Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Hood Ajar Switch Signal 2	P257E	P257F	P257F	P257D
Ground	-	B3006 04, P257F	-	-

Circuit/System Description

The Hybrid/EV Powertrain Control Module 2 applies B+ to the hood ajar signal 2 circuit and monitors the voltage to determine the position of the hood. The hood ajar switch contains a multiplexed resistor. This resistor will vary the voltage seen by the Hybrid/EV Powertrain Control Module 2 by pulling down the applied voltage based on the position of the switch.

Conditions for Running the DTC

Propulsion system is active.

Conditions for Setting the DTC

P257D

The hood ajar switch signal voltage as measured by the Hybrid/EV Powertrain Control Module 2 is not within a valid voltage range.

P257E

The Hybrid/EV Powertrain Control Module 2 detects a short to ground in the hood ajar switch signal.

P257F

The Hybrid/EV Powertrain Control Module 2 detects a short to voltage or an open/high resistance in the hood ajar switch signal.

Action Taken When the DTC Sets

The engine will start and run whenever the vehicle is in Service Mode or the vehicle speed is less than 5 kph (3 mph).

Conditions for Clearing the DTC

DTCs P257D, P257E, and P257F are Type B DTCs.

Reference Information

Schematic Reference

Immobilizer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Hood Ajar Indicator Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Fig. 13: Hood Primary Latch Release Cable Grommet
Courtesy of GENERAL MOTORS COMPANY

2. Install the hood primary latch release cable grommet to the dash.

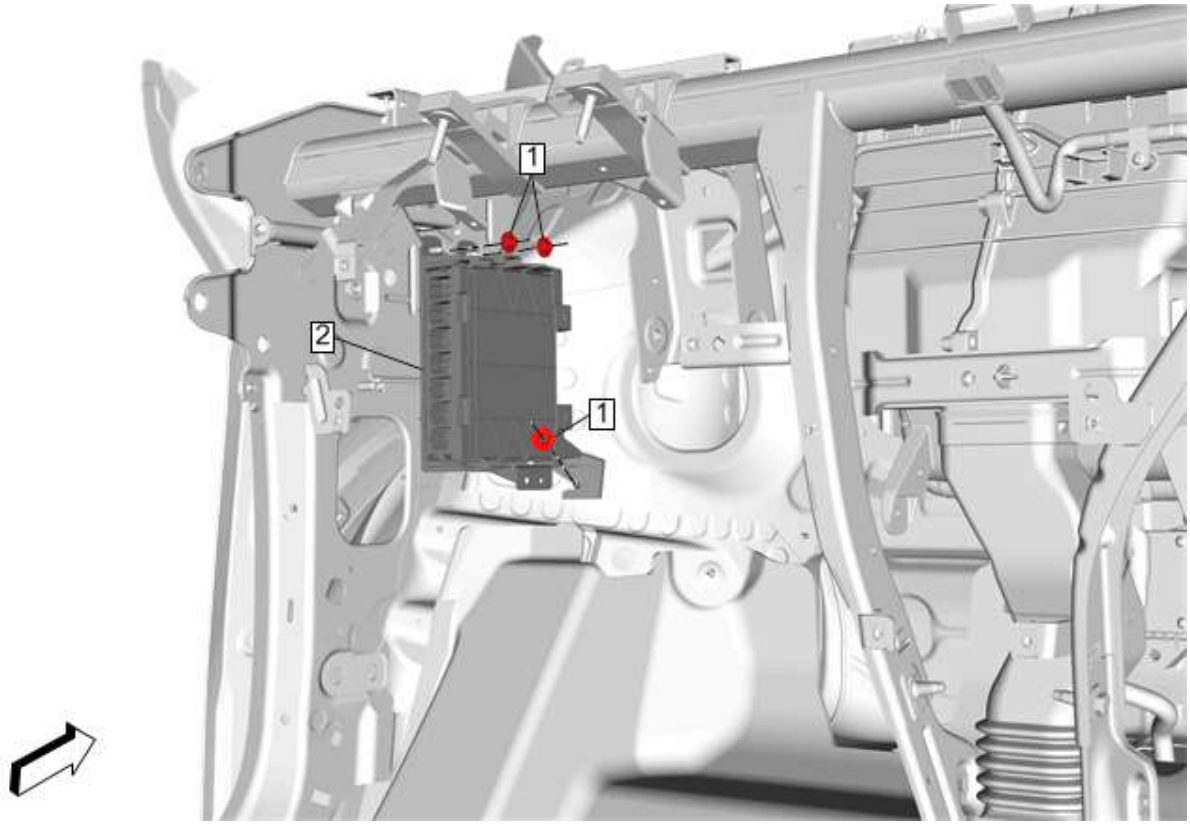


Fig. 14: Body Control Module Bracket
Courtesy of GENERAL MOTORS COMPANY

3. Body Control Module Bracket - Install - **Body Control Module Bracket Replacement**

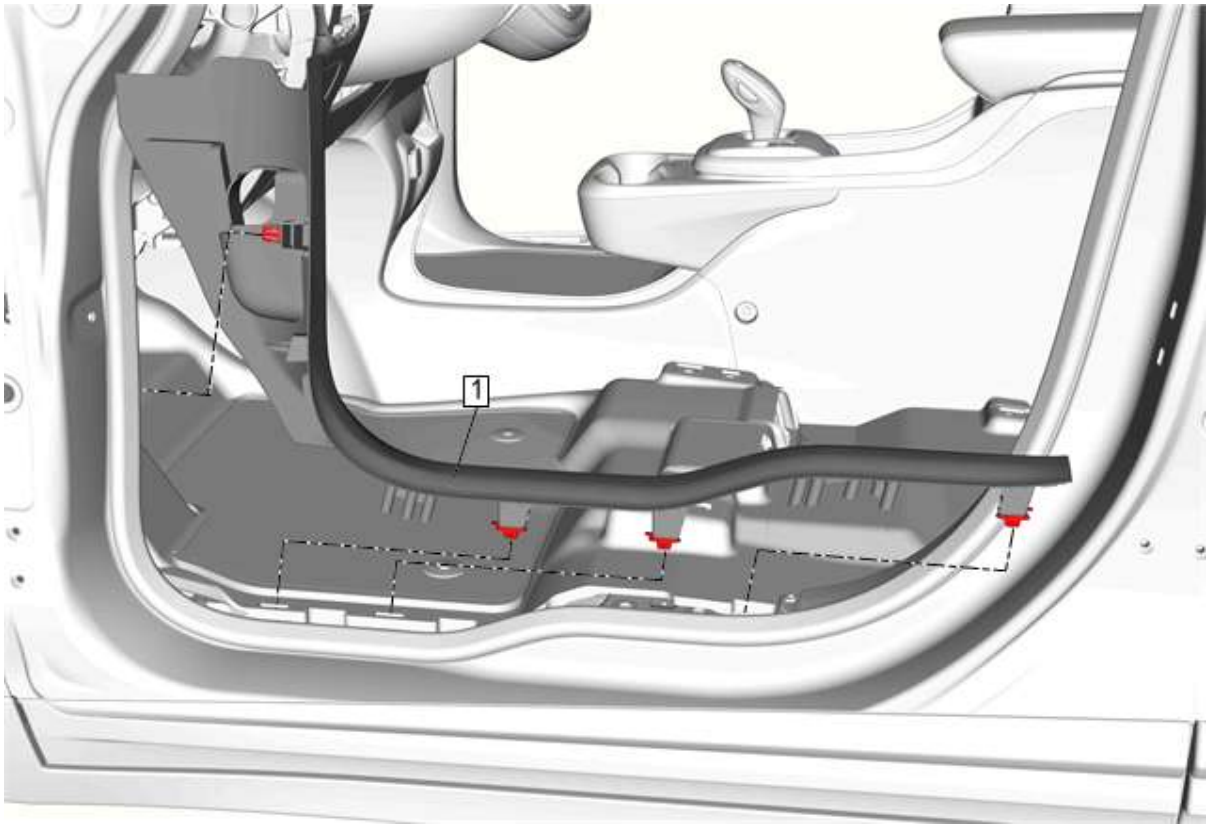


Fig. 15: Front Side Door Sill Garnish Molding
Courtesy of GENERAL MOTORS COMPANY

4. Front Side Door Sill Garnish Molding - Install - **Front Side Door Sill Garnish Molding Replacement**

- If less than 1 V

3. Ignition OFF/vehicle OFF.
4. 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 K73 Telematics Communication Interface Control Module.

- **If between 500 - 900 Ω**

7. Test or replace the S51 Telematics Button Assembly.

Repair Instructions

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

- Refer to **Communication Center Call Switch Replacement**
- Refer to **Control Module References** for telematics communication interface control module replacement, programming and setup

ONSTAR STEERING WHEEL CONTROL FUNCTIONS MALFUNCTION

Some vehicles equipped with the OnStarÃ‚Â® system have the capability of accessing voice mailboxes and other automated phone systems by means of the steering wheel controls, while the OnStarÃ‚Â® Personal Calling feature is in use. If the "Talk" or "Mute" button (depending upon the vehicle) on the steering wheel controls is depressed during an OnStarÃ‚Â® Personal Calling call, the telematics communication interface control module receives the message on the serial data bus from either the radio or body control module. This message is interpreted as a request to turn any spoken numbers into dual tone multi-frequency tones to be delivered over the airwaves to the phone system the user is communicating with. Complete instructions for operation of these features can be found in the information provided to the customer with the OnStarÃ‚Â® system.

The steering wheel controls are a resistor network that consist of multiple momentary contact switches and a series of resistors. The switches and resistor network are arranged so that each switch has a different resistance value. When a switch is pressed, a voltage drop occurs in the resistor network, which produces a specific voltage value unique to the switch selected, to be interpreted by either the radio or BCM. In the event the OnStarÃ‚Â® steering wheel control functions are inoperative, technicians should refer to **Steering Wheel Controls Malfunction** , to begin diagnosis of the steering wheel control concern.

RADIO CONTROLS 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.
- Refer to **Diagnostic Procedure Instructions** to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal terminal 6	B123E 02, 1	B123E 01, 1	B123E 01, 1	-
Signal terminal 5	2	2	2	-
Signal terminal 7	3	3	3	-
signal terminal 8	3	3	3	-
Low Reference terminal 10	-	4	-	-
1. Home, Seek Up, Seek Down, and/or Phone button will not function 2. Power Button will not function 3. Unable to adjust volume 4. All Radio Control buttons may not function				

Circuit/System Description

The radio info display module, radio controls and radio are all separate components. The radio controls communicate radio control inputs directly to the radio through a discrete circuit for volume up, volume down and power ON button. It also uses a series of resistors through a single signal circuit when the home, seek up, seek down

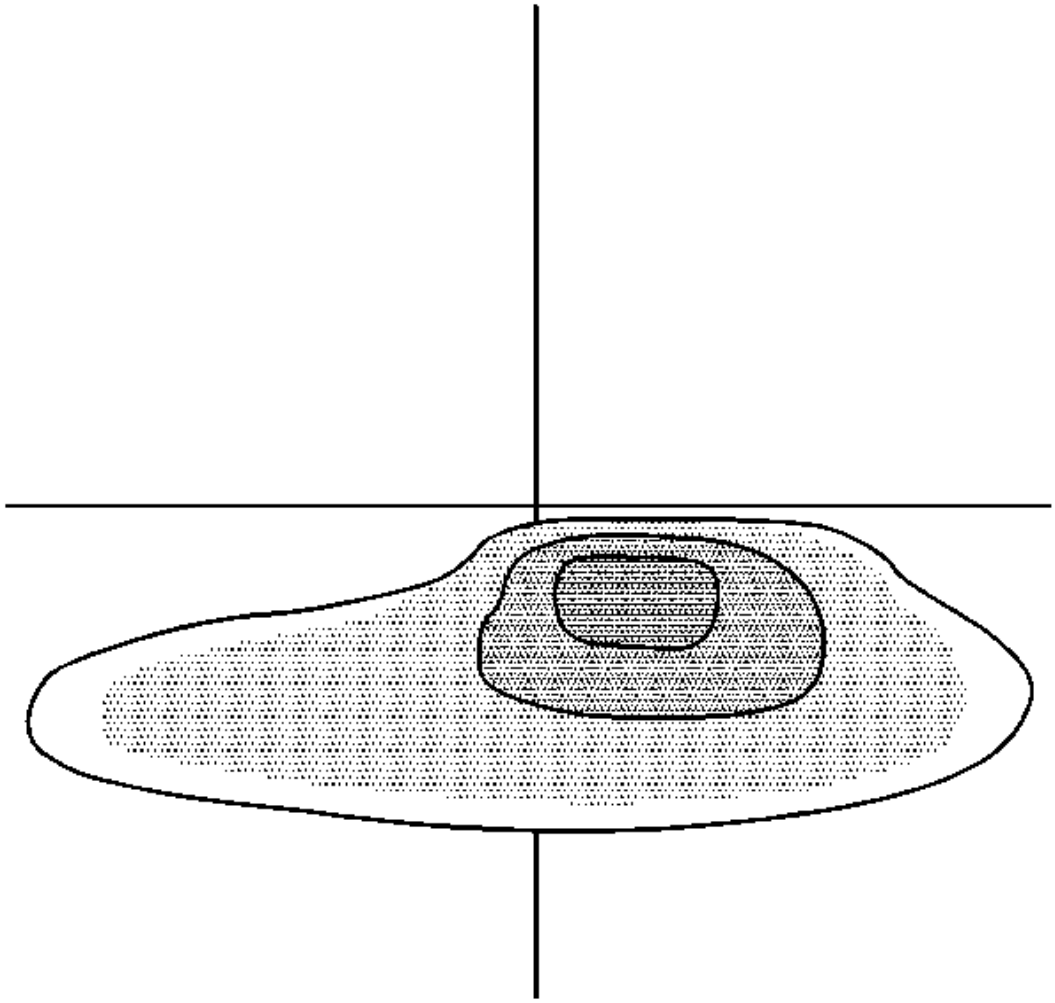


Fig. 31: Right Side Low Beam Proper Screen Positioning
Courtesy of GENERAL MOTORS COMPANY

NOTE: **DO NOT cover the headlamp. This may cause excessive heat build up.**

8. Turn ON the low beam headlamps. Block the light from projecting onto the screen from the passenger side headlamp.

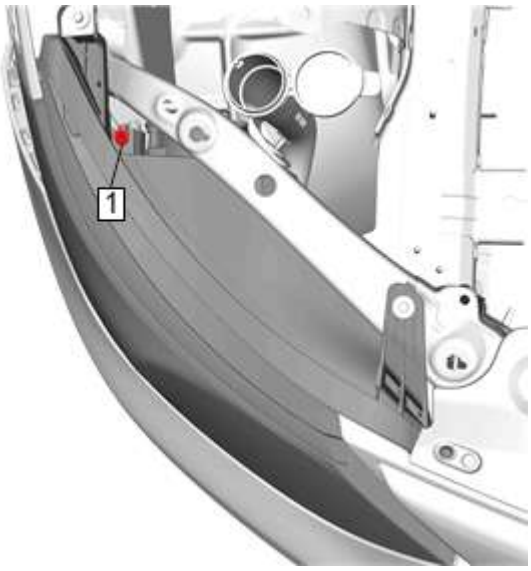


Fig. 32: Vertical Aim Screw
Courtesy of GENERAL MOTORS COMPANY

- **If 11.5 V or less**

1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
2. Test for infinite resistance between the B+ circuit and ground.
    - If less than infinite resistance, repair the short to ground on the circuit.
    - If Infinite resistance.
3. Test for less than 2 Ω in the B+ circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω, replace the K9 Body Control Module.

- **If greater than 11.5 V**

5. Test for 1 - 6 V between the serial data circuit terminal 2 and ground.
    - **If less than 1 V**

    1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
    2. Test for infinite resistance between the serial data circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the serial data circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the K9 Body Control Module.

    - **If greater than 6 V**

    1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module, ignition ON.
    2. Test for less than 1 V between the serial data circuit and ground.
        - If 1 V or greater, repair the short to voltage on the circuit.
        - If less than 1 V, replace the K9 Body Control Module.

    - **If between 1 - 6 V**

6. Ignition OFF, disconnect the X1 and X2 harness connectors at the K9 Body Control Module, ignition ON.
7. Test for less than 1 V between the K9 Body Control Module serial data circuit terminal 26 X1 and ground.
    - **If 1 V or greater**

      Repair the short to voltage on the circuit.

    - **If less than 1 V**
8. Ignition OFF.
9. Test for infinite resistance between the K9 Body Control Module serial data circuit terminal 26 X1 and ground.
    - **If less than infinite resistance**

      Repair the short to ground on the circuit.

    - **If infinite resistance**
10. Test for less than 2 Ω between the K9 Body Control Module serial data circuit terminal 26 X1 and the K77 Remote Control Door Lock Receiver serial data circuit terminal 3.
    - **If 2 Ω or greater**

      Repair the open/high resistance in the circuit.

    - **If less than 2 Ω**
11. Replace the K77 Remote Control Door Lock Receiver.
12. Verify DTC B3101 does not set while operating the vehicle under the conditions for running the DTC.
    - **If the DTC sets**

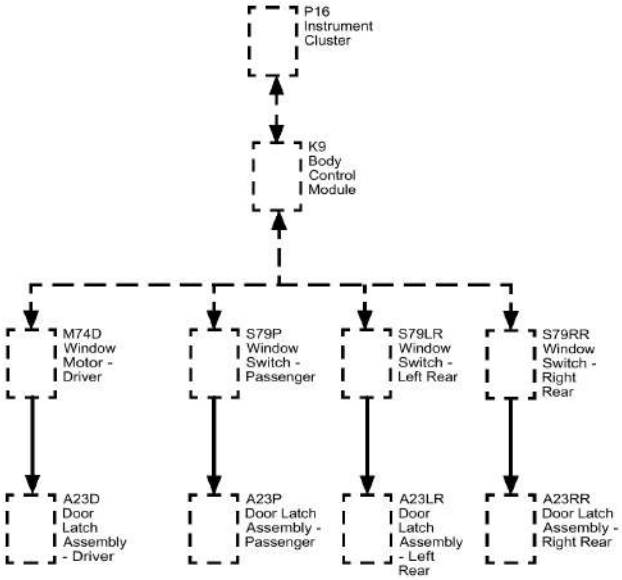


Fig. 96: Door Ajar System Block Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
P16	P16 Instrument Cluster
M74D	M74D Window Motor - Driver
S79P	S79P Window Switch - Passenger
S79LR	S79LR Window Switch - Left Rear
S79RR	S79RR Window Switch - Right Rear
A23D	A23D Door Latch Assembly - Driver
A23P	A23P Door Latch Assembly - Passenger
A23LR	A23LR Door Latch Assembly - Left Rear
A23RR	A23RR Door Latch Assembly - Right Rear
K9	K9 Body Control Module

Driver Door Ajar

The driver window motor provides a 12V signal to the driver door ajar switch signal circuit. The driver door ajar switch is integral to the driver door latch assembly. When the driver door is opened, the normally open door ajar switch closes. With the door ajar switch closed, ground is provided to the door ajar switch signal circuit and the voltage within the signal circuit drops. The driver window motor will detect the voltage drop and will send a serial data message to the body control module which will then send a message to the instrument panel cluster to command the door ajar message

Passenger Door Ajar

The passenger window switches each provide a 12 V signal to their respective door ajar switch signal circuits. The door ajar switches are integral to each door latch assembly. When a door is opened, the normally open door ajar switch closes. With the door ajar switch closed, ground is provided to the door ajar switch signal circuit and the voltage within the signal circuit drops. The window switches will detect the voltage drop and will send a serial data message to the body control module which will then send a message to the instrument panel cluster to command the door ajar message.

LIFTGATE AJAR INDICATOR DESCRIPTION AND OPERATION

Hatch Open Indicator

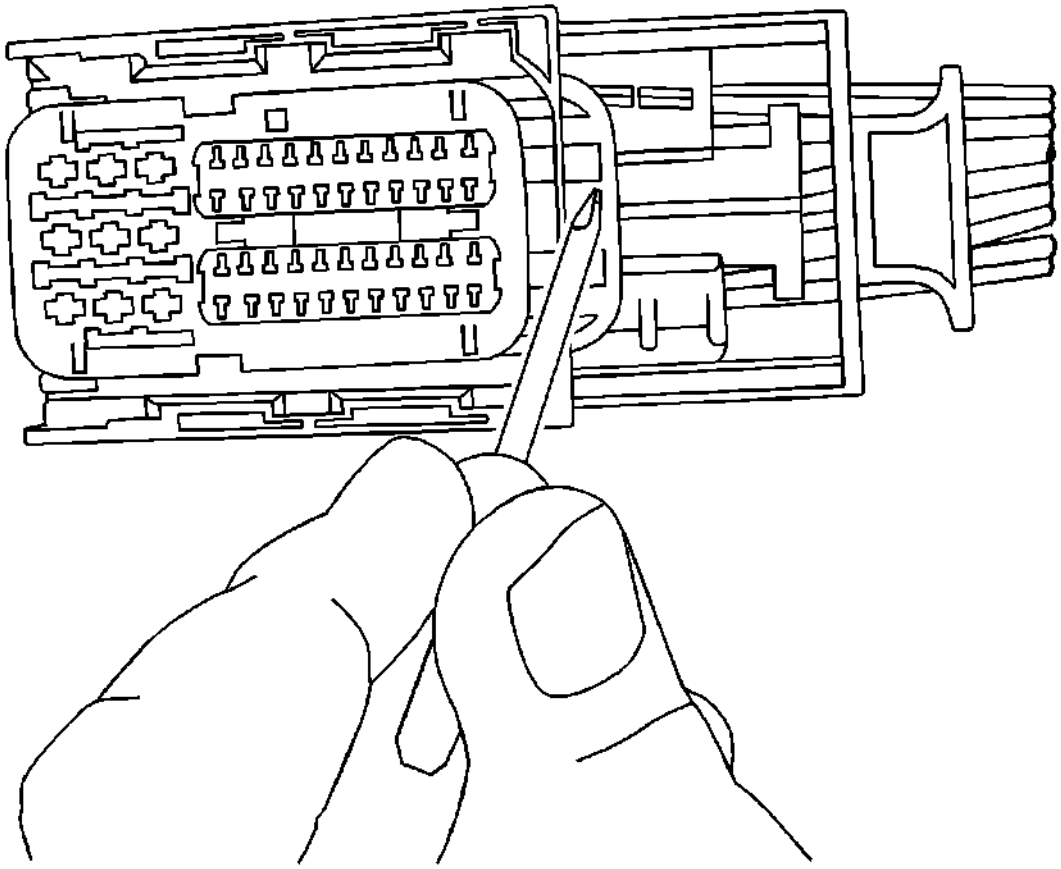


Fig. 104: Using Small Flat-Blade Tool To Remove Rear TPA
Courtesy of GENERAL MOTORS COMPANY

7. Use a small flat-blade tool to completely remove the rear TPA from the connector.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K17 Electronic Brake Control Module.

- **If the parameter is OK**

5. Install a 3 A fused jumper wire between the signal circuit terminal 1 and ground.
6. Verify the scan tool Brake Fluid Level Sensor parameter is Low.
   - **If the parameter is not Low**
   1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the K17 Electronic Brake Control Module, ignition ON.
   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.
   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 K17 Electronic Brake Control Module.
   - **If the parameter is Low**
7. Test or replace the B20 Brake Fluid Level Switch.

Repair Instructions

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

- Refer to **Brake Fluid Level Indicator Switch Replacement**
- Refer to **Control Module References** for electronic brake control module replacement, programming and setup.

DTC C029F: BRAKE BOOSTER SYSTEM 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.
- Refer to **Diagnostic Procedure Instructions** to provide an overview of each diagnostic category.

DTC Descriptor

DTC C029F

Brake Booster System Performance

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

Circuit/System Description

The brake booster system consists of a motor, electronic control unit (ECU), pedal travel sensor, and a master cylinder. If the electronic brake control module (EBCM) detects a brake booster system condition a DTC will be set.

Conditions for Running the DTC

Vehicle ON.

Conditions for Setting the DTC

The device has detected an internal malfunction

Action Taken When the DTC Sets

- No boost or blending available
- Red brake light and MIL are illuminated

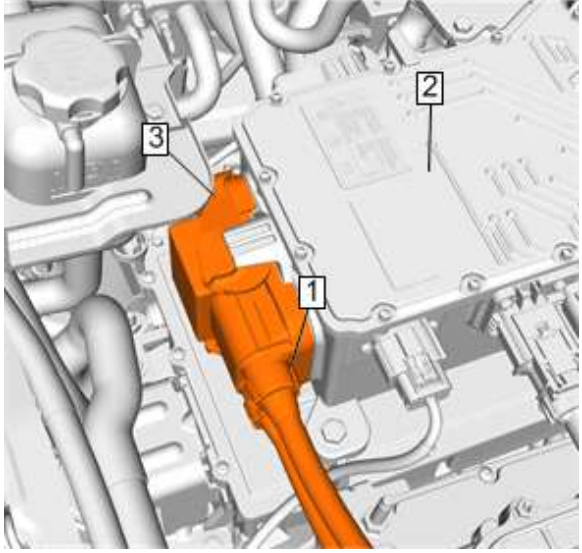


Fig. 51: Drive Motor Battery Charger Receptacle, Generator Battery Control Wiring Junction Block And Handle
Courtesy of GENERAL MOTORS COMPANY

12. Install the Drive Motor Battery Charger Receptacle (1) to the generator battery control wiring junction block (2), and lock the handle (3) into the lock position.
13. Enable High Voltage Stem. Refer to **High Voltage Enabling**

HIGH VOLTAGE BATTERY CONTROL WIRING JUNCTION BLOCK REPLACEMENT (WITHOUT QUICK CHARGE)

Removal Procedure

WARNING: **Always perform the High Voltage Disabling procedure prior to servicing any High Voltage component or connection. Personal Protection Equipment (PPE) and proper procedures must be followed.**

The High Voltage Disabling procedure includes the following steps:

- **Identify how to disable high voltage.**
- **Identify how to test for the presence of high voltage.**
- **Identify condition under which high voltage is always present and personal protection equipment (PPE) and proper procedures must be followed.**

Before working on any high voltage system, be sure to wear the following Personal Protection Equipment:

- **Safety glasses with appropriate side shields when within 15 meters (50 feet) of the vehicle, either indoors or outdoors.**
- **Certified and up-to-date Class "0" Insulation gloves rated at 1000V with leather protectors.**
  - **Visually and functionally inspect the gloves before use.**
  - **Wear the Insulation gloves with leather protectors at all times when working with the high voltage battery assembly, whether the system is energized or not.**

Failure to follow the procedures may result in serious injury or death.

1. Disable High Voltage System. Refer to **High Voltage Disabling**

- **Identify how to test for the presence of high voltage.**
- **Identify condition under which high voltage is always present and personal protection equipment (PPE) and proper procedures must be followed.**

Before working on any high voltage system, be sure to wear the following Personal Protection Equipment:

- **Safety glasses with appropriate side shields when within 15 meters (50 feet) of the vehicle, either indoors or outdoors.**
- **Certified and up-to-date Class "0" Insulation gloves rated at 1000V with leather protectors.**
  - **Visually and functionally inspect the gloves before use.**
  - **Wear the Insulation gloves with leather protectors at all times when working with the high voltage battery assembly, whether the system is energized or not.**

Failure to follow the procedures may result in serious injury or death.

1. Disable the high voltage system. **High Voltage Disabling**

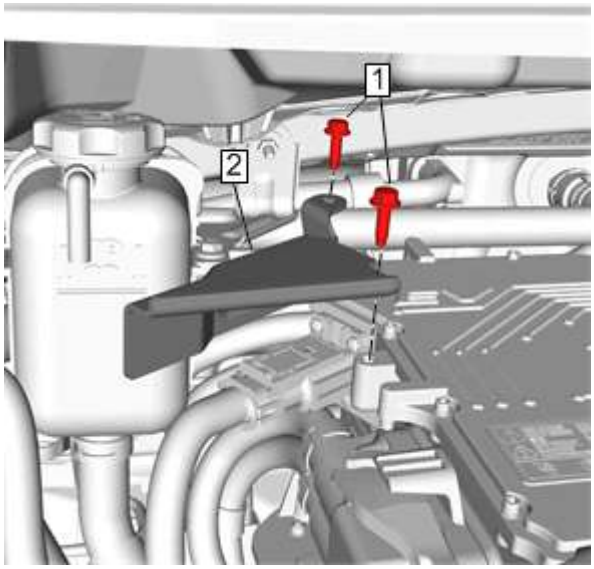


Fig. 199: Accessory DC Power Control Module High Voltage Connector Protector And Bolts
Courtesy of GENERAL MOTORS COMPANY

2. Remove Accessory DC Power Control Module High Voltage Connector Protector Bolt(1)
3. Remove Accessory DC Power Control Module High Voltage Connector Protector(2)

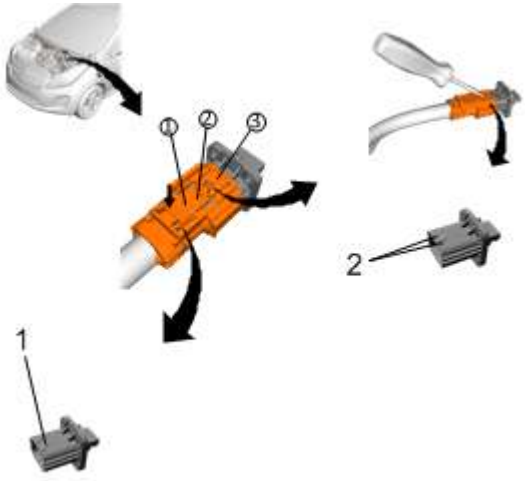


Fig. 200: First Stage Connector Tab And Connector Retaining Tabs
Courtesy of GENERAL MOTORS COMPANY

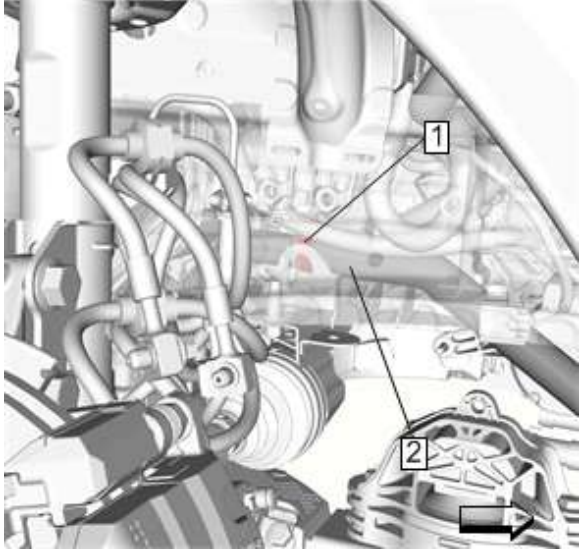


Fig. 227: Drive Motor Battery Coolant Cooler Inlet Hose And Retainer
Courtesy of GENERAL MOTORS COMPANY

6. Remove Retainer (1)
7. Remove Drive Motor Battery Coolant Cooler Inlet Hose (2)

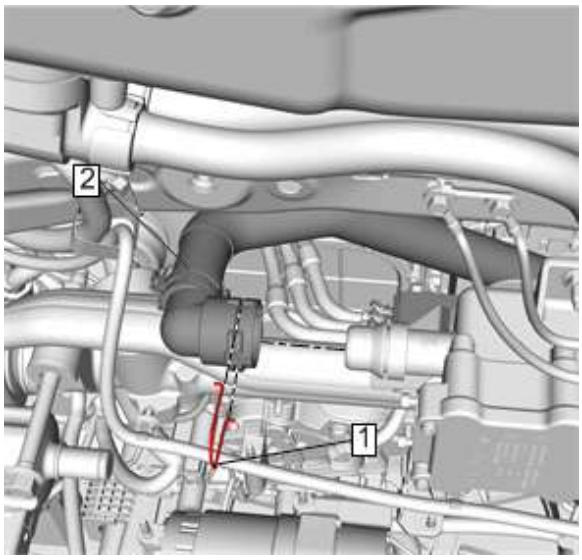
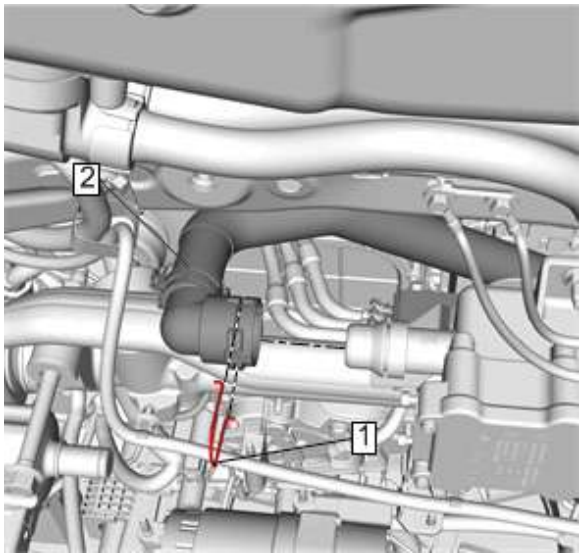
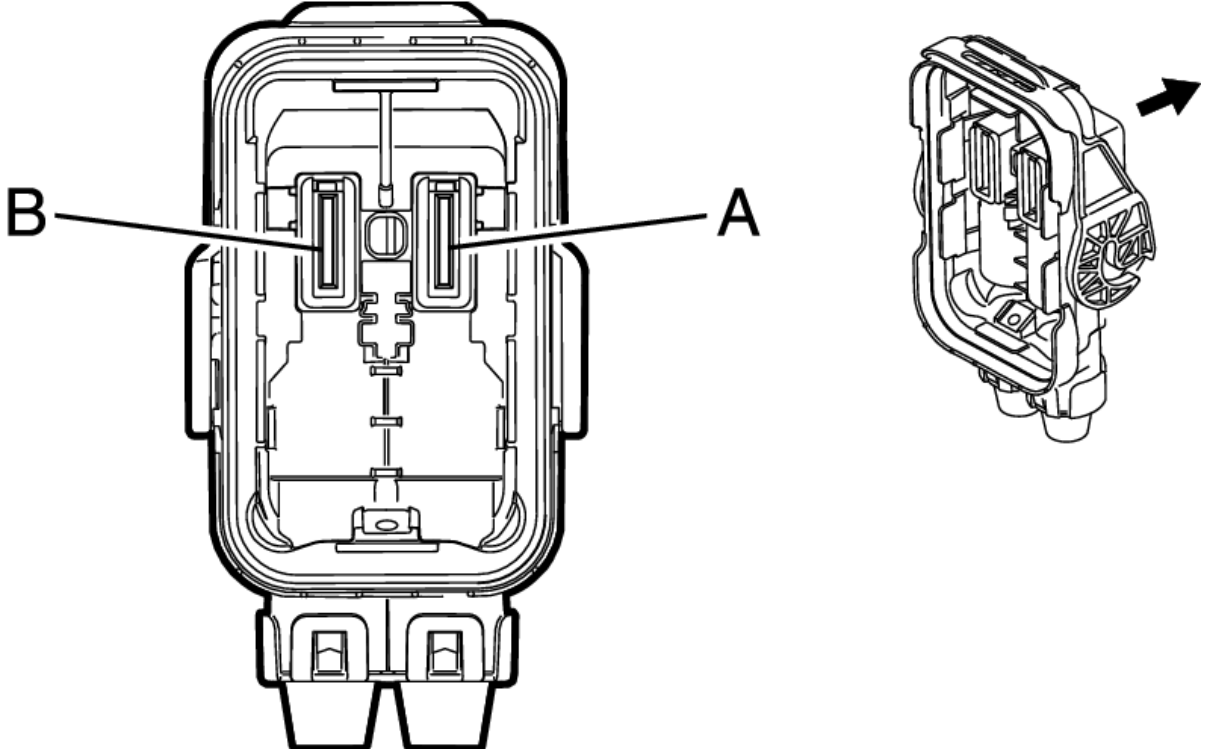


Fig. 228: Drive Motor Battery Coolant Cooler Inlet Hose And Clip
Courtesy of GENERAL MOTORS COMPANY

8. Release Clip (1)
9. Remove Drive Motor Battery Coolant Cooler Inlet Hose (2)

Installation Procedure





Connector Part Information

- Harness Type: Engine
- OEM Connector: 13598848
- Service Connector: Service by Harness - See Part Catalog
- Description: 2-Way F Power Pack 2000, Sealed (OG)

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	Not Available	No Tool Required	Not Required	Not Required	Not Required	Not Required

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
A	-	OG	4336	B+ (360 V)	I	-
B	-	OG/BK	4335	360 VDC Ground	I	-

T24 BATTERY CHARGER - DC X3

RPO	Description
TCU	LICENSE PLATE-FRT & RR MOUNTING, ECE
TD1	REFLECTOR-SAFETY TRIANGLE
TDM	MODE-TEEN DRIVER SETTINGS
TQ5	HEADLAMP HIGH BEAM-AUTO CONTROL
TR6	CONTROL, HEADLAMPS-LEVELING SYSTEM, MANUAL
TT9	LAMP-STOP, HIGH LEVEL, LED TYPE
TUI	LAMP-FRT TURN SIGNAL, AMBER
TUR	GRILLE-RADIATOR, DK SILVER
TUS	GRILLE-RADIATOR, BLACK PC MET
TW5	LAMP-TAIL & STOP, SAE, LED
U05	HORN-DUAL
U18	SPEEDOMETER-INST, KILO
U25	LAMP-INTR, RR COMPT, COURTESY
U2K	DIGITAL AUDIO SYSTEM-S-BAND
UC1	SPEEDOMETER-INST, MILES
UC3	CONTROL-STEERING WHEEL, RADIO & PHONE, REDUNDANT CONTROLS
UD5	PARK ASSIST-FRONT AND REAR
UD7	PARK ASSIST-REAR
UDV	DISPLAY INSTRUMENT-DRIVER INFO ENHANCED, FULL CLUSTER (MULTI COLOR GRAPHIC)
UE1	COMMUNICATION SYSTEM-VEHICLE, ONSTAR
UE4	SENSOR INDICATOR-FOLLOWING DISTANCE
UEU	SENSOR INDICATOR-FORWARD COLLISION ALERT
UEV	COMMUNICATION EQUIP-AUTOMATIC TOLL COLLECTION
UFA	DISPLAY-OUTSIDE TEMPERATURE
UFG	SENSOR INDICATOR-REAR CROSS TRAFFIC ALERT
UFQ	PARK ASSIST-FRONT, REAR, LATERAL-FRONT (SEMIAUTOMATIC STEERING ADVANCED PARKING AID)
UGM	SENSOR EQUIPMENT-OUTSIDE AIR TEMPERATURE SENSOR
UHG	INDICATOR-SEAT BELT WARNING, DRIVER
UHH	INDICATOR-SEAT BELT WARNING, PASSENGER
UHX	LANE ACTIVE SAFETY-KEEP ASSIST
UHY	COLL IMMINENT BRK-LOW SPEED, VEH FWD MOVEMENT, BRAKE PREFILL, INTEGRATED BRAKE ASSIST
UJM	TIRE PRESS INDICATOR-MANUAL LEARN
UKC	SIDE ACTIVE SAFETY-OBSTACLE DETECTION ENHANCED
UKJ	PED DETECTION FRT-BASIC, PEDESTRIANS
UQ3	SPEAKER SYSTEM-ENHANCED AUDIO
UQA	SPEAKER SYSTEM-PREMIUM AUDIO, BRANDED AMPLIFIER
UQK	RESTRAINT PROVISIONS-CHILD, ISOFIX 2 POINT ONLY, POINT/LAT CH(INC 2 TOP TETHER POINTS)
UQL	RESTRAINT PROVISIONS-CHILD, ISOFIX 2 POINT ONLY, POINT/LAT CH(INC 3 TOP TETHER POINTS)
US2	VEHICLE VIN-NON-SALEABLE, 0777 SERIES (DO NOT USE)
USS	RECEPTACLE-USB CHARGE PORT
UST	RECEPTACLE-DUAL USB, SINGLE AUX
UTJ	THEFT DETERENT-ELECTRICAL, UNAUTHORIZED ENTRY
UUQ	ANTENNA-ROOF, RADIO, SHARK FIN
UVC	VISION-REAR VIEW, MONO, ANALOG
UVD	STEERING WHEEL HEAT-MANUAL
UVH	VISION-360 VIEW, MONO, ANALOG
V2P	LUGGAGE CARRIER-RF RAIL

Parameter	System State	Expected Value	Description
Software Module 3 Identifier	-	Varies	The scan tool displays the software calibration part number 3.
Sun Azimuth	-	0 - 90Â°	The scan tool displays degrees. This is the current angle in the horizontal plane between the sun and the vehicle driving direction.
Sun Elevation	-	0 - 360Â°	The scan tool displays degrees. This is the current angle in the vertical sun height.
Sunload / Sun Intensity	-	0 - 1200 W/m^2	The scan tool displays W/m^2 . This is the current sun heat intensity.
Upper Left Duct Air Temperature Sensor	-	-40 to +80Â°C (-40 to +176Â°F)	The scan tool displays Â°C (Â°F). This is the current temperature at the upper left duct temperature sensor.
Upper Rear Duct Air Temperature Sensor	-	-40 to +80Â°C (-40 to +176Â°F)	The scan tool displays Â°C (Â°F). This is the current temperature at the rear upper duct temperature sensor.
Upper Right Duct Air Temperature Sensor	-	-40 to +80Â°C (-40 to +176Â°F)	The scan tool displays Â°C (Â°F). This is the current temperature at the upper right duct temperature sensor.
Vehicle Identification Number (VIN)	-	Varies	The scan tool displays the learned vehicle identification number.
Windshield Temperature	-	-40 to +80Â°C (-40 to +176Â°F)	The scan tool displays Â°C (Â°F). This is the current temperature at the windshield temperature sensor.

Heating Ventilation and Air Conditioning Control Module Scan Tool Output Controls

Output Control	Description
A/C Compressor Clutch Enable	This control function enables or disables the A/C Compressor Clutch. The scan tool displays Engaged or Disengaged depending on the state of the A/C compressor clutch.
A/C Compressor Valave Control	This control function increases or decreases the command to the A/C Compressor Solenoid in %. The scan tool displays amperage in % depending on the state of the command for increased/decreased compressor displacement.
Aero Shutter Enable	This control function commands the state of the Aero Shutter between Active and Not Active.
Air Inlet Door Actuator Control	This control function commands the door position to increase or decrease. During the movement of the door, the scan tool shows Increase or Decrease dependant on the movement direction. When the position of the door is reached, the scan tool displays Stop.
Air Recirculation Door Actuator Direction	This control function commands the door position to increase or decrease. During the movement of the door, the scan tool shows Increase or Decrease dependant on the movement direction. When the position of the door is reached, the scan tool displays Stop.
Auxiliary Blower Motor Speed	This control function commands the auxiliary blower motor speed from 0 to 100% and back again.
Auxiliary Coolant Pump Speed	The HVAC control module enables or disables the coolant pump, and varies the pump speed when commanded from the scan tool.
Auxiliary Heater Output Enable	This control function increases or decreases the command to the Auxiliary Heater in %. The scan tool displays amperage in % depending on the state of the command.

10. Lower the vehicle.

DRIVE MOTOR REAR MOUNT REPLACEMENT

Removal Procedure

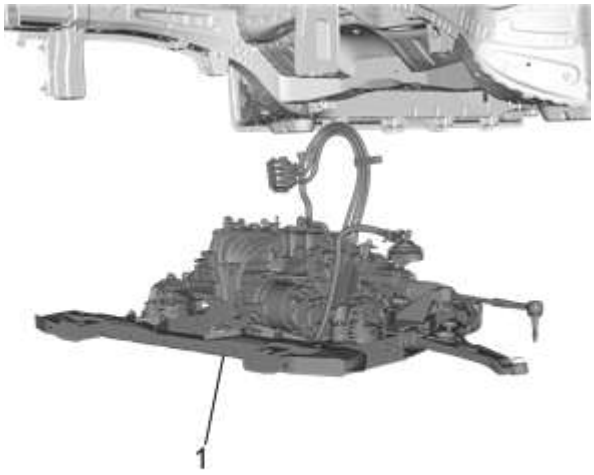


Fig. 49: Automatic Transmission and Drivetrain and Front Suspension Frame Assembly
Courtesy of GENERAL MOTORS COMPANY

1. Remove Automatic Transmission and Drivetrain and Front Suspension Frame Assembly (1). Refer to **Drivetrain and Front Suspension Frame Removal and Installation**
2. Using an appropriate lift hook and engine hoist, raise the transmission slightly to remove weight from the rear mount.

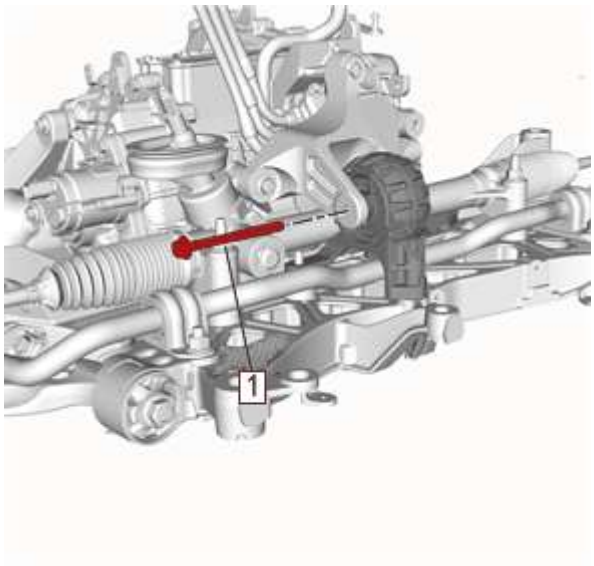


Fig. 50: Drive Motor Rear Mount Drive Motor Side Bolt
Courtesy of GENERAL MOTORS COMPANY

3. Remove and DISCARD Drive Motor Rear Mount Drive Motor Side Bolt (1)