

2007 Hummer H3

2007 Driveline/Axle Rear Drive Axle - H3

2007 Driveline/Axle

Rear Drive Axle - H3

SPECIFICATIONS

AXLE PRELOAD AND BACKLASH SPECIFICATIONS

Axle Preload and Backlash Specifications

Application	Specification	
	Metric	English
Backlash	0.08-0.25 mm	0.003-0.010 in
Backlash, Preferred	0.13-0.18 mm	0.005-0.007 in
Pinion and Differential Case Bearing Preload, New Bearings	2.8-4.5 N.m	25-40 lb in
Pinion and Differential Case Bearing Preload, Used Bearings	1.7-3.4 N.m	15-30 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

DIFFERENTIAL ADJUSTMENT SHIM SPECIFICATIONS

Differential Adjustment Shims Specifications

Number of Notches		Specification	
Inside	Outside	Metric	English
0	3	1.016 mm	0.040 in
0	4	1.067 mm	0.042 in
0	5	1.118 mm	0.044 in
1	1	1.168 mm	0.046 in
1	2	1.219 mm	0.048 in
1	3	1.270 mm	0.050 in
1	4	1.321 mm	0.052 in
1	5	1.372 mm	0.054 in
2	1	1.422 mm	0.056 in
2	2	1.473 mm	0.058 in
2	3	1.524 mm	0.060 in
2	4	1.575 mm	0.062 in

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2	5	1.626 mm	0.064 in
3	1	1.676 mm	0.066 in
3	2	1.727 mm	0.068 in
3	3	1.778 mm	0.070 in
3	4	1.829 mm	0.072 in
3	5	1.880 mm	0.074 in
4	1	1.930 mm	0.076 in
4	2	1.981 mm	0.078 in
4	3	2.032 mm	0.080 in
4	4	2.083 mm	0.082 in
4	5	2.134 mm	0.084 in
5	1	2.184 mm	0.086 in
5	2	2.235 mm	0.088 in
5	3	2.286 mm	0.090 in
5	4	2.337 mm	0.092 in
5	5	2.388 mm	0.094 in
6	1	2.438 mm	0.096 in
6	2	2.489 mm	0.098 in
6	3	2.540 mm	0.100 in

FASTENER TIGHTENING SPECIFICATIONS**Fastener Tightening Specifications**

Application	Specification	
	Metric	English
Bearing Cap Bolt	75 N.m	55 lb ft
Brake Line Retainer Bolt	20 N.m	15 lb ft
Differential Housing Cover Bolt	25 N.m	18 lb ft
Disc Brake Backing Plate Bolt	135 N.m	100 lb ft
Fill/Drain Plug	33 N.m	24 lb ft
Park Brake Cable to Leaf Spring Bolt	20 N.m	18 lb ft
Pinion Shaft Lock Bolt	25 N.m	18 lb ft
Ring Gear Bolt	120 N.m	89 lb ft
Wheel Speed Sensor Bolt	18 N.m	13 lb ft

SEALERS, ADHESIVES AND LUBRICANTS

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Sealers, Adhesives and Lubricants

Application	Type of Material	GM Part Number
Rear Drive Axle	Lubricant	12378261 (Canadian P/N 10953455) or equivalent meeting GM Specification 9986115
Pinion Yoke Splines	Sealant	12346004 (Canadian P/N 10953480) or equivalent

SCHEMATIC AND ROUTING DIAGRAMS

DIFFERENTIAL LOCK SCHEMATICS

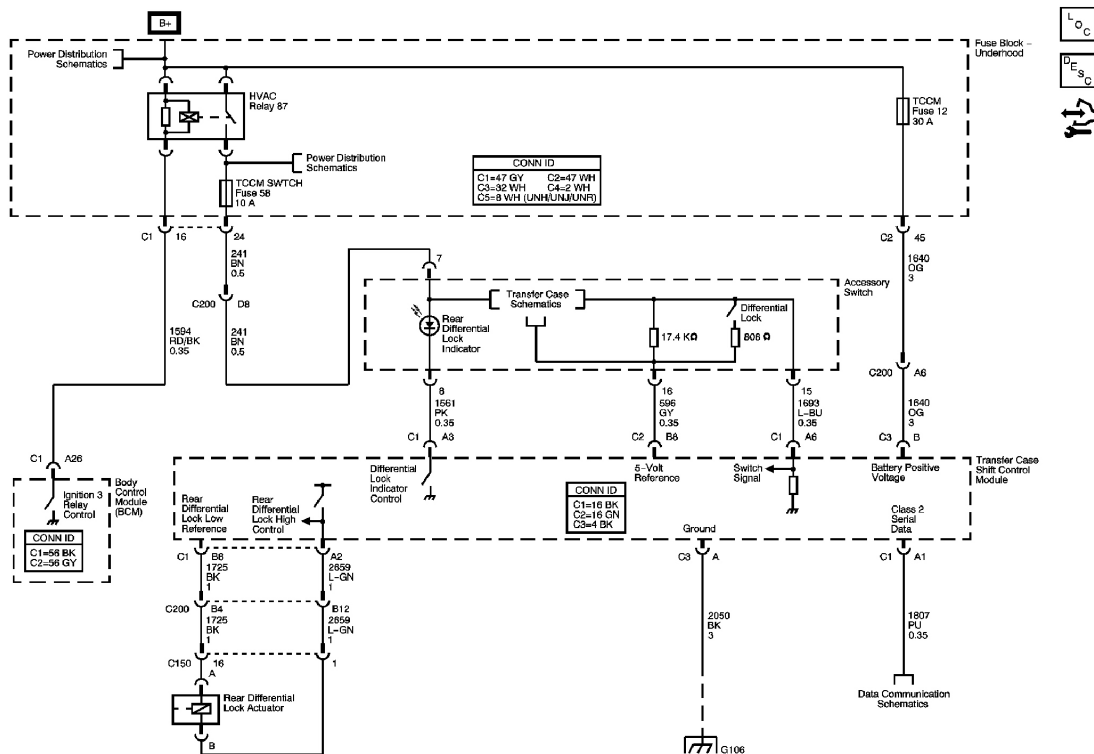


Fig. 1: Differential Lock Schematic
 Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

REAR AXLE COMPONENT VIEWS

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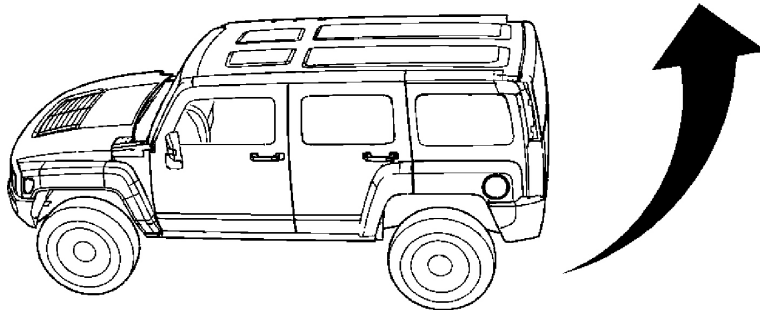
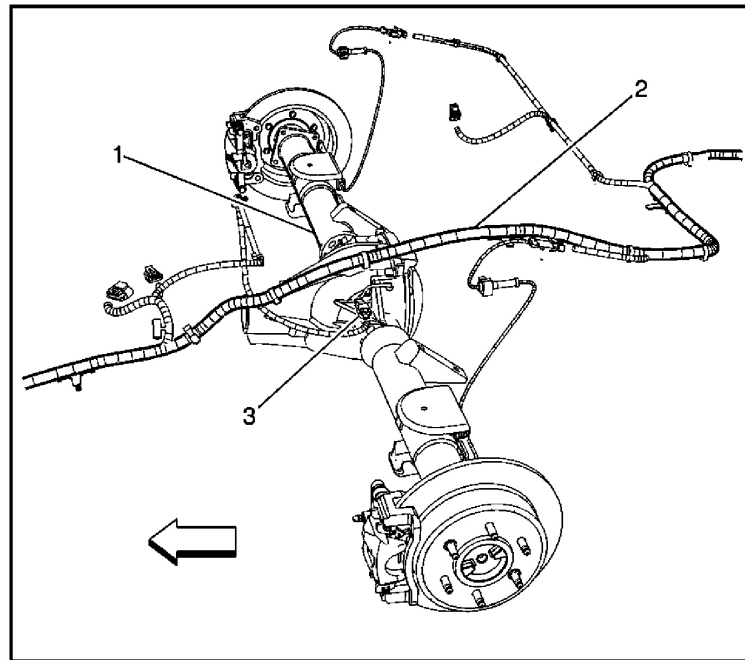


Fig. 2: Identifying Rear Axle Components
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 2

Callout	Component Name
1	Rear Axle
2	Chassis Harness
3	Rear Differential Lock Actuator

REAR AXLE CONNECTOR END VIEWS

Rear Differential Lock Actuator

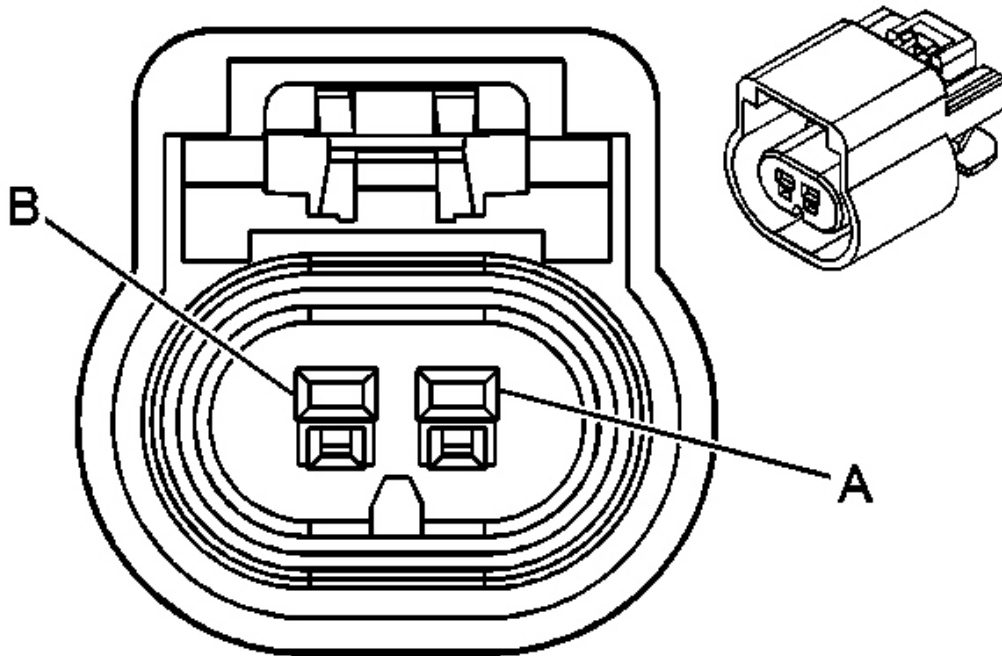


Fig. 3: Rear Differential Lock Actuator Connector End Views
 Courtesy of GENERAL MOTORS CORP.

Rear Differential Lock Actuator Connector Parts Information

Connector Part Information

- OEM: 15326801
- Service: 15306156
- Description: 2-Way F GT 150 Series Sealed (BK)

Terminal Part Information

- Terminal/Tray: 12191819/8
- Core/Insulation Crimp: 2/A
- Release Tool/Test Probe: 15315247/J-35616-2A (GY)

Rear Differential Lock Actuator Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function

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A	BK	1725	Rear Differential Lock Low Reference
B	L-GN	2659	Rear Differential Lock High Control

LOCKING DIFFERENTIAL DISASSEMBLED VIEWS

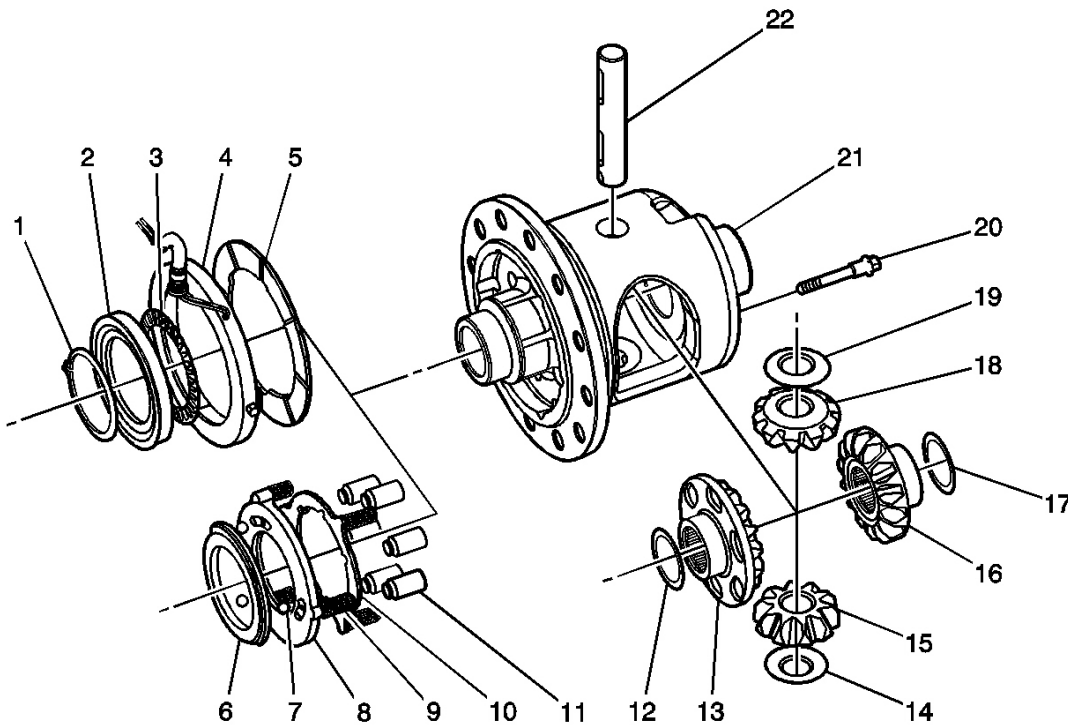


Fig. 4: Locking Differential Component View
 Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 4

Callout	Component Name
1	Differential Bearing Retainer Ring
2	Differential Bearing Race
3	Differential Bearing Assembly
4	Locking Differential Coil Assembly
5	Locking Differential Coil Plate
6	Locking Differential Ball Bearing Plate - Outboard
7	Locking Differential Ball Bearing Assembly
8	Locking Differential Ball Bearing Plate - Inboard

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9	Locking Differential Clutch Spring
10	Locking Differential Clutch Spring Retainer
11	Differential Carrier Lock Pin
12	Differential Side Gear Thrust Washer
13	Locking Differential Side Gear
14	Pinion Thrust Washer
15	Differential Pinion Gear
16	Differential Side Gear
17	Differential Side Gear Thrust Washer
18	Differential Pinion Gear
19	Pinion Thrust Washer
20	Differential Pinion Shaft Lock Screw
21	Electric Locking Differential Case Assembly
22	Differential Pinion Gear Shaft

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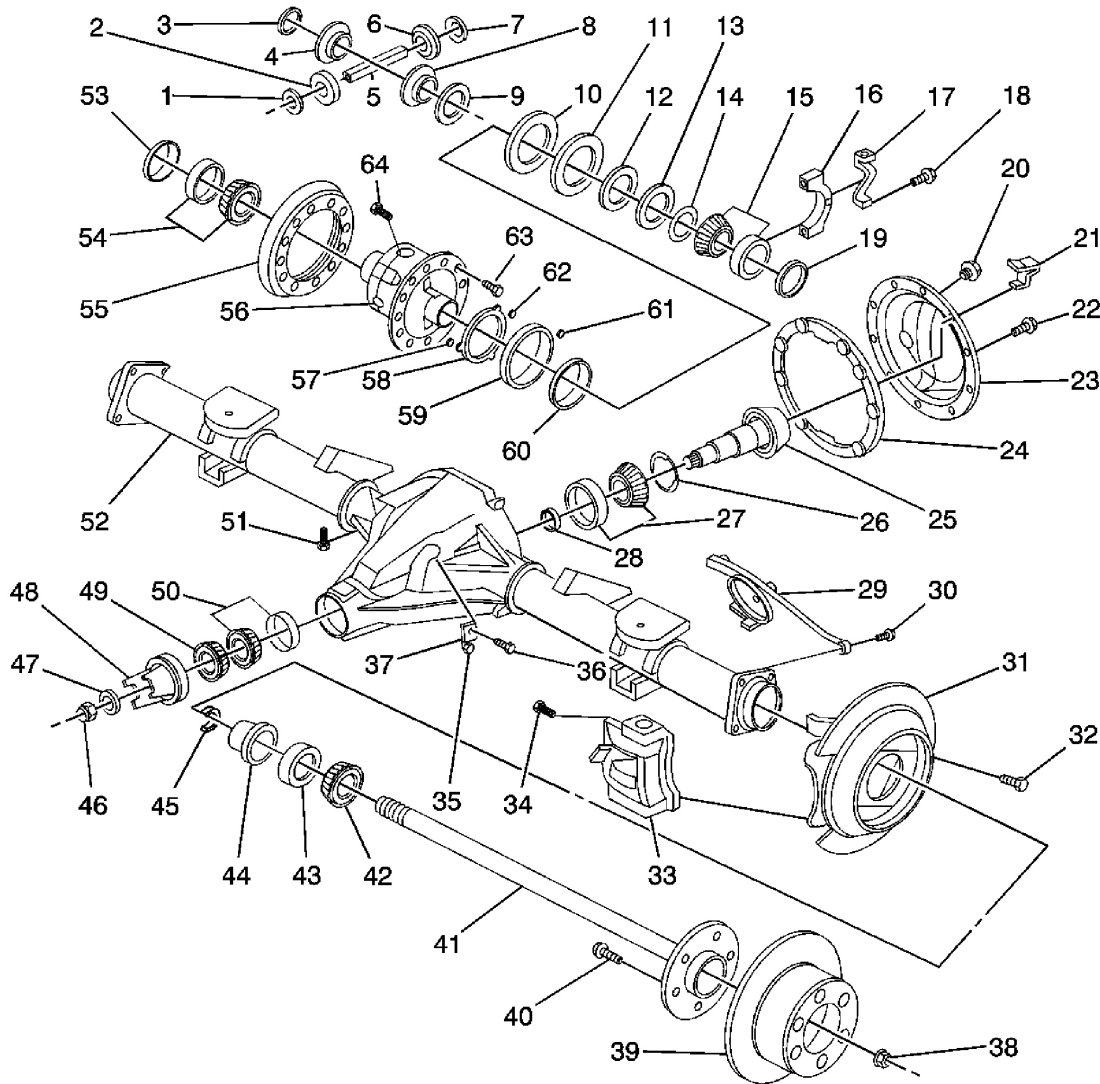


Fig. 5: Rear Axle With Electric Locker Disassembled View
 Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 5

Callout	Component Name
1	Differential Side Gear Thrust Washer
2	Differential Side Gear
3	Differential Side Gear Thrust Washer
4	Differential Side Locker Gear
5	Differential Pinion Gear Shaft
6	Differential Side Gear

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7	Differential Side Gear Thrust Washer
8	Differential Side Locker Gear
9	Differential Side Gear Thrust Washer
10	Differential Bearing Spacer
11	Electric Locking Differential Coil Lock
12	Locking Differential Bearing Assembly
13	Locking Differential Spacer
14	Locking Differential Clutch Spring Retainer
15	Differential Bearing Assembly
16	Rear Axle Housing Assembly
17	Rear Axle Housing Assembly
18	Rear Axle Housing Assembly
19	Differential Bearing Spacer
20	Differential Carrier Fill Plug
21	Brake Pipe Bracket
22	Rear Axle Housing Cover Bolt/Screw
23	Rear Axle Housing Cover
24	Rear Axle Housing Cover Gasket
25	Differential Ring and Drive Pinion 4.56 Ratio Gear Set
26	Differential Drive Pinion Spacer
27	Differential Drive Pinion Gear Inner Bearing Assembly
28	Differential Drive Pinion Gear Bearing Spacer
29	Rear Wheel Speed Sensor Assembly
30	Rear Wheel Speed Sensor Bolt/Screw
31	Differential Assembly Park Brake
32	Park Brake Bolt/Screw
33	Rear Disc Brake Assembly Caliper
34	Rear Disc Brake Caliper Bolt/Screw
35	Differential Housing Bolt/Screw
36	Differential Housing Bolt/Screw
37	Differential Housing Bracket
38	Rear Brake Rotor Retainer
39	Rear Brake Rotor Assembly
40	Rear Wheel Stud
41	Rear Axle Shaft

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	Rear Axle Shaft Seal Assembly
43	Rear Axle Shaft Bearing Assembly
44	Wheel Speed Sensor Reluctor Ring
45	Rear Axle Shaft Lock
46	Differential Drive Pinion Gear Nut
47	Differential Drive Pinion Gear Washer
48	Differential Drive Pinion Gear Yoke
49	Differential Drive Pinion Gear Seal
50	Differential Drive Pinion Gear Outer Bearing Assembly
51	Rear Axle Vent Hose Connector
52	Rear Axle Housing Assembly
53	Differential Bearing Spacer
54	Differential Bearing Assembly
55	Differential Ring and Drive Pinion Gear Set
56	Differential Case
57	Differential Carrier Lock Pin
58	Differential Bearing Retainer Ring
59	Electric Locking Differential Ball Bearing Plate
60	Electric Differential Ball Bearing Plate
61	Electric Locking Differential Ball Bearing Assembly
62	Locking Differential Clutch Spring
63	Differential Ring Gear Bolt/Screw
64	Differential Ring Gear Shaft Lock Bolt/Screw

REAR AXLE DISASSEMBLED VIEWS

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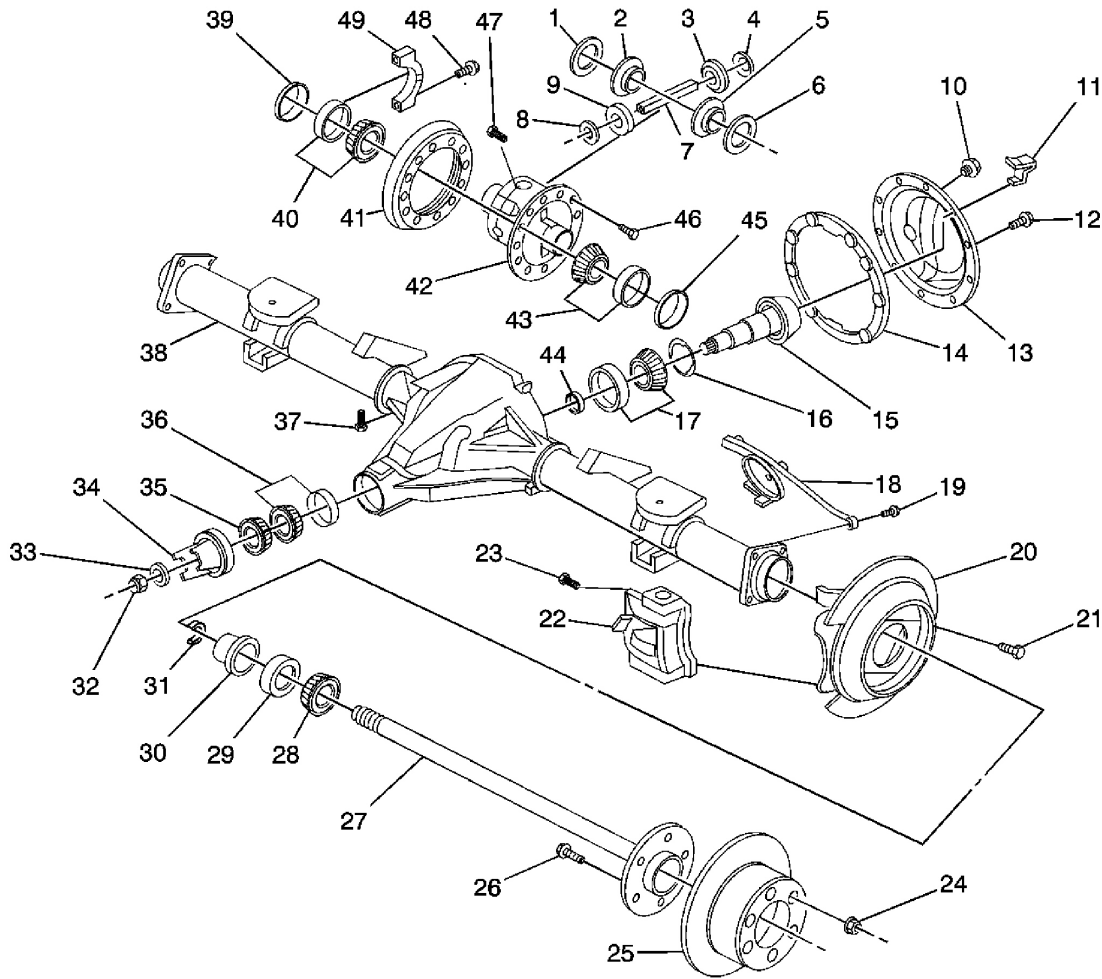


Fig. 6: Rear Drive Axle Disassembled View
 Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 6

Callout	Component Name
1	Differential Side Gear Thrust Washer
2	Differential Side Gear
3	Differential Pinion Gear
4	Differential Pinion Gear Thrust Washer
5	Differential Side Gear
6	Differential Side Gear Thrust Washer
7	Differential Pinion Gear Shaft
8	Differential Pinion Gear Thrust Washer
9	Differential Pinion Gear

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10	Differential Carrier Fill Plug
11	Brake Pipe Bracket
12	Rear Axle Housing Cover Bolt/Screw
13	Rear Axle Housing Cover
14	Rear Axle Housing Cover Gasket
15	Differential Ring and Drive Pinion Ratio 4.56 - G80 Gear Set
16	Differential Drive Pinion Spacer
17	Differential Drive Pinion Gear Inner Bearing Assembly
18	Rear Wheel Speed Sensor Assembly
19	Rear Wheel Speed Sensor Bolt/Screw
20	Park Assembly Brake
21	Park Brake Assembly Bolt/Screw
22	Rear Brake Assembly Caliper
23	Rear Brake Caliper Assembly Bolt/Screw
24	Rear Brake Rotor Retainer
25	Rear Brake Rotor
26	Rear Wheel Stud
27	Rear Axle Shaft
28	Rear Axle Shaft Seal Assembly
29	Rear Axle Shaft Bearing Assembly
30	Wheel Speed Sensor Reluctor Ring
31	Rear Axle Shaft Lock
32	Differential Drive Pinion Gear Nut
33	Differential Drive Pinion Gear Washer
34	Differential Drive Pinion Gear Yoke
35	Differential Drive Pinion Gear Seal
36	Differential Drive Pinion Gear Outer Bearing Assembly
37	Rear Axle Vent Hose Connector
38	Rear Axle Housing Assembly
39	Differential Spacer
40	Differential Bearing Assembly
41	Differential Ring and Gear Pinion 4.56 Ratio - G80 Gear Set
42	Differential Case
43	Differential Bearing Assembly
44	Differential Drive Pinion Gear Bearing Spacer

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	Differential Bearing Spacer
46	Differential Ring Gear Bolt
47	Differential Bolt
48	Bearing Cap Bolt (Not Serviced Separately)
49	Bearing Cap (Not Serviced Separately)

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - LOCKING/LIMITED SLIP REAR AXLE

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

DIAGNOSTIC STARTING POINT - REAR DRIVE AXLE

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

DTC C0388

Circuit Description

The rear differential control circuit consists of an actuator which engages and disengages the rear axle differential lock. The rear differential actuator consists of a coil assembly and a locking assembly with springs and pins to lock the rear differential, all within the rear differential assembly.

The rear axle differential lock actuator consists of the following circuits:

- The rear differential lock control circuit, which is connected to the transfer case shift control module and supplies battery voltage.
- The rear differential lock return ground circuit, which is also connected to the transfer case

shift control module.

Whenever the rear differential lock has been requested the transfer case shift control module provides battery voltage through the rear differential lock control circuit and provides ground through the rear differential lock return circuit through a current limiting driver.

Whenever a rear differential lock is requested the transfer case must be in 4 LO and the vehicle speed must be below 5 km/h (3 mph) for the request to be accepted. The rear differential lock will remain locked up to 32 km/h (20 mph) after which the rear differential lock will disengage.

This DTC detects a short to ground, short-to-voltage or an open circuit.

Conditions for Running the DTC

- The ignition is ON.
- The system voltage is 9-18 volts.

Conditions for Setting the DTC

- The transfer case shift control module monitors the state of the rear axle differential lock actuator. The transfer case shift control module reads the rear differential lock control and the rear differential lock return circuits for a high and low voltage. The DTC will set if these circuits are high when a low voltage is expected or when the circuits are low when a high voltage is expected.
- The DTC will set if this circuit is high when a low voltage is present or when the circuit is low when a high voltage is present.

Action Taken When the DTC Sets

- All rear differential lock requests will be disabled. Transfer case mode shifts will not be affected.
- SERVICE 4WD indicator will be latched on for the remainder of the current ignition cycle.

Conditions for Clearing the DTC

- The Transfer case shift control module will clear the DTC if the condition for setting the DTC is not currently present.
- A history DTC will clear after 33 consecutive ignition cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Test Description

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The numbers below refer to the step numbers on the diagnostic table.

- 2:** This step determines if the coil has excessive resistance or if the windings are shorted together.
- 3:** This step determines if the coil or pigtail is shorted to ground.
- 4:** This step determines if either the differential lock control or differential lock return circuits are shorted to ground.
- 5:** This step determines if the differential lock control and differential lock return circuits are shorted together.
- 6:** This step tests for an open or high resistance in both the return and control circuits.
- 7:** This step refers to transfer case shift control module replacement.
- 8:** This step refers to encoder motor replacement.

DTC C0388

Step	Action	Value (s)	Yes	No
Schematic Reference: <u>Transfer Case Control Schematics</u>				
Connector End View Reference: <u>Rear Axle Connector End Views</u>				
1	Did you perform the Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u>
2	1. Disconnect the rear differential lock harness from the rear differential lock coil pigtail. 2. With a DMM, measure the resistance of the rear differential lock coil and pigtail by probing the rear differential lock return and the rear differential lock control circuits. Was the resistance reading within the specified values?	2.2-4.3 ohms	Go to Step 3	Go to Step 8
	With the connector still			

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<p align="center">3</p>	<p>disconnected, with a DMM, probe the return then the control circuits and check for resistance to ground. Did the DMM indicate a short to ground?</p>	<p align="center">-</p>	<p align="center">Go to Step 8</p>	<p align="center">Go to Step 4</p>
<p align="center">4</p>	<ol style="list-style-type: none"> 1. Disconnect connector C1 from the transfer case shift control module. 2. Disconnect the rear differential lock harness from the rear differential coil pigtail. 3. With a DMM, check for a short to power or short to ground on the differential lock control and differential lock return circuits. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> . <p>Was the condition found and corrected?</p>	<p align="center">-</p>	<p align="center">Go to Step 9</p>	<p align="center">Go to Step 5</p>
<p align="center">5</p>	<p>IMPORTANT: This circuit contains a reversed bias diode. The red lead of the DMM must be placed on the rear differential lock high control circuit and the black lead on the rear differential lock low reference circuit. This is done to avoid showing the circuits falsely shorted together.</p> <p>Check the differential lock control and the differential lock return circuits for being shorted together. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> . Was the condition</p>	<p align="center">-</p>		

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	found and corrected?		Go to Step 9	Go to Step 6
6	Check the suspect circuit for an open or high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> . Was the condition found and corrected?	-	Go to Step 9	Go to Step 7
7	Replace the transfer case shift control module. Refer to <u>Control Module References</u> for replacement, setup and programming. Was the repair completed?	-	Go to Step 9	-
8	Replace the rear differential lock coil. Refer to <u>Electronic Locking Differential Coil Lock Replacement</u> . Was the repair completed?	-	Go to Step 9	-
9	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	-	Go to Step 1	System OK

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:

- **Electronic Rear Differential Lock Will Not Engage**
- **Electronic Rear Differential Lock Will Not Disengage**

SYMPTOMS - REAR DIFFERENTIAL CARRIER

Review the system and operation in order to familiarize yourself with the system functions. Refer to **Rear Drive Axle Description and Operation**.

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**

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.

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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

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- 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 deceleration 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

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Inspect, adjust or replace the affected components as necessary.

NOISY IN DRIVE

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 <u>Backlash Adjustment</u> .
Worn pinion and ring gear	Replace the pinion and the ring gear. Refer to <u>Drive Pinion and Ring Gear Replacement</u> .
Worn pinion bearings	Replace the pinion bearings. Refer to <u>Drive Pinion Bearings Replacement</u> .
Loose pinion bearings	Adjust the pinion bearings preload. Refer to <u>Pinion Depth Adjustment</u> .
Excessive pinion end play	Adjust the pinion end play. Refer to <u>Pinion Depth Adjustment</u> .
Worn differential bearings	Replace the differential bearings. Refer to <u>Differential Side Bearings Replacement</u> .
Loose differential bearings	Adjust the differential bearing preload. Refer to <u>Differential Side Bearing Preload Adjustment</u> .
Excessive ring gear runout	Replace the ring gear. Refer to <u>Drive Pinion and Ring Gear Replacement</u> .
Low oil level	Fill the fluid level to specifications with the proper lubricant. Refer to <u>Rear Axle Lubricant Level Inspection</u> .
Wrong or poor grade oil	Drain and refill the system with the proper lubricant. Refer to <u>Rear Axle Lubricant Replacement</u> .
Bent axle housing	Replace the axle housing. Refer to <u>Rear Axle Housing Replacement</u> .

NOISY WHEN COASTING

Noisy When Coasting

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

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Pinion and ring gear too tight	Adjust the pinion and the ring gear backlash. Refer to <u>Backlash Adjustment</u> .
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INTERMITTENT NOISE

Intermittent Noise

Checks	Action
Warped ring gear	Replace the ring gear. Refer to <u>Drive Pinion and Ring Gear Replacement</u> .
Loose differential case bolts	Tighten differential case bolts to specifications. Refer to <u>Fastener Tightening Specifications</u> .

CONSTANT NOISE

Constant Noise

Checks	Action
Flat spot on the pinion or the ring gear teeth	Replace the pinion and the ring gear. Refer to <u>Drive Pinion and Ring Gear Replacement</u> .
Flat spot on the pinion bearing	Replace the bearing. Refer to <u>Drive Pinion Bearings Replacement</u> .
Worn pinion splines	Replace the pinion. Refer to <u>Drive Pinion and Ring Gear Replacement</u> .
Worn axle shaft dowel holes	Replace the axle shaft. Refer to <u>Rear Axle Shaft Replacement</u> .
Worn hub studs	Replace the wheel studs. Refer to <u>Wheel Stud Replacement</u> .
Bent axle shaft	Replace the axle shaft. Refer to <u>Rear Axle Shaft Replacement</u> .

NOISY ON TURNS

Noisy on Turns

Checks	Action
Worn axle shaft splines	Replace the axle shaft. Refer to <u>Rear Axle Shaft Replacement</u> .

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)

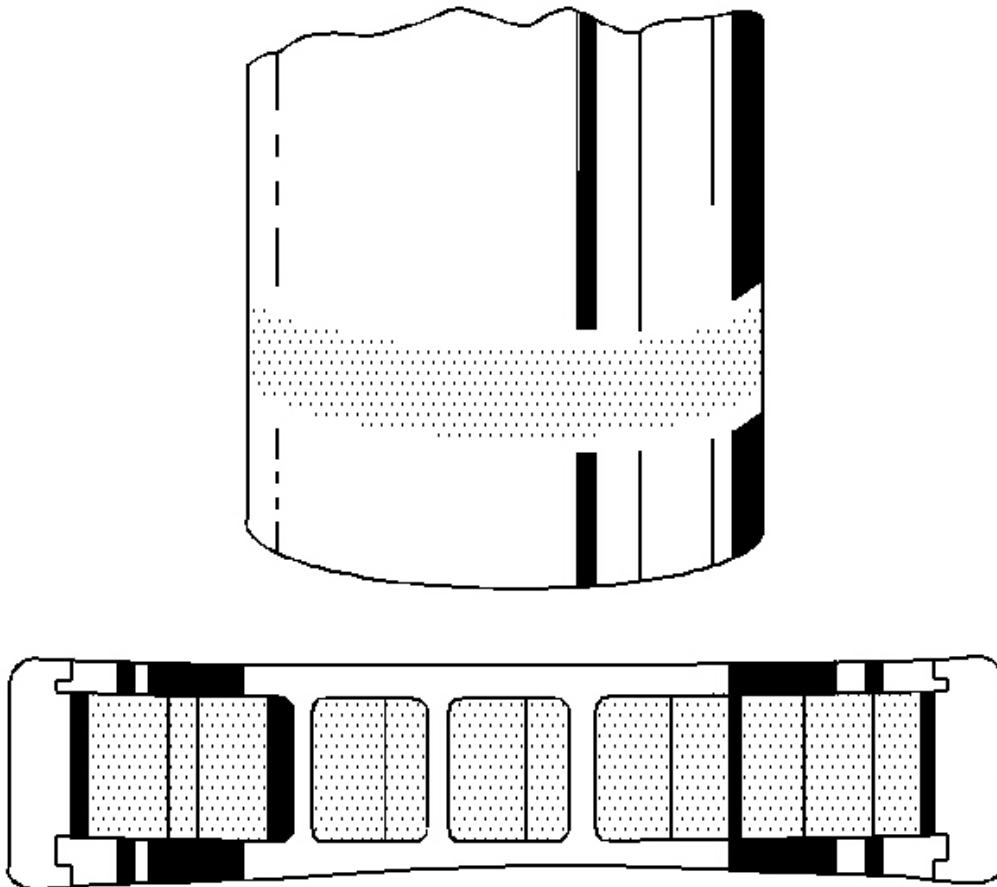


Fig. 7: Identifying Minor Wear
Courtesy of GENERAL MOTORS CORP.

Light pattern on races and rollers can be caused by fine abrasives. Clean all of the parts including

the housings. Check the seals. Replace the bearings if rough or noisy. Replace the shaft if damaged.

Wear (Major)

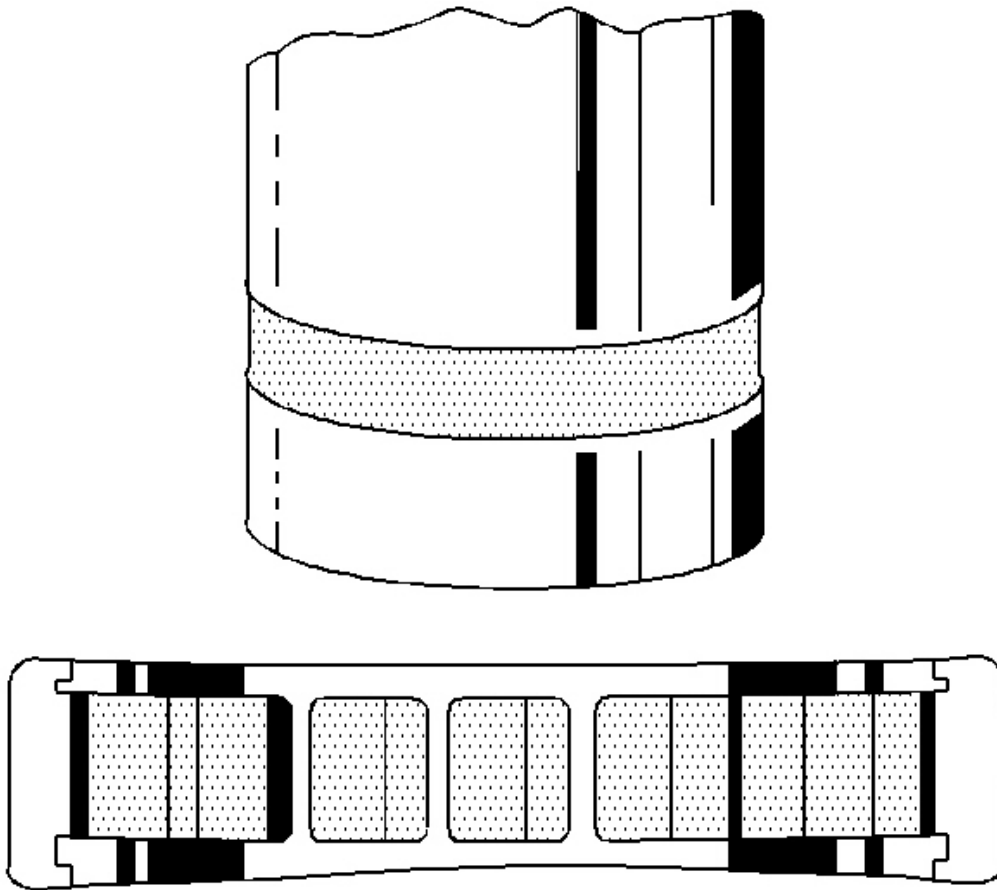


Fig. 8: Identifying Major Wear
Courtesy of GENERAL MOTORS CORP.

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

Brinelling

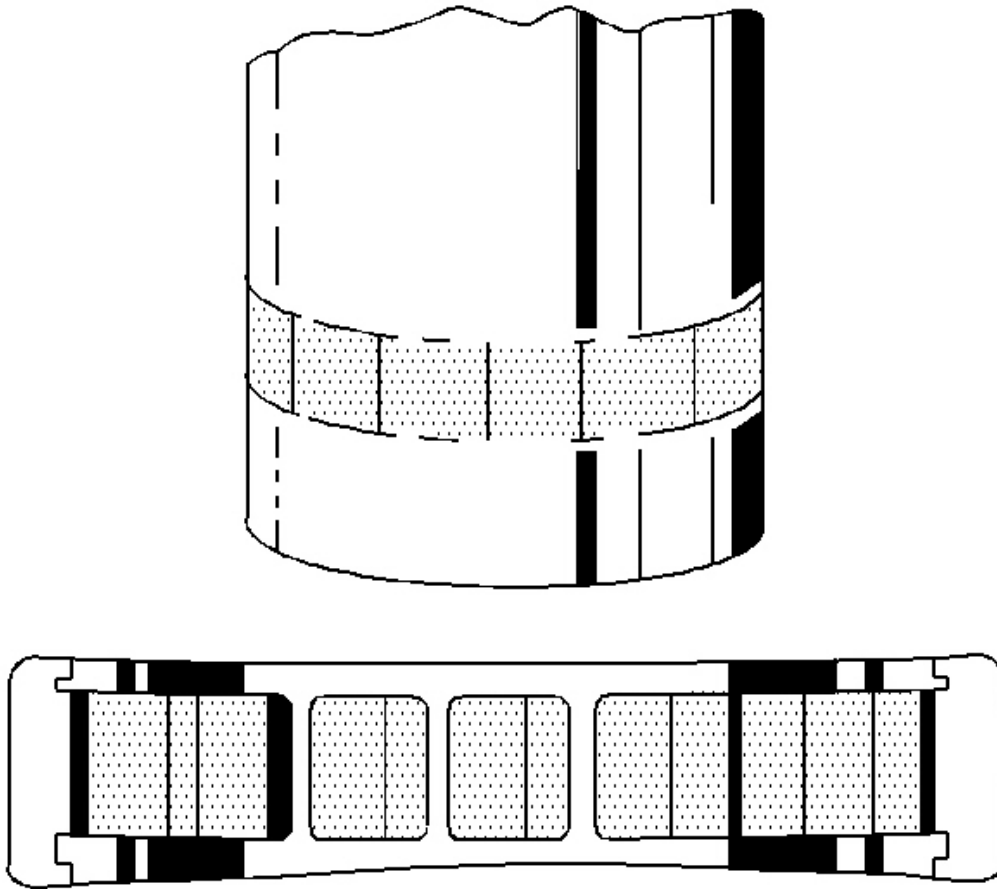


Fig. 9: Identifying Brinelling
Courtesy of GENERAL MOTORS CORP.

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

Indentations

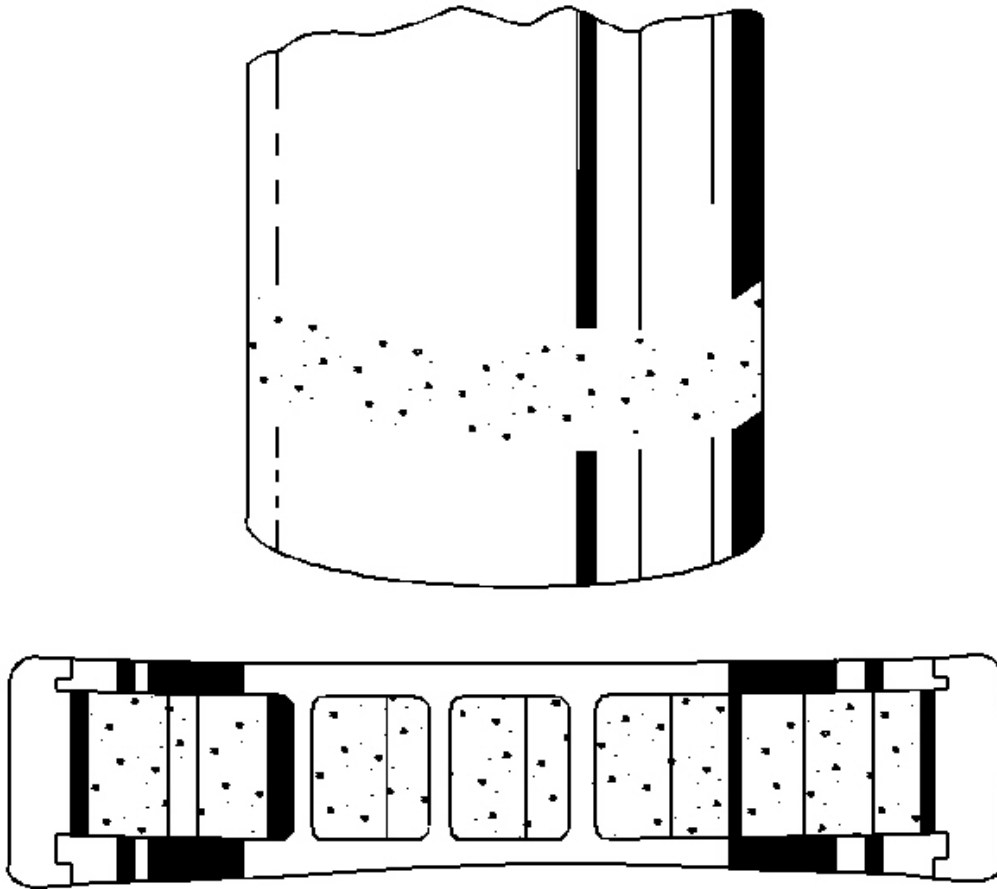


Fig. 10: Identifying Indentations
Courtesy of GENERAL MOTORS CORP.

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

Single Edge Pitting

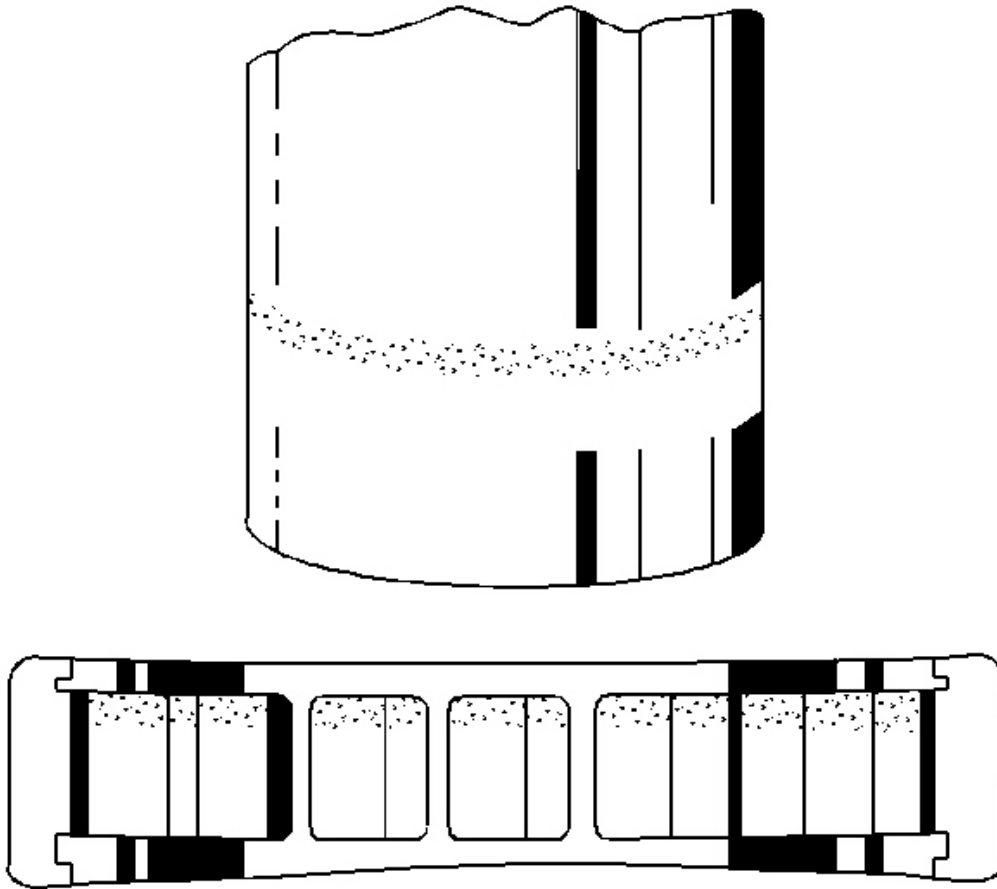


Fig. 11: Identifying Single Edge Pitting
Courtesy of GENERAL MOTORS CORP.

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

Double Edge Pitting

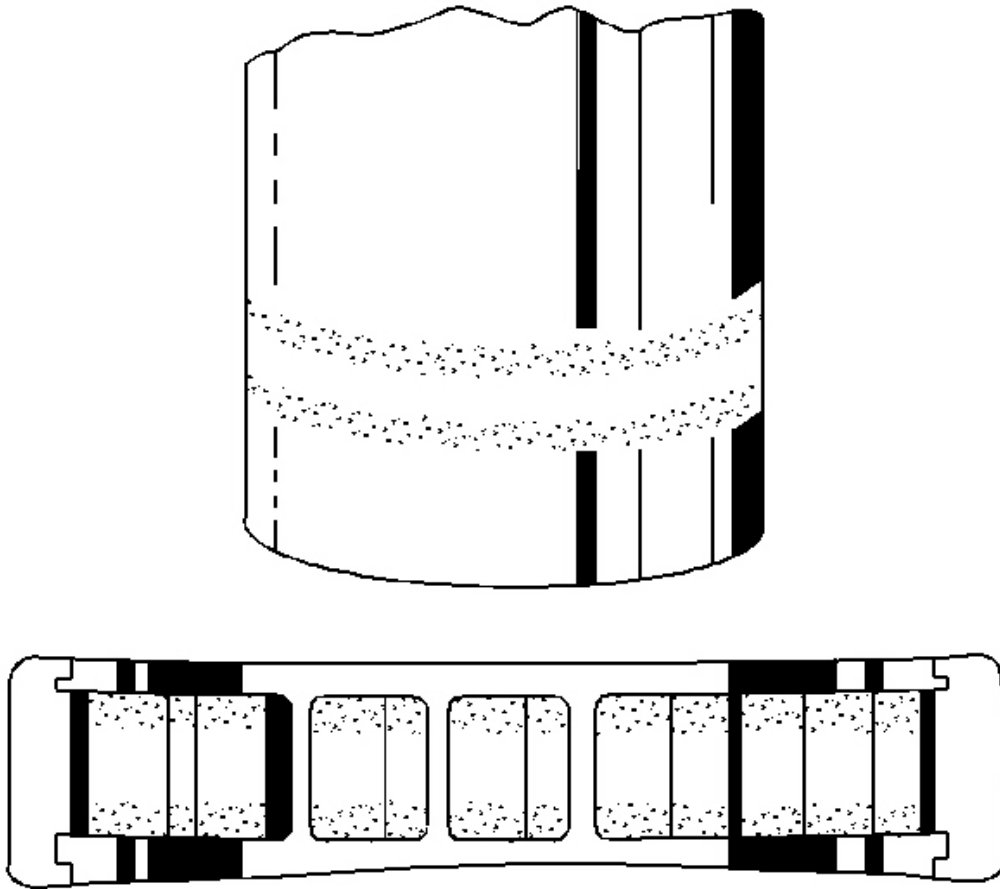


Fig. 12: Identifying Double Edge Pitting
Courtesy of GENERAL MOTORS CORP.

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

Misalignment

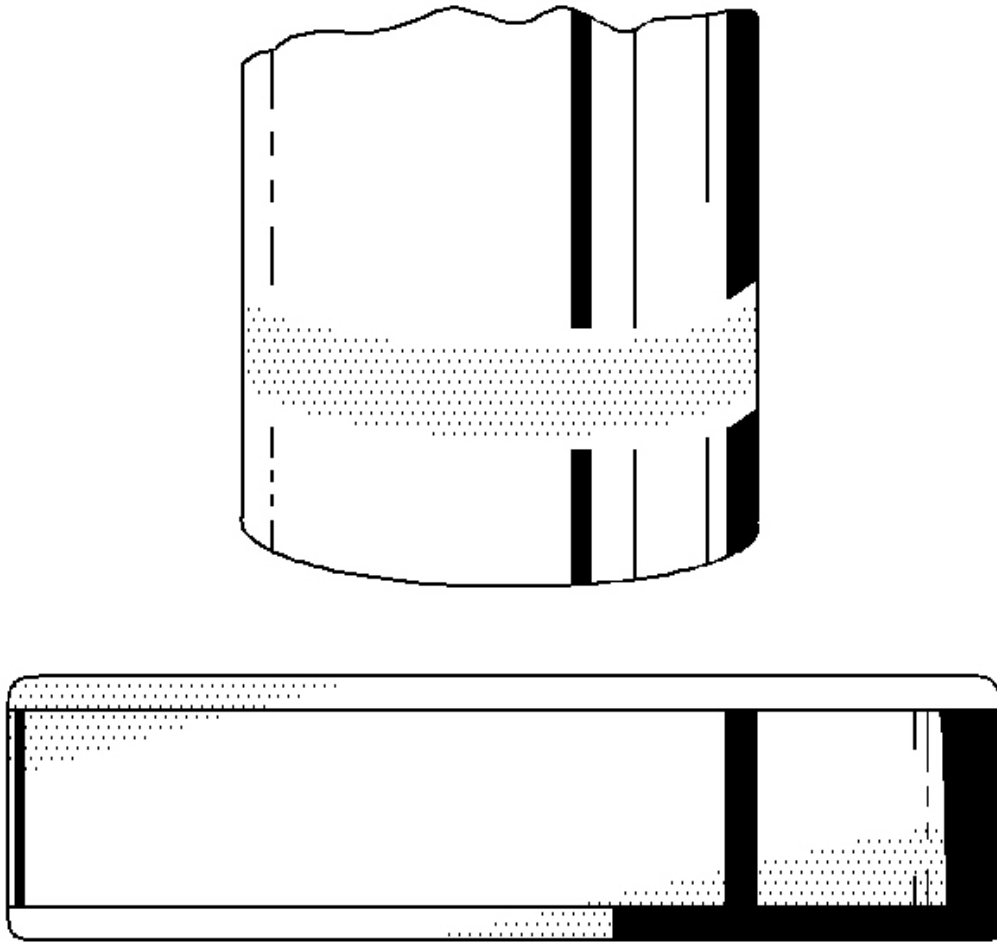


Fig. 13: Identifying Misalignment
Courtesy of GENERAL MOTORS CORP.

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

Fretting

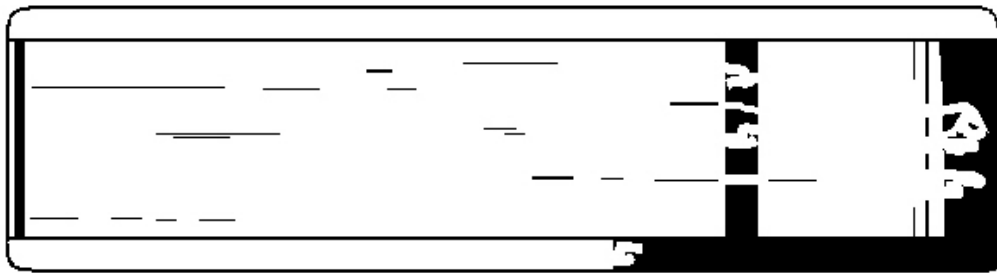
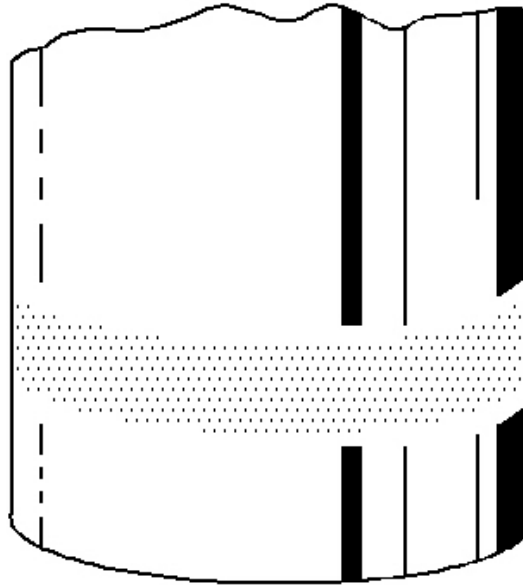


Fig. 14: Identifying Frettage
Courtesy of GENERAL MOTORS CORP.

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

Smears

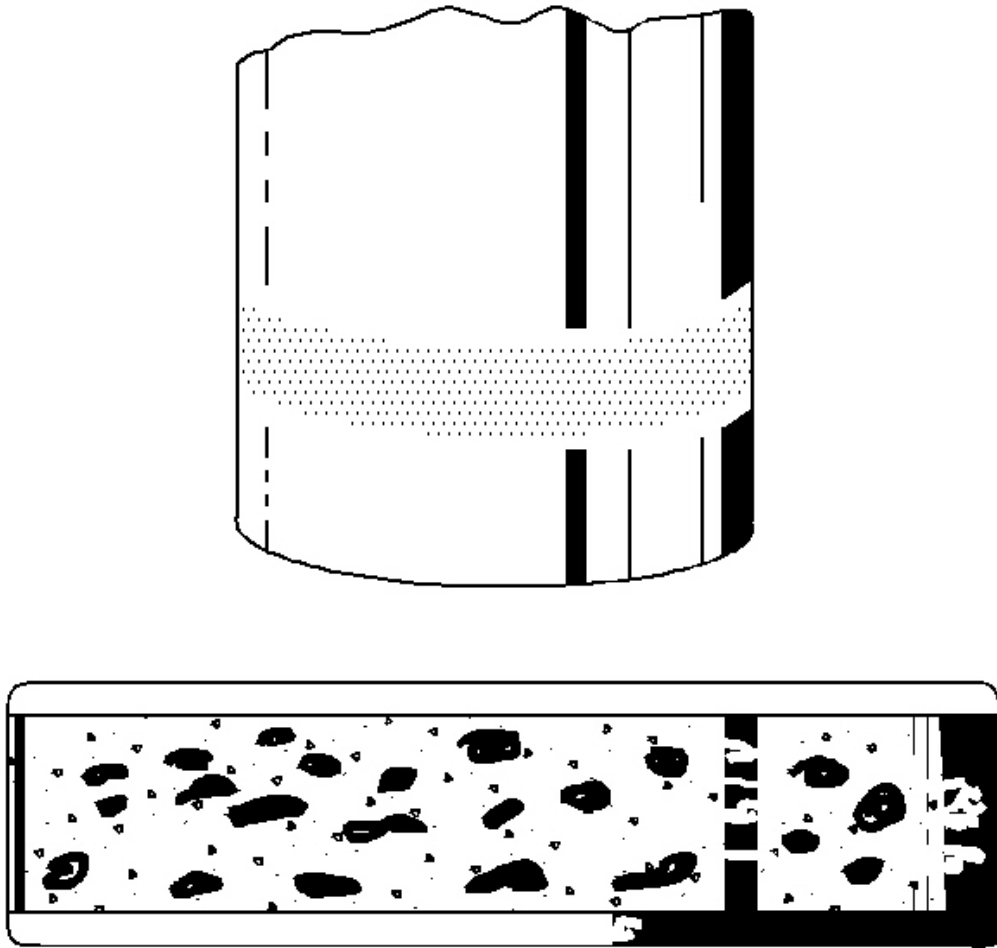


Fig. 15: Identifying Smears
Courtesy of GENERAL MOTORS CORP.

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

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 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.

LOCKING DIFFERENTIAL DIAGNOSIS

1. Block the right front and rear wheels.
2. Turn the Ignition ON - Do not start the engine.
3. Place the transmission in NEUTRAL.
4. Shift the transfer case into 4 LOW.
5. Engage the differential lock switch.
6. Raise the left front wheel off the ground. Refer to **Lifting and Jacking the Vehicle** .

Support the left front wheel with safety stands.

7. Raise the left rear wheel off the ground. Refer to **Lifting and Jacking the Vehicle** .

Support the left rear wheel with safety stands.

8. Attempt to rotate the left rear wheel 1 full revolution clockwise and counterclockwise by hand.
 - If the wheel does not rotate 1 full revolution in either direction, the locking differential is engaging properly.
 - If the wheel rotates more than 1 revolution in either direction, the locking differential is not engaging properly.
9. Disengage the differential lock switch.
10. Attempt to rotate the left rear wheel 1 full revolution clockwise and counterclockwise by hand.
 - If the wheel rotates 1 full revolution in either direction, the locking differential is disengaging properly.
 - If the wheel does not rotate more than 1 revolution in either direction, the locking

differential is not disengaging properly.

11. If the locking differential is not functioning properly, remove the differential and determine the cause of failure. Refer to **Differential Replacement** and **Locking Differential Disassemble**.

ELECTRONIC REAR DIFFERENTIAL LOCK WILL NOT ENGAGE

Circuit Description

The rear differential control circuit consists of an actuator which engages and disengages the rear axle differential lock. The rear differential actuator consists of a coil assembly and a locking assembly with springs and pins to lock the rear differential, all within the rear differential assembly.

The rear axle differential lock actuator consists of the following circuits:

- The rear differential lock control circuit, which is connected to the transfer case shift control module and supplies battery voltage.
- The rear differential lock return ground circuit, which is also connected to the transfer case shift control module.

Whenever the rear differential lock has been requested the transfer case shift control module provides battery voltage through the rear differential lock control circuit and provides ground through the rear differential lock return circuit through a current limiting driver.

Whenever a rear differential lock is requested the transfer case must be in 4LO and the vehicle speed must be below 5 km/h (3 mph) for the request to be accepted. The rear differential lock will remain locked up to 32 km/h (20 mph) after which the rear differential lock will disengage.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

- 2:** This step determines if the fault is present or intermittent.
- 3:** This step determines if the transfer case shift control module is receiving a differential lock request from the transfer case shift control switch.
- 4:** This step determines if a bad switch is causing the symptom.
- 5:** This step determines if a short, open or high resistance in the 5-volt reference or switch signal circuits is causing the symptom.
- 6:** This step determines if the coil has excessive resistance or if the windings are shorted

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together.

7: This step determines if the coil or pigtail is shorted to ground.

8: This step determines if either the differential lock control or differential lock return circuits are shorted to ground.

9: This step tests for an open or high resistance in both the return and control circuits.

10: This step refers to transfer case shift control module replacement.

11: This step refers to encoder motor replacement.

12: This step replaces the transfer case shift control switch.

Electronic Rear Differential Lock Will Not Engage

Step	Action	Value (s)	Yes	No
Schematic Reference: <u>Differential Lock Schematics</u>				
Connector End View Reference: <u>Rear Axle Connector End Views</u>				
1	Did you perform the Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u>
2	Verify the fault is present. Perform the locking differential functional check. Refer to <u>Locking Differential Diagnosis</u> . Does the system operate normally?	-	Go to <u>Testing for Intermittent Conditions and Poor Connections</u>	Go to Step 3
3	While observing the rear axle lock request on the scan tool, request the rear differential lock ON by pressing the rear differential lock button. Does the scan tool indicate rear axle lock ON?	-	Go to Step 6	Go to Step 4
	<ol style="list-style-type: none"> 1. With a DMM, check the resistance of the transfer case shift control switch. 2. While depressing and holding the differential lock 			

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4	<p>button, probe the 5-volt reference and switch signal circuit pins on the back of the switch.</p> <p>Is the switch within the specified value?</p>	64.25-65.55 ohms	Go to Step 5	Go to Step 12
5	<p>Check the 5-volt reference and switch signal circuits for an open, short or high resistance between the transfer case shift control switch and the transfer case shift control module. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> .</p> <p>Was the condition found and corrected?</p>	-	Go to Step 13	Go to Step 6
6	<ol style="list-style-type: none"> 1. Disconnect the rear differential lock harness from the rear differential lock coil pigtail. 2. With a DMM, measure the resistance of the rear differential lock coil and pigtail by probing the rear differential lock return and the rear differential lock control circuits. <p>Was the resistance reading within the specified values?</p>	2.2-4.3 ohms	Go to Step 7	Go to Step 11
7	<p>With the connector still disconnected, with a DMM, probe the return then the control circuits and check for resistance to ground.</p> <p>Did the DMM indicate a short to ground?</p>	-	Go to Step 11	Go to Step 8
	<ol style="list-style-type: none"> 1. Disconnect the C1 from the transfer case shift control 			

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<p>8</p>	<p>module.</p> <ol style="list-style-type: none"> 2. Disconnect the rear differential lock harness from the rear differential coil pigtail. 3. Turn the ignition ON. 4. With a DMM, check for a short to power or short to ground on the differential lock control and differential lock return circuits. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> . <p>Was the condition found and corrected?</p>	<p>-</p>	<p>Go to Step 13</p>	<p>Go to Step 9</p>
<p>9</p>	<p>Check the differential lock control and differential lock return circuits for an open or high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> .</p> <p>Was the condition found and corrected?</p>	<p>-</p>	<p>Go to Step 13</p>	<p>Go to Step 10</p>
<p>10</p>	<p>Replace the transfer case shift control module. Refer to <u>Control Module References</u> for replacement, setup and programming.</p> <p>Was the repair completed?</p>	<p>-</p>	<p>Go to Step 13</p>	<p>-</p>
<p>11</p>	<p>Replace the electronic locking differential locking mechanism and/or side gear. Refer to <u>Locking Differential Disassemble</u> and <u>Locking Differential Assemble</u>.</p> <p>Was the repair completed?</p>	<p>-</p>	<p>Go to Step 13</p>	<p>-</p>
	<p>Replace the transfer case shift</p>			

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12	control switch. Refer to <u>Transfer Case Shift Control Switch Replacement</u> . Was the repair completed?	-	Go to Step 13	-
13	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for allowing the symptom to occur. Does the symptom occur?	-	Go to Step 1	System OK

ELECTRONIC REAR DIFFERENTIAL LOCK WILL NOT DISENGAGE

Circuit Description

The rear differential control circuit consists of an actuator which engages and disengages the rear axle differential lock. The rear differential actuator consists of a coil assembly and a locking assembly with springs and pins to lock the rear differential, all within the rear differential assembly.

The rear axle differential lock actuator consists of the following circuits:

- The rear differential lock control circuit, which is connected to the transfer case shift control module and supplies battery voltage.
- The rear differential lock return ground circuit, which is also connected to the transfer case shift control module.

Whenever the rear differential lock has been requested the transfer case shift control module provides battery voltage through the rear differential lock control circuit and provides ground through the rear differential lock return circuit through a current limiting driver.

Whenever a rear differential lock is requested the transfer case must be in 4LO and the vehicle speed must be below 5 km/h (3 mph) for the request to be accepted. The rear differential lock will remain locked up to 32 km/h (20 mph) after which the rear differential lock will disengage.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: This step determines if the differential lock is engaged due to an electrical condition or a

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mechanical condition.

3: This step determines if the differential lock high control circuit is shorted to power and if the differential low reference circuit is shorted to ground.

4: This step indicates the transfer case shift control module needs replaced.

5: This step checks for the possibility of the rear differential mechanically binding causing it to stay on.

Electronic Rear Differential Lock Will Not Disengage

Step	Action	Yes	No
Schematic Reference: <u>Differential Lock Schematics</u> Connector End View Reference: <u>Rear Axle Connector End Views</u>			
1	Did you perform the Diagnostic System Check-Vehicle?	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u>
2	Disconnect the rear differential lock harness from the rear differential lock coil pigtail at the rear differential and verify the fault is present. Refer to <u>Locking Differential Diagnosis</u> . Does the system operate normally?	Go to Step 3	Go to Step 5
3	Check the rear differential lock high control circuit for a short to power and the differential lock low reference for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> . Was the condition found and corrected?	Go to Step 6	Go to Step 4
4	Replace the transfer case shift control module. Refer to <u>Control Module References</u> for replacement, setup and programming. Was the repair completed?	Go to Step 6	-
5	Replace the electronic locking differential locking mechanism and/or side gear. Refer to <u>Locking Differential Disassemble</u> and <u>Locking Differential Assemble</u> . Was the condition repaired?	Go to Step 6	-
	1. Use the scan tool in order to clear the DTCs.		

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6	2. Operate the vehicle within the Conditions for allowing the symptom to re-occur. Does the symptom re-occur?	Go to Step 1	System OK
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REPAIR INSTRUCTIONS

REAR AXLE LUBRICANT LEVEL INSPECTION

1. Raise 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.
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** .

NOTE: Refer to **FASTENER NOTICE** .

Use the correct fastener in the correct location. Replacement fasteners must be the correct part number for that application. Fasteners requiring replacement or fasteners requiring the use of thread locking compound or sealant are identified in the service procedure. Do not use paints, lubricants or corrosion inhibitors on fasteners or fastener joint surfaces unless specified. These coatings affect fastener torque and joint clamping force and may damage the fastener. Use the correct tightening sequence and specifications when installing fasteners in order to avoid damage to parts and systems.

8. Install the rear axle fill plug.

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

9. Lower the vehicle.

REAR AXLE LUBRICANT REPLACEMENT

Removal Procedure

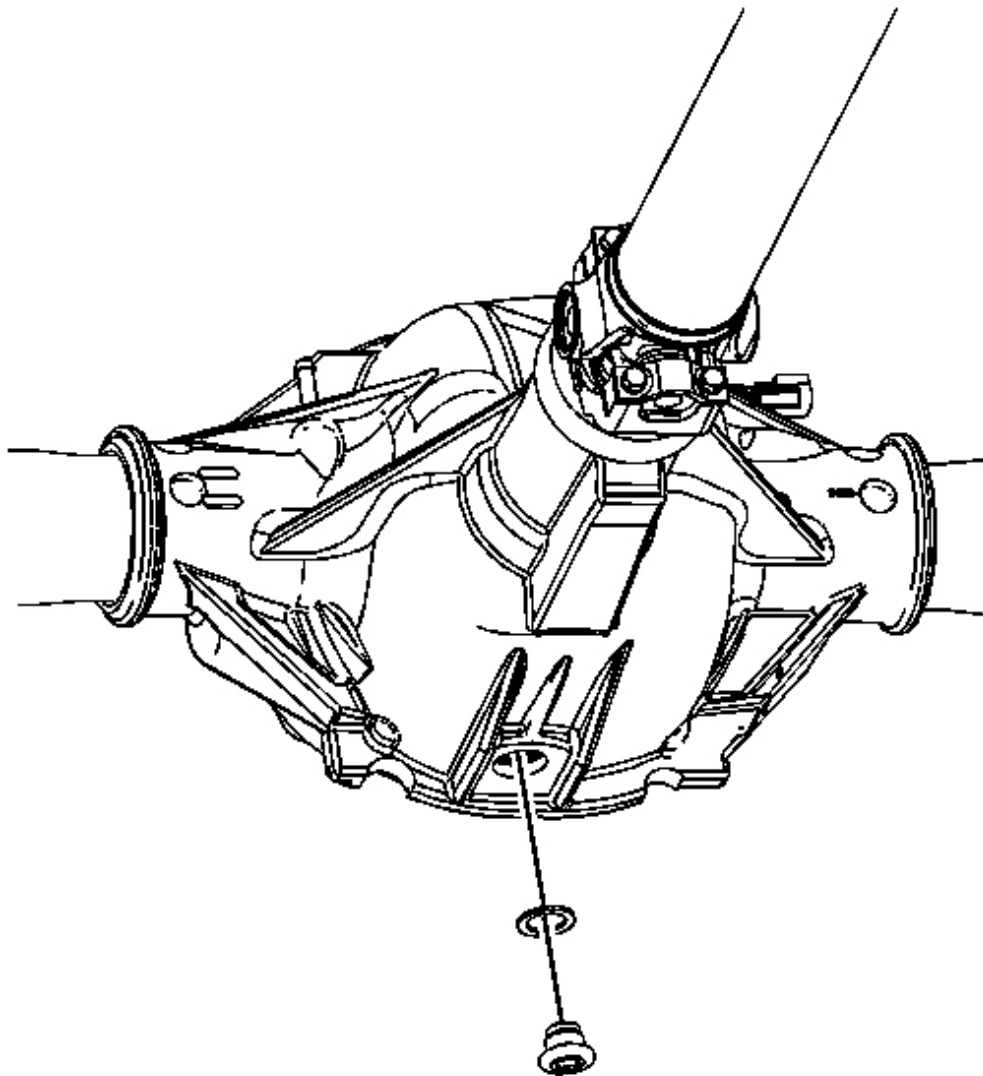


Fig. 16: Identifying Rear Axle Drain Plug
Courtesy of GENERAL MOTORS CORP.

1. Clean the area around the rear axle fill plug.
2. Remove the rear axle drain plug and drain the lubricant into a suitable container.

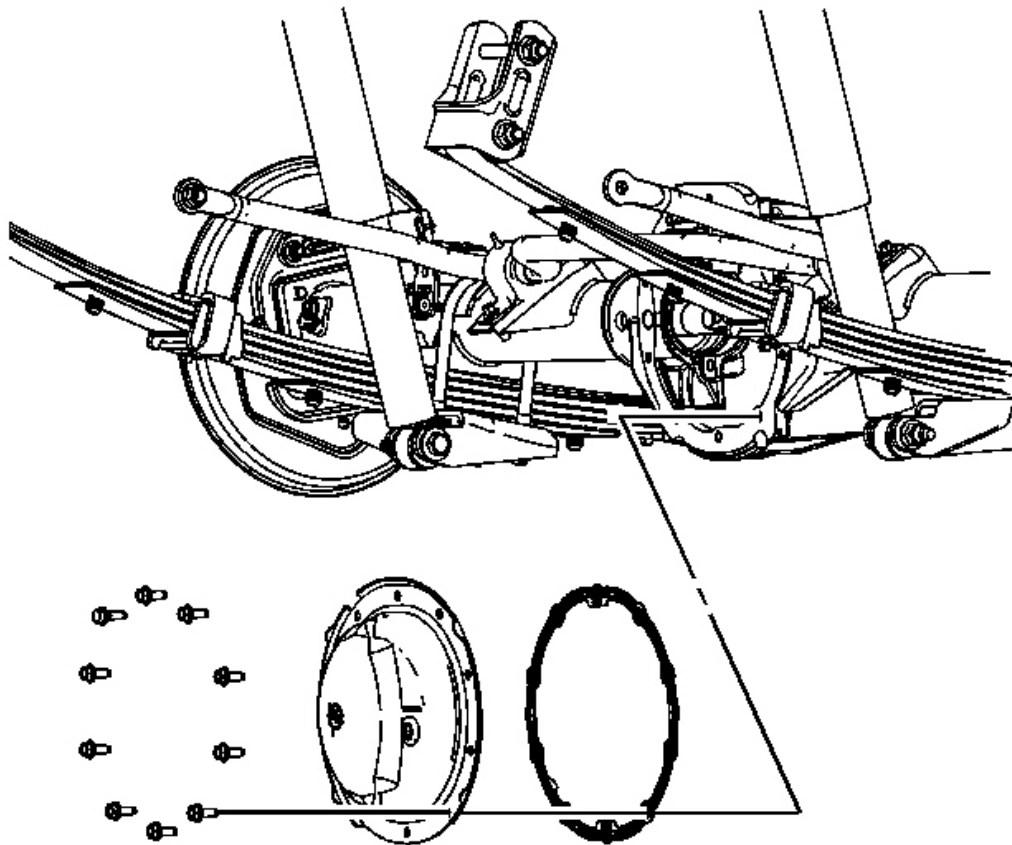


Fig. 17: View Of Rear Axle Cover
Courtesy of GENERAL MOTORS CORP.

3. Remove the rear axle cover. Refer to **Rear Axle Housing Cover and Gasket Replacement**.

Installation Procedure

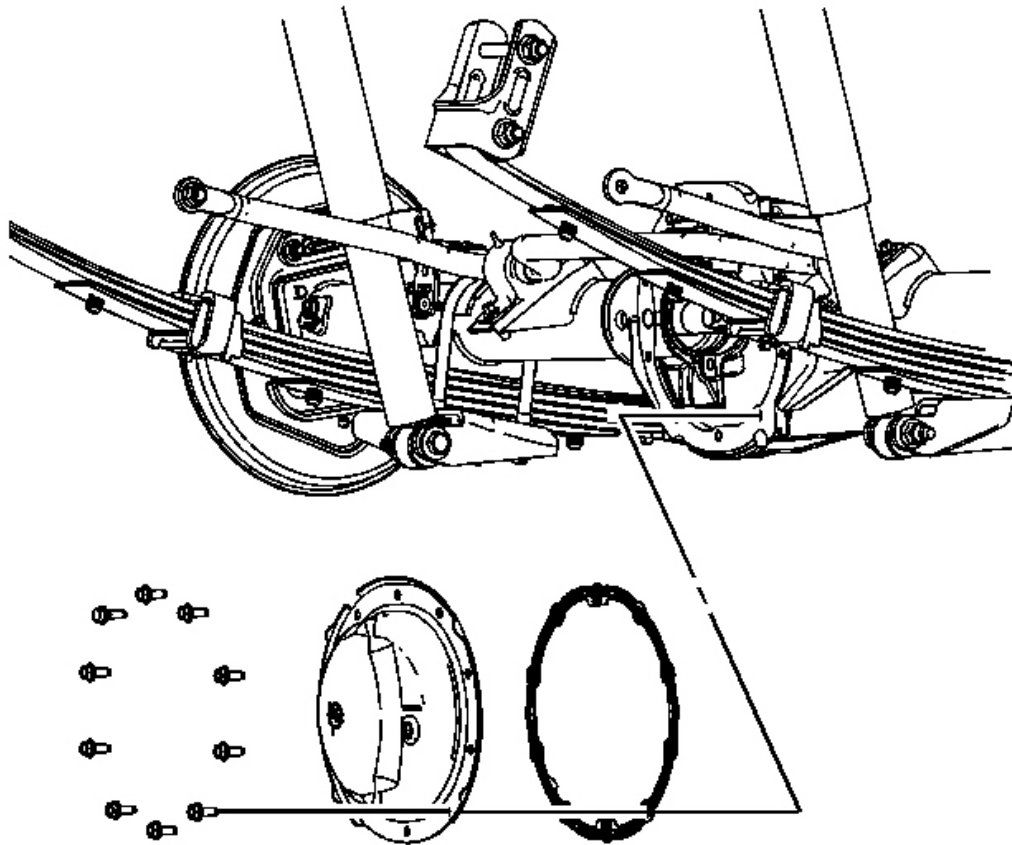


Fig. 18: View Of Rear Axle Cover
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: A new gasket is not required unless the gasket is damaged.

1. Install the rear axle cover. Refer to **Rear Axle Housing Cover and Gasket Replacement.**

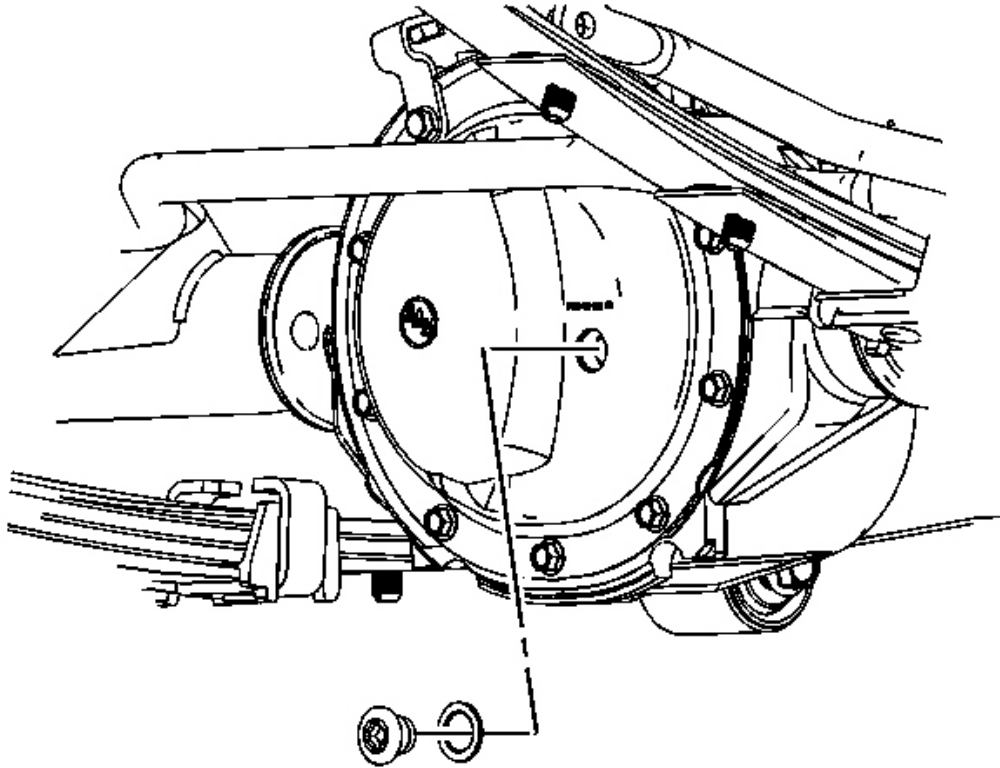


Fig. 19: View Of Rear Axle Fill Plug
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

2. Install the drain plug.

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

3. Fill the rear axle with axle lubricant. Use the proper fluid. Refer to Approximate Fluid Capacities and Fluid and Lubricant Recommendations .
4. Inspect the fluid level. Refer to Rear Axle Lubricant Level Inspection.

VENT HOSE REPLACEMENT

Removal Procedure

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

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

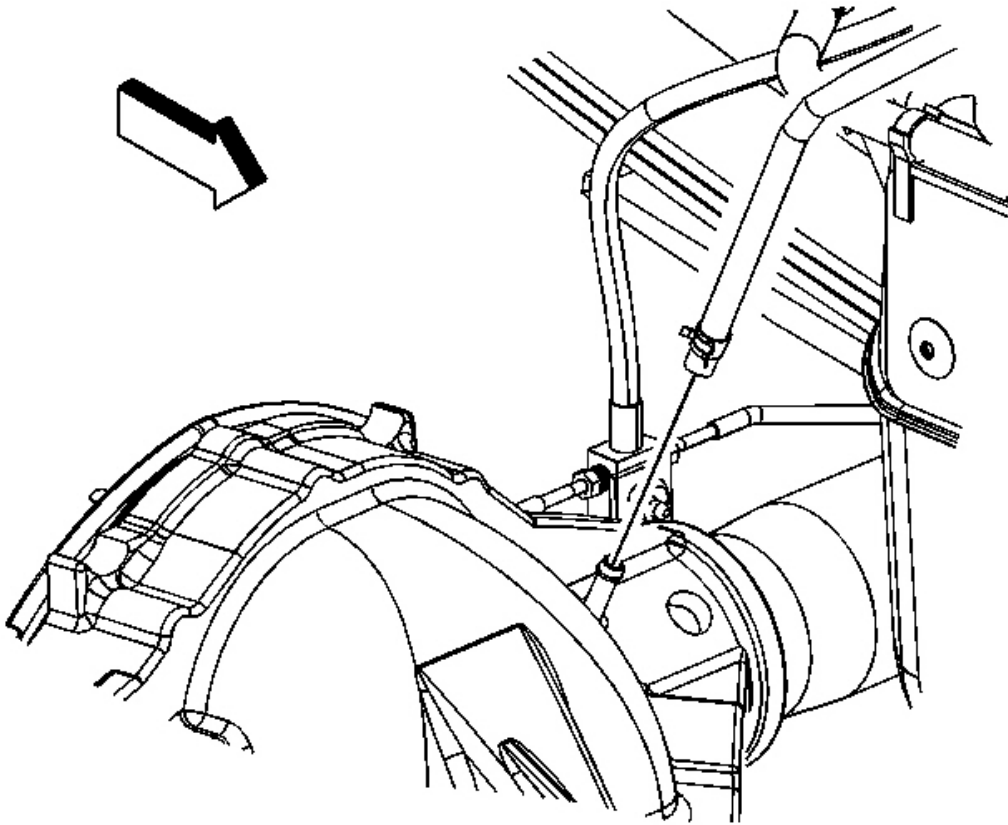


Fig. 20: View Of Vent Hose At Top Of Rear Axle
Courtesy of GENERAL MOTORS CORP.

2. Remove the vent hose from the top of the rear axle.

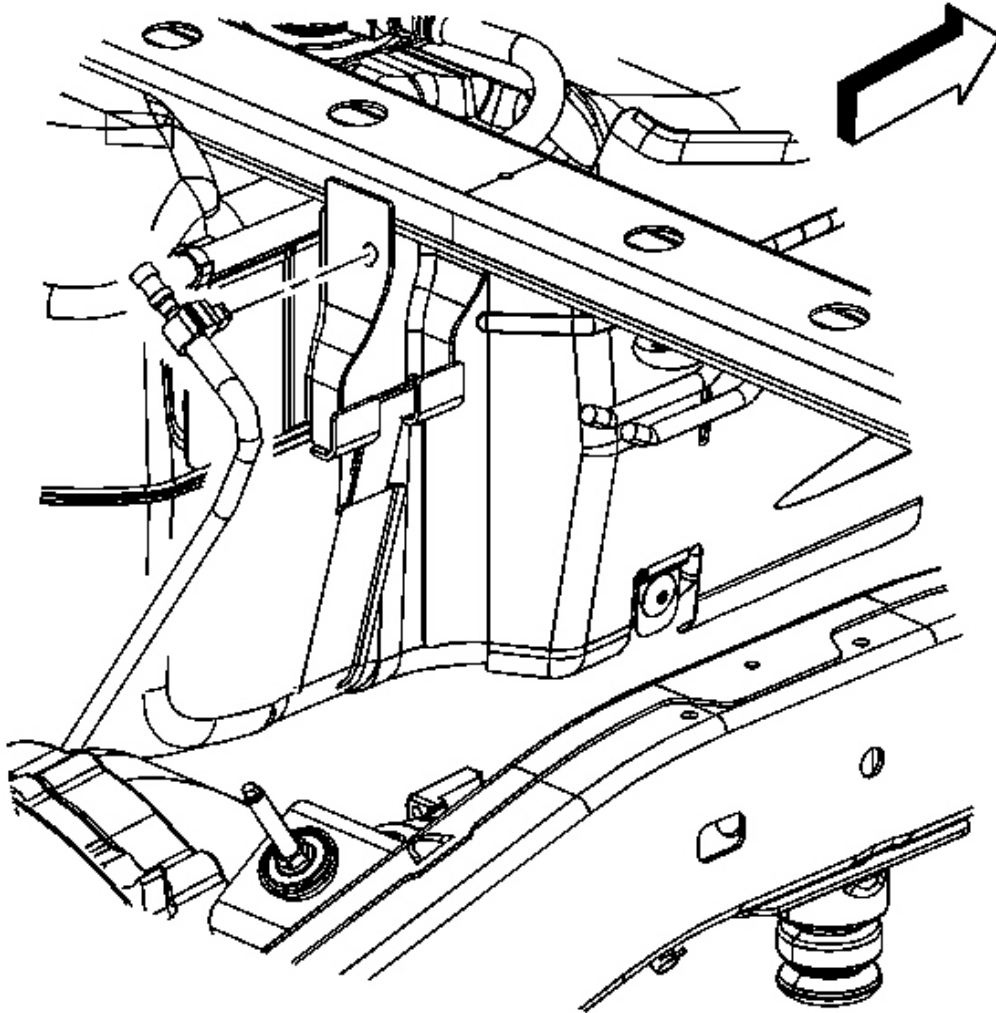


Fig. 21: View Of Vent Hose At Frame
Courtesy of GENERAL MOTORS CORP.

3. Remove the vent hose from the clip attached to the frame.

Installation Procedure

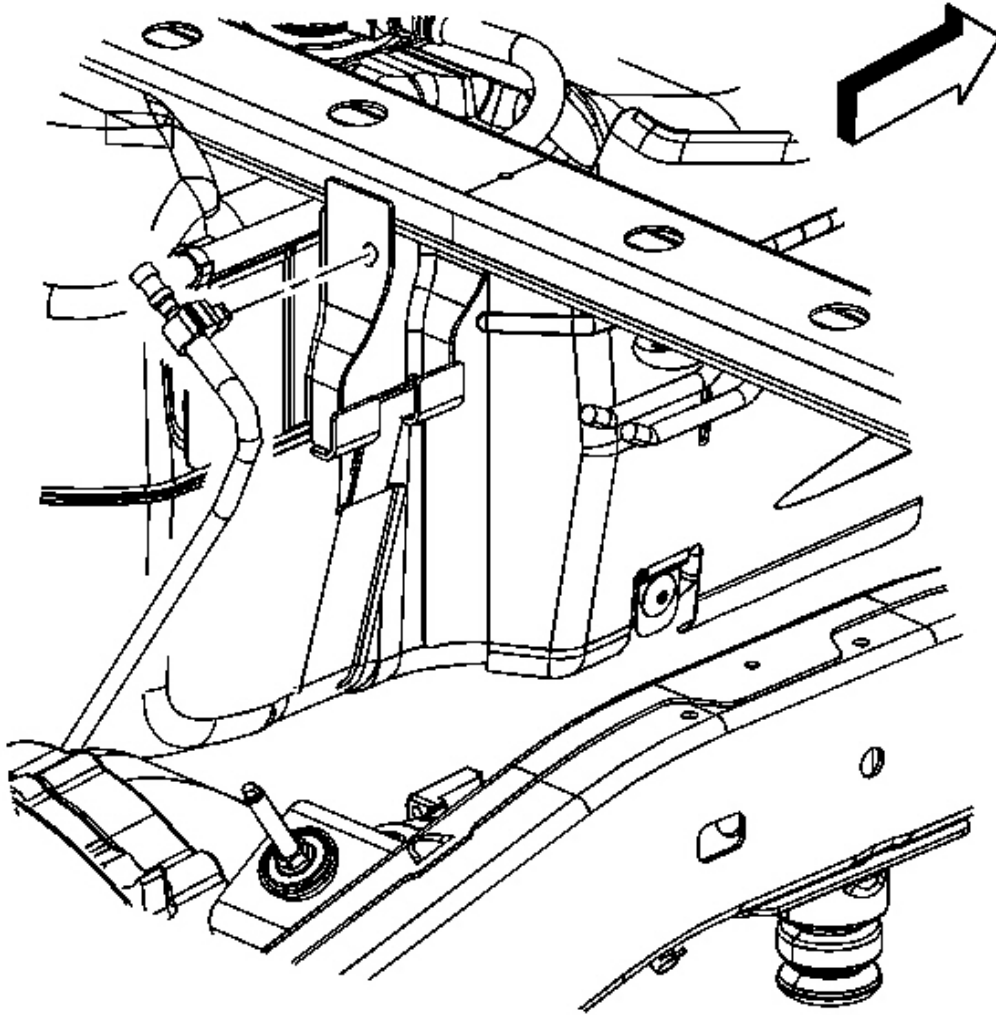


Fig. 22: View Of Vent Hose At Frame
Courtesy of GENERAL MOTORS CORP.

1. Install the vent hose to the clip attached to the frame.
 - 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.

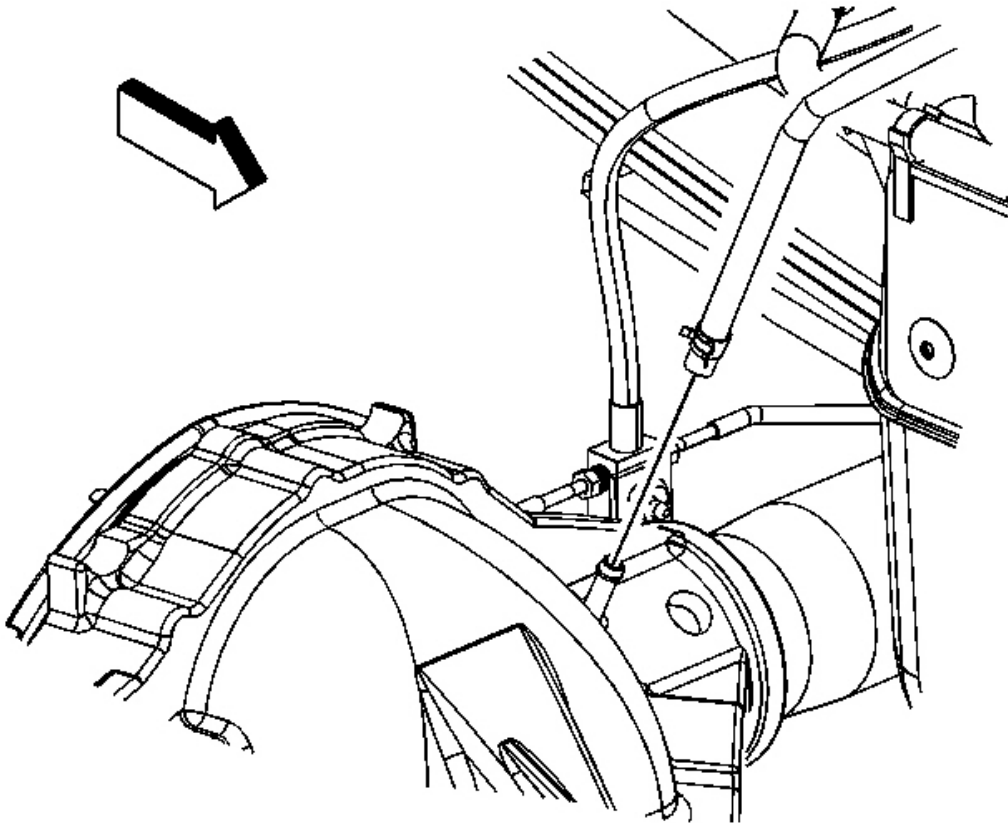


Fig. 23: View Of Vent Hose At Top Of Rear Axle
Courtesy of GENERAL MOTORS CORP.

2. Install the vent hose to the top of the rear axle.
3. Lower the vehicle.

REAR AXLE HOUSING COVER AND GASKET REPLACEMENT

Removal Procedure

NOTE: Refer to Differential Housing Cover and Gasket Removal Notice .

IMPORTANT: The gasket and rear cover are reusable. Replace them only if they are damaged.

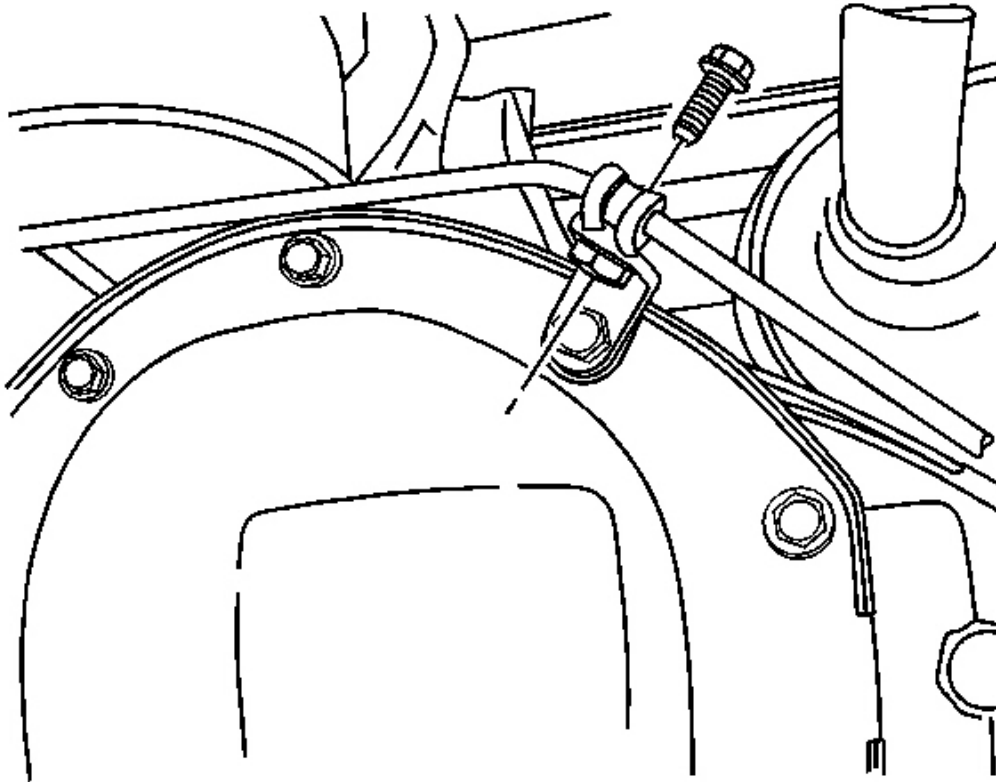


Fig. 24: View Of Right Brake Pipe Axle Housing Retainer
Courtesy of GENERAL MOTORS CORP.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the bolt for the rear brake pipe retainer.

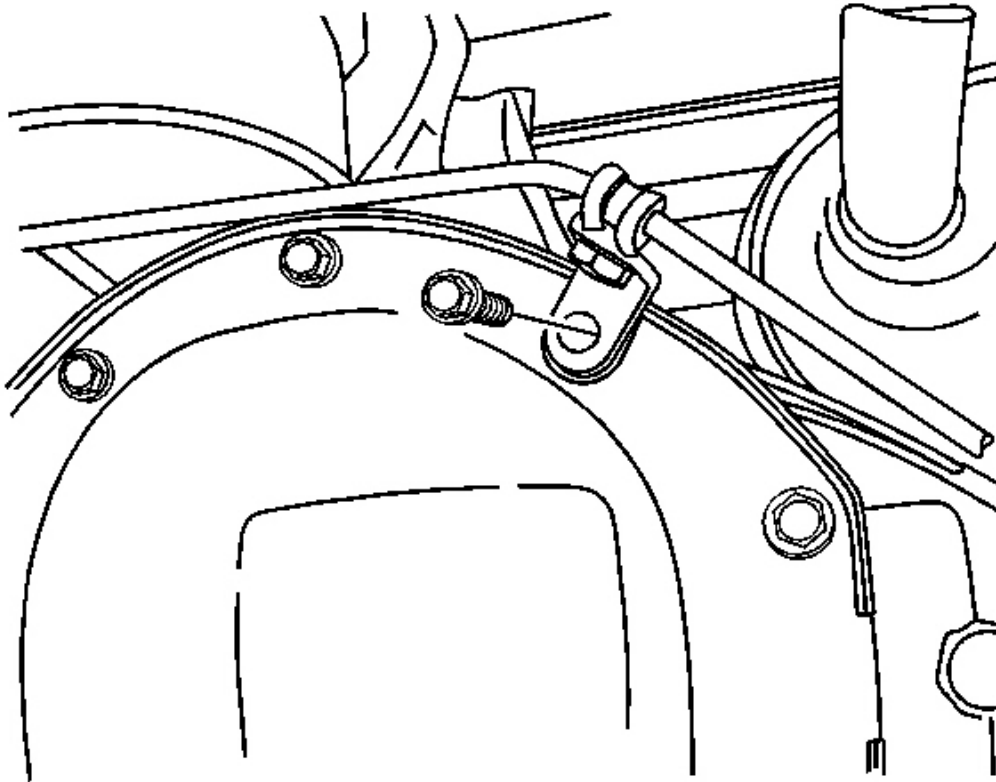


Fig. 25: View Of Mounting Bracket Bolt
Courtesy of GENERAL MOTORS CORP.

3. Remove the bolt for the mounting bracket.

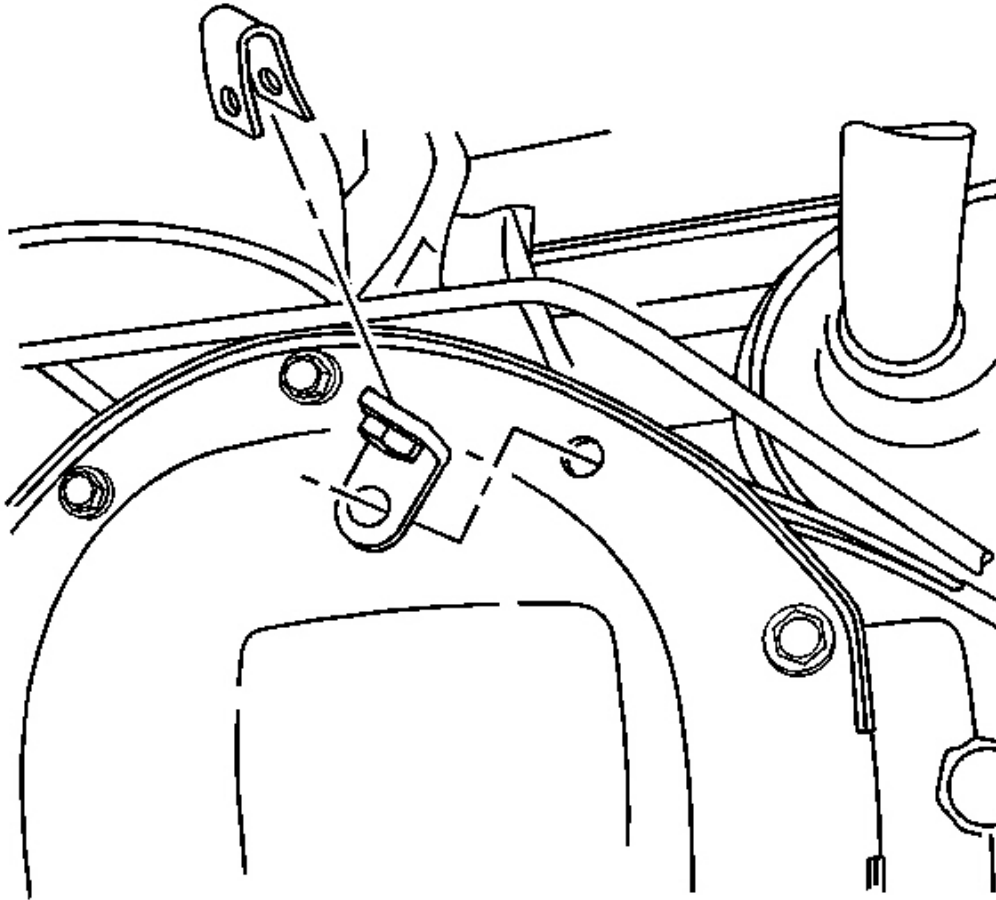


Fig. 26: View Of Rear Axle Cover Mounting Brackets
Courtesy of GENERAL MOTORS CORP.

4. Remove the mounting brackets from the rear axle cover.
5. Position a suitable drain pan under the axle.
6. Remove the rear cover mounting bolts.
7. Remove the rear cover and gasket from the differential housing.
8. Drain the rear axle.

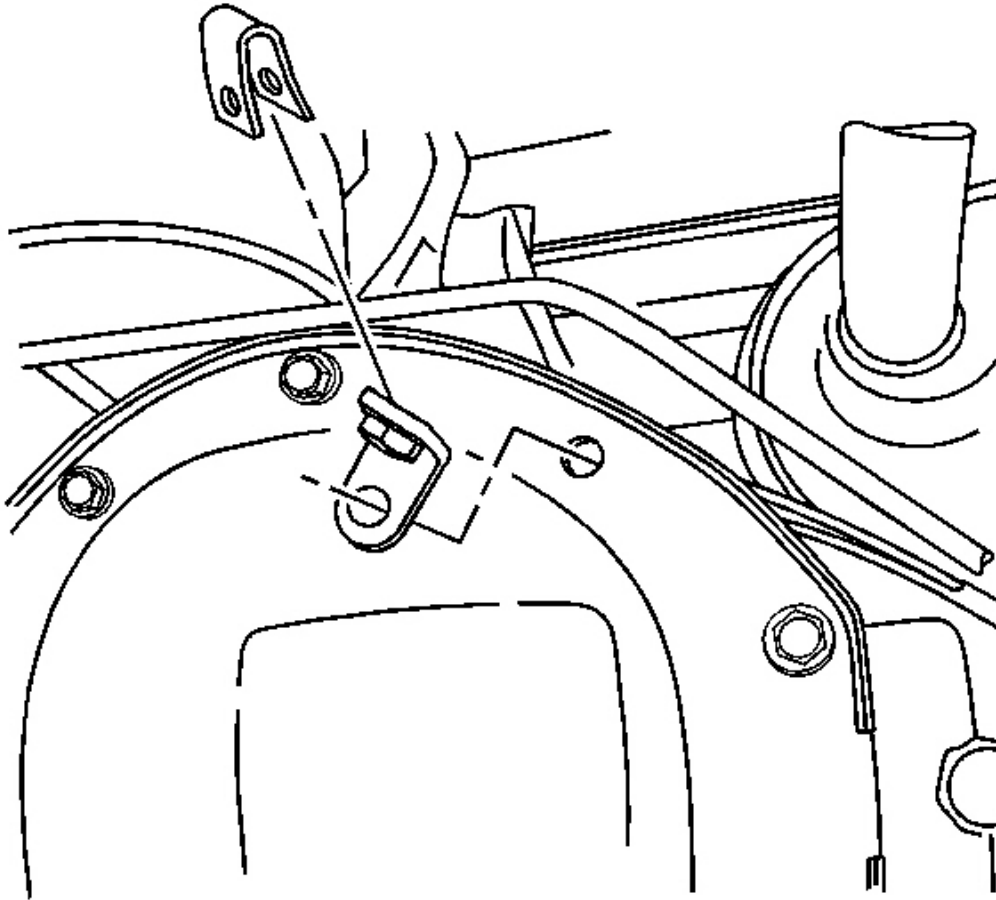


Fig. 27: View Of Rear Axle Cover Mounting Brackets
Courtesy of GENERAL MOTORS CORP.

1. Clean the contact area for the rear cover and gasket and the differential housing.
2. Install the retainer and mounting bracket for the rear brake pipe.

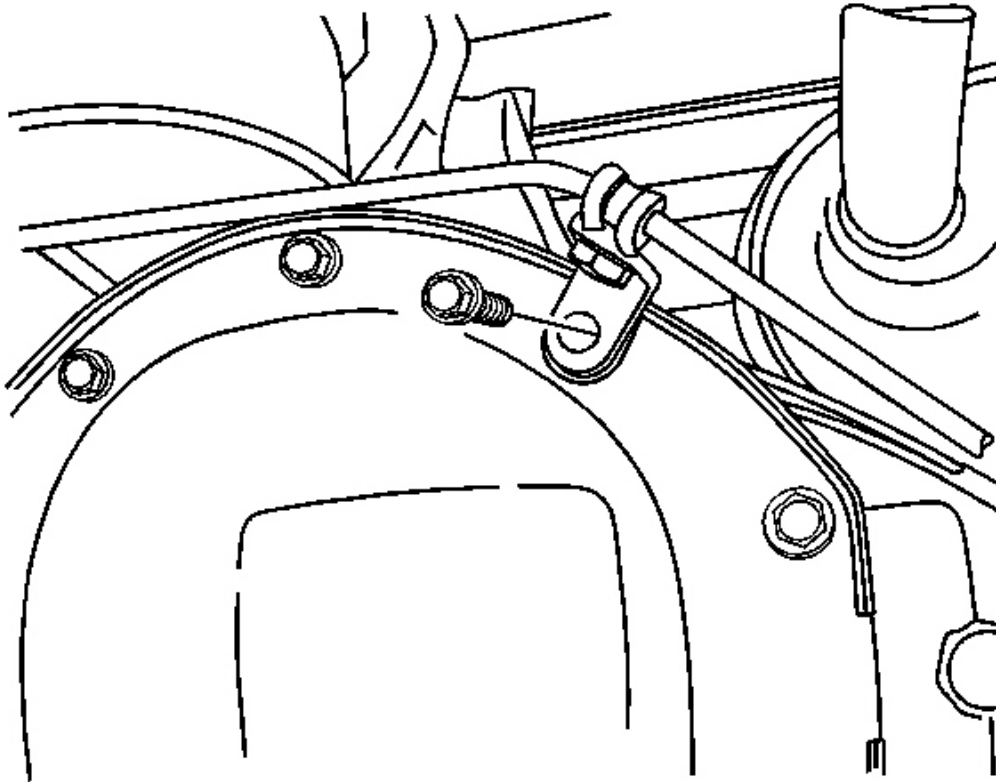


Fig. 28: View Of Mounting Bracket Bolt
Courtesy of GENERAL MOTORS CORP.

3. Install the mounting bolt for the mounting bracket.
4. Finger tighten the bolt for the mounting bracket.
5. Install the axle housing cover and gasket.

NOTE: Refer to Fastener Notice .

6. Install the mounting bolts.

Tighten: Tighten the mounting bolts to 30 N.m (20 lb ft).

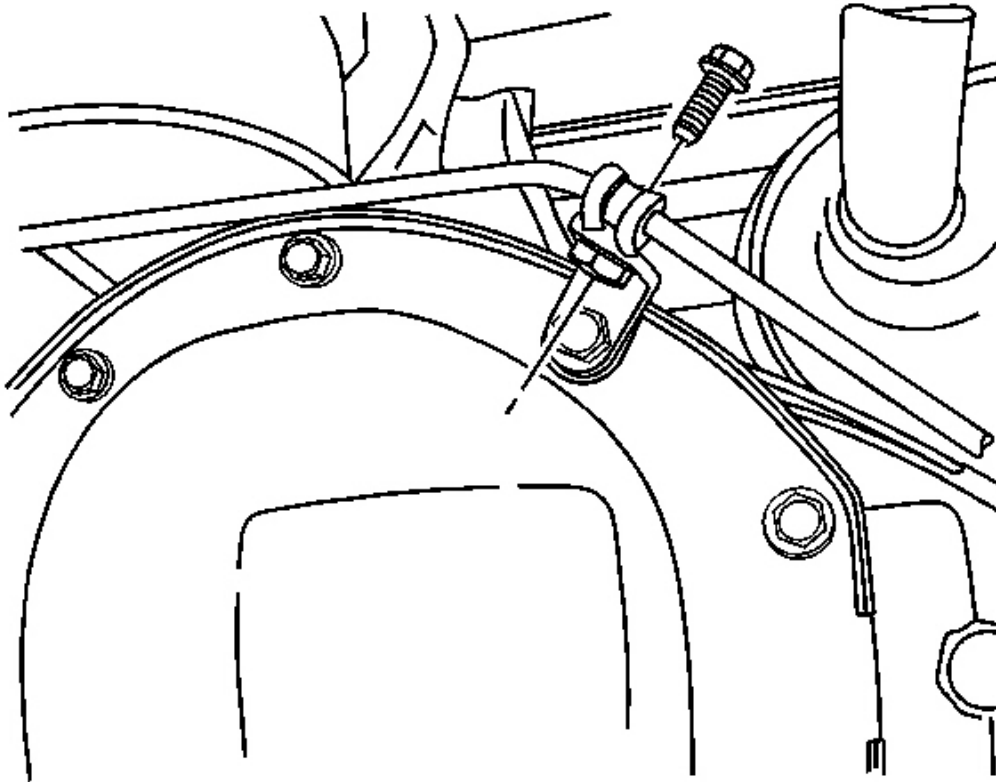


Fig. 29: View Of Right Brake Pipe Axle Housing Retainer
Courtesy of GENERAL MOTORS CORP.

7. Install the retaining bolt for the brake pipe retainer.

Tighten: Tighten the mounting bolts to 20 N.m (14 lb ft).

8. Fill the rear axle with fluid. Refer to **Rear Axle Lubricant Level Inspection.**
9. Lower the vehicle.

REAR AXLE SHAFT REPLACEMENT

Tools Required

- J 2619-01 Slide Hammer

- **J 45859** Axle Remover. See **Special Tools**.

Removal Procedure

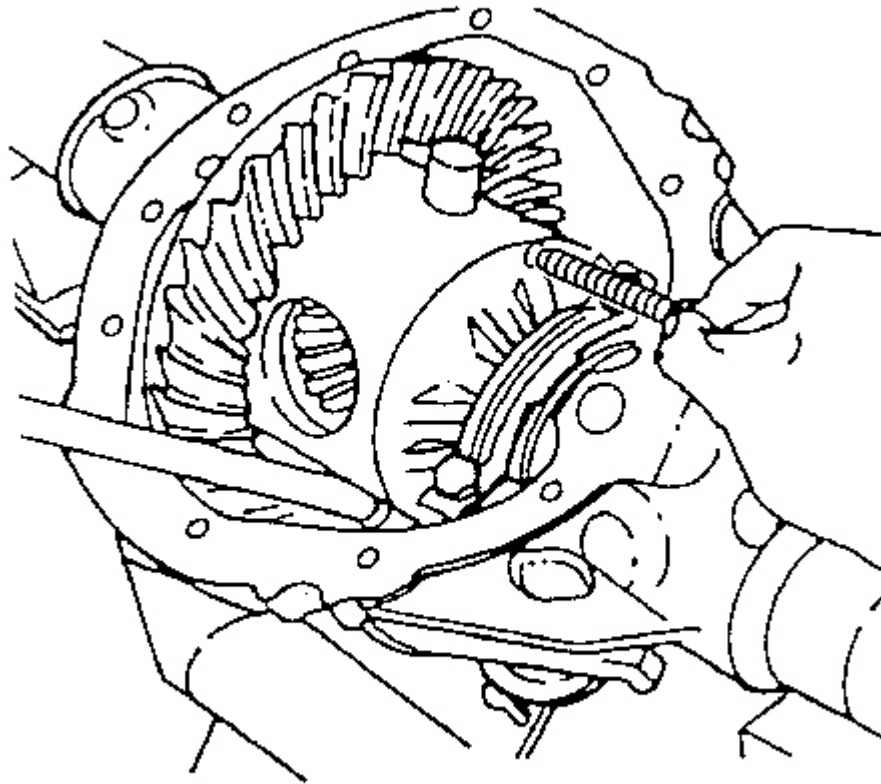


Fig. 30: View Of Pinion Shaft Locking Bolt
Courtesy of GENERAL MOTORS CORP.

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** .
3. Remove the brake caliper. Refer to **Rear Brake Caliper Replacement** .
4. Remove the rear cover and the gasket. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
5. Remove the pinion shaft locking bolt.

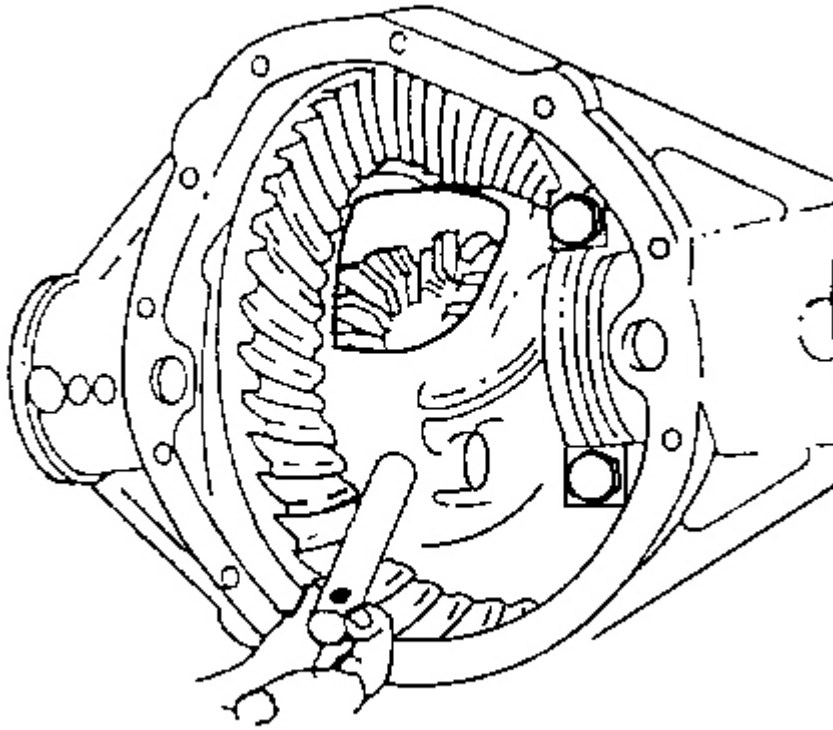


Fig. 31: View Of Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

6. On axles without a locking differential, remove the pinion shaft.

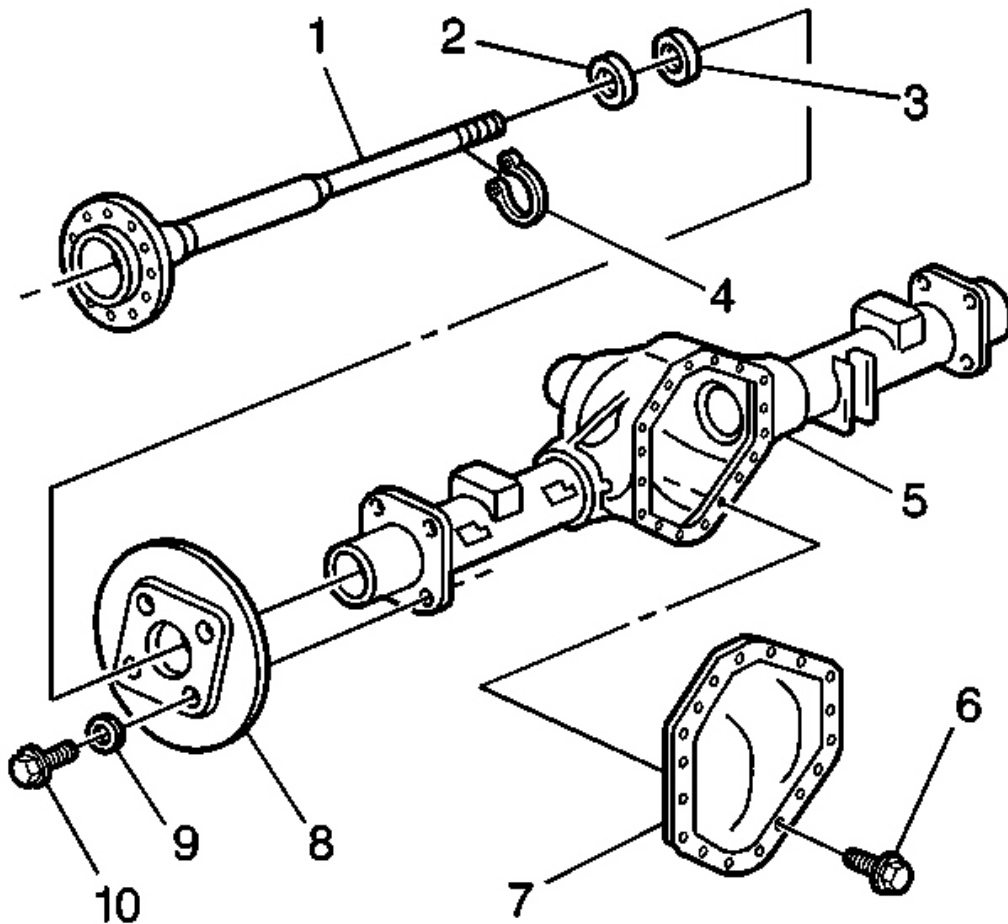


Fig. 32: Axle Shaft Housing & Components
 Courtesy of GENERAL MOTORS CORP.

7. Push the flange of the axle shaft (1) toward the differential.
8. Remove the C-lock (4) from the button end of the axle shaft (1).

IMPORTANT: When removing the axle shaft, do not rotate the shaft. Rotating the shaft will misalign the gears. Misaligning the gears will make the assembly difficult.

9. Remove the axle shaft (1) from the housing (5).

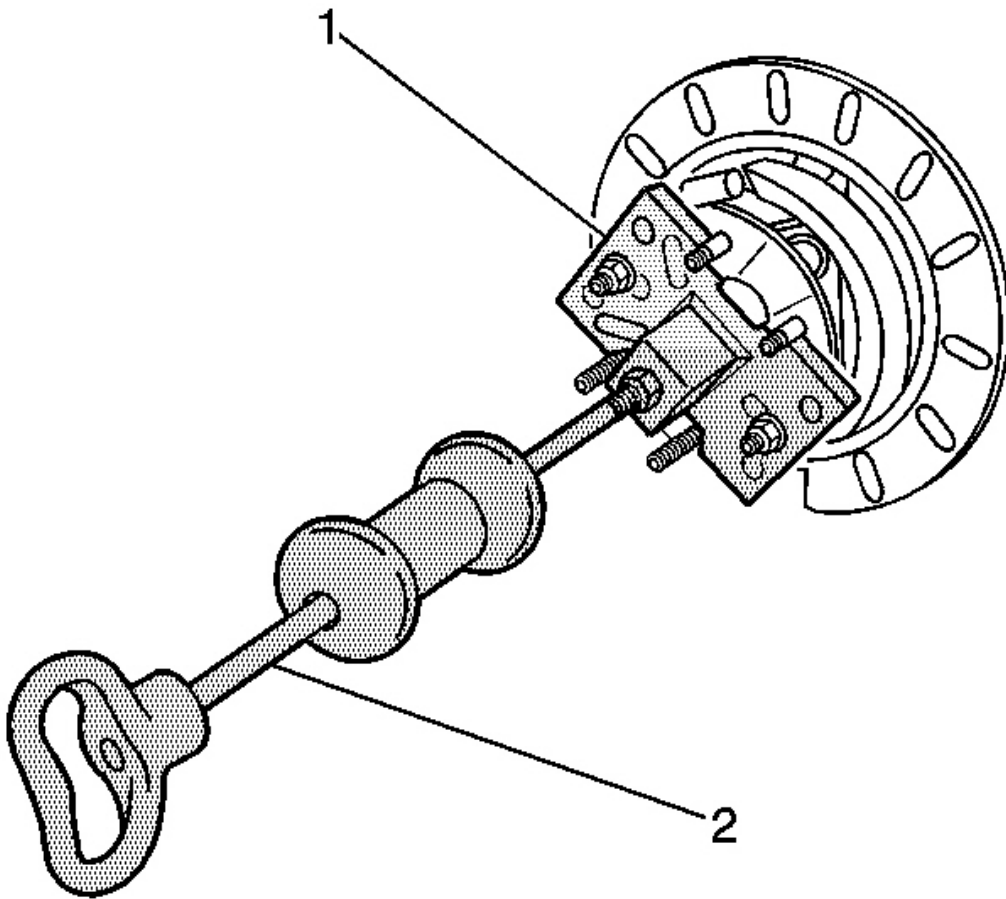


Fig. 33: Removing Axle Shaft Using J 45859 & J 2619-01
Courtesy of GENERAL MOTORS CORP.

10. If the axle is difficult to remove, use the **J 45859** (1) and the **J 2619-01** (2) to remove the axle shaft from the housing. See **Special Tools**.

Installation Procedure

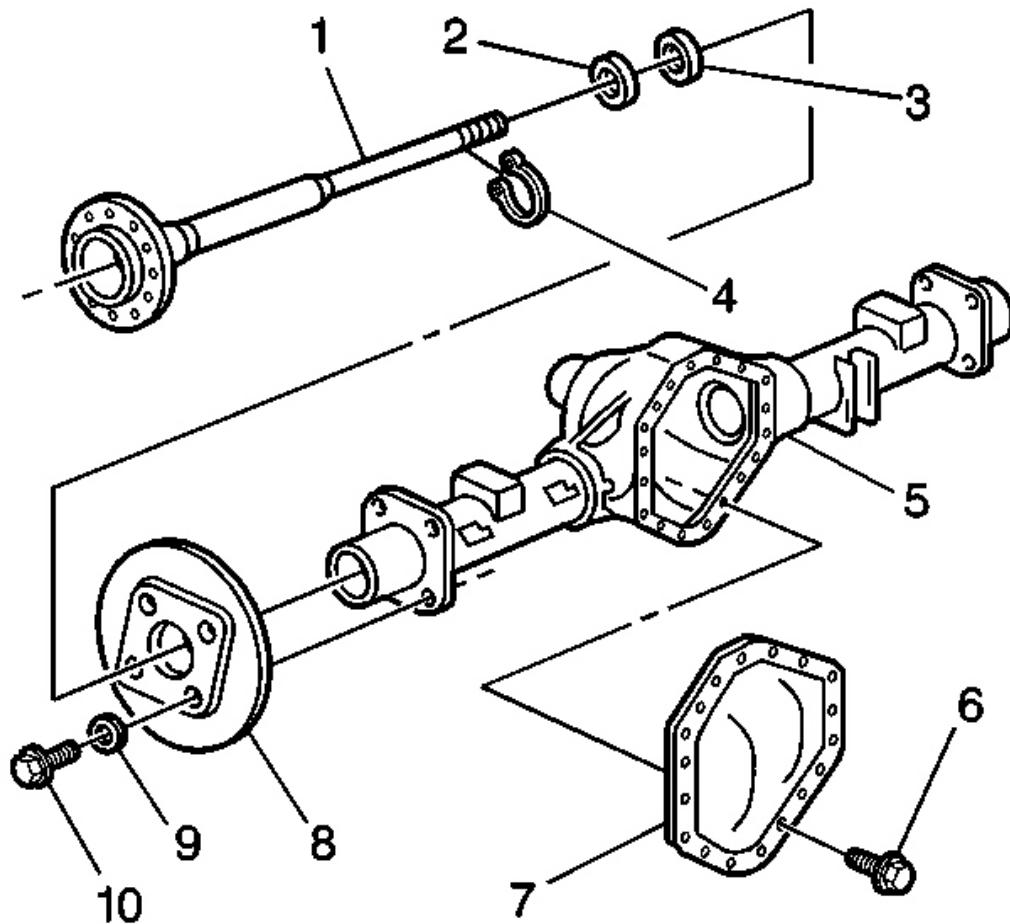


Fig. 34: Axle Shaft Housing & Components
 Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Carefully insert the axle shaft in order to not damage the seal.

1. Install the axle shaft (1) into the rear axle housing (5).
2. Slide the axle shaft (1) into place allowing the splines to engage the differential side gear.
3. Place the lock (4) on the button end of the axle shaft (1).
4. Pull the shaft flange outward in order to seat the lock in the differential gear.

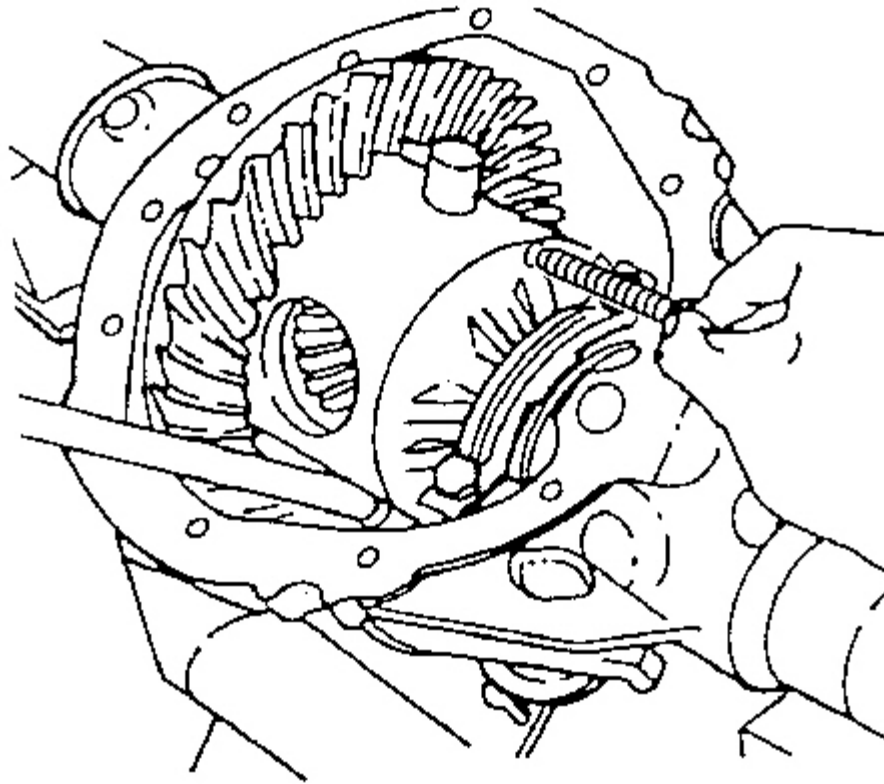


Fig. 35: View Of Pinion Shaft Locking Bolt
Courtesy of GENERAL MOTORS CORP.

5. Align the hole in the pinion shaft with the bolt hole in the differential case.

NOTE: Refer to Fastener Notice .

6. Install the new pinion shaft locking bolt.

Tighten: For the 8.6 inch axle, tighten the pinion shaft locking bolt to 25 N.m (187 lb ft).

7. Install the rear cover and the gasket. Refer to Rear Axle Housing Cover and Gasket Replacement.
8. Install the brake caliper. Refer to Rear Brake Caliper Replacement .

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9. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
10. Fill the rear axle. Use the proper fluid. Refer to **Approximate Fluid Capacities** and **Fluid and Lubricant Recommendations** .
11. Lower the vehicle.

REAR AXLE SHAFT SEAL AND/OR BEARING REPLACEMENT

Tools Required

- **J 8092** Universal Driver Handle-3/4 in - 10
- **J 21128** Axle Pinion Oil Seal Installer (8.6 inch)
- **J 23690** Axle Shaft Bearing Installer (8.6 inch)
- **J 2619-01** Slide Hammer
- **J 45857** Tone Wheel and/or Bearing Remover. See **Special Tools**.

Removal Procedure

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** .
3. Remove the rear axle housing cover. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
4. Remove the axle shaft. Refer to **Rear Axle Shaft Replacement**.

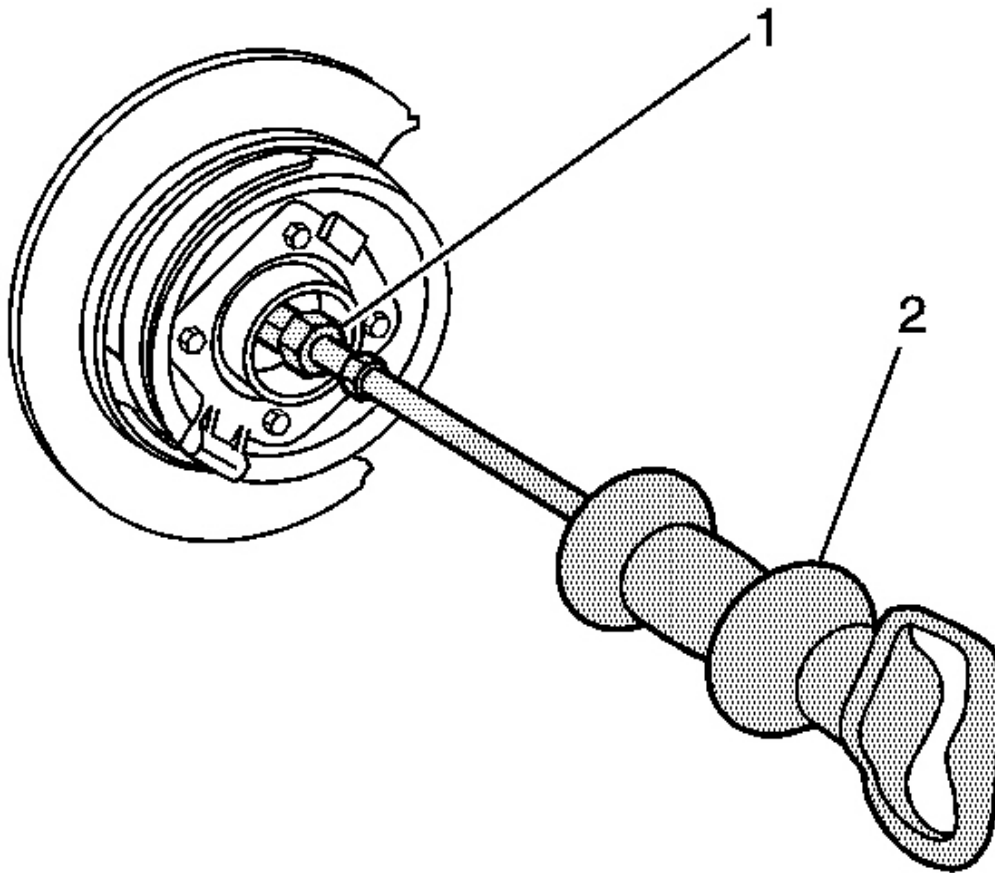


Fig. 36: Removing The Wheel Speed Sensor Ring From The Axle Housing
Courtesy of GENERAL MOTORS CORP.

5. Remove the axle shaft seal and the bearing from the axle housing using the **J 45857** (1) and the **J 2619-01** (2). See **Special Tools**.
6. To remove the seal only, use a suitable seal remover.

Installation Procedure

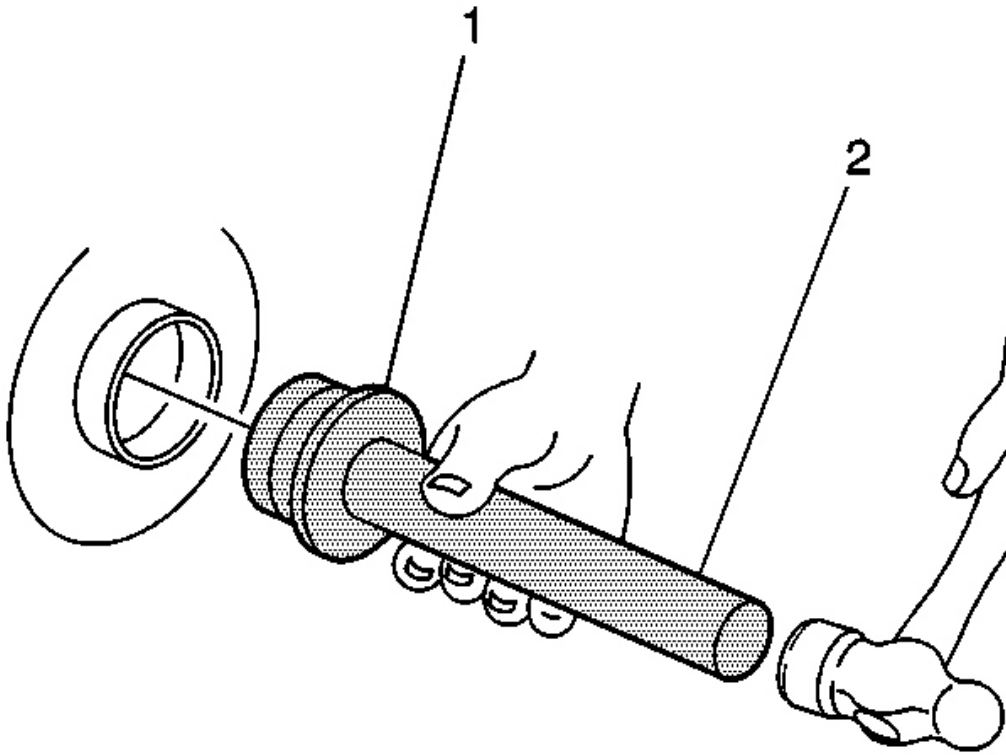


Fig. 37: Installing Axle Shaft Bearing Using J 23690 & J 8092
Courtesy of GENERAL MOTORS CORP.

1. Install the axle shaft bearing using the **J 23690** (1) and the **J 8092** (2).
2. Drive the axle shaft bearing into the axle housing until the tool bottoms against the tube.

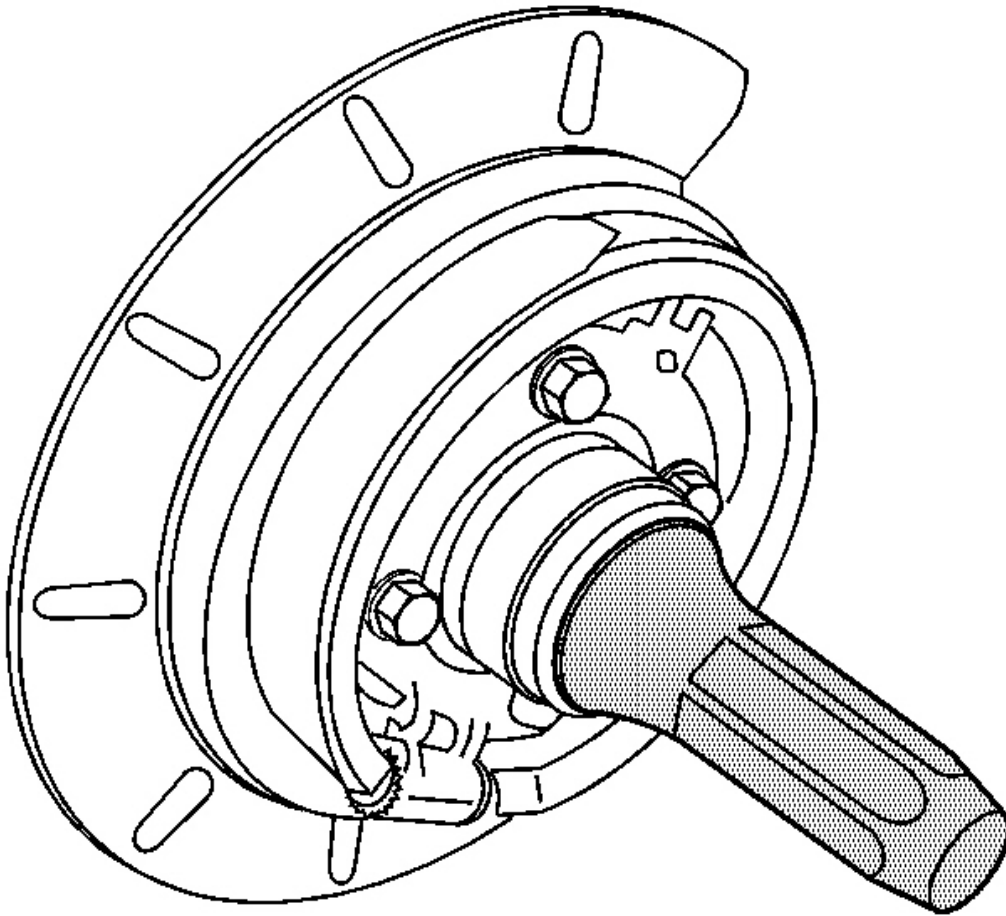


Fig. 38: Installing Axle Shaft Seal Using J 21128
Courtesy of GENERAL MOTORS CORP.

3. Install the axle shaft seal using the **J 21128** .
4. Drive the tool into the bore until the axle shaft seal bottoms flush with the tube.
5. Install the axle shaft. Refer to **Rear Axle Shaft Replacement**.
6. Install the rear axle housing cover. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
7. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
8. Fill the rear axle. Refer to **Rear Axle Lubricant Replacement**.
9. Lower the vehicle.

DRIVE PINION FLANGE/YOKE AND/OR OIL SEAL REPLACEMENT

Tools Required

- **J 8614-01** Flange and Pulley Holding Tool
- **J 33782** Pinion Oil Seal Installer. See Special Tools.
- **J 38694** Extension Housing Oil Pump/Seal Installer. See Special Tools.

Removal Procedure

IMPORTANT: 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 the vehicle. Refer to Lifting and Jacking the Vehicle .
2. Drain the drive axle. Refer to Rear Axle Lubricant Replacement.
3. Remove the rear brake rotors. Refer to Rear Brake Rotor Replacement .

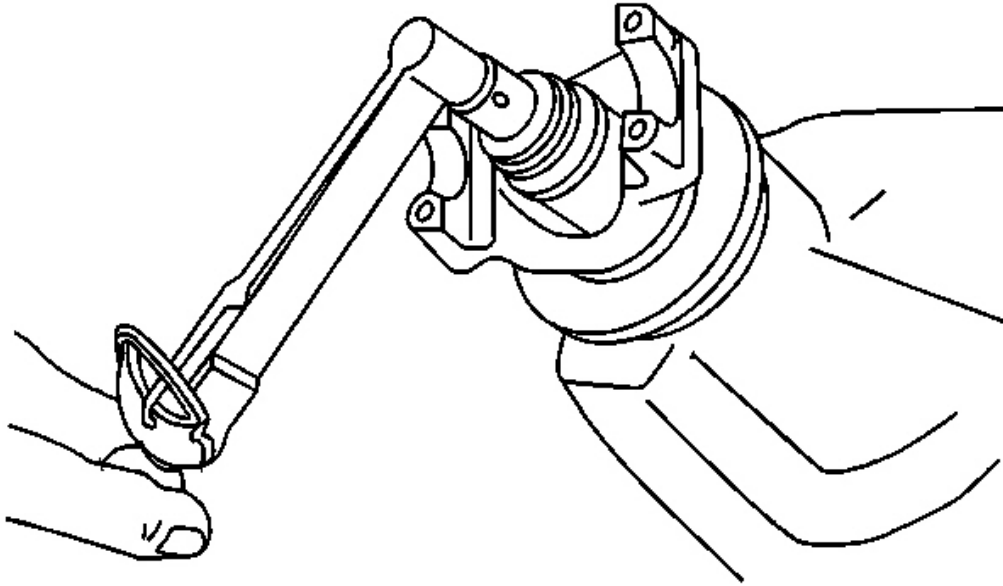


Fig. 39: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

4. Measure the amount of torque required to rotate the pinion. Use an inch-pound torque wrench. Record this measurement for reassembly. This will give the combined preload for the following components:
 - The pinion bearings
 - The differential case bearings
 - The axle bearings
 - The axle seals

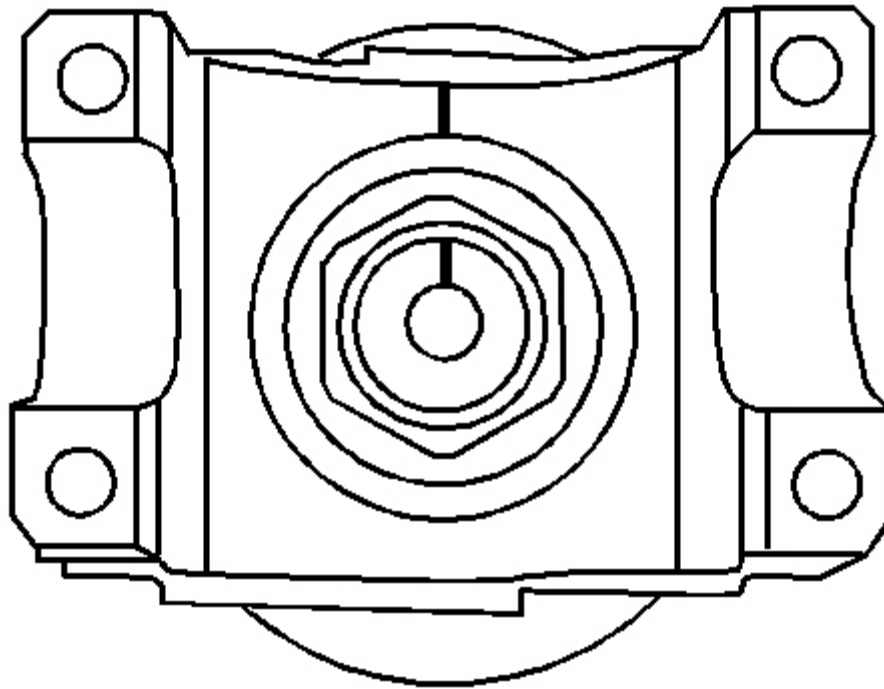


Fig. 40: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS CORP.

5. Place an alignment mark between the pinion and the pinion yoke.

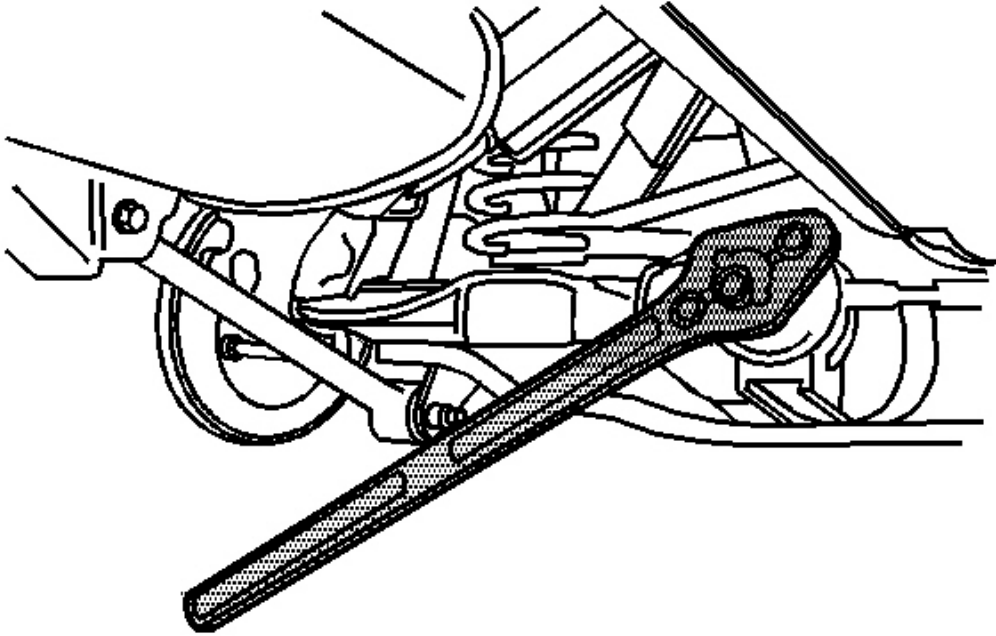


Fig. 41: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

6. Install the **J 8614-01** as shown.
7. Remove the pinion nut while holding the **J 8614-01** .
8. Remove the washer.

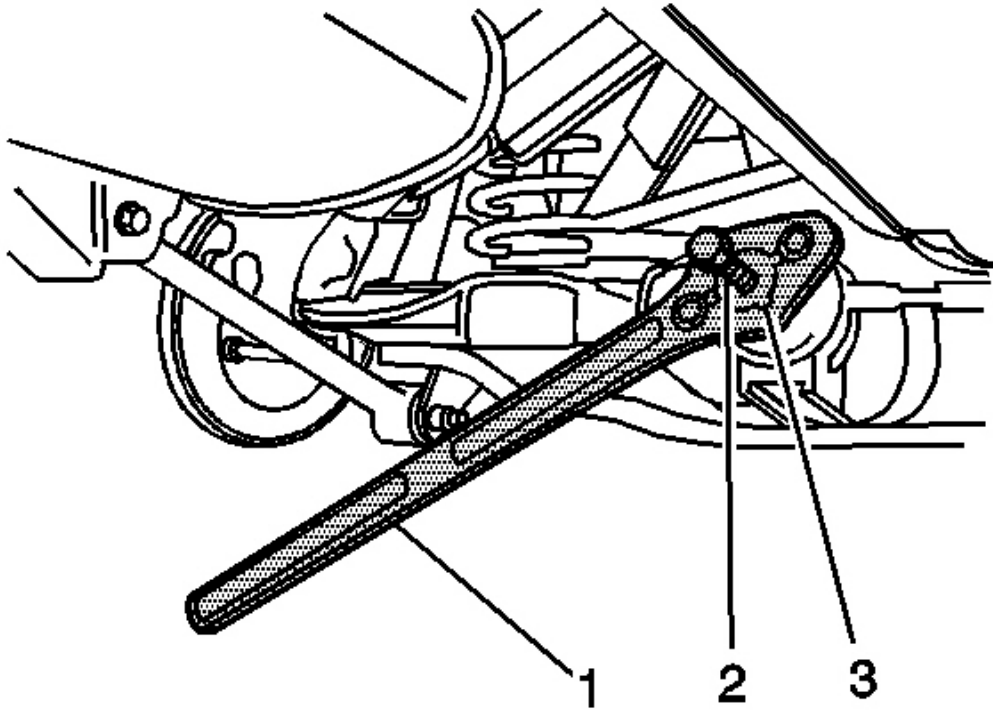


Fig. 42: Installing J 8614-3 And J 8614-2 Into J 8614-01
Courtesy of GENERAL MOTORS CORP.

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

Use a container in order to retrieve the lubricant.

11. Remove the pinion oil seal. Use a suitable seal removal tool. Do not damage the housing.

Installation Procedure

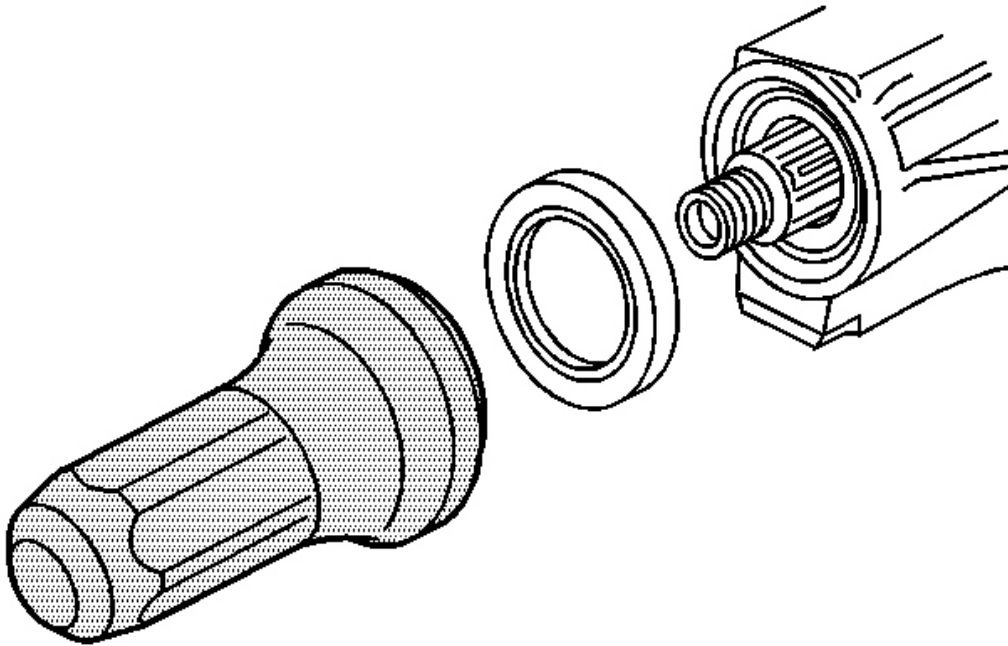


Fig. 43: Installing Pinion Oil Seal
Courtesy of GENERAL MOTORS CORP.

1. Using the **J 33782** , install the pinion seal. See **Special Tools**.
2. Apply sealant GM P/N 12346004 (Canadian P/N 10953480) or equivalent to the splines of the pinion yoke.

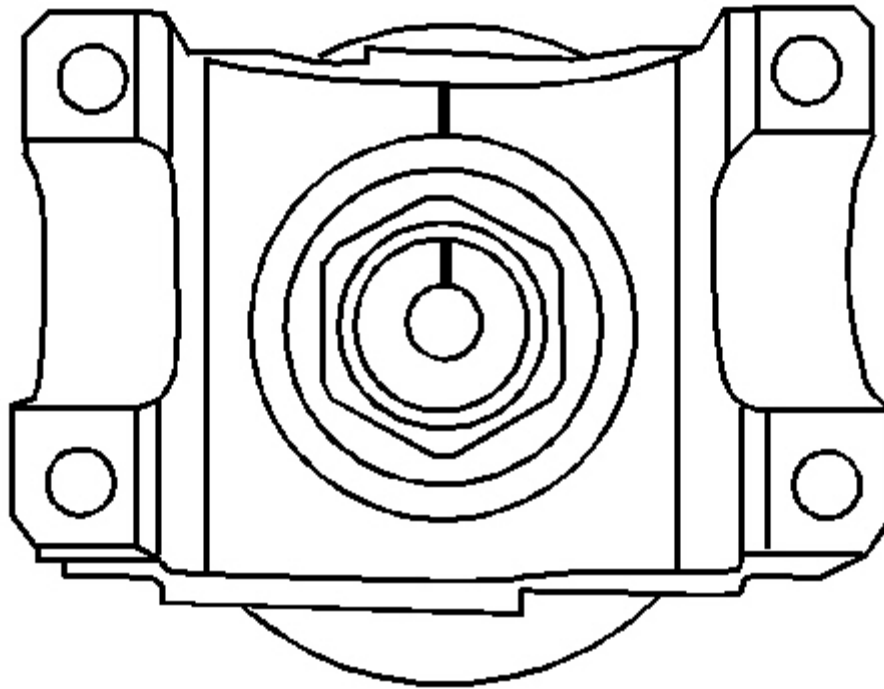


Fig. 44: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS CORP.

3. Align the reference marks.
4. Install the pinion yoke.

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

5. Using a soft-faced hammer, tap the pinion yoke until the threads on the pinion shaft can be seen.
6. Install the washer and a new pinion nut.

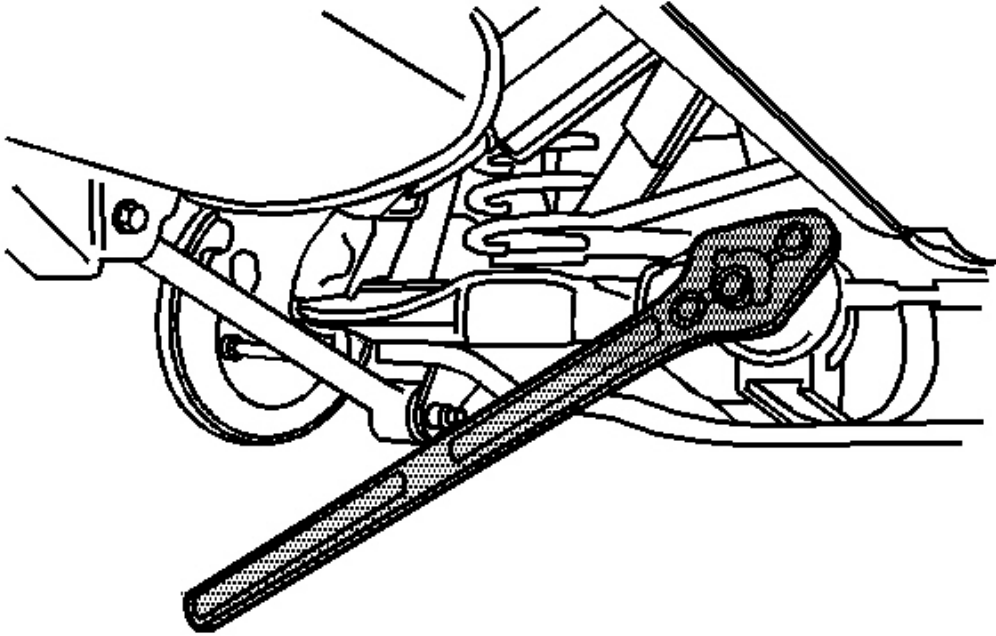


Fig. 45: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

7. Install the **J 8614-01** onto the pinion yoke as shown.

NOTE: Refer to Fastener Notice .

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

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

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

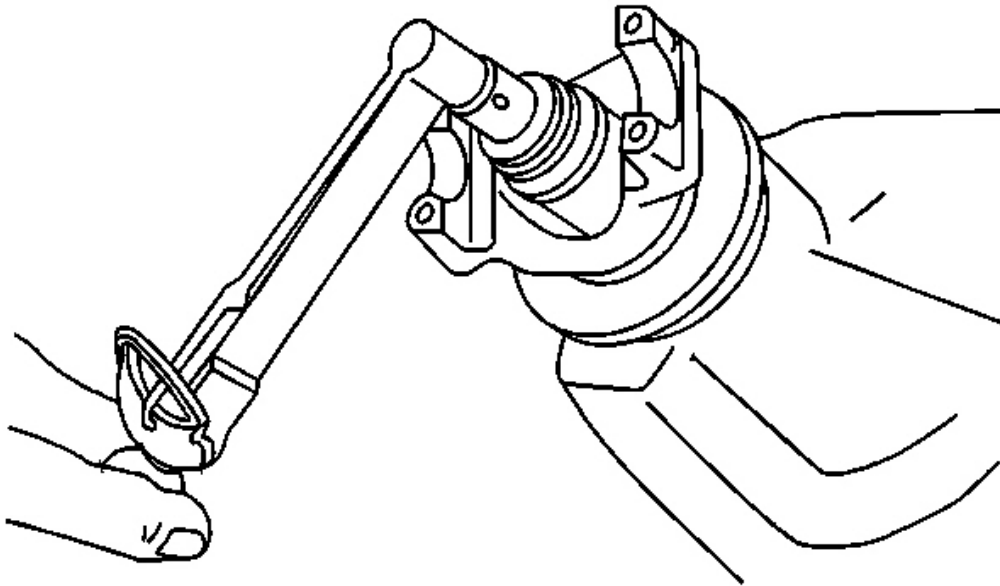


Fig. 46: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

9. Measure the rotating torque of the pinion. Compare this measurement with the rotating torque recorded during removal.

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

10. 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.

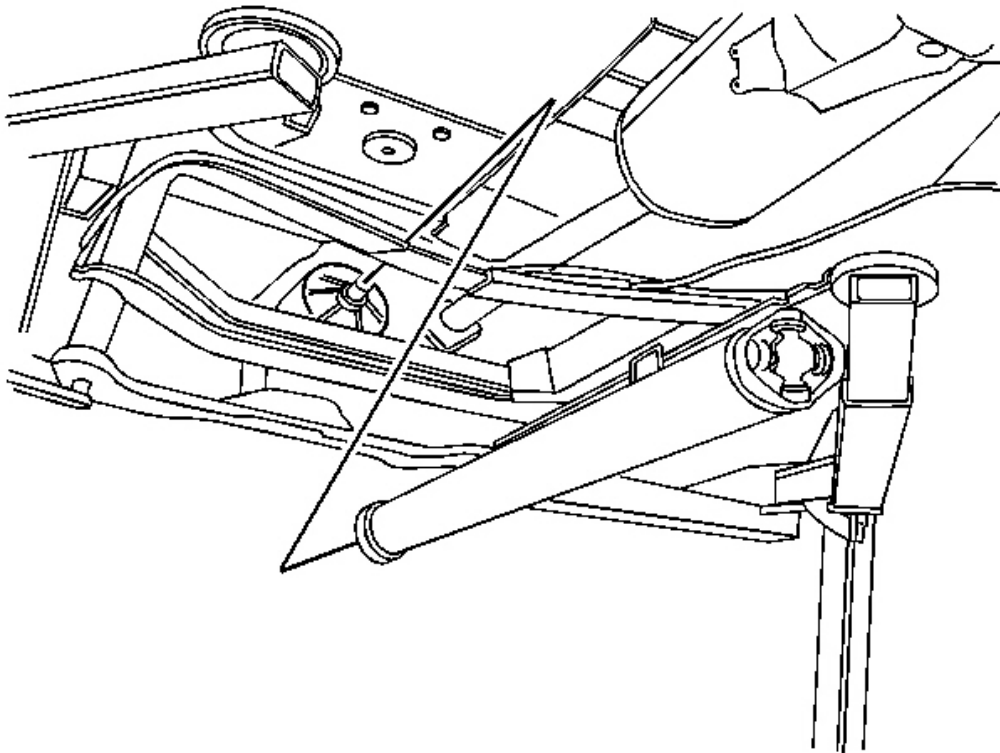


Fig. 47: View Of Propeller Shaft
Courtesy of GENERAL MOTORS CORP.

11. Install the propeller shaft. Refer to **Rear Propeller Shaft Replacement** .

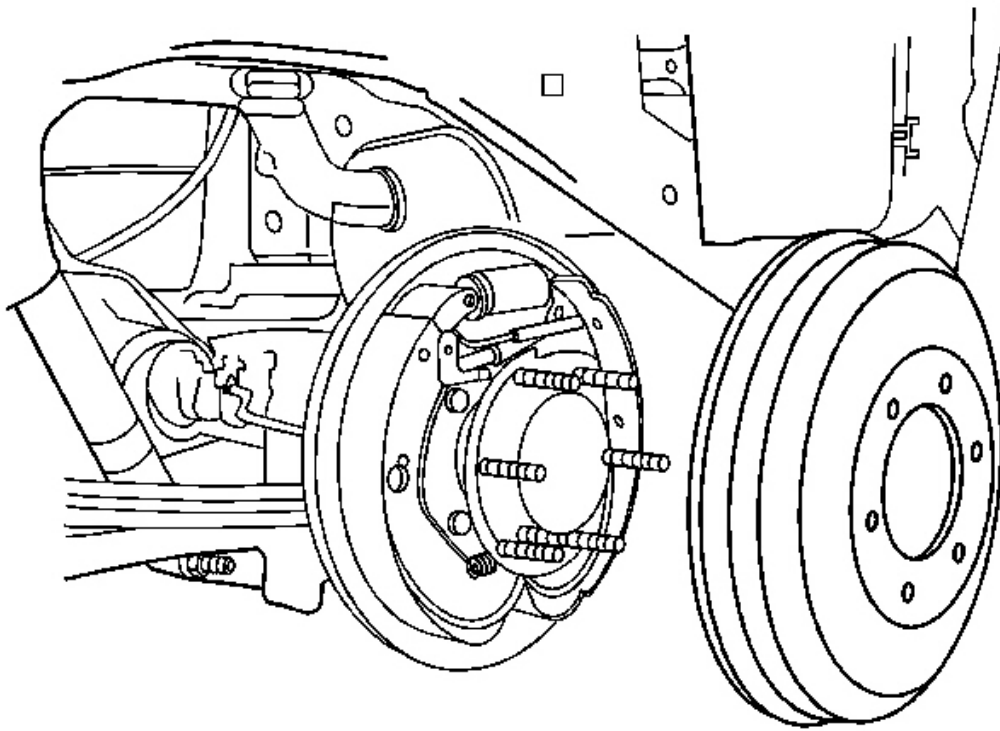


Fig. 48: View Of Rear Brake Drum
Courtesy of GENERAL MOTORS CORP.

12. Install the brake rotors. Refer to **Rear Brake Rotor Replacement** .
13. Inspect and add axle lubricant to the axle housing, if necessary. Refer to **Rear Axle Lubricant Replacement**.
14. Fill the drive axle. Refer to **Rear Axle Lubricant Replacement**.
15. Lower the vehicle.

DRIVE PINION AND RING GEAR REPLACEMENT

Tools Required

J 22536 Pinion Driver, 8.6 inch

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the differential assembly. Refer to **Differential Replacement**.
3. Remove the pinion yoke and the oil seal. Refer to **Drive Pinion Flange/Yoke and/or Oil Seal Replacement**.

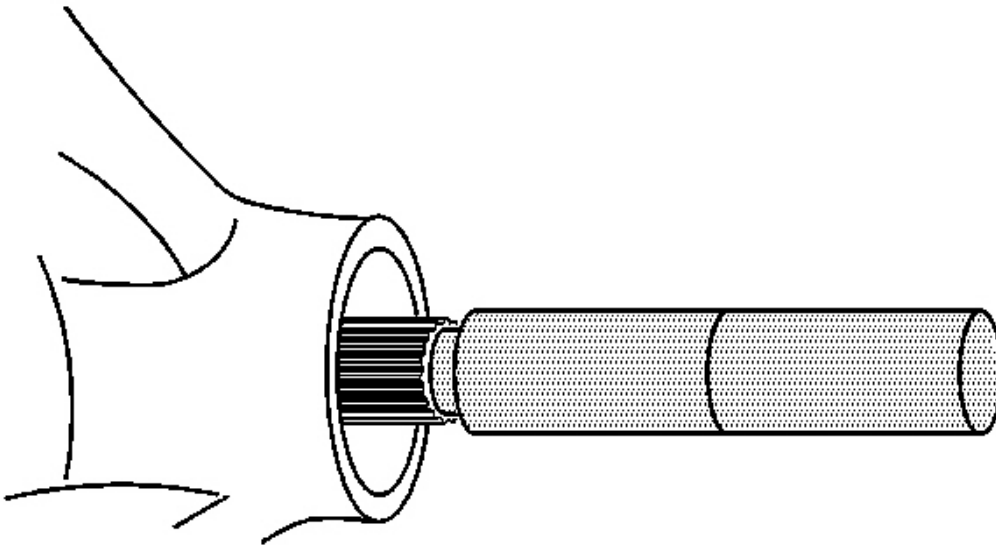


Fig. 49: Installing J 22536 Or J 44421 On Pinion
Courtesy of GENERAL MOTORS CORP.

4. Install the **J 22536** as shown.

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

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

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

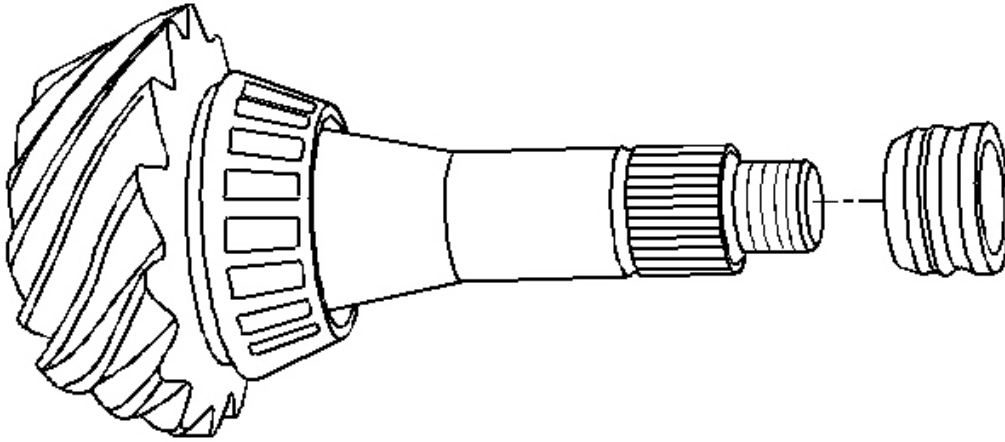


Fig. 50: View Of Collapsible Spacer & Pinion
Courtesy of GENERAL MOTORS CORP.

6. Remove the collapsible spacer from the pinion. Discard the spacer.
7. Remove the pinion bearings and the cups. Refer to **Drive Pinion Bearings Replacement**.

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

8. Remove the gear bolts. Discard the bolts.

NOTE: Refer to Ring Gear Removal Notice .

9. Remove the ring gear from the differential. Drive the gear off with a brass drift if necessary.

Installation Procedure

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

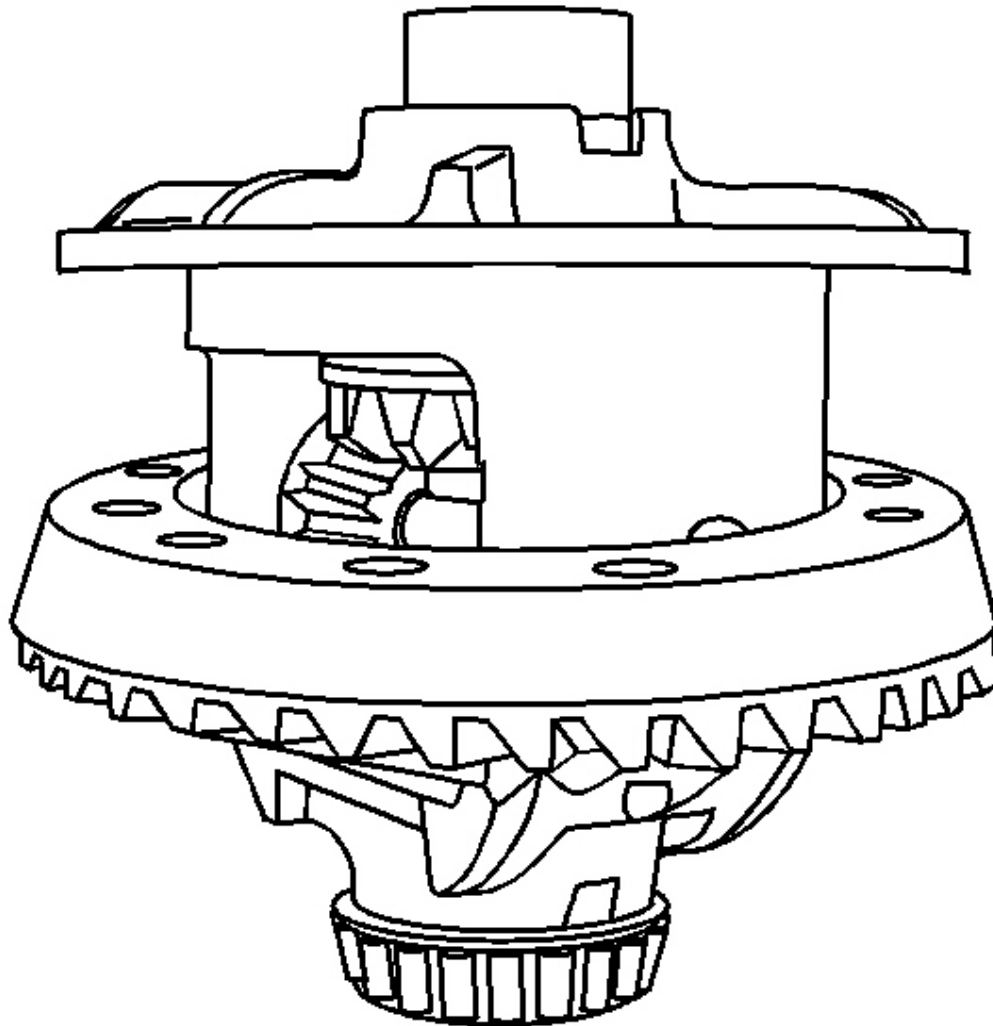


Fig. 51: Installing Ring Gear Onto Differential Case
Courtesy of GENERAL MOTORS CORP.

1. Install the ring gear to the differential case.

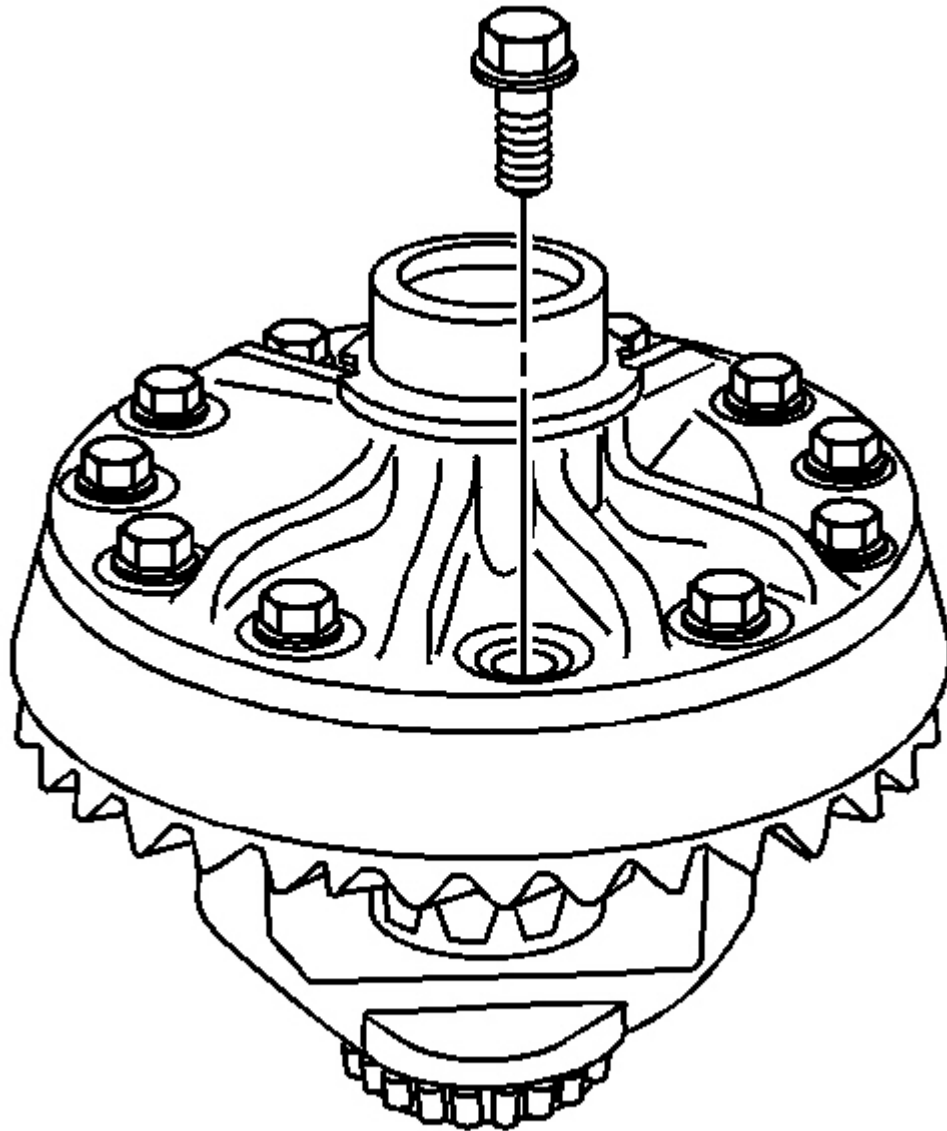


Fig. 52: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

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

2. Install the new ring gear bolts.

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

NOTE: Refer to Fastener Notice .

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

Tighten: For the 8.6 inch axle, tighten the ring gear bolts in sequence to 120 N.m (89 lb ft).

4. Install the pinion bearing cups. Refer to Drive Pinion Bearings Replacement.
5. Determine the selective shim thickness for the pinion gear. Refer to Pinion Depth Adjustment .
6. Install the selective shim onto the pinion.
7. Install the inner pinion bearing to the pinion. Refer to Drive Pinion Bearings Replacement.
8. Install a new collapsible spacer.
9. Lubricate the pinion bearings with axle lubricant. Refer to Fluid and Lubricant Recommendations .
10. Install the outer pinion bearing into the axle housing.
11. Install the new pinion oil seal. Refer to Drive Pinion Flange/Yoke and/or Oil Seal Replacement.
12. Install the pinion into the axle housing.
13. Install the pinion yoke. Refer to Drive Pinion Flange/Yoke and/or Oil Seal Replacement.
14. Install the differential assembly. Refer to Differential Replacement.
15. Fill the axle with lubricant. Use the proper fluid. Refer to Rear Axle Lubricant Replacement.
16. Lower the vehicle.

DRIVE PINION BEARINGS REPLACEMENT

Tools Required

- **J 8092** Driver Handle 3/4 in.
- **J 8608** Rear Pinion Bearing Race Installer. See Special Tools.6 inch, 11.5 inch axle
- **J 8611-01** Rear Pinion Bearing Race Installer. See Special Tools.
- **J 8614-01** Flange and Pulley Holding Tool

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- **J 22388** Rear Axle Pinion Oil Seal Installer, 8.6 inch
- **J 22912-B** Split Plate Bearing Puller
- **J 24433** Pinion Cone and Side Bearing Installer. See **Special Tools**.6 inch axle
- **J 45871** Pinion Bearing Remover
- **J 45900** Pinion Bearing Cup Installer, 8.6 in axle

Removal Procedure

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

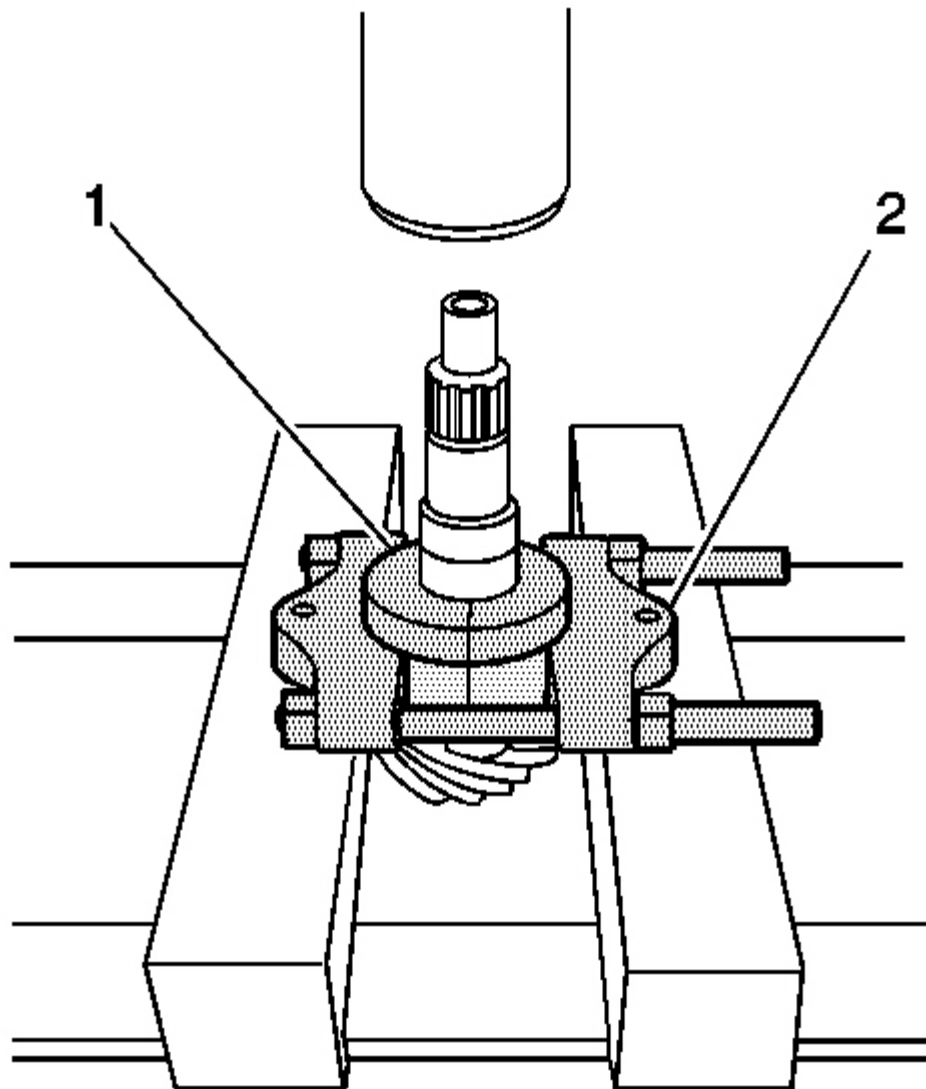


Fig. 53: Identifying J 45871 & J 22912-01
Courtesy of GENERAL MOTORS CORP.

4. For the 8.6 inch axle, install the **J 45871** (1) around the pinion bearing and the **J 22912-B** (2) in the inverted position around the **J 45871** .
5. Press the bearing off of the pinion using the **J 45871** and the **J 22912-B** .

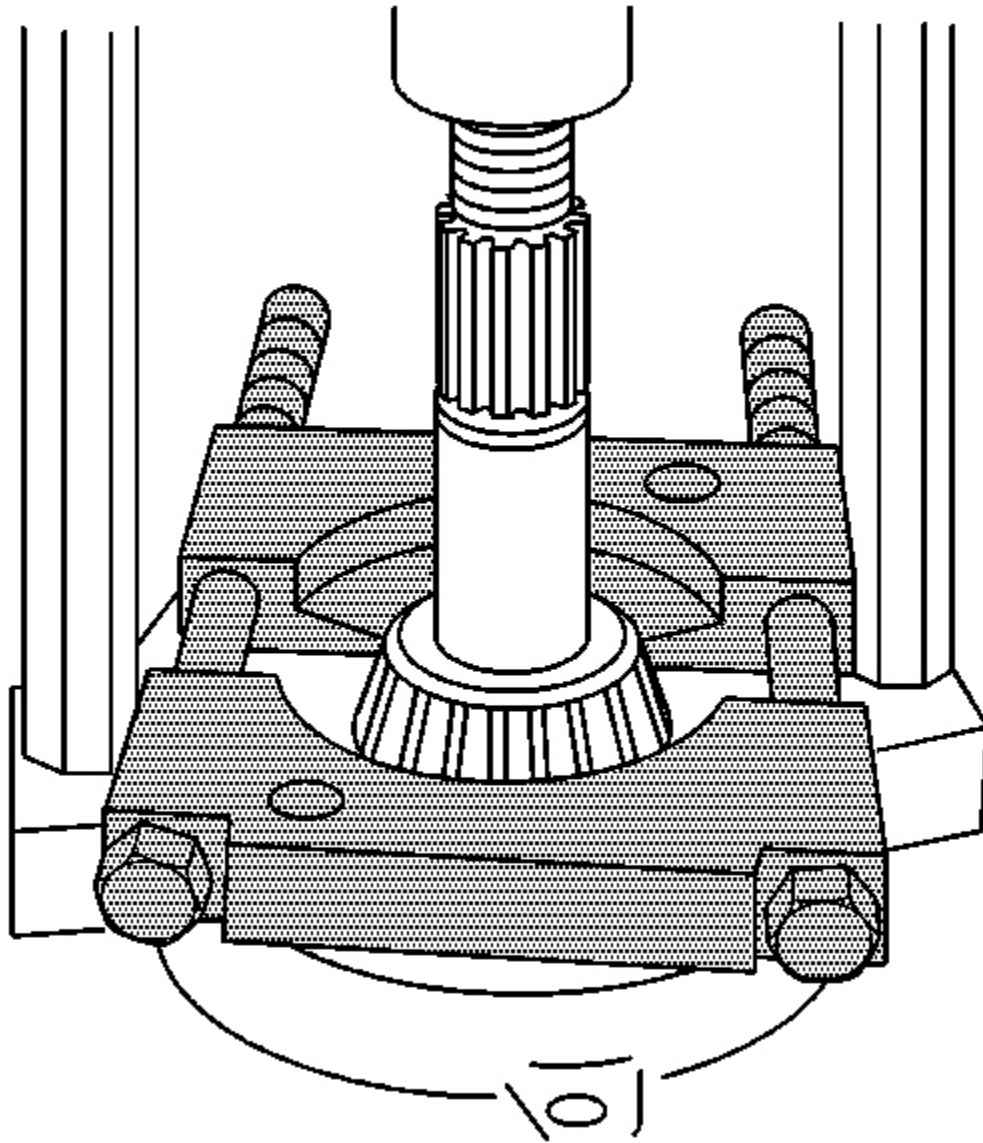


Fig. 54: Removing Inner Pinion Bearing Using Hydraulic Press
Courtesy of GENERAL MOTORS CORP.

6. Remove the shim.

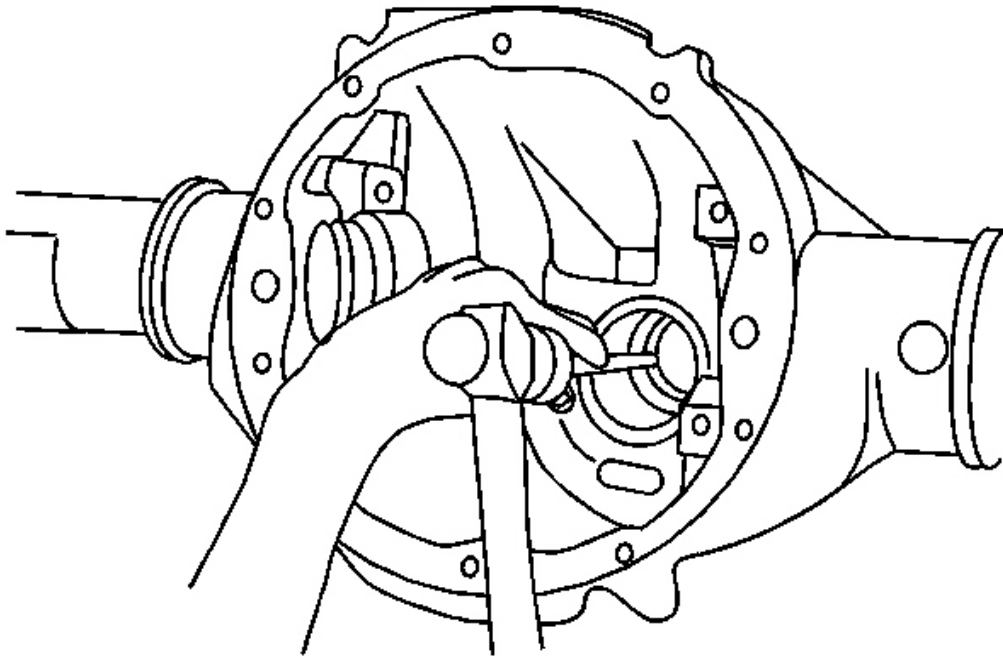


Fig. 55: Removing Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

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

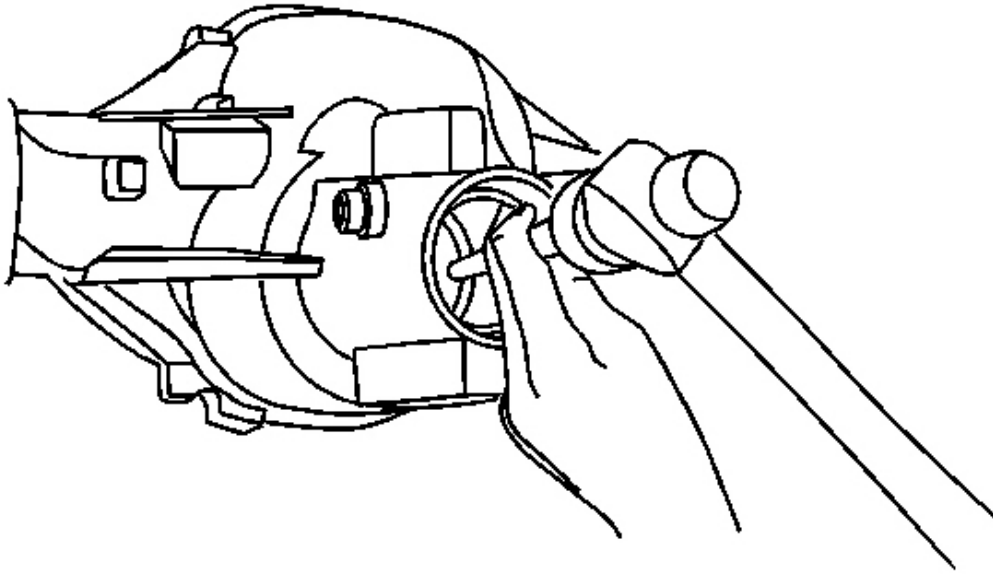


Fig. 56: Removing Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

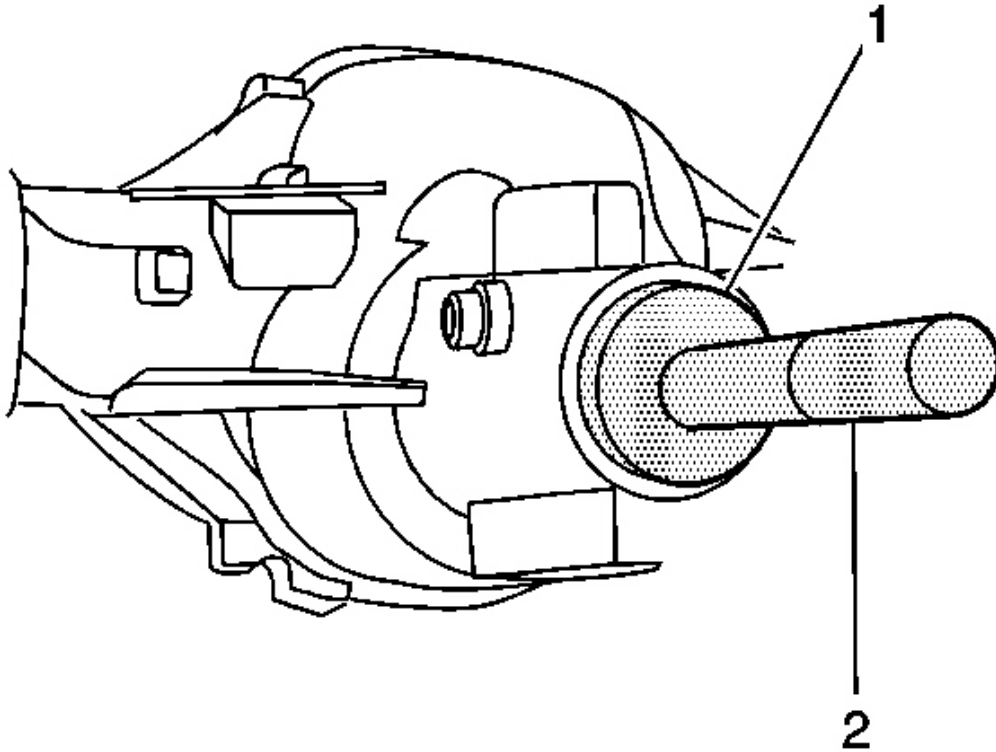


Fig. 57: Install Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

1. Install the outer pinion bearing cup using the **J 8611-01** , 8. See **Special Tools**.6 inch axle (2) and the **J 8092** (1).

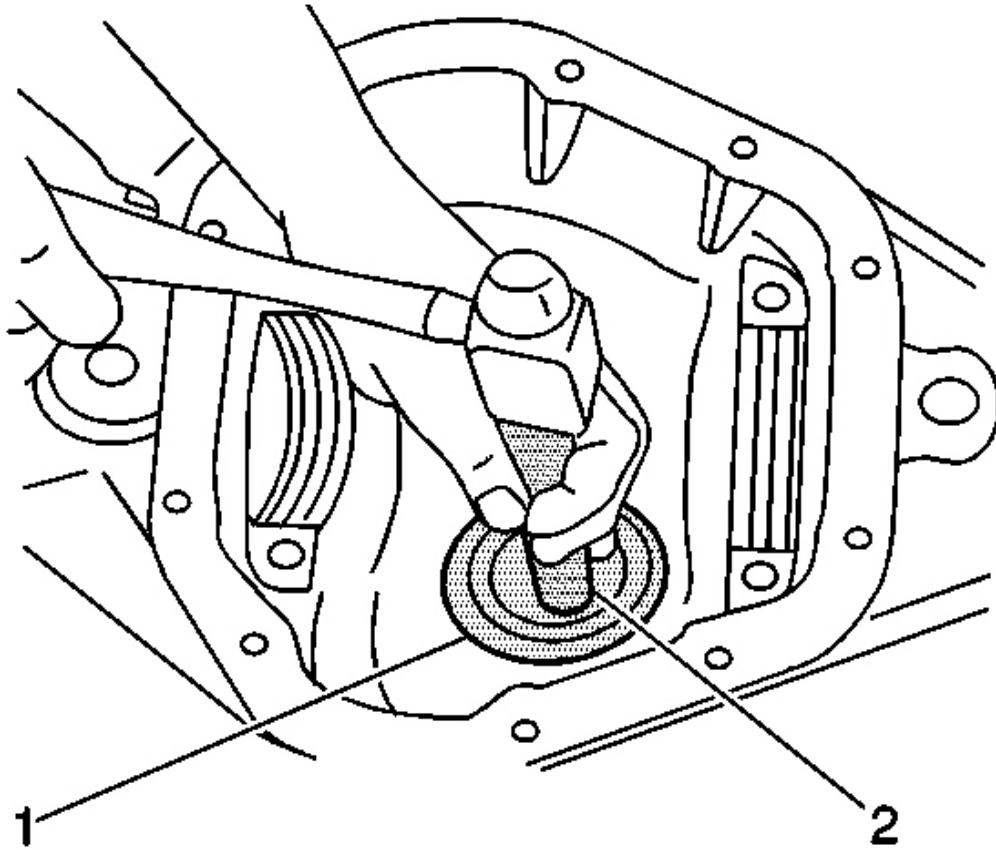


Fig. 58: Installing Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

2. Install the inner pinion bearing cup using the **J 45900** , 8.6 inch axle (2) and the **J 8092** (1).
3. Determine the selective shim thickness for the pinion. Refer to **Pinion Depth Adjustment** .

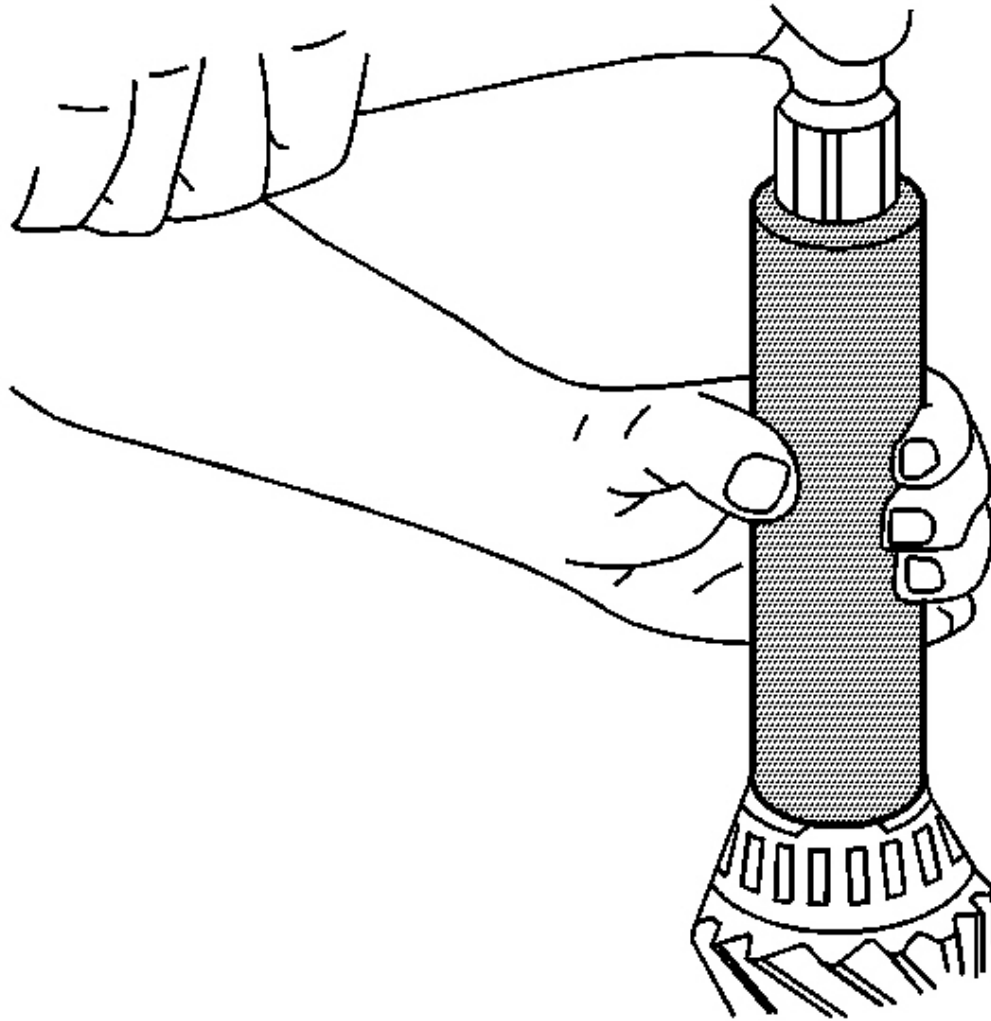


Fig. 59: Installing Inner Pinion Bearing
Courtesy of GENERAL MOTORS CORP.

4. Install the selective shim between the inner pinion bearing and the shoulder on the gear.
5. Install the inner pinion bearing using the **J 24433** , 8. See **Special Tools**.6 inch axle.

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

6. Install a new collapsible spacer.

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

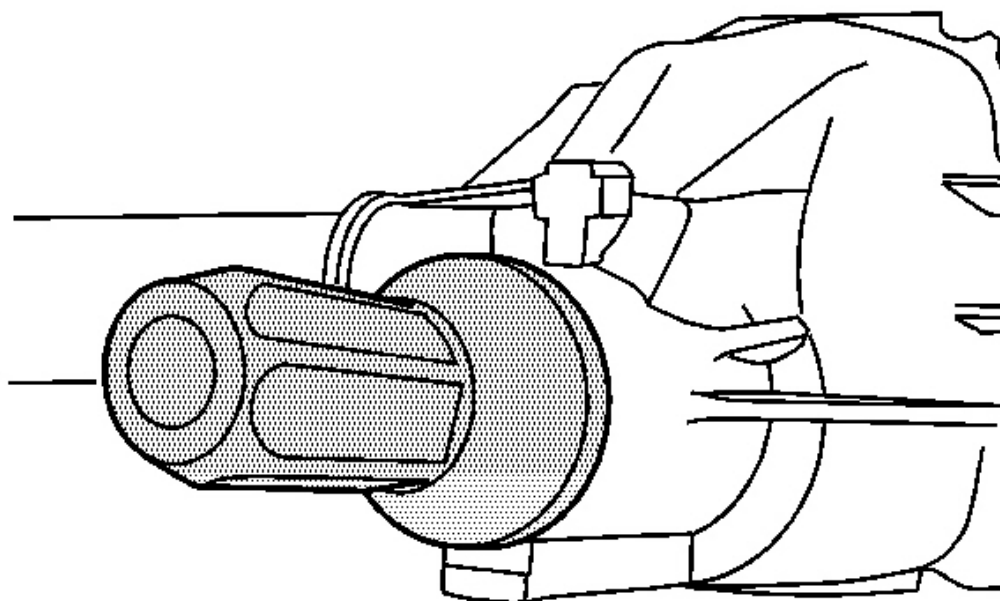


Fig. 60: Installing New Pinion Oil Seal
Courtesy of GENERAL MOTORS CORP.

9. Install a new pinion oil seal using the **J 22388** , 8.6 inch.
10. Install the pinion into the axle housing.
11. Apply sealant, GM P/N 12346004 (Canadian P/N 10953480) or equivalent to the splines of the pinion yoke.

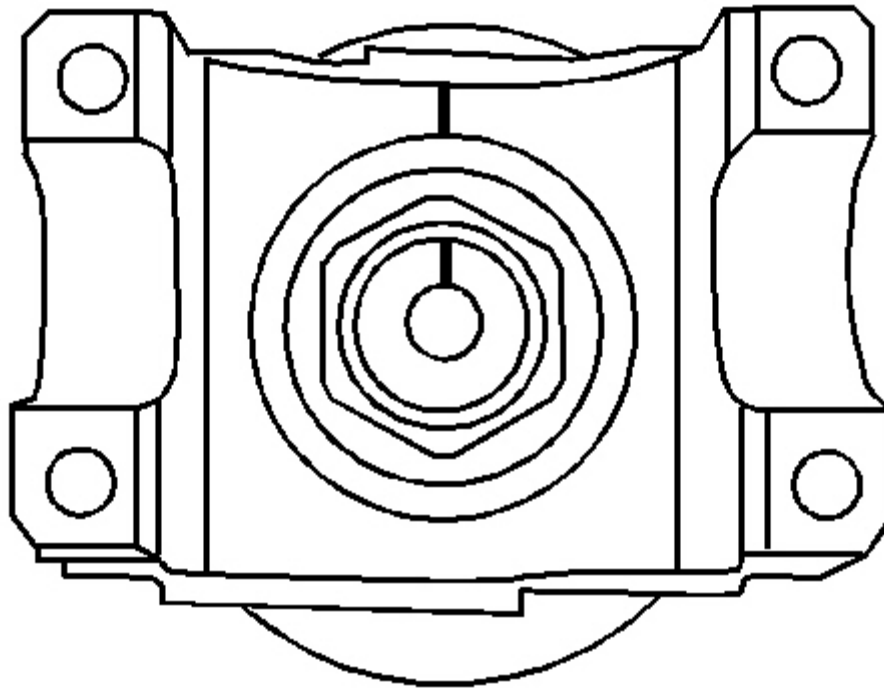


Fig. 61: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS CORP.

12. Install the pinion yoke.

Align the marks made during removal.

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

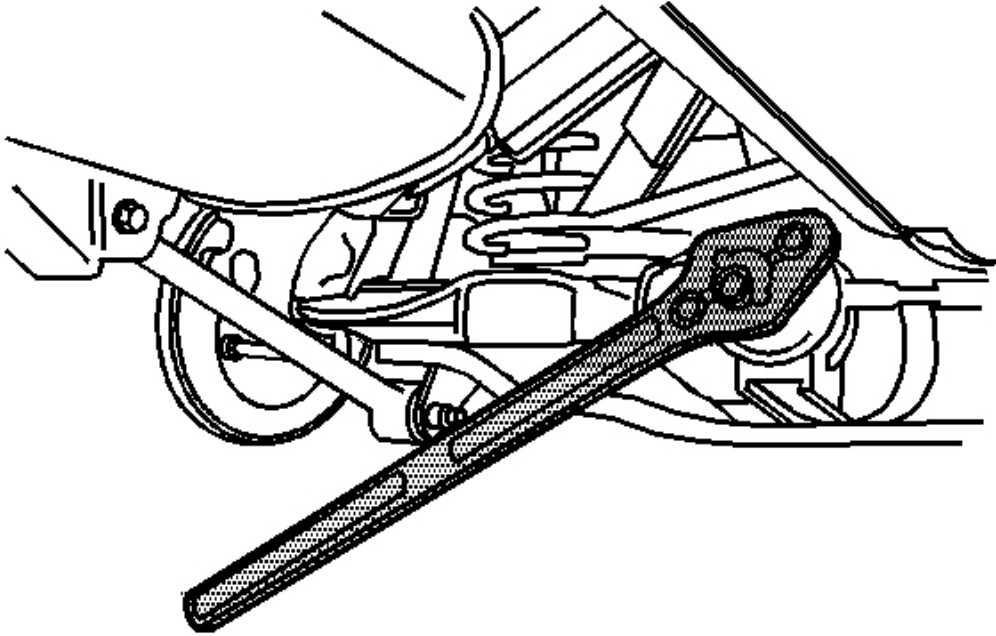


Fig. 62: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

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

NOTE: Refer to Fastener Notice .

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

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

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

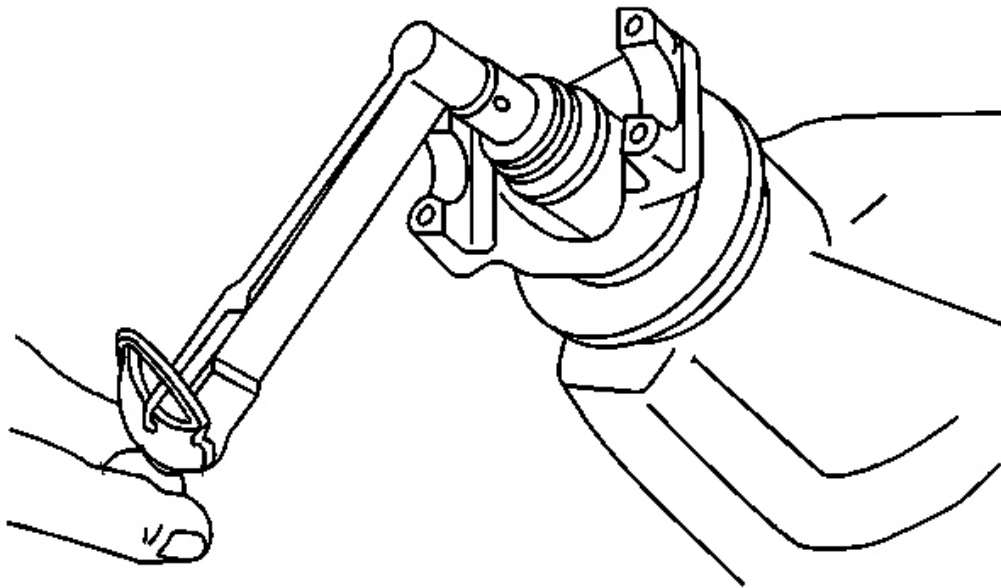


Fig. 63: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

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

Specification: The rotating torque of the pinion should be 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.

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

Tighten: Tighten the pinion nut, in small increments, as needed, until the torque required in order to rotate the pinion is 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.

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

Inspect the rotating torque and adjust if necessary.

20. Install the differential assembly. Refer to **Differential Replacement**.

21. Fill the axle with lubricant. Use the proper fluid. Refer to **Rear Axle Lubricant Replacement**.
22. Lower the vehicle.

DIFFERENTIAL REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the rear axle. Refer to **Rear Axle Lubricant Replacement**.

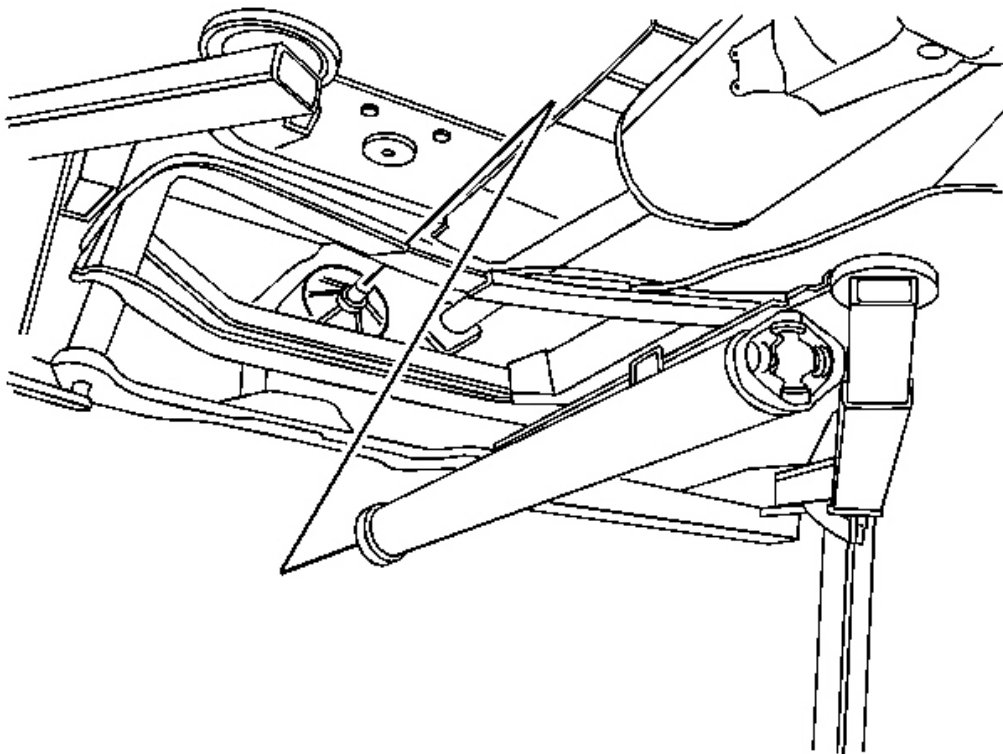


Fig. 64: View Of Propeller Shaft
Courtesy of GENERAL MOTORS CORP.

3. Remove the propeller shaft. Refer to **Rear Propeller Shaft Replacement** .

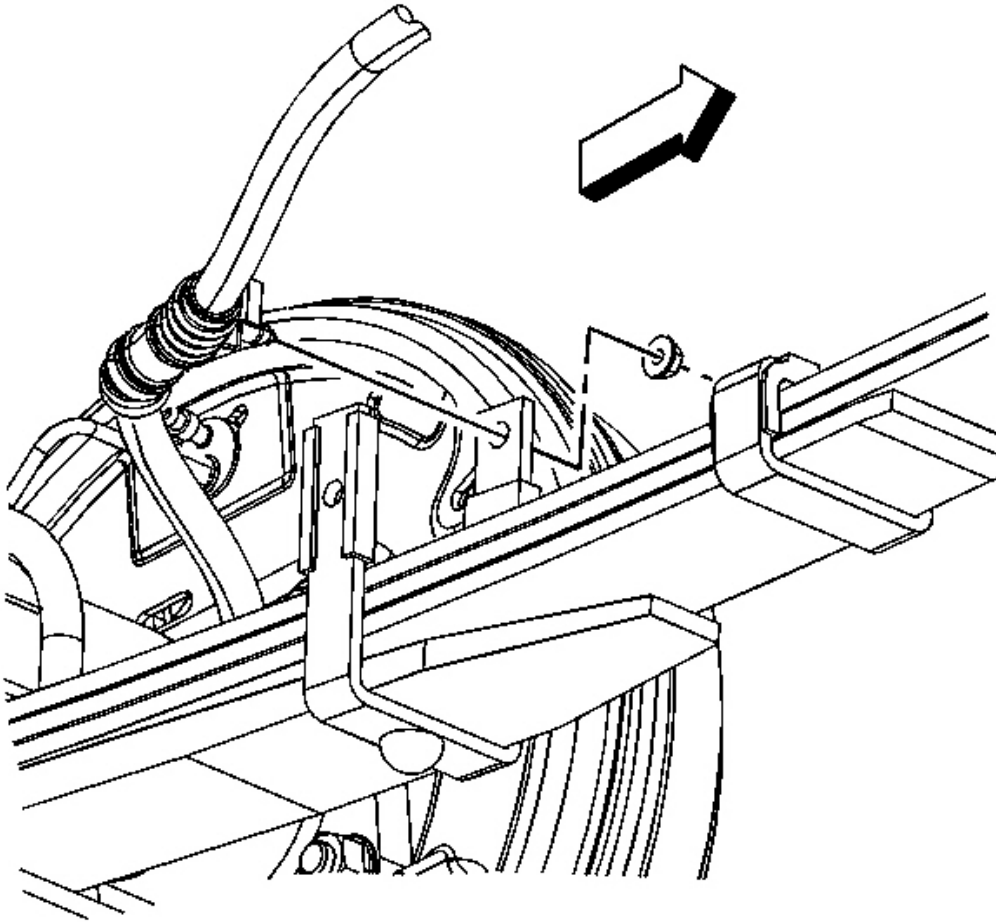


Fig. 65: View Of Rear Leaf Spring Park Brake Cable Retaining Bolt
Courtesy of GENERAL MOTORS CORP.

4. Remove the retaining bolt for the park brake cables at the leaf springs.

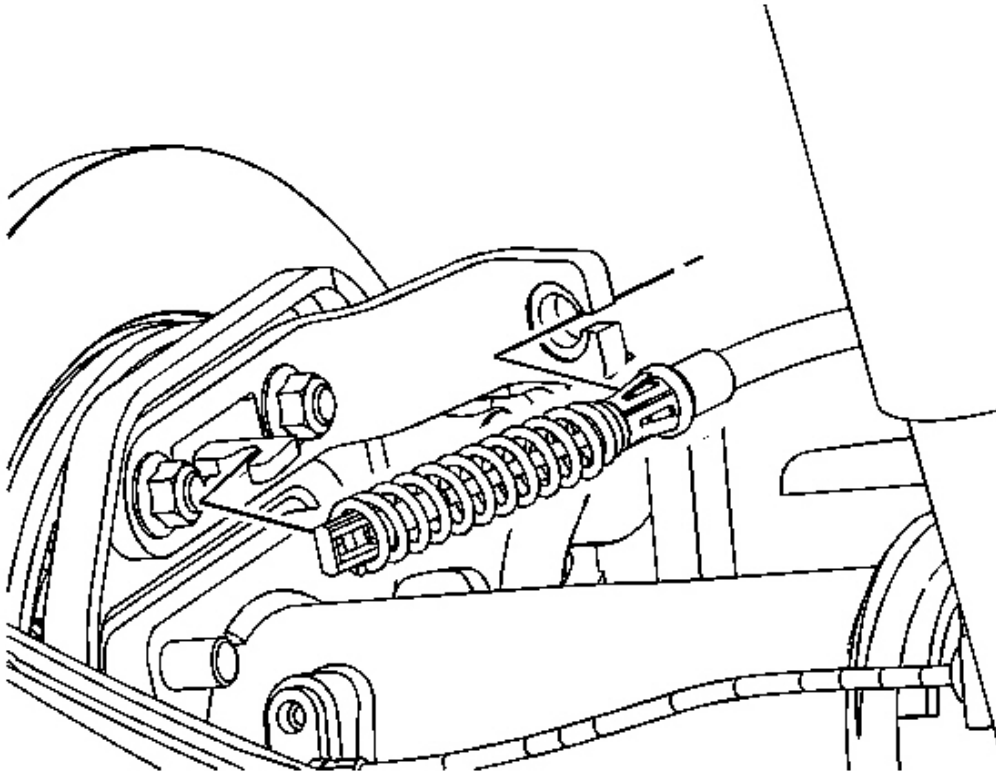


Fig. 66: View Of Park Brake Cable At Cable Bracket & Park Brake Lever
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: In the following service procedure, just remove the park brakes from the actuators. The entire park brake cables **DO NOT** have to be removed.

5. Remove the park brake cables from the actuators.
 - For the left park brake cable, refer to **Parking Brake Rear Cable Replacement - Left Side** .
 - For the right park brake cable, refer to **Parking Brake Rear Cable Replacement - Right Side** .

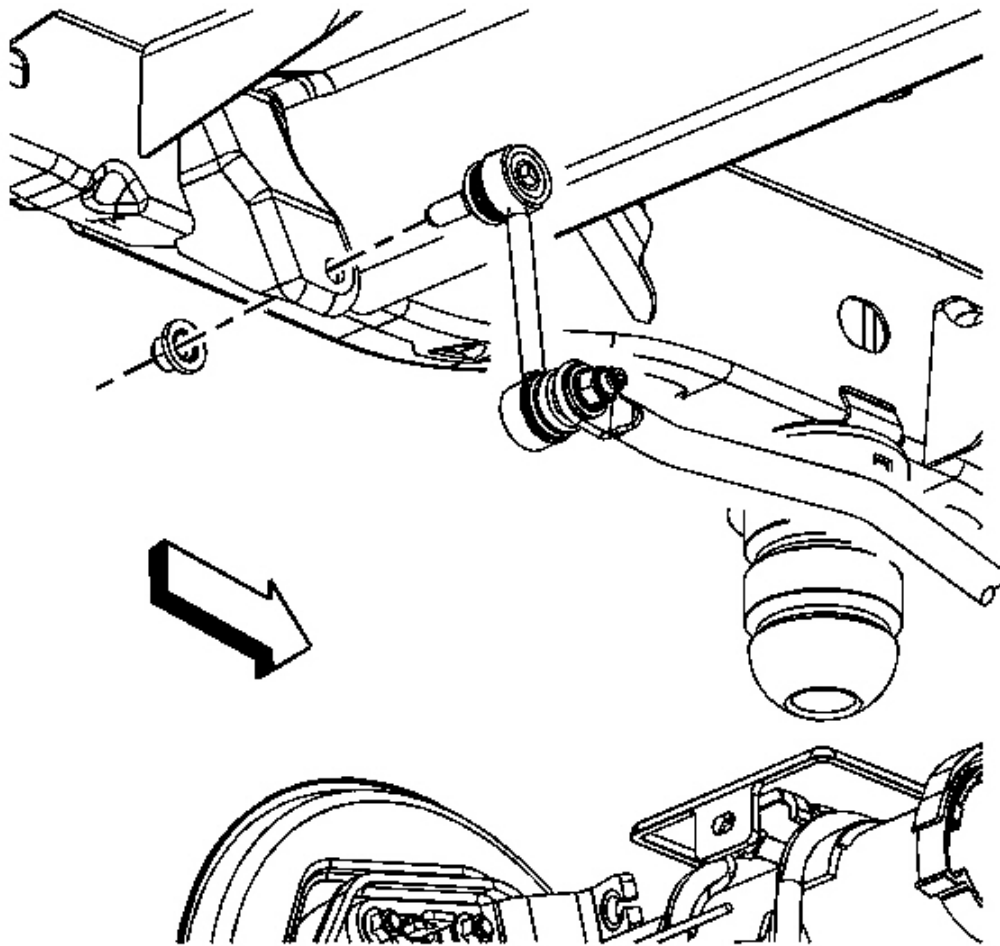


Fig. 67: Removing/Installing Stabilizer Shaft-To-Link Nut
Courtesy of GENERAL MOTORS CORP.

6. Remove the sway bar link from the frame. Refer to **Stabilizer Shaft Link Replacement** .

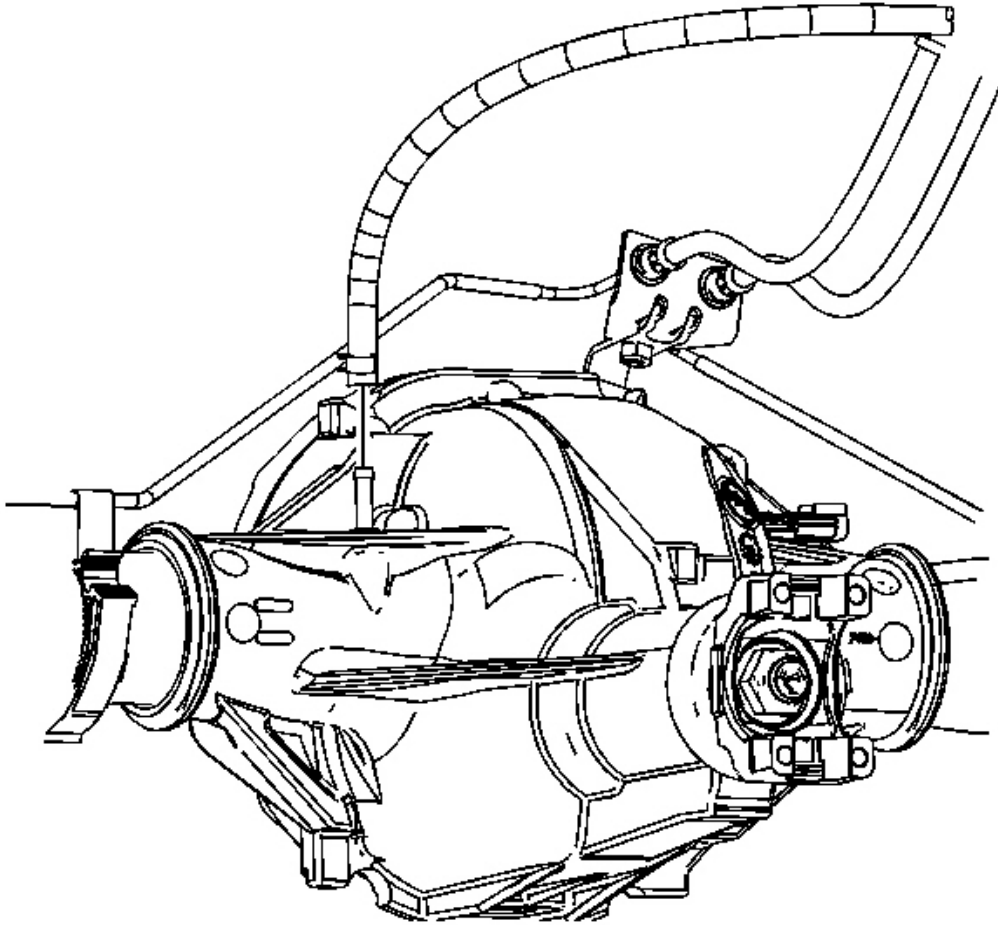


Fig. 68: Identifying Axle Housing Vent Hose
Courtesy of GENERAL MOTORS CORP.

7. Remove the vent hose from the axle housing.

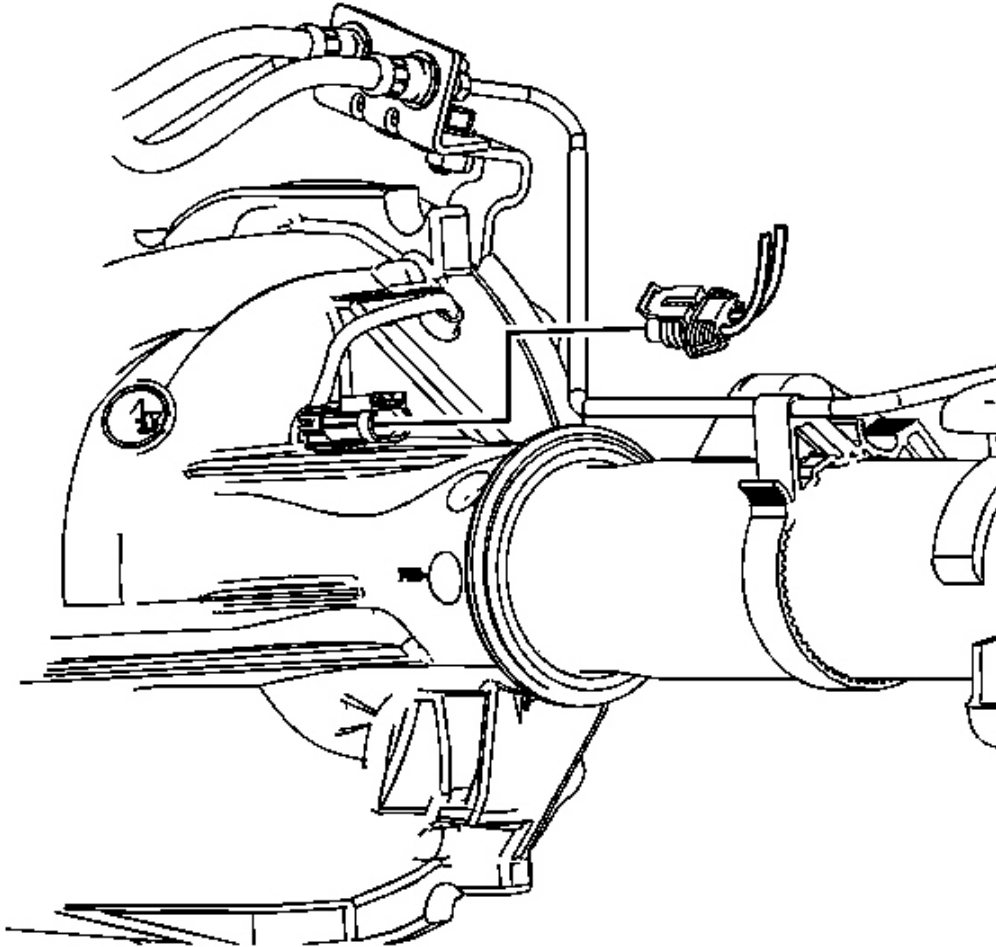


Fig. 69: Locating Electronic Locking Differential Connector
Courtesy of GENERAL MOTORS CORP.

8. Disconnect the electrical connector for the electronic locking differential, if equipped.

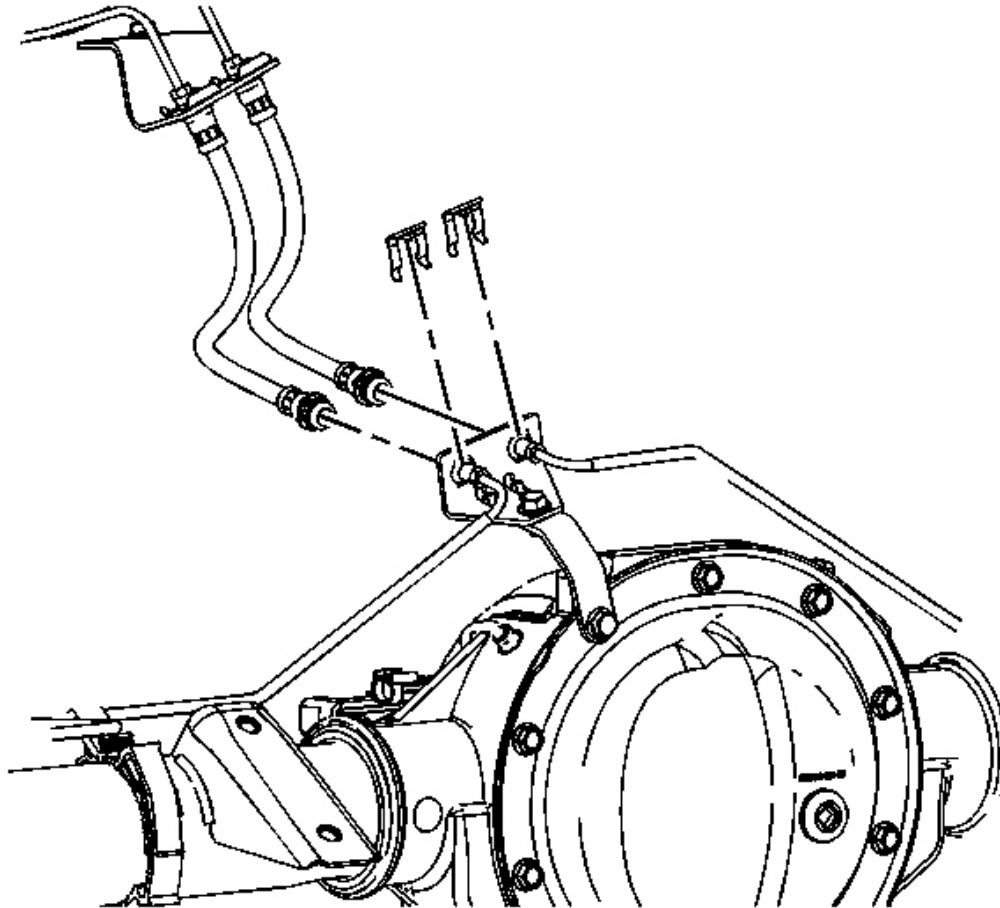


Fig. 70: Locating Brake Line Retaining Clips
Courtesy of GENERAL MOTORS CORP.

9. Remove the retaining clips for the brake lines.

IMPORTANT: Always use a back up wrench on the brake pipe fittings when removing or installing the brake pipes.

10. Remove the brake hoses from the brake pipes.

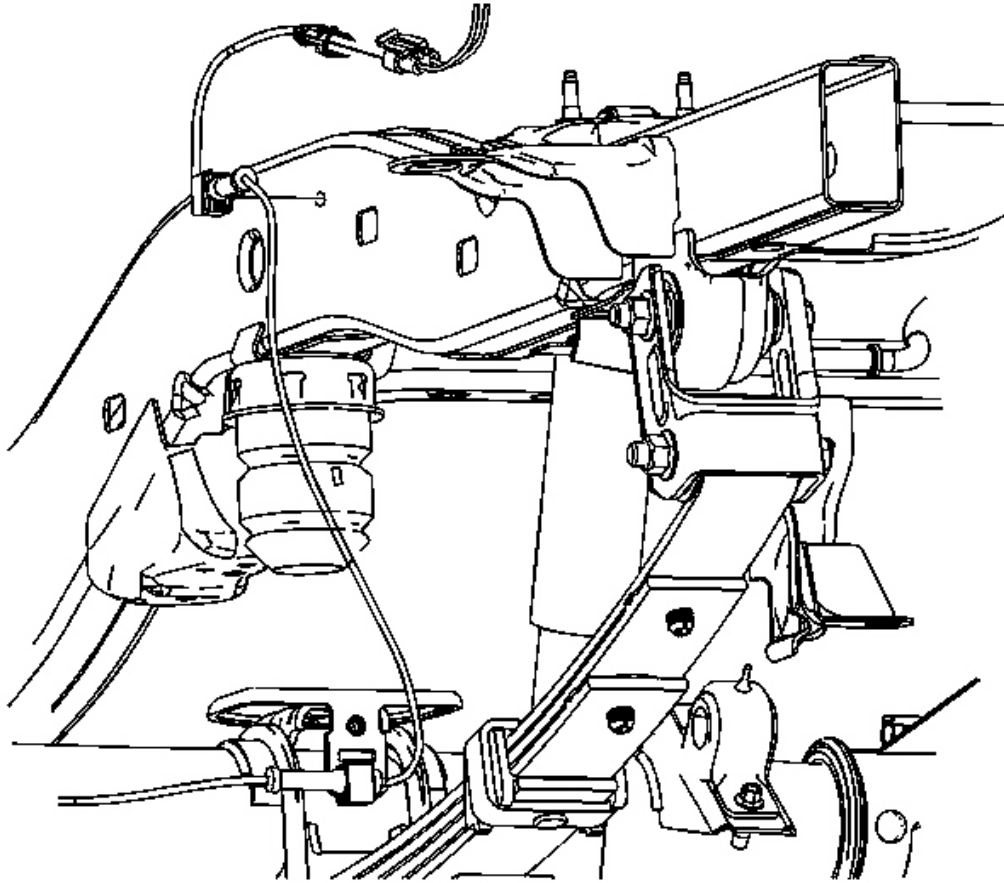


Fig. 71: Locating Rear Speed Sensor Retaining Clips
Courtesy of GENERAL MOTORS CORP.

11. Remove the rear speed sensor retaining clips from the frame.
12. Disconnect the rear speed sensors.
13. Support the rear drive axle with a transmission jack stand.

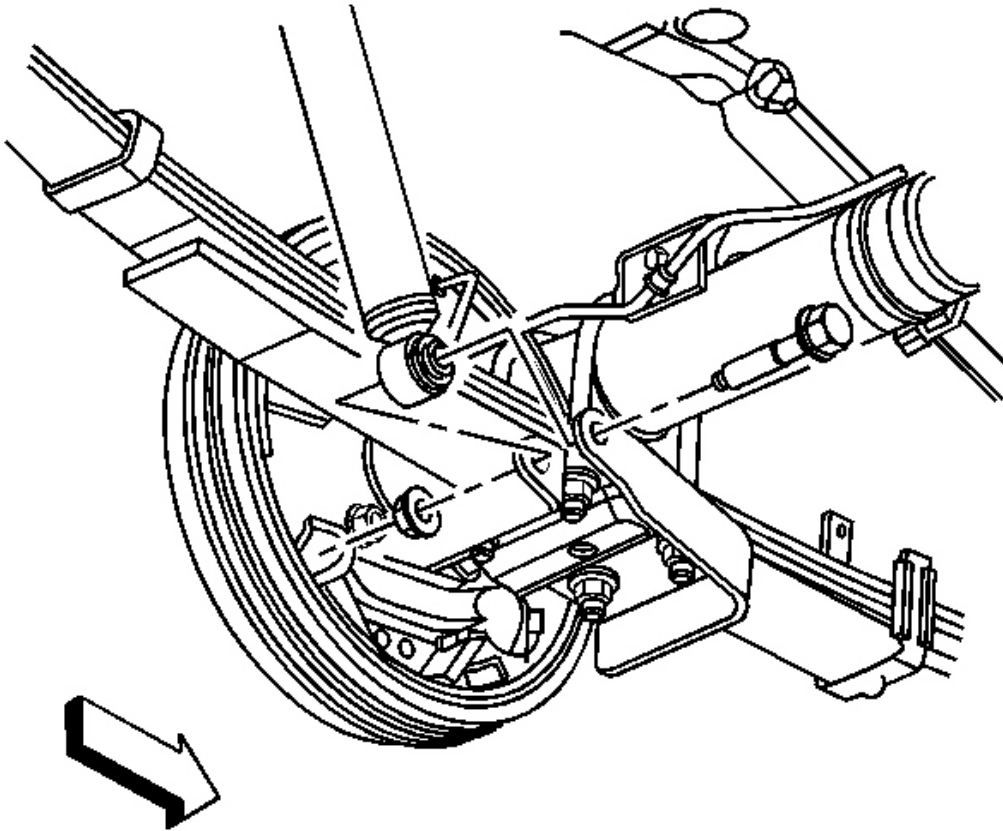


Fig. 72: View Of Lower Shock Absorber Mounting Bolt & Nut
Courtesy of GENERAL MOTORS CORP.

14. Remove the lower shock absorber mounting bolts.

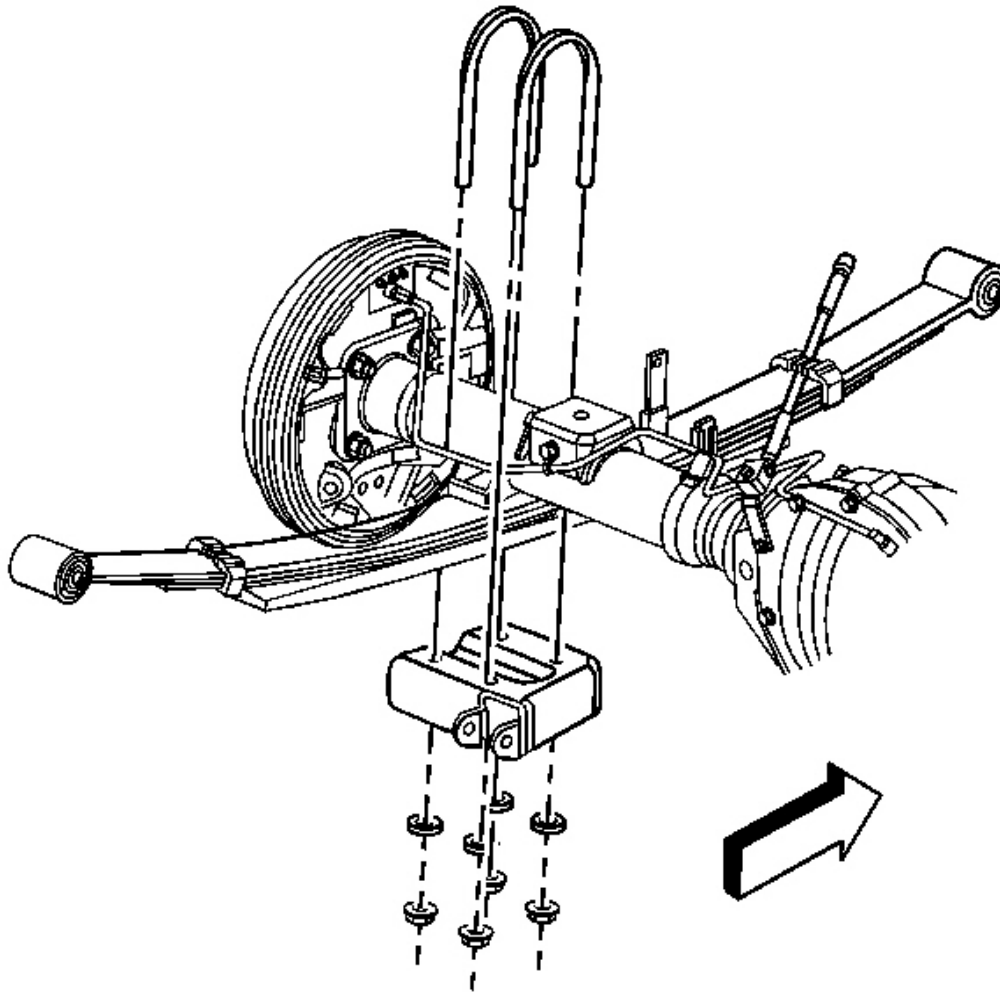


Fig. 73: View Of U-Bolt
Courtesy of GENERAL MOTORS CORP.

15. Remove the U-bolt nuts.
16. Remove the U-bolts from the rear axle housing.
17. Remove the anchor plate.

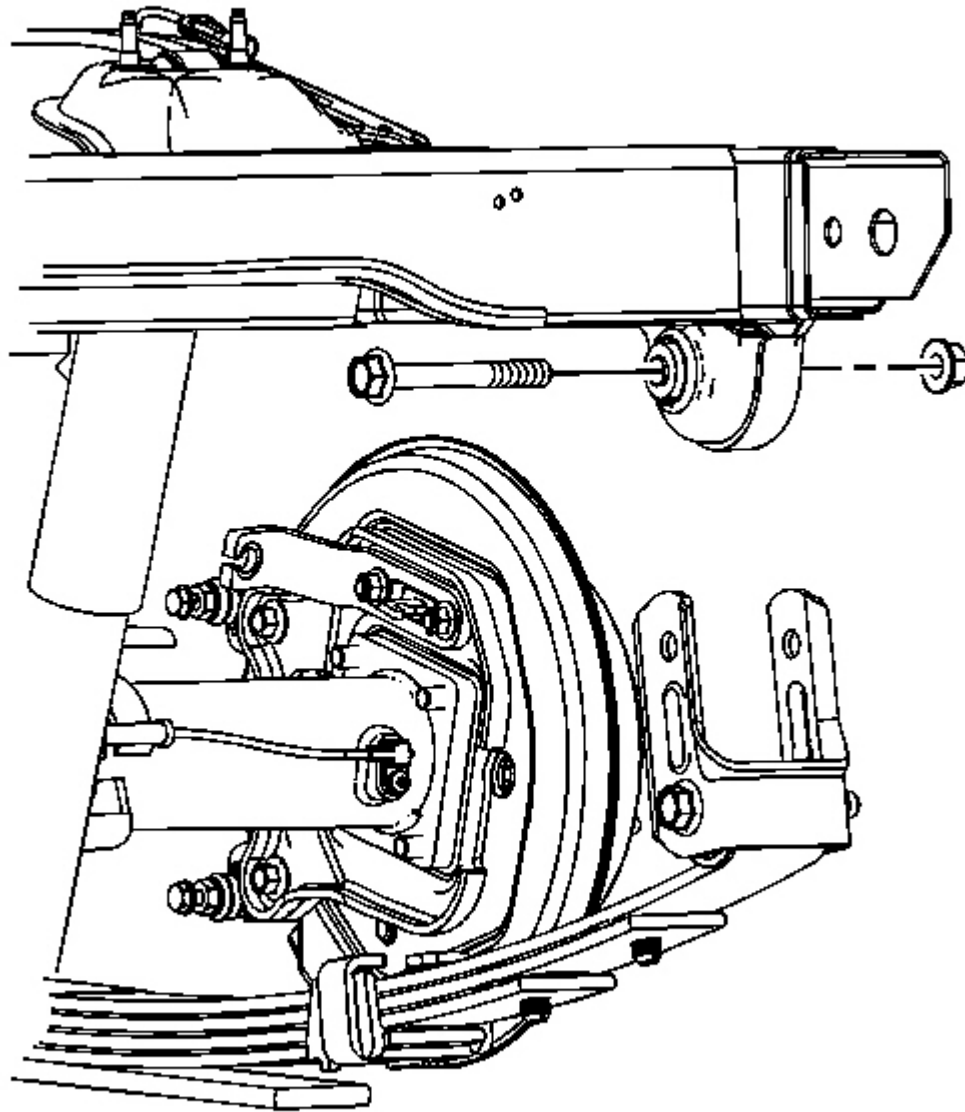


Fig. 74: View Of Rear Leaf Spring Shackles
Courtesy of GENERAL MOTORS CORP.

18. Remove the rear leaf spring shackles.
 - Remove the shackle bolt and nut.
 - Lower the leaf spring to allow enough clearance to remove the rear drive axle.

- Support the leaf springs with jack stands.

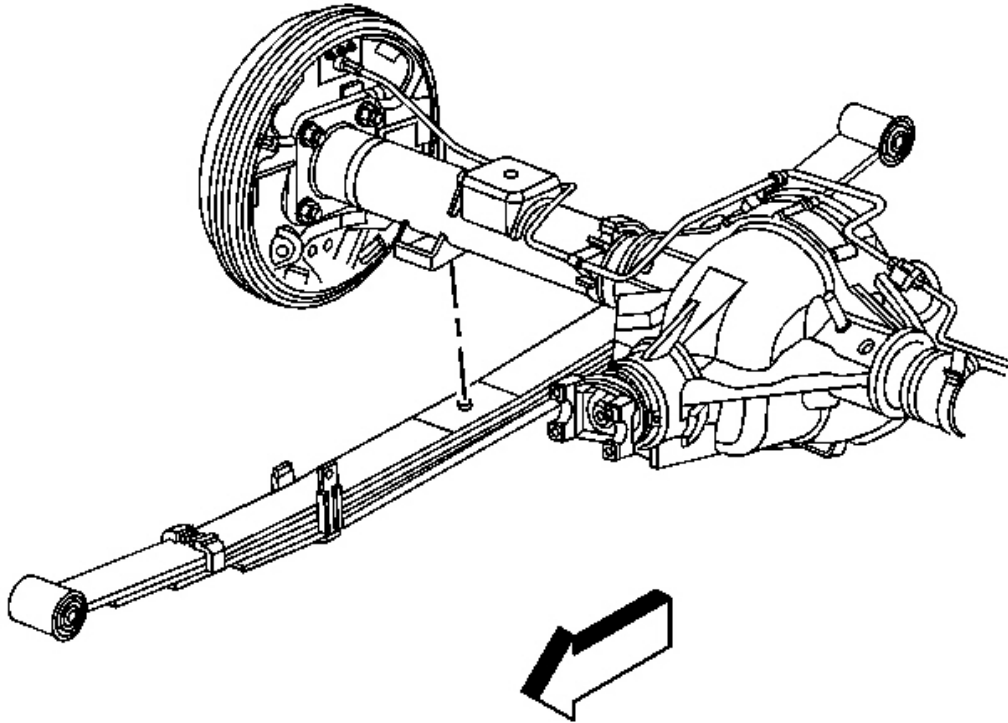


Fig. 75: View Of Rear Axle Assembly
Courtesy of GENERAL MOTORS CORP.

19. With the aid of an assistant and using a transmission jack stand, remove the rear drive axle assembly from the vehicle.

Installation Procedure

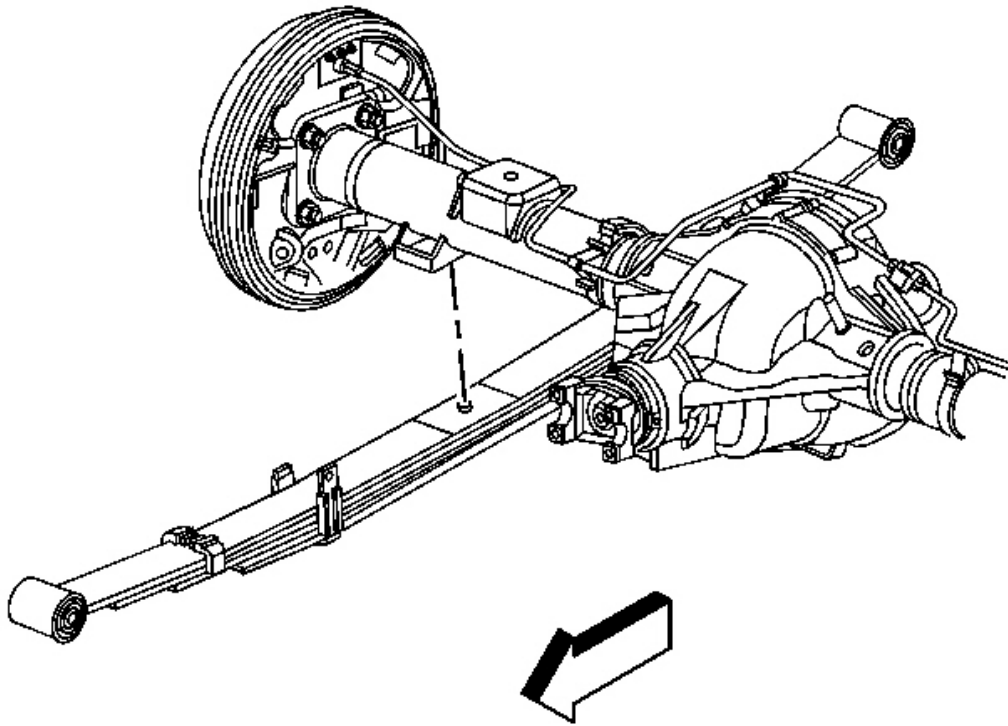


Fig. 76: View Of Rear Axle Assembly
Courtesy of GENERAL MOTORS CORP.

1. With the aid of an assistant and using a transmission jack stand, install the rear drive axle assembly in the vehicle.

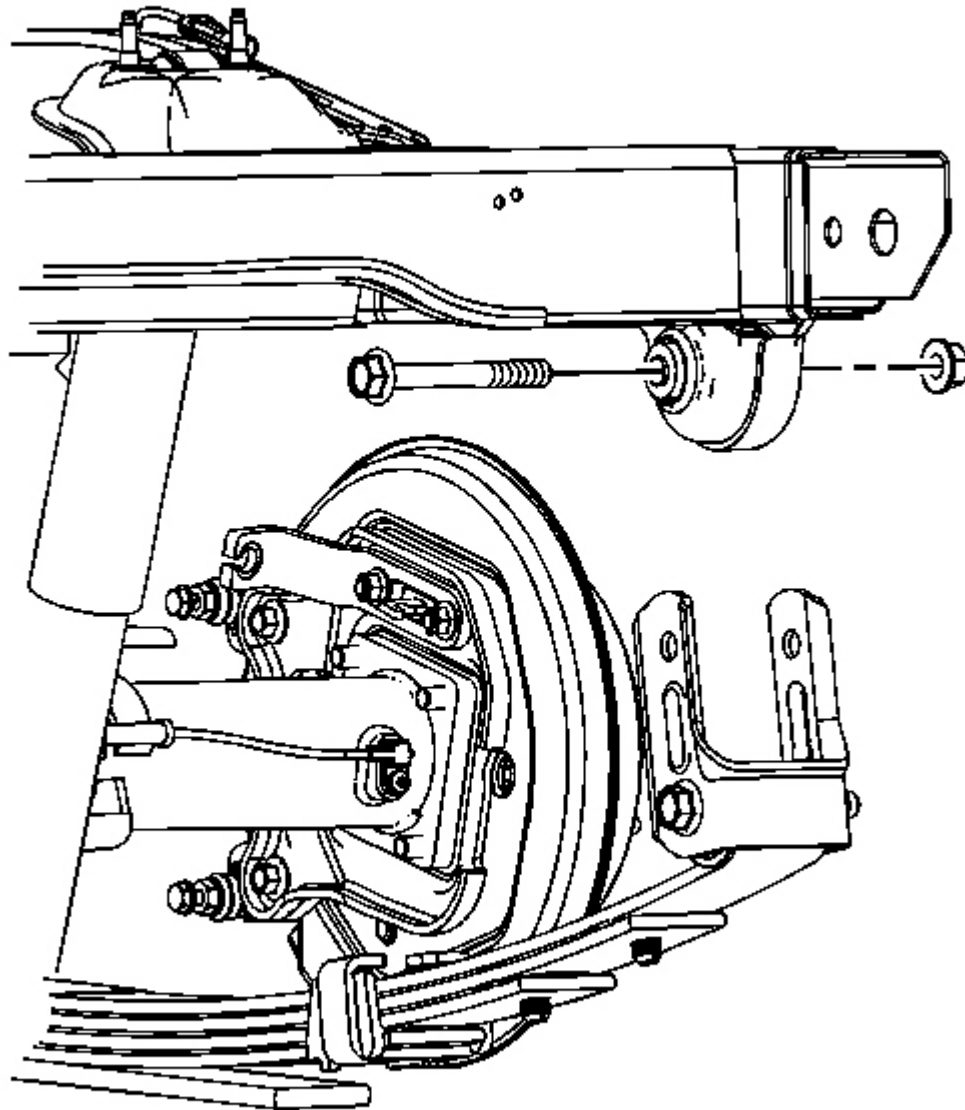


Fig. 77: View Of Rear Leaf Spring Shackles
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

2. Install the leaf spring shackles.

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

3. Remove the jack stands.

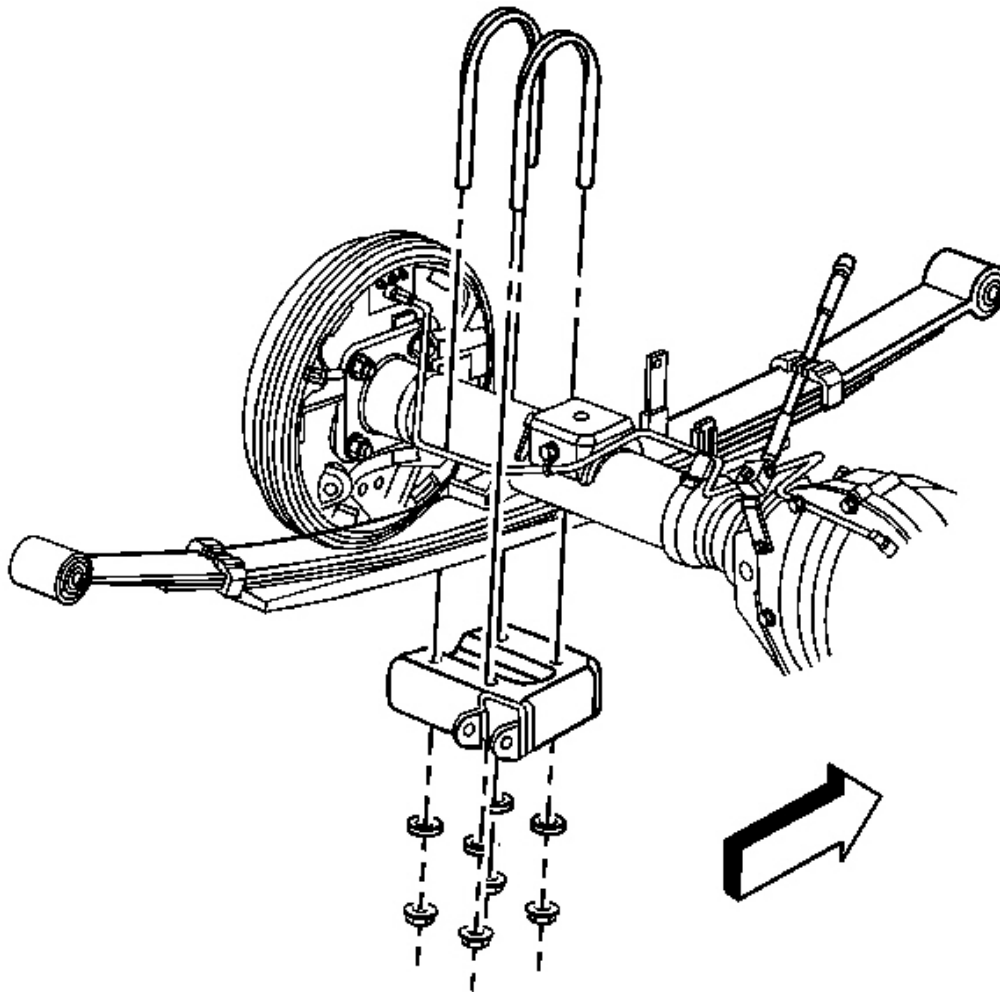


Fig. 78: View Of U-Bolt
Courtesy of GENERAL MOTORS CORP.

4. Position the U-bolts on the rear axle housing.
5. Position the anchor plates on the leaf springs.
6. Install the U-nuts.

Tighten: Tighten the nuts 76 N.m (56 lb ft).

7. Install the bottom shock absorber nut and bolt.

Tighten: Tighten the nuts 95 N.m (70 lb ft).

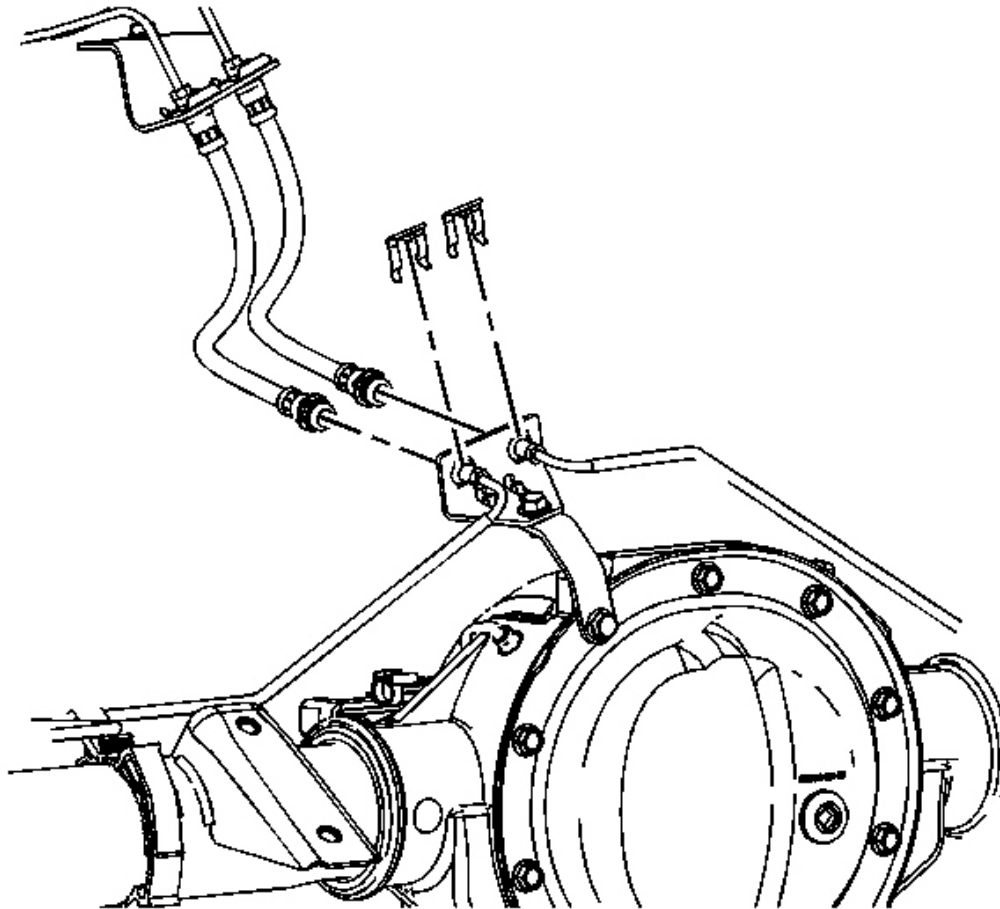


Fig. 79: Locating Brake Line Retaining Clips
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Always use a back up wrench when tightening the brake pipes.

8. Install the brake pipes.

Tighten: Tighten the fitting to 19 N.m (14 lb ft).

9. Install the retaining clips for the brake pipes.

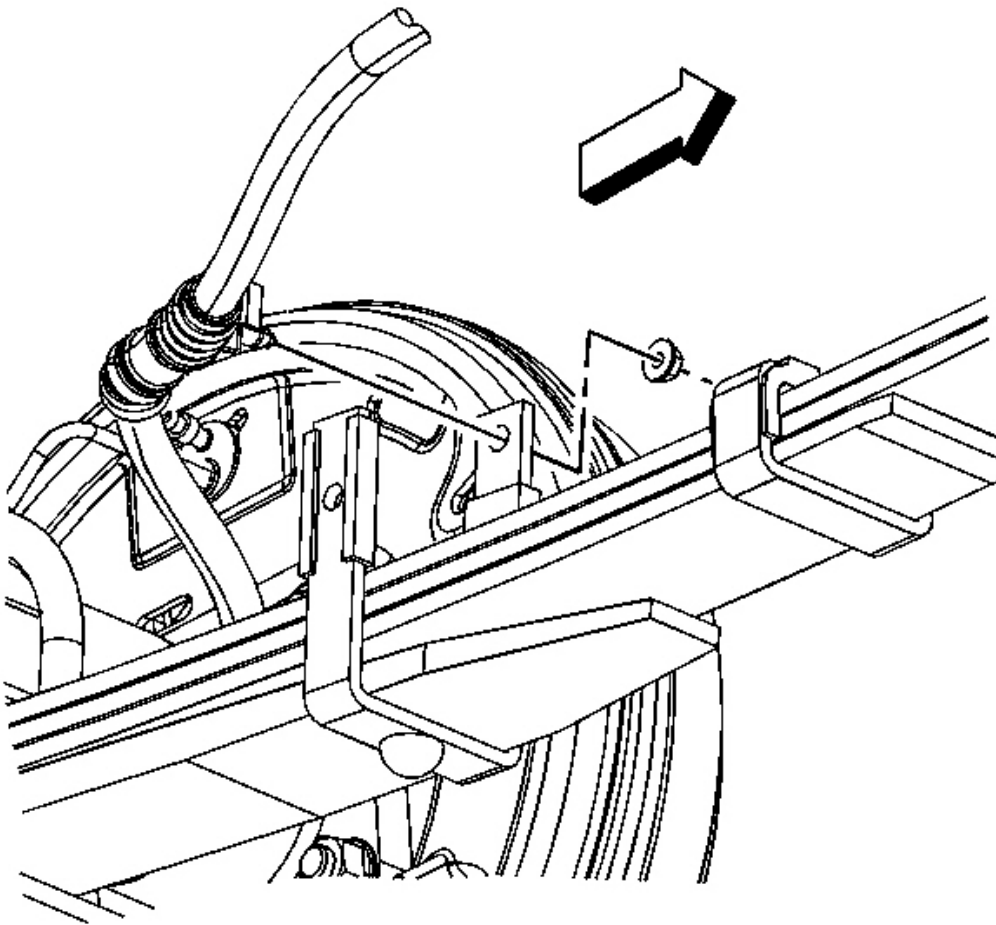


Fig. 80: View Of Rear Leaf Spring Park Brake Cable Retaining Bolt
Courtesy of GENERAL MOTORS CORP.

10. Install the retaining clips for the park brake cables at the rear leaf spring.

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

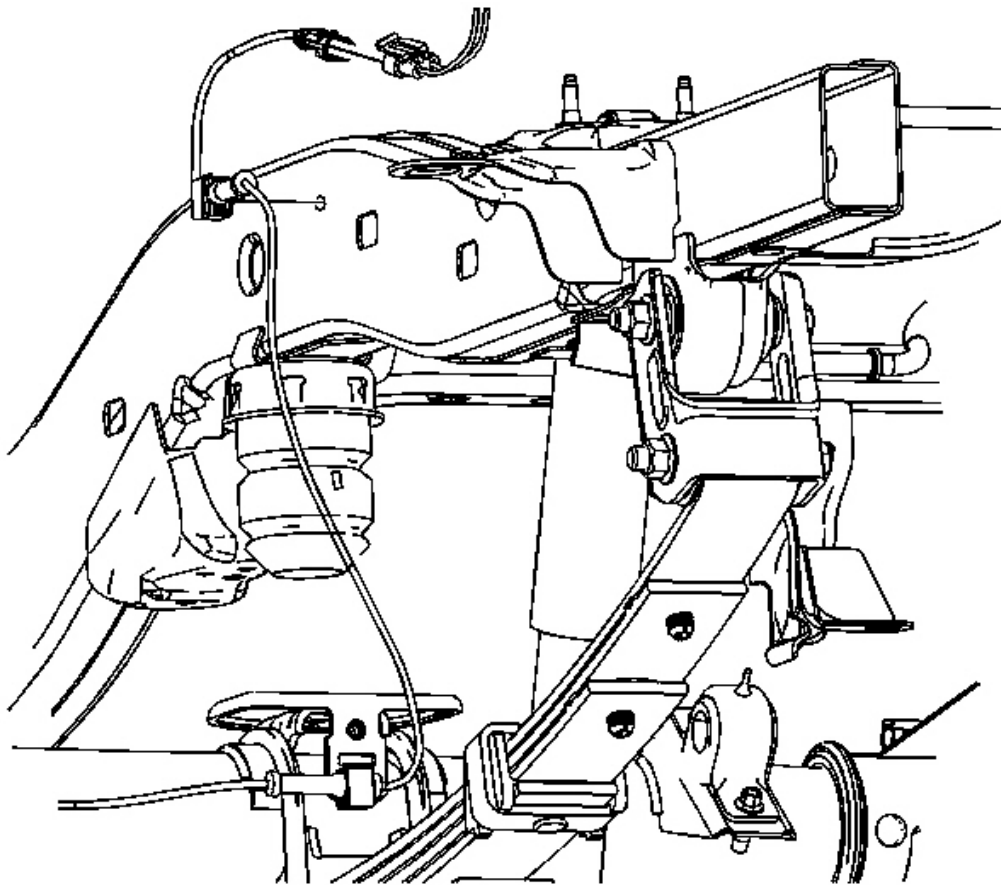


Fig. 81: Locating Rear Speed Sensor Retaining Clips
Courtesy of GENERAL MOTORS CORP.

11. Install the rear speed sensors retainers in the frame. Refer to **Rear Wheel Speed Sensor Replacement** .
12. Reconnect the speed sensor electrical connector.

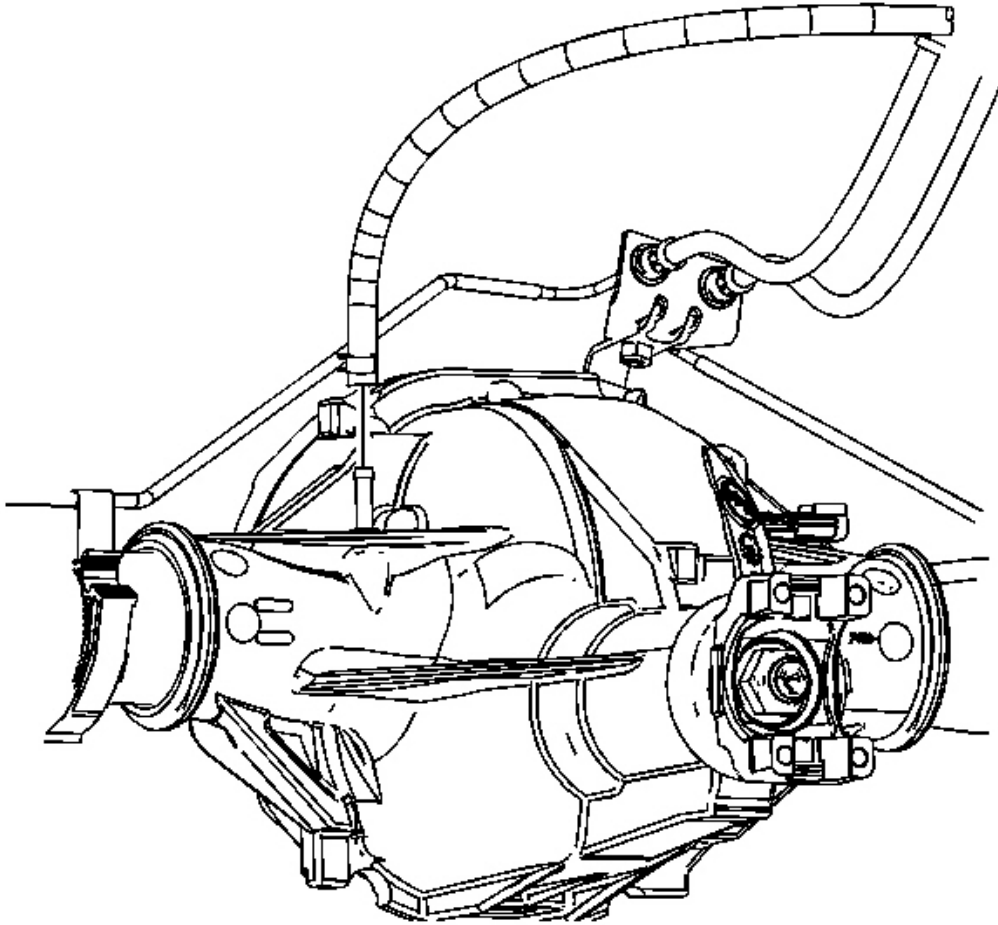


Fig. 82: Identifying Axle Housing Vent Hose
Courtesy of GENERAL MOTORS CORP.

13. Install the vent hose on the axle housing.

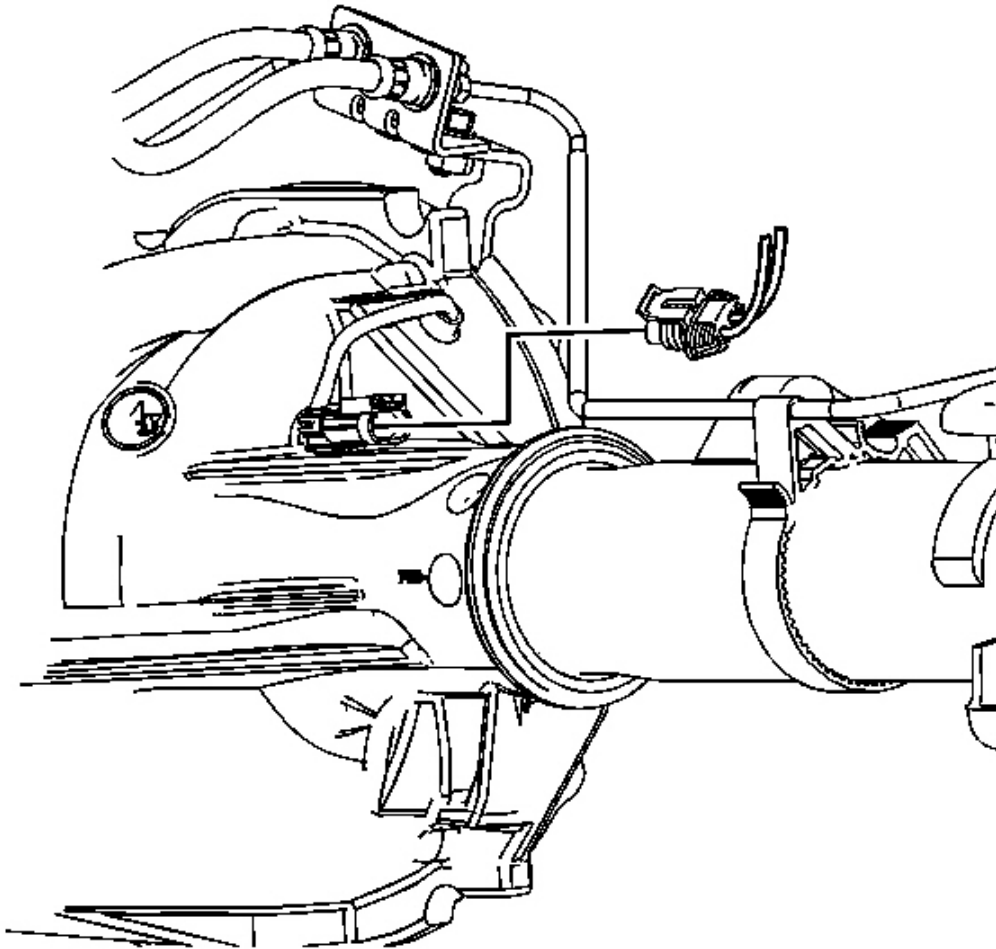


Fig. 83: Locating Electronic Locking Differential Connector
Courtesy of GENERAL MOTORS CORP.

14. Reconnect the electrical connector for the electronic locking differential, if equipped.
15. Install the propeller shaft. Refer to **Rear Propeller Shaft Replacement** .
16. Fill the rear axle housing with fluid. Refer to **Rear Axle Lubricant Level Inspection**.
17. Remove the support stands.
18. Lower the vehicle.

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2007 Driveline/Axle Rear Drive Axle - H3

Tools Required

- **J 22912-B** Split Plate Bearing Puller
- **J 8092** Universal Driver Handle - 3/4 in - 10
- **J 21784** Side Bearing Installer. See **Special Tools**.
- **J 22888-D** Side Bearing Remover Kit
- **J 29710** Differential Side Bearing Installer
- **J 44420** Differential Bearing and Hub Seal Installer

Removal Procedure

1. Remove the differential assembly. Refer to **Differential Replacement**.

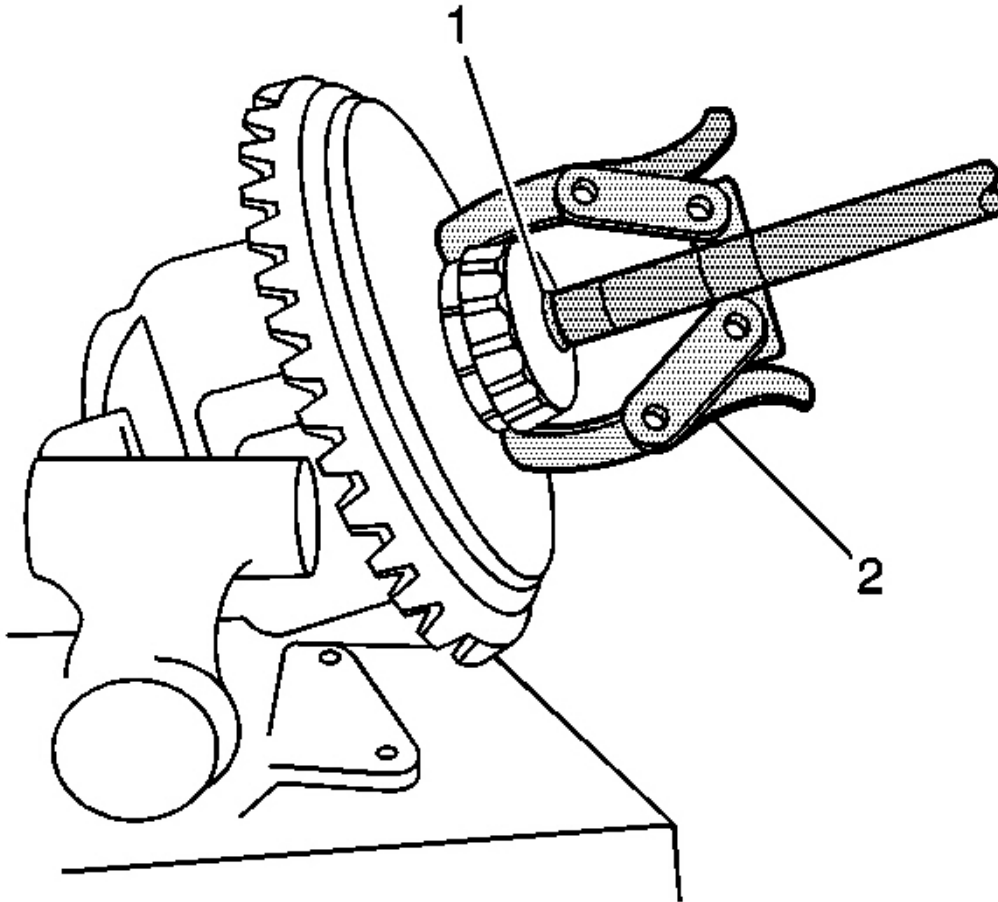


Fig. 84: Removing Differential Side Bearing
Courtesy of GENERAL MOTORS CORP.

2. Remove the differential side bearings by doing the following:
 1. For the 8.6 inch, install the differential assembly into a vise.
 2. Install the **J 22888-20A** (2) and the **J 8107-4** , 8.6 inch axle (1) axle, over the differential case side bearing bore. See **Special Tools**.
 3. Remove the differential side bearings using the **J 22888-20A** . See **Special Tools**.

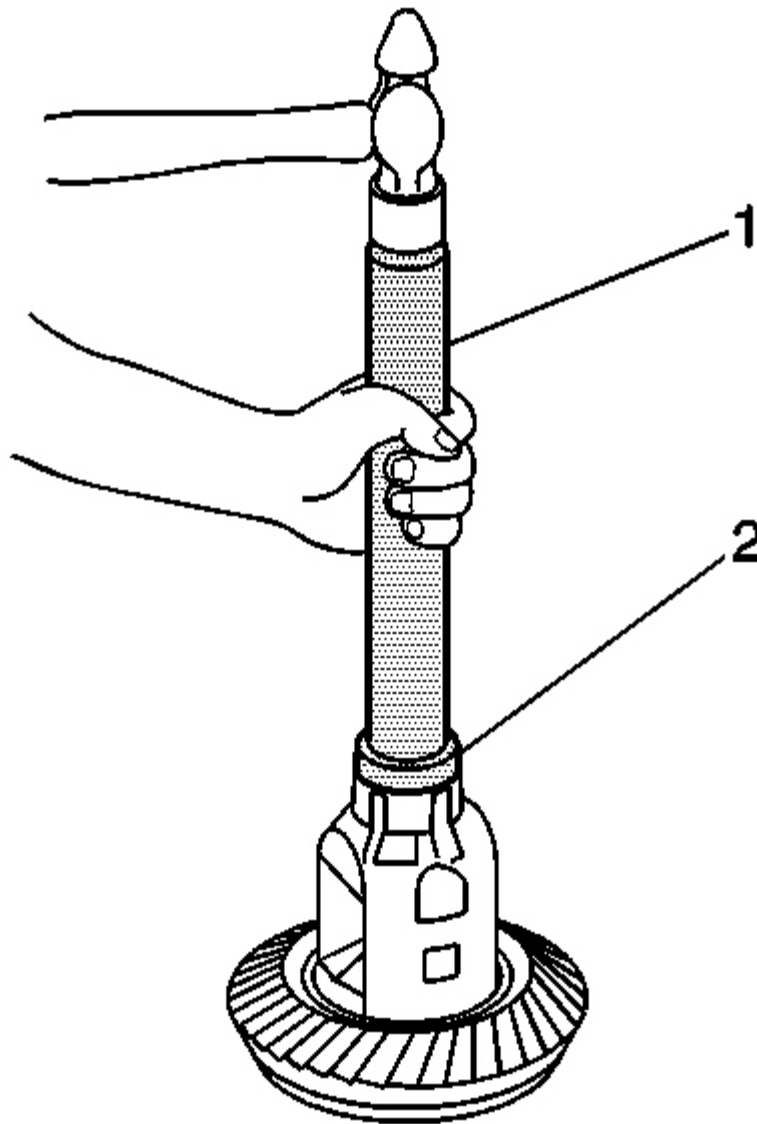


Fig. 85: Installing Differential Side Bearings
Courtesy of GENERAL MOTORS CORP.

1. For the 8.6 inch, install the differential side bearings by doing the following:
 1. In order to protect the differential case, install the **J 8107-4** , 8.6 inch axle in the case on the side opposite the bearing installation.

2. Install the **J 21784** , 8. See **Special Tools**. 6 inch axle (2) and the **J 8092** (1) onto the differential case bearing as shown.
3. Drive the bearing onto the case using the **J 21784** or the **J 29710** and the **J 8092** . See **Special Tools**.
2. Install the differential assembly. Refer to **Differential Replacement**.

REAR AXLE REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the rear axle. Refer to **Rear Axle Lubricant Replacement**.

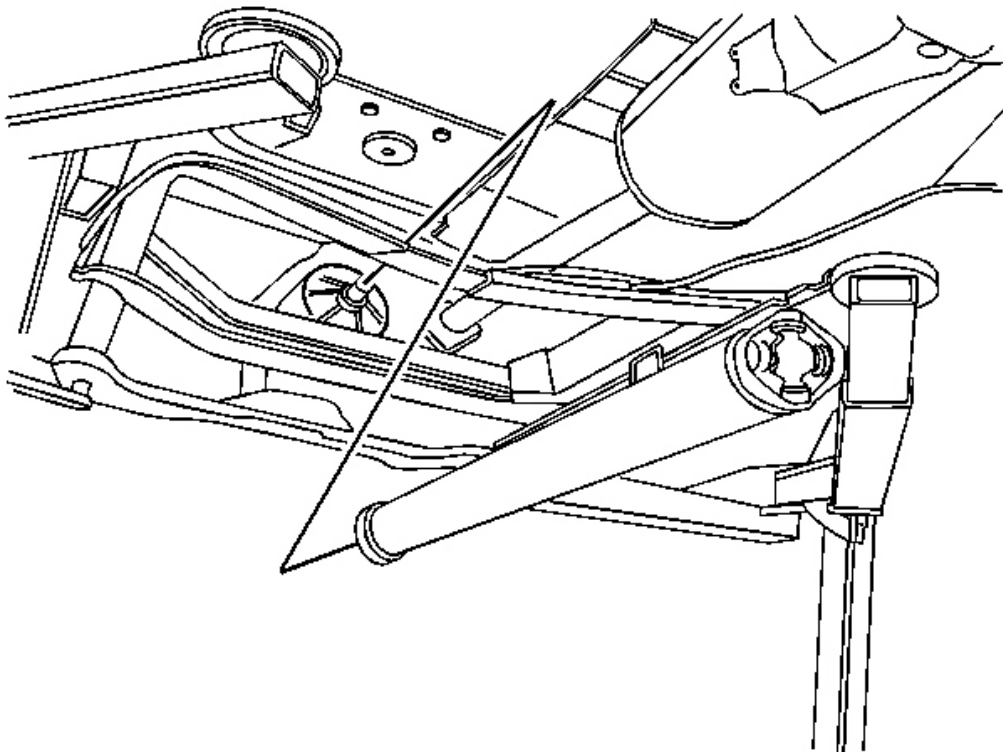


Fig. 86: View Of Propeller Shaft
Courtesy of GENERAL MOTORS CORP.

3. Remove the propeller shaft. Refer to **Rear Propeller Shaft Replacement** .

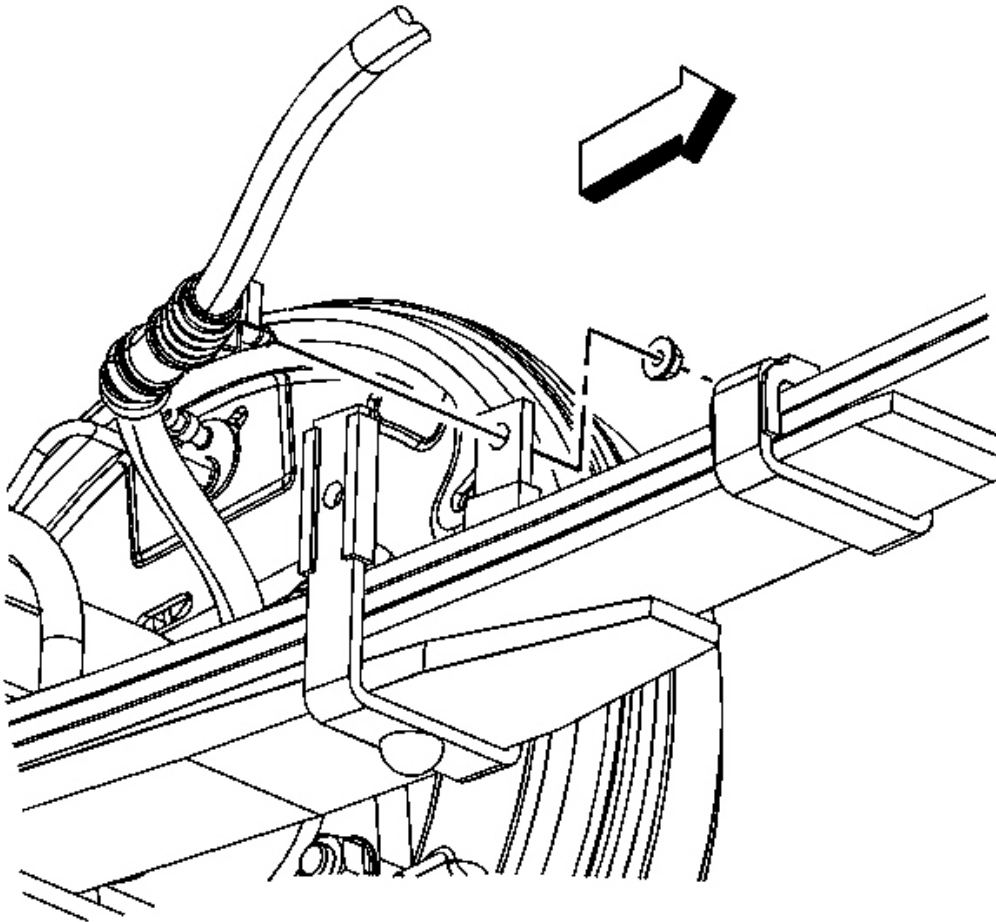


Fig. 87: View Of Rear Leaf Spring Park Brake Cable Retaining Bolt
Courtesy of GENERAL MOTORS CORP.

4. Remove the retaining bolt for the park brake cables at the leaf springs.

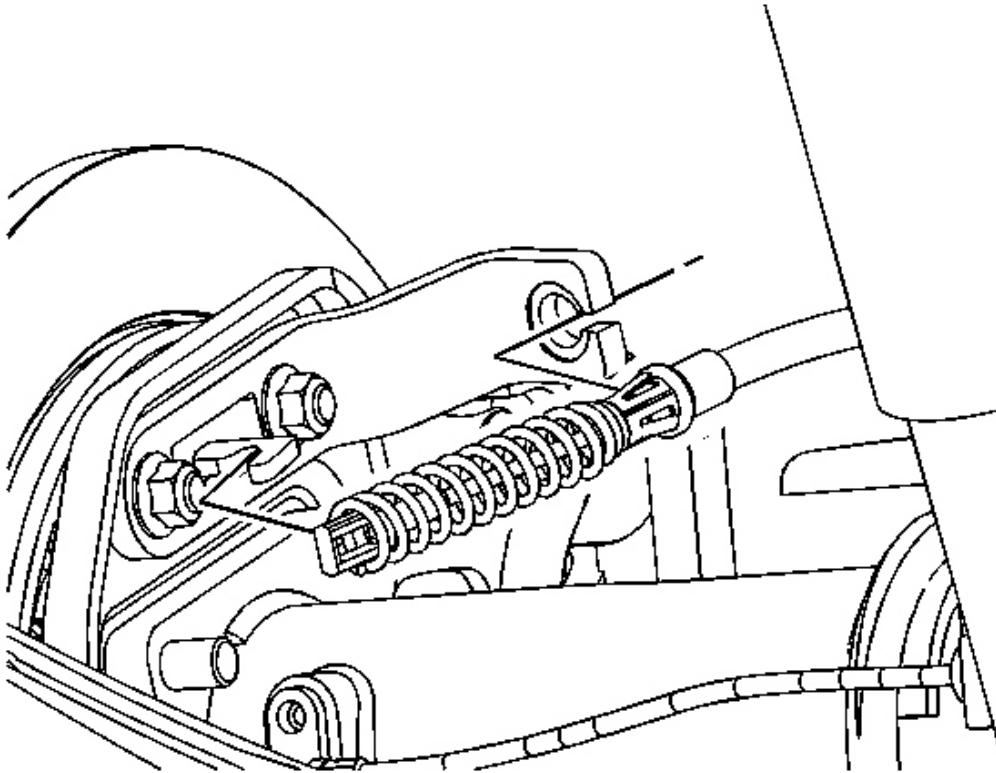


Fig. 88: View Of Park Brake Cable At Cable Bracket & Park Brake Lever
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: In the following service procedure, just remove the park brake cables from the actuators. The entire park brake cables **DO NOT** have to be removed.

5. Remove the park brake cables from the actuators. Left side shown, right side similar.
 - For the left brake cable, refer to **Parking Brake Rear Cable Replacement - Left Side** .
 - For the right park brake cable, refer to **Parking Brake Rear Cable Replacement - Right Side** .

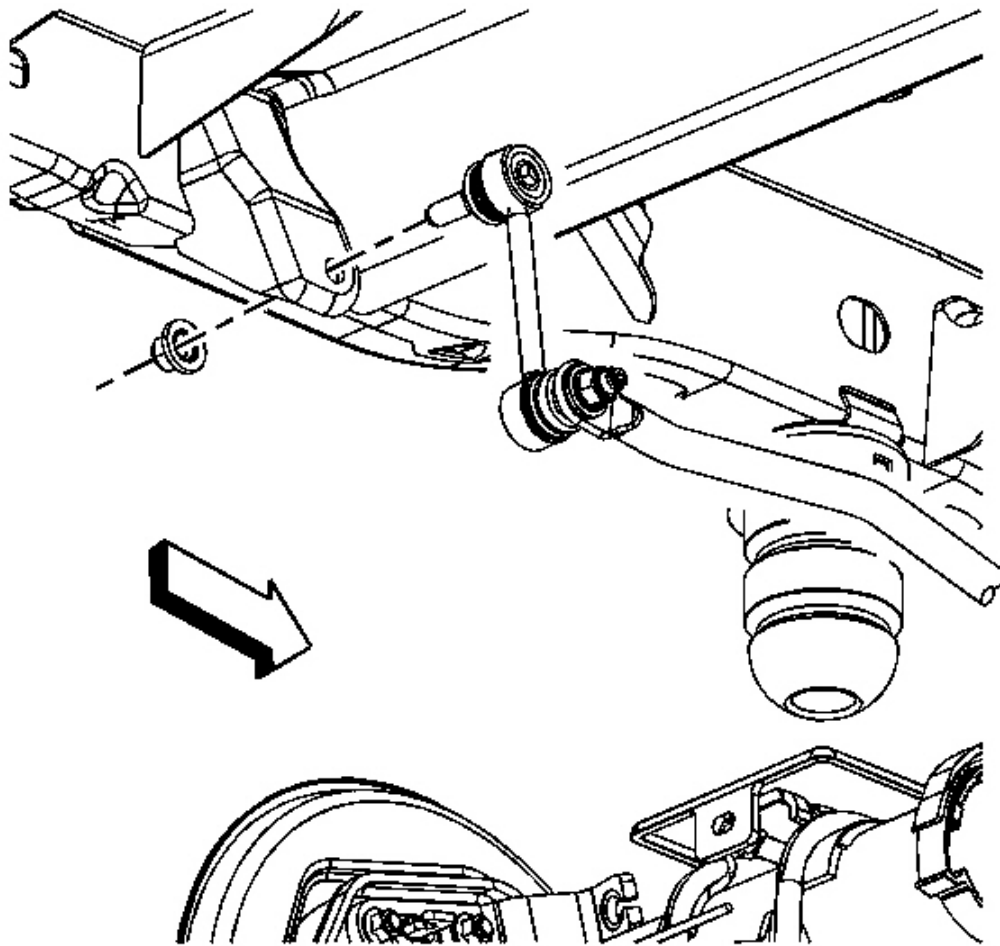


Fig. 89: Removing/Installing Stabilizer Shaft-To-Link Nut
Courtesy of GENERAL MOTORS CORP.

6. Remove the sway bar link from the frame. Refer to **Stabilizer Shaft Link Replacement** .

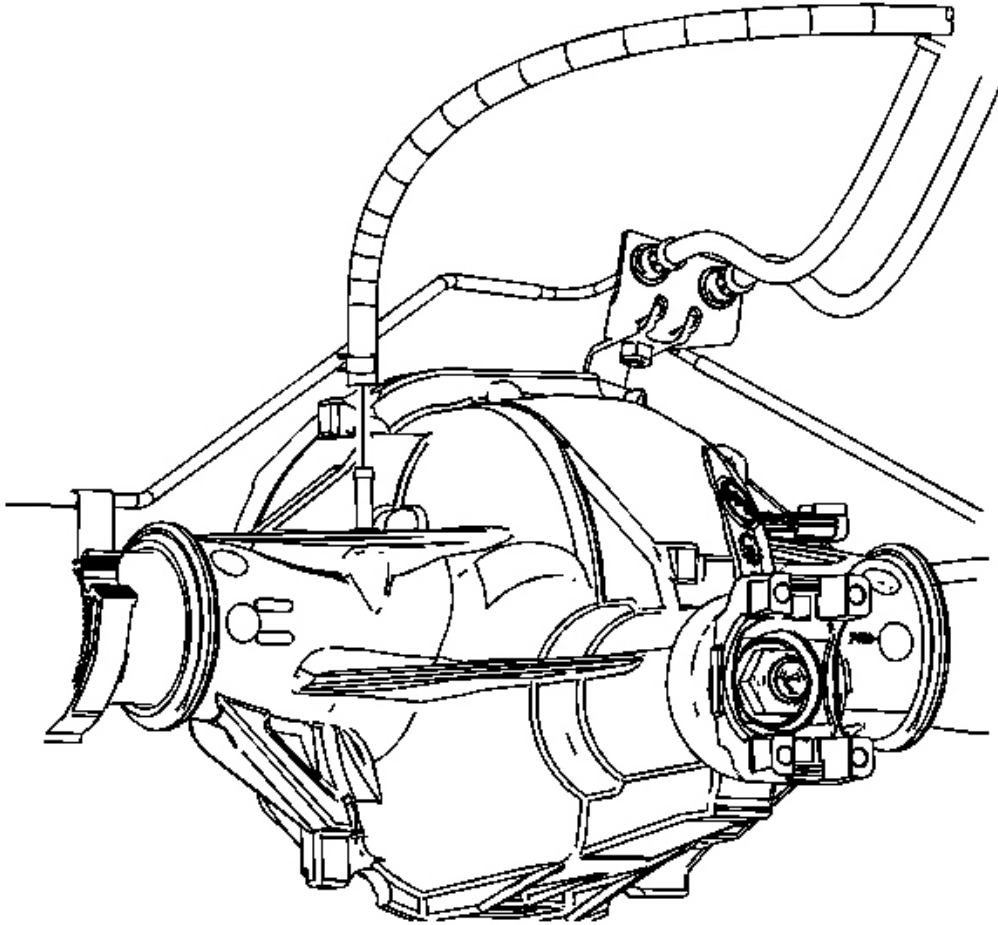


Fig. 90: Identifying Axle Housing Vent Hose
Courtesy of GENERAL MOTORS CORP.

7. Remove the vent hose from the axle housing.

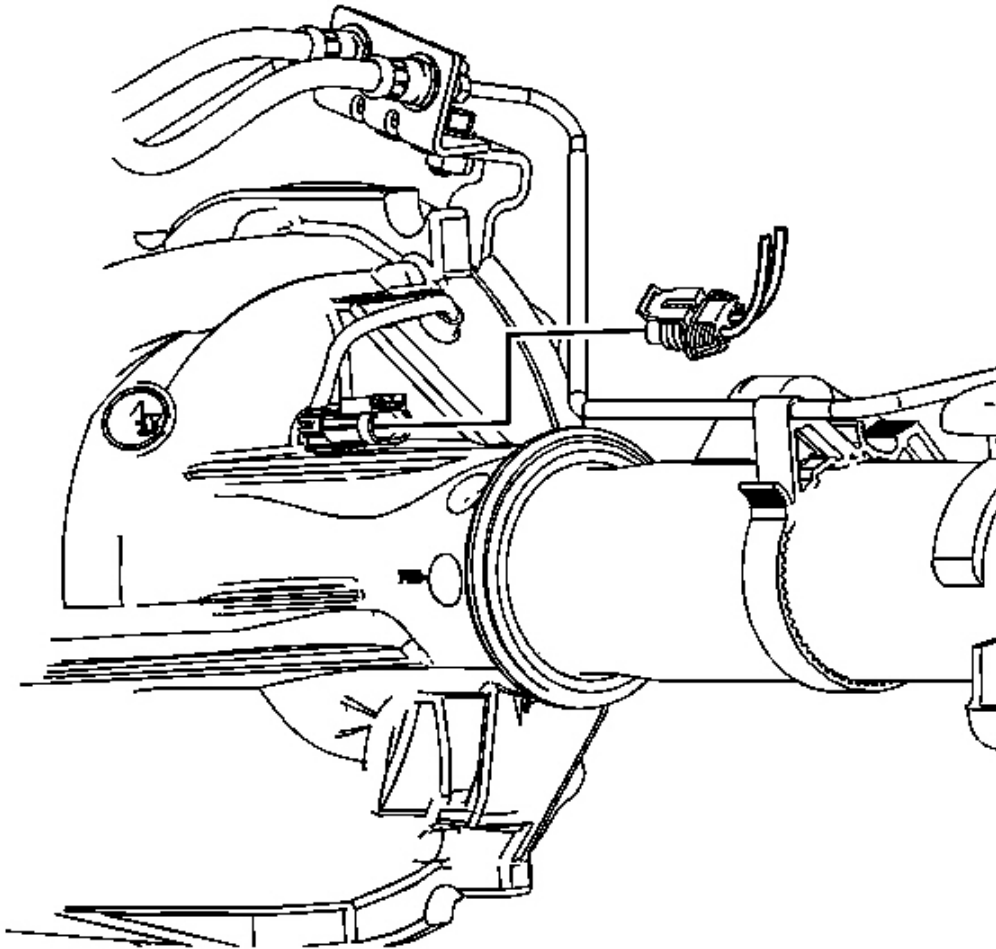


Fig. 91: Locating Electronic Locking Differential Connector
Courtesy of GENERAL MOTORS CORP.

8. Disconnect the electrical connector for the electronic locking differential, if equipped.

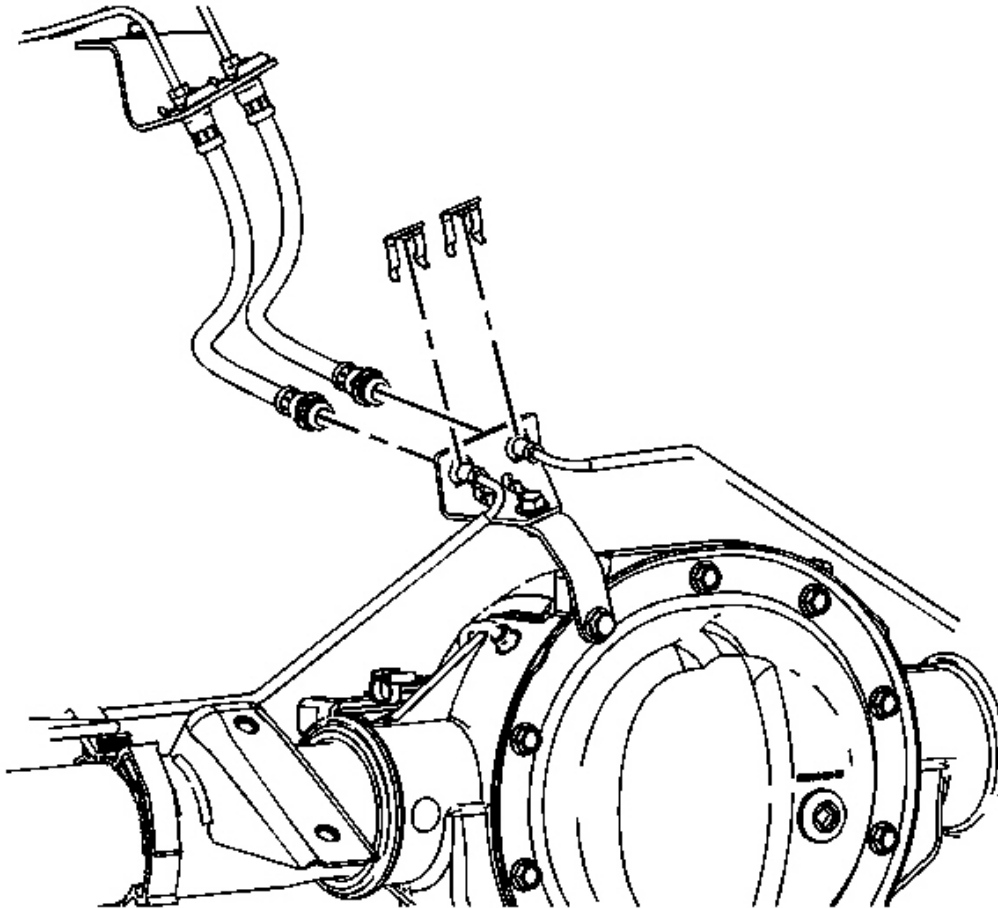


Fig. 92: Locating Brake Line Retaining Clips
Courtesy of GENERAL MOTORS CORP.

9. Remove the retaining clips for the brake line.
10. Remove the brake hoses from the brake pipes.

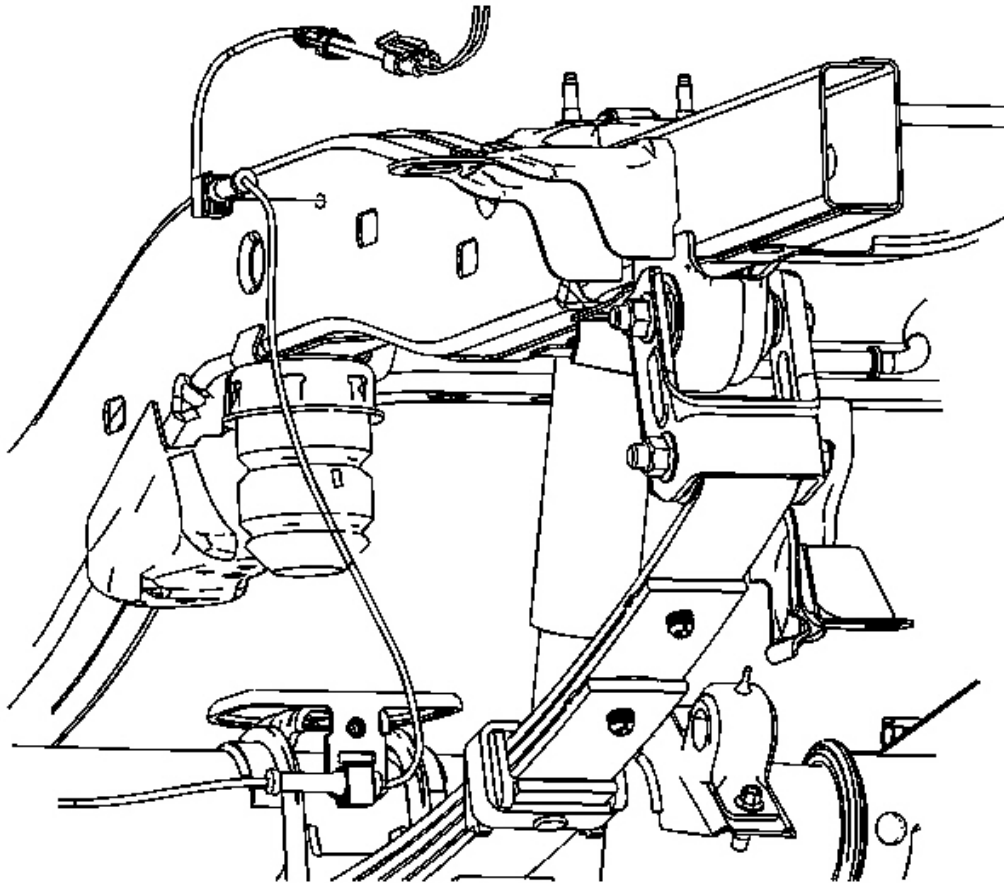


Fig. 93: Locating Rear Speed Sensor Retaining Clips
Courtesy of GENERAL MOTORS CORP.

11. Remove the rear speed sensors retaining clips from frame.
12. Disconnect the rear speed sensors.
13. Support the rear drive axle with a transmission jack stand.

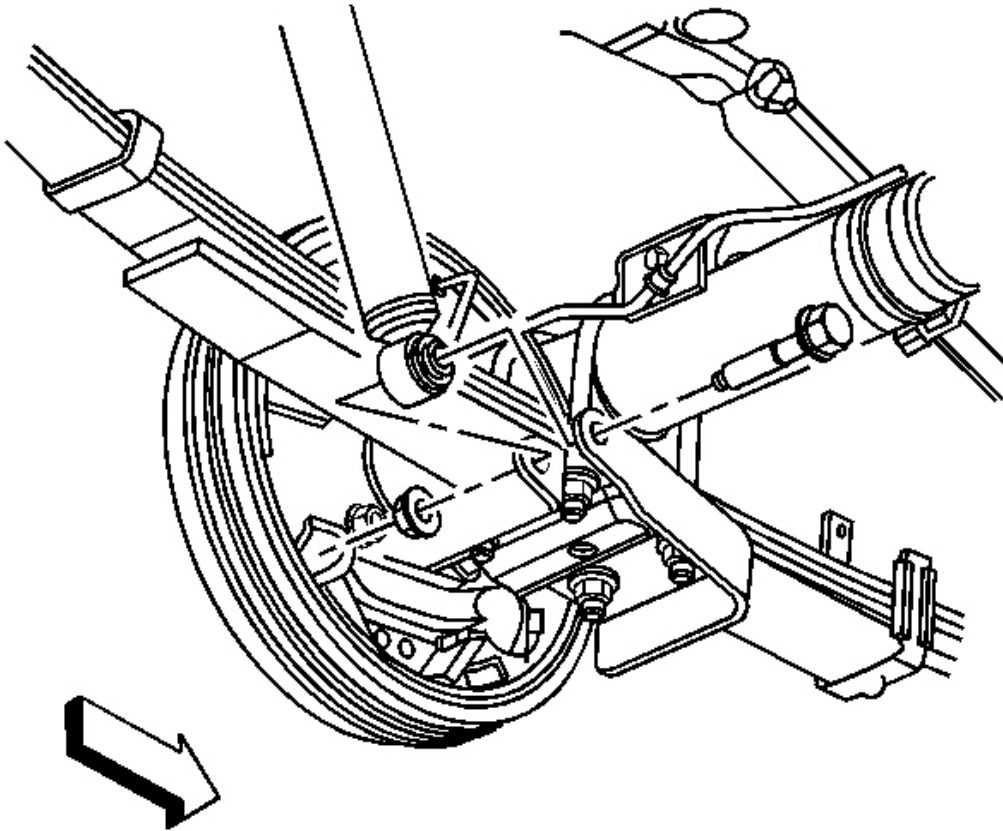


Fig. 94: View Of Lower Shock Absorber Mounting Bolt & Nut
Courtesy of GENERAL MOTORS CORP.

14. Remove the lower shock absorber mounting bolts.

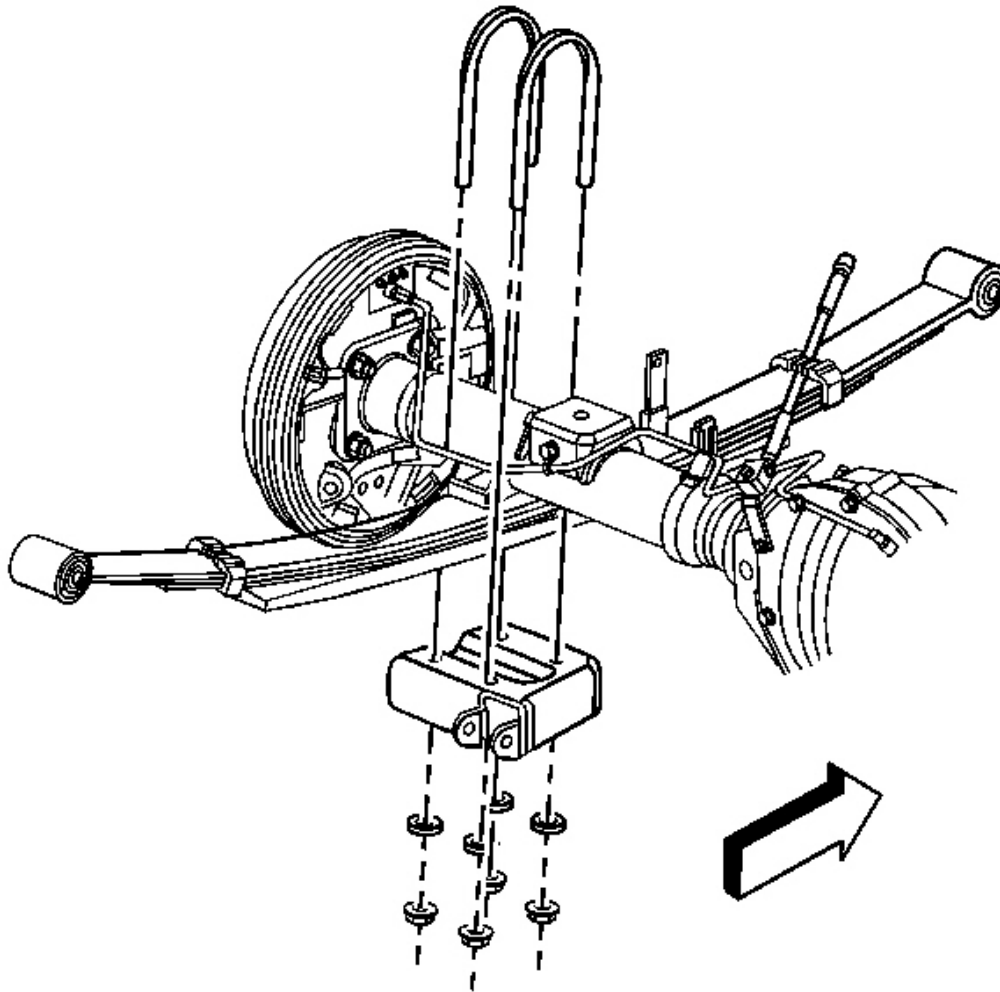


Fig. 95: View Of U-Bolt
Courtesy of GENERAL MOTORS CORP.

15. Remove the U-bolt nuts.
16. Remove the U-bolts from the rear axle housing.
17. Remove the anchor plate.

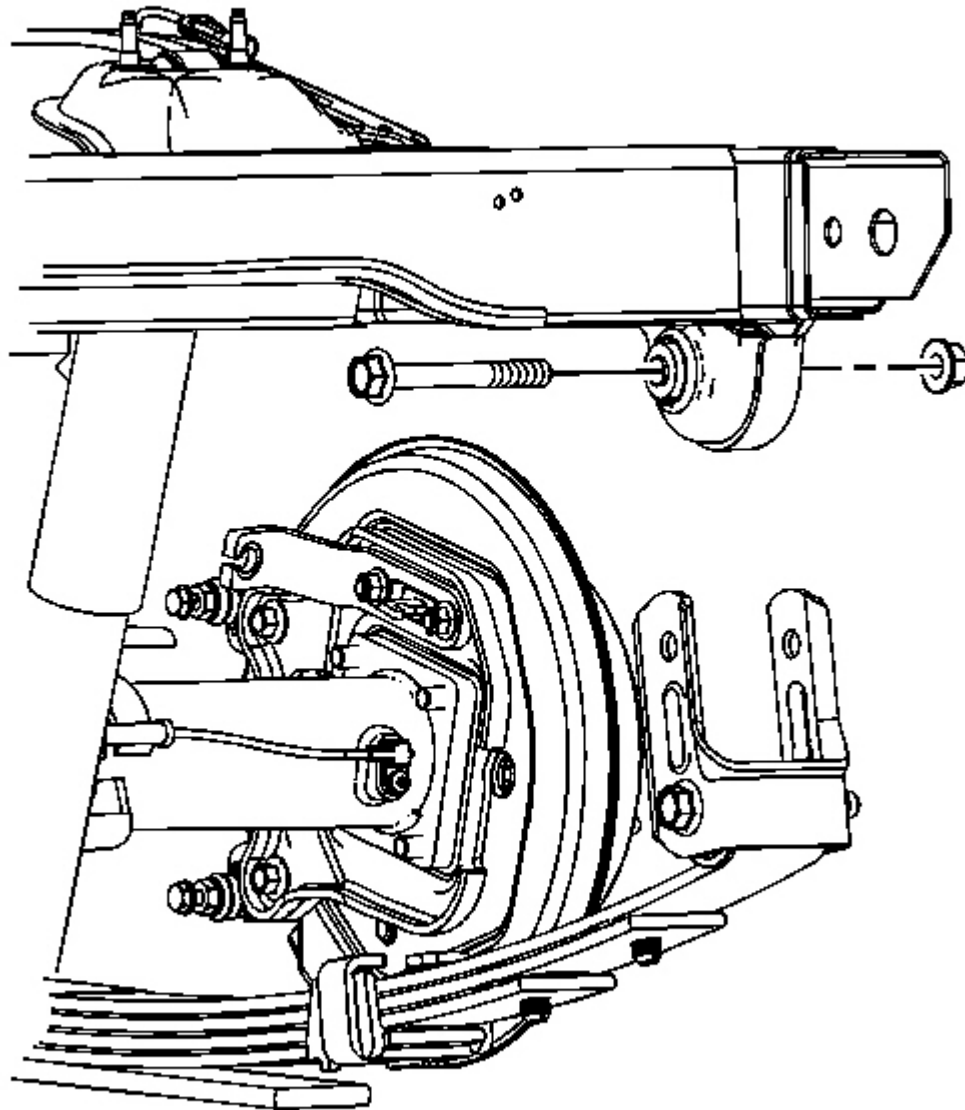


Fig. 96: View Of Rear Leaf Spring Shackles
Courtesy of GENERAL MOTORS CORP.

18. Remove the rear leaf spring shackles.
 1. Remove the shackle bolt and nut.
 2. Lower the leaf spring to allow enough clearance to remove of the rear drive axle.

3. Support the leafs springs with jack stands.

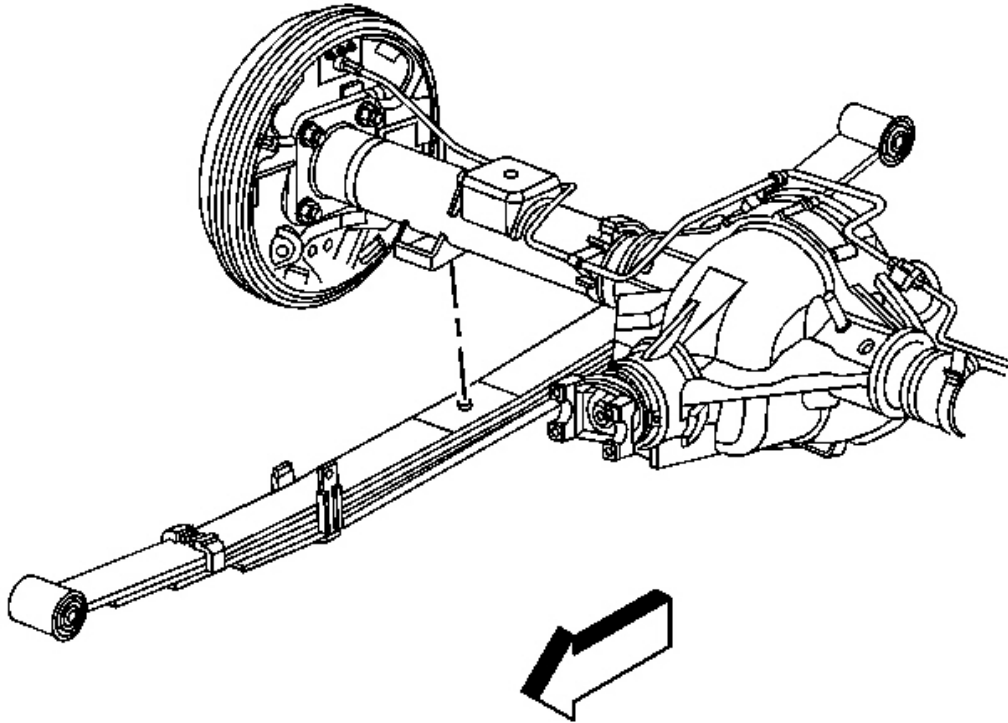


Fig. 97: View Of Rear Axle Assembly
Courtesy of GENERAL MOTORS CORP.

19. With the aid of an assistant and using a transmission jack stand and the remove the rear axle assembly from the vehicle.

Installation Procedure

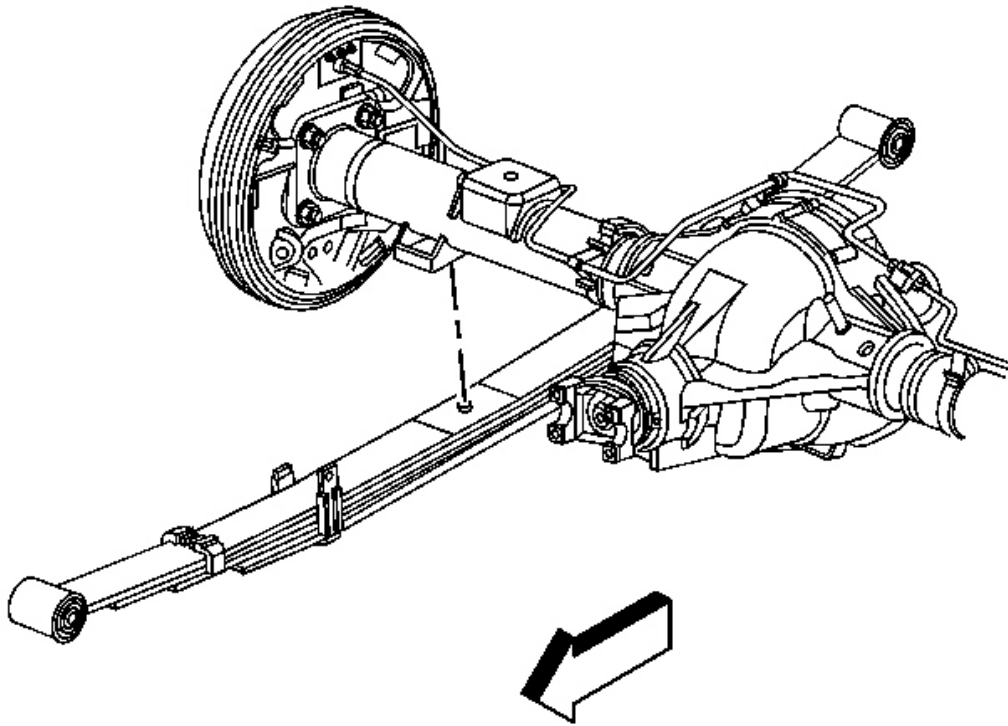


Fig. 98: View Of Rear Axle Assembly
Courtesy of GENERAL MOTORS CORP.

1. Using a transmission jack stand and the aid of an assistant, position the read drive axle over the rear leaf springs.

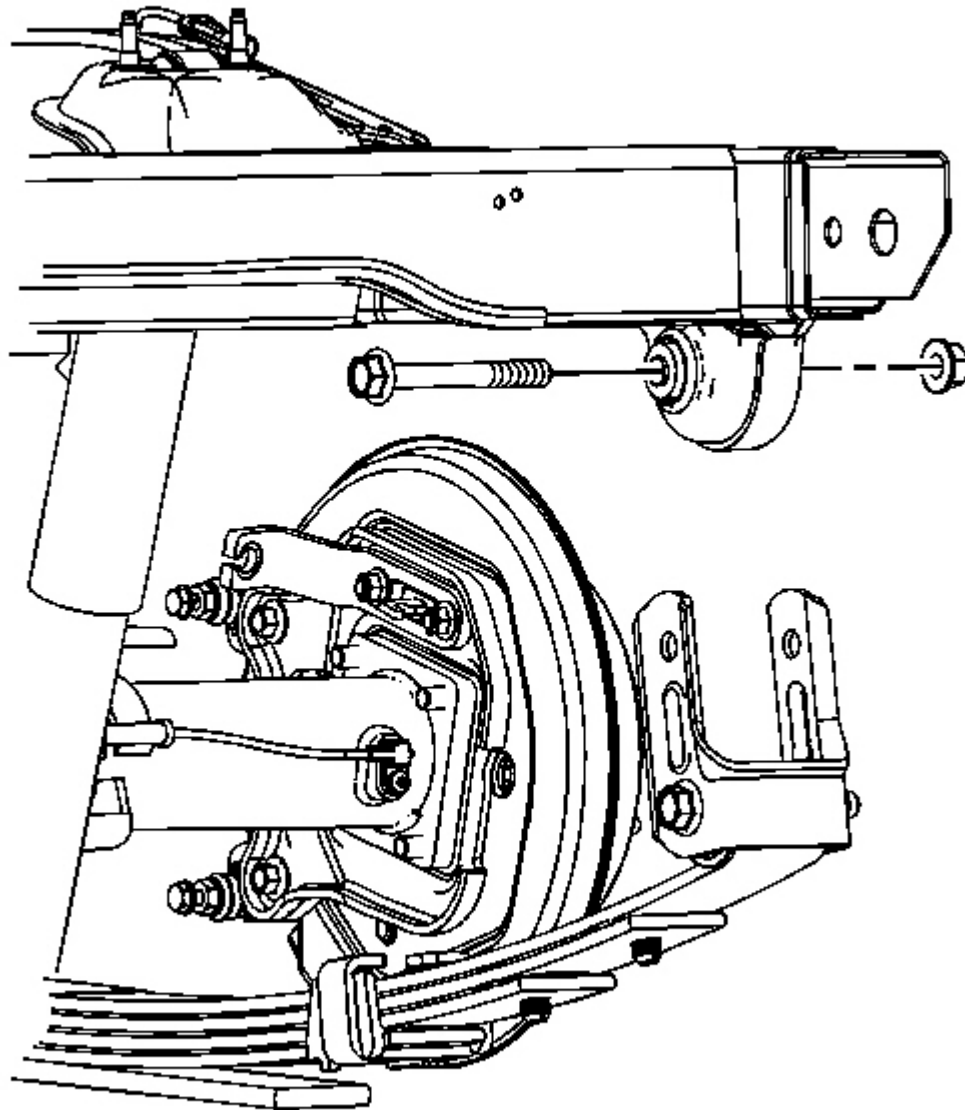


Fig. 99: View Of Rear Leaf Spring Shackles
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

2. Install the rear leaf spring shackles.

Tighten: Tighten the shackle bolt and nut to 85 N.m (63 lb ft).

3. Remove the jack stands.

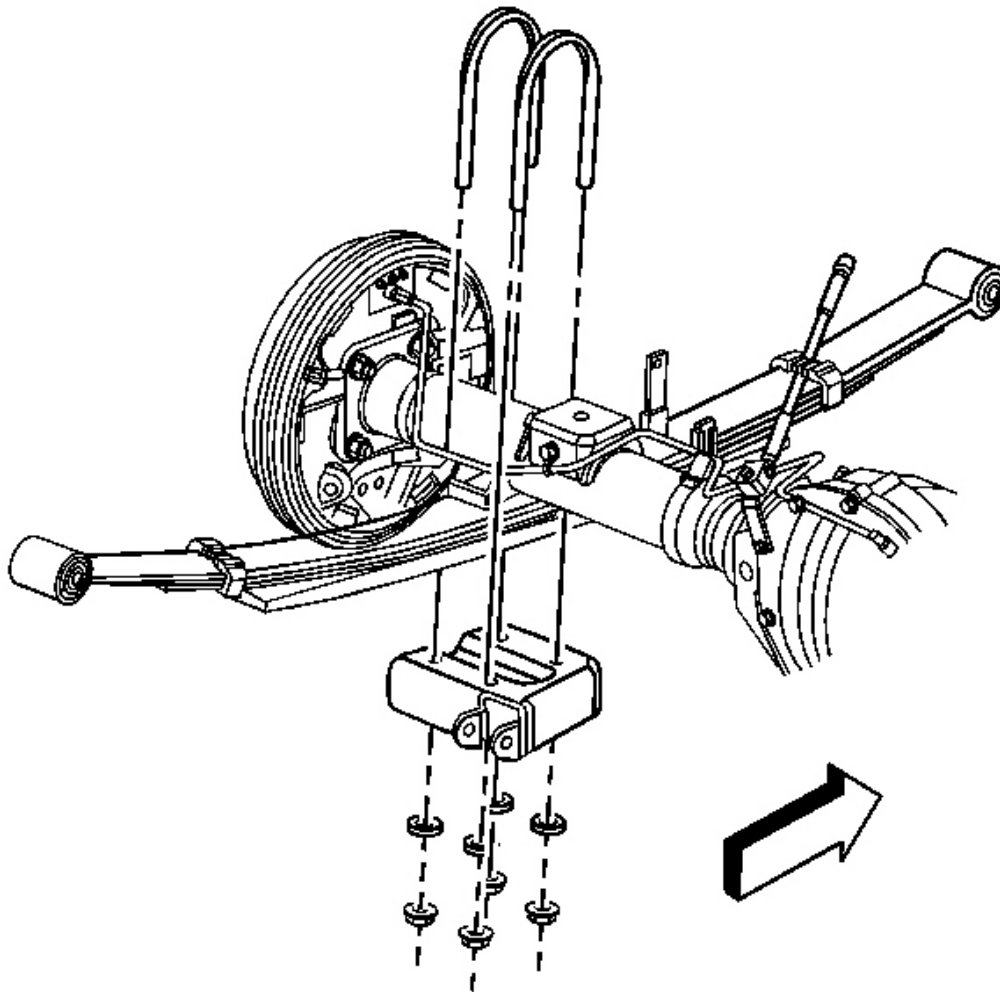


Fig. 100: View Of U-Bolt
Courtesy of GENERAL MOTORS CORP.

4. Position the U-bolts on the rear axle housing.
5. Position the anchor plates on the leaf springs.

NOTE: Refer to Fastener Notice .

6. Install the U-bolt nuts.

Tighten: Tighten the nuts to 76 N.m (56 lb ft).

7. Install the bottom shock absorber nut and bolt.

Tighten: Tighten the nuts to 95 N.m (70 lb ft).

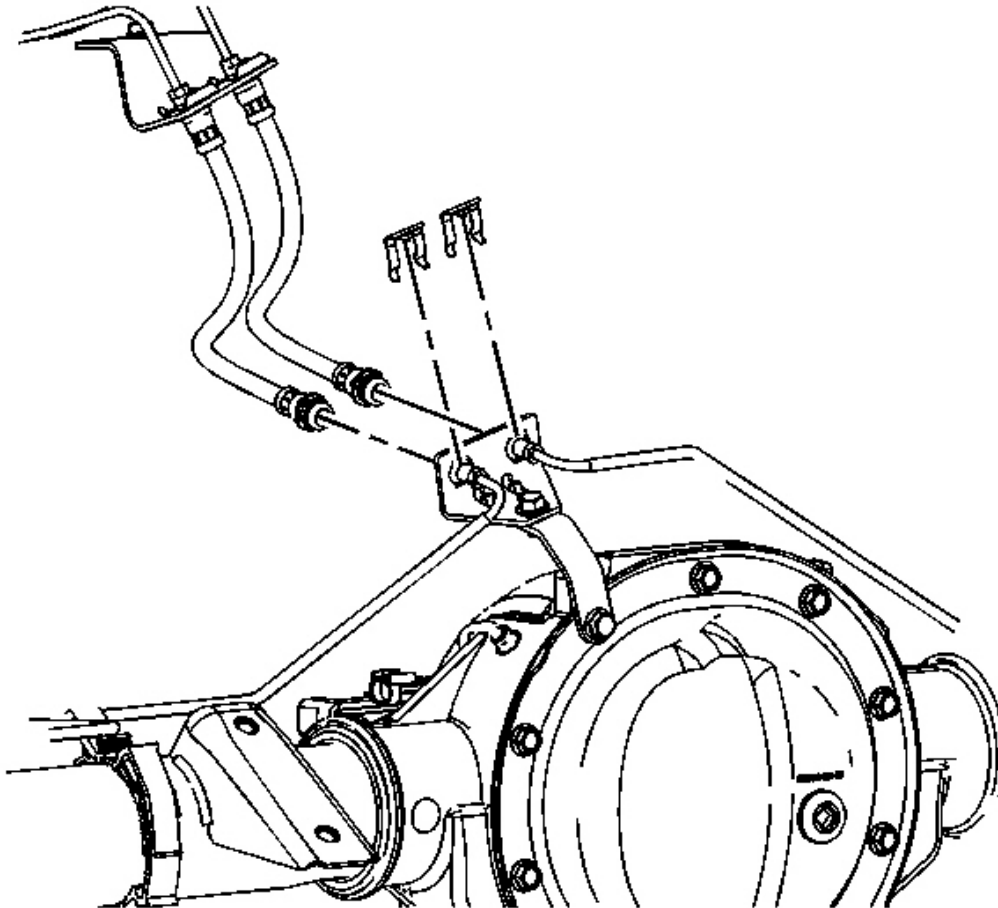


Fig. 101: Locating Brake Line Retaining Clips
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Always use a backup wrench when tightening the brake pipes.

8. Install the brake pipes.

Tighten: Tighten the brake lines to 19 N.m (14 lb ft).

9. Install the retaining clips for the brake line.

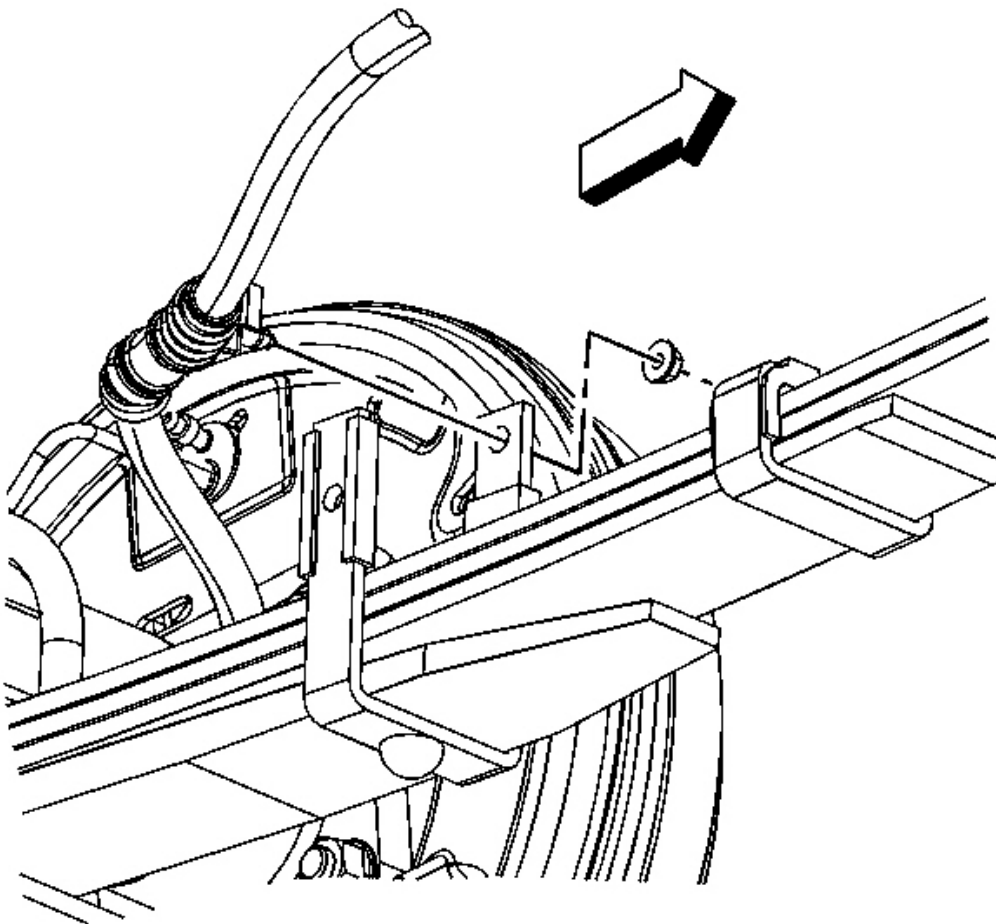


Fig. 102: View Of Rear Leaf Spring Park Brake Cable Retaining Bolt
Courtesy of GENERAL MOTORS CORP.

10. Install the retaining bolts for the park brake cables at the rear leaf springs.

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

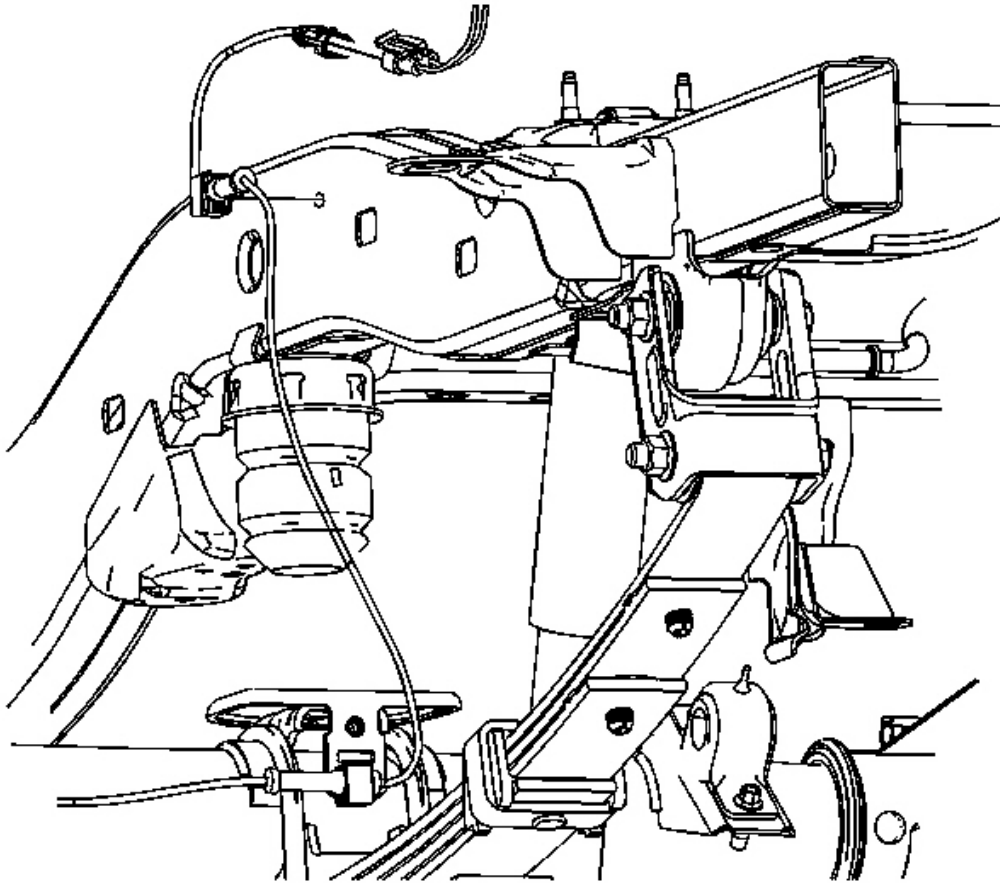


Fig. 103: Locating Rear Speed Sensor Retaining Clips
Courtesy of GENERAL MOTORS CORP.

11. Install the rear speed sensors retainers in the frame. Refer to **Rear Wheel Speed Sensor Replacement** .
12. Reconnect the speed sensor electrical connector.

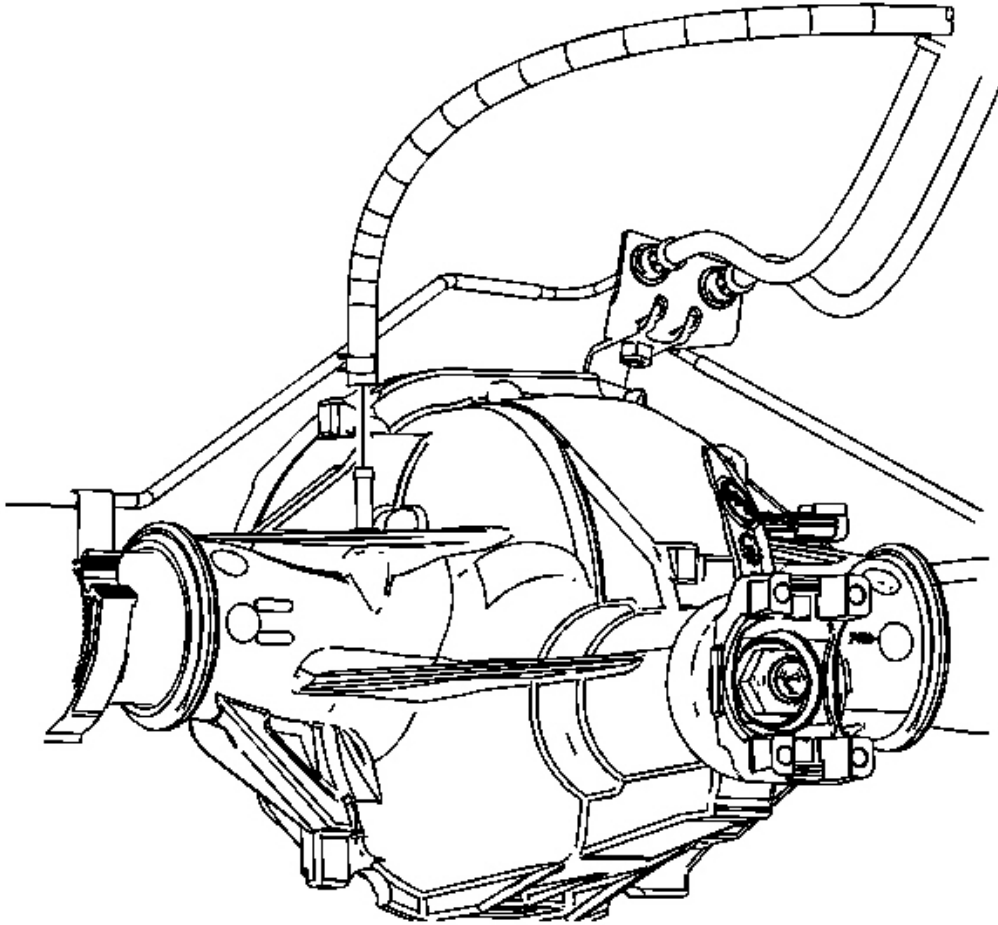


Fig. 104: Identifying Axle Housing Vent Hose
Courtesy of GENERAL MOTORS CORP.

13. Install the vent hose on the axle housing.

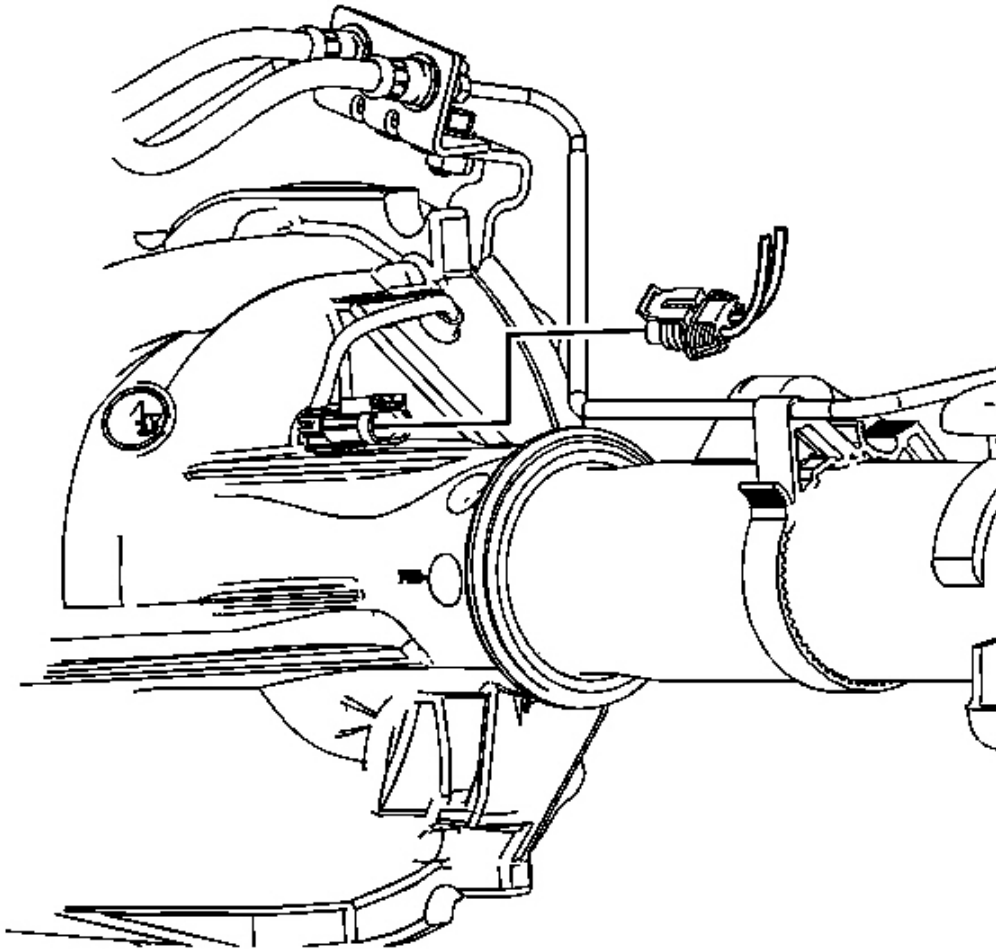


Fig. 105: Locating Electronic Locking Differential Connector
Courtesy of GENERAL MOTORS CORP.

14. Reconnect the electrical connector for the electronic locking differential, if equipped.

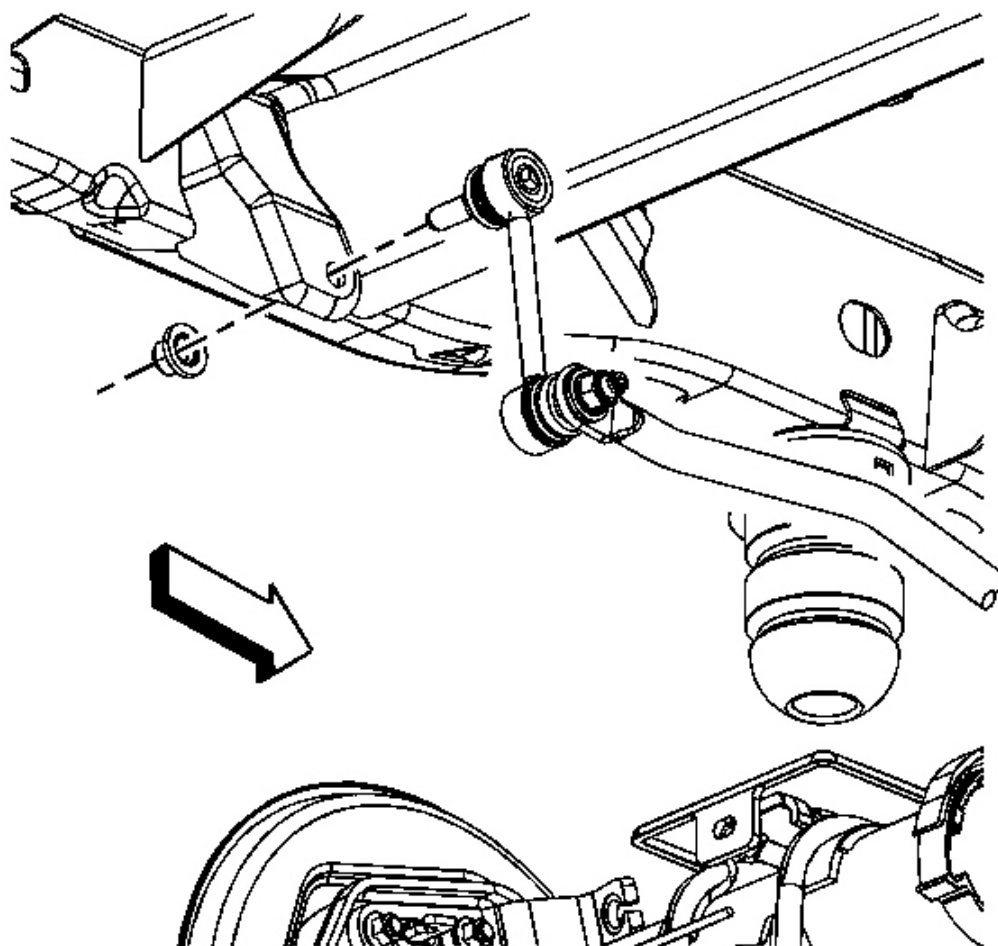


Fig. 106: Removing/Installing Stabilizer Shaft-To-Link Nut
Courtesy of GENERAL MOTORS CORP.

15. Install the sway bar link to the frame. Refer to **Stabilizer Shaft Link Replacement** .
16. Install the propeller shaft. Refer to **Rear Propeller Shaft Replacement** .
17. Fill the rear axle housing with fluid. Refer to **Rear Axle Lubricant Level Inspection** .
18. Remove the support stands.
19. Lower the vehicle.

REAR AXLE HOUSING REPLACEMENT

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the axle lubricant. Refer to **Rear Axle Lubricant Replacement**.
3. Remove the rear axle assembly. Refer to **Rear Axle Replacement**.
4. Remove the rear axle housing cover and gasket. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
5. Remove the axle shafts. Refer to **Rear Axle Shaft Replacement**.
6. Remove the differential assembly. Refer to **Drive Pinion and Ring Gear Replacement**.
7. Remove the disc brake backing plates. Refer to **Rear Disc Brake Backing Plate Replacement** .
8. Remove the drive pinion shaft yoke and the seal. Refer to **Drive Pinion Flange/Yoke and/or Oil Seal Replacement**.
9. Remove the drive pinion. Refer to **Drive Pinion and Ring Gear Replacement**.

Installation Procedure

1. Install the drive pinion. Refer to **Drive Pinion and Ring Gear Replacement**.
2. Install the differential assembly. Refer to **Drive Pinion and Ring Gear Replacement**.
3. Adjust the differential side bearing preload. Refer to **Differential Side Bearing Preload Adjustment**.
4. Adjust the backlash. Refer to **Backlash Adjustment**.
5. Perform a gear tooth contact pattern check. Refer to **Gear Tooth Contact Pattern Inspection**.
6. Install the disc brake backing plates. Refer to **Rear Disc Brake Backing Plate Replacement** .
7. Install the axle shafts. Refer to **Rear Axle Shaft Replacement**.
8. Install the rear axle housing cover and gasket. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
9. Install the rear axle. Refer to **Rear Axle Replacement**.
10. Fill the axle with lubricant. Refer to **Rear Axle Lubricant Replacement**.
11. Lower the vehicle.

ELECTRONIC LOCKING DIFFERENTIAL COIL LOCK REPLACEMENT

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the differential assembly. Refer to **Differential Replacement**.
3. Remove the differential side bearing. Refer to **Differential Side Bearings Replacement**.

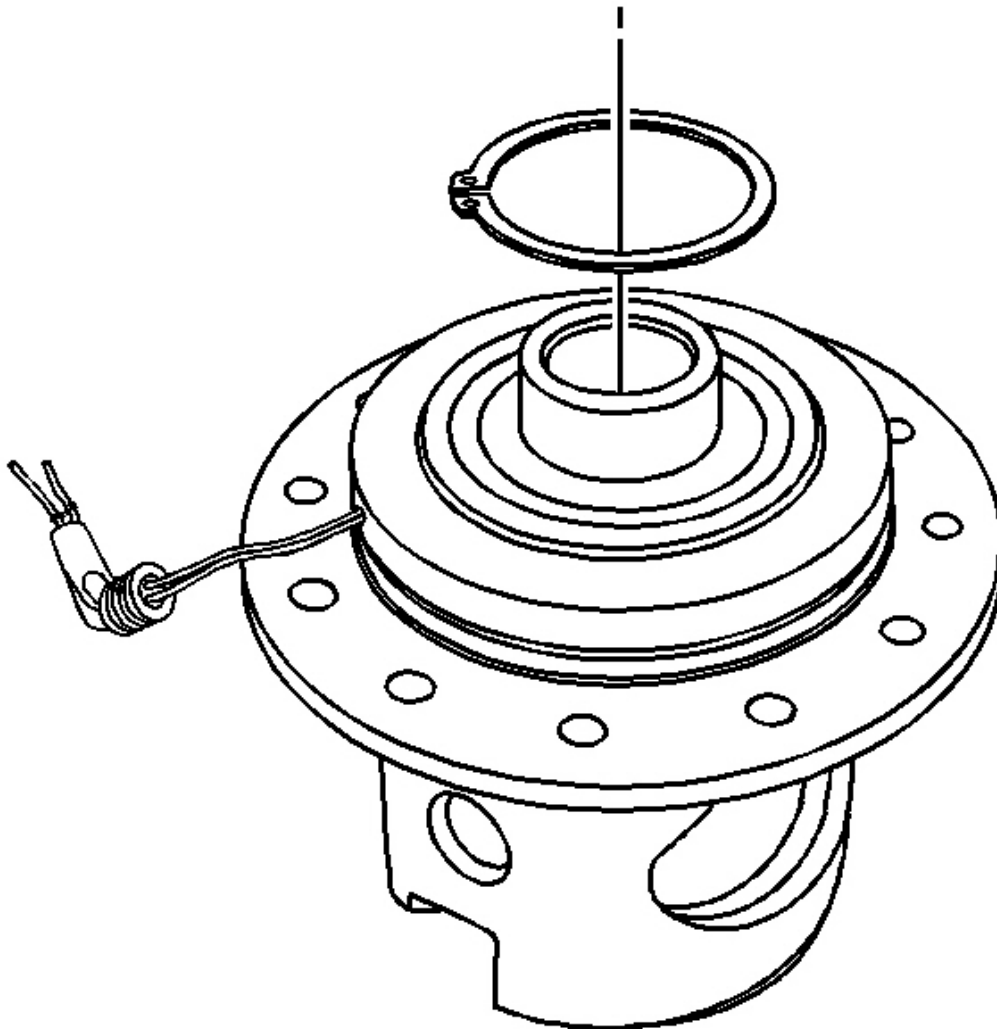


Fig. 107: Identifying Differential Bearing Retainer
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The differential bearing race must be compressed in order to

remove the differential bearing retainer.

4. Remove the differential bearing retainer by performing the following steps:
 1. With the aid of an assistant, push the differential bearing race down towards the differential case in order to relieve the pressure against the differential bearing retainer.
 2. Remove the differential bearing retainer.

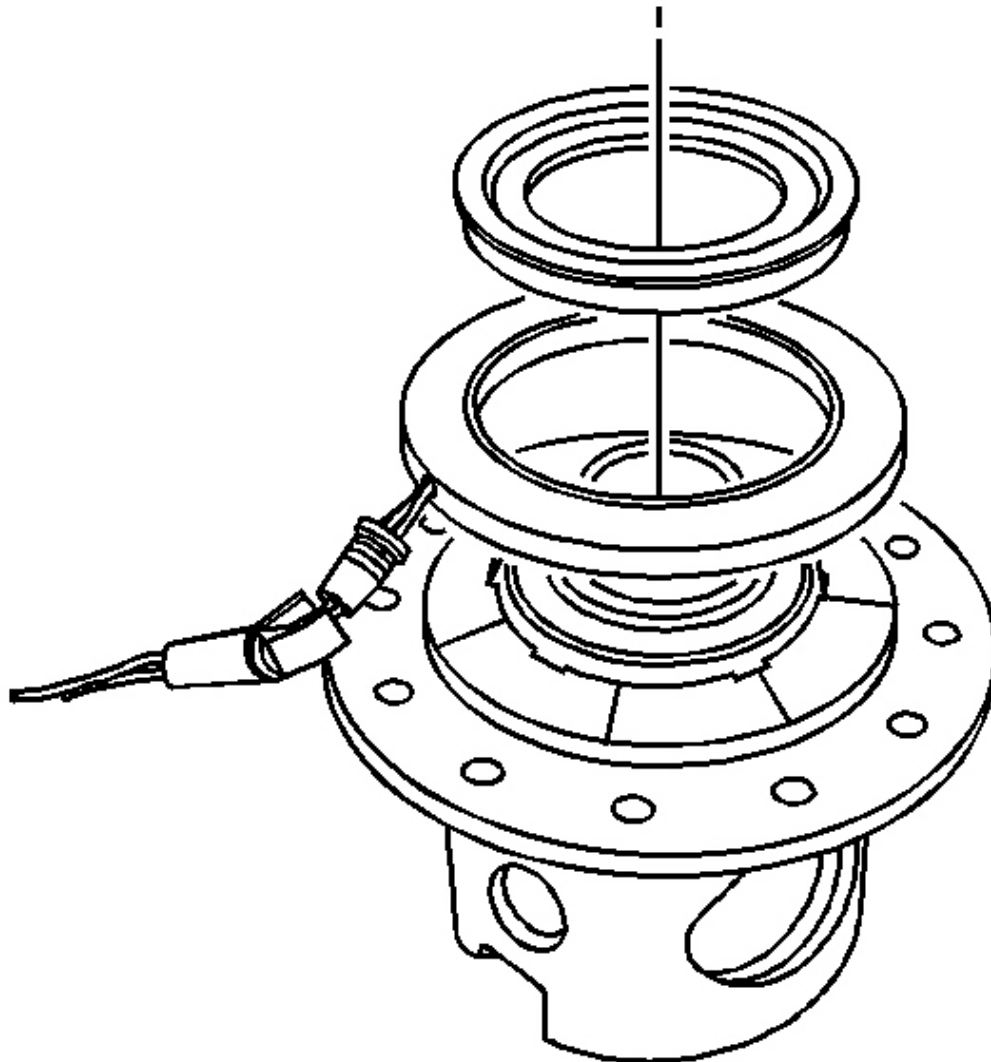


Fig. 108: View Of Differential Bearing Race
Courtesy of GENERAL MOTORS CORP.

5. Remove the differential bearing race.
6. Remove the locking differential coil assembly.

Installation Procedure

1. Lubricate the differential bearing assembly, the differential coil assembly and the differential bearing race with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .

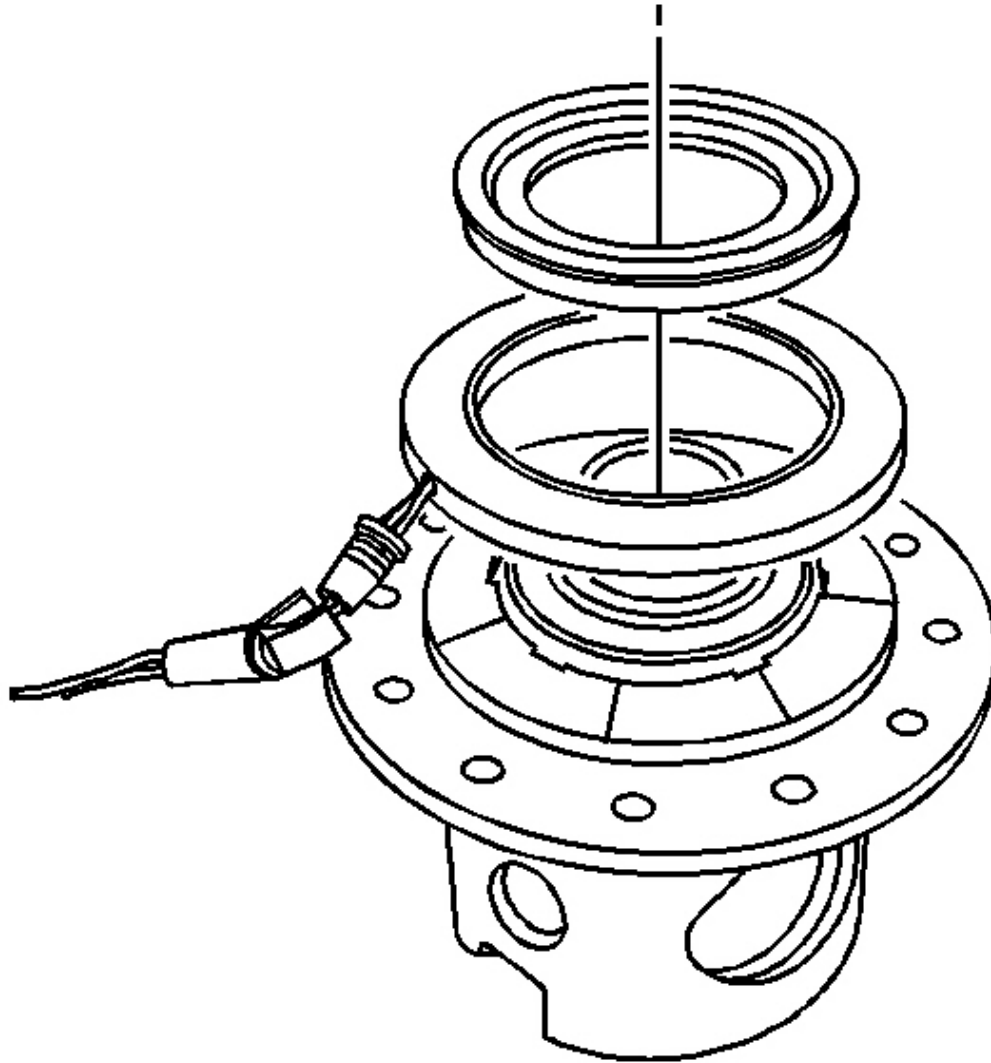


Fig. 109: View Of Differential Bearing Race
Courtesy of GENERAL MOTORS CORP.

2. Install the locking differential coil assembly.
3. Install the differential bearing race.

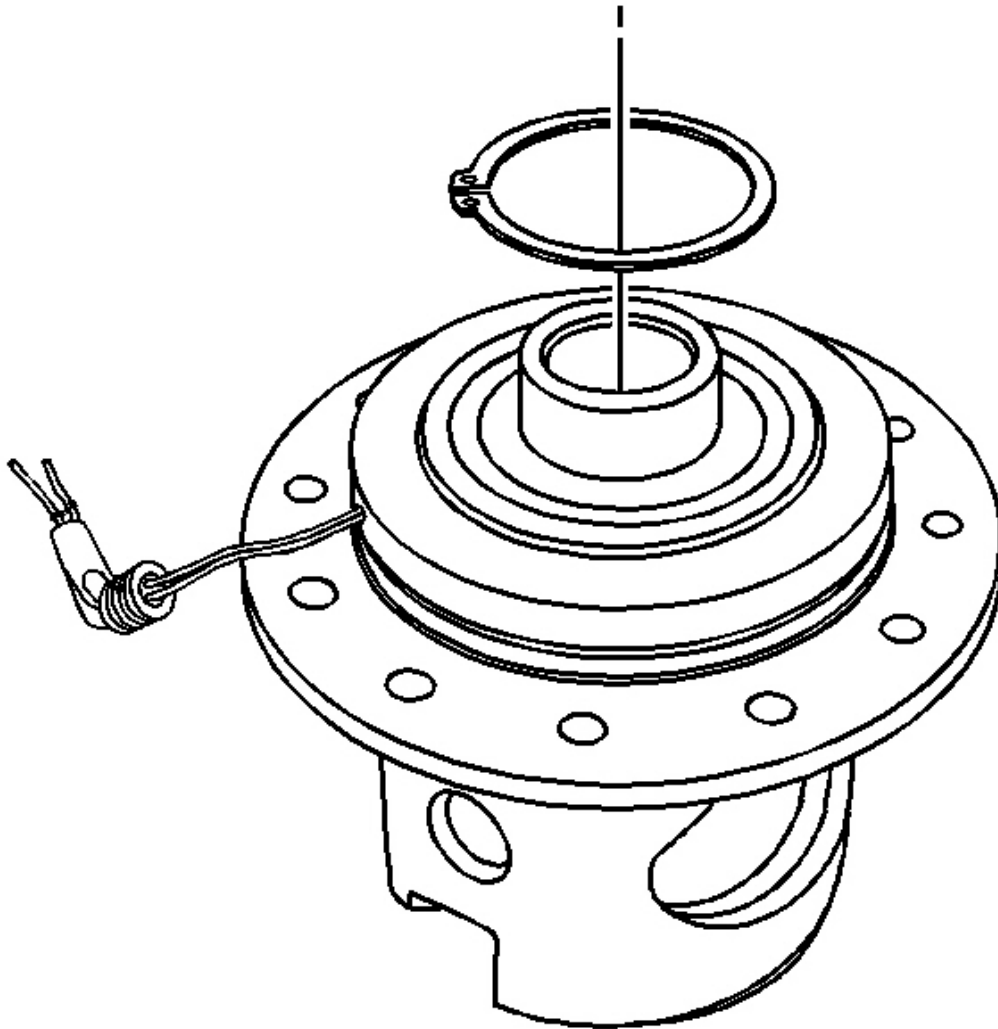


Fig. 110: Identifying Differential Bearing Retainer
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The differential bearing race must be compressed in order to install the differential bearing retainer.

4. Install the differential bearing retainer by performing the following steps:
 1. Install the differential bearing retainer.
 2. With the aid of an assistant, push the differential bearing race down towards the

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2007 Driveline/Axle Rear Drive Axle - H3

differential case in order to compress the differential bearing retainer and differential coil assembly against the locking differential coil plate.

3. Install the differential bearing retainer.

Make sure the differential bearing retainer is evenly and fully seated in the differential bearing retainer slot before releasing the differential bearing race.

5. Install the differential side bearing. Refer to **Differential Side Bearings Replacement**.
6. Install the differential assembly. Refer to **Differential Replacement**.
7. Lower the vehicle.

DIFFERENTIAL OVERHAUL

Disassembly Procedure

1. Remove the differential side bearings. Refer to **Differential Side Bearings Replacement**.

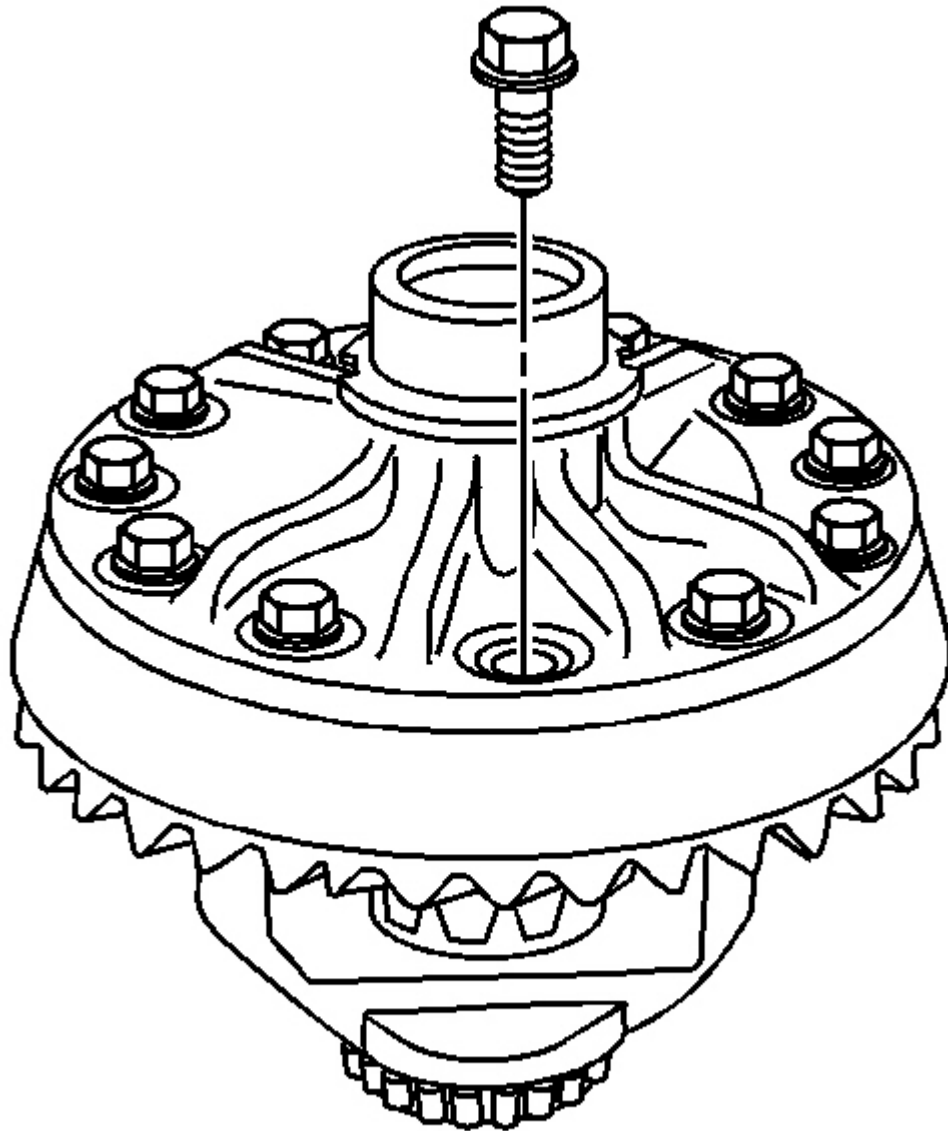


Fig. 111: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

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

2. Remove the ring gear bolts. Discard the bolts.

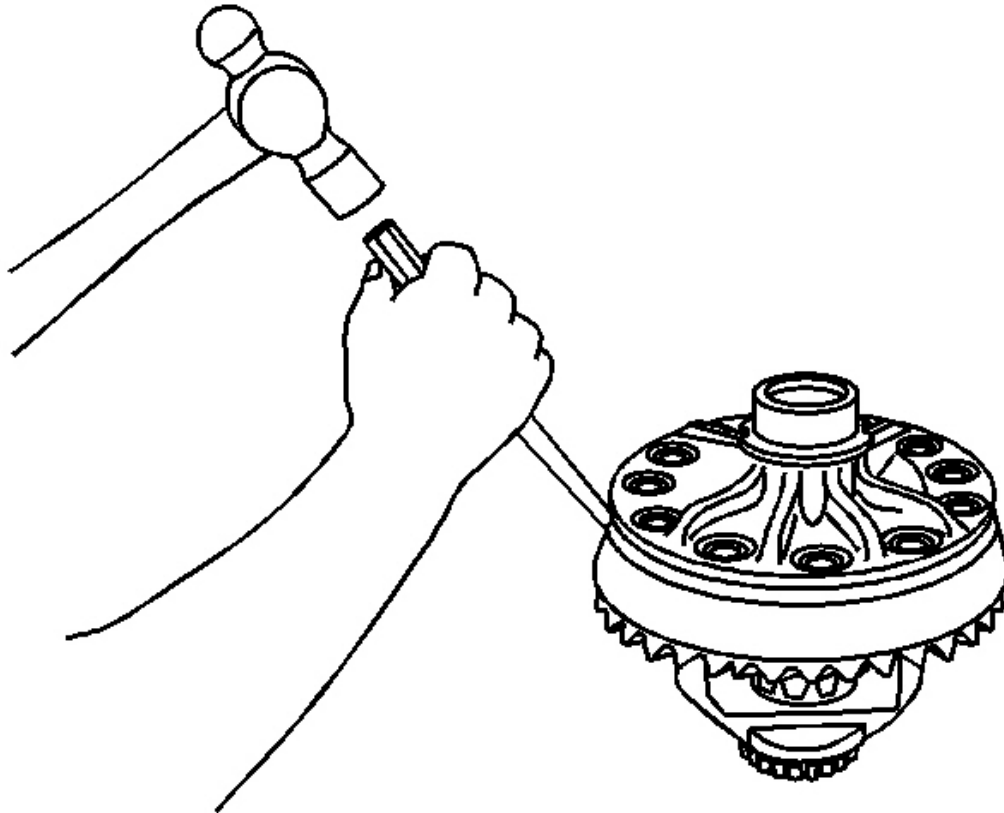


Fig. 112: Removing Ring Gear From Differential
Courtesy of GENERAL MOTORS CORP.

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

3. Remove the ring gear from the differential case.

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

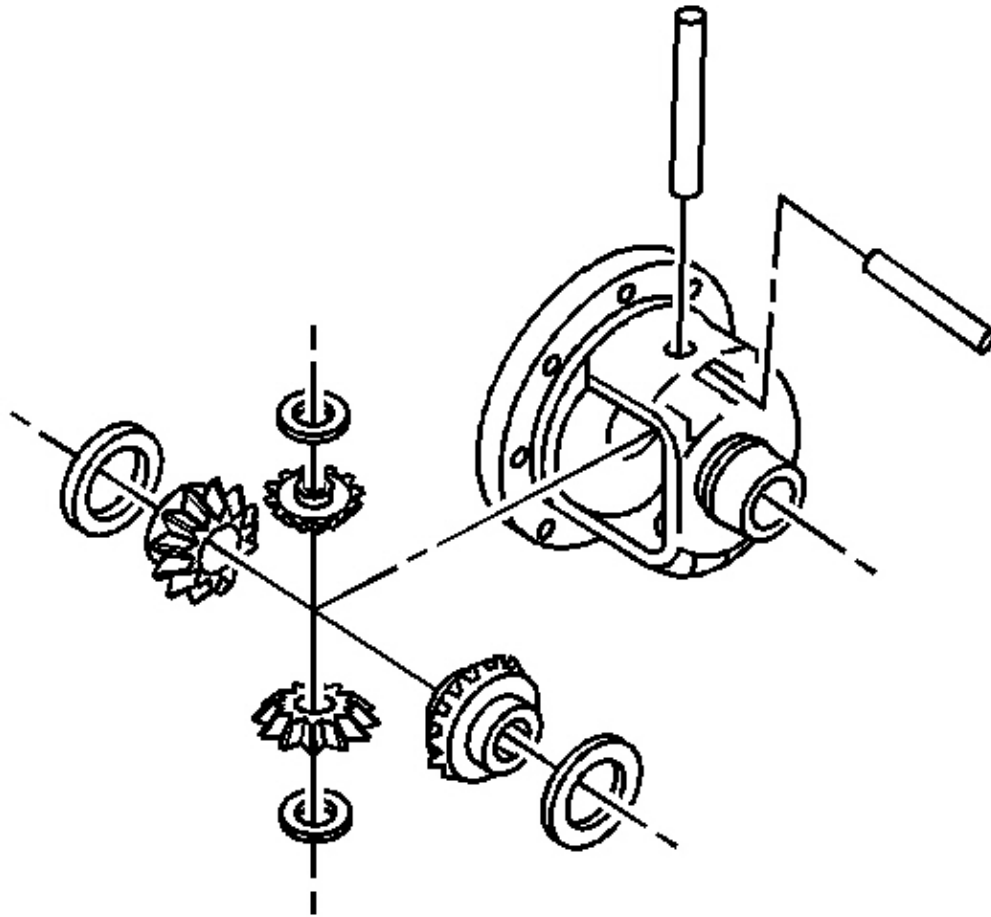


Fig. 113: Exploded View Of Differential Case
Courtesy of GENERAL MOTORS CORP.

4. Remove the differential pinion gears and the differential side gears by performing the following steps:
 1. Mark the pinion gears top and bottom and the differential side gears left and right.
 2. Remove the pinion shaft lock bolt.
 3. Remove the pinion shaft.
 4. Roll the differential pinion gears out of the case with the pinion gear thrust washers.
 5. Remove the differential side gears and the side gear thrust washers.

Assembly Procedure

1. Lubricate the pinion and side gears using axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .
2. Install the differential side gear thrust washers to the differential side gears.
3. Install the differential side gears and thrust washers into the differential case.

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

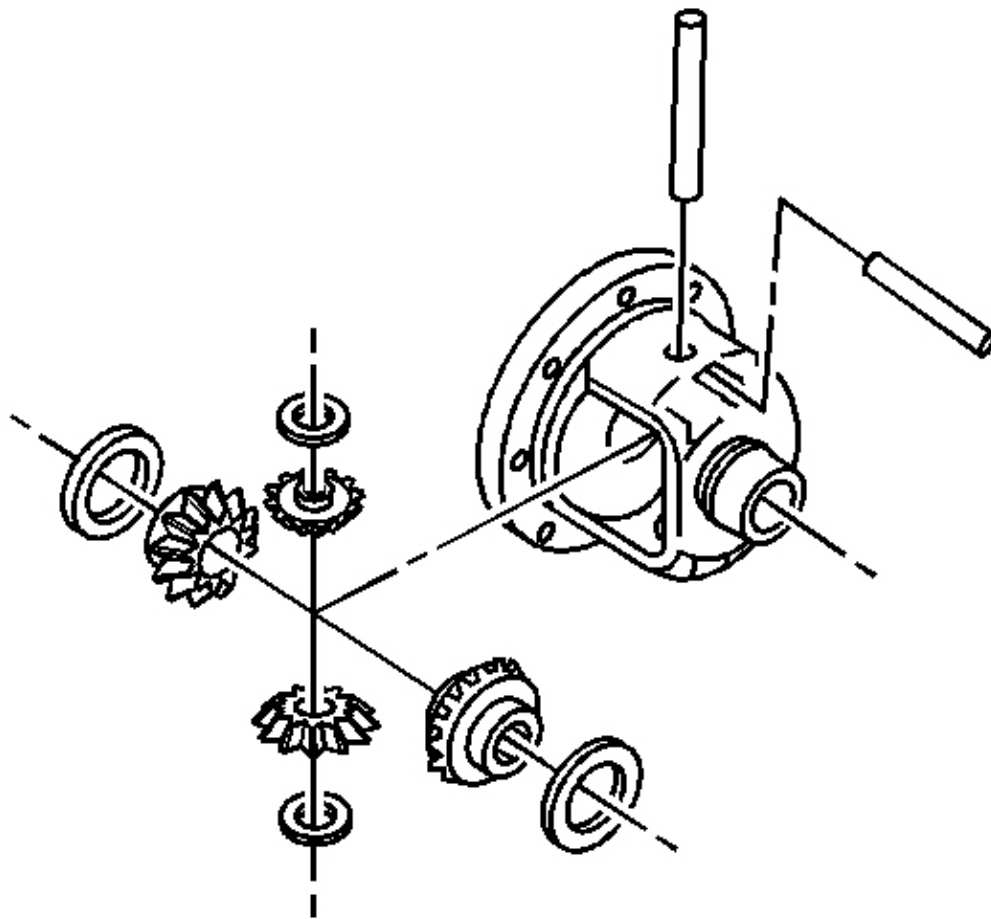


Fig. 114: Exploded View Of Differential Case
Courtesy of GENERAL MOTORS CORP.

4. Install the differential pinion gears and pinion gear thrust washers by performing the following steps:
 1. Position one pinion gear between the differential side gears.
 2. Position the second pinion gear between the differential side gears directly opposite the of the first gear.
 3. Rotate the differential side gears until the pinion gears is directly opposite the opening in the differential case.
 4. Install the thrust washers.

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

5. Install the pinion shaft.

NOTE: Refer to Fastener Notice .

6. Install a new pinion shaft lock bolt.

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

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

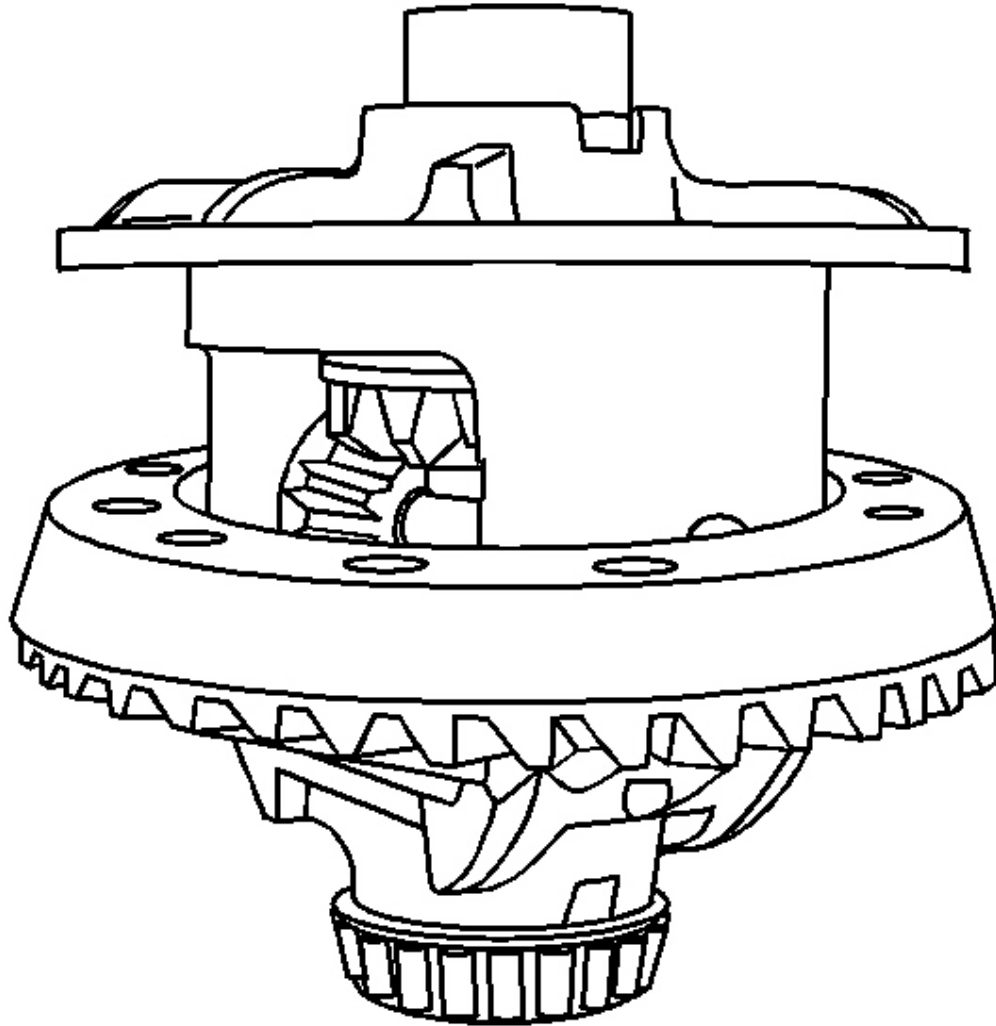


Fig. 115: Installing Ring Gear Onto Differential Case
Courtesy of GENERAL MOTORS CORP.

7. Install the ring gear to the differential case.

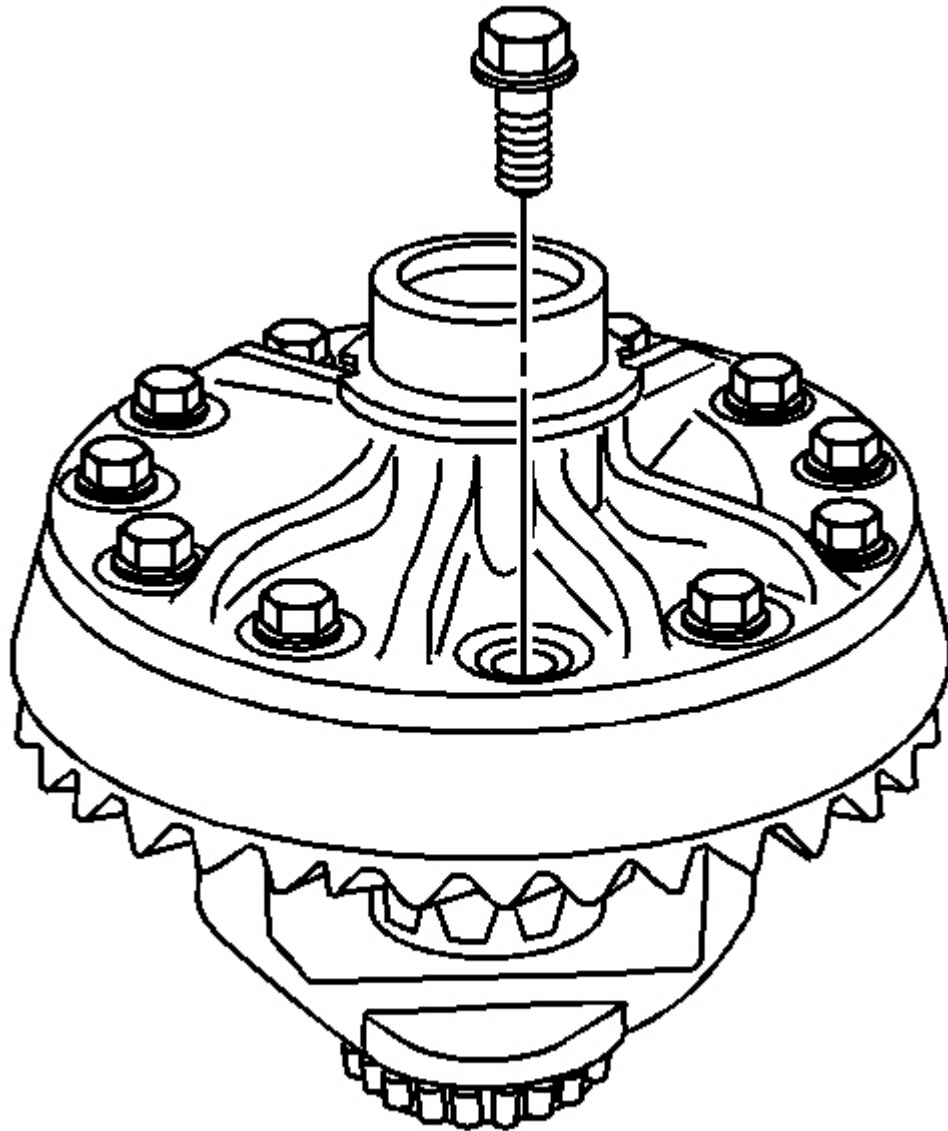


Fig. 116: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

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

8. Install the new ring gear bolts.

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

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

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

10. Install the differential side bearings. Refer to **Differential Side Bearings 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.

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- 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

- IMPORTANT:**
- **Do not reinstall the original cast iron production shims, if removed. Once the cast iron shims are removed from the axle housing, they must be replaced with service shims and spacers.**
 - **If service shims were previously installed, the shims can be reused.**

Inspect the shims for cracks and chips. Replace the damaged shims.

PINION DEPTH ADJUSTMENT

Tools Required

- **J 8001** Dial Indicator Set
- **J 34925** Pinion Setting Gage and Components

Adjustment Procedure

IMPORTANT: Make sure all of the tools, the differential side bearing bores

and the pinion bearing cups are clean before proceeding.

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

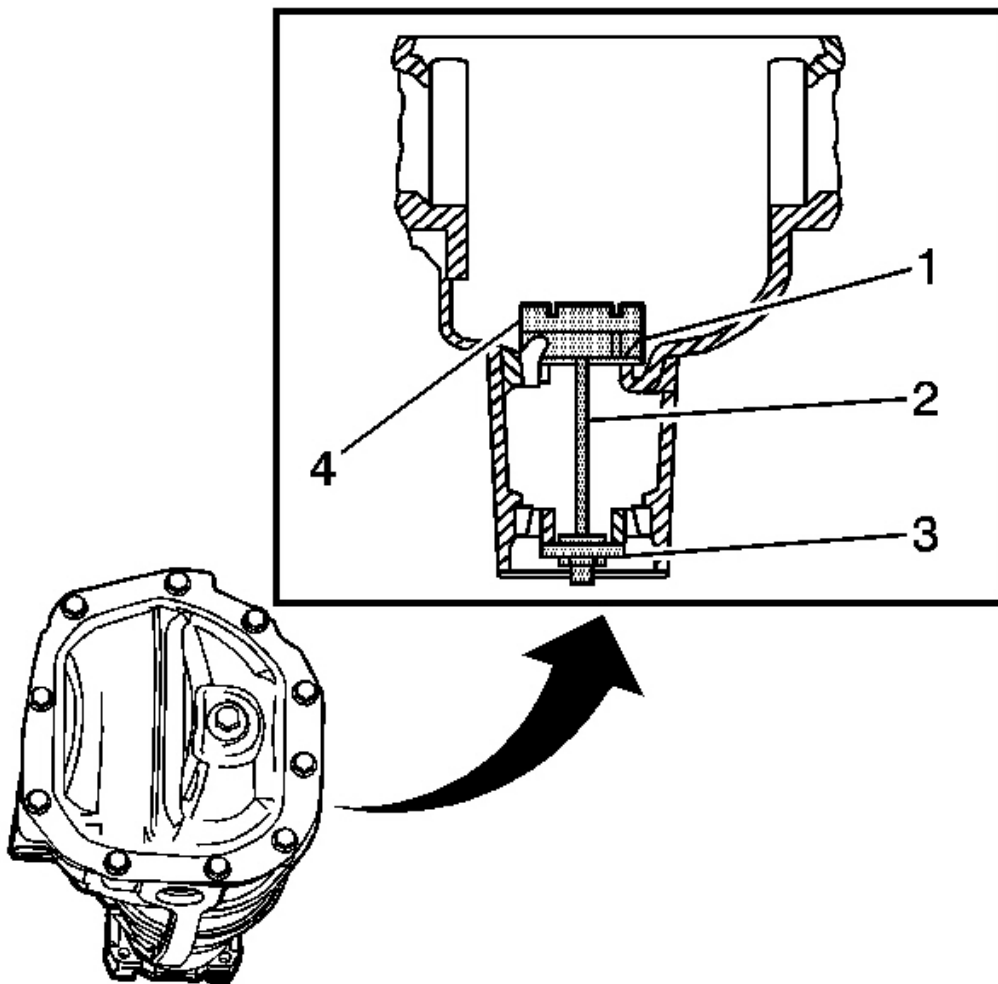


Fig. 117: Assembling J 21777-35, J 21777-43, J 21777-42 & J 23597-11
Courtesy of GENERAL MOTORS CORP.

3. Assemble the J 21777-40 (1), the J 21777-43 (2), the J 21777-42 (3) and the J 23597-11

(4) into the axle housing as shown. See **Special Tools**.

NOTE: Refer to **Fastener Notice** .

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

Tighten: Tighten the nut on the **J 21777-43** until a rotating torque of 1. See **Special Tools**.7-2.8 N.m (15-25 lb in) is obtained.

5. Rotate the assembly several times in both directions in order to seat the pinion bearings.
6. Check the rotating torque of the assembly. If the torque is less than 1.7 N.m (15 lb in), continue to tighten the nut on the **J 21777-43** until a rotating torque of 1. See **Special Tools**.7-2.8 N.m (15-25 lb in) is obtained.

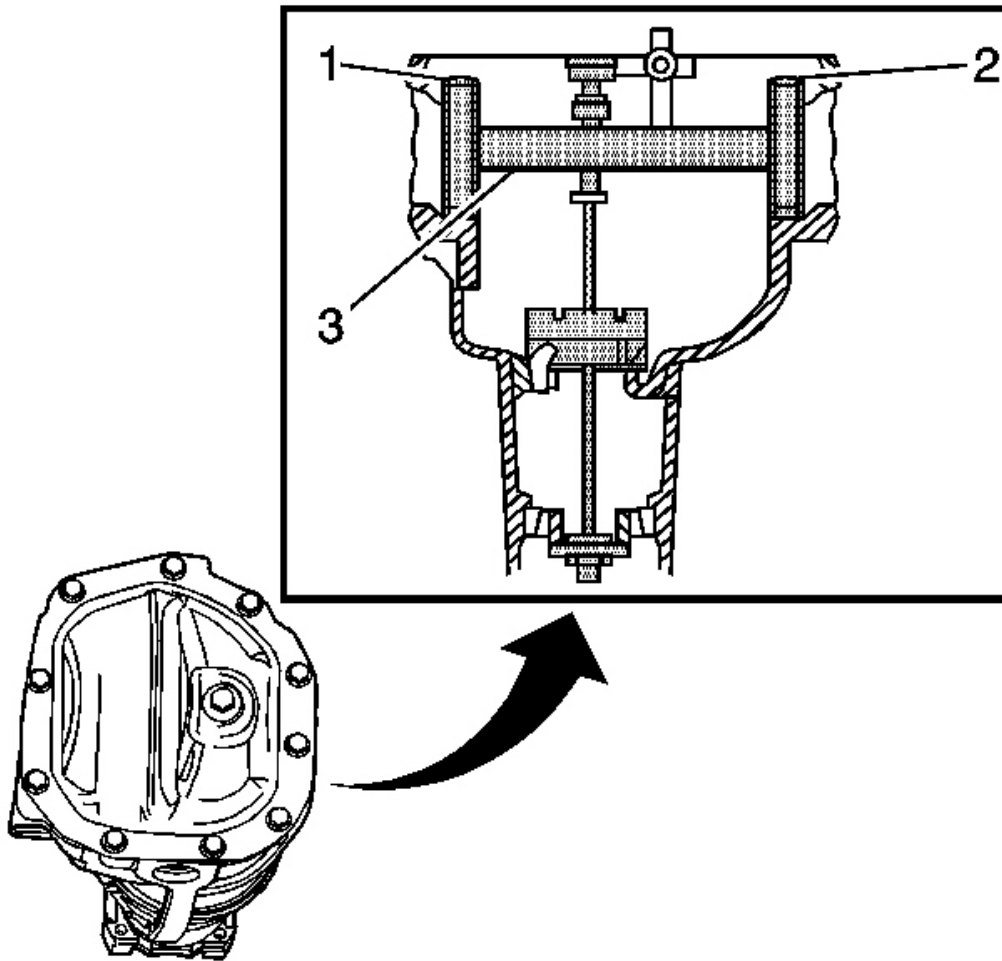


Fig. 118: Assembling J 21777-45 & J 21777-1
Courtesy of GENERAL MOTORS CORP.

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

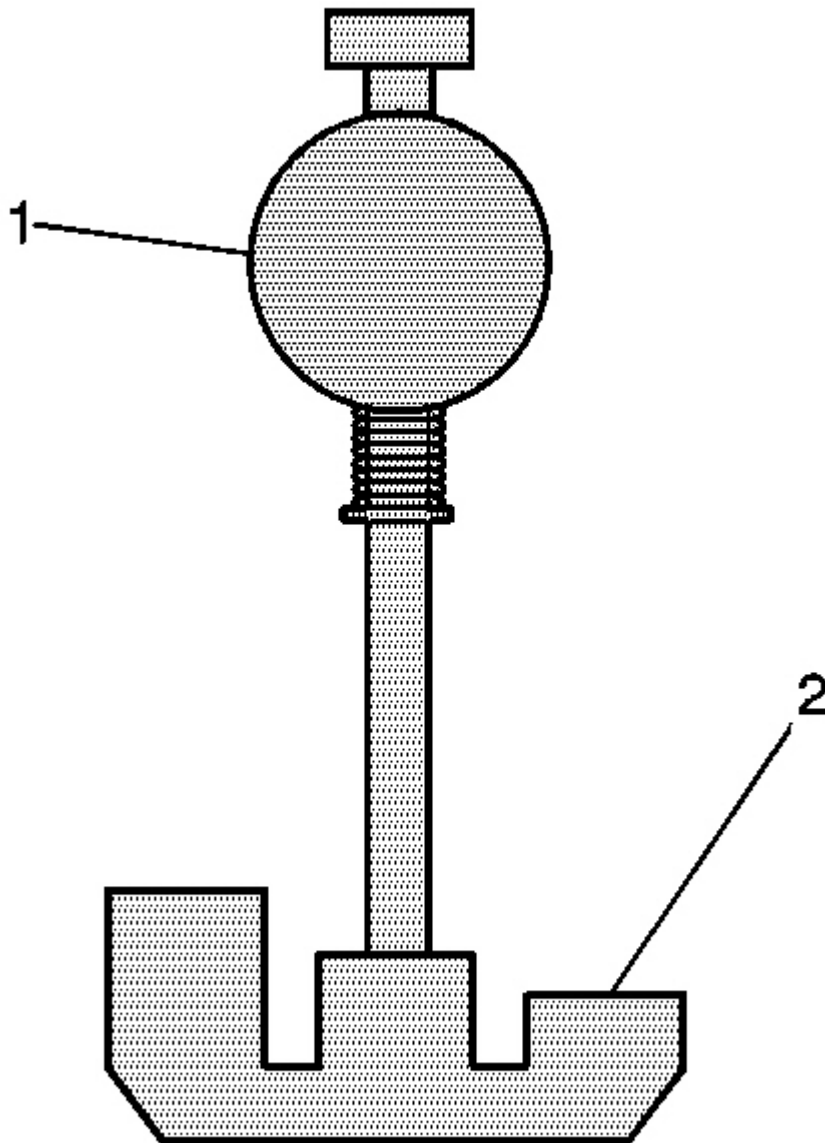


Fig. 119: Identifying J 21777-1 & J 44416-3
Courtesy of GENERAL MOTORS CORP.

9. Align the plunger of the J 23597-1 (1) to the J 23597-11 (2).
10. Install the **J 8001** to the J 23597-1 as follows:

1. Loosely clamp the **J 8001** onto the stem on the J 23597-1.
 2. Place the contact pad of the **J 8001** onto the mounting post of the J 23597-1.
 3. With the contact pad of the **J 8001** touching the mounting post of the J 23597-1, loosen the lock nut on the **J 8001** and push down on the **J 8001** until the needle the **J 8001** has turned 3/4 of a turn clockwise.
 4. Tighten the clamp on the **J 8001** finger tight.
11. Move the plunger of the J 23597-1 back and forth until the needle of the **J 8001** indicates the greatest deflection.

The deflection is the point where the needle changes direction.

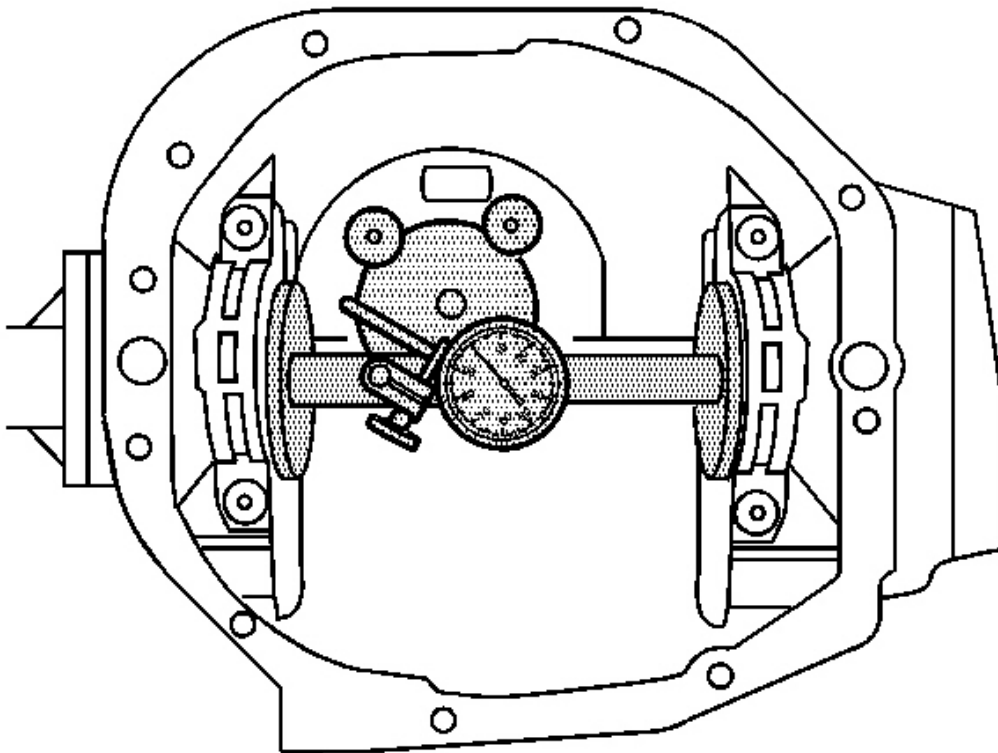


Fig. 120: Measuring Necessary Shim Thickness
Courtesy of GENERAL MOTORS CORP.

12. At the greatest point of deflection, move the housing of the **J 8001** until the needle indicates

ZERO.

13. Move the plunger of the J 23597-1 back and forth again to verify the zero setting. Adjust the housing of the **J 8001** as necessary to set the needle to zero.
14. Rotate the plunger of the J 23597-1 away from the J 23597-11 until it no longer touches the J 23597-11 or the J 21777-29.
15. The value indicated on the **J 8001** is the thickness of the shim needed in order to set the depth of the pinion.
16. Select the shim that indicates the proper thickness. Measure the shim with a micrometer in order to verify that the thickness is correct.
17. Remove the pinion depth setting tools.
18. Remove the pinion bearings.
19. Install the pinion shim between the pinion gear and the inner pinion bearing. Refer to **Drive Pinion Bearings Replacement**.

DIFFERENTIAL SIDE BEARING PRELOAD ADJUSTMENT

Tools Required

- **J 22779** Side Bearing Backlash Gage
- **J 25588** Side Bearing Shim Installer

IMPORTANT:

- **The differential side bearing preload adjustment must be completed before the backlash adjustment can be started.**
- **In order to maintain the original backlash, adjust the differential case side bearing preload by changing the thickness of the left and the right side shim packs equally.**
- **Measure the service shims and the spacers one at a time. Add the measurements together in order to obtain the total thickness of the left or the right side shim pack.**
- **Do not use or reuse the original cast iron production shims. Use service shims and spacers instead.**

Wedge Method

1. Install the drive pinion, if necessary. Refer to **Drive Pinion and Ring Gear Replacement**.
2. Measure the rotating torque of the drive pinion using an inch-pound torque wrench. Record the measurement.

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

3. If the rotating torque for the drive pinion bearings is not within specifications, adjust as necessary. Refer to **Drive Pinion and Ring Gear Replacement**.

IMPORTANT: 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. Slide the differential assembly towards the service spacer in order to hold the spacer in place.
7. Install the **J 22779** into the right side of the axle housing.

The **J 22779** must be installed between the service spacer and the differential side bearing cup.

IMPORTANT: Over-tightening of the J 22779 may spread the housing and result in incorrect shim selection.

8. Tighten the knob on the **J 22779** until there is moderate drag when the **J 22779** is moved.
9. Remove the **J 22779**.
10. Remove the service spacer.
11. Using a micrometer, measure the thickness of the service spacer. Record the measurement.
12. Using a micrometer, measure the thickness of the **J 22779** in 3 locations. Calculate the average of the 3 measurements. Record the measurement.
13. Add the thickness of the service spacer, measured in Step 11 to the average thickness of the **J 22779**, 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.

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15. Install the **J 22779** into the left side of the axle housing. The **J 22779** 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** 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** .
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** 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** , if necessary. The service shim must be installed between the service spacer and the differential side bearing cup.

NOTE: Refer to Fastener Notice .

29. Install the differential bearing caps and the bolts.

Tighten: Tighten the differential bearing cap bolts to 75 N.m (55 lb ft).

30. Rotate the pinion several times to ensure the drive pinion and differential side bearings have seated.
31. Measure the rotating torque of the drive pinion and differential side bearings using an inch-pound torque wrench. Record the measurement.

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

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 33. Multiply the value obtained by the axle ratio.

Specification: 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**.
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

- IMPORTANT:**
- **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**.
2. Measure the rotating torque of the drive pinion using an inch-pound torque wrench. Record the measurement.

Specification: The rotating torque for the drive pinion bearings 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**.

IMPORTANT: 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.

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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.
16. Select the correct service shim thickness for each side corresponding to the measurements determined above. 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.
17. Install the left side service shim into the axle housing. The service shim must be installed between the service spacer and the differential side bearing cup.
18. Move the differential assembly towards the left side of the axle housing.
19. Install the right side service shim into the axle housing using the **J 25588** , if necessary. The service shim must be installed between the service spacer and the differential side bearing cup.
20. Install the differential bearing caps and bolts.

Tighten: Tighten the differential bearing cap bolts to 75 N.m (55 lb ft).

21. Rotate the pinion several times to ensure the bearings have seated.
22. Measure the rotating torque of drive pinion and differential case side bearings using an inch-pound torque wrench.

Specification: The rotating torque of the drive pinion and differential side bearings should be 3.9-6.2 N.m (30-55 lb in) for new bearings or 2.8-5.6 N.m (25-50 lb in) for used bearings.

Record the measurement.

23. Determine the preload for the differential side bearings by performing the following calculation:
 1. Subtract the drive pinion rotating torque, measured in step 2, from the drive pinion and differential case side bearing rotating torque, measured in step 22.
 2. Multiply the value obtained by the axle ratio. This value equals the preload for the differential side bearings.

Specification: 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**.
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**.

BACKLASH ADJUSTMENT

Tools Required

- **J 8001** Dial Indicator Set
- **J 25025** Guide Pins
- **J 25588** Side Bearing Shim Installer

Adjustment Procedure

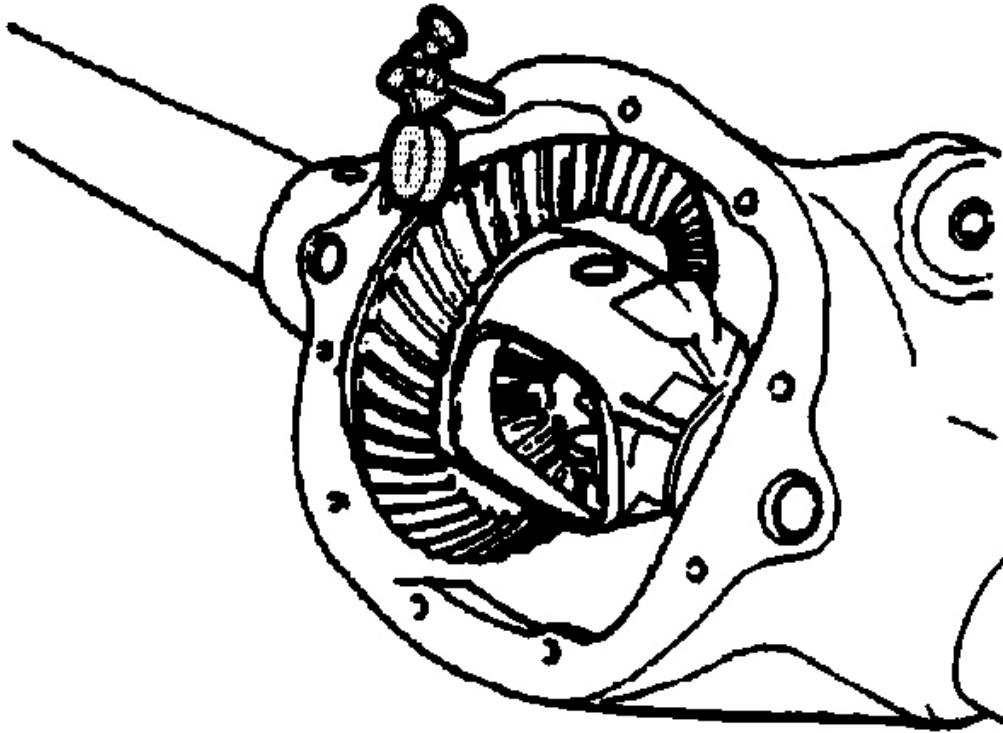


Fig. 121: Measuring Ring Gear Backlash
Courtesy of GENERAL MOTORS CORP.

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

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

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

Measure and record the backlash.

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

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

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

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

IMPORTANT:

- **Do not use the original cast iron production shims to adjust the backlash. Use service shims and spacers instead.**
- **Adjust the thickness of the shim pack on each side of the differential in equal amounts. This will maintain the correct axle side bearing preload.**
- **Moving 0.05 mm (0.002 in) of shim thickness from one side of the differential to the other will change the backlash adjustment approximately 0.03 mm (0.001 in).**

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

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

Mark the bearing caps left or right.

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

Mark the bearing cups and the shims left or right.

3. Measure the thickness of left side shim pack.

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

Measure each shim separately.

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

Add the average of each of the shim measurements together.

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

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

6. Measure the thickness of right side shim pack.

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

Measure each shim separately.

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

Add the average of each of the shim measurements together.

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

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

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

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

Mark the bearing caps left or right.

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

Mark the bearing cups and the shims left or right.

3. Measure the thickness of left side shim pack.

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

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Measure each shim separately.

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

Add the average of each of the shim measurements together.

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

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

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

Measure each shim separately.

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

Add the average of each of the shim measurements together.

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

8. Assemble a new right side shim pack by decreasing the appropriate amount of thickness to the original right side shim pack. If the original shim is cast iron production shim, assemble the shim pack using a service spacer and service shims. For example, to decrease the backlash by 0.05 mm (0.002 in), remove 0.10 mm (0.004 in) of thickness to the right side shim pack.
11. Install the differential case assembly with the bearing cups.
12. Install the left side service spacer between the axle housing and the differential case.
13. Install the right side service spacer between the axle housing and the differential case.

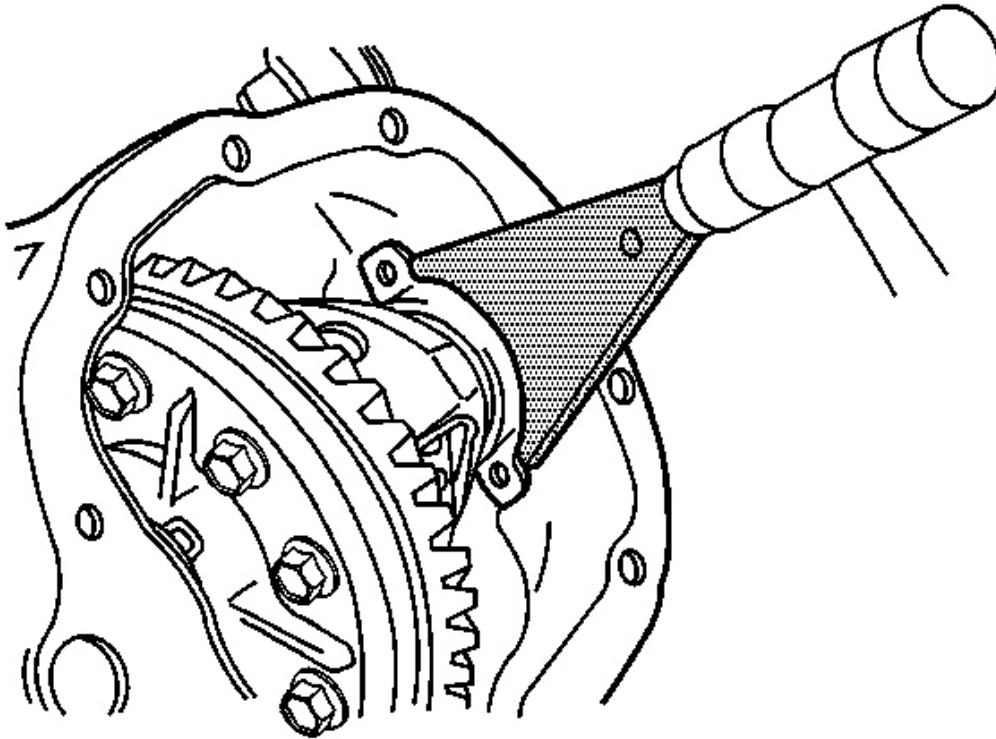


Fig. 122: Installing The Service Shim Using J 25588
Courtesy of GENERAL MOTORS CORP.

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

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

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

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

NOTE: Refer to **Fastener Notice** .

16. Install the bearing caps and bolts.

Tighten: Tighten the bolts to 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**.

GEAR TOOTH CONTACT PATTERN INSPECTION

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

Drive Pinion and Ring Gear Identification

Production drive pinion and ring gears are manufactured by using a 2-cut or a 5-cut method. The 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 set will produce a square pattern from the toe to the heel of the tooth (drive side). When diagnosing the gear tooth contact pattern, regardless of what type of gear set it is, a correct pattern will be centered within the area of the tooth, from toe to heel and from top to bottom.

Gear Tooth Nomenclature

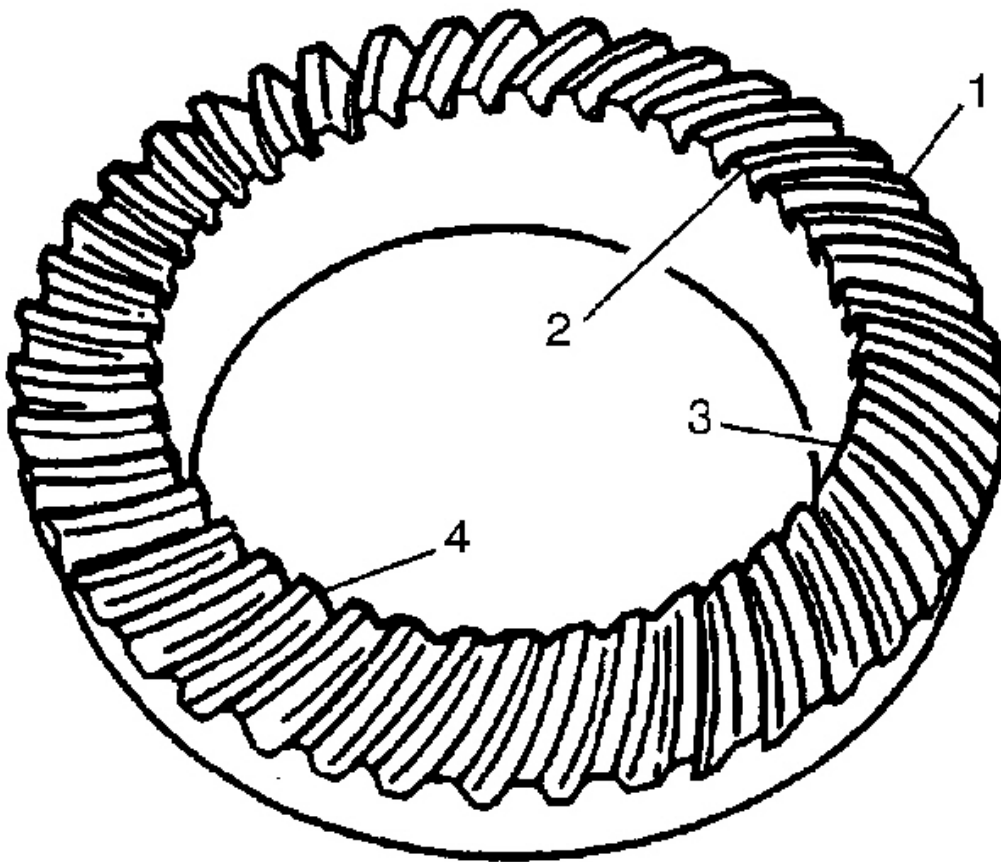


Fig. 123: Identifying Gear Tooth Components
Courtesy of GENERAL MOTORS CORP.

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

Adjustments Affecting Tooth Contact

The following 2 adjustments affect the tooth contact pattern:

- Backlash adjustment
- Pinion depth adjustment

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

Backlash Adjustment

The backlash can be adjusted by either varying the thickness of the side bearing shims from side to side or by moving the adjuster sleeve(s) in or out or both. By adjusting the shim thickness or moving the adjuster sleeve(s), the case and ring gear assembly will move closer to or further away from the pinion. In most cases, adjusting the backlash will correct an abnormal contact pattern. This adjustment will also be used to set the side bearing preload.

- If the thickness of the right shim is increased or the adjuster sleeve is moved in (if applicable), along with an equal decrease in the thickness of the left shim or the adjuster sleeve is moved out (if applicable), the backlash will increase.
- If the thickness of the left shim is increased or the adjuster sleeve is moved in (if applicable), along with an equal decrease in the thickness of the right shim or the adjuster sleeve is moved out (if applicable), the backlash will decrease.

Pinion Depth Adjustment

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

Testing Procedure

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

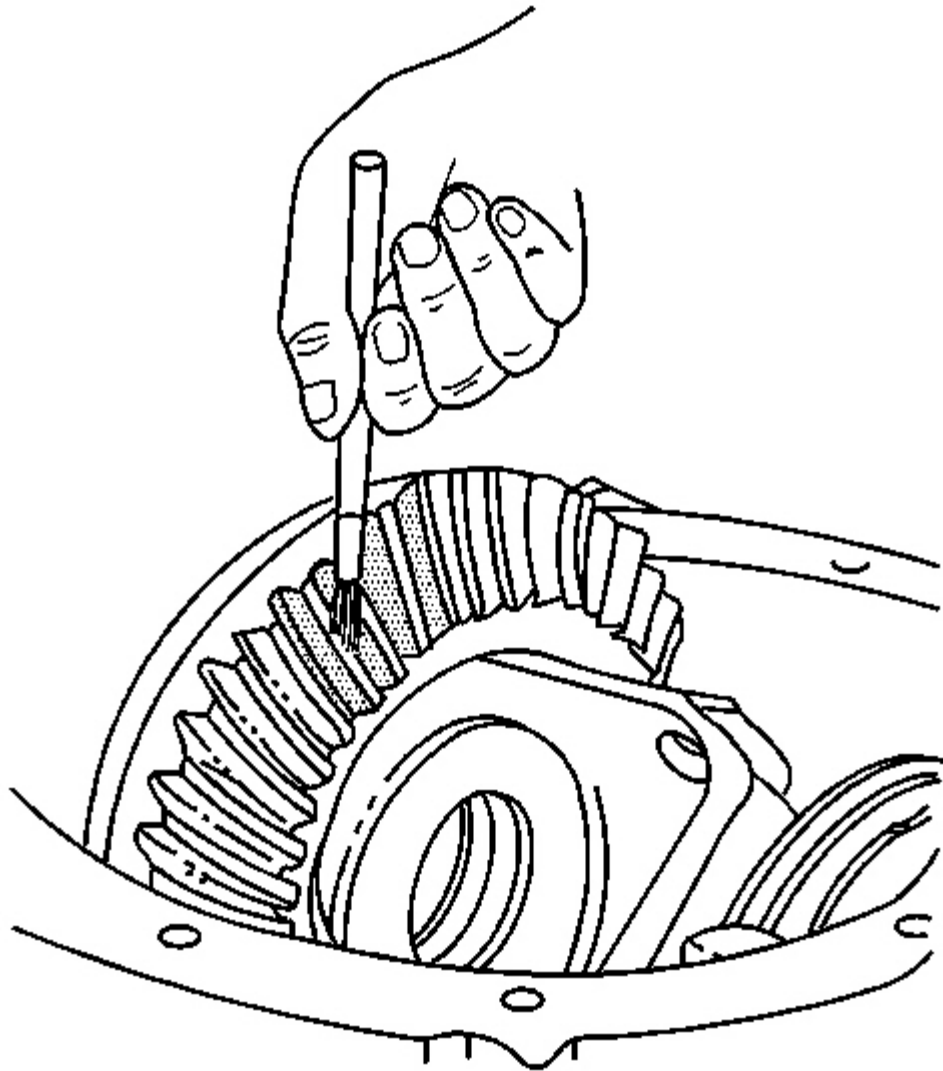


Fig. 124: Applying Gear Marking Compound To Ring Gear Teeth
Courtesy of GENERAL MOTORS CORP.

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

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

4. Apply the park brake until a torque load of 14 N.m (10 lb ft) is required in order to turn the pinion.

IMPORTANT: Avoid turning the ring gear excessively.

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

Correct Contact Pattern

Condition

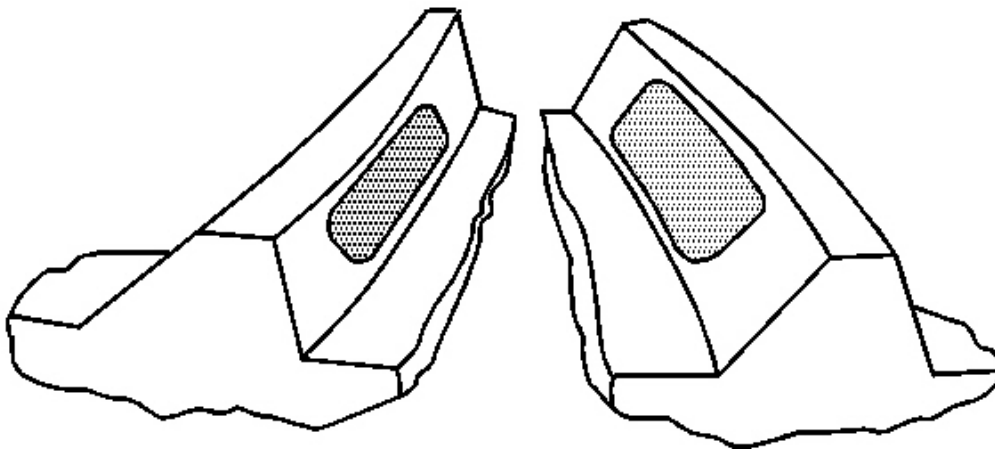


Fig. 125: Identifying Correct Gear Tooth Contact Pattern
Courtesy of GENERAL MOTORS CORP.

The backlash and pinion depth is correct.

Correction

None required.

Service Hints

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

- Total assembly
- Differential case
- Pinion

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

Drive Side Heel - Coast Side Toe Contact Pattern

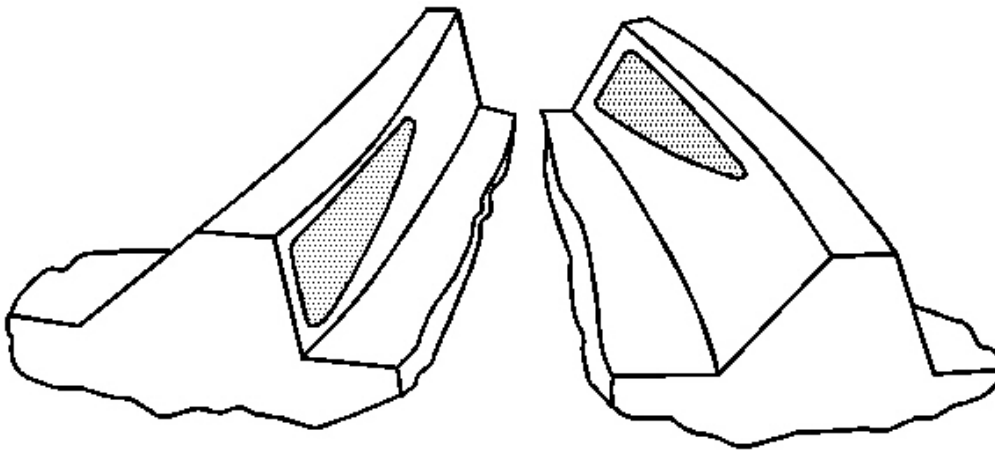


Fig. 126: Identifying Drive Side Heel - Coast Side Toe Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

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

Correction

Decrease the backlash. Move the ring gear closer to the pinion by adjusting the side bearing shim thickness or the adjuster sleeve(s). Refer to **Backlash Adjustment**.

Drive Side Toe - Coast Side Heel Contact Pattern

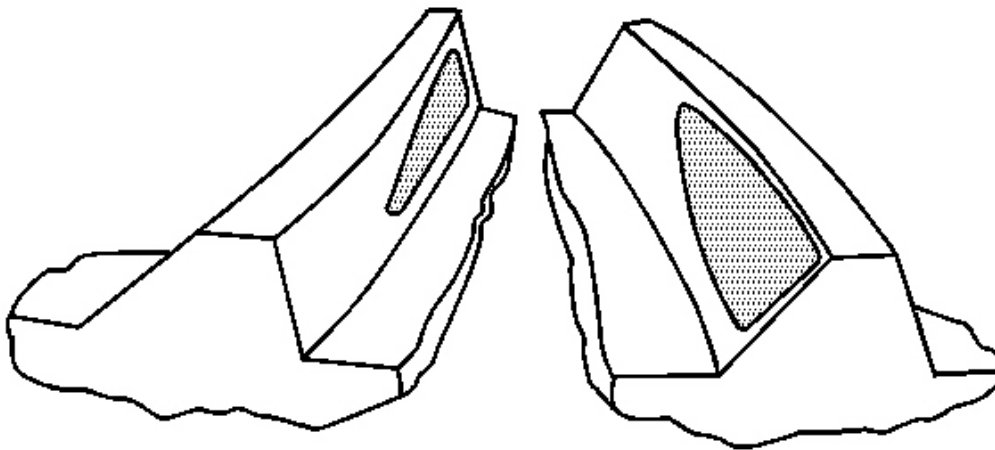


Fig. 127: Identifying Drive Side Toe - Coast Side Heel Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

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

Correction

Increase the backlash. Move the ring gear away from the pinion by adjusting the side bearing shim thickness or the adjuster sleeve(s). Refer to **Backlash Adjustment**.

Drive Side Heel - Coast Side Heel Contact Pattern

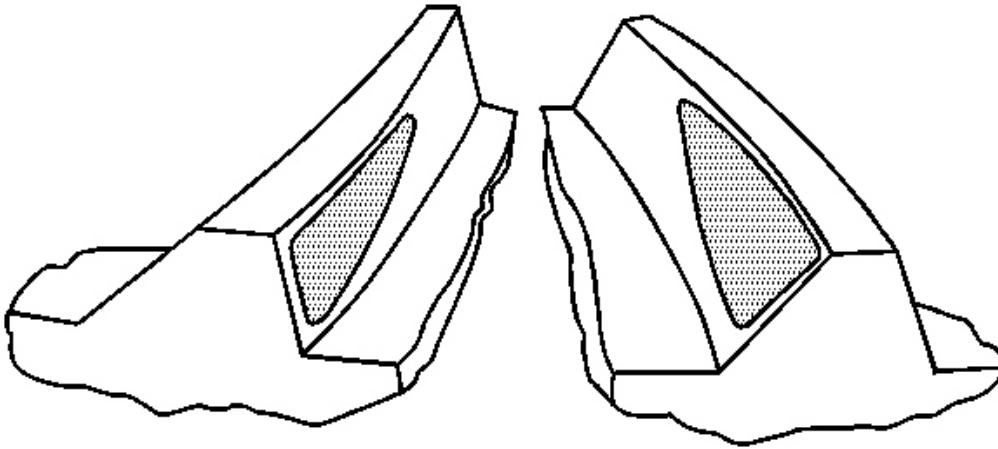


Fig. 128: Identifying Drive Side Heel - Coast Side Heel Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

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

Correction

Decrease the backlash. Move the ring gear closer to the pinion by adjusting the side bearing shim thickness or the adjuster sleeve(s). Refer to **Backlash Adjustment**.

Drive Side Toe - Coast Side Toe Contact Pattern

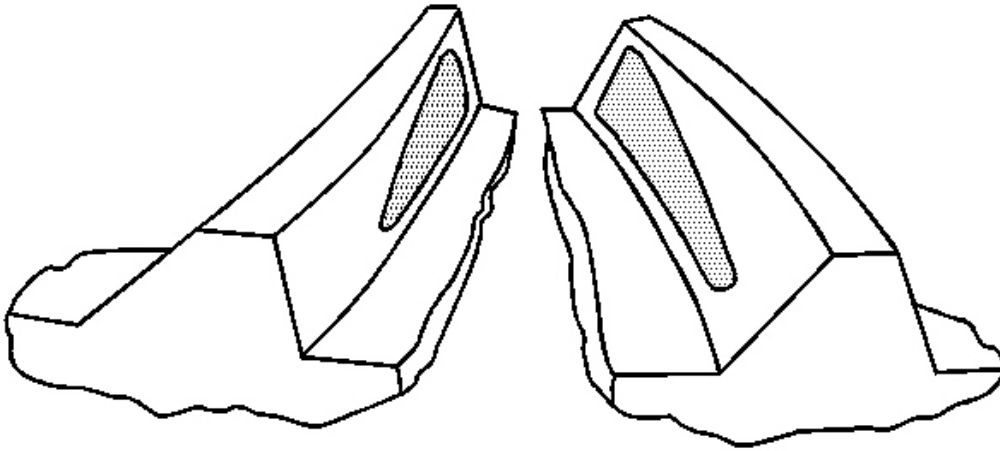


Fig. 129: Identifying Drive Side Toe - Coast Side Toe Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

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

Correction

Increase the backlash. Move the ring gear away from the pinion by adjusting the side bearing shim thickness or the adjuster sleeve(s). Refer to **Backlash Adjustment**.

High Flank Contact Pattern

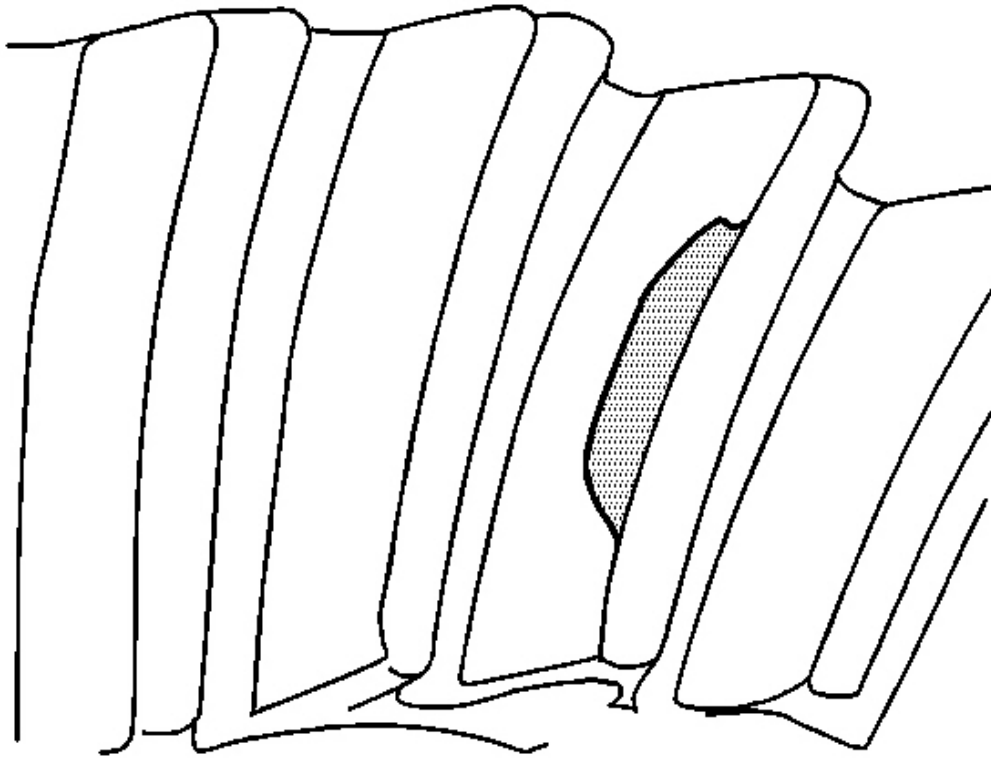


Fig. 130: Identifying High Flank Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

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

Correction

Increase the pinion depth. Move the pinion gear closer to the ring gear by increasing the pinion shim thickness. Refer to **Pinion Depth Adjustment** .

Low Flank Contact Pattern

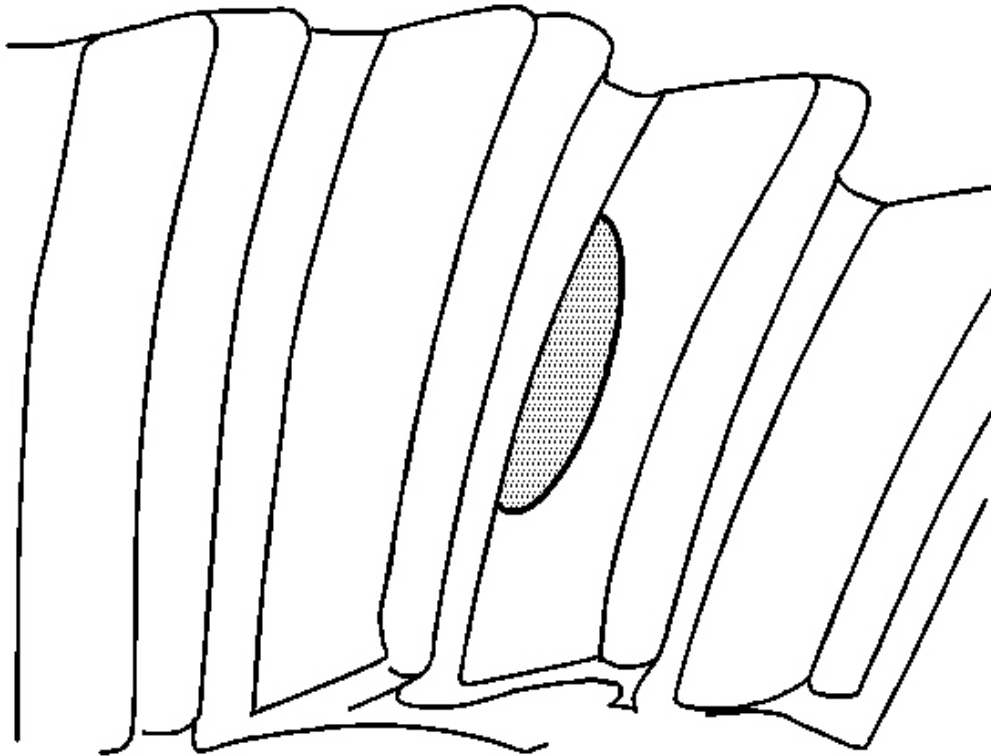


Fig. 131: Identifying Low Flank Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

The pinion depth is incorrect. The pinion gear is too close to the ring gear.

Correction

Decrease the pinion depth. Move the pinion gear away from the ring gear by decreasing the pinion shim thickness. Refer to **Pinion Depth Adjustment** .

LOCKING DIFFERENTIAL DISASSEMBLE

1. Remove the differential side bearings. Refer to **Differential Side Bearings Replacement**.
2. Remove the ring gear. Refer to **Drive Pinion and Ring Gear Replacement**.

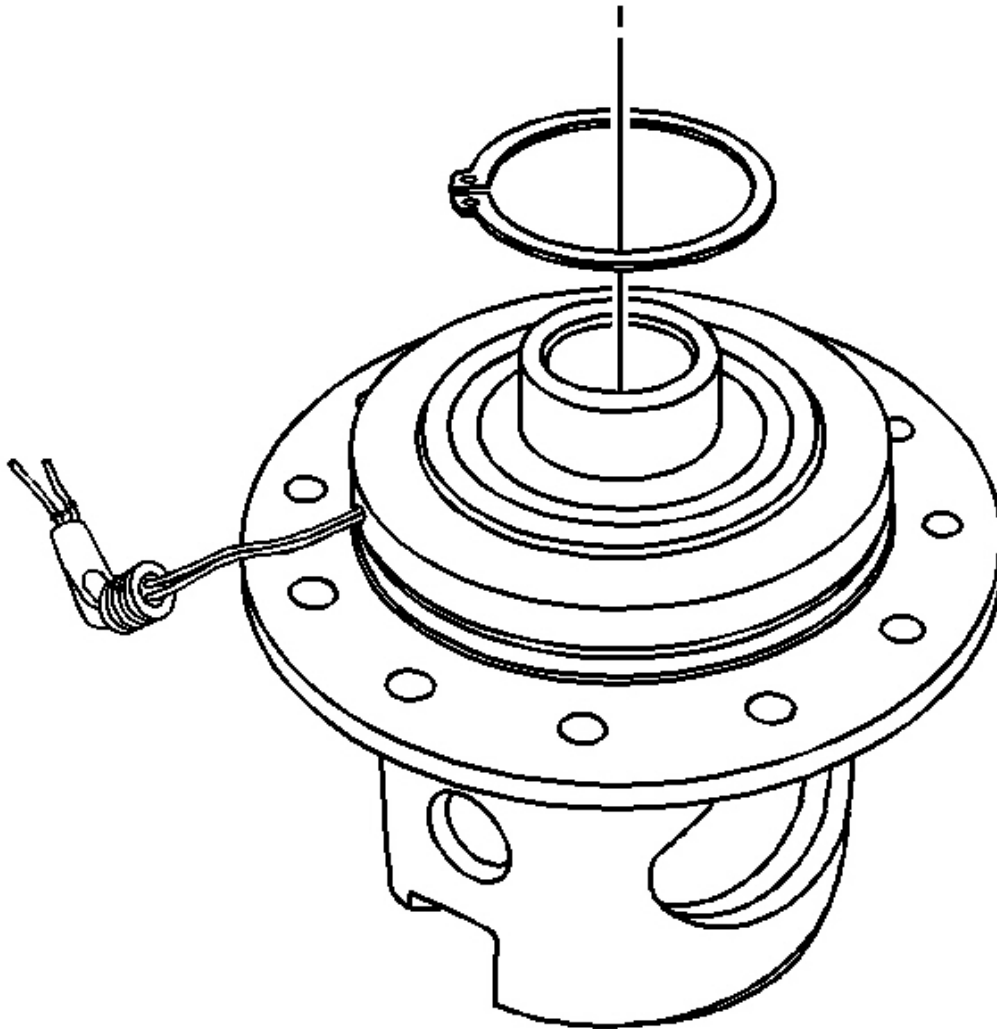


Fig. 132: Identifying Differential Bearing Retainer
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The differential bearing race must be compressed in order to remove the differential bearing retainer.

3. Remove the differential bearing retainer by performing the following steps:
 1. With the aid of an assistant, push the differential bearing race down towards the differential case in order to relieve the pressure against the differential bearing

retainer.

2. Remove the differential bearing retainer.

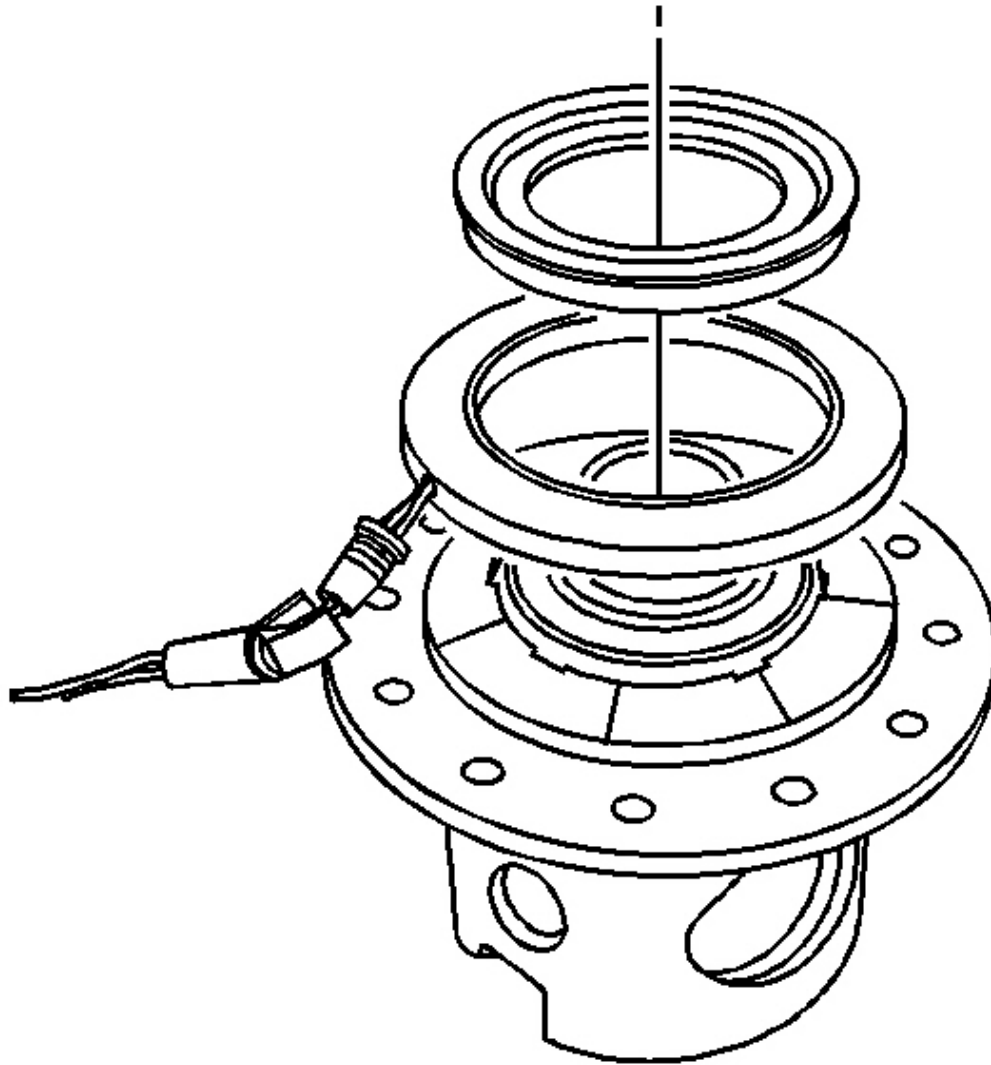


Fig. 133: View Of Differential Bearing Race
Courtesy of GENERAL MOTORS CORP.

4. Remove the differential bearing race.
5. Remove the locking differential coil assembly.

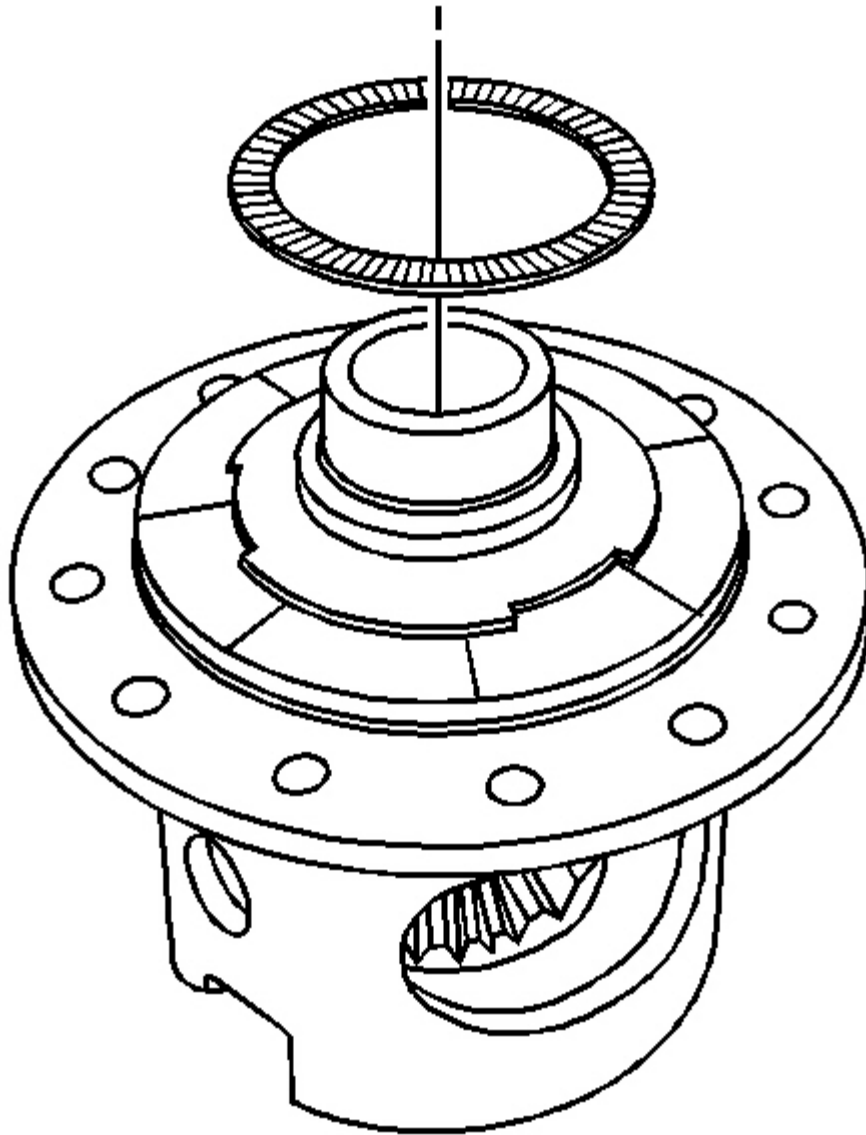


Fig. 134: Removing Differential Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

6. Remove the differential bearing assembly.

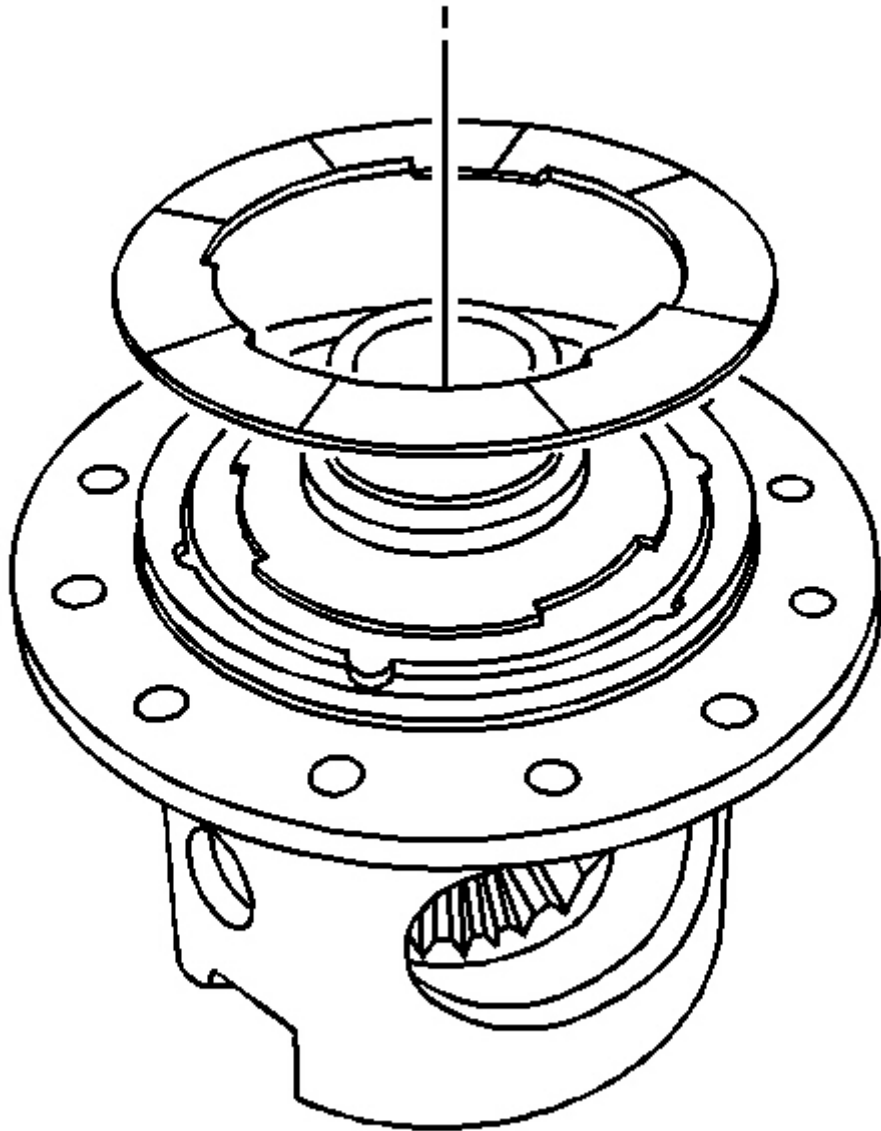


Fig. 135: Identifying Locking Differential Coil Plate
Courtesy of GENERAL MOTORS CORP.

7. Remove the locking differential coil plate.

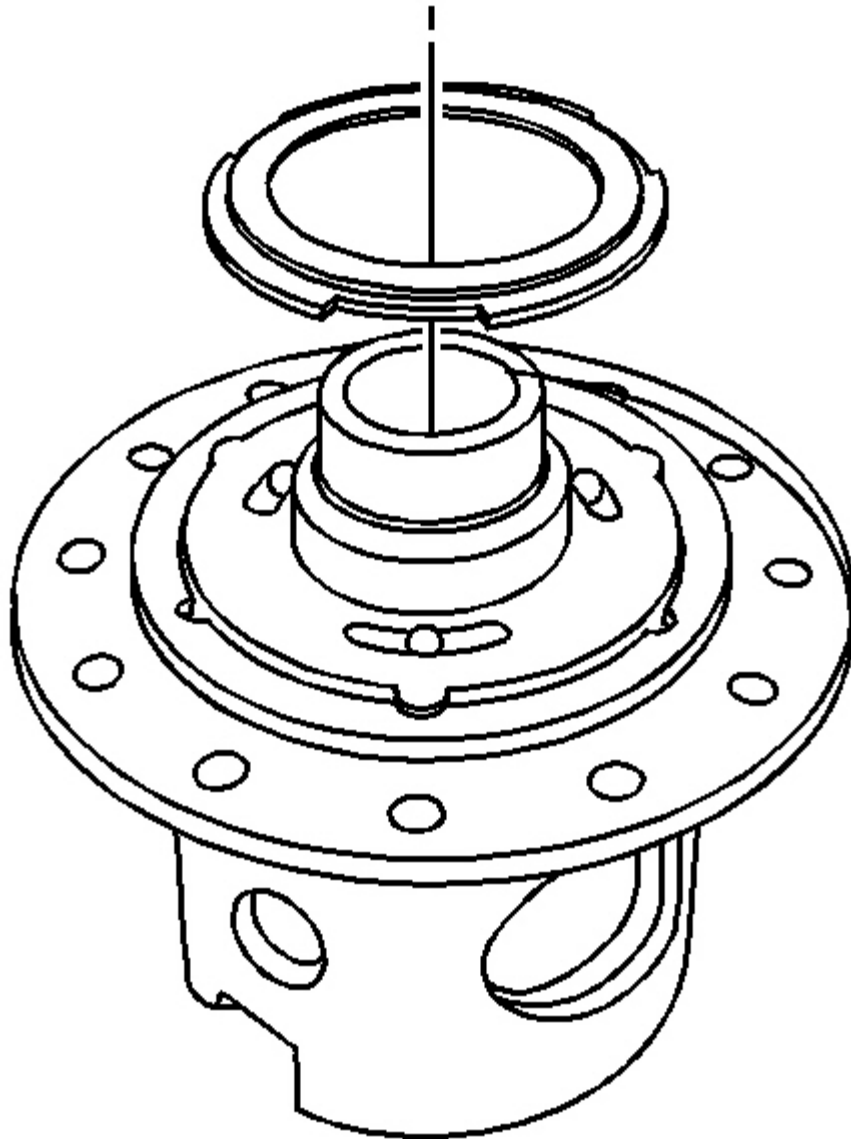


Fig. 136: Identifying Outboard Locking Differential Ball Bearing Plate
Courtesy of GENERAL MOTORS CORP.

8. Remove the outboard locking differential ball bearing plate.

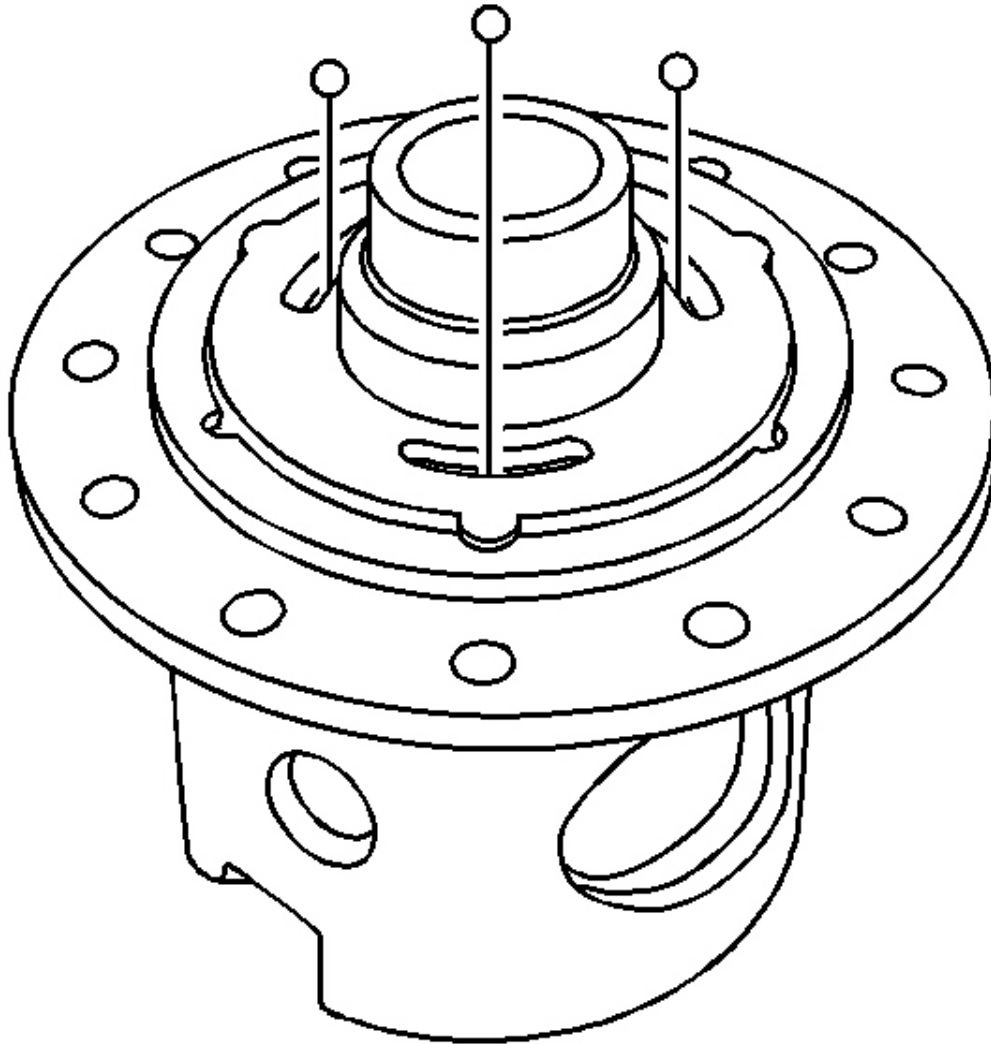


Fig. 137: Identifying Locking Differential Ball Bearings
Courtesy of GENERAL MOTORS CORP.

9. Remove the locking differential ball bearings.

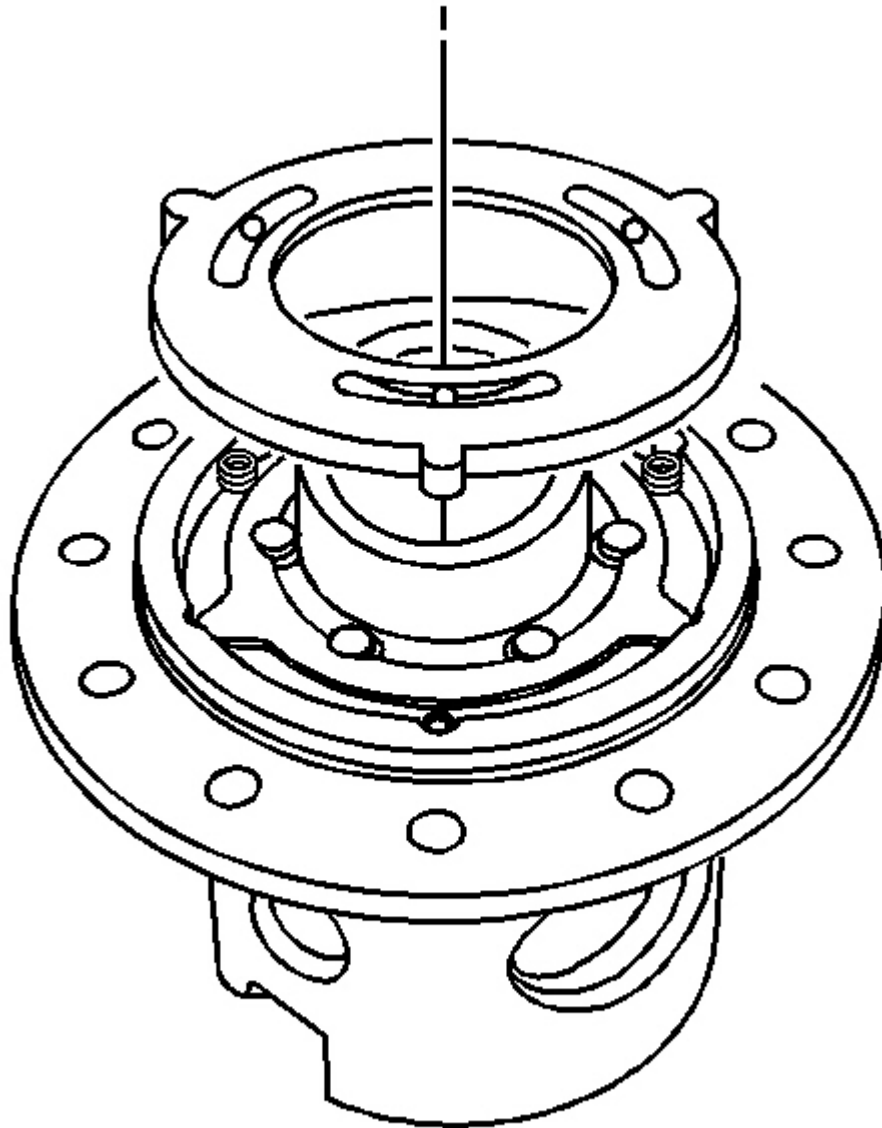


Fig. 138: Identifying Inboard Locking Differential Ball Bearing Plate
Courtesy of GENERAL MOTORS CORP.

10. Remove the inboard locking differential ball bearing plate.

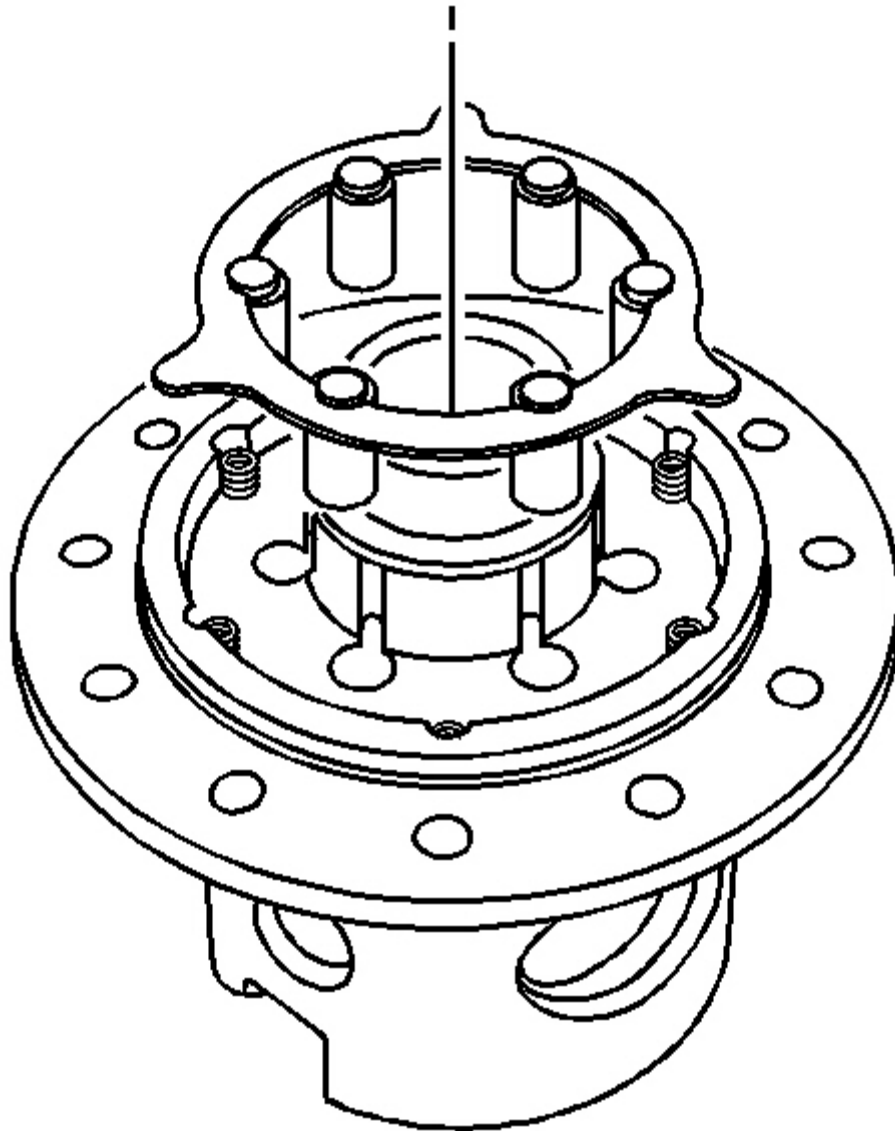


Fig. 139: Identifying Locking Differential Clutch Spring Retainer & Differential Carrier Lock Pins
Courtesy of GENERAL MOTORS CORP.

11. Remove the locking differential clutch spring retainer and the differential carrier lock pins.

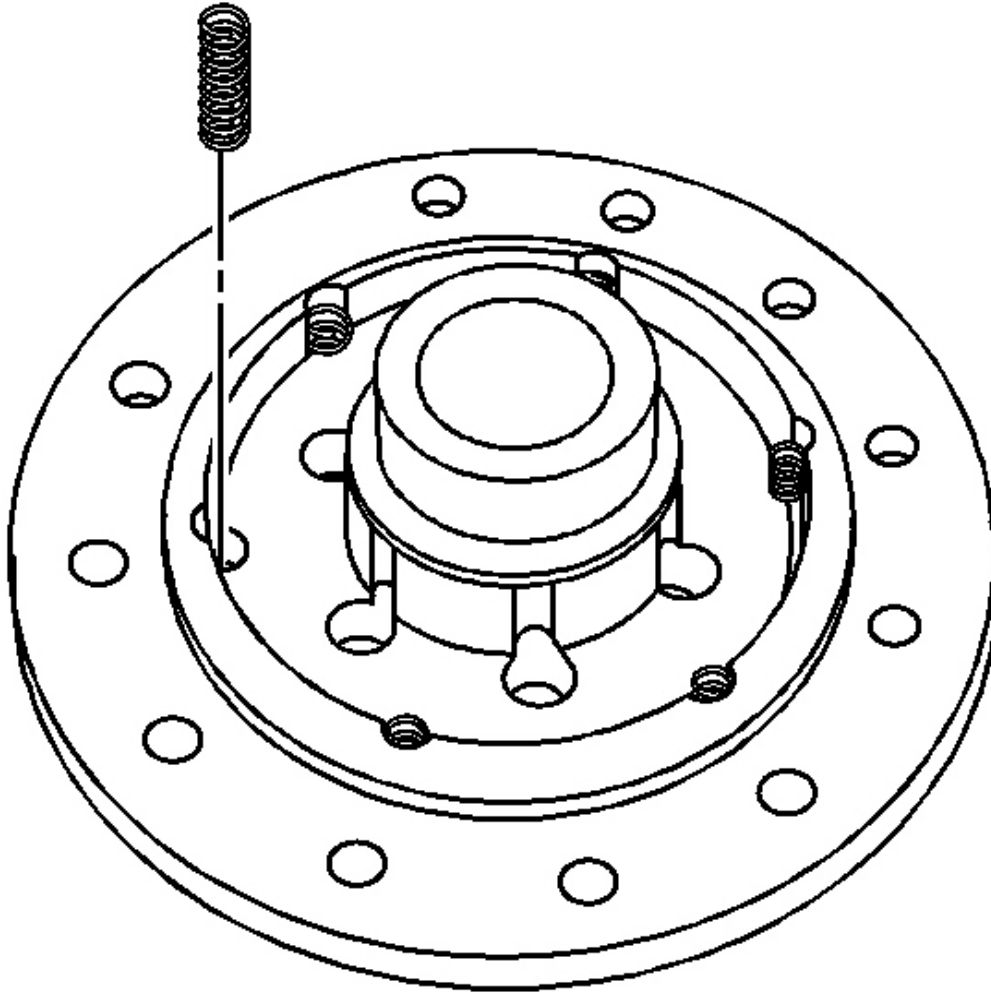


Fig. 140: Identifying Locking Differential Clutch Springs
Courtesy of GENERAL MOTORS CORP.

12. Remove the locking differential clutch springs.

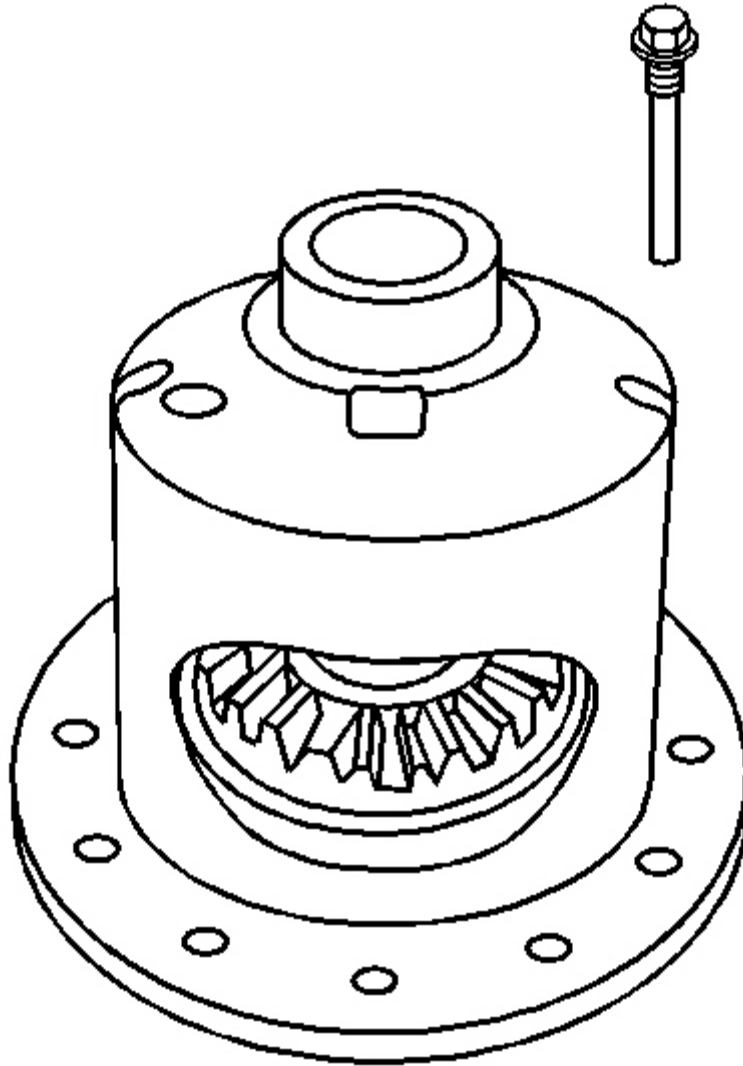


Fig. 141: View Of Pinion Shaft Lock Bolt
Courtesy of GENERAL MOTORS CORP.

13. Remove the pinion shaft lock screw.

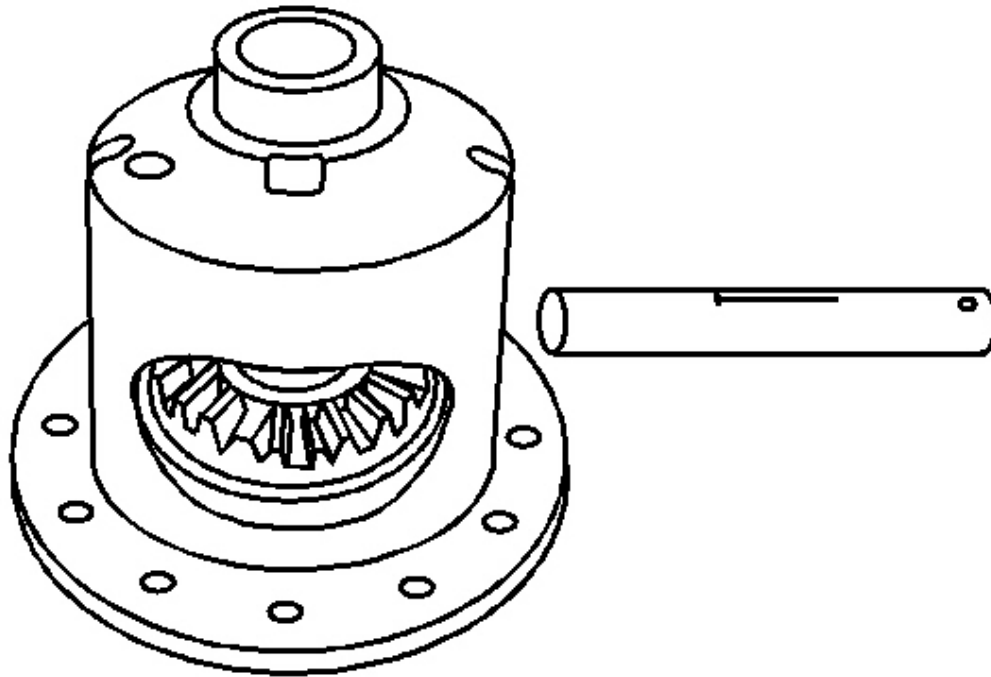


Fig. 142: View Of Differential And Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

14. Remove the pinion gear shaft.

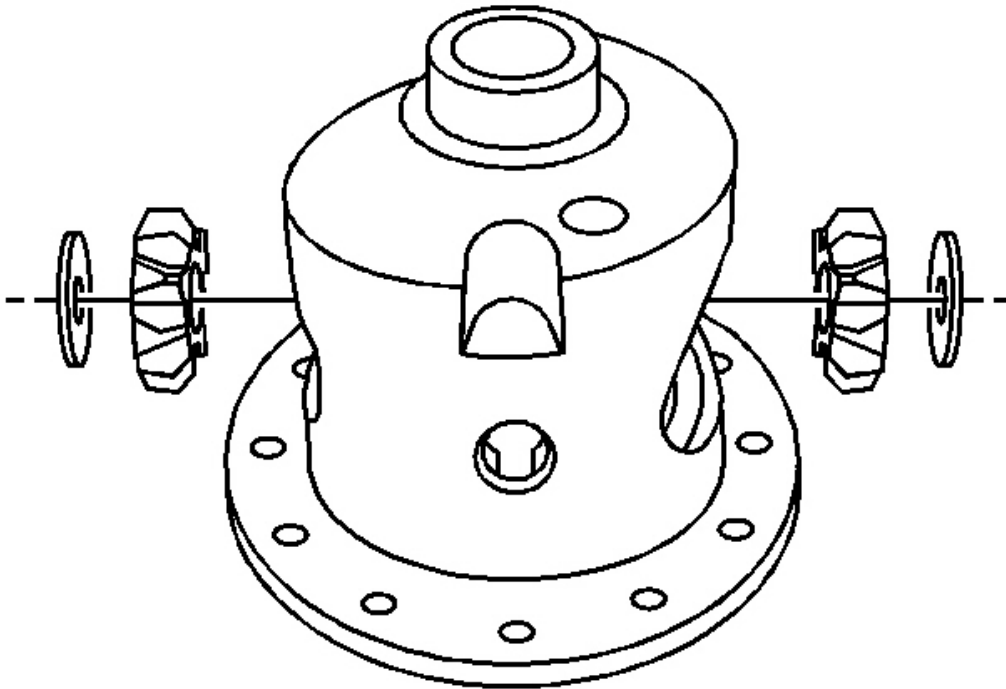


Fig. 143: Identifying Differential Pinion Gears & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

15. Remove the two differential pinion gear thrust washers.

Drive the pinion gear thrust washers out using a brass drift and a hammer.

16. Remove the two differential pinion gears.

Rotate the differential side gears in opposite directions in order to remove the differential pinion gears.

Mark the differential pinion gears and the thrust washers top and bottom.

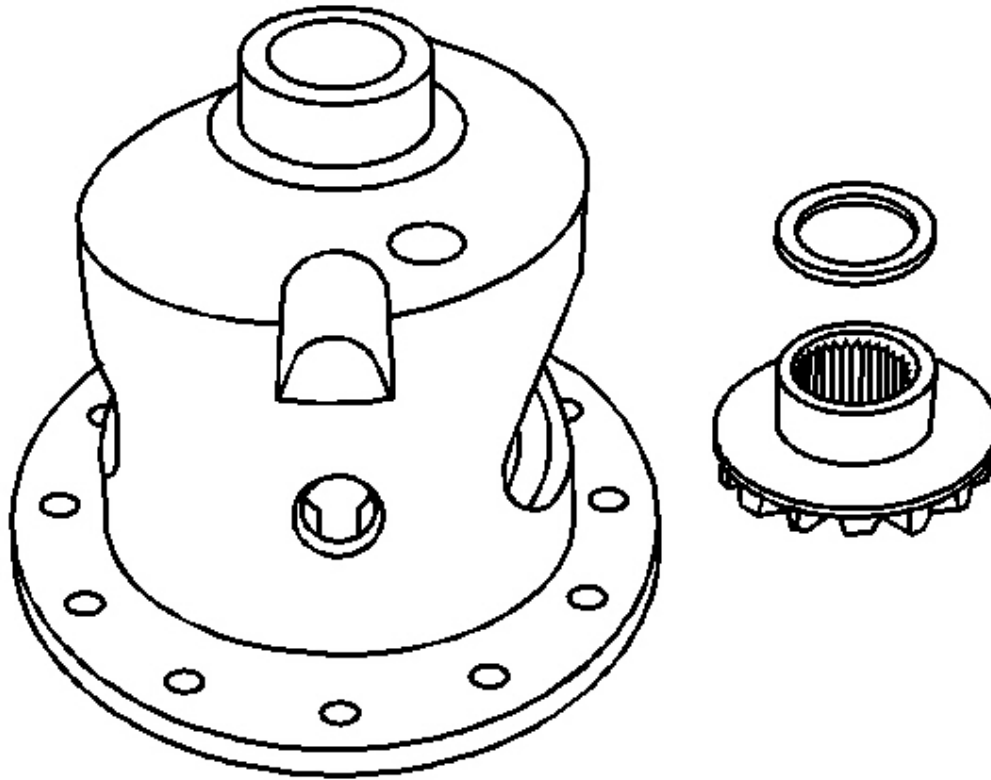


Fig. 144: Identifying Differential Side Gears & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

17. Remove the differential side gear and the side gear thrust washer.

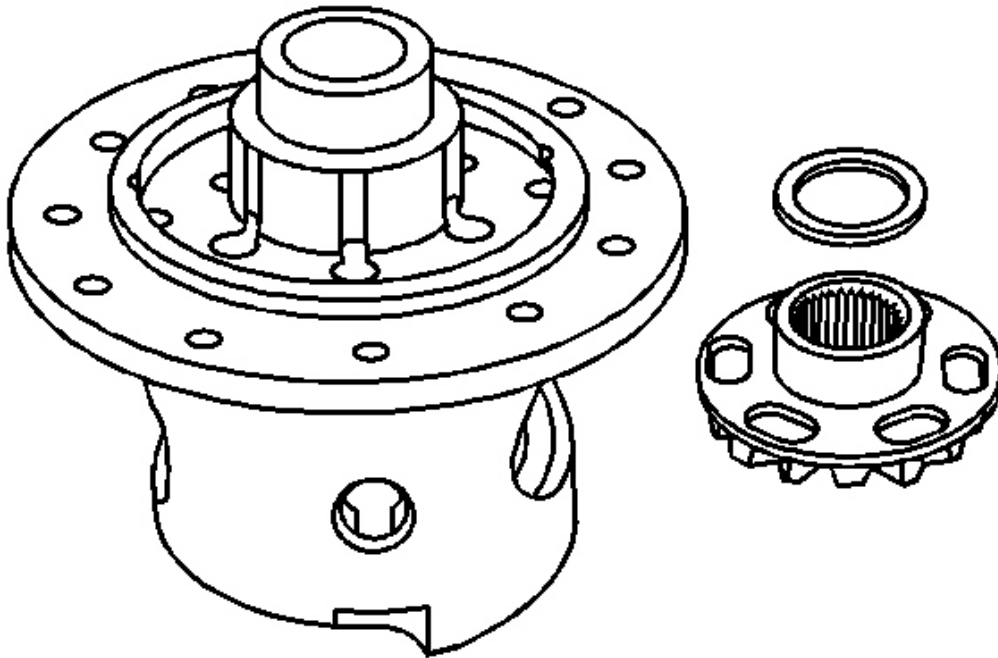


Fig. 145: View Of Locking Differential Side Gear & Thrust Washer
Courtesy of GENERAL MOTORS CORP.

18. Remove the locking differential side gear and thrust washer.

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

LOCKING DIFFERENTIAL CLEANING AND INSPECTION

1. Clean all of the parts using an approved solvent.
2. Visually inspect all the parts for excessive wear or breakage. Replace the parts if necessary.
3. Check the pinion gear and the side gear teeth for any the following conditions:
 - Wear
 - Cracks
 - Scoring
 - Spalling
4. Check the thrust washer for wear.

5. Check the fit of the side gears on the axle shafts.
6. Check the differential case for cracks and scoring.

IMPORTANT: Do not replace the thrust sleeve unless this is necessary.

7. Check the thrust sleeve for excessive wear.
8. Check 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 ADJUSTMENT

Tools Required

J 7872 Magnetic Base Dial Indicator. See **Special Tools**.

Locking Differential Side Gear Backlash Adjustment

IMPORTANT: If it is necessary to replace the left side gear, the right side gear or the thrust washers, the entire differential must be adjusted. The differential is adjusted using selective thickness thrust washers between the side gears and the case and adjusting the pinion gear to side gear backlash.

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

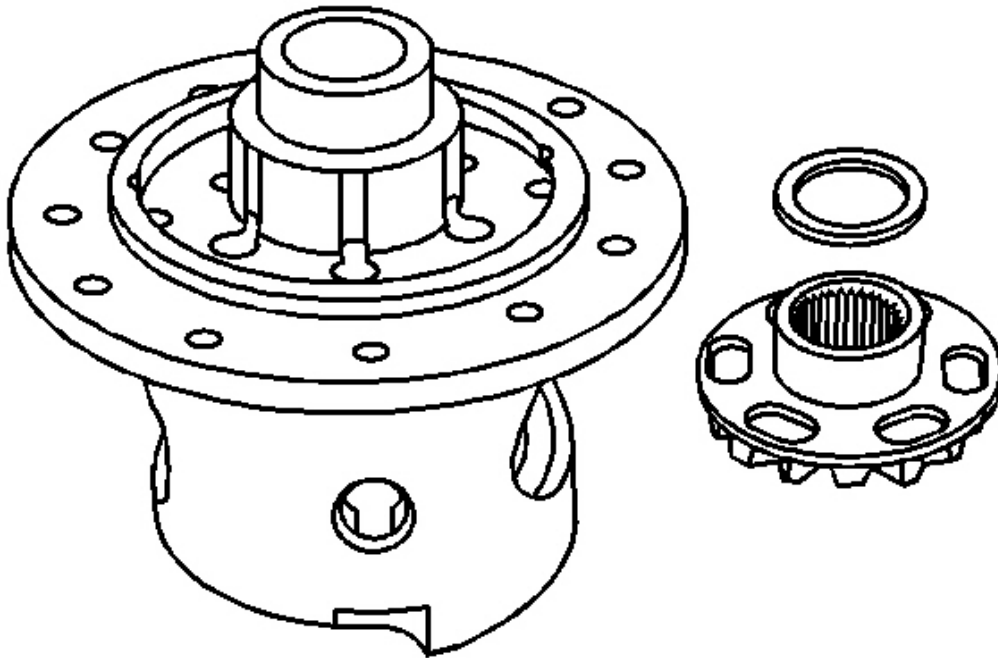


Fig. 146: View Of Locking Differential Side Gear & Thrust Washer
Courtesy of GENERAL MOTORS CORP.

2. Install the differential side gear thrust washer to the locking differential side gear.

If the original differential side gear thrust washer is not available, install a 25.40 mm (1.000 in) thrust washer.

3. Install the locking differential side gear and thrust washer into the ring gear side of the differential case.

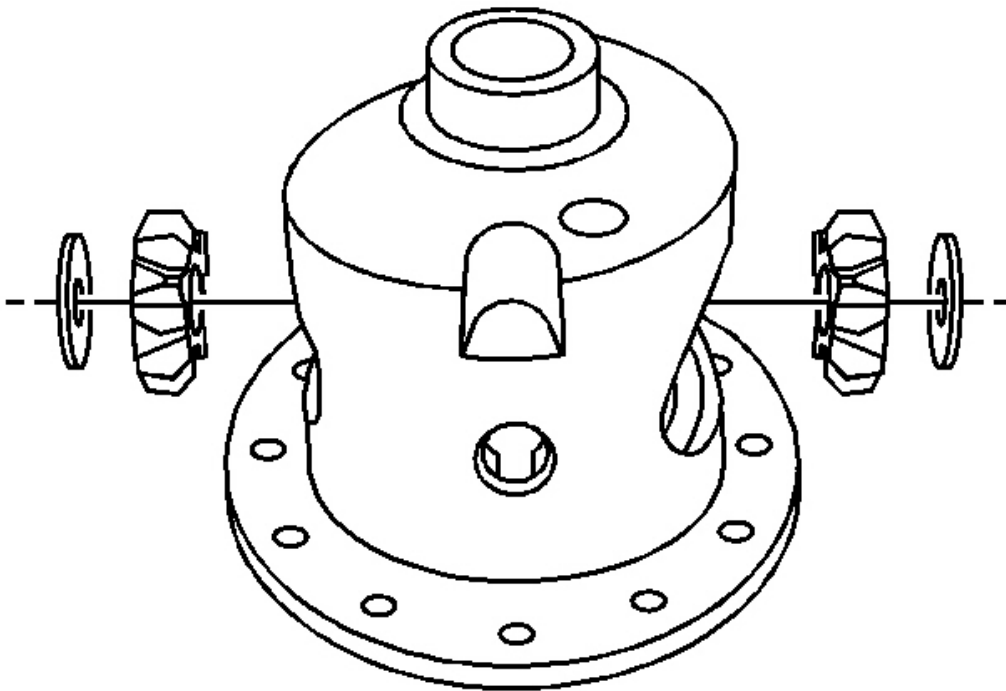


Fig. 147: Identifying Differential Pinion Gears & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

4. Install the differential pinion gears and the thrust washers by doing the following:
 1. Position both pinion gears and each thrust washer into each side of the differential window.

Place the pinion gears 180 degrees across from each other.

2. Rotate the differential side gears until both pinion gears are directly opposite the opening in the differential case.

Line up the pinion shaft opening in each of the pinion gears with the pinion shaft opening in the differential case.

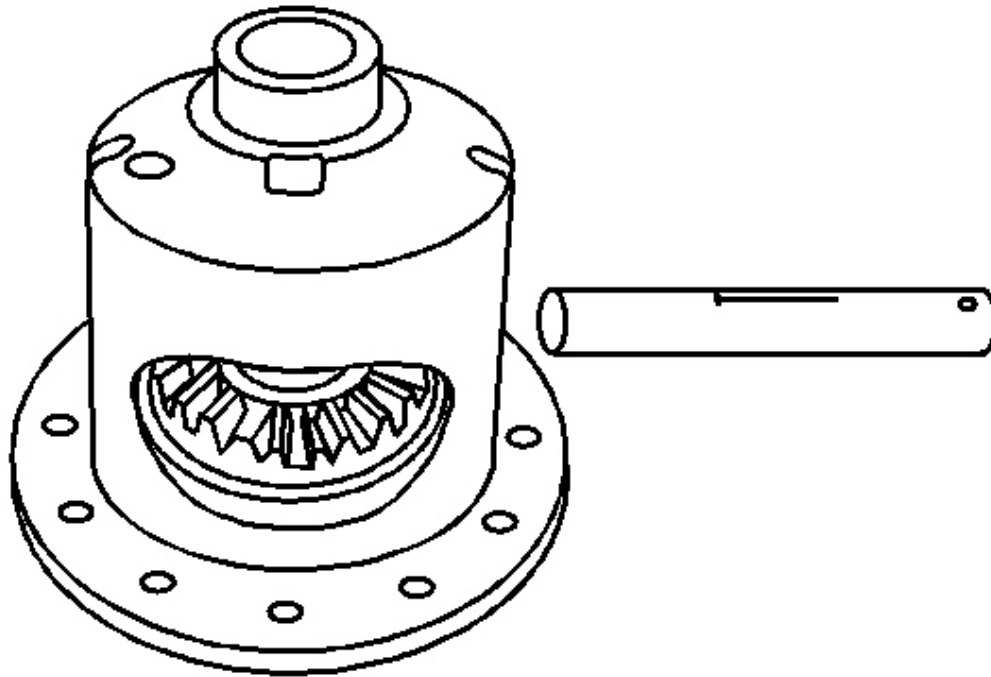


Fig. 148: View Of Differential And Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

5. Install the pinion shaft.
6. If the pinion shaft cannot be installed, remove the pinion gears and thrust washers, the locking differential side gear and differential thrust washer.
7. Install a smaller differential side thrust washer and re-install the locking differential side gear, the pinion gears and thrust washers and the pinion shaft.

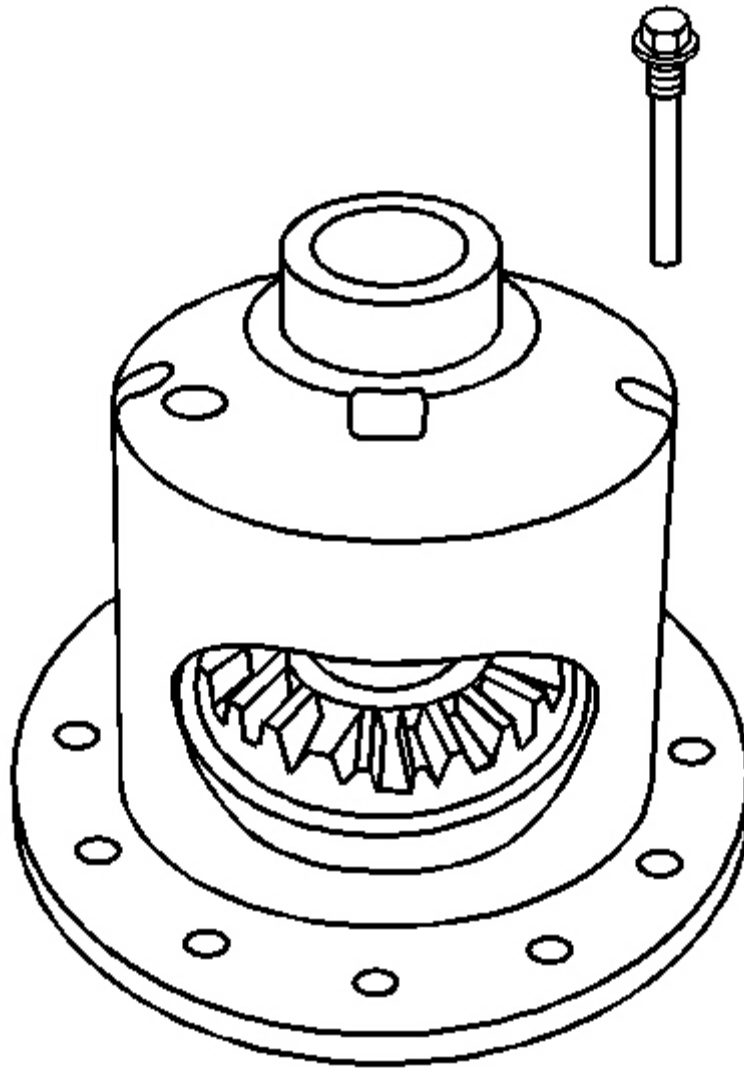


Fig. 149: View Of Pinion Shaft Lock Bolt
Courtesy of GENERAL MOTORS CORP.

8. Install the pinion shaft lock bolt.

Do not torque the pinion shaft lock bolt at this time.

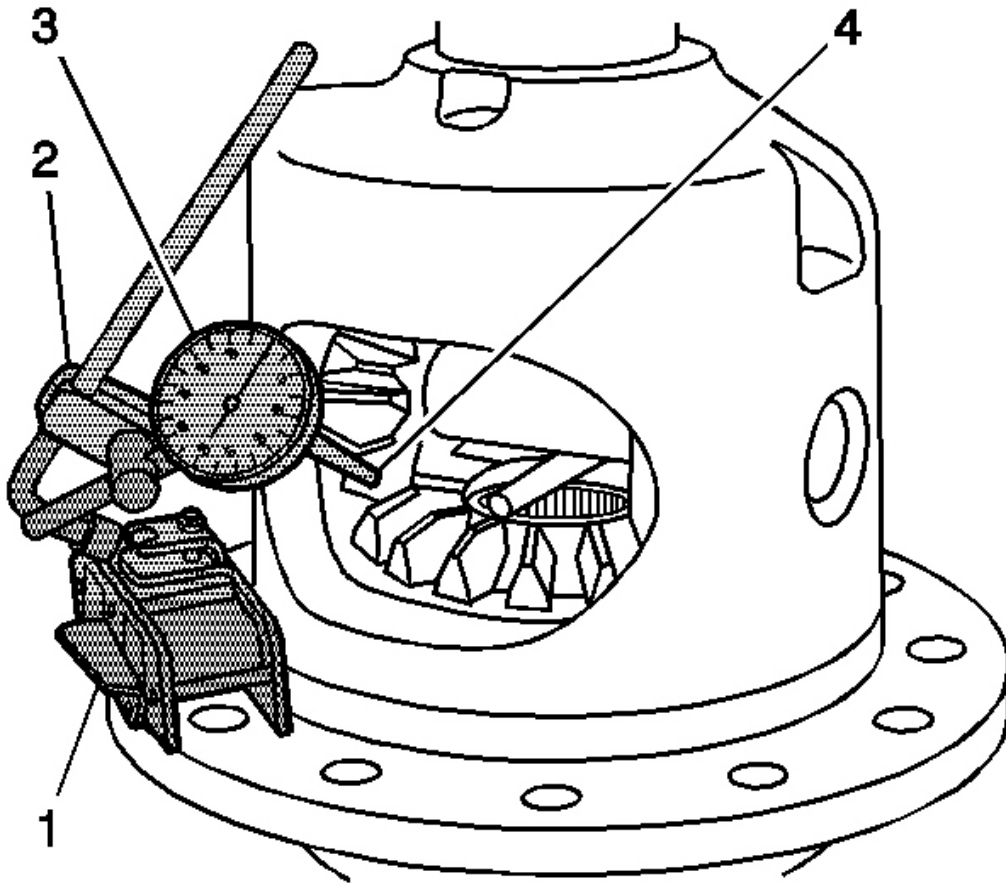


Fig. 150: Measuring Backlash Of Pinion Gear Closest To Pinion Shaft Lock Bolt & Locking Differential Side Gear
Courtesy of GENERAL MOTORS CORP.

9. Measure the backlash of the pinion gear closest to the pinion shaft lock bolt and the locking differential side gear by doing the following:
 1. Rotate the pinion gear so that one of the teeth is perpendicular to the ring gear flange.
 2. Install a brass drift between the locking differential side gear and the pinion shaft in order to prevent the side gear from moving.
 3. Install the **J 7872** (1) to the ring gear flange. See **Special Tools**.
 4. Loosely clamp the J 7872-2 (2) and the **J 8001-3** (3) onto the stem on the **J 7872** (1). See **Special Tools**.

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5. Install the J 7872-3 (4) to the **J 8001-3** (3). See **Special Tools**.
6. Place the contact pad of the J 7872-3 (4) onto one of the teeth of the pinion gear closest to the locking differential side gear.

Preload the dial of the **J 8001-3** approximately 3/4 of a turn clockwise. See **Special Tools**.

7. Tighten the lock nut of the J 7872-2 (2) finger tight.
8. Turn the dial of the **J 8001-3** until the needle and the dial face indicate ZERO. See **Special Tools**.
9. Pull the pinion gear firmly into the differential case seat.
10. Rotate the pinion gear back and forth.
11. Measure the backlash.

Specification: The backlash between the locking differential side gear and the pinion gears should be 0.051-0.076 mm (0.002-0.003 in).

10. If the backlash is too large, disassemble the differential, install the next larger size side gear thrust washer, re-assemble the differential and recheck the backlash.
11. If the backlash is too small, disassemble the differential, install next smaller size side gear thrust washer, re-assemble the differential and recheck the backlash.

Locking differential side gear thrust washers are available in the following sizes:

Washer Sizes:

- 19.05 mm (0.750 in)
- 20.32 mm (0.800 in)
- 21.59 mm (0.850 in)
- 22.86 mm (0.900 in)
- 24.13 mm (0.950 in)
- 25.40 mm (1.000 in)
- 26.67 mm (1.050 in)
- 27.94 mm (1.100 in)
- 29.21 mm (1.150 in)
- 30.48 mm (1.200 in)
- 31.75 mm (1.250 in)

Differential Side Gear Backlash Adjustment

1. Remove the following from the differential case:
 1. The pinion shaft lock bolt
 2. The pinion shaft
 3. The pinion gears
 4. The pinion gear thrust washers
 5. The locking differential side gear
 6. The locking differential side gear thrust washer

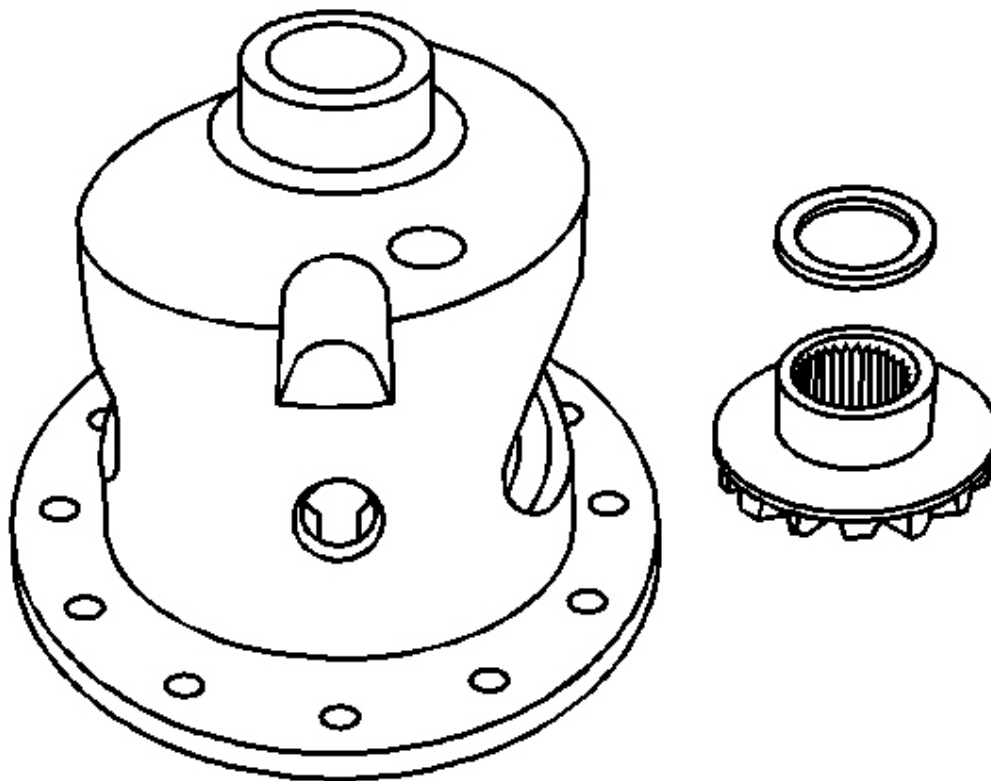


Fig. 151: Identifying Differential Side Gears & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

2. Install the differential side gear thrust washer into the bell-end of the differential case.

3. Install the differential side gear into the bell-end of the differential case.

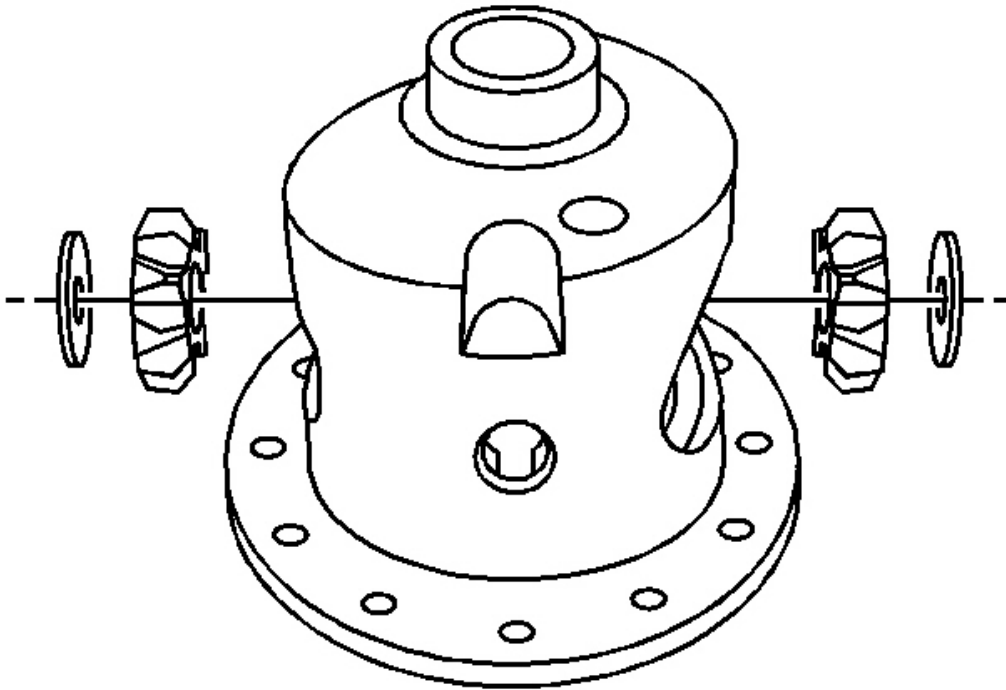


Fig. 152: Identifying Differential Pinion Gears & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

4. Install the differential pinion gears by doing the following:
 1. Position both pinion gears and each thrust washer into each side of the differential window.

Place the pinion gears 180 degrees across from each other.

2. Rotate the differential side gears until both pinion gears are directly opposite the opening in the differential case.

Line up the pinion shaft opening in each of the pinion gears with the pinion shaft opening in the differential case.

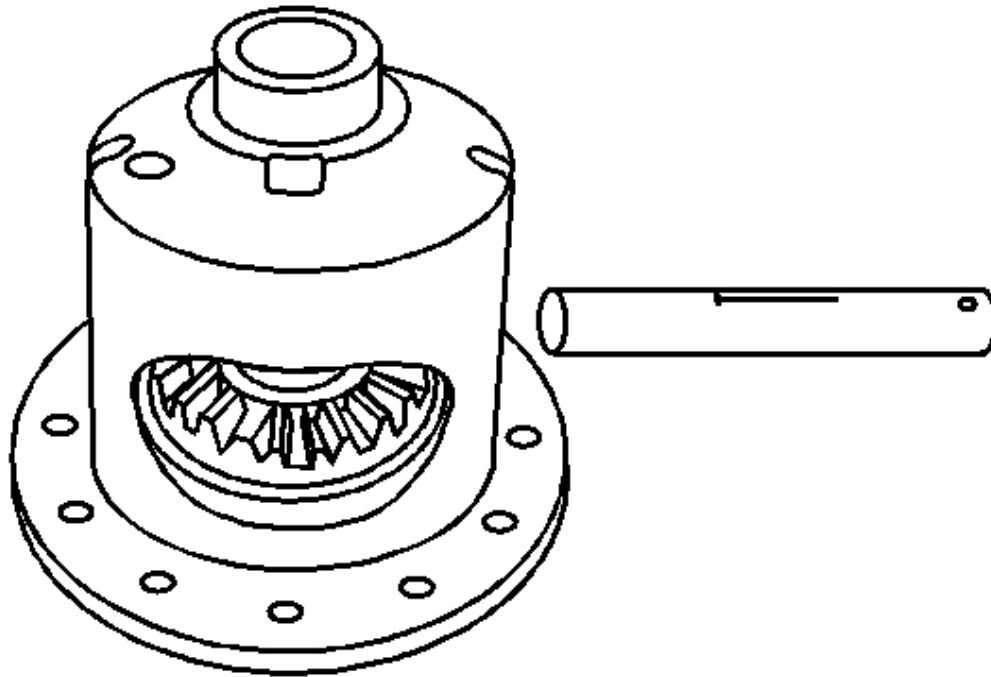


Fig. 153: View Of Differential And Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

5. Install the pinion shaft.
6. If the pinion shaft cannot be installed, remove the pinion gears and thrust washers, the locking differential side gear and differential thrust washer.
7. Install a smaller differential side thrust washer and re-install the locking differential side gear, the pinion gears and thrust washers and the pinion shaft.

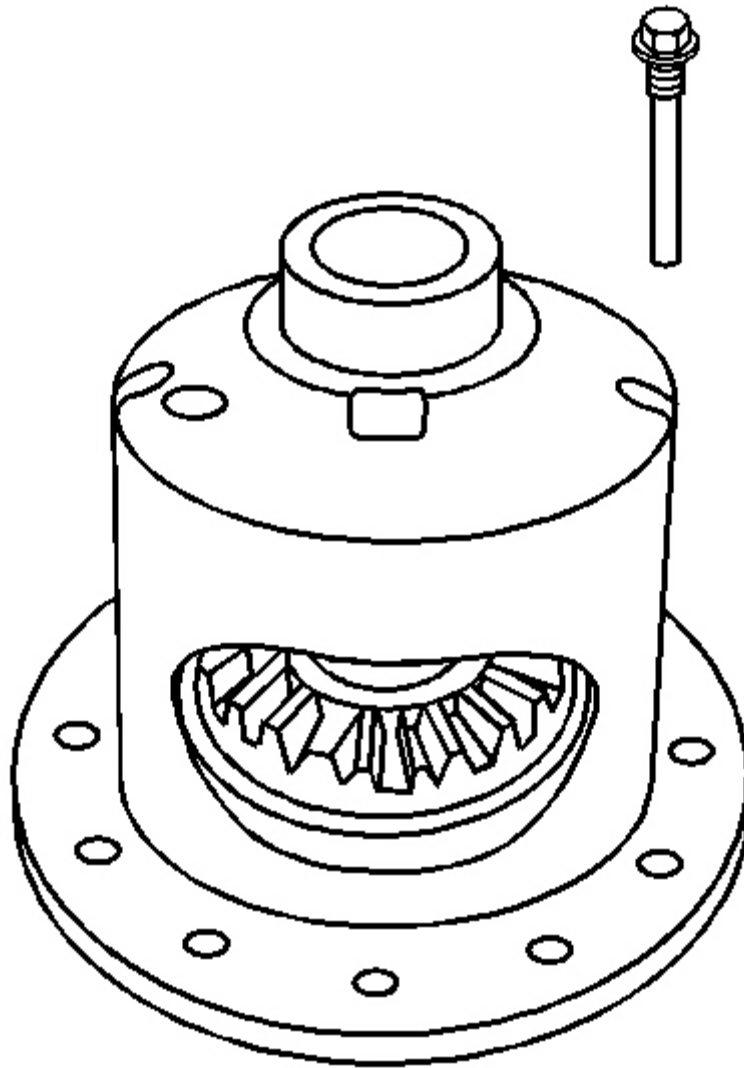


Fig. 154: View Of Pinion Shaft Lock Bolt
Courtesy of GENERAL MOTORS CORP.

8. Install the pinion shaft lock bolt.

Do not torque the pinion shaft lock bolt at this time.

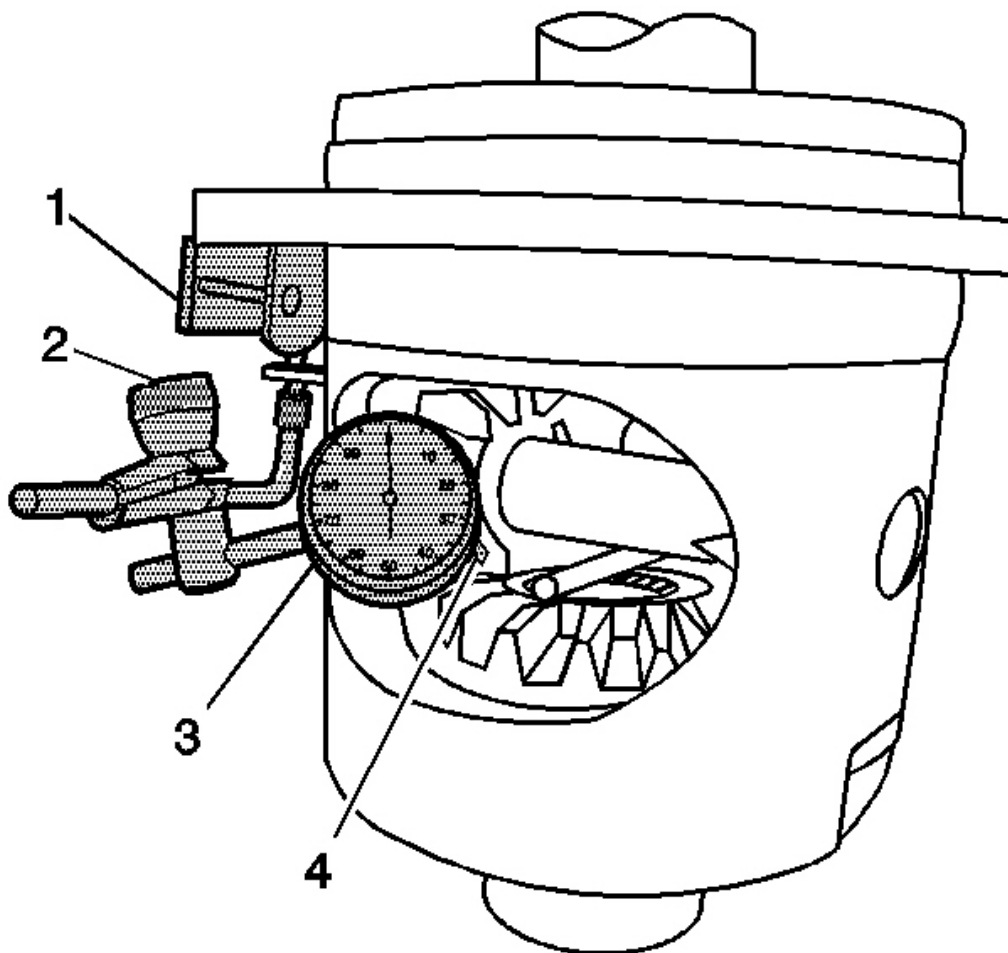


Fig. 155: Measuring Backlash Of Pinion Gear Closest To Pinion Shaft Lock Bolt & Differential Side Gear

Courtesy of GENERAL MOTORS CORP.

9. Measure the backlash of the pinion gear closest to the pinion shaft lock bolt and the differential side gear by doing the following:
 1. Rotate the pinion gear so that one of the teeth is perpendicular to the ring gear flange.
 2. Install a brass drift between the locking differential side gear and the pinion shaft in order to prevent the side gear from moving.
 3. Install the **J 7872** (1) to the ring gear flange. See **Special Tools**.
 4. Loosely clamp the J 7872-2 (2) and the **J 8001-3** (3) onto the stem on the **J 7872** (1).

See **Special Tools**.

5. Install the J 7872-3 (4) to the **J 8001-3** (3). See **Special Tools**.
6. Place the contact pad of the J 7872-3 (4) onto one of the teeth of the pinion gear closest to the locking differential side gear.

Preload the dial of the **J 8001-3** approximately 3/4 of a turn clockwise. See **Special Tools**.

7. Tighten the lock nut of the J 7872-2 (2) finger tight.
8. Turn the dial of the **J 8001-3** until the needle and the dial face indicate ZERO. See **Special Tools**.
9. Pull the pinion gear firmly into the differential case seat.
10. Rotate the pinion gear back and forth.
11. Measure the backlash.

Specification: The backlash between the locking differential side gear and the pinion gears should be 0.051-0.076 mm (0.002-0.003 in).

10. If the backlash is too large, disassemble the differential, install the next larger size side gear thrust washer, re-assemble the differential and recheck the backlash.
11. If the backlash is too small, disassemble the differential, install next smaller size side gear thrust washer, re-assemble the differential and recheck the backlash.

Differential side gear thrust washers are available in the following sizes:

Washer Sizes:

- 19.05 mm (0.750 in)
- 20.32 mm (0.800 in)
- 21.59 mm (0.850 in)
- 22.86 mm (0.900 in)
- 24.13 mm (0.950 in)
- 25.40 mm (1.000 in)
- 26.67 mm (1.050 in)
- 27.94 mm (1.100 in)
- 29.21 mm (1.150 in)
- 30.48 mm (1.200 in)

- 31.75 mm (1.250 in)

LOCKING DIFFERENTIAL ASSEMBLY

IMPORTANT:

- If the same differential side gears and the thrust washers are being used, install the differential side gears and the thrust washers in their original locations.
 - The locking differential side gear and the differential side gear are not interchangeable. The side gears must be installed in the correct location in order for the locking differential to function properly.
1. Measure the backlash of the pinion gears to differential side gear and locking differential side gear. Refer to Locking Differential Adjustment.

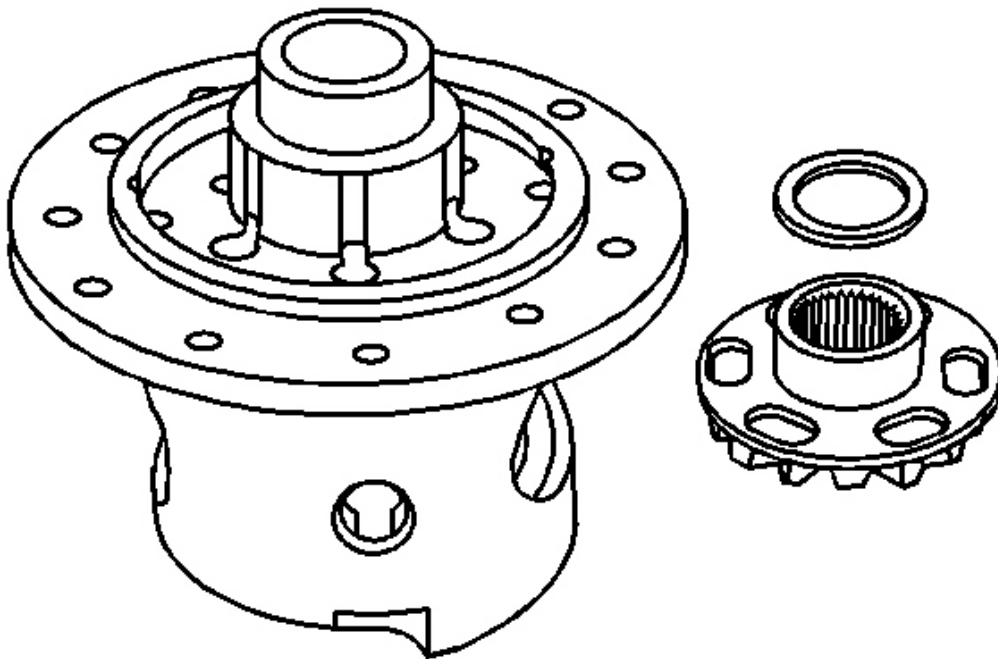


Fig. 156: View Of Locking Differential Side Gear & Thrust Washer
Courtesy of GENERAL MOTORS CORP.

2. Install the differential side gear thrust washer to the locking differential side gear.
3. Install the locking differential side gear and thrust washer into the ring gear side of the differential case.

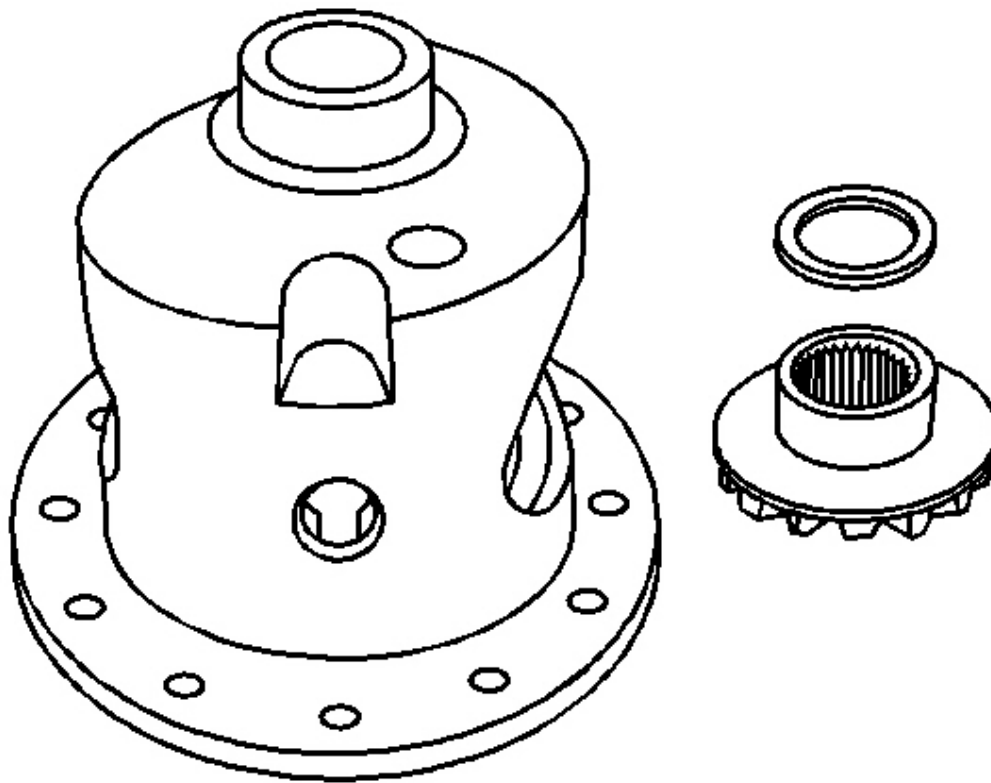


Fig. 157: Differential Side Gears & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

4. Install the differential side gear thrust washer to the differential side gear.
5. Install the differential side gear and thrust washer into the bell side of the differential case.

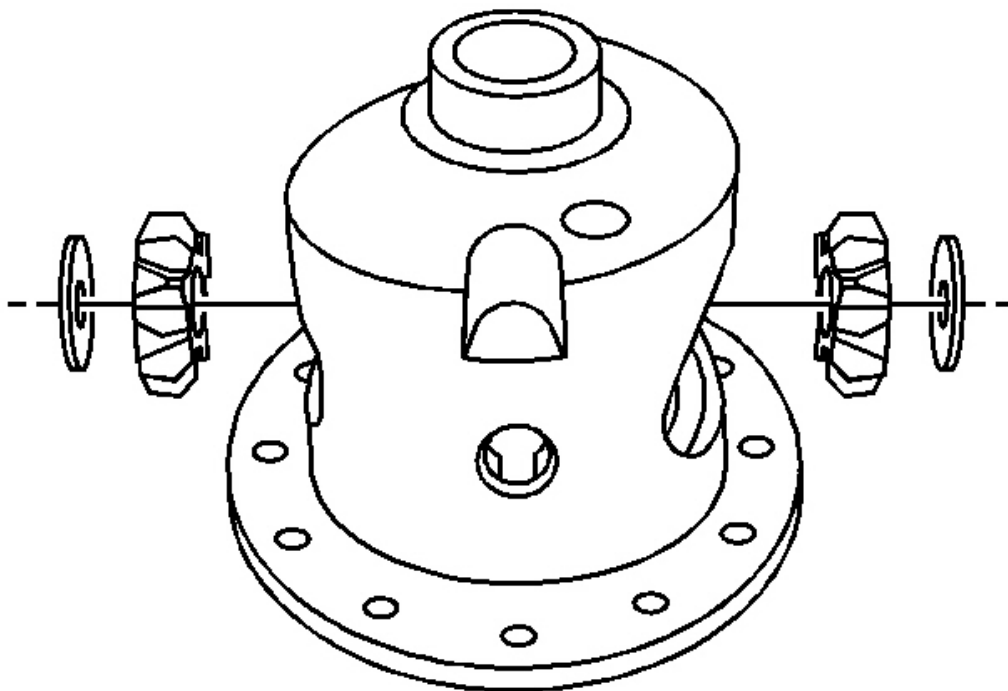


Fig. 158: Identifying Differential Pinion Gears & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

6. Install the differential pinion gears and thrust washers by doing the following:
 1. Position both pinion gears and thrust washers between the differential side gears.

Place the pinion gears and thrust washers 180 degrees across from each other.
 2. Rotate the differential side gears until both pinion gears and thrust washers are directly opposite the opening in the differential case.

Line up the pinion shaft opening in each of the pinion gears with the pinion shaft opening in the differential case.

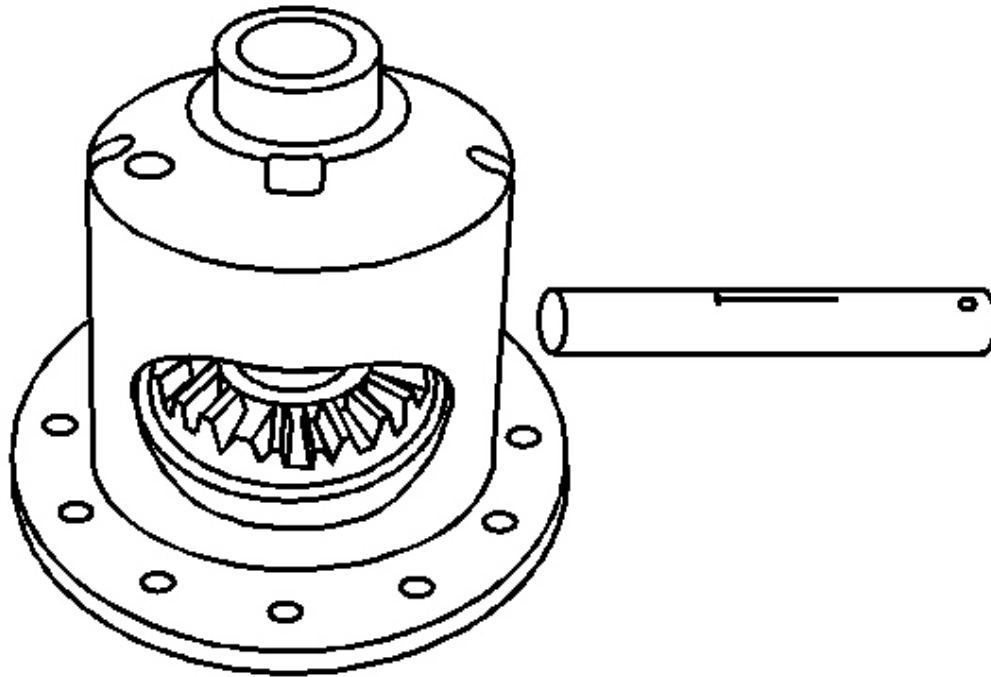


Fig. 159: View Of Differential And Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

7. Install the pinion shaft.

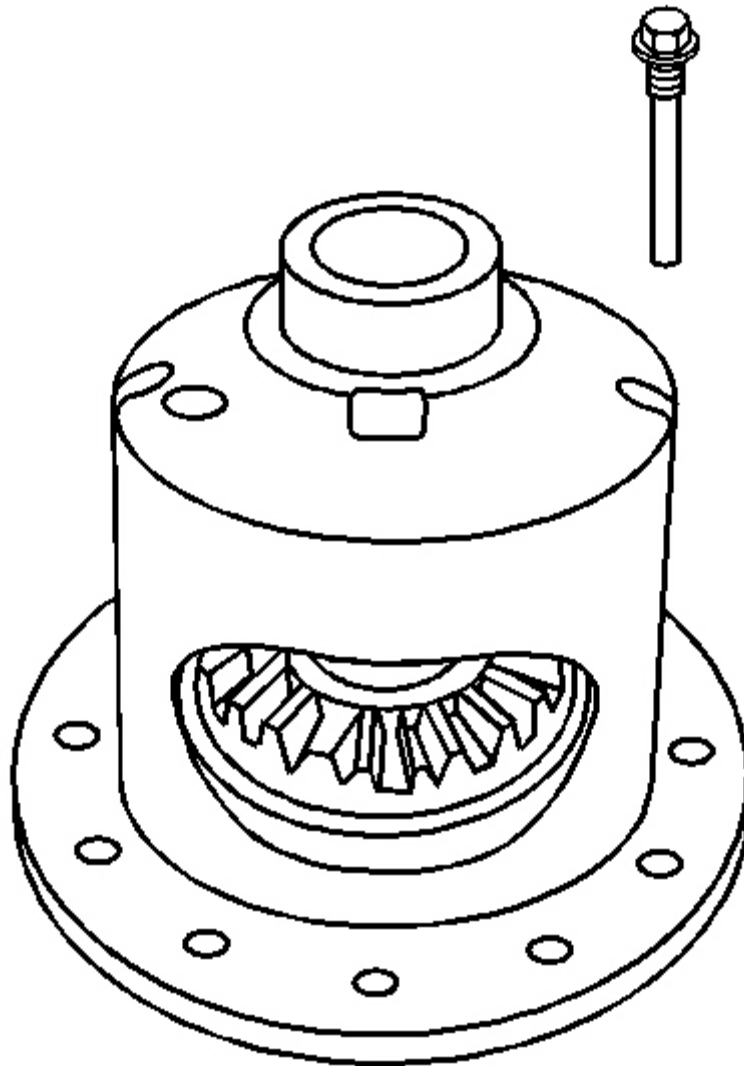


Fig. 160: View Of Pinion Shaft Lock Bolt
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

8. Install a new pinion shaft lock bolt.

Tighten: Tighten the new pinion shaft lock bolt to 50 N.m (37 lb ft).

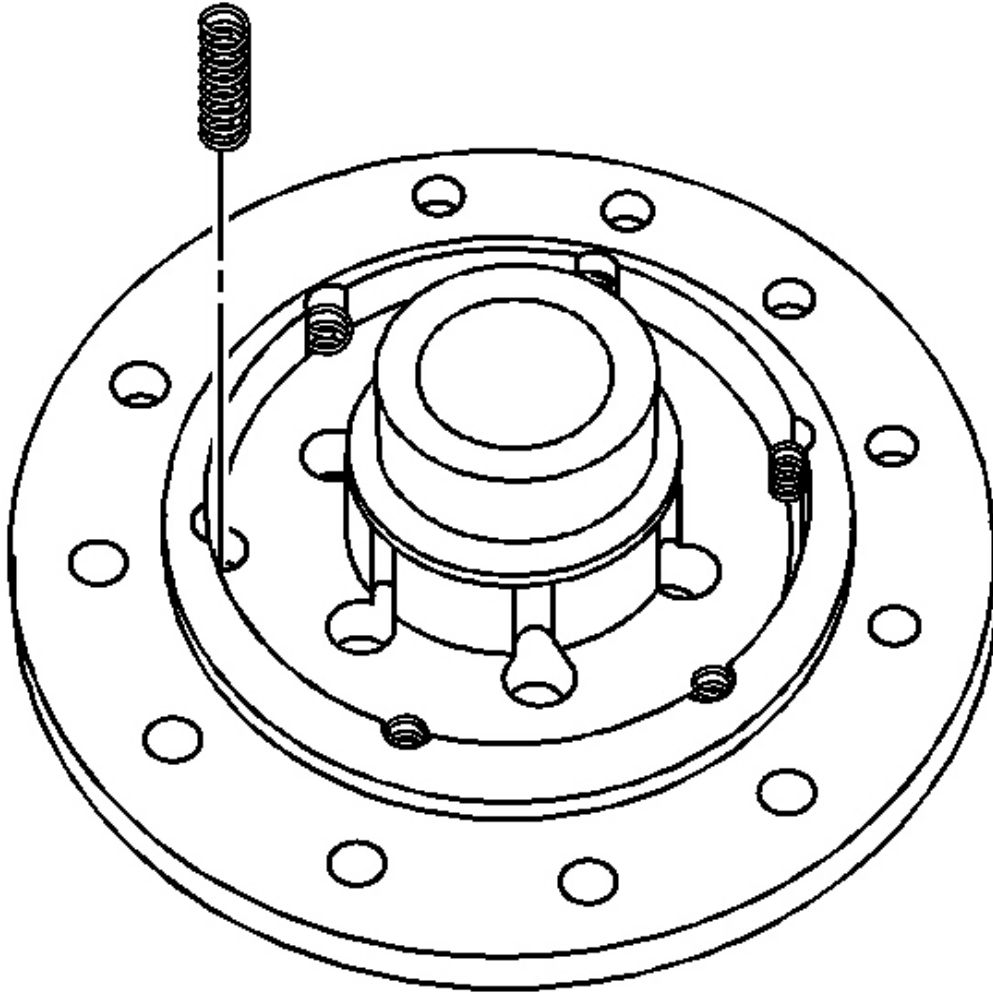


Fig. 161: Identifying Locking Differential Clutch Springs
Courtesy of GENERAL MOTORS CORP.

9. Install the locking differential clutch springs.

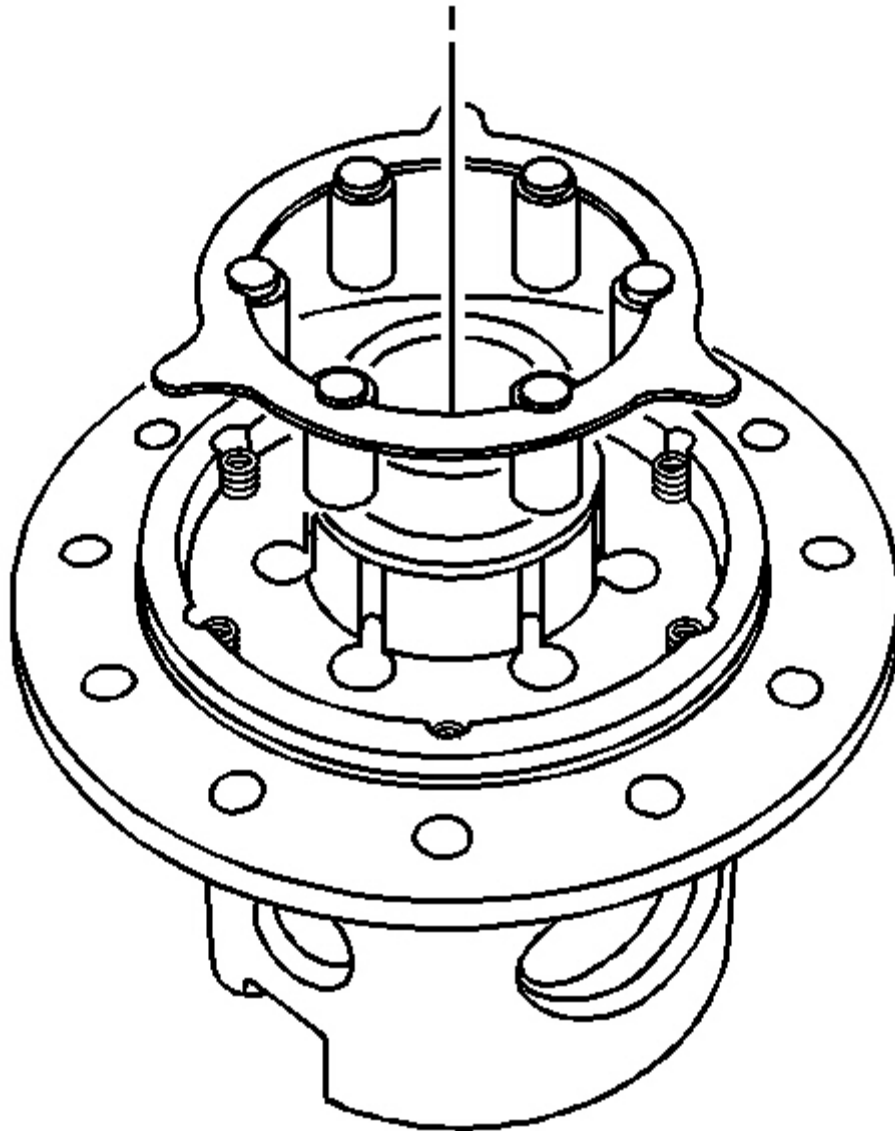


Fig. 162: Identifying Locking Differential Clutch Spring Retainer & Differential Carrier Lock Pins
Courtesy of GENERAL MOTORS CORP.

10. Install the locking differential clutch spring retainer and the differential carrier lock pins.

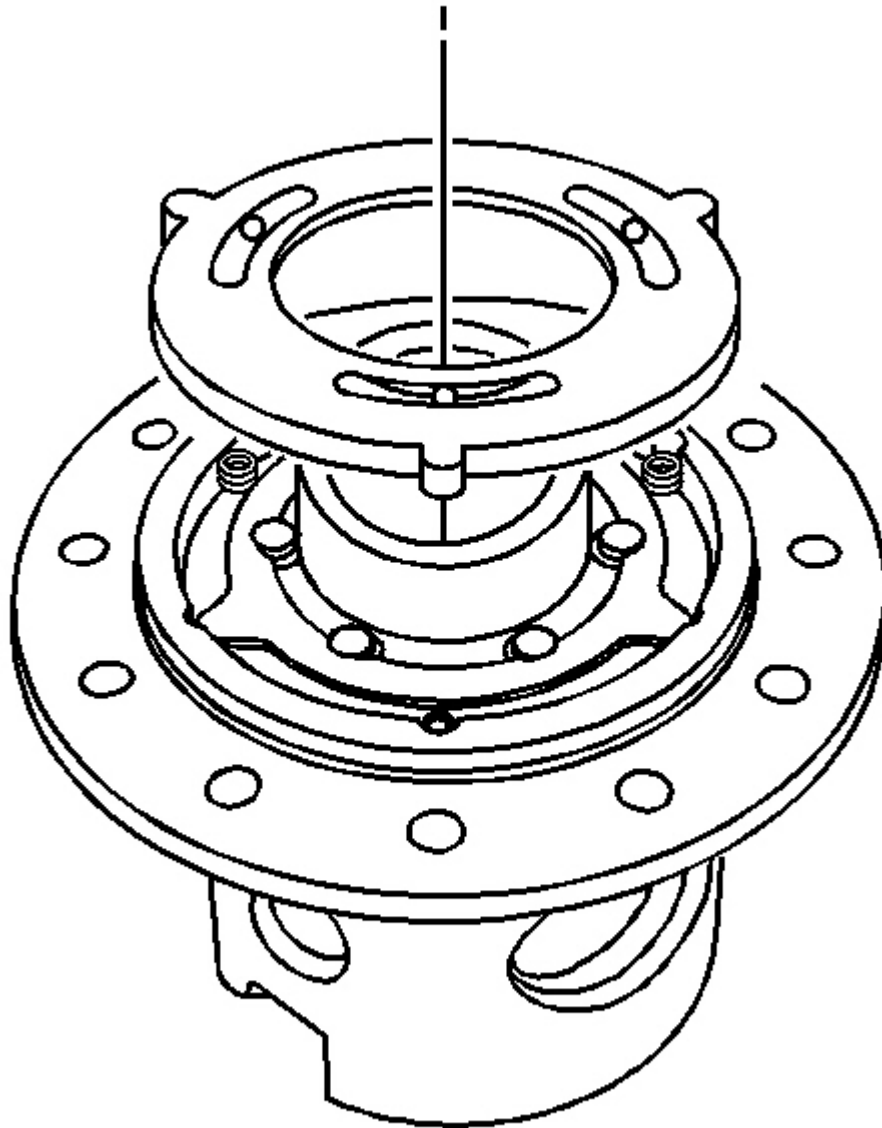


Fig. 163: Identifying Inboard Locking Differential Ball Bearing Plate
Courtesy of GENERAL MOTORS CORP.

11. Install the inboard locking differential ball bearing plate.

Place the inboard locking differential ball bearing plate on the three exposed differential

clutch springs.

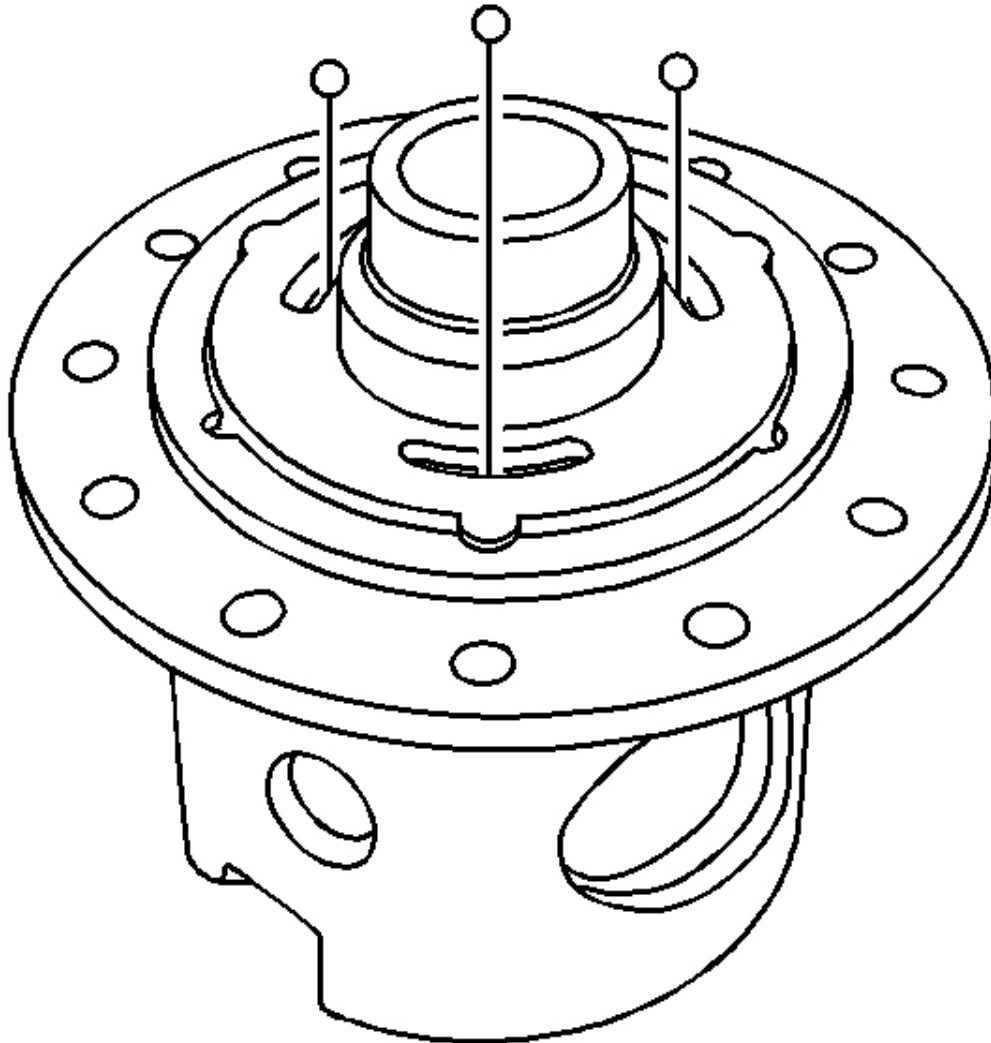


Fig. 164: Identifying Locking Differential Ball Bearings
Courtesy of GENERAL MOTORS CORP.

12. Install the locking differential ball bearings.

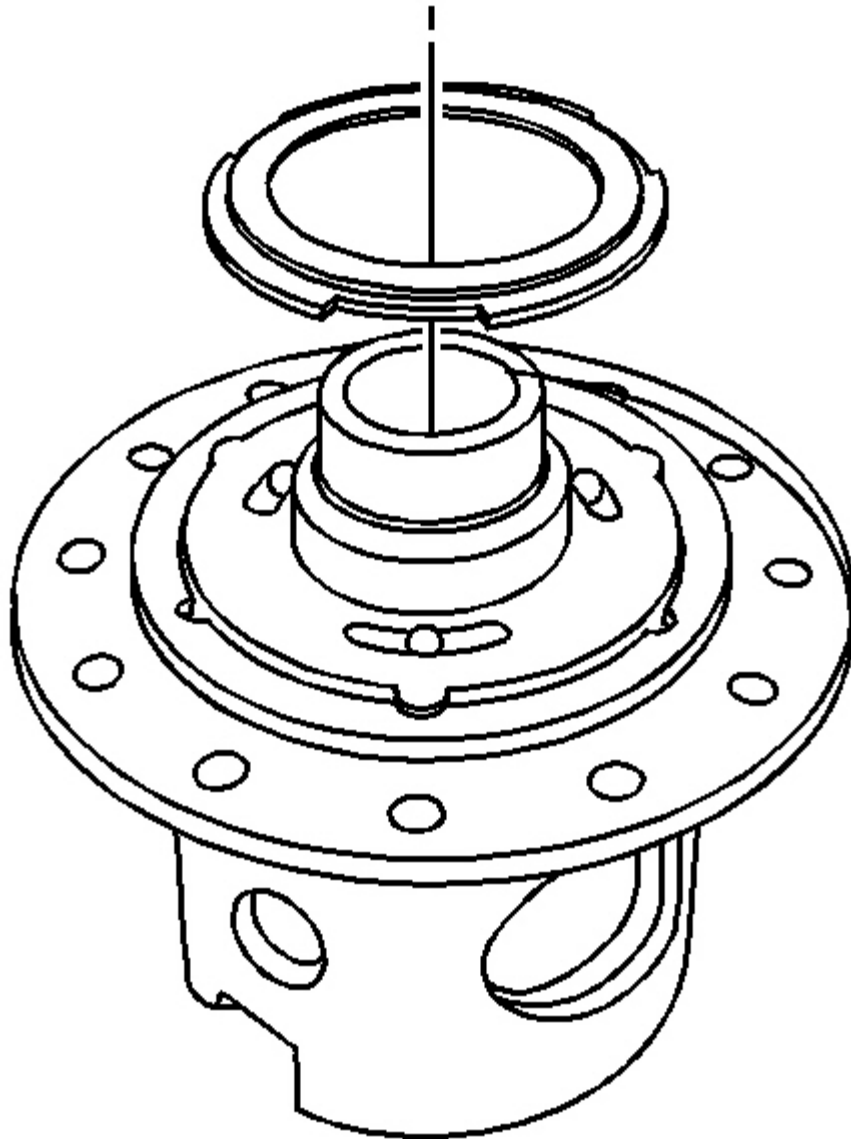


Fig. 165: Identifying Outboard Locking Differential Ball Bearing Plate
Courtesy of GENERAL MOTORS CORP.

13. Install the outboard locking differential ball bearing plate.

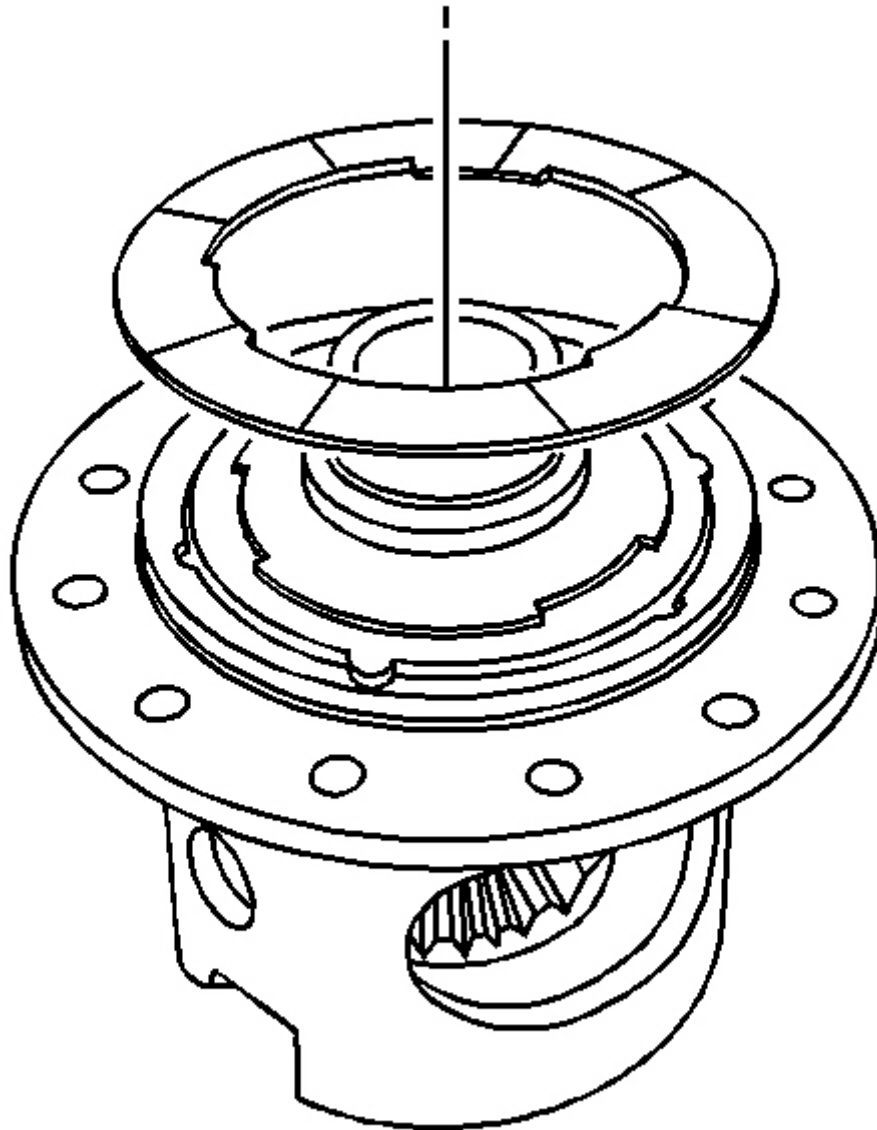


Fig. 166: Identifying Locking Differential Coil Plate
Courtesy of GENERAL MOTORS CORP.

14. Install the locking differential coil plate.

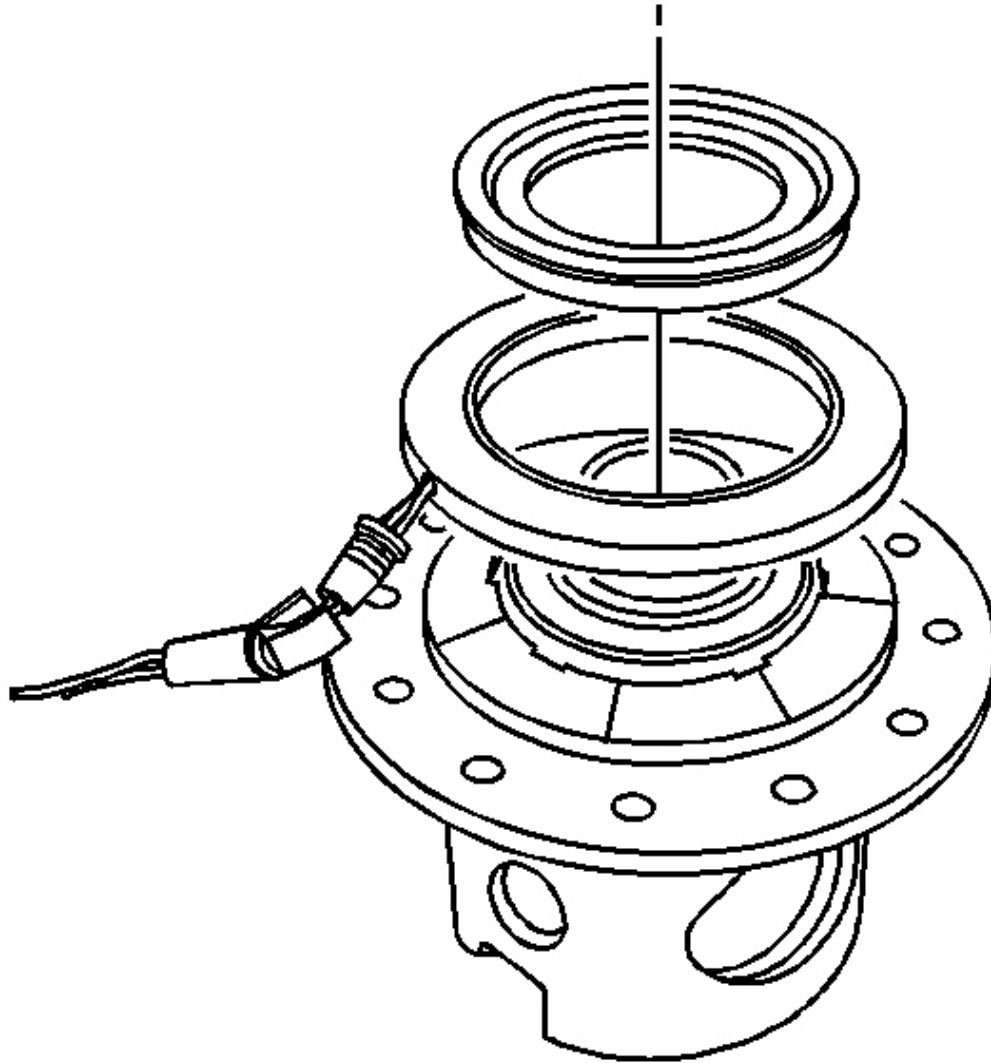


Fig. 167: View Of Differential Bearing Race
Courtesy of GENERAL MOTORS CORP.

15. Install the locking differential coil assembly.
16. Install the differential bearing race.

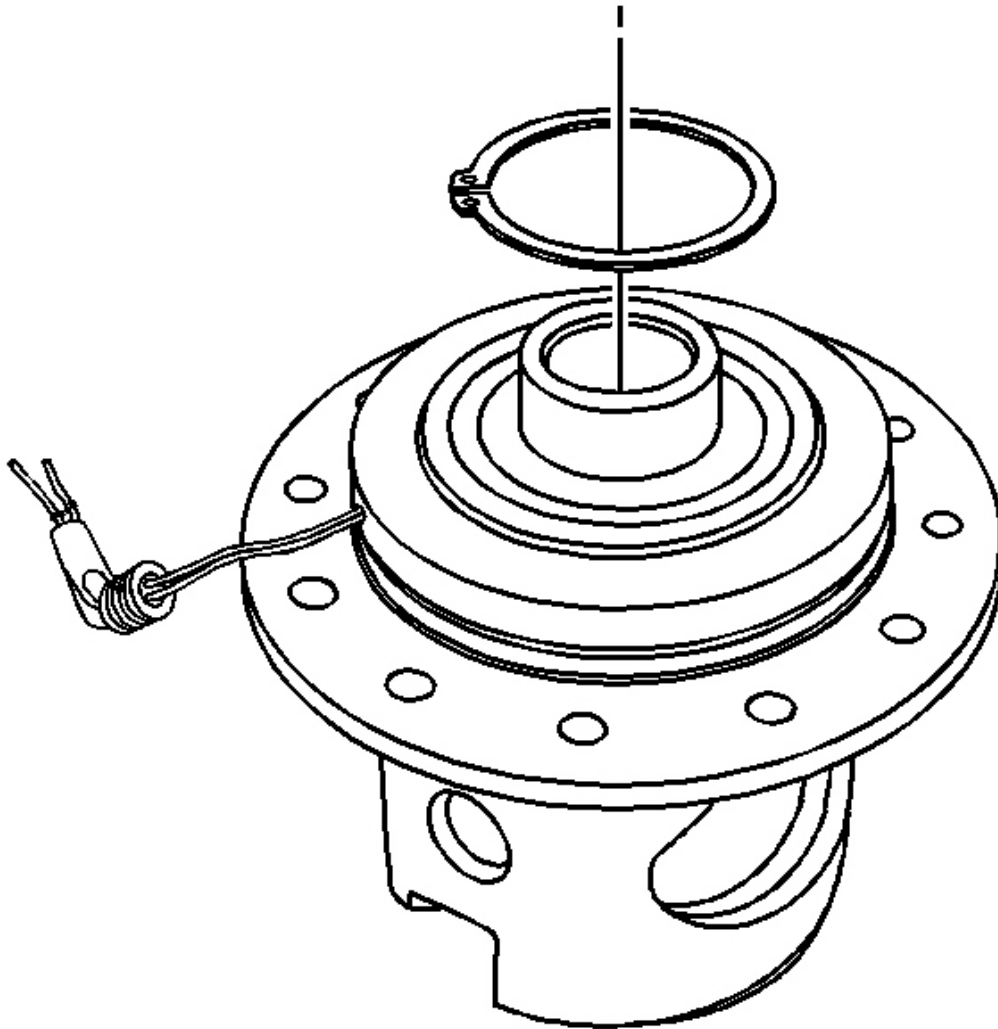


Fig. 168: Identifying Differential Bearing Retainer
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The differential bearing race must be compressed in order to install the differential bearing retainer.

17. Install the differential bearing retainer by performing the following steps:
 1. Install the differential bearing retainer.
 2. With the aid of an assistant, push the differential bearing race down towards the

differential case in order to compress the differential bearing retainer and differential coil assembly against the locking differential coil plate.

3. Install the differential bearing retainer.

Ensure the differential bearing retainer is evenly and fully seated in the differential bearing retainer slot before releasing the differential bearing race.

18. Install the ring gear. Refer to **Drive Pinion and Ring Gear Replacement**.

19. Install the differential side bearings. Refer to **Differential Side Bearings Replacement**.

DESCRIPTION AND OPERATION

LOCKING DIFFERENTIAL DESCRIPTION AND OPERATION

The electronic locking differential consists of the following components:

- Differential Bearing Retainer Race
- Differential Bearing Race
- Differential Bearing Assembly
- Locking Differential Coil Assembly
- Locking Differential Coil Plate
- Locking Differential Ball Bearing Plate - Outboard
- Locking Differential Ball Bearing Assembly
- Locking Differential Ball Bearing Plate - Inboard
- Locking Differential Clutch Spring
- Locking Differential Clutch Spring Retainer
- Differential Carrier Lock Pins
- Differential Case
- Differential Pinion Gears and Thrust Washers
- Locking Differential Side Gear and Thrust Washer
- Differential Side Gear and Thrust Washer

The electronic locking differential is a combination of an open differential and an electrically energized coil assembly. When the coil is not energized, the differential operates in the same manner as an open differential. The locking differential coil assembly is located on the left side of the differential case. The locking differential coil is held stationary within the differential case housing through the lock tab on the coil and the hold down lock that attaches to the differential

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bearing cap. The remainder of the locking components: the locking differential coil plate, the locking differential ball bearing plates, the clutch springs and the lock pins are located within the differential case and rotate at the same speed as the differential case. The locking function of the differential is accomplished by a combination of vehicle and user inputs. In order to the differential coil to energize, the vehicle must be operating under the following conditions:

- The transfer case indicator switch indicates 4 LO.
- The vehicle's speed must be less than 4.8 km/h (3 mph).
- The differential lock switch is turned ON.
- The left to right rear wheel speed difference is less than 50 RPM.

Once the above conditions are met, the automatic transfer case shift control module sends a signal to energize the coil. The energized coil creates a magnetic field that allows the outboard locking differential ball bearing plate to rotate at a slower speed than inboard locking differential ball bearing plate and the differential case. The difference in the 2 speeds causes the ball bearings that are between the outboard and the inboard ball bearing plate to move along their respective ramps and separate the 2 ball bearing plates. The separation increases the width of the plates and allows the differential lock pins to be pushed through the differential case towards the locking differential side gear. The locking differential side gear has 6 notches that accept the differential lock pins. Once the differential lock pins are engaged, the locking differential side gear can no longer rotate independently of the differential case. Since the locking differential side gear is now apart of the differential case and turning at the same speed as the ring gear, the pinion gears that are perpendicular to the locking differential side gear, cannot rotate within the differential case. This causes the bell-side differential side gear to rotate at the same speed as the locking differential side gear. The driving force generated by the ring gear, is transmitted through the locking differential side gear, through the pinion gears, to the bell-side differential side gear. The axle shafts, which are splined to each side gear, receive the force and rotate together at the same speed along with the differential case and ring gear. The will remain the locked position until the vehicle's speed exceeds 32 km/h (20 mph) or the operator turns OFF the differential lock switch or the transfer case is shifted into 4 HI, 2 HI or NEUTRAL. The locking differential coil will de-energize and the differential will function as an open differential.

REAR DRIVE AXLE DESCRIPTION AND OPERATION

The rear axle for this vehicle consist of the following components:

- Differential Carrier Housing
- Differential Case Assembly (Open or Locking)
- Ring Gear and Drive Pinion Shaft

- Left and Right Axle Shaft Tubes
- Left and Right Axle Shafts
- Fill Plug
- Drain Plug

The rear axle receives power from the propeller shaft and transfers it to the drive pinion through the universal joint and the pinion yoke, which is attached to the drive pinion. The drive pinion transfers the power to the ring gear which is splined to the drive pinion at a 90 degree angle. The ring gear is attached to the differential case which contains four gears inside of it. Two of the gear are side gears and two are pinion gears. Each side gear is splined to an axle shaft so each axle shaft turns when it's side gear rotates. The pinion gears are mounted on a differential pinion shaft and the pinion 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 rotates the differential case. The ring gear, as it rotates with the differential case, forces the pinion gears against the side gears. The side gears rotate the axle shafts to which the wheels are attached to. When both wheels have an equal amount of traction, the pinion gears do not rotate on the pinion shaft because of input force on the pinion gears 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. As long as the input force is equal between the two axle shafts, the axle shafts could be solidly attached to the ring gear. The addition of the two pinion gears and the two side gears are needed to allow the axle shafts to turn at different speeds. When the vehicle turns a corner, the inner wheel turns slower than the outer wheel. The amount slower the inner wheel spins is equal to the same amount the outer wheel spins faster, as compared to the straight line speed. When this happens, the pinion gears rotate around the pinion shaft and allow the wheels to spin at different speeds. For information regarding the description and operation of a locking differential, refer to **Locking Differential Description and Operation**.

SPECIAL TOOLS AND EQUIPMENT

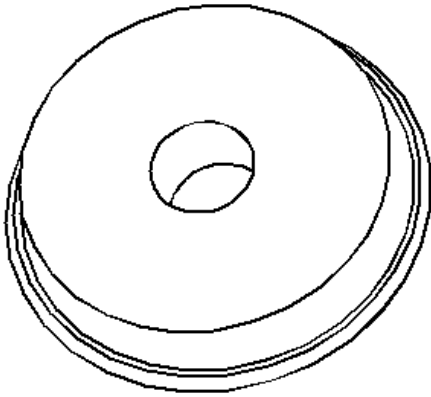
SPECIAL TOOLS

Special Tools

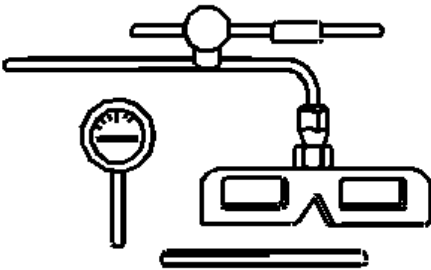
Illustration	Tool Number/Description
	J 2619-01 Slide Hammer

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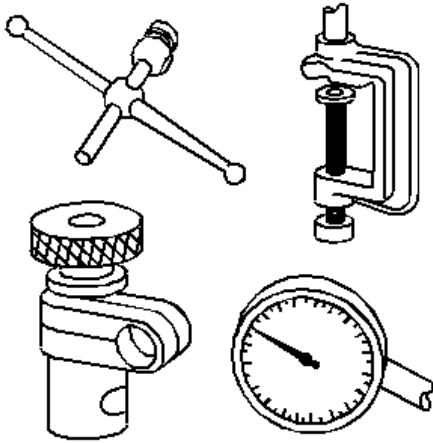
J 7817
Outer Bearing Race Installer



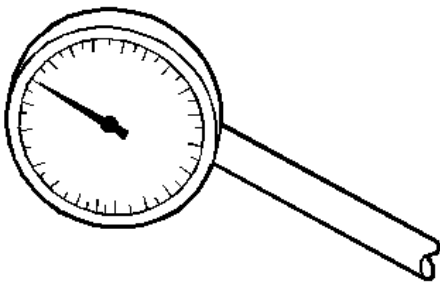
J 7872
Magnetic Base Dial Indicator

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J 8001
Dial Indicator Set

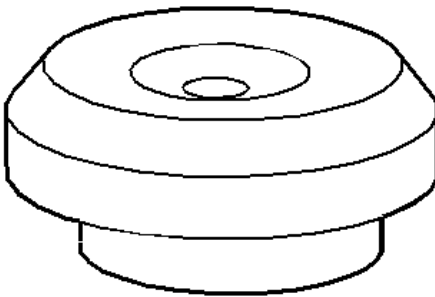
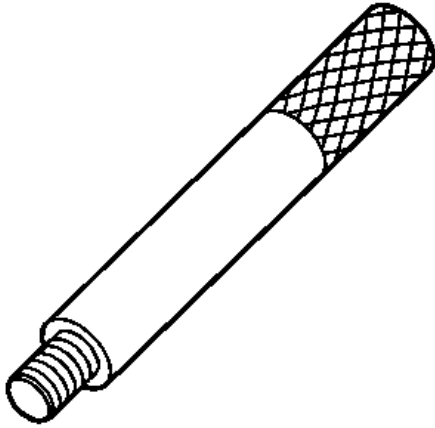


J 8001-3
Dial Indicator

J 8092
Driver Handle

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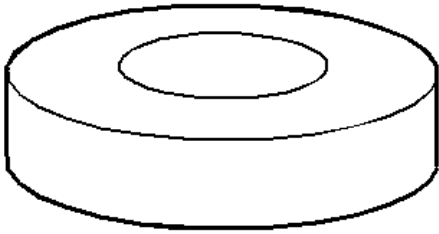
J 8107-02
Side Bearing Puller Pilot



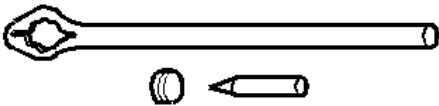
J 8608
Rear Pinion Bearing Race Installer

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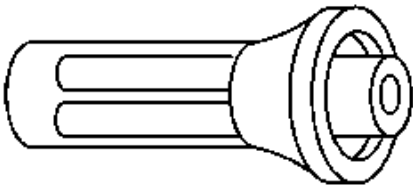
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J 8611-01
Rear Pinion Bearing Race Installer



J 8614-01
Flange and Pulley Holding Tool

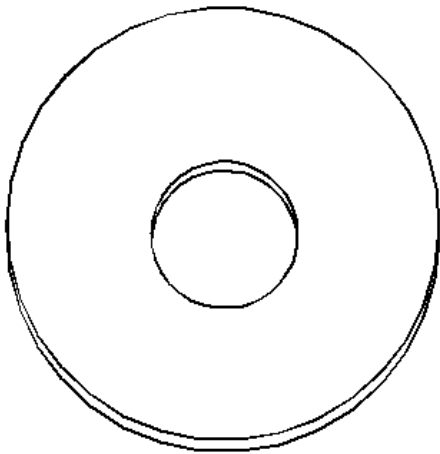
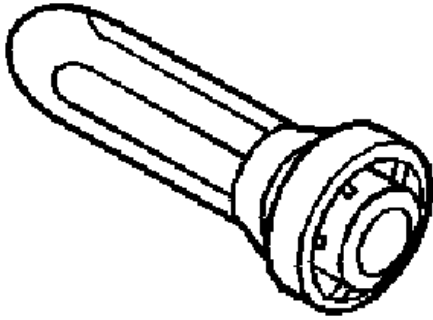


J 21128
Axle Pinion Oil Seal Installer

J 21426
Extension Housing Seal Installer

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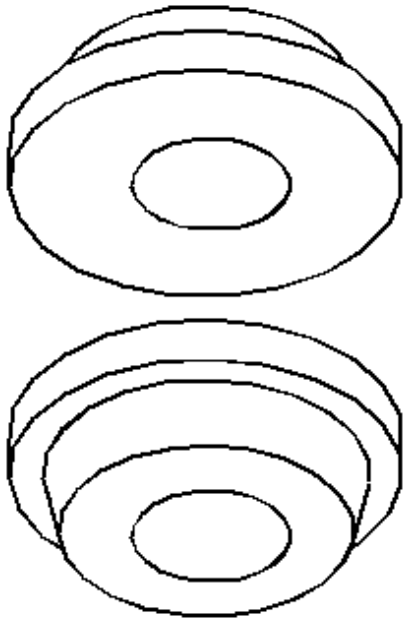


J 21777-42
Pinion Setting Pilot Washer

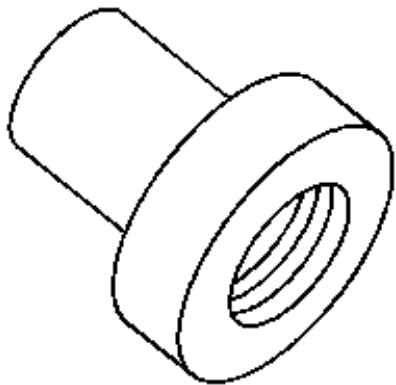
J 21777-43
Stud Assembly Bolt

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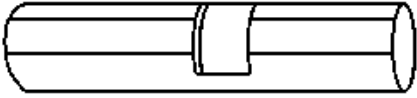
J 21777-45
Side Bearing Discs



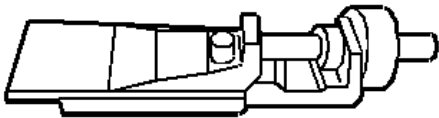
J 21784
Side Bearing Installer

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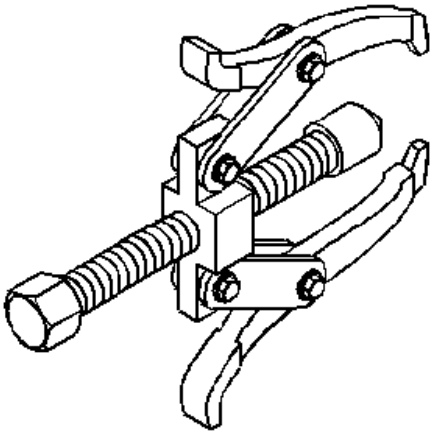
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J 22536
Pinion Driver



J 22779
Side Bearing Backlash Gage

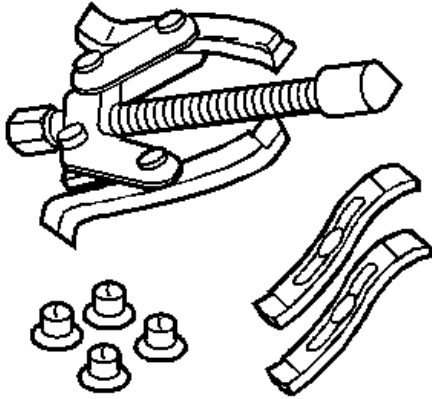


J 22888-20A
Universal Two Jaw Puller

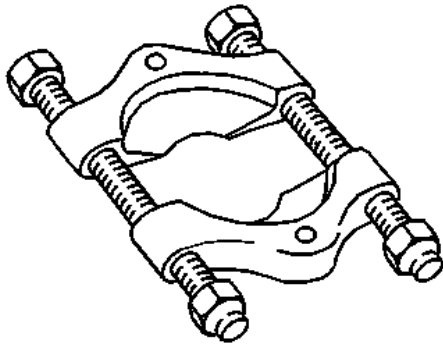
J 22888-D

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Side Bearing Remover Kit

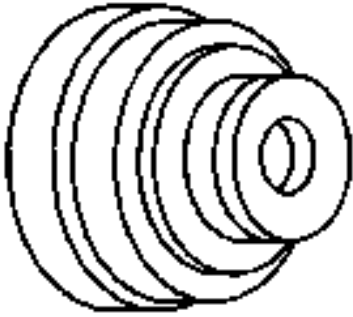


J 22912-01
Rear Pinion and Axle Bearing Remover

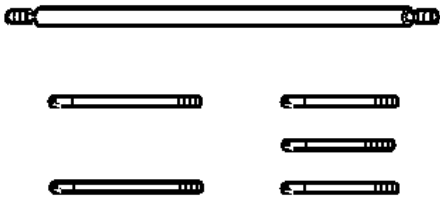
J 23690
Bearing Installer

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J 24433
Inner Pinion Bearing Installer

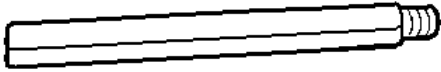


J 25025
Guide Pins

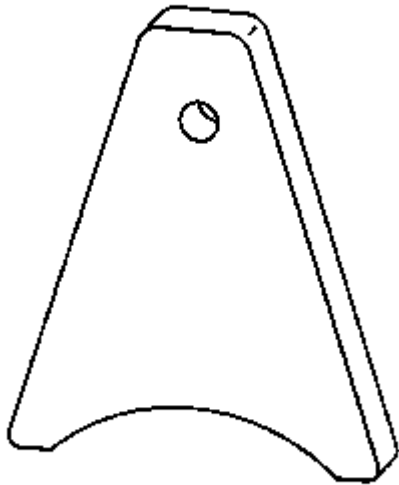
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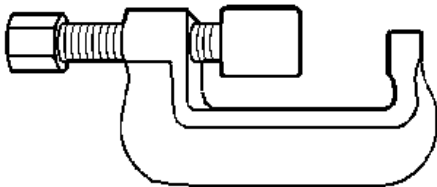
Dial Indicator Mounting Post



J 25588
Side Bearing Shim Installer

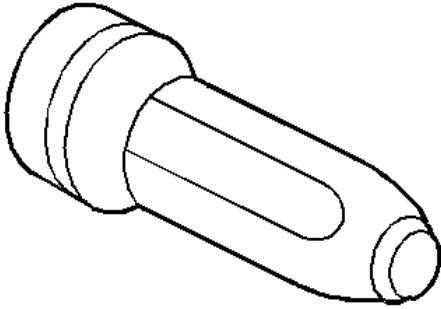


J 26252
Locking Differential Governor Remover

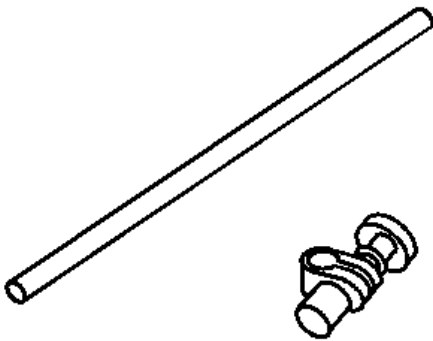


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J 33782
Pinion Oil Seal Installer

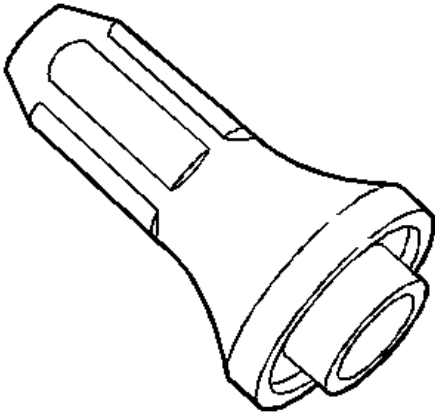


J 34178
Spreader Gage Adapter

J 34925
Pinion Setting Gage and Components

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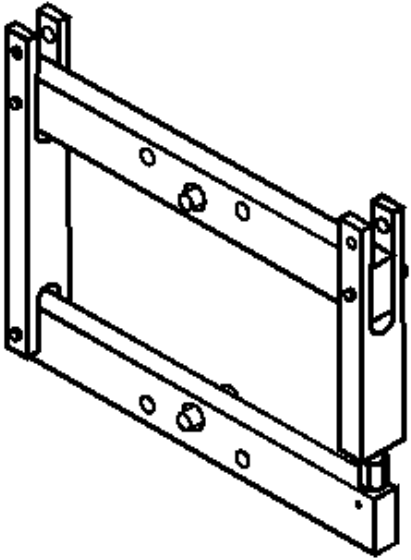
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J 38694
Extension Housing Oil Pump/Seal Installer

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2007 Driveline/Axle Rear Drive Axle - H3

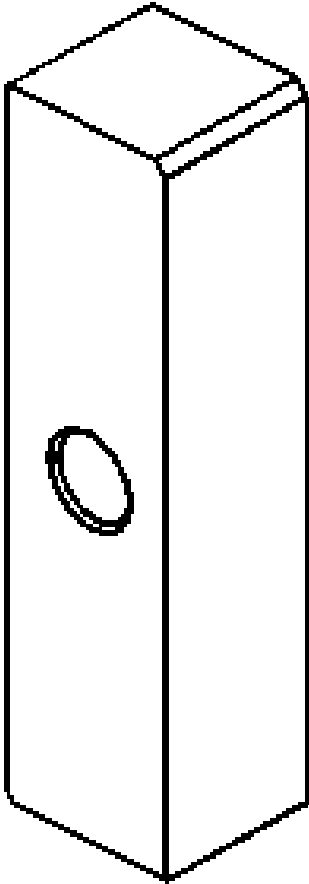


J 45222
Axle Housing Spreader

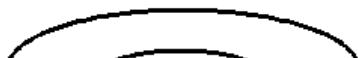
J 45230
Pinion Setting Gage Block

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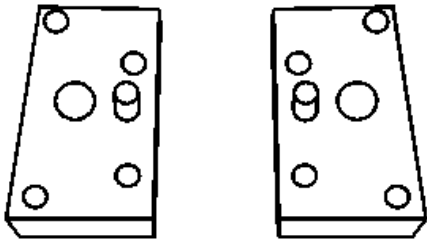


J 45231
Differential Side Bearing Installer

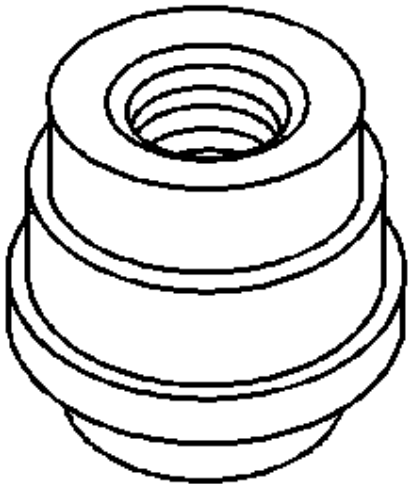


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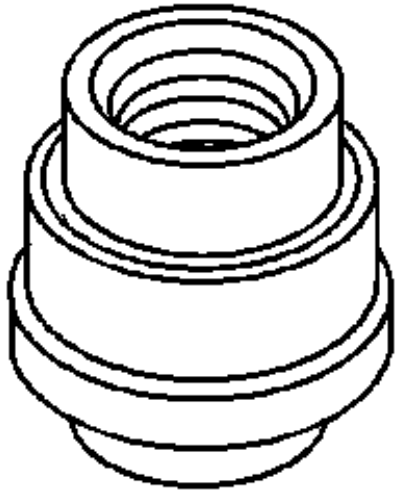
J 45232-10
Axle Housing Spreaders Adapters



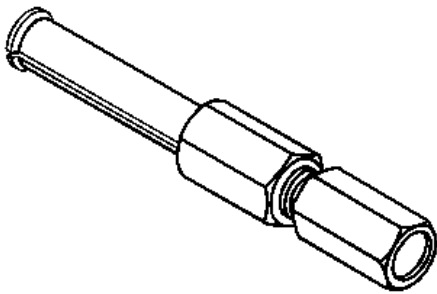
J 45232
Differential Bearing Adjuster Needle Bearing
Replacer - LH

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2007 Driveline/Axle Rear Drive Axle - H3



J 45233
Differential Bearing Adjuster Needle Bearing
Replacer - RH



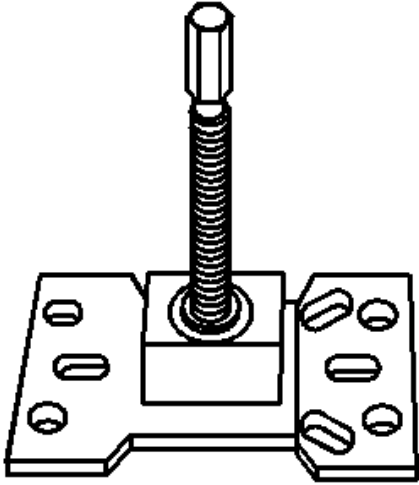
J 45857
Tone Wheel and/or Bearing Remover

J 45859

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2007 Driveline/Axle Rear Drive Axle - H3

Axle Remover



J 49935
Holding Fixture

