ACCESSORIES & EQUIPMENT

Seat Heating and Cooling - Escalade, Suburban, Tahoe, Yukon

SCHEMATIC WIRING DIAGRAMS

HEATED/COOLED SEAT WIRING SCHEMATICS

Power, Ground, Serial Data and Switches (KA1)

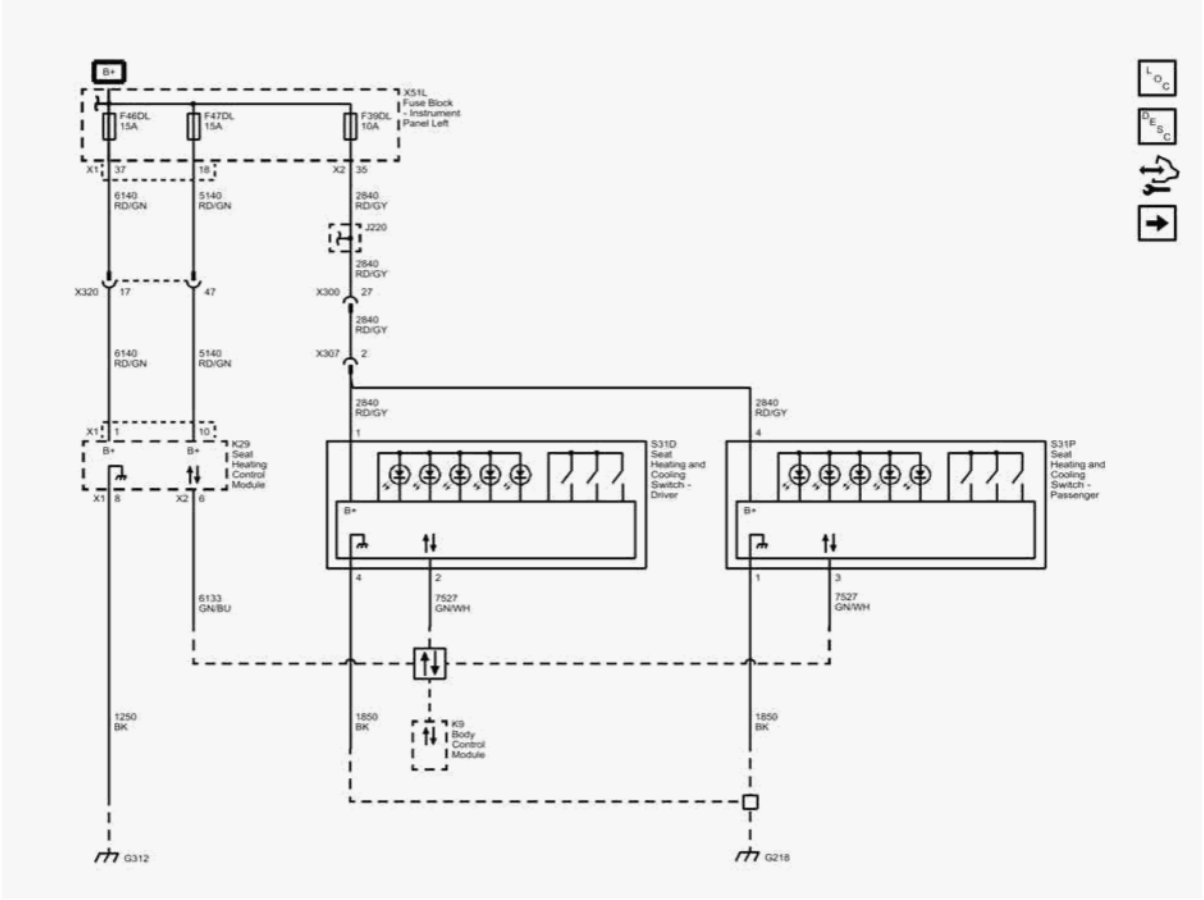

Fig. 1: Power, Ground, Serial Data and Switches (KA1)
Courtesy of GENERAL MOTORS COMPANY

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Heating Elements (KA1)

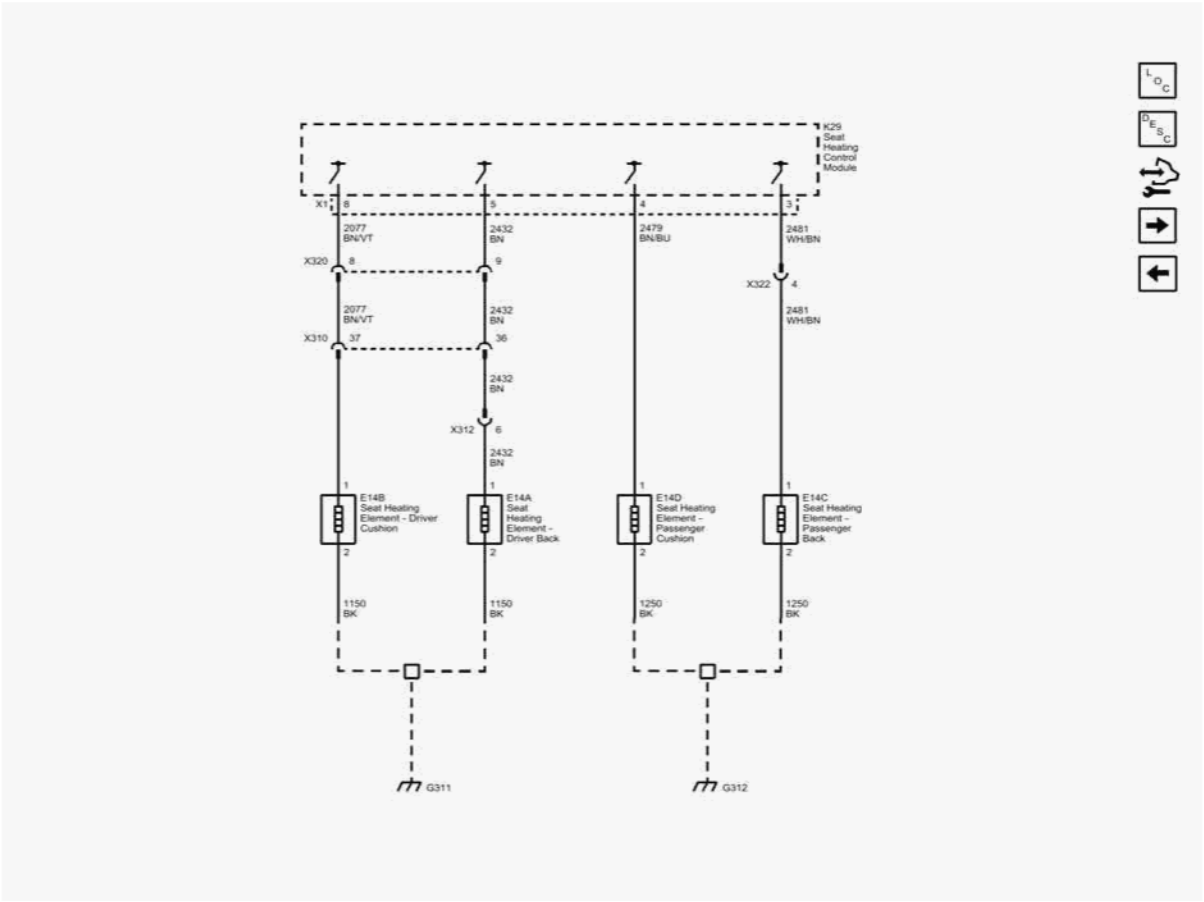

Fig. 2: Heating Elements (KA1)
Courtesy of GENERAL MOTORS COMPANY

Switches and Controls (KB6)

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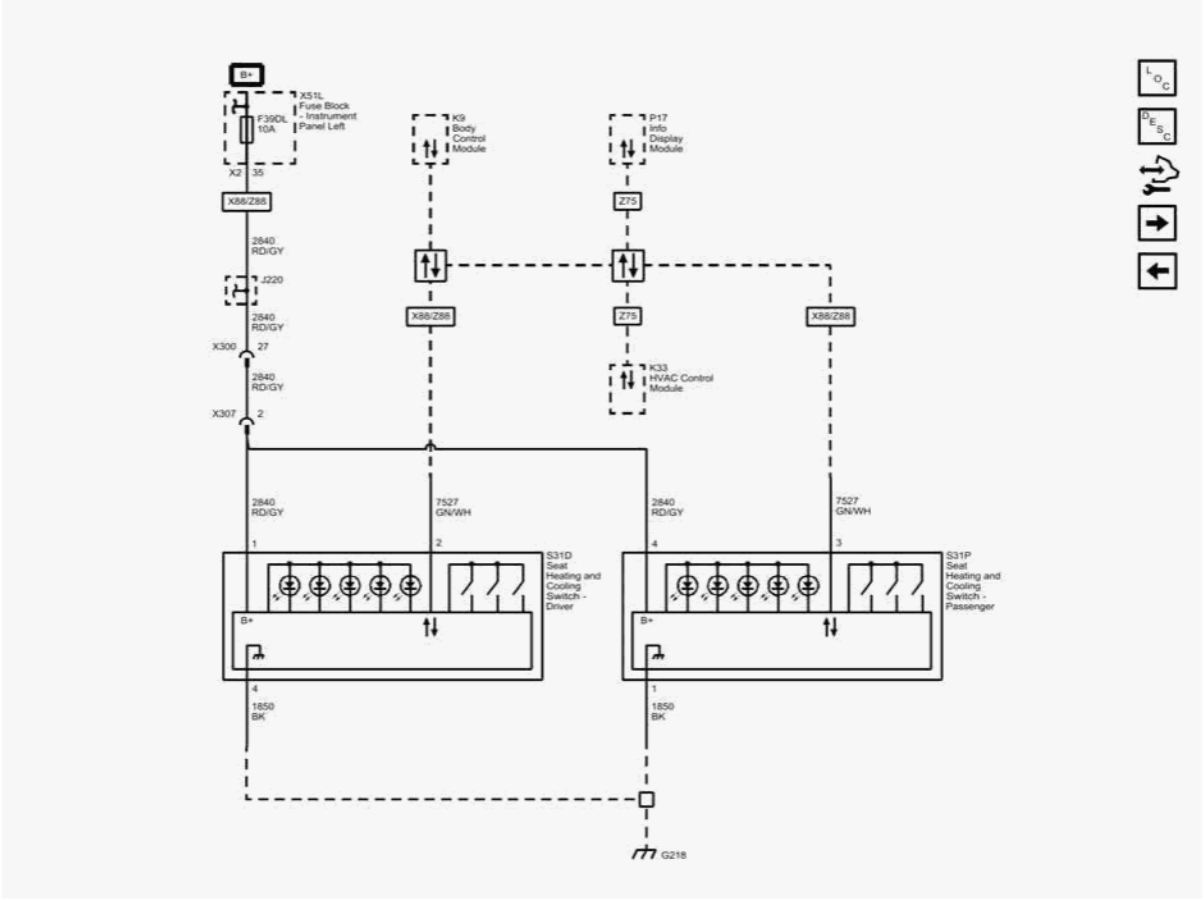

Fig. 3: Switches and Controls (KB6)
Courtesy of GENERAL MOTORS COMPANY

Driver Seat (KB6)

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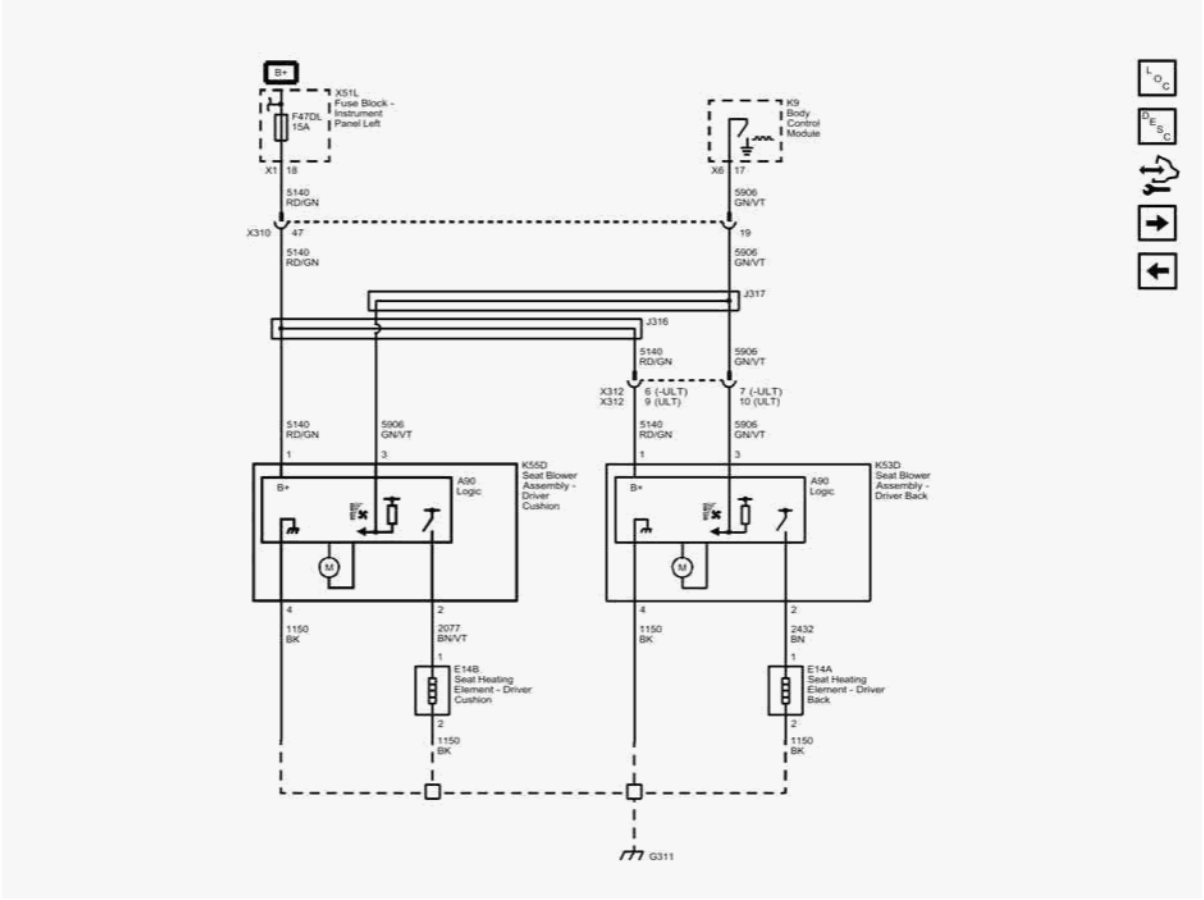

Fig. 4: Driver Seat (KB6)

Courtesy of GENERAL MOTORS COMPANY

Passenger Seat (KB6)

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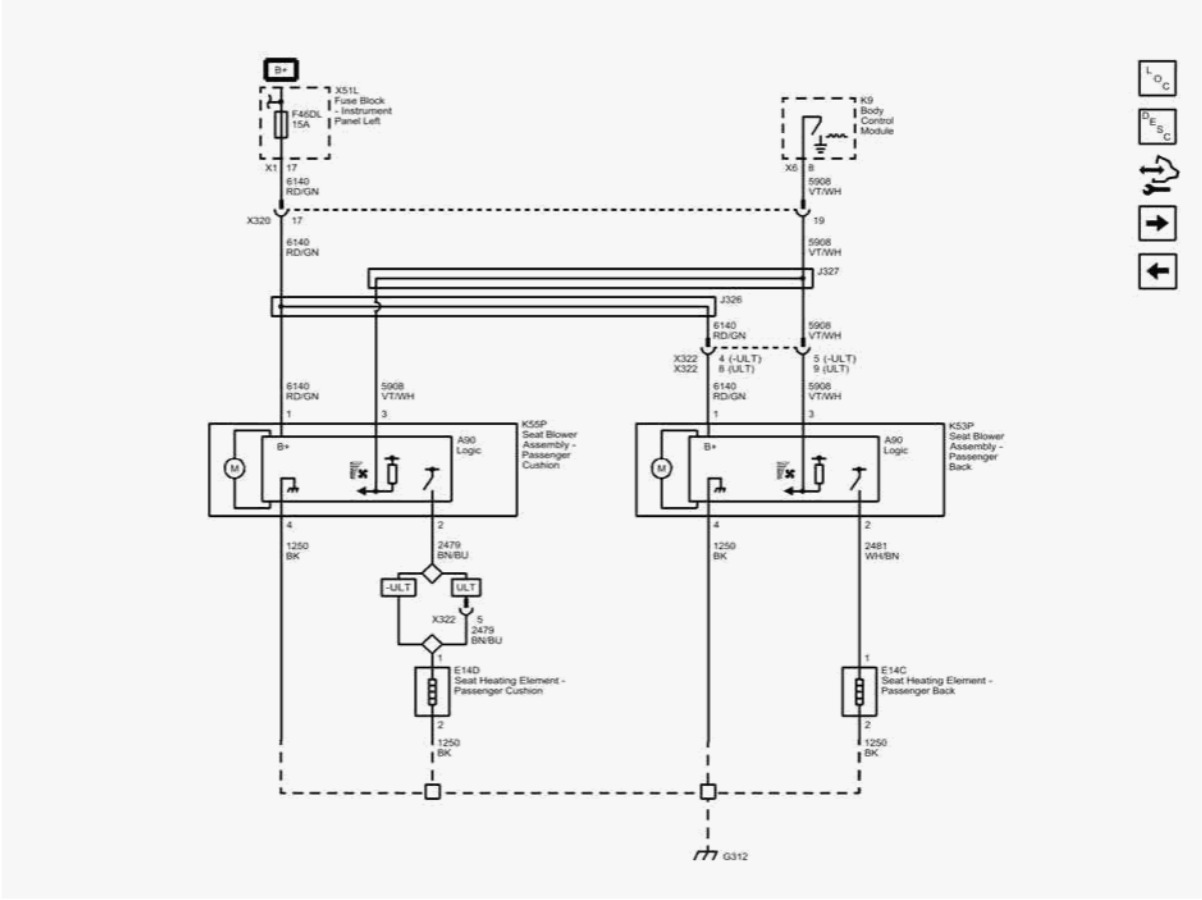

Fig. 5: Passenger Seat (KB6)
Courtesy of GENERAL MOTORS COMPANY

Rear Seats (KA6)

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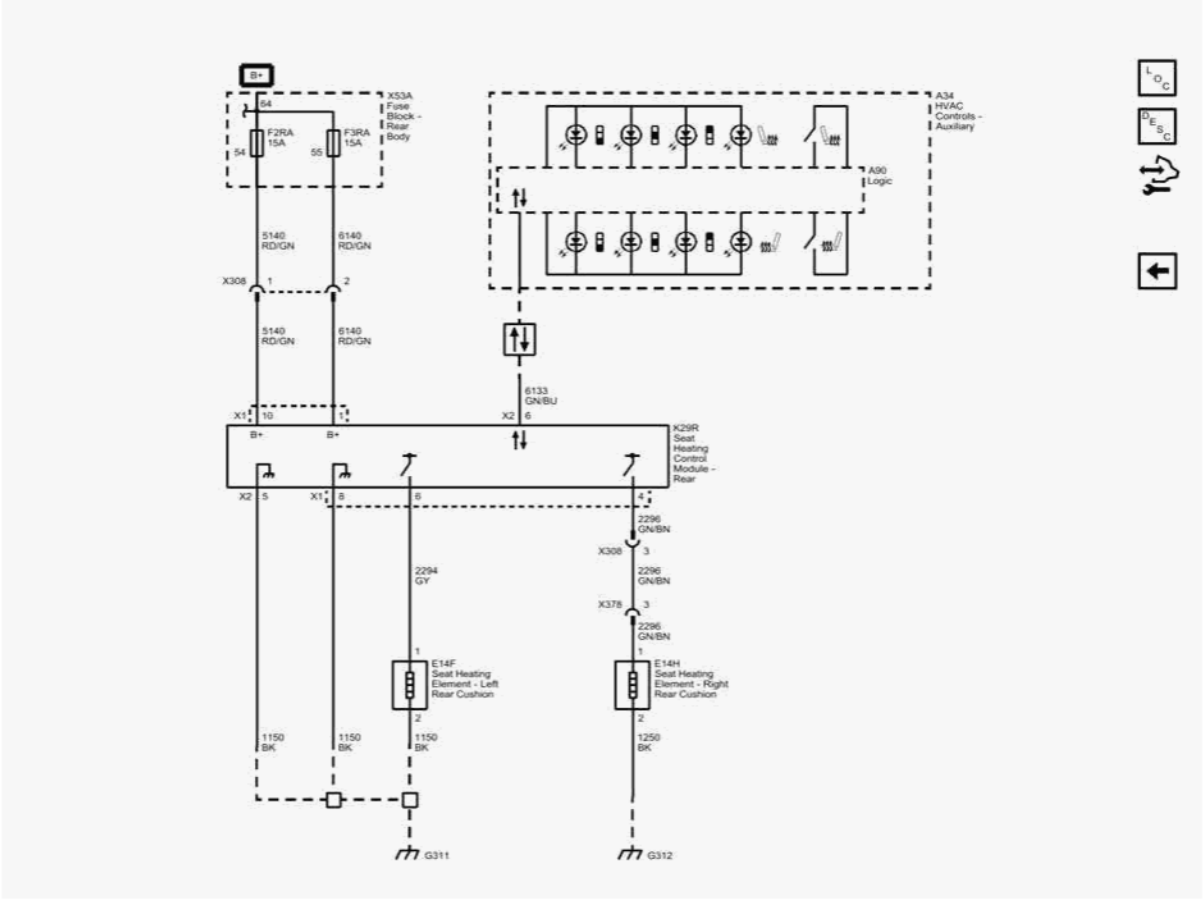

Fig. 6: Rear Seats (KA6)
Courtesy of GENERAL MOTORS COMPANY

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.

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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

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Description and Operation

- **Heated/Cooled 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

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.

B191B

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

     Replace the K29R Seat Heating Control Module - Rear.

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- **If the DTC is not set**

3. All OK.

Repair Instructions

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

Control Module References for K29 Seat Heating Control Module replacement, programming and setup

DTC B242C OR B242D: DRIVER/PASSENGER SEAT TEMPERATURE REQUEST

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 B242C

Driver Seat Temperature Request Circuit

DTC B242D

Passenger Seat Temperature Request Circuit

For Symptom byte information refer to **Symptom Byte List** .

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Driver Seat Blower Assembly B+	B242C 02, B242C 04	B242C 02, B242C 04	-	-
Passenger Seat Blower Assembly B+	B242D 02, B242D 04	B242D 02, B242D 04	-	-

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Driver Seat Vent Motor Control	B242C 02, B242C 04	B242C 04, 1	B242C 01	-
Passenger Seat Vent Motor Control	B242D 02, B242D 04	B242D 04, 2	B242D 01	-
1. The driver seat cushion or back blower is inoperative 2. The passenger seat cushion or back blower is inoperative				

Circuit/System Description

When a heated or cooled seat switch is pressed, a LIN Bus message is sent to the body control module (BCM) indicating the heated or cooled seat request. The BCM then sends a low side pulse width modulation (PWM) signal through the heated/cooled seat mode signal circuit to the seat back and seat cushion blower assemblies for the appropriate seat.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC

B0242C 01 or B242D 01

The BCM detects a shorted to voltage on the control circuit.

B0242C 02 or B242D 02

The BCM detects a shorted to ground on the control circuit.

B0242C 04 or B242D 04

The BCM detects an open in the control circuit.

Action Taken When the DTC Sets

- Current and history DTCs are set.
- All heated and cooled seat commands are ignored.

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Conditions for Clearing the DTC

- The DTC automatically clears when the switch circuit setting the DTC is no longer active.
- A history DTC will clear once 50 consecutive fault-free ignition cycles have occurred.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Heated/Cooled Seats Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connectors at the appropriate K55 Seat Blower Assembly - Cushion and the K53 Seat Blower Assembly - Back. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.
    - **If 10 Ω or greater**

    1. Ignition OFF.

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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. Ignition ON.
4. Verify a test lamp illuminates between the B+ circuit terminal 1 and ground.
    - **If the test lamp does not illuminate and the circuit fuse is good**
    1. Ignition OFF, remove the test lamp, disconnect the X1 harness connector at the appropriate X51L Fuse Block - Instrument Panel Left or X51R Fuse Block - Instrument Panel Right.
    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 circuit fuse is good 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, disconnect the X1 harness connector at the X51L Fuse Block - Instrument Panel Left or X51R Fuse Block - Instrument Panel Right.
    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 circuit fuse is good and there is voltage at the fuse.
    - **If the test lamp illuminates**
5. Connect a test lamp between the control circuit terminal 3 and B+, engine ON.
6. Verify the test lamp turns ON while pressing the HEATED or COOLED seat switch through the High, Medium, and Low positions until the OFF position is reached.
    - **If the test lamp does not turn ON**
    1. Ignition OFF, disconnect the X6 harness connector at the K9 Body Control Module, ignition ON.
    2. Test for less than 1 V between the control circuit and ground.
        - If greater than 1 V, 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.

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- If less than 2 Ω, replace the K9 Body Control Module.

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

1. Ignition OFF, remove the test lamp, disconnect the X6 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, replace the K9 Body Control Module.

- **If the test lamp turns ON and OFF**

7. Ignition OFF, connect the harness connector at the K55 Seat Blower Assembly - Cushion, ignition ON.
8. Verify the DTC does not set.
   - **If the DTC sets**

     Test or replace the K55 Seat Blower Assembly - Cushion.

   - **If the DTC does not set**
9. Ignition OFF, connect the harness connector at the K53 Seat Blower Assembly - Back, ignition ON.
10. Verify the DTC does not set.
    - **If the DTC sets**

      Test or replace the K53 Seat Blower Assembly - Back.

    - **If the DTC does not set**
11. All OK.

Repair Instructions

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

- **Driver or Passenger Seat Back Ventilation Heating and Cooling Blower Replacement (with KB6)**
- **Front Seat Cushion Ventilation Blower Replacement (with KB6)Front Seat Cushion Ventilation Blower Replacement (22-Way Power)**
- **Control Module References** for K9 Body Control Module replacement, programming and setup

DTC B243A OR B243B: LEFT/RIGHT FRONT SEAT HEATING SWITCH

Diagnostic Instructions

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

DTC Descriptors

DTC B243A 39

Left Front Seat Heating Switch

DTC B243B 39

Right Front Seat Heating Switch

Circuit/System Description

The BCM detects an internal fault with the seat heating switch. No external circuits are involved.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC

The BCM detects an internal fault with the seat heating switch.

Action Taken When the DTC Sets

The BCM ignores all seat heating switch inputs.

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

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Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

- **Heated Seats Description and Operation**
- **Heated/Cooled 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 B243A

1. Ignition ON.
2. Verify DTC B243A is not set.
    - **If the DTC is set**

      Replace the Replace the S31D Seat Heating and Cooling Switch - Driver.

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

DTC B243B

1. Ignition ON.

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2. Verify DTC B243B is not set.
    - **If the DTC is set**

      Replace the S31P Seat Heating and Cooling Switch - Passenger.

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

Repair Instructions

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

Driver or Passenger Seat Heater Switch Replacement

SYMPTOMS - SEAT HEATING AND COOLING

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

1. Perform the **Diagnostic System Check - Vehicle** before using the Symptom Tables in order to verify that all of the following are true:
    - There are no DTCs set.
    - The control modules can communicate via the serial data link.
2. Review the system operation in order to familiarize yourself with the system functions. Refer to the following system descriptions:
    - **Heated Seats Description and Operation**
    - **Heated/Cooled Seats Description and Operation**
    - **Rear Heated Seats Description and Operation**

Visual/Physical Inspection

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

Intermittent

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

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Symptom List

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

- **Front Heated Seat Malfunction (KA1)**
- **Rear Heated Seat Malfunction**
- **Heated and Cooled Seat Malfunction (Chevrolet or GMC with KB6)Heated and Cooled Seat Malfunction (Cadillac with KB6)**

FRONT HEATED SEAT MALFUNCTION (KA1)

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 1 X1	4, 5	4, 5	-	-
B+ Terminal 10 X1	U1524 00, 1	U1524 00, 1	-	-
Driver Seat Back Heating Element Control	2	2	6	-
Driver Seat Back Heating Element Ground	-	2	-	-
Driver Seat Cushion Heating Element Control	3	3	6	-
Driver Seat Cushion Heating Element Ground	-	3	-	-
Passenger Seat Back Heating Element Control	4	4	6	-
Passenger Seat Back Heating Element Ground	-	4	-	-
Passenger Seat Cushion Heating Element Control	5	5	6	-
Passenger Seat Cushion Heating Element Ground	-	5	-	-
Ground	-	1	-	-

1. The driver and front passenger heated seats are inoperative.
2. The driver seat back heat function is inoperative

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
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 switch panel. When a heated seat switch is pressed, a LIN Bus message is sent from the switch panel to the body control module (BCM) indicating the heated seat request. The BCM then sends a LIN Bus 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 BCM then sends a LIN Bus message back to the switch panel to either illuminate or turn off the appropriate temperature indicator.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Heated Seats Description and Operation

Electrical Information Reference

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

Scan Tool Reference

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Control Module References for scan tool information

Circuit/System Verification

1. Engine 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 heated seat switch.
   - **If the parameter does not change**

     Replace the S31D Seat Heating and Cooling Switch - Driver.

   - **If the parameter changes**
3. Verify the scan tool Body Control Module Passenger Seat Heating/Venting/Cooling Mode parameter changes between Off and Seat Back and Cushion Heating when pressing the heated seat switch.
   - **If the parameter does not change**

     Replace the S31P Seat Heating and Cooling Switch - Passenger.

   - **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. Verify the heated seat switch indicators turn ON and OFF when pressing the S31 Seat Heating and Cooling Switch,
   - **If any indicator does not turn ON and OFF**

     Replace the S31 Seat Heating and Cooling Switch.

   - **If all indicators turn ON and OFF**
6. All OK.

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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 X1 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 Ω between the ground circuit terminal 8 and ground.
   - **If 10 Ω or greater**
   1. Ignition 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. Ignition ON.
4. Verify a test lamp illuminates between the B+ circuit terminals listed below and ground.
   - Terminal 1
   - Terminal 10
   - **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 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 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**

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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 X1 harness connector at the K29 Seating Control Module, ignition ON.
2. Verify a test lamp illuminates between the B+ circuit terminal 1 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 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 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 X1 harness connector at the K29 Seat Heating Control Module. 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 Ω between the ground circuit terminal 2 and ground.
   - **If 10 Ω or greater**
   1. Ignition 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**
5. Connect a test lamp between the control circuit terminal 1 and ground, ignition 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

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seat heating switch.

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

1. Ignition OFF, remove the test lamp, disconnect the X1 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 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 K29 Seat Heating Control Module.

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

1. Ignition OFF, remove the test lamp, disconnect the X1 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**

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.

Repair Instructions

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

- **Driver or Passenger Seat Heater Switch Replacement**
- **Driver or Passenger Seat Back Heater Replacement**
- **Front Seat Cushion Heater Replacement (with KA1)**
- **Control Module References** for K29 Seat Heating Control Module replacement, programming and setup

REAR HEATED SEAT MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+ Terminal 1 X1	1	1	-	-
B+ Terminal 10 X1	U1526, 1	U1526, 1	-	-
Left Rear Heated Seat Element Control	2	2	4	-
Left Rear Heated Seat Element Ground	-	2	-	-
Right Rear Heated Seat Element Control	3	3	4	-
Right Rear Heated Seat Element Ground	-	3	-	-
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. Right rear heated seat is inoperative. 4. Heated seat is always ON.				

Circuit/System Description

The rear seat heated seat switches are located in the auxiliary HVAC controls. When a heated seat switch is pressed, a serial data message is sent from the auxiliary HVAC controls to the body control module (BCM) indicating the heated seat request. The BCM 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

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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. Engine 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 A34 HVAC Controls - 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 A34 HVAC Controls - 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**

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1. Ignition OFF and all vehicle systems OFF, disconnect the X1 and X2 harness connectors 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 Ω between each ground circuit terminal listed below and ground:
    - Terminal 8 X1
    - Terminal 5 X2
    - **If 10 Ω or greater**
    1. Ignition 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. Ignition ON.
4. Verify a test lamp illuminates between each B+ circuit terminal listed below and ground:
    - Terminal 1 X1
    - Terminal 10 X1
    - **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 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 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 K29R Seat Heating Control Module - Rear.
5. Ignition OFF and all vehicle systems OFF, connect the X1 and X2 harness connectors at the K29R Seat Heating Control Module - Rear. 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 Ω between the ground circuit terminal 2 and ground.
    - **If 10 Ω or greater**

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1. Ignition 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**

7. Connect a test lamp between the control circuit terminal 1 and the ground circuit terminal 2, ignition ON.
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 X1 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 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 K29R Seat Heating Control Module - Rear.

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

1. Ignition OFF, remove the test lamp, disconnect the X1 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 Cushion Heater Replacement**
- **Control Module References** for K29R Seat Heating Control Module - Rear replacement, programming and setup

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HEATED AND COOLED SEAT MALFUNCTION (CHEVROLET OR GMC WITH KB6)

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Seat Heating and Cooling Switch B+	U0028, U0029, U0155, U1550, U1558, U15E1, U15F0, U2098	U1550, U1558	-	-
Seat Heating and Cooling Switch Linear Interconnect Network Bus 5	U1550, U1558	U1550, U1558	U1550, U1558	-
Seat Heating and Cooling Switch Ground	-	U1550, U1558	-	-
Seat Back and Cushion Blower Assembly B+	1	2, 5	-	-
Driver Seat Vent Motor Control (1)	B242C 02, B242C 04	1, 2, 5	B242C 01	-
Passenger Seat Vent Motor Control (1)	B242D 02, B242D 04	1, 2, 5	B242D 01	-
Seat Back or Cushion Blower Assembly Ground	-	2, 5	-	-
Heated Seat Element Supply Voltage Control - Seat Back	3	3	4	-
Seat Back Heating Element Ground	-	3	-	-
Heated Seat Element Supply Voltage Control - Seat Cushion	6	6	7	-
Seat Cushion Heating Element Ground	-	6	-	-

1. The driver or passenger seat back and cushion heat/cool modes are inoperative.
2. The driver or passenger seat back heat/cool modes are inoperative.
3. The driver or passenger seat back heat mode is inoperative.

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
4. The driver or passenger seat back heat mode is always ON.				
5. The driver or passenger seat cushion heat/cool modes are inoperative.				
6. The driver or passenger seat cushion heat mode is inoperative.				
7. The driver or passenger seat cushion heat mode is always ON.				

Circuit/System Description

Each seat has two seat blower motor assemblies, one located under the seat cushion to control cushion temperature and one located in the seat back to control seat back temperature.

Each seat blower motor assembly contains the necessary electronics to control the heating and cooling functions, as well as a thermo-electric device (TED) and blower motor used for the cooling functions. The heating function is provided by a separate self-regulated heating element which is also controlled by the seat blower motor assembly.

In the description below, the TEDs and blower motors are referenced independently even though they are packaged together as indicated above.

When a heated or cooled seat switch is pressed, a LIN Bus message is sent to the body control module (BCM) indicating the heated or cooled seat request. The BCM then sends a low side pulse width modulation (PWM) signal through the heated/cooled seat mode signal circuit to both seat blower motor assemblies for a given seat.

Battery positive voltage is supplied to the heating and cooling ventilation modules through a fuse located in the I/P fuse block.

When a cooled seat request is received, the seat blower motor assemblies apply voltage to the TEDs and a pre-determined voltage to the blower motors. When a heated seat request is received, the seat blower motor assemblies apply battery voltage through the control circuit to the self regulating seat heating elements.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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Description and Operation

Heated/Cooled 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. Engine ON.
2. Verify that no DTCs are set.
   - **If any DTCs are set**

     Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

   - **If no DTCs are set**
3. Verify the scan tool Body Control Module parameters listed below change state when pressing the appropriate seat heating and cooling switch.
   - Driver Seat Heating/Venting/Cooling Mode
   - Passenger Seat Heating/Venting/Cooling Mode
   - **If either parameter does not change**

     Replace the S31 Seat Heating and Cooling Switch.

   - **If both parameters change**
4. Verify the heated and cooled seat functions listed below operate in all three modes of operation:
   - Seat back and cushion heat mode
   - Seat back heat mode

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- Seat cool mode
- **If both the heat and cooled seat functions are inoperative**

  Refer to Circuit/System Testing - Heated and Cooled Seat Circuit Test.

- **If just the heat function is inoperative**

  Refer to Circuit/System Testing - Seat Cushion or Seat Back Heater Element Circuit Test.

- **If the heated seat function is always ON**

  Refer to Circuit/System Testing - Heated Seat Always ON Test.

- **If just the cooled seat function is inoperative**

  Replace the seat blower assembly.

- **If both the heat and cooled seat functions operate**

5. Verify the heated/cooled seat switch indicators turn ON and OFF when pressing the S31 Seat Heating and Cooling Switch.
   - **If any indicator does not turn ON and OFF**

     Replace the S31 Seat Heating and Cooling Switch.

   - **If all indicators turn ON and OFF**
6. All OK

Circuit/System Testing

Heated and Cooled Seat Circuit Test

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

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connectors at the appropriate K55 Seat Blower Assembly - Cushion and the K53 Seat Blower Assembly - Back. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.
   - **If 10 Ω or greater**

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1. Ignition 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. Ignition ON.
4. Verify a test lamp illuminates between the B+ circuit terminal 1 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 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 circuit fuse is good 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, test or replace the appropriate K55 Seat Blower Assembly - Cushion or K53 Seat Blower Assembly - Back.

- **If the test lamp illuminates**

5. Connect a test lamp between the control circuit terminal 3 and B+, engine ON.
6. Verify the test lamp turns ON while the pressing the HEAT or COOL seat switch through the high, medium, and low positions until the OFF position is reached.

- **If the test lamp does not turn ON**

1. Ignition OFF, disconnect the X6 harness connector at the K9 Body Control Module, ignition ON.
2. Test for less than 1 V between the signal circuit and ground.
    - If greater than 1 V, 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.

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

1. Ignition OFF, disconnect the X6 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, replace the K9 Body Control Module.

- **If the test lamp turns ON and OFF**

7. Test or replace the seat blower assembly.

Seat Cushion or Seat Back Heater Element Circuit Test

NOTE: **Circuit/System Verification must be performed before proceeding with Circuit/System Testing. This procedure tests for one fault at a time. If both the seat cushion and seat back heating elements are inoperative, chose one to diagnosis first then move to the other one.**

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the appropriate E14 Seat Heating Element - Back or Cushion. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 2 and ground.
    - **If 10 Ω or greater**

    1. Ignition 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. Connect a test lamp between the control circuit terminal 1 and ground, engine ON.

NOTE: **The ignition must be cycled OFF with the heated seat switch in the OFF position for 5 s then engine ON between each test in order to reset the blower motor.**

With the heater element disconnected, the seat blower assembly senses a fault (an open) in the control circuit. Because of this fault the blower assembly will only turn ON the output to the heater element for approximately 1-2 s.

4. Verify the test lamp briefly illuminates after pressing the heated seat switch. The test lamp may exhibit a 3 s delay before it illuminates.

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- **If the test lamp does not illuminate**

1. Ignition OFF, disconnect the harness connector at the appropriate K55 Seat Blower Assembly - Cushion or K53 Seat Blower Assembly - Back.
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, test or replace the seat blower assembly.

- **If the test lamp briefly illuminates**

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

5. Test or replace the seat heating element.

Heated Seat Always ON

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

1. Ignition OFF, disconnect the harness connector at the appropriate K55 Seat Blower Assembly - Cushion or K53 Seat Blower Assembly - Back, ignition ON.
2. Test for less than 1 V between the control circuit terminal 2 and ground.
   - **If 1 V or greater**

     Repair the short to voltage on the circuit.

   - **If less than 1 V**
3. Test or replace the seat blower assembly.

Repair Instructions

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

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- **Driver or Passenger Seat Heater Switch Replacement**
- **Driver or Passenger Seat Back Heater Replacement**
- **Front Seat Cushion Heater Replacement (with KA1)**
- **Driver or Passenger Seat Back Ventilation Heating and Cooling Blower Replacement (with KB6)**
- **Front Seat Cushion Ventilation Blower Replacement (with KB6)Front Seat Cushion Ventilation Blower Replacement (22-Way Power)**
- **Control Module References** for the K9 Body Control Module replacement, programming and setup

HEATED AND COOLED SEAT MALFUNCTION (CADILLAC WITH KB6)

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 and Cushion Blower Assembly B+	1	2, 5	-	-
Driver Seat Vent Motor Control (1)	B242C 02, B242C 04	1, 2, 5	B242C 01	-
Passenger Seat Vent Motor Control (1)	B242D 02, B242D 04	1, 2, 5	B242D 01	-
Seat Back or Cushion Blower Assembly Ground	-	2, 5	-	-
Heated Seat Element Supply Voltage Control - Seat Back	3	3	4	-
Seat Back Heating Element Ground	-	3	-	-
Heated Seat Element Supply Voltage Control - Seat Cushion	6	6	7	-
Seat Cushion Heating Element Ground	-	6	-	-

1. The driver or passenger seat back and cushion heat/cool modes are inoperative.
2. The driver or passenger seat back heat/cool modes are inoperative.
3. The driver or passenger seat back heat mode is inoperative.

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
4. The driver or passenger seat back heat mode is always ON.				
5. The driver or passenger seat cushion heat/cool modes are inoperative.				
6. The driver or passenger seat cushion heat mode is inoperative.				
7. The driver or passenger seat cushion heat mode is always ON.				

Circuit/System Description

Each seat has two seat blower motor assemblies, one located under the seat cushion to control cushion temperature and one located in the seat back to control seat back temperature.

Each seat blower motor assembly contains the necessary electronics to control the heating and cooling functions, as well as a thermo-electric device (TED) and blower motor used for the cooling functions. The heating function is provided by a separate self-regulated heating element which is also controlled by the seat blower motor assembly.

In the description below, the TEDs and blower motors are referenced independently even though they are packaged together as indicated above.

When a heated or cooled seat switch is pressed, a LIN Bus message is sent to the body control module (BCM) indicating the heated or cooled seat request. The BCM then sends a low side pulse width modulation (PWM) signal through the heated/cooled seat mode signal circuit to both seat blower motor assemblies for a given seat.

Battery positive voltage is supplied to the heating and cooling ventilation modules through a fuse located in the I/P fuse block.

When a cooled seat request is received, the seat blower motor assemblies apply voltage to the TEDs and a pre-determined voltage to the blower motors. When a heated seat request is received, the seat blower motor assemblies apply battery voltage through the control circuit to the self regulating seat heating elements.

Reference Information

Schematic Reference

Heated/Cooled Seat Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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Description and Operation

Heated/Cooled 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. Engine ON.
2. Verify the scan tool Body Control Module parameters listed below change state when pressing the appropriate seat heating and cooling switch.
    - Driver Seat Heating/Venting/Cooling Mode
    - Passenger Seat Heating/Venting/Cooling Mode
    - **If either parameter does not change**

      Replace the A20 Radio/HVAC Controls.

    - **If both parameters change**
3. Verify the heated and cooled seat functions listed below operate in all three modes of operation:
    - Seat back and cushion heat mode
    - Seat back heat mode
    - Seat cool mode
    - **If both the heat and cooled seat functions are inoperative**

      Refer to Circuit/System Testing - Heated and Cooled Seat Circuit Test.

    - **If just the heat function is inoperative**

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Refer to Circuit/System Testing - Seat Cushion or Seat Back Heater Element Circuit Test.

- **If the heated seat function is always ON**

  Refer to Circuit/System Testing - Heated Seat Always ON Test.

- **If just the cooled seat function is inoperative**

  Replace the seat blower assembly.

- **If both the heat and cooled seat functions operate**

4. All OK

Circuit/System Testing

Heated and Cooled Seat Circuit Test

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

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connectors at the appropriate K55 Seat Blower Assembly - Cushion and the K53 Seat Blower Assembly - Back. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.
   - **If 10 Ω or greater**
   1. Ignition 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. Ignition ON.
4. Verify a test lamp illuminates between the B+ circuit terminal 1 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 Ω in the B+ circuit end to end.
      - If 2 Ω or greater, repair the open/high resistance in the circuit.

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- If less than 2 Ω, verify the circuit fuse is good 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, test or replace the appropriate K55 Seat Blower Assembly - Cushion or K53 Seat Blower Assembly - Back.

- **If the test lamp illuminates**

5. Connect a test lamp between the control circuit terminal 3 and B+, engine ON.
6. Verify the test lamp turns ON while the pressing the HEAT or COOL seat switch through the high, medium, and low positions until the OFF position is reached.

- **If the test lamp does not turn ON**

1. Ignition OFF, disconnect the X6 harness connector at the K9 Body Control Module, ignition ON.
2. Test for less than 1 V between the signal circuit and ground.
   - If greater than 1 V, 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 is always ON**

1. Ignition OFF, disconnect the X6 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, replace the K9 Body Control Module.

- **If the test lamp turns ON and OFF**

7. Test or replace the seat blower assembly.

Seat Cushion or Seat Back Heater Element Circuit Test

NOTE: **Circuit/System Verification must be performed before proceeding with Circuit/System Testing. This procedure tests for one fault at a time. If both the seat cushion and seat back heating elements are**

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inoperative, chose one to diagnosis first then move to the other one.

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the appropriate E14 Seat Heating Element - Back or Cushion. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 2 and ground.
   - **If 10 Ω or greater**
   1. Ignition 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. Connect a test lamp between the control circuit terminal 1 and ground, engine ON.

NOTE: **The ignition must be cycled OFF with the heated seat switch in the OFF position for 5 s then engine ON between each test in order to reset the blower motor.**

With the heater element disconnected, the seat blower assembly senses a fault (an open) in the control circuit. Because of this fault the blower assembly will only turn ON the output to the heater element for approximately 1-2 s.

4. Verify the test lamp briefly illuminates after pressing the heated seat switch. The test lamp may exhibit a 3 s delay before it illuminates.
   - **If the test lamp does not illuminate**
   1. Ignition OFF, disconnect the harness connector at the appropriate K55 Seat Blower Assembly - Cushion or K53 Seat Blower Assembly - Back.
   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, test or replace the seat blower assembly.
   - **If the test lamp briefly illuminates**

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

5. Test or replace the seat heating element.

Heated Seat Always ON

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

1. Ignition OFF, disconnect the harness connector at the appropriate K55 Seat Blower Assembly - Cushion or K53 Seat Blower Assembly - Back, ignition ON.
2. Test for less than 1 V between the control circuit terminal 2 and ground.
   - **If 1 V or greater**

     Repair the short to voltage on the circuit.

   - **If less than 1 V**
3. Test or replace the seat blower assembly.

Repair Instructions

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

- **Driver or Passenger Seat Back Heater Replacement**
- **Front Seat Cushion Heater Replacement (with KA1)**
- **Driver or Passenger Seat Back Ventilation Heating and Cooling Blower Replacement (with KB6)**
- **Front Seat Cushion Ventilation Blower Replacement (with KB6)Front Seat Cushion Ventilation Blower Replacement (22-Way Power)**
- **Control Module References** for the A20 Radio/HVAC Controls and K9 Body Control Module replacement, programming and setup

REPAIR INSTRUCTIONS

WIRE TO WIRE REPAIR - SEATS

Special Tools

- **EL-38125-10** Splice Sleeve Crimping Tool (non GMNA)

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- **J-38125-5A** Ultra Torch Special Tool
- **J-38125-8** Splice Sleeve Crimping Tool (GMNA)

For equivalent regional tools, refer to **Special Tools** .

WARNING: **In order to reduce the risk of personal injury, loss of high voltage isolation to ground and higher system impedance, do not attempt to repair any HV wiring, connector, or terminal that is damaged. High voltage coaxial type cables are not repairable. Never attempt to repair a coaxial type cable. The entire cable/harness or component must be replaced. In order to maintain system integrity and personal safety, never attempt to repair any high voltage wiring, cables, or terminals. Performing this procedure on high voltage circuits may result in serious injury or death.**

NOTE: **If the wiring harness internal to the transmission is damaged, the wiring harness must be replaced. The use of splice sleeves in an attempt to repair the internal transmission wires, connectors, or terminals could result in performance issues.**

NOTE: **Do not splice wires in Door Harness Grommets.**

NOTE: **The DuraSeal splice sleeves have the following 2 critical features:**

- **A special heat shrink sleeve environmentally seals the splice. The heat shrink sleeve contains a sealing adhesive inside.**
- **A cross hatched (knurled) core crimp provides the necessary low resistance contact integrity for these sensitive, low energy circuits.**

Use only DuraSeal splice sleeves to form a one-to-one splice on all types of insulation except high voltage and specialty cables. Use DuraSeal splice sleeves where there are special requirements such as moisture sealing. Follow the instructions below in order to splice copper wire using DuraSeal splice sleeves.

Splice Sleeve Selection

Splice Sleeve Color	Crimp Tool Nest Color		Wire Gauge mm^2 / (AWG)
	3 Crimp Nests	4 Crimp Nests	
Salmon (Yellow-Pink) 19300089	Red (1) or Red/Green (1)	Red (2)	0.22-0.8/(18-26)

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Splice Sleeve Color	Crimp Tool Nest Color		Wire Gauge mm^2 / (AWG)
	3 Crimp Nests	4 Crimp Nests	
Blue 19168447	Blue (2)	Blue (3)	1.0-2.0/(14-16)
Yellow 19168448	Yellow (3)	Yellow (4)	3.0-5.0/(10-12)

NOTE: **You must perform the following procedures in the listed order. Repeat the procedure if any wire strands are damaged. You must obtain a clean strip with all of the wire strands intact.**

1. Open the harness by removing any tape:
   - Use a sewing seam ripper, available from sewing supply stores, in order to cut open the harness in order to avoid wire insulation damage.
   - Use the DuraSeal splice sleeves on all types of insulation except Tefzel and coaxial.
   - Do not use the crimp and DuraSeal splice sleeve to form a splice with more than 2 wires coming together.
2. Cut as little wire off the harness as possible. You may need the extra length of wire in order to change the location of a splice.

   Adjust splice locations so that each splice is at least 40 mm (1.5 in) away from the other splices, harness branches, or connectors.

3. Strip the insulation:
   - When adding a length of wire to the existing harness, use the same size wire as the original wire.
   - Perform one of the following items in order to find the correct wire size:
     - Find the wire on the schematic and convert to regional wiring gauge size.
     - If you are unsure of the wire size, begin with the largest opening in the wire stripper and work down until achieving a clean strip of the insulation.
   - Strip approximately 5.0 mm (0.20 in) of insulation from each wire to be spliced.
   - Do not nick or cut any of the strands. Inspect the stripped wire for nicks or cut strands.
   - If the wire is damaged, repeat this procedure after removing the damaged section.
4. For high temperature wiring, slide a section of high temperature SCT1 shrink tubing down the length of wire to be spliced. Ensure that the shrink tubing will not interfere with the splice procedure.
5. Select the proper DuraSeal splice sleeve according to the wire size. Refer to the above table at the beginning of the repair procedure for the color coding of the DuraSeal splice sleeves and the crimp tool nests.

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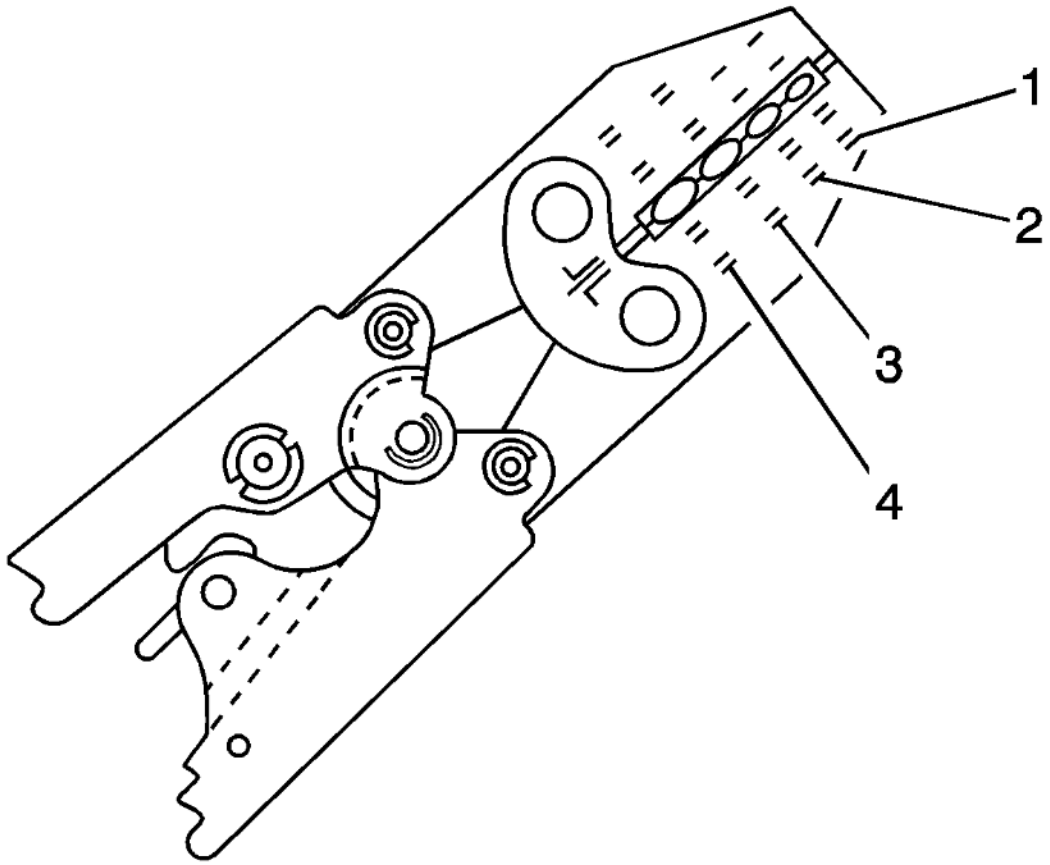

Fig. 7: Splice Sleeve Crimping Tool With 4 Crimp Nests
Courtesy of GENERAL MOTORS COMPANY

6. The **EL-38125-10** splice sleeve crimping tool has four crimp nests. The largest crimp nest (4) is used for crimping 10 and 12 gauge wires. The second largest crimp nest (3) is used for crimping 14 and 16 gauge wires. The third largest crimp nest (2) is used for crimping 18 and 20 gauge wires. The smallest crimp nest (1) is used for crimping 22 to 26 gauge wires. The crimp nests are referenced in the table (farther above) under the crimp tool nest color.

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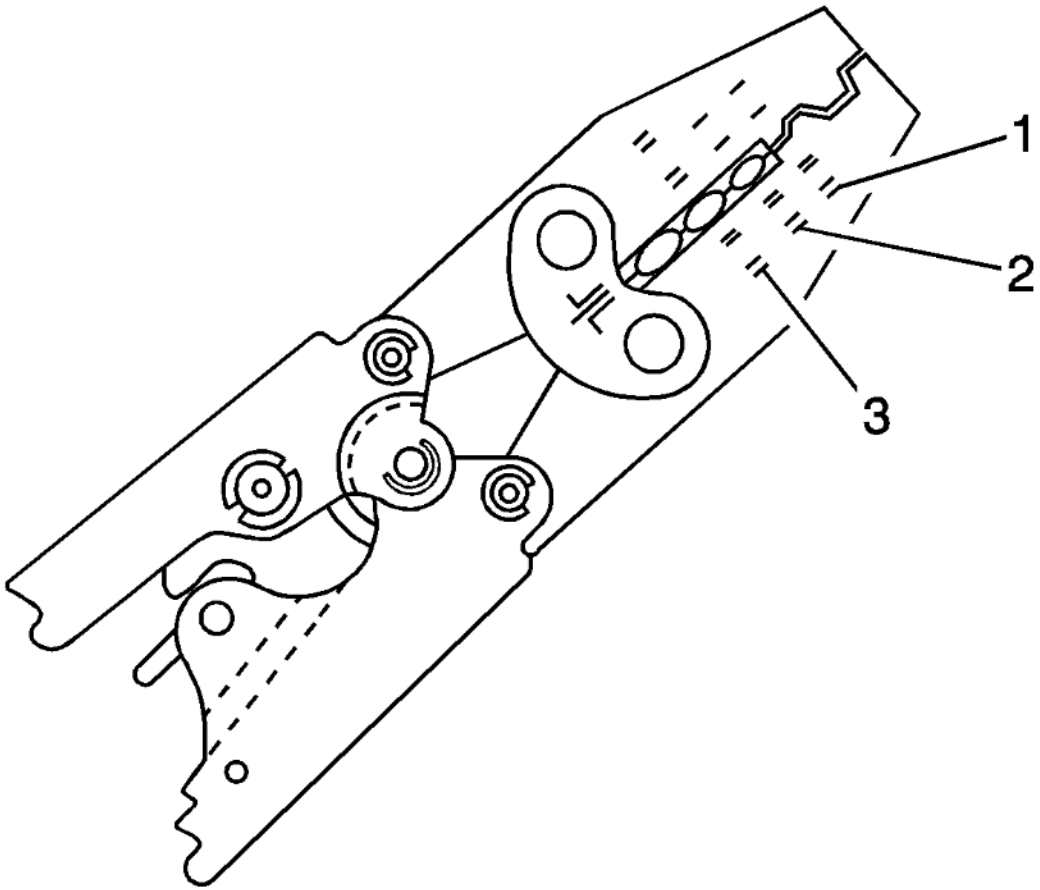

Fig. 8: Splice Sleeve Crimping Tool With 3 Crimp Nests
Courtesy of GENERAL MOTORS COMPANY

7. The **J-38125-8** splice sleeve crimping tool has three crimp nests. The largest crimp nest (3) is used for crimping 10 and 12 gauge wires. The second largest crimp nest (2) is used for crimping 14 and 16 gauge wires. The smallest crimp nest (1) is used for crimping 18 to 20 gauge wires. The crimp nests are referenced in the table (farther above) under the crimp tool nest color.
8. Use the splice sleeve crimp tool in order to position the DuraSeal splice sleeve in the proper color nest of the splice sleeve crimp tool. For the four crimp nest tool, use the three largest crimp nests to crimp the splice sleeves. For the three crimp nest tool, use all three crimp nests to

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crimp the splice sleeves. Use the four and three crimp tool diagrams (above) and the table (farther above) to match the splice sleeve with the correct crimp nest. The crimp tool diagram callout numbers match the numbers in the table (under crimp tool nest color).

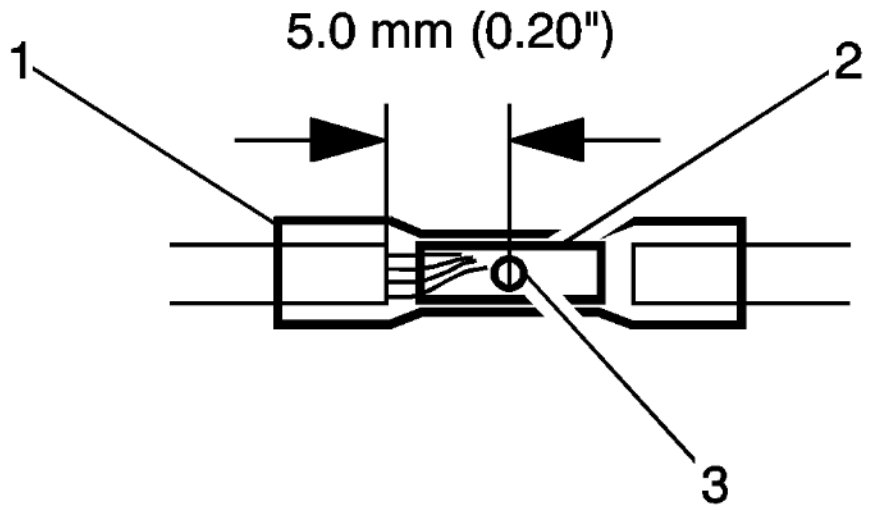

Fig. 9: Duraseal Splice Sleeve
Courtesy of GENERAL MOTORS COMPANY

9. Place the DuraSeal splice sleeve in the nest. Ensure that the crimp falls midway between the end of the barrel and the stop. The sleeve has a stop (3) in the middle of the barrel (2) in order to prevent the wire (1) from going further. Close the hand crimper handles slightly in order to

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firmly hold the DuraSeal splice sleeve in the proper nest.

Fig. 10: Crimped Duraseal Splice Sleeve
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10. Insert the wire into the splice sleeve barrel until the wire hits the barrel stop. Refer to **Folded-Over Wire Repair** for splicing wires of 0.35 mm or less (22, 24, 26 gauge sizes) and for splicing wires of different gauges.
11. Tightly close the handles of the crimp tool until the crimper handles open when released.

    The crimper handles will not open until you apply the proper amount of pressure to the DuraSeal splice sleeve. Repeat steps 4 and 6 for the opposite end of the splice.

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Fig. 11: Crimped Duraseal Splice Sleeve
Courtesy of GENERAL MOTORS COMPANY

12. Using the heat torch, apply heat to the crimped area of the barrel.
13. Start in the middle and gradually move the heat barrel to the open ends of the tubing:

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- The tubing will shrink completely as the heat is moved along the insulation.
- A small amount of sealant will come out of the end of the tubing when sufficient shrinkage is achieved.

Weatherpack™ Wiring Repair

NOTE: **Some replacement pigtail connectors may be delivered without the terminated leads installed into the connector. For Weatherpack™ connectors, all terminated leads included in the package should to be installed into the connector. If the connector end view shows that a terminal is not occupied, the extra terminated lead(s) need to be installed and the end(s) sealed using a DuraSeal splice sleeve and taped back into the harness.**

1. Insert the wire into the splice sleeve barrel until the wire hits the barrel stop. Refer to **Folded-Over Wire Repair** for splicing wires of 0.35 mm or less (22, 24, 26 gauge sizes) and for splicing wires of different gauges.

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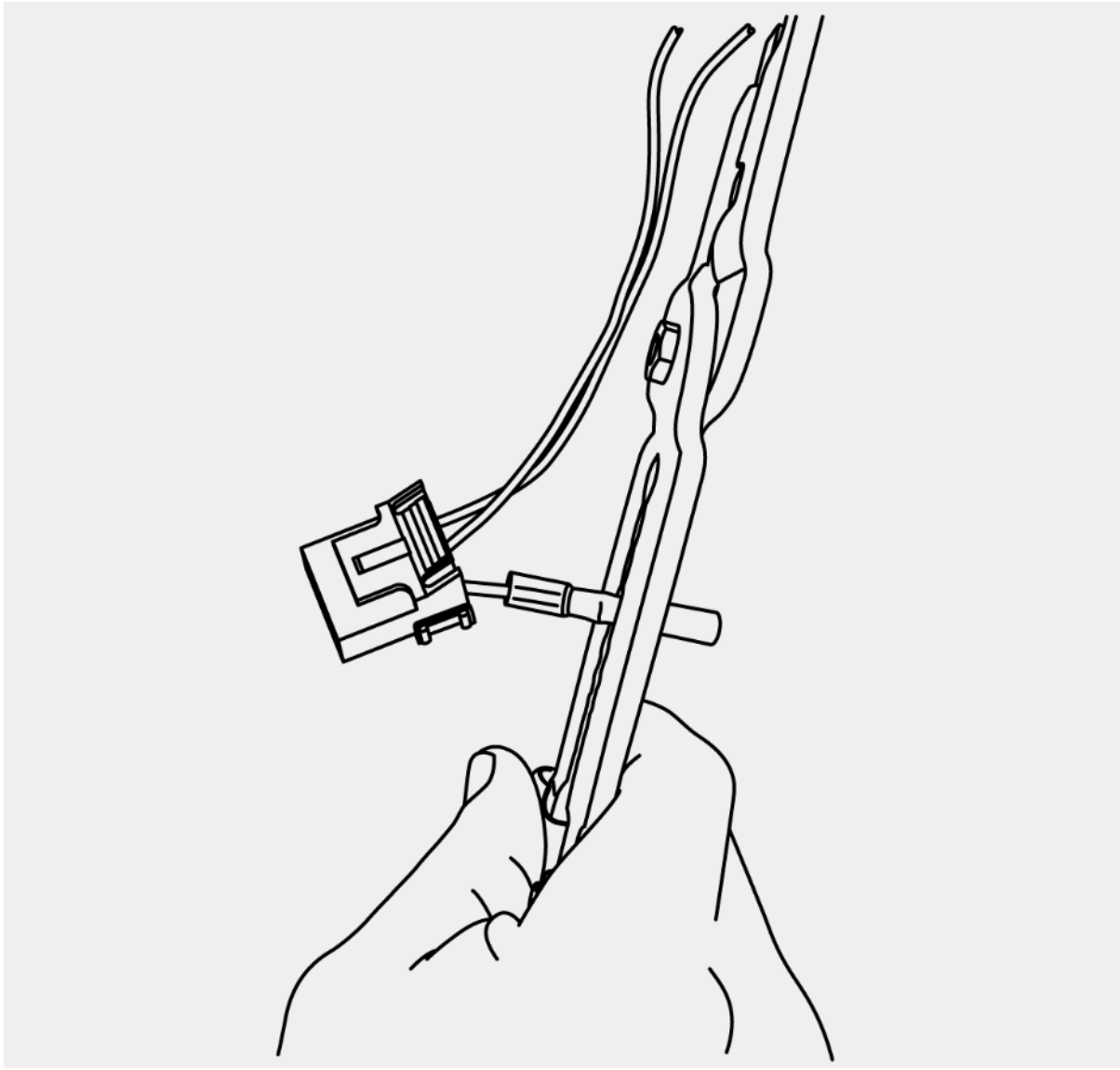

Fig. 12: Tightly Close Handles Of Crimp Tool
Courtesy of GENERAL MOTORS COMPANY

2. Tightly close the handles of the crimp tool until the crimper handles open when released.

   The crimper handles will not open until you apply the proper amount of pressure to the DuraSeal splice sleeve. Holding the DuraSEAL with

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one hand gently tug on the wire to ensure it is crimped in the DuraSeal.

3. Using the heat torch, apply heat to the crimped area of the barrel.

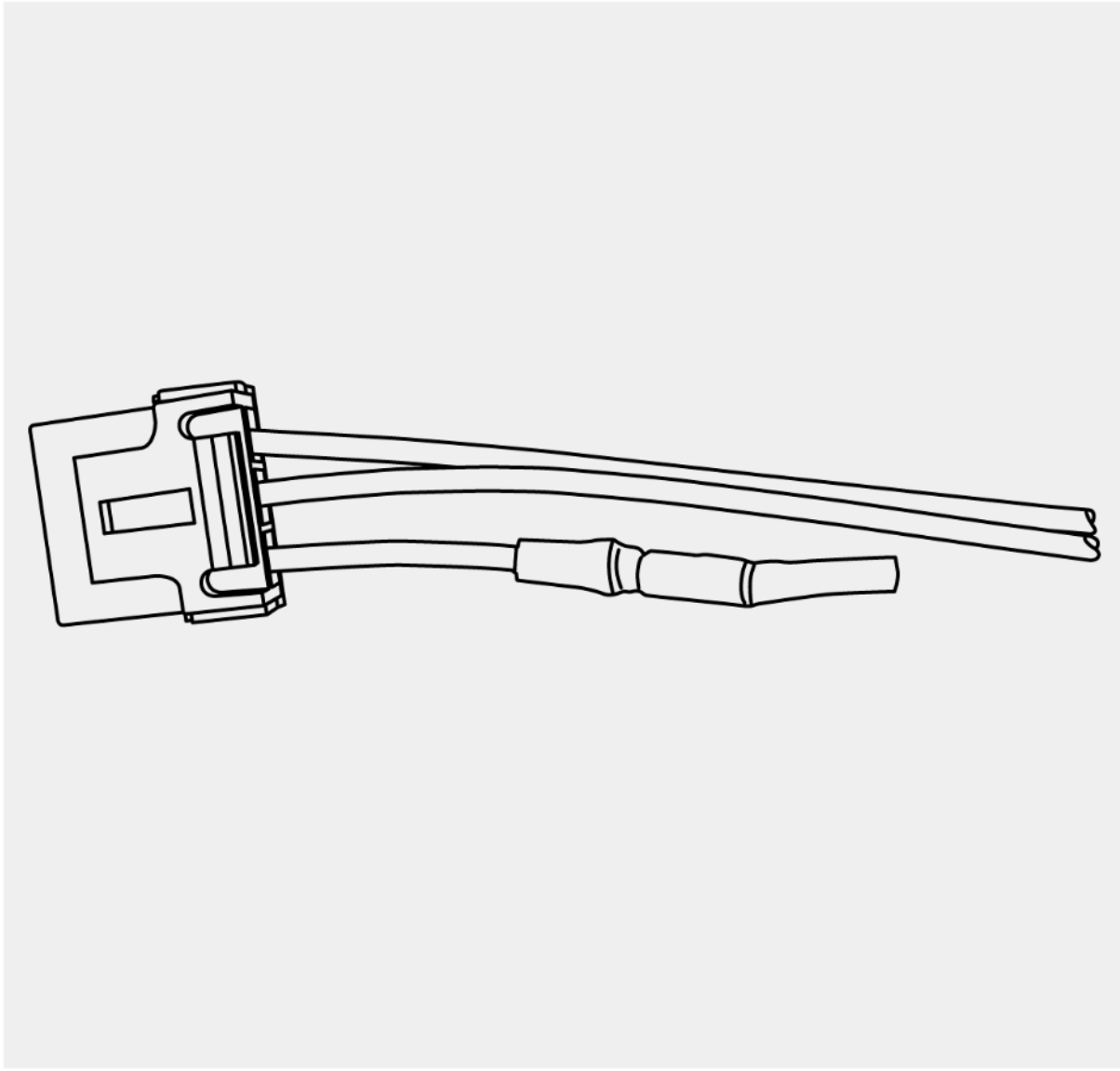

Fig. 13: Applying Heat To Crimped Area Of Barrel
Courtesy of GENERAL MOTORS COMPANY

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4. Start in the middle and gradually move the heat barrel to the open ends of the tubing:
    - The tubing will shrink completely as the heat is moved along the insulation.
    - A small amount of sealant will come out of the end of the tubing when sufficient shrinkage is achieved.

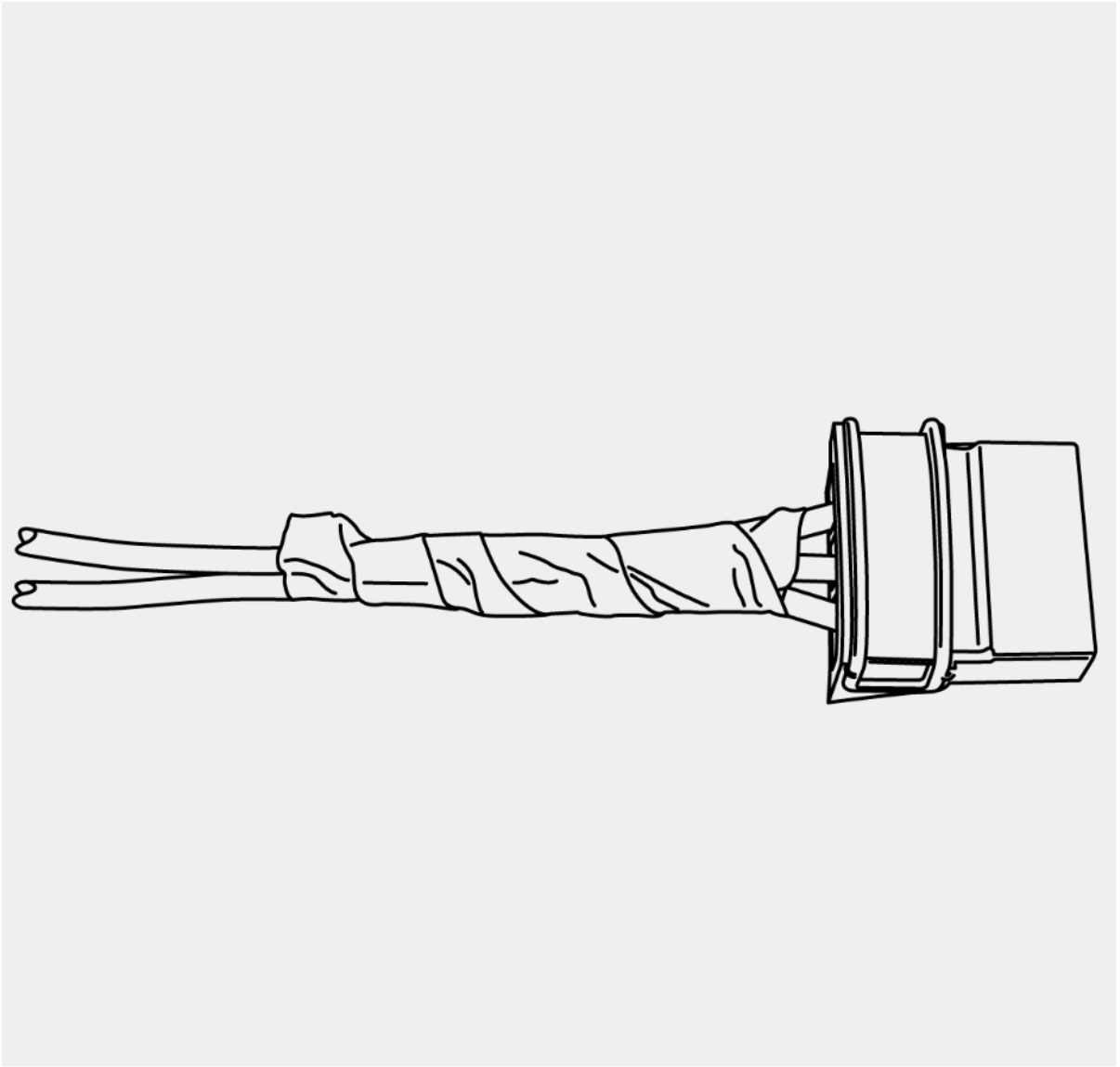

Fig. 14: Taping Extra Terminated Leads Back Into Harness
Courtesy of GENERAL MOTORS COMPANY

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5. Tape the extra terminated lead(s) back into the harness.

High Temperature Wiring Repairs

Use the following procedures to perform high temperature wiring repairs:

1. Center the high temperature SCT1 shrink tube over the DuraSeal splice sleeve.
2. Using the heat torch, apply heat to the high temperature heat shrink tubing.
3. Gradually move the heat from the center to the open end of the tubing:
    - The tubing will shrink completely as the heat is moved along the insulation.
    - A small amount of sealant will come out of the end of the tubing when sufficient shrinkage is achieved.
4. Replace any reflective tape and clips that may have been removed during the repair.

CONNECTOR RECONNECTION - SEATS

Special Tools

EL-35616 Terminal Test Probe Kit

For equivalent regional tools, refer to **Special Tools** .

When the condition is not currently present, but is indicated in DTC history, the cause may be intermittent. An intermittent may also be the cause when there is a customer complaint, but the symptom cannot be duplicated. Refer to the Symptom Table of the system that is suspect of causing the condition before trying to locate an intermittent condition.

Most intermittent conditions are caused by faulty electrical connections or wiring. Inspect for the following items:

- Wiring broken inside the insulation
- Poor connection between the male and female terminal at a connector
- A terminal not seated all the way into the connector body
- Poor terminal to wire connection - Some conditions which fall under this description are poor crimps, poor solder joints, crimping over the wire insulation rather than the wire itself, and corrosion in the wire to terminal contact area, etc.
- Pierced or damaged insulation can allow moisture to enter the wiring causing corrosion. The conductor can corrode inside the insulation, with little visible evidence. Look for swollen and stiff sections of wire in the suspect circuits.
- Wiring which has been pinched, cut, or its insulation rubbed through may cause an intermittent open or short as the bare area touches other

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wiring or parts of the vehicle.

- Wiring that comes in contact with hot or exhaust components
- Refer to **Inducing Intermittent Fault Conditions** in order to duplicate the conditions required, in order to verify the customer concern.
- Refer to **Testing for Electrical Intermittents** for test procedures to detect intermittent open, high resistance, short to ground, and short to voltage conditions.
- Refer to **Scan Tool Snapshot Procedure** for advanced intermittent diagnosis and Vehicle Data Recorder operation.

Testing for Terminal Fretting

Some intermittent conditions can be caused by wire terminal fretting corrosion. Fretting corrosion is a build-up of insulating, oxidized wear debris that can form when there is a small motion between electrical contacts. The oxidized wear debris can pile up enough at the electrical contact spots that the electrical resistance across the connection increases. Movement between the contacting surfaces as small as 10 to 100 microns can cause fretting. To put this in perspective, a sheet of paper is about 100 microns thick, so fretting motion is small and hard to see. Vibration and thermal expansion/contraction are the main sources that create fretting motion. Since vehicles vibrate and can experience large temperature swings, they are a good source for fretting motion. Tin, copper, nickel, and iron surfaces are all susceptible to fretting corrosion. Fretting corrosion can be difficult to see but it looks like small, dark smudges on the terminals contact surface.

To correct a fretting condition disconnect the suspect connector and add dielectric grease / lubricant (Nyogel 760G or equivalent, meeting GM specification 9986087) to both sides of the connector terminals. Then reconnect the connector and wipe away any excess lubricant. This will correct the additional terminal contact resistance due to the terminal fretting corrosion.

Testing for Proper Terminal Contact

It is important to test terminal contact at the component and any inline connectors before replacing a suspect component. Mating terminals must be inspected to ensure good terminal contact. A poor connection between the male and female terminal at a connector may be the result of contamination or deformation.

Contamination may be caused by the connector halves being improperly connected. A missing or damaged connector seal, damage to the connector itself, or exposing the terminals to moisture and dirt can also cause contamination. Contamination, usually in the underhood or underbody connectors, leads to terminal corrosion, causing an open circuit or intermittently open circuit.

Deformation is caused by probing the mating side of a connector terminal without the proper adapter. Always use the **EL-35616** kit when probing connectors. Other causes of terminal deformation are improperly joining the connector halves, or repeatedly separating and joining the connector halves. Deformation, usually to the female terminal contact tang, can result in poor terminal contact causing an open or intermittently open circuit.

Testing for Proper Terminal Contact in Bussed Electrical Centers

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It is very important to use the correct test adapter when testing for proper terminal contact of fuses and relays in a bussed electrical center. Use the **EL-35616** kit to test for proper terminal contact. Failure to use the **EL-35616** kit can result in improper diagnosis of the bussed electrical center.

Follow the procedure below in order to test terminal contact:

1. Separate the connector halves.
2. Visually inspect the connector halves for contamination. Contamination may result in a white or green build-up within the connector body or between terminals. This causes high terminal resistance, intermittent contact, or an open circuit. An underhood or underbody connector that shows signs of contamination should be replaced in its entirety: terminals, seals, and connector body.
3. Using an equivalent male terminal/terminated lead, verify that the retention force is significantly different between a known good terminal and the suspect terminal. Replace the female terminal in question.

Flat Wire Connectors

There are no serviceable parts for flat wire connectors on the harness side or the component side.

Follow the procedure below in order to test terminal contact:

1. Remove the component in question.
2. Visually inspect each side of the connector for signs of contamination. Avoid touching either side of the connector as oil from your skin may be a source of contamination as well.
3. Visually inspect the terminal bearing surfaces of the flat wire circuits for splits, cracks, or other imperfections that could cause poor terminal contact. Visually inspect the component side connector to ensure that all of the terminals are uniform and free of damage or deformation.
4. Insert the appropriate adapter into the flat wire harness connector in order to test the circuit in question.

Control Module/Component Voltage and Grounds

Poor voltage or ground connections can cause widely varying symptoms.

- Test all control module voltage supply circuits. Many vehicles have multiple circuits supplying voltage to a control module. Other components in the system may have separate voltage supply circuits that may also need to be tested. Inspect connections at the module/component connectors, fuses, and any intermediate connections between the voltage source and the module/component. A test lamp or a DMM may indicate that voltage is present, but neither tests the ability of the circuit to carry sufficient current. Operate the component to test the ability of the circuit to carry sufficient current. Refer to **Circuit Testing** , and **Power Distribution Schematics** .
- Test all control module ground and system ground circuits. The control module may have multiple ground circuits. Other components in the system may have separate grounds that may also need to be tested. Inspect grounds for clean and tight connections at the grounding point.

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Inspect the connections at the component and in splice packs, where applicable. Operate the component to test the ability of the circuit to carry sufficient current. Refer to **Circuit Testing** , and **Ground Distribution Schematics** .

Temperature Sensitivity

- An intermittent condition may occur when a component/connection reaches normal operating temperature. The condition may occur only when the component/connection is cold, or only when the component/connection is hot.
- Freeze Frame, Failure Records, Snapshot, or Vehicle Data Recorder data may help with this type of intermittent condition, where applicable.
- If the intermittent is related to heat, review the data for a relationship with the following:
  - High ambient temperatures
  - Underhood/engine generated heat
  - Circuit generated heat due to a poor connection, or high electrical load
  - Higher than normal load conditions, towing, etc.
- If the intermittent is related to cold, review the data for the following:
  - Low ambient temperatures - In extremely low temperatures, ice may form in a connection or component. Inspect for water intrusion.
  - The condition only occurs on a cold start.
  - The condition goes away when the vehicle warms up.
- Information from the customer may help to determine if the trouble follows a pattern that is temperature related.
- If temperature is suspected of causing an intermittent fault condition, attempt to duplicate the condition. Refer to **Inducing Intermittent Fault Conditions** in order to duplicate the conditions required.

Electromagnetic Interference and Electrical Noise

Some electrical components/circuits are sensitive to electromagnetic interference or other types of electrical noise. Inspect for the following conditions:

- A mis-routed harness that is too close to high voltage/high current devices such as secondary ignition components, motors, generator etc. - These components may induce electrical noise on a circuit that could interfere with normal circuit operation.
- Electrical system interference caused by a malfunctioning relay, or a control module driven solenoid or switch - These conditions can cause a sharp electrical surge. Normally, the condition will occur when the malfunctioning component is operating.
- Installation of non-factory or aftermarket add on accessories such as lights, 2-way radios, amplifiers, electric motors, remote starters, alarm systems, cell phones, etc. - These accessories may create interference in other circuits while operating and the interference would disappear when the accessory is not operating. Refer to **Checking Aftermarket Accessories** .

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- Test for an open diode across the A/C compressor clutch and for other open diodes. Some relays may contain a clamping diode.
- The generator may be allowing AC noise into the electrical system.

Incorrect Control Module

- There are only a few situations where reprogramming a control module is appropriate:
  - A new service control module is installed.
  - A control module from another vehicle is installed.
  - Revised software/calibration files have been released for this vehicle.

NOTE: **DO NOT re-program the control module with the SAME software/calibration files that are already present in the control module. This is not an effective repair for any type of concern.**

- Verify that the control module contains the correct software/calibration. If incorrect programming is found, reprogram the control module with the most current software/calibration. Refer to **Control Module References** for replacement, setup, and programming.

DRIVER OR PASSENGER SEAT HEATER SWITCH REPLACEMENT

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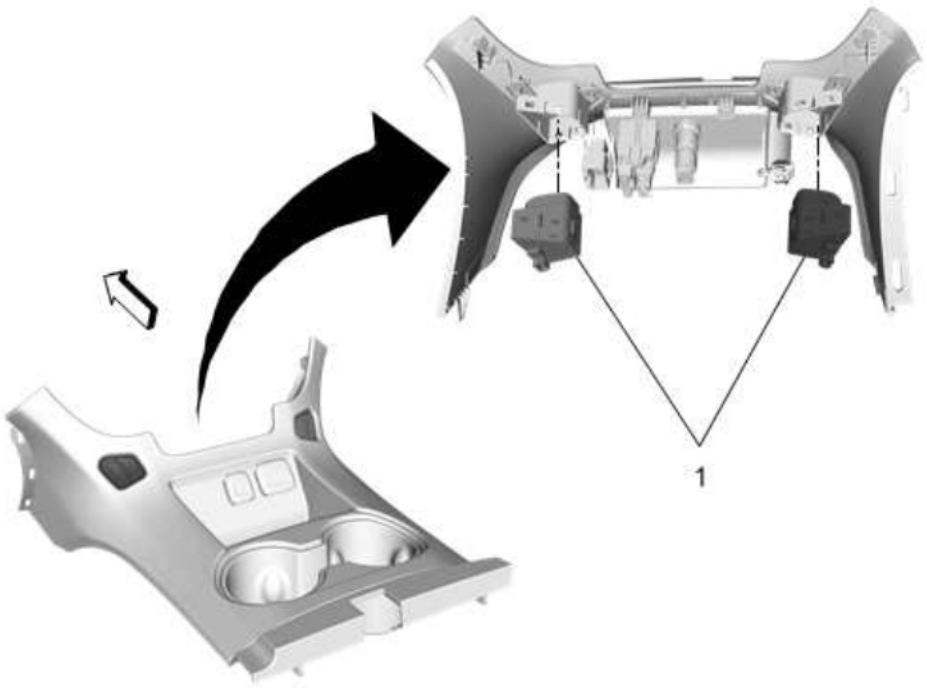

Fig. 15: Driver or Passenger Seat Heater Switch
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the front floor console trim plate. Refer to **Front Floor Console Trim Plate Replacement (Chevrolet / GMC)** .	
1	Driver or Passenger Seat Heater Switch (Qty: 2) **Procedure** 1. Disconnect the electrical connector. 2. Use a flat bladed plastic trim tool in order to release the seat heater switch from the trim plate.

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FRONT SEAT HEATER CONTROL MODULE REPLACEMENT

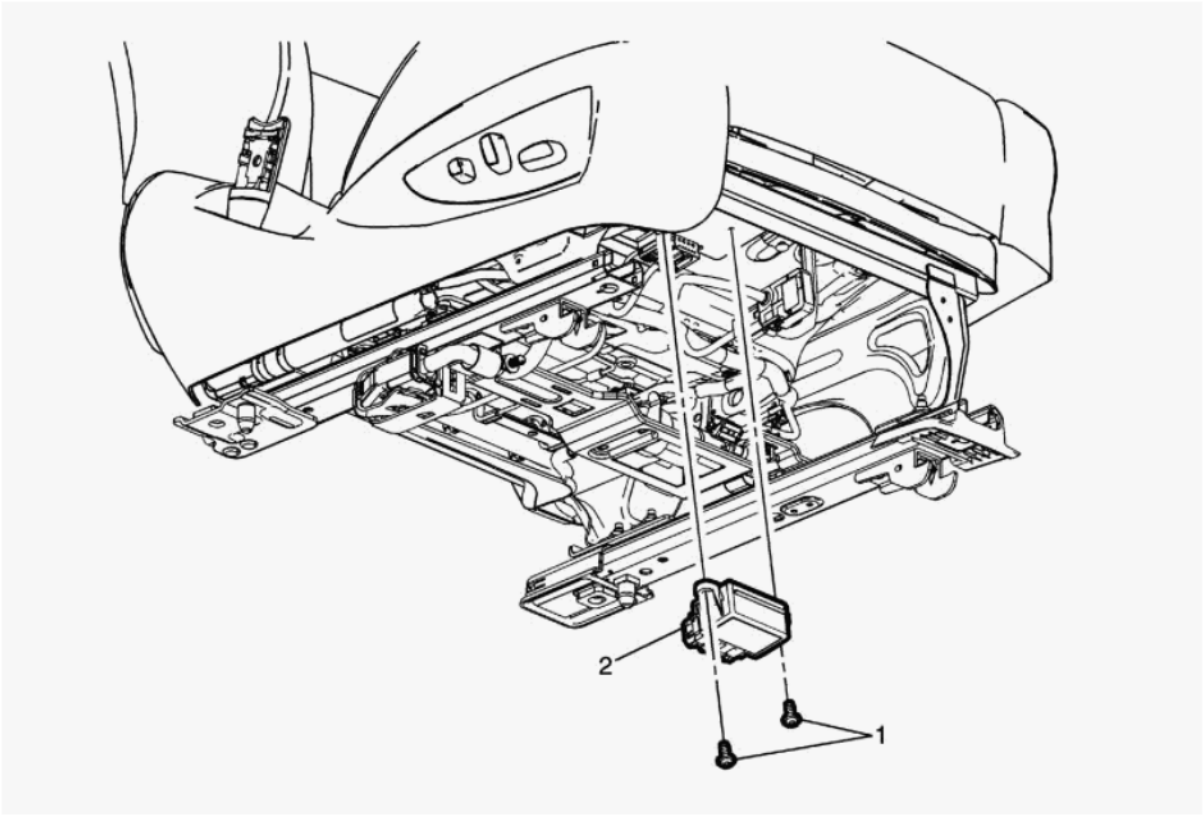

Fig. 16: Front Seat Heater Control Module
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the driver or passenger seat. Refer to **Driver or Passenger Seat Removal and Installation**	
1	Front Seat Heater Control Module Fastener (Qty: 2) **CAUTION:** **Refer to** **Fastener** **Caution** .

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Callout	Component Name
2	Front Seat Heater Control Module **Procedure** 1. Disconnect the electrical connector. 2. Refer to **Control Module References** for programing and setup information.

DRIVER OR PASSENGER SEAT BACK HEATER REPLACEMENT

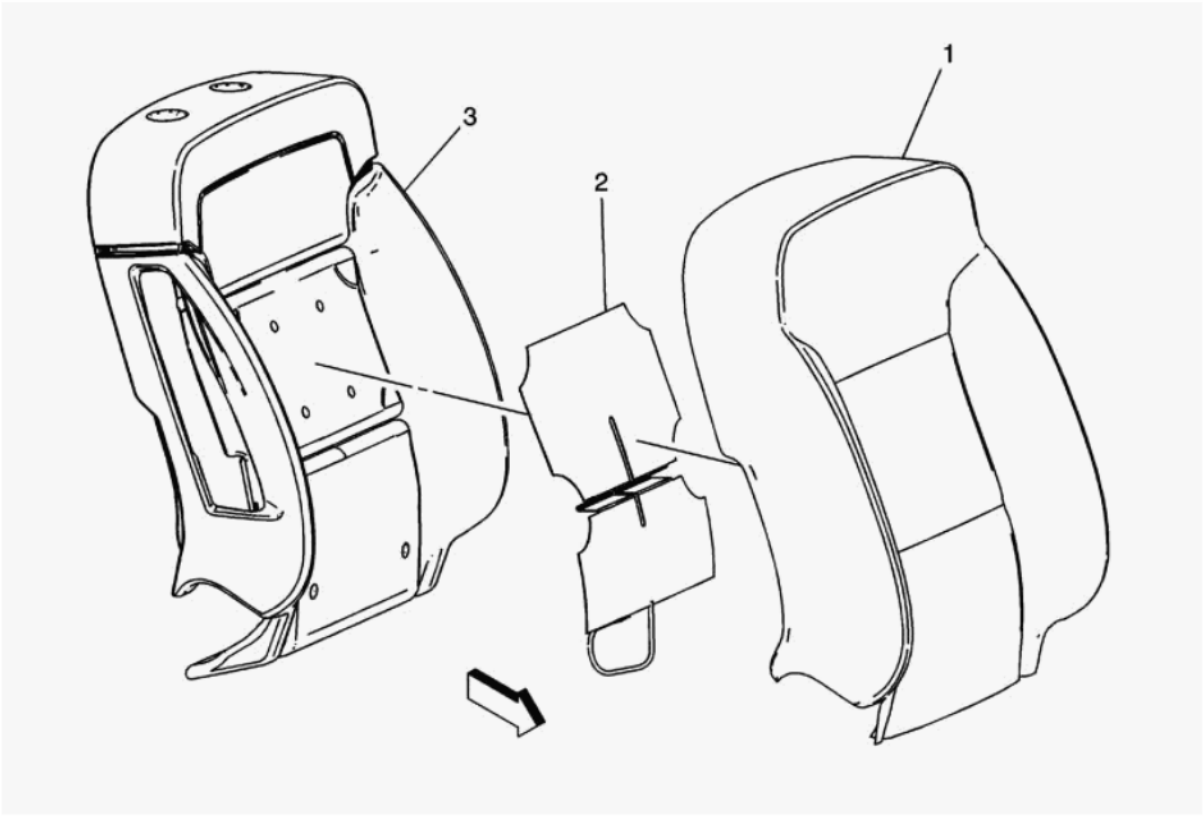

Fig. 17: Driver or Passenger Seat Back Cushion Heater
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

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Callout	Component Name
WARNING: **Refer to SIR** **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 back cushion cover and pad. Refer to **Driver or Passenger Seat Back Cover and Pad Replacement** **Driver or Passenger Seat Back Cover and Pad Replacement (22-Way Power)** .	
1	Driver or Passenger Seat Back Cushion Cover **Procedure** 1. Disconnect the electrical connectors.

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Callout	Component Name
	2. Disengage the j-channel retainers from the seat back cushion frame. 3. Remove the seat back cushion cover and pad from the seat back frame as an assembly. 4. Separate the seat back cushion from the seat back cushion pad by pulling the cover away from the pad.
2	Driver or Passenger Seat Back Cushion Heater **Procedure** 1. Disconnect the heater element and peel away from the cushion to remove. 2. Note the routing of the wiring harness and connector location for installation.
3	Driver or Passenger Seat Back Cushion Pad **Procedure** Reassemble the trim to the cushion using hog ring tool.

FRONT SEAT CUSHION HEATER REPLACEMENT (WITH KA1)

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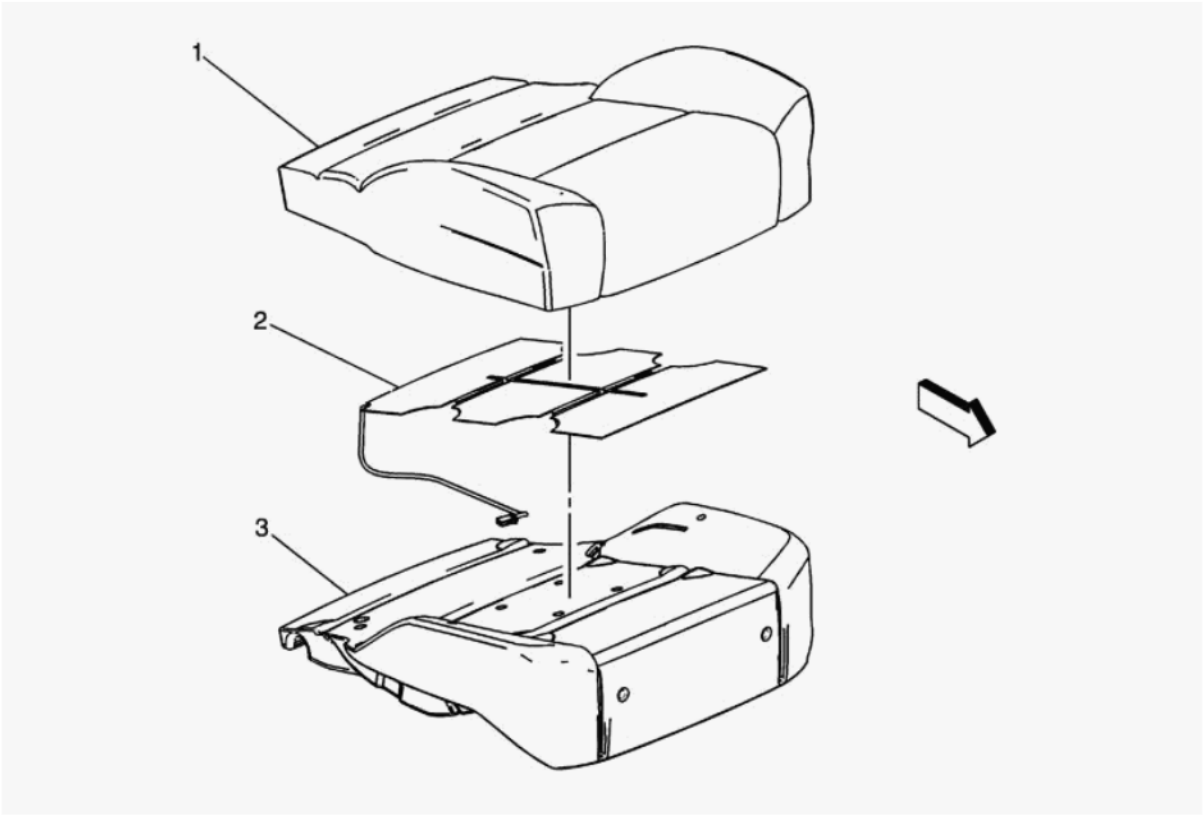

Fig. 18: Driver or Passenger Seat Cushion Heater (with KA1)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
WARNING: Refer to SIR Warning . **WARNING:** To avoid personal injury, perform a preload test	

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Callout	Component Name
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 front seat cushion cover and pad. Refer to **Front Seat Cushion Cover and Pad Replacement** .	
1	Driver or Passenger Seat Cushion Cover **Procedure** 1. Disconnect the electrical connectors. 2. Disengage the j-channel retainers from the seat cushion frame. 3. Remove the seat cushion cover and pad from the seat cushion frame as an assembly. 4. Separate the seat cushion from the seat cushion pad by pulling the cover away from the pad.
2	Driver or Passenger Seat Cushion Heater **Procedure**

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Callout	Component Name
	1. Disconnect the heater element and peel away from the cushion to remove. 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 **Control Module References**
3	Driver or Passenger Seat Cushion Pad

REAR SEAT HEATER CONTROL MODULE REPLACEMENT

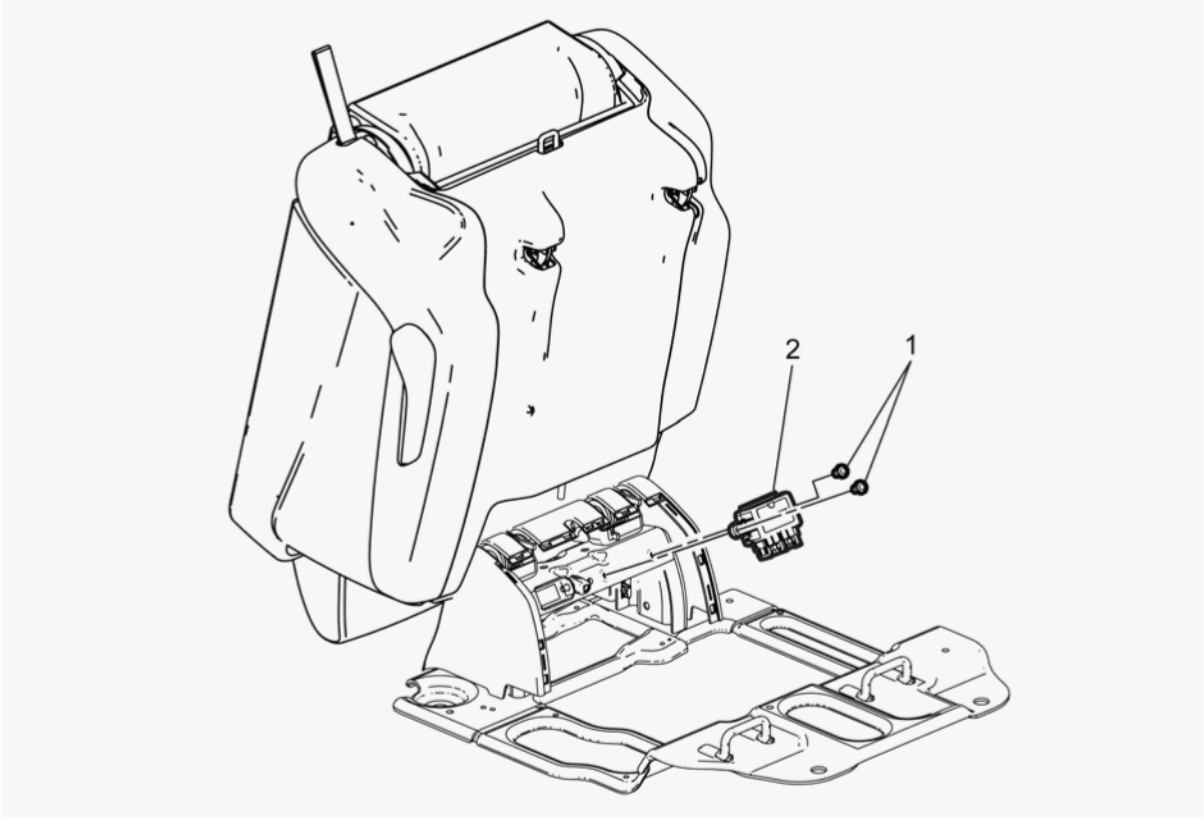

Fig. 19: Rear Seat Heater Control Module
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure	

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Callout	Component Name
Remove the rear seat riser opening finish cover. Refer to **Rear Seat Riser Opening Finish Cover Replacement** .	
1	Rear Seat Heater Control Module Fastener (Qty: 2) **CAUTION:** **Refer to** **Fastener** **Caution** . **Tighten** 2 N.m (18 lb in)
2	Rear Seat Heater Control Module **Procedure** Disconnect the electrical connectors.

REAR SEAT CUSHION HEATER REPLACEMENT

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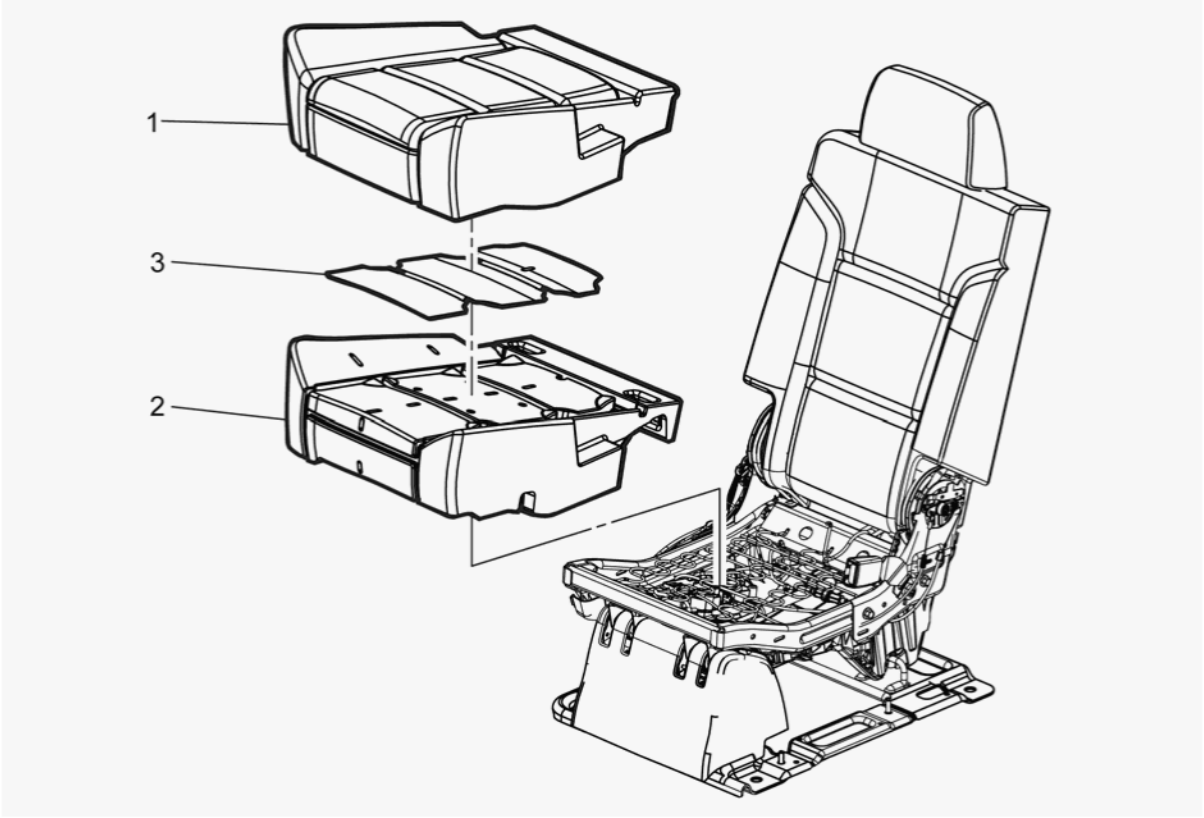

Fig. 20: Rear Seat Cushion Heater
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Remove the rear seat cushion cover and pad. Refer to **Rear Seat Cushion Cover and Pad Replacement (Bucket)** **Rear Seat Cushion Cover and Pad Replacement (60/40 Bench)** .	
1	Rear Seat Cushion Cover
2	Rear Seat Cushion Pad
3	Rear Seat Cushion Heater **Procedure**

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Callout	Component Name
	1. Release the heater element and peel away from the cushion to remove. 2. Note the routing of the wiring harness and connector location for installation.

FRONT SEAT VENT FAN MAT REPLACEMENT (WITH KB6)

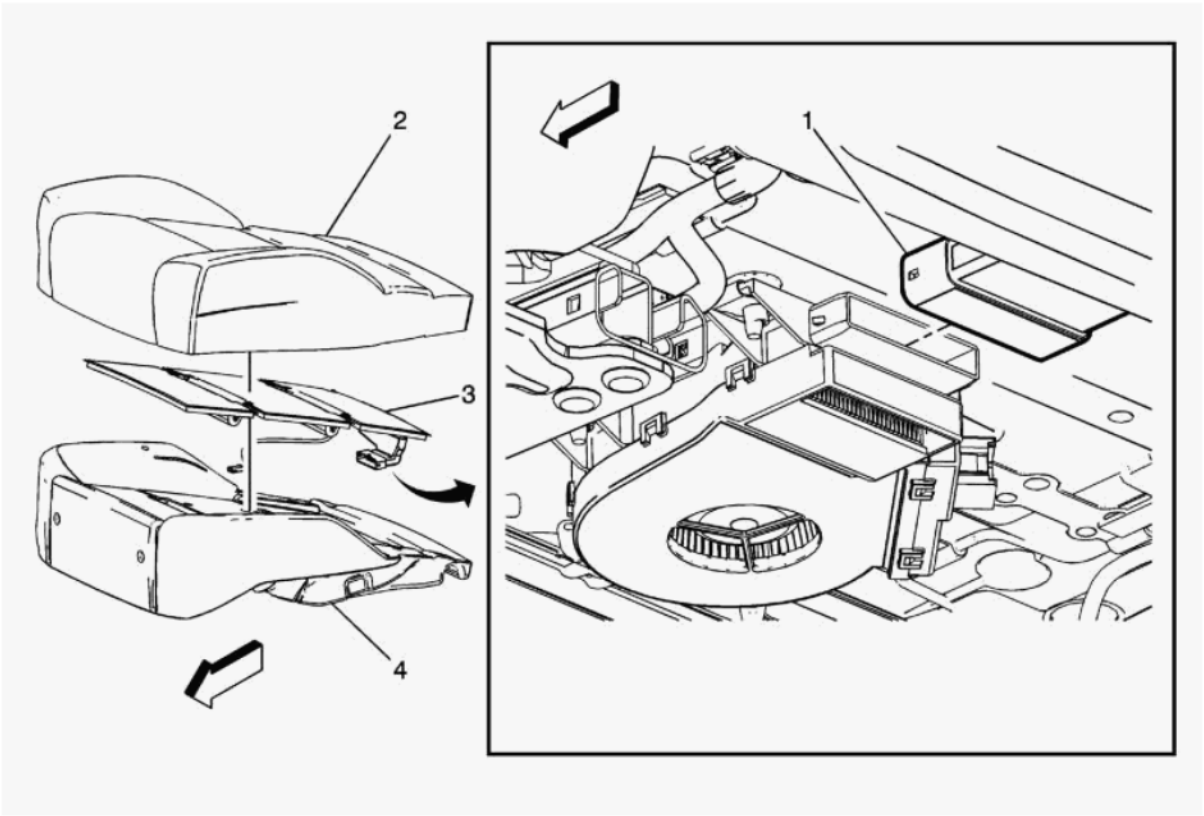

Fig. 21: Front Seat Vent Fan Mat
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
WARNING: **Refer to SIR Warning .**	

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Callout	Component Name
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 front seat cushion cover and pad and separate them. Refer to **Front Seat Cushion Cover and Pad Replacement** .	
1	Driver or Passenger Seat Cushion Heater
2	Driver or Passenger Seat Cushion Cover
3	Front Seat Vent Fan Mat **Procedure** 1. Release the front seat ventilation fan mat and peel away from the cushion to remove.

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Callout	Component Name
	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 **Control Module References**
4	Driver or Passenger Seat Cushion Pad

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

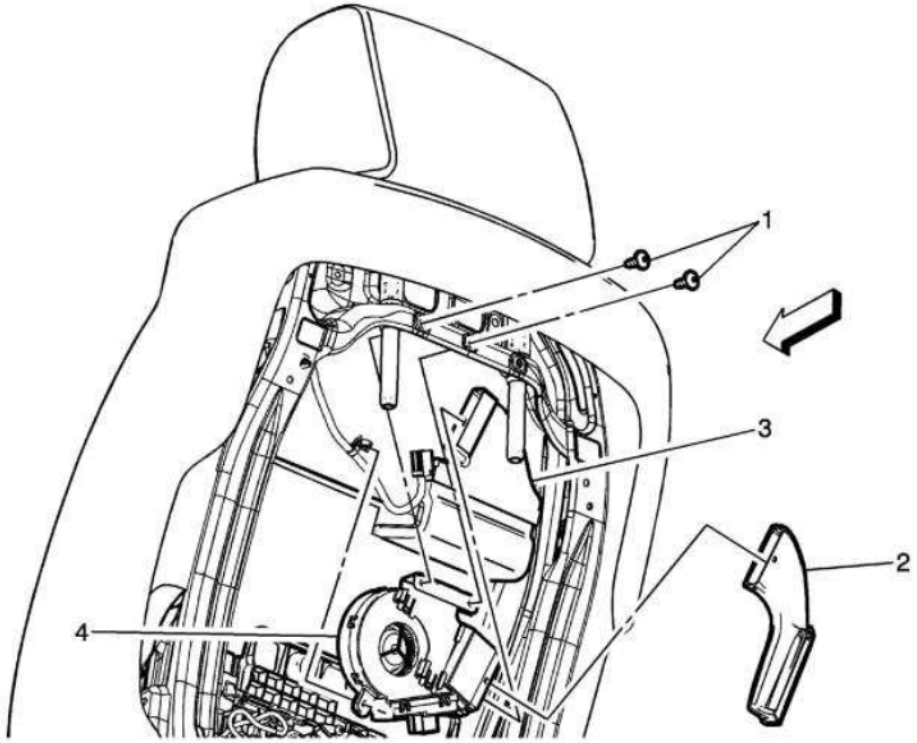

Fig. 22: Driver or Passenger Seat Back Ventilation Heating and Cooling Blower (with KB6)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the front seat back cushion finish panel. Refer to **Front Seat Back Cushion Finish Panel Replacement** .	

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Callout	Component Name
1	Driver or Passenger Seat Back Ventilation Heating and Cooling Blower Screw (Qty: 2) **CAUTION:** **Refer to** **Fastener Caution .**
2	Driver or Passenger Seat Back Ventilation Exhaust Duct **Procedure** Disengage the ventilation exhaust duct from the ventilation blower duct.
3	Driver or Passenger Seat Back Cushion Heater Mat **Procedure** Disengage the seat back cushion heating mat from the ventilation blower duct.
4	Driver or Passenger Seat Back Ventilation Heating and Cooling Blower **Procedure** 1. Disconnect the electrical connector. 2. Disconnect the ventilation blower from the seat back frame. 3. Note the routing of the wiring harness and connector location for installation.

FRONT SEAT BACK VENTILATION BLOWER REPLACEMENT (22-WAY POWER)

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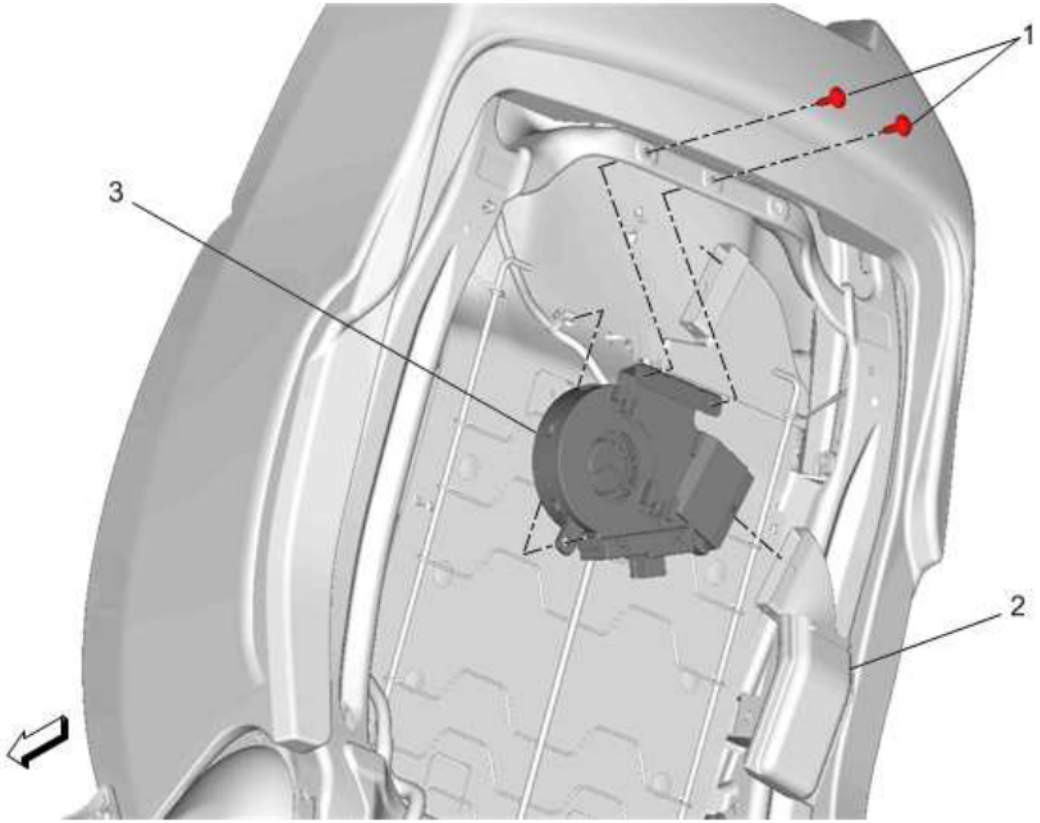

Fig. 23: Front Seat Back Ventilation Blower (22-Way Power)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure **Front Seat Back Cushion Finish Panel Replacement**	
1	Front Seat Back Ventilation Blower Bolt (Qty: 2) **CAUTION:** **Refer to** **Fastener** **Caution** .

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Callout	Component Name
	Tighten 4 N.m (35 lb in)
2	Front Seat Back Ventilation Duct
3	Front Seat Back Ventilation Blower **Procedure** 1. Disconnect the electrical connector. 2. Transfer components as necessary.

FRONT SEAT CUSHION VENTILATION BLOWER REPLACEMENT (WITH KB6)

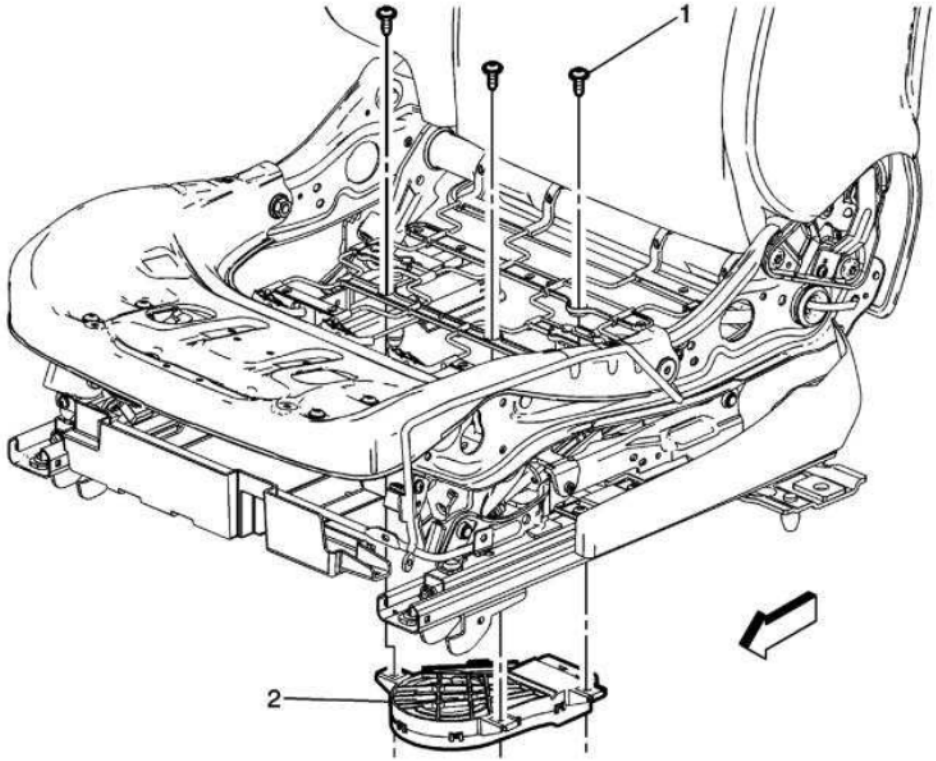

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Fig. 24: Front Seat Cushion Ventilation Blower (with KB6)
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Callout	Component Name
Preliminary Procedure Remove the front seat cushion and pad. Refer to **Front Seat Cushion Cover and Pad Replacement** .	
1	Front Seat Ventilation Blower Screw (Qty: 3) **CAUTION:** **Refer to** **Fastener** **Caution** .
2	Front Seat Ventilation Blower **Procedure** 1. Disengage the seat cushion ventilation blower duct from the seat cushion heating mat. 2. Disconnect the electrical connector. 3. Disconnect the ventilation blower from the seat cushion frame. 4. Note the routing of the wiring harness and connector location for installation.

FRONT SEAT CUSHION VENTILATION BLOWER REPLACEMENT (22-WAY POWER)

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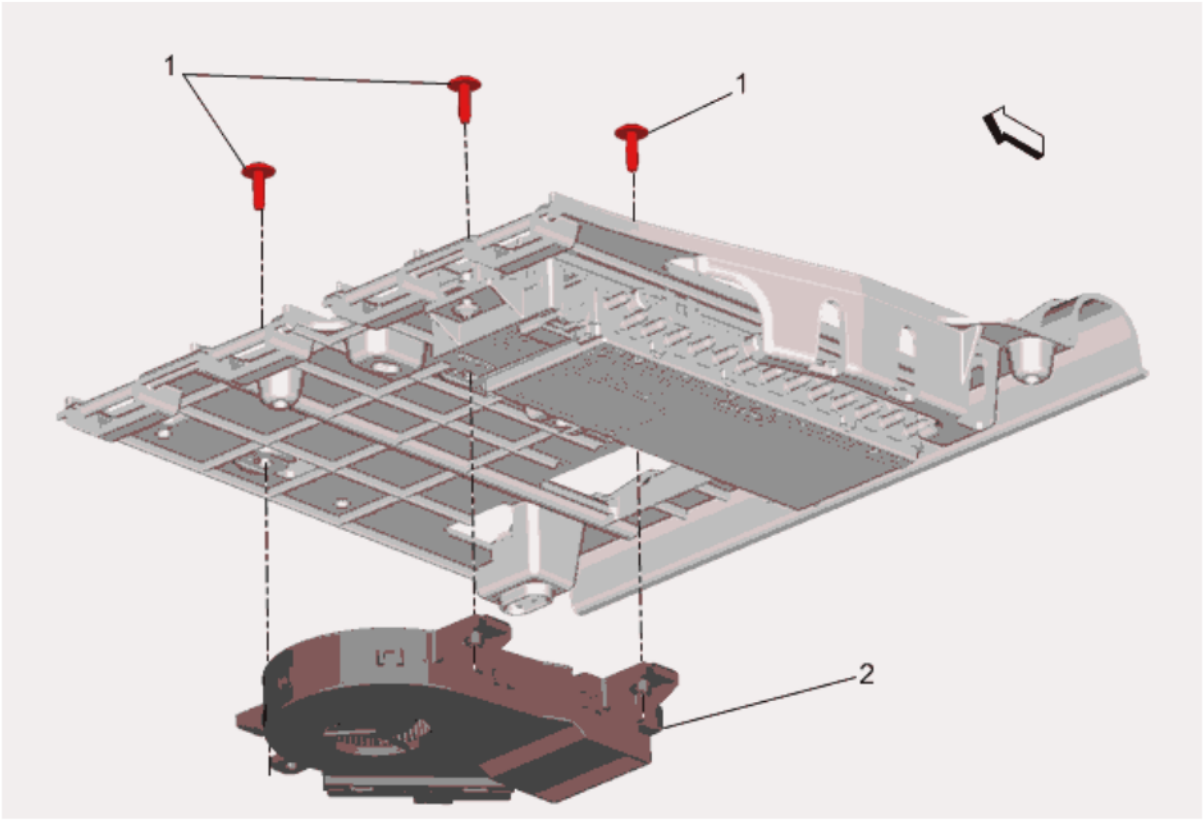

Fig. 25: Front Seat Cushion Ventilation Blower (22-Way Power)
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Callout	Component Name
Preliminary Procedure **Front Seat Cushion Pad Support Replacement (22-Way Power)**	
1	Front Seat Cushion Ventilation Blower Bolt (Qty: 3) **CAUTION:** **Refer to** **Fastener** **Caution** .

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Callout	Component Name
	Tighten 4 N.m (35 lb in)
2	Front Seat Cushion Ventilation Blower **Procedure** 1. Disconnect the electrical connector. 2. Transfer components as necessary. 3. Note the routing of the wiring harness and connector location for installation

FRONT SEAT BACK CUSHION VENT FAN MAT REPLACEMENT

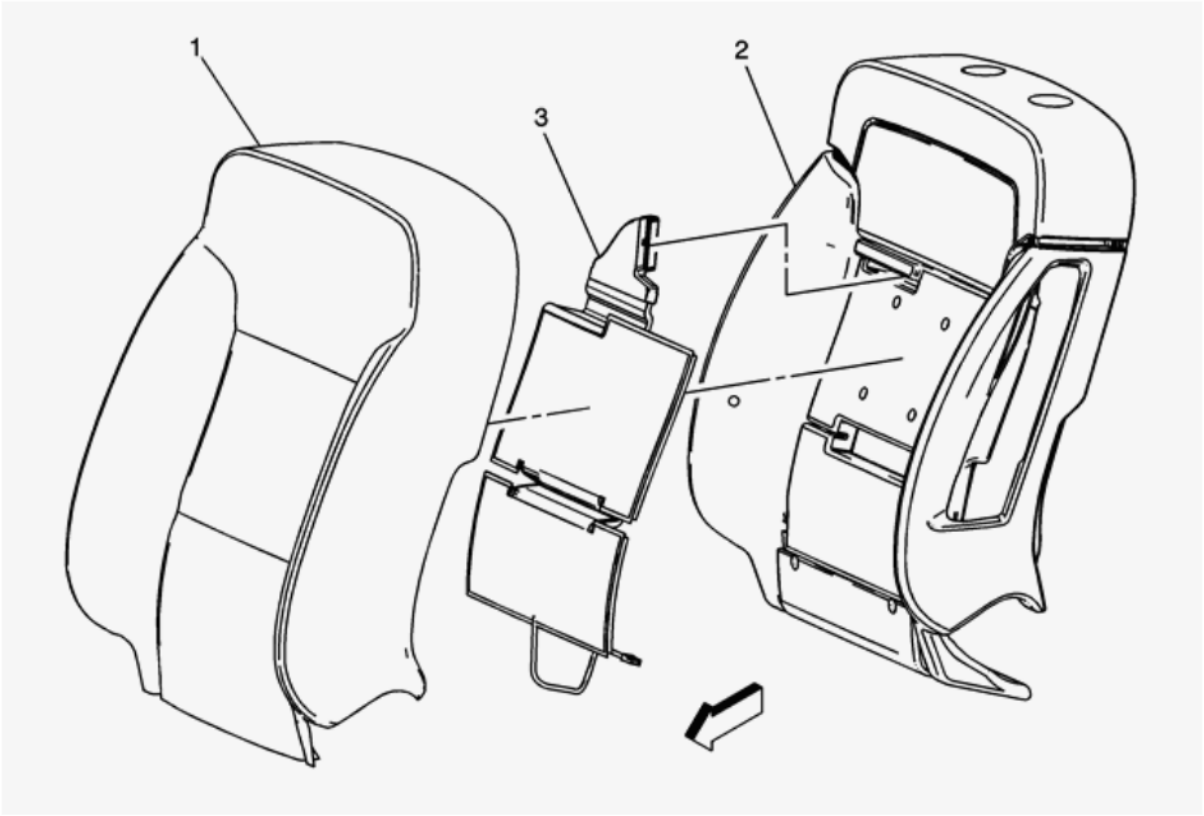

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Fig. 26: Front Seat Back Cushion Vent Fan Mat
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Callout	Component Name
WARNING: Refer to SIR Warning . **WARNING:** To avoid personal injury, perform a preload test on the passenger presence system whenever you remove or replace the seat cushion trim. Failure to do so may cause the system to malfunction. **Preliminary Procedures** 1. SIR Disabling and Enabling 2. Driver or Passenger Seat Removal and Installation 3. Driver or Passenger Seat Back Cover and Pad Replacement Driver or Passenger Seat Back Cover and Pad Replacement (22-Way Power)	

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FRONT SEAT BACK CUSHION VENT FAN MAT REPLACEMENT (22-WAY POWER)

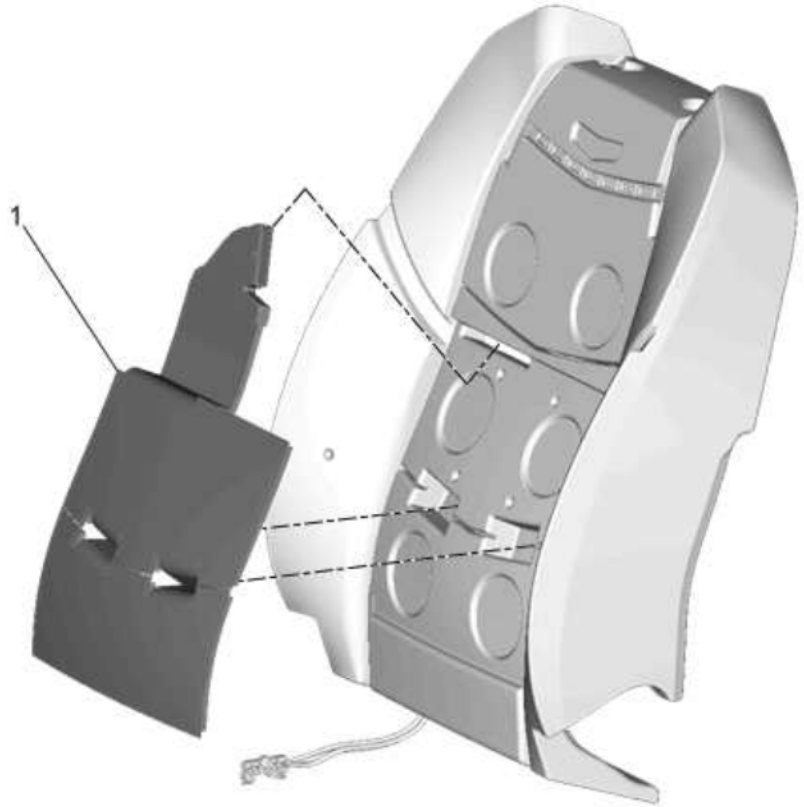

Fig. 27: Front Seat Back Cushion Vent Fan Mat (22-Way Power)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure **Driver or Passenger Seat Back Cover and Pad Replacement** **Driver or Passenger Seat Back Cover and Pad Replacement (22-Way Power)**	
1	Front Seat Back Vent Fan Mat **Procedure** 1. Release the front seat vent fan mat and peel away from the cushion to remove.

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Callout	Component Name
	2. Note the location and routing of the wiring harness to ensure proper reinstallation.

DRIVER OR PASSENGER SEAT BACK VENTILATION DUCT REPLACEMENT (22-WAY POWER)

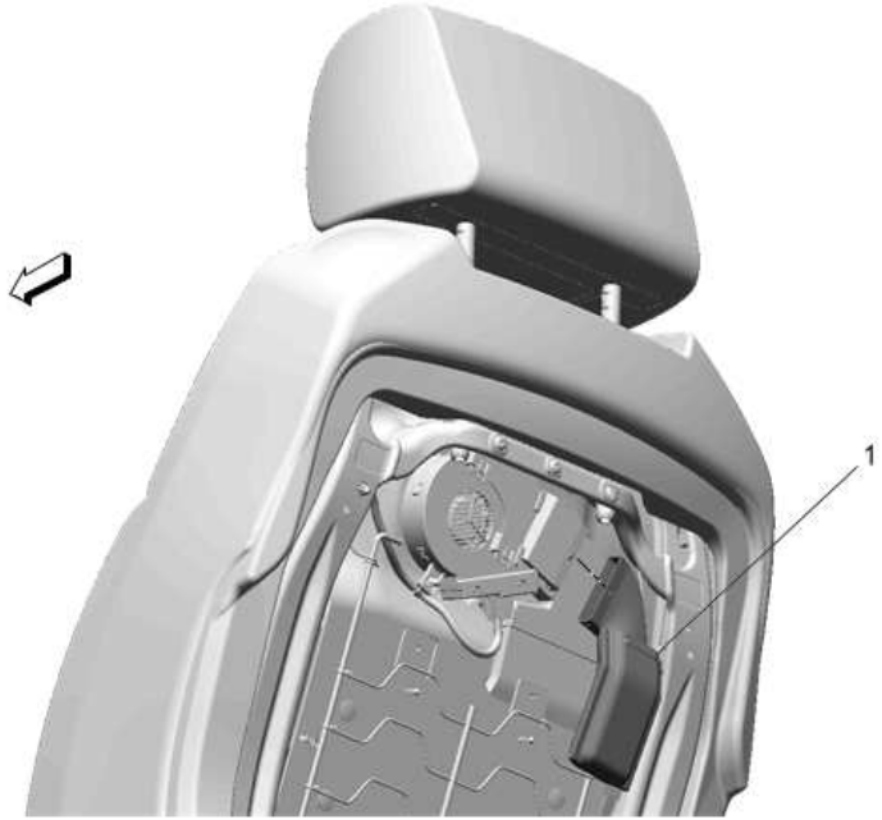

Fig. 28: Driver or Passenger Seat Back Ventilation Duct (22-Way Power)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Front Seat Back Cushion Finish Panel Replacement	
1	Front Seat Back Ventilation Duct

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DESCRIPTION AND OPERATION

HEATED SEATS DESCRIPTION AND OPERATION

Heated Seat Components

The heated seat system consists of the following components:

- Seat heating and cooling switch
- Body control module
- Seat heating control module
- Seat cushion heating element
- Seat back heating element

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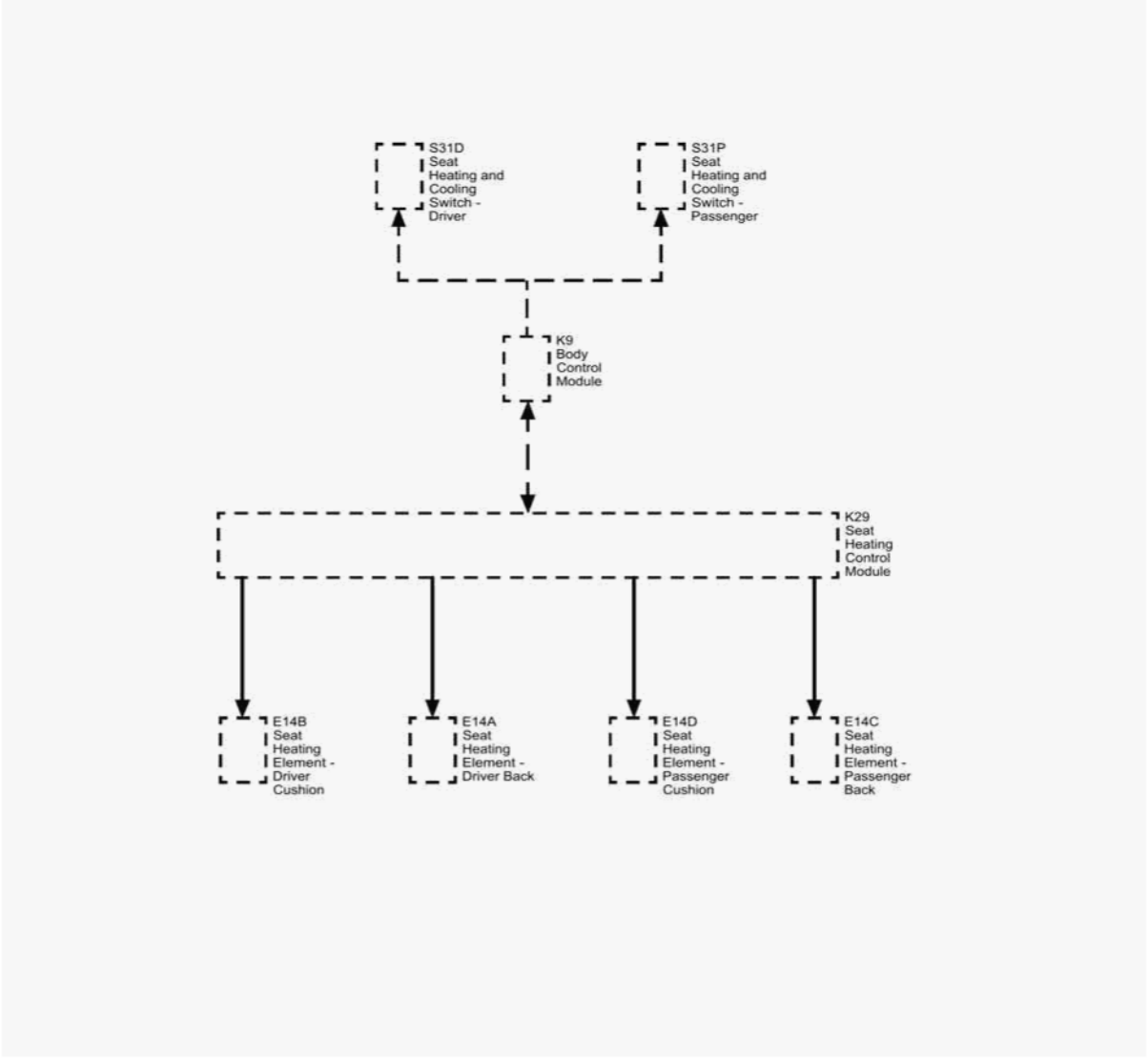

Fig. 29: Heated Seat Diagram

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
S31D	S31D Seat Heating and Cooling Switch - Driver
S31P	S31P Seat Heating and Cooling Switch - Passenger
K9	K9 Body Control Module

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Callout	Component Name
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

Heated Seat Switches

The driver and passenger heated seats switches are located in the switch control panel. The body control module (BCM) monitors each switch activation to determine which seat is activated and at what temperature level. With each press of the switch, the system will cycle through High, Medium, Low, and then back to Off again.

When a heated seat switch is pressed, a LIN bus serial data message is sent from the switch 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 LIN bus serial data message to the seat heating control module indicating the heated 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

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.

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** .

HEATED/COOLED SEATS DESCRIPTION AND OPERATION

The driver and front passenger heated cooled seat system consist of the following components:

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- Heated/cooled seat switches
- Body control module
- Seat cushion blower assembly
- Seat back blower assembly
- Seat cushion heating element
- Seat back heating element

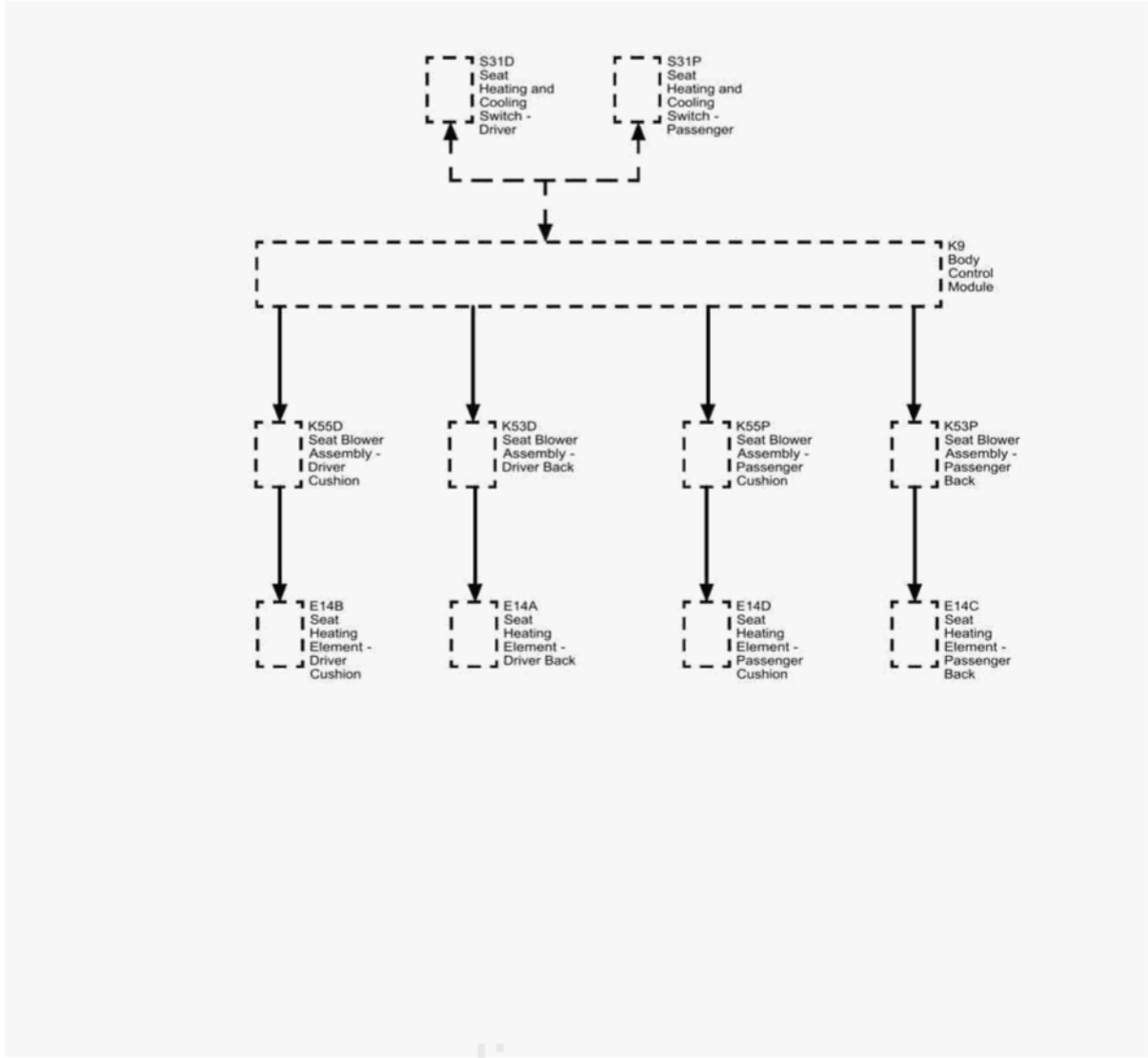

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Fig. 30: Driver And Front Passenger Heated Cooled Seat System Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
S31D	S31D Seat Heating and Cooling Switch - Driver
S31P	S31P Seat Heating and Cooling Switch - Passenger
K9	K9 Body Control Module
K55D	K55D Seat Blower Assembly - Driver Cushion
K53D	K53D Seat Blower Assembly - Driver Back
K55P	K55P Seat Blower Assembly - Passenger Cushion
K53P	K53P Seat Blower Assembly - Passenger Back
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

Body Control Module

The body control module (BCM) monitors the heated cooled seat switches through LIN bus message inputs and determines the heated cooled seat operating modes and temperature levels. Each heated cooled seat is capable of operating in 3 modes with 3 temperature levels. The BCM controls the operating mode of the driver and passenger seats through separate pulse width modulation (PWM) signal circuits. Each mode and temperature level is commanded by a different Duty Cycle. The PWM signal circuits are referenced from battery voltage by the blower assemblies and pulsed low by the BCM.

Seat Blower Assembly Power and Ground

Battery positive voltage is supplied at all times to the seat blower assemblies through a 30 A fuse that is located in the I/P fuse block. This voltage is to supply power to the TEDs, the blower motors, and the seat heater elements. The heated and cooled seat system will operate only with the ignition in the ON position. Each seat blower assembly is grounded through the ground circuit and ground connection.

Seat Blower Assembly

Each heated/cool seat has 2 blower assemblies, one located under the seat cushion and one located in the seat back. Each blower assembly contains a thermo-electric device (TED) and a blower motor. The TED is mounted downstream of the blower motor. Each TED consists of a circuit of positive and negative connections sandwiched between 2 ceramic plates. Each ceramic plate is equipped with copper fins for cool exchange. The air flowing past these fins is directed as conditioned air into the seat cushion and seat back or directed into the cabin as waste air.

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Cooled Seat Operation and Blower Motors

As mentioned above in the seat blower assembly description, each seat blower assembly is packaged with a TED, blower motor, and it also contains logic that will allow for the blower to operate only when the ignition is in the ON position and only during cooled seat operation. When a cooled seat switch is pressed, the seat blower assembly applies a pre-determined voltage to the TED and blower motor. Then based on the feedback from a internal seat temperature sensor, the blower assembly controls the applied voltage to the TEDs and blower motors in order to maintain the desired seat temperature.

With cooled seat operation, the speed of the blower motor is not related directly to the High, Med, or Low input from the heated/cool seat switch. The speed of the blower motor is related directly to TED temperature. In order for the cooled seat system to operate to its optimum performance, it is crucial to have unrestricted air flow through the system. A dirty or restricted air filter, the blockage of an exhaust air duct, a misaligned blower assembly, or incorrect foam installation of the seat cushion or seat back will all have negative effects on the cooled seat system operation.

Modes of Operation

There are 3 modes available for the heated and cooled seat system operation; seat back and cushion heat, back only heat, and cool seat operation. When a heat or cool seat mode signal request is received, both the seat cushion and seat back blower assemblies will be activated. When the seat BACK ONLY mode button is pressed, the seat cushion blower assembly is turned off leaving the seat back blower assembly ON.

Heated Seat Operation

When the seat blower motor assembly 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.

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

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- Auxiliary HVAC 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 Seat Heating Control Module Power and Ground

Battery positive voltage is supplied to the rear seat heating control module through a fuse located in the rear fuse block. This voltage is used to power up the rear seat heating control module and to supply power to the seat heater elements. Ground for the rear seat heating control module is provided at the module connection.

Rear Heated Seat Operation

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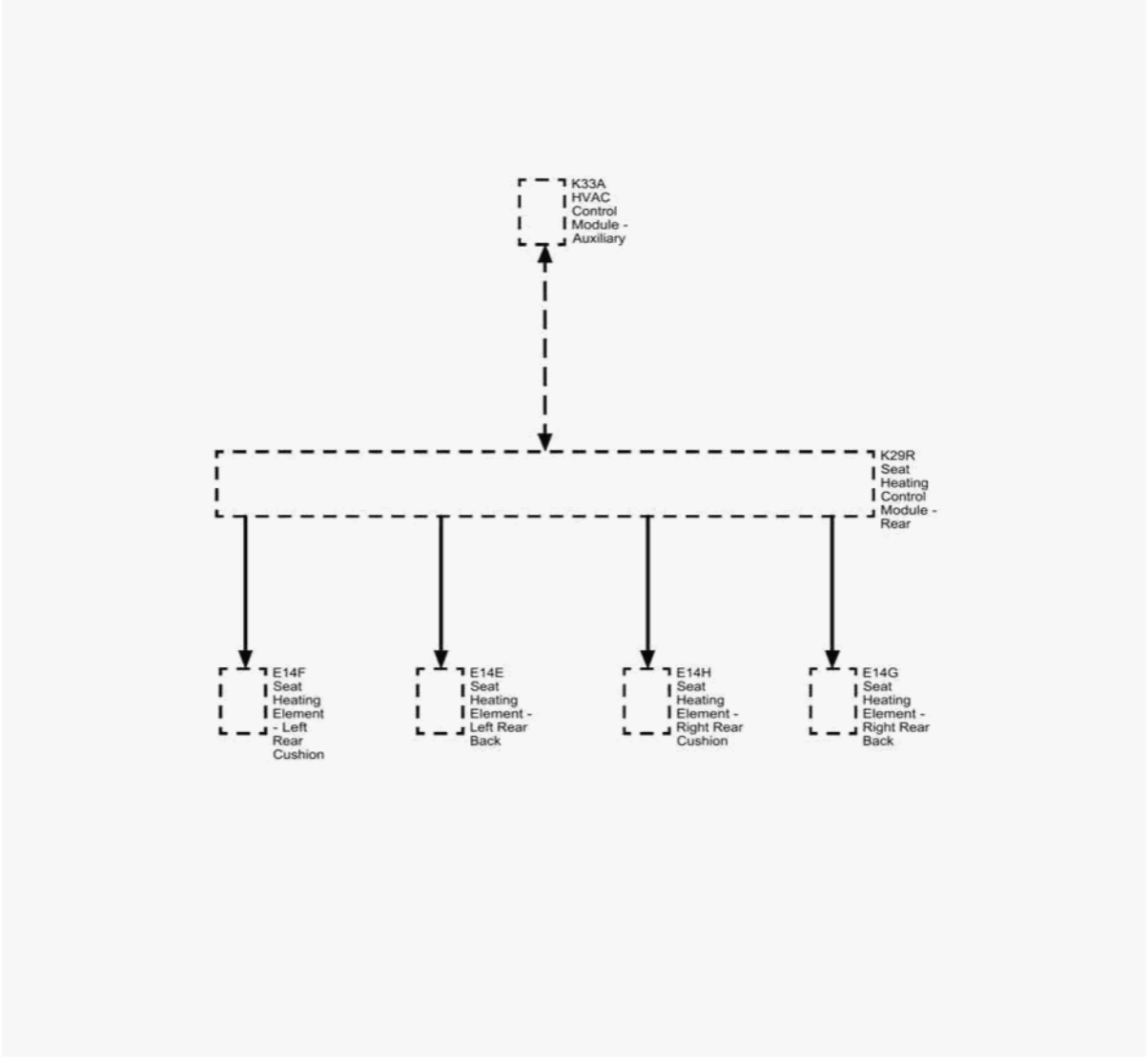

Fig. 31: Rear Heated Seat Block Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
K33A	K33A HVAC Control Module - Auxiliary
K29R	K29R Seat Heating Control Module - Rear
E14G	E14G Seat Heating Element - Right Rear Back

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Callout	Component Name
E14H	E14H Seat Heating Element - Right Rear Cushion
E14E	E14E Seat Heating Element - Left Rear Back
E14F	E14F Seat Heating Element - Left Rear Cushion

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 from the auxiliary HVAC control module 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.

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** .

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