

2017 DRIVELINE/AXLE
Rear Drive Axle - Encore, Trax

SPECIFICATIONS

FASTENER SPECIFICATIONS

Single Use Non-Threaded Fasteners/Components

NOTE: <i>All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.</i>	
Application	
Differential Clutch O-ring	
Rear Axle Retaining Ring	

Reusable Threaded Fastener Tightening Specifications

NOTE: <i>All fasteners listed in this table can be reused after removal.</i>	
Application	Specification
	Metric (English)
Differential Carrier Front Mounting Bolts	100 N.m (74 lb ft)
Differential Carrier Rear Mounting Bolts	108 N.m (80 lb ft)
Differential Clutch Bolts	40 N.m (30 lb ft)
Differential Clutch Module Screws	22 N.m (16 lb ft)
Differential Clutch Module Shield Nut	10 N.m (89 lb in)
Differential Clutch Module Shield Screws	11 N.m (97 lb in)
Rear Differential Drain Plug	39 N.m (29 lb ft)
Rear Differential Fill Plug	39 N.m (29 lb ft)

APPROXIMATE FLUID CAPACITIES

Capacities

Application	Quantity	
	Metric	English
Rear Axle Lubricant	0.46 L	0.48 qt

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

Application	Type of Material	GM Part Number	
		United States	Canada
Rear Axle Lubricant	DEXRON [®] MTF 75W-90	88863089	88863090

SCHEMATIC WIRING DIAGRAMS

REAR AXLE WIRING SCHEMATICS (BUICK WITH F46)

Rear Differential Clutch Control Module (Buick with F46)

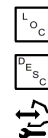
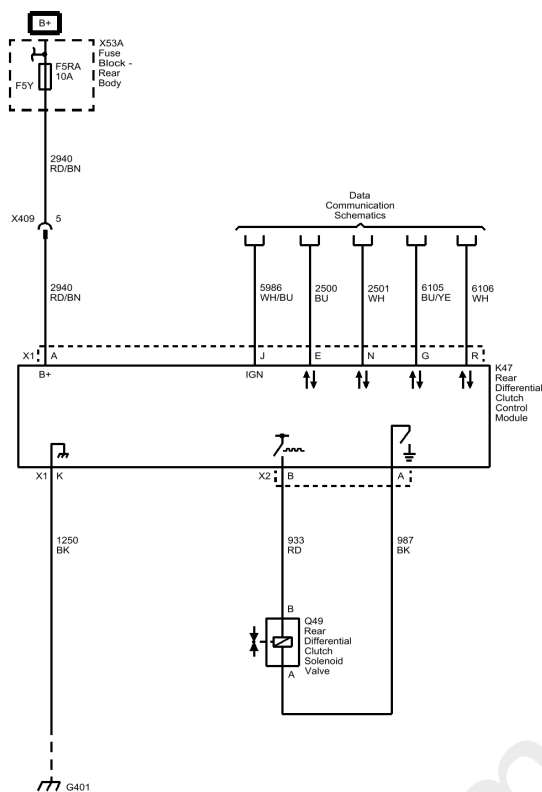


Fig. 1: Rear Differential Clutch Control Module (Buick with F46)
Courtesy of GENERAL MOTORS COMPANY

REAR AXLE WIRING SCHEMATICS (CHEVROLET WITH F46)

Rear Differential Clutch Control Module (Chevrolet with F46)

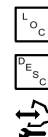
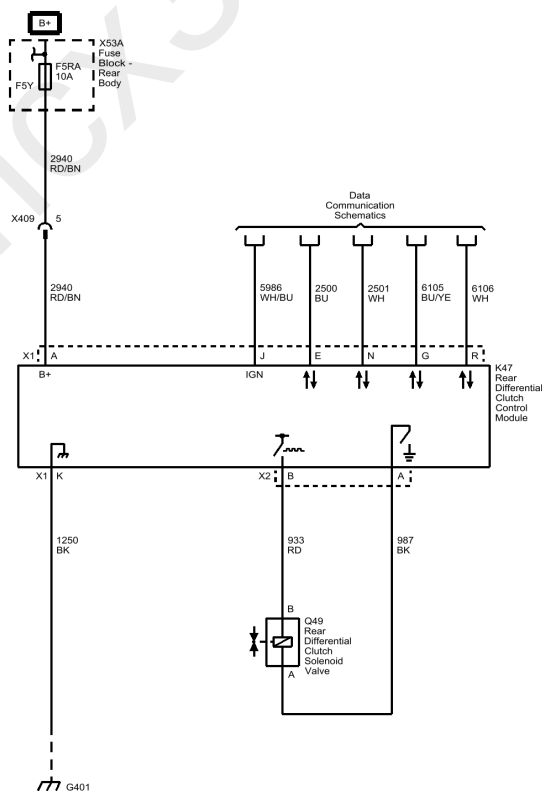


Fig. 2: Rear Differential Clutch Control Module (Chevrolet with F46)
Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DTC C0417: REAR DRIVE CLUTCH CONTROL SOLENOID VALVE CONTROL 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC C0417 01

Rear Drive Clutch Control Solenoid Valve Control Circuit Short to Battery

DTC C0417 02

Rear Drive Clutch Control Solenoid Valve Control Circuit Short to Ground

DTC C0417 04

Rear Drive Clutch Control Solenoid Valve Control Circuit Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Control - Terminal B	C0417 02	C0417 04	C0417 01	-
Control - Terminal A	-	C0417 04	-	-

Circuit/System Description

The rear differential clutch control module provides power and ground switching circuits to the rear drive clutch coil. The coil receives current from the rear differential clutch control module through PWM high side driver, and converts that signal into torque through the clutch to the rear tires when all wheel drive (AWD) is requested.

Conditions for Running the DTC

- The ignition is ON.
- Battery voltage is between 9-16 volts.

Conditions for Setting the DTC

- An open is detected on the high or low coil control circuits.
- A short to ground is detected on the high or low coil control circuits.
- A short to voltage is detected on the high coil control circuits.

Action Taken When the DTC Sets

One or more of the following actions may occur:

- All Wheel Drive Off or code 173 (AWD Disabled) will be displayed in the Driver Information Center.
- Service All Wheel Drive or code 73 (Service AWD) will be displayed in the Driver Information Center.

Conditions for Clearing the DTC

- The condition for the DTC is no longer present.
- The DTC is not detected in 40 consecutive drive cycles.

Reference Information

Schematic Reference

[Rear Axle Schematics \(Buick with F46\)](#)[Rear Axle Schematics \(Chevrolet with F46\)](#)

Connector End View Reference

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 Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the Q49 Rear Differential Clutch Solenoid Valve, ignition ON.
2. Test for 3-5 V between the control circuit terminal B and ground.
 - **If less than 3 V**
 1. Ignition OFF, disconnect the harness connector at the K47 Rear Differential Clutch Control Module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K47 Rear Differential Clutch Control Module.
 - **If greater than 5 V**
 1. Ignition OFF, disconnect the harness connector at the K47 Rear Differential Clutch Control Module, ignition ON.
 2. Test for less than 1 V between the control circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K47 Rear Differential Clutch Control Module.
 - **If between 3-5 V**
3. Test for less than 1 V between the control circuit terminal A and ground.
 - **If 1 V or greater**
 1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module.
 2. Test for less than 1 V between the control circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K47 Rear Differential Clutch Control Module.
 - **If less than 1 V**
4. Ignition OFF, connect the harness connector at the Q49 Rear Differential Clutch Solenoid Valve. Disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module.
5. Test for infinite resistance between the control circuit terminal A and ground.
 - **If less than infinite resistance**
 1. Ignition OFF, disconnect the harness connector at the Q49 Rear Differential Clutch Solenoid Valve.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the Q49 Rear Differential Clutch Solenoid Valve.
 - **If infinite resistance**
6. Test for 1.5-2.5 Ω between the control circuit terminal A and the control circuit terminal B.

7. Test for infinite resistance between the control circuit and ground.

- **If not between 1.5-2.5 Ω**

1. Ignition OFF, disconnect the harness connector at the Q49 Rear Differential Clutch Solenoid Valve.
2. Test for less than 2 Ω between the K47 Rear Differential Clutch Control Module control circuit terminal A and the Q49 Rear Differential Clutch Solenoid Valve control circuit terminal A.
 - If 2 Ω or greater, repair the open/high resistance on the circuit.
 - If less than 2 Ω , test or replace the Q49 Rear Differential Clutch Solenoid Valve.

- **If between 1.5-2.5 Ω**

8. Replace the K47 Rear Differential Clutch Control Module.

Component Testing

Static Test

1. Ignition OFF, disconnect the harness at the Q49 Rear Differential Clutch Solenoid Valve.
2. Test for 1.5-2.5 Ω between the control terminal B and the low reference terminal A.

- **If not between 1.5-2.5 Ω**

Replace the Q49 Rear Differential Clutch Solenoid Valve.

- **If between 1.5-2.5 Ω**

3. Test for infinite resistance between each terminal and the Q49 Rear Differential Clutch Solenoid Valve case.

- **If not infinite resistance**

Replace the Q49 Rear Differential Clutch Solenoid Valve.

- **If infinite resistance**

4. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Differential Clutch Replacement](#)
- Refer to [Control Module References](#) for Rear Differential Clutch Control Module replacement, programming, and setup

DTC C0561: SYSTEM DISABLED INFORMATION STORED

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC C0561 00

System Disabled Information Stored

Circuit/System Description

The rear differential clutch control module receives messages from other modules over serial data which are needed to perform all wheel drive (AWD) functions.

Conditions for Running the DTC

The ignition is ON.

Conditions for Setting the DTC

The rear differential clutch control module receives an invalid message from the electronic brake control module (EBCM) over the serial data circuit which causes the rear drive clutch control module to deactivate.

Action Taken When the DTC Sets

One or more of the following actions may occur:

- All Wheel Drive Off or code 173 (AWD Disabled) will be displayed in the Driver Information Center.
- Service All Wheel Drive or code 73 (Service AWD) will be displayed in the Driver Information Center.

Conditions for Clearing the DTC

- The condition for the DTC is no longer present.
- The DTC is not detected in 40 consecutive drive cycles.

Diagnostic Aids

DTC C0561 is an indicator that the rear differential clutch control module receives an invalid message from the EBCM and does not necessarily indicate a fault is present with the rear drive clutch control module. This DTC should not be used as a fault indicator but rather as a symptom to assist in the diagnosis of these other systems. The EBCM should be checked for possible faults.

Reference Information

Schematic Reference

Rear Axle Schematics (Buick with F46)Rear Axle Schematics (Chevrolet with F46)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE) COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)

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

1. Ignition ON.
2. Verify that no DTCs are set in the K17 Electronic Brake Control Module.
 - **If any other DTCs are set**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .
 - **If no other DTCs are set**
3. Replace the K17 Electronic Brake Control Module.
4. Verify the DTC does not set while operating the vehicle under the Conditions for Running the DTC.
 - **If the DTC sets**

Replace the K47 Electronic Rear Differential Control Module.
 - **If the DTC does not set**

5. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for Electronic Brake Control Module and Electronic Rear Differential Control Module replacement, programming and setup.

REPAIR INSTRUCTIONS

REAR WHEEL DRIVE MODULE DIFFERENTIAL CLUTCH CONTROL MODULE REPLACEMENT

Removal Procedure

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

NOTE: The propeller shaft does not have to be removed from this vehicle to replace rear differential module (RDM).

2. Remove the propeller shaft from the rear differential and re-locate to side.

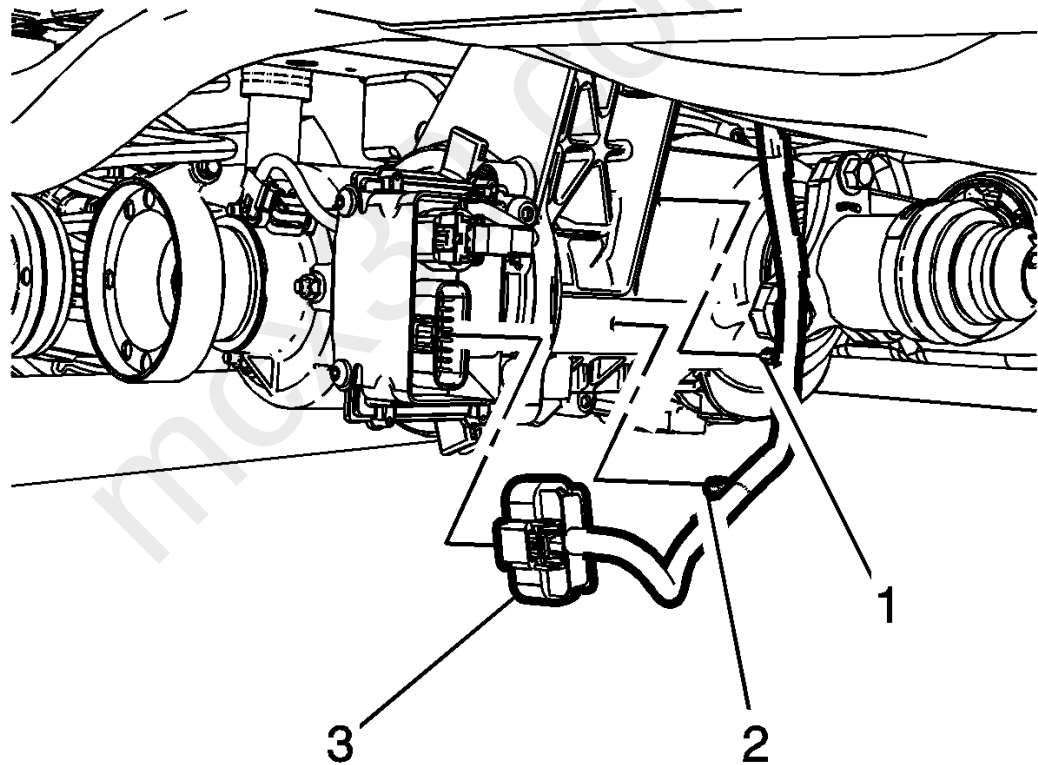


Fig. 3: Wiring Harness, Retainers And Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

3. Remove the electrical connector (3).
4. Remove the wiring harness from retainers (1) and (2).

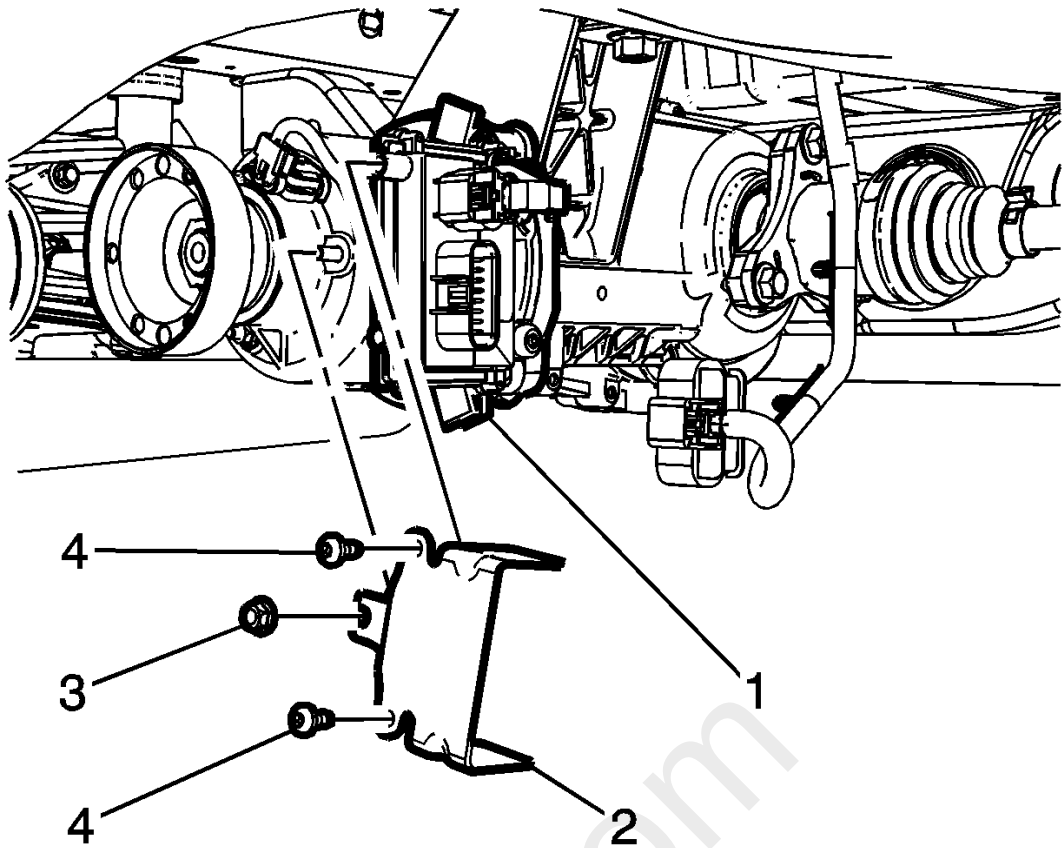


Fig. 4: Differential Clutch Control Module, Shield, Screws And Nut
Courtesy of GENERAL MOTORS COMPANY

5. Remove the retaining screws (4), retaining nut (3), and the shield (2) from the differential clutch control module (1).

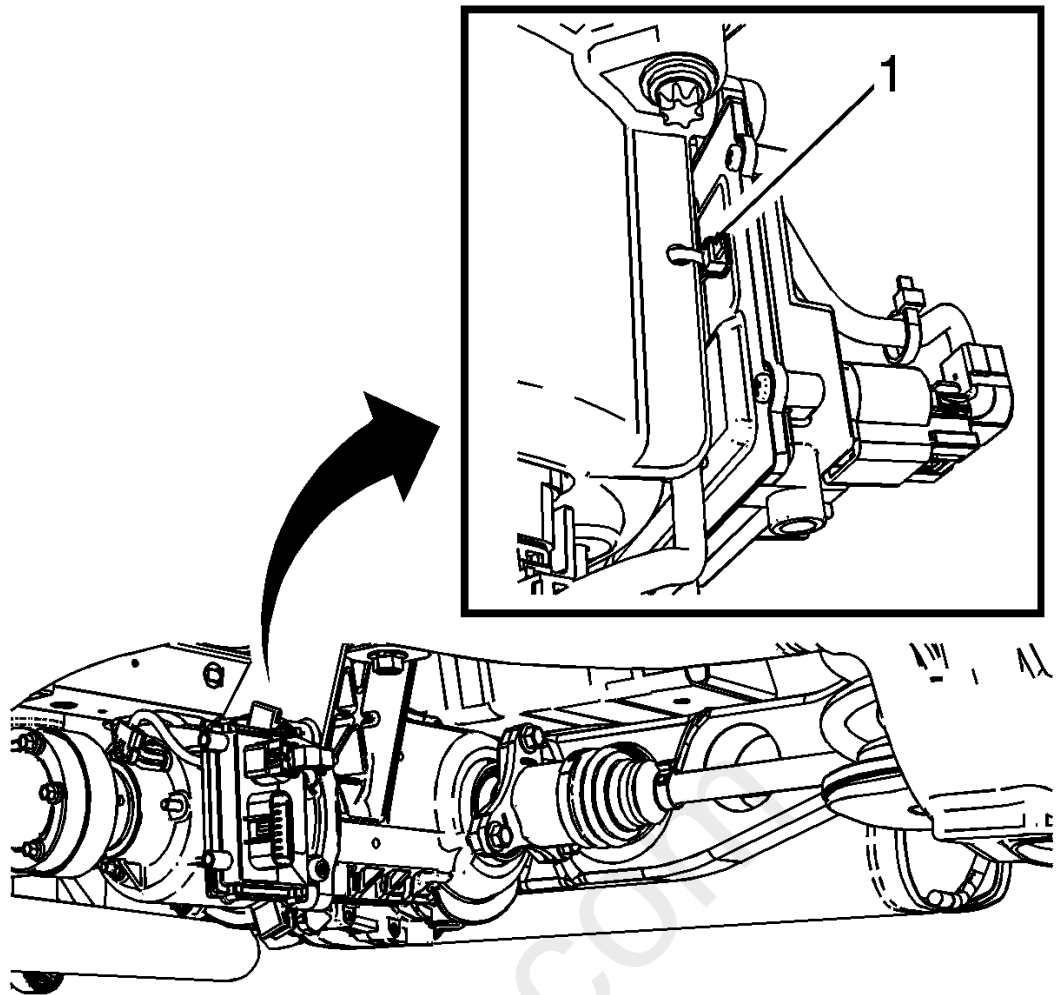


Fig. 5: Electrical Tie

Courtesy of GENERAL MOTORS COMPANY

6. Using the appropriate tool, remove the electrical tie (1).

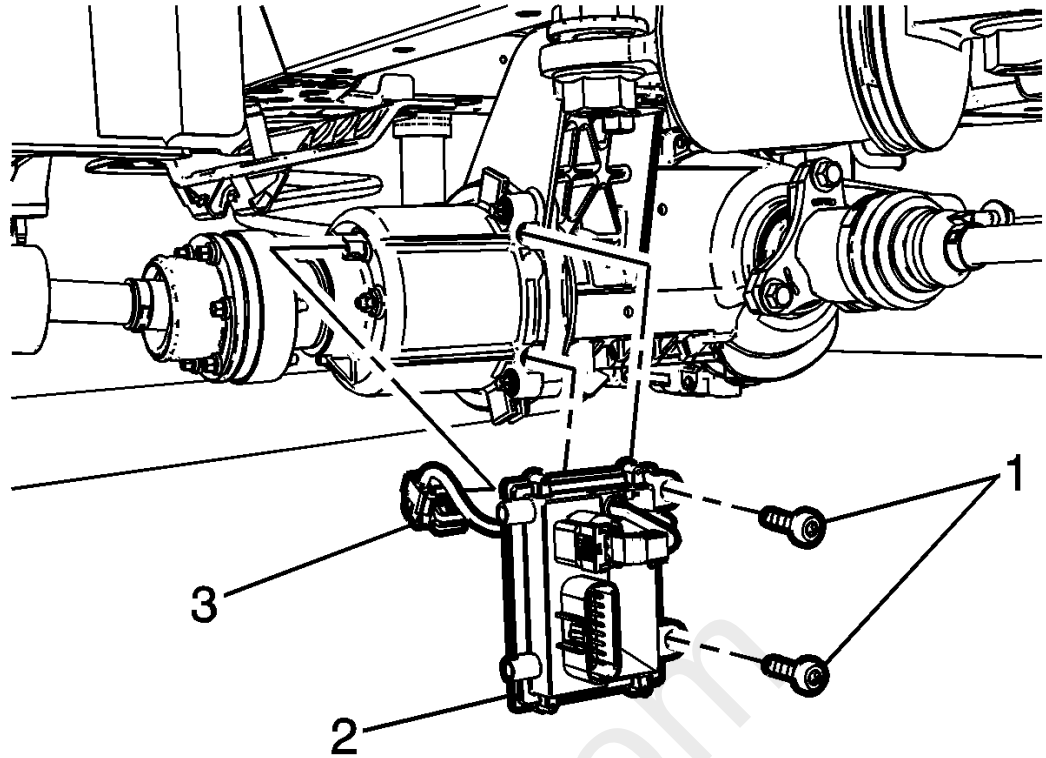


Fig. 6: Differential Clutch Control Module, Screws And Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

7. Remove the mounting screws (1) from the differential clutch control module (2).
8. Remove the electrical connector (3).
9. Remove the differential clutch control module (2).

Installation Procedure

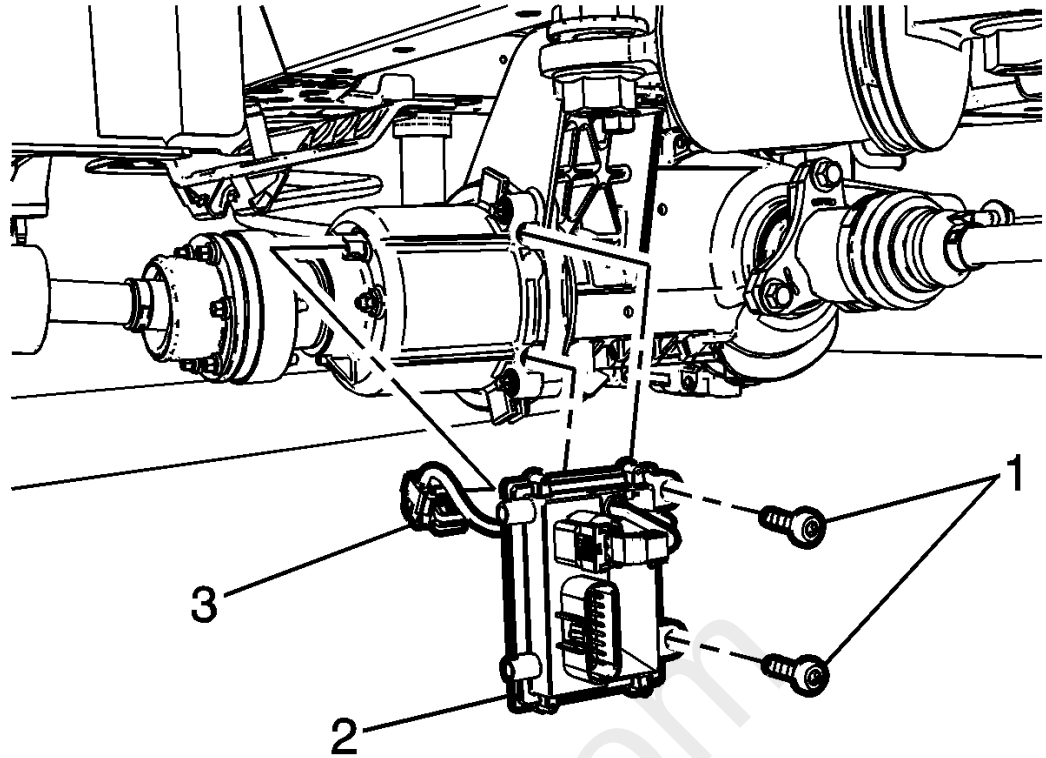


Fig. 7: Differential Clutch Control Module, Screws And Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

1. Position the differential clutch control module (2) on the differential carrier.

CAUTION: Refer to **Fastener Caution** .

2. Install the mounting screws (1) to the differential carrier and tighten to 22 N.m (16 lb ft).
3. Connect the electrical connector (3) to the differential carrier.

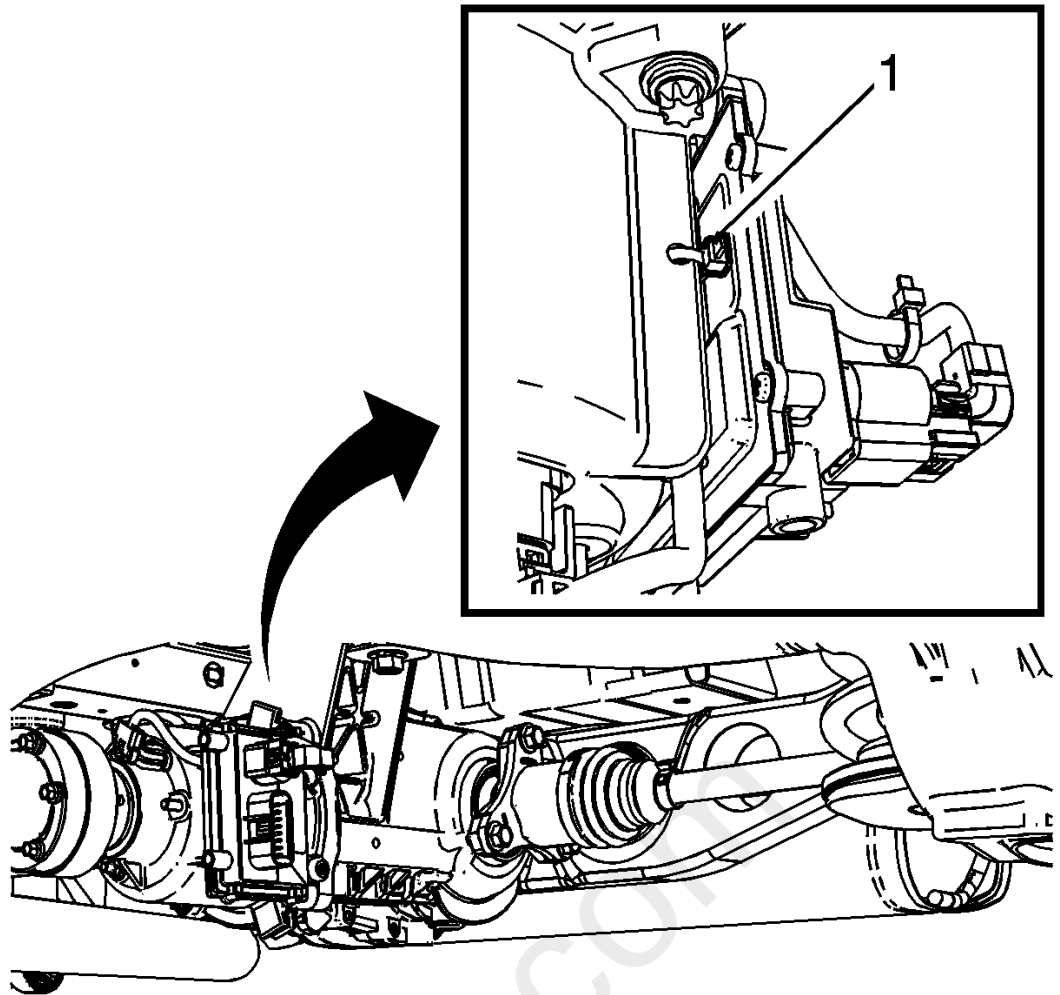


Fig. 8: Electrical Tie

Courtesy of GENERAL MOTORS COMPANY

4. Secure the differential control module to the differential clutch using the electrical tie (1).

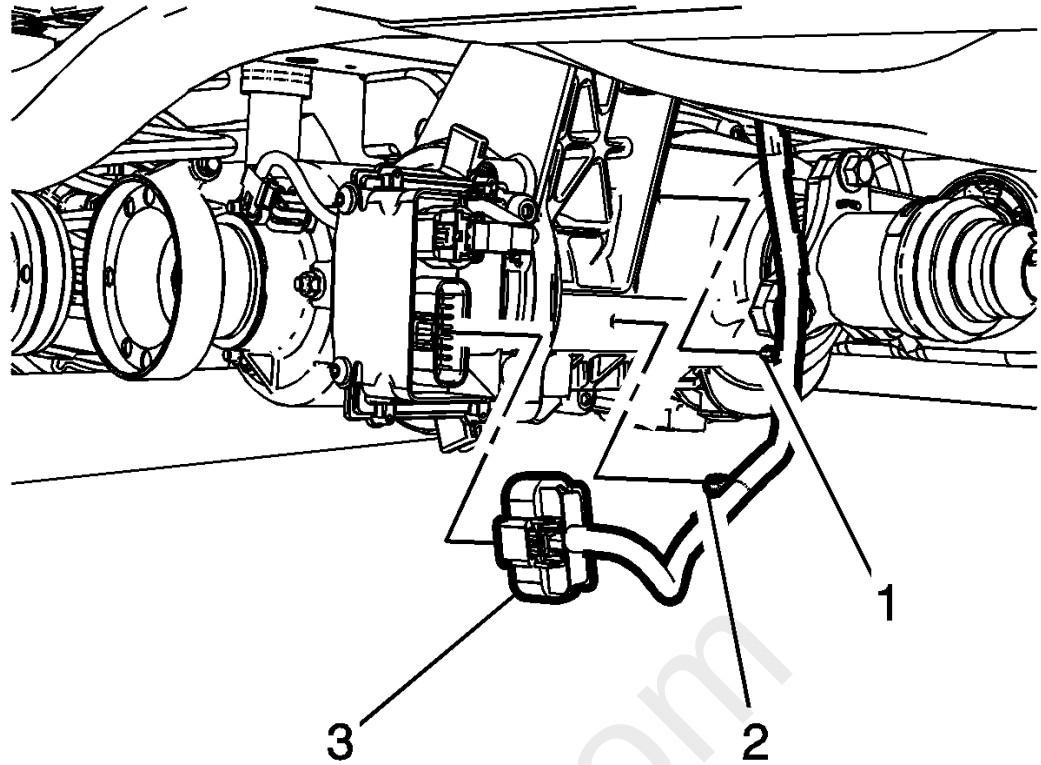


Fig. 9: Wiring Harness, Retainers And Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

5. Connect the electrical connector (3).
6. Install the wiring harness retainers (2) and (1) to the differential clutch control module.

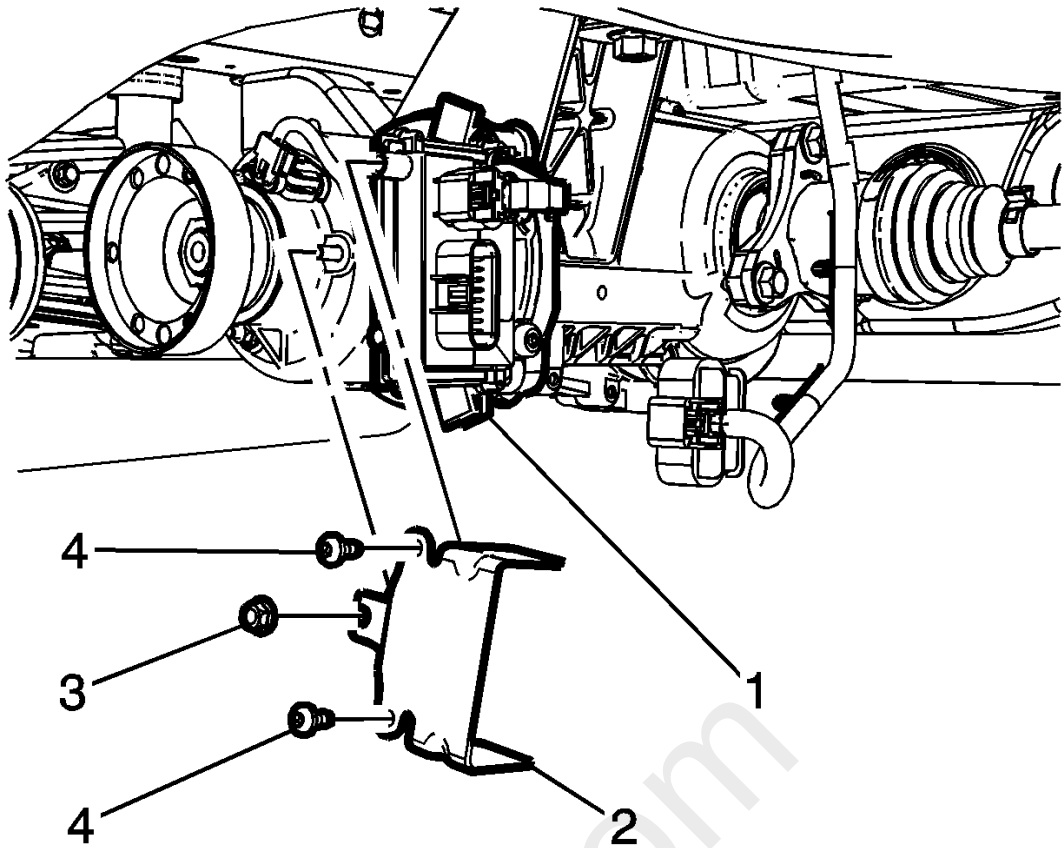


Fig. 10: Differential Clutch Control Module, Shield, Screws And Nut
Courtesy of GENERAL MOTORS COMPANY

7. Position the shield (2) on the differential clutch control module (1).
8. Install the 2 mounting screws (4) and tighten to 11 N.m (97 lb in).
9. Install the mounting nut (3) and tighten to 10 N.m (89 lb in).
10. Install the propeller shaft to the rear differential.
11. Remove the support and lower the vehicle.
12. Reprogram the differential clutch control module. Refer to [Rear Differential Clutch Control Module Programming and Setup](#).

REAR AXLE LUBRICANT LEVEL INSPECTION

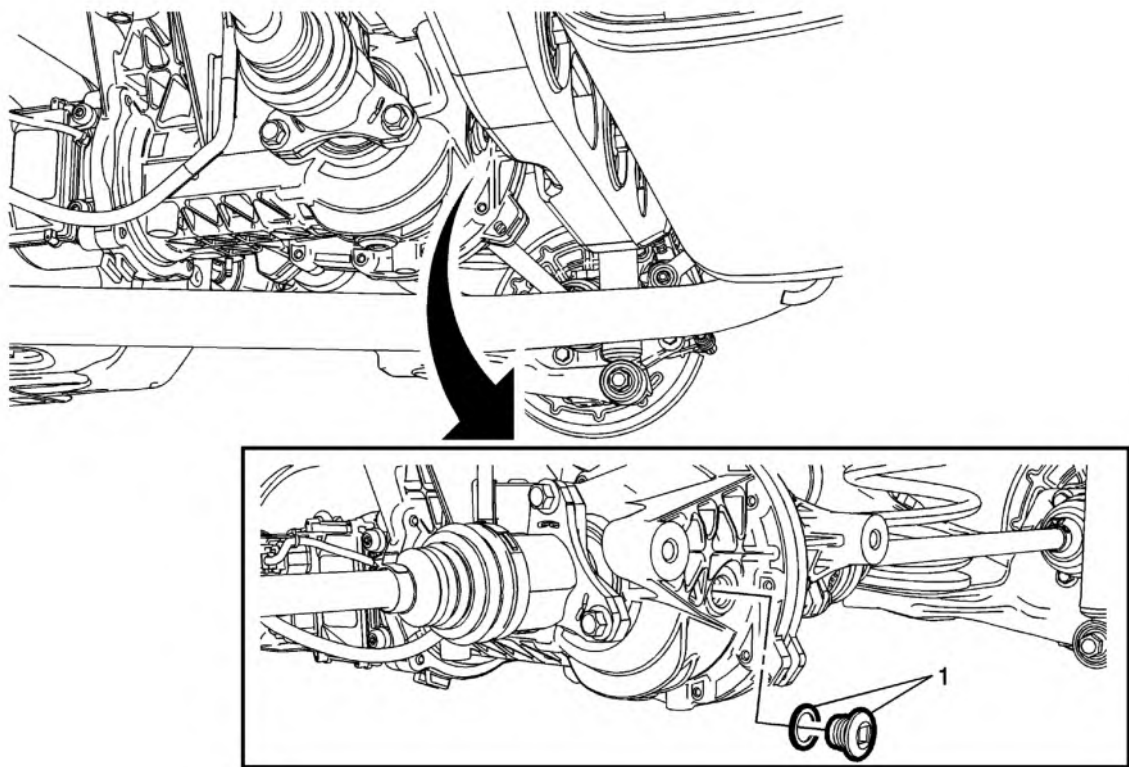


Fig. 11: Rear Axle Lubricant Level Inspection Plug

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .	
1	Rear Differential Fill Plug CAUTION: Refer to Fastener Caution . Procedure 1. The differential fluid should be even with the bottom threads on the fill hole. 2. If fluid is needed, refer to Approximate Fluid Capacities. Tighten 39 N.m (29 lb ft)

DIFFERENTIAL OIL REPLACEMENT

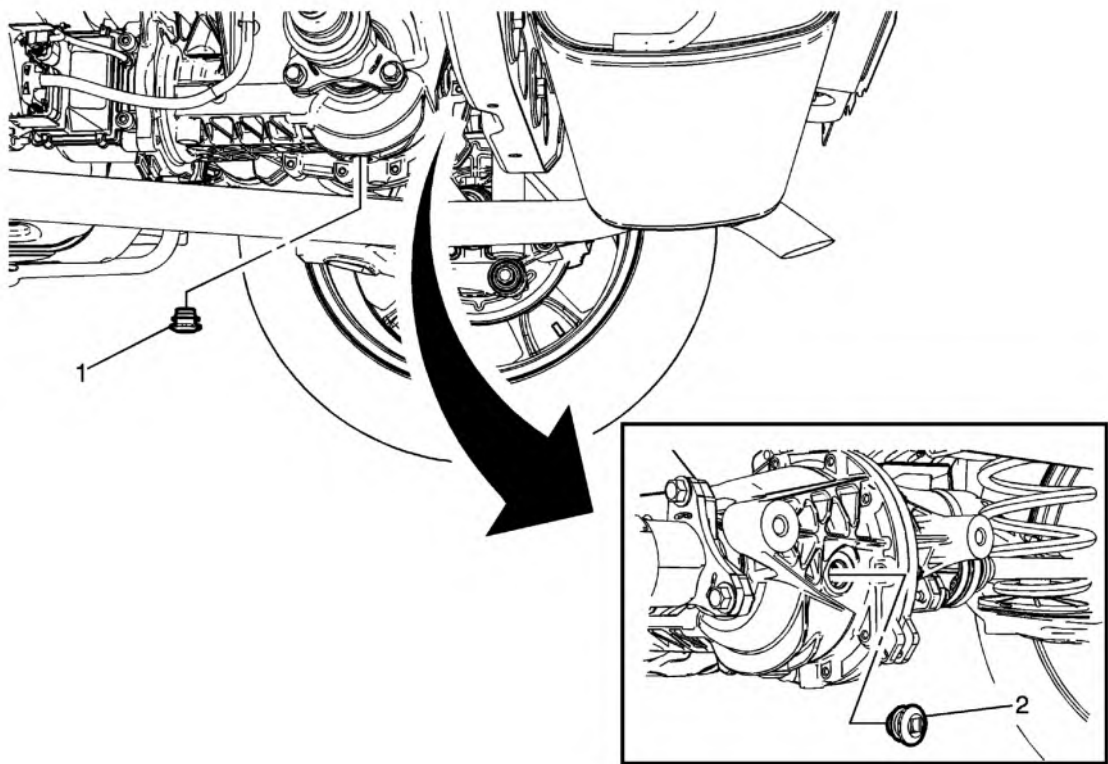


Fig. 12: Differential Oil Drain Plug
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .	
1	Rear Differential Drain Plug CAUTION: Refer to Fastener Caution . Tighten 39 N.m (29 lb ft)
2	Rear Differential Fill Plug Procedure Fill the rear differential with the proper fluid. Refer to Approximate Fluid Capacities . Tighten 39 N.m (29 lb ft)

DIFFERENTIAL CARRIER BUSHING REPLACEMENT - REAR

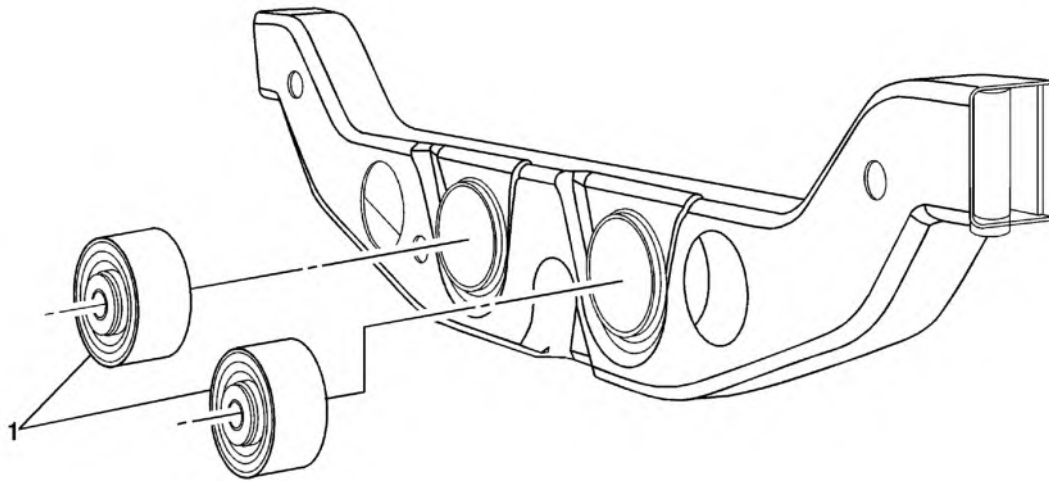


Fig. 13: Differential Carrier Bushing - Rear
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle . 2. Remove the rear crossmember. Refer to Rear Crossmember Replacement (AWD) .	
1	Differential Carrier Bushing - Rear (Qty: 2) Procedure 1. Place the rear crossmember in a vise. 2. Using the CH-51036 remover/installer, remove the rear differential carrier bushing from the rear crossmember. 3. Remove any residue from the old bushing before installing the new rear differential bushing. 4. Position the rear differential bushing in the rear crossmember. 5. Using the CH-51036 remover/installer, Install the rear differential carrier bushing. Special Tools CH-51036 RDM crossmember bushing remover/installer For equivalent regional tools, refer to Special Tools .

REAR AXLE SHAFT REPLACEMENT

Special Tools

- **J-2619-01** Slide Hammer
- **J-45019** Flange Remover

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

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Remove the wheel drive shaft. Refer to [Rear Wheel Drive Shaft Replacement](#) .

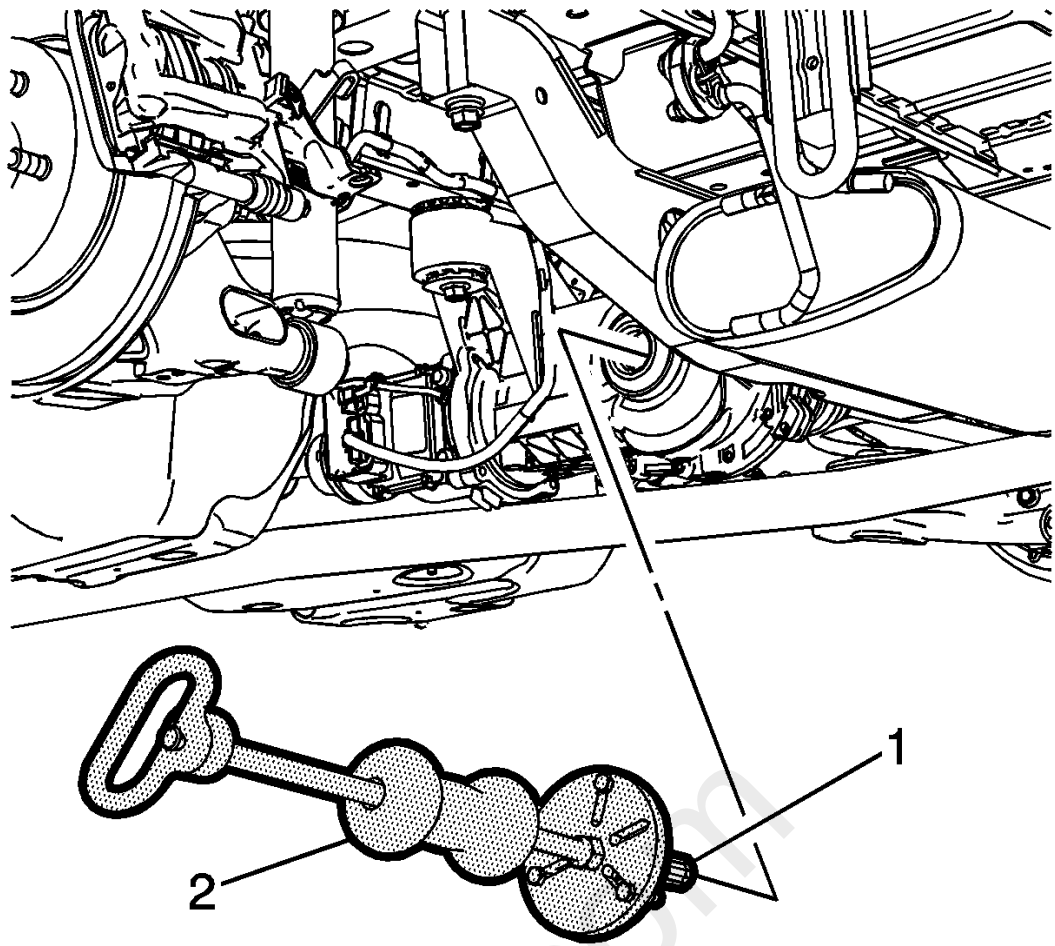


Fig. 14: Slide Hammer And Rear Axle Shaft
Courtesy of GENERAL MOTORS COMPANY

NOTE: Remove and discard the retaining ring from the rear axle. Replace with **NEW** only.

3. Using the **J-2619-01** hammer and the **J-45019** remover (2), remove the rear axle shaft (1).
4. Remove the **J-2619-01** hammer and the **J-45019** remover (2) from the rear axle shaft (1).

Installation Procedure

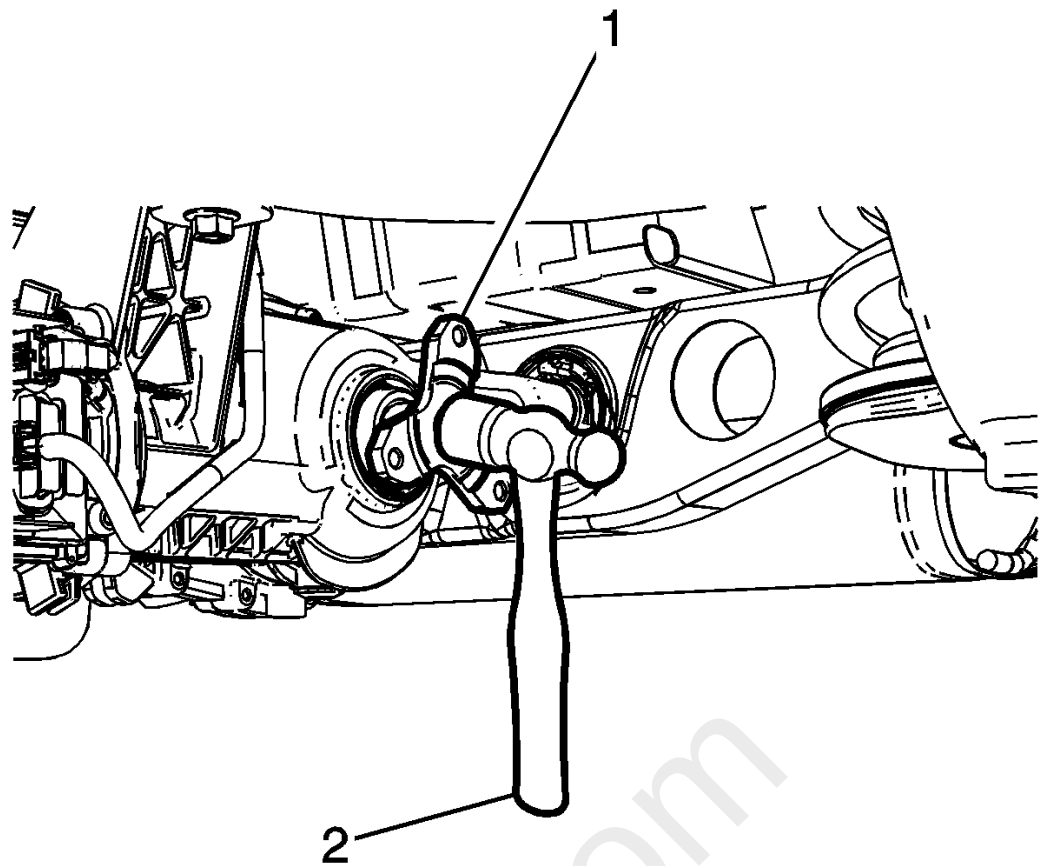


Fig. 15: Rear Axle

Courtesy of GENERAL MOTORS COMPANY

1. Position the rear axle with the NEW retaining ring in the rear differential.
2. Using a suitable hammer, lightly tap the rear axle (1) until it locks into place.
3. Install the rear wheel drive shaft. Refer to [Rear Wheel Drive Shaft Replacement](#).
4. Remove the support and lower the vehicle.

REAR AXLE SHAFT SEAL REPLACEMENT

Special Tools

- EN-45000 Seal Remover
- J-44809 Seal Installer

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

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the rear axle shaft. Refer to [Rear Axle Shaft Replacement](#).

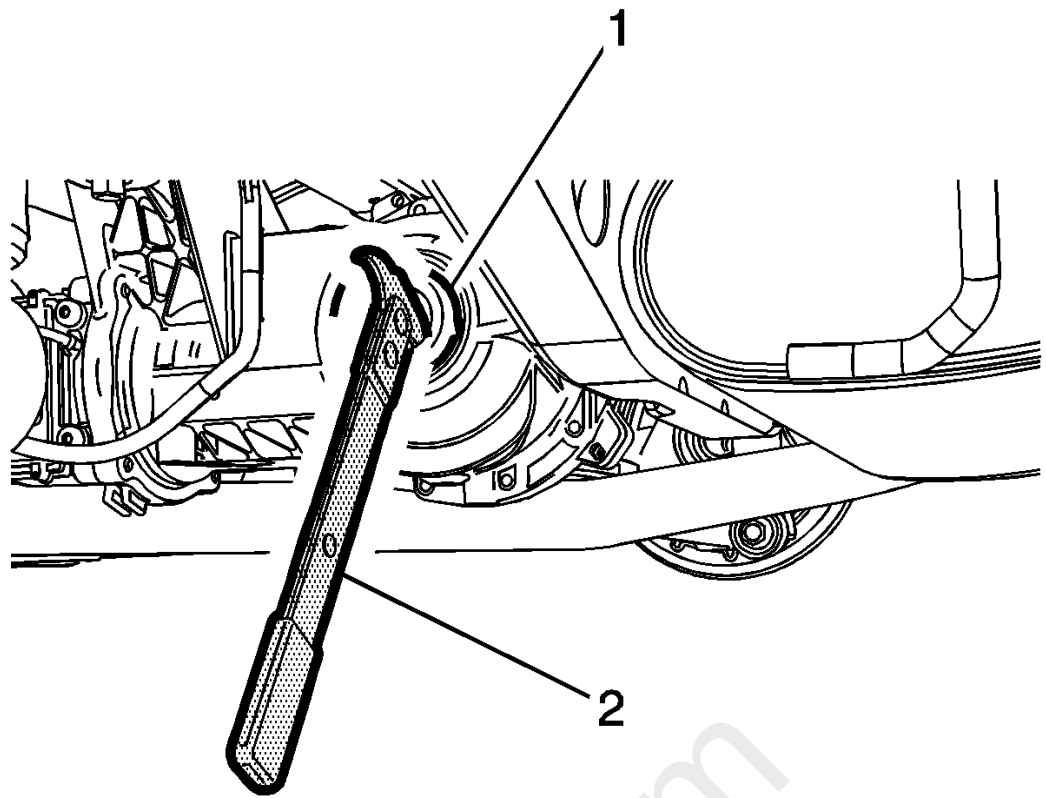


Fig. 16: Seal Removal Tool And Rear Axle Shaft Seal
Courtesy of GENERAL MOTORS COMPANY

3. Using the **EN-45000** seal remover (2), remove the rear axle shaft seal (1).

Installation Procedure

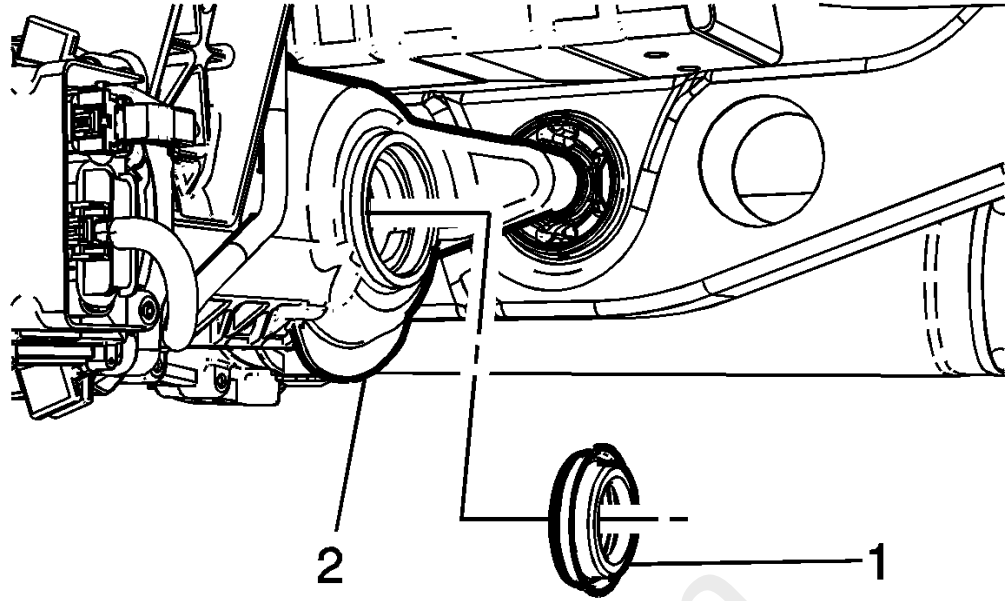


Fig. 17: Rear Axle Seal And Rear Differential Carrier
Courtesy of GENERAL MOTORS COMPANY

1. Position the rear axle seal (1) in the rear differential carrier (2).

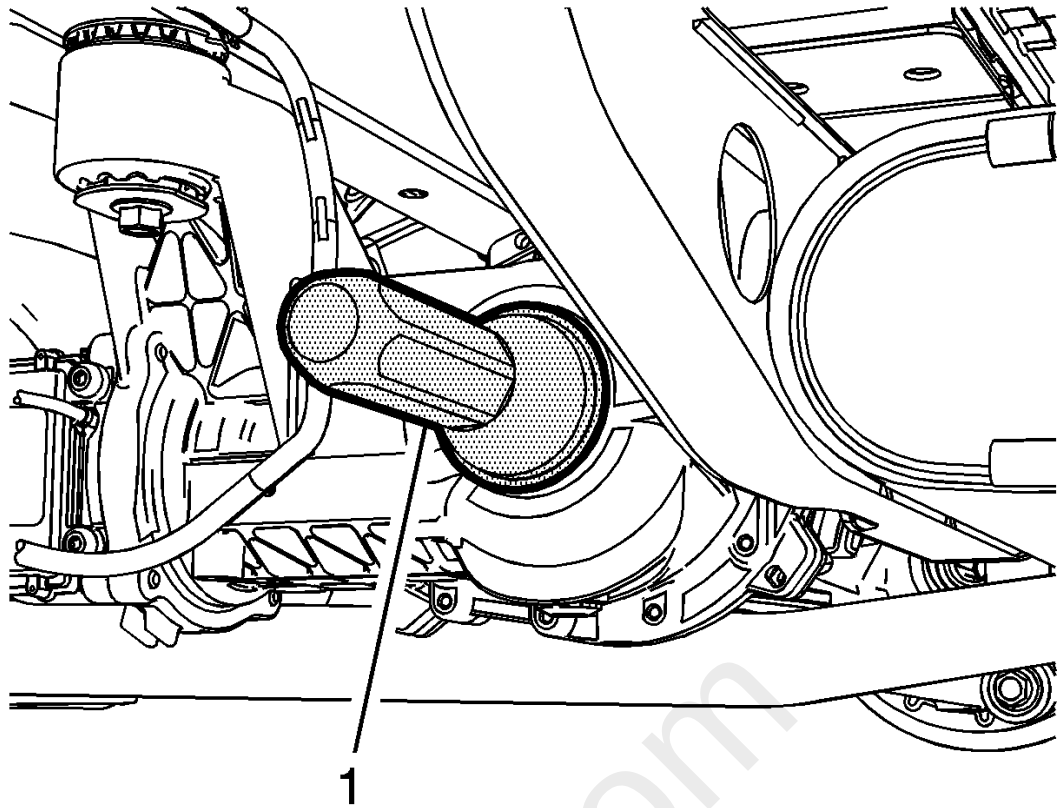


Fig. 18: Rear Axle Seal And Special Tool

Courtesy of GENERAL MOTORS COMPANY

2. Using the **J-44809** installer (1), install the rear axle seal.
3. Install the rear axle shaft. Refer to [Rear Axle Shaft Replacement](#).
4. Remove the support and lower the vehicle.

DIFFERENTIAL CARRIER ASSEMBLY REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Drain the rear differential carrier. Refer to [Differential Oil Replacement](#).
3. Disconnect the propeller shaft from the rear differential and relocate to the side. Refer to [Two-Piece Propeller Shaft Replacement](#).

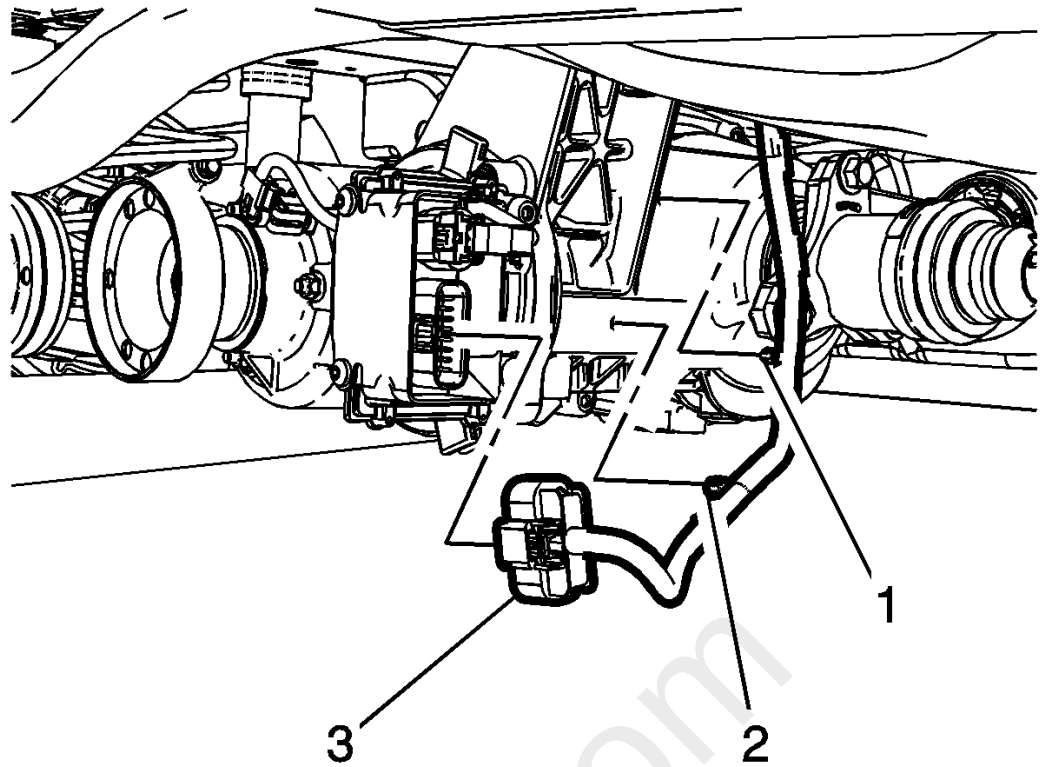


Fig. 19: Wiring Harness, Retainers And Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

4. Remove the electrical harness connector (3).
5. Disconnect the rear wheel drive shafts from the rear differential and re-locate to the side. Refer to [Rear Wheel Drive Shaft Replacement](#) .

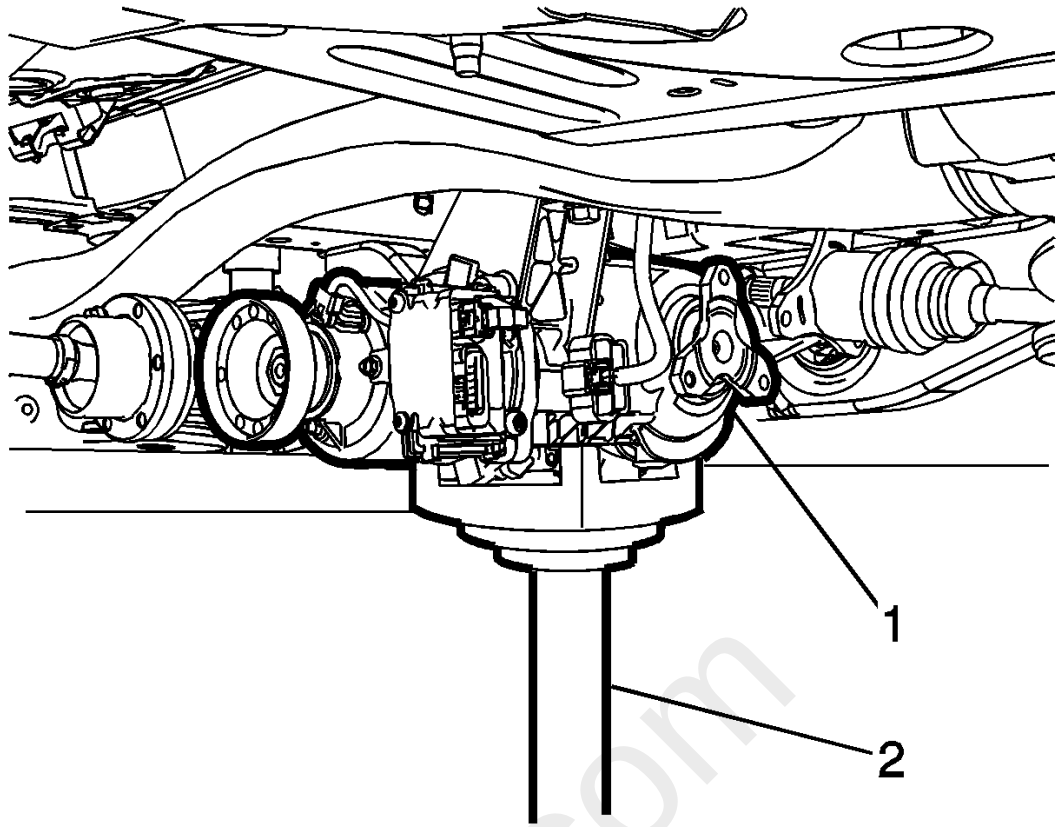


Fig. 20: Jack Stand And Rear Differential
Courtesy of GENERAL MOTORS COMPANY

NOTE: Ensure that the rear differential assembly is securely tie to the jack stand.

6. Support the rear differential (1) with a suitable transmission jack stand (2).

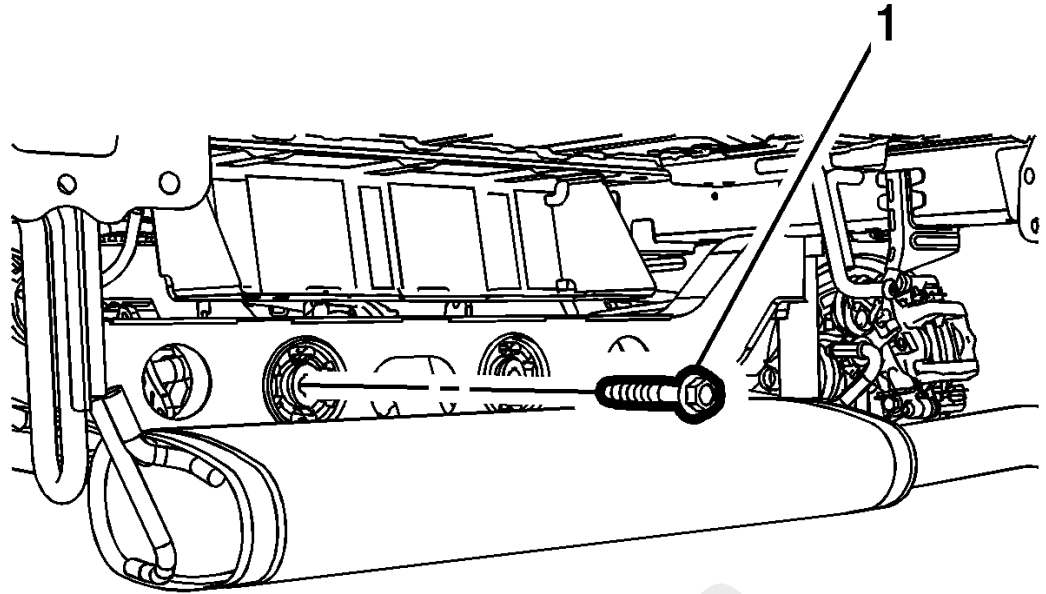


Fig. 21: Rear Differential Support Mounting Bolts
Courtesy of GENERAL MOTORS COMPANY

7. Remove the 2 rear differential support mounting bolts (1).

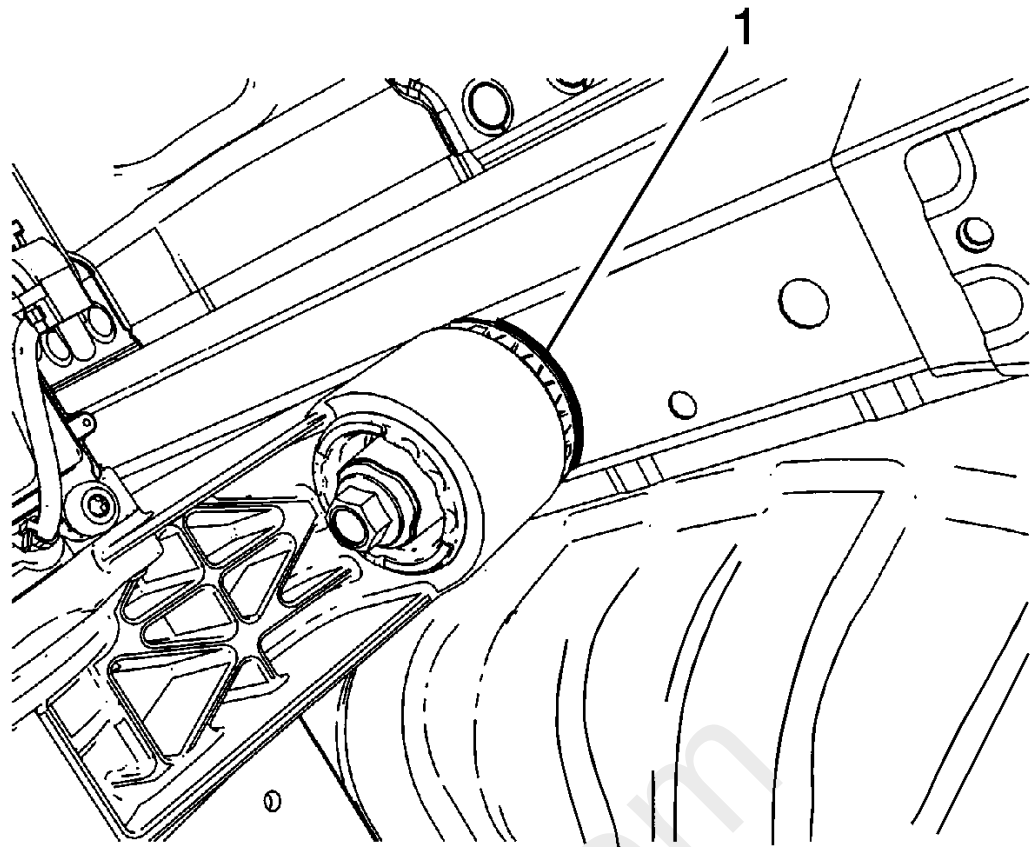


Fig. 22: Rear Differential Support Mounting Outline Mark
Courtesy of GENERAL MOTORS COMPANY

8. Using a bright colored paint, mark the outline (1) of the front rear differential mounting on the body to properly align the mounting to the painted outline for installation.

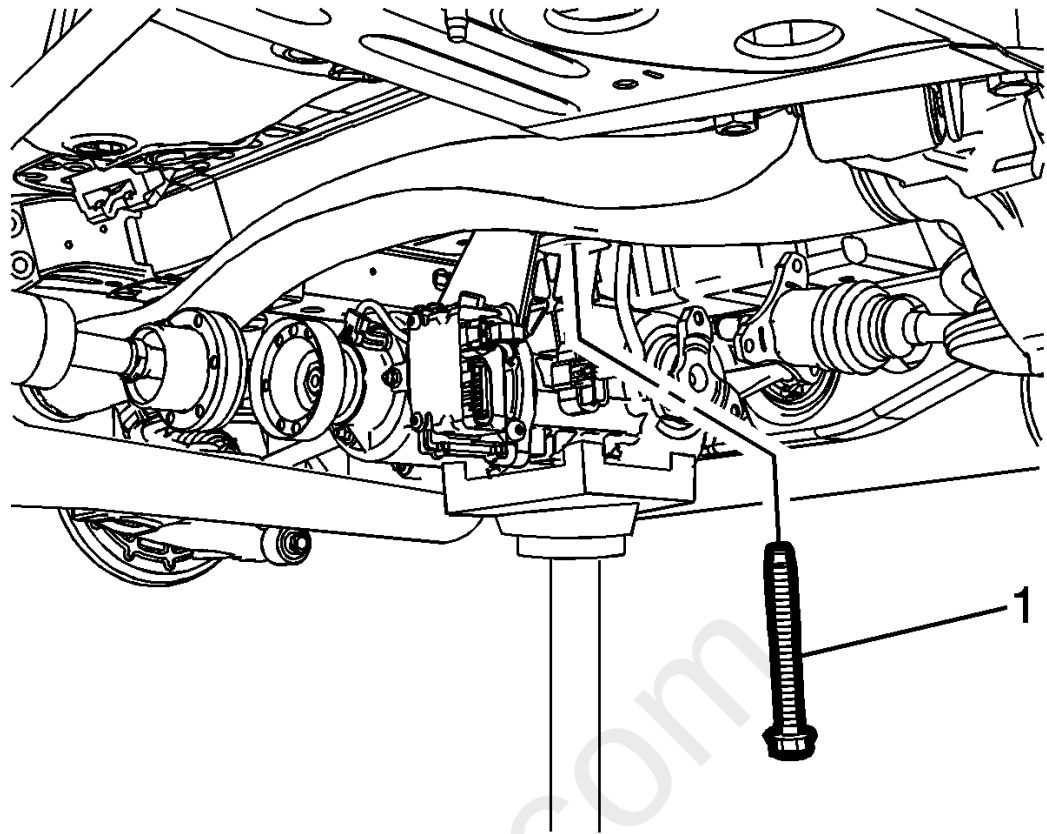


Fig. 23: Rear Differential Mounting Bolt
Courtesy of GENERAL MOTORS COMPANY

9. Remove the front rear differential mounting bolt (1).

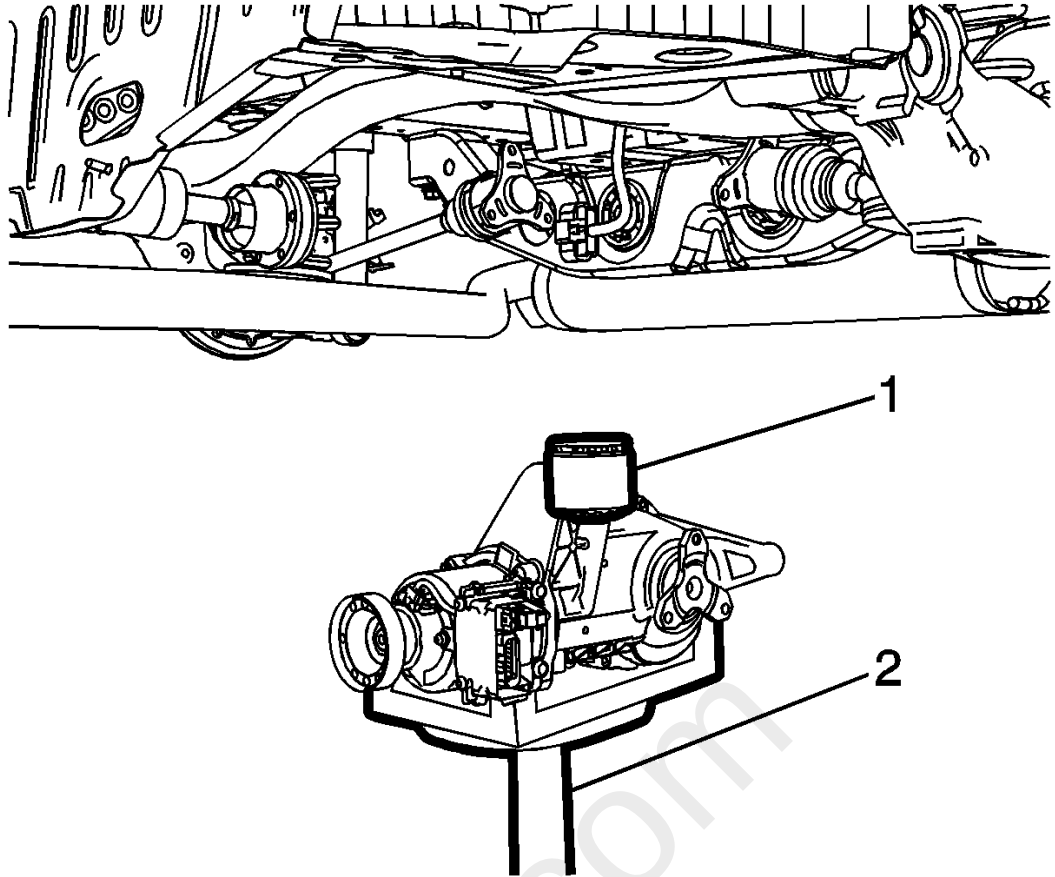


Fig. 24: Rear Differential Assembly And Jack Stand
Courtesy of GENERAL MOTORS COMPANY

10. Using the transmission jack stand (2), remove the rear differential assembly (1) from the vehicle.

Installation Procedure

1. Fill the rear differential assembly. Refer to [Differential Oil Replacement](#).

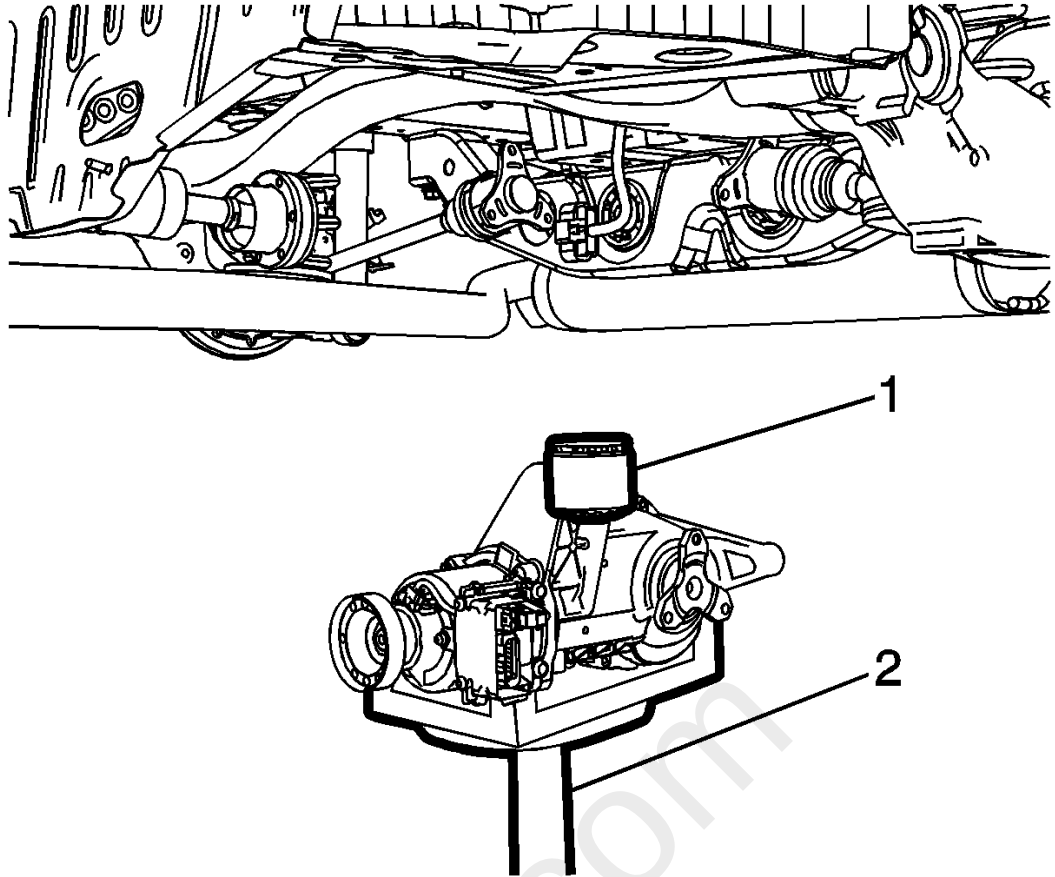


Fig. 25: Rear Differential Assembly And Jack Stand
Courtesy of GENERAL MOTORS COMPANY

2. Using the transmission jack stand (2), lift the rear differential assembly (1) into position.
3. Install and hand tighten the 3 mounting bolts.

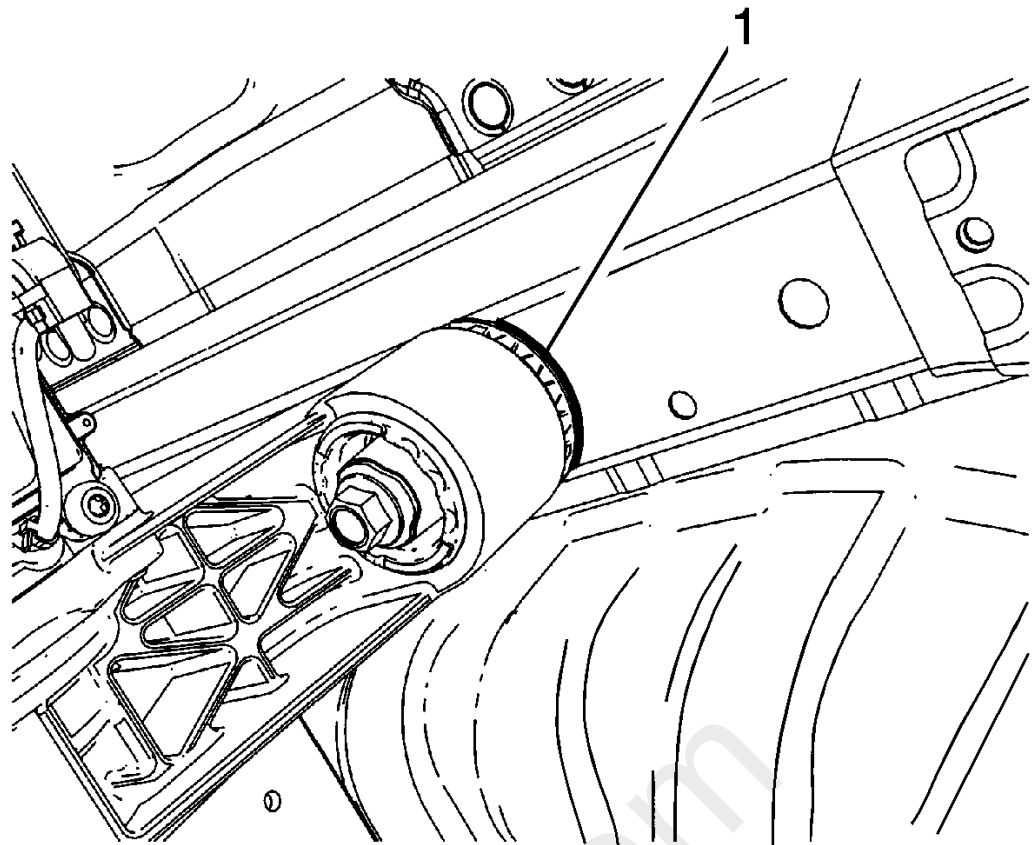


Fig. 26: Rear Differential Support Mounting Outline Mark
Courtesy of GENERAL MOTORS COMPANY

4. Align the front rear differential mounting to the painted outline (1) on the body.

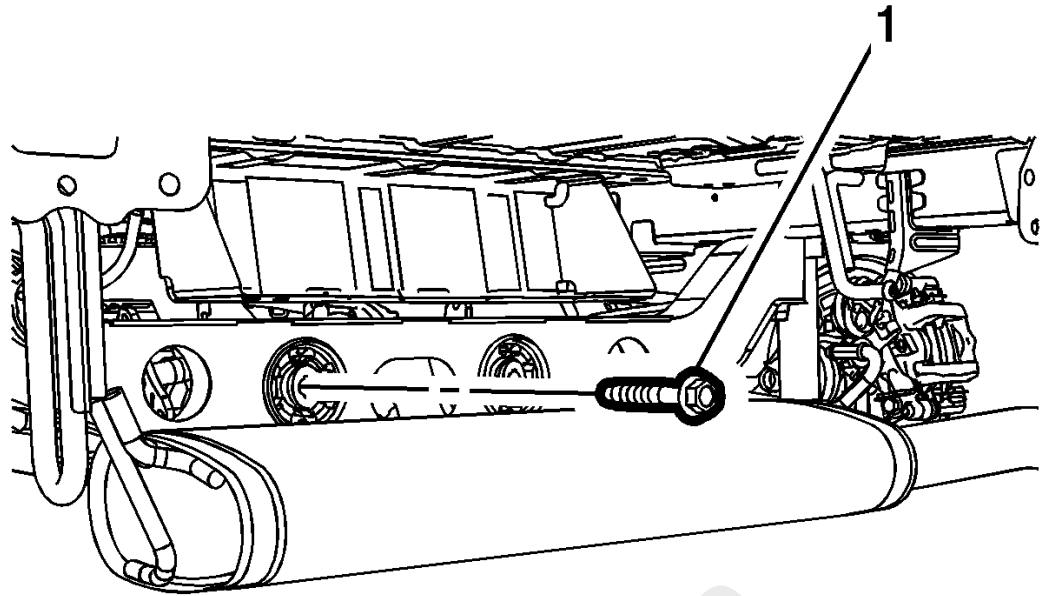


Fig. 27: Rear Differential Support Mounting Bolts
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to **Fastener Caution** .

5. Install the 2 rear mounting bolts (1) and tighten to 108 N.m (80 lb ft).

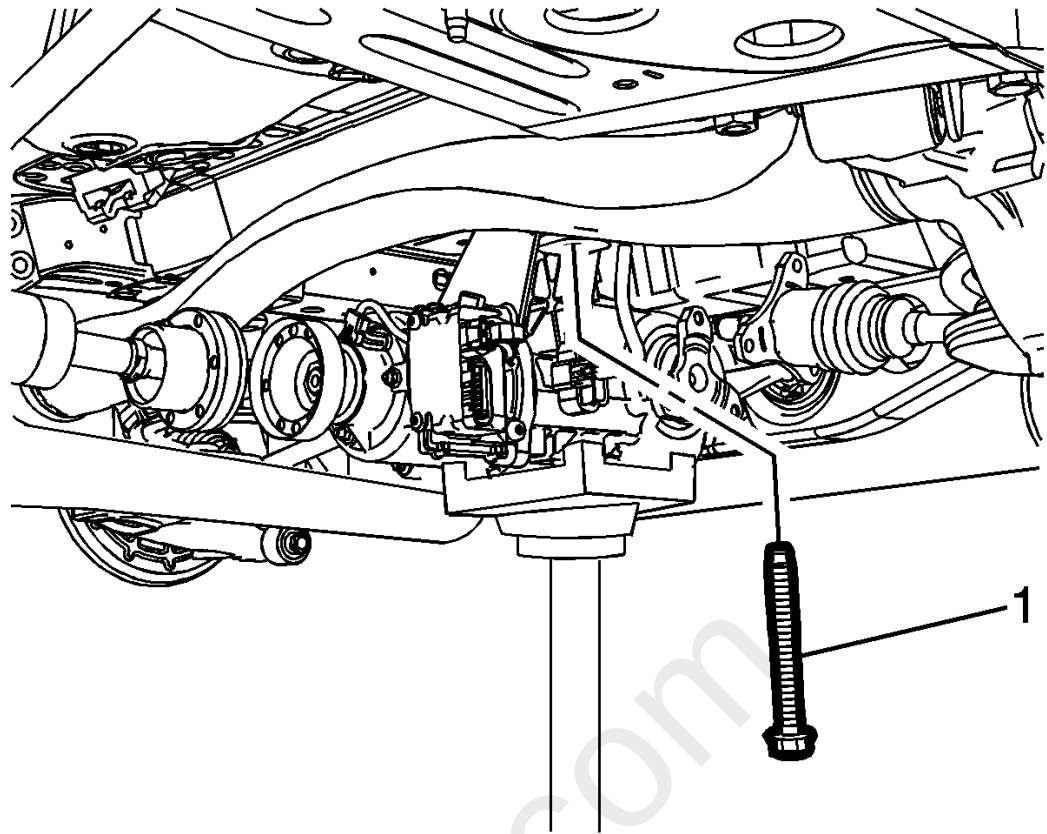


Fig. 28: Rear Differential Mounting Bolt

Courtesy of GENERAL MOTORS COMPANY

6. Install the front mounting bolt (1) and tighten to 100 N.m (74 lb ft).

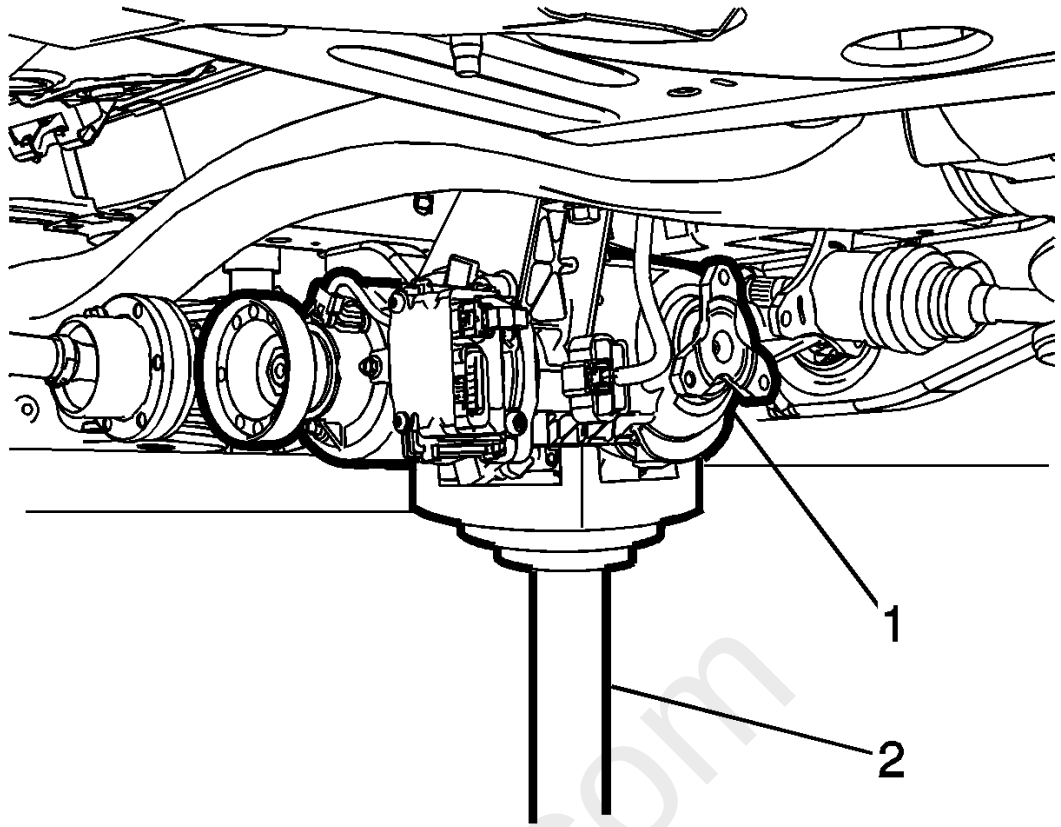


Fig. 29: Jack Stand And Rear Differential
Courtesy of GENERAL MOTORS COMPANY

7. Remove the transmission jack stand (2) from the rear differential assembly (1).

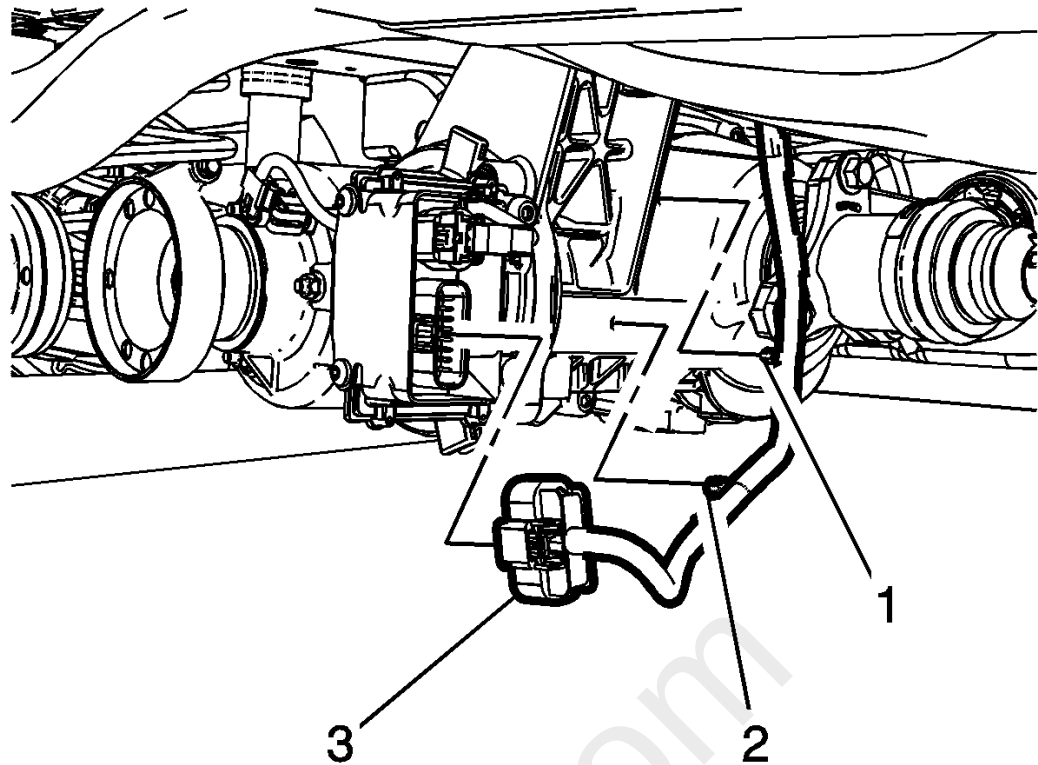


Fig. 30: Wiring Harness, Retainers And Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

8. Reconnect the electrical harness connector (3).
9. Install the propeller shaft to the rear differential assembly. Refer to [Two-Piece Propeller Shaft Replacement](#) .
10. Install the rear wheel drive shafts to the rear differential. Refer to [Rear Wheel Drive Shaft Replacement](#) .
11. Refill the rear differential assembly. Refer to [Differential Oil Replacement](#).
12. Remove the support and lower the vehicle.

DIFFERENTIAL CLUTCH REPLACEMENT

Removal Procedure

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

NOTE: **Support the propeller shaft with mechanics wire.**

2. Remove the propeller shaft from the differential carrier and relocate to the side. Refer to [Two-Piece Propeller Shaft Replacement](#)
3. Remove the differential clutch control module. Refer to [Rear Wheel Drive Module Differential Clutch Control Module Replacement](#)

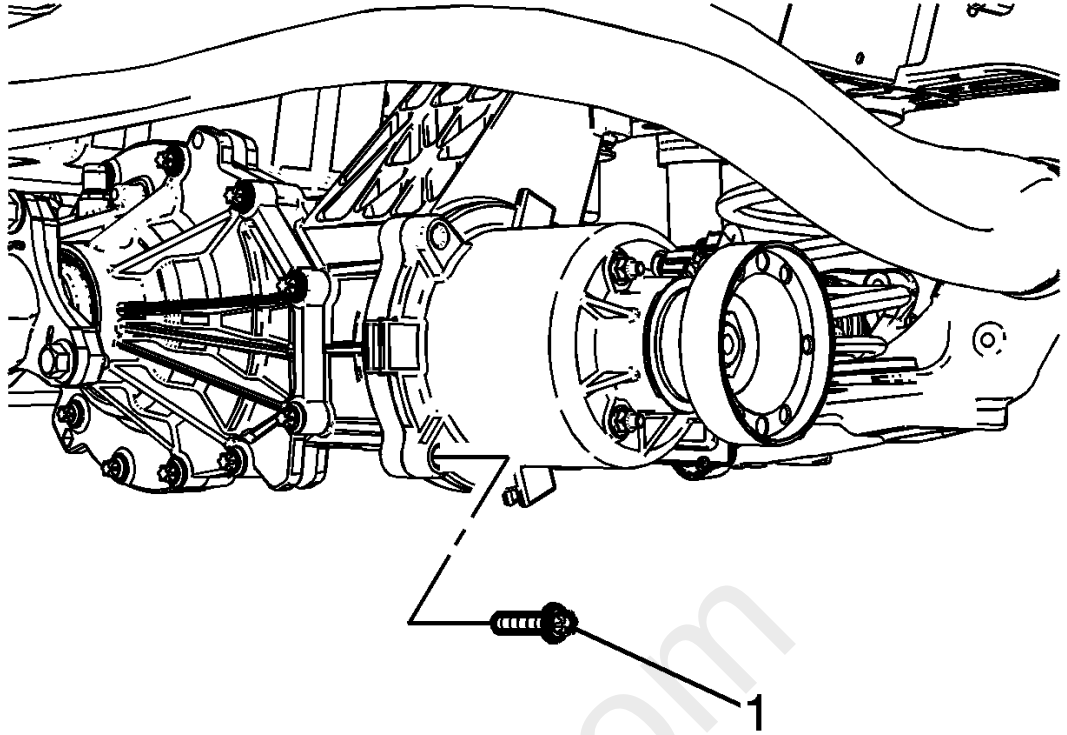


Fig. 31: Differential Clutch Mounting Bolts
Courtesy of GENERAL MOTORS COMPANY

4. Remove the 4 differential clutch mounting bolts (1).

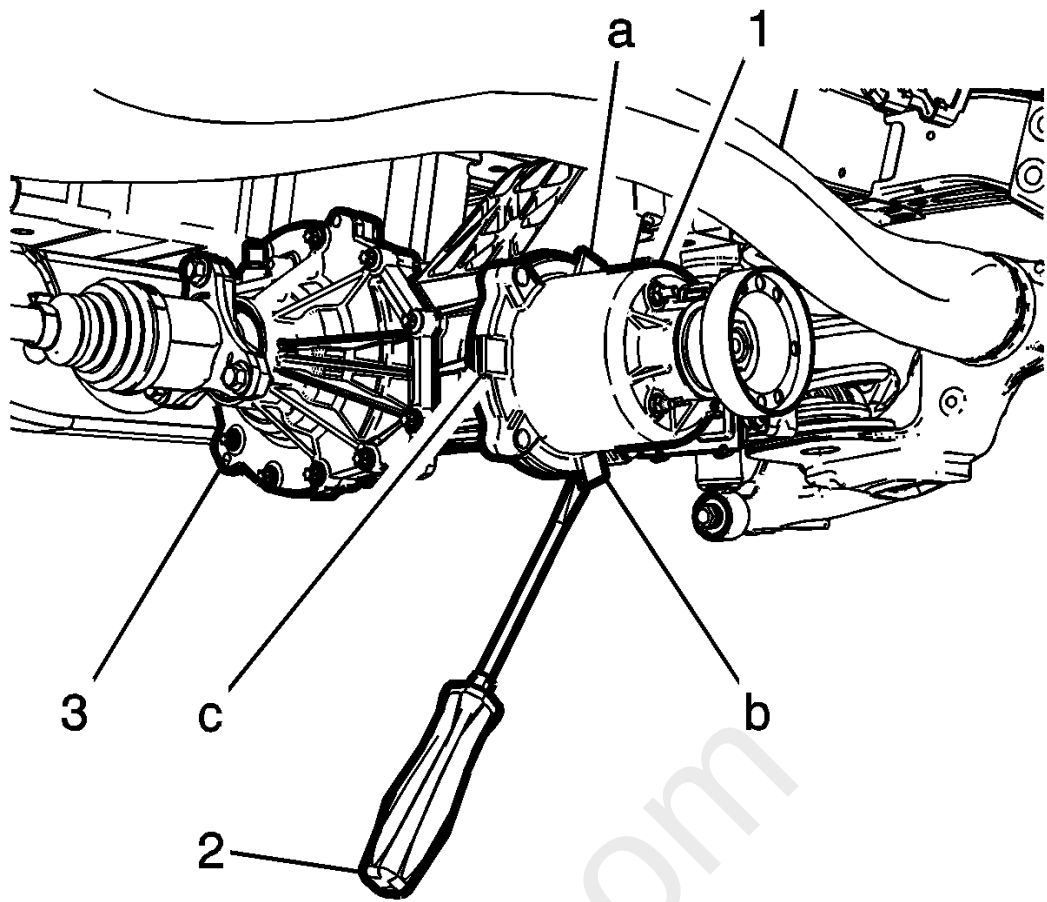


Fig. 32: Separating Differential Clutch

Courtesy of GENERAL MOTORS COMPANY

5. Using the screw driver (2) in the 3 locations a, b and c to separate the differential clutch (1) from the differential carrier (3).

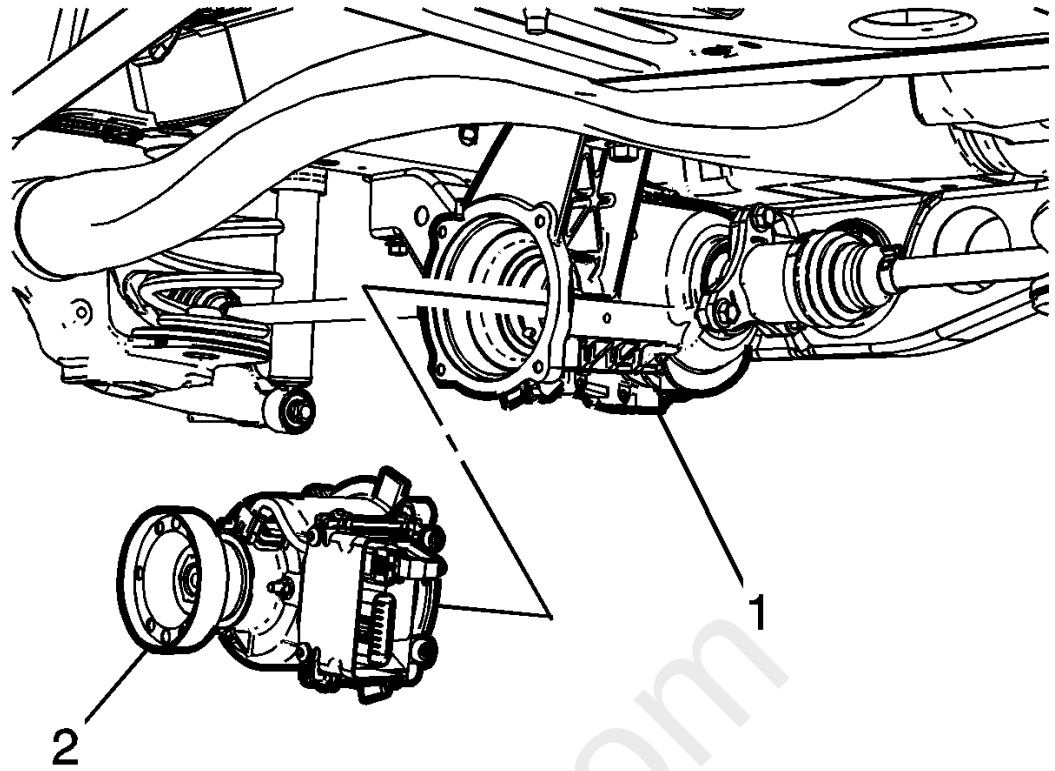


Fig. 33: Differential Clutch And Differential Carrier

Courtesy of GENERAL MOTORS COMPANY

6. Remove the differential clutch (2) from the differential carrier (1).

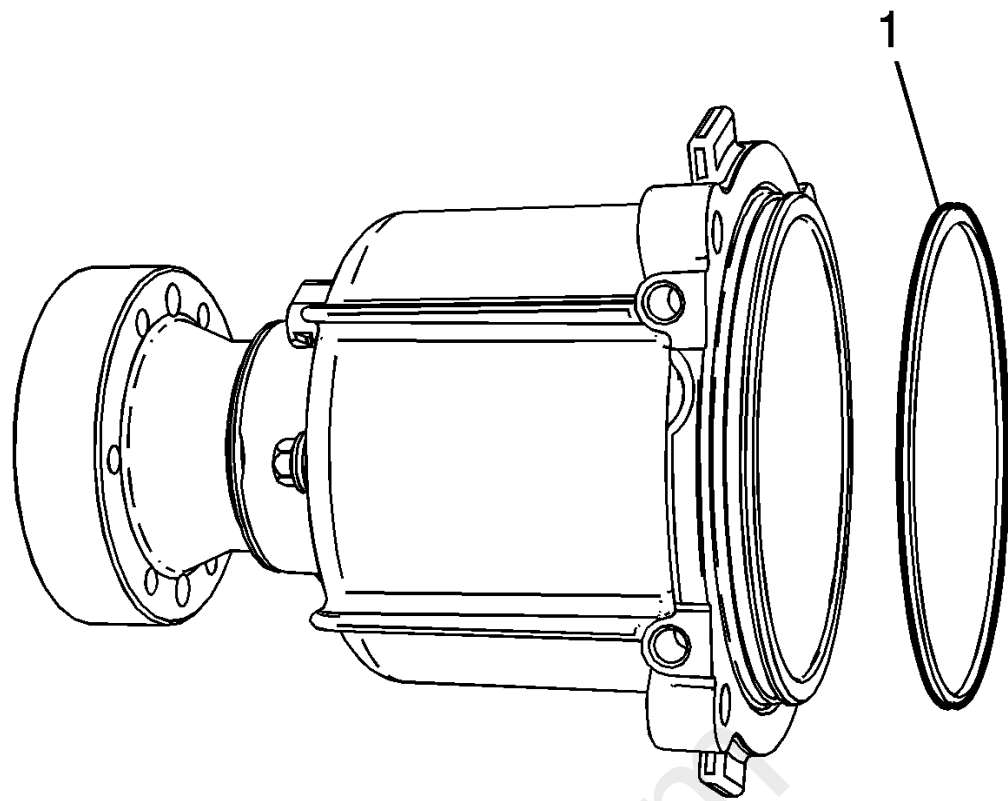


Fig. 34: Differential Clutch O-Ring
Courtesy of GENERAL MOTORS COMPANY

7. Remove and discard the differential clutch O-ring (1).

Installation Procedure

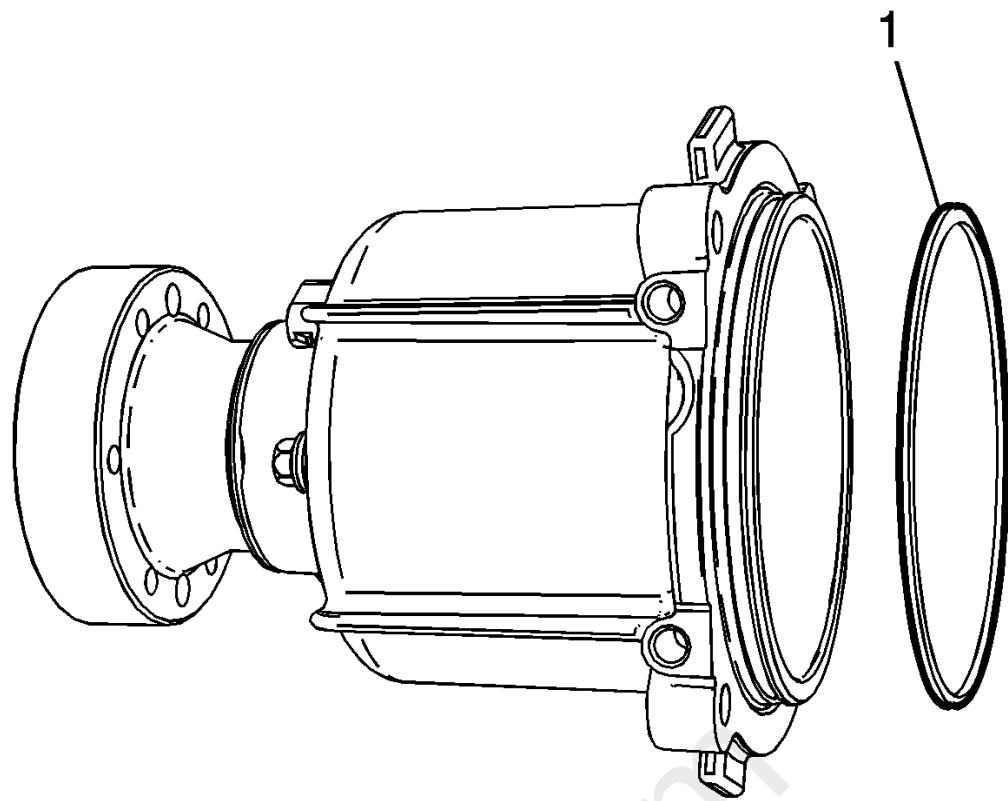


Fig. 35: Differential Clutch O-Ring

Courtesy of GENERAL MOTORS COMPANY

1. Install the NEW differential clutch O-ring (1).

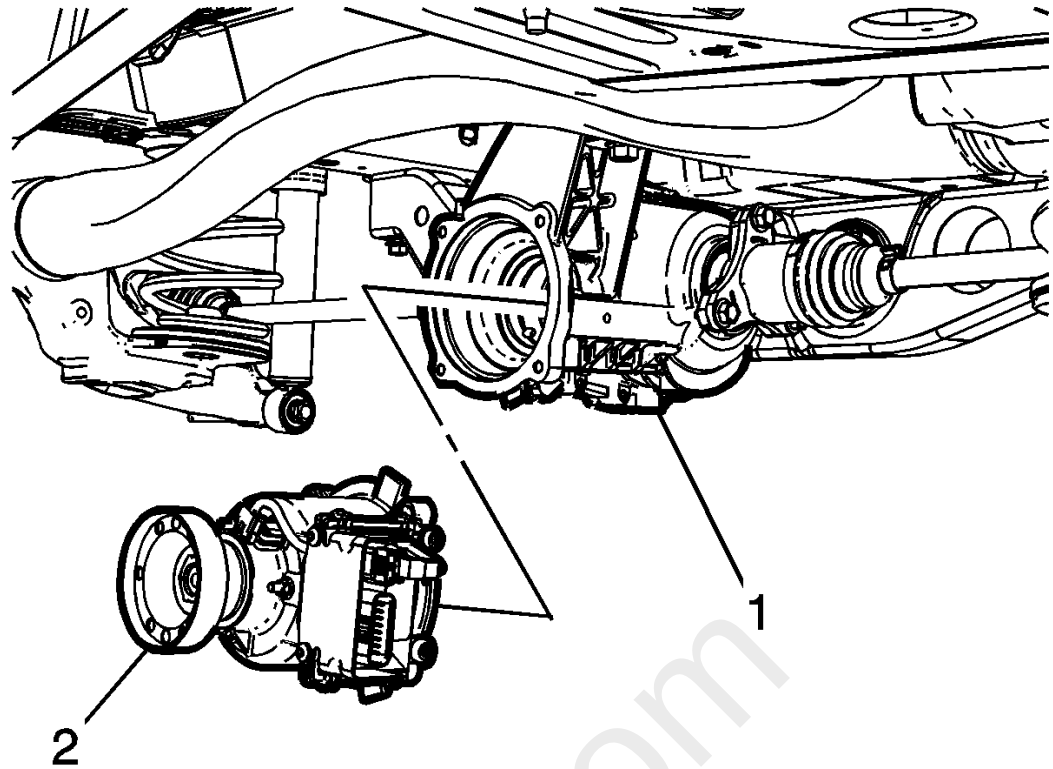


Fig. 36: Differential Clutch And Differential Carrier

Courtesy of GENERAL MOTORS COMPANY

NOTE: Ensure that the rear wheel drive module differential clutch control module is on the left side of the differential carrier.

2. Position the differential clutch (2) on the differential carrier (1).

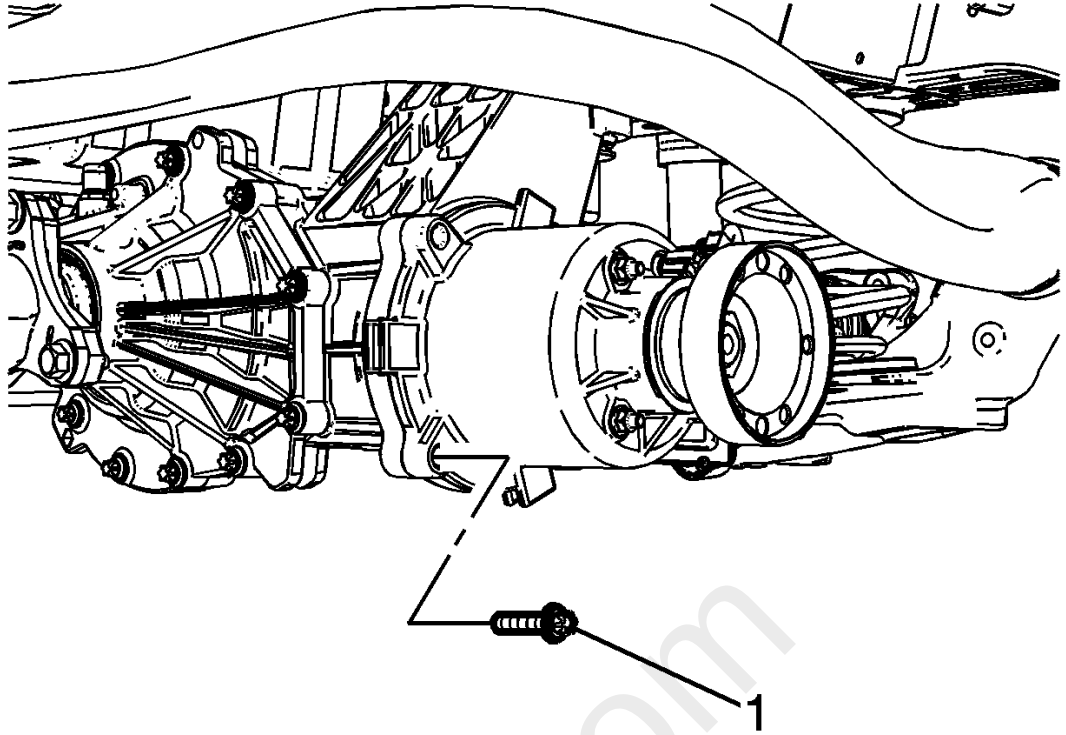


Fig. 37: Differential Clutch Mounting Bolts
Courtesy of GENERAL MOTORS COMPANY

3. Install the 4 differential clutch mounting bolts (1).

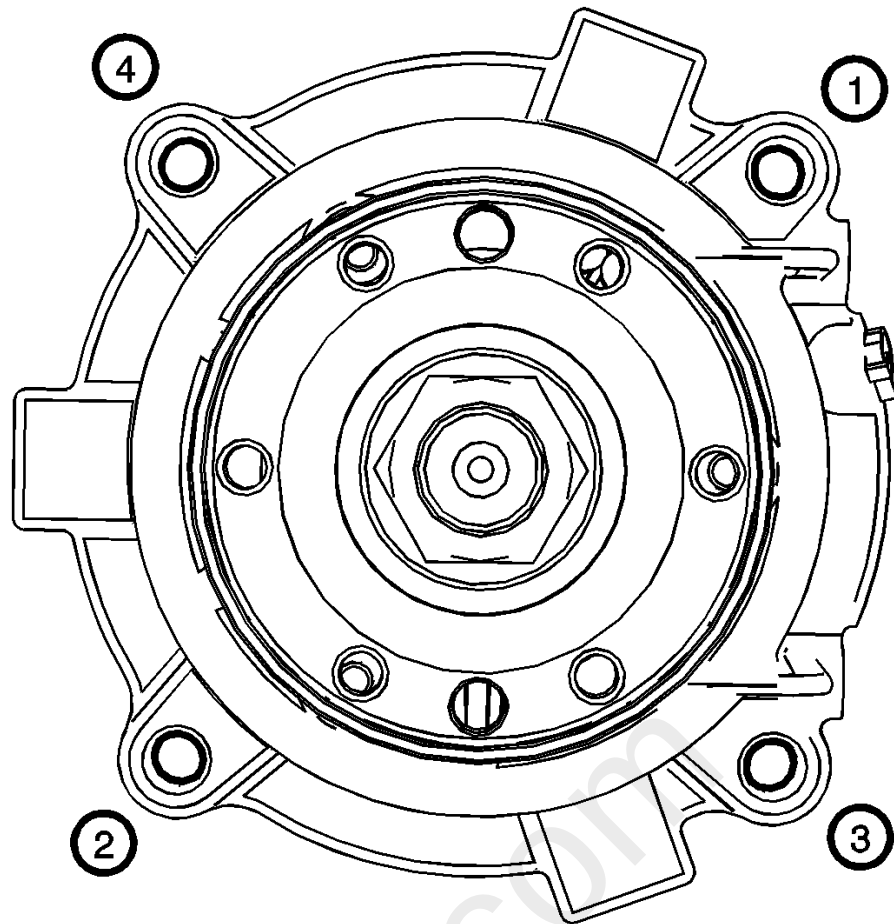


Fig. 38: Differential Clutch Bolt Tightening Sequence
Courtesy of GENERAL MOTORS COMPANY

4. Tighten the differential clutch bolts in a cross pattern (1), (2), (3) and (4).

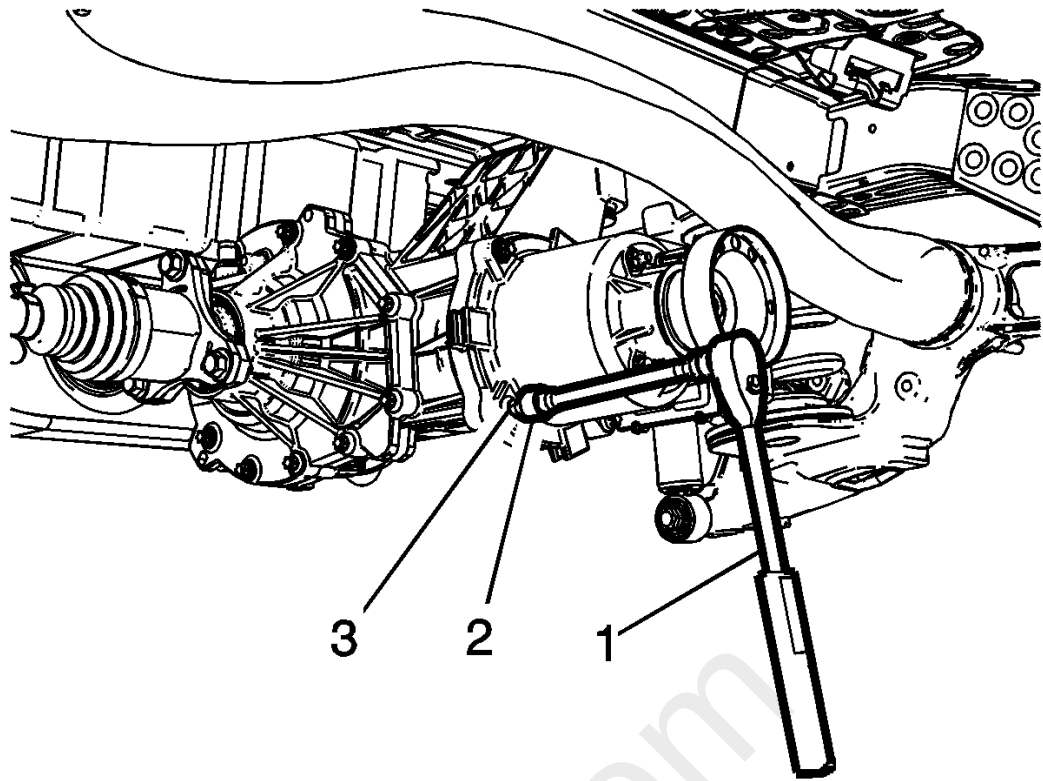


Fig. 39: Tightening Differential Clutch Bolts
Courtesy of GENERAL MOTORS COMPANY

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

5. Using the proper size Torx™ bit and extension (2) and torque wrench (1), tighten the 4 differential clutch bolts (3) to 40 N.m (30 lb ft).
6. Install the differential clutch control module. Refer to [Rear Wheel Drive Module Differential Clutch Control Module Replacement](#)
7. Install the propeller shaft to the differential carrier. Refer to [Two-Piece Propeller Shaft Replacement](#)
8. Remove the support and lower the vehicle.

REAR DIFFERENTIAL CLUTCH CONTROL MODULE CALIBRATION

Configuring the Rear Differential Clutch Control Module with the clutch classification value is required after certain service procedures are performed. The clutch classification value is based on the pressure-to-torque performance of the individual clutch pack. The clutch classification helps to improve vehicle performance by adjusting software parameters to suit the mechanical hardware.

Procedures that will require configuration of the Rear Differential Clutch Control Module are:

- Rear differential assembly replacement
- Rear differential clutch control module replacement

Calibrate Control Module

To calibrate control module, perform the following procedure:

1. Install a scan tool.
2. Ignition ON.

3. Select Rear Differential Clutch Service Calibration Setup in the Rear Differential Clutch Control Module Configuration/Reset Function List.
4. Follow the scan tool directions to complete the calibration procedure.

NOTE: The clutch service calibration will be a single numeric digit. It will be found etched (1) on clutch pack housing. The top of the numeric digit is towards the prop-shaft flange.

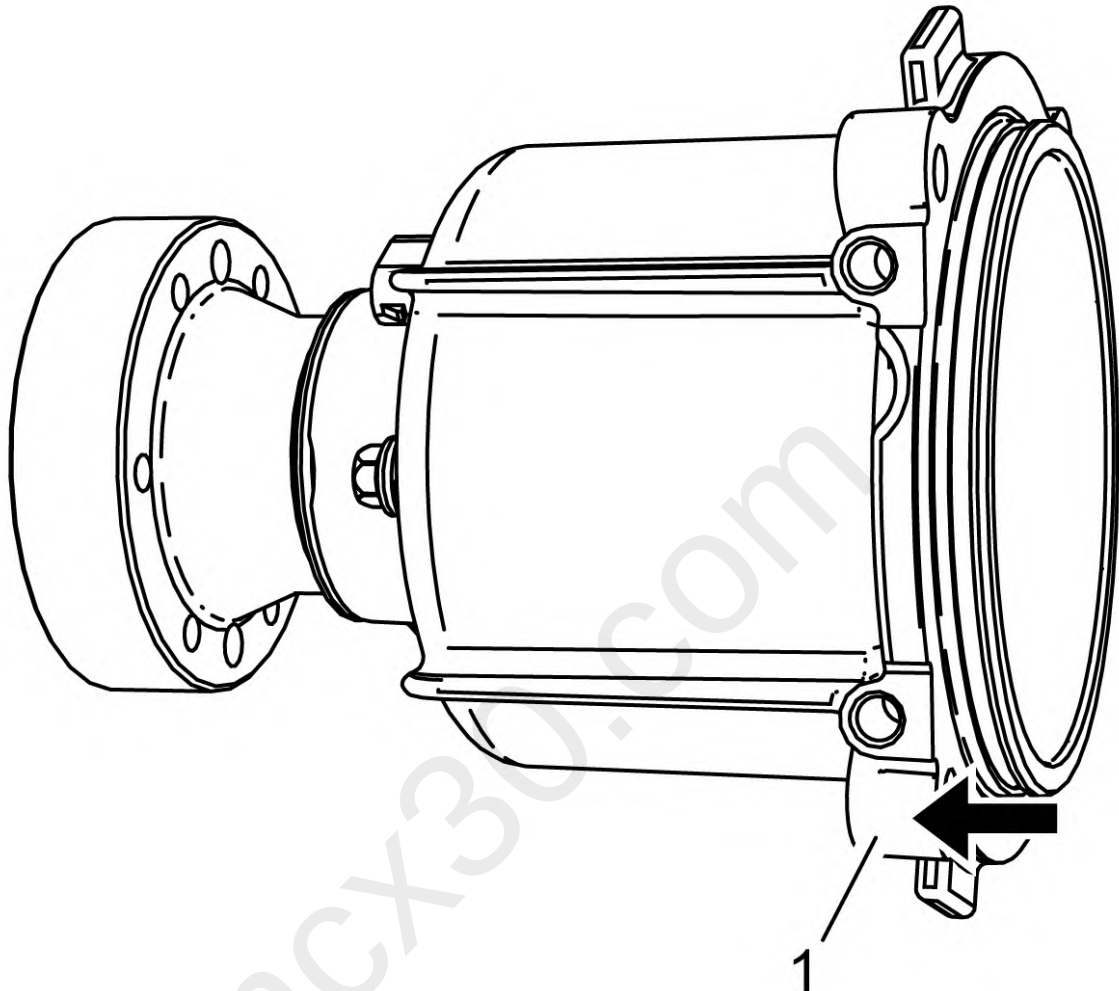


Fig. 40: Etch Mark Location

Courtesy of GENERAL MOTORS COMPANY

DESCRIPTION AND OPERATION

REAR DRIVE AXLE DESCRIPTION AND OPERATION

The rear differential assembly in this vehicle consists of an aluminum housing which contains a electric clutch/coupler and a differential. The differential fluid is only contained in the differential housing portion.

The clutch and clutch housing are serviced as an assembly. The fluid level range for proper rear differential assembly operation is 500 ml. New service replacement units will be shipped dry (without fluid). Fill new units with 500 ml of GL Synthetic fluid.

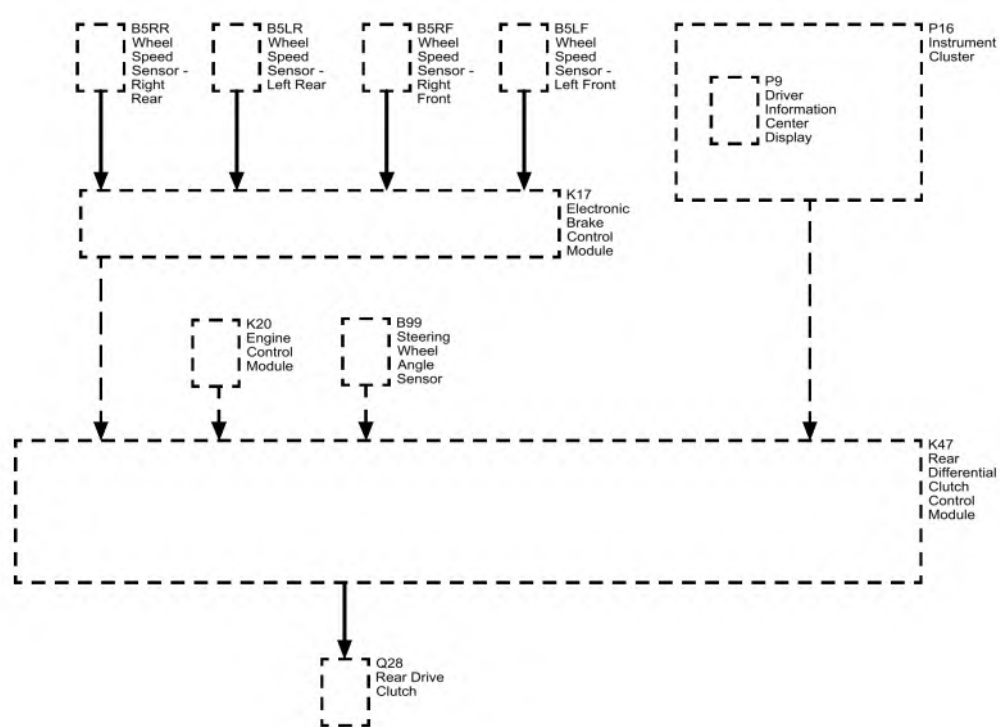


Fig. 41: Rear Drive Axle Block Diagram
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
P16	P16 Instrument Cluster
B5LF	B5LF Wheel Speed Sensor - Left Front
B5RF	B5RF Wheel Speed Sensor - Right Front
B5LR	B5LR Wheel Speed Sensor - Left Rear
B5RR	B5RR Wheel Speed Sensor - Right Rear
K17	K17 Electronic Brake Control Module
K20	K20 Engine Control Module
B99	B99 Steering Wheel Angle Sensor
K47	K47 Rear Differential Clutch Control Module
P9	P9 Driver Information Center Display
Q28	Q28 Rear Drive Clutch

The rear drive axle system operates as follows:

- The system distributes torque to the rear wheels to enhance traction and improve vehicle handling performance.
- The all wheel drive (AWD) clutch assembly contains an electromagnetic coil, primary clutch, a ball cam, a secondary clutch, and a rear differential clutch control module.
- The rear differential clutch control module uses wheel speeds, steering angle, lateral acceleration, yaw, chassis control intervention, and other signals to determine the torque to be applied. This data is transmitted via the vehicles Controller Area Network (CAN) from other modules and sensors in the vehicle.
- The driver information center can display two messages for the Rear Drive Axle system. Service All Wheel Drive or code 73 and AWD Off or code 173. When these messages are displayed, the system is disabled and the vehicle will default to 2WD.
- If the vehicle is being driven very aggressively or an unexpected tire size has been used, the AWD Off or code 173 message will be displayed in the driver information center. This should not result in the replacement of rear differential clutch control module.
- The AWD Off or code 173 message will be displayed in the driver information center if the mini-spare tire or a very small sized tire has been installed. This should not result in the replacement of rear differential clutch control module.
- The torque transfer to the rear wheels is controlled by the rear differential clutch control module which sends current to the electromagnetic coil in the clutch. The coil applies a load on the primary clutch which rotates the

ball cam loading the secondary clutch. The secondary clutch applies the torque from the drive shaft, driving the rear wheels. Safe current range is between 0-6.0 A. If the current is out of the specified range, a DTC will be set, and the driver information center will display the Service AWD or code 73 message.

- The rear differential clutch control module has an internal temperature sensor, which will maintain consistent and continuous temperature compensation for torque transfer from -40Â°C to +120Â°C. When the temperature of the module is determined to be beyond its limits, the rear differential clutch control module will temporarily disable the rear drive system and the driver information center will display the AWD Off or code 173 message. When the temperature of the module is back within the limits, the rear differential clutch control module will enable the rear drive system.
- The rear differential clutch control module monitors the outside air temperature maintaining consistent and continuous temperature compensation for torque transfer from -20Â°C (-4Â°F) to 100Â°C (212Â°F).
- Voltage to the module is between 9-16 V. The module will set a low voltage DTC and a high voltage DTC to indicate voltage value out of range.
- If replacing the rear differential assembly or the rear differential clutch control module, the module needs to be configured for the clutch control calibrations. The rear differential housing will have a 1 digit code on it. The 1 digit code must be programmed into the rear differential clutch control module using the scan tool.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

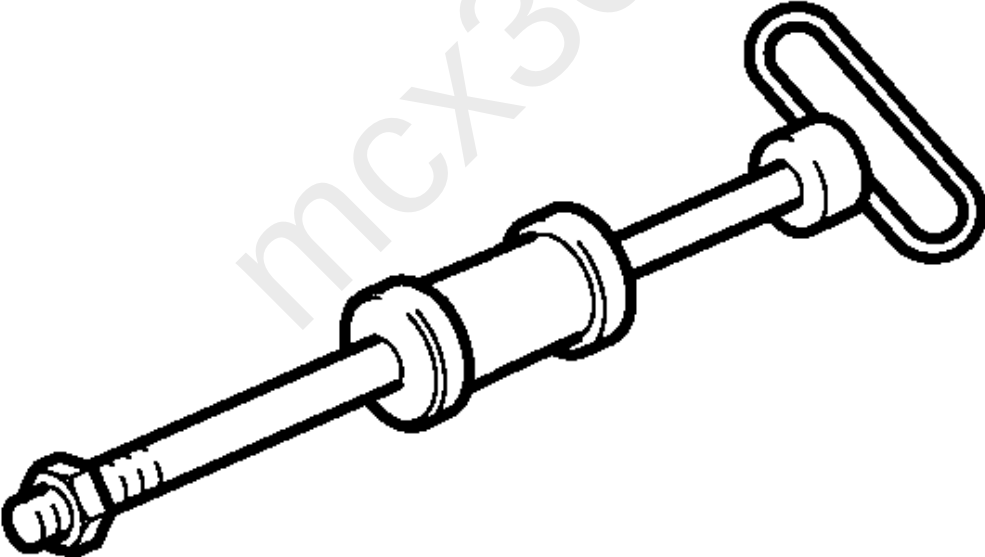
Illustration	Tool Number/Description
	CH-313 KM-313 J-2619-01 J-6125-1B Slide Hammer

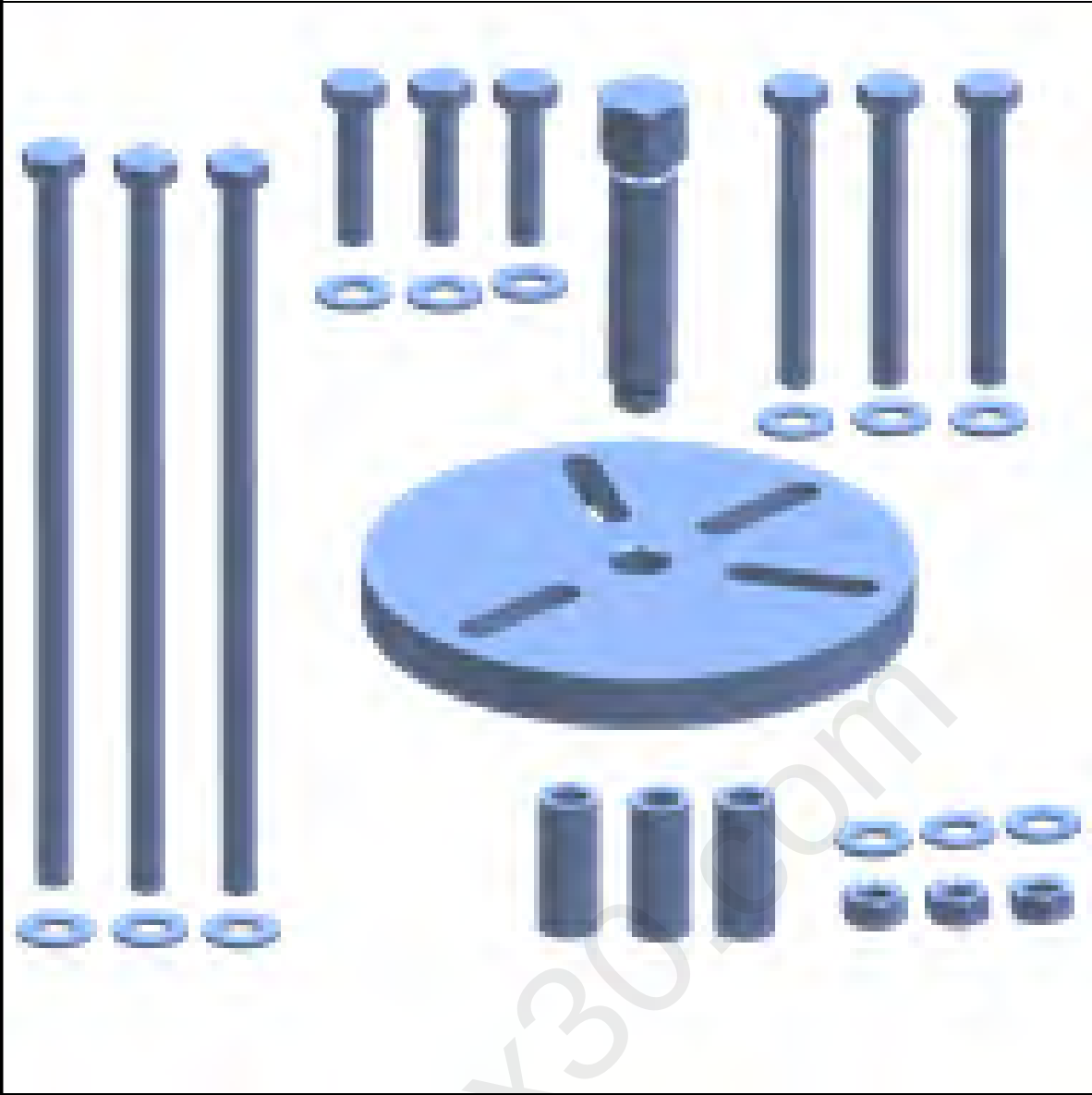
Illustration	Tool Number/Description
 The illustration shows the J-45019 Flange Remover tool kit. It includes a central circular plate with four slots. Surrounding the plate are various components: three long bolts with washers, three medium bolts with washers, three short bolts with washers, three spacers, three small bolts with washers, three small bolts without washers, and three small bolts with washers. A large watermark 'mcx30.com' is visible across the image.	J-45019 Flange Remover

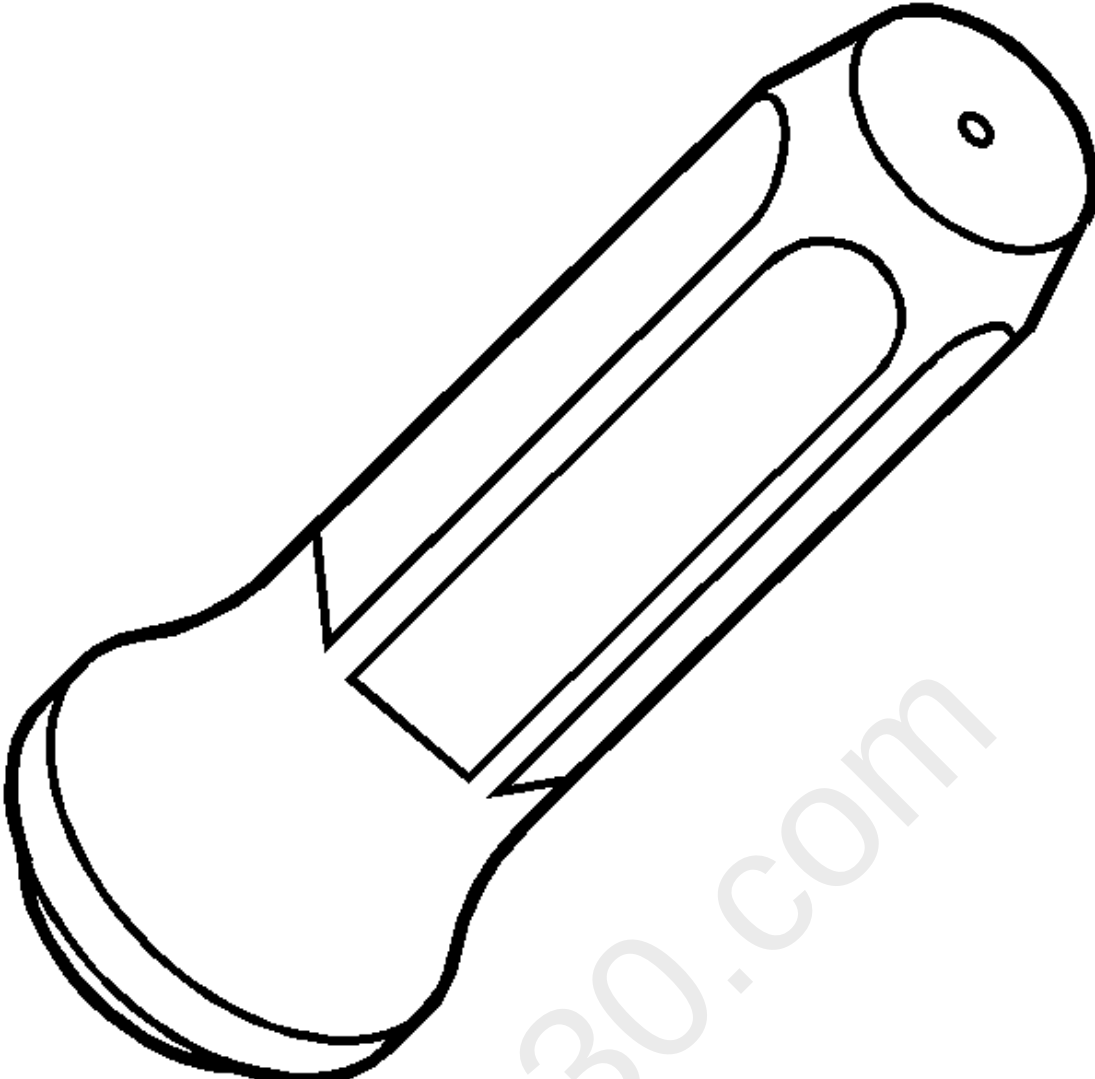
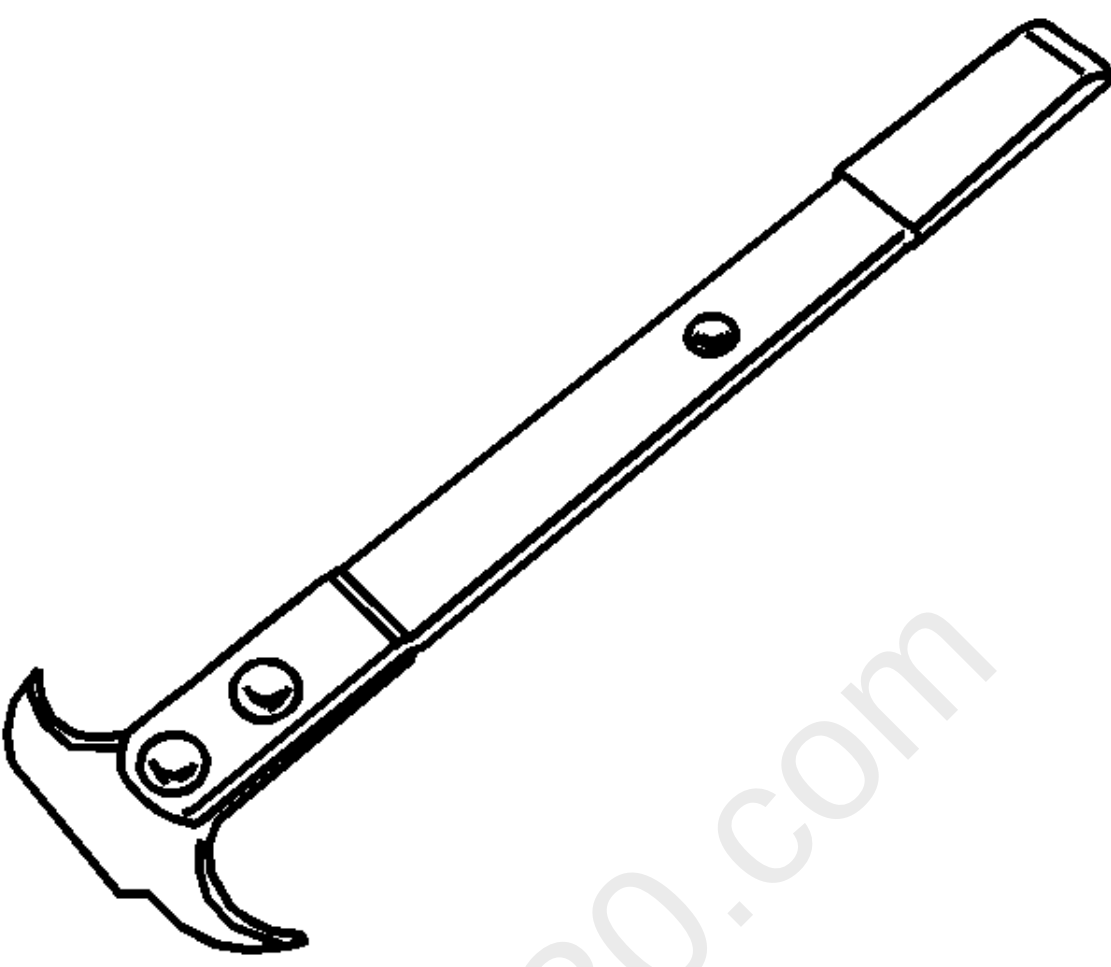
Illustration	Tool Number/Description
	J-44809 Seal Installer

Illustration	Tool Number/Description
	EN-45000 Seal Remover