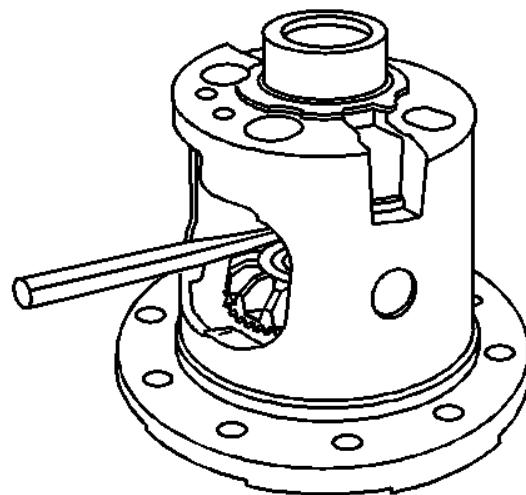


Fig. 304: Installing Brass Drift Between Locking Differential Side Gear & Pinion Shaft

Courtesy of GENERAL MOTORS COMPANY

6. Install a brass drift between the left locking differential side gear cam unit and the pinion shaft.
7. Press the brass drift in far enough in order to compress the clutch disc assembly and hold the left side gear assembly in place.
8. Install a brass drift between the right side locking differential side gear and the pinion shaft.
9. Press the brass drift in far enough in order to hold the right side gear assembly in place.

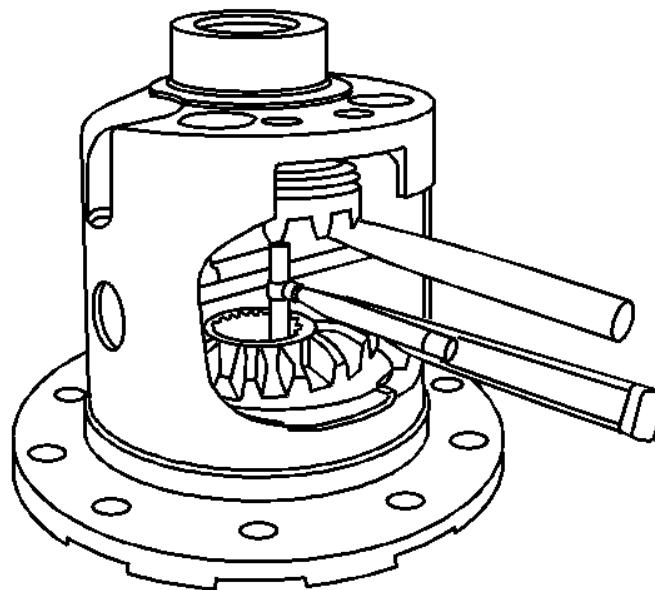


Fig. 305: Measuring Distance Between Side Gear Faces

Courtesy of GENERAL MOTORS COMPANY

NOTE: DO NOT measure the distance between the side gear teeth.

10. Using a 25.4-50.8 mm (1-2 in) telescoping gauge, measure the distance between the side gear faces.
11. Measure the telescoping gauge with a micrometer and record the measurement.

NOTE: If the measurement is equal to one of the thrust blocks sizes available, then select that thrust block.

12. Compare the measurement obtained in step 11 to the thrust block sizes available.

NOTE: For example, if the measurement is 33.833 mm (1.332 in), select the 33.782 mm (1.330 in) thrust block.

13. If the measurement obtained in step 11 is not equal to one of the thrust blocks sizes available, then select the thrust block that is smaller than the measurement.

NOTE: The backlash must be rechecked and adjusted to specification anytime the left and/or the right thrust washers are replaced.

14. If the measurement obtained in step 11 is less than 33.578 mm (1.322 in) for the 8.6 inch axle or 40.488 mm (1.622 in) for the 9.5/9.76 LD axle, then reduce the left side gear thrust washer or the right side gear shim thickness in order to increase the thrust block opening.
15. If the measurement obtained in step 11 is greater than 34.290 mm (1.350 in) for the 8.6 inch axle or 41.120 mm (1.622 in) for the 9.5/9.76 LD axle, then increase the left side gear thrust washer or the right side gear shim thickness in order to decrease the thrust block opening.
16. Recheck the left and/or right side gear backlash and adjust as necessary.

17. Recheck the thrust block clearance and adjust as necessary.

18. Assemble the differential. Refer to [**Locking Differential Assemble \(8.6/9.5/9.76 Inch Axles\)**](#).

LOCKING DIFFERENTIAL ADJUSTMENT (10.5 INCH AXLE)

Special Tools

- **J-7872** Magnetic Base Dial Indicator
- **J-8001** Dial Indicator Set
- **J-34672** Depth Micrometer
- **J-34673** Flat Gauge Bar

Adjustment of the Differential

NOTE: If it is necessary to replace the right side cam gear and clutch disc assembly, the left hand side gear and clutch disc assembly, or the thrust block, the entire differential must be adjusted. The differential is adjusted using selective thickness thrust washers between the clutch pack assemblies and case and/or different selective thickness thrust blocks.

When adjusting the differential, note the following:

NOTE: Proper clearance between the parts is critical to the operation of the unit.

- Build up the clutch disc packs properly.
- Adjust the backlash and thrust block clearance in the following order:
 1. The left side gear backlash
 2. The right side gear backlash
 3. The thrust block clearance

Left Side Gear Backlash Adjustment

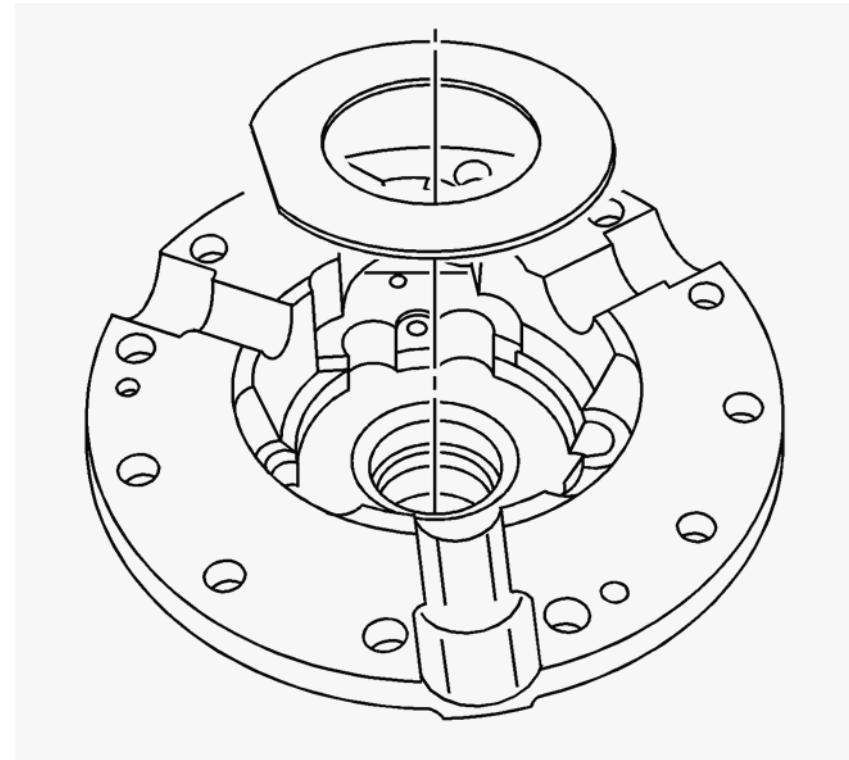


Fig. 306: Left Side Gear Thrust Washer

Courtesy of GENERAL MOTORS COMPANY

1. Install the differential side gear shim.

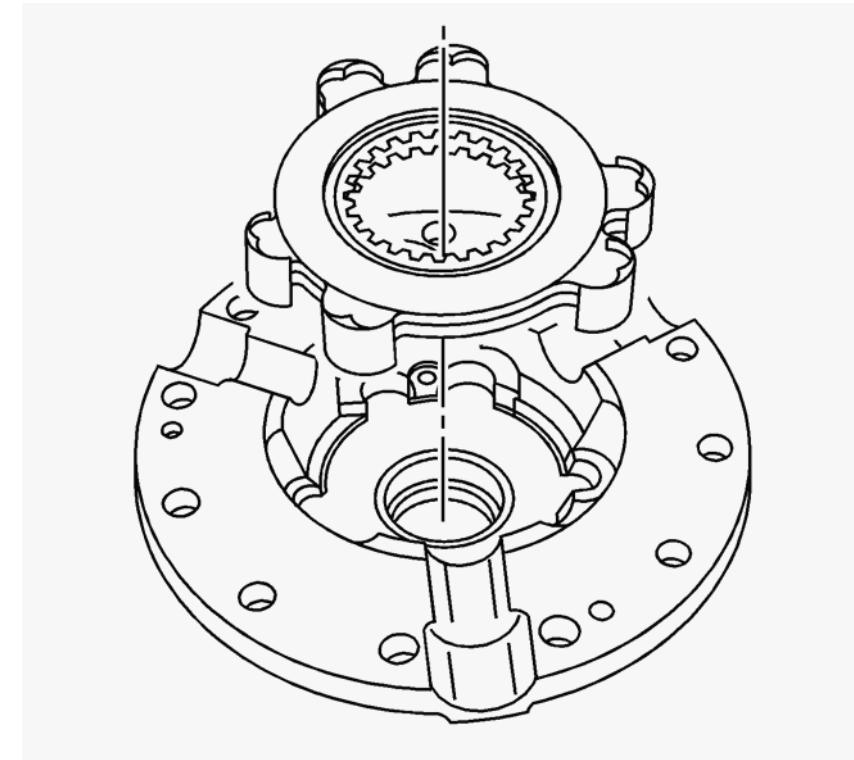


Fig. 307: Left Side Clutch Plates And Guide Clips

Courtesy of GENERAL MOTORS COMPANY

2. Install the clutch pack assembly.

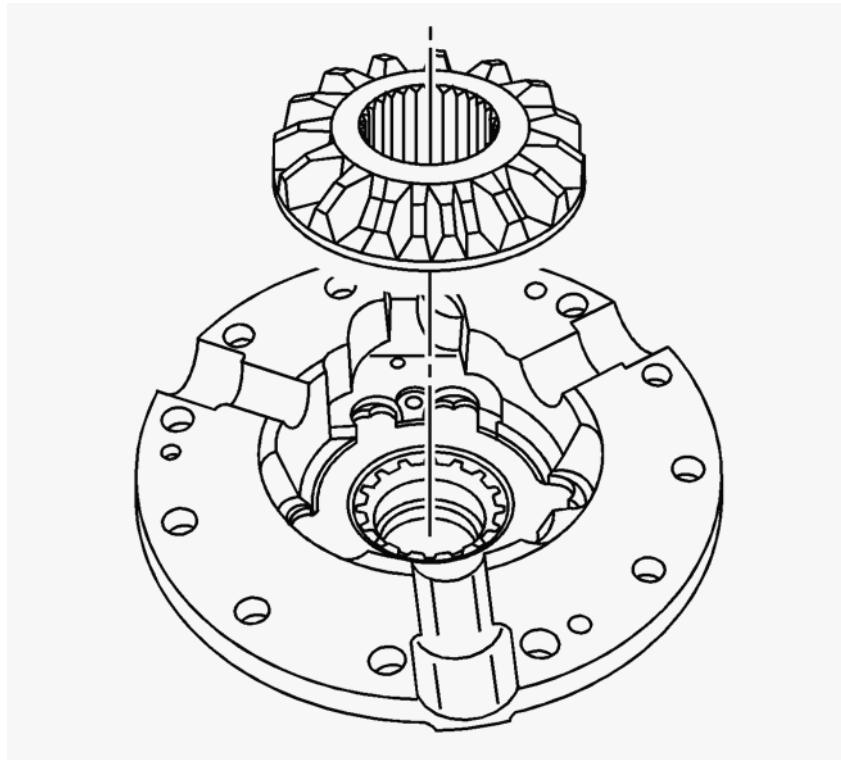


Fig. 308: Locking Differential Side Gear

Courtesy of GENERAL MOTORS COMPANY

3. Install the differential side gear.

NOTE: The washers must be large enough in order to fit over the differential side gear, but not too large to where they will cause an interference with the pinion gear and spider assembly.

4. Assemble a set of washers, a nut, and a bolt long enough in order to hold the side gear in place.

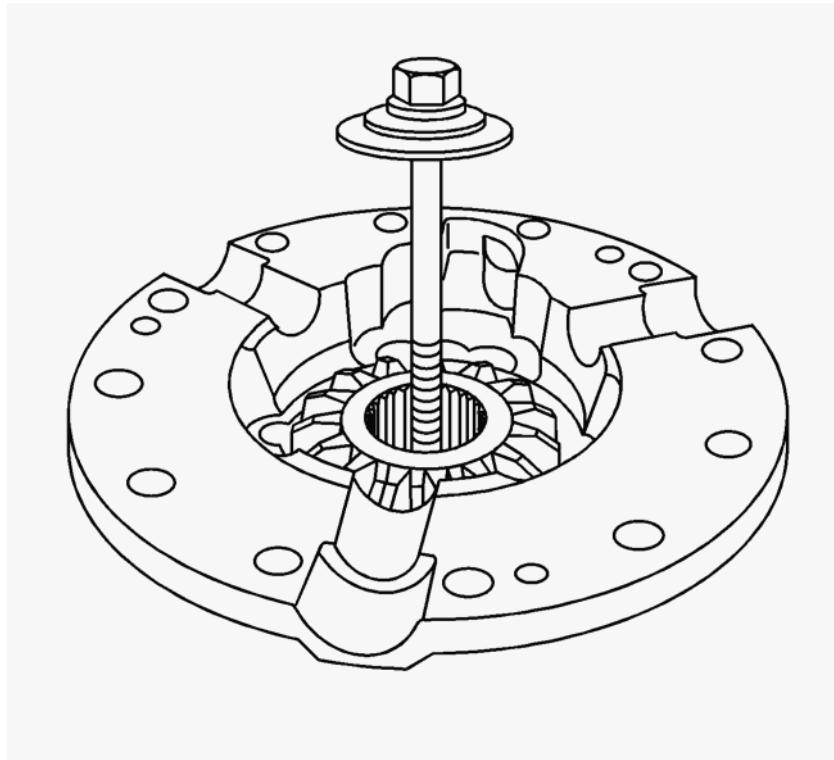


Fig. 309: Installing Bolt & Washer Assembly Through Differential Case Half

Courtesy of GENERAL MOTORS COMPANY

5. Install the bolt and washer assembly through the differential case half.
6. Install a second set of washers and the nut onto the bolt extending through the differential case half.
7. Install the differential case half into a vise.
8. Clamp on the nut on the bottom of the differential case.

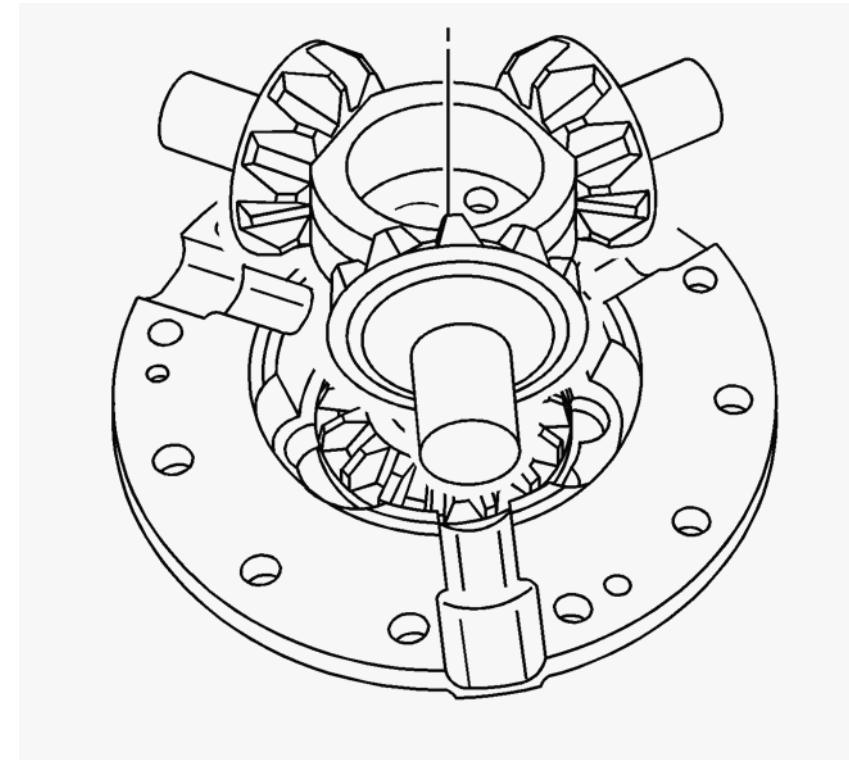


Fig. 310: Differential Case Components

Courtesy of GENERAL MOTORS COMPANY

9. Install the differential pinion gears, the differential pinion gear thrust washers and the locking differential spider into the case half.
10. Loosen the bolt in order to turn the differential side gear.
11. Index the pinion gear so that one tooth is pointing downward, perpendicular to the case half face.
12. Tighten the bolt until the clutch discs are compressed.

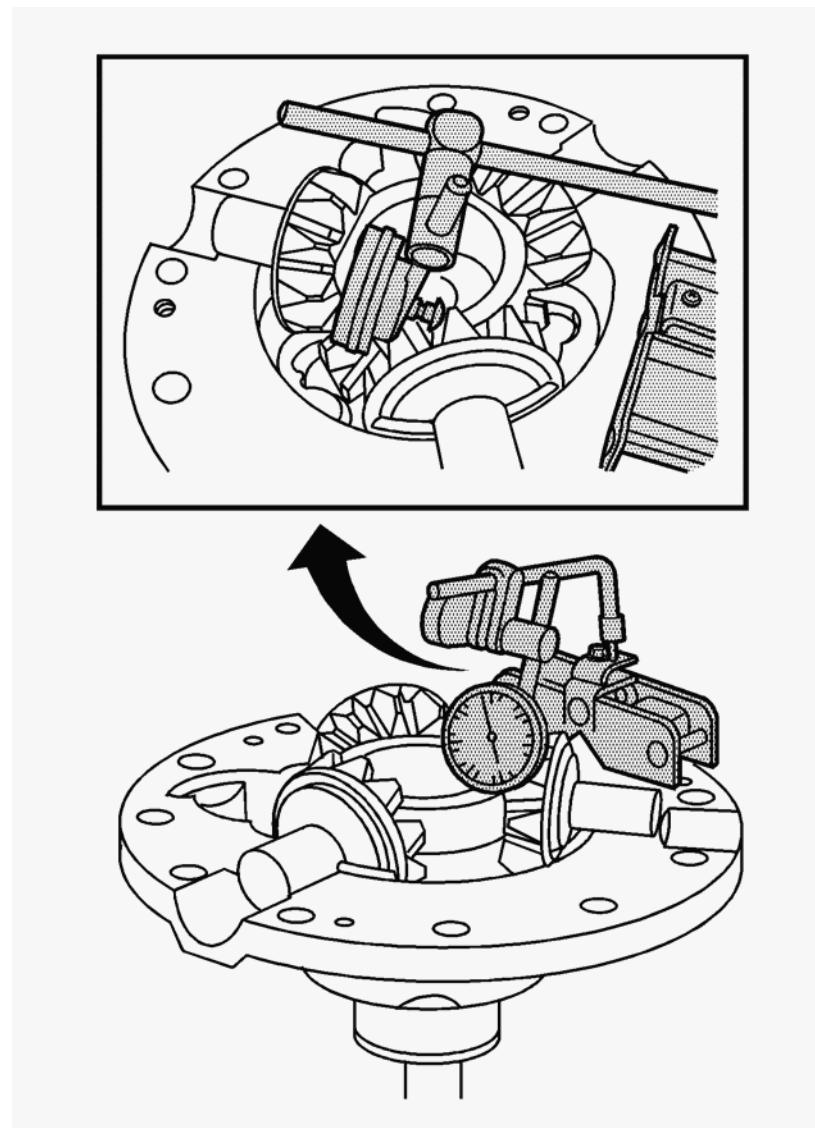


Fig. 311: Measuring Differential Pinion Gear To Locking Differential Side Gear Backlash

Courtesy of GENERAL MOTORS COMPANY

13. Install the **J-7872** indicator onto the differential case.
14. Loosely clamp the **J-8001** dial indicator set onto the stem of the **J-7872** indicator.
15. Place the contact pad of the **J-8001** dial indicator set on the tooth that is perpendicular to the differential side gear.
16. Preload the dial of the **J-8001** dial indicator set approximately one turn clockwise.
17. Tighten the lock nut on the **J-7872** indicator finger tight.
18. Turn the dial of the **J-8001** dial indicator set until the needle and the dial face indicate ZERO.

NOTE: In the following procedure, DO NOT unseat the locking differential spider. This will make the backlash reading inaccurate.

19. Measure the differential pinion gear to locking differential side gear backlash by performing the following steps:

- Pull the pinion gear firmly into the seat.
- Rotate the pinion gear back and forth while reading the dial indicator.
- Record the measurement.

NOTE: Measure the differential pinion gear to locking differential side gear backlash on the other 2 pinion gears

20. The measured backlash between the differential pinion gear and locking differential side gear should be 0.051-0.203 mm (0.002-0.008 in).

21. If the backlash is too large, install a thicker differential side gear shim and recheck the backlash.

22. If the backlash is too small, use a thinner differential side gear shim and recheck the backlash.

Differential side gear shims are available in the following sizes:

Shim Sizes

- 0.254 mm (0.010 in)
- 0.381 mm (0.015 in)
- 0.508 mm (0.020 in)
- 0.635 mm (0.025 in)
- 0.762 mm (0.030 in)
- 0.899 mm (0.035 in)
- 1.016 mm (0.040 in)
- 1.143 mm (0.045 in)
- 1.270 mm (0.050 in)
- 1.397 mm (0.055 in)
- 1.524 mm (0.060 in)

Right Side Gear Backlash Adjustment

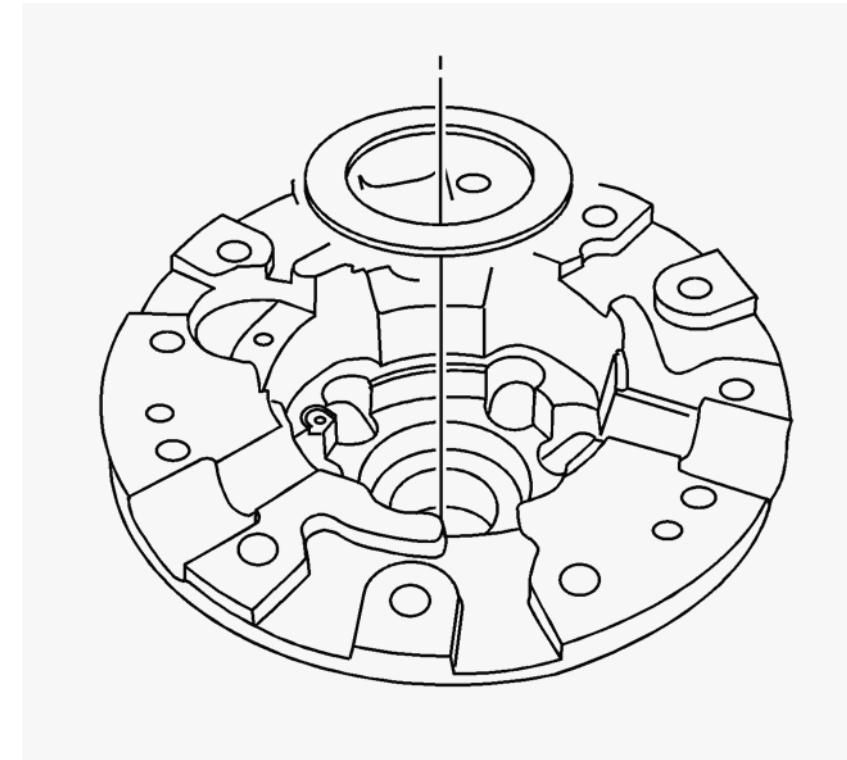


Fig. 312: Right Side Locking Differential Clutch Disc Thrust Washer

Courtesy of GENERAL MOTORS COMPANY

1. Install the locking differential clutch disc thrust washer.

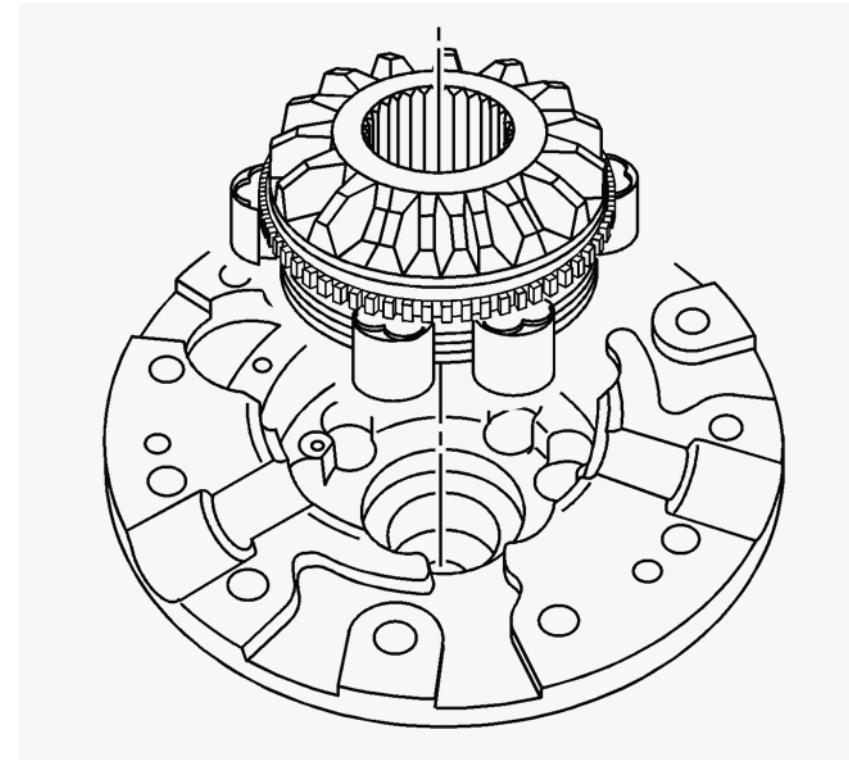


Fig. 313: Right Side Cam Unit And Clutch Plate Assembly

Courtesy of GENERAL MOTORS COMPANY

2. Install the differential side gear cam unit and clutch pack assembly.

NOTE: The washers must be large enough in order to fit over the differential side gear but not too large to where they will cause an interference with the pinion gear and spider assembly.

3. Assemble a set of washers, a nut, and a bolt long enough in order to hold the side gear in place.

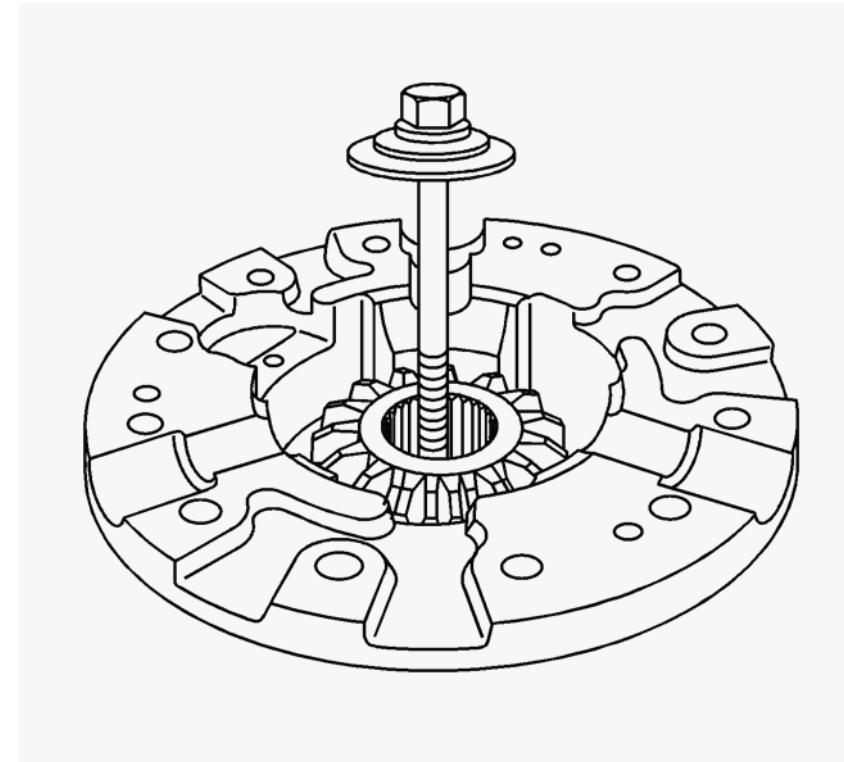


Fig. 314: Installing Bolt And Washer Assembly Through Differential Case Half

Courtesy of GENERAL MOTORS COMPANY

4. Install the bolt and washer assembly through the differential case half.
5. Install a second set of washers and the nut onto the bolt extending through the differential case half.
6. Install the differential case half into a vise.
7. Clamp on the nut on the bottom of the differential case.

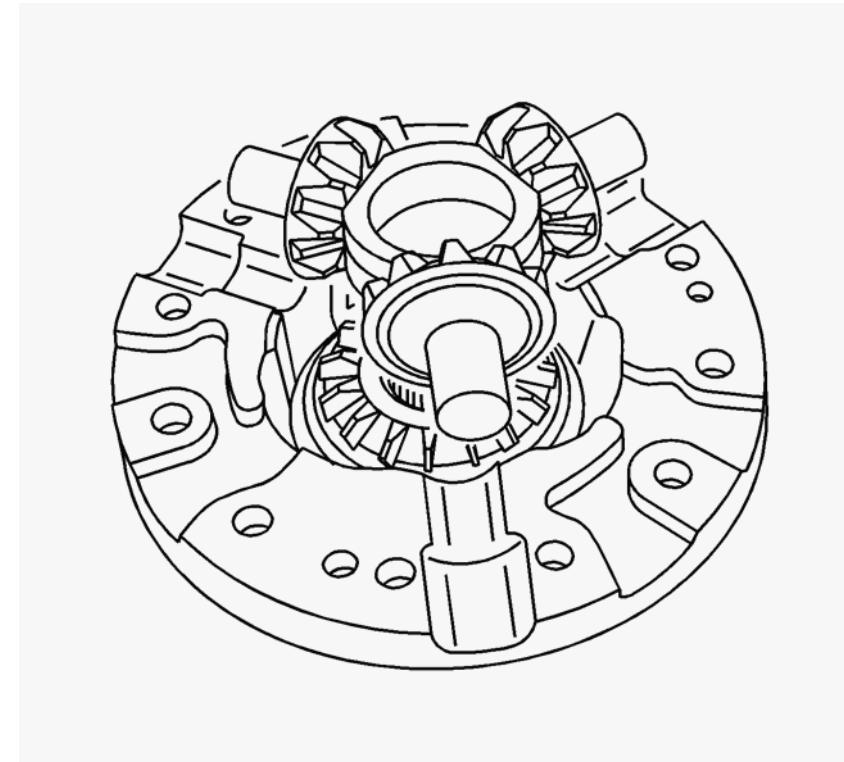


Fig. 315: Differential Pinion Gears, Thrust Washers And Spider

Courtesy of GENERAL MOTORS COMPANY

8. Install the differential pinion gears, the differential pinion gear thrust washers and the locking differential spider into the case half.
9. Loosen the bolt in order to turn the differential side gear.
10. Index the pinion gear so that one tooth is pointing downward, perpendicular to the case half face.
11. Tighten the bolt until the clutch plates are compressed.

NOTE: In the following procedure, DO NOT unseat the locking differential spider. This will make the backlash reading inaccurate.

12. Measure the differential pinion gear to locking differential side gear backlash by performing the following steps:
 - Pull the pinion gear firmly into the seat.
 - Rotate the pinion gear back and forth while reading the dial indicator.
 - Record the measurement.
13. The backlash between the differential pinion gear and locking differential side gear should be between 0.279-0.432 mm (0.011-0.017 in).
14. If the backlash is too large, install a thicker locking differential side gear thrust washer and recheck the backlash.
15. If the backlash is too small, use a thinner locking differential side gear thrust washer and recheck the backlash.
16. Locking differential side gear thrust washers are available in the following sizes:

Washer Sizes

- 0.559 mm (0.022 in)
- 0.686 mm (0.027 in)
- 0.813 mm (0.032 in)
- 0.914 mm (0.036 in)
- 1.016 mm (0.040 in)
- 1.067 mm (0.042 in)
- 1.118 mm (0.044 in)
- 1.219 mm (0.048 in)
- 1.321 mm (0.052 in)

Thrust Block Clearance Adjustment

NOTE: The left and right side gear backlash measurements must be done before the thrust block measurement can be completed.

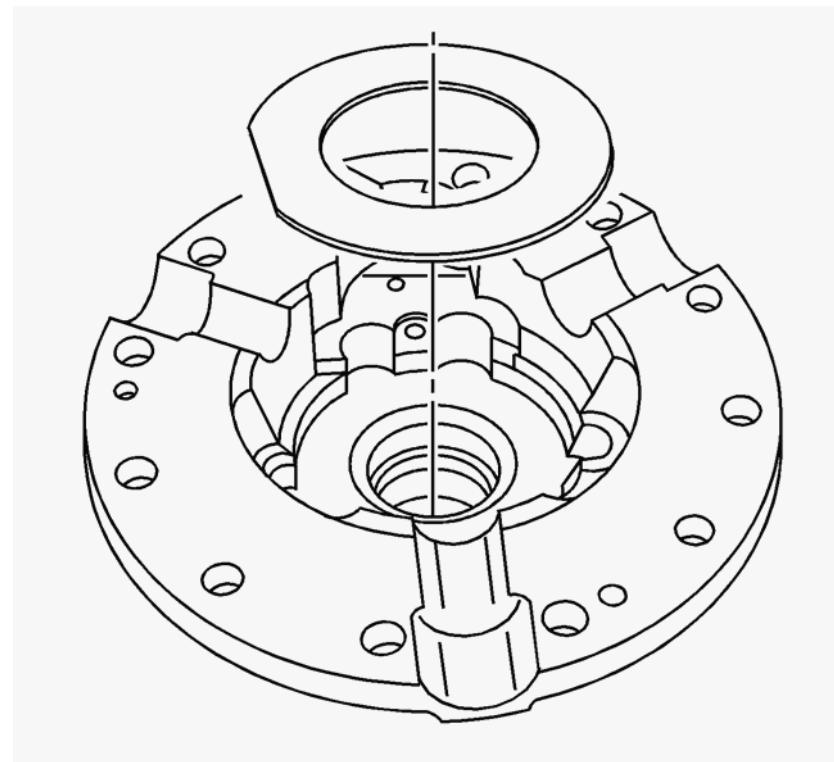


Fig. 316: Left Side Gear Thrust Washer

Courtesy of GENERAL MOTORS COMPANY

1. Install the differential side gear shim.

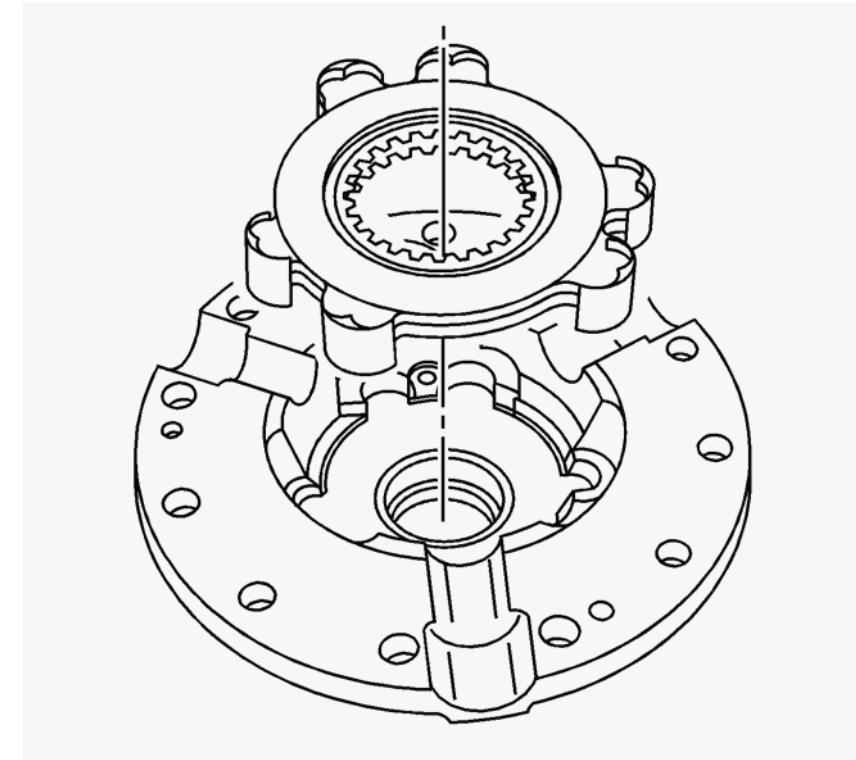


Fig. 317: Left Side Clutch Plates And Guide Clips

Courtesy of GENERAL MOTORS COMPANY

2. Install the clutch pack assembly.

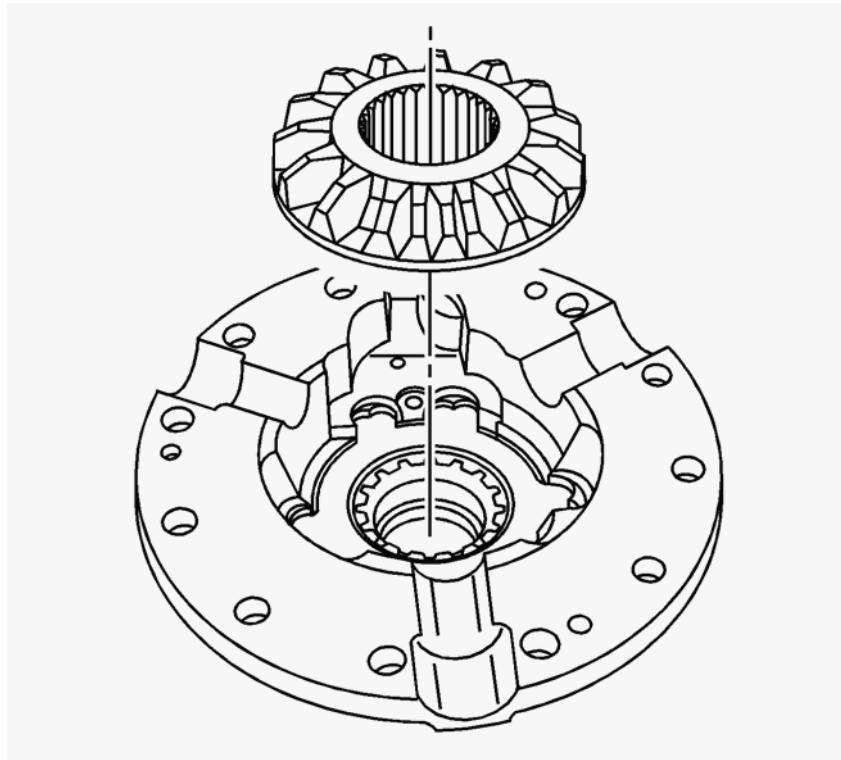


Fig. 318: Locking Differential Side Gear

Courtesy of GENERAL MOTORS COMPANY

3. Install the differential side gear.
4. Assemble a set of washers, a nut, and a bolt long enough in order to hold the side gear in place.

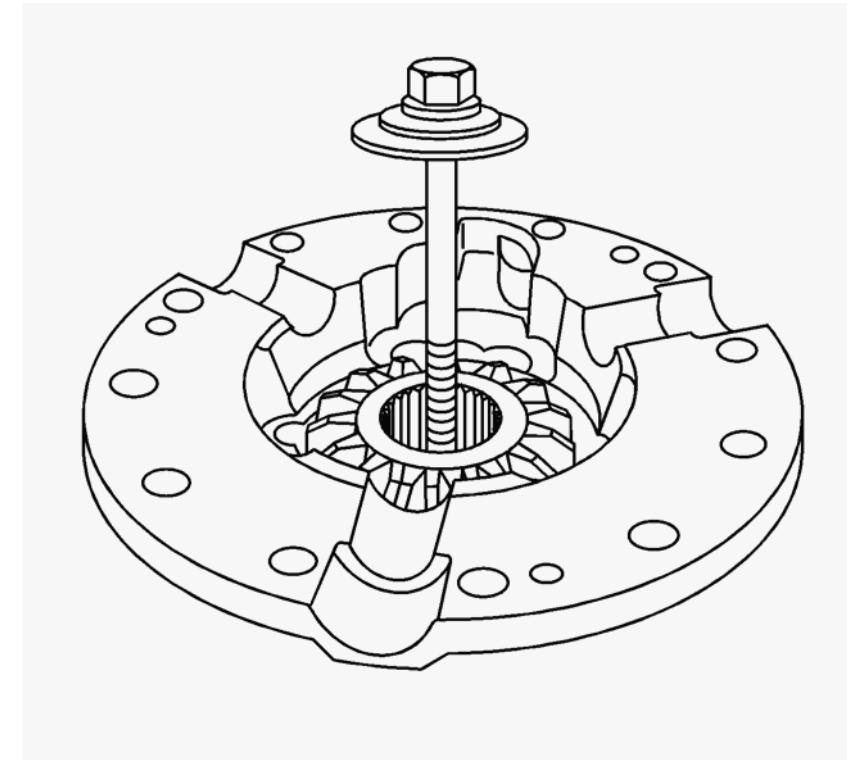


Fig. 319: Bolt And Washer Assembly Through Differential Case Half

Courtesy of GENERAL MOTORS COMPANY

5. Install the bolt and washer assembly through the differential case half.
6. Install a second set of washers and the nut onto the bolt extending through the differential case half.
7. Install the differential case half into a vise.
8. Clamp on the nut on the bottom of the differential case.
9. Tighten the bolt until the clutch plates are compressed.

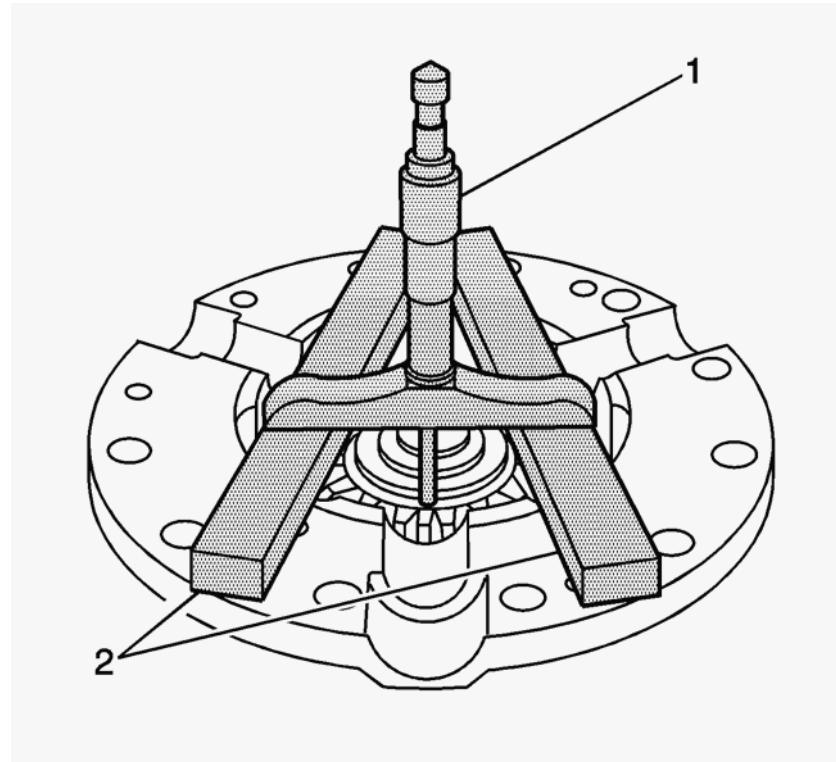


Fig. 320: Magnetic Base Indicator And Flat Gauge Bar Tools

Courtesy of GENERAL MOTORS COMPANY

NOTE: You will need two of the J 34673 to perform the following service procedure.

10. Install the **J-34673** bar, **J-34672** micrometer (2) and the **J-34672** micrometer (1) onto the differential case as shown.
11. Install the **J-34673** bar onto the face of the differential case, not the ridge of the differential case, or an inaccurate measurement will result.
12. Measure the depth from the face of the **J-34673** bar to the face of the differential side gear using the **J-34672** micrometer.

Record the measurement.

13. Measure the thickness of the **J-34673** bar.
14. Subtract the thickness of the **J-34673** bar from the measurement obtained in step 10.
15. Record the measurement. This measurement is equal to one-half of the thrust block thickness.
16. Remove both of the **J-34673** bar from the differential case.
17. Remove the differential case half from the vise.

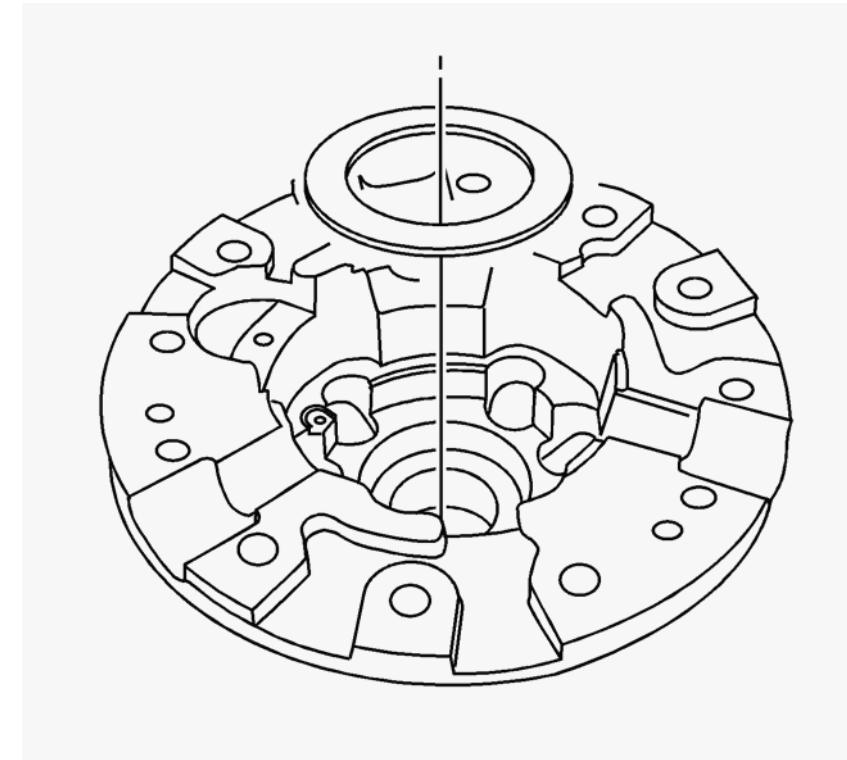


Fig. 321: Right Side Locking Differential Clutch Disc Thrust Washer

Courtesy of GENERAL MOTORS COMPANY

18. Install the locking differential clutch disc thrust washer.

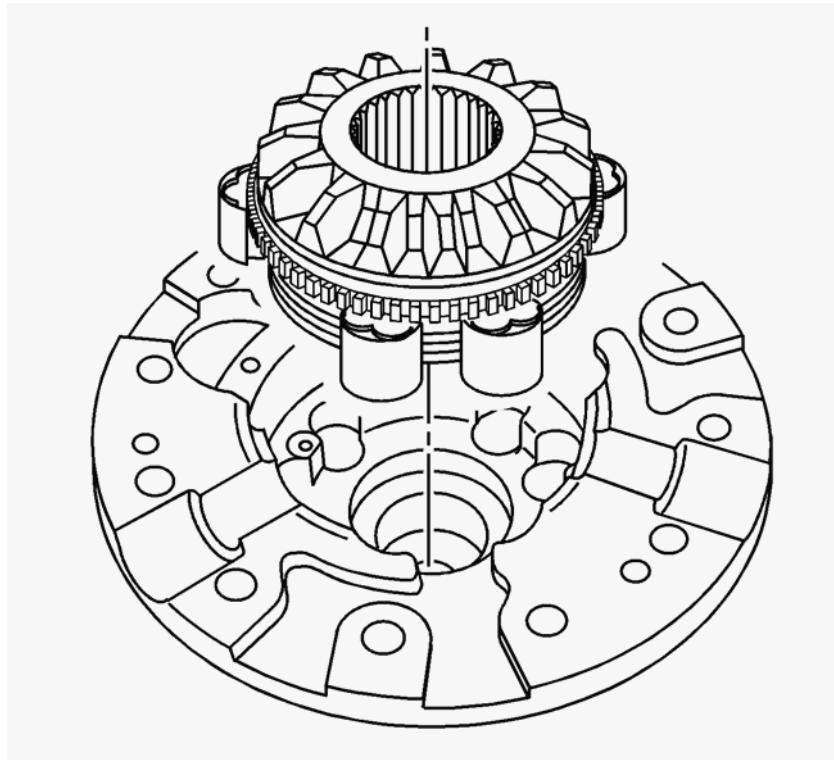


Fig. 322: Right Side Cam Unit And Clutch Plate Assembly

Courtesy of GENERAL MOTORS COMPANY

19. Install the differential side gear cam unit and clutch pack assembly.
20. Assemble a set of washers, a nut, and a bolt long enough in order to hold the side gear in place.

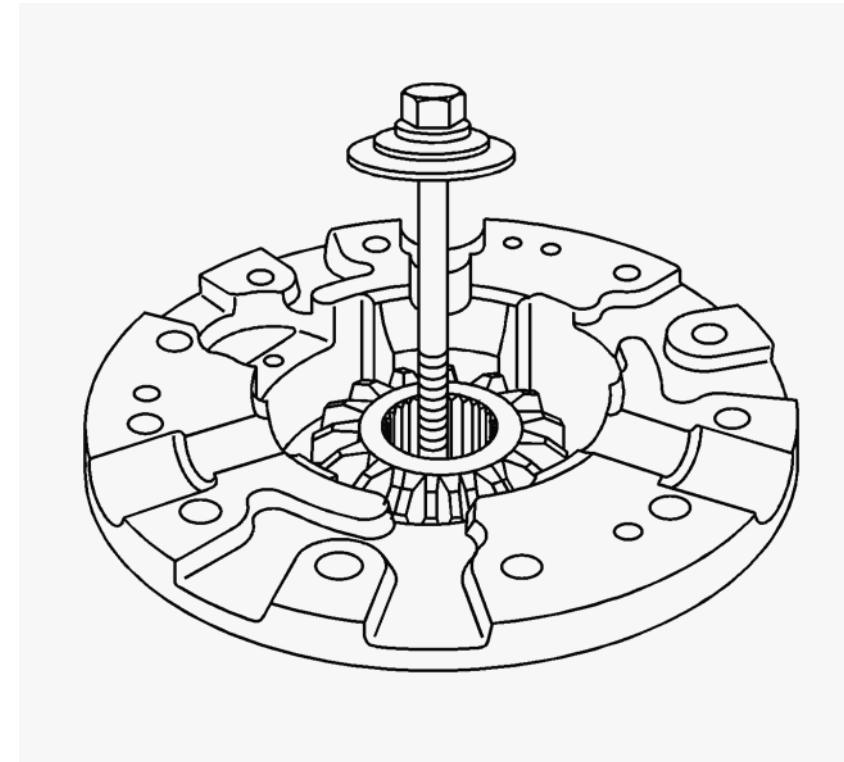


Fig. 323: Bolt And Washer Assembly Through Differential Case Half

Courtesy of GENERAL MOTORS COMPANY

21. Install the bolt and washer assembly through the differential case half.
22. Install a second set of washers and the nut onto the bolt extending through the differential case half.
23. Install the differential case half into a vise.
24. Clamp on the nut on the bottom of the differential case.
25. Tighten the bolt until the clutch plates are compressed.

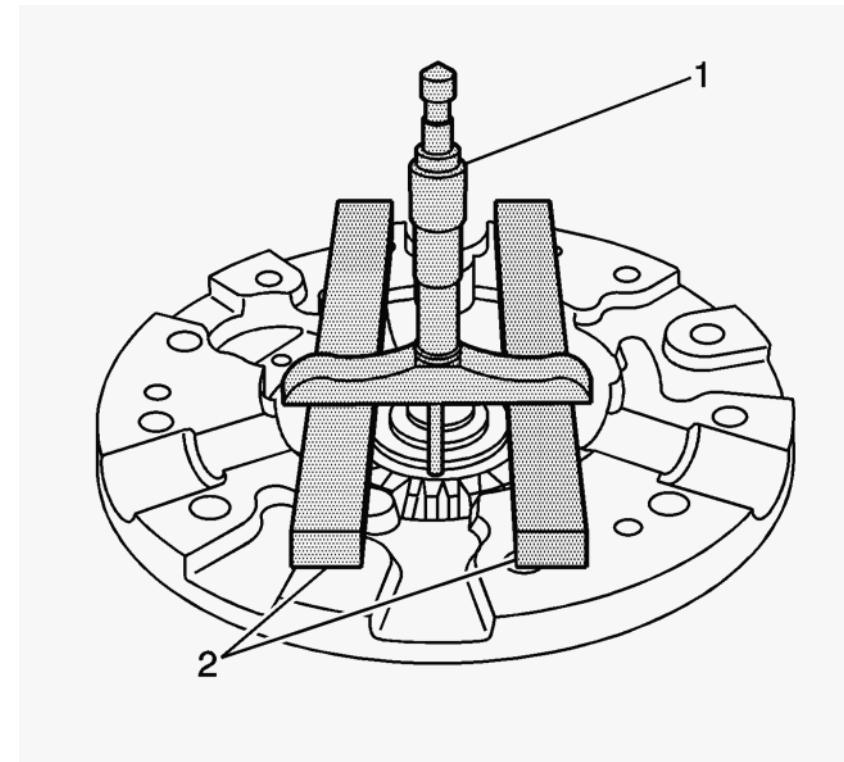


Fig. 324: Installing Special Tools Onto Differential Case

Courtesy of GENERAL MOTORS COMPANY

26. Install the **J-34673** bar (2) and the **J-34672** micrometer (1) onto the differential case.
27. Measure the depth from the face of the **J-34673** bar to the face of the differential side gear using the **J-34672** micrometer. Record the measurement.
28. Measure the thickness of the **J-34673** bar.
29. Subtract the thickness of the **J-34673** bar from the measurement obtained in step 23.
30. Record the measurement. This measurement is equal to one-half of the thrust block thickness.
31. Add the measurements in step 12 and step 25 together. This is the thickness for the thrust block.
32. Compare the measurement obtain in step 25 to the thrust block sizes available. If the measurement is equal to one of the thrust block sizes available, the select that thrust block.
33. If the measurement obtained in step 25 is not equal to one of the thrust block sizes available, then select the thrust block that is smaller the measurement. For example, if the measurement is 40.919 mm (1.611 in), select the 40.894 mm (1.610 in) thrust block.

NOTE: The backlash must be rechecked and adjusted to specification anytime the left and/or the right thrust washers are replaced.

34. If the measurement obtained in step 25 is less then 40.488 mm (1.594 in), then reduce the left differential side gear shim or the right locking differential clutch disc thrust washer thickness in order to increase the thrust block opening.
35. If the measurement obtained in step 25 is greater then 41.120 mm (1.622 in), then increase the left differential side gear shim or the right locking differential clutch disc thrust washer thickness in order to decrease the thrust block opening.
36. Recheck the left and/or right side gear backlash and adjust as necessary.
37. Recheck the thrust block clearance and adjust as necessary.

LOCKING DIFFERENTIAL ASSEMBLE (8.6/9.5/9.76 INCH AXLES)

NOTE: The left and right side gear backlash and thrust block thickness measurements must be completed before the components of the locking differential can be assembled.

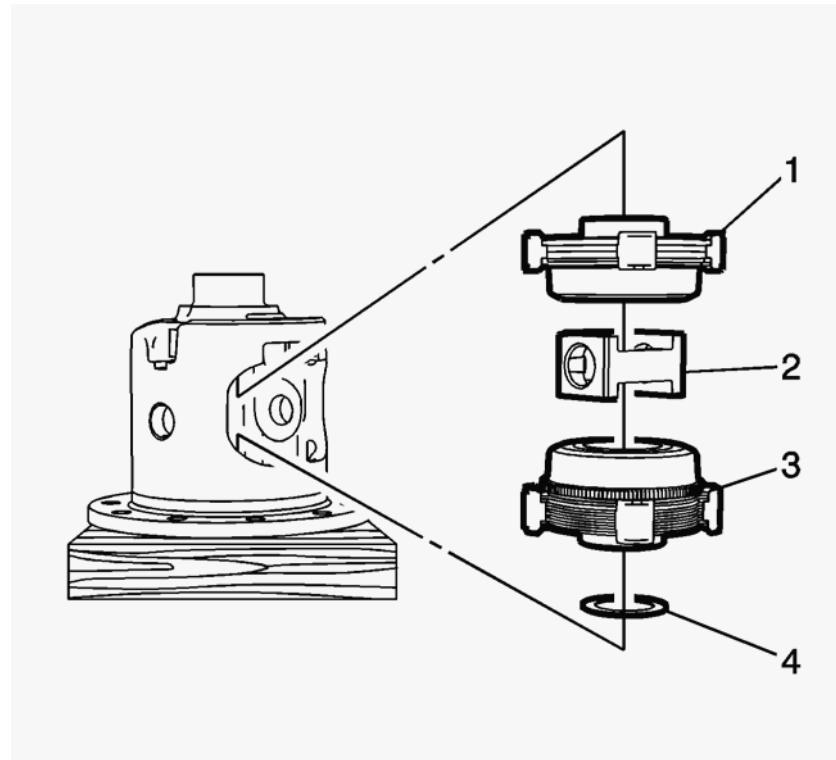


Fig. 325: Right Clutch Pack And Thrust Block

Courtesy of GENERAL MOTORS COMPANY

1. Install the washer (4).
2. Install the left differential locking clutch disc pack and side gear (3).
3. Install the right differential locking clutch disc pack and side gear (2).
4. While holding the right differential locking clutch disc pack and side gear (2), install the differential thrust block (2).

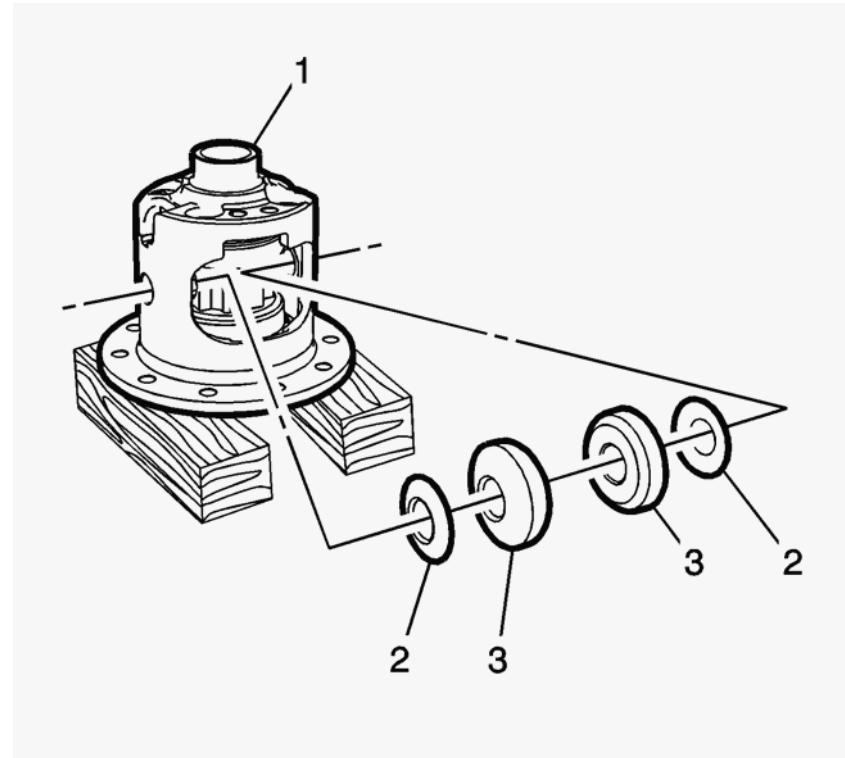


Fig. 326: Differential Side Gears And Thrust Washers

Courtesy of GENERAL MOTORS COMPANY

5. Install the differential pinion gears (3) and thrust washers (2) by rotating the differential pinion gears.

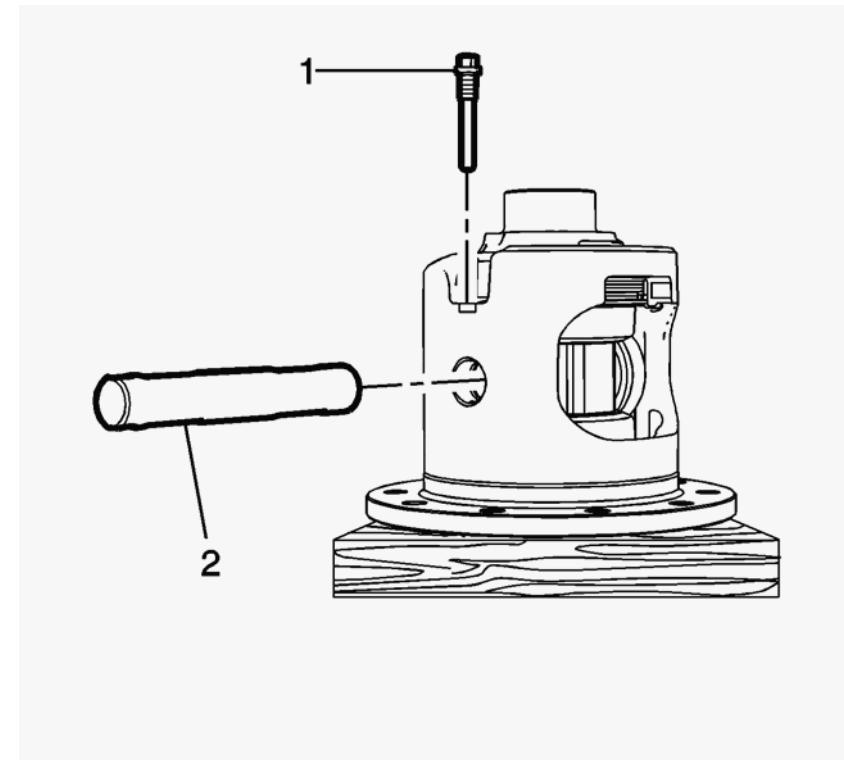


Fig. 327: Differential Pinion Gear Shaft And Bolt

Courtesy of GENERAL MOTORS COMPANY

6. Install the differential pinion gear shaft (2).
7. Install the differential pinion gear shaft bolt (1) and tighten to:
 - For the 8.6 inch axle, tighten to 36 N.m (27 lb ft)
 - For the 9.5/9.76 inch LD axle, tighten to 50 N.m (37 lb ft)

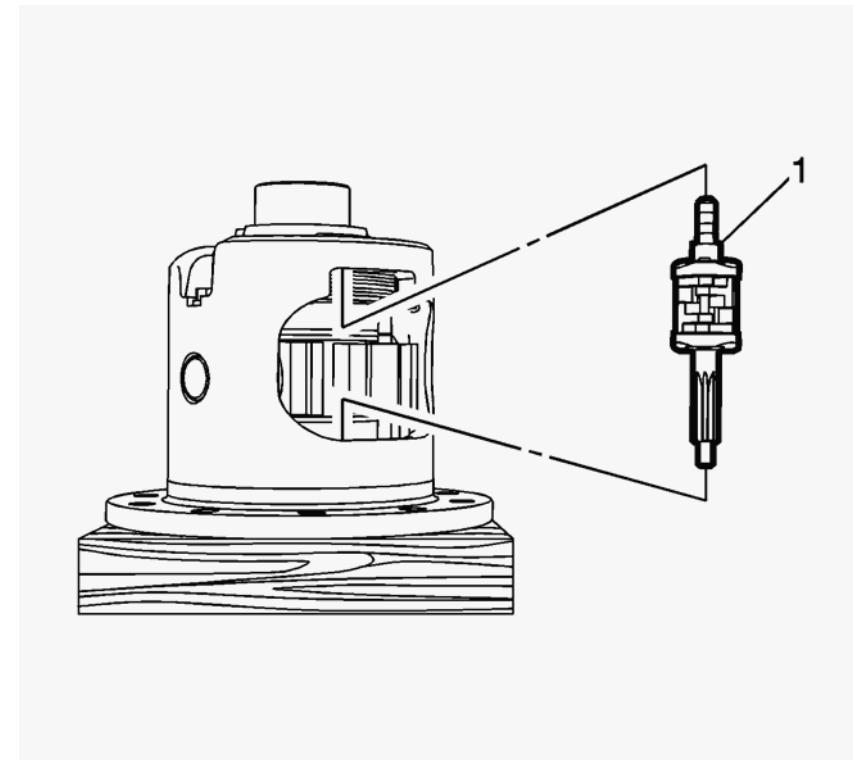


Fig. 328: Locking Differential Governor

Courtesy of GENERAL MOTORS COMPANY

8. Install the locking differential governor (1).

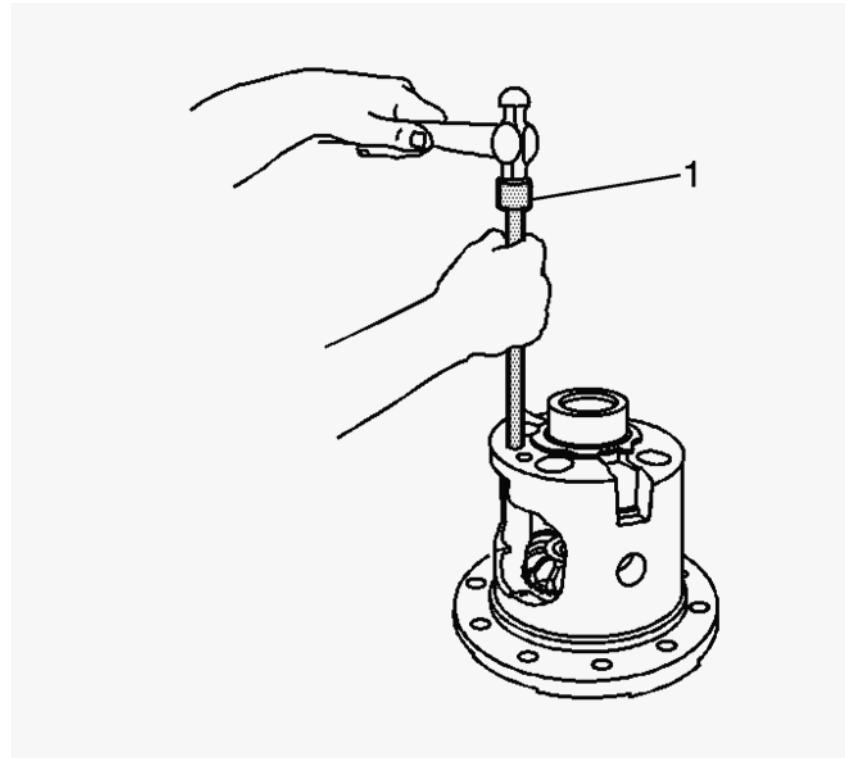


Fig. 329: Installing Governor Bushing

Courtesy of GENERAL MOTORS COMPANY

9. Using a hammer and a punch (1), install the governor bushing until the shaft end play is 0.25-1.27 mm (0.010-0.050 in).

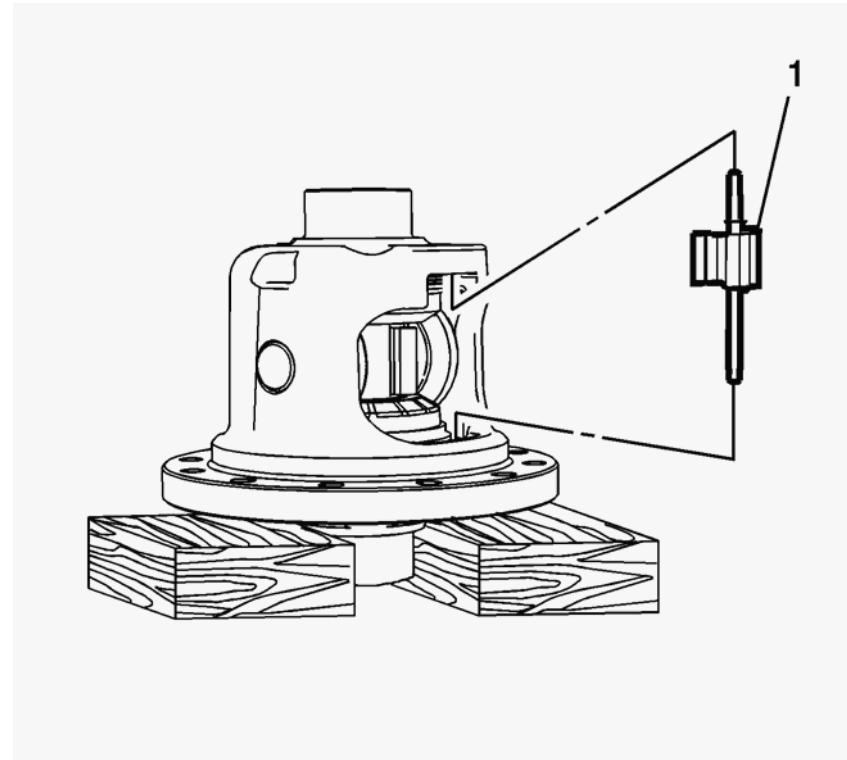


Fig. 330: Locking Differential Latching Bracket

Courtesy of GENERAL MOTORS COMPANY

NOTE: The straight end of the latching bracket spring must be over and outside the governor assembly shaft.

10. Install the locking differential latching bracket (1).

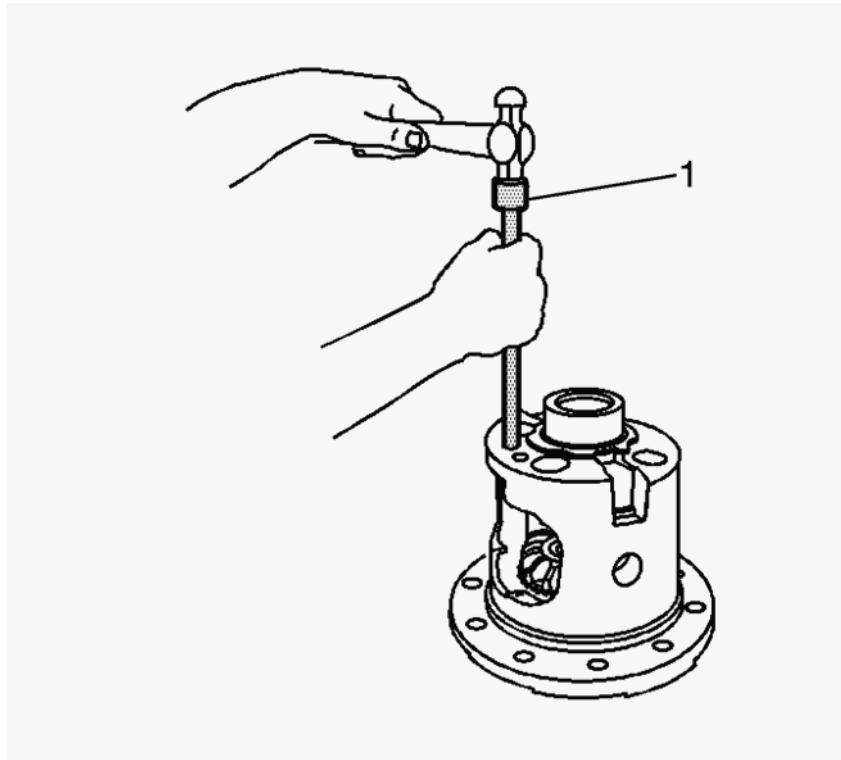


Fig. 331: Installing Governor Bushing

Courtesy of GENERAL MOTORS COMPANY

11. Using a hammer and a punch (1), install the governor bushing until the shaft end play is 0.000-0.051 mm (0.000-0.002 in).
12. Install the ring gear, if necessary. Refer to [Drive Pinion and Ring Gear Replacement \(8.6/9.5/9.76 Inch Axle\)](#)

LOCKING DIFFERENTIAL ASSEMBLE (10.5 INCH AXLE)

NOTE: The left and right side gear backlash and thrust block thickness measurement must be completed before the components of the differential can be assembled.

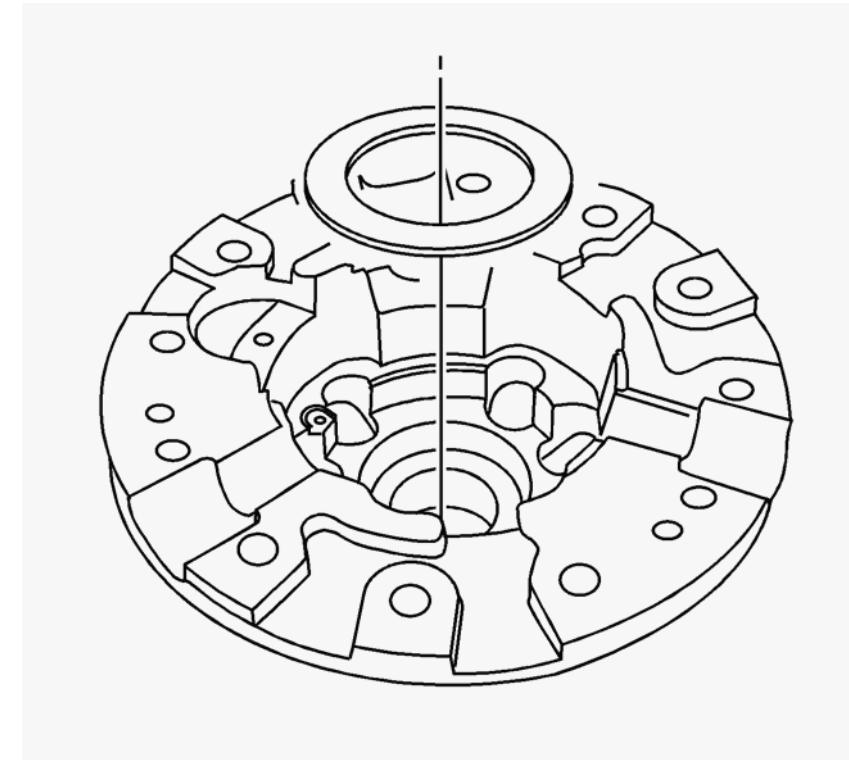


Fig. 332: Right Side Locking Differential Clutch Disc Thrust Washer

Courtesy of GENERAL MOTORS COMPANY

1. Install the right side differential side gear shim into the right differential case half.

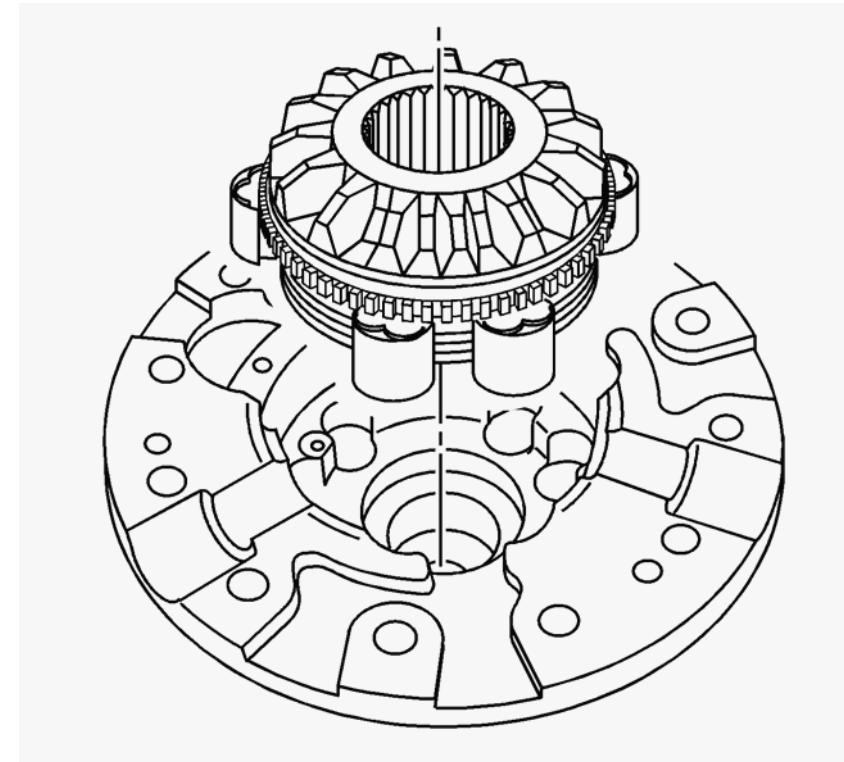


Fig. 333: Right Side Cam Unit And Clutch Plate Assembly

Courtesy of GENERAL MOTORS COMPANY

2. Install the locking differential side gear cam unit and clutch disc assembly.

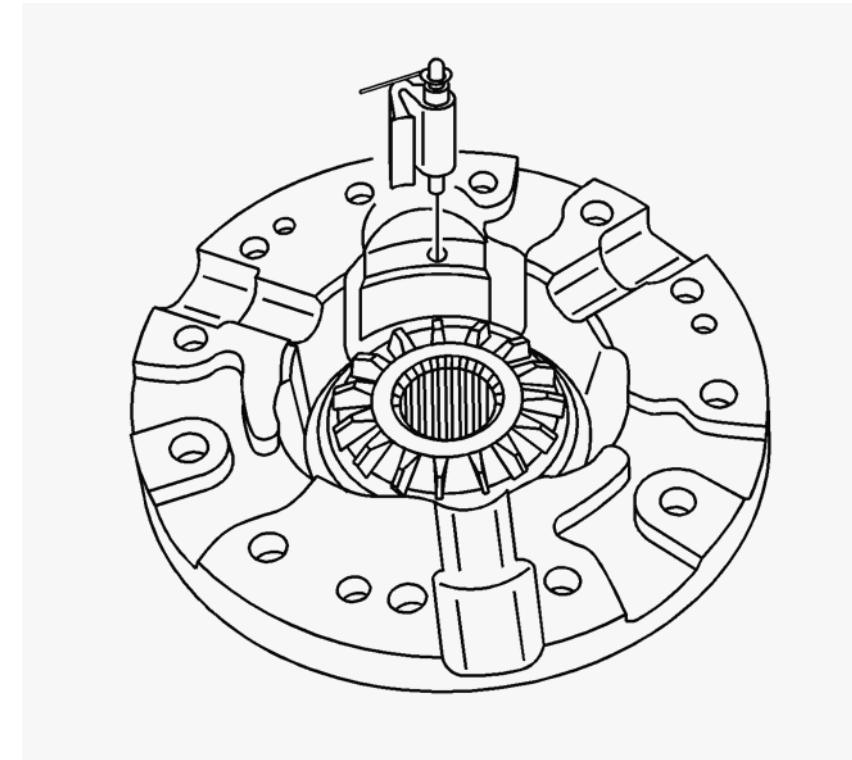


Fig. 334: Latching Bracket And Spring Assembly
Courtesy of GENERAL MOTORS COMPANY

3. Install the latching bracket and spring assembly.

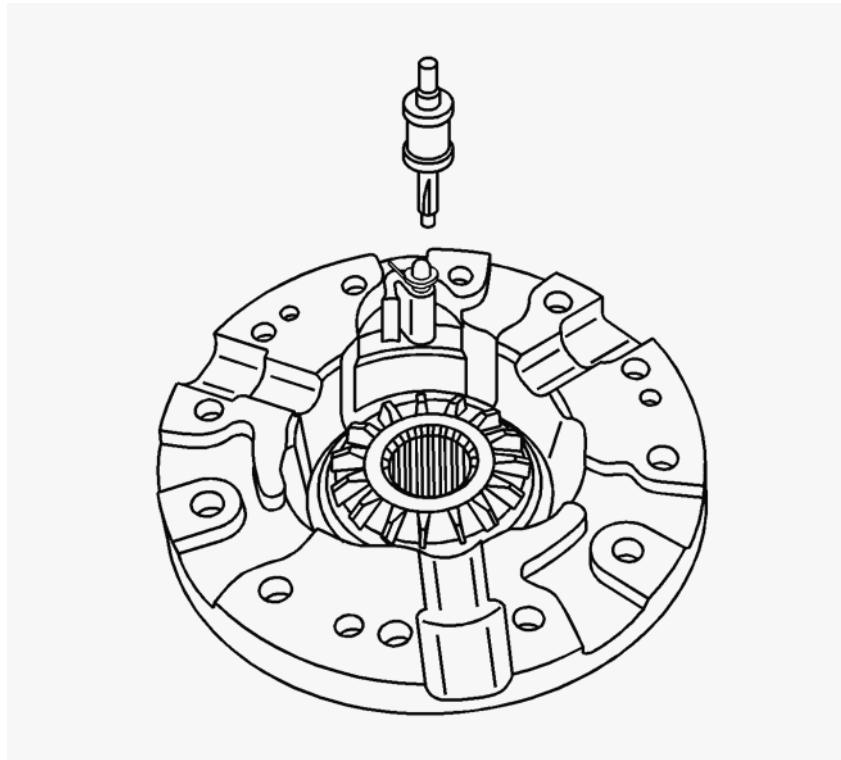


Fig. 335: Governor Assembly

Courtesy of GENERAL MOTORS COMPANY

4. Install the governor assembly.

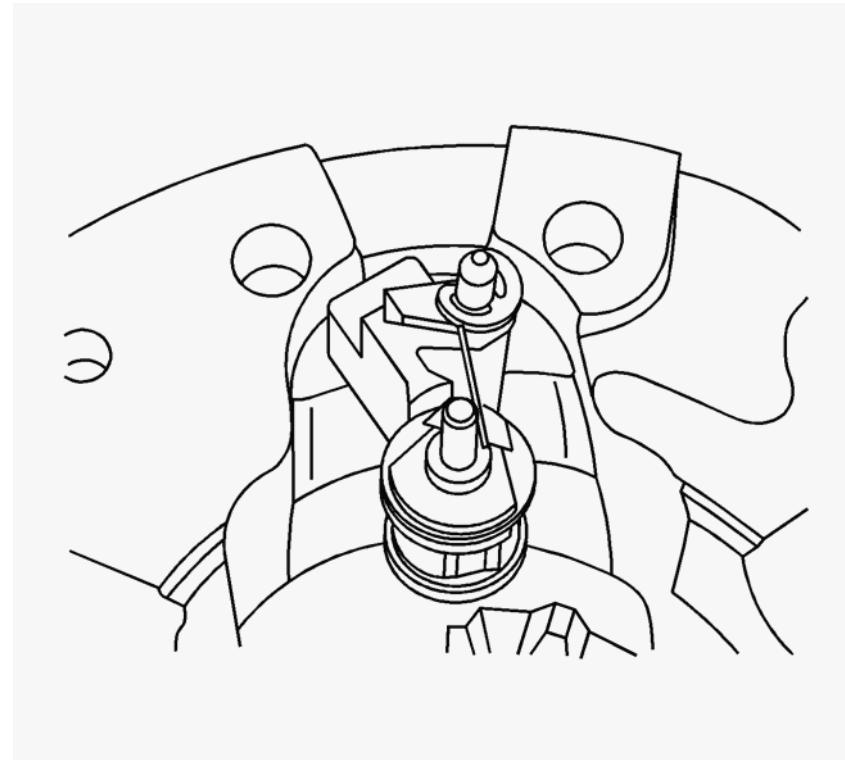


Fig. 336: Latching Bracket Spring And Governor Assembly Shaft

Courtesy of GENERAL MOTORS COMPANY

5. Position the straight end of the latching bracket spring over the governor assembly shaft.

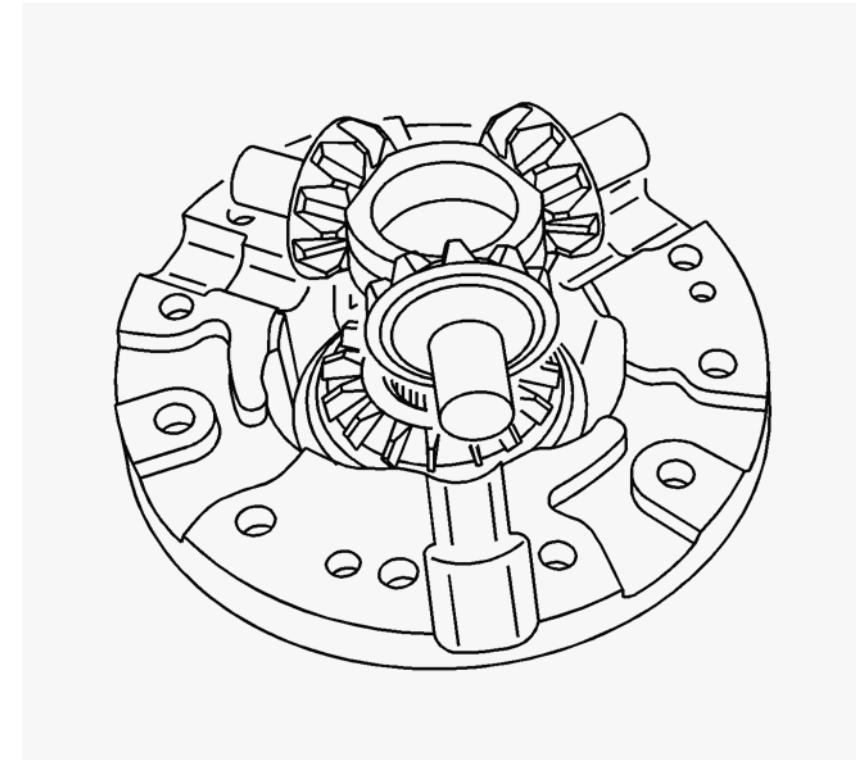


Fig. 337: Locking Differential Spider, Differential Pinion Gears & Thrust Washers

Courtesy of GENERAL MOTORS COMPANY

6. Install the locking differential spider, the differential pinion gears, and the differential pinion gear thrust washers into the differential case.

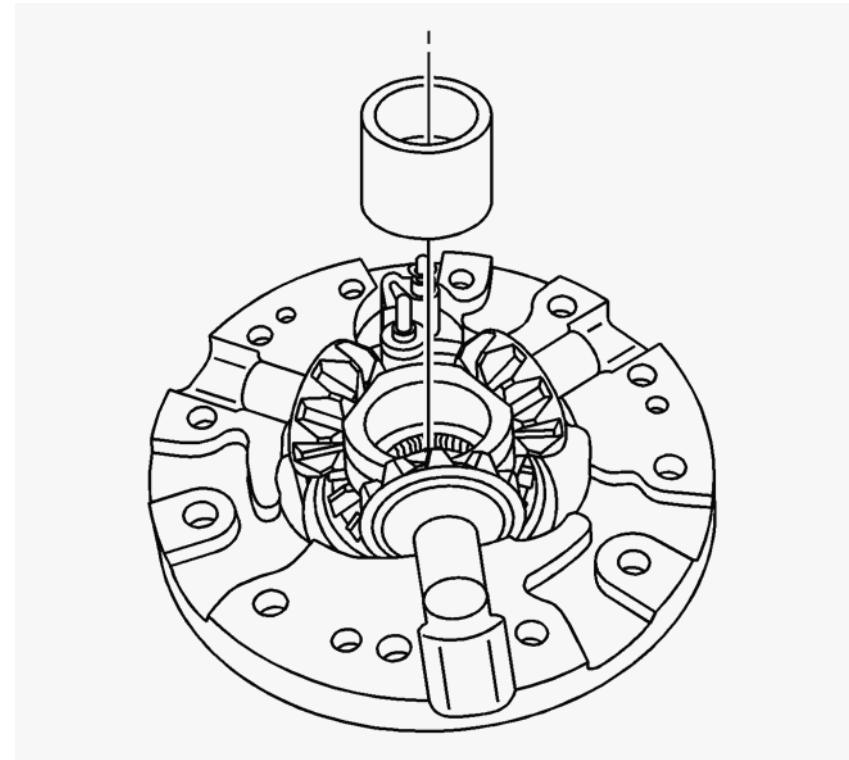


Fig. 338: Thrust Block

Courtesy of GENERAL MOTORS COMPANY

7. Install the thrust block.

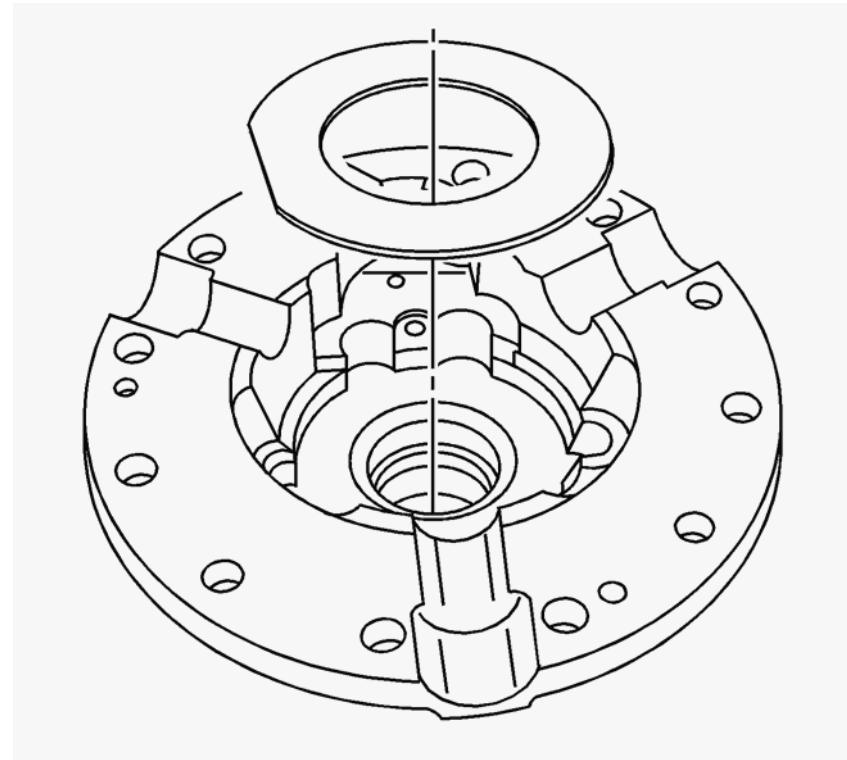


Fig. 339: Left Side Gear Thrust Washer

Courtesy of GENERAL MOTORS COMPANY

8. Install the left side differential side gear shim into the left differential case half.

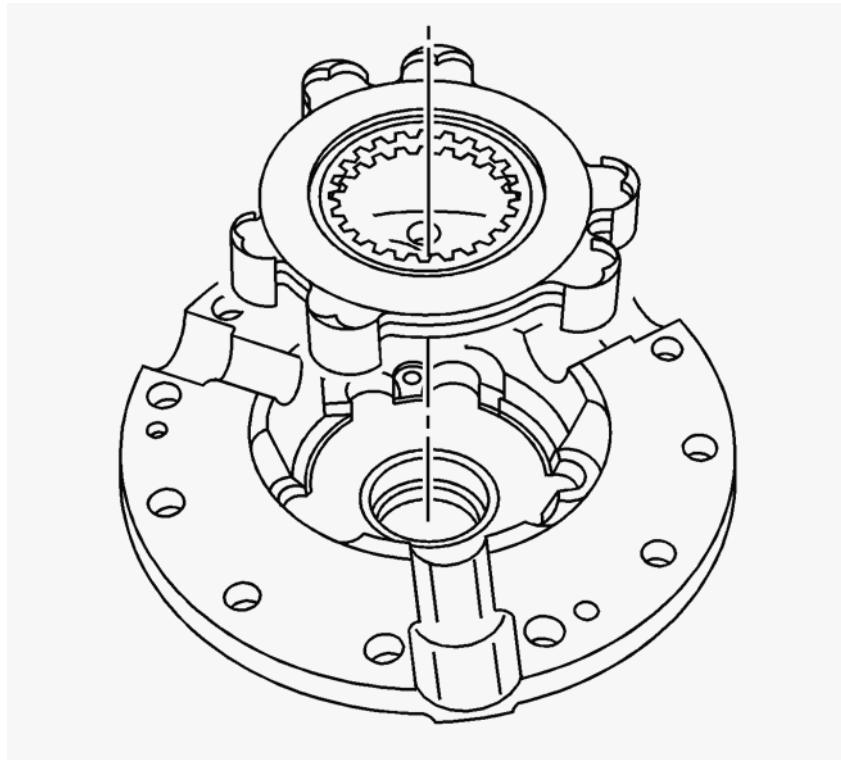


Fig. 340: Left Side Clutch Plates And Guide Clips

Courtesy of GENERAL MOTORS COMPANY

9. Install the left side clutch disc assembly.

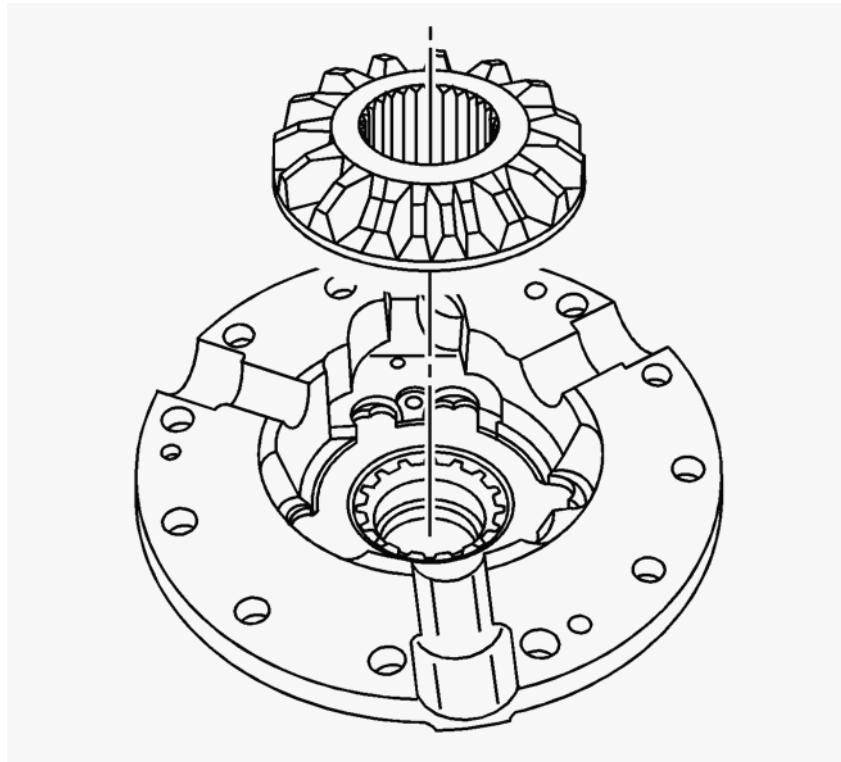


Fig. 341: Locking Differential Side Gear

Courtesy of GENERAL MOTORS COMPANY

10. Install the locking differential side gear.

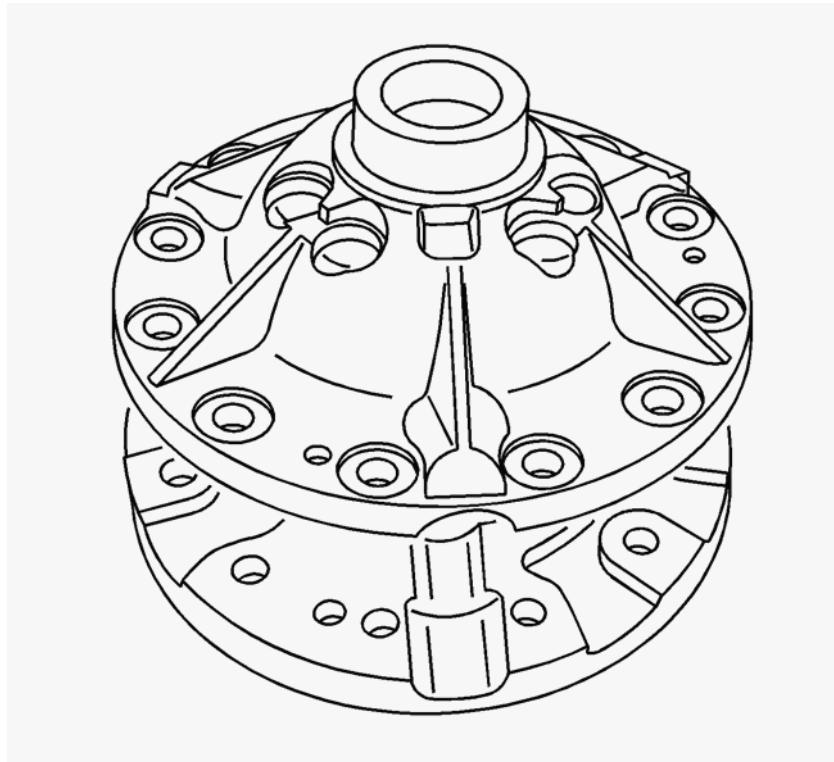


Fig. 342: Left Case Half And Right Case Half
Courtesy of GENERAL MOTORS COMPANY

11. Install the left case half to the right case half.

Hold the left side locking differential side gear and clutch disc assembly in the left side case half.

Align the governor and latching bracket assembly shaft with the holes in the left case half.

12. Turn the differential case over onto the left case half.

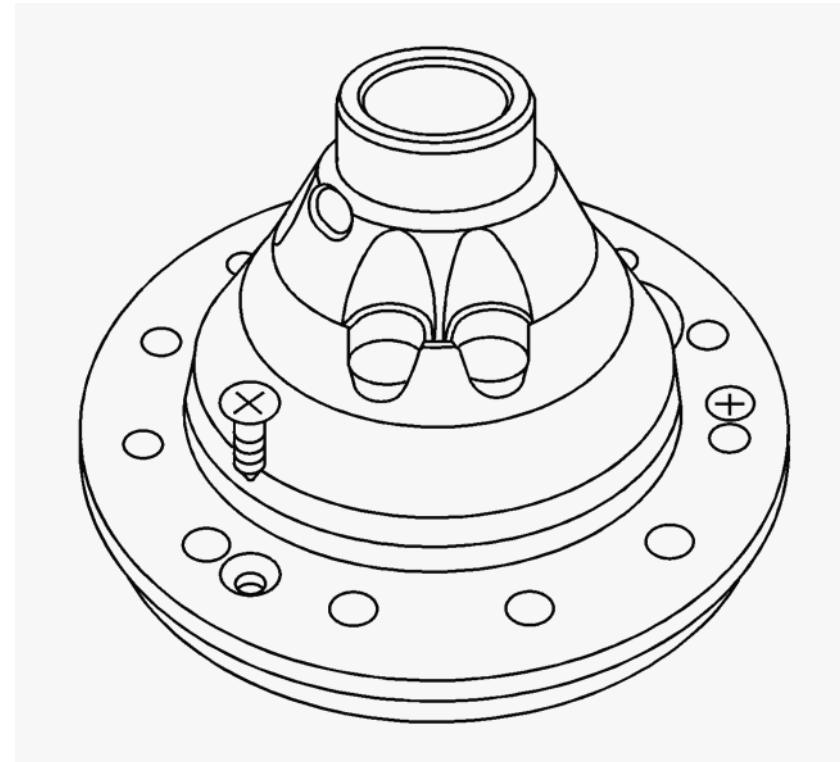


Fig. 343: Differential Case Screws

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

13. Install the differential case screws.

Tighten

Tighten the differential case screws to 17 N.m (13 lb ft).

14. Install the ring gear. Refer to [**Drive Pinion and Ring Gear Replacement \(10.5 Inch Axle\)**](#).

15. Install the differential side bearings. Refer to [**Differential Bearing Replacement**](#).

DESCRIPTION AND OPERATION

DIFFERENTIAL DRIVE PINION GEAR AND RING GEAR DESCRIPTION AND OPERATION

Drive Pinion and Ring Gear Identification

Production drive pinion and ring gears are manufactured by using a 2 cut or a 5 cut method. The 2 cut drive pinions and ring gears can be identified by having a groove cut into the outside edge of the ring gear and a ring on the stem of the drive pinion. The gear tooth contact patterns that are produced from each style of gear set differ slightly. A 2 cut gear will produce a pattern that is bias from the toe to the heel of the tooth (drive side), while a 5 cut gear will produce a square pattern from the toe to the heel of the (drive side). When diagnosing the gear tooth contact pattern, regardless of what type of gear set it is, a correct pattern will be centered within the area of the tooth, from the toe to the heel and from the top to the bottom. For the proper gear tooth wear pattern, refer to [**Gear Tooth Contact Pattern Inspection**](#).

Test Procedure

1. Using the appropriate cleaning solvent, remove the lubricant from the differential housing and from the teeth of the ring gear.

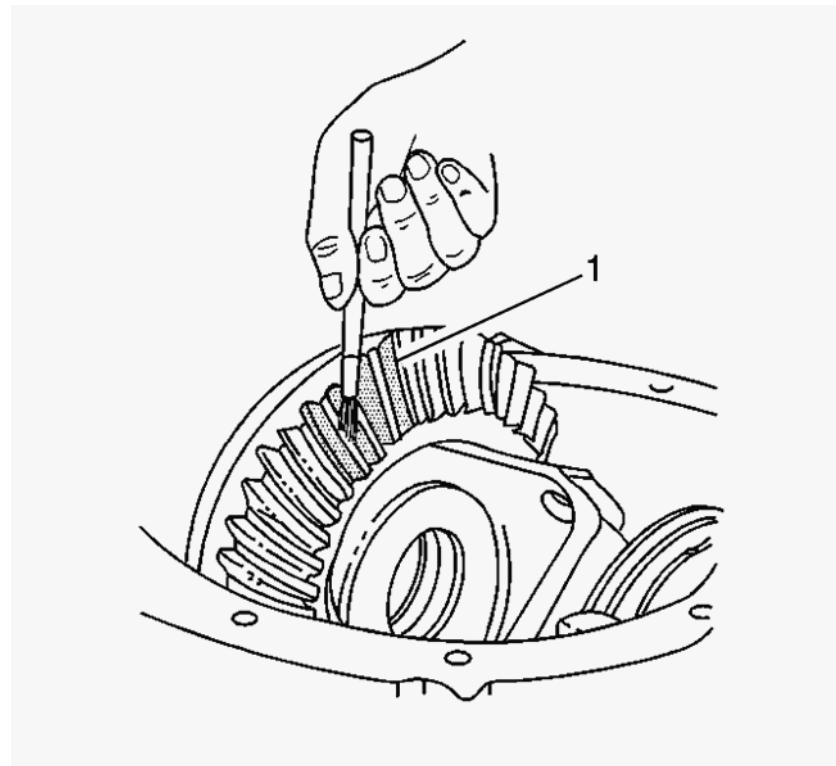


Fig. 344: Applying Gear Marking Compound To Ring Gear Teeth

Courtesy of GENERAL MOTORS COMPANY

2. Using a medium stiff brush, sparingly apply gear marking compound to all of the ring gear teeth. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).

CAUTION: Refer to [Fastener Caution](#).

3. Torque the differential bearing caps.

- Tighten the differential bearing caps. For the 8.6 inch axle, tighten the bearing caps to 75 N.m (55 lb ft)
- For the 9.5/9.76 inch axles, tighten the bearing caps to 95 N.m (63 lb ft)

4. Apply the park brake until the torque load is 14 N.m (10 lb ft) is required to rotate the pinion.

NOTE: Avoid rotating the ring gear excessively, this could give a false contact pattern.

5. Using the appropriate size wrench, slowly rotate the drive pinion flange/yoke 3 complete revolutions clockwise.

6. Slowly rotate the drive pinion flange/yoke 3 complete revolutions counter-clockwise.

7. Observe the contact pattern on the teeth. Refer to [Gear Tooth Contact Pattern Inspection](#).

LOCKING DIFFERENTIAL DESCRIPTION AND OPERATION

The locking differential consists of the following components:

- Differential case - 1 or 2 piece
- Locking differential spider - 2 piece case only
- Pinion gear shaft - 1 piece case only
- Differential pinion gear shaft lock bolt - 1 piece case only
- Two clutch discs sets
- Locking differential side gear
- Thrust block
- Locking differential clutch disc guides
- Differential side gear shim
- Locking differential clutch disc thrust washer
- Locking differential governor
- Latching bracket
- Cam plate assembly
- Differential pinion gears
- Differential pinion gear thrust washers

The optional locking differential (RPO G80) enhances the traction capability of the rear axle by combining the characteristics of a limited-slip differential and the ability of the axle shafts to "lock" together when uneven traction surfaces exist. The differential accomplishes this in 2 ways. First by having a series of clutch plates at each side of the differential case to limit the amount of slippage between each wheel. Second, by using a mechanical locking mechanism to stop the rotation of the right differential side gear, in order to transfer the rotating torque of the wheel without traction to the wheel with traction. Each of these functions occur under different conditions.

Limited-Slip Function

Under normal conditions, when the differential is not locked, a small amount of limited-slip action occurs. The gear separating force developed in the right-hand clutch pack is primarily responsible for this.

The operation of how the limited-slip function of the unit works can be explained when the vehicle makes a right-hand turn. Since the left wheel travels farther than the right wheel, it must rotate faster than the ring gear and differential case assembly. This results in the left axle and left side gear rotating faster than the differential case. The faster rotation of the left-side gear causes the pinion gears to rotate on the pinion shaft. This causes the right-side gear to rotate slower than the differential case.

Although the side gear spreading force produced by the pinion gears compresses the clutch packs, primarily the right side, the friction between the tires and the road surface is sufficient to overcome the friction of the clutch packs. This prevents the side gears from being held to the differential case.

Locking Function

Locking action occurs through the use of some special parts:

- A governor mechanism with 2 flyweights
- A latching bracket
- The left side cam plate and cam side gear

When the wheel-to-wheel speed difference is 100 RPM or more, the flyweights of the governor will fling out and one of them will contact an edge of the latching bracket. This happens because the left cam side gear and cam plate are rotating at a speed different, either slower or faster, than that of the ring gear and differential case assembly. The cam plate has teeth on its outer diameter surface in mesh with teeth on the shaft of the governor.

As the side gear rotates at a speed different than that of the differential case, the shaft of the governor rotates with enough speed to force the flyweights outward against spring tension. One of the flyweights catches its edge on the closest edge of the latching bracket, which is stationary in the differential case. This latching process triggers a chain of events.

When the governor latches, it stops rotating. A small friction clutch inside the governor allows rotation, with resistance, of the governor shaft while one flyweight is held to the differential case through the latching bracket. The purpose of the governor's latching action is to slow the rotation of the cam plate as compared to the cam side gear. This will cause the cam plate to move out of its detent position.

The cam plate normally is held in its detent position by a small wave spring and detent humps resting in matching notches of the cam side gear. At this point, the ramps of the cam plate ride up on the ramps of the cam side gear, and the cam plate compresses the left clutch pack with a self-energizing action.

As the left clutch pack is compressed, it pushes the cam plate and cam side gear slightly toward the right side of the differential case. This movement of the cam side gear pushes the thrust block which compresses the right-hand side gear clutch pack.

At this point, the force of the self-energizing clutches and the side gear separating force combine to hold the side gears to the differential case in the locking stage.

The entire locking process occurs in less than 1 second. The process works with either the left or right wheel spinning, due to the design of the governor and cam mechanism. A torque reversal of any kind will unlatch the governor, causing the cam plate to ride back down to its detent position. Cornering or deceleration during a transmission shift will cause a torque reversal of this type. The differential unit returns to its limited-slip function.

The self-energizing process would not occur if it were not for the action of one of the left clutch discs. This energizing disc provides the holding force of the ramping action to occur. It is the only disc which is splined to the cam plate itself. The other splined discs fit on the cam side gear.

If the rotating speed of the ring gear and differential case assembly is high enough, the latching bracket will pivot due to centrifugal force. This will move the flyweights so that no locking is permitted. During vehicle driving, this happens at approximately 32 km/h (20 mph) and continues at faster speeds.

When comparing the effectiveness of the locking differential, in terms of percent-of-grade capability to open and limited-slip units, the locking differential has nearly 3 times the potential of the limited-slip unit under the same conditions.

Locking Differential Torque-Limiting Disc

The locking differential design was modified in mid-1986 to include a load-limiting feature to reduce the chance of breaking an axle shaft under abusive driving conditions. The number of tangs on the energizing disc in the left-hand clutch pack was reduced allowing these tangs to shear in the event of a high-torque engagement of the differential locking mechanism.

At the time of failure of the load-limiting disc, there will be a loud bang in the rear axle and the differential will operate as a standard differential with some limited-slip action of the clutch packs at low torques.

The service procedure, when the disc tangs shear, involves replacing the left-hand clutch plates and the wave spring. It is also necessary to examine the axle shafts for twisting because at high torques it is possible to not only shear the load-limiting disc, but to also twist the axle shafts.

REAR DRIVE AXLE DESCRIPTION AND OPERATION

Rear axles for this vehicle consist of the following components:

- Differential axle housing
- Differential carrier
- Right and left axle tubes
- Right and left axle shafts

These axles are either full-floating or semi-floating. These axles can be identified as follows: The semi-floating axle has axle shafts with C-clips inside the differential carrier on the inner ends of the axle shafts. The full-floating axle has bolts at the hub retaining the axle shafts to the hub assembly. The axles can be identified by the stamping on the right side axle tube. They may also be identified by the ring gear size. The ring gear sizes include 8.60, 9.50, 10.50 and 11.50 inch axles. The limited slip/locking differential information for these rear axles can be located in the limited slip/locking differential section.

An open differential has a set of four gears. Two are side gears and 2 are pinion gears. Some differentials have more than 2 pinion gears. Each side gear is splined to an axle shaft so each axle shaft; so each axle shaft turns when its side gear rotates. The pinion gears are mounted on a differential pinion shaft, and the gears are free to rotate on this shaft. The pinion shaft is fitted into a bore in the differential case and is at right angles to the axle shafts. Power is transmitted through the differential as follows: the drive pinion rotates the ring gear. The ring gear being bolted to the differential case, rotates the case. The differential pinion, as it rotates the case, forces the pinion gears against the side gears. When both wheels have equal traction, the pinion gears do not rotate on the pinion shaft because of input force on the pinion gear is equally divided between the two side gears. Therefore, the pinion gears revolve with the pinion shaft, but do not rotate around the shaft itself. The side gears, being splined to the axle shafts and in mesh with the pinion gears rotate the axle shafts. If a vehicle were always driven in a straight line, the ring and pinion gears would be sufficient. The axle shaft could be solidly attached to the ring gear and both driving wheels

would turn at equal speed. However, if it became necessary to turn a corner, the tires would scuff and slide because the differential allows the axle shafts to rotate at different speeds. When the vehicle turns a corner, the inner wheel turns slower than the out wheel and slows its rear axle side gear (as the shaft is splined to the side gear). The rear axle pinion gears will roll around the slowed rear axle side gear, driving the rear axle side gear faster.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

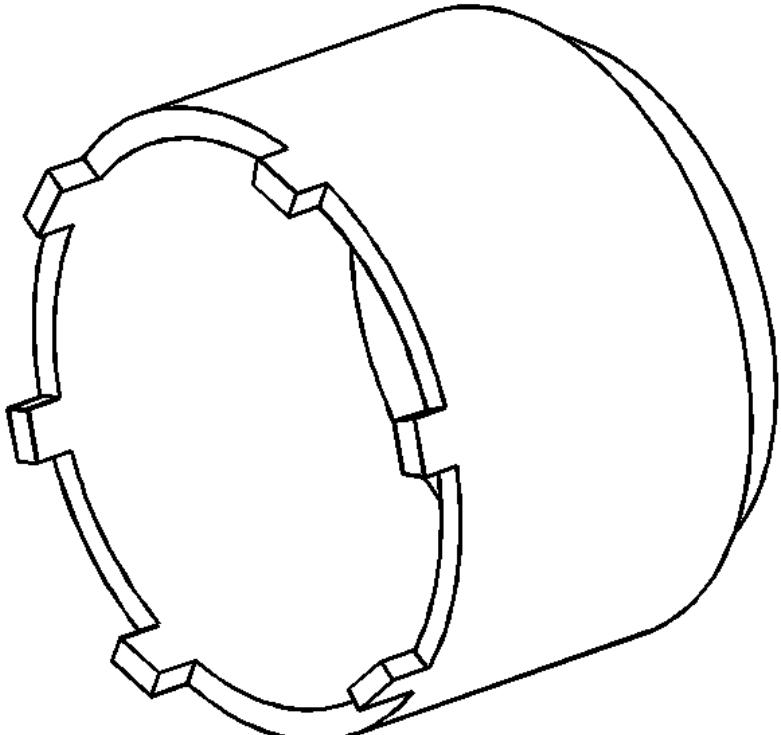
Illustration	Tool Number/Description
	CH 49794 J 2222-C Wheel Bearing Race Installer Outer

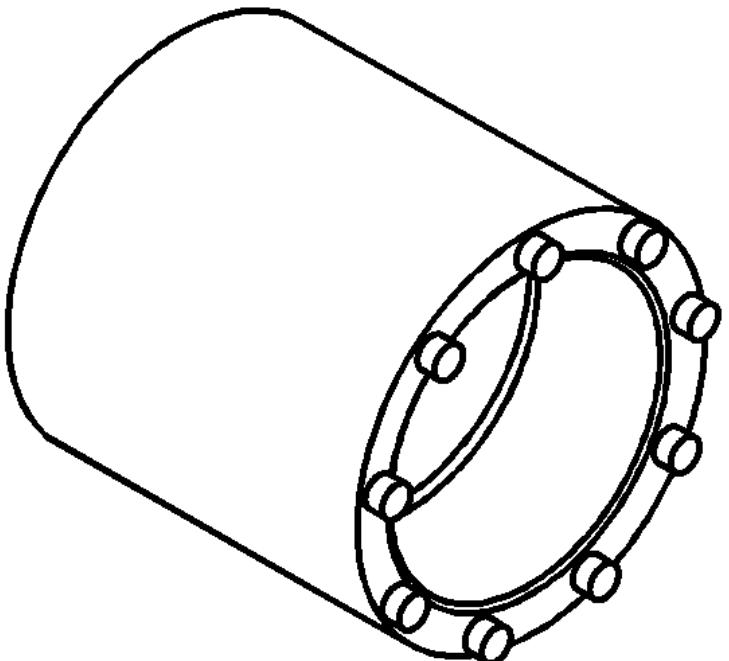
Illustration	Tool Number/Description
	<p>CH 50636 Wheel Bearing Nut Wrench</p>

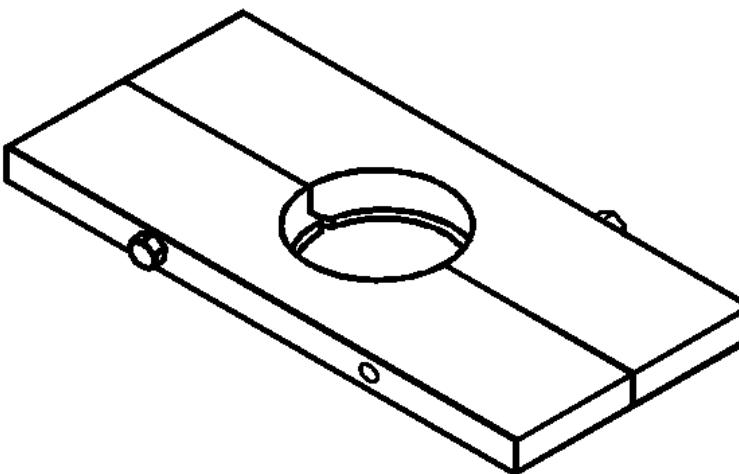
Illustration	Tool Number/Description
	<p>DT 47688 Pinion Bearing Remover</p>

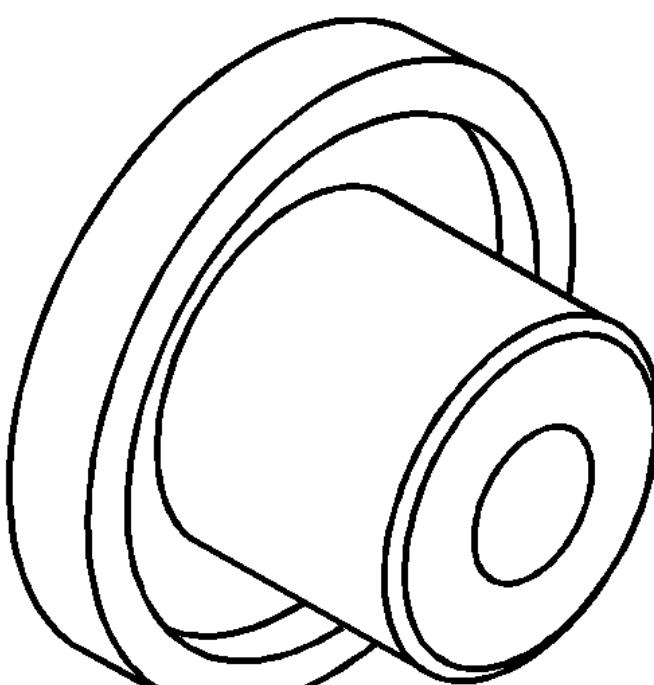
Illustration	Tool Number/Description
	<p>DT 49032 Inner Pinion Bearing Race Installer</p>

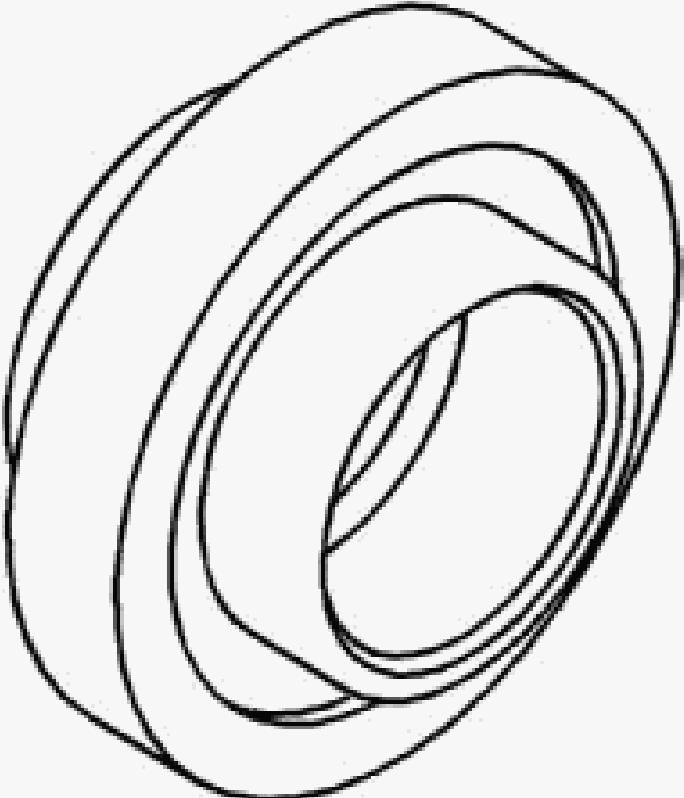
Illustration	Tool Number/Description
	<p>DT 50871 Seal Installer</p>

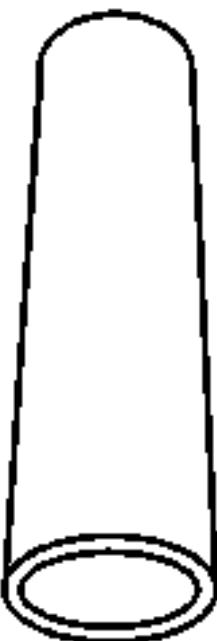
Illustration	Tool Number/Description
 A line drawing of a cylindrical tool. The top portion is flared outwards, and there is a small circular opening at the bottom end of the cylinder.	<p>J-44412 Pinion Bearing Installer</p>

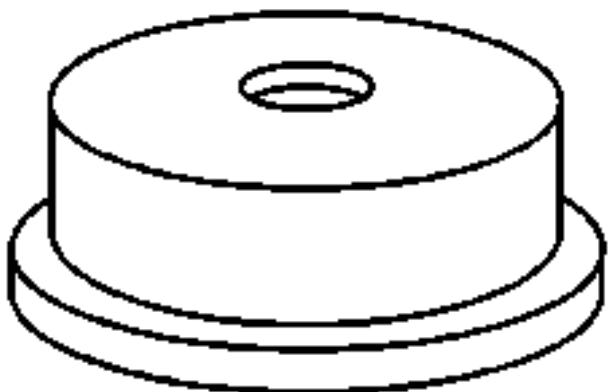
Illustration	Tool Number/Description
	<p>J-44417 Pinion Bearing Race Installer</p>

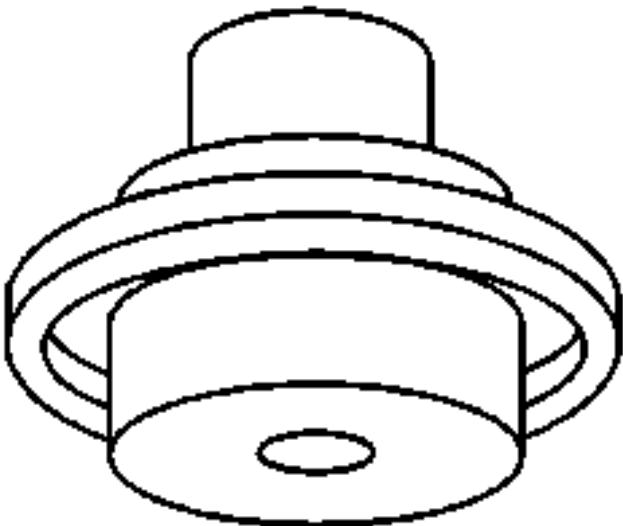
Illustration	Tool Number/Description
	<p>DT 50289</p> <p>J 44420</p> <p>Differential Bearing and Hub Seal Installer</p>

Illustration	Tool Number/Description
	<p>DT 50290</p> <p>J 44419</p> <p>Hub Outer Bearing Race Installer</p>

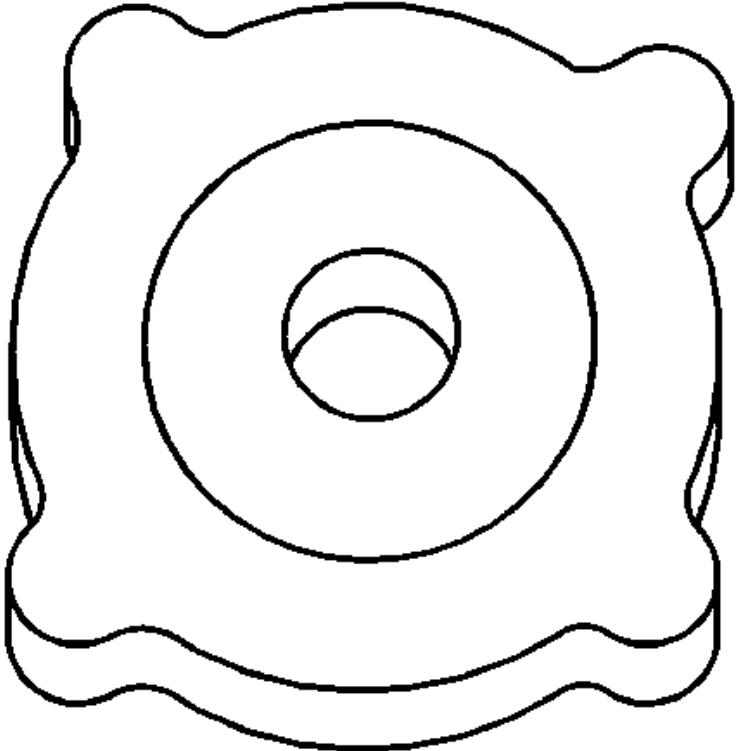
Illustration	Tool Number/Description
	<p>DT 50291</p> <p>J 24426</p> <p>Wheel Bearing Race Installer - Outer</p>

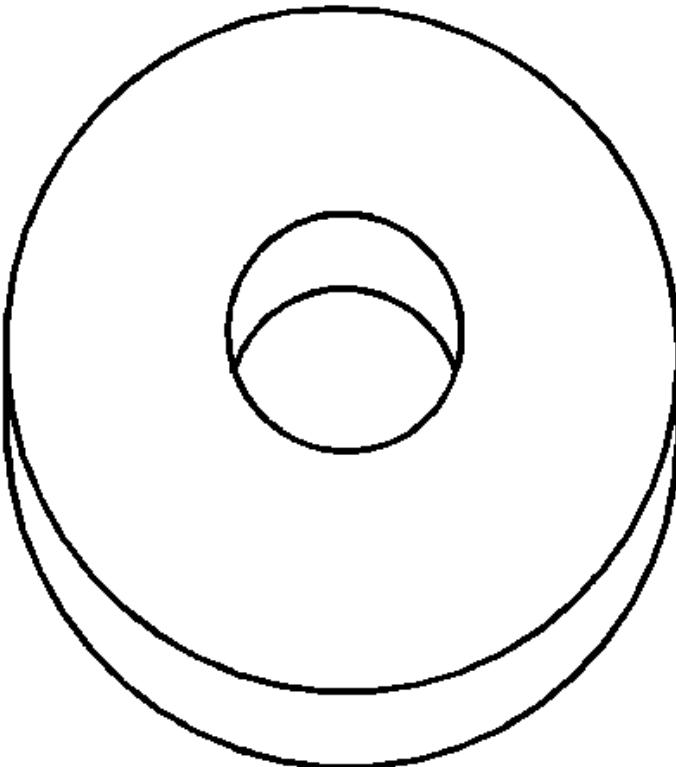
Illustration	Tool Number/Description
	<p>DT 50292 J 24427 Hub Outer Bearing Race Installer</p>

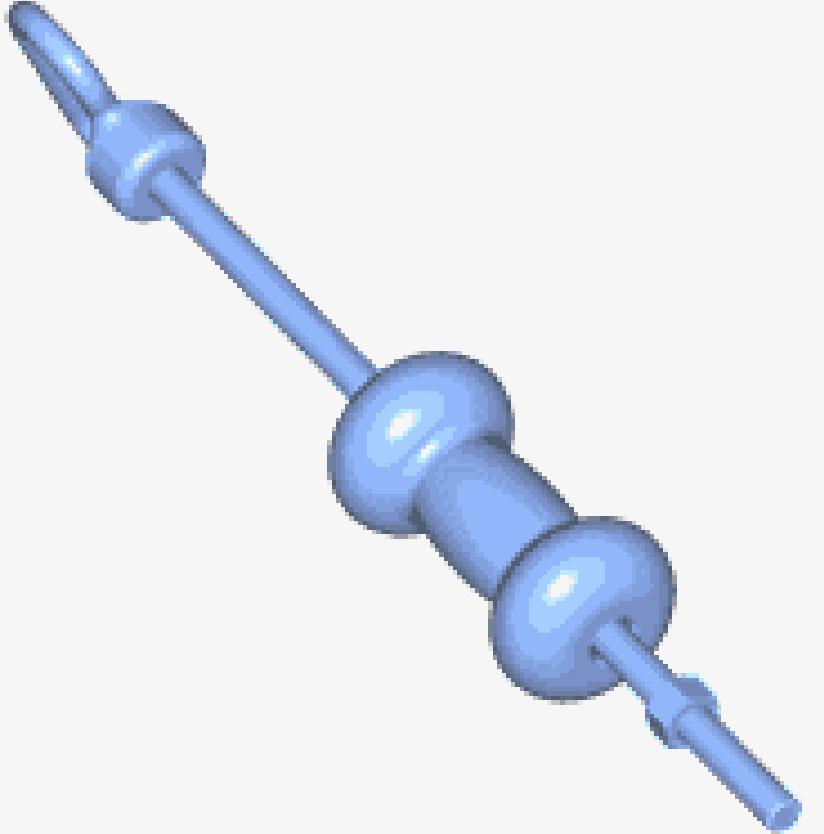
Illustration	Tool Number/Description
	<p>J 2619-01 Slide Hammer</p>

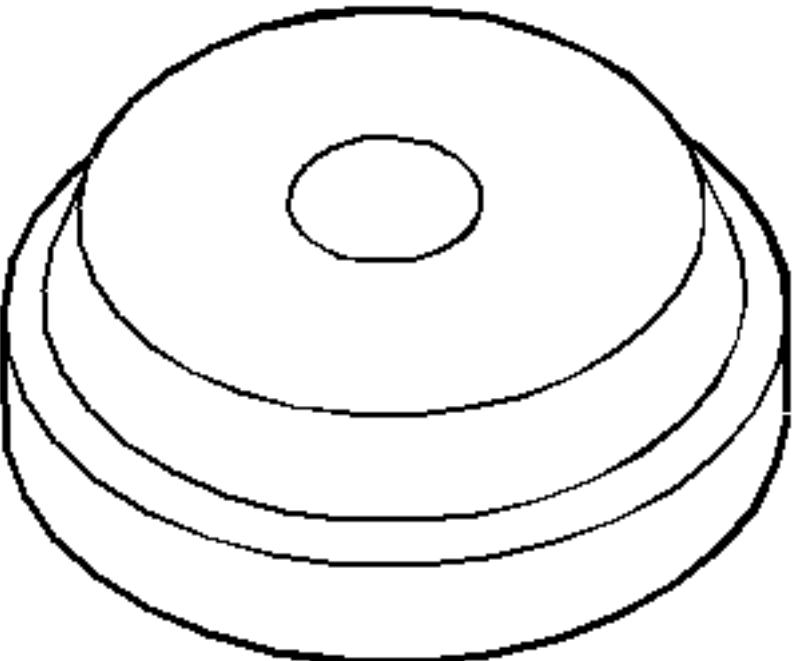
Illustration	Tool Number/Description
	<p>J 7818 Inner Bearing Race Installer</p>

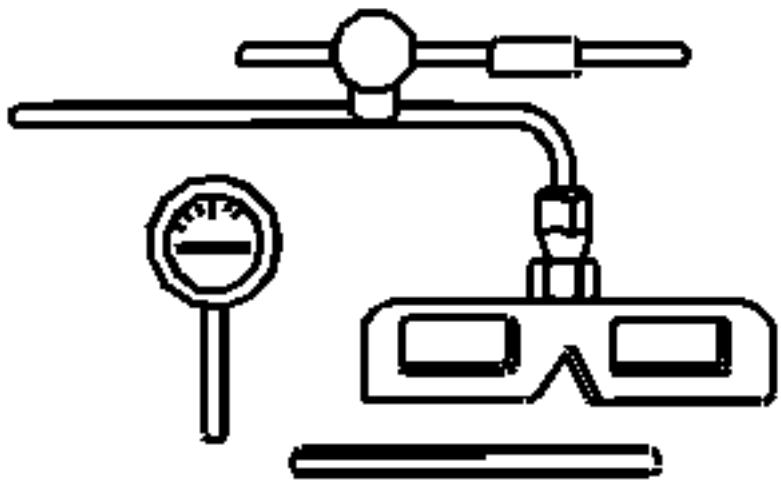
Illustration	Tool Number/Description
	<p>J 7872 Magnetic Base Dial Indicator</p>

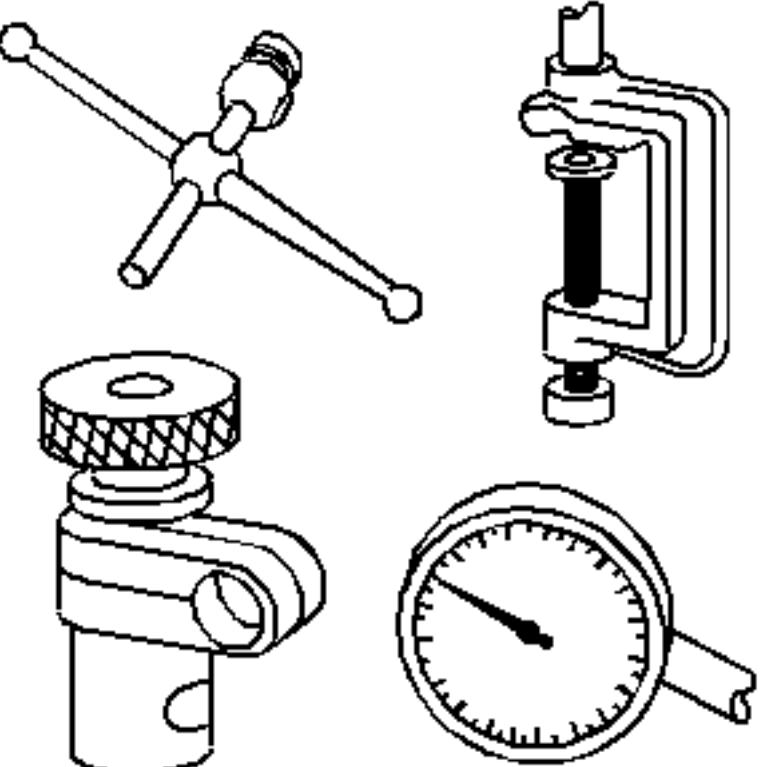
Illustration	Tool Number/Description
 A technical line drawing of a dial indicator set. It includes a dial gauge with a circular scale and a needle, a long probe with a tip, and a base with a handle. The probe is shown inserted into a small cylindrical component, likely a bearing. The base is connected to a U-shaped clamp that holds a vertical cylindrical part.	<p>J 8001 Dial Indicator Set</p>

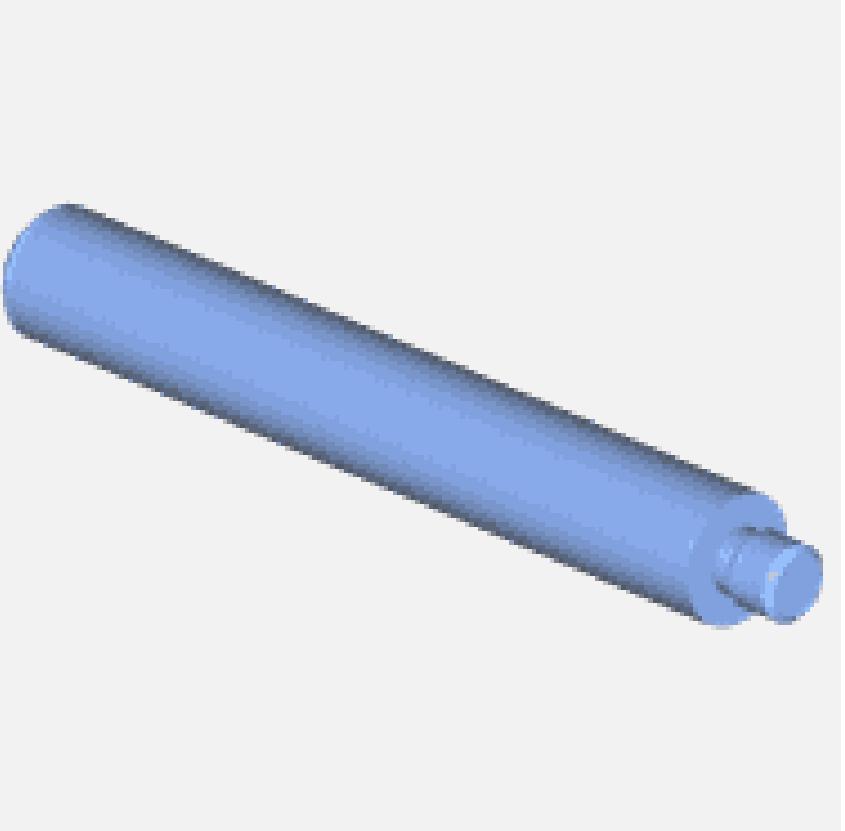
Illustration	Tool Number/Description
 A 3D rendering of a blue cylindrical driver handle. The handle is oriented diagonally, with the rounded end pointing towards the top-left and the flat end towards the bottom-right. The surface has a slight texture and a small circular indentation near the flat end.	<p>J 8092 Driver Handle</p>

Illustration	Tool Number/Description
	<p>J 8107-4 Side Bearing Puller Pilot</p>

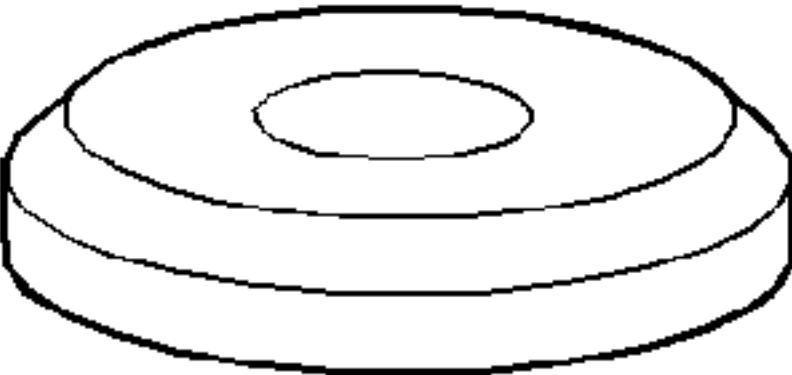
Illustration	Tool Number/Description
	<p>J 8608 Rear Pinion Bearing Race Installer</p>

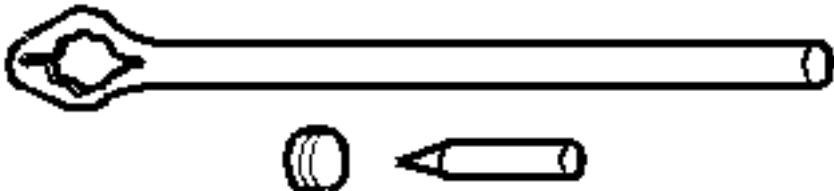
Illustration	Tool Number/Description
	<p>J 8614-01 Flange and Pulley Holding Tool</p>

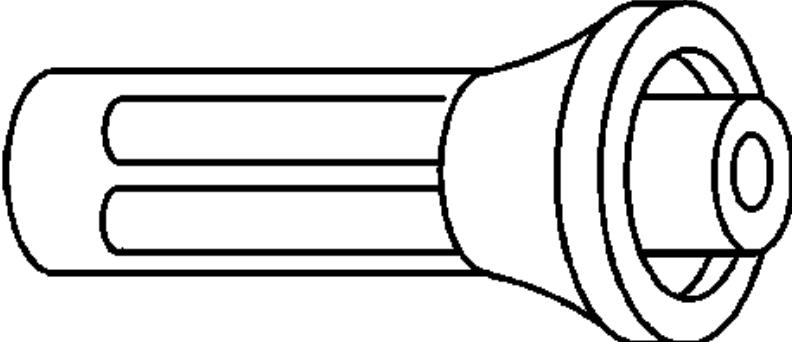
Illustration	Tool Number/Description
	<p>J 21128 Axe Pinion Oil Seal Installer</p>

Illustration	Tool Number/Description
	<p>J 21777-B Pinion Setting Gauge Kit</p>

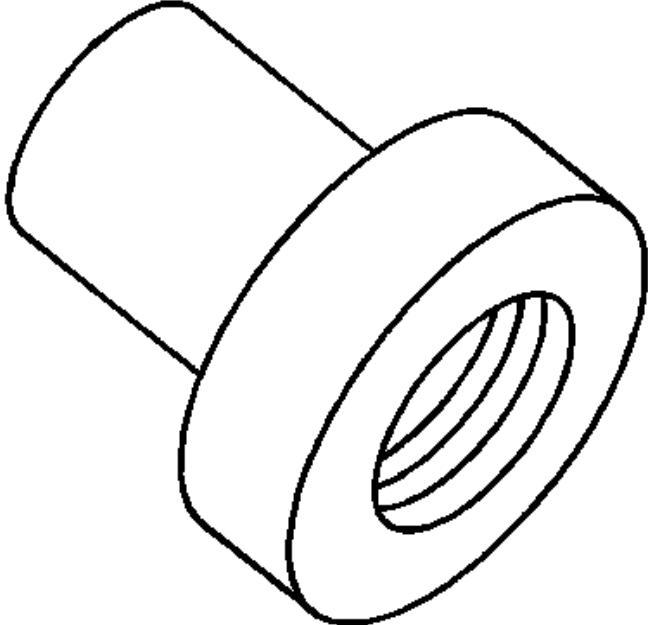
Illustration	Tool Number/Description
	<p>J 21784 Side Bearing Installer</p>

Illustration	Tool Number/Description
	<p>J 22306</p> <p>Pinion Cup Bearing Installer - Rear</p>

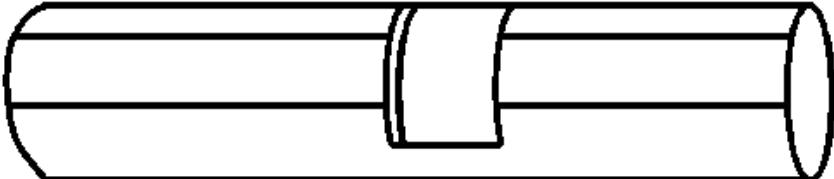
Illustration	Tool Number/Description
	<p>J 22536 Pinion Driver</p>

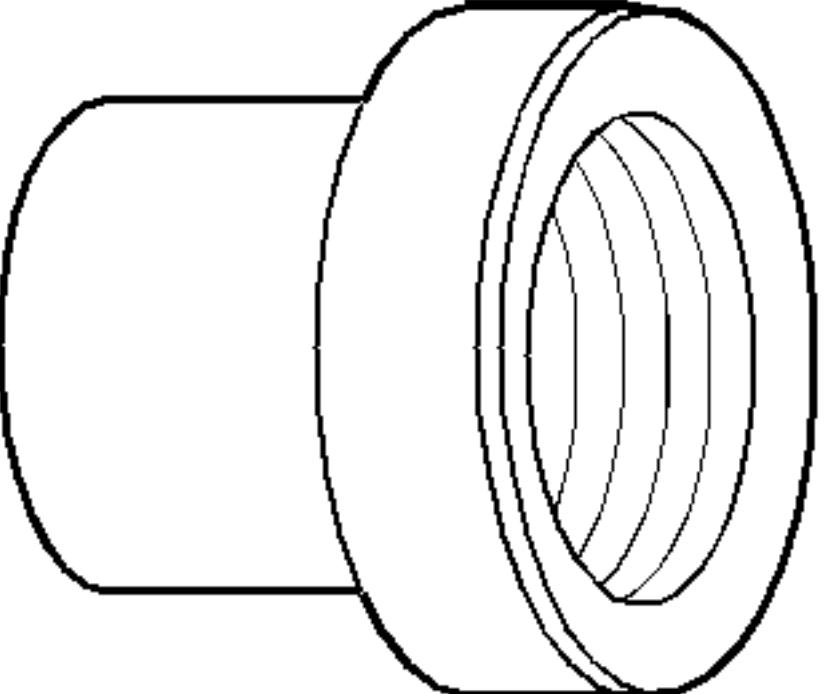
Illustration	Tool Number/Description
	<p>J 22761 Differential Side Bearing Installer</p>

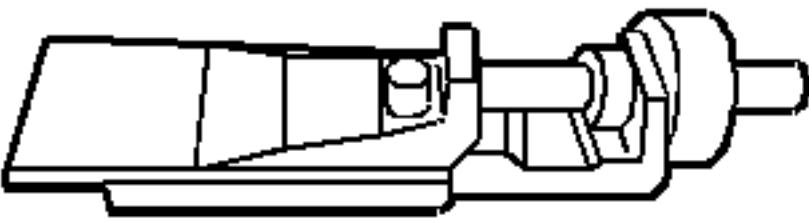
Illustration	Tool Number/Description
	<p>J 22779 Side Bearing Backlash Gauge</p>

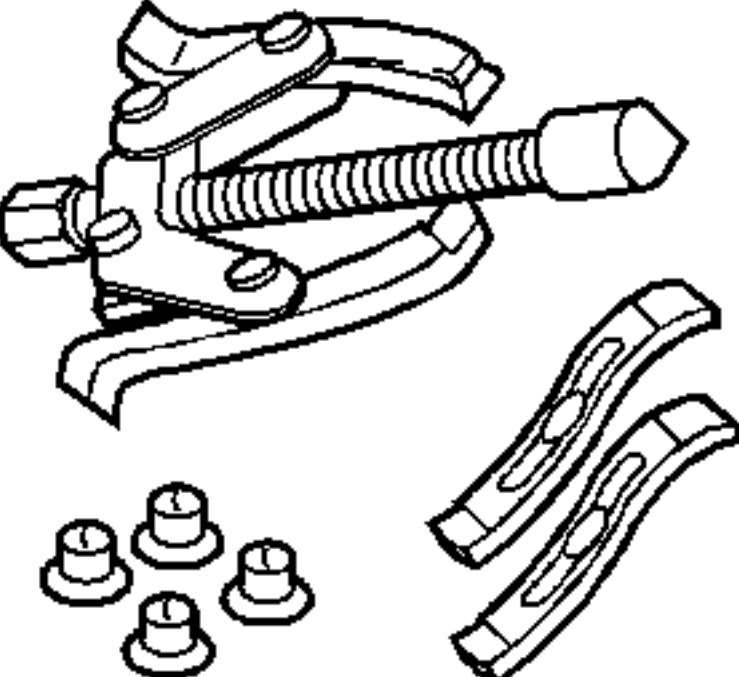
Illustration	Tool Number/Description
	<p>J 22888-D Side Bearing Remover Kit</p>

Illustration	Tool Number/Description
	<p>J 22912-B Bearing Puller</p>

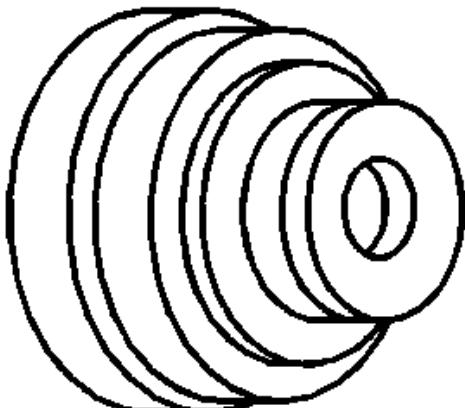
Illustration	Tool Number/Description
	<p>J 23690 Bearing Installer</p>

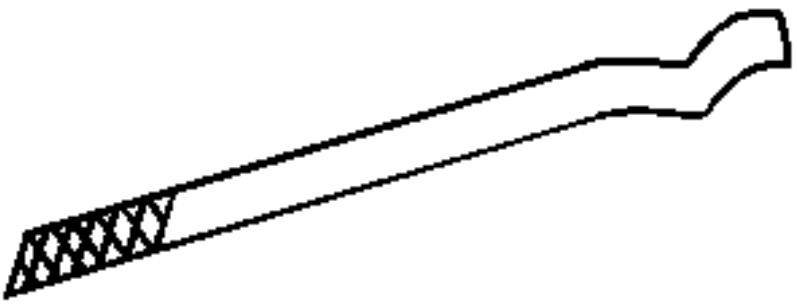
Illustration	Tool Number/Description
	<p>J 24429 Side Bearing Backlash Spanner</p>

Illustration	Tool Number/Description
    	J 25025 Guide Pins

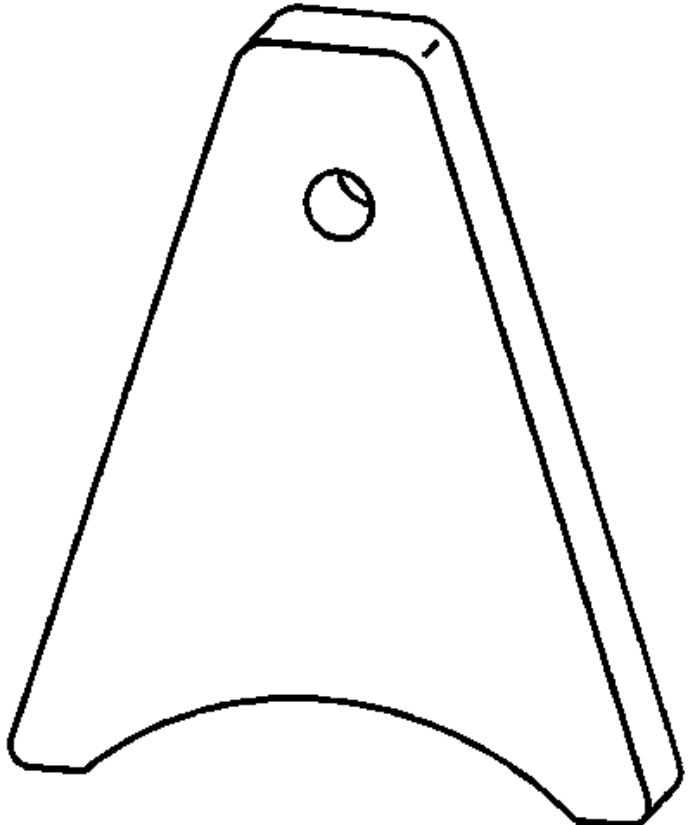
Illustration	Tool Number/Description
	<p>J 25588 Side Bearing Shim Installer</p>

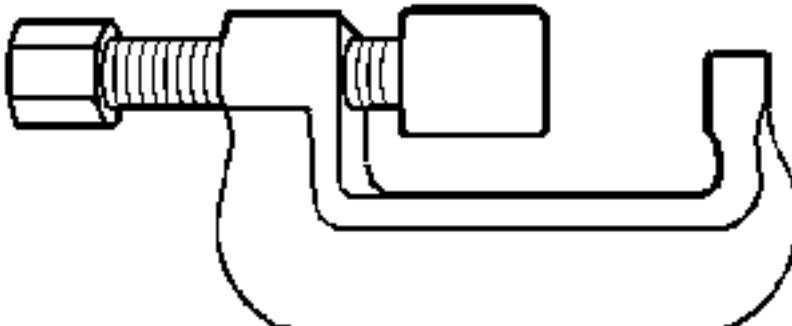
Illustration	Tool Number/Description
	<p>J 26252</p> <p>Locking Differential Governor Remover</p>

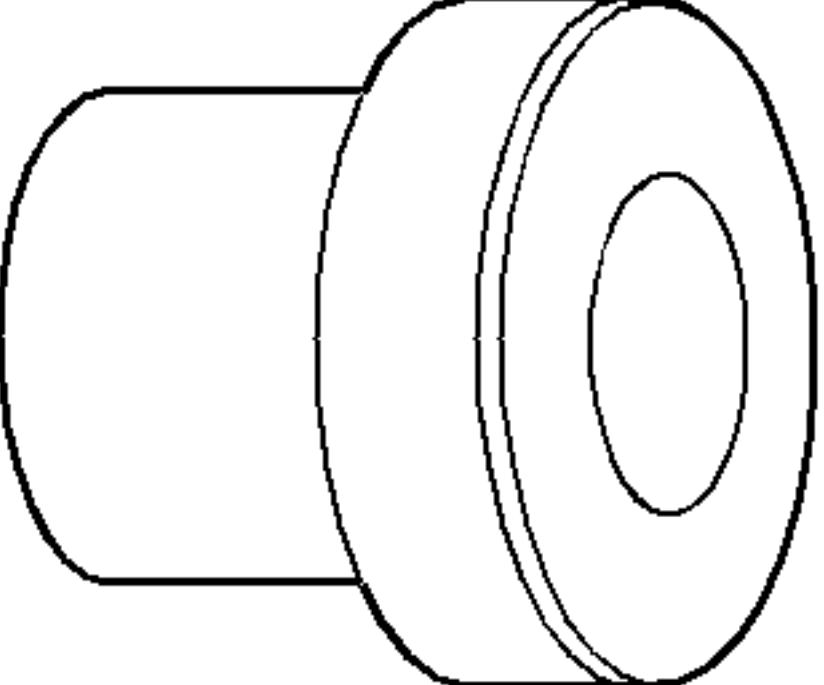
Illustration	Tool Number/Description
	<p>J 29710 Differential Side Bearing Installer</p>

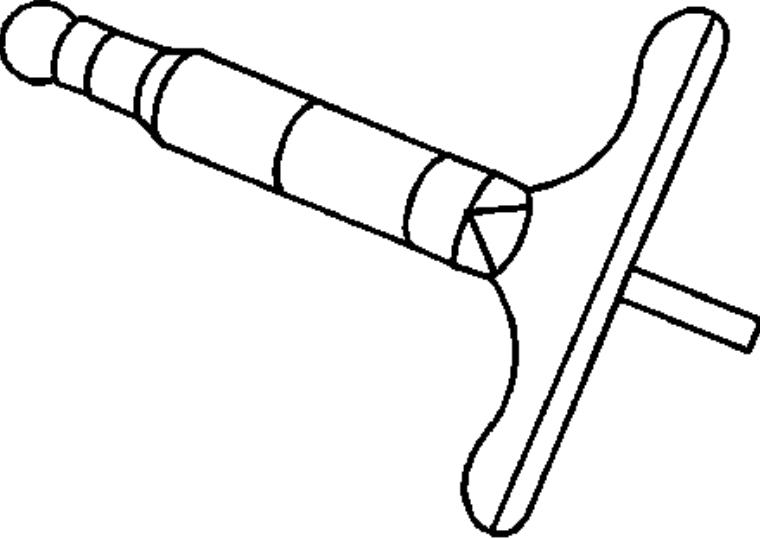
Illustration	Tool Number/Description
	<p>J 34672 Depth Micrometer</p>

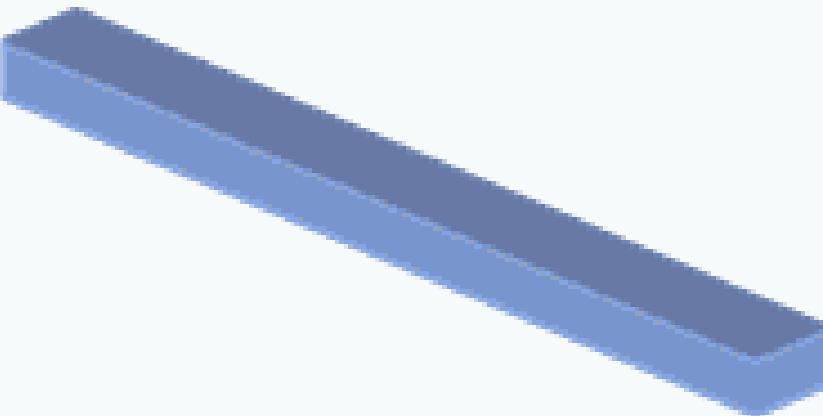
Illustration	Tool Number/Description
	<p>J 34673 Flat Gauge Bar</p>

Illustration	Tool Number/Description
	<p>J 34925 Pinion Setting Gauge and Components</p>

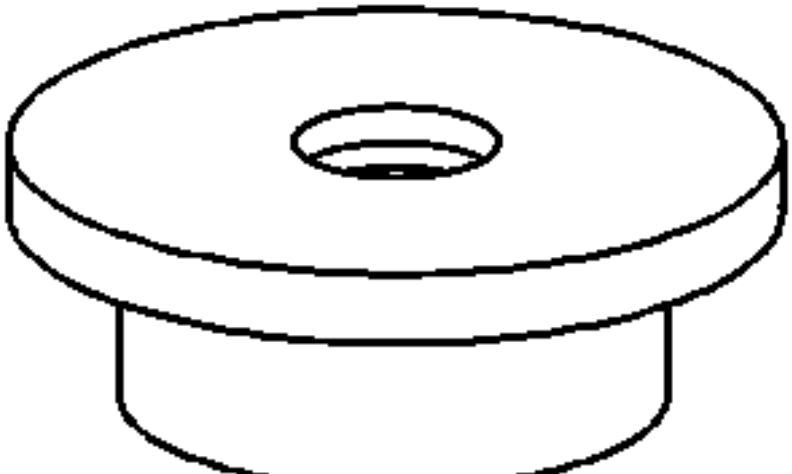
Illustration	Tool Number/Description
	<p>J 37624 Pinion Bearing Installer</p>

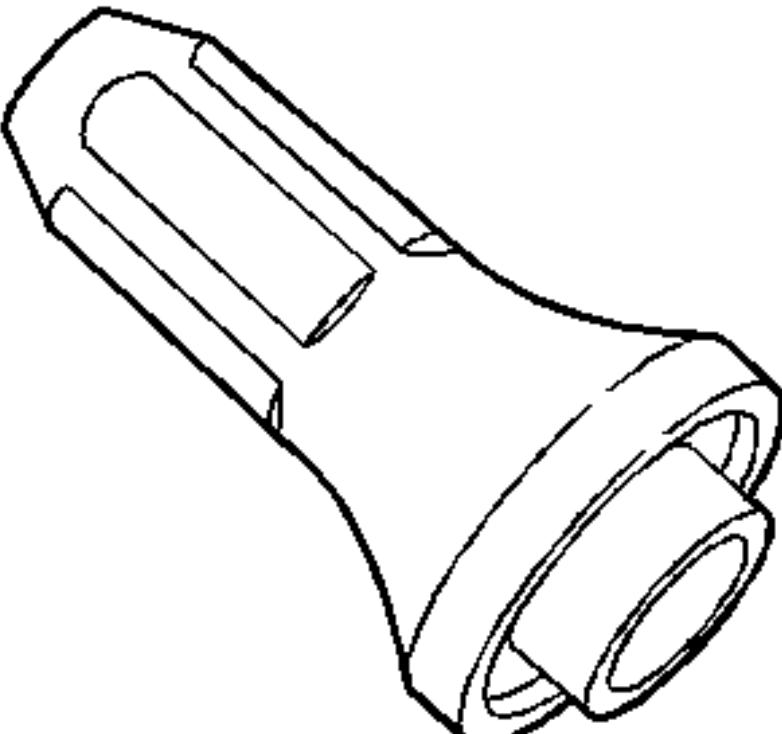
Illustration	Tool Number/Description
	<p>J 38694 Seal Installer</p>

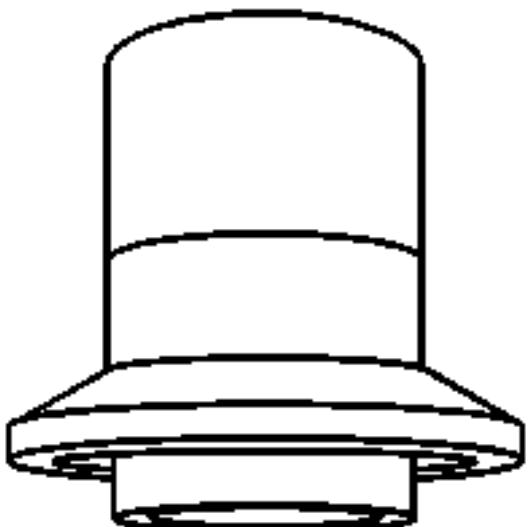
Illustration	Tool Number/Description
	<p>J 44414 Pinion Seal Installer</p>

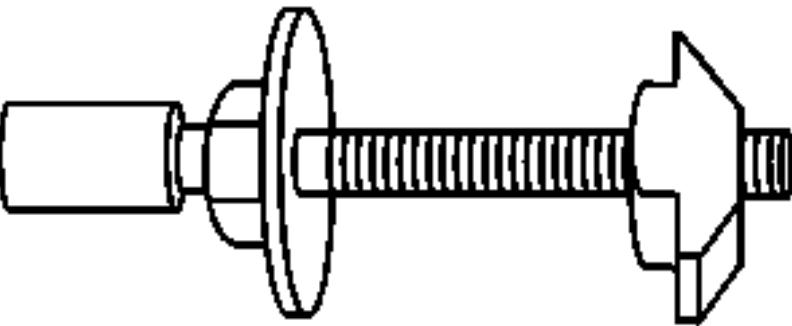
Illustration	Tool Number/Description
	<p>J 44685 Rear Axle Seal and Bearing Remover</p>

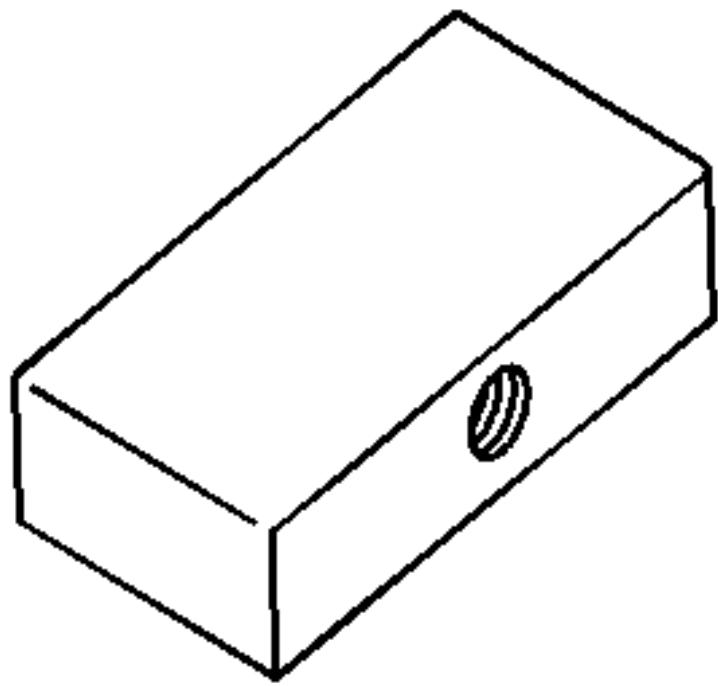
Illustration	Tool Number/Description
	<p>J 45108 Pinion Setting Gauge Block</p>

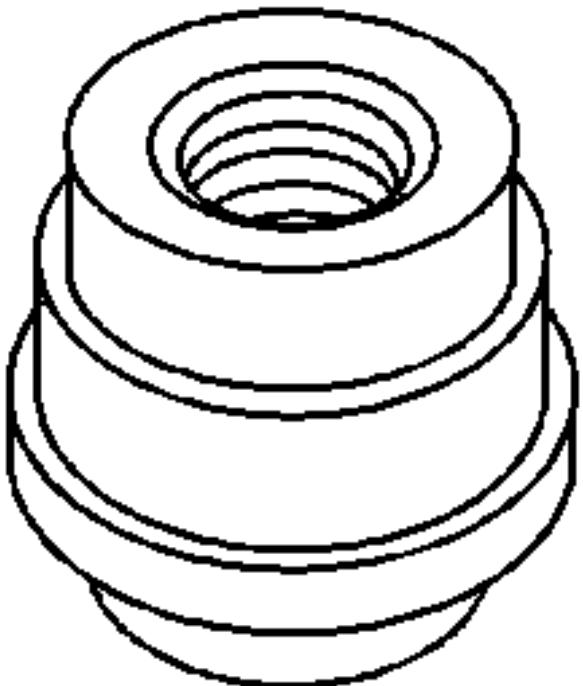
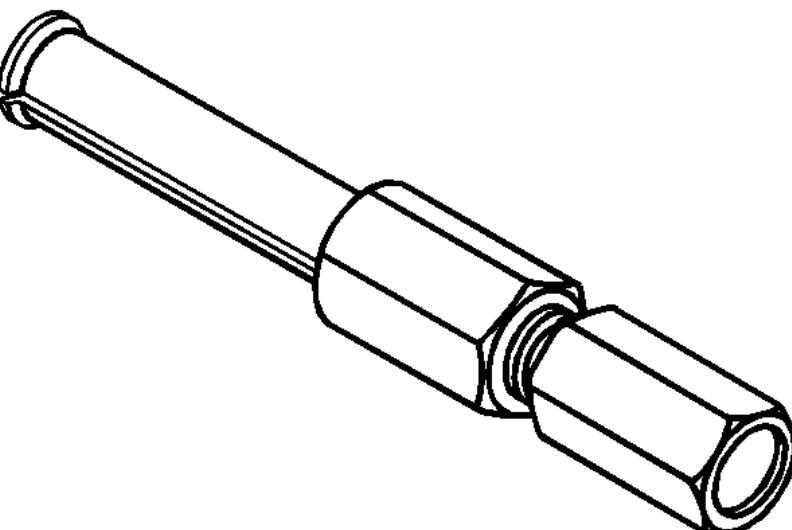
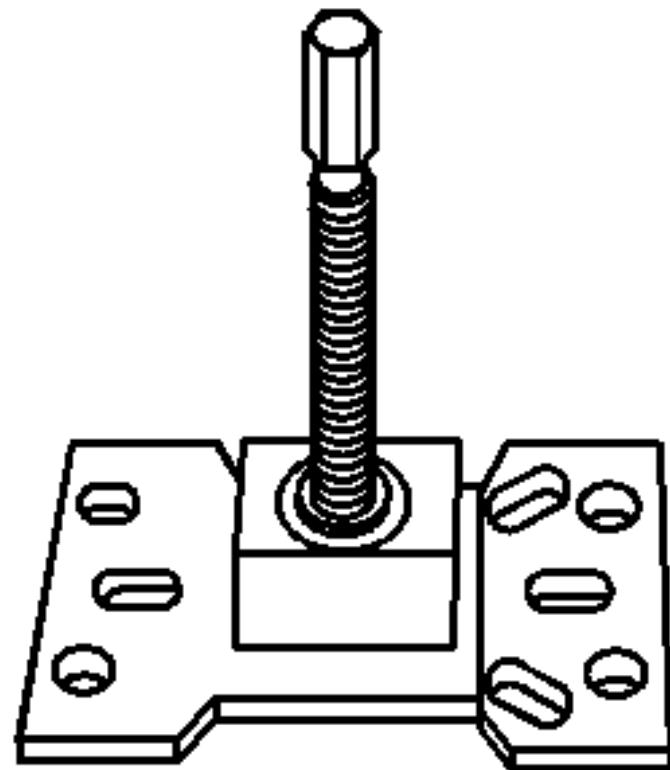
Illustration	Tool Number/Description
	<p>J 45232</p> <p>Differential Side Bearing Adjuster Needle Bearing Installer</p>

Illustration	Tool Number/Description
	<p>J 45857</p> <p>Tone Wheel and/or Bearing Remover</p>



DRIVELINE/AXLE

Wheel Drive Shafts - Escalade, Suburban, Tahoe, Yukon

SPECIFICATIONS

FASTENER SPECIFICATIONS

Application	Specification	
	Metric	English
Hub Nut	255 N.m	188 lb ft
Inboard Flange Bolts	79 N.m	58 lb ft
Small Seal Retaining Clamp	136 N.m	100 lb ft

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

Application	Type of Material	GM Part Number	
		United States	Canada
Wheel Drive Shaft/Intermediate Shaft	Grease	1051344	993037
Output Shaft Splines	Grease	12345879	10953511

COMPONENT LOCATOR

WHEEL DRIVE SHAFTS DISASSEMBLED VIEWS

Halfshaft Components, Disassembled View

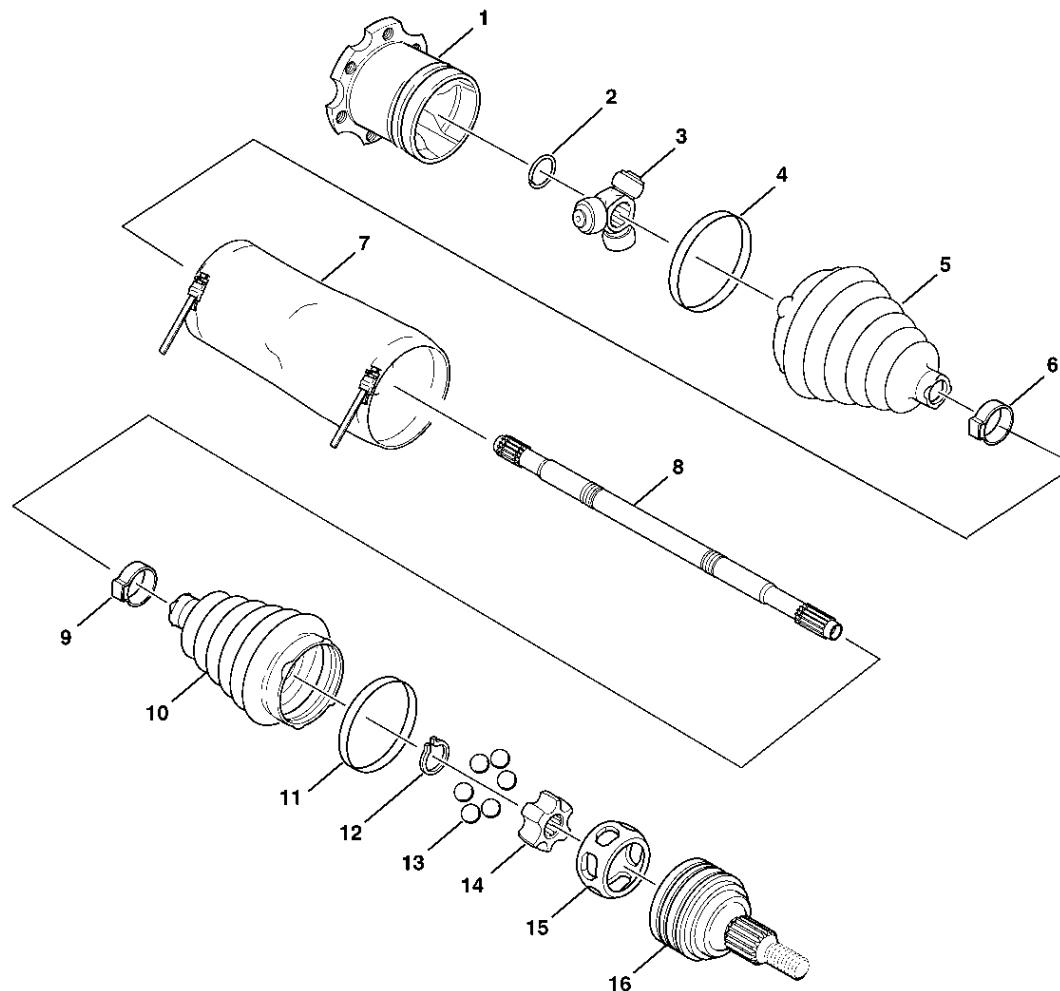


Fig. 1: Wheel Drive Shaft Components, Disassembled View

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Tripot Housing Assembly
2	Spacer Ring
3	Tripot Joint Spider Assembly

Callout	Component Name
4	Swage Ring
5	Tripot Joint Boot
6	Small Boot Retaining Clamp
7	Halfshaft Boot Cover (Optional)
8	Halfshaft Bar
9	Small Boot Retaining Clamp
10	CV Joint Boot
11	Swage Ring
12	Race Retaining Ring
13	Ball
14	CV Joint Inner Race
15	CV Joint Cage
16	CV Joint Outer Race

DIAGNOSTIC INFORMATION AND PROCEDURES

SYMPTOMS - WHEEL DRIVE SHAFTS

Before beginning diagnosis, review the system description and operation in order to familiarize yourself with the system function. Refer to [Wheel Drive Shafts Description and Operation](#).

Classifying the Symptom

Wheel Drive Shaft symptoms can usually be classified into the following categories:

- Noises
- Vibrations

Noise related concerns are diagnosed within the Wheel Drive Shafts section. For vibration related symptoms, refer to [Vibration Diagnosis, Starting Point, and Correction](#) for diagnosis.

Visual/Physical Inspection

- Inspect the system for aftermarket devices which could affect the operation of the wheel drive shafts.

- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

Symptom List

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

- [Click Noise In Turns](#)
- [Clunk When Accelerating from Coast](#)
- [Clunk Noise When Accelerating During Turns](#)

CLICK NOISE IN TURNS

Step	Action	Yes	No
DEFINITION: Clicking noise while turning in drive under load.			
1	Check for worn or damaged outer CV joints. Are the outer CV joints/seals worn?	Go to Step 2	System OK
2	Replace the outer CV joints/seals. Refer to <u>Front Wheel Drive Shaft Outer Joint and Boot Replacement</u> . Is the repair complete?	System OK	-

CLUNK WHEN ACCELERATING FROM COAST

Step	Action	Value(s)	Yes	No
DEFINITION: A clunking noise present when accelerating from coast to drive under load.				
1	Check for a loose wheel drive shaft to hub assembly nut. Is the wheel drive shaft nut loose?	-	Go to Step 2	Go to Step 3
2	Tighten the wheel drive shaft to hub assembly nut to specification. Is the repair complete?	240 N.m (177 lb ft)	System OK	-
3	Check for a damaged inner CV joint. Is the inner CV joint damaged?	-	Go to Step 4	System OK
4	Replace the inner CV joint. Refer to <u>Front Wheel Drive Shaft Inner Joint and Boot Replacement</u> . Is the repair complete?	-	System OK	-

CLUNK NOISE WHEN ACCELERATING DURING TURNS

Step	Action	Yes	No
1	Check for worn or damaged outer wheel drive shaft joints and or boots. Are the outer wheel drive shaft joints worn?	Go to Step 2	System OK
2	Check for proper clearance between the wheel drive shaft and other components. Correct as necessary. Is the repair complete?	System OK	Go to Step 3
3	Replace the outer CV joints and or boots. Refer to Front Wheel Drive Shaft Outer Joint and Boot Replacement . Is the repair complete?	System OK	-

REPAIR INSTRUCTIONS

FRONT WHEEL DRIVE SHAFT REPLACEMENT - LEFT SIDE (1500)

Special Tools

J-45859 Axle Remover

Removal Procedure

WARNING: Do not attempt to move vehicle with drive axle(s) removed from wheel bearing. Wheel(s) could fall off, dropping vehicle to the ground and causing personal injury or damage to the vehicle.

1. Remove the tire and wheel. [**Tire and Wheel Removal and Installation \(6-Lug Wheel\)**](#) [**Tire and Wheel Removal and Installation \(8-Lug Wheel\)**](#)
2. Remove the front axle hub cap from the wheel bearing, if equipped.

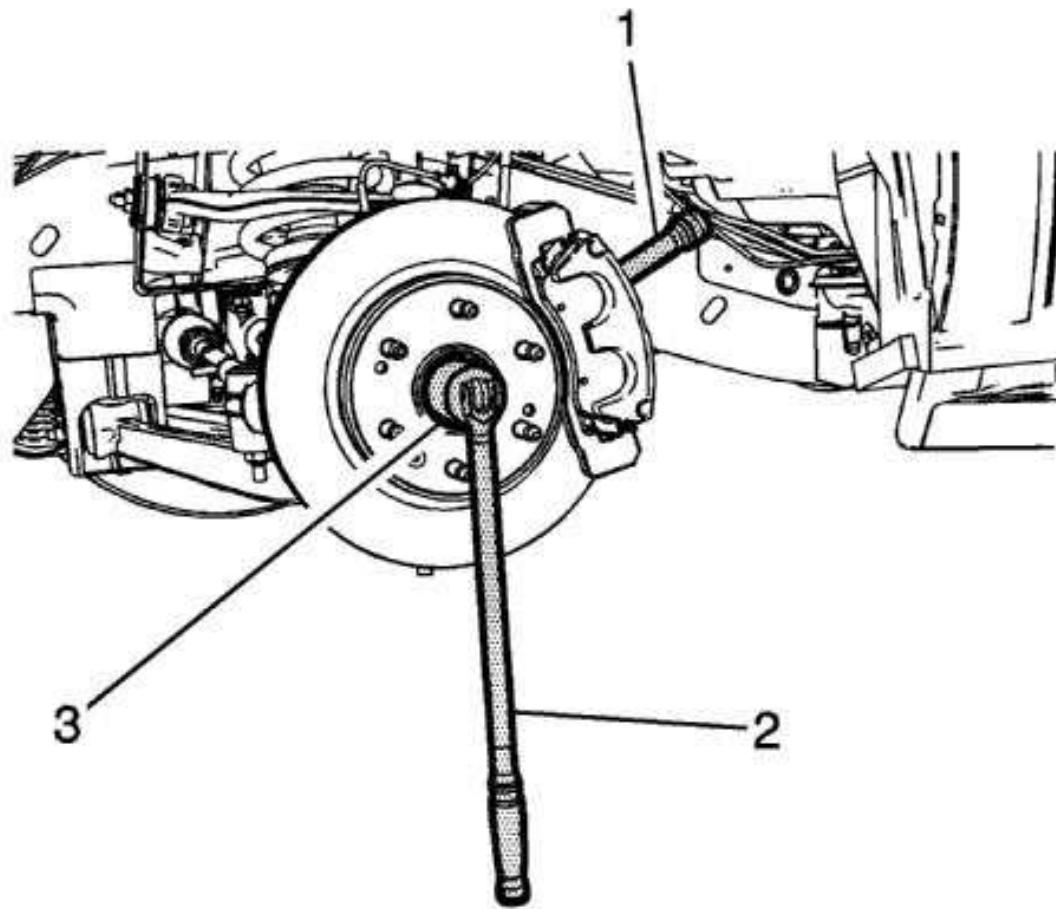


Fig. 2: Loosening Axle Retaining Nut With A Breaker Bar And Correct Sized Socket

Courtesy of GENERAL MOTORS COMPANY

3. Insert a drift (1) through the brake caliper into one of the brake rotor vanes in order to prevent the wheel drive shaft from turning and loosen the axle retaining nut with a breaker bar (2) and correct sized socket (3).

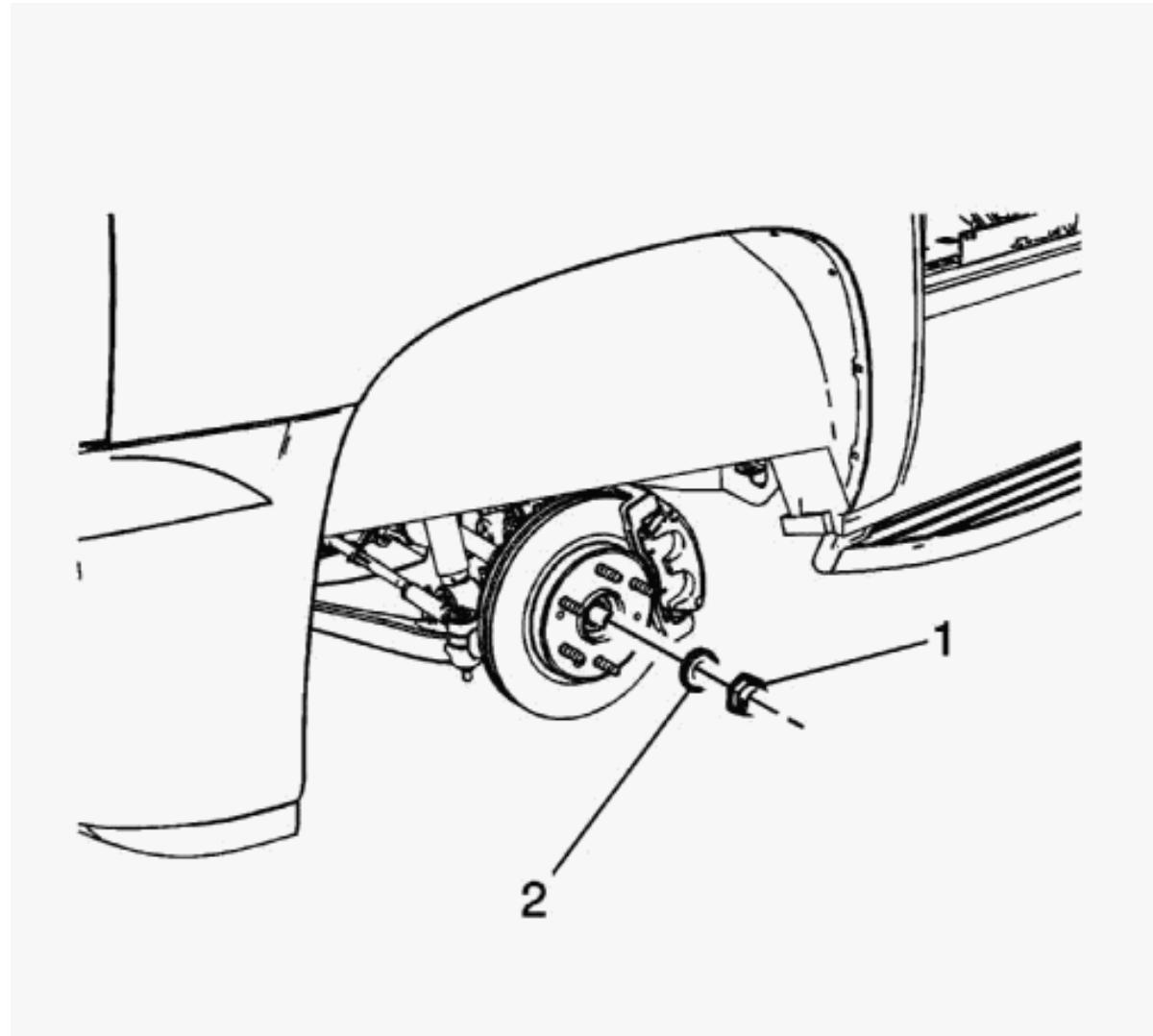


Fig. 3: View Of Nut And Hub

Courtesy of GENERAL MOTORS COMPANY

NOTE: Do NOT reuse the wheel drive shaft nut, use a NEW nut only.

4. Remove the nut (1) and washer (2) from the hub.

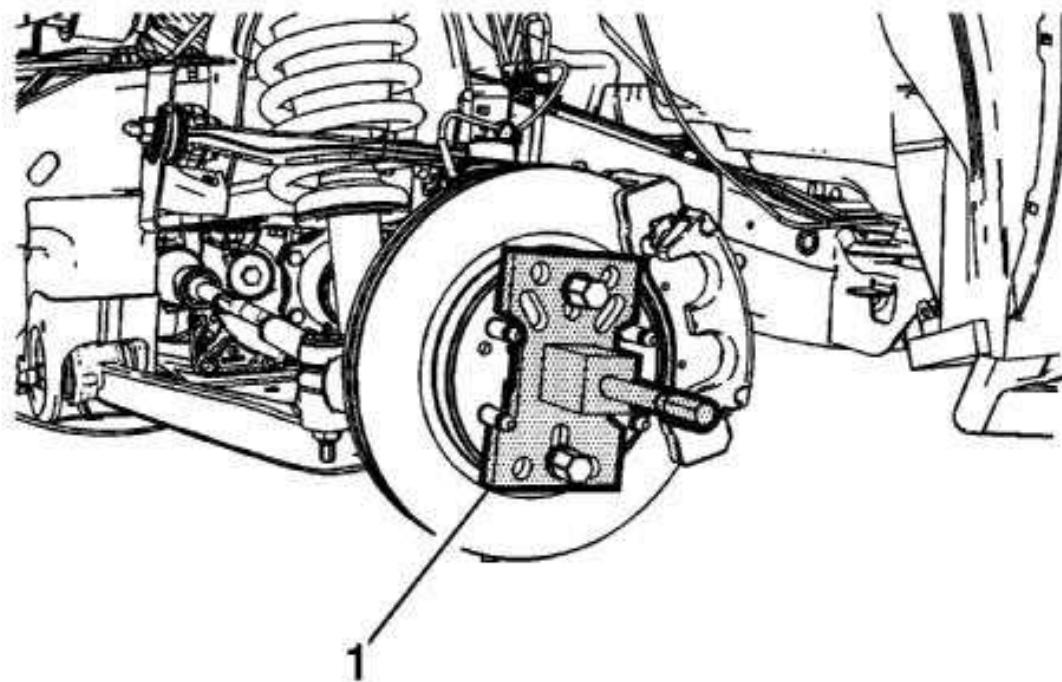


Fig. 4: J-45859 Axle Remover

Courtesy of GENERAL MOTORS COMPANY

5. Using the **J-45859** axle remover, remove the wheel drive shaft from the hub.
6. Remove the steering gear skid shield, if equipped. **[Steering Gear Skid Shield Replacement](#)**

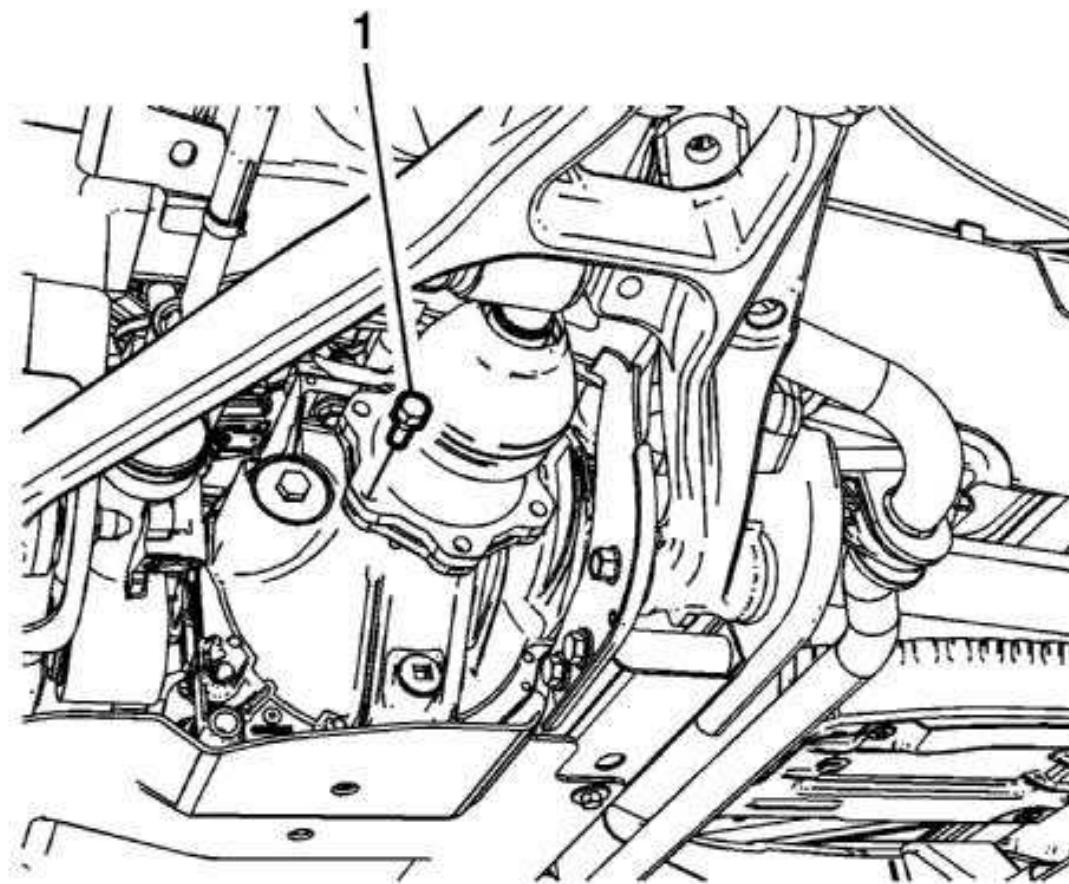


Fig. 5: Wheel Driver Shaft Retaining Bolts And Drive Flange

Courtesy of GENERAL MOTORS COMPANY

7. Remove the (QTY 6) wheel drive shaft retaining bolts (1) from the drive flange.
8. Remove both stabilizer shaft links from the lower control arm. [Stabilizer Shaft Link Replacement \(Light Duty\)](#)
9. Remove the left shock absorber. [Shock Absorber and Spring Removal and Installation \(Light Duty, With Z85/Z95\)](#) [Shock Absorber and Spring Removal and Installation \(Light Duty, Without Z85/Z95\)](#)

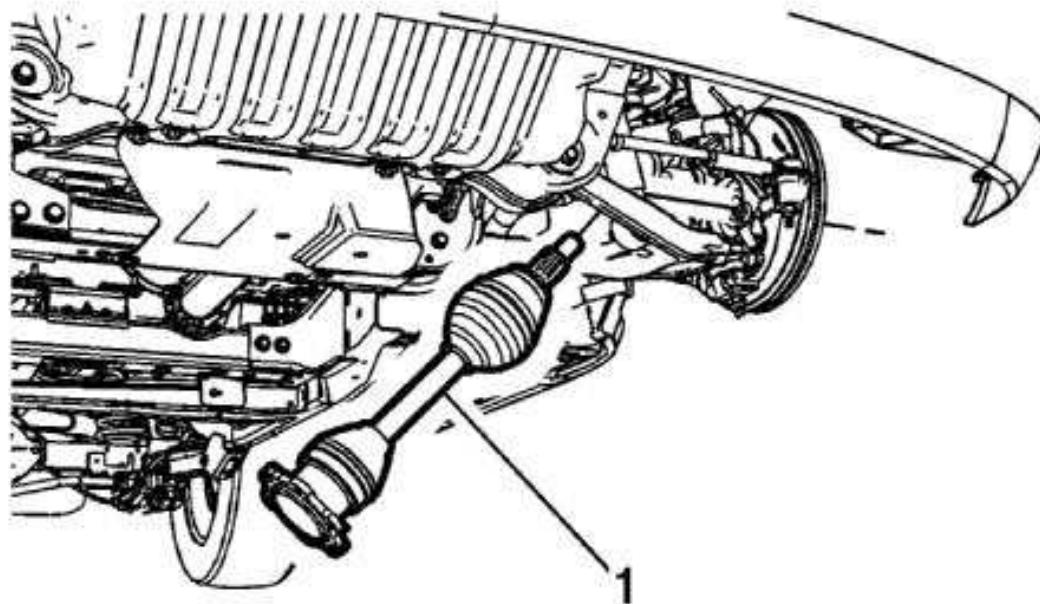


Fig. 6: Wheel Drive Shaft Through Lower Control Arm Opening

Courtesy of GENERAL MOTORS COMPANY

NOTE: Wrap a shop towel around the wheel drive shaft to protect the joint boots. Do not remove the shop towel until the shaft is reinstalled.

10. Remove the wheel drive shaft through the lower control arm opening.
11. Remove all dirt and debris from the splines on the wheel hub/bearing.

Installation Procedure

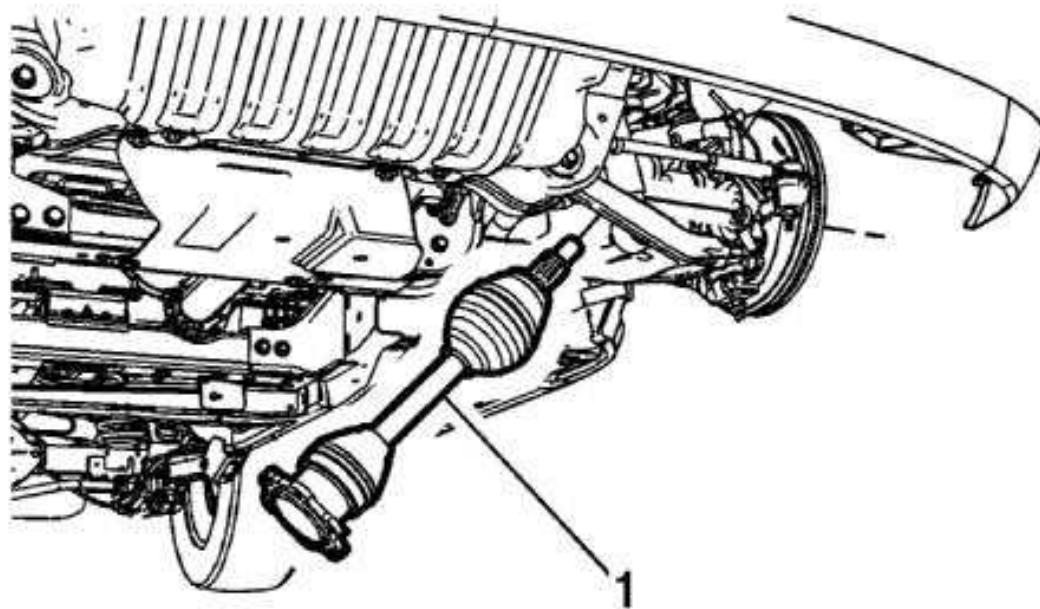


Fig. 7: Wheel Drive Shaft Through Lower Control Arm Opening

Courtesy of GENERAL MOTORS COMPANY

1. Install the wheel drive shaft (1) in the steering knuckle.

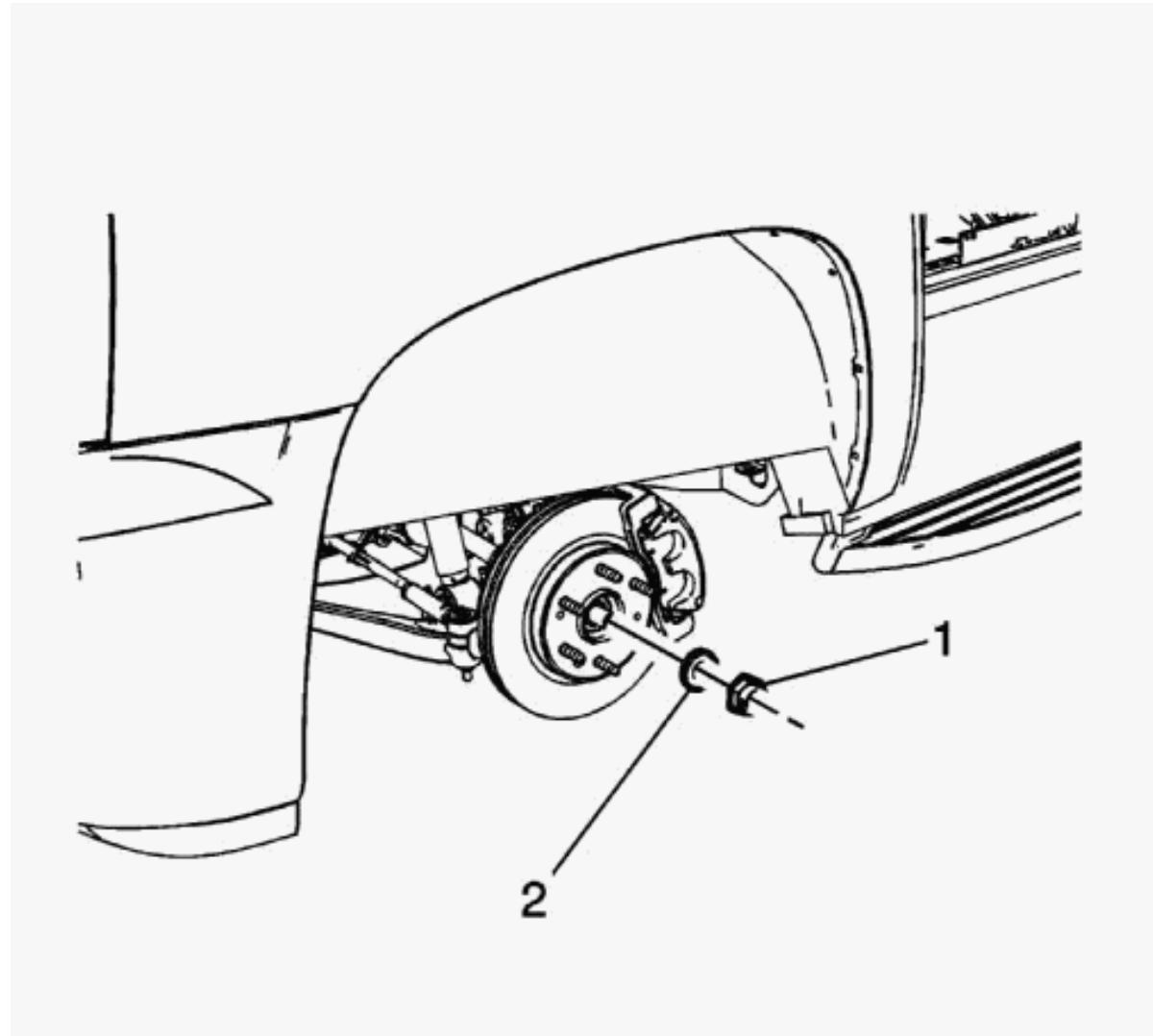


Fig. 8: View Of Nut And Hub

Courtesy of GENERAL MOTORS COMPANY

NOTE: Install the NEW nut and washer, but Do NOT tighten at this time.

2. Install the NEW nut (1) and washer (2) and finger tighten.

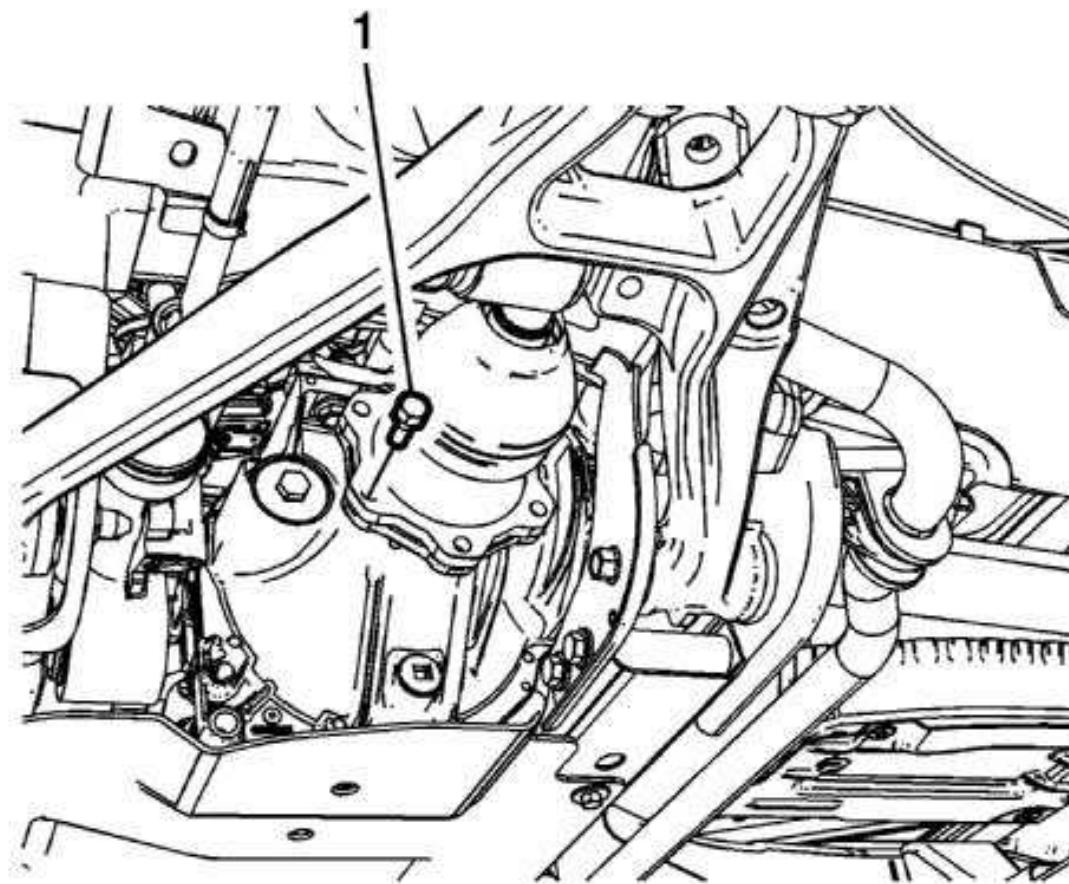


Fig. 9: Wheel Driver Shaft Retaining Bolts And Drive Flange

Courtesy of GENERAL MOTORS COMPANY

3. Install the (QTY 6) wheel drive shaft flange retaining bolts (1) and finger tighten.

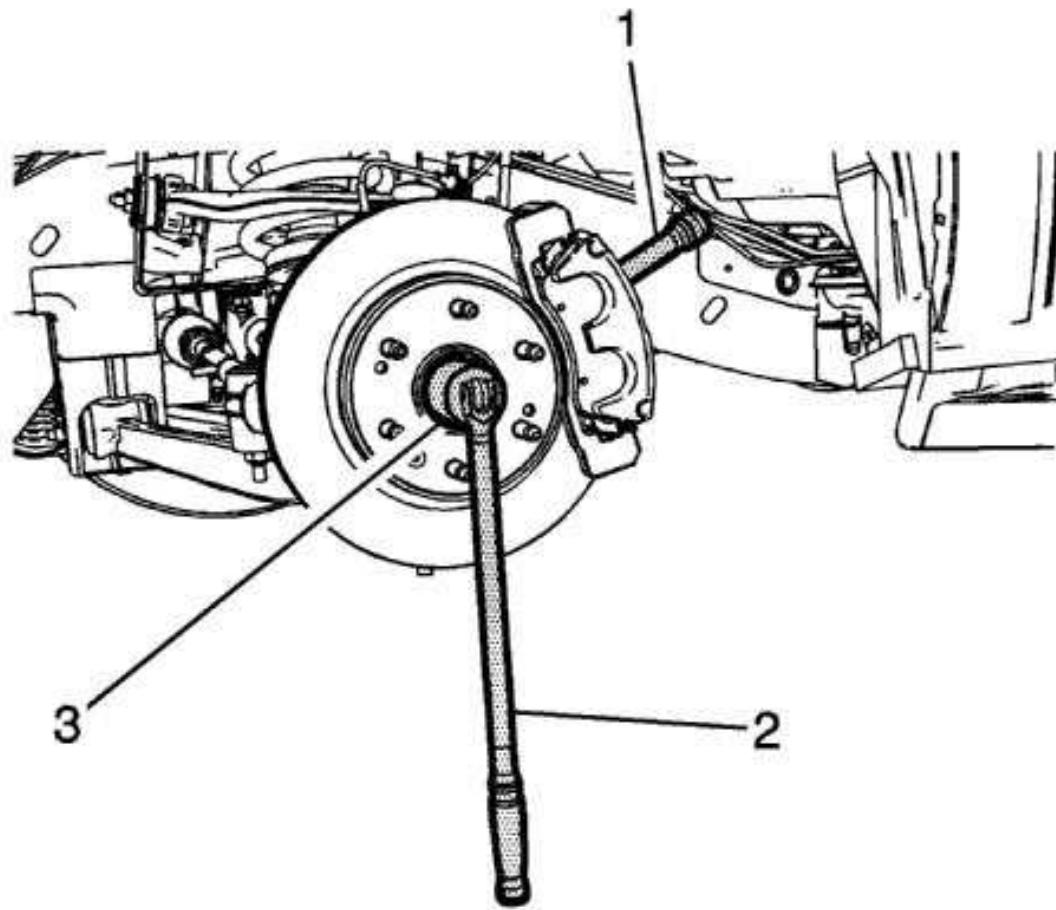


Fig. 10: Loosening Axle Retaining Nut With A Breaker Bar And Correct Sized Socket

Courtesy of GENERAL MOTORS COMPANY

4. Insert a drift (1) through the brake caliper into one of the brake rotor vanes in order to prevent the wheel drive shaft from turning.

CAUTION: Refer to Fastener Caution .

5. Tighten the wheel drive shaft flange retaining bolts to 79 N.m (58 lb ft).

6. Tighten the wheel drive shaft retaining nut to 255 N.m (188 lb ft).
7. Install the left shock absorber. [Shock Absorber and Spring Removal and Installation \(Light Duty, With Z85/Z95\) Shock Absorber and Spring Removal and Installation \(Light Duty, Without Z85/Z95\)](#)
8. Install the stabilizer shaft links to the lower control arms. [Stabilizer Shaft Link Replacement \(Light Duty\)](#)
9. Install the front axle hub cap to the wheel bearing, if equipped.
10. Install the tire and wheel. [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#)

FRONT WHEEL DRIVE SHAFT REPLACEMENT - LEFT SIDE (HEAVY DUTY)

Removal Procedure

WARNING: Do not attempt to move vehicle with drive axle(s) removed from wheel bearing. Wheel(s) could fall off, dropping vehicle to the ground and causing personal injury or damage to the vehicle.

1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
2. Remove the tire and wheel assembly. [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#)

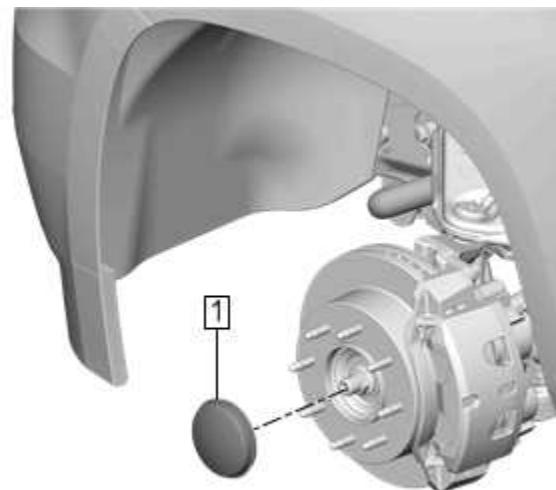


Fig. 11: Front Axle Hub Cap

Courtesy of GENERAL MOTORS COMPANY

3. Remove the front axle hub cap (1) from the wheel hub assembly.

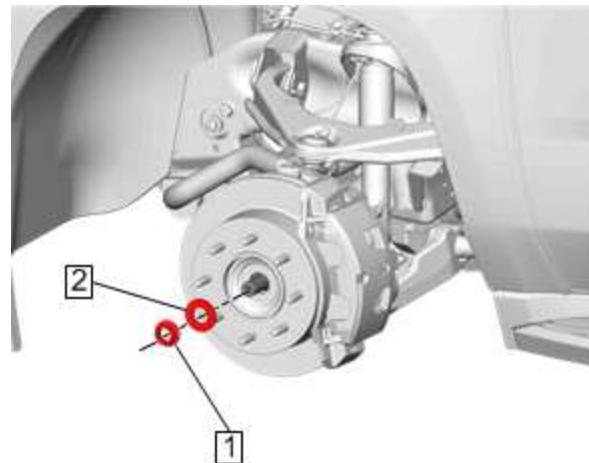


Fig. 12: Nut And Washer

Courtesy of GENERAL MOTORS COMPANY

NOTE: DO NOT reuse the wheel drive shaft nut, use a NEW nut only.

4. Remove the nut (1) and washer (2) from the hub.
5. Remove the steering gear skid shield. [Steering Gear Skid Shield Replacement](#)

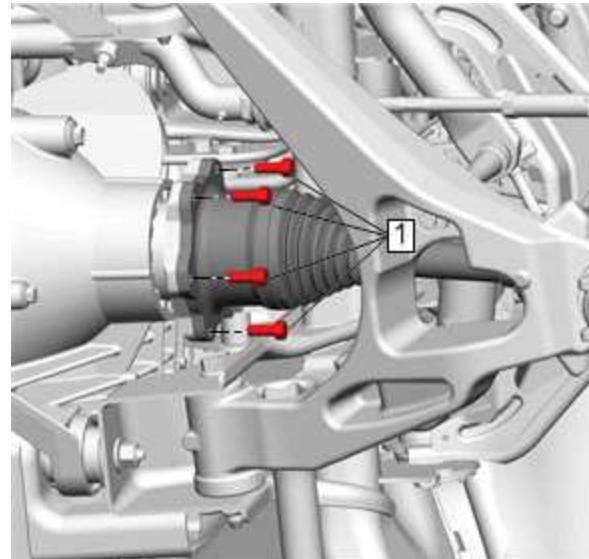


Fig. 13: Wheel Drive Shaft Retaining Bolts

Courtesy of GENERAL MOTORS COMPANY

6. Remove the [6x] wheel drive shaft retaining bolts (1) from the drive flange.
7. Remove the stabilizer link from the lower control arm. [Stabilizer Shaft Link Replacement \(Heavy Duty\)](#)
8. Remove the left shock absorber from the lower control arm. [Shock Absorber and Spring Removal and Installation \(Light Duty, With Z85/Z95\) Shock Absorber and Spring Removal and Installation \(Light Duty, Without Z85/Z95\)](#)
9. Remove the lower control arm from the steering knuckle. [Lower Control Arm Replacement \(Heavy Duty\)](#)

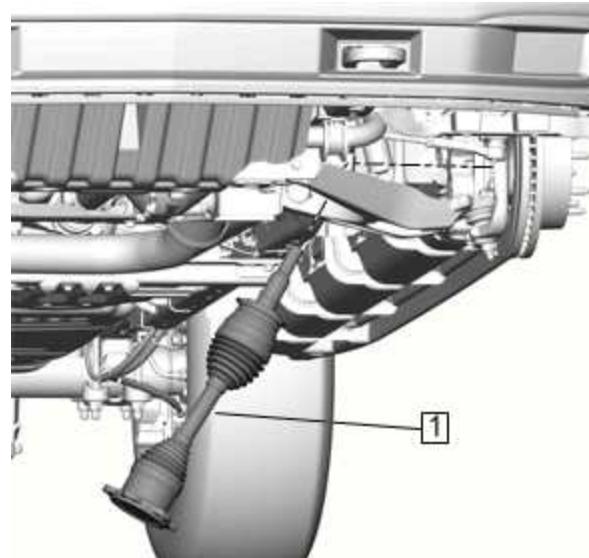


Fig. 14: Wheel Drive Shaft

Courtesy of GENERAL MOTORS COMPANY

NOTE: Wrap a shop towel around the wheel drive shaft to protect the joint boots. Do not remove the shop towel until the shaft is reinstalled.

10. Remove the wheel drive shaft (1) through the lower control arm opening.
11. Remove all dirt and debris from the splines on the wheel hub/bearing.

Installation Procedure

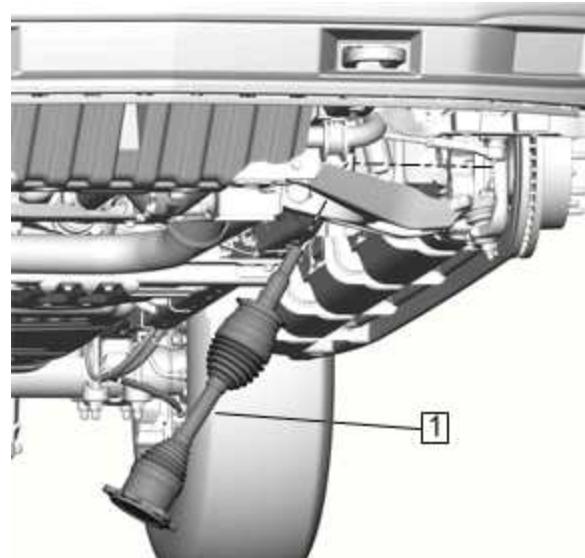


Fig. 15: Wheel Drive Shaft

Courtesy of GENERAL MOTORS COMPANY

1. Install the wheel drive shaft (1) through the lower control arm opening into the steering knuckle.

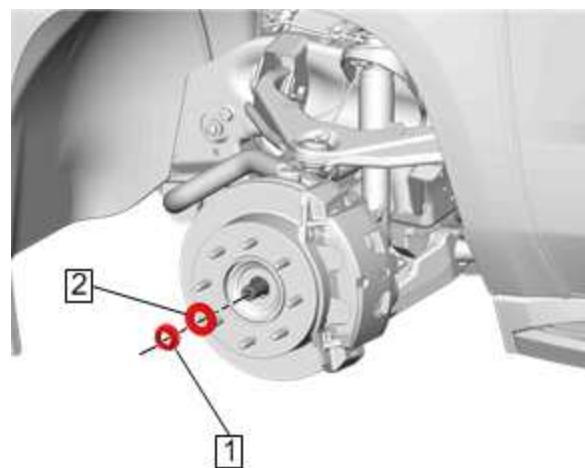


Fig. 16: Nut And Washer

Courtesy of GENERAL MOTORS COMPANY

NOTE: Install the NEW nut and washer, but DO NOT tighten at this time.

2. Install the NEW nut (1) and washer (2) and finger tighten.

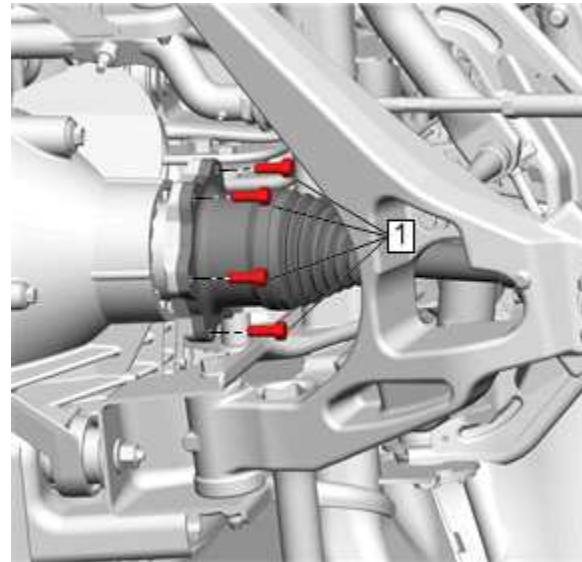


Fig. 17: Wheel Drive Shaft Retaining Bolts

Courtesy of GENERAL MOTORS COMPANY

3. Install the [6x] wheel drive shaft flange retaining bolts (1) and finger tighten.

CAUTION: Refer to Fastener Caution

4. Tighten the wheel drive shaft flange retaining bolts to 79 N.m (58 lb ft).
5. Tighten the wheel drive shaft retaining nut to 255 N.m (188 lb ft).
6. Install the left shock absorber to the lower control arm. [Shock Absorber and Spring Removal and Installation \(Light Duty, With Z85/Z95\)](#)
[Shock Absorber and Spring Removal and Installation \(Light Duty, Without Z85/Z95\)](#)
7. Install the stabilizer shaft link to the lower control arm. [Stabilizer Shaft Link Replacement \(Heavy Duty\)](#)
8. Install the lower control arm to the steering knuckle. [Lower Control Arm Replacement \(Heavy Duty\)](#)
9. Install the front axle hub cap to the wheel hub assembly.

10. Install the steering gear skid shield. [Steering Gear Skid Shield Replacement](#)
11. Install the tire and wheel assembly. [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#)
12. Lower the vehicle.

FRONT WHEEL DRIVE SHAFT REPLACEMENT - RIGHT SIDE (1500)

Special Tools

J-45859 Axle Remover

Removal Procedure

WARNING: Do not attempt to move vehicle with drive axle(s) removed from wheel bearing. Wheel(s) could fall off, dropping vehicle to the ground and causing personal injury or damage to the vehicle.

1. Raise the vehicle. [Lifting and Jacking the Vehicle](#) .
2. Remove the wheel and tire assembly. [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#) .
3. Remove the drive axle center cap, if equipped.

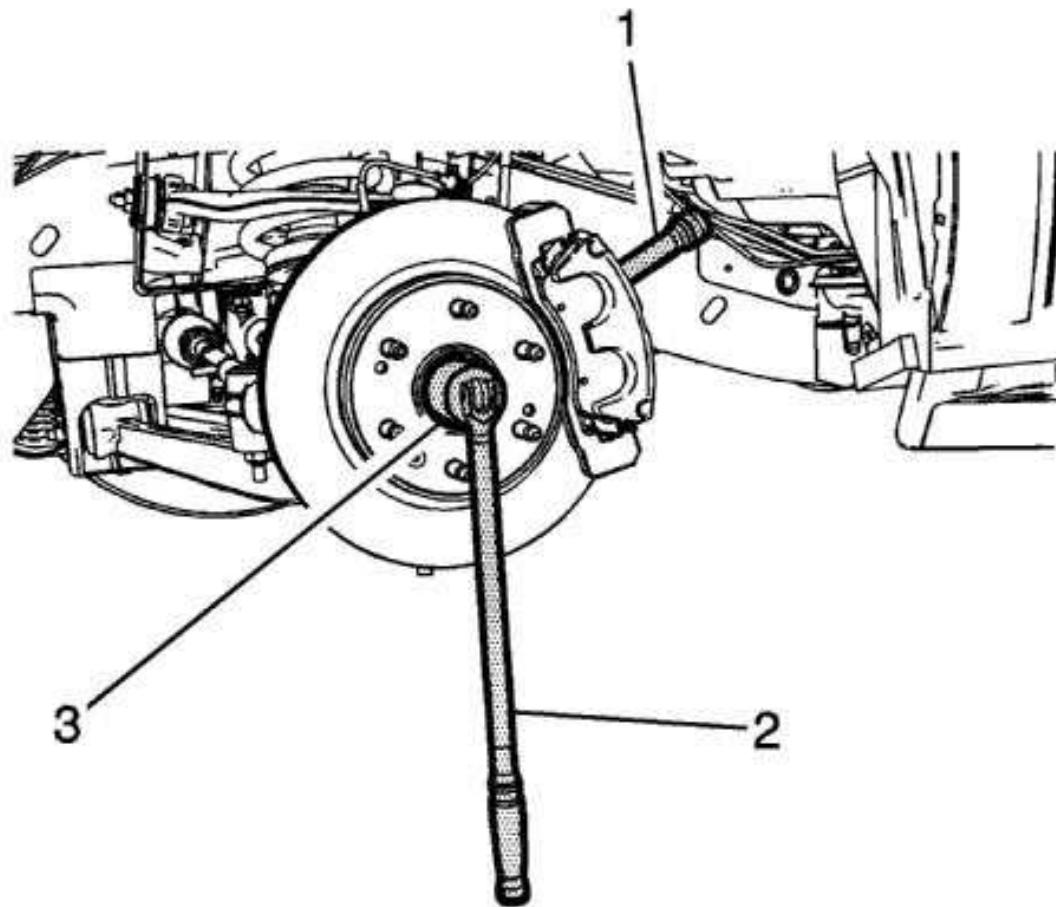


Fig. 18: Loosening Axle Retaining Nut With A Breaker Bar And Correct Sized Socket
Courtesy of GENERAL MOTORS COMPANY

4. Insert a drift or a large screwdriver (1) into the webbing of the brake rotor to prevent the axle from spinning.
5. Loosen the wheel driveshaft nut using a breaker bar (2) and proper size socket (3).

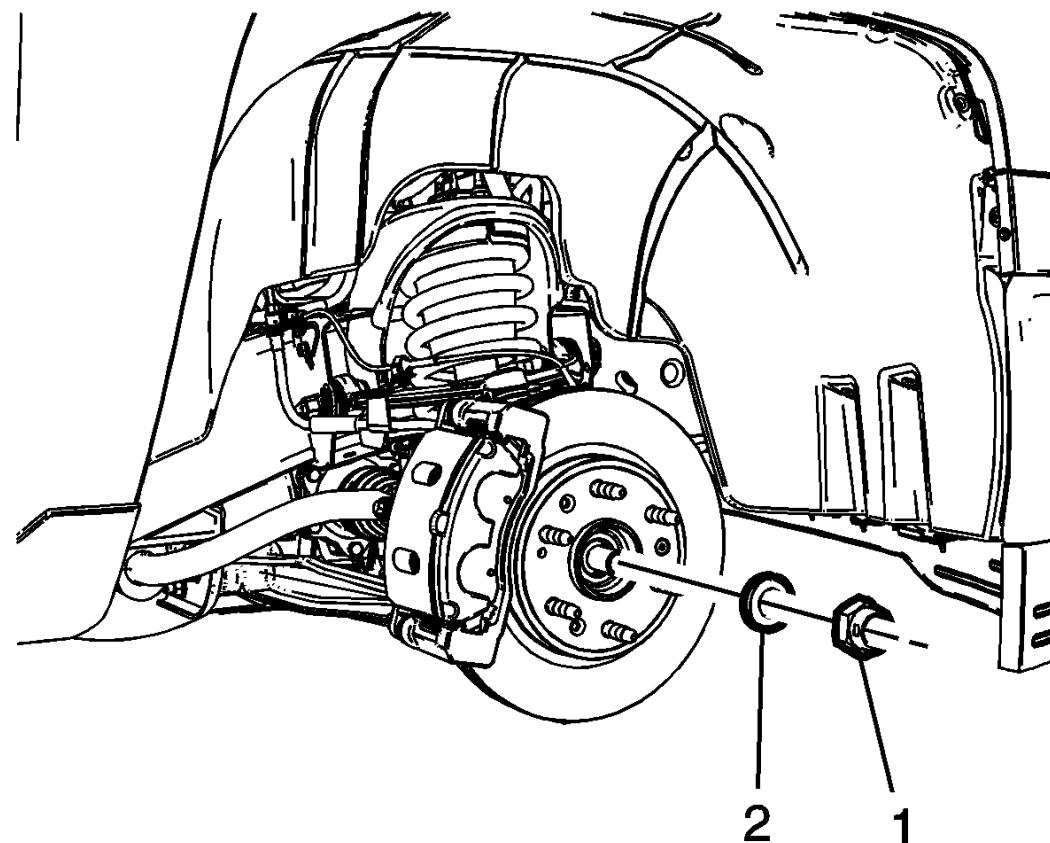


Fig. 19: Wheel Drive Shaft Nut And Washer

Courtesy of GENERAL MOTORS COMPANY

NOTE: DO NOT reuse the wheel drive shaft nut. Discard and replace with new.

6. Remove the nut (1) and the washer (2) from the wheel drive shaft.

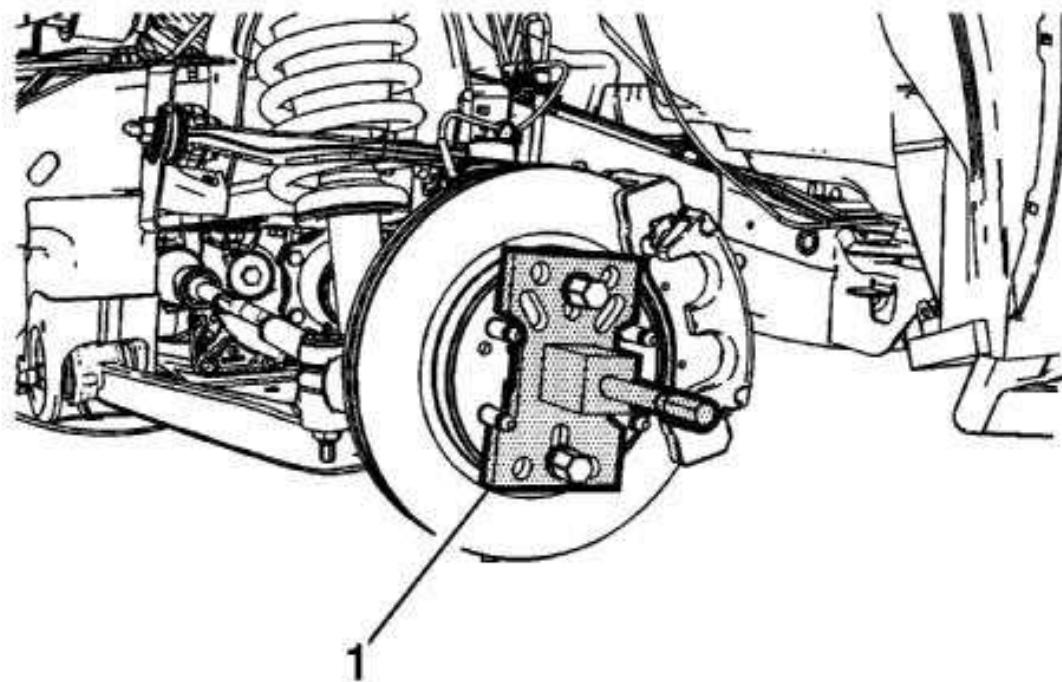


Fig. 20: J-45859 Axle Remover

Courtesy of GENERAL MOTORS COMPANY

7. Using **J-45859** Axle Remover (1), remove the wheel drive shaft from the hub.
8. Remove the steering gear skid shield. **Steering Gear Skid Shield Replacement** .

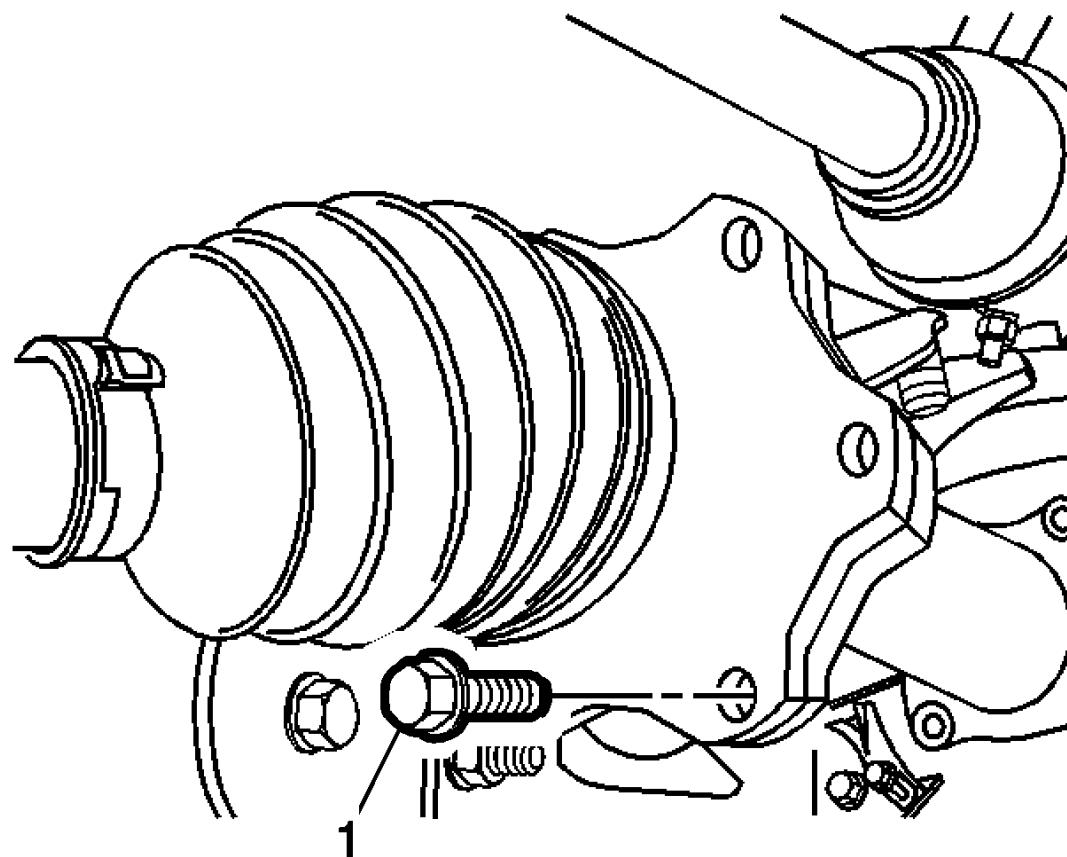


Fig. 21: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

9. Remove the (Qty 6) flange bolts (1) securing the wheel drive shaft inboard flange to the output shaft flange.
10. Remove both of the stabilizer shaft links from the lower control arms. [**Stabilizer Shaft Link Replacement \(Light Duty\)**](#) .
11. Remove the right shock absorber. [**Shock Absorber and Spring Removal and Installation \(Light Duty, With Z85/Z95\) Shock Absorber and Spring Removal and Installation \(Light Duty, Without Z85/Z95\)**](#) .

NOTE: **DO NOT** remove the shop towel from the wheel drive shaft boots until the wheel drive shaft has been re-installed in the vehicle.

12. Wrap shop towels around both the inner and the outer wheel drive shaft boots in order to avoid damage to the boots during removal and installation.
13. Clean the steering knuckle and the wheel drive shaft splines and threads.

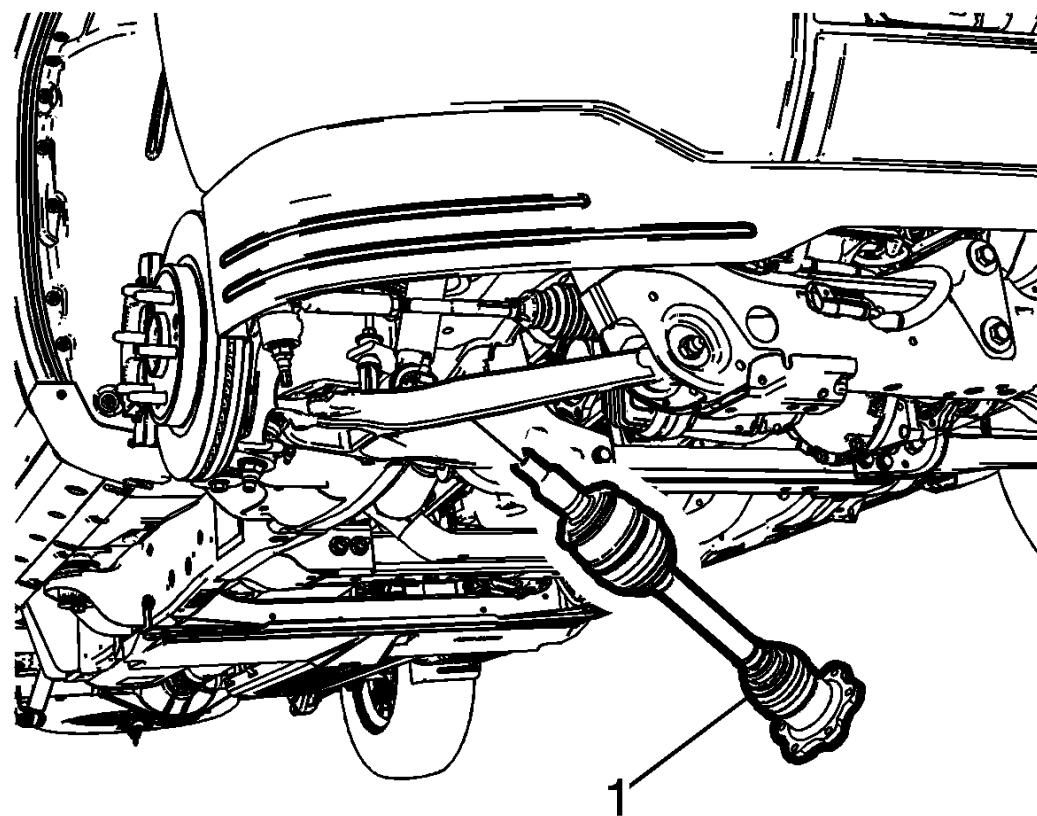


Fig. 22: Wheel Drive Shaft

Courtesy of **GENERAL MOTORS COMPANY**

14. Pull the wheel drive shaft (1) through the lower control arm opening.

Installation Procedure

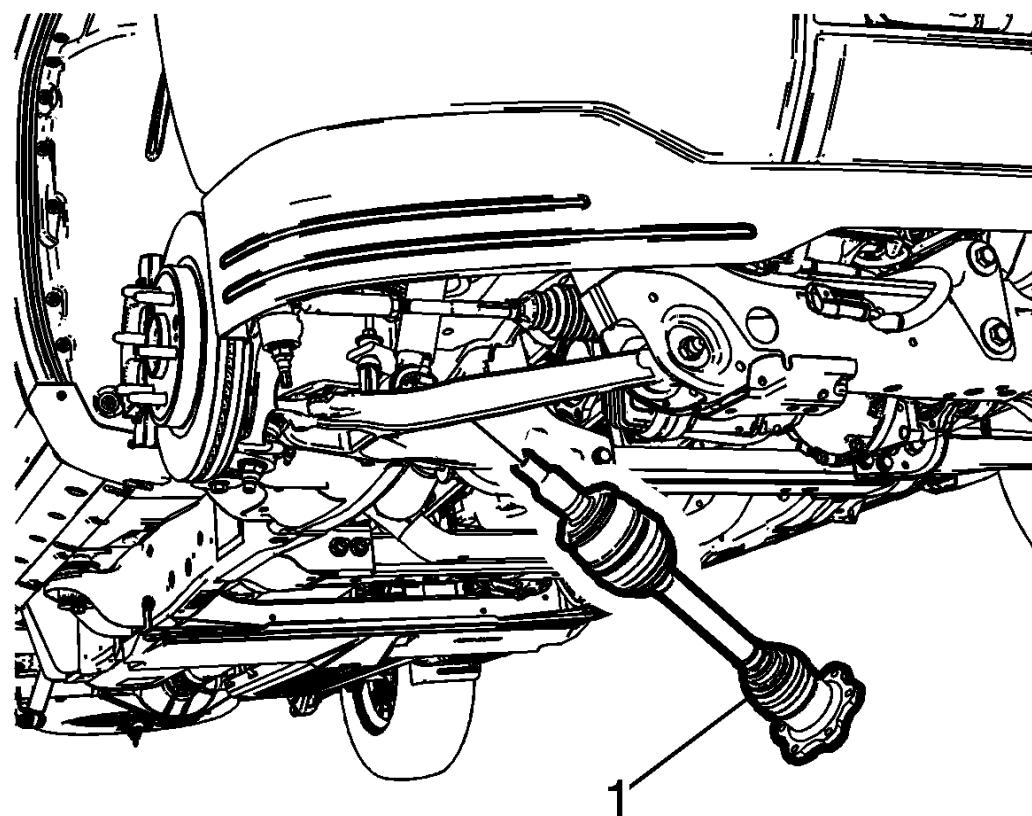


Fig. 23: Wheel Drive Shaft

Courtesy of **GENERAL MOTORS COMPANY**

1. Install the wheel drive shaft (1) in the steering knuckle.

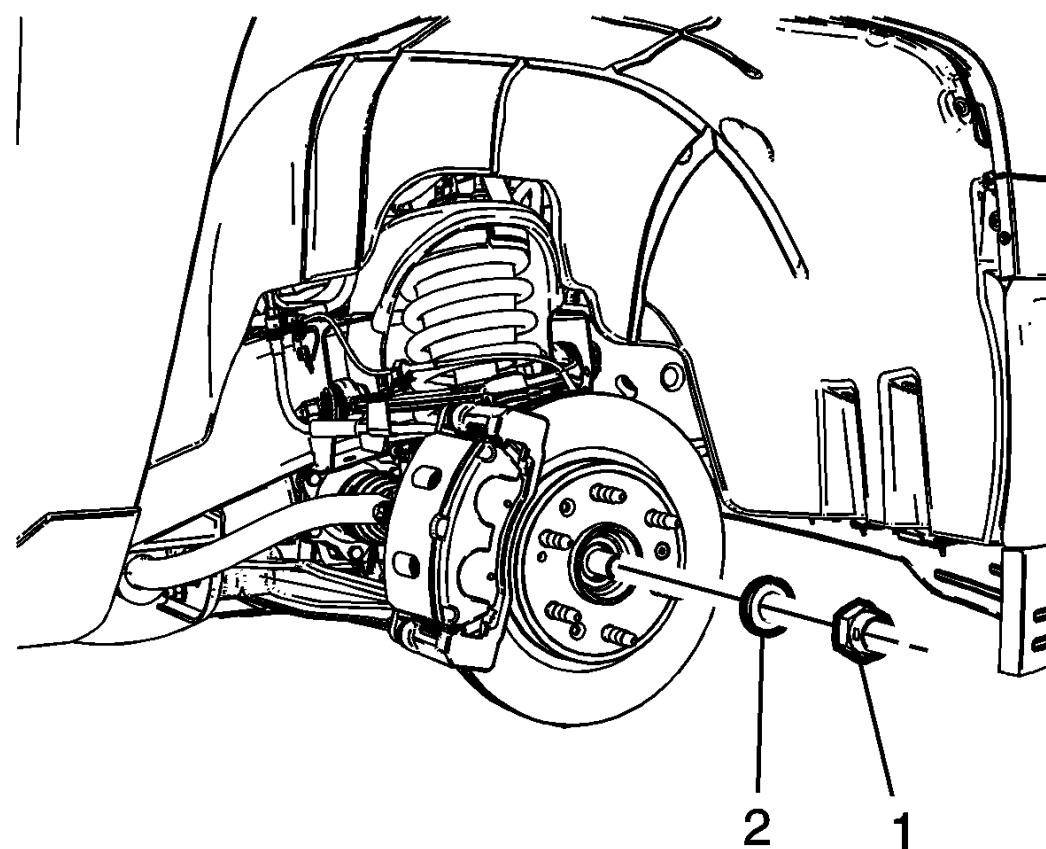


Fig. 24: Wheel Drive Shaft Nut And Washer

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Use only a genuine GM front wheel drive shaft nut. Installation of anything but an OEM front wheel drive shaft nut could cause damage to the vehicle.

2. Install the washer (2) and the NEW wheel drive shaft nut (1) and hand tighten ONLY.

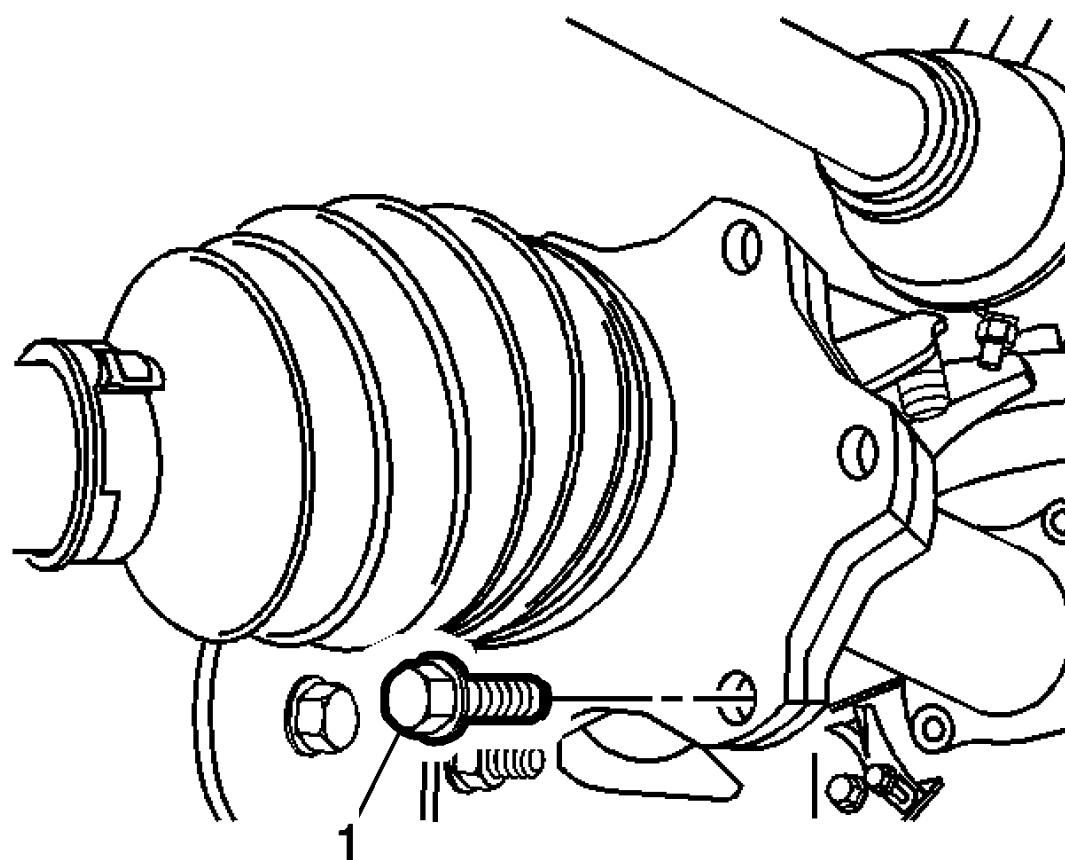


Fig. 25: View Of Wheel Drive Shaft Inboard Flange Bolt - Front Drive Axle

Courtesy of GENERAL MOTORS COMPANY

NOTE: Hand tighten the flange bolts ONLY at this time.

3. Install the (Qty 6) flange bolts (1) into the flange and hand tighten.

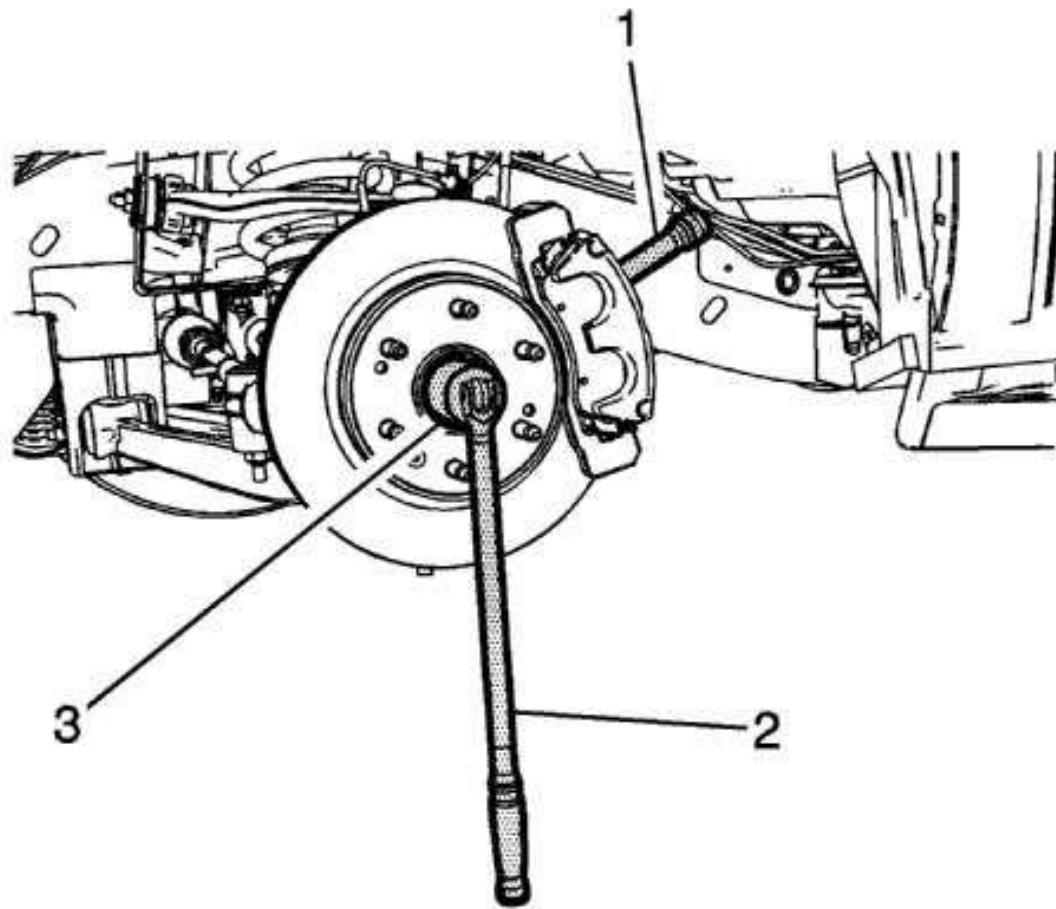


Fig. 26: Loosening Axle Retaining Nut With A Breaker Bar And Correct Sized Socket

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

4. Insert a drift (1) into the webbing of the brake rotor to prevent the axle from spinning.

Tighten:

- Tighten the inboard flange bolts to 79 N.m (58 lb ft).
 - Tighten the wheel drive shaft nut to 255 N.m (188 lb ft).
5. Install the drive axle center cap, if equipped.
 6. Install both of the stabilizer shaft links. [Stabilizer Shaft Link Replacement \(Light Duty\)](#) .
 7. Install the right shock absorber. [Shock Absorber and Spring Removal and Installation \(Light Duty, With Z85/Z95\)](#) [Shock Absorber and Spring Removal and Installation \(Light Duty, Without Z85/Z95\)](#) .
 8. Install the steering gear skid shield. [Steering Gear Skid Shield Replacement](#) .
 9. Install the wheel and tire assembly. [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#) .
 10. Lower the vehicle.

FRONT WHEEL DRIVE SHAFT REPLACEMENT - RIGHT SIDE (HEAVY DUTY)

Removal Procedure

WARNING: Do not attempt to move vehicle with drive axle(s) removed from wheel bearing. Wheel(s) could fall off, dropping vehicle to the ground and causing personal injury or damage to the vehicle.

1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
2. Remove the tire and wheel assembly. [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#)

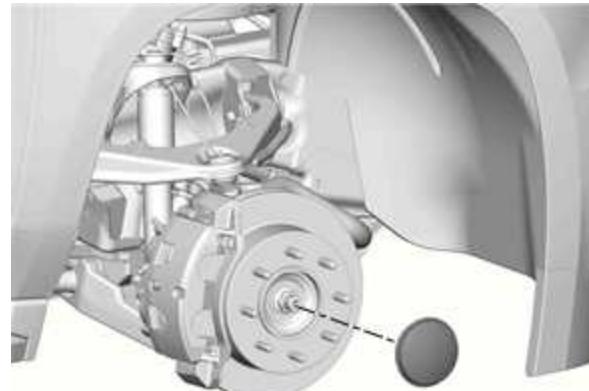


Fig. 27: Front Axle Hub Cap

Courtesy of GENERAL MOTORS COMPANY

3. Remove the front axle hub cap (1) from the wheel hub assembly.

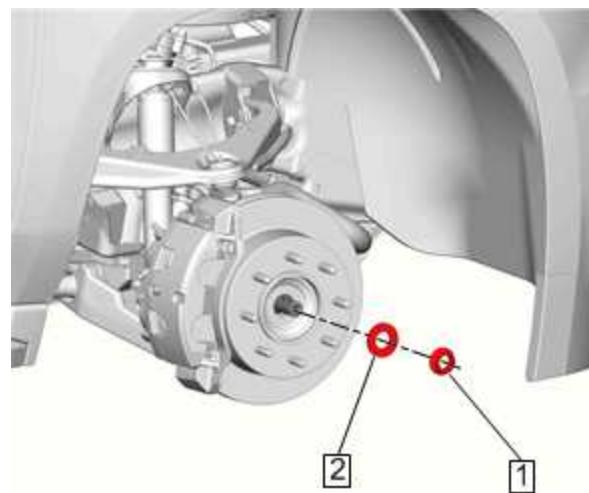


Fig. 28: Nut And Washer

Courtesy of GENERAL MOTORS COMPANY

NOTE: DO NOT reuse the wheel drive shaft nut. Discard and replace with new.

4. Remove the nut (1) and washer (2) from the hub.
5. Remove the steering gear skid shield. [Steering Gear Skid Shield Replacement](#)

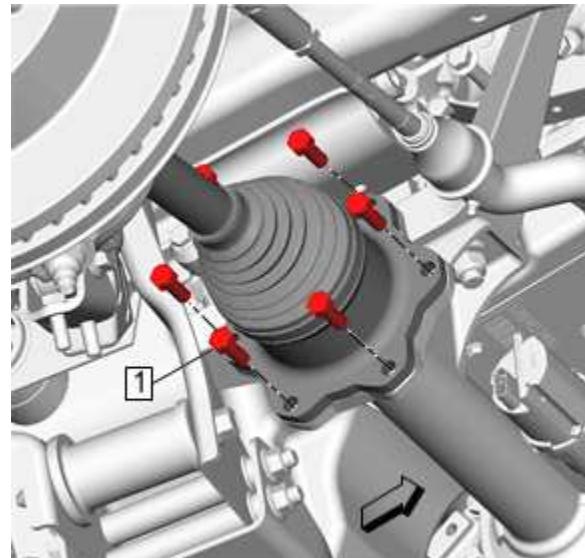


Fig. 29: Wheel Drive Shaft Flange Retaining Bolts

Courtesy of GENERAL MOTORS COMPANY

6. Remove the [6x] wheel drive shaft retaining bolts (1) from the drive flange.
7. Remove the stabilizer link from the lower control arm. [Stabilizer Shaft Link Replacement \(Heavy Duty\)](#)
8. Remove the right shock absorber from the lower control arm. [Shock Absorber and Spring Removal and Installation \(Light Duty, With Z85/Z95\) Shock Absorber and Spring Removal and Installation \(Light Duty, Without Z85/Z95\)](#)
9. Remove the lower control arm from the steering knuckle. [Lower Control Arm Replacement \(Heavy Duty\)](#)
10. Wrap shop towels around both the inner and the outer wheel drive shaft boots in order to avoid damage to the boots during removal and installation.

NOTE: DO NOT remove the shop towel from the wheel drive shaft boots until the wheel drive shaft has been re-installed in the vehicle.

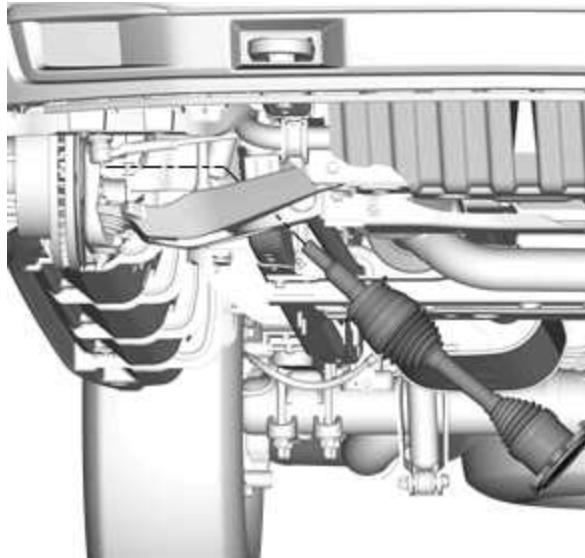


Fig. 30: Lower Control Arm Opening Into Steering Knuckle

Courtesy of GENERAL MOTORS COMPANY

11. Remove the wheel drive shaft through the lower control arm opening.
12. Clean the steering knuckle and the wheel drive shaft splines and threads.

Installation Procedure

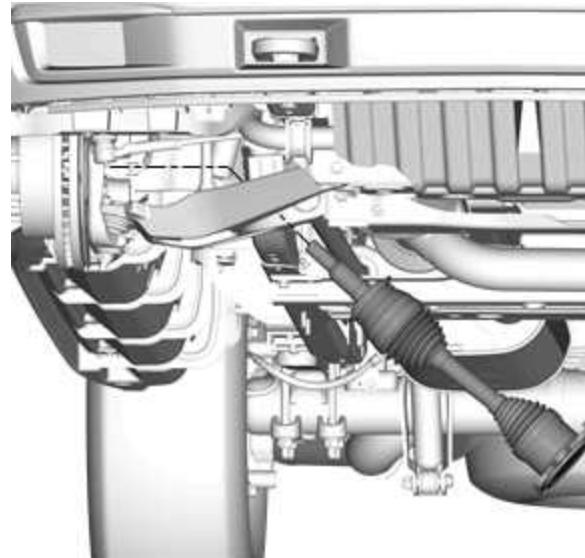


Fig. 31: Lower Control Arm Opening Into Steering Knuckle

Courtesy of GENERAL MOTORS COMPANY

1. Install the wheel drive shaft through the lower control arm opening into the steering knuckle.

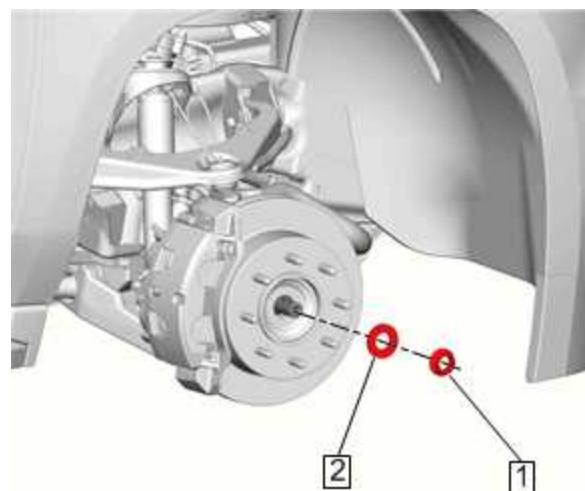


Fig. 32: Nut And Washer

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Use only a genuine GM front wheel drive shaft nut. Installation of anything but an OEM front wheel drive shaft nut could cause damage to the vehicle.

2. Install the NEW nut (1) and washer (2) and finger tighten.

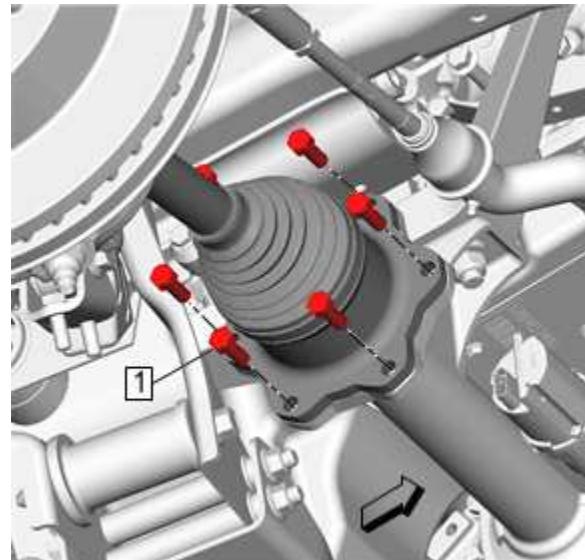


Fig. 33: Wheel Drive Shaft Flange Retaining Bolts

Courtesy of GENERAL MOTORS COMPANY

NOTE: Hand tighten the flange bolts ONLY at this time.

3. Install the [6x] wheel drive shaft flange retaining bolts (1) and finger tighten.

CAUTION: Refer to [Fastener Caution](#)

4. Tighten the wheel drive shaft flange retaining bolts to 79 N.m (58 lb ft).

5. Tighten the wheel drive shaft retaining nut to 255 N.m (188 lb ft).

6. Install the right shock absorber to the lower control arm. [Shock Absorber and Spring Removal and Installation \(Light Duty, With Z85/Z95\) Shock Absorber and Spring Removal and Installation \(Light Duty, Without Z85/Z95\)](#)

7. Install the stabilizer shaft link to the lower control arm. [Stabilizer Shaft Link Replacement \(Heavy Duty\)](#)

8. Install the lower control arm to the steering knuckle. [Lower Control Arm Replacement \(Heavy Duty\)](#)
9. Install the front axle hub cap to the wheel hub assembly.
10. Install the steering gear skid shield. [Steering Gear Skid Shield Replacement](#)
11. Install the tire and wheel assembly. [Tire and Wheel Removal and Installation \(6-Lug Wheel\)](#) [Tire and Wheel Removal and Installation \(8-Lug Wheel\)](#)
12. Lower the vehicle.

FRONT WHEEL DRIVE SHAFT INNER JOINT AND BOOT REPLACEMENT

Special Tools

- **J-35910** Drive Axle Seal Clamp Pliers
- **J-36652-98** Drive Axle Clamp Swage Tool

Disassemble Procedure

1. Remove the wheel drive shaft. Refer to [Front Wheel Drive Shaft Replacement - Left Side \(1500\)](#) [Front Wheel Drive Shaft Replacement - Left Side \(Heavy Duty\)](#), or refer to [Front Wheel Drive Shaft Replacement - Right Side \(1500\)](#) [Front Wheel Drive Shaft Replacement - Right Side \(Heavy Duty\)](#).

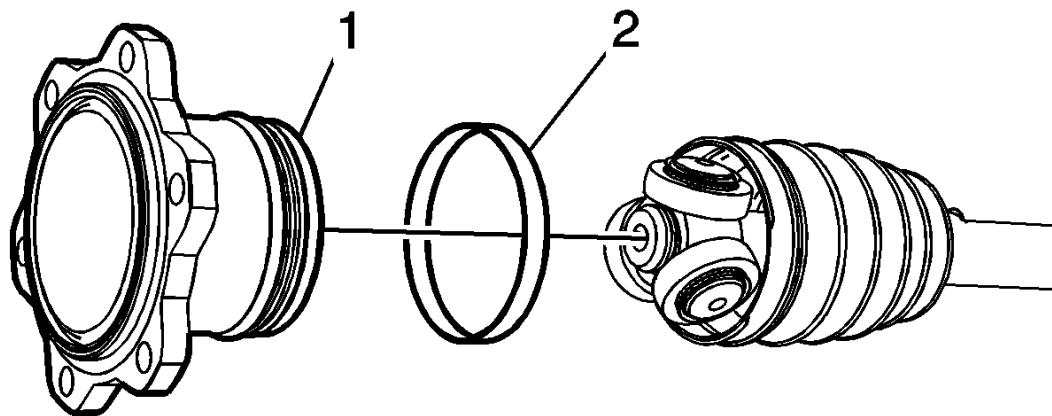


Fig. 34: View Of Tripot Housing, Boot & Clamp

Courtesy of GENERAL MOTORS COMPANY

NOTE: Use caution when removing the tripot housing (1).

2. Using the appropriate tool, remove the boot clamp (2).
3. Remove the tripot housing (1).

NOTE: If using denatured alcohol or any other recommend cleaning solvent, allow the tripot housing to air dry.

4. Remove any grease from of the housing (1).

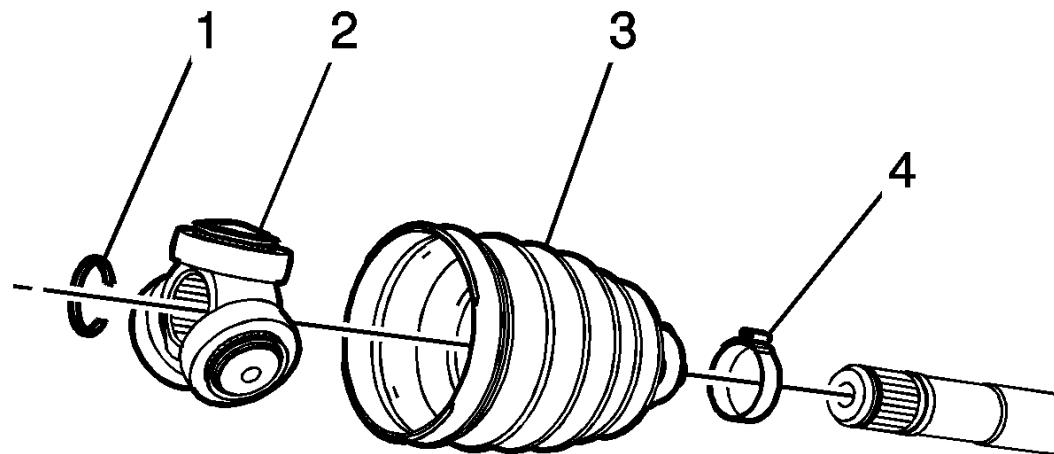


Fig. 35: View Of Spider Assembly, Boot & Retaining Ring

Courtesy of GENERAL MOTORS COMPANY

5. Using side cutters, remove the small boot retaining clamp (4).

6. Using the appropriate tool, remove the retaining ring (1), then the spider assembly (2), and the boot (3).

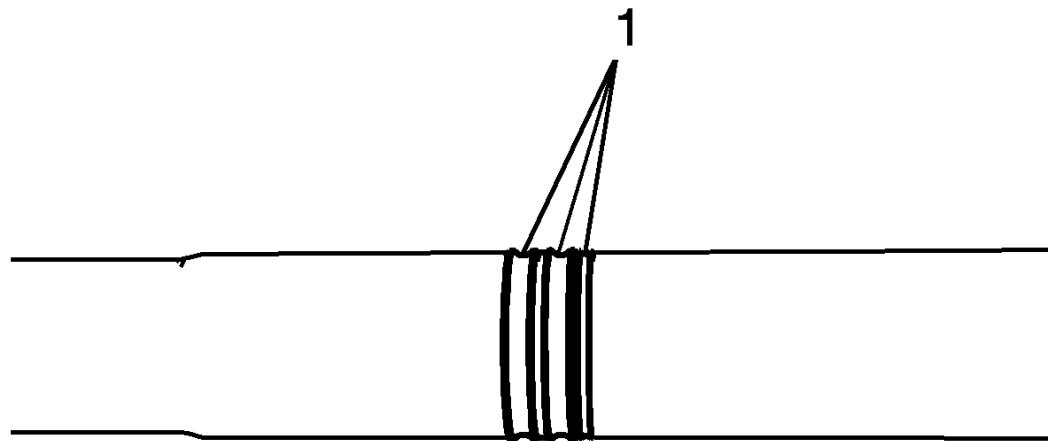


Fig. 36: Identifying Seal Area Mounting Grooves

Courtesy of GENERAL MOTORS COMPANY

7. Using the appropriate tool, remove the any rust in the seal mounting area (grooves) (1).
8. If any of the internal components of the tripot assembly are found to be damaged or have excessive wear, replace the tripot as an assembly.

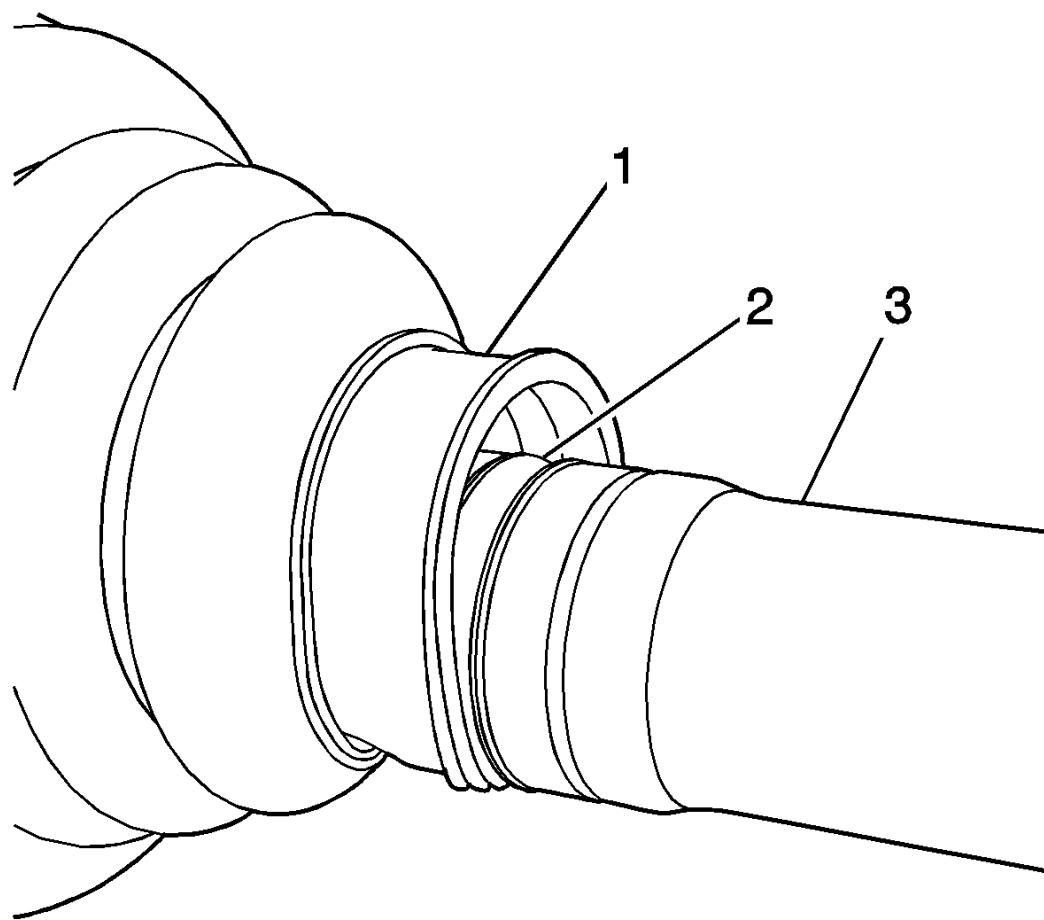
Assemble Procedure

Fig. 37: Identifying Groove In Wheel Drive Shaft

Courtesy of **GENERAL MOTORS COMPANY**

1. Position the boot (1) so that it is seated properly in the groove (2) in the wheel drive shaft (3).

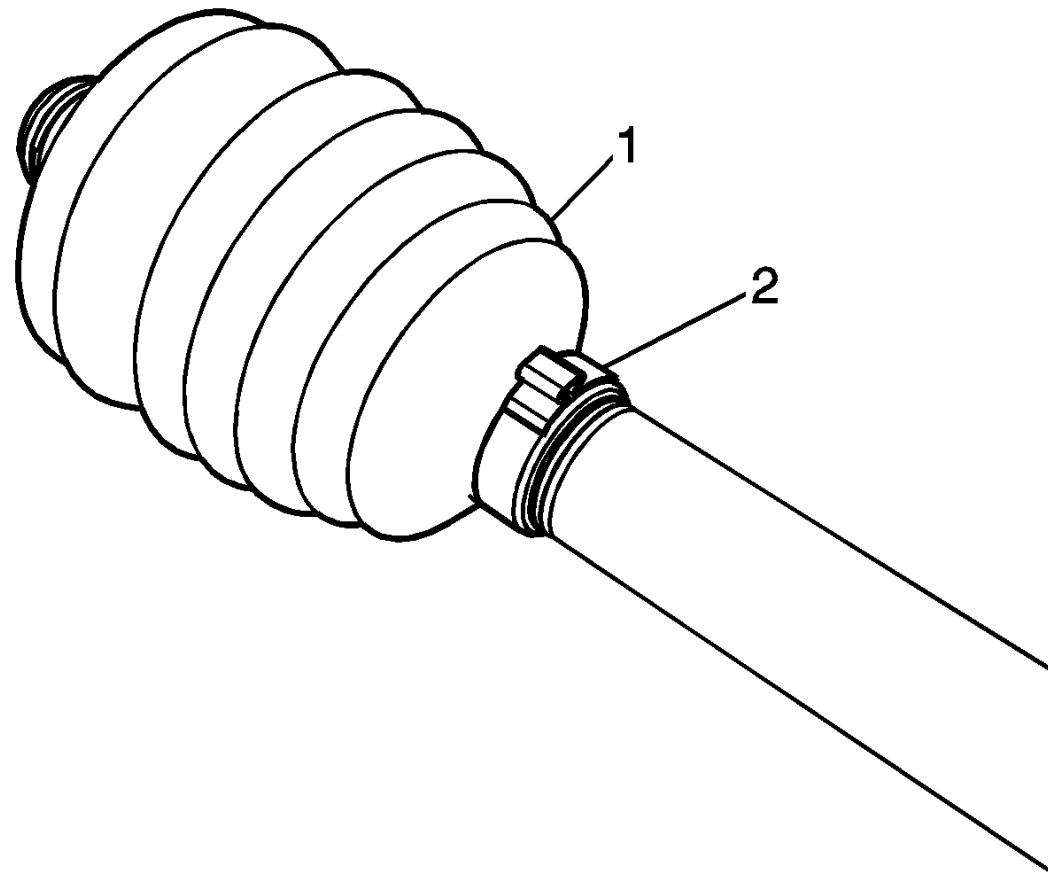


Fig. 38: Identifying Boot & Small Clamp
Courtesy of GENERAL MOTORS COMPANY

2. Install the small boot clamp (2) on the boot (1).

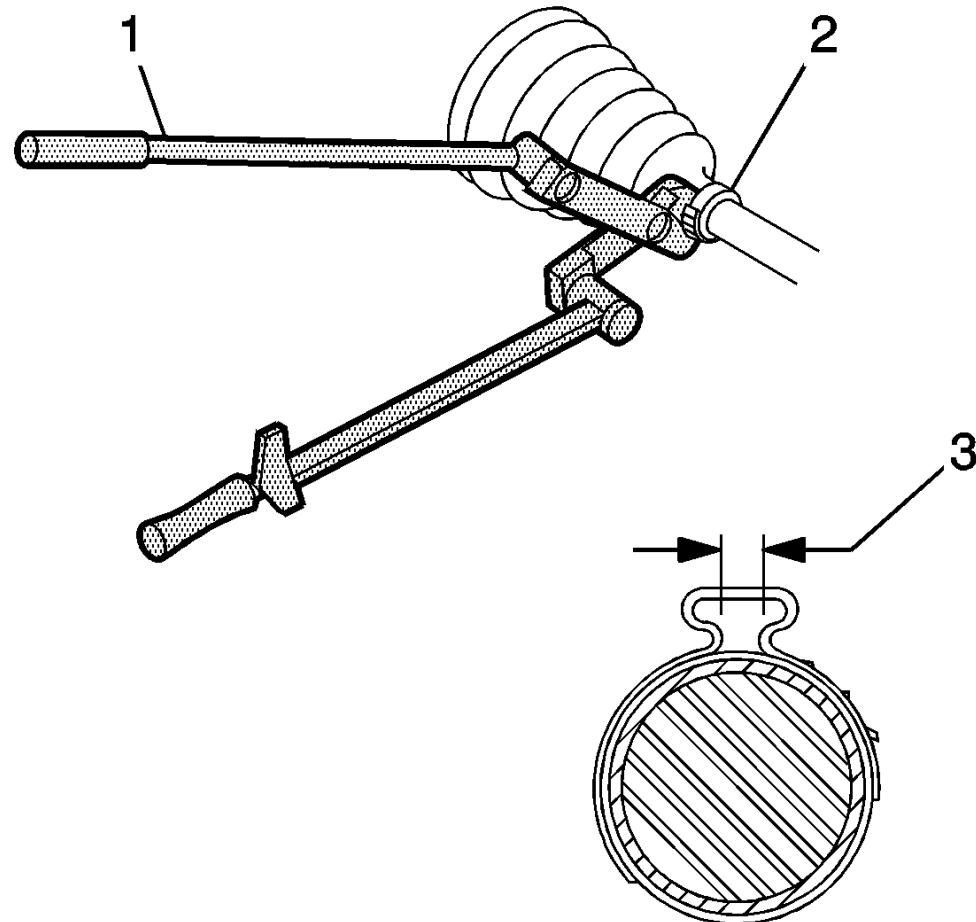


Fig. 39: Identifying Pliers Breaker Bar, Torque Wrench, Ratchet & Gap Measurement

Courtesy of GENERAL MOTORS COMPANY

3. Using the **J-35910** pliers, a breaker bar, and a torque wrench (1), close the boot clamp (2) until the gap (3) measures 2.15 mm (0.085 inch).

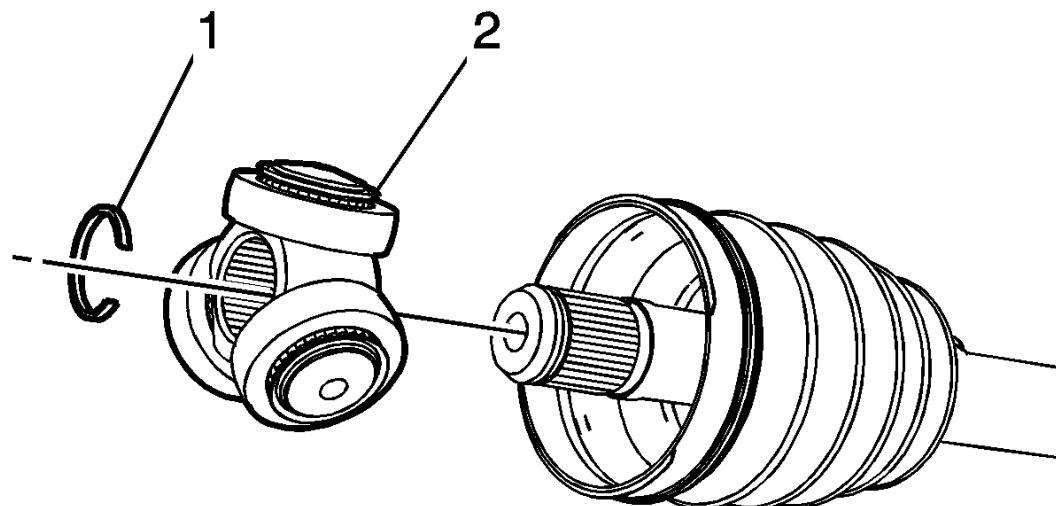


Fig. 40: View Of Spider Assembly & Retaining Ring

Courtesy of GENERAL MOTORS COMPANY

4. Install the spider assembly (2).
5. Using the appropriate tool, install the retaining ring (1).

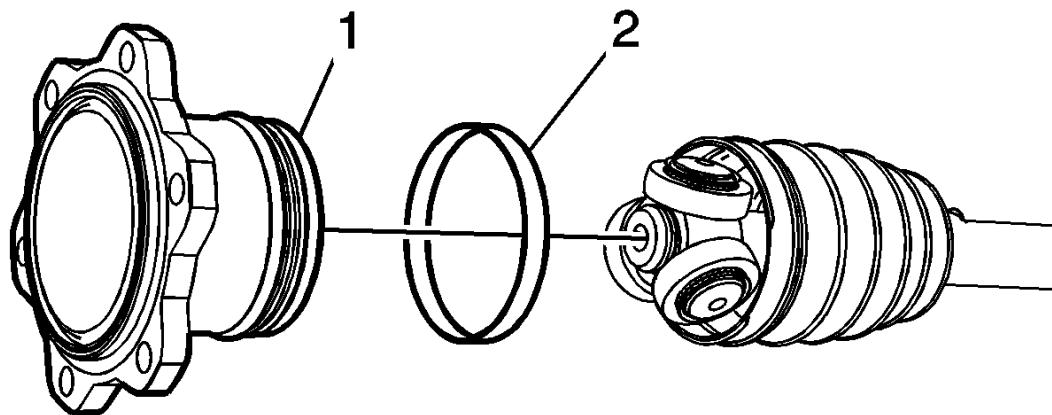


Fig. 41: View Of Tripot Housing, Boot & Clamp

Courtesy of GENERAL MOTORS COMPANY

NOTE: Position the boot clamp so that it is at the small end of the boot.

6. Install the tripot assembly (1) and the boot clamp (2)

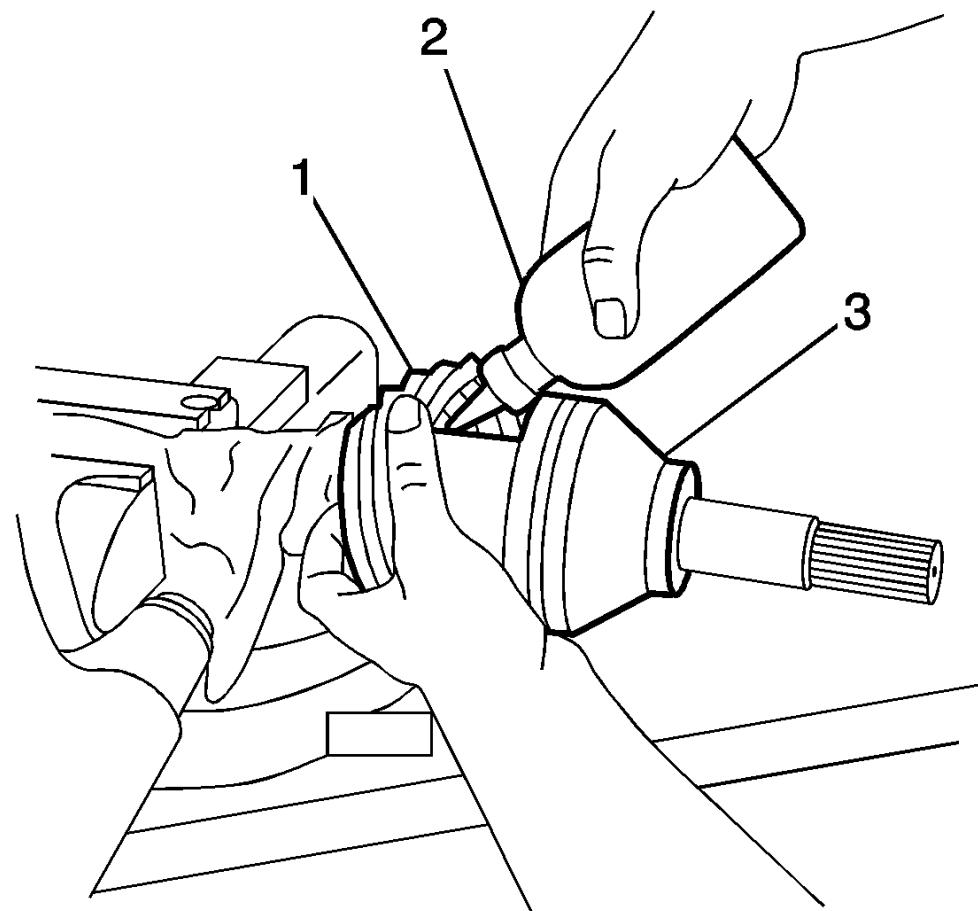


Fig. 42: Adding Lubricant Into Axle Boot

Courtesy of GENERAL MOTORS COMPANY

7. Place approximately half of the lubricant (2) in the boot (1) and the remaining half in the tripot housing (3).

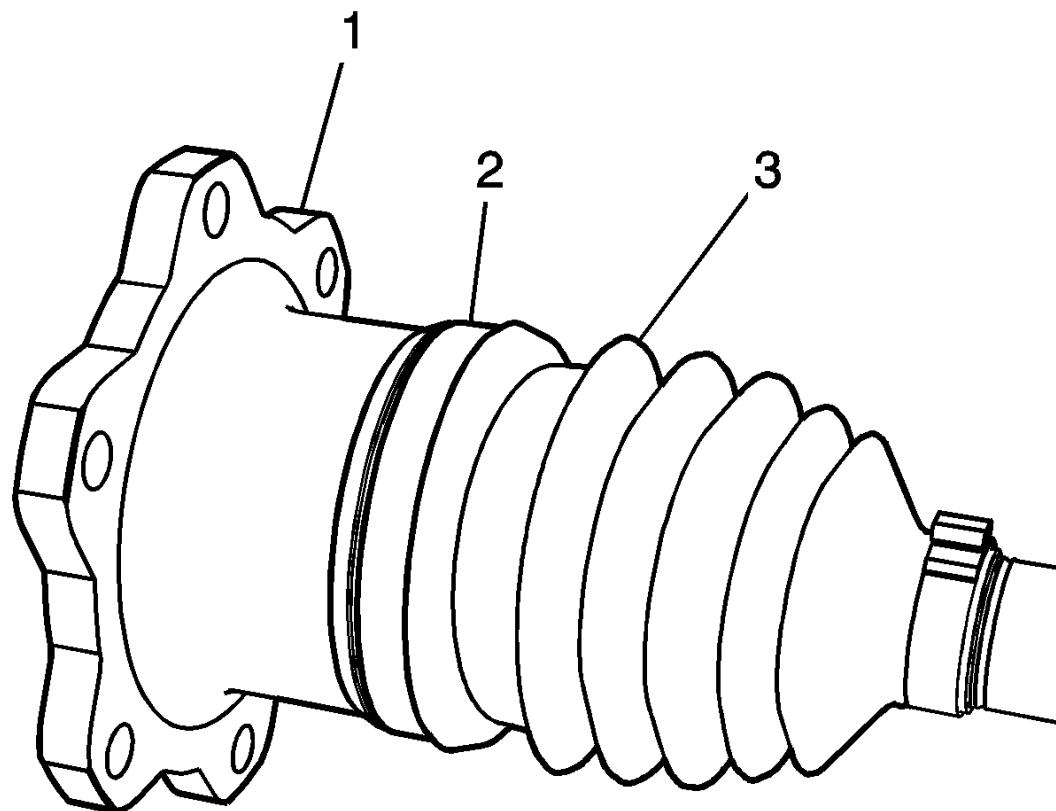


Fig. 43: View Of Tripot Housing, Boot & Clamp

Courtesy of GENERAL MOTORS COMPANY

NOTE: Pinch the slightly by hand in order to distort it into an oval shape.

8. Install the boot (1) and the boot clamp (2) on the tripot housing (3).

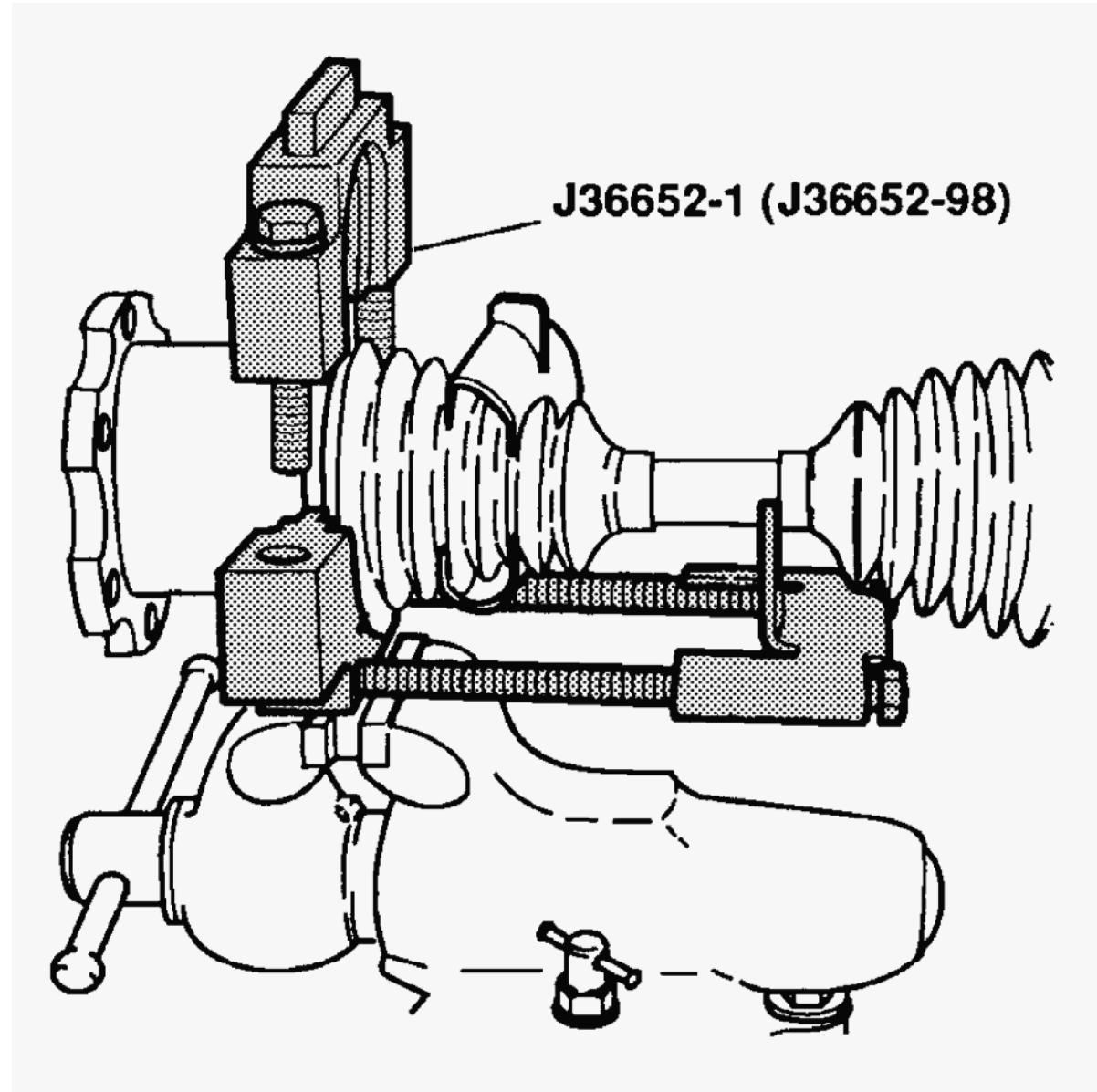


Fig. 44: Assembling Bolts And Support Plate To Base Of J 36652-98

Courtesy of GENERAL MOTORS COMPANY

9. Assemble the bolts and the support plate to the base of the **J-36652-98** tool and secure the base in a vise.

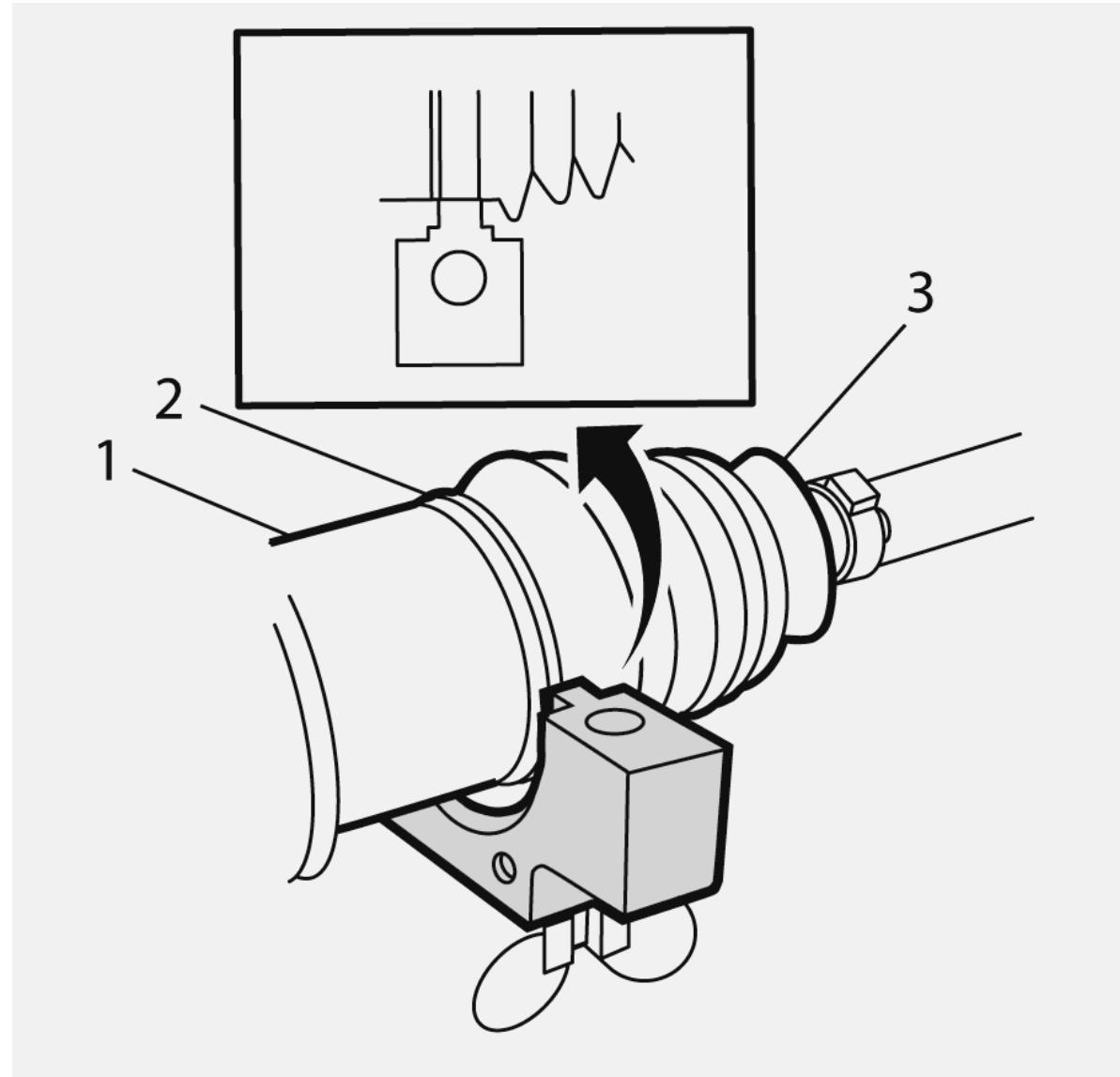


Fig. 45: Swage Ring

Courtesy of GENERAL MOTORS COMPANY

10. Position the tripot end of the wheel drive shaft assembly into the base of the **J-36652-98** tool.
11. Install the top half of the **J-36652-98** tool.
12. Align the boot clamp (2) and the clamp.

NOTE: **Hand tighten the bolts until the bolts are snug.**

13. Insert the bolts.
14. Align the tripot boot, tripot housing, and the boot clamp.

NOTE: **Alternate between the bolts until both sides of the top half of the tool touch the bottom half.**

15. Tighten each bolt 180 degrees at a time.
16. Loosen the bolts and remove the halfshaft assembly from the tool.

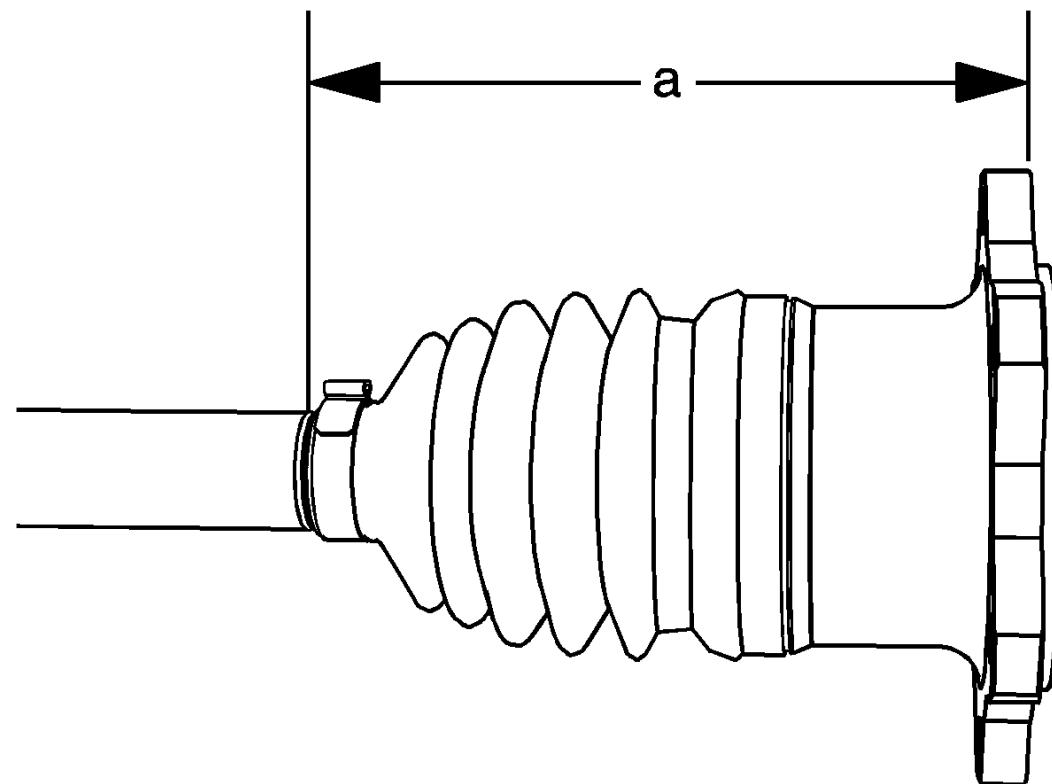


Fig. 46: Measuring Axle, Boot & Tripot Housing Length

Courtesy of GENERAL MOTORS COMPANY

17. Inspect the inboard stroke position. Measurement (a) should be 178 mm (7.01 in).
18. Install the wheel drive shaft. Refer to [Front Wheel Drive Shaft Replacement - Left Side \(1500\)](#)
[Front Wheel Drive Shaft Replacement - Left Side \(Heavy Duty\)](#), or refer to [Front Wheel Drive Shaft Replacement - Right Side \(1500\)](#)
[Front Wheel Drive Shaft Replacement - Right Side \(Heavy Duty\)](#).

FRONT WHEEL DRIVE SHAFT OUTER JOINT AND BOOT REPLACEMENT

Special Tools

- **J-8059** Snap Ring Pliers
- **J-35910** Drive Axle Seal Clamp Pliers
- **J-36652-1** Drive Axle Clamp Swage Tool
- **J-36652-2** Axle Swage Tool

Removal Procedure

1. Remove the wheel drive shaft. Refer to [Front Wheel Drive Shaft Replacement - Left Side \(1500\)](#)[Front Wheel Drive Shaft Replacement - Left Side \(Heavy Duty\)](#), refer to [Front Wheel Drive Shaft Replacement - Right Side \(1500\)](#)[Front Wheel Drive Shaft Replacement - Right Side \(Heavy Duty\)](#).

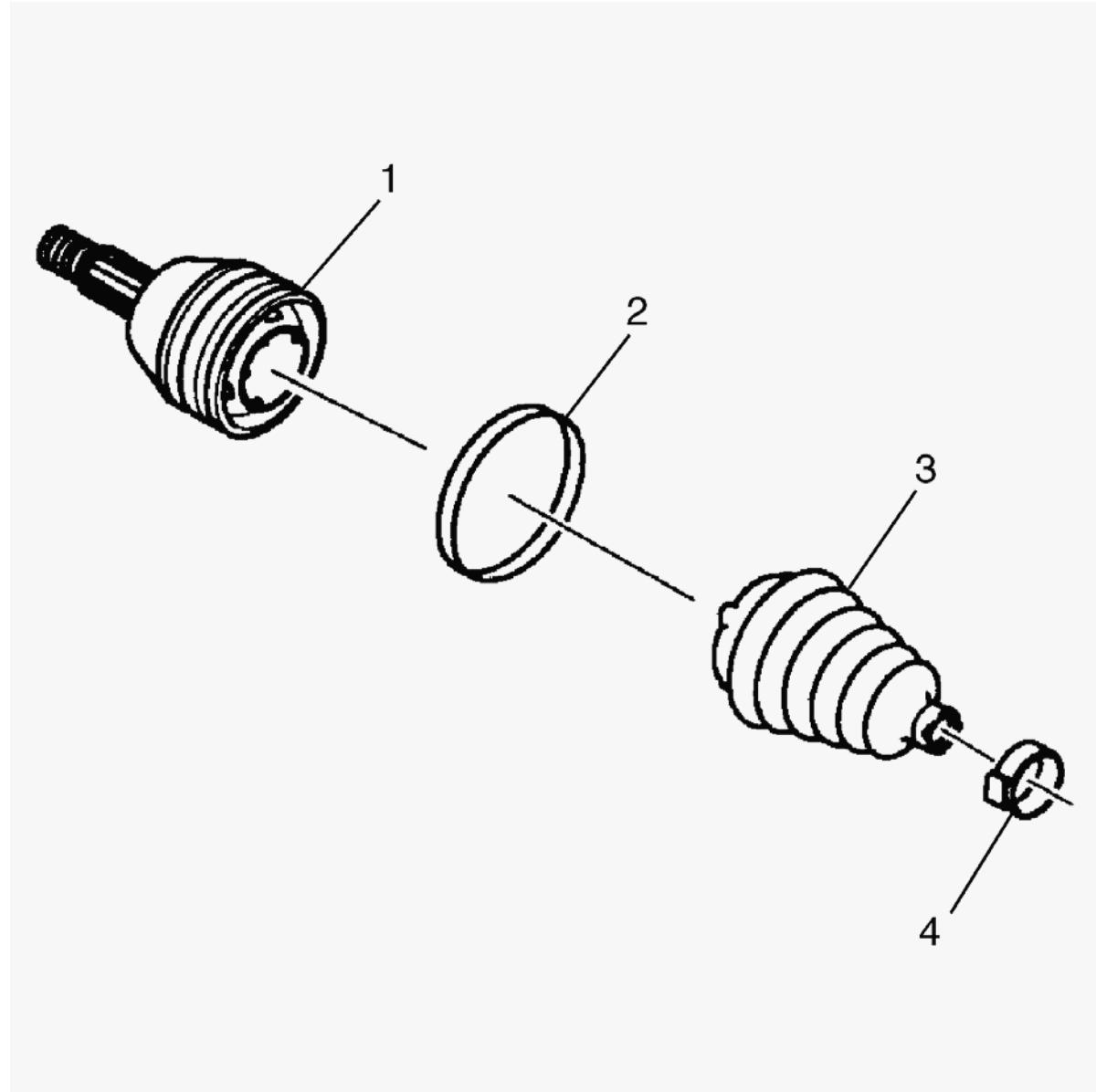


Fig. 47: CV Joint Outer Race, Swage Ring, Boot & Small Boot Clamp

Courtesy of GENERAL MOTORS COMPANY

NOTE: Use caution when using the hand grinder by the CV joint outer race (1).

2. Use a hand grinder to cut through the swage ring (2).
3. Use side cutters to cut off the small boot clamp (4).

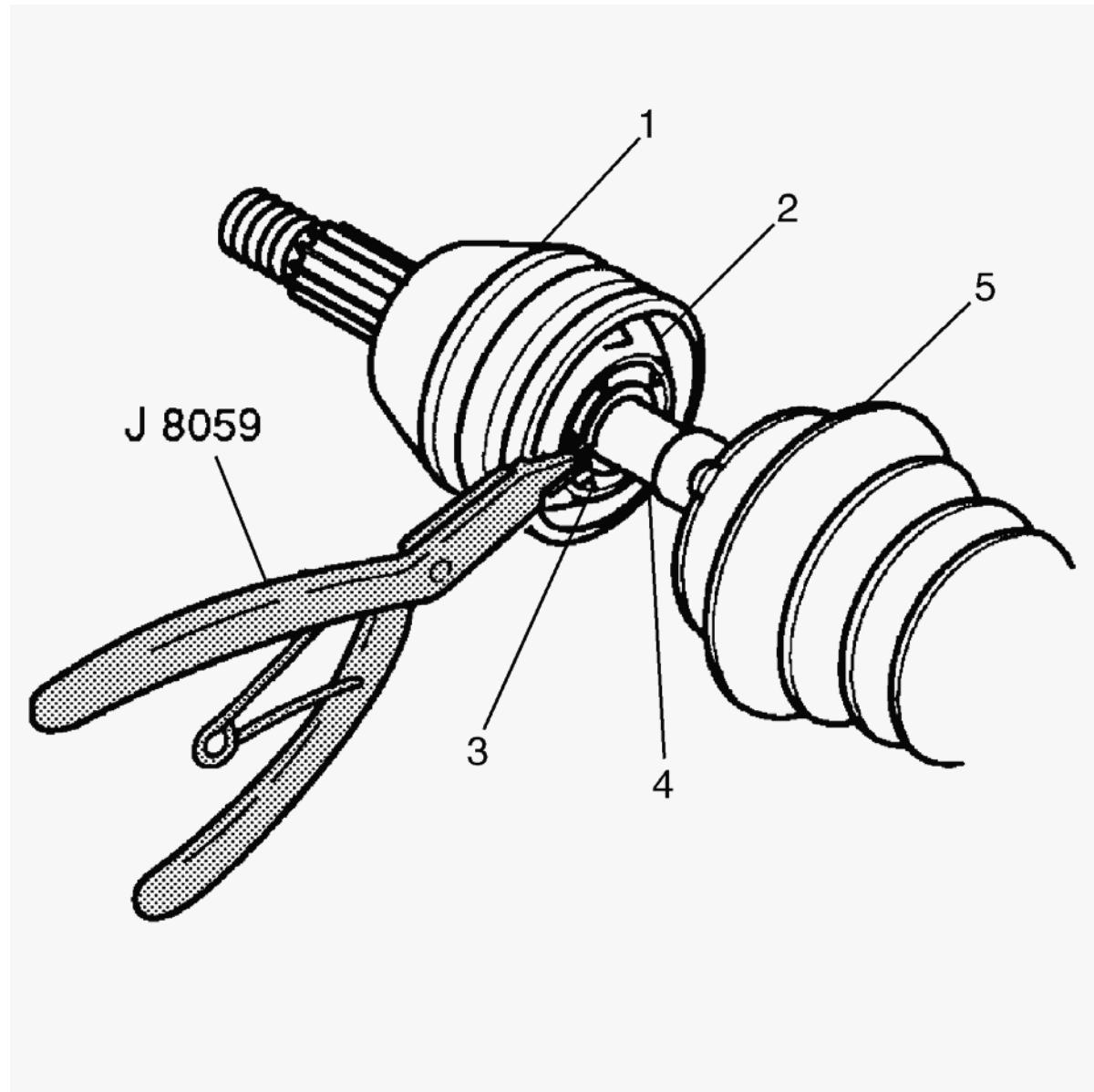


Fig. 48: Boot, Halfshaft Bar And CV Joint Outer Race
Courtesy of GENERAL MOTORS COMPANY

4. Slide the boot (5) down the halfshaft bar (4) and away from the CV joint outer race (1).
5. Wipe all grease away from the face of the CV joint.
6. Find the halfshaft bar retaining snap ring (3), which is located in the inner race (2).
7. Spread the snap ring ears apart using **J-8059** snap ring pliers (or equivalent).
8. Pull the CV joint (1) and the CV joint boot (5) from the halfshaft bar (4).
9. Discard the old CV joint boot (5).

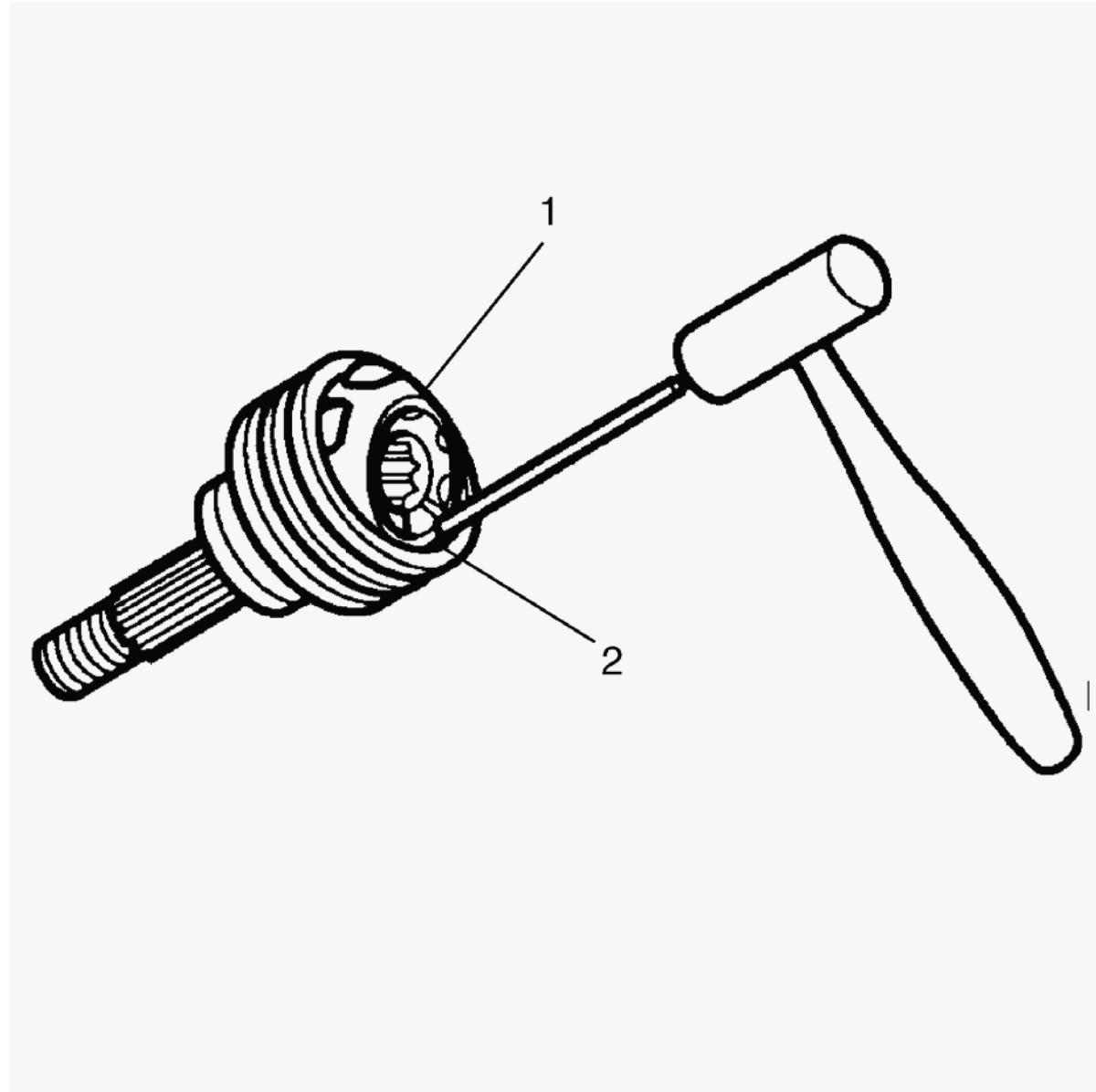


Fig. 49: Tapping Gently On Brass Drift With A Hammer In Order To Tilt Cage

Courtesy of GENERAL MOTORS COMPANY

10. Place a brass drift against the CV joint cage (1).
11. Tap gently on the brass drift with a hammer in order to tilt the cage (1).

12. Remove the first chrome alloy ball (2) when the CV joint cage (1) tilts.
13. Tilt the CV joint cage (1) in the opposite direction to remove the opposing chrome alloy ball (2).
14. Repeat this process to remove all six of the balls.

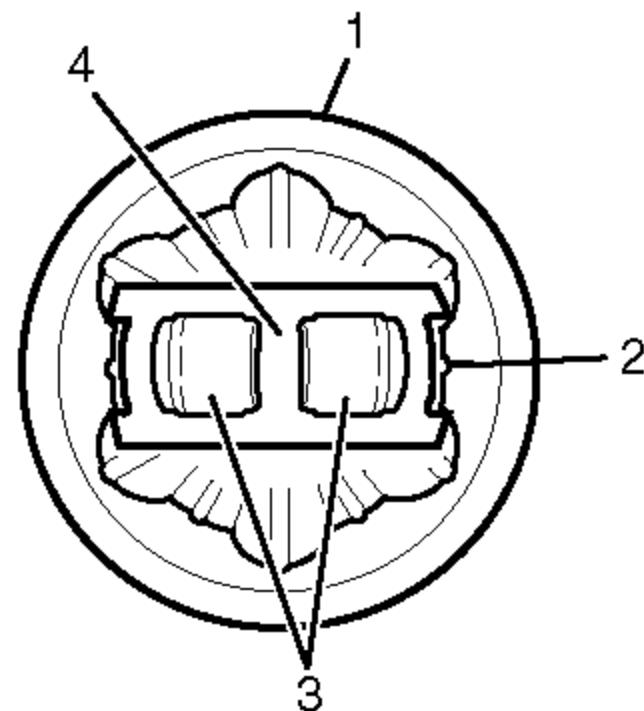


Fig. 50: View Of Outer Race, Inner Race, Cage Window & CV Joint Cage

Courtesy of GENERAL MOTORS COMPANY

15. Pivot the CV joint cage (4) and the inner race 90 degrees to the center line of the outer race (1). At the same time, align the cage windows (3) with the lands of the outer race (2).
16. Lift out the cage (4) and the inner race.

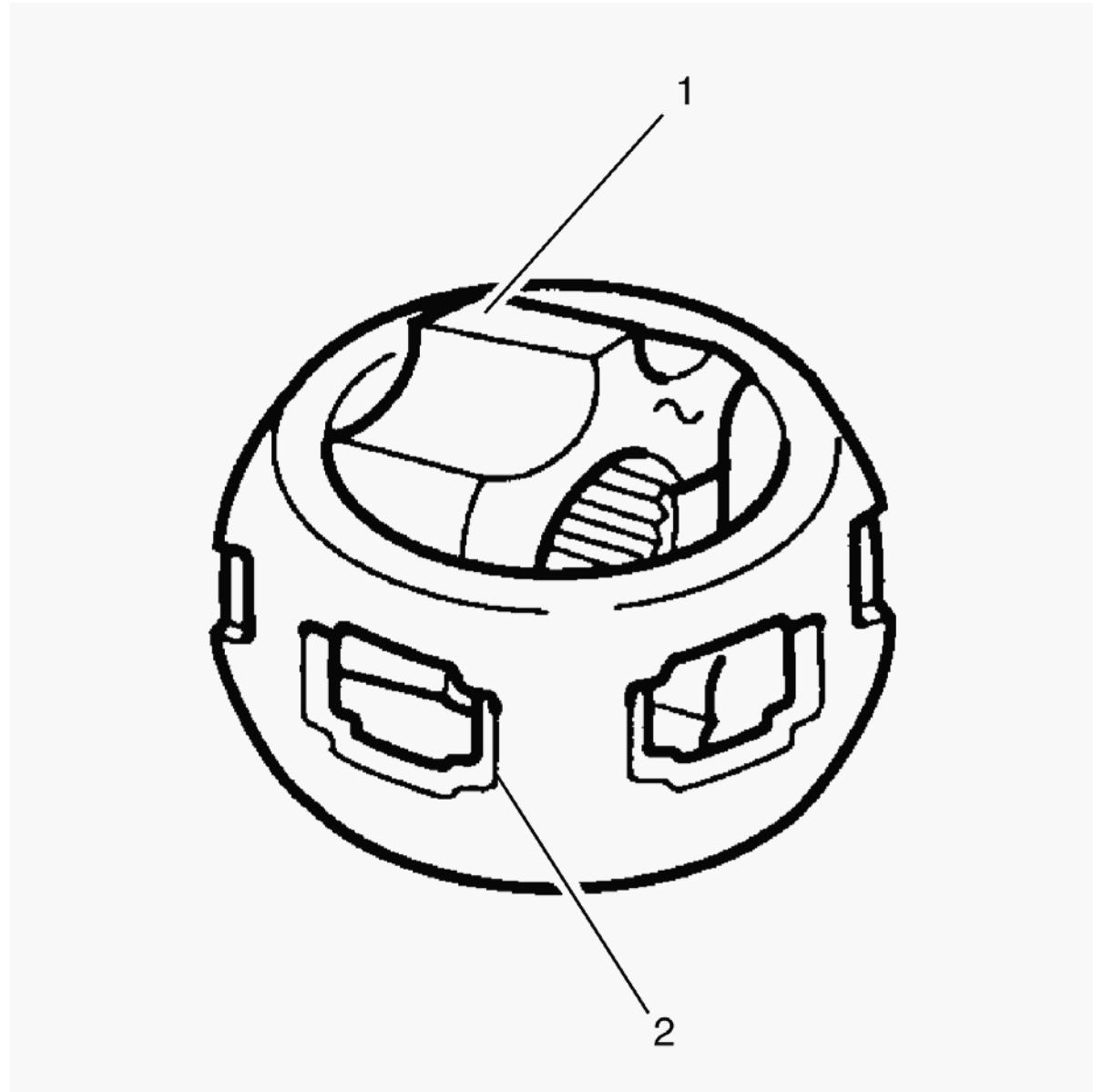


Fig. 51: View Of Inner Race & Cage

Courtesy of GENERAL MOTORS COMPANY

17. Remove the inner race (1) from the cage (2) by rotating the inner race (1) upward.
18. Clean the following items thoroughly with cleaning solvent. Remove all traces of old grease and any contaminates.

1. The inner and outer race assemblies
 2. The CV joint cage
 3. The chrome alloy balls
19. Dry all the parts.
20. Check the CV joint assembly for unusual wear, cracks, or other damage.
21. Replace any damaged parts.
22. Clean the halfshaft bar. Use a wire brush to remove any rust in the seal mounting area (grooves).

Installation Procedure

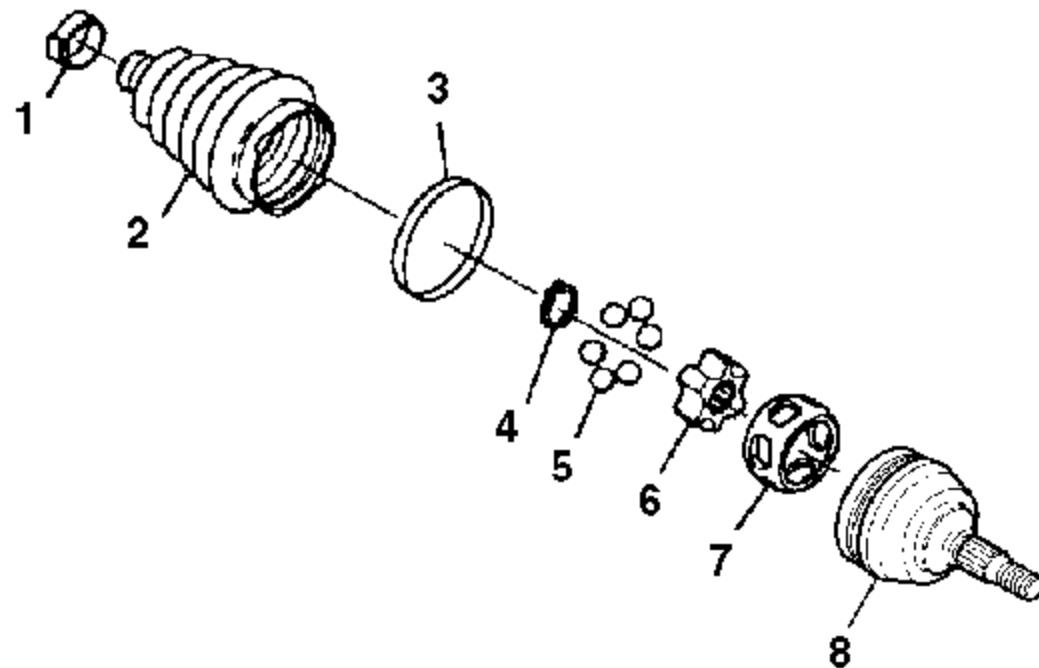


Fig. 52: Exploded View Of Wheel Drive Shaft Outer Joint

Courtesy of GENERAL MOTORS COMPANY

1. Inspect all of the parts for unusual wear, cracks, or other damage. Replace the CV joint assembly if necessary.
2. Put a light coat of the recommended grease on the inner (6) and the outer race (8) grooves.

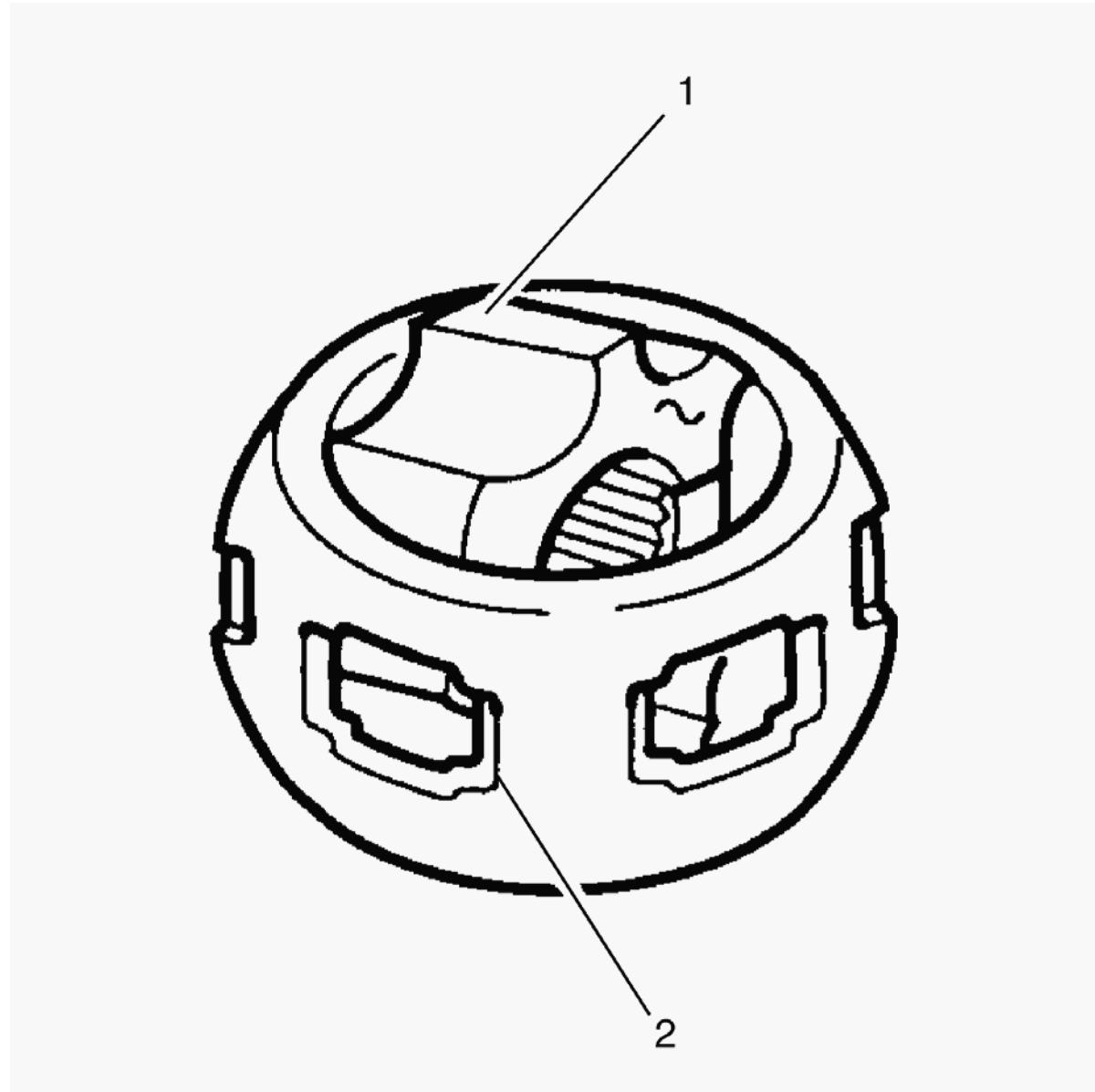


Fig. 53: View Of Inner Race & Cage

Courtesy of **GENERAL MOTORS COMPANY**

3. Hold the inner race (1) at 90 degrees to the centerline of the cage (2).
4. Align the lands of the inner race (1) with the windows of the cage (2).

5. Insert the inner race (1) into the cage (2), by rotating the inner race (1) downward.

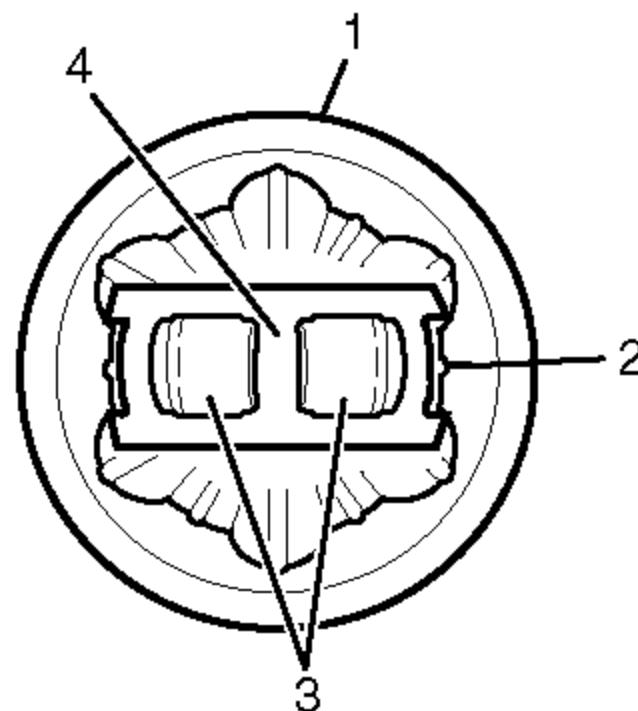


Fig. 54: View Of Outer Race, Inner Race, Cage Window & CV Joint Cage

Courtesy of GENERAL MOTORS COMPANY

6. Insert the cage (4) and inner race into the outer race (1).

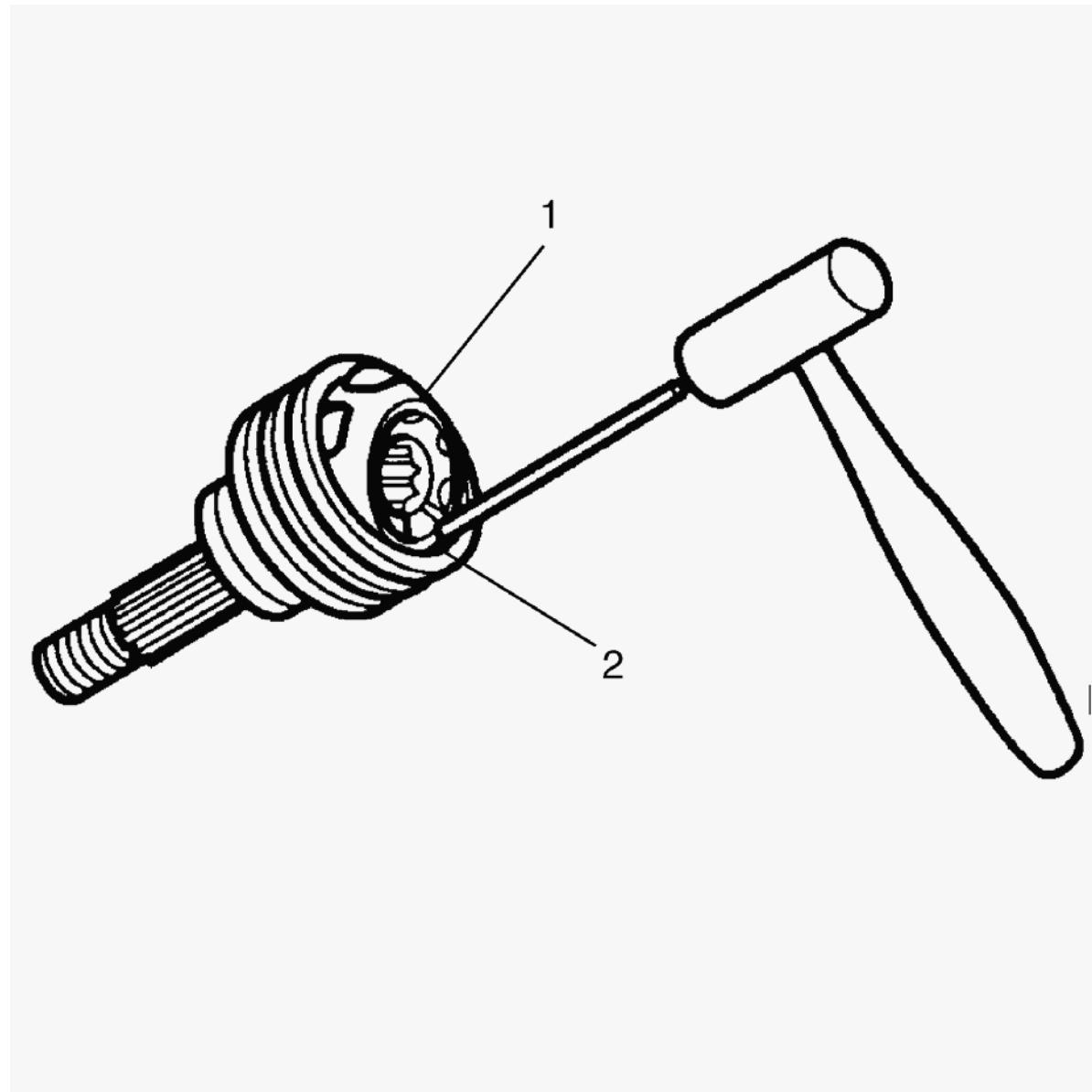


Fig. 55: Tapping Gently On Brass Drift With A Hammer In Order To Tilt Cage

Courtesy of GENERAL MOTORS COMPANY

7. Place a brass drift against the CV joint cage (1).
8. Tap gently on the brass drift with a hammer in order to tilt the cage (1).
9. Install the first chrome alloy ball (2) when the CV joint cage (1) tilts.
10. Tilt the CV joint cage (1) in the opposite direction to install the opposing chrome alloy ball (2).
11. Repeat this process in order to install all six of the balls.

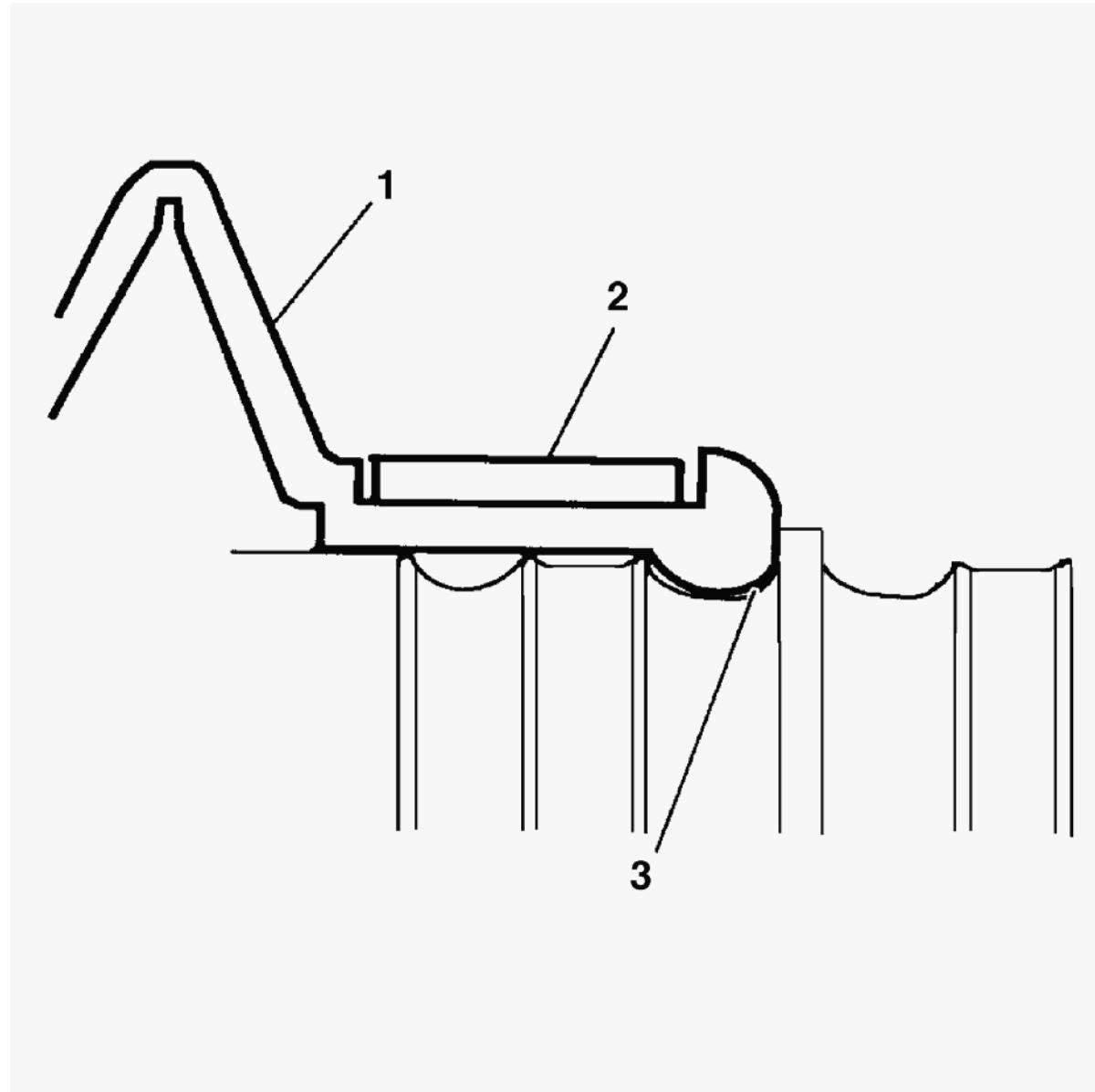


Fig. 56: Positioning Small End Of Joint Seal Into Joint Seal Groove

Courtesy of GENERAL MOTORS COMPANY

12. Pack the CV joint boot (1) and the CV joint assembly with the grease supplied in the kit. The amount of grease supplied in this kit has been pre-measured for this application.

13. Place the new small boot clamp (2) onto the CV joint seal (1).
14. Slide the CV joint boot (1) onto the halfshaft bar.
15. Position the small end of the CV joint boot (1) into the joint boot groove (3) on the halfshaft bar.

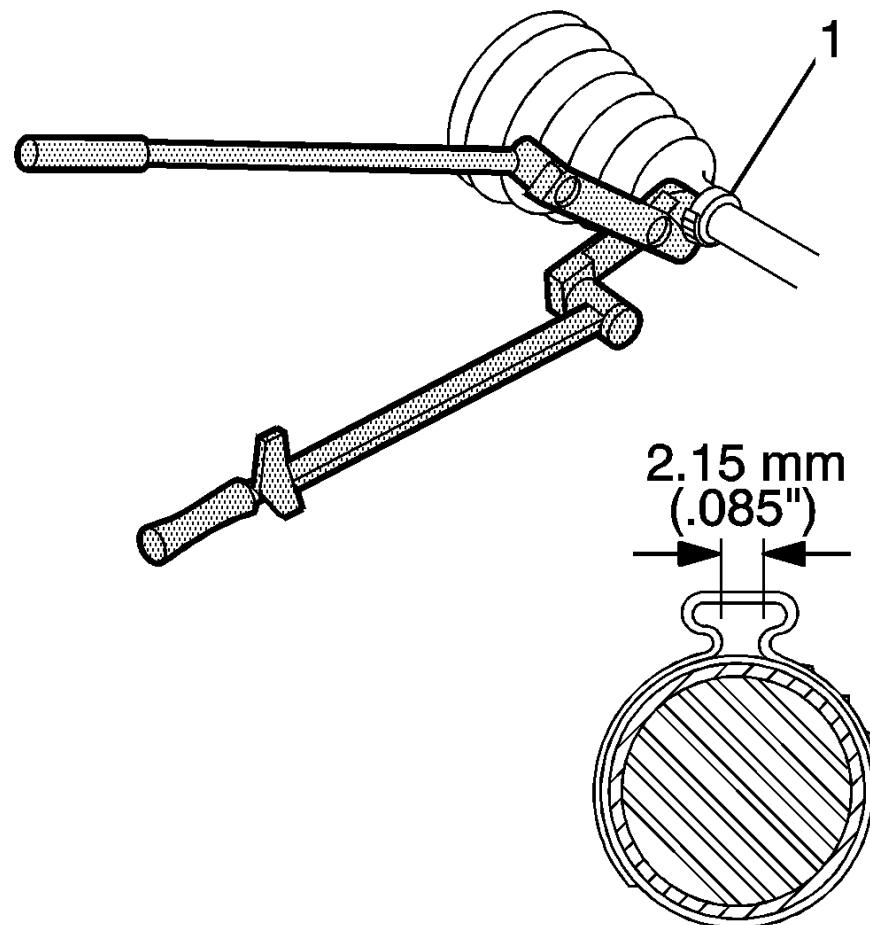


Fig. 57: View Of CV Joint Seal Retaining Clamp

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

16. Secure the small boot clamp (1) using **J-35910** drive axle seal clamp pliers (or equivalent), a breaker bar, and a torque wrench.
17. Crimp the boot clamp to the gap of 2.15 mm (.085 in).
18. Check the gap dimension on the clamp ear. Continue tightening until the gap dimension is reached.

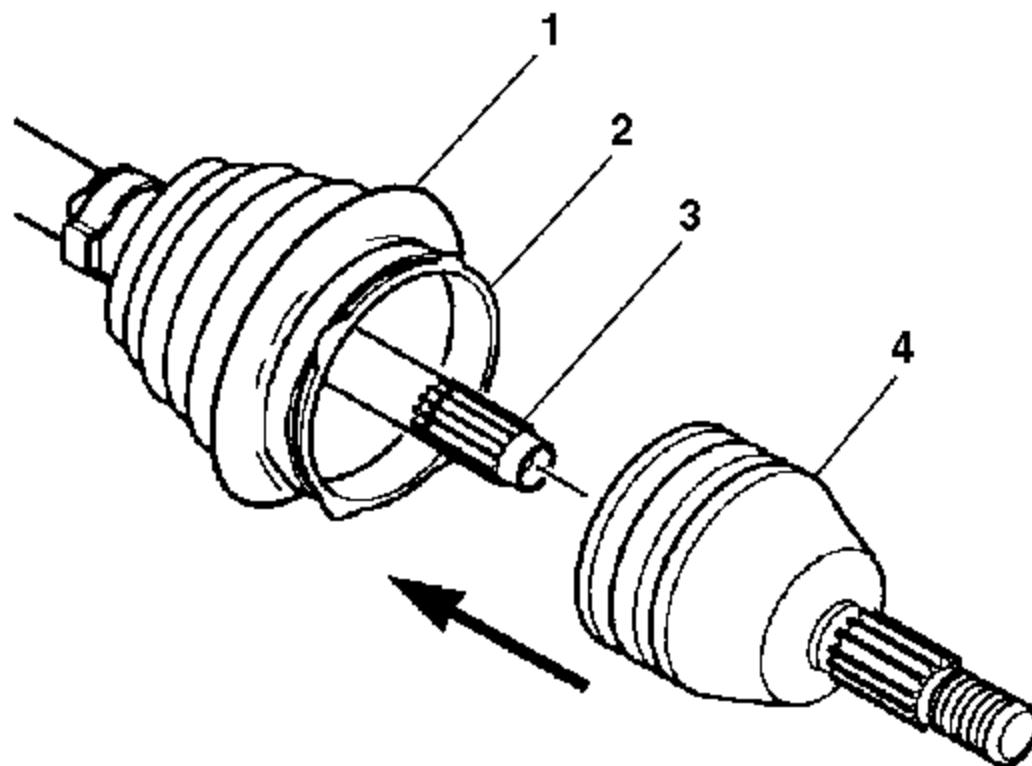


Fig. 58: CV Boot, Swage Ring, Halfshaft Bar & CV Joint

Courtesy of GENERAL MOTORS COMPANY

19. Pinch the new swage ring (2) slightly by hand to distort it into an oval shape.
20. Slide the distorted swage ring (2) over the large diameter of the boot (1).

NOTE: Be sure that the retaining ring side of the CV joint inner race faces the halfshaft bar (3) before installation.

21. Slide the CV joint (4) onto the halfshaft bar (3). The retaining snap ring inside of the inner race engages in the halfshaft bar groove with a click when the CV joint (4) is in the proper position.
22. Pull on the CV joint (4) to verify engagement.
23. Slide the large diameter of the CV joint boot (1), with the large swage ring (2) in place, over the outside edge of the CV joint outer race (4).

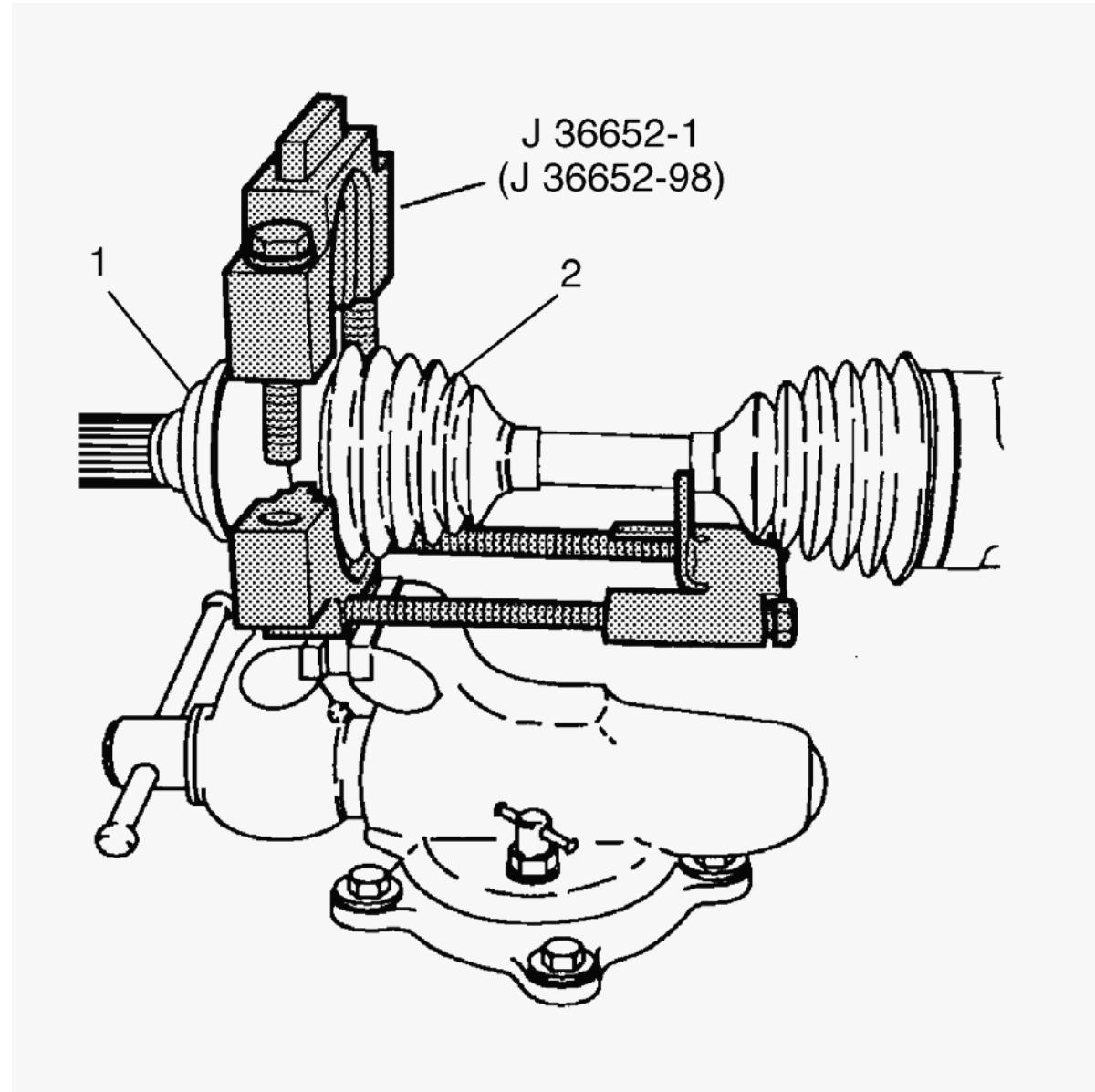


Fig. 59: Clamping CV Joint Boot

Courtesy of GENERAL MOTORS COMPANY

24. Clamp the CV joint boot (2) tightly to the CV joint outer race (1) with the large swage ring (4), using the following procedure:
25. For the 1500 models, assemble the bolts and the support plate to the base of the **J-36652-1** drive axle clamp swage tool and secure the base in a

vise. For the 2500 and 3500 models, use the **J-36652-2** axle swage tool.

26. Position the CV joint end (outboard end) of the halfshaft assembly in the bottom half of **J-36652-1** drive axle clamp swage tool or **J-36652-2** axle swage tool.

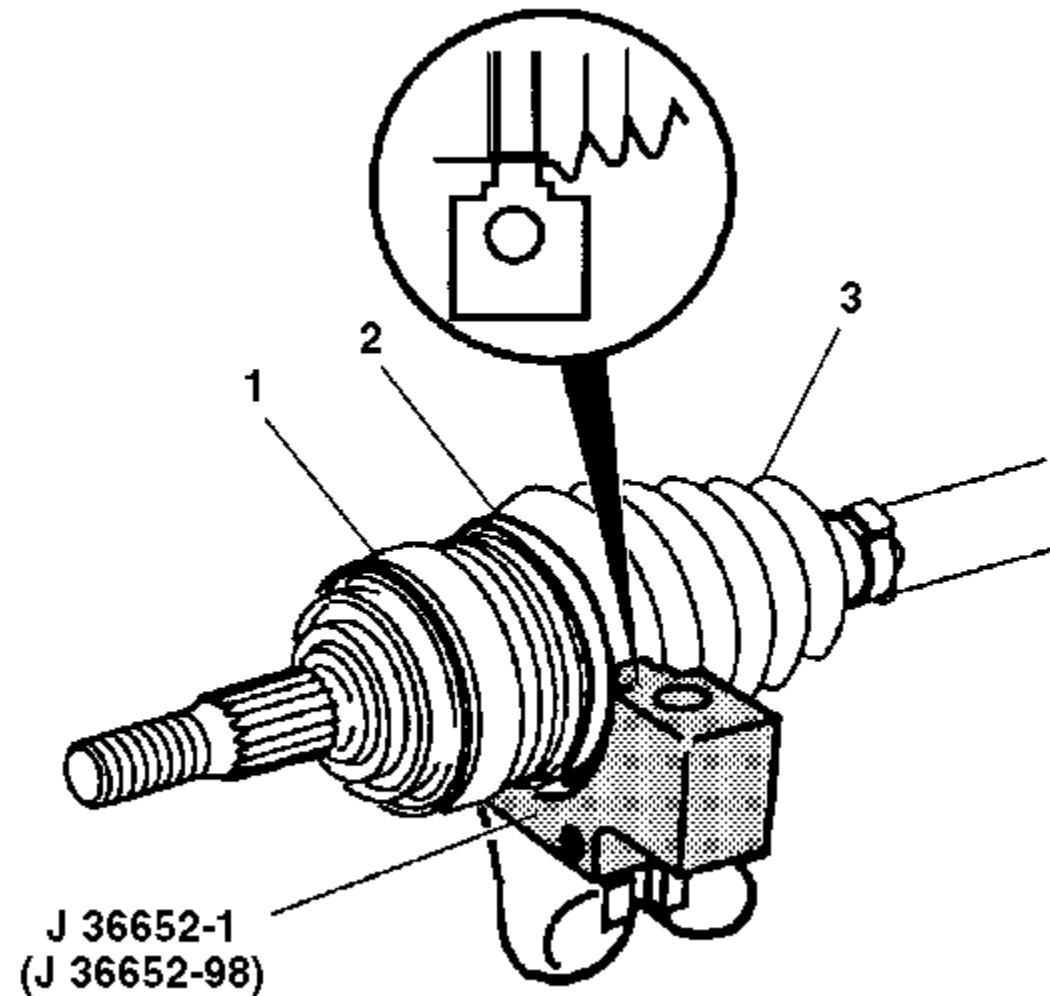


Fig. 60: Align Swage Ring And Swage Ring Clamp

Courtesy of GENERAL MOTORS COMPANY

27. Align the following during this procedure:

- The CV joint boot (3)
- The CV joint assembly (1)
- The swage ring (2)

28. Install the top half of **J-36652-1** drive axle clamp swage tool or **J-36652-2** axle swage tool onto the lower half of the tool, over the CV joint boot (3) and the CV joint assembly (1).

29. Align the swage ring (2) and the swage ring clamp.

30. Insert the bolts into **J-36652-1** drive axle clamp swage tool or **J-36652-2** axle swage tool. Hand tighten the bolts until the bolts are snug.

Tighten

Tighten each bolt 180 degrees at a time. Alternate between the bolts until both sides of the top half of the tool touch the bottom half of the tool.

31. Loosen the bolts and remove the halfshaft assembly from the tool.

32. Install the wheel drive shaft. Refer to [**Front Wheel Drive Shaft Replacement - Left Side \(1500\)**](#)
[**Front Wheel Drive Shaft Replacement - Left Side \(Heavy Duty\)**](#), or refer to [**Front Wheel Drive Shaft Replacement - Right Side \(1500\)**](#)
[**Front Wheel Drive Shaft Replacement - Right Side \(Heavy Duty\)**](#).

DESCRIPTION AND OPERATION

WHEEL DRIVE SHAFTS DESCRIPTION AND OPERATION

Front Wheel Drive Shafts are flexible assemblies which consist of the following components:

- Front wheel drive shaft constant velocity joint outer joint.
- Front wheel drive shaft tri-pot joint inner joint.
- The front wheel drive shaft connects the front wheel drive shaft tri-pot joint and the front wheel drive shaft constant velocity joint.
- Wheel Drive Shaft Seal Cover 15 Series
- The front wheel drive shaft tri-pot joint is completely flexible, and moves with an in and out motion.
- The front wheel drive shaft constant velocity joint is flexible but can not move in and out.

The Wheel Drive Shaft is a balanced shaft that transmits rotational force from the front differential to the front wheels when the transfer case is

engaged. The wheel drive shaft is mounted to the front differential by bolting the flange of the wheel drive shaft to the flange on the inner output shaft of the front differential. The other end of the wheel drive shaft is splined to fit into and drive the hub assembly when the transfer case is engaged. The tri-pot joint and constant velocity joint on the wheel drive shaft allows the shaft to be flexible to move with the suspension travel of the vehicle.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/ Description
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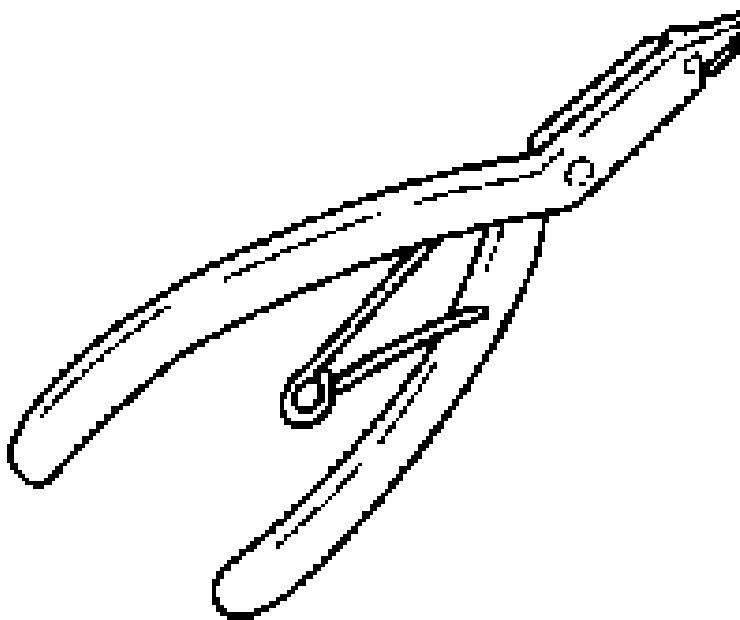
Illustration	Tool Number/ Description
 A line drawing of a pair of snap ring pliers. The tool has a long, thin handle and a long, thin jaws. The jaws are slightly curved and have a small circular opening in the middle, which is used for gripping and removing snap rings. The handle is straight and has a small circular hole near the end.	<p>J 8059 Snap Ring Pliers</p>

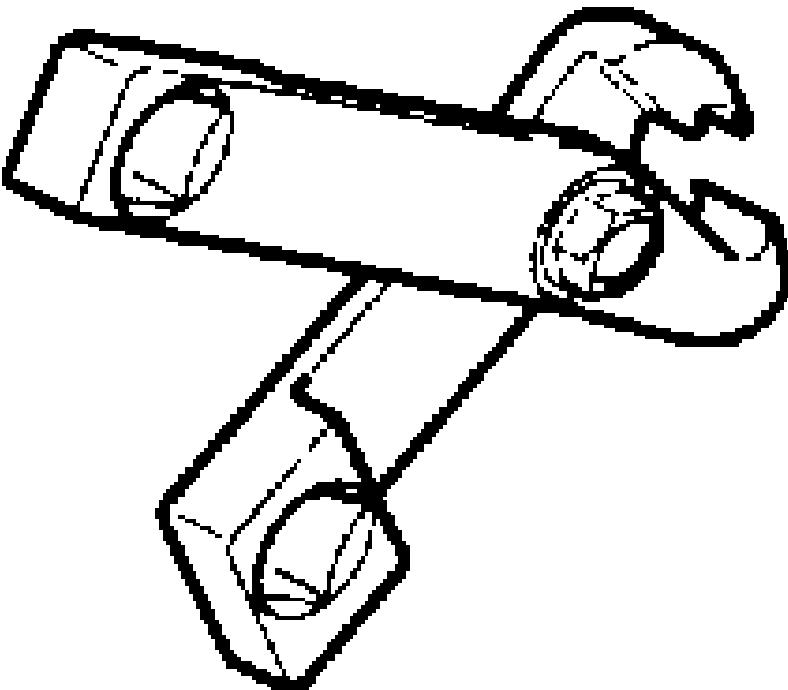
Illustration	Tool Number/ Description
 A black and white line drawing of a pair of pliers. The tool has a long, straight handle and a curved, adjustable jaw. The jaw is designed to grip cylindrical objects, such as drive axle seals. The pliers are shown from a side-on perspective, slightly angled.	<p>J 35910 Drive Axle Seal Clamp Pliers</p>

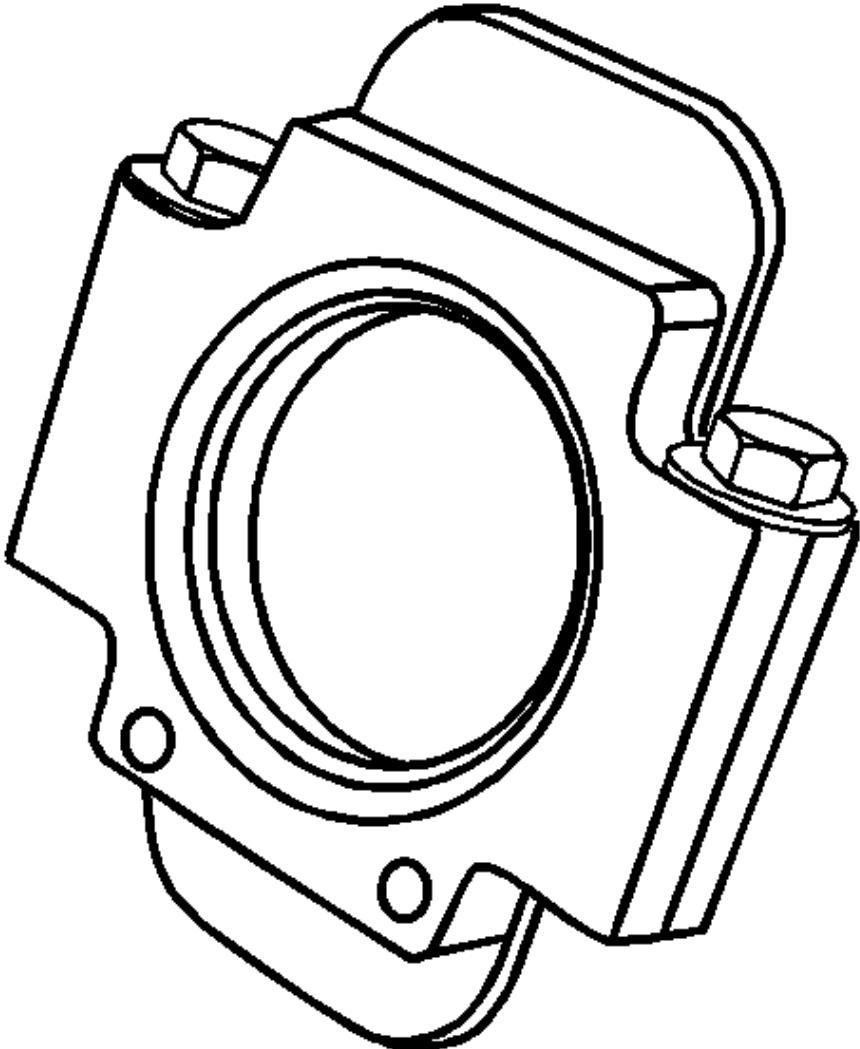
Illustration	Tool Number/ Description
	<p>J 36652-1 Drive Axle Clamp Swage Tool</p>

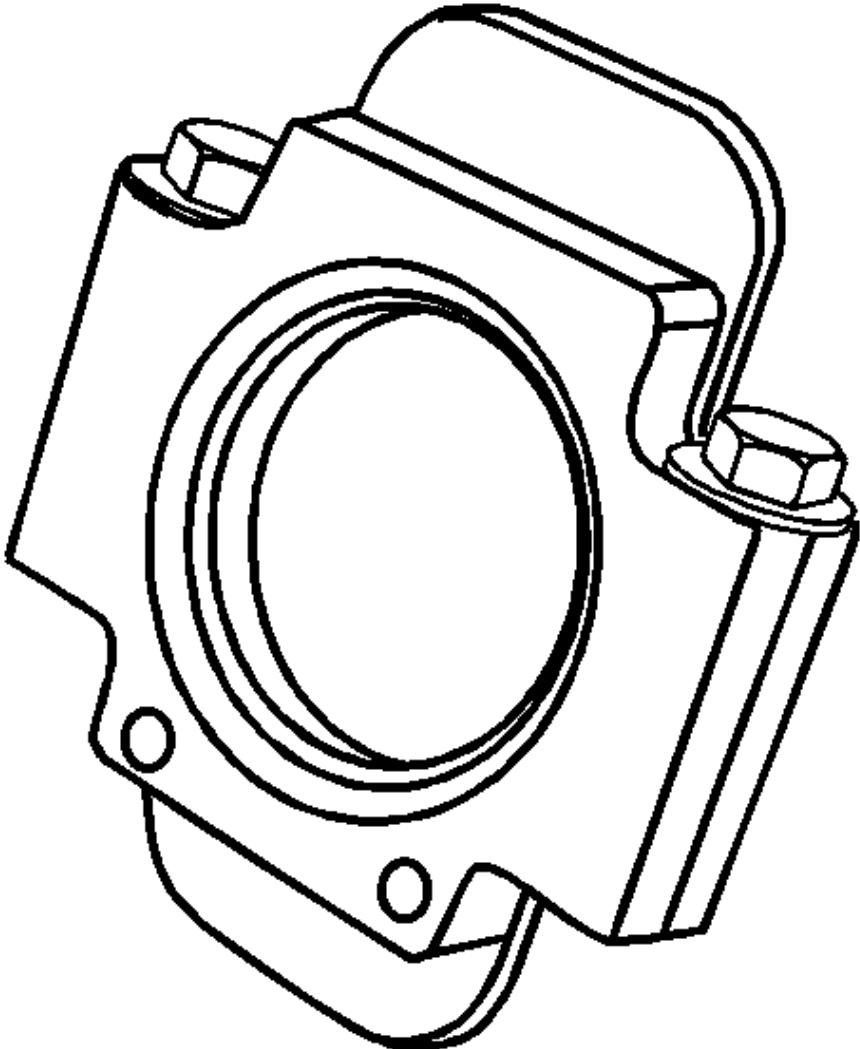
Illustration	Tool Number/ Description
	<p>J 36652-2 Drive Axle Clamp Swage Tool</p>

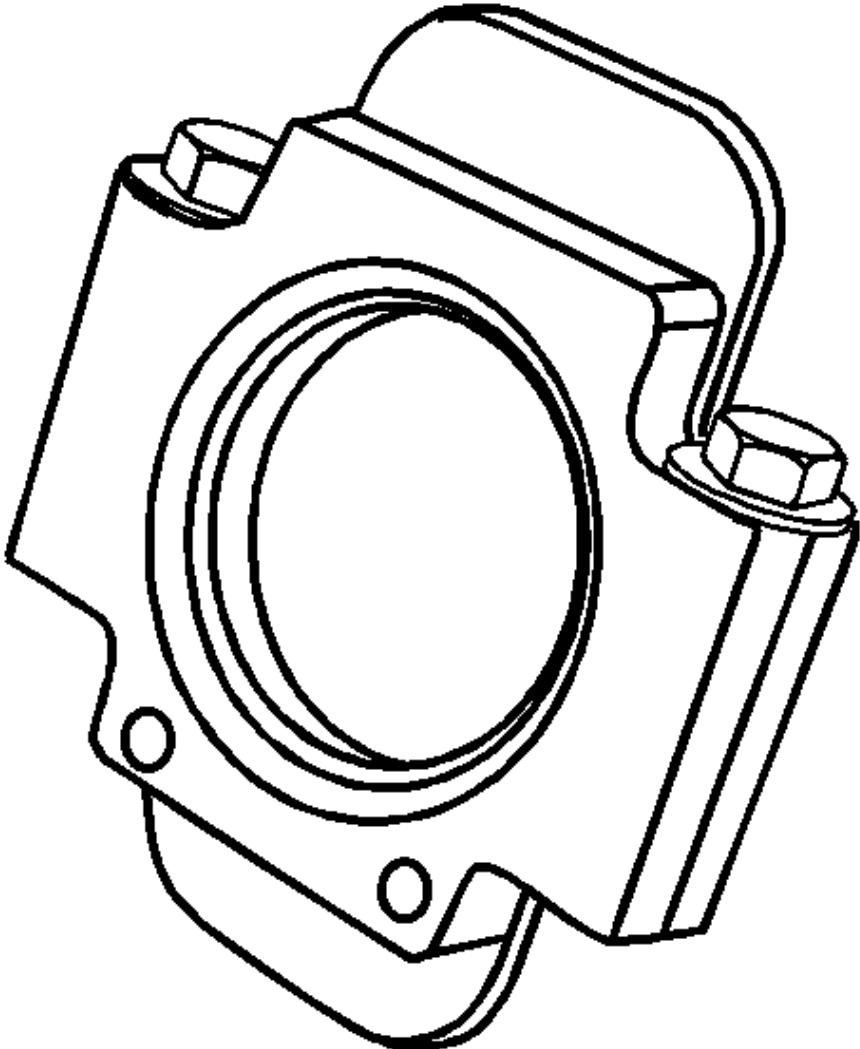
Illustration	Tool Number/ Description
	<p>J 36652-98 Axe Swage Tool</p>

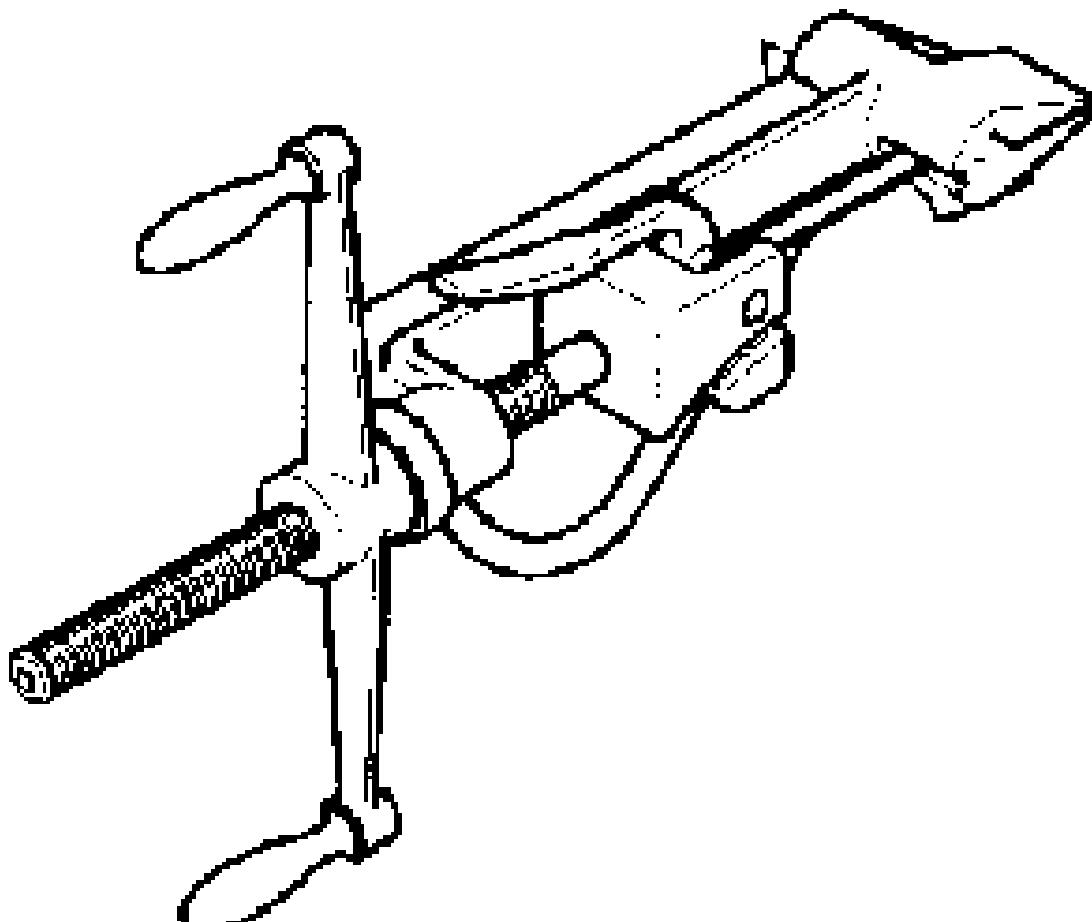
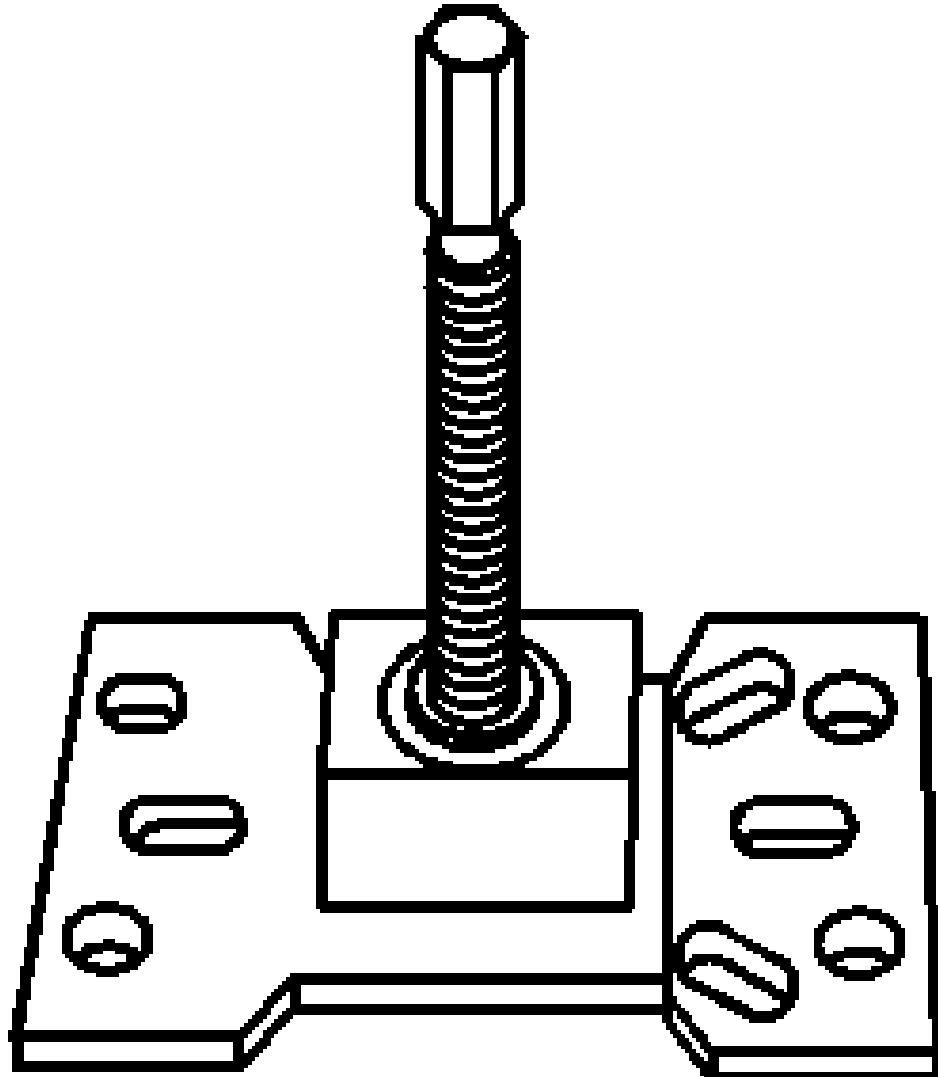
Illustration	Tool Number/ Description
	<p>J 41187 Banding Tool</p>

Illustration	Tool Number/ Description
	<p>J 45859 Axe Remover</p>

DRIVELINE/AXLE**Propeller Shaft - Escalade, Suburban, Tahoe, Yukon****SPECIFICATIONS****FASTENER SPECIFICATIONS**

Application	Specification	
	Metric	English
• Yoke Retainer Bolts	25 N.m	18 lb ft

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

Application	Type of Material	GM Part Number
Propeller Shaft Splines (Front Propeller Shaft and all RWD Propeller Shaft w/MYC Automatic Transmission)	Lubricant	19257121 (Canadian P/N 19257122) or equivalent meeting GM Specification 9985830
Propeller Shaft-to-Flange Bolts	Thread locker	89021297 (Canadian P/N 10953488) or equivalent meeting GM Specification

COMPONENT LOCATOR**DRIVELINE DISASSEMBLED VIEWS****Front Propeller Shaft**

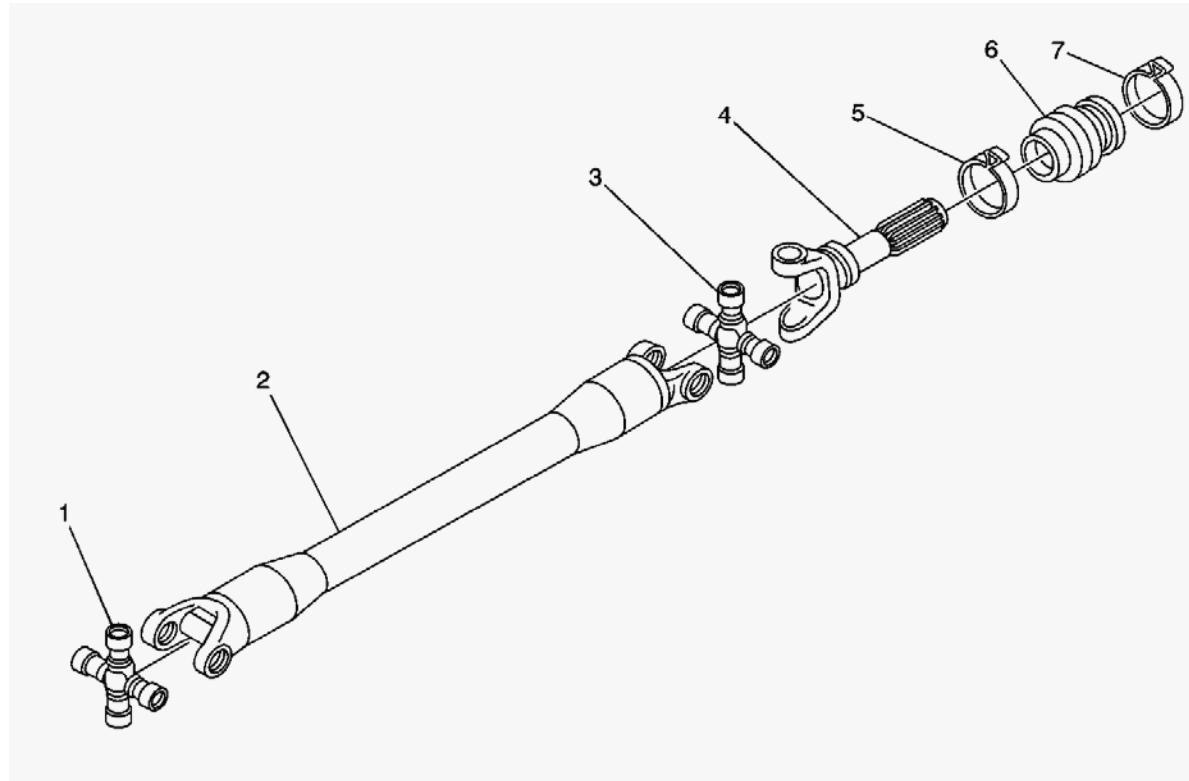


Fig. 1: Front Propeller Shaft Disassembled View

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Propeller Shaft Universal Joint
2	Propeller Shaft Tube
3	Propeller Shaft Universal Joint
4	Propeller Shaft Slip Yoke
5	Propeller Shaft Rear Slip Yoke Boot Clamp - Front
6	Propeller Shaft Rear Slip Yoke Boot
7	Propeller Shaft Rear Slip Yoke Boot Clamp - Rear

One-Piece Propeller Shaft

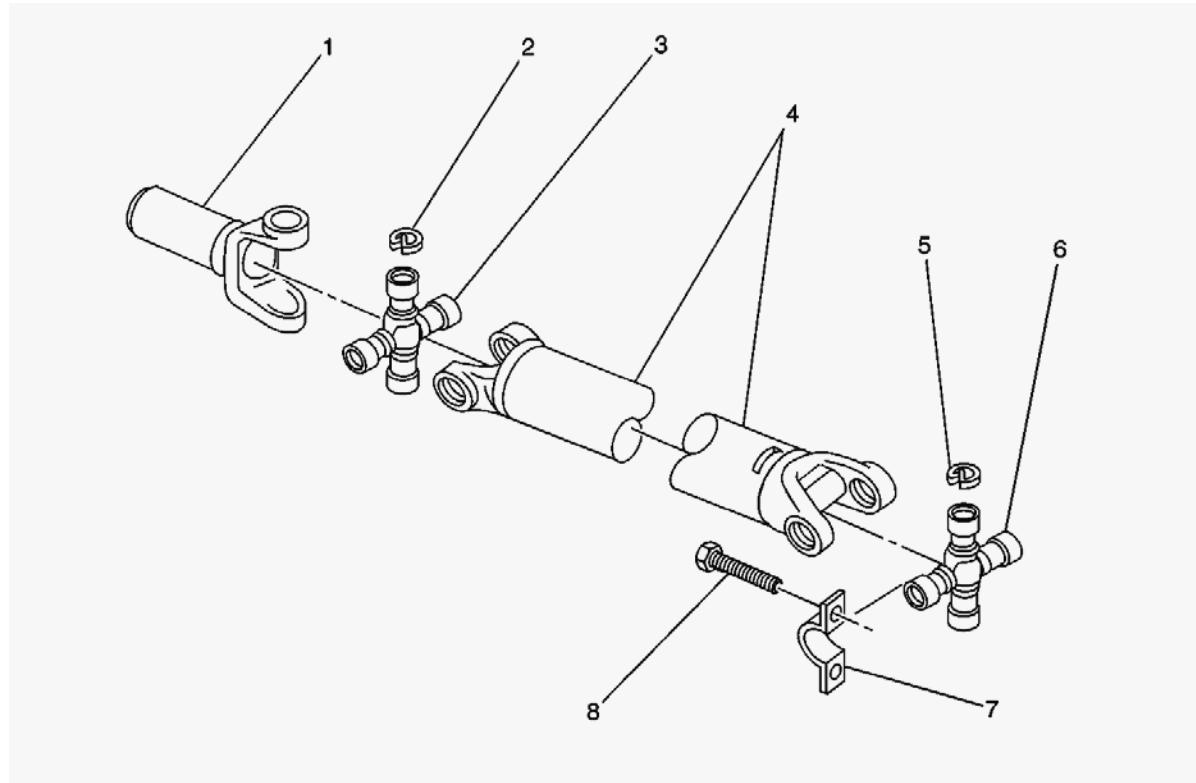


Fig. 2: One-Piece Propeller Shaft Disassembled View

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Propeller Shaft Slip Yoke
2	Propeller Shaft Universal Joint Spider Bearing Retainer Ring
3	Propeller Shaft Universal Joint
4	Propeller Shaft Tube
5	Propeller Shaft Universal Joint Spider Bearing Retainer Ring
6	Propeller Shaft Universal Joint
7	Propeller Shaft Bearing Retainer
8	Propeller Shaft Bearing Retainer Bolt

DIAGNOSTIC INFORMATION AND PROCEDURES

SYMPTOMS - PROPELLER SHAFT

Before beginning diagnosis, review the system description and operation in order to familiarize yourself with the system function. Refer to [Propeller Shaft Description and Operation](#).

Classifying the Symptom

Propeller Shaft symptoms can usually be classified into the following categories:

- Leaks
- Noises
- Vibrations

Leak and noise related symptoms are diagnosed within the Propeller Shaft section. For vibration related symptoms, refer to [Vibration Diagnosis, Starting Point, and Correction](#).

Visual/Physical Inspection

- Inspect the system for aftermarket devices which could affect the operation of the Propeller Shaft.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

Symptom List

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

- [Leak at Front Slip Yoke](#)
- [Universal Joint Noise](#)
- [Ping, Snap, or Click Noise](#)
- [Knock or Clunk Noise](#)
- [Scraping Noise](#)
- [Squeak Noise](#)
- [Shudder on Acceleration at Low Speed](#)

LEAK AT FRONT SLIP YOKE

Checks	Action
--------	--------

Checks	Action
DEFINITION: A few drops of lubricant that are leaking from the splined yoke are normal. This condition does not require attention.	
The slip yoke barrel is burred, nicked, corroded, or worn.	<p>1. Inspect the slip yoke for burrs. Careful use of crocus cloth or fine stone honing can remove minor burrs.</p> <p>2. If the yoke is badly burred, corroded, or worn, replace the yoke. Refer to Universal Joint Replacement - Nylon Injected Ring, or Universal Joint Replacement - External Snap Ring.</p> <p>3. Replace the oil seal. Refer to one of the following procedures:</p> <ul style="list-style-type: none"> • Rear Output Shaft Seal Replacement for the MP 3010-NP0 transfer case • Rear Output Shaft Seal Replacement for the MP 3023/3024-NQH transfer case • Transmission Output Shaft Seal Replacement (Four Wheel Drive) for the 6L50/6L80/6L90 automatic transmission
There is a faulty oil seal in the transmission or in the transfer case output shaft.	<p>Replace the oil seal. Refer to one of the following procedures:</p> <ul style="list-style-type: none"> • Rear Output Shaft Seal Replacement for the MP 3010-NP0 transfer case • Rear Output Shaft Seal Replacement for the MP 3023/3024-NQH transfer case • Transmission Output Shaft Seal Replacement (Four Wheel Drive) for the 6L50/6L80/6L90 automatic transmission

UNIVERSAL JOINT NOISE

Problem	Action
One or more of the universal joints are worn or damaged.	Replace the universal joint. Refer to Universal Joint Replacement - External Snap Ring , or Universal Joint Replacement - Nylon Injected Ring .
One or more of the universal joints have lost lubricant.	Replace the universal joint. Refer to Universal Joint Replacement - External Snap Ring , or Universal Joint Replacement - Nylon Injected Ring .
The yoke retainer strap bolts are loose.	Tighten the yoke retainer strap bolts to specifications. Refer to Fastener Specifications .

PING, SNAP, OR CLICK NOISE

Checks	Action
DEFINITION: A ping, snap or click is usually heard on initial load after the transmission is in gear, either in forward or reverse.	
A loose pinion yoke or companion flange.	Tighten the bolts and the pinion nut to specified torque. Refer to Fastener Specifications .
One or more of the universal joints are worn or damaged.	Replace the universal joint. Refer to the following: <ul style="list-style-type: none"> • Universal Joint Replacement - Nylon Injected Ring • Universal Joint Replacement - External Snap Ring
Heat shield interference	Eliminate interference.

KNOCK OR CLUNK NOISE

Checks	Action
DEFINITION: Knocking or clunking noise occurs when operating the vehicle in high gear or coasting in NEUTRAL at 16 km/h (10 mph).	
One or more of the universal joints are worn or damaged.	Replace the universal joint. Refer to the following: <ul style="list-style-type: none"> • Universal Joint Replacement - Nylon Injected Ring • Universal Joint Replacement - External Snap Ring
The side gear hub counterbore in the differential is worn oversize.	Replace the differential case and/or the side gears. Refer to Differential Replacement (8.6/9.5/9.76 Inch Axles) Differential Replacement (10.5 Inch Axle) .

SCRAPING NOISE

Checks	Action
DEFINITION: A scraping noise occurs when driving the vehicle at various speeds.	
The pinion flange deflector or the center bearing is rubbing.	Correct the interference as necessary.
Center bearing heat shield, if equipped.	Correct the interference as necessary.
Exhaust pipe contact.	Correct the interference as necessary.
Balance weight detached from the propeller shaft.	A detached balance weight may create a sliding, scraping, or ticking type noise during acceleration or deceleration. <ol style="list-style-type: none"> 1. Inspect the propeller shaft and tube for a detached balance weight.

Checks	Action
	2. Replace components as required. Do not attempt to reattach the balance weight to the propeller shaft.

SQUEAK NOISE

Checks	Action
DEFINITION: When driving the vehicle at various speeds a squeaking sound occurs.	
One or more of the universal joints have lost lubricant.	Replace the universal joint. Refer to the following: <ul style="list-style-type: none"> • <u>Universal Joint Replacement - Nylon Injected Ring</u> • <u>Universal Joint Replacement - External Snap Ring</u>
C/V boot worn or torn.	Replace components as necessary.
Center bearing is dry or worn.	Lube or replace the center bearing.

SHUDDER ON ACCELERATION AT LOW SPEED

Checks	Action
DEFINITION: When the vehicle is accelerating at low speed a shudder occurs.	
The yoke retainer strap bolts are loose or missing.	Replace or tighten the yoke retainer strap bolts to specifications. Refer to <u>Fastener Specifications</u> .
The driveline joint angle is excessive or incorrectly set.	Determine if the driveline angle is incorrect and correct as necessary. Refer to <u>Vibration Diagnosis, Starting Point, and Correction</u> .
One or more of the universal joints are worn or damaged.	Replace the universal joint. Refer to <u>Universal Joint Replacement - Nylon Injected Ring</u> , or <u>Universal Joint Replacement - External Snap Ring</u> .

REPAIR INSTRUCTIONS

FRONT AXLE PROPELLER SHAFT REPLACEMENT (NPO)

Special Tools

J-43218 Clamp Pliers - Narrow Jaw

Removal Procedure

1. Raise the vehicle. Refer to [**Lifting and Jacking the Vehicle**](#) .
2. Remove the transfer case shield, if equipped. Refer to [**Transfer Case Shield Replacement**](#) .

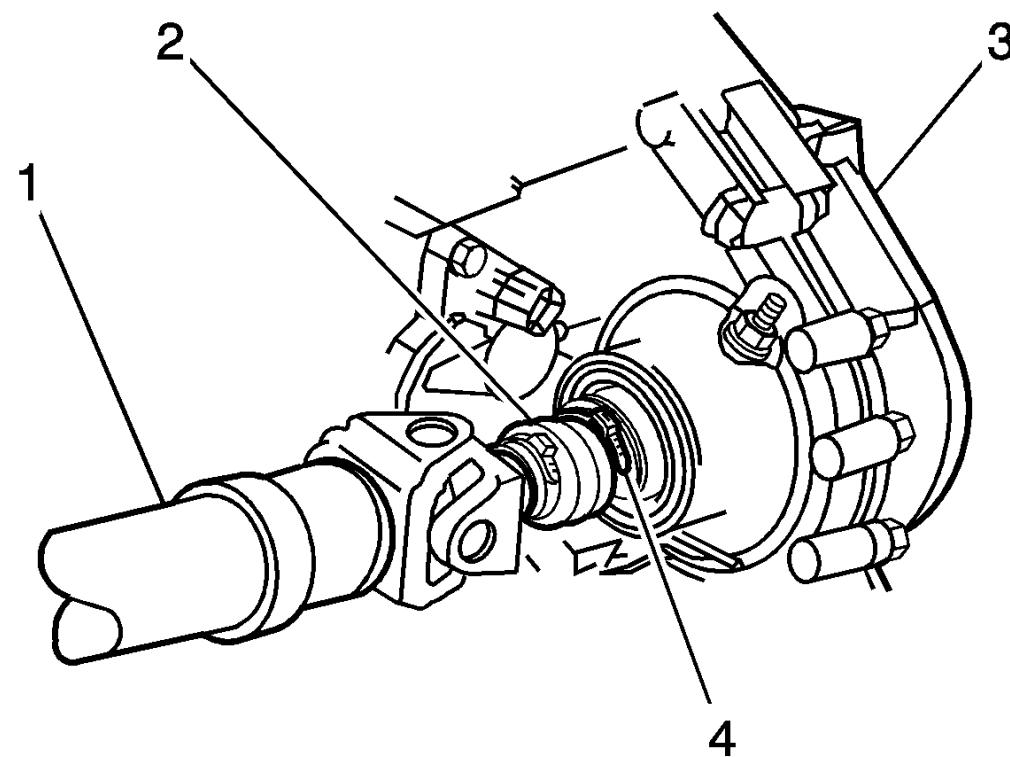


Fig. 3: Removing Clamp At Transfer Case

Courtesy of GENERAL MOTORS COMPANY

3. Remove the clamp (4) at the transfer case by prying up the exposed end of the clamp with a flat-bladed tool.

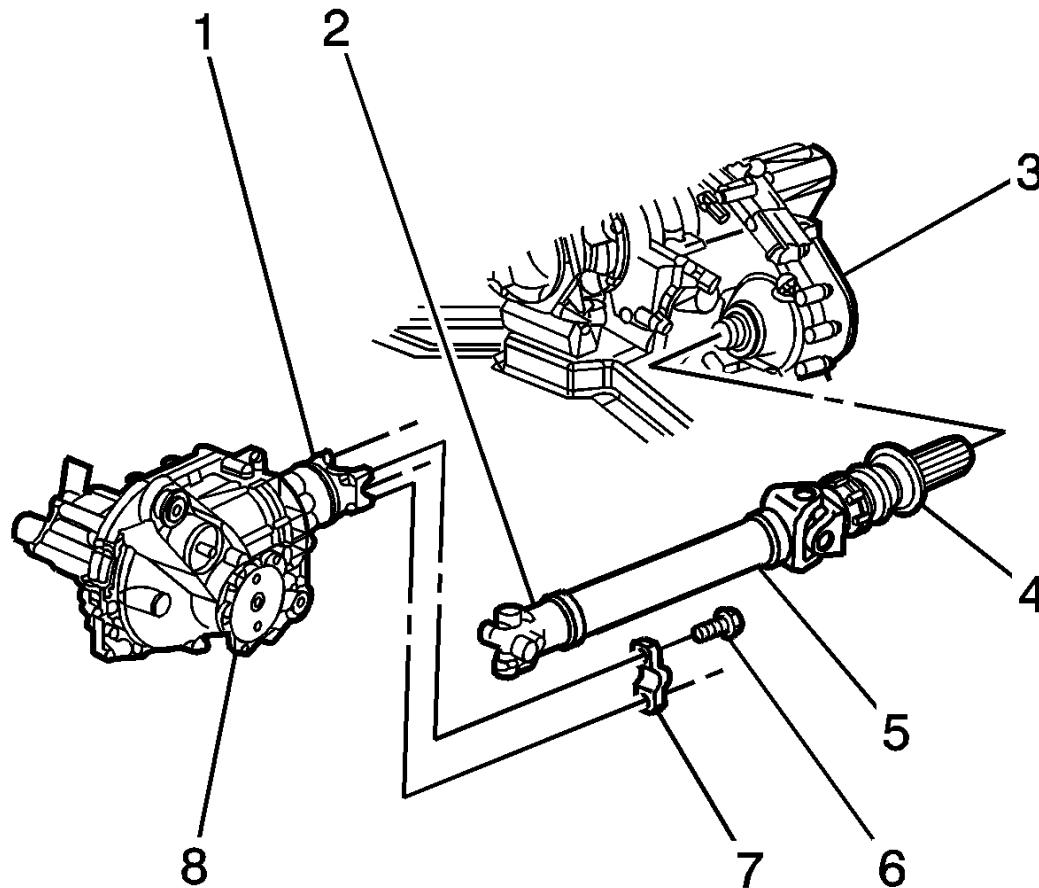


Fig. 4: Disconnecting Propeller Shaft From Front Axle Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

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

NOTE: Mark the relationship of the front propeller shaft to the drive axle flange.

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

NOTE: Do not drop the bearing cap assemblies of the yoke end.

5. Disconnect the propeller shaft (2) from the front axle pinion yoke (1).

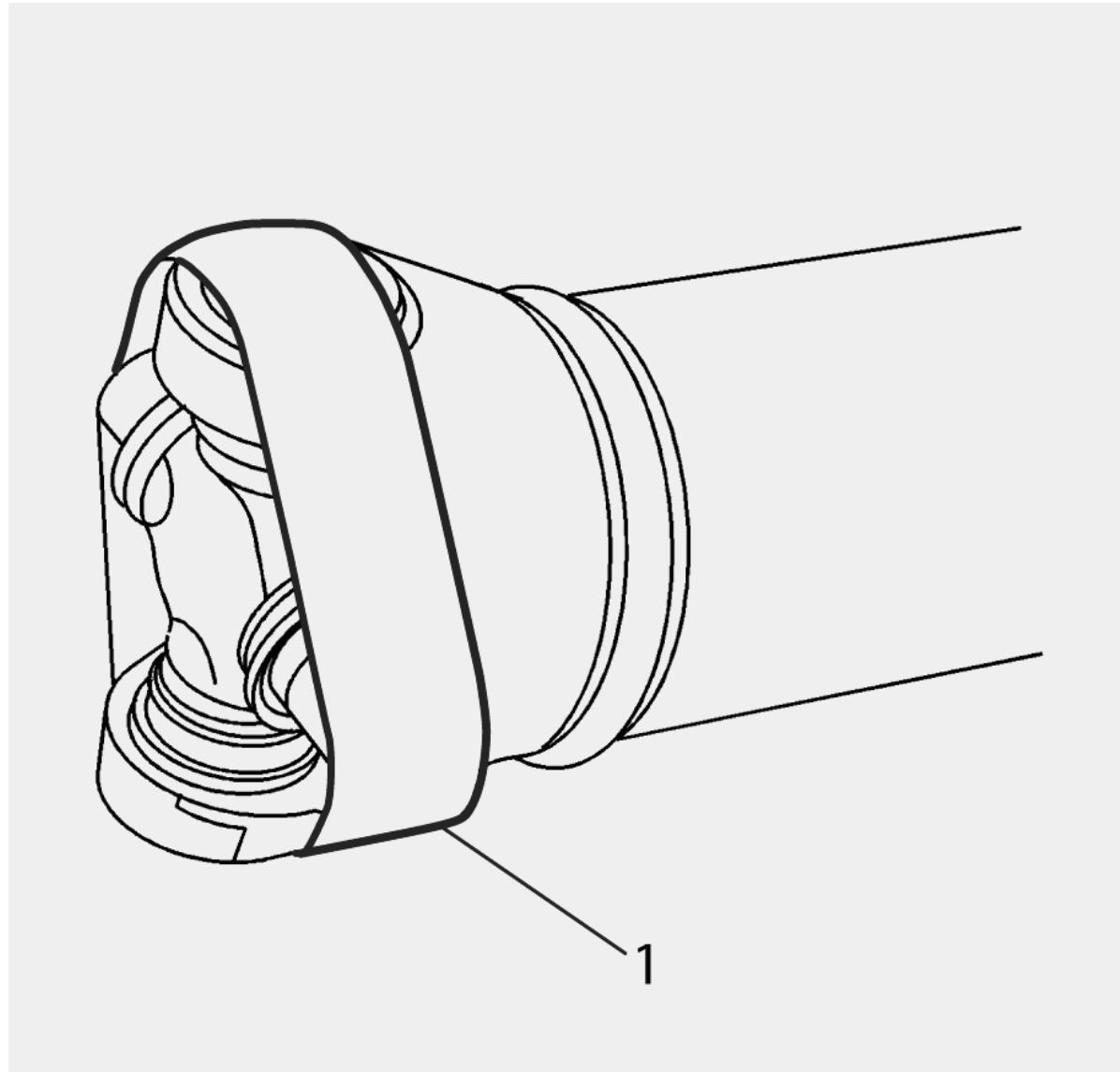


Fig. 5: U-Joint Bearing Caps

Courtesy of GENERAL MOTORS COMPANY

6. Use tape (1) to secure the bearing caps.

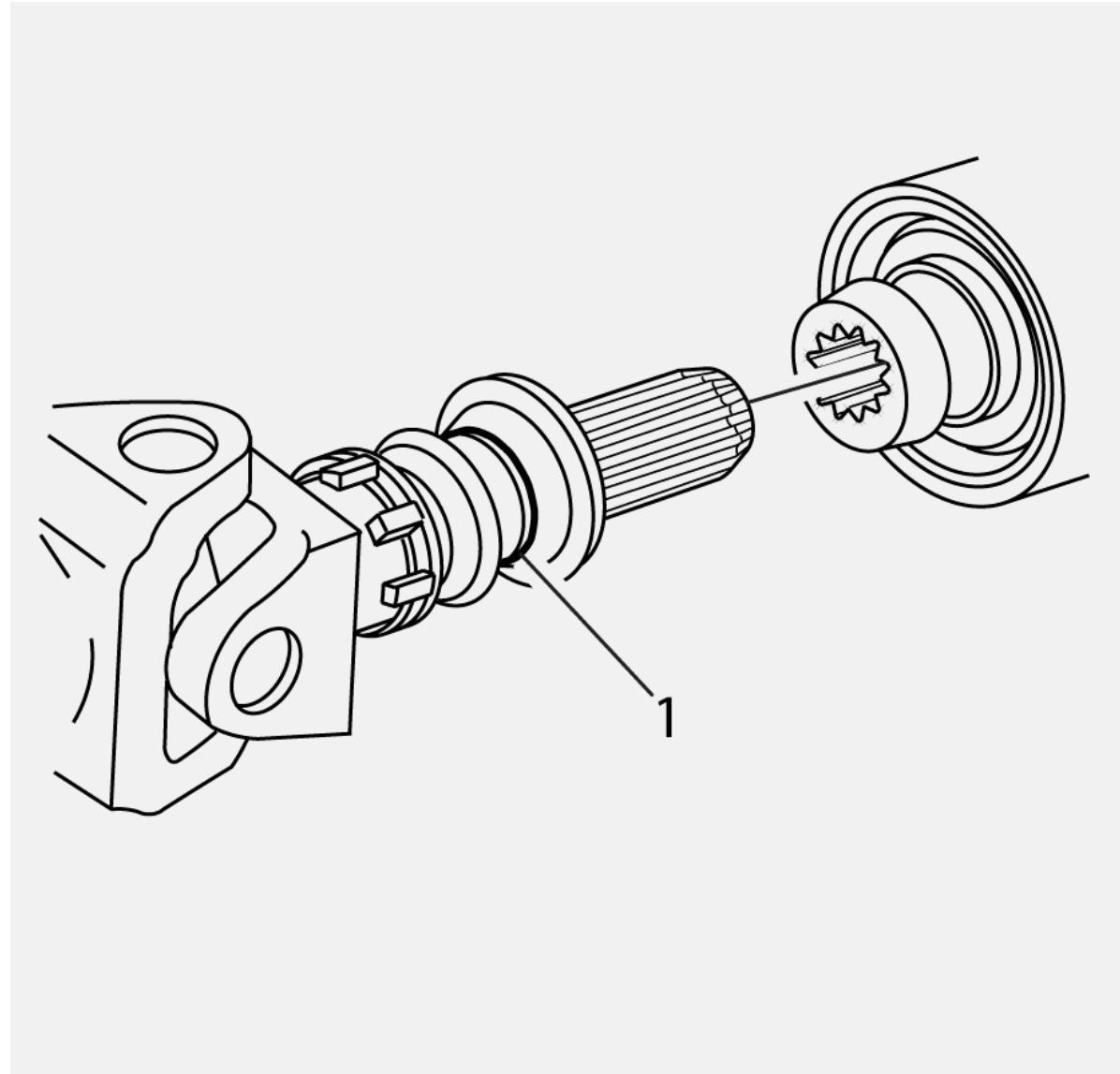


Fig. 6: Boot, Groove & Transfer Case Output Shaft

Courtesy of GENERAL MOTORS COMPANY

7. Remove the boot (1) from the groove on the transfer case output shaft.
8. Remove the propeller shaft from the transfer case output shaft.
9. Remove the propeller shaft from the vehicle.

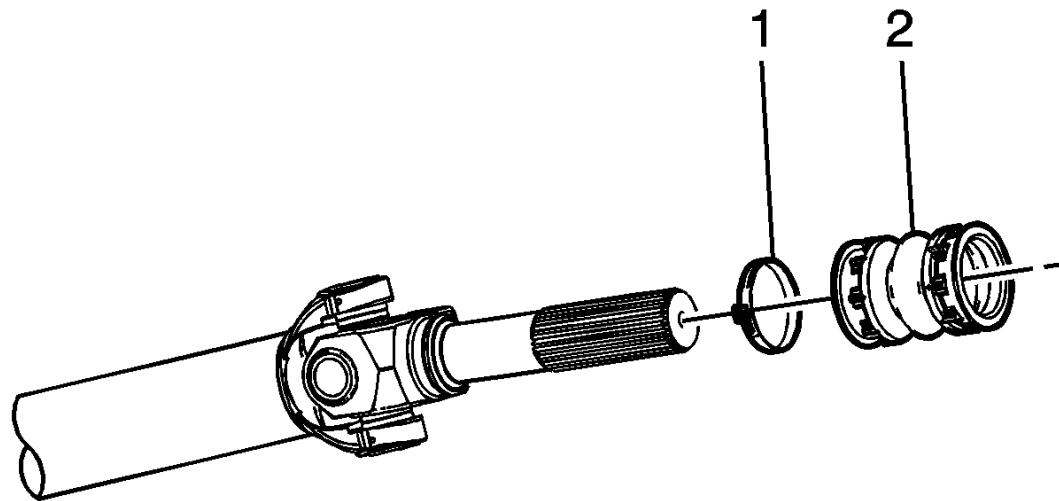


Fig. 7: Propeller Shaft, Clamp And Shaft Boot

Courtesy of GENERAL MOTORS COMPANY

10. Remove the clamp (1) from the propeller shaft boot (2), if needed.
11. Remove the propeller shaft boot (2) from the propeller shaft, if needed.

Installation Procedure

1. Inspect the splines of the transfer case output shaft for a sufficient coating of lubricant. If the output shaft does not have a sufficient coating of lubricant, lubricate the shaft with grease. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#) .

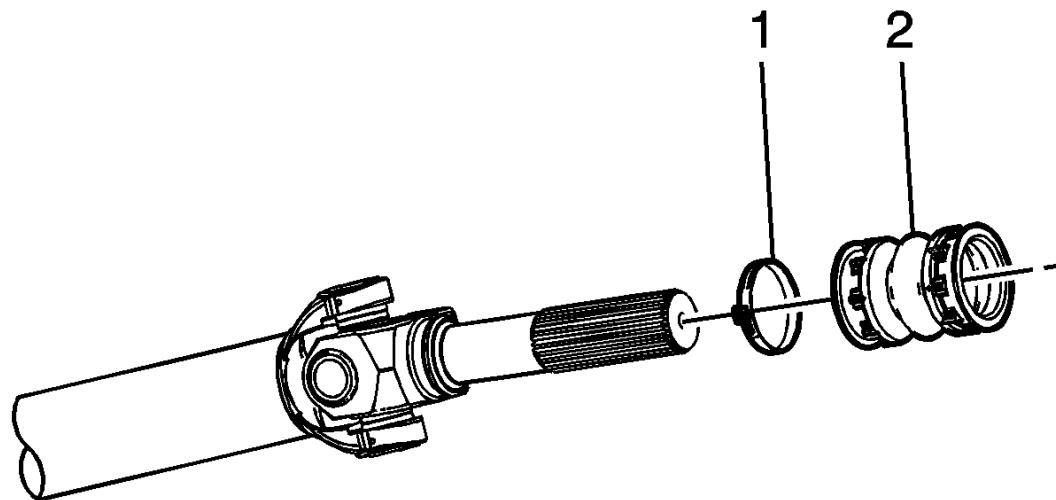


Fig. 8: Propeller Shaft, Clamp And Shaft Boot
Courtesy of GENERAL MOTORS COMPANY

2. Install the propeller shaft boot clamps (1).
3. Install the propeller shaft boot (2).

4. Position the propeller shaft into the vehicle.

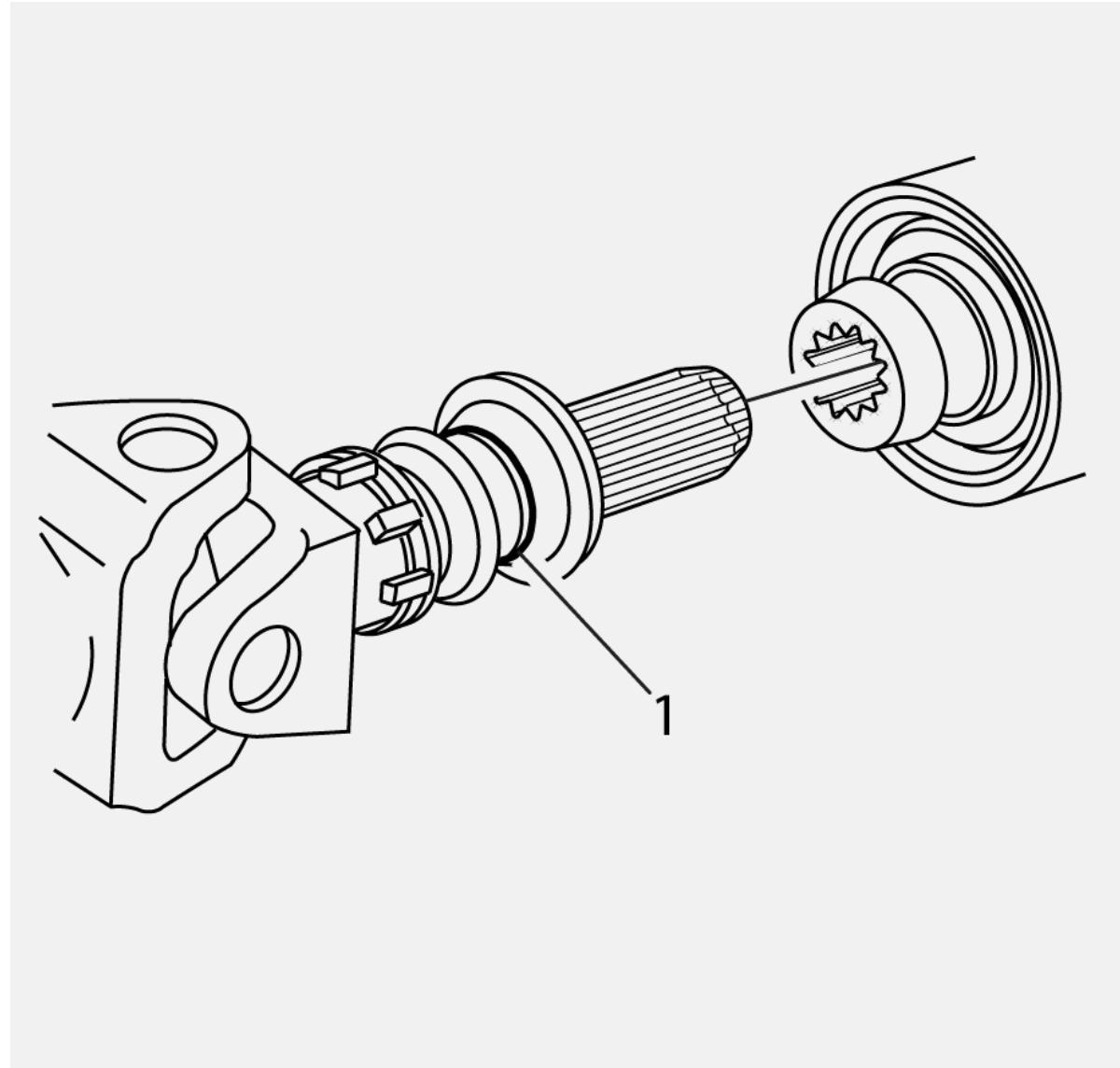


Fig. 9: Boot, Groove & Transfer Case Output Shaft

Courtesy of GENERAL MOTORS COMPANY

5. Install the propeller shaft splines into the transfer case output shaft.

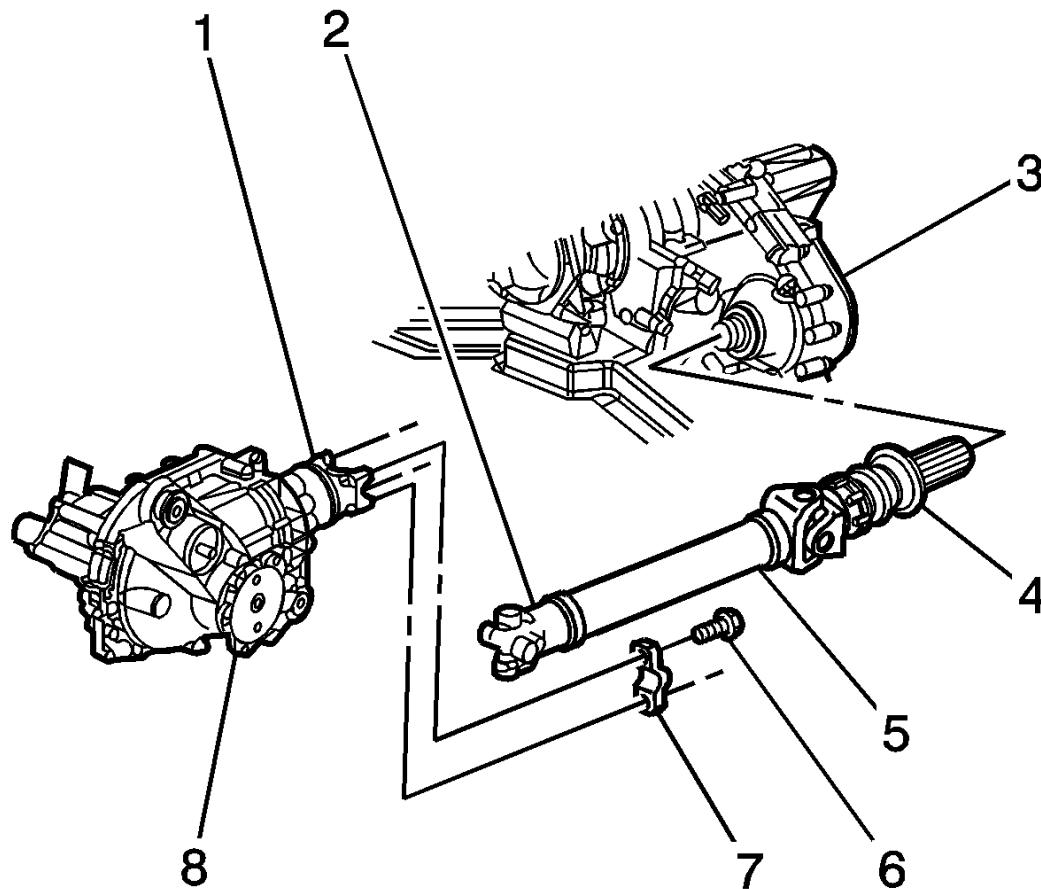


Fig. 10: Installing Propeller Shaft To Front Axle Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

NOTE: Align the relationship marks on the front propeller shaft and the drive axle flange.

6. Align the reference marks made during removal.
7. Remove the tape securing the universal joint bearing caps.

8. Position the propeller shaft (5) to the front axle pinion yoke (1).

CAUTION: Refer to Fastener Caution .

9. Install the universal joint retainers (7) and the bolts (6) and tighten to 25 N.m (18 lb ft).

10. Install the boot onto the transfer case output shaft until the boot snaps into the groove on the output shaft.

11. Using the **J-43218** Clamp Pliers - Narrow Jaw, crimp both clamps.

12. Install the transfer case shield.

- For vehicles equipped with the MP 3010-NP0 transfer case, refer to Transfer Case Shield Replacement .

13. Check the fluid level of the transfer case.

14. Lower the vehicle.

FRONT AXLE PROPELLER SHAFT REPLACEMENT (NQH)

Special Tools

J-43218 Clamp Pliers - Narrow Jaw

Removal Procedure

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

2. Remove the transfer case shield, if equipped. Refer to Transfer Case Shield Replacement .

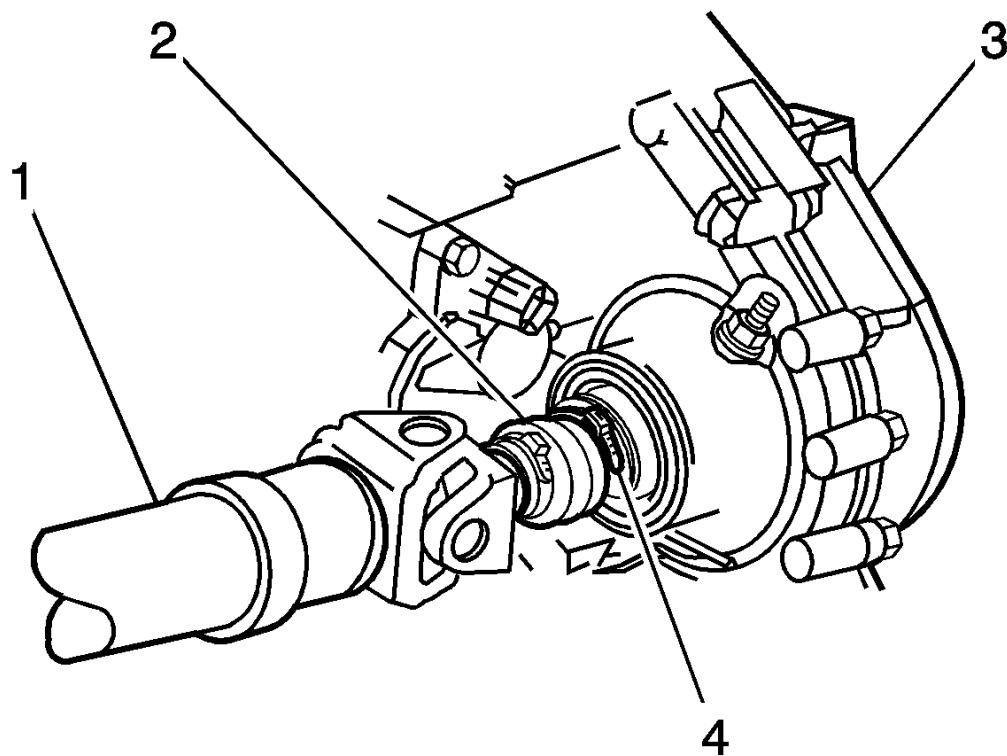


Fig. 11: Removing Clamp At Transfer Case

Courtesy of GENERAL MOTORS COMPANY

3. Remove the clamp (4) at the transfer case by prying up the exposed end of the clamp with a flat-bladed tool.

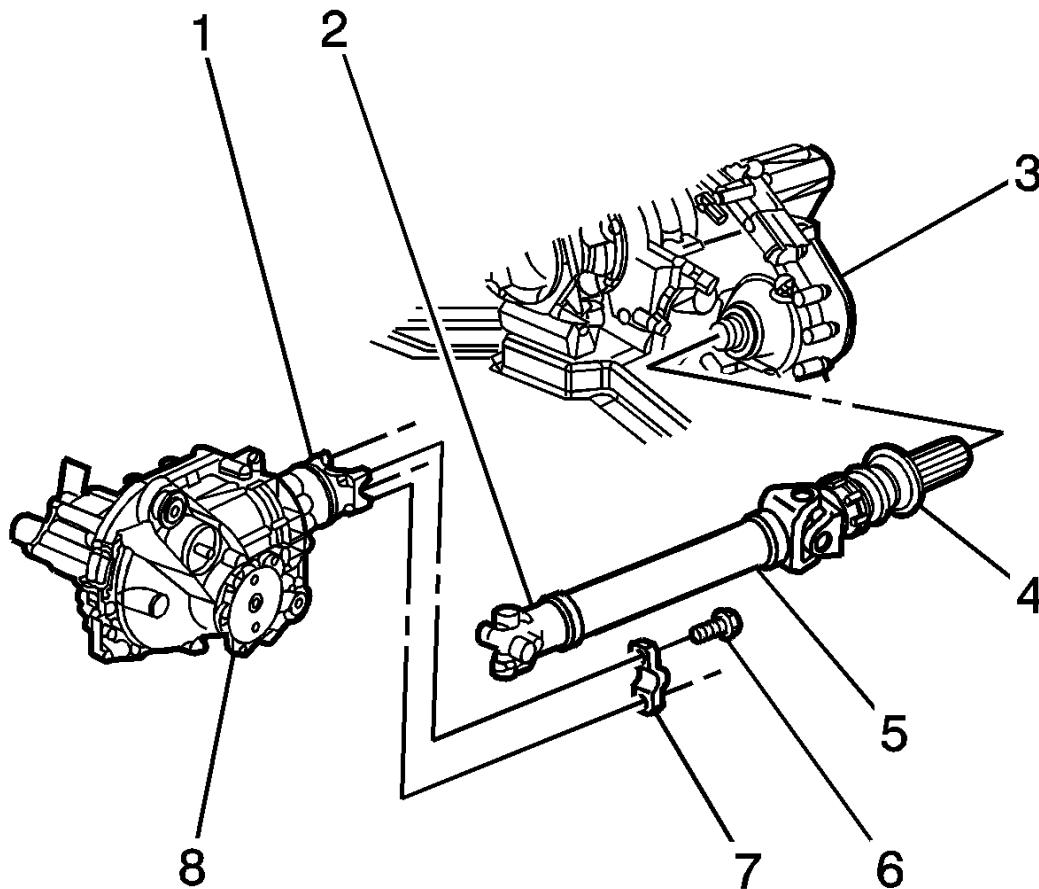


Fig. 12: Disconnecting Propeller Shaft From Front Axle Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

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

NOTE: Mark the relationship of the front propeller shaft to the drive axle flange.

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

NOTE: **Do not drop the bearing cap assemblies of the yoke end.**

5. Disconnect the propeller shaft (2) from the front axle pinion yoke (1).

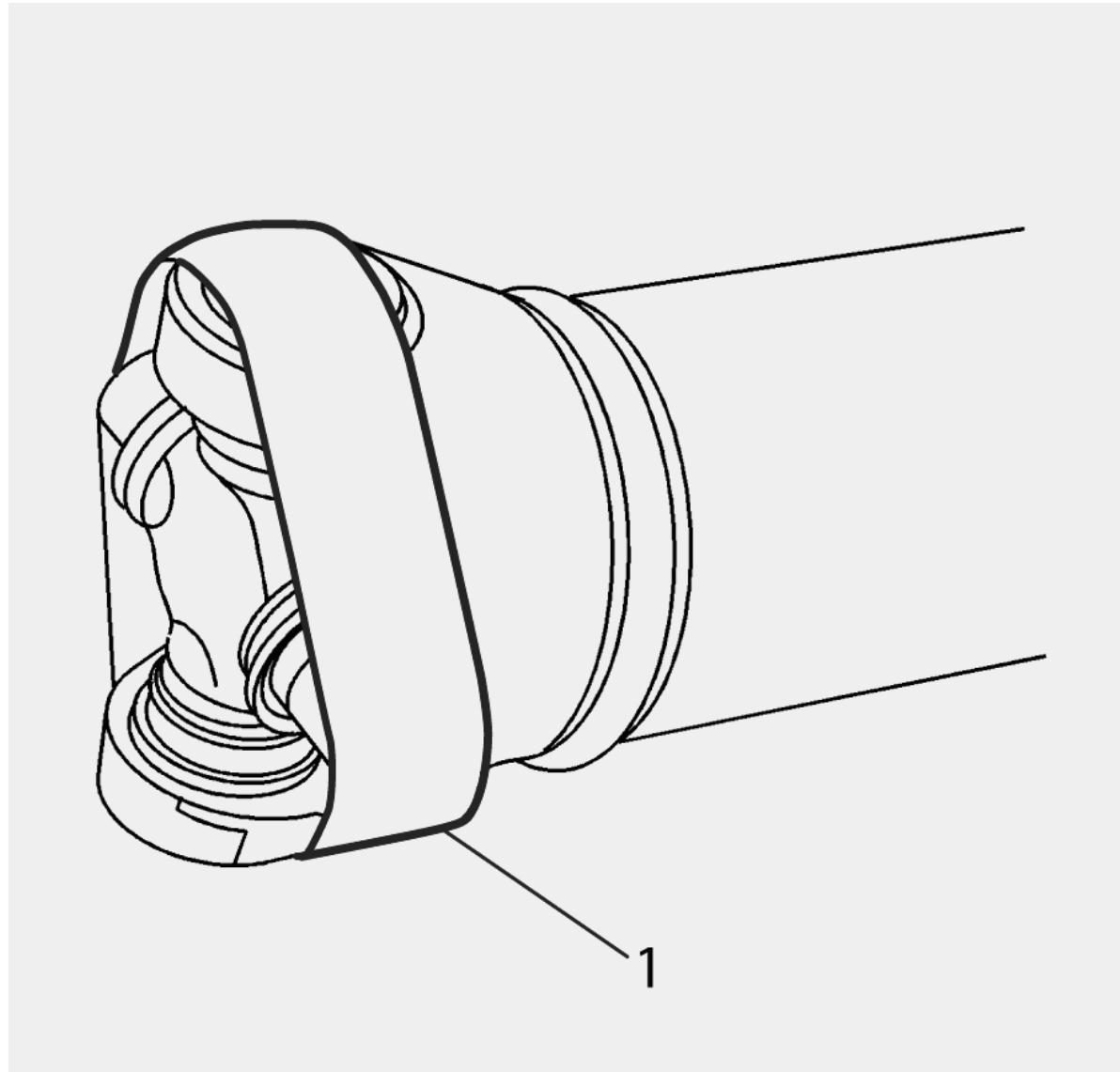


Fig. 13: U-Joint Bearing Caps

Courtesy of GENERAL MOTORS COMPANY

6. Use tape (1) to secure the bearing caps.

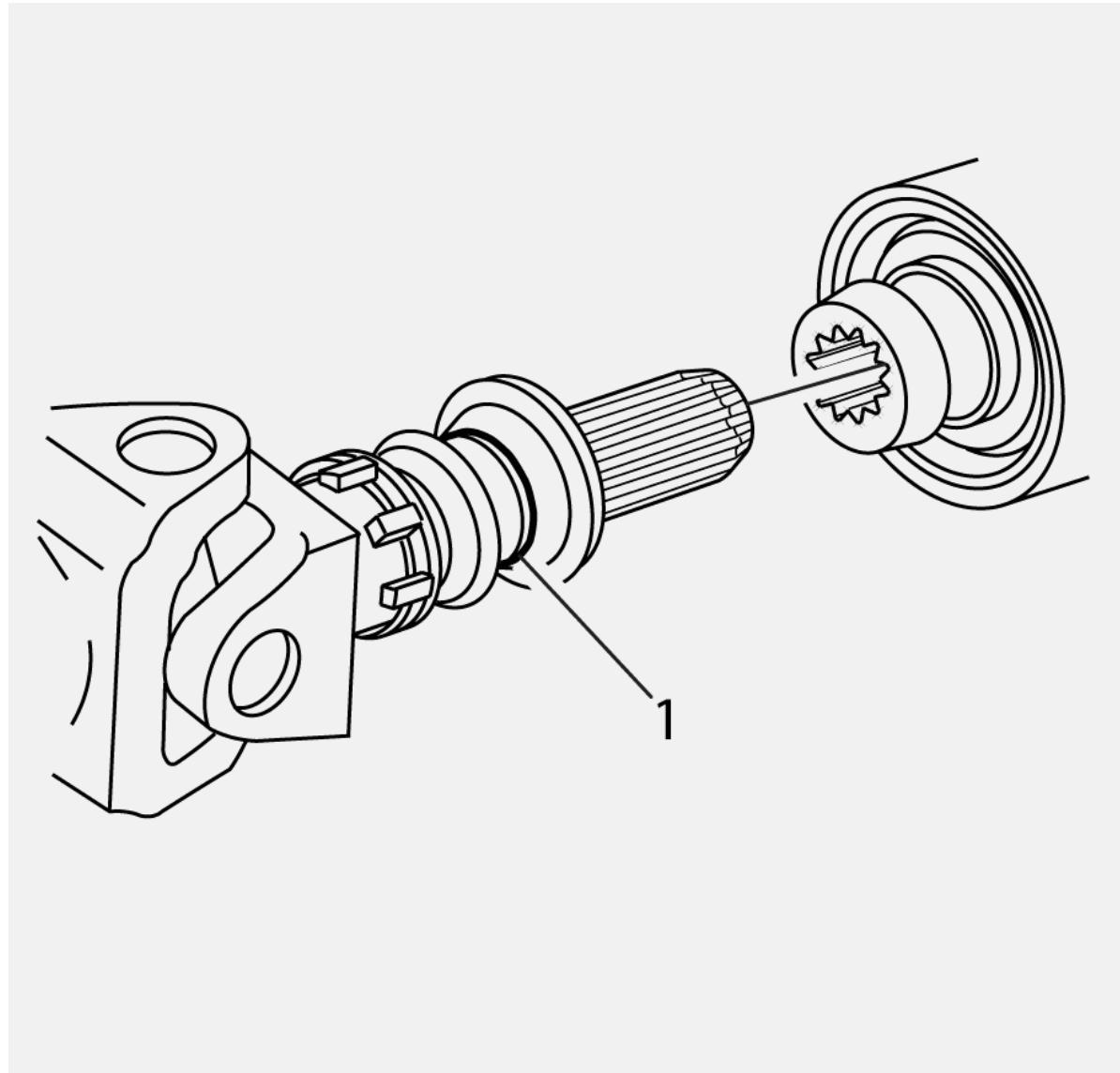


Fig. 14: Boot, Groove & Transfer Case Output Shaft

Courtesy of **GENERAL MOTORS COMPANY**

7. Remove the boot (1) from the groove on the transfer case output shaft.
8. Remove the propeller shaft from the transfer case output shaft.

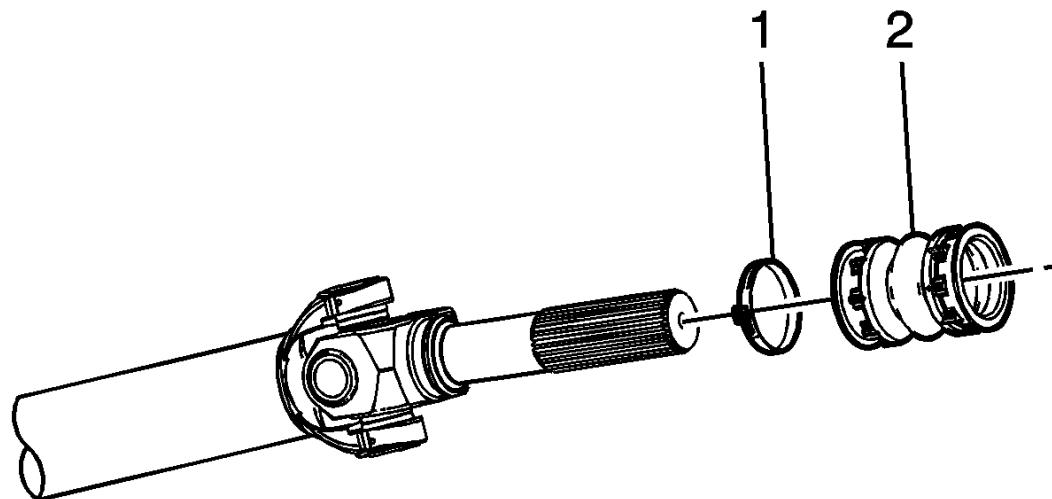


Fig. 15: Propeller Shaft, Clamp And Shaft Boot

Courtesy of **GENERAL MOTORS COMPANY**

9. Remove the clamp (1) from the propeller shaft boot (2), if needed.
10. Remove the propeller shaft boot (2) from the propeller shaft, if needed.

Installation Procedure

1. Inspect the splines of the transfer case output shaft for a sufficient coating of lubricant. If the output shaft does not have a sufficient coating of lubricant, lubricate the shaft with grease. Refer to [**Adhesives, Fluids, Lubricants, and Sealers**](#) .

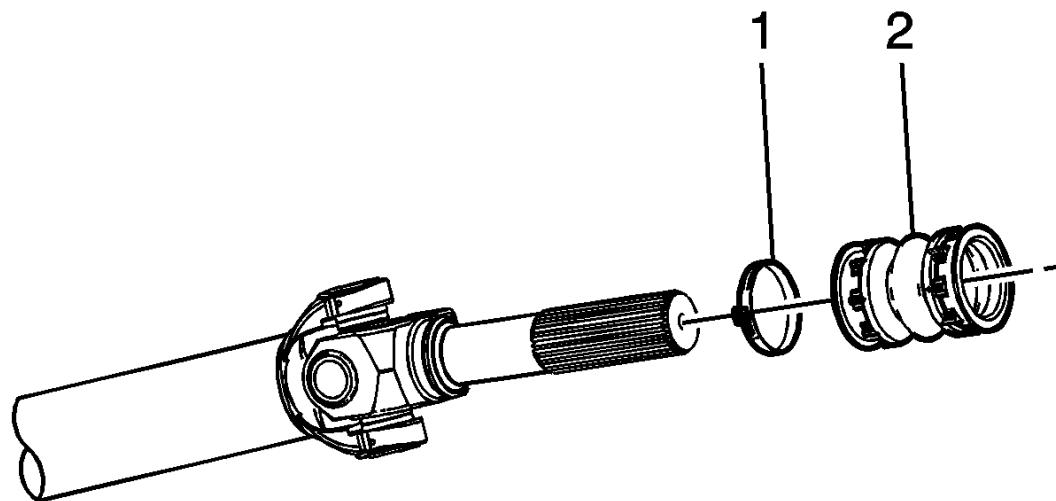


Fig. 16: Propeller Shaft, Clamp And Shaft Boot

Courtesy of GENERAL MOTORS COMPANY

2. Install the propeller shaft boot (2).
3. Install the propeller shaft boot clamp (1).

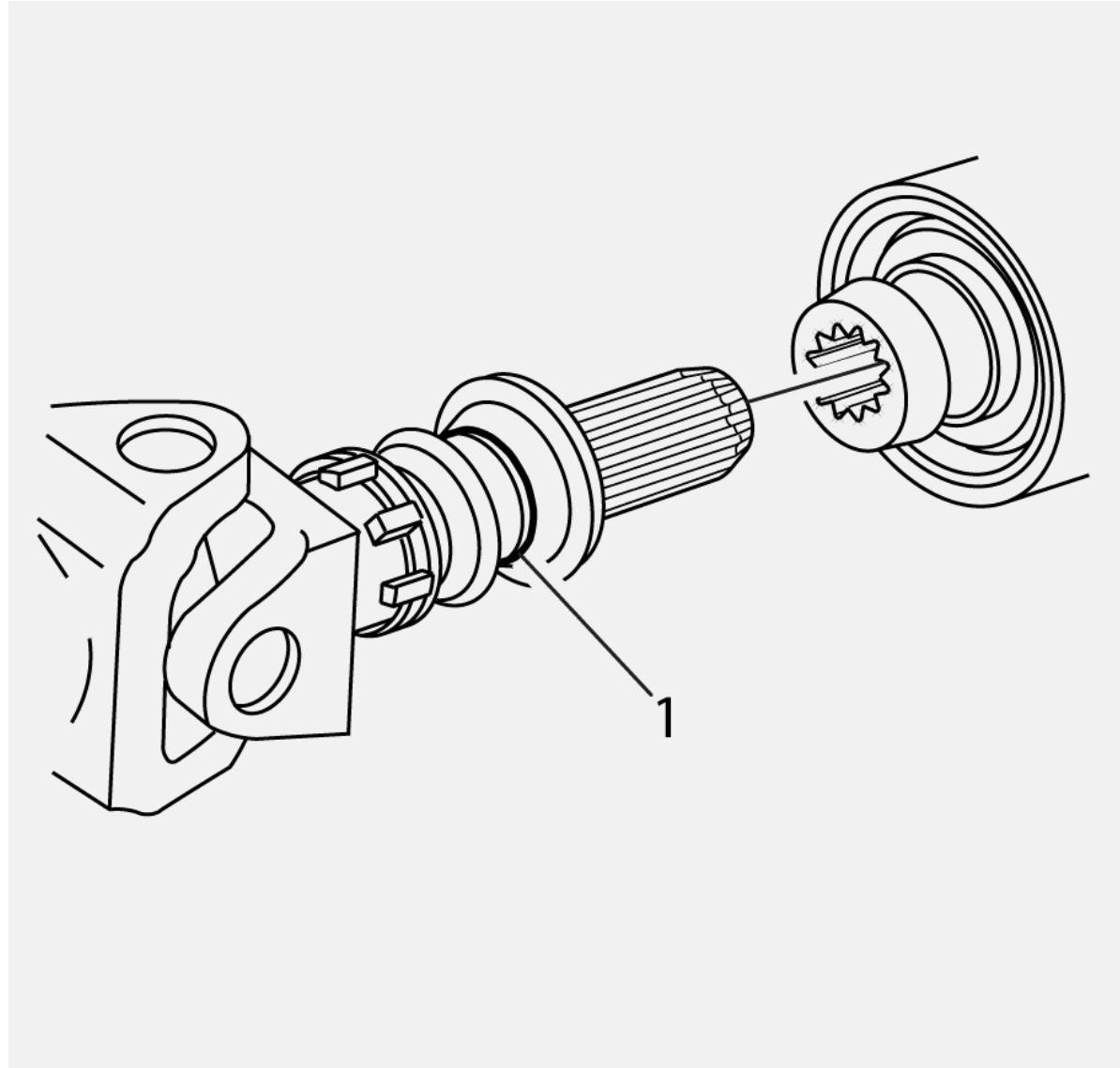


Fig. 17: Boot, Groove & Transfer Case Output Shaft

Courtesy of GENERAL MOTORS COMPANY

4. Inspect the boot (1) for tears. Install the propeller shaft splines into the transfer case output shaft.

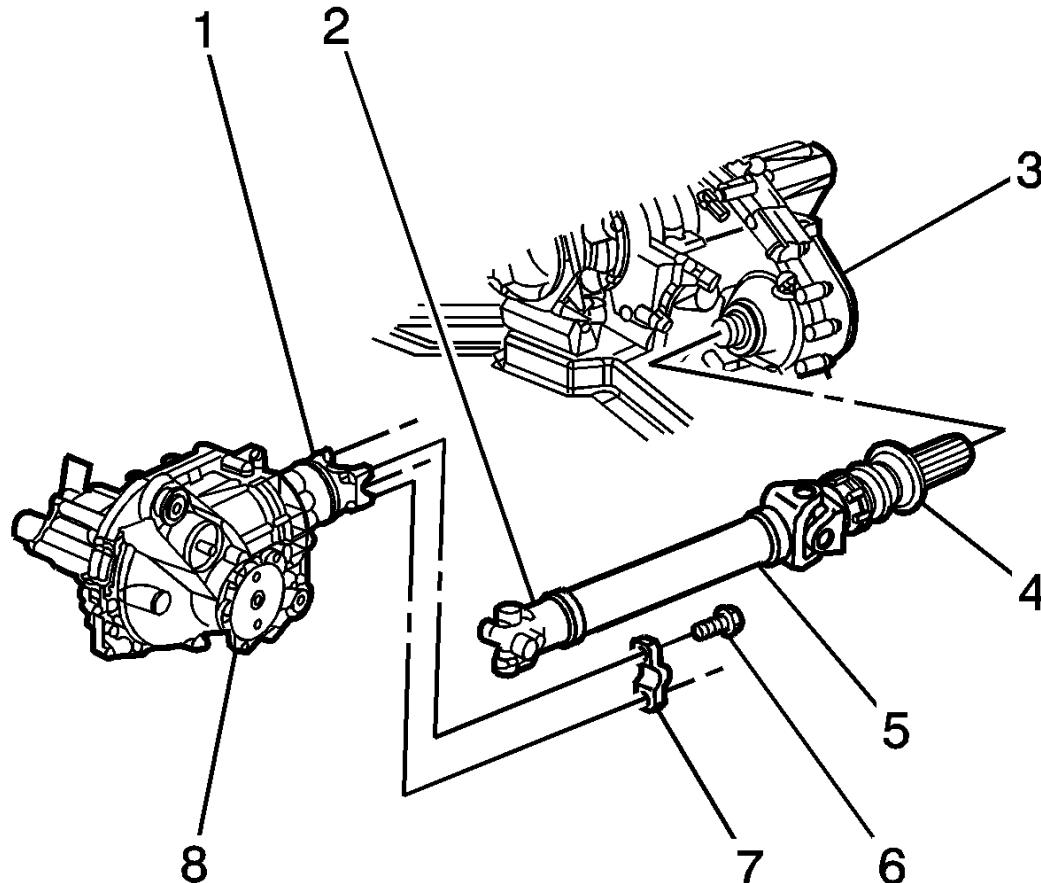


Fig. 18: Installing Propeller Shaft To Front Axle Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

NOTE: Align the relationship marks on the front propeller shaft and the drive axle flange.

5. Install the propeller shaft (5) to the front axle pinion yoke (1).

Align the reference marks made during removal.

CAUTION: Refer to Fastener Caution .

6. Install the universal joint retainers (7) and the bolts (6) and tighten to 25 N.m (18 lb ft).

7. Install the boot onto the transfer case output shaft until the boot snaps into the groove on the output shaft.

8. Using the **J-43218** Clamp Pliers - Narrow Jaw, crimp both clamps.

9. Install the transfer case shield.

- For vehicles equipped with the for the MP 3023/3024-NQH transfer case, refer to Transfer Case Shield Replacement .

10. Check the fluid level of the transfer case.

11. Lower the vehicle.

FRONT AXLE PROPELLER SHAFT REPLACEMENT (HEAVY DUTY)

Special Tools

J-43218 Clamp Pliers - Narrow Jaw

Removal Procedure

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

2. Remove the transfer case shield. Refer to Transfer Case Shield Replacement

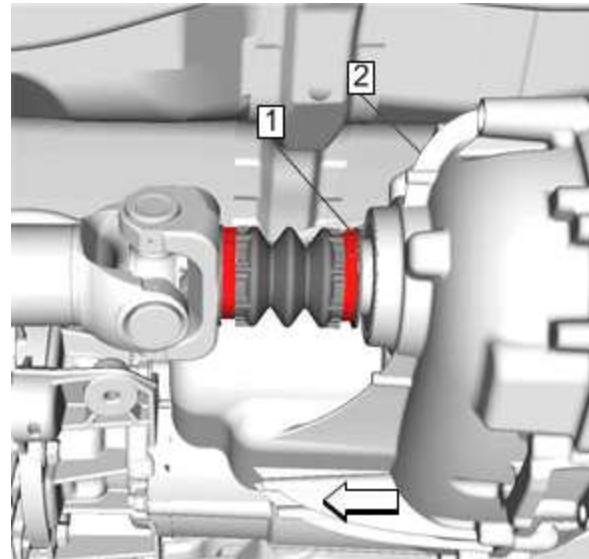


Fig. 19: Removing Clamp At Transfer Case

Courtesy of GENERAL MOTORS COMPANY

3. Remove the clamp (1) at the transfer case (2) by prying up the exposed end of the clamp with a flat-bladed tool.

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

NOTE: Mark the relationship of the front propeller shaft to the drive axle flange.

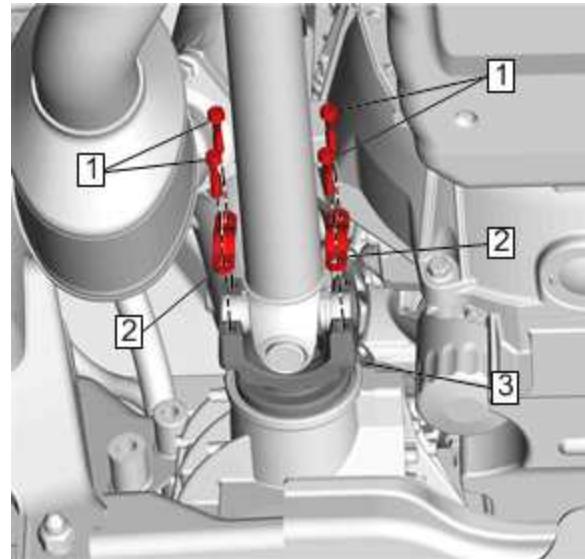


Fig. 20: Front Axle Pinion Yoke Bolts And Retainers

Courtesy of GENERAL MOTORS COMPANY

4. Remove the bolts (1) and the yoke retainers (2) from the front axle pinion yoke (3).

NOTE: **Do not drop the bearing cap assemblies of the yoke end.**

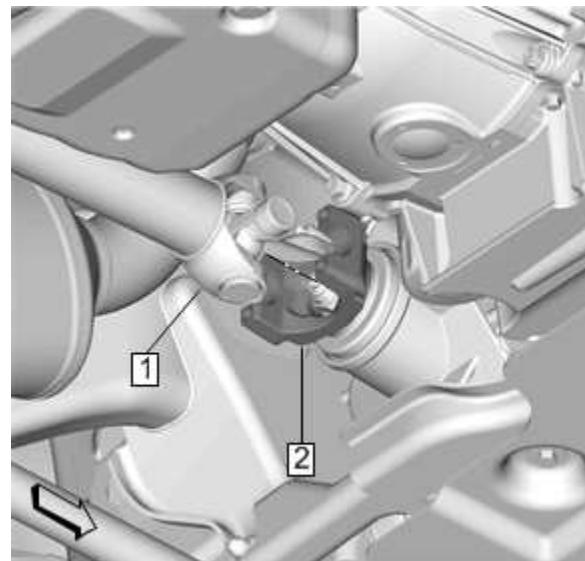


Fig. 21: Disconnecting Propeller Shaft From Front Axle Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

5. Disconnect the propeller shaft (1) from the front axle pinion yoke (2).

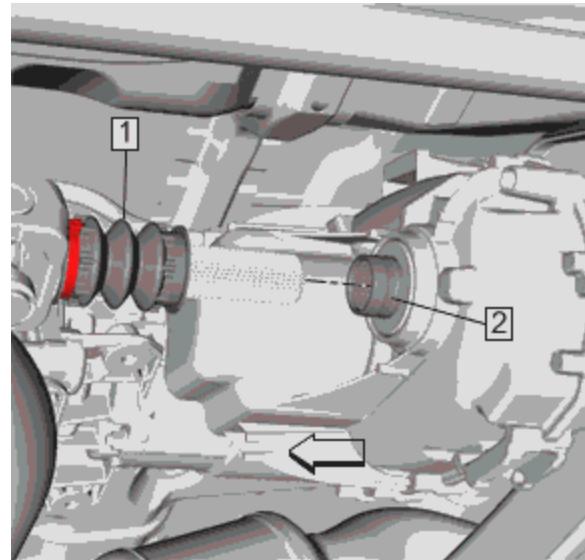


Fig. 22: Boot, Groove & Transfer Case Output Shaft

Courtesy of GENERAL MOTORS COMPANY

6. Remove the boot (1) from the groove on the transfer case output shaft (2).
7. Remove the propeller shaft from the transfer case output shaft.

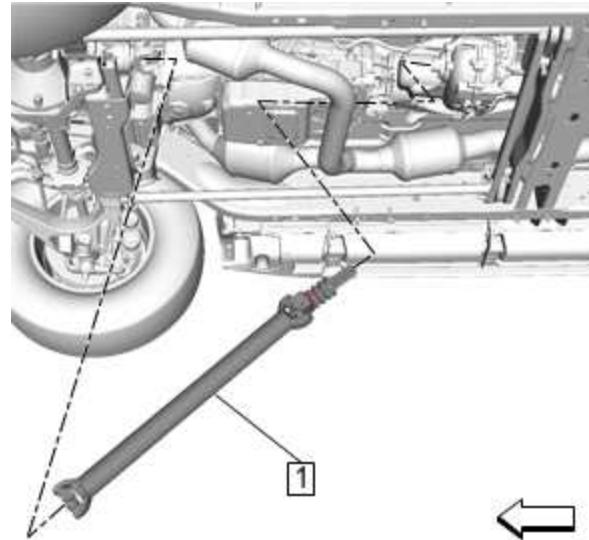


Fig. 23: Propeller Shaft

Courtesy of GENERAL MOTORS COMPANY

8. Remove the propeller shaft (1) from the vehicle.

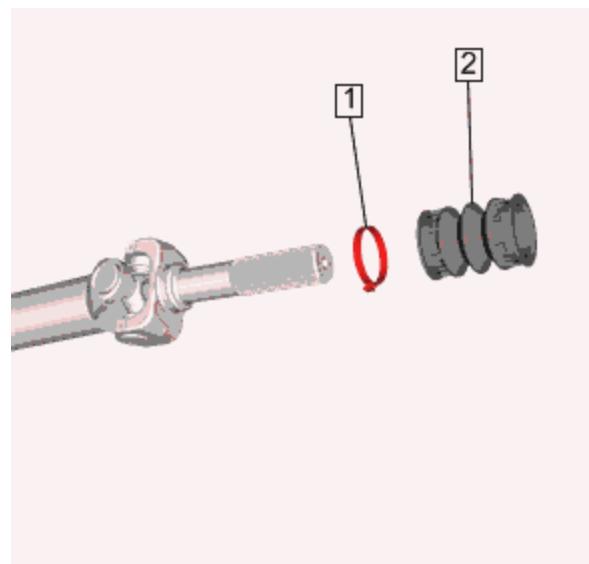


Fig. 24: Propeller Shaft Boot And Clamp

Courtesy of GENERAL MOTORS COMPANY

9. Remove the clamp (1) from the propeller shaft boot (2), if needed.
10. Remove the propeller shaft boot (2) from the propeller shaft, if needed.

Installation Procedure

1. Inspect the splines of the transfer case output shaft for a sufficient coating of lubricant. If the output shaft does not have a sufficient coating of lubricant, lubricate the shaft with grease. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#).

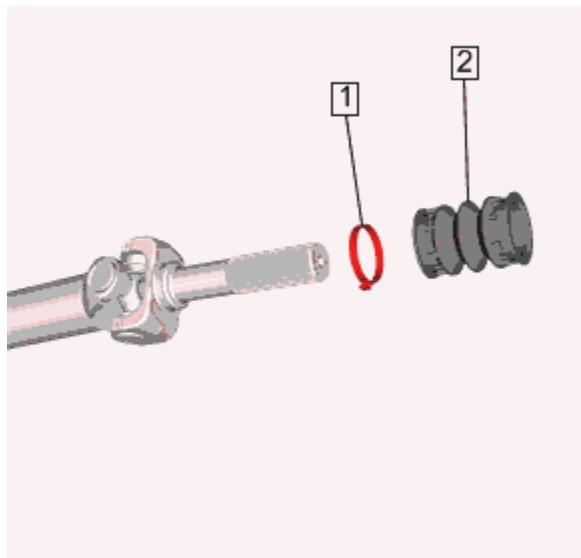


Fig. 25: Propeller Shaft Boot And Clamp

Courtesy of GENERAL MOTORS COMPANY

2. Install the propeller shaft boot clamps (1).
3. Install the propeller shaft boot (2).

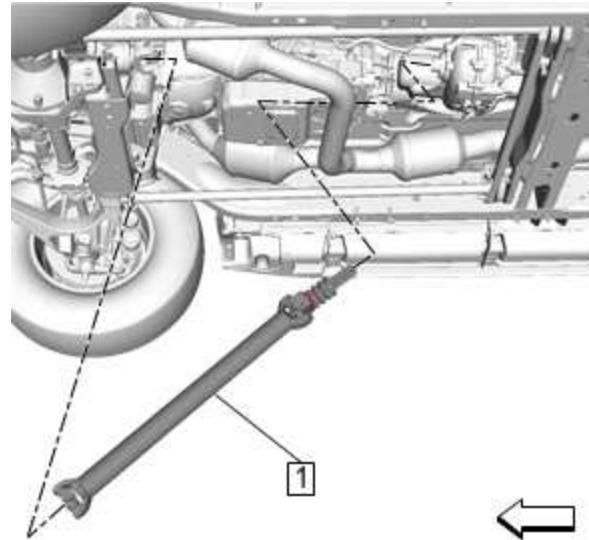


Fig. 26: Propeller Shaft

Courtesy of GENERAL MOTORS COMPANY

4. Position the propeller shaft (1) into the vehicle.

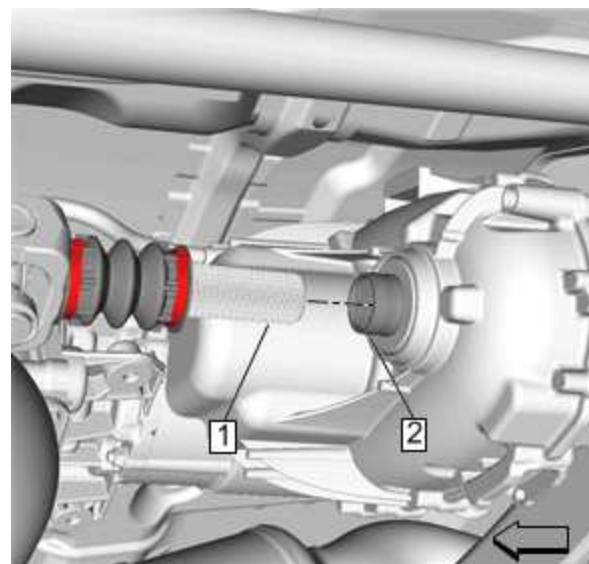


Fig. 27: Propeller Shaft Splines And Transfer Case Output Shaft

Courtesy of GENERAL MOTORS COMPANY

5. Install the propeller shaft splines (1) into the transfer case output shaft (2).

NOTE: Align the relationship marks on the front propeller shaft and the drive axle flange.

6. Align the reference marks made during removal.

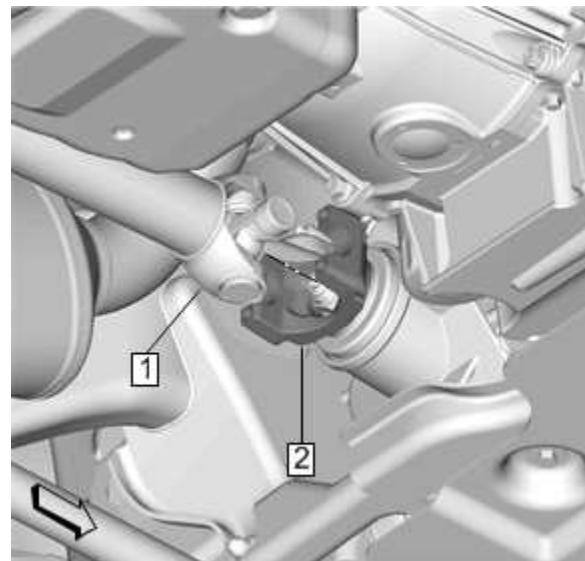


Fig. 28: Propeller Shaft To Front Axle Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

7. Position the propeller shaft (1) to the front axle pinion yoke (2).

CAUTION: Refer to Fastener Caution.

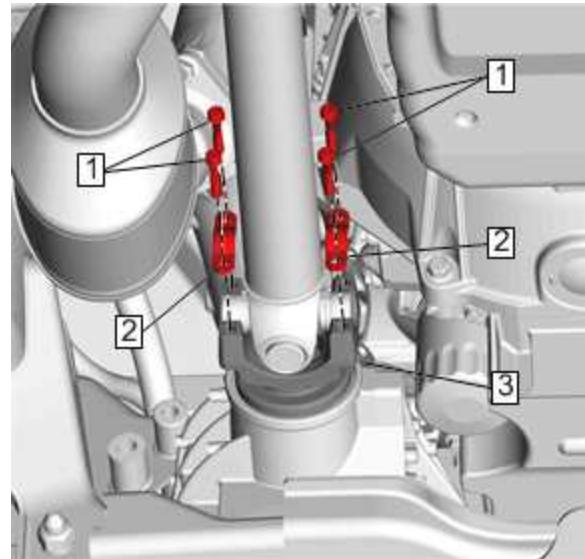


Fig. 29: Front Axle Pinion Yoke Bolts And Retainers

Courtesy of GENERAL MOTORS COMPANY

8. Install the universal joint retainers (2) and the bolts (1) into the front axle pinion yoke (3) and tighten to 25 N.m (18 lb ft).
9. Install the boot onto the transfer case output shaft until the boot snaps into the groove on the output shaft.

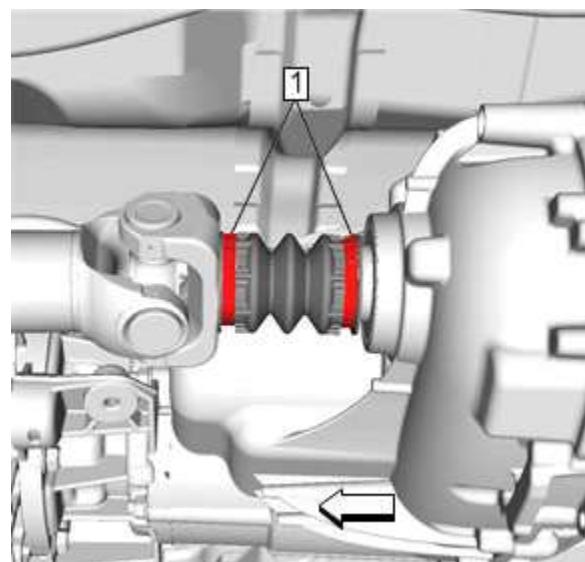


Fig. 30: Boot Clamps

Courtesy of GENERAL MOTORS COMPANY

10. Using the **J-43218** Clamp Pliers - Narrow Jaw, crimp both clamps (1).
11. Install the transfer case shield. Refer to [**Transfer Case Shield Replacement**](#)
12. Check the fluid level of the transfer case.
13. Lower the vehicle.

REAR PROPELLER SHAFT REPLACEMENT (1500)

Removal Procedure

NOTE: Observe and accurately reference mark all driveline components relative to the propeller shaft and axles before disassembly. These components include the propeller shafts, the drive axles, the pinion flanges, the output shafts, etc. All components must be reassembled in the exact relationship to each other as they were when removed. In addition, published specifications and torque values, as well as any measurements made prior to disassembly must be followed.

1. Raise the vehicle. Refer to [**Lifting and Jacking the Vehicle**](#)

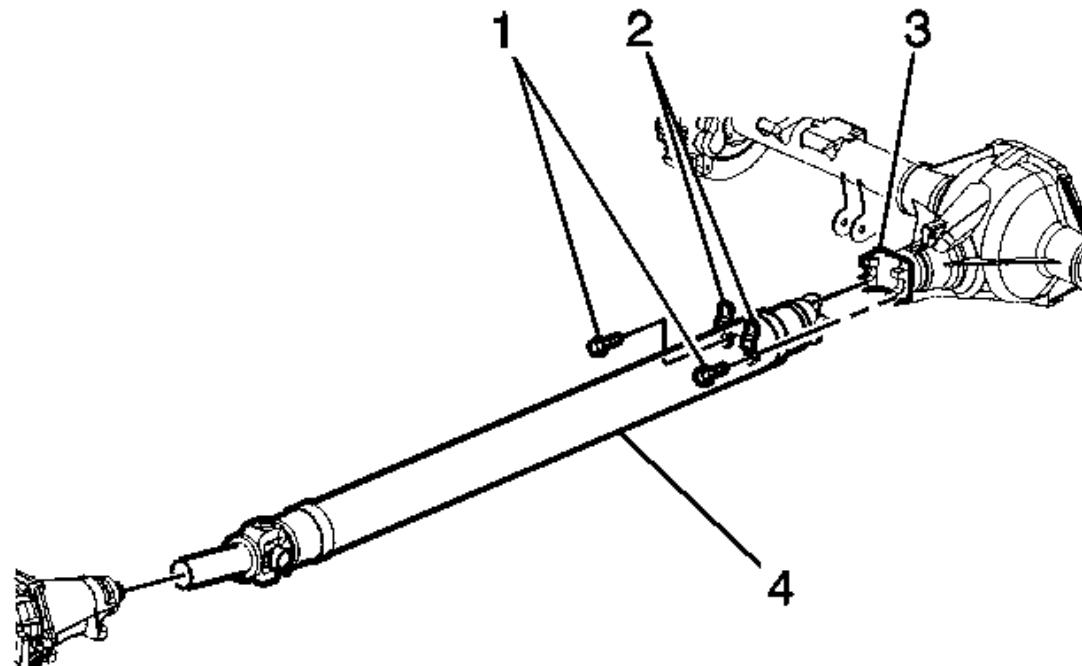


Fig. 31: Yoke Retainers, Rear Axle Pinion Yoke & Bolts

Courtesy of GENERAL MOTORS COMPANY

2. Reference mark the propeller shaft to the rear axle pinion yoke.
3. Reference mark the propeller shaft to the transmission or transfer case.

NOTE: DO NOT re-use the yoke retainers. DISCARD and replace with NEW only.

4. Remove the bolts (1) and the yoke retainers (2) from the rear axle pinion yoke (3). DISCARD the bolts.

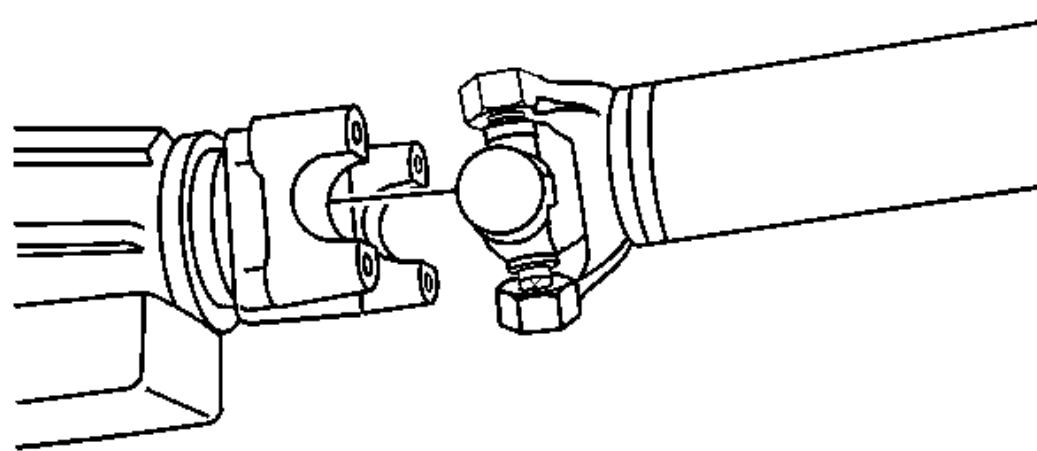


Fig. 32: Disconnecting Propeller Shaft From Rear Axle Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

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

5. Slide the propeller shaft forward in order to disconnect the propeller shaft from the rear axle pinion yoke.

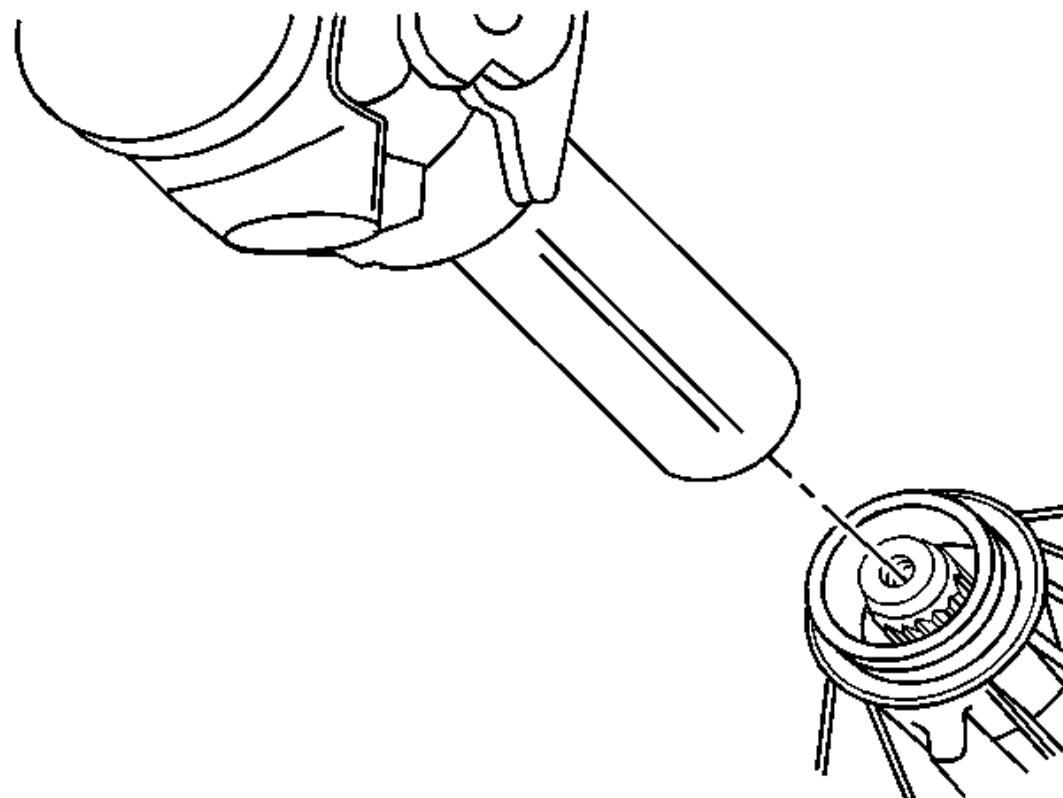


Fig. 33: Removing Propeller Shaft

Courtesy of GENERAL MOTORS COMPANY

6. Slide the propeller shaft rearward in order to disconnect the propeller shaft from the transmission or transfer case.
7. Remove the propeller shaft from the vehicle.

Installation Procedure

1. Inspect the splines of the slip yoke for a sufficient coating of lubricant. If the splines of the slip yoke do not have a sufficient coating, lubricate the internal slip yoke splines with proper lubricant. [Adhesives, Fluids, Lubricants, and Sealers](#)

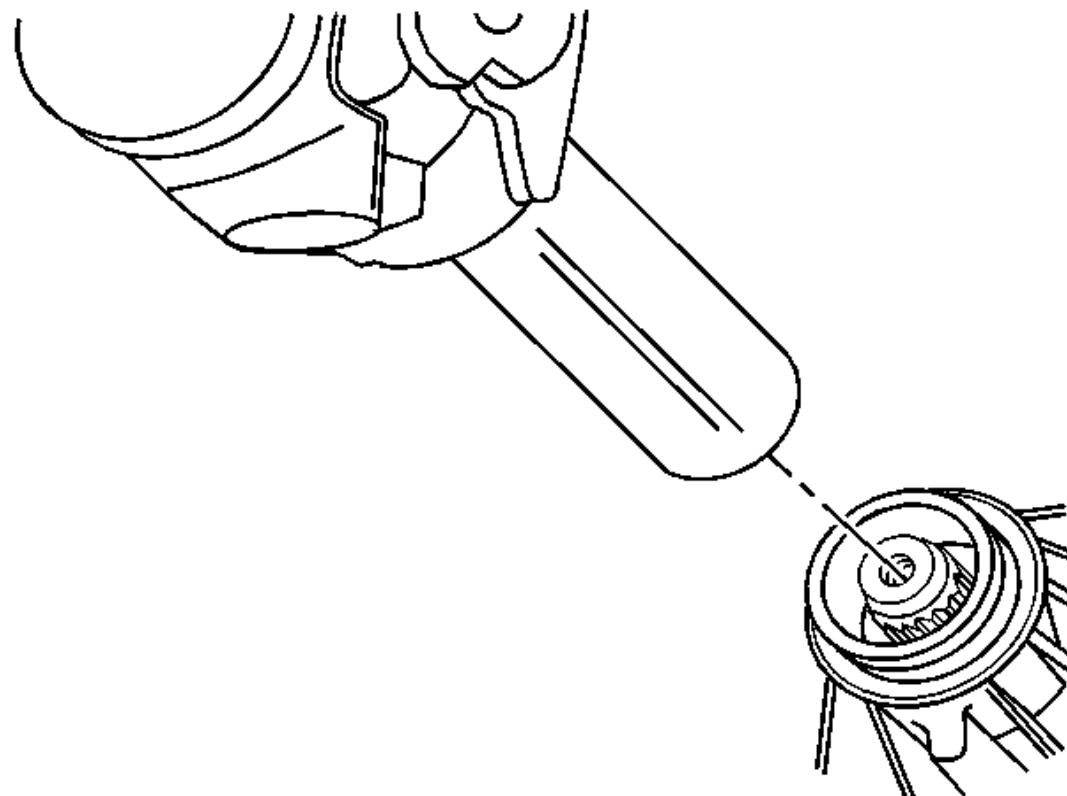


Fig. 34: Installing Propeller Shaft To Transmission Or Transfer Case

Courtesy of GENERAL MOTORS COMPANY

2. Install the propeller shaft into the transmission or transfer case.

Align the reference marks made during removal.

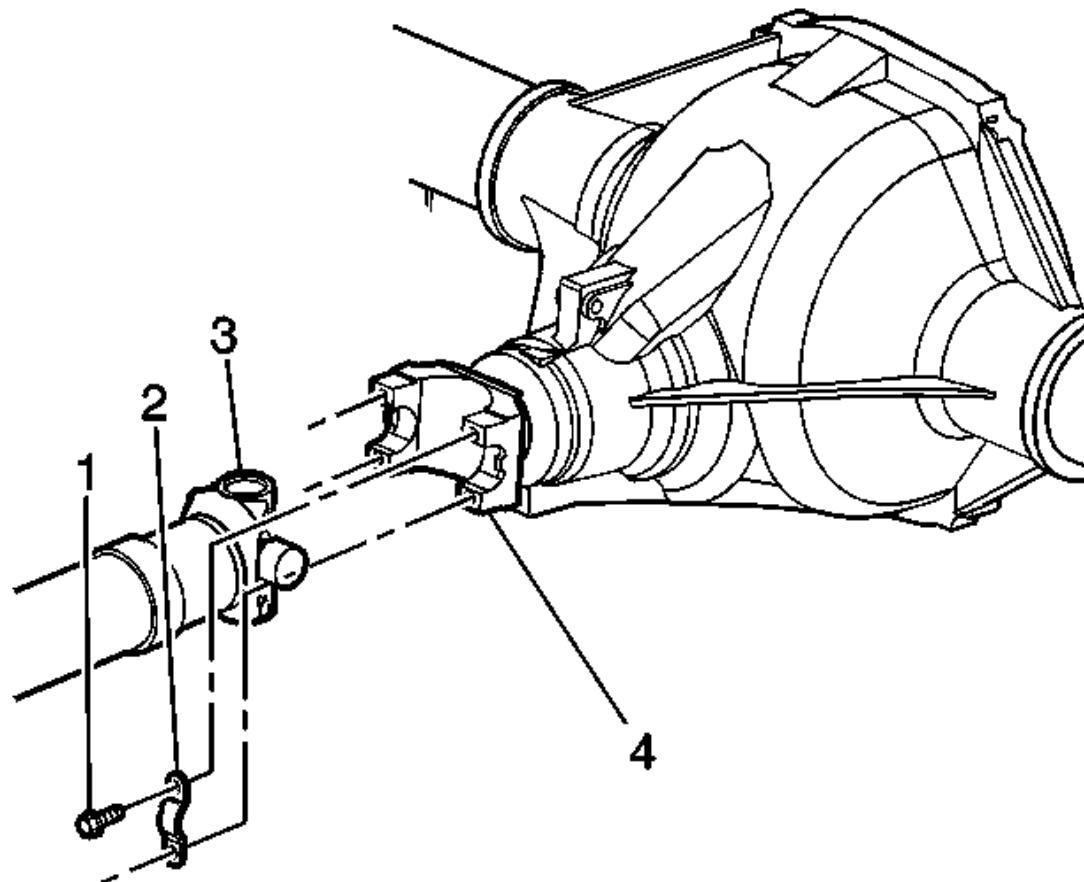


Fig. 35: Propeller Shaft, Rear Axle Pinion Yoke, Yoke Retainers And Bolts

Courtesy of GENERAL MOTORS COMPANY

3. Install the propeller shaft (3) to the rear axle pinion yoke (4).

Align the reference marks made during removal.

CAUTION: Refer to Fastener Caution .

4. Install the NEW yoke retainers (2) and the NEW bolts (1). Tighten to 25 N.m (18 lb ft).
5. Lower the vehicle.

REAR PROPELLER SHAFT REPLACEMENT (HEAVY DUTY)

Removal Procedure

NOTE: Observe and accurately reference mark all driveline components relative to the propeller shaft and axles before disassembly. These components include the propeller shafts, the drive axles, the pinion flanges, the output shafts, etc. All components must be reassembled in the exact relationship to each other as they were when removed. In addition, published specifications and torque values, as well as any measurements made prior to disassembly must be followed.

1. Raise the vehicle. Refer to [Lifting and Jacking the Vehicle](#)

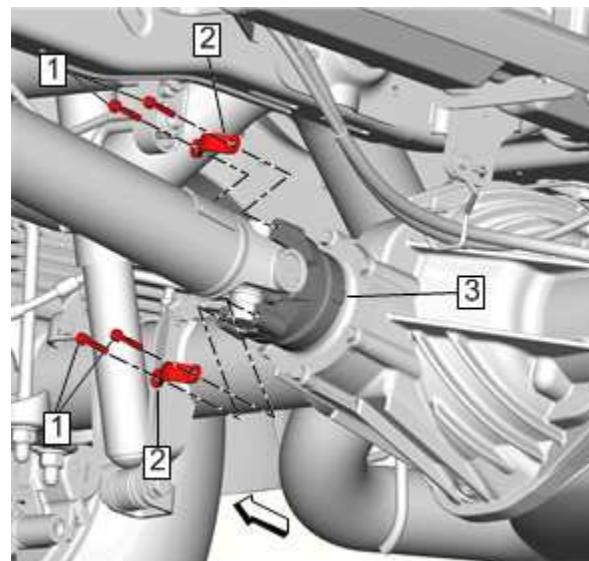


Fig. 36: Propeller Shaft, Rear Axle Pinion Yoke, Bolts And Yoke Retainers

Courtesy of GENERAL MOTORS COMPANY

2. Mark a reference point between the propeller shaft and the flange.
3. Mark a reference point between the propeller shaft and the transmission or transfer case.

NOTE: DO NOT re-use the yoke retainers. Discard and replace with NEW only.

4. Remove and discard the bolts, (1) (Qty: 4) and the yoke retainers, (2) (Qty: 2) from the rear axle pinion yoke (3).

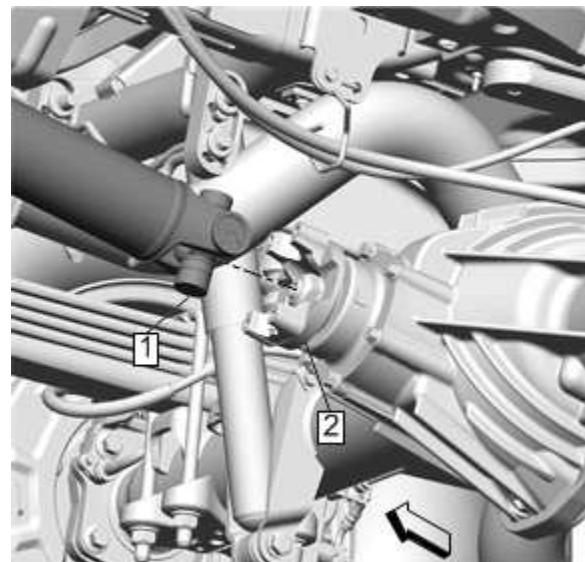


Fig. 37: Disconnecting Propeller Shaft From Rear Axle Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

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

5. Slide the propeller shaft (1) forward in order to disconnect the propeller shaft from the rear axle pinion yoke (2).

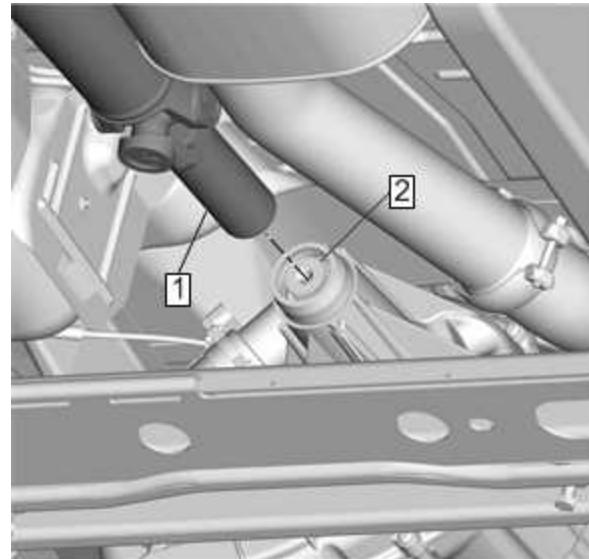


Fig. 38: Disconnecting Propeller Shaft From Transmission Or Transfer Case

Courtesy of GENERAL MOTORS COMPANY

6. Slide the propeller shaft (1) rearward in order to disconnect the propeller shaft from the transmission or transfer case (2).

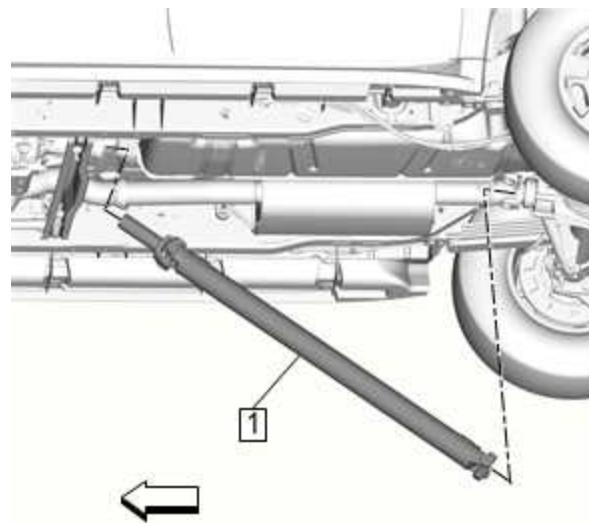


Fig. 39: Removing Propeller Shaft

Courtesy of GENERAL MOTORS COMPANY

- 7.
8. Remove the rear propeller shaft.

Installation Procedure

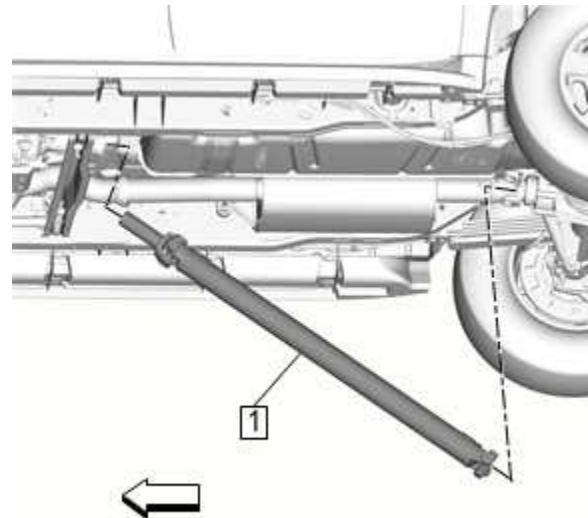


Fig. 40: Propeller Shaft

Courtesy of GENERAL MOTORS COMPANY

1. Install the propeller shaft (1) into the vehicle.
2. Inspect the splines of the slip yoke for a sufficient coating of lubricant. If the splines of the slip yoke do NOT have a sufficient coating, lubricate the internal slip yoke splines with clean transmission fluid. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#)

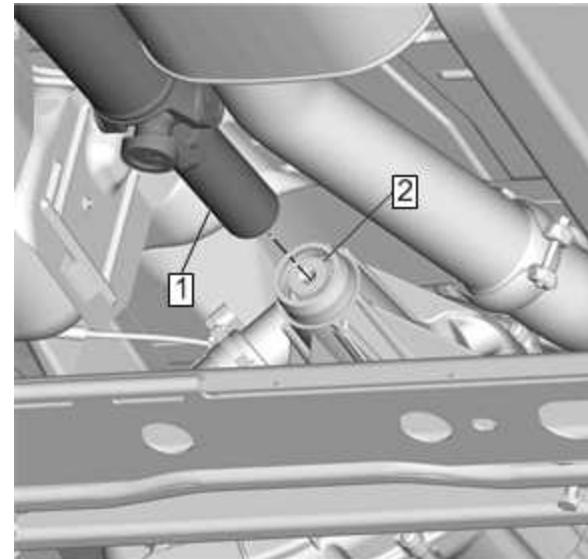


Fig. 41: Propeller Shaft To Transmission Or Transfer Case

Courtesy of GENERAL MOTORS COMPANY

3. Install the propeller shaft (1) into the transmission or transfer case (2).

Align the reference marks made during removal.

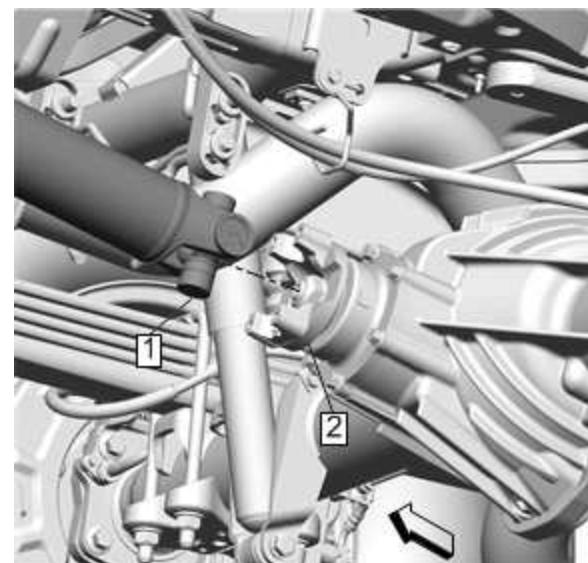


Fig. 42: Propeller Shaft To Rear Axle Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

4. Install the propeller shaft (1) to the rear axle pinion yoke (2).

Align the reference marks made during removal.

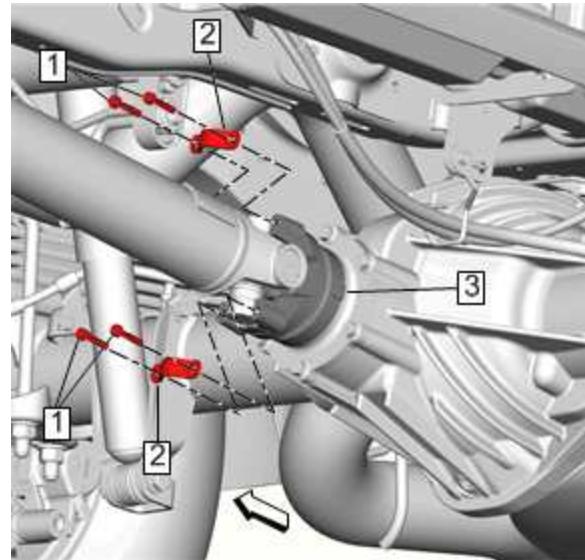


Fig. 43: Propeller Shaft, Rear Axle Pinion Yoke, Bolts And Yoke Retainers

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

5. Install the NEW yoke retainers, (2) (Qty: 2) NEW bolts, (1) (Qty: 4) and tighten to 25 N.m (18 lb ft).

6. Lower the vehicle.

REAR PROPELLER SHAFT REPLACEMENT (MSU, 2WD)

Removal Procedure

NOTE: Observe and accurately reference mark all driveline components relative to the propeller shaft and axles before disassembly. These components include the propeller shafts, the drive axles, the pinion flanges, the output shafts, etc. All components must be reassembled in the exact relationship to each other as

they were when removed. In addition, published specifications and torque values, as well as any measurements made prior to disassembly must be followed.

1. Raise the vehicle. Refer to [Lifting and Jacking the Vehicle](#)

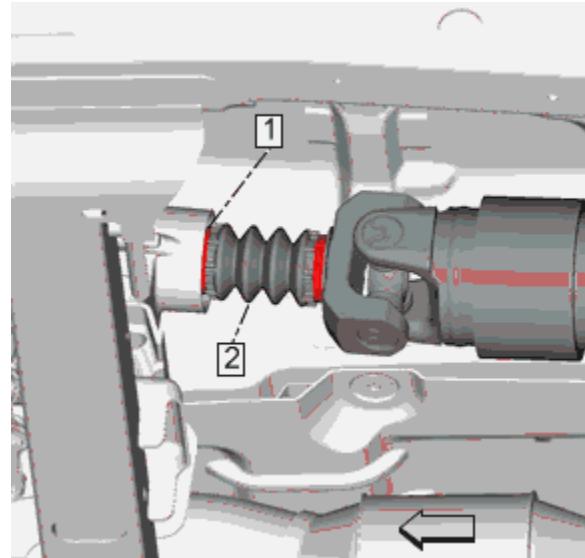


Fig. 44: Front Boot Clamp And Propeller Shaft Slip Yoke Boot

Courtesy of GENERAL MOTORS COMPANY

2. Remove the front boot clamp (1) from the propeller shaft slip yoke boot (2) by prying up the exposed end of the clamp with a flat-bladed tool.
3. Mark a reference point between the propeller shaft and the flange.
4. Mark a reference point between the propeller shaft and the transmission.

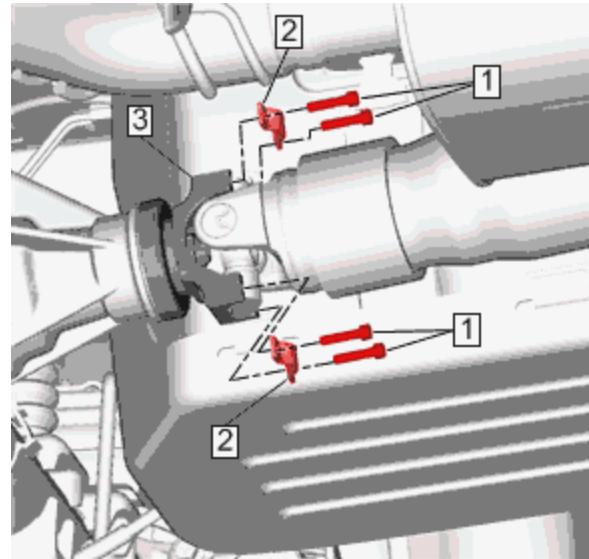


Fig. 45: Bolts, Yoke Retainers And Rear Axle Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

NOTE: DO NOT re-use the yoke retainers. Discard and replace with NEW only.

5. REMOVE and DISCARD the bolts (1) (Qty: 4), and the yoke retainers (2) (Qty: 2), from the rear axle pinion yoke (3).

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

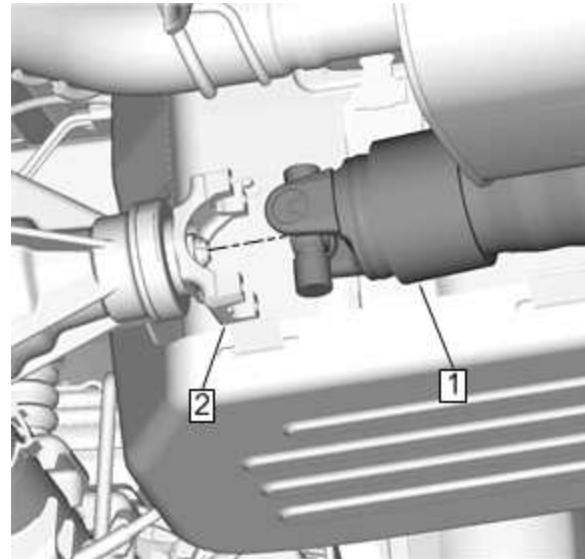


Fig. 46: Disconnecting Propeller Shaft From Rear Axle Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

6. Slide the propeller shaft (1) forward in order to disconnect the propeller shaft (1) from the rear axle pinion yoke (2).

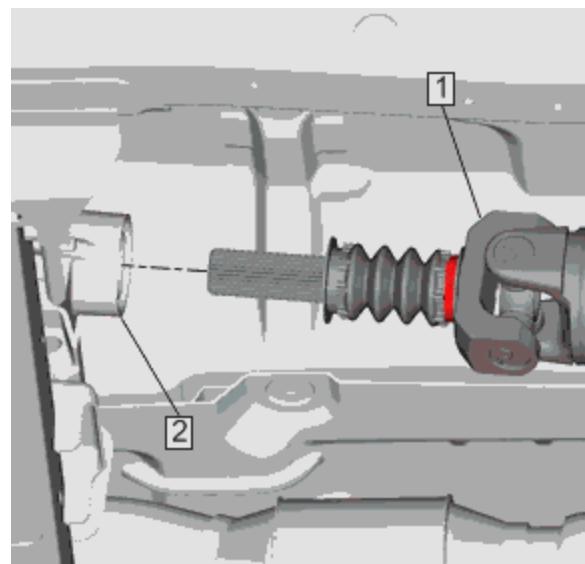


Fig. 47: Disconnecting Propeller Shaft From Transmission

Courtesy of GENERAL MOTORS COMPANY

7. Slide the propeller shaft (1) rearward in order to disconnect the propeller shaft (1) from the transmission (2).

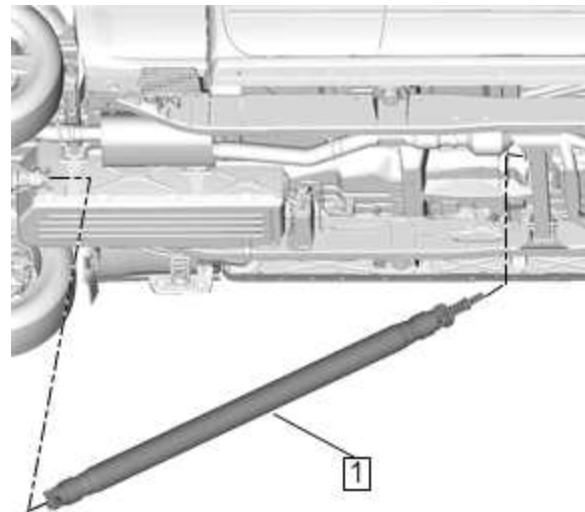


Fig. 48: Propeller Shaft

Courtesy of GENERAL MOTORS COMPANY

- 8.
9. Remove the rear propeller shaft (1).

Installation Procedure

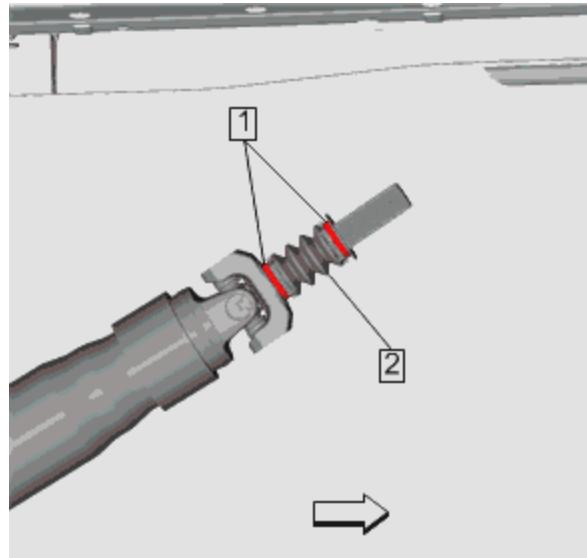


Fig. 49: Slip Yoke Boot And Clamps

Courtesy of GENERAL MOTORS COMPANY

NOTE: Prior to installation closely inspect the slip yoke boot for damage. Replace the boot if damaged.

1. Loosely install the clamps (1) and the boot (2) onto the propeller shaft.
2. Inspect the splines of the slip yoke for a sufficient coating of lubricant. If the splines of the slip yoke do NOT have a sufficient coating, lubricate the internal slip yoke splines with clean transmission fluid. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#)

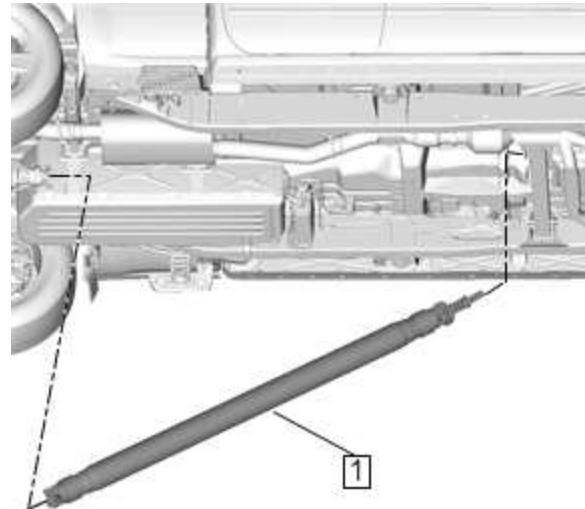


Fig. 50: Propeller Shaft

Courtesy of GENERAL MOTORS COMPANY

3. Install the propeller shaft (1)
4. Align the reference marks made during removal.

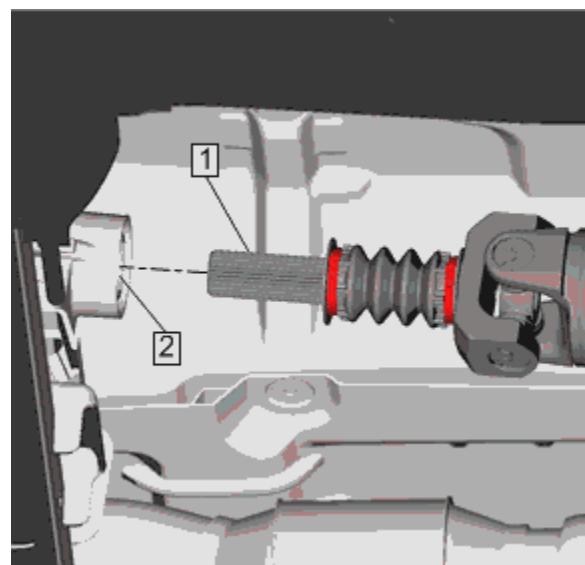


Fig. 51: Propeller Shaft To Transmission Output Shaft

Courtesy of GENERAL MOTORS COMPANY

5. Install the propeller shaft splines (1) into the transmission output shaft (2).

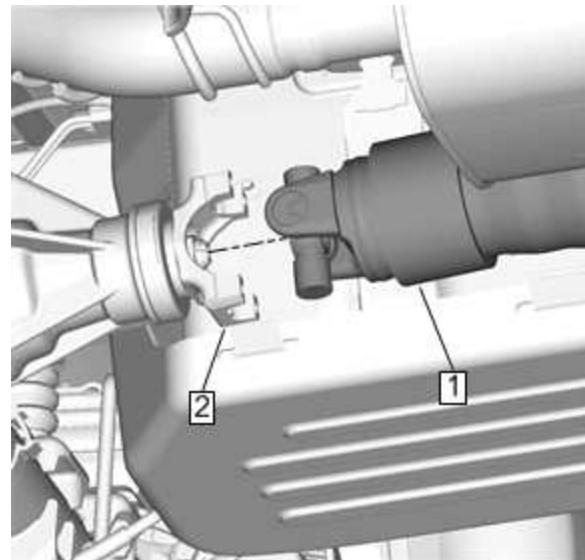


Fig. 52: Propeller Shaft To Rear Axle Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

6. Install the propeller shaft (1) to the rear axle pinion yoke (2).

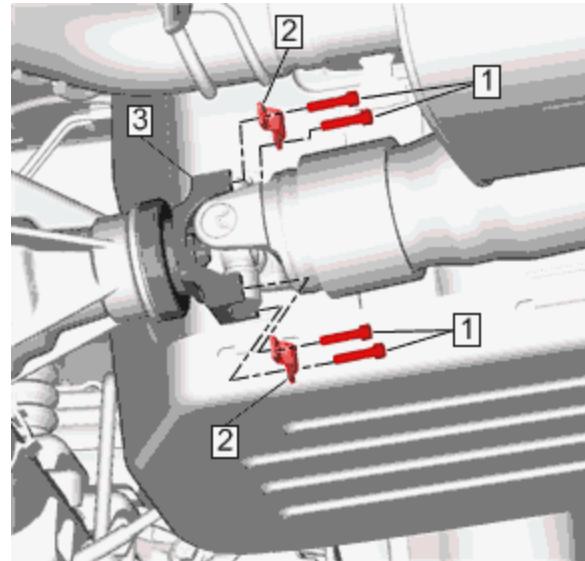


Fig. 53: Yoke Retainers And Bolts

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

7. Install the NEW yoke retainers (2) (Qty: 2), NEW bolts (1) (Qty: 4) and tighten to 25 N.m (18 lb ft).
8. Install the boot onto the transmission output shaft until the boot snaps into the groove on the output shaft.
9. Use the **J-43218** clamp pliers to crimp both clamps.
10. Lower the vehicle.

PROPELLER SHAFT SLIP YOKE BOOT REPLACEMENT (M5U, 2WD)

Special Tools

J-43218 Clamp Pliers - Narrow Jaw

Removal Procedure

NOTE: Before disassembly, observe and accurately reference mark all driveline components relative to the propeller shaft and axles. These items include the following components:

- The propeller shafts

- The wheel drive shafts
- The pinion flanges
- The output shafts

Assemble all components in the exact relationship to each other as they were prior to removal. Observe all published specifications and torque values, and any measurements obtained prior to disassembly.

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#)

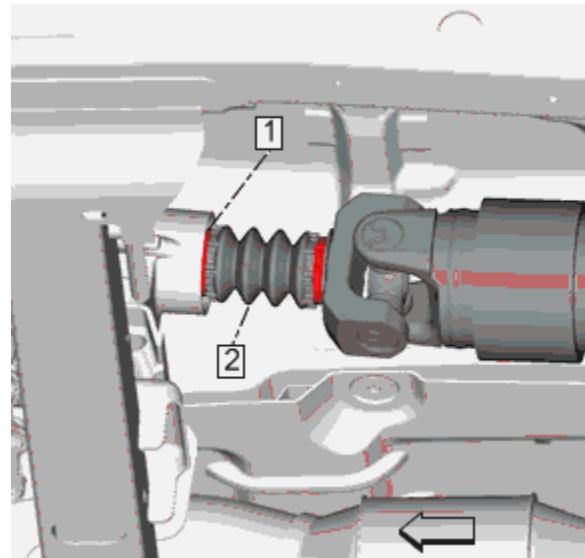


Fig. 54: Front Boot Clamp And Propeller Shaft Slip Yoke Boot

Courtesy of GENERAL MOTORS COMPANY

2. Remove the front boot clamp (1) from the propeller shaft slip yoke boot (2) by prying up the exposed end of the clamp with a flat-bladed tool.
3. Mark a reference point between the propeller shaft and the rear axle flange.

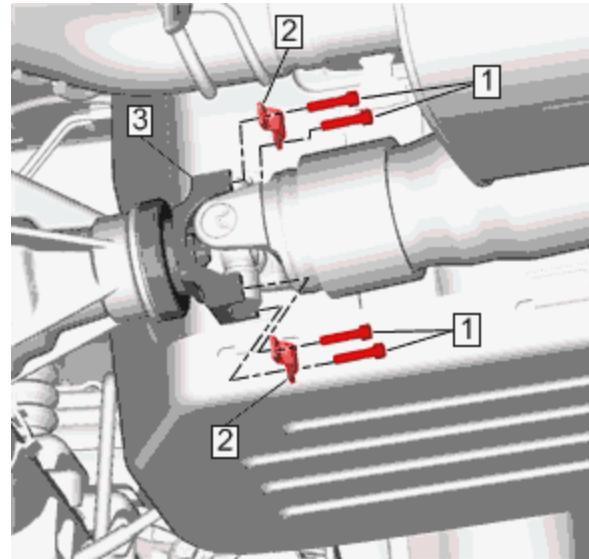


Fig. 55: Propeller Shaft Bolts, Yoke Retainers And Rear Axle Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

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

4. REMOVE and DISCARD the propeller shaft bolts (1) (Qty: 4) and the yoke retainers (2) (Qty: 2) from the rear axle pinion yoke.

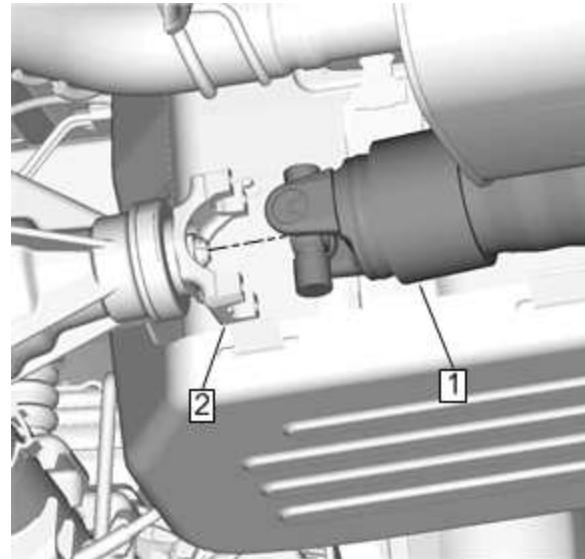


Fig. 56: Propeller Shaft And Rear Axle Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

NOTE: Do not drop the bearing cap assemblies of the yoke end.

5. Disconnect the propeller shaft (1) from the rear axle pinion yoke (2).

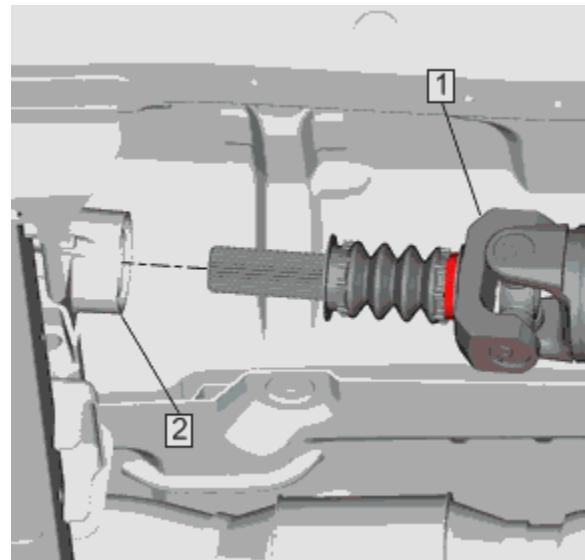


Fig. 57: Removing Propeller Shaft From Transmission Output Shaft

Courtesy of GENERAL MOTORS COMPANY

6. Remove the boot from the groove on the transfer case output shaft.
7. Remove the propeller shaft (1) from the transmission output shaft (2) by sliding the propeller shaft (1) reward.

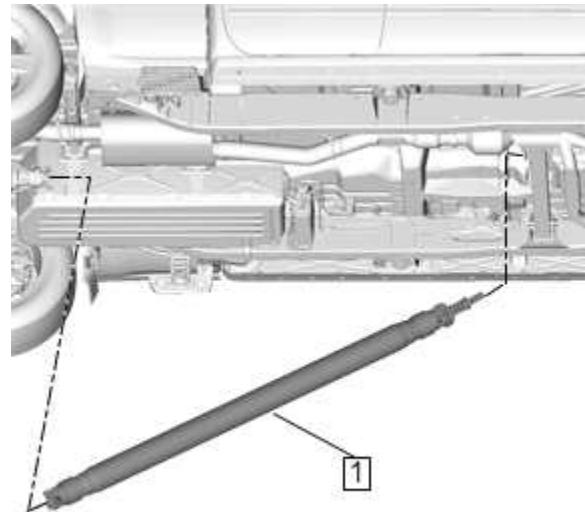


Fig. 58: Propeller Shaft

Courtesy of GENERAL MOTORS COMPANY

8. Remove the propeller shaft (1) from the vehicle.

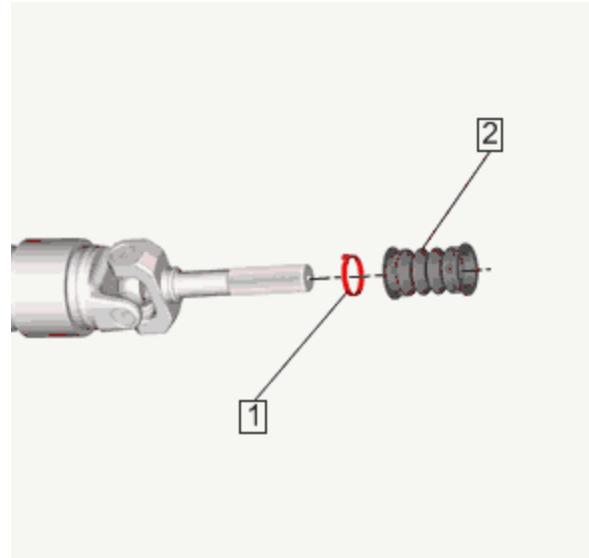


Fig. 59: Propeller Shaft Boot And Clamp

Courtesy of GENERAL MOTORS COMPANY

9. Remove the clamp (1) from the propeller shaft boot (2).
10. Remove the propeller shaft boot (2) from the propeller shaft.

Installation Procedure

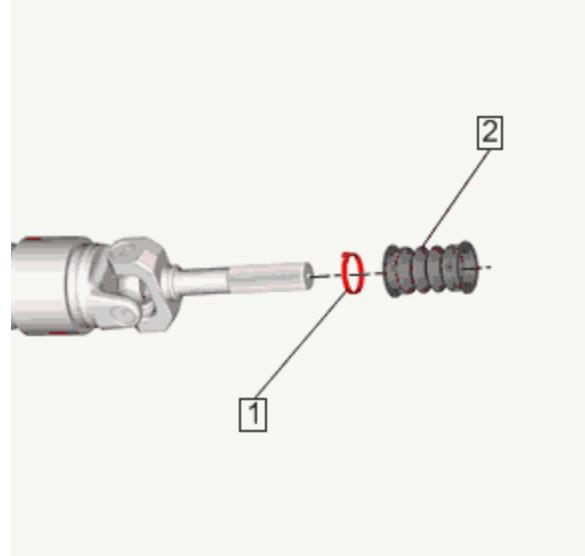


Fig. 60: Propeller Shaft Boot And Clamp

Courtesy of GENERAL MOTORS COMPANY

1. Install the propeller shaft boot clamp (1).
2. Install the propeller shaft boot (2).

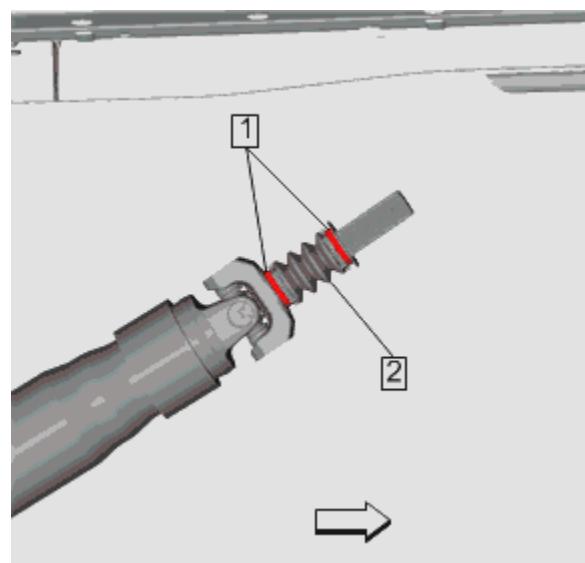


Fig. 61: Propeller Shaft Boot And Clamps

Courtesy of GENERAL MOTORS COMPANY

3. Loosely install the clamps (1) and the boot (2) onto the propeller shaft.

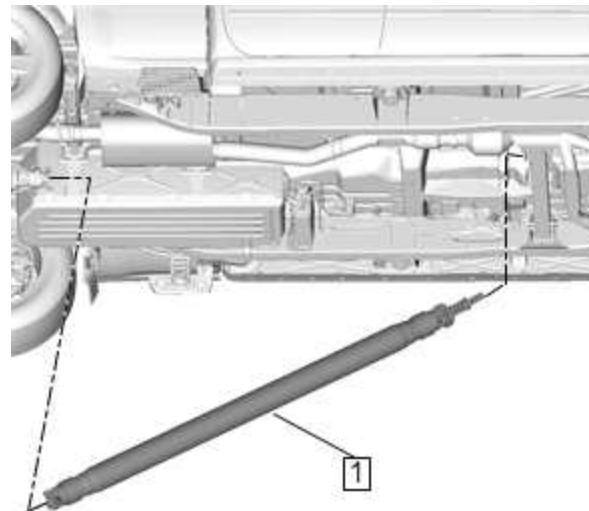


Fig. 62: Propeller Shaft

Courtesy of GENERAL MOTORS COMPANY

4. Inspect the splines of the slip yoke for a sufficient coating of lubricant. If the splines of the slip yoke do not have a sufficient coating, lubricate the internal slip yoke splines with clean transmission fluid.
5. Install the propeller shaft (1) into the vehicle

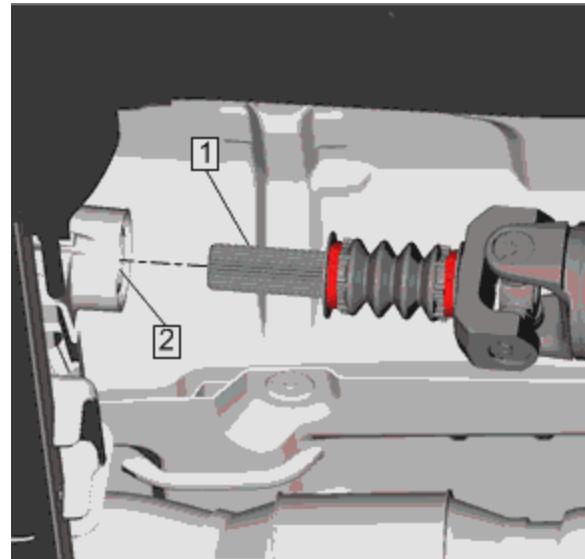


Fig. 63: Propeller Shaft And Transmission Output Shaft

Courtesy of GENERAL MOTORS COMPANY

6. Install the propeller shaft splines (1) into the transmission output shaft (2).

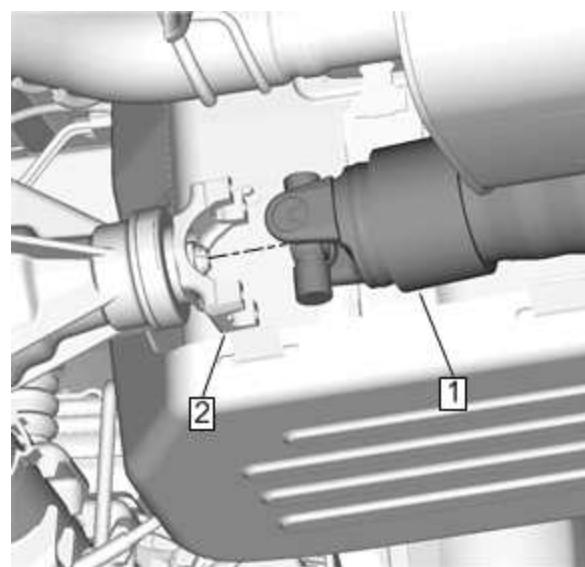


Fig. 64: Propeller Shaft To Rear Axle Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

7. Install the propeller shaft (1) to the rear axle pinion yoke (2).

Align the reference marks made during removal.

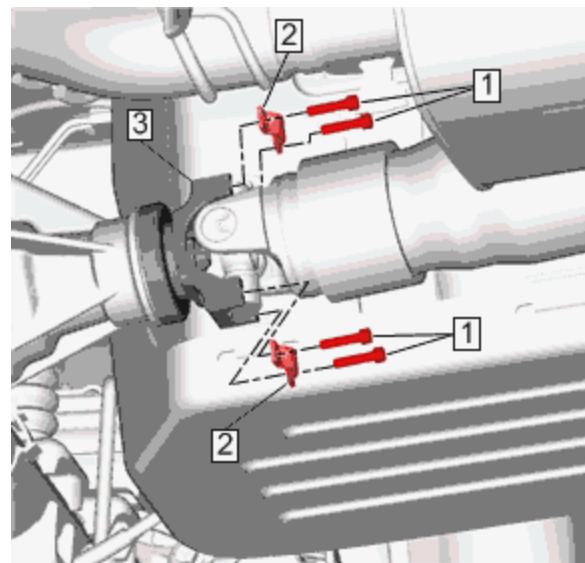


Fig. 65: Yoke Retainers And Bolts

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

8. Install the NEW yoke retainers (2) (Qty: 2) and the NEW bolts (1) (Qty: 4).

Tighten

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

9. Install the boot onto the transmission output shaft until the boot snaps into the groove on the output shaft.
10. Use the **J-43218** clamp pliers to crimp both clamps.
11. Lower the vehicle.

FRONT AXLE PROPELLER SHAFT SLIP YOKE BOOT REPLACEMENT

Special Tools

J-43218 Clamp Pliers - Narrow Jaw

Removal Procedure

NOTE: Before disassembly, observe and accurately reference mark all driveline components relative to the propeller shaft and axles. These items include the following components:

- The propeller shafts
- The wheel drive shafts
- The pinion flanges
- The output shafts

Assemble all components in the exact relationship to each other as they were prior to removal. Observe all published specifications and torque values, and any measurements obtained prior to disassembly.

1. Raise the vehicle. Refer to [Lifting and Jacking the Vehicle](#).

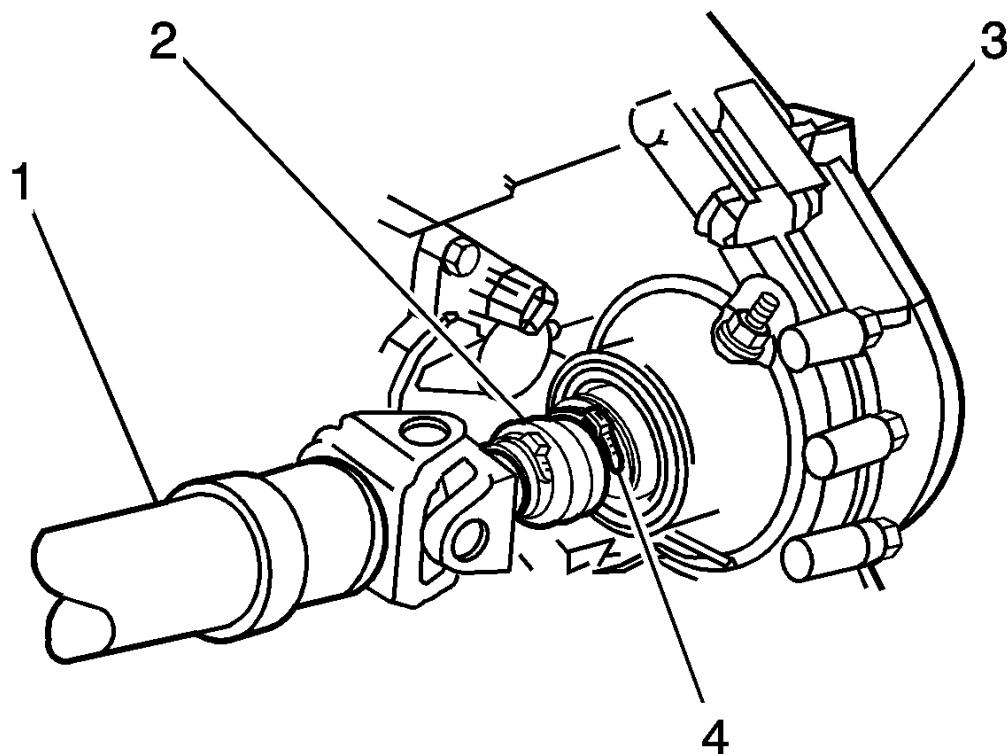


Fig. 66: Removing Clamp At Transfer Case

Courtesy of GENERAL MOTORS COMPANY

2. Remove the clamp (4) at the transfer case by prying up the exposed end of the clamp with a flat-bladed tool.
3. Reference mark the relationship of the propeller shaft to the front axle pinon yoke.

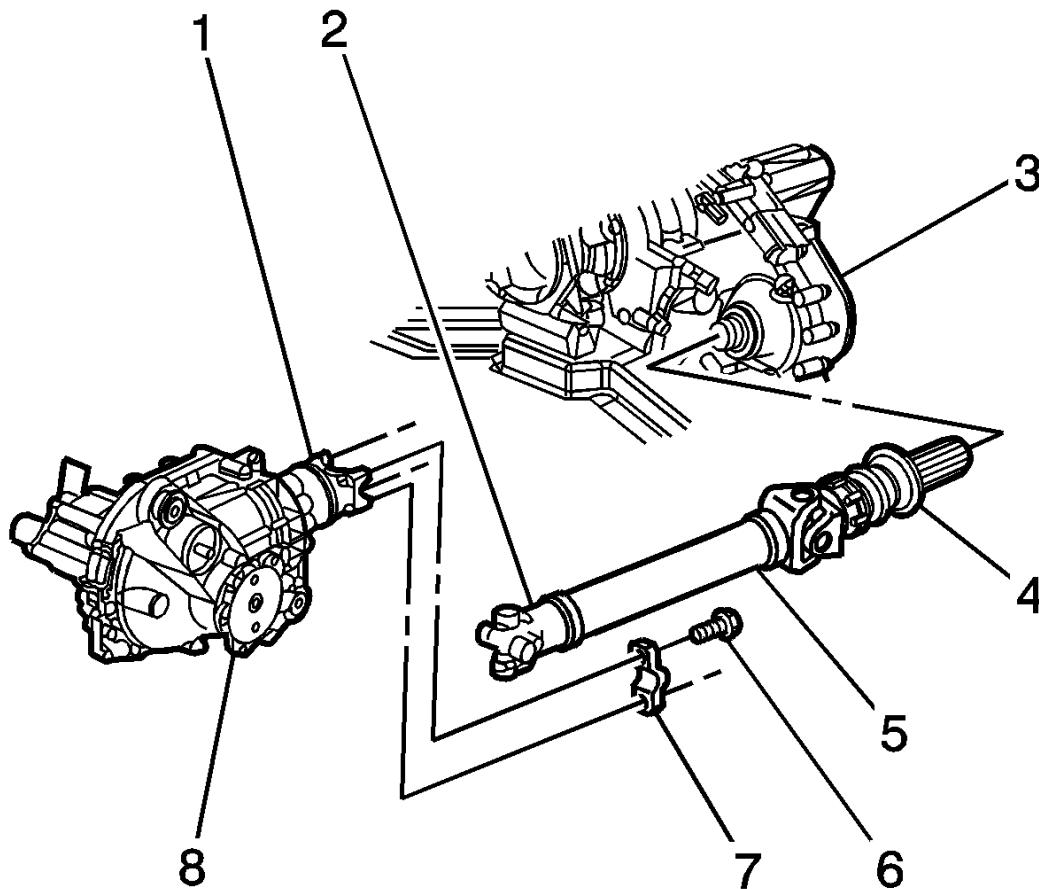


Fig. 67: Disconnecting Propeller Shaft From Front Axle Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

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

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

NOTE: Do not drop the bearing cap assemblies of the yoke end.

5. Disconnect the propeller shaft (2) from the front axle pinion yoke (1).

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

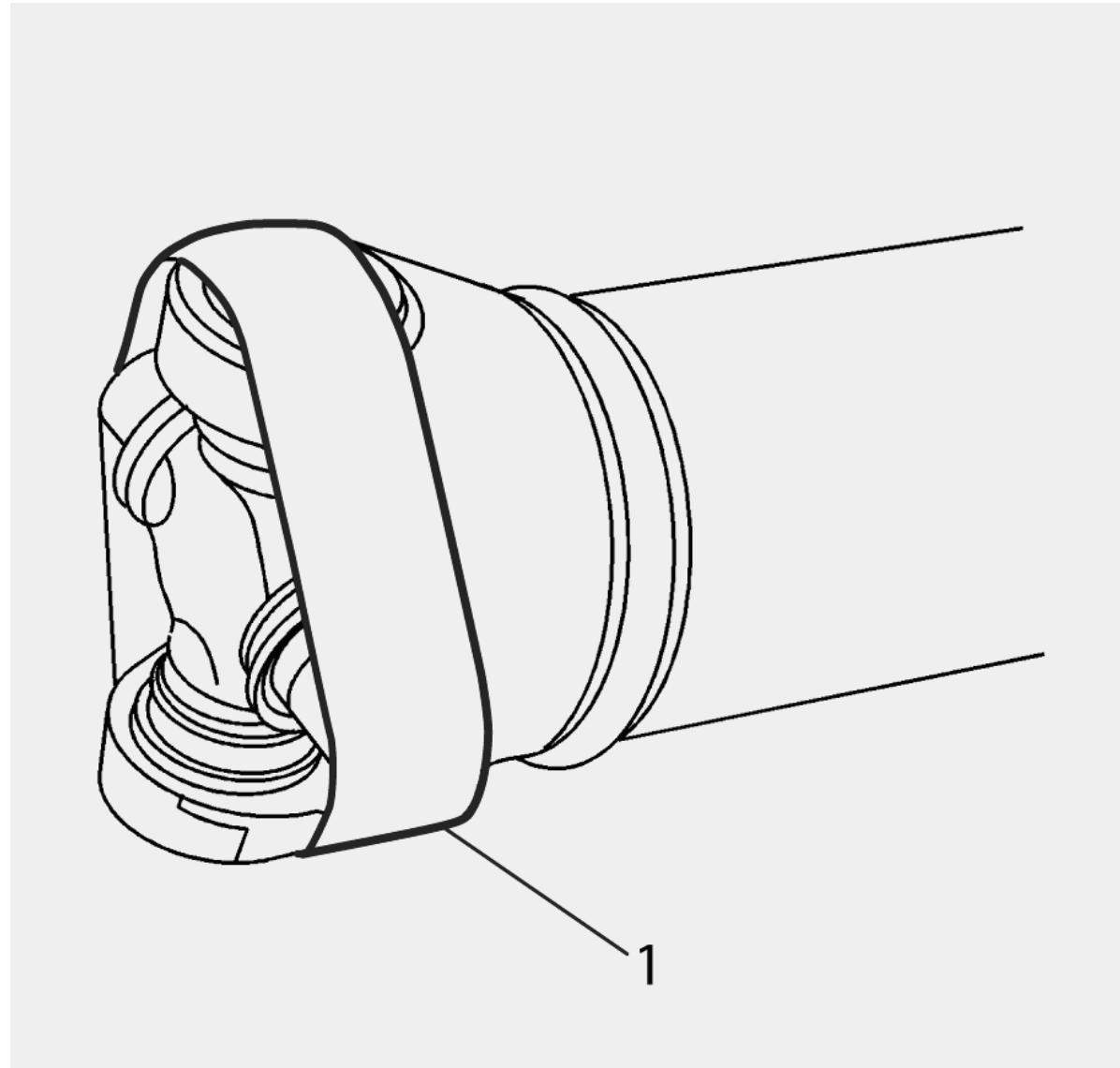


Fig. 68: U-Joint Bearing Caps

Courtesy of GENERAL MOTORS COMPANY

6. Use tape to secure the bearing caps.

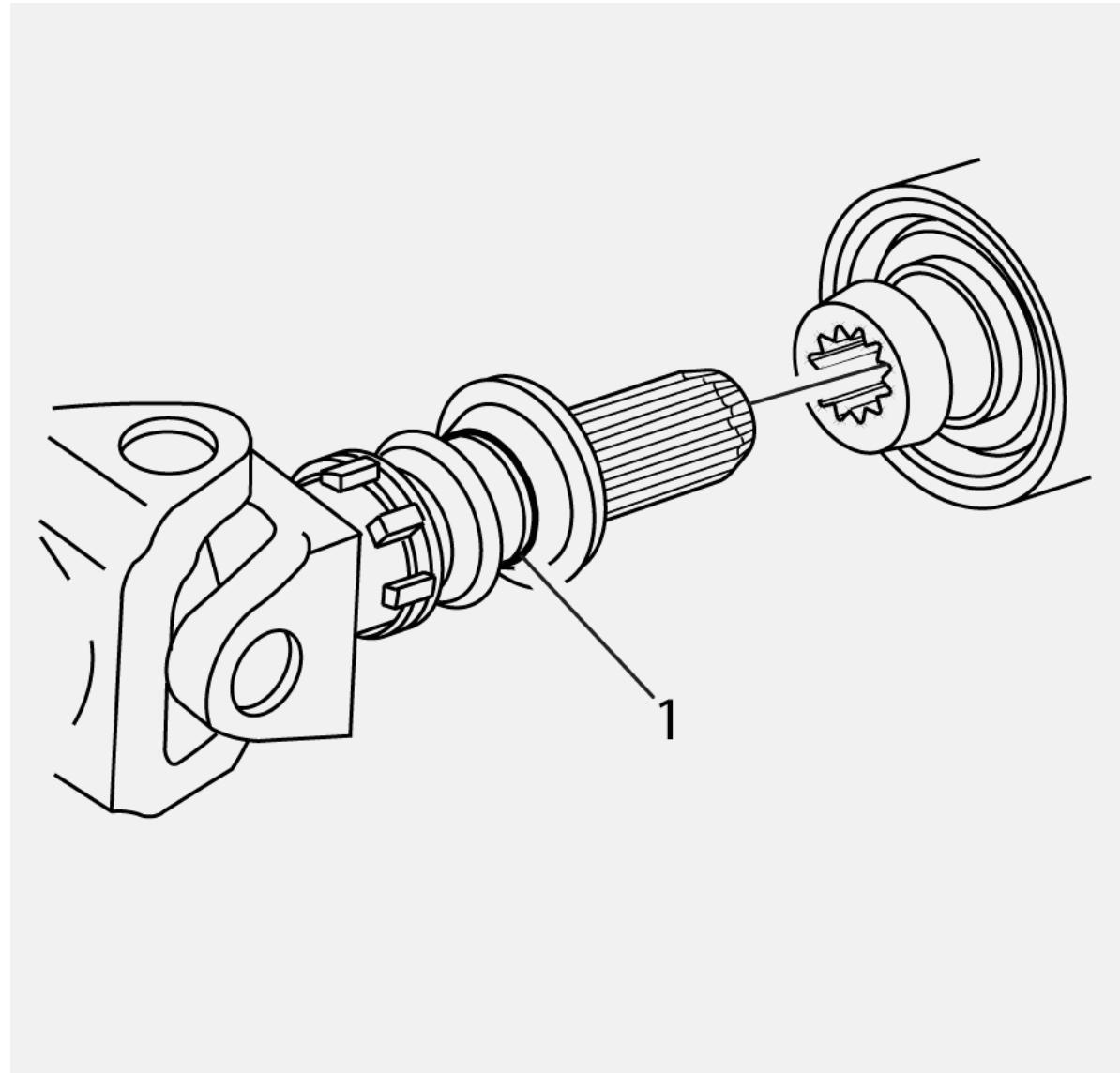


Fig. 69: Boot, Groove & Transfer Case Output Shaft

Courtesy of **GENERAL MOTORS COMPANY**

7. Remove the boot from the groove on the transfer case output shaft.
8. Remove the propeller shaft from the transfer case output shaft by sliding the propeller shaft forward.

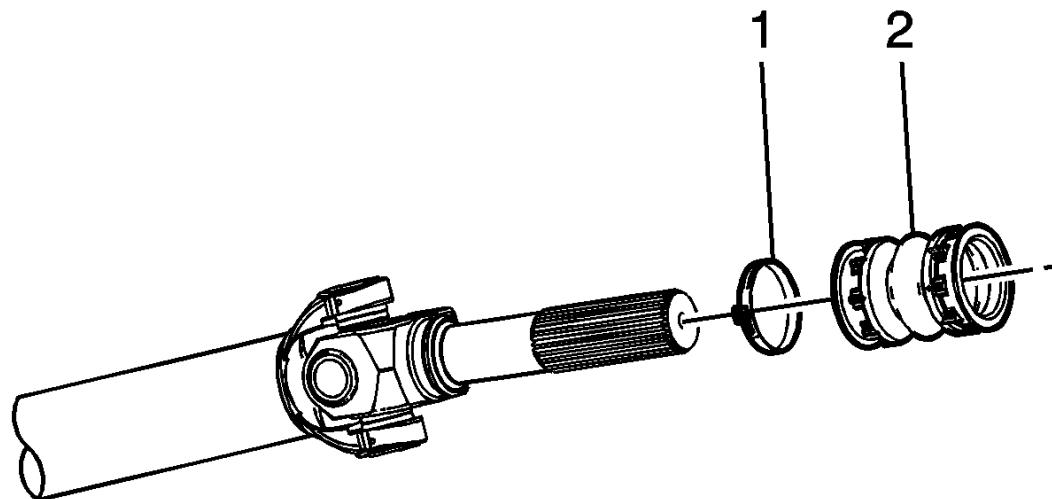


Fig. 70: Propeller Shaft, Clamp And Shaft Boot

Courtesy of **GENERAL MOTORS COMPANY**

9. Remove the clamp (1) from the propeller shaft boot (2).
10. Remove the propeller shaft boot (2) from the propeller shaft.

Installation Procedure

NOTE: Use of grease on splines of 4WD vehicles can negatively affect transfer case performance. Use transfer case lubricant only.

1. Inspect the splines of the slip yoke for a sufficient coating of lubricant. If the splines of the slip yoke do not have a sufficient coating, lubricate the internal slip yoke splines with clean transmission fluid.

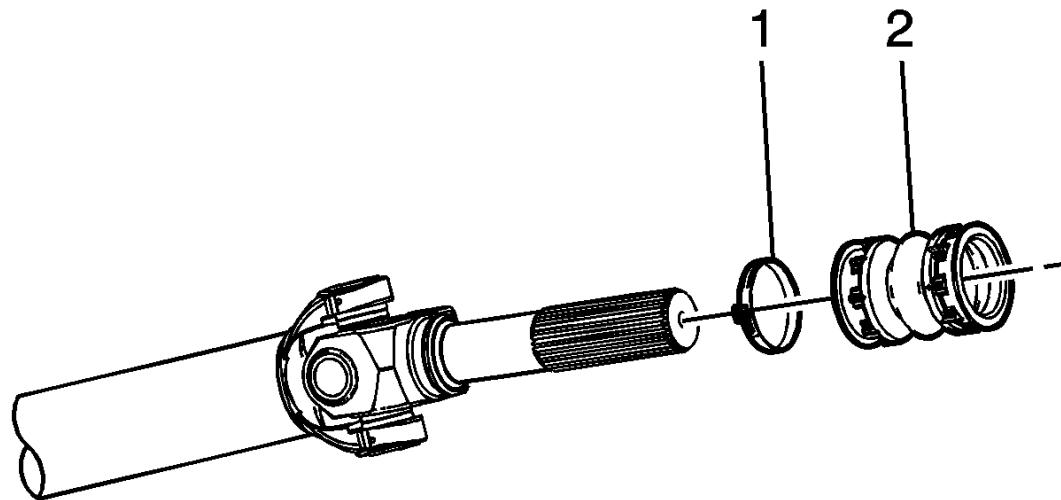


Fig. 71: Propeller Shaft, Clamp And Shaft Boot

Courtesy of GENERAL MOTORS COMPANY

2. Install the propeller shaft boot (2).
3. Install the propeller shaft boot clamp (1).

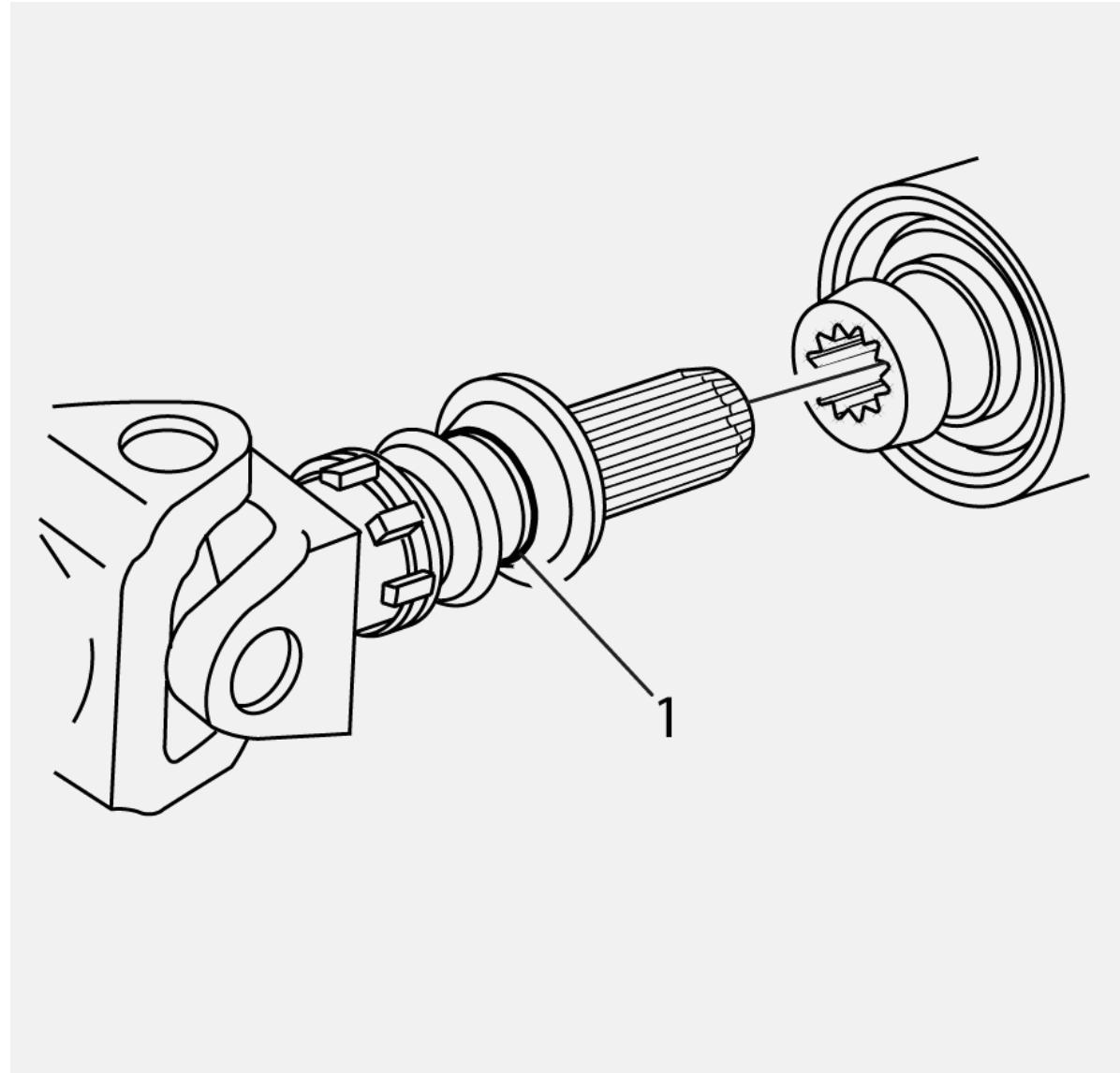


Fig. 72: Boot, Groove & Transfer Case Output Shaft

Courtesy of GENERAL MOTORS COMPANY

4. Install the propeller shaft splines into the transfer case output shaft.

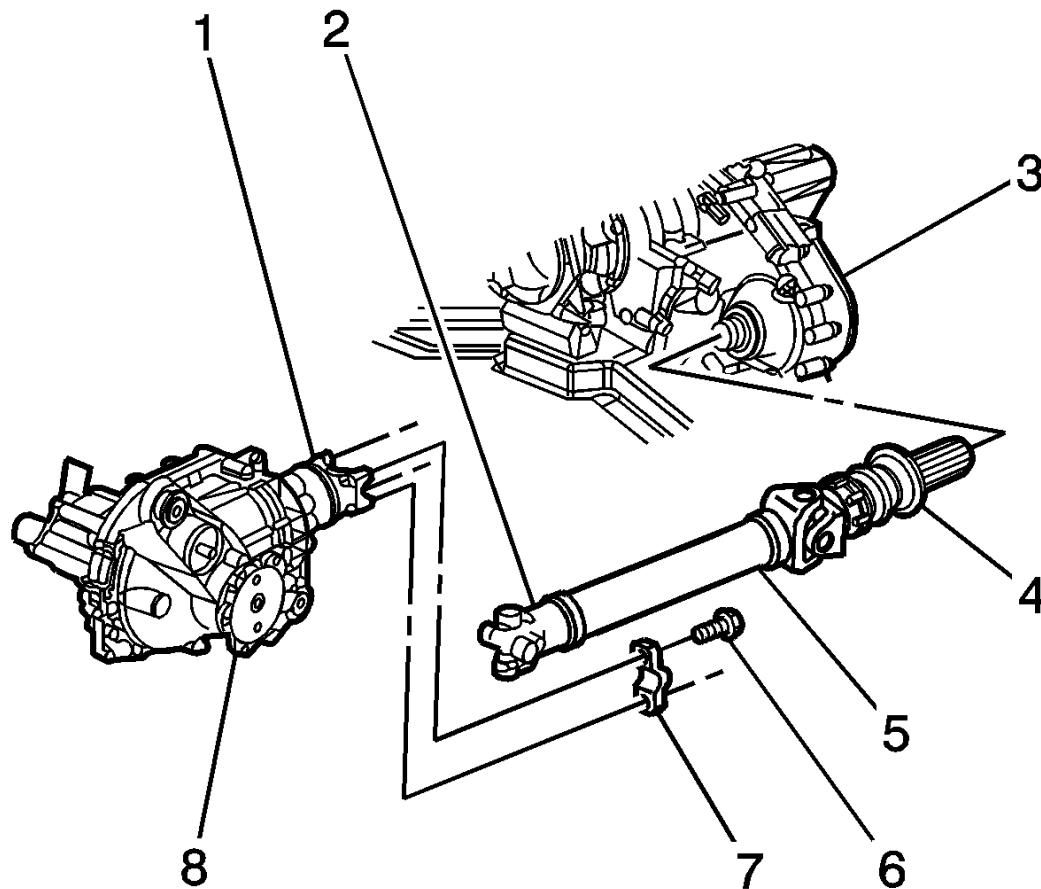


Fig. 73: Installing Propeller Shaft To Front Axle Pinion Yoke

Courtesy of GENERAL MOTORS COMPANY

5. Install the propeller shaft (5) to the front axle pinion yoke (1).

Align the reference marks made during removal.

CAUTION: Refer to Fastener Caution.

6. Install the yoke retainers (7) and the bolts (6).

Tighten

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

7. Install the boot onto the transfer case output shaft until the boot snaps into the groove on the output shaft.

8. Using the **J-43218** clamp pliers to crimp both clamps.

9. Lower the vehicle.

PROPELLER SHAFT SLIP YOKE REPLACEMENT

Special Tools

- **J 9522-3** U-Joint Bearing Separator
- **J 9522-5** U-Joint Bearing Spacer Remover

Disassembly Procedure

1. Remove the propeller shaft:

- For Front Propeller Shaft replacement, refer to [Front Axle Propeller Shaft Replacement \(NPO\)](#)[Front Axle Propeller Shaft Replacement \(NQH\)](#)[Front Axle Propeller Shaft Replacement \(Heavy Duty\)](#).
- For Rear Propeller Shaft replacement, refer to [Rear Propeller Shaft Replacement \(1500\)](#)[Rear Propeller Shaft Replacement \(Heavy Duty\)](#)[Rear Propeller Shaft Replacement \(M5U, 2WD\)](#).

CAUTION: **Never clamp propeller shaft tubing in a vise. Clamping propeller shaft tubing in a vise could dent or deform the tube causing an imbalance or unsafe condition. Always clamp on one of the yokes and support the shaft horizontally. Avoid damaging the slip yoke sealing surface. Nicks may damage the bushing or cut the lip seal.**

2. Support the propeller shaft in a line horizontal with the table of a press.

3. Mark the relation of propeller shaft to the slip yoke in order to ensure the reassembly is correct.

4. Remove the snap rings by pinching the ends together with a pair of pliers.

5. If the ring does not readily snap out of the groove in the yoke, tap the end of the cup lightly in order to relieve the pressure from the ring.

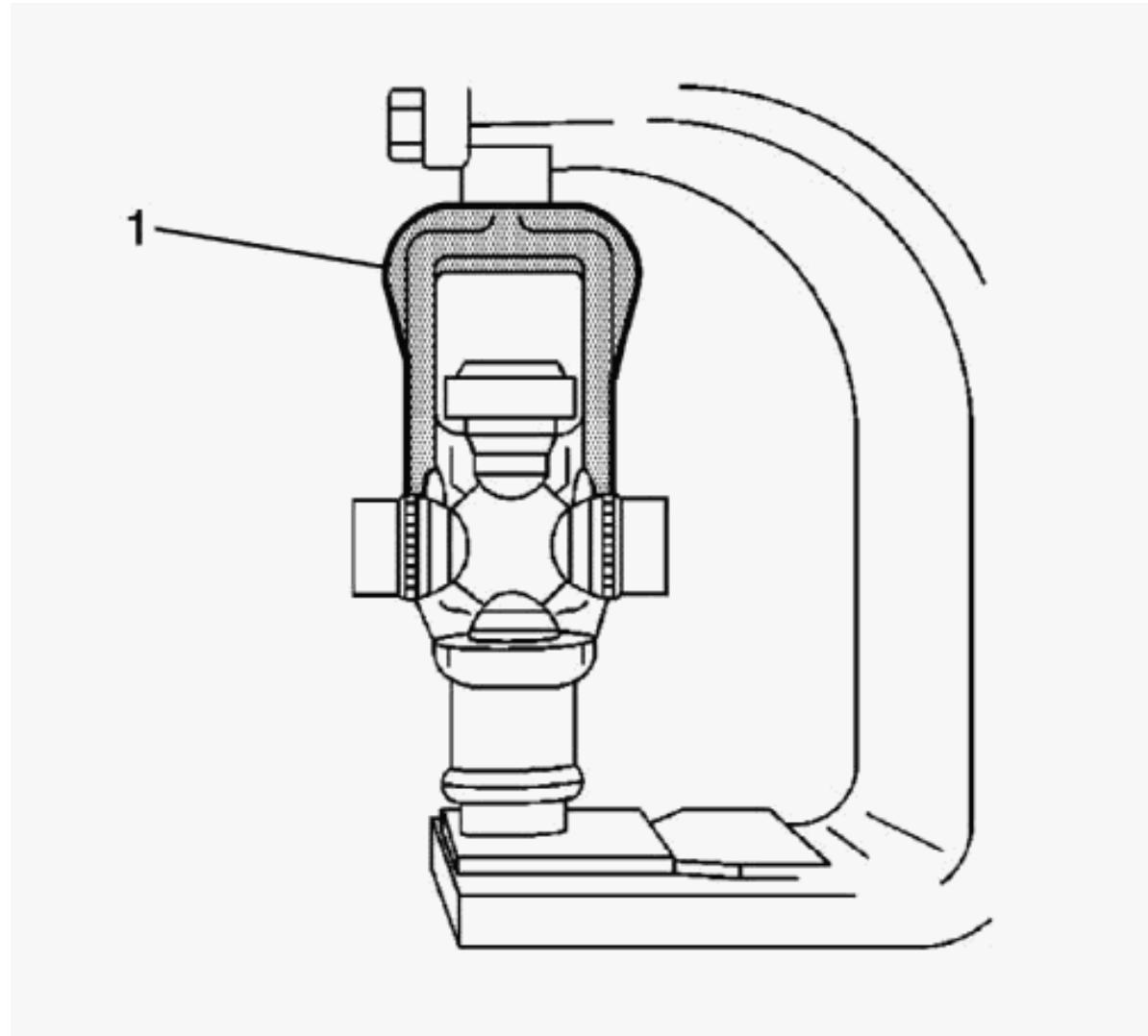


Fig. 74: Disassembling Universal Joint

Courtesy of GENERAL MOTORS COMPANY

6. Place the propeller shaft yoke in the press, so that the lower ear of the yoke is supported by a socket. The socket should be deep enough to allow the bearing to completely pass through the bore of the yoke.
7. Place **J 9522-3** u-joint bearing separator (1) on the open horizontal bearing cups. Press the lower bearing cup out of the yoke ear.

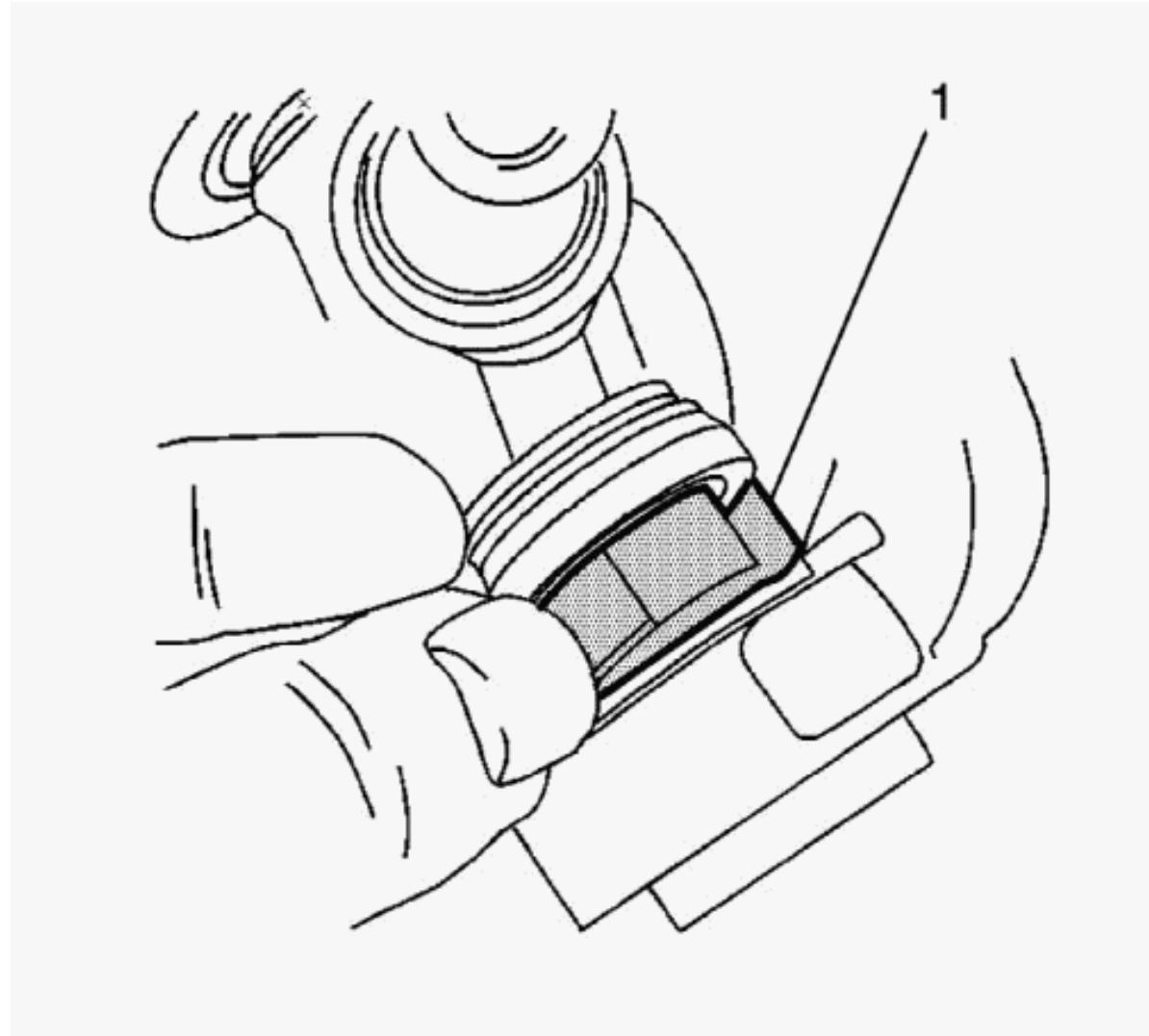


Fig. 75: Placing U-Joint Bearing Spacer Remover Between Seal And Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

8. If you do not completely remove the bearing cup, lift the spider and insert **J 9522-5** u-joint bearing spacer remover (1) between the seal and the bearing cup you are removing. Continue pressing the bearing cup out of the yoke.
9. Rotate the propeller shaft. Press the opposite bearing cup out of the yoke.
10. Remove the spider from the yoke.

11. Remove the remaining universal joint parts from the yoke.
12. Inspect the retaining ring grooves for dirt, corrosion, or pieces of the old ring.
13. Inspect the bearing cup bores for burrs or imperfections.
14. Clean the retaining ring grooves. Corrosion, dirt, rust, or pieces of the old retaining ring may prevent the bearing cups from pressing into place or prevent the bearing retainers from properly seating.

Assembly Procedure

NOTE: **Care must be taken when removing the bearings from the spider. Inspect inside the bearing cap to ensure none of the needle bearings become loose or have fallen out. Its best to place the bearing cups on a clean surface, where they will not be disturbed until installation. Also make sure the surface the bearing rides on does not get damaged and remains free of debris.**

1. Remove the bearing cups from the universal joint.
2. Assemble one bearing cup part way into one side of the yoke.

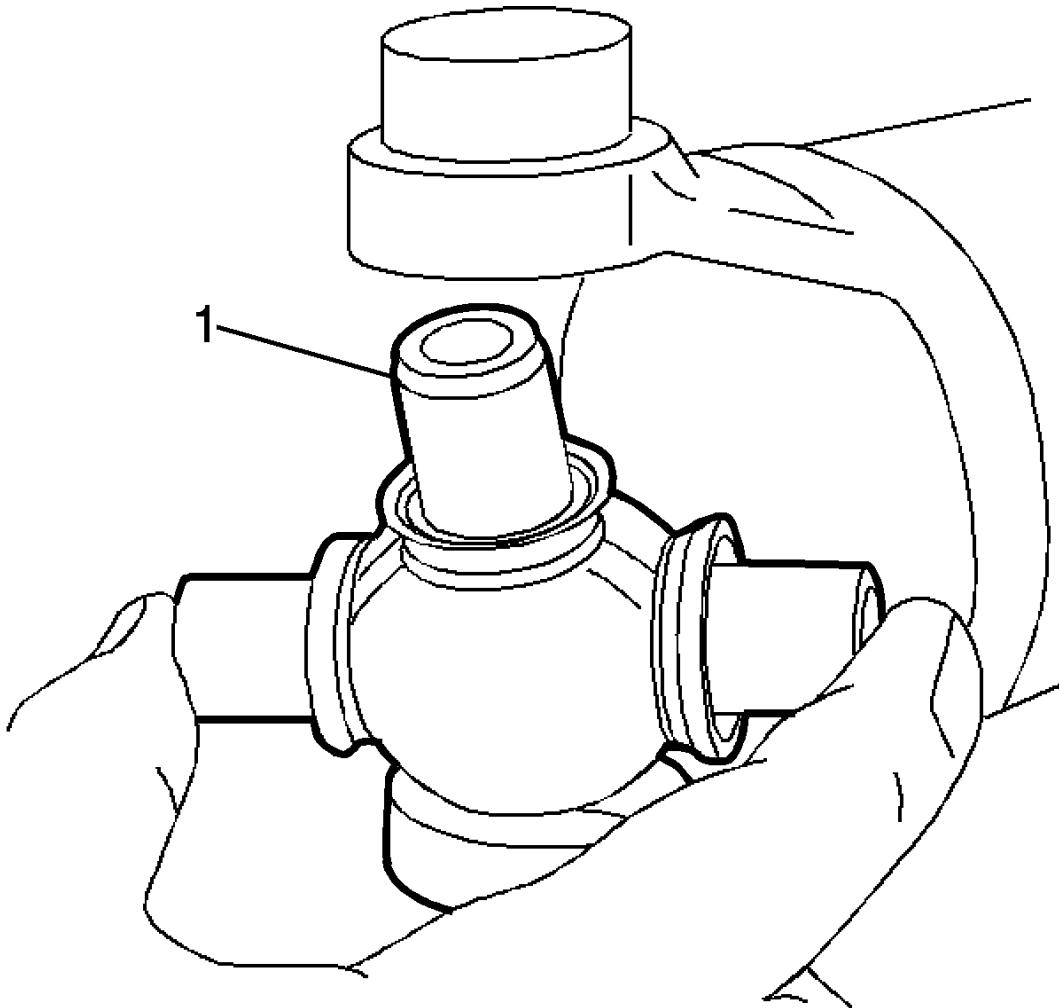


Fig. 76: Assembling Trunnion Into Yoke

Courtesy of GENERAL MOTORS COMPANY

3. Turn the yoke ear toward the bottom. Assemble the spider (1) into the yoke so that the trunnion seats freely into the bearing cup.

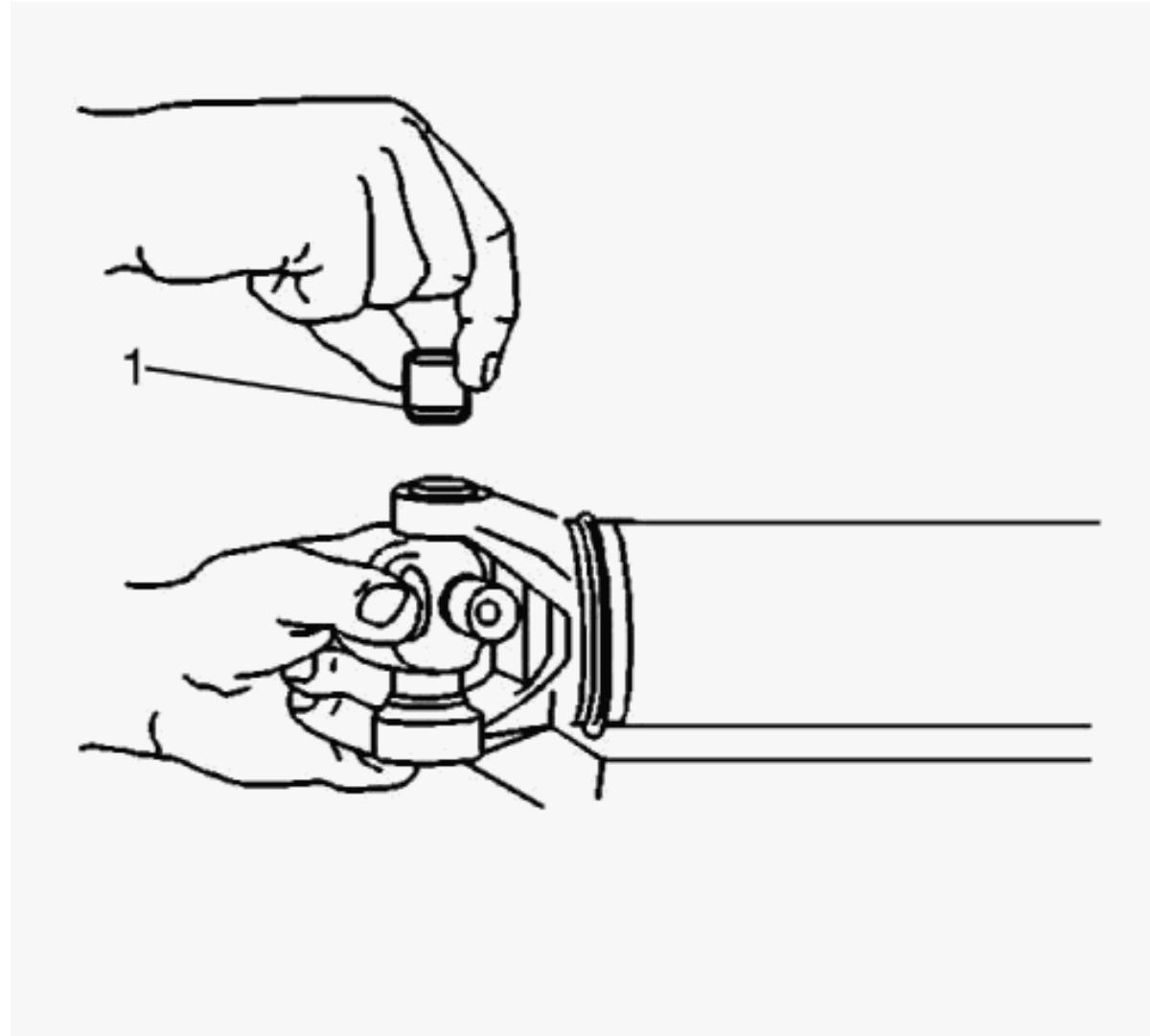


Fig. 77: Installing Bearing Cup Into Yoke Ear

Courtesy of GENERAL MOTORS COMPANY

4. With the trunnion seated in the bearing cup, press the bearing cup (1) into the yoke until the bearing cup is flush with the yoke ear.
5. Install the opposite bearing cup part way into the yoke ear.
6. Ensure that the trunnions start straight and true into both bearing cups.
7. Press the opposite bearing cup into the yoke ear while twisting the spider back and forth, in order to inspect for free unbinding movement of

the trunnions in the bearing cups.

NOTE: If there seems to be a hang up or binding, stop pressing. Inspect the needle bearings for misalignment in the bearing cup.

8. Press the bearing cup into the yoke until the bearing cup retainer groove is visible over the top of the bearing cup.

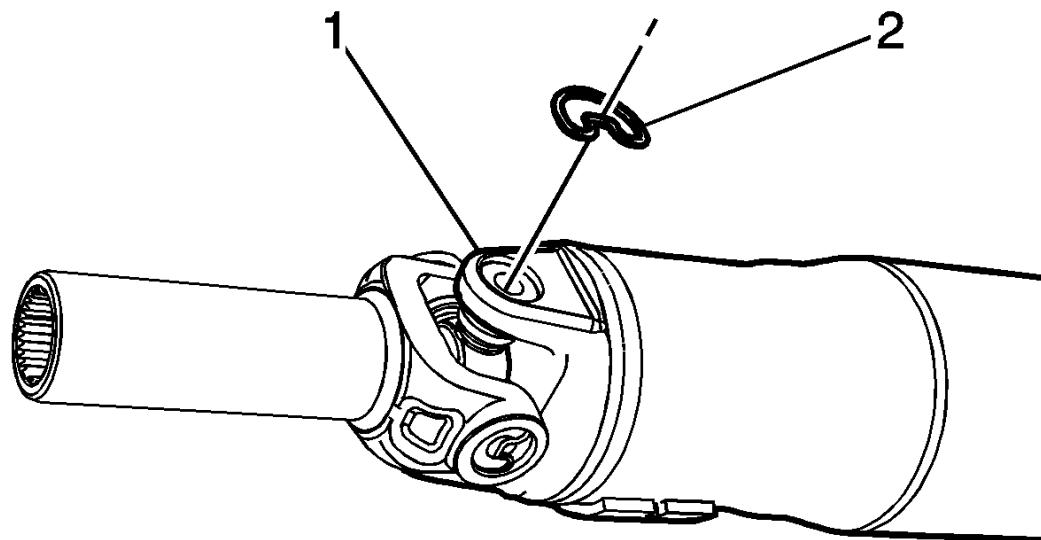


Fig. 78: Retaining Ring & Propeller Shaft Yoke

Courtesy of **GENERAL MOTORS COMPANY**

9. Assemble the bearing retainer (2) into the retainer groove (1).
10. Continue pressing until both retainers can be snapped into place.

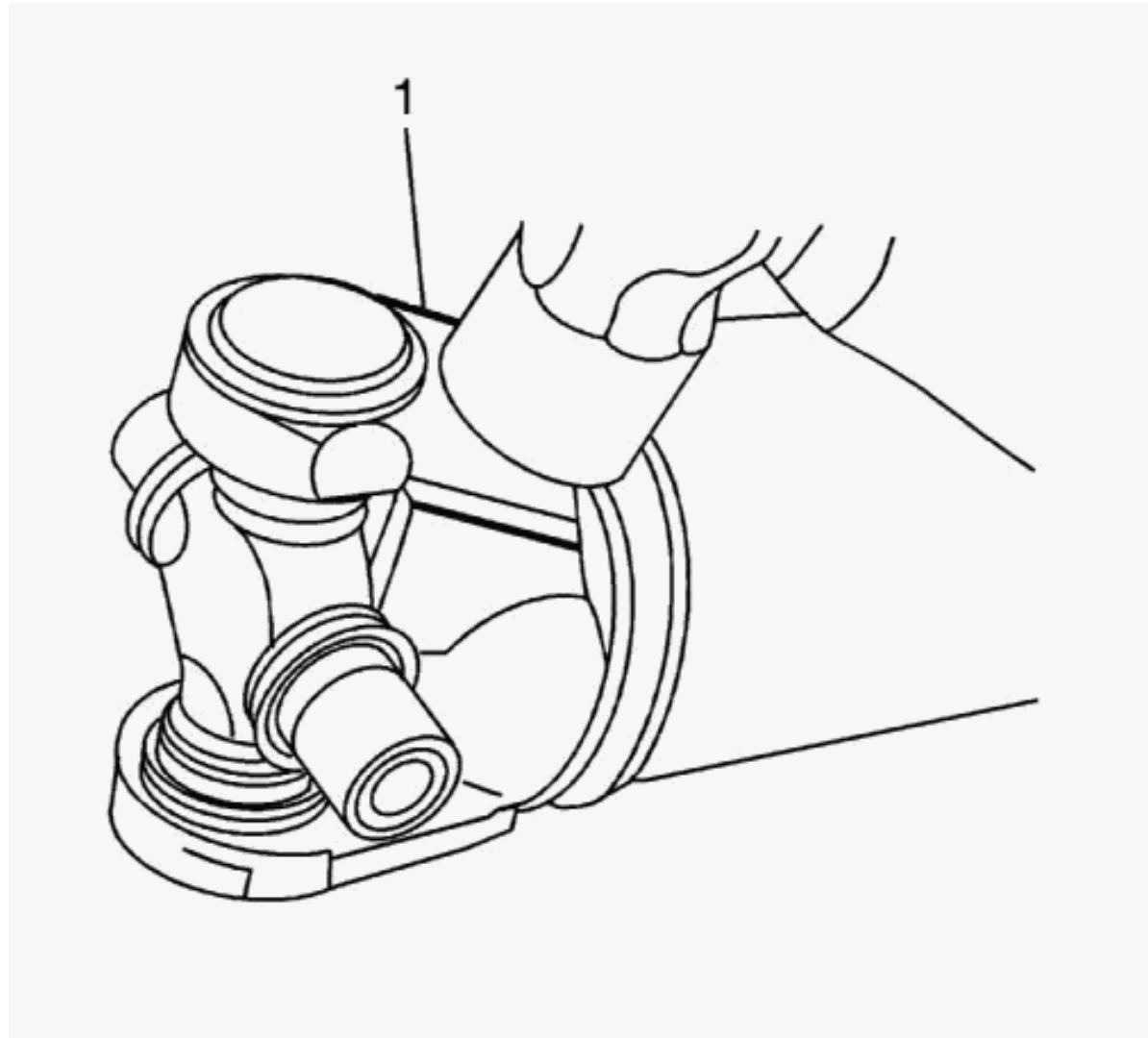


Fig. 79: Springing Yoke Using Hammer

Courtesy of **GENERAL MOTORS COMPANY**

11. If the retainer is difficult to seat, the yoke (1) can be unsprung slightly with a firm blow from a dead blow hammer.
12. It may be necessary to lubricate the snap ring with a slight amount of chassis grease so that the snap ring seats in the bearing cup groove.
13. Reinstall the propeller shaft:
 - For Front Propeller Shaft replacement, refer to [**Front Axle Propeller Shaft Replacement \(NPO\)**](#)
[**Front Axle Propeller Shaft Replacement \(NQH\)**](#)
[**Front Axle Propeller Shaft Replacement \(Heavy Duty\)**](#).
 - For Rear Propeller Shaft replacement, refer to [**Rear Propeller Shaft Replacement \(1500\)**](#)
[**Rear Propeller Shaft Replacement \(Heavy Duty\)**](#)
[**Rear Propeller Shaft Replacement \(M5U, 2WD\)**](#).

UNIVERSAL JOINT REPLACEMENT - NYLON INJECTED RING

Special Tools

- **J-9522-3** U Joint Bearing Separator
- **J-9522-5** U Joint Bearing Spacer Remover

Disassembly Procedure

CAUTION: **Never clamp propeller shaft tubing in a vise. Clamping propeller shaft tubing in a vise could dent or deform the tube causing an imbalance or unsafe condition. Always clamp on one of the yokes and support the shaft horizontally. Avoid damaging the slip yoke sealing surface. Nicks may damage the bushing or cut the lip seal.**

1. Support the propeller shaft in a line horizontal with the table of a press.
2. Mark the propeller shaft as to which end is the transmission end and which end goes to the rear axle.

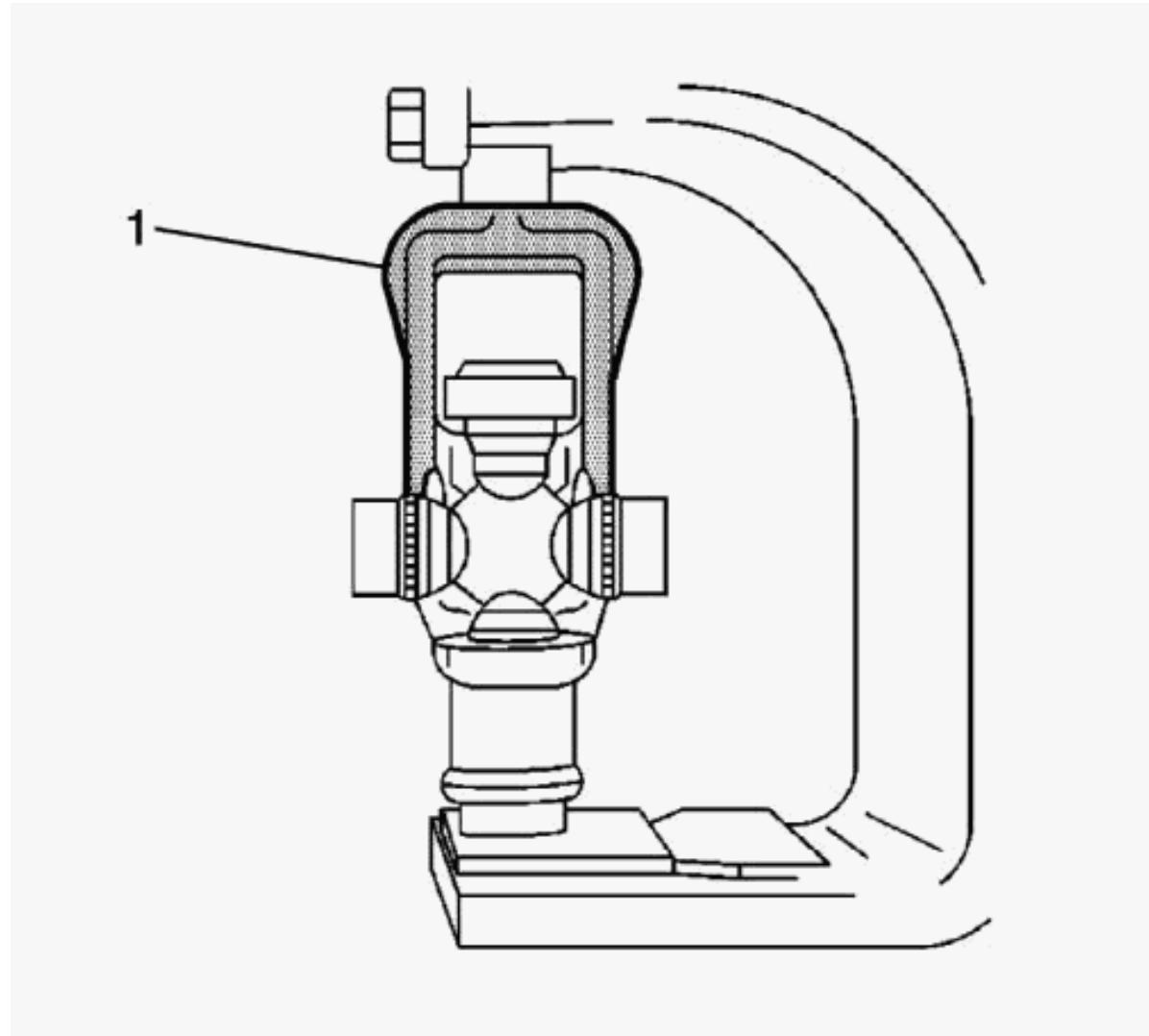


Fig. 80: Disassembling Universal Joint

Courtesy of GENERAL MOTORS COMPANY

3. Place the universal joint so that the lower ear of the yoke is supported on a 30 mm (1 1/8 in) socket.

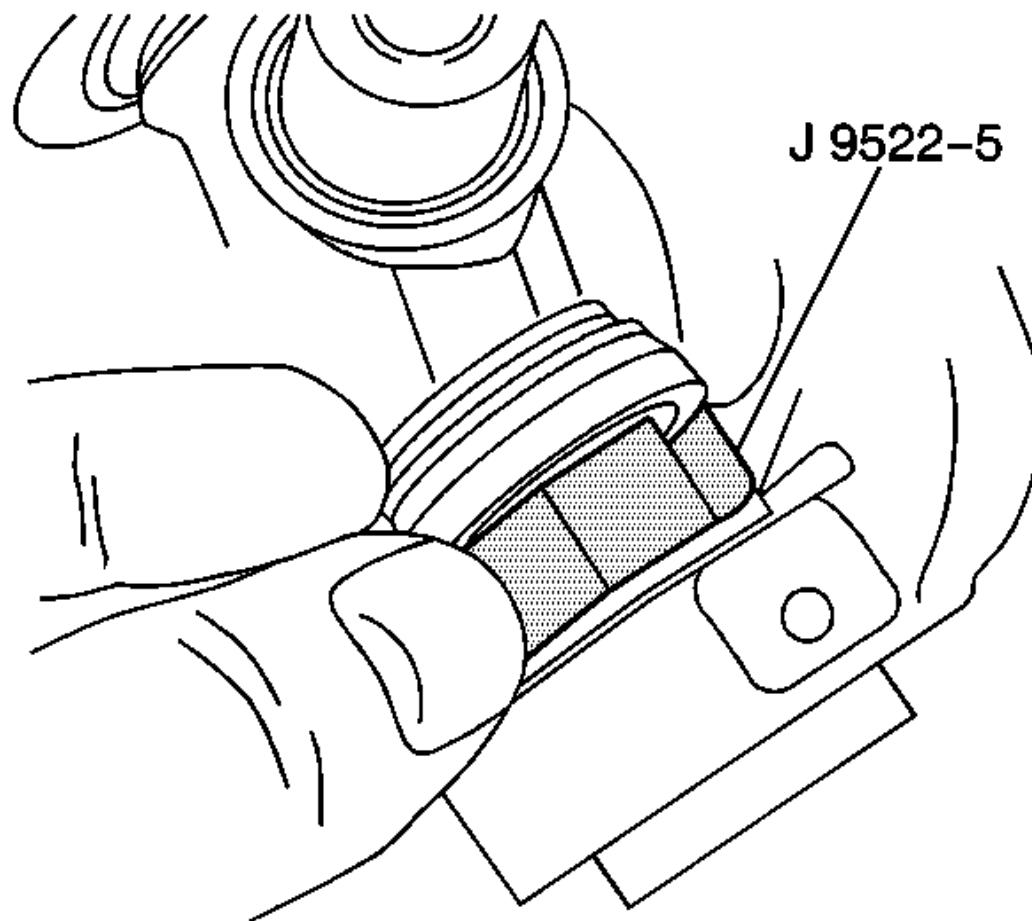


Fig. 81: Inserting Special Tool Between Seal And Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

4. In order to shear the plastic retaining ring on the bearing cup, place **J-9522-3** U Joint Bearing Separator on the open horizontal bearing cups. Press the lower bearing cup out of the yoke ear.
5. If you do not completely remove the bearing cup, lift the cross and insert **J-9522-5** U Joint Bearing Spacer Remover between the seal and the bearing cup you are removing. Continue to press the bearing cup out of the yoke.

6. Rotate the propeller shaft. Press the opposite bearing cup out of the yoke.
7. Mark the orientation of the slip yoke to the tube for proper reassembly.
8. Remove the cross from the yoke.
9. Remove the remaining universal joint parts from the yoke. If you are replacing the front universal joint, remove the bearing cups in the slip yoke in the same manner.
10. Inspect the retaining ring grooves for plastic.
11. Inspect the bearing cup bores in the yoke ears for burrs or imperfections.
12. Clean the remains of the sheared plastic bearing retainers from the grooves in the yoke.
13. The sheared plastic may prevent the bearing cups from pressing into place and thus prevent the bearing retainers from properly seating.

Assembly Procedure

1. Remove the bearing cups from the universal joint.

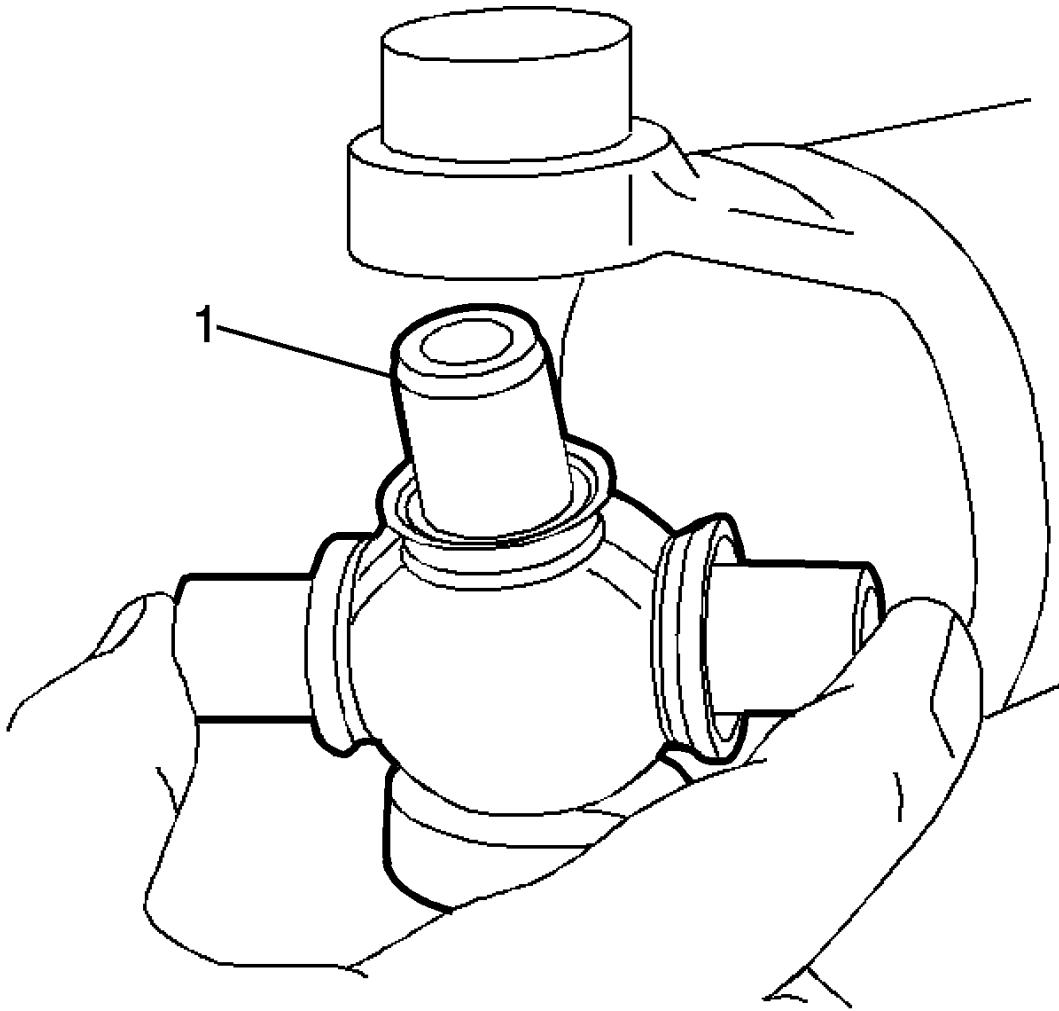


Fig. 82: Assembling Trunnion Into Yoke

Courtesy of GENERAL MOTORS COMPANY

2. Assemble 1 bearing cup part way into 1 side of the yoke.
3. Turn the yoke ear toward the bottom.
4. Assemble the cross into the yoke so the trunnion seats freely into the bearing cup.
5. With the trunnion seated in the bearing cup, press the bearing cup into the yoke until the bearing cup is flush with the yoke ear.

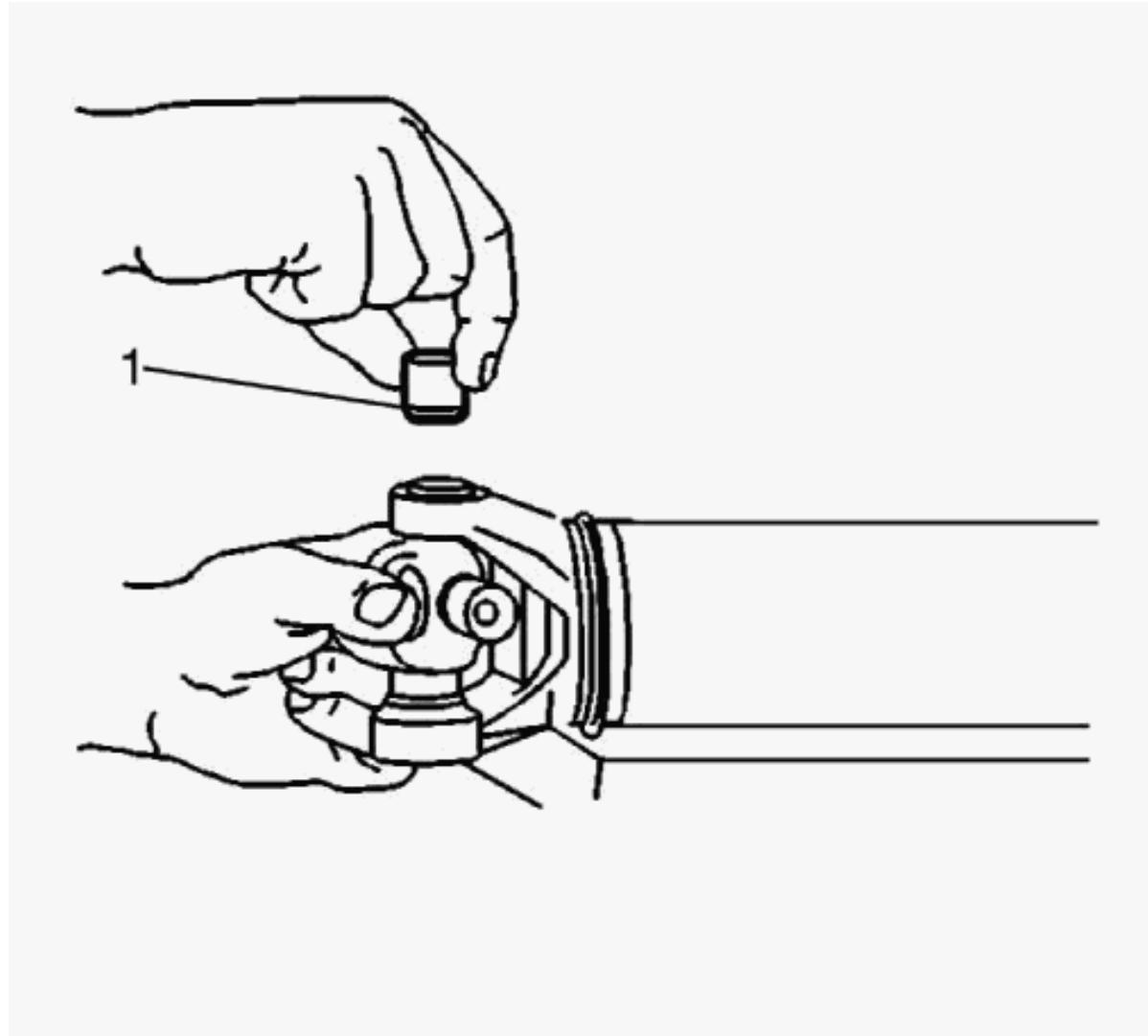


Fig. 83: Installing Bearing Cup Into Yoke Ear

Courtesy of GENERAL MOTORS COMPANY

6. Assemble the opposite bearing cup part way into the yoke ear.
7. Ensure that the trunnions start straight and true into both bearing cups.
8. Press the opposite bearing cup into the yoke ear while working the cross all the time in order to inspect for a free unbinding movement of the trunnions in the bearing cups.

NOTE: If there seems to be a hang up or binding, stop pressing, and inspect the needle bearings for misalignment in the bearing cup.

9. Press the bearing cup into the yoke until the bearing retainer groove clears the inside of the yoke.

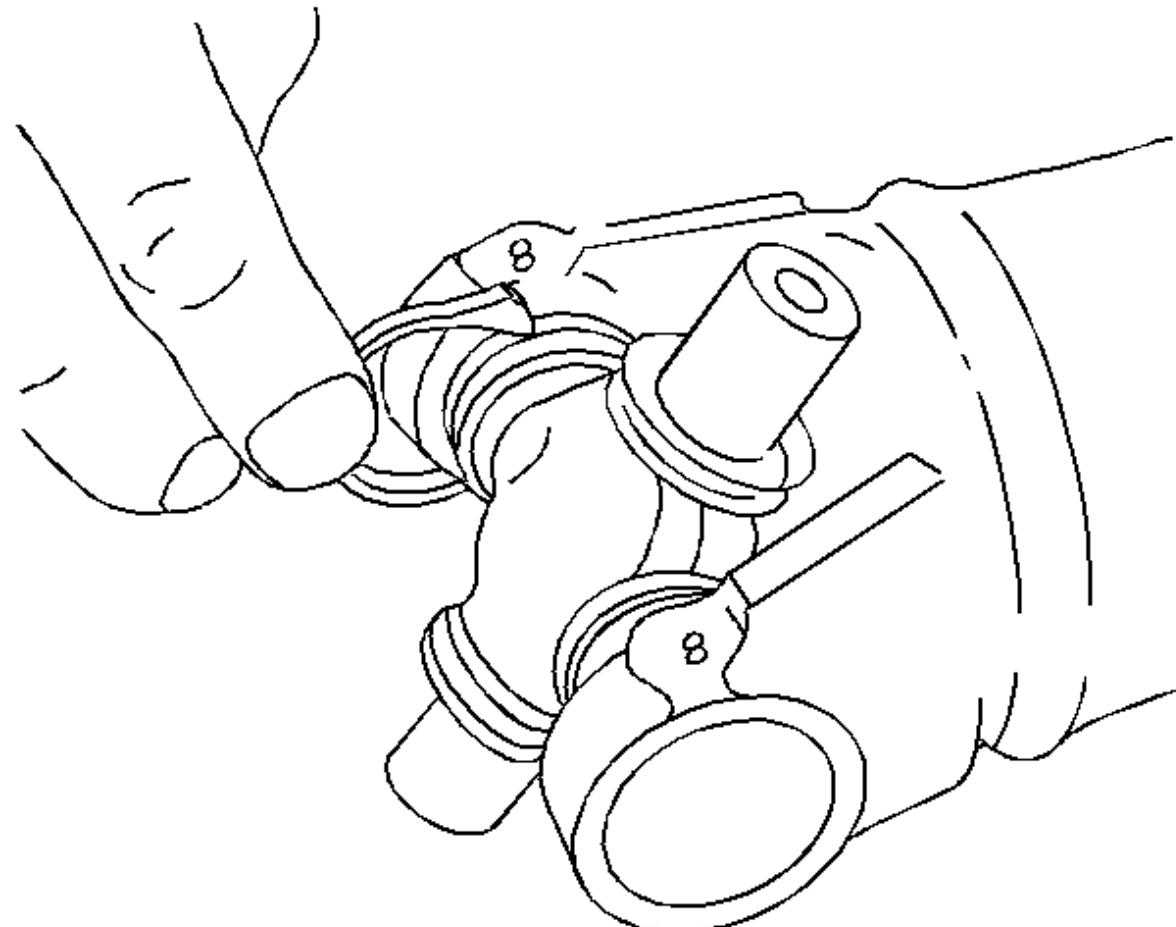


Fig. 84: Assembling Bearing Retainer In Retainer Groove

Courtesy of GENERAL MOTORS COMPANY

10. Assemble the bearing retainer in the retainer groove.
11. Continue pressing until you can snap both retainers into place.

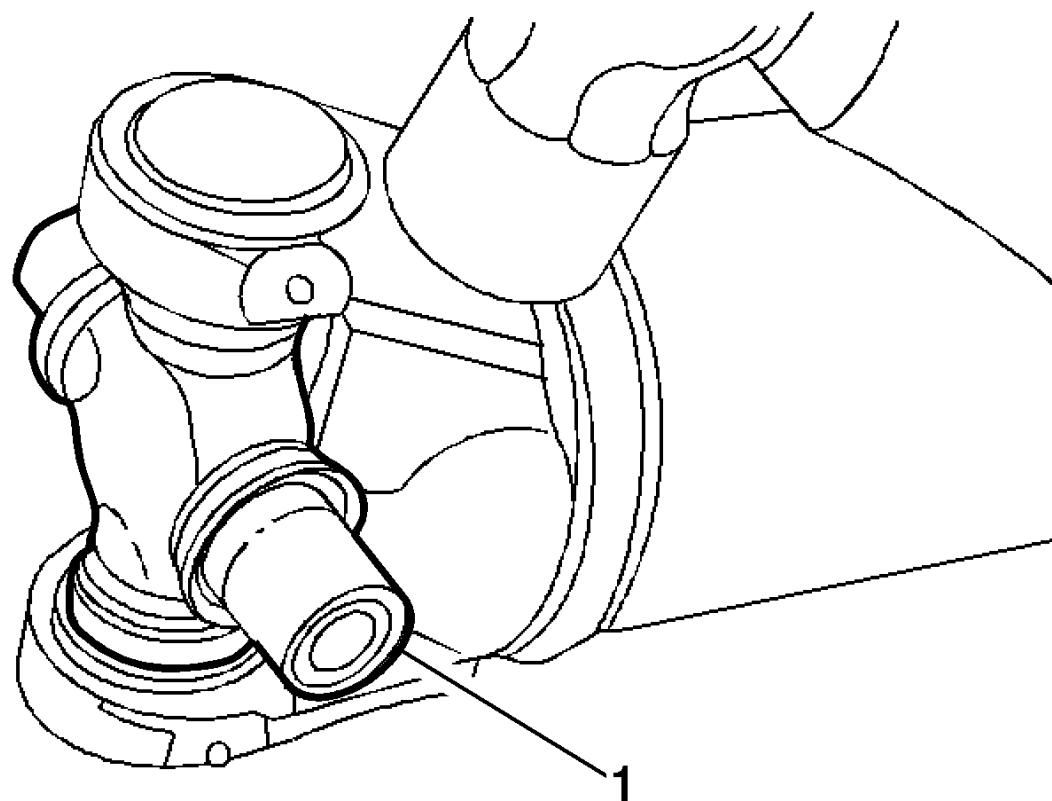


Fig. 85: Springing Yoke Using Hammer

Courtesy of GENERAL MOTORS COMPANY

12. If seating the retainer is difficult, spring the yoke slightly with a firm blow from a dead blow hammer.
13. It may be necessary to lubricate the snap ring with a slight amount of chassis grease so the snap ring seats in the bearing cup groove.

UNIVERSAL JOINT REPLACEMENT - EXTERNAL SNAP RING

Special Tools

- **J 9522-3** U-Joint Bearing Separator
- **J 9522-5** U-Joint Bearing Spacer Remover

Disassembly Procedure

CAUTION: **Never clamp propeller shaft tubing in a vise. Clamping propeller shaft tubing in a vise could dent or deform the tube causing an imbalance or unsafe condition. Always clamp on one of the yokes and support the shaft horizontally. Avoid damaging the slip yoke sealing surface. Nicks may damage the bushing or cut the lip seal.**

1. Support the propeller shaft in a line horizontal with the table of a press.
2. Mark the propeller shaft in order to show which end connects to the transmission and which end goes to the rear axle.
3. Disassemble the snap rings by pinching the ends together with a pair of pliers.
4. If the ring does not readily snap out of the groove in the yoke, tap the end of the cup lightly in order to relieve the pressure from the ring.

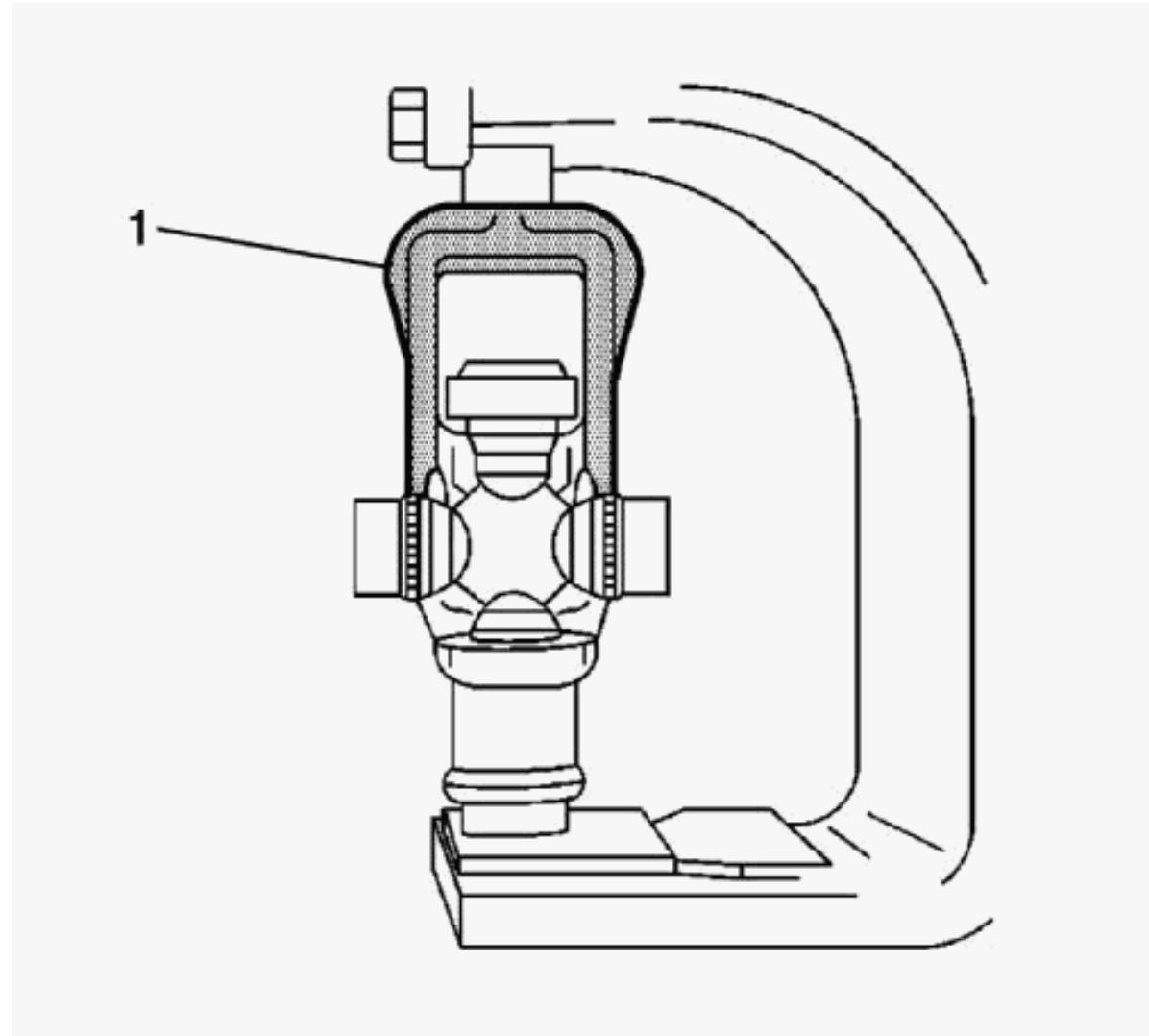


Fig. 86: Disassembling Universal Joint

Courtesy of GENERAL MOTORS COMPANY

5. Place the universal joint so that the lower ear of the yoke is supported on a 30 mm (1-1/8 in) hex head socket or a 27 mm (1-1/16 in) socket.

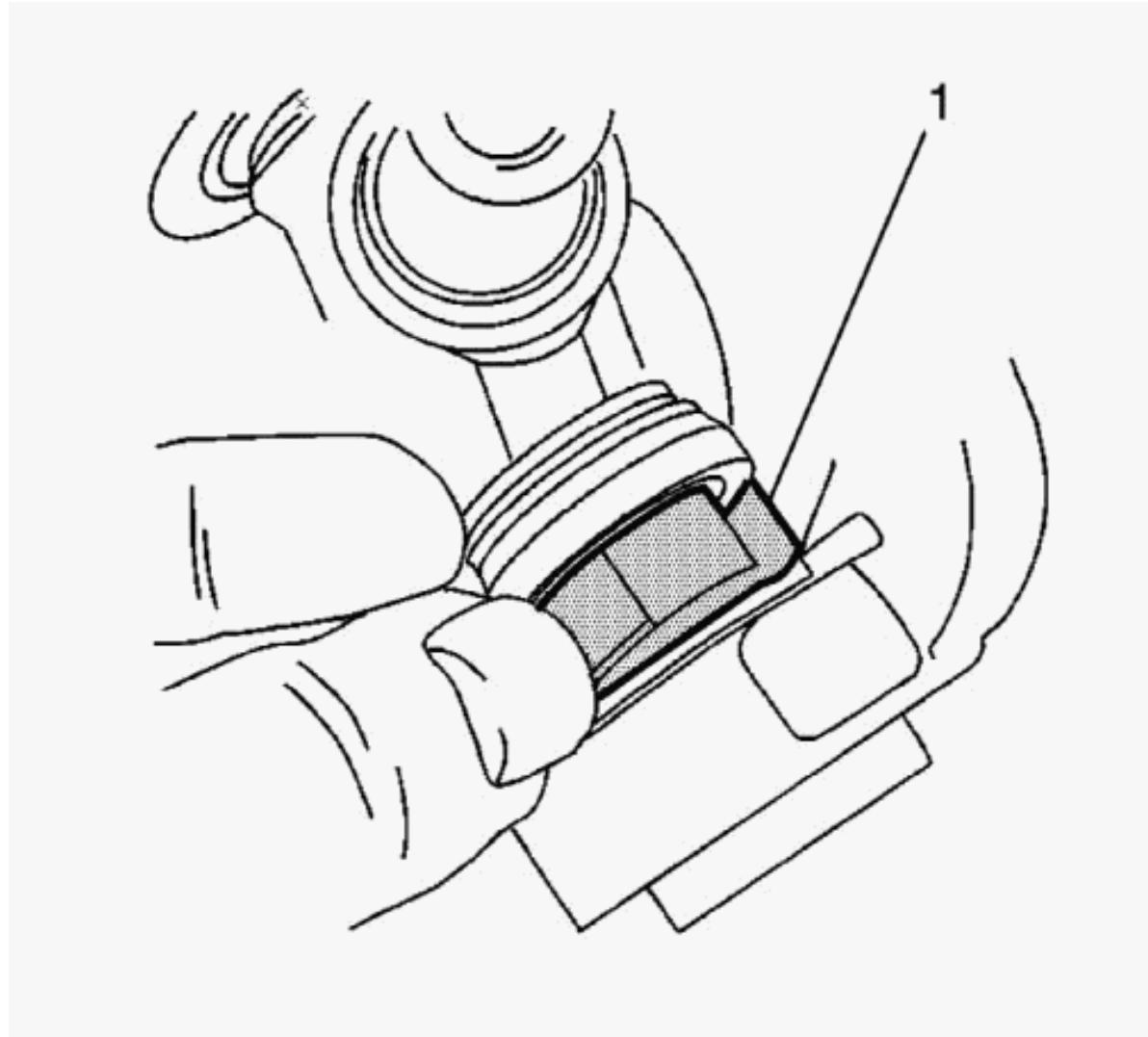


Fig. 87: Placing U-Joint Bearing Spacer Remover Between Seal And Bearing Cup

Courtesy of GENERAL MOTORS COMPANY

6. Place **J 9522-3** u-joint bearing separator on the open horizontal bearing cups. Press the lower bearing cup out of the yoke ear.
7. If you do not completely remove the bearing cup, lift the cross and insert **J 9522-5** u-joint bearing spacer remover between the seal and the bearing cup you are removing. Continue pressing the bearing cup out of the yoke.
8. Rotate the propeller shaft. Press the opposite bearing cup out of the yoke.

9. Mark the orientation of the slip yoke to the tube for proper reassembly.
10. Remove the cross from the yoke.
11. Remove the remaining universal joint parts from the yoke.
12. If you are replacing the front universal joint, remove the bearing cups in the slip yoke in the same manner.
13. Inspect the retaining ring grooves for dirt, corrosion, or pieces of the old ring.
14. Inspect the bearing cup bores for burrs or imperfections.
15. Clean the retaining ring grooves. Corrosion, dirt, rust, or pieces of the old retaining ring may prevent the bearing cups from pressing into place or prevent the bearing retainers from properly seating.

Assembly Procedure

1. Remove the bearing cups from the universal joint.

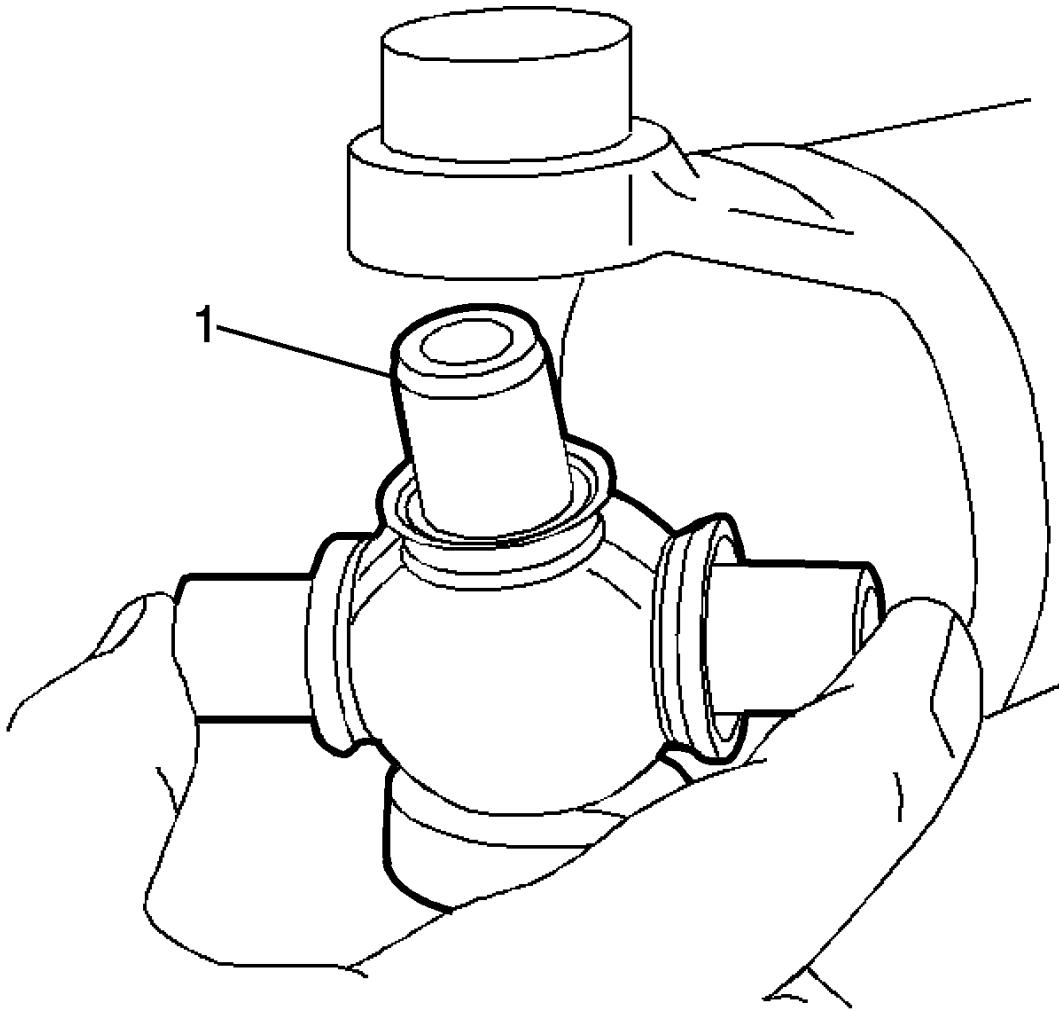


Fig. 88: Assembling Trunnion Into Yoke

Courtesy of GENERAL MOTORS COMPANY

2. Assemble one bearing cup part way into 1 side of the yoke. Turn the yoke ear toward the bottom.
3. Assemble the cross into the yoke so that the trunnion seats freely into the bearing cup.

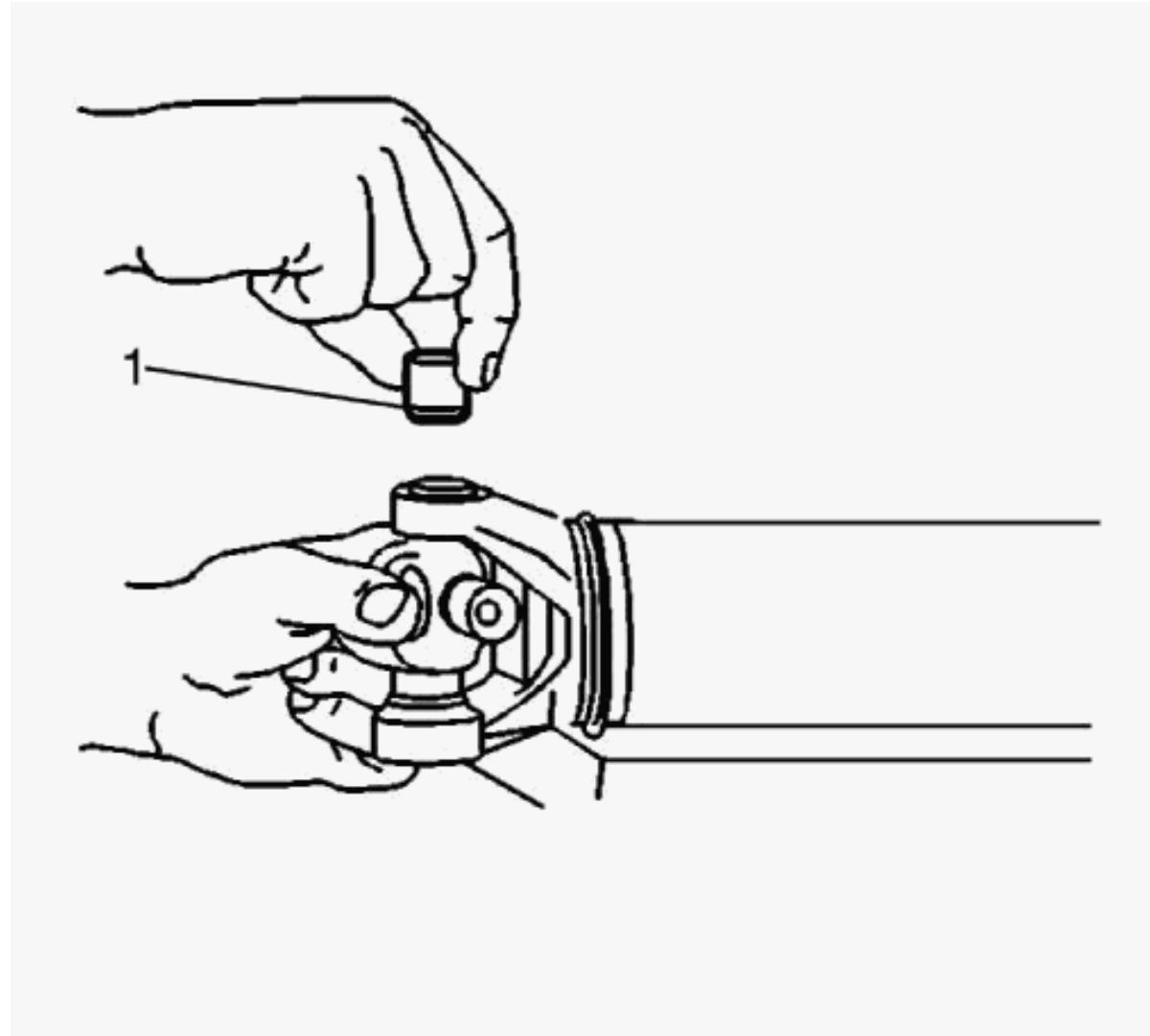


Fig. 89: Installing Bearing Cup Into Yoke Ear

Courtesy of GENERAL MOTORS COMPANY

4. With the trunnion seated in the bearing cup, press the bearing cup into the yoke until the bearing cup is flush with the yoke ear.
5. Install the opposite bearing cup part way into the yoke ear.
6. Ensure that the trunnions start straight and true into both bearing cups.
7. Press the opposite bearing cup into the yoke ear while working the cross all the time in order to inspect for free unbinding movement of the

trunnions in the bearing cups.

NOTE: If there seems to be a hang up or binding, stop pressing. Inspect the needle bearings for misalignment in the bearing cup.

8. Press the bearing cup into the yoke until the bearing cup retainer groove is visible over the top of the bearing cup.

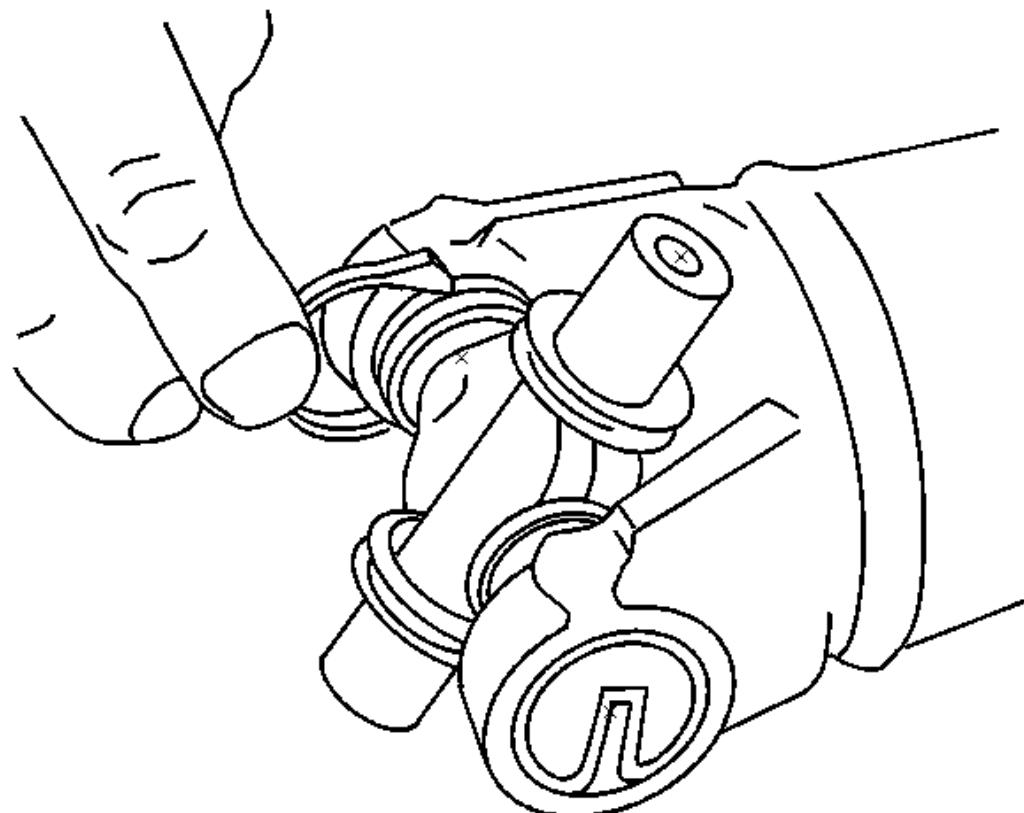


Fig. 90: Assembling Bearing Retainer In Retainer Groove

Courtesy of GENERAL MOTORS COMPANY

9. Assemble the bearing retainer in the retainer groove.
10. Continue pressing until both retainers can be snapped into place.

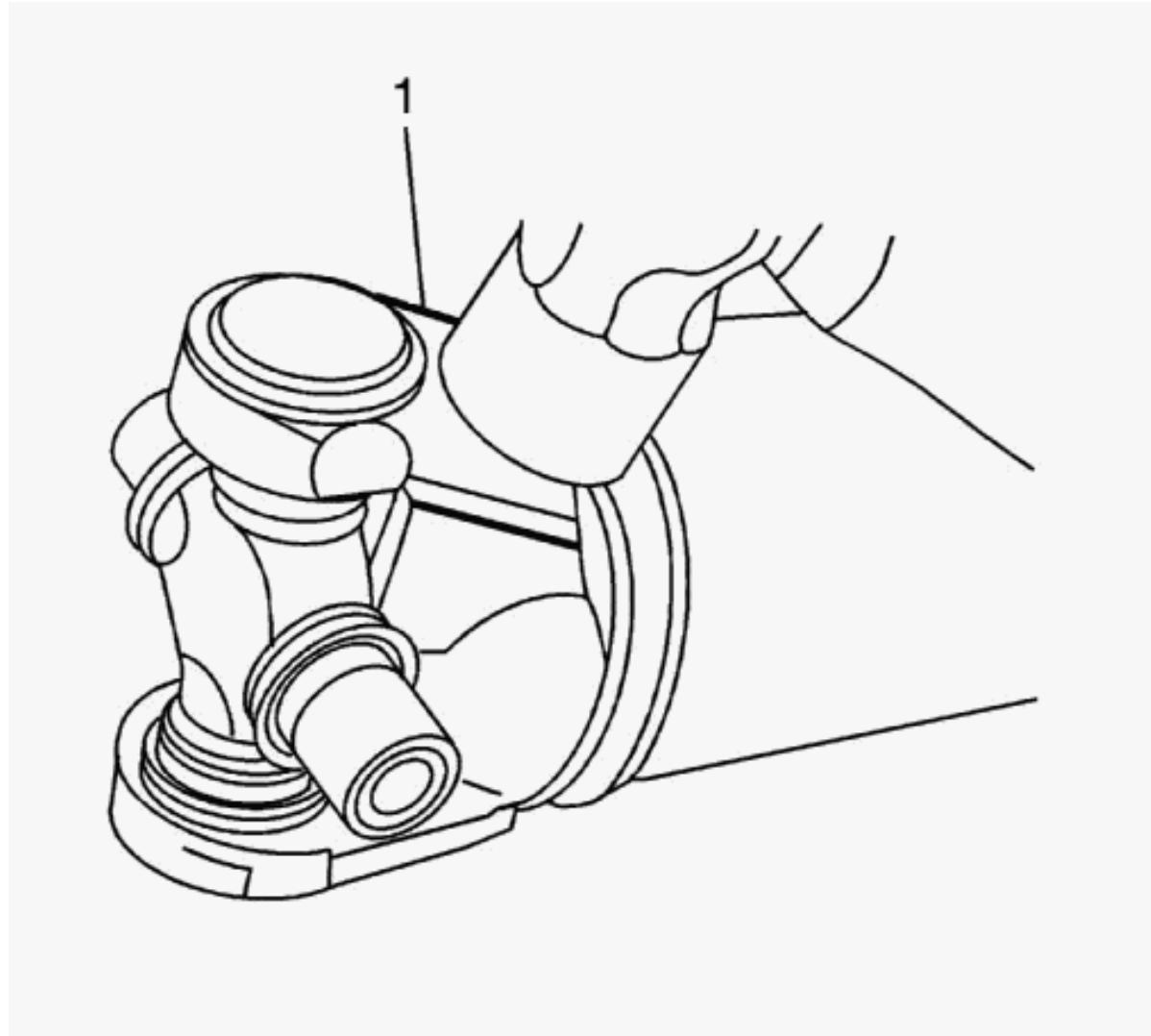


Fig. 91: Springing Yoke Using Hammer

Courtesy of GENERAL MOTORS COMPANY

11. If the retainer is difficult to seat, the yoke can be sprung slightly with a firm blow from a dead blow hammer.
12. It may be necessary to lubricate the snap ring with a slight amount of chassis grease so that the snap ring seats in the bearing cup groove.

DESCRIPTION AND OPERATION

PROPELLER SHAFT DESCRIPTION AND OPERATION

The propeller shaft is a tube with universal joints at both ends that do not require periodic maintenance. The universal joints transmit power from the transfer case, or from the transmission output shaft, to the differential.

Front Propeller Shaft Description

The front propeller shaft transmits rotating force from the transfer case to the front differential when the transfer case is engaged. The front propeller shaft connects to the transfer case using a splined slip joint.

One-Piece Propeller Shaft Description

A one-piece propeller shaft uses a splined slip joint in order to connect the driveline to the transmission, or to the transfer case.

Propeller Shaft Phasing Description

The propeller shaft is designed and built with the yoke lugs, or the ears, in-line with each other. This produces the smoothest running shaft possible. A propeller shaft that is designed with built-in yoke lugs in-line is known as in-phase. An out-of-phase propeller shaft often causes vibration. The propeller shaft generates vibration from speeding up and from slowing down each time that the universal joint spins around. The vibration is similar to a person snapping a rope and watching the wave reaction flow to the end. An in-phase propeller shaft is similar to 2 persons snapping a rope at the same time and watching the waves meet and cancel each other. Cancelling the vibration produces a smooth flow of power in the drive line. All splined shaft slip yokes are keyed in order to ensure proper phasing.

Universal Joint Description

The universal joint is connected to the propeller shaft. The universal joint consists of 4 caps with needle bearings and with grease seals. The caps and the seals are mounted on the trunnions of a cross or of a spider. The bearings and the caps are greased at the factory. No periodic maintenance is required. Two universal joints are used in a one-piece propeller shaft. Three universal joints are used in a two-piece propeller shaft. The bearings and the caps are pressed into the yokes. The bearings and the caps are held in place with snap rings, except for 2 bearings on some models. These bearings on some models are attached to the pinion flange of the differential. Universal joints handle the effects of various loads and of rear axle windup conditions during acceleration and braking. The universal joint operation is efficient and safe within the designed angle variations. When the design angle is exceeded, the operational life of the joint decreases.

Center Bearing Description

Center bearings support the driveline when using 2 or more propeller shafts. The center bearing is a ball bearing in a rubber cushion that attaches to a frame crossmember. The manufacturer lubricates the bearing and seals the bearing. The cushion allows vertical motion at the driveline and helps isolate the vehicle from vibration.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/Description
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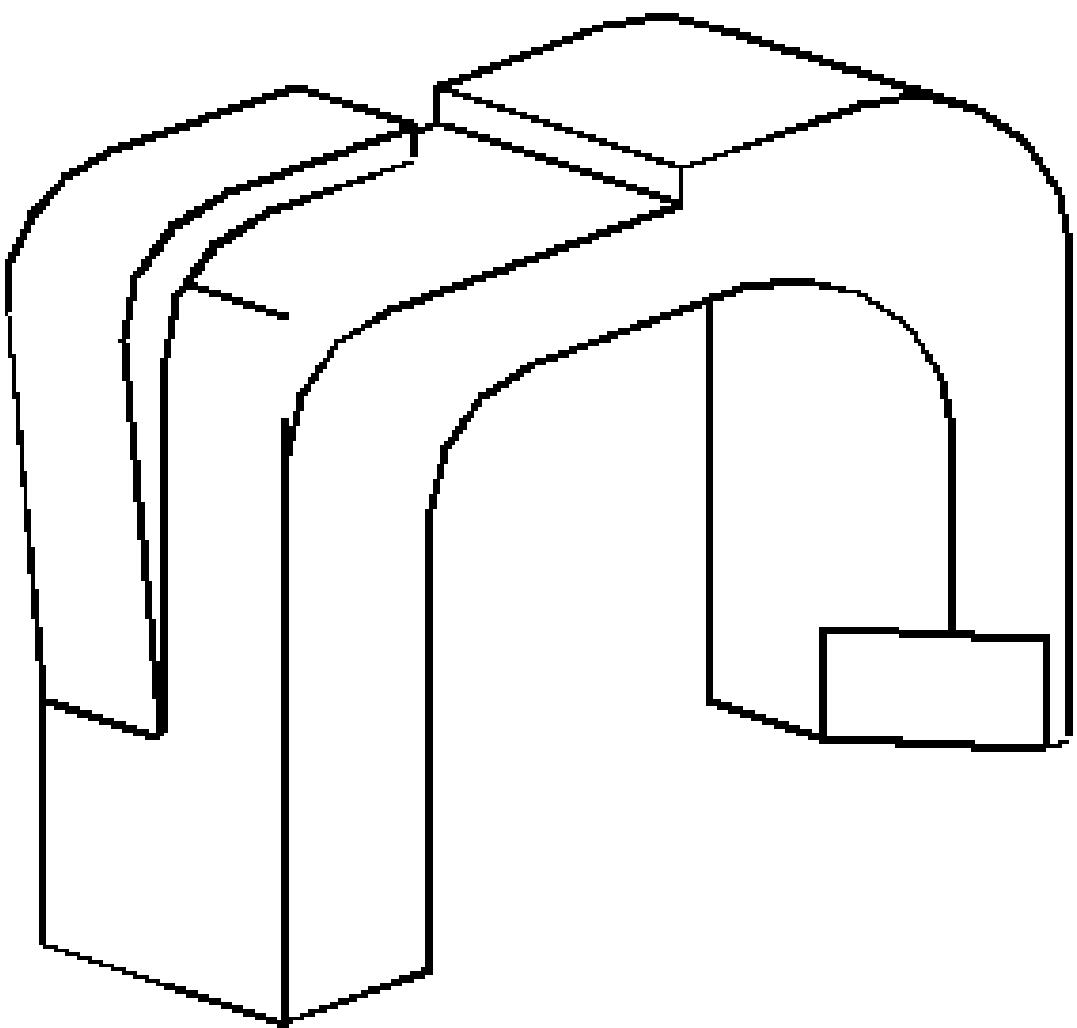
Illustration	Tool Number/Description
	<p>J 9522-3 U Joint Bearing Separator</p>

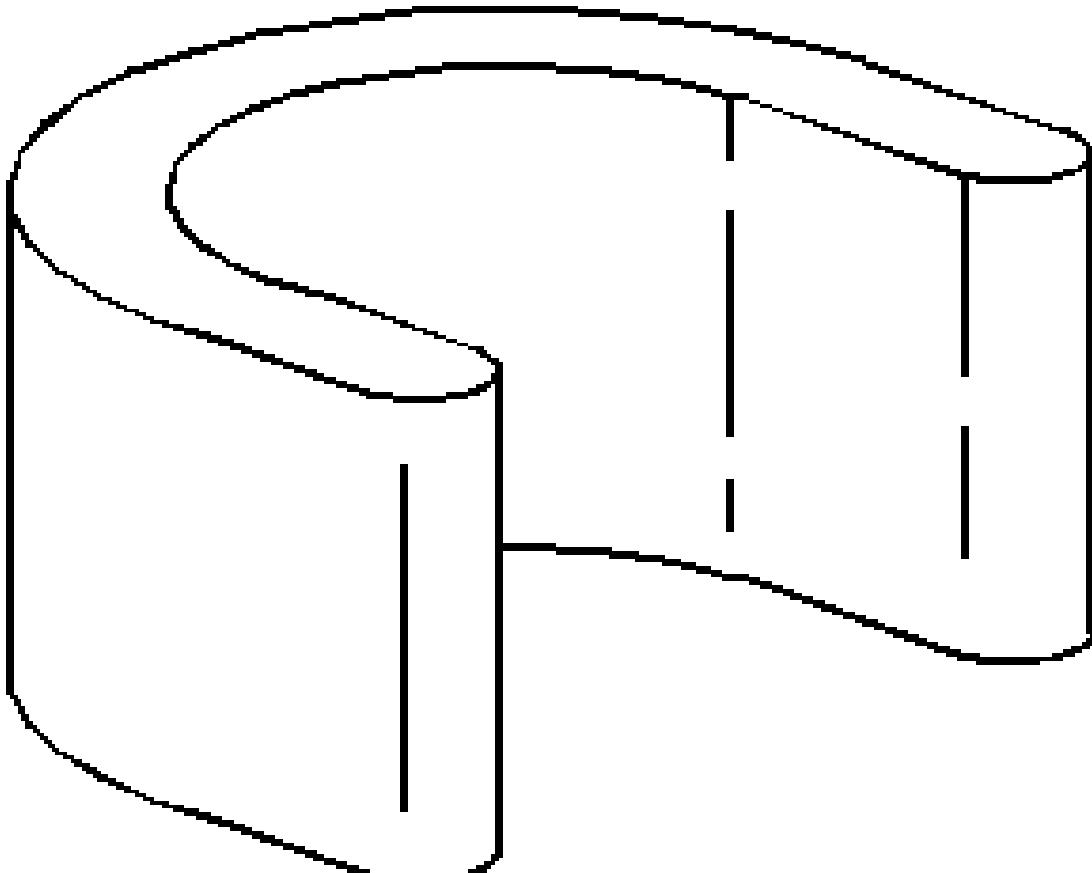
Illustration	Tool Number/Description
	<p>J 9522-5 U Joint Bearing Spacer Remover - Use with J 9522-3</p>

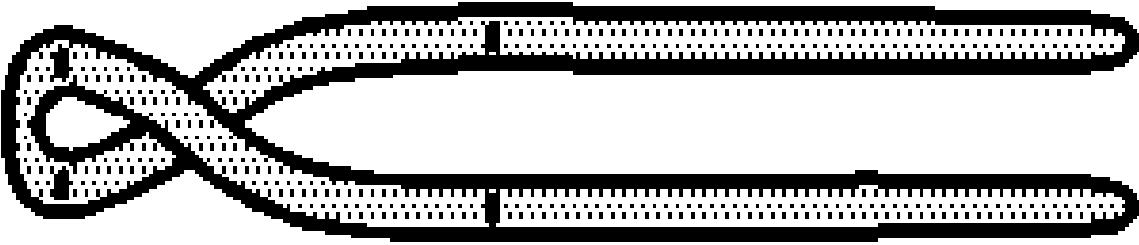
Illustration	Tool Number/Description
 A black and white line drawing of a pair of clamp pliers. The pliers are shown from a side-on perspective, slightly angled. The handles are on the left, and the jaws are on the right, pointing towards the viewer. The jaws are relatively narrow and have a slightly serrated or textured appearance. The overall shape is elongated and slightly curved.	<p>J 43218 Clamp Pliers - Narrow Jaw</p>

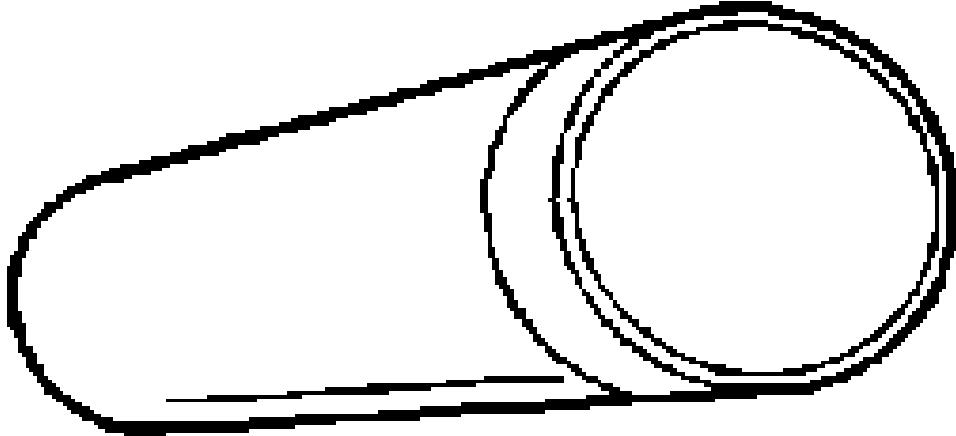
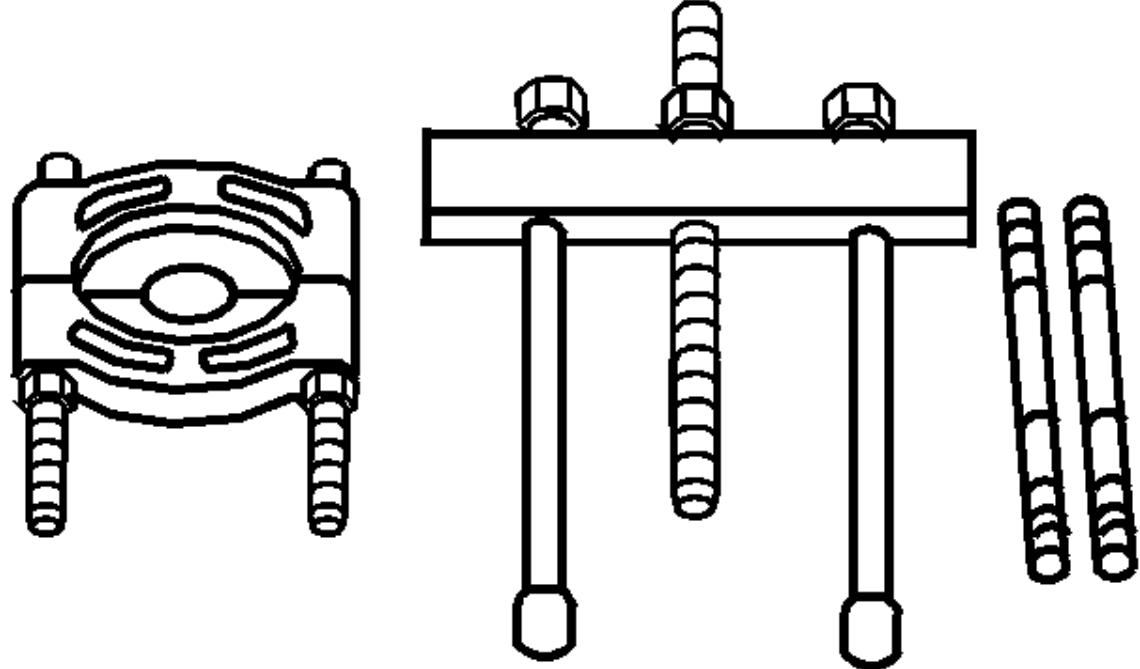
Illustration	Tool Number/Description
	<p>J 6133 Bearing Installer</p>

Illustration	Tool Number/Description
	<p>J-39477 Puller Kit</p>