

ACCESSORIES & EQUIPMENT Seat

Heating and Cooling - CTS Sedan

SCHEMATIC WIRING DIAGRAMS

HEATED/COOLED SEAT WIRING SCHEMATICS

Heated Seats - Front (KA1)

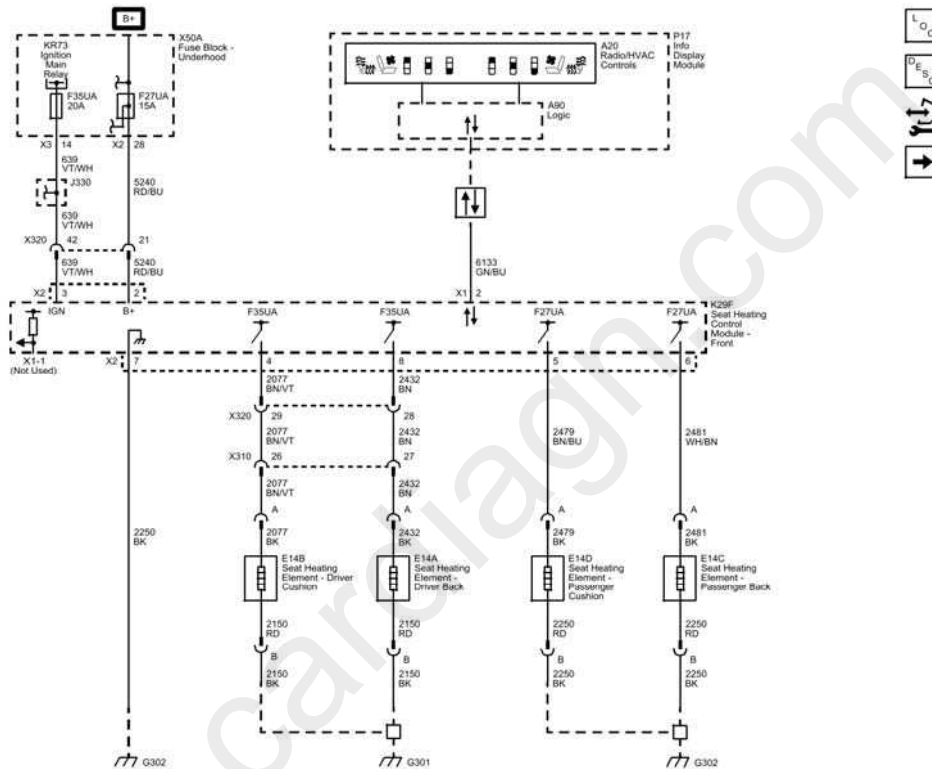


Fig. 1: Heated Seats - Front (KA1)

Courtesy of GENERAL MOTORS COMPANY

Heated Seats - Rear (KA6)

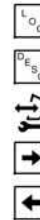
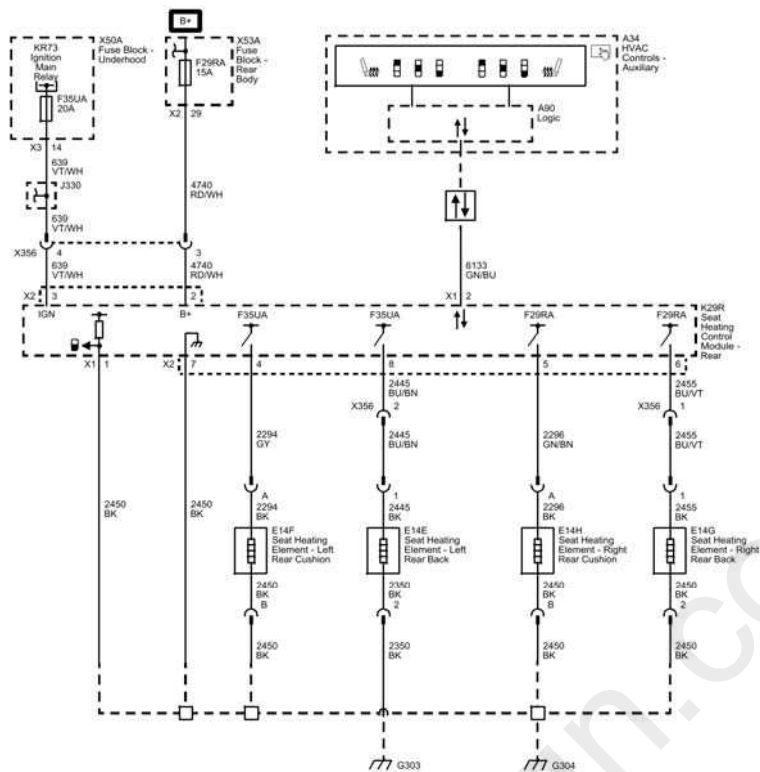


Fig. 2: Heated Seats - Rear (KA6)

Courtesy of GENERAL MOTORS COMPANY

Vented Seat - Driver (KB6)

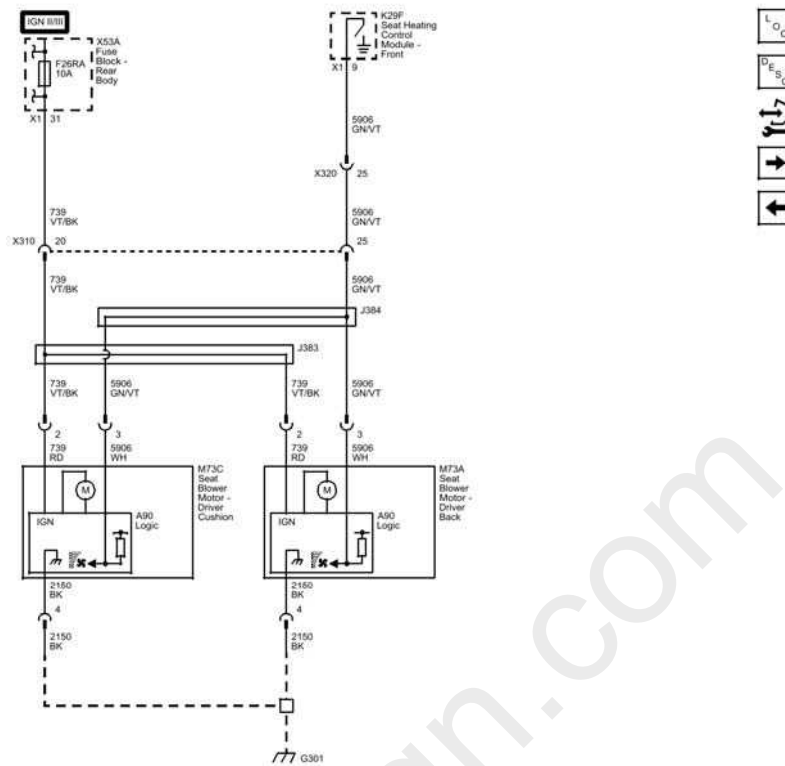


Fig. 3: Vented Seat - Driver (KB6)

Courtesy of GENERAL MOTORS COMPANY

Vented Seat - Passenger (KB6)

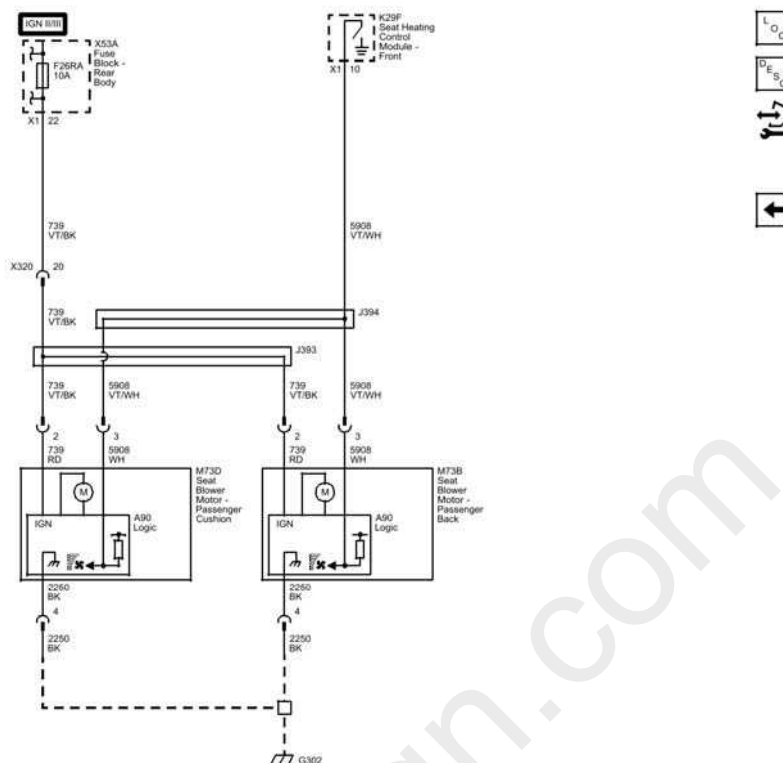


Fig. 4: Vented Seat - Passenger (KB6)
Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
DTC B191A or B191B	DTC B191A 39 Front Heated Seat Module DTC B191B 39 Rear Heated Seat Module

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 detection 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 - SEDAN

Description and Operation

- **Heated/Vented Seat 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:

- **Rear Heated Seats Description and Operation**
- **Heated/Vented Seat 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**
- **Vented 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 2 X2	4, 5	4, 5	-	-
B+ Terminal 3 X2	U1524 00, 1	U1524 00, 1	-	-
Driver Heated Seat Back Element Control	2	2	6	-
Driver Heated Seat Cushion Element Control	3	3	6	-

Passenger Heated Seat Back Element Control	4	4	6	-
Passenger Heated Seat Cushion Element Control	5	5	6	-
Ground	-	1	-	-
1. The driver and front passenger heated seats are inoperative. 2. The driver seat back heat function is inoperative 3. The driver seat cushion heat function is inoperative 4. Front passenger seat back heat function is inoperative 5. Front passenger seat cushion heat function is inoperative 6. Heated seat is always ON.				

Circuit/System Description

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

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

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. Engine ON.
2. Verify the scan tool Driver Heated Seat Switch parameter changes between Inactive and Active when pressing the heated seat switch.
 - **If the parameter does not change**

Replace the A20 Radio/HVAC Controls.
 - **If the parameter changes**
3. Verify the scan tool Passenger Heated Seat Switch parameter changes between Inactive and Active when pressing the heated seat switch.
 - **If the parameter does not change**

Replace the A20 Radio/HVAC Controls.
 - **If the parameter changes**
4. Verify that both the driver and front passenger heated seats operate.
 - **If both the driver and front passenger heated seats are inoperative**

Refer to Circuit/System Testing - Both Heated Seats are Inoperative
 - **If just one of the heated seats is inoperative**

Refer to Circuit/System Testing - One Heated Seat Inoperative
 - **If both heated seats operate**
5. All OK.

Circuit/System Testing

Both Heated Seats are Inoperative

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

1. Ignition OFF and all vehicle systems OFF, disconnect the X2 harness connector at the K29 Seat Heating Control Module. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 7 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.

- If 2 ohms or greater, repair the open/high resistance in the circuit.
- If less than 2 ohms, repair the open/high resistance in the ground connection.
- **If less than 10 ohms**
- 3. Ignition ON.
- 4. Verify a test lamp illuminates between the B+ circuit terminals listed below and ground.
 - Terminal 2
 - Terminal 3
 - **If the test lamp does not illuminate and the circuit fuse is good**
 - 1. Ignition OFF, remove the test lamp.
 - 2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is not open and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 - 1. Ignition 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 K29 Seat Heating Control Module.
 - **If the test lamp illuminates**
- 5. Replace the K29 Seat Heating Control Module.

One Heated Seat is Inoperative

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

1. Ignition OFF, disconnect the X2 harness connector at the K29 Seating Control Module, ignition ON.
2. Verify a test lamp illuminates between the B+ circuit terminal 2 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 - 1. Ignition OFF, remove the test lamp
 - 2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is not open and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 - 1. Ignition 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 K29 Seat Heating Control Module.
 - **If the test lamp illuminates**
3. Ignition OFF and all vehicle systems OFF, connect the X2 harness connector at the K29 Seat Heating

Control Module and disconnect the harness connector at the appropriate E14 Seat Heating Element. It may take up to 2 min for all vehicle systems to power down.

4. Test for less than 10 ohms between the ground circuit terminal B and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
5. Connect a test lamp between the control circuit terminal A and ground, engine ON.
6. Verify the test lamp turns ON and OFF when commanding the appropriate Driver or Passenger Seat Heating element ON and OFF using the seat heating switch.
 - **If the test lamp is always OFF**
 1. Ignition OFF, remove the test lamp, disconnect the X2 harness connector at the K29 Seat Heating 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 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K29 Seat Heating Control Module.
 - **If the test lamp is always ON**
 1. Ignition OFF, remove the test lamp, disconnect the X2 harness connector at the K29 Seat Heating Control Module, ignition 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 K29 Seat Heating Control Module.
 - **If the test lamp turns ON and OFF**
7. Test or replace the E14 Seat Heating Element.

Repair Instructions

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

- **Driver or Passenger Seat Back Cushion Heater Replacement**
- **Driver or Passenger Seat Cushion Heater Replacement**
- **Control Module References** for K29 Radio/HVAC Controls and K29 Seat Heating Control Module replacement, programming and setup

REAR 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 2 X2	5	5	-	-
B+ Terminal 3 X2	U1526, 1	U1526, 1	-	-
Left Rear Heated Seat Back Element Control	3	3	8	-
Left Rear Heated Seat Cushion Element Control	4	4	8	-
Right Rear Heated Seat Back Element Control	6	6	8	-
Right Rear Heated Seat Cushion Element Control	7	7	8	-
Rear Seat Heating Control Module Ground	-	1	-	-
1. Left rear and right rear heated seats are inoperative. 2. Left rear heated seat is inoperative. 3. Left rear seat back heat function is inoperative. 4. Left rear seat cushion heat function is inoperative. 5. Right rear heated seat is inoperative. 6. Right rear seat back heat function is inoperative. 7. Right rear seat cushion heat function is inoperative. 8. Heated seat is always ON.				

Circuit/System Description

The rear seat heated seat switches are located in the auxiliary HVAC control module. When a heated seat switch is pressed, a serial data message is sent to the HVAC control module indicating the heated seat request. The HVAC control module serves as a gateway to transmit the message to the rear seat heating control module via the serial data line. In response to this message, the rear seat heating control module applies battery voltage through the heater element control circuits to the appropriate seat heating elements.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

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. Ignition ON.
2. Verify the scan tool Body Control Module Left Rear Seat Heating Switch parameter changes between Inactive and Active when pressing the left rear heated seat switch.
 - **If the parameter does not change**

Replace the K33A HVAC Control Module - Auxiliary
 - **If the parameter changes**
3. Verify the scan tool Right Rear Heated Seat Switch parameter changes between Inactive and Active when pressing the heated seat switch.
 - **If the parameter does not change**

Replace the K33A HVAC Control Module - Auxiliary
 - **If the parameter changes**
4. Refer to Circuit/System Testing.

Circuit/System Testing

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

1. Ignition OFF and all vehicle systems OFF, disconnect the X2 harness connector at the K29R Seat Heating Control Module - Rear. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 7 and ground.
 - **If 10 ohms or greater**

1. Ignition OFF.
2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify a test lamp illuminates between the B+ circuit terminals listed below and ground.
 - Terminal 2
 - Terminal 3
 - **If the test lamp does not illuminate and the circuit fuse is good**
1. Ignition OFF.
2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is not open and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
1. Ignition OFF.
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.
5. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the appropriate E14 Seat Heating Element. It may take up to 2 min for all vehicle systems to power down.
6. Test for less than 10 ohms between the appropriate ground circuit terminal listed below and ground:
 - Seat back terminal 2
 - Seat cushion terminal B
 - **If 10 ohms or greater**
1. Ignition OFF.
2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
7. Connect a test lamp between the appropriate control circuit terminal listed below and the ground, ignition ON.
 - Seat back terminal 1
 - Seat cushion terminal A
8. Verify the test lamp turns ON and OFF when commanding the appropriate left rear or right rear seat heating element ON and OFF using the seat heating switch.
 - **If the test lamp is always OFF**
1. Ignition OFF, remove the test lamp, disconnect the X2 harness connector at the K29R Seat Heating

Control Module - Rear.

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 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K29R Seat Heating Control Module - Rear.
 - **If the test lamp is always ON**
1. Ignition OFF, remove the test lamp, disconnect the X2 harness connector at the K29R Seat Heating Control Module - Rear, ignition 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 K29R Seat Heating Control Module - Rear.
 - **If the test lamp turns ON and OFF**
9. Test or replace the E14 Seat Heating Element.

Repair Instructions

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

- **Rear Seat Back Cushion Heater Replacement (40%), Rear Seat Back Cushion Heater Replacement (60%)**
- **Rear Seat Cushion Heater Replacement**
- **Control Module References** for K33A HVAC Control Module - Auxiliary and K29R Seat Heating Control Module - Rear replacement, programming and setup

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
Seat Back Blower Motor Ignition	1	2	-	-
Seat Back Blower Motor Control	1	2	1	-
Seat Back Blower Motor Ground	-	2	-	-
Seat Cushion Blower Motor Ignition	1	3	-	-

Seat Cushion Blower Motor Control	1	3	1	-
Seat Cushion Blower Motor Ground	-	3	-	-

1. The driver and passenger seat ventilation function is inoperative.
2. Seat back ventilation function is inoperative
3. Seat cushion ventilation function is inoperative

Circuit/System Description

The driver and front passenger vented seats are controlled by separate vented seat switches that are located in the radio/HVAC controls. When a vented seat switch is pressed, a LIN Bus serial message is sent from the radio/HVAC controls to the body control module (BCM). The BCM serves as the heated/vented seat system master to determine the requested operating mode. The BCM then sends a LIN bus serial data message to the seat heating control module indicating the vented seat command. In response to this message, the seat heating control module applies battery positive voltage through the element supply voltage circuit to the appropriate seat blower motor. The seat heating control module then sends a serial data message back to the radio/HVAC controls to either illuminate or turn off the appropriate temperature indicator.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

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. Engine ON.
2. Verify the heated seat system operates.

- **If the heated seat system does not operate**

Refer to **Front Heated Seat Malfunction**

- **If the heated seat system operates**

3. Verify the appropriate scan tool vented seat switch parameter listed below changes between Inactive and Active when pressing the vented seat switch.

- Driver Seat Ventilation Switch
- Passenger Seat Ventilation Switch
- **If the parameter does not change**

Replace the A20 Radio/HVAC Controls.

- **If the parameter changes**

4. Verify that the seat cushion and seat back blower motors turn ON and OFF.

- **If either or both the seat cushion and seat back blower motors are inoperative**

Refer to Circuit/System Testing

- **If the blower motors do not change speed or are always ON**

Refer to Circuit/System Testing

- **If the seat cushion and seat back blower motors operate**

5. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the appropriate M73 Seat Blower Motor. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 4 and ground.

- **If 10 ohms or greater**

1. Ignition OFF.
2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.

- **If less than 10 ohms**

3. Ignition ON.
4. Verify a test lamp illuminates between the ignition circuit terminal 2 and ground.

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

1. Ignition OFF, remove the test lamp.
2. Test for less than 2 ohms in the ignition circuit end to end.

- If 2 ohms or greater, repair the open/high resistance in the circuit.
- If less than 2 ohms, refer to **Power Mode Mismatch**.
- **If the test lamp does not illuminate and the circuit fuse is open**
- 1. Ignition OFF, remove the test lamp, disconnect the harness connector at all components connected to the ignition circuit.
- 2. Test for infinite resistance between the ignition circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
- 3. Connect each component one at a time while testing for greater than 10 ohms on the ignition circuit.
 - If 10 ohms or less, replace the component.
 - If greater than 10 ohms
- 4. All OK.
 - **If the test lamp illuminates**
- 5. Connect a test lamp between the control circuit terminal 3 and B+, ignition ON.
- 6. Verify the test lamp turns ON when pressing the vented seat switch through the High, Medium, and Low positions and the test lamp turns OFF when the OFF position is reached.
 - **If the test lamp does not turn ON**
 - 1. Ignition OFF, remove the test lamp, disconnect the X1 harness connector at the K29F Seat Heating Control Module - Front, ignition 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
 - 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K29F Seat Heating Control Module - Front.
 - **If the test lamp does not turn OFF**
 - 1. Ignition OFF, remove the test lamp, disconnect the X1 harness connector at the K29F Seat Heating Control Module - Front.
 - 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K29F Seat Heating Control Module - Front.
 - **If the test lamp turns ON and OFF**
- 7. Replace the M73 Seat Blower Motor.

Repair Instructions

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

• **Front Seat Back Ventilation Blower Replacement**

- **Front Seat Cushion Ventilation Blower Replacement**
- **Control Module References** for K29F Seat Heating Control Module - Front and A20 Radio/HVAC Controls replacement, programming and setup

REPAIR INSTRUCTIONS

FRONT SEAT HEATER CONTROL MODULE REPLACEMENT

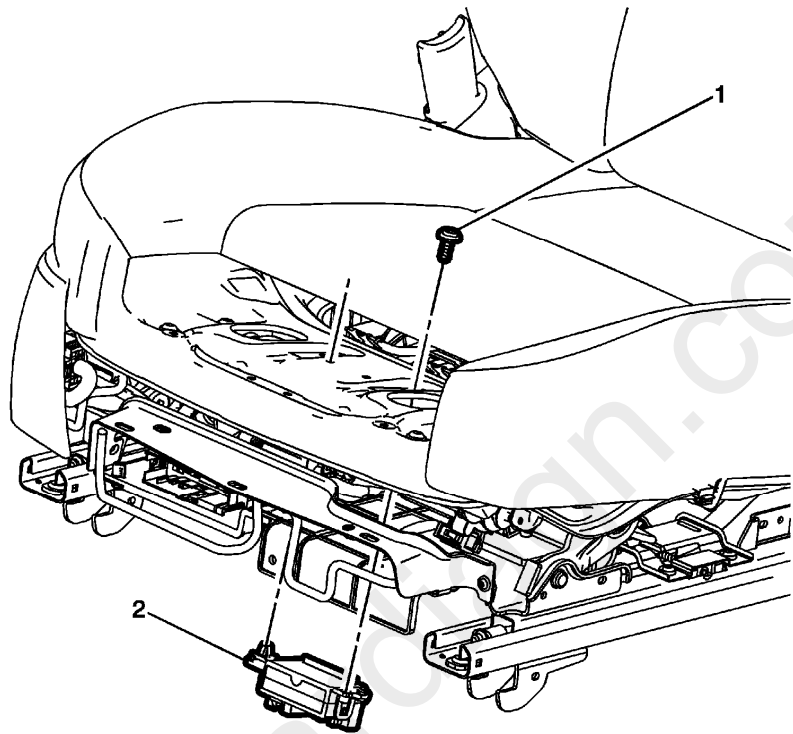


Fig. 5: Front Seat Heater Control Module
Courtesy of GENERAL MOTORS COMPANY

Front Seat Heater Control Module Replacement

Callout	Component Name
Preliminary Procedure Remove the front seat front extension cushion. Refer to <u>Front Seat Front Extension Cushion Replacement</u>	
1	Front Seat Heater Control Module Replacement Fastener (Qty: 3) CAUTION: Refer to <u>Fastener Caution</u> .
2	Front Seat Heater Control Module Replacement Procedure

1. Disconnect the electrical connectors.
2. Remove the module from the adjuster memory and wiring harness bracket.
3. Refer to **Control Module References** for programing and setup information.

DRIVER OR PASSENGER SEAT BACK CUSHION HEATER REPLACEMENT

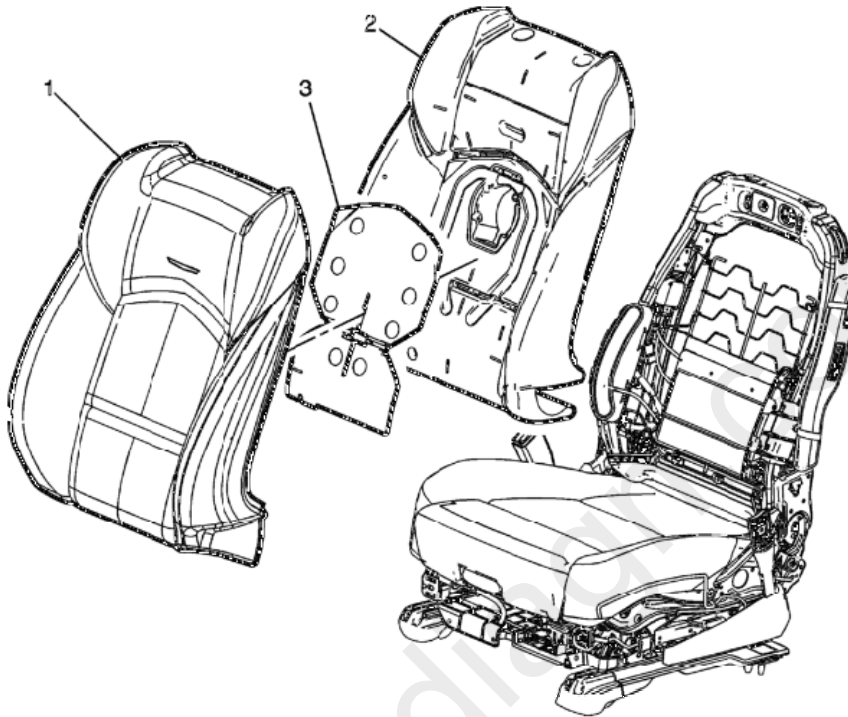


Fig. 6: Driver or Passenger Seat Back Cushion Heater
Courtesy of GENERAL MOTORS COMPANY

Driver or Passenger Seat Back Cushion Heater Replacement

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

Driver or Passenger Seat Back Cushion Heater

Procedure

3

1. Remove the heater element by peeling it off the seat back cushion pad. Apply service heater by removing the adhesive backing and attach to the gray strips of fabric inside the cushion trim. Align the notches in the fabric strips to those in the service heater. Place heater so that copper colored wires face the trim cover.
2. If this is the second time for servicing, then remove the heater leaving the old adhesive strips intact on the seat cushion trim. The new seat heater adhesive strips will be placed over the old adhesive strips.
3. Reassemble the trim to the cushion using hog ring tool.

DRIVER OR PASSENGER SEAT CUSHION HEATER REPLACEMENT

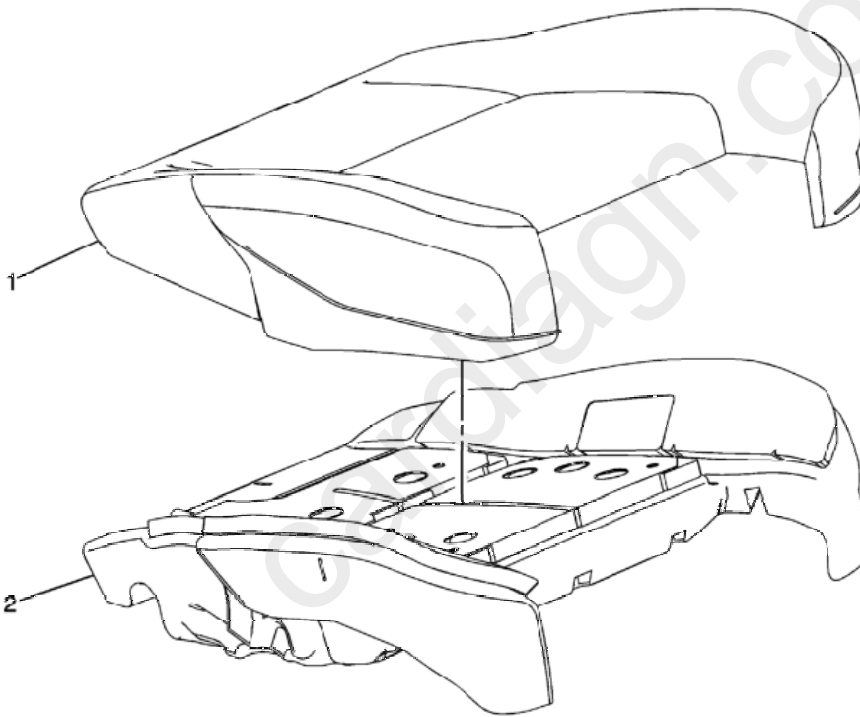


Fig. 7: Driver or Passenger Seat Cushion Heater
Courtesy of GENERAL MOTORS COMPANY

Driver or Passenger Seat Cushion Heater Replacement

Callout	Component Name
WARNING: Refer to <u>SIR Warning</u> .	
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.

Preliminary Procedure

1. Disable the SIR system. Refer to. **SIR Disabling and Enabling**
2. Remove the driver or passenger seat. Refer to. **Driver or Passenger Seat Removal and Installation**
3. Remove the driver or passenger seat cushion pad. Refer to **Driver or Passenger Seat Cushion Pad Replacement** .

1	Driver or Passenger Seat Cushion Cover
2	Driver or Passenger Seat Cushion Heater Procedure 1. The passenger presence system and heater element are both integral parts of the pad on the passenger seat cushion. Refer to <u>Airbag Front Passenger Presence Module Replacement</u> 2. Note the routing of the wiring harness and connector location for installation. 3. Program the inflatable restraint passenger presence system after replacement. Refer to <u>Control Module References</u>

REAR SEAT HEATER CONTROL MODULE REPLACEMENT

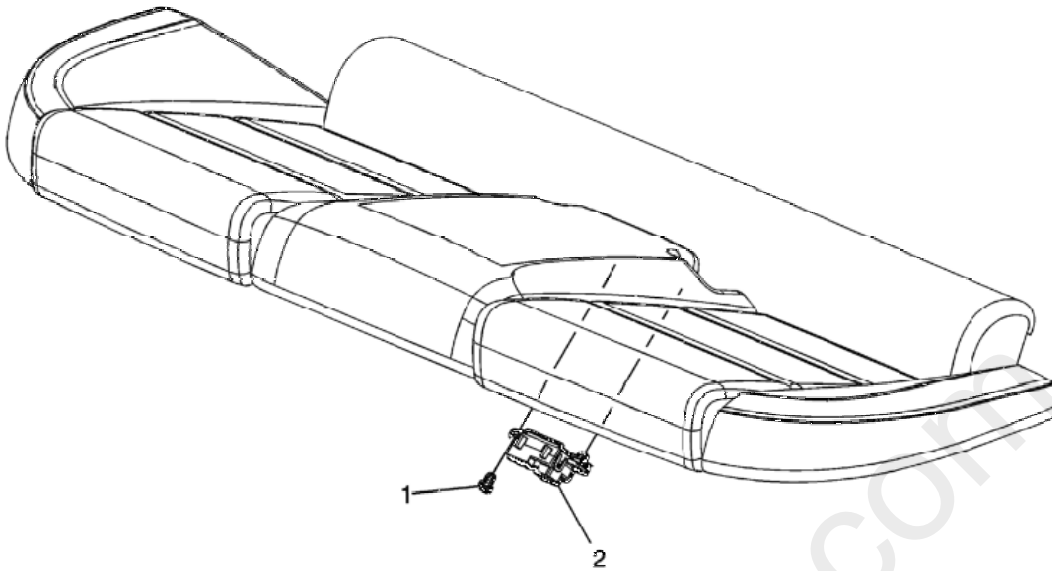


Fig. 8: Rear Seat Heater Control Module
 Courtesy of GENERAL MOTORS COMPANY

Rear Seat Heater Control Module Replacement

Callout	Component Name
Preliminary Procedure	
Remove the rear seat cushion. Refer to <u>Rear Seat Cushion Removal and Installation</u> .	
1	Rear Seat Heater Control Module Fastener (Qty: 2)
2	Rear Seat Heater Control Module Procedure 1. Disconnect the electrical connector. 2. Refer to <u>Control Module References</u> for programming and setup information.

REAR SEAT BACK CUSHION HEATER REPLACEMENT (40%)

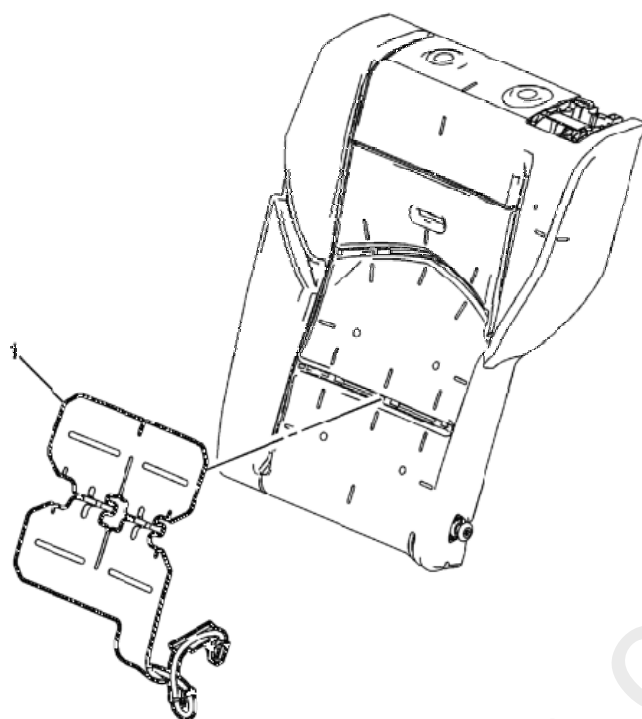


Fig. 9: Rear Seat Back Cushion Heater (40%)
Courtesy of GENERAL MOTORS COMPANY

Rear Seat Back Cushion Heater Replacement (40%)

Callout	Component Name
Preliminary Procedure	
1. Remove the rear seat back cushion. Refer to <u>Rear Seat Back Cushion Removal and Installation (40% with AM9)</u> , <u>Rear Seat Back Cushion Removal and Installation (60% with AM9)</u> , <u>Rear Seat Back Cushion Removal and Installation (without AM9)</u> . 2. Remove the rear seat back cushion cover and pad. Refer to <u>Rear Seat Back Cushion Cover and Pad Replacement (40%)</u> , <u>Rear Seat Back Cushion Cover and Pad Replacement (60%)</u> .	
1	Rear Seat Back Cushion Heater Procedure Remove the heater element leaving the old adhesive strips intact on the seat cushion. The new seat heater adhesive strips will be placed over the old adhesive strips.

REAR SEAT BACK CUSHION HEATER REPLACEMENT (60%)

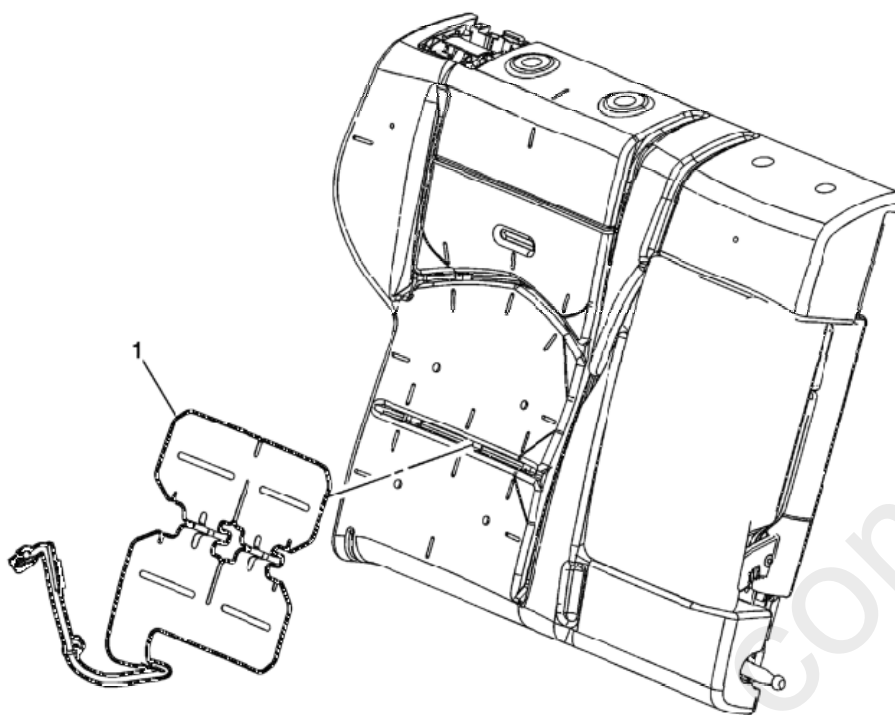


Fig. 10: Rear Seat Back Cushion Heater (60%)
 Courtesy of GENERAL MOTORS COMPANY

Rear Seat Back Cushion Heater Replacement (60%)

Callout	Component Name
Preliminary Procedure	
1. Remove the rear seat back cushion. Refer to <u>Rear Seat Back Cushion Removal and Installation (40% with AM9)</u> , <u>Rear Seat Back Cushion Removal and Installation (60% with AM9)</u> , <u>Rear Seat Back Cushion Removal and Installation (without AM9)</u> . 2. Remove the rear seat back cushion cover and pad. Refer to <u>Rear Seat Back Cushion Cover and Pad Replacement (40%)</u> , <u>Rear Seat Back Cushion Cover and Pad Replacement (60%)</u> .	
1	Rear Seat Back Cushion Heater Procedure Remove the heater element leaving the old adhesive strips intact on the seat cushion. The new seat heater adhesive strips will be placed over the old adhesive strips.

REAR SEAT CUSHION HEATER REPLACEMENT

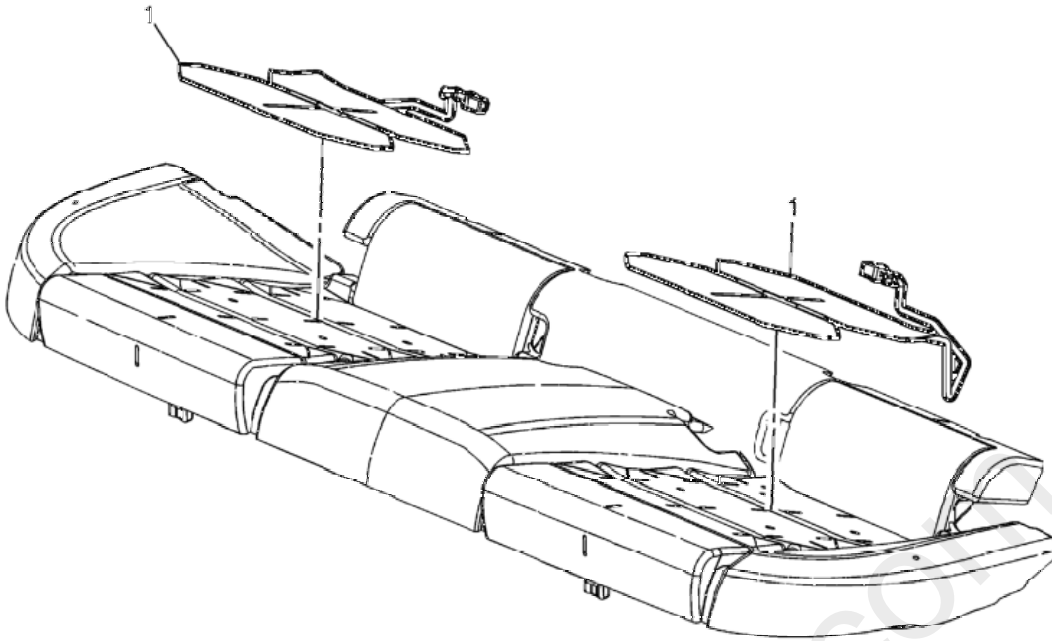


Fig. 11: Rear Seat Cushion Heater
 Courtesy of GENERAL MOTORS COMPANY

Rear Seat Cushion Heater Replacement

Callout	Component Name
Preliminary Procedure 1. Remove the rear seat cushion. Refer to <u>Rear Seat Cushion Removal and Installation</u> . 2. Remove the rear seat cushion cover and pad. Refer to <u>Rear Seat Cushion Cover and Pad Replacement</u> .	
1	Rear Seat Cushion Heater Procedure 1. Disconnect the electrical connector. 2. Remove the heater element leaving the old adhesive strips intact on the seat cushion. The new seat heater adhesive strips will be placed over the old adhesive strips.

FRONT SEAT BACK VENTILATION BLOWER REPLACEMENT

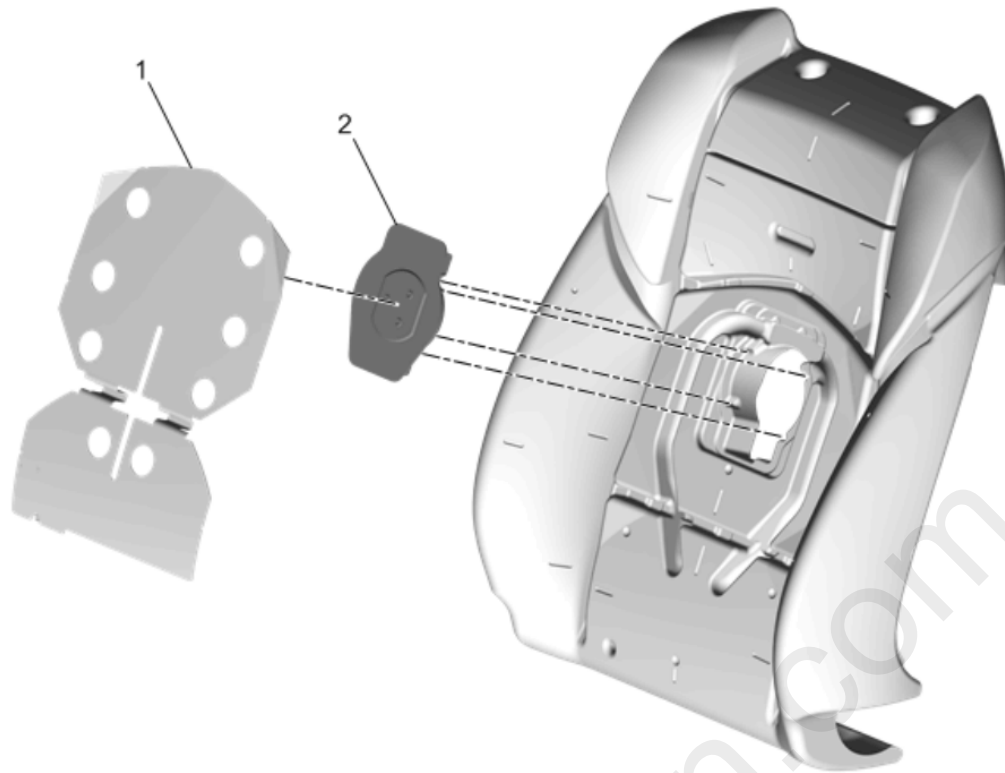


Fig. 12: Front Seat Back Ventilation Blower
 Courtesy of GENERAL MOTORS COMPANY

Front Seat Back Ventilation Blower Replacement

Callout	Component Name
Preliminary Procedure	
1. Remove the driver or passenger seat back cushion heater. Refer to <u>Driver or Passenger Seat Back Cushion Heater Replacement</u> .	
1	Driver or Passenger Seat Back Cushion Heater Procedure 1. Disconnect any or all electrical connectors, if equipped.
2	Front Seat Back Ventilation Blower Procedure 1. If replacing with a new blower, transfer components as necessary.

FRONT SEAT CUSHION VENTILATION BLOWER REPLACEMENT

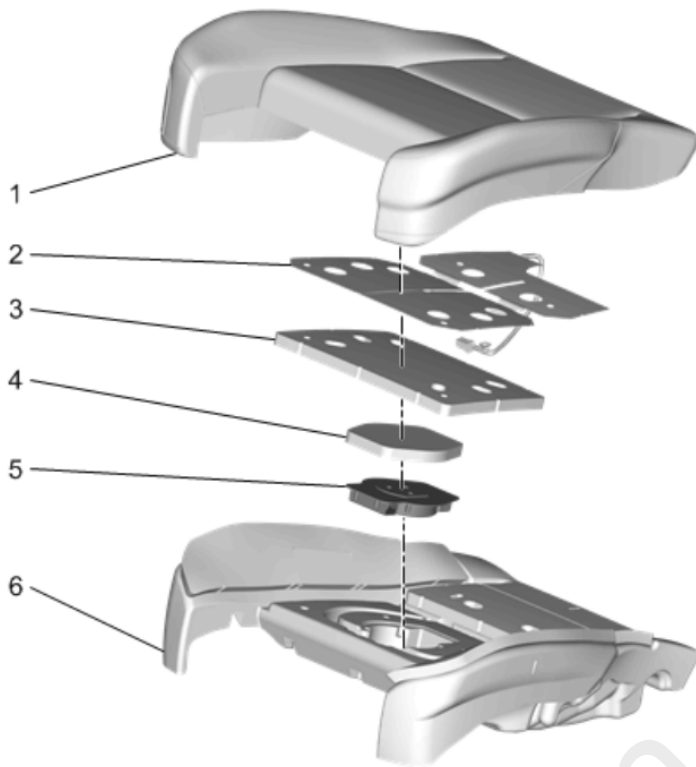


Fig. 13: Front Seat Cushion Ventilation Blower
Courtesy of GENERAL MOTORS COMPANY

Front Seat Cushion Ventilation Blower Replacement

Callout	Component Name
Preliminary Procedure NOTE: This procedure only applies to the front driver seat. If working on the front passenger seat refer to inflatable restraint front passenger presence module. <u>Airbag Front Passenger Presence Module Replacement</u>	
1. Remove the driver or passenger seat. Refer to <u>Driver or Passenger Seat Removal and Installation</u> . 2. Remove the front seat cushion heater. Refer to <u>Driver or Passenger Seat Cushion Heater Replacement</u> .	
1	Front Seat Cushion Cover
2	Front Seat Cushion Heater
3	Front Seat Cushion Ventilation Pad
4	Front Seat Cushion Ventilation Pad Fan Topper
	Front Seat Cushion Ventilation Blower
Procedure	

5	1. Disconnect the electrical. 2. Separate the seat cushion cover from the seat cushion pad. 3. Remove the heater element and ventilation pad as one unit from the seat cushion pad. 4. If replacing with a new blower, transfer components as necessary.
6	Front Seat Cushion Pad

DESCRIPTION AND OPERATION

HEATED/VENTED SEAT DESCRIPTION AND OPERATION

Heated/Vented Seat Components

The heated/vented seat system consists of the following components:

- Radio/HVAC controls with heated and vented seat switches
- Body control module
- Seat heating control module
- Seat cushion heating element
- Seat back heating element
- Seat cushion blower motor
- Seat back blower motor

Heated/Vented Seat Switches

The driver and passenger heated seats switches are located in the radio/HVAC controls. The body control module (BCM) monitors each switch activation to determine whether heat or ventilation mode has been requested and to what level. With each press of the switch, the system will cycle through High, Medium, Low, and then back to Off again.

When a heated or vented seat switch is pressed, a LIN bus serial data message is sent from the radio/HVAC controls to the body control module (BCM). The BCM serves as the heated/vented seat system master to determine the requested operating mode. The BCM then sends a LIN bus serial data message to the seat heating control module indicating the heated/vented seat 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

Heated Seat Block Diagram

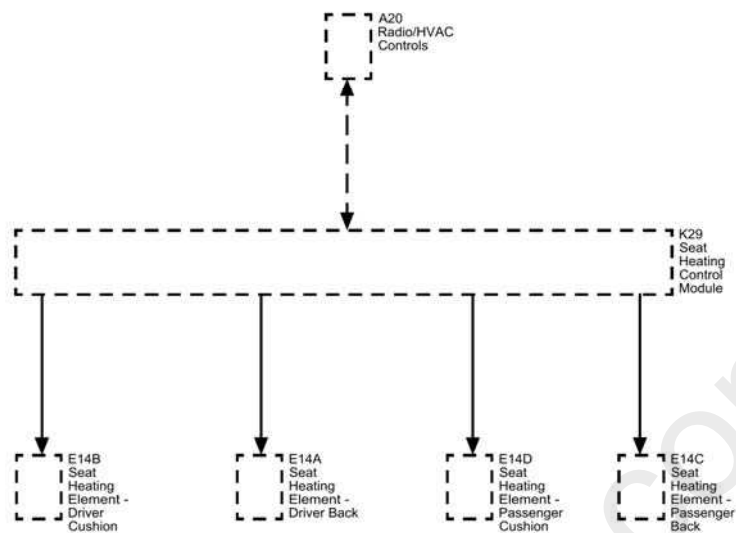


Fig. 14: Heated Seat Block Diagram
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
DA	Serial Data
HW	Hard-Wired
HW	Hard-Wired
HW	Hard-Wired
HW	Hard-Wired
A20	A20 Radio/HVAC Controls
K29	K29 Seat Heating Control Module
E14B	E14B Seat Heating Element - Driver Cushion
E14A	E14A Seat Heating Element - Driver Back
E14D	E14D Seat Heating Element - Passenger Cushion
E14C	E14C Seat Heating Element - Passenger Back

When the seat heating control module receives a heated seat command, it applies a high side drive pulse width modulated (PWM) signals driven at the required duty cycles to generate the appropriate effective voltage to the heating elements to attain the commanded seat temperature.

This heated seat system utilizes a self-regulating heating element system, which is different from the non-regulated heating element systems with seat temperature sensors previously used on GM vehicles. In the self-regulating type of system, temperature feedback to a control module is not required for temperature regulation. The heating element material itself regulates the surface temperature based on the effective voltage applied to the heating element.

Vented Seat Operation

Vented Seat Block Diagram

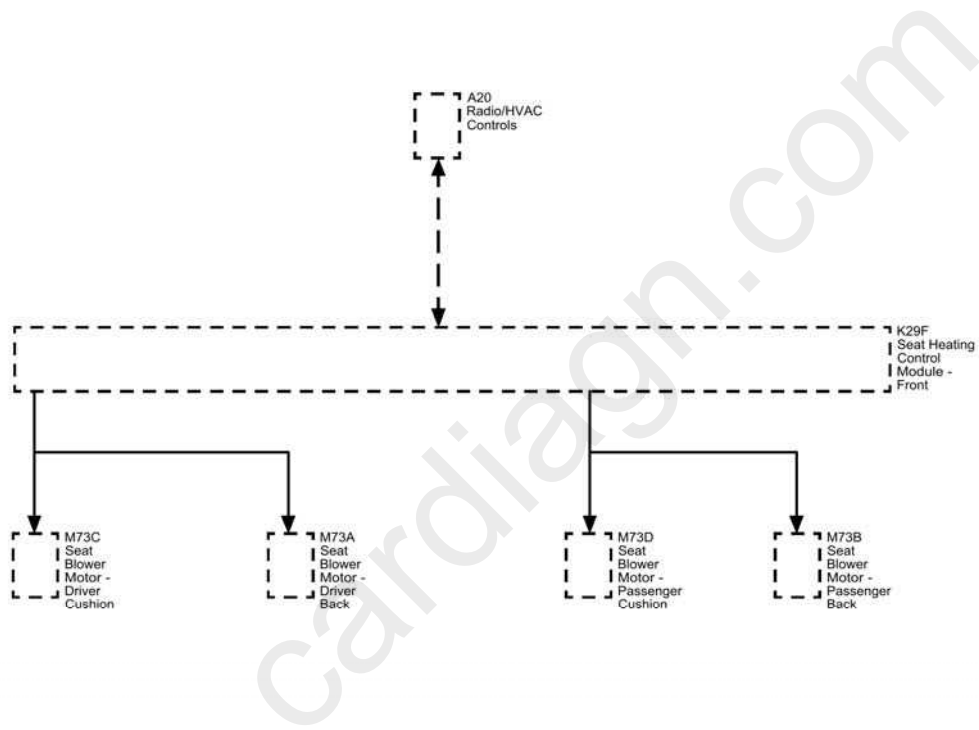


Fig. 15: Vented Seat Block Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
DA	Serial Data
HW	Hard-Wired
HW	Hard-Wired
A20	A20 Radio/HVAC Controls
K29F	Seat Heating Control Module - Front
M73B	M73B Seat Blower Motor - Passenger Back

M73D	M73D Seat Blower Motor - Passenger Cushion
M73A	M73A Seat Blower Motor - Driver Back
M73C	M73C Seat Blower Motor - Driver Cushion

Each vented seat consists of 2 blower motors; one in the seat back and one in the seat cushion. The vented seat operation is designed to draw cabin air around and away from the occupant through small holes in the seat covers, through channels in the foam pad, and then through the blower motor exhausting the waste air under the seat cushion.

With the ignition ON, battery voltage is applied through a 10 A fuse to the seat blower motors. Ground for the blower motors is provided from the ground circuit and the ground connection.

When the seat heating control module receives a ventilation seat command, it sends a low side drive pulse width modulation (PWM) signal through the blower motor control circuit to the seat blower motors indicating the seat ventilation command. The logic in the blower motors then sets the blower speed to the switch set point. The blower motors run drawing cabin air around and away from the occupant.

Load Shed 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** .

REAR HEATED SEATS DESCRIPTION AND OPERATION

Rear Heated Seat Components

The rear heated seat system has one control module that controls heat operation for both the left and right rear seat. The rear heated seats system consists of the following components:

- Rear seat heating control module
- Body control module
- Left rear seat heating switch
- Right rear seat heating switch
- Left seat cushion heating element
- Left seat back heating element
- Right seat cushion heating element
- Right seat back heating element

Rear Heated Seat Block Diagram

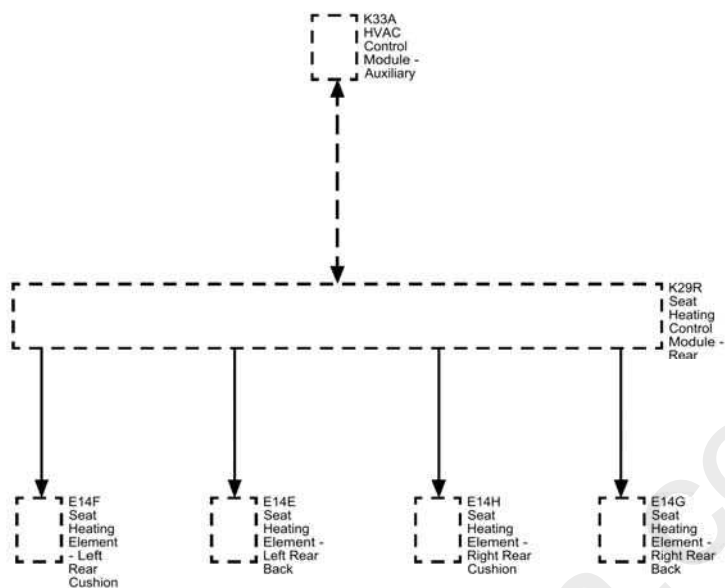


Fig. 16: Rear Heated Seat Block Diagram
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
DA	Serial Data
HW	Hard-Wired
HW	Hard-Wired
HW	Hard-Wired
HW	Hard-Wired
K33A	K33A HVAC Control Module - Auxiliary
K29R	K29R Seat Heating Control Module - Rear
E14G	E14G Seat Heating Element - Right Rear Back
E14H	E14H Seat Heating Element - Right Rear Cushion
E14E	E14E Seat Heating Element - Left Rear Back
E14F	E14F Seat Heating Element - Left Rear Cushion

Power and Grounds

Battery positive voltage is supplied to the rear seat heating control module through a 15 A fuse located in the rear body fuse block. This voltage is used to power up the rear seat heating control module. Battery positive voltage is also supplied to the seat heating control module through a 20 A fuse located in the underhood fuse block. This voltage is used to supply power to the seat heater elements. Ground for the rear seat heating control module is provided at G304.

Heated Seat Operation

The rear seat heated seat switches are located in the auxiliary HVAC control module. When a heated seat switch is pressed, a LIN Bus serial data message is sent to the body control module (BCM) indicating the heated seat request. The BCM serves as the heated seat system master to transmit the message to the rear seat heating control module via the serial data line. In response to this message, the rear seat heating control module applies battery voltage through the heater element control circuits to the appropriate seat heating elements.

When the seat heating control module receives a heated seat command, it applies high side drive pulse width modulated (PWM) signals driven at the required duty cycles to generate the appropriate effective voltage to the heating elements to attain the commanded seat temperature.

The rear seat heating system utilizes a self-regulating heating element system, which is different from the non-regulated heating element systems with temperature sensors previously used on GM vehicles. In the self-regulating type of system, temperature feedback to a control module is not required for temperature regulation. The heating element material itself regulates the surface temperature based on the effective voltage applied to the heating element.

Load Shed 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/cooled 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** .