

2017 ACCESSORIES AND EQUIPMENT

Seat Heating and Cooling - Bolt EV

SPECIFICATIONS

FASTENER SPECIFICATIONS

Reusable Threaded Fastener Tightening Specifications

Application	Specification
	Metric (English)
NOTE: <i>All fasteners listed in this table can be reused after removal.</i>	
Front Seat Heater Control Module Bracket Fastener	4.7 N.m (42 lb in)
Front Seat Heater Control Module Fastener	2.5 N.m (22 lb in)

SCHEMATIC WIRING DIAGRAMS

HEATED/COOLED SEAT WIRING SCHEMATICS

Heated Seats - Front (KA1)

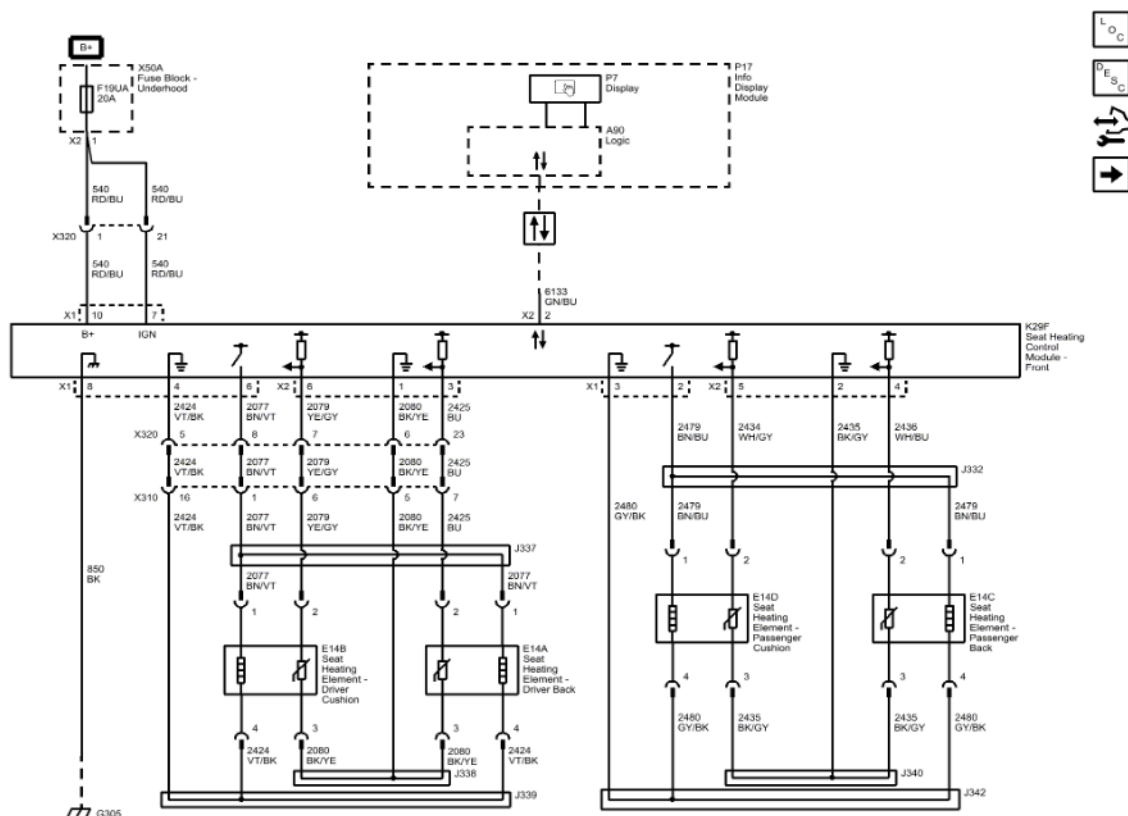


Fig. 1: Heated Seats - Front (KA1)

Courtesy of GENERAL MOTORS COMPANY

Heated Seats - Rear (KA6)

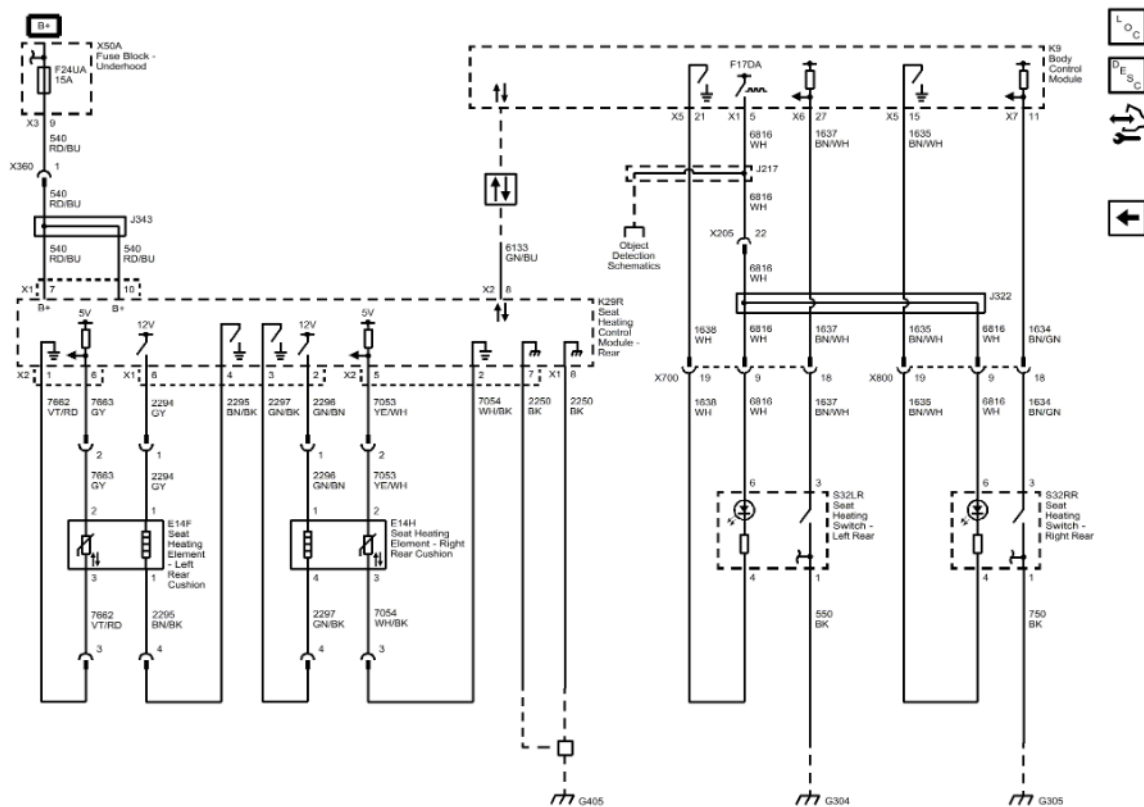


Fig. 2: Heated Seats - Rear (KA6)

Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B191A OR B191B: HEATED SEAT MODULE

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 B191A 39

Front Heated Seat Module

DTC B191B 39

Rear Heated Seat Module

Circuit/System Description

An internal fault is detected inside the control module. No external circuits are involved.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC

The control module detects an internal fault.

Action Taken When the DTC Sets

The seat heating control module will disable all heated seat functions.

Conditions for Clearing the DTC

- The DTC clears when the diagnostic runs and passes.
- 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 - INDEX

Description and Operation

- **Heated Seats Description and Operation**
- **Rear Heated Seats Description and Operation**

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

DTC B191A

1. Ignition ON.
2. Verify DTC B191A is not set.
 - **If the DTC is set**

Replace the K29F Seat Heating Control Module - Front.

- **If the DTC is not set**
3. All OK.

DTC B191B

1. Ignition ON.
2. Verify DTC B191B is not set.
 - **If the DTC is set**

Replace the K29R Seat Heating Control Module - Rear.

- **If the DTC is not set**
3. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for K29F Seat Heating Control Module - Front or K29R Seat Heating Control Module - Rear replacement, programming and setup

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 module(s) can communicate via the serial data link.
2. Refer to the system description and operation from the following list in order to familiarize yourself with the system functions:
 - [Heated Seats Description and Operation](#)
 - [Rear Heated Seats Description and Operation](#)

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:

- [Front Heated Seat Malfunction](#)
- [Rear Heated Seat Malfunction](#)

FRONT HEATED 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
B+ Terminal 10 X1	U1524, 1	U1524, 1	-	-
B+ Terminal 7 X1	6	6	-	-
Driver Heated Seat Back Temperature Sensor Signal	2	5	5	-
Driver Heated Seat Back Temperature Sensor Low Reference	-	5	-	-
Driver Heated Seat Element Voltage Control Terminal 6 X1	1	2	1	-
Driver Heated Seat Element Ground Control Terminal 4 X1	1	2	1	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Driver Heated Seat Back Element Voltage Control	1	3	1	-
Driver Heated Seat Back Element Ground Control	1	3	1	-
Driver Heated Seat Cushion Temperature Sensor Signal	2	5	5	-
Driver Heated Seat Cushion Temperature Sensor Low Reference	-	5	-	-
Driver Heated Seat Cushion Element Voltage Control	1	4	1	-
Driver Heated Seat Cushion Element Ground Control	1	4	1	-
Passenger Seat Back Temperature Sensor Signal	6	9	9	-
Passenger Seat Back Temperature Sensor Low Reference	-	9	-	-
Passenger Heated Seat Element Voltage Control Terminal 2 X1	1	6	1	-
Passenger Heated Seat Element Ground Control Terminal 3 X1	1	6	1	-
Passenger Heated Seat Back Element Voltage Control	1	7	1	-
Passenger Heated Seat Back Element Ground Control	1	7	1	-
Passenger Heated Seat Cushion Temperature Sensor Signal	6	9	9	-
Passenger Heated Seat Cushion Temperature Sensor Low Reference	-	9	-	-
Passenger Heated Seat Cushion Element Voltage Control	1	8	1	-
Passenger Heated Seat Cushion Element Ground Control	1	8	1	-
Front Seat Heating Control Module Ground	-	U1524, 1	-	-
1. Driver and passenger heated seats are inoperative. 2. Driver heated seat is inoperative 3. Driver seat back heat function is inoperative 4. Driver seat cushion heat function is inoperative 5. Degraded driver heated seat operation 6. Passenger heated seat is inoperative 7. Passenger seat back heat function is inoperative 8. Passenger seat cushion heat function is inoperative 9. Degraded passenger heated seat operation				

Circuit/System Description

The driver and passenger heated seats switches are located on the infotainment display. When a heated seat switch is pressed, a serial data message is sent from the infotainment display to the body control module (BCM) indicating the heated seat command. The BCM serves as the heated seat system master

to determine the requested operating mode. The BCM then sends a serial data message to the seat heating control module indicating the heated seat command. In response to this message, the seat heating control module attempts to drive the appropriate seat heating elements per the BCM command. The BCM also controls the seat temperature and mode indicators, via the serial data line, used to provide the operator with feedback as to the operating status of the system.

The seat heating control module controls heated seat operation for the driver and passenger seats. When active, power is applied to the seat cushion and back heater elements through a common pulse width modulated (PWM) voltage supply control circuit. Each individual heater element is switched to ground by the module through a common low side drive control circuit.

The seat back and cushion temperature sensors (thermistors) are packaged with the seat heating elements located just under the seat covers. The seat heating control module supplies each temperature sensor with a 5 V reference signal circuit and a low reference circuit. The module monitors the voltage from the 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 module senses the seat reached the set temperature, it will then begin regulate the current flow through the heater elements in order to maintain the desired seat temperature based on the feedback voltage from the sensor.

Diagnostic Aids

- A short to ground or B+ in either the heating element voltage control circuit or ground control circuit will cause both the driver and front passenger heated seats to be inoperative.
- An open in either the voltage control circuit or ground control circuit between the module and the splice will cause the seat cushion and seat back the heated seat function to be inoperative for that seat.
- A short to ground on either the seat cushion or seat back temperature sensor signal circuit will cause the heated seat function to be inoperative for that seat.
- An open in either the voltage control circuit or ground control circuit between the splice and the heating element will cause just that one heating element to be inoperative.
- The following faults will cause a degraded heated seat operation for both the seat back and seat cushion.
 - An open or a short to voltage on either the seat cushion or seat back temperature sensor signal circuit.
 - An open in either the seat cushion or seat back temperature sensor low reference circuit.
 - A fault in either the seat cushion or seat back temperature sensor.
- A broken wire in a heating element may cause a degraded heated seat operation for that particular heating element.
- When inactive the seat heating control module connects the heating element low side outputs to a common reference point internal to the module which is biased to approximately 3.5 V. The module uses this biased voltage in order to check the high side and low side control circuits for a short to battery or ground before enabling the driver and passenger seat heating elements.
- With both the seat cushion and seat back heater elements disconnected, if the high side output of the module is measured it will display a low current 12 V bleed off voltage. This bleed off voltage does not have a meaningful diagnostic purpose. With one or both of the heater elements connected you would just see the 3.5 V biased voltage from this circuit.
- If the heated seats are on high, the temperature level may automatically be lowered after approximately 30 min of operation.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

cardiagn.com

COMPONENT CONNECTOR END VIEWS - INDEX

Heated Seats Description and Operation

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

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

Circuit/System Verification

NOTE: Review the Diagnostic Fault Information table and Diagnostic Aids in order to get a better understanding of the possible heated seat system faults before proceeding Circuit/System Verification and Circuit/System Testing.

1. Vehicle ON.
2. Verify the scan tool Body Control Module Driver Seat Heating/Venting/Cooling Mode parameter changes between OFF and Seat Back and Cushion Heating when pressing the driver heated seat switch.
 - **If the parameter does not change**
Replace the P17 Info Display Module.
 - **If the parameter changes**
3. Verify the scan tool Passenger Seat Heating/Venting/Cooling Mode parameter changes between OFF and Seat Back and Cushion Heating when pressing the passenger heated seat switch.
 - **If the parameter does not change**
Replace the P17 Info Display Module.
 - **If the parameter changes**
4. Verify the driver and front passenger heated seats operate.
 - **If the driver and front passenger heated seats are inoperative**
Refer to Circuit/System Testing - Both Heated Seats are Inoperative
 - **If the seat cushion and back heating elements are inoperative of one seat**
Refer to Circuit/System Testing - One Heated Seat Inoperative
 - **If just one of the heating elements is inoperative**
Refer to Circuit/System Testing - One Heating Element is Inoperative.
 - **If the driver seat exhibits a degraded heated seat operation**
Refer to Circuit/System Testing - Degraded Heated Seat Operation Driver Seat
 - **If the passenger seat exhibits a degraded heated seat operation**
Refer to Circuit/System Testing - Degraded Heated Seat Operation Passenger Seat
 - **If both heated seats operate**
5. All OK.

Both Heated Seats are Inoperative

NOTE: **Circuit/System Verification must be performed before proceeding with Circuit/System Testing.**

1. Vehicle OFF, disconnect the X1 harness connector at the K29F Seat Heating Control Module - Front, Vehicle ON.
2. Verify a test lamp illuminates between each B+ circuit terminal listed below and ground.
 - Terminal 7
 - Terminal 10
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Vehicle OFF, remove the test lamp.
 2. Test for less than 2 Ω in the B+ circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is OK and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Vehicle OFF, remove the test lamp.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K29F Seat Heating Control Module - Front.
 - **If the test lamp illuminates**
3. Vehicle OFF.
4. Test for infinite resistance between each control circuit terminal listed below and ground, one at a time.
 - Terminal 2
 - Terminal 3
 - Terminal 4
 - Terminal 6
 - **If less than infinite resistance**

Repair the short to ground on the circuit.
 - **If infinite resistance**
5. Vehicle ON.
6. Test for less than 1 V between each control circuit terminal listed below and ground, one at a time.
 - Terminal 2
 - Terminal 3
 - Terminal 4
 - Terminal 6
 - **If 1 V or greater**

Repair the short to voltage on the circuit.
 - **If less than 1 V**
7. Replace the K29F Seat Heating Control Module - Front.

One Heated Seat is Inoperative

NOTE: **Circuit/System Verification must be performed before proceeding with Circuit/System Testing**

1. Vehicle OFF, disconnect the X1 harness connector at the K29F Seat Heating Control Module - Front, Vehicle ON.
2. Verify a test lamp illuminates between the B+ circuit terminal 7 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Vehicle OFF, remove the test lamp
 2. Test for less than 2 Ω in the B+ circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is OK and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Vehicle OFF, remove the test lamp.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K29F Seat Heating Control Module - Front.
 - **If the test lamp illuminates**
3. Vehicle OFF, connect the X1 harness connector at the K29F Seat Heating Control Module - Front. Disconnect the harness connector at the E14 Seat Heating Element - Cushion and the E14 Seat Heating Element - Back, Vehicle ON.

NOTE: When performing this test ensure that you are testing from the correct terminal. Testing from the incorrect terminal will cause a misdiagnosis of the circuit. Three of the four terminals in this connector will not only display a voltage reading but a different voltage reading.

4. Test for 4.8 - 5.2 V between each signal circuit terminal listed below and ground, one at a time.
 - E14 Seat Heating Element - Cushion terminal 2
 - E14 Seat Heating Element - Back terminal 2
 - **If less than 4.8 V**
 1. Vehicle OFF, disconnect the X2 harness connector at the K29F Seat Heating Control Module - Front.
 2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K29F Seat Heating Control Module - Front.
 - **If greater than 5.2 V**
 1. Vehicle OFF, disconnect the X2 harness connector at the K29F Seat Heating Control Module - Front, Vehicle ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K29F Seat Heating Control Module - Front.
 - **If between 4.8 - 5.2 V**
5. Connect a test lamp between control circuit terminal 1 and control circuit terminal 4 of the E14 Seat Heating Element - Back, Vehicle ON.

NOTE: The test lamp should turn ON for approximately 10 s after the heated seat is commanded ON.

6. Verify the test lamp turns ON after pressing the heated seat switch.
 - **If the test lamp is always OFF**
 1. Vehicle OFF, remove the test lamp, disconnect the X1 harness connector at the K29F Seat Heating Control Module - Front.

2. Test for less than 2 Ω in each control circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , replace the K29F Seat Heating Control Module - Front.

- **If the test lamp turns ON**

7. Vehicle OFF, connect the harness connector at the E14 Seat Heating Element - Cushion, Vehicle ON.

8. Verify the test lamp turns ON after pressing the heated seat switch.

- **If the test lamp is always OFF**

NOTE: Because of the type of material used in the heater element, a reliable resistance value is unavailable for a component test.

Test or replace the E14 Seat Heating Element - Cushion.

- **If the test lamp turns ON**

NOTE: Because of the type of material used in the heater element, a reliable resistance value is unavailable for a component test.

9. Test or replace the E14 Seat Heating Element - Back.

One Heating Element is Inoperative

NOTE: Circuit/System Verification must be performed before proceeding with Circuit/System Testing.

1. Vehicle OFF, disconnect the harness connector at the appropriate E14 Seat Heating Element.

2. Connect a test lamp between control circuit terminal 1 and control circuit terminal 4, Vehicle ON.

3. Verify the test lamp turns ON after pressing the heated seat switch.

- **If the test lamp is always OFF**

1. Vehicle OFF, remove the test lamp, disconnect the X1 harness connector at the K29F Seat Heating Control Module - Front.

2. Test for less than 2 Ω in each control circuit end to end.

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

- **If the test lamp turns ON**

NOTE: Because of the type of material used in the heater element, a reliable resistance value is unavailable for a component test.

4. Test or replace the E14 Seat Heating Element.

Degraded Heated Seat Operation Driver Seat

NOTE: Circuit/System Verification must be performed before proceeding with Circuit/System Testing

1. Vehicle OFF, disconnect the harness connector at each component listed below. It may take up to 2 min for all vehicle systems to power down.

- E14B Seat Heating Element - Driver Cushion
- E14A Seat Heating Element - Driver Back

2. Test for less than 40 Ω between each low reference circuit terminal listed below and ground, one at a time.

- E14B Seat Heating Element - Driver Cushion terminal 3
- E14A Seat Heating Element - Driver Back terminal 3
- **If 40 Ω or greater**

1. Vehicle OFF, disconnect the X2 harness connector at the K29F Seat Heating Control Module - Front.
2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K29F Seat Heating Control Module - Front.
 - **If less than 40 Ω**
3. Vehicle ON.
4. Test for 4.8 - 5.2 V between each signal circuit terminal listed below and ground, one at a time.
 - E14B Seat Heating Element - Driver Cushion terminal 2
 - E14A Seat Heating Element - Driver Back terminal 2
 - **If less than 4.8 V**
 1. Vehicle OFF, disconnect the X2 harness connector at the K29F Seat Heating Control Module - Front.
 2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K29F Seat Heating Control Module - Front.
 - **If greater than 5.2 V**
 1. Vehicle OFF, disconnect the X2 harness connector at the K29F Seat Heating Control Module - Front, Vehicle ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K29F Seat Heating Control Module - Front.
 - **If between 4.8 - 5.2 V**
5. Vehicle OFF, connect the harness connector at the E14B Seat Heating Element - Driver Cushion and the E14A Seat Heating Element - Driver Back. Disconnect the X2 harness connector at the K29F Seat Heating Control Module - Front.
6. Test for 500 Ω - 300 k Ω between the signal circuit and the low reference circuit terminals listed below, one at a time.
 - E14B Seat Heating Element - Driver Cushion terminal 6 and terminal 1
 - E14A Seat Heating Element - Driver Back terminal 3 and terminal 1
 - **If not between 500 Ω - 300 k Ω**

Replace the E14 Seat Heating Element.

 - **If between 500 Ω - 300 k Ω**
7. Replace the K29F Seat Heating Control Module - Front.

Degraded Heated Seat Operation Passenger Seat

NOTE: **Circuit/System Verification must be performed before proceeding with Circuit/System Testing**

1. Vehicle OFF, disconnect the harness connector at each component listed below. It may take up to 2 min for all vehicle systems to power down.
 - E14D Seat Heating Element - Passenger Cushion
 - E14C Seat Heating Element - Passenger Back
2. Test for less than 40 Ω between each low reference circuit terminal listed below and ground, one at a time.
 - E14D Seat Heating Element - Passenger Cushion terminal 3
 - E14C Seat Heating Element - Passenger Back terminal 3

- **If 40 Ω or greater**

1. Vehicle OFF, disconnect the X2 harness connector at the K29F Seat Heating Control Module - Front.
2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K29F Seat Heating Control Module - Front.

- **If less than 40 Ω**

3. Vehicle ON.

4. Test for 4.8 - 5.2 V between each signal circuit terminal listed below and ground, one at a time.

- E14D Seat Heating Element - Passenger Cushion terminal 2
- E14C Seat Heating Element - Passenger Back terminal 2

- **If less than 4.8 V**

1. Vehicle OFF, disconnect the X2 harness connector at the K29F Seat Heating Control Module - Front.

2. Test for infinite resistance between the signal circuit and ground.

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

3. Test for less than 2 Ω in the signal circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , replace the K29F Seat Heating Control Module - Front.

- **If greater than 5.2 V**

1. Vehicle OFF, disconnect the X2 harness connector at the K29F Seat Heating Control Module - Front, Vehicle ON.

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

- If 1 V or greater, repair the short to voltage on the circuit.
- If less than 1 V, replace the K29F Seat Heating Control Module - Front.

- **If between 4.8 - 5.2 V**

5. Vehicle OFF, connect the harness connector at the E14D Seat Heating Element - Passenger Cushion and the E14C Seat Heating Element - Passenger Back. Disconnect the X2 harness connector at the K29F Seat Heating Control Module - Front.

6. Test for 500 Ω - 300 k Ω between the signal circuit and the low reference circuit terminals listed below, one at a time.

- E14D Seat Heating Element - Passenger Cushion terminal 5 and terminal 2
- E14C Seat Heating Element - Passenger Back terminal 4 and terminal 2

- **If not between 500 Ω - 300 k Ω**

Replace the E14 Seat Heating Element.

- **If between 500 Ω - 300 k Ω**

7. Replace the K29F Seat Heating Control Module - Front.

Repair Instructions

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

- [Driver Information Display Replacement](#)
- [Driver or Passenger Seat Back Heater Replacement](#)
- [Front Seat Cushion Heater Replacement \(Korea\)](#)[Front Seat Cushion Heater Replacement \(North America\)](#)
- [Control Module References](#) for K29F Seat Heating Control Module - Front replacement, programming and setup

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+ Terminal 10 X1	U1526, 1	U1526, 1	-	-
B+ Terminal 7 X1	4	4	-	-
Left Rear Heated Seat Switch Signal	7	2	2	-
Indicator Dimming Control Terminal 6	B2625 02	6	6	-
Left Rear Heated Seat High Indicator Control Terminal 4	6	6	-	-
Left Rear Heated Seat Cushion Temperature Sensor Signal	2	3	3	-
Left Rear Heated Seat Cushion Temperature Sensor Low Reference	-	3	-	-
Left Rear Heated Seat Cushion Element Voltage Control	1	2	1	-
Left Rear Heated Seat Cushion Element Ground Control	1	2	1	-
Right Rear Heated Seat Switch Signal	7	4	4	-
Indicator Dimming Control Terminal 6	B2625 02	6	6	-
Right Rear Heated Seat High Indicator Control Terminal 4	6	6	-	-
Right Rear Heated Seat Cushion Temperature Sensor Signal	4	5	5	-
Right Rear Heated Seat Cushion Temperature Sensor Low Reference	-	5	-	-
Right Rear Heated Seat Cushion Element Voltage Control	1	4	1	-
Right Rear Heated Seat Cushion Element Ground Control	1	4	1	-
Rear Seat Heating Control Module Ground Terminal 7 X2	-	8	-	-
Rear Seat Heating Control Module Ground Terminal 8 X1	-	U1526, 1	-	-
1. Left and right rear heated seats are inoperative 2. Left rear heated seat is inoperative 3. Degraded left rear heated seat operation 4. Right rear heated seat is inoperative 5. Degraded right rear heated seat operation 6. Rear heated seat switch indicator malfunction 7. The heated seat is always ON 8. No effect				

Circuit/System Description

When a heated seat switch is pressed, the heated seat switch signal circuit from the body control module (BCM) is pulled low indicating the heated seat command. The BCM serves as the heated seat system

master to determine the requested operating mode. The BCM then sends a LIN bus serial data message to the rear seat heating control module indicating the heated seat command. In response to this message, the seat heating control module attempts to drive the appropriate seat heating element per the BCM command.

The rear seat heating control module controls heated seat operation for the left and right rear seats. When active, power is applied to the seat cushion heater element through a pulse width modulated (PWM) voltage supply control circuit. The heater element is switched to ground by the module through a low side drive control circuit.

The seat cushion temperature sensor (thermistor) is packaged with the seat heating element located just under the seat cover. The rear seat heating control module supplies the temperature sensor with a 5 V reference signal circuit and a low reference circuit. The module monitors the voltage from the 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 module senses the seat reached the set temperature, it will then begin regulate the current flow through the heater elements in order to maintain the desired seat temperature based on the feedback voltage from the sensor.

Diagnostic Aids

- A short to ground or B+ in either the heating element voltage control circuit or ground control circuit will cause both rear heated seats to be inoperative.
- A short to ground on the seat cushion temperature sensor signal circuit will cause the heated seat function to be inoperative for that seat.
- The following faults will cause a degraded heated seat operation.
 - An open or a short to voltage on the seat cushion temperature sensor signal circuit.
 - An open in the seat cushion temperature sensor low reference circuit.
 - A fault in the seat cushion temperature sensor.
- A broken wire in a heating element may cause a degraded heated seat operation for that particular heating element.
- When inactive the seat heating control module connects the heating element low side outputs to a common reference point internal to the module which is biased to approximately 3.5 V. The module uses this biased voltage in order to check the high side and low side control circuits for a short to battery or ground before enabling the left and right rear seat heating elements.
- With the seat cushion heater element disconnected, if the high side output of the control module is measured it will display a low current 12 V bleed off voltage. This bleed off voltage does not have a meaningful diagnostic purpose. With the heater elements connected you would just see the 3.5 V biased voltage from this circuit.
- If the heated seats are on high, the temperature level may automatically be lowered after approximately 30 min of operation.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Rear Heated Seats Description and Operation

Electrical Information Reference

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

- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

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

Circuit/System Verification

1. Vehicle ON.

NOTE: Review the Diagnostic Fault Information table and Diagnostic Aids in order to get a better understanding of the possible heated seat system faults before proceeding Circuit/System Verification and Circuit/System Testing.

2. Verify the scan tool Body Control Module Left Rear Seat Heating/Venting/Cooling Mode parameter changes between Off and Seat Back and Cushion Heating when pressing the left rear heated seat switch.

- **If the parameter does not change**

Refer to Circuit/System Testing - Heated Seat Switch Circuit Test.

- **If the parameter changes**

3. Verify the scan tool Right Rear Seat Heating/Venting/Cooling Mode parameter changes between Off and Seat Back and Cushion Heating when pressing the right rear heated seat switch.

- **If the parameter does not change**

Refer to Circuit/System Testing - Rear Heated Seat Switch Circuit Test.

- **If the parameter changes**

4. Verify the left and right rear heated seats operate.

- **If both rear heated seats are inoperative**

Refer to Circuit/System Testing - Both Rear Heated Seats are Inoperative

- **If just one of the rear heated seats is inoperative**

Refer to Circuit/System Testing - One Rear Heated Seat is Inoperative

- **If the left rear seat exhibits a degraded heated seat operation**

Refer to Circuit/System Testing - Degraded Heated Seat Operation Left Rear Seat

- **If the right rear seat exhibits a degraded heated seat operation**

Refer to Circuit/System Testing - Degraded Heated Seat Operation Right Rear Seat

- **If both heated seats operate**

5. Verify the rear heated seat switch indicator illuminates after pressing the rear seat heating switch.

- **If the indicator does not illuminate**

Refer to Circuit/System Testing - Heated Seat Switch Indicator Circuit Test.

- **If the indicator illuminates**

6. All OK.

Circuit/System Testing

Rear Heated Seat Switch Circuit Test

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NOTE: Circuit/System Verification must be performed before proceeding

with Circuit/System Testing

1. Vehicle OFF and all vehicle systems OFF, disconnect the harness connector at the appropriate S32 Seat Heating Switch - Rear. It may take up to 2 min for all vehicle system to power down.
2. Test for less than 10 Ω between the ground circuit terminal 1 and ground.
 - **If 10 Ω or greater**
 1. Vehicle OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Vehicle ON.
4. Verify the appropriate scan tool Rear Seat Heating/Venting/Cooling Mode parameter is Off.
 - **If not Off**
 1. Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit terminal 3 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 Body Control Module.
 - **If Off**
5. Install a 3 A fused jumper wire between the signal circuit terminal 3 and the ground circuit terminal 1.
6. Verify the scan tool scan tool Rear Seat Heating/Venting/Cooling Mode parameter is Seat Back and Cushion Heating - High.
 - **If not Seat Back and Cushion Heating - High**
 1. Vehicle OFF, remove the jumper wire, disconnect the X4 harness connector at the K9 Body Control Module, Vehicle ON.
 2. Test for less than 1 V between the signal circuit terminal 3 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If Seat Back and Cushion Heating - High**
7. Test or replace the S32 Seat Heating Switch - Rear.

Both Heated Seats are Inoperative

NOTE: **Circuit/System Verification must be performed before proceeding with Circuit/System Testing.**

1. Vehicle OFF and all vehicle systems OFF, disconnect the X1 harness connector at the K29R Seat Heating Control Module - Rear, Vehicle ON.
2. Verify a test lamp illuminates between each B+ circuit terminal listed below and ground.
 - Terminal 7
 - Terminal 10
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Vehicle OFF, remove the test lamp.
 2. Test for less than 2 Ω in the B+ circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is OK and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Vehicle OFF, remove the test lamp.

2. Test for infinite resistance between the B+ circuit and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K29R Seat Heating Control Module - Rear.

- **If the test lamp illuminates**

3. Vehicle OFF.

4. Test for infinite resistance between each control circuit terminal listed below and ground, one at a time.

- Terminal 2
- Terminal 6
- **If less than infinite resistance**

Repair the short to ground on the circuit.

- **If infinite resistance**

5. Vehicle ON.

6. Test for less than 1 V between each control circuit terminal listed below and ground, one at a time.

- Terminal 2
- Terminal 6
- **If 1 V or greater**

Repair the short to voltage on the circuit.

- **If less than 1 V**

7. Replace the K29R Seat Heating Control Module - Rear.

One Heated Seat is Inoperative

NOTE: **Circuit/System Verification must be performed before proceeding with Circuit/System Testing**

1. Vehicle OFF, disconnect the X1 harness connector at the K29R Seat Heating Control Module - Rear, Vehicle ON.

2. Verify a test lamp illuminates between the B+ circuit terminal 7 and ground.

- **If the test lamp does not illuminate and the circuit fuse is good**

1. Vehicle OFF, remove the test lamp

2. Test for less than 2 Ω in the B+ circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , verify the fuse is OK and there is voltage at the fuse.

- **If the test lamp does not illuminate and the circuit fuse is open**

1. Vehicle OFF, remove the test lamp.

2. Test for infinite resistance between the B+ circuit and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K29R Seat Heating Control Module - Rear.

- **If the test lamp illuminates**

3. Vehicle OFF, connect the X1 harness connector at the K29R Seat Heating Control Module - Rear and disconnect the harness connector at the appropriate E14 Seat Heating Element - Rear Cushion, Vehicle ON.

NOTE: **When performing this test ensure that you are testing from the correct terminal. Testing from the incorrect terminal will cause a misdiagnosis of the circuit. Three of the four terminals in this connector will not only display a voltage reading but a different voltage reading.**

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4. Test for 4.8 - 5.2 V between the signal circuit terminal 2 and ground.

- **If less than 4.8 V**

1. Vehicle OFF, disconnect the X2 harness connector at the K29R Seat Heating Control Module - Rear.
2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K29R Seat Heating Control Module - Rear.

- **If greater than 5.2 V**

1. Vehicle OFF, disconnect the X2 harness connector at the K29R Seat Heating Control Module - Rear, Vehicle ON.
2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K29R Seat Heating Control Module - Rear.

- **If between 4.8 - 5.2 V**

5. Connect a test lamp between control circuit terminal 1 and control circuit terminal 4, Vehicle ON.

NOTE: **The test lamp should turn ON for approximately 20 s after the heated seat is commanded ON.**

6. Verify the test lamp turns ON after pressing the rear heated seat switch.

- **If the test lamp is always OFF**

1. Vehicle OFF, remove the test lamp, disconnect the X1 harness connector at the K29R Seat Heating Control Module - Rear.
2. Test for less than 2 Ω in each control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K29R Seat Heating Control Module - Rear.

- **If the test lamp turns ON**

NOTE: **Because of the type of material used in the heater element, a reliable resistance value is unavailable for a component test.**

7. Test or replace the E14 Seat Heating Element - Rear Cushion.

Degraded Heated Seat Operation Left Rear Seat

NOTE: **Circuit/System Verification must be performed before proceeding with Circuit/System Testing**

1. Vehicle OFF, disconnect the harness connector at the E14F Seat Heating Element - Left Rear Cushion. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 40 Ω between the low reference circuit terminal 3 and ground.
 - **If 40 Ω or greater**
 - 1. Vehicle OFF, disconnect the X2 harness connector at the K29R Seat Heating Control Module - Rear.
 - 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K29R Seat Heating Control Module - Rear.

- **If less than 40 Ω**

3. Vehicle ON.
4. Test for 4.8 - 5.2 V between the signal circuit terminal 2 and ground.

- **If less than 4.8 V**

1. Vehicle OFF, disconnect the X2 harness connector at the K29R Seat Heating Control Module - Rear.
2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K29R Seat Heating Control Module - Rear.
- **If greater than 5.2 V**
 1. Vehicle OFF, disconnect the X2 harness connector at the K29R Seat Heating Control Module - Rear, Vehicle ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K29R Seat Heating Control Module - Rear.
 - **If between 4.8 - 5.2 V**
5. Vehicle OFF, connect the harness connector at the E14F Seat Heating Element - Left Rear Cushion and disconnect the X2 harness connector at the K29R Seat Heating Control Module - Rear.
6. Test for 500 Ω - 300 k Ω between the signal circuit terminal 6 and the low reference circuit terminal 1.
 - **If not between 500 Ω - 300 k Ω**

Replace the E14F Seat Heating Element - Left Rear Cushion.
 - **If between 500 Ω - 300 k Ω**
7. Replace the K29R Seat Heating Control Module - Rear.

Degraded Heated Seat Operation Right Rear Seat

NOTE: **Circuit/System Verification must be performed before proceeding with Circuit/System Testing**

1. Vehicle OFF, disconnect the harness connector at the E14H Seat Heating Element - Right Rear Cushion. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 40 Ω between the low reference circuit terminal 3 and ground.
 - **If 40 Ω or greater**
 1. Vehicle OFF, disconnect the X2 harness connector at the K29R Seat Heating Control Module - Rear.
 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K29R Seat Heating Control Module - Rear.
 - **If less than 40 Ω**
3. Vehicle ON.
4. Test for 4.8 - 5.2 V between the signal circuit terminal 2 and ground.
 - **If less than 4.8 V**
 1. Vehicle OFF, disconnect the X2 harness connector at the K29R Seat Heating Control Module - Rear.
 2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K29R Seat Heating Control Module - Rear.

- **If greater than 5.2 V**
 1. Vehicle OFF, disconnect the X2 harness connector at the K29R Seat Heating Control Module - Rear, Vehicle ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K29R Seat Heating Control Module - Rear.
 - **If between 4.8 - 5.2 V**
- 5. Vehicle OFF, connect the harness connector at the E14H Seat Heating Element - Right Rear Cushion and disconnect the X2 harness connector at the K29R Seat Heating Control Module - Rear.
- 6. Test for 500 Ω - 300 k Ω between the signal circuit terminal 5 and the low reference circuit terminal 2.
 - **If not between 500 Ω - 300 k Ω**
 Replace the E14H Seat Heating Element - Right Rear Cushion.
 - **If between 500 Ω - 300 k Ω**
- 7. Replace the K29R Seat Heating Control Module - Rear.

Heated Seat Switch Indicator Circuit Test

NOTE: **Circuit/System Verification must be performed before proceeding with Circuit/System Testing.**

1. Vehicle OFF, disconnect the harness connector at the appropriate S32 Seat Heating Switch - Rear, Vehicle ON.

NOTE: **The test lamp in the following step will illuminate at LOW intensity. This is normal circuit operation and does not indicate a circuit malfunction.**

2. Verify a test lamp illuminates at LOW intensity between the control circuit terminal 6 and ground.
 - **If the test lamp does not illuminate**
 1. Vehicle OFF, remove the test lamp, disconnect the X1 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module
 - **If the test lamp illuminates at FULL intensity**
 1. Vehicle OFF, remove the test lamp, disconnect the X1 harness connector at the K9 Body Control Module, Vehicle ON.
 2. Test for less than 1 V between the control circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 Body Control Module.
 - **If the test lamp illuminates at LOW intensity**
3. Connect a test lamp illuminate between control circuit terminal 6 and control circuit terminal 4.
4. Verify the test lamp Does Not illuminate.
 - **If the test lamp illuminates**
 1. Vehicle OFF, remove the test lamp, disconnect the X5 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the control circuit terminal 4 and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 Body Control Module.
 - **If the test lamp does not illuminate**
5. Verify the test lamp illuminates when commanding the Rear Seat Heating Indicator Active with a scan tool.
 - **If the test lamp does not illuminate**
 1. Vehicle OFF, disconnect the X5 harness connector at the K9 Body Control Module, Vehicle ON.
 2. Test for less than 1 V between the control circuit terminal 4 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If the test lamp illuminates**
 6. Test or replace the S32 Seat Heating Switch - Rear.

Repair Instructions

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

- [Rear Seat Heater Switch Replacement](#)
- [Rear Seat Cushion Heater Replacement](#)
- [Control Module References](#) for K29R Seat Heating Control Module - Rear replacement, programming and setup

REPAIR INSTRUCTIONS

FRONT SEAT HEATER CONTROL MODULE BRACKET REPLACEMENT

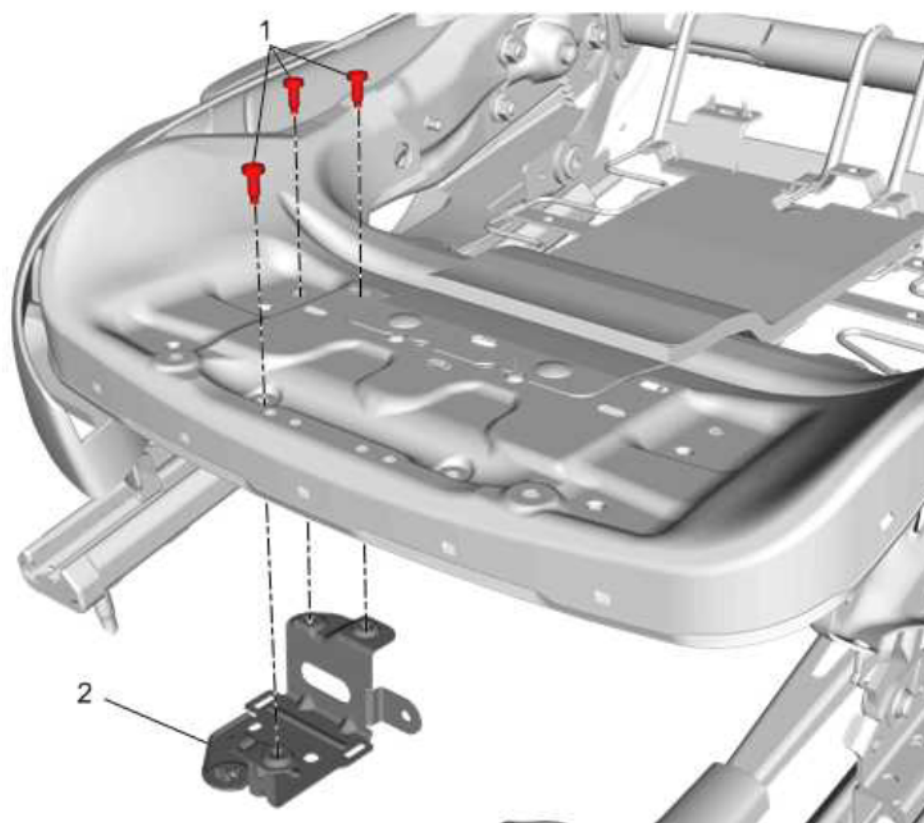


Fig. 3: Front Seat Heater Control Module Bracket
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

Callout	Component Name
Preliminary Procedures <u>Front Seat Cushion Cover and Pad Replacement</u> <u>Front Seat Heater Vent Control Module Replacement</u>	
1	Front Seat Heater Control Module Bracket Fastener CAUTION: <u>Fastener Caution</u> Tighten 4.7 N.m (42 lb in)
2	Front Seat Heater Control Module Bracket Procedure Unclip the wiring harness from the bracket.

FRONT SEAT HEATER VENT CONTROL MODULE REPLACEMENT

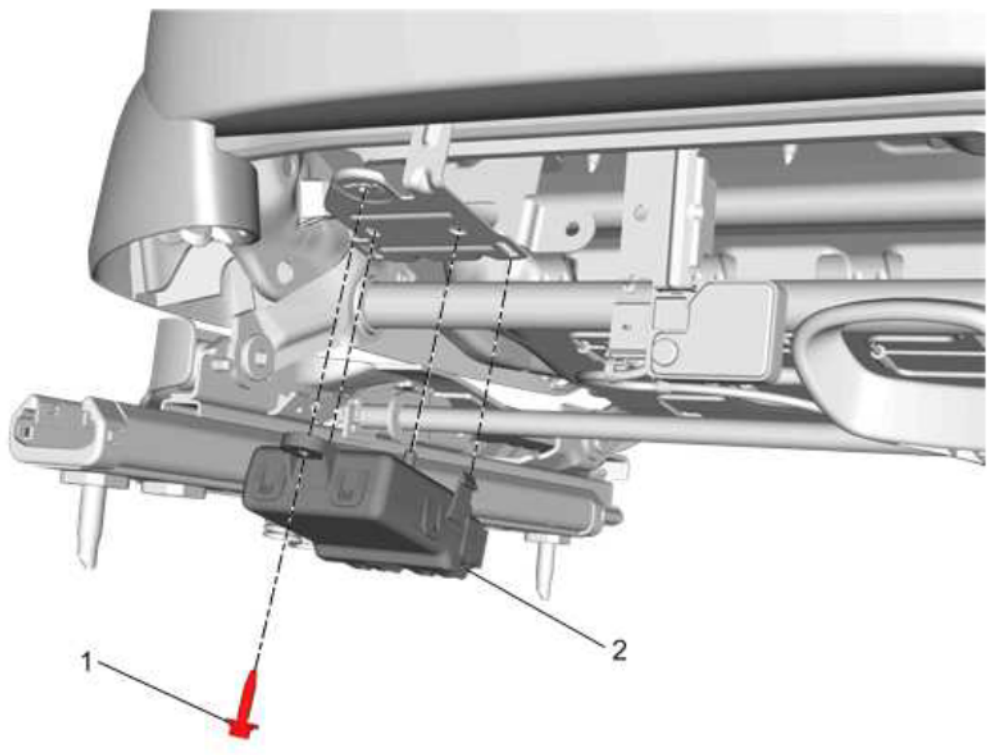


Fig. 4: Front Seat Heater Vent Control Module
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Front Seat Heater Control Module Fastener CAUTION: <u>Fastener Caution</u> Tighten 2.5 N.m (22 lb in)
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Callout	Component Name
2	Front Seat Heater Control Module Procedure 1. Adjust the seat to be in the full up position. 2. Disconnect the electrical connectors.

DRIVER OR PASSENGER SEAT BACK HEATER REPLACEMENT

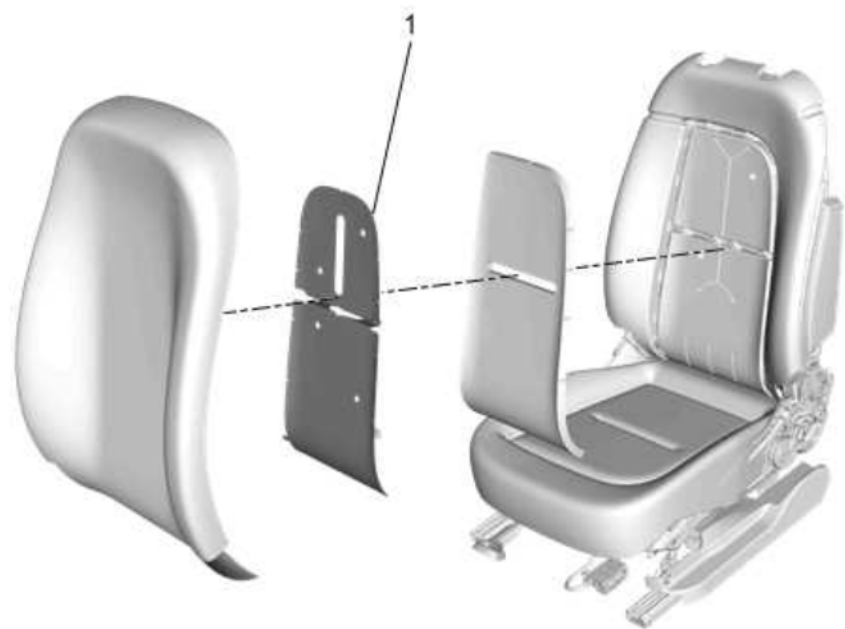


Fig. 5: Driver or Passenger Seat Back Heater
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
WARNING: SIR Warning Preliminary Procedures 1. Driver or Passenger Seat - Remove - Driver or Passenger Seat Removal and Installation 2. Driver or Passenger Seat Head Restraint Replacement 3. Front Seat Back Cushion Latch Finish Cover &ndash;Back Panel - Remove - Front Seat Back Cushion Latch Finish Cover Replacement (Back Panel) Front Seat Back Cushion Latch Finish Cover Replacement (Front Panel) 4. Driver or Passenger Seat Back Cushion Cover - Remove - Driver or Passenger Seat Back Cover and Pad Replacement	

Callout	Component Name
	Driver or Passenger Seat Back Heater
	Procedure 1. Disconnect the electrical connector and unclip the harness. 2. Driver or Passenger Seat - Install - Driver or Passenger Seat Removal and Installation
1	NOTE: Separate the seat cushion heater mat from the seat cushion pad by pulling the heater mat away from the pad. Use a heat gun to loosen the glue : moving slowly from one end to the other, slowly peeling the heater mat up as you go. This makes removal easier and ensures minimum damage to the underlying foam. Be careful not to use overly high temperatures or hold the heat gun in one place for too long as this can damage the foam.

FRONT SEAT CUSHION HEATER REPLACEMENT (KOREA)

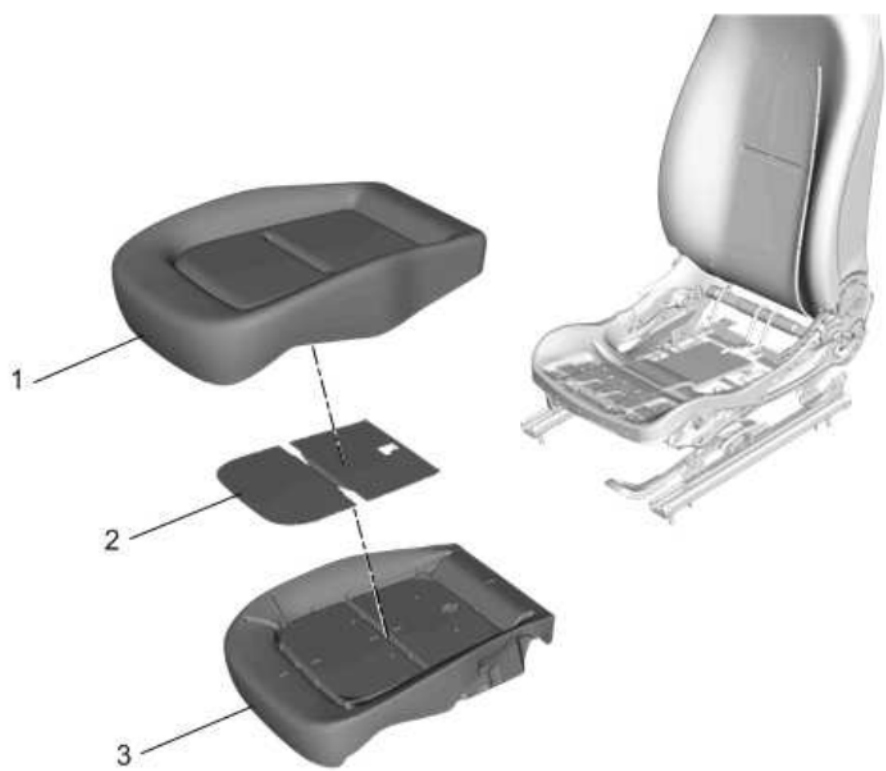


Fig. 6: Front Seat Cushion Heater (Korea)
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
WARNING: SIR Warning	
Preliminary Procedure Front Seat Cushion Cover and Pad Replacement	
1	Front Seat Cushion Cover
2	Front Seat Cushion Heater

Callout	Component Name
3	Front Seat Cushion Pad NOTE: Separate the seat cushion heater mat from the seat cushion pad by pulling the heater mat away from the pad. Use a heat gun to loosen the glue : moving slowly from one end to the other, slowly peeling the heater mat up as you go. This makes removal easier and ensures minimum damage to the underlying foam. Be careful not to use overly high temperatures or hold the heat gun in one place for too long as this can damage the foam.

FRONT SEAT CUSHION HEATER REPLACEMENT (NORTH AMERICA)

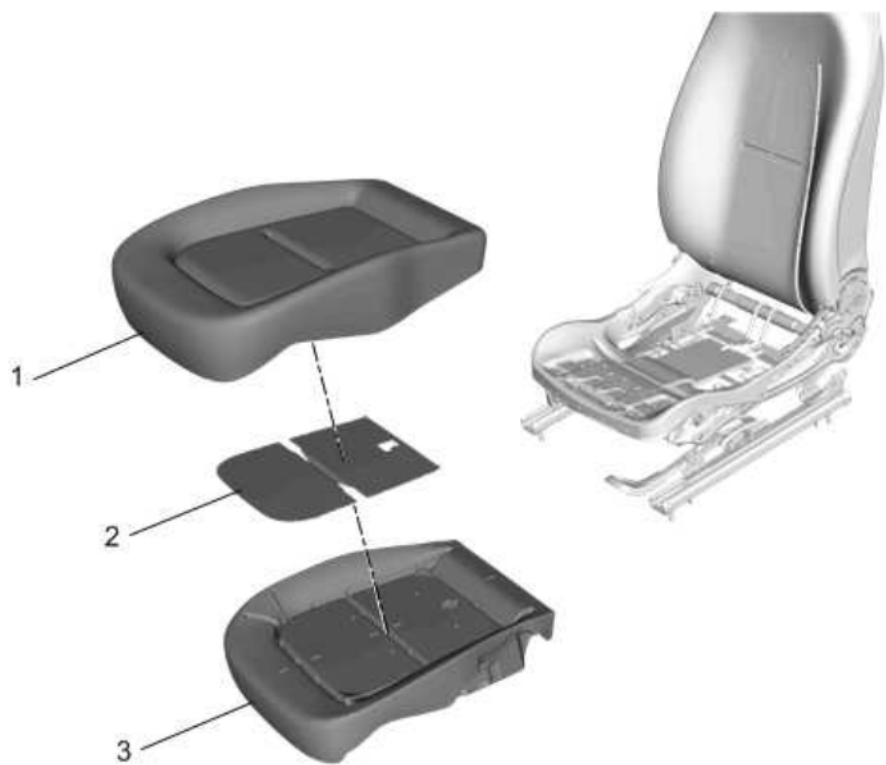


Fig. 7: Front Seat Cushion Heater (North America)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
WARNING: SIR Warning	
Preliminary Procedure Front Seat Cushion Cover and Pad Replacement	
1	Front Seat Cushion Cover
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Callout	Component Name
2	Front Seat Cushion Heater 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. NOTE: The passenger seat belt presence sensor and heat mat, if equipped, are integral parts of the seat cushion pad.
3	Front Seat Cushion Pad NOTE: Separate the seat cushion heater mat from the seat cushion pad by pulling the heater mat away from the pad. Use a heat gun to loosen the glue : moving slowly from one end to the other, slowly peeling the heater mat up as you go. This makes removal easier and ensures minimum damage to the underlying foam. Be careful not to use overly high temperatures or hold the heat gun in one place for too long as this can damage the foam.

REAR SEAT HEATER SWITCH REPLACEMENT

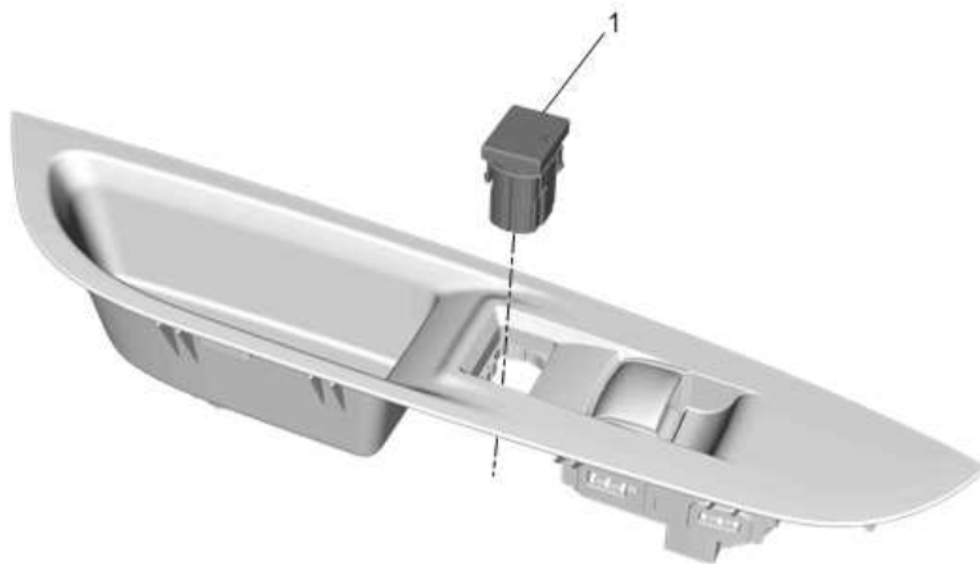


Fig. 8: Rear Seat Heater Switch

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures	
Rear Side Door Armrest Switch Mount Plate Replacement	
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Callout	Component Name
1	Rear Seat Heater Switch Procedure Release the switch assembly from the switch mount plate by depressing the tabs along each side of the switch.

REAR SEAT CUSHION HEATER REPLACEMENT

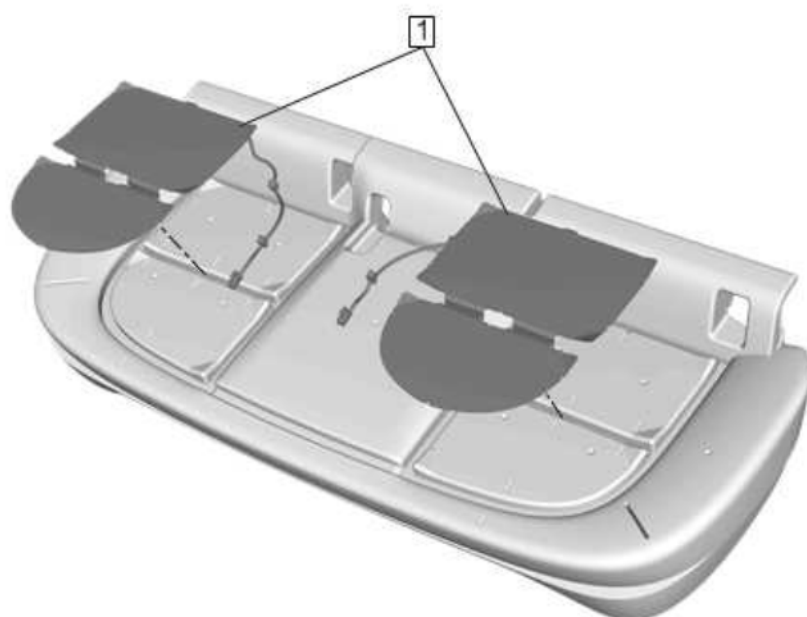


Fig. 9: Rear Seat Cushion Heater

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Rear Seat Cushion Cover - Remove - Rear Seat Cushion Cover and Pad Replacement	
1	Rear Seat Cushion Heater NOTE: Separate the seat cushion heater mat from the seat cushion pad by pulling the heater mat away from the pad. Use a heat gun to loosen the glue : moving slowly from one end to the other, slowly peeling the heater mat up as you go. This makes removal easier and ensures minimum damage to the underlying foam. Be careful not to use overly high temperatures or hold the heat gun in one place for too long as this can damage the foam.

DESCRIPTION AND OPERATION

HEATED SEATS DESCRIPTION AND OPERATION

Heated Seat Components

The heated seat system consists of the following components:

- Heated seat switches
- Body control module
- Seat heating control module

- Driver seat cushion heating element
- Driver seat cushion temperature sensor
- Driver seat back heating element
- Driver seat back temperature sensor
- Passenger seat cushion heating element
- Passenger seat cushion temperature sensor
- Passenger seat back heating element
- Passenger seat back temperature sensor

Heated Seat Switches

The driver and passenger heated seats switches are located on the infotainment display. The vehicle must be ON to operate the heated seat system. When a heated seat switch is pressed, a serial data message is sent from the infotainment display to the body control module (BCM) indicating the heated seat command. The BCM serves as the heated seat system master to determine the requested operating mode. The BCM then sends a serial data message to the seat heating control module indicating the heated seat command. In response to this message, the seat heating control module attempts to drive the appropriate seat heating elements per the BCM command. The BCM also controls the seat temperature and mode indicators, via the serial data line, used to provide the operator with feedback as to the operating status of the system.

Heated Seat Operation

The seat heating control module controls heated seat operation for the driver and passenger seats. When active, power is applied to the seat cushion and back heater elements through a common pulse width modulated (PWM) voltage supply control circuit. Each individual heater element is switched to ground by the module through a common low side drive control circuit.

When inactive the seat heating control module connects the heating element low side outputs to a common reference point internal to the module which is biased to approximately 3.5 V. The module uses this biased voltage in order to check the high side and low side control circuits for a short to battery or ground before enabling the driver and passenger seat heating elements. During heated seat operation, the seat heating control module interrupts control of the heating elements every 10 s for approximately 10 ms to make this biased voltage check.

With both the seat cushion and seat back heater elements disconnected, if the high side output of the module is measured it will display a low current 12 V bleed off voltage. This bleed off voltage does not have a meaningful diagnostic purpose. With one or both of the heater elements connected you would just see the 3.5 V biased voltage from this circuit.

Temperature Regulation

The seat back and cushion temperature sensors (thermistors) are packaged with the seat heating elements located just under the seat covers. The seat heating control module supplies each temperature sensor with a 5 V reference signal circuit and a low reference circuit. The module monitors the voltage from the 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 module senses the seat reached the set temperature, it will then begin regulate the current flow through the heater elements in order to maintain the desired seat temperature based on the feedback voltage from the sensor.

If the heated seats are on high, the temperature level may automatically be lowered after approximately 30 min of operation.

REAR HEATED SEATS DESCRIPTION AND OPERATION

Heated Seat Components

The rear heated seat system consists of the following components:

- Rear heated seat switches

- Body control module
- Rear seat heating control module
- Left rear seat cushion heating element
- Left rear seat cushion temperature sensor
- Right rear seat cushion heating element
- Right rear seat cushion temperature sensor

Heated Seat Switches

When a heated seat switch is pressed, the heated seat switch signal circuit from the body control module (BCM) is pulled low indicating the heated seat command. The BCM serves as the heated seat system master to determine the requested operating mode. The BCM then sends a LIN bus serial data message to the rear seat heating control module indicating the heated seat command. In response to this message, the seat heating control module attempts to drive the appropriate seat heating element per the BCM command.

Rear Heated Seat Operation

The rear seat heating control module controls heated seat operation for the left and right rear seats. When active, power is applied to the seat cushion and back heater elements through a common pulse width modulated (PWM) voltage supply control circuit. Each individual heater element is switched to ground by the module through a common low side drive control circuit.

When inactive the rear seat heating control module connects the heating element low side outputs to a common reference point internal to the control module which is biased to approximately 3.5 V. The control module uses this biased voltage in order to check the high side and low side control circuits for a short to battery or ground before enabling either the left or right rear seat heating element. During heated seat operation, the control module interrupts control of the heating elements every 10 s for approximately 10 ms to make this biased voltage check.

Temperature Regulation

The seat cushion temperature sensor (thermistors) is packaged with the seat heating element located just under the seat cover. The rear seat heating control module supplies the temperature sensor with a 5 V reference signal circuit and a low reference circuit. The control module monitors the voltage from the 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 rear seat heating control module senses the seat reached the set temperature, it will then begin regulate the current flow through the heater elements in order to maintain the desired seat temperature based on the feedback voltage from the sensor.

The temperature level may automatically be lowered after approximately 30 min of operation.
