

2010 ACCESSORIES & EQUIPMENT

Seat Heating and Cooling - Equinox & Terrain

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Front Seat Heater Control Module Fastener	4 N.m	35 lb in

SCHEMATIC AND ROUTING DIAGRAMS

HEATED/COOLED SEAT SCHEMATICS

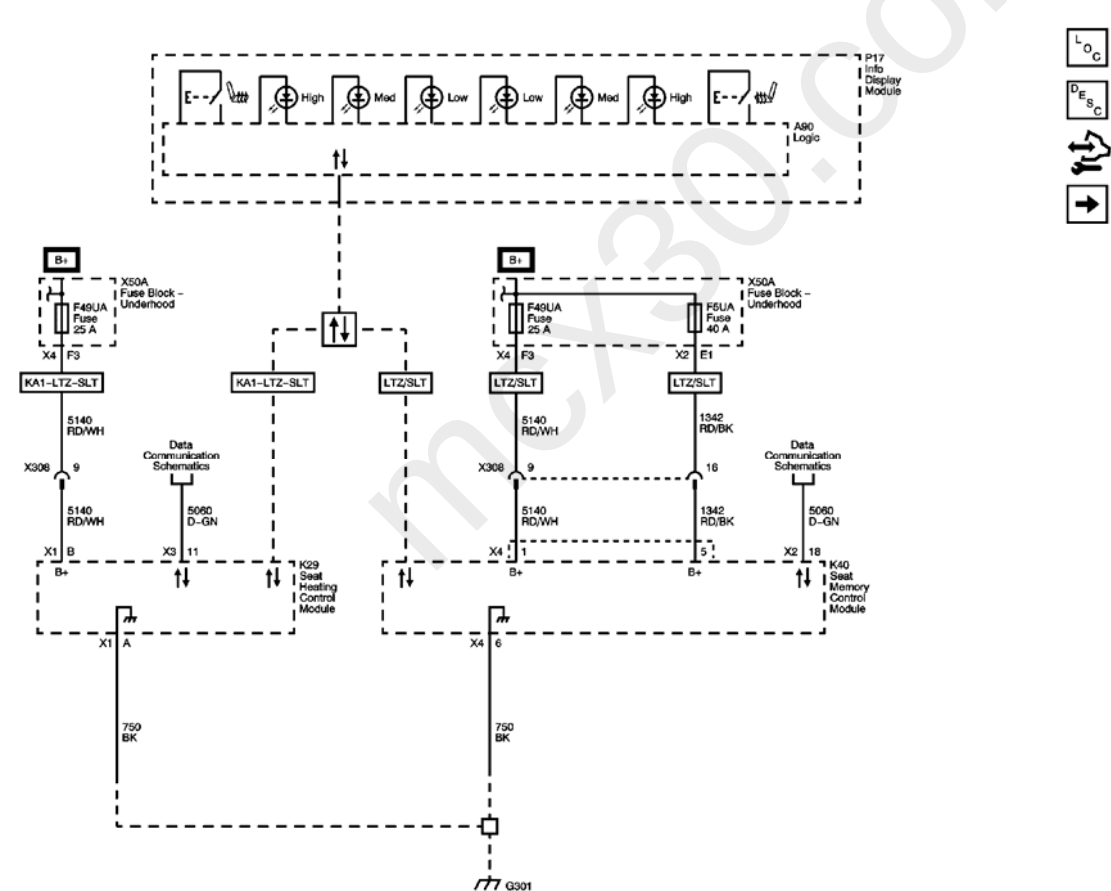


Fig. 1: Power, Ground, Serial Data, and Controls (KA1)
Courtesy of GENERAL MOTORS CORP.

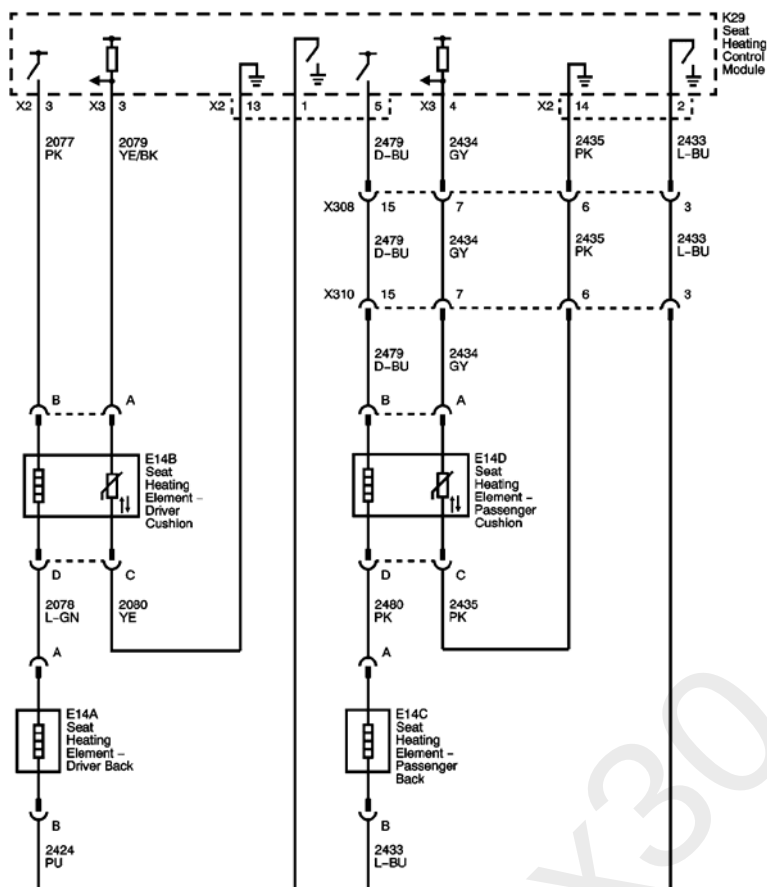


Fig. 2: Heating Elements (KA1 without LTZ or SLT)
Courtesy of GENERAL MOTORS CORP.

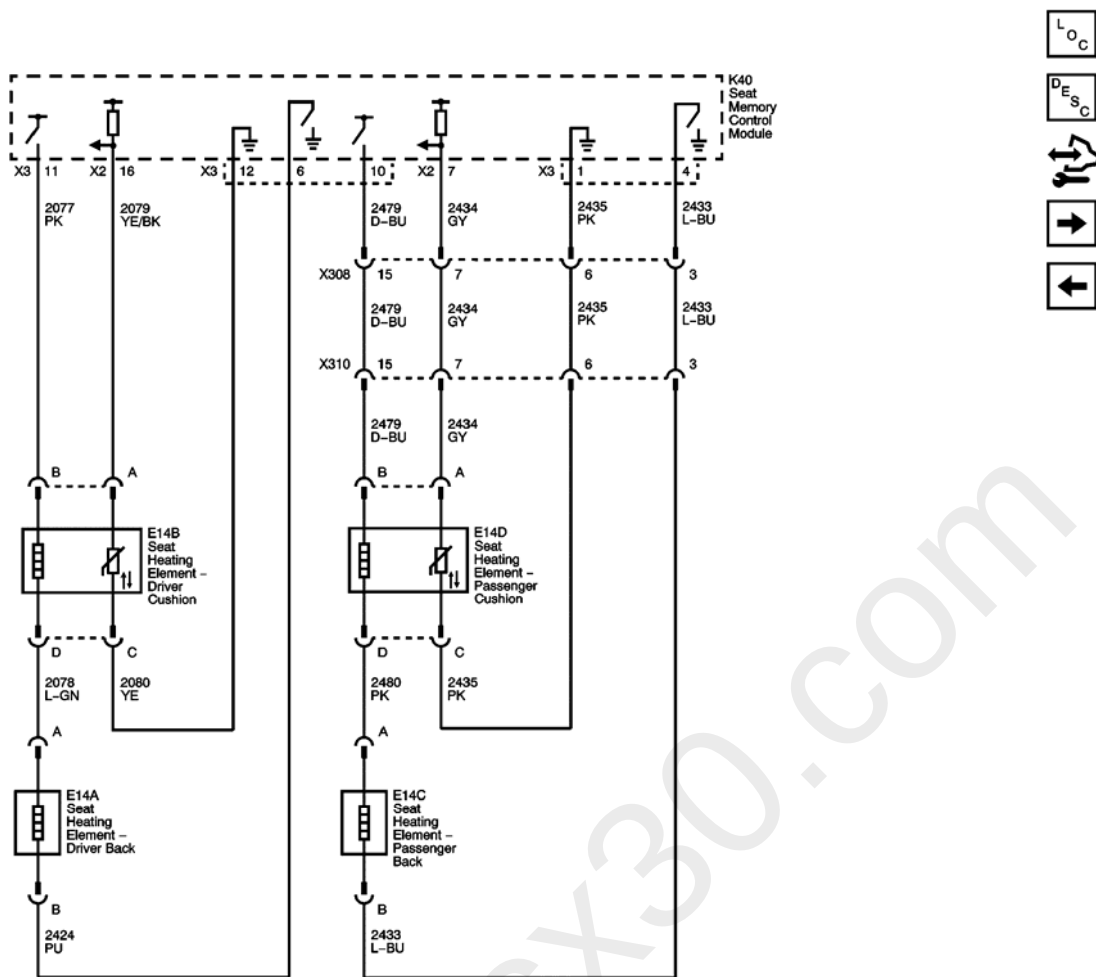


Fig. 3: Heating Elements (KA1 with LTZ or SLT)
 Courtesy of GENERAL MOTORS CORP.

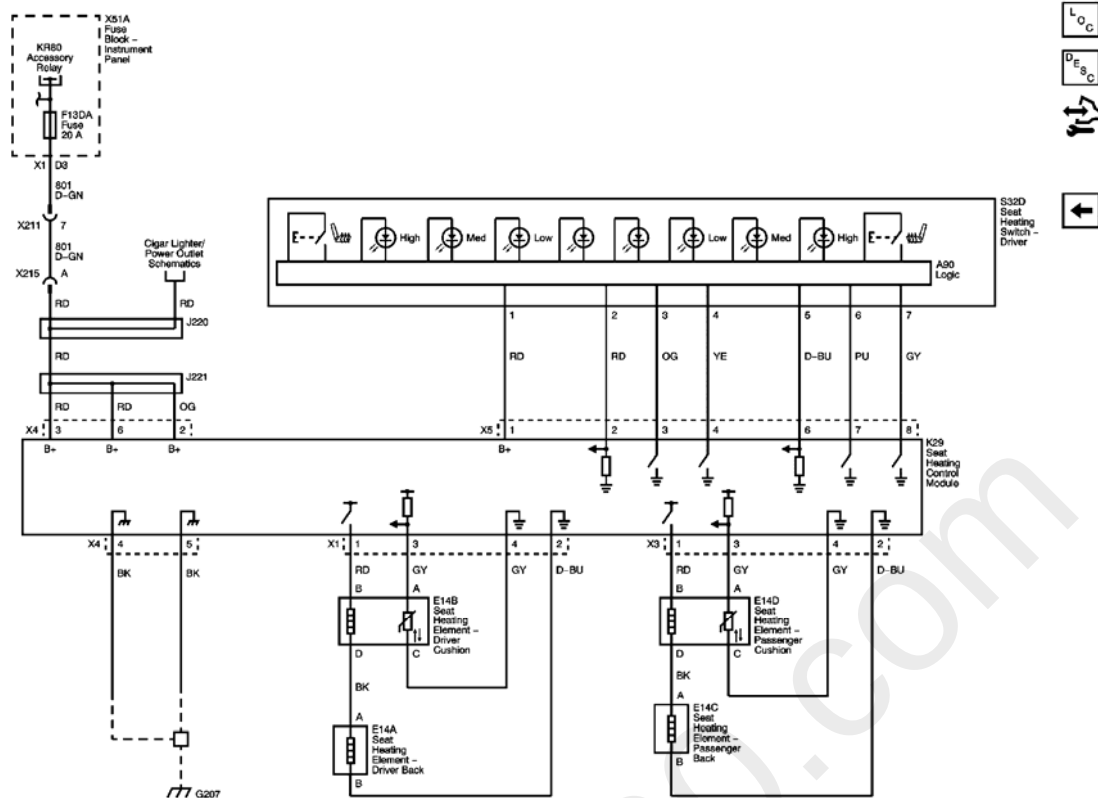


Fig. 4: SPO Heated Seats

Courtesy of GENERAL MOTORS CORP.

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
<u>DTC B1925 or B2170 (Without Memory)</u>	B1925 02: Driver Seat Cushion Heater Sensor Circuit Short to Ground B1925 05: Driver Seat Cushion Heater Sensor Circuit High Voltage/Open B2170 02: Passenger Seat Cushion Heater Sensor Circuit Short to Ground B2170 05: Passenger Seat Cushion Heater Sensor Circuit High Voltage/Open
<u>DTC B1925 or B2170 (With Memory)</u>	B1925 02: Driver Seat Cushion Heater Sensor Circuit Short to Ground B1925 05: Driver Seat Cushion Heater Sensor Circuit High Voltage/Open B2170 02: Passenger Seat Cushion Heater Sensor Circuit Short to Ground B2170 05: Passenger Seat Cushion Heater Sensor Circuit High

	Voltage/Open
<u>DTC B2345 (Without Memory)</u>	B2345 13: Seat Heater Disable Circuit Low Voltage/High Temperature
<u>DTC B2345 (With Memory)</u>	B2345 13: Seat Heater Disable Circuit Low Voltage/High Temperature
<u>DTC B2425 or B2430 (Without Memory)</u>	B2425 0B: Driver Seat Cushion Heater Circuit High Current B2425 0D: Driver Seat Cushion Heater Circuit High Resistance B2425 0E: Driver Seat Cushion Heater Circuit Low Resistance B2430 0B: Passenger Seat Cushion Heater Circuit High Current B2430 0D: Passenger Seat Cushion Heater Circuit High Resistance B2430 0E: Passenger Seat Cushion Heater Circuit Low Resistance
<u>DTC B2425 or B2430 (With Memory)</u>	B2425 0B: Driver Seat Cushion Heater Circuit High Current B2425 0D: Driver Seat Cushion Heater Circuit High Resistance B2425 0E: Driver Seat Cushion Heater Circuit Low Resistance B2430 0B: Passenger Seat Cushion Heater Circuit High Current B2430 0D: Passenger Seat Cushion Heater Circuit High Resistance B2430 0E: Passenger Seat Cushion Heater Circuit Low Resistance
<u>DTC B242A (Without Memory)</u>	B242A 01: Seat Heaters Common Circuit Short to Battery B242A 02: Seat Heaters Common Circuit Short to Ground
<u>DTC B242A (With Memory)</u>	B242A 01: Seat Heaters Common Circuit Short to Battery B242A 02: Seat Heaters Common Circuit Short to Ground

DTC B1925 OR B2170 (WITHOUT MEMORY)

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 B1925 02

Driver Seat Cushion Heater Sensor Circuit Short to Ground

DTC B1925 05

Driver Seat Cushion Heater Sensor Circuit High Voltage/Open

DTC B2170 02

Passenger Seat Cushion Heater Sensor Circuit Short to Ground

DTC B2170 05

Passenger Seat Cushion Heater Sensor Circuit High Voltage/Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Driver Heated Seat Element Control Terminal 3 X2	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Element Control Terminal 1 X2	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Temperature Sensor Signal	B1925 02	B1925 05	B1925 05	B2345 13
Driver Heated Seat Temperature Sensor Low Reference	-	B1925 05	-	B2345 13
Passenger Heated Seat Element Control Terminal 5 X2	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Element Control Terminal 2 X2	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Temperature Sensor Signal	B2170 02	B2170 05	B2170 05	B2345 13
Passenger Heated Seat Temperature Sensor Low Reference	-	B2170 05	-	B2345 13

Circuit/System Description

The heated seat temperature sensor that set this diagnostic trouble code (DTC) is located in the seat cushion just under the seat cover with the seat heating element. The seat heating control module supplies a 5 V reference voltage through the temperature sensor signal circuit and a ground through the low reference circuit to the sensor. The module monitors the voltage of the sensor signal circuit to determine the temperature of the seat. The temperature sensor varies in resistance based on the temperature of the heating element causing the signal voltage to change. Once the seat reaches the set temperature, the module will then cycle the control circuit of the heating elements ON and OFF in order to maintain the desired seat temperature based on the feedback voltage from the sensor.

Conditions for Running the DTC

- DTC B1325 must not be present.
- The seat heating control module must be powered.

Conditions for Setting the DTC

B1925 02 or B2170 02

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

B1925 05 or B2170 05

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

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

- The current DTC will clear and set the code to history 3 seconds after the reference voltage returns to normal operating range and the ignition is cycled OFF then back to ACC or RUN.
- The history DTC will clear after 40 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 (Factory Installed) or Heated Seats Description and Operation (Dealer Installed)

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 harness connector at the appropriate E14B or E14D seat cushion heating element.
2. Test for less than 10 ohms between the low reference circuit terminal C and ground.
 - If greater than the specified range, test the low reference circuit for an open/high resistance. If the circuit test normal, replace the K29 seat heating control module.
3. Ignition ON, test for 4.8 - 5.2 V between the signal circuit terminal A and ground.
 - If less than the specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K29 seat heating control module.

- If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the K29 seat heating control module.
4. If all circuits test normal, test or replace the E14 seat cushion heating element.

Component Testing

E14B or E14D Seat Cushion Heating Element

1. Ignition OFF, disconnect the harness connector at the appropriate E14B or E14D seat cushion heating element.
2. Test for 500 ohms - 300 kohms between the signal circuit terminal A and the low reference circuit terminal C.
 - If not within the specified range, replace the E14 seat cushion heating element.

Repair Procedures

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

- **Driver or Passenger Seat Cushion Heater Replacement**
- **Control Module References** for seat heating control module replacement, setup, and programming

DTC B1925 OR B2170 (WITH MEMORY)

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 B1925 02

Driver Seat Cushion Heater Sensor Circuit Short to Ground

DTC B1925 05

Driver Seat Cushion Heater Sensor Circuit High Voltage/Open

DTC B2170 02

Passenger Seat Cushion Heater Sensor Circuit Short to Ground

DTC B2170 05

Passenger Seat Cushion Heater Sensor Circuit High Voltage/Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Seat Memory Control Module B+ Terminal 5 X4	B242A 02, B2425 0D, B2430 0D, 1, 2	B242A 02, B2425 0D, B2430 0D, 1, 2	-	-
Driver Heated Seat Element Control Terminal 11 X3	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Element Control Terminal 6 X3	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Temperature Sensor Signal	B1925 02	B1925 05	B1925 05	B2345 13
Driver Heated Seat Temperature Sensor Low Reference	-	B1925 05	-	B2345 13
Passenger Heated Seat Element Control Terminal 10 X3	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Element Control Terminal 4 X3	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Temperature Sensor Signal	B2170 02	B2170 05	B2170 05	B2345 13
Passenger Heated Seat Temperature Sensor Low Reference	-	B2170 05	-	B2345 13
1. Power seats inoperative 2. Heated seats inoperative				

Circuit/System Description

The heated seat temperature sensor that set this diagnostic trouble code (DTC) is located in the seat cushion just under the seat cover with the seat heating element. The seat memory control module supplies a 5 V reference voltage through the temperature sensor signal circuit and a ground through the low reference circuit to the sensor. The module monitors the voltage of the sensor signal circuit to determine the temperature of the seat. The temperature sensor varies in resistance based on the temperature of the heating element causing the signal voltage to change. Once the seat reaches the set temperature, the module will then cycle the control circuit of the heating elements ON and OFF in order to maintain the desired seat temperature based on the feedback voltage from the sensor.

Conditions for Running the DTC

- DTC B1325 must not be present.
- The seat memory control module must be powered.

Conditions for Setting the DTC

B1925 02 or B2170 02

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

B1925 05 or B2170 05

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

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

- The current DTC will clear and set the code to history 3 seconds after the reference voltage returns to normal operating range and the ignition is cycled OFF then back to ACC or RUN.
- The history DTC will clear after 40 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 (Factory Installed) or **Heated Seats Description and Operation (Dealer Installed)**

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 harness connector at the appropriate E14B or E14D seat cushion heating element.
2. Test for less than 10 ohms between the low reference circuit terminal C and ground.

- If greater than the specified range, test the low reference circuit for an open/high resistance. If the circuit test normal, replace the K40 seat memory control module.
- 3. Ignition ON, press a power seat switch in order to wake up the module. Test for 4.8 - 5.2 V between the signal circuit terminal A and ground.
 - If less than the specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K40 seat memory control module.
 - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the K40 seat memory control module.
- 4. If all circuits test normal, test or replace the E14 seat cushion heating element.

Component Testing

E14B or E14D Seat Cushion Heating Element

1. Ignition OFF, disconnect the harness connector at the appropriate E14B or E14D seat cushion heating element.
2. Test for 500 ohms - 300 kohms between the signal circuit terminal A and the low reference circuit terminal C.
 - If not within the specified range, replace the E14 seat cushion heating element.

Repair Procedures

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

- **Driver or Passenger Seat Cushion Heater Replacement**
- **Control Module References** for seat memory control module replacement, setup, and programming

DTC B2345 (WITHOUT MEMORY)

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 B2345 13

Seat Heater Disable Circuit Low Voltage/High Temperature

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance

Driver Heated Seat Element Control Terminal 3 X2	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Element Control Terminal 1 X2	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Temperature Sensor Signal	B1925 02	B1925 05	B1925 05	B2345 13
Driver Heated Seat Temperature Sensor Low Reference	-	B1925 05	-	B2345 13
Passenger Heated Seat Element Control Terminal 5 X2	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Element Control Terminal 2 X2	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Temperature Sensor Signal	B2170 02	B2170 05	B2170 05	B2345 13
Passenger Heated Seat Temperature Sensor Low Reference	-	B2170 05	-	B2345 13

Circuit/System Description

The seat heating control module controls seat heating operation for both the driver and front passenger seats. The heating elements are controlled through individual high side and low side control circuits. The low side control circuits for both seats are connected to a common reference point internal to the module. This reference point is biased to approximately 2.5 V. Before the seat heating control module will allow heated seat operation, it checks to see if this biased voltage is shorted to ground or voltage. Once the module verifies that it is not closing to a shorted heating element, it allows for heated seat operation. The module will then continue to monitor the heating elements for a shorted circuit.

Conditions for Running the DTC

- The engine must be running.
- The seat memory control module must be powered.

Conditions for Setting the DTC

B2345 13

Any temperature sensor input that remains below 1.5 V for more than 1 second.

Action Taken When the DTC Sets

The heated seat function for both front seats will be disabled.

Conditions for Clearing the DTC

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

- The history DTC will clear after 40 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 (Factory Installed) or Heated Seats Description and Operation (Dealer Installed)

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 X2, X3 harness connectors at the K29 seat heating control module.
2. Test for greater than 3.0 kohms between the signal and the low reference circuits listed below:
 - E14B driver seat cushion terminal 3 X3 and terminal 13 X2
 - E14D passenger seat cushion terminal 4 X3 and terminal 14 X2
 - If less than the specified range, test for a short between the signal and low reference circuits. If the circuits test normal, replace the appropriate E14 seat cushion heating element.
3. If all circuits test normal, replace the K29 seat heating control module.

Repair Procedures

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Driver or Passenger Seat Cushion Heater Replacement
- Control Module References for seat heating control module replacement, setup and programming

DTC B2345 (WITH MEMORY)

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 B2345 13

Seat Heater Disable Circuit Low Voltage/High Temperature

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Seat Memory Control Module B+ Terminal 5 X4	B242A 02, B2425 0D, B2430 0D, 1, 2	B242A 02, B2425 0D, B2430 0D, 1, 2	-	-
Driver Heated Seat Element Control Terminal 11 X3	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Element Control Terminal 6 X3	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Temperature Sensor Signal	B1925 02	B1925 05	B1925 05	B2345 13
Driver Heated Seat Temperature Sensor Low Reference	-	B1925 05	-	B2345 13
Passenger Heated Seat Element Control Terminal 10 X3	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Element Control Terminal 4 X3	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Temperature Sensor Signal	B2170 02	B2170 05	B2170 05	B2345 13
Passenger Heated Seat Temperature Sensor Low Reference	-	B2170 05	-	B2345 13
1. Power seats inoperative 2. Heated seats inoperative				

Circuit/System Description

The seat memory control module controls seat heating operation for both the driver and front passenger seats. The heating elements are controlled through individual high side and low side control circuits. The low side control circuits for both seats are connected to a common reference point internal to the module. This reference point is biased to approximately 2.5 V. Before the seat memory control module will allow heated seat operation,

it checks to see if this biased voltage is shorted to ground or voltage. Once the module verifies that it is not closing to a shorted heating element, it allows for heated seat operation. The module will then continue to monitor the heating elements for a shorted circuit.

Conditions for Running the DTC

- The engine must be running.
- The seat memory control module must be powered.

Conditions for Setting the DTC

B2345 13

Any temperature sensor input that remains below 1.5 V for more than 1 second.

Action Taken When the DTC Sets

The heated seat function for both front seats will be disabled.

Conditions for Clearing the DTC

- The current DTC will clear and set the code to history 3 seconds after the reference voltage returns to the normal operating range and the ignition is cycled OFF then back to ACC or RUN.
- The history DTC will clear after 40 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 (Factory Installed) or Heated Seats Description and Operation (Dealer Installed)

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 X2, X3 harness connectors at the K40 seat memory control module.
2. Test for greater than 3.0 kohms between the signal and the low reference circuits listed below:
 - E14B driver seat cushion terminal 16 X2 and terminal 12 X3
 - E14D passenger seat cushion terminal 7 X2 and terminal 1 X3
 - If less than the specified range, test for a short between the signal and low reference circuits. If the circuits test normal, replace the appropriate E14 seat cushion heating element.
3. If all circuits test normal, replace the K40 seat memory control module.

Repair Procedures

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

- **Driver or Passenger Seat Cushion Heater Replacement**
- **Control Module References** for seat memory control module replacement, setup and programming

DTC B2425 OR B2430 (WITHOUT MEMORY)

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 0B

Driver Seat Cushion Heater Circuit High Current

DTC B2425 0D

Driver Seat Cushion Heater Circuit High Resistance

DTC B2425 0E

Driver Seat Cushion Heater Circuit Low Resistance

DTC B2430 0B

Passenger Seat Cushion Heater Circuit High Current

DTC B2430 0D

Passenger Seat Cushion Heater Circuit High Resistance

DTC B2430 0E

Passenger Seat Cushion Heater Circuit Low Resistance

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Driver Heated Seat Element Control Terminal 3 X2	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Element Control Terminal 1 X2	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Temperature Sensor Signal	B1925 02	B1925 05	B1925 05	B2345 13
Driver Heated Seat Temperature Sensor Low Reference	-	B1925 05	-	B2345 13
Passenger Heated Seat Element Control Terminal 5 X2	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Element Control Terminal 2 X2	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Temperature Sensor Signal	B2170 02	B2170 05	B2170 05	B2345 13
Passenger Heated Seat Temperature Sensor Low Reference	-	B2170 05	-	B2345 13

Circuit/System Description

The driver and front passenger heated seats are controlled by the seat heating control module that is located under the driver seat cushion. When the heated seat is active, the module applies power through a common voltage supply circuit to the seat heater elements. The module controls the seat temperature by providing a pulse width modulation (PWM) ground through the seat heater element control circuit to the heater elements. The module then monitors the current flow through the heating elements and the rate of change of the temperature sensor to verify correct heated seat operation.

Conditions for Running the DTC

- DTC B1325 must not be present.
- The seat heating control module must be powered and the heated seat must be enabled.

Conditions for Setting the DTC

B2425 0D or B2430 0D

By measuring current and voltage output to the seat heating elements every 10 seconds, the seat heating control module calculates that the heating element resistance is above the maximum resistance.

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

By measuring current and voltage output to the seat heating elements every 10 seconds, the seat heating control module calculates that the heating element resistance is below the minimum resistance.

Action Taken When the DTC Sets

The heated seat 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 40 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 (Factory Installed) or Heated Seats Description and Operation (Dealer Installed)

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 0B, B2425 0D, or B2425 0E

1. Ignition OFF, disconnect the harness connector at the E14A seat back heating element.

NOTE: Element resistance must be measured twice to ensure that all failure conditions are simulated. First with the seat unoccupied, then with the seat occupied.

2. Test for 0.5 - 5 ohms between terminal A and terminal B.
 - If not within the specified range, replace the E14A seat back heating element.
3. Connect the harness connector at the E14A seat back heating element and disconnect the X2 harness connector at the K29 seat heating control module.

NOTE: Element resistance must be measured twice to ensure that all failure conditions are simulated. First with the seat unoccupied, then with the seat occupied.

4. Test for 1 - 5 ohms between control circuit terminal 3 and control circuit terminal 1.
 - If less than the specified range, test for a short between the control circuits. If the circuits test normal, replace the E14B seat cushion heating element.
 - If greater than the specified range, test the control circuits for an open/high resistance. If the circuits test normal, replace the E14B seat cushion heating element.
5. If all circuits test normal, replace the K29 seat heating control module.

B2430 0B, B2430 0D, or B2430 0E

1. Ignition OFF, disconnect the harness connector at the E14C seat back heating element.

NOTE: Element resistance must be measured twice to ensure that all failure conditions are simulated. First with the seat unoccupied, then with the seat occupied.

2. Test for 0.5 - 5 ohms between terminal A and terminal B.
 - If not within the specified range, replace the E14C seat back heating element.
3. Connect the harness connector at the E14C seat back heating element and disconnect the X2 harness connector at the K29 seat heating control module.

NOTE: Element resistance must be measured twice to ensure that all failure conditions are simulated. First with the seat unoccupied, then with the seat occupied.

4. Test for 1 - 5 ohms between control circuit terminal 5 and control circuit terminal 2.
 - If less than the specified range, test for a short between the control circuits. If the circuits test normal, replace the E14D seat cushion heating element.
 - If greater than the specified range, test the control circuits for an open/high resistance. If the circuits

test normal, replace the E14D seat cushion heating element.

5. If all circuits test normal, replace the K29 seat heating control module.

Repair Procedures

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

- **Driver or Passenger Seat Back Cushion Heater Replacement**
- **Driver or Passenger Seat Cushion Heater Replacement**
- **Control Module References** for seat heating control module replacement, setup, and programming

DTC B2425 OR B2430 (WITH MEMORY)

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 0B

Driver Seat Cushion Heater Circuit High Current

DTC B2425 0D

Driver Seat Cushion Heater Circuit High Resistance

DTC B2425 0E

Driver Seat Cushion Heater Circuit Low Resistance

DTC B2430 0B

Passenger Seat Cushion Heater Circuit High Current

DTC B2430 0D

Passenger Seat Cushion Heater Circuit High Resistance

DTC B2430 0E

Passenger Seat Cushion Heater Circuit Low Resistance

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Seat Memory Control Module B+ Terminal 5 X4	B242A 02, B2425 0D, B2430 0D, 1, 2	B242A 02, B2425 0D, B2430 0D, 1, 2	-	-
Driver Heated Seat Element Control Terminal 11 X3	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Element Control Terminal 6 X3	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Temperature Sensor Signal	B1925 02	B1925 05	B1925 05	B2345 13
Driver Heated Seat Temperature Sensor Low Reference	-	B1925 05	-	B2345 13
Passenger Heated Seat Element Control Terminal 10 X3	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Element Control Terminal 4 X3	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Temperature Sensor Signal	B2170 02	B2170 05	B2170 05	B2345 13
Passenger Heated Seat Temperature Sensor Low Reference	-	B2170 05	-	B2345 13
1. Power seats inoperative 2. Heated seats inoperative				

Circuit/System Description

The driver and front passenger heated seats are controlled by the seat memory control module that is located under the driver seat cushion. When the heated seat is active, the module applies power through a common voltage supply circuit to the seat heater elements. The module controls the seat temperature by providing a pulse width modulation (PWM) ground through the seat heater element control circuit to the heater elements. The module then monitors the current flow through the heating elements and the rate of change of the temperature sensor to verify correct heated seat operation.

Conditions for Running the DTC

- DTC B1325 must not be present.
- The seat memory control module must be powered and the heated seat must be enabled.

Conditions for Setting the DTC

B2425 0D or B2430 0D

By measuring current and voltage output to the seat heating elements every 10 seconds, the seat memory control module calculates that the heating element resistance is above the maximum resistance.

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

By measuring current and voltage output to the seat heating elements every 10 seconds, the seat memory control module calculates that the heating element resistance is below the minimum resistance.

Action Taken When the DTC Sets

The heated seat 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 40 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 (Factory Installed) or Heated Seats Description and Operation (Dealer Installed)

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 0B, B2425 0D, or B2425 0E

1. Ignition OFF, disconnect the X4 harness connector at the K40 seat memory control module.
2. Ignition ON, verify that a test lamp illuminates between the B+ circuit terminal 5 and ground.
 - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high

resistance.

3. Ignition OFF, connect the X4 harness connector at the K40 seat memory control module and disconnect the harness connector at the E14A seat back heating element.

NOTE: **Element resistance must be measured twice to ensure that all failure conditions are simulated. First with the seat unoccupied, then with the seat occupied.**

4. Test for 0.5 - 5 ohms between terminal A and terminal B.
 - If not within the specified range, replace the E14A seat back heating element.
5. Connect the harness connector at the E14A seat back heating element and disconnect the X3 harness connector at the K40 seat memory control module.

NOTE: **Element resistance must be measured twice to ensure that all failure conditions are simulated. First with the seat unoccupied, then with the seat occupied.**

6. Test for 1 - 5 ohms between control circuit terminal 11 and control circuit terminal 6.
 - If less than the specified range, test for a short between the control circuits. If the circuits test normal, replace the E14B seat cushion heating element.
 - If greater than the specified range, test the control circuits for an open/high resistance. If the circuits test normal, replace the E14B seat cushion heating element.
7. If all circuits test normal, replace the K40 seat memory control module.

B2430 0B, B2430 0D, or B2430 0E

1. Ignition OFF, disconnect the X4 harness connector at the K40 seat memory control module.
2. Ignition ON, verify that a test lamp illuminates between the B+ circuit terminal 5 and ground.
 - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance.
3. Ignition OFF, connect the X4 harness connector at the K40 seat memory control module and disconnect the harness connector at the E14C seat back heating element.

NOTE: **Element resistance must be measured twice to ensure that all failure conditions are simulated. First with the seat unoccupied, then with the seat occupied.**

4. Test for 0.5 - 5 ohms between terminal A and terminal B.
 - If not within the specified range, replace the E14C seat back heating element.
5. Connect the harness connector at the E14C seat back heating element and disconnect the X3 harness connector at the K40 seat memory control module.

NOTE: **Element resistance must be measured twice to ensure that all failure**

conditions are simulated. First with the seat unoccupied, then with the seat occupied.

6. Test for 1 - 5 ohms between control circuit terminal 10 and control circuit terminal 4.
 - If less than the specified range, test for a short between the control circuits. If the circuits test normal, replace the E14D seat cushion heating element.
 - If greater than the specified range, test the control circuits for an open/high resistance. If the circuits test normal, replace the E14D seat cushion heating element.
7. If all circuits test normal, replace the K40 seat memory control module.

Repair Procedures

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

- **Driver or Passenger Seat Back Cushion Heater Replacement**
- **Driver or Passenger Seat Cushion Heater Replacement**
- **Control Module References** for seat memory control module replacement, setup, and programming

DTC B242A (WITHOUT MEMORY)

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 B242A 01

Seat Heaters Common Circuit Short to Battery

DTC B242A 02

Seat Heaters Common Circuit Short to Ground

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Driver Heated Seat Element Control Terminal 3 X2	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Element Control Terminal 1 X2	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Temperature				

Sensor Signal	B1925 02	B1925 05	B1925 05	B2345 13
Driver Heated Seat Temperature Sensor Low Reference	-	B1925 05	-	B2345 13
Passenger Heated Seat Element Control Terminal 5 X2	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Element Control Terminal 2 X2	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Temperature Sensor Signal	B2170 02	B2170 05	B2170 05	B2345 13
Passenger Heated Seat Temperature Sensor Low Reference	-	B2170 05	-	B2345 13

Circuit/System Description

The seat heating control module controls seat heating operation for both the driver and front passenger seats. The heating elements are controlled through individual high side and low side control circuits. The low side control circuits for both seats are connected to a common reference point internal to the module. This reference point is biased to approximately 2.5 V. Before the seat heating control module will allow heated seat operation, it checks to see if this biased voltage is shorted to ground or voltage. Once the module verifies that it is not closing to a shorted heating element, it allows for heated seat operation. The module will then continue to monitor the heating elements for a shorted circuit.

Conditions for Running the DTC

- DTC B1325 must not be present.
- The seat heating control module must be powered.

Conditions for Setting the DTC

B242A 01

The seat heating control module detects a short to voltage on the heater element control circuits.

B242A 02

The seat heating control module detects a short to ground on the heater element control circuits.

Action Taken When the DTC Sets

The heated seat function for both seats will be disabled.

Conditions for Clearing the DTC

- The current DTC will clear and set a history code 3 seconds after the reference voltage returns to normal operating range and the ignition is cycled OFF then back to ACC or RUN.
- The history DTC will clear after 40 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 (Factory Installed) or Heated Seats Description and Operation (Dealer Installed)

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 X2 harness connector at the K29 seat heating control module.
2. Test for infinite resistance between the control circuit terminal 3 and ground.
 - If not the specified value, test the control circuit for a short to ground.
3. Test for infinite resistance between the control circuit terminal 5 and ground.
 - If not the specified value, test the control circuit for a short to ground.
4. Ignition ON, verify that a test lamp does not illuminate between the control circuit terminal 3 and ground.
 - If the test lamp illuminates, test the control circuit for a short to voltage.
5. Verify that a test lamp does not illuminate between the control circuit terminal 5 and ground.
 - If the test lamp illuminates, test the control circuit for a short to voltage.
6. If all circuits test normal, replace the K29 seat heating control module.

Repair Procedures

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

Control Module References for seat heating control module replacement, setup, and programming

DTC B242A (WITH MEMORY)

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 B242A 01

Seat Heaters Common Circuit Short to Battery

DTC B242A 02

Seat Heaters Common Circuit Short to Ground

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Seat Memory Control Module B+ Terminal 5 X4	B242A 02, B2425 0D, B2430 0D, 1, 2	B242A 02, B2425 0D, B2430 0D, 1, 2	-	-
Driver Heated Seat Element Control Terminal 11 X3	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Element Control Terminal 6 X3	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Temperature Sensor Signal	B1925 02	B1925 05	B1925 05	B2345 13
Driver Heated Seat Temperature Sensor Low Reference	-	B1925 05	-	B2345 13
Passenger Heated Seat Element Control Terminal 10 X3	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Element Control Terminal 4 X3	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Temperature Sensor Signal	B2170 02	B2170 05	B2170 05	B2345 13
Passenger Heated Seat Temperature Sensor Low Reference	-	B2170 05	-	B2345 13
1. Power seats inoperative 2. Heated seats inoperative				

Circuit/System Description

The seat heating control module controls seat heating operation for both the driver and front passenger seats. The heating elements are controlled through individual high side and low side control circuits. The low side control circuits for both seats are connected to a common reference point internal to the module. This reference point is biased to approximately 2.5 V. Before the seat heating control module will allow heated seat operation, it checks to see if this biased voltage is shorted to ground or voltage. Once the module verifies that it is not closing to a shorted heating element, it allows for heated seat operation. The module will then continue to monitor the heating elements for a shorted circuit.

Conditions for Running the DTC

- DTC B1325 must not be present.
- The seat memory control module must be powered.

Conditions for Setting the DTC

B242A 01

The seat memory control module detects a short to voltage on the heater element control circuits.

B242A 02

The seat memory control module detects a short to ground on the heater element control circuits.

Action Taken When the DTC Sets

The heated seat function for both seats will be disabled.

Conditions for Clearing the DTC

- The current DTC will clear and set a history code 3 seconds after the reference voltage returns to normal operating range and the ignition is cycled OFF then back to ACC or RUN.
- The history DTC will clear after 40 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 (Factory Installed) or **Heated Seats Description and Operation (Dealer Installed)**

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 X4 harness connector at the K40 seat memory control module.
2. Ignition ON, verify that a test lamp illuminates between the B+ circuit terminal 5 and ground.
 - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance.
3. Ignition OFF, connect the X4 harness connector at the K40 seat memory control module and disconnect the X3 harness connector at the K40 seat memory control module.
4. Test for infinite resistance between the control circuit terminal 11 and ground.
 - If not the specified value, test the control circuit for a short to ground.
5. Test for infinite resistance between the control circuit terminal 10 and ground.
 - If not the specified value, test the control circuit for a short to ground.
6. Ignition ON, verify that a test lamp does not illuminate between the control circuit terminal 11 and ground.
 - If the test lamp illuminates, test the control circuit for a short to voltage.
7. Verify that a test lamp does not illuminate between the control circuit terminal 10 and ground.
 - If the test lamp illuminates, test the control circuit for a short to voltage.
8. If all circuits test normal, replace the K40 seat memory control module.

Repair Procedures

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

Control Module References for seat memory control module replacement, setup, and programming

SYMPTOMS - SEAT HEATING AND COOLING

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

1. When diagnosing a heated seat system condition 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 module(s) 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 (Factory Installed)** or **Heated Seats Description and Operation (Dealer Installed)**.

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the power seats. Refer to **Checking Aftermarket Accessories**.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Inspect the seat adjuster track for conditions which may cause binding or objects within the seat adjustment range which obstruct movement or interfere with wiring.

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 the **Front Heated Seat Malfunction (Without Memory)** or **Front Heated Seat Malfunction (With Memory)** or **Front Heated Seat Malfunction (Dealer Installed)** diagnostic procedure in order to diagnose the symptom.

FRONT HEATED SEAT MALFUNCTION (WITHOUT MEMORY)

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 Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Driver Heated Seat Element Control Terminal 3 X2	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Element Control Terminal 1 X2	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Temperature Sensor Signal	B1925 02	B1925 05	B1925 05	B2345 13
Driver Heated Seat Temperature Sensor Low Reference	-	B1925 05	-	B2345 13

Passenger Heated Seat Element Control Terminal 5 X2	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Element Control Terminal 2 X2	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Temperature Sensor Signal	B2170 02	B2170 05	B2170 05	B2345 13
Passenger Heated Seat Temperature Sensor Low Reference	-	B2170 05	-	B2345 13

Circuit/System Description

The driver and front passenger heated seats are controlled by separate heated seat switches that are located in the radio/HVAC controls. When a heated seat switch is pressed, a serial message is sent from the radio/HVAC controls to the HVAC control module indicating the heated seat command. The HVAC control module serves as a gateway to transmit the message to the seat heating control module via the serial data line. In response to this message, the seat heating control module applies battery voltage through the element supply voltage circuit to the appropriate seat heating elements. The seat heating control module then sends a serial data message back to the HVAC control module to gateway the information to the radio/HVAC controls to either illuminate or turn off the appropriate temperature indicator.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Heated Seats Description and Operation (Factory Installed) or **Heated Seats Description and Operation (Dealer Installed)**

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. Engine ON, observe the scan tool Driver Seat Heating/Venting/Cooling Mode parameter while pressing the driver HEATED seat switch. The reading should change between Off and Back & Cushion.
 - If not the specified value, replace the A20 radio/HVAC controls.
2. Observe the scan tool Passenger Seat Heating/Venting/Cooling Mode parameter while pressing the passenger HEATED seat switch. The reading should change between Off and Back & Cushion.
 - If not the specified value, replace the A20 radio/HVAC controls.
3. If all scan tool parameter readings test normal, there are no DTCs set, and the driver and/or passenger heated seat is inoperative, replace the K29 seat heating control module.

Repair Procedures

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

- **Radio Control Assembly Replacement**
- **Control Module References** for seat memory control module replacement, setup, and programming

FRONT HEATED SEAT MALFUNCTION (WITH MEMORY)

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 Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Seat Memory Control Module B+ Terminal 5 X4	B242A 02, B2425 0D, B2430 0D, 1, 2	B242A 02, B2425 0D, B2430 0D, 1, 2	-	-
Driver Heated Seat Element Control Terminal 11 X3	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Element Control Terminal 6 X3	B242A 02	B2425 0D	B242A 01	B2425 0B, B2425 0E
Driver Heated Seat Temperature Sensor Signal	B1925 02	B1925 05	B1925 05	B2345 13
Driver Heated Seat Temperature Sensor Low Reference	-	B1925 05	-	B2345 13
Passenger Heated Seat Element Control Terminal 10 X3	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E
Passenger Heated Seat Element Control Terminal 4 X3	B242A 02	B2430 0D	B242A 01	B2430 0B, B2430 0E

Passenger Heated Seat Temperature Sensor Signal	B2170 02	B2170 05	B2170 05	B2345 13
Passenger Heated Seat Temperature Sensor Low Reference	-	B2170 05	-	B2345 13
1. Power seats inoperative 2. Heated seats inoperative				

Circuit/System Description

The driver and front passenger heated seats are controlled by separate heated seat switches that are located in the radio/HVAC controls. When a heated seat switch is pressed, a serial data message is sent from the radio/HVAC controls to the HVAC control module indicating the heated seat command. The HVAC control module serves as a gateway to transmit the message to the seat memory control module via the serial data line. In response to this message, the seat memory control module applies battery voltage through the element supply voltage circuit to the appropriate seat heating elements. The seat memory control module then sends a serial data message back to the HVAC control module to gateway the information to the radio/HVAC controls to either illuminate or turn off the appropriate temperature indicator.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Heated Seats Description and Operation (Factory Installed) or **Heated Seats Description and Operation (Dealer Installed)**

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 X4 harness connector at the K40 seat memory control module.
2. Ignition ON, verify that a test lamp illuminates between the B+ circuit terminal 5 and ground.
 - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance.
3. Ignition OFF, connect the X4 harness connector at the K40 seat memory control module.
4. Ignition ON, observe the scan tool Driver Seat Heating/Venting/Cooling Mode parameter while pressing the driver HEATED seat switch. The reading should change between Off and Back & Cushion.
 - If not the specified value, replace the A20 radio/HVAC controls.
5. Observe the scan tool Passenger Seat Heating/Venting/Cooling Mode parameter while pressing the passenger HEATED seat switch. The reading should change between Off and Back & Cushion.
 - If not the specified value, replace the A20 radio/HVAC controls.
6. If all scan tool parameter readings test normal, there are no DTCs set, and the driver and/or passenger heated seat is inoperative, replace the K40 seat memory control module.

Repair Procedures

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

- **Radio Control Assembly Replacement**
- **Control Module References** for seat memory control module replacement, setup, and programming

FRONT HEATED SEAT MALFUNCTION (DEALER INSTALLED)

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 Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Seat Heating Control Module B+	1	1	-	-
Heated Seat Switch B+	1	1	-	-
Left Heated Seat Switch Signal	2	2	2	-
Left Heated Seat Temperature Sensor Signal	2	2	2	-
Left Heated Seat Temperature Sensor Low Reference	-	2	-	-
Left Heated Seat Element Supply Voltage	1	2	3	-
Left Seat Heater Element Low	-	2	2	-

Reference				
Left Seat Cushion Heater Element Control	-	2	-	-
Right Heated Seat Switch Signal	4	4	4	-
Right Heated Seat Temperature Sensor Signal	4	4	4	-
Right Heated Seat Temperature Sensor Low Reference	-	4	-	-
Right Heated Seat Element Supply Voltage	4	4	5	-
Right Seat Heater Element Low Reference	-	4	-	-
Seat Heating Control Module Ground	-	1	-	-
1. Left and right heated seats are inoperative 2. Left heated seat is inoperative 3. Left heated seat is always ON 4. Right heated seat is inoperative 5. Right heated seat is always ON				

Circuit/System Description

Battery positive voltage and ground is supplied to the seat heating control module from the auxiliary power outlet harness connector located under the CD player. This voltage is used to power up the heated seat module and to supply power to the seat heater elements. Battery voltage is supplied to the heated seat switch from the seat heating control module. When a heated seat switch is pressed, battery voltage is applied through the switch contacts and the heated seat switch signal circuit to the seat heating control module indicating the heated seat command. In response to this signal, the seat heating control module applies battery voltage through the control circuit to the seat heater elements.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Heated Seats Description and Operation (Factory Installed) or Heated Seats Description and Operation (Dealer Installed)

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

NOTE: For a valid test of the heated seat operation, you must sit in the seat for at least a 5 minute period for which the heat has time to reach the seat surface.

1. Ignition ON, operate both heated seats. The seat cushion and seat back should get warm for both seats.
 - If both the driver and front passenger heated seats are inoperative, refer to Driver and Passenger Heated Seats Inoperative.
 - If just one of the heated seats is inoperative or always ON, refer to Heated Seat Malfunction.
2. Observe the heated seat switch temperature indicators while pressing the appropriate heated seat switch through the high, medium, and low positions. The appropriate indicators should illuminate as the switch is activated.
 - If the heated seat operates normal, but one or all of the switch temperature indicators are inoperative or always ON, refer to Heated Seat Switch Indicator Malfunction.
 - If three temperature indicators are flashing, there is a problem with the heating element circuit. Refer to Heated Seat Malfunction.
 - If one temperature indicator is flashing, there is a problem with the temperature sensor circuit. Refer to Heated Seat Malfunction.

Circuit/System Testing

Driver and Passenger Heated Seats Inoperative

1. Ignition OFF, disconnect the X4 harness connector at the seat heating control module.
2. Test for less than 5 ohms between the ground circuit terminals listed below and ground:
 - Terminal 2
 - Terminal 5
 - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Ignition ON, verify that a test lamp illuminates between the B+ circuit terminals listed below and ground:
 - Terminal 3
 - Terminal 6
 - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance.

4. Ignition OFF, connect the X2 harness connector at seat heating control module and disconnect the harness connector at the heated seat switch.
5. Ignition ON, verify that a test lamp illuminates between the B+ circuit terminal 1 and ground.
 - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the seat heating control module.
6. If all circuits test normal, replace the seat heating control module.

Heated Seat Malfunction

1. Ignition OFF, disconnect the X5 harness connector at the seat heating control module.
2. Install a 3 A fused jumper wire between the B+ circuit terminal 1 and B+.
3. Connect a test lamp between the appropriate signal circuit terminal listed below and ground.
 - Driver heated seat switch terminal 2
 - Passenger heated seat switch terminal 7
4. Ignition ON, press and release the appropriate heated seat switch. The test lamp should turn ON and OFF as the switch is pressed and released.
 - If the test lamp is always ON, test the signal circuit for a short to voltage. If the circuit tests normal, test or replace the heated seat switch.
 - If the test lamp is always OFF, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, test or replace the heated seat switch.
5. Ignition OFF, connect the X5 harness connector at the seat heating control module and disconnect the appropriate X1 or X3 harness connector at the seat heating control module.
6. Test for 800 - 300 kohms between the signal circuit terminal 3 and low reference circuit terminal 4.
 - If less than the specified range, test for a short between the signal and low reference circuits. If the circuits test normal, test or replace the seat cushion heater element.
 - If greater than the specified range, test the signal and low reference circuits for a short to voltage or an open/high resistance. If the circuits test normal, test or replace the seat cushion heater element.
7. Disconnect the harness connector at the seat back heating element.

NOTE: Element resistance must be measured twice to ensure that all failure conditions are simulated. First with the seat unoccupied, then with the seat occupied.

8. Test for 1 - 5 ohms between control the circuit terminal A and the low reference circuit terminal B.
 - If not within the specified range, test or replace the seat back heating element.
9. Connect the harness connector at the seat back heating element.

NOTE: Element resistance must be measured twice to ensure that all failure conditions are simulated. First with the seat unoccupied, then with the seat occupied.

10. At the seat heating control module harness connector, test for 1 - 7 ohms between the control circuit

terminal 1 and the low reference circuit terminal 2.

- If less than the specified range, test for a short between the control and low reference circuits. If the circuits test normal, test or replace the seat cushion heater element.
 - If greater than the specified range, test the control and low reference circuits for an open/high resistance. If the circuits test normal, test or replace the seat cushion heater element.
11. Test for infinite resistance between the control circuit terminal 1 and ground.
 - If not the specified value, test the control circuit for a short to ground.
 12. Ignition ON, test for less than 0.1 V between the control circuit terminal 1 and ground.
 - If greater than the specified value, test the control circuit for a short to voltage.
 13. If all circuits test normal, replace the seat heating control module.

Heated Seat Switch Indicator Malfunction

1. Ignition OFF, disconnect the harness connector at the heated seat switch.
2. Ignition ON, verify that a test lamp does not illuminate between the control circuit terminals listed below and B+.
 - Left seat high temperature indicator terminal 2
 - Left seat medium temperature indicator terminal 3
 - Left seat low temperature indicator terminal
 - Right seat high temperature indicator terminal 6
 - Right seat medium temperature indicator terminal 7
 - Right seat low temperature indicator terminal
 - If the test illuminates, test the appropriate control circuit for a short to ground. If the circuit tests normal, replace the seat heating control module.
3. Ignition OFF, connect the harness connector at the heated seat switch and disconnect the X5 harness connector at the seat heating control module.
4. Install a 3 A fused jumper wire between the B+ circuit terminal 1 and B+.
5. Ignition ON, connect a test lamp between the control circuit terminals listed below and ground. The appropriate temperature indicator should illuminate.
 - Left seat high temperature indicator terminal 2
 - Left seat medium temperature indicator terminal 3
 - Left seat low temperature indicator terminal
 - Right seat high temperature indicator terminal 7
 - Right seat medium temperature indicator terminal 8
 - Right seat low temperature indicator terminal
 - If the indicator does not illuminate, test the control circuit for a short to voltage or an open/high resistance. If the circuit tests normal, test or replace the heated seat switch.
6. If all circuits test normal, replace the seat heating control module.

Repair Procedures

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

Front Seat Heater Kit Installation

REPAIR INSTRUCTIONS

FRONT SEAT HEATER CONTROL MODULE REPLACEMENT

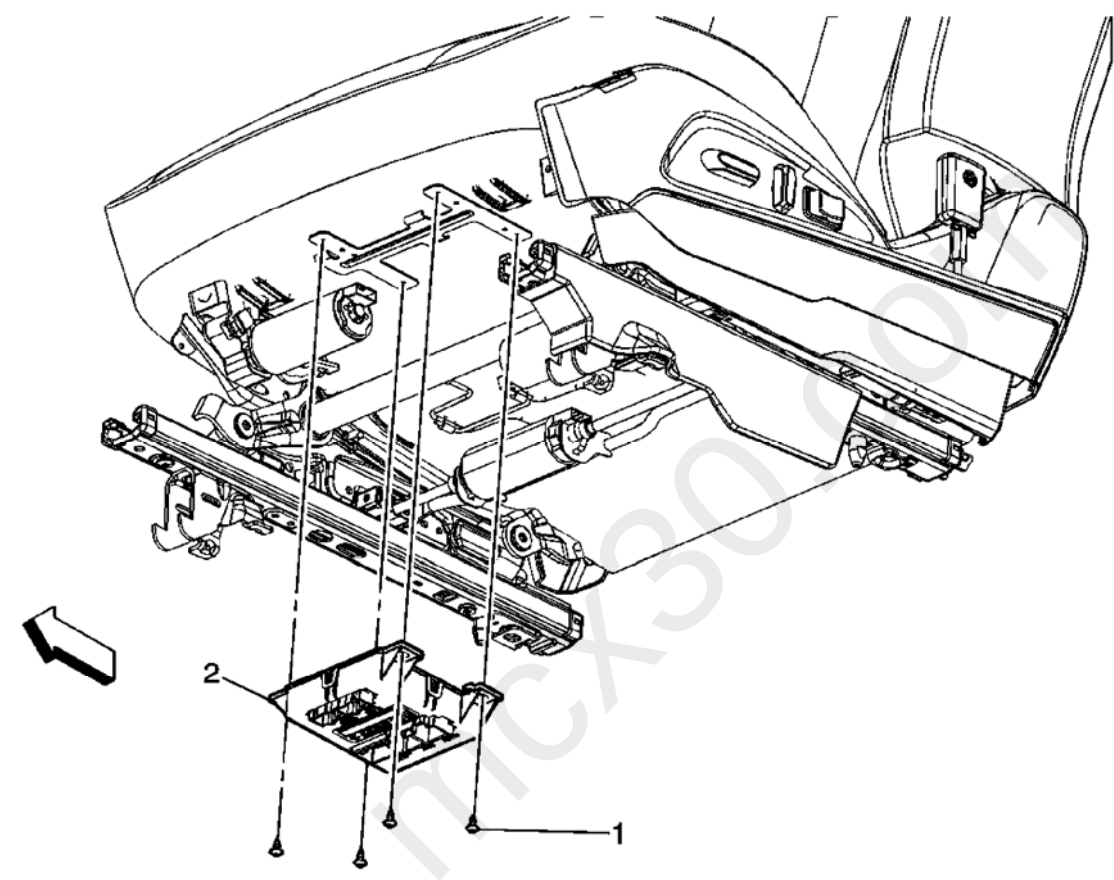


Fig. 5: Front Seat Heater Control Module
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Front Seat Heater Control Module Fastener (Qty: 4) CAUTION: Refer to <u>Fastener Caution</u> . Tighten: 4 N.m (35 lb in)
	Front Seat Heater Control Module

Procedure	
2	1. Disconnect the electrical connectors. 2. Remove the module from the heater control module bracket. 3. Refer to <u>Control Module References</u> for replacement and setup information.

DRIVER OR PASSENGER SEAT BACK CUSHION HEATER REPLACEMENT

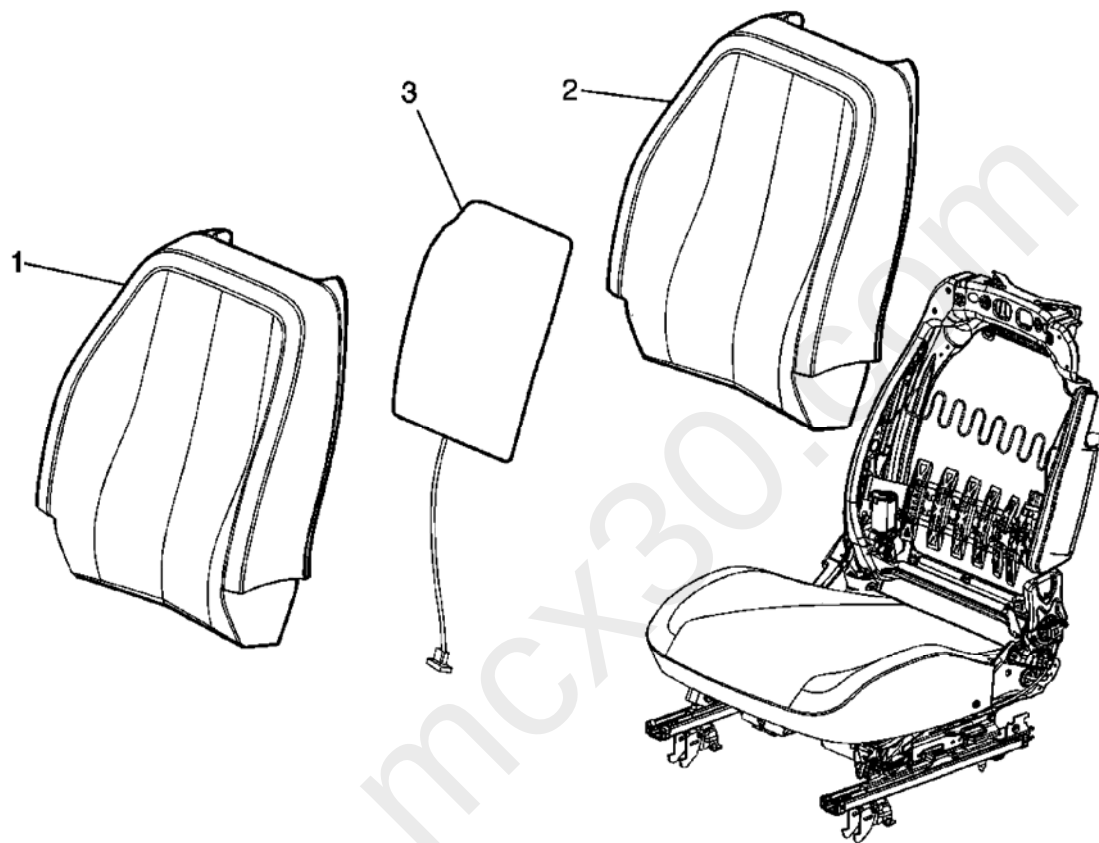


Fig. 6: Driver or Passenger Seat Back Cushion Heater
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
WARNING: Refer to <u>SIR Warning</u> .	
Preliminary Procedure	
1. Remove the driver or passenger seat. Refer to <u>Driver or Passenger Seat Replacement</u> . 2. Remove the driver or passenger seat back cushion cover and pad. Refer to <u>Driver or Passenger Seat Back Cushion Cover and Pad Replacement</u> .	

1	Driver or Passenger Seat Back Cushion Cover Procedure: Separate the seat cushion from the seat cushion pad.
2	Driver or Passenger Seat Back Cushion Pad
3	Driver or Passenger Seat Back Cushion Heater Procedure 1. Disconnect the electrical connector. 2. Remove the heater element leaving the old adhesive strips intact on the seat cushion. The new seat heater adhesive strips will be placed over the old adhesive strips.

DRIVER OR PASSENGER SEAT CUSHION HEATER REPLACEMENT

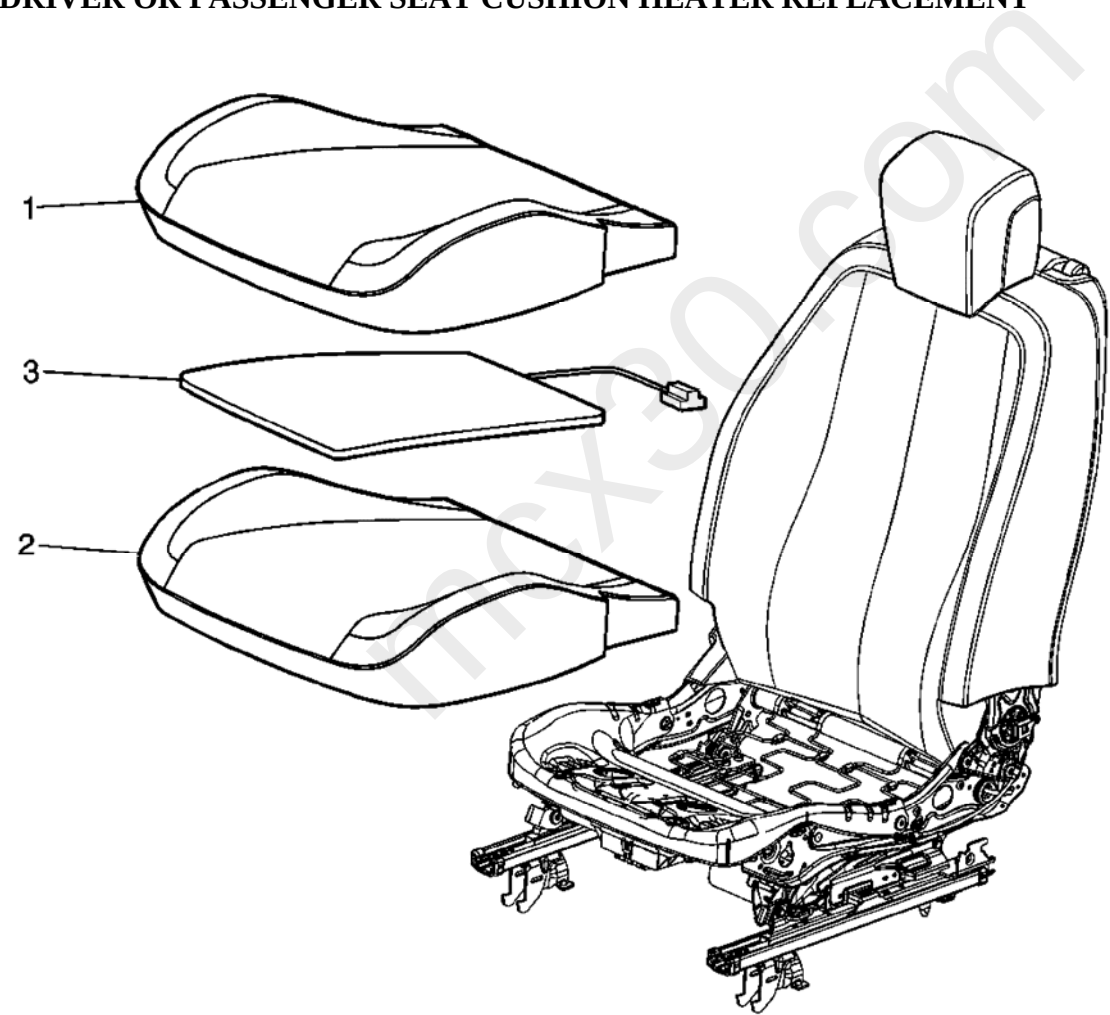


Fig. 7: Driver or Passenger Seat Cushion Heater
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name

Preliminary Procedure

1. Remove the driver or passenger seat. Refer to **Driver or Passenger Seat Replacement** .
2. Remove the front seat cushion cover and pad. Refer to **Front Seat Cushion Cover and Pad Replacement** .

1	Driver or Passenger Seat Cushion Cover Procedure: Separate the seat cushion from the seat cushion pad.
2	Driver or Passenger Seat Cushion Pad
3	Driver or Passenger Seat Cushion Heater Procedure 1. Disconnect the electrical connector. 2. Remove the seat belt buckle pretensioner electrical wire from the seat cushion cover. 3. Remove the heater element leaving the old adhesive strips intact on the seat cushion trim. The new seat heater adhesive strips will be placed over the old adhesive strips.

DESCRIPTION AND OPERATION

HEATED SEATS DESCRIPTION AND OPERATION (FACTORY INSTALLED)

Heated Seat Components

The heated seat system consists of the following components:

- Heated seat switch
- HVAC control
- Seat memory control module or seat heating control module
- Seat cushion heating element
- Seat back heating element
- Seat cushion temperature sensor
- 10 A fuse
- 25 A fuse

Heated Seat Operation

The driver and passenger heated seats are controlled by separate heated seat switches. Both switches are located in the HVAC controls. When a heated seat switch is pressed, a LIN-Bus message is sent from the HVAC control to the HVAC control module. The HVAC control module then serves as a gateway to transmit the message to the seat memory control module/seat heating control module via serial data line indicating the heated seat command. In response to this message, the seat memory control module/seat heating control module applies or removes battery voltage through the element supply voltage circuit of the seat heating elements. The seat memory control module/seat heating control module sends a serial data message back to the HVAC control

module to gateway the information to the HVAC control to either illuminate or turn off the appropriate temperature indicator.

Temperature Regulation

The seat memory control module/seat heating control module monitors the seat temperature through the temperature sensor signal circuit and the temperature sensor (thermistor) located in the seat cushion with the heater element. The temperature sensor is a variable resistor, its resistance varies as the temperature of the seat changes. When the temperature sensor resistance indicates to the seat module that the seat has reached the desired temperature, the module opens the ground path of the seat heating elements through the heated seat element control circuit. The module will then cycle the element control circuit open and closed in order to maintain the desired temperature.

Remote Start Seat Heating and Ventilation

Some vehicles allow the customer to configure their heated and/or ventilated seats to come on after a remote start is commanded. The heated seats will only come on if the outside air temperature is below 50°F as measured by the outside air temperature sensor. When seat heating is commanded, the heating level will be on the "High" setting. On some vehicles, the LED display for the temperature level may not illuminate during remote start operation. When the vehicle operator inserts the key in the ignition and turns it to the "On" position, the heated seats will automatically turn off. Be aware that during remote start heated seat operation, since there is no occupant in the seat, the customer may comment that they feel little or no difference in the temperature of the seat. This is due to little heat transfer to the seat cover occurring since there is no weight on the cushion. Once the seat is occupied and the seat cover is pressed against the heater element, heat will begin to transfer more rapidly to the seat cover.

Load Management

The electrical power management function is designed to monitor the vehicle electrical load and determine when the battery is potentially in a high discharge condition. The heated seat system is one of the vehicle loads that is subject to reduction during a battery discharge condition. For more information on load management refer to **Electrical Power Management Description and Operation** .

HEATED SEATS DESCRIPTION AND OPERATION (DEALER INSTALLED)

Heated Seat Components

The heated seat system consists of the following components:

- Heated seat switch
- Seat heating control module
- Driver seat cushion heating element
- Driver seat back heating element
- Driver seat cushion temperature sensor
- Passenger seat cushion heating element
- Passenger seat back heating element

- Passenger seat cushion temperature sensor

Heated Seat Operation

Battery positive voltage and ground is supplied to the seat heating control module from the auxiliary power outlet harness connector located under the CD player. This voltage is used to power up the heated seat module and to supply power to the seat heater elements. Battery voltage is supplied to the heated seat switch from the seat heating control module. When a heated seat switch is pressed, battery voltage is applied through the switch contacts and the heated seat switch signal circuit to the seat heating control module indicating the heated seat command. In response to this signal, the seat heating control module applies battery voltage through the control circuit to the seat heater elements.

Temperature Regulation

The seat memory control module/seat heating control module monitors the seat temperature through the temperature sensor signal circuit and the temperature sensor (thermistor) located in the seat cushion with the heater element. The temperature sensor is a variable resistor, its resistance varies as the temperature of the seat changes. When the temperature sensor resistance indicates to the seat module that the seat has reached the desired temperature, the module opens the ground path of the seat heating elements through the heated seat element control circuit. The module will then cycle the element control circuit open and closed in order to maintain the desired temperature.