

2008 Chevrolet Silverado 1500

2008 ACCESSORIES & EQUIPMENT Seat Heating and Cooling - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

2008 ACCESSORIES & EQUIPMENT

Seat Heating and Cooling - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Seat Heater Switch Screw	2 N.m	18 lb in
Front Heated Seat Module Bolt	9 N.m	80 lb in

SCHEMATIC AND ROUTING DIAGRAMS

HEATED/COOLED SEAT SCHEMATICS

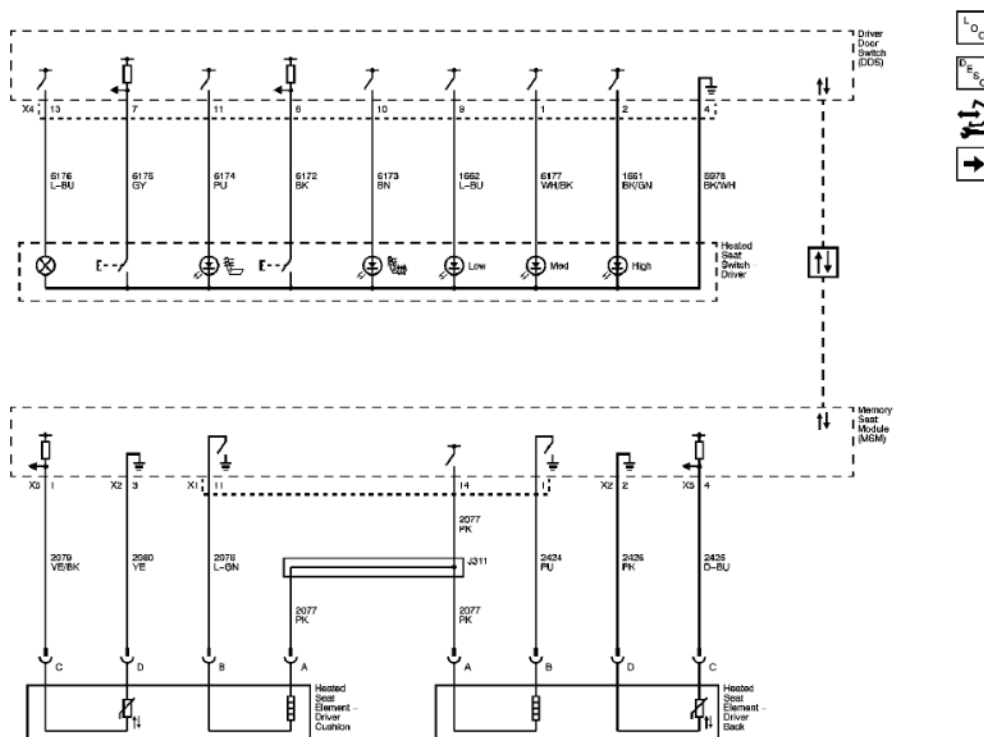


Fig. 1: Heated Seat - Driver
Courtesy of GENERAL MOTORS CORP.

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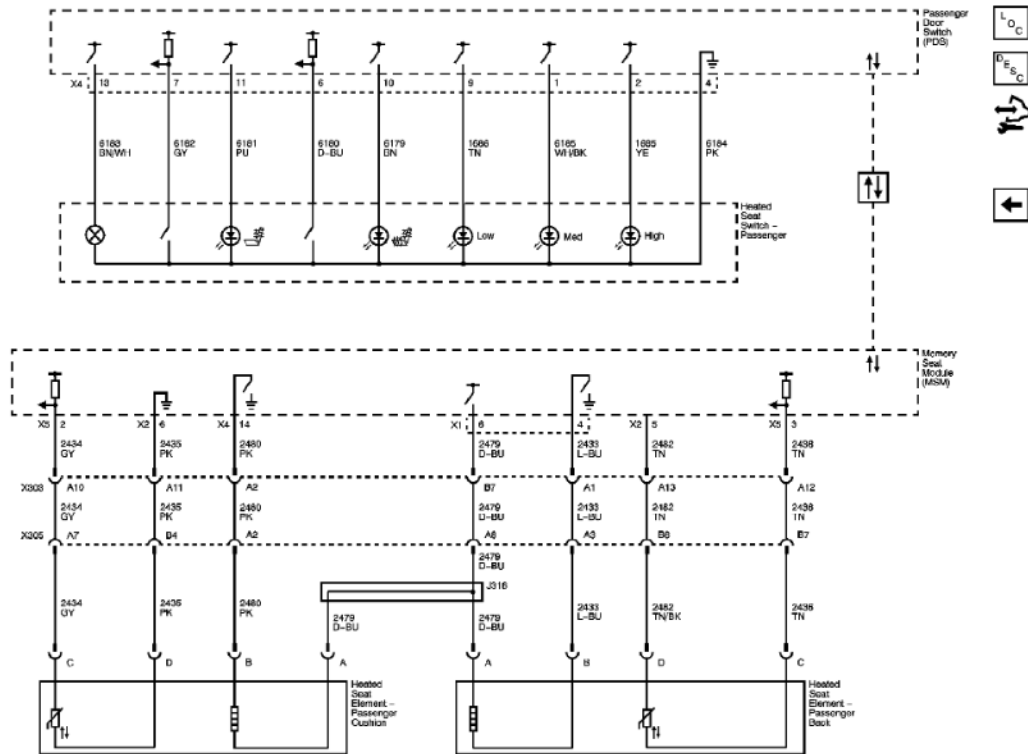


Fig. 2: Heated Seat - Passenger
Courtesy of GENERAL MOTORS CORP.

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
DTC B1925 or B2170	B1925 02: Left Seat Heater Cushion Sensor Circuit Shorted to Ground B1925 05: Left Seat Heater Cushion Sensor Circuit Shorted to Battery or Open B2170 02: Right Seat Heater Cushion Sensor Circuit Shorted to Ground B2170 05: Right Seat Heater Cushion Sensor Circuit Shorted to Battery or Open
DTC B1935 or B2180	B1935 04: Left Seat Back Heater Circuit Open B1935 0A: Left Seat Back Heater Circuit Rate of Change

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	Below Threshold B1935 0B: Left Seat Back Heater Circuit Current Above Threshold B1935 0C: Left Seat Back Heater Circuit Current Below Threshold B1935 0D: Left Seat Back Heater Circuit Resistance Above Threshold B1935 0E: Left Seat Back Heater Circuit Resistance Below Threshold B1935 1F: Left Seat Back Heater Circuit Intermittent B2180 04: Right Seat Back Heater Circuit Open B2180 0A: Right Seat Back Heater Circuit Rate of Change Below Threshold B2180 0B: Right Seat Back Heater Circuit Current Above Threshold B2180 0C: Right Seat Back Heater Circuit Current Below Threshold B2180 0D: Right Seat Back Heater Circuit Resistance Above Threshold B2180 0E: Right Seat Back Heater Circuit Resistance Below Threshold B2180 1F: Right Seat Back Heater Circuit Intermittent
<u>DTC B2345</u>	B2345 00: Seat Heater Disable Circuit B2345 13: Seat Heater Disable Circuit High Temperature B2345 42: Seat Heater Disable Circuit Calibration Data Set Not Programmed B2345 4B: Seat Heater Disable Circuit Calibration Not Learned
<u>DTC B2425 or B2430</u>	B2425 04: Left Seat Cushion Heater Circuit Open B2425 0A: Left Seat Cushion Heater Circuit Rate of Change Below Threshold B2425 0B: Left Seat Cushion Heater Circuit Current Above Threshold B2425 0C: Left Seat Cushion Heater Circuit Current Below Threshold B2425 0D: Left Seat Heater Cushion Circuit Resistance Above Threshold B2425 0E: Left Seat Heater Cushion Circuit Resistance Below Threshold

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	B2425 1F: Left Seat Cushion Heater Circuit Intermittent B2430 04: Right Seat Cushion Heater Circuit Open B2430 0A: Right Seat Cushion Heater Circuit Rate of Change Below Threshold B2430 0B: Right Seat Cushion Heater Circuit Current Above Threshold B2430 0C: Right Seat Cushion Heater Circuit Current Below Threshold B2430 0D: Right Seat Heater Cushion Circuit Resistance Above Threshold B2430 0E: Right Seat Heater Cushion Circuit Resistance Below Threshold B2430 1F: Right Seat Cushion Heater Circuit Intermittent
<u>DTC B2435 or B2440</u>	B2435 02: Left Seat Back Heater Sensor Circuit Shorted to Ground B2435 05: Left Seat Back Heater Sensor Circuit Shorted to Battery or Open B2440 02: Right Seat Back Heater Sensor Circuit Shorted to Ground B2440 05: Right Seat Back Heater Sensor Circuit Shorted to Battery or Open
<u>DTC B2508 or B2509</u>	B2508 01: Seat Heater Relay Circuit Shorted to Battery or Open B2508 02: Seat Heater Relay Circuit Shorted to Ground

DIAGNOSTIC STARTING POINT - SEATS

Begin the system diagnosis with the **Diagnostic System Check - Vehicle** . The Diagnostic System Check will provide the following information:

- The identification of the control modules which command the system.
- The ability of the control modules to communicate through the serial data circuit.
- The identification of any stored diagnostic trouble codes (DTCs) and their status.

The use of the Diagnostic System Check will identify the correct procedure for diagnosing the system and where the procedure is located.

DTC B1925 OR B2170

Diagnostic Instructions

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- 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 B1925 02

Left Seat Heater Cushion Sensor Circuit Shorted to Ground

DTC B1925 05

Left Seat Heater Cushion Sensor Circuit Shorted to Battery or Open

DTC B2170 02

Right Seat Heater Cushion Sensor Circuit Shorted to Ground

DTC B2170 05

Right Seat Heater Cushion Sensor Circuit Shorted to Battery or Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Left Heated Seat Cushion Element Supply Voltage	B2508 02	B2425 0C B2425 0D	B2508 01	-
Left Heated Seat Cushion Element Control	B2508 02	B2425 0C B2425 0D	B2508 01	-
Left Heated Seat Cushion Temperature Sensor Signal	B1925 02	B1925 05 B2425 04 B2425 1F	B1925 05 B2425 04 B2425 1F	-
Left Heated Seat Cushion Temperature Low Reference	-	B1925 05 B2425 04 B2425 1F	-	-
Right Heated Seat Cushion Element Supply Voltage	B2508 02	B2430 0C B2430 0D	B2508 01	-
Right Heated Seat Cushion Element Control	B2508 02	B2430 0C B2430 0D	B2508 01	-

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Right Heated Seat Cushion Temperature Sensor Signal	B2170 02	B2170 05 B2430 04 B2430 1F	B2170 05 B2430 04 B2430 1F	-
Right Heated Seat Cushion Temperature Low Reference	-	B2170 05 B2430 04 B2430 1F	-	-

Circuit/System Description

The heated seat temperature sensor is located in the seat cushion just under the seat cover with the seat heating element. The temperature sensor is a 2 wire thermistor and resistance through the sensor varies with temperature. The signal circuit is referenced from 5 volts within the module and the temperature of the seat surface determines the signal circuit voltage. Once the seat reaches the set temperature, the module will then cycle the control circuits of the heating elements ON and OFF in order to maintain the desired seat temperature based on the feedback voltage from the sensors.

Conditions for Running the DTC

The memory seat module must be powered.

Conditions for Setting the DTC

B1925 02, B2170 02

The temperature sensor voltage drops below 0.80 volt for more than 1 second.

B1925 05, B2170 05

The temperature sensor voltage is greater than 5 volts for more than 1 second.

Action Taken When the DTC Sets

The heated seat cushion function for the affected seat will be disabled.

Conditions for Clearing the DTC

- The current DTC will clear 3 seconds after the reference voltage returns to normal operating range, and the ignition is cycled OFF then back to ACC or RUN.
- A history DTC will clear after 50 ignition cycles or with a scan tool using the clear DTCs function.

Reference Information

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2008 ACCESSORIES & EQUIPMENT Seat Heating and Cooling - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Heated Seats 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

B1925

1. Ignition OFF, disconnect the X2, X5 harness connectors at the MSM.
2. Test for 850-300k ohms between the signal circuit terminal 1 X5 and the low reference circuit terminal 3 X2.
 - If greater than the specified range, test the signal circuit and low reference circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the seat cushion heater element.
 - If less than the specified range, test for a short between the signal and low reference circuits. If the circuit tests normal, replace the seat cushion heater element.
3. Connect the X2, X5 harness connectors at the MSM.
4. Disconnect the harness connector at the seat cushion heater element.
5. Ignition ON, test for 4.8-5.2 volts between the temperature sensor signal circuit terminal C and ground.

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- If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the MSM.
- If less than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the MSM.
- 6. If all circuits test normal, replace the MSM.

B2170

1. Ignition OFF, disconnect the X2, X5 harness connectors at the MSM.
2. Test for 850-300k ohms between the signal circuit terminal 2 X5 and the low reference circuit terminal 6 X2.
 - If greater than the specified range, test the signal circuit and low reference circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the seat cushion heater element.
 - If less than the specified range, test for a short between the signal and low reference circuits. If the circuit tests normal, replace the seat cushion heater element.
3. Connect the X2, X5 harness connectors at the MSM.
4. Disconnect the harness connector at the seat cushion heater element.
5. Ignition ON, test for 4.8-5.2 volts between the temperature sensor signal circuit terminal C and ground.
 - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the MSM.
 - If less than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the MSM.
6. If all circuits test normal, replace the MSM.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Driver Seat and Passenger Seat Cushion Heater Replacement**
- **Control Module References** for the MSM replacement, setup, and programming

DTC B1935 OR B2180

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

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- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DTC Descriptors

DTC B1935 04

Left Seat Back Heater Circuit Open

DTC B1935 0A

Left Seat Back Heater Circuit Rate of Change Below Threshold

DTC B1935 0B

Left Seat Back Heater Circuit Current Above Threshold

DTC B1935 0C

Left Seat Back Heater Circuit Current Below Threshold

DTC B1935 0D

Left Seat Back Heater Circuit Resistance Above Threshold

DTC B1935 0E

Left Seat Back Heater Circuit Resistance Below Threshold

DTC B1935 1F

Left Seat Back Heater Circuit Intermittent

DTC B2180 04

Right Seat Back Heater Circuit Open

DTC B2180 0A

Right Seat Back Heater Circuit Rate of Change Below Threshold

DTC B2180 0B

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Right Seat Back Heater Circuit Current Above Threshold

DTC B2180 0C

Right Seat Back Heater Circuit Current Below Threshold

DTC B2180 0D

Right Seat Back Heater Circuit Resistance Above Threshold

DTC B2180 0E

Right Seat Back Heater Circuit Resistance Below Threshold

DTC B2180 1F

Right Seat Back Heater Circuit Intermittent

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Left Heated Seat Cushion Element Supply Voltage	B2508 02	B2425 0C B2425 0D	B2508 01	-
Left Heated Seat Cushion Element Control	B2508 02	B2425 0C B2425 0D	B2508 01	-
Left Heated Seat Cushion Temperature Sensor Signal	B1925 02	B1925 05 B2425 04 B2425 1F	B1925 05 B2425 04 B2425 1F	-
Left Heated Seat Cushion Temperature Low Reference	-	B1925 05 B2425 04 B2425 1F	-	-
Right Heated Seat Cushion Element Supply Voltage	B2508 02	B2430 0C B2430 0D	B2508 01	-
Right Heated Seat Cushion Element Control	B2508 02	B2430 0C B2430 0D	B2508 01	-
Right Heated Seat Cushion Temperature Sensor Signal	B2170 02	B2170 05 B2430 04 B2430 1F	B2170 05 B2430 04 B2430 1F	-
		B2170 05		

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Right Heated Seat Cushion		B2430 04		
Temperature Low Reference	-	B2430 1F	-	-

Circuit/System Description

When the heated seat function is active, the Memory Seat Module (MSM) supplies battery voltage through the element supply voltage circuit to the seat heater elements. The module controls the seat temperature by providing a PWM ground through the heated seat element control circuit to the seat heater elements. The module then monitors the current flow through the heating element and the temperature sensor rate of change to verify correct operation.

Conditions for Running the DTC

The MSM must be powered and the heated seat must be enabled.

Conditions for Setting the DTC

B1935 04, B2180 04

The module does not detect a temperature change within 210 seconds.

B1935 0A, B2180 0A

The module detects that the set point temperature has not been reached within 8.5 minutes.

B1935 0B, B1935 0E, B2180 0B, B2180 0E

By measuring output current, the module calculates that the heating element resistance is below the minimum resistance.

B1935 0C, B1935 0D, B2180 0C, B2180 0D

By measuring output current, the module calculates that the heating element resistance is above the maximum resistance.

B1935 1F, B2180 1F

The temperature sensor voltage is erratic or changes suddenly.

Action Taken When the DTC Sets

The heated seat back function for the affected seat will be disabled.

Conditions for Clearing the DTC

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- The current DTC clears when the malfunction is no longer present and the power mode changes to OFF then back to ACC or RUN.
- The history DTC will clear after 50 consecutive fault-free ignition cycles have occurred.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Heated Seats 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

B1935

1. Ignition OFF, disconnect the X1 harness connector at the MSM.
2. Test for less than 15 ohms between the heater element supply voltage circuit terminal 14 and the control circuit terminal 1.
 - If greater than the specified range, test the supply voltage circuit and the control circuit for an open/high resistance. If the circuits test normal, replace the seat back heating element.
3. Disconnect the X2, X5 harness connectors at the MSM.

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4. Test for 850-300k ohms between the temperature sensor signal circuit terminal 4 X5 and the low reference circuit terminal 2 X2.
 - If greater than the specified range, test the signal circuit and low reference circuit for a short to voltage or an open/high resistance. If the circuits test normal, replace the seat back heating element.
 - If less than the specified range, test for a short between the signal and low reference circuits. If the circuits test normal, replace the seat back heater element.
5. Connect the X1, X2, X5 harness connectors at the MSM.
6. Disconnect the harness connector at the seat back heater element.
7. Ignition ON, test for 4.8-5.2 volts between the temperature sensor signal circuit terminal C and ground.
 - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the MSM.
 - If less than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the MSM.
8. If all circuits test normal, replace the MSM.

B2180

1. Ignition OFF, disconnect the X1 harness connector at the MSM.
2. Test for less than 15 ohms between the heater element supply voltage circuit terminal 6 and the control circuit terminal 4.
 - If greater than the specified range, test the supply voltage circuit and the control circuit for an open/high resistance. If the circuits test normal, replace the seat back heating element.
3. Disconnect the X2, X5 harness connectors at the MSM.
4. Test for 850-300k ohms between the temperature sensor signal circuit terminal 3 X5 and the low reference circuit terminal 5 X2.
 - If greater than the specified range, test the signal circuit and low reference circuit for a short to voltage or an open/high resistance. If the circuits test normal, replace the seat back heating element.
 - If less than the specified range, test for a short between the signal and low reference circuits. If the circuits test normal, replace the seat back heating element.
5. Connect the X1, X2, X5 harness connectors at the MSM.
6. Disconnect the harness connector at the seat back heating element.
7. Ignition ON, test for 4.8-5.2 volts between the temperature sensor signal circuit terminal C

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and ground.

- If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the MSM.
- If less than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the MSM.

8. If all circuits test normal, replace the MSM.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Driver Seat and Passenger Seat Back Cushion Heater Replacement**
- **Control Module References** for the MSM replacement, setup, and programming

DTC B2345

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 B2345 00

Seat Heater Disable Circuit

DTC B2345 13

Seat Heater Disable Circuit High Temperature

DTC B2345 42

Seat Heater Disable Circuit Calibration Data Set Not Programmed

DTC B2345 4B

Seat Heater Disable Circuit Calibration Not Learned

Diagnostic Fault Information

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Left Heated Seat Back Element Supply Voltage	B2508 02	B1935 0C B1935 0D	B2508 01	-
Left Heated Seat Cushion Element Supply Voltage	B2508 02	B2425 0C B2425 0D	B2508 01	-
Left Heated Seat Back Element Control	B2508 02	B1935 0C B1935 0D	B2508 01	-
Left Heated Seat Cushion Element Control	B2508 02	B2425 0C B2425 0D	B2508 01	-
Right Heated Seat Back Element Supply Voltage	B2508 02	B2180 0C B2180 0D	B2508 01	-
Right Heated Seat Cushion Element Supply Voltage	B2508 02	B2430 0C B2430 0D	B2508 01	-
Right Heated Seat Back Element Control	B2508 02	B2180 0C B2180 0D	B2508 01	-
Right Heated Seat Cushion Element Control	B2508 02	B2430 0C B2430 0D	B2508 01	-

Circuit/System Description

The front seat heating elements are controlled by a common high current relay internal to the Memory Seat Module (MSM) and on the low side by individual element control circuits. The module connects the heated seat heater element supply voltage circuits to a common reference point. This reference point is biased to approximately 2.0 volts. Before the module will allow heated seat operation, it checks to see if the heating element supply voltage circuits and control circuits are shorted to ground or battery voltage. Once the module verifies that it is not closing into a shorted heating element, it allows heated seat operation. After which it continues to monitor for a shorted circuit.

Conditions for Running the DTC

The MSM must be powered.

Conditions for Setting the DTC

B2345 00

After a heated seat is activated, the MSM detects a shorted circuit on the seat heating element supply voltage circuit or control circuit.

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B2345 13

Any of the temperature sensor inputs remains below 1.5 volts for a seat back or 0.95 volts for a seat cushion more than 1 second.

B2345 42

The current sensing calibration data is out of range.

B2345 4B

The current sensing calibration data is not programmed.

Action Taken When the DTC Sets

The heated seat functions for both seats will be disabled.

Conditions for Clearing the DTC

- The current DTC clears when the malfunction is no longer present and the power mode changes to OFF then back to ACC or RUN.
- The history DTC will clear after 50 consecutive fault-free ignition cycles have occurred.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Heated Seats Description and Operation

Electrical Information Reference

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

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• Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

B2345 00

1. Ignition OFF, disconnect the X1, X4 harness connectors at the MSM.
2. Test for infinite resistance between the driver seat heating element supply voltage circuit terminal 14 X1 and ground.
 - If less than the specified range, test the supply voltage circuit and the seat cushion and seat back heating element control circuits for a short to ground.
3. Ignition ON, verify that a test lamp does not illuminate between the supply voltage circuit terminal 14 X1 and ground.
 - If the test lamp illuminates, test the supply voltage circuit and the seat cushion and seat back heating element control circuits for a short to voltage.
4. Test for infinite resistance between the passenger seat heating element supply voltage circuit terminal 6 X1 and ground.
 - If less than the specified range, test the supply voltage circuit and the seat cushion and seat back heating element control circuits for a short to ground.
5. Ignition ON, verify that a test lamp does not illuminate between the supply voltage circuit terminal 6 X1 and ground.
 - If the test lamp illuminates, test the supply voltage circuit and the seat cushion and seat back heating element control circuits for a short to voltage.
6. If all circuits test normal, replace the MSM.

B2345 13

1. Ignition OFF, disconnect the X2, X5 harness connectors at the MSM.
2. Test for greater than 850 ohms between the following seat cushion temperature sensor signal circuits and the low reference circuits:
 - Driver seat cushion terminal 1 X5 and terminal 3 X2
 - Passenger seat cushion terminal 2 X5 and terminal 6 X2
 - If less than the specified value, test for a short between the signal and low reference circuits. If the circuits test normal, replace the affected seat cushion heater element.

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3. Test for greater than 850 ohms between the following seat back temperature sensor signal circuits and the low reference circuits:
 - Driver seat back terminal 4 X5 and terminal 2 X2
 - Passenger seat back terminal 3 X5 and terminal 5 X2
 - If less than the specified value, test for a short between the signal and low reference circuits. If the circuits test normal, replace the affected seat back heater element.
4. If the circuits test normal replace the MSM.

B2345 42 or B2345 4B

If this DTC is retrieved as a current DTC, replace the MSM.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Driver Seat and Passenger Seat Back Cushion Heater Replacement**
- **Driver Seat and Passenger Seat Cushion Heater Replacement**
- **Control Module References** for the MSM replacement, setup, and programming

DTC B2425 OR B2430

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 B2425 04

Left Seat Cushion Heater Circuit Open

DTC B2425 0A

Left Seat Cushion Heater Circuit Rate of Change Below Threshold

DTC B2425 0B

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Left Seat Cushion Heater Circuit Current Above Threshold

DTC B2425 0C

Left Seat Cushion Heater Circuit Current Below Threshold

DTC B2425 0D

Left Seat Heater Cushion Circuit Resistance Above Threshold

DTC B2425 0E

Left Seat Heater Cushion Circuit Resistance Below Threshold

DTC B2425 1F

Left Seat Cushion Heater Circuit Intermittent

DTC B2430 04

Right Seat Cushion Heater Circuit Open

DTC B2430 0A

Right Seat Cushion Heater Circuit Rate of Change Below Threshold

DTC B2430 0B

Right Seat Cushion Heater Circuit Current Above Threshold

DTC B2430 0C

Right Seat Cushion Heater Circuit Current Below Threshold

DTC B2430 0D

Right Seat Heater Cushion Circuit Resistance Above Threshold

DTC B2430 0E

Right Seat Heater Cushion Circuit Resistance Below Threshold

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DTC B2430 1F

Right Seat Cushion Heater Circuit Intermittent

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Left Heated Seat Cushion Element Supply Voltage	B2508 02	B2425 0C B2425 0D	B2508 01	-
Left Heated Seat Cushion Element Control	B2508 02	B2425 0C B2425 0D	B2508 01	-
Left Heated Seat Cushion Temperature Sensor Signal	B1925 02	B1925 05 B2425 04 B2425 1F	B1925 05 B2425 04 B2425 1F	-
Left Heated Seat Cushion Temperature Low Reference	-	B1925 05 B2425 04 B2425 1F	-	-
Right Heated Seat Cushion Element Supply Voltage	B2508 02	B2430 0C B2430 0D	B2508 01	-
Right Heated Seat Cushion Element Control	B2508 02	B2430 0C B2430 0D	B2508 01	-
Right Heated Seat Cushion Temperature Sensor Signal	B2170 02	B2170 05 B2430 04 B2430 1F	B2170 05 B2430 04 B2430 1F	-
Right Heated Seat Cushion Temperature Low Reference	-	B2170 05 B2430 04 B2430 1F	-	-

Circuit/System Description

When the heated seat function is active, the Memory Seat Module (MSM) supplies battery voltage through the element supply voltage circuit to the seat heater elements. The module controls the seat temperature by providing a pulse width modulated (PWM) ground through the heated seat element control circuit to the seat heater elements. The module then monitors the current flow through the heating element and the temperature sensor rate of change to verify correct operation.

Conditions for Running the DTC

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The MSM must be powered and the heated seat must be enabled.

Conditions for Setting the DTC

B2425 04, B2430 04

The module does not detect a temperature change within 210 seconds.

B2425 0A, B2430 0A

The module detects that the set point temperature has not been reached within 8.5 minutes.

B2425 0B, B2425 0E, B2430 0B, B2430 0E

By measuring output current, the module calculates that the heating element resistance is below the minimum resistance.

B2425 0C, B2445 0D, B2430 0C, B2430 0D

By measuring output current, the module calculates that the heating element resistance is above the maximum resistance.

B2425 1F, B2430 1F

The temperature sensor voltage is erratic or changes suddenly.

Action Taken When the DTC Sets

The heated seat cushion function for the affected seat will be disabled.

Conditions for Clearing the DTC

- The current DTC clears when the malfunction is no longer present, and the power mode changes to OFF then back to ACC or RUN.
- The history DTC will clear after 50 consecutive fault-free ignition cycles have occurred.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

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Component Connector End Views

Description and Operation

Heated Seats 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

B2425

1. Ignition OFF, disconnect the X1 harness connector at the MSM.
2. Test for less than 15 ohms between the heater element supply voltage circuit terminal 14 and the control circuit terminal 11.
 - If the resistance is greater than 15 ohms test the supply and control circuits for an open/high resistance. If the circuits test normal replace the seat cushion heater element.
3. Disconnect the X2, X5 harness connectors at the MSM.
4. Test for 850-300k ohms between the temperature sensor signal circuit terminal 1 X5 and the low reference circuit terminal 3 X2.
 - If greater than the specified range, test the signal circuit and low reference circuit for a short to voltage or an open/high resistance. If the circuits test normal, replace the seat cushion heater element.
 - If less than the specified range, test for a short between the signal and low reference circuits. If the circuits test normal, replace the seat cushion heater element.
5. Connect the X1, X2, X5 harness connectors at the MSM.
6. Disconnect the harness connector at the seat cushion heater element.
7. Ignition ON, test for 4.8-5.2 volts between the temperature sensor signal circuit terminal C and ground.

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- If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the MSM.
- If less than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the MSM.
- 8. If all circuits test normal, replace the MSM.

B2430 Front

1. Ignition OFF, disconnect the X1, X4 harness connector at the MSM.
2. Test for less than 15 ohms between the heater element supply voltage circuit terminal 6 X1 and the control circuit terminal 14 X4.
 - If the resistance is greater than 15 ohms test the supply and control circuits for an open/high resistance. If the circuits test normal replace the seat cushion heater element.
3. Disconnect the X2, X5 harness connectors at the MSM.
4. Test for 850-300k ohms between the temperature sensor signal circuit terminal 2 X5 and the low reference circuit terminal 6 X2.
 - If greater than the specified range, test the signal circuit and low reference circuit for a short to voltage or an open/high resistance. If the circuits test normal, replace the seat cushion heater element.
 - If less than the specified range, test for a short between the signal and low reference circuits. If the circuits test normal, replace the seat cushion heater element.
5. Connect the X1, X2, X4, X5 harness connectors at the MSM.
6. Disconnect the harness connector at the seat cushion heater element.
7. Ignition ON, test for 4.8-5.2 volts between the temperature sensor signal circuit terminal C and ground.
 - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the MSM.
 - If less than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the MSM.
8. If all circuits test normal, replace the MSM.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Driver Seat and Passenger Seat Cushion Heater Replacement**
- **Control Module References** for the MSM replacement, setup, and programming

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DTC B2435 OR B2440

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 B2435 02

Left Seat Back Heater Sensor Circuit Shorted to Ground

DTC B2435 05

Left Seat Back Heater Sensor Circuit Shorted to Battery or Open

DTC B2440 02

Right Seat Back Heater Sensor Circuit Shorted to Ground

DTC B2440 05

Right Seat Back Heater Sensor Circuit Shorted to Battery or Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Left Heated Seat Back Element Supply Voltage	B2508 02	B1935 0C B1935 0D	B2508 01	-
Left Heated Seat Back Element Control	B2508 02	B1935 0C B1935 0D	B2508 01	-
Left Heated Seat Back Temperature Sensor Signal	B2435 02	B1935 04 B1935 1F B2435 05	B1935 04 B1935 1F B2435 05	-
Left Heated Seat Back Temperature Low Reference	-	B1935 04 B1935 1F B2435 05	-	-
Right Heated Seat Back		B2180 0C		

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Element Supply Voltage	B2508 02	B2180 0D	B2508 01	-
Right Heated Seat Back Element Control	B2508 02	B2180 0C B2180 0D	B2508 01	-
Right Heated Seat Back Temperature Sensor Signal	B2440 02	B2180 04 B2180 1F B2440 05	B2180 04 B2180 1F B2440 05	-
Right Heated Seat Back Temperature Low Reference	-	B2180 04 B2180 1F B2440 05	-	-

Circuit/System Description

The heated seat temperature sensor is located in the seat back just under the seat cover with the seat heating element. The temperature sensor is a 2 wire thermistor and resistance through the sensor varies with temperature. The signal circuit is referenced from 5 volts within the module and the temperature of the seat surface determines the signal circuit voltage. Once the seat reaches the set temperature, the module will then cycle the control circuits of the heating elements ON and OFF in order to maintain the desired seat temperature based on the feedback voltage from the sensors.

Conditions for Running the DTC

The heated seat system must be active.

Conditions for Setting the DTC

B2435 02, B2440 02

The temperature sensor voltage drops below 0.8 volt for more than 1 second.

B2435 05, B2440 05

The temperature sensor voltage is greater than 5 volts for more than 1 second.

Action Taken When the DTC Sets

The heated seat back function for the affected seat will be disabled.

Conditions for Clearing the DTC

- The current DTC will clear 3 seconds after the reference voltage returns to normal operating range, and the ignition is cycled OFF then back to ACC or RUN.

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- A history DTC will clear after 50 ignition cycles or with a scan tool using the clear DTCs function.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Heated Seats 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

B2435

1. Ignition OFF, disconnect the X2, X5 harness connectors at the MSM.
2. Test for 850-300k ohms between the signal circuit terminal 4 X5 and the low reference circuit terminal 2 X2.
 - If greater than the specified range, test the signal circuit and low reference circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the seat back heater element.
 - If less than the specified range, test for a short between the signal and low reference circuits. If the circuit tests normal, replace the seat back heater element.

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3. Connect the X2, X5 harness connectors at the MSM.
4. Disconnect the harness connector at the seat back heater element.
5. Ignition ON, test for 4.8-5.2 volts between the temperature sensor signal circuit terminal C and ground.
 - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the MSM.
 - If less than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the MSM.
6. If all circuits test normal, replace the MSM.

B2440

1. Ignition OFF, disconnect the X2, X5 harness connectors at the MSM.
2. Test for 850-300k ohms between the signal circuit terminal 3 X5 and the low reference circuit terminal 5 X2.
 - If greater than the specified range, test the signal circuit and low reference circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the seat back heater element.
 - If less than the specified range, test for a short between the signal and low reference circuits. If the circuit tests normal, replace the seat back heater element.
3. Connect the X2, X5 harness connectors at the MSM.
4. Disconnect the harness connector at the seat back heater element.
5. Ignition ON, test for 4.8-5.2 volts between the temperature sensor signal circuit terminal C and ground.
 - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the MSM.
 - If less than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the MSM.
6. If all circuits test normal, replace the MSM.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Driver Seat and Passenger Seat Back Cushion Heater Replacement**
- **Control Module References** for the MSM replacement, setup, and programming

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DTC B2508 OR B2509

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 B2508 01

Seat Heater Relay Circuit Shorted to Battery or Open

DTC B2508 02

Seat Heater Relay Circuit Shorted to Ground

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Left Heated Seat Back Element Supply Voltage	B2508 02	B1935 0C B1935 0D	B2508 01	-
Left Heated Seat Cushion Element Supply Voltage	B2508 02	B2425 0C B2425 0D	B2508 01	-
Left Heated Seat Back Element Control	B2508 02	B1935 0C B1935 0D	B2508 01	-
Left Heated Seat Cushion Element Control	B2508 02	B2425 0C B2425 0D	B2508 01	-
Right Heated Seat Back Element Supply Voltage	B2508 02	B2180 0C B2180 0D	B2508 01	-
Right Heated Seat Cushion Element Supply Voltage	B2508 02	B2430 0C B2430 0D	B2508 01	-
Right Heated Seat Back Element Control	B2508 02	B2180 0C B2180 0D	B2508 01	-
Right Heated Seat Cushion Element Control	B2508 02	B2430 0C B2430 0D	B2508 01	-

Circuit/System Description

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The front seat heating elements are controlled by a common high current relay internal to the Memory Seat Module (MSM) and on the low side by individual element control circuits. The module connects the heated seat heater element supply voltage circuits to a common reference point. This reference point is biased to approximately 2.0 volts. Before the module will allow heated seat operation, it checks to see if the heating element supply voltage circuits and control circuits are shorted to ground or battery voltage. Once the module verifies that it is not closing into a shorted heating element, it allows heated seat operation. After which it continues to monitor for a shorted circuit.

Conditions for Running the DTC

The MSM must be powered.

Conditions for Setting the DTC

B2508 02

Before the heated seats are activated, the MSM detects a short to ground on the seat heating element supply voltage circuit or control circuit.

B2508 01

Before the heated seats are activated, the MSM detects a short to battery voltage on the seat heating element supply voltage circuit or control circuit.

Action Taken When the DTC Sets

The heated seat function for both seats will be disabled.

Conditions for Clearing the DTC

- The current DTC clears when the malfunction is no longer present and the power mode changes to OFF then back to ACC or RUN.
- The history DTC will clear after 50 consecutive fault-free ignition cycles have occurred.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

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Component Connector End Views

Description and Operation

Heated Seats 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, disconnect the X1, X4 harness connectors at the MSM.
2. Test for infinite resistance between the driver seat heating element supply voltage circuit terminal 14 X1 and ground.
 - If less than the specified range, test the supply voltage circuit and the seat cushion and seat back heating element control circuits for a short to ground.
3. Ignition ON, verify that a test lamp does not illuminate between the supply voltage circuit terminal 14 X1 and ground.
 - If the test lamp illuminates, test the supply voltage circuit and the seat cushion and seat back heating element control circuits for a short to voltage.
4. Test for infinite resistance between the passenger seat heating element supply voltage circuit terminal 6 X1 and ground.
 - If less than the specified range, test the supply voltage circuit and the seat cushion and seat back heating element control circuits for a short to ground.
5. Ignition ON, verify that a test lamp does not illuminate between the supply voltage circuit terminal 6 X1 and ground.
 - If the test lamp illuminates, test the supply voltage circuit and the seat cushion and seat back heating element control circuits for a short to voltage.
6. If all circuits test normal, replace the MSM.

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Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Driver Seat and Passenger Seat Back Cushion Heater Replacement**
- **Driver Seat and Passenger Seat Cushion Heater Replacement**
- **Control Module References** for the MSM replacement, setup, and programming

SYMPTOMS - SEAT HEATING AND COOLING

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

1. Perform the **Diagnostic System Check - Vehicle** before using the Symptom Tables 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 **Heated Seats Description and Operation**.

Visual/Physical Inspection

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

Intermittent

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

Symptom List

Refer to **Heated Seat Inoperative** in order to diagnose the symptom.

HEATED SEAT INOPERATIVE

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

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- 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 heated seat system operation is controlled through the switch inputs to the driver and passenger door modules. When a heated seat switch is pressed a GMLAN message is sent to the memory seat module (MSM) indicating the switch is active. The MSM monitors the heated seat switch inputs and determines the appropriate operating mode. When a heated seat function is activated the MSM will send a GMLAN message to the door module to illuminate the appropriate indicators. The memory seat module controls the voltage supply and the ground circuits to the seat heater elements. When a heated seat function is commanded active, the seat module will switch battery voltage to the heater element supply circuits, and ground is provided through pulse width modulated (PWM) low side drive control circuits. During heated seat operation both the seat back and cushion heater elements are supplied battery voltage. The seat module grounds the appropriate control circuits for back only or back and cushion heating modes, and opens or closes the active control circuits as necessary in order to maintain the desired seat temperature. The seat module relies on 4 independent inputs from thermistors located in the seat back and seat cushion of the driver and passenger seats to control heated seat temperatures. The thermistors are 2-wire sensors supplied with a 5-volt referenced signal circuit and a low reference circuit from the seat module. Resistance through the thermistors varies with temperature causing the heated seat sensor signal circuit voltage levels to decrease as the seat temperatures rise.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Heated Seats Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**

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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 ON, verify that the driver and passenger door switch heated seat switch parameters display Active while the heated seat switches are pressed.
 - If either of the switch parameters are continuously Active or Inactive while the switch is pressed, perform the heated seat switch circuit test.
2. Verify that the MSM driver and passenger seat HVC mode and level parameters are displayed correctly as the heated seat switches are activated through all of the operating modes.
 - If the MSM parameters are not displayed correctly replace the MSM.
3. If the circuits test normal replace the driver or passenger door module.

Component Testing

1. Disconnect the heated seat switch connector at the door module.
2. Connect a fused jumper wire from the low reference circuit terminal 4 to ground.
3. Verify that a test lamp does not illuminate when connected from battery voltage to the switch signal circuit terminals 6 and 7.
 - If the test lamp illuminates while the switches are in an inactive state, replace the heated seat switch.
4. Verify that a test lamp illuminates when connected from battery voltage to the switch signal circuit terminals 6 and 7 while pressing the heated seat switches.
 - If the test lamp does not illuminate while the switches are in an active state, replace the heated seat switch.
5. Verify that the heated seat switch indicators illuminate with a test lamp connected from battery voltage to the indicator control circuit terminals 1, 2, 9, 10, and 11.
 - If the indicators do not illuminate replace the heated seat switch.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

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- **Front Seat Heater Switch Replacement (w/o KB6)**
- **Control Module References** for MSM and Driver or Passenger Door switch replacement, programming, and setup

REPAIR INSTRUCTIONS

FRONT SEAT HEATER SWITCH REPLACEMENT (W/O KB6)

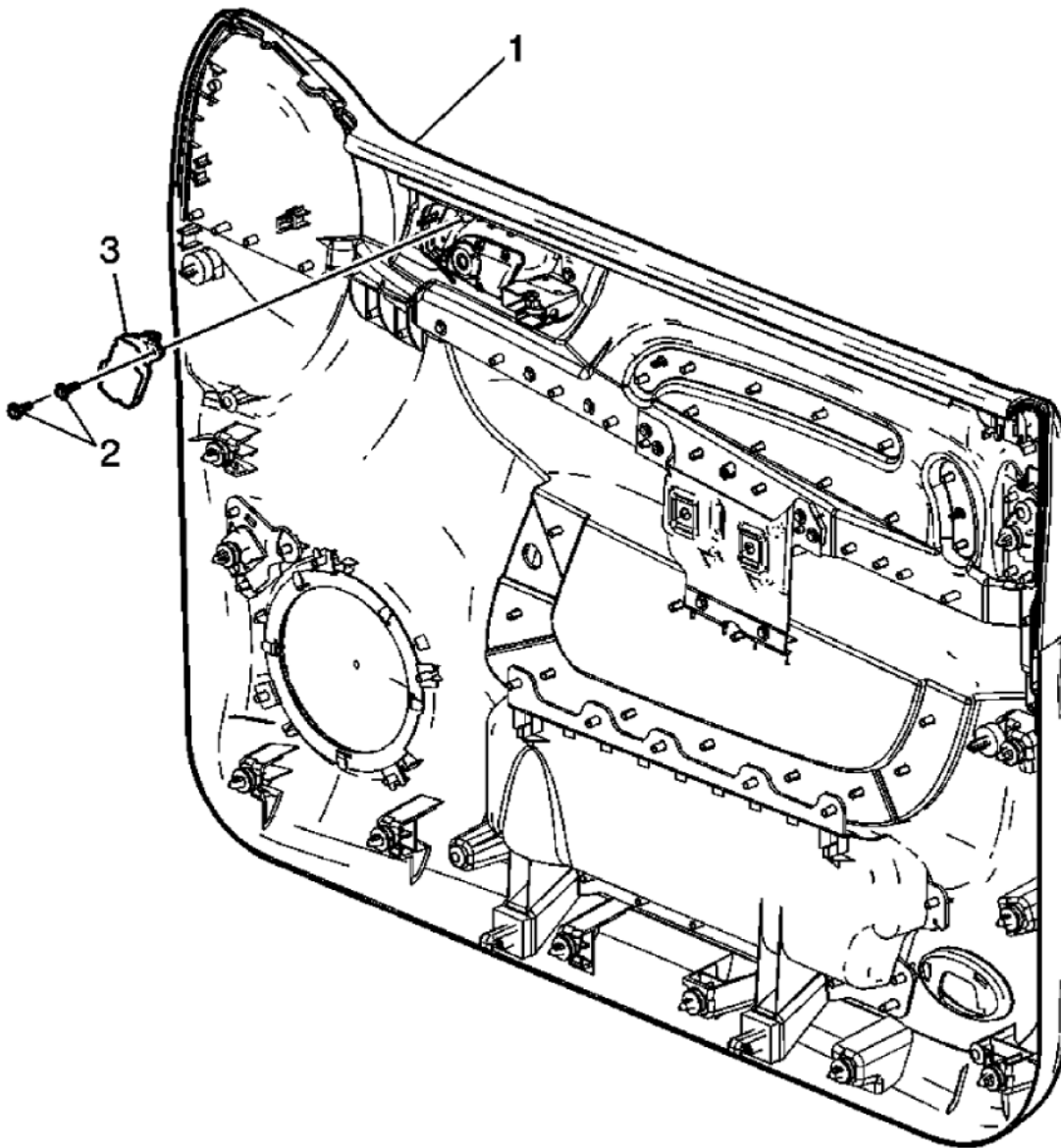


Fig. 3: View Of Seat Heater Switch Assembly, Screws & Trim Panel
Courtesy of GENERAL MOTORS CORP.

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Callout	Component Name
1	Front Side Door Trim Panel Refer to <u>Front Side Door Trim Panel Replacement (YE9)</u> or <u>Front Side Door Trim Panel Replacement (SLT)</u> .
2	Seat Heater Switch Screw (Qty: 2) NOTE: Refer to <u>Fastener Notice</u> . Tighten: 2 N.m (18 lb in)
3	Seat Heater Switch Assembly Tip: Disconnect the electrical connector.

FRONT SEAT HEATER CONTROL MODULE REPLACEMENT

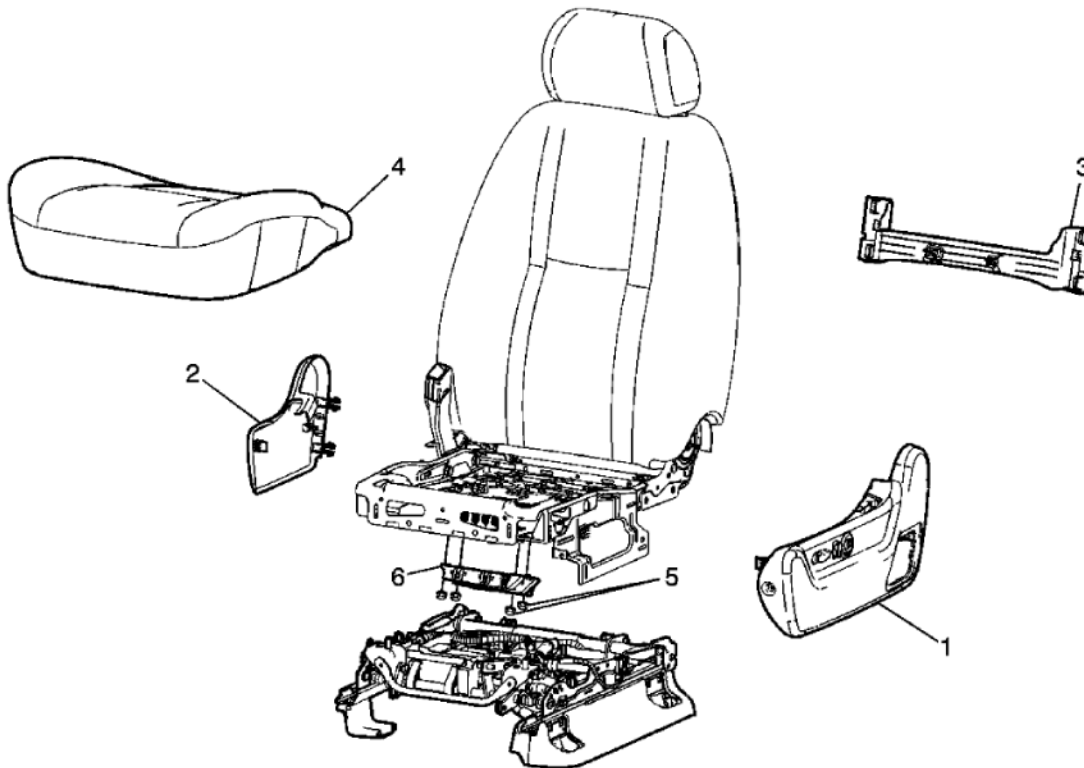


Fig. 4: View Of Front Seat Heater Control Module & Components
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name

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Preliminary Procedure:

Remove the front driver seat. Refer to **Front Seat Replacement - Bucket** .

1	Driver Seat Adjuster Outer Finish Cover Refer to <u>Front Seat Cushion Outer Trim Panel Replacement (Manual)</u> or <u>Front Seat Cushion Outer Trim Panel Replacement (Power)</u> .
2	Driver Seat Adjuster Inner Finish Cover Refer to <u>Front Seat Cushion Inner Trim Panel Replacement</u> .
3	Driver Seat Riser Finish Cover Tip: Pull rearward to disengage the cover from the seat riser.
4	Driver Seat Cushion Cover and Pad Refer to <u>Seat Cushion Trim Cover and Pad Replacement</u> .
5	Front Seat Heater Control Module Bolt (Qty: 2) NOTE: Refer to <u>Fastener Notice</u> . Tighten: 9 N.m (80 lb in)
6	Front Seat Heater Control Module Tip: Disconnect the electrical connector.

DRIVER SEAT AND PASSENGER SEAT BACK CUSHION HEATER REPLACEMENT

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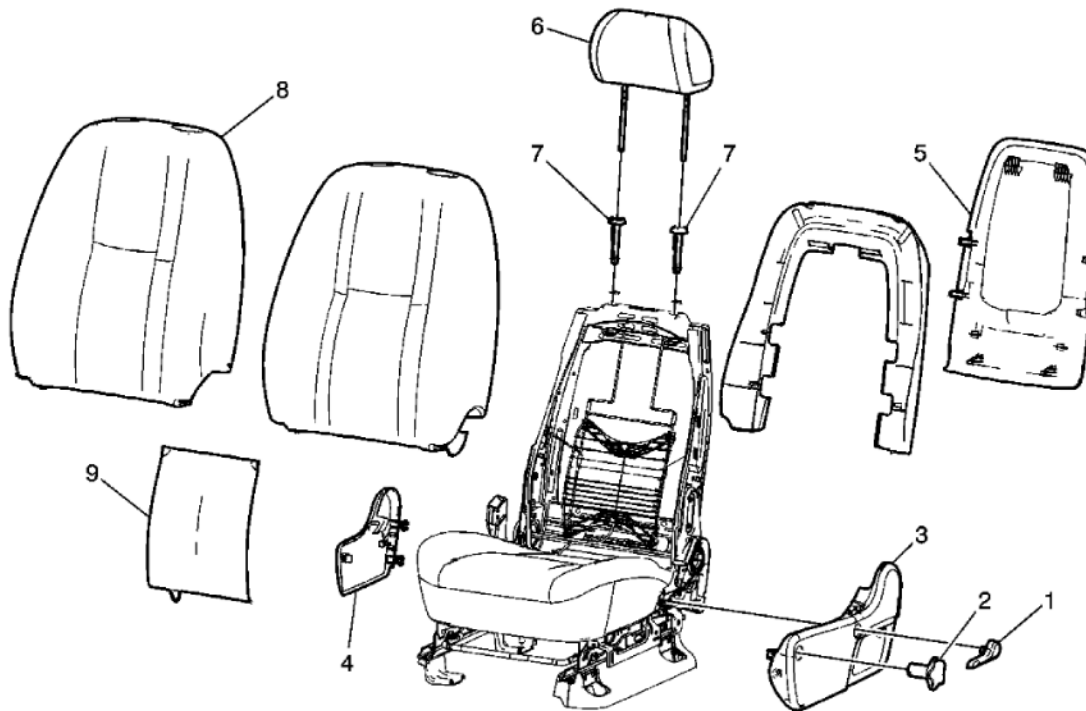


Fig. 5: Driver Seat and Passenger Seat Back Cushion Heater
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the front seat. Refer to <u>Front Seat Replacement - Bucket</u> .	
1	Front Seat Recliner Lever Tip: Using a flat-bladed tool, push the retainer clip downward and pull outward to release the lever.
2	Front Seat Manual Lumbar Knob Tip: Using a flat-bladed tool, push the retainer clip downward and pull outward to release the knob.
3	Front Seat Adjuster Outer Finish Cover Refer to <u>Front Seat Cushion Outer Trim Panel Replacement (Manual)</u> or <u>Front Seat Cushion Outer Trim Panel Replacement (Power)</u> .
4	Front Seat Adjuster Inner Finish Cover Refer to <u>Front Seat Cushion Inner Trim Panel Replacement</u> .
5	Front Seat Back Cushion Finish Panel Tip: Using a nylon flat-bladed tool push the tabs in on the side of the panel to release from the seat back to remove.

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	Front Seat Head Restraint Assembly Tip:
6	1. Depress the button on the inboard head restraint guide to raise the head restraint to the full up position. 2. Insert a small diameter tool into the hole on the inboard side of the outboard head restraint guide and pull upward to remove.
7	Front Seat Head Restraint Guide (Qty: 2) Tip: Squeeze the bottom of the guide together and push up to remove from the seat back.
8	Seat Back Cushion Cover and Pad Refer to <u>Front Seat Back Cushion Cover and Cushion Pad Replacement</u> .
9	Seat Back Cushion Heater Element

DRIVER SEAT AND PASSENGER SEAT CUSHION HEATER REPLACEMENT

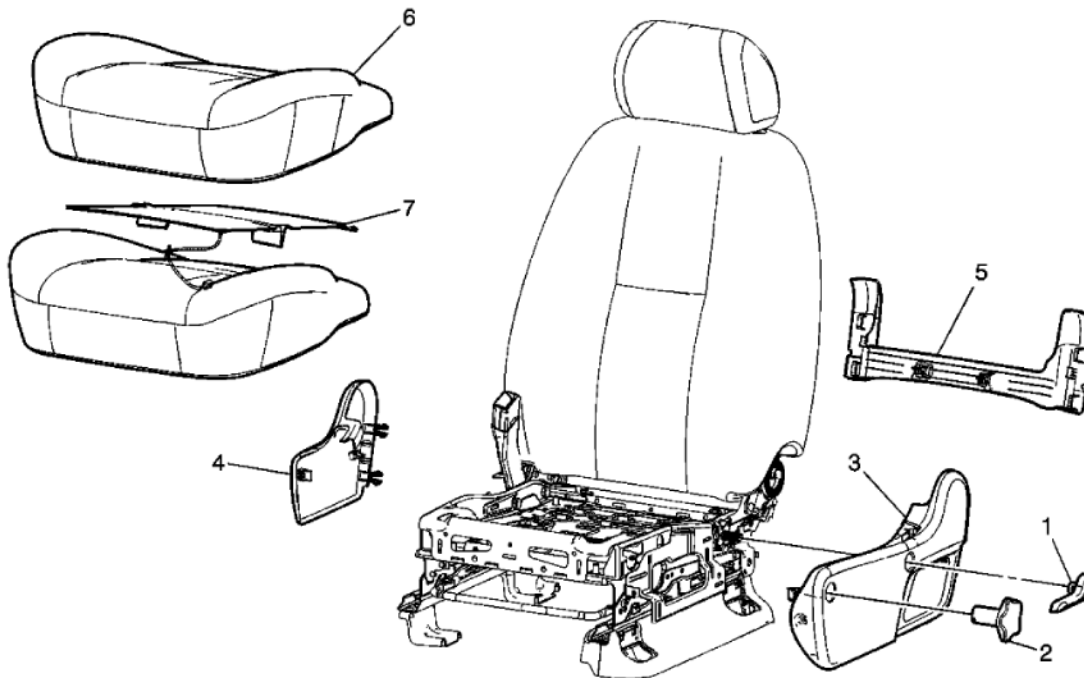


Fig. 6: Driver Seat and Passenger Seat Cushion Heater
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure:	

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Remove the front seat. Refer to **Front Seat Replacement - Bucket** .

1	Front Seat Recliner Lever Tip: Using a flat-bladed tool, push the retainer clip downward and pull outward to release the knob.
2	Front Seat Manual Lumbar Knob Tip: Using a flat-bladed tool, push the retainer clip downward and pull outward to release the knob.
3	Front Seat Adjuster Outer Finish Cover Refer to <u>Front Seat Cushion Outer Trim Panel Replacement (Manual)</u> or <u>Front Seat Cushion Outer Trim Panel Replacement (Power)</u> .
4	Front Seat Adjuster Inner Finish Cover Refer to <u>Front Seat Cushion Inner Trim Panel Replacement</u> .
5	Front Seat Riser Finish Cover Tip: Pull rearward to disengage the cover from the seat riser.
6	Front Seat Cushion Cover and Pad Procedure 1. Disengage the j-channel retainers from the seat cushion frame. 2. Remove the seat cushion cover and pad from the seat cushion frame as an assembly.
7	Front Seat Cushion Heater Element 1. Disconnect the heater element and peel away from the cushion to remove. 2. If working on the passenger seat, re-zero the inflatable restraint passenger presence system whenever the seat cushion or any component of the passenger presence system is removed. Refer to <u>Control Module References</u> .

DESCRIPTION AND OPERATION

HEATED SEATS DESCRIPTION AND OPERATION

The driver and passenger heated seats have 2 heat zone operating modes with 3 heat level modes and will operate only while the engine is running. The heat zones are determined by which of the 2 heated seat buttons are pressed, while the heat level is determined by the number of times they are pressed. Pressing the seat cushion button 1 time will activate the seat back and cushion heater elements in the high mode. Each time the seat cushion button is pressed the seat back and cushion heat level is reduced from high to medium, low, and off. Pressing the heated seat back button 1

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time will activate only the seat back heater element in the high mode. Each time the seat back button is pressed the seat back heat level is reduced from high to medium, low, and off. During heated seat operation the heat zone operating mode may be changed without affecting the current heat level mode.

The heated seat switches are momentary contact switches and are inputs to the driver and passenger door switches. A ground circuit is connected to the switch assembly through the door switch, and when a heated seat switch is pressed and released a brief switch signal is supplied to the door switch. Whenever the door module receives an active heated seat switch input, the active switch signal is sent to the memory seat module as a GMLAN message. The memory seat module determines the heated seat mode based on the switch messages and sends a message to the door switch to display the heated seat indicators as necessary.

The memory seat module controls the voltage supply and the ground circuits to the seat heater elements. When a heated seat function is commanded active, the seat module will switch battery voltage to the heater element supply circuits, and ground is provided through pulse width modulation (PWM) low side drive control circuits. During heated seat operation both the seat back and cushion heater elements are supplied battery voltage. The seat module grounds the appropriate control circuits for back only or back and cushion heating modes, and opens or closes the active control circuits as necessary in order to maintain the desired seat temperature. The seat module relies on 4 independent inputs from thermistors located in the seat back and seat cushion of the driver and passenger seats to control heated seat temperatures. The thermistors are 2-wire sensors supplied with a 5-volt referenced signal circuit and a low reference circuit from the seat module. Resistance through the thermistors varies with temperature causing the heated seat sensor signal circuit voltage levels to decrease as the seat back temperatures rise.

