

ACCESSORIES & EQUIPMENTS Seat
Heating And Cooling - Coupe & Wagon

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Front Seat Cushion Ventilation Heating and Cooling Blower Screw	3 N.m	27 lb in

SCHEMATIC WIRING DIAGRAMS

HEATED/COOLED SEAT WIRING SCHEMATICS

Power, Ground, and Switches

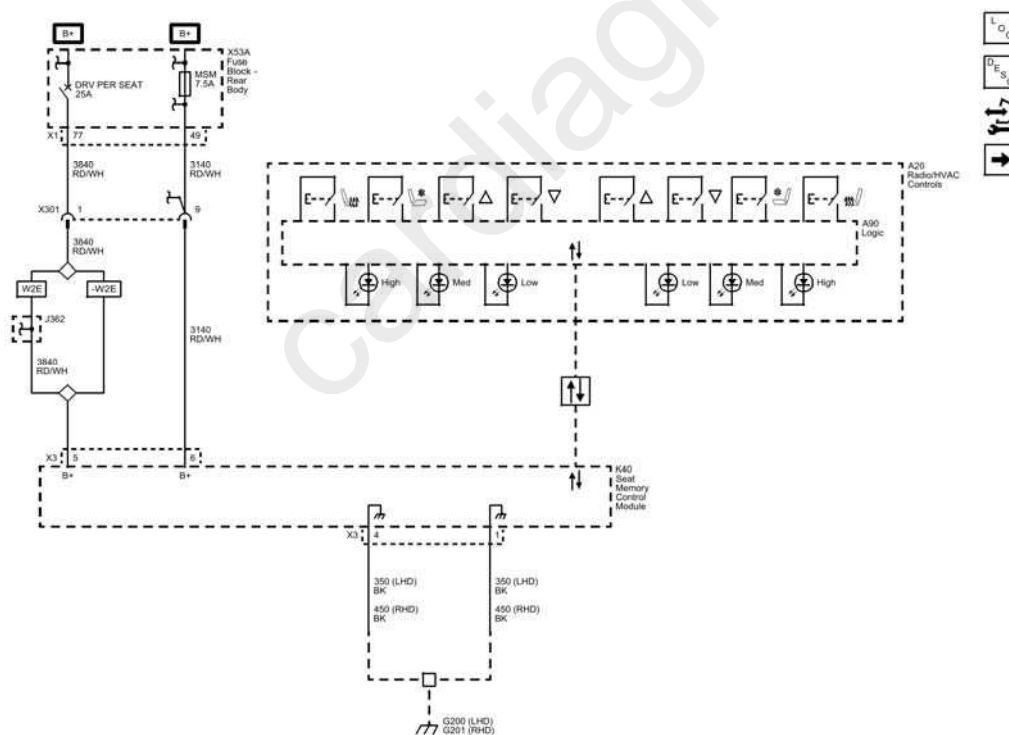


Fig. 1: Power, Ground, and Switches
Courtesy of GENERAL MOTORS COMPANY

Driver Seat (W2E)

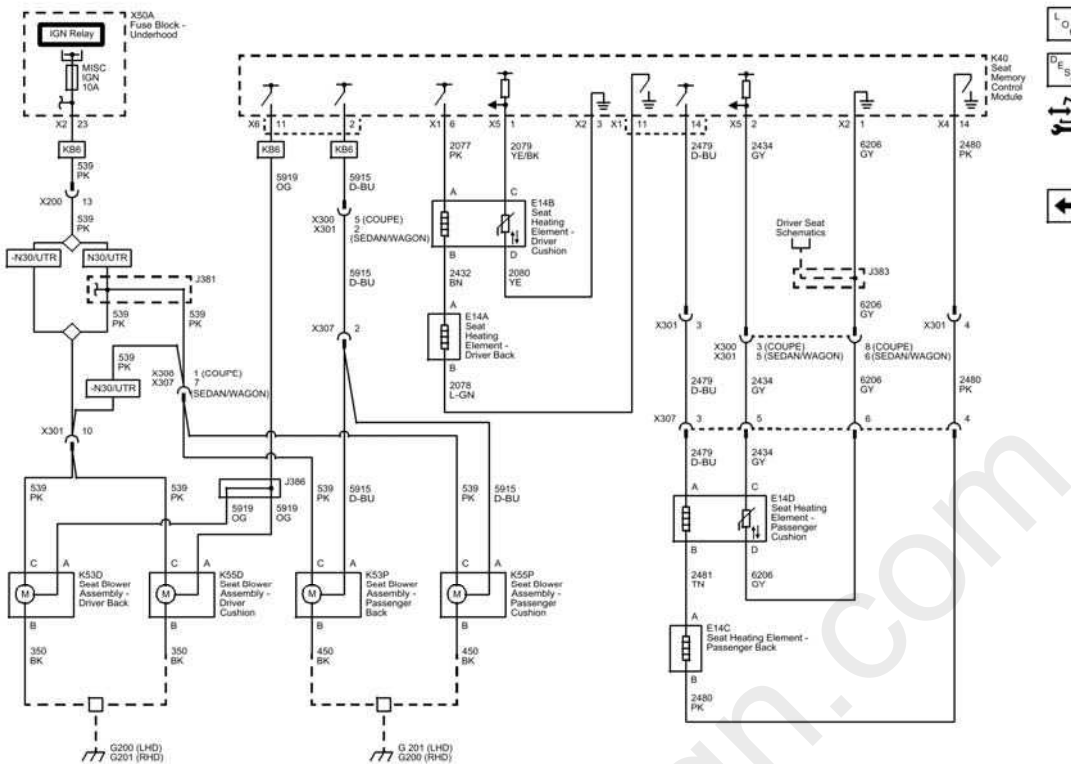


Fig. 4: Seat Heating or Cooling (without W2E)
 Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
DTC B1925 or B2170	DTC B1925 02 Left Seat Heater Sensor Circuit Short to Ground DTC B1925 05 Left Seat Heater Sensor Circuit Short to Battery or Open DTC B2170 02 Right Seat Heater Cushion Sensor Circuit Short to Ground DTC B2170 05 Right Seat Heater Cushion Sensor Circuit Short to Battery or Open
DTC B2345	DTC B2345 4B Front Seat Heater Current Sensing Calibration Out of Range DTC B2345 13 Front Seat Heater Temperature Above Threshold DTC B2345 42 Front Seat Heater Current Sensing Calibration Not Present
DTC B2425 or B2430	DTC B2425 0D Left Seat Heater Cushion Circuit Resistance Above Threshold DTC B2425 0E Left Seat Heater Cushion Circuit Resistance Below Threshold DTC B2430 0D Right Seat Heater Cushion Circuit Resistance Above Threshold DTC B2430 0E Right Seat Heater Cushion Circuit Resistance Below Threshold

DTC B2508 or B2509

DTC B2508 01 Seat Heater Relay Circuit Short to Battery
DTC B2508 02 Seat Heater Relay Circuit Short to Ground

DTC B1925 OR B2170: SEAT HEATER SENSOR CIRCUIT SHORT**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**

Left Seat Heater Sensor Circuit Short to Ground

DTC B1925 05

Left Seat Heater Sensor Circuit Short to Battery or Open

DTC B2170 02

Right Seat Heater Cushion Sensor Circuit Short to Ground

DTC B2170 05

Right Seat Heater Cushion Sensor Circuit Short to Battery or Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Memory Seat Module B+ Terminal 5 X3	1, 2, B2425 0D, B2430 0D	1, 2, B2425 0D, B2430 0D	-	-
Driver Heated Seat Element Supply Voltage	B2508 02	B2425 0D	B2508 01	B2425 0E
Driver Heated Seat Element Control	B2508 02	B2425 0D	B2508 01	B2425 0E
Driver Heated Seat Temperature Sensor Signal	B1925 02	B1925 05	B1925 05	B2345 13, B2345 42, B2345 4B
Driver Heated Seat Temperature Sensor Low Reference	-	B1925 05	-	B2345 13, B2345 42, B2345 4B
Passenger Heated Seat Element Supply Voltage	B2508 02	B2430 0D	B2508 01	B2430 0E
Passenger Heated Seat Element	B2508 02	B2430 0D	B2508 01	B2430 0E

Control				
Passenger Heated Seat Temperature Sensor Signal	B2170 02	B2170 05	B2170 05	B2345 13, B2345 42, B2345 4B
Passenger Heated Seat Temperature Sensor Low Reference	-	B2170 05	-	B2345 13, B2345 42, B2345 4B
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 memory seat module (MSM) 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

The MSM must be powered.

Conditions for Setting the DTC

B1925 02, B2170 02

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

B1925 02, 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 50 consecutive fault-free ignition cycles have occurred.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

Description and Operation

Heated/Vented Seat 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 02 or B1925 05

1. Ignition OFF, disconnect the X2, X5 harness connectors at the MSM.
2. Test for 1.4 k-300 kohms between the signal circuit terminal 1 X5 and the low reference circuit terminal 3 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 seat temperature sensor.
 - 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 temperature sensor.
3. Ignition OFF, connect the X2, X5 harness connectors at the MSM.
4. Disconnect the harness connector at the seat cushion heating element/temperature sensor.
5. Ignition ON, test for 4.8 - 5.2 V between the signal circuit terminal C and ground.
 - If less than the specified range, test the signal circuit for a short to ground. If the circuit tests normal, replace the MSM.
 - If greater 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 02 or B2170 05

1. Ignition OFF, disconnect the X2, X5 harness connectors at the MSM.

2. Test for 1.4k - 300 kohms between the signal circuit terminal 2 X5 and the low reference circuit terminal 6 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 seat temperature sensor.
 - 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 temperature sensor.
3. Ignition OFF, connect the X2, X5 harness connectors at the MSM.
4. Disconnect the harness connector at the seat cushion heating element/temperature sensor.
5. Ignition ON, test for 4.8 - 5.2 V between the signal circuit terminal C and ground.
 - If less than the specified range, test the signal circuit for a short to ground. If the circuit tests normal, replace the MSM.
 - If greater 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 Instructions

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

- **Driver or Passenger Seat Back Cushion Heater Replacement (KA1)**
- **Driver Seat Cushion Heater Replacement (KA1)**
- **Passenger Seat Cushion Heater Replacement (KA1)**
- **Control Module References** for MSM replacement, setup, and programming

DTC B2345: SEAT HEATER CURRENT SENSING CALIBRATION

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 4B

Front Seat Heater Current Sensing Calibration Out of Range

DTC B2345 13

Front Seat Heater Temperature Above Threshold

DTC B2345 42

Front Seat Heater Current Sensing Calibration Not Present

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Memory Seat Module B+ Terminal 5 X3	1, B2425 0D, B2430 0D	1, B2425 0D, B2430 0D	-	-
Driver Heated Seat Element Supply Voltage	B2508 02	B2425 0D	B2508 01	B2425 0E
Driver Heated Seat Element Control	B2508 02	B2425 0D	B2508 01	B2425 0E
Driver Heated Seat Temperature Sensor Signal	B1925 02	B1925 05	B1925 05	B2345 13, B2345 42, B2345 4B
Driver Heated Seat Temperature Sensor Low Reference	-	B1925 05	-	B2345 13, B2345 42, B2345 4B
Passenger Heated Seat Element Supply Voltage	B2508 02	B2430 0D	B2508 01	B2430 0E
Passenger Heated Seat Element Control	B2508 02	B2430 0D	B2508 01	B2430 0E
Passenger Heated Seat Temperature Sensor Signal	B2170 02	B2170 05	B2170 05	B2345 13, B2345 42, B2345 4B
Passenger Heated Seat Temperature Sensor Low Reference	-	B2170 05	-	B2345 13, B2345 42, B2345 4B
1. Power seats inoperative				

Circuit/System Description

The heated seat heating elements are controlled by a common high current relay internal to the memory seat module (MSM) and by individual low side element control circuits. The MSM connects the heater element supply voltage circuits for both seats to a common reference point. This reference point is biased to approximately 2.5 V. Before the MSM will allow heated seat operation, it checks to see if the heating element supply voltage circuits and control circuits are shorted to ground or 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 a circuit.

Conditions for Running the DTC

The MSM must be powered.

Conditions for Setting the DTC

B2345 13

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

B2345 42

This DTC will set if the module calibration is not present.

B2345 4B

This DTC will set if the module calibration is out of range.

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 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 50 consecutive fault-free ignition cycles have occurred.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

Description and Operation

Heated/Vented Seat 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

B2345 13

1. Ignition OFF, disconnect the X2, X5 harness connector at the MSM.

2. Test for greater than 1.4 kohms between the signal and low reference circuits listed below:
 - 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 appropriate temperature sensor.
3. If all circuits test normal, replace the MSM.

B2345 42 or B2345 4B

If either DTC is set, replace the MSM.

Repair Instructions

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

- **Driver or Passenger Seat Back Cushion Heater Replacement (KA1)**
- **Driver Seat Cushion Heater Replacement (KA1)**
- **Passenger Seat Cushion Heater Replacement (KA1)**
- **Control Module References** for MSM replacement, setup, and programming

DTC B2425 OR B2430: SEAT HEATER CUSHION CIRCUIT RESISTANCE

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 0D

Left Seat Heater Cushion Circuit Resistance Above Threshold

DTC B2425 0E

Left Seat Heater Cushion Circuit Resistance Below Threshold

DTC B2430 0D

Right Seat Heater Cushion Circuit Resistance Above Threshold

DTC B2430 0E

Right Seat Heater Cushion Circuit Resistance Below Threshold

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Memory Seat Module B+ Terminal 5 X3	1, B2425 0D, B2430 0D	1, B2425 0D, B2430 0D	-	-
Driver Heated Seat Element Supply Voltage	B2508 02	B2425 0D	B2508 01	B2425 0E
Driver Heated Seat Element Control	B2508 02	B2425 0D	B2508 01	B2425 0E
Driver Heated Seat Temperature Sensor Signal	B1925 02	B1925 05	B1925 05	B2345 13, B2345 42, B2345 4B
Driver Heated Seat Temperature Sensor Low Reference	-	B1925 05	-	B2345 13, B2345 42, B2345 4B
Passenger Heated Seat Element Supply Voltage	B2508 02	B2430 0D	B2508 01	B2430 0E
Passenger Heated Seat Element Control	B2508 02	B2430 0D	B2508 01	B2430 0E
Passenger Heated Seat Temperature Sensor Signal	B2170 02	B2170 05	B2170 05	B2345 13, B2345 42, B2345 4B
Passenger Heated Seat Temperature Sensor Low Reference	-	B2170 05	-	B2345 13, B2345 42, B2345 4B
1. Power seats inoperative				

Circuit/System Description

The driver and front passenger heated seats are controlled by the memory seat module (MSM) 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

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

Conditions for Setting the DTC

B2425 0D, B2430 0D

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

B2425 0E, B2430 0E

By measuring current and voltage output to the seat heating elements every 10 seconds, the MSM 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 50 consecutive fault-free ignition cycles have occurred.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

Description and Operation

Heated/Vented Seat 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 0D or B2425 0E

1. Ignition OFF, disconnect the X3 harness connector at the MSM.
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 X3 harness connector at the MSM and disconnect the harness connector at the

seat back heating element.

4. Test for 1.7 - 7.0 ohms between the control circuit terminal A and control circuit terminal B.
 - If less than the specified range, test for a short between the control circuits. If the circuits test normal, replace the seat back heating element.
 - If greater than the specified range, replace the seat back heating element.
5. Connect the harness connector at the seat back heating element and disconnect the X1 harness connector at the MSM.

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 1.7 - 7.0 ohms between the control circuit terminal 6 and control circuit terminal 11.
 - If less than the specified range, test for a short between the control circuits. If the circuits test normal, replace the 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 seat cushion heating element.
7. If all circuits test normal, replace the MSM.

B2430 0D or B2430 0E

1. Ignition OFF, disconnect the X3 harness connector at the MSM.
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 X3 harness connector at the MSM and 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.**

4. Test for 1.7 - 7.0 ohms between the control circuit terminal A and control circuit terminal B.
 - If less than the specified range, test for a short between the control circuits. If the circuits test normal, replace the seat back heating element.
 - If greater than the specified range, replace the seat back heating element.
5. Connect the harness connector at the seat back heating element and disconnect the X1, X4 harness connectors at the MSM.
6. Test for 1.7 - 7.0 ohms between the control circuit terminal 14 X1 and the control circuit terminal 14 X4.
 - If less than the specified range, test for a short between the control circuits. If the circuits test normal, replace the 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 seat cushion heating element.

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

Repair Instructions

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

- **Driver or Passenger Seat Back Cushion Heater Replacement (KA1)**
- **Driver Seat Cushion Heater Replacement (KA1)**
- **Passenger Seat Cushion Heater Replacement (KA1)**
- **Control Module References** for MSM replacement, setup, and programming

DTC B2508 OR B2509: SEAT HEATER RELAY

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 Short to Battery

DTC B2508 02

Seat Heater Relay Circuit Short to Ground

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Memory Seat Module B+ Terminal 5 X3	1, B2425 0D, B2430 0D	1, B2425 0D, B2430 0D	-	-
Driver Heated Seat Element Supply Voltage	B2508 02	B2425 0D	B2508 01	B2425 0E
Driver Heated Seat Element Control	B2508 02	B2425 0D	B2508 01	B2425 0E
Driver Heated Seat Temperature Sensor Signal	B1925 02	B1925 05	B1925 05	B2345 13, B2345 42, B2345 4B
Driver Heated Seat Temperature Sensor Low Reference	-	B1925 05	-	B2345 13, B2345 42, B2345 4B
Passenger Heated Seat Element Supply Voltage	B2508 02	B2430 0D	B2508 01	B2430 0E
Passenger Heated Seat Element				

Control	B2508 02	B2430 0D	B2508 01	B2430 0E
Passenger Heated Seat Temperature Sensor Signal	B2170 02	B2170 05	B2170 05	B2345 13, B2345 42, B2345 4B
Passenger Heated Seat Temperature Sensor Low Reference	-	B2170 05	-	B2345 13, B2345 42, B2345 4B
1. Power seats inoperative				

Circuit/System Description

The driver and passenger seat heating elements are controlled by a common high current relay internal to the memory seat module (MSM) and by individual low side element control circuits. The MSM connects the heated seat heater element supply voltage circuits for both seats to a common reference point. This reference point is biased to approximately 2.5 V. Before the MSM will allow heated seat operation, it checks to see if this reference 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 MSM must be powered.

Conditions for Setting the DTC

B2508 01

The MSM detects a short to voltage on the heater element supply voltage circuit or control circuit.

B2508 02

The MSM detects a short to ground on the heater element supply voltage circuit or control circuit.

Action Taken When the DTC Sets

The heated seat function for both the driver and passenger 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 50 consecutive fault-free ignition cycles have occurred.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

Description and Operation

Heated/Vented Seat 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 control circuit terminal 6 X1 and ground.
 - If not the specified value, test the control circuits for a short to ground.
3. Test for infinite resistance between the control circuit terminal 14 X1 and ground.
 - If not the specified value, test the control circuits for a short to ground.
4. Ignition ON, verify that a test lamp does not illuminate between the control circuit terminal 6 X1 and ground.
 - If the test lamp illuminates, test the control circuits for a short to voltage.
5. Verify that a test lamp does not illuminate between the control circuit terminal 14 X1 and ground.
 - If the test lamp illuminates, test the control circuits for a short to voltage.
6. If all circuits test normal, replace the MSM.

Repair Instructions

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

- **Driver or Passenger Seat Back Cushion Heater Replacement (KA1)**
- **Driver Seat Cushion Heater Replacement (KA1)**
- **Passenger Seat Cushion Heater Replacement (KA1)**
- **Control Module References** for 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. Refer to **Heated/Vented Seat Description and Operation** in order to familiarize yourself with the system functions.

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 a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- **Heated Seat Inoperative**
- **Vented Seat Malfunction**

HEATED SEAT INOPERATIVE

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
B+ MSM Terminal 5 X3	1, 2, B2425 0D, B2430 0D	1, 2, B2425 0D, B2430 0D	-	-
Driver Heated Seat Element				

Supply Voltage	B2508 02	B2425 0D	B2508 01	B2425 0E
Driver Heated Seat Element Control	B2508 02	B2425 0D	B2508 01	B2425 0E
Driver Heated Seat Temperature Sensor Signal	B1925 02	B1925 05	B1925 05	B2345 13, B2345 42, B2345 4B
Driver Heated Seat Temperature Sensor Low Reference	-	B1925 05	-	B2345 13, B2345 42, B2345 4B
Passenger Heated Seat Element Supply Voltage	B2508 02	B2430 0D	B2508 01	B2430 0E
Passenger Heated Seat Element Control	B2508 02	B2430 0D	B2508 01	B2430 0E
Passenger Heated Seat Temperature Sensor Signal	B2170 02	B2170 05	B2170 05	B2345 13, B2345 42, B2345 4B
Passenger Heated Seat Temperature Sensor Low Reference	-	B2170 05	-	B2345 13, B2345 42, B2345 4B
1. Power seats inoperative 2. Heated seats inoperative				

Circuit/System Description

The driver and passenger heated seats are controlled by separate heated seat switches located in the radio/HVAC control panel. When a heated seat switch is pressed, a serial data message is sent to the radio. The radio then serves as a gateway to transmit the serial data message to the memory seat module (MSM) indicating the heated seat command. In response to this signal, the MSM then applies or removes battery voltage through the element supply voltage circuit of the seat heating elements. The MSM then sends a serial data message back to the radio to gateway the information to the radio/HVAC control panel 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 - INDEX - COUPE AND WAGON

Description and Operation

Heated/Vented Seat 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 X3 harness connector at the MSM.
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 X3 harness connector at the MSM.
4. Ignition ON, observe the scan tool Radio Driver Heated Seat Sw. parameter while pressing the driver HEATED seat switch. The readings should change between Inactive and Active.
 - If not the specified value, replace the radio/HVAC control panel.
5. Observe the scan tool Radio Pass. Heated Seat Sw. parameter while pressing the passenger HEATED seat switch. The readings should change between Inactive and Active.
 - If not the specified value, replace the radio/HVAC control panel.
6. Ignition OFF, disconnect the harness connector at the seat back heating element.
7. Test for 1.7-7.0 ohms between control circuit terminal A and control circuit terminal B.
 - If less than the specified range, test for a short between the control circuits. If the circuits test normal, replace the seat back heating element.
 - If greater than the specified range, replace the seat back heating element.
8. Connect the harness connector at the seat back heating element and disconnect the X1 harness connector at the MSM.
9. Test for 1.7-7.0 ohms between the appropriate control circuit terminals listed below:
 - Driver seat control circuit terminal 6 and control circuit terminal 11.
 - Passenger seat control circuit terminal 14 X1 and control circuit terminal 14 X4.
 - If less than the specified range, test for a short between the control circuits. If the circuits test normal, replace the 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 seat cushion heating element.
10. If the scan tool readings and all circuits test normal, replace the MSM.

Repair Instructions

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

- **Radio Control Assembly Replacement (with Navigation Display) , Radio Control Assembly**

Replacement (without Navigation Display)

- **Driver or Passenger Seat Back Cushion Heater Replacement (KA1)**
- **Driver Seat Cushion Heater Replacement (KA1)**
- **Passenger Seat Cushion Heater Replacement (KA1)**
- **Control Module References** for MSM replacement, setup, and programming

VENTED SEAT MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition Voltage	1, 4	1, 4	-	-
Driver Seat Back Ventilation Heating and Cooling Module Ignition Voltage	1, 4	2	-	-
Driver Seat Cushion Ventilation Heating and Cooling Module Ignition Voltage	1, 4	3	-	-
Driver Vented Seat Signal	1	1	1	-
Driver Seat Back Ventilation Heating and Cooling Module Ground	-	2	-	-
Driver Seat Cushion Ventilation Heating and Cooling Module Ground	-	3	-	-
Passenger Seat Back Ventilation Heating and Cooling Module Ignition Voltage	1, 4	5	-	-
Passenger Seat Cushion Ventilation Heating and Cooling Module Ignition Voltage	1, 4	6	-	-
Passenger Vented Seat Signal	4	4	4	-
Passenger Seat Back Ventilation Heating and Cooling Module Ground	-	5	-	-
Passenger Seat Cushion Ventilation Heating and Cooling Module	-	6	-	-

Ground				
1. Driver Vented Seat is Inoperative 2. Driver Vented Seat Back is Inoperative 3. Driver Vented Seat Cushion is Inoperative 4. Passenger Vented Seat is Inoperative 5. Passenger Vented Seat Back is Inoperative 6. Passenger Vented Seat Cushion is Inoperative				

Circuit/System Description

The driver and passenger vented seats are controlled by separate vented seat switches located in the radio/HVAC control panel. Ignition voltage is supplied to the driver and passenger seat ventilation heating and cooling modules through the MISC IGN fuse located in the underhood fuse block. Ground for the driver seat ventilation heating and cooling modules is provided at G200, while ground for the passenger seat ventilation heating and cooling modules is provided at G201. When a vented seat switch is pressed a serial data message is sent to the radio, the radio then serves as a gateway to transmit the serial data message to the memory seat module (MSM) indicating the vented seat command. In response to this message, the MSM applies a low side pulse width modulation (PWM) signal through the control circuits to the seat cushion and seat back ventilation heating and cooling modules indicating the vented seat command. The logic in the modules set the blower speed to the switch set point. Both seat ventilation heating and cooling module blower motors run drawing cabin air around and away from occupant. The MSM then sends a serial data message back to the radio to gateway the information back to the radio/HVAC control panel to either illuminate or turn off the appropriate switch indicator.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

Description and Operation

Heated/Vented Seat Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON, observe the scan tool Radio Driver Cooled Seat Button parameter while pressing the driver VENTED seat switch. The reading should change between Inactive and Active.
 - If not the specified value, replace the radio/HVAC control panel.
2. Observe the scan tool Radio Passenger Cooled Seat Button parameter while pressing the passenger VENTED seat switch. The reading should change between Inactive and Active.
 - If not the specified value, replace the radio/HVAC control panel.
3. If all scan tool readings test normal and the driver and/or passenger vented seat is inoperative, refer to Circuit/System Testing.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the appropriate seat ventilation heating and cooling module.
2. Test for less than 5 ohms between the ground circuit terminal B and ground.
 - If greater than the specified value, test the ground circuit for an open/high resistance.
3. Ignition ON, verify that a test lamp illuminates between the ignition circuit terminal C and ground.
 - If the test lamp does not illuminate, test the ignition circuit for a short to ground or an open/high resistance.
4. Connect a test lamp between the signal circuit terminal A and battery voltage.
5. Press the VENTED seat switch through the high, medium, and low positions to OFF. The test lamp should illuminate until the OFF position is reached.
 - If the test lamp does not illuminate, test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the MSM.
 - If the test lamp is ON with the switch in the OFF position, test the signal circuit for a short to ground. If the circuit tests normal, replace the MSM.
6. If all circuits test normal, test or replace the seat ventilation heating and cooling module.

Repair Instructions

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

- **Driver or Passenger Seat Back Ventilation Heating and Cooling Blower Replacement (KB6), Driver or Passenger Seat Back Ventilation Heating and Cooling Blower Replacement (W2E)**
- **Front Seat Cushion Ventilation Blower Replacement (W2E), Front Seat Cushion Ventilation Blower Replacement (KB6)**
- **Radio Control Assembly Replacement (with Navigation Display) , Radio Control Assembly Replacement (without Navigation Display)**
- **Control Module References** for MSM replacement, setup, and programming

REPAIR INSTRUCTIONS

DRIVER OR PASSENGER SEAT BACK CUSHION HEATER REPLACEMENT (KA1)

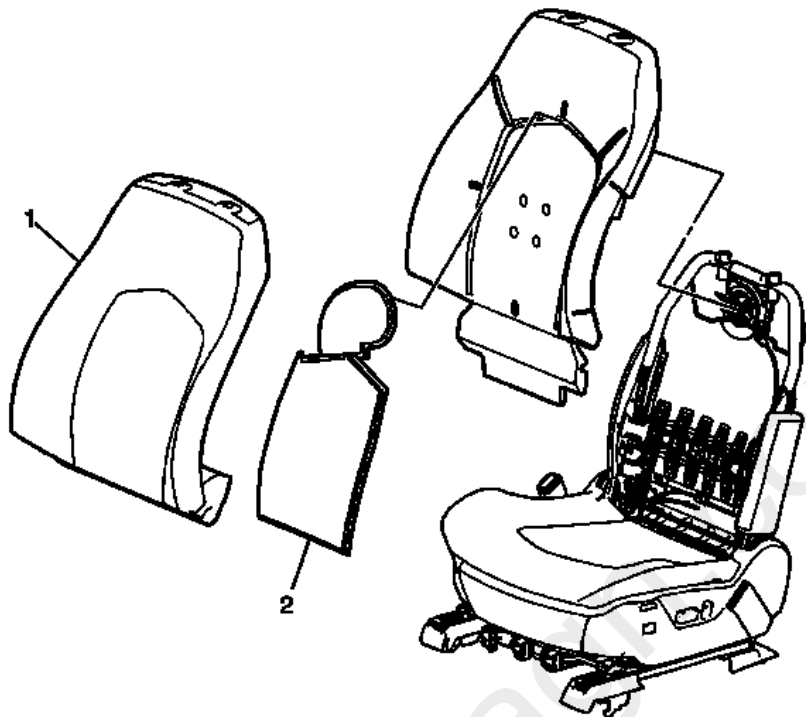


Fig. 5: Driver Seat and Passenger Seat Back Cushion Heater (KA1)
Courtesy of GENERAL MOTORS COMPANY

Driver or Passenger Seat Back Cushion Heater Replacement (KA1)

Callout	Component Name
Preliminary Procedure	
1.	Remove the front seat. Refer to <u>Front Seat Removal and Installation - Bucket (W2E)</u> , <u>Front Seat Removal and Installation - Bucket (AQ9)</u> .
2.	Remove the front seat adjuster switch bezel. Refer to <u>Driver or Passenger Seat Adjuster Switch Bezel Replacement (AQ9)</u> , <u>Driver or Passenger Seat Adjuster Switch Bezel Replacement (W2E)</u> .
3.	Remove the front seat inner recliner finish cover. Refer to <u>Driver or Passenger Seat Inner Recliner Finish Cover Replacement (AQ9)</u> , <u>Driver or Passenger Seat Inner Recliner Finish Cover Replacement (W2E)</u> .
4.	Remove the front seat back cushion finish panel. Refer to <u>Front Seat Back Cushion Finish Panel Replacement (W2E)</u> , <u>Front Seat Back Cushion Finish Panel Replacement (AQ9)</u> .
5.	Remove the front seat head restraint. Refer to <u>Driver or Passenger Seat Head Restraint Replacement (AQ9)</u> , <u>Driver or Passenger Seat Head Restraint Replacement (W2E)</u> .
6.	Remove the front seat head restraint guides. Refer to <u>Driver or Passenger Seat Head Restraint</u>

Guide Replacement (AQ9) , Driver or Passenger Seat Head Restraint Guide Replacement (W2E) .

7. Remove the front seat inner adjuster rear finish cover.
8. Remove the front seat back cushion cover and cushion pad. Refer to **Front Seat Back Cushion Cover and Cushion Pad Replacement (AQ9) , Front Seat Back Cushion Cover and Cushion Pad Replacement (W2E)**

1	Seat Back Cushion Cover Procedure 1. Disengage the j-channel retainers from the seat back cushion frame. 2. Disconnect the blower from the seat back cushion pad. 3. Disconnect the electrical connectors that attach to the seat back cushion, if equipped. 4. Remove the seat back cushion cover and pad from the seat cushion frame as an assembly. 5. Pull the cover away from the pad to disengage the retainers
2	Front Seat Back Cushion Heater Procedure Remove the seat back heater from the seat back cushion pad by sliding it through the upper portion of the seat back cushion pad.

DRIVER SEAT CUSHION HEATER REPLACEMENT (KA1)



Fig. 6: Driver Seat and Passenger Seat Cushion Heater (KA1)

Courtesy of GENERAL MOTORS COMPANY

Driver Seat Cushion Heater Replacement (KA1)

Callout	Component Name
WARNING: Refer to <u>SIR Warning</u> .	
Preliminary Procedure 1. Remove the front seat. Refer to <u>Front Seat Removal and Installation - Bucket (W2E)</u> , <u>Front Seat Removal and Installation - Bucket (AQ9)</u> . 2. Remove the front seat cushion cover and pad. Refer to <u>Front Seat Cushion Cover and Pad Replacement (W2E)</u> , <u>Front Seat Cushion Cover and Pad Replacement (AQ9)</u> .	
1	Seat Cushion Cover Procedure 1. Disengage the j-channel retainers from the seat cushion frame. 2. Disconnect the blower from the seat cushion pad. 3. Disconnect the electrical connectors that attach to the seat cushion, if equipped. 4. Remove the seat cushion cover and pad from the seat cushion frame as an assembly. 5. Pull the cover away from the pad to disengage the retainers
2	Front Seat Cushion Heater Procedure Remove the seat cushion heater from the seat cushion pad by sliding it through the seat cushion pad.

PASSENGER SEAT CUSHION HEATER REPLACEMENT (KA1)

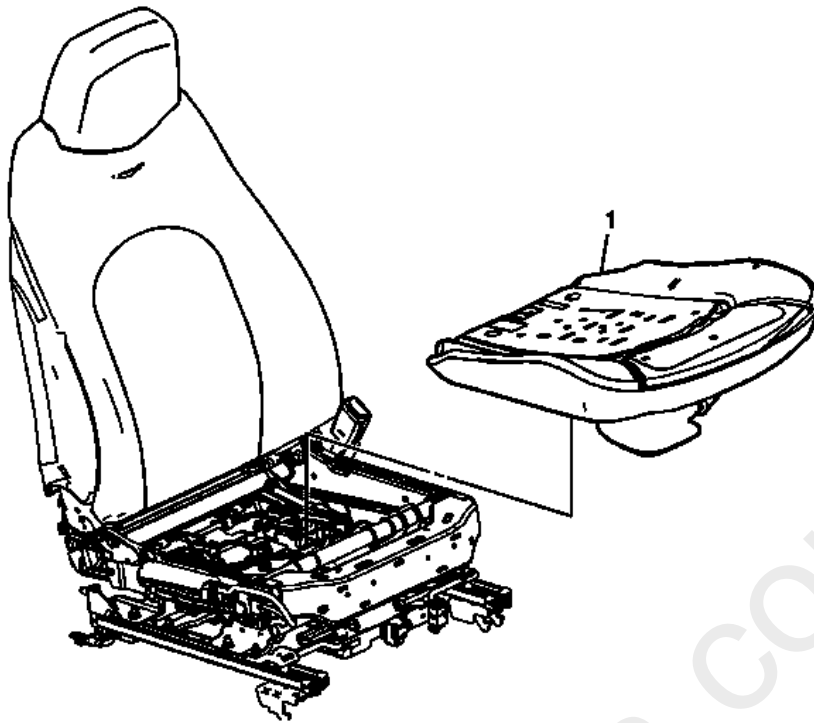


Fig. 7: Inflatable Restraint Passenger Presence System - Front (KA1)
 Courtesy of GENERAL MOTORS COMPANY

Passenger Seat Cushion Heater Replacement (KA1)

Callout	Component Name
WARNING: Refer to <u>SIR Warning</u>	
Preliminary Procedure	
1. Remove the front seat. Refer to <u>Front Seat Removal and Installation - Bucket (W2E)</u> , <u>Front Seat Removal and Installation - Bucket (AQ9)</u> . 2. Remove the seat cushion cover. Refer to <u>Front Seat Cushion Cover and Pad Replacement (W2E)</u> , <u>Front Seat Cushion Cover and Pad Replacement (AQ9)</u> .	
	Inflatable Restraint Front Passenger Presence System Assembly WARNING: Replace the passenger presence system as a complete assembly to prevent possible injury to the occupant. All the components in the service kit are assembled and calibrated as a unit. Using only some of the components in the service kit will cause the passenger presence system to operate improperly. WARNING: To avoid personal injury, perform a preload test on the passenger presence system whenever you remove or replace the seat cushion trim. Failure to do so may cause the

system to malfunction.

Procedures

1

1. Preload Test the inflatable restraint passenger presence system whenever the seat cushion or any component of the passenger presence system is removed. Refer to **Control Module References** .
 2. Program the inflatable restraint passenger presence system after replacement. Refer to **Control Module References** .
- The passenger presence system is an integral part of the pad on the passenger seat cushion.
 - The sensor, module and seat cushion pad must be replaced as a unit.
 - Note the routing of the wiring harness and connector location for installation.

DRIVER OR PASSENGER SEAT BACK VENTILATION HEATING AND COOLING BLOWER REPLACEMENT (KB6)

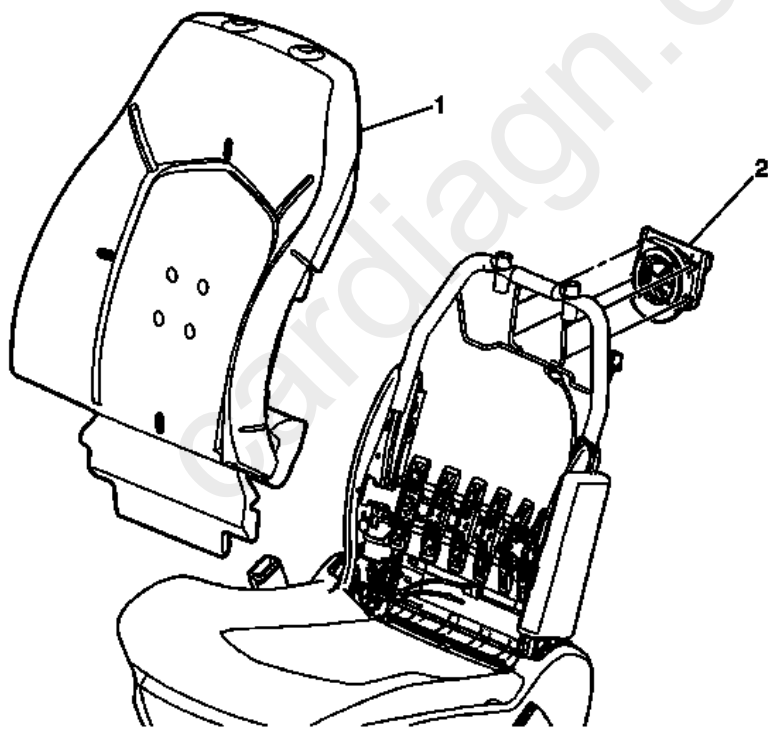


Fig. 8: Driver Seat and Passenger Seat Back Ventilation Heating and Cooling Blower (KB6)
Courtesy of GENERAL MOTORS COMPANY

Driver or Passenger Seat Back Ventilation Heating and Cooling Blower Replacement (KB6)

Callout	Component Name
Preliminary Procedure	

1. Remove the front seat. Refer to <u>Front Seat Removal and Installation - Bucket (W2E)</u> , <u>Front Seat Removal and Installation - Bucket (AQ9)</u> . 2. Remove the front seat back cushion cover and pad. Refer to <u>Front Seat Back Cushion Cover and Cushion Pad Replacement (AQ9)</u> , <u>Front Seat Back Cushion Cover and Cushion Pad Replacement (W2E)</u> .	
1	Front Seat Back Cushion Cover and Pad Refer to <u>Front Seat Back Cushion Cover and Cushion Pad Replacement (AQ9)</u> , <u>Front Seat Back Cushion Cover and Cushion Pad Replacement (W2E)</u> .
2	Front Seat Back Cushion Ventilation Heating and Cooling Blower Procedure Disconnect the electrical connector.

DRIVER OR PASSENGER SEAT BACK VENTILATION HEATING AND COOLING BLOWER REPLACEMENT (W2E)

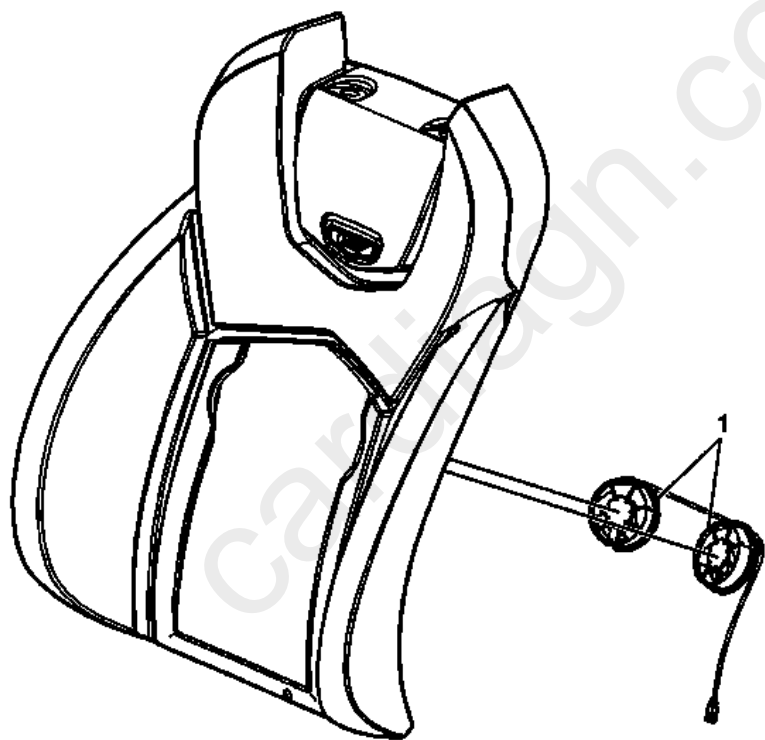


Fig. 9: Identifying Driver & Passenger Seat Back Ventilation Heating & Cooling Blower (W2E)
Courtesy of GENERAL MOTORS COMPANY

Driver or Passenger Seat Back Ventilation Heating and Cooling Blower Replacement (W2E)

Callout	Component Name
Preliminary Procedure	
1. Remove the front seat head restraint. Refer to <u>Driver or Passenger Seat Head Restraint Replacement (W2E)</u> .	

2. Remove the front seat head restraint guide. Refer to <u>Driver or Passenger Seat Head Restraint Guide Replacement (W2E)</u> . 3. Remove the front seat back cushion cover and pad. Refer to <u>Front Seat Back Cushion Cover and Cushion Pad Replacement (W2E)</u> .	
1	Front Seat Back Ventilation Heating and Cooling Blower Procedure 1. Disconnect the electrical connector. 2. Twist the fan assembly counter clockwise, then slide it rearward seperating it from the seat back cushion pad. 3. Transfer components as necessary.

FRONT SEAT CUSHION VENTILATION BLOWER REPLACEMENT (KB6)

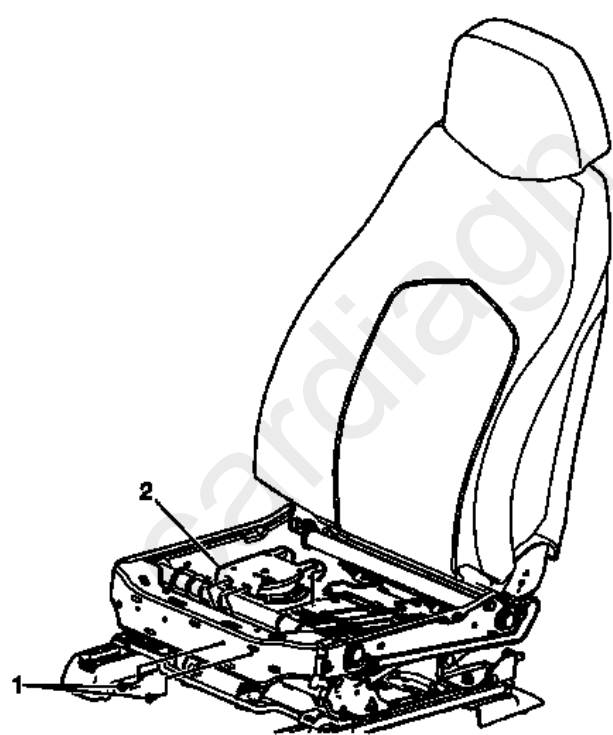


Fig. 10: Driver Seat and Passenger Seat Cushion Ventilation Heating and Cooling Blower Replacement (KB6)
 Courtesy of GENERAL MOTORS COMPANY

Front Seat Cushion Ventilation Blower Replacement (KB6)

Callout	Component Name
Preliminary Procedure 1. Remove the front seat. Refer to <u>Front Seat Removal and Installation - Bucket (W2E)</u> , <u>Front</u>	

Seat Removal and Installation - Bucket (AQ9) .

2. Remove the front seat cushion cover and pad. Refer to **Front Seat Cushion Cover and Pad Replacement (W2E)** , **Front Seat Cushion Cover and Pad Replacement (AQ9)** .

1	Front Seat Cushion Ventilation Heating and Cooling Blower Screw (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 3 N.m (27 lb in)
2	Front Seat Cushion Ventilation Heating and Cooling Blower Procedure Disconnect the electrical connector.

FRONT SEAT CUSHION VENTILATION BLOWER REPLACEMENT (W2E)

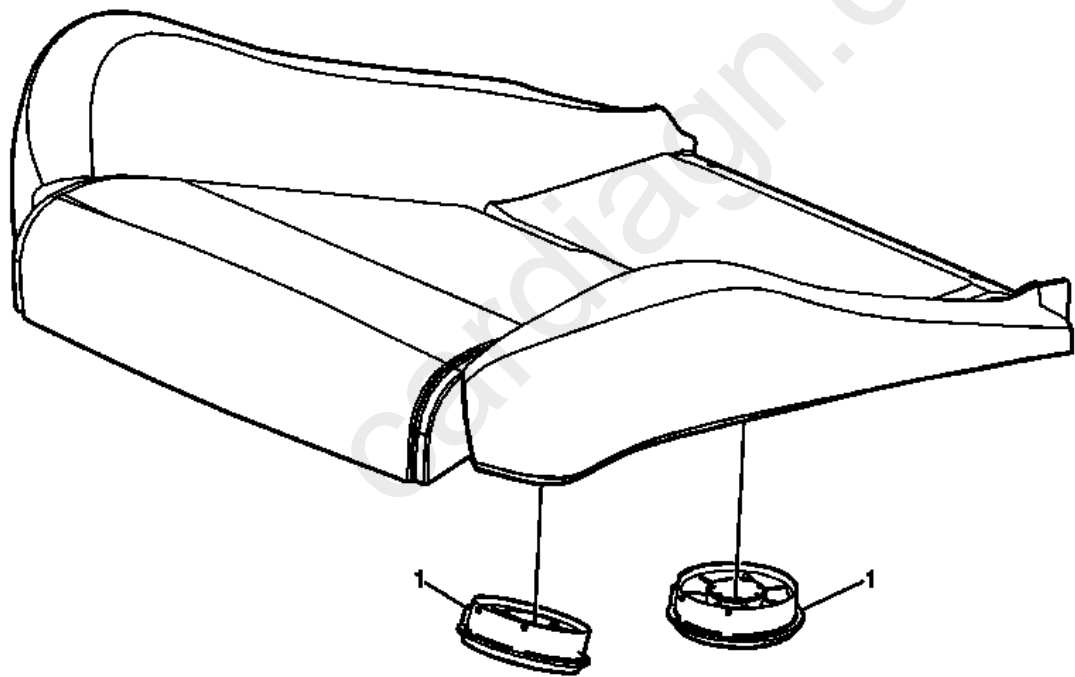


Fig. 11: Identifying Driver & Passenger Seat Cushion Ventilation Heating & Cooling Blower (W2E)
Courtesy of GENERAL MOTORS COMPANY

Front Seat Cushion Ventilation Blower Replacement (W2E)

Callout	Component Name
Preliminary Procedure	

1. Remove the front seat. Refer to <u>Front Seat Removal and Installation - Bucket (W2E)</u> . 2. Remove the front seat cushion cover and pad. Refer to <u>Front Seat Cushion Cover and Pad Replacement (W2E)</u> .	
1	Front Seat Cushion Ventilation Heating and Cooling Blower Procedure 1. Disconnect the electrical connector. 2. Twist the fan assembly counterclockwise, then slide it downward separating it from the seat cushion pad. 3. Transfer components as necessary.

DESCRIPTION AND OPERATION

HEATED/VENTED SEAT DESCRIPTION AND OPERATION

Heated Seat Components

The driver and passenger heated and vented seat system each consist of the following components:

- Seat heating switch
- Seat venting switch
- Radio/HVAC controls
- Seat memory control module
- Seat cushion heating element
- Seat back heating element
- Seat cushion temperature sensor

Heated Seat Operation

NOTE: **The passenger seat block diagram is identical to the driver seat.**

Heated Seat Block Diagram

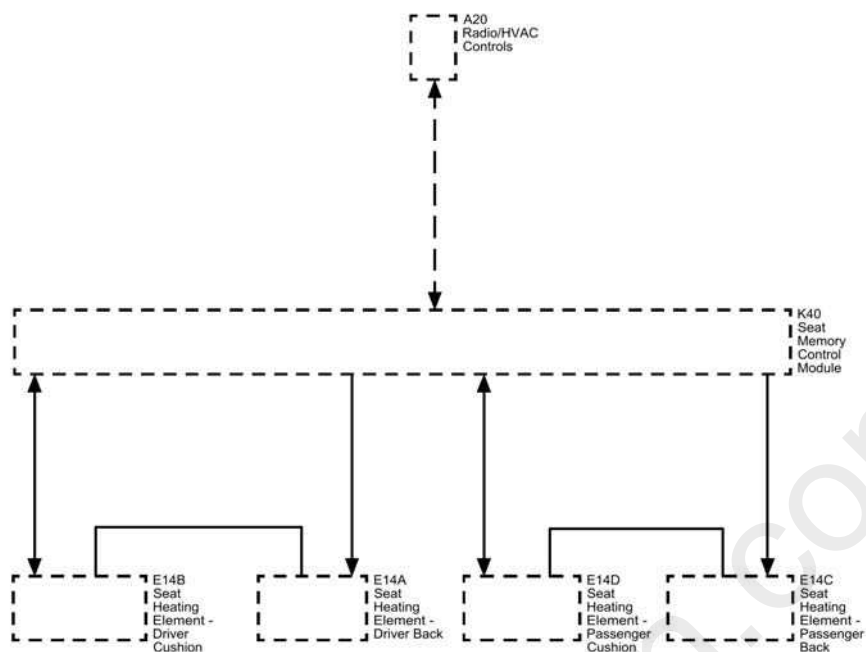


Fig. 12: Heated Seat Block Diagram
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
DA	Serial Data
HW	Hard-Wired
HW	Hard-Wired
HW	Hard-Wired
HW	Hard-Wired
HW	Hard-Wired
A20	A20 Radio/HVAC Controls
E14C	E14C Seat Heating Element - Passenger Back
E14D	E14D Seat Heating Element - Passenger Cushion
E14A	E14A Seat Heating Element - Driver Back
E14B	E14B Seat Heating Element - Driver Cushion
K40	K40 Seat Memory Control Module

The driver and passenger heated seats are controlled by separate heated seat switches. Both switches are located in the integrated center stack (ICS). When a heated seat switch is pressed, a message is sent via the CAN graphical interface (CGI) serial data line to the radio. The radio then serves as a gateway to transmit the message to the memory seat module (MSM) via GMLAN serial data indicating the heated seat command. In response to this signal, the MSM then applies or removes battery voltage through the element supply voltage circuit of the seat heating elements. The MSM then sends a serial data message back to the radio to gateway the information to the ICS to either illuminate or turn off the appropriate temperature indicator.

Temperature Regulation

The heated seat system is designed to warm the seat cushion and seat back to 3 different temperature settings; High, MED, and Low. The memory seat module (MSM) monitors the seat temperature through the temperature sensor signal circuits and the temperature sensors (thermistor) that are located in the seat cushion and the seat back. The temperature sensors are variable resistors, their resistance varies as the temperature of the seat changes. When the temperature sensor resistance indicates to the MSM 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.

Vented Seat Operation

NOTE: The passenger seat block diagram is identical to the driver seat.

Cooled Seat Block Diagram

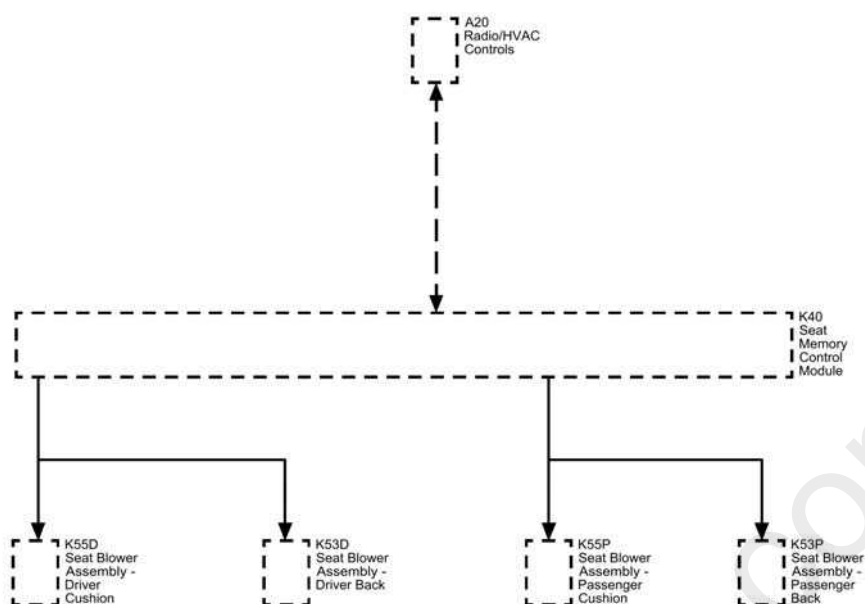


Fig. 13: Cooled Seat Block Diagram
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
DA	Serial Data
HW	Hard-Wired
HW	Hard-Wired
A20	A20 Radio/HVAC Controls
K40	K40 Seat Memory Control Module
K53P	K53P Seat Blower Assembly - Passenger Back
K55P	K55P Seat Blower Assembly - Passenger Cushion
K53D	K53D Seat Blower Assembly - Driver Back
K55D	K55D Seat Blower Assembly - Driver Cushion

The vented seat operation is designed to draw cabin air around and away from the occupant through small holes in the seat cushion and seat back covers, through channels in the foam pad, and then through the blower motor exhausting the waste air under the seat cushion.

The driver and passenger vented seats are controlled by separate vented seat switches located in the integrated center stack (ICS) with the radio and HVAC controls. With the ignition ON, Ignition voltage is supplied to the driver and passenger seat blower motors through the MISC IGN fuse located in the underdood fuse block. Ground from G200 is provided to the driver seat blower motors, while G201 provides ground for the passenger seat blower motors. When a vented seat switch is pressed, a message is sent via the CAN graphical interface (CGI) serial data line to the radio. The radio then serves as a gateway to transmit the message to the memory seat module (MSM) via the GMLAN serial data line indicating the vented seat command. In response to this message, the MSM applies a low side pulse width modulation (PWM) signal through the blower motor control circuits to the seat cushion and seat back blower motors indicating the vented seat command. The logic in the blower motors then sets the blower speed to the switch set point. Both blower motors run drawing cabin air around and away from occupant. The MSM then sends a serial data message back to the radio to gateway the information back to the ICS to either illuminate or turn off the appropriate switch indicator.

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** .