

DRIVELINE/AXLE

Rear Drive Axle - Coupe And Wagon

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Differential Dampener Bolt	58 N.m	43 lb ft
Differential Dampener Bracket Bolt	58 N.m	43 lb ft
Differential Housing Cover Bolts	29 N.m	21 lb ft
Differential Mounting Bracket Bolts	29 N.m	21 lb ft
Differential Oil Pump Mounting Bracket Bolts	9 N.m	80 lb ft
Differential Oil Cooler to Body Bolts	40 N.m	30 lb ft
Differential Oil Cooler Temperature Sensor	23 N.m	17 lb ft
Differential Ring Gear Bolts	185 N.m	136 lb ft
Differential Temperature Sensor	23 N.m	17 lb ft
Differential Mounting Bolts-Front	175 N.m	129 lb ft
Differential Mounting Nut-Rear	220 N.m	162 lb ft
Differential Oil Cooler Adapter	39 N.m	29 lb ft
Differential Oil Cooler fittings	24 N.m	18 lb ft
Drain Plug	39 N.m	29 lb ft
Fill Plug	39 N.m	29 lb ft
Pinion Nut	245 N.m	181 lb ft

LUBRICATION SPECIFICATIONS

Capacities

Application	Quantity	
	Metric	English
Synthetic Differential Lubricant-Refer to Adhesives, Fluids, Lubricants, and Sealers .		
Drain and fill, if differential side cover has been removed to service any internal differential component.		
• For vehicles equipped with a limited slip differential	1.2 L	1.26 Qt
• For vehicles not equipped with the limited slip differential	1.3 L	1.3 Qt
• For vehicles equipped with a limited slip differential and a differential oil cooler	2.0 L	2.1 Qt
Drain and fill with use of drain plug.		
• For vehicles equipped without a differential oil cooler	1.1 L	1.16 Qt

• For vehicles equipped with a differential oil cooler	1.8 L	1.9 Qt
NOTE: The following is for vehicles equipped with the Limited Slip Differential option. The Limited Slip Additive container capacity is greater than the amount needed. Only add the amount specified.		
Limited Slip Differential Lubricant Additive-Refer to <u>Adhesives, Fluids, Lubricants, and Sealers</u> .		
• Drain and fill with cover removed without a differential oil cooler.	100 ml	3.38 oz
• Drain and fill with use of drain plug without a differential oil cooler	70 ml	2.37 oz
• Drain and fill with cover removed with a differential oil cooler	170 ml	5.75 oz
• Drain and fill with use of drain plug with a differential oil cooler	150 ml	5.07 oz

REAR AXLE SPECIFICATIONS

Rear Axle Specifications

Application	Specification	
	Metric	English
Differential Case Shim Sizes	3.5-4.4 mm	0.14-0.17 in
Pinion Housing Shim Sizes	1.2-1.9 mm	0.04-0.07 in
Pinion Rotating Torque w/seals	2.5-4 N.m	22-35 lb in
Ring Gear/Pinion A1 Nominal Value-All Axles	111.00 mm	4.37 in
Ring Gear/Pinion A2 Nominal Value-3.42 Ratio Axles	63.5 mm	2.50 in
Ring Gear/Pinion A2 Nominal Value-3.73 Ratio Axle	63.5 mm	2.50 in
Torsional Backlash		
• 3.23 Ratio with 105 mm Flange	0.23-0.37 mm	0.009-0.014 in
• 3.42 Ratio with 105 mm Flange	0.24-0.38 mm	0.009-0.015 in
• 3.73 Ratio with 105 mm Round Flange	0.21-0.34 mm	0.008-0.013 in

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

Adhesives, Fluids, Lubricants, and Sealers

Application	Type of Material	GM Part Number	
		US	Canada
Rear Differential	Limited Slip Additive	1052358	992694
Rear Differential Lubricant	Synthetic Gear Oil	89021677	89021678
Pinion Nut	Thread Locker	12345382	10953489

SCHEMATIC WIRING DIAGRAMS

REAR AXLE WIRING SCHEMATICS

Rear Differential

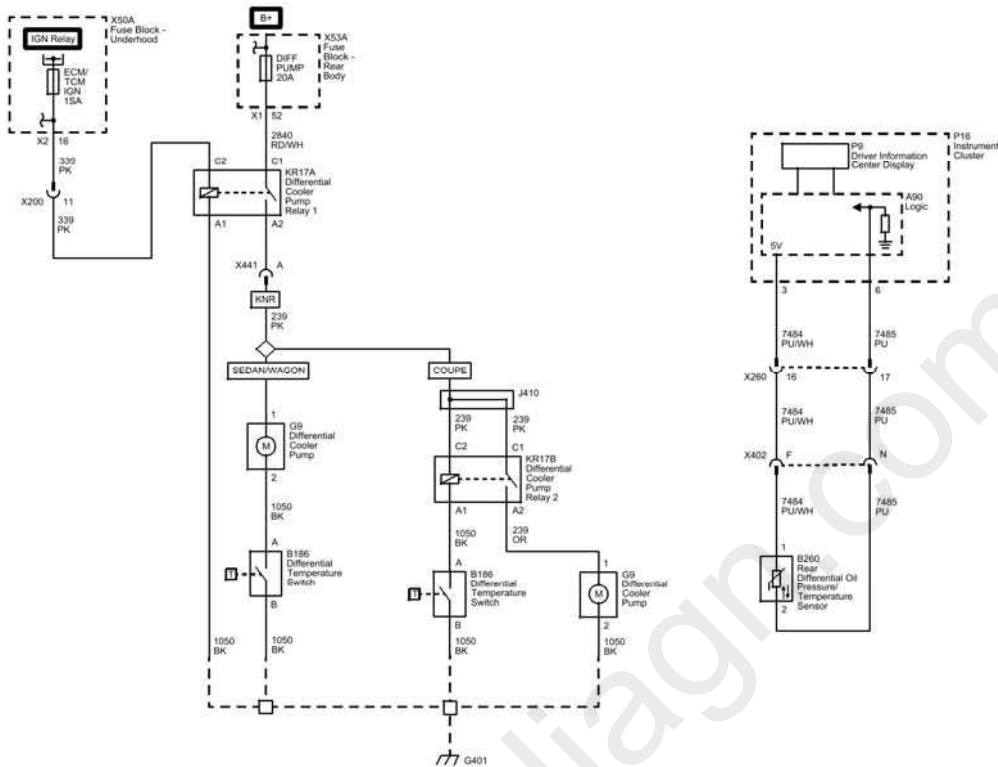


Fig. 1: Rear Differential

Courtesy of GENERAL MOTORS COMPANY

VISUAL IDENTIFICATION

REAR AXLE IDENTIFICATION

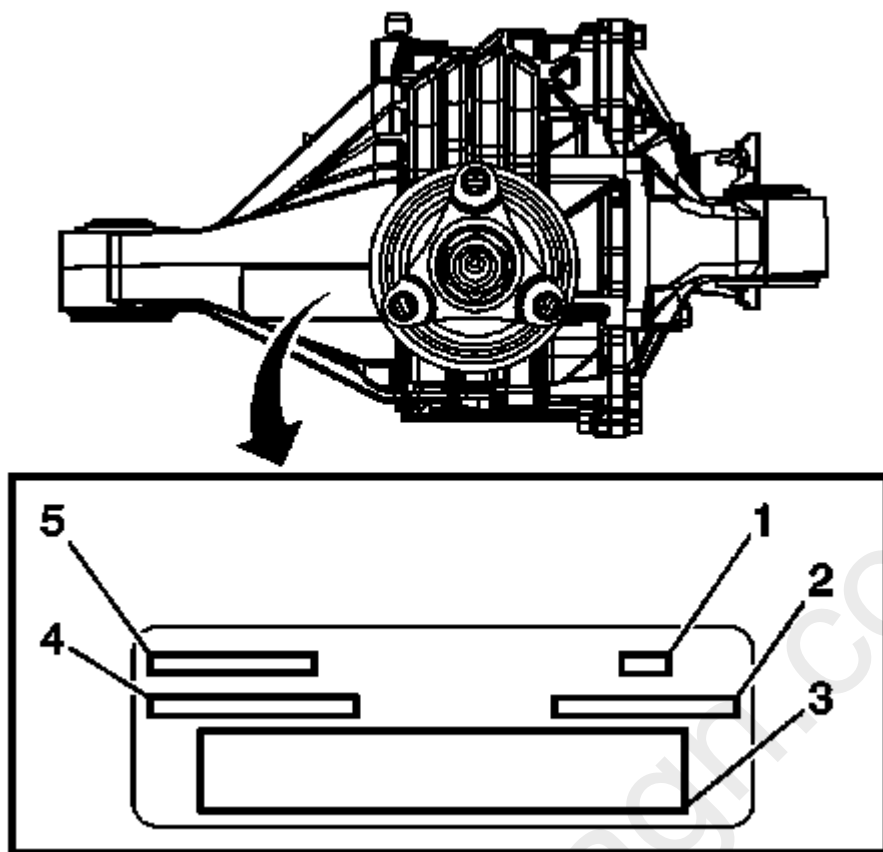


Fig. 2: Rear Axle Identification
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	GM Logo
2	GM Part Number
3	Bar Code
4	Getrag Serial Number
5	Getrag Logo

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
<u>DTC C0394</u>	DTC C0394 00 Rear Axle Coupling Temperature Sensor Circuit

DTC C0394: REAR AXLE COUPLING TEMPERATURE SENSOR CIRCUIT

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC C0394 00

Rear Axle Coupling Temperature Sensor Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
5 V Ref	C0394	C0394	C0394	-
Signal	C0394	C0394	C0394	-

Circuit/System Description

The rear axle differential temperature sensor is a two wire sensor that is a variable resistor type. It is used by the instrument panel cluster (IPC) to monitor the temperature of the rear axle. The IPC provides a 5 volt reference and receives a signal voltage from the sensor which is mounted on the rear differential housing.

Conditions for Running the DTC

Ignition ON

Conditions for Setting the DTC

The IPC detects signal voltage less than 0.1 V or greater than 5 V for 60 seconds.

Action Taken When the DTC Sets

The SERVICE DIFFERENTIAL SENSOR message is displayed on the IPC.

Conditions for Clearing the DTC

- The DTC will become history if the IPC no longer detects a failure.
- The history DTC will clear after 100 fault-free ignition cycles.

Reference Information

Schematic Reference

Rear Axle Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

Description and Operation

Rear Drive Axle Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Ignition ON, observe the IPC Rear Differential Temp Sensor parameter. The value should be .1-4.9 volts and should change with rear differential temperature.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the rear differential temperature sensor.
2. Ignition ON, test for 4.8-5.2 V between the 5 V reference circuit terminal 1 and ground.
 - If less than the specified range, test the reference circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the IPC.
 - If greater than the specified range, test the reference circuit for a short to voltage. If the circuit tests normal, replace the IPC.
3. With a scan tool, verify the IPC Rear Differential Temp Sensor parameter is less than 0.1 V.
 - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the IPC.
4. Install a 3 A fused jumper wire between the signal circuit terminal 2 and the reference circuit terminal 1. With a scan tool, verify the IPC Rear Differential Temp Sensor parameter is greater than 4.8 V.
 - If less than the specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the IPC.
5. If all circuits test normal, test or replace the rear differential temperature sensor.

Component Testing

1. Ignition OFF, disconnect the harness connector at the rear differential temperature sensor.
2. Test for 25-10K ohms between the sensor signal terminal 2 and the low reference circuit terminal 1.

- If not within the specified range, replace the rear differential temperature sensor.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Differential Temperature Sensor Replacement**
- **Control Module References** for IPC replacement, setup, and programming.

SYMPTOMS - LOCKING/LIMITED SLIP REAR AXLE

Strategy Based Diagnostics

Review the system operations in order to familiarize yourself with the system functions. Refer to **Limited Slip 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 **Limited Slip Differential Diagnosis**.

Symptom List

Refer to the following diagnostic procedure **Limited Slip Differential Chatters in Turns**.

SYMPTOMS - REAR DRIVE AXLE

Strategy Based Diagnostics

Review the system operations in order to familiarize yourself with the system functions. Refer to **Rear Drive Axle Description and Operation**, and **Wheel Drive Shafts Description and Operation**, . All diagnosis on a vehicle should follow a logical process. Strategy based diagnostics is a uniform approach for repairing all systems. The diagnostic flow may always be used in order to resolve a system problem. The diagnostic flow is the place to start when repairs are necessary. For a detailed explanation, refer to **Strategy Based Diagnosis** .

Visual/Physical Inspection

- Inspect for aftermarket devices, which could affect the operation of the vehicle. Refer to **Checking Aftermarket Accessories** .
- Inspect the easily accessible or visible system components for obvious damage or conditions, which could cause the symptom.
- Check for the correct lubricant level and the proper viscosity.
- Verify the exact operating conditions under which the concern exists. Note factors such as vehicle speed, road conditions, ambient temperature, and other specifics.

- Compare the driving characteristics or sounds, if applicable, to a known good vehicle and make sure you are not trying to correct a normal condition.

Intermittent

Test the vehicle under the same conditions that the customer reported in order to verify the system is operating properly.

Symptom List

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

- **Diagnostic Starting Point - Vehicle**
- **Differential Oil Cooler Malfunction (Coupe), Differential Oil Cooler Malfunction (Wagon)**
- **Noisy in Drive**
- **Noisy When Coasting**
- **Intermittent Noise**
- **Constant Noise**
- **Noisy on Turns**
- **Rear Axle Lubricant Leak Diagnosis**

DIFFERENTIAL OIL COOLER MALFUNCTION (WAGON)

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Relay 1 B+	1	1	-	-
Relay 1 Coil IGN.	1	1	-	-
Relay 1 Control	1	1	-	-
Relay 1 Coil Control	-	1	-	-
Differential Cooler Pump Control	2	1	-	-
Differential Temperature Switch Ground	-	1	-	-
1. Differential Cooler Pump Is Always OFF 2. Differential Cooler Pump Is Always ON				

Circuit/System Description

The differential cooler is designed to reduce the temperature of the rear differential fluid during high speed driving. The differential cooler system is controlled by a temperature switch located in the rear of the differential housing and functions when conditions require it to operate. The fluid capacity for the rear differential cooler is greater than the standard system.

Reference Information

Schematic Reference

Rear Axle Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

NOTE: **Allow the differential housing temperature to adjust to approximate ambient air temperature before performing any testing.**

1. Ignition OFF, disconnect the differential cooler pump relay 1.
2. Test for less than 10 ohms between the ground terminal A1 and ground.
 - If greater than the specified value, repair the open/high resistance in the ground circuit.
3. Ignition ON, verify that a test lamp illuminates between the ignition circuit terminal C2 and ground.
 - If the test lamp does not illuminate, test the ignition circuit for a short to ground or an open/high resistance. If the circuit tests normal and the ignition circuit fuse is open, test or replace the differential cooler pump relay.
4. Verify that a test lamp illuminates between the B+ circuit terminal C1 and ground.
 - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance. If the circuit tests normal and the B+ circuit fuse is open, test the differential cooler pump control circuit terminal A2 for a short to ground. If the circuit tests normal, test or replace the differential cooler pump.
5. Disconnect the harness connector at the differential temperature switch.

- If the differential coolant pump was activated and deactivates when disconnected, replace the differential temperature switch.
- 6. Ignition OFF, test for less than 10 ohms between the ground terminal B and ground.
 - If greater than the specified value, repair the open/high resistance in the ground circuit.
- 7. Ignition ON, momentarily connect a 5 A fused jumper between the switch control circuit terminal A and the ground circuit terminal B.
 - If the differential coolant pump activates, replace the differential temperature switch.
- 8. Ignition OFF, disconnect the harness connector at the differential cooler pump.
- 9. Verify a test lamp does not illuminate between the differential cooler pump control circuit terminal 1 and ground.
 - If the test lamp illuminates, test for a short to voltage on the pump control circuit. If the circuit tests normal, test or replace the differential cooler pump relay 1.
- 10. Ignition ON, momentarily connect and disconnect a 5 A fused jumper between the differential temperature switch control circuit terminal A and the ground circuit terminal B.
- 11. Verify a test lamp illuminates ON and OFF between the differential cooler pump control circuit terminal 1 and ground circuit terminal 2
 - If the test lamp does not illuminate, test the pump B+ control and ground control circuits for an open/high resistance. If all circuits test normal, test or replace the differential cooler pump relay 1.
 - If the test lamp is always illuminated, test the pump ground control circuit for a short to ground.
- 12. If all circuits test normal, test or replace the differential cooler pump.

Component Testing

Relay Test

1. Ignition OFF, disconnect the differential cooler pump relay.
2. Test for 60-180 ohms between terminals C2 and A1.
 - If not within the specified range, replace the differential cooler pump relay.
3. Test for infinite resistance between the following terminals:
 - C1 and C2
 - C1 and A2
 - C1 and A1
 - A1 and A2
 - If not the specified value, replace the differential cooler pump relay.
4. Test for less than 2 ohms between terminals C1 and A2.
 - If greater than the specified range, replace the differential cooler pump relay.
5. Install a 20 A fused jumper wire between relay terminal C2 and B+. Install a jumper wire between relay terminal A1 and ground. Test for less than 2 ohms between terminals C1 and A2.
 - If greater than the specified range, replace the differential cooler pump relay.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Differential Oil Cooler Temperature Sensor Replacement**
- **Intermediate Axle Differential Lubricant Pump Replacement**

DIFFERENTIAL OIL COOLER MALFUNCTION (COUPE)

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Relay 1 B+	1	1	-	-
Relay 1 Coil IGN.	1	1	-	-
Relay 1 Control	1	1	-	-
Relay 1 Coil Ground	-	1	-	-
Relay 2 Coil Control	2	1	1	-
Relay 2 Differential Cooler Pump Control	1	1	2	-
Differential Cooler Pump Ground	-	1	-	-
Differential Temperature Switch Ground	-	1	-	-
1. Differential Cooler Pump Is Always OFF 2. Differential Cooler Pump Is Always ON				

Circuit/System Description

The differential cooler is designed to reduce the temperature of the rear differential fluid during high speed driving. The differential cooler system is controlled by a temperature switch located in the rear of the differential housing and functions when conditions require it to operate. The fluid capacity for the rear differential cooler is greater than the standard system.

Reference Information

Schematic Reference

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- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

NOTE: **Allow the differential housing temperature to adjust to approximate ambient air temperature before performing any testing.**

1. Ignition OFF, disconnect the differential cooler pump relay 1.
2. Test for less than 10 ohms between the ground terminal A1 and ground.
 - If greater than the specified value, repair the open/high resistance in the ground circuit.
3. Ignition ON, verify that a test lamp does not illuminate between the control circuit terminal A2 and ground.
 - If the test lamp illuminates, test the control circuit for a short to voltage.
4. Verify that a test lamp illuminates between the ignition circuit terminal C2 and ground.
 - If the test lamp does not illuminate, test the ignition circuit for a short to ground or an open/high resistance. If the circuit tests normal and the ignition circuit fuse is open, test or replace the differential cooler pump relay.
5. Verify that a test lamp illuminates between the B+ circuit terminal C1 and ground.
 - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance. If the circuit tests normal and the B+ circuit fuse is open, test both differential cooler pump relay 1 and relay 2 control circuits terminals A2 for a short to ground. If the circuits test normal, test or replace the differential cooler pump.
6. Ignition OFF, reconnect differential cooler pump relay 1.
7. Disconnect the differential cooler pump relay 2.
8. Ignition ON, verify that a test lamp does not illuminate between the control circuit terminal A2 and ground.
 - If the test lamp illuminates, test the control circuit for a short to voltage.
9. Verify that a test lamp illuminates between the ignition circuit terminal C2 and ground.
 - If the test lamp does not illuminate, test the ignition circuit for a short to ground or an open/high resistance. If the circuit tests normal and the ignition circuit fuse is open, test or replace the differential cooler pump relay 2.
10. Verify that a test lamp illuminates between the B+ circuit terminal C1 and ground.

- If the test lamp does not illuminate, test the B+ circuit for an open/high resistance.
- 11. Ignition OFF, reconnect differential cooler pump relay 2.
- 12. Ignition ON, disconnect the harness connector at the differential temperature switch.
 - If the differential coolant pump was activated and deactivates when disconnected, replace the differential temperature switch.
- 13. Ignition OFF, test for less than 10 ohms between the ground terminal B and ground.
 - If greater than the specified value, repair the open/high resistance in the ground circuit.
- 14. Test for infinite resistance between the control terminal A and ground.
 - If less than the specified value, test for a short to ground in the relay 2 coil control circuit. If the circuit tests normal, replace the differential cooler pump relay 2.
- 15. Ignition ON, momentarily install a 5 A fused jumper between the relay 2 coil control circuit terminal A and the ground circuit terminal B.
 - If the differential coolant pump activates, replace the differential temperature switch.
- 16. Ignition OFF, disconnect the harness connector at the differential cooler pump.
- 17. Test for less than 10 ohms between the differential cooler pump ground circuit terminal 2 and ground.
 - If greater than the specified range, repair the open/high resistance in the ground circuit.
- 18. Ignition ON, verify a test lamp does not illuminate between the differential cooler pump control circuit terminal 1 and ground.
 - If the test lamp illuminates, test for a short to voltage on the pump control circuit. If the circuit tests normal, test or replace the differential cooler pump relay 2.
- 19. Install a 5 A fused jumper between the differential temperature switch control circuit terminal A and the ground circuit terminal B.
- 20. Verify a test lamp illuminates between the differential cooler pump control circuit terminal 1 and ground circuit terminal 2
 - If the test lamp does not illuminate, test the relay 2 coil control and pump control circuits for an open/high resistance. If all circuits test normal, test or replace the differential cooler pump relay 2.
- 21. If all circuits test normal, test or replace the differential cooler pump.

Component Testing

Relay Test

1. Ignition OFF, disconnect the differential cooler pump relay.
2. Test for 60-180 ohms between terminals C2 and A1.
 - If not within the specified range, replace the differential cooler pump relay.
3. Test for infinite resistance between the following terminals:
 - C1 and C2
 - C1 and A2
 - C1 and A1
 - A1 and A2
 - If not the specified value, replace the differential cooler pump relay.

4. Test for less than 2 ohms between terminals C1 and A2.
 - If greater than the specified range, replace the differential cooler pump relay.
5. Install a 20 A fused jumper wire between relay terminal C2 and B+. Install a jumper wire between relay terminal A1 and ground. Test for less than 2 ohms between terminals C1 and A2.
 - If greater than the specified range, replace the differential cooler pump relay.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Differential Oil Cooler Temperature Sensor Replacement**
- **Intermediate Axle Differential Lubricant Pump Replacement**

NOISY IN DRIVE

Noisy in Drive

Cause	Correction
Inspect for the proper gear oil levels prior to performing system diagnosis. Refer to <u>Rear Axle Lubricant Level Inspection</u> .	
Worn clutch disc and/or pressure plate assembly (if equipped)	Repair or replace as required. Refer to <u>Clutch Noisy</u> .
Transmission noise	Repair or replace as required.
Worn axle shaft constant velocity joints	Replace the constant velocity joints as required.
Worn, loose, or damaged axle mount and/or bracket	Repair or replace the axle mount and/or bracket as required.
Bearing noise within the differential assembly	A grinding or roar type noise will increase or decrease relative to the vehicle speed. 1. Check for the proper fluid level. Fill as required. 2. If the noise continues, repair or replace the unit as required.
Gear set whine noise within the differential assembly	A whine type noise will increase or decrease relative to the vehicle speed, approximately 80-96 km/h (50-60 mph). Typical causes of a gear set whine type noise may include incorrect backlash and/or pinion depth adjustment or worn or scored gear set teeth. 1. Check for the proper fluid level. Fill as required. 2. Repair or replace the unit as required.

NOISY WHEN COASTING

Noisy When Coasting

Cause	Correction
IMPORTANT: Inspect for the proper gear oil levels prior to performing system diagnosis. Refer to <u>Rear Axle Lubricant Level Inspection</u> .	
Worn axle shaft constant velocity joints	Replace the constant velocity joints as required.
Worn, loose, or damaged axle mount and/or bracket	Repair or replace the axle mount and/or bracket as required.
Bearing noise within the differential assembly	A grinding or roar type noise will increase or decrease relative to the vehicle speed. 1. Check for the proper fluid level. Fill as required. 2. If the noise continues, repair or replace the unit as required.
Gear set whine noise within the differential assembly	A whine type noise will increase or decrease relative to the vehicle speed, approximately 80-100 km/h (50-60 mph). Typical causes of a gear set whine type noise may include incorrect backlash and/or pinion depth adjustment or worn or scored gear set teeth. 1. Check for the proper fluid level. Fill as required. 2. Repair or replace the unit as required.

INTERMITTENT NOISE

Intermittent Noise

Cause	Correction
IMPORTANT: Inspect for the proper gear oil levels prior to performing system diagnosis. Refer to <u>Rear Axle Lubricant Level Inspection</u> .	
Worn, loose, or damaged axle mount and/or bracket	Repair or replace the axle mount and/or bracket as required.
Incorrect gear oil	Replace with the correct gear oil and friction modifier additive. Refer to <u>Adhesives, Fluids, Lubricants, and Sealers</u> .

CONSTANT NOISE

Constant Noise

Cause	Correction
IMPORTANT: Inspect for the proper gear oil levels prior to performing system diagnosis. Refer to <u>Rear Axle</u>	

Lubricant Level Inspection.

DEFINITION: A noise heard in the rear axle during all driving conditions. This noise may increase or decrease in volume based on different driving maneuvers and speeds.

Low gear oil levels	Faulty oil seals or other type leaks may contribute to lower than required fluid levels. Refer to <u>Rear Axle Lubricant Leak Diagnosis.</u> Fill to the proper level with the correct gear oil and friction modifier additive. Refer to <u>Adhesives, Fluids, Lubricants, and Sealers,</u> and <u>Rear Axle Lubricant Level Inspection.</u>
Worn, loose, or damaged axle mount and/or bracket	Repair or replace the axle mount and/or bracket as required.
Bearing noise within the differential assembly	A grinding or roar type noise will increase or decrease relative to the vehicle speed. 1. Check for the proper fluid level. Fill as required. 2. If the noise continues, repair or replace the unit as required.
Gear set whine noise within the differential assembly	A whine type noise will increase or decrease relative to the vehicle speed, approximately 80-96 km/h (50-60 mph). Typical causes of a gear set whine type noise may include incorrect backlash and/or pinion depth adjustment or worn or scored gear set teeth. 1. Check for the proper fluid level. Fill as required. 2. Repair or replace the unit as required.

NOISY ON TURNS

Noisy on Turns

Cause	Correction
IMPORTANT: • Inspect for the proper gear oil levels prior to performing system diagnosis. Refer to <u>Rear Axle Lubricant Level Inspection.</u> • Operate the vehicle turning in tight circles in both left and right directions. A chatter type concern may indicate an incorrect type gear oil, lack of the friction modifier additive, or worn friction discs and/or plates.	
DEFINITION: A noise is present only when the vehicle turns.	
Worn or loose rear axle mount and/or bracket	Repair or replace as required.
Worn axle shaft constant velocity joints	Replace the constant velocity joints as required.
Worn wheel bearings	Replace the wheel bearings as required.

Incorrect gear oil	Fill to the proper level with the correct gear oil and friction modifier additive. Refer to <u>Adhesives, Fluids, Lubricants, and Sealers</u> , and <u>Rear Axle Lubricant Level Inspection</u> .
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REAR AXLE LUBRICANT LEAK DIAGNOSIS

Rear Axle Lubricant Leak Diagnosis

Cause	Correction
IMPORTANT: Upon completion of all repairs, refill the axle with the proper amounts of axle lubricant and friction modifier additive. Refer to <u>Rear Axle Lubricant Level Inspection</u>, and <u>Lubrication Specifications</u>.	
Restricted or damaged vent valve assembly	Repair or replace the vent valve as required.
Left side cover O-ring seal	Replace the side cover O-ring seal as required.
Worn or damaged axle shaft oil seals	Replace the axle shaft oil seals as required.
Housing or side cover porosity	Replace the housing and/or the covers as required.
Loose Drain or Fill Plug	Tighten to specification
Pinion Cage Assembly O-Ring	• Pull Cage Assembly • Replace O-Ring

LIMITED SLIP DIFFERENTIAL DIAGNOSIS

Limited Slip Differential Diagnosis

Step	Action	Values	Yes	No
1	Did you review the general description and perform the necessary inspections?	-	Go to Step 2	Go to <u>Limited Slip Differential Description and Operation</u> , and <u>Symptoms - Rear Drive Axle</u>
2	Measure the rotational force of the axle using the following procedure: 1. Block the front wheels. 2. Place the transmission in Neutral with the parking brake released. 3. Raise the right rear tire off the ground. Confirm the left rear tire remains on the ground. Refer to <u>Lifting and Jacking the Vehicle</u>. 4. Remove the tire and wheel. Refer to <u>Tire and Wheel Removal and Installation</u>. 5. Using the CH-49400 axle remover and a	CTS (Base) 60-140 Y (44-103 lb ft) CTS (V		

	digital torque wrench, slowly turn the wheel in the drive direction to obtain a peak measurement of the rotational force of the axle. Check in 90 degree increments for two wheel revolutions to obtain a peak measurement. 6. Repeat the procedure for the other wheel drive shaft.	Series) 100-190 Y (74-140 lb ft)		
	Does the force measure outside the specified range?		Go to Step 3	System OK
3	Repair the rear axle. Did you complete the repair?	-	Go to Step 4	-
4	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to Step 2

LIMITED SLIP DIFFERENTIAL CHATTERS IN TURNS

Limited Slip Differential Chatters in Turns

Checks	Action
Lubricant is contaminated	Drain and flush the axle housing thoroughly. Refill with the correct lubricant. Refer to <u>Axle Lubricant Change (w/o Differential Cooler)</u> , <u>Axle Lubricant Change (w Differential Cooler)</u> .
The clutch plates are deteriorated	Replace the clutch plates. Refer to <u>Limited Slip Differential Disassemble</u> , and <u>Limited Slip Differential Assemble</u> .

REPAIR INSTRUCTIONS

REAR AXLE LUBRICANT LEVEL INSPECTION

Inspection Procedure

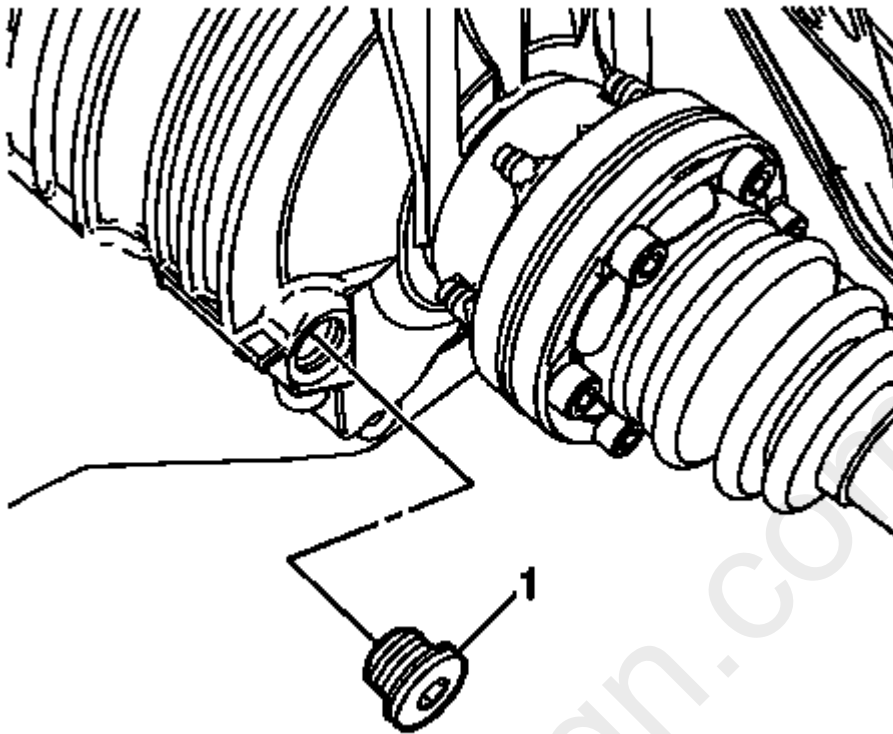


Fig. 3: View of Fill Plug

Courtesy of GENERAL MOTORS COMPANY

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Clean any dirt from around the differential fill plug (1).
3. Remove the fill plug (1) from the differential.
4. Check the differential fluid level, it should be even with the bottom of the fill plug hole to no lower than 6 mm (0.25 in) below the opening.
5. Add new fluid if necessary. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

CAUTION: Refer to Fastener Caution .

6. Install the differential fill plug (1) to the differential and tighten to 39 (29 lb ft).
7. Remove the support and lower the vehicle.

AXLE LUBRICANT CHANGE (W/O DIFFERENTIAL COOLER)

Draining Procedure

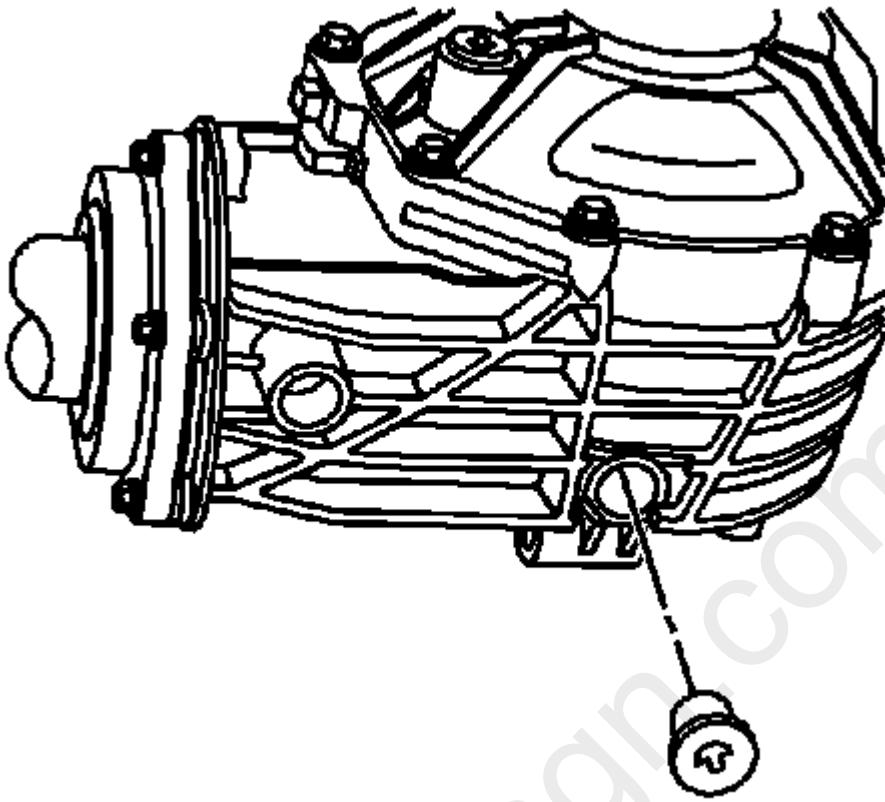


Fig. 4: View Of Differential Drain Plug
Courtesy of GENERAL MOTORS COMPANY

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Clean any dirt from around the differential drain plug.
3. Position a drain pan under drain plug.
4. Remove the drain plug from the differential and drain the fluid.

Filling Procedure

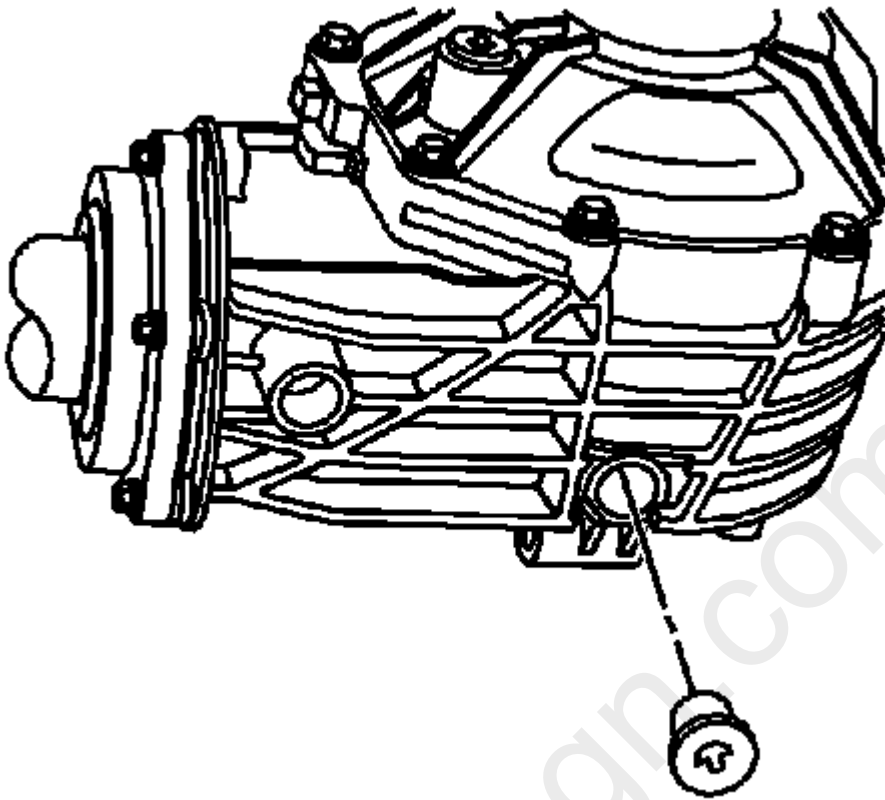


Fig. 5: View Of Differential Drain Plug
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

1. Install the drain plug to the differential and tighten to 23 N.m (17 lb ft).

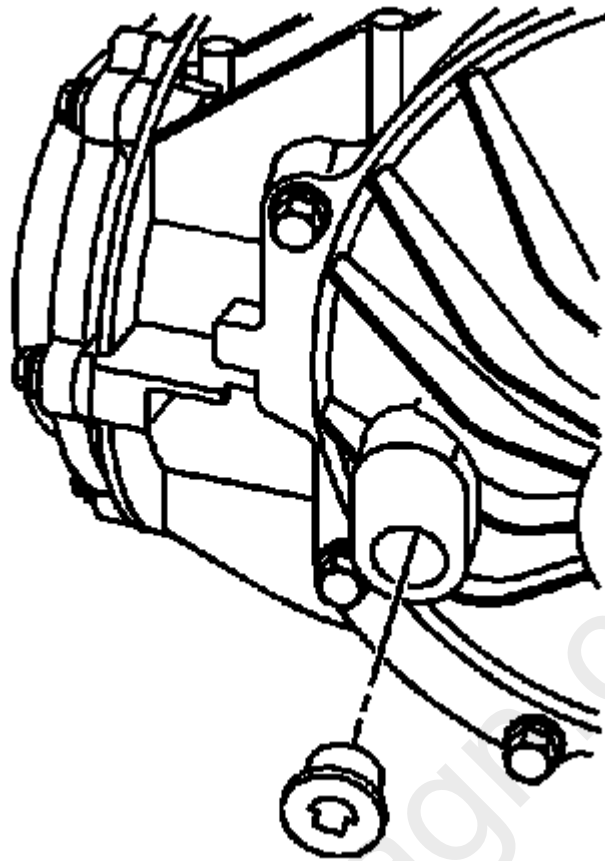


Fig. 6: View Of Differential Fill Plug
Courtesy of GENERAL MOTORS COMPANY

2. Clean any dirt from around the differential fill plug.
3. Remove the fill plug from the differential.

NOTE: If equipped with a limited slip differential, limited slip differential lubricant additive, GM P/N 1052358 (Canadian P/N 992394) or equivalent must be added first. Refer to Lubrication Specifications. Approximately 0.23 L (7.8 oz) of residual fluid will remain in the differential.

4. Fill the differential with 75W90 synthetic axle lubricant , GM P/N 12378261 (Canadian P/N 10953455) or equivalent. Refer to Lubrication Specifications.
5. Inspect the gear lubricant level to ensure it is even with the bottom of the fill plug hole to no lower than 6 mm (0.25 in) below the opening.
6. Install the fill plug to the differential and tighten to 23 N.m (17 lb ft).
7. Lower the vehicle.

AXLE LUBRICANT CHANGE (W DIFFERENTIAL COOLER)

Draining Procedure

1. Turn ON the ignition, with the engine OFF. For vehicles equipped with Y41 passive keyless entry systems, refer to Keyless Entry System Description and Operation (without ATH) , Keyless Entry System Description and Operation (with ATH) .
2. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
3. Install a drain pan under the differential.

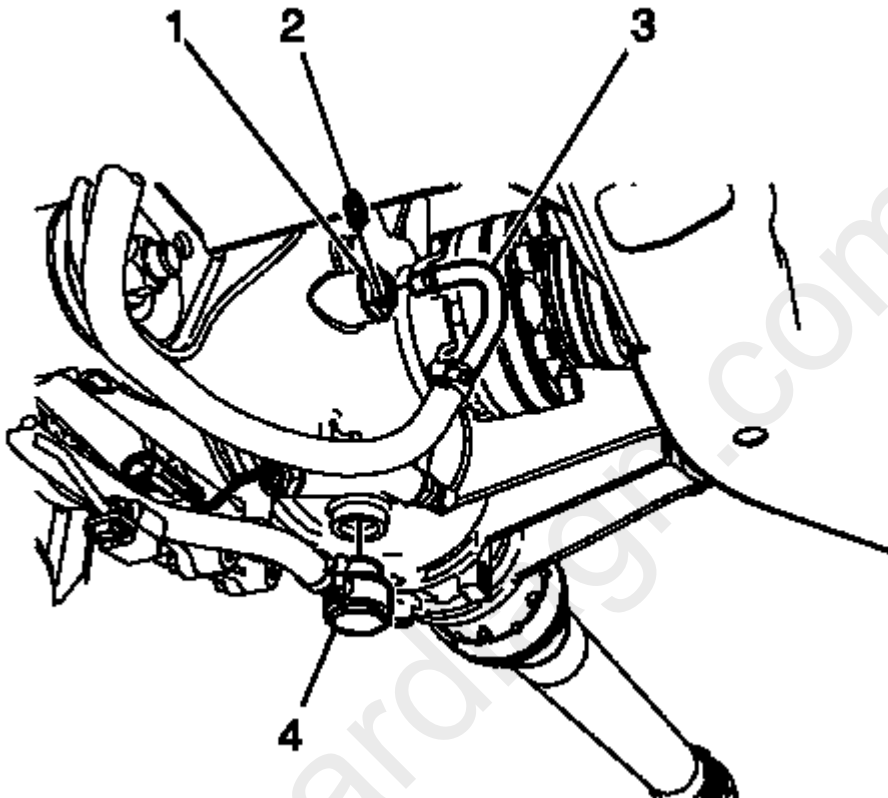


Fig. 7: Identifying Spring Retainer, Elbow, Quick-Connect Fitting And Drain Plug Adaptor
Courtesy of GENERAL MOTORS COMPANY

NOTE: Disengage the spring retainer (2) from the quick-connect fitting.

4. Disconnect the elbow (3) from the quick-connect fitting (1) in the differential housing.
5. Cap or plug the elbow to prevent dirt or debris from entering the hose.
6. Remove the quick connect fitting (1) from the differential housing.
7. Disengage the banjo fitting and drain plug adaptor (4) from differential drain hole.
8. Drain the fluid from the rear axle.
9. Purge the oil from the differential oil cooler using the following procedure.
 1. Secure the quick connect elbow over a drain pan.
 2. Insert a temperature switch bypass plug into the differential cooler temperature switch wiring

harness connector.

NOTE: Take care to catch excess fluid in the drain pan.

3. Run the coolant pump for 1 minute.

NOTE: Replace the differential temperature sensor gasket whenever the sensor is removed.

4. Remove the temperature switch bypass plug from the differential cooler temperature switch wiring harness connector.

Filling Procedure

1. Clean any dirt or debris from around the fill plug opening.

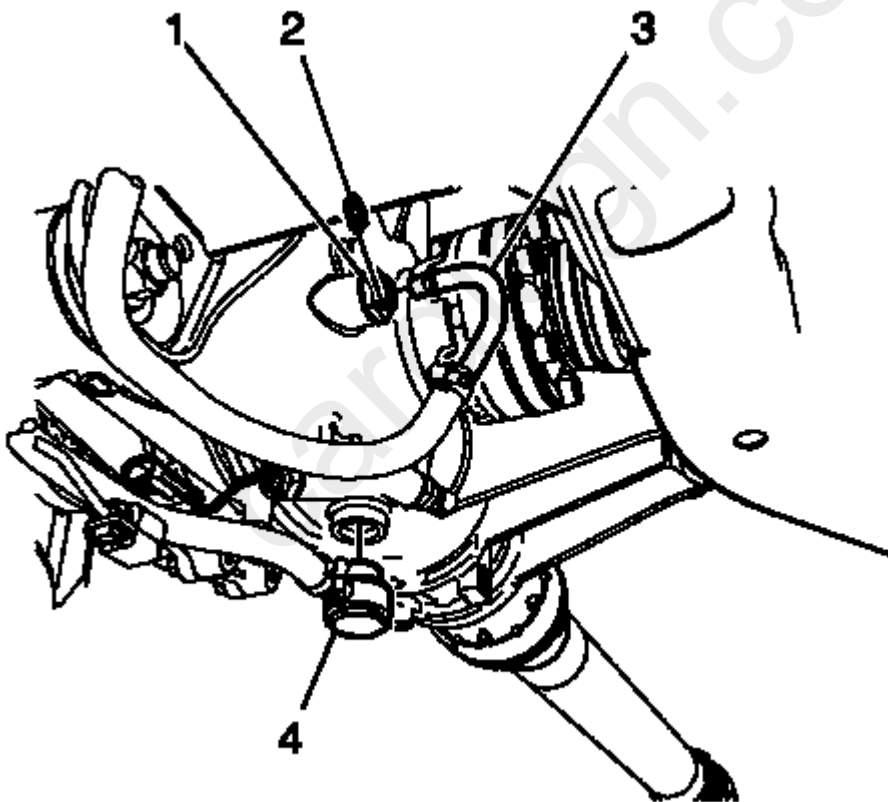


Fig. 8: Identifying Spring Retainer, Elbow, Quick-Connect Fitting And Drain Plug Adaptor
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

NOTE: **The drain plug adaptor must be oriented to the rear of the vehicle.**

2. Connect the banjo fitting and drain plug adaptor (1) to differential drain hole and tighten to 23 N.m (17 lb ft).
3. If the vehicle is equipped with a limited slip differential, first add limited slip lubricant additive to the differential. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
4. Fill the differential with lubricant. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
5. Ensure that the gear lubricant level is even with the bottom of the fill plug hole to no lower than 6 mm (0.25 in) below the opening.
6. Purge the air in the system by the following manner:
 1. Secure the quick connect elbow over a drain pan.
 2. Insert a temperature switch bypass plug into the differential cooler temperature switch wiring harness connector.

NOTE: **Take care to catch excess fluid in the drain pan.**

3. Run the coolant pump until a steady stream of fluid is present.
4. Remove the temperature switch bypass plug from the differential cooler temperature switch wiring harness connector.
5. Secure the quick connect elbow at a level above the fill opening
6. Ensure that the gear lubricant level is even with the bottom of the fill plug hole to no lower than 6 mm (0.25 in) below the opening. Add axle lubricant as needed.
7. Install the quick connect fitting (1) into the differential housing and tighten to 39 N.m (29 lb ft).
8. Connect the elbow (3) to the quick connect fitting (1) in the differential housing.
9. Insert a temperature switch bypass plug into the differential cooler temperature switch wiring harness connector.
10. Run the coolant pump for 1 minute.
11. Check the differential coolant system for leaks.
12. Remove the temperature switch bypass plug from the differential cooler temperature switch wiring harness connector.
13. Repair any leaks as needed.
14. Remove the quick-connect fitting and recheck the fluid level taking care not to spill fluid from the cooler lines.
15. Ensure that the gear lubricant level is even with the bottom of the fill plug hole to no lower than 6 mm (0.25 in) below the opening. Add axle lubricant as needed.
16. Install the quick connect fitting (1) into the differential housing and tighten to 39 N.m (29 lb ft).
7. Lower the vehicle.
8. Turn OFF the ignition.

DIFFERENTIAL OIL COOLER REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
2. Drain the rear differential. Refer to Axle Lubricant Change (w Differential Cooler).

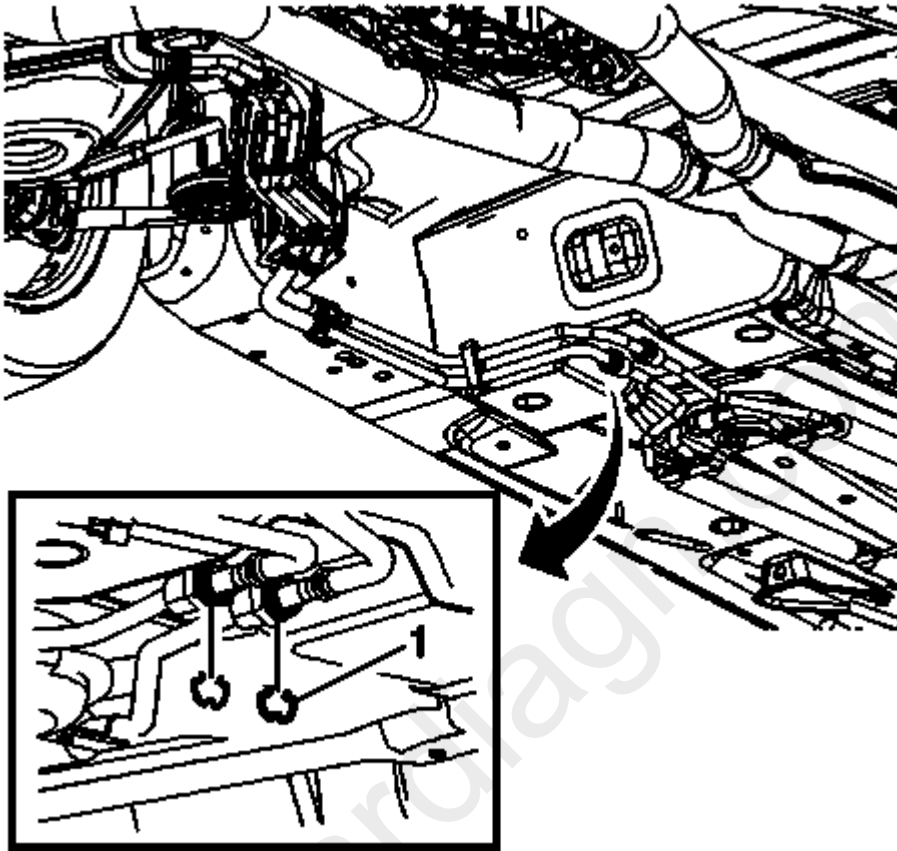


Fig. 9: Oil Cooler Line Retaining Clips
Courtesy of GENERAL MOTORS COMPANY

NOTE: DO NOT reuse the differential oil cooler line retaining clips. Replace with NEW only.

3. Remove the differential oil cooler line retaining clips (1) from the oil cool line fittings.

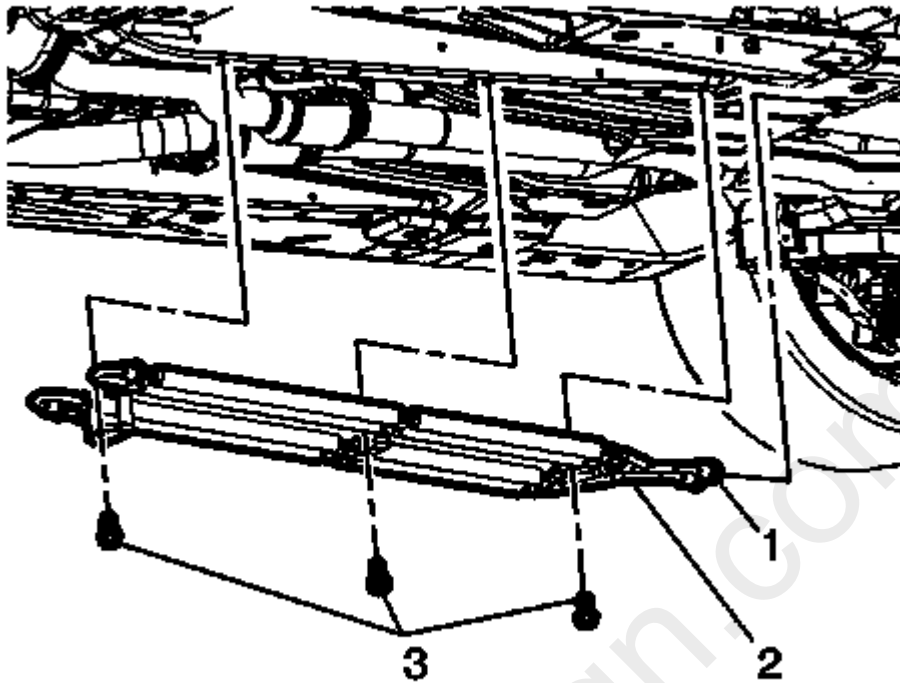


Fig. 10: Oil Cooler Lines, Fittings & Bolts
Courtesy of GENERAL MOTORS COMPANY

4. Separate the differential oil cooler fittings (1) from the differential oil cooler lines.
5. Remove the differential oil cooler bolts (3).

NOTE: Cover the open differential oil cooler lines with a clean shop towel so that the oil does not become contaminated.

6. Remove the differential oil cooler assembly (2) from the vehicle.

Installation Procedure.

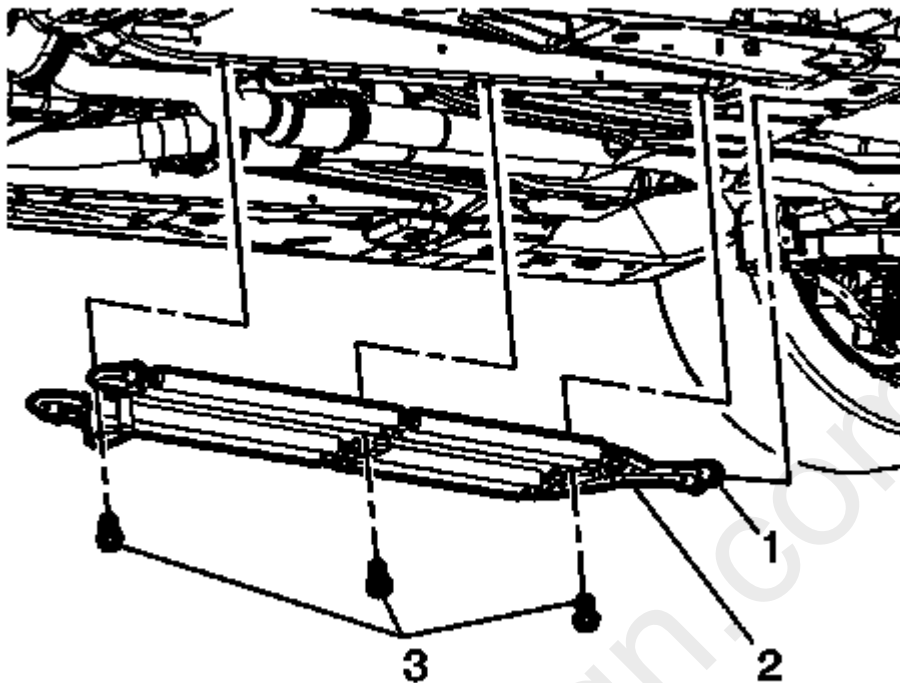


Fig. 11: Oil Cooler Lines, Fittings & Bolts
Courtesy of GENERAL MOTORS COMPANY

NOTE: Ensure that the differential oil cooler fitting are seated properly on the oil cooler lines.

1. Install the differential oil cooler lines (1) in the differential cooler lines.
2. Position the differential oil cooler assembly (2) on the vehicle.

CAUTION: Refer to Fastener Caution .

3. Tighten the differential oil cooler assembly bolts (3) to 40 N.m 30 lb ft.

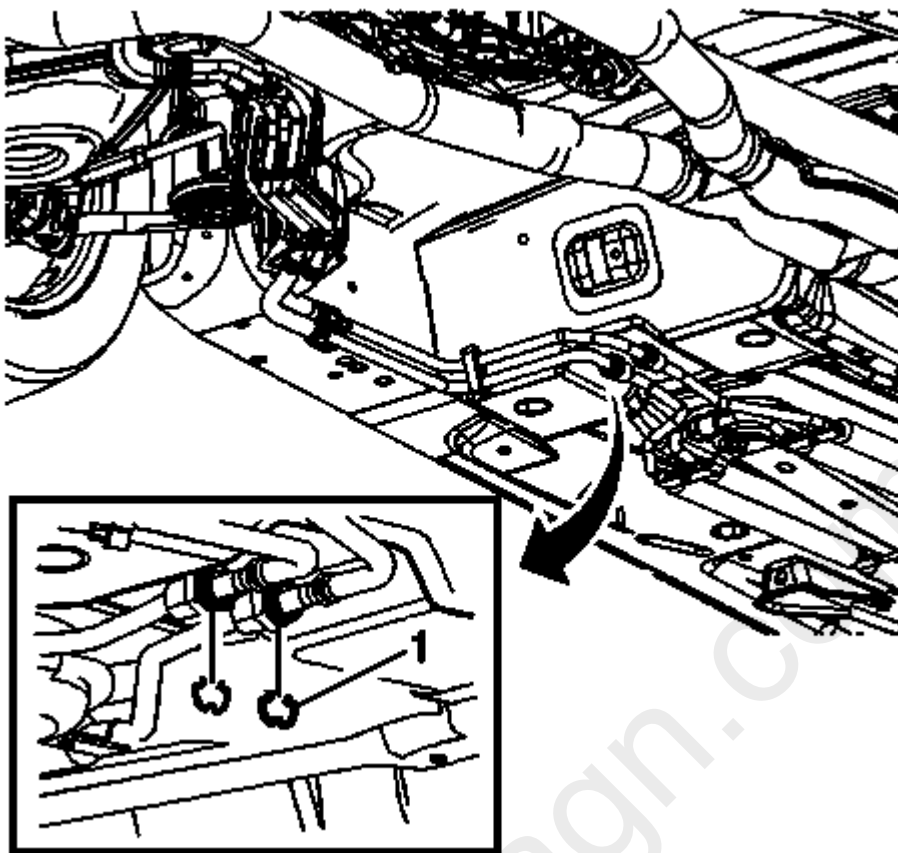


Fig. 12: Oil Cooler Line Retaining Clips
Courtesy of GENERAL MOTORS COMPANY

4. Install the NEW differential oil cooler line fitting retaining clips (1).
5. Fill the rear differential with fluid. Refer to **Axle Lubricant Change (w Differential Cooler)**
6. Remove the supports and lower the vehicle.

DIFFERENTIAL OIL COOLER ADAPTER REPLACEMENT

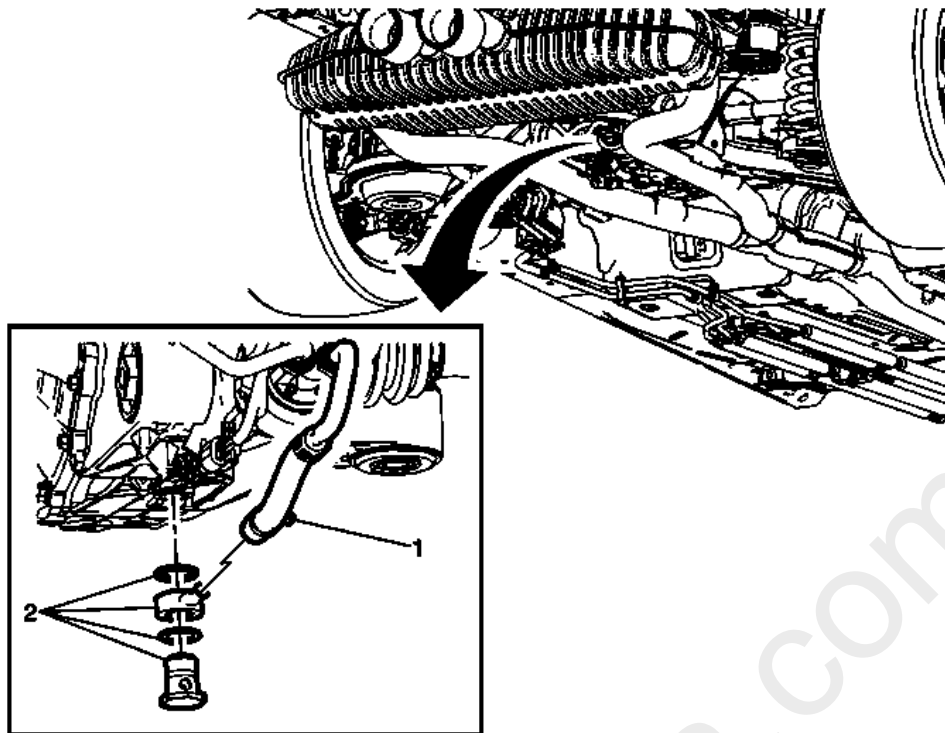


Fig. 13: Differential Oil Cooler Adapter & Pipe Clamp
 Courtesy of GENERAL MOTORS COMPANY

Differential Oil Cooler Adapter Replacement

Callout	Component Name
Preliminary Procedure	
1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> . 2. Drain the differential carrier. Refer to <u>Axle Lubricant Change (w Differential Cooler)</u> .	
1	Differential Carrier Oil Cooler Pipe Clamp CAUTION: Refer to <u>Fastener Caution</u> . NOTE: Rotate the differential carrier oil cooler inlet pipe to the side. Tighten 3 N.m (27 lb in)
	Differential Oil Cooler Pump Inlet Hose Adapter Procedure Refill the rear differential carrier with fluid. Refer to <u>Axle Lubricant Change (w Differential Cooler)</u> .

2

NOTE:

DO NOT re-use the washers, replace with **NEW** only.

Tighten

39 N.m (29 lb ft)

DIFFERENTIAL OIL COOLER OUTLET HOSE REPLACEMENT

Removal Procedure

NOTE: **DO NOT** reuse any of the retaining clips for the differential oil cooler lines or pump. Replace with **NEW** only.

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
2. Drain the differential carrier. Refer to Axle Lubricant Change (w Differential Cooler).

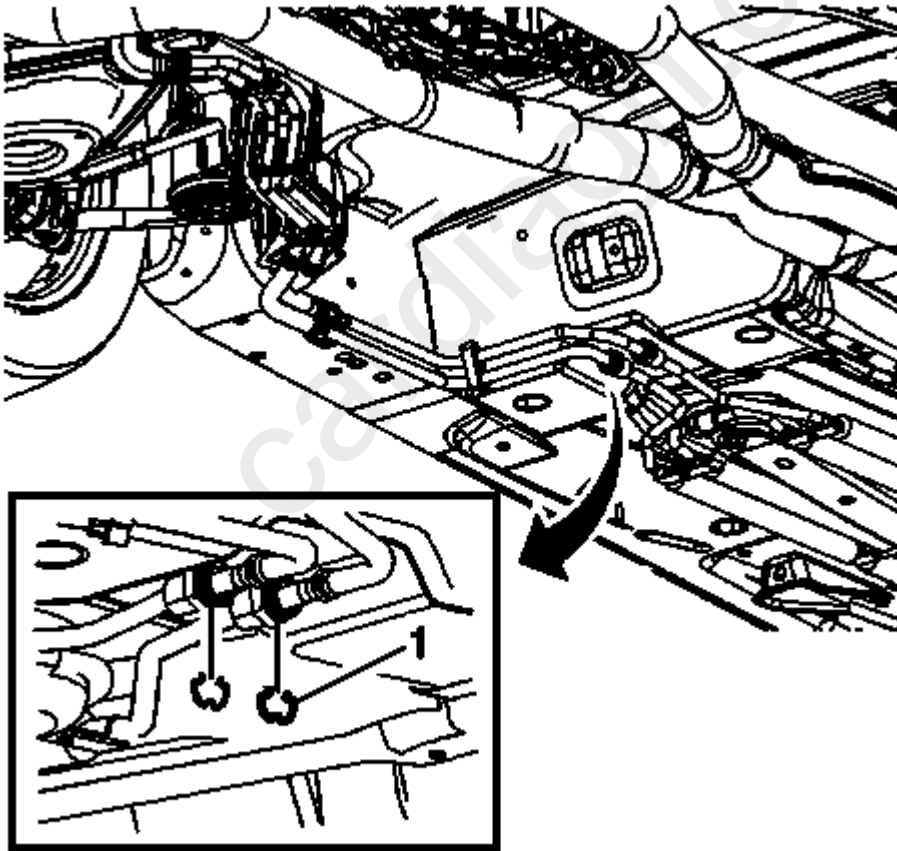


Fig. 14: Oil Cooler Line Retaining Clips
Courtesy of GENERAL MOTORS COMPANY

3. Remove and discard the differential oil cooler line retaining clip (1).

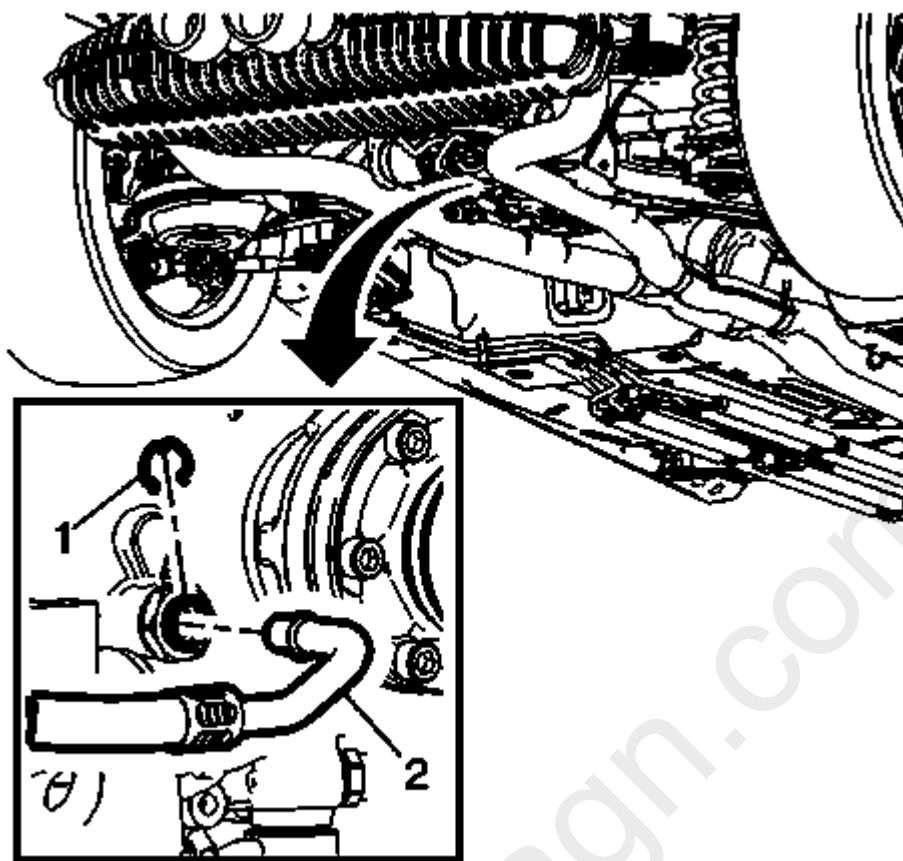


Fig. 15: Differential Oil Cooler Line & Retaining Clip
Courtesy of GENERAL MOTORS COMPANY

4. Remove and discard the differential oil cooler line retaining clip (1).
5. Remove the differential oil cooler line (2).

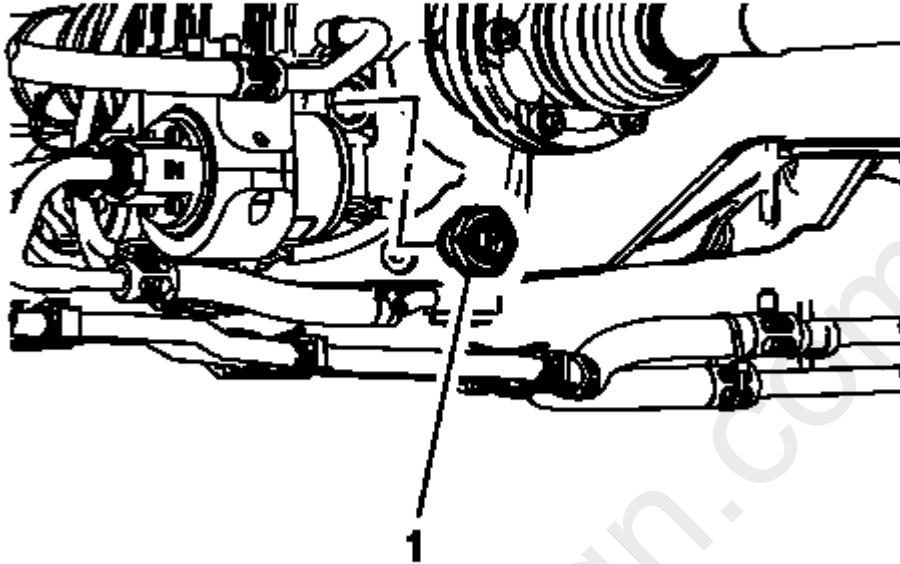


Fig. 16: Differential Oil Cooler Line Fitting
Courtesy of GENERAL MOTORS COMPANY

6. Remove the differential oil cooler line fitting (1), if needed. Replace with NEW only.

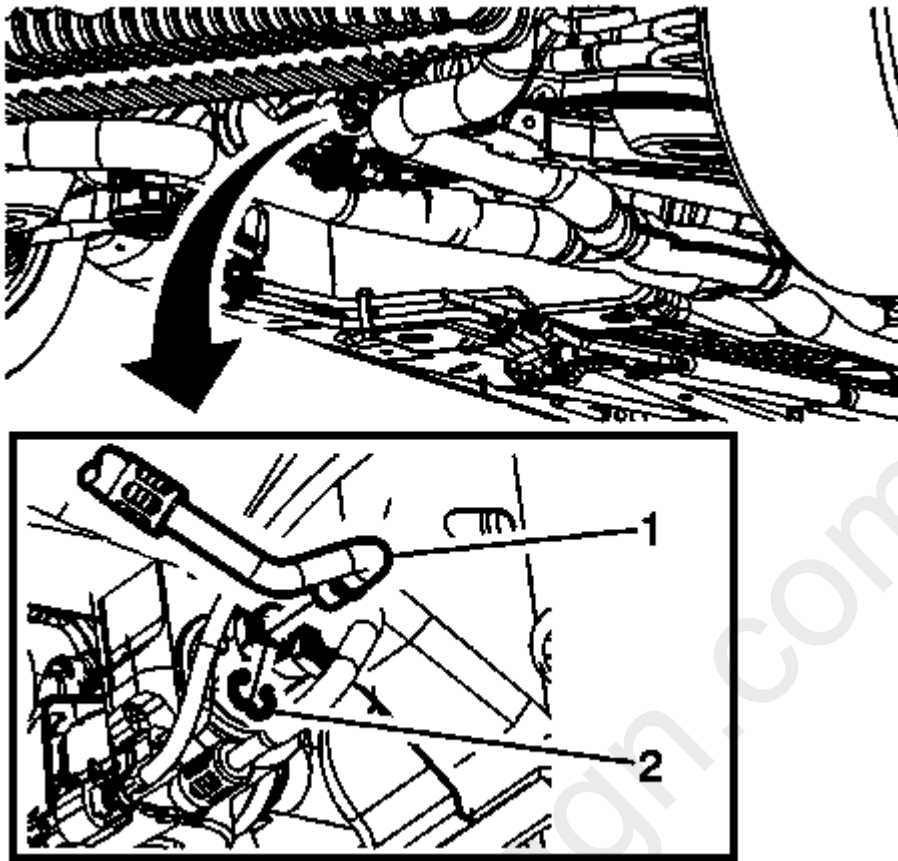


Fig. 17: Differential Oil Cooler Outlet Pipe & Retaining Clip
Courtesy of GENERAL MOTORS COMPANY

7. Remove and discard the differential oil cooler outlet line retaining clip (2). Replace with NEW only.
8. Remove the differential oil cooler outlet pipe (1).

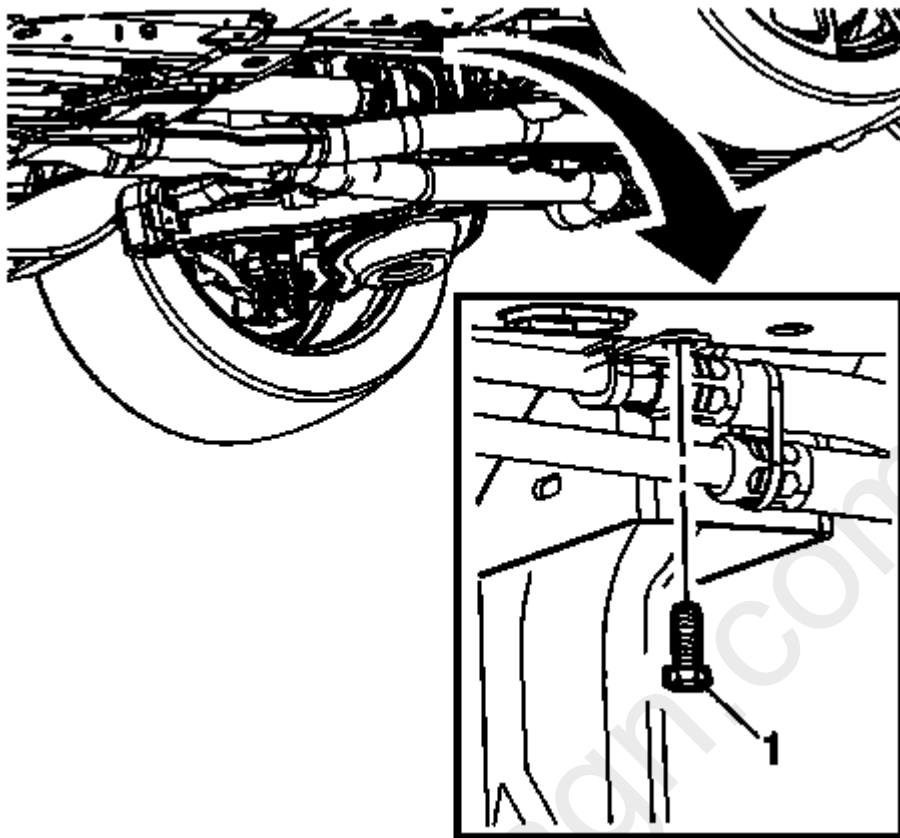


Fig. 18: Differential Oil Cooler Line Mounting Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

9. Remove the differential oil cooler line assembly mounting bracket bolt (1).

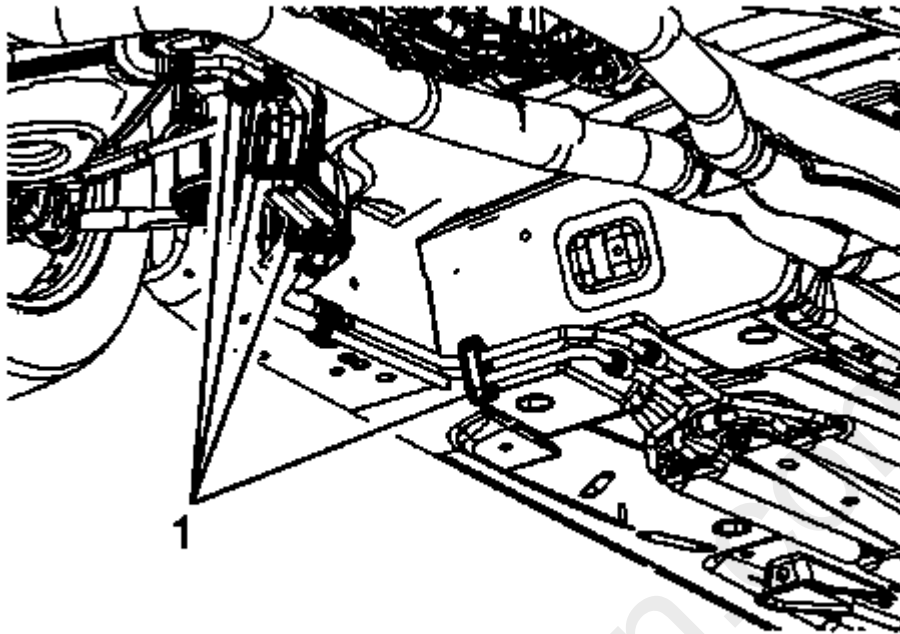


Fig. 19: Differential Oil Cooler Line Clips
Courtesy of GENERAL MOTORS COMPANY

10. Remove the 5 differential oil cooler line clip (1) from the under body.

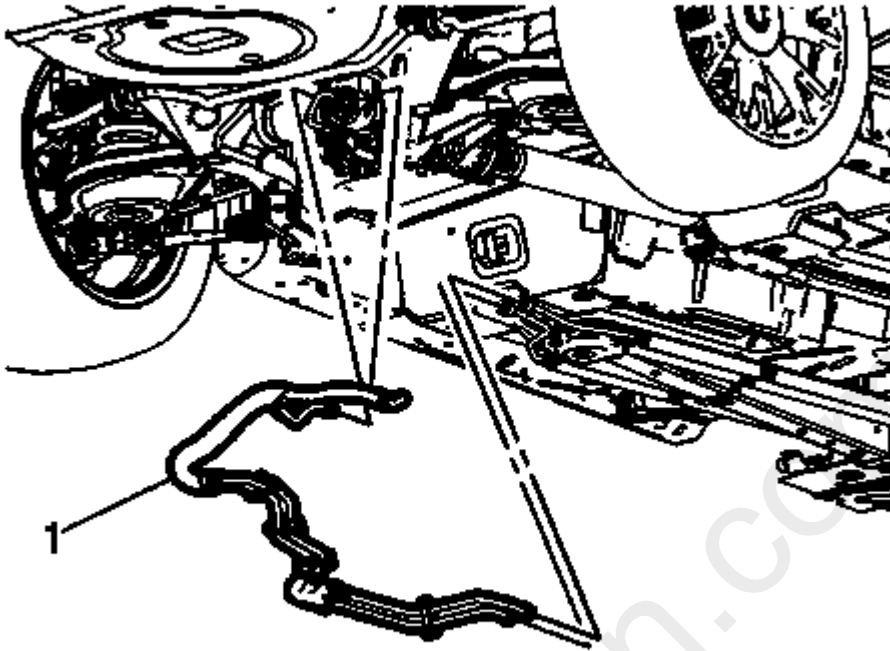


Fig. 20: Differential Oil Cooler Line Assembly
Courtesy of GENERAL MOTORS COMPANY

11. Remove the differential oil cooler line assembly (1) from the vehicle.

Installation Procedure

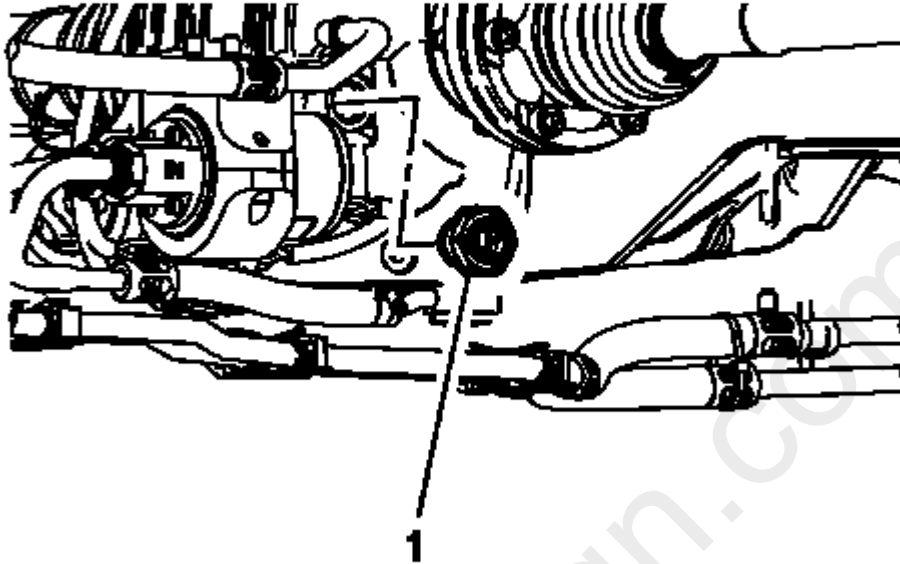


Fig. 21: Differential Oil Cooler Line Fitting
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

1. If needed, install the NEW differential oil cooler outlet line fitting (1) and tighten to 24 N.m (18 lb ft).

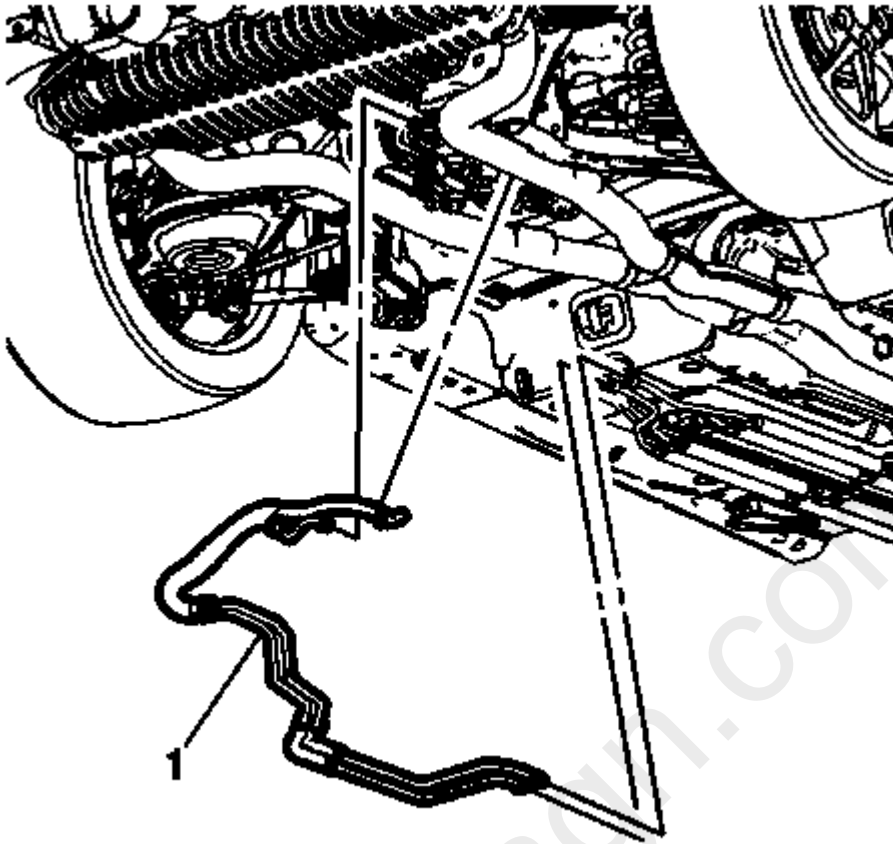


Fig. 22: Differential Oil Cooler Line Assembly
Courtesy of GENERAL MOTORS COMPANY

2. Position the differential oil cooler line assembly (1) on the vehicle.

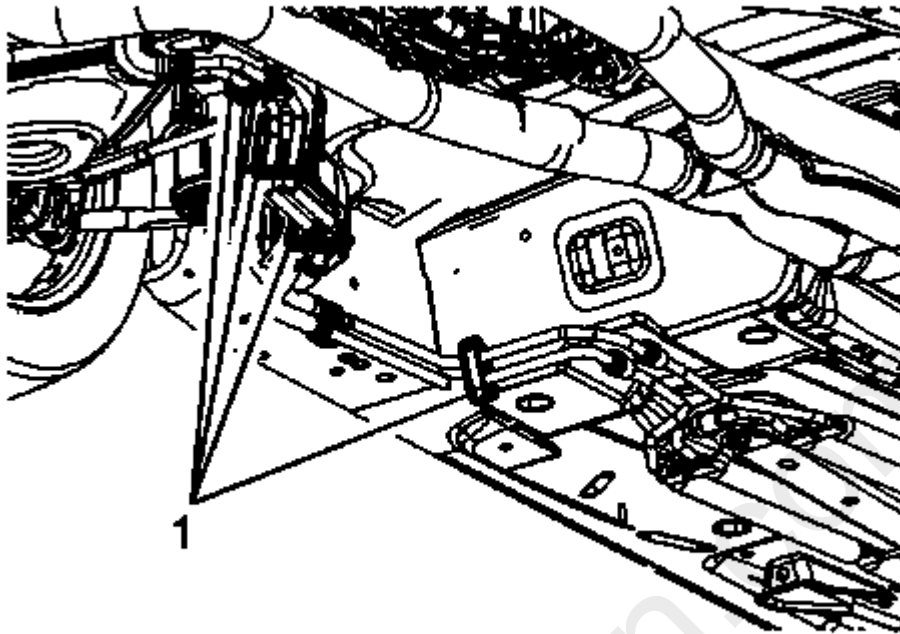


Fig. 23: Differential Oil Cooler Line Clips
Courtesy of GENERAL MOTORS COMPANY

3. Install the 5 differential oil cooler line clips (1) in the under body.

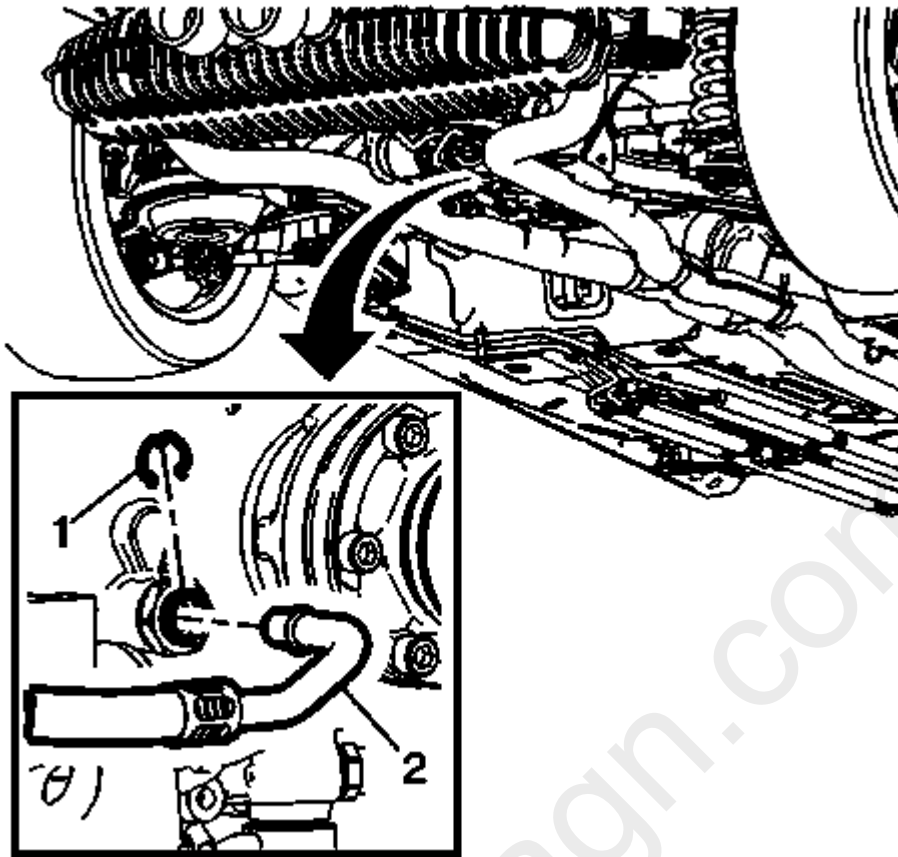


Fig. 24: Differential Oil Cooler Line & Retaining Clip
Courtesy of GENERAL MOTORS COMPANY

4. Install the differential oil cooler return line (2) and the NEW retaining clip (1).

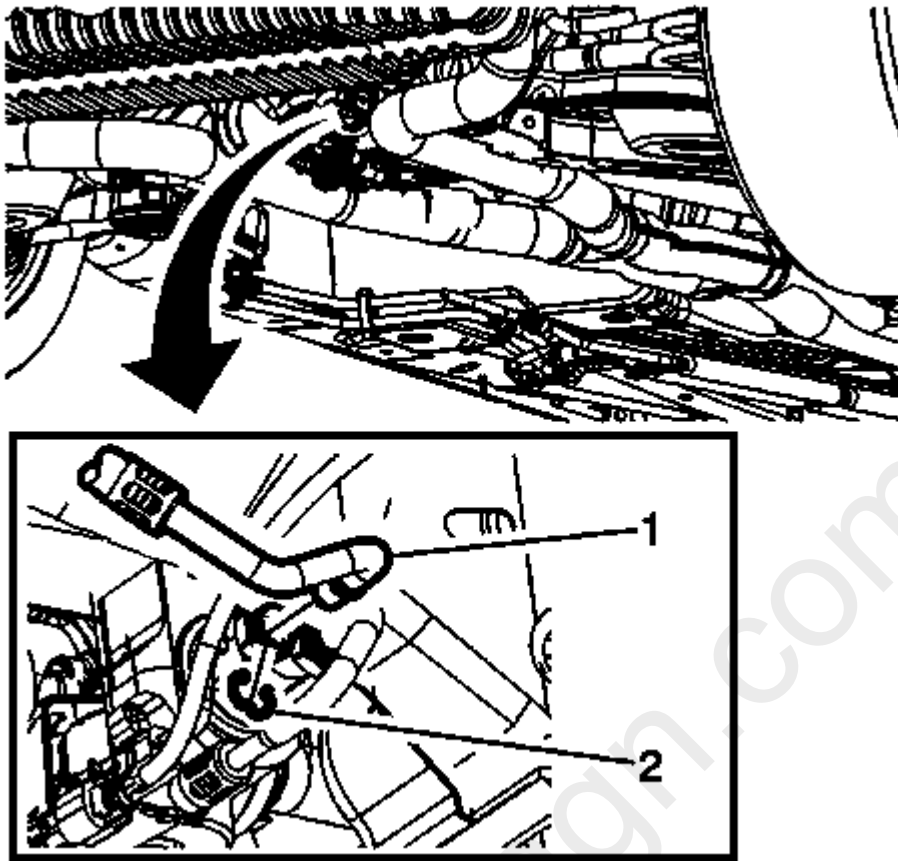


Fig. 25: Differential Oil Cooler Outlet Pipe & Retaining Clip
Courtesy of GENERAL MOTORS COMPANY

5. Install the rear differential oil cooler outlet line (1).
6. Install the NEW rear differential oil cooler outlet line retaining clip (2).

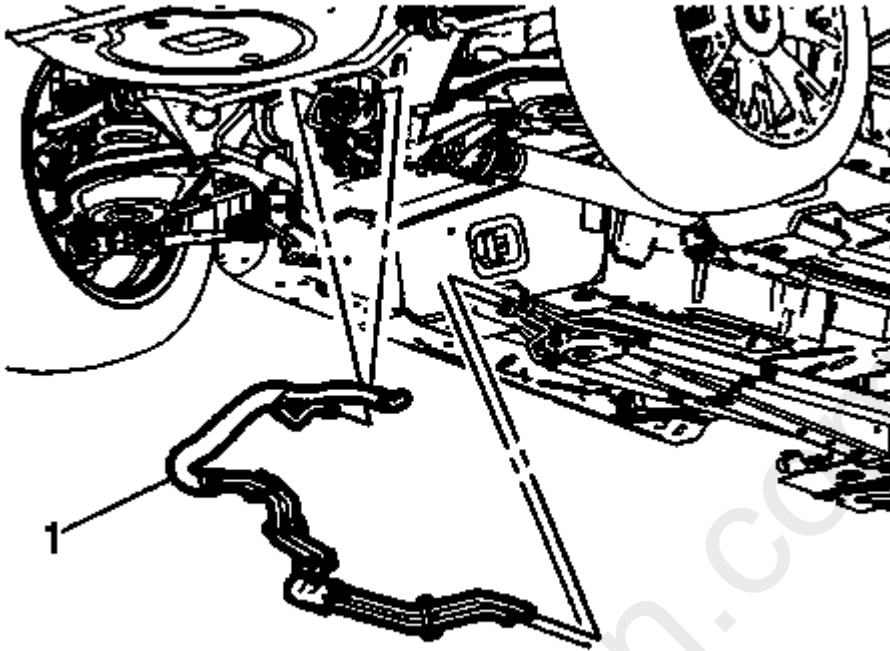


Fig. 26: Differential Oil Cooler Line Assembly
Courtesy of GENERAL MOTORS COMPANY

7. Install the rear differential oil cooler outlet lines and the NEW retaining clips (1).

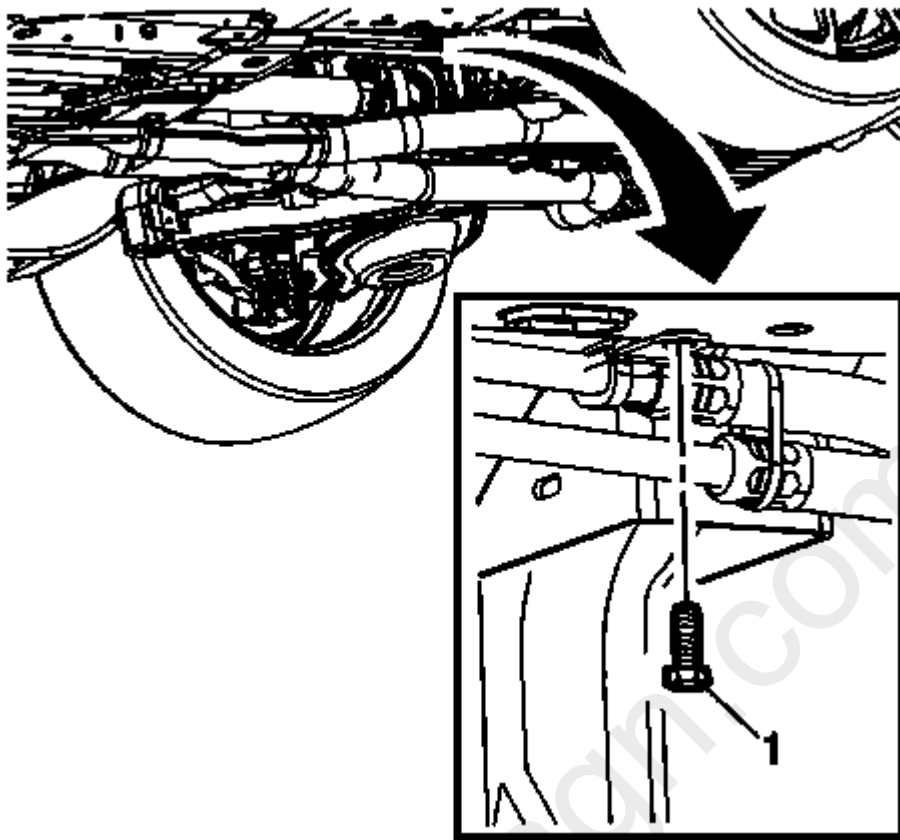


Fig. 27: Differential Oil Cooler Line Mounting Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

8. Install the differential oil cooler line assembly mounting bracket bolt (1) and tighten to 9 N.m (80 lb in).
9. Fill the rear differential carrier. Refer to **Axle Lubricant Change (w Differential Cooler)**.
10. Remove the supports and lower the vehicle.

INTERMEDIATE AXLE DIFFERENTIAL LUBRICANT PUMP REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the differential carrier. Refer to **Axle Lubricant Change (w/o Differential Cooler)**, **Axle Lubricant Change (w Differential Cooler)**

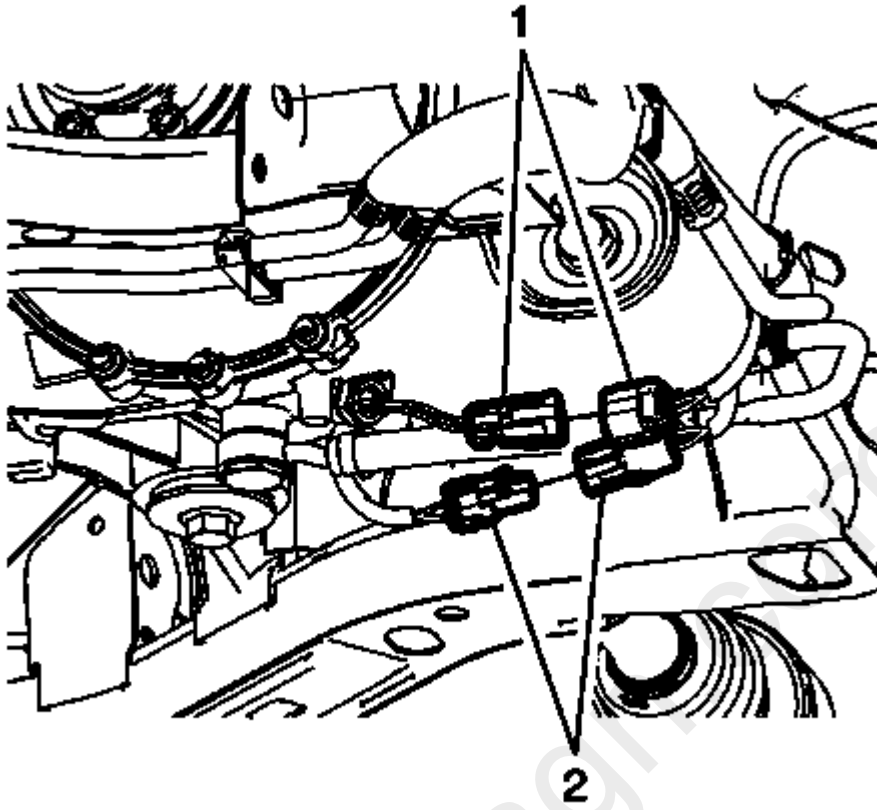


Fig. 28: Inter Axle Differential Lubricant Pump & Temperature Sending Unit Electrical Connectors

Courtesy of GENERAL MOTORS COMPANY

3. Disconnect the differential oil cooler pump electrical connector (2) and the temperature sensor electrical connector (1).

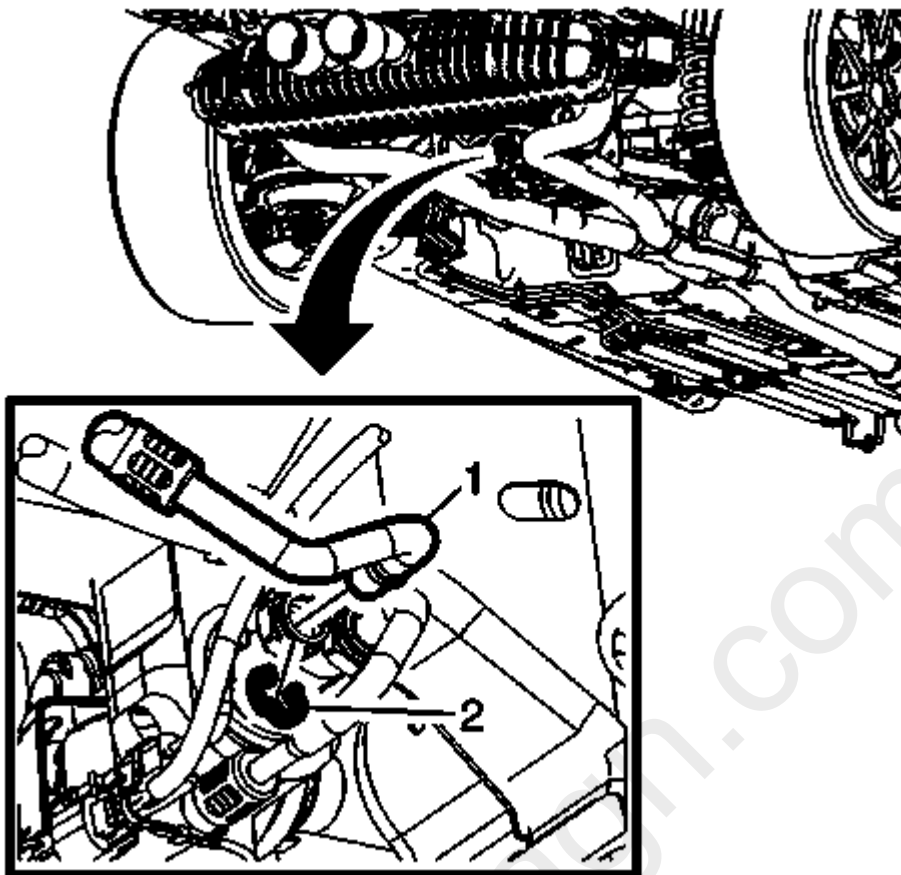


Fig. 29: Differential Oil Cooler Pump Inlet Hose & Retaining Clip
Courtesy of GENERAL MOTORS COMPANY

4. Remove and discard the differential oil cooler pump inlet hose retaining clip (1). Replace with NEW only.
5. Remove the differential oil cooler pump inlet hose (2).

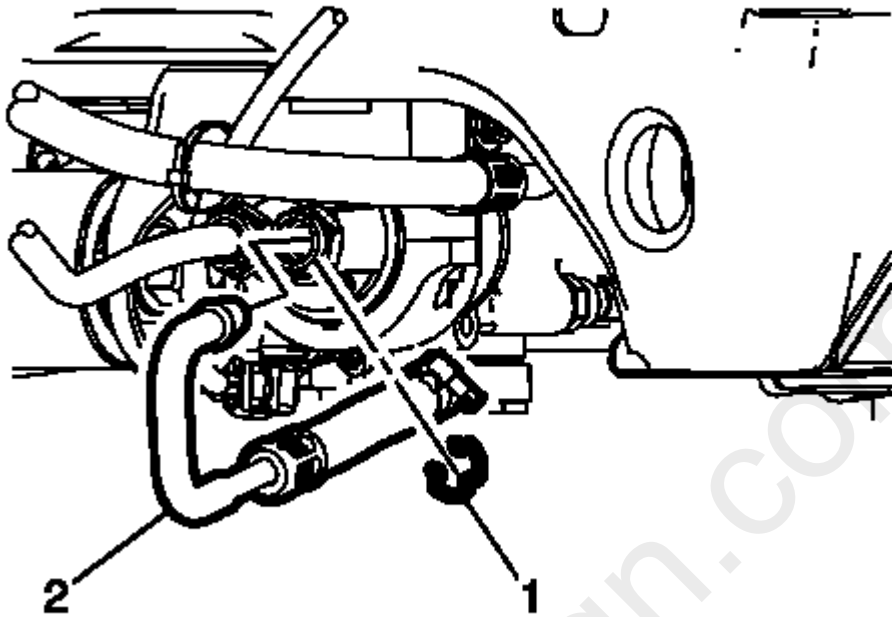


Fig. 30: Differential Oil Cooler Inlet Hose & Retaining Clip
Courtesy of GENERAL MOTORS COMPANY

6. Remove the differential oil cooler inlet hose retaining clip (1).
7. Remove the differential oil cooler inlet hose (2) and relocate to the side.

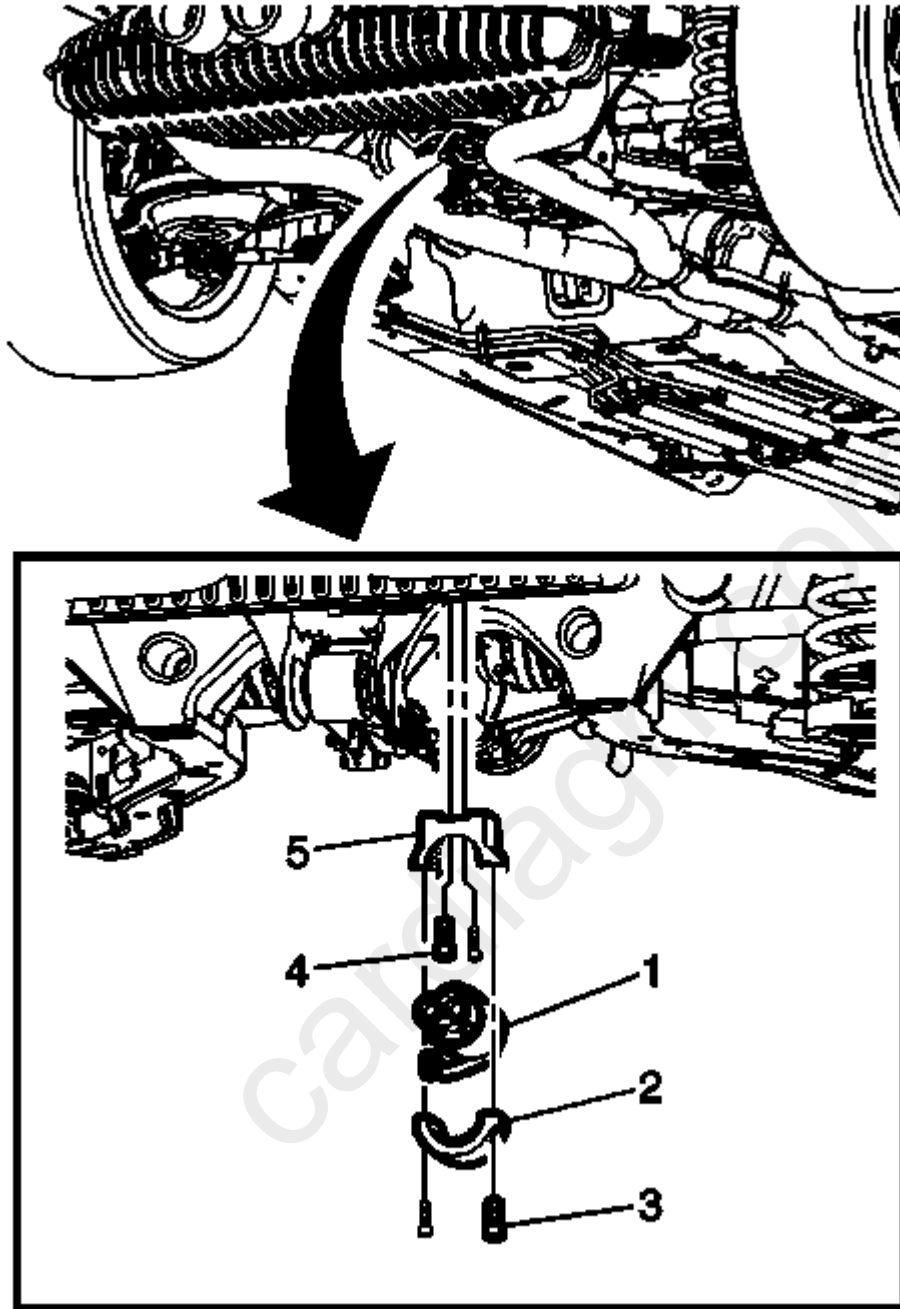


Fig. 31: Differential Oil Cooler Bracket Bolts
Courtesy of GENERAL MOTORS COMPANY

8. Remove the 2 differential oil cooler bracket bolts (3).

NOTE:

- Note the position of the inter axle differential lubricant pump before removal.

- **The inter axle differential lubricant pump comes with new fittings and retaining clips. DO NOT re-use the retaining clips. Replace with the NEW ones supplied with the pump.**

9. Remove the inter axle differential lubricant pump (1).
10. Remove the 2 upper differential oil cooler bracket bolts (4).

Installation Procedure

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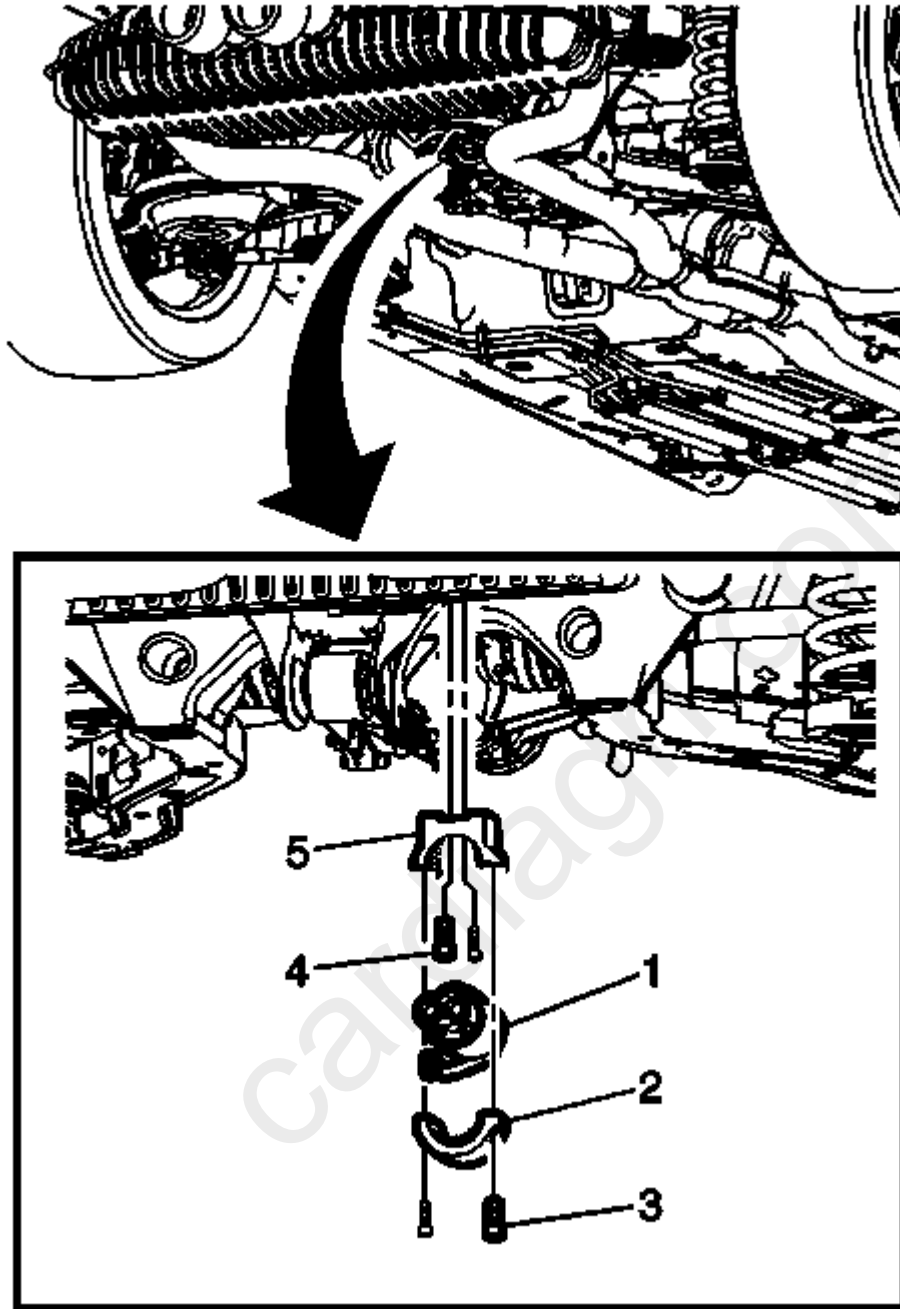


Fig. 32: Differential Oil Cooler Bracket Bolts
Courtesy of GENERAL MOTORS COMPANY

1. Position the upper differential oil cooler bracket (5) on the rear differential carrier
2. Install the 2 upper differential oil cooler bracket bolts (4) and tighten to 9 N.m (80 lb in).
3. Position the inter axle differential lubricant pump (1) in the upper differential oil cooler bracket (5).

NOTE: Before tightening the bracket bolts to specification, ensure that the inter

axle differential lubricant pump is properly orientated correctly in the bracket.

4. Install the lower differential oil cooler bracket bolts (4) and tighten to 9 N.m (80 lb in)

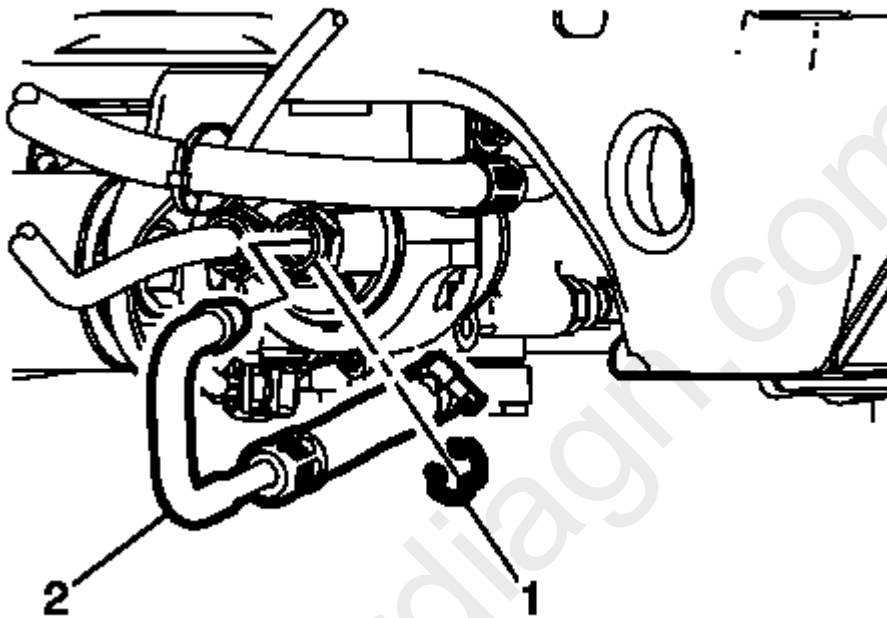


Fig. 33: Differential Oil Cooler Inlet Hose & Retaining Clip
Courtesy of GENERAL MOTORS COMPANY

5. Install the differential oil cooler inlet hose (2).
6. Install the NEW differential oil cooler inlet hose retaining clip (1).

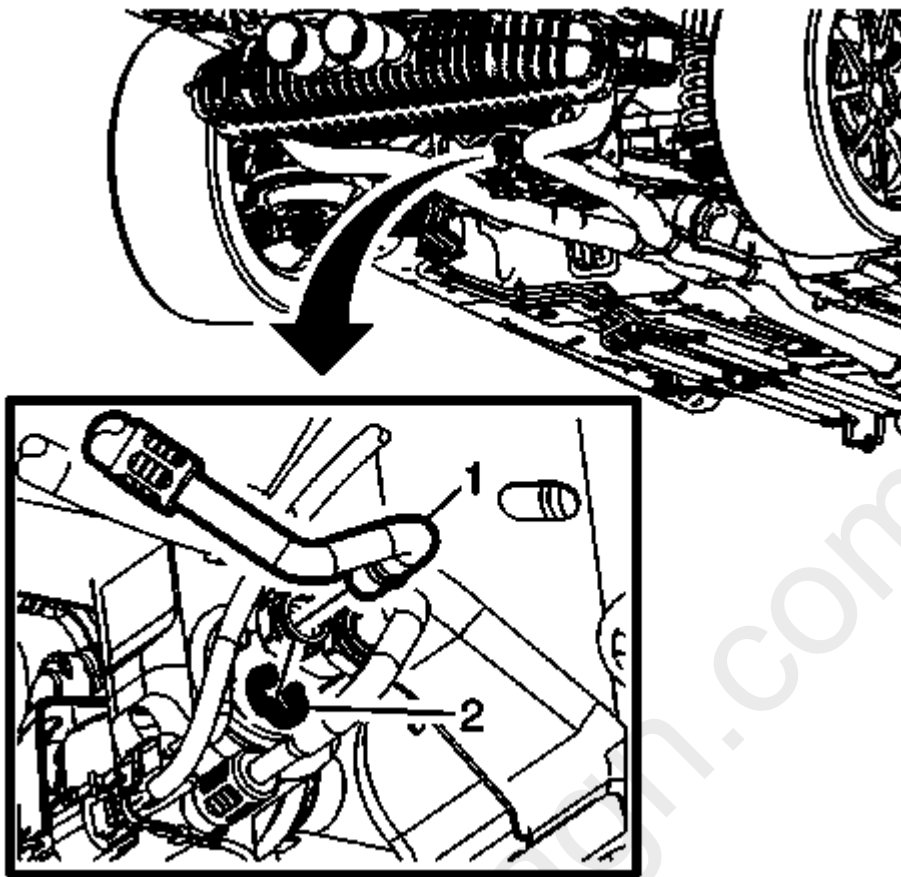


Fig. 34: Differential Oil Cooler Pump Inlet Hose & Retaining Clip
Courtesy of GENERAL MOTORS COMPANY

7. Install the differential oil cooler pump inlet hose from the differential oil cooler pump.

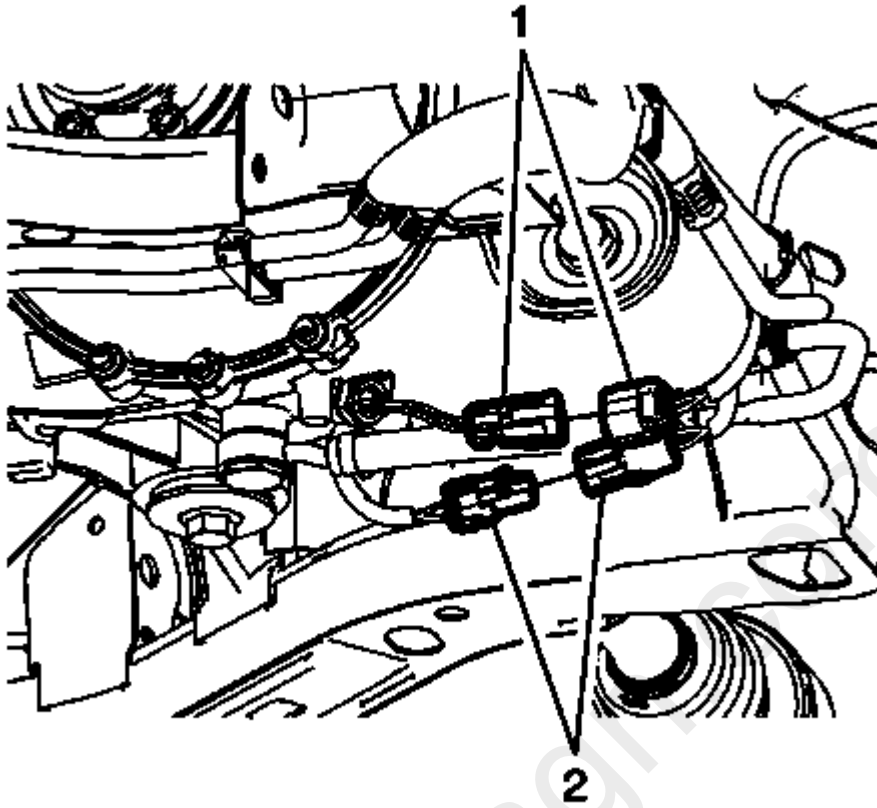


Fig. 35: Inter Axle Differential Lubricant Pump & Temperature Sending Unit Electrical Connectors

Courtesy of GENERAL MOTORS COMPANY

8. Reconnect the electrical connectors for the temperature sending unit (1) and the inter axle differential lubricant pump (1).
9. Refill the differential carrier. Refer to **Axle Lubricant Change (w/o Differential Cooler)**, **Axle Lubricant Change (w Differential Cooler)**.
10. Remove the supports and lower the vehicle.

DIFFERENTIAL OIL COOLER TEMPERATURE SENSOR REPLACEMENT

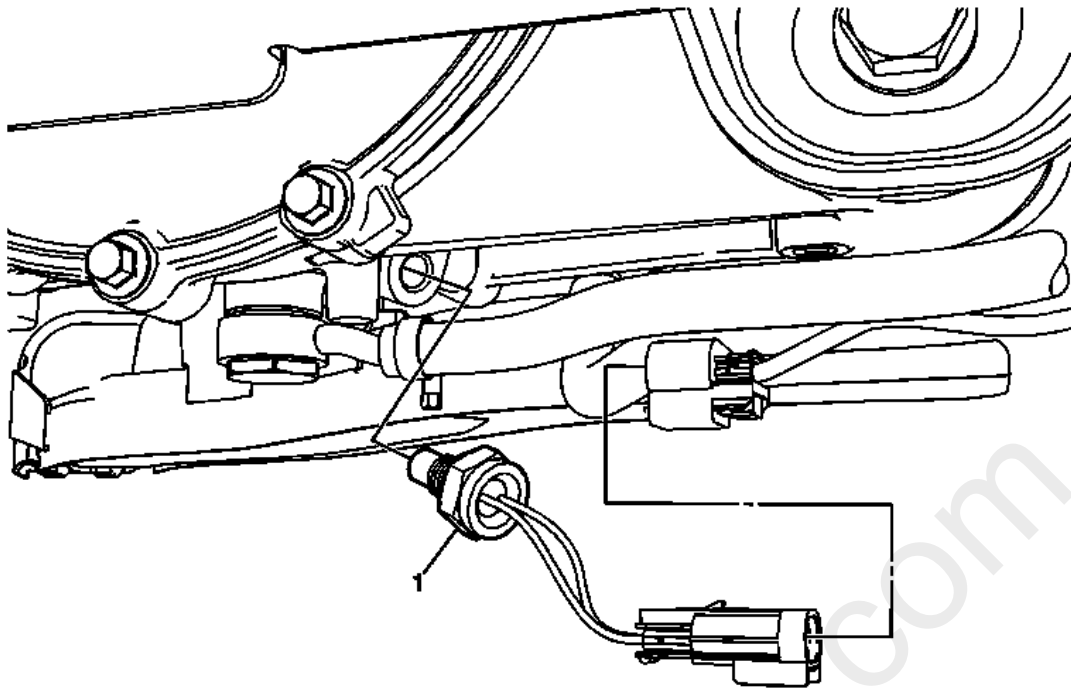


Fig. 36: Differential Temperature Sensor
 Courtesy of GENERAL MOTORS COMPANY

Differential Oil Cooler Temperature Sensor Replacement

Callout	Component Name
Preliminary Procedures	
1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> . 2. Drain the rear differential. Refer to <u>Axle Lubricant Change (w Differential Cooler)</u> .	
1	Differential Oil Cooler Temperature Sensor CAUTION: Refer to <u>Fastener Caution</u> . TIP: Replace the differential oil cooler temperature sensor gasket whenever the sensor is removed. Tighten 23 N.m (17 lb ft)

DIFFERENTIAL TEMPERATURE SENSOR REPLACEMENT

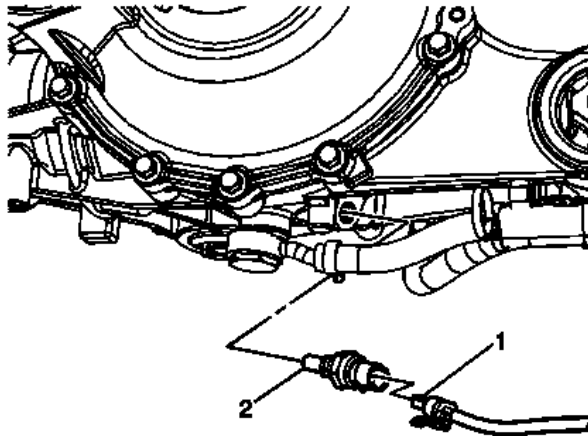


Fig. 37: Identifying Differential Oil Cooler Temperature Sensor
 Courtesy of GENERAL MOTORS COMPANY

Differential Temperature Sensor Replacement

Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> . 2. Drain the rear differential. Refer to <u>Axle Lubricant Change (w/o Differential Cooler)</u>, <u>Axle Lubricant Change (w Differential Cooler)</u>.	
1	Differential Temperature Sensor Electrical Connector
2	Differential Temperature Sensor CAUTION: Refer to <u>Fastener Caution</u> . Procedure Remove the differential temperature electrical connector. TIP: Replace the differential oil cooler temperature sensor gasket whenever the sensor is removed. Tighten 23 N.m (17 lb ft)

DIFFERENTIAL CARRIER COOLANT INLET PIPE REPLACEMENT

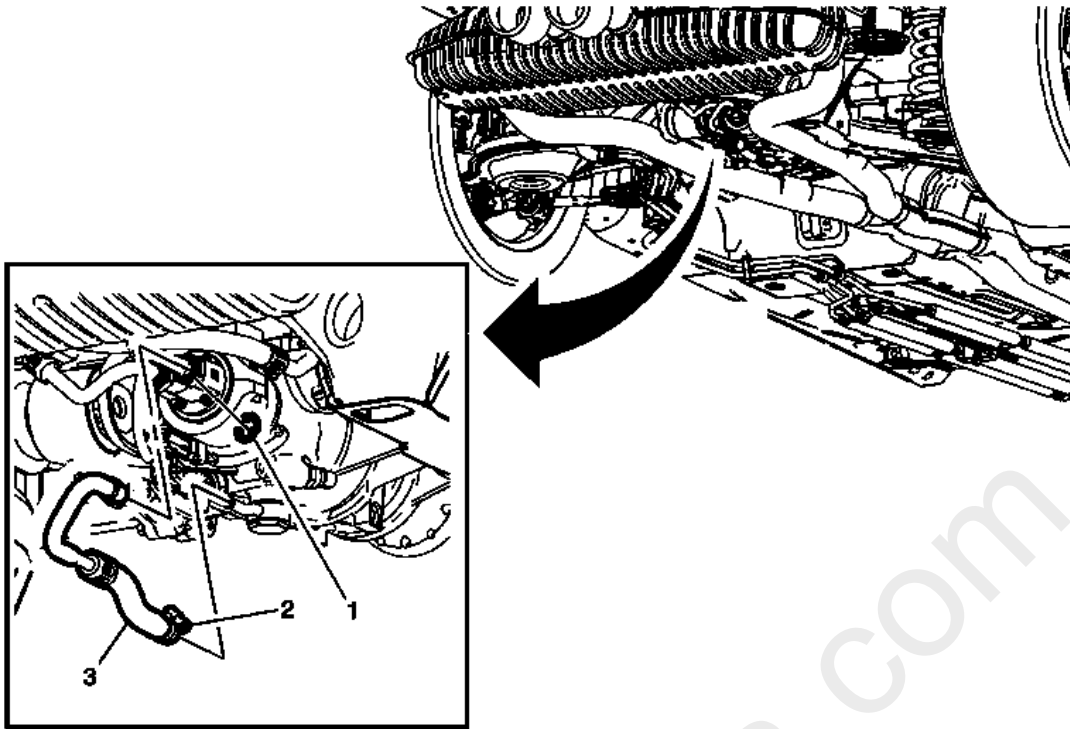


Fig. 38: Differential Carrier Coolant Inlet Pipe, Clamp & Retaining Clip
 Courtesy of GENERAL MOTORS COMPANY

Differential Carrier Coolant Inlet Pipe Replacement

Callout	Component Name
Preliminary Procedure	
1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> . 2. Drain the rear differential fluid. Refer to <u>Axle Lubricant Change (w Differential Cooler)</u> .	
1	Differential Carrier Oil Pump Adapter Retaining Clip NOTE: DO NOT re-use the retaining clip, replace with NEW only.
2	Differential Carrier Oil Cooler Inlet Pipe Clamp
3	Differential Carrier Oil Cooler Inlet Pipe Procedure Fill the rear differential carrier. Refer to <u>Axle Lubricant Change (w Differential Cooler)</u>

REAR AXLE SHAFT SEAL AND REAR WHEEL DRIVE SHAFT FLANGE REPLACEMENT

Special Tools

- J 2619-01 Slide Hammer
- J 21426 Seal Installer

- **J 24420-C** Harmonic Balancer Puller

Removal Procedure

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

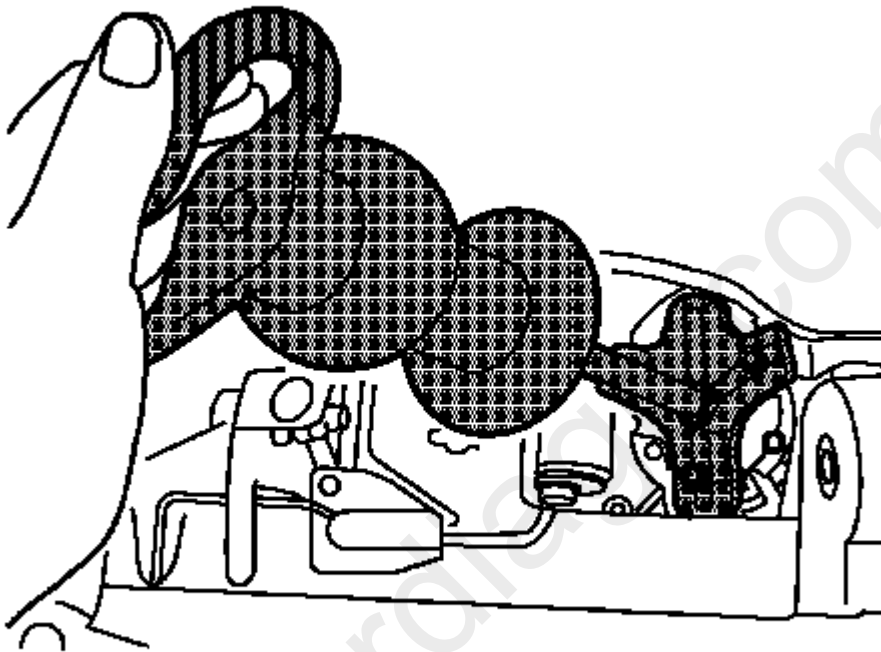


Fig. 39: View of Tool J 24420-C
Courtesy of GENERAL MOTORS COMPANY

3. Using the **J 24420-C** harmonic balancer puller and the **J 2619-01** slide hammer , remove the rear drive axle flange.

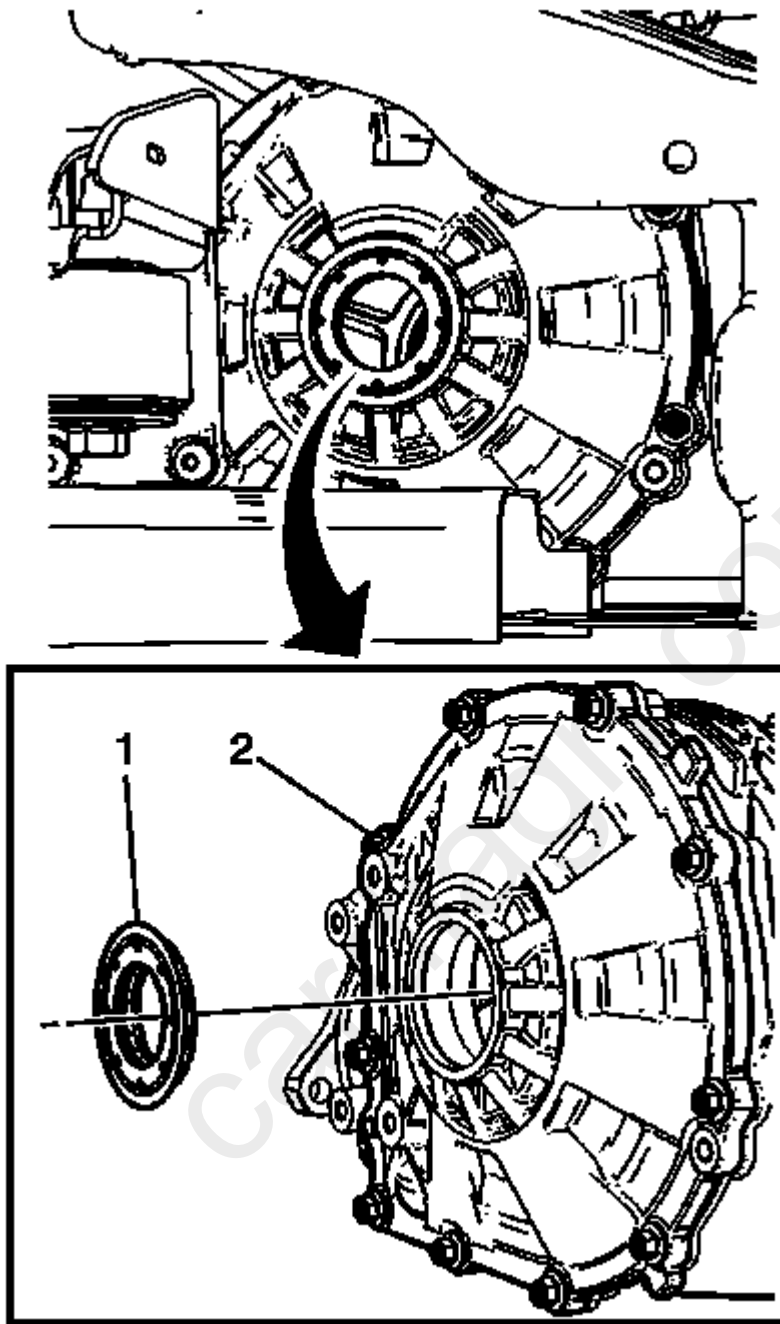


Fig. 40: View of Drive Axle Flange and Seal
Courtesy of GENERAL MOTORS COMPANY

4. Using a flat-bladed screwdriver, remove the drive axle flange axle seal (1) from the differential side cover (2).

Installation Procedure

1. Apply a small amount of clean 75W-90 synthetic gear lube, GM P/N 12378261 (Canadian P/N 10953455) to the sealing lips of the seal.

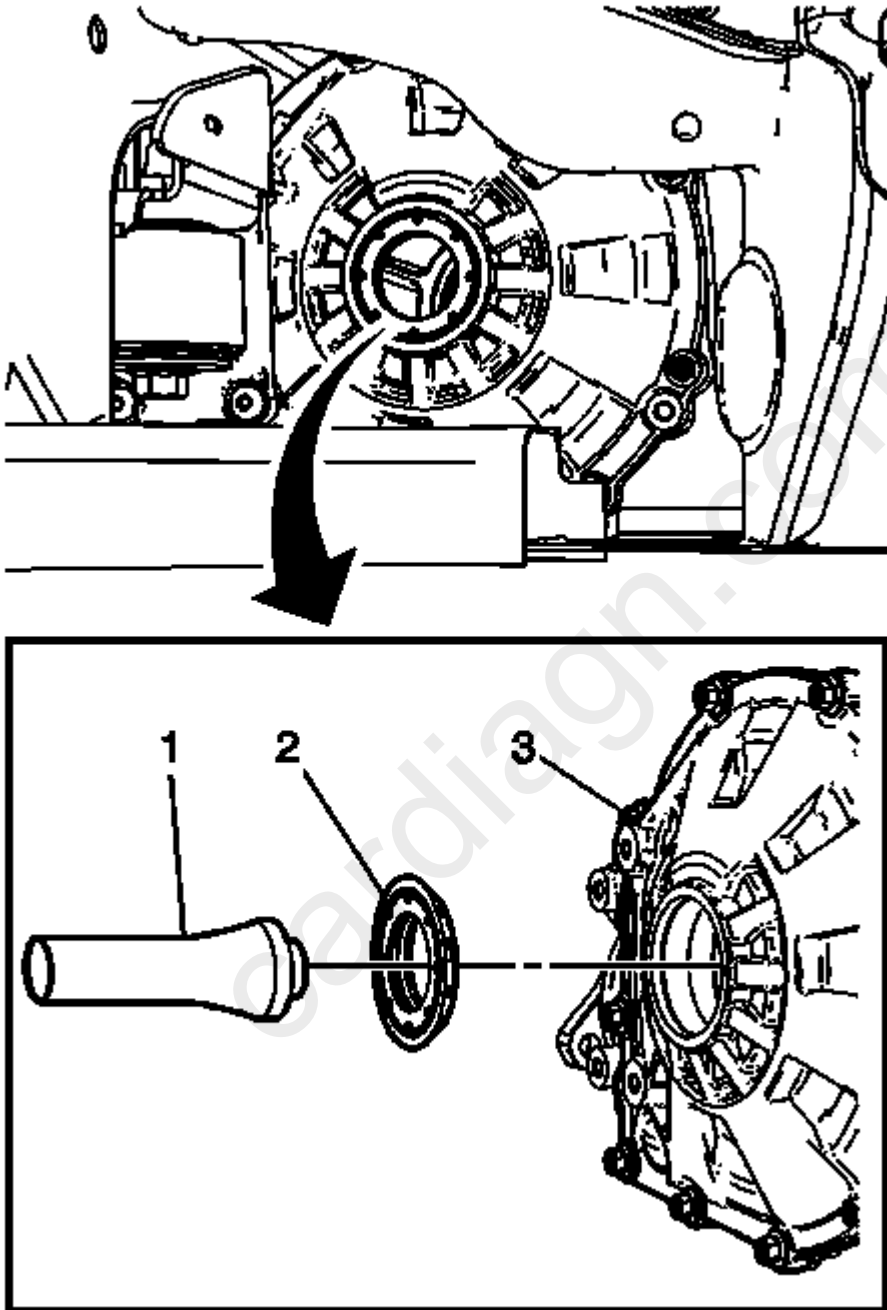


Fig. 41: View of Drive Axle Flange Seal
Courtesy of GENERAL MOTORS COMPANY

2. Using the J 21426 seal installer (1) and a hammer, install the drive axle flange seal (2) in the differential side cover (3).

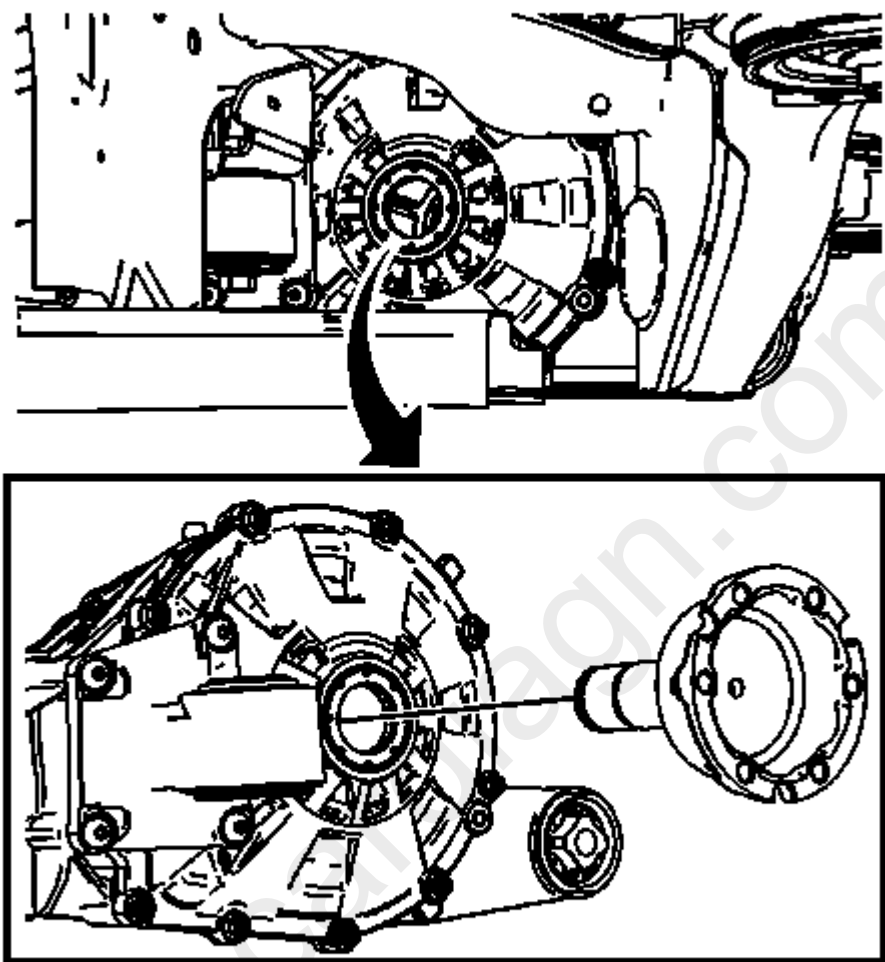


Fig. 42: View of Wheel Drive Flange
Courtesy of GENERAL MOTORS COMPANY

3. Using the appropriate tool, install the wheel drive flange in the rear differential.
4. Install the rear wheel drive shaft. Refer to **Rear Wheel Drive Shaft Replacement** .
5. Inspect the fluid level of the rear drive axle. Refer to **Rear Axle Lubricant Level Inspection**.
6. Remove the support and lower the vehicle.

DRIVE PINION FLANGE/YOKE AND/OR OIL SEAL REPLACEMENT (LSA)

Special Tools

- **J 8614-01** Flange Holder and Remover
- **J 34826** Hub Nut Socket 36 mm
- **J 42851** Front Cover Oil Seal Installer

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the exhaust system. Refer to **Exhaust System Replacement (LSA-Coupe)** , **Exhaust System Replacement (LSA-Wagon)** .
3. Remove the propeller shaft from the vehicle. Refer to **Rear Propeller Shaft Replacement (RPO LSA)** .

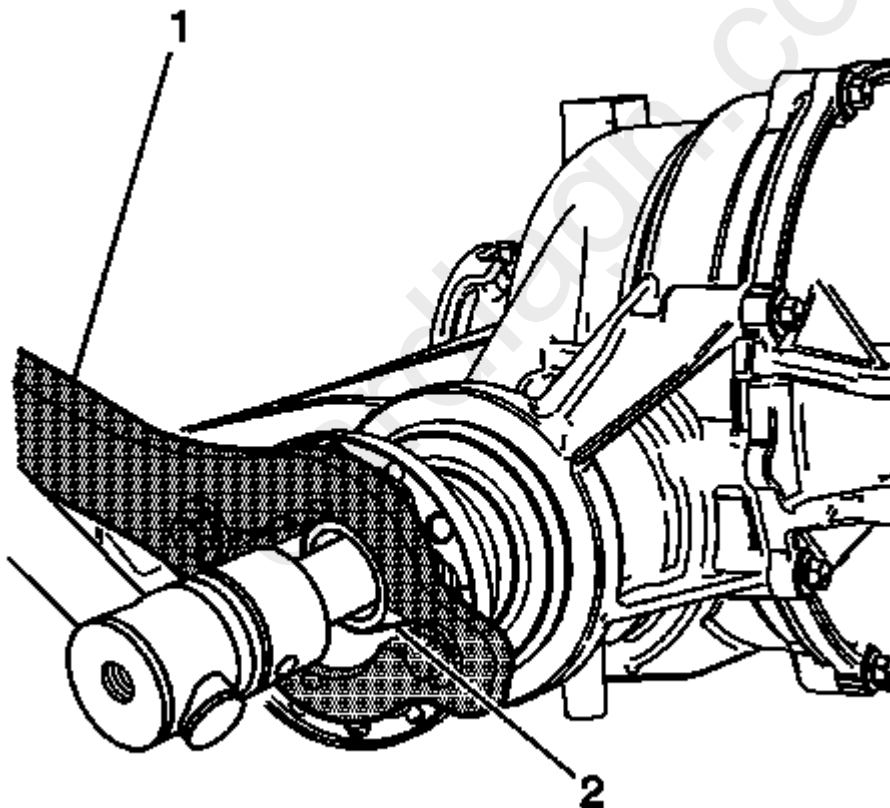


Fig. 43: View Of Socket And Special Tool J 8614-01 (Remover)
Courtesy of GENERAL MOTORS COMPANY

NOTE: Position the bolt behind and outside of the J 45012.

4. Using the **J 8614-01** remover (1) and the **J 34826** socket (2), remove the drive pinion flange nut.

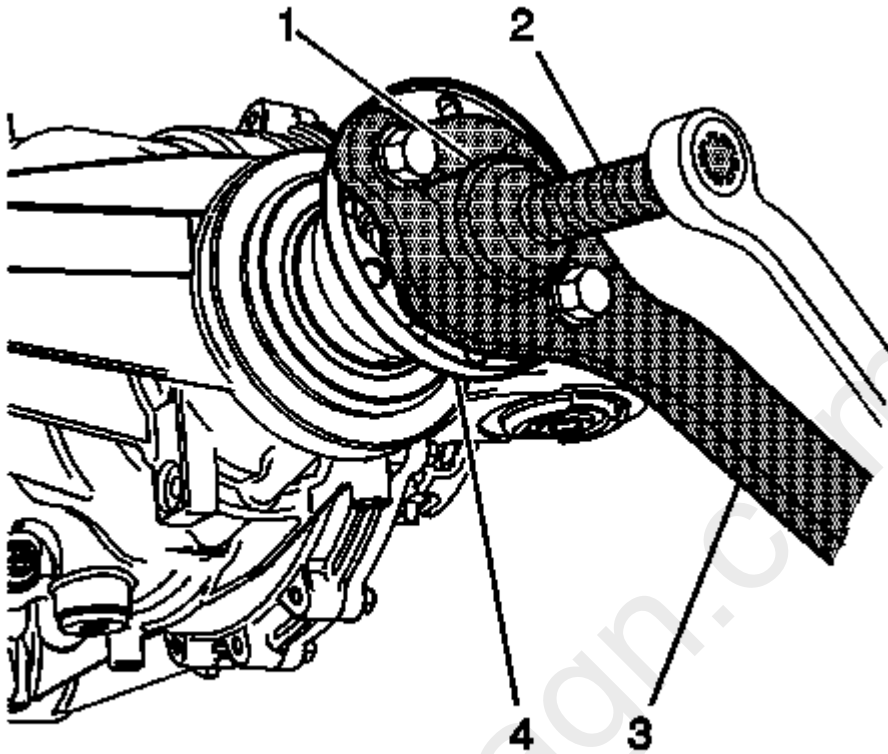


Fig. 44: Identifying Flange Holder/Removers & Drive Pinion Flange
Courtesy of GENERAL MOTORS COMPANY

5. Using the **J 8614-01** remover (3), **J 8614-2** (1) and the **J 8614-3** (3), remove the drive pinion flange (4).

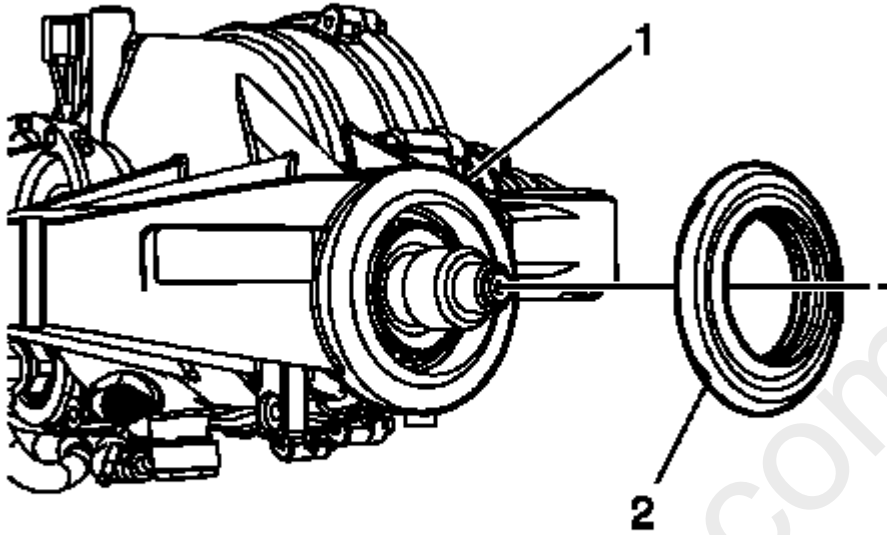


Fig. 45: Identifying Drive Pinion Seal
Courtesy of GENERAL MOTORS COMPANY

NOTE: Do not damage the sealing surfaces of the pinion shaft or differential pinion housing.

6. Using the appropriate tool, remove the drive pinion seal (2) from the differential housing (1).

Installation Procedure

1. Remove any debris and excess gear lubricant from the pinion bore.
2. Lubricate the drive pinion flange sealing surface with the gear lubricant. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

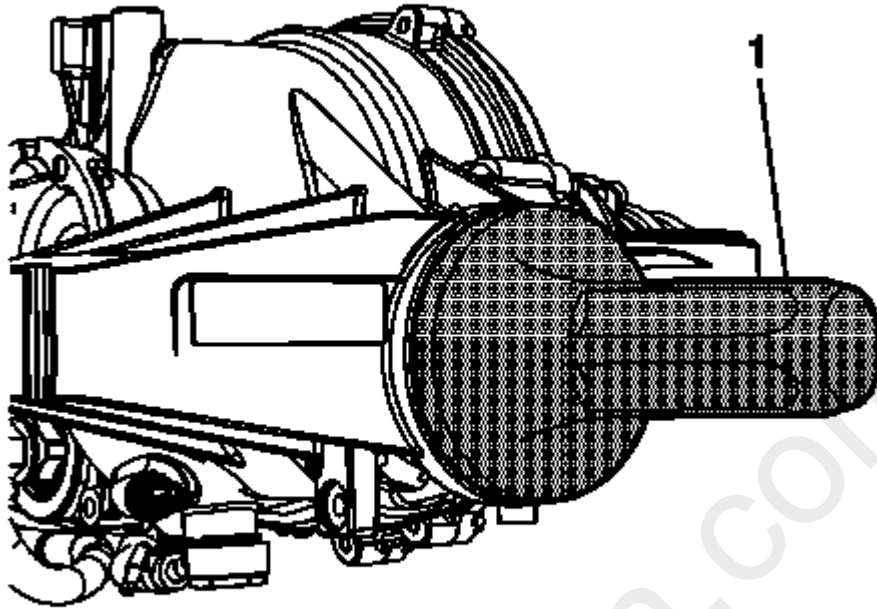


Fig. 46: Installing Drive Pinion Seal
Courtesy of GENERAL MOTORS COMPANY

3. Using the J 42851 installer (1), install the drive pinion seal to the differential housing.

NOTE: Allow the drive pinion gear threads and the nut to air dry.

4. Using the appropriate cleaning solvent, thoroughly clean the drive pinion shaft threads and the drive pinion flange nut.

NOTE: Ensure that there are no gaps in the threadlocker along the length of the filled area of the pinion shaft threads.

5. Apply threadlocker to 2/3 of the threaded length of the pinion shaft threads. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

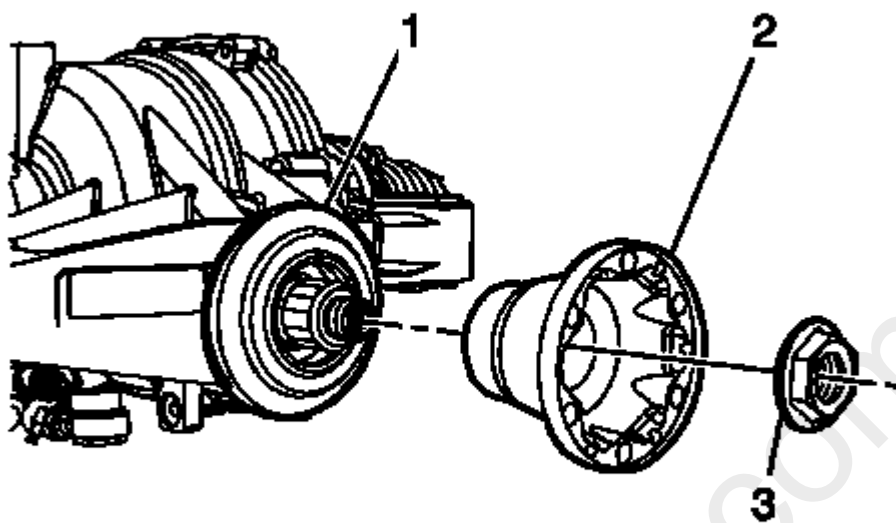


Fig. 47: Identifying Pinion Gear Components
Courtesy of GENERAL MOTORS COMPANY

6. Position the drive flange (2) on the pinion gear (1).
7. Install the pinion nut (3) on the pinion gear (1).

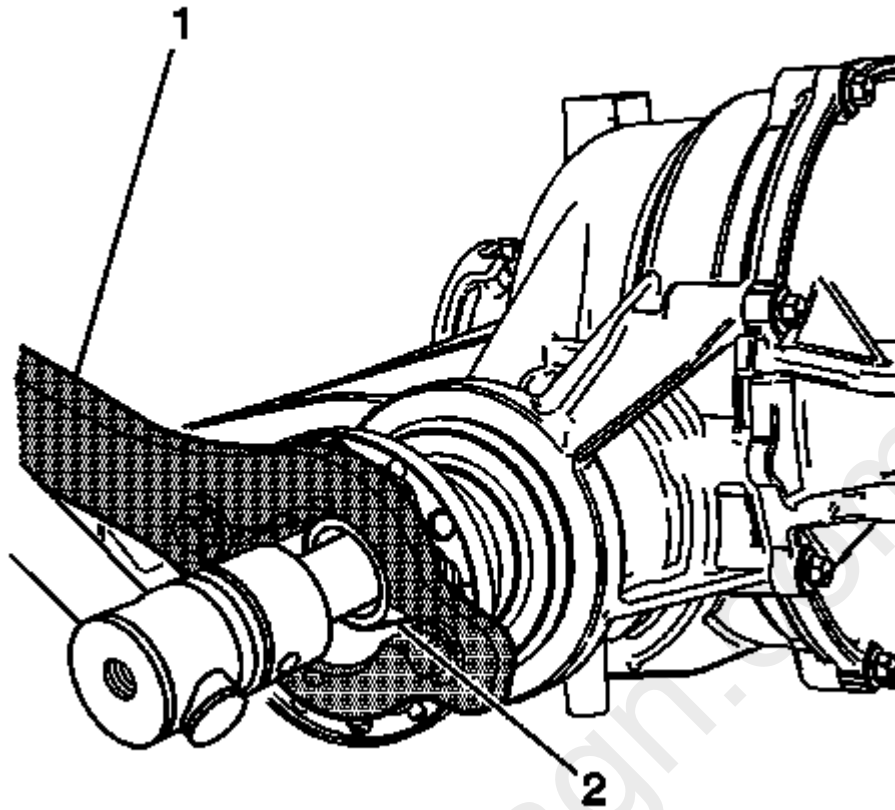


Fig. 48: View Of Socket And Special Tool J 8614-01 (Remover)
 Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

NOTE: Position the bolt behind and outside of the J 45012.

8. Using the **J 8614-01** remover (1) and the **J 34826** socket (2) , tighten the pinion nut to 245 N.m (181 lb ft).
9. Install the propeller shaft. Refer to **Rear Propeller Shaft Replacement (RPO LSA)**
10. Inspect the rear drive axle lubricant level. Refer to **Rear Axle Lubricant Level Inspection.**
11. Install the exhaust system. Refer to **Exhaust System Replacement (LSA-Coupe)** , **Exhaust System Replacement (LSA-Wagon)** .
12. Remove the supports and lower the vehicle.

DRIVE PINION FLANGE/YOKE AND/OR OIL SEAL REPLACEMENT (LFW/LFX)

Special Tools

- **J 34826** Hub Nut Socket (36 mm)
- **J 42851** Seal Installer
- **J 45012** Holding Fixture
- **J 45019** Flange and Pinion Cage Remover

Removal Procedure

1. Raise and support vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the exhaust system. Refer to **Exhaust System Replacement (Single Exhaust)** , **Exhaust System Replacement (LFX/LFW-Coupe)** , **Exhaust System Replacement (LFX/LFW-Wagon)** .
3. Remove the propeller shaft. Refer to **Rear Propeller Shaft Replacement (RPO LFX or LFW with MXO)** , **Rear Propeller Shaft Replacement (RPO LFX or LFW with MX7 or MN6)** .

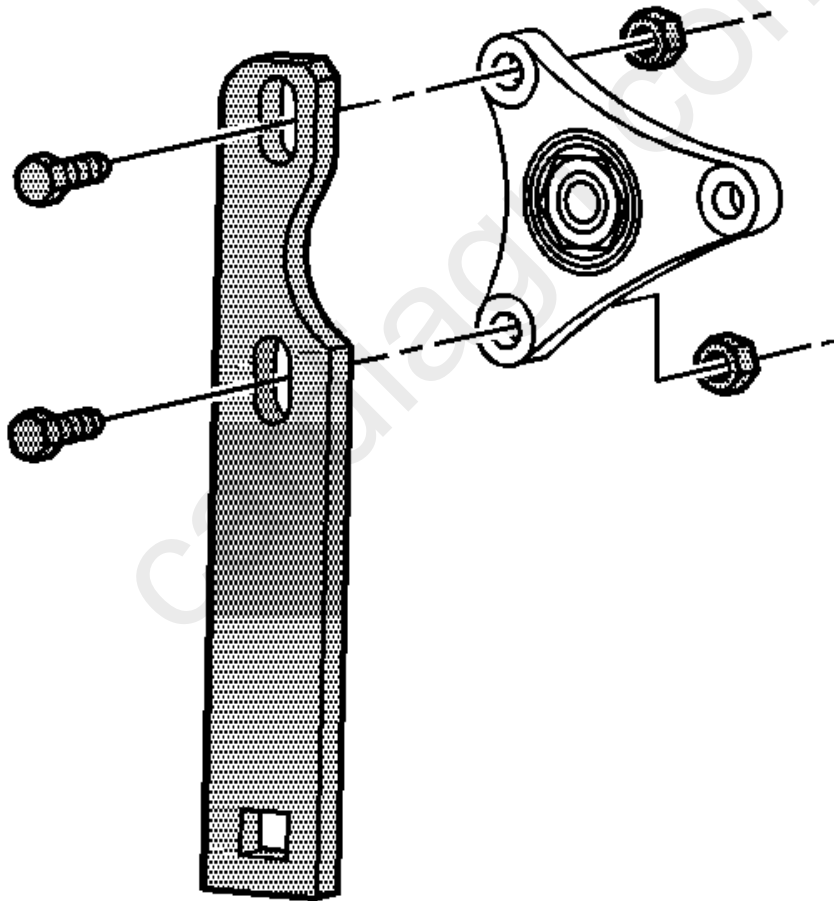


Fig. 49: View Of Flange Tool

Courtesy of GENERAL MOTORS COMPANY

4. Use the **J 45012** holding fixture to hold the pinion flange.

5. Using the **J 34826** hub nut socket (36 mm) , remove the drive pinion nut.

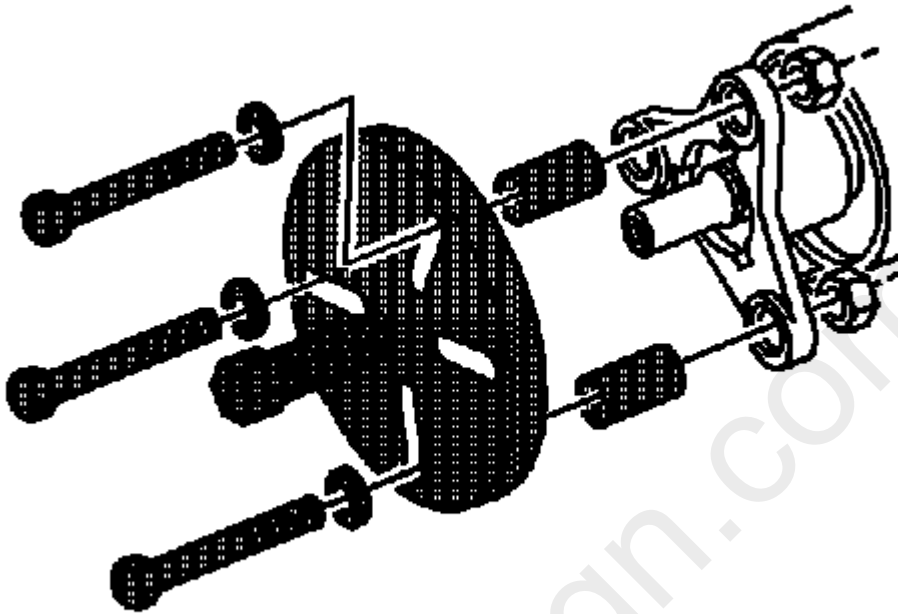


Fig. 50: Flange & Pinion Cage Remover
Courtesy of GENERAL MOTORS COMPANY

6. Using the **J 45019** flange and pinion cage remover , remove the flange.
7. Using a flat-bladed tool, remove the drive pinion seal. Take care not to damage any sealing surfaces.

Installation Procedure

NOTE: **Ensure the pinion bore is free of dirt debris.**

1. Apply a small amount of synthetic gear oil GM P/N 12378514 (Canadian P/N 88901045) or equivalent to the drive pinion flange sealing surface of the drive pinion seal.

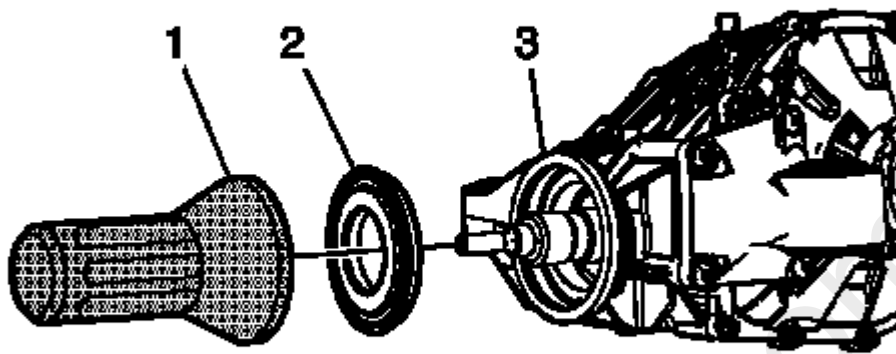


Fig. 51: View of Pinion Seal and Differential Housing
Courtesy of GENERAL MOTORS COMPANY

2. Using the J 42851 seal installer (1), install the pinion seal (2) to the differential housing (3).

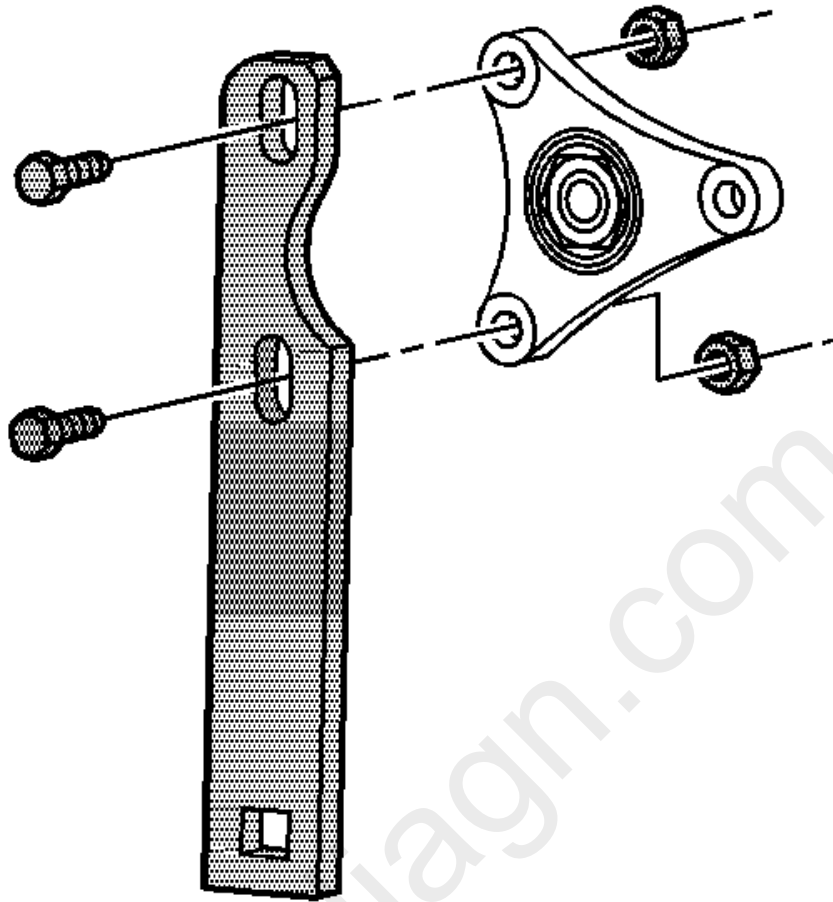


Fig. 52: View Of Flange Tool

Courtesy of GENERAL MOTORS COMPANY

3. Install the **J 45012** holding fixture on the drive pinion shaft.
4. Install the pinion flange on the drive pinion shaft.

NOTE: **The pinion shaft threads and the pinion flange nut must be free of residue and debris prior to the application of the threadlocker.**

5. Thoroughly clean the residue from the pinion shaft threads and the pinion flange nut by using denatured alcohol or equivalent and allow to dry.
6. Apply threadlocker GM P/N 12345382 (Canadian P/N 10953489), or equivalent to 2/3 of the threaded length of the pinion shaft threads. Ensure that there are no gaps in the threadlocker along the length of the filled area of the pinion shaft threads.
7. Allow the threadlocker to cure approximately 10 minutes before installation.
8. Use the **J 45012** holding fixture to hold the pinion flange.

CAUTION: Refer to Fastener Caution .

9. Using the J 34826 hub nut socket (36 mm) , tighten the drive pinion nut to 245 N.m (181 lb ft).
10. Install the propeller shaft. Refer to Rear Propeller Shaft Replacement (RPO LFX or LFW with MXO) , Rear Propeller Shaft Replacement (RPO LFX or LFW with MX7 or MN6) .
11. Inspect the fluid level. Refer to Rear Axle Lubricant Level Inspection.
12. Install the exhaust system. Refer to Exhaust System Replacement (Single Exhaust) , Exhaust System Replacement (LFX/LFW-Coupe) , Exhaust System Replacement (LFX/LFW-Wagon) .
13. Lower the vehicle.

DIFFERENTIAL CARRIER DAMPENER AND BRACKET REPLACEMENT

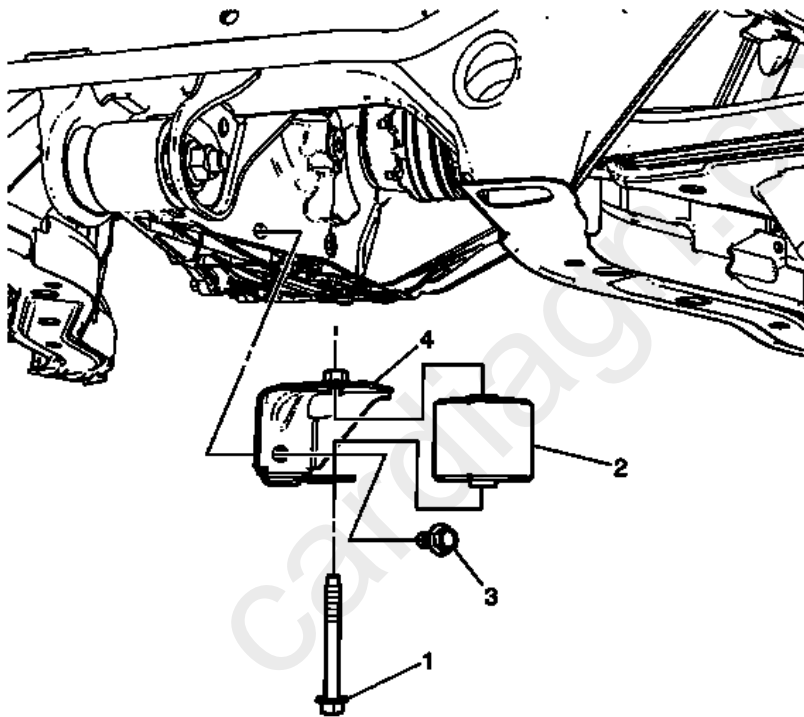


Fig. 53: Identifying Differential Carrier Dampener & Bracket Components
Courtesy of GENERAL MOTORS COMPANY

Differential Carrier Dampener and Bracket Replacement

Callout	Component Name
Preliminary Procedure	
Raise and support the vehicle. Refer to <u>Tire and Wheel Removal and Installation</u> .	
	Differential Dampener Bolt
	CAUTION: Refer to <u>Fastener Caution</u> .

1	NOTE: Note the orientation of the dampener and related parts for the proper installation. Tighten 58 (43 lb ft)
2	Differential Dampener
3	Differential Dampener Bracket Bolt Tighten 58 (43 lb ft)
4	Differential Dampener Bracket

DIFFERENTIAL REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tires and wheels. Refer to **Tire and Wheel Removal and Installation** .
3. Remove the rear propeller shaft. Refer to **Rear Propeller Shaft Replacement (RPO LSA)** , **Rear Propeller Shaft Replacement (RPO LFX or LFW with MXO)** , **Rear Propeller Shaft Replacement (RPO LFX or LFW with MX7 or MN6)** .
4. Drain the rear differential, if needed. Refer to **Axle Lubricant Change (w/o Differential Cooler)**, **Axle Lubricant Change (w Differential Cooler)**.

NOTE: It is only necessary to remove only one of the rear wheel drive shafts from the vehicle. Remove and support the remaining wheel drive shaft.

5. Remove the rear wheel drive shaft from the rear differential. Refer to **Rear Wheel Drive Shaft Replacement** .
6. Place a transmission jack stand under the rear differential assembly.
7. Secure the rear differential assembly to the transmission jack stand.

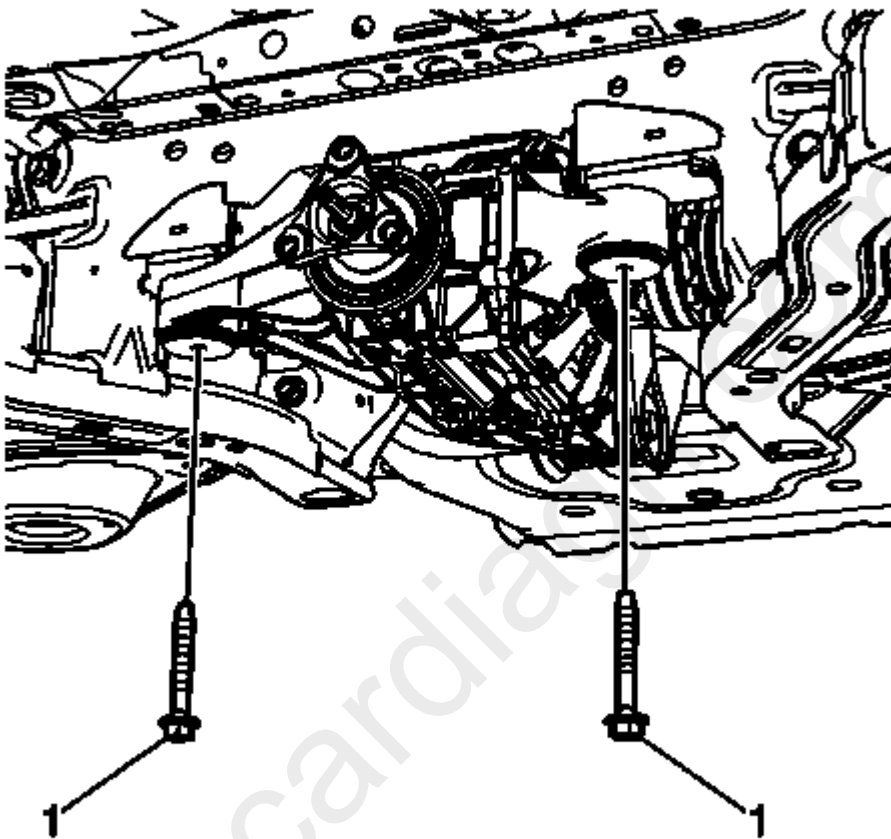


Fig. 54: View of Front Differential Mounting Bolts
Courtesy of GENERAL MOTORS COMPANY

8. Remove the two front differential mounting bolts (1).

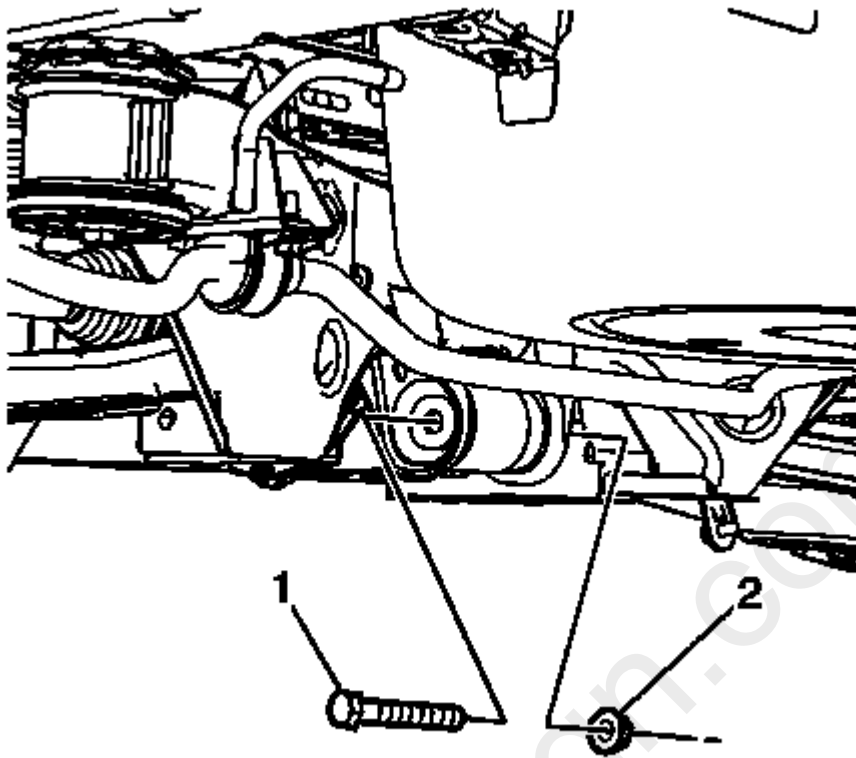


Fig. 55: View of Rear Differential Mounting Bolts
Courtesy of GENERAL MOTORS COMPANY

9. Remove the rear mounting bolt (1) and nut (2) for the differential.

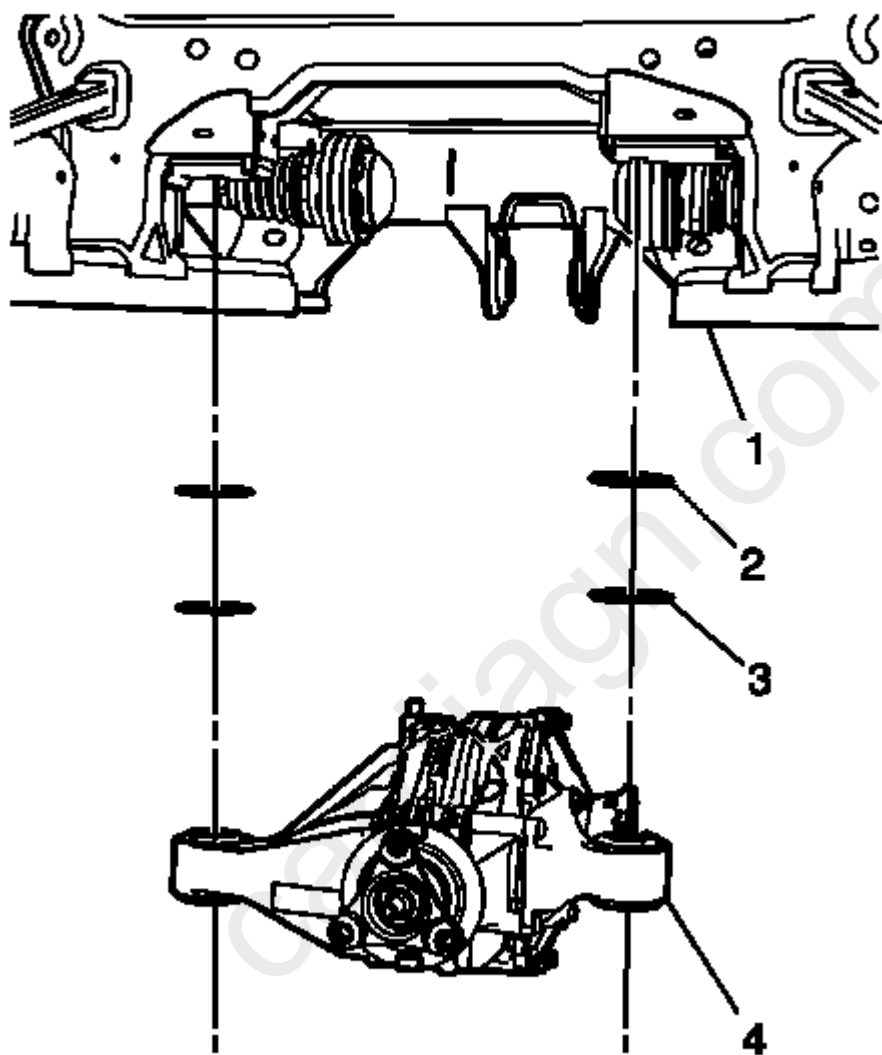


Fig. 56: Identifying Differential Assembly, Rear Frame And Insulators
Courtesy of GENERAL MOTORS COMPANY

NOTE: The following step also included vehicles equipped with the MYB transmission.

10. Lower the rear differential assembly (4) from the rear frame (1) and remove from the vehicle.

NOTE: **Insulator (3) is used on the Sport Wagon/Coupe equipped with the MYB transmission only.**

11. Replace the insulators (2) and (3) if found to be damaged or missing.
12. If applicable and if replacing the rear differential assembly, remove the rear differential dampener assembly. Refer to **Differential Carrier Dampener and Bracket Replacement**.

Installation Procedure

1. If applicable and if replacing a new rear differential assembly, install the rear differential dampener assembly. Refer to **Differential Carrier Dampener and Bracket Replacement**.

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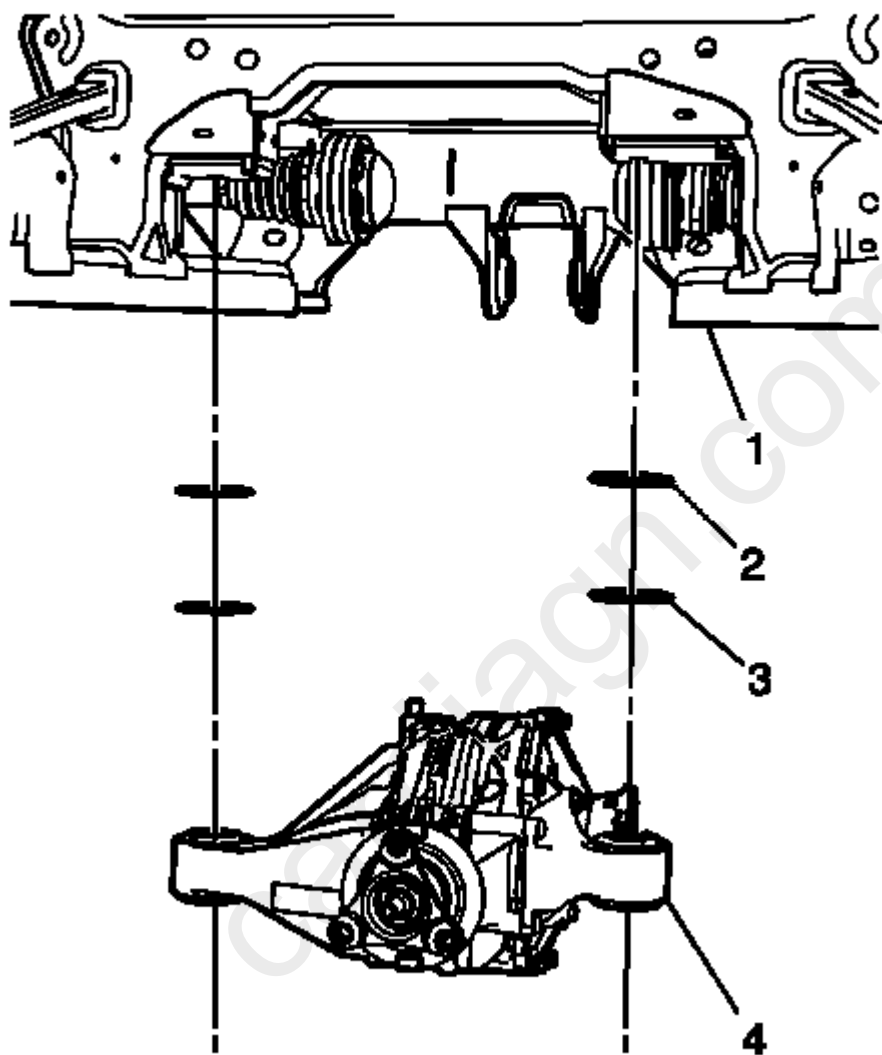


Fig. 57: Identifying Differential Assembly, Rear Frame And Insulators
Courtesy of GENERAL MOTORS COMPANY

2. Install the new insulators (2) and (3), if needed.
3. Install the rear differential assembly (4) in the rear frame (1).

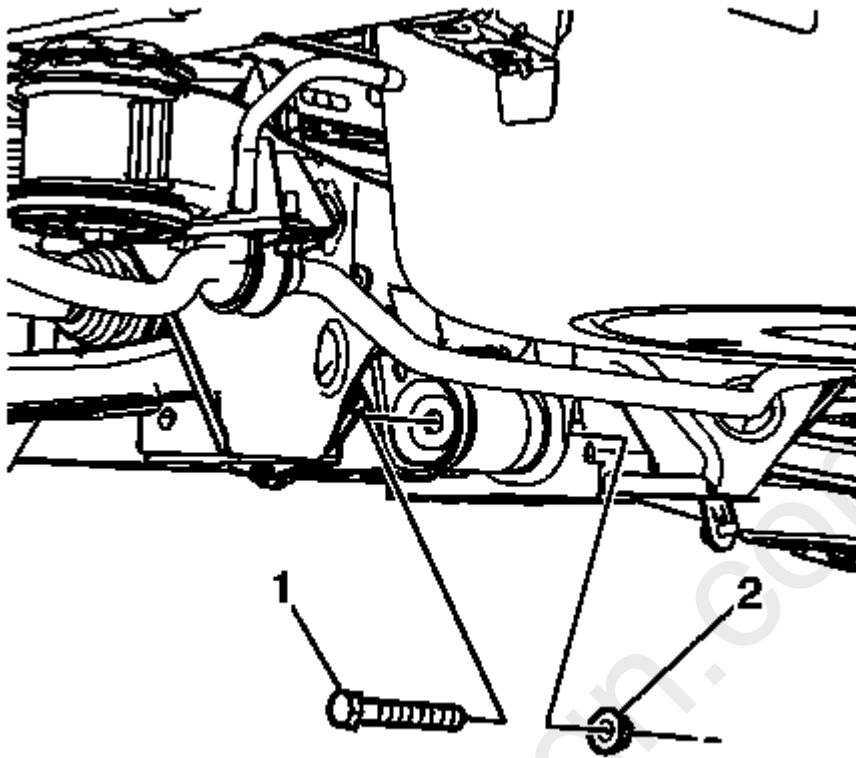


Fig. 58: View of Rear Differential Mounting Bolts
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

4. Install the rear differential mounting bolt (1) and nut (2).

Tighten

Tighten the rear differential mounting nut (2) to 220 N.m (162 lb ft).

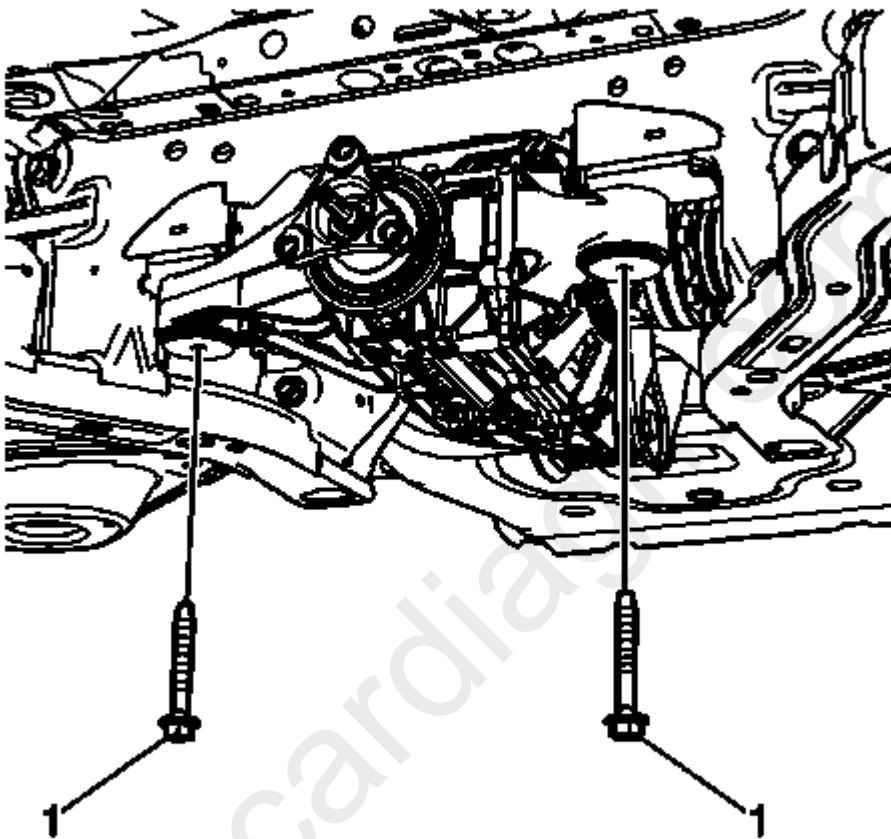


Fig. 59: View of Front Differential Mounting Bolts
Courtesy of GENERAL MOTORS COMPANY

5. Install the rear differential front mounting bolts (1).

Tighten

Tighten the rear differential mounting bolt (1) to 175 N.m (129 lb ft).

6. Remove the transmission jack stand.
7. Install the rear wheel drive shafts. Refer to **Rear Wheel Drive Shaft Replacement** .
8. Install the rear propeller shaft. Refer to **Rear Propeller Shaft Replacement (RPO LSA)** , **Rear Propeller Shaft Replacement (RPO LFX or LFW with MXO)** , **Rear Propeller Shaft Replacement (RPO LFX or LFW with MX7 or MN6)** .
9. Fill the differential with fluid, if needed. Refer to **Axle Lubricant Change (w/o Differential Cooler)**, **Axle Lubricant Change (w Differential Cooler)**.
10. Install the tires and wheels. Refer to **Tire and Wheel Removal and Installation** .
11. Remove the support and lower the vehicle.

REAR AXLE DISASSEMBLE

Special Tools

J 24433 Pinion Cone and Side Bearing Installer

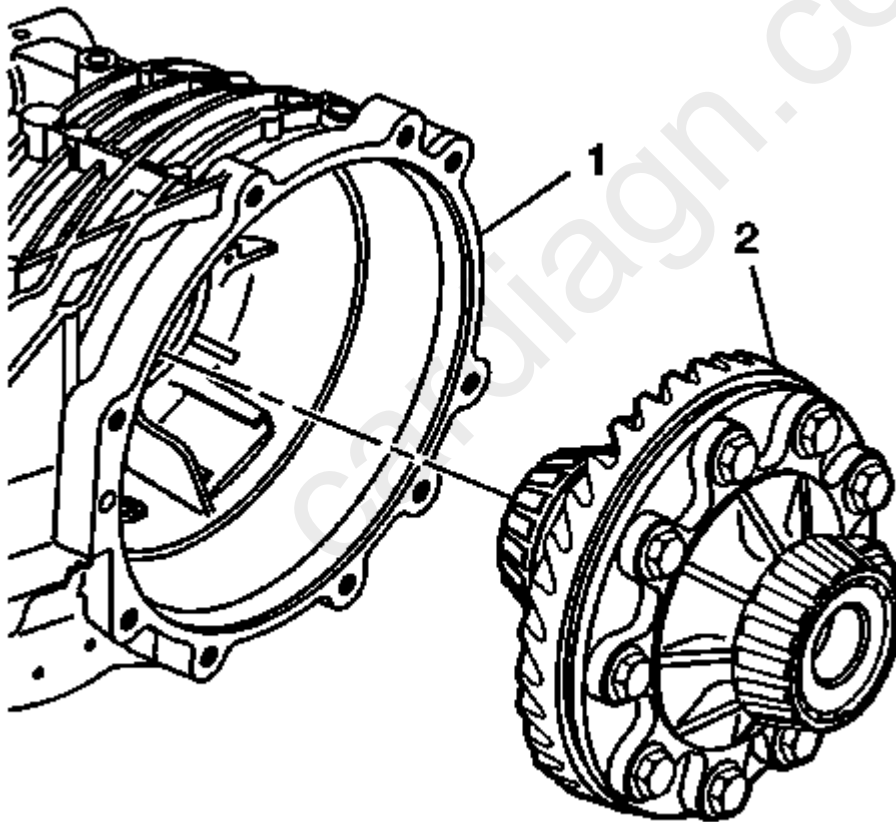


Fig. 60: View Of Differential Assembly
Courtesy of GENERAL MOTORS COMPANY

1. Remove the differential assembly (2) from the carrier (1).

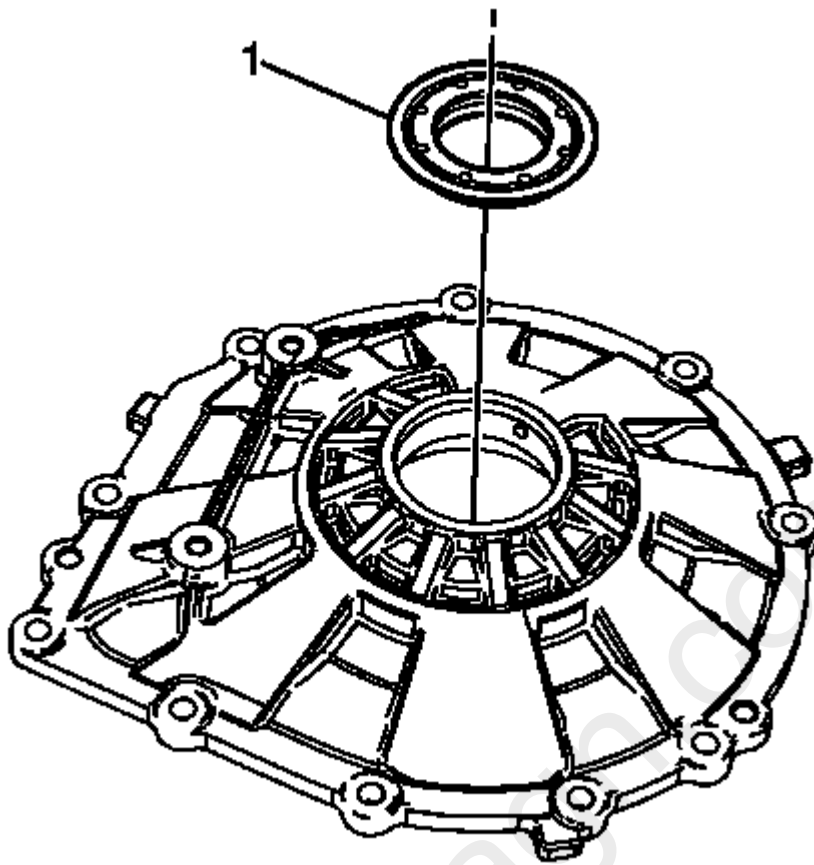


Fig. 61: View of Axle Seal

Courtesy of GENERAL MOTORS COMPANY

2. Using the J 24433 pinion cone and side bearing installer and a hammer, remove the axle seal (1) from the side cover.

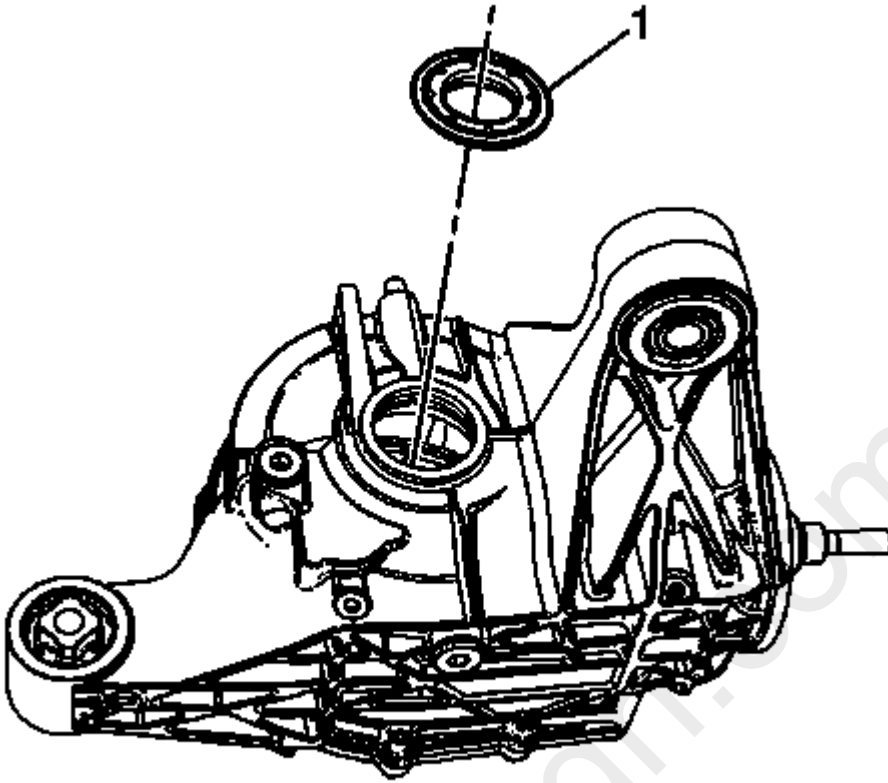


Fig. 62: View of Oil Seal

Courtesy of GENERAL MOTORS COMPANY

3. Using the J 24433 pinion cone and side bearing installer and a hammer, remove the axle oil seal (1) from the differential housing.

DIFFERENTIAL CASE CLEANING AND INSPECTION

Differential Case

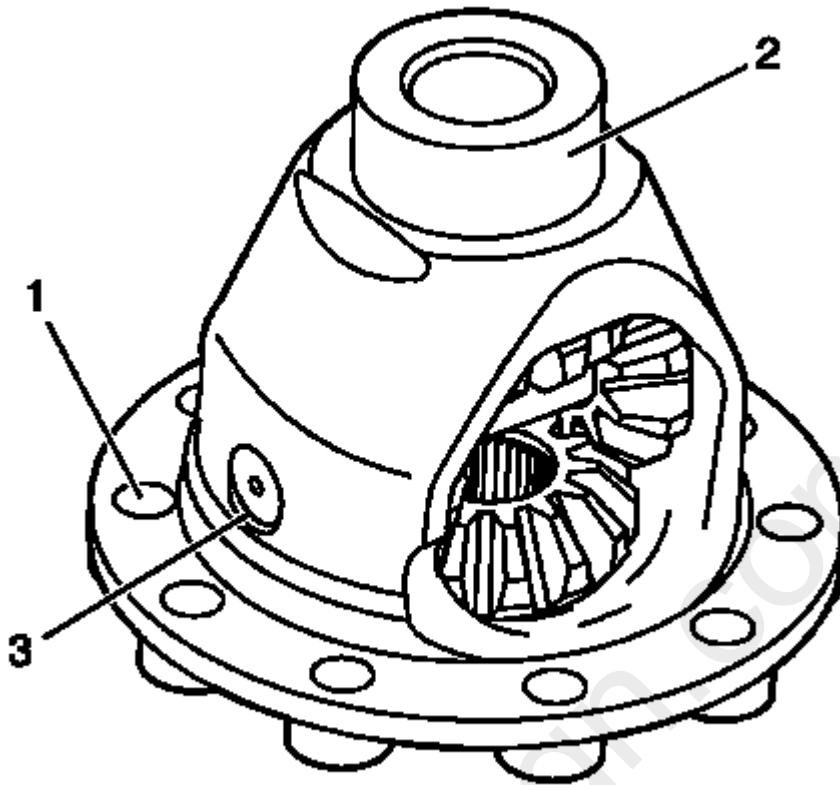


Fig. 63: Inspecting Differential Case
Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to Safety Glasses Warning .

1. Clean the differential case in solvent.
2. Inspect the differential case for the following conditions:
 - Chips or cracks
 - Damage to the bolts holes (1)
 - Unusual wear, grooves or scoring
 - Damaged side bearing flanges (2)
 - Heat discoloration
 - Worn differential pin bores (3)

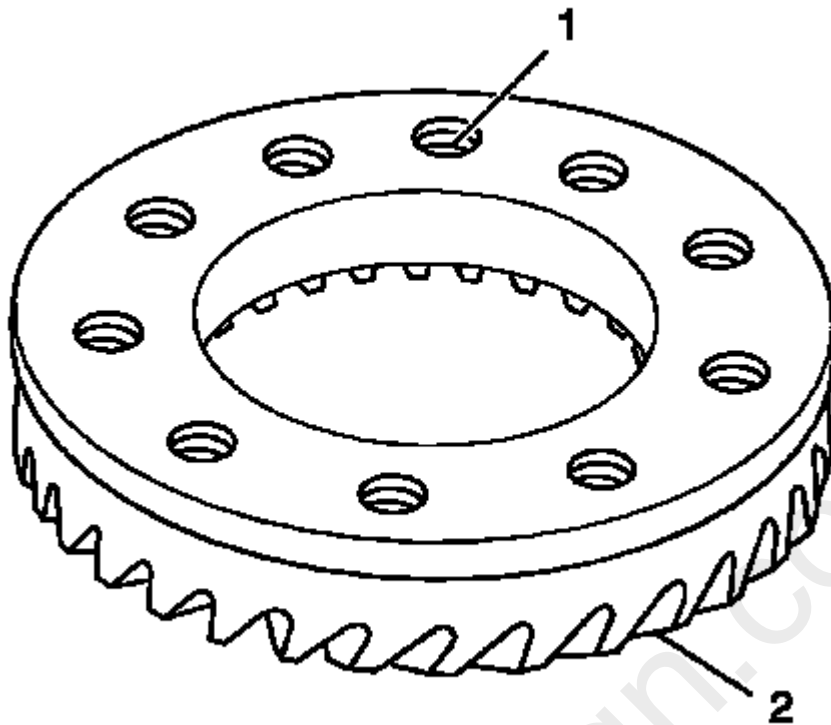


Fig. 64: Inspecting Ring Gear

Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to Safety Glasses Warning .

3. Clean the ring gear in solvent.
4. Inspect the ring gear for the following conditions:
 - Damage to the threaded holes (1)
 - Unusual wear or heat discoloration to the gear teeth (2)

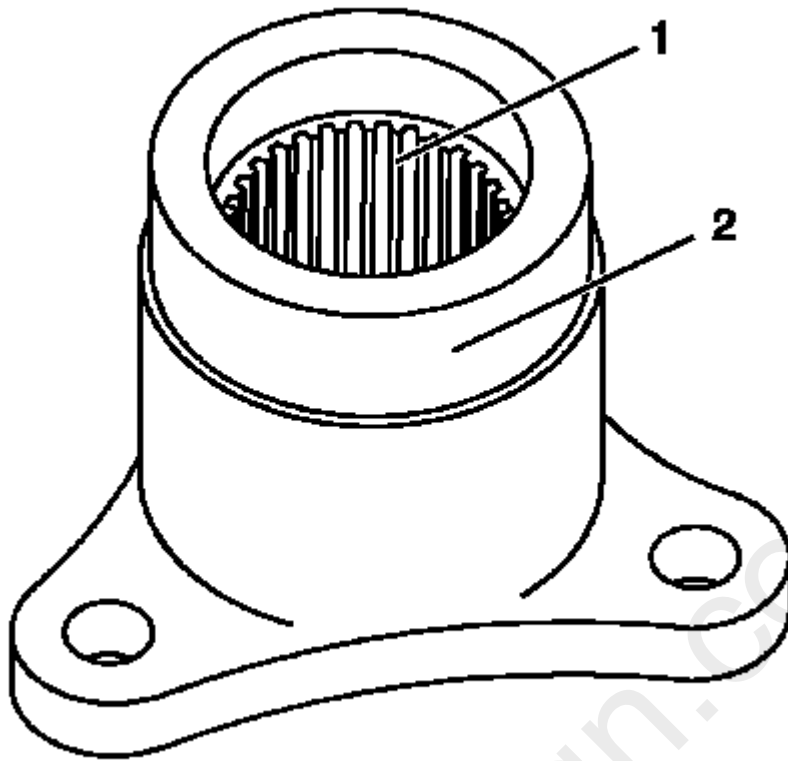


Fig. 65: Inspecting Pinion Flange
Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to Safety Glasses Warning .

5. Clean the pinion flange in solvent.
6. Inspect the pinion flange for the following conditions:
 - Splines for wear, pitting or twisting (1)
 - Sealing surface for grooves or pitting (2)

Bearings and Races

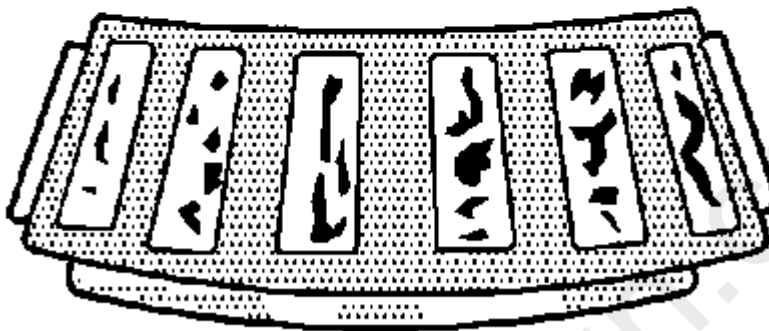


Fig. 66: Inspecting Bearing Rollers & Races For Pitting, Grooves, Spalling & Excessive Wear
Courtesy of GENERAL MOTORS COMPANY

1. Inspect the bearing rollers and races for the following conditions:
 - Pitting
 - Scoring or grooves
 - Excessive wear or other damage

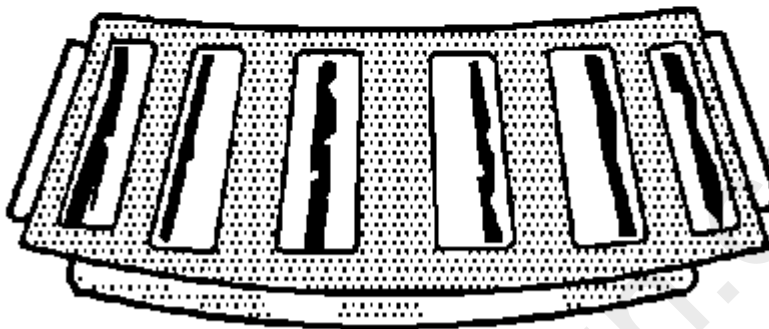
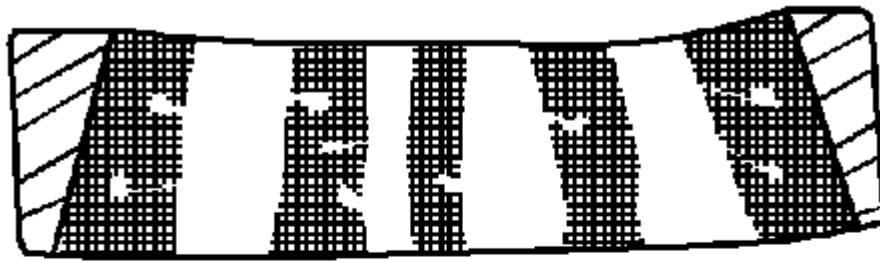


Fig. 67: Inspecting Bearing Rollers & Races For Heat Discoloration
Courtesy of GENERAL MOTORS COMPANY

2. Inspect the bearing rollers and races for heat discoloration.

Heat discoloration ranges from a faint yellow to a dark blue color. This discoloration may result from an overload or improper lubrication. Excessive heat causes softening of the rollers and races. Bearings or races with sign of heat discoloration must be replaced.

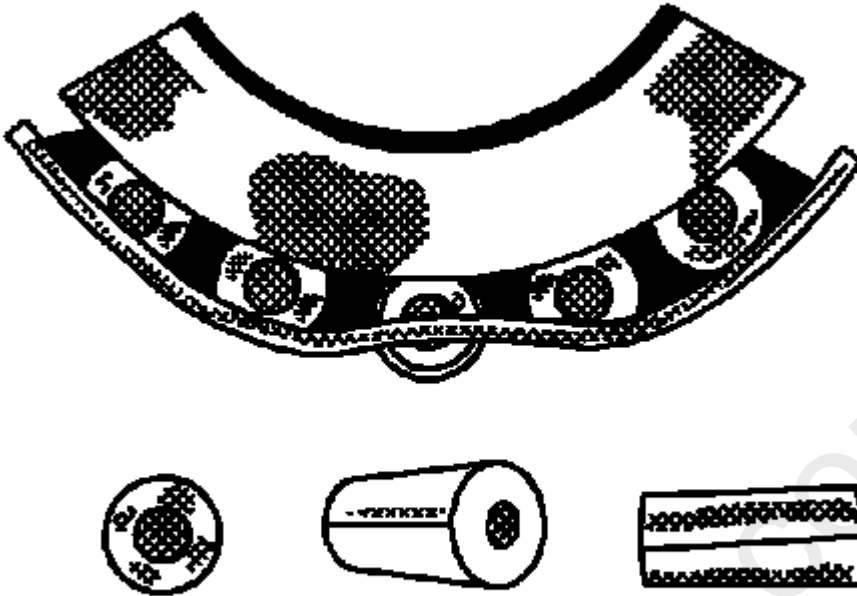


Fig. 68: Identifying Bent Roller Cage
Courtesy of GENERAL MOTORS COMPANY

3. Inspect for bent bearing cages.

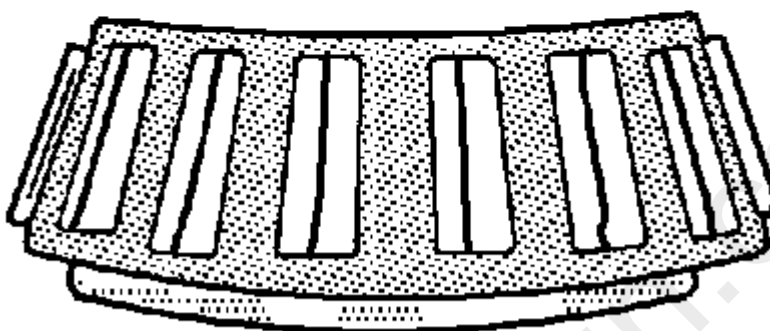
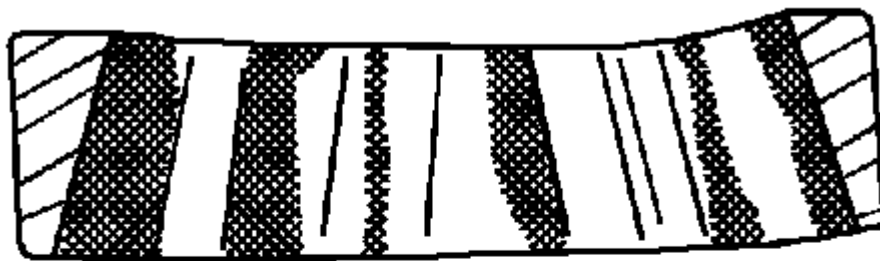


Fig. 69: Identifying Brinelling

Courtesy of GENERAL MOTORS COMPANY

4. Inspect for damaged bearing cages.

DIFFERENTIAL HOUSING CLEANING AND INSPECTION

Differential Housing

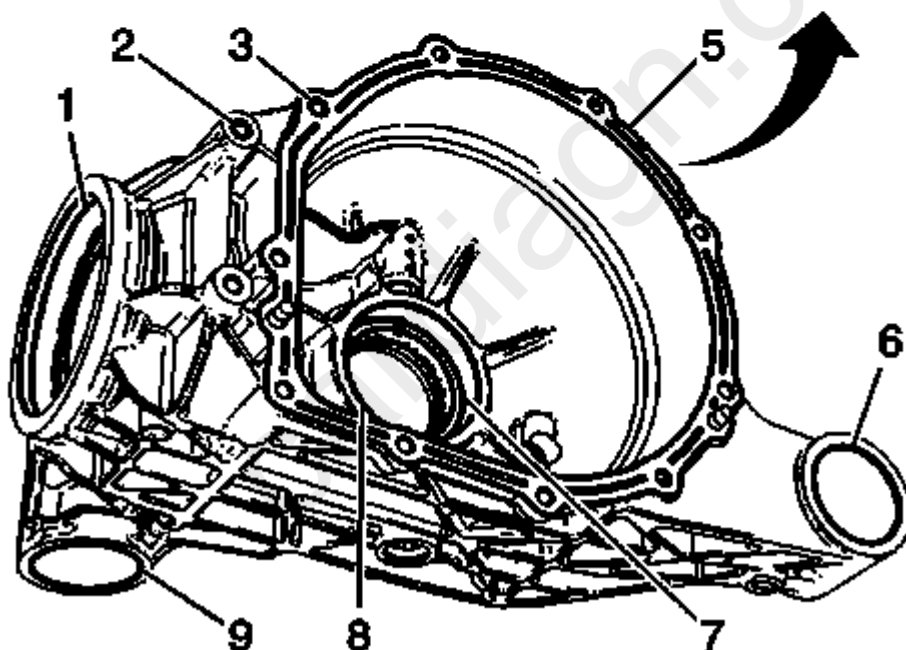
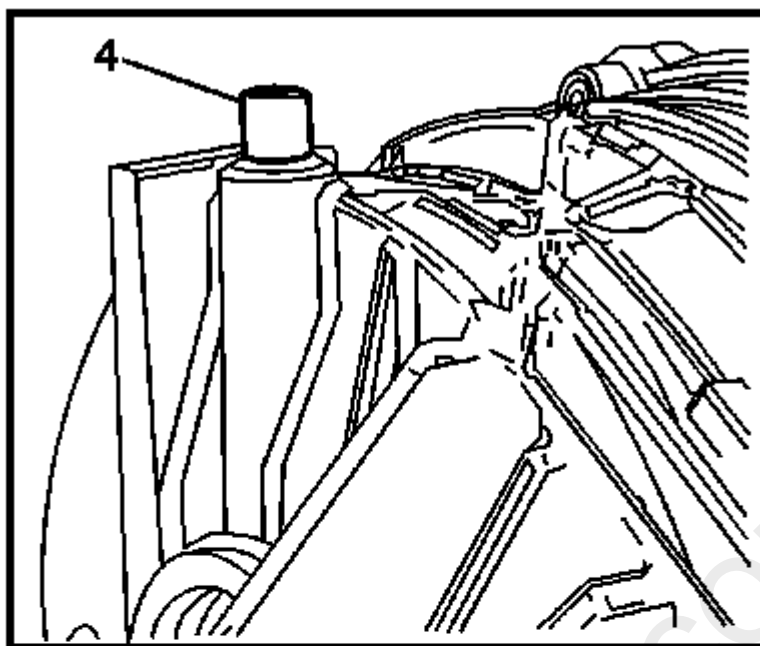


Fig. 70: View of Differential Housing
 Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to Safety Glasses Warning .

1. Clean the differential housing in solvent.

2. Clean and inspect the differential housing for the following:

- The mounting bolt threads (2)
- The case cover bolt hole threads (3)
- The sealing surface for nicks or burrs (5)
- The drain plug hole threads (8)
- The axle seal area (7)
- The drive pinion seal area (1)
- The rear differential support bushing bore (6)
- Front right side differential support bushing bore (9)
- Vent for operation (4)
- Cracks in the housing, if removed

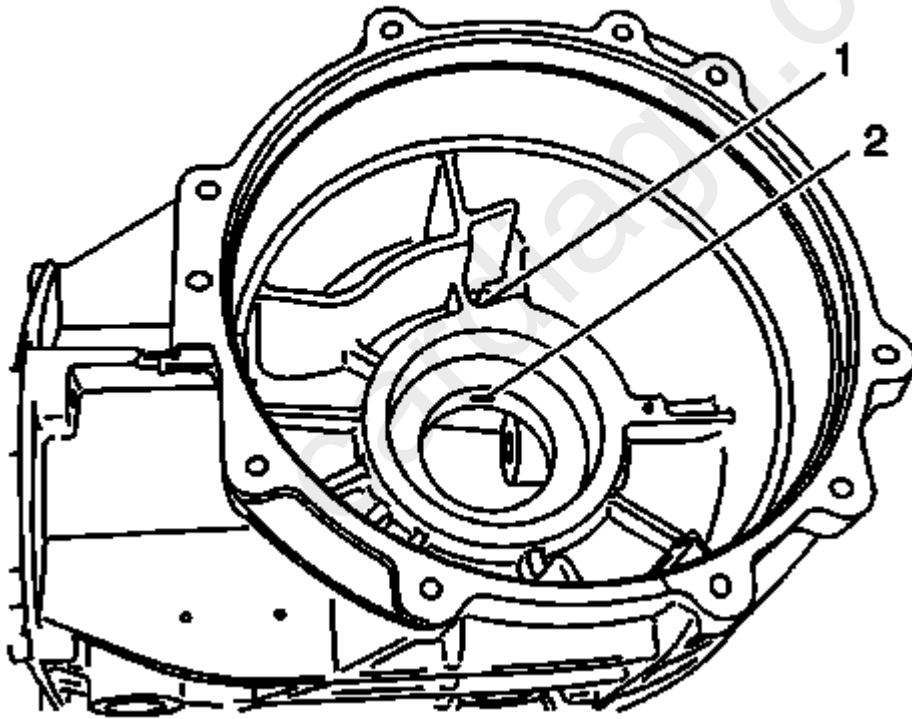


Fig. 71: Cleaning Oil Passage

Courtesy of GENERAL MOTORS COMPANY

3. Clean the oil passage between (1) and (2), in the axle bearing bore.

Differential Carrier Cover

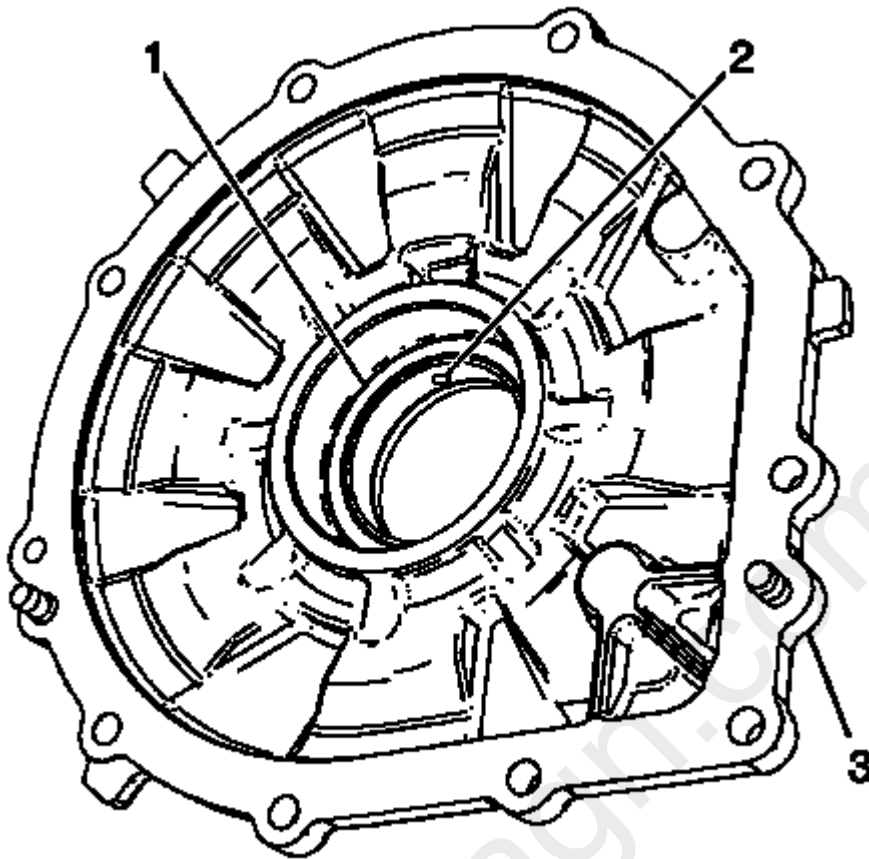


Fig. 72: View of Carrier Cover
Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to Safety Glasses Warning .

1. Clean the differential carrier cover in solvent.
2. Clean and inspect the differential carrier cover for the following:
 - Clean the oil passage between (2)
 - Inspect the cover flat (3) for nicks and burrs.
 - Inspect the race and shim surfaces (1)

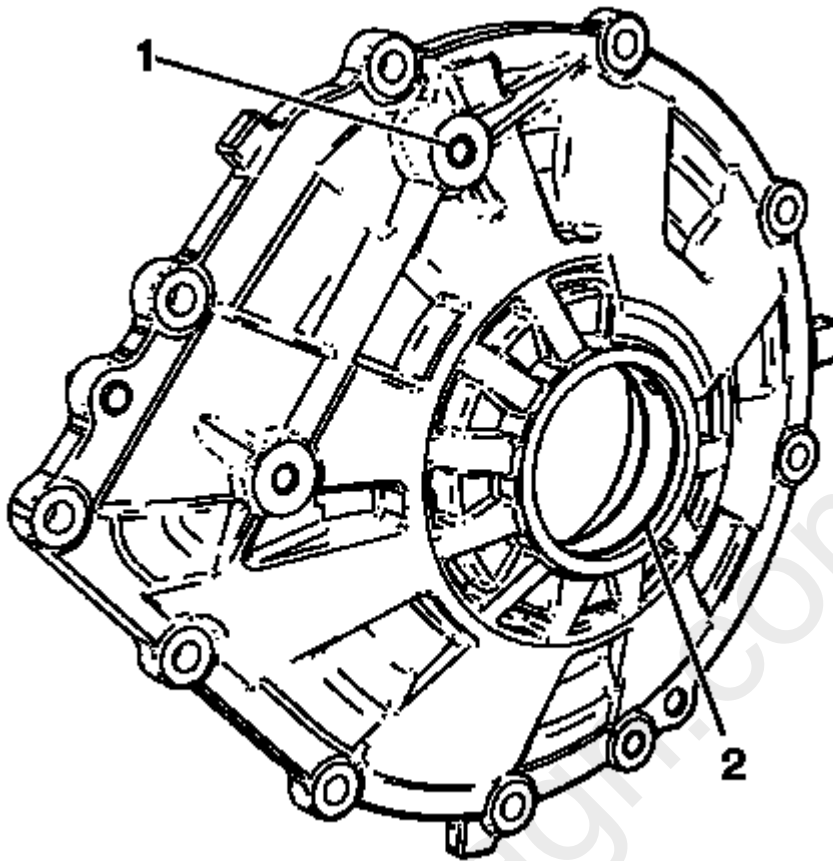


Fig. 73: Identifying Carrier Cover Exterior
Courtesy of GENERAL MOTORS COMPANY

3. Inspect the differential carrier cover exterior for the following:
 - The mounting bolt threads (1)
 - The axle seal mounting surface (2)

DIFFERENTIAL HOUSING SUPPORT BUSHING REPLACEMENT (RIGHT)

Special Tools

DT-48060-A Bushing Remover/Installer

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the rear differential assembly. Refer to **Differential Replacement**.

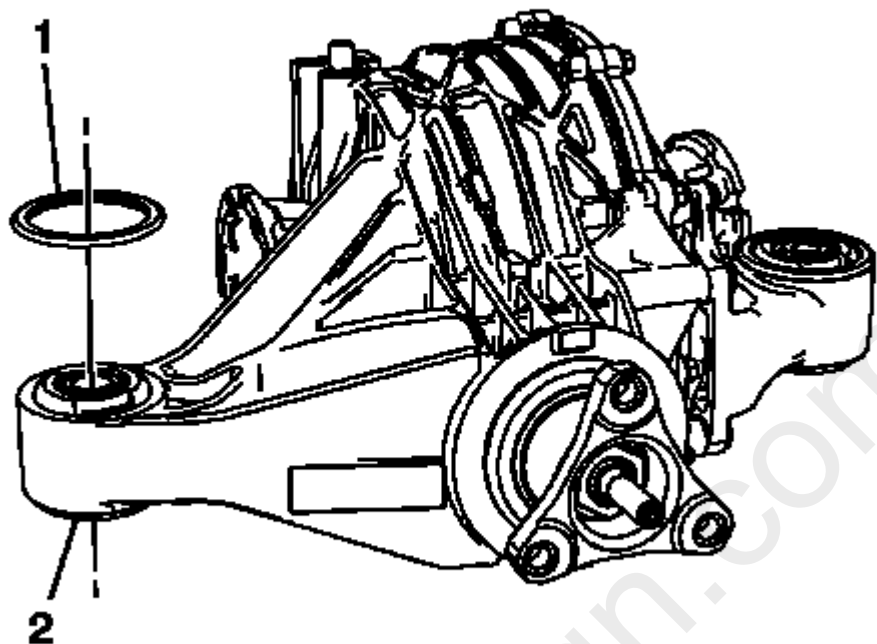


Fig. 74: Identifying Rear Differential Assembly & Insulator
Courtesy of GENERAL MOTORS COMPANY

3. Remove the insulator (1) from the rear differential assembly (2).

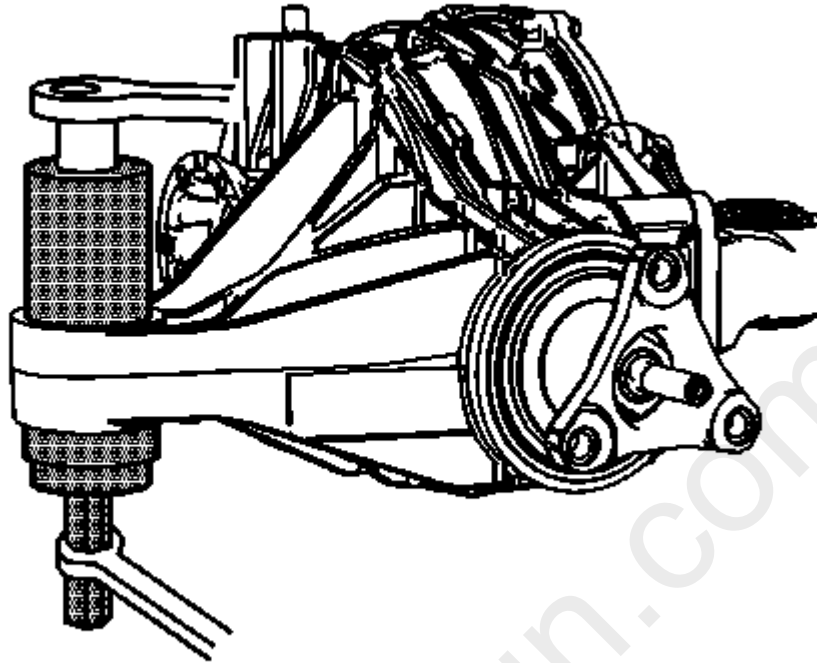


Fig. 75: Identifying DT-48060-A
Courtesy of GENERAL MOTORS COMPANY

IMPORTANT: Apply a small amount of clean oil on the threads of the DT-48060-A bushing remover/installer.

IMPORTANT: Check the bore of the bushing for any damage. If there is any damage found, cracks, etc., replace the differential assembly.

4. Using the **DT-48060-A** bushing remover/installer , remove the differential housing support bushing.

Installation Procedure

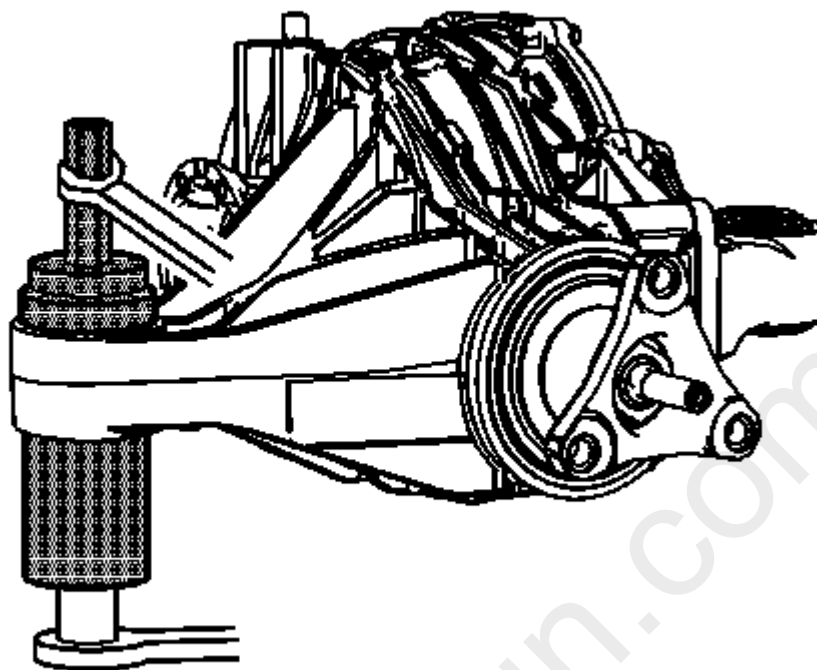


Fig. 76: Identifying DT-48060-A
Courtesy of GENERAL MOTORS COMPANY

1. Using the **DT-48060-A** bushing remover/installer , install the differential housing support bushing.

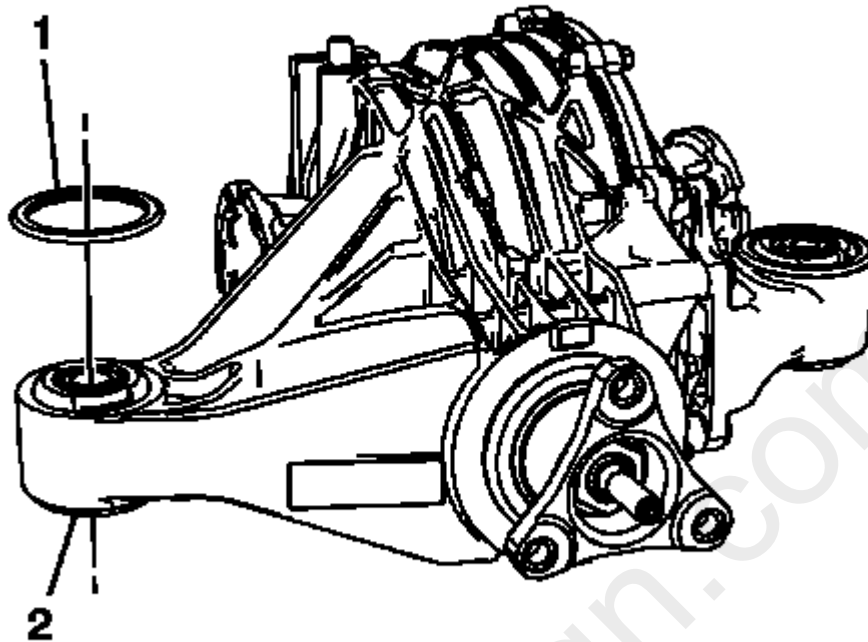


Fig. 77: Identifying Rear Differential Assembly & Insulator
Courtesy of GENERAL MOTORS COMPANY

2. Install the insulator (1) on the rear differential assembly (2).
3. Install rear differential assembly. Refer to **Differential Replacement**.
4. Remove the support and lower the vehicle.

DIFFERENTIAL HOUSING SUPPORT BUSHING REPLACEMENT (REAR)

Special Tools

DT-48060-A Bushing Remover/Installer

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the rear differential assembly. Refer to **Differential Replacement**.

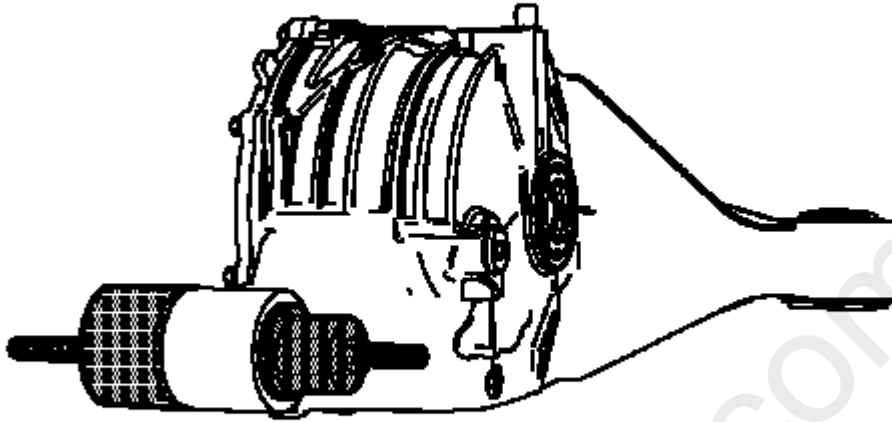


Fig. 78: Bushing Remover/Installer
Courtesy of GENERAL MOTORS COMPANY

IMPORTANT: Apply a small amount of clean grease or oil the thread of the DT-48060-A bushing remover/installer.

IMPORTANT: Check the bore of the support bushing for damage, cracks, etc. If any damage is found, replace the rear differential.

3. Using the **DT-48060-A** bushing remover/installer remove the rear differential housing support bushing.

Installation Procedure.

1. Remove any dirt or debris from the support bushing bore.
2. Position the rear support bushing in the bore.

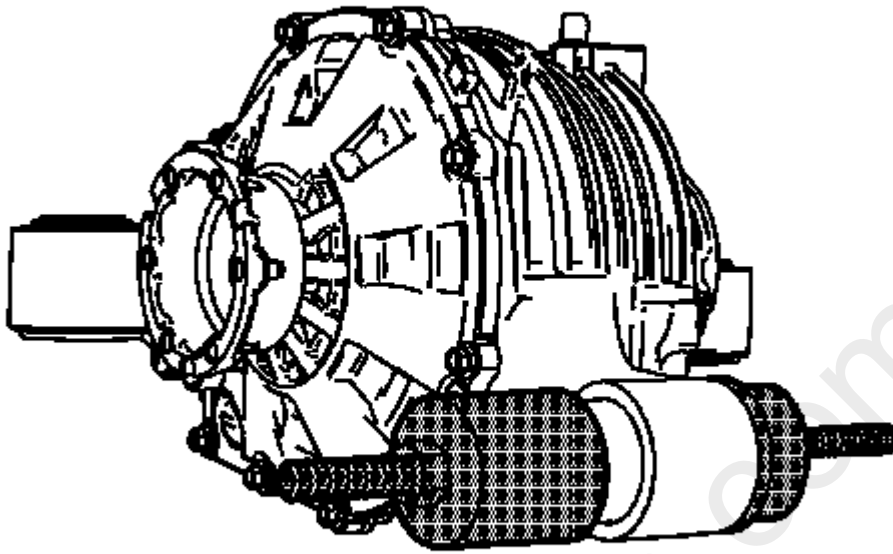


Fig. 79: Bushing Remover/Installer
Courtesy of GENERAL MOTORS COMPANY

3. Using the **DT-48060-A** bushing remover/installer , install the rear support bushing in the differential housing.
4. Install the rear differential assembly. Refer to **Differential Replacement**.
5. Remove the support and lower the vehicle.

DIFFERENTIAL HOUSING SUPPORT BUSHING REPLACEMENT (LEFT)

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Place a transmission jack stand under the rear differential assembly.
3. Remove the right front differential support bushing bolt.

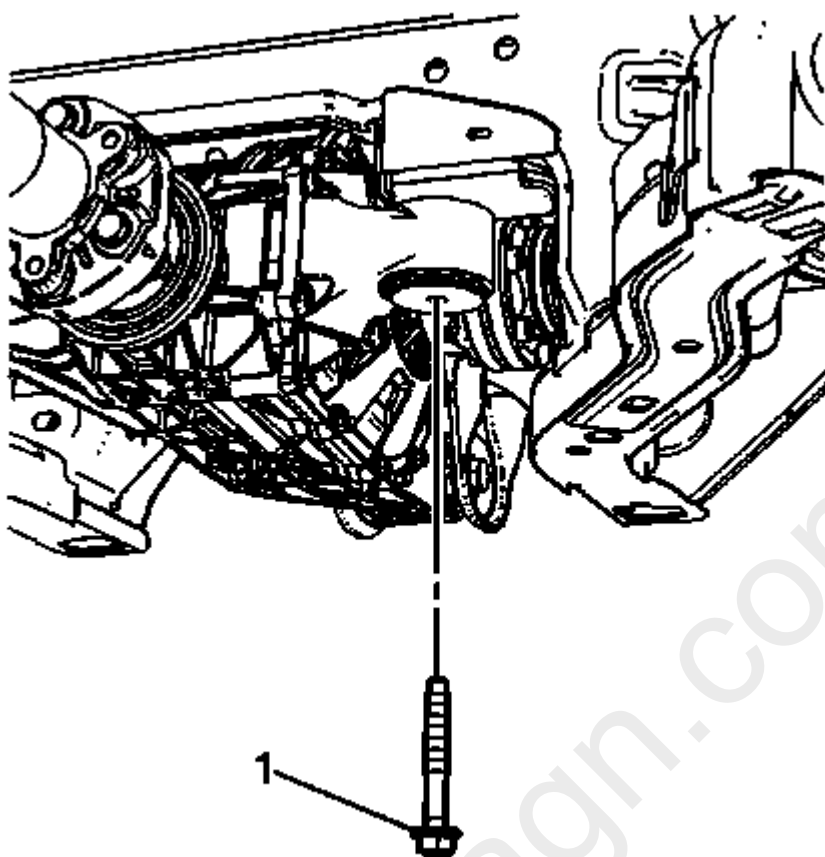


Fig. 80: View of Differential Support Bushing and Bolt
Courtesy of GENERAL MOTORS COMPANY

4. Remove the left front rear differential support bushing bolt (1).

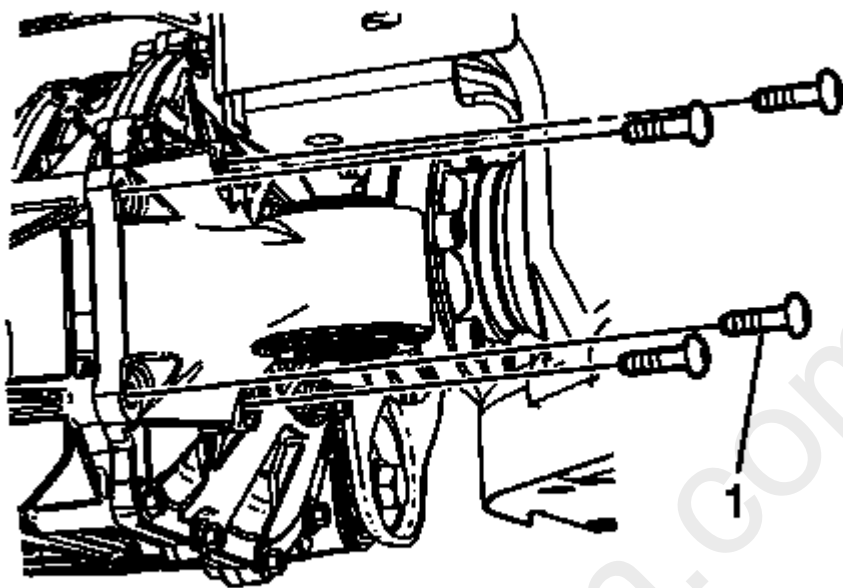


Fig. 81: Identifying Mounting Bolts of Mounting Bracket
Courtesy of GENERAL MOTORS COMPANY

5. Remove the left differential support bushing bracket mounting bolts (1).

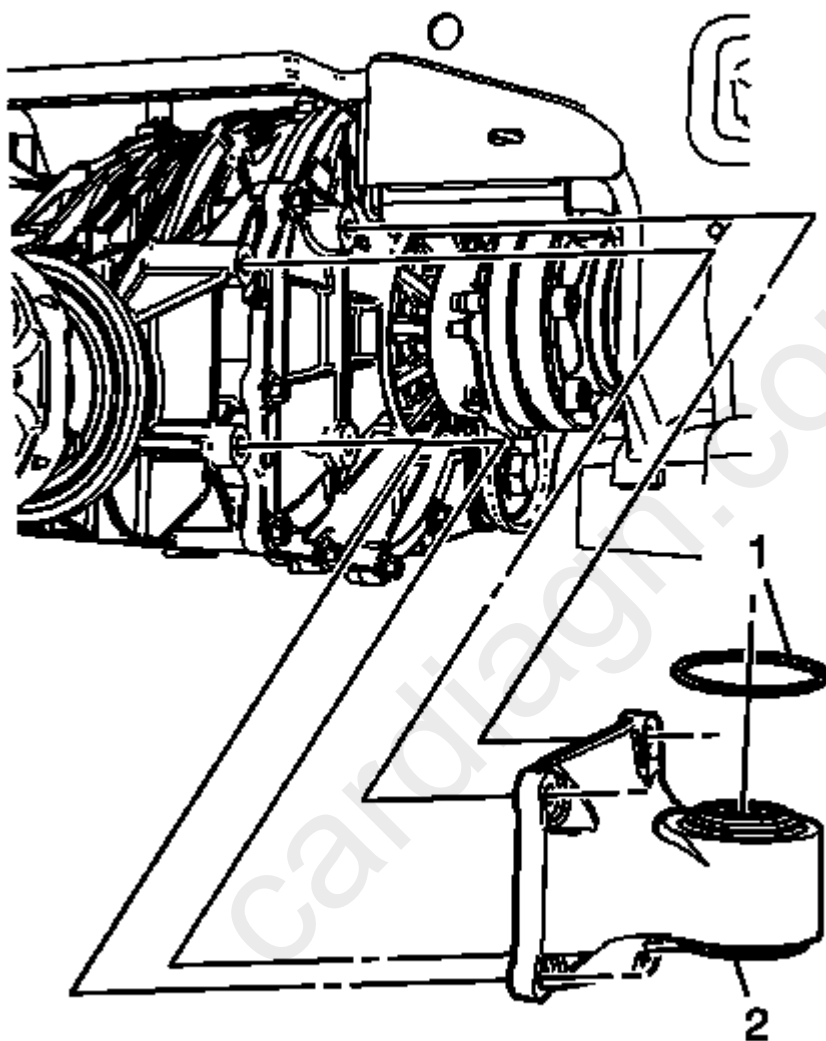


Fig. 82: View of Differential Support Bushing and Bolt
Courtesy of GENERAL MOTORS COMPANY

6. Remove the left front bushing and mounting bracket (2).

NOTE: If the insulator (1) is found to be damaged, DO NOT re-use. Replace with NEW.

7. Remove the insulator (1) from the support bracket (2).

Installation Procedure

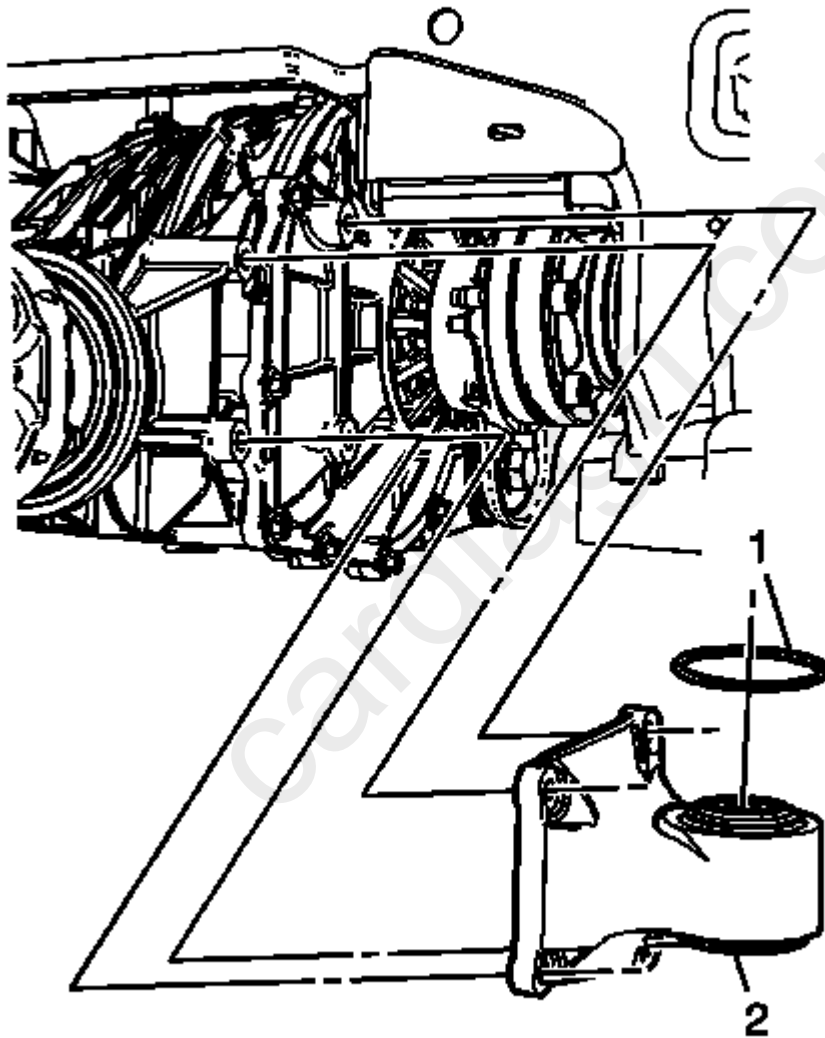


Fig. 83: View of Differential Support Bushing and Bolt
Courtesy of GENERAL MOTORS COMPANY

1. Install the NEW insulator (1) on the mounting bracket (2).

2. Position the differential support bracket assembly (1) on the differential housing.

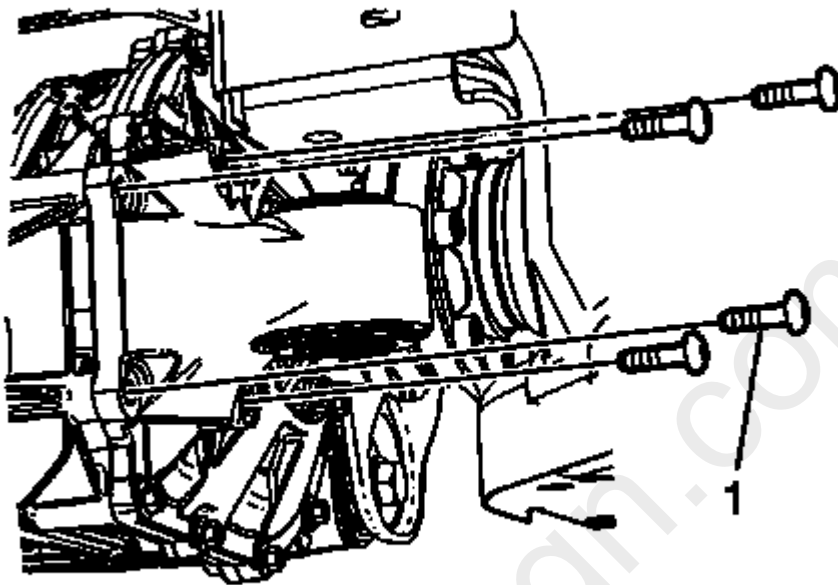


Fig. 84: Identifying Mounting Bolts of Mounting Bracket
Courtesy of GENERAL MOTORS COMPANY

3. Hand start the mounting bolts (1) for the support bushing mounting bracket.

CAUTION: Refer to Fastener Caution .

4. Tighten the support bushing mounting brackets bolt.

Tighten the differential mounting bracket bolts to 29 N.m (21 lb ft).

5. Lift the rear differential into position.

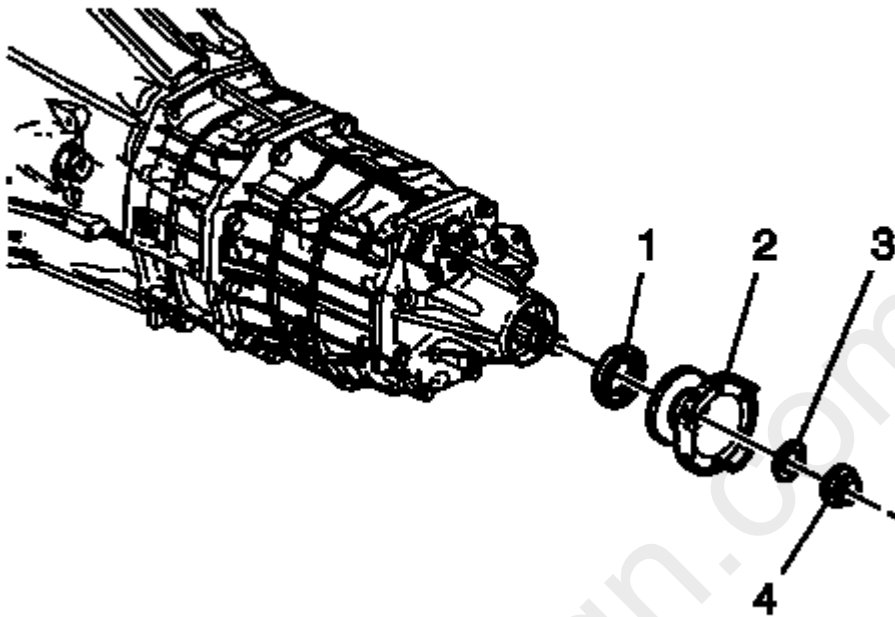


Fig. 85: View of Case Seal, Drive Flange, Seal & Nut
Courtesy of GENERAL MOTORS COMPANY

6. Hand start the support bushing mounting (1) by hand.
7. Install the left and right front differential support bushing mounting bolt.

Tighten the differential mounting bolts to 175 N.m (129 lb ft).

8. Remove the transmission jack stand.
9. Remove the supports and lower the vehicle.

RING GEAR AND DIFFERENTIAL HOUSING ASSEMBLE

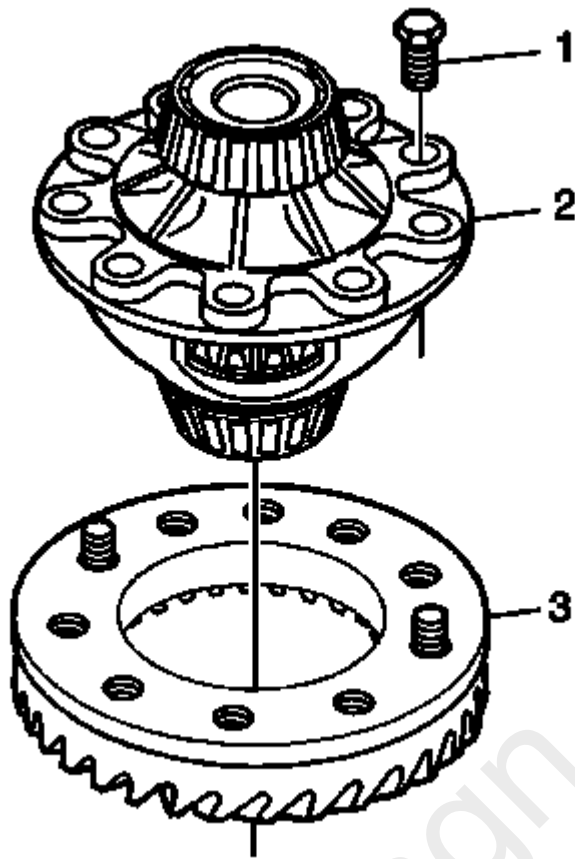


Fig. 86: Installing Ring Gear & Bolts
Courtesy of GENERAL MOTORS COMPANY

1. Install the ring gear (2) onto the differential carrier (3).

CAUTION: Refer to Fastener Caution .

2. Install the 10 NEW ring gear bolts (1) in order to align the gear to the hub and tighten slowly in a criss-cross pattern to 185 N.m (136 lb ft).

REAR AXLE ASSEMBLY

Special Tools

J 21426 Seal Installer

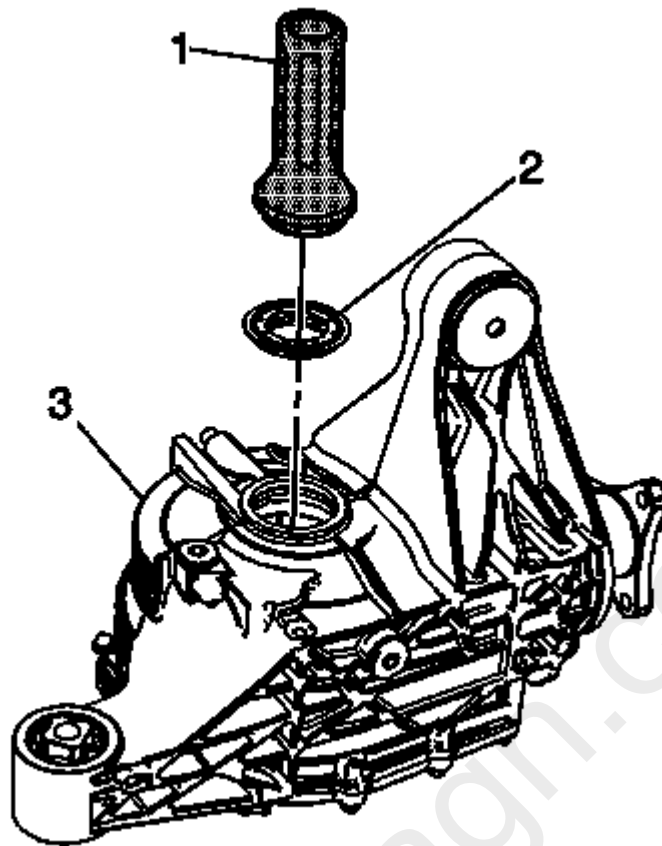


Fig. 87: View of Seal, Seal Installer & Housing
Courtesy of GENERAL MOTORS COMPANY

1. Lightly lube the outer diameter of the seal with axle lube (1).
2. Using the J 21426 seal installer (1), install the axle oil seal (2) into the housing (3).

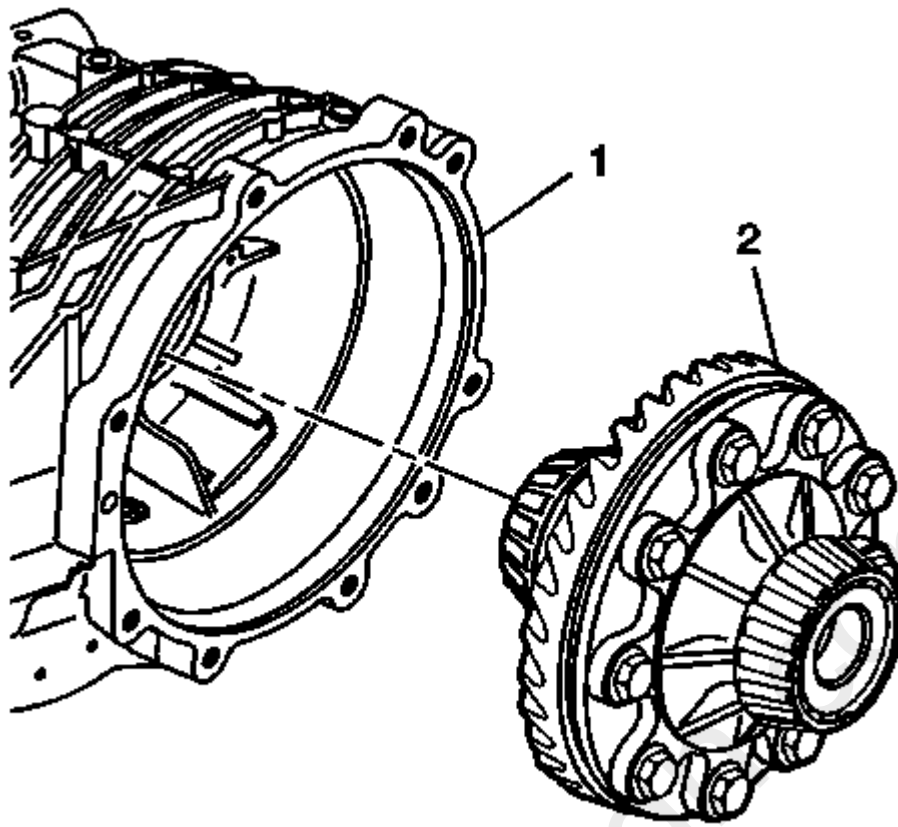


Fig. 88: View Of Differential Assembly
Courtesy of GENERAL MOTORS COMPANY

3. Install the differential carrier (2) into the housing (1).

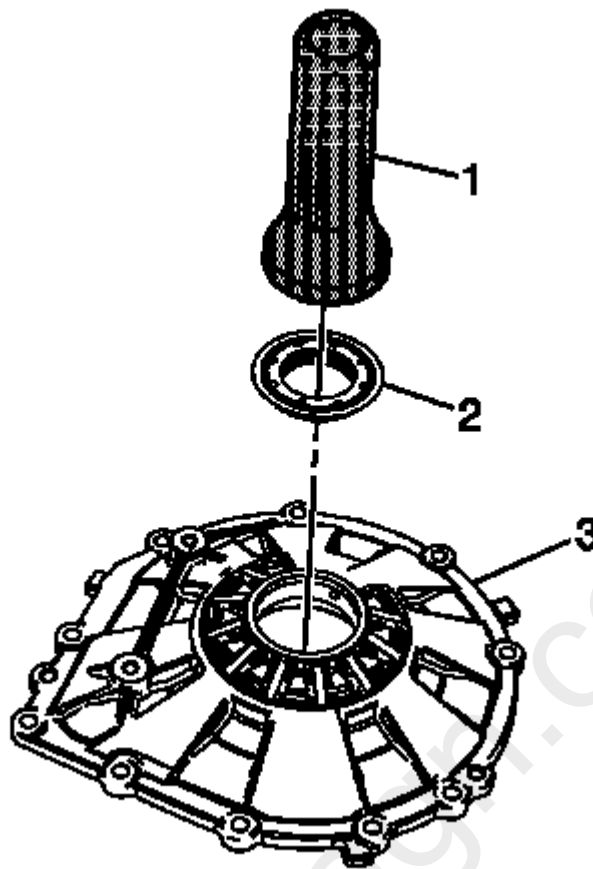


Fig. 89: View of Seal

Courtesy of GENERAL MOTORS COMPANY

4. Lightly lube the outer diameter of the seal with axle lube.
5. Using the J 21426 seal installer (1), install the axle oil seal (2) into the differential side cover (3).

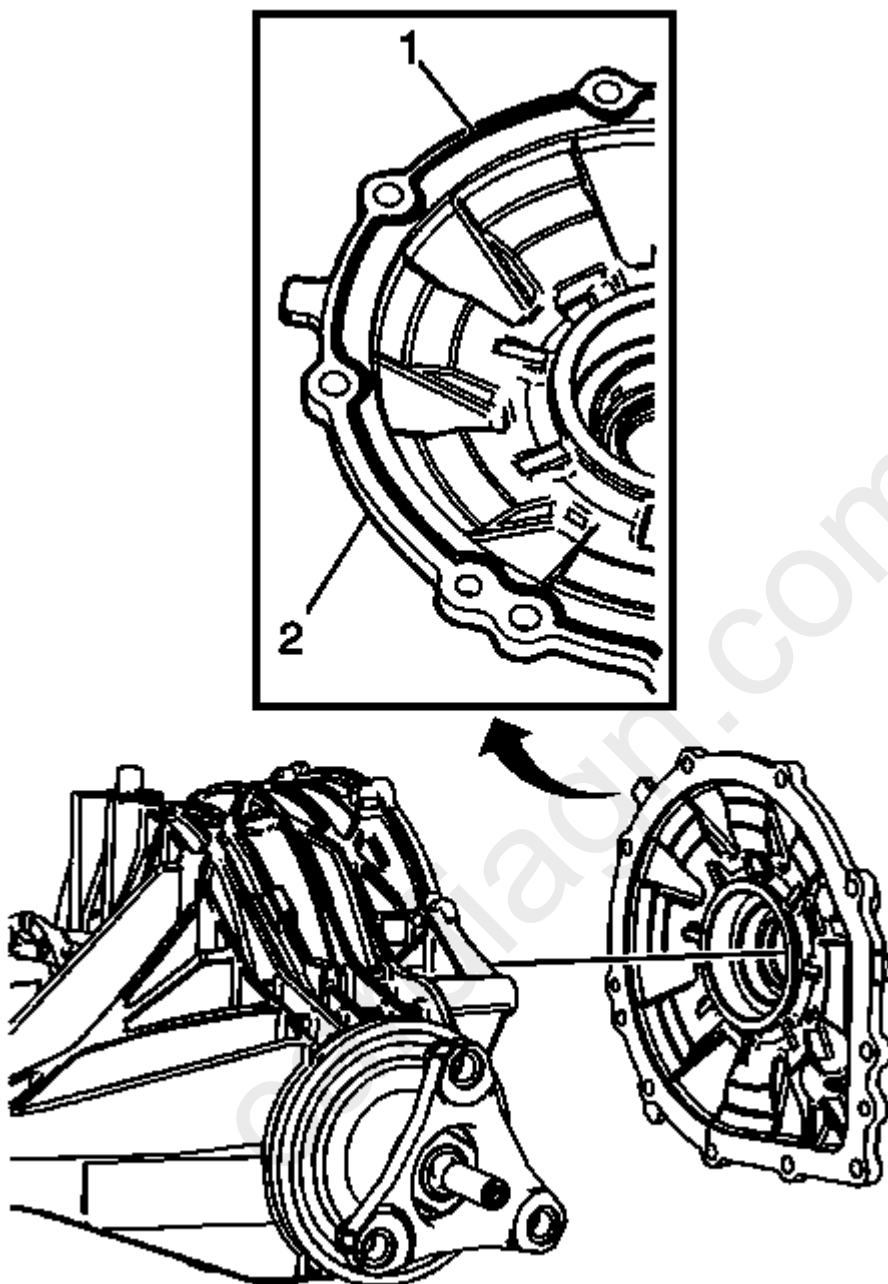


Fig. 90: Identifying Differential Side Cover
Courtesy of GENERAL MOTORS COMPANY

6. Apply a bead of silicone sealant GM P/N 12346286 (Canadian P/N 1095372) (1) 3 - 6 mm (0.118 to 0.236 in) to the side cover (2).

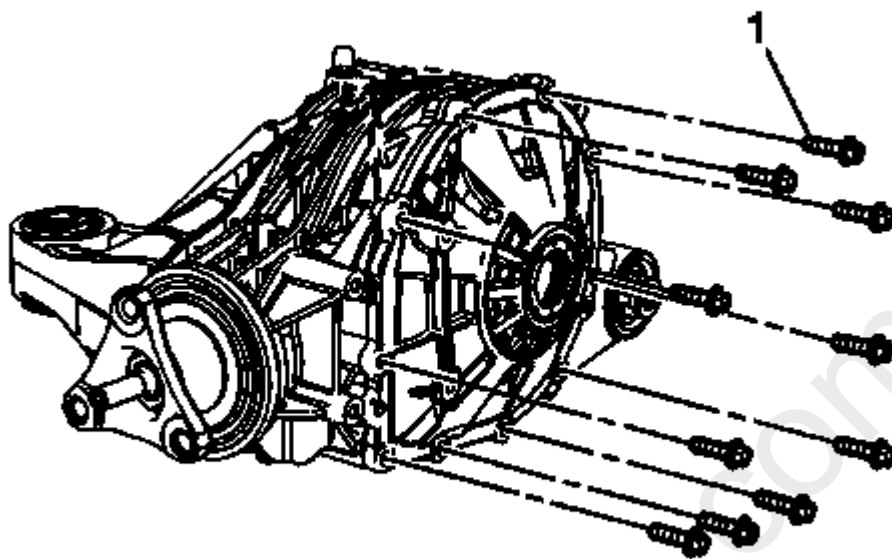


Fig. 91: View of Differential Cover and Side Bolts
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

7. Install the differential side cover bolts (1) and tighten in a criss-cross pattern to 29 N.m (21 lb ft).
8. Install the drain plug and fill the axle with axle lube. Refer to Axle Lubricant Change (w/o Differential Cooler), Axle Lubricant Change (w Differential Cooler).

LIMITED SLIP DIFFERENTIAL DISASSEMBLE

Special Tools

J 42162 Getrag Axle Side Gear Compressor

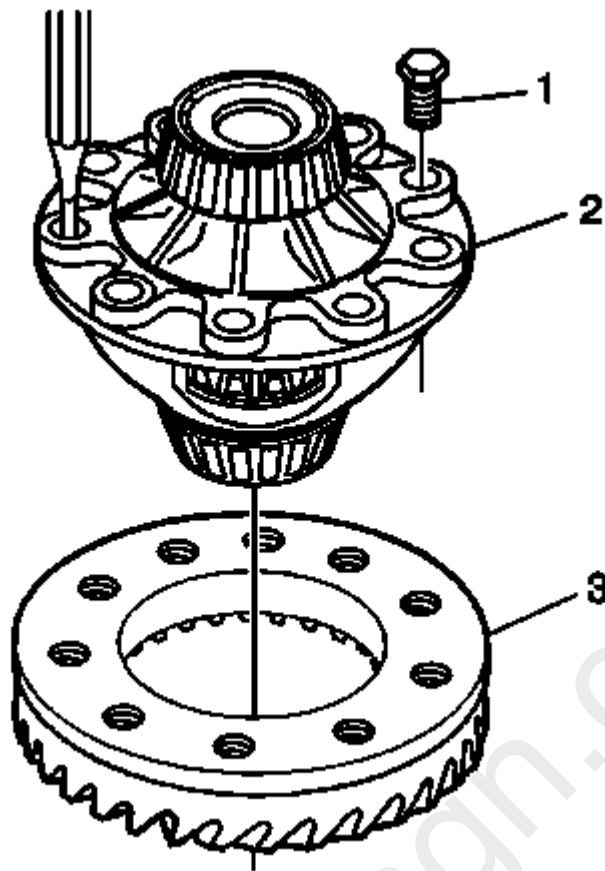


Fig. 92: Identifying Ring Gear Bolts, Differential Carrier & Ring Gear
Courtesy of GENERAL MOTORS COMPANY

1. Using a punch and a hammer, through a bolt hole, remove the ring gear bolts (1) and the ring gear (3) from the differential carrier (2).

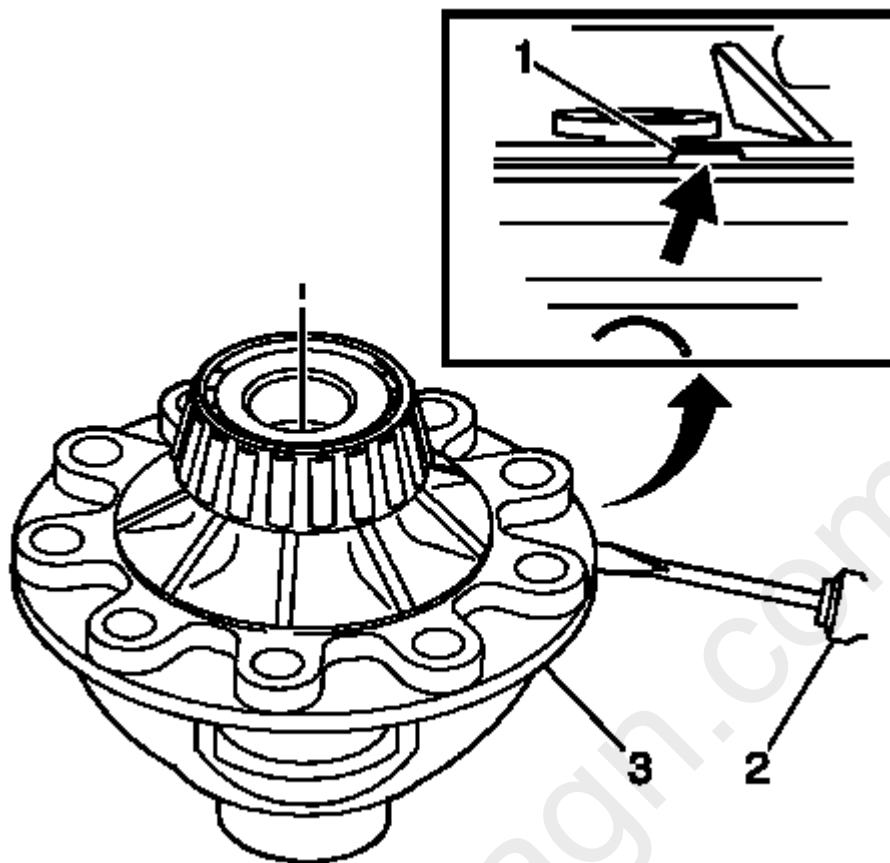


Fig. 93: View of Differential Carrier
Courtesy of GENERAL MOTORS COMPANY

2. Insert a screwdriver (2) in the differential carrier slot (1).
3. Using the screwdriver (1), separate the differential carrier (3).

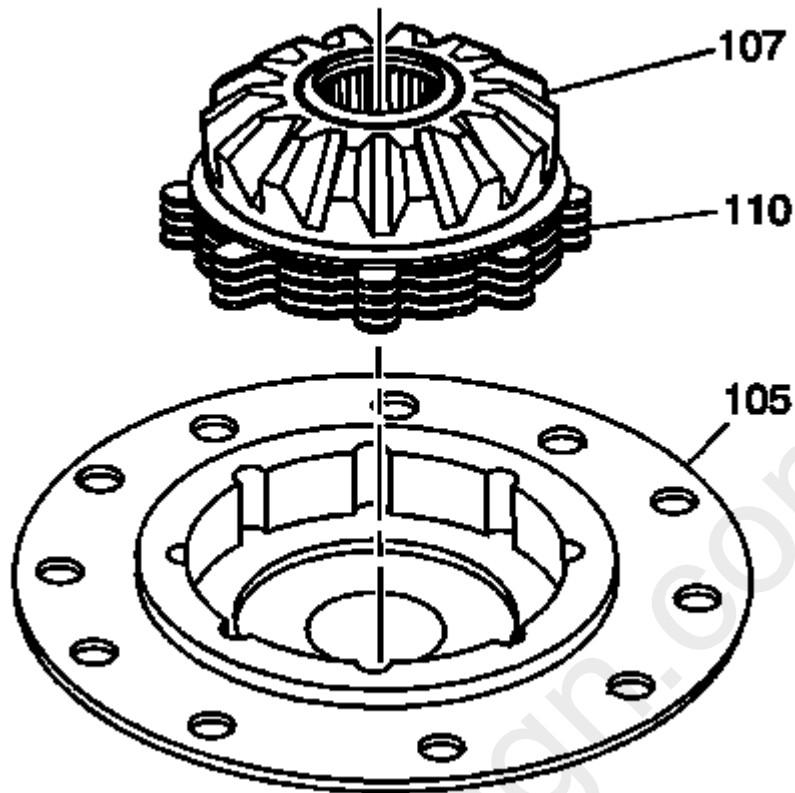


Fig. 94: Identifying Axle Side Gear, Clutch Pack & Right Case Half
Courtesy of GENERAL MOTORS COMPANY

IMPORTANT: Friction discs and separator plates develop specific wear patterns. During disc and plate removal, keep the components in the order in which they were removed.

4. Remove the axle side gear (107) and the clutch pack (110) from the differential carrier half (105).

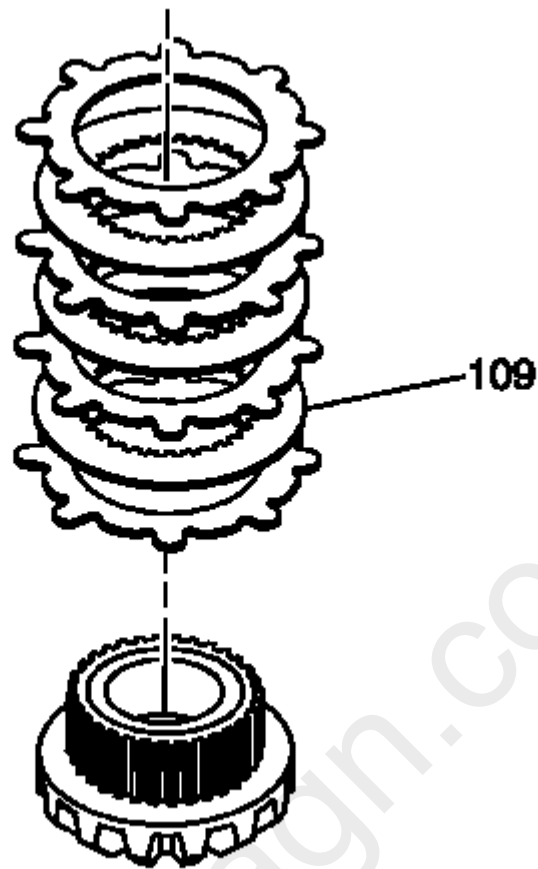


Fig. 95: Identifying Clutch Pack & Pressure Plate
Courtesy of GENERAL MOTORS COMPANY

5. Remove the clutch pack and axle gear from the right half. Note the thick pressure plate (109) side that has friction material faces away from the gear teeth.

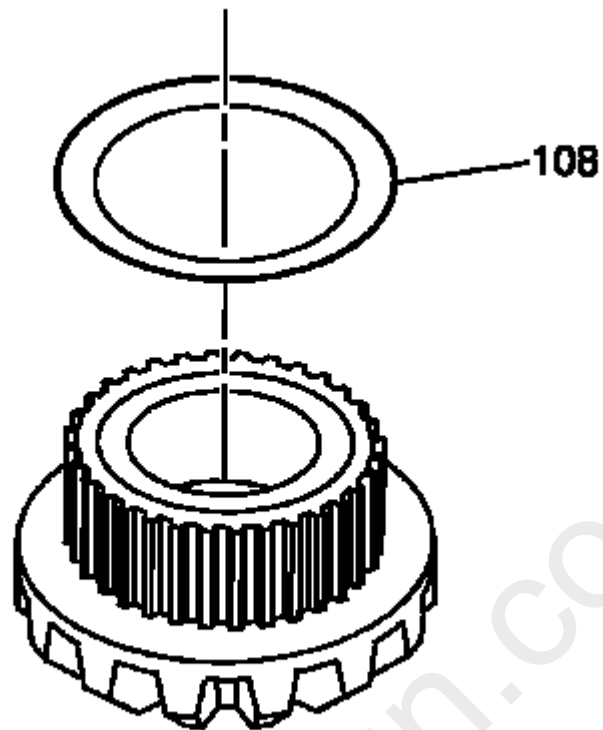


Fig. 96: Identifying Beveled Washer
Courtesy of GENERAL MOTORS COMPANY

6. Remove the beveled washer from the axle side gear. Note that the orientation of the beveled washer (108) faces out.

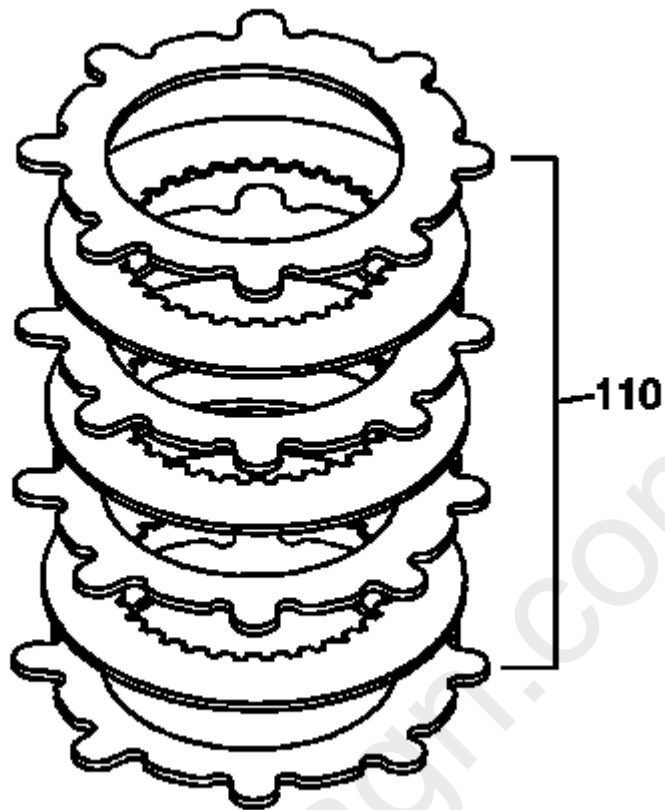


Fig. 97: Identifying Clutch Pack

Courtesy of GENERAL MOTORS COMPANY

7. Mark the clutch pack (110) to indicate the position of the components.

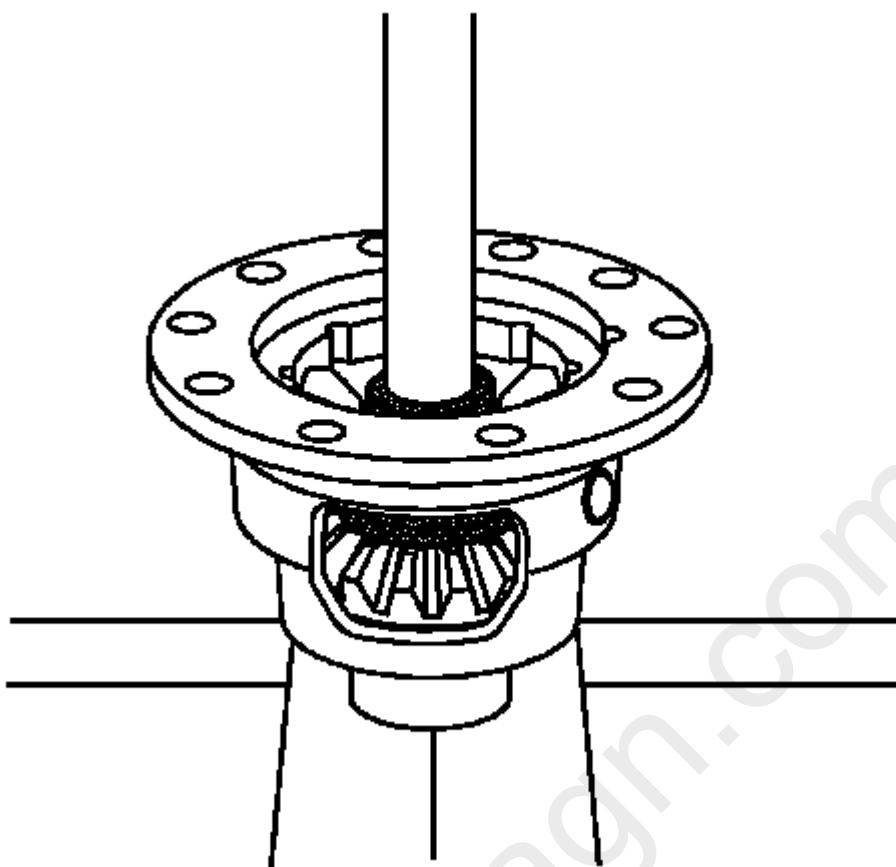


Fig. 98: Removing Differential Shaft
Courtesy of GENERAL MOTORS COMPANY

8. Using the **J 42162** Getrag axle side gear compressor and a press as shown, apply light pressure so the differential pinion gear shaft can be removed.

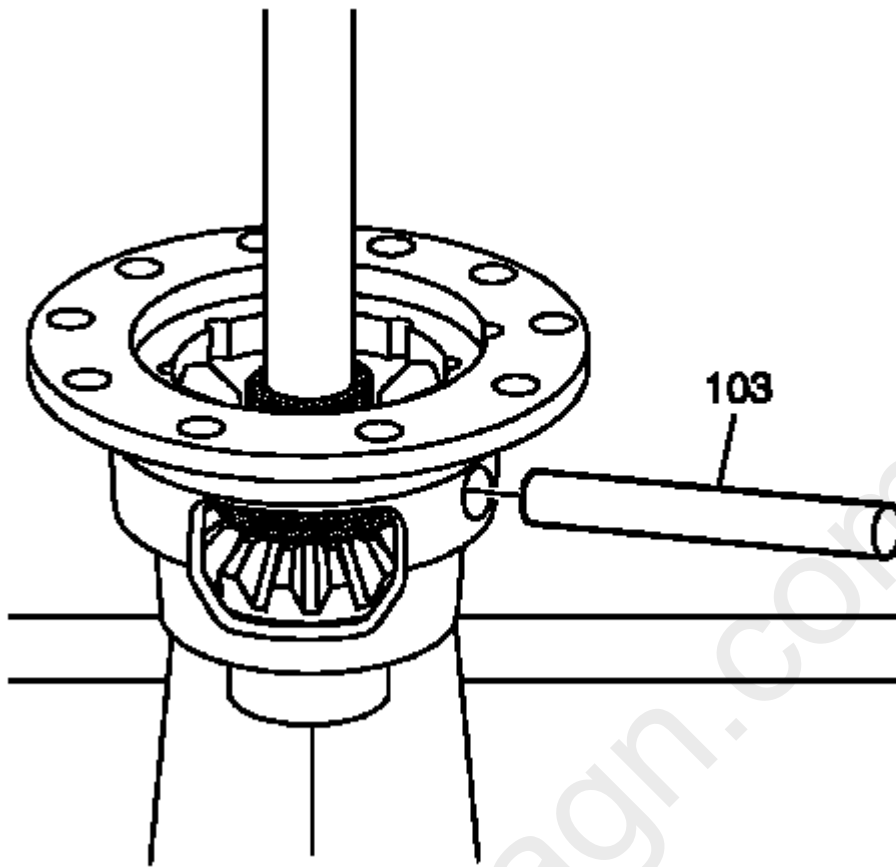


Fig. 99: Identifying Differential Shaft
Courtesy of GENERAL MOTORS COMPANY

9. Remove the differential pinion gear shaft (103). Release pressure from the press.

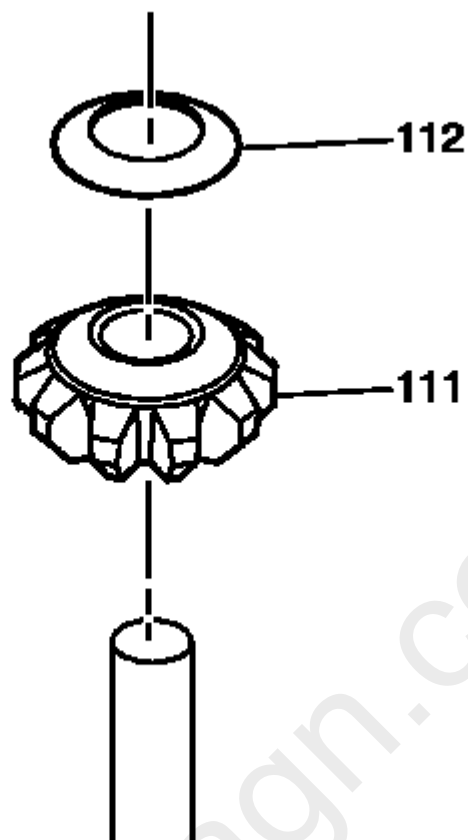


Fig. 100: Identifying Pinion Gears & Washers
Courtesy of GENERAL MOTORS COMPANY

10. Remove the pinion gears (111) and washers (112).

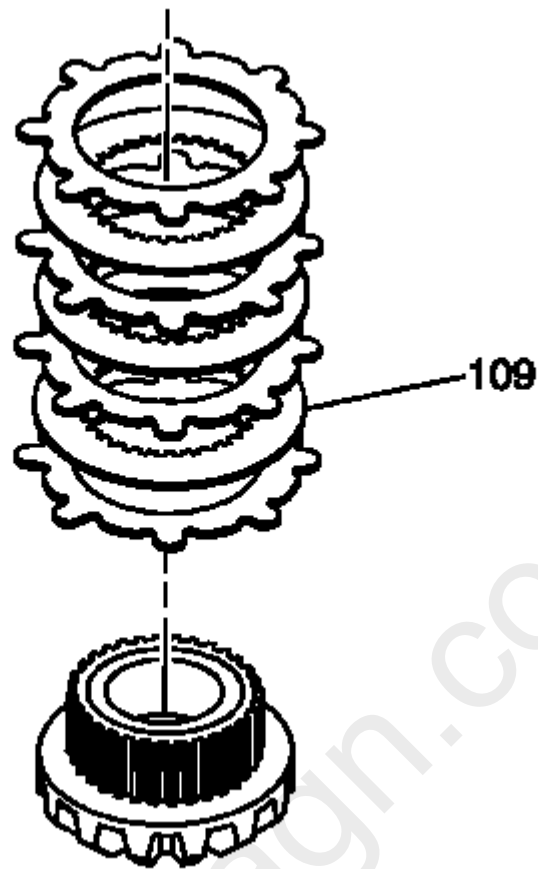


Fig. 101: Identifying Clutch Pack & Pressure Plate
Courtesy of GENERAL MOTORS COMPANY

11. Remove the clutch pack and axle gear from the left half. Note the thick pressure plate (109) side that has friction material faces away from the gear teeth.

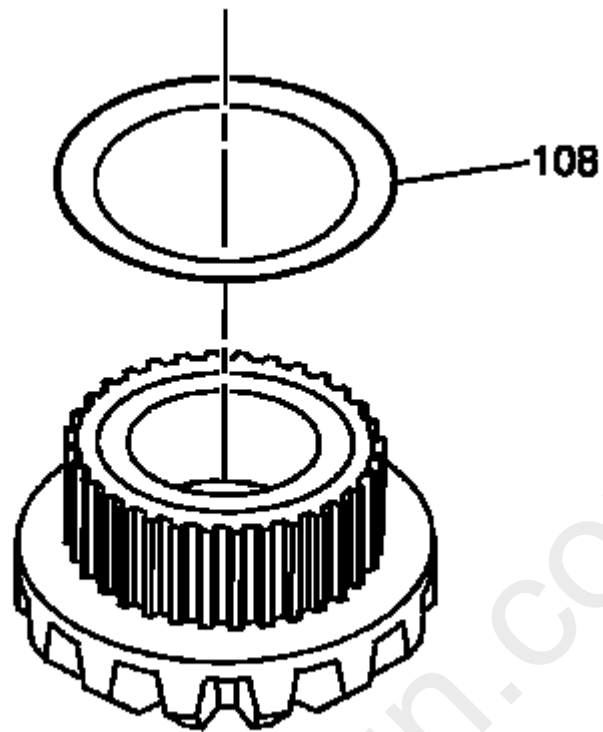


Fig. 102: Identifying Beveled Washer
Courtesy of GENERAL MOTORS COMPANY

12. Remove the beveled washer from the axle side gear. Note that the orientation of the beveled washer (108) faces out.

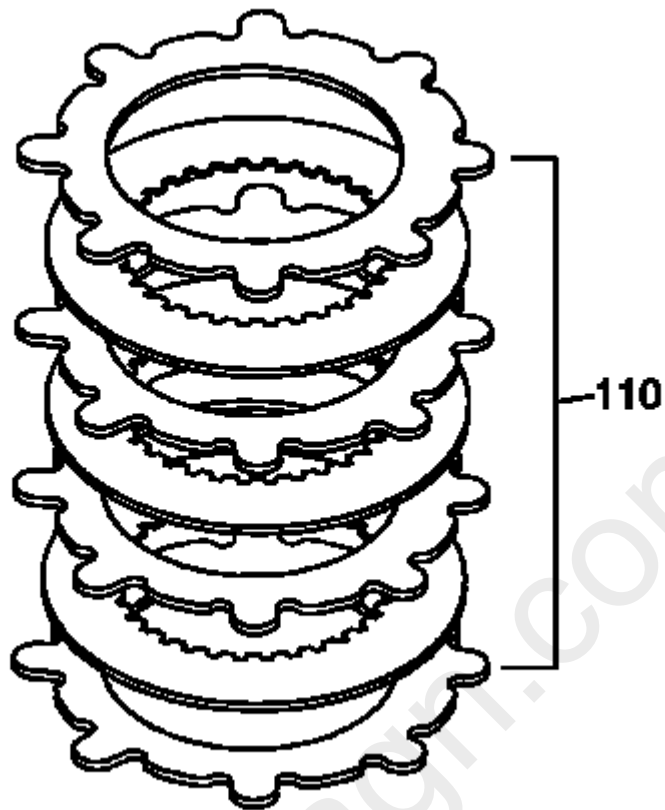


Fig. 103: Identifying Clutch Pack
Courtesy of GENERAL MOTORS COMPANY

13. Mark the clutch pack (110) to indicate the position of the components.

LIMITED SLIP DIFFERENTIAL CLEANING AND INSPECTION

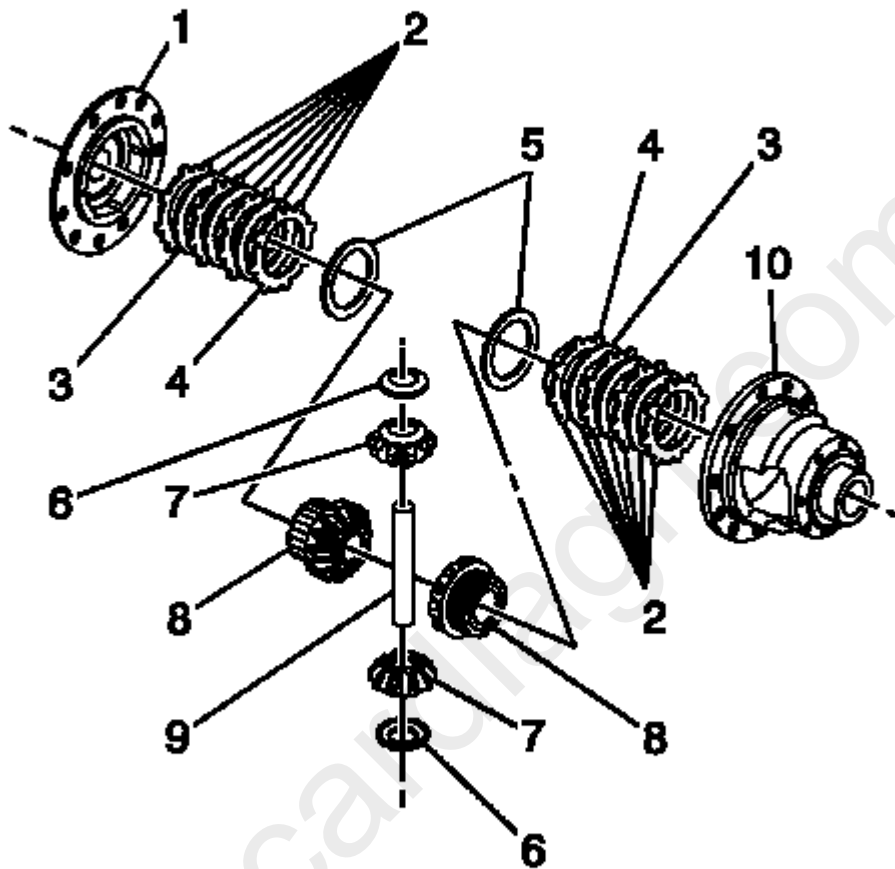


Fig. 104: View of Differential Pinion Gears
Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to Safety Glasses Warning .

1. Clean all parts with an approved solvent.

2. Visually inspect all the parts for excessive wear or breakage. Replace the parts if necessary.
3. Inspect the differential pinion gears (7) and the side gears (8) for any of the following conditions:
 - Wear
 - Cracks
 - Scoring
 - Spalling
4. Inspect the differential clutch disc packs (2).
 - Inspect the splined differential clutch disc (3)
 - Inspect the eared differential clutch disc (4)
5. Inspect the differential clutch disc thrust washers (5).
6. Inspect the differential thrust washers for wear (6).
7. Inspect the differential carrier case (1) and (10) for cracks and scoring.
8. Replace the differential assembly if there is damage to the differential carrier case.

LIMITED SLIP DIFFERENTIAL ASSEMBLE

Special Tools

J 42162 Getrag Axle Side Gear Compressor

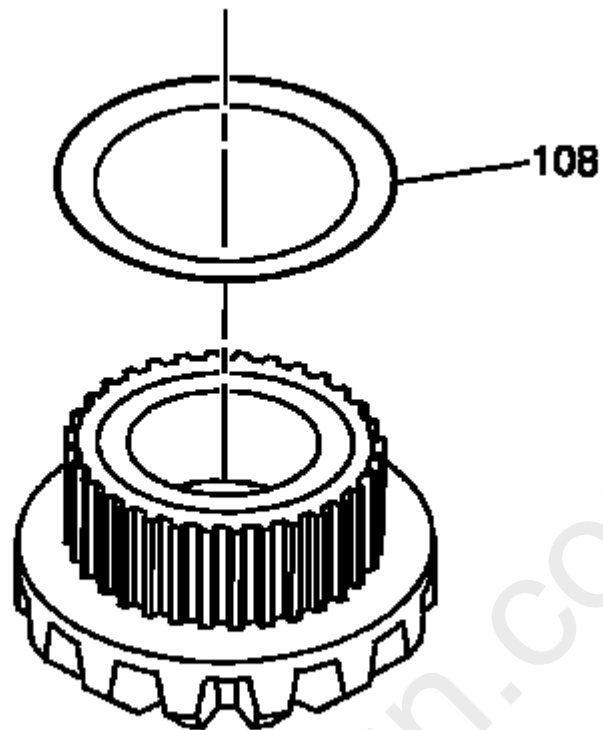


Fig. 105: Identifying Beveled Washer
Courtesy of GENERAL MOTORS COMPANY

1. Install the clutch disc thrust washers (108) on the pinion side gears with the bevel facing out.

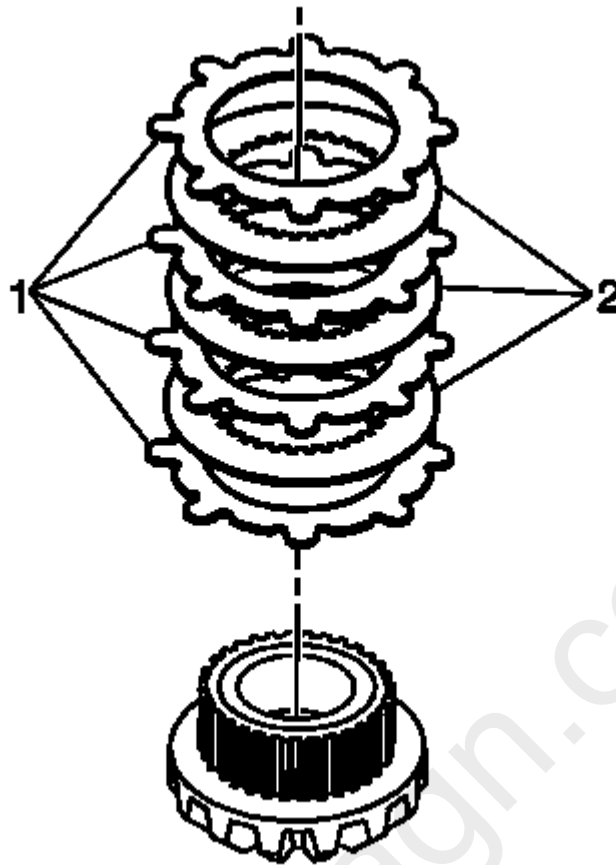


Fig. 106: View of Clutch Discs

Courtesy of GENERAL MOTORS COMPANY

NOTE: The clutch discs develop specific wear patterns, and must be reassembled the same way as they were removed.

2. Install the eared clutch disc (1) first, then the splined clutch disc (2). Repeat this pattern until the clutch all the clutch disc have been installed.

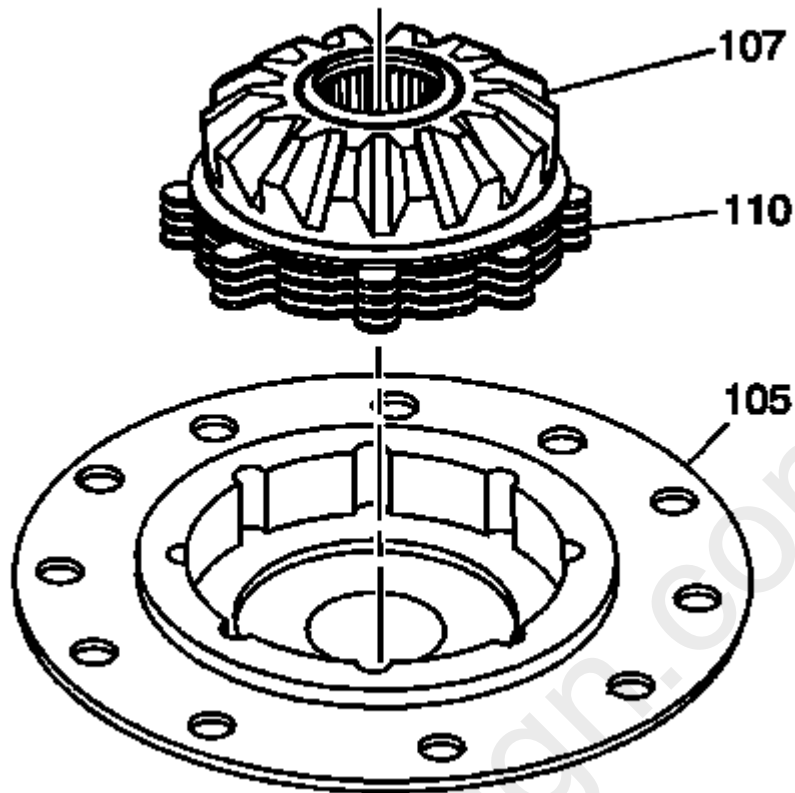


Fig. 107: Identifying Axle Side Gear, Clutch Pack & Right Case Half
Courtesy of GENERAL MOTORS COMPANY

3. Align all the eared clutch disc (110) before installing the clutch disc assembly in the left or right differential case halves.
4. Install the assembled axle side gear (107) into the right differential case half (105).

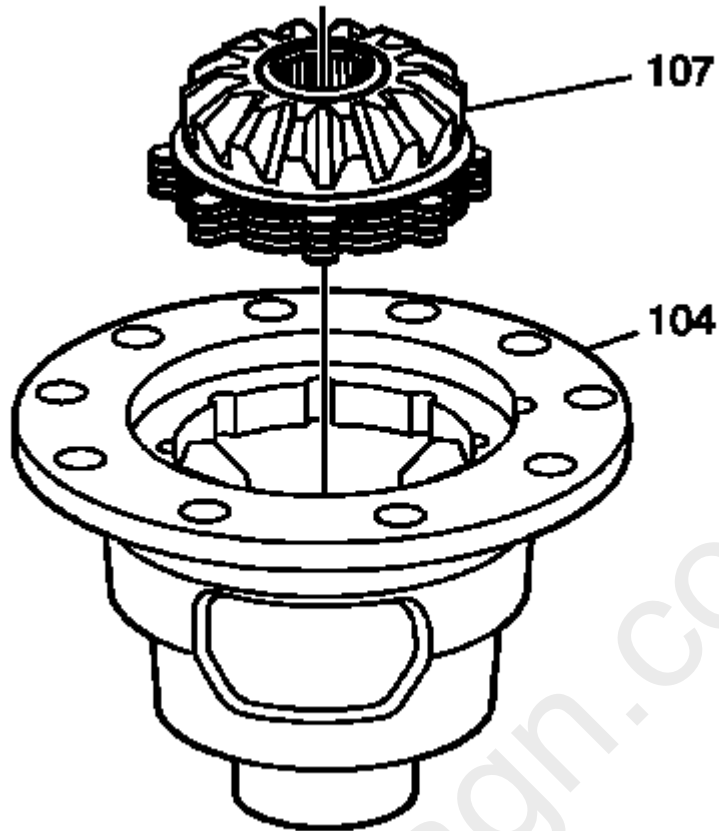


Fig. 108: Installing Assembled Axle Side Gear Into Left Case Half
Courtesy of GENERAL MOTORS COMPANY

5. Install the assembled axle side gear (107) into the left differential case half (104).

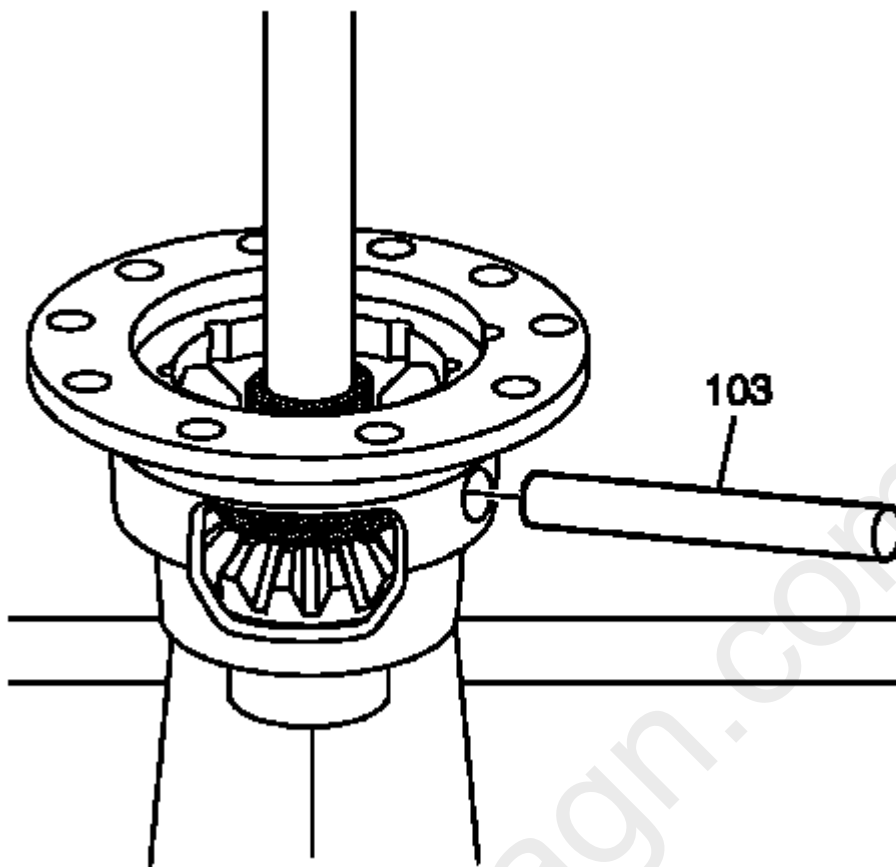


Fig. 109: Identifying Differential Shaft
Courtesy of GENERAL MOTORS COMPANY

6. Using the J 42162 Getrag axle side gear compressor and a press, apply light pressure on the pinion gears to align the pinion differential shaft bores.

IMPORTANT: The differential pinion gear shaft should move freely in the differential case.

7. Install the differential pinion shaft (103) into the differential carrier.

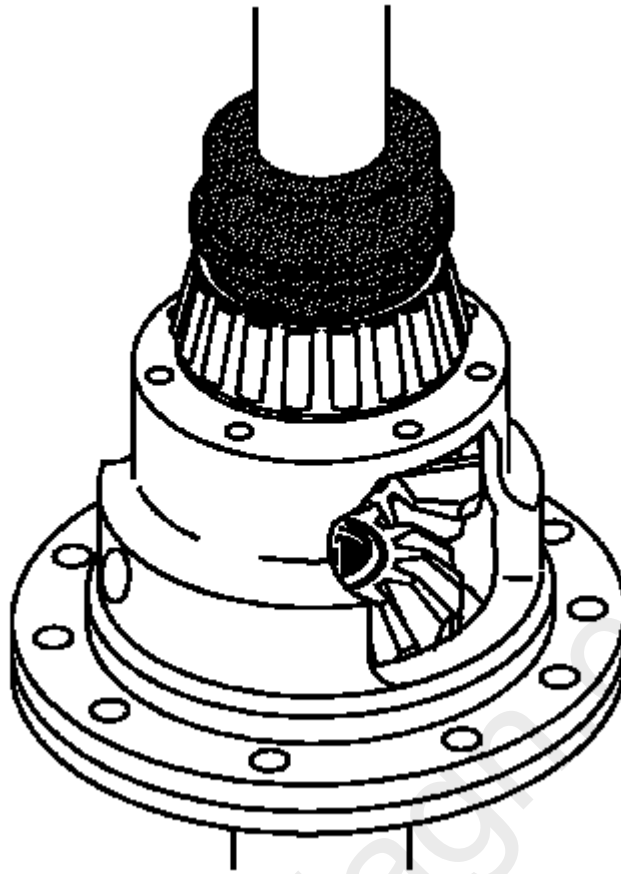


Fig. 110: Aligning Bolt Holes Between Halves
Courtesy of GENERAL MOTORS COMPANY

8. Using the proper punch or a Phillips screwdriver, align the bolt holes between the differential case halves and lightly press them together.

DESCRIPTION AND OPERATION

LIMITED SLIP DIFFERENTIAL DESCRIPTION AND OPERATION

Limited Slip Differential

The locking differential consists of the following components:

- Differential case
- Pinion gear shaft
- Differential pinion gear shaft lock pin
- Limited Slip Differential Clutch Disc Splined (Friction material on disc and splines on the inside of disc)
- Limited Slip Differential Clutch Disc Eared (Disc without friction material and ears to the outside of the disc)

- Differential side gears
- Differential clutch disc thrust washer
- Differential pinion gears
- Differential pinion gear thrust washers

In a conventional differential, if one wheel spins, the opposite wheel will generate only as much torque as the wheel with the least amount of traction. In a limited slip differential, part of the ring gear torque is transmitted through clutch packs which contain multiple discs. In operation, two forces engage the limited slip differential's clutches. The first is the pre-load force within the clutch packs. The second is the separating forces generated by the side gears as torque is applied through the ring gear. The limited slip design provides the action needed for turning corners and for driving in a straight line when traction is uneven. When one wheel loses traction, the clutch packs transfer additional torque to the wheel having the most traction. Limited slip differential resist wheel spin on bumpy roads and provides greater pulling power when one wheel loses traction. If both wheels slip due to unequal traction, limited slip operation is normal. Also in extreme case of unequal traction, the wheel with the least amount of traction may spin.

Differential Cooler

The differential cooler is designed to reduce the temperature of the rear differential fluid during high speed driving. The differential cooler system is controlled by a temperature switch (included with the differential cooler kit) located in the rear of the differential housing and functions when conditions require it to operate. The fluid capacity for the rear differential cooler is greater than the standard system. Refer to **Lubrication Specifications**.

The differential lubricant pump and cooler assembly is located under the vehicle and is mounted to the rear storage compartment well. The cooler module assembly consists of a pump, heat exchanger, electric fan, temperature switch, and assorted hoses/fittings. All components except the external lines, temperature switch, and fittings are located in the Cooler Module. Oil is pulled from the differential and pumped through a hose to the cooler/heat exchanger. The differential oil is cooled by dissipating heat as the 12 volt electric fan blows outside air over the heat exchanger. The cooled differential oil then returns to the differential. The differential cooler pump will not run until the differential fluid reaches 120C. The pump and electric fan can be turned on by bypassing the temperature switch with the plug included with the wiring harness.

REAR DRIVE AXLE DESCRIPTION AND OPERATION

Differential

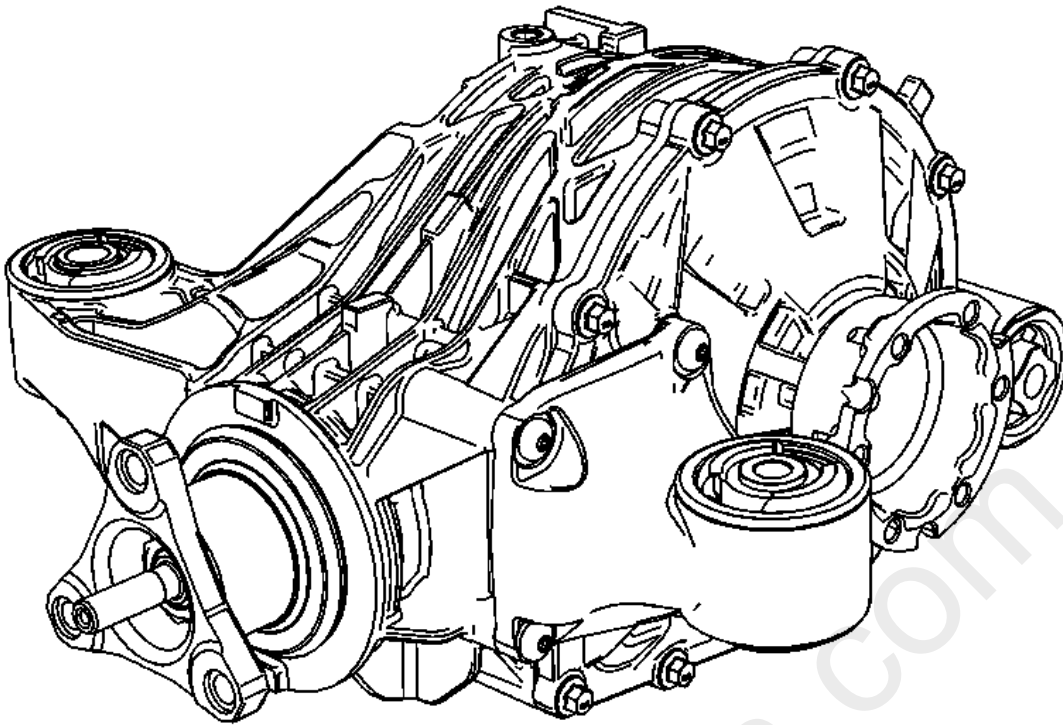


Fig. 111: Rear Drive Axle Description And Operation
Courtesy of GENERAL MOTORS COMPANY

The differential housing, side cover and pinion housing are constructed of cast aluminum. The internal components incorporate a hypoid gear set, ring and pinion, carrier assembly and pinion housing assembly. The pinion is supported in a pinion housing by tapered roller bearings. The pinion is positioned forward of the ring gear centerline. All models have a 7 5/8 inch ring gear. Each ring gear has specific setup dimensions, A1 and A2 values, stamped onto the side area of the gear. The A1 and A2 values are unique to each ring gear/pinion and are determined during the manufacturers gear/pinion noise and vibration setup and testing.

Pinion position, ring gear position and carrier bearing preload are determined by shimming procedures.

Rear Differential Temperature Sensor (RPO LSA)

The rear differential has a temperature sensor that monitors the fluid temperature. In the event the fluid temperature exceeds 160°C (320°F), the instrument panel cluster (IPC) will display a DIFFERENTIAL HOT REDUCE SPEED message until the fluid temperature drops below 150°C (302°F). If there is a malfunction in the rear differential temperature sensor circuit, the IPC will display a SERVICE DIFFERENTIAL SENSOR message and a DTC will be set in the IPC.

Differential Cooler

The differential cooler is designed to reduce the temperature of the rear differential fluid during high speed driving. The differential cooler system is controlled by a temperature switch (included with the differential cooler kit) located in the rear of the differential housing and functions when conditions require it to operate. The fluid capacity for the rear differential cooler is greater than the standard system. Refer to **Lubrication**

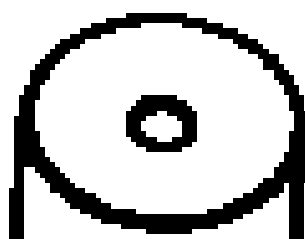
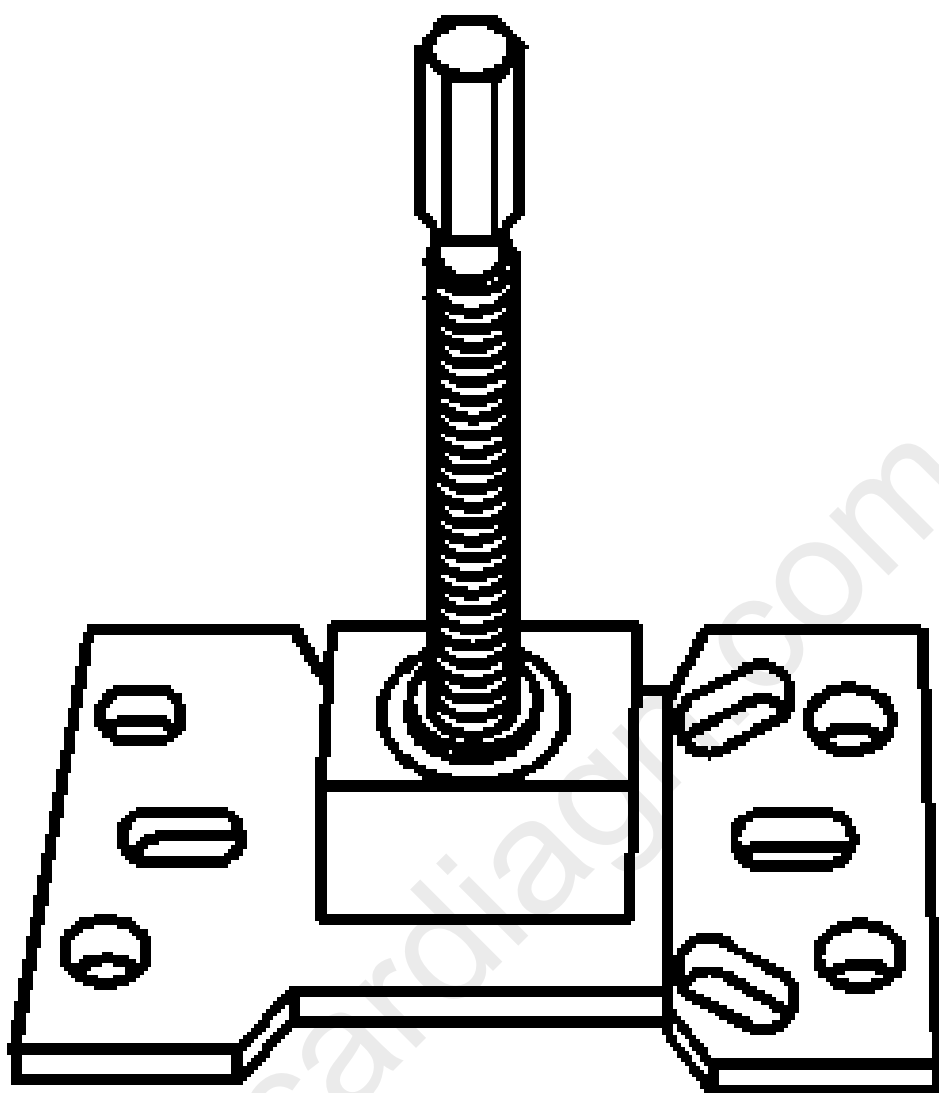
Specifications.

The differential lubricant pump and cooler assembly is located under the vehicle and is mounted to the rear storage compartment well. The cooler module assembly consists of a pump, heat exchanger, electric fan, temperature switch, and assorted hoses/fittings. All components except the external lines, temperature switch, and fittings are located in the Cooler Module. Oil is pulled from the differential and pumped through a hose to the cooler/heat exchanger. The differential oil is cooled by dissipating heat as the 12 volt electric fan blows outside air over the heat exchanger. The cooled differential oil then returns to the differential. The differential cooler pump will not run until the differential fluid reaches 120°C (248°F). The pump and electric fan can be turned on by bypassing the temperature switch with the plug included with the wiring harness.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

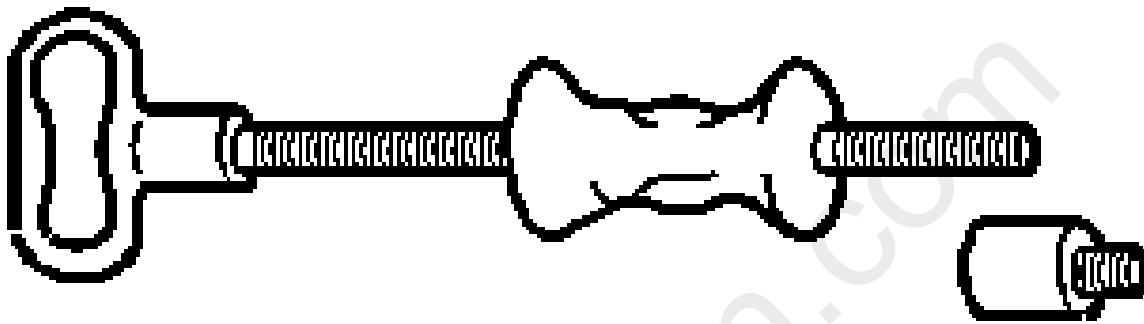
Illustration	Tool Number/Descrip
	CH-49400 J-28733-B J-42129 J-45859 KM-6282 Axle Remove



DT 48060-A
Bushing
Remover/Install

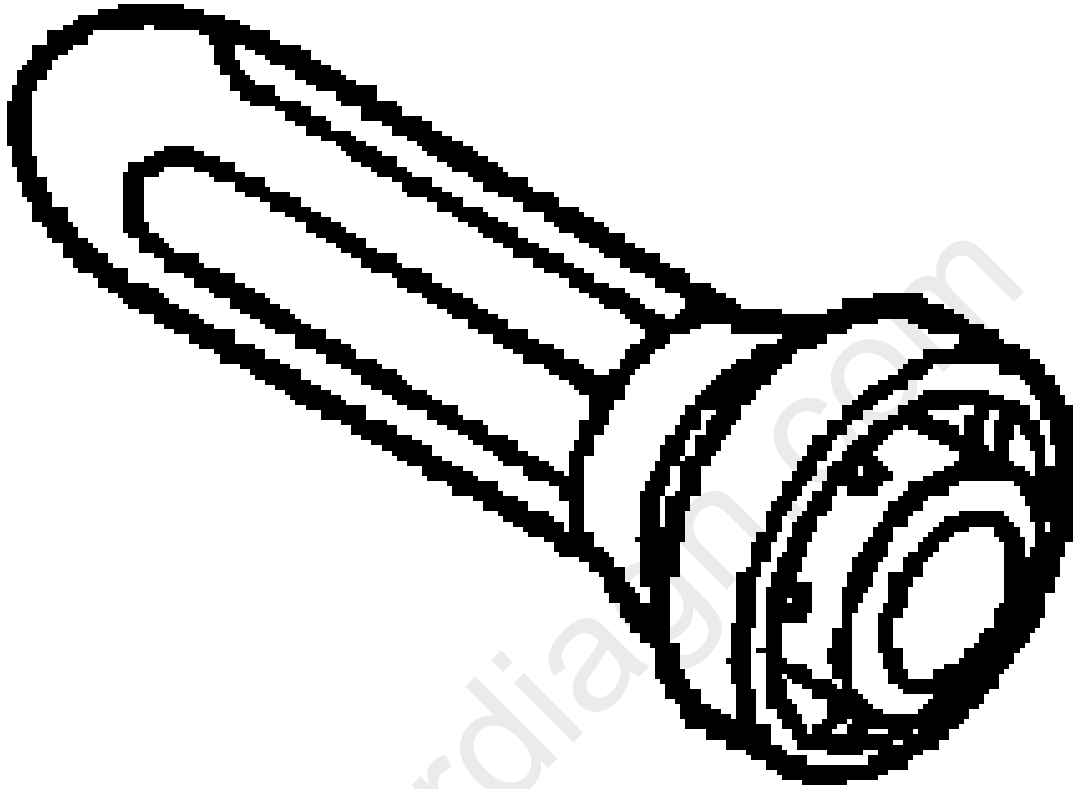
cardiagn.com

J 2619-01
Slide Hammer



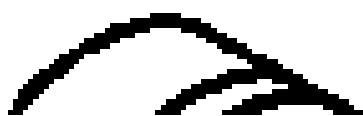
J 8614-01
Flange Holder
Remover

J 21426
Seal Installer



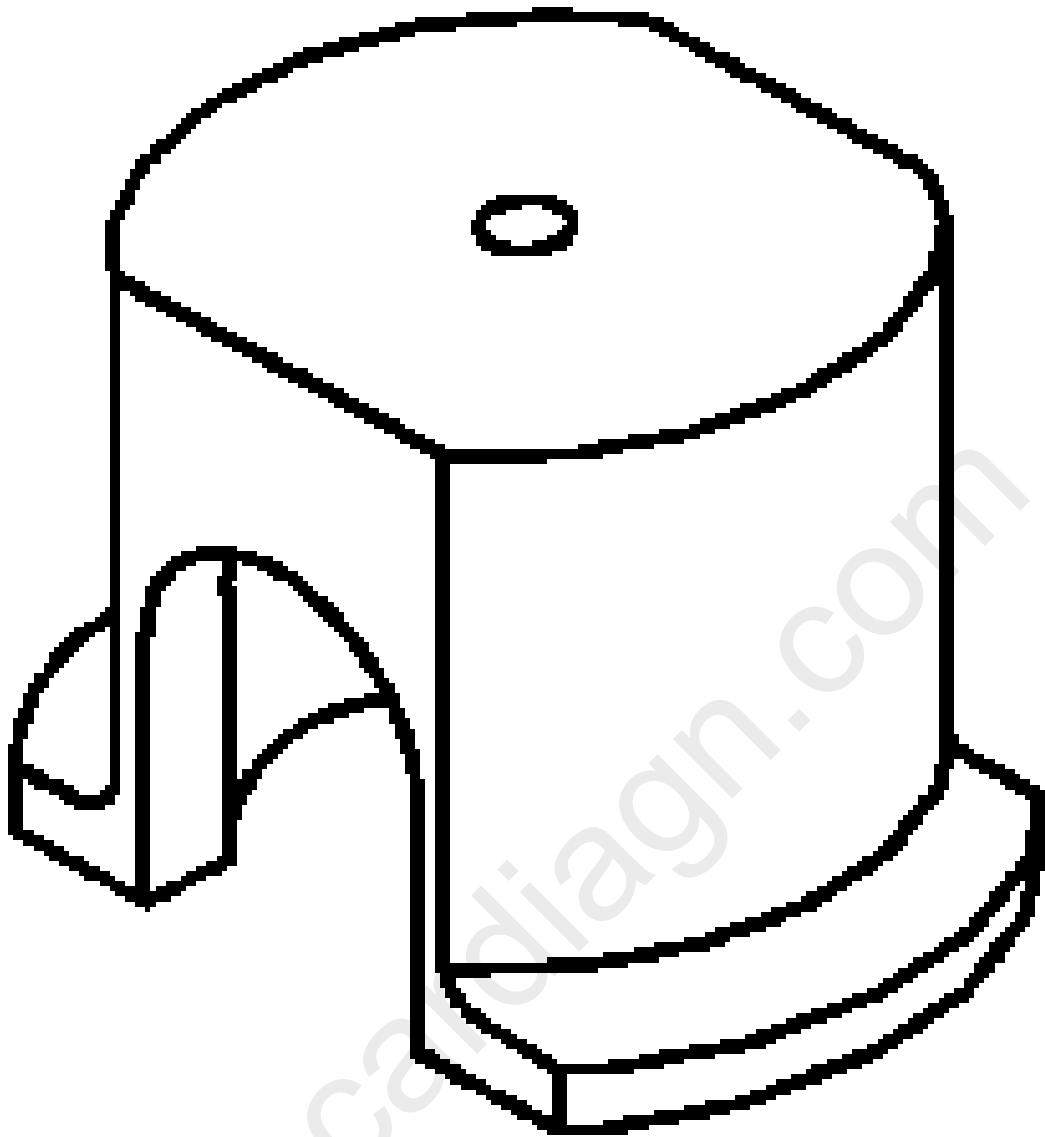
J 24420
Harmonic Balance
Puller

J 24433
Pinion Cone and
Bearing Installation



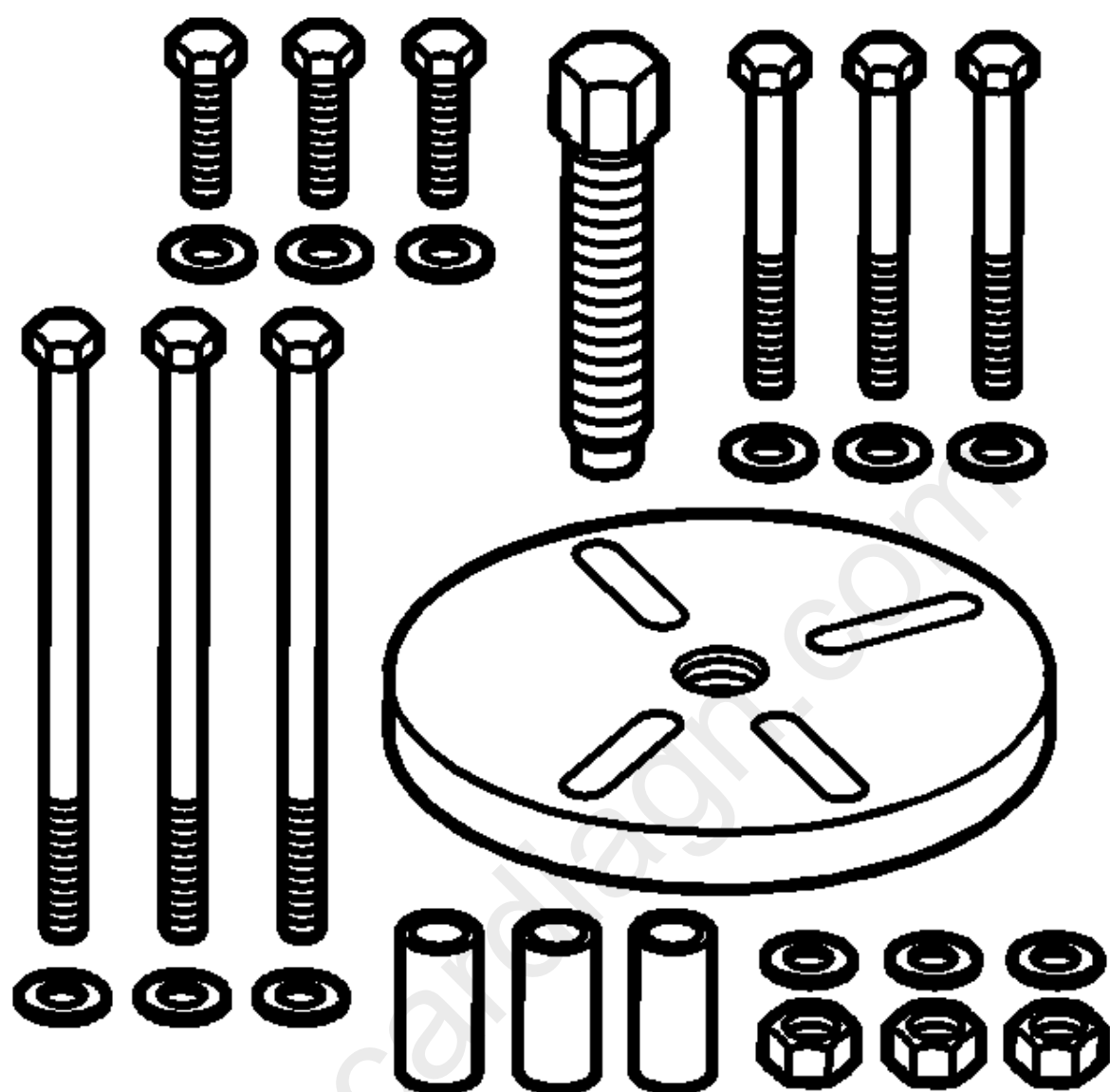
J 34826
Hub Nut Socket-
mm

J 42162
Getrag Axle Six
Gear Compress



J 42851
Seal Installer

J 45012
Holder Fixture



J 45019
Flange and Pin
Cage Remove

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