

2017 STEERING

Rear Wheel Steering - CT6

SPECIFICATIONS

FASTENER SPECIFICATIONS

Reusable Threaded Fastener Tightening Specifications

NOTE: <i>All fasteners listed in this table can be reused after removal.</i>	
Application	Specification
	Metric (English)
Rear Wheel Steering Actuator Bolt	
• First Pass:	100 N.m (74 lb ft)
• Final Pass:	45-60 degrees
Rear Wheel Steering Actuator Shield Bolt	9 N.m (80 lb in)

DIAGNOSTIC INFORMATION AND PROCEDURES

DTC C0176: SYSTEM THERMAL ERROR - HIGH TEMPERATURE

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 C0176 54

System Thermal Error - High Temperature

Circuit/System Description

The rear steering control module monitors the temperature of the rear wheel steering system. The rear steering control module uses voltage, current levels and input from an internal temperature sensor to calculate an estimated system temperature. If the rear steering control module detects a high system temperature event is occurring, the amount of current commanded is decreased to reduce system temperature, in effort to prevent thermal damage to the module.

Conditions for Running the DTC

- Ignition ON, engine running.
- Power steering system voltage is 9-16 V.
- ARS initialized.

Conditions for Setting the DTC

The rear steering control module detects a high system temperature.

Action Taken When the DTC Sets

- DTC C0176 54 is stored in memory.
- Rear steering temporarily unavailable.

Conditions for Clearing the DTC

A current DTC will clear on the next malfunction-free ignition cycle.

Diagnostic Aids

- DTC C0176 54 does not indicate that a malfunction has occurred. Rather that the rear steering control module had to limit current to the rear steering actuator to avoid thermal damage to the system components. Discuss with the customer about driving conditions when the rear steering system became unavailable.

Reference Information

Schematic Reference

Power Steering Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Rear Wheel Steering System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information.

Circuit/System Verification

1. Verify that the DTC sets outside of the conditions for running and setting. Since most occurrences of this DTC are caused by excessive driver inputs, review with the customer the conditions under which the DTC set. Operate the vehicle within the conditions that the customer experienced, avoiding excessive inputs and verify the DTC does not reset.
 - **If the DTC did not set outside of the conditions for running and setting**
 1. Ignition ON.
 2. Verify that no steering components of the rear steering system are mechanically binding.
 - If steering components are mechanically binding, replace the mechanically binding steering components.
 - If no steering components are mechanically binding
 3. Replace the Rear Wheel Steering Actuator.
 - **If the DTC set outside of the conditions for running and setting**
2. All OK. The rear steering system is operating as designed.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

- Rear Wheel Steering Actuator Replacement
- Control Module References for control module replacement, programming and setup.

DTC C0522: REAR STEERING POSITION SENSOR 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.

DTC Descriptor

DTC C0522

Rear Steering Position Sensor Malfunction

Circuit/System Description

The rear steering control module continuously monitors the rear steering position sensor. The rear steering position sensor indicates the direction and degree in which the rear wheels are rotated.

Conditions for Running the DTC

- Ignition ON.
- System voltage 9-16 V.

Conditions for Setting the DTC

The rear steering control module detects a not plausible or inconsistent signal from the rear steering position sensor.

Action Taken When the DTC Sets

- DTC C0522 is stored in memory.
- Rear steering unavailable.

Conditions for Clearing the DTC

A history DTC will clear after 40 consecutive malfunction free ignition cycles.

Reference Information

Schematic Reference

Power Steering Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Rear Wheel Steering System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

[Control Module References](#) for scan tool information.

Circuit/System Verification

1. Ignition ON.
2. Verify that no other DTCs are set except for C0522.

- **If any other DTCs are set**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#)

- **If no other DTCs are set**

3. Verify that DTC C0522 is not set.

NOTE: Verify that all terminals at the ARS harness connector are free of damage or corrosion.

- **If the DTC is set**

4. Replace the K92 Rear Steering Control Module.

- **If the DTC is not set**

5. All OK.

Repair Instructions

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

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

DTC C0527: REAR STEERING MOTOR POSITION SENSOR CIRCUIT 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.

DTC Descriptor

DTC C0527 00

Rear Steering Motor Position Sensor Circuit Malfunction

Circuit/System Description

The rear steering control module continuously monitors the motor position sensor voltage signals. The voltage signals of the motor position sensor and the rear wheel rack displacement sensor signal are both processed by the rear steering control module to detect and calculate the rear wheel steering angle.

Conditions for Running the DTC

- Ignition ON.
- The steering wheel has been rotated greater than 15°.

Conditions for Setting the DTC

C0527

The power steering control module detects a short to ground, short to voltage or an open/high resistance on any of the internal motor position sensor circuits. The calculated difference between the rear steering angle and the rear steering rack displacement is out of the specified range.

Action Taken When the DTC Sets

Rear steering unavailable.

Conditions for Clearing the DTC

A history DTC will clear after 40 consecutive malfunction-free ignition cycles.

Diagnostic Aids

Verify the rear steering control module harness connector terminals are free of damage or corrosion.

Reference Information

Schematic Reference

Power Steering Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Rear Wheel Steering System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information.

Circuit/System Verification

1. Ignition ON.
2. Verify that DTC C0527 is not set
 - **If the DTC is set**

Replace the K92 Rear Steering Control Module.
 - **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 C056E: ELECTRONIC CONTROL UNIT SOFTWARE

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 C056E

Electronic Control Unit Software

For symptom byte information, refer to **Symptom Byte List** .

Circuit/System Description

After replacement of the rear steering control module, the rear steering control module must be configured with the proper tuning profile using the service programming system (SPS).

After replacement of the rear steering control module, the calibration procedure must be performed.

Conditions for Running the DTC

Ignition OFF, ACCESSORY or RUN mode.

Conditions for Setting the DTC

The power steering control module has detected missing calibration data, calibration procedure not run or completed, missing VIN or internal software malfunction.

Actions Taken When DTC Sets

- DTC is stored in memory.
- Rear steering temporarily unavailable.

Conditions for Clearing the DTC

A current or history DTC will clear after the rear steering control module has been programmed and calibrated.

Reference Information

Schematic Reference

Power Steering Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Rear Wheel Steering System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information.

Circuit/System Verification

1. Ignition ON.
2. Verify that DTC C056E is not set.
 - **If the DTC C056E is set**
 1. Program the K92 Rear Wheel Steering Control Module.
 2. Verify the DTC does not set.
 - If the DTC sets, replace the K92 Rear Wheel Steering Control Module.
 - If the DTC does not set
 - 3. All OK.
 - **If the DTC C056E 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 C158B: REAR STEERING CONTROL MODULE

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 C158B 00

Rear Steering Control Module EBCM Internal Malfunction

DTC C158B 5A

Rear Steering Control Module Signal Not Plausible

Circuit/System Description

The Rear Steering Control Module is commanded by the Electronic Brake Control Module. The EBCM uses information such as vehicle speed and steering input to determine the direction and amount of rear wheel steering. The Rear Steering Control Module then communicates the position of the rear wheels back to the EBCM in order to verify that the commanded position is met.

Conditions for Running the DTC

- Ignition ON, engine running.
- Power steering system voltage is 9-16 V.
- ARS initialized.

Conditions for Setting the DTC

DTC C158B 00

The EBCM detects an internal fault.

DTC C158B 5A

The rear steering control module cannot meet the commanded position.

Action Taken When the DTC Sets

- DTC C158B is stored in memory.
- Rear wheel steering unavailable.

Conditions for Clearing the DTC

- A current DTC will clear on the next malfunction free ignition cycle.
- A history DTC will clear after 40 consecutive malfunction free ignition cycles.

Diagnostic Aids

Verify that all harnesses and terminals at the rear steering control module and EBCM are free of any damage or corrosion that could interfere with CAN communication.

Reference Information

[Power Steering Schematics](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Description and Operation

[Power Steering System Description and Operation \(Belt Drive Electronic Power Steering\)](#)

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](#)

DTC C158B 00

1. Ignition ON.
2. Verify that DTC C158B 00 is not set.
 1. Program the K17 Electronic Brake Control Module.
 2. Verify the DTC does not set.
 - If the DTC sets, replace the K17 Electronic Brake Control Module.
 - If the DTC does not set
 3. All OK.
 - **If the DTC is not set**
3. All OK.

DTC C158B 5A

1. Ignition ON.
2. Verify that no other DTCs are set except for C158B.
 - **If any other DTCs are set**
Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#)
 - **If no other DTCs are set**
3. Verify that no steering components of the rear steering system are mechanically binding.

NOTE: **Verify that all terminals at the ARS harness connector are free of damage or corrosion.**

- If steering components are mechanically binding, replace the mechanically binding steering components.
 - If no steering components are mechanically binding
4. Program the K92 Rear Wheel Steering Control Module
 5. Verify that DTC C158B is not set.
 - **If the DTC is set**
Replace the K92 Rear Steering Control Module.

- If the DTC is not set

6. All OK.

Repair Instructions

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

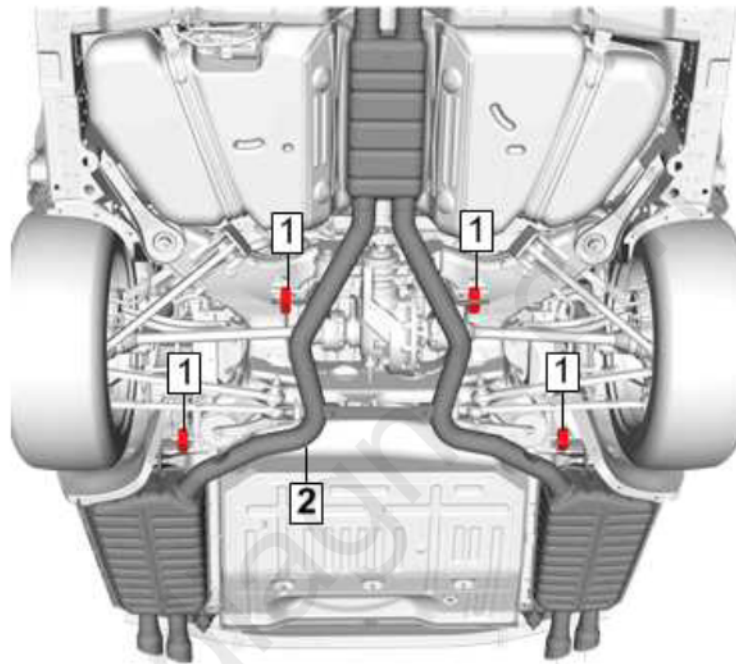
- [Control Module References](#) for control module replacement, programming and setup.

REPAIR INSTRUCTIONS

REAR WHEEL STEERING ACTUATOR REPLACEMENT

Removal Procedure

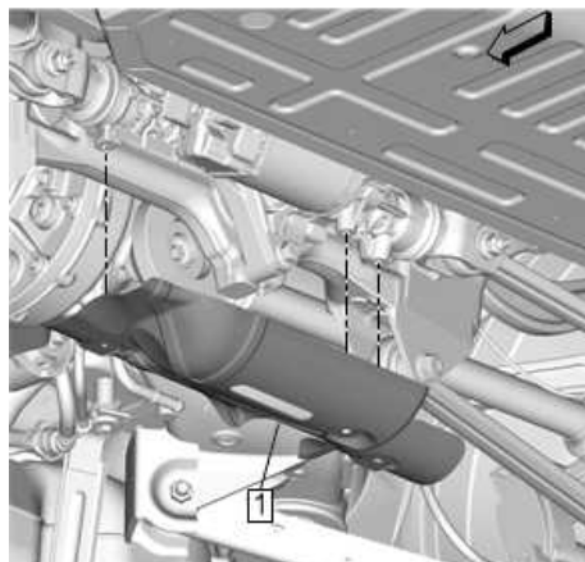
1. Exhaust Muffler (2)» Remove - [Exhaust Muffler Replacement \(LTG without HP9\)](#) , [Exhaust Muffler Replacement \(LGW, LGX\)](#) and/or [Exhaust Muffler Replacement \(LTG with HP9\)](#)



[Fig. 1: Exhaust Muffler Assembly](#)

Courtesy of GENERAL MOTORS COMPANY

2. Rear Wheel Steering Actuator Shield (1)» Remove - [Rear Wheel Steering Actuator Shield Replacement](#)



[Fig. 2: Rear Wheel Steering Actuator Shield](#)

Courtesy of GENERAL MOTORS COMPANY

3. Disconnect the rear wheel steering actuator electrical connectors (1).

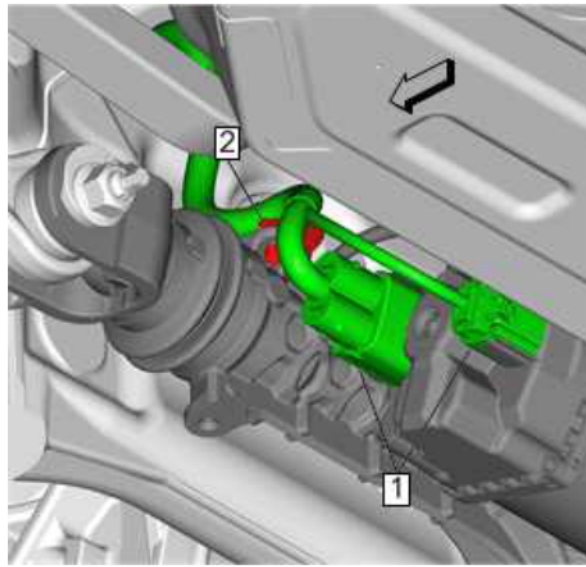


Fig. 3: Wiring Harness Clip

Courtesy of GENERAL MOTORS COMPANY

4. Remove the wiring harness clip (2) from the mounting point on the rear wheel steering actuator.
5. Rear Suspension Adjust Link (1) @ Rear Wheel Steering Actuator» Separate (1) - **Adjust Link Replacement (Without NYS)** **Adjust Link Replacement (With NYS)**

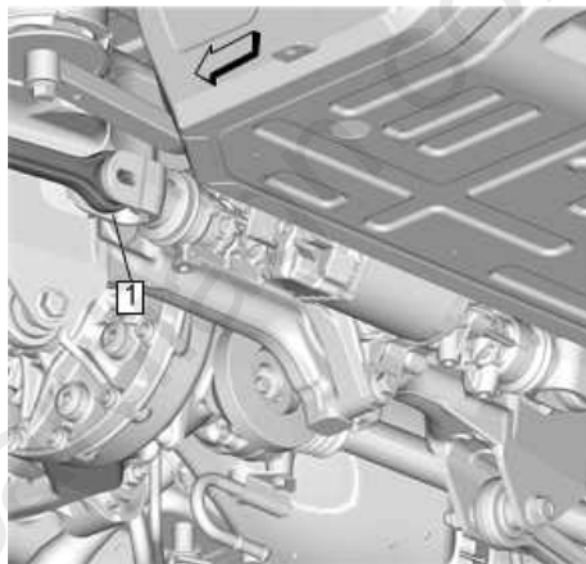


Fig. 4: Rear Suspension Adjust Link

Courtesy of GENERAL MOTORS COMPANY

6. Support the rear wheel steering actuator.
7. Rear Wheel Steering Actuator Bolt (1)» Remove [3x]

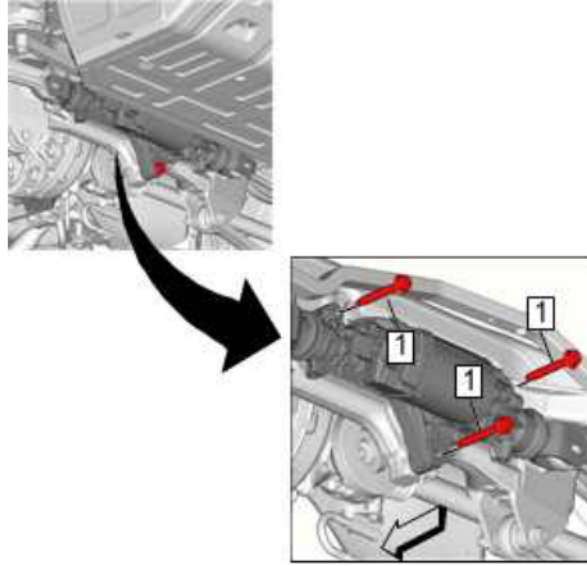


Fig. 5: Rear Wheel Steering Actuator Bolt
Courtesy of GENERAL MOTORS COMPANY

8. Remove the rear wheel steering actuator (1) from the vehicle.

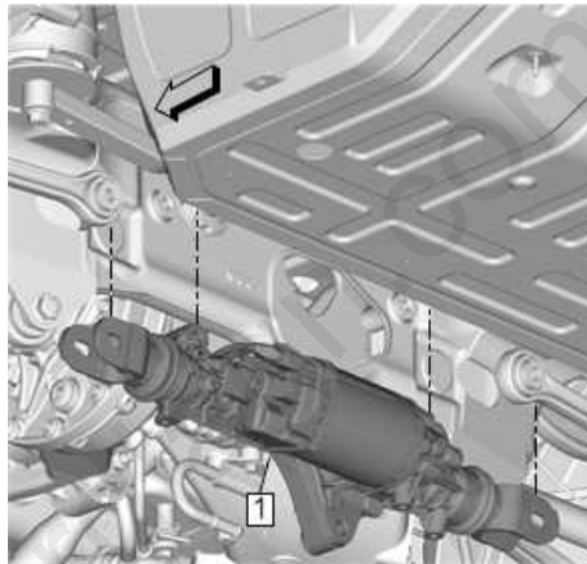


Fig. 6: Rear Wheel Steering Actuator
Courtesy of GENERAL MOTORS COMPANY

Installation Procedure

1. Position the rear wheel steering actuator (1) on the vehicle.

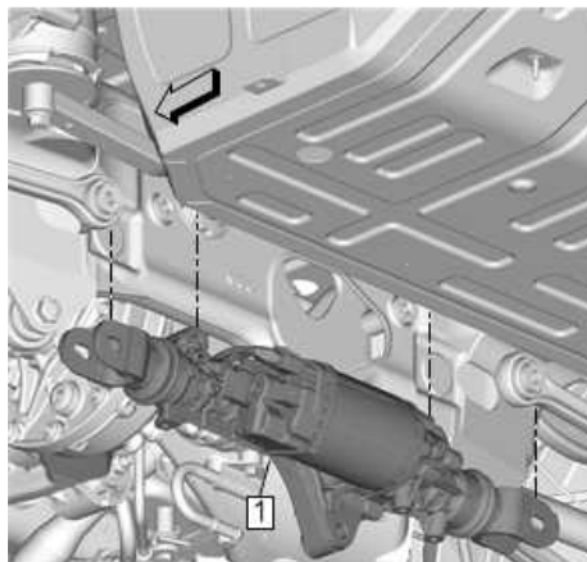


Fig. 7: Rear Wheel Steering Actuator
Courtesy of GENERAL MOTORS COMPANY

2. Support the rear wheel steering actuator.
3. Rear Wheel Steering Actuator Bolt (1) » Install and tighten [3x]

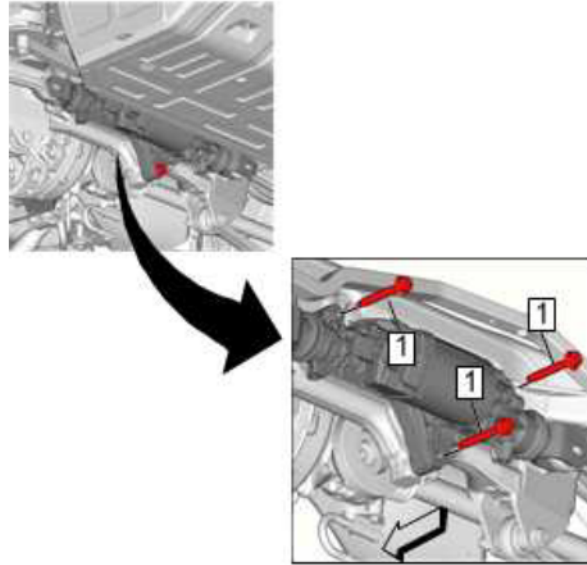


Fig. 8: Rear Wheel Steering Actuator Bolt
Courtesy of GENERAL MOTORS COMPANY

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

Tighten

1. First Pass: 100 N.m (74 lb ft)
2. Final Pass: (45-60 degrees)
4. Remove the support.
5. Rear Suspension Adjust Link (1) @ Rear Wheel Steering Actuator » Install [2x] - [Adjust Link Replacement \(Without NYS\)](#) [Adjust Link Replacement \(With NYS\)](#)

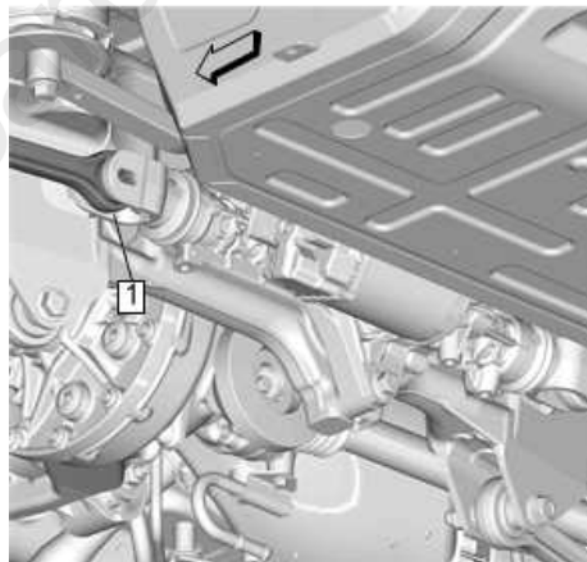


Fig. 9: Rear Suspension Adjust Link
Courtesy of GENERAL MOTORS COMPANY

6. Install the wiring harness clip (2) in the mounting point on the rear wheel steering actuator.

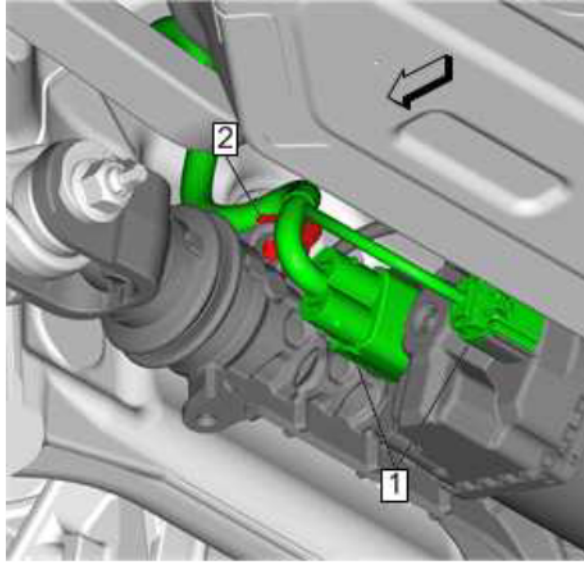


Fig. 10: Wiring Harness Clip

Courtesy of GENERAL MOTORS COMPANY

7. Connect the rear wheel steering actuator electrical connectors (1).
8. Rear Wheel Steering Actuator Shield (1)» Install - **Rear Wheel Steering Actuator Shield Replacement**

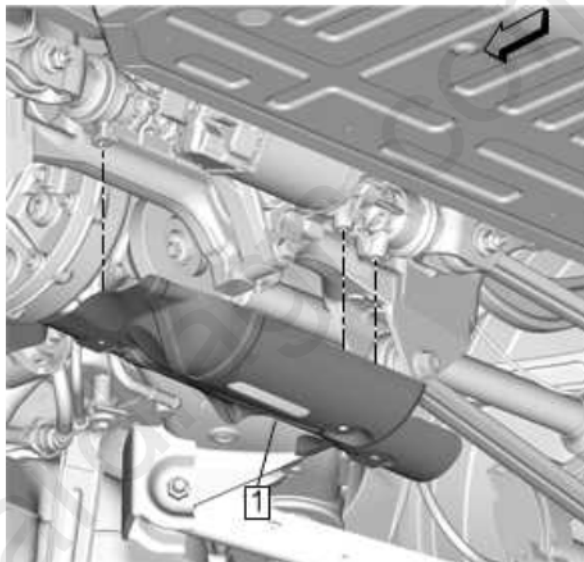


Fig. 11: Rear Wheel Steering Actuator Shield

Courtesy of GENERAL MOTORS COMPANY

9. Exhaust Muffler (2)» Install - **Exhaust Muffler Replacement (LTG without HP9)** , **Exhaust Muffler Replacement (LGW, LGX)** and/or **Exhaust Muffler Replacement (LTG with HP9)**

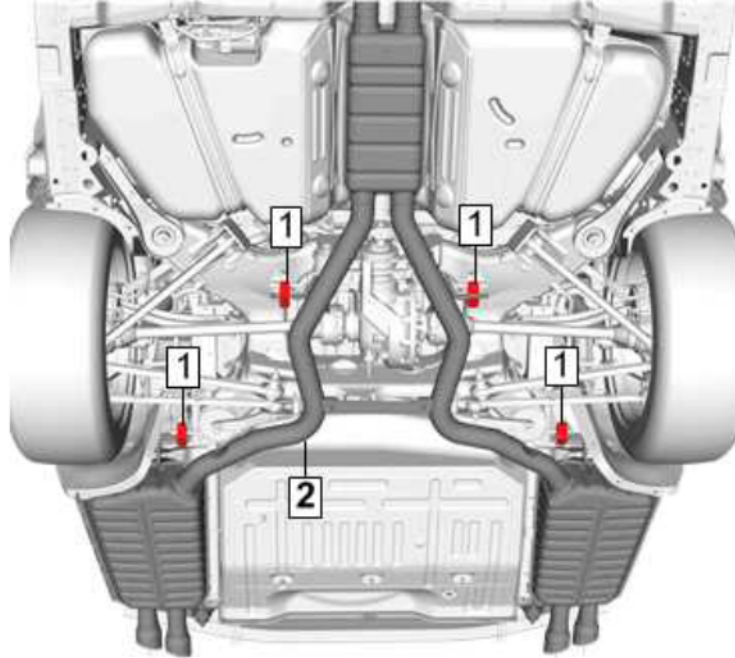


Fig. 12: Exhaust Muffler Assembly

Courtesy of GENERAL MOTORS COMPANY

10. Measure and adjust the wheel alignment. Refer to [Wheel Alignment Measurement](#)

REAR WHEEL STEERING ACTUATOR SHIELD REPLACEMENT

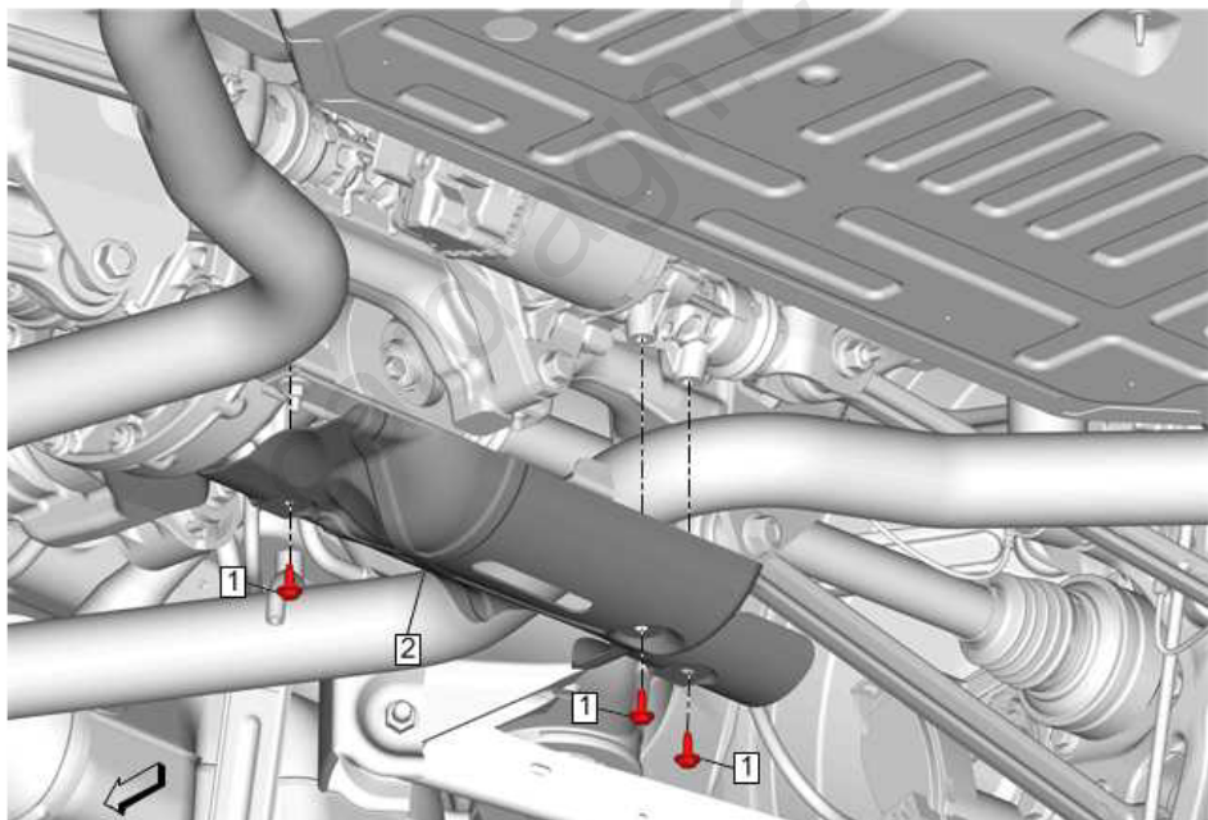


Fig. 13: Rear Wheel Steering Actuator Shield

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure	
Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle	

Callout	Component Name
1	Rear Wheel Steering Actuator Shield Bolt [3x] CAUTION: Refer to Fastener Caution . Tighten 9 N.m (80 lb in)
2	Rear Wheel Steering Actuator Shield

DESCRIPTION AND OPERATION

REAR WHEEL STEERING SYSTEM DESCRIPTION AND OPERATION

The Active Rear Steering (ARS) system consists of the following components:

- ARS Smart Actuator, which contains the control module and motor
- Mechanical linkage from the actuator to the rear wheels

The ARS module receives all high level commands from the EBCM. All rear angle commands come from the ARS control logic within the EBCM. The EBCM uses signals such as vehicle speed, steering wheel angle and rate of steering angle change to determine the rear wheel steering angle to be commanded to the ARS module. The ARS module provides feedback to the EBCM such as rear wheel angle and rate of angle change.

The rear wheels are able to be controlled to a maximum angle of 3.5° . The system hardware is capable to move up to 4.6° . Below speeds of 36 kph (22.3 mph), the rear wheels are steering out of phase with the front wheels in both forward and reverse movement. At speeds above 36 kph, the rear wheels will steer in phase with the front wheels.

The ARS system has the ability to enter "Car Wash Mode". When the vehicle is put into neutral, the rear steering will gracefully ramp back to a zero steering angle while the vehicle remains in neutral below a set speed. This feature is intended for situations where the steering wheel could be turned while the vehicle is moving through a fixed track, such as a car wash.