Back To Article

SCHEMATIC WIRING DIAGRAMS

ACTIVE NOISE CANCELLATION WIRING SCHEMATICS

Active Noise Cancellation

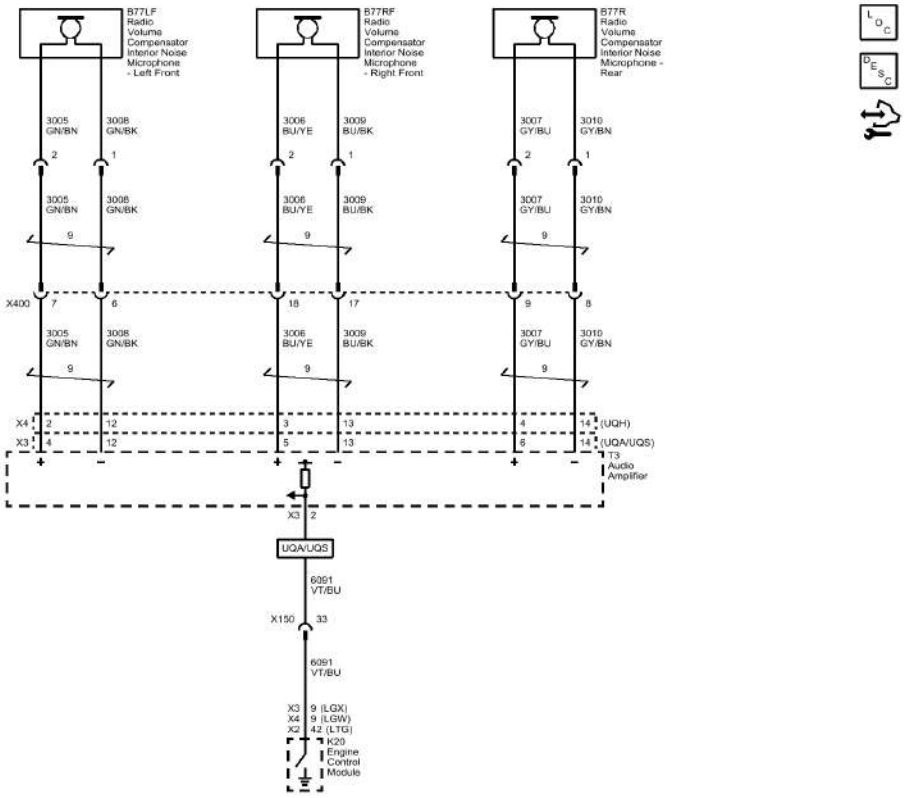


Fig. 1: Active Noise Cancellation
Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B0560: ENGINE RPM INPUT CIRCUIT SIGNAL INVALID

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 B0560 08

Engine RPM Input Circuit Signal Invalid

Circuit/System Description

The Audio Amplifier receives a discrete pulse-width modulated engine speed signal from the Engine Control Module. The Audio Amplifier uses the engine RPM signal for operating active noise

2017 ACCESSORIES & EQUIPMENT

Fixed and Moveable Windows - CT6

SPECIFICATIONS

FASTENER SPECIFICATIONS

Reusable Threaded Fastener Tightening Specifications

NOTE:
All fasteners listed in this table can be reused after removal.

Application	Specification
	Metric (English)
Front Side Door Window Channel Retainer Bolt	9 N.m (80 lb in)
Front Side Door Window Frame Inner Upper Screw	1.5 N.m (13 lb in)
Front Side Door Window Frame Rear Applique Outer Screw	1.5 N.m (13 lb in)
Front Side Door Window Regulator Motor Screw	10 N.m (89 lb in)
Front Side Door Window Regulator Nut	10 N.m (89 lb in)
Rear Side Door Window Channel Bolt	10 N.m (89 lb in)
Rear Side Door Window Frame Applique Screw	1.5 N.m (13 lb in)
Rear Side Door Window Frame Rear Applique Screw	1.5 N.m (13 lb in)
Rear Side Door Window Regulator Motor Screw	10 N.m (89 lb in)
Rear Side Door Window Regulator Nut	10 N.m (89 lb in)

SCHEMATIC WIRING DIAGRAMS

MOVEABLE WINDOW WIRING SCHEMATICS

Driver

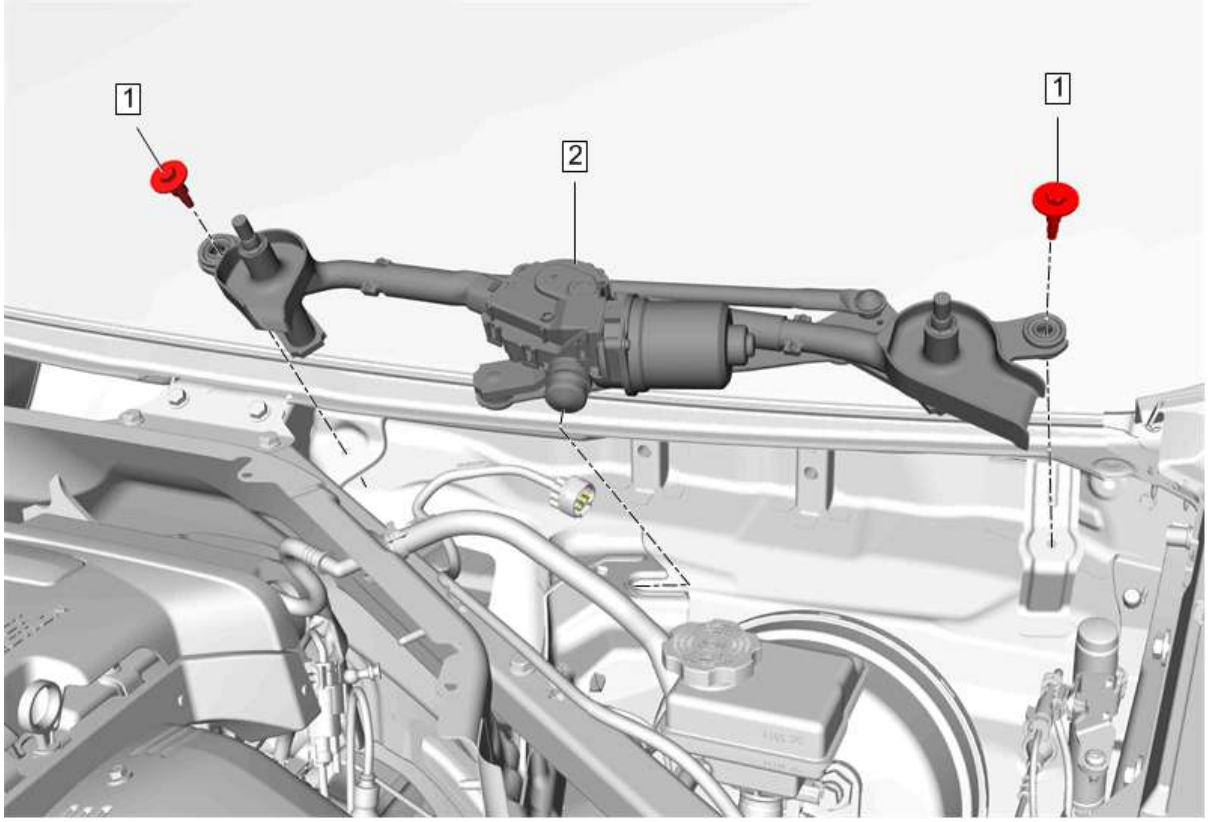
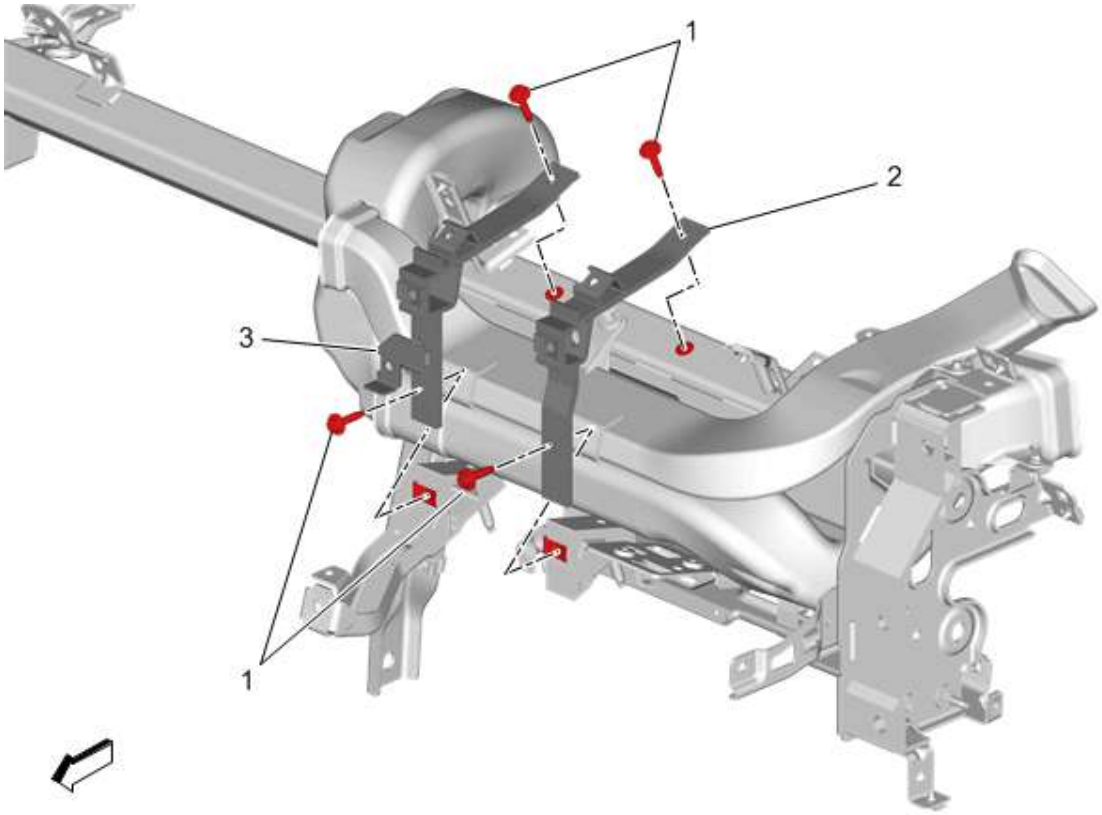


Fig. 152: Windshield Wiper Transmission
Courtesy of GENERAL MOTORS COMPANY

23. Fill the cooling system to the proper level. Refer to **Cooling System Draining and Filling (Static without HP9)** , **Cooling System Draining and Filling (GE 47716 without HP9)** , **Cooling System Draining and Filling (Static LTG with HP9)** and/or **Cooling System Draining and Filling (GE 47716 LTG with HP9)**
24. Evacuate and charge the refrigerant system. Refer to **Refrigerant Recovery and Recharging (R-134a)** and/or **Refrigerant Recovery and Recharging (R-1234yf)**
25. Inspect for coolant leaks.
26. Inspect for refrigerant leaks.

INSTRUMENT PANEL TIE BAR BRACKET REPLACEMENT



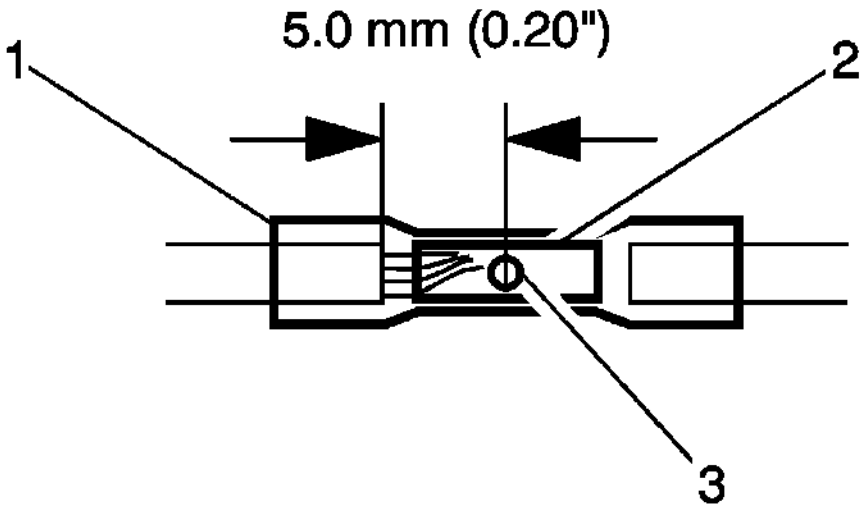


Fig. 13: Identifying Duraseal Splice Sleeve
Courtesy of GENERAL MOTORS COMPANY

10. Insert the wire into the splice sleeve barrel until the wire hits the barrel stop. Refer to **Folded-Over Wire Repair** for splicing wires of 0.35 mm or less (22, 24, 26 gauge sizes) and for splicing wires of different gauges.

Fig. 172: Brake Warning Block Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
P16	P16 Instrument Cluster
B20	B20 Brake Fluid Level Switch
K17	K17 Electronic Brake Control Module

The instrument cluster turns the brake warning indicator ON when the following occurs:

- The instrument cluster performs the bulb check. The brake warning indicator illuminates for 5 seconds.
- When the EBCM detects a too low brake fluid level it sets a DTC and sends a serial data message to the instrument cluster, which will illuminate.

Electronic brake control module (EBCM) monitors the brake fluid level in the brake fluid reservoir. When the fluid within the brake fluid reservoir is below the MIN level, contacts within the brake fluid level switch closes causing the voltage within the signal circuit to drop. The electronic brake control module (EBCM) will detect the voltage drop and will send a serial data message to the instrument cluster commanding the brake warning indicator to illuminate.

HYDRAULIC BRAKE SYSTEM DESCRIPTION AND OPERATION

System Component Description

The hydraulic brake system consists of the following:

Hydraulic Brake Master Cylinder Fluid Reservoir

Contains supply of brake fluid for the hydraulic brake system.

Hydraulic Brake Master Cylinder

Converts mechanical input force into hydraulic output pressure.
Hydraulic output pressure is distributed from the master cylinder through 2 hydraulic circuits, supplying diagonally-opposed wheel apply circuits.

Hydraulic Brake Pressure Balance Control System

Regulates brake fluid pressure delivered to hydraulic brake wheel circuits, in order to control the distribution of braking force.
Pressure balance control is achieved through dynamic rear proportioning (DRP), which is a function of the ABS modulator.

Hydraulic Brake Pipes and Flexible Brake Hoses

Carries brake fluid to and from hydraulic brake system components.

Hydraulic Brake Wheel Apply Components

Converts hydraulic input pressure into mechanical output force.

System Operation

Mechanical force is converted into hydraulic pressure by the master cylinder, regulated to meet braking system demands by the pressure balance control system and delivered to the hydraulic brake wheel circuits by the pipes and flexible hoses. The wheel apply components then convert the hydraulic pressure back into mechanical force which presses linings against rotating brake system components.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Electrical Information Reference

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

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Circuit/System Verification

1. Vehicle ON.
2. Verify DTC P0562 is not set.
    - **If the DTC is set**

      Refer to **DTC B1325, B1330, B1517, C0800, C0899, C0900, C12E1, C12E2, P0561-P0563, P1A0C, P1A0D or P1EFC** .

    - **If the DTC is not set**
3. Verify DTC P0601-P0604, P0606, P062F, P16F2, P1EB6 or P1EB7 is not set.
    - **If any of the DTCs are set**
    1. Program the T6 Power Inverter Module.
    2. Verify the DTC does not set.
        - If the DTC sets, replace the T6 Power Inverter Module.
        - If the DTC does not set
    3. All OK.
    - **If none of the DTCs are set**
4. All OK.

Repair Instructions

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

Control Module References for T6 Power Inverter Module, often referred to as the Drive Motor Generator Power Inverter Module, replacement, programming and setup.

DTC P061A OR P061B: CONTROL MODULE TORQUE PERFORMANCE

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 P061A

Control Module Torque System Circuitry Performance

DTC P061B

Control Module Torque Calculation Performance

Circuit/System Description

The hybrid/EV powertrain control module 1 is responsible for vehicle torque management. To accomplish this, the hybrid/EV powertrain control module 1 constantly monitors all aspects of requested and actual

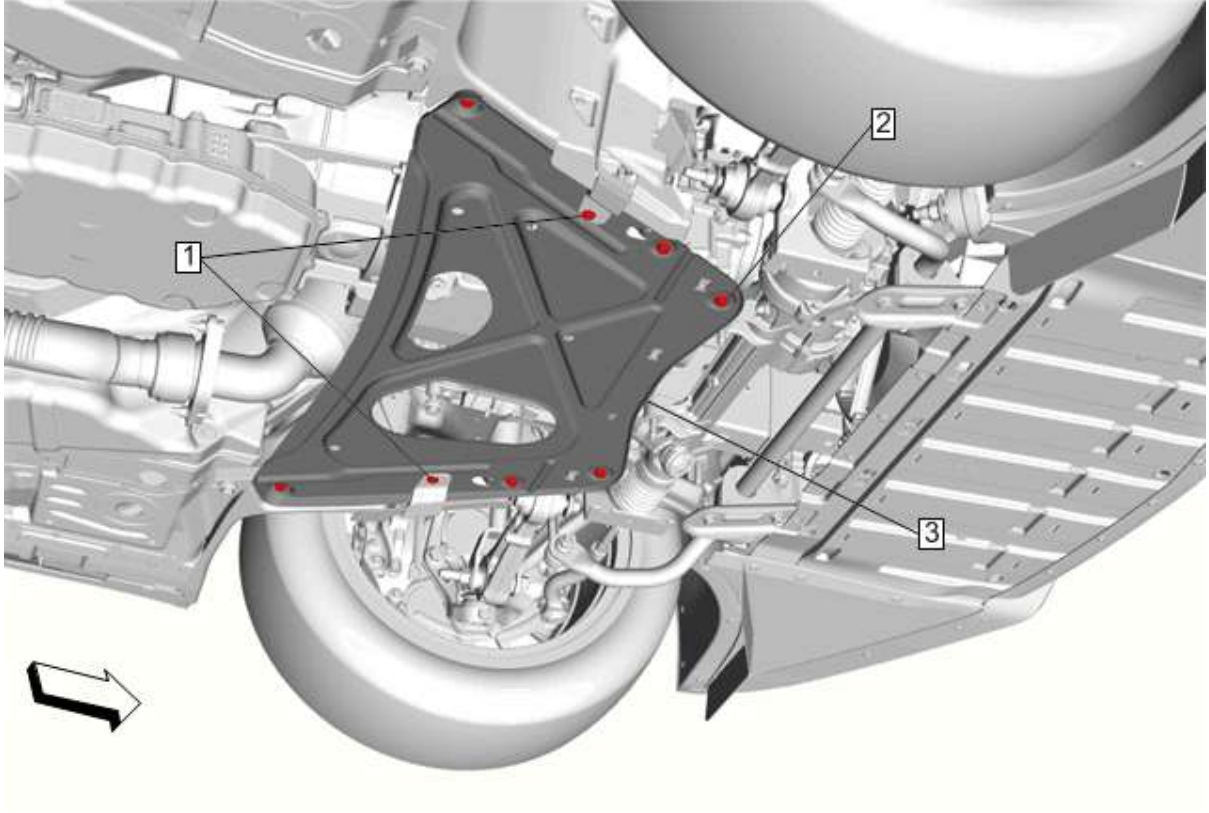


Fig. 195: Drivetrain and Front Suspension Cradle Plate
Courtesy of GENERAL MOTORS COMPANY

6. Engine Lower Front Splash Shield (2)Â» Install - **Engine Lower Front Splash Shield Replacement (LTG)**

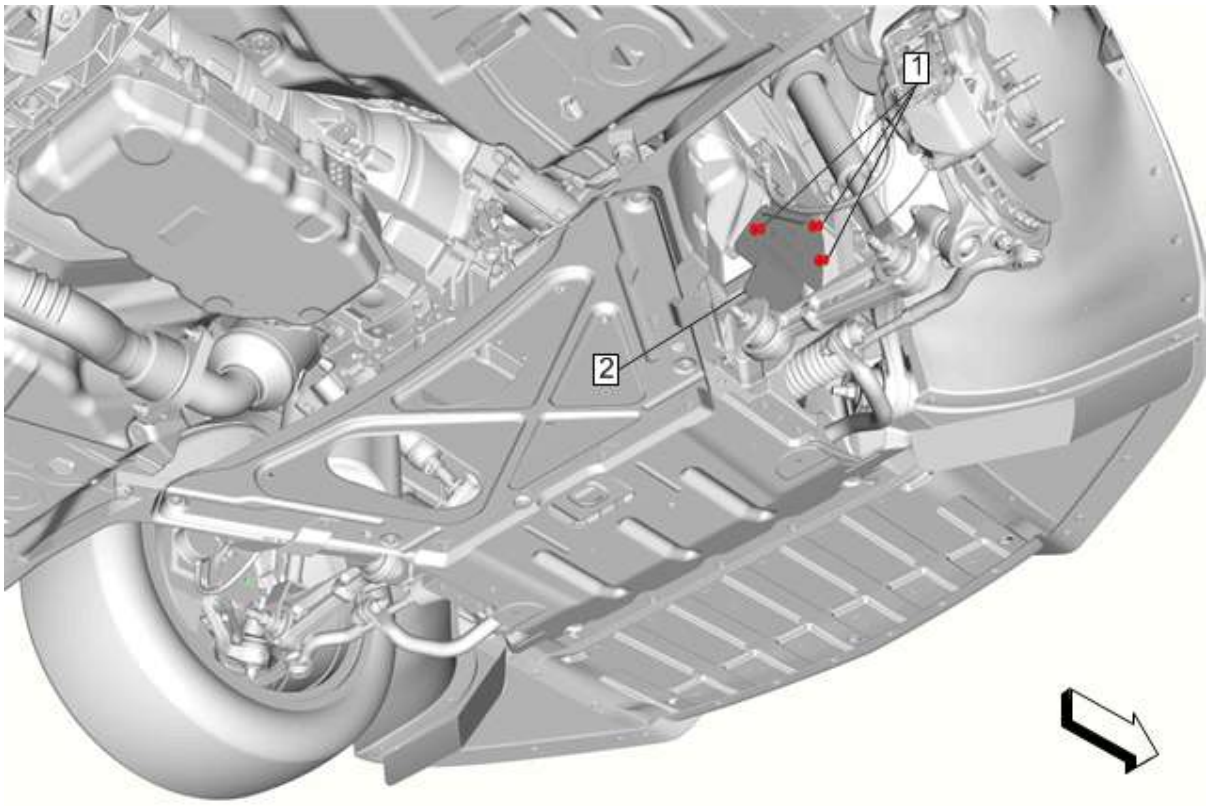
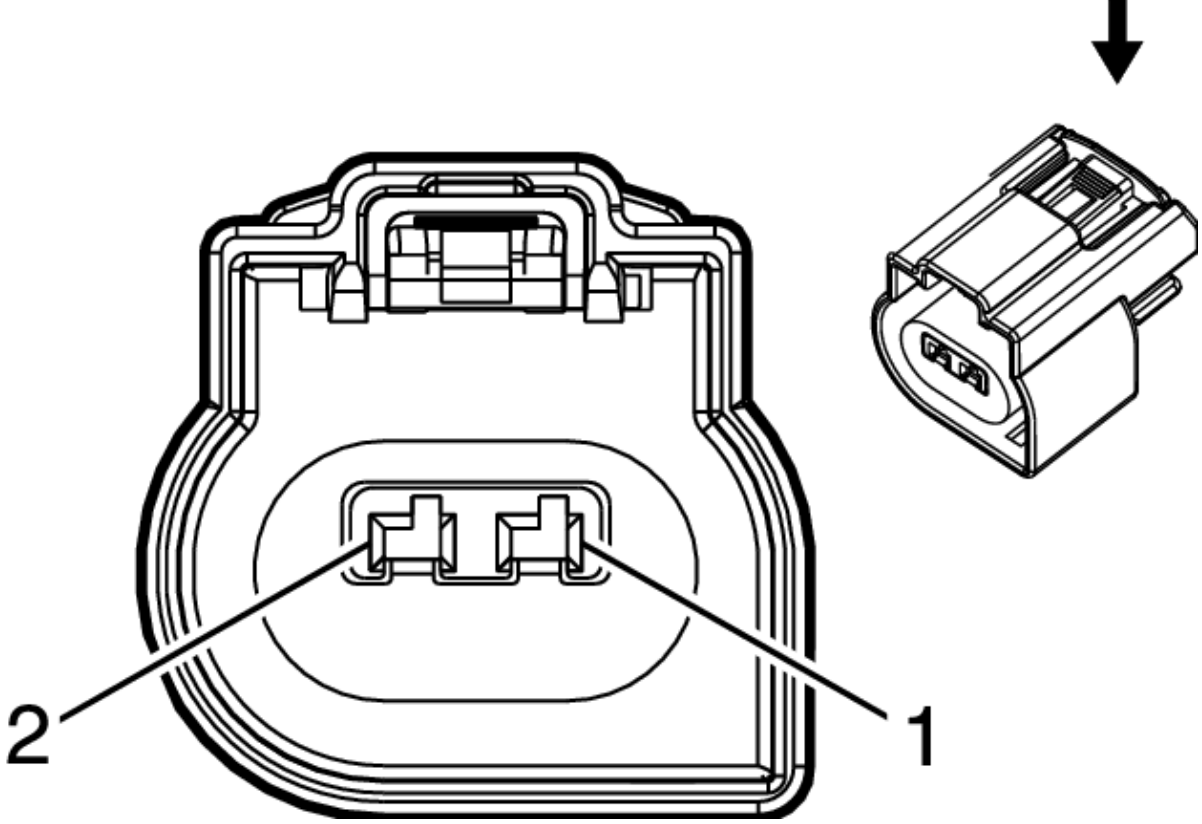


Fig. 196: Engine Lower Front Splash Shield (LTG)
Courtesy of GENERAL MOTORS COMPANY

7. Fill the power electronics and auxiliary radiator cooling system. Refer to **Power Electronics and Auxiliary Radiator Drain and Fill (LTG HP9)**
8. Enable the high voltage system. Refer to **High Voltage Enabling**
9. Start the engine and check for coolant leaks.

GENERATOR CONTROL MODULE COOLANT OUTLET HOSE REPLACEMENT (INLET)



Connector Part Information

- Harness Type: Engine Jumper
- OEM Connector: 13583154
- Service Connector: Service by Harness - See Part Catalog
- Description: 2-Way F 150 MX Series, Sealed (BK)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray Name	Core Crimp	Insulation Crimp
I	Not Required	No Tool Required	No Tool Required	Not Required	Not Required	Not Required	Not Required

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	0.5	WH/GY	1876	Knock Sensor Signal 2	I	-
2	0.5	BK/GY	2303	Knock Sensor Low Reference 2	I	-

B68B KNOCK SENSOR 2 (LGX/LTG)

6. Test for less than 5.0 Ω between terminals 3 and 5.
    - **If 5.0 Ω or greater**

      Replace the relay.

    - **If less than 5.0 Ω**
7. Install a 3 A fused jumper wire between relay terminal 2 and 12 V. Install a jumper wire between relay terminal 6 and ground.
8. Test infinite resistance between terminals 3 and 5.
    - **If less than infinite resistance**

      Replace the relay.

    - **If infinite resistance**
9. All OK

Repair Instructions

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

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

POWER MODE MISMATCH (WITH HP9)

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.

Circuit/System Description

The body control module (BCM) controls the ignition main (underhood) and ignition main (rear body) relays by applying voltage to the run/crank relay coil control circuit. The ignition main (underhood) and ignition main (rear body) relays are energized when the ignition is in the ON or the CRANK position.

The BCM also controls the battery saver relays through individual circuits by applying voltage to the battery saver set and reset circuits. The battery saver relays are a latching relays that when enabled disconnect some modules from their ignition power or memory power sources.

The keyless entry control module controls the retained accessory power relay (instrument panel) and retained accessory power relay (rear body) by applying voltage to the interruptible retained accessory power relay coil control circuit. The retained accessory power relays are energized during all power modes, except OFF-awake, CRANK and during transmitter authentication. The keyless entry control module will deactivate components that may cause radio frequency (RF) interference when the ignition mode switch is pressed which may result in NO REMOTE DETECTED displayed on the driver information center. The relays are also energized for approximately 10 min after shutting the Ignition OFF/Vehicle OFF, providing no door is opened.

The engine control module (ECM) controls the engine controls the ignition relay by applying voltage to the engine controls relay control circuit.

Diagnostic Aids

A short to voltage on the ignition run/crank relay coil control will cause the engine to remain running after the mode is changed to OFF.

Reference Information

Schematic Reference

- **Power Distribution Schematics**
- **Power Moding Schematics**

Diagnostic Aids

This test procedure requires that the vehicle battery has passed a load test and is completely charged. Refer to **Battery Inspection/Test** .

Reference Information

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Perform the scan tool. Refer to **Crankshaft Position Variation Learn** procedure.
2. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed in the Freeze Frame/Failure Records data.
3. Verify the DTC is not set.
    - **If the DTC sets**

      Replace the K20 Engine Control Module.

    - **If the DTC does not set**
4. All OK

Repair Instructions

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

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

DTC P0324, P0326, P0331, P06B6 OR P06B7: KNOCK SENSOR

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 P0324

Knock Sensor System Performance

DTC P0326

Knock Sensor 1 Performance

DTC P0331

Knock Sensor 2 Performance

DTC P06B6

Control Module Knock Sensor Processor 1 Performance

DTC P06B7

Control Module Knock Sensor Processor 2 Performance

Repair Instructions

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

DTC P0443, P0458 OR P0459: EVAPORATIVE EMISSION (EVAP) PURGE SOLENOID VALVE CONTROL CIRCUIT

Diagnostic Instructions

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

DTC Descriptors

DTC P0443

Evaporative Emission (EVAP) Purge Solenoid Valve Control Circuit

DTC P0458

Evaporative Emission (EVAP) Purge Solenoid Valve Control Circuit Low Voltage

DTC P0459

Evaporative Emission (EVAP) Purge Solenoid Valve Control Circuit High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Ignition	P0443, P0458	P0443	P0690
Control	P0443, P0458	P0443, P0458	P0459, P0690

Circuit/System Description

The evaporative emission (EVAP) purge solenoid valve is used to purge fuel vapor from the EVAP canister to the intake manifold. The EVAP purge solenoid valve is pulse width modulated (PWM). Ignition voltage is supplied directly to the EVAP purge solenoid valve. The engine control module (ECM) controls the solenoid valve by grounding the control circuit with a solid state device called a driver. The driver is equipped with a feedback circuit that is pulled-up to a voltage. The ECM can determine if the control circuit is open, shorted to ground or shorted to a voltage by monitoring the feedback voltage. A scan tool will display the amount of ON time as a percentage.

Conditions for Running the DTC

- The ignition voltage is greater than 11 V.
- The DTCs run continuously once the above conditions are met.

Conditions for Setting the DTC

P0443

The ECM detects the EVAP purge solenoid valve control circuit is open within 0.25 s.

P0458

The ECM detects the EVAP purge solenoid valve control circuit is shorted to ground within 0.25 s.

P0459

The ECM detects the EVAP purge solenoid valve control circuit is shorted to voltage within 0.25 s.

Action Taken When the DTC Sets

NOTE:

All fasteners listed in this table can be reused after removal.

Application	Specification
	Metric (English)
Engine Front Cover Bolt	25 N.m (18 lb ft)
Engine Oil Cooler Adapter Bolt	10 N.m (89 lb in)
Engine Oil Cooler Connector (LTG)	50 N.m (37 lb ft)
Engine Oil Cooler Coolant Inlet Hose Bracket Bolt	22 N.m (16 lb ft)
Engine Oil Cooler Inlet Pipe Bolt (LGW)	10 N.m (89 lb in)
Engine Oil Cooler Pipe Bolt (LGX)	10 N.m (89 lb in)
Engine Oil Cooler Pipe Fastener (LTG)	10 N.m (89 lb in)
Engine Oil Cooler Pipe Quick Connect Fitting (LGW)	35 N.m (26 lb ft)
Heater Inlet and Outlet Pipe Bolt (LGW, LGX)	9 N.m (80 lb in)
Heater Inlet and Outlet Pipe Bracket Bolt	9 N.m (80 lb in)
Heater Water Bypass Inlet Hose Bolt (LGW)	22 N.m (16 lb ft)
Heater Water Bypass Inlet Hose Bracket Bolt (LGX)	22 N.m (16 lb ft)
Radiator Air Side Baffle Bracket Bolt	9 N.m (80 lb in)
Radiator Air Upper Baffle Bolt (LGW LGX LTG - Left Side	4 N.m (35 lb in)
Radiator Air Upper Baffle Bolt (LGX - Right Side)	9 N.m (80 lb in)
Radiator Air Upper Baffle Bolt (LGW, LTG - Right Side)	4 N.m (35 lb in)
Radiator Air Upper Baffle Bolt @ Radiator Air Side Upper Baffle	2.5 N.m (22 lb in)
Radiator Inlet Pipe Bolt (LTG)	9 N.m (80 lb in)
Radiator Lower Bracket Bolt	22 N.m (16 lb ft)
Radiator Surge Tank Bolt	9 N.m (80 lb in)
Radiator Upper Mount Bracket Bolt	9 N.m (80 lb in)
Thermostat Bypass Pipe Bolt (LTG)	10 N.m (89 lb in)
Turbocharger Coolant Feed and Return Pipe Bolt (LGW)	35 N.m (26 lb ft)
Turbocharger Coolant Feed Pipe Fasteners (LTG)	10 N.m (89 lb in)
Turbocharger Coolant Feed Pipe Hollow Screw (LTG)	35 N.m (26 lb ft)
Turbocharger Coolant Return Pipe Fasteners (LTG)	10 N.m (89 lb in)
Turbocharger Coolant Return Pipe Hollow Screw (LTG)	35 N.m (26 lb ft)
Water Outlet Bolt (LGW, LGX, LTG)	10 N.m (89 lb in)
Water Pump Bolt (LGW, LGX)	15 N.m (11 lb ft)
Water Pump Inlet Pipe Bolt (LGW, LGX)	9 N.m (80 lb in)
Water Pump Pulley Bolt (LGW, LGX)	10 N.m (89 lb in)

APPROXIMATE FLUID CAPACITIES

Application	Specification	
	Metric	US English
Cooling Systems		
2.0L (LTG) with CJ2	8.6 L	9.0 qt
2.0L (LTG) with C24	10.3 L	10.9 qt
2.0L (LTG) with HP9	9.8 L	10.4 qt
3.0L (LGW) with CJ2	10.6 L	11.2 qt
3.0L (LGW) with CJ2 with V03	11.5 L	12.2 qt
3.0L (LGW) with CJ2 without V03	10.6 L	11.2 qt
3.0L (LGW) with C24	12.3 L	13.0 qt
3.0L (LGW) with C24 with V03	13.2 L	13.9 qt

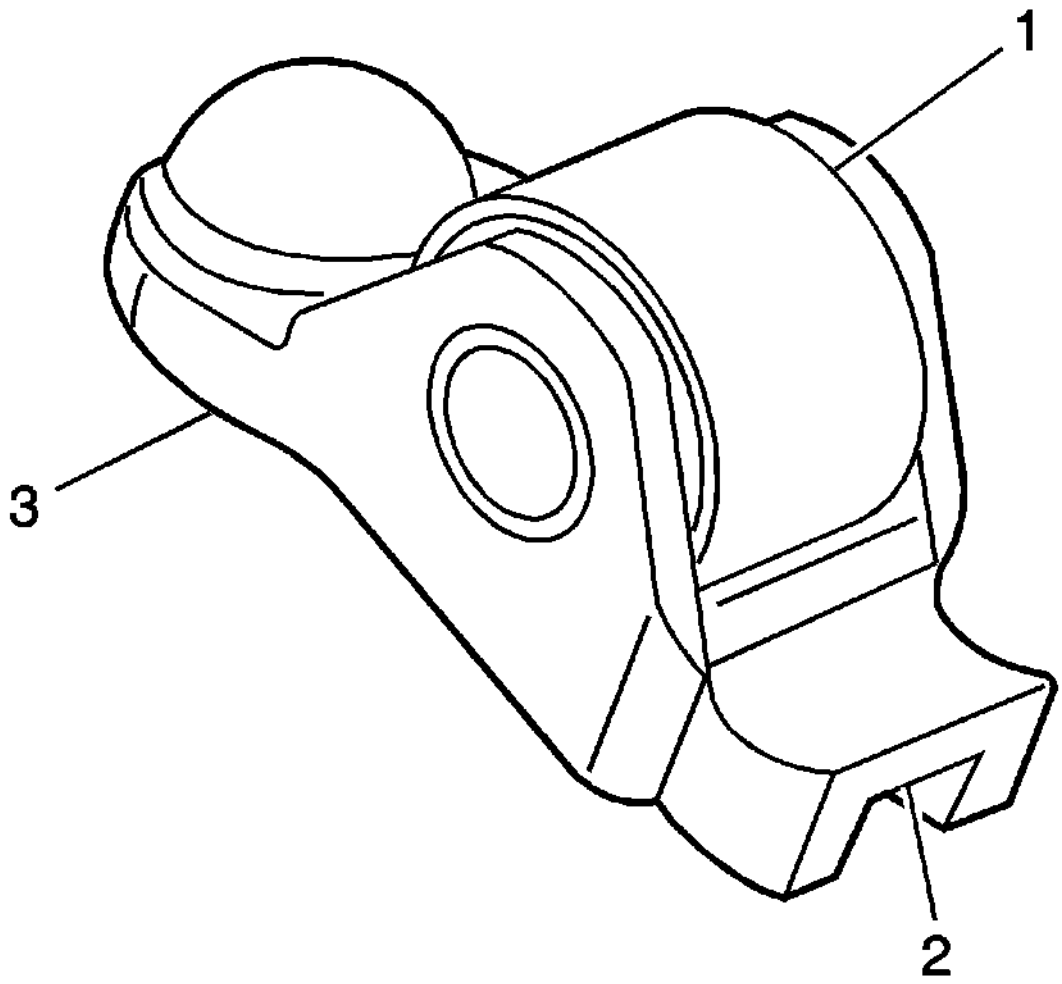


Fig. 123: Inspecting Valve Rocker Arms
Courtesy of GENERAL MOTORS COMPANY

- Flat spots
- Excessive scoring and pitting
- Ensure the roller spins freely

2. Inspect the camshaft follower valve tip area (2).
3. Inspect the camshaft follower stationary hydraulic lash adjuster (SHLA) pivot area (3).
4. Replace the camshaft follower or followers as necessary.

Cylinder Head and Gasket Surface Cleaning and Inspection

1. Remove the spark plugs (1) using **EN-39358** socket.

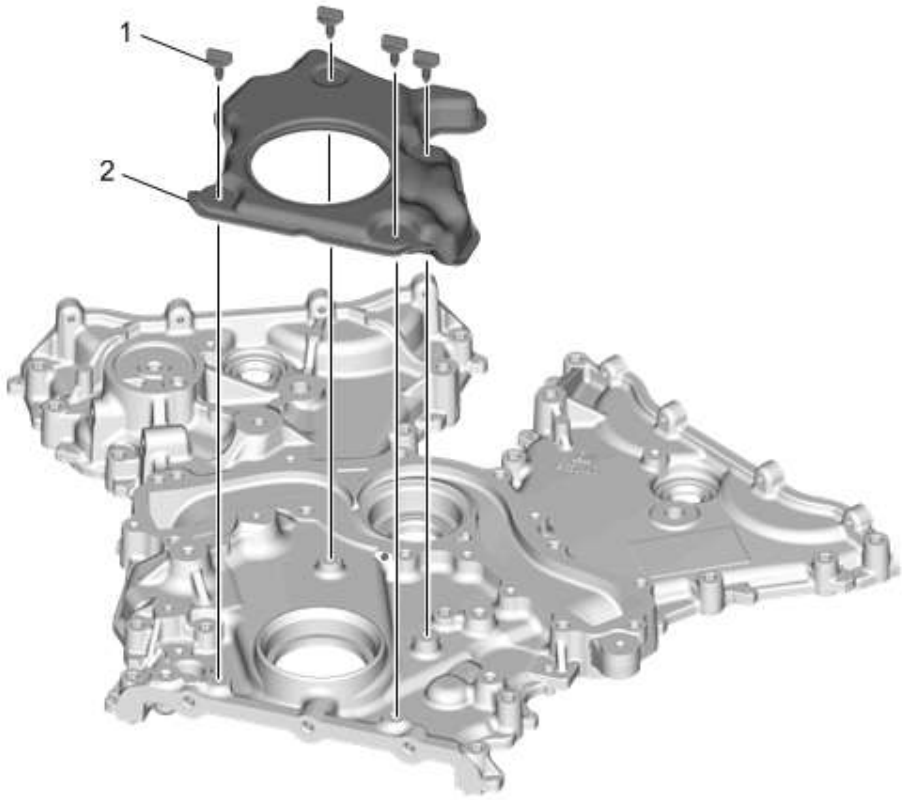


Fig. 212: Engine Front Cover Insulator Assemble
Courtesy of GENERAL MOTORS COMPANY

Engine Front Cover Insulator Assemble

Callout	Component Name
1	Engine Front Cover Insulator
2	Engine Front Cover Retainer [4x]

Crankshaft Front Oil Seal Assemble

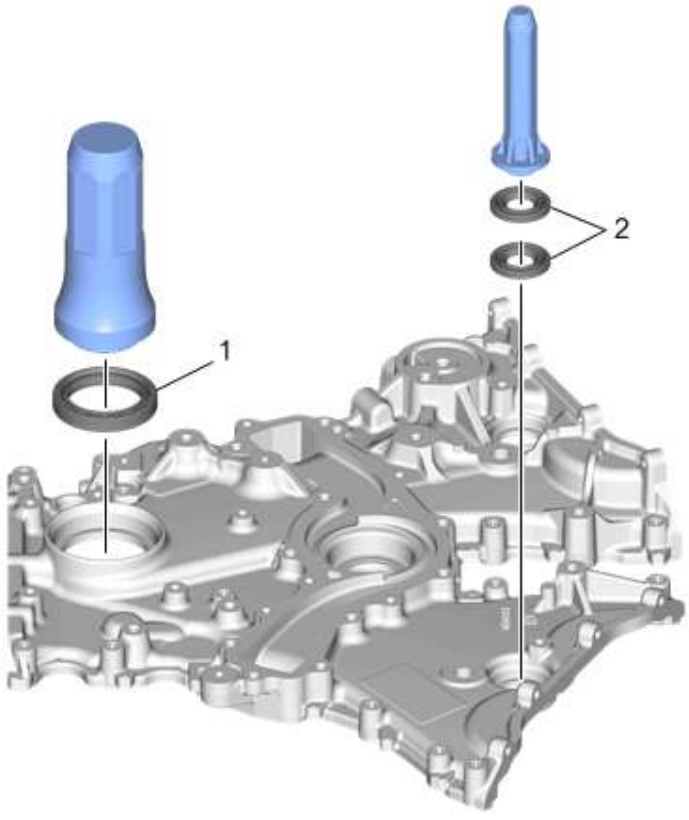


Fig. 213: Crankshaft Front Oil Seal Assemble
Courtesy of GENERAL MOTORS COMPANY

Crankshaft Front Oil Seal Assemble

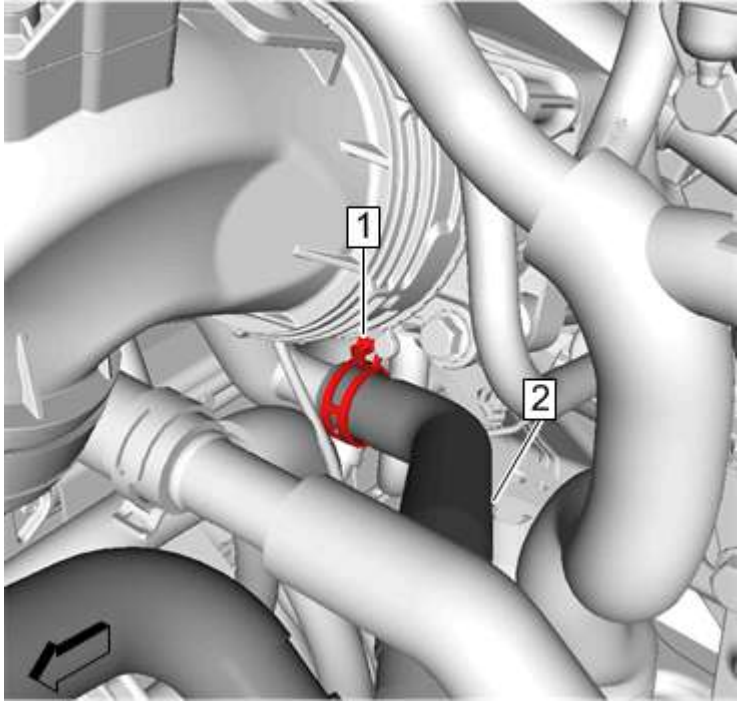


Fig. 834: Heater Water Auxiliary Pump Hose Clamp
Courtesy of GENERAL MOTORS COMPANY

11. Heater Water Auxiliary Pump Hose (2) @ Radiator Inlet PipeÂ» Remove
12. Heater Water Auxiliary Pump Hose (2)Â» Remove

Installation Procedure

1. Heater Water Auxiliary Pump Hose (2) @ Radiator Inlet PipeÂ» Install

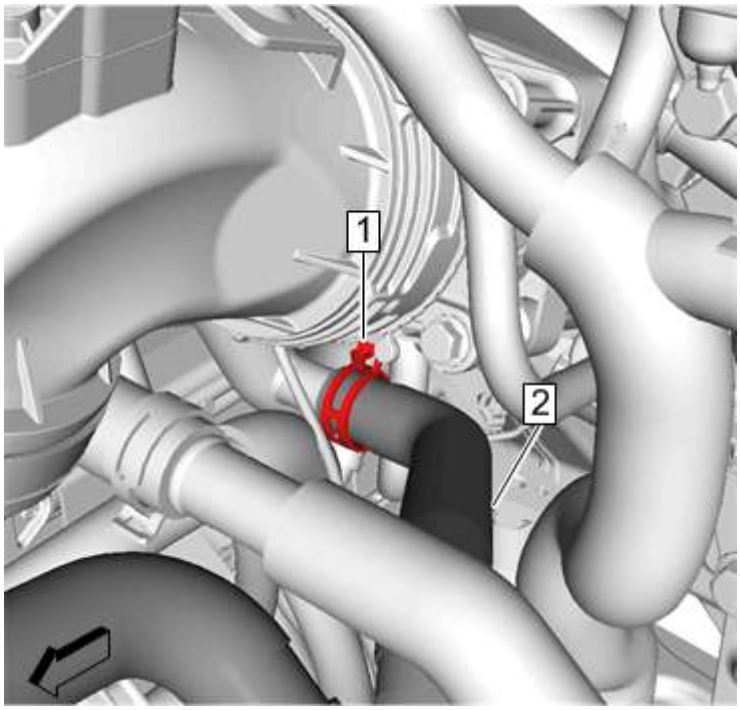


Fig. 835: Heater Water Auxiliary Pump Hose Clamp
Courtesy of GENERAL MOTORS COMPANY

2. Heater Water Auxiliary Pump Hose Clamp (1)Â» Engage - **Hose Clamp Replacement Guidelines - Spring Type**
3. Heater Water Auxiliary Pump Hose (2) @ Heater Coolant PumpÂ» Install