

Automatic HVAC Description and Operation

The air temperature and the air delivery description and operation are divided into eight areas:

- HVAC Control Components
- Air Speed
- Air Delivery
- Heating and A/C Operation
- Recirculation Operation
- Automatic Operation
- Engine Coolant
- A/C Cycle

[HVAC Control Components](#)

HVAC Control

The HVAC control contains all switches, buttons, and dials which are required to control the functions of the HVAC system and serve as interface between the operator and the HVAC control module. The selected values are passed to the HVAC control module via LIN-Bus.

HVAC Control Module

The HVAC control module is a GMLAN device that interfaces between the operator and the HVAC system to maintain and control desired air temperature and air distribution settings. The battery positive voltage circuit provides power that the HVAC control module uses for keep alive memory. If the battery positive voltage circuit loses power, all HVAC DTCs and settings will be erased from keep alive memory. The body control module (BCM), which is the vehicle mode master, provides a device ON-Signal. The HVAC control module provides blower, air delivery mode and air temperature settings.

The HVAC control module supports the following features:

Feature	Availability
Afterblow	Available if reprogrammed by the technician
Purge	Yes
Personalization	Yes
Actuator Calibration	Yes

Mode Actuator

The mode actuator is a 5-wire bi-directional electric motor that incorporates a feedback potentiometer. The five circuits are low reference, 5 V reference, actuator position signal, and two control circuits. The actuator control circuits use either a ground or 5 V signal to command the actuator movement. When the actuator is at rest, both control circuit voltage values are 2.5 V. To operate the actuator, the HVAC control module supplies 5 V on one control circuit and ground on the other control circuit. Reversing the polarity results in the actuator moving in the opposite direction. When the actuator shaft rotates, the potentiometers sliding contact changes the door position signal between 0–5 volts. The door position signal voltage is converted to a 0–255 count range. The HVAC control module uses a range of 0–255 counts to

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index signal voltage is converted to a 0–255 count range. The HVAC control module uses a range of 0–255 counts to index the actuator position. When the module sets a commanded, or targeted, value, the control signal is changed to either 0 or 5 V depending upon the direction that the actuator needs to rotate to reach the commanded value. As the actuator shaft rotates the changing position signal is sent to the module. Once the position signal and the commanded value are the same, the module changes both control signals to 2.5 V.

Air Temperature Actuators

The air temperature actuator is a 5-wire bi-directional electric motor that incorporates a feedback potentiometer. The five circuits are low reference, 5 V reference, actuator position signal, and two control circuits. The actuator control circuits use either a ground or 5 V signal to command the actuator movement. When the actuator is at rest, both control circuit voltage values are 2.5 V. To operate the actuator, the HVAC control module supplies 5 V on one control circuit and ground on the other control circuit. Reversing the polarity results in the actuator moving in the opposite direction. When the actuator shaft rotates, the potentiometers sliding contact changes the door position signal between 0–5 volts. The door position signal voltage is converted to a 0–255 count range. The HVAC control module uses a range of 0–255 counts to index signal voltage is converted to a 0–255 count range. The HVAC control module uses a range of 0–255 counts to index the actuator position. When the module sets a commanded, or targeted, value, the control signal is changed to either 0 or 5 V depending upon the direction that the actuator needs to rotate to reach the commanded value. As the actuator shaft rotates the changing position signal is sent to the module. Once the position signal and the commanded value are the same, the module changes both control signals to 2.5 V.

Recirculation Actuator

The recirculation actuator is a 5-wire bi-directional electric motor that incorporates a feedback potentiometer. The five circuits are low reference, 5 V reference, actuator position signal, and two control circuits. The actuator control circuits use either a ground or 5 V signal to command the actuator movement. When the actuator is at rest, both control circuit voltage values are 2.5 V. To operate the actuator, the HVAC control module supplies 5 V on one control circuit and ground on the other control circuit. Reversing the polarity results in the actuator moving in the opposite direction. When the actuator shaft rotates, the potentiometers sliding contact changes the door position signal between 0–5 volts. The door position signal voltage is converted to a 0–255 count range. The HVAC control module uses a range of 0–255 counts to index signal voltage is converted to a 0–255 count range. The HVAC control module uses a range of 0–255 counts to index the actuator position. When the module sets a commanded, or targeted, value, the control signal is changed to either 0 or 5 V depending upon the direction that the actuator needs to rotate to reach the commanded value. As the actuator shaft rotates the changing position signal is sent to the module. Once the position signal and the commanded value are the same, the module changes both control signals to 2.5 V.

Blower Motor

The blower motor control module is an interface between the HVAC control module and the blower motor. The blower motor speed control from the HVAC control module, battery positive and ground circuits enable the blower motor control module to operate. The HVAC control module provides a pulse width modulation (PWM) signal to the blower motor control module in order to command the blower motor speed. The blower motor control module transfers the PWM signal into a corresponding blower motor voltage.

Duct Temperature Sensors

The air temperature sensors are 2-wire negative temperature co-efficient thermistors. The sensors operate within a temperature range of –40 to +85°C (–40 to +185°F). The sensors are installed in the air distribution ducts and measure the temperature of the air that streams from the ducts. The HVAC control module uses these values to adjust the mixed air flap position according to the requested temperature.

Evaporator Temperature Sensor

The evaporator temperature sensor is a 2-wire negative temperature co-efficient thermistor. The sensor operates within a temperature range of –40 to +85°C (–40 to +185°F). The

sensor is installed at the evaporator and measures its temperature. If the temperature drops under 3°C (38°F), the compressor will be switched off in order to prevent evaporator icing.

A/C Refrigerant Pressure Sensor

The A/C refrigerant pressure sensor is a 3-wire piezoelectric pressure transducer. A 5 V reference voltage, low reference, and signal circuits enable the sensor to operate. The A/C pressure signal can be between 0.2–4.8 V. When the A/C refrigerant pressure is low, the signal value is near 0 V. When the A/C refrigerant pressure is high, the signal value is near 5 V. The engine control module (ECM) converts the voltage signal to a pressure value. When pressure is too high or too low, the ECM will not allow the A/C compressor clutch to engage.

A/C Compressor

The A/C compressor uses a conventional belt driven magnetic clutch to engage and mechanically turn the compressor. When the A/C switch is pressed, the HVAC control module sends an A/C request message to the ECM via serial data. If specific criteria is met, the ECM then grounds the A/C compressor clutch relay control circuit, which will switch the A/C compressor clutch relay. With the relay contacts closed, battery voltage is supplied to the permanently grounded A/C compressor clutch. The A/C compressor clutch will then be activated.

This A/C system utilizes a variable displacement solenoid valve to alter the amount of displacement created by the turning of the compressor. The HVAC control module provides both battery voltage and a pulse width modulated ground to the variable displacement solenoid valve. When the A/C switch is pressed, the HVAC control module grounds the variable displacement solenoid using a (PWM) signal in order to determine the amount of compressor displacement. The performance of the A/C compressor is regulated based on cooling load.

Ambient Light/Sunload Sensor

The sunload sensor is connected to ground and to a 12 V clocked power supply through the HVAC control module. This clocked power supply is to power the sensor electronics and to work as a clock generator to the sunload sensor micro controller. The sensor uses a pulse signal for data identification and transferring the sun intensity measurement. At each positive transition from the clocked supply input, the sunload sensor micro controller will shift channels enabling new intensity measurement on the signal output to the HVAC control module. The signal voltage varies between 0–4 V.

The passenger compartment temperature sensor is a negative temperature co-efficient thermistor. A signal and low reference circuit enables the sensor to operate. As the air temperature increases, the sensor resistance decreases. The sensor signal varies between 0–5 V.

Bright or high intensity light causes the vehicles interior temperature to increase. The HVAC system compensates for the increased temperature by diverting additional cool air into the vehicle.

Air Speed

The blower control switch is part of the HVAC controls. The selected value of the blower switch position is sent to the HVAC control module via LIN-Bus. The blower motor control circuitry is integrated within the blower motor assembly. The HVAC control module provides a low side pulse width modulation (PWM) signal to the blower motor to request a specific motor speed. The blower motor translates the PWM signal and drives the motor accordingly.

Afterblow

Afterblow is a feature that dries the evaporator core by operating the blower motor after the engine is turned OFF. This reduces the amount of microbial growth that can create undesirable odors. The vehicle does not come equipped with the afterblow feature turned ON. If the afterblow feature is required due to an odor concern, it must be enabled using the scan tool Afterblow configuration function.

After the HVAC control module has been programmed for afterblow, the following conditions must be met for afterblow to operate:

- The engine has been turned OFF for at least 30 minutes.
- The ambient air temperature is at least 21°C (70°F).
- The A/C compressor operated for more than 2 minutes before shut down.
- The system voltage is at least 12 volts.

Once the above conditions have been met, the blower motor will perform the following sequence up to 5 times. This could last up to an hour:

1. The blower motor will be OFF for 7–11 minutes.
2. The blower motor will RUN for 25–30 seconds.

Air Delivery

The HVAC control module controls the distribution of air by the use of recirculation and mode door actuator. The modes that may be selected are:

- Defrost
- Defog
- Panel
- Floor

The desired air distribution mode can be selected with the air distribution switches at the HVAC control. The HVAC control delivers the values to the HVAC control module via LIN-Bus. The HVAC control module controls the mode door actuator so that it drives the flap to the calculated position. Depending on the position of the flap, air is distributed through various ducts leading to the outlets in the dash. Turning the mode flap to the defrost position, the HVAC control module will move the recirculation actuator to outside air, reducing window fogging. When defrost is selected, the blower motor will be activated, regardless of the coolant temperature. The HVAC control module enables a high volume of air delivered to the front defrost vents. A/C is available in all modes.

The rear window defogger does not affect the HVAC system.

Heating and A/C Operation

The purpose of the heating and A/C system is to provide heated and cooled air to the interior of the vehicle. The A/C system will also remove humidity from the interior and reduce windshield fogging. Regardless of the temperature setting, the following can affect the rate that the HVAC system can achieve the desired temperature:

- Recirculation actuator setting
- Difference between inside and desired temperature
- Blower motor speed setting
- Mode setting

When the A/C switch is pressed, the HVAC controls sends a signal to the HVAC control module via LIN-Bus. The HVAC control module evaluates this signal and sends an A/C request signal to the ECM via CAN-Bus. The ECM checks all preconditions before releasing and if all conditions are met sends a release signal back to the HVAC control module. The ECM will provide a ground for the A/C compressor relay enabling it to close its internal contacts to send battery voltage to the A/C compressor clutch coil. The A/C compressor clutch will be activated. The performance of the A/C compressor is regulated via a variable A/C compressor solenoid valve. The HVAC control module supplies battery voltage to the A/C compressor. When the A/C switch is pressed, the HVAC control module provides a pulse width modulation (PWM) signal to the A/C compressor solenoid valve in order to command the performance of the A/C compressor.

The following conditions must be met in order to activate the A/C compressor:

- Battery voltage is between 9–18 V
- Engine coolant temperature is less than 124°C (255°F)
- Engine speed is greater than 600 RPM
- Engine speed is less than 5 500 RPM
- A/C high side pressure is between 269–2 929 kPa (39–425 PSI)
- Throttle position is less than 100%
- Evaporator temperature is greater than 3°C (38°F)
- ECM does not detect immoderate torque load
- ECM does not detect insufficient idle quality
- The ambient temperature is above 1°C (34°F)

The sensor information is used by the ECM to determine the following:

- The A/C high side pressure
- An A/C system load on the engine
- An immoderate A/C high side pressure
- The heat load at the A/C condenser

The air streams into the passenger compartment through the heater core and the evaporator core. The air temperature actuator drives the mixed air flap to direct the airflow. If the interior temperature should be increased, the mixed air flap is put into the position in which more air streams through the heater core. If the interior temperature should be decreased, the mixed air flap is put into the position in which more air streams through the evaporator core.

Recirculation Operation

The recirculation switch is integrated into the HVAC control. The selected recirculation switch position is sent to the HVAC control module via LIN-Bus. The HVAC control module controls the air intake using the recirculation actuator. In recirculation mode the recirculation flap opens in order to circulate the air within the vehicle. In fresh air mode the recirculation flap is closed in order to route outside air into the vehicle.

Automatic Operation

In automatic operation, the HVAC control module maintains the comfort level inside of the vehicle by controlling the A/C compressor clutch, the blower motor, the air temperature actuators, mode actuator and recirculation actuator.

To put the HVAC system in automatic mode, the following is required:

1. The auto switch must be activated.
2. The air temperature switch must not be in either the full hot or full cold position.

Once the desired temperature is reached, the blower motor, mode, recirculation and temperature actuators automatically adjust to maintain the temperature selected. The HVAC control module performs the following functions to maintain the desired air temperature:

- Monitors the following sensors:
 - Ambient air temperature sensor
 - Lower left duct air temperature sensor
 - Lower right duct air temperature sensor
 - Upper left duct air temperature sensor
 - Upper right duct air temperature sensor
 - Ambient light/sunload sensor
- Regulate the blower motor speed
- Position the air temperature actuators

- Position the mode door actuator
- Position the recirculation actuator
- Request A/C operation
- Control of the A/C compressor

When the warmest position is selected in automatic operation the blower speed will increase gradually until the vehicle reaches normal operating temperature. When normal operating temperature is reached the blower stays on high speed and the air temperature actuators stays in the full heat position.

When the coldest position is selected in automatic operation the blower stays on high and the air temperature actuators stay in full cold position. The mode actuator remains in the panel position and the recirculation actuator will remain in the recirculation position.

Under cold ambient temperatures, the automatic HVAC system provides heat in the most efficient manner. The operator can select an extreme temperature setting but the system will not warm the vehicle any faster. Under warm ambient temperatures, the automatic HVAC system also provides air conditioning in the most efficient manner. Selecting an extreme cool temperature will not cool the vehicle any faster.

Engine Coolant

Engine coolant is the essential element of the heating system. The thermostat controls the normal engine operating coolant temperature. The thermostat also creates a restriction for the cooling system that promotes a positive coolant flow and helps prevent cavitation.

Coolant enters the heater core through the inlet heater hose, in a pressurized state. The heater core is located inside the HVAC control module. The ambient air drawn through the HVAC control module absorbs the heat of the coolant flowing through the heater core. Heated air is distributed to the passenger compartment, through the HVAC control module, for passenger comfort. Opening or closing the air temperature flap controls the amount of heat delivered to the passenger compartment. The coolant exits the heater core through the return heater hose and recirculates back to the engine cooling system.

A/C Cycle

Refrigerant is the key element in an air conditioning system. R-134a is a very low temperature gas that can transfer the undesirable heat and moisture from the passenger compartment to the outside air.

The A/C system used on this vehicle is a non-cycling system. Non-cycling A/C systems use a pressure transducer to protect the A/C system from a predetermined high pressure. The A/C system is also mechanically protected with the use of a high pressure relief valve. If the pressure transducer were to fail or if the refrigerant system becomes restricted and refrigerant pressure continues to rise, the high pressure relief will pop open and release refrigerant from the system.

The compressor builds pressure on the vapor refrigerant. Compressing the refrigerant also adds heat to the refrigerant. The refrigerant is discharged from the compressor, through the discharge hose, and forced to flow to the condenser and then through the balance of the A/C system. The A/C system is mechanically protected with the use of a high pressure relief valve. If the A/C refrigerant pressure sensor fails or if the refrigerant system becomes restricted and refrigerant pressure continued to rise, the high pressure relief will pop open and release refrigerant from the system.

Compressed refrigerant enters the condenser in a high temperature, high pressure vapor state. As the refrigerant flows through the condenser, the heat of the refrigerant is transferred to the ambient air passing through the condenser. Cooling the refrigerant causes the refrigerant to condense and change from a vapor to a liquid state.

The condenser is located in front of the radiator for maximum heat transfer. The condenser is made of aluminum tubing and aluminum cooling fins, which allows rapid heat transfer for the refrigerant. The semi-cooled liquid refrigerant exits the condenser and flows to the Receiver/Dehydrator(R/D).

The R/D contains desiccant that absorbs moisture that may be in the refrigerant system. The R/D also acts as a storage vessel to ensure that a steady flow of liquid reaches the thermal expansion valve. The refrigerant exits the R/D and flows through the liquid line to the thermal expansion valve.

The thermal expansion valve is located at the front of dash and attaches to the evaporator inlet and outlet pipes. The thermal expansion valve is the dividing point for the high and the low pressure sides of the A/C system. As the refrigerant passes through the thermal expansion valve, the pressure on the refrigerant is lowered. The thermal expansion valve also meters the amount of liquid refrigerant that can flow into the evaporator.

Refrigerant exiting the thermal expansion valve flows into the evaporator core in a low pressure, liquid state. Ambient air is drawn through the HVAC control module and passes through the evaporator core. Warm and moist air will cause the liquid refrigerant boil inside of the evaporator core. The boiling refrigerant absorbs heat from the ambient air and draws moisture onto the evaporator. The refrigerant exits the evaporator through the suction line and back to the A/C compressor, in a vapor state, and completing the A/C cycle of heat removal. At the A/C compressor, the refrigerant is compressed again and the cycle of heat removal is repeated.

The conditioned air is distributed through the HVAC control module for passenger comfort. The heat and moisture removed from the passenger compartment will also change form, or condense, and is discharged from the HVAC control module as water.

HVAC Component Replacement Reference

HVAC Component Replacement Reference

Component	Repair Instruction
A26 HVAC Controls	Heater and Air Conditioning Control Replacement
B1 A/C Refrigerant Pressure Sensor	Air Conditioning (A/C) Refrigerant Pressure Sensor Replacement
B10B Ambient Light/Sunload Sensor	Sun Load Temperature and Headlamp Automatic Control Ambient Light Sensor Replacement
B39 A/C Evaporator Temperature Sensor	Evaporator Air Temperature Sensor Replacement
B7D Air Temperature Sensor - Duct Left Lower	Duct Air Temperature Sensor Replacement - Lower Left Side
B7E Air Temperature Sensor - Duct Right Lower	Duct Air Temperature Sensor Replacement - Lower Right Side
B7H Air Temperature Sensor - Duct Left Upper	Duct Air Temperature Sensor Replacement - Upper Left Side
B7J Air Temperature Sensor - Duct Right Upper	Duct Air Temperature Sensor Replacement - Upper Right Side
K33 HVAC Control Module	Heater and Air Conditioning Remote Control Replacement
K8 Blower Motor Control Module	Blower Motor Control Module Replacement
M37 Mode Door Actuator	Mode Valve Actuator Motor Replacement - Front Mode
M46 Air Recirculation Door Actuator	Mode Valve Actuator Motor Replacement - Fresh Air Recirculation

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Component	Repair Instruction
M6L Air Temperature Door Actuator – Left	Mode Valve Actuator Motor Replacement - Left Side Air Mix
M6R Air Temperature Door Actuator – Right	Mode Valve Actuator Motor Replacement - Right Side Air Mix
M8 Blower Motor	Blower Motor Replacement
Q2 A/C Compressor Clutch	Air Conditioning Clutch Replacement
Q46 A/C Compressor Solenoid Valve	Air Conditioning Compressor Replacement

DTC B0163, B0183, or B1405

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 B0163

Passenger Compartment Temperature Sensor Circuit

DTC B0183

Solar Load Sensor Circuit

DTC B1405

Control Module Voltage Reference Output 2 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
Temperature Signal	B0163 02	B0163 05	B0163 05	1
Sunload Signal	B0183 05	B0183 02	B0183 02	1
Clock Signal	B1405 02	B1405 05	B1405 05	1
Low Reference	—	B0163 05, B0183 05	—	—
1. HVAC Malfunction				

Circuit/System Description

The ambient light/sunload sensor integrates the sunload and passenger compartment temperature functions within a single assembly.

The solar sensor uses 4 unique circuits as detailed below:

- Low reference circuit — This is a common ground for the ambient light/sunload sensor assembly.
- Temperature signal circuit — This is the signal circuit for the temperature sensor.
- Clock signal circuit — This has 2 functions, via a high side PWM signal, the HVAC control module supplies power to the sensor as well as a clock input for the sensor microprocessor.
- Sunload signal circuit — This is used as an output from the solar sensor to the HVAC control module to transmit sun heat (IR) intensity, elevation, and azimuth data.

The passenger compartment temperature sensor is a negative temperature coefficient thermistor. As the air temperature increases, the sensor resistance decreases. The sensor signal varies between 0–5 V.

Bright or high intensity light causes the vehicle's interior temperature to increase. The automatic HVAC system compensates for the increased temperature by diverting additional cool air into the vehicle.

Conditions for Running the DTC

- Ignition ON
- The HVAC control module is ON.

Conditions for Setting the DTC

B0163 02

The input signal is out of range. The HVAC control module detects voltage less than 0.1 V on the temperature signal circuit.

B0163 05

The input signal is out of range. The HVAC control module detects voltage greater than 4.9 V on the temperature signal circuit.

B0183 02

The input signal is out of range. The HVAC control module detects voltage less than 0.1 V on the solar sensor signal circuit.

B0183 05

The input signal is out of range. The HVAC control module detects voltage greater than 4.9 V on the solar sensor signal circuit.

B1405 02

The input signal is out of range. The HVAC control module detects voltage less than 10 V on the clock/power supply circuit.

B1405 05

The input signal is out of range. The HVAC control module detects a short to voltage or an open in the clock/power supply circuit.

Action Taken When the DTC Sets

B0163 02, B0163 05, B0183 02, B0183 05

The system will use the last valid values as a default.

B1405 02, B1405 05

If no value is read at the time of fault, the HVAC control module uses 0 W/m² as intensity.

Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

Reference Information

Schematic Reference

[HVAC Schematics](#)

Connector End View Reference

[Component Connector End Views](#)

Description and Operation

[Automatic HVAC 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 DTCs B0163 and B0183 are not both set concurrently.
 - ⇒ **If both DTCs are set**
Refer to Low Reference Test.
 - ⇓ **If both DTCs are not set**
2. Verify DTC B0163, B0183, or B1405 is not set.
 - ⇒ **If one of the DTCs is set**
Refer to the appropriate diagnostic in Circuit/System Testing.
 - ⇓ **If none of the DTCs are set**
3. Verify the B10B Ambient Light/Sunload Sensor is accurate.
 - ⇒ **If the sensor is not accurate**
 - 3.1. Perform the following Circuit/System Testing in the order listed below:
 - Circuit/System Testing — Low Reference Test
 - Circuit/System Testing — DTC B0163
 - Circuit/System Testing — DTC B1405
 - Circuit/System Testing — DTC B0183
 - ⇓ **If the sensor is accurate**
4. All OK.

[Circuit/System Testing](#)

Low Reference Test

Note: You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the B10B Ambient Light/Sunload Sensor. It may take up to 10 min for all vehicle systems to power down.
 - Note:** The scan tool must be disconnected from the vehicle before performing the next test.
2. Test for less than 10 Ω between the low reference circuit terminal 6 and ground.
 - ⇒ **If 10 Ω or greater**
 - 2.1. Ignition OFF, disconnect the harness connector at the K33 HVAC Control Module.
 - 2.2. 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 K33 HVAC Control Module.
 - ⇓ **If less than 10 Ω**
3. Test or replace the B10B Ambient Light/Sunload Sensor.

DTC B0163

Note: You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.

1. Ignition OFF, disconnect the harness connector at the B10B Ambient Light/Sunload Sensor, ignition ON.
2. Verify the scan tool Passenger Compartment Air Temperature (Unfiltered) parameter is less than -37°C (-35°F).

⇒ **If -37°C (-35°F) or greater**

- 2.1. Ignition OFF, disconnect the harness connector at the K33 HVAC Control Module.
- 2.2. Test for infinite resistance between the signal circuit terminal 3 and ground.
 - ⇒ If less than infinite resistance, repair the short to ground on the circuit.
 - ⇒ If infinite resistance, replace the K33 HVAC Control Module.

⇓ **If less than -37°C (-35°F)**

3. Install a 3 A fused jumper wire between the signal circuit terminal 3 and the low reference circuit terminal 6.
4. Verify the scan tool parameter Passenger Compartment Air Temperature (Unfiltered) parameter is greater than 78°C (172°F).

⇒ **If 78°C (172°F) or less**

- 4.1. Ignition OFF, remove the jumper wire and disconnect the harness connector at the K33 HVAC Control Module, ignition ON.
- 4.2. 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
- 4.3. Ignition OFF.
- 4.4. Test for less than $2\ \Omega$ in the signal circuit end to end.
 - ⇒ If $2\ \Omega$ or greater, repair the open/high resistance in the circuit.
 - ⇒ If less than $2\ \Omega$, replace the K33 HVAC Control Module.

⇓ **If greater than 78°C (172°F)**

5. Test or replace the B10B Ambient Light/Sunload Sensor.

DTC B0183

Note: You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.

1. Ignition OFF, disconnect the harness connector at the B10B Ambient Light/Sunload Sensor, ignition ON.
2. Test for 4.8–5.2 V between the signal circuit terminal 4 and ground.

⇒ **If less than 4.8 V**

- 2.1. Ignition OFF, disconnect the harness connector at the K33 HVAC Control Module.
- 2.2. Test for infinite resistance between the signal circuit and ground.
 - ⇒ If less than infinite resistance, repair the short to ground on the circuit.
 - ⇓ If infinite resistance
- 2.3. Test for less than $2\ \Omega$ in the signal circuit end to end.
 - ⇒ If $2\ \Omega$ or greater, repair the open/high resistance in the circuit.
 - ⇒ If less than $2\ \Omega$, replace the K33 HVAC Control Module.

⇒ **If greater than for 5.2 V**

- 2.1. Ignition OFF, disconnect the harness connector at the K33 HVAC Control Module, ignition ON.
- 2.2. 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 K33 HVAC Control Module.

↓ **If between 4.8–5.2 V**

3. Test or replace the B10B Ambient Light/Sunload Sensor.

4. Verify DTC B0183 did not reset.

⇒ **If DTC B0183 reset**

Replace the K33 HVAC Control Module.

↓ **If DTC B0183 did not reset**

5. All OK.

DTC B1405

Note: You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.

1. Ignition OFF, disconnect the harness connector at the B10B Ambient Light/Sunload Sensor, ignition ON.

2. Test for greater than 10 V between signal circuit terminal 2 and ground.

⇒ **If less than 10 V**

2.1. Ignition OFF, disconnect the harness connector at the K33 HVAC Control Module.

2.2. Test for infinite resistance between signal circuit terminal 2 and ground.

⇒ If less than infinite resistance, repair the short to ground on the circuit.

↓ If infinite resistance

2.3. 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 K33 HVAC Control Module.

↓ **If 10 V or greater**

3. Ignition OFF, disconnect the harness connector at the K33 HVAC Control Module, ignition ON.

4. Test for less than 1 V between the signal circuit terminal 2 and ground.

⇒ **If 1 V or greater**

Repair the short to voltage on the circuit.

↓ **If less than 1 V**

5. Test or replace the B10B Ambient Light/Sunload Sensor.

6. Verify DTC B1405 did not reset.

⇒ **If DTC B1405 reset**

Replace the K33 HVAC Control Module.

↓ **If DTC B1405 did not reset**

7. All OK.

Repair Instructions

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

- [HVAC Component Replacement Reference](#)
- [Control Module References](#) for HVAC control module replacement, programming and setup

DTC B0173, B0178, B0509, B0514 or B3933

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 B0173 02

Upper Left Duct Air Temperature Sensor Circuit Short to Ground

DTC B0173 05

Upper Left Duct Air Temperature Sensor Circuit High Voltage/Open

DTC B0178 02

Lower Left Duct Air Temperature Sensor Circuit Short to Ground

DTC B0178 05

Lower Left Duct Air Temperature Sensor Circuit High Voltage/Open

DTC B0509 02

Upper Right Duct Air Temperature Sensor Circuit Short to Ground

DTC B0509 05

Upper Right Duct Air Temperature Sensor Circuit High Voltage/Open

DTC B0514 02

Lower Right Duct Air Temperature Sensor Circuit Short to Ground

DTC B0514 05

Lower Right Duct Air Temperature Sensor Circuit High Voltage/Open

DTC B3933 02

Air Conditioning Evaporator Temperature Sensor Circuit Short to Ground

DTC B3933 05

Air Conditioning Evaporator Temperature Sensor Circuit High Voltage/Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Upper Left Duct Air Temperature Sensor Signal	B0173 02	B0173 05	B0173 05	—
Lower Left Duct Air Temperature Sensor Signal	B0178 02	B0178 05	B0178 05	—

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Upper Right Duct Air Temperature Sensor Signal	B0509 02	B0509 05	B0509 05	—
Lower Right Duct Air Temperature Sensor Signal	B0514 02	B0514 05	B0514 05	—
Air Conditioning Evaporator Temperature Sensor Signal	B3933 02	B3933 05	B3933 05	—
Low Reference	—	B0173 05, B0178 05, B0509 05, B0514 05, B3933 05	B0173 05, B0178 05, B0509 05, B0514 05, B3933 05	—

Circuit/System Description

The air temperature sensors are a 2-wire negative temperature coefficient thermistor. The vehicle uses the following air temperature sensors:

- Air temperature sensor - left upper
- Air temperature sensor - left lower
- Air temperature sensor - right upper
- Air temperature sensor - right lower
- A/C evaporator temperature sensor

This sensor operates using signal and low reference circuits. As the air temperature surrounding the sensor increases, the sensor resistance decreases. The sensor is capable of reading temperatures ranging from -40 to $+115^{\circ}\text{C}$ (-40 to $+240^{\circ}\text{F}$), with a signal voltage between $0-5\text{ V}$. If the HVAC control module detects a malfunctioning sensor the software uses a default air temperature value. The default action ensures that the HVAC system can adjust the inside air temperature near the desired temperature until the condition is corrected.

Conditions for Running the DTC

- Ignition ON.
- The HVAC control module is ON.

Conditions for Setting the DTC

The HVAC control module detects the sensor signal out of range. The signal voltage is less than 0.1 V or greater than 4.9 V for more than 50 ms .

Action Taken When the DTC Sets

The system operates using a default value.

Conditions for Clearing the DTC

The sensor signal is within specified range between $0.1-4.9\text{ V}$.

Reference Information

Schematic Reference

[HVAC Schematics](#)

Connector End View Reference

[Component Connector End Views](#)**Description and Operation**[Automatic HVAC 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 the appropriate temperature sensor has a parameter displayed in HVAC scan tool information.
 - ⇒ **If there is no scan tool parameter**
Refer to Circuit/System Testing — Without Scan Tool Support.
 - ⇓ **If there is a scan tool parameter**
3. Refer to Circuit/System Testing — With Scan Tool Support

[Circuit/System Testing](#)**With Scan Tool Support**

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the appropriate temperature sensor. It may take up to 10 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal B and ground.
 - ⇒ **If 10 Ω or greater**
 - 2.1. Ignition OFF, disconnect the harness connector at the K33 HVAC Control Module.
 - 2.2. 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 K33 HVAC Control Module.
 - ⇓ **If less than 10 Ω**
3. Ignition ON.
4. Verify the appropriate scan tool temperature sensor parameter is less than -37°C (-35°F)
 - ⇒ **If greater than -37°C (-35°F)**
 - 4.1. Ignition OFF, disconnect the harness connector at the K33 HVAC Control Module.
 - 4.2. Test for infinite resistance between the signal circuit terminal A and ground.
 - ⇒ If less than infinite resistance, repair the short to ground on the circuit.
 - ⇒ If infinite resistance, replace the K33 HVAC Control Module.
 - ⇓ **If -37°C (-35°F) or less**
5. Install a 3 A fused jumper wire between the signal circuit terminal A and the low reference circuit terminal B.
6. Verify the scan tool temperature sensor parameter is greater than 110°C (230°F).
 - ⇒ **If less than 110°C (230°F)**

- 6.1. Ignition OFF, remove the jumper wire and disconnect the harness connector at the K33 HVAC Control Module, ignition ON.
- 6.2. 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
- 6.3. Ignition OFF
- 6.4. 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 K33 HVAC Control Module.

↓ **If 110°C (230°F) or greater**

7. Test or replace the temperature sensor.

Without Scan Tool Support

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the appropriate temperature sensor. It may take up to 10 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal B and ground.
 - ⇒ **If 10 Ω or greater**
 - 2.1. Ignition OFF, disconnect the harness connector at the K33 HVAC Control Module.
 - 2.2. 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 K33 HVAC Control Module.
 - ↓ **If less than 10 Ω**
3. Test for 4.8–5.2 V between the signal circuit terminal A and ground.
 - ⇒ **If less than 4.8 V**
 - 3.1. Ignition OFF, disconnect the harness connector at the K33 HVAC Control Module.
 - 3.2. Test for infinite resistance between the signal circuit and ground.
 - ⇒ If less than infinite resistance, repair the short to ground on the circuit.
 - ↓ If infinite resistance
 - 3.3. 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 K33 HVAC Control Module.
 - ⇒ **If greater than 5.2 V**
 - 3.1. Ignition OFF, disconnect the harness connector at the K33 HVAC Control Module, ignition ON.
 - 3.2. 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 K33 HVAC Control Module.
 - ↓ **If between 4.8–5.2 V**
4. Test or replace the temperature sensor.
5. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
6. Verify the DTC does not set.
 - ⇒ **If the DTC sets**
Replace the K33 HVAC Control Module.
 - ↓ **If the DTC does not set**

7. All OK

Repair Instructions

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

- [HVAC Component Replacement Reference](#)
- [Control Module References](#) for HVAC control module replacement, programming and setup

DTC B0193

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 B0193 01

Front Blower Motor Speed Circuit Short to Battery

DTC B0193 06

Front Blower Motor Speed Circuit Low Voltage/Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	B0193 06	B0193 06	—	—
Control	B0193 06	B0193 06	B0193 01	—
Ground	—	B0193 06	—	—

Circuit/System Description

The blower motor control module is an interface between the HVAC control module and the blower motor. The blower motor control module has 4 circuits: a B+ input, a signal input from the HVAC control module, a B+ output to the blower motor, and a low side pulse width modulation (PWM) output. The HVAC control module provides a low side (PWM) signal to the blower motor control module in order to request the blower motor speed. The blower motor control module grounds the blower motor using a low side PWM signal in order to vary the blower motor speed.

Conditions for Running the DTC

- Ignition ON.
- The HVAC control module is ON.

Conditions for Setting the DTC

B0193 01

The voltage at the HVAC control module output to the blower motor control module is always high.

B0193 06

The voltage at the HVAC control module output to the blower motor control module is always low or fluctuating.

Action Taken When the DTC Sets

The blower motor is inoperative.

Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

Diagnostic Aids

Inspect the motor shaft for rust or other foreign material which may prohibit proper motor operation.

If the motor operates properly please reinstall it and check for Preliminary Information or Technical Service Bulletins.

Reference Information

Schematic Reference

[HVAC Schematics](#)

Connector End View Reference

[Component Connector End Views](#)

Description and Operation

[Automatic HVAC 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 Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the X1 harness connector at the K8 Blower Motor Control Module. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 5 and ground.
⇒ **If 10 Ω or greater**
 - 2.1. Ignition OFF.
 - 2.2. Test for less than 2 Ω in the ground circuit end to end.
⇒ If 2 Ω or greater, repair the open/high resistance in the circuit.
⇒ If less than 2 Ω , repair the open/high resistance in the ground connection.
- ⇓ **If less than 10 Ω**
3. Ignition ON.
4. Verify a test lamp illuminates between the B+ circuit terminal 6 and ground.
⇒ **If the test lamp does not illuminate and the circuit fuse is good**
 - 4.1. Ignition OFF, remove the test lamp.
 - 4.2. 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 , verify the fuse is not open and there is voltage at the fuse.
- ⇒ **If the test lamp does not illuminate and the circuit fuse is open**

- 4.1. Ignition OFF, remove the test lamp.
- 4.2. Test for infinite resistance between the B+ circuit terminal 6 and ground.
 - ⇒ If less than infinite resistance, repair the short to ground on the circuit.
 - ⇓ If infinite resistance
- 4.3. Disconnect the X2 harness connector at the K8 Blower Motor Control Module and disconnect the harness connector at the M8 Blower Motor.
- 4.4. Test for infinite resistance between the M8 Blower Motor control circuit terminal B and ground.
 - ⇒ If less than infinite resistance, repair the short to ground on the circuit.
 - ⇒ If infinite resistance, test or replace the M8 Blower Motor.
- ⇓ **If the test lamp illuminates**
5. Remove the test lamp.
6. Test for 2.6–3.2 V between the control circuit terminal 3 and ground.
 - ⇒ **If less than 2.6 V**
 - 6.1. Ignition OFF, disconnect the X2 harness connector at the K33 HVAC Control Module, ignition ON.
 - 6.2. Test for infinite resistance between the control circuit and ground.
 - ⇒ If less than infinite resistance, repair the short to ground on the circuit.
 - ⇓ If infinite resistance.
 - 6.3. 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 K33 HVAC Control Module.
 - ⇒ **If greater than 3.2 V**
 - 6.1. Ignition OFF, disconnect the X2 harness connector at the K33 HVAC Control Module, ignition ON.
 - 6.2. 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 K33 HVAC Control Module.
- ⇓ **If between 2.6–3.2 V**
7. Ignition OFF, connect the X1 harness connector at the K8 Blower Motor Control Module and disconnect the harness connector at the M8 Blower Motor, ignition ON and blower ON.
8. Verify a test lamp illuminates between the control circuit terminal 1 and ground.
 - ⇒ **If the test lamp does not illuminate**
 - 8.1. Ignition OFF, disconnect the X2 harness connector at the K8 Blower Motor Control Module.
 - 8.2. 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 K8 Blower Motor Control Module.
 - ⇓ **If the test lamp illuminates**
9. Connect a test lamp between control circuit terminal 1 and control circuit terminal 2.
10. Verify the test lamp becomes progressively brighter as the blower speed is increased and progressively dimmer as the blower speed is decreased.
 - ⇒ **If the test lamp does not illuminate**
 - 10.1. Ignition OFF, disconnect the X2 harness connector at the K8 Blower Motor Control Module, ignition ON.
 - 10.2. Test for less than 1 V between the control circuit terminal 1 and ground.
 - ⇒ If 1 V or greater, repair the short to voltage on the circuit.

⇓ If less than 1 V

10.3. 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 K8 Blower Motor Control Module.

⇒ **If the test lamp illuminates, but does not change in brightness**

10.1. Ignition OFF, disconnect the X2 harness connector at the K8 Blower Motor Control Module.

10.2. Test for infinite resistance between the control circuit and ground.

⇒ If less than infinite resistance, repair the short to ground on the circuit.

⇒ If infinite resistance, replace the K8 Blower Motor Control Module.

⇓ **If the test lamp changes in brightness as the blower speed is changed**

11. Test or replace the M8 Blower Motor.

Repair Instructions

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

- [HVAC Component Replacement Reference](#)
- [Control Module References](#) for HVAC control module replacement, programming and setup

DTC B0228, B0413, B0423, B1395, or B374A

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 B0228 02

Left Recirculate Position Feedback Circuit Short to Ground

DTC B0228 05

Left Recirculate Position Feedback Circuit High Voltage/Open

DTC B0228 61

Left Recirculate Position Feedback Circuit Stuck

DTC B0413 02

Main Temperature Control Feedback Circuit Short to Ground

DTC B0413 05

Main Temperature Control Feedback Circuit High Voltage/Open

DTC B0413 61

Main Temperature Control Feedback Circuit Stuck

DTC B0423 02

Right Temperature Control Feedback Circuit Short to Ground

DTC B0423 05

Right Temperature Control Feedback Circuit High Voltage/Open

DTC B0423 61

Right Temperature Control Feedback Circuit Stuck

DTC B1395 03

Control Module Voltage Reference Output Circuit Low Voltage

DTC B1395 07

Control Module Voltage Reference Output Circuit High Voltage

DTC B374A 02

Air Flow Control Feedback Circuit Short to Ground

DTC B374A 05

Air Flow Control Feedback Circuit High Voltage/Open

DTC B374A 61

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Air Flow Control Feedback Circuit Stuck

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
5V Reference	B1395 03	B1395 07	B1395 07	—
Recirculation Actuator Signal	B0228 02	B0228 05	B0228 05	1
Main Temperature Actuator Signal	B0413 02	B0413 05	B0413 05	2
Right Temperature Actuator Signal	B0423 02	B0423 05	B0423 05	3
Mode Actuator Signal	B374A 02	B374A 05	B374A 05	4
Recirculation Actuator Control 1	1	1	1	1
Recirculation Actuator Control 2	1	1	1	1
Main Temperature Actuator Control 1	2	2	2	2
Main Temperature Actuator Control 2	2	2	2	2
Right Temperature Actuator Control 1	3	3	3	3
Right Temperature Actuator Control 2	3	3	3	3
Mode Actuator Control 1	4	4	4	4
Mode Actuator Control 2	4	4	4	4
Low Reference	—	B0228 05	B0228 05	—
1. Air Recirculation Malfunction 2. Main Temperature Malfunction 3. Right Temperature Malfunction 4. Air Distribution Malfunction				

Circuit/System Description

The actuators are 5-wire bi-directional electric motors that incorporate a feedback potentiometer. Low reference, 5V reference, position signal, and 2 control circuits enable the actuator to operate. The control circuits use either a ground or 12 V value to coordinate the actuator movement. When the actuator is at rest, both control circuits have a value of 0 V. In order to move the actuator, the HVAC control module grounds one of the control circuits while providing the other with 12 V. The HVAC control module reverses the polarity of the control circuits to move the actuator in the opposite direction. When the actuator shaft rotates, the

potentiometer's sliding contact changes the door position signal between 0–5 V. When the module sets a commanded, or targeted, value, one of the control circuits is grounded, and the other is supplied 12 V. As the actuator shaft rotates, the changing position signal is sent to the module. Once the position signal and the commanded value are the same, the module removes power and ground from the control circuits.

Conditions for Running the DTC

- Ignition ON.
- The HVAC control module is ON.

Conditions for Setting the DTC

B0228 02, B0413 02, B0423 02 or B374A 02

The HVAC control module detects the sensor signal out of range. The signal voltage is less than 0.1 V for more than 50 ms.

B0228 05, B0413 05, B0423 05 or B374A 05

The HVAC control module detects the sensor signal out of range. The signal voltage is greater than 4.9 V for more than 50 ms.

B1395 03

The HVAC control module detects the sensor reference voltage out of range. The reference voltage is less than 0.1 V for more than 50 ms.

B1395 07

The HVAC control module detects the sensor reference voltage out of range. The reference voltage is greater than 4.9 V for more than 50 ms.

Action Taken When the DTC Sets

B1395

- The affected output will be switched off for hardware protection.
- All actuators are deactivated.

B0228, B0413, B0423 or B374A

- The affected output will be switched off for hardware protection.
- The affected actuator is deactivated.

Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

Reference Information

Schematic Reference

[HVAC Schematics](#)

Connector End View Reference

[Component Connector End Views](#)

Description and Operation

[Automatic HVAC 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. Perform the [Actuator Recalibration](#) procedure.
2. Verify the concern or DTC has been corrected.
⇒ **If the concern or DTC has not been corrected**
 - 2.1. Verify DTC B1395 is not set.
 - ⇒ If DTC B1395 is set
Refer to Circuit/System Testing — DTC B1395.
 - ⇒ If DTC B1395 is not set
Refer to Circuit/System Testing — DTC B0228, B0413, B0423 or B374A.

[Circuit/System Testing](#)

DTC B1395

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the components listed below. It may take up to 2 min for all vehicle systems to power down.
 - M37 Mode Door Actuator
 - M46 Air Recirculation Door Actuator
 - M6L Air Temperature Door Actuator — Left
 - M6R Air Temperature Door Actuator — Right
2. Disconnect the X3 and X4 harness connectors at the K33 HVAC Control Module.
3. Test for infinite resistance between the K33 HVAC Control Module 5 V reference circuit terminal 10 and ground.
⇒ **If less than infinite resistance**
Repair the short to ground on the circuit.
↓ **If infinite resistance**
4. Ignition ON.
5. Test for less than 1 V between the K33 HVAC Control Module 5 V reference terminal 10 and ground.
⇒ **If 1 V or greater**
Repair the short to voltage on the circuit.
↓ **If less than 1 V**
6. Clear all DTCs.
7. Ignition OFF, connect the X3 and X4 harness connectors at the K33 HVAC Control Module, ignition ON.
8. Verify DTC B1395 is not set.
⇒ **If the DTC is set.**
 - 8.1. Replace the K33 HVAC Control Module.
↓ **If the DTC is not set.**
9. Verify DTC B1395 does not set after connecting each of the components listed below one at a time and operating them through their full range.
 - M37 Mode Door Actuator
 - M46 Air Recirculation Door Actuator
 - M6L Air Temperature Door Actuator — Left

- M6R Air Temperature Door Actuator — Right

⇒ **If the DTC sets after connecting one of the components**

Replace the component that was connected immediately before the DTC set.

⇓ **If the DTC does not set**

10. All OK.

DTC B0228, B0413, B0423 or B374A

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the appropriate door 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**

- 2.1. Ignition OFF, disconnect the harness connector at the K33 HVAC Control Module.
- 2.2. 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 K33 HVAC Control Module.

⇓ **If less than 10 Ω**

3. Ignition ON.
4. Test for 4.8–5.2 V between the 5 V reference circuit terminal 1 and ground.

⇒ **If less than 4.8 V**

- 4.1. Ignition OFF, disconnect the harness connector at the K33 HVAC Control Module.
- 4.2. 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.
 - ⇓ If infinite resistance
- 4.3. 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 K33 HVAC Control Module.

⇒ **If greater than 5.2 V**

- 4.1. Ignition OFF, disconnect the harness connector at the K33 HVAC Control Module, ignition ON.
- 4.2. 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 K33 HVAC Control Module.

⇓ **If between 4.8–5.2 V**

5. Test for 4.8–5.2 V between the signal circuit terminal 5 and ground.

⇒ **If less than 4.8 V**

- 5.1. Ignition OFF, disconnect the harness connector at the K33 HVAC Control Module.
- 5.2. Test for infinite resistance between the signal circuit and ground.
 - ⇒ If less than infinite resistance, repair the short to ground on the circuit.
 - ⇓ If infinite resistance
- 5.3. 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 K33 HVAC Control Module.

⇒ **If greater than 5.2 V**

- 5.1. Ignition OFF, disconnect the harness connector at the K33 HVAC Control Module, ignition ON.
- 5.2. 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 K33 HVAC Control Module.

↓ **If between 4.8–5.2 V**

6. Connect a test lamp between control circuit terminal 6 and control circuit terminal 7, ignition ON.

7. Verify the test lamp turns ON and then OFF when commanding the appropriate door actuator in both directions with a scan tool.

⇒ **If the test lamp does not turn ON and then OFF during either of the commands**

7.1. Ignition OFF, remove the test lamp and disconnect the harness connector at the K33 HVAC Control Module, ignition ON.

7.2. Test for less than 1 V between each control circuit and ground.

⇒ If 1 V or greater, repair the short to voltage on the circuit.

↓ If less than 1 V

7.3. Test for infinite resistance between each control circuit and ground.

⇒ If less than infinite resistance, repair the short to ground on the circuit.

↓ If infinite resistance

7.4. Test for infinite resistance between the control circuits.

⇒ If less than infinite resistance, repair the short on the circuit.

↓ If infinite resistance

7.5. Test for less than 2 Ω in each 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 K33 HVAC Control Module.

↓ **If the test lamp turns ON and then OFF during each of the commands**

8. Test or replace the actuator.

Repair Instructions

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

- [HVAC Component Replacement Reference](#)
- [Control Module References](#) for HVAC control module replacement, programming and setup

DTC B393B

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 B393B

Air Conditioning Compressor 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
B+	1	B393B 04	—	—
Control	B393B 04	B393B 04	B393B 0B	—
1. Solenoid Valve Malfunction				

Circuit/System Description

This A/C system uses a conventional clutch to engage and mechanically turn the compressor and a variable displacement solenoid valve to alter the amount of displacement created by the turning of the compressor. The HVAC control module provides both battery voltage and a pulse width modulated ground to the variable displacement solenoid valve. When the A/C switch is pressed, the HVAC control module grounds the variable displacement solenoid using a low side (PWM) signal in order to command the amount of compressor displacement. The performance of the A/C compressor is based on adjusted interior temperature and engine load.

Conditions for Running the DTC

- Ignition ON.
- The HVAC control module is ON.

Conditions for Setting the DTC

B393B 04

A PWM greater than 10% is sent but no current is read back.

B393B 0B

Measured current is above threshold of 815 mA.

Action Taken When the DTC Sets

B393B 04

The A/C compressor is disabled.

B393B 0B

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- The A/C compressor is disabled.
- Output will be switched off for hardware protection.

Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

Reference Information

Schematic Reference

[HVAC Schematics](#)

Connector End View Reference

[Component Connector End Views](#)

Description and Operation

[Automatic HVAC Description and Operation](#)

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- [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 Testing

1. Ignition OFF, disconnect the harness connector at the Q46 A/C Compressor Solenoid Valve, ignition ON.
2. Verify a test lamp illuminates between the B+ circuit terminal 2 and ground.
⇒ **If the test lamp does not illuminate**
 - 2.1. Ignition OFF, remove the test lamp and disconnect the harness connectors at the K33 HVAC Control Module.
 - 2.2. Test for infinite resistance between the Q46 A/C Compressor Solenoid Valve B+ circuit terminal 2 and ground.
⇒ If less than infinite resistance, repair the short to ground on the circuit.
⇓ If infinite resistance.
 - 2.3. 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 K33 HVAC Control Module.
- ⇓ **If the test lamp illuminates**
3. Ignition OFF, connect a test lamp between the control circuit terminal 1 and the B+ circuit terminal 2, ignition ON.
4. Verify the test lamp turns ON and OFF when commanding the Q46 A/C Compressor Refrigerant Solenoid Valve On and Off with a scan tool.
⇒ **If the test lamp is always OFF**
 - 4.1. Ignition OFF, remove the test lamp and disconnect the harness connectors at the K33 HVAC Control Module, ignition ON.
 - 4.2. Test for less than 1 V between the Q46 A/C Compressor Refrigerant Solenoid Valve control circuit terminal 1 and ground.
⇒ If 1 V or greater, repair the short to voltage on the circuit.

⇓ If less than 1 V

4.3. Ignition OFF.

4.4. 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 K33 HVAC Control Module.

⇒ **If the test lamp is always ON**

4.1. Ignition OFF, remove the test lamp and disconnect the harness connectors at the K33 HVAC Control Module.

4.2. Test for infinite resistance between the Q46 A/C Compressor Refrigerant Solenoid Valve control circuit terminal 1 and ground.

⇒ If less than infinite resistance, repair the short to ground on the circuit.

⇒ If infinite resistance, replace the K33 HVAC Control Module.

⇓ **If the test lamp turns ON and OFF**

5. Test or replace the G1 A/C Compressor.

Component Testing

A/C Compressor Solenoid Valve Test

1. Ignition OFF, disconnect the harness connector at the Q46 A/C Compressor Solenoid Valve.

2. Test for 7–15 Ω between B+ terminal 2 and control terminal 1.

⇒ **If less than 7 Ω or greater than 15 Ω**

Replace the G1 A/C Compressor.

⇓ **If between 7–15 Ω**

3. Test for infinite resistance between each terminal and the Q46 A/C Compressor Solenoid Valve housing/case.

⇒ **If less than infinite resistance**

Replace the G1 A/C Compressor.

⇓ **If infinite resistance**

4. All OK.

Repair Instructions

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

- [HVAC Component Replacement Reference](#)
- [Control Module References](#) for HVAC control module replacement, programming and setup

DTC P0532 or P0533

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 the diagnostic category.

DTC Descriptors

DTC P0532

Air Conditioning (A/C) Refrigerant Pressure Sensor Circuit Low Voltage

DTC P0533

Air Conditioning (A/C) Refrigerant Pressure Sensor Circuit High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
5 V Reference	P0532, P0641	P0532	P0533	—
Signal	P0532	P0532	P0533	—
Low Reference	—	P0533	—	—

Circuit/System Description

The engine control module (ECM) monitors the high side refrigerant pressure through the A/C refrigerant pressure sensor. The ECM supplies a 5 V reference and a low reference to the sensor. Changes in the A/C refrigerant pressure cause the sensor signal to the ECM to vary. When the pressure is high, the signal voltage is high. When the pressure is low, the signal voltage is low. The ECM may use this information to turn the cooling fans on as well as to monitor clutch engagement. The HVAC module will receive the A/C refrigerant pressure information from the ECM via serial data.

Conditions for Running the DTC

- Engine is running.
- Any of the conditions for setting the DTC are met for 15 s.
- Battery voltage is between 11–18 V.

Conditions for Setting the DTC

P0532

The ECM detects that the A/C pressure is less than 1 psi (0.25 V).

P0533

The ECM detects that the A/C pressure is more than 428 psi (4.92 V).

Action Taken When the DTC Sets

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- DTCs P0532 and P0533 are Type B DTCs
- The A/C compressor is disabled.
- The ECM will illuminate the malfunction indicator lamp (MIL).

Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

Diagnostic Aids

A malfunction within the refrigerant system causing high pressure can cause this DTC to set.

Reference Information

Schematic Reference

[HVAC Schematics](#)

Connector End View Reference

[Component Connector End Views](#)

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- [Wiring Repairs](#)

DTC Type Reference

[Powertrain Diagnostic Trouble Code \(DTC\) Type Definitions](#)

Scan Tool Reference

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

Circuit/System Verification

1. Ignition ON
2. Verify the scan tool engine control module A/C High Side Pressure Sensor parameter is between 6.8 kPa (1 psi) and 2950 kPa (428 psi).
 - ⇒ **If not between 6.8 kPa (1 psi) and 2950 kPa (428 psi)**
Refer to Circuit/System Testing
 - ⇓ **If between 6.8 kPa (1 psi) and 2950 kPa (428 psi)**
3. All OK

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the B1 A/C Refrigerant Pressure Sensor. 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 1 and ground.
 - ⇒ **If 10 Ω or greater**
 - 2.1. Ignition OFF, disconnect the harness connector at the K20 Engine Control Module.
 - 2.2. 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 K20 Engine Control Module.

↓ **If less than 10 Ω**

3. Ignition ON.

4. Test for 4.8–5.2 V between the 5 V reference circuit terminal 2 and ground.

⇒ **If less than 4.8 V**

4.1. Ignition OFF, disconnect the harness connector at the K20 Engine Control Module.

4.2. 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.

↓ If infinite resistance

4.3. 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 K20 Engine Control Module.

⇒ **If greater than 5.2 V**

4.1. Ignition OFF, disconnect the harness connector at the K20 Engine Control Module, ignition ON.

4.2. 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 K20 Engine Control Module.

↓ **If between 4.8–5.2 V**

5. Verify the scan tool A/C High Side Pressure Sensor parameter is less than .25 V.

⇒ **If .25 V or greater**

5.1. Ignition OFF, disconnect the harness connector at the K20 Engine Control Module, ignition ON.

5.2. Test for less than 1 V between the signal 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 K20 Engine Control Module.

↓ **If less than .25 V**

6. Install a 3 A fused jumper wire between the signal circuit terminal 3 and the 5 V reference circuit terminal 2.

7. Verify the scan tool A/C High Side Pressure Sensor parameter is greater than 4.8 V.

⇒ **If 4.8 V or less**

7.1. Ignition OFF, remove the jumper wire, disconnect the harness connector at the K20 Engine Control Module.

7.2. Test for infinite resistance between the signal circuit terminal 3 and ground.

⇒ If less than infinite resistance, repair the short to ground on the circuit.

↓ If infinite resistance

7.3. 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 K20 Engine Control Module.

↓ **If greater than 4.8 V**

8. Test or replace the B1 A/C Refrigerant Pressure Sensor.

Repair Instructions

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

- [HVAC Component Replacement Reference](#)

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

DTC P0645, P0646, or P0647

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 P0645

Air Conditioning (A/C) Compressor Clutch Relay Control Circuit

DTC P0646

Air Conditioning (A/C) Compressor Clutch Relay Control Circuit Low Voltage

DTC P0647

Air Conditioning (A/C) Compressor Clutch Relay Control Circuit High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Relay Coil Ignition	P0645	P0645	—	—
Relay Switch B+	1	1	—	—
Relay Coil Control	P0646	P0645	P0647	—
Relay Switch Control	1	1	1	—
Ground	—	1	—	—
1. A/C Compressor Malfunction				

Circuit/System Description

When the A/C switch is pressed, the HVAC control module sends an A/C request message to the engine control module (ECM) via serial data. The ECM then grounds the A/C compressor clutch relay coil control circuit, closing the relay contacts. The closed relay contacts provide voltage to the compressor clutch causing it to engage.

Conditions for Running the DTC

- Engine is running.
- The HVAC control module is ON.
- The A/C switch is active.

Conditions for Setting the DTC

P0645 or P0646

The ECM detects a short to ground or an open at the A/C compressor clutch relay control circuit.

P0647

The ECM detects a short to voltage at the A/C compressor clutch relay control circuit.

Action Taken When the DTC Sets**P0645 or P0646**

The A/C compressor is inoperative or always active. The A/C compressor solenoid is commanded to 0% displacement. This causes warm air from the ducts, even with unwanted clutch engagement.

P0647

The A/C compressor is inoperative.

Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

Reference Information**Schematic Reference**

[HVAC Schematics](#)

Connector End View Reference

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- [Wiring Repairs](#)

DTC Type Reference

[Powertrain Diagnostic Trouble Code \(DTC\) Type Definitions](#)

Scan Tool Reference

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

Circuit/System Testing

1. Ignition OFF, disconnect the KR29 A/C Compressor Clutch Relay, ignition ON.
2. Verify a test lamp illuminates between the B+ circuit terminal 30 and ground.
⇒ **If the test lamp does not illuminate and the circuit fuse is good**
 - 2.1. Ignition OFF, remove the test lamp.
 - 2.2. 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 , verify the fuse is not open and there is voltage at the fuse.
- ⇒ **If the test lamp does not illuminate and the circuit fuse is open**
 - 2.1. Ignition OFF, remove the test lamp.

2.2. 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

2.3. Disconnect the harness connector at the Q2 A/C Compressor Clutch.

2.4. Test for infinite resistance between the control circuit terminal 87 and ground.

⇒ If less than infinite resistance, repair the short to ground on the circuit.

⇒ If infinite resistance, test or replace the Q2 A/C Compressor Clutch.

⇓ **If the test lamp illuminates**

3. Ignition ON.

4. Verify a test lamp illuminates between the ignition circuit terminal 85 and ground.

⇒ **If the test lamp does not illuminate**

Refer to [Power Mode Mismatch](#).

⇓ **If the test lamp illuminates**

5. Connect a test lamp between the ignition circuit terminal 85 and the control circuit terminal 86.

6. Verify the test lamp turns ON and OFF when commanding the ECM A/C Compressor Clutch Relay On and Off with a scan tool.

⇒ **If the test lamp is always OFF**

6.1. Ignition OFF, remove the test lamp and disconnect the harness connector at the K20 Engine Control Module, ignition ON.

6.2. 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

6.3. Ignition OFF.

6.4. 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 K20 Engine Control Module.

⇒ **If the test lamp is always ON**

6.1. Ignition OFF, remove the test lamp and disconnect the harness connector at the K20 Engine Control Module.

6.2. Test for infinite resistance between the control circuit and ground.

⇒ If less than infinite resistance, repair the short to ground on the circuit.

⇒ If infinite resistance, replace the K20 Engine Control Module.

⇓ **If the test lamp turns ON and OFF**

7. Verify a test lamp does not illuminate between the control circuit terminal 87 and ground.

⇒ **If the test lamp illuminates**

Repair the short to voltage on the circuit.

⇓ **If the test lamp does not illuminate**

8. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the Q2 A/C Compressor Clutch. It may take up to 2 min for all vehicle systems to power down.

9. Test for less than 10 Ω between the ground circuit terminal 1 and ground.

⇒ **If 10 Ω or greater**

9.1. Ignition OFF.

9.2. Test for less than 2 Ω in the ground circuit end to end.

⇒ If 2 Ω or greater, repair the open/high resistance in the circuit.

⇒ If less than 2 Ω , repair the open/high resistance in the ground connection.

- ⇓ **If less than 10 Ω**
10. Connect the harness connector at the Q2 A/C Compressor Clutch.
 11. Ignition ON, connect a 10 A fused jumper wire between the B+ circuit terminal 30 and the control circuit terminal 87.
 12. Verify the Q2 A/C Compressor Clutch is engaged.
 - ⇒ **If the Q2 A/C Compressor Clutch does not engage**
 - 12.1. Ignition OFF, disconnect the harness connector at the Q2 A/C Compressor Clutch.
 - 12.2. 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 Q2 A/C Compressor Clutch.
- ⇓ **If the Q2 A/C Compressor Clutch is engaged**
13. Test or replace the KR29 A/C Compressor Clutch Relay.

Component Testing

1. Ignition OFF, disconnect the KR29 A/C Compressor Clutch Relay.
2. Test for 60–180 Ω between terminals 85 and 86.
 - ⇒ **If not between 60–180 Ω**
Replace the KR29 A/C Compressor Clutch Relay.
- ⇓ **If between 60–180 Ω**
3. Test for infinite resistance between the terminals listed below:
 - 30 and 86
 - 30 and 87
 - 30 and 85
 - 85 and 87
- ⇒ **If less than infinite resistance**
Replace the KR29 A/C Compressor Clutch Relay.
- ⇓ **If infinite resistance**
4. Install a 15 A fused jumper wire between terminal 86 and 12 V. Install a jumper wire between terminal 85 and ground.
5. Test for less than 2 Ω between terminals 30 and 87.
 - ⇒ **If 2 Ω or greater**
Replace the KR29 A/C Compressor Clutch Relay.
- ⇓ **If less than 2 Ω**
6. All OK.

Repair Instructions

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

- [HVAC Component Replacement Reference](#)
- [Control Module References](#) for engine control module replacement, programming and setup

Symptoms - HVAC Systems - Automatic

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

1. Perform the [Diagnostic System Check - Vehicle](#) before using the HVAC System Malfunction procedure in order to verify that all of the following are true:
 - There are no DTCs set.
 - The control modules can communicate via the serial data link.
2. Review the system operation in order to familiarize yourself with the system functions. Refer to [Automatic HVAC Description and Operation](#).

Visual/Physical Inspection

Note: Shutting one or more outlets may adversely affect the Automatic HVAC system by producing erroneous duct air temperature sensor readings in the duct connecting to the closed outlet. Where possible, always operate the Automatic HVAC system with all outlets open.

- Inspect for aftermarket devices which may affect the operation of the HVAC System. Refer to [Checking Aftermarket Accessories](#).
- Inspect the easily accessible or visible system components for obvious damage or conditions which may cause the symptom.
- Verify the A/C compressor turns freely and is not seized.
- Verify that the customer is using the correct key to enable personalization and is not inadvertently activating auxiliary HVAC controls.
- The A/C compressor will not operate in cold outside air temperatures.
- The following conditions may cause window fogging:
 - Wet carpet or mats
 - High humidity
 - Interior water leak
 - Blocked A/C evaporator drain tube
 - Maximum passenger capacity
 - Blocked body pressure relief valves
- Inspect the air distribution system for causes of reduced air flow:
 - Obstructed or dirty passenger compartment air filter, if equipped
 - Blocked or damaged air inlet or outlet vents

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 [HVAC System Malfunction](#) in order to diagnose the symptom.

HVAC System 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 Aids

Check the following mechanical fault sources:

- Air distribution box
- Air distribution hoses/air distribution ducts

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- [Wiring Repairs](#)

Scan Tool Reference

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

Special Tools

J43600 ACR Air Conditioning Service Center

Circuit/System Verification

Note: Check for bulletins before proceeding.

1. Ignition ON.
2. Verify every applicable scan tool Switch parameter changes when pressing the appropriate switch on the A20 Radio/HVAC Controls.
⇒ **If any parameter does not change**
Replace the A20 Radio/HVAC Controls.
⇓ **If all parameters change**
3. Verify the blower motor operates properly with the blower motor switch in each speed position.
⇒ **If the blower motor does not operate in each speed position**

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Refer to [DTC B0193](#).

↓ **If the blower motor operates properly in each speed position**

4. Verify the HVAC doors listed below move when pressing the appropriate switch.

- Driver Temperature
- Passenger Temperature
- Mode
- Recirculation

⇒ **If any HVAC door does not move**

Refer to [DTC B0228, B0413, B0423, B1395, or B374A](#).

↓ **If all HVAC doors move**

5. Install the J43600 ACR Air Conditioning Service Center.

6. Verify the high side pressure reading on the Air Conditioning Service Center is within 10% of the scan tool A/C High Side Pressure Sensor parameter.

⇒ **If the reading is not within 10%**

Refer to [DTC P0532 or P0533](#).

↓ **If the reading is within 10%**

7. Verify the A/C High Side Pressure Sensor parameter is between 269–2929 kPa (39–425 PSI).

⇒ **If the reading is not between 269–2929 kPa (39–425 PSI)**

Refer to [Air Conditioning \(A/C\) System Performance Test](#)

↓ **If the reading is between 269–2929 kPa (39–425 PSI)**

8. Verify the scan tool parameters listed below are within 10% of ambient temperature.

- Lower Left Duct Air Temperature Sensor
- Upper Left Duct Air Temperature Sensor
- Lower Right Duct Air Temperature Sensor
- Upper Right Duct Air Temperature Sensor
- A/C Evaporator Temperature Sensor

⇒ **If not within 10% of ambient temperature**

Refer to [DTC B0173, B0178, B0509, B0514 or B3933](#).

↓ **If within 10% of ambient temperature**

9. Engine ON, A/C system ON.

10. Verify cool air flows from the ducts with the temperature control in the coldest position.

⇒ **If the air is not cool**

10.1. Verify the Q2 A/C Compressor Clutch is engaged.

⇒ If the Q2 A/C Compressor Clutch is not engaged, refer to [Air Conditioning Compressor Malfunction](#).

⇒ If the Q2 A/C Compressor Clutch is engaged, refer to [Air Conditioning \(A/C\) System Performance Test](#) and [DTC B393B](#).

↓ **If the air is cool**

11. Verify warm air flows from the ducts with the temperature control in the warmest position.

⇒ **If the air is not warm**

Refer to [Heating Performance Diagnostic](#).

↓ **If the air is warm**

12. Engine OFF, ignition ON.

13. Verify the Sunload parameter changes while covering the B10B Ambient Light/Sunload Sensor with a shop towel or other suitable item.

⇒ **If the Sunload parameter does not change**

Refer to [DTC B0163, B0183, or B1405](#).

↓ **If the Sunload parameter changes**

14. Verify the actual inside air temperature, using a thermometer, is less than 3°C (5°F) difference from the scan tool Inside Passenger Compartment Air Temp. Sensor parameter.

⇒ **If greater than a 3°C (5°F) difference**

Refer to [DTC B0163, B0183, or B1405](#).

↓ **If less than a 3°C (5°F) difference**

15. All OK.

Repair Instructions

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

- [HVAC Component Replacement Reference](#)
- [Control Module References](#) for HVAC control module replacement, programming and setup

Air Conditioning Compressor 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.

Circuit/System Description

The A/C compressor uses a conventional belt driven magnetic clutch to engage and mechanically turn the compressor. When the A/C switch is pressed, the HVAC control module sends an A/C request message to the ECM via serial data. If specific criteria is met, the ECM then grounds the A/C compressor clutch relay control circuit, which will switch the A/C compressor clutch relay. With the relay contacts closed, battery voltage is supplied to the permanently grounded A/C compressor clutch. The A/C compressor clutch will then be activated.

This A/C system utilizes a variable displacement solenoid valve to alter the amount of displacement created by the turning of the compressor. The HVAC control module provides both battery voltage and a pulse width modulated ground to the variable displacement solenoid valve. When the A/C switch is pressed, the HVAC control module grounds the variable displacement solenoid using a (PWM) signal in order to determine the amount of compressor displacement. The performance of the A/C compressor is regulated based on the adjusted interior temperature.

Diagnostic Aids

The following conditions must be met in order to turn on the A/C compressor:

- Battery voltage is between 9–18 V.
- Engine coolant temperature is less than 124°C (255°F).
- Engine speed is greater than 600 RPM.
- Engine speed is less than 5 500 RPM.
- A/C high side pressure is between 269–2 929 kPa (39–425 PSI).
- Throttle position is less than 100%.
- Evaporator temperature is greater than 3°C (38°F).
- ECM does not detect excessive torque load.
- ECM does not detect insufficient idle quality.
- The ambient temperature is above 1°C (34°F).
- Blower motor is ON.

Reference Information

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[HVAC Schematics](#)

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Scan Tool Reference

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

[Circuit/System Verification](#)

Note: Refer to [HVAC System Malfunction](#) before performing this procedure.

1. Ignition ON, press and release the A/C Switch.
2. Verify the HVAC control module scan tool A/C Request Signal parameter changes between Active and Inactive.
 - ⇒ **If the parameter does not change**
Replace the A20 Radio/HVAC Controls.
 - ⇓ **If the parameter changes**
3. Set A/C system to coolest setting with blower ON.
4. Press and release the A/C switch several times.
5. Verify the ECM scan tool A/C Request Signal parameter changes between Active and Inactive.
 - ⇒ **If the parameter does not change**
Replace the K33 HVAC Control Module.
 - ⇓ **If the parameter changes**
6. Verify the A/C compressor clutch engages when commanding the ECM A/C Relay output function On and Off with a scan tool.
 - ⇒ **If the A/C compressor clutch does not engage**
Refer to [DTC P0645, P0646, or P0647](#)
 - ⇓ **If the A/C compressor clutch engages**
7. Engine ON.
8. Verify the HVAC control module scan tool A/C Compressor Refrigerant Solenoid Valve Command parameter changes with varying cooling loads.
 - ⇒ **If the parameter does not change**
Refer to [DTC B393B](#)
 - ⇓ **If the parameter does change**
9. All OK.

[Repair Instructions](#)

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

- [HVAC Component Replacement Reference](#)
- [Control Module References](#) for HVAC control module replacement, programming and setup

Afterblow Enabling

The afterblow mode can be enabled using the scan tool. The afterblow mode allows the blower motor to operate after the engine has been turned off. This operation of the blower motor dries the evaporator core, which reduces the amount of microbial growth which can create undesirable odors.

Use the following procedure in order to enable the afterblow mode:

1. Connect the Scan Tool.
2. Turn ON the ignition, with the engine OFF.
3. Build the vehicle with the scan tool.
4. Select Module Diagnosis.
5. Select Remote Heater and Air Conditioning Control Module.
6. Select Configuration/Reset Functions.
7. Select HVAC Afterblow Configuration.

When afterblow has been enabled by the scan tool the blower motor will operate at 68% blower speed, following the sequence below up to 5 times. This could last up to an hour:

1. The blower motor will be OFF for 7–11 minutes.
2. The blower motor will RUN for 25–30 seconds.

The following conditions must be met for the HVAC module to operate the afterblow:

- The engine must be turned off for at least 30 min.
- The outside air temperature must be at least 21°C (70°F).
- The A/C compressor must have operated for more than 2 minutes before shut down during the latest key cycle.
- The system voltage must be at least 12 V.

Actuator Recalibration

HVAC Control Module Replacement

When replacing or disconnecting the HVAC control module, it will be necessary to perform a recalibration process. When installing or reconnecting the HVAC control module, be sure to perform the following:

Preferred Method (with Scan Tool)

Note: Do not adjust any controls on the HVAC control module while the HVAC control module is self-calibrating. If interrupted, improper HVAC performance will result.

1. Ignition OFF.
2. Disconnect the scan tool.
3. Install/connect the HVAC control module.
4. Connect all previously disconnected components.
5. Start the vehicle.
6. With the scan tool, initiate the HVAC Actuators Learn feature of the HVAC control module Special Functions menu.
7. Operate system and verify that no DTCs have set as current DTCs.
8. If DTCB101E 4B is set after attempting the actuator recalibration procedure, perform the following:
 - 8.1. Verify which actuator does not have a scan tool learn status parameter status of complete.
 - 8.2. Verify the unlearned actuator is physically rotating — A common cause of DTCB101E 4B is an actuator that is electrically OK but fails to physically rotate (e.g. stripped gears).
 - 8.3. If the unlearned actuator is not physically rotating, replace the actuator, otherwise replace the HVAC control module.

Alternate Method (without Scan Tool)

Note: Do not adjust any controls on the HVAC control module while the HVAC control module is self-calibrating. If interrupted, improper HVAC performance will result.

1. Clear all DTCs.
2. Ignition OFF.
3. Install/connect the HVAC control module.
4. Connect all previously disconnected components.
5. Remove the HVAC control module fuse for a minimum of 10 s.
6. Install the HVAC control module fuse.
7. Start the vehicle.
8. Wait 40 s for the HVAC control module to self-calibrate.

Actuator Replacement

When replacing an HVAC actuator it will be necessary to allow the HVAC control module to perform a recalibration process. When installing an HVAC actuator be sure to perform one of the following:

Preferred Method (with Scan Tool)

Note: Do not adjust any controls on the HVAC control module while the HVAC control module is self-calibrating. If interrupted, improper HVAC performance will result.

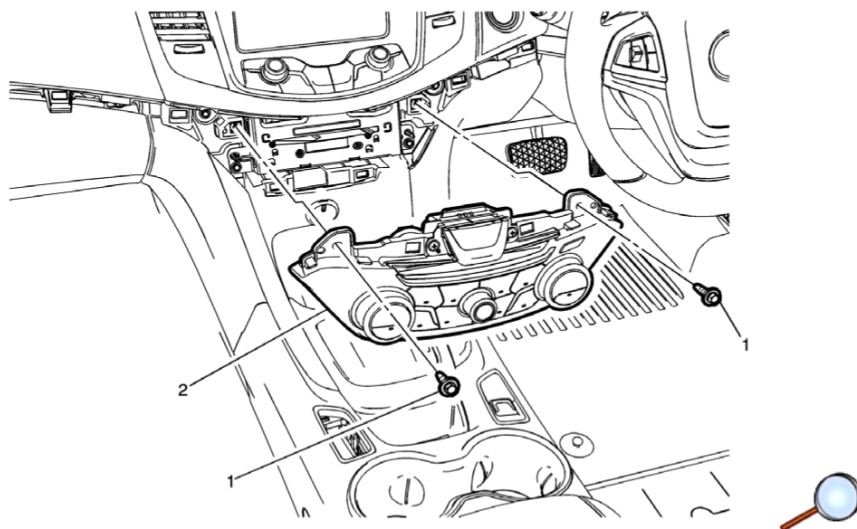
1. Clear all DTCs.
2. Ignition OFF.
3. Install the HVAC actuator.
4. Connect all previously disconnected components.
5. Start the vehicle.
6. With the scan tool, initiate the HVAC Actuators Relearn feature of the HVAC control module Special Functions menu.
7. Operate system and verify that no DTCs have set as current DTCs.
8. If DTCEB101E 4B is set after attempting the actuator recalibration procedure, perform the following:
 - 8.1. Verify which actuator does not have a scan tool learn status parameter status of complete.
 - 8.2. Verify the unlearned actuator is physically rotating — A common cause of DTCEB101E 4B is an actuator that is electrically OK but fails to physically rotate (e.g. stripped gears).
 - 8.3. If the unlearned actuator is not physically rotating, replace the actuator, otherwise replace the HVAC control module.

Alternate Method (without Scan Tool)

Note: Do not adjust any controls on the HVAC control module while the HVAC control module is self-calibrating. If interrupted, improper HVAC performance will result.

1. Clear all DTCs.
2. Ignition OFF.
3. Install the HVAC actuator.
4. Connect all previously disconnected components.
5. Remove the HVAC control module fuse for a minimum of 10 s.
6. Install the HVAC control module fuse.
7. Start the vehicle.
8. Wait 40 s for the HVAC control module to self-calibrate.

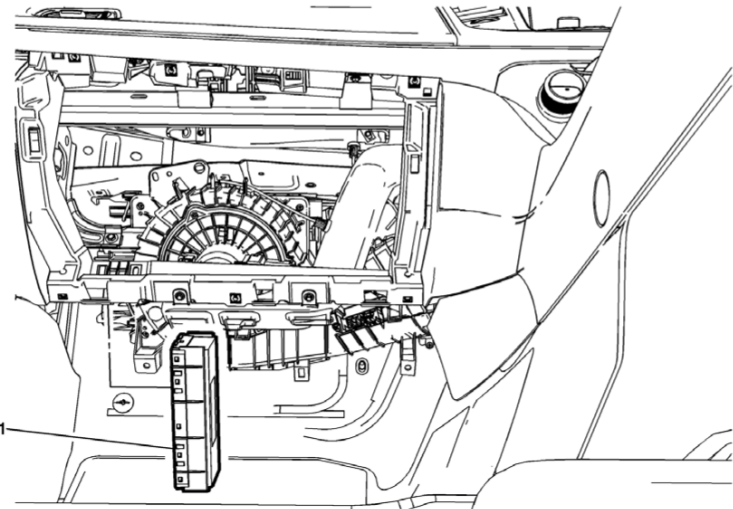
Heater and Air Conditioning Control Replacement



Heater and Air Conditioning Control Replacement

Callout	Component Name
Preliminary Procedures 1. Remove the instrument panel center trim plate applique. Refer to Instrument Panel Center Trim Plate Applique Replacement. 2. Remove the left side instrument panel trim plate applique. Refer to Instrument Panel Trim Plate Applique Replacement - Left Side. 3. Remove the radio assembly. Refer to Radio Replacement.	
1	Heater and Air Conditioning Control Fastener (Qty: 2) Caution: Refer to Fastener Caution .
2	Heater and Air Conditioning Control Procedure 1. Disconnect the heater and air conditioning control electrical connector. 2. Transfer the components as necessary.

Heater and Air Conditioning Remote Control Replacement

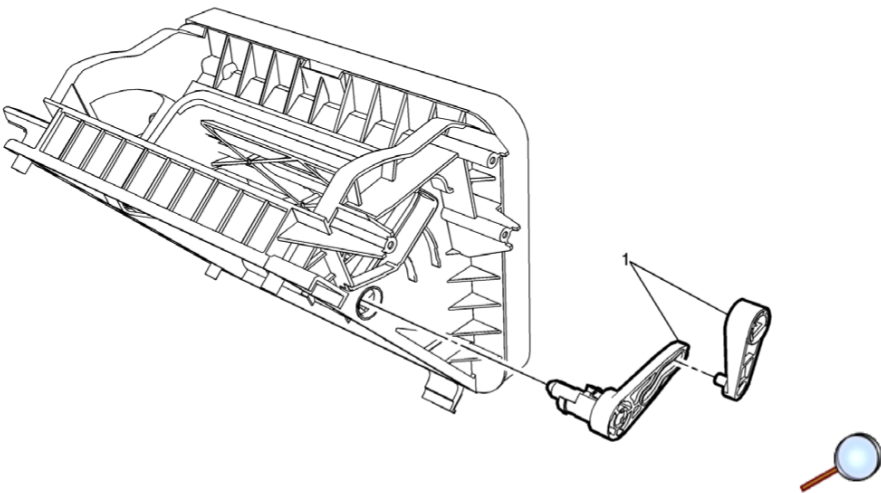


Heater and Air Conditioning Remote Control Replacement

Callout	Component Name
Preliminary Procedure Remove the instrument panel compartment door opening frame. Refer to Instrument Panel Compartment Door Opening Frame Replacement .	
1	Heater and Air Conditioning Remote Control Procedures 1. Unclip the heater and air conditioning remote control from the blower case retainers. 2. Maneuver the heater and air conditioning remote control out and down from behind the instrument panel assembly. 3. Disconnect the heater and air conditioning remote control electrical connectors.

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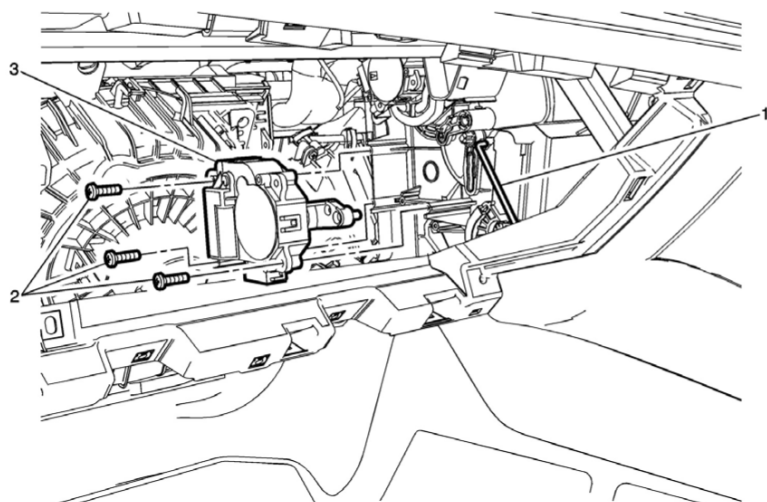
Air Inlet Valve Lever Replacement - Front



Air Inlet Valve Lever Replacement - Front

Callout	Component Name
Preliminary Procedure Remove the fresh air recirculation mode valve actuator motor. Refer to Mode Valve Actuator Motor Replacement - Fresh Air Recirculation .	
1	Air Inlet Valve Lever (Qty: 2) Procedure Apply a small amount of grease to the pin and run channel of the levers.

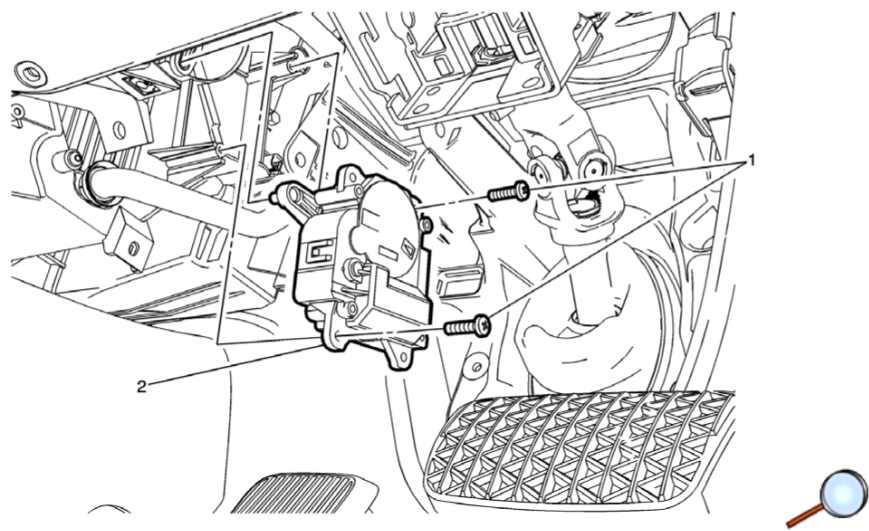
Mode Valve Actuator Motor Replacement - Left Side Air Mix (Temperature)



Mode Valve Actuator Motor Replacement - Left Side Air Mix

Call out	Component Name
Preliminary Procedure Remove the left side front floor air outlet duct. Refer to Floor Front Air Outlet Duct Replacement - Left Side .	
1	Air Mix Mode Rod Link
2	Mode Valve Actuator Motor Fastener (Qty: 3) Caution: Refer to Fastener Caution . Tighten 1.1 N•m (10 lb in)
3	Mode Valve Actuator Motor — Left Side Air Mix Procedures 1. Disconnect the left side air mix mode valve actuator motor electrical connector. 2. Ensure the control arm pin is relocated correctly in the door lever slot during reassembly.

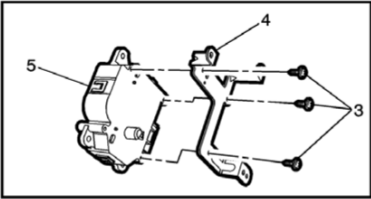
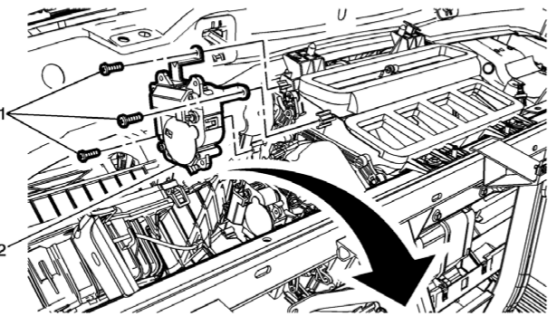
Mode Valve Actuator Motor Replacement - Right Side Air Mix (Temperature)



Mode Valve Actuator Motor Replacement - Right Side Air Mix

Callout	Component Name
Preliminary Procedures 1. Remove the right floor front air outlet duct. Refer to Floor Front Air Outlet Duct Replacement - Right Side . 2. Remove the right side front floor console extension panel. Refer to Front Floor Console Extension Panel Replacement - Right Side .	
1	Mode Valve Actuator Motor Fastener (Qty: 2) Caution: Refer to Fastener Caution . Tighten 1.1 N·m (10 lb in)
2	Mode Valve Actuator Motor — Right Air Mix Procedures 1. Disconnect the right air mix mode valve actuator motor electrical connector. 2. Ensure the control arm pin is relocated correctly in the door lever slot during reassembly.

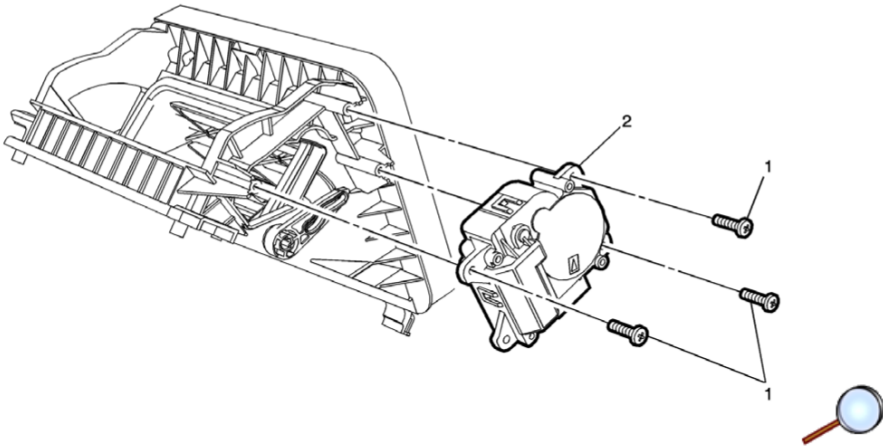
Mode Valve Actuator Motor Replacement - Front Mode



Mode Valve Actuator Motor Replacement - Front Mode

Callout	Component Name
Preliminary Procedure Remove the instrument panel assembly. Refer to Instrument Panel Assembly Replacement .	
1	Mode Valve Actuator Motor Bracket Fastener (Qty: 3) Caution: Refer to Fastener Caution . Tighten 1.1 N•m (10 lb in)
2	Mode Valve Actuator Motor and Bracket Assembly Procedure Disconnect the front mode valve actuator motor electrical connector.
3	Mode Valve Actuator Motor to Bracket Fastener (Qty: 3) Tighten 1.1 N•m (10 lb in)
4	Mode Valve Actuator Motor Bracket
5	Mode Valve Actuator Motor — Front Mode Procedure Ensure the control arm pin is relocated correctly in the door lever slot during reassembly.

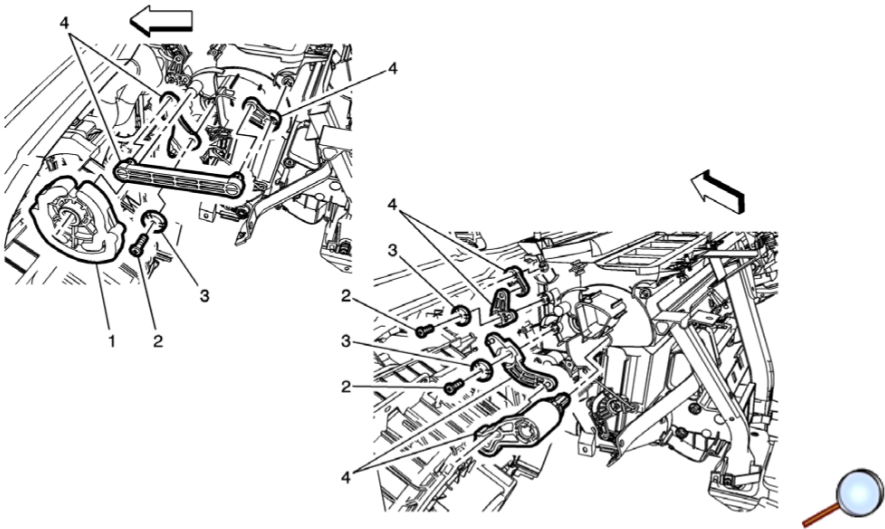
Mode Valve Actuator Motor Replacement - Fresh Air Recirculation (Air Inlet)



Mode Valve Actuator Motor Replacement - Fresh Air Recirculation

Call out	Component Name
Preliminary Procedure Remove the front blower case assembly. Refer to Blower Front Case Replacement .	
1	Mode Valve Actuator Motor Fastener (Qty: 3) Caution: Refer to Fastener Caution . Tighten 1.1 N·m (10 lb in)
2	Mode Valve Actuator Motor — Fresh Air Recirculation Procedures 1. Disconnect the fresh air recirculation mode valve actuator motor electrical connector. Note: On reassembly, ensure the control arm pin is relocated correctly in the door lever slot.

Mode Control Cam Actuator Lever Replacement

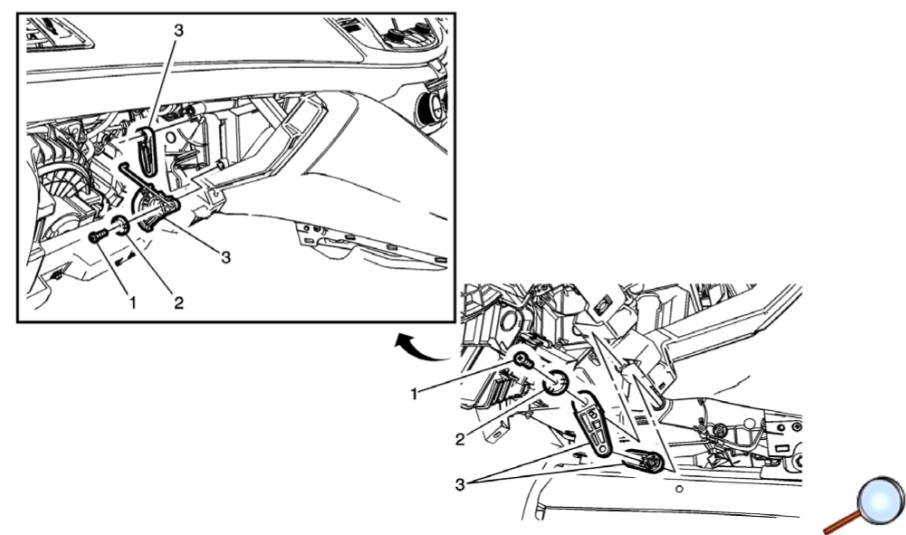


Mode Control Cam Actuator Lever Replacement

Call out	Component Name
Preliminary Procedures 1. Remove the instrument panel tie bar. Refer to Instrument Panel Tie Bar Replacement. 2. Remove the front mode valve actuator motor. Refer to Mode Valve Actuator Motor Replacement - Front Mode.	
1	Mode Control Cam
2	Mode Control Cam Lever Fastener (Qty: 3) Caution: Refer to Fastener Caution . Tighten 1.1 N•m (10 lbin)
3	Mode Control Cam Lever Fastener Washer (Qty: 3)
4	Mode Control Cam Lever (Qty: 7) Procedure Apply a small amount of grease to the lever run channels.

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Front Floor Console Rear Air Valve Actuator Lever Replacement

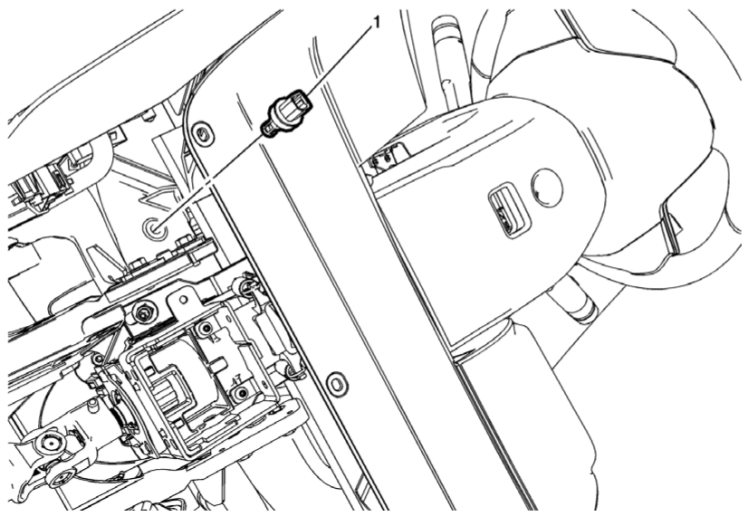


Front Floor Console Rear Air Valve Actuator Lever Replacement

Call out	Component Name
Preliminary Procedure Remove the left side air mix mode valve actuator motor. Refer to Mode Valve Actuator Motor Replacement - Left Side Air Mix .	
1	Floor Front Console Rear Air Valve Actuator Lever Fastener (Qty: 2) Caution: Refer to Fastener Caution . Tighten 1.1 N•m (10 lb in)
2	Floor Front Console Rear Air Valve Actuator Lever Washer (Qty: 2)
3	Floor Front Console Rear Air Valve Actuator Lever (Qty: 4) Procedure Apply a small amount of grease to the lever run channels.

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Duct Air Temperature Sensor Replacement - Upper Right Side

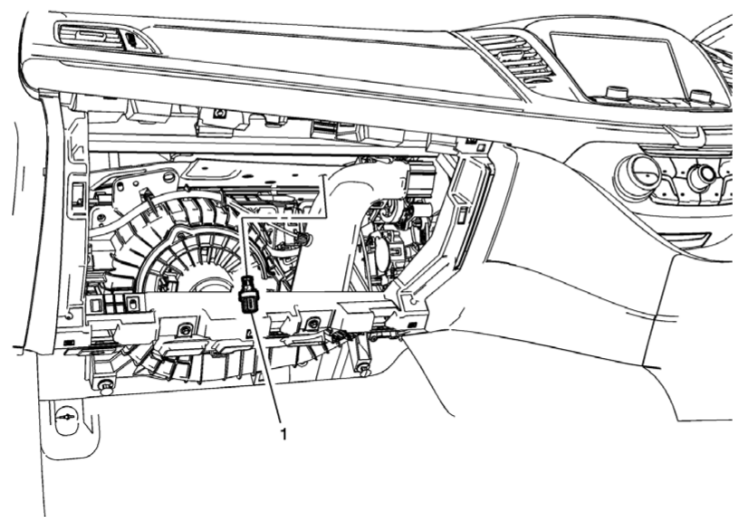


Duct Air Temperature Sensor Replacement - Upper Right Side

Callout	Component Name
Preliminary Procedure Remove the right floor front air outlet duct. Refer to Floor Front Air Outlet Duct Replacement - Right Side .	
1	Duct Air Temperature Sensor — Upper Right Side Procedures 1. Disconnect the upper right side duct air temperature sensor electrical connector. 2. Using light pressure twist and pull the upper right side duct air temperature sensor out of the right side instrument panel outer air outlet duct.

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Duct Air Temperature Sensor Replacement - Upper Left Side

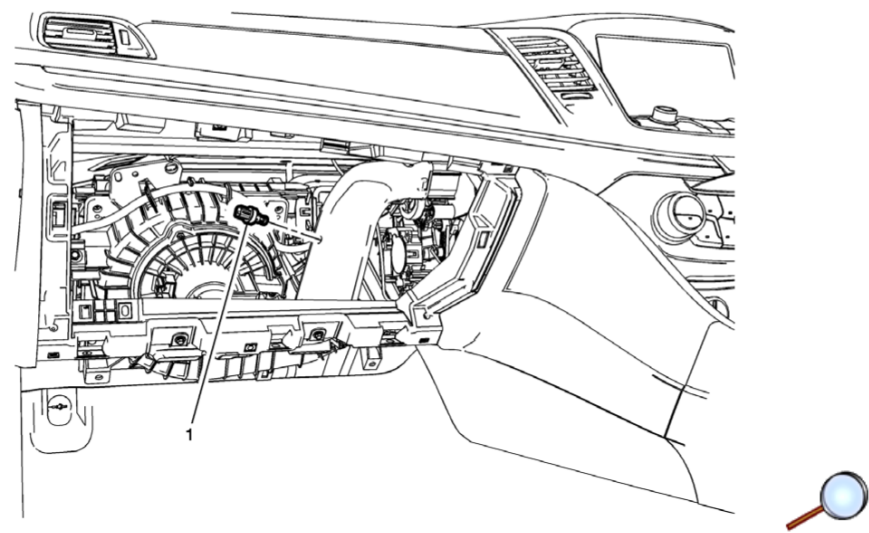


Duct Air Temperature Sensor Replacement - Upper Left Side

Callout	Component Name
Preliminary Procedure Remove the instrument panel compartment door opening frame. Refer to Instrument Panel Compartment Door Opening Frame Replacement .	
1	Duct Air Temperature Sensor — Left Upper Procedures 1. Disconnect the duct air temperature sensor electrical connector. 2. Using light pressure twist and pull the upper duct air temperature sensor out of the left instrument panel outer air outlet duct.

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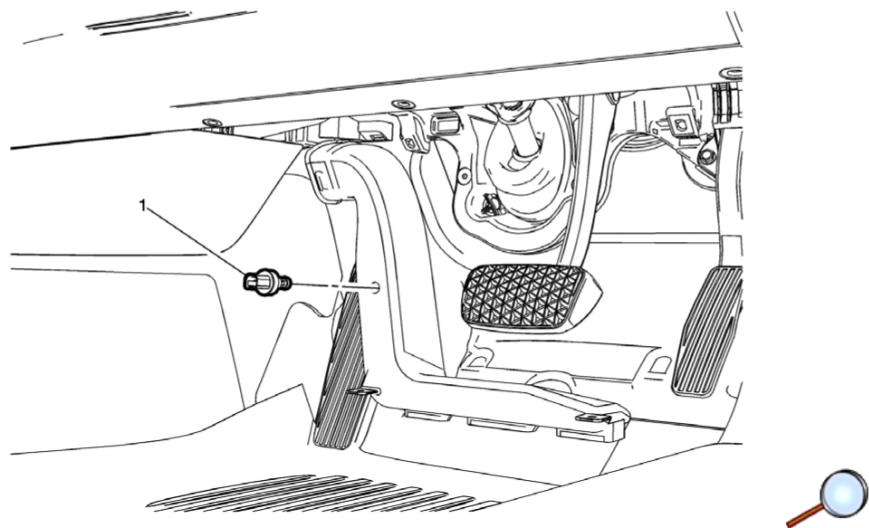
Duct Air Temperature Sensor Replacement - Lower Left Side



Duct Air Temperature Sensor Replacement - Lower Left Side

Callout	Component Name
Preliminary Procedure Remove the instrument panel compartment door opening frame. Refer to Instrument Panel Compartment Door Opening Frame Replacement .	
1	Duct Air Temperature Sensor — Lower Left Side Procedures 1. Disconnect the lower left side duct air temperature sensor electrical connector. 2. Using light pressure twist and pull the lower left side duct air temperature sensor out of the left floor front air outlet duct.

Duct Air Temperature Sensor Replacement - Lower Right Side

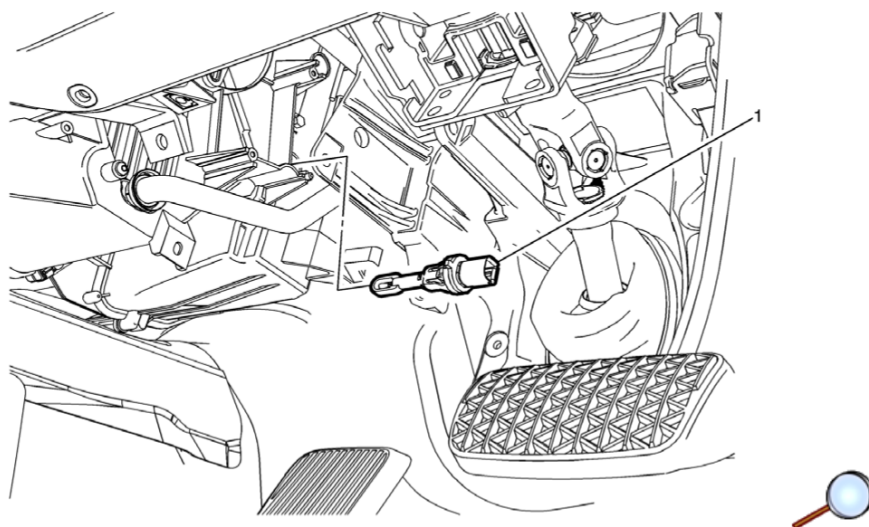


Duct Air Temperature Sensor Replacement - Lower Right Side

Callout	Component Name
Preliminary Procedure Remove the right floor front air outlet duct. Refer to Floor Front Air Outlet Duct Replacement - Right Side .	
1	Duct Air Temperature Sensor — Lower Right Side Procedures 1. Disconnect the lower right side duct air temperature sensor electrical connector. 2. Using light pressure twist and pull the lower right side duct air temperature sensor out of the right floor front air outlet duct.

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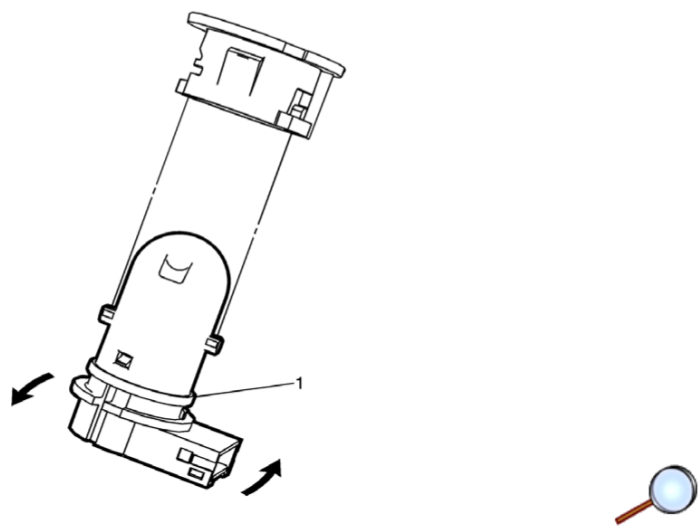
Evaporator Air Temperature Sensor Replacement



Evaporator Air Temperature Sensor Replacement

Callout	Component Name
Preliminary Procedure Remove the right side air mix mode valve actuator motor. Refer to Mode Valve Actuator Motor Replacement - Right Side Air Mix .	
1	Air Conditioning Evaporator Air Temperature Sensor Procedures 1. Disconnect the air conditioning evaporator air temperature sensor electrical connector. 2. Using light pressure twist and pull the air conditioning evaporator air temperature sensor out of the heater and air conditioning evaporator and blower module assembly.

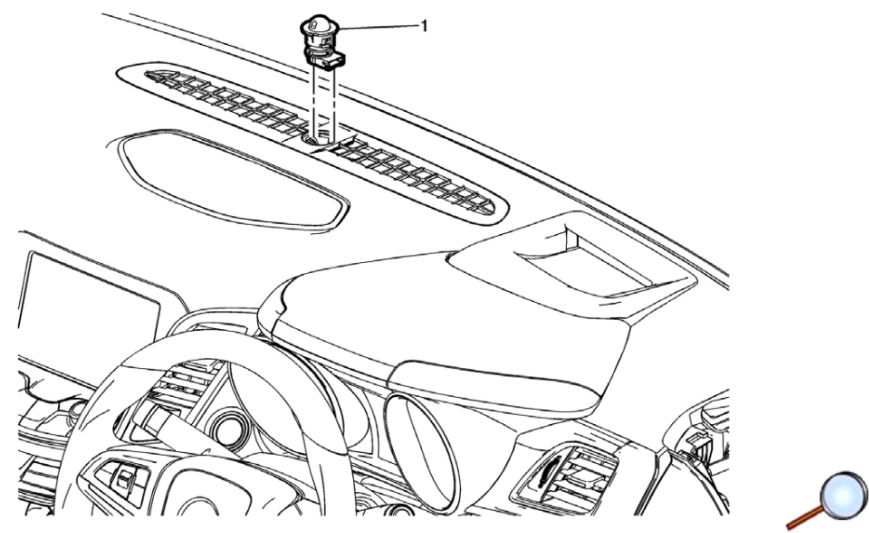
Sun Load Temperature and Headlamp Automatic Control Ambient Light Sensor Replacement



Sun Load Temperature and Headlamp Automatic Control Ambient Light Sensor Replacement

Callout	Component Name
Preliminary Procedure Remove the sun load temperature and headlamp automatic control ambient light sensor bezel. Refer to Sun Load Temperature and Headlamp Automatic Control Ambient Light Sensor Bezel Replacement .	
1	Sun Load Temperature and Headlamp Automatic Control Ambient Light Sensor Procedure Turn the sun load temperature and headlamp automatic control ambient light sensor quarter of a turn counter clockwise to remove.

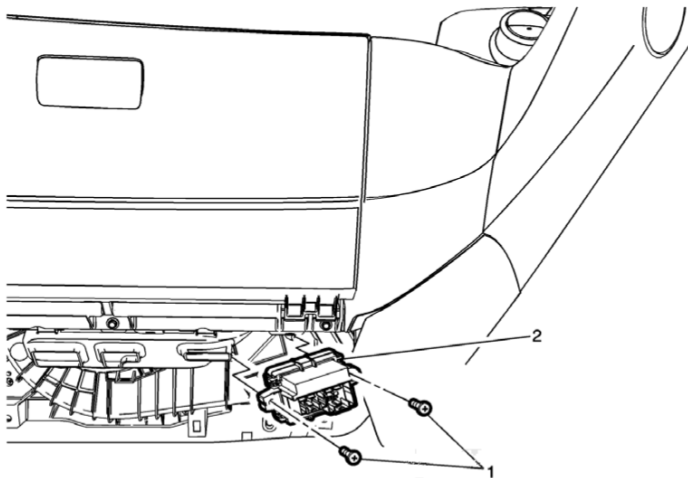
Sun Load Temperature and Headlamp Automatic Control Ambient Light Sensor Bezel Replacement



Sun Load Temperature and Headlamp Automatic Control Ambient Light Sensor Bezel Replacement

Callout	Component Name
1	Sun Load Temperature and Headlamp Automatic Control Ambient Light Sensor Bezel Procedure 1. Use a flat bladed plastic trim tool in order to release the bezel secured to the instrument panel assembly. 2. Disconnect the electrical connection. 3. Transfer components as necessary.

Blower Motor Control Module Replacement



Blower Motor Control Module Replacement

Call out	Component Name
Preliminary Procedure Remove the left side instrument panel lower trim panel insulator. Refer to Instrument Panel Lower Trim Panel Insulator Replacement - Left Side .	
1	Blower Control Module Fastener (Qty: 2) Caution: Refer to Fastener Caution . Tighten 1.1 N•m (10 lb in)
2	Blower Control Module Procedure Disconnect the blower control module electrical connector.

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Fastener Tightening Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Blower Control Module Fastener	1.1 N•m	10 lb ft
Floor Front Console Rear Air Valve Actuator Lever Fastener	1.1 N•m	10 lb ft
Mode Control Cam Lever Fastener	1.1 N•m	10 lb ft
Mode Valve Actuator Motor Bracket Fastener	1.1 N•m	10 lb ft
Mode Valve Actuator Motor Fastener	1.1 N•m	10 lb ft
Mode Valve Actuator Motor to Bracket Fastener	1.1 N•m	10 lb ft

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HVAC Schematics

Figure 1: [Module Power, Ground, Data Communications, and Blower Controls](#)

Figure 2: [Mode and Temperature Controls](#)

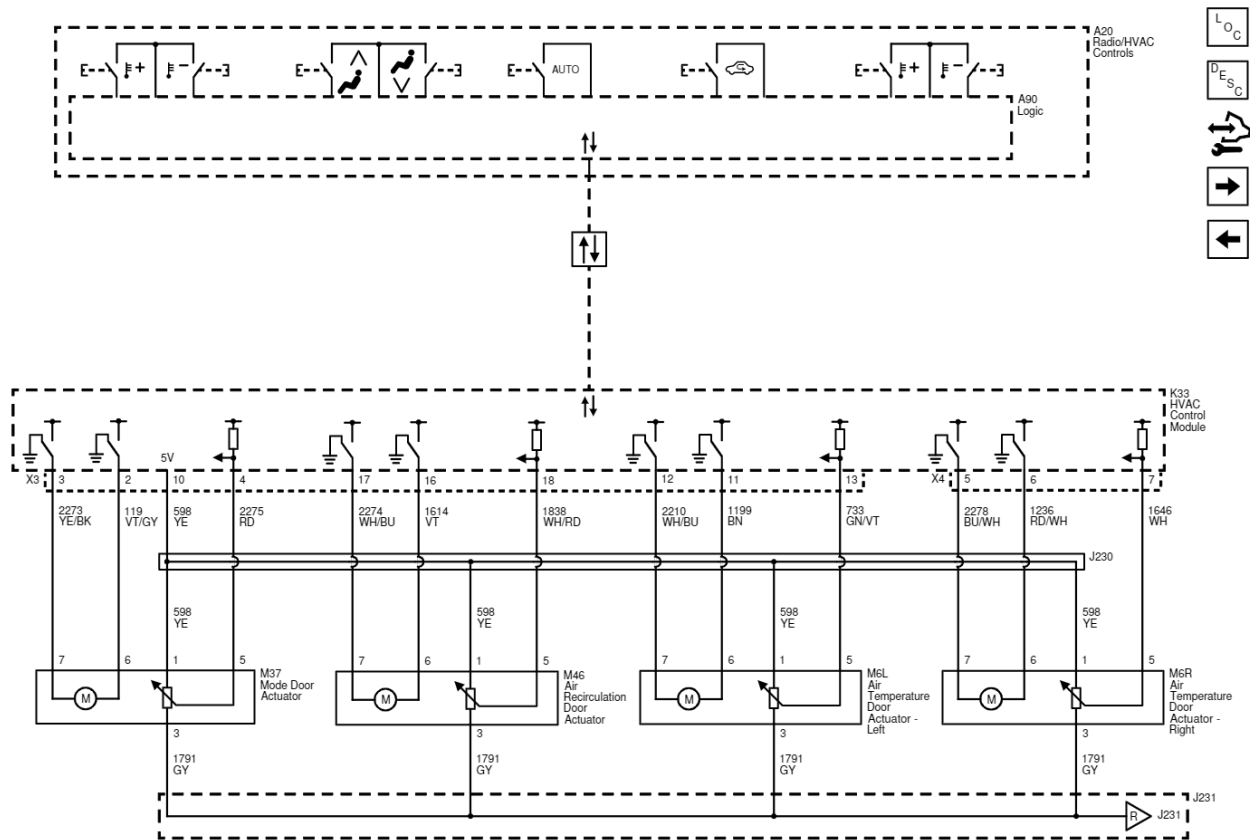
Figure 3: [Temperature Controls](#)

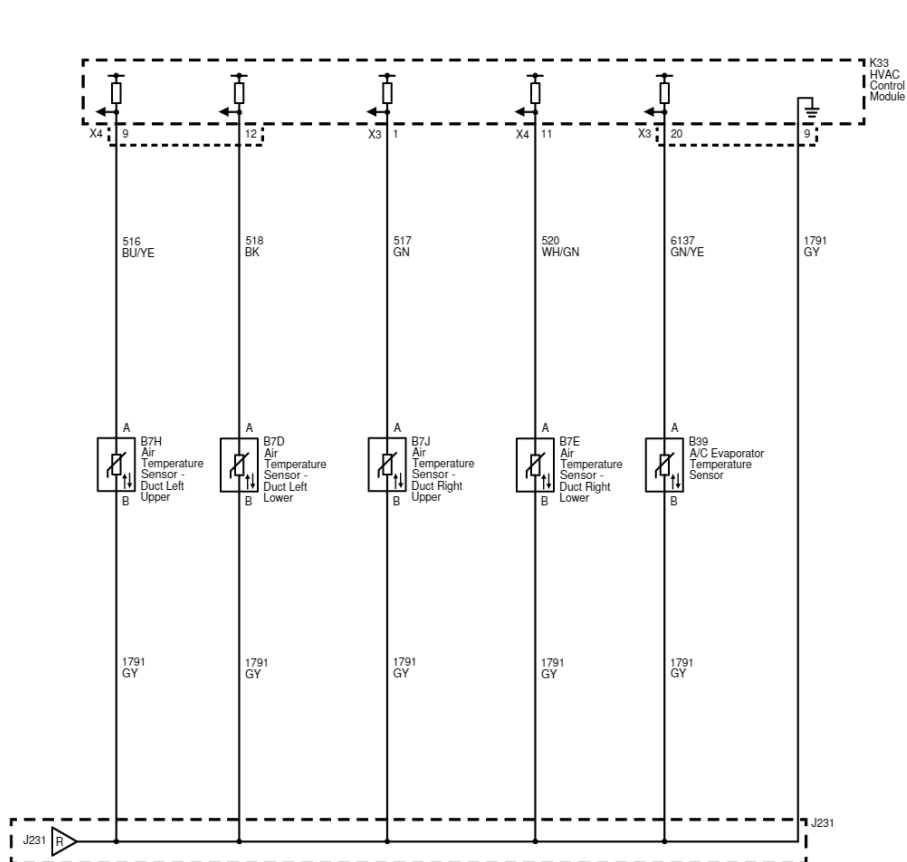
Figure 4: [A/C Compressor Controls](#)

Figure 5: [Temperature Control Sensor](#)

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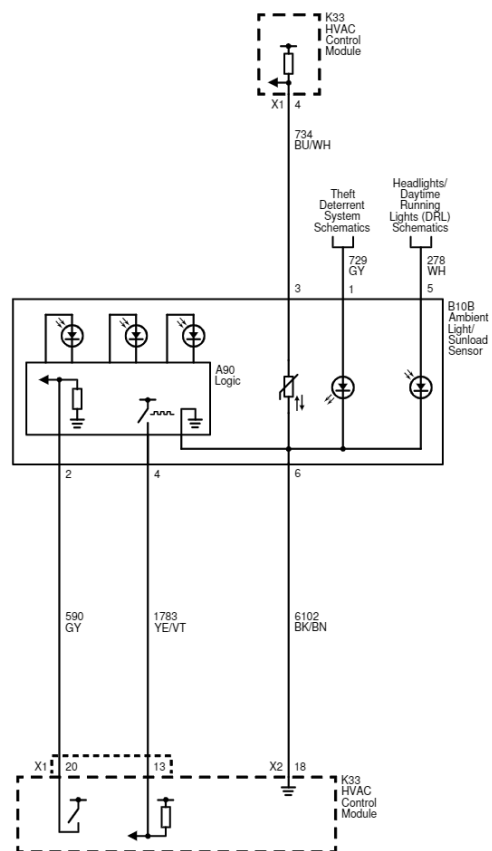




L_{OG}

D_{ESC}





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