

2018 DRIVELINE/AXLE
Rear Drive Axle - Traverse

SPECIFICATIONS

FASTENER SPECIFICATIONS

Reusable Threaded Fastener Tightening Specifications

Application	Specification
	Metric (English)
NOTE: <i>All fasteners listed in this table can be reused after removal.</i>	
Clutch Control Module Bracket Bolts	6 N.m (53 lb in)
Differential-to-Cradle Mount Bolts/Nuts	100 N.m (74 lb ft)
Differential Clutch Fill Plug	12 N.m (106 lb in)
Differential Clutch Drain Plug	12 N.m (106 lb in)
Lubricant Drain Plug	39 N.m (29 lb ft)
Lubricant Fill Plug	39 N.m (29 lb ft)
Torque Tube Bracket-to-Body Bolt	160 N.m (118 lb ft)
Torque Tube-to-Differential Bolts	55 N.m (41 lb ft)

APPROXIMATE FLUID CAPACITIES

Application	Specification	
	Metric	English
Axle Ratio	2.77	
Differential Lubricant Fill Quantity	0.75 liters	0.79 quarts
Differential Clutch Oil Fill Quantity	0.35 liters	0.37 quarts

DIFFERENTIAL CARRIER ASSEMBLY SPECIFICATIONS

Application	Specification	
	Metric	English
Axle Ratio	2.77	

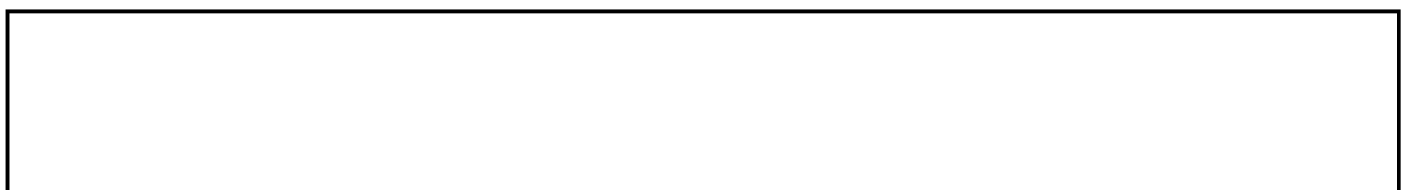
ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

Application	Type of Material	GM Part Number	
		United States	Canada
Differential Lubricant	Dexron LS Hypoid Fluid	88862624	88862625
Differential Clutch Oil	Pentosin CHF-11S	88901975	88901976

SCHEMATIC WIRING DIAGRAMS

REAR AXLE WIRING SCHEMATICS

Rear Differential Clutch Control Module Power, Ground, Data Communication, and Indicator (F48)



Circuit/System Description

The right and left rear differential clutch solenoid valves are electro-hydraulic valves used to relieve pressure in the hydraulic system. When the solenoid valves are energized, the valves are closed and hydraulic pressure can be accumulated. When the solenoid valves are de-energized, the valves are open and it is not possible to build hydraulic pressure.

Conditions for Running the DTC

- The engine is running.
- Battery voltage is between 9-16 V.
- DTC C0800 is not current.

Conditions for Setting the DTC

C0393 01

The rear differential clutch control module determines a short to battery on the rear differential clutch solenoid valve control circuit.

C0393 02

The rear differential clutch control module determines a short to ground on the rear differential clutch solenoid valve control circuit.

C0393 5A

The rear differential clutch control module determines a signal plausibility failure.

C0393 61

The rear differential clutch control module determines the differential clutch pump is stuck.

Action Taken When the DTC Sets

One or more of the following actions may occur:

- The electronic limited slip system is temporary inhibited for the duration of the key cycle.
- The electronic limited slip system is disabled for the duration of the key cycle.
- The AWD SERVICE message 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 Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Rear Drive Axle Description and Operation (With G99)

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. Verify that DTC C0393 with symptom byte 01, 02 or 5A is not set.

- **If the DTC is set**

Refer to Circuit/System Testing.

- **Go to next step: If the DTC is not set**

2. Verify that DTC C0393 61 is not set.

- **If the DTC is set.**

1. Perform the Rear Differential Hydraulic System Bleed Procedure with a scan tool. Refer to [Rear Differential Hydraulic System Service Fill/Bleed](#)

NOTE: The Rear Differential Clutch Module can run this procedure up to 3 attempts to get a Pass.

2.

3. Verify that DTC C0393 61 is not set.

- if DTC is set, test or replace the appropriate rear differential clutch solenoid valve.
- Go to next step: If the DTC is not set

4. All OK.

- **Go to next step: If the DTC is not set**

3. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the Q49 Rear Differential Clutch Solenoid Valve, Ignition ON/Vehicle in Service Mode.

2. Test for 5 - 6 V between the control circuit terminal 3 and ground.

- **If less than 5 V**

1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module.
2. Test for infinite resistance between the control circuit terminal 3 and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- Go to next step: If infinite resistance

3. Test for less than 2 Ω in the control circuit terminal 3 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 6 V**

1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module, Ignition ON/Vehicle in Service Mode.
2. Test for less than 1 V between the control circuit terminal 3 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.

- **Go to next step: If between 5 - 6 V**

3. Test for 4.9 - 5.3 V between the control circuit terminals listed below and ground.

- Control Circuit Terminal 2
- Control Circuit Terminal 1

- **If less than 4.9 V**

1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module.
2. Test for infinite resistance between the appropriate control circuit terminal and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
3. Test for less than 2 Ω in the appropriate control circuit terminal 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 5.3 V**
 1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module, Ignition ON/Vehicle in Service Mode.
 2. Test for less than 1 V between the appropriate control circuit terminal 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.
 - **Go to next step: If between 4.9 - 5.3 V**
 4. Test or replace the Q49 Rear Differential Clutch Solenoid Valve.

Repair Instructions

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

- [Differential Carrier Assembly Replacement](#) for Q49 Rear Differential Clutch Solenoid Valve.
- [Control Module References](#) for control module replacement, programming, and setup.

DTC C0407

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 Descriptors

DTC C0407

Differential Oil Pump Motor

For symptom byte information, refer to [Symptom Byte List](#)

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Control Circuit Terminal 6	C0407 02	C0407 04	C0407 01	C0407 1B
Control Circuit Terminal 7	C0407 02	C0407 04	C0407 01	C0407 1B
Control Circuit Terminal 8	C0407 02	C0407 04	C0407 01	C0407 1B

Circuit/System Description

The pressure in the hydraulic circuit is controlled by the differential clutch pump. The differential clutch pump utilizes a brushless motor and a radial piston pump. The motor in the differential clutch pump is controlled utilizing a bi-directional control that applies power and ground to each control circuit. By reversing the polarity of the motor, the differential clutch pump is able to spin both clockwise and counter-clockwise as a means to increase and decrease pressure in the system. The differential clutch pump is constantly increasing or decreasing the pressure in the system according to the torque request signal as controlled by the rear differential clutch control module.

Conditions for Running the DTC

C0407 01, C0407 02, C0407 1B, C0407 5A

- The engine is running.
- Battery voltage is between 9-16 V.
- The engine speed is above 400 RPM.

C0407 04

- The engine is running.
- The starter motor commanded on is false.
- Battery voltage is between 9-16 V.
- The engine speed is above 400 RPM.

C0407 0B, C0407 61, C0407 64

- The engine is running.
- The engine speed is above 400 RPM.

Conditions for Setting the DTC

C0407 01

When voltage for motor phase U, V, and W is above 1.0 V.

C0407 02

When voltage for motor phase U, V, and W is below 7.0 V.

C0407 04

When voltage for motor phase U, V, and W is below 7.0 V.

C0407 0B

The bridge driver circuit detects shunt voltage above 0.16 V.

C0407 1B

A rear differential clutch control module has detected a short between U, V, and W phases.

C0407 5A

The rear differential clutch control module detects implausible voltage reading.

C0407 61

The rear differential clutch control module determines the differential clutch pump is stuck.

C0407 64

The rear differential clutch control module determines the differential clutch pump is slipping.

Action Taken When the DTC Sets

- Electronic limited slip is disabled for the duration of the key cycle.
- The AWD SERVICE message is 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 ignition cycles.

Reference Information

Schematic Reference

Rear Axle Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Rear Drive Axle Description and Operation (With G99)Rear Drive Axle Description and Operation (Without G99)

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. Verify that DTC C0407 with symptom byte 01, 02 or 04 is not set.
 - **If the DTC is set**

Refer to Circuit/System Testing.
 - **Go to next step: If the DTC is not set**
2. Verify the differential clutch oil level is correct. Refer to [Rear Axle Lubricant Level Inspection](#).
 - **If the differential clutch fluid level is below specifications**
 1. Verify the rear axle lubricant level is correct. Refer to [Rear Axle Lubricant Level Inspection](#).

NOTE:

If the vehicle is unable to complete the rear differential hydraulic system service fill/bleed procedure, the M32 Differential Clutch Pump may have been damaged by the low differential clutch fluid level.

- If the rear axle lubricant level is above specifications, the differential clutch may be leaking differential clutch oil into the rear axle lubricant. Inspect for and correct any internal fluid leaks between the differential clutch oil and the rear axle lubricant. Refer to [Rear Differential Carrier Leak Diagnosis](#). After the repair has been completed, perform the [Rear Differential Hydraulic System Service Fill/Bleed](#).
 - If the rear axle lubricant level is below specifications, inspect for fluid leaks and fill as required.
 - Go to next step: If the rear axle lubricant level is correct.
2. Verify there are no external differential clutch oil leaks.
 - If any external differential clutch oil leaks are observed, repair as necessary and perform the [Rear Differential Hydraulic System Service Fill/Bleed](#).
 - Go to next step: If there are there are no external differential clutch oil leaks.
 3. Perform the [Rear Differential Hydraulic System Service Fill/Bleed](#) procedure.
 4. Verify the vehicle is able to complete the rear differential hydraulic system service fill/bleed procedure.
 - If the vehicle is unable to complete the rear differential hydraulic system service fill/bleed procedure, test or replace the M32 Differential Clutch Pump.
 - Go to next step: If the vehicle is able to complete the rear differential hydraulic system service fill/bleed procedure.
 5. Clear all DTCs.
 6. Verify the DTC does not set while operating the vehicle within the conditions for running the DTC.
 - If the DTC sets, test or replace the M32 Differential Clutch Pump.
 - Go to next step: If the DTC does not set.
 7. All OK.
 - **Go to next step: If the differential clutch fluid level is correct**
3. Perform the [Rear Differential Hydraulic System Service Fill/Bleed](#).
 4. Verify the vehicle is able to complete the rear differential hydraulic system service fill/bleed procedure.

- If the vehicle is unable to complete the rear differential hydraulic system service fill/bleed procedure, perform the **Rear Differential Hydraulic System Service Fill/Bleed** two additional times. If the vehicle is unable to complete the rear differential hydraulic system service fill/bleed procedure after three attempts, replace the M32 Differential Clutch Pump.
- Go to next step: If the vehicle is able to complete the rear differential hydraulic system service fill/bleed procedure.

5. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the M32 Differential Clutch Pump, Ignition ON/Vehicle in Service Mode.
2. Test for 3.3 - 5.3 V AC between the control circuit terminal 8 and ground.
 - **If less than 3.3 V AC**
 1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module.
 2. Test for infinite resistance between the control circuit terminal 8 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
 3. Test for less than 2 Ω in the control circuit terminal 8 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 5.3 V AC**
 1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module, Ignition ON/Vehicle in Service Mode.
 2. Test for less than 1 V between the control circuit terminal 8 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.
 - **Go to next step: If between 3.3 - 5.3 V AC**
3. Test for 1.2 - 3.7 V between the control circuit terminal 7 and ground.
 - **If less than 1.2 V**
 1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module.
 2. Test for infinite resistance between the control circuit terminal 7 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
 3. Test for less than 2 Ω in the control circuit terminal 7 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 3.7 V**
 1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module, Ignition ON/Vehicle in Service Mode.
 2. Test for less than 1 V between the control circuit terminal 7 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.
 - **Go to next step: If between 1.2 - 3.7 V**
4. Test for 6.4 - 6.8 V between the control circuit terminal 6 and ground.
 - **If less than 6.4 V**
 1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module.
 2. Test for infinite resistance between the control circuit terminal 6 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
 3. Test for less than 2 Ω in the control circuit terminal 6 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 6.8 V**

1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module, Ignition ON/Vehicle in Service Mode.
2. Test for less than 1 V between the control circuit terminal 6 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.

- **Go to next step: If between 6.4 - 6.8 V**

5. Ignition OFF, disconnect the scan tool and disconnect the harness connector at the M32 Differential Clutch Pump.
6. Test for greater than 25 Ω between the following control circuit terminals listed below.
 - Control Circuit Terminal 6
 - Control Circuit Terminal 7
 - Control Circuit Terminal 8
 - **If 25 Ω or less**
 1. Disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module.
 2. Test for infinite resistance between the three control circuits.
 - If less than infinite resistance, repair the short between the three circuits.
 - If infinite resistance, replace the K47 Rear Differential Clutch Control Module.
 - **Go to next step: If greater than 25 Ω**
7. Test or replace the M32 Differential Clutch Pump.
8. Operate the vehicle under the conditions for setting the DTC, the DTC should not set.
 - **If the DTC sets**

Replace the K47 Rear Differential Clutch Control Module.

- **Go to next step: If the DTC does not set**

9. All OK.

Repair Instructions

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

- [Differential Carrier Assembly Replacement](#) for M32 Differential Clutch Pump.
- [Control Module References](#) for control module replacement, programming and setup.

DTC C122F

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](#) provide an overview of each diagnostic category.

DTC Descriptors

DTC C122F

Rear Differential Clutch System Performance

For symptom byte information, refer to [Symptom Byte List](#).

Circuit/System Description

The rear differential clutch control module detects a series of overheat events that have occurred in the rear differential clutch system.

Conditions for Running the DTC

- The engine is running.
- The engine speed is above 400 RPM.

Conditions for Setting the DTC

C122F 54

The rear differential clutch control module detects a series of overheat events on the clutch.

Action Taken When the DTC Sets

- The electronic limited slip control is disabled.
- The AWD SERVICE message is 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 ignition cycles.

Diagnostic Aids

Excessive differentiation (wheel/tire slip) can cause high temperatures in the rear drive axle and DTC C122F may set.

Reference Information

Schematic Reference

Rear Axle Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Rear Drive Axle Description and Operation (With G99)Rear Drive Axle Description and Operation (Without G99)

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 DTC C122F is not set.
 - **If the DTC is set**
 1. Ignition OFF.
 2. Allow 30 min for the clutch to cool completely down.
 3. Perform key cycle, ignition OFF then ON.
 4. Clear DTC.
 5. Verify DTC C122F is not set.
 - If the DTC is set, replace K47 Rear Differential Clutch Control Module.
 - Go to next step: If the DTC is not set.

6. All OK.

- **Go to next step: If the DTC is not set**

3. All OK.

Repair Instructions

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

For control module replacement, programming, and setup refer to: [Control Module References](#)

DTC C1230 OR C1231 (G99)

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](#) provide an overview of each diagnostic category.

DTC Descriptors

DTC C1230

Left Rear Drive Clutch System Performance

DTC C1231

Right Rear Drive Clutch System Performance

For symptom byte information, refer to [Symptom Byte List](#).

Circuit/System Description

The rear differential clutch control module detects a series of overheat events that have occurred in the left and right rear differential clutch system. No external circuit diagnosis is involved.

Conditions for Running the DTC

- The engine is running.
- The engine speed is above 400 RPM.

Conditions for Setting the DTC

C1230 54

The rear differential clutch control module detects a series of overheat events on the left clutch.

C1231 54

The rear differential clutch control module detects a series of overheat events on the right clutch.

Action Taken When the DTC Sets

- The electronic limited slip control is disabled.
- The AWD SERVICE message is 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 ignition cycles.

Diagnostic Aids

Excessive differentiation (wheel/tire slip) can cause high temperatures in the rear drive axle and DTC C1230 or C1231 may set.

Reference Information

Schematic Reference

Rear Axle Wiring Schematics

Connector End View Reference

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Rear Drive Axle Description and Operation (With G99)

Electrical Information Reference

- Circuit Testing
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- 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 DTC C1230 or C1231 is not set.
 - **If any of the DTCs are set**
 1. Ignition OFF.
 2. Allow 30 min for the clutch to cool completely down.
 3. Perform key cycle, ignition OFF then ON.
 4. Clear DTC.
 5. Verify DTC C1230 or C1231 is not set.
 - If any of the DTCs are set, replace K47 Rear Differential Clutch Control Module.
 - Go to next step: If none of the DTCs are set.
 - 6. All OK.
 - **Go to next step: If none of the DTCs are set**
3. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

Control Module References for control module replacement, programming and setup.

DTC C1244, C1245, OR C124B

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 Descriptors

DTC C1244

AWD Oil Pump Motor Speed Sensor Supply Circuit Low Voltage

DTC C1245

DTC C124B**AWD Oil Pump Motor Speed Sensor Signal Circuit Erratic**

For symptom byte information, refer to [Symptom Byte List](#)

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Voltage	C1244 00	-	C1245 00	-
Signal Circuit Terminal 2	-	-	-	C124B 00
Signal Circuit Terminal 3	C124B 00	-	-	C124B 00
Signal Circuit Terminal 4	-	-	C124B 00	C124B 00
Low Reference	-	C124B 00	-	-

Circuit/System Description

The rear differential clutch control module monitors the speed of the AWD oil pump motor by using a hall effect sensor which is internal to the differential clutch pump. The sensor is a transducer that varies its output voltage in response to a magnetic field.

Conditions for Running the DTC**C1244 00, C1245 00, C124B 00**

- The engine is running.
- Battery voltage is between 9-16 V.
- The engine speed is above 400 RPM.

Conditions for Setting the DTC**C1244 00**

The AWD oil pump motor speed sensor supply circuit voltage is below 1.0 V.

C1245 00

The AWD oil pump motor speed sensor supply circuit voltage is above 6.0 V.

C124B 00

A plausibility error is detected on the AWD oil pump motor speed sensor signal circuit.

Action Taken When the DTC Sets

- Electronic limited slip is disabled for the duration of the key cycle.
- The AWD SERVICE message is 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 ignition cycles.

Reference Information

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Rear Axle Wiring Schematics

Connector End View Reference

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- [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 M32 Differential Clutch Pump. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 5 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module.
 2. Test for less than 2 Ω in the low reference 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.
 - **Go to next step: If less than 10 Ω**
3. Ignition ON/Vehicle in Service Mode.
4. Test for 4.8 - 5.2 V between the 5 V reference circuit terminal 1 and ground.
 - **If less than 4.8 V**
 1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module.
 2. Test for infinite resistance between the 5 V reference circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
 3. Test for less than 2 Ω in the 5 V reference 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 5.2 V**
 1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module, Ignition ON/Vehicle in Service Mode.
 2. Test for less than 1 V between the 5 V reference 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.
 - **Go to next step: If between 4.8 - 5.2 V**
5. Test for 4.4 - 4.8 V between the signal circuit terminals listed below and ground.
 - Signal Circuit Terminal 2
 - Signal Circuit Terminal 3
 - Signal Circuit Terminal 4
 - **If less than 4.4 V**
 1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module.
 2. Test for infinite resistance between the appropriate signal circuit terminal and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
 3. Test for less than 2 Ω in the appropriate signal circuit terminal 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 4.8 V**
 1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module, Ignition ON/Vehicle in Service Mode.
 2. Test for less than 1 V between the appropriate signal circuit terminal 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.
 - **Go to next step: If between 4.4 - 4.8 V**
6. Test or replace the M32 Differential Clutch Pump.

Repair Instructions

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

- [Differential Carrier Assembly Replacement](#) for M32 Differential Clutch Pump.
- [Control Module References](#) for control module replacement, programming and setup.

DTC C1260, C1261, C1262, C1263, C1264, C1265, C1266, OR C1267

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 Descriptors

DTC C1260 00

Power Transfer Unit Clutch Position Sensor Circuit High Voltage

DTC C1261 00

Power Transfer Unit Clutch Position Sensor Circuit Low Voltage

DTC C1262 00

Power Transfer Unit Clutch Position Sensor Circuit

DTC C1263 00

Power Transfer Unit Clutch Position Sensor Signal Circuit High

DTC C1264 00

Power Transfer Unit Clutch Position Sensor Signal Circuit Low

DTC C1265 00

Power Transfer Unit Clutch Position Sensor Signal Circuit

DTC C1266 00

Power Transfer Unit Clutch Position Sensor Signal Circuit Incorrect

DTC C1267 00

Power Transfer Unit Clutch Position Sensor Signal Out Of Range

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
5 V Reference	C1261 00	C1262 00	C1260 00	-
Signal	C1264 00	C1265 00	C1263 00	C1266 00 C1267 00
Low Reference	-	C1262 00	-	-

Circuit/System Description

The power transfer unit shift actuator sensor is to monitor the position of the power transfer unit actuator. The sensor is a three wire circuit that consists of a 5 V reference, low reference, and signal low circuit.

Conditions for Running the DTC

The engine is running.

Conditions for Setting the DTC

C1260 00

The rear differential clutch control module detects a short to battery on the power transfer unit shift actuator position sensor circuit.

C1261 00

The rear differential clutch control module detects a short to ground on the power transfer unit shift actuator position sensor circuit.

C1262 00

The rear differential clutch control module detects a open on the power transfer unit shift actuator position sensor circuit.

C1263 00

The rear differential clutch control module detects a short to battery on the power transfer unit shift actuator position sensor circuit.

C1264 00

The rear differential clutch control module detects a short to ground on the power transfer unit shift actuator position sensor circuit.

C1265 00

The rear differential clutch control module detects a open on the power transfer unit shift actuator position sensor circuit.

C1266 00

The rear differential clutch control module detects that the power transfer unit shift actuator position sensor signal has incorrect frequency.

C1267 00

The rear differential clutch control module detects that the power transfer unit shift actuator position sensor signal is out of range.

Action Taken When the DTC Sets

One or more of the following actions may occur:

- The electronic limited slip system is disabled for the duration of the key cycle.
- The AWD SERVICE message is 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 Wiring Schematics

Connector End View Reference

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Description and Operation

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Electrical Information Reference

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

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the M115 Power Transfer Unit Shift Actuator. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 3 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF, disconnect the X1 harness connector at the K47 Rear Differential Clutch Control Module.
 2. Test for less than 2 Ω in the low reference 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.
 - **Go to next step: If less than 10 Ω**
3. Ignition ON/Vehicle In Service Mode.
4. Test for 4.8 - 5.2 V between the 5 V reference circuit terminal 2 and ground.
 - **If less than 4.8 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K47 Rear Differential Clutch Control Module.
 2. Test for infinite resistance between the 5 V reference circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
 3. Test for less than 2 Ω in the 5 V reference 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 5.2 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K47 Rear Differential Clutch Control Module, ignition ON/Vehicle In Service Mode.
 2. Test for less than 1 V between the 5 V reference 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.
 - **Go to next step: If between 4.8 - 5.2 V**
5. Ignition ON/Vehicle In Service Mode.
6. Test for 4.6 - 5.6 V between the signal circuit terminal 1 and ground.

- **If less than 4.6 V**

1. Ignition OFF, disconnect the X1 harness connector at the K47 Rear Differential Clutch Control Module.
2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
3. Test for less than 2 Ω in the signal 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 5.6 V**

1. Ignition OFF, disconnect the X1 harness connector at the K47 Rear Differential Clutch Control Module, ignition ON/Vehicle In Service Mode.
2. Test for less than 1 V between the signal 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.

- **Go to next step: If between 4.6 - 5.6 V**

7. Test or replace the M115 Power Transfer Unit Shift Actuator.
8. Operate the vehicle under the conditions for setting the DTC, the DTC should not set.
 - **If the DTC sets**

Replace the K47 Rear Differential Clutch Control Module.

Repair Instructions

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

- [Power Transfer Unit Shift Actuator Replacement](#)
- [Control Module References](#) for clutch control module replacement, programming, and setup.

DTC C1282

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](#) provide an overview of each diagnostic category.

DTC Descriptors

DTC C1282

Rear Drive Clutch Classification Not Programmed

For symptom byte information, refer to [Symptom Byte List](#) .

Circuit/System Description

The rear differential clutch control module detects if the initial clutch classification calibration procedure has not been performed or has not been performed incorrectly. No external circuit diagnosis is involved.

Conditions for Running the DTC

- The engine is running.
- The engine speed is above 400 RPM.

Conditions for Setting the DTC

C1282 00

The rear differential clutch control module detects that the clutch classification has not been programmed.

Action Taken When the DTC Sets

- The electronic limited slip control is disabled.
- The AWD SERVICE message is 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 ignition cycles.

Diagnostic Aids

- The clutch service calibration will be the alphanumeric characters of the supplier assigned unique serial number found etched/stamped on the clutch pack housing. The characters must be entered exactly how it appears etched/stamped on the clutch pack housing. The calibration procedure is done through SPS programming and setup.

NOTE: When entering the alphanumeric characters into the scan tool, be sure to enter the characters as seen.

-
- For the single clutch system (RPO F46), there is only one clutch calibration alphanumeric code.
- For the twin clutch system (RPO G99), there are two clutch calibration alphanumeric code. Both codes must be entered during the calibration procedure for the right and left clutch respectively.

Reference Information

Schematic Reference

Rear Axle Wiring Schematics

Connector End View 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 Verification

1. Ignition ON.
2. Verify DTC C1282 is not set.
 - **If the DTC is set**
 1. Perform the rear differential clutch classification calibration procedure. Refer to K47 Rear Differential Clutch Control Module: Programming and Setup.
 2. Verify the Rear Differential Clutch Factory Calibration parameter has stored the value used during the rear differential clutch classification calibration procedure.
 3. Perform key cycle, ignition OFF then ON.
 - If the Rear Differential Clutch Factory Calibration parameter has not stored the value used during the rear differential clutch classification calibration procedure, replace the K47 Rear Differential Clutch Control Module.

- Go to next step: If the Rear Differential Clutch Factory Calibration parameter has stored the value used during the rear differential clutch classification calibration procedure.

4. Verify DTC C1282 is not set.

- If the DTC is set, replace the K47 Rear Differential Clutch Control Module.
- Go to next step: If the DTC is not set

5. All OK.

- **Go to next step: If the DTC is not set**

3. All OK.

Repair Instructions

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

[Control Module References](#) for control module replacement, programming, and setup.

DTC C1290, C1291, C1292, C1293, OR C1295

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 C1290 00

Power Transfer Unit Clutch Motor Circuit High Voltage

DTC C1291 00

Power Transfer Unit Clutch Motor Circuit Low Voltage

DTC C1292 00

Power Transfer Unit Clutch Motor Circuit

DTC C1293 00

Power Transfer Unit Clutch Motor Circuit High Current

DTC C1295 00

Power Transfer Unit Clutch Motor Circuit Erratic

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Control	C1291 00	C1292 00	C1290 00	C1295 00
Low Reference	C1291 00	C1292 00	C1290 00	C1295 00

Circuit/System Description

Rear differential clutch control module is supplying voltage to the power transfer unit shift actuator motor and is grounded through the control module.

Conditions for Running the DTC

The engine is running.

Conditions for Setting the DTC

C1290 00

The rear differential clutch control module detects a short to battery on the power transfer unit clutch motor circuit.

C1291 00

The rear differential clutch control module detects a short to ground on the power transfer unit clutch motor circuit.

C1292 00

The rear differential clutch control module detects an open on the power transfer unit clutch motor circuit.

C1293 00

The rear differential clutch control module detects high current at the power transfer unit clutch motor circuit.

C1295 00

The rear differential clutch control module detects plausibility error at the power transfer unit clutch motor circuit.

Action Taken When the DTC Sets

One or more of the following actions may occur:

- The electronic limited slip system is disabled for the duration of the key cycle.
- The AWD SERVICE message is 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 Wiring Schematics

Connector End View Reference

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Description and Operation

Rear Drive Axle Description and Operation (With G99)**Rear Drive Axle Description and Operation (Without G99)**

Electrical Information 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

1. Ignition OFF, disconnect the X1 harness connector at the K47 Rear Differential Clutch Control Module, ignition ON/Vehicle in Service Mode.
2. Test for less than 1 V between the K47 Rear Differential Clutch Control Module harness connector terminals listed below and ground.
 - Terminal 1
 - Terminal 12

- **If 1 V or greater**

Repair the short to voltage on the circuit.

- **Go to next step: If less than 1 V**

3. Ignition OFF.

4. Test for infinite resistance between K47 Rear Differential Clutch Control Module harness connector terminals listed below and ground.

- Terminal 1
- Terminal 12

- **If less than infinite resistance**

Repair the short to ground on the circuit.

- **Go to next step: If Infinite resistance**

5. Disconnect harness connector at the M115 Power Transfer Unit Shift Actuator.

6. Test for less than 2 Ω between M115 Power Transfer Unit Shift Actuator harness connector terminal 4 and K47 Rear Differential Clutch Control Module harness connector terminal 1 end to end.

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **Go to next step: If less than 2 Ω**

7. Test for less than 2 Ω between M115 Power Transfer Unit Shift Actuator harness connector terminal 5 and K47 Rear Differential Clutch Control Module harness connector terminal 12 end to end.

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **Go to next step: If less than 2 Ω**

NOTE: DTC C1295 may set due to a mechanical issue within the power transfer unit in which the unit is not physically engaging, despite being commanded to do so.

8. Visually inspect the power transfer unit for any signs of mechanical damage or other conditions which may prevent the unit from physically engaging. This may require disassembly of the power transfer unit. Refer to:

[Power Transfer Unit Case Disassemble](#)

- **If damage is found**

Repair as necessary.

- **Go to next step: If no damage is found**

9. Test or replace the M115 Power Transfer Unit Shift Actuator.

10. Operate the vehicle under the conditions for setting the DTC, the DTC should not set.

- **If the DTC sets**

Replace the K47 Rear Differential Clutch Control Module.

- **Go to next step: If no DTC sets**

11. All OK

Component Testing

1. Ignition OFF, disconnect the harness connector at the M115 Power Transfer Unit Shift Actuator.

2. Install a 20 A fused jumper wire between the control terminal 5 and 12 V. Install a jumper wire between the low reference terminal 4 and ground.

3. Verify the power transfer unit clutch motor turns ON and OFF

- **If the power transfer unit clutch motor does not turn ON and OFF**

Replace the M115 Power Transfer Unit Shift Actuator.

- Go to next step: If the power transfer unit clutch motor does turn ON and OFF

4. All OK

Repair Instructions

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

- [Power Transfer Unit Shift Actuator Replacement](#)
- [Control Module References](#) for rear differential clutch control module replacement, programming, and setup.

DTC C1296

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](#) provide an overview of each diagnostic category.

DTC Descriptors

DTC C1296 61

Power Transfer Unit Clutch Motor Performance

Circuit/System Description

When the rear differential clutch control module receives a request to engage the rear differential, it will command the power transfer unit clutch motor to activate providing the operator with all wheel drive

Conditions for Running the DTC

- The engine is running.

Conditions for Setting the DTC

C1296 61

The rear differential clutch control module has detected that the power transfer unit clutch motor does not activate when commanded.

Action Taken When the DTC Sets

- The electronic limited slip control is disabled.
- The AWD SERVICE message is 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 ignition cycles.

Reference Information

Schematic Reference

[Rear Axle Wiring Schematics](#)

Connector End View Reference

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Description and Operation

[Rear Drive Axle Description and Operation \(With G99\)](#)[Rear Drive Axle Description and Operation \(Without G99\)](#)

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 M115 Power Transfer Unit Shift Actuator. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 4.2 K Ω between the low reference circuit terminal 4 and ground.
 - **If 4.2 K Ω or greater**
 1. Ignition OFF, disconnect the X1 harness connector at the K47 Rear Differential Clutch Control Module.
 2. Test for less than 2 Ω in the low reference 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.
 - **Go to next step: If less than 4.2 K Ω**
3. Ignition ON/Vehicle In Service Mode.
4. Test for 1.9 - 2.3 V between the control circuit terminal 5 and ground.
 - **If less than 1.9 V**
 1. Ignition OFF, disconnect the X1 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.
 - Go to next step: 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 2.3 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K47 Rear Differential Clutch Control Module, ignition ON/Vehicle In Service Mode.
 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.
 - **Go to next step: If between 1.9 - 2.3 V**
5. Ignition OFF, disconnect the X1 harness connector at the K47 Rear Differential Clutch Control Module, ignition ON/Vehicle In Service Mode.
6. Test for less than 1 V between the M115 harness connector terminals listed below and ground.
 - Terminal 4
 - Terminal 5
 - **If 1 V or greater**

Repair the short to voltage on the circuit.
 - **Go to next step: If less than 1 V**
7. Ignition OFF.
8. Test for infinite resistance between M115 harness connector terminals listed below and ground.
 - Terminal 4
 - Terminal 5
 - **If less than infinite resistance**

Repair the short to ground on the circuit.

- **Go to next step: If Infinite resistance**

9. Test for less than 2 Ω between M115 Power Transfer Unit Shift Actuator harness connector terminal 4 and K47 Rear Differential Clutch Control Module harness connector terminal 1 end to end.

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **Go to next step: If less than 2 Ω**

10. Test for less than 2 Ω between M115 Power Transfer Unit Shift Actuator harness connector terminal 5 and K47 Rear Differential Clutch Control Module harness connector terminal 12 end to end.

11. Test or replace the M115 Power Transfer Unit Shift Actuator.

12. Operate the vehicle under the conditions for setting the DTC, the DTC should not set.

- **If the DTC sets**

Replace the K47 Rear Differential Clutch Control Module.

Component Testing

1. Ignition OFF, disconnect the harness connector at the M115 Power Transfer Unit Shift Actuator.

2. Install a 20 A fused jumper wire between the control terminal 5 and 12 V. Install a jumper wire between the low reference terminal 4 and ground.

3. Verify the power transfer unit clutch motor turns ON and OFF

- **If the power transfer unit clutch motor does not turn ON and OFF**

Replace the M115 Power Transfer Unit Shift Actuator.

- **Go to next step: If the power transfer unit clutch motor does turn ON and OFF**

4. All OK

Repair Instructions

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

- [Power Transfer Unit Shift Actuator Replacement](#)
- [Control Module References](#) for rear differential clutch control module replacement, programming, and setup.

DTC C12A1 OR C12A9 (G99)

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 C12A1

Right Rear Differential Clutch Solenoid Valve Control Circuit

DTC C12A9

Left Rear Differential Clutch Solenoid Valve Control Circuit

For symptom byte information, refer to [Symptom Byte List](#)

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Control Terminal 3	C0393 02	C12A1 00, C12A9 00	C0393 01	C0393 5A

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Control Terminal 2	C0393 02	C12A1 00	C0393 01	-
Control Terminal 1	C0393 02	C12A1 00	C0393 01	-

Circuit/System Description

The right and left rear differential clutch solenoid valves are an electro-hydraulic valve used to relieve pressure in the hydraulic system for safety reasons. When the valves are energized, the valves are closed and hydraulic pressure can be accumulated. When the valves are de-energized, the valves are open and it is not possible to build hydraulic pressure.

Conditions for Running the DTC

- The engine is running.
- The engine speed is above 400 RPM.

Conditions for Setting the DTC

C12A1 00

- The right valve high side voltage monitor signal is significantly greater than 0 V.
- The right valve low side voltage monitor signal is close to 0 V.

C12A9 00

- The left valve high side voltage monitor signal is significantly greater than 0 V.
- The left valve low side voltage monitor signal is close to 0 V.

Action Taken When the DTC Sets

One or more of the following actions may occur:

- The electronic limited slip system is temporary inhibited for the duration of the key cycle.
- Symptom bytes 00 will display the AWD SERVICE message 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 Wiring Schematics

Connector End View Reference

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- Wiring Repairs

Scan Tool Reference

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the Q49 Rear Differential Clutch Solenoid Valve, Ignition ON/Vehicle in Service Mode.
2. Test for 5 - 6 V between the control circuit terminal 3 and ground.
 - **If less than 5 V**
 1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module.
 2. Test for infinite resistance between the control circuit terminal 3 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
 3. Test for less than 2 Ω in the control circuit terminal 3 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 6 V**
 1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module, Ignition ON/Vehicle in Service Mode.
 2. Test for less than 1 V between the control circuit terminal 3 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.
 - **Go to next step: If between 5 - 6 V**
3. Test for 4.9 - 5.3 V between the control circuit terminals listed below and ground.
 - Control Circuit Terminal 2
 - Control Circuit Terminal 1
 - **If less than 4.9 V**
 1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module.
 2. Test for infinite resistance between the appropriate control circuit terminal and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
 3. Test for less than 2 Ω in the appropriate control circuit terminal 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 5.3 V**
 1. Ignition OFF, disconnect the X2 harness connector at the K47 Rear Differential Clutch Control Module, Ignition ON/Vehicle in Service Mode.
 2. Test for less than 1 V between the appropriate control circuit terminal 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.
 - **Go to next step: If between 4.9 - 5.3 V**
4. Test or replace the Q49 Rear Differential Clutch Solenoid Valve.

Repair Instructions

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

- [Differential Carrier Assembly Replacement](#) for Q49 Rear Differential Clutch Solenoid Valve.
- [Control Module References](#) for control module replacement, programming, and setup.

SYMPTOMS - REAR DIFFERENTIAL CARRIER

Strategy Based Diagnostics

Review the system operations in order to familiarize yourself with the system functions. Refer to [Rear Drive Axle Description and Operation \(With G99\)](#), [Rear Drive Axle Description and Operation \(Without G99\)](#), and [Power](#)

Transfer Unit Case 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 condition. 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. **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.
- Inspect for all-wheel drive activation and operation.
- Factors that may contribute to an inoperative rear differential include:
 - Low gear oil levels
 - Differential inoperative due to antilock brake system (ABS) function
 - Inoperative powertrain control module (PCM) and/or wiring system
 - A mini-spare or different size tire installed
 - A fluid over-temperature condition
 - An inoperative or "stuck" clutch pump check valve
 - A defective rear differential assembly
 - An inoperative transfer case assembly

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:

- **Symptoms - Vehicle**
- **Noisy in Drive**
- **Noisy When Coasting**
- **Intermittent Noise**
- **Constant Noise**
- **Noisy on Turns**
- **Rear Differential Carrier Leak Diagnosis**

ALL WHEEL DRIVE INDICATOR MALFUNCTION

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
Control	1	2	2	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
1. AWD indicator always ON. 2. AWD indicator always OFF.				

Circuit/System Description

The body control module provides voltage to the AWD indicator and other vehicle indicators. The rear differential clutch control module monitors the input received by the drive mode switch, when the driver selects the All Wheel Drive mode, the rear differential clutch control module will provide a ground for the AWD indicator control circuit causing the AWD indicator to illuminate.

Reference Information

Schematic Reference

Rear Axle Wiring Schematics

Connector End View Reference

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- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Circuit/System Verification

1. Engine running/Vehicle ON.
2. Using the drive mode switch, rotate the switch clockwise or counter clockwise to All Wheel Drive mode, verify the AWD indicator turns ON.
 - **If the AWD indicator does not turn ON**
Refer to Circuit/System Testing.
 - **Go to next step: If the AWD indicator does turn ON**
3. Using the drive mode switch, rotate the switch clockwise or counter clockwise to a Tour mode / Two Wheel Drive mode, verify the AWD indicator turns OFF.
 - **If the indicator does not turn OFF**
Refer to Circuit/System Testing.
 - **Go to next step: If the indicator turns OFF**
4. All OK.

Circuit/System Testing

1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K47 Rear Differential Clutch Control Module. Ignition ON/Vehicle In Service Mode.
2. Verify the AWD indicator is not illuminated.
 - **If illuminated**
 1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the S126 Drive Mode Select Switch.

2. Test for infinite resistance between the control circuit terminal 2 and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, test or replace the S126 Drive Mode Select Switch.

• **Go to next step: If not illuminated**

3. Ignition ON/Vehicle In Service Mode, connect a 3 A fused jumper wire between the control circuit terminal 2 and the ground.

4. Verify the AWD indicator is illuminated.

• **If not illuminated**

1. Ignition OFF/Vehicle OFF, remove the jumper wire, disconnect the harness connector at the S126 Drive Mode Select Switch, ignition ON / Vehicle In Service Mode.

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.
- Go to next step: If less than 1 V

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 , test or replace the S126 Drive Mode Select Switch.

• **Go to next step: If illuminated**

5. Replace the K47 Rear Differential Clutch Control Module.

Repair Instructions

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

- [Ride Control Switch Replacement - Center Console](#)
- [Control Module References](#) for rear differential clutch control module replacement, programming, and setup

NOISY IN DRIVE

Cause	Correction
Inspect for the proper gear oil levels prior to performing system diagnosis. Refer to Rear Axle Lubricant Replacement .	
Incorrect type fluid Installation of the incorrect type gear oil may create a "moan" type noise within 7770 - 25900 km (3 - 10000 miles). Fluid that is "black" in color is to be considered normal and is darkened by the carbon material in the clutch plates.	Replace the rear differential assembly as required. Fluid replacement will not correct a "moan" condition caused by the use of incorrect oil. Refer to Differential Carrier Assembly Replacement .
Water or contamination within the transmission oil Water or contamination within the transmission fluid, causing excessive torque converter clutch slip rate, may create a "grind, growl, or moan" in the rear differential or torque tube under light or steady load conditions.	Replace the transmission fluid and flush the transfer case of the contaminated fluid.
Loose propeller shaft mounting bolts	Tighten the bolts as required. Refer to Two-Piece Propeller Shaft Replacement .
Worn propeller shaft constant velocity joints	Replace propeller shaft assembly. Refer to Two-Piece Propeller Shaft Replacement .
Worn axle shaft constant velocity joints	Replace the constant velocity joints as required.
Worn, loose, or missing differential mounts	Repair or replace the differential mounts as required.
Loose torque tube bracket or a worn bracket bushing	Tighten the bracket bolts or replace the bracket as required.
Worn bearing in the torque tube assembly	Replace the torque tube assembly
Torque tube dampner loose or missing A "moan" or "exhaust leak" type noise at higher engine speeds, approximately 2000 - 2500 RPM, may indicate a loose or missing dampner.	Tighten the dampner retaining bolt or replace the torque tube assembly as required.

Cause	Correction
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, replace 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 - 97 km/h (50 - 60 mph).	1. Check for the proper fluid level. Fill as required. 2. Replace unit as required.

NOISY WHEN COASTING

Cause	Correction
Inspect for the proper gear oil levels prior to performing system diagnosis. Refer to Rear Axle Lubricant Replacement . A light "clunk" type noise during a downshift is to be considered a normal condition.	
Loose propeller shaft mounting bolts	Tighten the bolts as required. Refer to Two-Piece Propeller Shaft Replacement .
Worn propeller shaft constant velocity joints	Replace the propeller shaft assembly. Refer to Two-Piece Propeller Shaft Replacement .
Worn axle shaft constant velocity joints	Replace the constant velocity joints as required.
Worn, loose, or missing differential mounts	Repair or replace the differential mounts as required.
Loose torque tube bracket or a damaged bracket bushing	Tighten the bracket bolts or replace the bracket as required.
Worn bearing in the torque tube assembly	Replace the torque tube assembly.
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, replace 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 - 97 km/h (50 - 60 mph).	1. Check for the proper fluid level. Fill as required. 2. Replace unit as required.

INTERMITTENT NOISE

Cause	Correction
Inspect for the proper gear oil levels prior to performing system diagnosis. Refer to Rear Axle Lubricant Replacement .	
Loose propeller shaft mounting bolts	Tighten the bolts as required. Refer to Two-Piece Propeller Shaft Replacement .
Worn, loose, or missing differential mounts	Repair or replace the differential mounts as required.
Loose torque tube bracket or a damaged bracket bushing	Tighten the bracket bolts or replace the bracket as required.
Incorrect type fluid Installation of the incorrect type gear oil may create a "moan" type noise within 7770 - 25900 km (3 - 10000 miles). Fluid that is "black" in color is to be considered normal and is darkened by the carbon material in the clutch plates.	Replace the rear differential assembly as required. Fluid replacement will not correct a "moan" condition caused by the use of incorrect oil. Refer to Differential Carrier Assembly Replacement .

CONSTANT NOISE

Cause	Correction
Inspect for the proper gear oil levels prior to performing system diagnosis. Refer to Rear Axle Lubricant Replacement .	

Special Tools

- **GE-28431-6** Fluorescent Oil Dye
- **GE-42220** Leak Detection Lamp 12V

Equivalent regional tools: [Special Tools](#)

Procedure

1. Thoroughly clean the suspected leak area using a rag and approved cleaner.
2. Detect the source of the leak:

Fluorescent Dye Method

1. Add **GE-28431-6** Fluorescent Oil Dye to the rear differential clutch or differential lubricant to determine the source of the leak.

NOTE:

Do not drive the vehicle on the freeway as this will splatter oil, inhibiting leak diagnosis.

2. Operate the vehicle for 15 - 20 minutes under city driving conditions until normal operating temperatures are reached.
3. Shut OFF the engine.
4. Inspect for the presence of dye within the oil leak using the **GE-42220** Leak Detection Lamp 12V or equivalent. A presence or non-presence of dye within the oil leak will indicate which component is the source of the leak.

Powder Method

1. Apply an aerosol type leak tracing powder to the suspected leak area.

NOTE:

Do not drive the vehicle on the freeway as this will splatter oil, inhibiting leak diagnosis.

2. Operate the vehicle for 15 - 20 minutes under city driving conditions until normal operating temperatures are reached.
 3. Shut OFF the engine.
 4. Trace the leak path through the powder in order to find the source of the leak.
3. Use the cause and correction below to determine the repair.

Worn, scored, or missing drain and/or fill plug sealing washers

Install new sealing washers and tighten the plugs per specifications.

Worn or damaged drive pinion oil seal (vehicles without torque tube)

1. Remove oil slinger for inspection.
2. Inspect the pinion for excessive play. Replace differential assembly if play exists.
3. Remove the pinion seal as required.
4. Replace the oil seal and slinger.

Worn or damaged axle shaft oil seals

1. Inspect the sealing surface of the axle shaft for noticeable wear. Replace axle shaft if wear exists.
2. Replace the axle shaft oil seal as required.

Carrier housing porosity

Replace the differential assembly.

Cause	Correction
Damaged Crossover Pipe (If equipped)	1. If necessary, run bleed cycle to confirm leak. 2. Inspect pipe fittings for leaks and tighten if necessary - run bleed cycle. 3. If leaking from pipe, replace pipe assembly, run bleed cycle to confirm repair. 4. If replacing pressure pipe does not resolve leak, replace full differential assembly.

REPAIR INSTRUCTIONS

REAR DIFFERENTIAL CLUTCH CONTROL MODULE REPLACEMENT

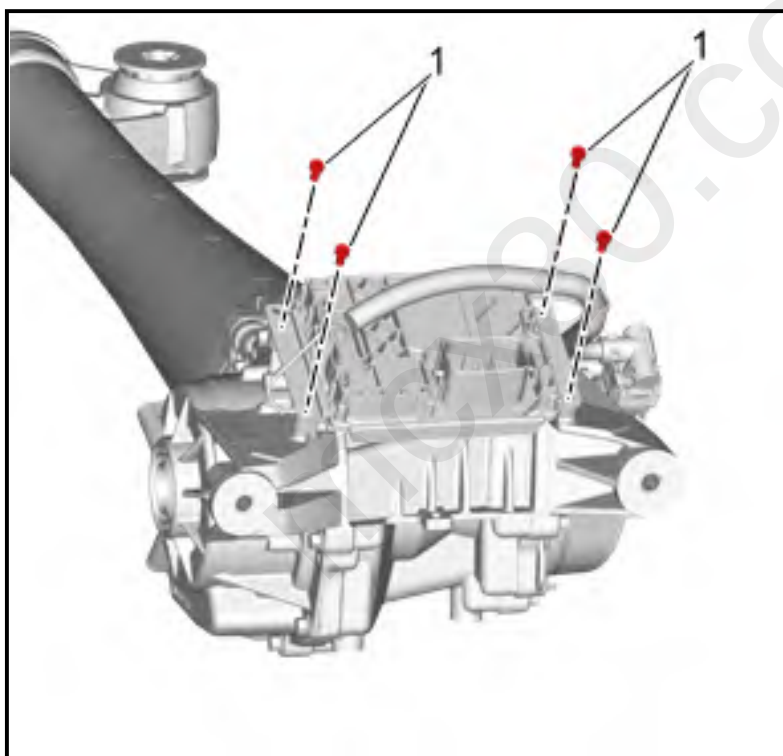
Removal Procedure

1. Prepare the Control Module for removal using the SPS programming support tool. [Control Module References](#)

NOTE: The rear differential clutch control module can now be removed and replaced.

2. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
3. Remove the rear axle assembly. [Differential Carrier Assembly Replacement](#)

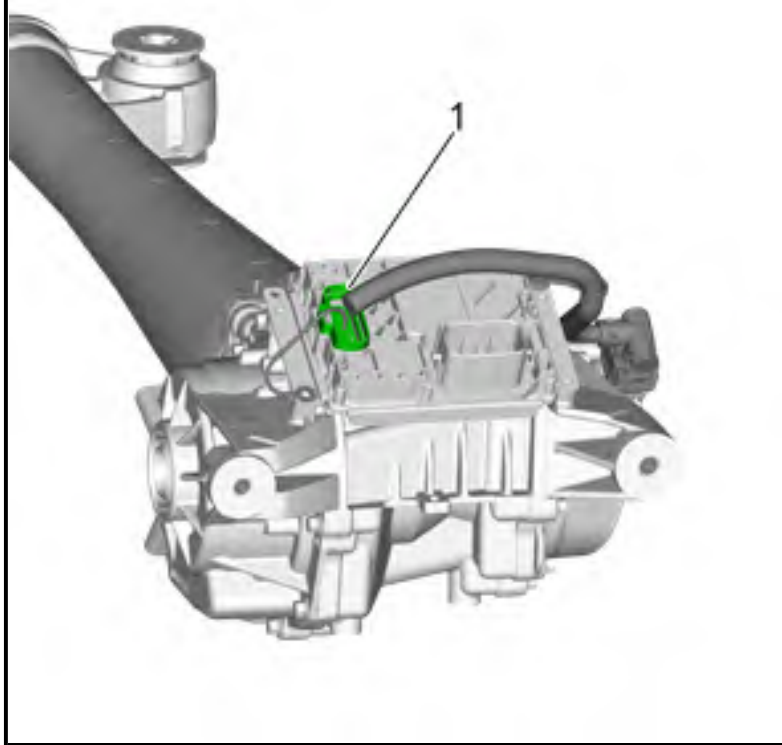
4.



Remove the four control module bracket bolts (1).

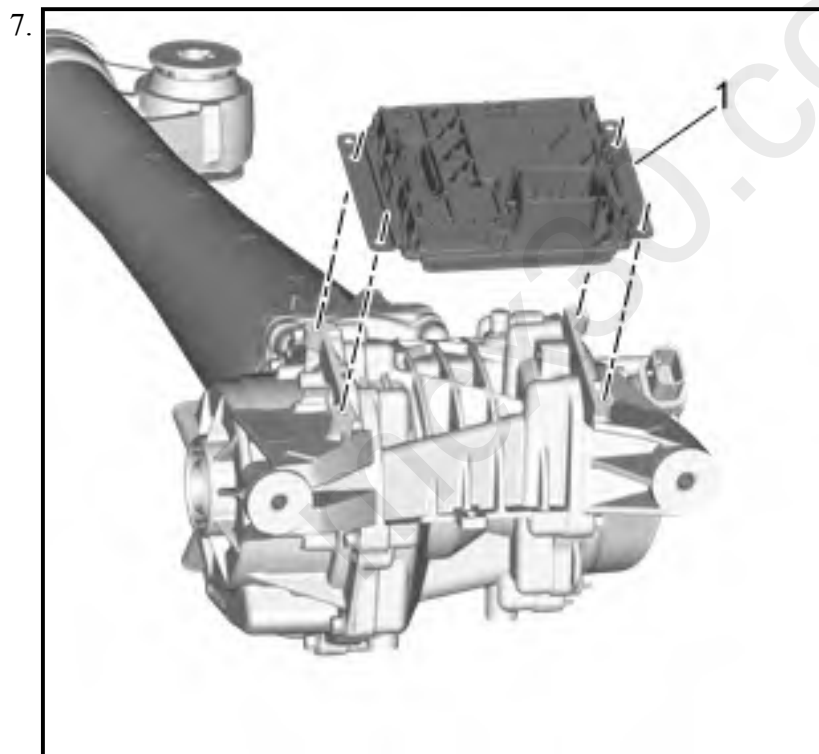
5.





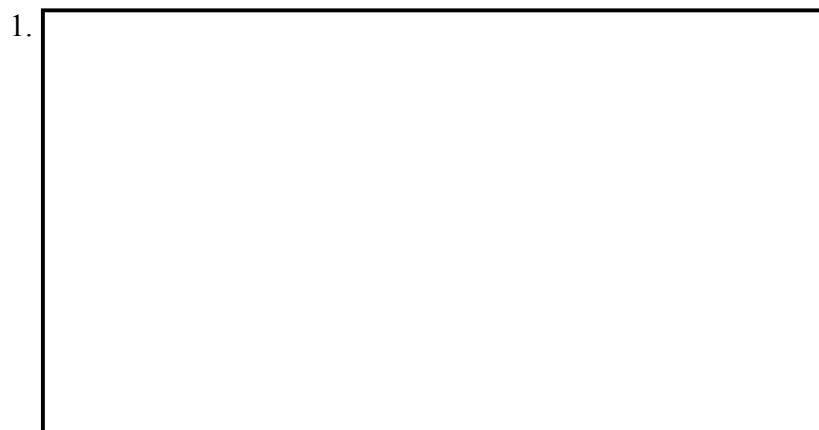
Disconnect the connector (1) from the control module.

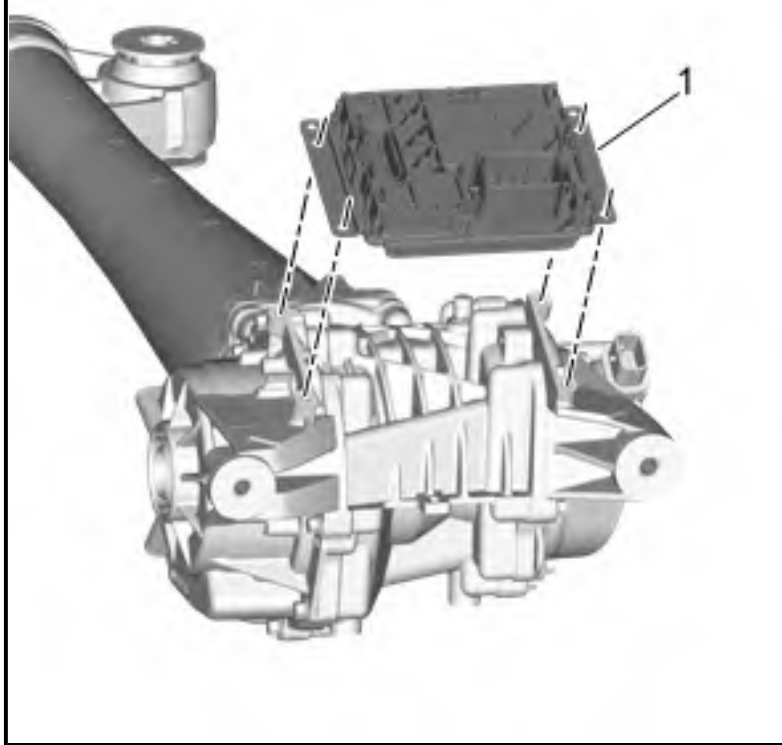
6. Remove Wiring Harness Retainer from Clutch Control Module.



Remove the clutch control module (1).

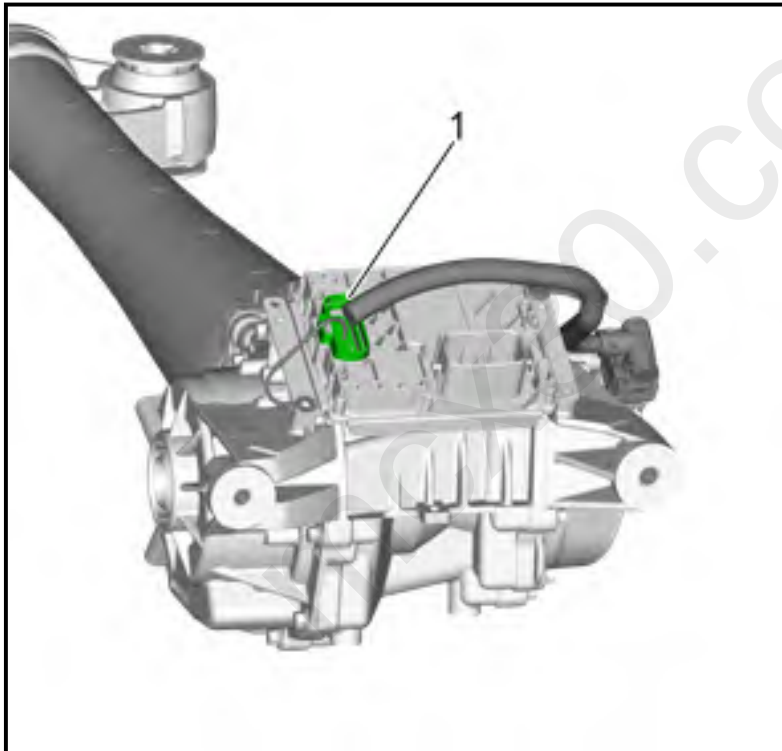
Installation Procedure





Position the clutch control module (1) onto the rear axle.

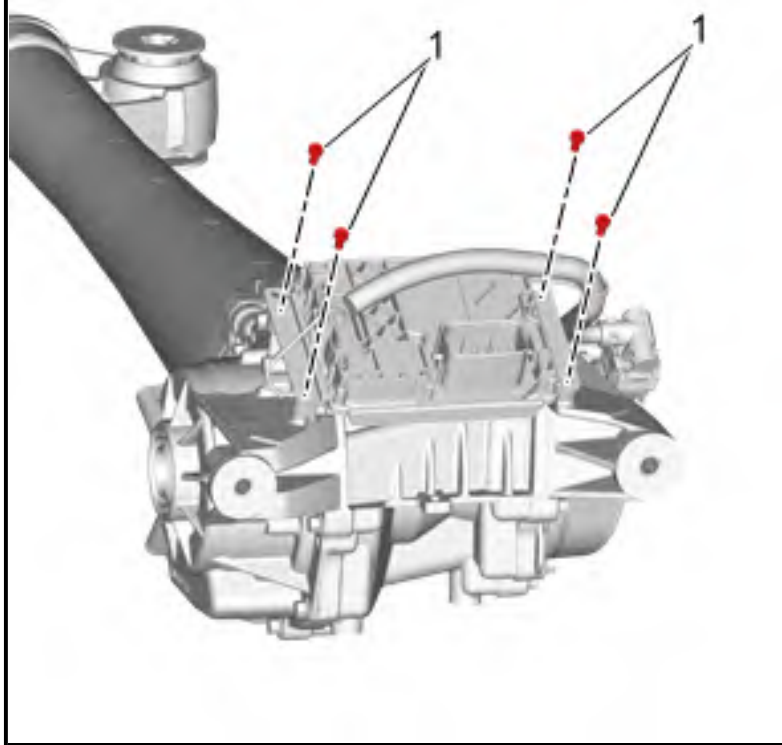
2.



Reconnect the electrical connector (1) to the clutch control module.

3.





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

NOTE: Apply loctite before installing bolts.

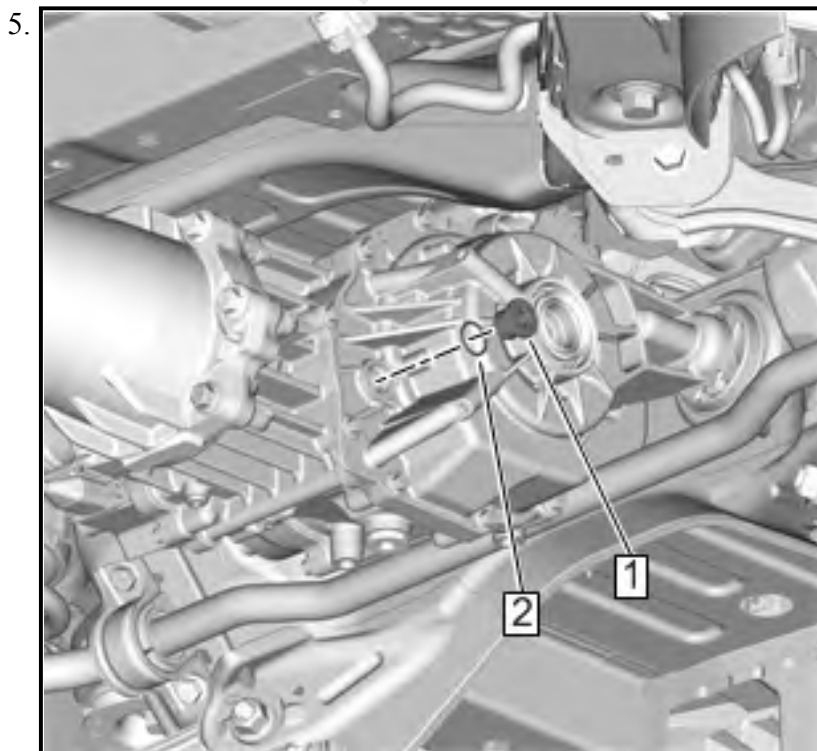
Install the clutch control module bracket bolts (1). Tighten to 6 N.m (53 lb in).

4. Install the rear drive axle assembly. [Differential Carrier Assembly Replacement](#)
5. Remove the support and lower the vehicle.
6. Reprogram the K47 clutch control module. [Control Module References](#)

REAR AXLE LUBRICANT LEVEL INSPECTION

Removal Procedure

1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
2. Ensure the vehicle is level.
3. Inspect the rear axle for leaks. Repair as necessary.
4. Clean the area around the rear axle fill plug.



Remove the fill plug (1) and seal (2).

6. Inspect the lubricant level. The level should be even with the bottom of the fill hole.
7. If the level is low, add lubricant until the level is even with the bottom of the fill plug opening. Use the proper fluid. [Adhesives, Fluids, Lubricants, and Sealers](#), [Approximate Fluid Capacities](#)

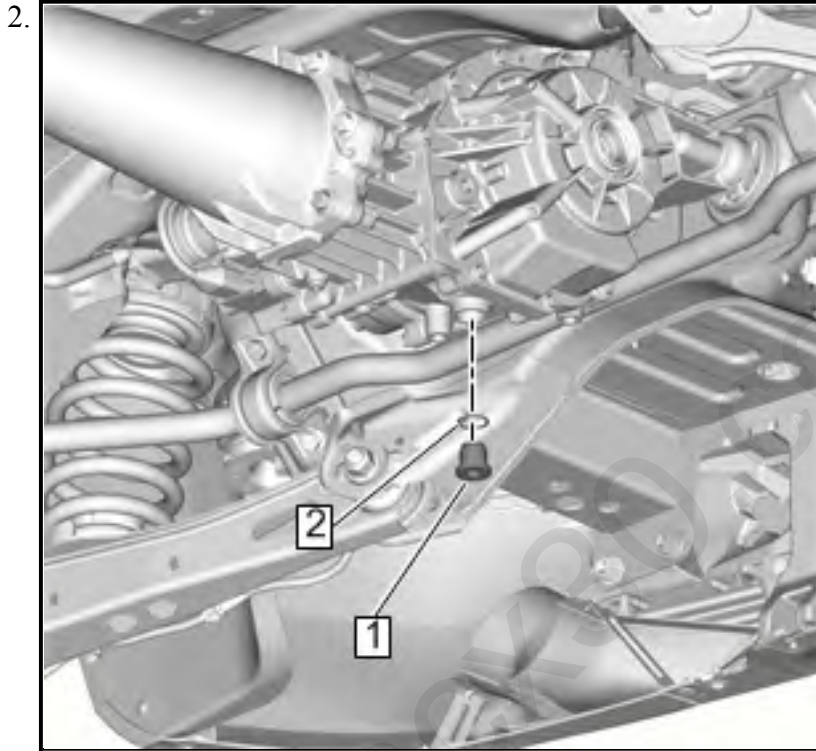
CAUTION: Refer to [Fastener Caution](#) .

8. Install the rear axle fill plug and tighten to 39 N.m (29 lb ft).
9. Lower the vehicle.

REAR AXLE LUBRICANT REPLACEMENT

Removal Procedure

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

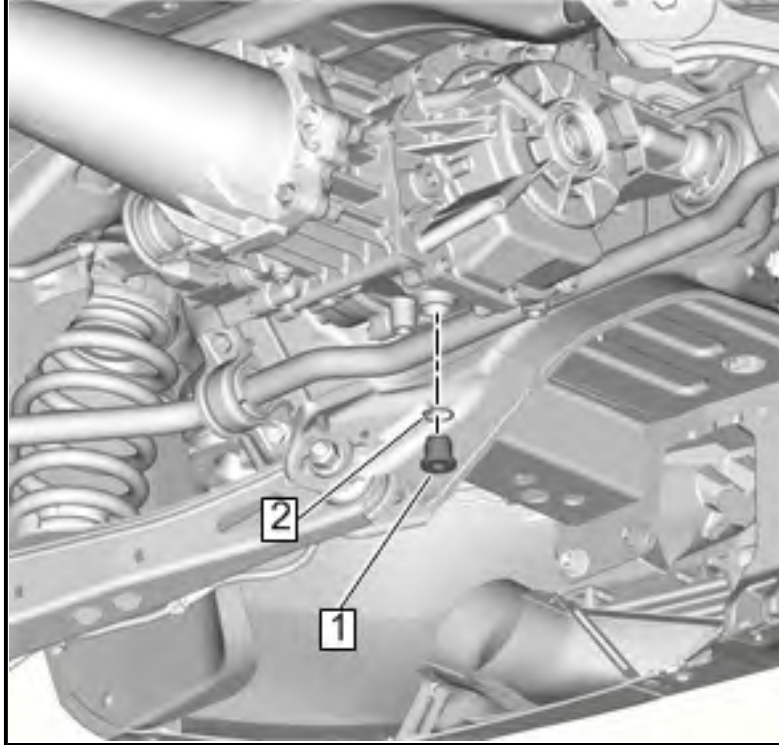


NOTE: If the drain plug seal is worn, replace the drain plug and seal.

Remove the drain plug (1) and seal (2) from the rear differential housing.

Installation Procedure

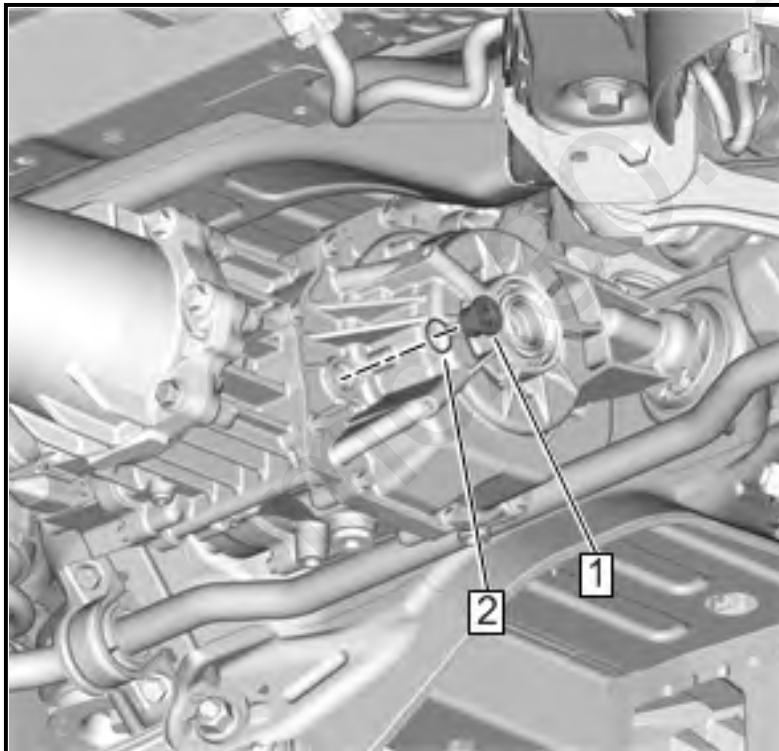
1.



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

Install the drain plug (1) and seal (2), then tighten to 39 N.m (29 lb ft).

2.

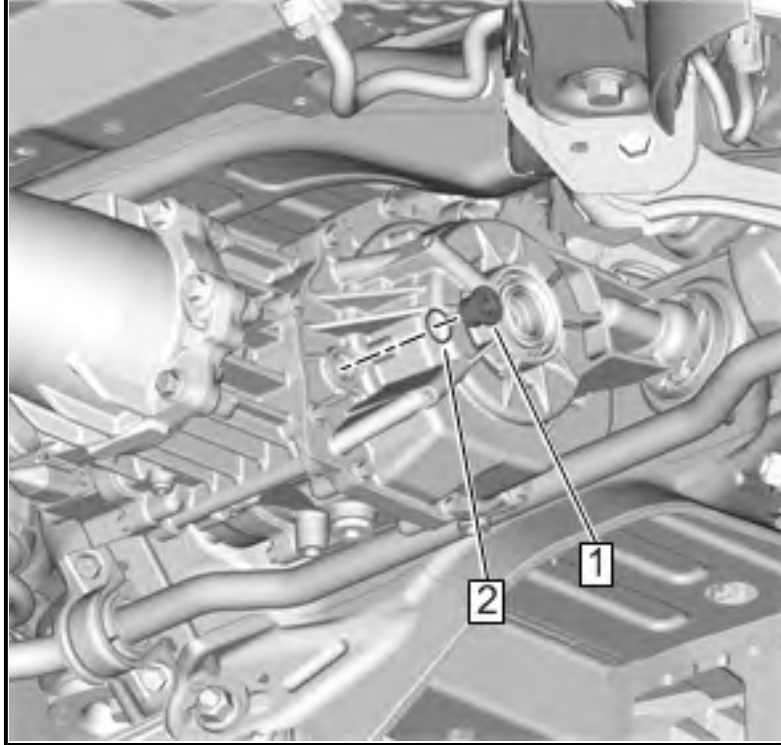


Remove the fill plug (1) and seal (2) from the rear differential housing.

3. Fill the rear differential with the proper synthetic gear lubricant. [Adhesives, Fluids, Lubricants, and Sealers, Approximate Fluid Capacities](#)
4. Inspect the gear oil level to ensure it is even with the bottom of the fill plug hole.

5.





Install the fill plug (1) and seal (2) in the rear differential housing and tighten to 39 N.m (29 lb ft).

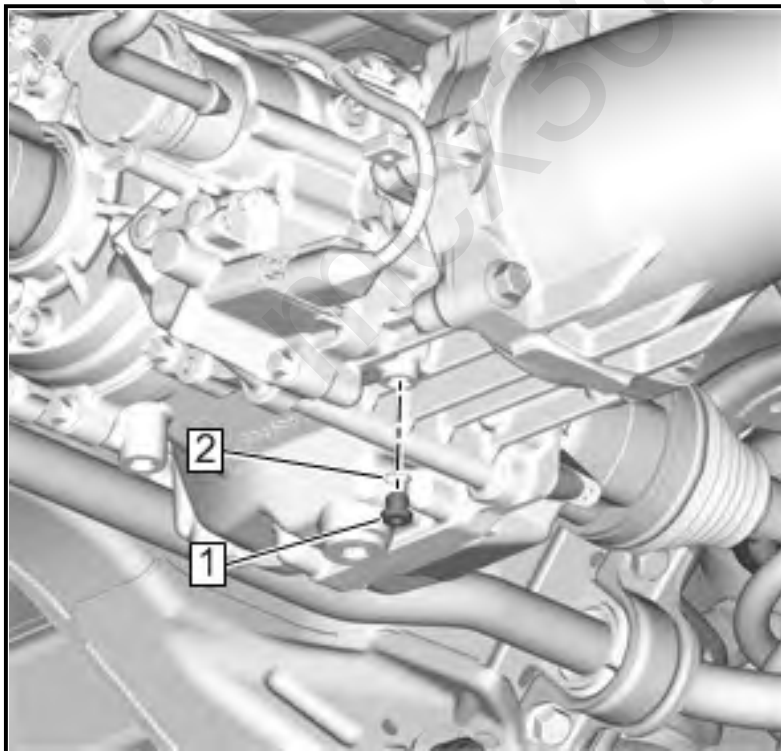
6. Remove the support and lower the vehicle.

DIFFERENTIAL CLUTCH OIL REPLACEMENT

Removal Procedure

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

2.

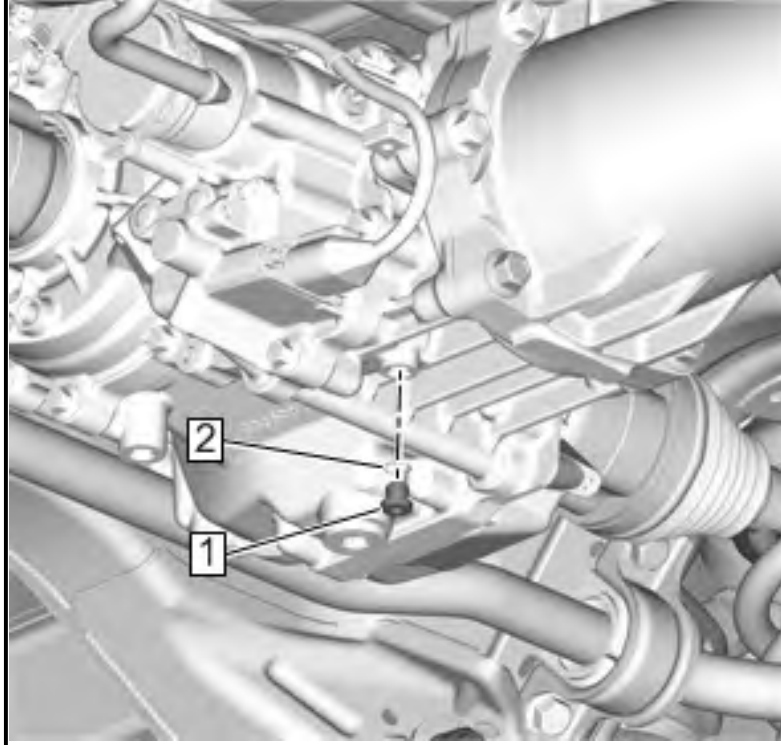


Remove the drain plug (1) and seal (2) from the rear differential clutch housing.

Installation Procedure

1.

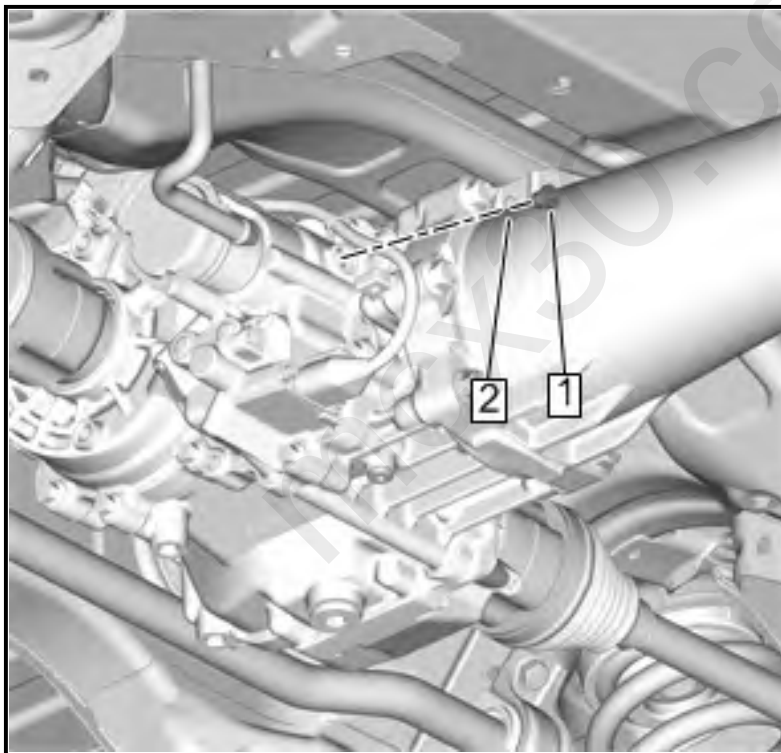




CAUTION: Refer to [Fastener Caution](#) .

Install the drain plug (1) and seal (2), then tighten to 12 N.m (106 lb in).

2.

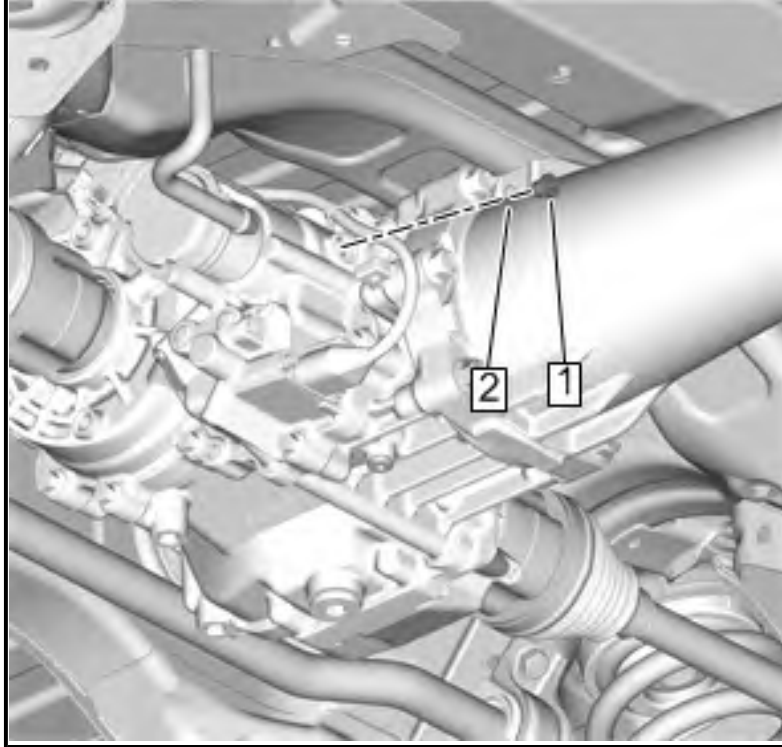


Remove the fill plug (1) and seal (2) from the rear differential clutch housing.

3. Fill the rear differential clutch with the proper synthetic gear lubricant. [Adhesives, Fluids, Lubricants, and Sealers, Approximate Fluid Capacities](#)
4. Inspect the oil level to ensure it is even with the bottom of the fill plug hole.

5.





Install the fill plug (1) and seal (2) in the rear differential clutch housing and tighten to 12 N.m (106 lb in).

6. Perform the Rear Differential Hydraulic System Service Fill/Bleed. [Rear Differential Hydraulic System Service Fill/Bleed](#)
7. Remove the support and lower the vehicle.

DIFFERENTIAL CARRIER BUSHING REPLACEMENT - REAR

Tools Required

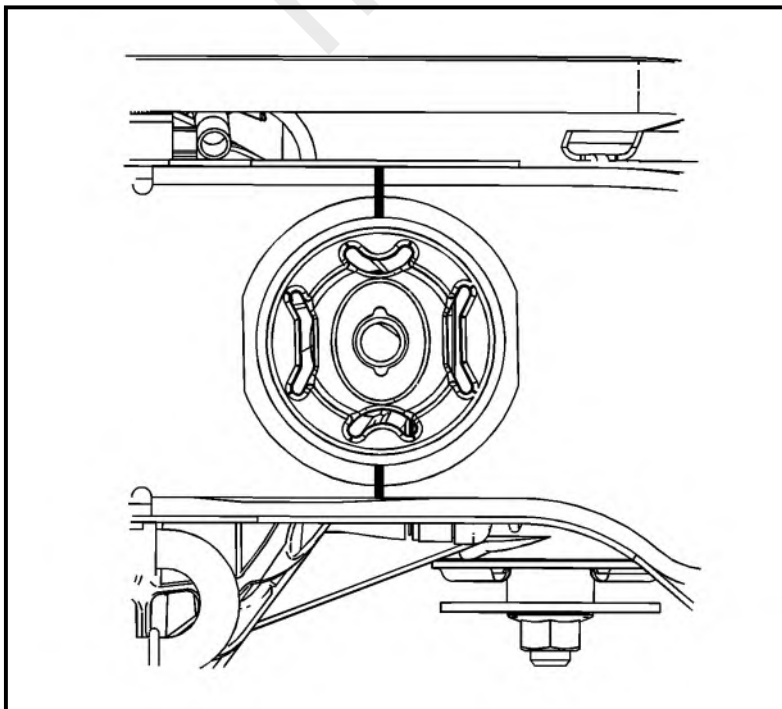
J-45725 Cradle Bushing Replacer

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

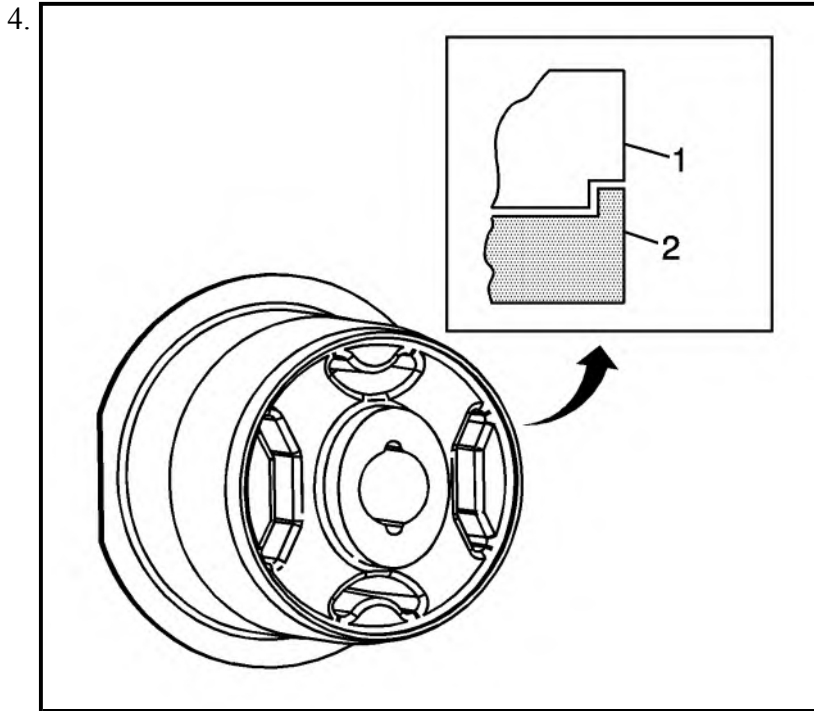
Removal Procedure

1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
2. Remove the rear differential assembly. [Differential Carrier Assembly Replacement](#)

3.



Mark a reference point on the frame and old bushing at the 12 and 6 o'clock position to use to align the new bushing.

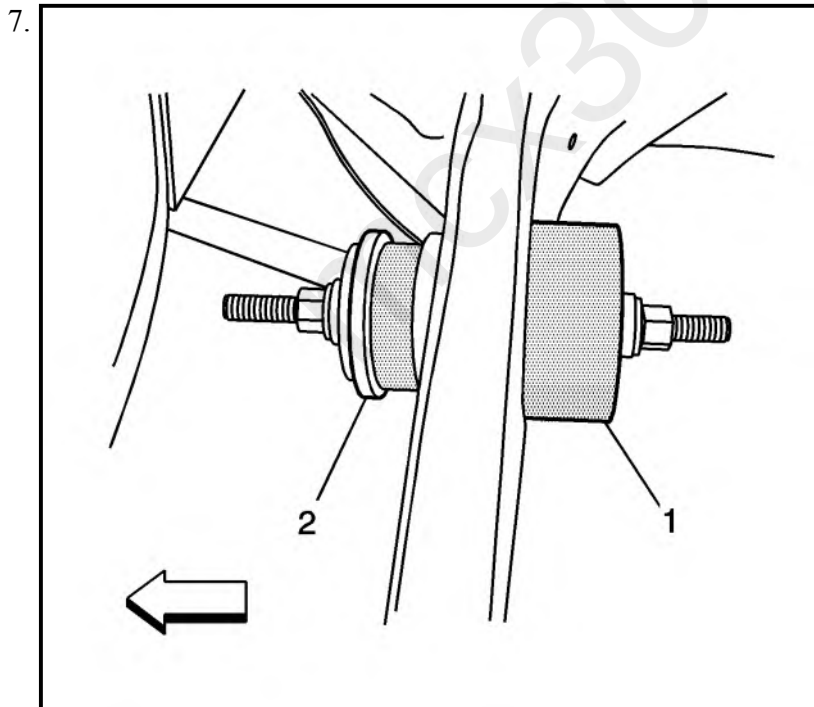


Position the J-45725-1A (1) on the bushing (2).

5. Position the J-45725-2A (1) on the frame.

IMPORTANT: Apply a small amount of grease on the threaded to lubricate the nuts when turning the nuts.

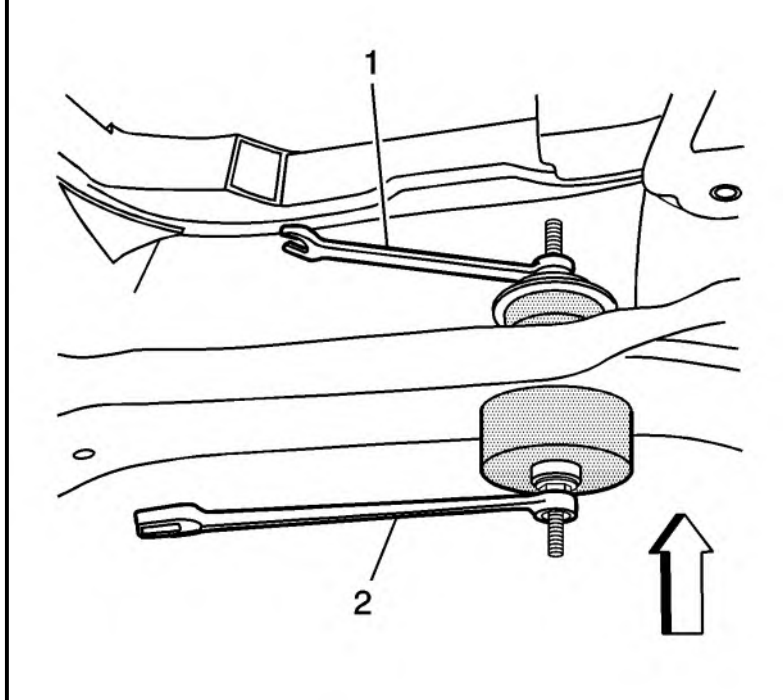
6. Install the threaded rod, bearing and washers.



Adjust the nuts so that they are touching the J-45725-1A (2) and the J-45725-2A (1).

8. Install the proper size wrenches on the nuts.



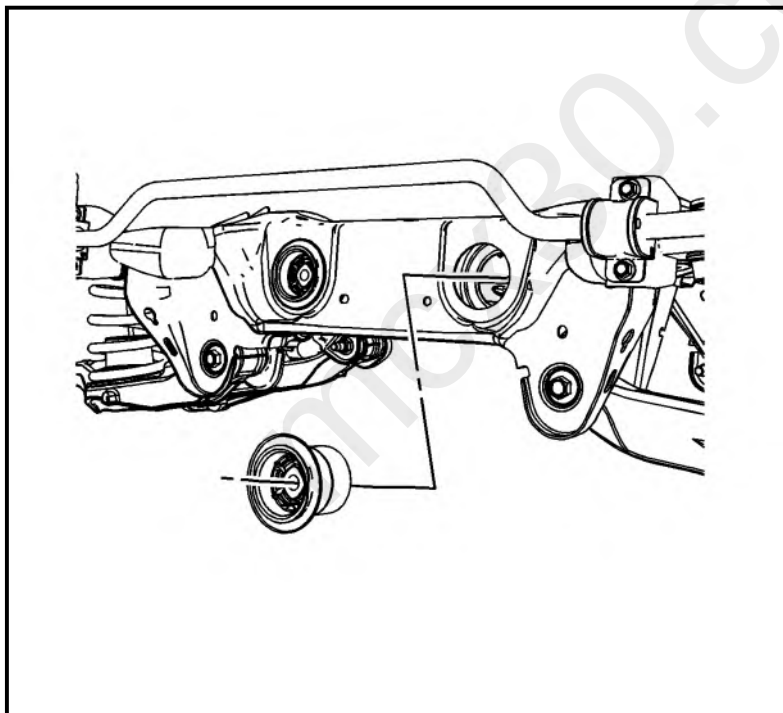


IMPORTANT: In the following service procedure, use only HAND TOOLS when using the **J-45725** Cradle Bushing Replacer.

While holding the front wrench (1) rotate the rear wrench (2) to remove the bushing.

10. Remove the special tools.

11.

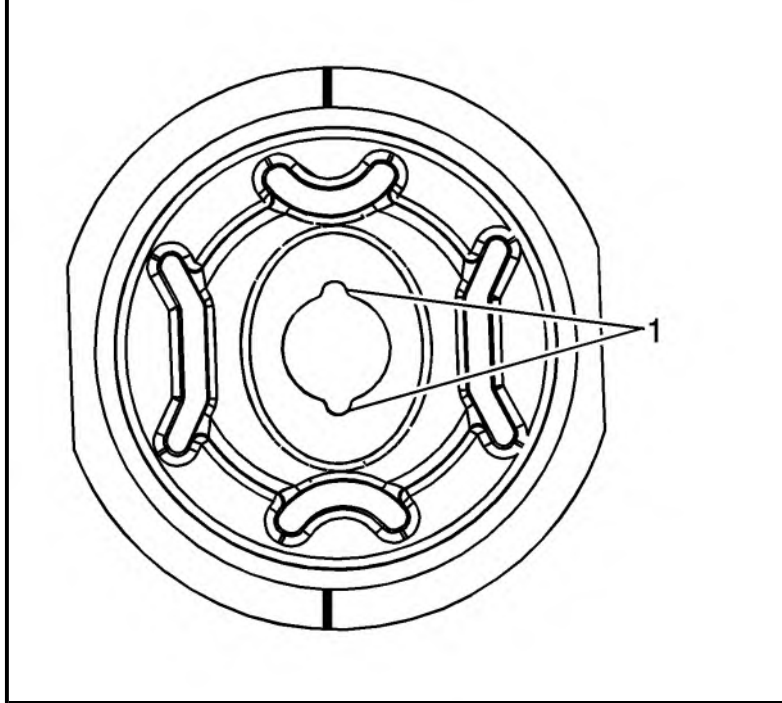


Remove the bushing from the frame.

Installation Procedure

1.





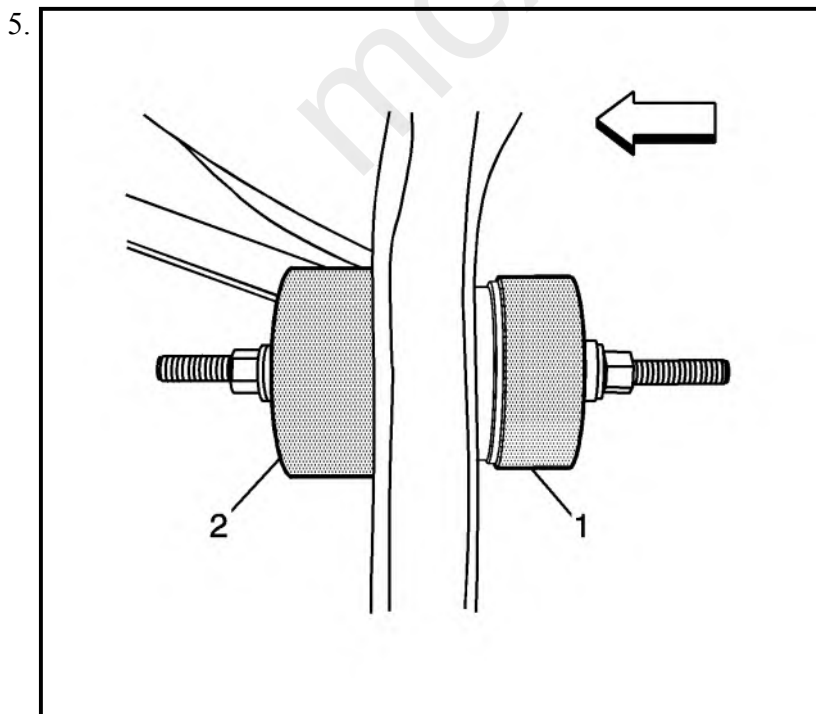
IMPORTANT: Failure to perform the following service procedure prior to the installation of the new bushing, could cause premature failure of the bushing.

Before the installation of the new bushing, use a straight edge draw a line on the new bushing at the 12 and 6 o'clock positions. Ensure that the grooves (1) are at the 12 and 6 o'clock positions.

2. Position the new bushing so that the reference marks on the frame and the bushing are in alignment. This will ensure that the new bushing will be within the 5 degree specification required for the proper alignment of the bushing.

IMPORTANT: The following procedure is to temporarily hold the new bushing in place so that the special tools can be installed for the proper installation. This is NOT to be used to install the bushing.

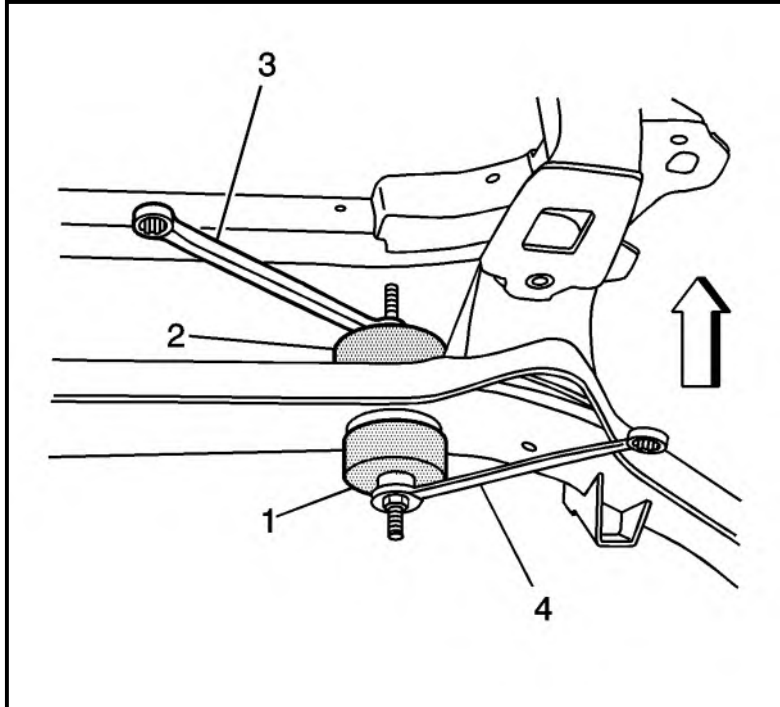
3. Using a block of wood and a hammer, slightly tap the bushing into the frame.
4. Assemble the threaded rod, bearings and washers as indicated in step 7 in the removal procedure.



Position the J-45725-2 (2) on the inside of the frame.

6. Position J-45725-2A (1) on the outside of the frame.
7. Adjust the nuts so that they are touching the J-45725-2 (1) and the J-45725-2A (2).

8.



While holding the front wrench (2) rotate the rear wrench (1) to install the bushing.

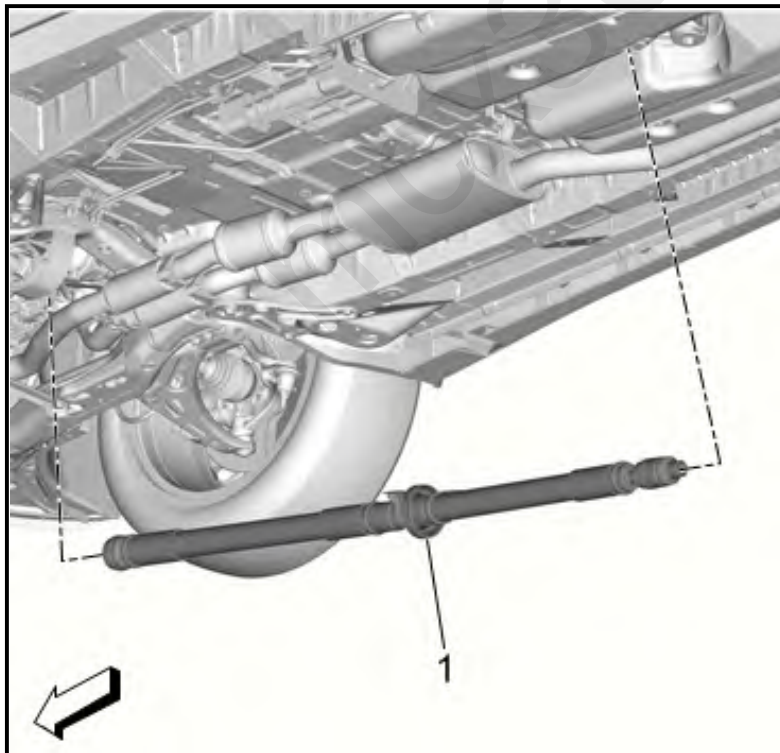
9. Remove the special tools.
10. Install the rear differential assembly. [Differential Carrier Assembly Replacement](#)
11. Lower the vehicle.

DRIVELINE TORQUE TUBE REPLACEMENT

Removal Procedure

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

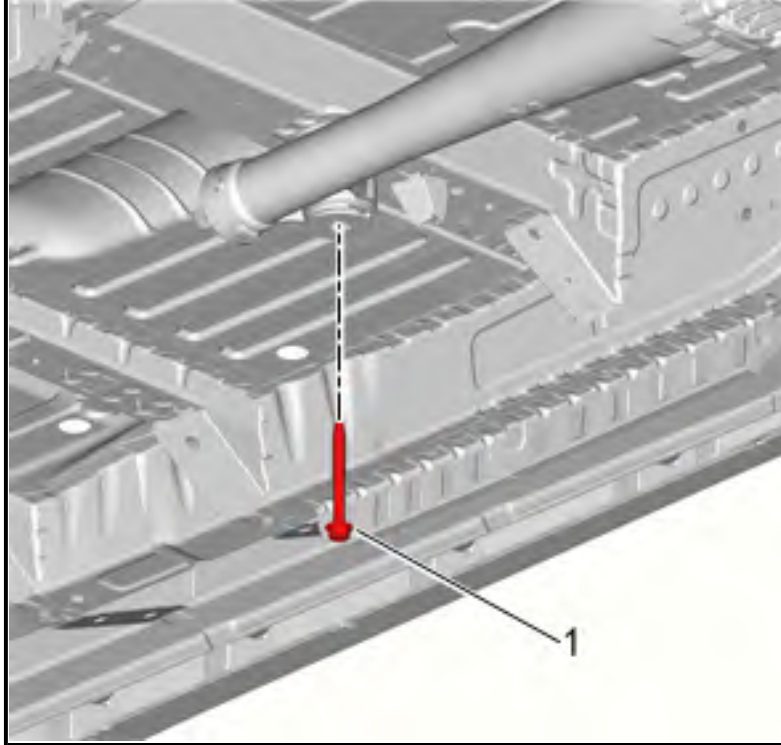
2.



Remove the propeller shaft assembly (1). [Two-Piece Propeller Shaft Replacement](#)

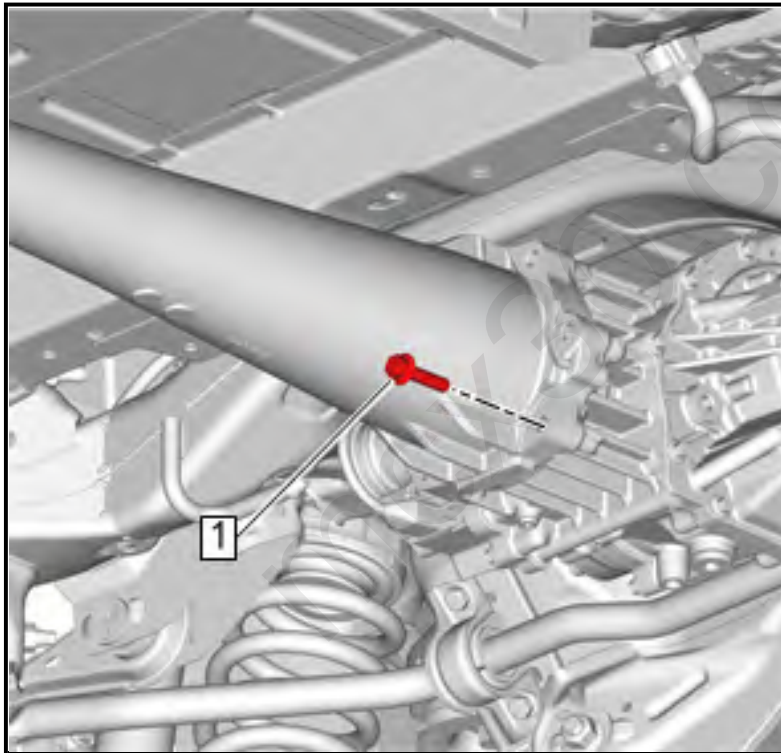
3.





Remove the torque tube mounting bolt (1).

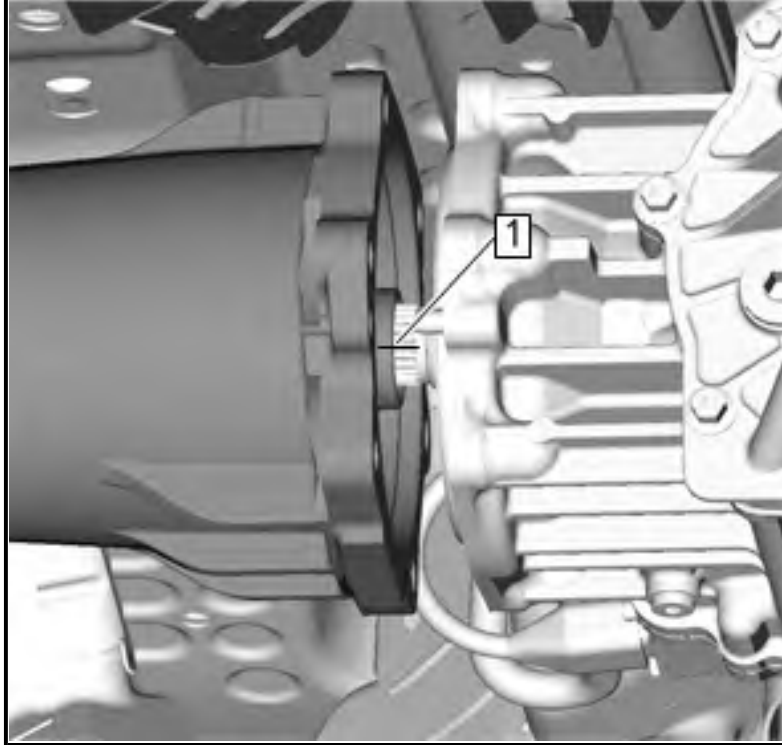
4.



Remove the six torque tube mounting bolts (1) from the rear differential.

5.

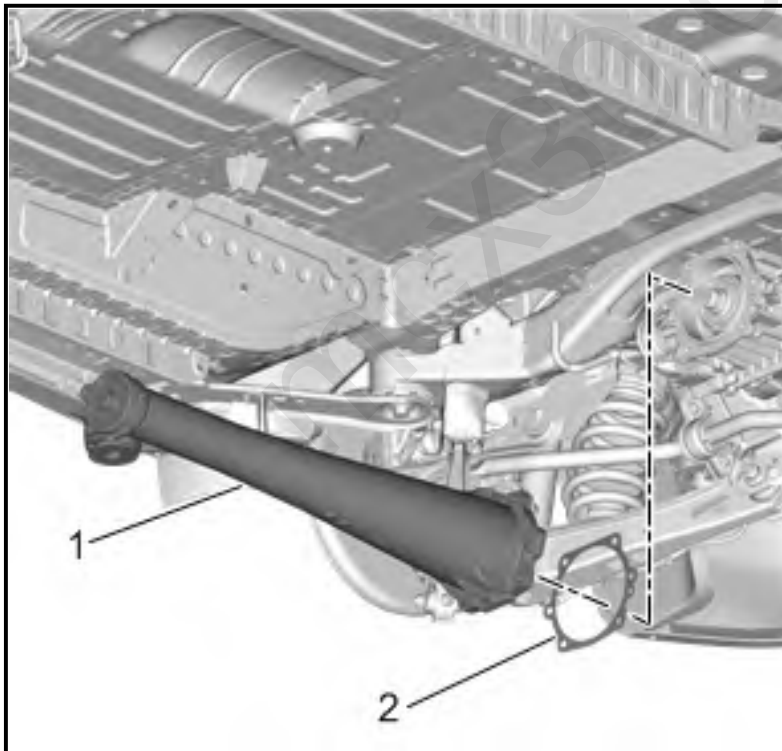




NOTE: The torque tube and RDM are balanced as an assembly. When re-using the original torque tube it should be re-installed in the same position in relation the pinion splines.

Using a paint pen or a suitable marker, mark the relationship of the torque tube splined shaft to the RDM Pinion (1).

6.



NOTE:

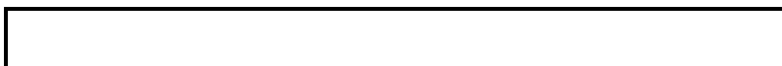
- DO NOT re-use the old gasket, discard and use NEW only.
- If any fluid is found in the torque tube, check the condition of pinion oil seal.

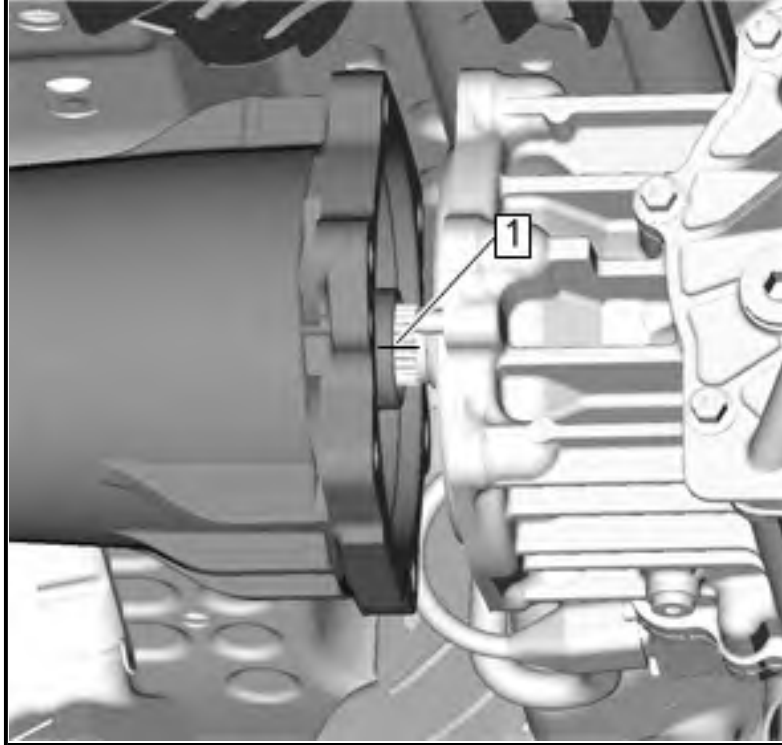
Remove the torque tube assembly (1) and gasket (2) from the rear differential assembly.

Installation Procedure

1. Using a suitable jack stand support the torque tube assembly.

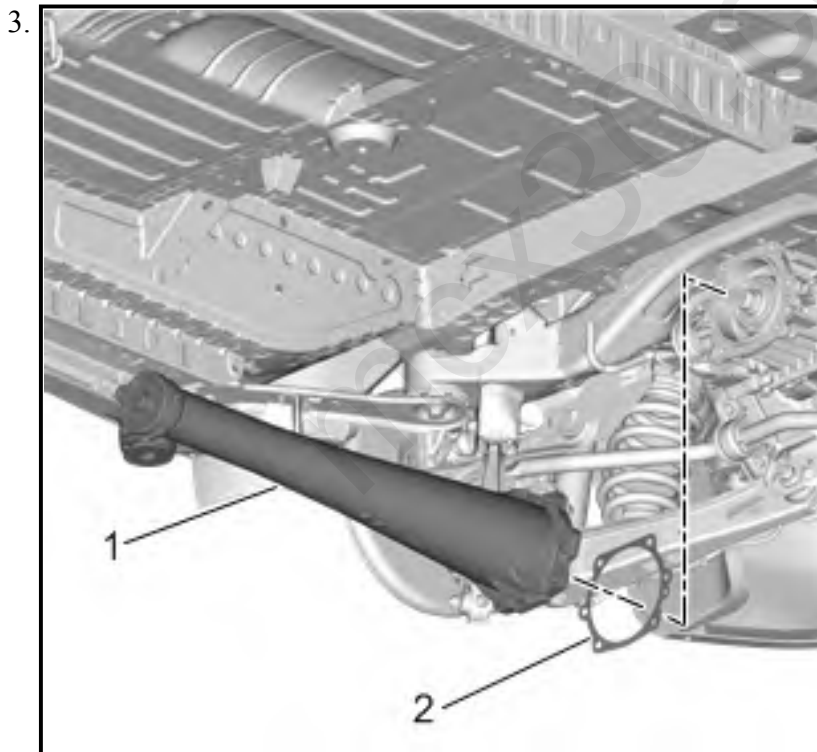
2.





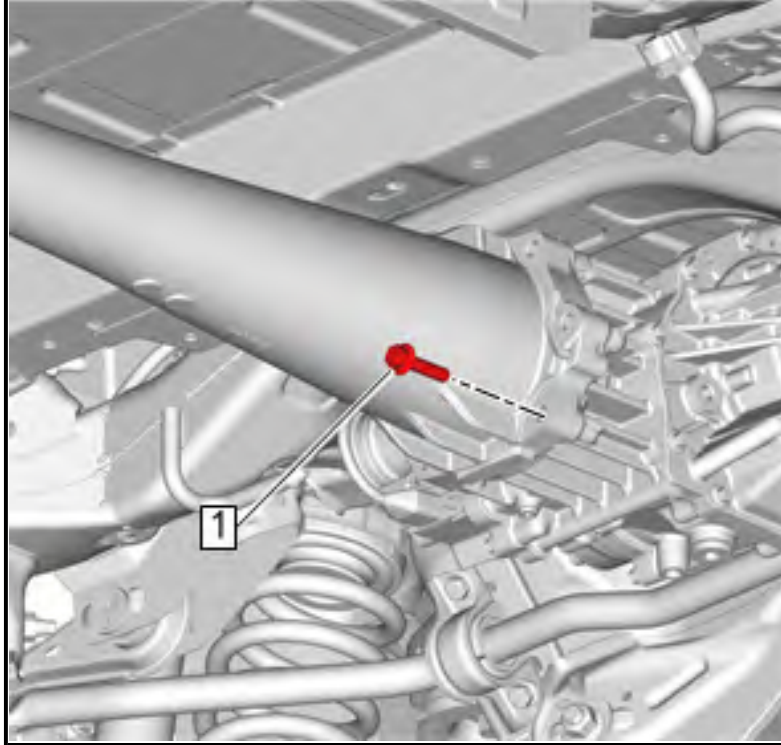
NOTE: The torque tube and RDM are balanced as an assembly. When re-using the original torque tube it should be re-installed in the same position in relation the pinion splines.

Ensure the torque tube and pinion spline marks are aligned (1).



Install the torque tube assembly (1) and the NEW gasket (2) to the rear differential assembly.





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

NOTE: Apply loctite before installing bolts.

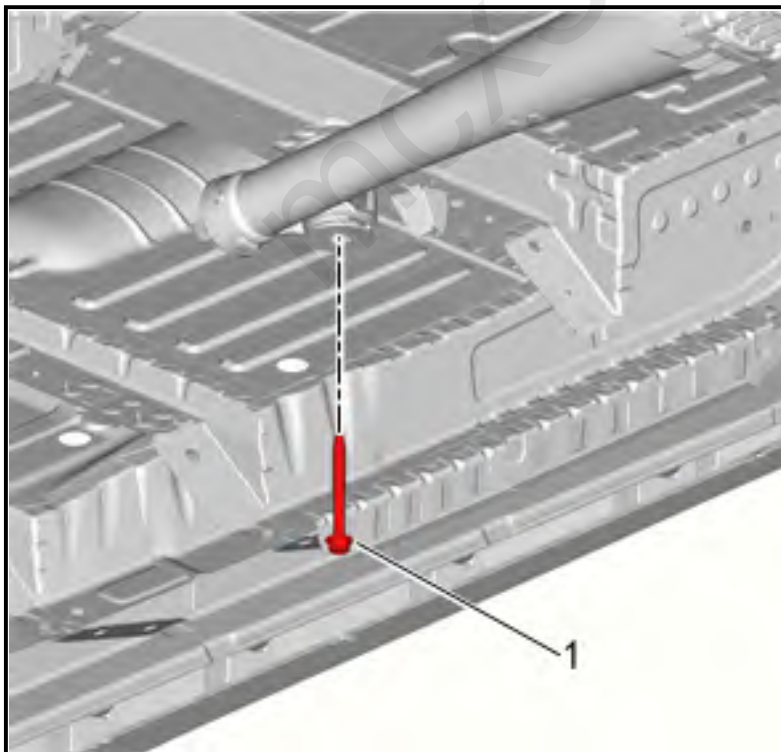
Install and hand tighten the torque tube to differential bolts (1) before torquing to specifications.

5. Torque the mounting bolts (1) to specifications.

Tighten

Tighten the bolts to 55 N.m (41 lb ft).

6.



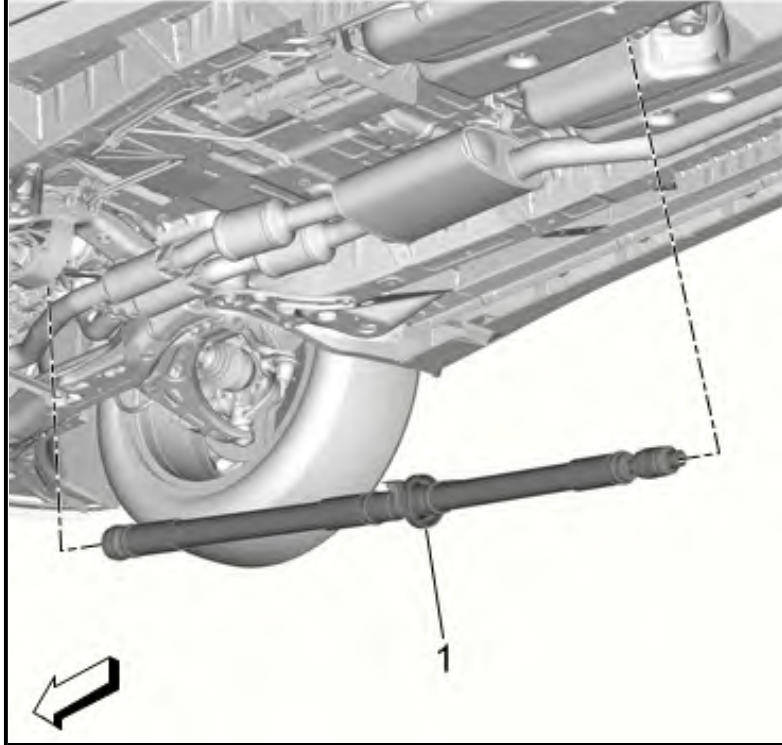
Install the front torque tube mounting bolt (1).

Tighten

Tighten the bolt to 160 N.m (118 lb ft).

7.





Install the propeller shaft assembly (1). [Two-Piece Propeller Shaft Replacement](#)

8. Remove the support and lower the vehicle.

REAR AXLE SHAFT SEAL REPLACEMENT

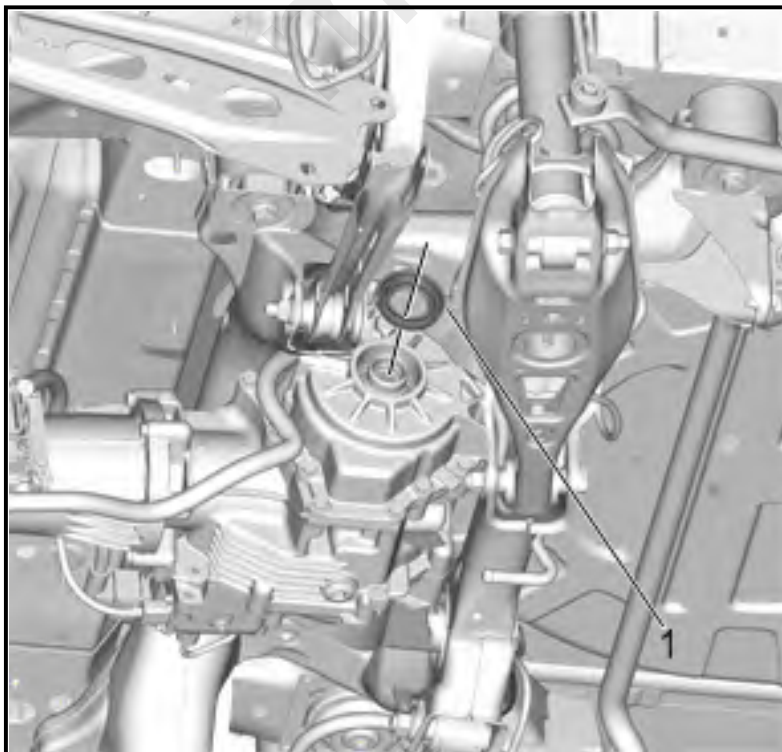
Special Tools

EN-45000 Seal Remover

Equivalent regional tools: [Special Tools](#) .

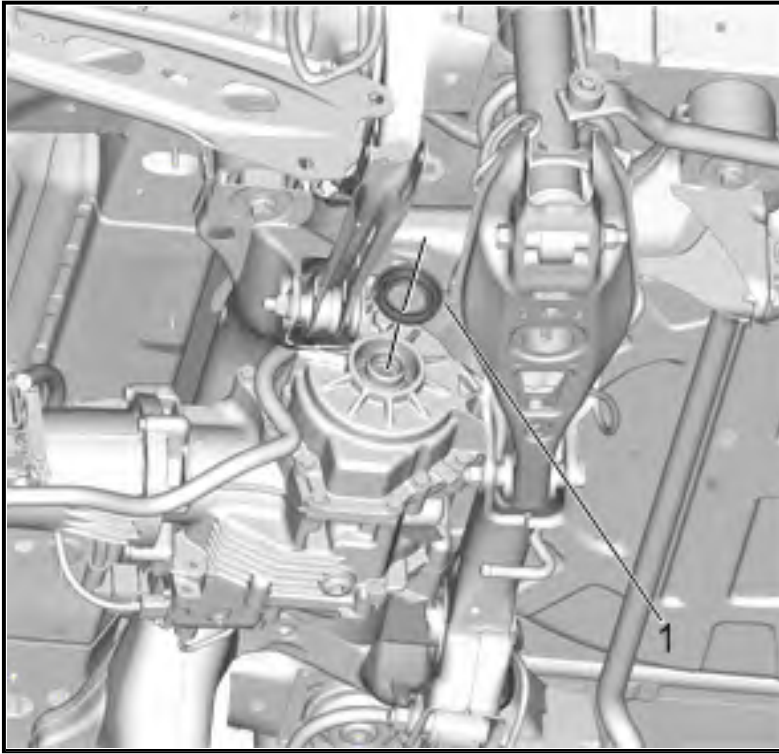
Removal Procedure

1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
2. Remove the rear axle shaft. [Rear Wheel Drive Shaft Replacement - Left Side](#) , [Rear Wheel Drive Shaft Replacement - Right Side](#)
- 3.



Using a suitable tool, remove the rear axle shaft seal (1).

1.



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

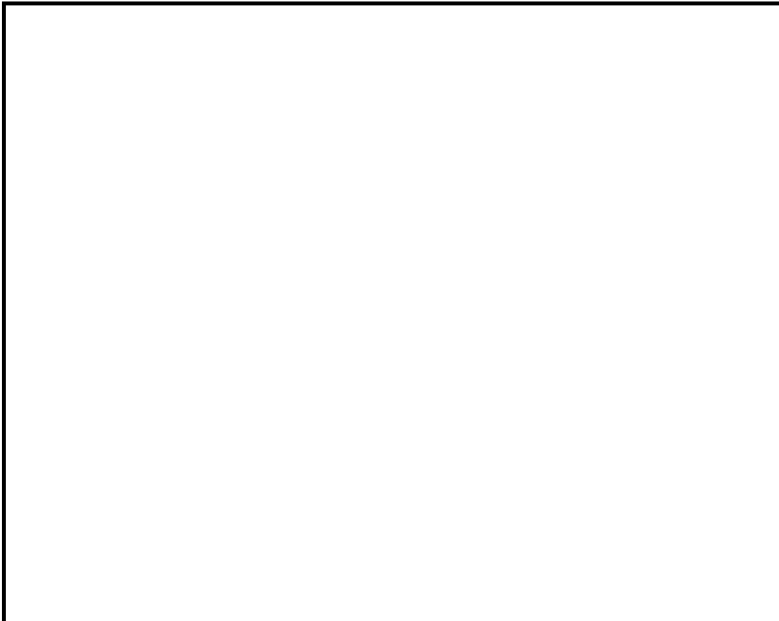
2. Using a suitable seal driver, install the rear axle seal (1).
3. Install the rear axle shaft. [Rear Wheel Drive Shaft Replacement - Left Side](#) , [Rear Wheel Drive Shaft Replacement - Right Side](#)
4. Remove the support and lower the vehicle.

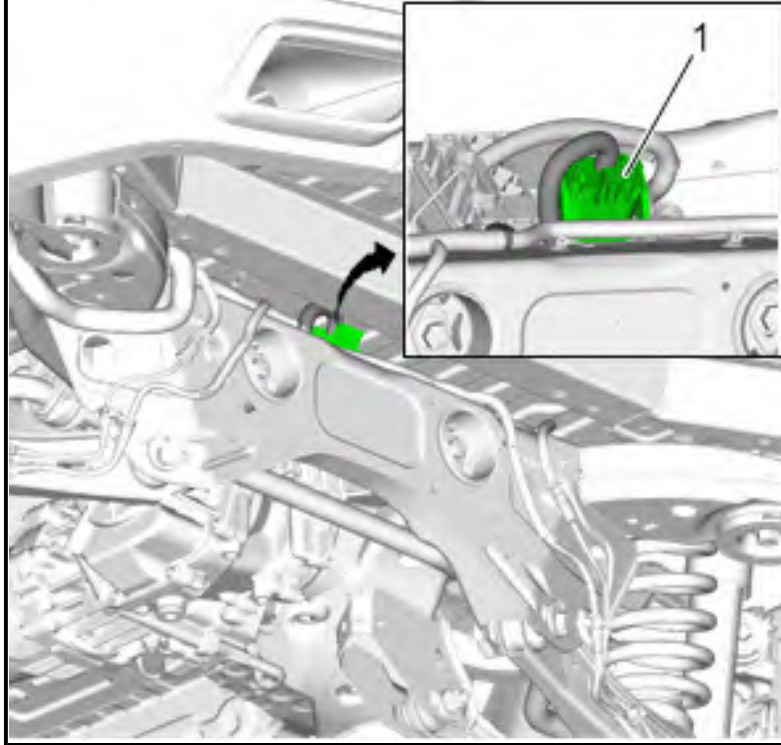
DIFFERENTIAL CARRIER ASSEMBLY REPLACEMENT

Removal Procedure

1. Prior to removing the rear differential carrier assembly. Review the clutch control module programming information. It may be necessary to prepare the control module for removal using the SPS programming tool prior to lowering the carrier assembly.
2. For programming information, refer to [Control Module References](#) .
3. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
4. Drain the rear differential assembly. [Rear Axle Lubricant Replacement](#)
5. Remove the rear wheel drive shafts. [Rear Wheel Drive Shaft Replacement - Left Side](#) , [Rear Wheel Drive Shaft Replacement - Right Side](#)
6. Remove the propeller shaft assembly. [Two-Piece Propeller Shaft Replacement](#)

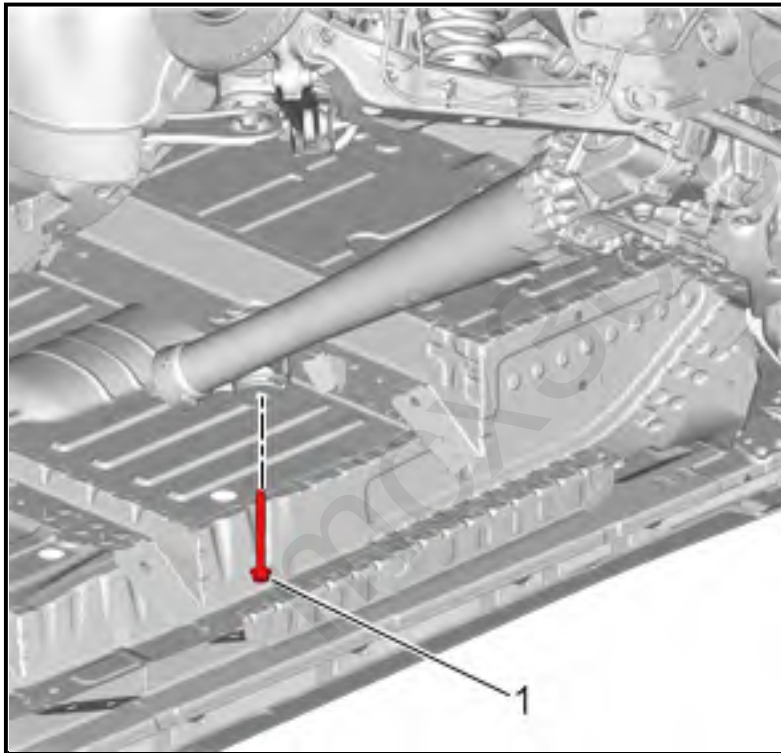
7.





Disconnect the electrical connector (1) from the electronic clutch control module.

8.



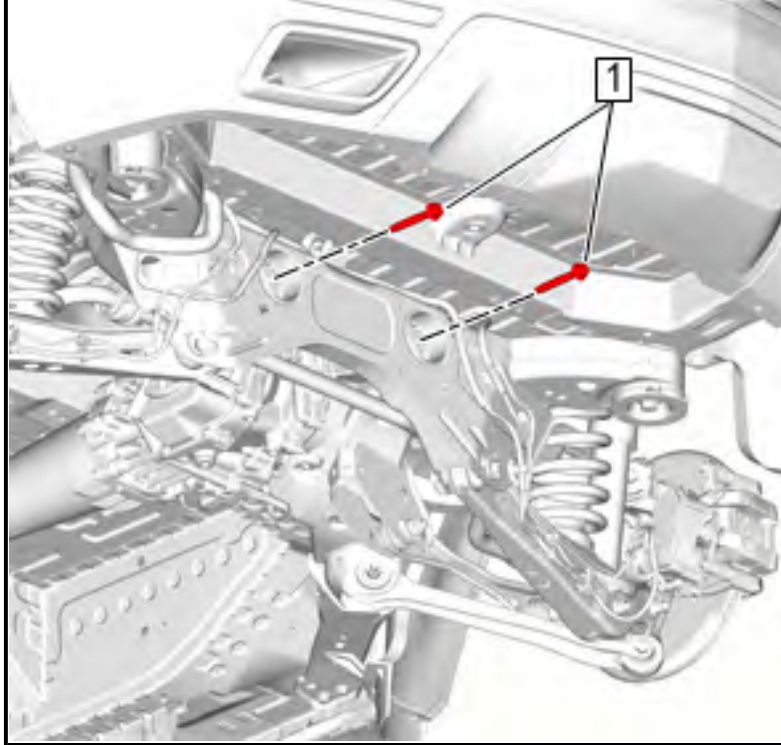
Remove the front torque tube mounting bracket bolt (1).

9. Support the torque tube with a jack stand.

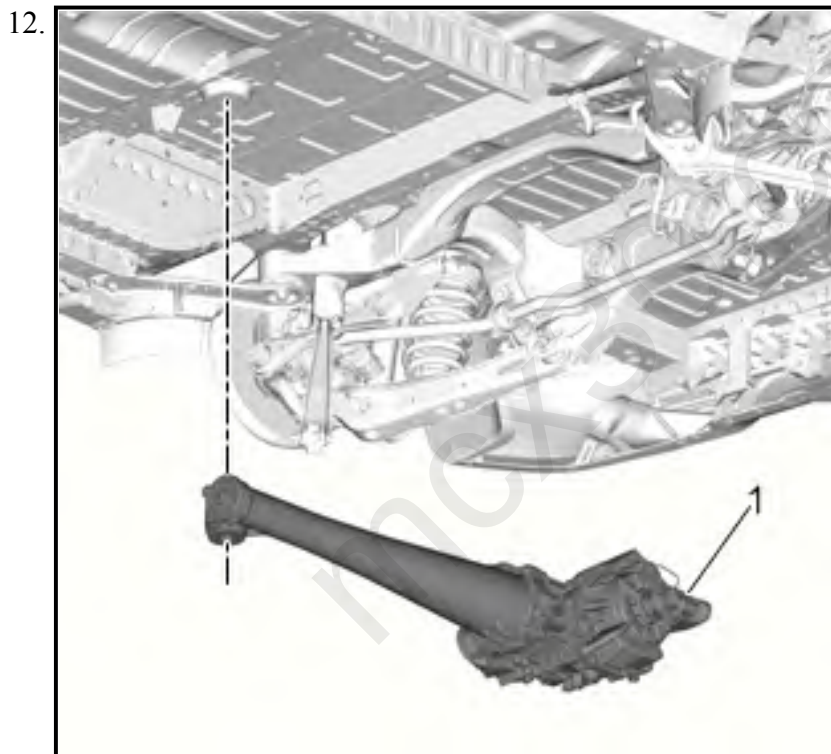
10. Support the rear differential assembly with a transmission jack.

11.





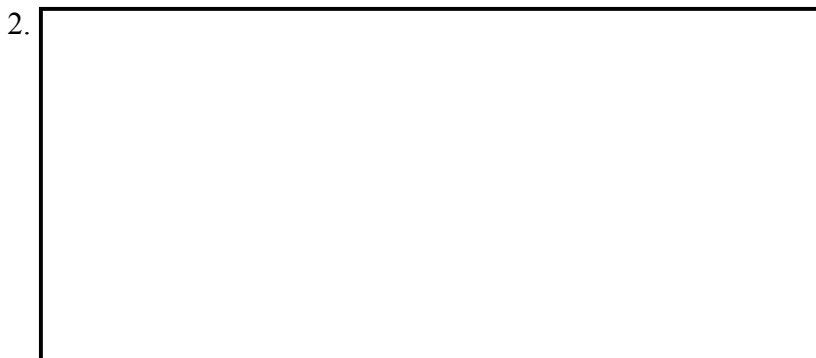
Remove the rear differential drive mounting bolts (1).

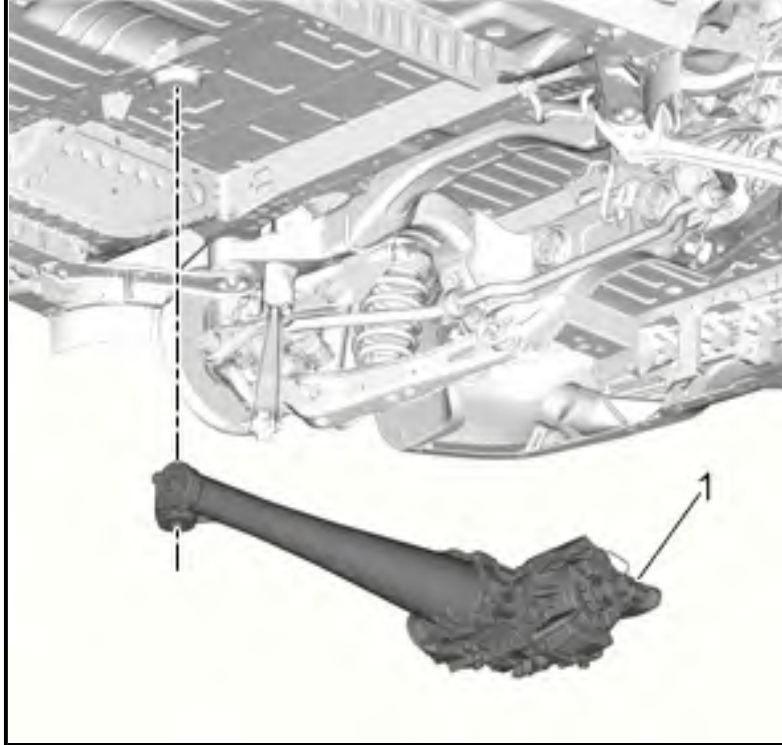


With the aide of an assistant, remove the rear differential assembly (1) from the vehicle.

Installation Procedure

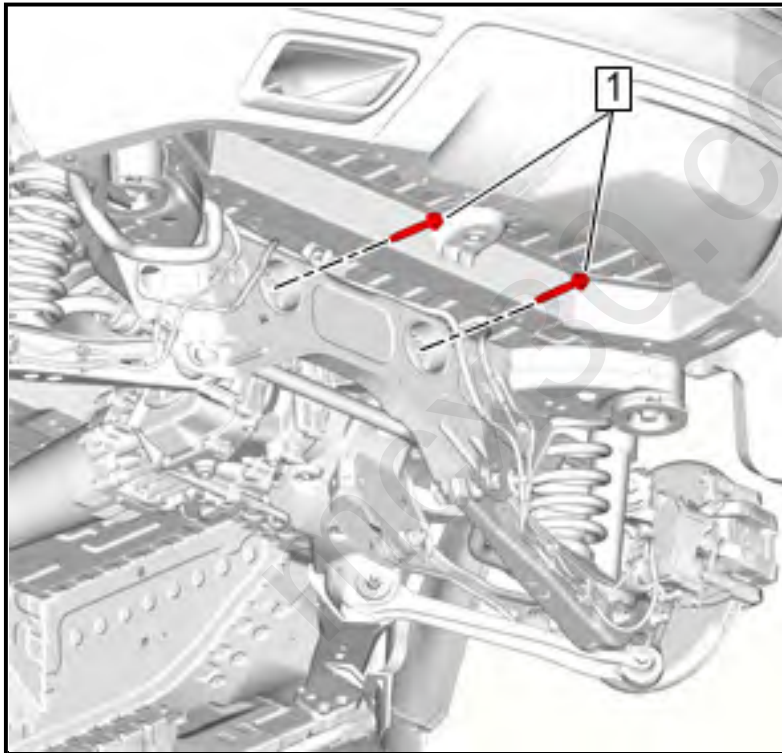
1. Prior to installing the rear differential carrier assembly. Review the clutch control module programming information. It may be necessary to record the rear differential clutch service calibration values found stamped in the differential housing.





Position the rear differential (1) in the vehicle.

3.



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

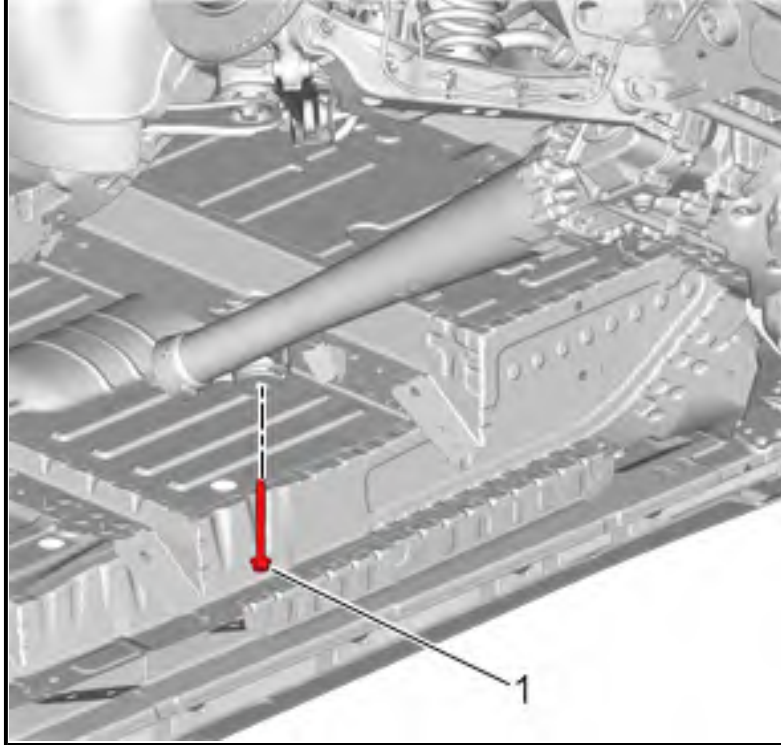
Install the rear differential mounting bolts (1).

Tighten

100 N.m (74 lb ft)

4.



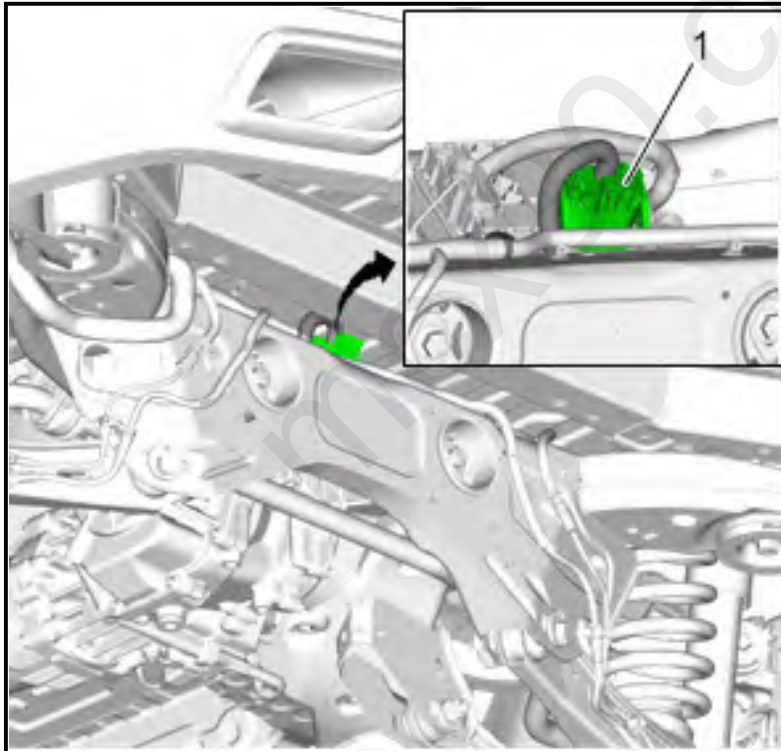


Install the torque tube bolt (1).

Tighten

Tighten the bolt to 160 N.m (118 lb ft).

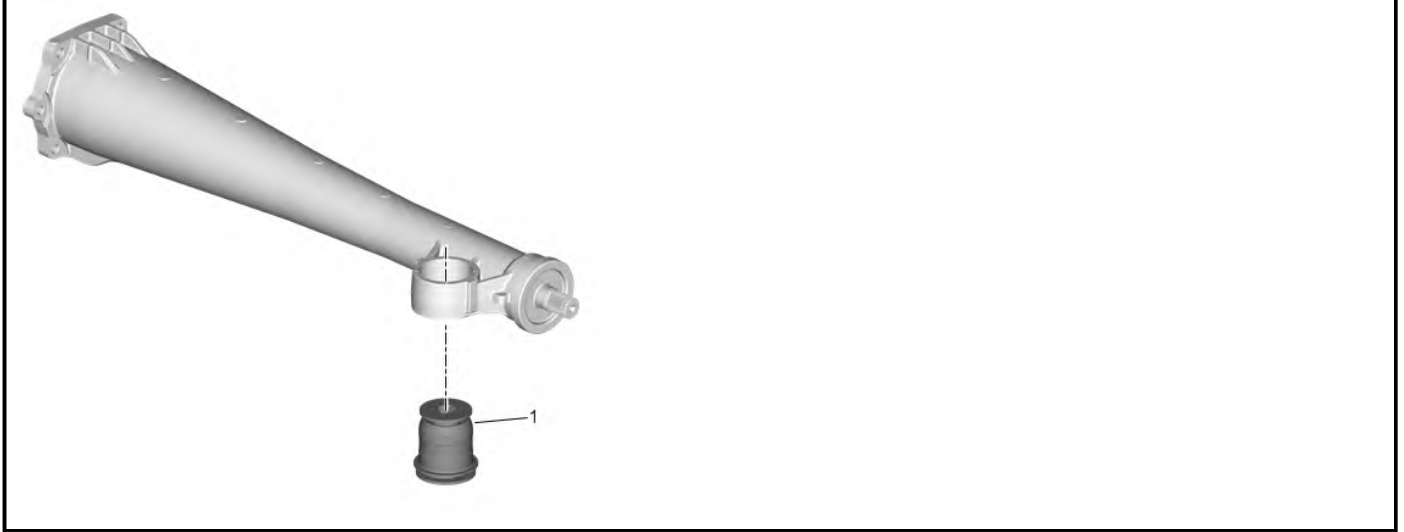
5.



Reconnect the electrical connector (1) for the electronic clutch control module.

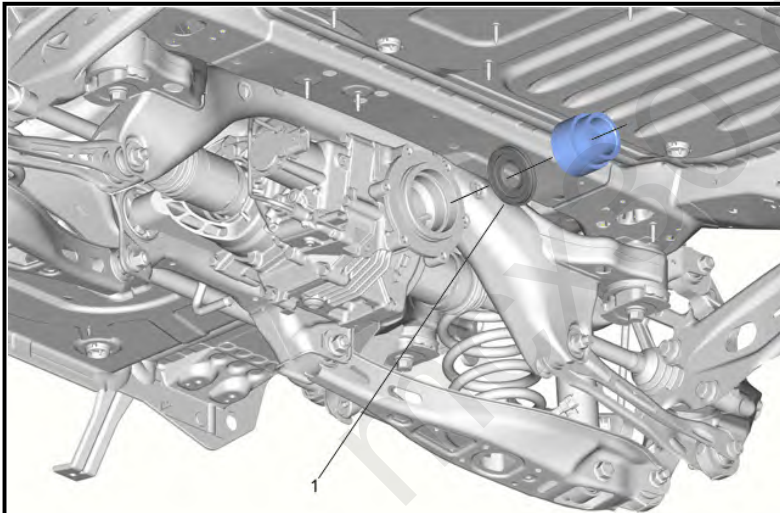
6. Install the propeller shaft assembly. [Two-Piece Propeller Shaft Replacement](#)
7. Refill the rear differential assembly. [Rear Axle Lubricant Replacement](#)
8. Install the rear wheel drive shaft. [Rear Wheel Drive Shaft Replacement - Left Side](#) , [Rear Wheel Drive Shaft Replacement - Right Side](#)
9. Remove the support and lower the vehicle.

DIFFERENTIAL CARRIER INSULATOR REPLACEMENT



Callout	Component Name
Preliminary Procedure Remove the rear axle assembly. Driveline Torque Tube Replacement	
1	Rear Differential Mount Bushing NOTE: Use the appropriate tool to remove the bushing.

DIFFERENTIAL DRIVE PINION GEAR SEAL REPLACEMENT



Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Lifting and Jacking the Vehicle 2. Remove the torque tube assembly. Driveline Torque Tube Replacement	

Callout	Component Name
1	Differential Pinion Seal Procedure 1. Install a sheet metal screw into the seal. 2. Attach a pair of pliers or a slider hammer to the screw and remove the seal. 3. Inspect the fluid level. Rear Axle Lubricant Level Inspection NOTE: The pinion flange, the nut and the dust cover are NOT SERVICED separately. These items are serviced with the torque tube assembly. Special Tools J 44636-1 Front Output Shaft Seal Protector For equivalent regional tools, refer to Special Tools.

REAR DIFFERENTIAL HYDRAULIC SYSTEM SERVICE FILL/BLEED

Rear Differential Hydraulic System Service Fill/Bleed Procedure

The rear differential hydraulic system service bleed is used to remove air from the system, check for proper system and solenoid function, and determine if full pressure can be achieved at the apply piston. Any time a rear differential hydraulic line is disconnected or any repairs are made, this procedure must be performed.

1. Connect scan tool and check the rear differential clutch control module for any DTCs and perform repairs as necessary. The scan tool may not allow the hydraulic system service bleed if certain DTCs are present.
2. Raise vehicle. Refer to [Lifting and Jacking the Vehicle](#).
3. Remove the fill plug. Fill the Rear Drive Clutch fill hole to the appropriate level with the appropriate fluid. Refer to [Differential Clutch Oil Replacement](#), [Approximate Fluid Capacities](#), and [Adhesives, Fluids, Lubricants, and Sealers](#).
4. Install fill plug. Lower vehicle.
5. Ignition ON.
6. From the scan tool menu, select Rear Differential Clutch Control Module, then select Control Functions, then Rear Differential Hydraulic System Service Bleed.

NOTE: The Rear Differential Clutch Control Module can run this procedure. If this step does not pass, repeat procedure from step 2.

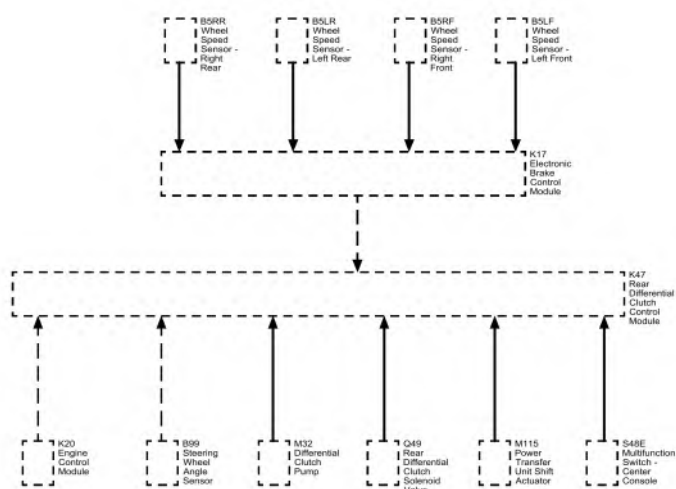
NOTE: Status will change to "Complete" when done.

7.

DESCRIPTION AND OPERATION

REAR DRIVE AXLE DESCRIPTION AND OPERATION (WITH G99)





Callout	Component Name
B5RR	B5RR Wheel Speed Sensor - Right Rear
B5LR	B5LR Wheel Speed Sensor - Left Rear
B5RF	B5RF Wheel Speed Sensor - Right Front
B5LF	B5LF Wheel Speed Sensor - Left Front
K17	K17 Electronic Brake Control Module
K47	K47 Rear Differential Clutch Control Module
K20	K20 Engine Control Module
B99	B99 Steering Wheel Angle Sensor
M32	M32 Differential Clutch Pump
Q49	Q49 Rear Differential Clutch Solenoid Valve
S48E	S48E Multifunction Switch - Center Console
M115	M115 Power Transfer Unit Shift Actuator

The rear differential clutch control modules function is to control the electronic limited slip differential. The rear differential control module receives a torque command signal from the chassis control module (CCM) according to the driving situation to achieve vehicle dynamics and traction.

The electronic limited slip differential system contains the following main components:

- The rear differential clutch control module
- The rear differential clutch solenoid valves
- The rear differential clutch motor
- The left and right rear differential multi-disc wet clutches

When the torque signal is received, the rear differential control module actuates the following components:

- The rear differential clutch motor
- The left and right rear differential clutch solenoid valves

The electro-hydraulic piston actuation engages the left or right limited slip clutch to allow active variable locking torque transfer to the left and right half shafts. to enable torque vectoring and to allow cornering with differential.

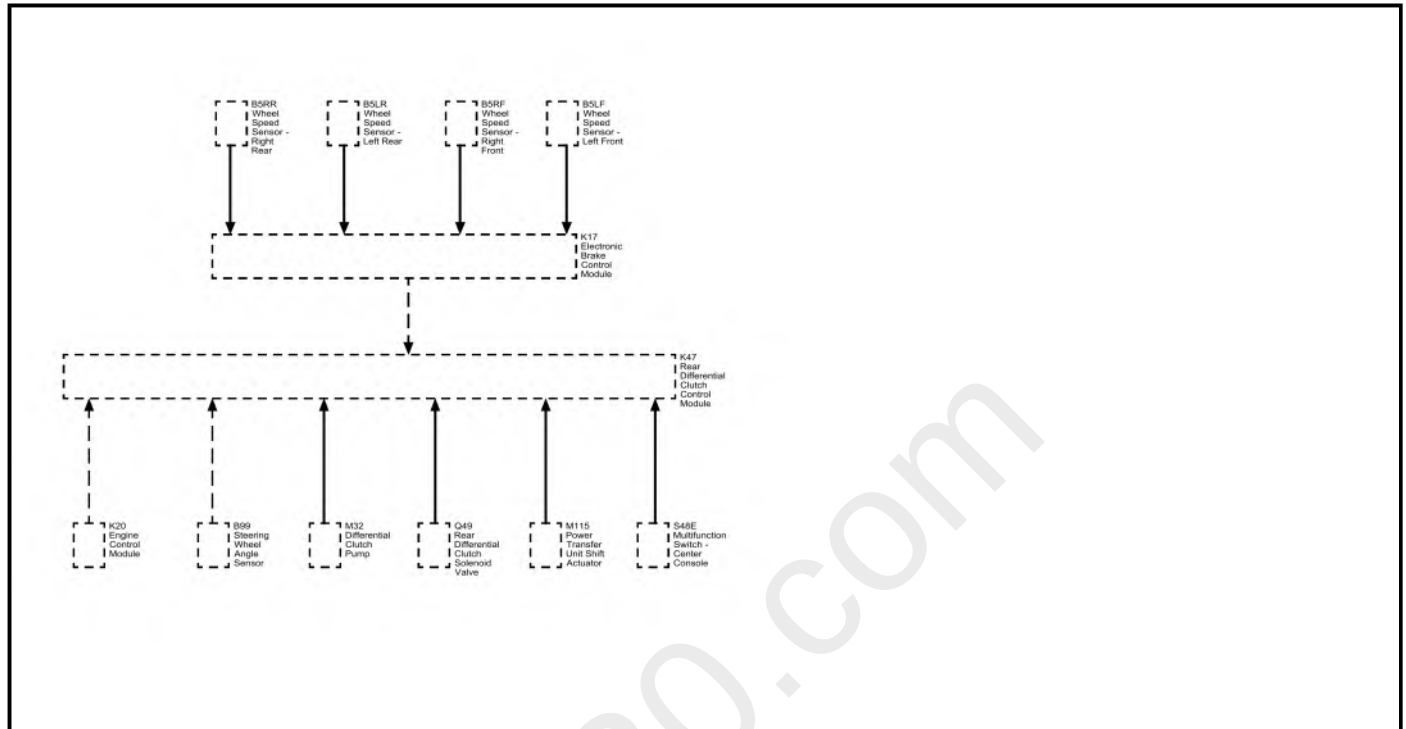
The rear differential clutch control module monitors voltage levels, clutch temperatures, over-current, and circuit failures.

Whenever the hydraulic control system within the electronic limited slip differential system is opened, a service bleed procedure (Rear Differential Hydraulic System Service Bleed) with a scan tool needs to be performed to remove any air from the system.

If replacing the rear drive clutch control module, the module needs to be programmed/configured with rear differential clutch correction factors. The clutch correction factor is an alphanumeric value that is stored in the rear differential clutch control module and stamped on the rear differential clutch pack housings. The clutch correction factor is based on the valve current-to-torque performance of the individual clutch pack. The clutch correction factor helps to improve vehicle performance by adjusting software parameters to suit the mechanical hardware.

Configuring the rear differential clutch control module with the clutch correction factors might be required after certain service procedures are performed. Two eight digit values will be used during the programming of the rear differential clutch control module using the scan tool.

REAR DRIVE AXLE DESCRIPTION AND OPERATION (WITHOUT G99)



Callout	Component Name
B5RR	B5RR Wheel Speed Sensor - Right Rear
B5LR	B5LR Wheel Speed Sensor - Left Rear
B5RF	B5RF Wheel Speed Sensor - Right Front
B5LF	B5LF Wheel Speed Sensor - Left Front
K17	K17 Electronic Brake Control Module
K47	K47 Rear Differential Clutch Control Module
K20	K20 Engine Control Module
B99	B99 Steering Wheel Angle Sensor
M32	M32 Differential Clutch Pump
Q49	Q49 Rear Differential Clutch Solenoid Valve
S48E	S48E Multifunction Switch - Center Console
M115	M115 Power Transfer Unit Shift Actuator

The rear differential clutch control modules function is to control the electronic open differential. The rear differential control module receives a torque command signal from the chassis control module (CCM) according to the driving situation to achieve vehicle dynamics and traction.

The electronic differential system contains the following main components:

- The rear differential clutch control module
- The rear differential clutch motor
- The rear differential multi-disc wet clutches

When the torque signal is received, the rear differential control module actuates the following components:

- The rear differential clutch motor

The hydraulic piston engages the clutch to allow torque to the open differential.

The rear differential clutch control module monitors voltage levels, clutch temperatures, over-current, and circuit failures.

Whenever the hydraulic control system within the electronic differential system is opened, a service bleed procedure with a scan tool needs to be performed to remove any air from the system.

If replacing the rear drive clutch control module, the module needs to be programmed/configured with a rear differential clutch correction factors. The clutch correction factor value is an alphanumeric value that is stored in the rear differential clutch control module and stamped on the rear differential clutch pack housing. The clutch correction factors is based on the valve current-to-torque performance of the individual clutch pack. The clutch correction factor helps to improve vehicle performance by adjusting software parameters to suit the mechanical hardware.

Configuring the rear differential clutch control module with the clutch classification value might be required after certain service procedures are performed. An eight digit values will be used during the programming of the rear differential clutch control module using the scan tool.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

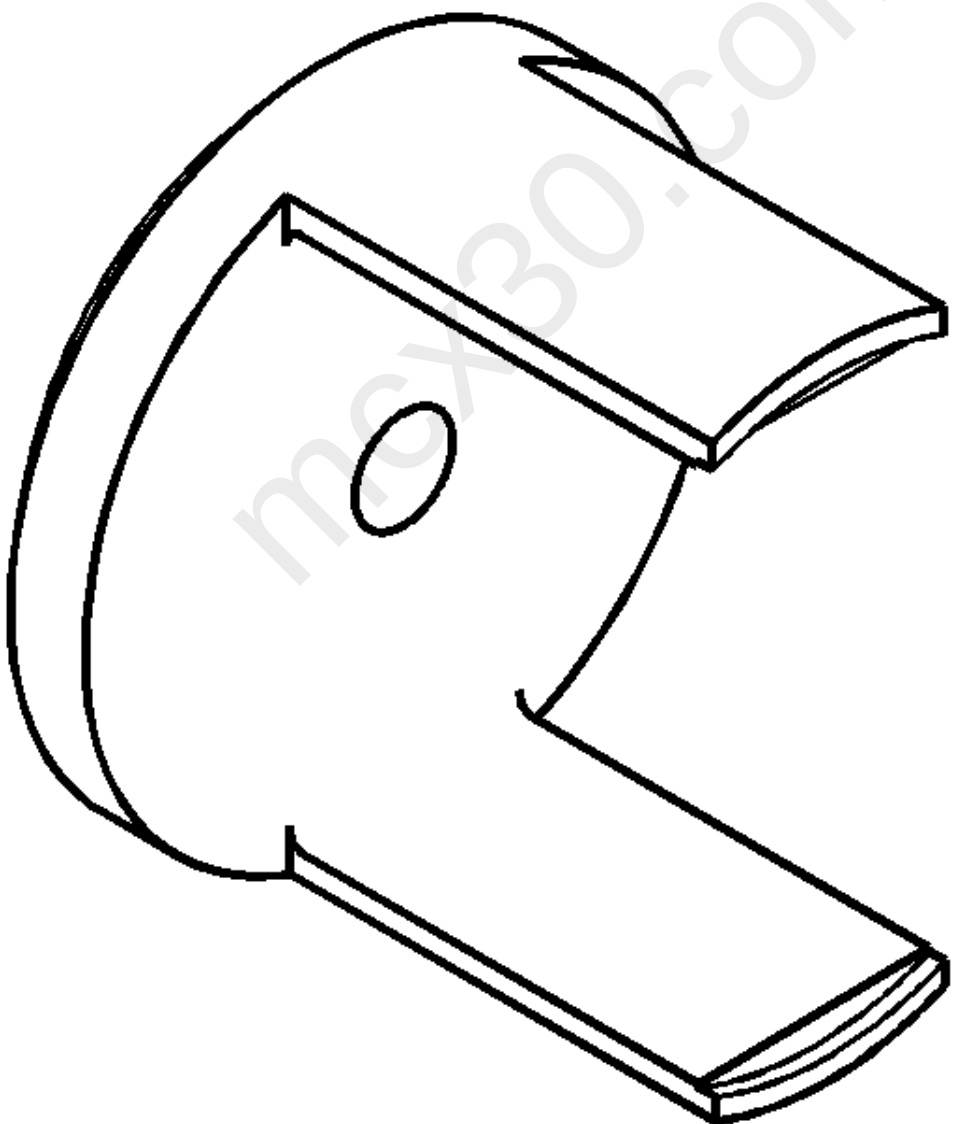
Illustration	Tool Number/Description
	DT-49126-1 Press Tool

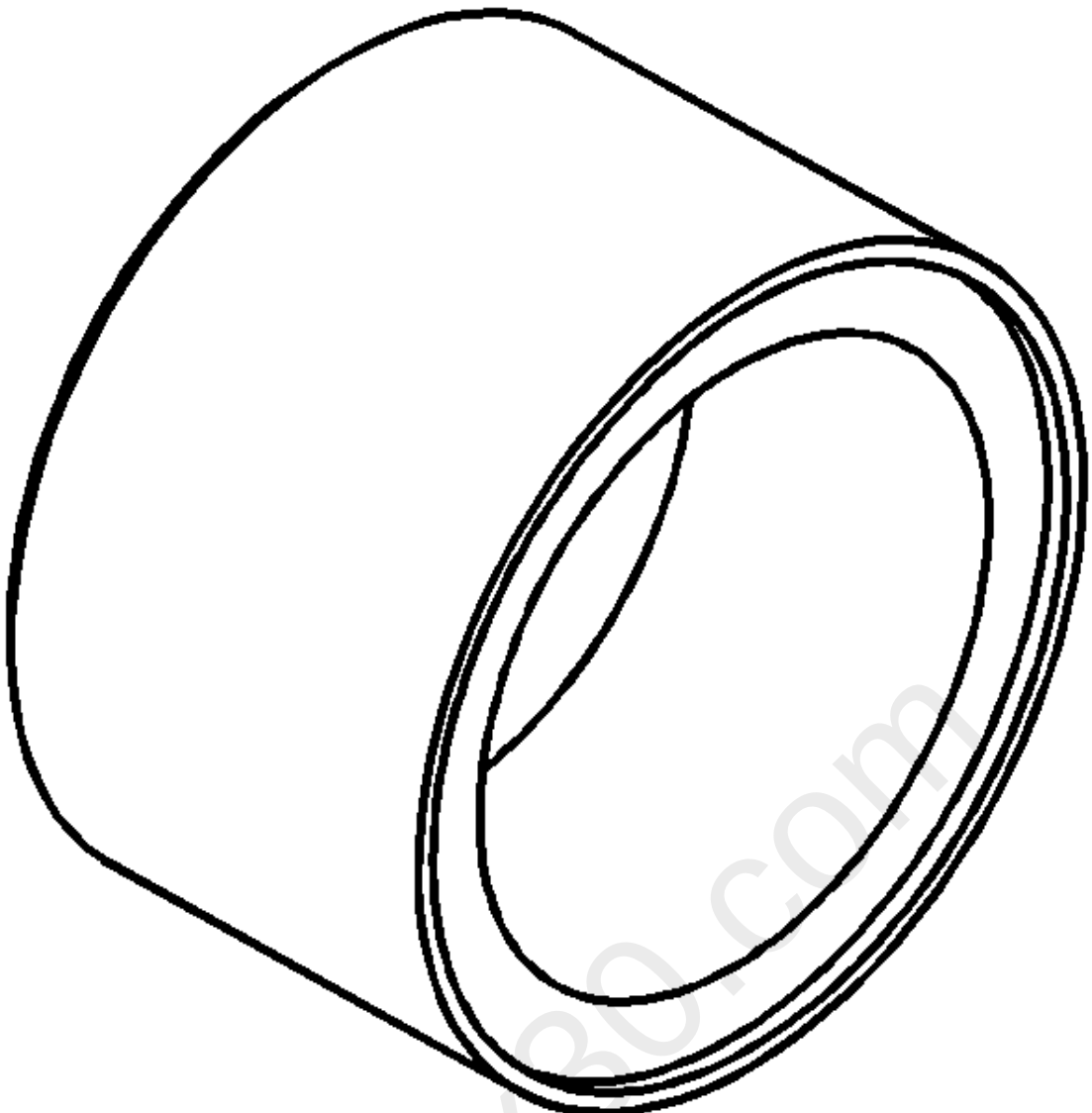
Illustration	Tool Number/Description
	DT-49126-2 Press Tool

Illustration	Tool Number/Description
	DT-51592 Seal Installer

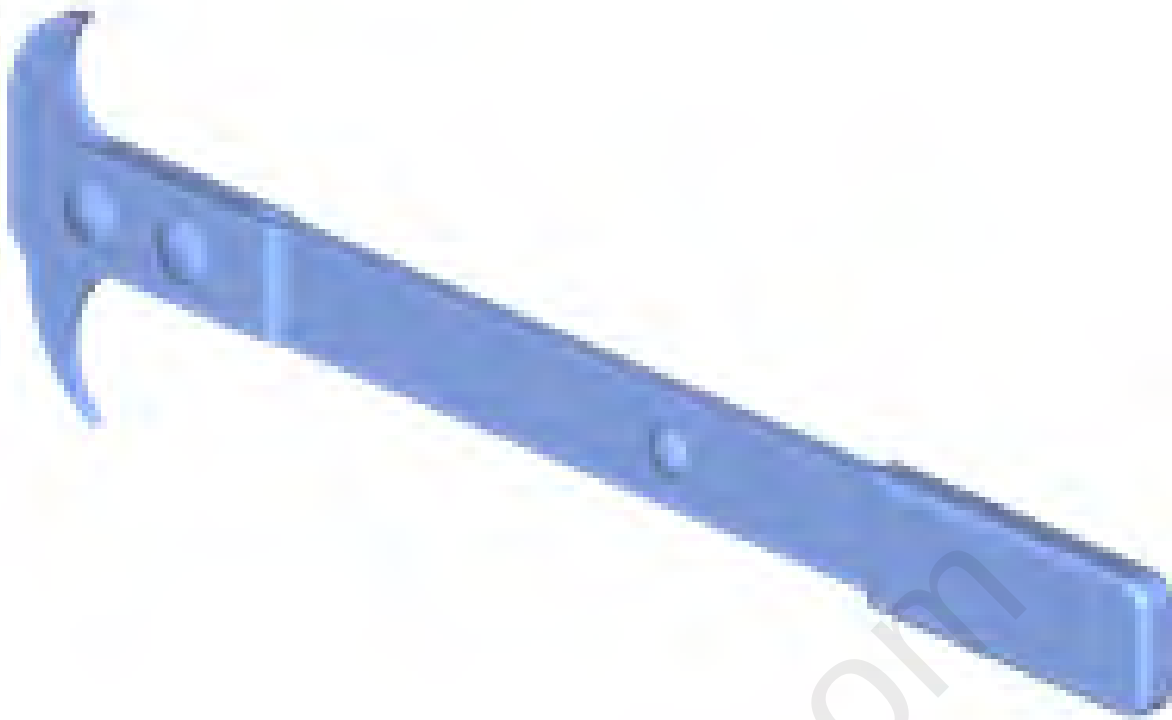
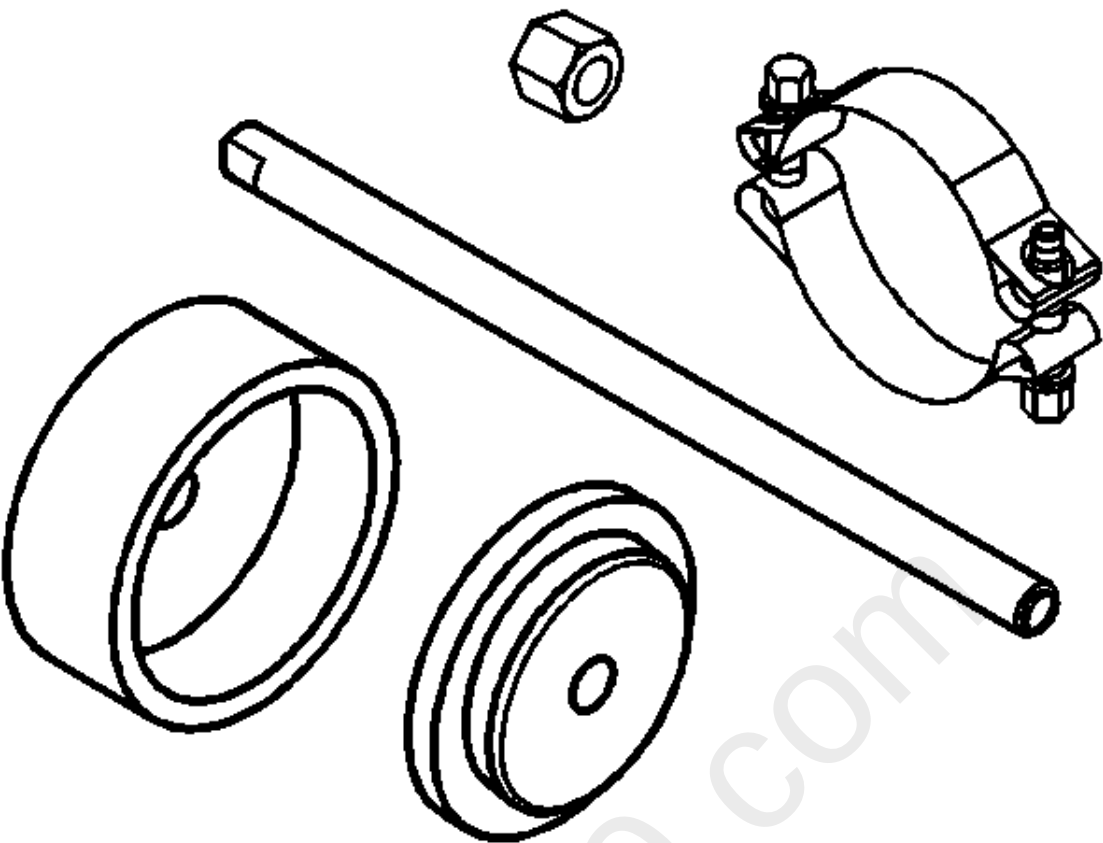
Illustration	Tool Number/Description
 A blue metal seal remover tool, likely made of steel, with a long, straight handle and a curved, notched head. The tool is shown against a white background. A large, diagonal watermark 'mcx30.com' is visible across the image.	J-45000 EN-45000 Seal Remover

Illustration	Tool Number/Description
	J-24428-A Pinion Seal Installer

Illustration	Tool Number/Description
	J-45725-A Frame Bushing Installer