

## 2004 ACCESSORIES & EQUIPMENT

### Wiring Systems - Hummer H2

## SPECIFICATIONS

### FASTENER TIGHTENING SPECIFICATIONS

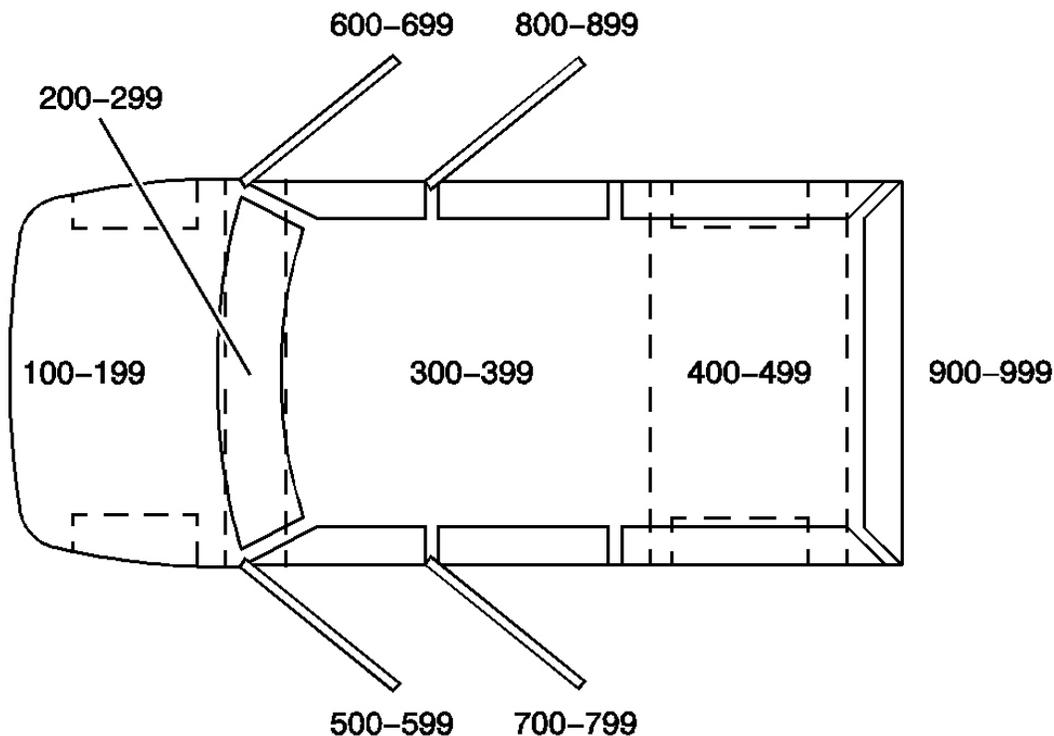
#### Fastener Tightening Specifications

Application	Specification	
	Metric	English
BEC Retaining Bolts	9 N.m	80 lb in
Fender Upper Brace Bolts	25 N.m	18 lb ft

## DIAGNOSTIC INFORMATION AND PROCEDURES

### UTILITY/VAN ZONING

All grounds, in-line connectors, pass-through grommets, and splices have identifying numbers that correspond to where they are located in the vehicle. The following table explains the numbering system.



**Fig. 1: Utility/Van Zoning**  
 Courtesy of GENERAL MOTORS CORP.

**Utility/Van Zoning**

<b>Callout Numbers</b>	<b>Zone Description</b>
100-199	Engine compartment (All forward of the dash panel) 001-099 are additional for the engine compartment (Only to be used if all 100-199 items are used)
200-299	Within the instrument panel area
300-399	Passenger compartment (From instrument panel to the rear wheelhouse)
400-499	Luggage compartment (From the rear wheelhouse to the rear of the vehicle)
500-599	Within the left front door
600-699	Within the right front door
700-799	Within the left rear door
800-899	Within the right rear door
900-999	Within the liftgate or endgate door

**ELECTRICAL SYMBOLS**

**Electrical Symbols**

<b>OLD Symbol</b>	<b>NEW Symbol</b>	<b>or Description</b>
		Supplemental Inflatable Restraint (SIR) or Supplemental Restraint System (SRS) Icon This icon is used to alert the technician that the system contains SIR/SRS components that require certain precautions before servicing.
		On-Board Diagnostic (OBD II) Icon This icon is used to alert the technician that the circuit is essential for proper OBD II emission controls circuit operation. Any circuit which, if it fails, causes the malfunction indicator lamp (MIL) to turn on, is identified as an OBD II circuit.

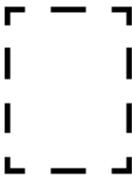


**Important Icon**  
This icon is used to alert the technician that there is additional information that will aid in servicing a system.

Hot At All Times  
Hot In Run  
Hot In Start  
Hot In Acc And Run  
Hot In Run And Start  
Hot In Run, Bulb Test And Start  
Hot With Headlamp  
Switch In Park Or Head  
Hot In Retained  
Accessory Power (RAP)

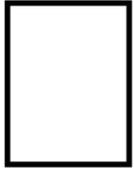
B+  
RUN  
START  
ACCY/RUN  
RUN/START  
RUN/BULBTEST/START  
HEADLAMP SWITCH  
PARK/HEAD  
RAP

**Voltage Indicator Boxes**  
These boxes are used on schematics to indicate when voltage is present at a fuse.



**Partial Component**  
When a component is represented in a dashed box, the component or its wiring is not shown in its entirety.

**Entire Component**  
When a component is represented in a solid box the component or its wiring is shown in its entirety.

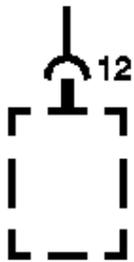
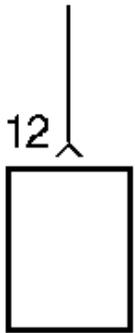


Fuse

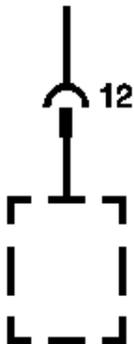
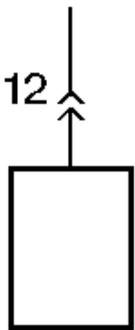
Circuit Breaker



Fusible Link

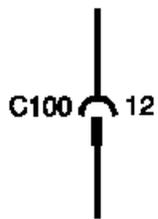
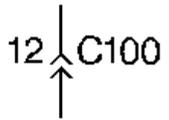
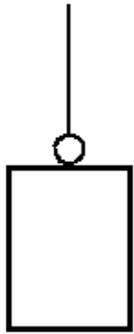
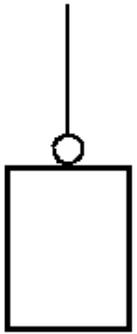


Connector Attached to Component

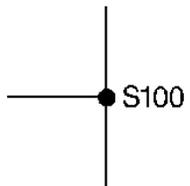
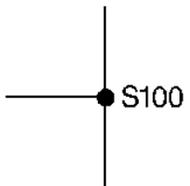


Pigtail Connector

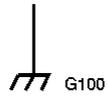
Bolt On or Screw On Eyelet Terminal



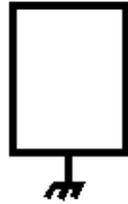
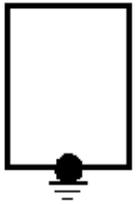
Inline Harness Connector



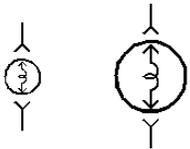
Splice



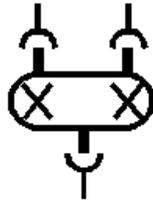
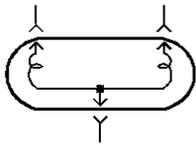
Chassis Ground



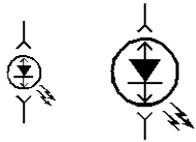
Case Ground



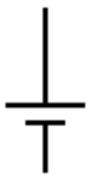
Single Filament Light Bulbs



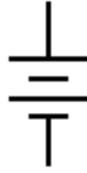
Double Filament Light Bulb



Light Emitting Diodes



Capacitor



Battery

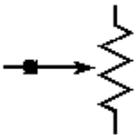


Variable Battery

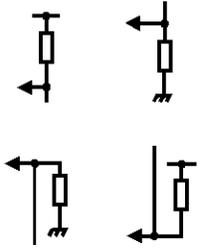
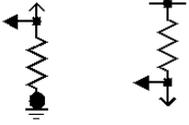
Resistor



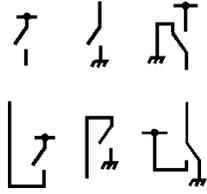
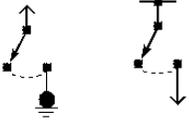
Variable Resistor



Position Sensor



I/O Resistors



I/O Switches



Diode

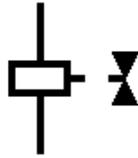


Heating Element



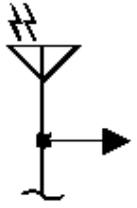
Motor

Solenoid

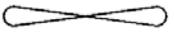


Coil

Antenna



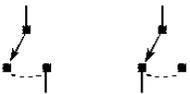
Twisted Wires



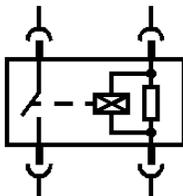
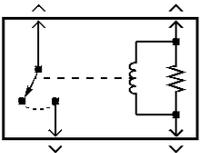
Shield

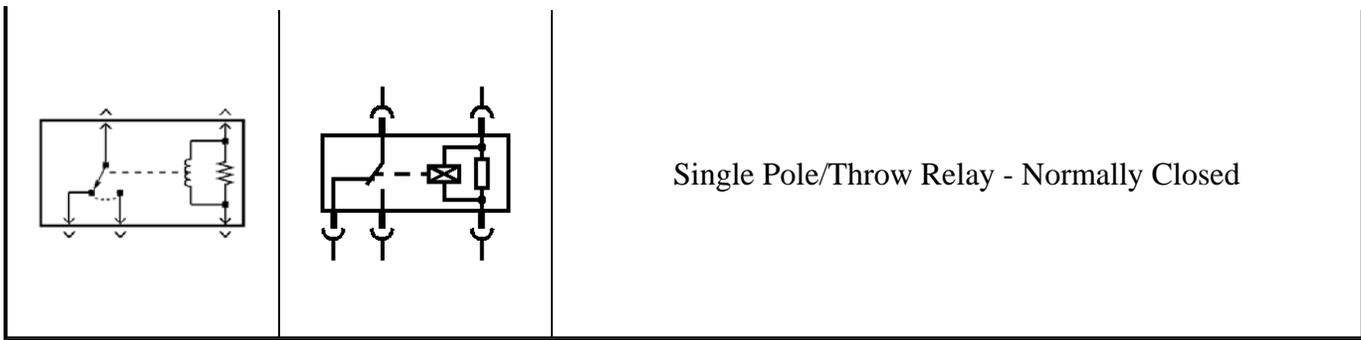


Switches



Single Pole/Throw Relay - Normally Open





## GENERAL ELECTRICAL DIAGNOSIS PROCEDURES

### Basic Knowledge Required

Without a basic knowledge of electricity, it will be difficult to use the diagnostic procedures contained in the service manual. You should understand the basic theory of electricity, and know the meaning of voltage (volts), current (amps), and resistance (ohms). You should also be able to read and understand a wiring diagram, as well as understand what happens in a circuit with an open or a shorted wire.

### CHECKING AFTERMARKET ACCESSORIES

Do not connect aftermarket accessories into the following circuits:

**CAUTION: Refer to SIR Caution in Cautions and Notices.**

- SIR circuits, all such circuits are indicated on circuit diagrams with the SIR symbol.

**NOTE: Refer to OBID II Symbol Description Notice in Cautions and Notices.**

- OBID II circuits, all such circuits are indicated on circuit diagrams with the OBID II symbol.

Always check for aftermarket accessories (non-OEM) as the first step in diagnosing electrical problems. If the vehicle is so equipped, disconnect the system to verify that these add-on accessories are not the cause of the problems.

Possible causes of vehicle problems related to aftermarket accessories include:

- Power feeds connected to points other than the battery
- Antenna location
- Transceiver wiring located too close to vehicle electronic modules or wiring
- Poor shielding or poor connectors on antenna feed line
- Check for recent service bulletins detailing installation guidelines for aftermarket accessories.

## CIRCUIT TESTING

The Circuit Testing section contains the following diagnostic testing information. Using this information along with the diagnostic procedures will identify the cause of the electrical malfunction.

- Using Connector Test Adapters
- Probing Electrical Connectors
- Troubleshooting with a Digital Multimeter
- Troubleshooting with a Test Lamp
- Using Fused Jumper Wires
- Measuring Voltage
- Measuring Voltage Drop
- Measuring Frequency
- Testing for Continuity
- Testing for Short to Ground
- Testing for a Short to Voltage

### USING CONNECTOR TEST ADAPTERS

**NOTE:** Do not insert test equipment probes (DVOM etc.) into any connector or fuse block terminal. The diameter of the test probes will deform most terminals. A deformed terminal will cause a poor connection, which will result in a system failure. Always use the J-35616 GM-Approved Terminal Test Kit or the J 42675 Flat-Wire Probe Adapter in order to front probe terminals. Do not use paper clips or other substitutes to probe terminals.

When using the J-35616 GM-Approved Terminal Test Kit, ensure the terminal test adapter choice is the correct size for the connector terminal. Do not visually choose the terminal test adapter because some connector terminal cavities may appear larger than the actual terminal in the cavity. Using a larger terminal test adapter will damage the terminal. Refer to the J-35616 GM-Approved Terminal Test Kit label on the inside of the J-35616 GM-Approved Terminal Test Kit for the correct adapter along with the connector end view for terminal size.

### PROBING ELECTRICAL CONNECTORS

**IMPORTANT:** Always be sure to reinstall the connector position assurance (CPA) and terminal position assurance (TPA) when reconnecting connectors or replacing terminals.

#### Frontprobe

Disconnect the connector and probe the terminals from the mating side (front) of the connector.

**NOTE:**

Do not insert test equipment probes (DVOM etc.) into any connector or fuse block terminal. The diameter of the test probes will deform most terminals. A deformed terminal will cause a poor connection, which will result in a system failure. Always use the J-35616 GM-Approved Terminal Test Kit or the J 42675 Flat-Wire Probe Adapter in order to front probe terminals. Do not use paper clips or other substitutes to probe terminals.

When using the J-35616 GM-Approved Terminal Test Kit, ensure the terminal test adapter choice is the correct size for the connector terminal. Do not visually choose the terminal test adapter because some connector terminal cavities may appear larger than the actual terminal in the cavity. Using a larger terminal test adapter will damage the terminal. Refer to the J-35616 GM-Approved Terminal Test Kit label on the inside of the J-35616 GM-Approved Terminal Test Kit for the correct adapter along with the connector end view for terminal size.

Refer to the following table as a guide in selecting the correct test adapter for frontprobing connectors:

**Probing Electrical Connectors**

<b>Test Adapter</b>	<b>Description</b>
J-35616-64	Male .64 Series Connector (lt blue)
J-35616-65	Female .64 Series Connector (lt blue)
J-35616-6	Male Flex MICRO-PACK Series Connector (brown)
J-35616-7	Female Flex MICRO-PACK Series Connector (brown)
J-35616-2A	Male Flex 150 Series Connector (gray)
J-35616-3	Female Flex 150 Series Connector (gray)
J-35616-4A	Male Spade 280 Series Connector (purple)
J-35616-5	Female Spade 280 Series Connector (purple)
J-35616-40	Male Flex 480 Series Connector (dk blue)
J-35616-41	Female Flex 480 Series Connector (dk blue)
J-35616-42	Male Flex 630 Series Connector (red)
J-35616-43	Female Flex 630 Series Connector (red)
J-35616-44	Male 800 Series Connector (yellow)
J-35616-45	Female 800 Series Connector (yellow)
J-35616-8	Male Weather Pack Connector (orange)
J-35616-9	Female Weather Pack Connector (orange)

**Backprobe****IMPORTANT:**

- **Backprobe connector terminals only when specifically required in diagnostic procedures.**
- **Do not backprobe a sealed (Weather Pack(R)) connector, less than a 280 series Metri-Pack connector, a Micro-Pack connector, or a flat wire (dock and lock) connector.**

- **Backprobing can be a source of damage to connector terminals. Use care in order to avoid deforming the terminal, either by forcing the test probe too far into the cavity or by using too large of a test probe.**
- **After backprobing any connector, inspect for terminal damage. If terminal damage is suspected, test for proper terminal contact.**

Do not disconnect the connector and probe the terminals from the harness side (back) of the connector.

## **TROUBLESHOOTING WITH A DIGITAL MULTIMETER**

**NOTE:** Refer to Test Probe Notice in Cautions and Notices.

**IMPORTANT:** Circuits which include any solid state control modules, such as the PCM, should only be tested with a 10 megohm or higher impedance digital multimeter such as the J 39200 .

The **J 39200** instruction manual is a good source of information and should be read thoroughly upon receipt of the DMM as well as kept on hand for future reference.

A DMM should be used instead of a test lamp in order to test for voltage in high impedance circuits. While a test lamp shows whether voltage is present, a DMM indicates how much voltage is present.

The ohmmeter function on a DMM shows how much resistance exists between 2 points along a circuit. Low resistance in a circuit means good continuity.

**IMPORTANT:** Disconnect the power feed from the suspect circuit when measuring resistance with a DMM. This prevents incorrect readings. DMMs apply such a small voltage to measure resistance that the presence of voltages can upset a resistance reading.

Diodes and solid state components in a circuit can cause a DMM to display a false reading. To find out if a component is affecting a measurement take a reading once, then reverse the leads and take a second reading. If the readings differ the solid state component is affecting the measurement.

Following are examples of the various methods of connecting the DMM to the circuit to be tested:

- Backprobe both ends of the connector and either hold the leads in place while manipulating the connector or tape the leads to the harness for continuous monitoring while you perform other operations or test driving. Refer to [Probing Electrical Connectors](#) .
- Disconnect the harness at both ends of the suspected circuit where it connects either to a component or to other harnesses.
- If the system that is being diagnosed has a specified pinout or breakout box, it may be used in order to simplify connecting the DMM to the circuit or for testing multiple circuits quickly.

## TROUBLESHOOTING WITH A TEST LAMP

### Tools Required

**J 35616-200** 12-Volt Unpowered Test Lamp

**NOTE:** Refer to Test Probe Notice in Cautions and Notices.

A test lamp can simply and quickly test a low impedance circuit for voltage.

The **J 35616-200** is Micro-Pack compatible and comprised of a 12-volt light bulb with an attached pair of leads.

To properly operate this tool use the following procedures.

### Testing For Voltage

When testing for voltage:

1. Attach 1 lead to ground.
2. Touch the other lead to various points along the circuit where voltage should be present.
3. When the bulb illuminates, there is voltage at the point being tested.

### Testing For Ground

When testing for ground:

1. Attach 1 lead to battery positive voltage.
2. Touch the other lead to various points along the circuit where ground should be present.
3. When the bulb illuminates, there is ground at the point being tested.

## USING FUSED JUMPER WIRES

### Tools Required

**J 36169-A** Fused Jumper Wire. See Special Tools and Equipment .

**IMPORTANT:** A fused jumper may not protect solid state components from being damaged.

The **J 36169-A** includes small clamp connectors that provide adaptation to most connectors without damage. This fused jumper wire is supplied with a 20-A fuse which may not be suitable for some circuits. Do not use a fuse with a higher rating than the fuse that protects the circuit being tested. See Special Tools and Equipment

## MEASURING VOLTAGE

**NOTE:** Refer to Test Probe Notice in Cautions and Notices.

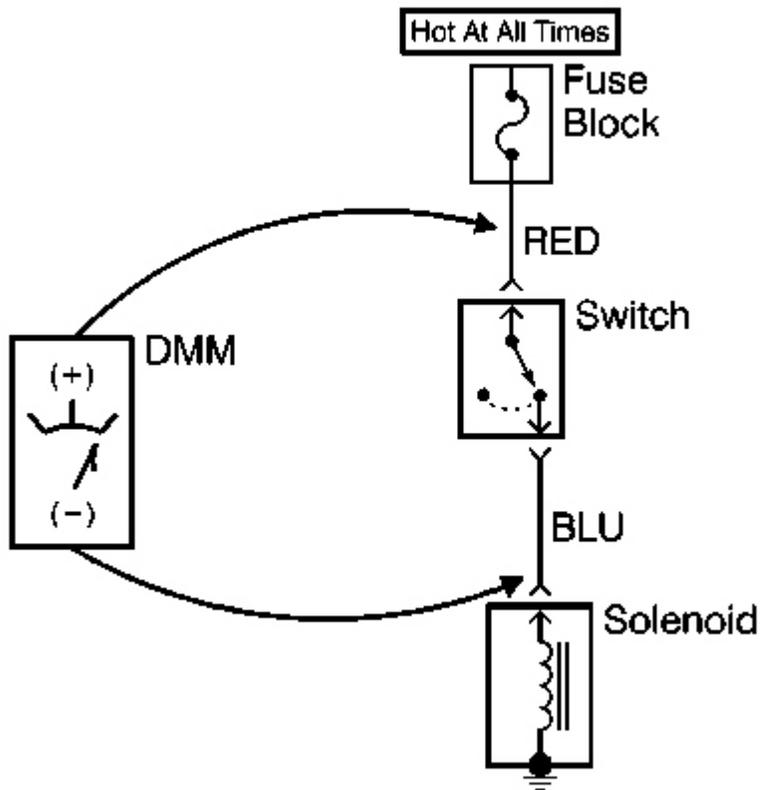
The following procedure measures the voltage at a selected point in a circuit.

1. Disconnect the electrical harness connector for the circuit being tested, if necessary.
2. Enable the circuit and/or system being tested. Use the following methods:
  - Turn ON the ignition, with the engine OFF.
  - Turn ON the engine.
  - Turn ON the circuit and/or system with a scan tool in Output Controls.
  - Turn ON the switch for the circuit and/or system being tested.
3. Select the V (AC) or V (DC) position on the DMM.
4. Connect the positive lead of the DMM to the point of the circuit to be tested.
5. Connect the negative lead of the DMM to a good ground.
6. The DMM displays the voltage measured at that point.

### **MEASURING VOLTAGE DROP**

**NOTE:**        **Refer to Test Probe Notice in Cautions and Notices.**

The following procedure determines the difference in voltage potential between 2 points.



**Fig. 2: Measuring Voltage Drop**  
 Courtesy of GENERAL MOTORS CORP.

1. Set the rotary dial of the DMM to the V (DC) position.
2. Connect the positive lead of the DMM to 1 point of the circuit to be tested.
3. Connect the negative lead of the DMM to the other point of the circuit.
4. Operate the circuit.
5. The DMM displays the difference in voltage between the 2 points.

## MEASURING FREQUENCY

**NOTE: Refer to Test Probe Notice in Cautions and Notices.**

The following procedure determines the frequency of a signal.

**IMPORTANT: Connecting the DMM to the circuit before pressing the Hz button will allow the DMM to autorange to an appropriate range.**

1. Apply power to the circuit.
2. Set the rotary dial of the DMM to the V (AC) position.
3. Connect the positive lead of the DMM to the circuit to be tested.
4. Connect the negative lead of the DMM to a good ground.
5. Press the Hz button on the DMM.
6. The DMM will display the frequency measured.

## **TESTING FOR CONTINUITY**

**NOTE: Refer to Test Probe Notice in Cautions and Notices.**

The following procedures verify good continuity in a circuit.

### **With a DMM**

1. Set the rotary dial of the DMM to the ohm position.
2. Disconnect the power feed (i.e. fuse, control module) from the suspect circuit.
3. Disconnect the load.
4. Press the MIN MAX button on the DMM.
5. Connect one lead of the DMM to one end of the circuit to be tested.
6. Connect the other lead of the DMM to the other end of the circuit.
7. If the DMM displays low or no resistance and a tone is heard, the circuit has good continuity.

### **With a Test Lamp**

**IMPORTANT: Only use the test lamp procedure on low impedance power and ground circuits.**

1. Remove the power feed (i.e. fuse, control module) from the suspect circuit.
2. Disconnect the load.
3. Connect 1 lead of the test lamp to 1 end of the circuit to be tested.
4. Connect the other lead of the test lamp to battery positive voltage.
5. Connect the other end of the circuit to ground.
6. If the test lamp illuminates (full intensity), then the circuit has good continuity.

## **TESTING FOR SHORT TO GROUND**

**NOTE: Refer to Test Probe Notice in Cautions and Notices.**

The following procedures test for a short to ground in a circuit.

#### **With a DMM**

1. Remove the power feed (i.e. fuse, control module) from the suspect circuit.
2. Disconnect the load.
3. Set the rotary dial of the DMM to the ohm position.
4. Connect 1 lead of the DMM to 1 end of the circuit to be tested.
5. Connect the other lead of the DMM to a good ground.
6. If the DMM does NOT display infinite resistance (OL), there is a short to ground in the circuit.

#### **With a Test Lamp**

1. Remove the power feed (i.e. fuse, control module) from the suspect circuit.
2. Disconnect the load.
3. Connect 1 lead of the test lamp to battery positive voltage.
4. Connect the other lead of the test lamp to 1 end of the circuit to be tested.
5. If the test lamp illuminates, there is a short to ground in the circuit.

#### **Fuse Powering Several Loads**

1. Review the system schematic and locate the fuse that is open.
2. Open the first connector or switch leading from the fuse to each load.
3. Connect a DMM across the fuse terminals (be sure that the fuse is powered).
  - When the DMM displays voltage the short is in the wiring leading to the first connector or switch.
  - If the DMM does not display voltage refer to the next step.
4. Close each connector or switch until the DMM displays voltage in order to find which circuit is shorted.

#### **TESTING FOR A SHORT TO VOLTAGE**

**NOTE: Refer to Test Probe Notice in Cautions and Notices.**

The following procedure tests for a short to voltage in a circuit.

1. Set the rotary dial of the DMM to the V (DC) position.
2. Connect the positive lead of the DMM to 1 end of the circuit to be tested.
3. Connect the negative lead of the DMM to a good ground.
4. Turn ON the ignition and operate all accessories.
5. If the voltage measured is greater than 1 volt, there is a short to voltage in the circuit.

#### **TESTING FOR INTERMITTENT CONDITIONS AND POOR CONNECTIONS**

## Tools Required

- J 35616 GM-Approved Terminal Test Kit
- **J-38125** Terminal Repair Kit. See **Special Tools and Equipment** .
- **J 42675** Flat-Wire Probe Adapter. See **Special Tools and Equipment** .

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.
- 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.
- Wire insulation which is rubbed through-This causes an intermittent short as the bare area touches other wiring or parts of the vehicle.
- Refer to **Inducing Intermittent Fault Conditions** in order to duplicate the conditions required in order to verify the complaint.
- 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.

## 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 **J 35616** 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. See **Special Tools and Equipment** .

## Round Wire Connectors

Follow the procedure below to test terminal contact of Metri-Pack or 56 series terminals. Refer to the **J-38125** or the J 38125-4 Instruction Manual for terminal identification. See **Special Tools and Equipment** .

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 from the **J-38125** , test that the retention force is significantly different between a good terminal and a suspect terminal. Replace the female terminal in question. See **Special Tools and Equipment** .

#### **Flat Wire (Dock and Lock) Connectors**

or

There are no serviceable parts for flat wire (dock and lock) 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 from the **J 42675** on the flat wire harness connector in order to test the circuit in question. See **Special Tools and Equipment** .

#### **INDUCING INTERMITTENT FAULT CONDITIONS**

In order to duplicate the customer's concern, it may be necessary to manipulate the wiring harness if the malfunction appears to be vibration related. Manipulation of a circuit can consist of a wide variety of actions, including:

- Wiggling the harness
- Disconnecting a connector and reconnecting
- Stressing the mechanical connection of a connector
- Pulling on the harness or wire in order to identify a separation/break inside the insulation
- Relocating a harness or wires

All these actions should be performed with some goal in mind. For instance, with a scan tool connected, wiggling the wires may uncover a faulty input to the control module. The snapshot option would be appropriate here. Refer to **Scan Tool Snapshot Procedure** . You may need to load the vehicle in order to duplicate the concern. This may require the use of weights, floorjacks, jackstands, frame machines, etc. In these cases you are attempting to duplicate the concern by manipulating the suspension or frame. This method is useful in finding

harnesses that are too short and their connectors pull apart enough to cause a poor connection. A DMM set to Peak Min/Max mode and connected to the suspect circuit while testing can yield desirable results. Refer to **Testing for Electrical Intermittents** .

Certainly, using the senses of sight, smell, and hearing while manipulating the circuit can provide good results as well.

There may be instances where circuit manipulation alone will not meet the required criteria for the fault condition to appear. In such cases it may be necessary to expose the suspect circuit to other conditions while manipulating the harness. Such conditions would include high moisture conditions, along with exceptionally high or low temperatures. The following discusses how to expose the circuit to these kinds of conditions.

### **Salt Water Spray**

Some compounds possess the ability to conduct electricity when dissolved in water such as ordinary salt. By mixing table salt with water in sufficient quantities, you can enhance the conductive properties of water so that any circuit which may be sensitive to moisture will more readily fail when liberally sprayed with this mixture.

Mixing 0.35L (12 oz) of water with approximately 1 tablespoon of salt will yield a salt solution of 5 percent. Fill a normal spray bottle with this mixture. This mixture is sufficient to enhance the water's own conductivity. This may cause the circuit to fail more easily when sprayed. Once the mixture is completed, spray the suspect area liberally with the solution. Then, while monitoring either a scan tool or DMM, manipulate the harness as discussed previously.

### **High Temperature Conditions**

#### **Tools Required**

**J 25070** Heat Gun. See **Special Tools and Equipment** .

#### **High Temperature Conditions**

If the complaint tends to be heat related, you can simulate the condition using the **J 25070** . See **Special Tools and Equipment** .

Using the heat gun, you can heat up the suspected area or component. Manipulate the harnesses under high temperature conditions while monitoring the scan tool or DMM to locate the fault condition.

The high temperature condition may be achieved simply by test driving the vehicle at normal operating temperature. If a heat gun is unavailable, consider this option to enhance your diagnosis. This option does not allow for the same control, however.

#### **Low Temperature Conditions**

Depending on the nature of the fault condition, placing a fan in front of the vehicle while the vehicle is in the shade can have the desired effect.

If this is unsuccessful, use local cooling treatments such as ice or a venturi type nozzle (one that provides hot or cold air). This type of tool is capable of producing air stream temperatures down to  $-18^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ) from one end and  $71^{\circ}\text{C}$  ( $160^{\circ}\text{F}$ ) from the other. This is ideally suited for localized cooling needs.

Once the vehicle, component, or harness has been sufficiently cooled, manipulate the harness or components in an effort to duplicate the concern.

## TESTING FOR ELECTRICAL INTERMITTENTS

Perform the following procedures while wiggling the harness from side to side. Continue this at convenient points (about 6 inches apart) while watching the test equipment.

- **Testing for Short to Ground**
- **Testing for Continuity**
- **Testing for a Short to Voltage**

If the fault is not identified, perform the procedure below using the MIN MAX feature on the **J 39200** DMM. This feature allows you to manipulate the circuit without having to watch the **J 39200**. The **J 39200** will generate an audible tone when a change is detected.

**IMPORTANT: The J 39200 must be used in order to perform the following procedure since the J 39200 can monitor current, resistance or voltage while recording the minimum (MIN), and maximum (MAX) values measured.**

1. Connect the **J 39200** to both sides of a suspected connector (still connected), or from one end of a suspected circuit to the other. Refer to **Troubleshooting with a Digital Multimeter** for information on connecting the **J 39200** to the circuit.
2. Set the rotary dial of the **J 39200** to the V (AC) or V (DC) position.
3. Press the range button of the **J 39200** in order to select the desired voltage range.
4. Press the MIN MAX button of the **J 39200**. The **J 39200** displays 100 ms RECORD and emits an audible tone (beep).

**IMPORTANT: The 100 ms RECORD mode is the length of time an input must stay at a new value in order to record the full change.**

5. Simulate the condition that is potentially causing the intermittent connection, either by wiggling the connections or the wiring, test driving, or performing other operations. Refer to **Inducing Intermittent Fault Conditions**.
6. Listen for the audible Min Max Alert which indicates that a new minimum or maximum value has been recorded.
7. Press the MIN MAX button once in order to display the MAX value and note the value.
8. Press the MIN MAX button again in order to display the MIN value and note the value.
9. Determine the difference between the MIN and MAX values.

- If the variation between the recorded MIN and MAX voltage values is 1 volt or greater an intermittent open or high resistance condition exists. Repair the condition as necessary.
- If the variation between the recorded MIN and MAX voltage values is less than 1 volt an intermittent open or high resistance condition does not exist.

## **SCAN TOOL SNAPSHOT PROCEDURE**

Snapshot is a recording of what a control module on the vehicle was receiving for information while the snapshot is being made. A snapshot may be used to analyze the data during the time a vehicle condition is current. This allows you to concentrate on making the condition occur, rather than trying to view all the data in anticipation of the fault. The snapshot contains information around a trigger point that you have determined. Only a single data list may be recorded in each snapshot. The **Scan Tool** has the ability to store 2 snapshots. The ability to record 2 snapshots allows comparing hot versus cold and good versus bad vehicle scenarios. The snapshots are stored on a first-in, first-out basis. If a third snapshot is taken, the first snapshot stored in the memory will be lost.

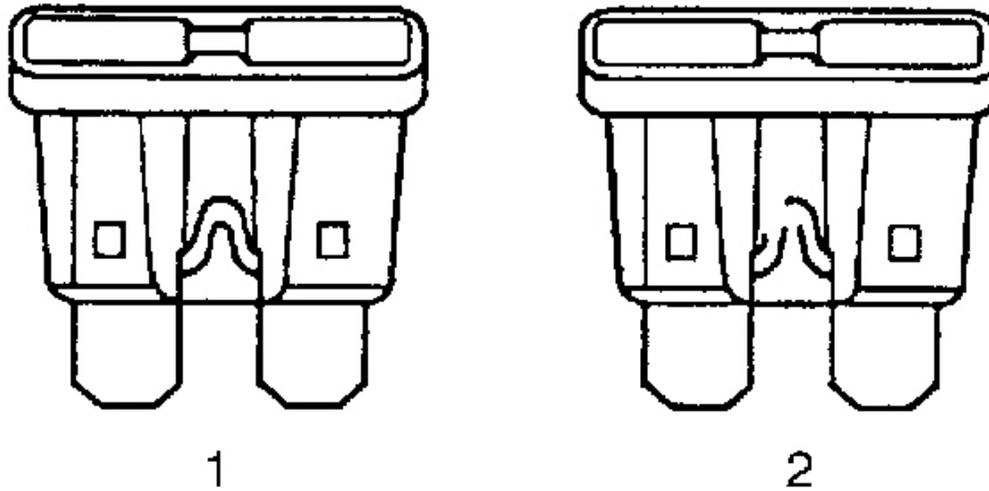
Snapshots can be 1 of 2 types:

- Snapshot - taken from the Snapshot menu choice
- Quick Snapshot - taken from the Data Display soft key choice, does not contain DTC information

When a snapshot is taken, it is recorded on the memory card and may contain as many as 1200 frames of information. Because the snapshot is recorded onto the memory card, snapshots are not lost if the **Scan Tool** is powered down.

The snapshot replay screen has a plot soft key that can be of great value for intermittent diagnosis. The snapshot plot feature can help you to quickly determine if a sensor is outside of its expected values by plotting 3 parameters at a time. The data will be displayed both graphically and numerically showing the minimum and maximum values for all frames captured. This is helpful, especially if the fault occurs only once and does not set a DTC.

## **CIRCUIT PROTECTION - FUSES**



**Fig. 3: View Of Good Fuse & Open (Melted) Fuse**  
 Courtesy of GENERAL MOTORS CORP.

The fuse is the most common method of an automotive wiring circuit protection. Whenever there is an excessive amount of current flowing through a circuit the fusible element will melt and create an open or incomplete circuit. Fuses are a one time protection device and must be replaced each time the circuit is overloaded. To determine if a fuse is open, remove the suspected fuse and examine the element in the fuse for an open (2). If not broken (1), also check for continuity using a DMM or a continuity tester. If the element is open or continuity is suspect, replace the fuse with one of equal current rating.

### Fuse Types

Current Rating Amperes	Color
Auto Fuses, Mini Fuses	
2	Gray
3	Violet
5	Tan
7.5	Brown
10	Red
15	Blue
20	Yellow
25	White or Natural
30	Green
Maxi Fuses	
20	Yellow

30	Light Green
40	Orange or Amber
60	Blue
50	Red

## **CIRCUIT PROTECTION - CIRCUIT BREAKERS**

A circuit breaker is a protective device that is designed to open the circuit when a current load is in excess of the rated breaker capacity. If there is a short or other type of overload condition in the circuit, the excessive current will open the circuit between the circuit breaker terminals. Two types of circuit breakers are used.

### **Circuit Breaker**

This type opens when excessive current passes through it for a period of time. It closes again after a few seconds, and if the cause of the high current is still present, it will open again. The circuit breaker will continue to cycle open and closed until the condition causing the high current is removed.

### **Positive Temperature Coefficient (PTC) Circuit Breaker**

This type greatly increases its resistance when excessive current passes through it. The excessive current heats the PTC device, as the device heats its resistance increases. Eventually the resistance gets so high that the circuit is effectively open. Unlike the ordinary circuit breaker the PTC unit will not reset until the circuit is opened, by removing the voltage from its terminals. Once the voltage is removed the circuit breaker will re-close within a second or 2.

## **CIRCUIT PROTECTION - FUSIBLE LINKS**

Fusible link is wire designed to melt and break continuity when excessive current is applied. It is often located between or near the battery and starter or electrical center. Use a continuity tester or a DMM at each end of the wire containing the fusible link in order to determine if it is broken. If broken, it must be replaced with fusible link of the same gauge size.

### **Repairing a Fusible Link**

**IMPORTANT: Fusible links cut longer than 225 mm (approximately 9 in) will not provide sufficient overload protection.**

Refer to [Splicing Copper Wire Using Splice Clips](#) .

## **WIRING REPAIRS**

The Wiring Repairs section contains the following types of wiring repair information. Using these elements together will make wiring repair faster and easier:

- **Circuit Protection - Fuses**

- Circuit Protection - Circuit Breakers
- Circuit Protection - Fusible Links
- Repairing Damaged Wire Insulation
- Splicing Copper Wire Using Splice Clips
- Splicing Copper Wire Using Splice Sleeves
- Splicing Twisted or Shielded Cable
- Splicing Inline Harness Diodes
- Heated Oxygen Sensor (HO2S) Wiring Repairs
- SIR/SRS Wiring Repairs
- Flat Wire Repairs

## REPAIRING DAMAGED WIRE INSULATION

If the conductive portion of the wire is not damaged, locate the problem and apply tape around the wire. If the damage is more extensive, replace the faulty segment of the wire. Refer to Splicing Copper Wire Using Splice Clips and follow the instruction to repair the wire.

### Wire Size Conversion

Metric Wire Sizes (mm 2)	AWG Sizes
0.22	24
0.35	22
0.5	20
0.8	18
1.0	16
2.0	14
3.0	12
5.0	10
8.0	8
13.0	6
19.0	4
32.0	2
50.0	1/0

## FLAT WIRE REPAIRS

**NOTE:** The flat wire within the flex wiring harness is not serviceable. If an open or short exists within the flex wiring harness the complete harness must be replaced.

## HEATED OXYGEN SENSOR (HO2S) WIRING REPAIRS

### Tools Required

**J-38125** Terminal Repair Kit. See **Special Tools and Equipment** .

**NOTE:**        **Do not solder repairs under any circumstances as this could result in the air reference being obstructed.**

### **Heated Oxygen Sensor (HO2S) Wiring Repairs**

If the heated oxygen sensor pigtail wiring, connector, or terminal is damaged the entire oxygen sensor assembly must be replaced. Do not attempt to repair the wiring, connector, or terminals. In order for the sensor to function properly it must have a clean air reference. This clean air reference is obtained by way of the oxygen sensor signal and heater wires. Any attempt to repair the wires, connectors or terminals could result in the obstruction of the air reference and degrade oxygen sensor performance.

The following guidelines should be used when servicing the heated oxygen sensor:

- Do not apply contact cleaner or other materials to the sensor or vehicle harness connectors. These materials may get into the sensor, causing poor performance. Also, the sensor pigtail and harness wires must not be damaged in such a way that the wires inside are exposed. This could provide a path for foreign materials to enter the sensor and cause performance problems.
- Neither the sensor nor vehicle lead wires should be bent sharply or kinked. Sharp bends, kinks, etc., could block the reference air path through the lead wire.
- Do not remove or defeat the oxygen sensor ground wire (where applicable). Vehicles that utilize the ground wire sensor may rely on this ground as the only ground contact to the sensor. Removal of the ground wire will also cause poor engine performance.
- To prevent damage due to water intrusion, be sure that the peripheral seal remains intact on the vehicle harness connector.

The engine harness may be repaired using the **J-38125** . See **Special Tools and Equipment** .

### **SPLICING COPPER WIRE USING SPLICE CLIPS**

**IMPORTANT: When making a splice in an area that may be exposed to moisture use a crimp and seal splice sleeve instead of a Splice Clip. Refer to Splicing Copper Wire Using Splice Sleeves**

#### **Tools Required**

**J-38125** Terminal Repair Kit. See **Special Tools and Equipment** .

#### **Splicing Copper Wire Using Splice Clips**

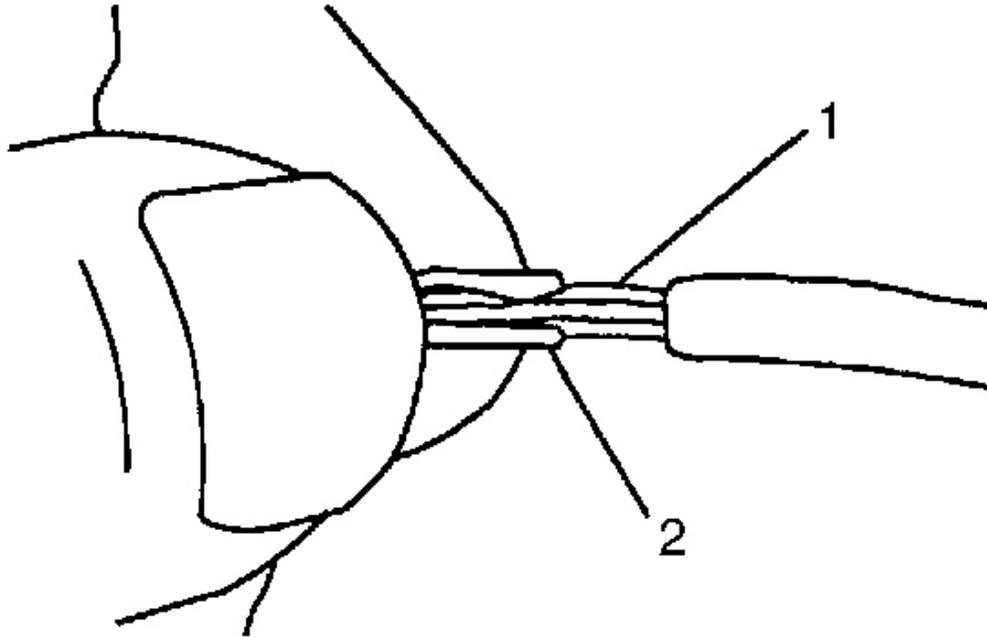
1. Open the harness.
  - If the harness is taped, remove the tape.
  - To avoid wiring insulation damage, use a sewing ripper in order to cut open the harness.
  - If the harness has a black plastic conduit, pull out the desired wire.

2. Cut the wire.
  - Cut as little wire off the harness as possible.
  - Ensure that each splice is at least 40 mm (1.5 in) away from other splices, harness branches and connectors. This helps prevent moisture from bridging adjacent splices and causing damage.
3. Select the proper size and type of wire.
  - The wire must be of equal or greater size than the original (except fusible link).
  - The wire's insulation must have the same or higher temperature rating.

- Use general purpose insulation for areas that are not subject to high temperatures.
- Use a cross-linked polyethylene insulated wire for areas where high temperatures are expected.

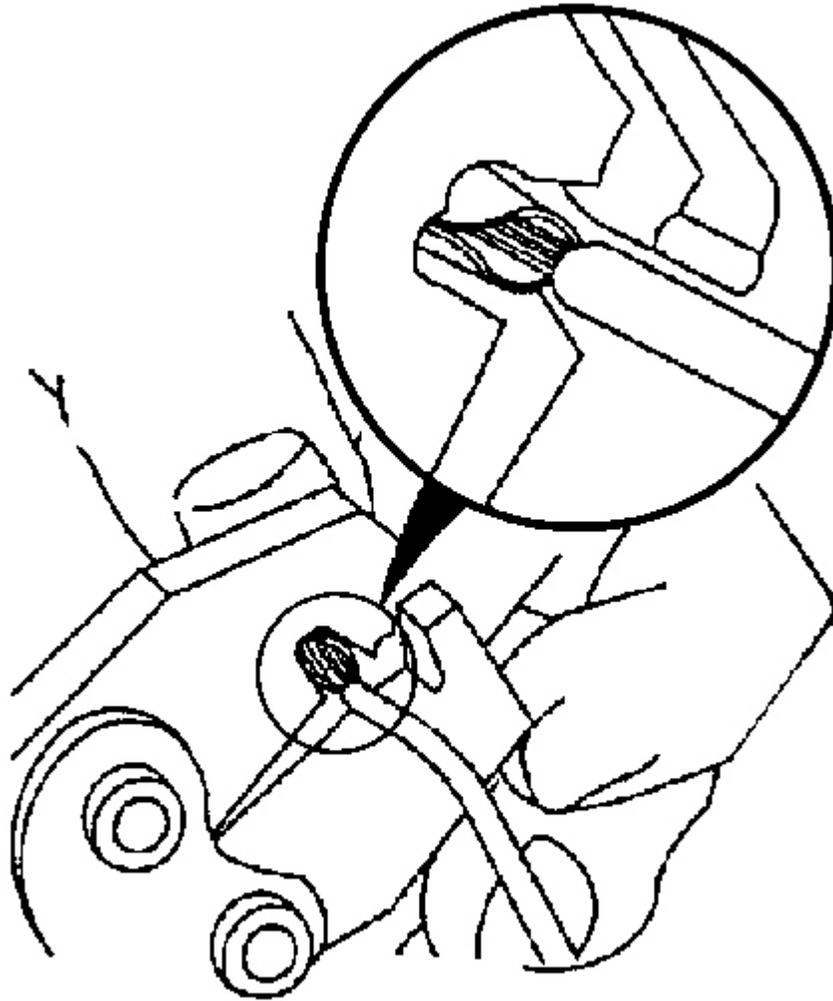
**IMPORTANT: Use cross-linked polyethylene wire to replace PVC, but do not replace cross-linked polyethylene with PVC. Cross-linked polyethylene wire is not fuel resistant. Do not use to replace wire where there is the possibility of fuel contact.**

4. Strip the insulation.
  - Select the correct size opening in the wire stripper or work down from the largest size.
  - Strip approximately 7.5 mm (5/16 in) of insulation from each wire to be spliced.
5. Select the proper clip to secure the splice. Follow the instructions in the **J-38125** in order to determine the proper clip size crimp tool and anvil. See **Special Tools and Equipment** .
6. Overlap the 2 stripped wire ends and hold them between thumb and forefinger.



**Fig. 4: Identifying Splice Clip & Stripped Wires**  
**Courtesy of GENERAL MOTORS CORP.**

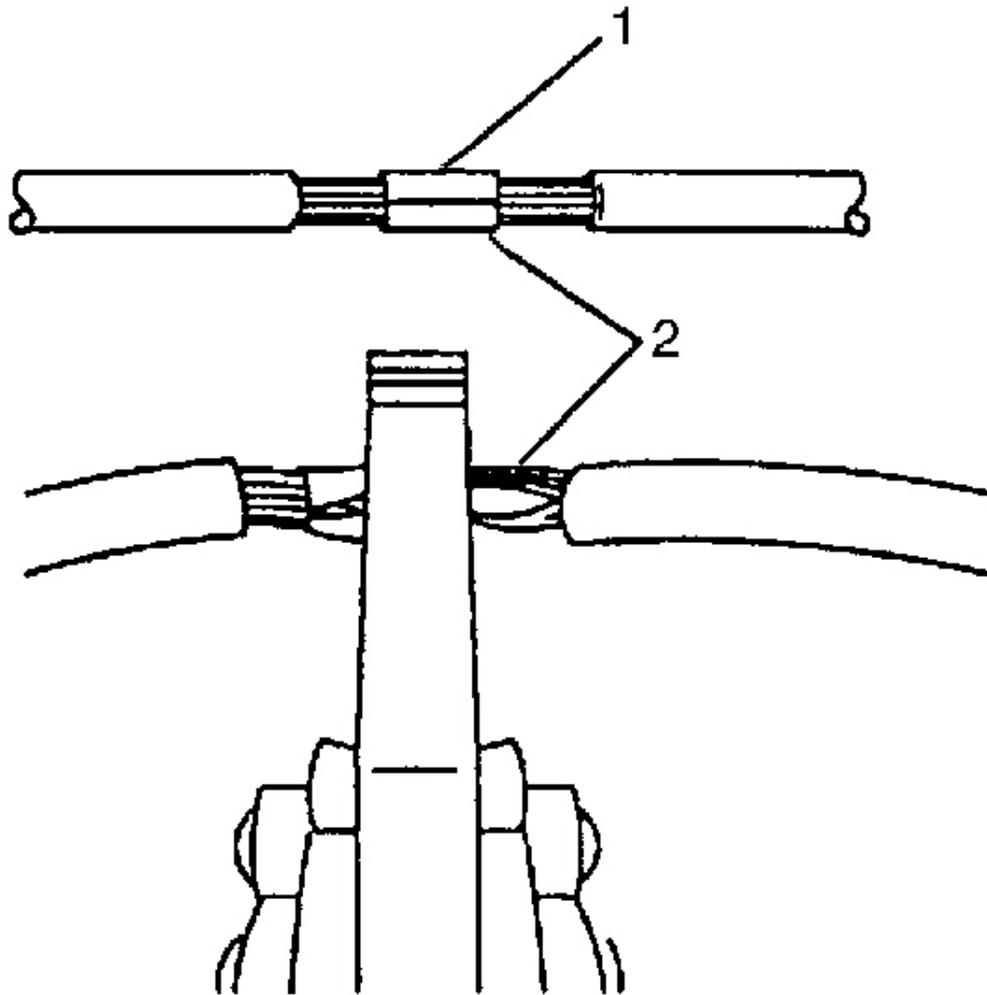
7. Center the splice clip (2) over the stripped wires (1) and hold the clip in place.
  - Ensure that the wires extend beyond the clip in each direction.
  - Ensure that no insulation is caught under the clip.



**Fig. 5: Centering Crimp Tool Over Splice Clip & Wires**  
Courtesy of GENERAL MOTORS CORP.

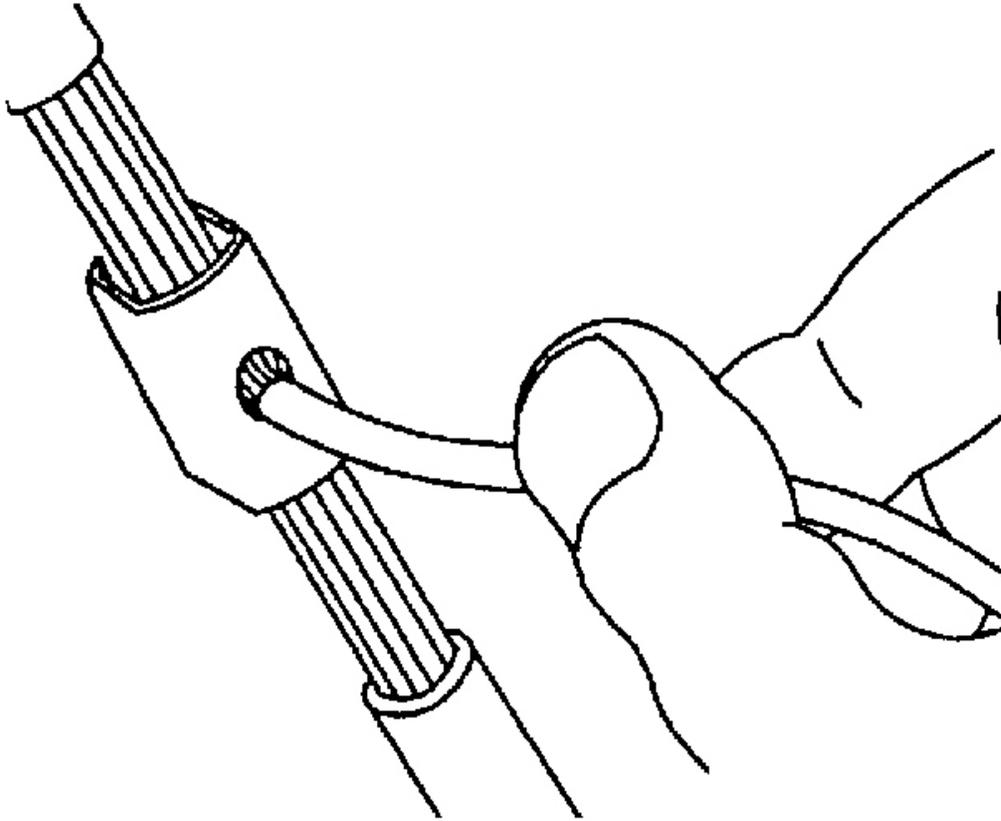
8. Center the crimp tool over the splice clip and wires.
9. Apply steady pressure until the crimp tool closes.

Ensure that no strands of wire are cut.



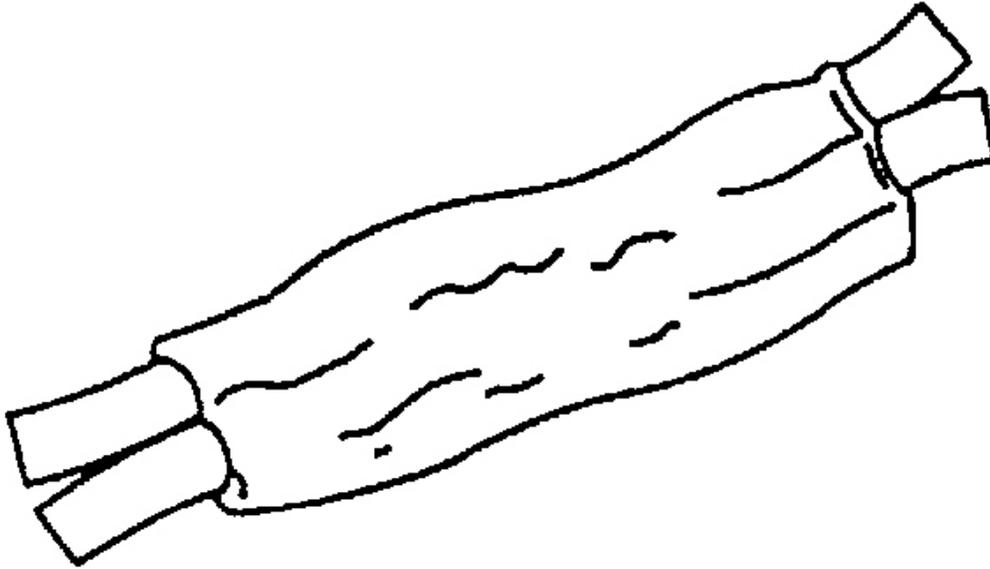
**Fig. 6: Crimping Splice Clip & Wires**  
Courtesy of GENERAL MOTORS CORP.

10. Crimp the splice on each end (2).



**Fig. 7: Applying Solder To Back Of Clip Opening**  
**Courtesy of GENERAL MOTORS CORP.**

11. Apply 60/40 rosin core solder to the opening in the back of the clip. Follow the manufacturer's instructions for the solder equipment.



**Fig. 8: Applying Electrical Tape**  
Courtesy of GENERAL MOTORS CORP.

12. Tape the splice. Roll on enough tape in order to duplicate the thickness of the insulation on the existing wires.



**Fig. 9: Additional Splice Taping**  
Courtesy of GENERAL MOTORS CORP.

13. Additional tape can be applied to the wire if the wire does not belong in a conduit or another harness covering. Use a winding motion in order to cover the first piece of tape.

## **SPLICING COPPER WIRE USING SPLICE SLEEVES**

### **Tools Required**

**J-38125** Terminal Repair Kit. See **Special Tools and Equipment** .

### **Splicing Copper Wire Using Splice Sleeves**

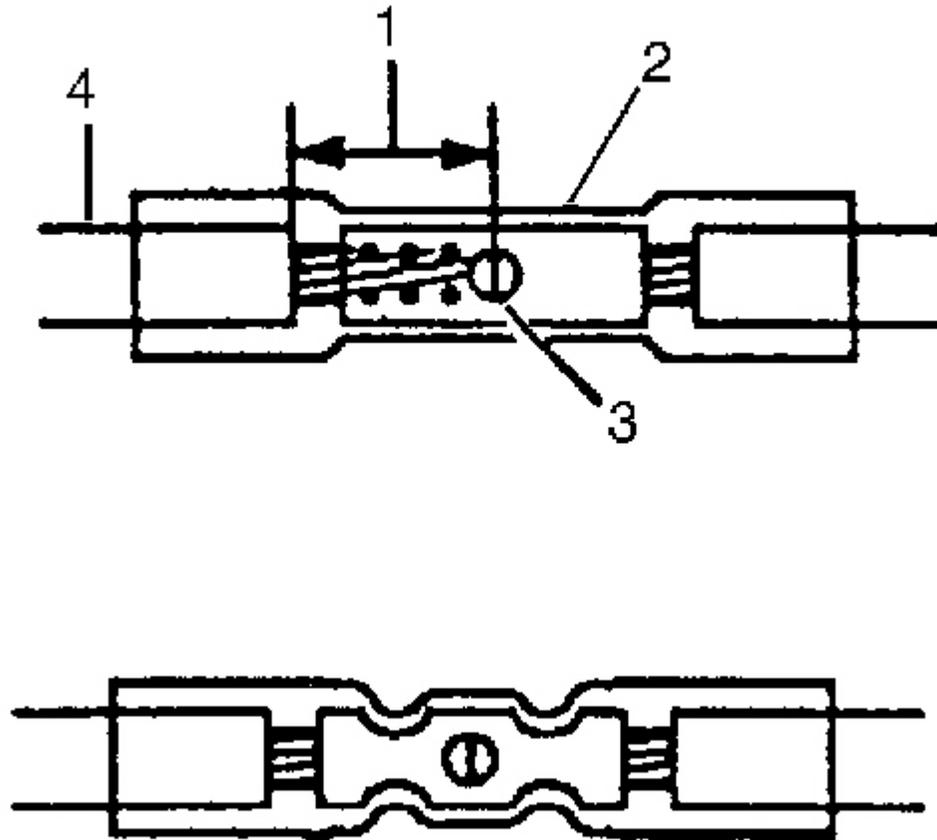
**IMPORTANT: Use only duraseal splice sleeves, other splice sleeves may not protect the splice from moisture or provide a good electrical connection.**

Use duraseal splice sleeves to form a one-to-one splice on all types of insulation except tefzel and coaxial. Use duraseal splice sleeves where there is special requirements such as moisture sealing. Follow the instructions below in order to splice copper wire using duraseal splice sleeves.

### **Splicing Copper Wire Using Splice Sleeves**

<b>Splice Sleeve Color</b>	<b>Crimp Tool Nest Color</b>	<b>Wire Gauge AWG/(Metric)</b>
Salmon 12089189	Red	20,18 / (0.5, 0.8)
Blue 12089190	Blue	16, 14 / (1.0, 2.0)
Yellow 12089191	Yellow	12, 10 / (3.0, 5.0)

1. Open the harness.
  - If the harness is taped, remove the tape.
  - To avoid wiring insulation damage, use a sewing ripper in order to cut open the harness.
  - If the harness has a black plastic conduit, pull out the desired wire.
2. Cut the wire.
  - Cut as little wire off the harness as possible.
  - Ensure that each splice is at least 40 mm (1.5 in) away from other splices, harness branches and connectors. This helps prevent moisture from bridging adjacent splices and causing damage.



**Fig. 10: Proper Crimping Of Solderless Connector**  
 Courtesy of GENERAL MOTORS CORP.

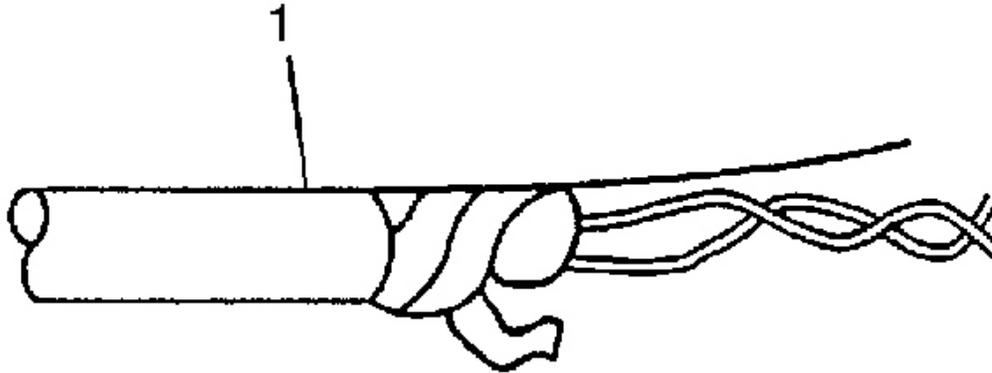
3. Select the proper size and type of wire.
  - The wire must be of equal or greater size than the original.
  - The wires insulation must have the same or higher temperature rating (4).
    - Use general purpose insulation for areas that are not subject to high temperatures.
    - Use a cross-linked polyethylene insulated wire for areas where high temperatures are expected.

**IMPORTANT: Use cross-linked polyethylene wire to replace PVC, but do not replace cross-linked polyethylene with PVC. Cross-linked polyethylene wire is not fuel resistant. Do not use to replace wire where there is the possibility of fuel contact.**

4. Strip the insulation.
  - Select the correct size opening in the wire stripper or work down from the largest size.
  - Strip approximately 7.5 mm (5/16 in) of insulation from each wire to be spliced (1).
5. Select the proper duraseal splice sleeve (2) and the required crimp nest tool, refer to the Crimp and Seal Splice Table.
6. Place the duraseal splice sleeve in the J-38125-8 (12085115) crimp tool nest so that the crimp falls at point 1 on the splice.
7. Close the hand crimper handles slightly in order to hold the duraseal splice sleeve firmly in the proper crimp tool nest.
8. Insert the wires into the duraseal splice sleeve until the wire hits the barrel stop. The splice sleeve has a stop in the middle of the barrel in order to prevent the wire from passing through the splice (3).
9. Close the handles of the J-38125-8 (12085115) until the crimper handles open when released. The crimper handles will not open until the proper amount of pressure is applied to the splice sleeve.
10. Shrink the insulation around the splice.
  - Using the heat torch apply heat to the crimped area of the barrel.
  - Gradually move the heat barrel 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.

#### **SPLICING TWISTED OR SHIELDED CABLE**

Twisted/shielded cable is used in order to protect wiring from electrical noise. Two-conductor cable of this construction is used between the radio and the Delco-Bose(R) speaker/amplifier units and other applications where low level, sensitive signals must be carried. Follow the instructions below in order to repair the twisted/shielded cable.



**Fig. 11: Outer Wiring Jacket**  
Courtesy of GENERAL MOTORS CORP.

1. Remove the outer jacket (1). Use care not to cut into the drain wire of the mylar tape.
2. Unwrap the tape. Do not remove the tape. Use the tape in order to rewrap the twisted conductors after the splice is made.

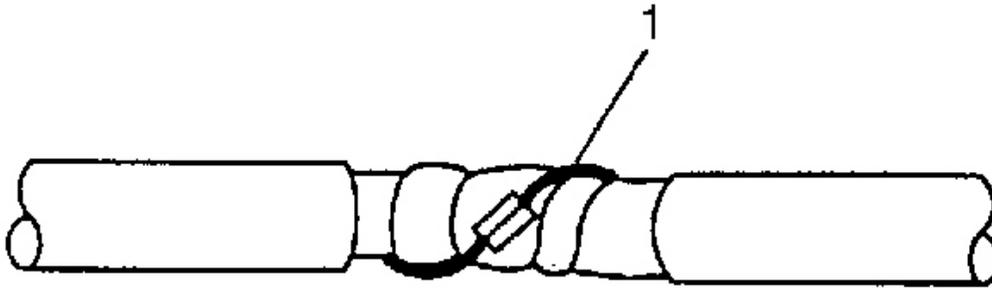


**Fig. 12: Inspecting Wiring Connections**  
Courtesy of GENERAL MOTORS CORP.

3. Prepare the splice. Untwist the conductors and follow the splicing instructions for copper wire. Staggering the splices by 65 mm (2.5 in) is recommended.

**IMPORTANT: Apply the mylar tape with the aluminum side inward. This ensures good**

electrical contact with the drain wire.



**Fig. 13: View Of Diode On Wire**  
Courtesy of GENERAL MOTORS CORP.

4. Re-assemble the cable.
  - Rewrap the conductors with the mylar tape.
  - Use caution not to wrap the drain wire in the tape (1).
  - Follow the splicing instructions for copper wire and splice the drain wire.
  - Wrap the drain wire around the conductors and tape with mylar tape.



**Fig. 14: Repaired Wire Covered With Electrical Tape**  
Courtesy of GENERAL MOTORS CORP.

5. Tape over the entire cable. Use a winding motion when you apply the tape.

## SPLICING INLINE HARNESS DIODES

Many vehicle electrical systems use a diode to isolate circuits and protect the components from voltage spikes.

When installing a new diode use the following procedure.

1. Open the harness.
  - If the harness is taped, remove the tape.
  - To avoid wiring insulation damage, use a sewing ripper in order to cut open the harness.
  - If the harness has a black plastic conduit, pull out the diode.
2. If the diode is taped to the harness, remove all of the tape.
3. Check and record the current flow direction and orientation of diode.
4. Remove the inoperative diode from the harness with a suitable soldering tool.

**IMPORTANT: If the diode is located next to a connector terminal remove the terminal(s) from the connector to prevent damage from the soldering tool.**

5. Carefully strip away a section of insulation next to the old soldered portion of the wire(s). Do not remove any more than is needed to attach the new diode.
6. Check current flow direction of the new diode, being sure to install the diode with correct bias. Reference the appropriate service manual wiring schematic to obtain the correct diode installation position.
7. Attach the new diode to the wire(s) using 60/40 rosin core solder. Before soldering attach some heat sinks (aluminum alligator clips) across the diode wire ends to protect the diode from excessive heat. Follow the manufacturer's instruction for the soldering equipment.
8. Reinstall terminal(s) into the connector body if previously removed.

**IMPORTANT: To prevent shorts to ground and water intrusion, completely cover all exposed wire and diode attachment points with tape.**

9. Tape the diode to the harness or connector using electrical tape.

## **SIR/SRS WIRING REPAIRS**

### **Tools Required**

**J-38125** Terminal Repair Kit. See **Special Tools and Equipment** .

The Supplemental Inflatable Restraint (SIR) System/Supplemental Restraint System (SRS) requires special wiring repair procedures due to the sensitive nature of the circuitry. Follow the specific procedures and instructions when working with the SIR/SRS system wiring, and the wiring components (such as connectors and terminals).

**IMPORTANT: Do not use the terminals in the kit in order to replace damaged SIR/SRS system terminals unless specifically indicated by the terminal package.**

The tool kit **J-38125** contains the following items: See **Special Tools and Equipment** .

- Duraseal splice sleeves-In order to repair the SIR/SRS system wiring
- A wire stripping tool
- A special crimping tool
- A heat torch
- An instruction manual

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 necessary contact integrity for the sensitive, low energy circuits.

The **J-38125** also serves as a generic terminal repair kit. See **Special Tools and Equipment** . The kit contains the following items:

- A large sampling of common electrical terminals
- The correct tools in order to attach the terminals to the wires
- The correct tools in order to remove the terminals from the connectors

#### **SIR/SRS Connector (Plastic Body and Terminal Metal Pin) Repair**

Use the connector repair assembly packs in order to repair the damaged SIR/SRS wire harness connectors and the terminals. Do not use the connector repair assembly pack in order to repair the pigtails. These kits include an instruction sheet and the duraseal splice sleeves. Use the duraseal splice sleeves in order to splice the new wires, connectors, and terminals to the harness. The splice crimping tool is color keyed in order to match the splices from the **J-38125** . You must use the splice crimping tool in order to apply these splices. See **Special Tools and Equipment** .

The terminals in the SIR/SRS system are made of a special metal. This metal provides the necessary contact integrity for the sensitive, low energy circuits. These terminals are only available in the connector repair assembly packs. Do not substitute any other terminals for those in the assembly packs.

If the individual terminals are damaged on the sensing and diagnostic module (SDM) harness connector, use one of the following 2 components in order to replace the SDM harness connector:

- The SDM harness connector pigtail assembly
- The SDM harness connector replacement kit

If the individual terminals are damaged on any other SIR/SRS connection, use the appropriate connector repair assembly pack in order to replace the entire connection. Replace the entire SIR/SRS wiring harness, if needed, in order to maintain SIR/SRS circuit integrity.

#### **SIR/SRS Wire Pigtail Repair**

**IMPORTANT: Do not make wire, connector, or terminal repairs on components with wire pigtails.**

A wire pigtail is a wire or wires attached directly to the device (not by a connector). If a wiring pigtail is damaged, you must replace the entire component (with pigtail). The inflatable restraint steering wheel module coil is an example of a pigtail component.

**SIR/SRS Wire Repair**

**IMPORTANT: Refer to Wiring Repairs in order to determine the correct wire size for the circuit you are repairing. You must obtain this information in order to ensure circuit integrity.**

If any wire except the pigtail is damaged, repair the wire by splicing in a new section of wire of the same gauge size (0.5 mm, 0.8 mm, 1.0 mm etc.). Use the duraseal splice sleeves and splice crimping tool from the **J-38125**. Use the following wiring repair procedures in order to ensure the integrity of the duraseal splice sleeves. See **Special Tools and Equipment**.

**SIR/SRS Wiring Repairs**

Splice Sleeve Color	Crimp Tool Nest Color	Wire Gauge mm <sup>2</sup> / (AWG)
Salmon (Yellow-Pink) 12089189	Red (1)	0.035-0.8/(18-20)
Blue 12089190	Blue (2)	1-2/(14-16)
Yellow 12089191	Yellow (3)	3-5/(10-12)

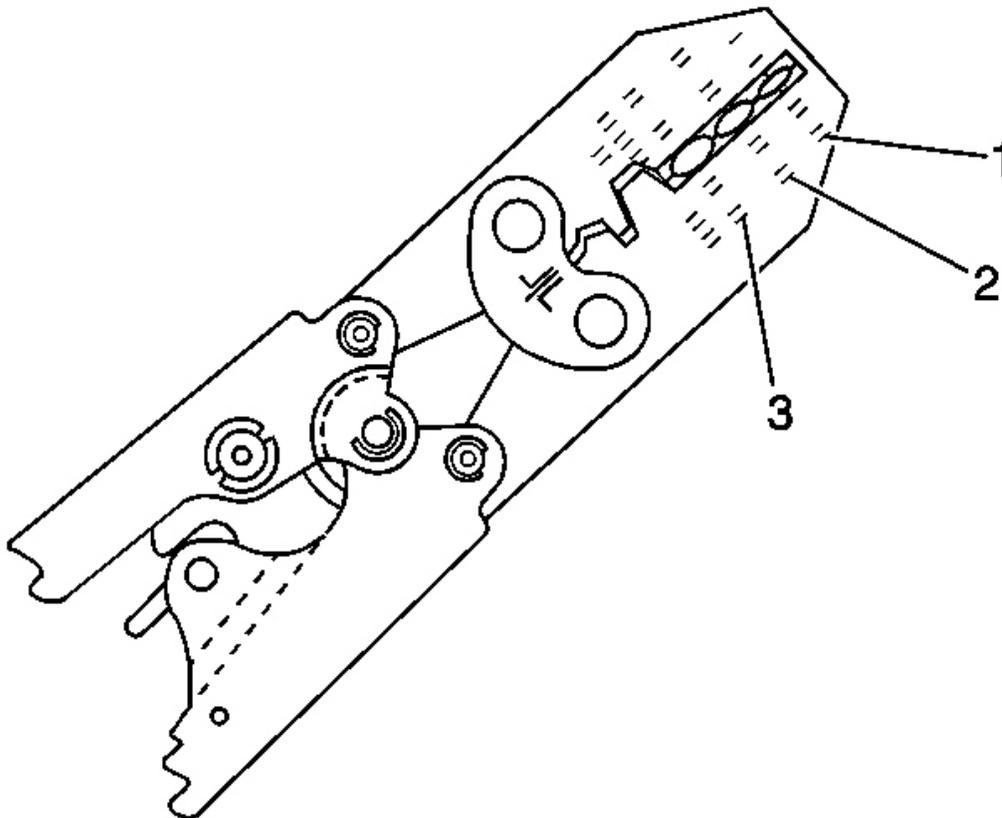
**IMPORTANT: You must perform the following procedures in the listed order. Repeat the procedure if any wire strands are damaged. You must obtain a clean strip with all of the wire strands intact.**

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.

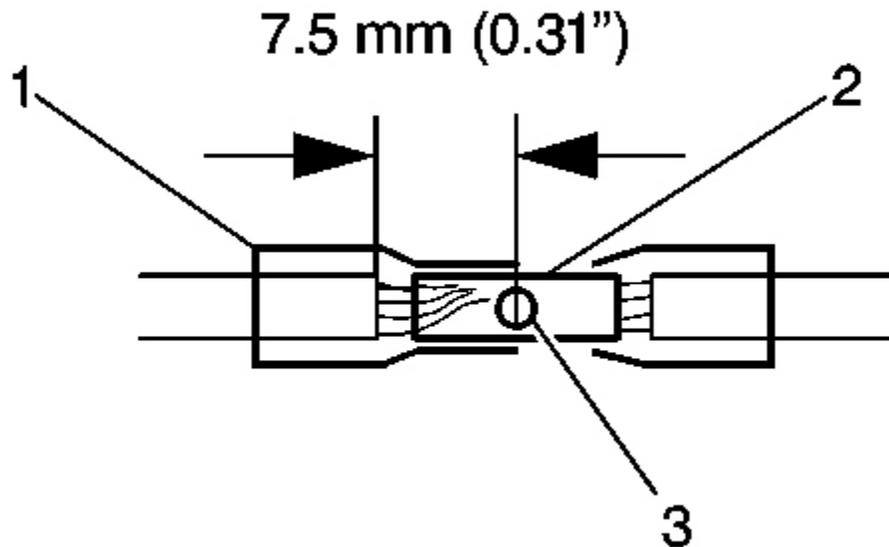
3. Strip the insulation:

- 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 the metric size to the equivalent AWG size.
    - Use an AWG wire gauge.
    - 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 7.5 mm (0.313 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. 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.



**Fig. 15: Identifying Splice Crimp Tool Nests**  
Courtesy of GENERAL MOTORS CORP.

5. Use the Splice Crimp Tool from the **J-38125** to crimp duraseal splice sleeve. In order to position the duraseal splice sleeve in the proper color nest of the Splice Crimp Tool, refer to the table at the beginning of this repair procedure. See **Special Tools and Equipment** .



**Fig. 16: Identifying Durasteel Splice Sleeve**  
Courtesy of GENERAL MOTORS CORP.

6. 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 firmly hold the duraseal splice sleeve in the proper nest.



**Fig. 17: Crimped Duraseal Splice Sleeve**  
Courtesy of GENERAL MOTORS CORP.

7. Insert the wire into the splice sleeve barrel until the wire hits the barrel stop.
8. 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 5 for the opposite end of the splice.



**Fig. 18: Identifying Heated Splice Sleeve**  
Courtesy of GENERAL MOTORS CORP.

9. Using the heat torch, apply heat to the crimped area of the barrel.
10. Gradually move the heat barrel 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.

#### **SIR/SRS System Wire Splice Repair**

Apply a new splice (not sealed) from the **J-38125** if damage occurs to any of the original equipment splices (3 wires or more) in the SIR/SRS wiring harness. Carefully follow the instructions included in the kit for proper

splice clip application. See **Special Tools and Equipment** .

### **Connector Position Assurance (CPA)**

The connector position assurance (CPA) is a small plastic insert that fits through the locking tabs of all the SIR/SRS system electrical connectors. The CPA ensures that the connector halves cannot vibrate apart. You must have the CPA in place in order to ensure good contact between the SIR/SRS mating terminals.

### **Terminal Position Assurance (TPA)**

The terminal position assurance (TPA) insert resembles the plastic combs used in the control module connectors. The TPA keeps the terminal securely seated in the connector body. Do not remove the TPA from the connector body unless you remove a terminal for replacement.

## **CONNECTOR REPAIRS**

The Connector Repairs section contains the following types of connector repair information. Using these elements together will make connector repair faster and easier:

- **Connector Position Assurance Locks**
- **Terminal Position Assurance Locks**
- **Push to Seat Connectors**
- **Pull to Seat Connectors**
- **Weather Pack Connectors**
- **Repairing Connector Terminals**

## **CONNECTOR POSITION ASSURANCE LOCKS**

The connector position assurance (CPA) is a small plastic insert that fits through the locking tabs of the connector. CPAs are used in various connectors throughout the vehicle. CPAs are also used in all SIR system electrical connectors. The CPA ensures that the connector halves cannot vibrate apart. You must have the CPA in place in order to ensure good contact between the mating terminals, of the connector.

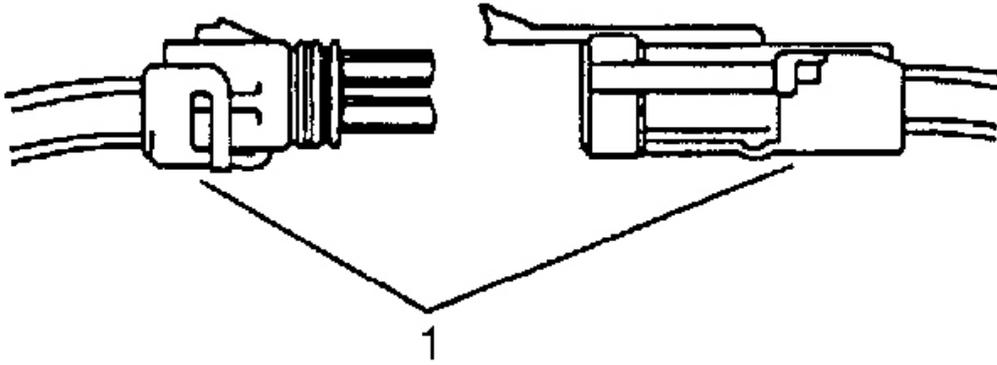
## **TERMINAL POSITION ASSURANCE LOCKS**

The terminal position assurance (TPA) insert resembles the plastic combs used in the control module connectors. The TPA keeps the terminal securely seated in the connector body. Do not remove the TPA from the connector body unless you remove a terminal for replacement.

## **PUSH TO SEAT CONNECTORS**

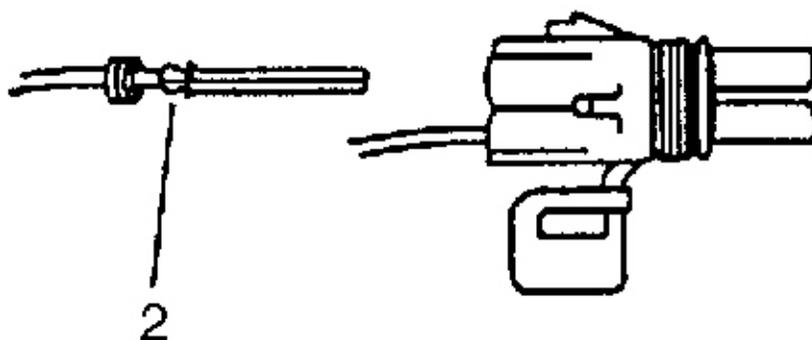
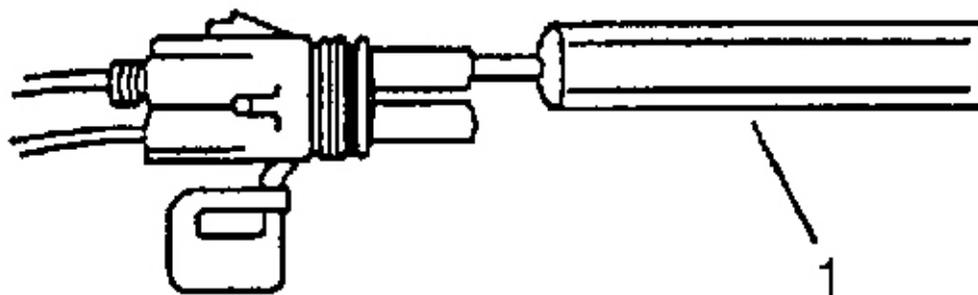
### **Terminal Removal**

Follow the steps below in order to repair push to seat connectors.



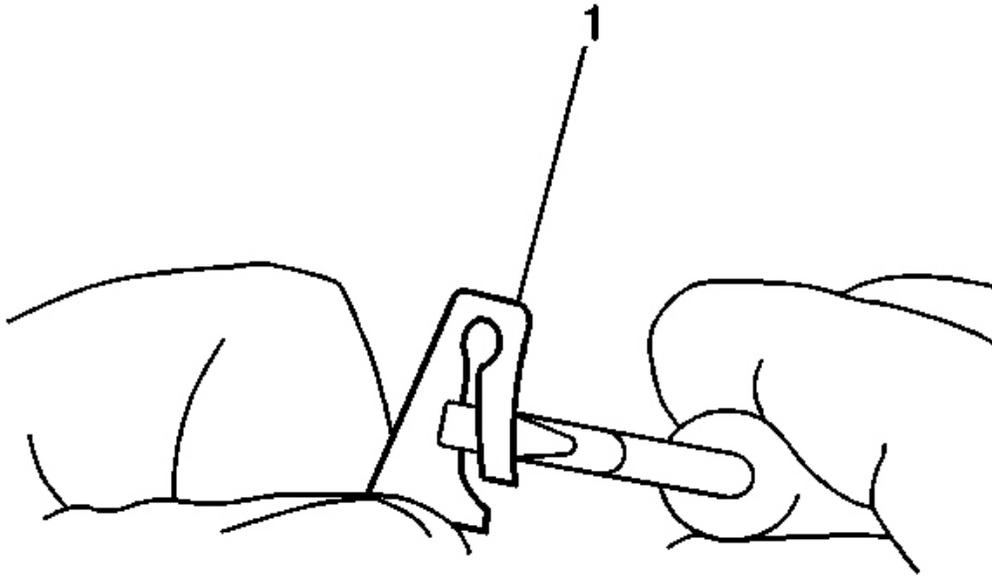
**Fig. 19: Separating Weather Pack Connector Halves**  
Courtesy of GENERAL MOTORS CORP.

1. Remove the terminal position assurance (TPA) device, the connector position assurance (CPA) device, and/or the secondary lock.
2. Separate the connector halves (1).



**Fig. 20: Removing Cable & Terminal From Connector**  
Courtesy of GENERAL MOTORS CORP.

3. Use the proper pick or removal tool (1) in order to release the terminal.
4. Gently pull the cable and the terminal (2) out of the back of the connector.



**Fig. 21: Aligning Locking Device**  
Courtesy of GENERAL MOTORS CORP.

5. Re-form the locking device if you are going to reuse the terminal (1).
6. To repair the terminal, refer to Terminal Repair.

#### **Terminal Repair**

1. Slip the cable seal away from the terminal.
2. Cut the wire as close to the terminal as possible.
3. Slip a new cable seal onto the wire.
4. Strip 5 mm (3/16 in) of insulation from the wire.
5. Crimp a new terminal to the wire.
6. Solder the crimp with rosin core solder.
7. Slide the cable seal toward the terminal.
8. Crimp the cable seal and the insulation.
9. If the connector is outside of the passenger compartment, apply grease to the connector.

#### **Reinstalling Terminal**

1. In order to reuse a terminal or lead assembly. Refer to **Wiring Repairs** .

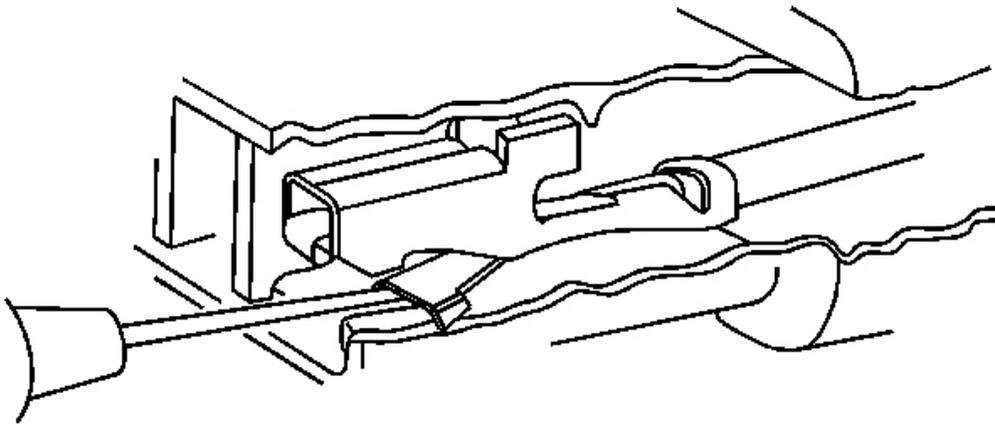
2. Ensure that the cable seal is kept on the terminal side of the splice.
3. Insert the lead from the back until it catches.
4. Install the TPA, CPA and/or the secondary locks.

## **PULL TO SEAT CONNECTORS**

### **Terminal Removal**

If the terminal is visibly damaged or is suspected of having a faulty connection, the terminal should be replaced.

Follow the steps below in order to repair pull-to-seat connectors:



**Fig. 22: Aligning Removal Tool**  
Courtesy of GENERAL MOTORS CORP.

1. Remove the connector position assurance (CPA) device and/or the secondary lock.
2. Disconnect the connector from the component or separate the connectors for in-line connectors.
3. Remove the terminal position assurance (TPA) device.
4. Insert the proper pick or removal tool into the front of the connector body.

**IMPORTANT: On connectors with more than one terminal the service loop may not be large enough to remove the terminal and crimp on a new one. If the terminal wire does not have a large enough service loop for removal, cut the wire 5 cm (2 in) behind the connector before removal.**

5. Grasp the wire at the back of the connector body and gently push the terminal (1) out the front of the

connector body (3).

### **Terminal Repair**

1. If the wire needed to be cut in order to remove the terminal, gently push a small length of the same size wire through the back of the connector cavity until there is enough wire exposed in order to crimp on a new terminal. If the wire was not cut, cut the existing wire as close to the old terminal as possible.
2. Strip 5 mm (3/16 in) of insulation from the wire.
3. Crimp a new terminal to the wire.
4. Solder the crimp with rosin core solder.

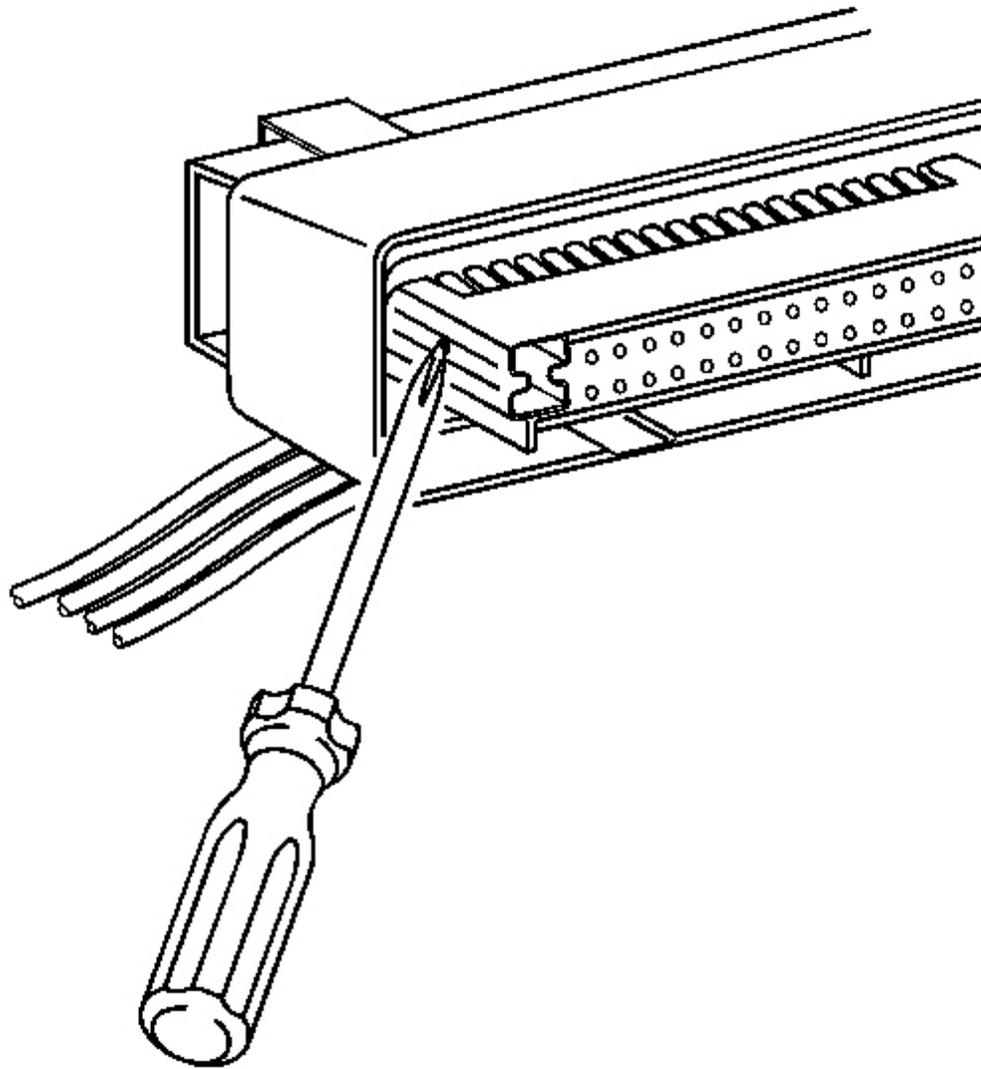
### **Terminal Installation**

1. Align the terminal and pull the wire from the back of the connector in order to seat the terminal.
2. If necessary, cut the new wire to proper length and splice with existing circuit. Refer to **Splicing Copper Wire Using Splice Sleeves** .
3. If the connector is outside of the passenger compartment, apply dielectric grease to the connector.
4. Install the TPA, CPA and/or the secondary locks.

## **MICRO-PACK 100W CONNECTORS**

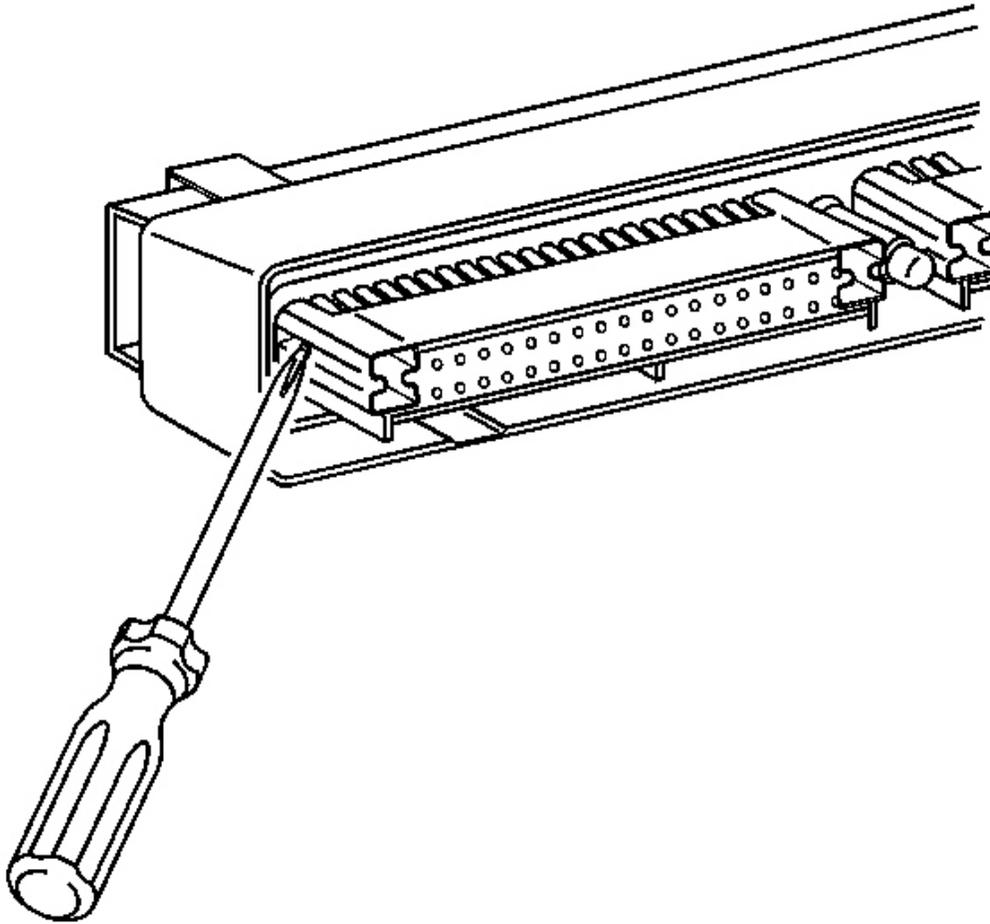
### **Terminal Removal Procedure**

1. Disconnect the connector from the component or separate the connector halves for in-line connectors.



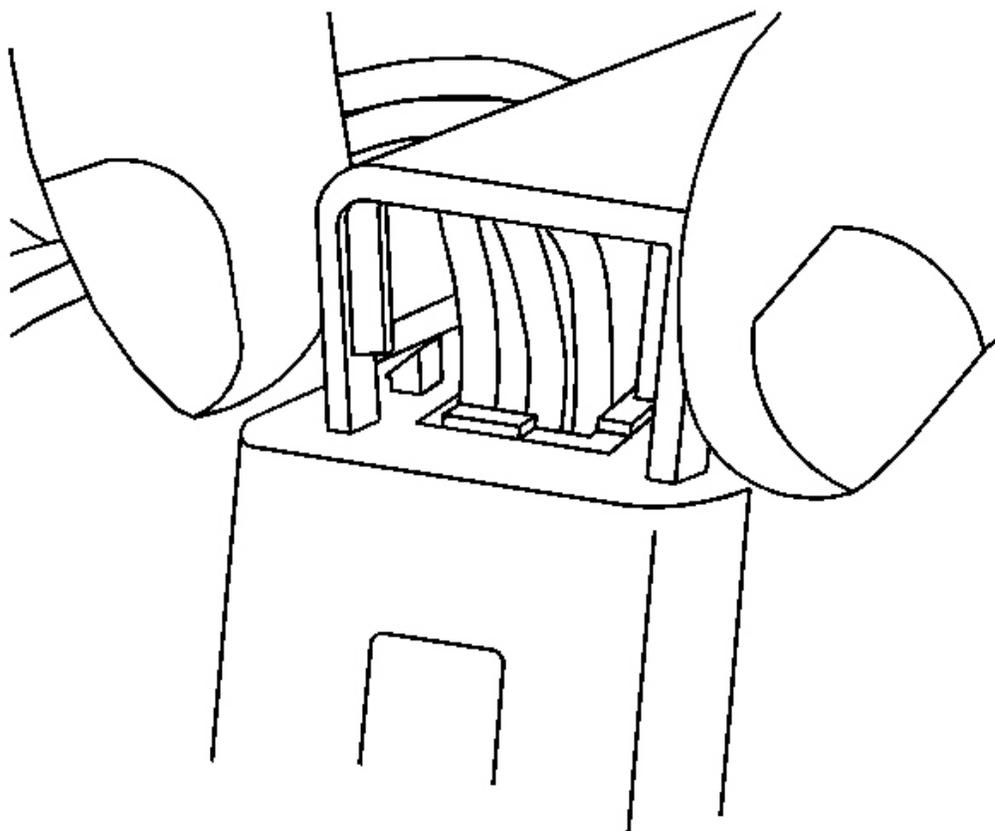
**Fig. 23: Locating Nose Piece Locking Tabs**  
Courtesy of GENERAL MOTORS CORP.

2. Locate the nose piece locking tabs that are positioned on the side of the connector nose piece.



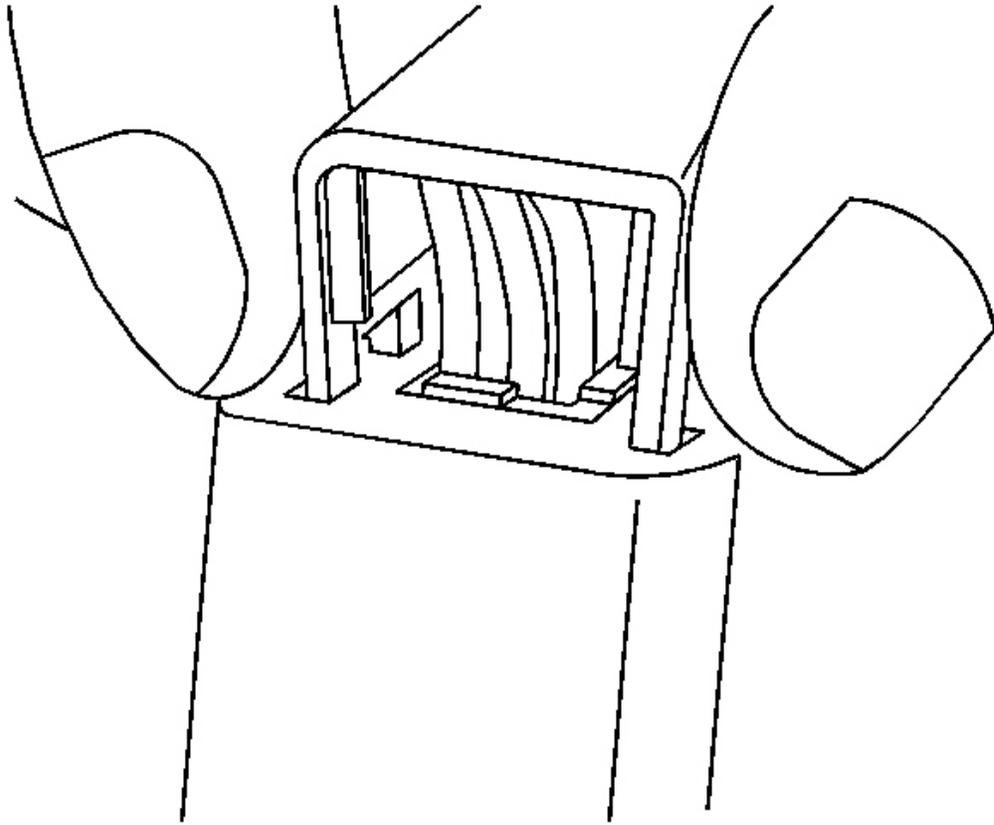
**Fig. 24: Pushing In Locking Tabs**  
Courtesy of GENERAL MOTORS CORP.

3. Use a small flat-bladed tool to push in one of the locking tabs while gently pushing on the same side of the nose piece.
4. Repeat the procedure for the other locking tab and remove the nose piece.
5. Remove the wire dress cover. The following is a general procedure for wire dress cover removal. Use this procedure as a guide, some dress cover removal procedures may vary.



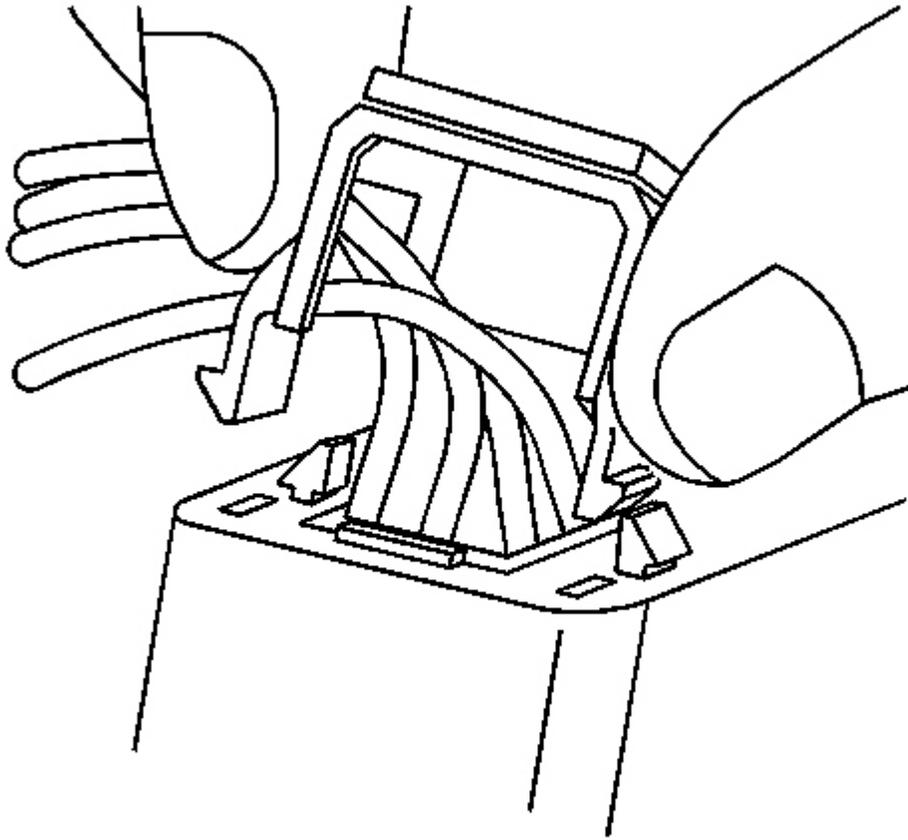
**Fig. 25: Squeezing Cover Locking Legs**  
**Courtesy of GENERAL MOTORS CORP.**

6. Use fingers to squeeze the 2 locking legs of the cover.



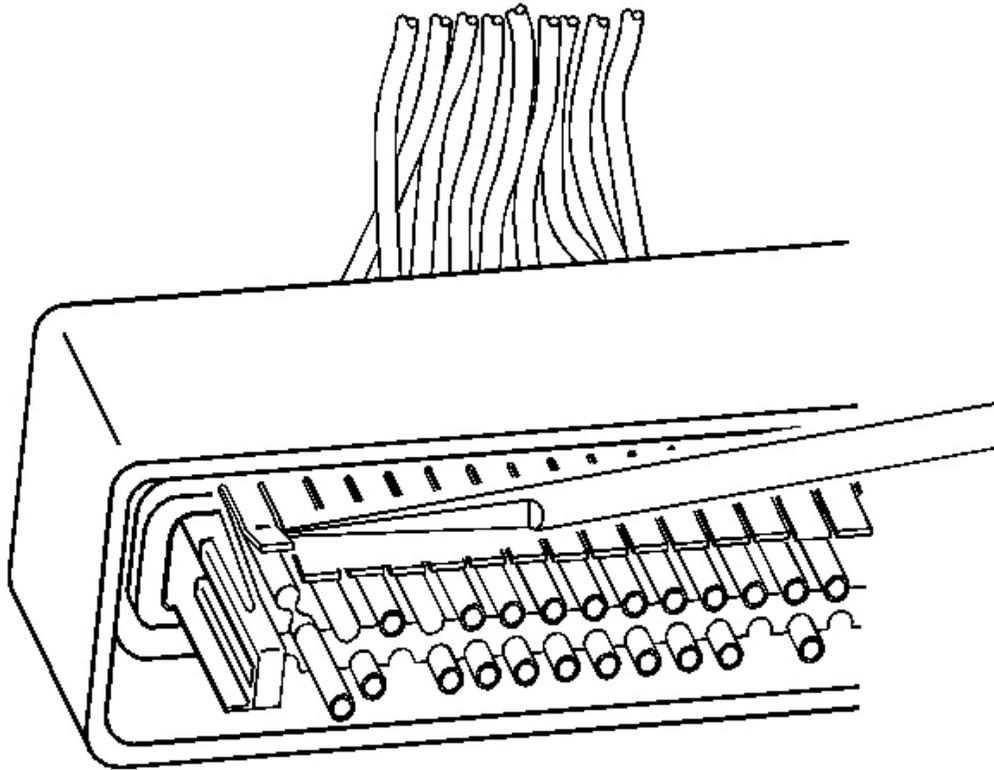
**Fig. 26: Unseating Locking Legs**  
**Courtesy of GENERAL MOTORS CORP.**

7. Apply pressure and gently rock the cover until one locking leg is unseated.



**Fig. 27: Removing Wire Dress Cover**  
Courtesy of GENERAL MOTORS CORP.

8. Continue to apply pressure and rock the cover until the second locking leg is unseated. Repeat procedure for the other side of the dress cover and remove the cover.



**Fig. 28: Lifting Terminal Retaining Tab**  
Courtesy of GENERAL MOTORS CORP.

9. Use J 38125-12A tool to gently lift the terminal retaining tab while gently pulling the wire out of the back of the connector. Always remember never use force when pulling a terminal out of a connector. If the terminal is severely bent or damaged, push the wire out of the front of the connector instead of pulling it through. This will prevent damage to the internal seals of the connector. Once the terminal is pushed out of the connector, cut the wire as close to the terminal as possible and pull the wire through the connector.

#### **Terminal Repair Procedure**

Use the appropriate wire assembly kit available through Saturn Service Parts.

1. Slide the new terminal into the correct cavity at the back of the connector.
2. Push the terminal into the connector until it locks into place. The new terminal should be even with the other terminals. Insure that the terminal is locked in place by gently pulling on the wire.
3. Replace the nose piece.
4. Replace the dress cover.

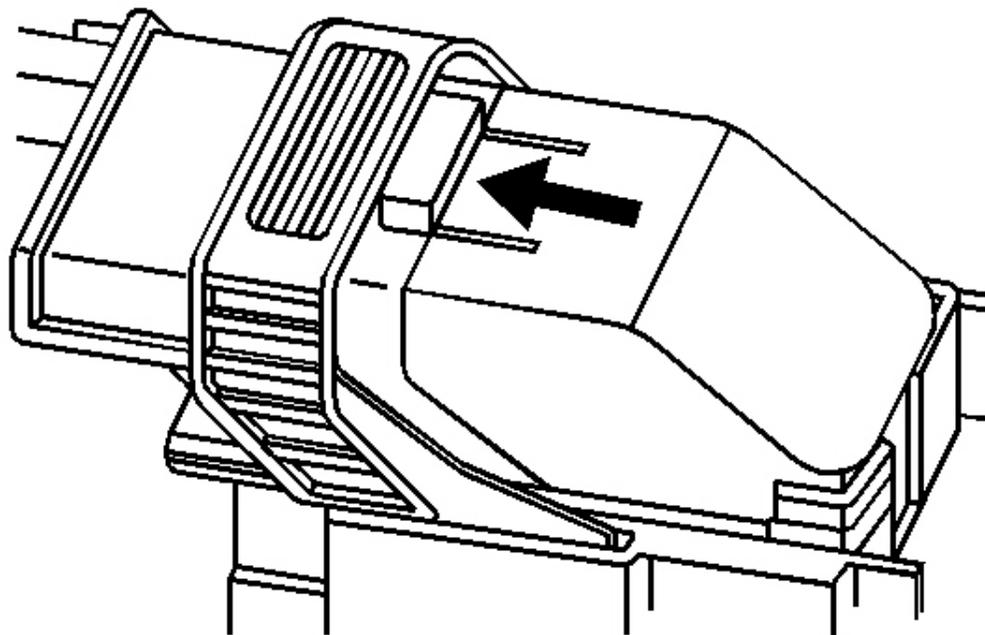
## MICRO .64 CONNECTORS

### Tools Required

**J-38125** Terminal Repair Kit. See **Special Tools and Equipment** .

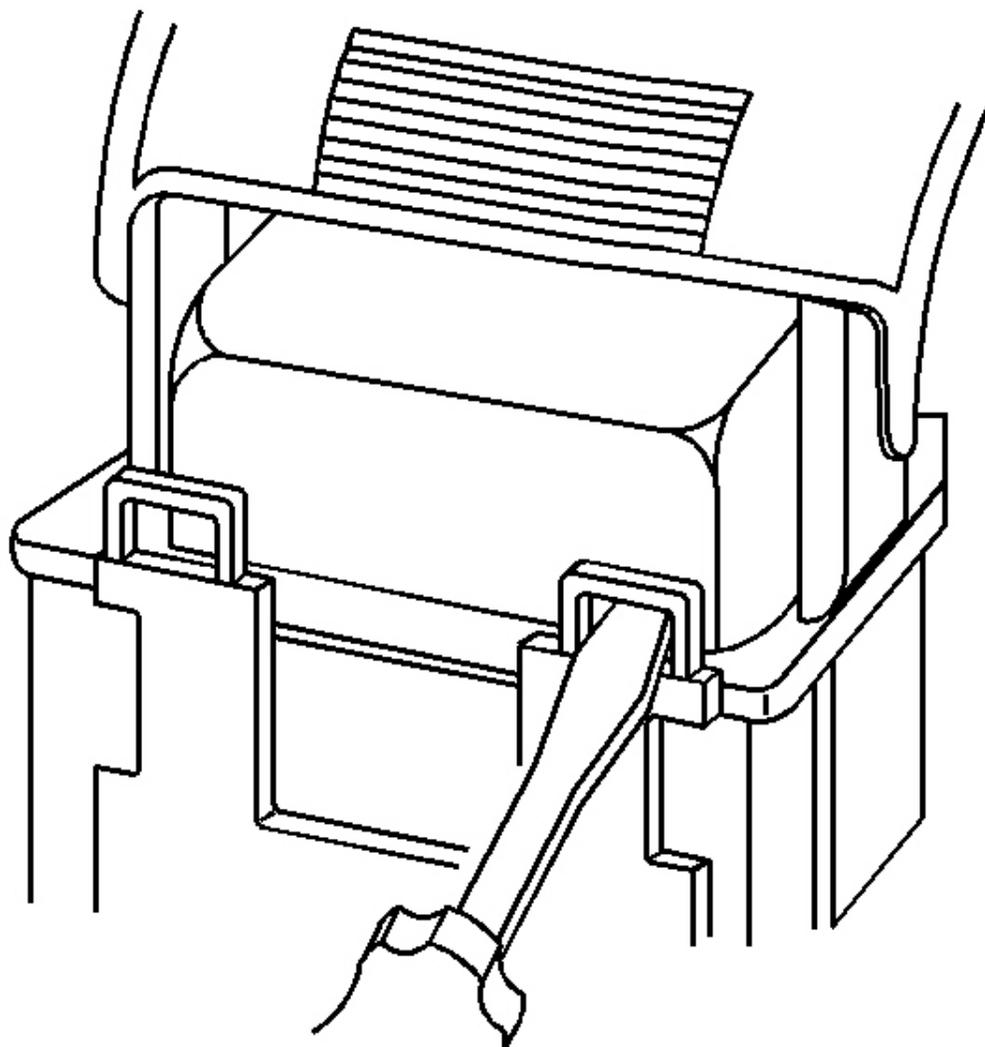
### Terminal Removal Procedure

Follow the steps below in order to remove terminals from Micro 64 connectors.



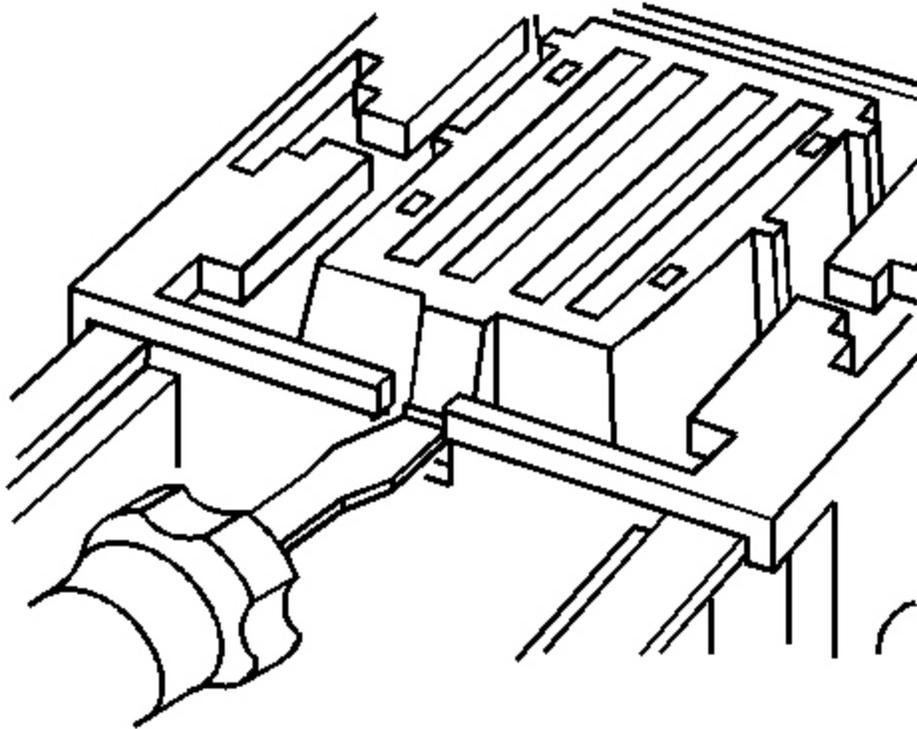
**Fig. 29: Disengaging Lever Lock**  
Courtesy of GENERAL MOTORS CORP.

1. Locate the lever lock on the wire dress cover. While depressing the lock, pull the lever over and past the lock.
2. Disconnect the connector from the component.



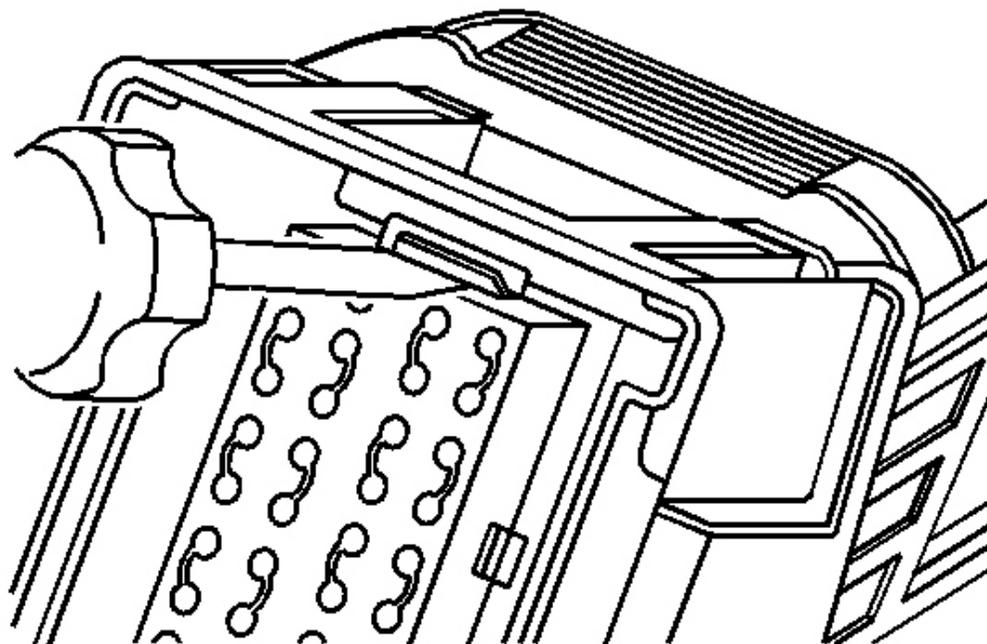
**Fig. 30: Releasing Locking Tabs**  
Courtesy of GENERAL MOTORS CORP.

3. Locate the dress cover locking tabs at the front of the connector. Using a small flat-bladed tool push down on one of the locking tabs and pull the cover up until the dress cover releases. Repeat this procedure for the other locking tab.
4. Once the front 2 locks are unlocked, lift the front of the dress cover and pull it forward.



**Fig. 31: Removing Nose Piece**  
Courtesy of GENERAL MOTORS CORP.

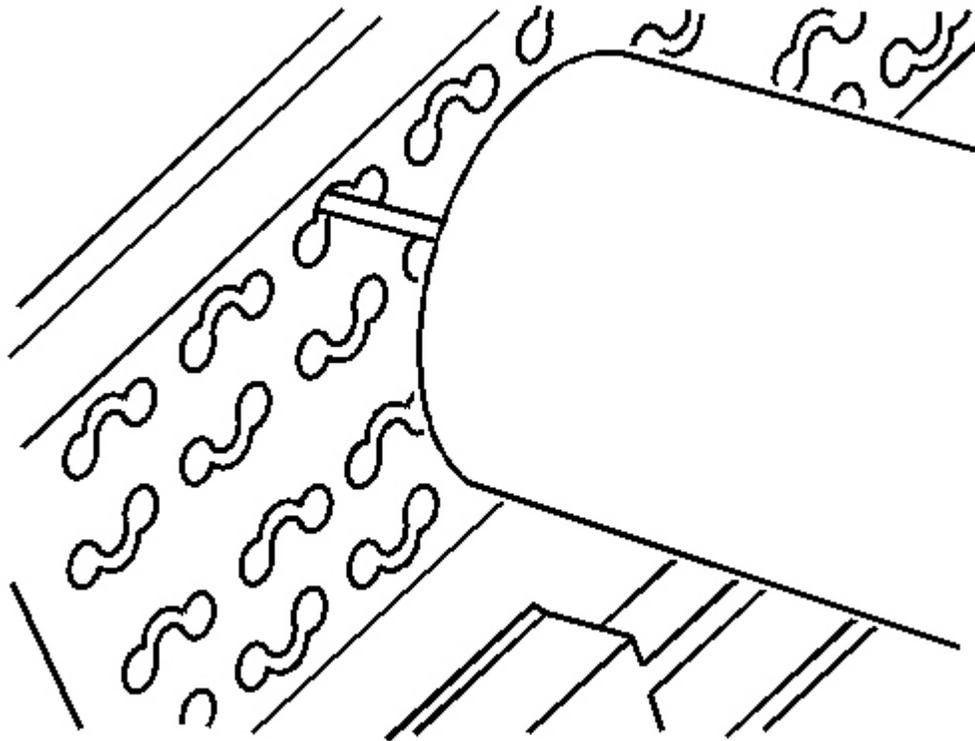
5. If the connector has a nose piece, use a small flat-blade tool to remove the nose piece by inserting the blade into the slot on the front of the connector and prying up on the nose piece.



**Fig. 32: Removing Terminal Position Assurance**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT:** Always use care when removing a terminal position assurance (TPA) in order to avoid damaging it.

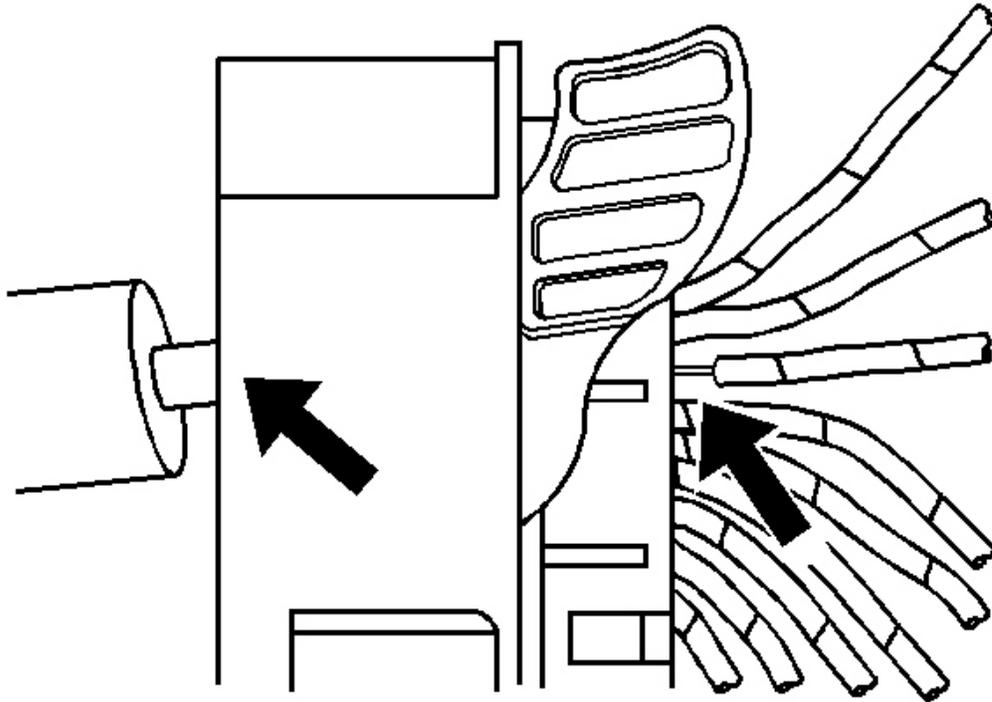
6. Remove the TPA by inserting a small flat-blade tool into the small slot on the TPA and pushing down until the TPA releases. Gently pry the TPA out of the connector.



**Fig. 33: Inserting J 38125-13A Into Terminal Cavities Canal**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT:** Be careful not to angle or rock the J 38125-13A tool when inserting it into the connector or the tool may break.

7. Insert the J 38125-13A (GM P/N 12031876-1) tool into the round canal between the terminals cavities at the front of the connector. See the release tool cross reference in the Reference Guide of the Terminal Repair Kit to ensure that the correct release tool is used.



**Fig. 34: Removing Wire From Back Of Connector**  
Courtesy of GENERAL MOTORS CORP.

8. While holding the removal tool in place, gently pull the wire out of the back of the connector. Always remember never use force when pulling a terminal out of a connector.

#### **Terminal Repair Procedure**

Follow the steps below in order to repair Micro 64 connector terminals.

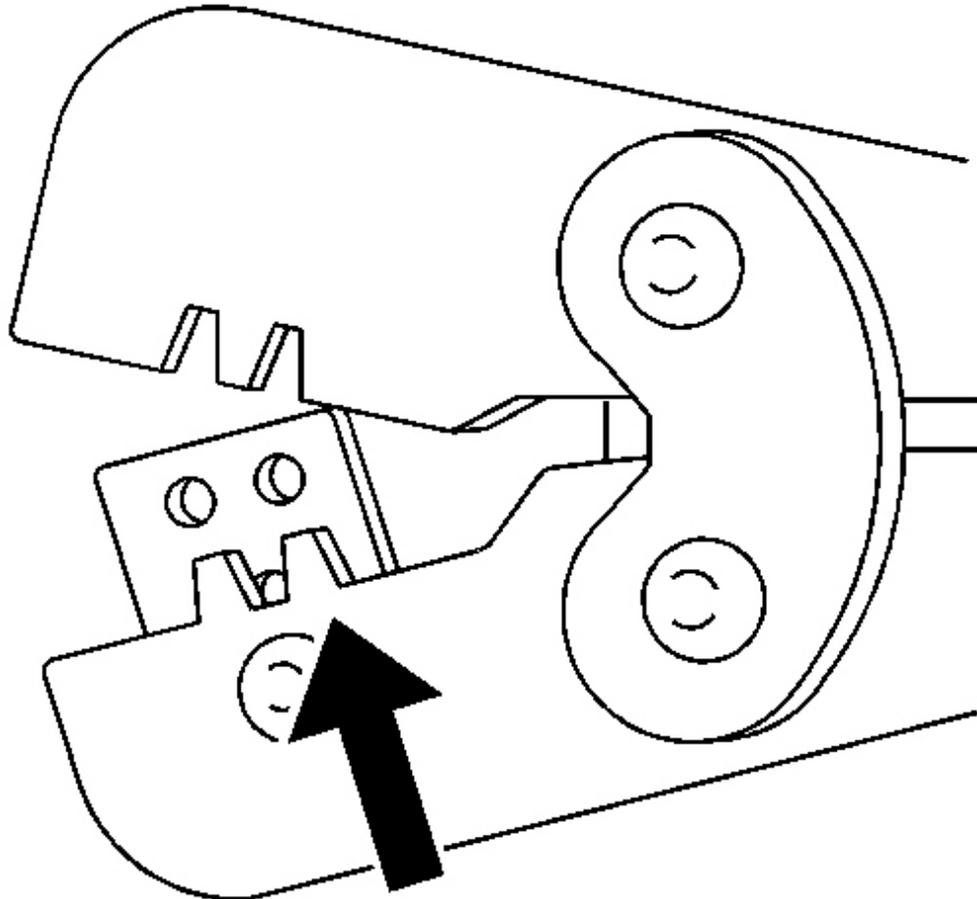
The Micro 64 connectors have small terminals that are difficult to handle and hold when crimping. In order to aid the technician when crimping these terminals, a new crimping tool was developed. The J 38125-64 (M jaw) was developed to crimp Micro 64 terminals. The J 38125-64 crimping tool has a terminal holding block that will hold the terminal in place while the terminal is being crimped. The J 38125-64 crimping tool is also designed to crimp both the wire and the insulation at the same time.

After the terminal is removed from the connector perform the following procedure in order to repair Micro 64 terminals.

**IMPORTANT: After cutting the damaged terminal from the wire, determine if the remaining**

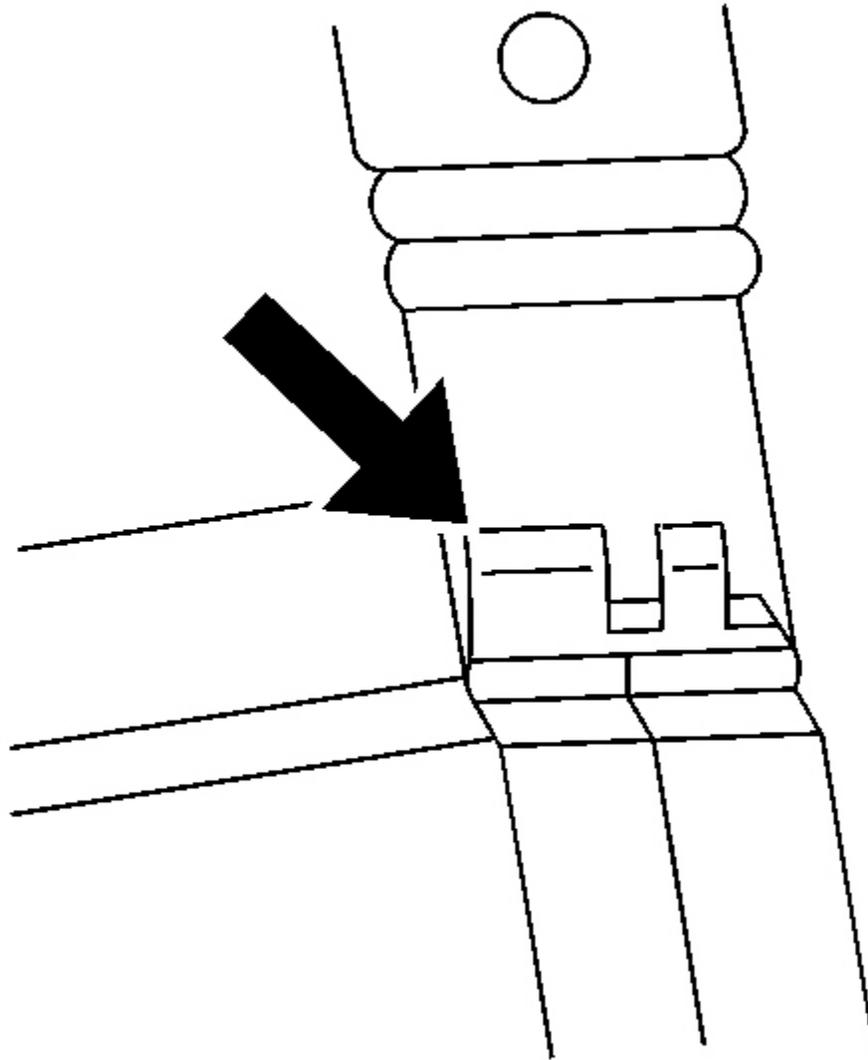
wire is long enough to reach the connector without putting a strain on the wire. If the wire is not long enough, splice a small length of the same gauge wire to the existing wire, then crimp the new terminal on the added wire.

1. Cut the wire as close to the damaged terminal as possible.
2. Strip 5 mm (3/16 in) of insulation from the wire.



**Fig. 35: Identifying Crimping Tool Spring Loaded Locator**  
Courtesy of GENERAL MOTORS CORP.

3. Depress the spring loaded locator of the crimping tool until the terminal holder is completely visible.



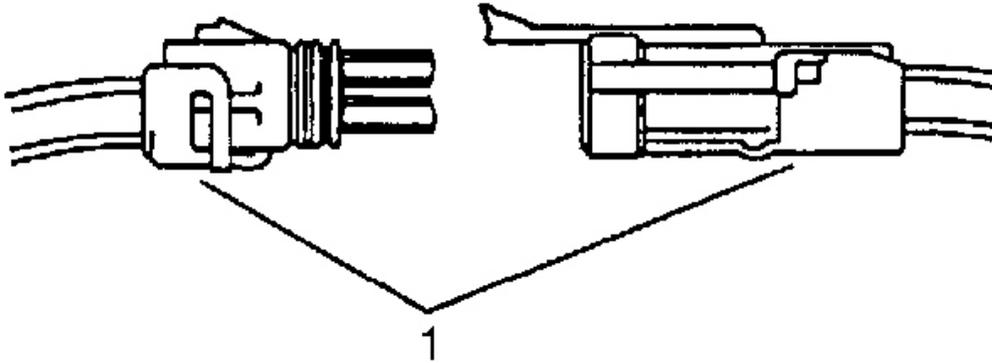
**Fig. 36: Inserting Terminal Into Terminal Holder**  
**Courtesy of GENERAL MOTORS CORP.**

4. Insert terminal into the appropriate terminal holder until it hits bottom and stops. The correct terminal holder is determined by the wire size. Also ensure that the terminal wings are pointing towards the former on the tool and the release locator.
5. Insert the stripped cable into the terminal. Insulation should be visible on both sides of the terminal insulation wings.
6. Compress the handles until the ratchet automatically releases.

7. Place the terminal into the appropriate cavity and assemble the connector.

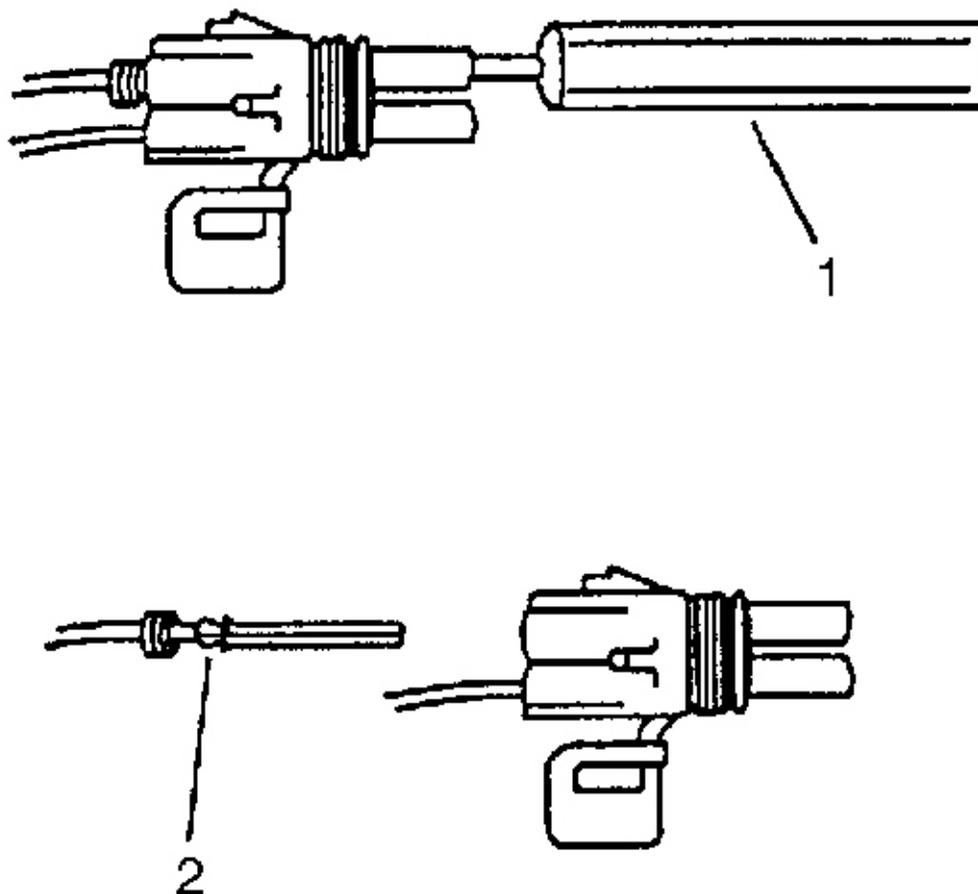
## **WEATHER PACK CONNECTORS**

The following is the proper procedure for the repair of Weather Pack(R) Connectors.



**Fig. 37: Separating Weather Pack Connector Halves**  
Courtesy of GENERAL MOTORS CORP.

1. Separate the connector halves (1).
2. Open the secondary lock. A secondary lock aids in terminal retention and is usually molded to the connector (1).
3. Grasp the wire and push the terminal to the forward most position. Hold the wire in this position.



**Fig. 38: Removing Cable & Terminal From Connector**  
 Courtesy of GENERAL MOTORS CORP.

4. Insert the Weather Pack(R) terminal removal tool into the front (mating end) of the connector cavity until it rests on the cavity shoulder (1).
5. Gently pull on the wire to remove the terminal through the back of the connector (2).

**IMPORTANT: Never use force to remove a terminal from a connector.**

6. Inspect the terminal and connector for damage. Repair as necessary. Refer to **Repairing Connector Terminals**.
7. Reform the lock tang (2) and reset terminal in connector body.
8. Close secondary locks and join connector halves.

9. Verify that circuit is complete and working satisfactorily.
10. Perform system check.

## **REPAIRING CONNECTOR TERMINALS**

### **Tools Required**

**J-38125** Terminal Repair Kit. See **Special Tools and Equipment** .

### **Repairing Connector Terminals**

Use the following repair procedures in order to repair the following:

- Push to Seat terminals
- Pull to Seat terminals

Some terminals do not require all of the steps shown. Skip the steps that do not apply for your terminal repair. The **J-38125** contains further information. See **Special Tools and Equipment** .

1. Cut off the terminal between the core and the insulation crimp. Minimize any wire loss.

For cable seal terminals, remove the seal.

2. Apply the correct cable seal per gauge size of the wire, if used.

Slide the seal back along the wire in order to enable insulation removal.

3. Remove the insulation.
4. For sealed terminals only, align the seal with the end of the cable insulation.
5. Position the strip in the terminal.

For sealed terminals, position the strip and seal in the terminal.

6. Hand crimp the core wings.
7. Hand crimp the insulation wings.

For sealed terminals, hand crimp the insulation wings around the seal and the cable.

8. Solder all of the hand crimp terminals excepting Micro-Pack 100 .64 size. Soldering Micro-Pack 100 World terminals may damage the terminal.

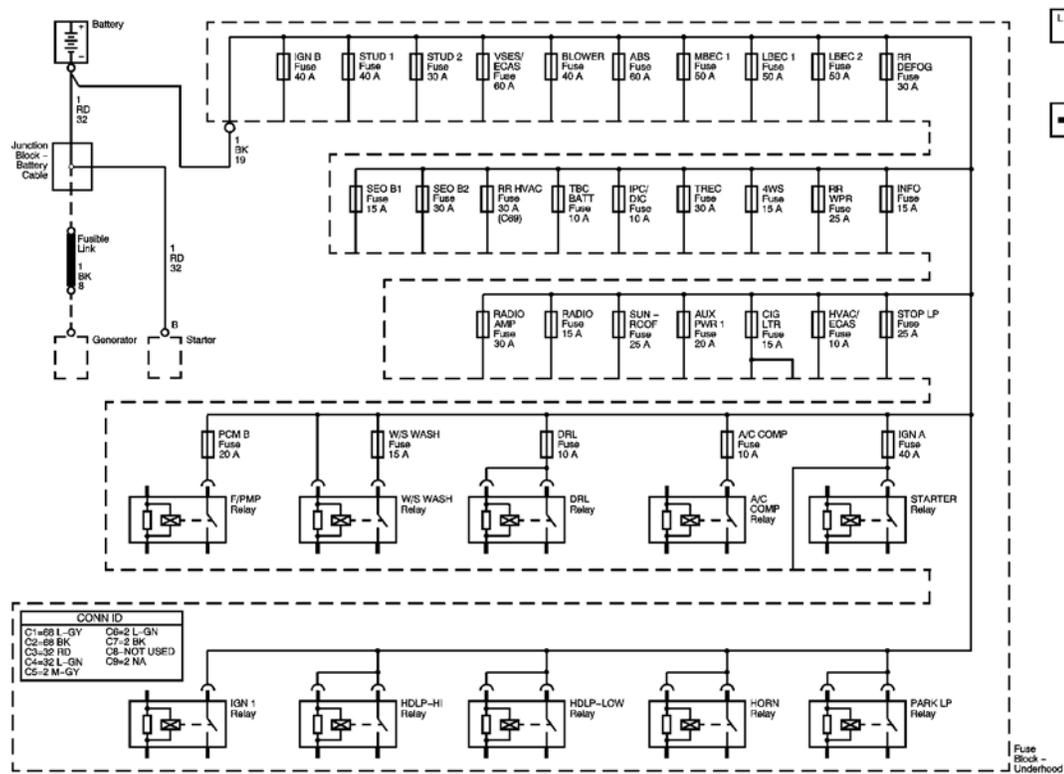
## **SCHEMATIC AND ROUTING DIAGRAMS**

### **POWER AND GROUNDING SCHEMATIC ICONS**

# Power and Grounding Schematic Icons

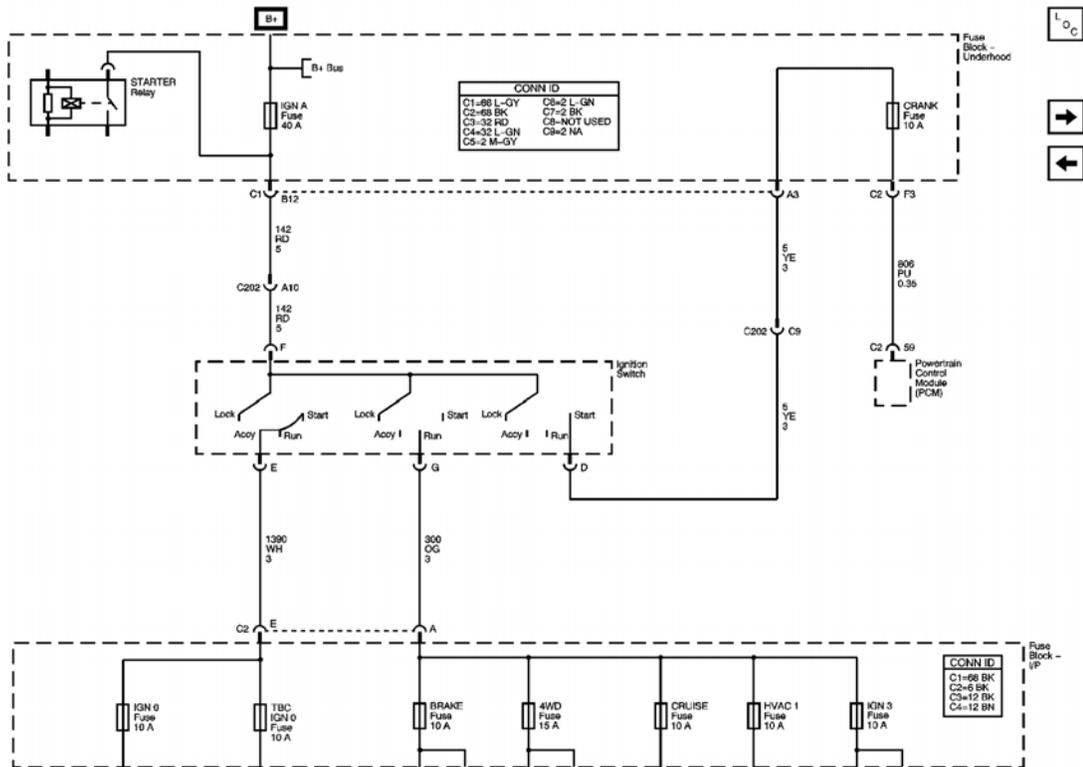
Icon	Icon Definition
	<p><b>CAUTION:</b></p> <p>When performing service on or near the SIR components or the SIR wiring, the SIR system must be disabled. Refer to SIR Disabling and Enabling Zones. Failure to observe the correct procedure could cause deployment of the SIR components, personal injury, or unnecessary SIR system repairs.</p>

## POWER DISTRIBUTION SCHEMATICS

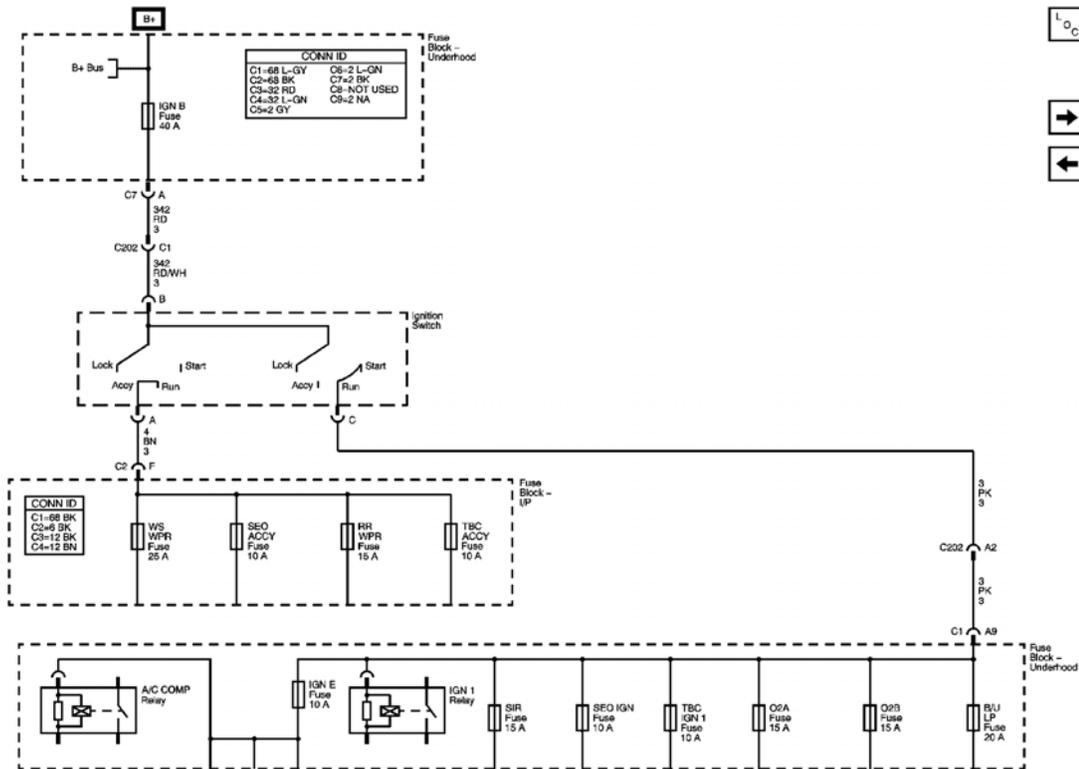


**Fig. 39: B+ Bus Schematic**

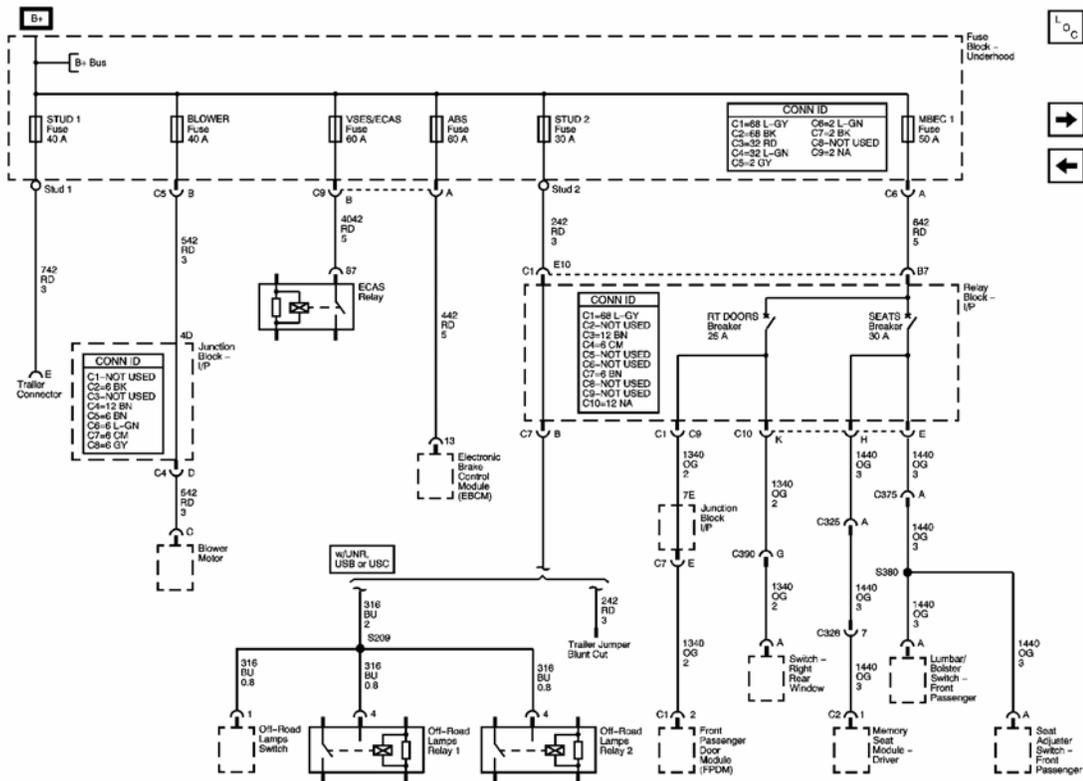
Courtesy of GENERAL MOTORS CORP.



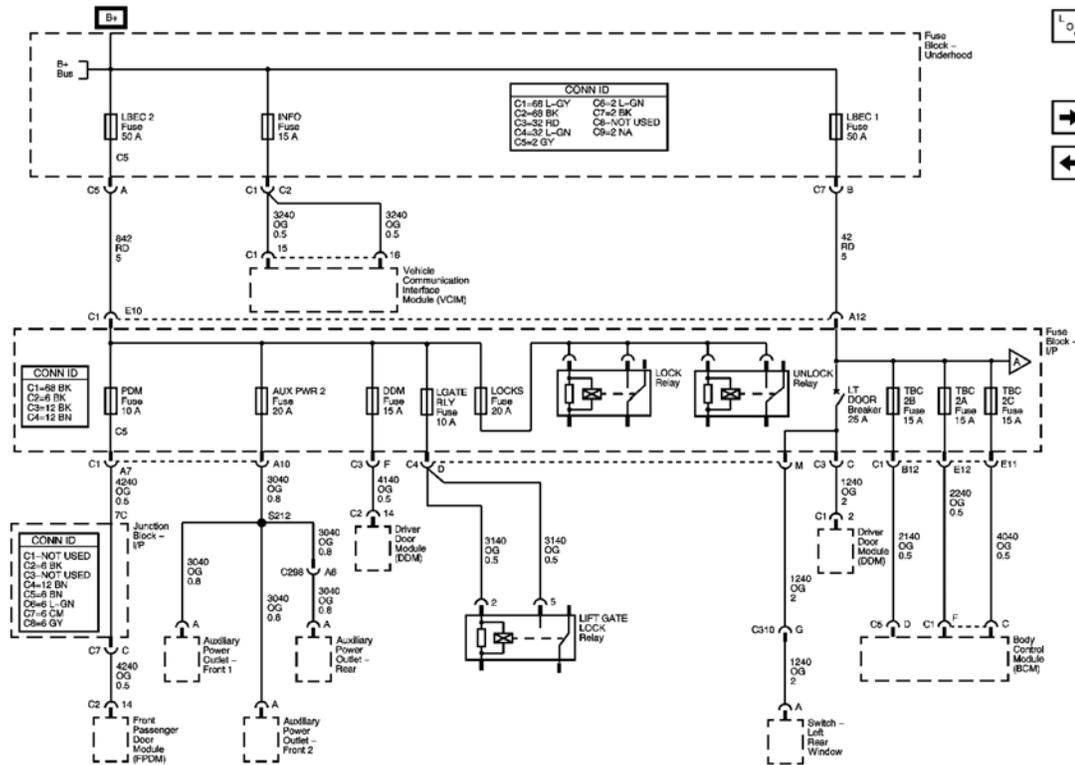
**Fig. 40: ACCY/RUN/START, RUN, and START Bus Bars, and CRANK Fuse Schematic**  
 Courtesy of GENERAL MOTORS CORP.



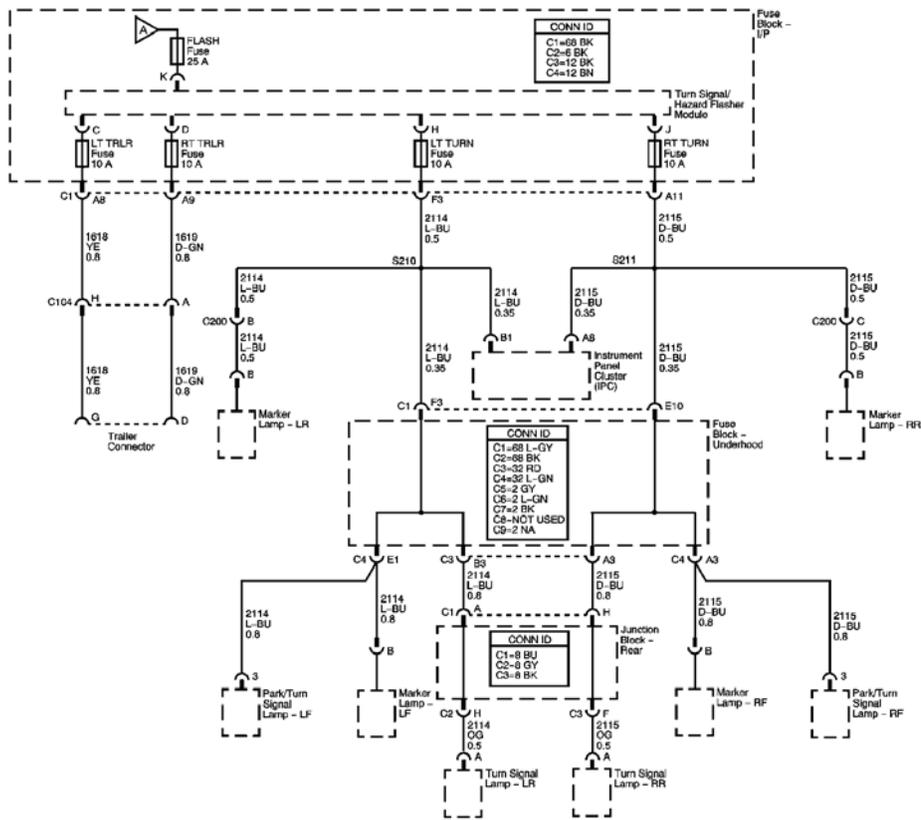
**Fig. 41: ACCY/RUN and RUN/START Bus Bars Schematic**  
 Courtesy of GENERAL MOTORS CORP.



**Fig. 42: STUD 1, STUD 2, VSES/ECAS, BLOWER, ABS, and MBEC 1 Fuses, RT DOORS and SEATS Circuit Breakers Schematic**  
 Courtesy of GENERAL MOTORS CORP.



**Fig. 43: LBEC 1, LBEC 2, INFO, PDM, AUX PWR, DDM, LOCKS, TBC 2A, 2B, and 2C Fuses, and LT DOORS Circuit Breaker Schematic**  
 Courtesy of GENERAL MOTORS CORP.

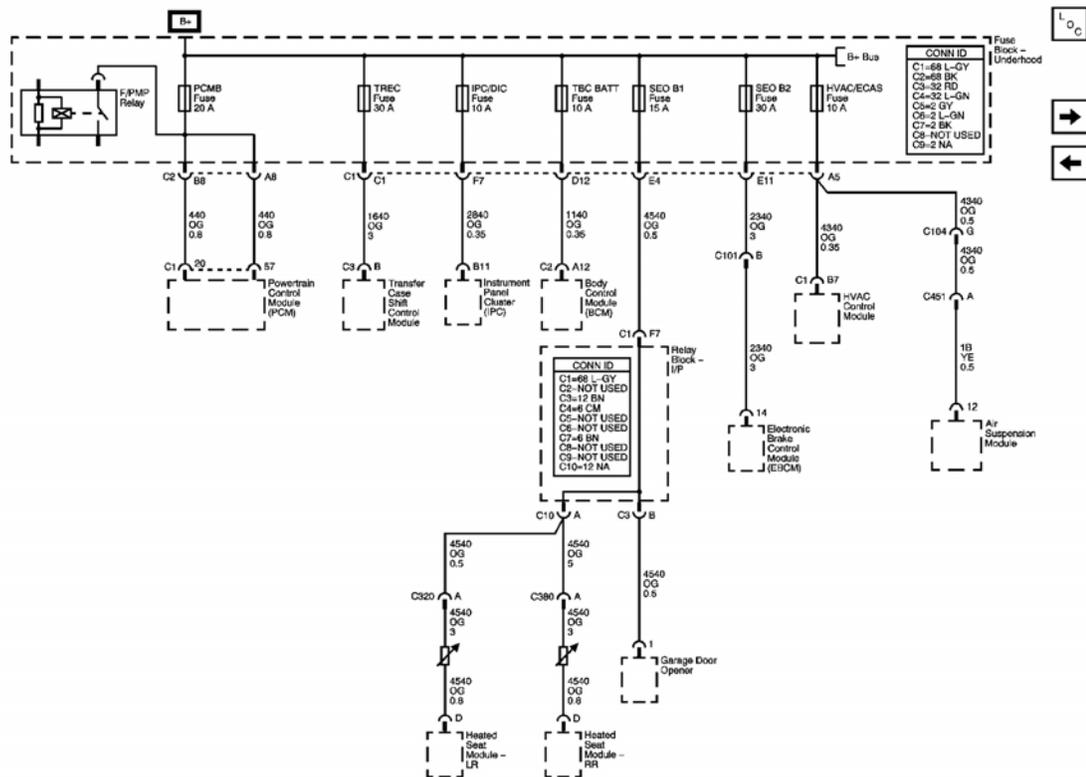


L<sub>o</sub>C

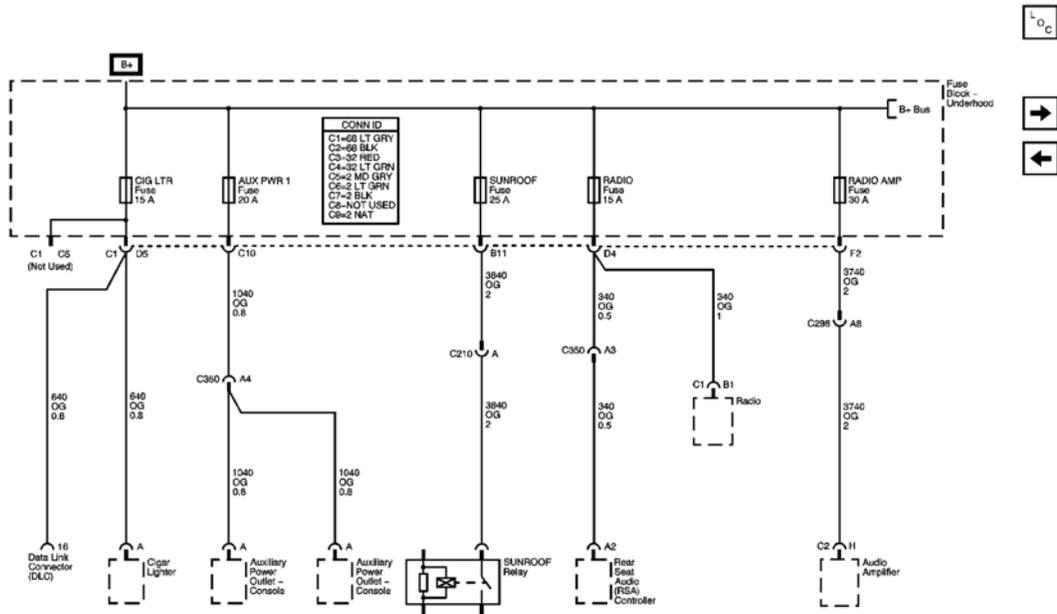


**Fig. 44: FLASH, LT TRLR, RT TRLR, LT TURN, and RT TURN Fuses Schematic**  
 Courtesy of GENERAL MOTORS CORP.

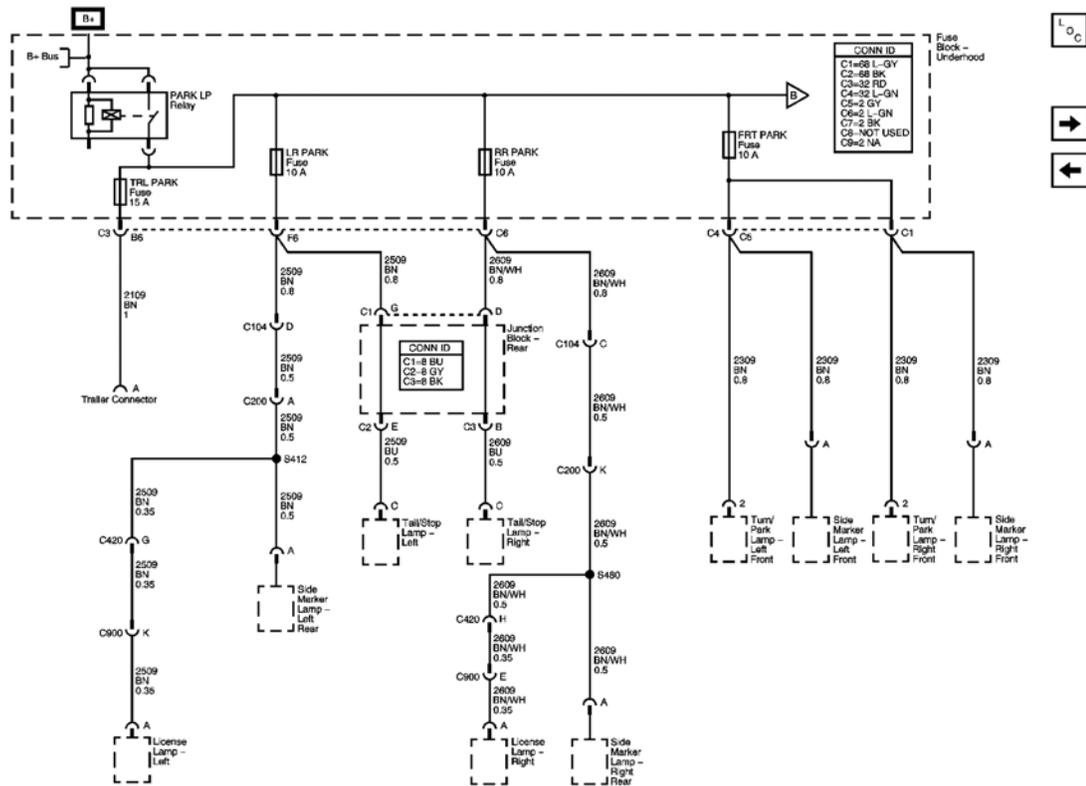




**Fig. 46: PCM B, TREC, IPC/DIC, TBC BATT, SEO B1, SEO B2, and HVAC/ECAS Fuses Schematic**  
 Courtesy of GENERAL MOTORS CORP.



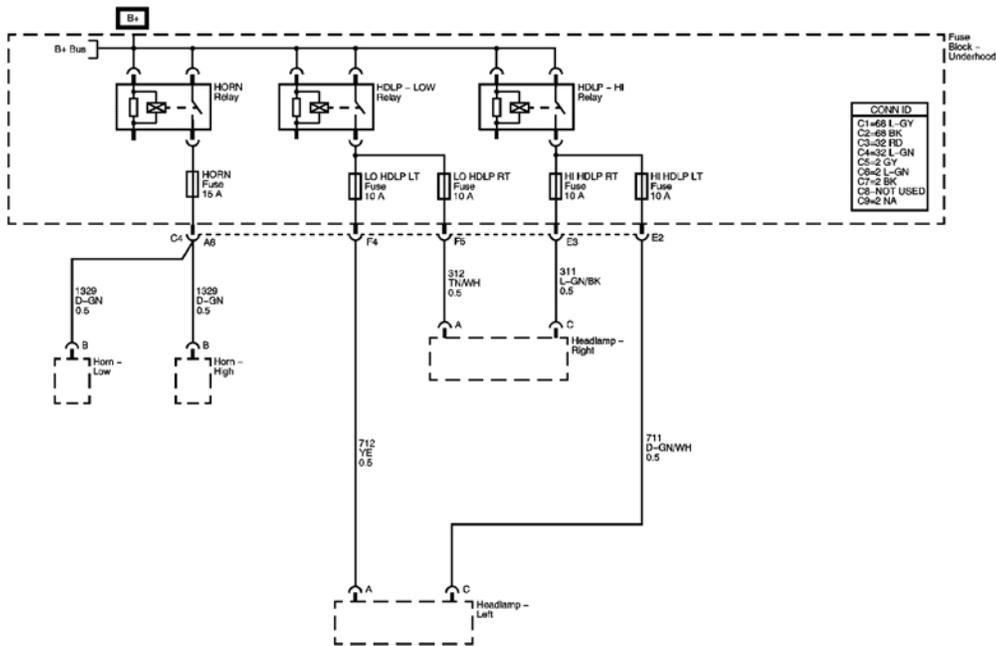
**Fig. 47: CIG LTR, AUX PWR 1, SUNROOF, RADIO, RADIO AMP, and RR HVAC Fuses Schematic**  
 Courtesy of GENERAL MOTORS CORP.



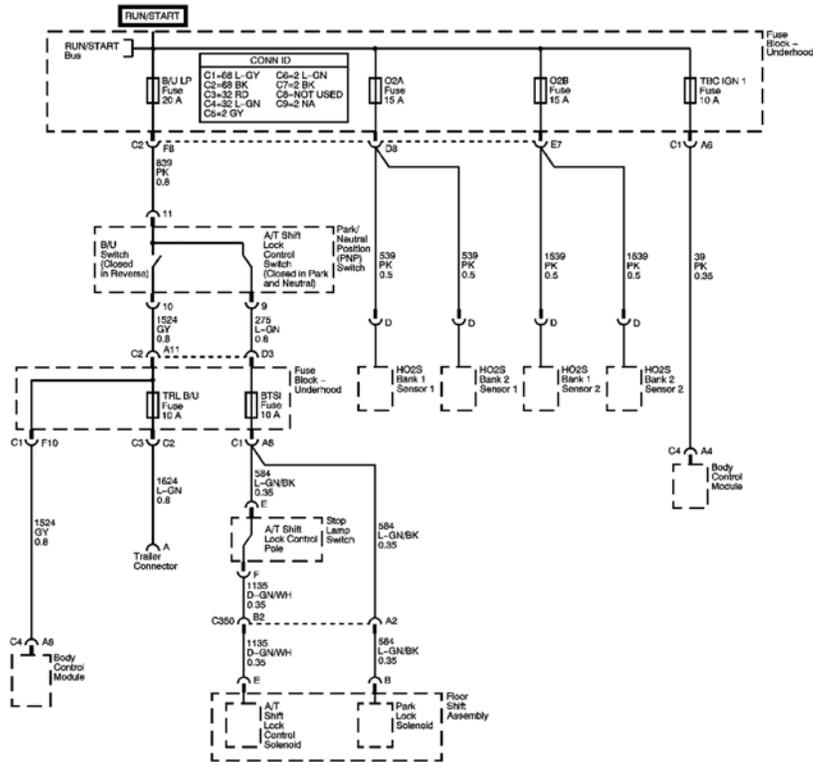
**Fig. 48: TRL PARK, LR PARK, RR PARK, and FRT PARK Fuses Schematic**  
 Courtesy of GENERAL MOTORS CORP.



L<sub>O</sub>C



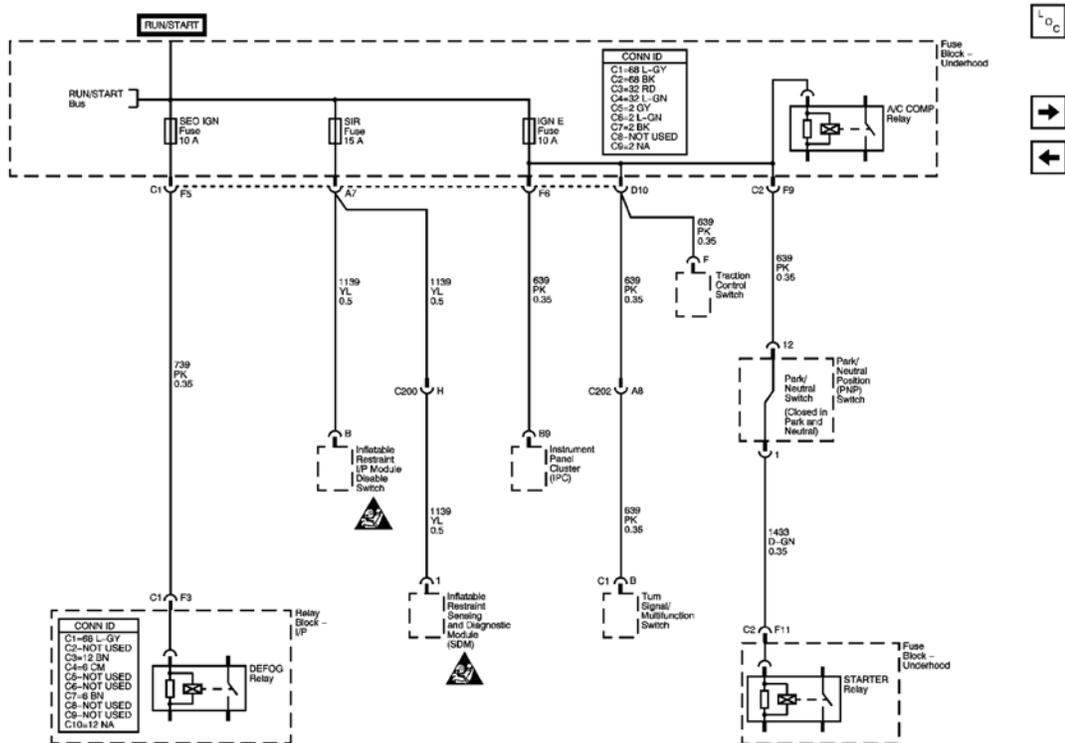
**Fig. 50: HORN, LO HDLP LT, LO HDLP RT, HI HDLP RT, and HI HDLP LT Fuses Schematic**  
 Courtesy of GENERAL MOTORS CORP.



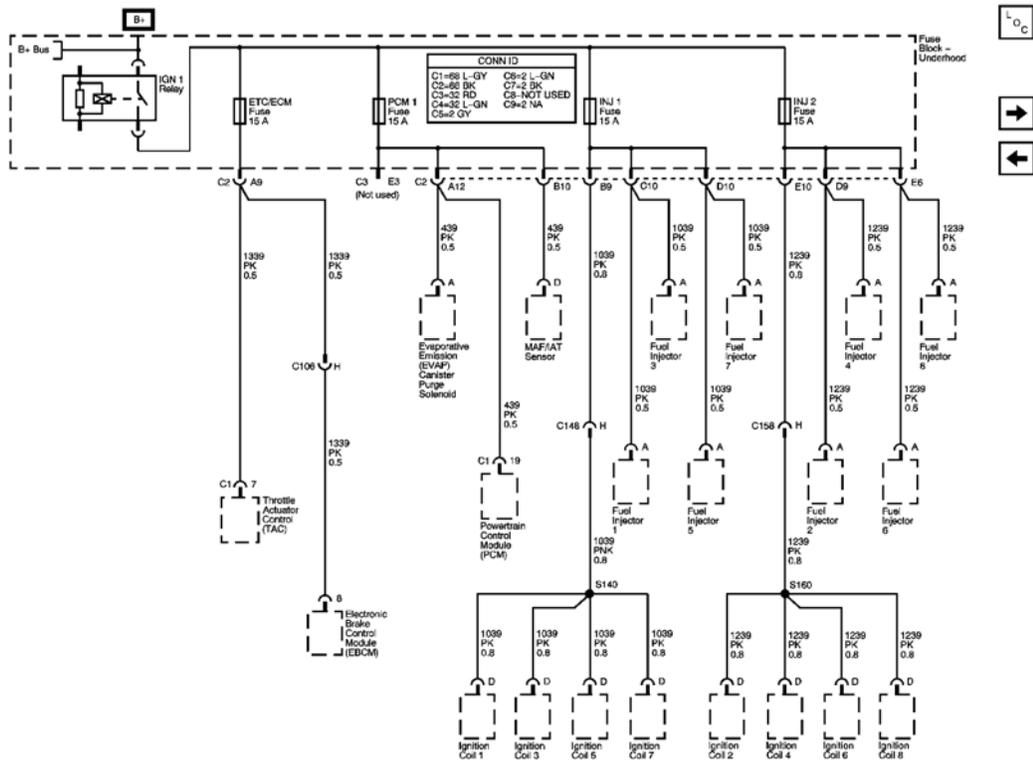
L<sub>O</sub>C



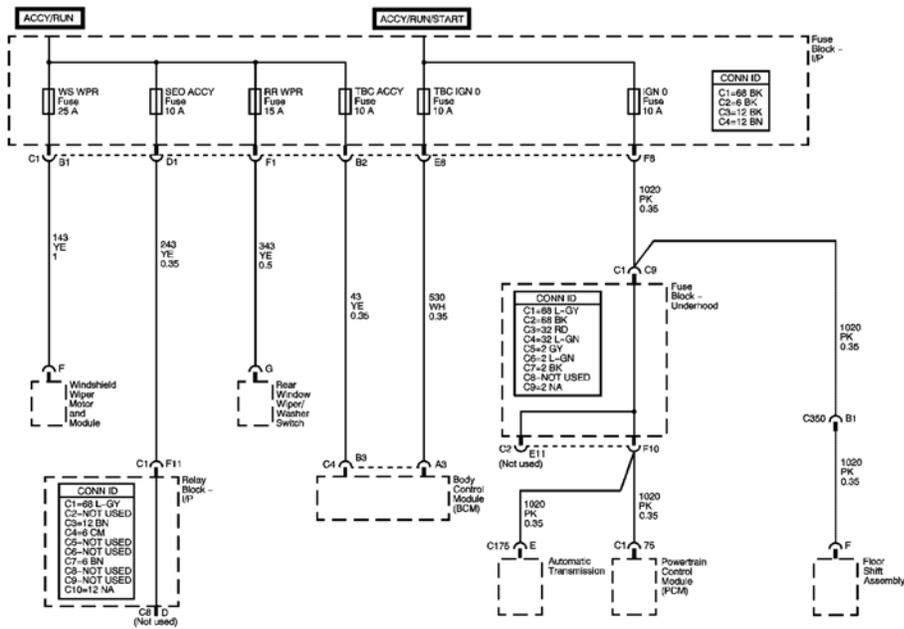
**Fig. 51: B/U LP, O2A, O2B, TBC IGN1, TRL B/U, and BTSI Fuses Schematic**  
 Courtesy of GENERAL MOTORS CORP.



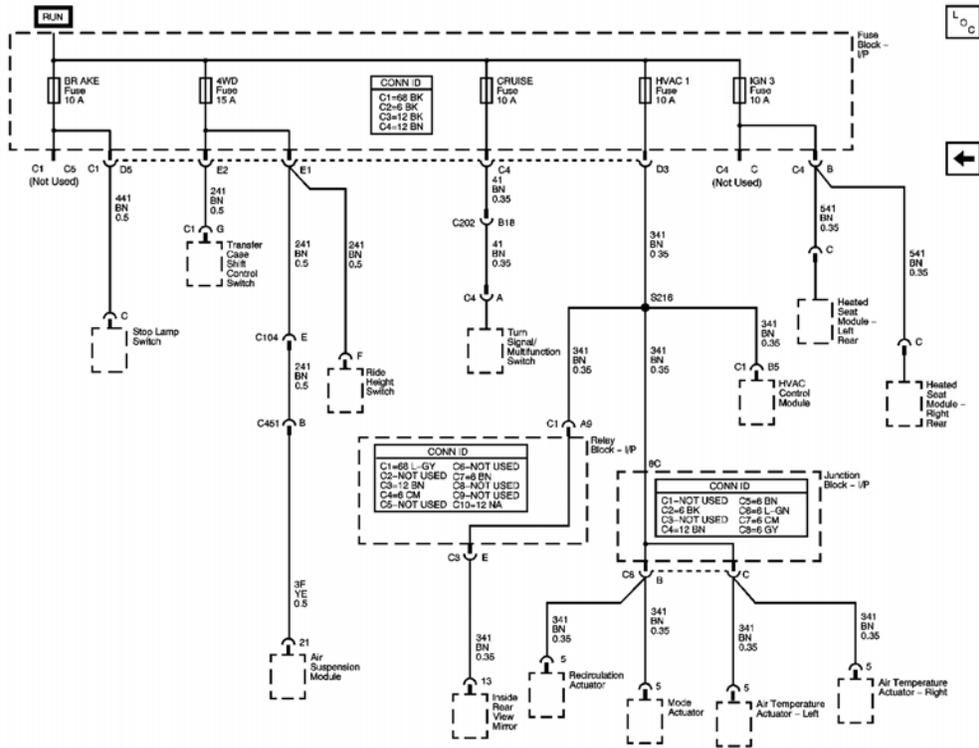
**Fig. 52: SEO IGN, SIR, and IGN E Fuses Schematic**  
 Courtesy of GENERAL MOTORS CORP.



**Fig. 53: ECT/ECM, PCM 1, INJ 1, and INJ 2 Fuses Schematic**  
 Courtesy of GENERAL MOTORS CORP.

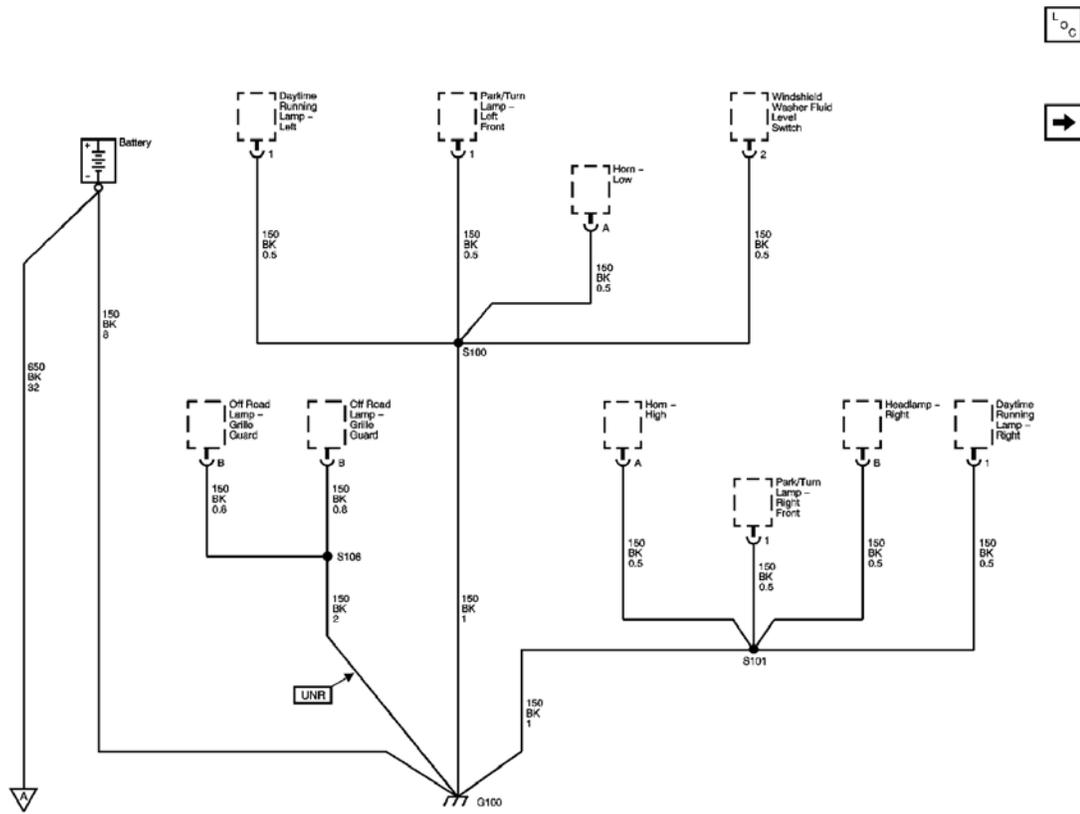


**Fig. 54: WS WPR, SEO ACCY, RR WPR, TBC ACCY, TBC IGN 0, and IGN 0 Fuses Schematic**  
 Courtesy of GENERAL MOTORS CORP.

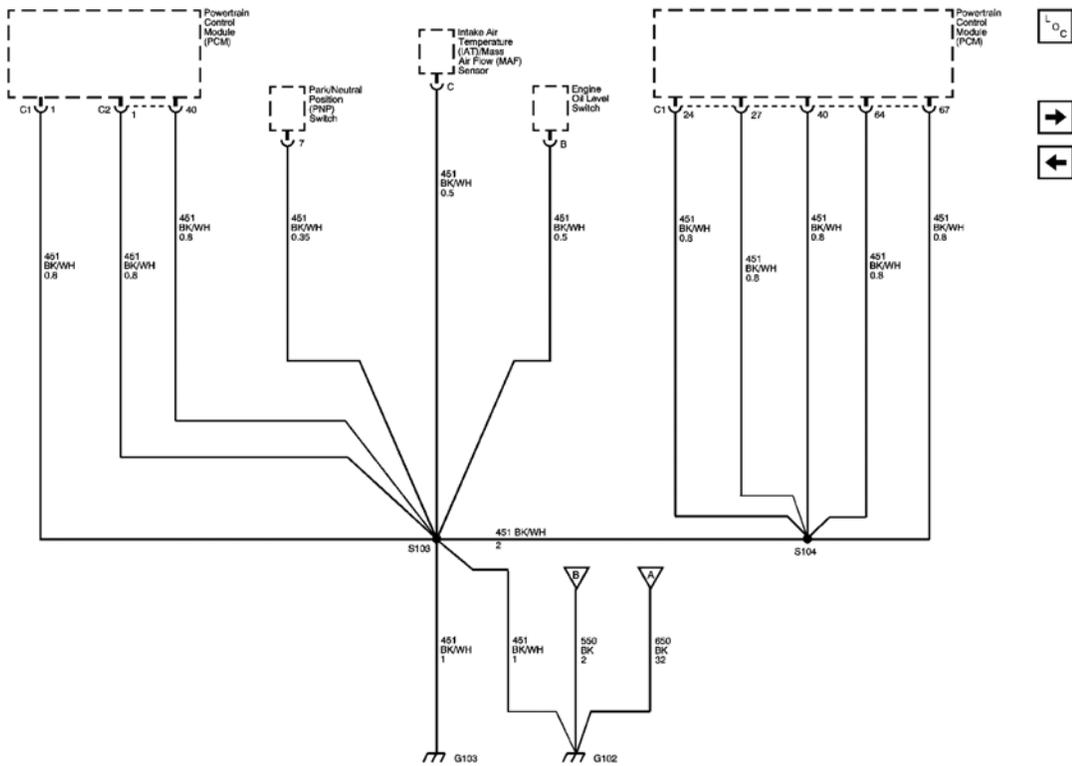


**Fig. 55: BRAKE, 4WD, CRUISE, HVAC 1, and IGN 3 Fuses Schematic**  
 Courtesy of GENERAL MOTORS CORP.

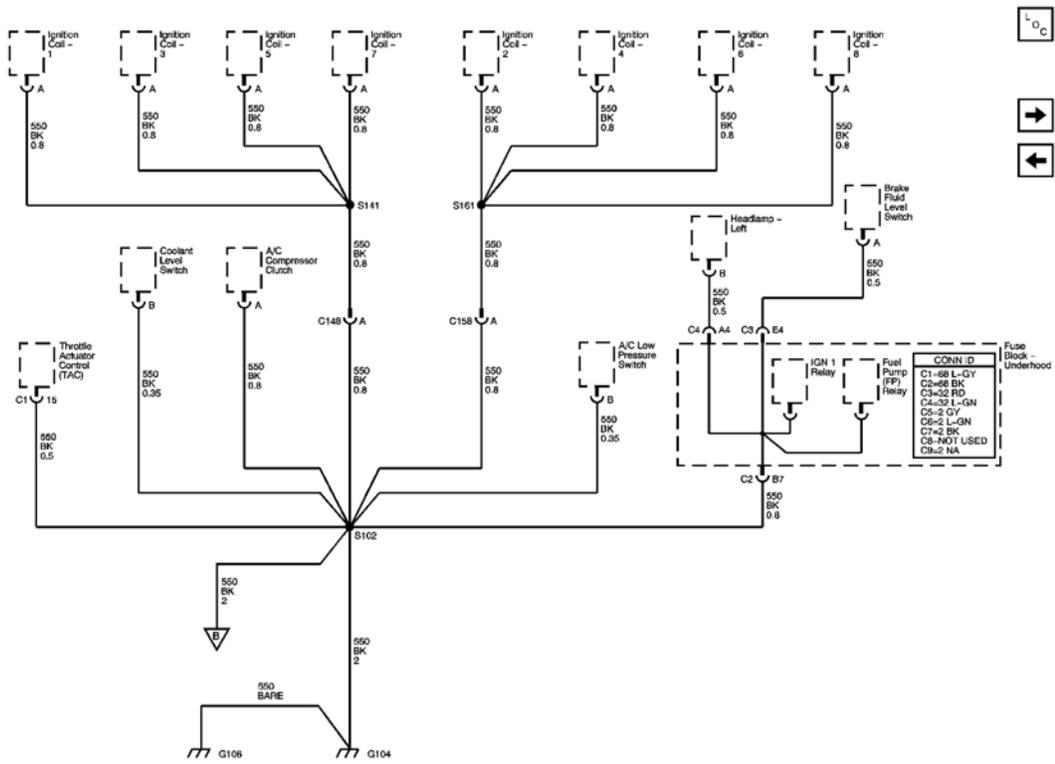
## GROUND DISTRIBUTION SCHEMATICS



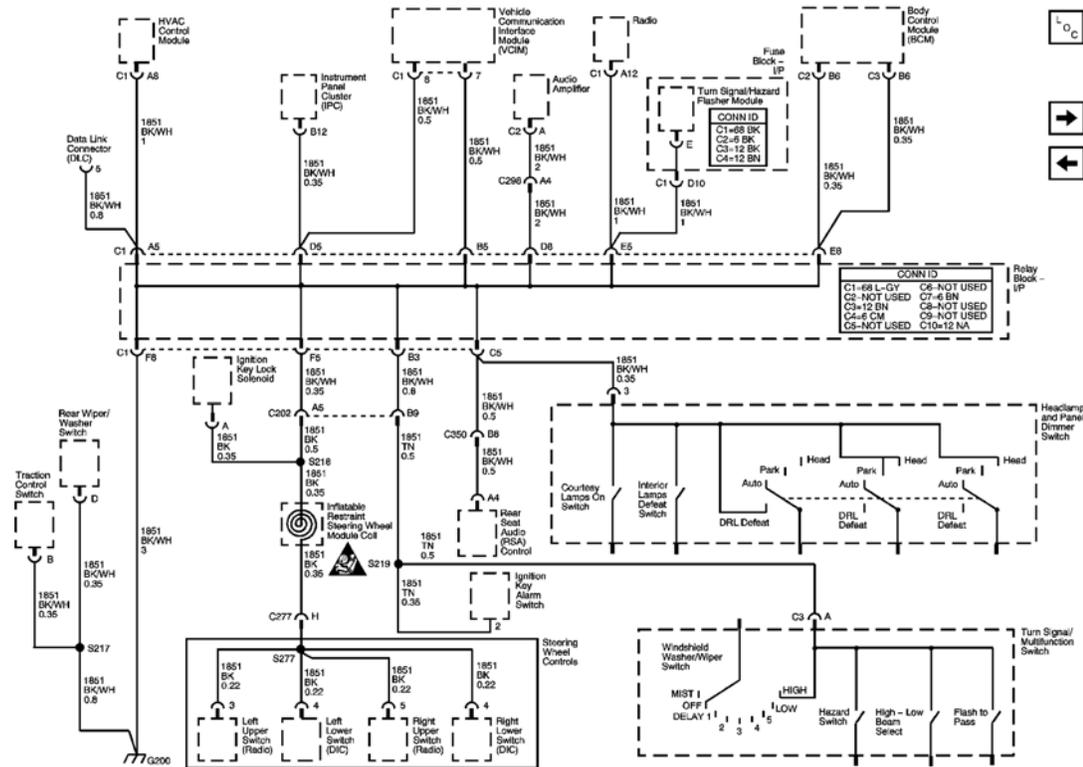
**Fig. 56: G100 Schematic**  
 Courtesy of GENERAL MOTORS CORP.



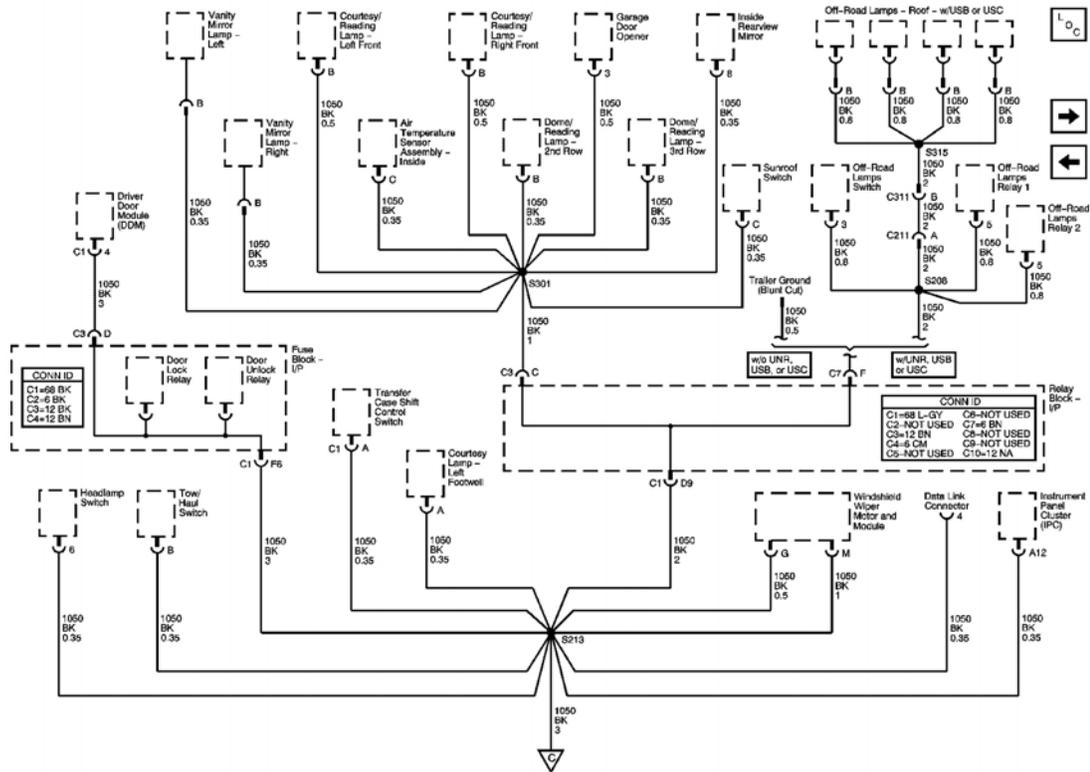
**Fig. 57: G102 and G103 Schematic**  
 Courtesy of GENERAL MOTORS CORP.



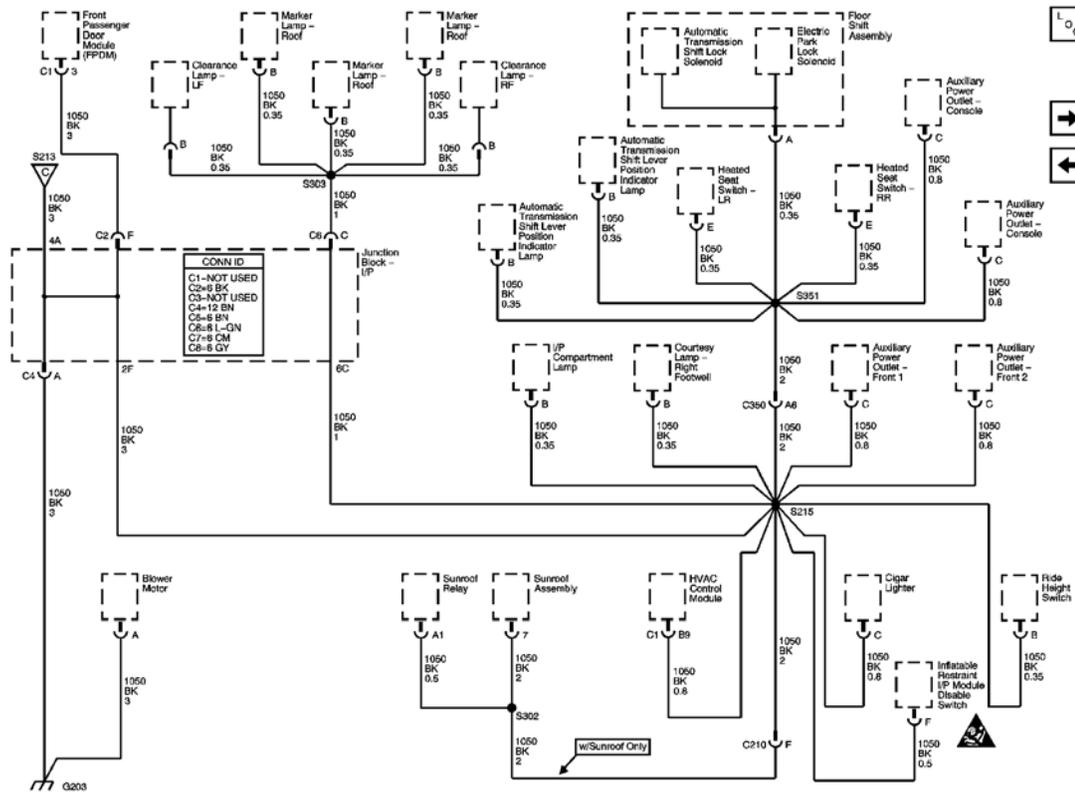
**Fig. 58: G104 and G106 Schematic**  
 Courtesy of GENERAL MOTORS CORP.



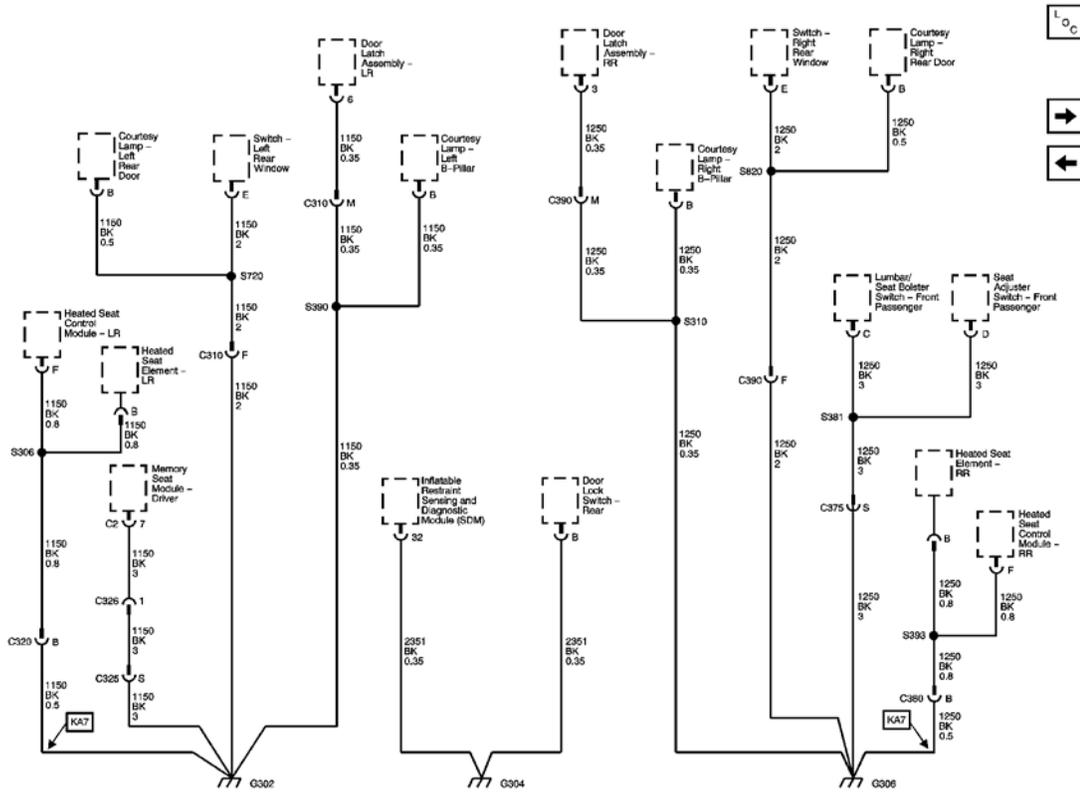
**Fig. 59: G200 Schematic**  
 Courtesy of GENERAL MOTORS CORP.



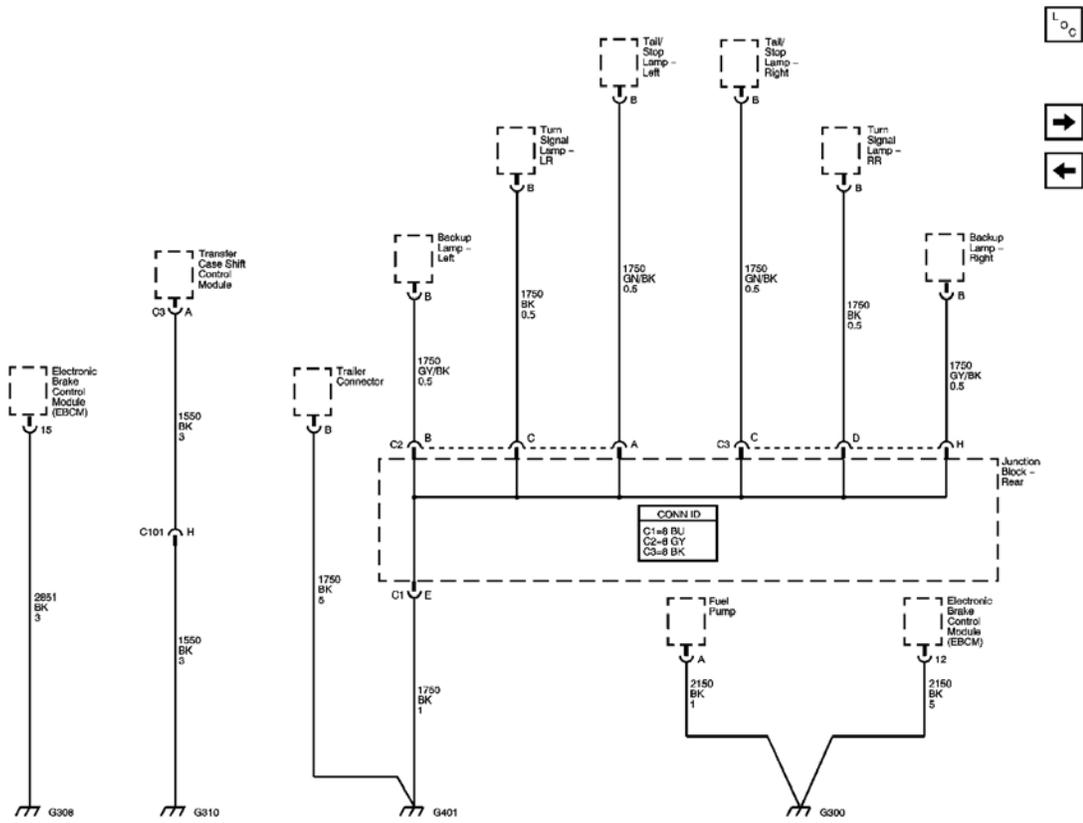
**Fig. 60: CKT 1050: S301 and S213 Schematic**  
 Courtesy of GENERAL MOTORS CORP.



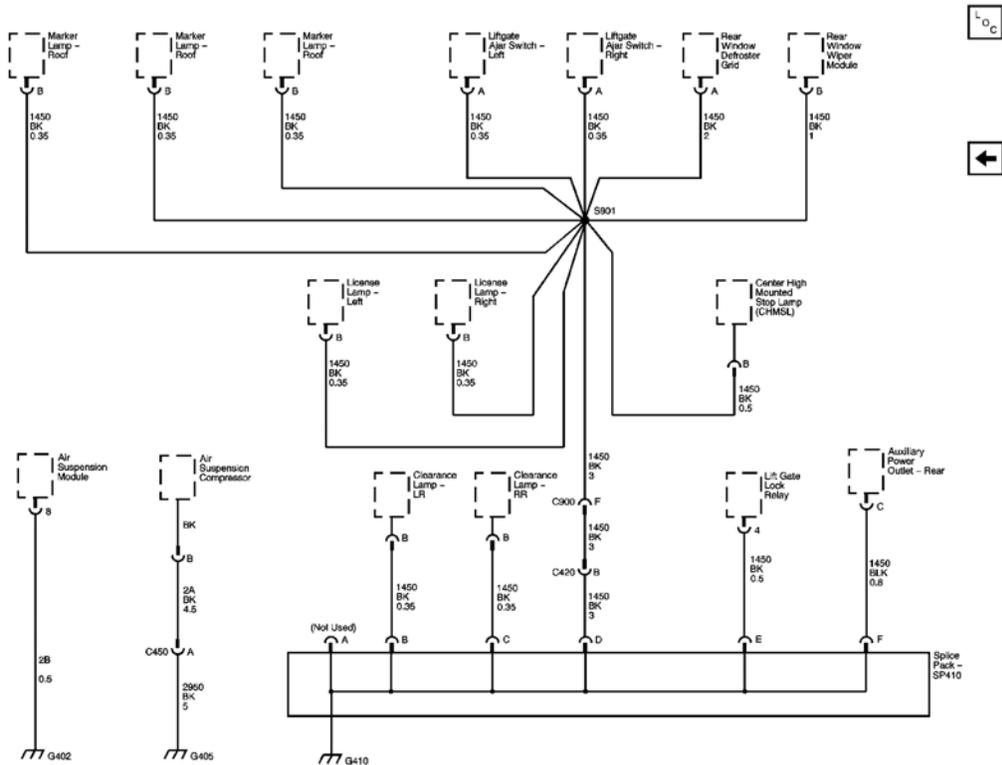
**Fig. 61: CKT 1050: G203, S302, S303, S351, and S215 Schematic**  
 Courtesy of GENERAL MOTORS CORP.



**Fig. 62: G302, G304, and G306 Schematic**  
**Courtesy of GENERAL MOTORS CORP.**

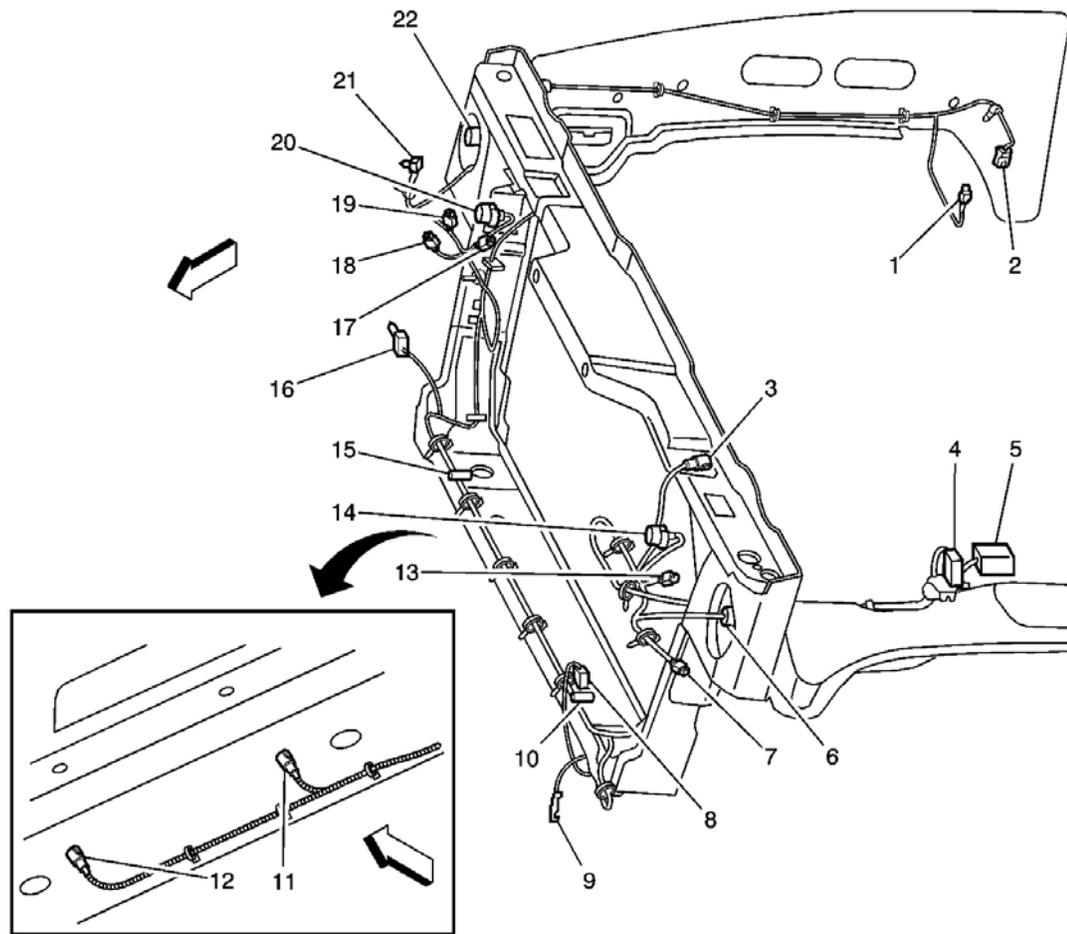


**Fig. 63: G308, G310, G401, and G300 Schematic**  
 Courtesy of GENERAL MOTORS CORP.



**Fig. 64: G402, G405, and G410 Schematic**  
 Courtesy of GENERAL MOTORS CORP.

## HARNES ROUTING COMPONENT VIEWS

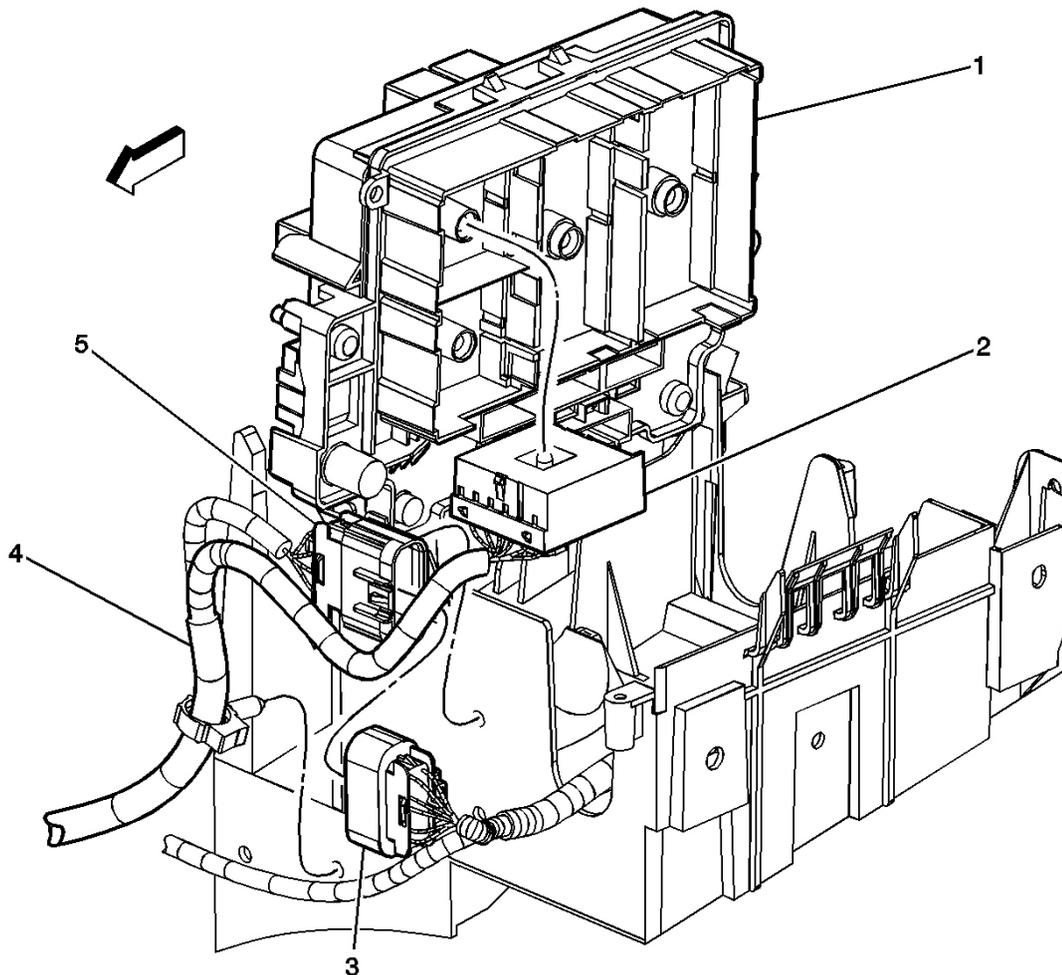


**Fig. 65: Forward Lamp Harness Routing Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 65**

Callout	Component Name
1	Washer Fluid Level Sensor Connector
2	Windshield Washer Fluid Pump Connector (Reversible)
3	Underhood Lamp Inline (If Equipped)
4	C103
5	Fuse Block - Underhood C4
6	Park/Turn Signal Lamp Connector - LF
7	Marker Lamp Connector - LF
8	Daytime Running Lamp (DRL) Connector - Left
9	G100
10	S101
11	Inflatable Restraint Front End Discriminating Sensor Connector - Left
12	

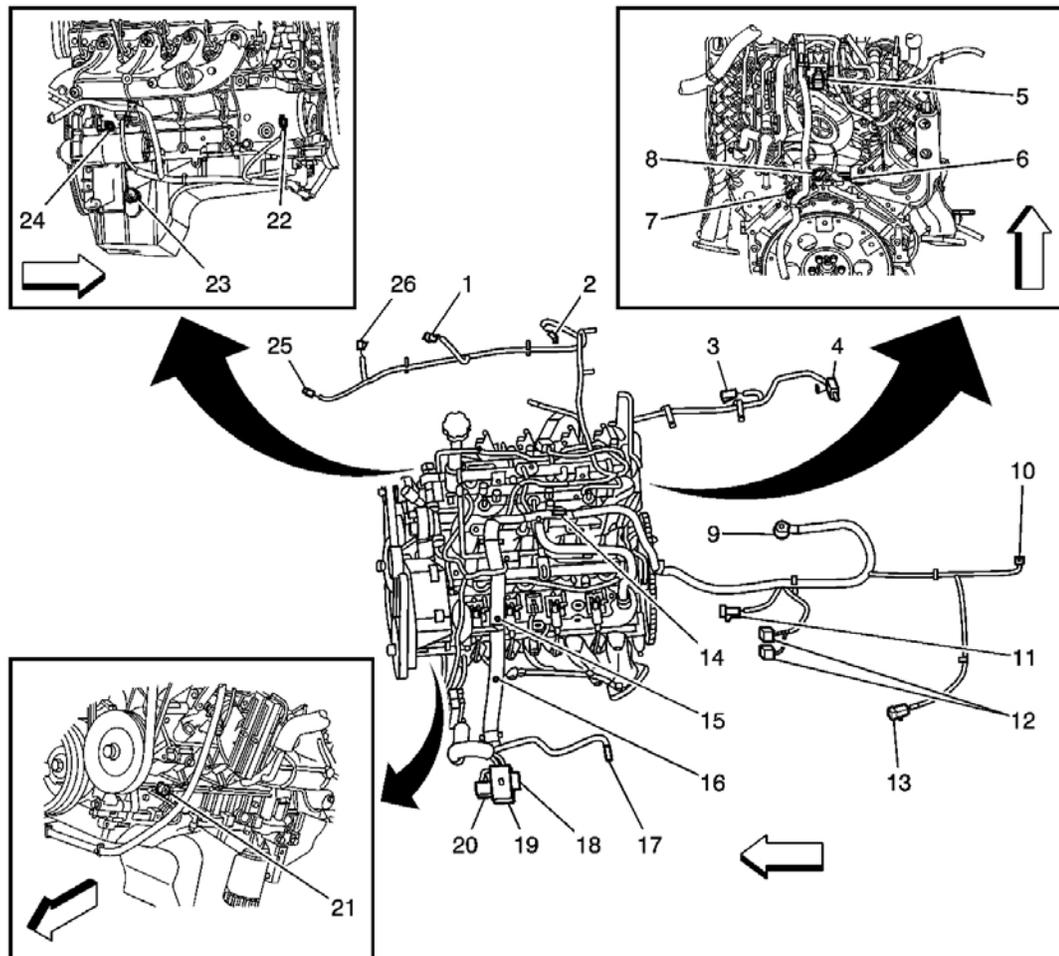
12	Inflatable Restraint Front End Discriminating Sensor Connector - Right
13	Horn Connector - Left
14	Headlamp Connector - Left
15	S100
16	Daytime Running Lamp (DRL) Connector - Right
17	Horn Connector - Right
18	Ambient Air Temperature Sensor Connector - HVAC
19	Ambient Air Temperature Sensor Connector - Mirror
20	Headlamp Connector - Right
21	Marker Lamp Connector - Right
22	Park/Turn Signal Lamp Connector - RF



**Fig. 66: Forward Lamp Harness to Fuse Block - Underhood Component Views**  
 Courtesy of GENERAL MOTORS CORP.

### Callouts For Fig. 66

Callout	Component Name
1	Fuse Block - Underhood Center Block
2	Fuse Block - Underhood-C4 (GRN)
3	C103 - I/P Harness Side
4	Forward Lamp Harness
5	C103-Forward Lamp Harness Side



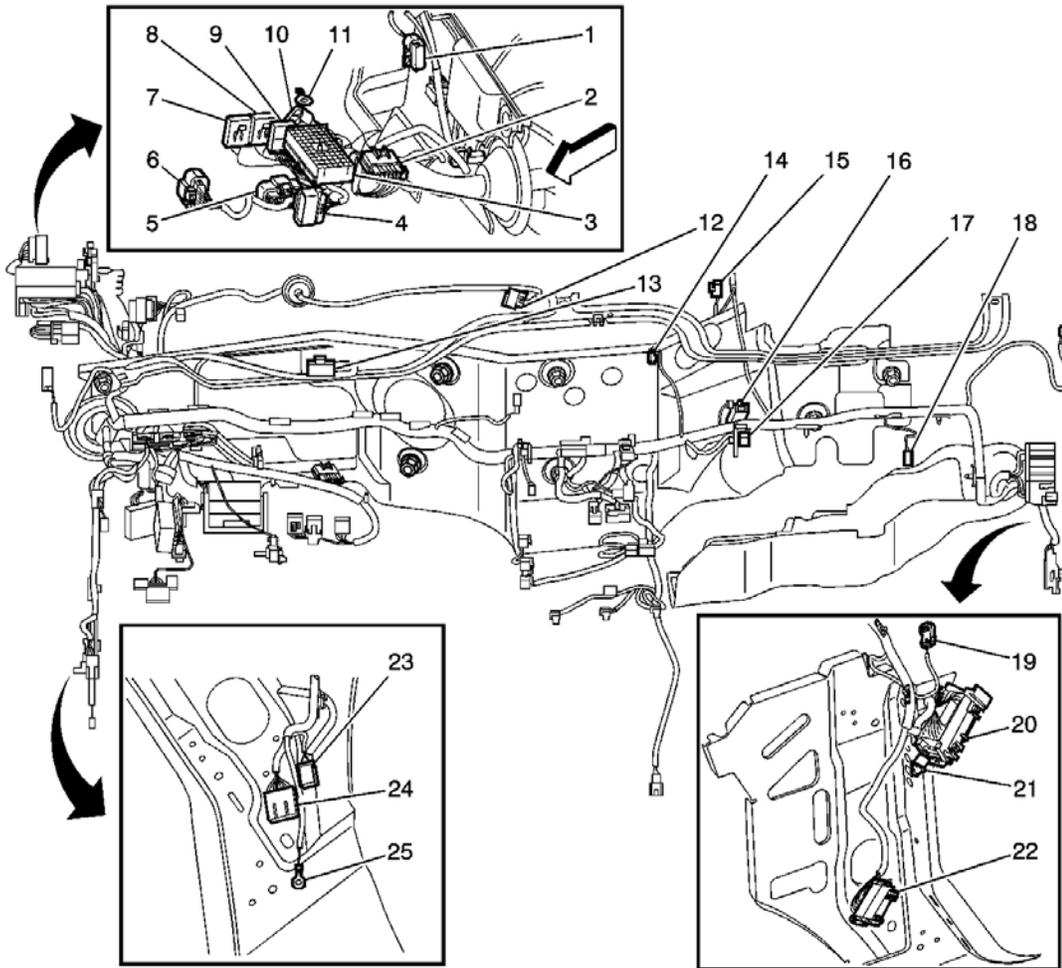
**Fig. 67: Engine Harness Routing Component Views (6.0L)**

Courtesy of GENERAL MOTORS CORP.

### Callouts For Fig. 67

Callout	Component Name
1	Intake Air Temperature (IAT)/Mass Air Flow (MAF) Sensor Connector
2	A/C Low Pressure Switch Connector

3	Heated Oxygen Sensor (HO2S) Bank 2 Sensor 1 Connector
4	Heated Oxygen Sensor (HO2S) Bank 2 Sensor 2 Connector
5	Manifold Absolute Pressure (MAP) Sensor Connector
6	G103
7	G104
8	Camshaft Position (CMP) Sensor Connector
9	C175
10	Vehicle Speed Sensor (VSS) Connector
11	Heated Oxygen Sensor (HO2S) Bank 1 Sensor 1 Connector
12	Park/Neutral Position (PNP) Switch Connector
13	Heated Oxygen Sensor (HO2S) Bank 1 Sensor 2 Connector
14	S102
15	S103
16	S104
17	Throttle Actuator Control (TAC) Assembly Connector
18	C100
19	Fuse Block - Underhood C2
20	C106
21	G102
22	A/C Compressor Clutch Connector
23	Engine Oil Level Switch Connector
24	Crankshaft Position (CKP) Sensor Connector
25	A/C Refrigerant Pressure Sensor Connector
26	Coolant Level Switch Connector

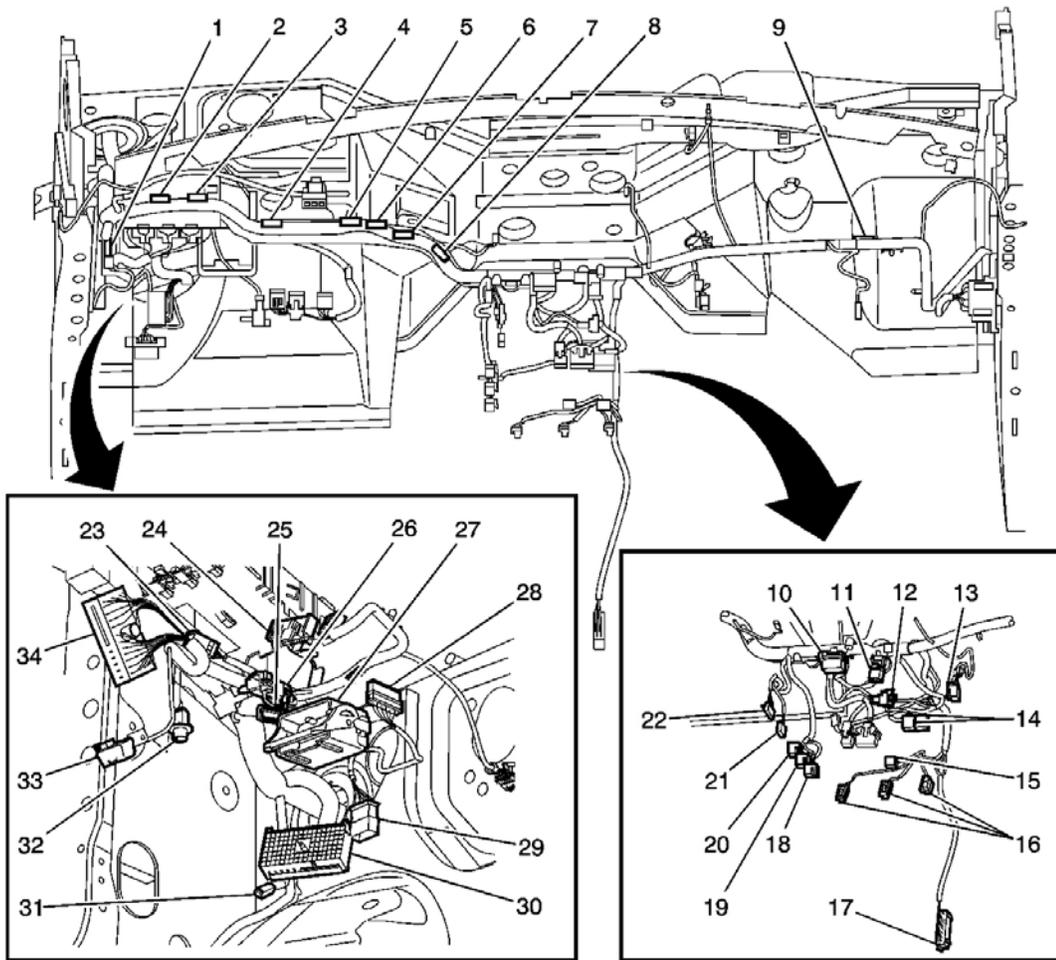


**Fig. 68: I/P Harness Routing Component Views (1 of 2)**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 68**

Callout	Component Name
1	Throttle Actuator Control (TAC) Module Connector - C2
2	C102 I/P to Chassis Harness
3	Fuse Block - Underhood C1
4	C101 I/P to Chassis Harness
5	C100 I/P to Engine Harness
6	C103 I/P to Forward Lamp Harness
7	Fuse Block - Underhood C6
8	Fuse Block - Underhood C5
9	Fuse Block - Underhood C7
10	C104 I/P to Chassis Harness

11	Trailer Harness Feed
12	Windshield Wiper Motor and Module Connector
13	Instrument Panel Cluster (IPC) Connector
14	Air Temperature Sensor - Upper Right Connector
15	Ambient Light/Sunload Sensor Assembly Connector
16	Inflatable Restraint I/P Module Connector
17	Inflatable Restraint I/P Module Disable Switch Connector
18	I/P Compartment Lamp Connector
19	Speaker - RF Tweeter Connector
20	Junction Block - I/P
21	Courtesy Lamp - Right Footwell Connector
22	C298 I/P to Body Harness
23	C201 I/P to Body Harness
24	C200 I/P to Body Harness
25	G200

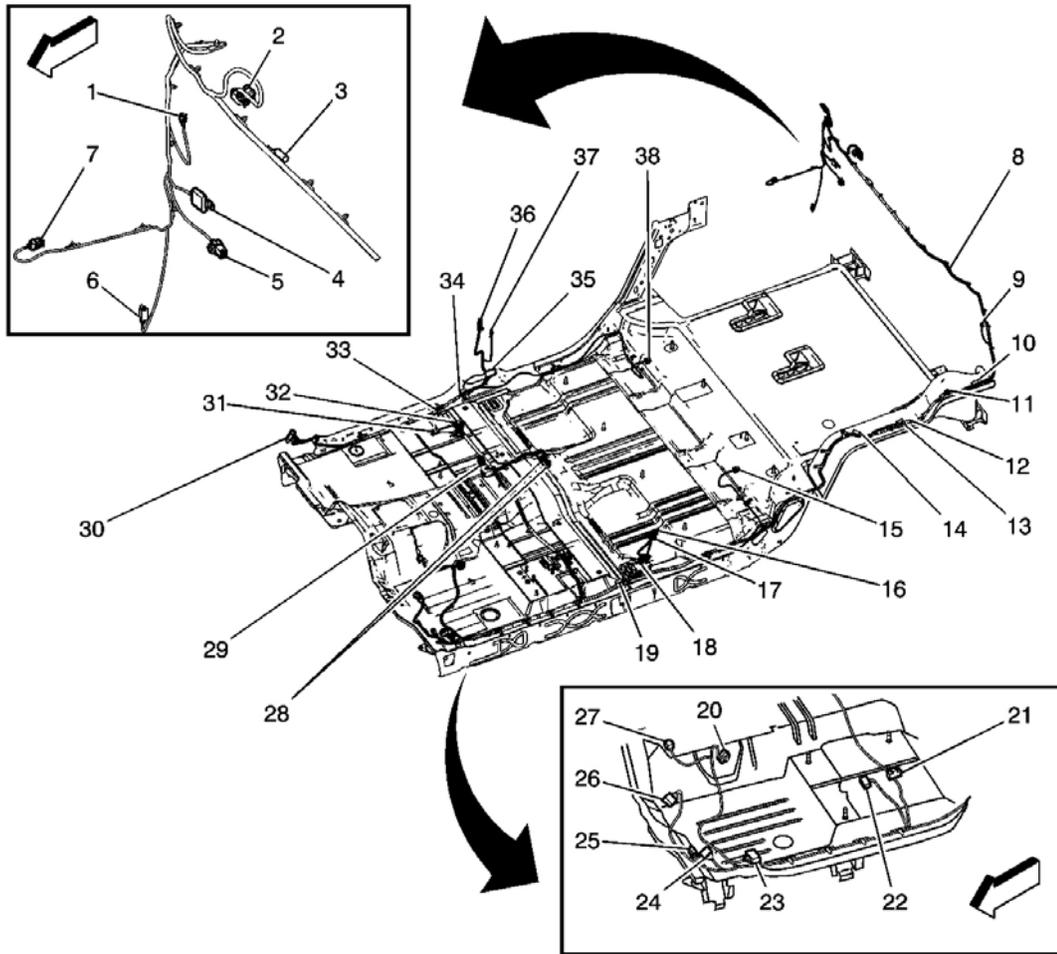


**Fig. 69: I/P Harness Routing Component Views (2 of 2)**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 69**

Callout	Component Name
1	Splice S217
2	Splice S210
3	Splice S211
4	Splice S212
5	Splice S213
6	Splice S214
7	Splice S216
8	Splice S215
9	Splice S290
10	Radio C1 Connector

11	Radio C2 Connector
12	Longitudinal Accelerometer Connector
13	Inflatable Restraint I/P Module Disable Switch Connector
14	Vehicle Communication Interface Module (VCIM) Connectors
15	OnStar(R) Button Assembly Connector
16	Accessory Power Outlet/Cigar Lighter Connectors
17	C298 I/P to Body Harness
18	Ride Height Switch Connector
19	Tow/Haul Switch Connector
20	Traction Control Switch Connector
21	Transfer Case Shift Control Switch C2 Connector
22	Transfer Case Shift Control Switch C1 Connector
23	Splice Pack SP205
24	Transfer Case Shift Control Module Connectors
25	C203 I/P to Steering Column Harness
26	Splice Pack SP206
27	C202 I/P to Steering Column Harness
28	Stop Lamp Switch Connector
29	C210 I/P to Headliner Harness
30	Relay Block I/P C1
31	Park Brake Switch Connector
32	Footwell Courtesy Lamp - Left
33	Data Link Connector (DLC)
34	Fuse Block - I/P C1

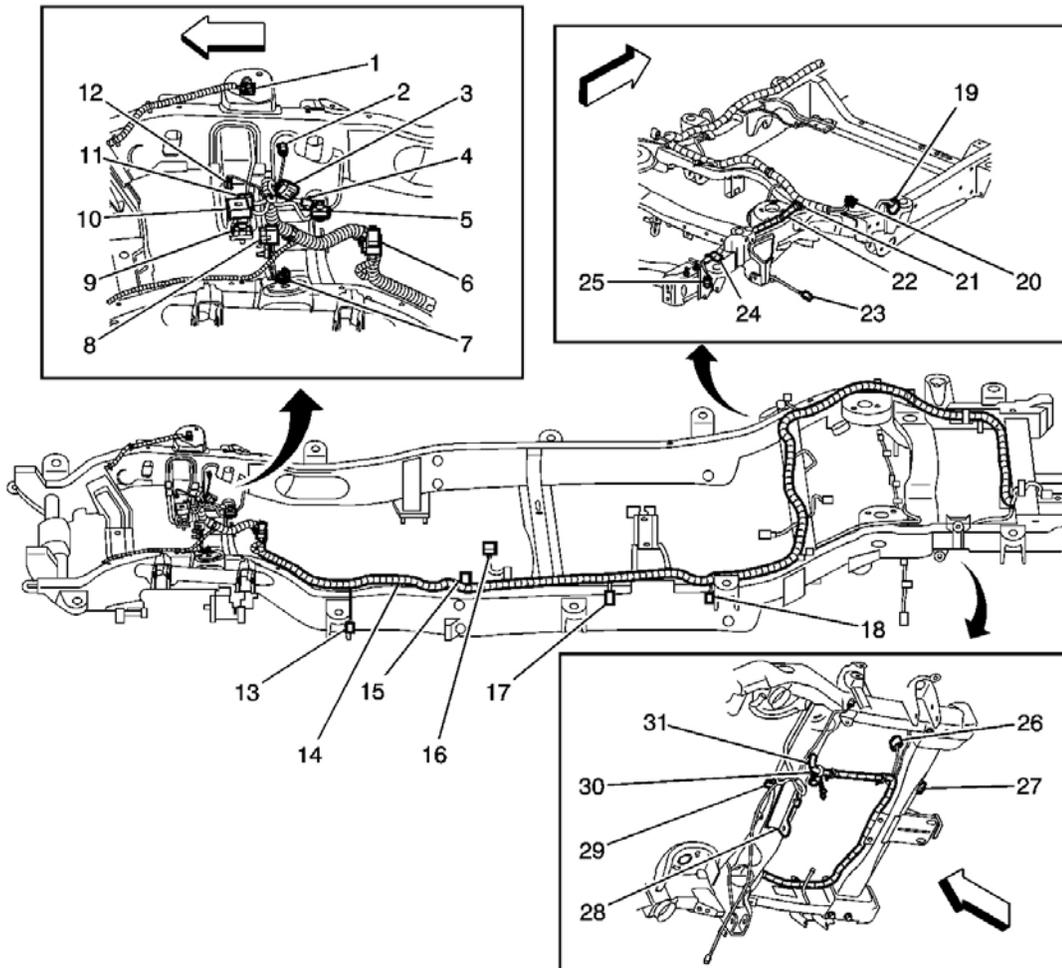


**Fig. 70: Body Harness Routing Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 70**

Callout	Component Name
1	Speaker Right D Pillar Twiddler Connector
2	C420
3	S480
4	Splice Pack SP410
5	Door Lock Switch Rear Cargo Connector
6	Accessory Power Outlet - Rear Connector
7	Marker Lamp-RR Connector
8	Clearance Lamp - RR Connector
9	Speaker - Left D Pillar Twiddler Connector
10	S411

11	Marker Lamp - LR Connector
12	S412
13	C312 (C69)
14	S307 (C69)
15	C320 (ZM6)
16	G302
17	C310
18	Courtesy Lamp Right B Pillar Connector
19	S390
20	Fuse Block - I/P C4
21	C325 (ZM6)
22	Inflatable Restraint Sensing and Diagnostic Module Connector
23	Splice Pack SP207
24	C200
25	C201
26	Relay Block - I/P C10
27	Body Control Module (BCM) - C6
28	Audio Amplifier Connectors
29	C355
30	C298
31	G304
32	C375
33	Liftgate Door Lock Relay
34	S310
35	Courtesy Lamp Left B Pillar Connector
36	C390
37	G306
38	C380

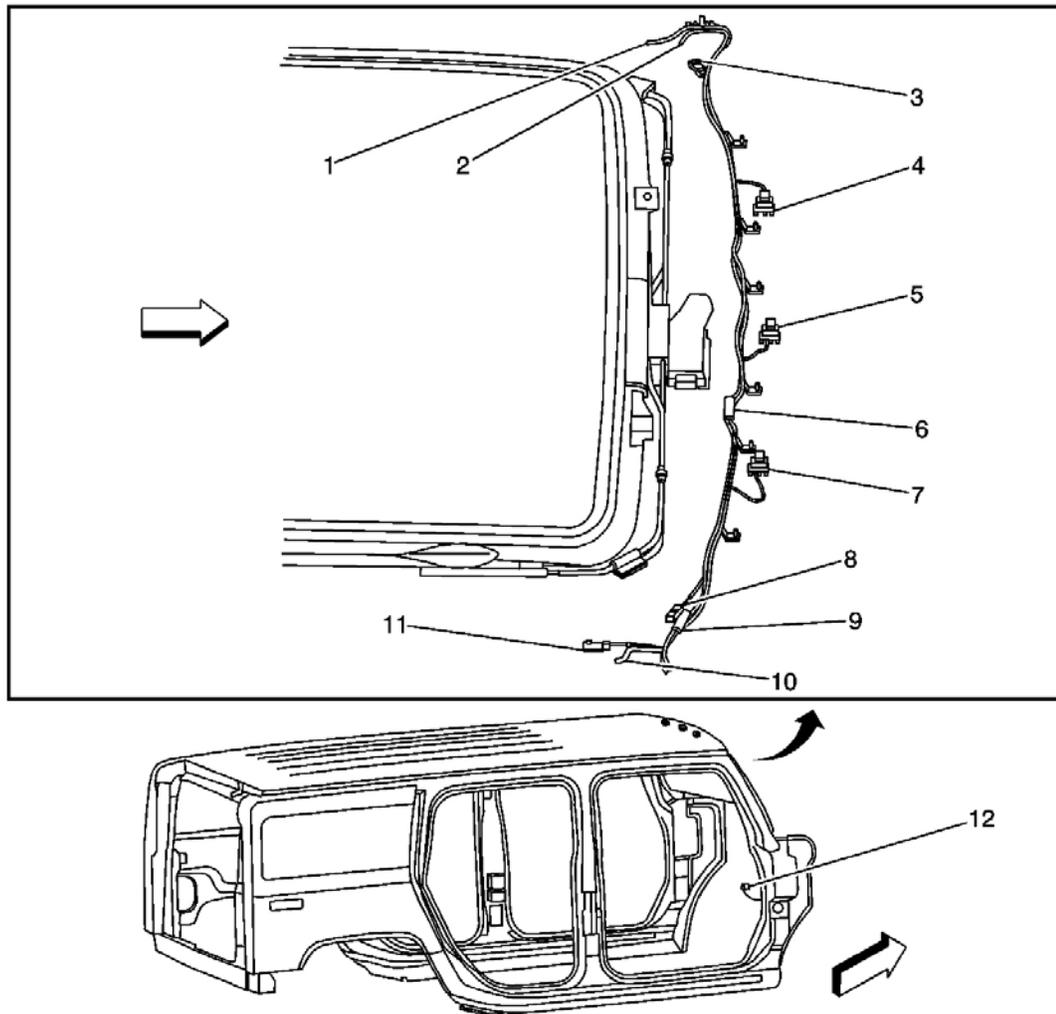


**Fig. 71: Chassis Harness Routing Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 71**

Callout	Component Name
1	Wheel Speed Sensor (WSS) - RF Connector
2	Brake Fluid Level Switch Connector
3	C104
4	C105
5	C102
6	Electronically Controlled Air Suspension Relay (ZM6)
7	Wheel Speed Sensor (WSS) - LF Connector
8	C101
9	C106
10	Fuse Block - Underhood C3

11	Fuse Block - Underhood C9
12	Stud 1
13	G300
14	S304
15	Electronic Brake Control Module (EBCM) Connector
16	Transfer Case Connector
17	Evaporative Emission (EVAP) Canister Vent Solenoid Connector
18	G310
19	G308
20	Air Suspension Sensor - RR Connector (ZM6)
21	S391
22	S392
23	Wheel Speed Sensor (WSS) - RR Connector
24	Air Suspension Inflator Switch Connector (ZM6)
25	G405
26	Junction Block - Rear C1
27	Trailer Connector
28	G402
29	Rear Differential Lock Actuator Connector
30	C450 (ZM6)
31	C451 (ZM6)

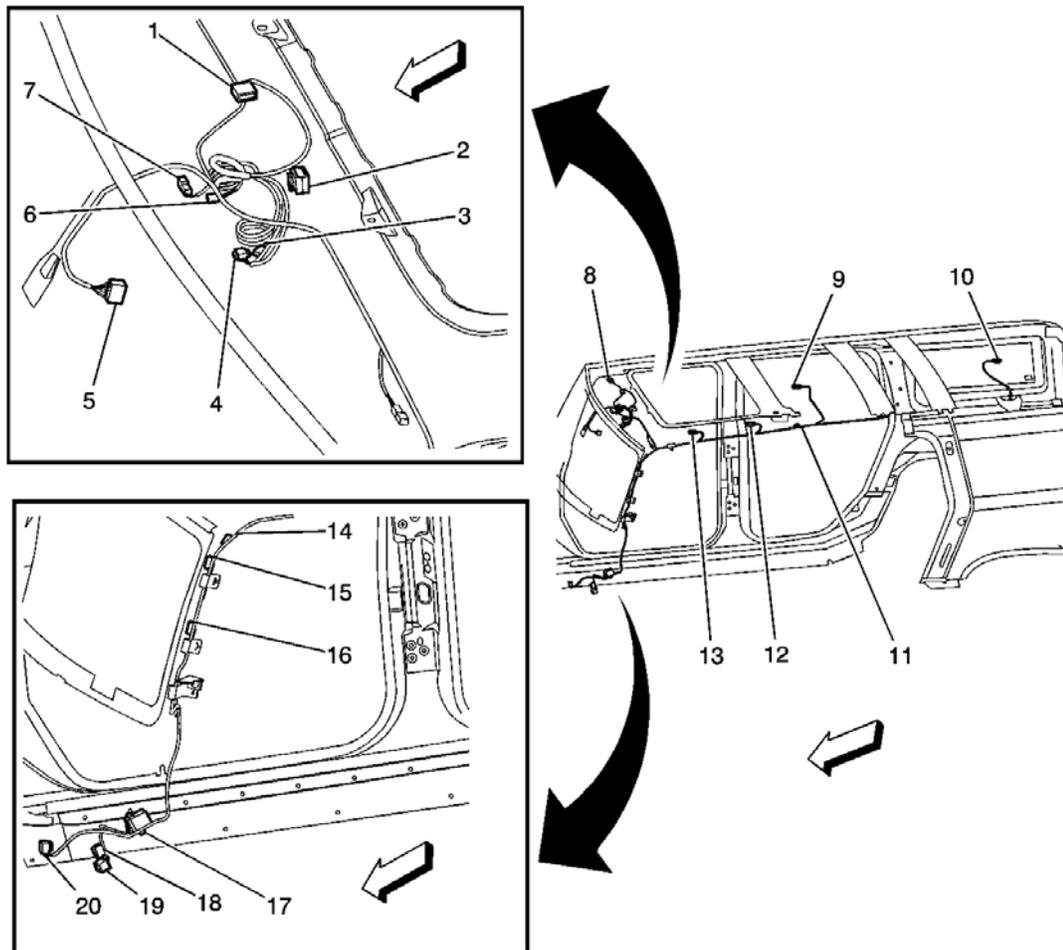


**Fig. 72: Roof Marker Harness Routing Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 72**

Callout	Component Name
1	Cellular Telephone Antenna
2	GPS Antenna
3	Clearance Lamp Connector - LF
4	Roof Lamp Connector - Front Center
5	Roof Lamp Connector - Front Center
6	S345
7	Roof Lamp Connector - Front Center
8	Clearance Lamp Connector - RF
9	S303

10	Radio Antenna
11	Antenna Preamplifier Connector
12	Junction Block - I/P C6

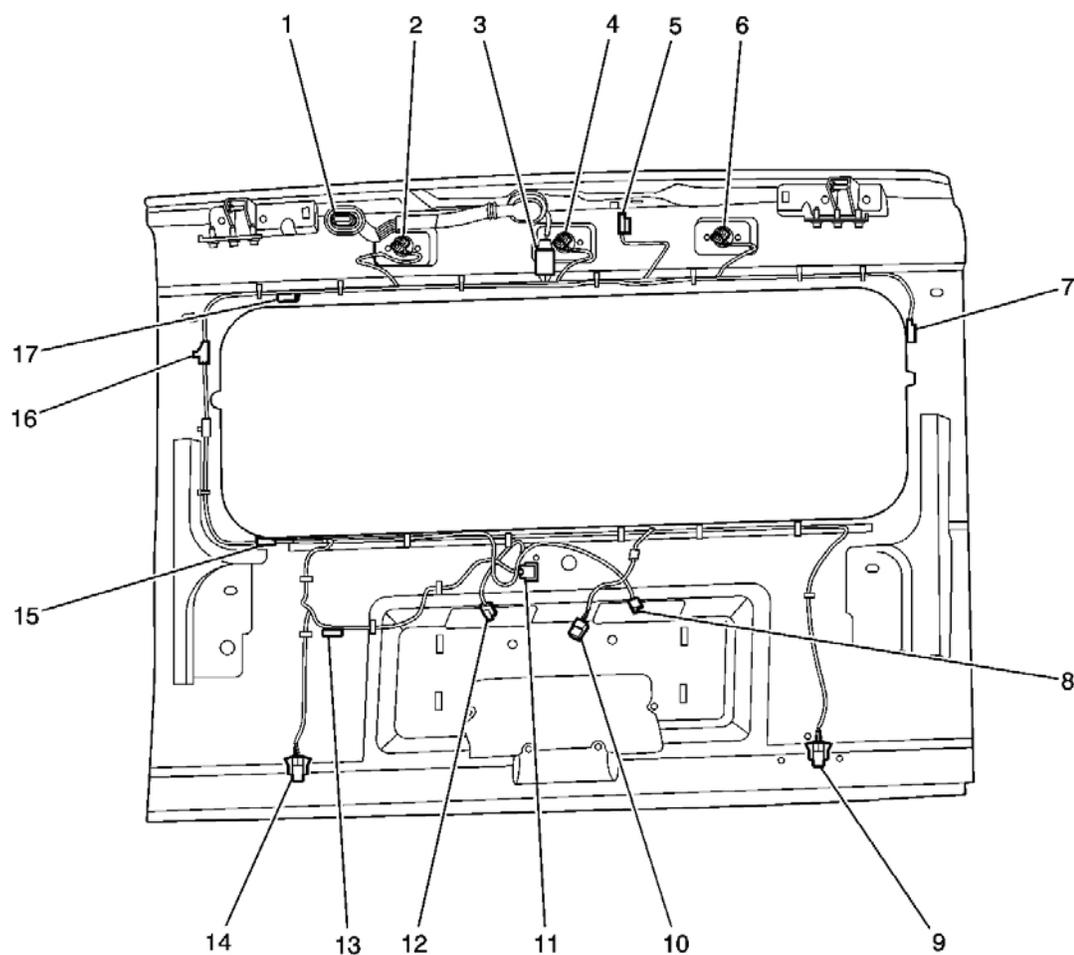


**Fig. 73: Headliner Harness Routing Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 73**

Callout	Component Name
1	Sunroof Module Connector
2	Sunroof Switch Connector
3	Courtesy/Reading Lamp - Left Front Connector
4	Garage Door Opener Connector
5	Inside Rearview Mirror Connector
6	Courtesy/Reading Lamp - Right Front Connector

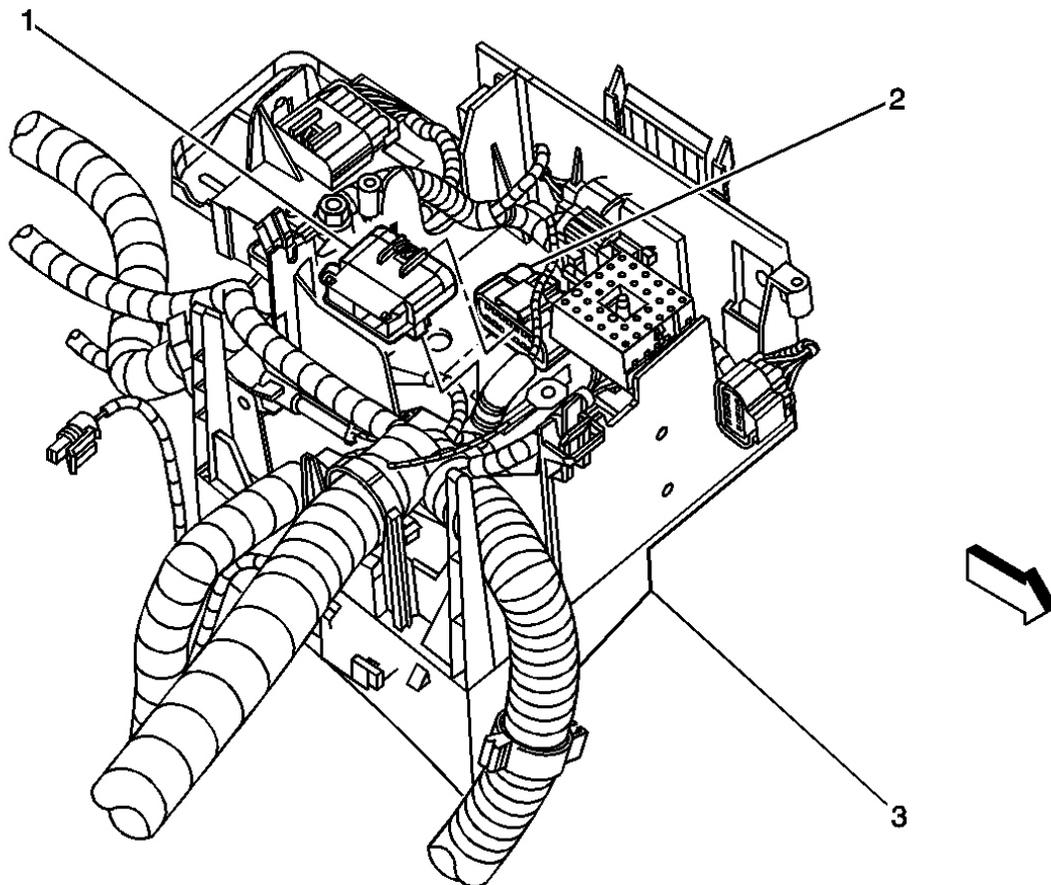
7	Noise Cancellation Microphone Connector
8	Vanity Mirror - Right Connector
9	Courtesy Reading Lamp - Center
10	Courtesy Reading Lamp - Rear
11	S300
12	Ambient Air Temperature Sensor Connector
13	Cellular Telephone Microphone Connector
14	S305
15	S301
16	S302 (CF5)
17	Sunroof Relay
18	Relay Block - I/P C4
19	Relay Block - I/P C3
20	C210



**Fig. 74: Liftgate Harness Routing Component Views**  
Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 74**

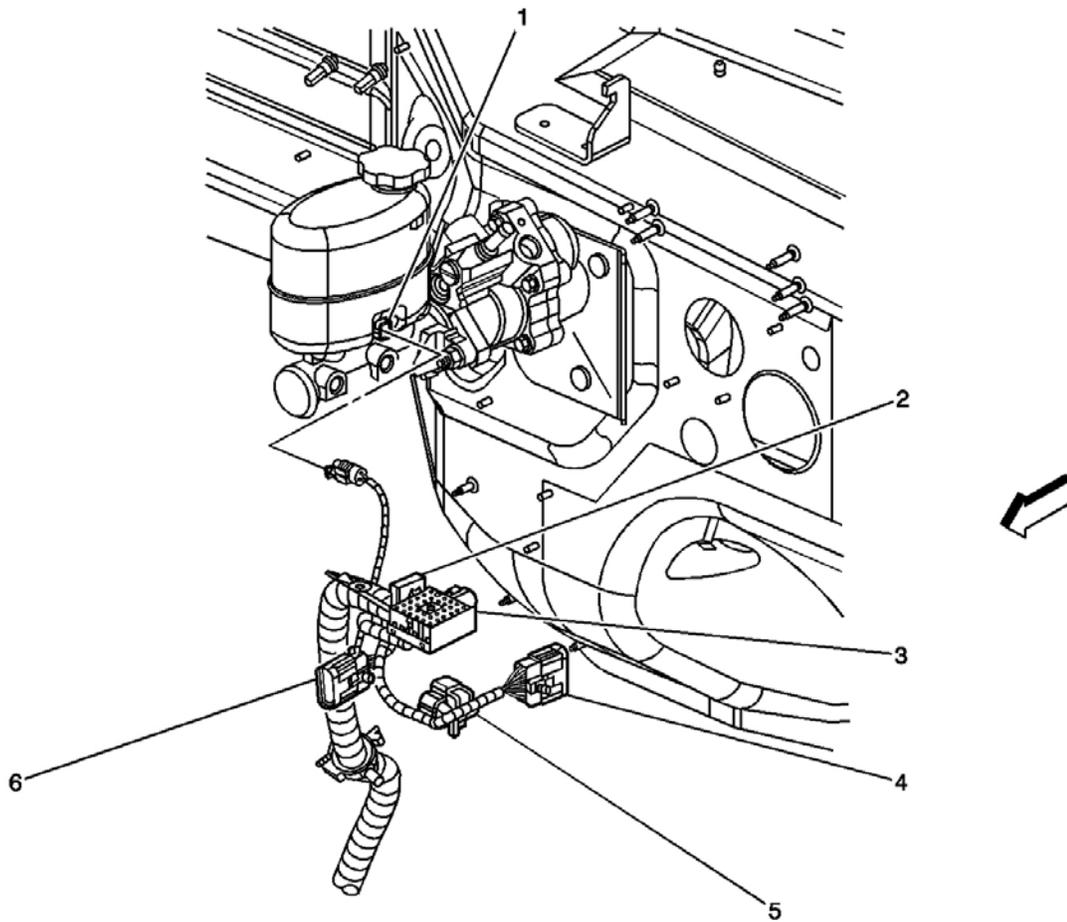
<b>Callout</b>	<b>Component Name</b>
1	C420
2	Roof Lamp - Right Rear Connector
3	C900
4	Roof Lamp - Center Connector
5	CHMSL
6	Roof Lamp - Left Rear Connector
7	Rear Window Defogger Grid - Left Connector
8	License Lamp Connector
9	Liftgate Ajar Switch - Left Connector
10	Door Lock Actuator - Liftgate Connector
11	Rear Window Wiper Motor Connector
12	License Lamp Connector
13	S902
14	Liftgate Ajar Switch - Right Connector
15	S901
16	Defogger Grid - Right Connector
17	S900



**Fig. 75: C100 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 75**

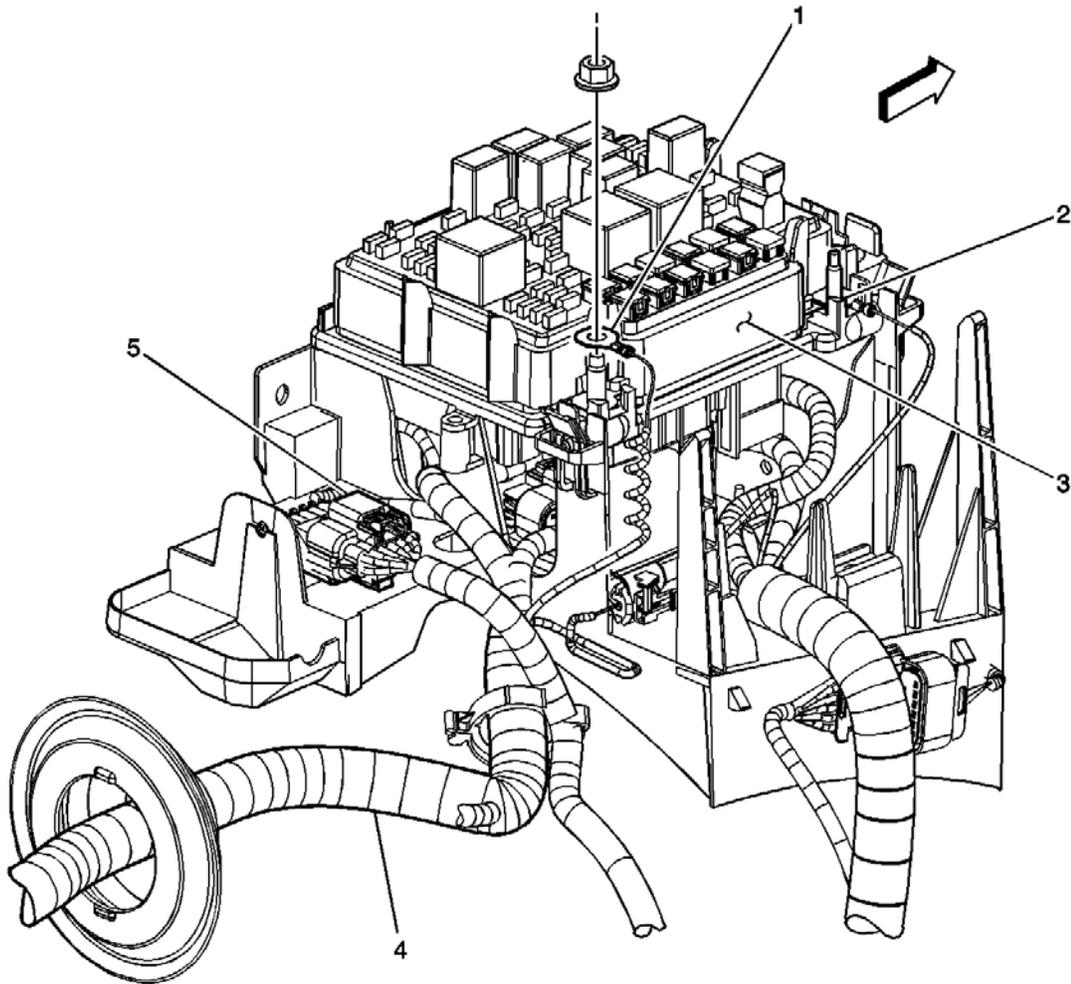
Callout	Component Name
1	C100 - Engine Harness Side
2	C100 - IP Harness Side
3	Fuse Block - Underhood



**Fig. 76: C101, C104 and C106 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 76**

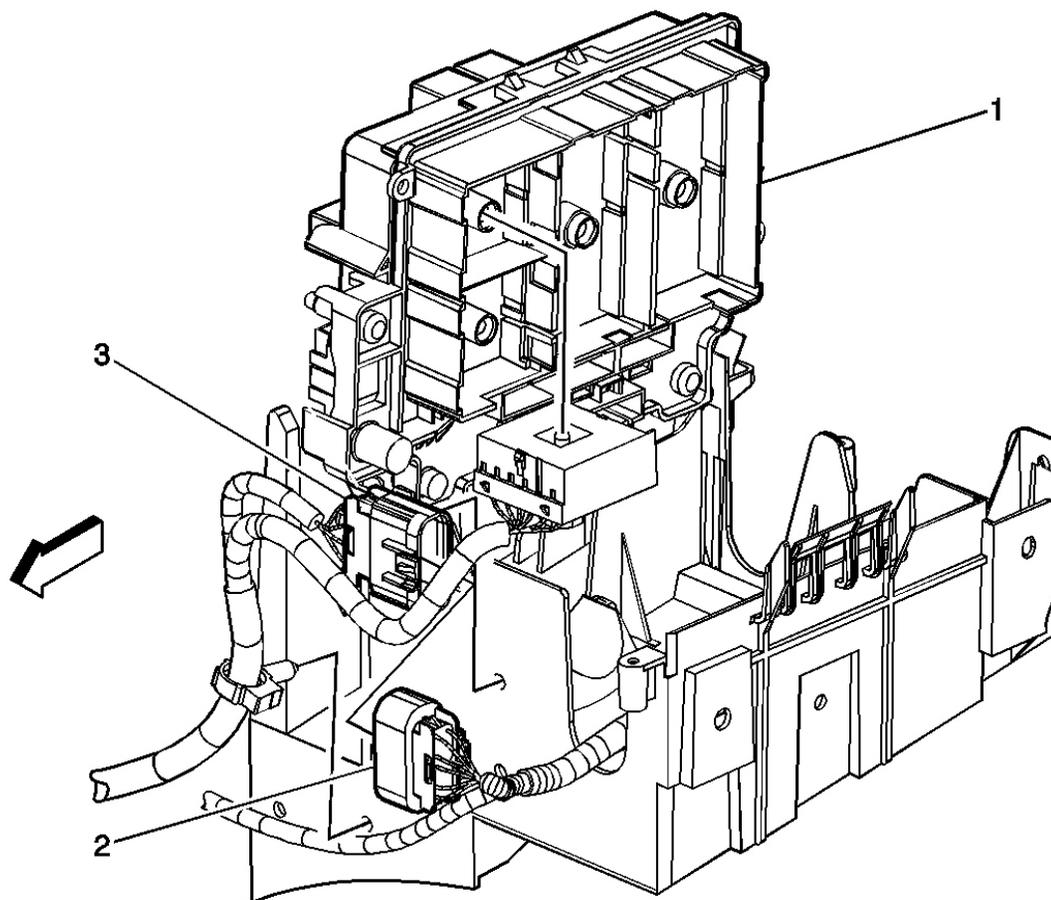
Callout	Component Name
1	Brake Fluid Level Switch
2	Fuse Block - Underhood - C9
3	Fuse Block - Underhood - C3
4	C101 - Chassis Harness Side
5	C106 - Chassis Harness Side
6	C104 - Chassis Harness Side



**Fig. 77: C102 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 77**

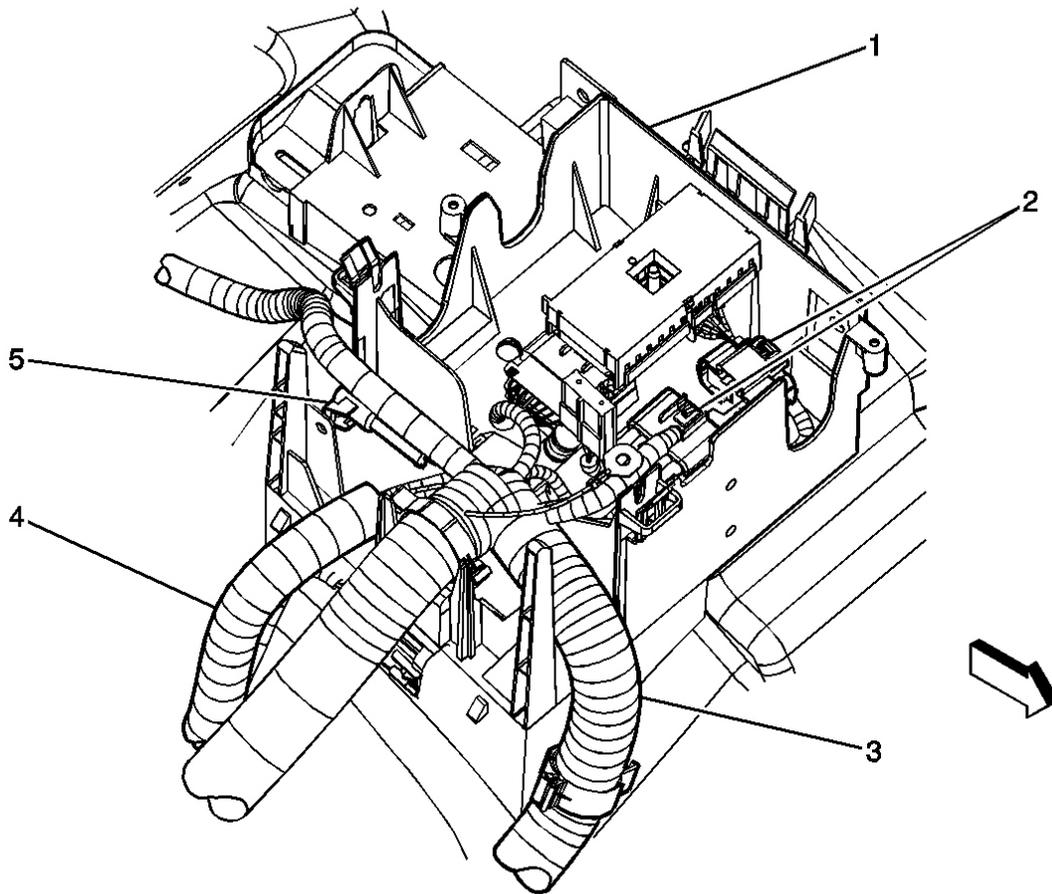
Callout	Component Name
1	Stud 2 - Trailer Lead Power Feed
2	Stud 1
3	Fuse Block - Underhood
4	IP Harness
5	C102



**Fig. 78: C103 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 78**

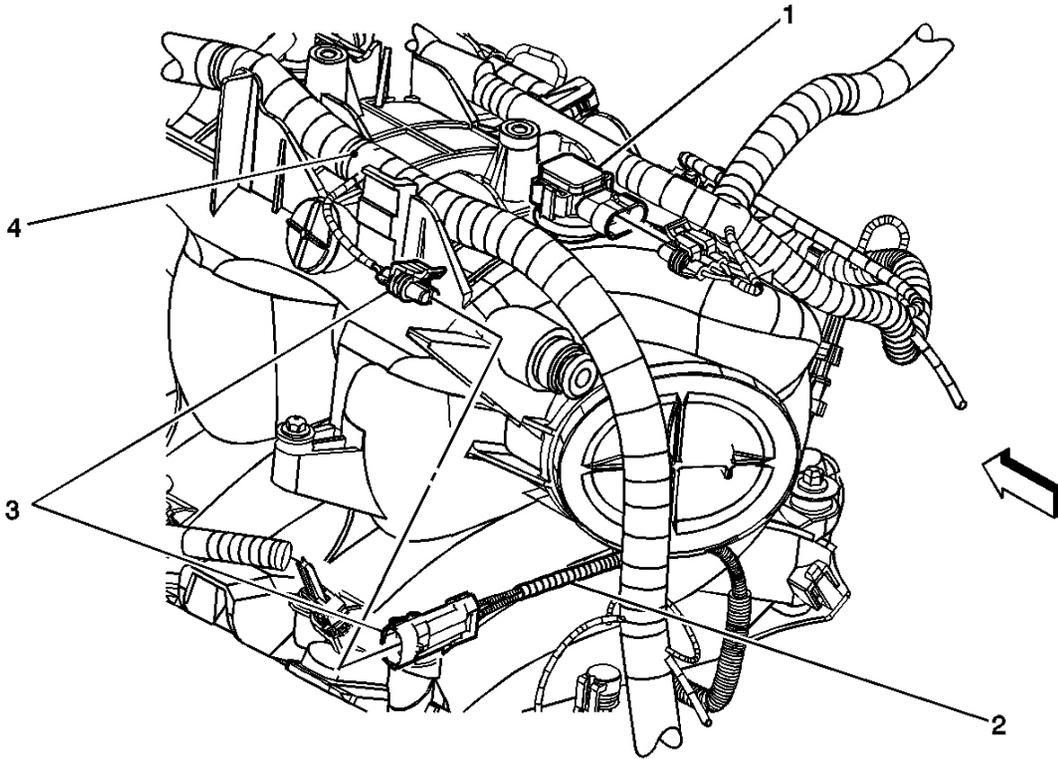
Callout	Component Name
1	Fuse Block - Underhood Center Block
2	C103 - I/P Harness Side
3	C103 - Forward Lamp Harness Side



**Fig. 79: C105 and C106 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 79**

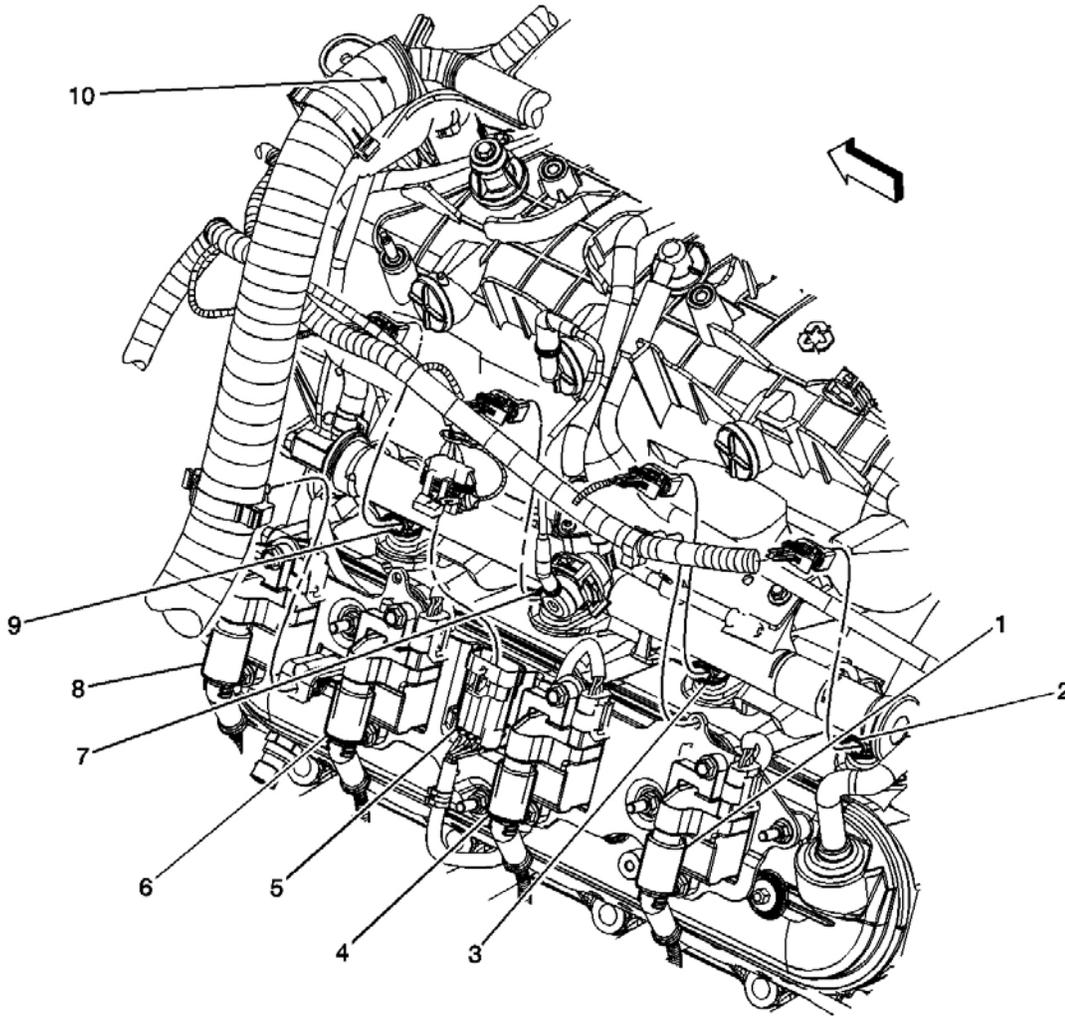
Callout	Component Name
1	Fuse Block - Underhood Bracket
2	C106 - Chassis to Engine
3	Engine Harness
4	Chassis Harness
5	C105 - Chassis to I/P



**Fig. 80: C115 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 80**

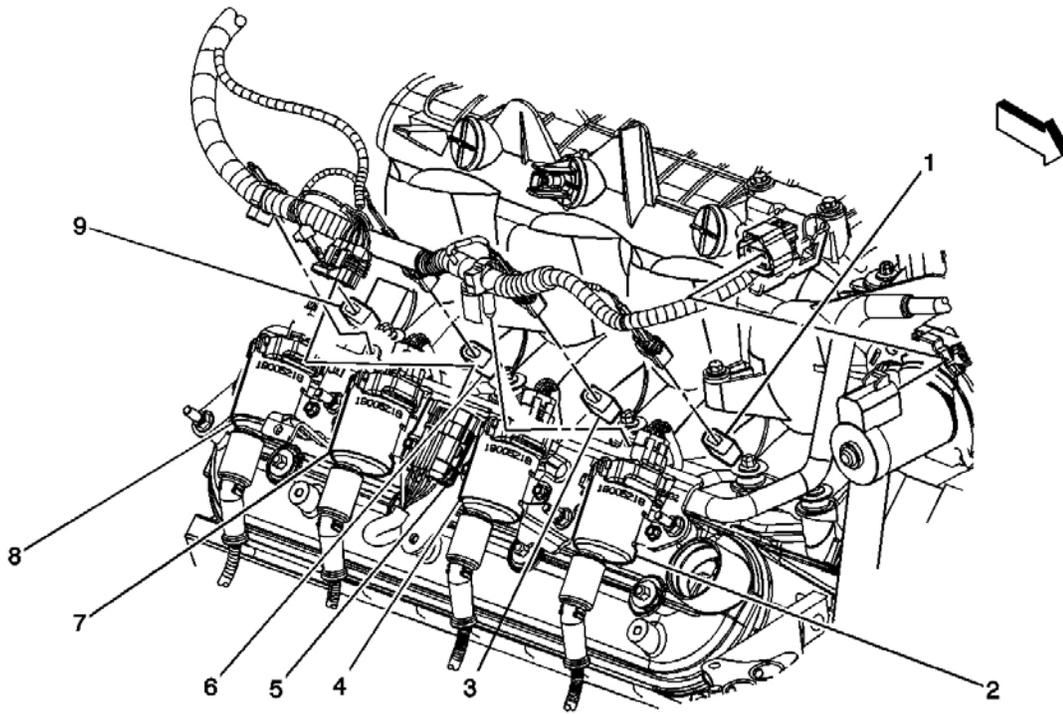
Callout	Component Name
1	MAP Sensor
2	Knock Sensor Pigtail
3	C115-Knock Sensors Inline
4	Engine Harness



**Fig. 81: C148 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 81**

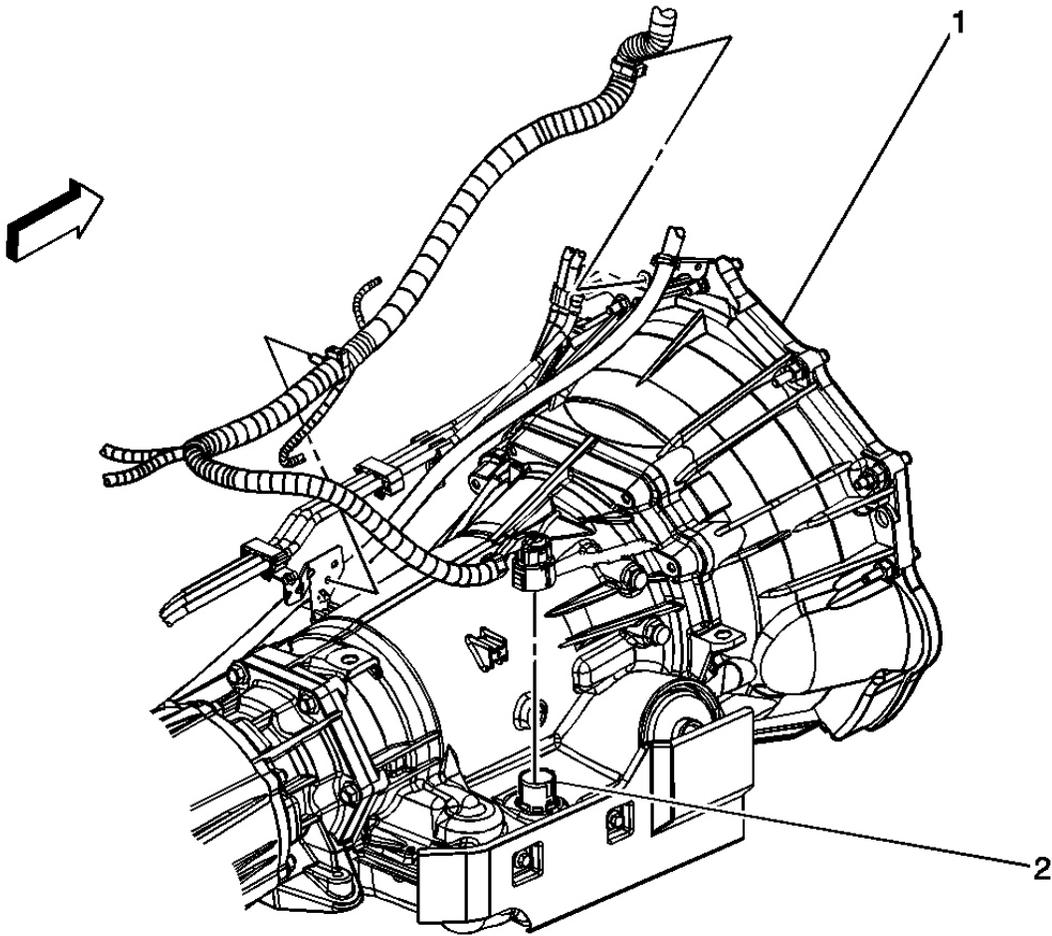
Callout	Component Name
1	Ignition Coil 7
2	Fuel Injector 7
3	Fuel Injector 5
4	Ignition Coil 5
5	Inline C148
6	Ignition Coil 3
7	Fuel Injector 3
8	Ignition Coil 1
9	Fuel Injector 1



**Fig. 82: C158 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 82**

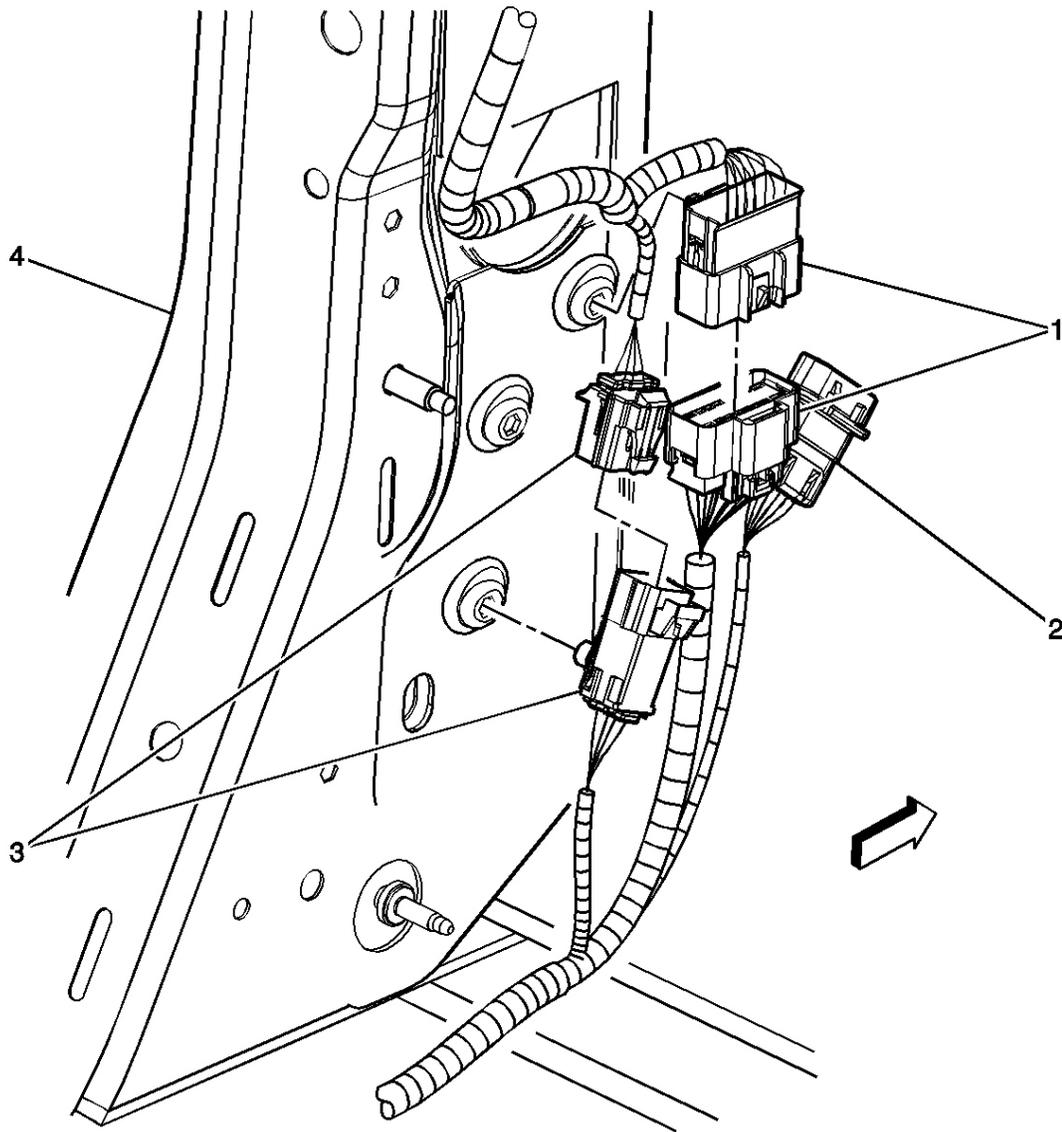
Callout	Component Name
1	Fuel Injector 2
2	Ignition Coil 2
3	Fuel Injector 4
4	Ignition Coil 4
5	C158 - Ignition Coil Inline
6	Fuel Injector 6
7	Ignition Coil 6
8	Ignition Coil 8
9	Fuel Injector 8



**Fig. 83: C175 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 83**

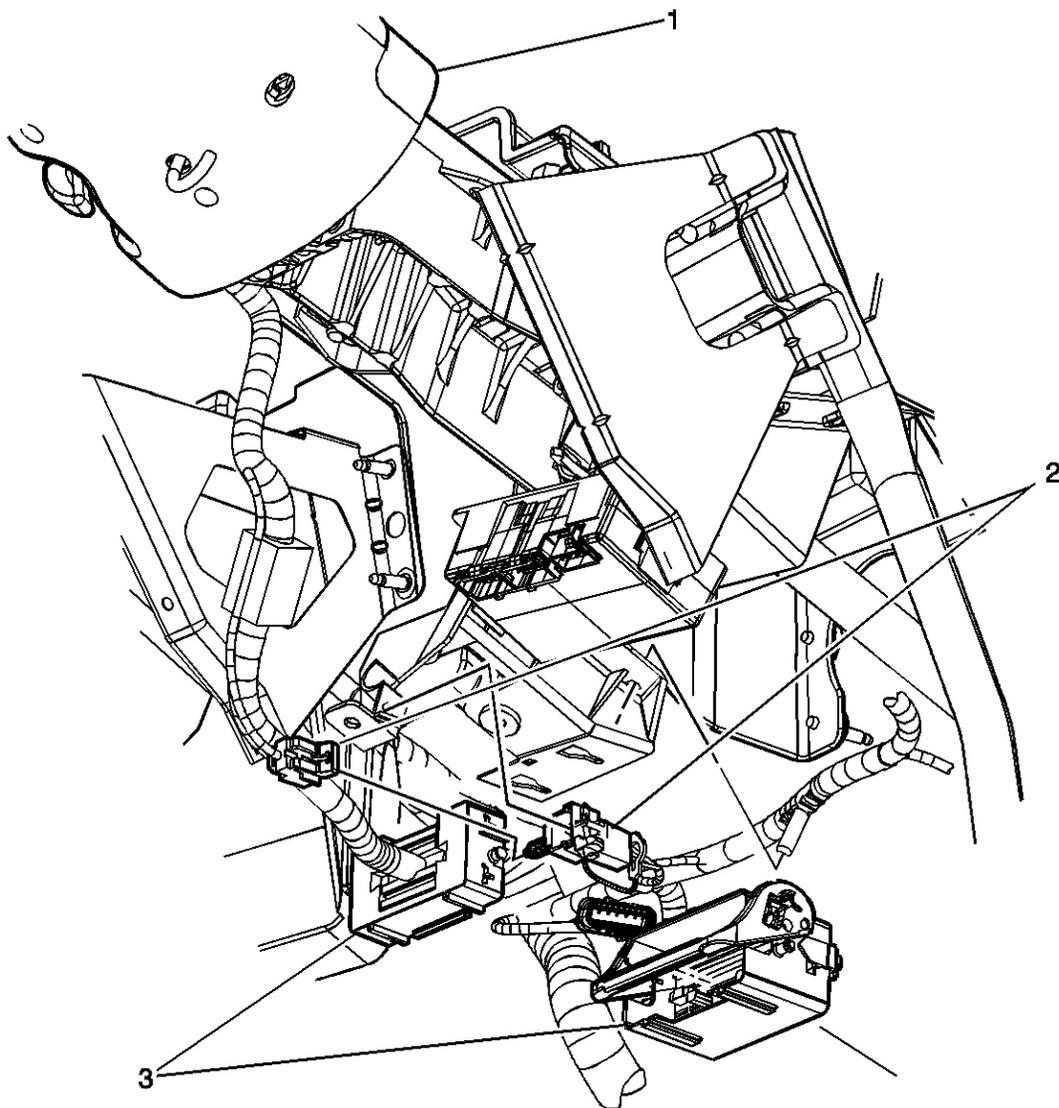
Callout	Component Name
1	Automatic Transmission
2	C175



**Fig. 84: C200, C201 and Splice Pack SP207 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 84**

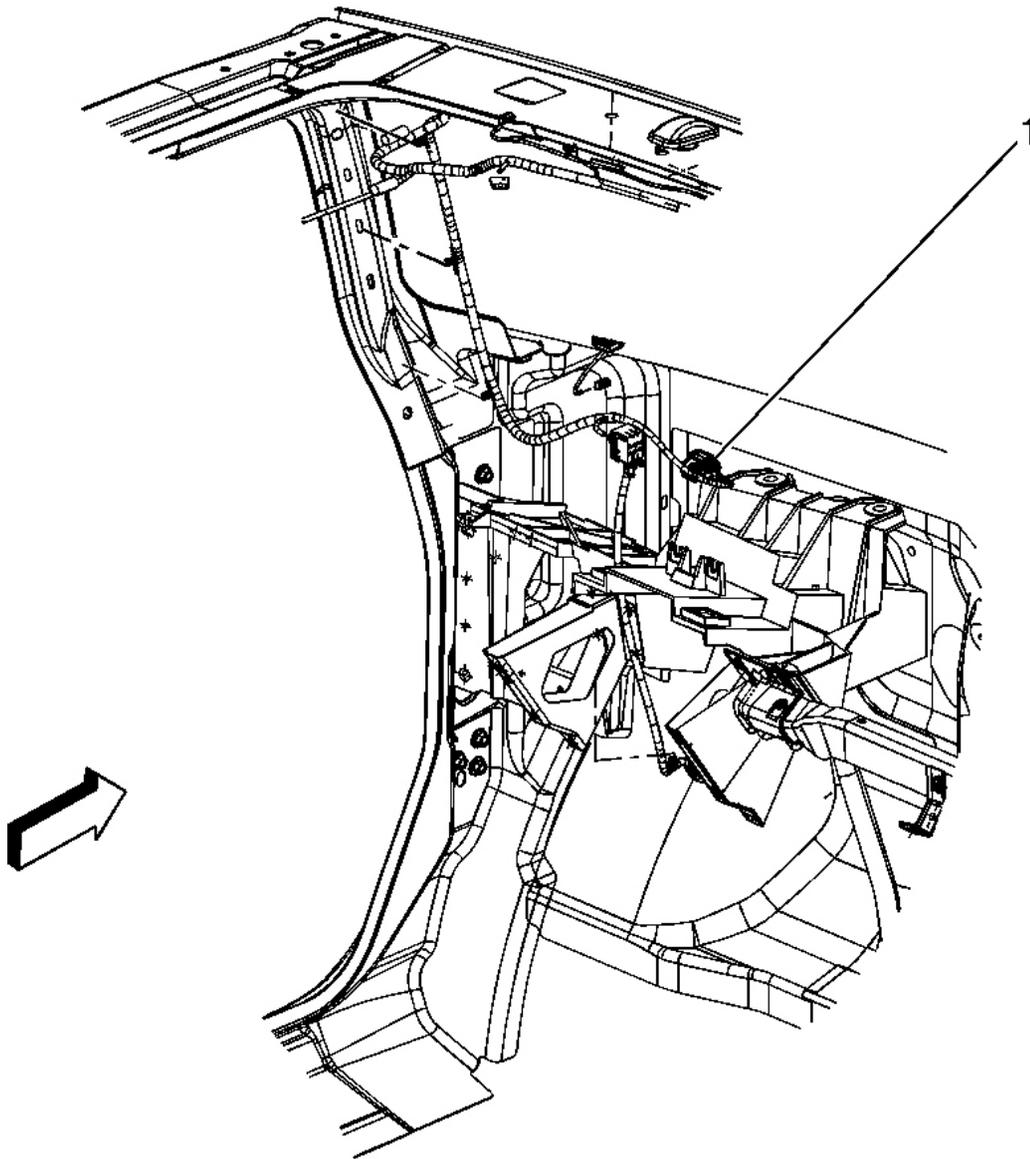
Callout	Component Name
1	C200
2	Splice Pack SP207
3	C201
4	Left Side Cowl Panel



**Fig. 85: C202 and C203 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 85**

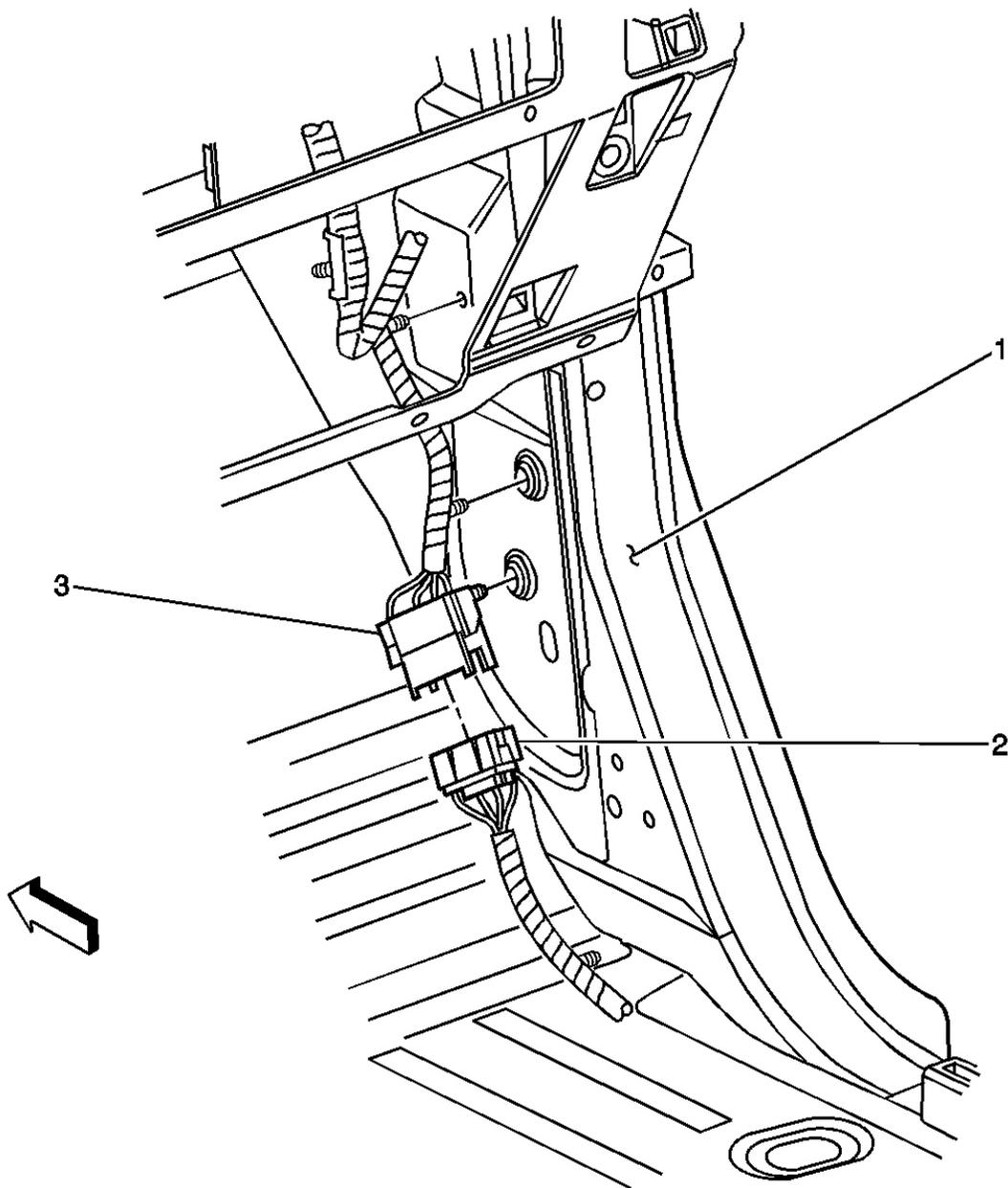
Callout	Component Name
1	Steering Column
2	C203
3	C202



**Fig. 86: C210 Component Views**  
Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 86**

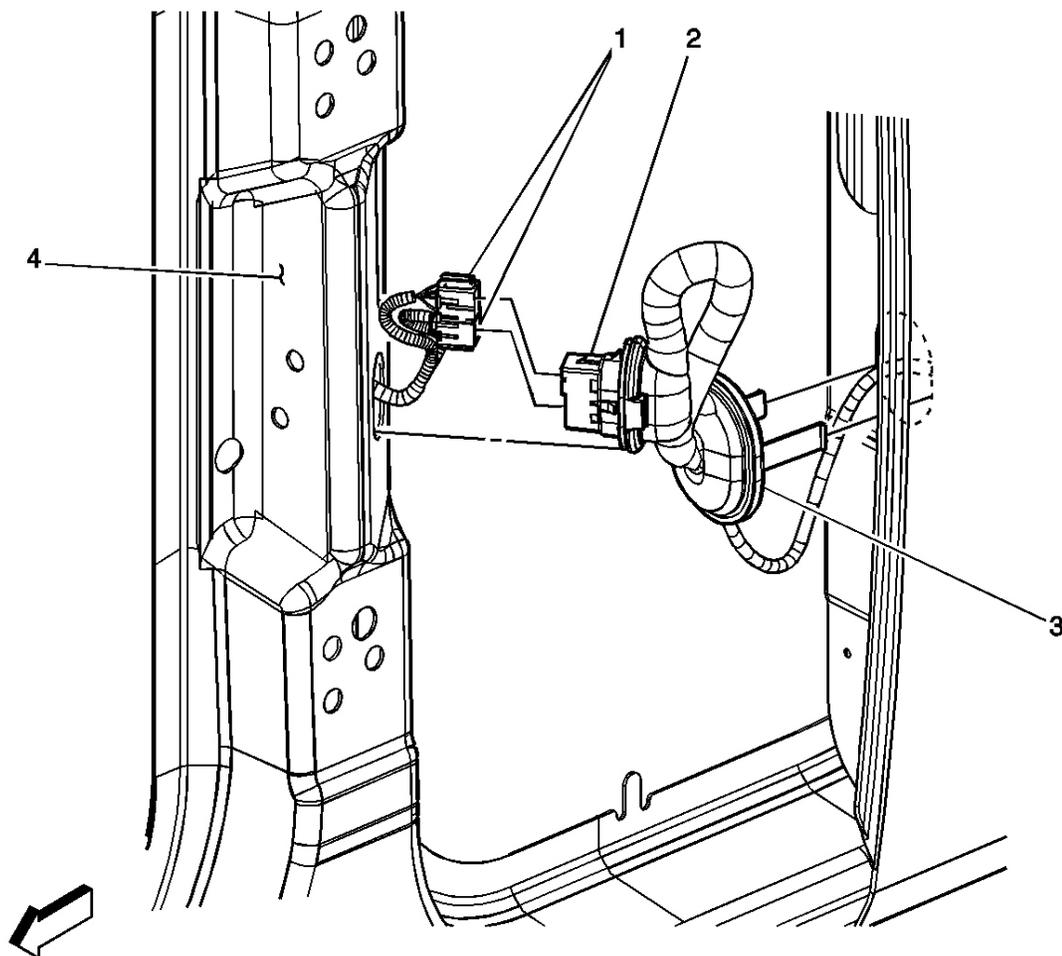
Callout	Component Name
1	C210 Headliner Harness Side



**Fig. 87: C298 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 87**

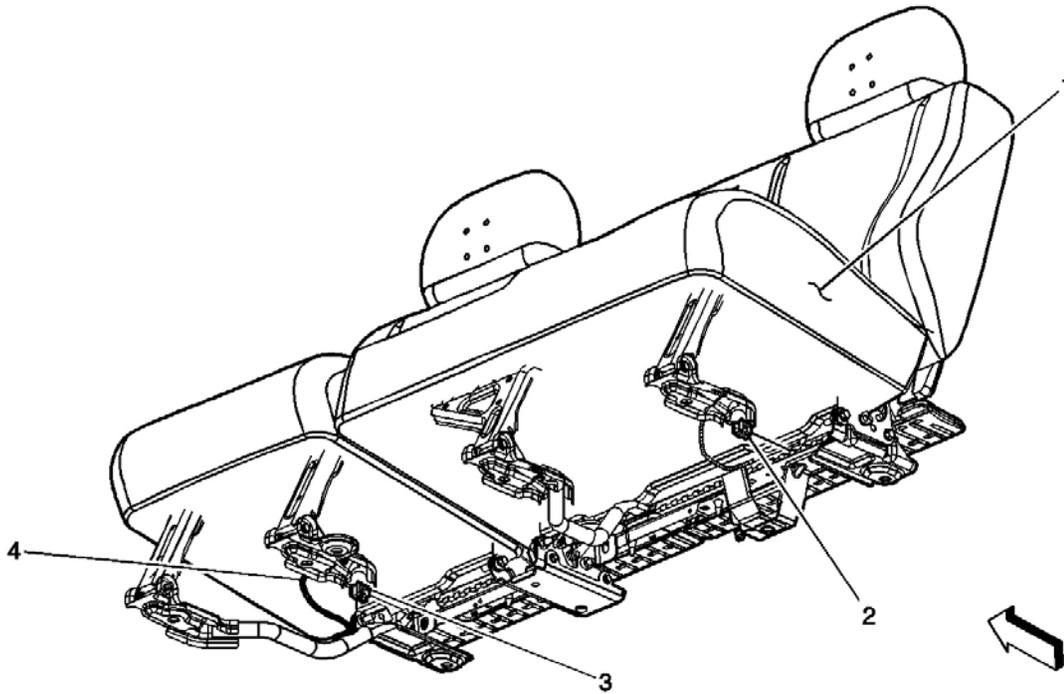
Callout	Component Name
1	RH Cowl Panel
2	C298 - Body Harness Side



**Fig. 88: C310 - LR Shown - RR Similar Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 88**

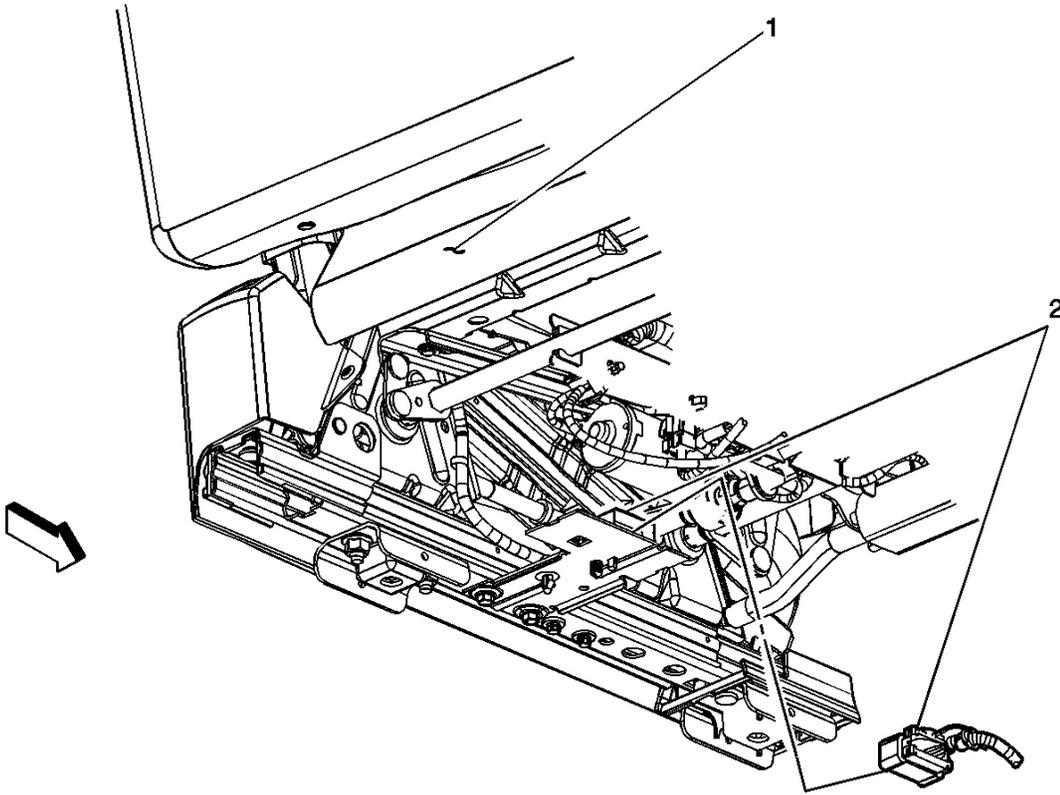
Callout	Component Name
1	C310 - Body Harness Side
2	C310 - LR Door Harness Side
3	Passthrough Grommet
4	B Pillar



**Fig. 89: C320 and C380 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 89**

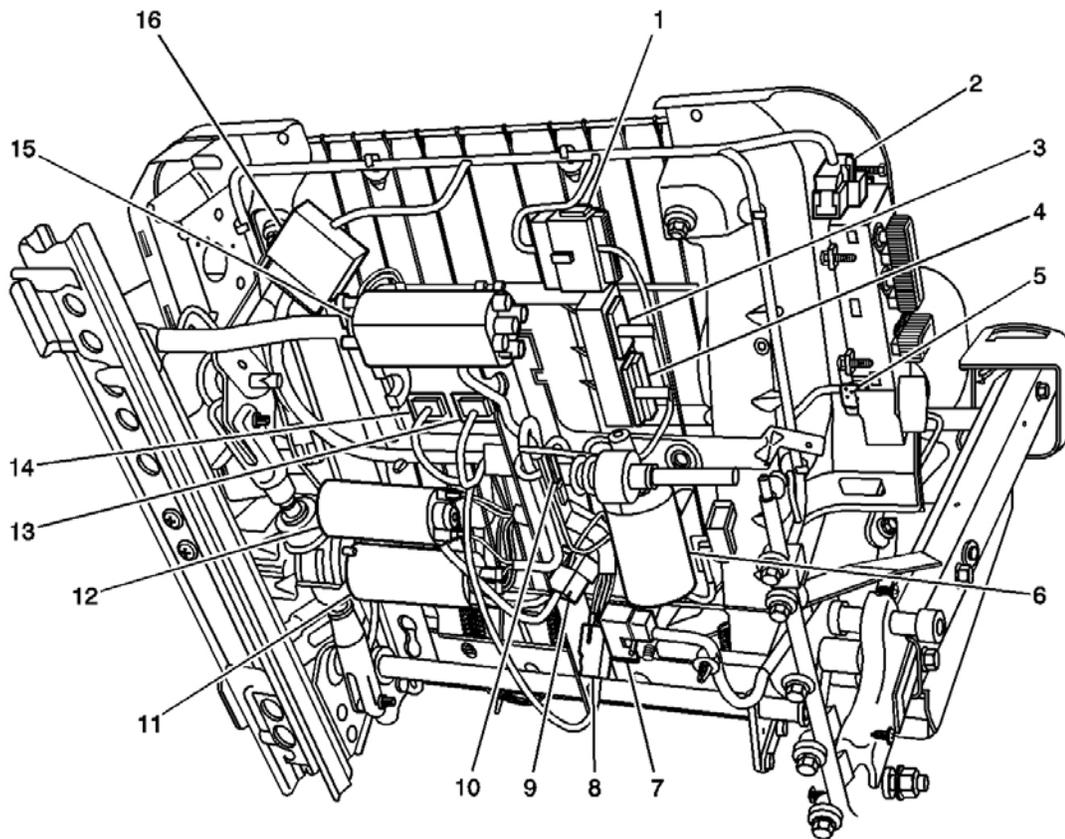
Callout	Component Name
1	Rear Seat Assembly
2	C320
3	C380
4	Body Harness



**Fig. 90: C325 - Driver Shown - Passenger Similar Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 90**

Callout	Component Name
1	Driver Seat
2	C325 - Driver Seat Harness

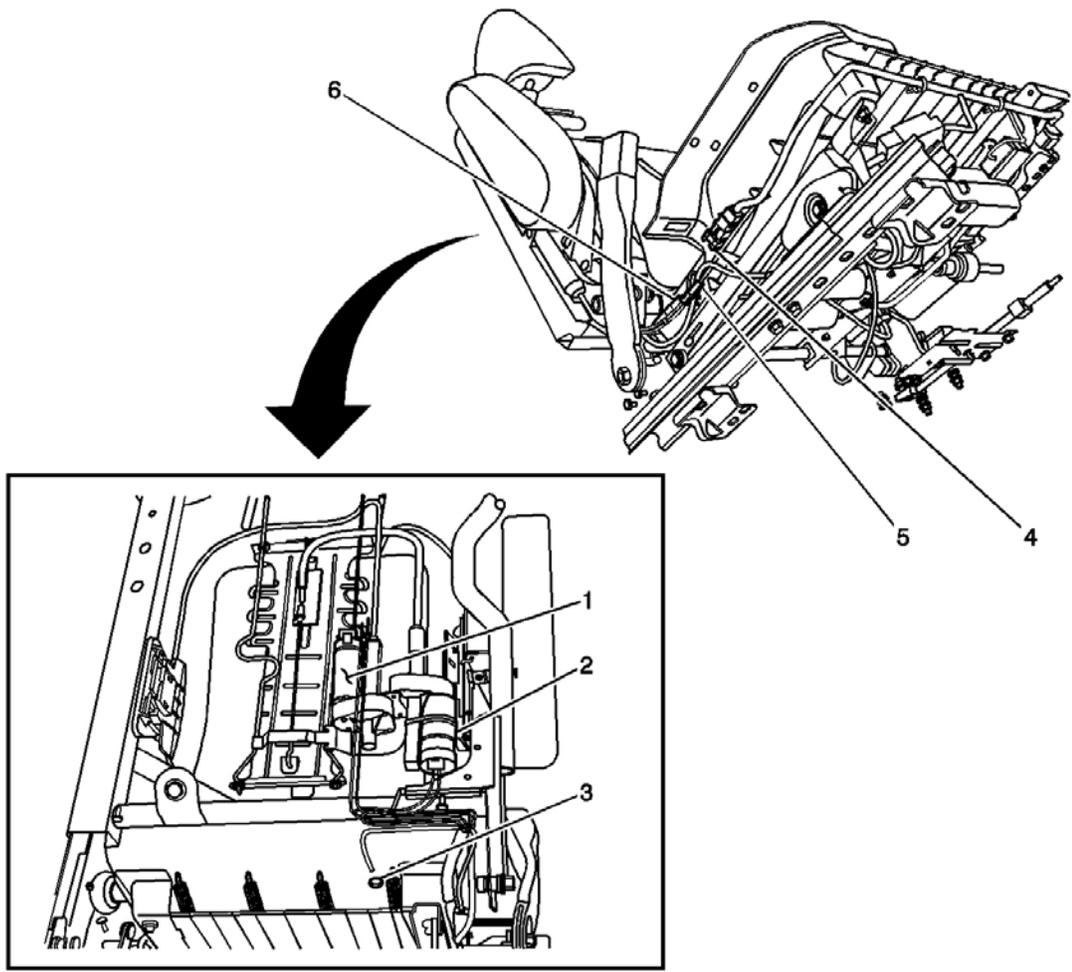


**Fig. 91: C325, C326, C327, C328, C329 and C330 - Driver Seat Inlines Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 91**

Callout	Component Name
1	C327
2	Seat Adjuster Switch - Driver
3	Memory Seat Module - C4
4	Memory Seat Module - C3
5	Seat Bolster/Lumbar Switch - Driver
6	Seat Recline Motor - Driver
7	C325
8	C329
9	C330
10	C328
11	Seat Rear Vertical Motor - Driver
12	Seat Front Vertical Motor - Driver
13	Memory Seat Module - C2

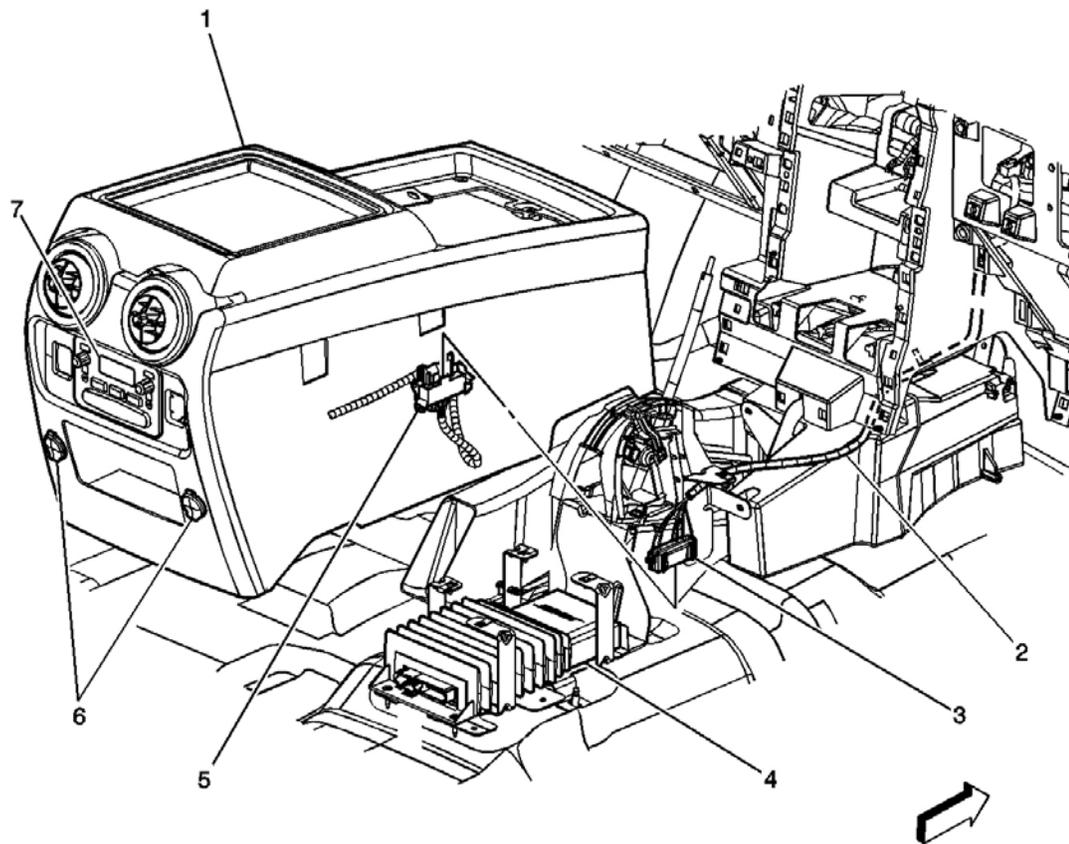
14	Memory Seat Module - C1
15	Seat Horizontal Motor - Driver
16	C326



**Fig. 92: C333 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 92**

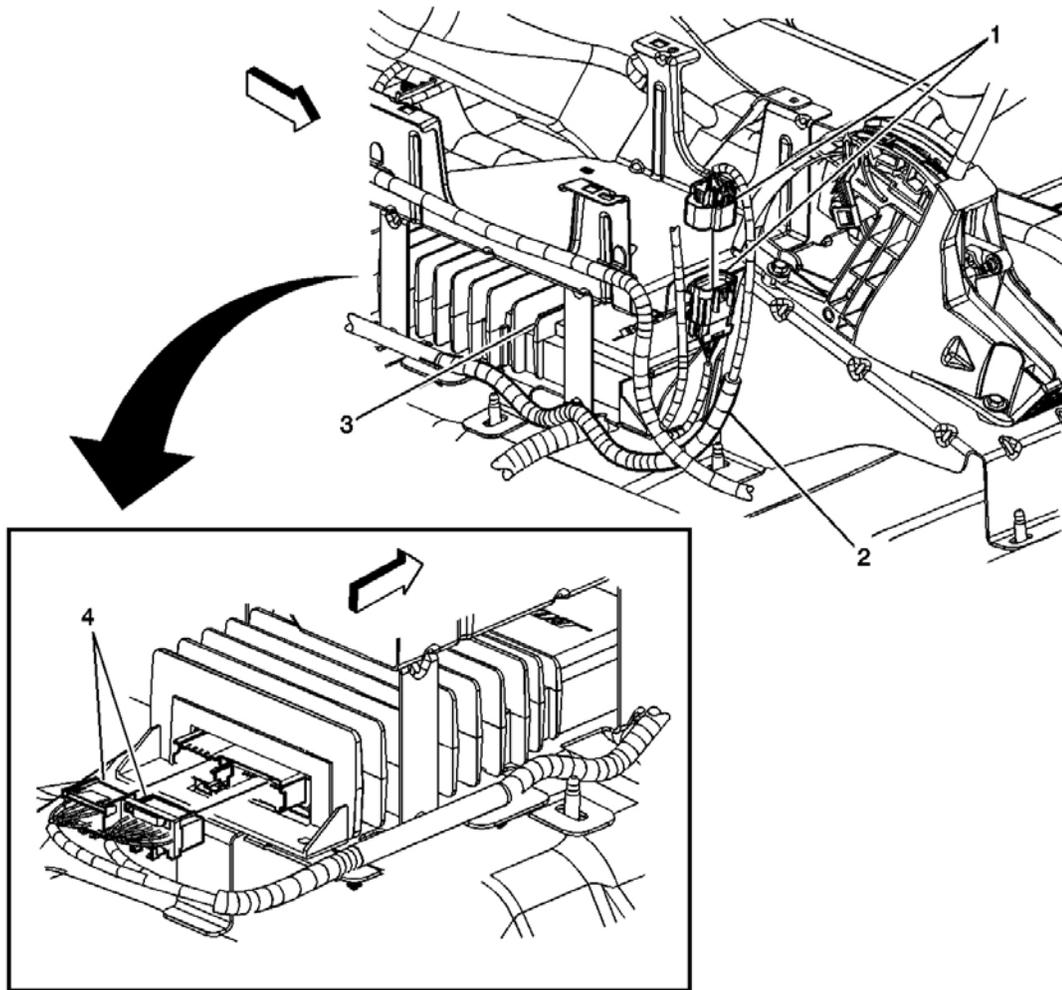
Callout	Component Name
1	Seat Bolster Motor - Driver
2	Seat Lumbar Motor - Driver
3	Heated Seat Element - Driver Cushion
4	C333
5	Seat Belt Switch Connector
6	Heated Seat Element - Driver Cushion Connector



**Fig. 93: C350 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 93**

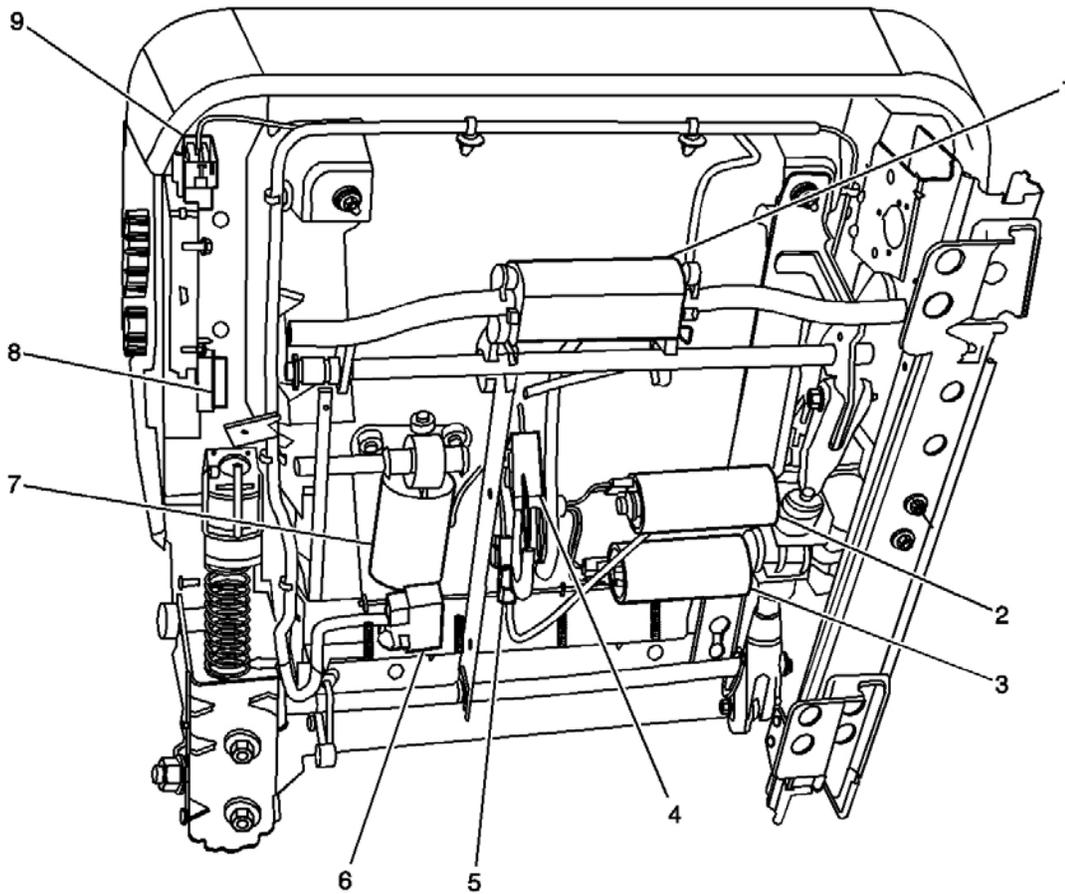
Callout	Component Name
1	Front Floor Console
2	I/P Harness
3	C350 - I/P Harness Side
4	Audio Amplifier
5	C350 - Console Harness Side
6	Accessory Power Outlets - Rear
7	Rear Seat Audio (RSA)



**Fig. 94: C355 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 94**

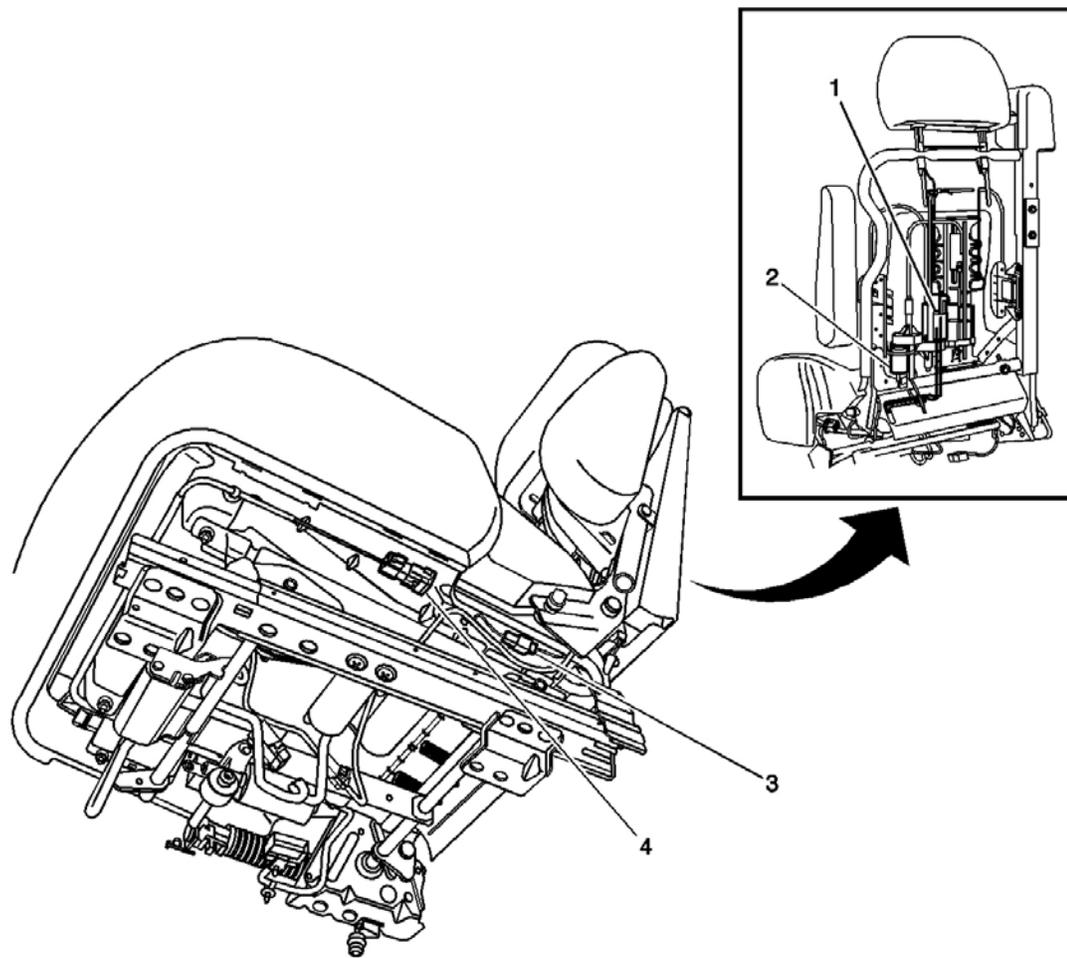
Callout	Component Name
1	C355
2	Body Harness
3	Audio Amplifier
4	Audio Amplifier Connectors



**Fig. 95: C375, C376 and C377 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 95**

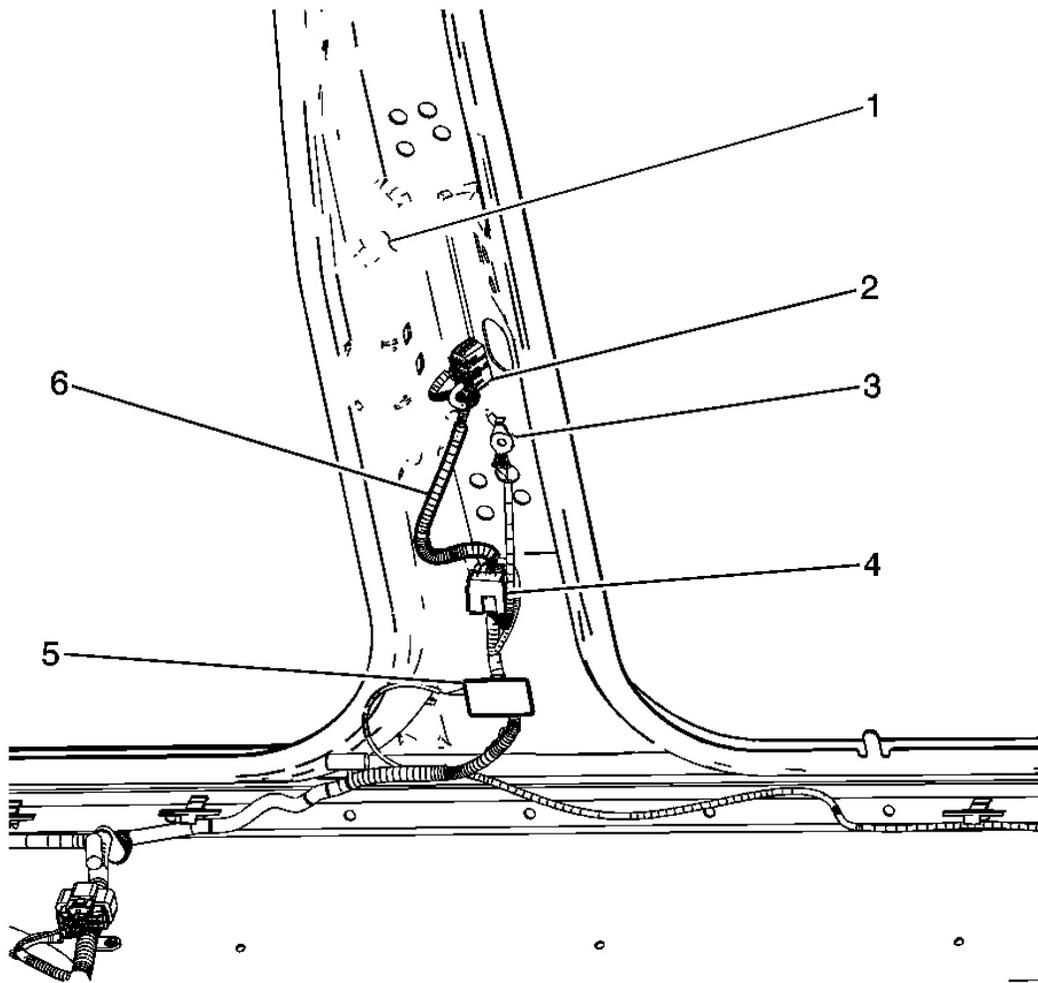
Callout	Component Name
1	Seat Horizontal Motor - Front Passenger
2	Seat Front Vertical Motor - Front Passenger
3	Seat Rear Vertical Motor - Front Passenger
4	C376
5	C377
6	C375
7	Seat Recline Motor - Front Passenger
8	Seat Bolster/Lumbar Switch - Front Passenger
9	Seat Adjuster Switch - Front Passenger



**Fig. 96: C378 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 96**

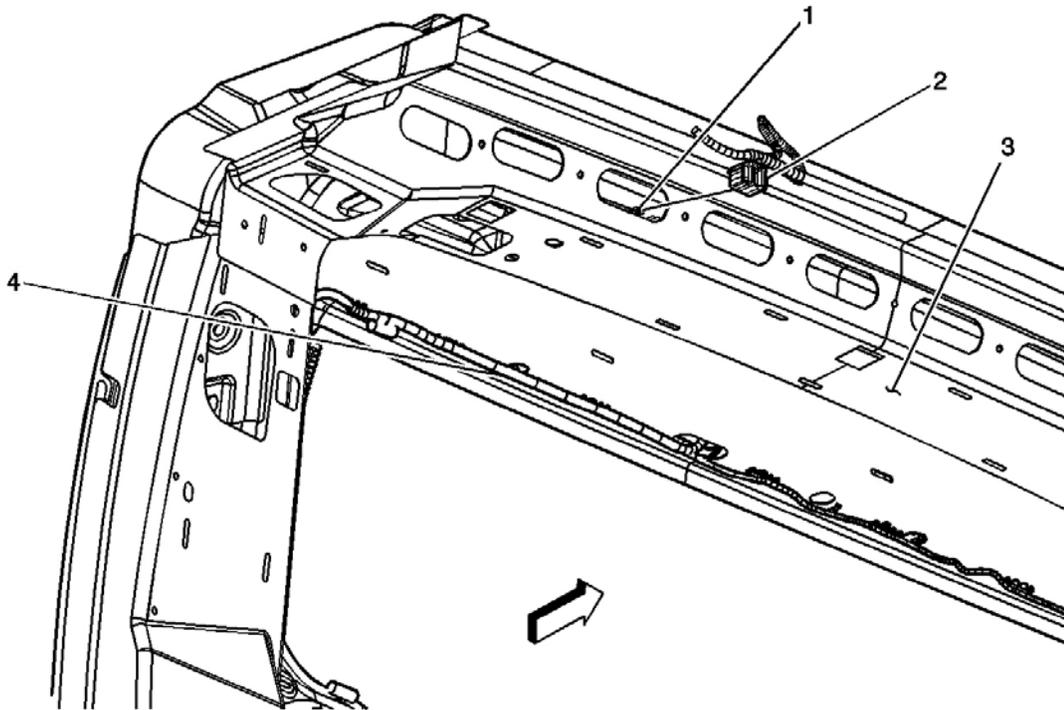
Callout	Component Name
1	Seat Bolster Motor - Passenger
2	Seat Lumbar Motor - Passenger
3	Heated Seat Element - Passenger Cushion Connector
4	C378



**Fig. 97: C390 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 97**

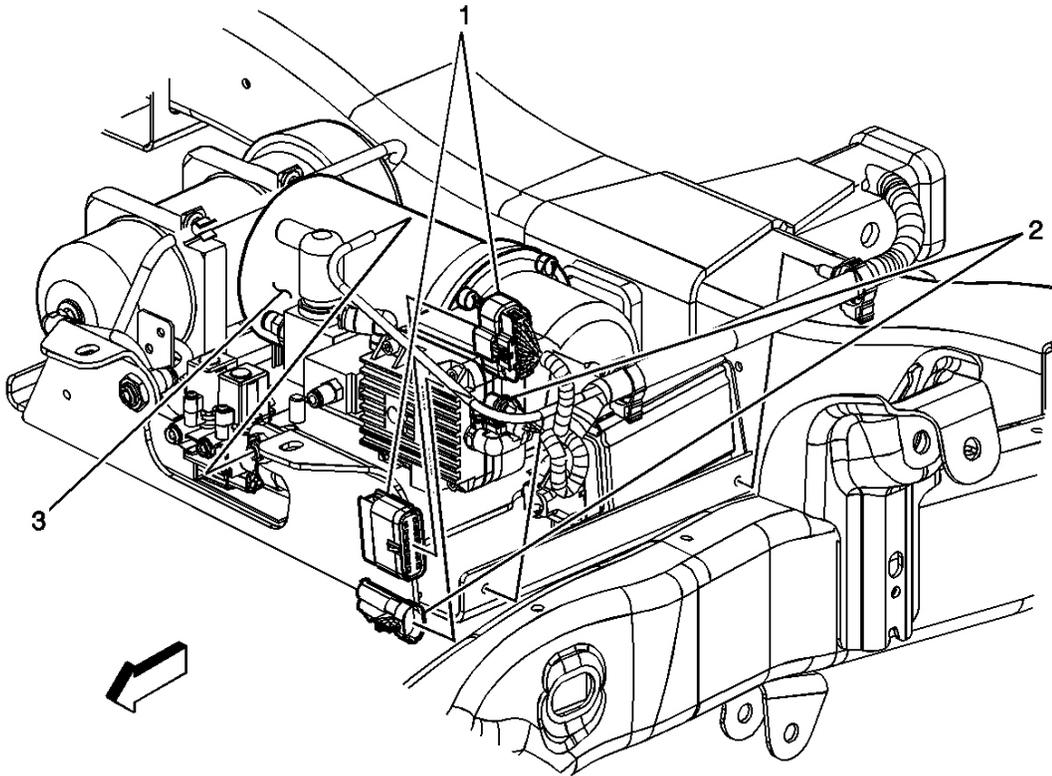
Callout	Component Name
1	RH B Pillar
2	C390
3	G306
4	Liftgate Relay
5	Courtesy Lamp - RH B Pillar
6	Body Harness



**Fig. 98: C420 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 98**

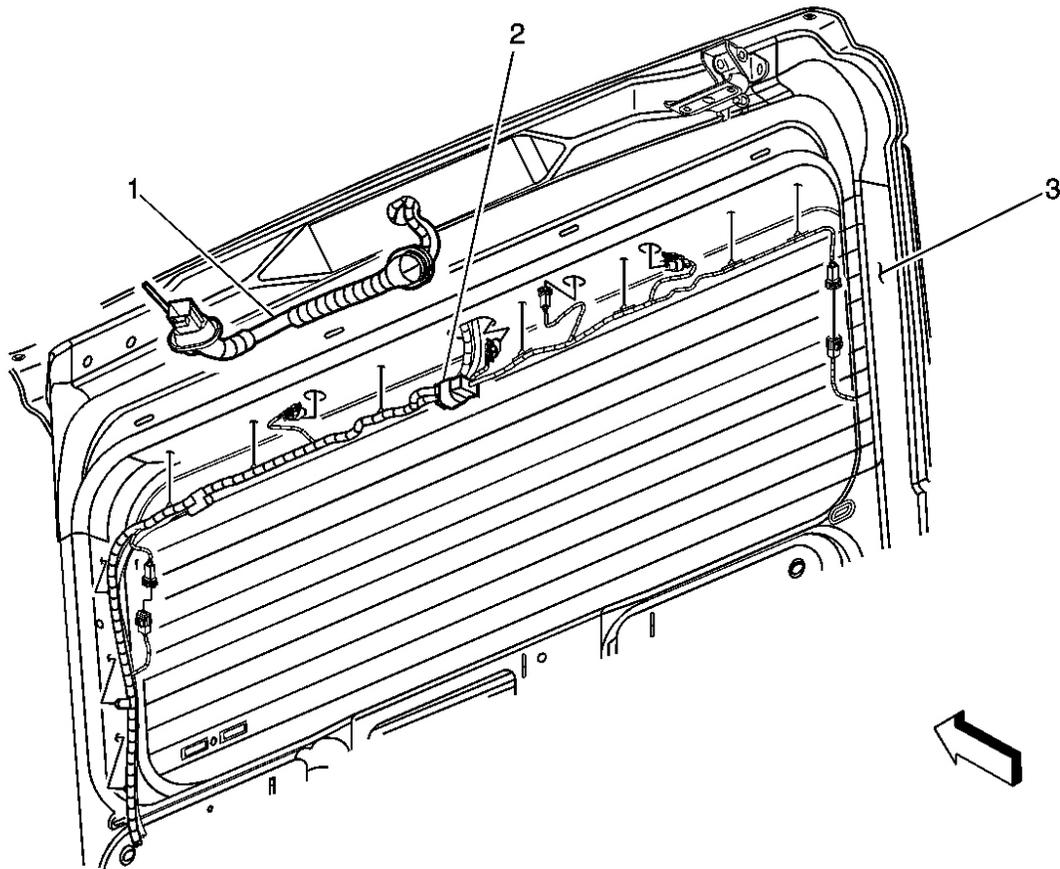
Callout	Component Name
1	C420 - Liftgate Harness Side
2	C420 - Body Harness Side
3	Liftgate
4	Liftgate Harness



**Fig. 99: C450 and C451 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 99**

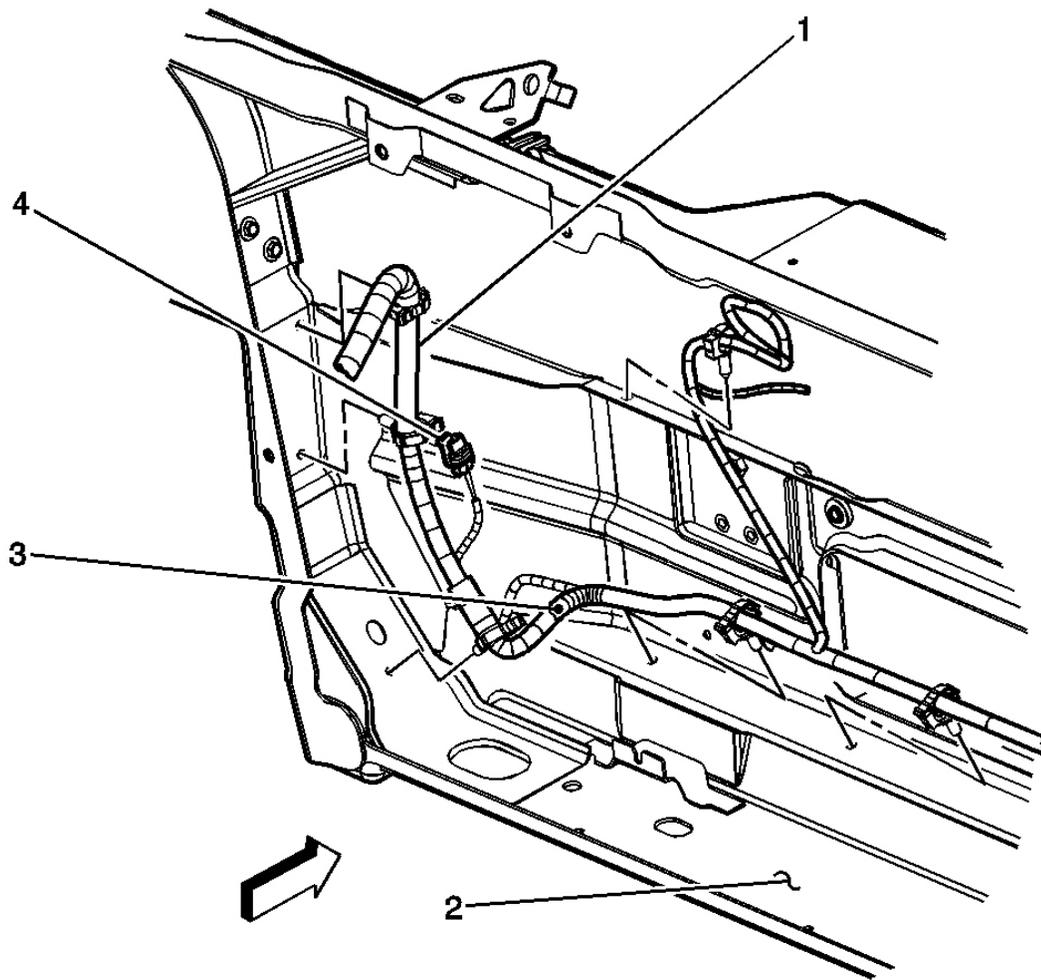
Callout	Component Name
1	C451
2	C450
3	Air Suspension Compressor



**Fig. 100: C900 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 100**

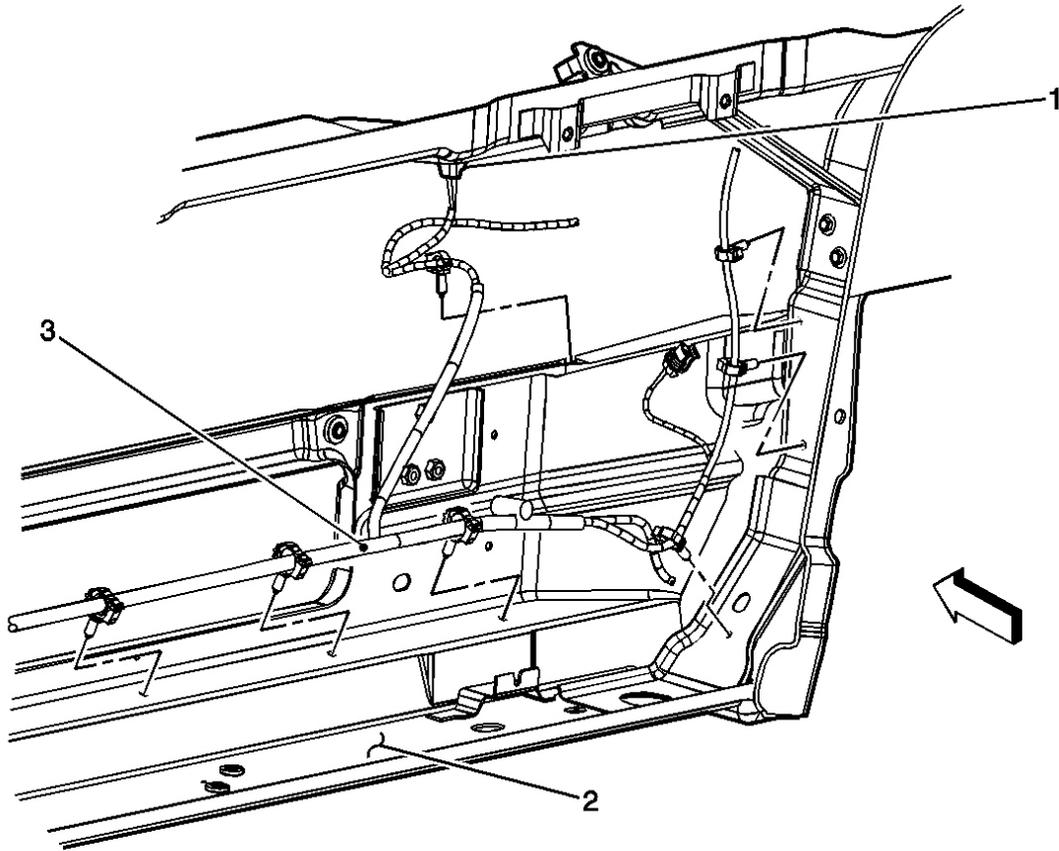
Callout	Component Name
1	Liftgate Jumper Harness
2	C900
3	Liftgate



**Fig. 101: Splice S100 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 101**

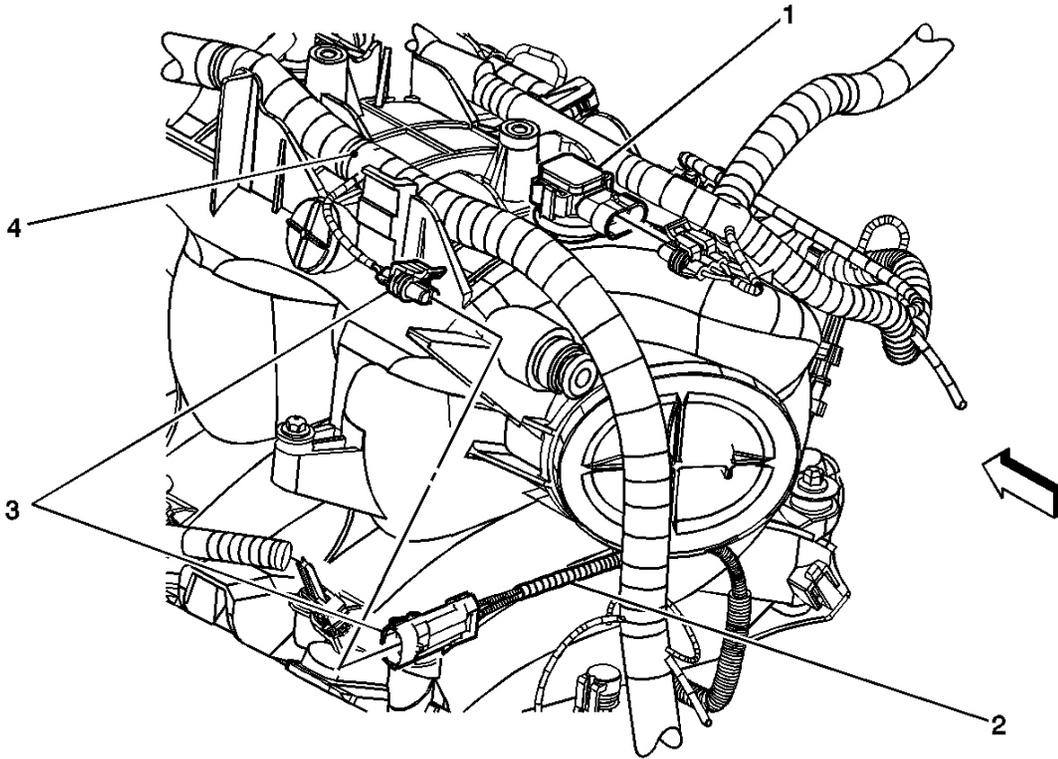
Callout	Component Name
1	Forward Lamp Harness
2	Radiator Support
3	S100
4	Horn Connector



**Fig. 102: Splice S101 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 102**

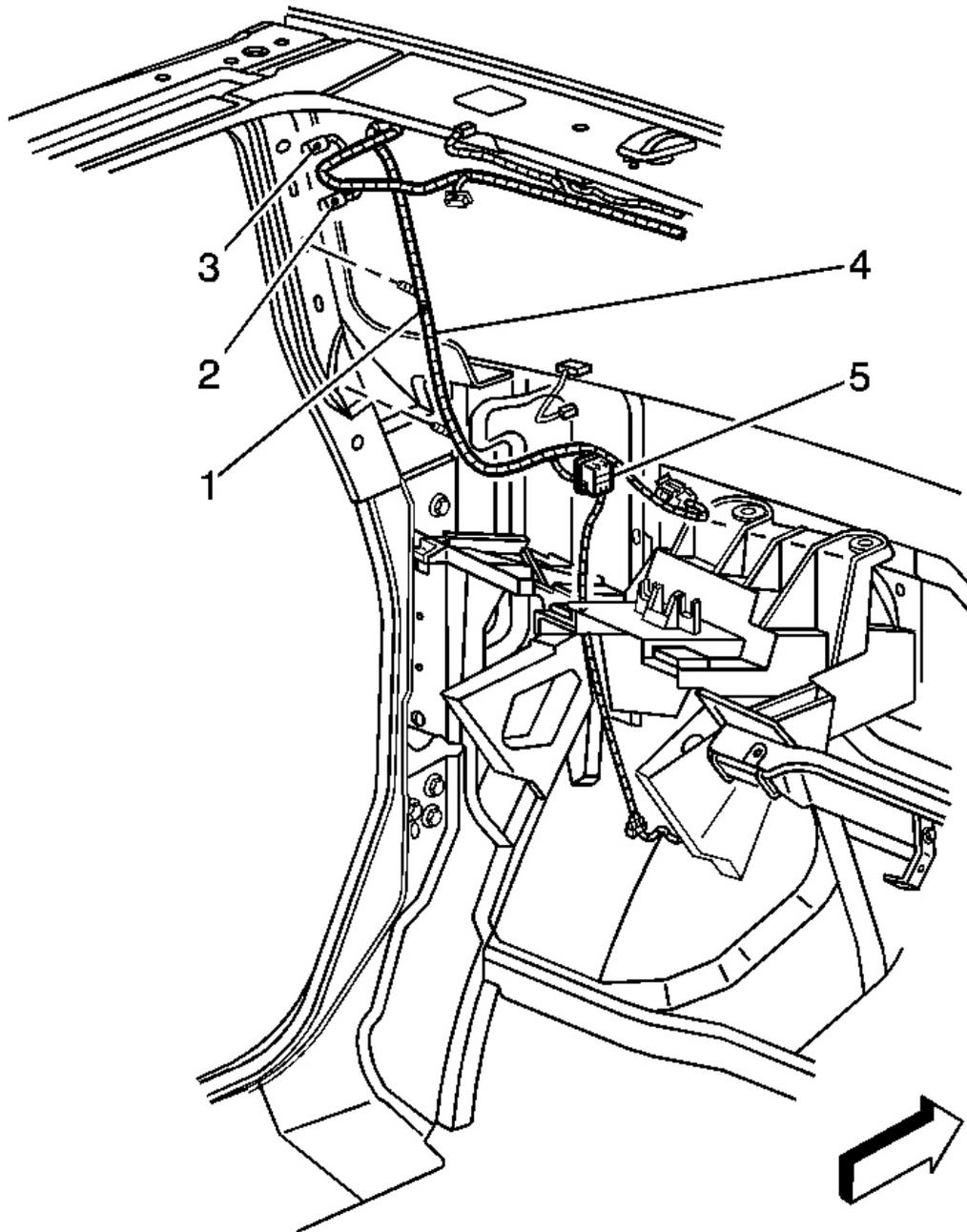
Callout	Component Name
1	Ambient Temperature Sensor - Mirror
2	Radiator Support
3	S101



**Fig. 103: Splice S102 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 103**

Callout	Component Name
1	MAP Sensor
2	Knock Sensor Pigtail
3	C115-Knock Sensors Inline
4	Engine Harness

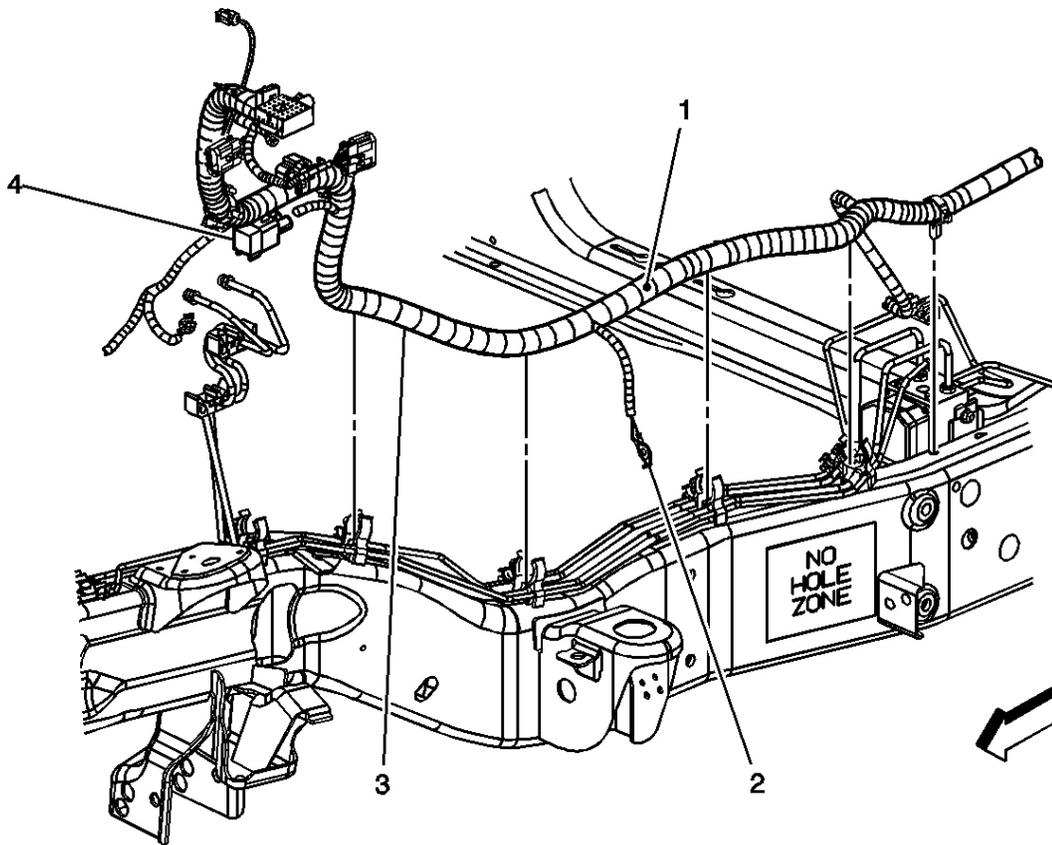


**Fig. 104: Splices S301, S302 and S305 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 104**

Callout	Component Name
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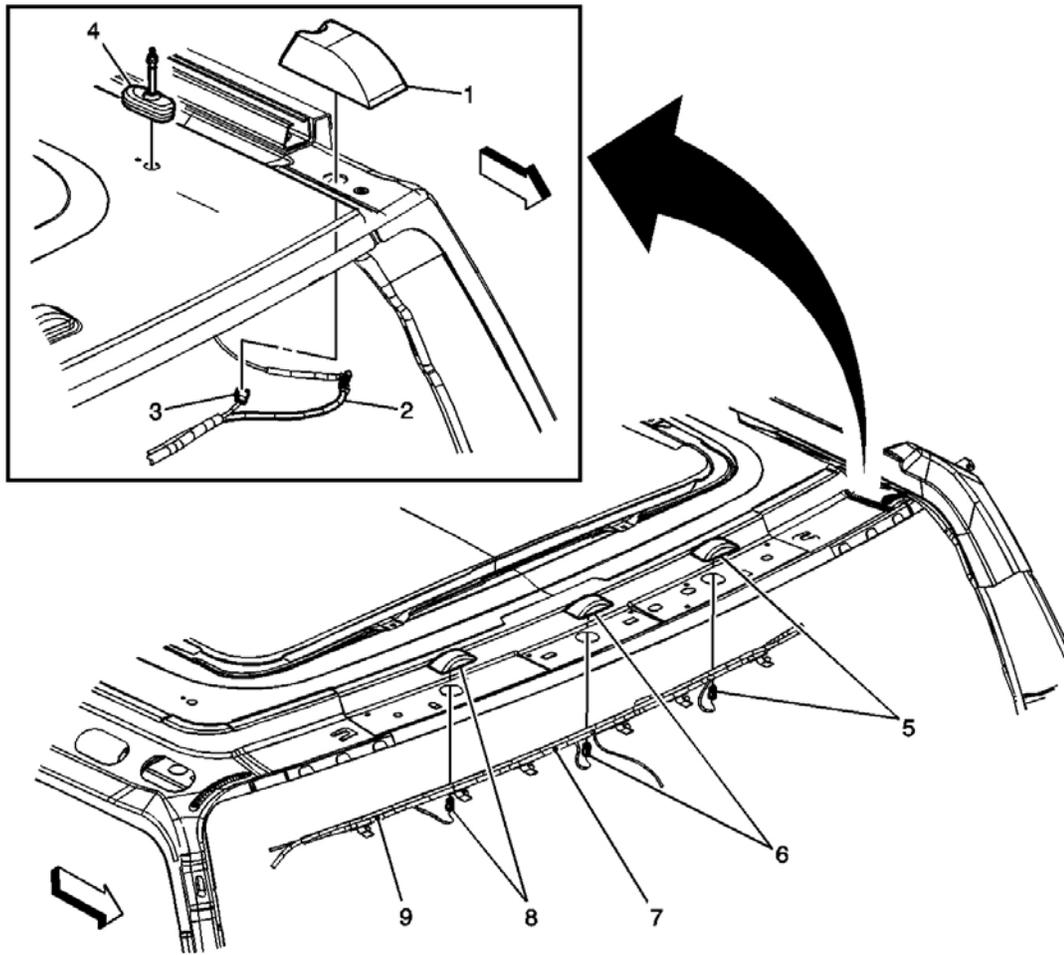
1	S302
2	S305
3	S301
4	Headliner Harness
5	Sunroof Relay



**Fig. 105: S304 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 105**

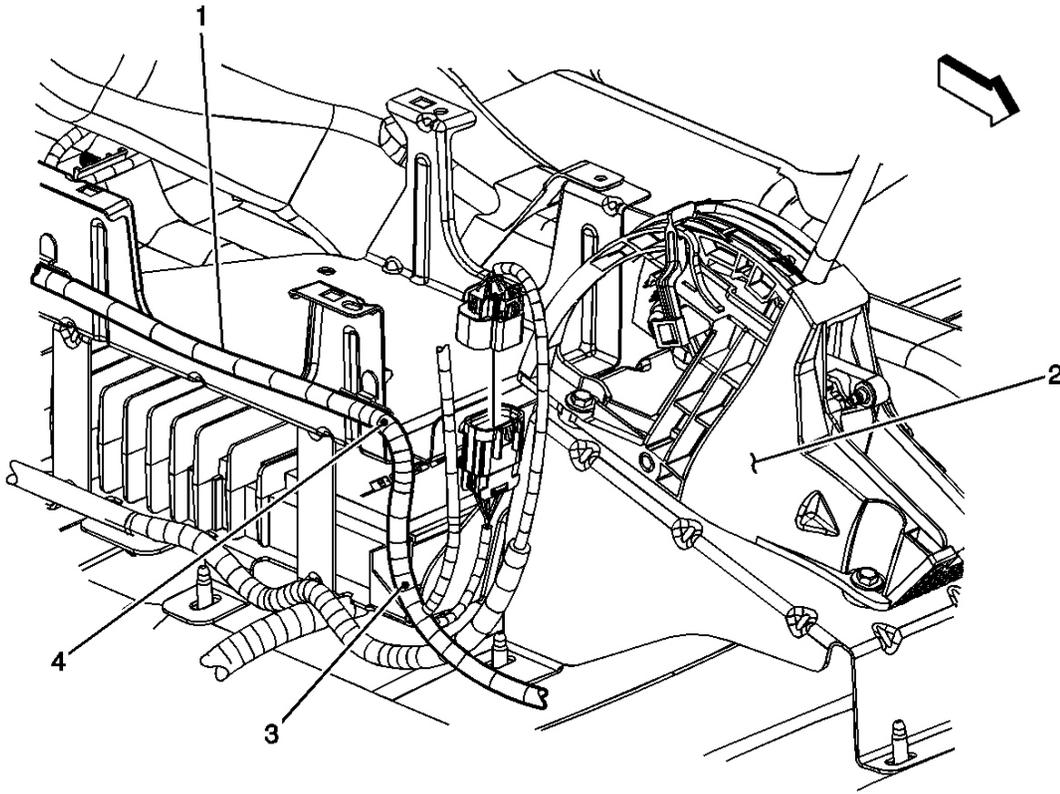
Callout	Component Name
1	S304
2	G300
3	Chassis Harness
4	Electronically Controlled Air Suspension Relay



**Fig. 106: Splice S303 and S345 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 106**

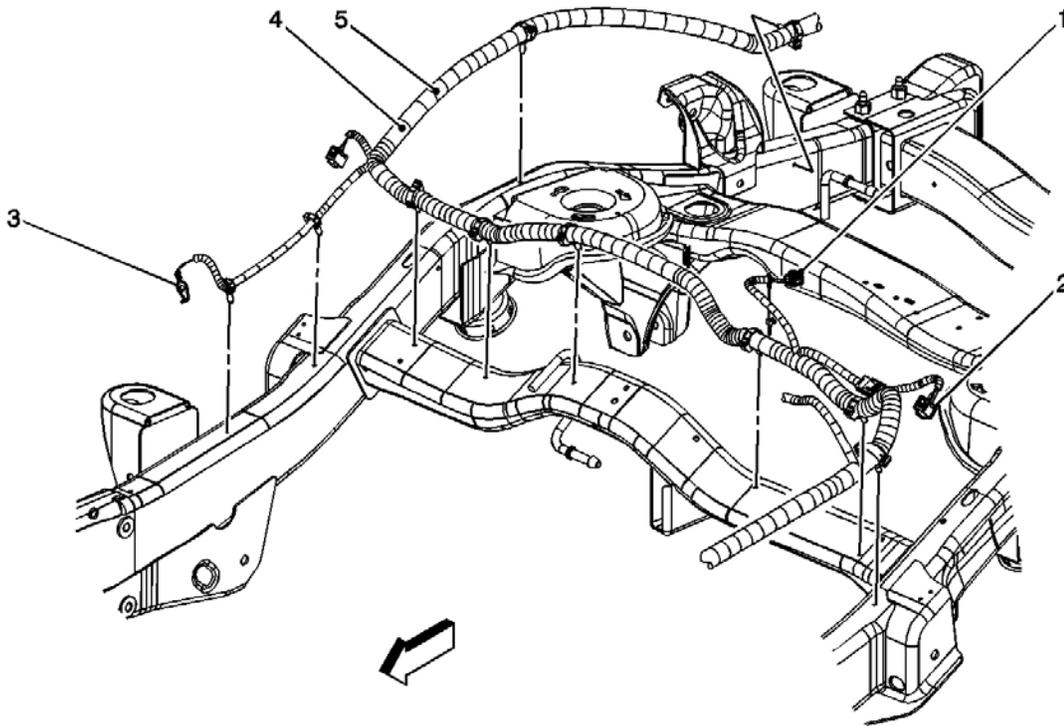
Callout	Component Name
1	Clearance Lamp - LF
2	Roof Marker Lamp Harness
3	Clearance Lamp Connector - LF
4	Cell Phone/GPS Antenna
5	Roof Lamp - Center Front
6	Roof Lamp - Center Front
7	Splice S345
8	Roof Lamp - Center Front
9	Splice S303



**Fig. 107: Splices S350 and S351 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 107**

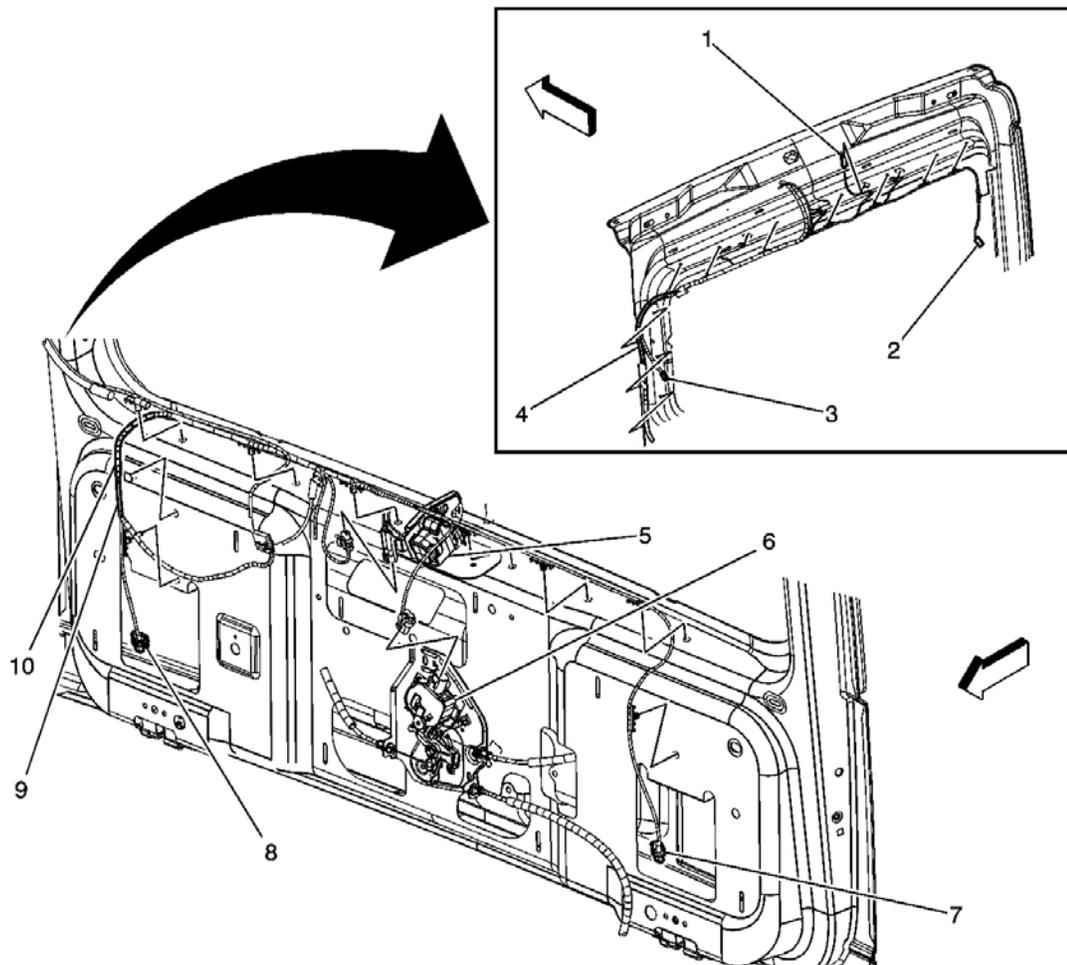
Callout	Component Name
1	Console Harness
2	Floor Shifter
3	S350
4	S351



**Fig. 108: S391 and S392 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 108**

Callout	Component Name
1	Fuel Tank Pressure (FTP) Sensor Connector
2	Air Suspension Sensor Connector - RR
3	G308
4	S391
5	S392



**Fig. 109: Splices S900, S901 and S902 Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 109**

Callout	Component Name
1	Center High Mounted Stop Lamp (CHMSL) Connector
2	Rear Window Defogger Grid Connector
3	Rear Window Defogger Grid Connector
4	Splice S900
5	Rear Window Wiper Module - w/Motor
6	Door Lock Actuator - Liftgate
7	Liftgate Ajar Switch - Left
8	Liftgate Ajar Switch - Right
9	Splice S902
10	Splice S901

# REPAIR INSTRUCTIONS

## RELAY REPLACEMENT (WITHIN AN ELECTRICAL CENTER)

### Tools Required

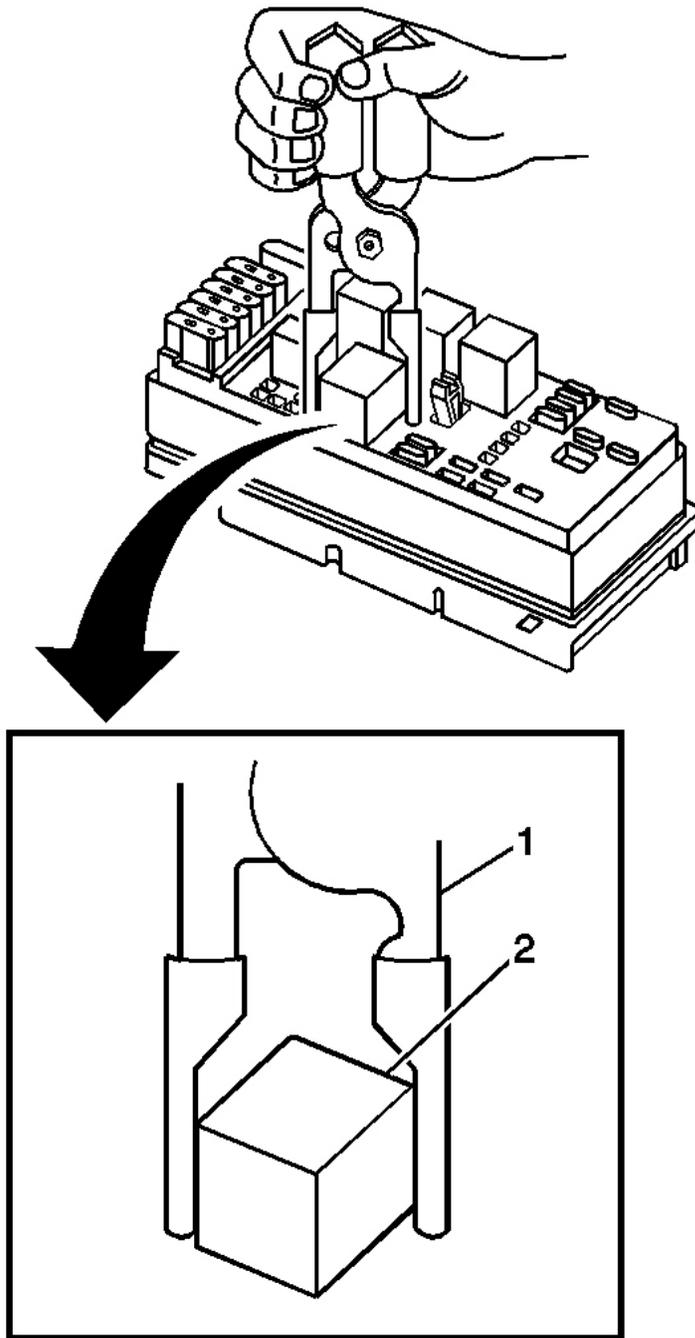
**J 43244** Relay Puller Pliers. See Special Tools and Equipment .

### Removal Procedure

1. Remove the electrical center cover.
2. Locate the relay. Refer to Electrical Center Identification Views to locate the electrical center where the relay exists.

### **IMPORTANT:**

- **Always note the orientation of the relay.**
- **Ensure that the electrical center is secure, as not to put added stress on the wires or terminals.**



**Fig. 110: Removing Or Installing Relay In Electrical Center**  
Courtesy of GENERAL MOTORS CORP.

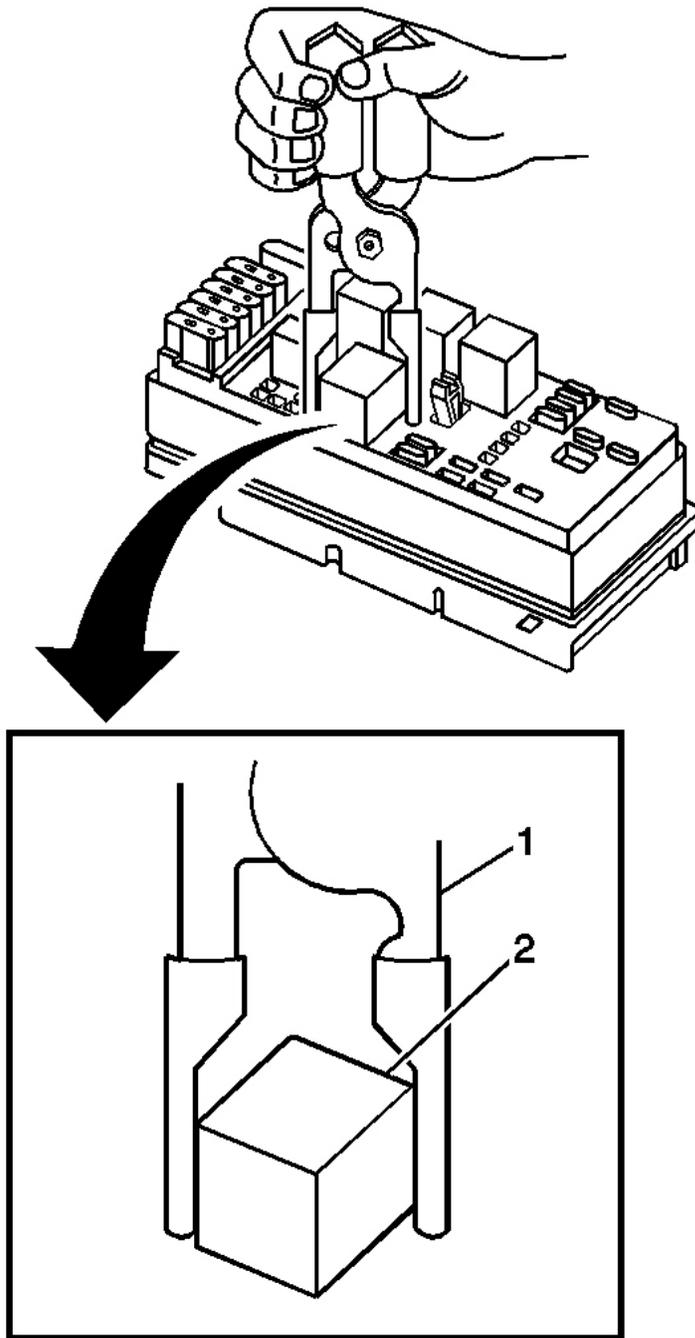
3. Using the **J 43244** (1) position the tool on opposing corners of the relay (2). See **Special Tools and**

## Equipment .

**NOTE:** Use J43244 to pull the relay straight out from the electrical center terminals. The use of pliers or a flat bladed tool could damage the electrical center.

4. Remove the relay (2) from the electrical center.

## **Installation Procedure**



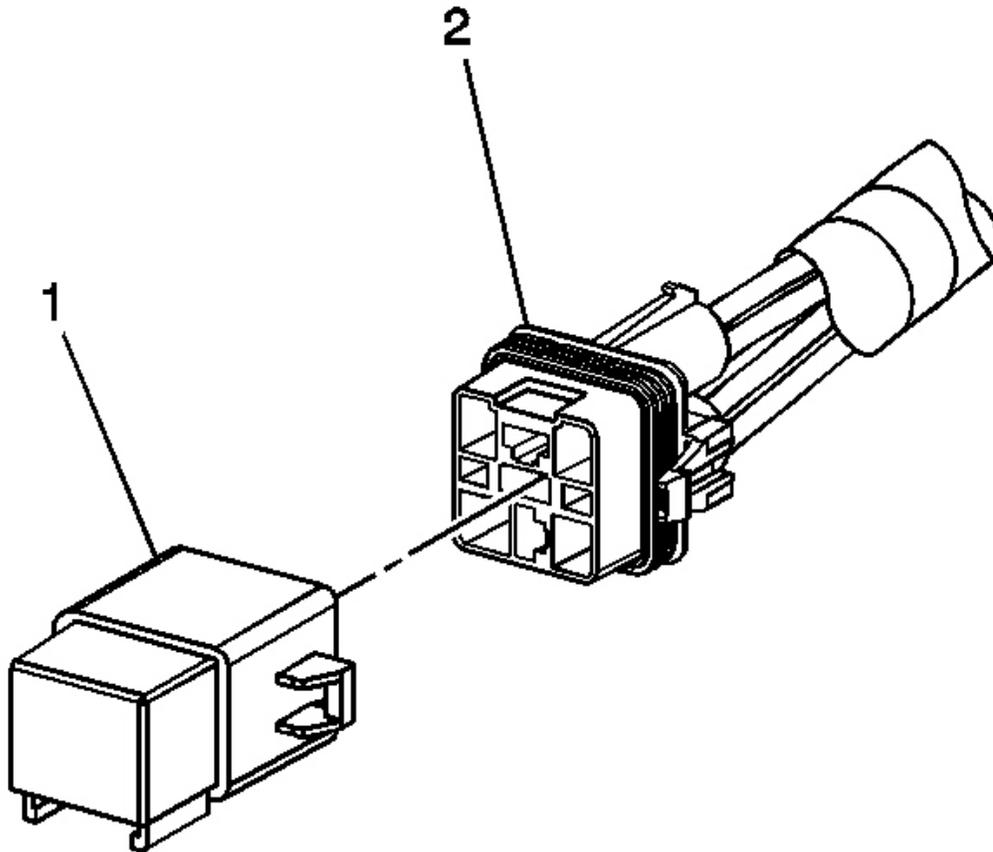
**Fig. 111: Removing Or Installing Relay In Electrical Center**  
Courtesy of GENERAL MOTORS CORP.

1. Install the relay (2) in the same position as removed.

2. Install the electrical center cover.

## RELAY REPLACEMENT (ATTACHED TO WIRE HARNESS)

### Removal Procedure



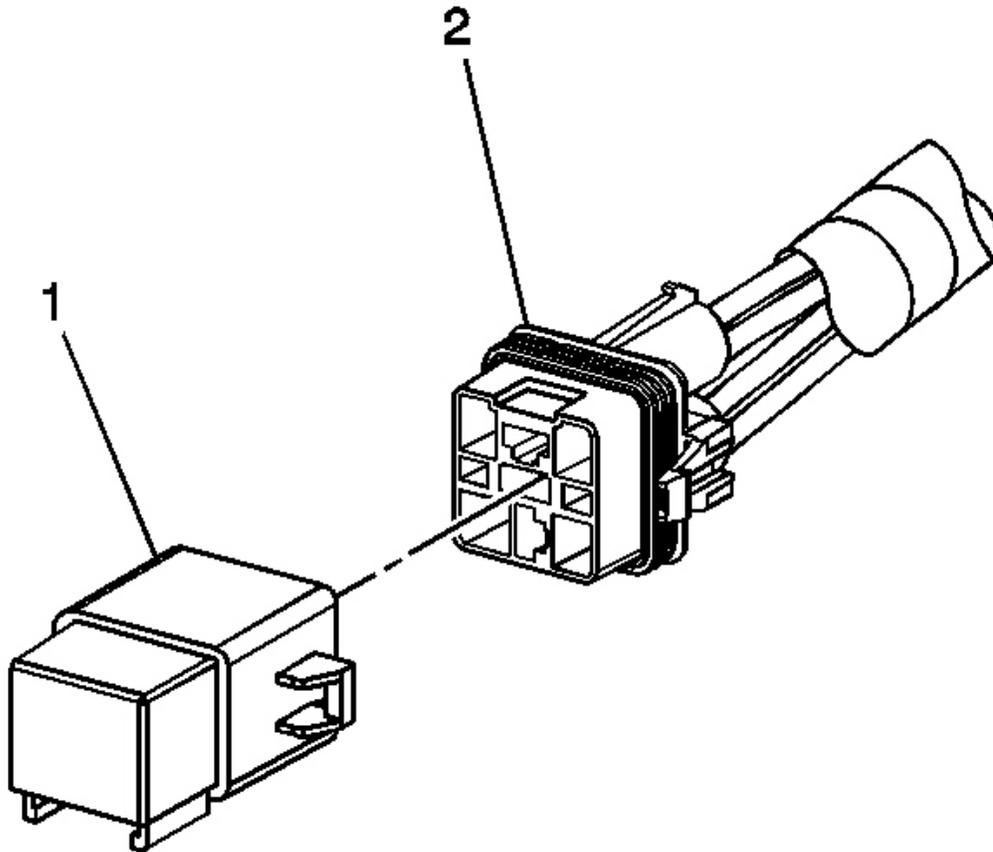
**Fig. 112: Relay & Wire Harness Connector**  
Courtesy of GENERAL MOTORS CORP.

1. Locate the relay. Refer to the **Master Electrical Component List** to locate the relay in the vehicle.
2. Remove any fasteners which hold the relay in place.
3. Remove any connector position assurance (CPA) devices or secondary locks.

**IMPORTANT: Use care when removing a relay in a wiring harness when the relay is secured by fasteners or tape.**

4. Separate the relay (1) from the wire harness connector (2).

### Installation Procedure



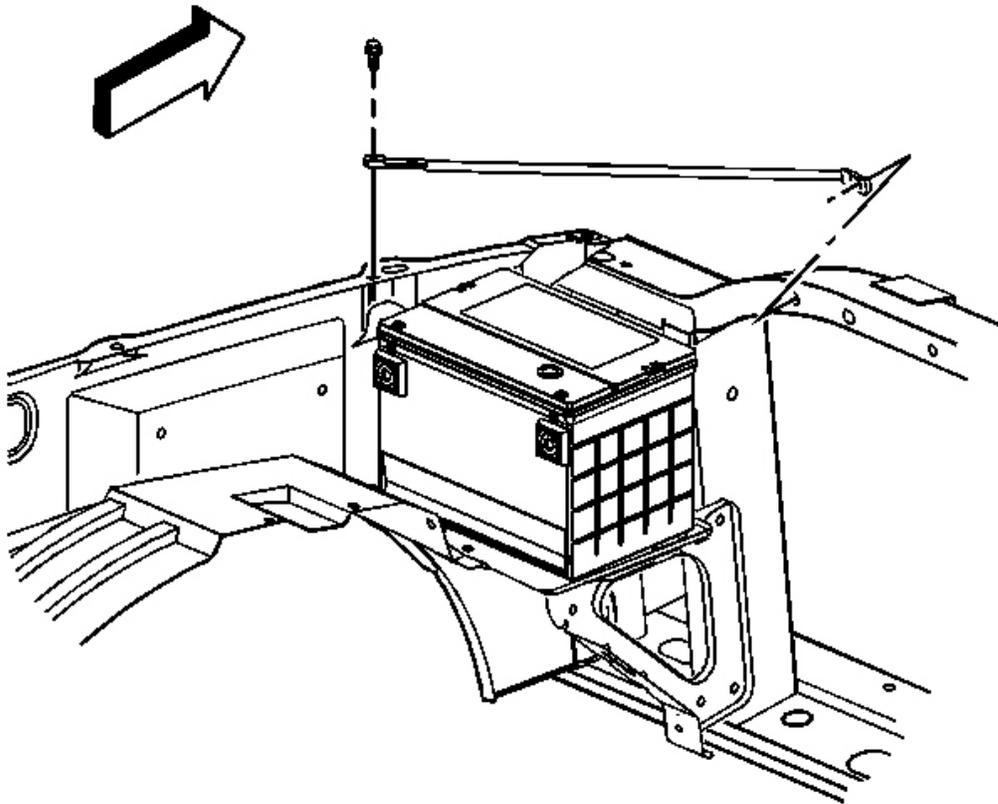
**Fig. 113: Relay & Wire Harness Connector**  
Courtesy of GENERAL MOTORS CORP.

1. Connect the relay (1) to the wire harness connector (2).
2. Install any connector position assurance (CPA) devices or secondary locks.
3. Install the relay using any fasteners or tape that originally held the relay in place.

### UNDERHOOD ELECTRICAL CENTER OR JUNCTION BLOCK REPLACEMENT

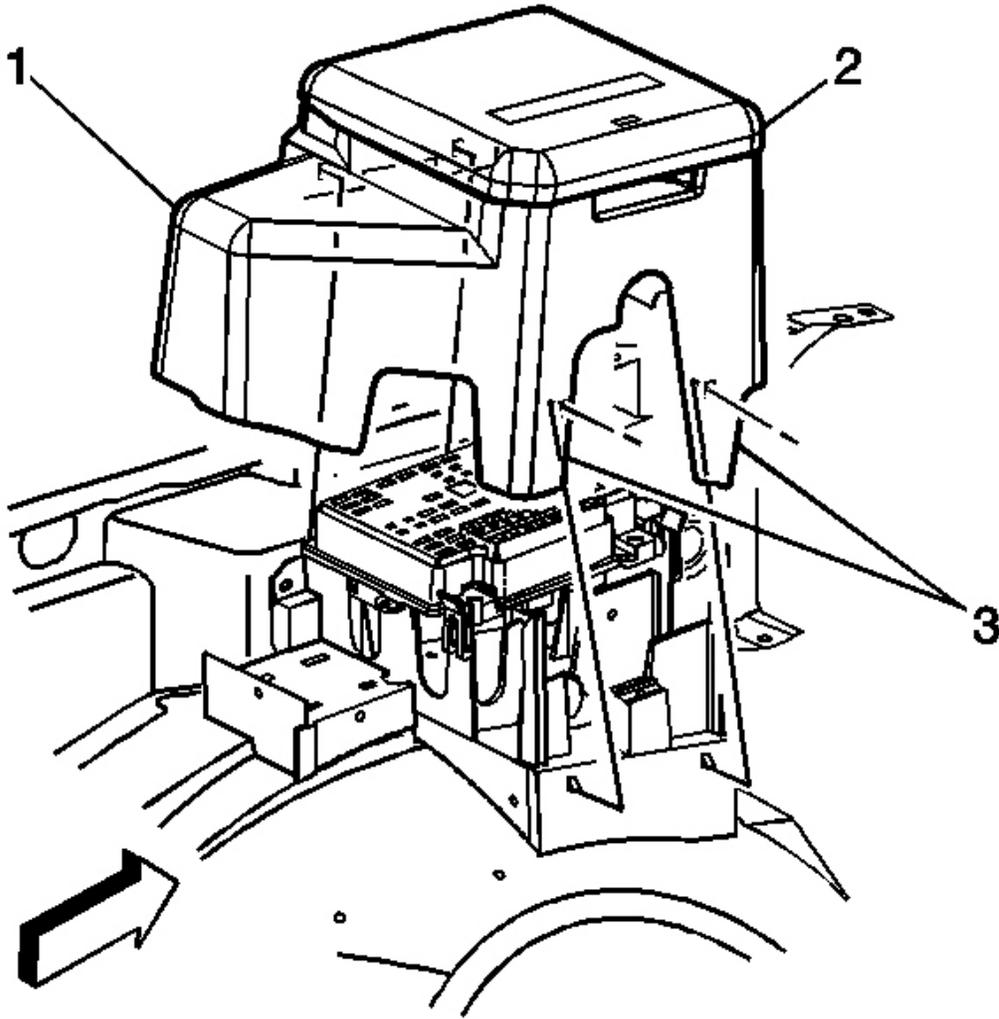
#### Removal Procedure

1. Disconnect the negative battery cable. Refer to **Battery Negative Cable Disconnect/Connect Procedure (Single Battery)** in Engine Electrical.



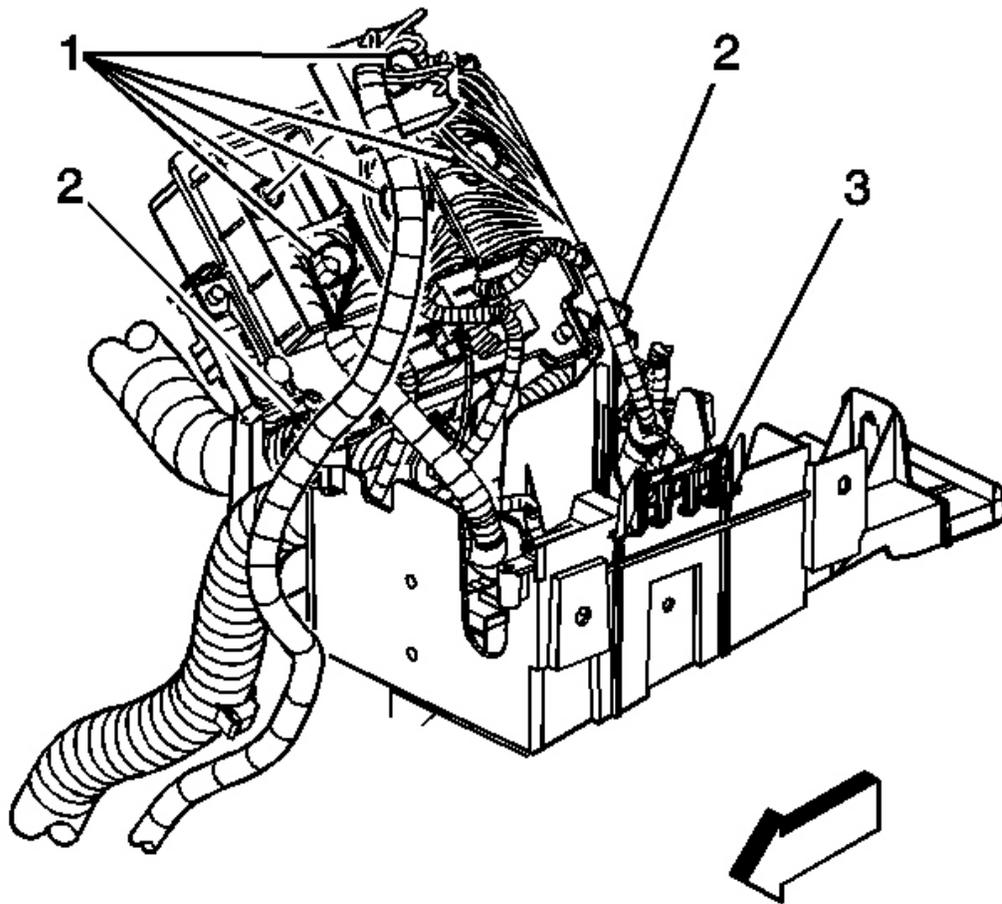
**Fig. 114: Left Fender Upper Brace**  
Courtesy of GENERAL MOTORS CORP.

2. Remove the left fender upper brace.



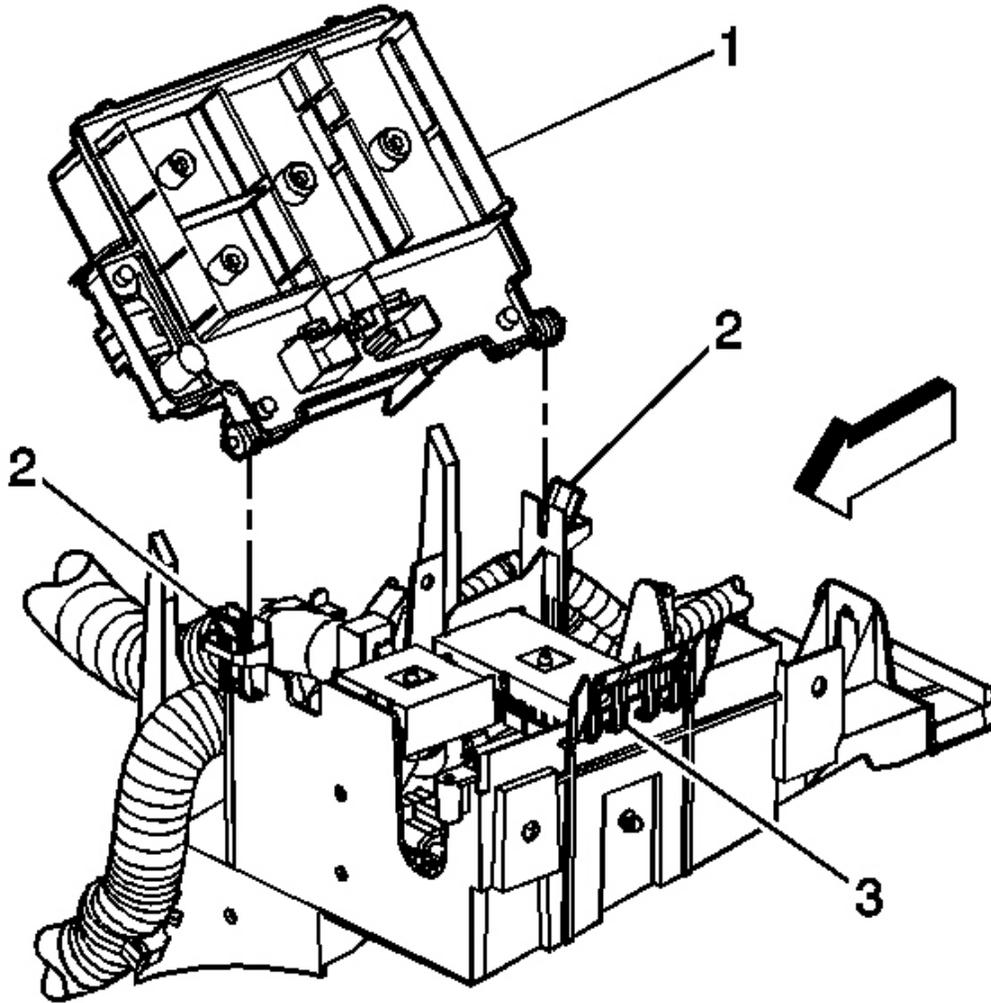
**Fig. 115: Electrical Center Brace Cover Assemble**  
Courtesy of GENERAL MOTORS CORP.

3. Remove the electrical center brace cover assemble by lifting the cover (3) outwards to clear the tabs.
4. Remove all fuses and relays.



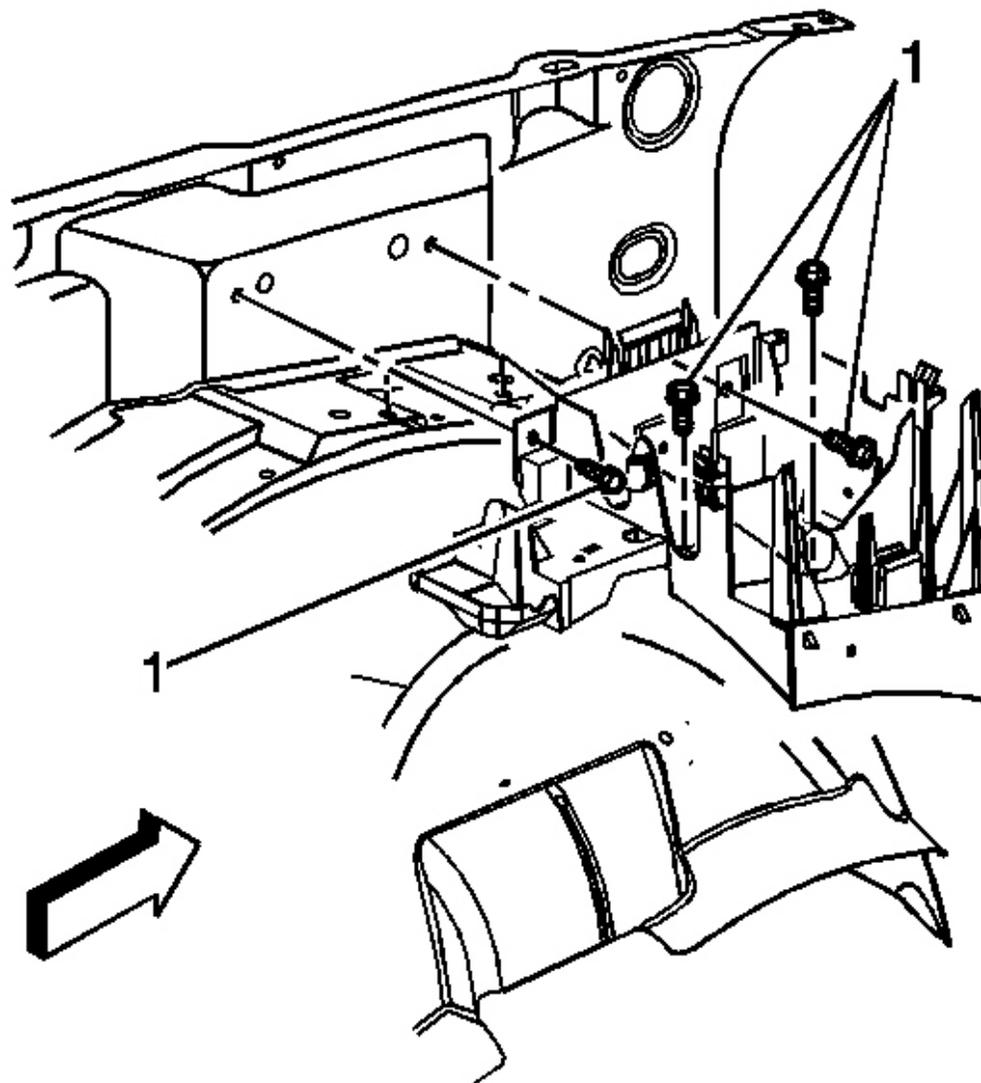
**Fig. 116: Connectors & Electrical Center Block**  
Courtesy of GENERAL MOTORS CORP.

5. Push on the tab (3) so that the electrical center can be rotated on the studs located at (2).
6. Remove all connectors by removing the bolt (1) for each connector.
7. Disconnect all connectors from the electrical center block.



**Fig. 117: Electrical Center & Housing**  
Courtesy of GENERAL MOTORS CORP.

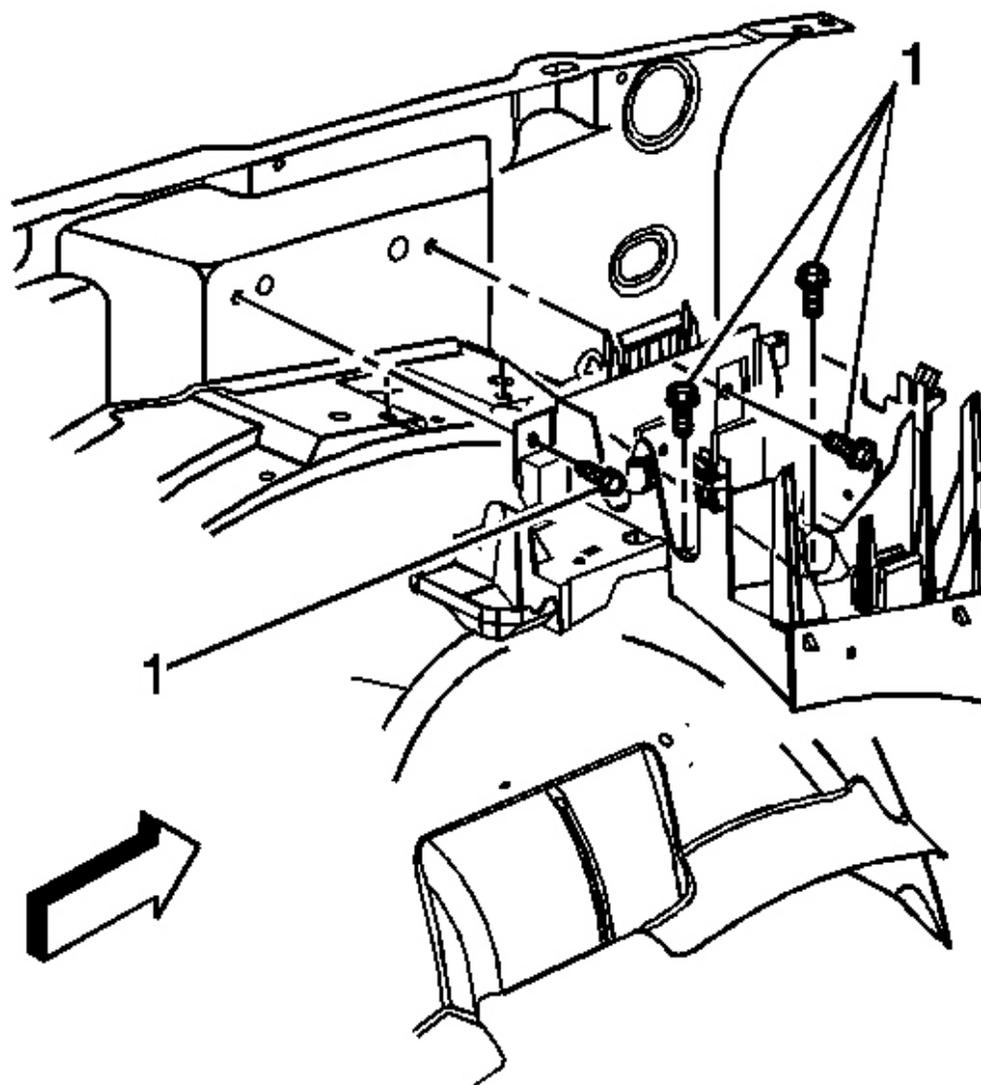
8. Push on the tabs (2) in order to lift the electrical center (1) out of the housing.



**Fig. 118: Engine Electrical Center Bracket Assembly**  
Courtesy of GENERAL MOTORS CORP.

9. To replace the engine electrical center bracket remove the 4 retaining bolts (1).
10. Remove the engine electrical center bracket assembly from the fender.

#### **Installation Procedure**



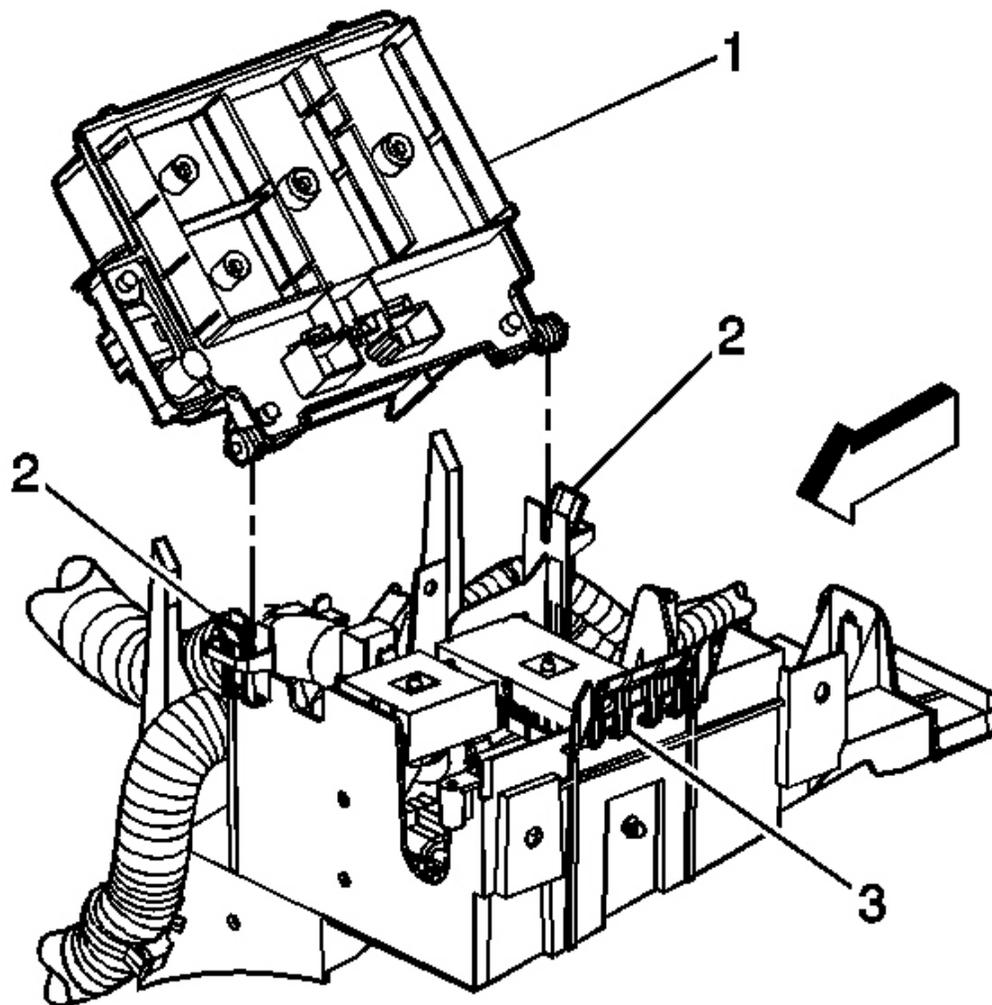
**Fig. 119: Engine Electrical Center Bracket Assembly**  
Courtesy of GENERAL MOTORS CORP.

1. Install the engine electrical center bracket assembly to the front fender.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

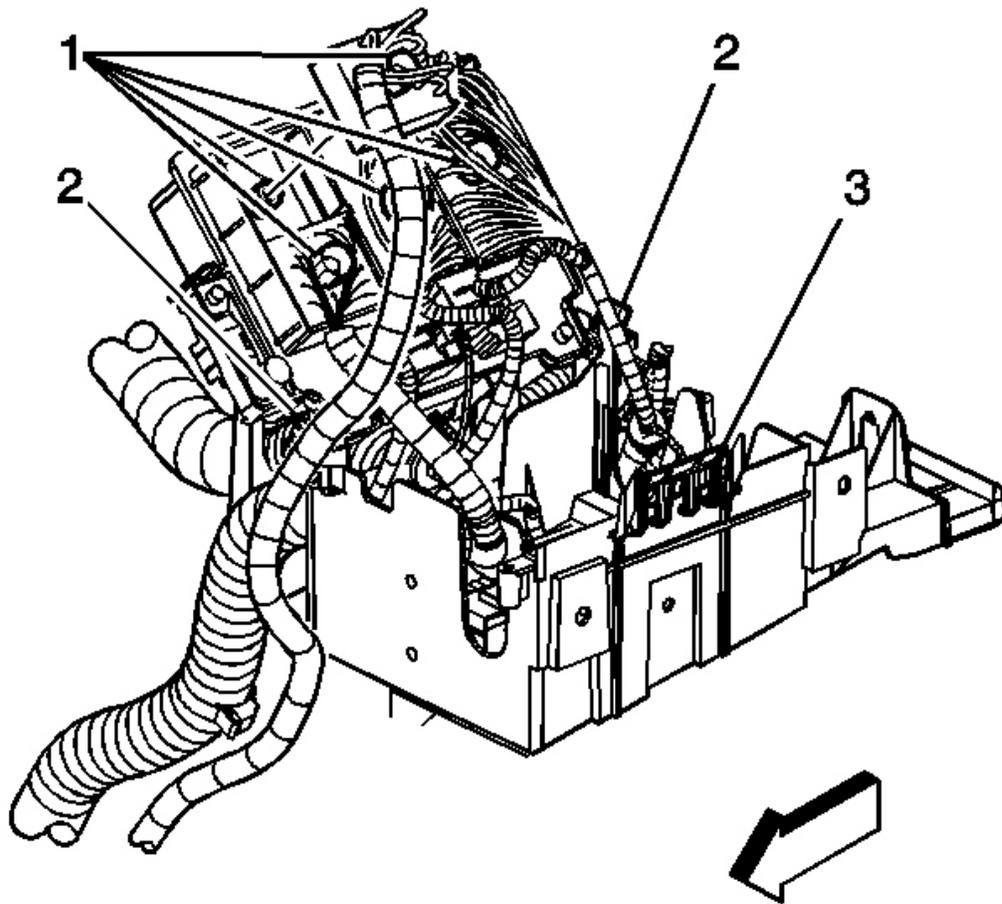
2. Install the 4 retaining bolts (1).

**Tighten:** Tighten the 4 retaining bolts (1) to 9 N.m (80 lb in).



**Fig. 120: Electrical Center & Housing**  
Courtesy of GENERAL MOTORS CORP.

3. Align the electrical center block (1) stubs in the slots so that the tabs (2) retains it in place.

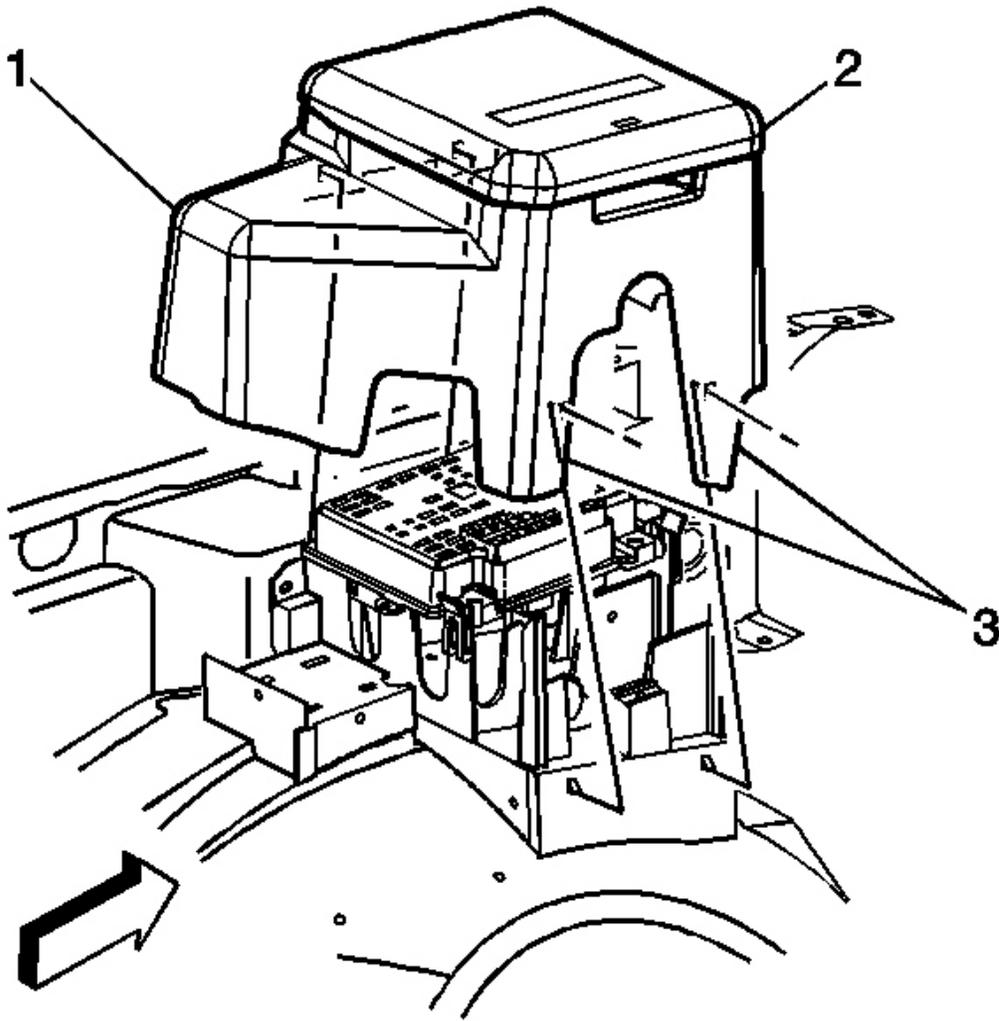


**Fig. 121: Connectors & Electrical Center Block**  
Courtesy of GENERAL MOTORS CORP.

4. Connect the wire connectors to the lower portion of the electrical center block.
5. Connect the wire connectors with the bolts to the electrical center block.

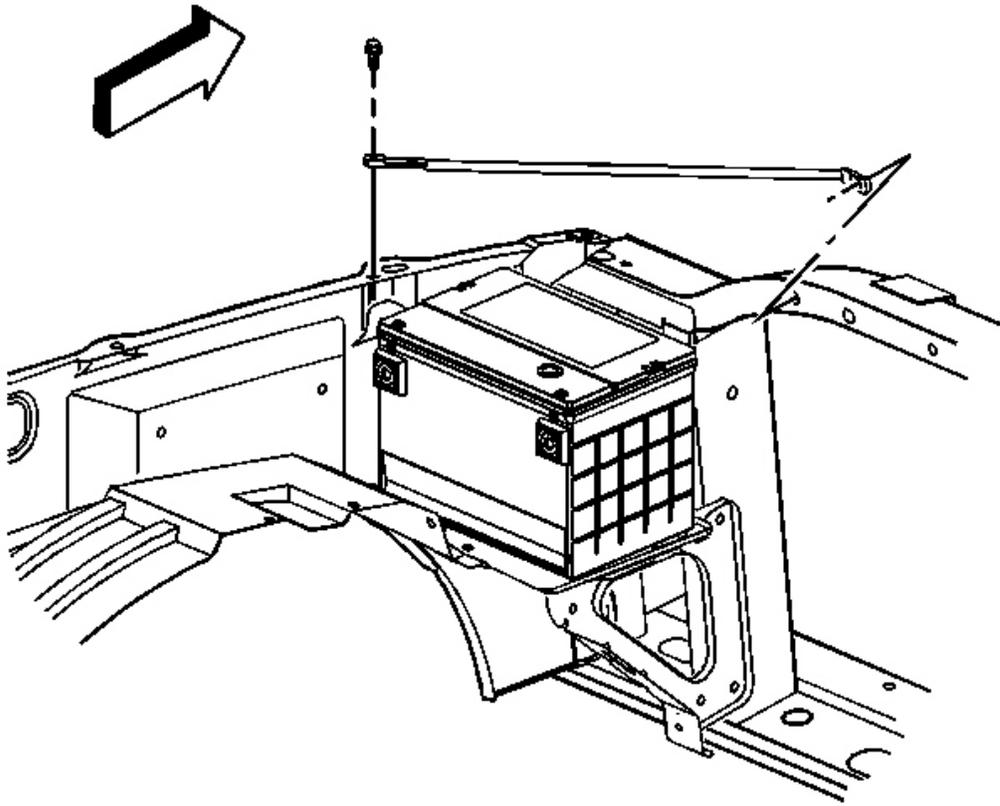
**Tighten:** Tighten all connector bolts (1) to 9 N.m (80 lb in).

6. Ensure all wire connectors are securely connected.
7. Set the electrical center block in its resting position till the tabs (3) locks in place.



**Fig. 122: Electrical Center Brace Cover Assemble**  
Courtesy of GENERAL MOTORS CORP.

8. Install the lower part of the cover (1).
9. With the cover (2) off, use the fuse location information to install all fuses and relays.
10. Install the cover.



**Fig. 123: Left Fender Upper Brace**  
Courtesy of GENERAL MOTORS CORP.

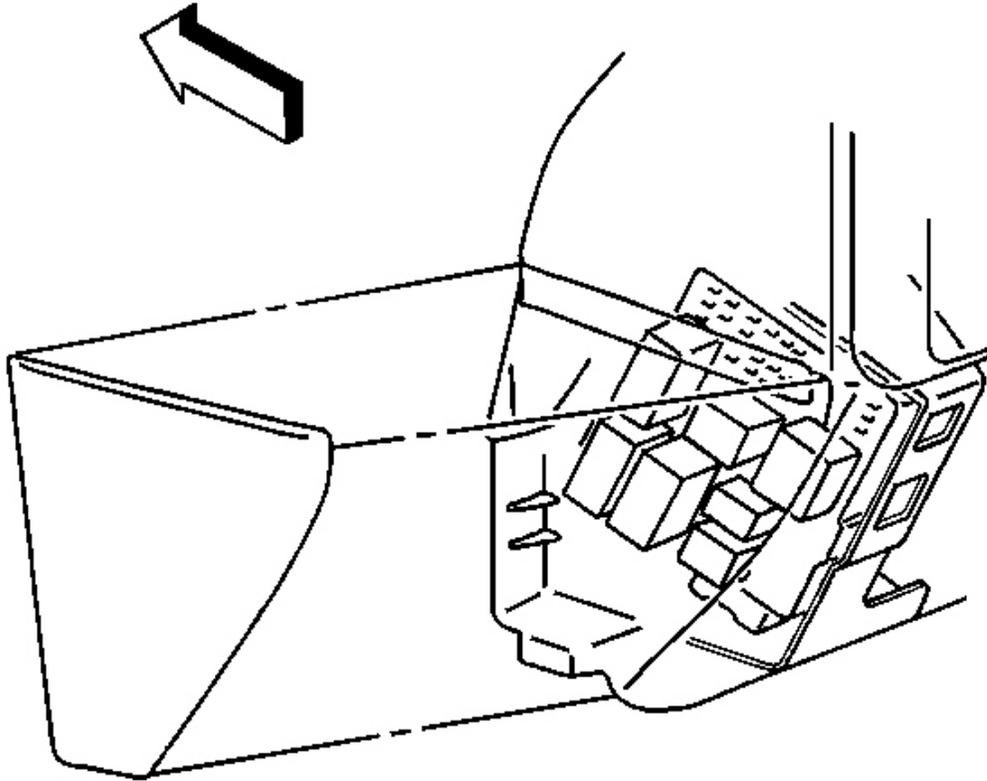
11. Install the fender upper brace.
12. Install the 4 fender upper brace bolts.

**Tighten:** Tighten the 4 retaining bolts to 25 N.m (18 lb ft).

13. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnect/Connect Procedure (Single Battery)** in Engine Electrical.
14. Start vehicle and ensure all components function properly.

## **INSTRUMENT PANEL ELECTRICAL CENTER OR JUNCTION BLOCK REPLACEMENT - LEFT**

### **Removal Procedure**



**Fig. 124: Left Side End Panel**  
Courtesy of GENERAL MOTORS CORP.

1. Remove the left side end panel.
2. Remove the knee bolster. Refer to **Trim Panel Replacement - Knee Bolster** in Instrument Panel, Gauges and Console.
3. Disconnect all the wiring connectors from the fuse block.
4. Remove all the fuses.
5. Remove the turn signal relay from the back of the fuse block.
6. From behind the fuse block, remove the retaining bolt.
7. Insert a screw driver between the fuse block and the wire harness block to separate.
8. Push on the retainers in order to remove the fuse block.
9. Remove the fuse block from the vehicle.

#### **Installation Procedure**

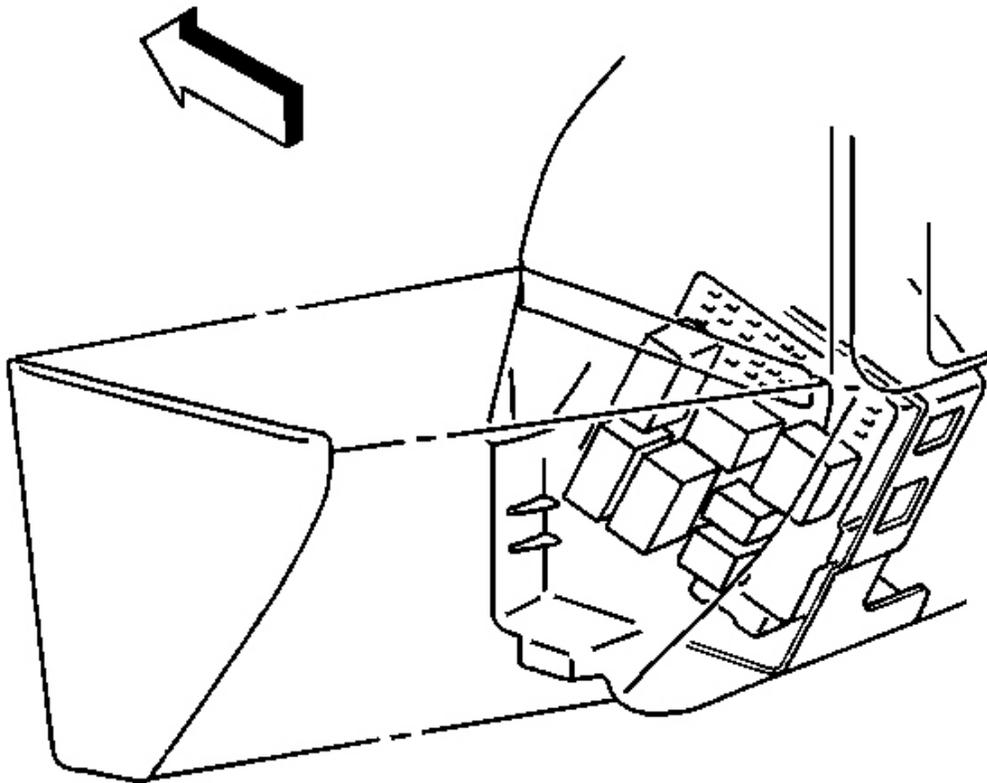
1. Install the fuse block onto the IP assembly till it clicks in place.
2. Install the wire harness block to the back of the fuse block.

**NOTE:** Refer to Fastener Notice in **Cautions and Notices**.

3. Install the bolt.

**Tighten:** Tighten the bolt to 6 N.m (53 lb in).

4. Install the turn signal relay to the back of the fuse block.
5. Using the wiring diagram on the cover of the fuse panel, install the fuses.
6. Install the electrical connectors.
7. Install the knee bolster. Refer to Trim Panel Replacement - Knee Bolster in Instrument Panel, Gauges and Console.



**Fig. 125: Left Side End Panel**

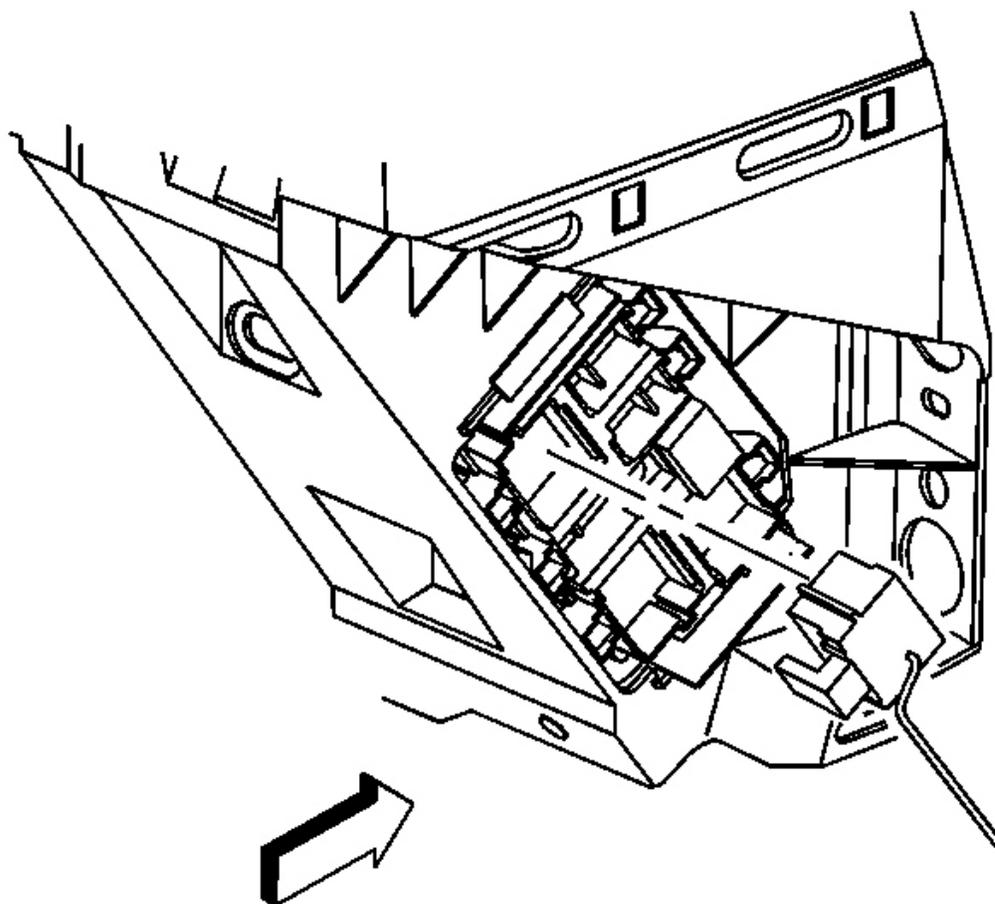
Courtesy of GENERAL MOTORS CORP.

8. Install the left side end panel.

## INSTRUMENT PANEL ELECTRICAL CENTER OR JUNCTION BLOCK REPLACEMENT - RIGHT

### Removal Procedure

1. Remove the right side end panel.
2. Push in the tabs in order to remove the fuse block.



**Fig. 126: Fuse Block & I/P**  
Courtesy of GENERAL MOTORS CORP.

3. Pull out the fuse block out of the I/P in order to remove the retaining bolt.
4. Loosen the bolt.
5. Insert a screw driver between the wire harness block and fuse block in order to separate.
6. Separate the fuse block from the I/P harness block.
7. Remove the IP wiring harness block from the vehicle.

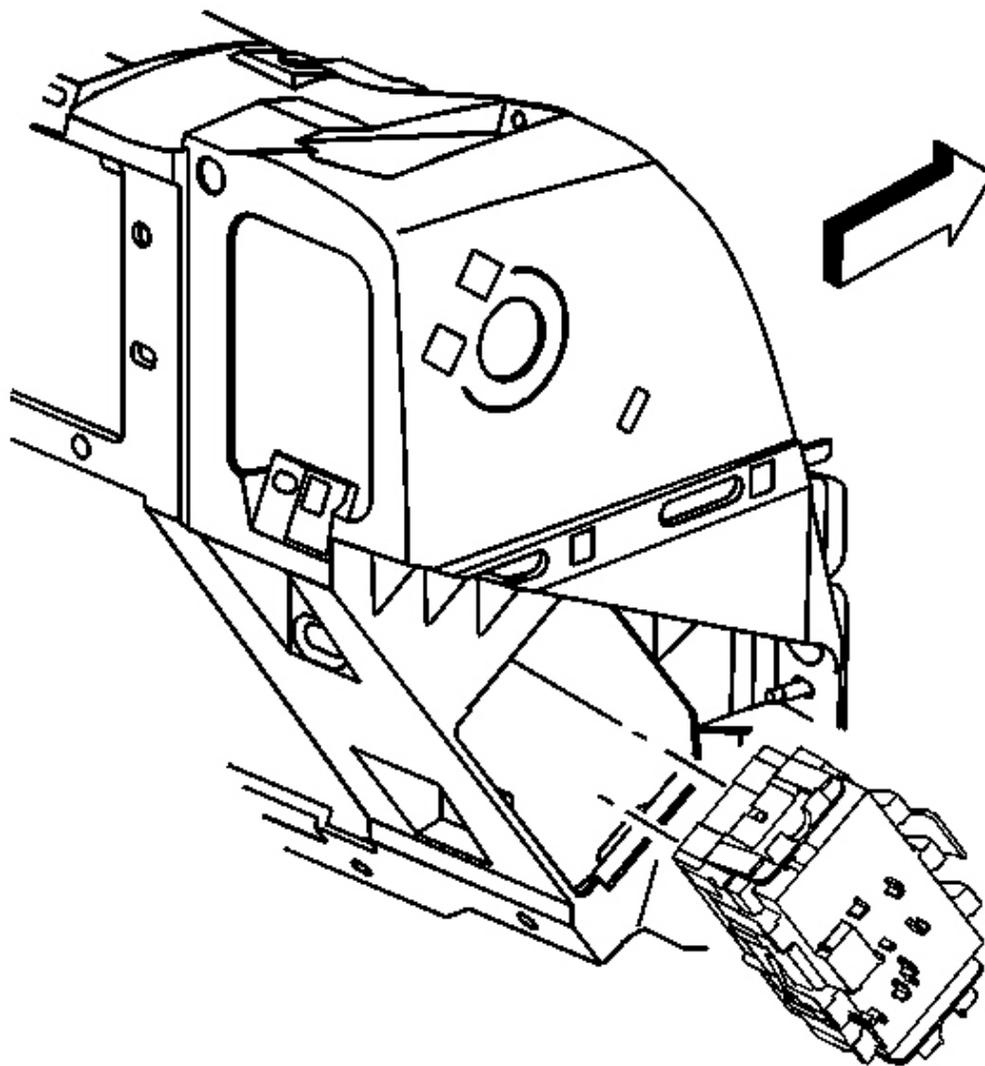
#### **Installation Procedure**

1. Install the fuse block to the I/P wire harness block.

**NOTE:** Refer to Fastener Notice in **Cautions and Notices**.

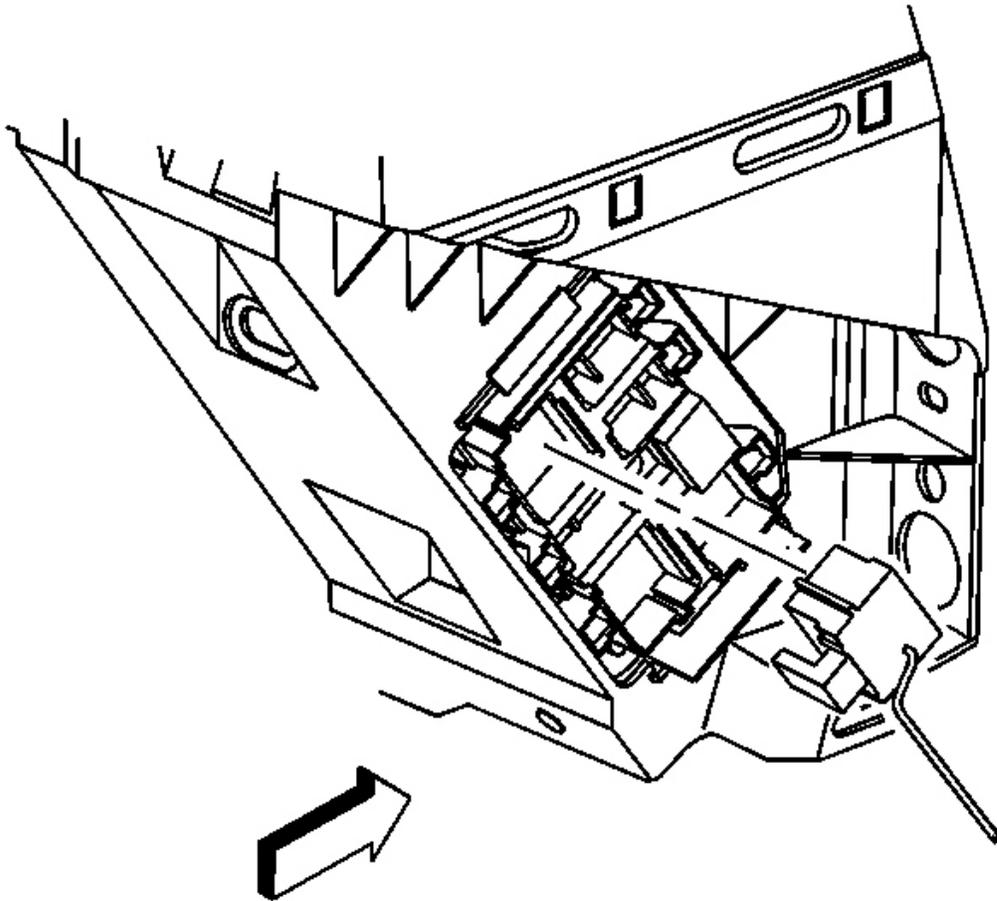
2. Install the retaining bolt.

**Tighten:** Tighten the bolt to 6 N.m (53 lb in)



**Fig. 127: Fuse Block & I/P**  
Courtesy of GENERAL MOTORS CORP.

3. Install the fuse block to the I/P till it clicks in place.



**Fig. 128: Connecting Wiring Connectors To Fuse Block**  
Courtesy of GENERAL MOTORS CORP.

4. Connect the wiring connectors to the fuse block.

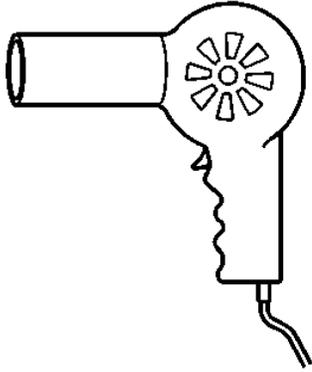
Refer to **Electrical Center Identification Views** to ensure the right connections are made.

5. Install the right side end panel.

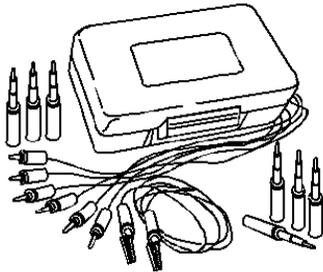
## **SPECIAL TOOLS AND EQUIPMENT**

### **SPECIAL TOOLS**

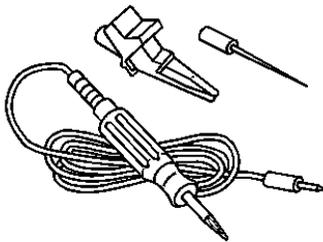
#### **Special Tools**

**Illustration****Tool Number/Description**

J 25070  
Heat Gun 500-700 F

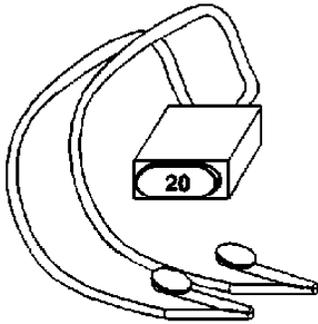


J 35616  
GM Terminal Test Kit

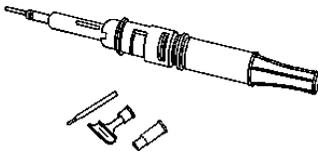


J 35616-200  
Test Light - Probe Kit

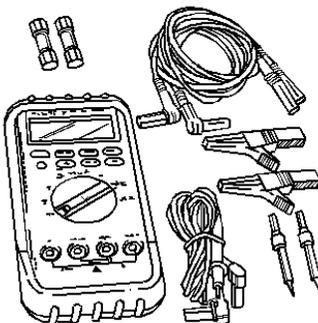
J 36169-A  
Fused Jumper Wire



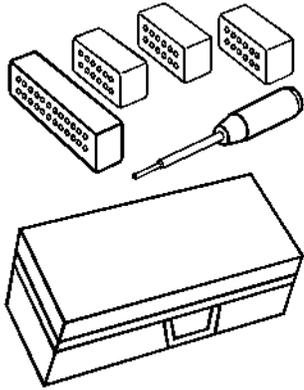
J 38125  
Terminal Repair Kit



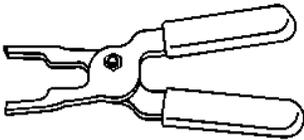
J 38125-5  
Ultra Torch



J 39200  
Digital Multimeter



J 42675  
Flat-Wire Probe Adapter



J 43244  
Relay Puller Pliers