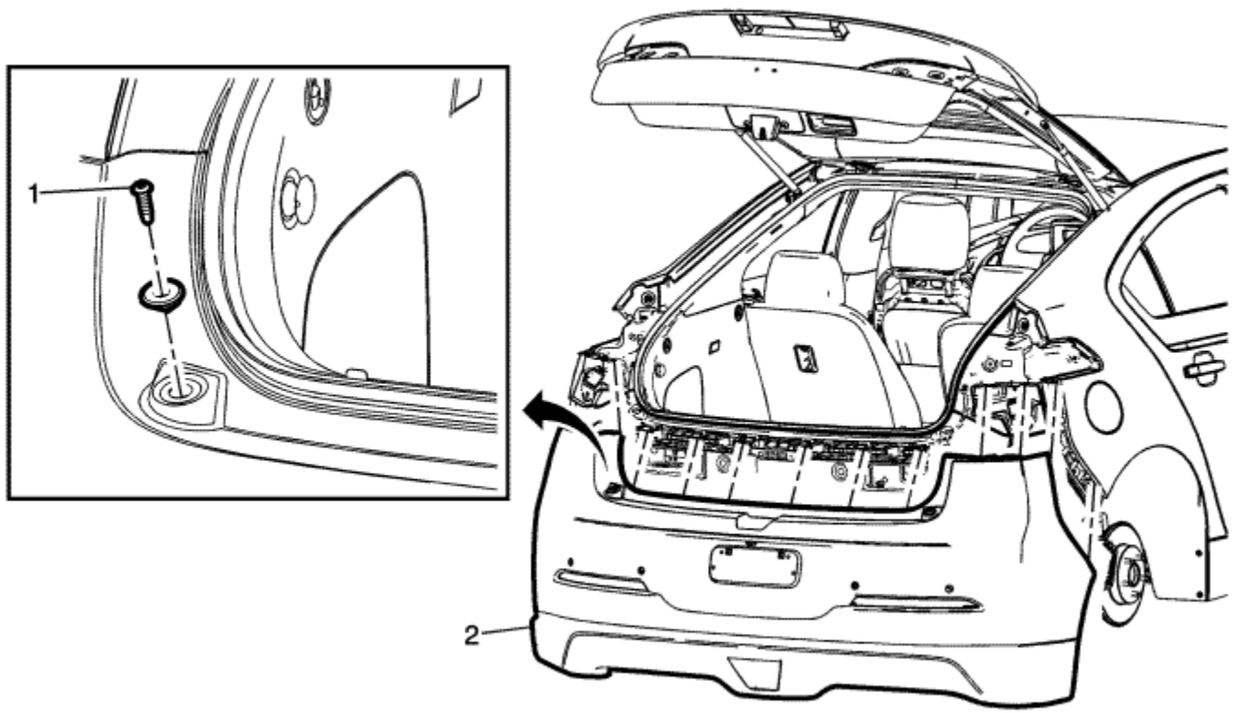
Work Stall Test Warning

Warning: One or more of the following guidelines may apply when performing specific required tests in the work stall:

- When a test requires spinning the drive wheels with the vehicle jacked up, adhere to the following precautions:
  - Do not exceed 56 km/h (35 mph) when spinning one drive wheel with the other drive wheel stopped. This limit is necessary because the speedometer indicates only one-half the actual vehicle speed under these conditions. Personal injury may result from excessive wheel spinning.
  - If all of the drive wheels are spinning at the same speed, do not exceed 112 km/h (70 mph). Personal injury may result from excessive wheel spinning.
  - All persons should stay clear of the rotating components and the balance weight areas in order to avoid possible personal injury.
  - When running an engine in the repair stall for an extended period of time, use care not to overheat the engine and the transmission.
- When a test requires jacking up the vehicle and running with the wheels and brake rotors removed, adhere to the following precautions:
  - Support the suspension at normal ride height.
  - Do not apply the brake with the brake rotors removed.
  - Do not place the transmission in PARK with the drive axles spinning.
  - Turn Off the ignition in order to stop the powertrain components from spinning.
- When running an engine in the work stall, use the exhaust removal system to prevent breathing dangerous gases.

Rear Bumper Fascia Removal and Installation - Volt



Callout	Component Name
Preliminary Procedures 1. Remove the underbody rear air deflector to fascia bolts. Refer to Underbody Rear Air Deflector Replacement . 2. Remove the rear screws from the wheelhouse liner. Refer to Rear Wheelhouse Panel Liner Replacement .	

Windscreen Replacement

Special Tools

- *BO-641* Suction Holder
- *BO-46974* Glass Removal System
- Use an adhesive that is approved by GM

For equivalent regional tools, refer to Special Tools .

Warning: Refer to Cracked Window Warning in the Preface section.

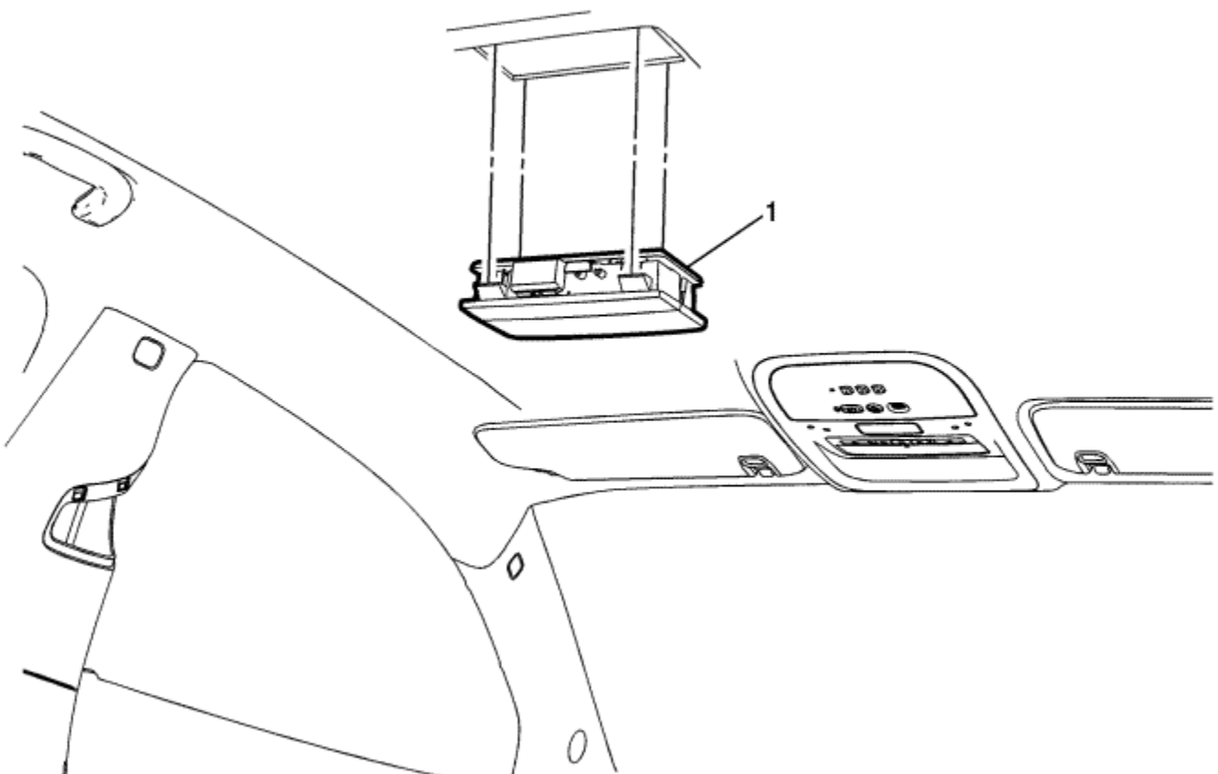
Warning: Refer to Glass and Sheet Metal Handling Warning in the Preface section.

1. Open the bonnet.
2. Remove the windscreen wiper arms and blades. Refer to Windscreen Wiper Arm Replacement : Passenger → Driver .
3. Remove the air inlet grille panel. Refer to Air Inlet Grille Panel Replacement .
4. Remove the left and right side corner weatherstrip by the air inlet panel.
5. Remove the left and right windscreen side garnish moldings. Refer to Windscreen Side Garnish Molding Replacement .
6. Remove the rearview mirror. Refer to Inside Rearview Mirror Replacement .
7. Disconnect the rain sensor connector, if equipped.

   Warning: If broken glass falls into the defroster outlets, it can be blown into the passenger compartment and cause personal injury.

8. Cover to protect the following parts from broken glass:
   - Upper dash pad
   - Demister outlets and A/C outlets
   - Seats and carpeting

Reading Lamp Replacement



Callout	Component Name
1	Reading Lamp **Procedure** 1. Depress the front integral tabs using the appropriate tool to remove the reading lamp from the headlining trim panel.

DTC C0201, C120D, or C120E

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 C0201 04: Antilock Brake System Enable Relay Primary Circuit Open

DTC C120D 00: Traction Control Power Switch Circuit Open

DTC C0201 0E: Antilock Brake System Enable Relay Contact Circuit Low Resistance

DTC C120E 00: Traction Control Power Switch Circuit Shorted

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	C0201 04	C0201 04	--	--
Ground Terminal 13	-	C056D 00, C12DA 00, C12D7 00	--	--
Ground Terminal 38	-	U0129 00, U1833 00	--	--

Circuit/System Description

Battery positive voltage is supplied to the electronic brake control module at all times through a 40 A fuse located in the under-bonnet fuse block. The electronic brake control module uses this voltage to power the pump motor. The pump motor is an integral part of the brake pressure modulator, while the pump motor relay is integral to the electronic brake control module. The pump motor relay is not engaged during normal system operation. When the antilock brake system or traction control system operation is required the electronic brake control module activates the pump motor relay and turns the pump motor ON.

DTC C028F

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 C028F 01: Hand brake Solenoid Actuator Circuit Short to Battery

DTC C028F 02: Hand brake Solenoid Actuator Circuit Short to Ground

DTC C028F 08: Hand brake Solenoid Actuator Circuit Performance-Signal Invalid

Circuit/System Description

The hand brake control module has an internal motor, apply actuator, release actuator, and temperature sensor. The hand brake control module also contains the logic for applying and releasing the hand brake when commanded by the hand brake control switch. When the hand brake control module receives a signal from the switch the internal circuit board temperature is checked to verify it is within operating range before the control module performs the requested operation. The hand brake control module contains an internal hand brake solenoid actuator, and performs diagnostics on the solenoid actuator circuitry to verify it is functioning properly

Conditions for Running the DTC

Ignition OFF, ACCESSORY, or RUN mode.

Conditions for Setting the DTC

The hand brake control module detects an internal hand brake solenoid malfunction.

Action Taken When the DTC Sets

DTC B1025, B1035, B1045, or B1055

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 B1025 01: Left Front Audio Output Circuit Short to Battery

DTC B1025 02: Left Front Audio Output Circuit Short to Ground

DTC B1025 04: Left Front Audio Output Circuit Open

DTC B1035 01: Front Audio Output Circuit Short to Battery

DTC B1035 02: Right Front Audio Output Circuit Short to Ground

DTC B1035 04: Right Front Audio Output Circuit Open

DTC B1045 01: Left Rear Audio Output Circuit Short to Battery

DTC B1045 02: Left Rear Audio Output Circuit Short to Ground

DTC B1045 04: Left Rear Audio Output Circuit Open

DTC B1055 01: Right Rear Audio Output Circuit Short to Battery

DTC B1055 02: Right Rear Audio Output Circuit Short to Ground

DTC B1055 04: Right Rear Audio Output Circuit Open

Symptoms - Cruise Control

Note: The following steps must be completed before using the symptom tables.

1. Before using the symptom diagnostic table, perform the Diagnostic Trouble Code (DTC) List - Vehicle in order to verify the following conditions:
   - There are no DTCs set.
   - The module can communicate via the serial data.
2. Review the system operation in order to understand the system functions. Refer to Cruise Control Description and Operation .

Visual/Physical Inspection

- Inspect for aftermarket devices which can affect the operation of the cruise control system. Refer to Checking Aftermarket Accessories .
- Inspect the accessible system components or the visible system components for obvious damage or for obvious conditions which can cause the symptom.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to Testing for Intermittent Conditions and Poor Connections .

Symptom List

Refer to Cruise Control Malfunction in order to diagnose the symptom.

DTC P1516, P2101, P2119, or P2176

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 P1516: Throttle Actuator Control (TAC) Module Throttle Actuator Position Performance

DTC P2101: Throttle Actuator Position Performance

DTC P2119: Throttle Closed Position Performance

DTC P2176: Minimum Throttle Position Not Learned

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Motor Control 1	P1516, P2101, P2176	P1516, P2101, P2176	P1516, P2101, P2176	P1516, P2101, P2176
Motor Control 2	P1516, P2101, P2176	P1516, P2101, P2176	P1516, P2101, P2176	P1516, P2101, P2176

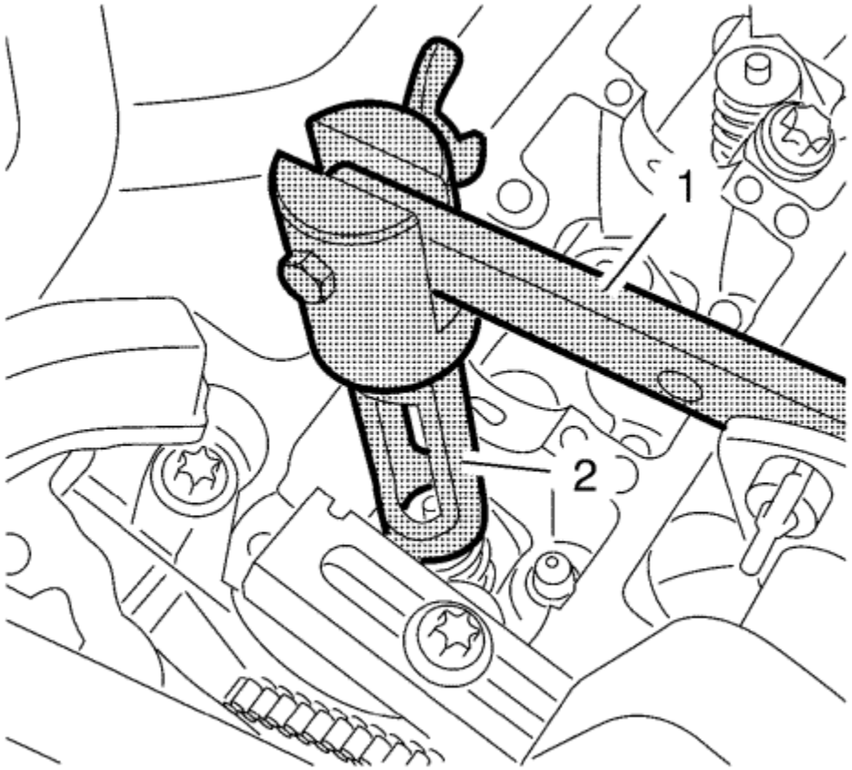
The engine control module (ECM) controls the throttle valve by applying a varying voltage to the control circuits of the throttle actuator control (TAC) motor. The ECM monitors the duty cycle that is required to actuate the throttle valve. The ECM monitors the throttle position (TP) sensors 1 and 2 to determine the actual throttle valve position.

Conditions for Running the DTC

P1516

Thermostat Diagnosis

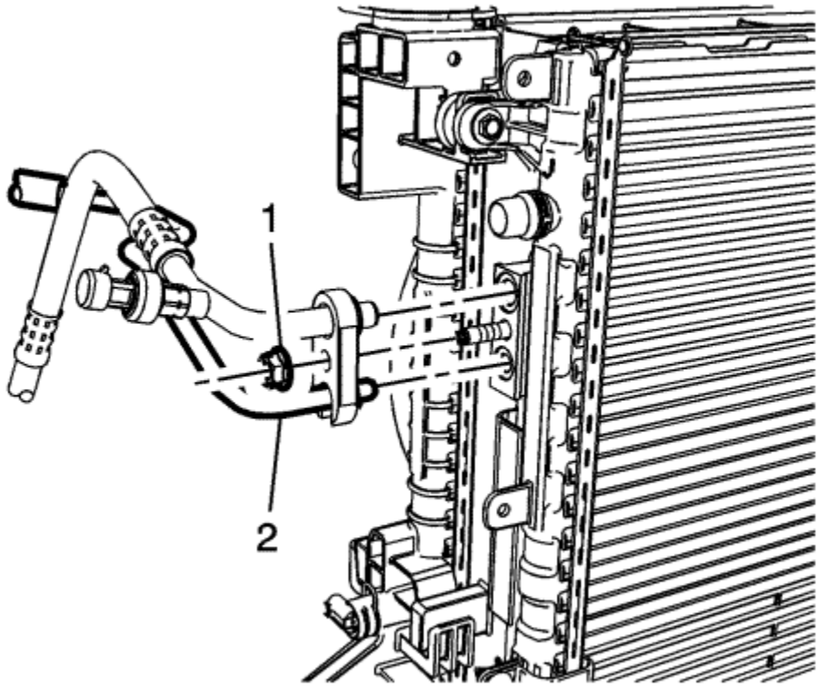
Step	Action	Values	Yes	No
1	1. Pressure test the cooling system and the cap for leaks. 2. Repair any leaks before proceeding. These engines use a 90°C (194°F) thermostat. The ambient temperatures should be within the specified range given. 3. Set the HVAC controls in the OFF position. 4. Run the cold engine at idle (68-70°F) for 15-20 minutes before checking the engine temperature. 5. Check the engine coolant temperature at idle with the scan tool. Is the engine coolant temperature (ECT) between 90-105°C (194-221°F)?	13-38°C (55-100°F)	System OK	Go to Step 2
2	Is the ECT below 90°C (194°F)?	-	Go to Step 3	Go to Step 4
3	The thermostat is opening early, or the thermostat seal is leaking. Replace the thermostat and the thermostat seal. Is the repair complete?	-	System OK	-
4	Is the ECT over 105°C (221°F)?	-	Go to Step 5	-
5	Is the radiator inlet hot?	-	Go to Step 6	Go to Step 7
6	1. Turn ON the heater. 2. Check if hot air is coming from the heater outlets. Is the air hot?	-	Go to Step 11	Go to Step 12
7	There may be air in the system. 1. Add coolant to the surge tank if the coolant level is low. Refer to Cooling System Draining and Filling . 2. Recheck the radiator inlet hose. Is the inlet hose hot?	-	Go to Step 6	Go to Step 8
	Inspect for blockage in the following areas:			



7. Remove the valve keys, valve spring retainers and the valve springs of the intake valves of cylinder 1, using the following procedure:

   Caution: The demounting piece part of EN-6086 Basic Kit, Spring and Wedge Replacer must be applied parallel to the valve retainers in order to prevent damage to the tools or the valve train components. If demounting piece is not applied parallel it could cause damage to the valve stem keys or the valve retainers.

   7.1. Apply tension to the valve springs, using the *EN-6086-7* lever (1) and the *EN-6086-11* demounting piece (2) until the valve keys are discharged from spring load and remove the valve keys.
   7.2. Release tension from the valve springs and remove the valve spring retainers and the valve springs.



13. Remove the air conditioning evaporator thermal expansion valve tube nut (1) at the air conditioning condenser.
14. Remove the air conditioning evaporator thermal expansion valve tube (2) from the air conditioning condenser.
15. Remove the air conditioning evaporator thermal expansion valve tube from the vehicle.

Installation Procedure

Temperature Versus Resistance

Temperature Degrees C (Degrees F)	Resistance k ohm (typical)
-40°C (-40°F)	75.5
-20°C (-4°F)	21.6
0°C (32°F)	7.2
20°C (68°F)	2.7
40°C (104°F)	1.2
60°C (140°F)	0.5
80°C (176°F)	0.3
100°C (212°F)	0.16

Control Module References for scan tool information

Special Tools

EL-48900 HEV Safety Kit

For equivalent regional tools, refer to Special Tools .

Circuit/System Testing

Danger: 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 will perform the following tasks:

- Identify how to disable high voltage.
- Identify how to test for the presence of high voltage.
- Identify conditions 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 goggles with appropriate side shields when within 15 metres (50 feet) of the vehicle, either indoors or outdoors.
- Certified and up-to-date Class "0" Insulation gloves rated at 1000 V 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 energised or not.

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

1. Vehicle OFF, disable the high voltage at the T18 battery charger. Refer to High Voltage Disabling . Disconnect the X1 harness connector at the T18 battery charger.
2. Vehicle ON, test for B+ between the IGN circuit terminal A and earth.
   If less than the specified range, test the B+ circuit for a short to ground or an open/high resistance.
3. If all circuits test normal, replace the T18 battery charger.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

Control Module References for battery charger replacement, programming and set-up

Door Ajar Switches