2007 ELECTRICAL

Wiring Systems and Power Management - Avalanche, Escalade, Suburban, Tahoe & Yukon

SYMPTOMS - WIRING SYSTEMS

IMPORTANT: Review the system operation in order to familiarize yourself with the system functions. Refer to Power Mode Description and Operation and Retained Accessory Power (RAP) Description and Operation .

VISUAL/PHYSICAL INSPECTION

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

INTERMITTENT

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

SYMPTOM LIST

In order to diagnose the symptom, refer to the following:

- **Power Mode Mismatch**
- **Retained Accessory Power (RAP) Malfunction**

POWER MODE MISMATCH

DIAGNOSTIC FAULT INFORMATION

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

Power Mode Mismatch

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Accessory Voltage	1[2]	1	1	-
Ignition 1 Voltage	1[2]	1	1	-
Off/Run Crank Voltage	1[2]	1	1	-
Ignition Key Resistor Signal	1	1	1	-
Accessory Wakeup Serial Data	DTC U1814[1]	DTC U0100-U0299, P0513	-	-

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Run/Crank Ignition 1 Voltage (Run/Crank Relay Coil Control)	DTC B1428[1]	2	3	-
Battery Positive Voltage (Ignition switch)	1[2]	1	-	-

1. Power Mode Mismatch. Different specific symptoms may occur depending on the vehicle operating conditions when the fault occurred.
2. Vehicle will not start and will set DTC B1370 06 in SIR.
3. The engine will continue to run after ignition key is removed.

[1] This circuit is a pass through circuit in the BCM and will cause Ign Switch fuse to open.[2] This circuit/condition will cause Ign Switch fuse to open, and may cause a no start condition.

CIRCUIT/SYSTEM DESCRIPTION

This vehicles power mode master (PMM) is the body control module (BCM). The ignition switch is a low current switch with multiple discrete ignition switch signals to the PMM for determination of the power mode. The PMM receives the ignition switch signals, and additionally a reference voltage signal from the BCM, through the ignition switch, and back to the BCM. There are redundancies within the PMM system that can allow operation of certain subsystems when there are faults in the ignition switch circuits. Other information such as serial data input from other modules and DTCs is also used to determine what power mode signals and information is transmitted by the PMM. The BCM logic uses all this information to identify the operators desired power mode and activate specific discrete signals, and serial data messages for the operation of many different subsystems as necessary. Other modules which have switched voltage inputs may operate in a default mode if the PMM serial data message does not match what the individual module can see from its own connections.

The PMM will activate relays and other direct outputs of the PMM as needed according to the calculated power mode. Several relays controlled by the BCM are switched ignition voltage outputs the are pass through circuits within the BCM directly from the ignition switch. If these circuits short to ground, the fuse to the ignition switch will open.

Some system functions may operate one time and not the next with a specific fault in the ignition switch circuits depending on the vehicle operating conditions when the fault occurred. Some examples are as follows:

Vehicle Conditions

- Vehicle running or not running
- Multiple circuit faults
- Ignition key position
- Transmission gear selected

System Action

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- The vehicle may or may not start
- Instrument panel indicators may illuminate or not illuminate at inappropriate times
- Remote start may operate incorrectly
- Ignition key may not return to OFF
- Specific retained accessory power (RAP) functions may operate while others do not

DIAGNOSTIC AIDS

- A short to ground in the accessory wakeup serial data circuit will cause an open fuse to the ignition switch. DTC U1814 should be current.
- A short to ground in the run/crank ignition 1 voltage circuit of the run crank relay will cause an open fuse to the ignition switch. DTC B1428 should be current.
- The power modes and controls are determined using BCM logic. Comparing the Body Control Module Power Mode data display parameters listed in Circuit/System Verification will determine if there is a power mode fault.

REFERENCE INFORMATION

Schematic Reference

- **Power Distribution Schematics**
- **Power Moding Schematics**

Connector End View Reference

Master Electrical Component List

Electrical Information Reference

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

CIRCUIT/SYSTEM VERIFICATION

1. Verify that the following DTCs are not set: U1814, B1428.
    - If either of the DTCs are set, refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .
2. With a scan tool, access Body Control Module, Power Mode data display list and compare all parameters listed with the corresponding ignition key position. The PMM Power Mode Parameters table below illustrates the correct state of these input parameters (circuits) in correspondence to the ignition switch position. The circuits which the individual parameters are related to are in parentheses.

PMM Power Mode Parameters

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Ignition Switch Position	Current Power Mode	Ign. Off/Run/Crank (Off/Run Crank voltage circuit)	Ignition Accessory/Run (Accessory voltage circuit)	Ignition Run/Crank (Ignition 1 Voltage circuit)
Off Key Out	Off	Key Out/ACC	Inactive	Inactive
Off Key IN	Off	Key In/Off	Inactive	Inactive
Accessory	Accessory	Key In/ACC	Active	Inactive
Run	Run	Run	Active	Active
Start	Crank Request	Crank	Inactive	Active

- If any parameters are incorrect in any key position, proceed to the Circuit/System Testing or Component Testing below.

CIRCUIT/SYSTEM TESTING

IMPORTANT: You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.

1. Inspect the Ign Switch fuse for open. The fuse should be OK.
   - If the fuse is open, test the following circuits for a short to ground, if all circuits test OK, replace the BCM.
     - Battery positive voltage of the ignition switch
     - Accessory voltage
     - Off/Run crank voltage
     - Ignition 1 voltage
2. Disconnect the ignition switch connector.
3. Test for battery positive voltage between the battery positive voltage circuit of the ignition switch and ground.
   - If less than battery positive voltage, repair the circuit for an open/high resistance

IMPORTANT: The ignition switch component test must be preformed before proceeding with this test to verify the integrity of the switch.

4. Perform the ignition switch component test.
   - If the ignition switch fails, replace the ignition switch.
5. Ignition OFF, disconnect BCM connector C1, test for less than 1 volt between the following circuits of the BCM and ground.
6. Ignition key out, test for less than 1 volt between the following circuits of the BCM and ground.
   - Ignition key resistor signal
   - Off/Run crank
   - Accessory voltage

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- Ignition 1 voltage
  - If more than 1 volt, repair the circuit for a short to voltage.
7. Test for less than 1 ohm of resistance between the BCM and the ignition switch on the following circuits.
   - Ignition key resistor signal
   - Off/Run crank
   - Accessory voltage
   - Ignition 1 voltage
     - If greater than 5 ohms, repair the circuit for open/high resistance
8. Test for infinite resistance between the ignition key resistor signal circuit of the BCM and ground.
   - If less than infinite resistance, repair the signal circuit for a short to ground.
9. Replace the BCM.

COMPONENT TESTING

Ignition Switch

Using the Resistance Test below, check the resistance between the pins of the ignition switch listed in each switch position listed.

- If any reading is other than specified, replace the ignition switch.

Resistance Test

Ignition Switch Position	Pins 2 and 1	Pins 2 and 3	Pins 2 and 5	Pins 2 and 6	Pins 5 and 6
Off Key Out	Infinite	Infinite	Infinite	Infinite	Infinite
Off Key IN	Infinite	Infinite	< 5.0 Ohms	Infinite	Infinite
Accessory	Infinite	< 5.0 Ohms	Infinite	Infinite	Infinite
Run	< 5.0 Ohms	< 5.0 Ohms	Infinite	Infinite	< 5.0 Ohms
Start	< 5.0 Ohms	Infinite	Infinite	Infinite	1275-1325 Ohms

REPAIR PROCEDURES

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

- **Control Module References** for module replacement, setup, and programming
- **Ignition and Start Switch Replacement**

RETAINED ACCESSORY POWER (RAP) MALFUNCTION

DIAGNOSTIC FAULT INFORMATION

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

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CIRCUIT/SYSTEM DESCRIPTION

The body control module (BCM) is the power mode master and will monitor the status of the ignition switch and the doors. When necessary conditions are met, the BCM provides battery voltage to specific components for a predetermined amount of time. This is known as the retained accessory power (RAP) mode. The RAP mode will provide battery voltage to the sunroof module (if equipped) or the special equipment option (SEO) RAP relay (if equipped). For components such as the radio and driver door module (DDM), each will receive a message broadcasted on the communication buss requesting to remain powered ON in support of RAP mode.

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- A short to ground on the RAP mode control circuit from the BCM will set DTC B1475.
- Short to voltage in the BCM RAP mode control circuit will cause the sunroof/SEO RAP relay to operate when the RAP feature is disabled.
- An open/high resistance in the BCM RAP mode control circuit will cause the sunroof and/or SEO RAP relay to not operate when the RAP feature is enabled.
- The fused battery feed circuit for the load side SEO RAP relay may be labeled as EAP fuse in the underhood fuse block.
- The SEO RAP relay is permanently soldered to the junction block-left I/P and is non-serviceable.

REFERENCE INFORMATION

Schematic Reference

- Power Moding Schematics

Connector End View Reference

- **Power and Grounding Connector End Views**
- **Sunroof Connector End Views**

Electrical Information Reference

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

CIRCUIT/SYSTEM VERIFICATION

1. Sit in the driver seat. With the ignition ON, verify all doors are closed and that the RAP feature is enabled via Driver Information Center. Refer to Owners Manual.
2. With the ignition ON, lower the driver door window. Ignition OFF, remove the key from the ignition switch.

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3. Operate the radio, driver side power window and the sunroof, if equipped
4. Open the driver door. The radio, power window and sunroof should not be operational.

CIRCUIT/SYSTEM TESTING

RAP Malfunction - Except Sunroof or SEO RAP Function

1. Ignition ON, with the scan tool, check for and diagnose any current DTC.
2. Perform system verification. Verify that the radio and DDM RAP mode is inoperative or always ON.
    - If for both components the RAP modes are inoperative or always ON, then replace the BCM. Refer to repair instructions.
    - If one of the components the RAP mode is inoperative or always ON, replace the component. Refer to repair instructions.

RAP Malfunction - Sunroof

1. If the sunroof RAP mode is malfunctioning, enable RAP mode and test for RAP mode control circuit voltage (12 volts) at the sunroof module.
    - If voltage is present repair/replace the sunroof module.
2. If voltage is not present, test for an open/high resistance in the RAP mode control circuit.
    - If a condition is found make the appropriate repair.
    - If the circuit tests normal, then replace the BCM.

RAP Malfunction - SEO RAP Relay

1. Test for voltage at the SEO RAP relay. enable the RAP mode and test both the RAP mode control circuit and the battery supply circuit for voltage.
    - If voltage is present repair/replace the junction block- left I/P.
2. If voltage is not present, test for an open/high resistance in the sunroof-RAP control circuit and/or the battery feed circuit. Verify that the EAP fuse in the underhood fuse block is not open.
    - If a condition is found make the appropriate repair.
    - If the RAP mode control circuit tests normal and battery voltage on the load side of the relay is present, replace the BCM.

REPAIR PROCEDURES

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

- **Instrument Panel Electrical Center or Junction Block Replacement - Left Side**
- **Underhood Electrical Center or Junction Block Replacement**
- **Control Module References** for BCM, DDM, Radio and Sunroof Control Module replacement, setup, and programming.

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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.

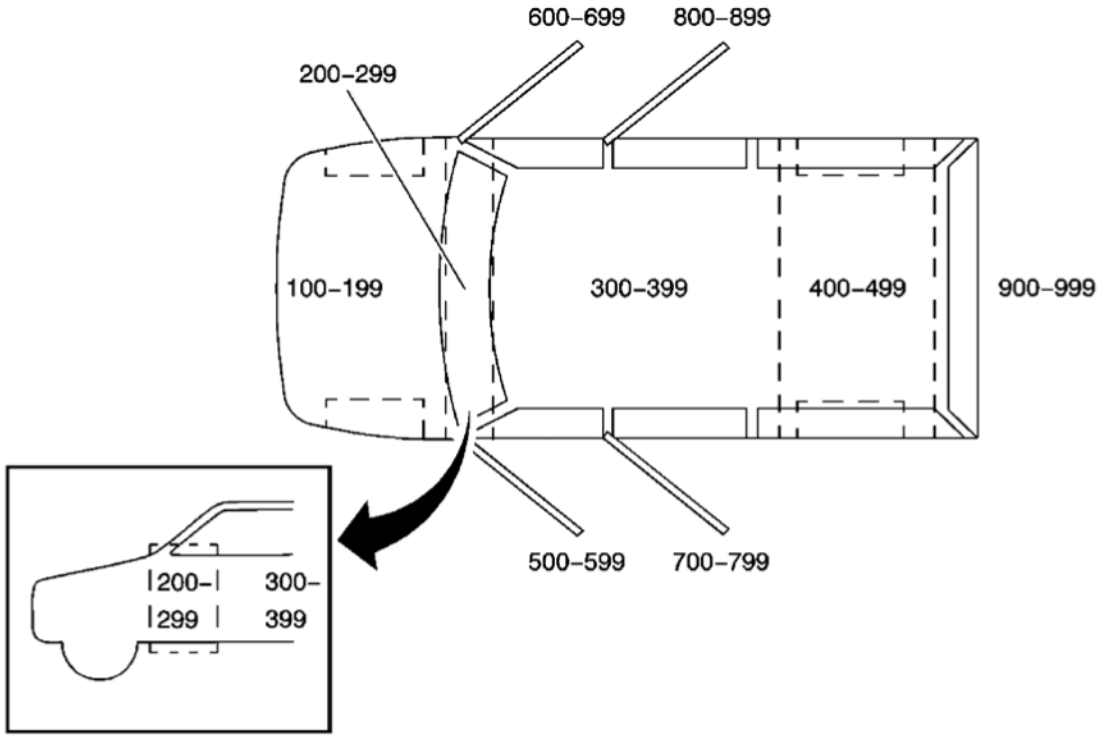


Fig. 1: Utility/Van Zoning
Courtesy of GENERAL MOTORS CORP.

Utility/Van Zoning

Callout Numbers	Zone Description
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

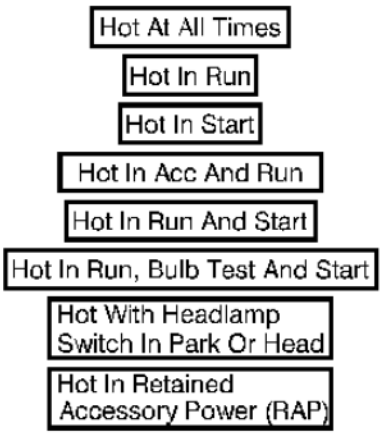
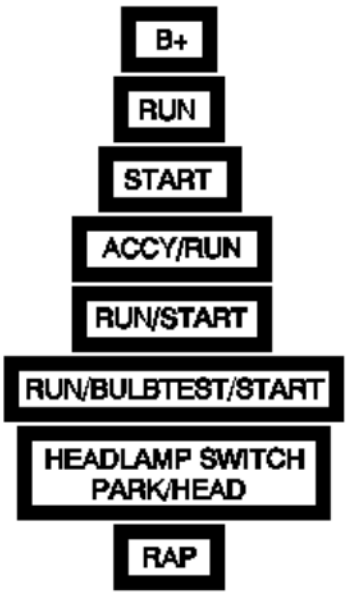
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ELECTRICAL SYMBOLS

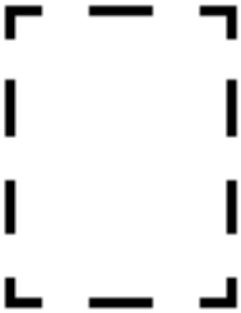
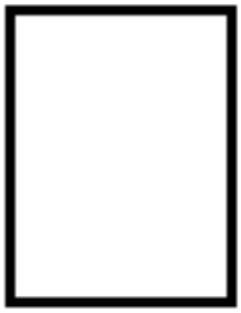
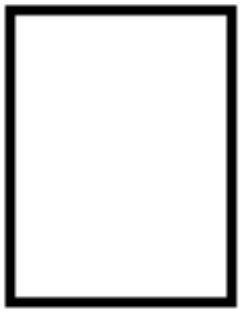
Electrical Symbols

OLD Symbol	NEW Symbol	Description
		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.

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		Important Icon This icon is used to alert the technician that there is additional information that will aid in servicing a system.
		Voltage Indicator Boxes These boxes are used on schematics to indicate when voltage is present at a fuse.

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		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.

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		Fuse

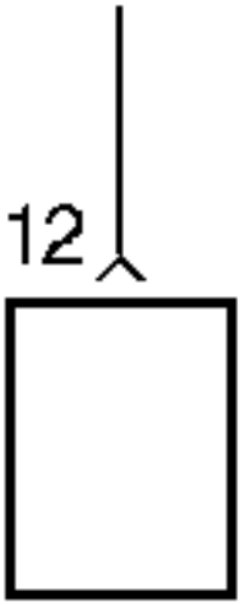
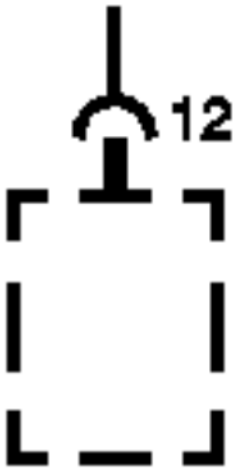
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		Circuit Breaker

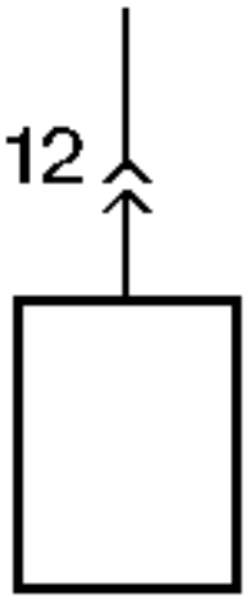
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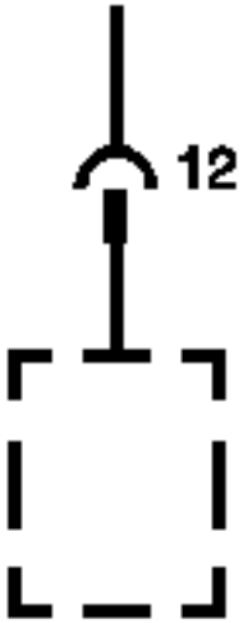
		Fusible Link

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		Connector Attached to Component
		Pigtail Connector

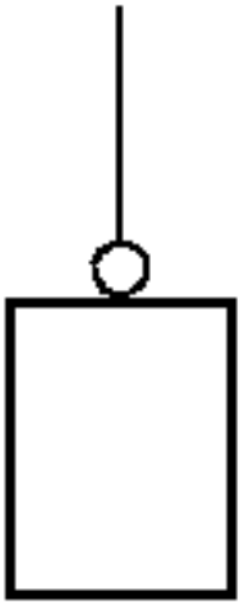
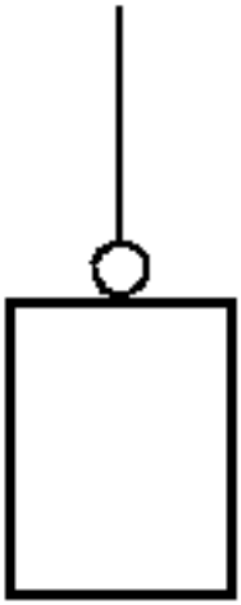
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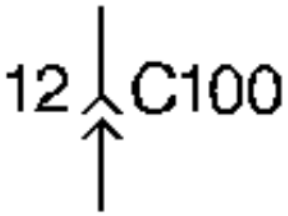
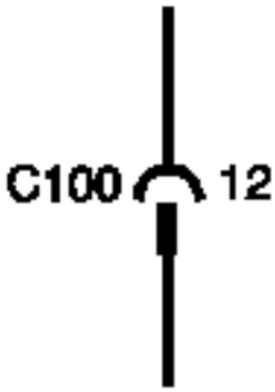
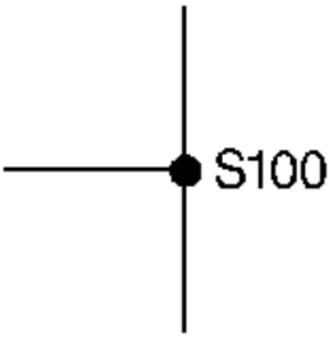
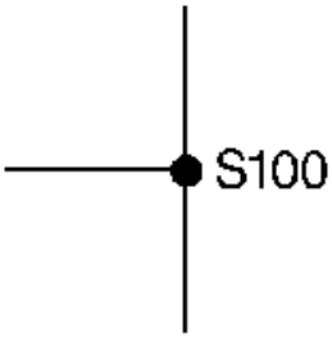


Bolt On or Screw On Eyelet

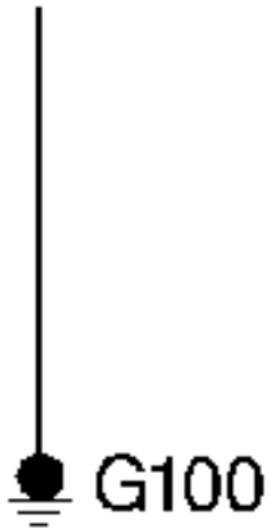
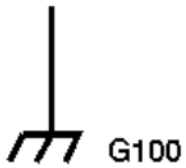
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		Terminal
		Inline Harness Connector

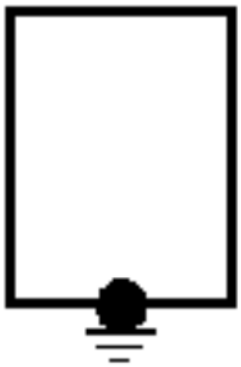
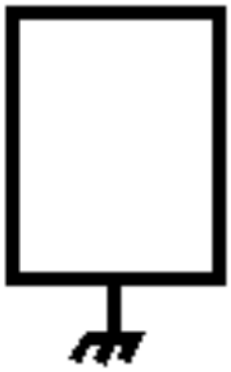
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		Splice

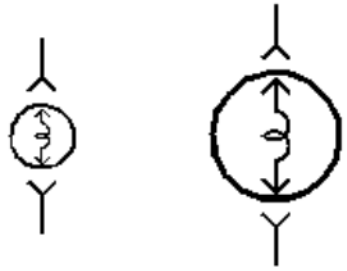
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		Chassis Ground
		Case Ground

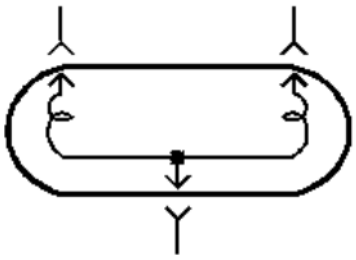
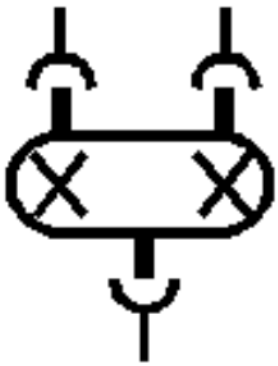
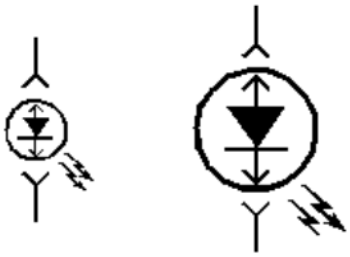
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		Single Filament Light Bulbs

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		Double Filament Light Bulb

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		Light Emitting Diodes

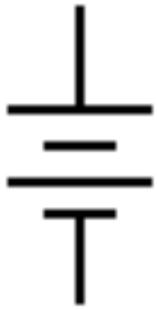
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		Capacitor

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		Battery

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		Variable Battery

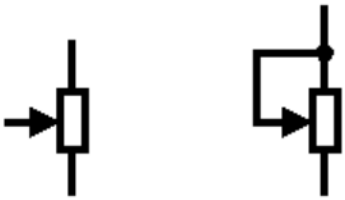
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		Resistor

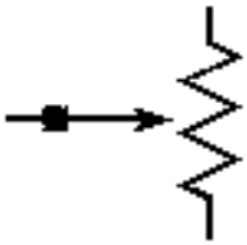
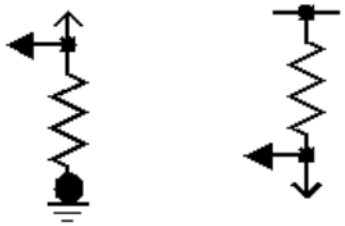
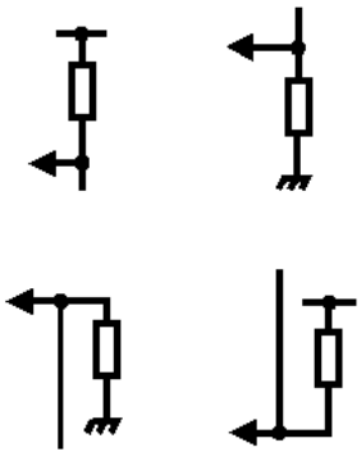
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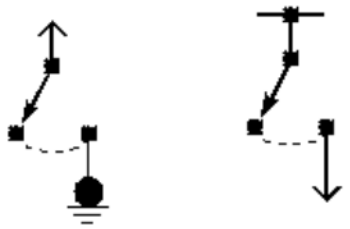
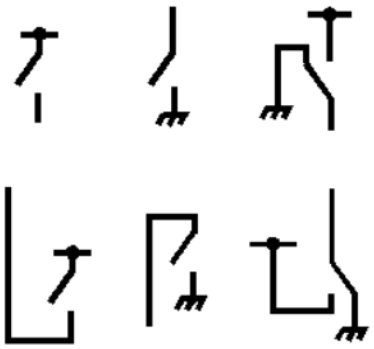
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		Variable Resistor
		Position Sensor

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		I/O Resistors

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		I/O Switches
		Diode

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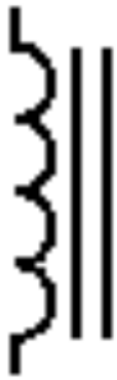
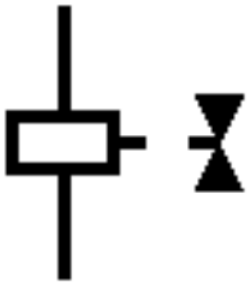
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		Heating Element

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		Motor

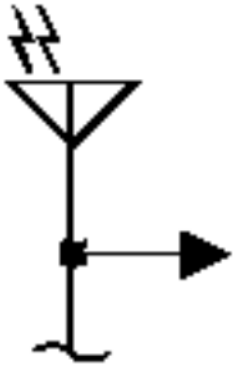
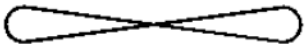
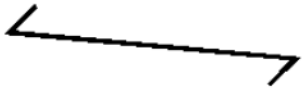
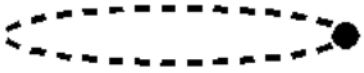
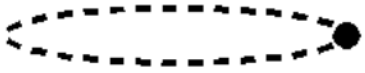
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		Solenoid

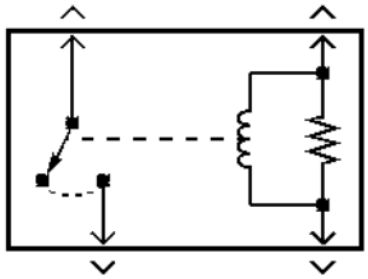
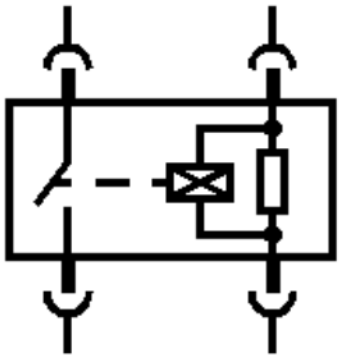
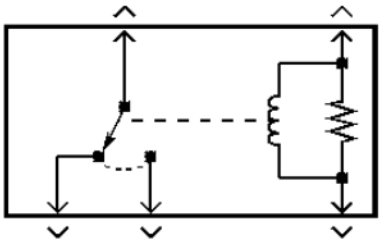
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		Coil

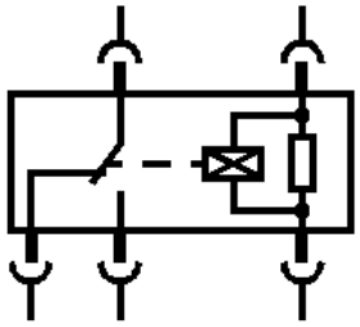
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		Antenna
		Twisted Wires
		Shield

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		Switches
		Single Pole/Throw Relay - Normally Open
		Single Pole/Throw Relay - Normally Closed

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GENERAL ELECTRICAL DIAGNOSIS

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 .

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

NOTE: Refer to OBD II Symbol Description Notice .

- OBD II circuits, all such circuits are indicated on circuit diagrams with the OBD 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:

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- 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**
- **Testing for Intermittent Conditions and Poor Connections**
- **Inducing Intermittent Fault Conditions**
- **Testing for Electrical Intermittents**
- **Scan Tool Snapshot Procedure**
- **Circuit Protection - Fuses**
- **Circuit Protection - Circuit Breakers**
- **Circuit Protection - Fusible Links**

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

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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.

IMPORTANT: When probing female 0.64 terminals, it is important to use the correct adapter. There have been some revisions to the test adapter for 0.64 terminals. The proper adapter for 0.64 terminals is the J 35616-64A which has a tin terminal and a blue wire between the base and tip. Failure to use the proper test adapter may result in damage to the terminal being tested and improper diagnosis.

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

Test Adapter	Description
J-35616-2A	150 Male Probe Adapter (gray)
J-35616-3	150 Female Probe Adapter (gray)
J-35616-4A	280 Male Probe Adapter (purple)

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J-35616-5	280 Female Probe Adapter (purple)
J-35616-6	100W Male (round) Probe Adapter (brown)
J-35616-7	100W Female (round) Probe Adapter (brown)
J-35616-8	Weather Pack Male Probe Adapter (orange)
J-35616-9	Weather Pack Female Probe Adapter (orange)
J-35616-10	100W Male (round) Probe Adapter (green)
J-35616-11	100W Female (round) Probe Adapter (green)
J-35616-12	130 Male Probe Adapter (blue)
J-35616-13	130 Female Probe Adapter (blue)
J-35616-16	100 Male Probe Adapter (lt green)
J-35616-17	100 Female Probe Adapter (lt green)
J-35616-18	220 Male Probe Adapter (black)
J-35616-19	220 Female Probe Adapter (black)
J-35616-21	950 Female Probe Adapter (red)
J-35616-22	950 Male Probe Adapter (red)
J-35616-31	500 Male Probe Adapter (orange)
J-35616-32	500 Female Probe Adapter (orange)
J-35616-33	160/180 Male Probe Adapter (yellow)
J-35616-34	160/180 Female Probe Adapter (yellow)
J-35616-35	280 Male Probe Adapter (violet)
J-35616-40	480 Male Probe Adapter (dk blue)
J-35616-41	480 Female Probe Adapter (dk blue)
J-35616-42	630 Male Probe Adapter (red)
J-35616-43	630 Female Probe Adapter (red)
J-35616-44	800 Male Probe Adapter (yellow)
J-35616-45	800 Female Probe Adapter (yellow)
J-35616-54	280 Male (round) Probe Adapter (tan)
J-35616-55	280 Female (round) Probe Adapter (tan)
J-35616-64B	.64 Male Probe Adapter (lt blue)
J-35616-65B	.64 Female Probe Adapter (lt blue)
J-35616-66	150 Male (round) Probe Adapter (yellow)
J-35616-67	150 Female (round) Probe Adapter (yellow)

BACKPROBE

IMPORTANT:

- **Backprobe connector terminals only when specifically required in diagnostic procedures.**
- **Do not backprobe a sealed (Weather Pack®) 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**

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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 .**

IMPORTANT: Circuits which include any solid state control modules, such as the powertrain control module (PCM), should only be tested with a 10 megohm or higher impedance digital multimeter such as the J 39200 . See Special Tools .

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. See **Special Tools** .

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

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TOOLS REQUIRED

J 35616-200 Test Light - Probe Kit

NOTE: Refer to Test Probe Notice .

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.

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.

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** .

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. See **Special Tools** . 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.

MEASURING VOLTAGE

NOTE: Refer to Test Probe Notice .

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:

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- 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 .**

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

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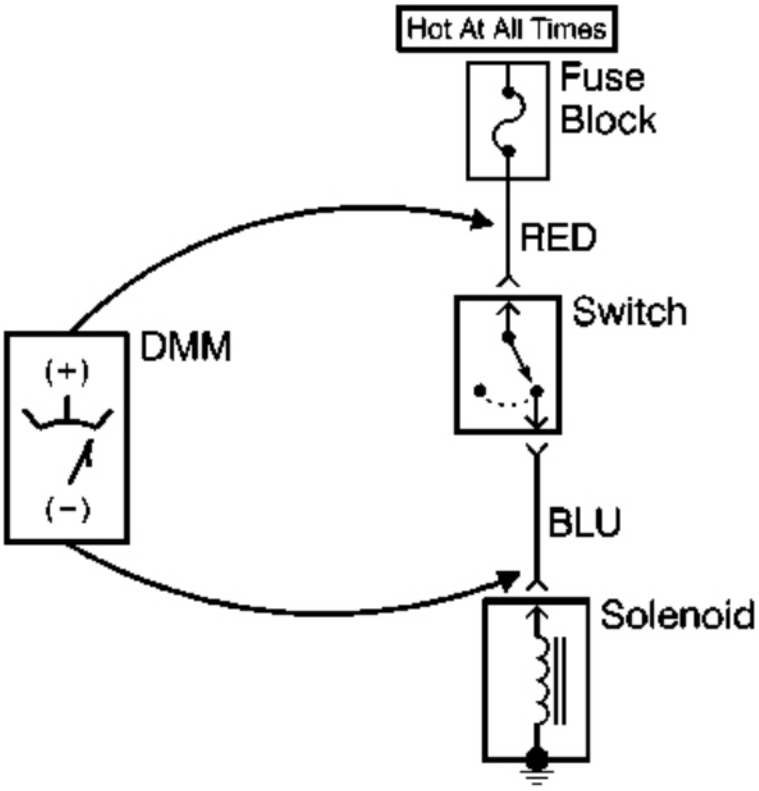


Fig. 2: Measuring Voltage Drop
Courtesy of GENERAL MOTORS CORP.

1. Set the rotary dial of the DMM to the V (DC) position.
2. Connect the positive lead of the DMM to one 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 .

The following procedure determines the frequency of a signal.

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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 .

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 one lead of the test lamp to one 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 .

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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 one lead of the DMM to one 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 one lead of the test lamp to battery positive voltage.
4. Connect the other lead of the test lamp to one 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 .

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 one 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

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Tools Required

- **J 35616** GM-Approved Terminal Test Kit
- **J-38125** Terminal Repair Kit. See **Special Tools** .

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

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

- Wiring broken inside the insulation
- Poor connection between the male and female terminal at a connector
- Poor terminal to wire connection-Some conditions which fall under this description are poor crimps, poor solder joints, crimping over the wire insulation rather than the wire itself, and corrosion in the wire to terminal contact area, etc.
- Pierced or damaged insulation can allow moisture to enter the wiring causing corrosion. The conductor can corrode inside the insulation, with little visible evidence. Look for swollen and stiff sections of wire in the suspect circuits.
- Wiring which has been pinched, cut, or its insulation rubbed through may cause an intermittent open or short as the bare area touches other wiring or parts of the vehicle.
- Wiring that comes in contact with hot or exhaust components
- Refer to **Inducing Intermittent Fault Conditions** in order to duplicate the conditions required, in order to verify the customer concern.
- Refer to **Testing for Electrical Intermittents** for test procedures to detect intermittent open, high resistance, short to ground, and short to voltage conditions.
- Refer to **Scan Tool Snapshot Procedure** for advanced intermittent diagnosis and Vehicle Data Recorder operation.

TESTING FOR 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

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terminal contact tang, can result in poor terminal contact causing an open or intermittently open circuit.

Testing for Proper Terminal Contact in Bussed Electrical Centers (BEC)

It is very important to use the correct test adapter when testing for proper terminal contact of fuses and relays in a Bussed Electrical Center (BEC). Use J-35616-35 to test for proper terminal contact. Failure to use J-35616-35 can result in improper diagnosis of the BEC.

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. See **Special Tools** . Replace the female terminal in question.

Flat Wire (Dock and Lock) Connectors

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 on the flat wire harness connector in order to test the circuit in question.

CONTROL MODULE/COMPONENT VOLTAGE AND GROUNDS

Poor voltage or ground connections can cause widely varying symptoms.

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

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- Test all control module ground and system ground circuits. The control module may have multiple ground circuits. Other components in the system may have separate grounds that may also need to be tested. Inspect grounds for clean and tight connections at the grounding point. Inspect the connections at the component and in splice packs, where applicable. Ensure that the circuit can carry the current necessary to operate the component. Refer to **Circuit Testing** and **Ground Distribution Schematics** .

TEMPERATURE SENSITIVITY

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

ELECTROMAGNETIC INTERFERENCE (EMI) AND ELECTRICAL NOISE

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

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

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

INCORRECT CONTROL MODULE

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

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

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

INDUCING INTERMITTENT FAULT CONDITIONS

TOOLS REQUIRED

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

Many intermittent open or shorted circuits are affected by harness/connector movement that is caused by vibration, engine torque, bumps/rough pavement, etc. 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**. Another option is, with the component commanded ON and OFF by the scan tool, move related connectors and wiring and observe the component operation. With the engine running, move related connectors and wiring while monitoring engine operation. If harness or connector movement affects the data displayed, component/system operation, or engine operation, inspect and repair the harness/connections as necessary.

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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

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

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°C (0°F) from one end and +71°C (160°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

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an effort to duplicate the concern.

DUPLICATING FAILURE CONDITIONS

- If none of the previous tests are successful, attempt to duplicate and/or capture the failure conditions.
- Freeze Frame/Failure Records data, where applicable, contains the conditions that were present when the DTC set.
  1. Review and record Freeze Frame/Failure Records data.
  2. Clear the DTCs using the scan tool.
  3. Turn the key to OFF and wait 15 seconds.
  4. Operate the vehicle under the same conditions that were noted in Freeze Frame/Failure Records data, as closely as possible. The vehicle must also be operating within the Conditions for Running the DTC. Refer to Conditions for Running the DTC in the supporting text if a DTC is being diagnosed.
  5. Monitor DTC Status for the DTC being tested. The scan tool will indicate Ran, when the enabling conditions have been satisfied long enough for the DTC to run. The scan tool will also indicate whether the DTC passed or failed.
- An alternate method is to drive the vehicle with the DMM connected to a suspected circuit. An abnormal reading on the DMM when the concern occurs, may help you locate 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. See **Special Tools** . This feature allows you to manipulate the circuit without having to watch the **J 39200** . See **Special Tools** . The **J 39200** will generate an audible tone when a change is detected. See **Special Tools** .

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. See Special Tools .

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. See **Special Tools** . Refer to **Troubleshooting with a Digital Multimeter** for information on connecting the **J 39200** to the circuit. See **Special Tools** .
2. Set the rotary dial of the **J 39200** to the V (AC) or V (DC) position. See **Special Tools** .
3. Press the range button of the **J 39200** in order to select the desired voltage range. See **Special Tools** .
4. Press the MIN MAX button of the **J 39200** . See **Special Tools** . The **J 39200** displays 100 ms RECORD

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and emits an audible tone (beep). See **Special Tools** .

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.

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CIRCUIT PROTECTION - FUSES

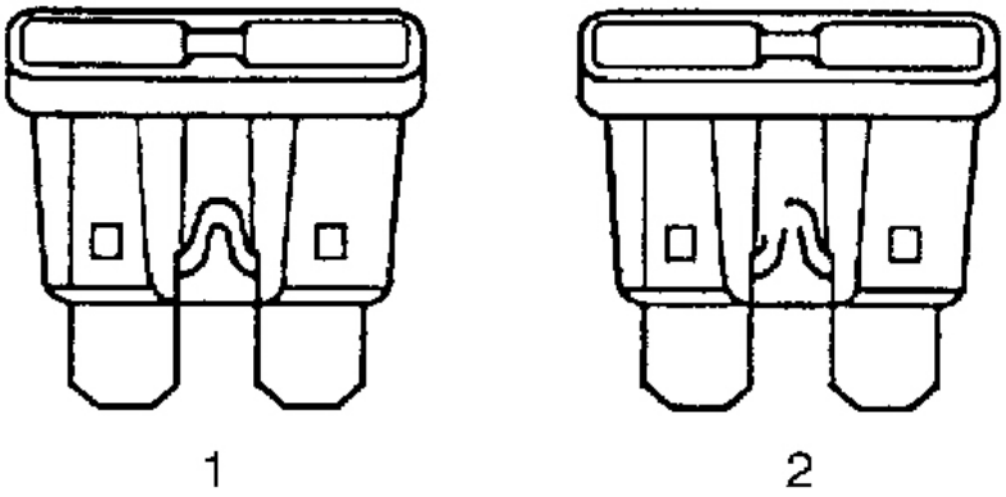


Fig. 3: Identifying Open Fuse Element
Courtesy of GENERAL MOTORS CORP.

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 an 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

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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 gage 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:

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- Testing for Intermittent Conditions and Poor Connections
- Flat Wire Repairs
- GMLAN Wiring Repairs
- High Temperature Wiring Repairs
- Heated Oxygen Sensor Wiring Repairs
- Splicing Copper Wire Using Splice Clips
- Splicing Copper Wire Using Splice Sleeves
- Splicing Twisted or Shielded Cable
- Splicing Inline Harness Diodes
- SIR/SRS Wiring 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.**

GMLAN WIRING REPAIRS

TOOLS REQUIRED

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

The GM Local Area Network (GMLAN) System requires special wiring repair procedures due to the sensitive nature of the circuitry. Follow the specific procedures and instructions when working on GMLAN connectors and terminals.

The tool kit **J-38125** contains the following items in order to repair the GMLAN wiring. See **Special Tools** .

- DuraSeal splice sleeves
- A wire stripping tool
- J 38125-8 Crimping Tool (GM P/N 12085115)
- J 38125-5 Ultra Torch Special Tool (GM P/N 12085116)

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** . 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

GMLAN Repairs

IMPORTANT: When making a repair to any GMLAN network, the original wire length after the repair must be the same length as before the repair. If the network is a twisted pair, the twist must be maintained after the repair is completed.

GMLAN has 2 types of networks, low speed and high speed. Low speed GMLAN has a single wire and works at slow speeds. High speed GMLAN has 2 wires in a twisted pair and works at higher speeds. For more information on GMLAN, refer to **Data Link Communications Description and Operation** .

GMLAN CONNECTOR TERMINAL REPAIR

IMPORTANT: A service terminal can be used to replace damaged connector terminals for both high speed and low speed GMLAN systems. When making a connector terminal repair on a GMLAN high speed system with twisted pair wires, do not untwist the wires more than necessary to make the repair.

The terminals in the GMLAN system are made of a special metal. This metal provides the necessary contact

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integrity for the sensitive, low energy circuits. These terminals are available in the **J-38125** . See **Special Tools** . If the individual terminals are damaged on any GMLAN connection, use the appropriate connector repair procedure in order to repair the terminal. Refer to **Connector Repairs** for the appropriate connector repair procedure.

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

GMLAN Wiring Repairs

Splice Sleeve Color	Crimp Tool Nest Color	Wire Gage mm^2 /(AWG)
Salmon (Yellow-Pink) 12089189	Red (1)	0.035-0.8/(18-20)
Blue 12089190	Blue (2)	1.0-2.0/(14-16)
Yellow 12089191	Yellow (3)	3.0-5.0/(10-12)
Green 88988379	Red (1)	0.22-0.35/(22-24)

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 coaxial.
   - Do not use the 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:

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- Find the wire on the schematic and convert the metric size to the equivalent American wire gage (AWG) size.
- Use an AWG wire gage.
- 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.

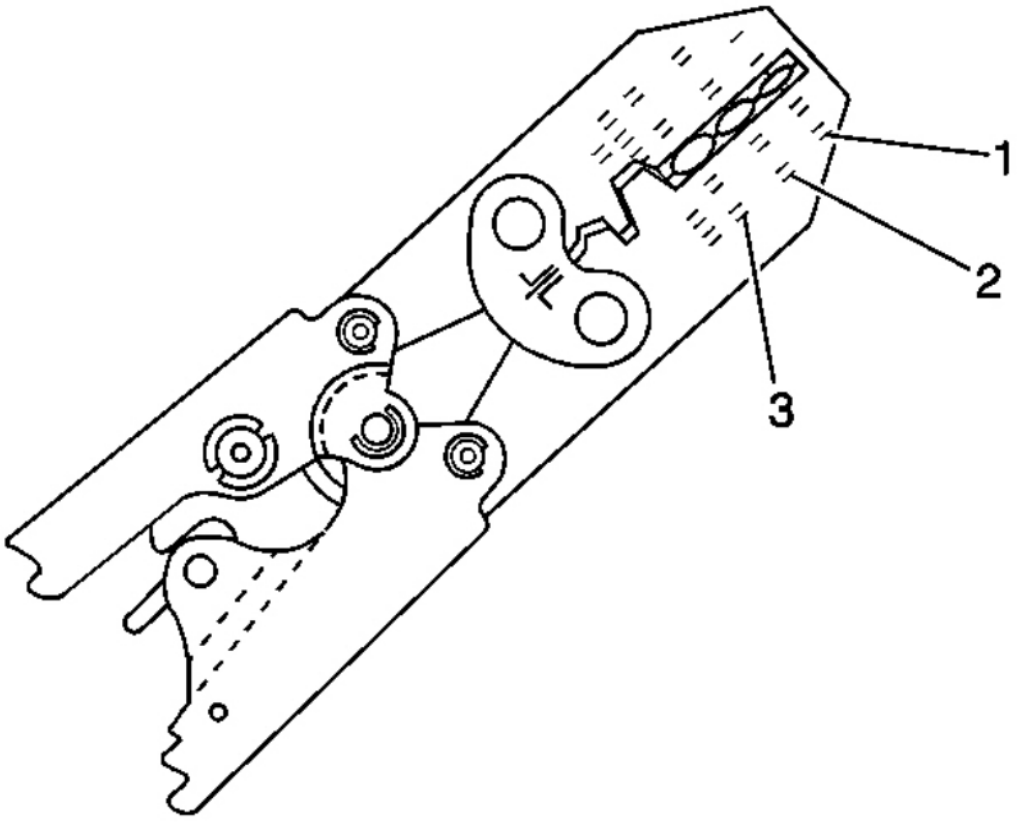


Fig. 4: Identifying Splice Crimp Tool Nests
Courtesy of GENERAL MOTORS CORP.

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5. Use the Splice Crimp Tool from the **J-38125** in order to position the DuraSeal splice sleeve in the proper color nest of the Splice Crimp Tool. See **Special Tools** . The crimp tool has three nests, 1 is for the salmon and green splice sleeve, 2 is for the blue splice sleeve, and 3 is for the yellow splice sleeve.

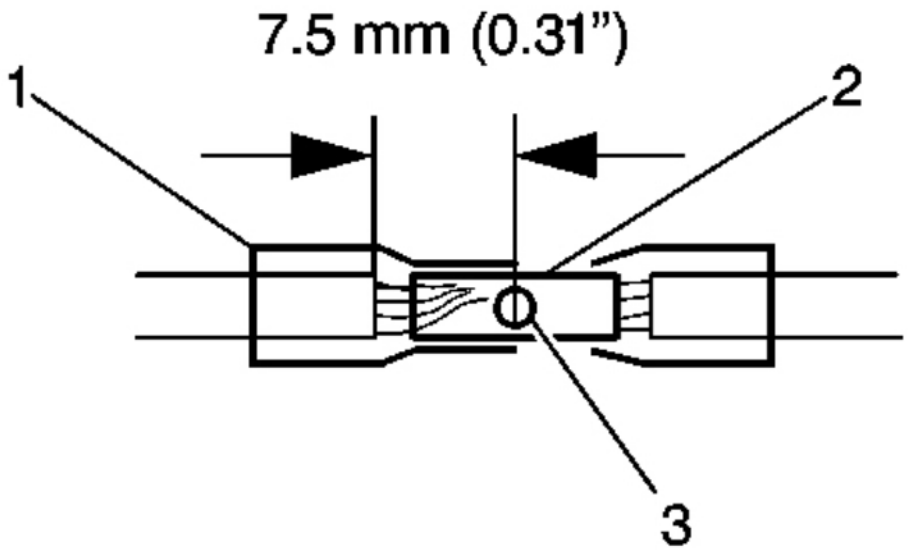


Fig. 5: Identifying Duraseal Splice Sleeve
Courtesy of GENERAL MOTORS CORP.

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.

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Fig. 6: Identifying 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 splice sleeve. Repeat steps 4 and 5 for the opposite end of the splice.



Fig. 7: Identifying Heated Splice Sleeve
Courtesy of GENERAL MOTORS CORP.

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

HIGH TEMPERATURE WIRING REPAIRS

TOOLS REQUIRED

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

HIGH TEMPERATURE WIRING

Wiring that is exposed to high temperatures, 135°C (275°F) or higher, for prolonged periods of time may use materials i.e. wires, connectors, and shielding that has a higher heat rating than typical wiring. When making a repair in a high temperature area observe the following:

- Use high temperature bulk wire rated at 150°C (302°F) continuous temperature to replace any damaged wire.
- Replace any heat shielding that is removed.
- Cover any DuraSeal splice sleeves with SCT1 shrink tubing (available in the J-38125 Terminal Repair kit).
- After making a wiring repair, ensure that the location of the wiring is not moved closer to the heat source.

IDENTIFYING HIGH TEMPERATURE WIRING

Wiring that is exposed to high temperature, 135°C (275°F) or higher, for prolonged periods of time need special considerations when making wiring repairs. Areas that may be exposed to higher temperatures can be identified by heat resistant materials that are being used in those areas. These materials may include heat reflective tape, moon tape, and high temperature shrink tubing. Also conduit and other protective coverings may be used. Because conduit or similar coverings are used throughout the vehicle regardless of the temperature, it may be necessary for the technician to determine if an area is exposed to excessive heat before making a wiring repair. Obvious areas of consideration would be any area located near the exhaust manifolds, catalytic converter, and exhaust pipes.

The **J-38125** contains much of the material you will need to perform repairs on areas exposed to high heat. See **Special Tools** . The kit contains the following items:

- DuraSeal splice sleeves to crimp and seal connections
- High temperature SCT1 shrink tubing to protect the splice sleeves
- A large sampling of common electrical terminals
- The correct crimp tool to attach the terminals to the wires
- The correct tools to remove the terminals from the connectors

The **J-38125** does not contain wire that is suitable to high temperature exposure. See **Special Tools** . Use high temperature bulk wire rated at 150°C (302°F) continuous temperature of the same or larger gage size as the original wire when repair damage wire. Also replace any reflective tape that you remove during the repair.

HIGH TEMPERATURE 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.

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If any wire except the pigtail is damaged, repair the wire by splicing in a new section of wire rated at 150°C (302°F) continuous temperature rating of the same gage size (0.5 mm, 0.8 mm, 1.0 mm etc.). Use the DuraSeal splice sleeves and splice crimping tool from the **J-38125** and then encapsulate the splice sleeve using the high temperature SCT1 shrink tubing. See **Special Tools** . Use the following wiring repair procedures in order to ensure the integrity of the sealed splice.

High Temperature Wiring Repairs

Splice Sleeve Color	Crimp Tool Nest Color	Wire Gage mm^2 /(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)
Green 88988379	Red (1)	0.22-0.35/(22-24)

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

1. Open the harness by removing any tape.
2. Use a sewing seam ripper, available from sewing supply stores, in order to cut open the harness in order to avoid wire insulation damage.
3. 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.

4. 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 american wire gage (AWG) size.
     - Use an AWG wire gage.
     - 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.
5. Slide a section of high temperature SCT1 shrink tubing down the length of wire to be spliced. Ensure that the shrink tubing will not interfere with the splice procedure.

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6. 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.

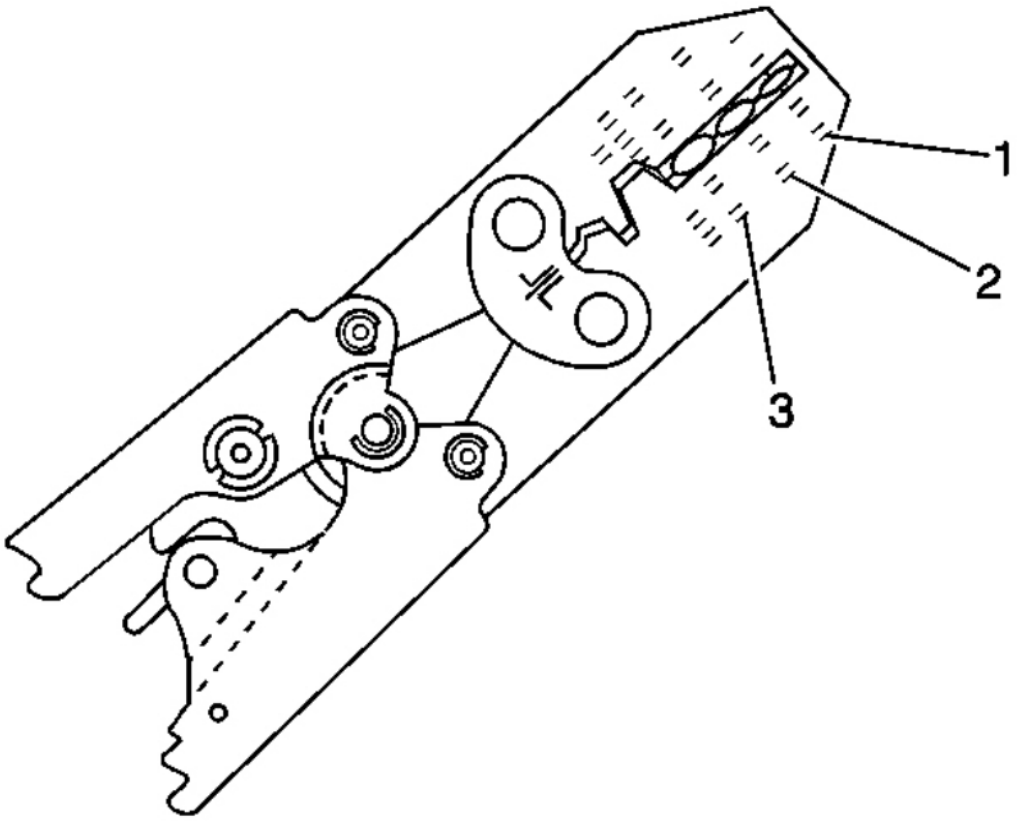


Fig. 8: Identifying Splice Crimp Tool Nests
Courtesy of GENERAL MOTORS CORP.

7. Use the Splice Crimp Tool from the **J-38125** in order to position the DuraSeal splice sleeve in the proper color nest of the Splice Crimp Tool. See **Special Tools** . The crimp tool has three nests, 1 is for the salmon and green splice sleeve, 2 is for the blue splice sleeve, and 3 is for the yellow splice sleeve.

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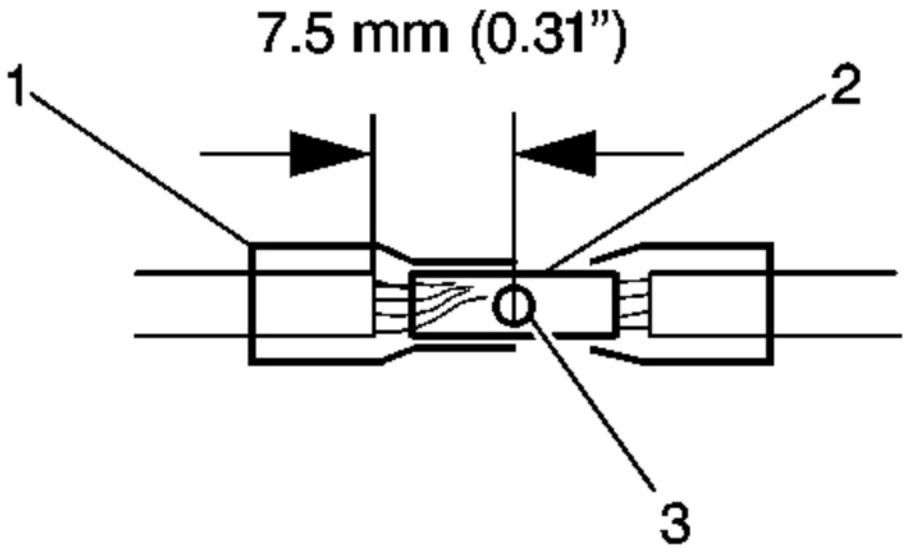


Fig. 9: Identifying Duraseal Splice Sleeve
Courtesy of GENERAL MOTORS CORP.

8. 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. 10: Identifying Crimped Duraseal Splice Sleeve
Courtesy of GENERAL MOTORS CORP.

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9. Insert the wire into the DuraSeal splice sleeve barrel until the wire hits the barrel stop.
10. 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 splice sleeve. Repeat steps 4 and 5 for the opposite end of the splice.



Fig. 11: Identifying Heated Splice Sleeve
Courtesy of GENERAL MOTORS CORP.

11. Using the heat torch, apply heat to the crimped area of the barrel.
12. 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.

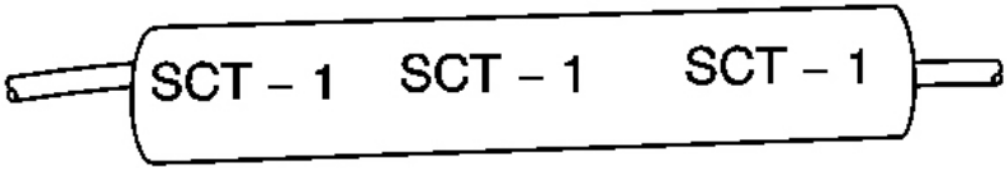


Fig. 12: View Of High Temperature SCT1 Shrink Tube
Courtesy of GENERAL MOTORS CORP.

13. Center the high temperature SCT1 shrink tube over the DuraSeal splice sleeve.
14. Using the heat torch, apply heat to the high temperature heat shrink tubing.
15. Gradually move the heat from the center to the open end of the tubing:

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

16. Replace any reflective tape and clips that may have been remove during the repair.

HEATED OXYGEN SENSOR WIRING REPAIRS

TOOLS REQUIRED

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

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

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** .

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

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

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** .
6. Overlap the 2 stripped wire ends and hold them between thumb and forefinger.

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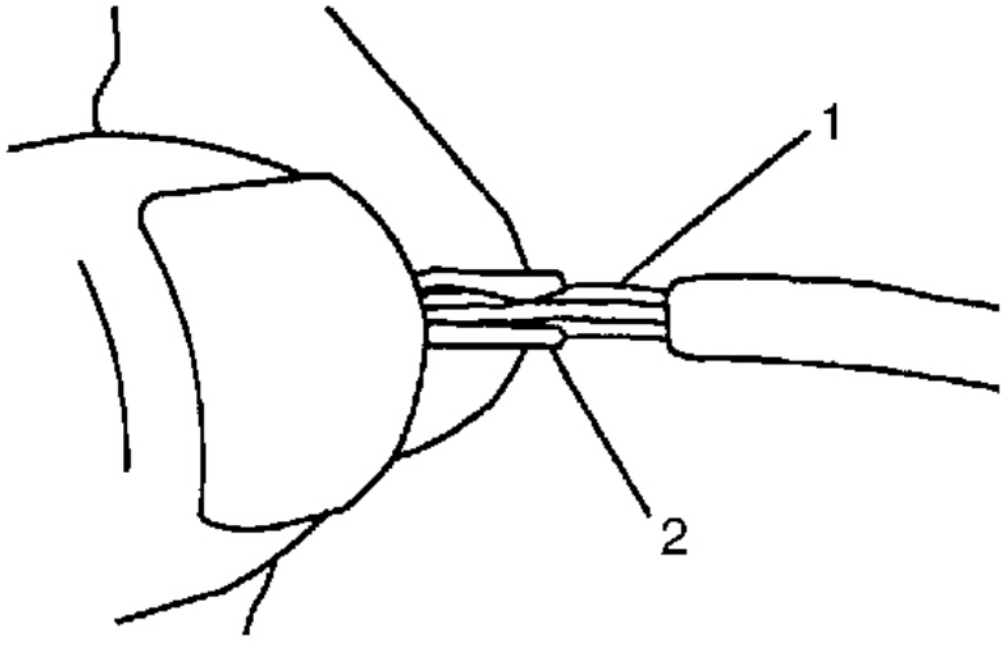


Fig. 13: Centering Splice Clip Over Stripped Wires
Courtesy of GENERAL MOTORS CORP.

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.

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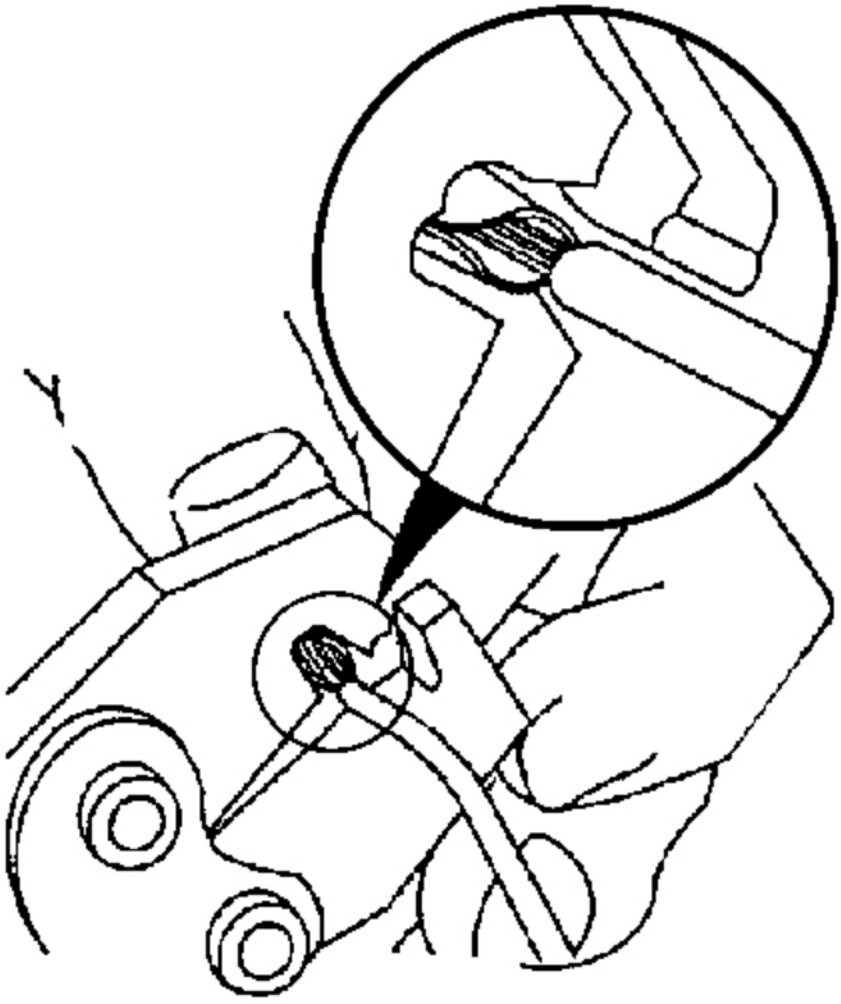


Fig. 14: Centering Crimp Tool Over Splice Clip & Wires
Courtesy of GENERAL MOTORS CORP.

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.

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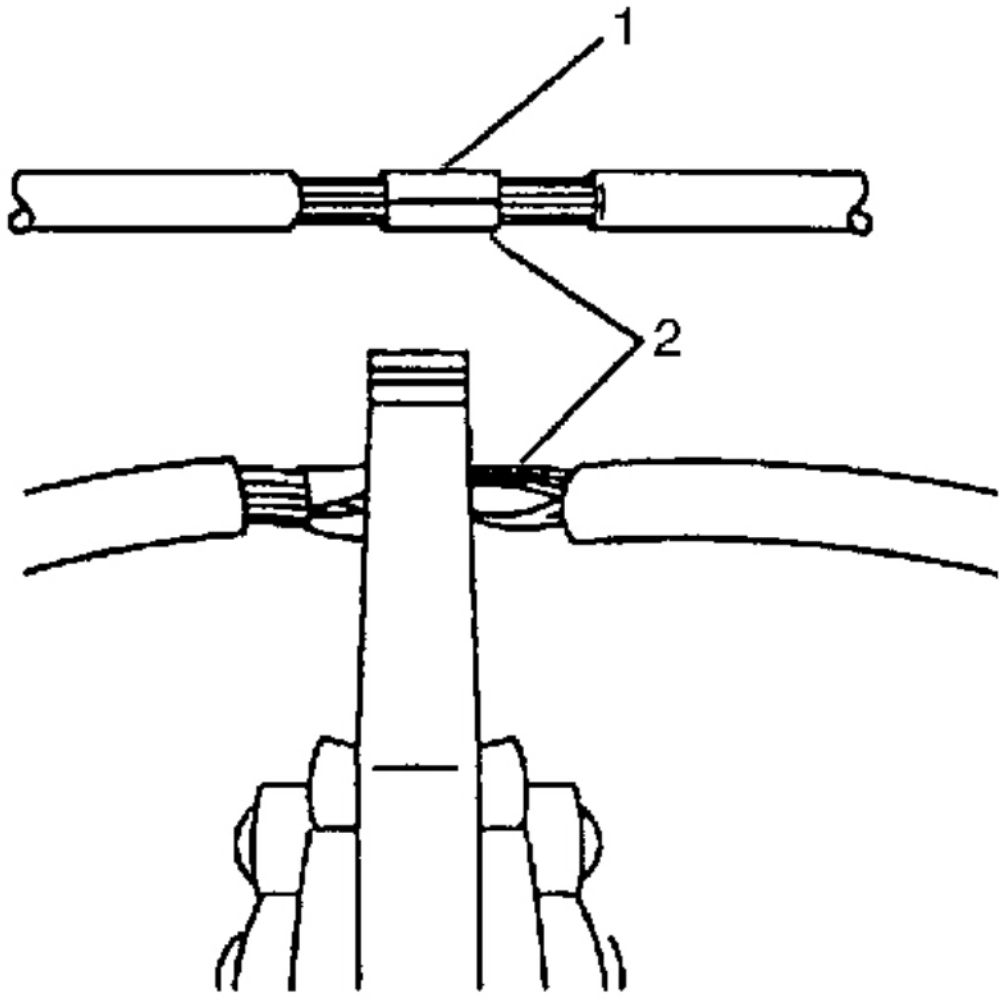


Fig. 15: Crimping Splices
Courtesy of GENERAL MOTORS CORP.

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

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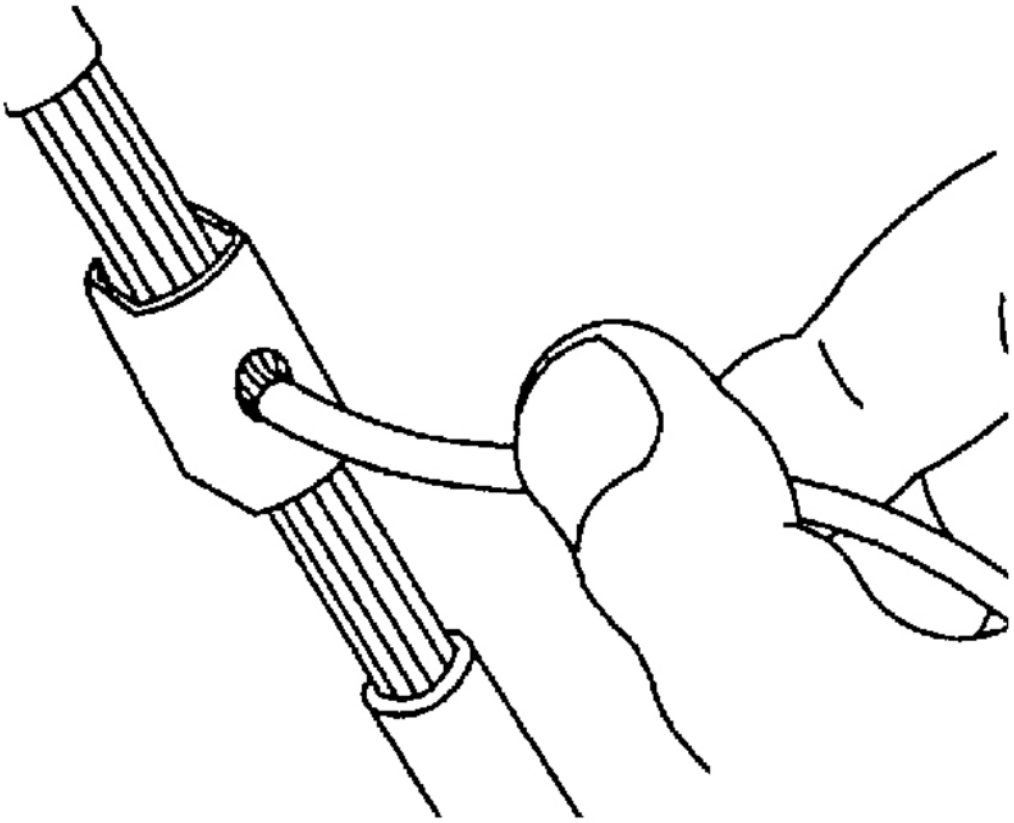


Fig. 16: Applying Solder To Back Of Clip Opening
Courtesy of GENERAL MOTORS CORP.

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.

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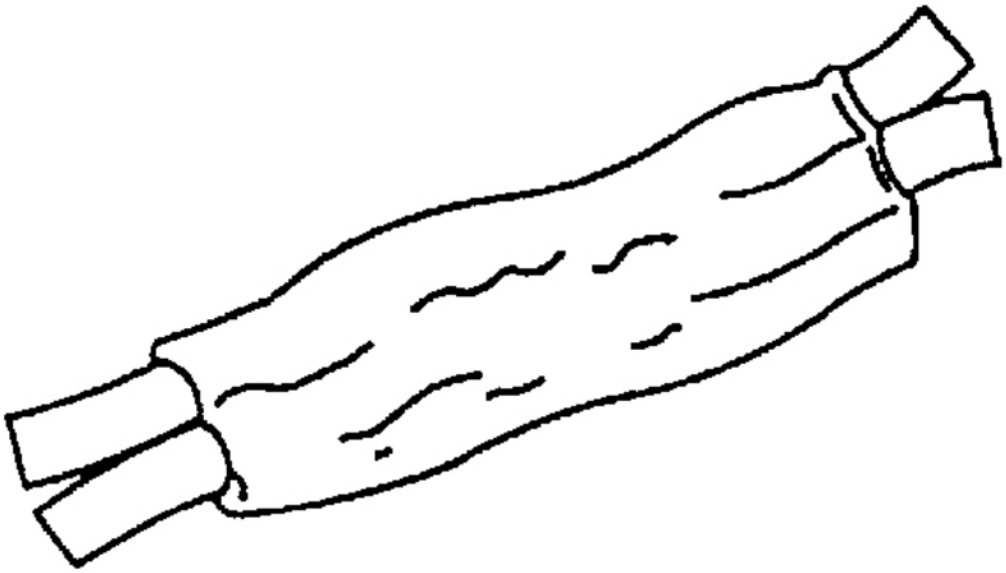


Fig. 17: Applying Electrical Tape
Courtesy of GENERAL MOTORS CORP.

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



Fig. 18: Applying Additional Tape To Wire
Courtesy of GENERAL MOTORS CORP.

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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** .

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

Splice Sleeve Color	Crimp Tool Nest Color	Wire Gage AWG/(Metric)
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)
Green 88988379	Red (1)	0.22-0.35/(22-24)

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.

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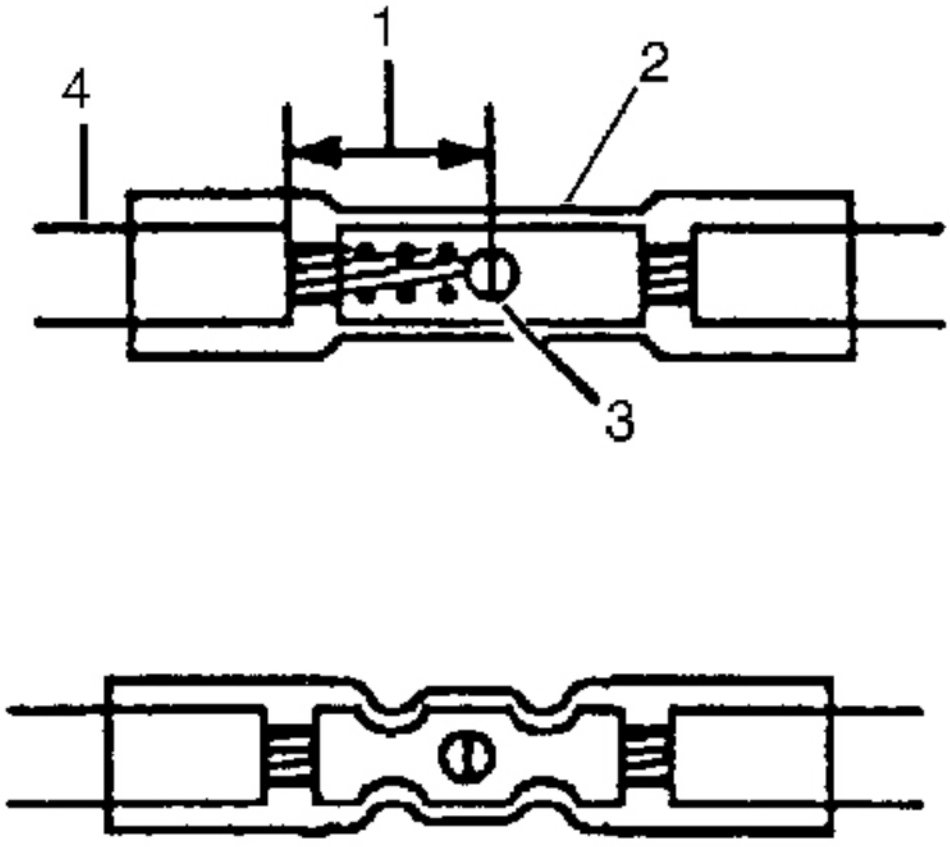


Fig. 19: Proper Crimping Of Solderless Connector
Courtesy of GENERAL MOTORS CORP.

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.

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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 (GM P/N 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 (GM P/N 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® 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.

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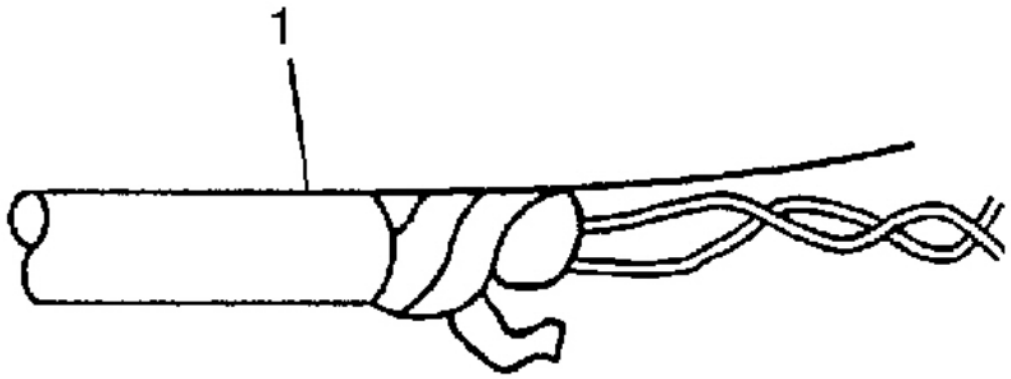


Fig. 20: View Of Outer Wiring Jacket
Courtesy of GENERAL MOTORS CORP.

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. 21: Identifying Staggered Splices
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

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electrical contact with the drain wire.

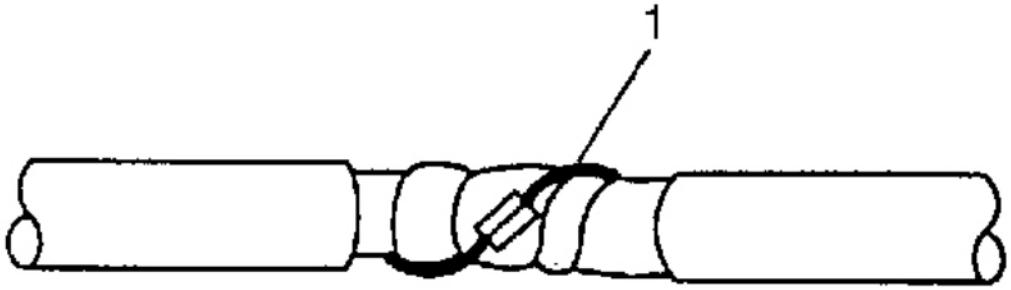


Fig. 22: Identifying Diode On Wire
Courtesy of GENERAL MOTORS CORP.

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. 23: View Of 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

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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** .

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, 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. Use either an SIR/SRS pigtail or a terminated lead from the SIR Repair Kit Tray.

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

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- DuraSeal splice sleeves, in order to repair the SIR/SRS wiring
- 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 the necessary low resistance contact integrity for these sensitive, low energy circuits.

The **J-38125** also serves as a generic terminal repair kit. See **Special Tools** . 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 Repair (Plastic Body and Terminal Metal Pin)

The terminals in the SIR/SRS system are made with a special plating. This plating provides the necessary contact integrity for the sensitive, low energy circuits. Use the**J-38125** SIR/SRS Terminal Repair Kit for repairing SIR/SRS terminals and connectors. See **Special Tools** . Do not substitute any other terminals for those in the repair kit.

The **J-38125** SIR/SRS Terminal Repair Kit contains: See **Special Tools** .

- Various terminated leads for sensing and diagnostic module (SDM) terminal replacement
- Various connector positive assurance (CPA) locks for SIR/SRS connectors
- Base of steering column pigtail connectors part number 12085514
- Yellow vinyl electrical tape

Pigtail repair packs are available for SIR/SRS connectors with eight or less terminals. Only the connector body is available for connectors with more than eight terminals. The terminated leads in the **J-38125** SIR/SRS Terminal Repair Kit can be used to replace damaged terminals when replacing the connector body. See **Special Tools** .

SIR/SRS COMPONENT 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

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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 gage size (0.5 mm, 0.8 mm, 1.0 mm etc.). Use the DuraSeal splice sleeves and splice crimping tool from the **J-38125** . See **Special Tools** . Use the following wiring repair procedures in order to ensure the integrity of the DuraSeal splice sleeves.

SIR/SRS Wiring Repairs

Splice Sleeve Color	Crimp Tool Nest Color	Wire Gage mm^2 / (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)
Green 88988379	Red (1)	0.22-0.35/(22-24)

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:

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- Find the wire on the schematic and convert the metric size to the equivalent AWG size.
- Use an AWG wire gage.
- 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.

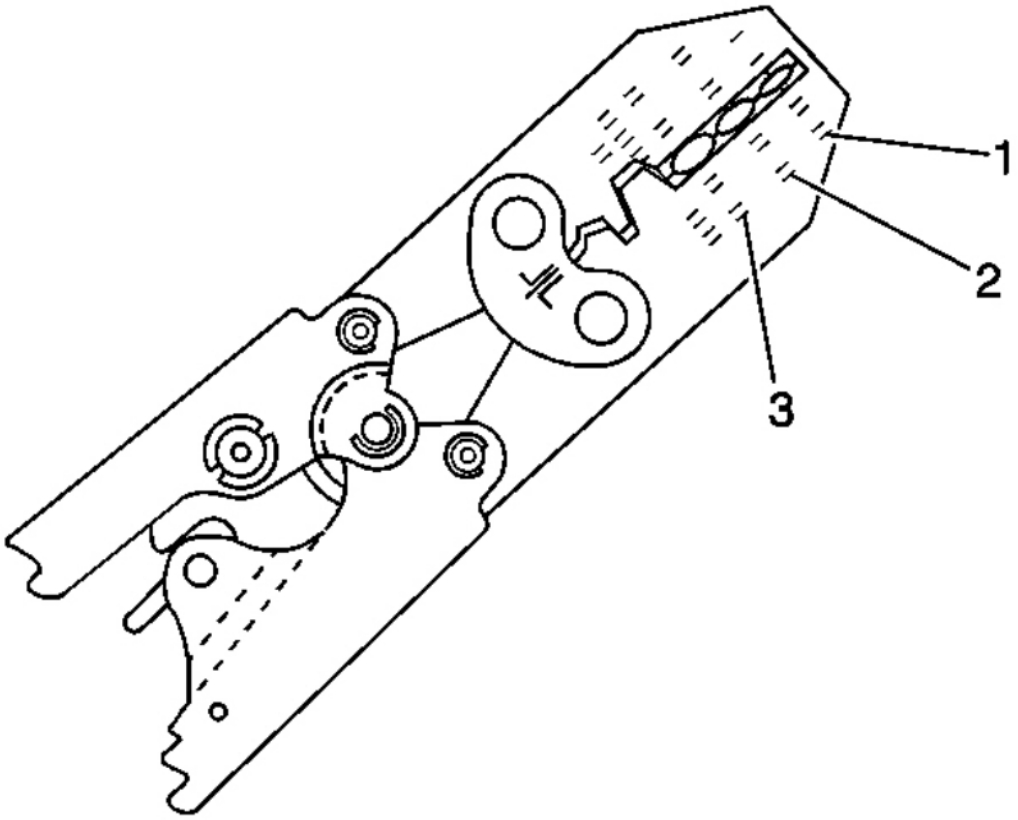


Fig. 24: Identifying Splice Crimp Tool Nests
Courtesy of GENERAL MOTORS CORP.

5. Use the Splice Crimp Tool from the **J-38125** to crimp DuraSeal splice sleeve. See **Special Tools** . In

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order to position the DuraSeal splice sleeve in the proper color nest of the Splice Crimp Tool. The crimp tool has three nests, 1 is for the salmon and green splice sleeve, 2 is for the blue splice sleeve, and 3 is for the yellow splice sleeve.

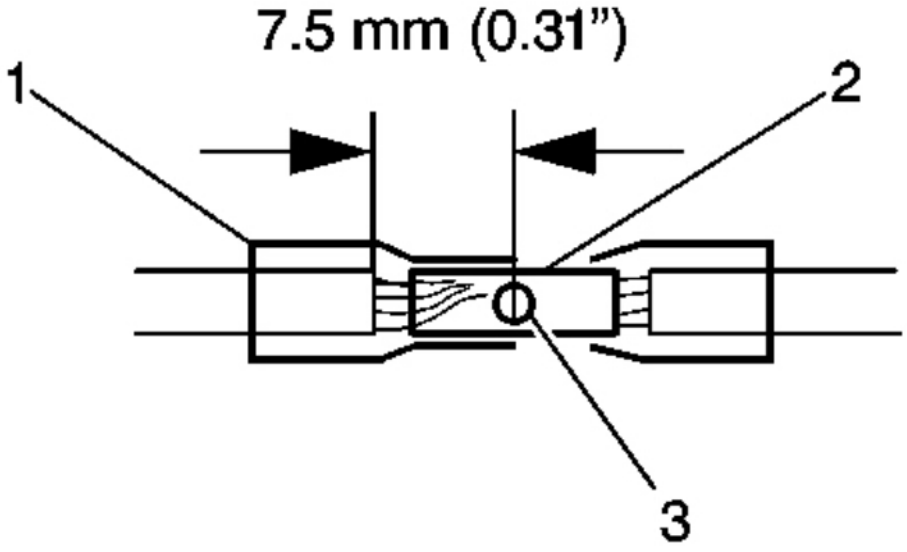


Fig. 25: Identifying Duraseal Splice Sleeve
Courtesy of GENERAL MOTORS CORP.

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.

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Fig. 26: Identifying 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. 27: 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.

CONNECTOR POSITION ASSURANCE (CPA)

The connector position assurance (CPA) is a small plastic insert that fits through the locking tabs of a connector. CPAs are used in all SIR System connectors and also in some connectors of other systems. The CPA

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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 a connection.

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

Connector Repairs contains a list of all connector repairs in Wiring Systems. The connector repairs are listed by the connector manufacturer and then by connector type. If the technician cannot identify the manufacturer of the connector, refer to Identifying Connectors below. Knowing the connector manufacturer will assist in finding the correct connector repair from the following list:

- **Connector Position Assurance Locks**
- **Terminal Position Assurance Locks**
- **Bosch Connectors (0.64)** or **Bosch Connectors (2.8 JPT)** or **Bosch Connectors (BSK)** or **Bosch Connectors (ECM)**
- **Delphi Connectors (Micro-Pack 100W)** or **Delphi Connectors (Pull To Seat)** or **Delphi Connectors (Push To Seat)** or **Delphi Connectors (Weather Pack)** or **Delphi Connectors (12-Way)**
- **Tyco/AMP Connectors (025 Cap)** or **Tyco/AMP Connectors (CM 42-Way)** or **Tyco/AMP Connectors (Sensor)** or **Tyco/AMP Connectors (43-Way)** or **Tyco/AMP Connectors (Door Module)**
- **Yazaki Connectors (2-Way)** or **Yazaki Connectors (16-Way)**
- **Repairing Connector Terminals**

IDENTIFYING CONNECTORS

Knowing the connector manufacturer is helpful when trying to locating the correct connector repair procedure. There are many different connector designs used on GM vehicles and it is sometimes difficult to identify the connector manufacturer. The information in this document should help with the identification of connector manufactures.

The following connector manufacturers make most of the connectors found in GM vehicles:

- AFL/EPC (Alcoa Fujikura Ltd./Engineered Plastics Components)
- Bosch
- Delphi
- FCI (Framatome Connectors International)
- JAE (Japan Aviation Electronics)
- JST (Japan Solderless Terminals)
- Kostel

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- Molex
- Sumitomo
- Tyco/AMP
- Yazaki

Identifying the manufacturer of a connector is often difficult. When trying to determine the manufacturer of a connector, look for specific identifying marks that are unique to that connector supplier. Most of these identify marks are hard to find or see. Check the connector carefully and refer to the information below for pictures and descriptions of connector identification markings.

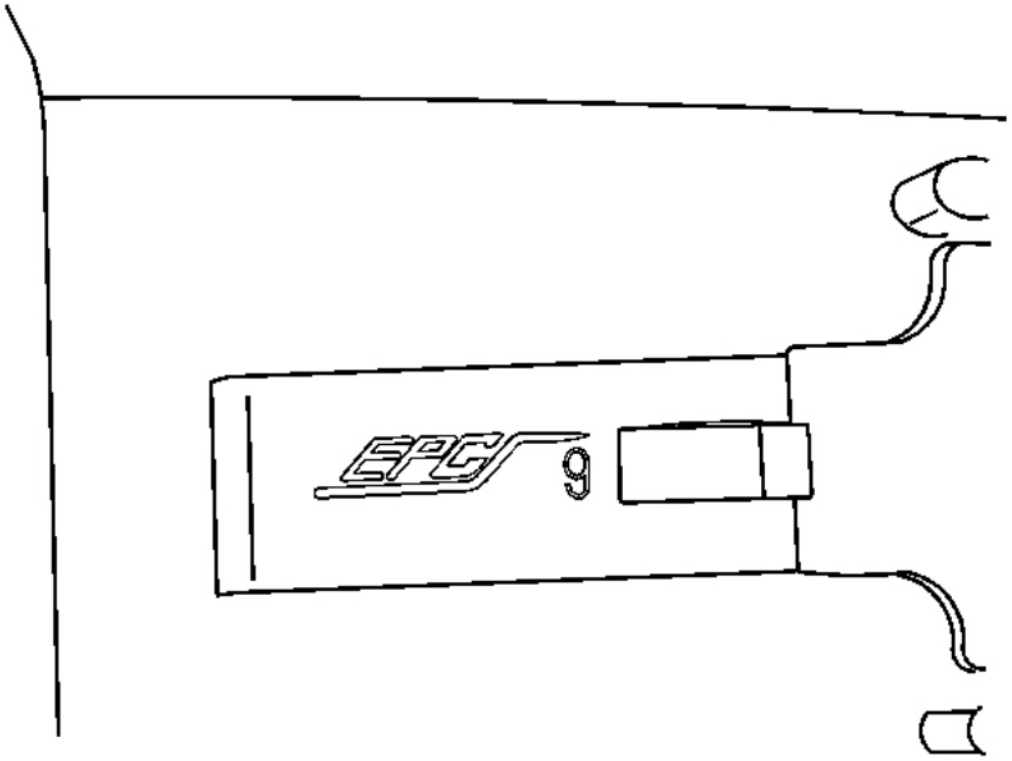


Fig. 28: View Of EPC Identification On Connector Body
Courtesy of GENERAL MOTORS CORP.

- Most of AFLs connectors have EPC on their connector body. Some of the smaller connectors will not have any markings on them.

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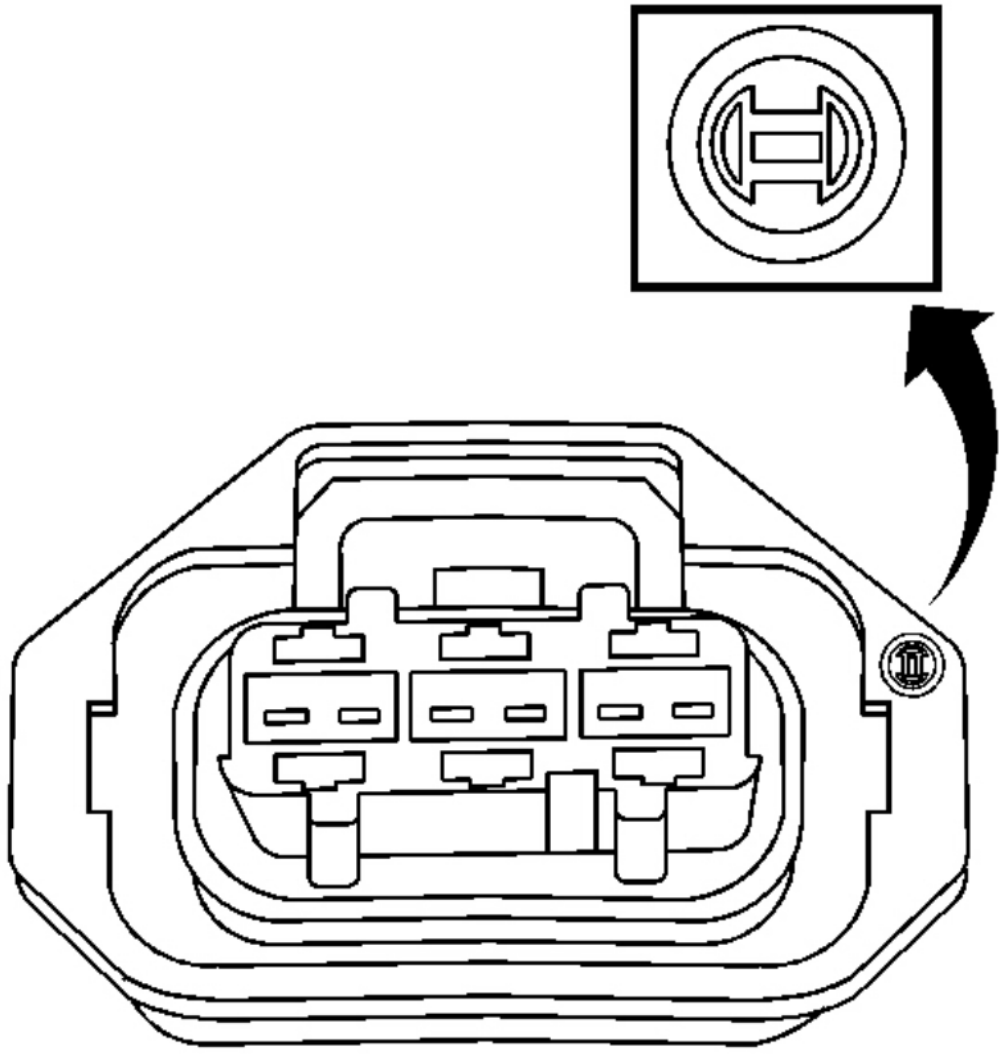


Fig. 29: View Of Bosch Identification On Connector Body
Courtesy of GENERAL MOTORS CORP.

- In some cases Bosch will actually be printed on the connector. If Bosch does not appear on the connector, look for the Bosch logo. The Bosch logo is a circle with a blunted arrow inside. This logo can appear anywhere on the connector and is often very small.

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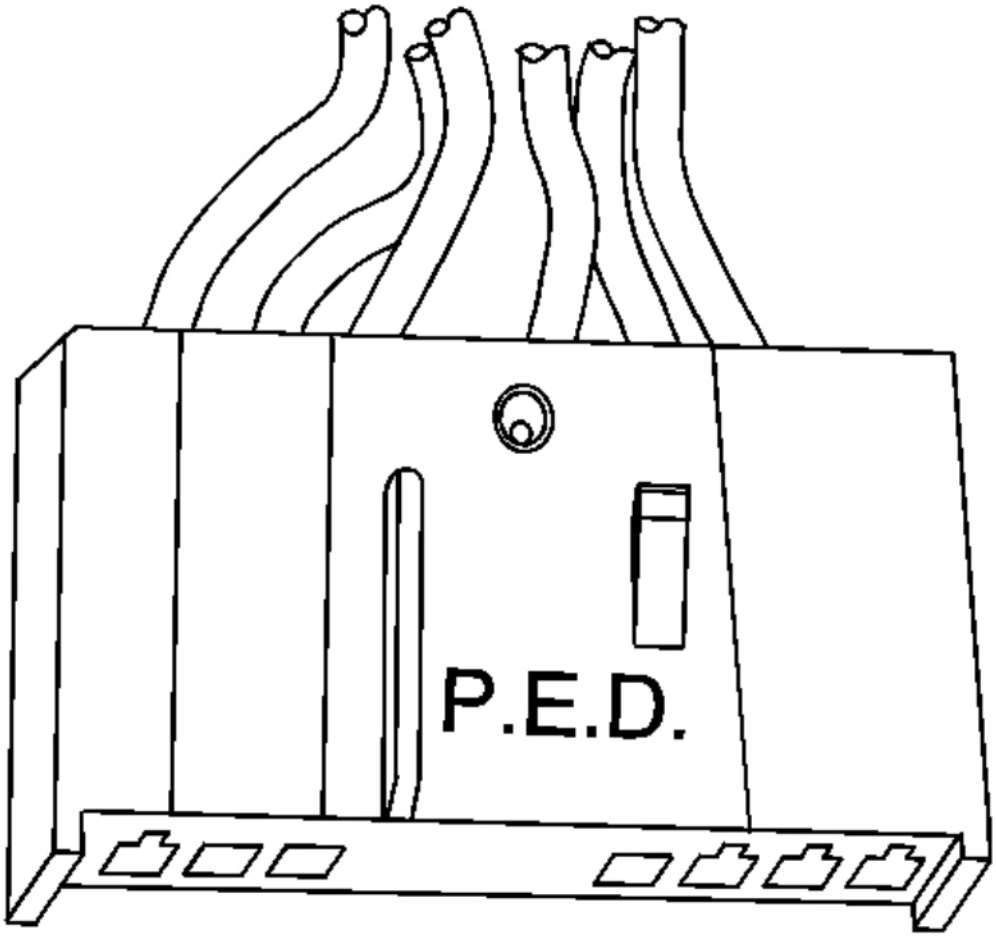


Fig. 30: View Of PED Identification On Connector Body
Courtesy of GENERAL MOTORS CORP.

- In some cases Delphi will actually be printed on the connector. If Delphi is not printed on the connector, look for PED. In both cases there is no specific orientation for Delphi or PED and they can appear anywhere on the connector.

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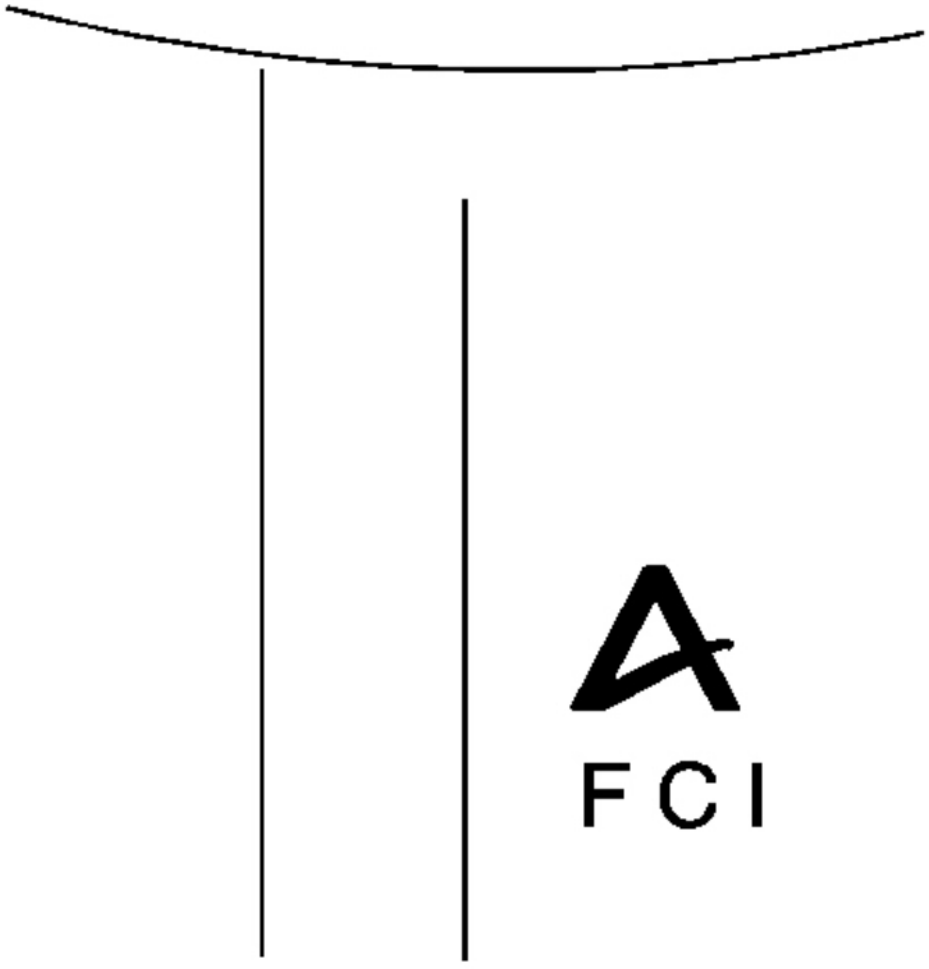


Fig. 31: View Of FCI Identification On Connector Body
Courtesy of GENERAL MOTORS CORP.

- FCI connectors may have the FCI logo on their connectors. The logo is the letters FCI with an "A" above it.

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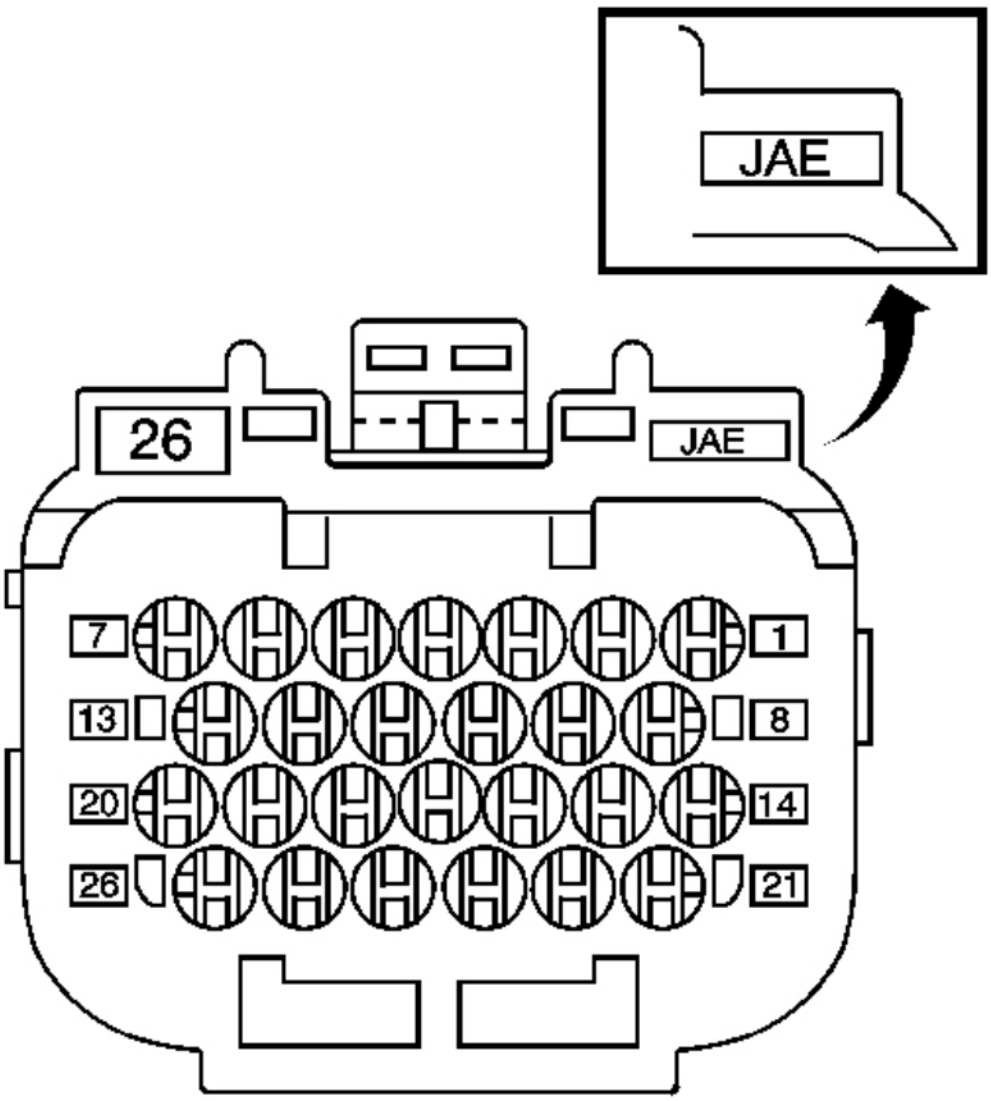


Fig. 32: View Of JAF Identification On Connector Body
Courtesy of GENERAL MOTORS CORP.

- JAE connector have JAE in small letters on their connectors.

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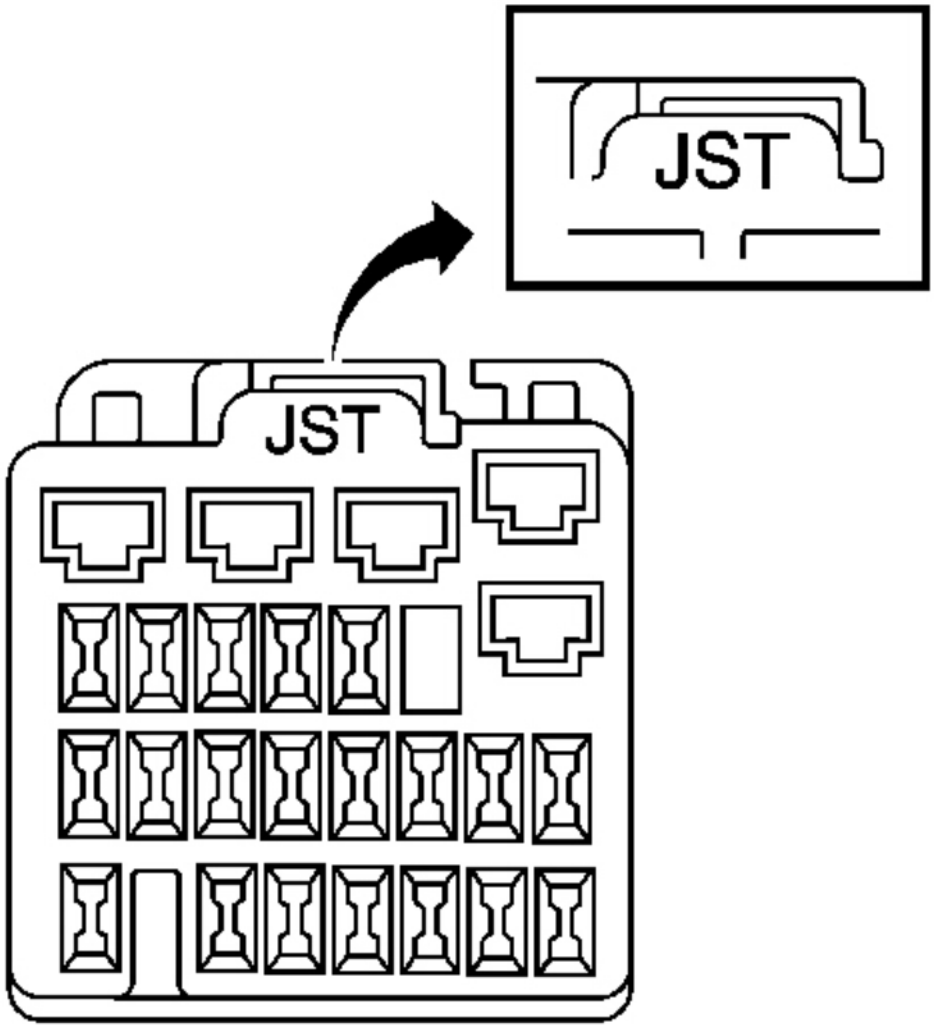


Fig. 33: View Of JST Identification On Connector Body
Courtesy of GENERAL MOTORS CORP.

- JST connectors have JST in small letters on their connectors, similar to that above. The location of the logo will vary with the connector size and style.

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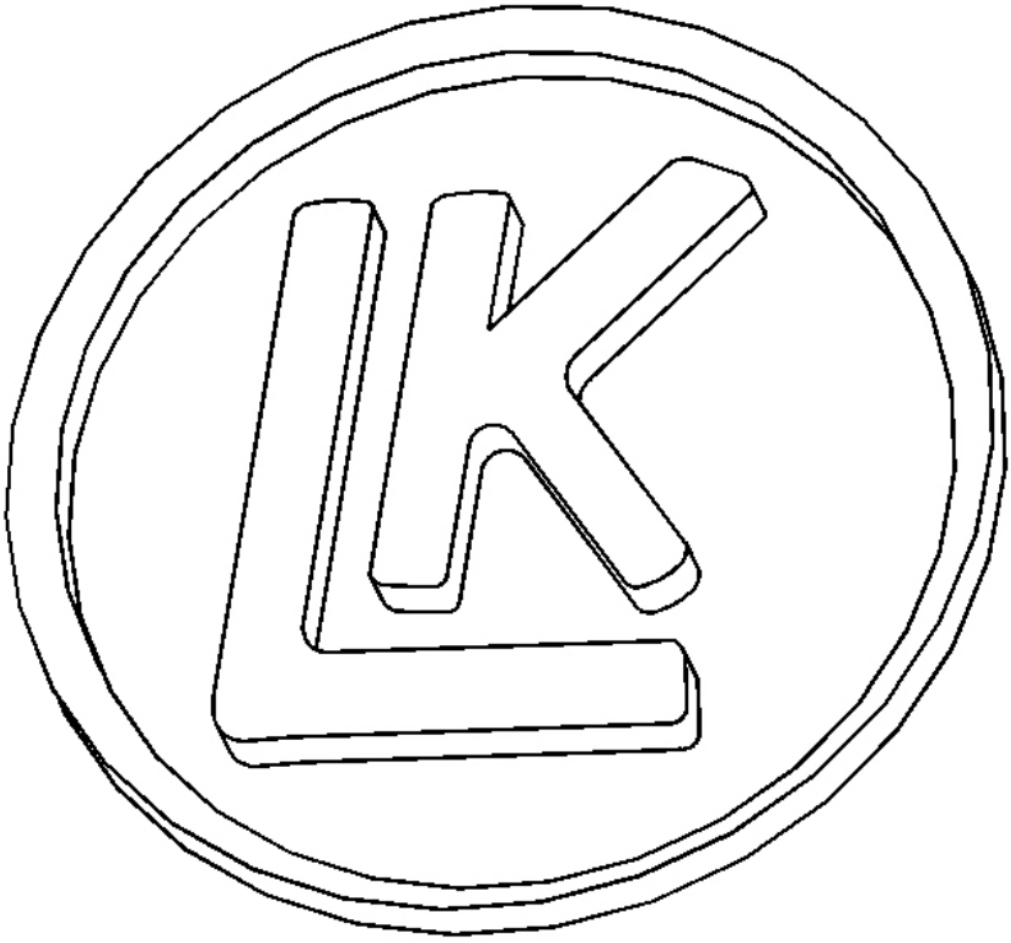


Fig. 34: View Of Kostel Connector Identifier
Courtesy of GENERAL MOTORS CORP.

- Kostel has an "LK" with a circle around it. These connector are usually used as a transmissions connection and are currently use on some Cadillac vehicles.

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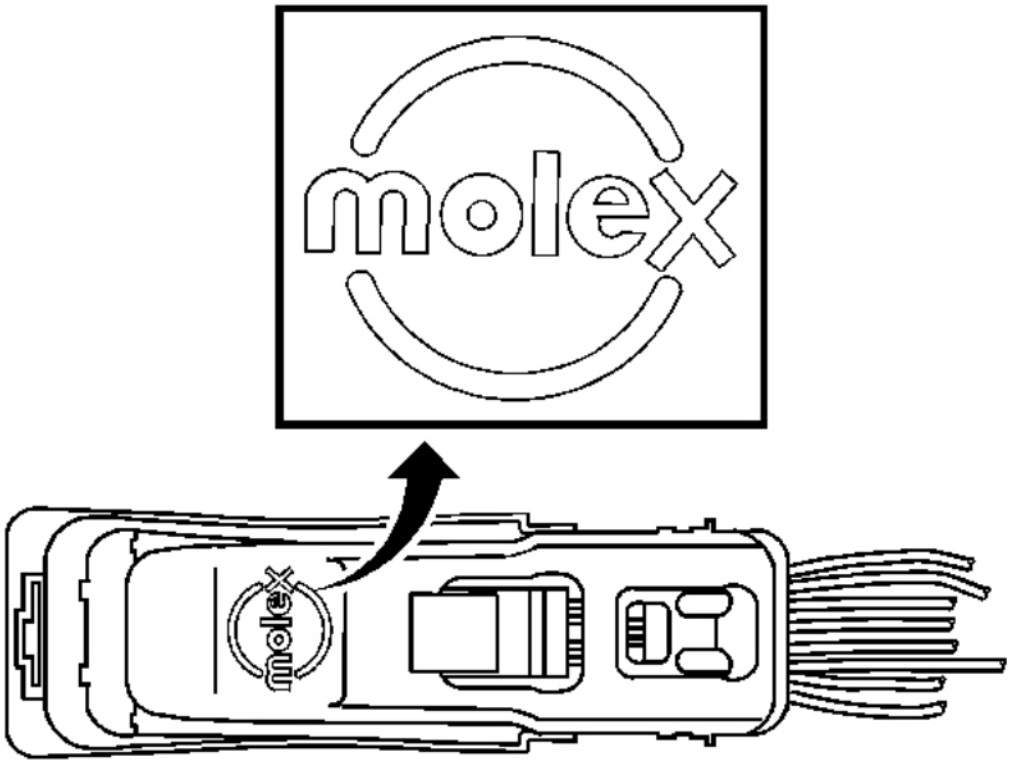


Fig. 35: View Of Molex Identification On Connector Body
Courtesy of GENERAL MOTORS CORP.

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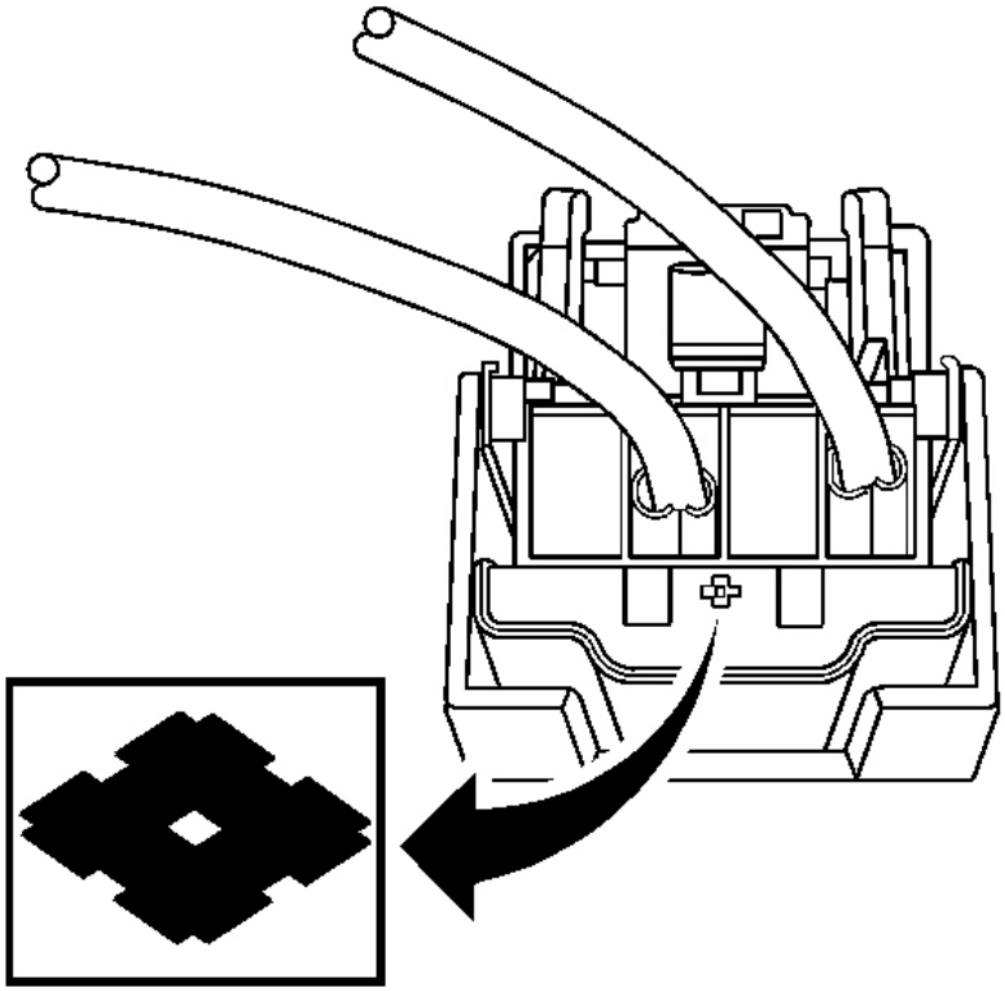


Fig. 36: View Of Sumitono Identification On Connector Body
Courtesy of GENERAL MOTORS CORP.

- Most Molex connectors will have the Molex logo on the dresscover of the connector. In some cases the connectors may have MX followed by another letter. The third letter indicates where the connector was made. A connector with MXD is a Molex connector made in Detroit.

  Sumitomo has a unique symbol on their connector and possibly a part number. The symbol is similar to that of a diamond lying on its side, similar to that shown. The logo could appear anywhere but the most common place is at the wire side of the housing.

- Tyco/AMP has many different and unique connector designs. Some may or may not have identifiable

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marks on them.

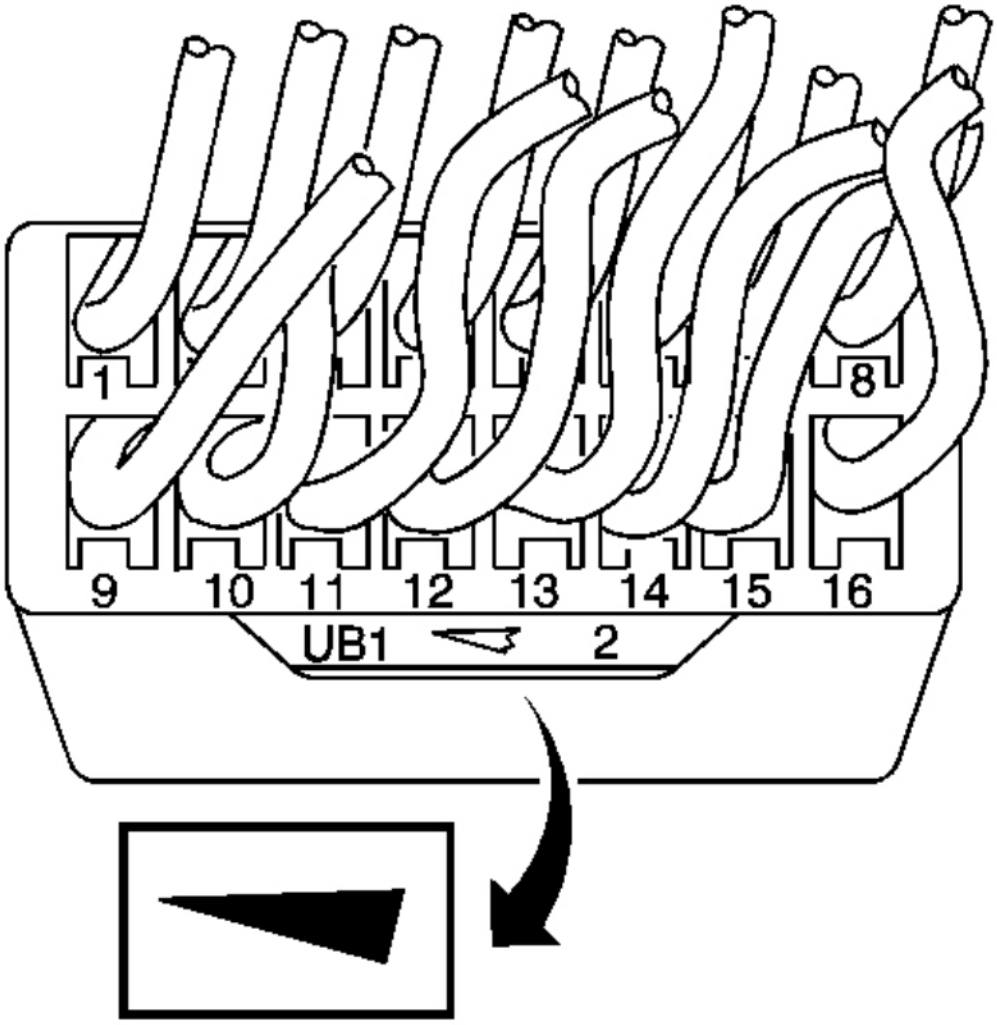


Fig. 37: View Of Yazaki Identification On Connector Body
Courtesy of GENERAL MOTORS CORP.

- Yazaki has a wedge or arrow shape, similar to that shown.

CONNECTOR POSITION ASSURANCE LOCKS

The connector position assurance (CPA) is a small plastic insert that fits through the locking tabs of the

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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.

AFL/EPC CONNECTORS

TOOLS REQUIRED

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

REMOVAL PROCEDURE

Follow the steps below in order to remove terminals from the connector.

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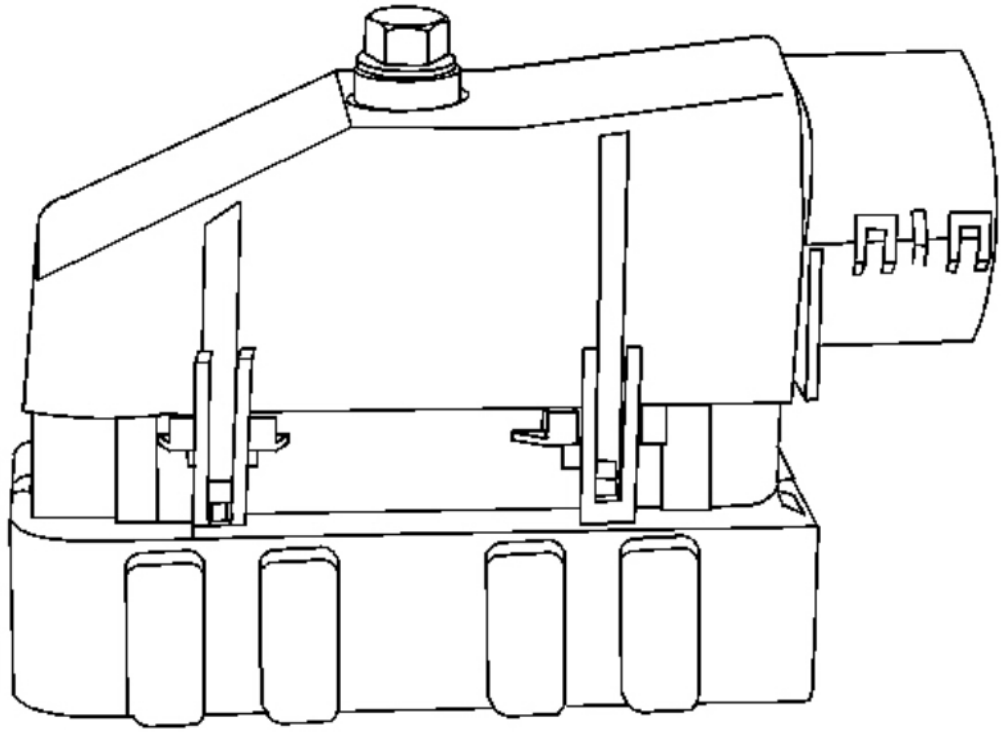


Fig. 38: View Of Connector With Bolt In Dress Cover
Courtesy of GENERAL MOTORS CORP.

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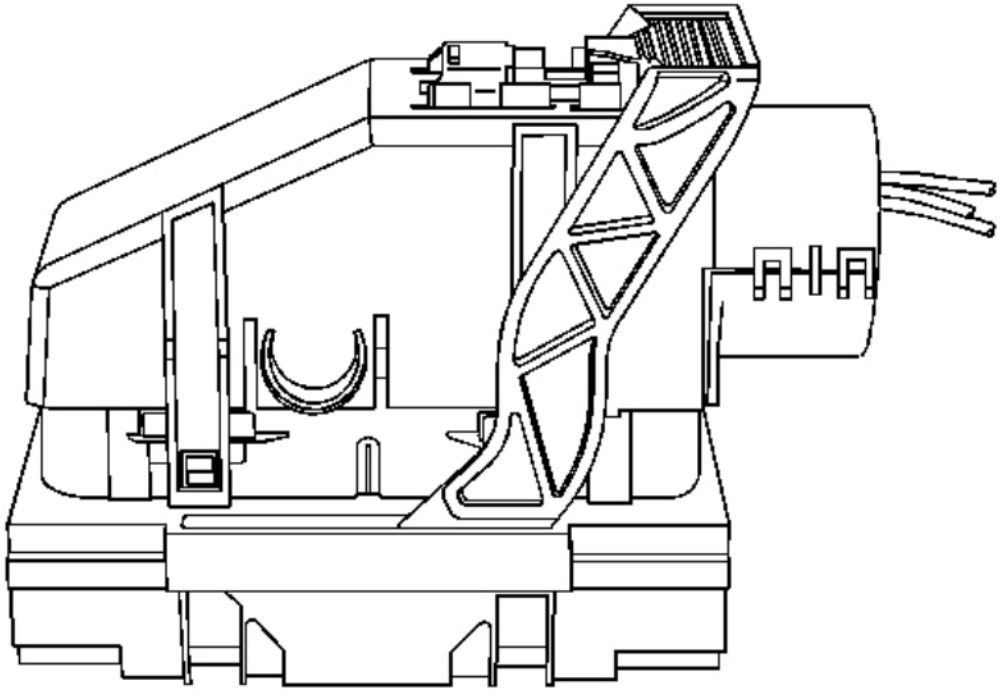


Fig. 39: Identifying Connector Position Assurance (CPA)
Courtesy of GENERAL MOTORS CORP.

1. For connectors with a bolt in the dress cover, turn the bolt counterclockwise to remove the connector from the component.
2. Locate the connector position assurance (CPA) on the top of the wire dress cover. Slide the CPA forward.

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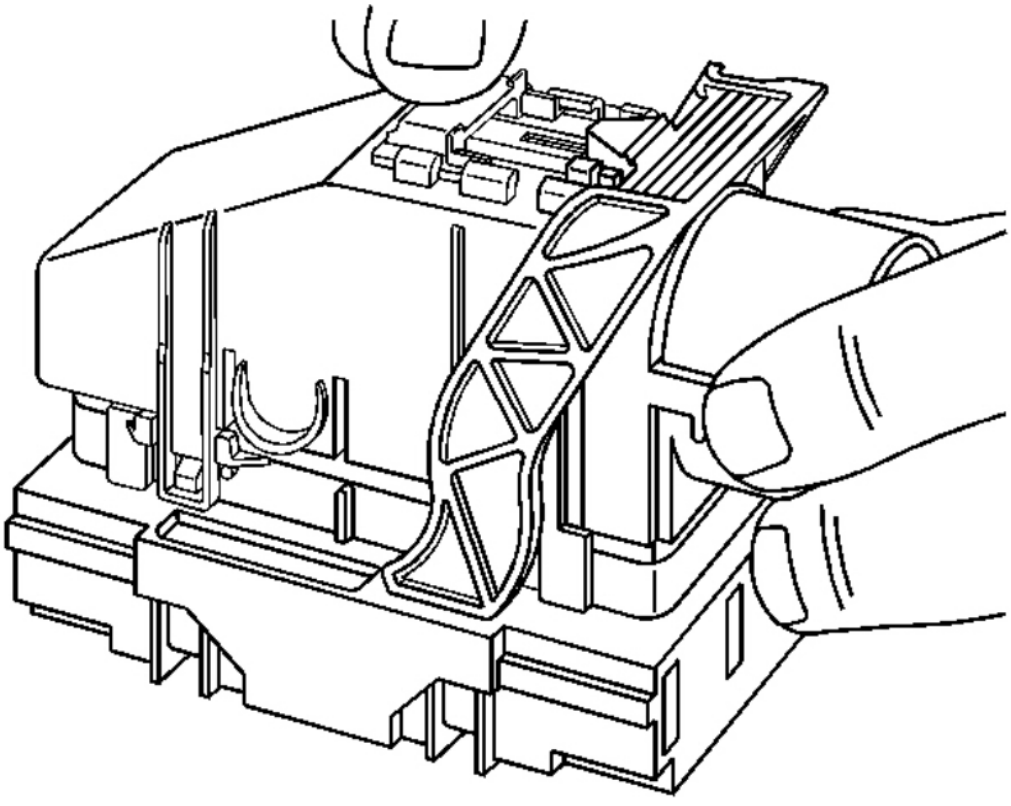


Fig. 40: Identifying Lever Lock & Lever Lock Release Tab
Courtesy of GENERAL MOTORS CORP.

3. Slide the lever lock forward while pressing down on the lever lock release tab.

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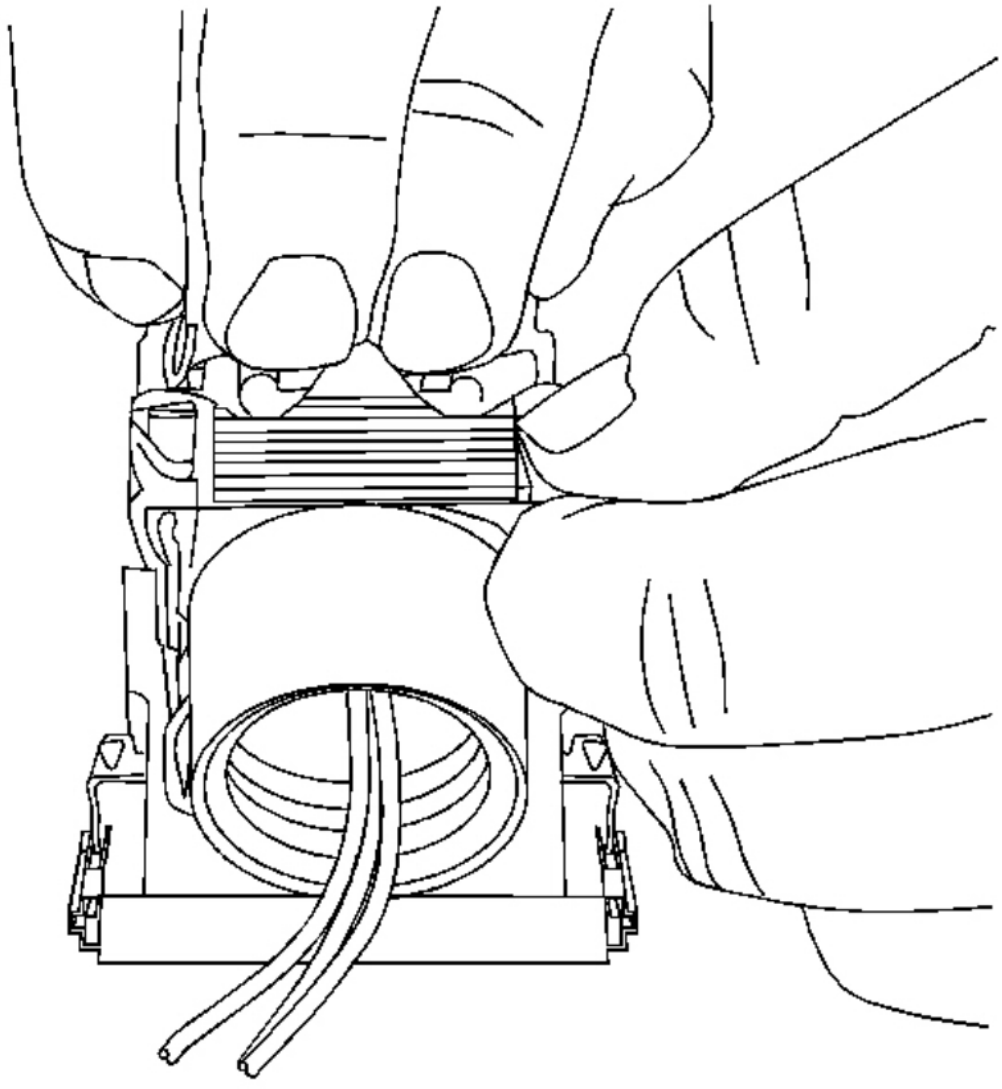


Fig. 41: Depressing Lever Lock Release Tab
Courtesy of GENERAL MOTORS CORP.

View showing depressing of the lever lock release tab.

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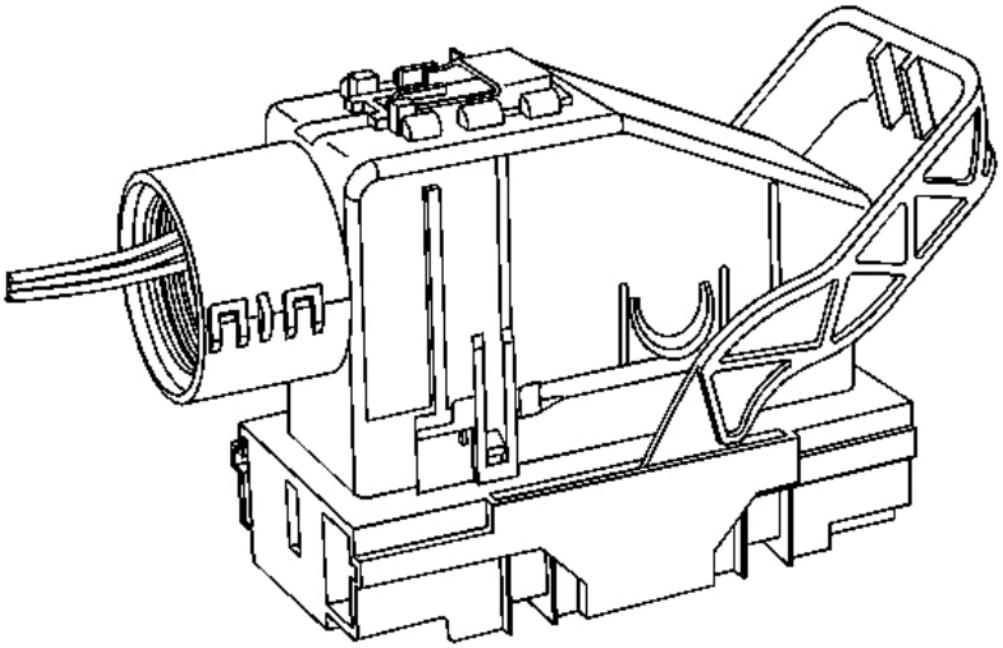


Fig. 42: View Of Connector In Released Position
Courtesy of GENERAL MOTORS CORP.

View of connector in released position.

4. Disconnect the connector from the component.
5. Locate the dress cover locking tabs at the corners of the dress cover. Use a small flat-blade tool to release the locking tabs and remove the dress cover.

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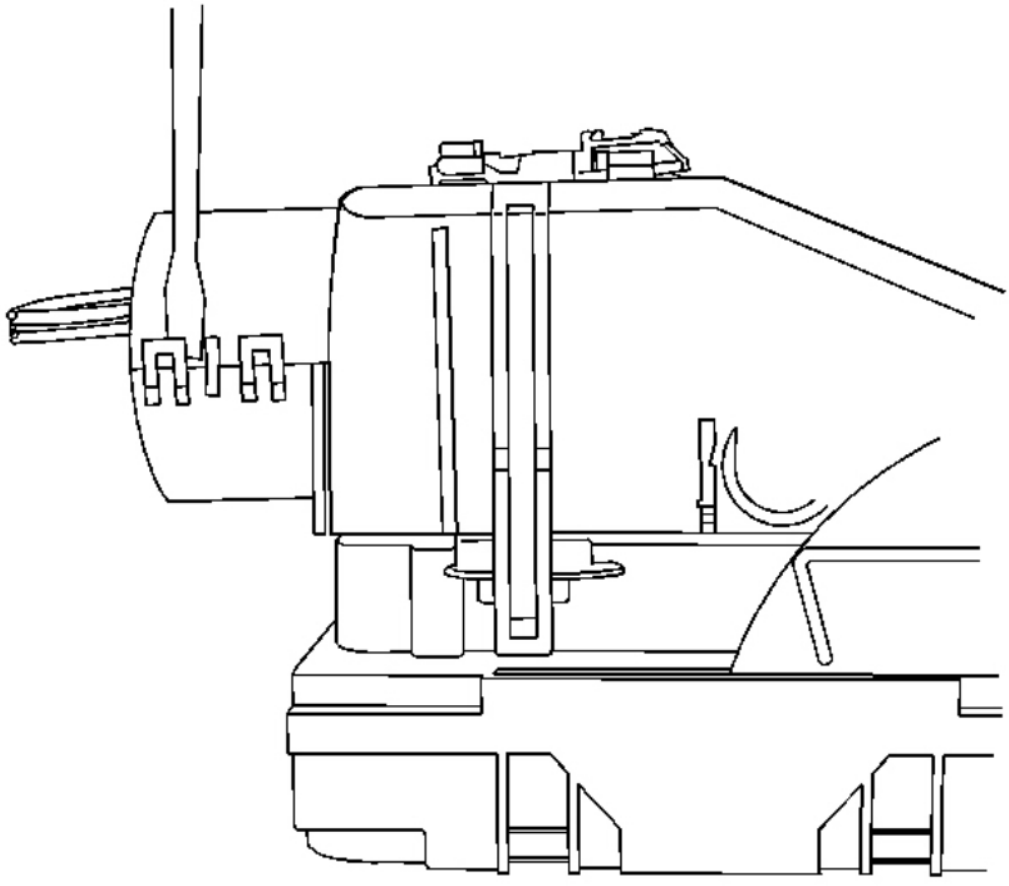


Fig. 43: Releasing Rear Lower Half Of Wiredress Cover
Courtesy of GENERAL MOTORS CORP.

Release the rear lower half of the wiredress cover.

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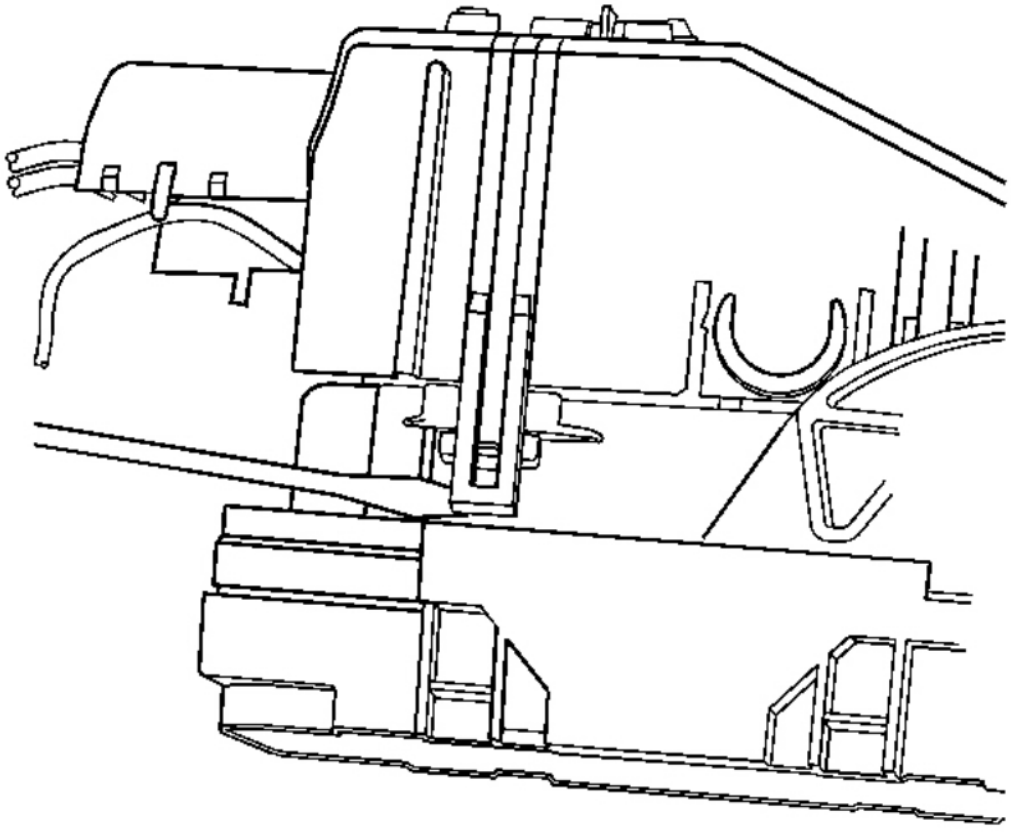


Fig. 44: Releasing Tabs Holding Wiredress Cover
Courtesy of GENERAL MOTORS CORP.

Release the tabs that are holding the wiredress cover to the connector body.

6. Remove the nose piece by inserting a small flat-blade tool into the slots on both ends of the connector body. Gently pry the nose piece out of the connector. J 38125-216 can also be used to remove the nose piece.

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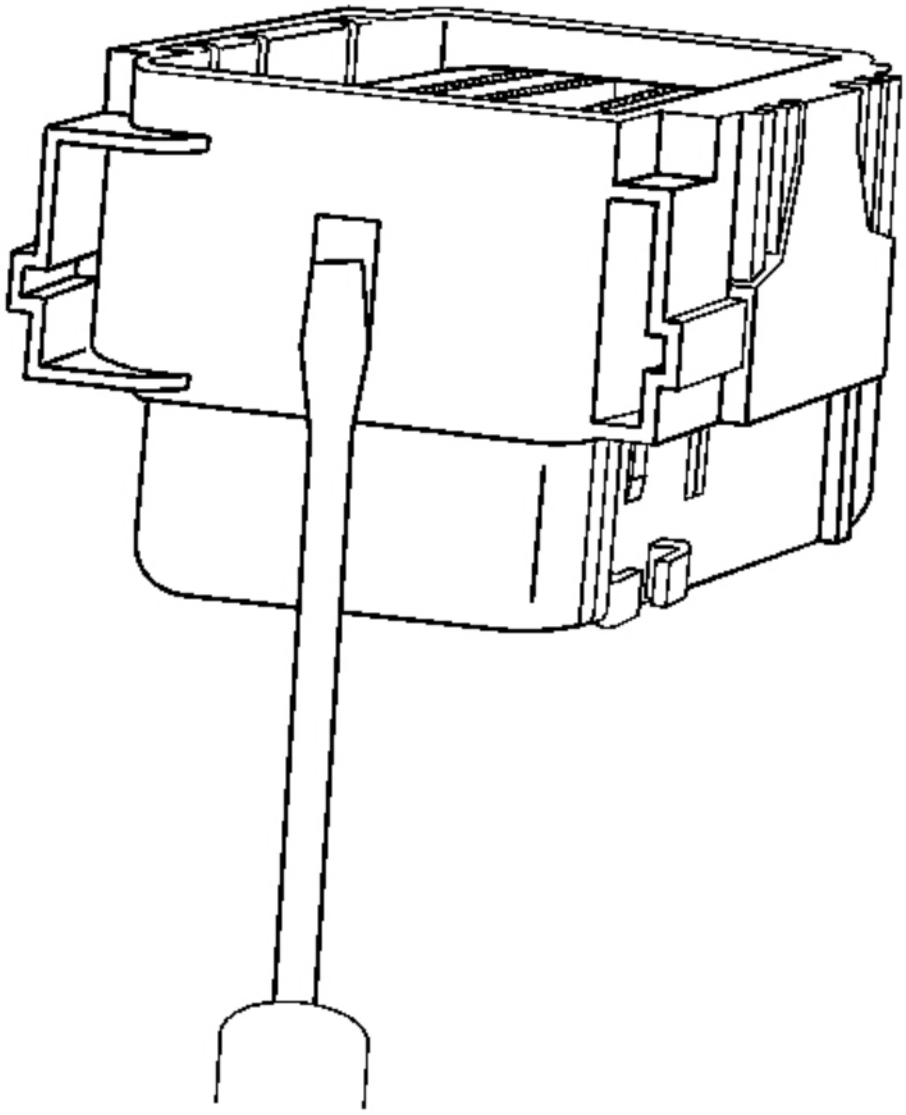


Fig. 45: Removing Nose Piece Using Flat-Blade Tool
Courtesy of GENERAL MOTORS CORP.

Use the J 38125-12A (GM P/N 12094429) tool to release the terminals by lifting the terminal retaining tabs on the inside of the connector. See the release tool cross reference in the Reference Guide of the J-38125 to ensure that the correct release tool is used.

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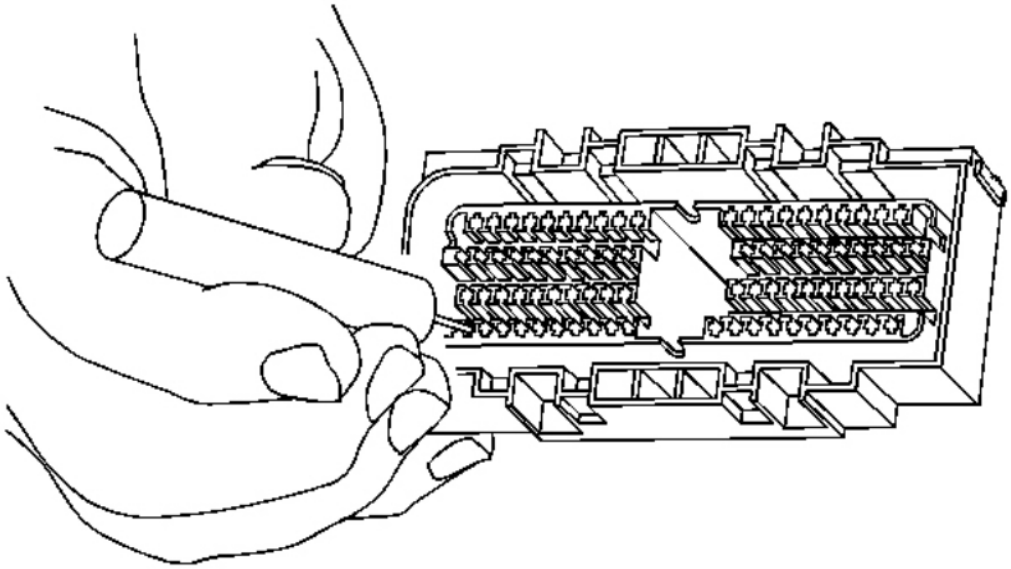


Fig. 46: View Of J 38125-12A Removal Tool
Courtesy of GENERAL MOTORS CORP.

7. 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.

REPAIR PROCEDURE

Use the appropriate terminal and follow the instructions in the **J-38125** . See **Special Tools** .

Location of the terminal in the repair tray and the proper crimp tool can be found in the appropriate connector end view.

BOSCH CONNECTORS (0.64)

TOOLS REQUIRED

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

TERMINAL REMOVAL PROCEDURE

1. Locate the lever lock on the wire dress cover. While pressing the lock, pull the lever over and past the lock until the lever is at the end of its travel.

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2. Disconnect the connector from the component.
3. Pull the rubber boot that covers the wires back to expose the end of the connector dress cover.
4. Place the connector locking lever in the center of the connector.

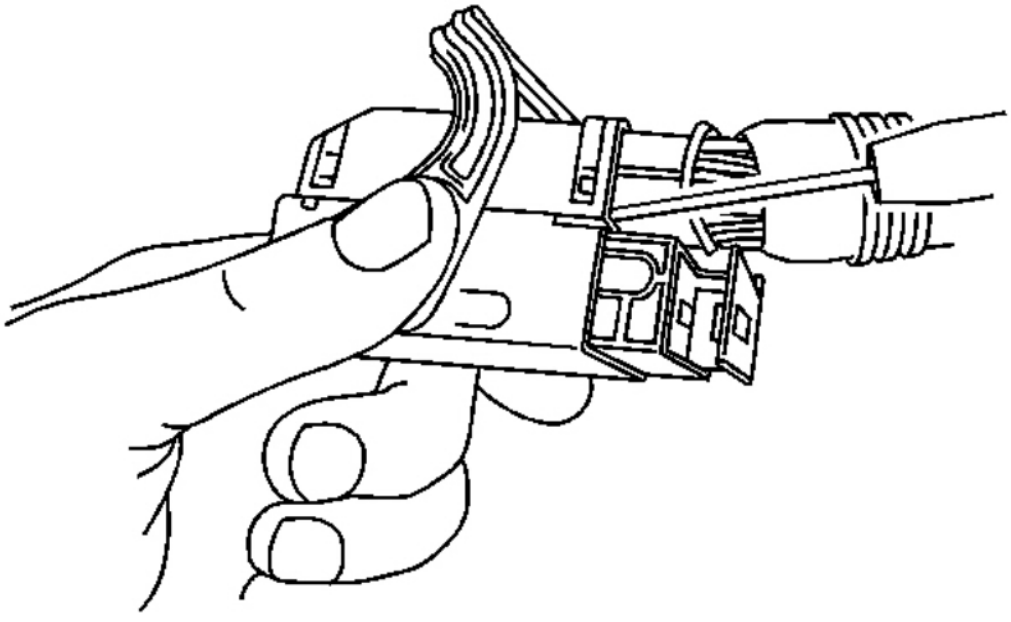


Fig. 47: Inserting Flat-Bladed Tool Between Cover & Connector Body
Courtesy of GENERAL MOTORS CORP.

5. Locate the 2 dress cover locking tabs that are on the wire end of the connector. Insert a small flat-bladed tool between the cover and connector body and pry up.

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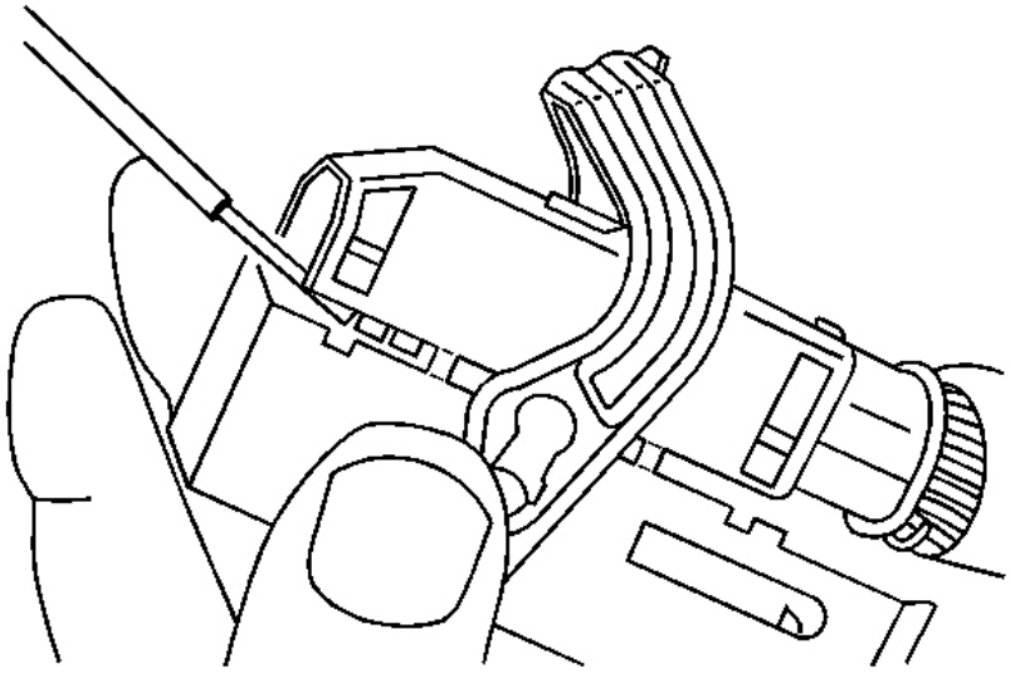


Fig. 48: Inserting Flat-Bladed Tool Between Cover & Connector End
Courtesy of GENERAL MOTORS CORP.

6. Locate the 2 dress cover locking tabs located on the opposite side of the connector. Insert a small flat-bladed tool between the cover at the connector end and pry up.
7. Remove the dress cover.
8. Cut the tie wrap on the wire bundle.

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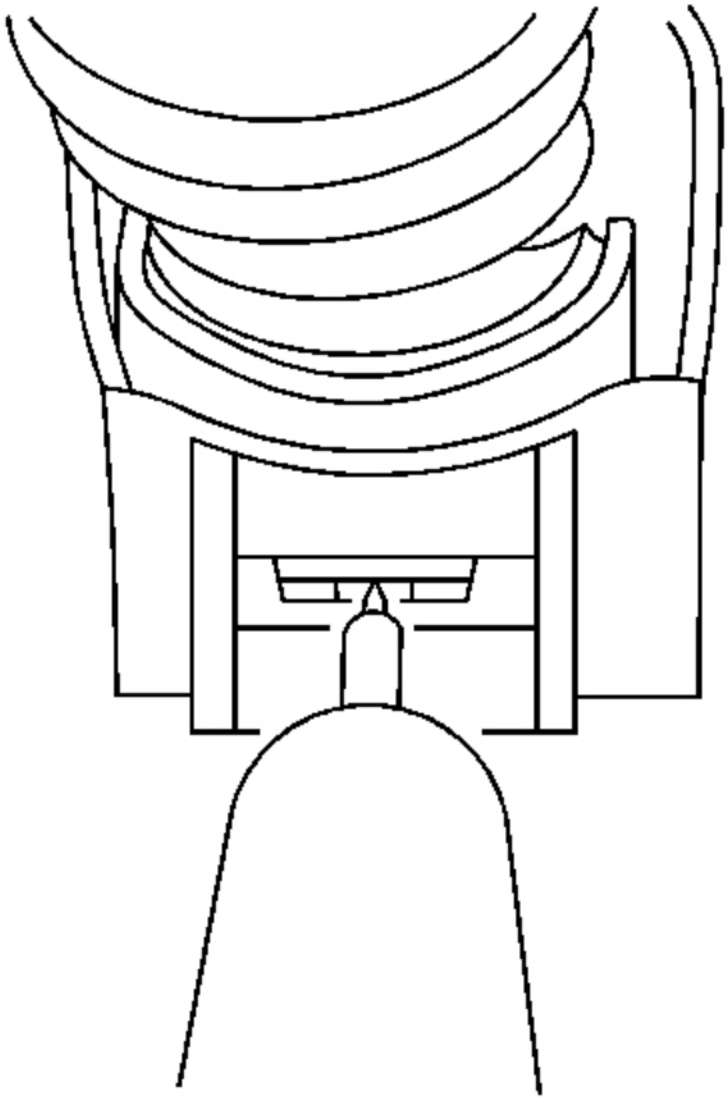


Fig. 49: View Of Terminal Position Assurance (TPA)
Courtesy of GENERAL MOTORS CORP.

9. Remove the terminal position assurance (TPA) by inserting a small flat-bladed tool into the small slot in the end of the slider and pushing on the TPA until it comes out of the connector. When the TPA exits the opposite side of the connector, gasp the TPA and pull it completely out of the connector.
10. Push the wire side of the terminal that is being removed toward the connector and hold it in position.

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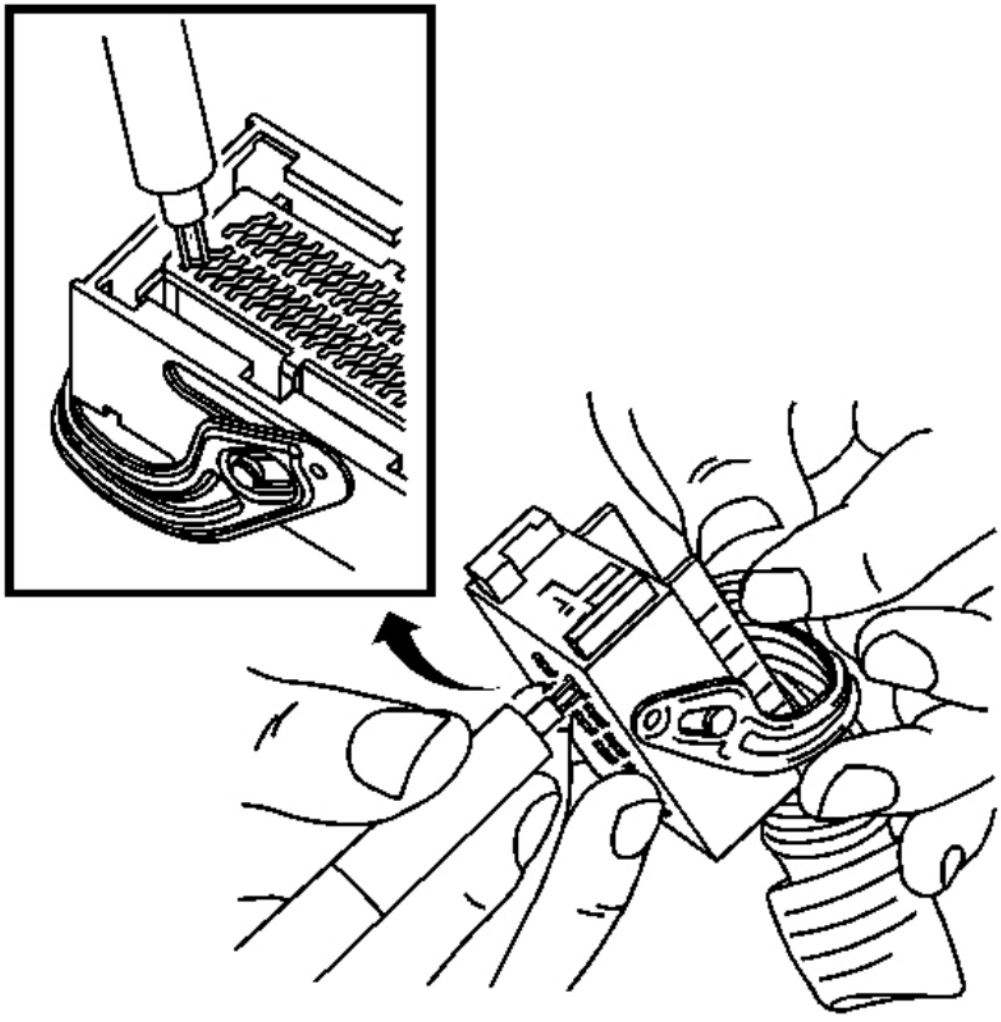


Fig. 50: Pulling Terminal Out Of Connector
Courtesy of GENERAL MOTORS CORP.

11. Insert the J 38125-560 (GM P/N 15314260) into the 2 triangular cavities on each side of the terminal at the front of the connector. See the release tool cross reference in the Reference Guide of the **J-38125** to ensure that the correct release tool is used. See **Special Tools** .
12. Carefully pull the terminal out of the connector. Always remember never use force when pulling a terminal out of a connector. If the terminal is difficult to remove, repeat the entire procedure.

TERMINAL REPAIR PROCEDURE

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Use the appropriate terminal and follow the instructions in the **J-38125** . See **Special Tools** .

TERMINAL REPLACEMENT PROCEDURE

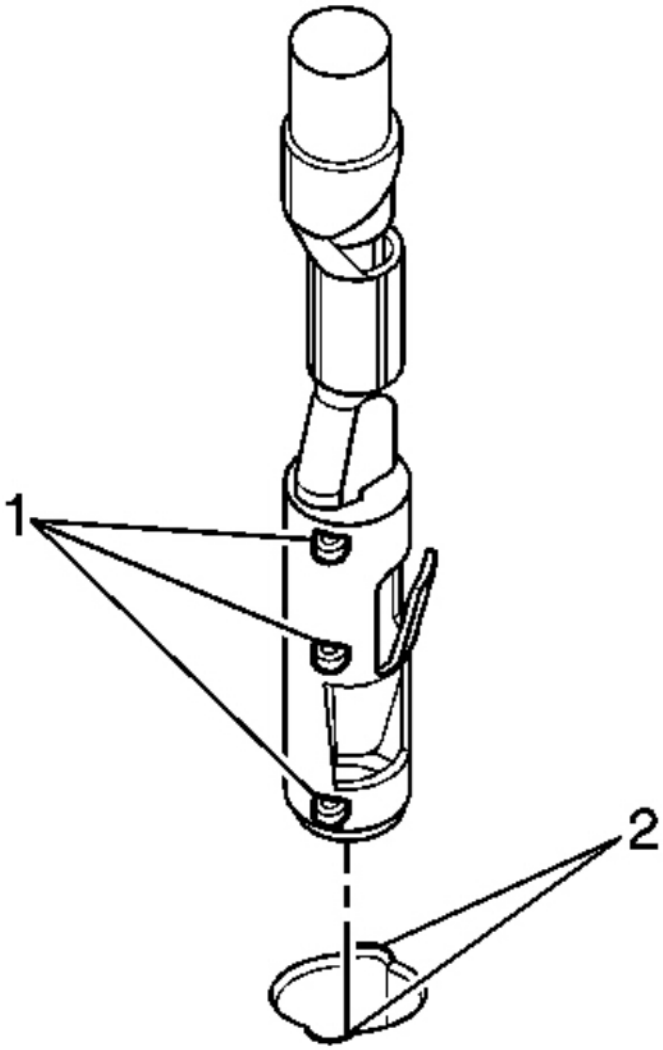


Fig. 51: Aligning Coding Lugs With Connector Coding Grooves
Courtesy of GENERAL MOTORS CORP.

1. Prior to installation the terminal must be aligned so the (1) coding lugs align with the (2) coding grooves on the connector.

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2. Once the terminal is aligned, slide the terminal into the cavity until the retainer has engaged in the cavity of the connector.
3. Slide the TPA in the connector body and seat it using a small flat bladed tool. The TPA is seated when it is flush with the contact housing.
4. Secure the wires to the connector body using a tie wrap and replace the dress cover and grommet.

BOSCH CONNECTORS (2.8 JPT)

TOOLS REQUIRED

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

TERMINAL REMOVAL PROCEDURE

1. Pull out the slider on the connector position assurance (CPA) until it is at the end of its travel.
2. Disconnect the connector from the component.
3. Remove the wire dress cover, if necessary.
4. Push the wire side of the terminal that is being removed toward the connector and hold it in position.

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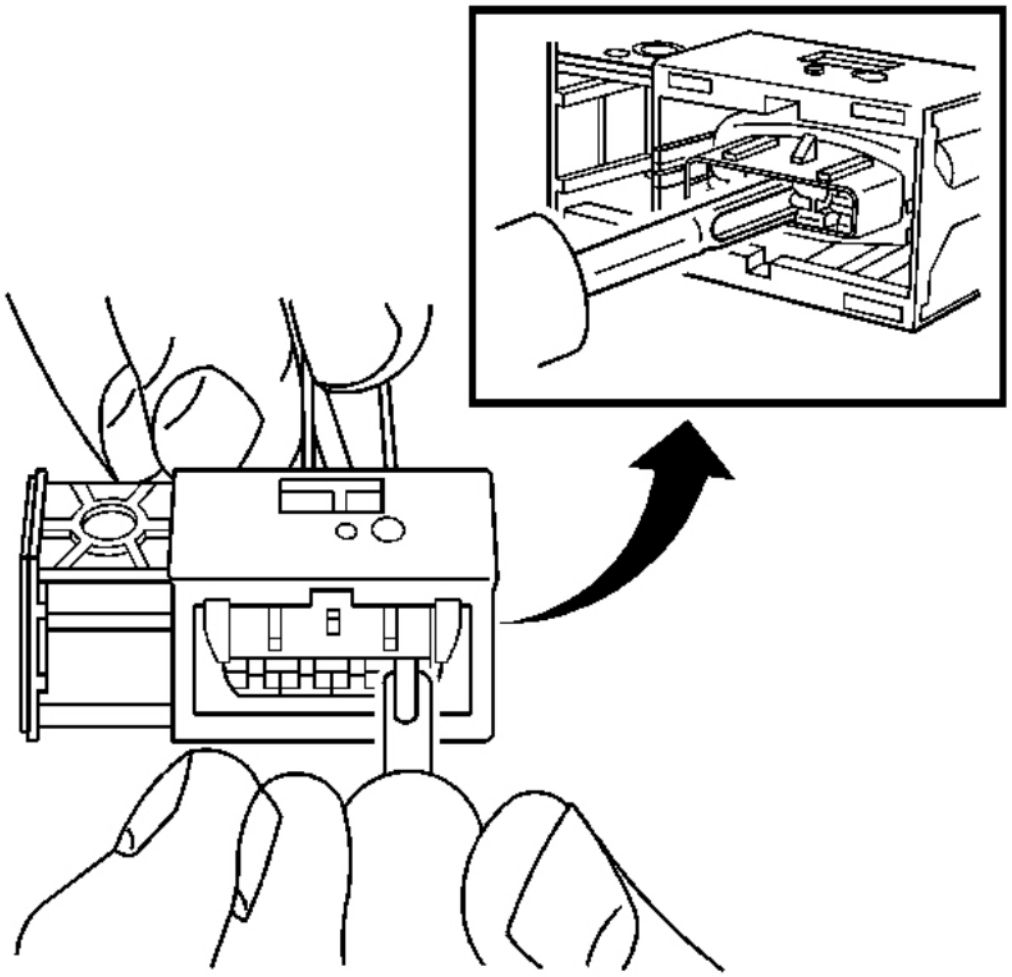


Fig. 52: View Of Bosch Connector Terminals (2.8 JPT)
Courtesy of GENERAL MOTORS CORP.

5. Insert the J 38125-557 (GM P/N 12122378) into the 2 cavities on each side of the terminal at the front of the connector and push until you feel the tool disengage the terminal retainers. See the release tool cross reference in the Reference Guide of the **J-38125** to ensure that the correct release tool is used. See **Special Tools** .
6. Carefully pull the terminal out of the connector. Always remember never use force when pulling a terminal out of a connector. If the terminal is difficult to remove, repeat the entire procedure.

TERMINAL REPAIR PROCEDURE

Use the appropriate terminal and follow the instructions in the **J-38125** . See **Special Tools**

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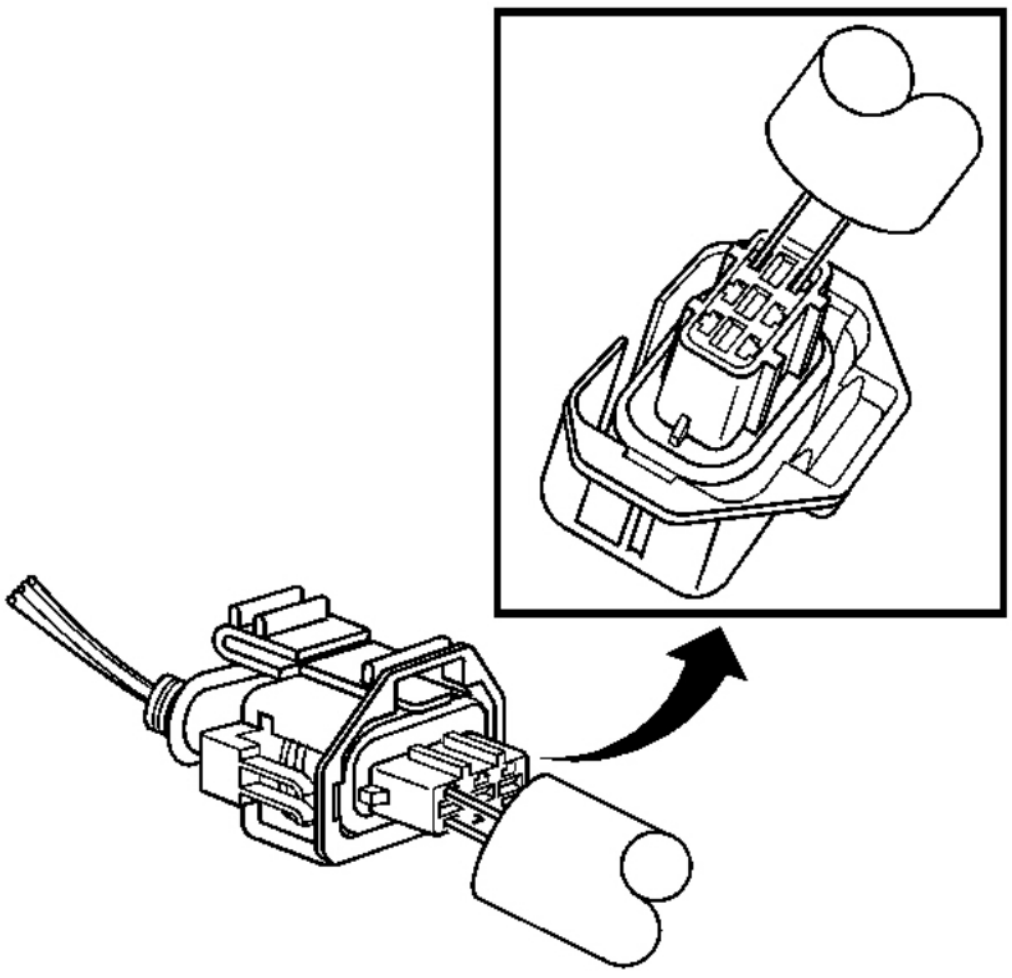
BOSCH CONNECTORS (BSK)

TOOLS REQUIRED

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

TERMINAL REMOVAL PROCEDURE

1. Disconnect the connector from the component.
2. Remove the wire dress cover, if necessary.
3. Push the wire side of the terminal that is being removed toward the connector and hold it in position.



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Fig. 53: View Of Bosch Connector Terminals (BSK)
Courtesy of GENERAL MOTORS CORP.

4. Insert the J 38125-561 tool into the 2 cavities on each side of the terminal at the front of the connector and push until you feel the tool disengage the terminal retainers. See the release tool cross reference in the Reference Guide of the **J-38125** to ensure that the correct release tool is used. See **Special Tools** .
5. Carefully pull the terminal out of the connector. Always remember never use force when pulling a terminal out of a connector. If the terminal is difficult to remove, repeat the entire procedure.

TERMINAL REPAIR PROCEDURE

Use the appropriate terminal and follow the instructions in the **J-38125** . See **Special Tools** .

BOSCH CONNECTORS (ECM)

TOOLS REQUIRED

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

REMOVAL PROCEDURE

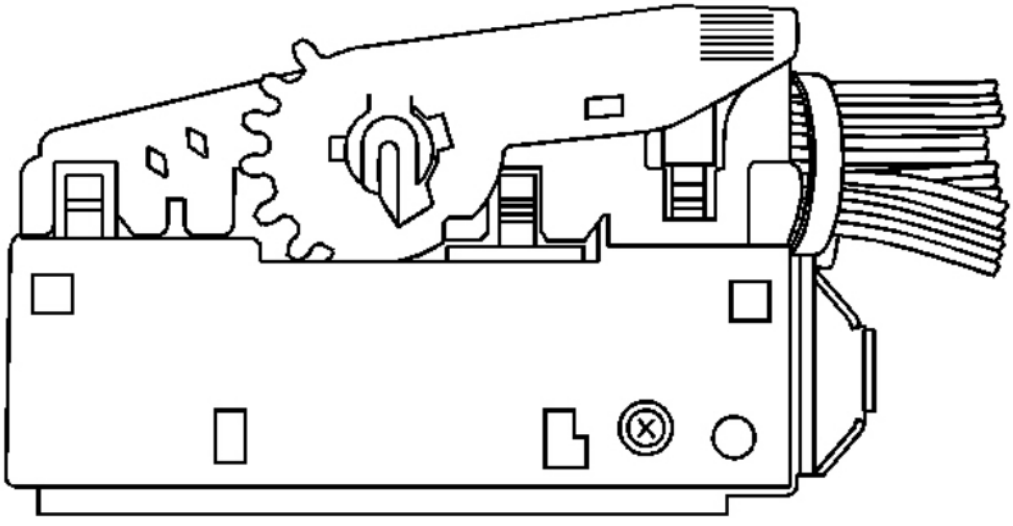


Fig. 54: View Of Bosch Connectors
Courtesy of GENERAL MOTORS CORP.

1. Locate the assist lever on the top of the connector. Move the assist lever to the forward position.

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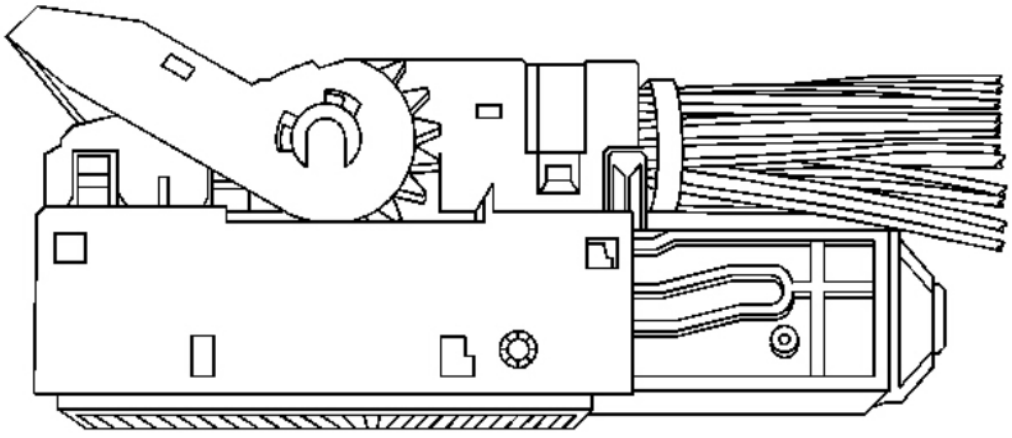


Fig. 55: Identifying Assist Lever In Forward Position
Courtesy of GENERAL MOTORS CORP.

2. Disconnect the connector from the component.

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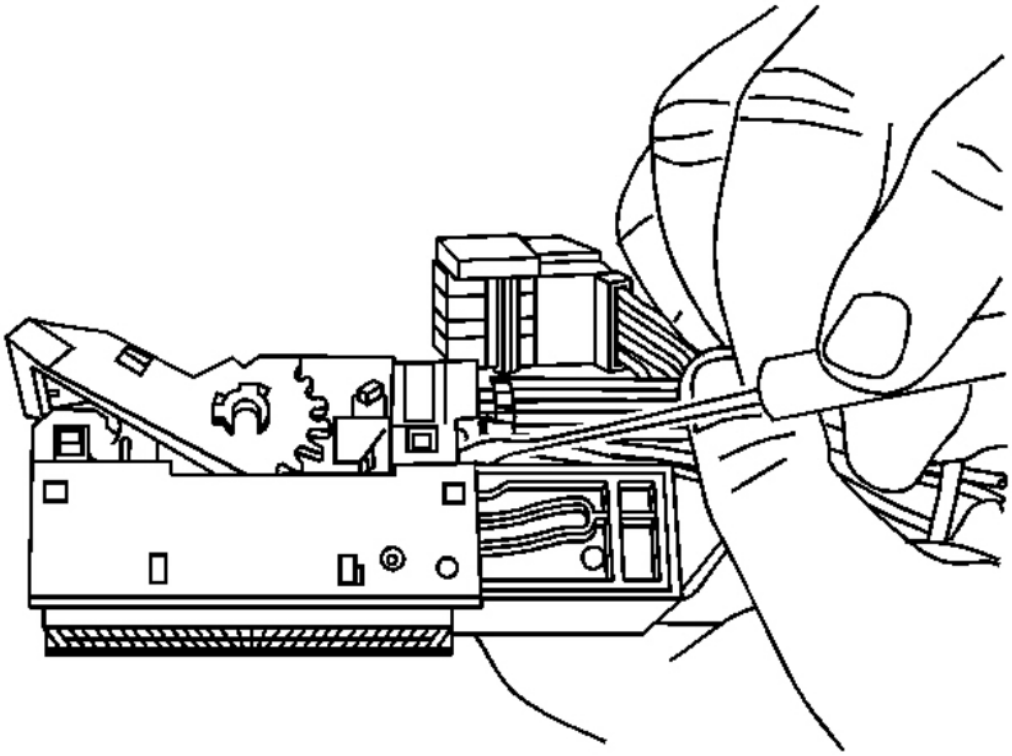


Fig. 56: Releasing Locking Tabs To Remove Dress Cover
Courtesy of GENERAL MOTORS CORP.

3. Locate the dress cover locking tabs at the corners of the connector. Use a small flat-blade tool to release the locking tabs and remove the dress cover.

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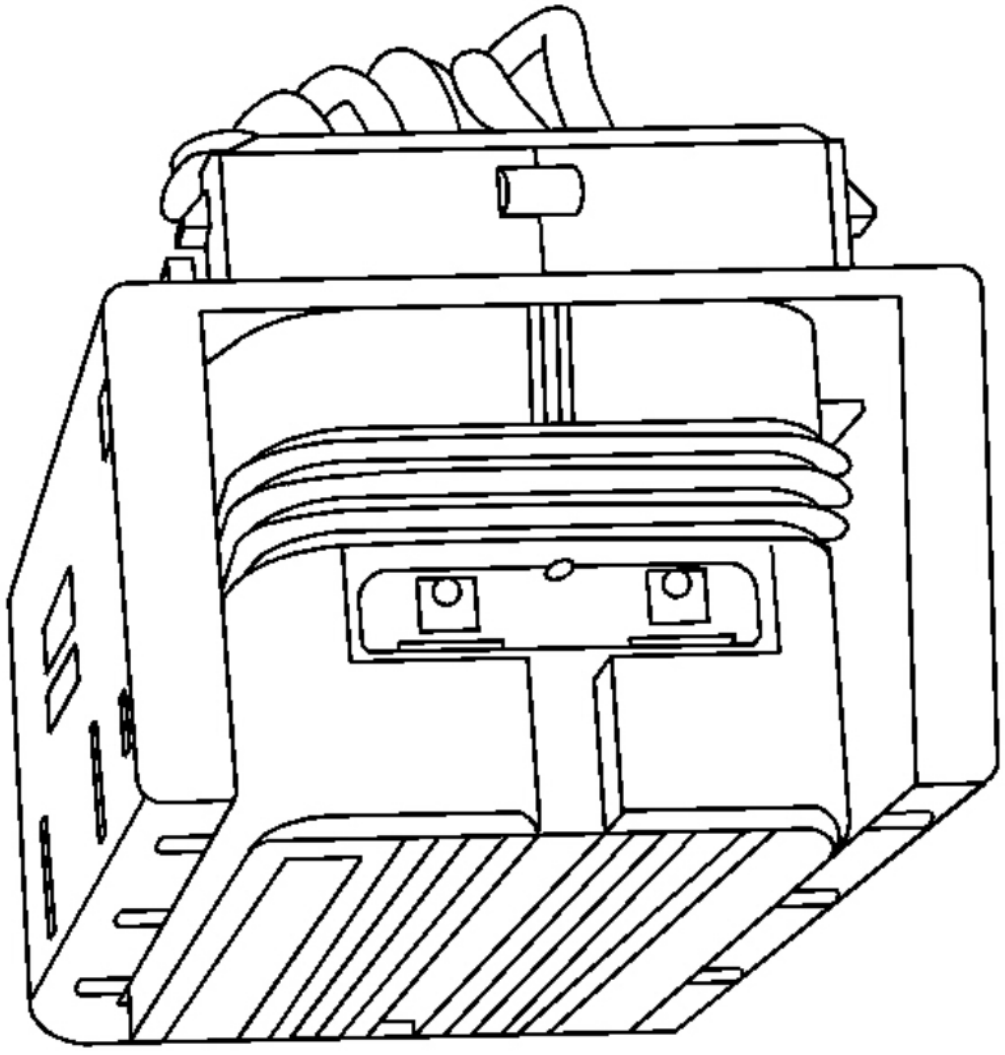


Fig. 57: View Of Terminal Positive Assurance (TPA) Connector
Courtesy of GENERAL MOTORS CORP.

4. The terminal positive assurance (TPA) is located in the front of the connector.

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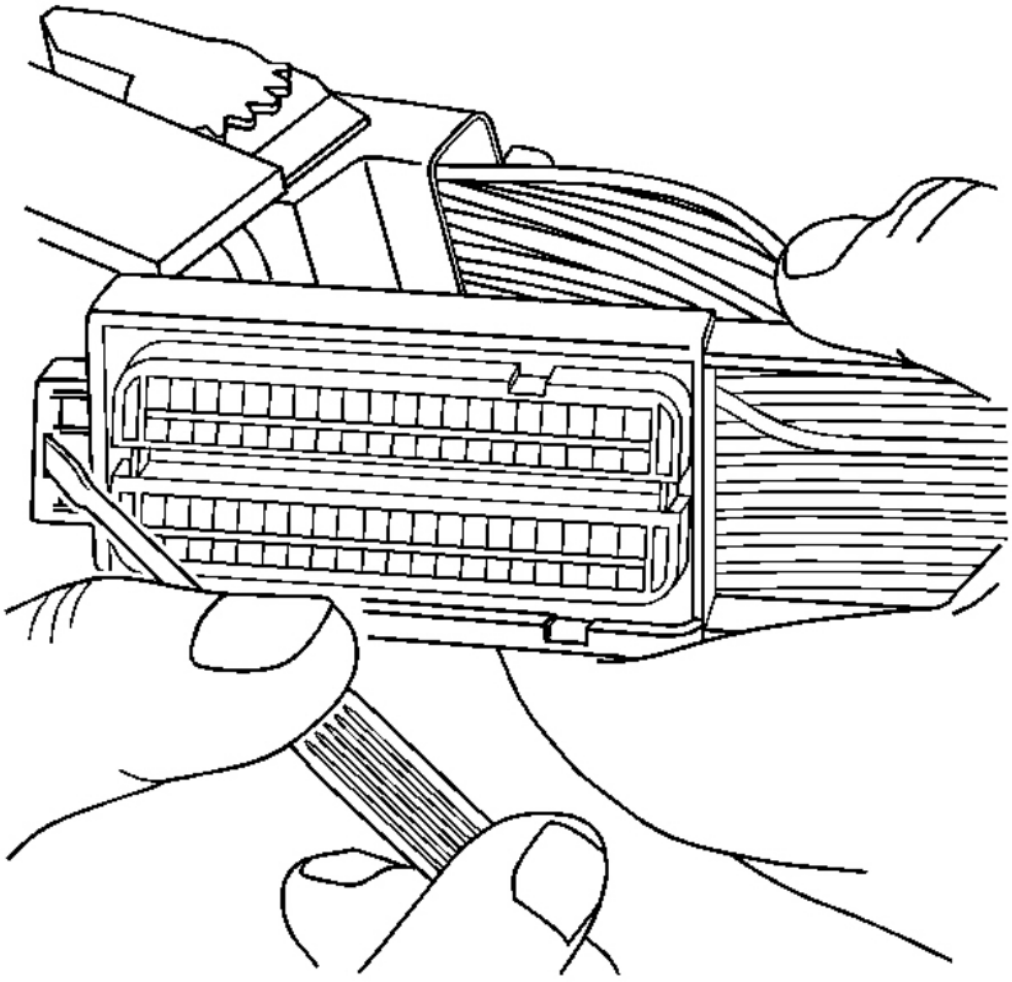


Fig. 58: Removing TPA From Connector
Courtesy of GENERAL MOTORS CORP.

5. Use a small flat-blade tool to remove TPA from the connector.

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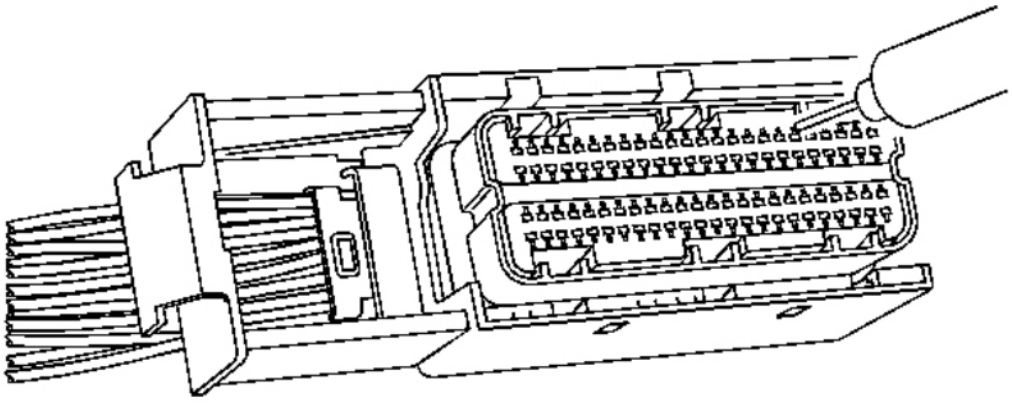


Fig. 59: View Of Special Tools & Terminals
Courtesy of GENERAL MOTORS CORP.

6. Use the J 38125-213 or the J 38125-556 (GM P/N 12093647) tool to release the terminals by inserting the tool into the terminal release cavity. See the release tool cross reference in the Reference Guide of the **J-38125** to ensure that the correct release tool is used. See **Special Tools** .
7. 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.

REPAIR PROCEDURE

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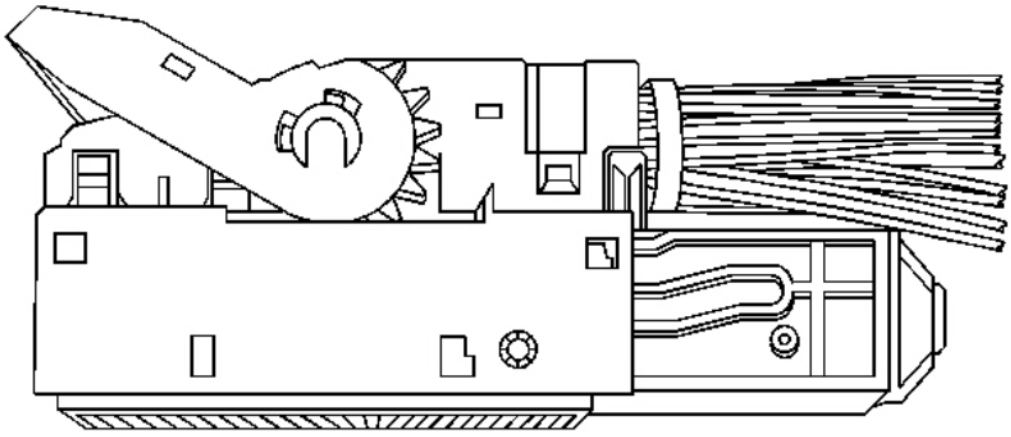


Fig. 60: Identifying Assist Lever In Forward Position
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Ensure that the dress cover and connector body are both in the released position before reassembling. Failure to do so may cause damage to the connector and component.

Use the appropriate terminal and follow the instructions in the **J-38125** . See **Special Tools** .

Location of the terminal in the repair tray and the proper crimp tool can be found in the appropriate connector end view.

DELPHI CONNECTORS (MICRO-PACK 100W)

TOOLS REQUIRED

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

TERMINAL REMOVAL PROCEDURE

There are 2 styles of Micro-Pack 100W connectors. These connectors are very similar but use different terminals and have some minor physical differences also.

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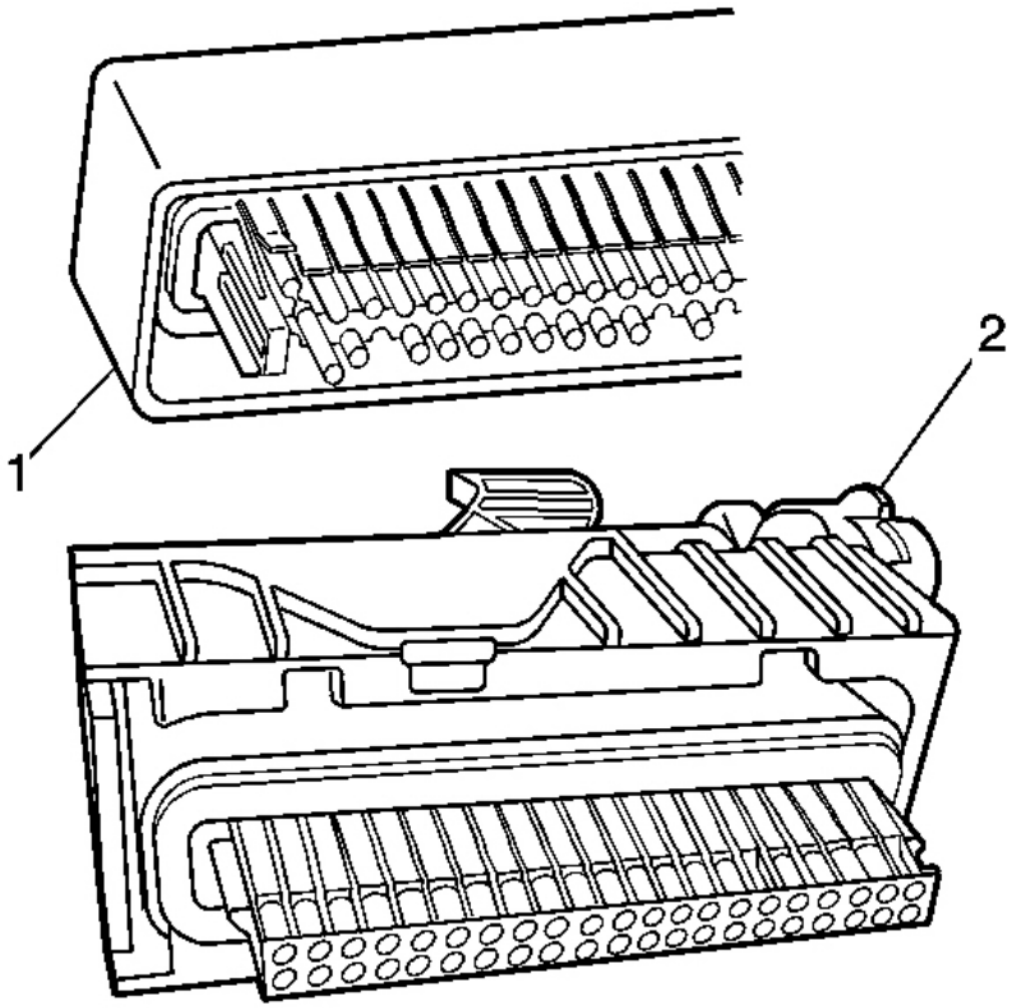


Fig. 61: Identifying Micro-Pack 100W First & Second Connector Designs
Courtesy of GENERAL MOTORS CORP.

The first connector design of the Micro-Pack 100W (1) has a white connector interface that holds the terminals. The second design of the Micro-Pack 100W (2) has a gray interface to hold the terminals. Also, the first design has terminal cavities that are further apart (3 mm centerline) and offset from the other row of terminal cavities in the connector. The second design has terminals cavities that are closer together (2.54 mm centerline) and aligned vertically. One other way to identify the second design is the thin strip of material that runs along the outside of the cavities.

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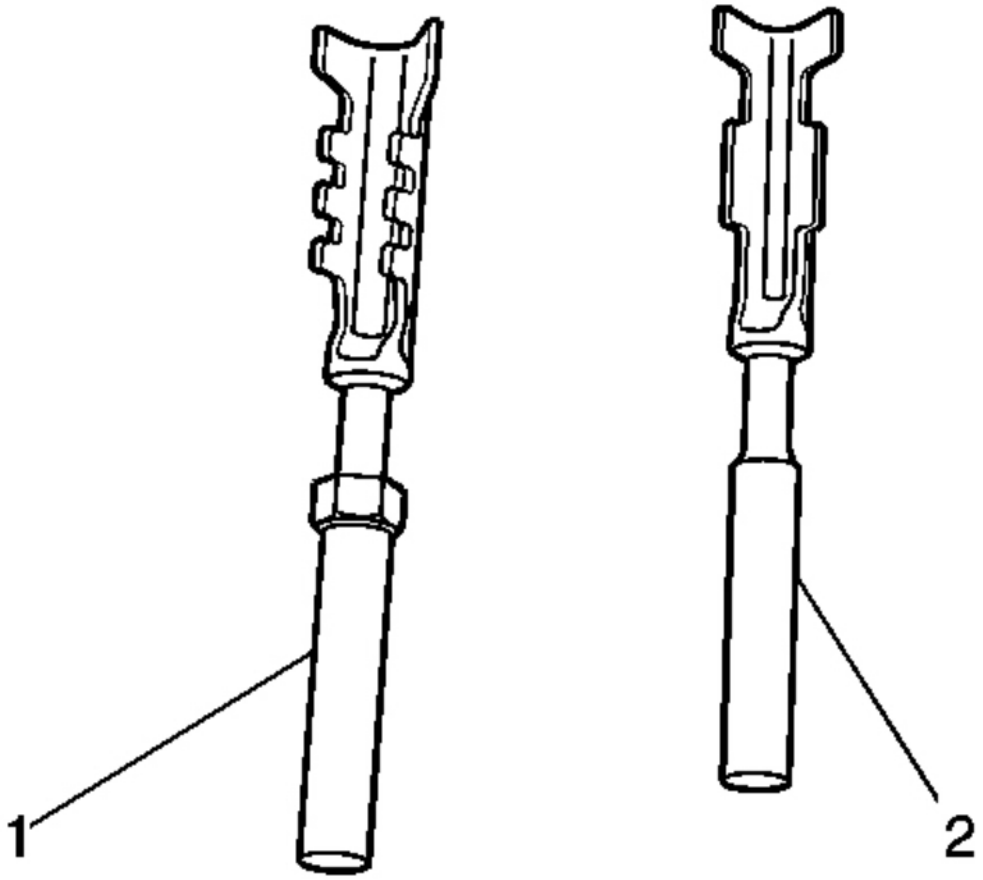


Fig. 62: Identifying Micro-Pack 100W Short & Long Terminals
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: There are 2 styles of Micro-Pack 100W terminals which are very similar. Ensure that you have the correct terminal before crimping the new terminal to the wire. The first design connector uses the longer terminal (1) that has a raised area in front of the recess in the terminal. The second design connector uses the shorter terminal without the raised area.

Follow the steps below in order to remove terminals from Micro-Pack 100W connectors. Some Micro-Pack 100W connector disassembly procedures will vary. Use this procedure as a guide.

1. Disconnect the connector from the component.

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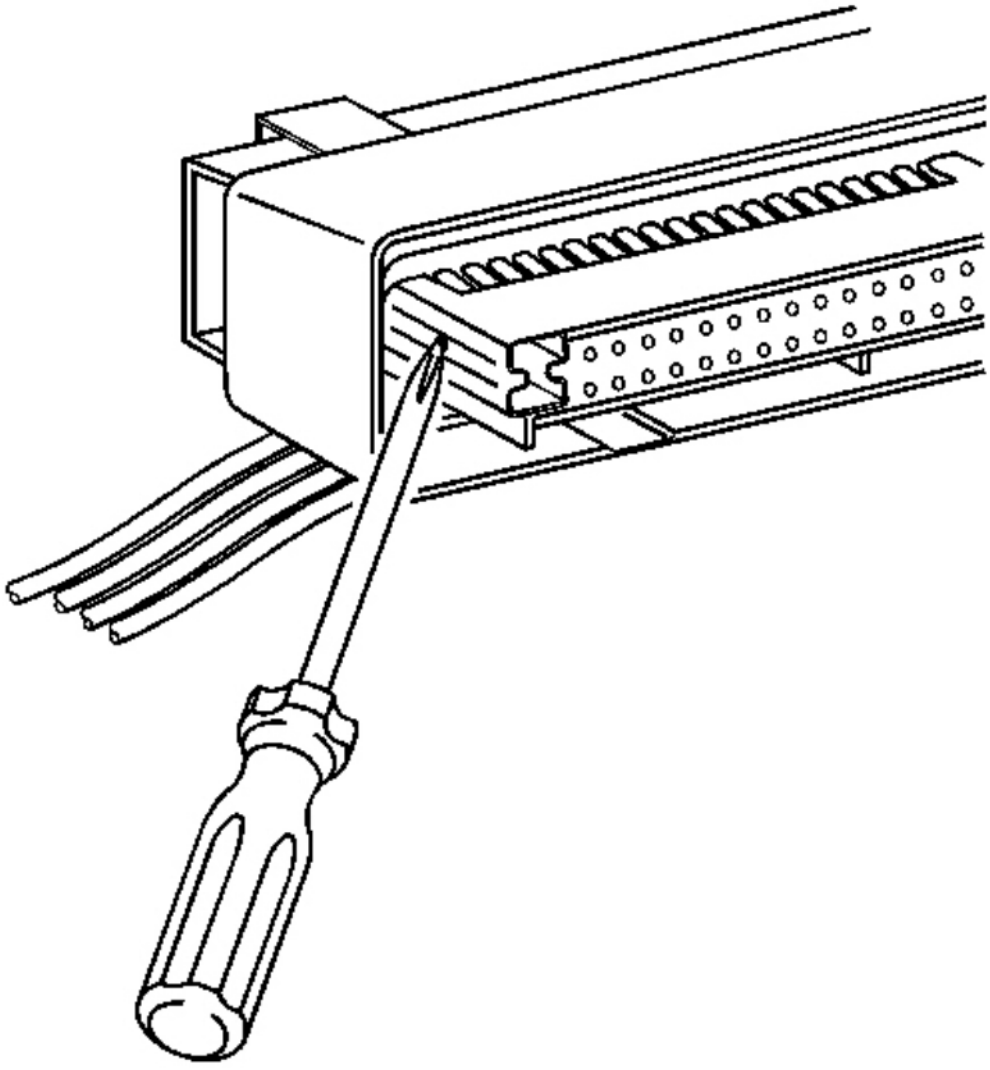


Fig. 63: Locating Nose Piece Locking Tabs
Courtesy of GENERAL MOTORS CORP.

2. Locate the nose piece locking tabs that are positioned on the side of the connector nose piece. The connector nose piece acts as a terminal positive assurance (TPA) and may be referred to as such.

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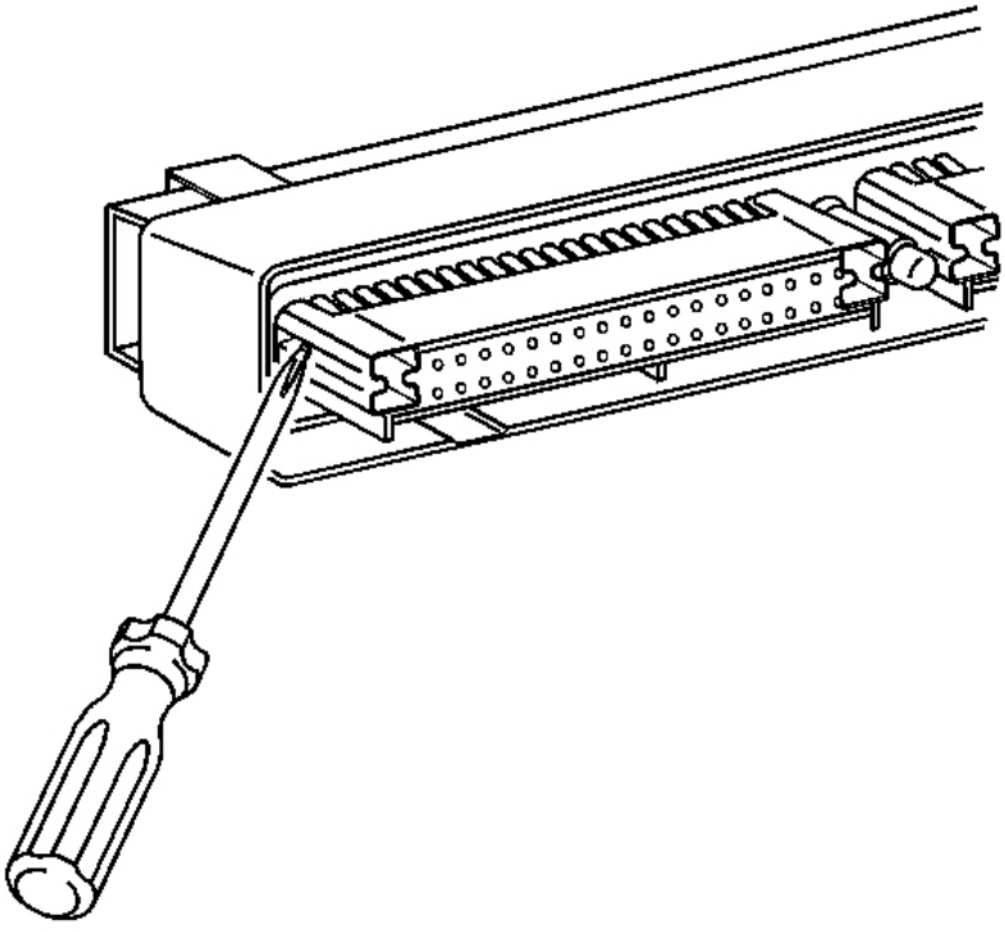


Fig. 64: Loosening Nose Piece Locking Tabs
Courtesy of GENERAL MOTORS CORP.

3. Use a small flat-blade tool to push in one of the locking tabs while gently pulling 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.

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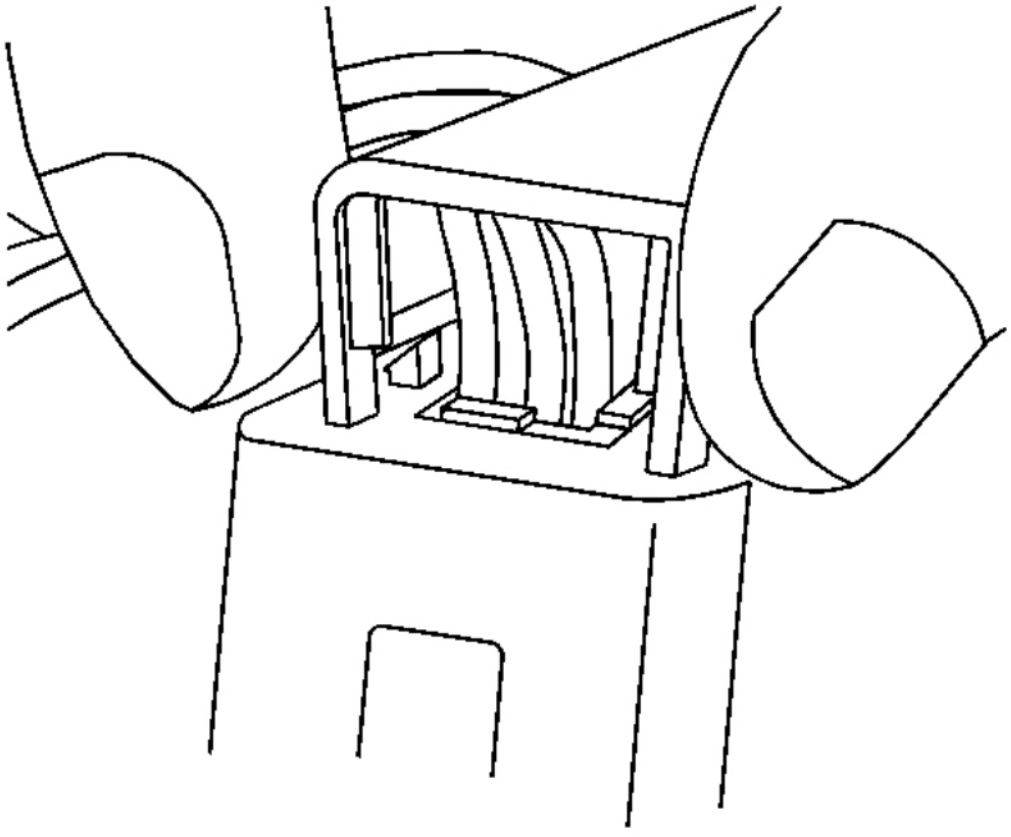


Fig. 65: Squeezing Cover Locking Legs
Courtesy of GENERAL MOTORS CORP.

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

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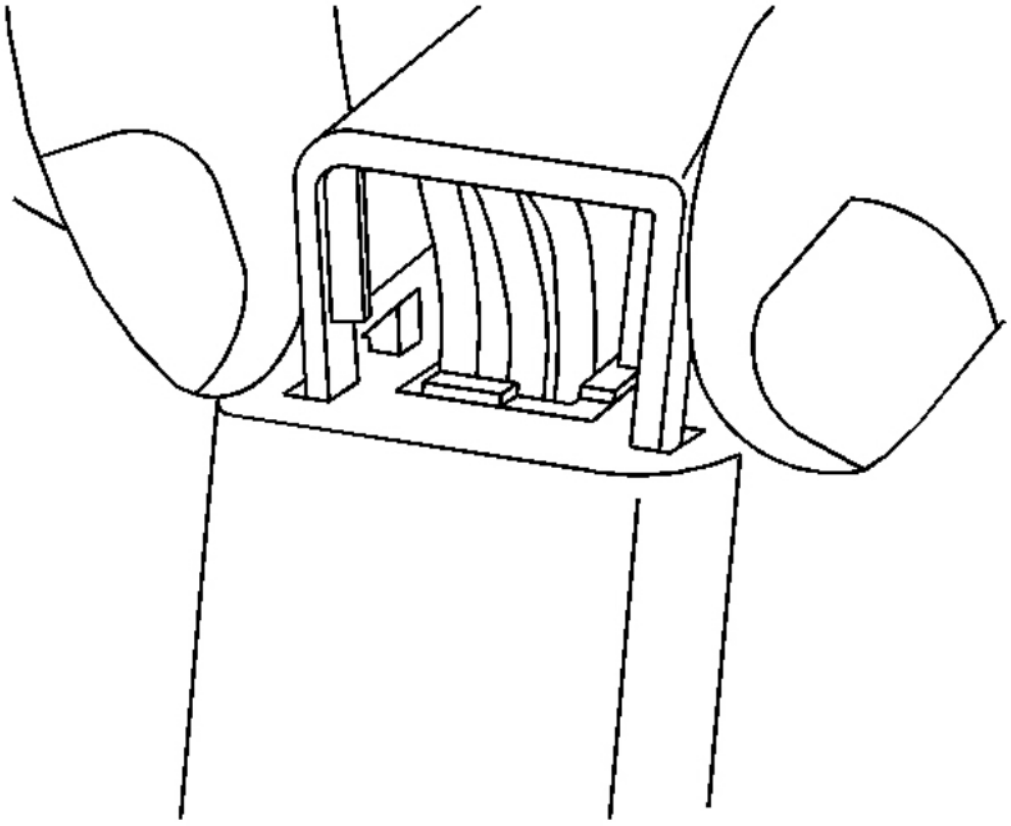


Fig. 66: Unseating Locking Leg
Courtesy of GENERAL MOTORS CORP.

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

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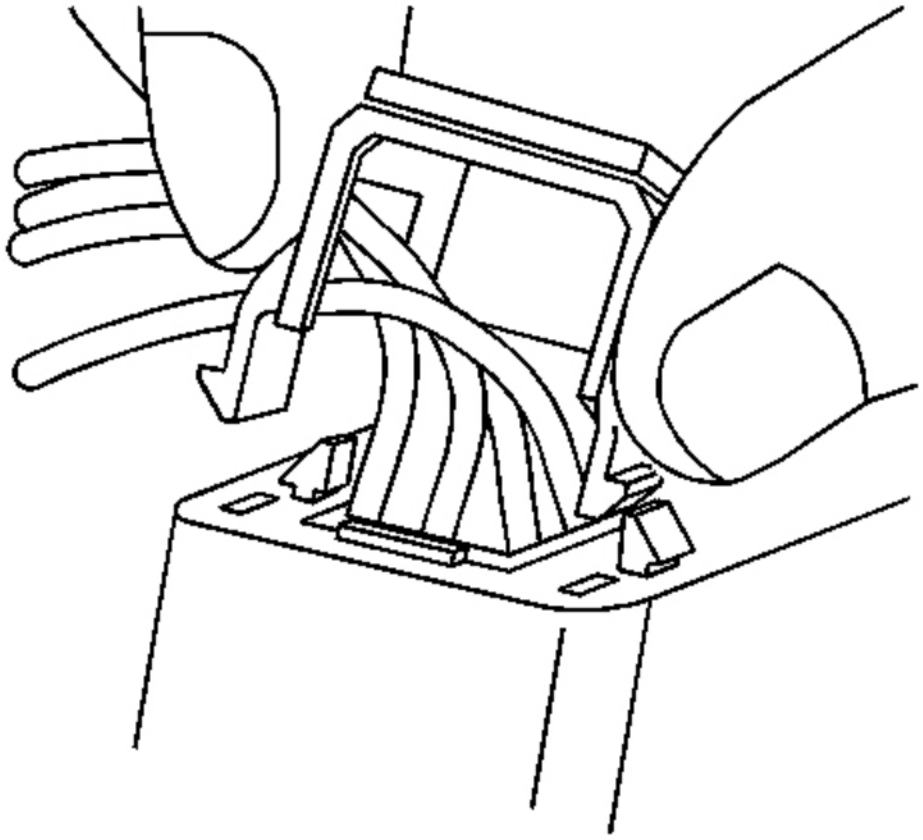


Fig. 67: Removing Wire Dress Cover
Courtesy of GENERAL MOTORS CORP.

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.

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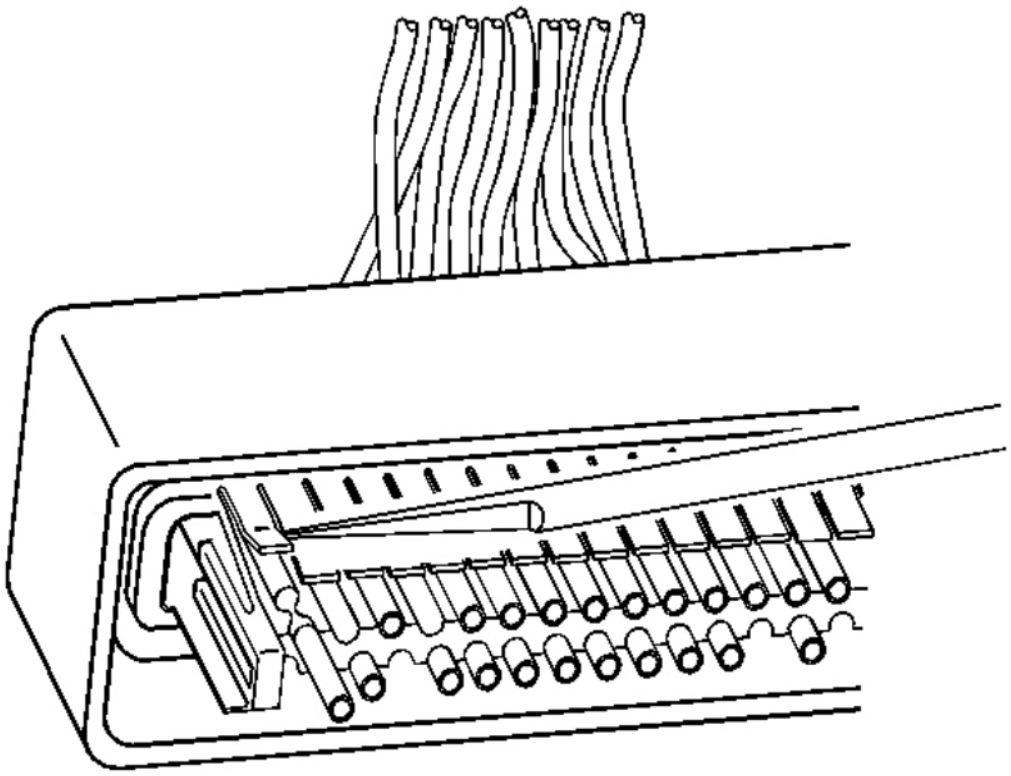


Fig. 68: Identifying Terminal Retaining Tab
Courtesy of GENERAL MOTORS CORP.

9. Use J 38125-12A (GM P/N 12094429) 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. See the release tool cross reference in the Reference Guide of the **J-38125** to ensure that the correct release tool is used. See **Special Tools** .
10. If the terminal is severely bent or damaged, it may be possible on some connectors to 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

The Micro-Pack 100W 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 38125-101 (W jaw) crimping tool was developed to crimp Micro-Pack 100W terminals. The J 38125-101 (W jaw) crimping tool has a terminal holding block that will hold the terminal in place while the terminal is being

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crimped. After the terminal is removed from the connector perform the following procedure in order to repair Micro-Pack 100 terminals.

1. Cut the wire as close to the terminal as possible.

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 gage wire to the existing wire, then crimp the new terminal on the added wire.

2. Strip 5 mm (3/16 in) of insulation from the wire.

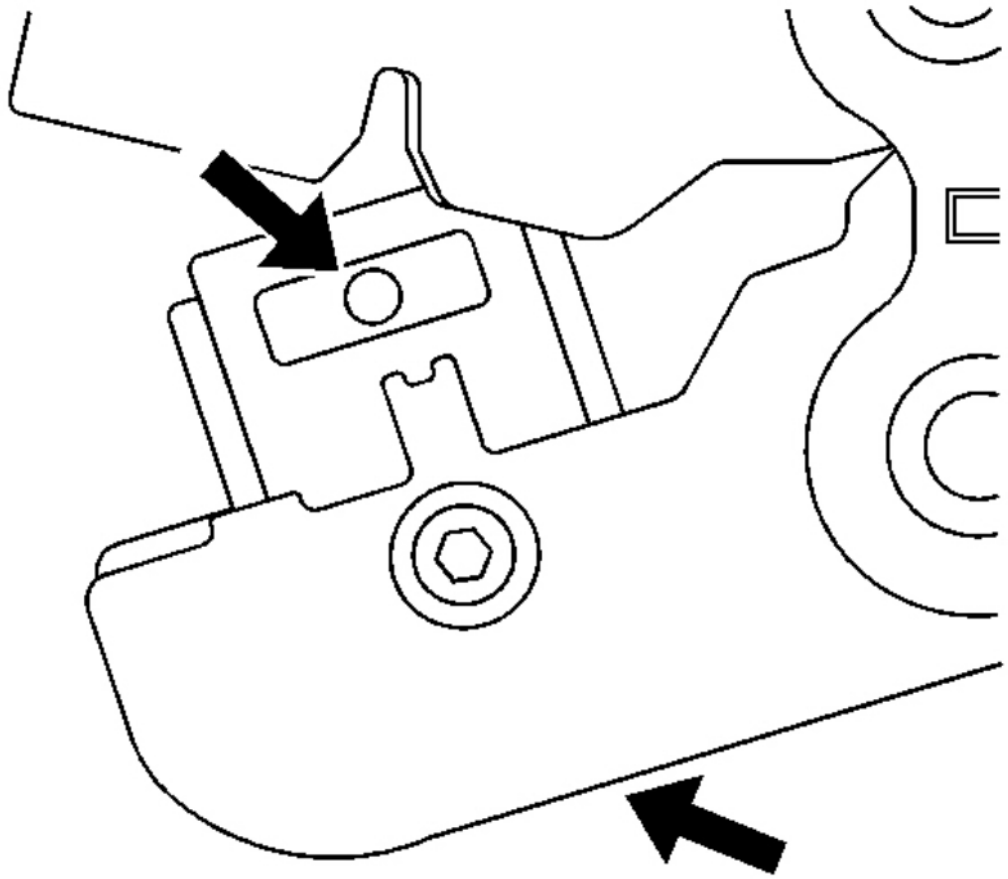


Fig. 69: Identifying Crimping Tool Spring Loaded Locator
Courtesy of GENERAL MOTORS CORP.

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3. Depress the spring loaded locator of the J 38125-101 (W jaw) crimping tool until the terminal holder is completely visible.

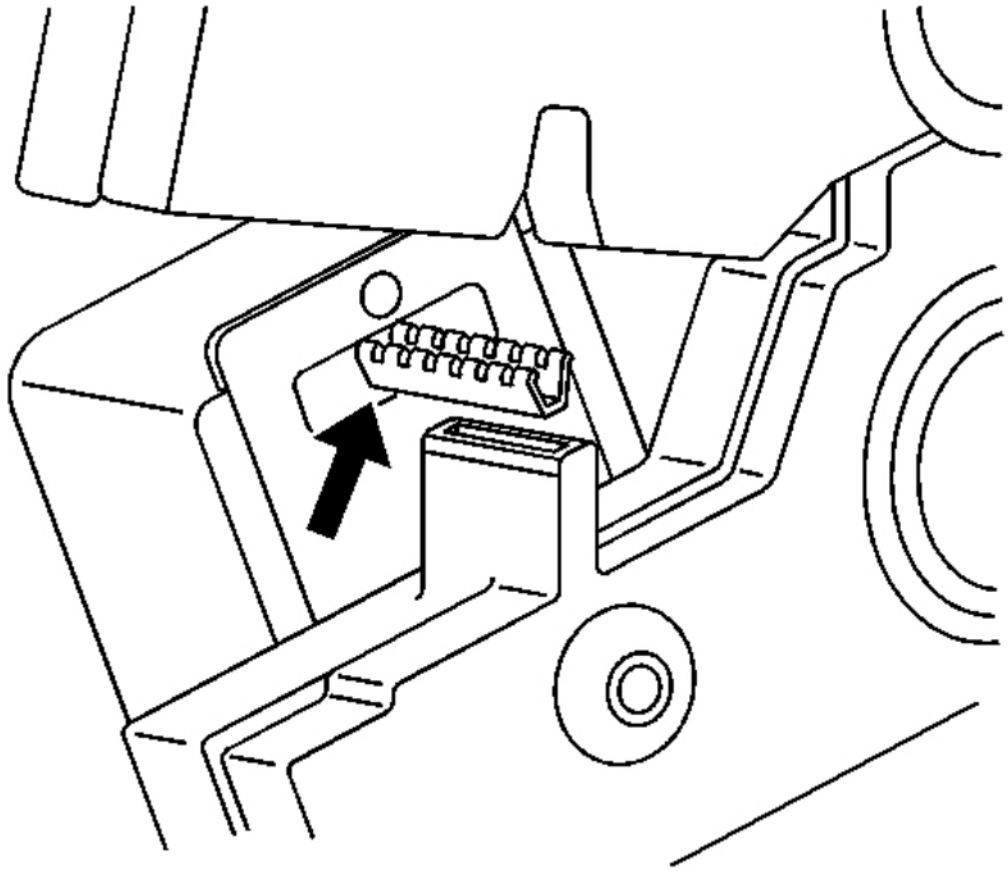


Fig. 70: Locating Terminal In Crimping Tool
Courtesy of GENERAL MOTORS CORP.

4. Insert the terminal into the crimp tool until the core wings are flush with the anvil on the crimp tool. Be sure that the wings are pointed toward the crimp tool former and release the spring locator. The locator will hold the terminal in place. Inspect the alignment of the terminal wings with the crimp tool former. If the terminal wings are wider than the crimp tool former, remove the terminal and bend the terminal wings in slightly.
5. Place stripped wire into terminal.
6. Crimp the new terminal to the wire. If a jam occurs, press the emergency release to open applicator.

TERMINAL REPLACEMENT PROCEDURE

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After the terminal is crimped to the wire perform the following procedure in order to replace Micro-Pack 100 terminals.

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. Ensure that the terminal is locked in place by gently pulling on the wire.
3. To assemble the connector, reverse the Terminal Removal Procedure.

DELPHI CONNECTORS (PULL TO SEAT)

TOOLS REQUIRED

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

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:

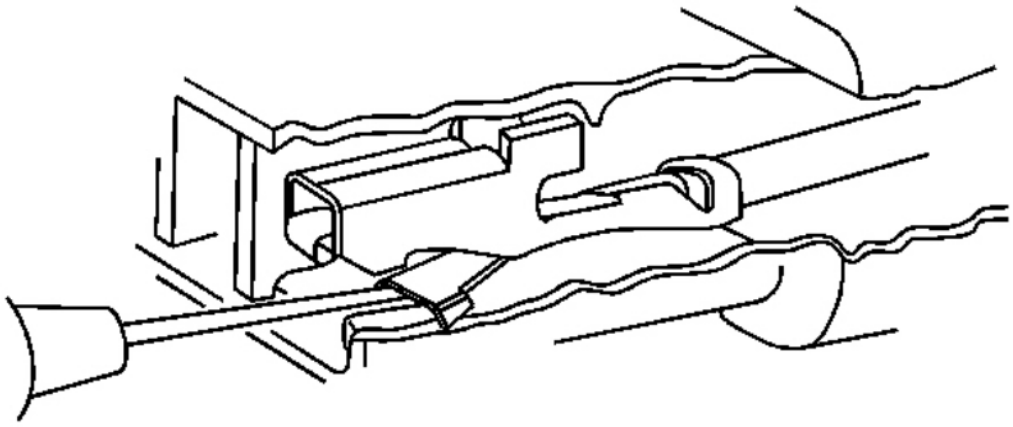


Fig. 71: Inserting Pick Into Connector Body
Courtesy of GENERAL MOTORS CORP.

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.

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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.

DELPHI CONNECTORS (PUSH TO SEAT)

TOOLS REQUIRED

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

TERMINAL REMOVAL

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

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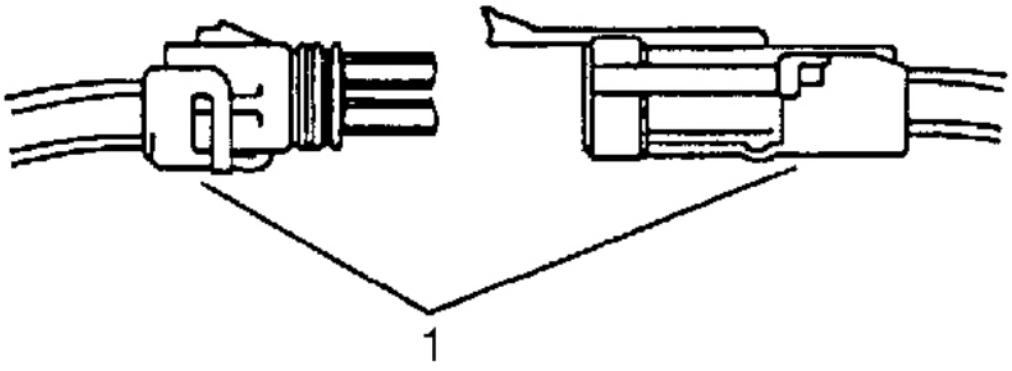


Fig. 72: View Of Connector Halves
Courtesy of GENERAL MOTORS CORP.

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).

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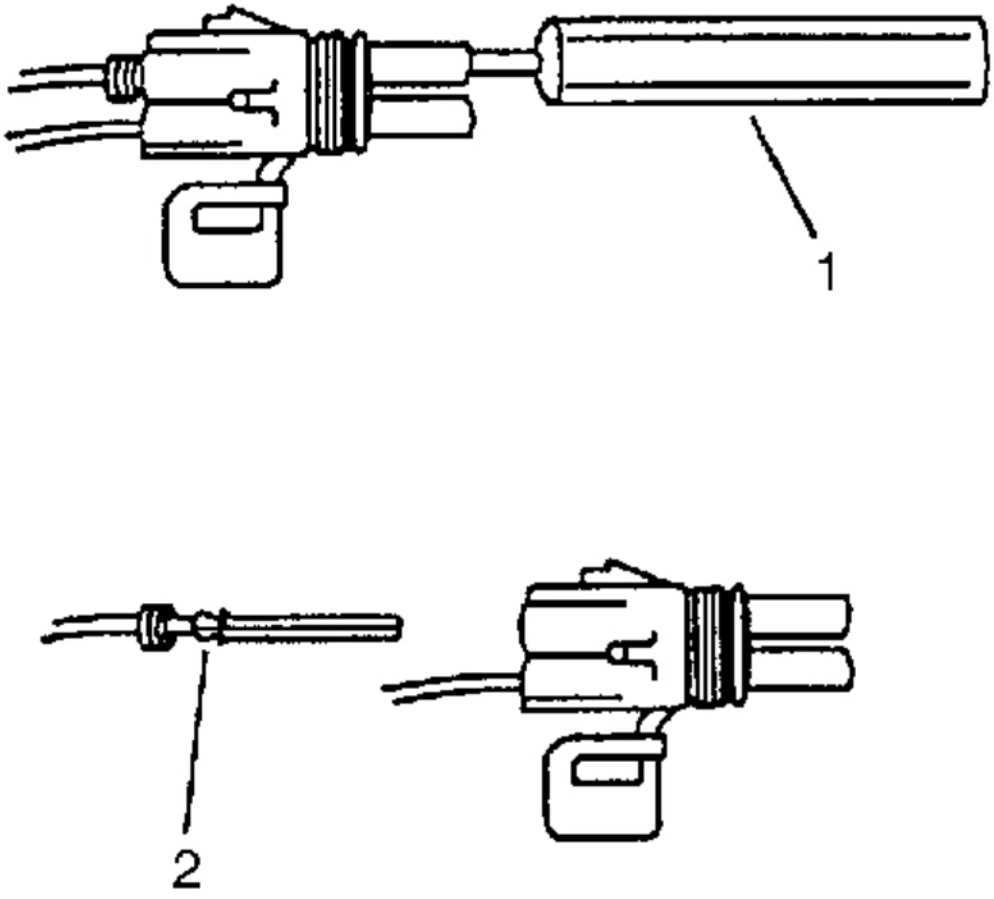


Fig. 73: View Of Removal Tool & Terminal
Courtesy of GENERAL MOTORS CORP.

3. Use the proper pick or removal tool (1) in order to release the terminal. See the release tool cross reference in the Reference Guide of the **J-38125** to ensure that the correct release tool is used. See **Special Tools** .
4. Gently pull the cable and the terminal (2) out of the back of the connector.

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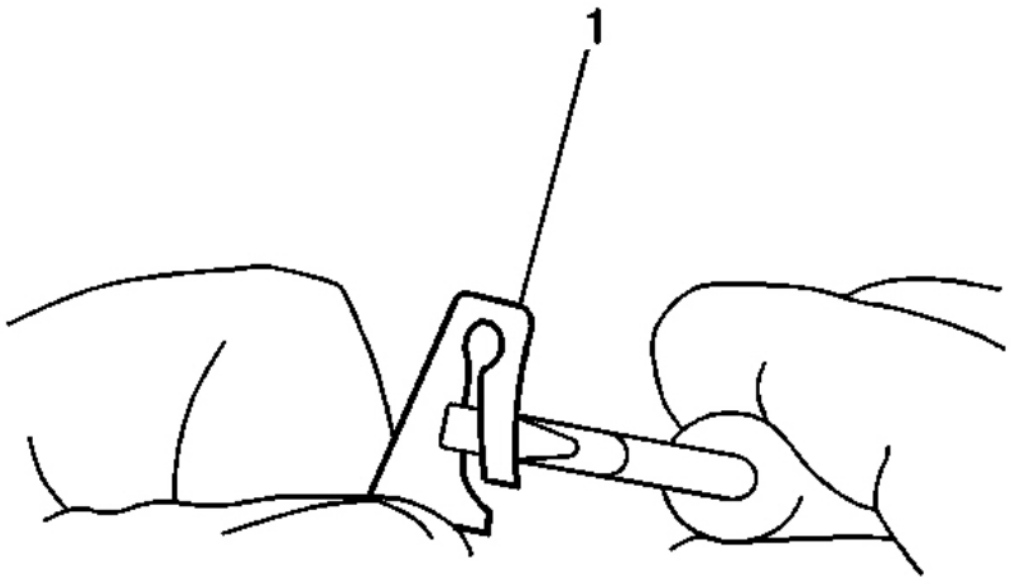


Fig. 74: Identifying Locking Device
Courtesy of GENERAL MOTORS CORP.

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**.

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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.

DELPHI CONNECTORS (WEATHER PACK)

TOOLS REQUIRED

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

The following is the proper procedure for the repair of Weather Pack® Connectors.

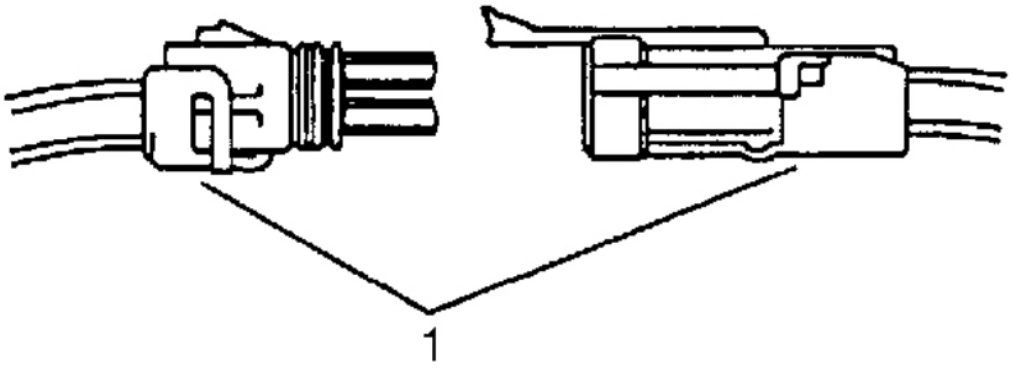


Fig. 75: View Of Connector Halves
Courtesy of GENERAL MOTORS CORP.

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.

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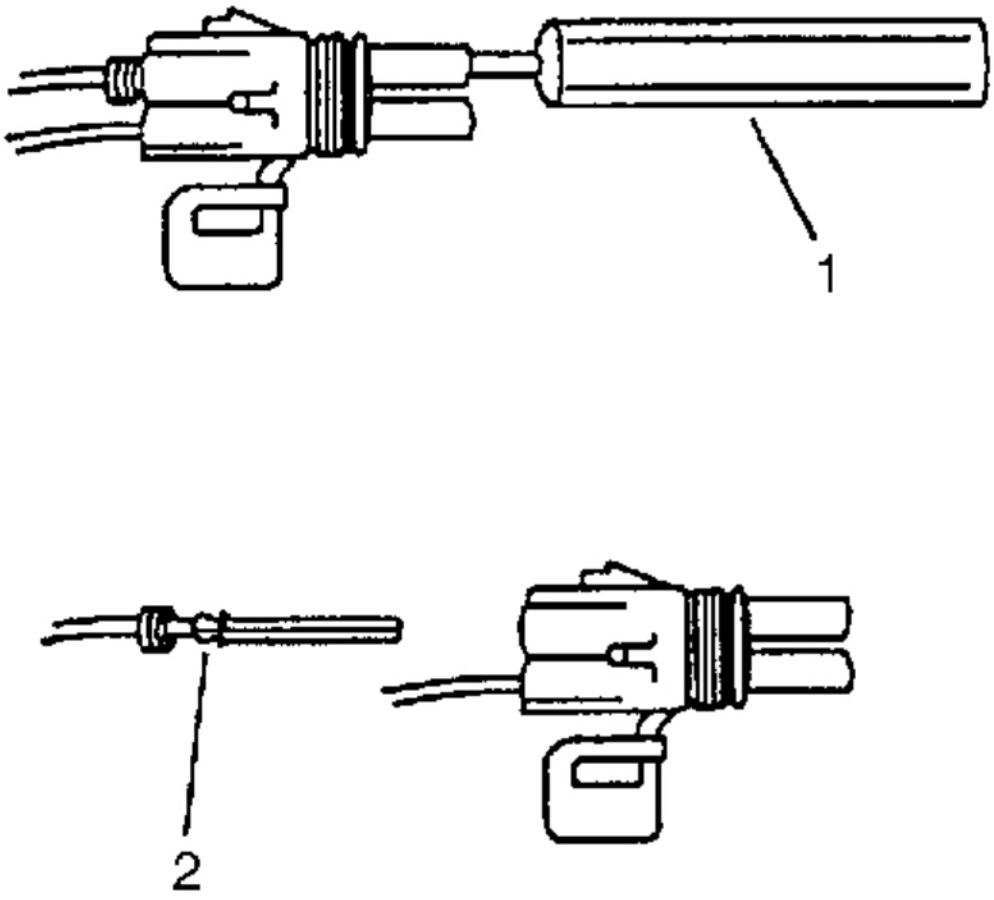


Fig. 76: View Of Removal Tool & Terminal
Courtesy of GENERAL MOTORS CORP.

4. Insert the Weather Pack® terminal removal tool J 38125-10A (GM P/N 12014012-1) 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.

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

DELPHI CONNECTORS (12-WAY)

TOOLS REQUIRED

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

REMOVAL PROCEDURE

Follow the steps below in order to remove terminals from the connector.

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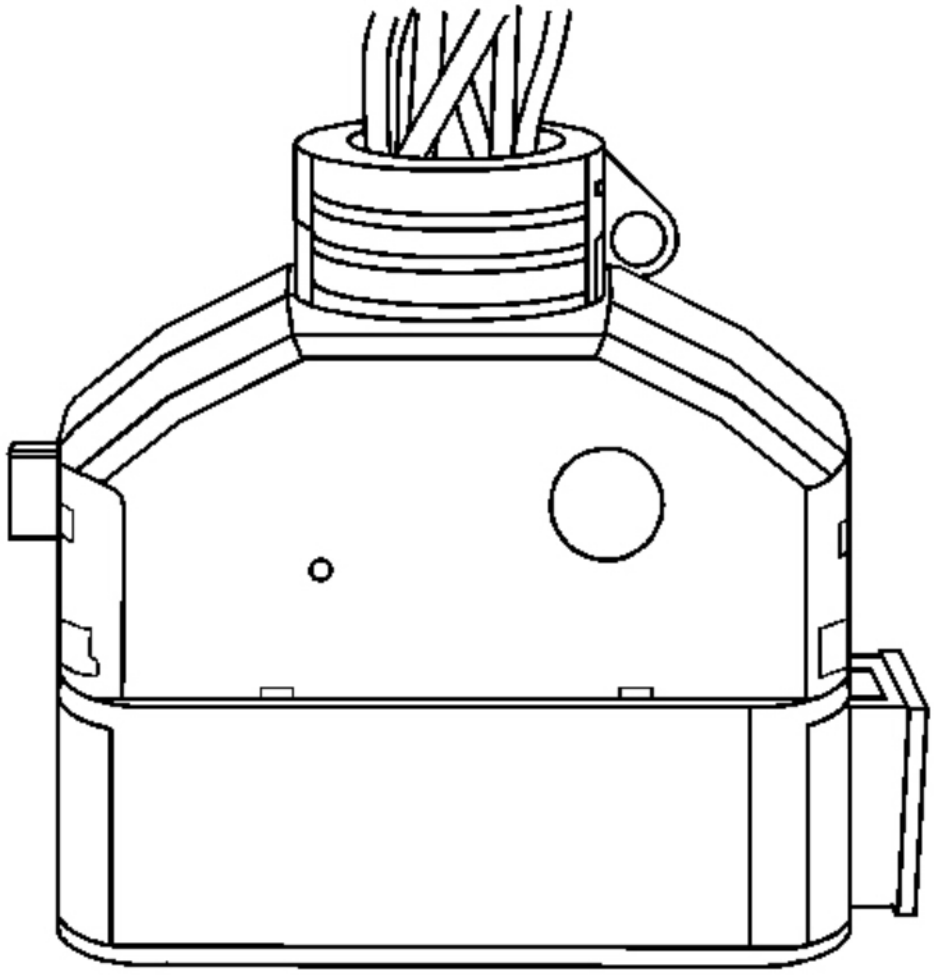


Fig. 77: Identifying Lever Lock
Courtesy of GENERAL MOTORS CORP.

1. Locate the lever lock on the wire dress cover. Remove the connector position assurance (CPA) and slide the lever lock away from the connector body.
2. Disconnect the connector from the component.

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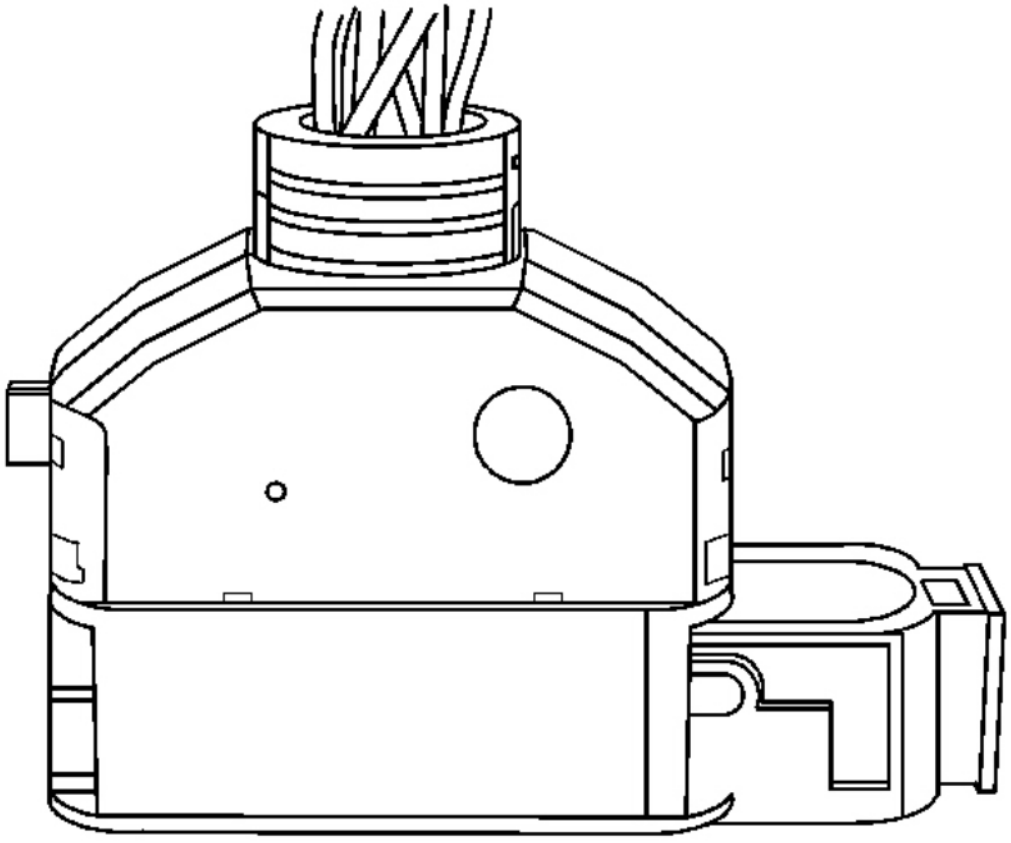


Fig. 78: Lever Lock Slid Away From Connector Body
Courtesy of GENERAL MOTORS CORP.

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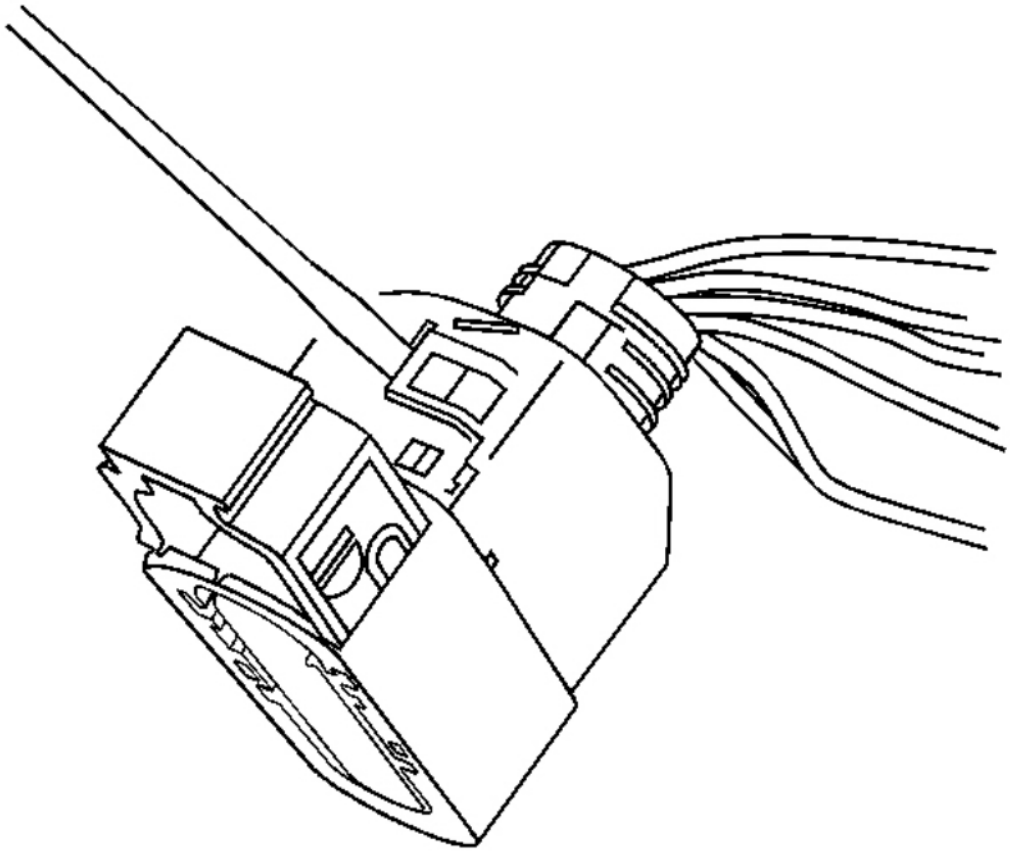


Fig. 79: Identifying Lower Wire Dress Cover Locking Tab
Courtesy of GENERAL MOTORS CORP.

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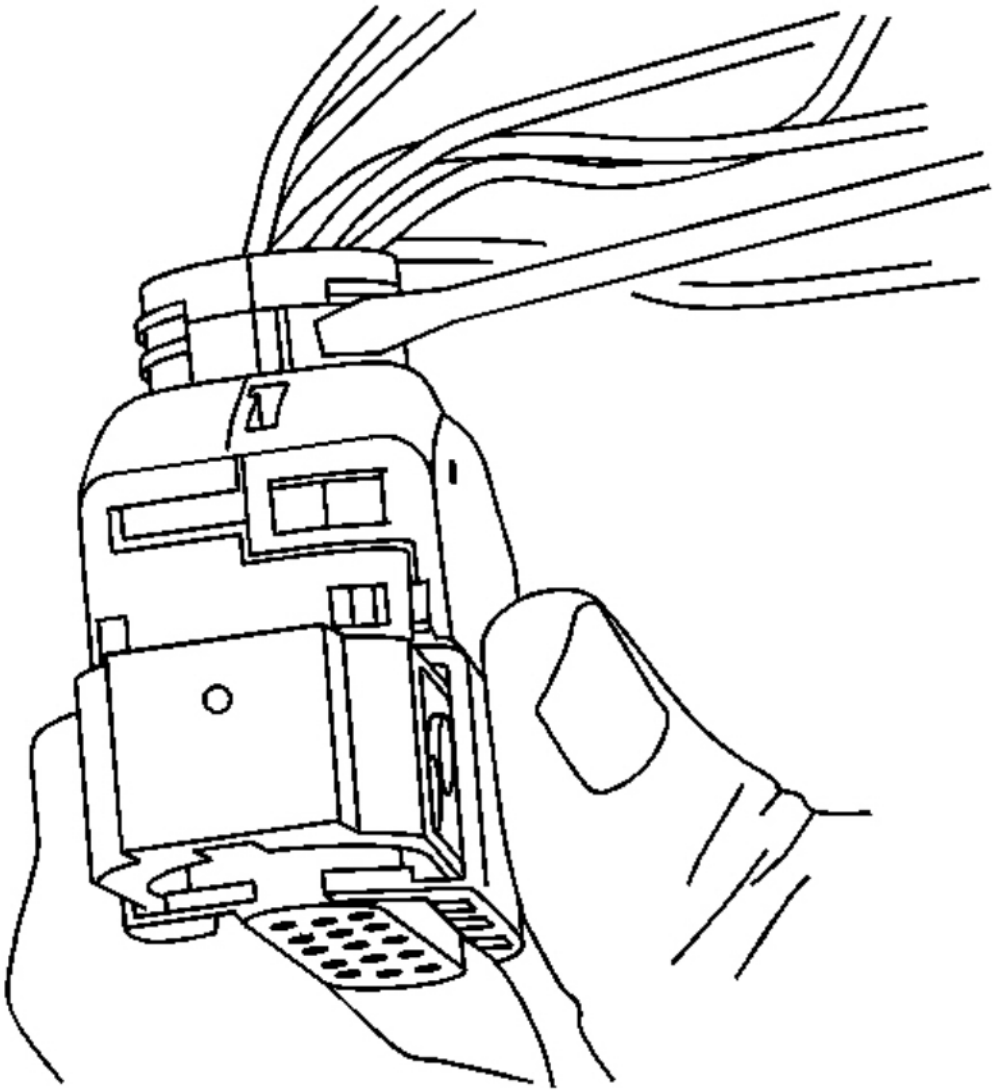


Fig. 80: Identifying Upper Wire Dress Cover Locking Tab
Courtesy of GENERAL MOTORS CORP.

3. Locate the dress cover locking tabs on the dress cover of the connector. Using a small flat-blade tool release all of the locking tabs.

   Release the lower wiredress cover locking tab.

   Release the upper wiredress cover locking tab.

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4. Once the locks are unlocked, lift the dress cover off.

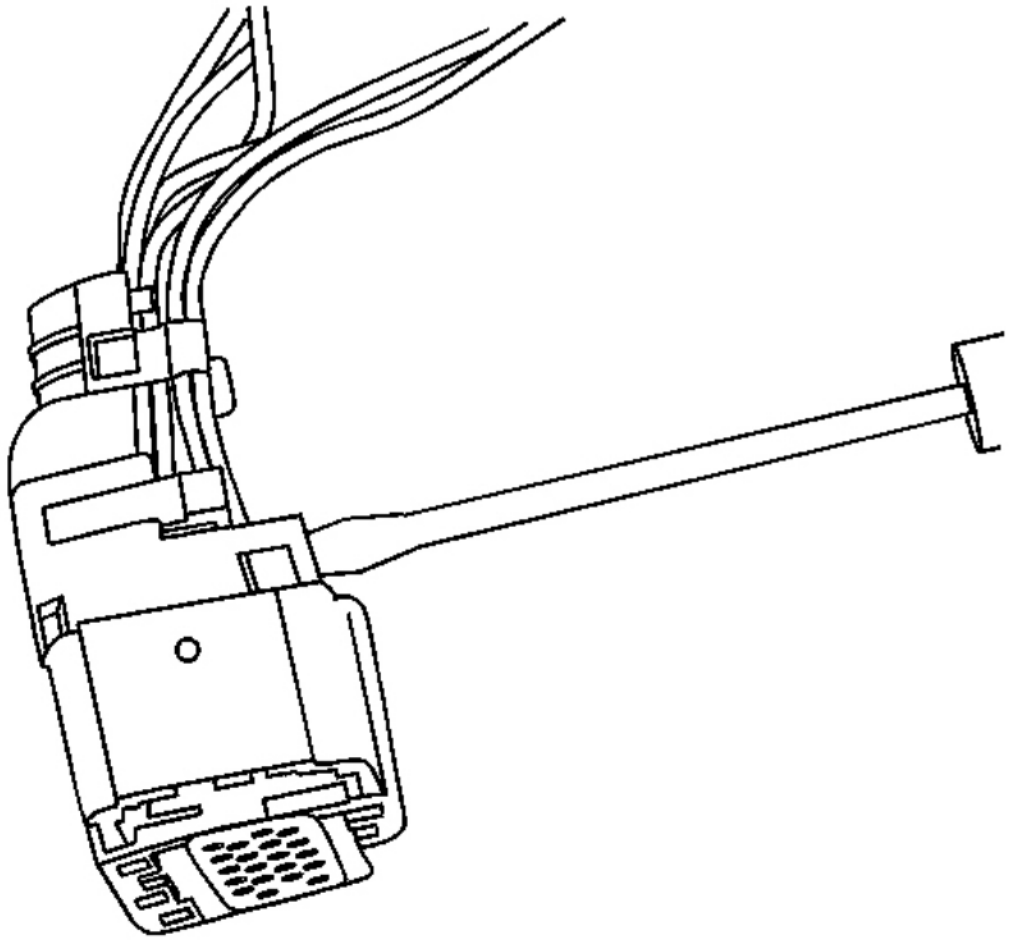


Fig. 81: Gently Prying TPA Out Of Connector
Courtesy of GENERAL MOTORS CORP.

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

5. Remove the TPA by inserting a small flat-blade tool into the locking tabs on both sides of the TPA. Gently pry the TPA out of the connector.

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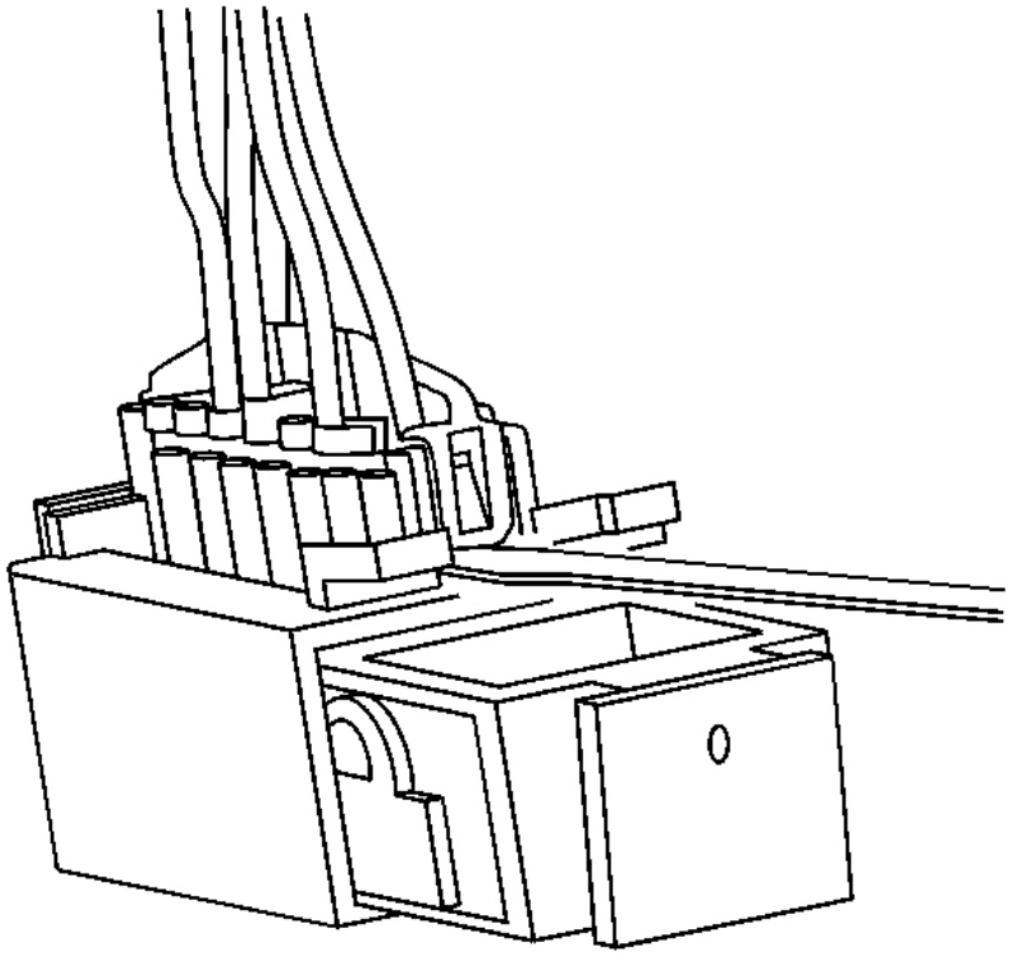


Fig. 82: Removing Nose Piece
Courtesy of GENERAL MOTORS CORP.

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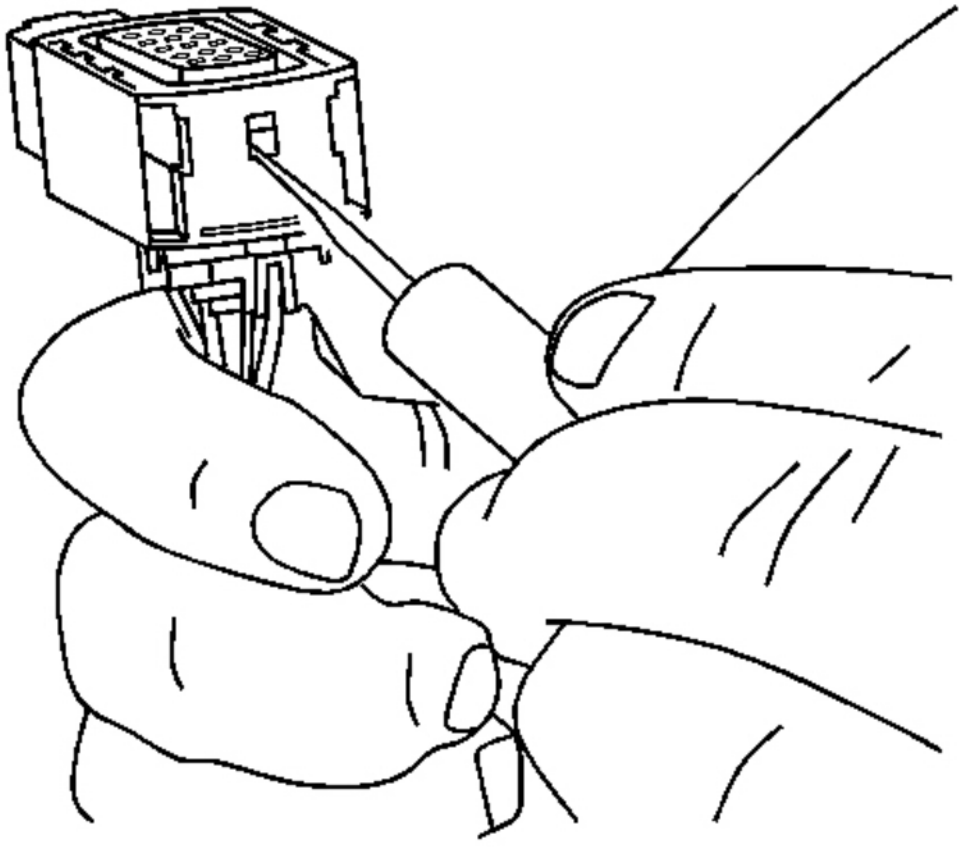


Fig. 83: Inserting J 38125-12A Into Terminal Release Cavity
Courtesy of GENERAL MOTORS CORP.

6. Remove the nose piece by inserting a small flat-blade tool into the locking tabs on both sides of the nose piece. Gently pry the nose piece out of the connector.

   Insert the J 38125-12A (GM P/N 12094429) tool to release the terminals by inserting the tool into the terminal release cavity. See the release tool cross reference in the Reference Guide of the J-38125 to ensure that the correct release tool is used.

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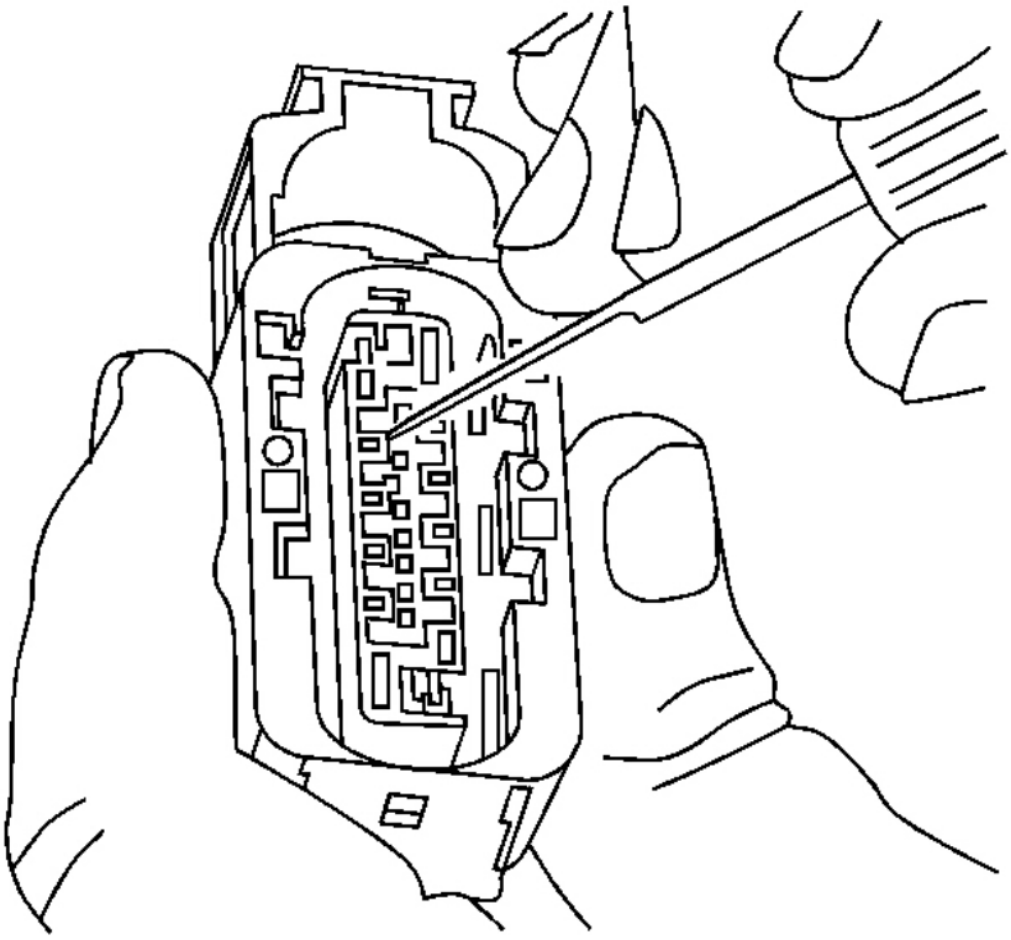


Fig. 84: Pulling Wire Out Of Back Of Connector
Courtesy of GENERAL MOTORS CORP.

7. 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.

REPAIR PROCEDURE

Use the appropriate terminal and follow the instructions in the **J-38125** J-38125. See **Special Tools** .

Location of the terminal in the repair tray and the proper crimp tool can be found in the appropriate connector end view.

FCI CONNECTORS

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TOOLS REQUIRED

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

REMOVAL PROCEDURE

Follow the steps below in order to remove terminals from the connector.

1. Slide the lever lock forward while pressing down on the lever lock release tab.

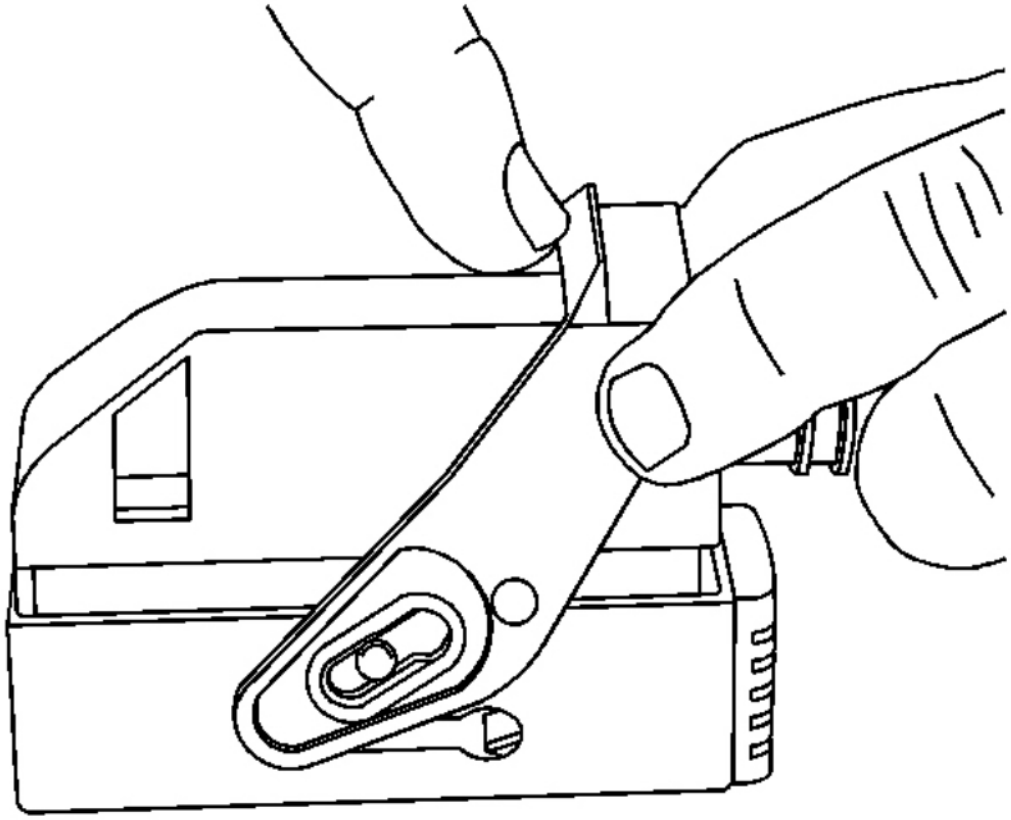


Fig. 85: Identifying Release Tab
Courtesy of GENERAL MOTORS CORP.

The release tab is located on the top of the wiredress cover.

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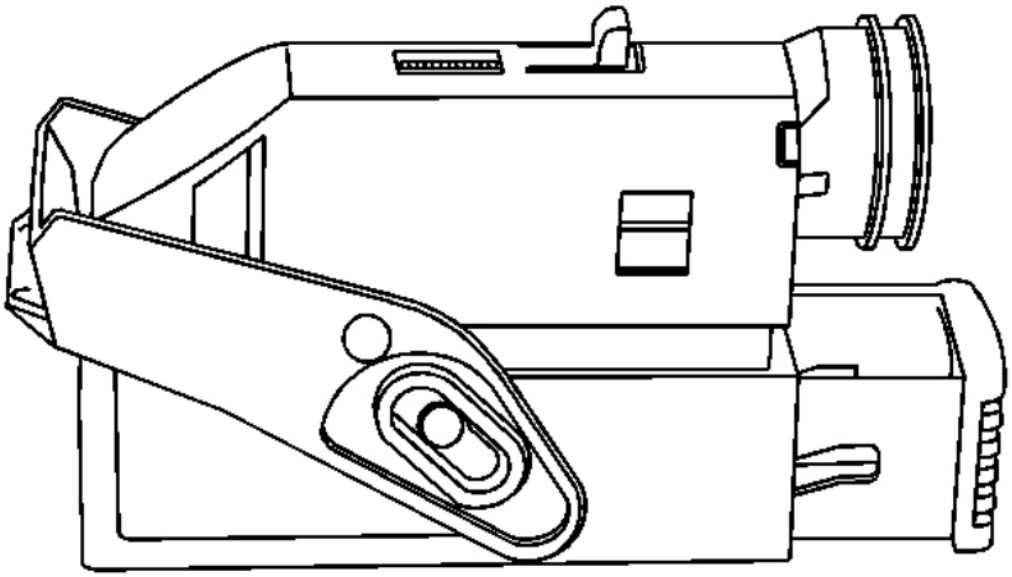


Fig. 86: View Of Connector In Released Position
Courtesy of GENERAL MOTORS CORP.

View of connector in released position.

2. Disconnect the connector from the component.
3. Locate the dress cover locking tabs at the corners of the dress cover. Use a small flat-blade tool to release the locking tabs and remove the dress cover.

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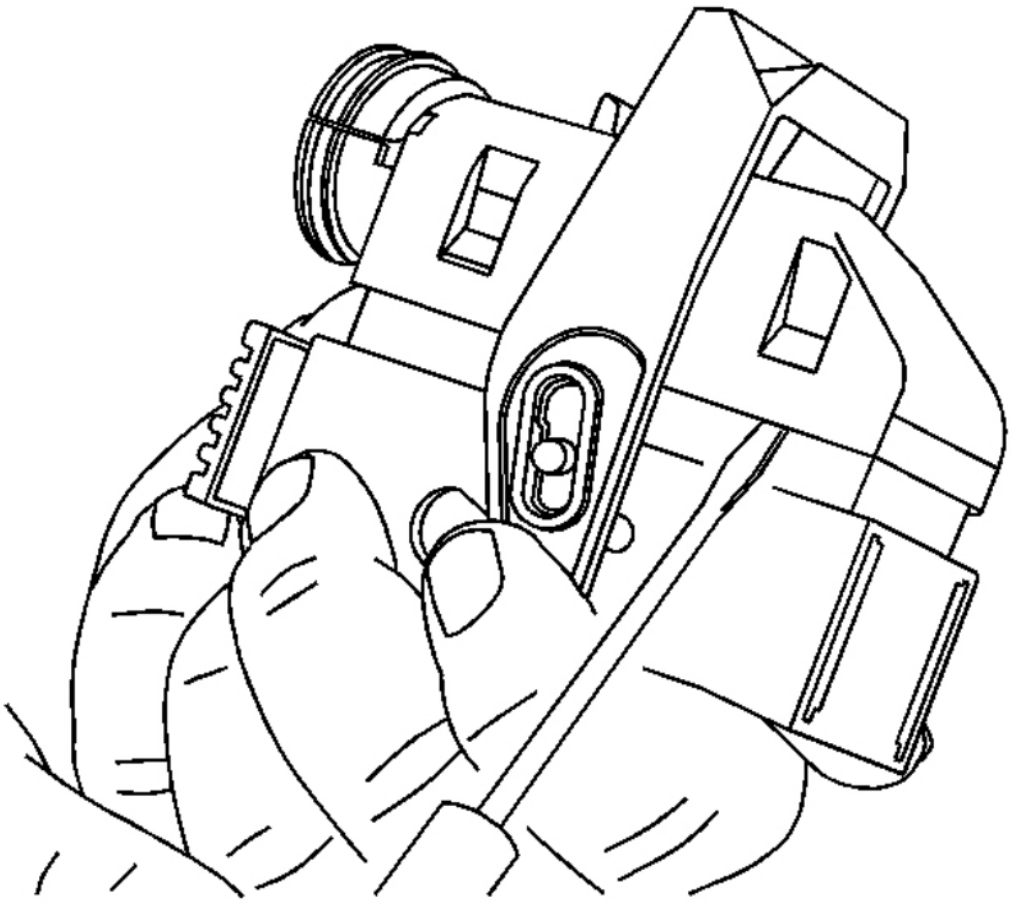


Fig. 87: Sliding Terminal Position Assurance (TPA) Up One Notch
Courtesy of GENERAL MOTORS CORP.

4. Use a small flat-blade tool to slide the terminal position assurance (TPA) up one notch on both ends of the connector. The TPA is located underneath the wire dress cover.

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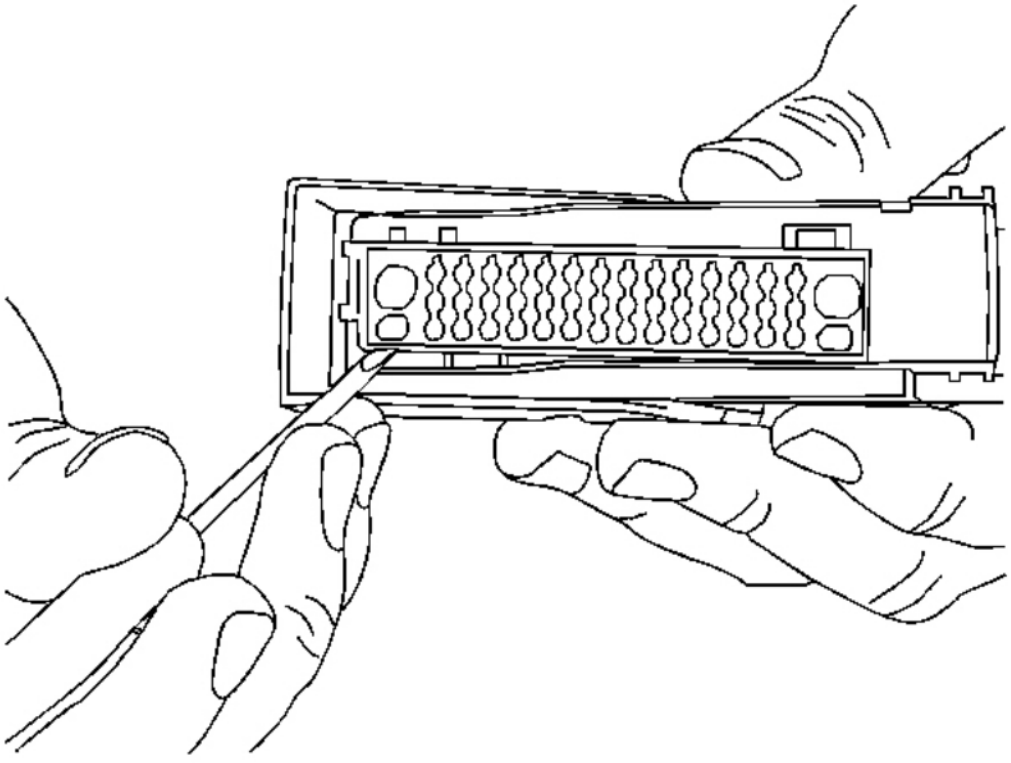


Fig. 88: Releasing Terminals
Courtesy of GENERAL MOTORS CORP.

For the larger terminals insert the J 38125-556 (GM P/N 12093647) tool to release the terminals by inserting the tool into the terminal release cavity. For the smaller terminals insert the J 38125-560 (GM P/N 15314260) tool to release the terminals by inserting the tool into the terminal release cavity. See the release tool cross reference in the Reference Guide of the**J-38125** J-38125 to ensure that the correct release tool is used. See **Special Tools** .

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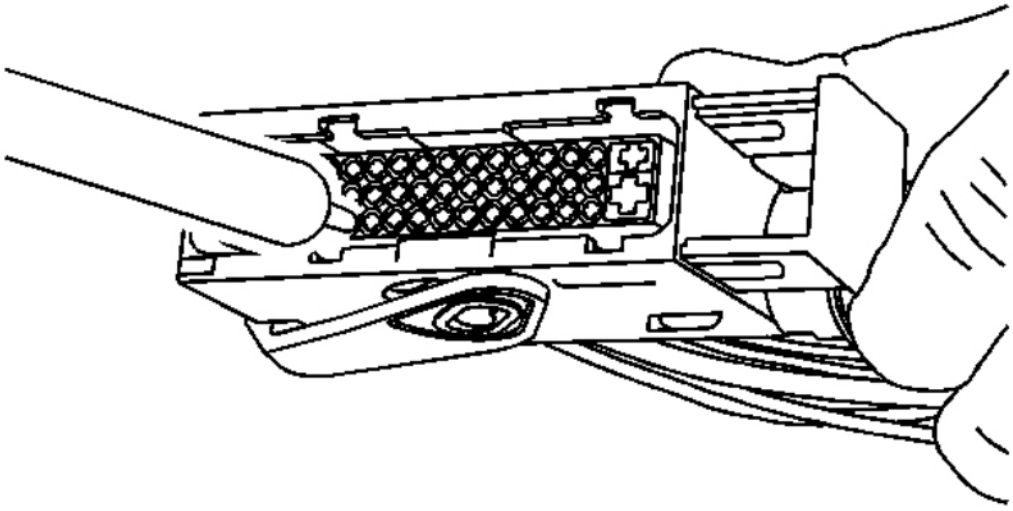


Fig. 89: Holding Removal Tool In Place, Gently Pull Wire Out Of Back Of Connector
Courtesy of GENERAL MOTORS CORP.

5. 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.

REPAIR PROCEDURE

Use the appropriate terminal and follow the instructions in the **J-38125** J-38125. See **Special Tools** .

Location of the terminal in the repair tray and the proper crimp tool can be found in the appropriate connector end view.

KOSTEL CONNECTORS

TOOLS REQUIRED

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

REMOVAL PROCEDURE

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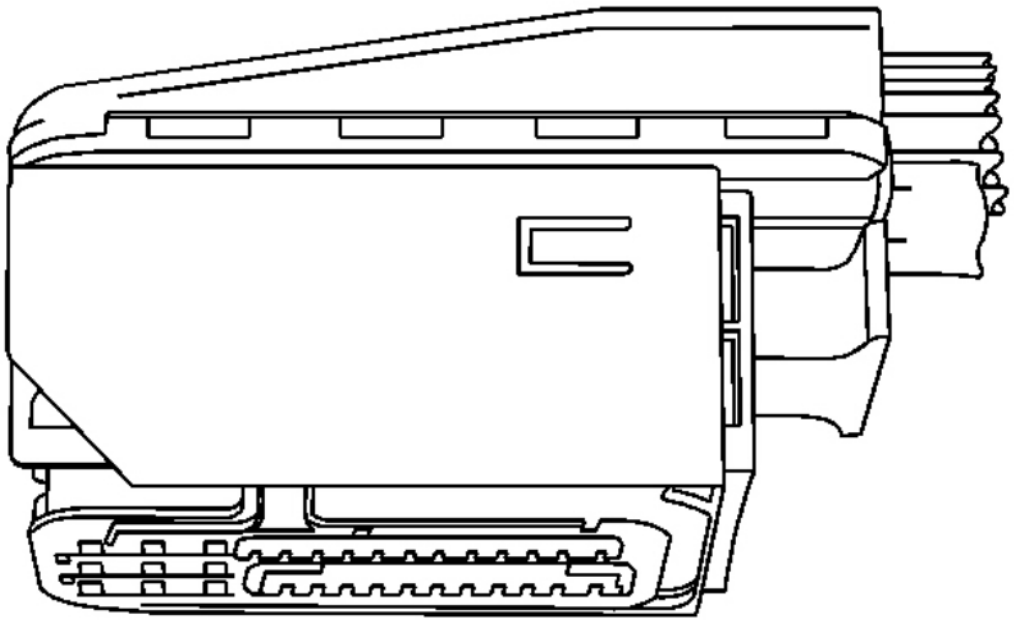


Fig. 90: View Of Typical Kostel Connector
Courtesy of GENERAL MOTORS CORP.

View of typical connector.

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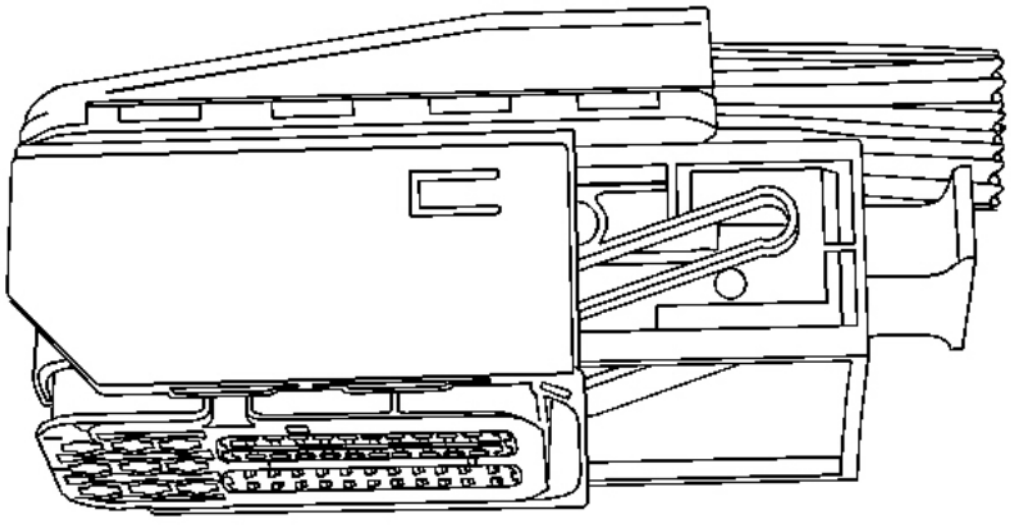


Fig. 91: View Of Connector In Released Position
Courtesy of GENERAL MOTORS CORP.

View of connector in released position.

1. Locate the assist lever at the back of the connector. Move the assist lever to the rear position.
2. Disconnect the connector from the component.

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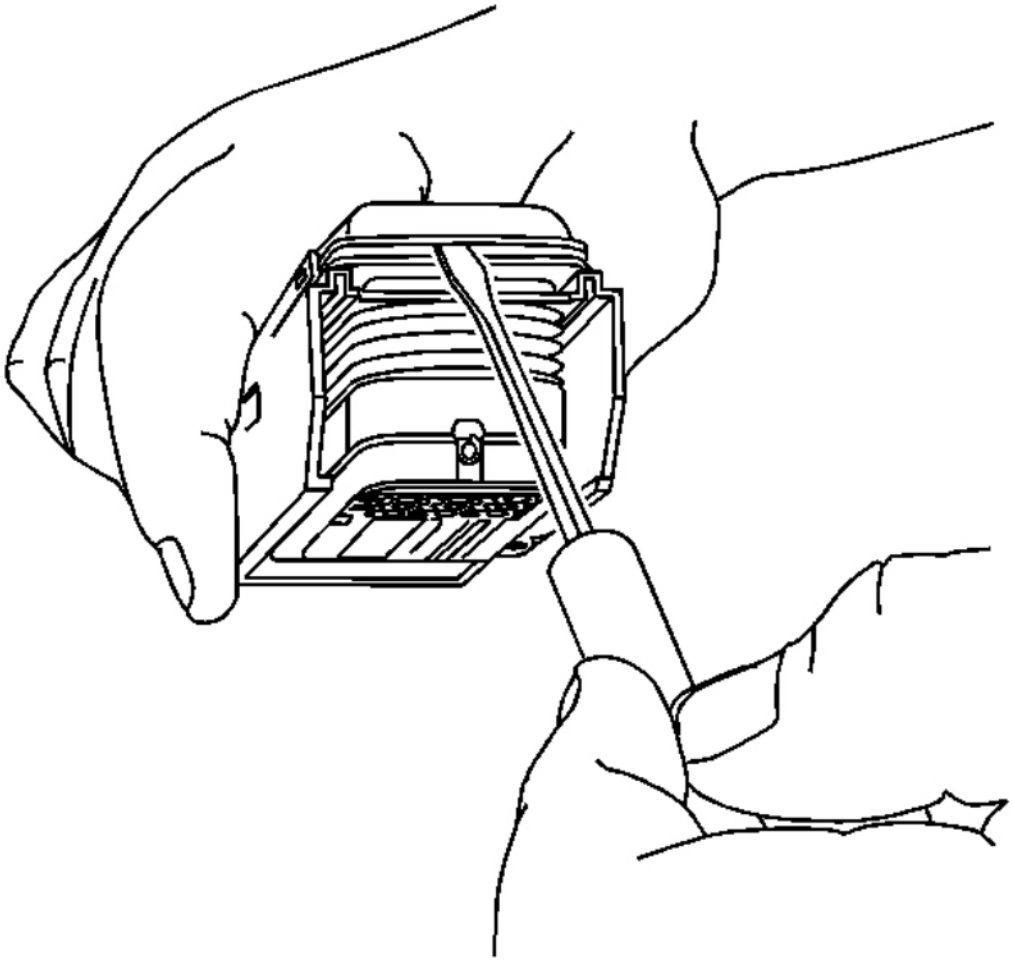


Fig. 92: Using Small Flat-Blade Tool To Remove Dress Cover
Courtesy of GENERAL MOTORS CORP.

3. Use a small flat-blade tool to remove the dress cover.

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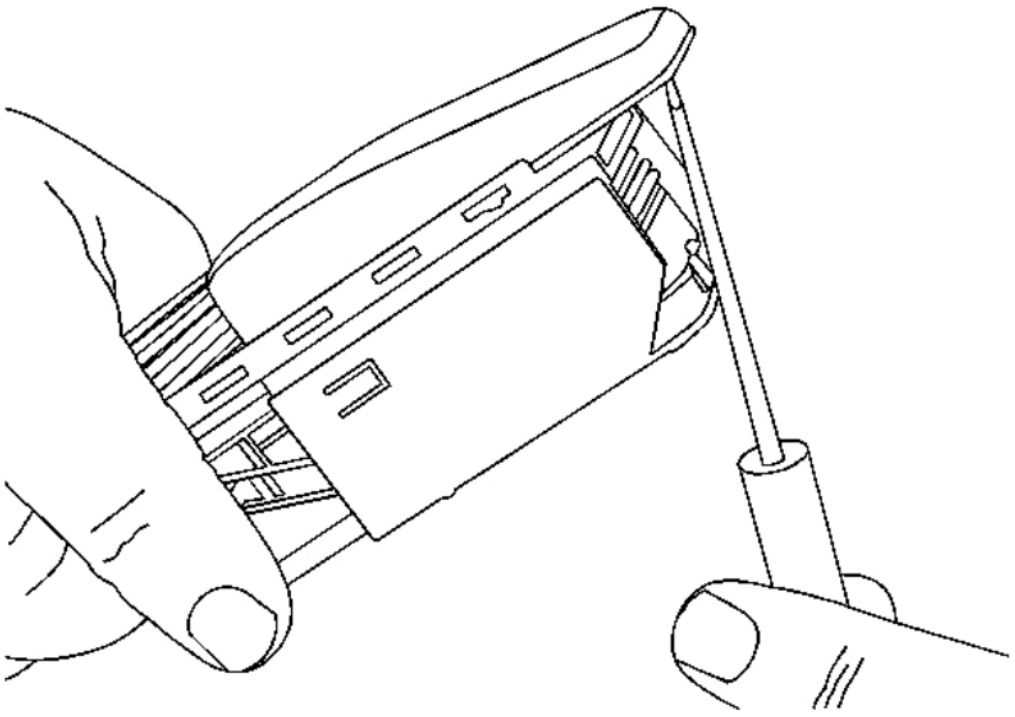


Fig. 93: Sliding Dress Cover Forward & Off Of Connector
Courtesy of GENERAL MOTORS CORP.

4. Slide the dress cover forward and off of the connector.

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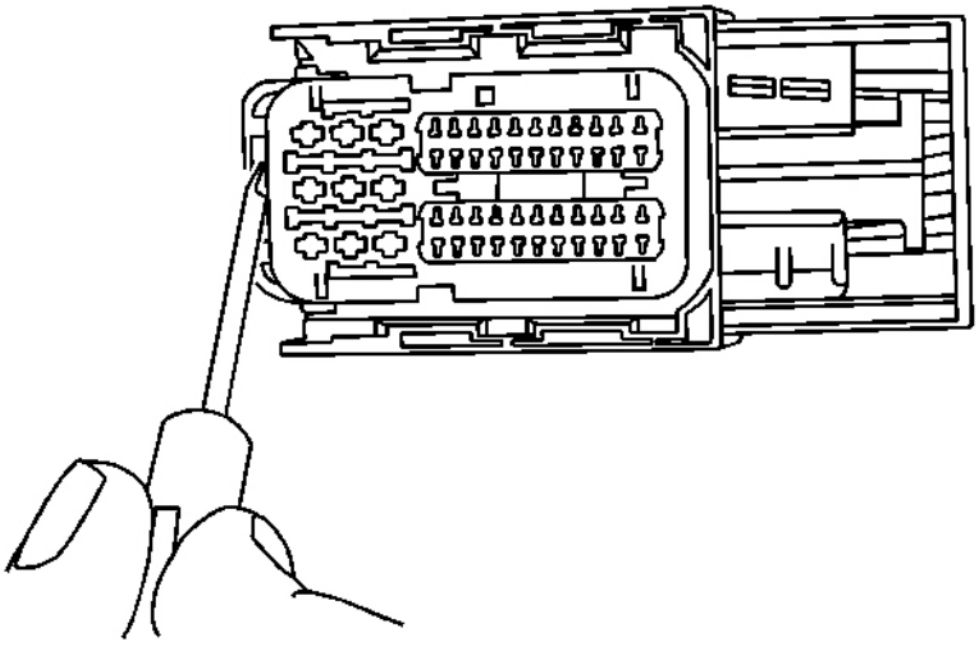


Fig. 94: Locating TPA In Front & Rear Of Connector
Courtesy of GENERAL MOTORS CORP.

5. The terminal positive assurance (TPA) is located in the front and rear of the connector.

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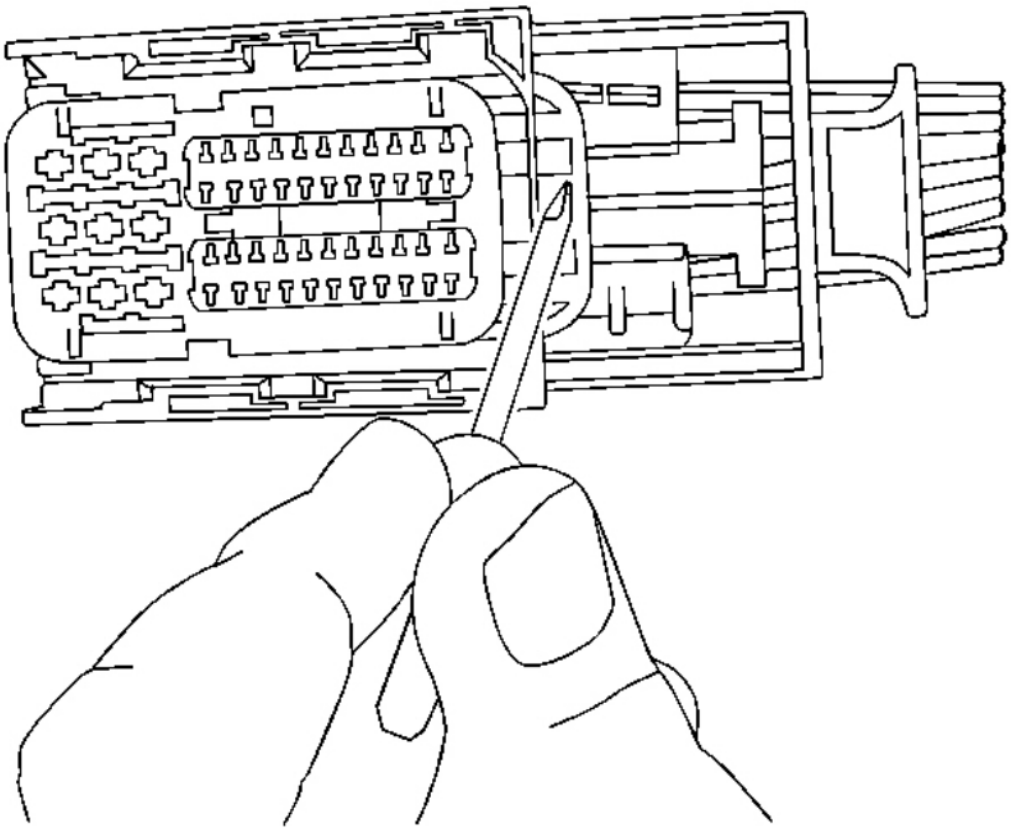


Fig. 95: Using Small Flat-Blade Tool To Remove Rear TPA
Courtesy of GENERAL MOTORS CORP.

6. Use a small flat-blade tool to remove the rear TPA from the connector.

IMPORTANT: The front TPA cannot be removed from the connector. Only move it to the release point.

7. Use a small flat-blade tool to move the front TPA to the release position.

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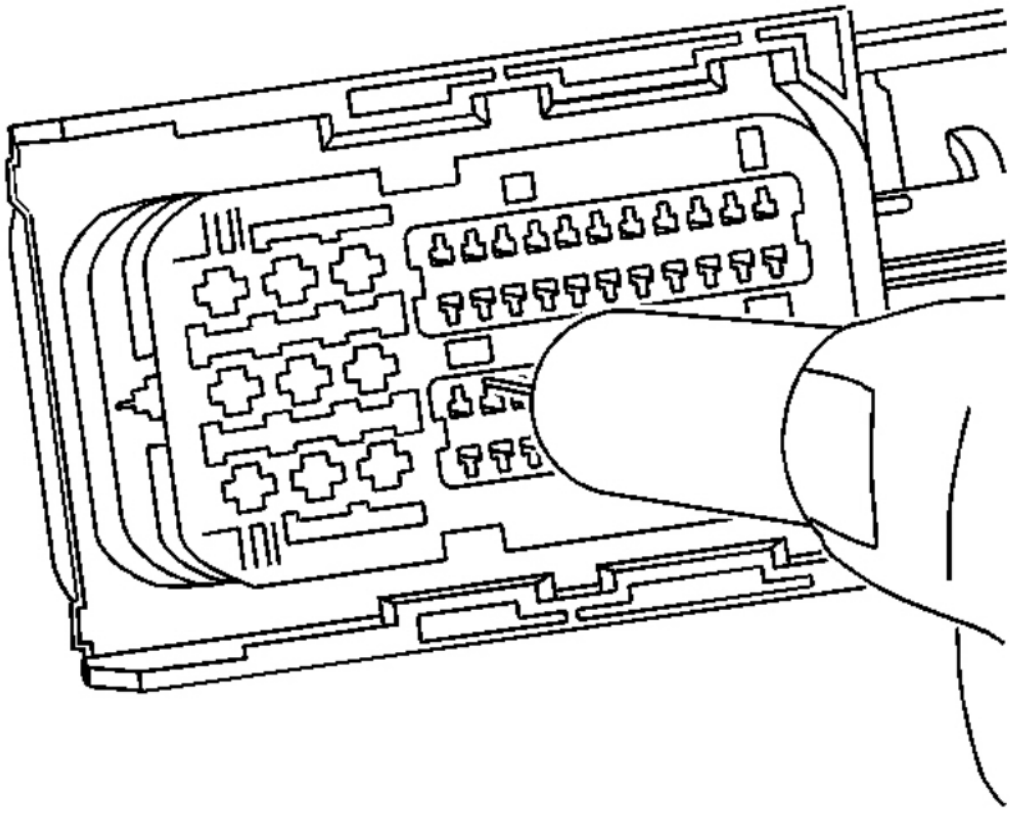


Fig. 96: Using J 38125-213 Or J 38125-560 To Release Terminals
Courtesy of GENERAL MOTORS CORP.

8. Use the J 38125-213 or the J 38125-560 (GM P/N 15314260) tool to release the terminals by inserting the tool into the terminal release cavity. See the release tool cross reference in the Reference Guide of the J-38125 to ensure that the correct release tool is used.
9. 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.

REPAIR PROCEDURE

Use the appropriate terminal and follow the instructions in the **J-38125** . See **Special Tools** .

Location of the terminal in the repair tray and the proper crimp tool can be found in the appropriate connector end view.

MOLEX CONNECTORS

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TOOLS REQUIRED

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

TERMINAL REMOVAL PROCEDURE

1. Locate the connector position assurance (CPA) on the top of the wire dress cover. Slide the CPA forward.

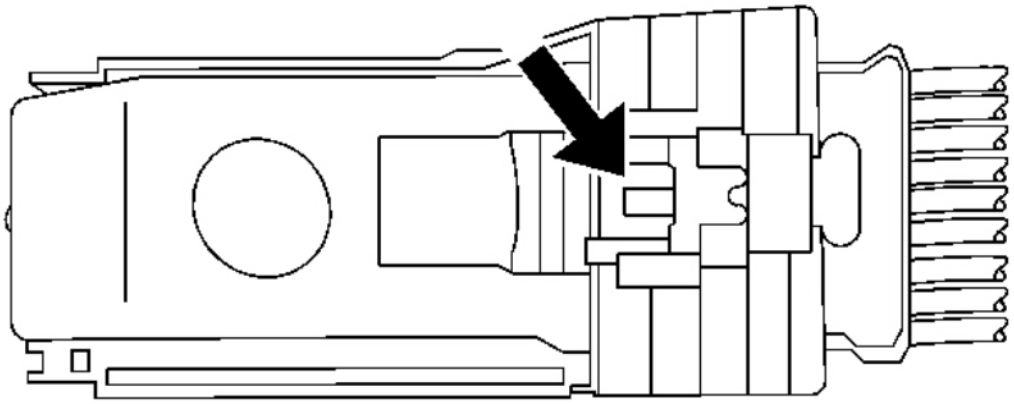


Fig. 97: Identifying Lever Lock Release Tab
Courtesy of GENERAL MOTORS CORP.

2. Slide the lever lock forward while pressing down on the lever lock release tab.

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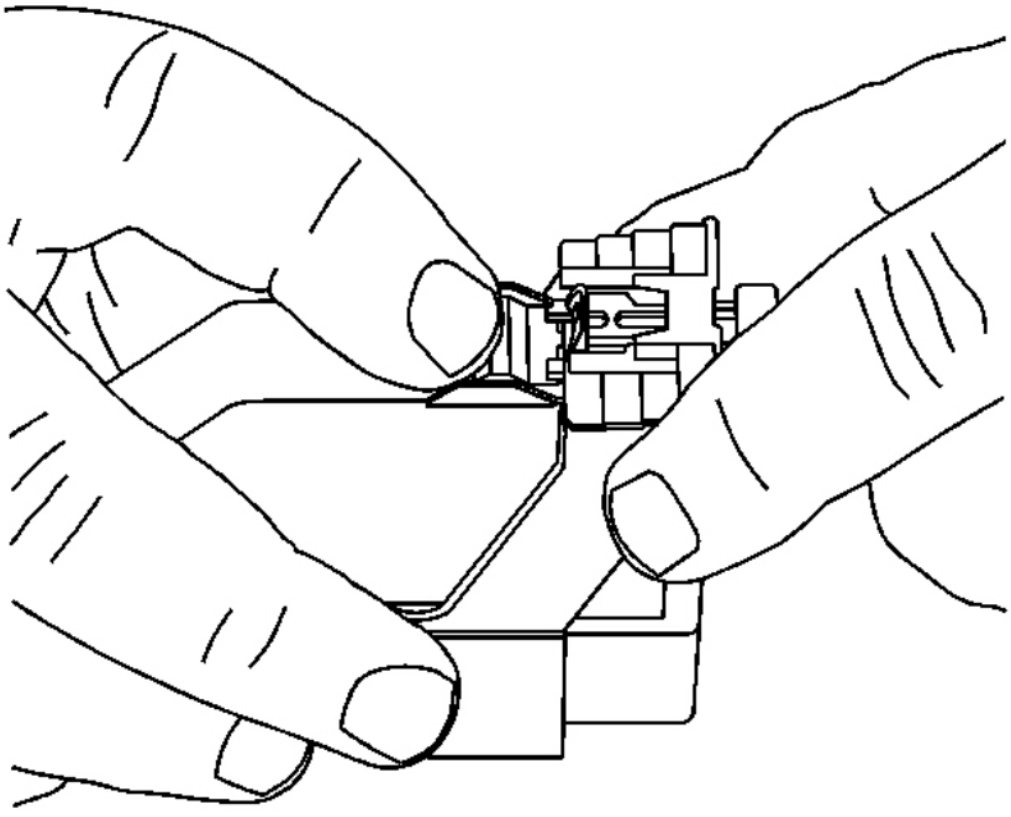


Fig. 98: View Of Lever In Full Forward Position
Courtesy of GENERAL MOTORS CORP.

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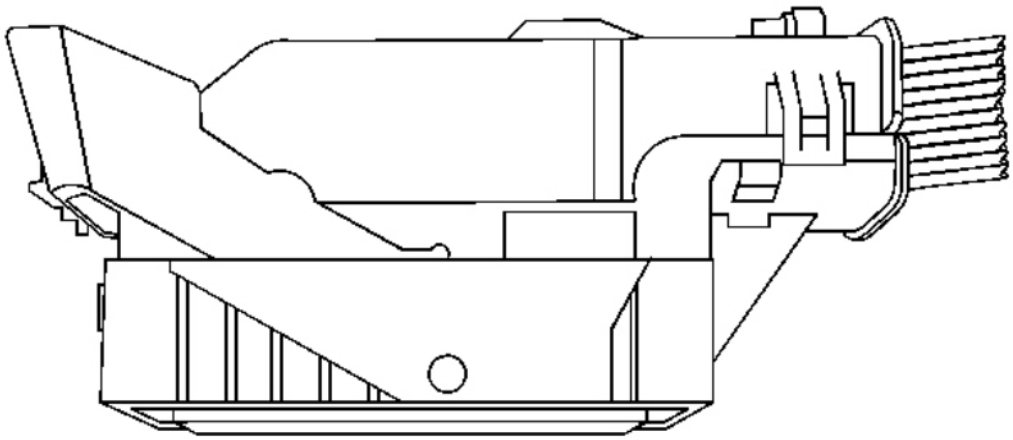


Fig. 99: View Of CPA Connector
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the connector from the component.

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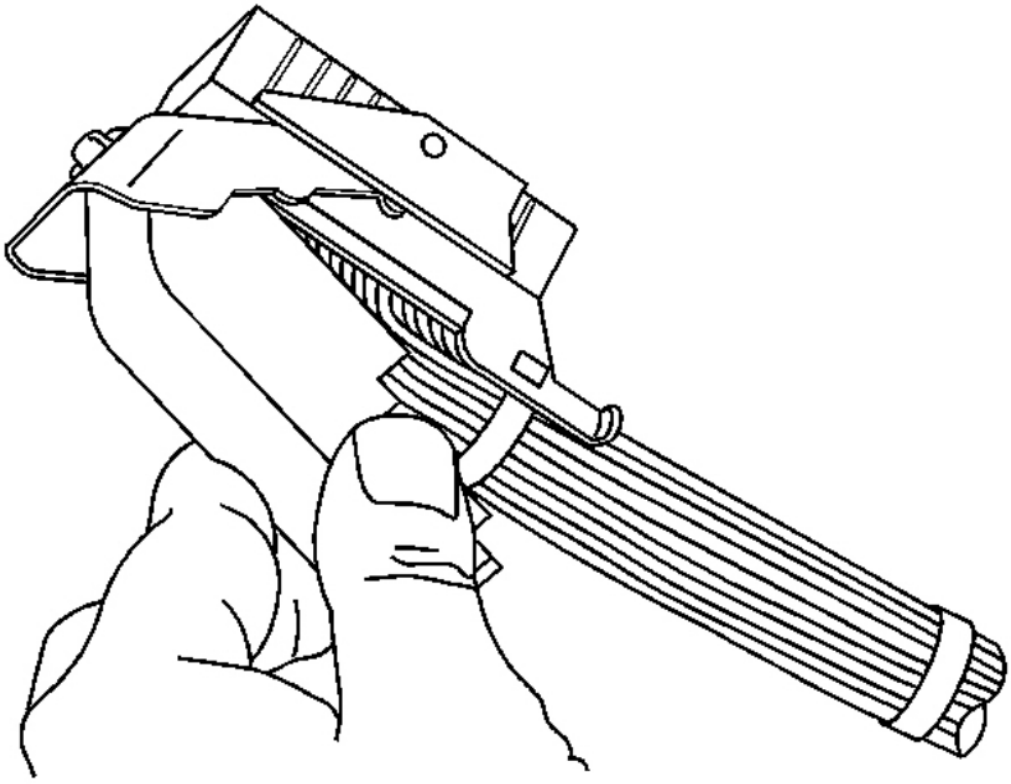


Fig. 100: View Of Dress Cover
Courtesy of GENERAL MOTORS CORP.

4. Remove the dress cover by using a flat bladed tool to release the dress cover locking tabs and lift up on the dress cover.
5. Cut the tie wrap that holds the wires to the connector body.

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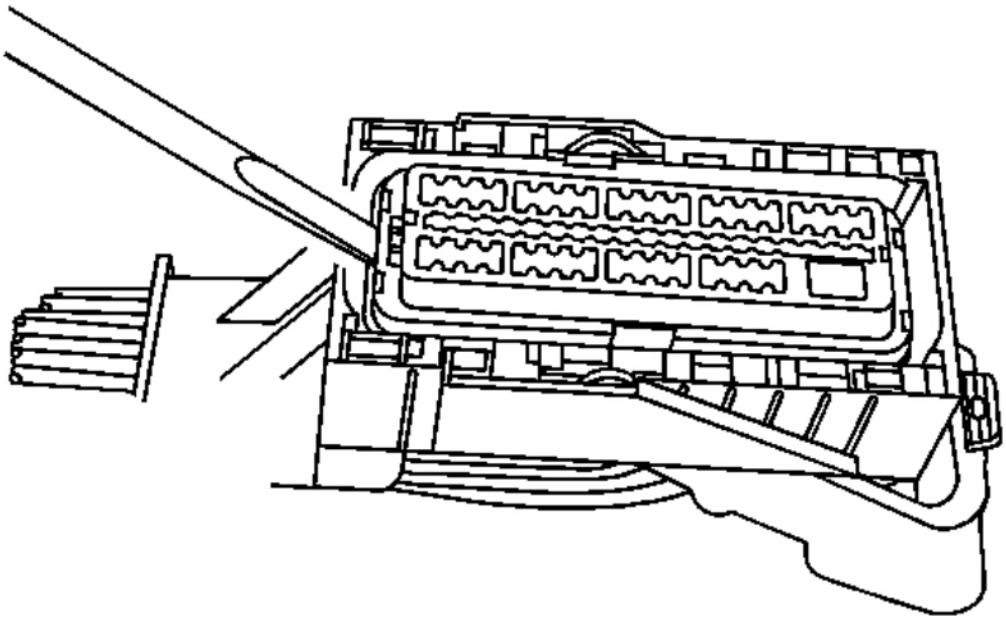


Fig. 101: Prying One Side Of Nose Piece
Courtesy of GENERAL MOTORS CORP.

6. Use a small flat-blade tool to pry one side of the nose piece up to the pre-stage position. When the nose piece is in the pre-staged position, the nose piece will be raised above the connector body the length of the step in the nose piece.

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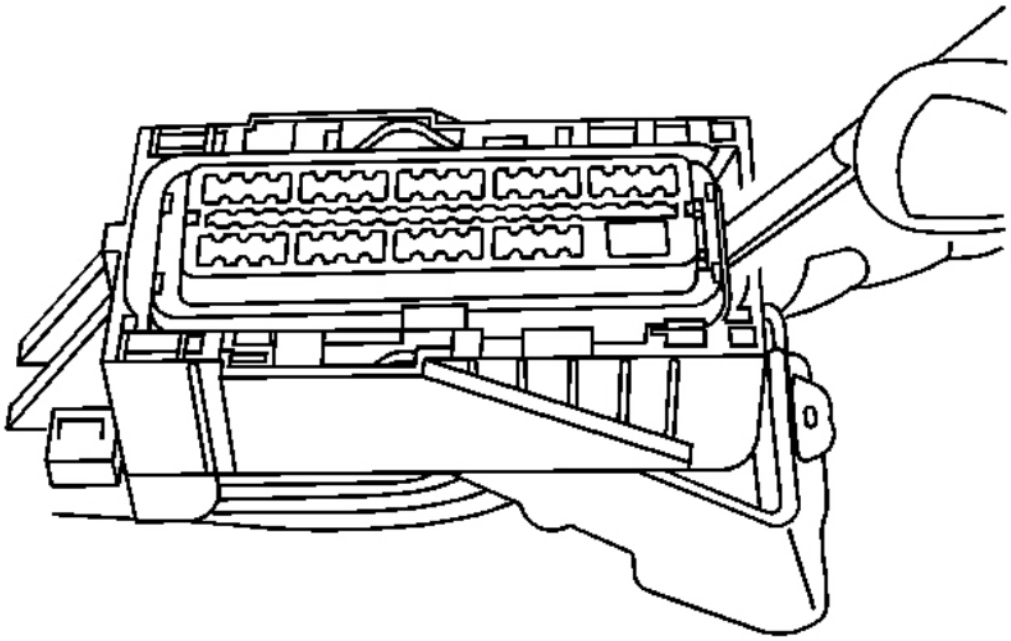


Fig. 102: Prying Other Side Of Nose Piece
Courtesy of GENERAL MOTORS CORP.

7. Use a small flat-blade tool to pry the other side of the piece to the pre-stage position. If the nose piece is higher than the first step in the nose piece, gently push down on the nose piece until it meets with resistance from the connector body, you should feel the nose piece click into position.

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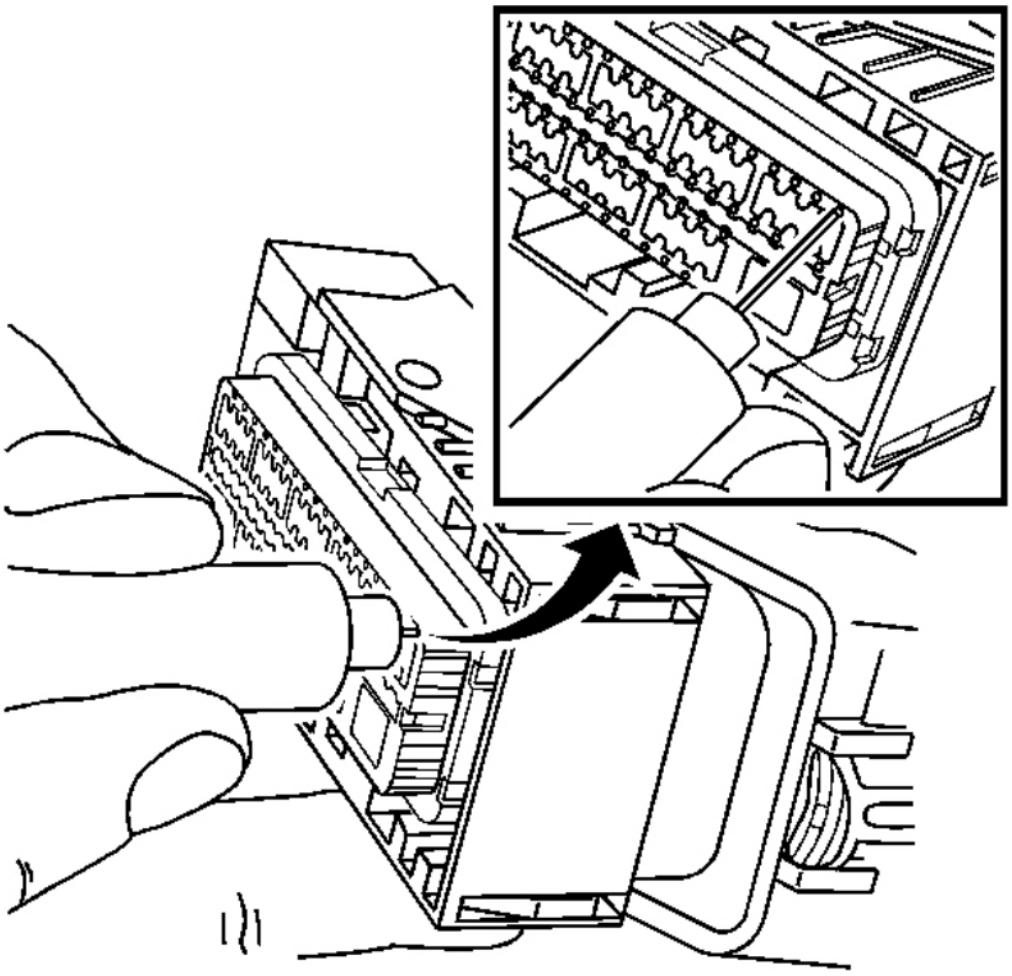


Fig. 103: Inserting J 38125-213 Into Small Terminal Release Hole
Courtesy of GENERAL MOTORS CORP.

8. Insert the J 38125-213 into the small terminal release hole on the nose piece and gently pull on the back of the wire.
9. See the release tool cross reference in the Reference Guide of the **J-38125** Terminal Repair Kit to ensure that the correct release tool is used. See **Special Tools** .

TERMINAL REPAIR PROCEDURE

Refer to the terminal crimping procedure in the Reference Guide of the **J-38125** Terminal Repair Kit. See **Special Tools** .

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TERMINAL REPLACEMENT PROCEDURE

After the terminal is crimped to the wire, perform the following procedure in order to replace the terminal.

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. To assemble the connector, reverse the connector disassembly procedure.

SUMITOMO CONNECTORS

TOOLS REQUIRED

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

TERMINAL REMOVAL PROCEDURE

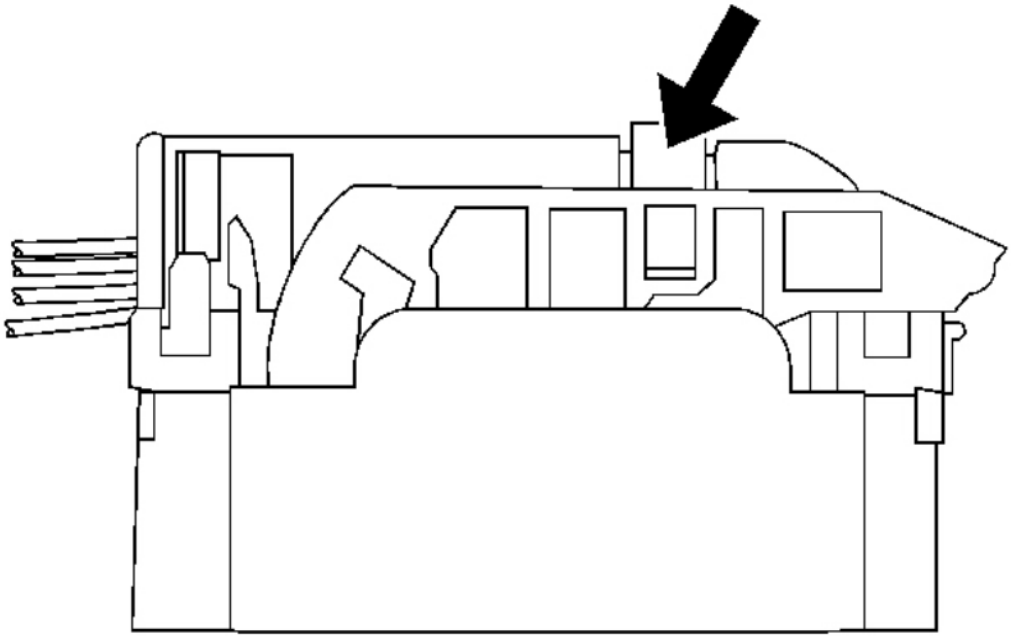


Fig. 104: Identifying Lever Lock
Courtesy of GENERAL MOTORS CORP.

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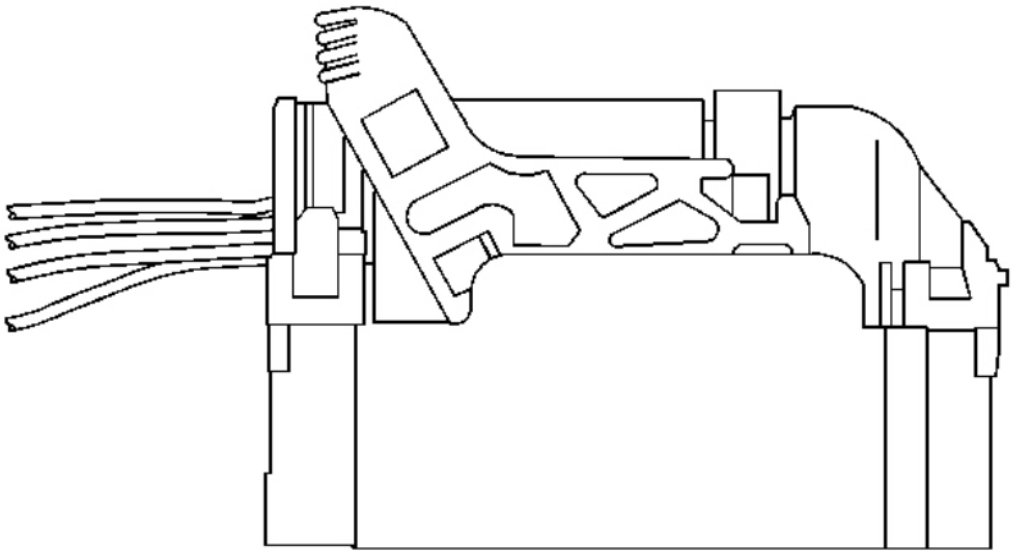


Fig. 105: View Of Lever Lock In Forward Position
Courtesy of GENERAL MOTORS CORP.

1. Slide the lever lock forward while pressing down on the lever lock release tab.
2. Disconnect the connector from the component.

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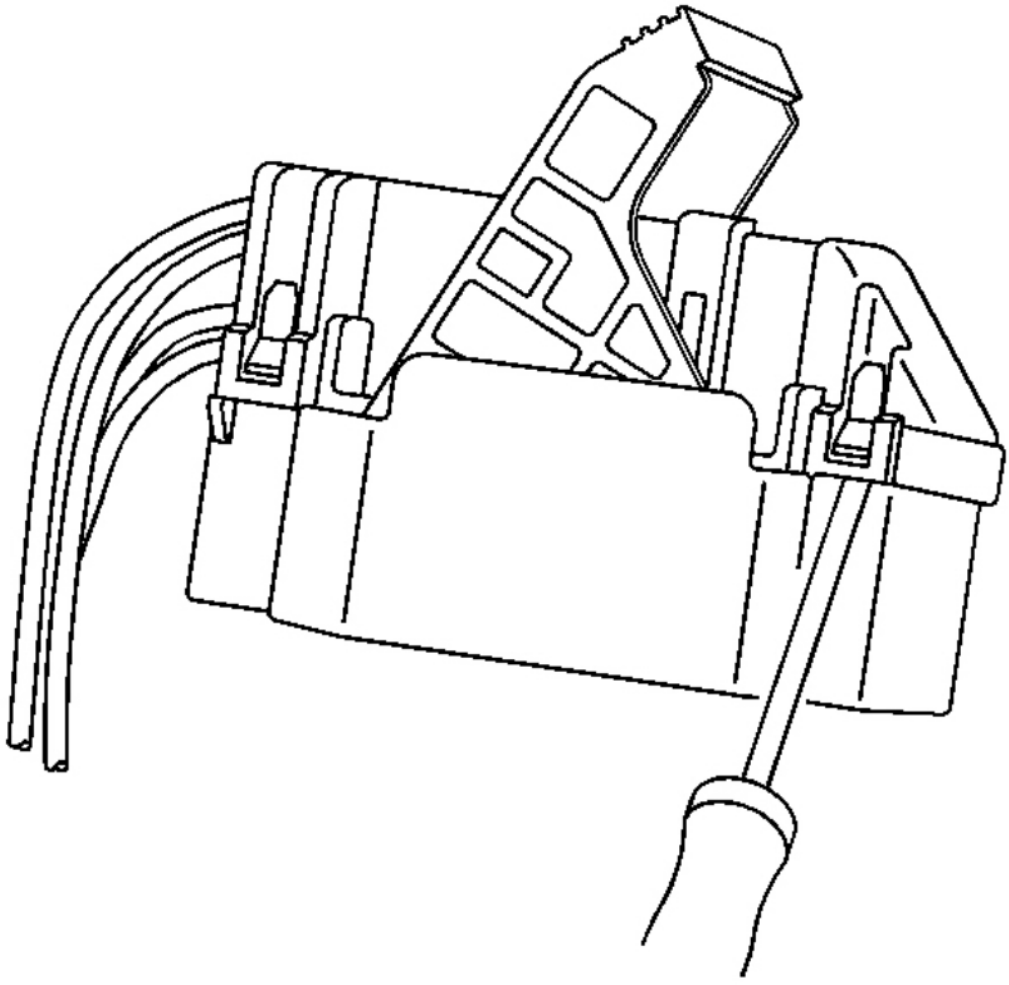


Fig. 106: Releasing Connector Locking Tabs
Courtesy of GENERAL MOTORS CORP.

3. Remove the dress cover by using a flat blade tool to release the connector locking tabs and pulling off the dress cover.

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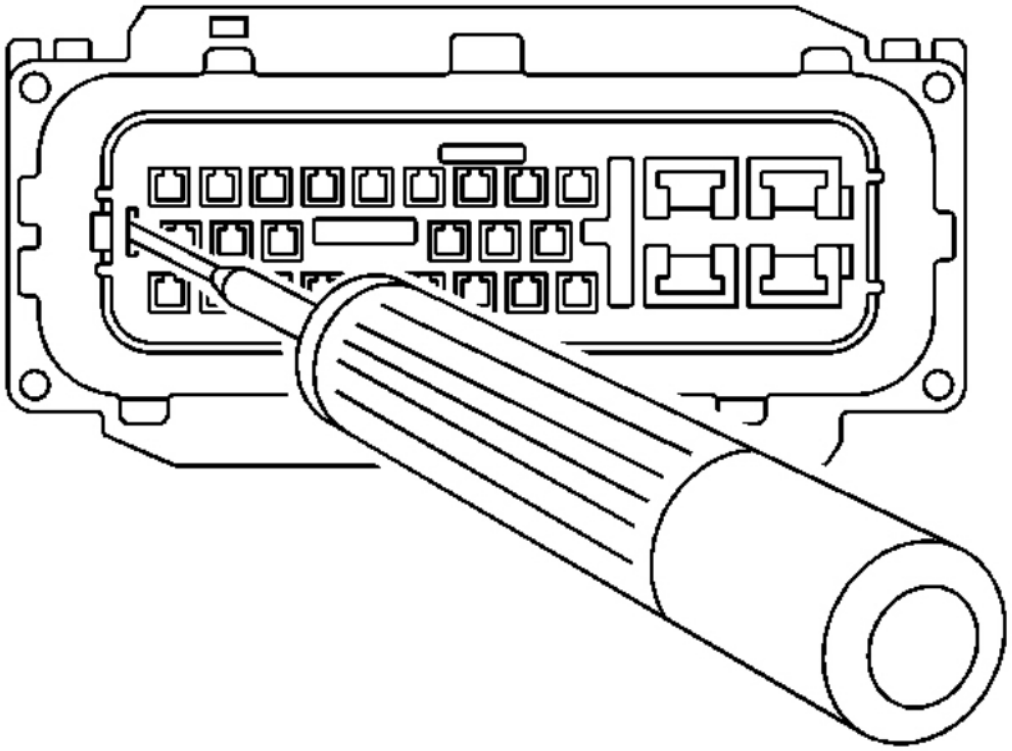


Fig. 107: Inserting J-38125-12A (12094429) Into Single Retainer Slot
Courtesy of GENERAL MOTORS CORP.

4. Relieve the tension on the nose piece retainers by inserting J 38125-12A (12094429) into the single retainer slot on the end of the nose piece and gently prying out the locking tab. Repeat the process for both of the nose piece locking tabs on the opposite side of the nose piece.

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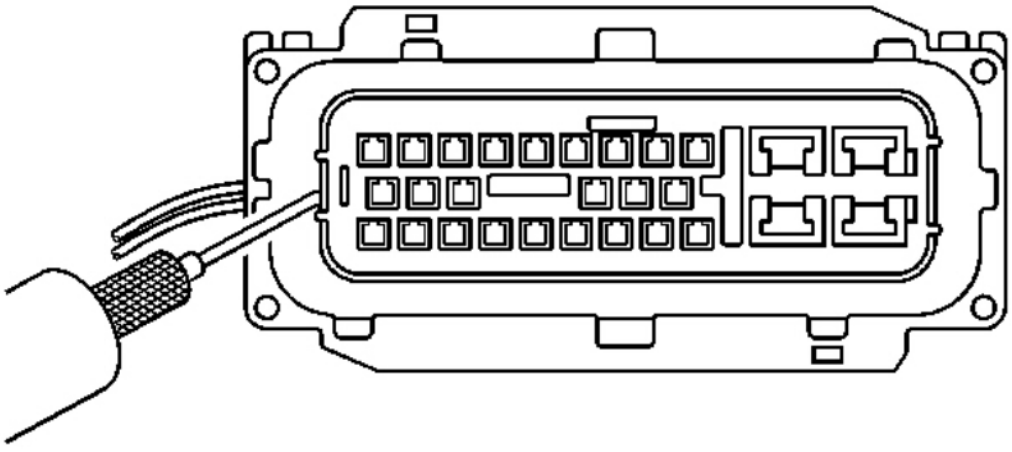


Fig. 108: View Of J38125-552 (15313892) & Nose Piece
Courtesy of GENERAL MOTORS CORP.

5. Once the nose piece retainers are relaxed, use the J 38125-552 (15313892) to pull up the nose piece by hooking the tool under the nose piece and pulling up. The nose piece should raise slightly.

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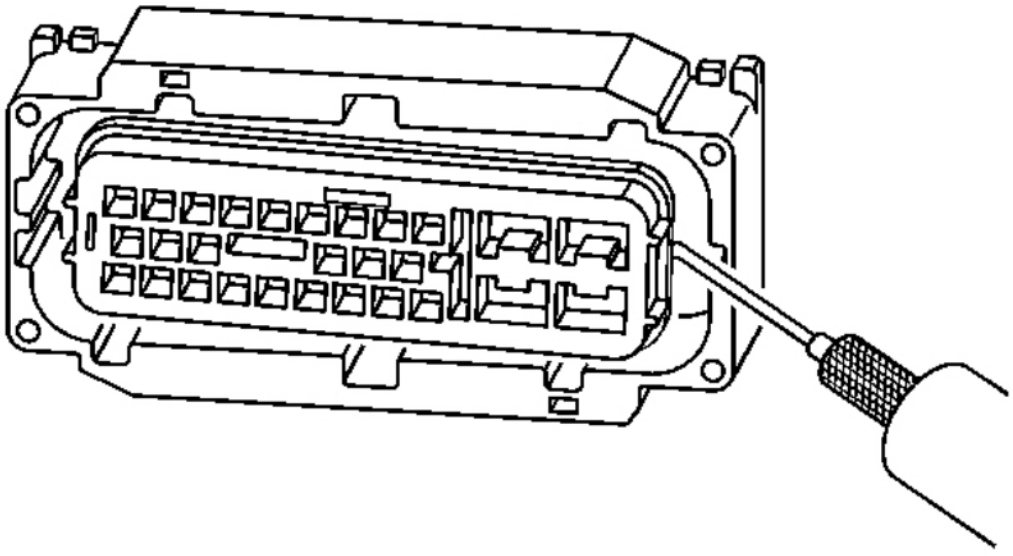


Fig. 109: Using Tool To Pull Up Other End Of Nose Piece
Courtesy of GENERAL MOTORS CORP.

6. On the opposite side of the nose piece, use the J 38125-552 (15313892) to pull up the nose piece by hooking the tool under the nose piece and pulling up. The nose piece should release completely. If the nose piece does not come off, repeat the procedure on the opposite side.

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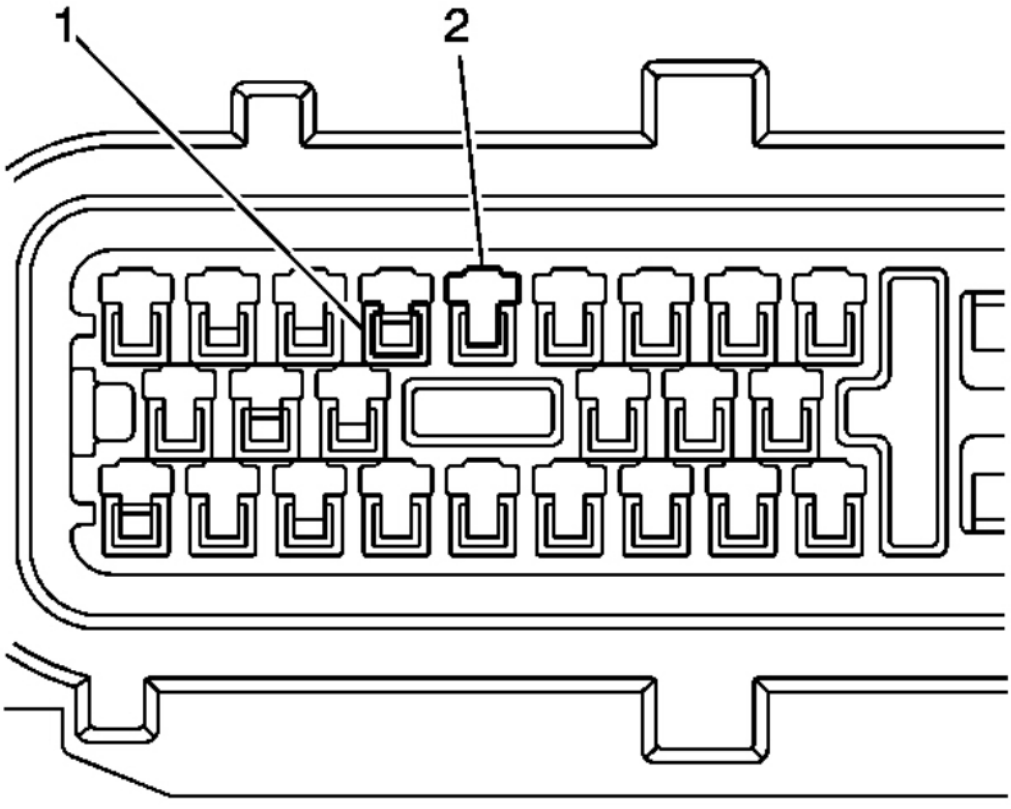


Fig. 110: View Of Terminal & Entry Canal
Courtesy of GENERAL MOTORS CORP.

7. The illustration above identifies the entry canal where the terminal release tool will be inserted, and the terminal cavity.
    - Terminal
    - Entry Canal

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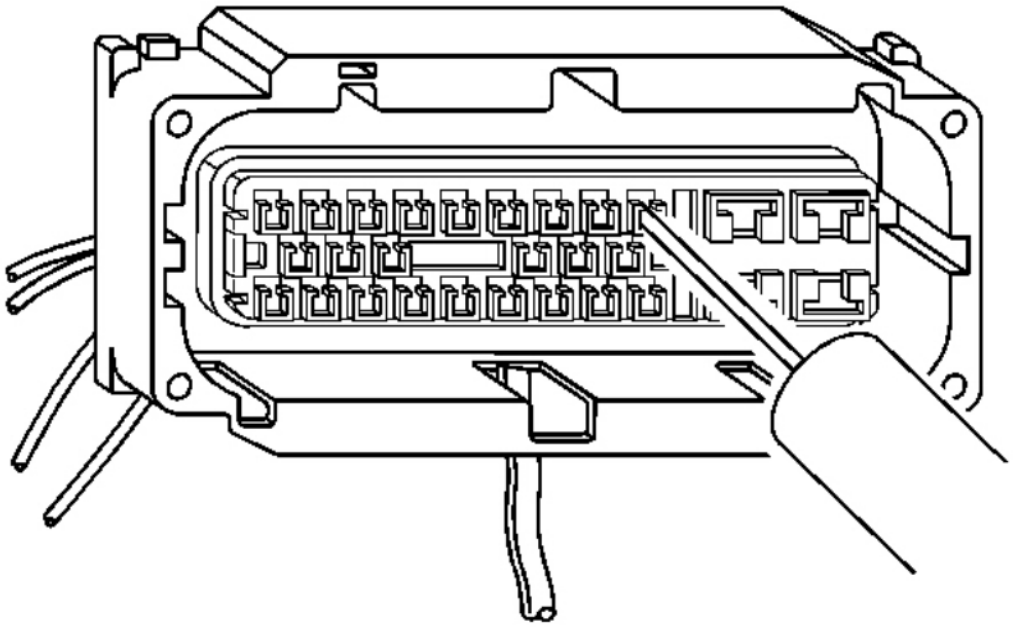


Fig. 111: Inserting J-38125-553 (15315247) Tool Into Entry Canal
Courtesy of GENERAL MOTORS CORP.

8. Insert the J 38125-553 (15315247) tool into the entry canal and pry up on the terminal retainer. The terminal retainer is a small plastic piece on the top of the terminal. The terminal retainer must be held up while the terminal is pulled out of the connector.

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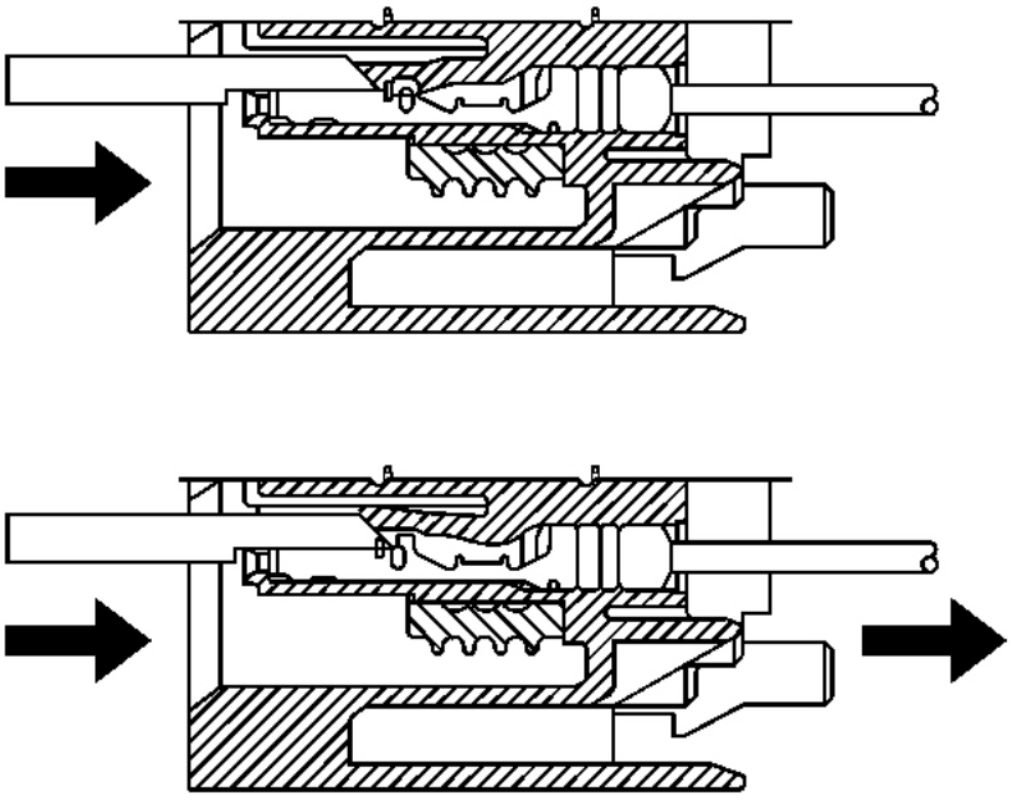


Fig. 112: Cutaway View Of Connector
Courtesy of GENERAL MOTORS CORP.

9. The illustration shows a cutaway view of the connector to aid the technician in releasing the terminal retainer.
10. See the release tool cross reference in the Reference Guide of the **J-38125** Terminal Repair Kit to ensure that the correct release tool is used. See **Special Tools** .

TERMINAL REPAIR PROCEDURE

Refer to the terminal crimping procedure in the Reference Guide of the **J-38125** Terminal Repair Kit. See **Special Tools** .

TERMINAL REPLACEMENT PROCEDURE

After the terminal is crimped to the wire, perform the following procedure in order to replace the terminal.

1. Slide the new terminal into the correct cavity at the back of the connector.

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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. To assemble the connector, reverse the connector disassembly procedure.

TYCO/AMP CONNECTORS (025 CAP)

TOOLS REQUIRED

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

TERMINAL REMOVAL PROCEDURE

1. Disconnect the connector from the component by pressing down on the connector position assurance (CPA).

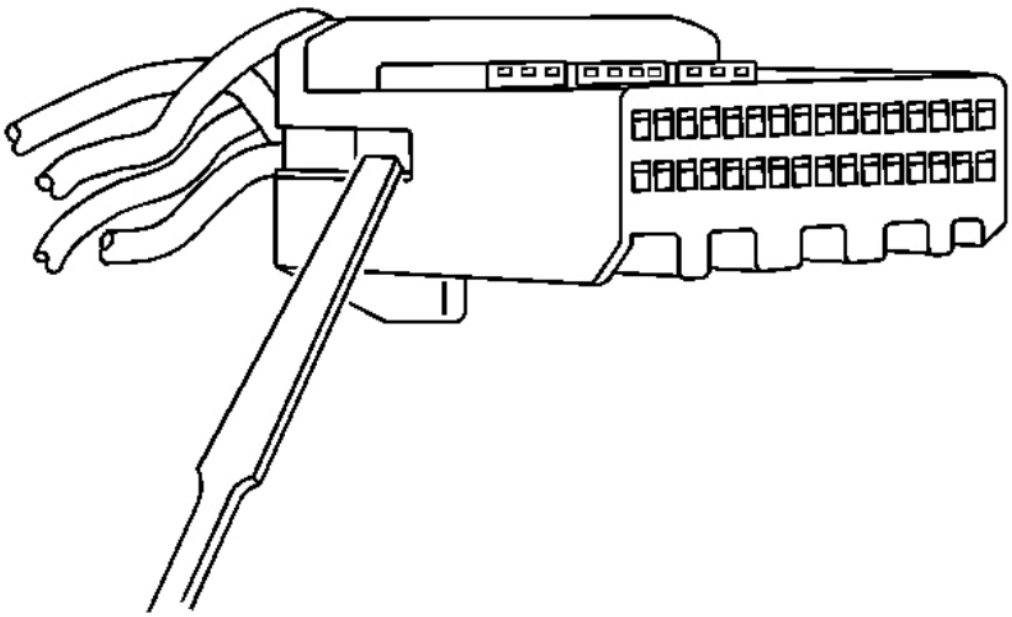


Fig. 113: Releasing TPA Using Small Flat-Bladed Tool
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The TPA on this connector cannot be removed unless the terminals are removed first. The TPA will come out of the connector body, but only slightly. When the TPA is slightly raised the terminals can be removed. Using excessive force to remove the TPA with the terminals still in the

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connector will damage the connector.

2. Use a small flat-bladed tool to release the terminal position assurance (TPA) by inserting the tool in the small recess on the side of the connector and pushing up until the TPA releases from the connector body. The TPA should raise just slightly. Do not try to remove the TPA.
3. Repeat the process for the other side of the connector.

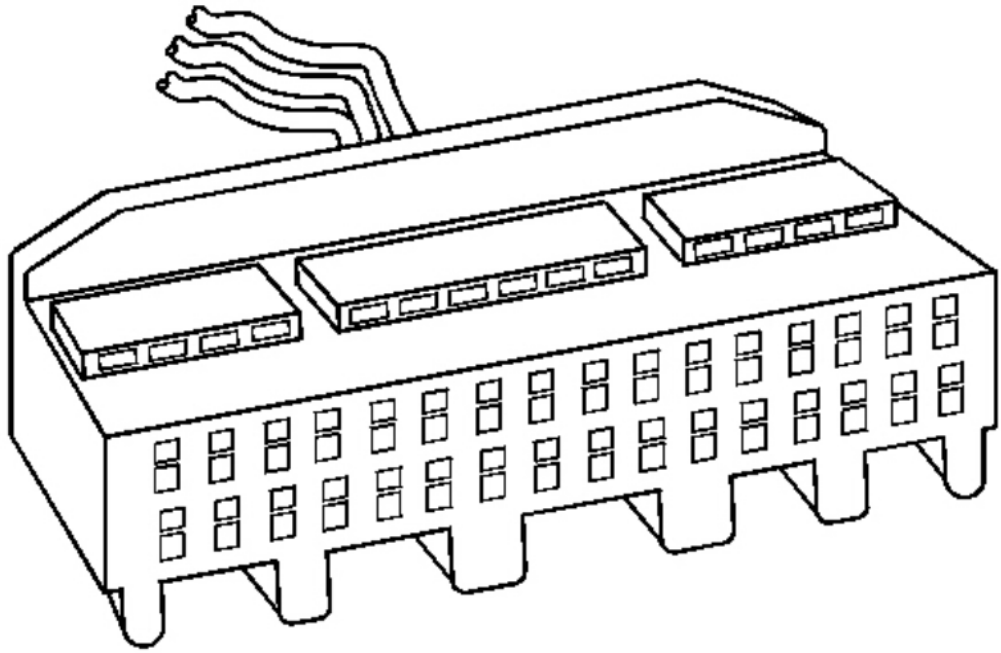


Fig. 114: View Of TPA
Courtesy of GENERAL MOTORS CORP.

4. Ensure that the TPA is in the proper position to remove the terminals.

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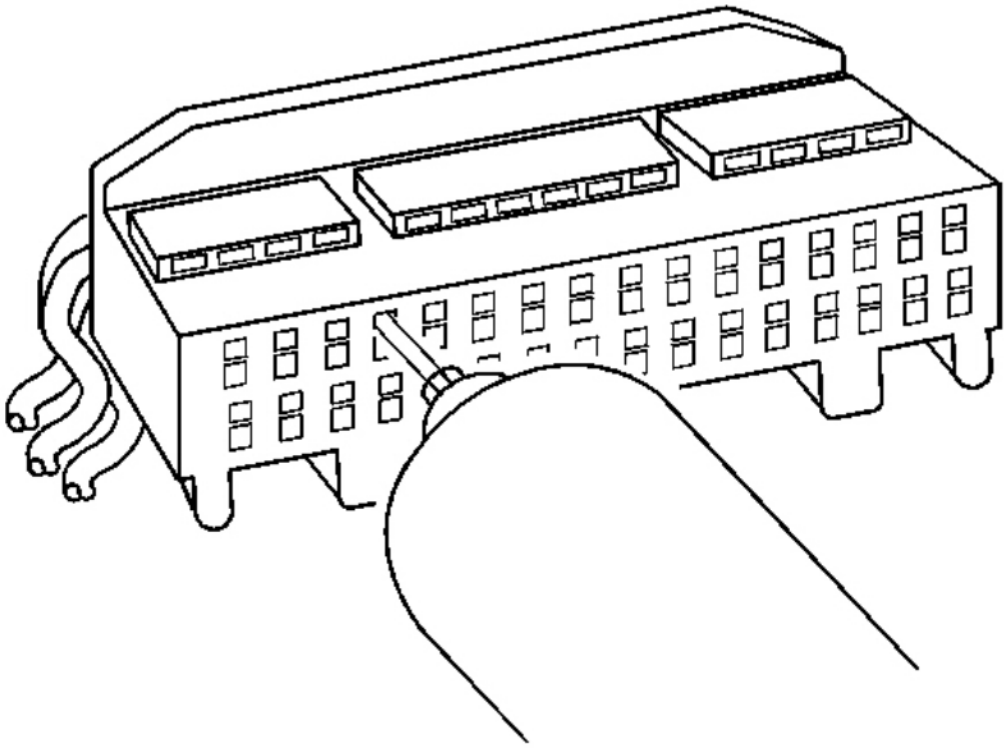


Fig. 115: Inserting Special Tool Into Release Cavity
Courtesy of GENERAL MOTORS CORP.

5. While pushing the terminal forward, insert the J 38125-24 in the release cavity above the terminal you are removing, gently pull the wire out of the back of the connector. Always remember never use force when pulling a terminal out of a connector. See the release tool cross reference in the Reference Guide of the **J-38125** to ensure that the correct release tool is used. See **Special Tools** .

TERMINAL REPAIR PROCEDURE

Use the appropriate terminal and follow the instructions in the **J-38125** in order to replace the terminal. See **Special Tools** .

TYCO/AMP CONNECTORS (CM 42-WAY)

TOOLS REQUIRED

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

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REMOVAL PROCEDURE

1. Locate the connector position assurance (CPA) on the connector body and pull the CPA out. The CPA is on the wire harness side of connector.
2. Disconnect the connector from the component.

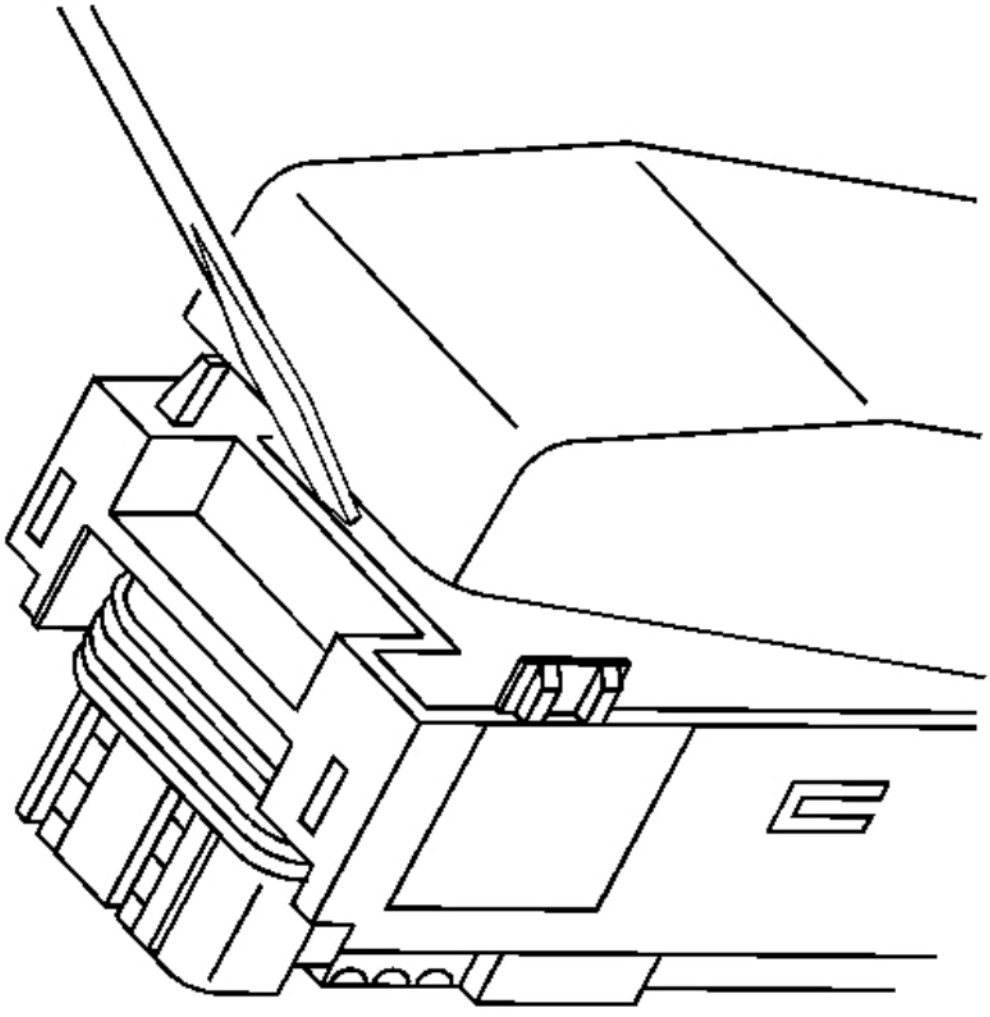


Fig. 116: Prying Off Dress Cover
Courtesy of GENERAL MOTORS CORP.

3. Use a small flat-bladed tool to gently pry off the dress cover by inserting the tool under the cover opposite

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the harness side and prying up.

4. Remove the cover.

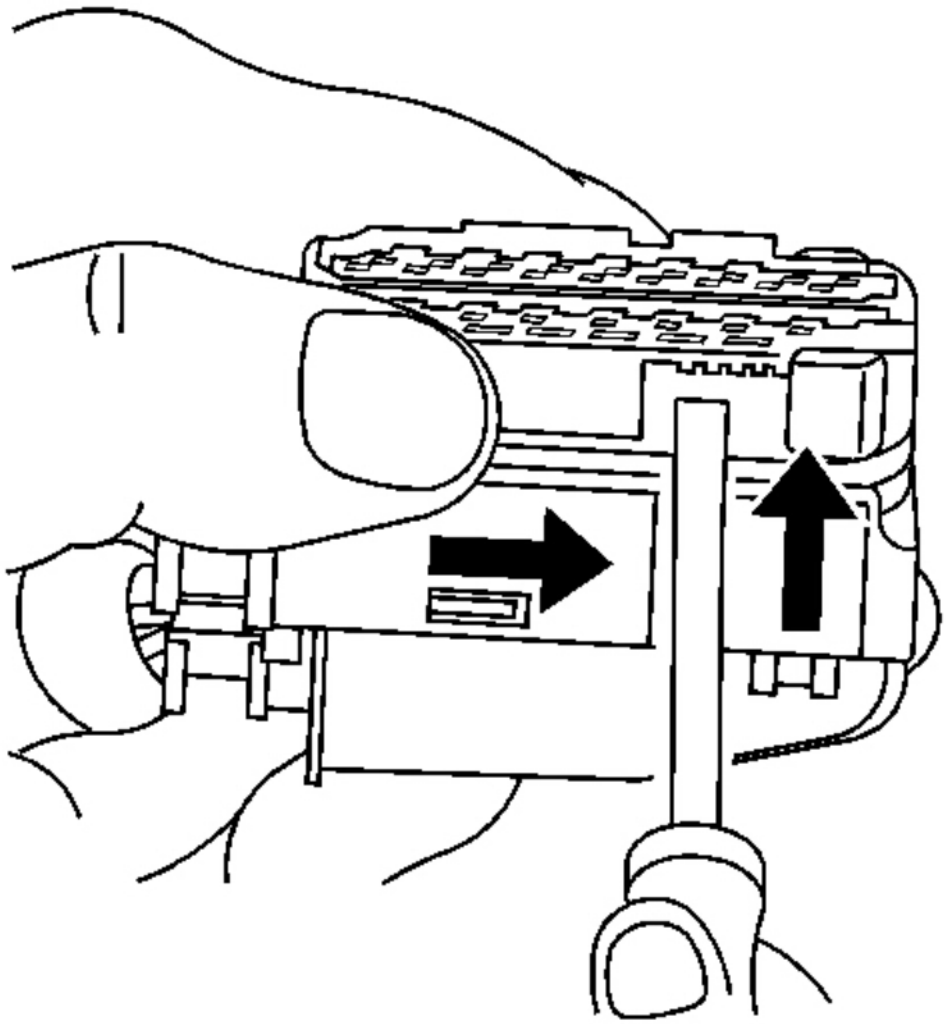


Fig. 117: View Of Terminal Position Assurance (TPA)
Courtesy of GENERAL MOTORS CORP.

5. Using a small flat-bladed tool, push on the side of the nose piece retainer while pushing the nose piece forward with your thumb. This will release the terminal position assurance (TPA).

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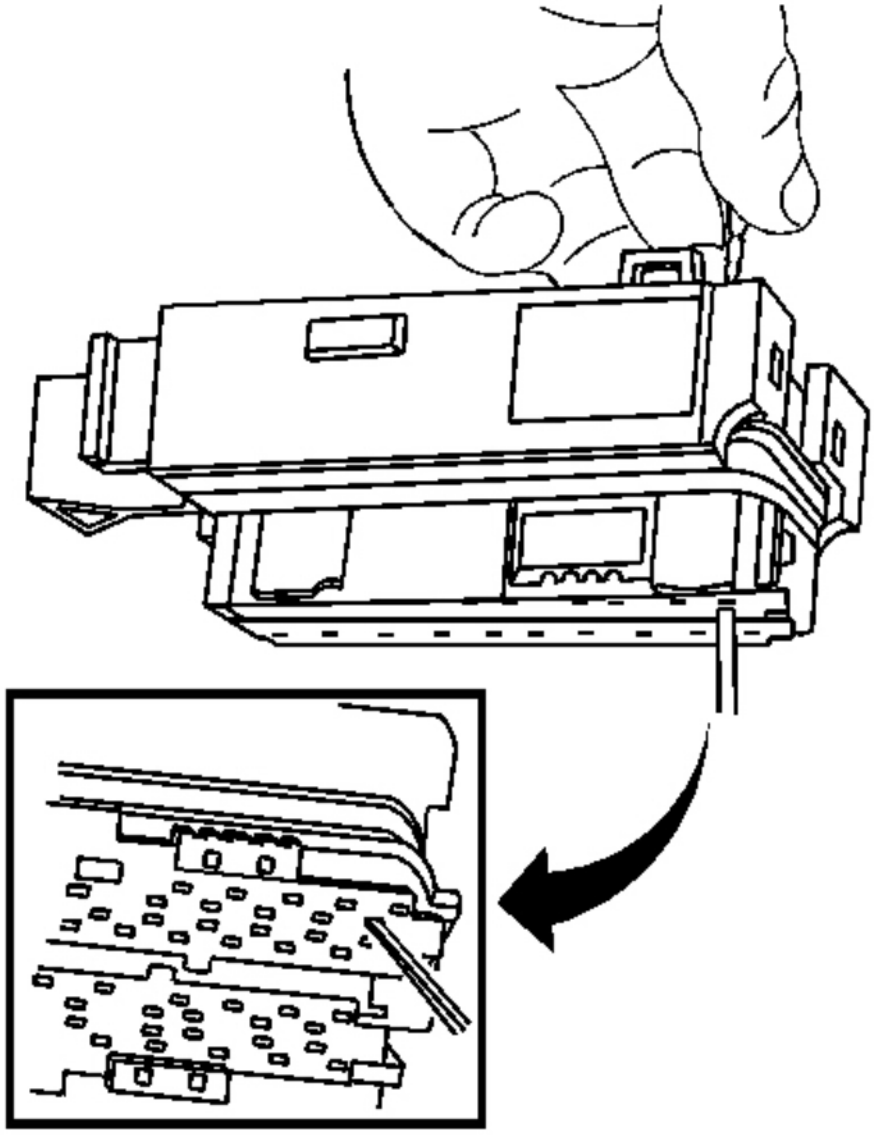


Fig. 118: Inserting J 38125-12A Into Terminal Release Cavity
Courtesy of GENERAL MOTORS CORP.

6. Insert the J 38125-12A (GM P/N 12094429) into the corresponding terminal release cavity. The release cavities are the 2 center rows of cavities on one half of the connector.

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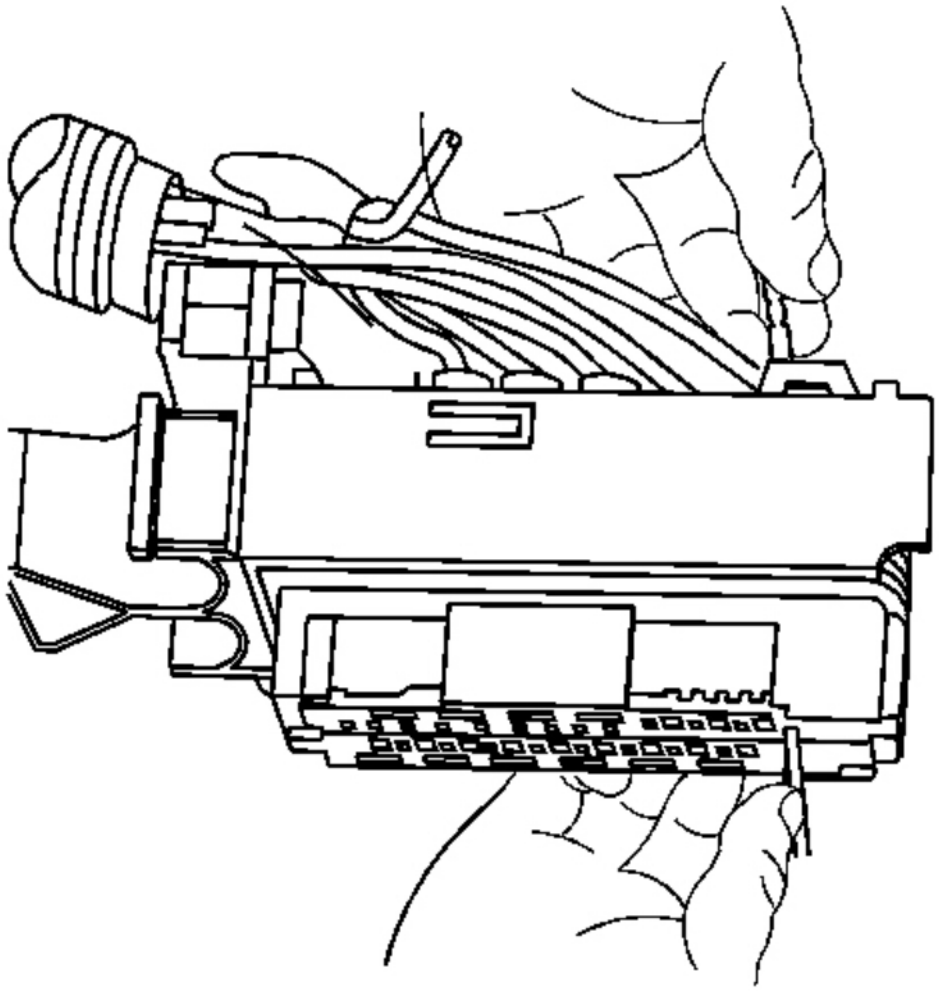


Fig. 119: Pulling Wire Out Of Back Of Connector
Courtesy of GENERAL MOTORS CORP.

7. Pressing the J 38125-12A (GM P/N 12094429) tool in the release cavity of the terminal you are removing, gently pull the wire out of the back of the connector. Always remember never use force when pulling a terminal out of a connector. See the release tool cross reference in the Reference Guide of the **J-38125** to ensure that the correct release tool is used. See **Special Tools** .

TERMINAL REPAIR PROCEDURE

Use the appropriate terminal and crimper in the **J-38125** in order to replace the terminal. See **Special Tools** .

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TYCO/AMP CONNECTORS (SENSOR)

TOOLS REQUIRED

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

TERMINAL REMOVAL PROCEDURE

1. Disconnect the connector from the component.

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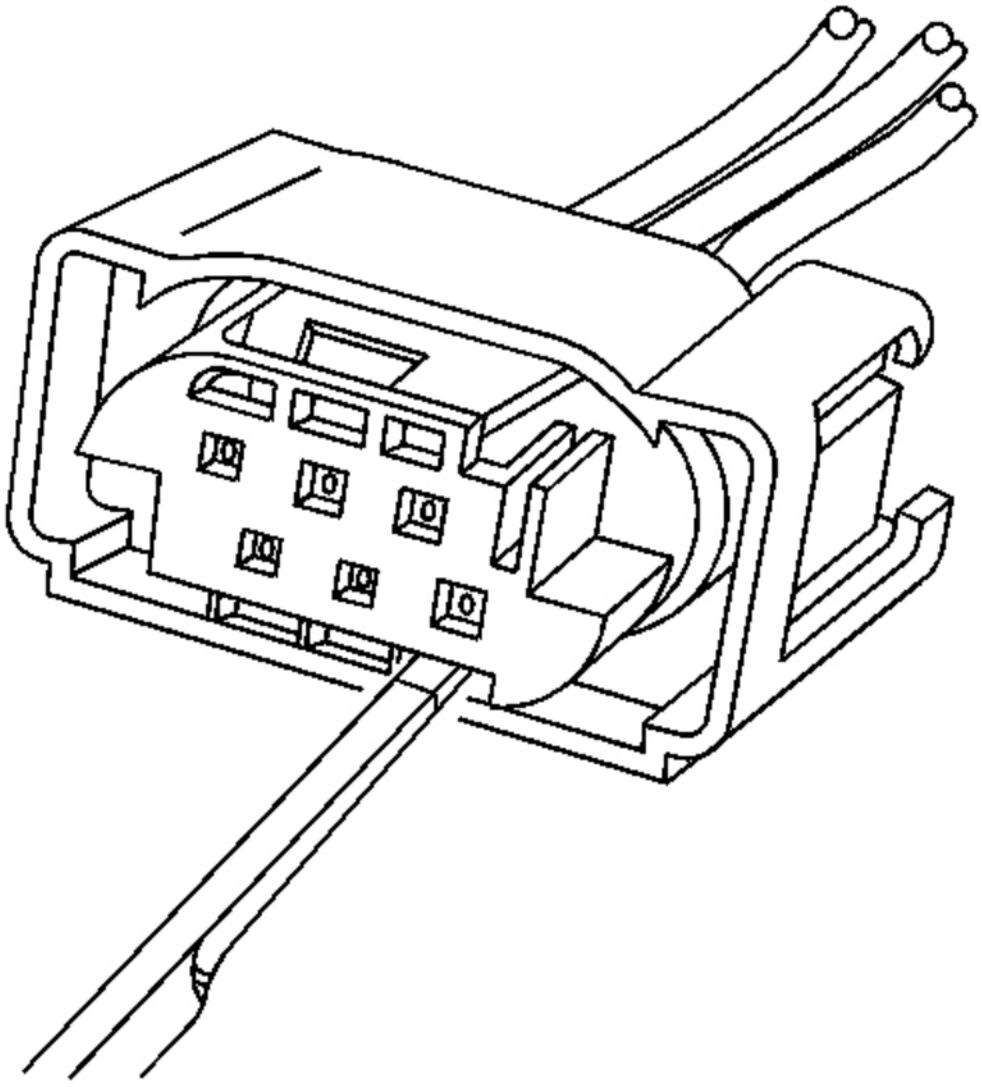


Fig. 120: Inserting Special Tool Into Lower Right Face Cavity
Courtesy of GENERAL MOTORS CORP.

2. Insert the J 38125-11A (GM P/N 12094430) tool into the cavity on the lower right hand face of the connector until the terminal release tang access panel slides over.

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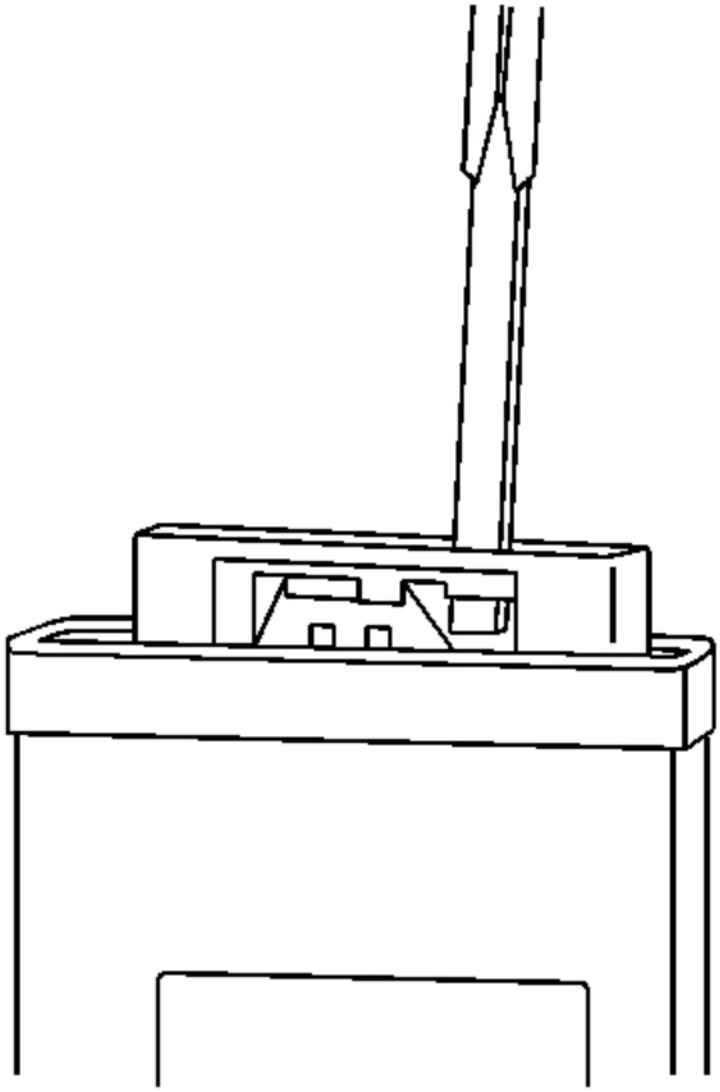


Fig. 121: Pushing Wire Side Of Terminal Toward Connector
Courtesy of GENERAL MOTORS CORP.

3. Ensure that the terminal release tang access panel is in the correct location to access the terminals.
4. Push the wire side of the terminal that is being removed toward the connector and hold it in position.

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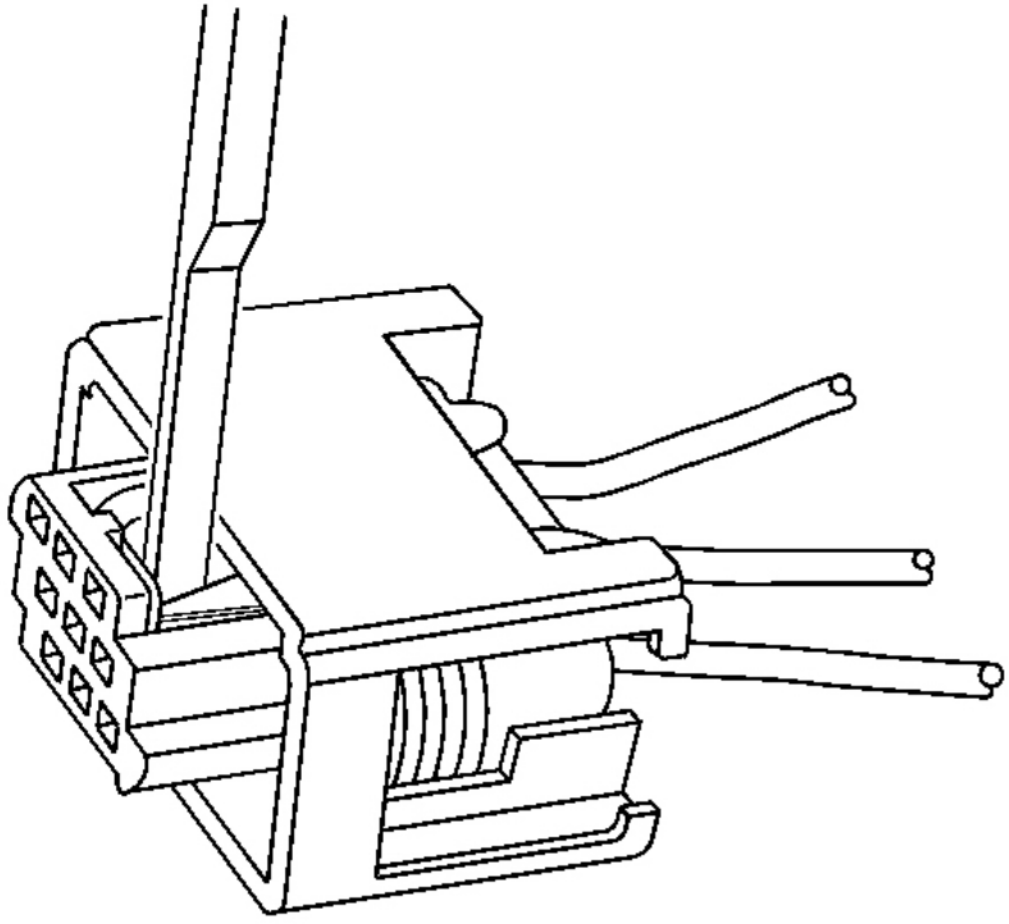


Fig. 122: Inserting Tool Into Terminal Release Tang Access Slot (Sensor)
Courtesy of GENERAL MOTORS CORP.

5. Insert the J 38125-11A (GM P/N 12094430) into the terminal release tang access slot located behind the access panel of the connector and press down on the terminal while carefully pulling the terminal out of the connector. Always remember never use force when pulling a terminal out of a connector. If the terminal is difficult to remove, repeat the entire procedure.

TERMINAL REPAIR PROCEDURE

Use the appropriate terminal and follow the instructions in the **J-38125** . See **Special Tools** .

TYCO/AMP CONNECTORS (43-WAY)

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TOOLS REQUIRED

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

REMOVAL PROCEDURE

Follow the steps below in order to remove terminals from the connector.

1. Locate the lever lock on the wire dress cover. Slide the lever lock away from the connector body.
2. Disconnect the connector from the component.
3. Locate the dress cover locking tabs on the dress cover of the connector. Using a small flat-blade tool release all of the locking tabs.
4. Once the locks are unlocked, lift the dress cover off.

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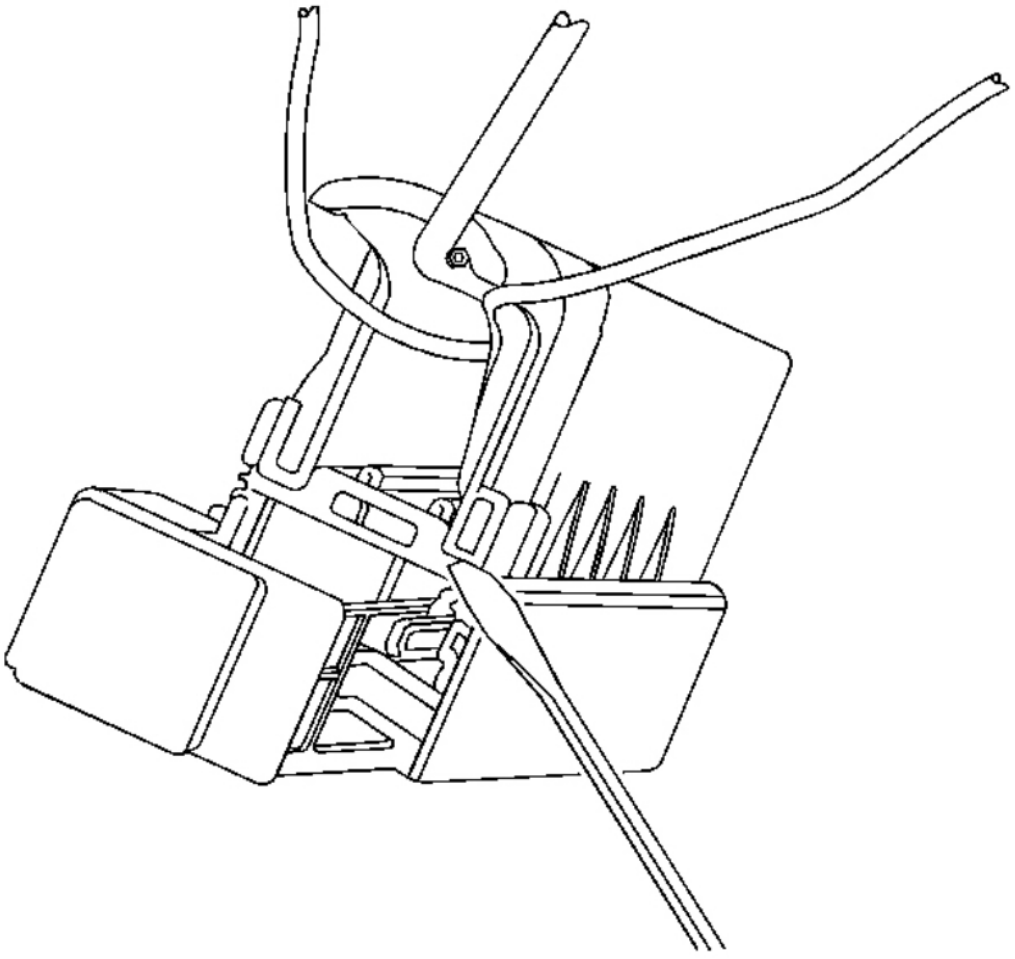


Fig. 123: Releasing TPA
Courtesy of GENERAL MOTORS CORP.

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

5. Release the TPA by inserting a small flat-blade tool into the blue locking tabs on both ends of the connector. Gently slide the TPA up to the released position on both ends.

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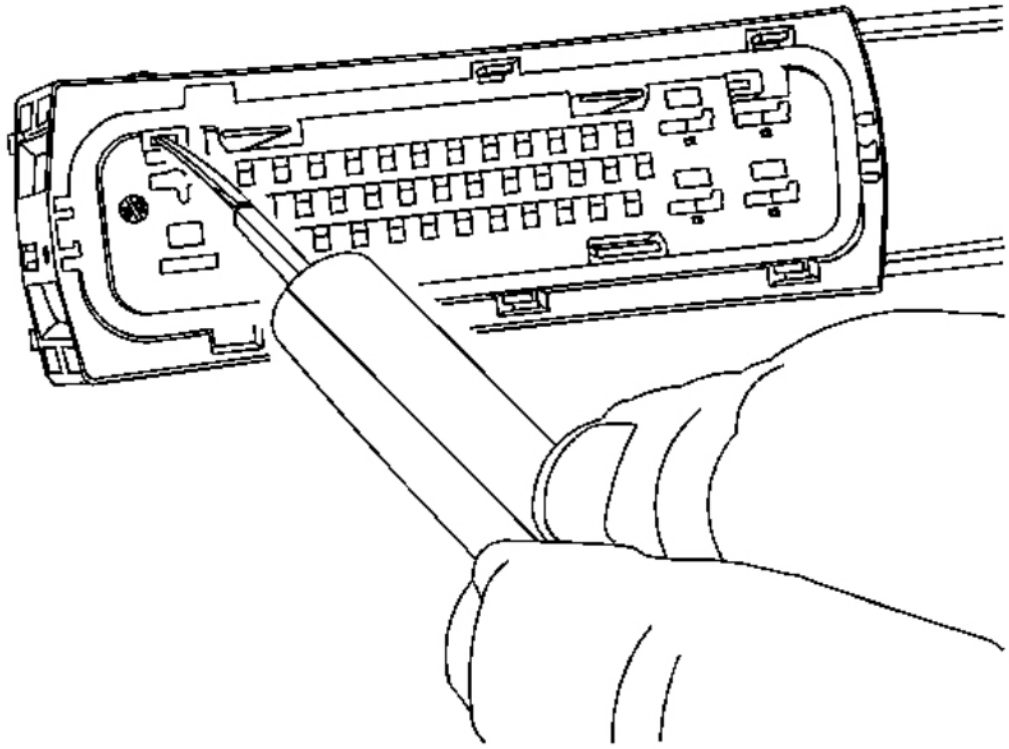


Fig. 124: Inserting Tool Into Terminal Release Cavity
Courtesy of GENERAL MOTORS CORP.

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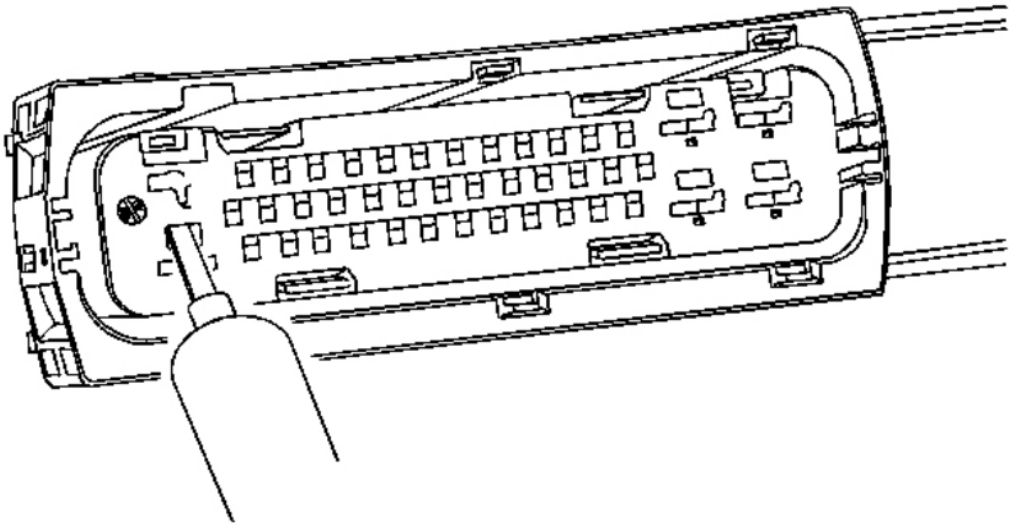


Fig. 125: View Of Release Tool Being Used For Larger Terminals
Courtesy of GENERAL MOTORS CORP.

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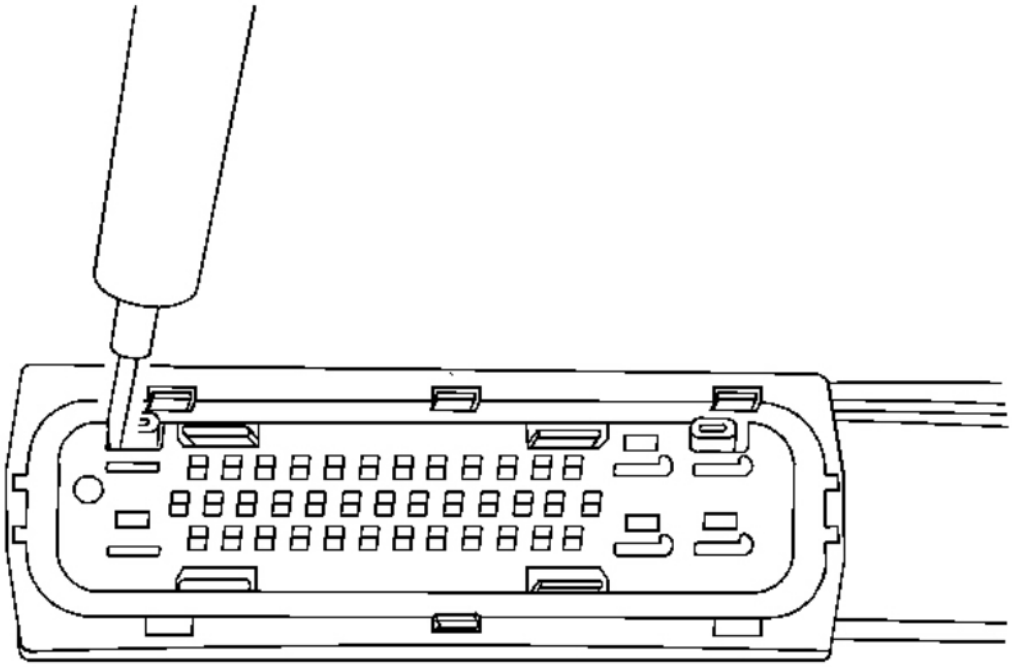


Fig. 126: View Of Release Tool Being Used For Larger Terminals
Courtesy of GENERAL MOTORS CORP.

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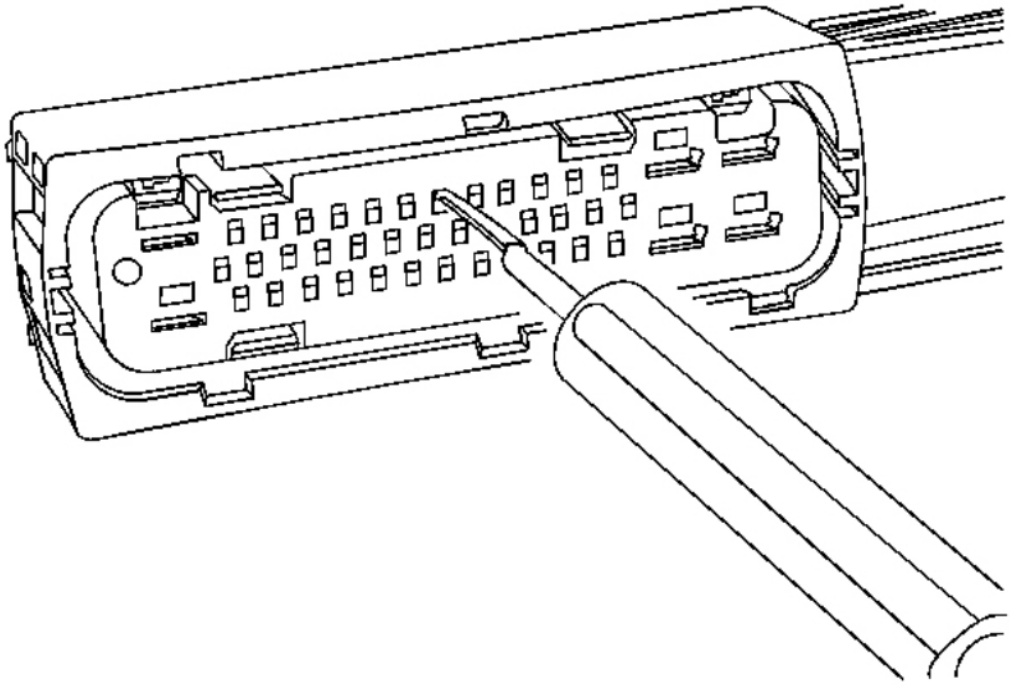


Fig. 127: View Of Release Tool Being Used For Smaller Terminals
Courtesy of GENERAL MOTORS CORP.

6. For the larger terminals insert the J 38125-13A (GM P/N 12031876-1) tool to release the terminals by inserting the tool into the terminal release cavity. For the smaller terminals insert the J 38125-12A (GM P/N 12094429) tool to release the terminals by inserting the tool into the terminal release cavity. See the release tool cross reference in the Reference Guide of the**J-38125** to ensure that the correct release tool is used. See **Special Tools** .

   View of the release tool being used for the larger terminals.

   View of the release tool being used for the larger terminals.

   View of the release tool being used for the smaller terminals.

7. 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.

REPAIR PROCEDURE

Use the appropriate terminal and follow the instructions in the **J-38125** . See **Special Tools** .

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Location of the terminal in the repair tray and the proper crimp tool can be found in the appropriate connector end view.

TYCO/AMP CONNECTORS (DOOR MODULE)

TOOLS REQUIRED

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

REMOVAL PROCEDURE

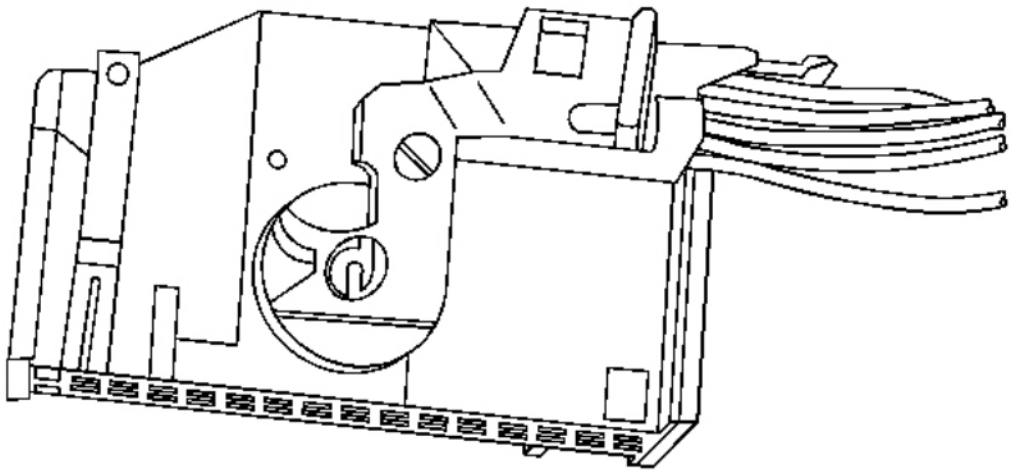


Fig. 128: Side View Of Tyco/AMP Connector
Courtesy of GENERAL MOTORS CORP.

Side view of connector.

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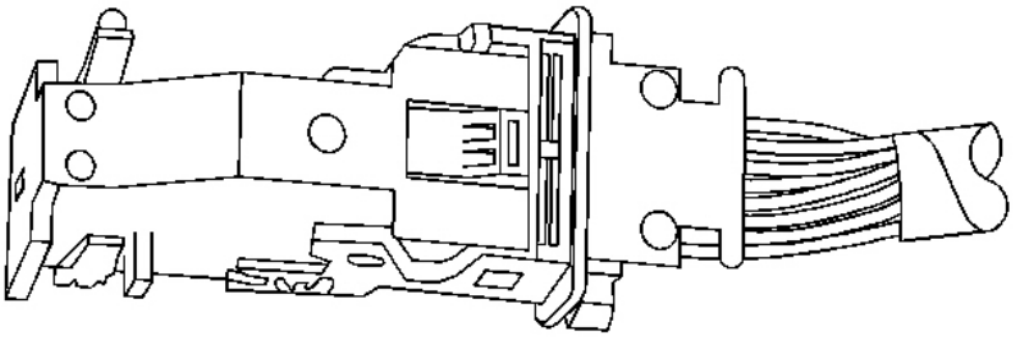
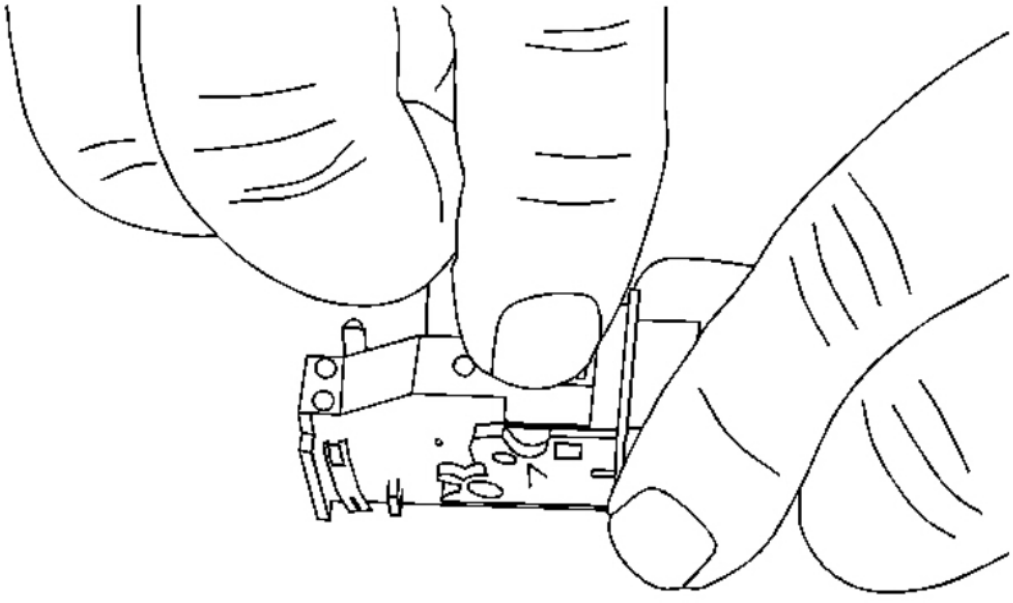


Fig. 129: Top View Of Tyco/AMP Connector
Courtesy of GENERAL MOTORS CORP.

View of top of connector.

1. Locate the assist lever and lock on the top of the connector.



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Fig. 130: Depressing Lock & Pulling Assist Lever
Courtesy of GENERAL MOTORS CORP.

2. While depressing the lock, pull the lever over and past the lock.

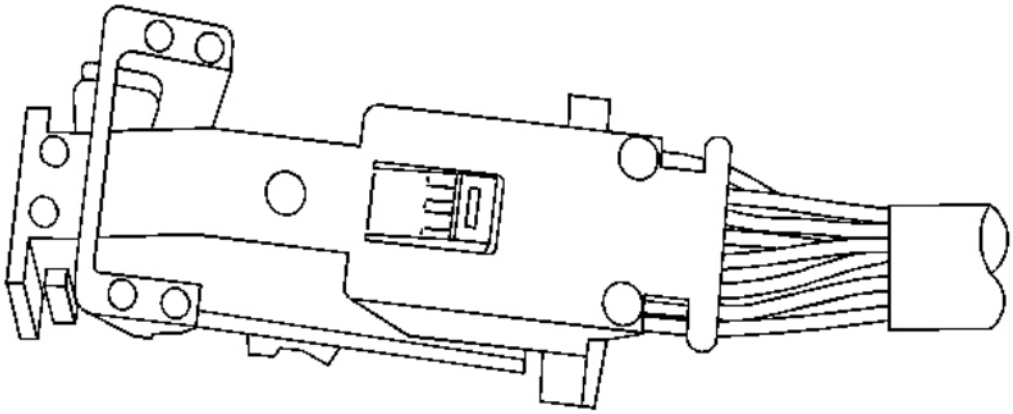
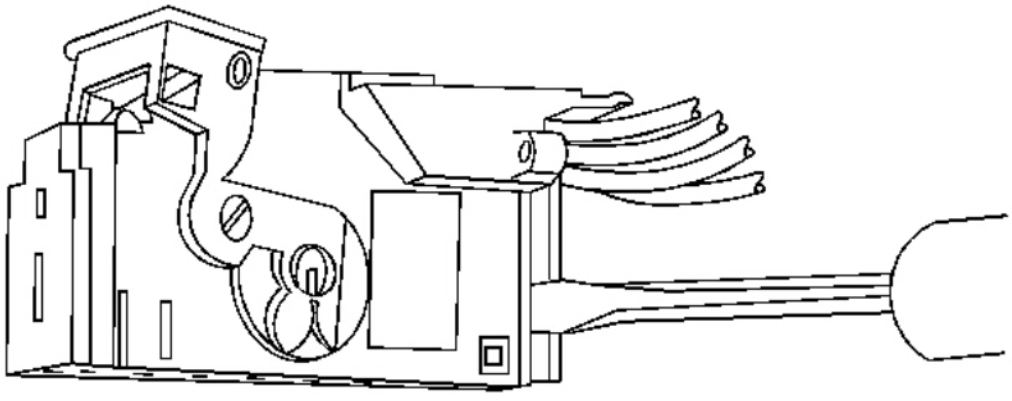


Fig. 131: View Of Component Connector
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the connector from the component.



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Fig. 132: Releasing Locking Tabs
Courtesy of GENERAL MOTORS CORP.

4. Locate the dress cover locking tabs at the rear of the connector. Use a small flat-blade tool to release the locking tabs. Repeat this procedure for the other locking tab.

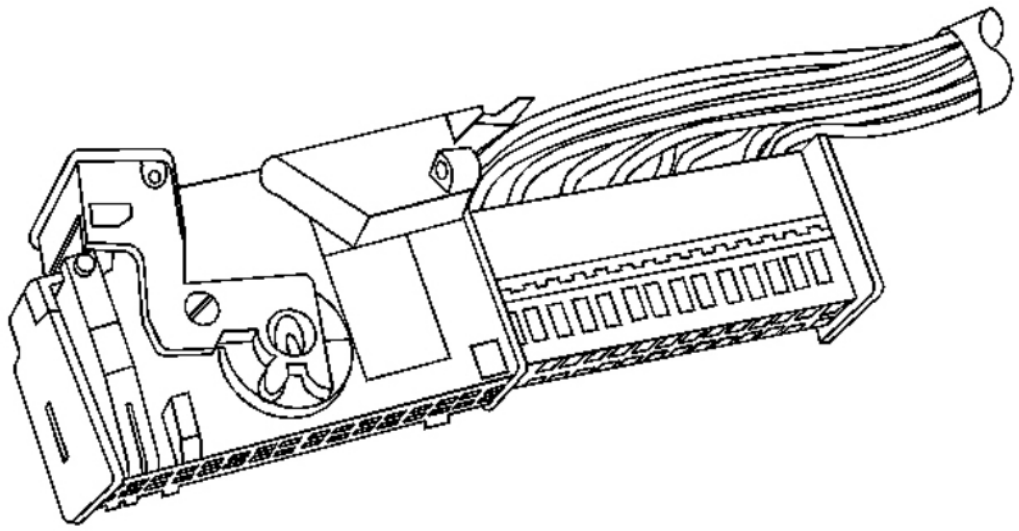


Fig. 133: View Of Inner Connector & Connector Housing
Courtesy of GENERAL MOTORS CORP.

5. Once the locking tabs are unlocked, slide the inner connector out of the rear of the connector housing.

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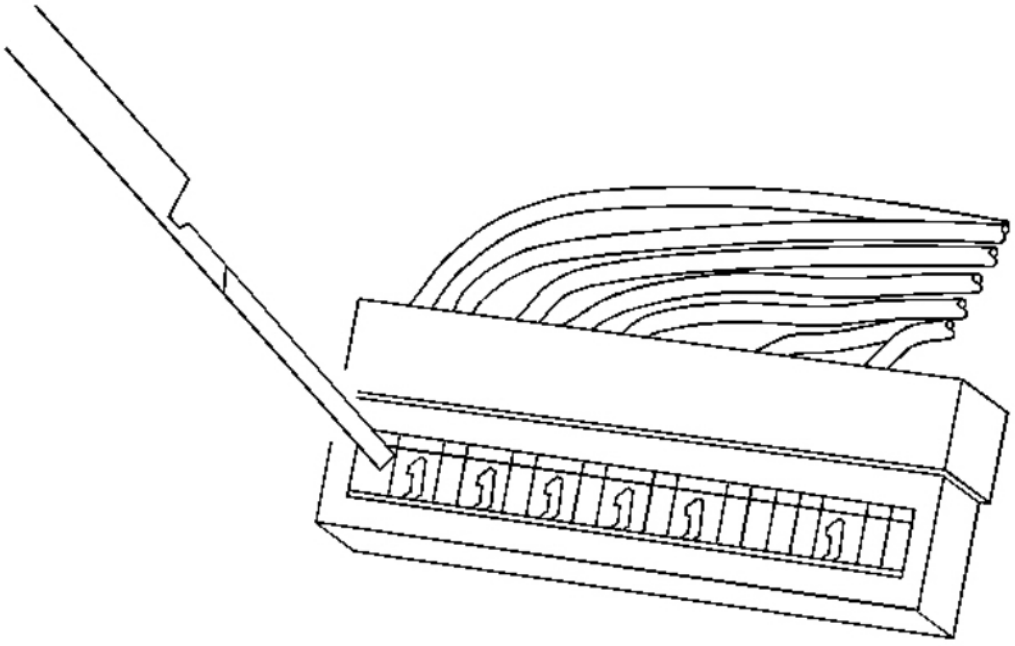


Fig. 134: Using J 38125-12A (GM P/N 12094429) Tool To Release Terminals
Courtesy of GENERAL MOTORS CORP.

6. Use the J 38125-12A (GM P/N 12094429) tool to release the terminals by pressing on the tang. See the release tool cross reference in the Reference Guide of the**J-38125** to ensure that the correct release tool is used. See **Special Tools** .
7. 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.

REPAIR PROCEDURE

Use the appropriate terminal and follow the instructions in the **J-38125** . See **Special Tools** .

Location of the terminal in the repair tray and the proper crimp tool can be found in the appropriate connector end view.

YAZAKI CONNECTORS (2-WAY)

TOOLS REQUIRED

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

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TERMINAL REMOVAL PROCEDURE

1. Disconnect the connector from the component.

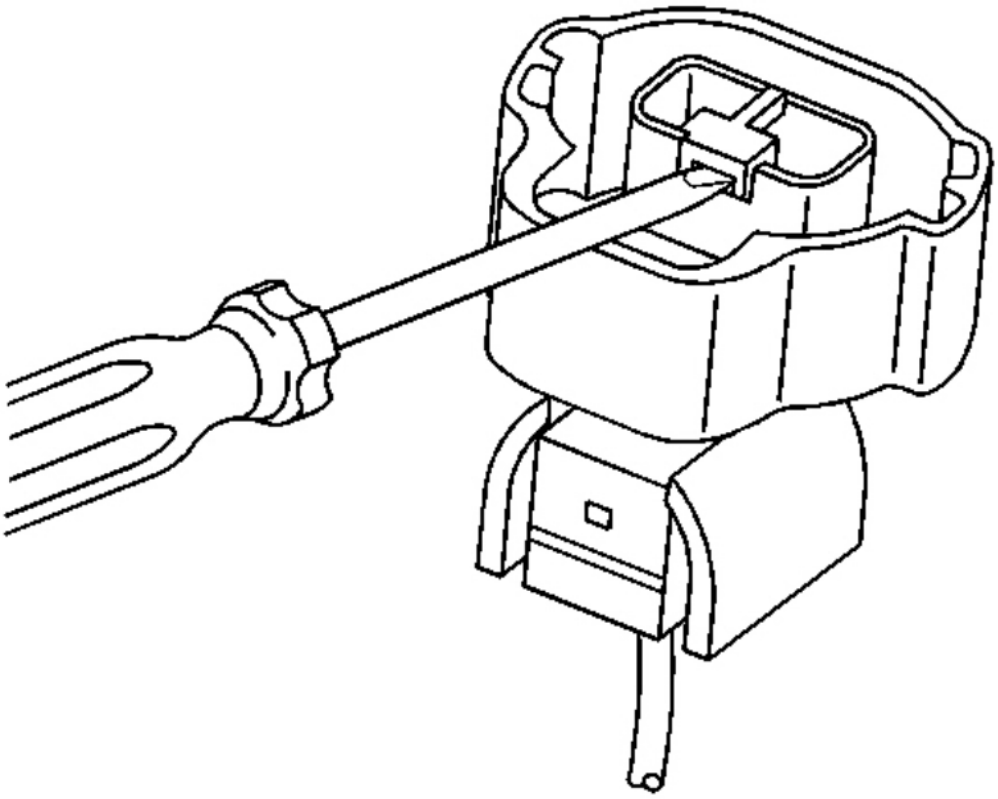


Fig. 135: Identifying Terminal Position Assurance (Yakazi)
Courtesy of GENERAL MOTORS CORP.

2. Insert a small flat blade tool in the slot below the front loaded terminal position assurance (TPA) and pry up.
3. Remove the TPA by pulling it out of the connector.
4. Push the wire side of the terminal that is being removed toward the connector and hold it in position.

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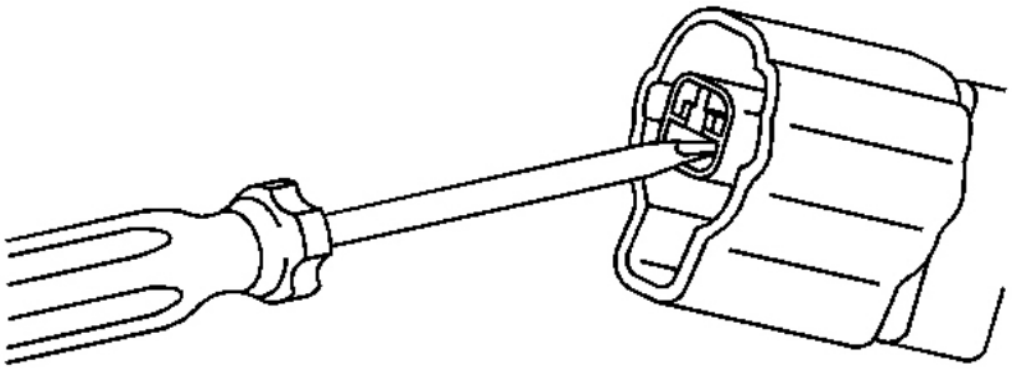


Fig. 136: Inserting Tool Into Terminal Cavity (Yakazi)
Courtesy of GENERAL MOTORS CORP.

5. Insert the J 38125-553 (GM P/N 15315247) on a slight upward angle into the cavity below the terminal to be removed. Ensure that the pointed on the end of the tool is facing the bottom of the terminal and it stays in contact with the terminal until it stops on the plastic terminal retainer. See the release tool cross reference in the Reference Guide of the **J-38125** to ensure that the correct release tool is used. See **Special Tools** .

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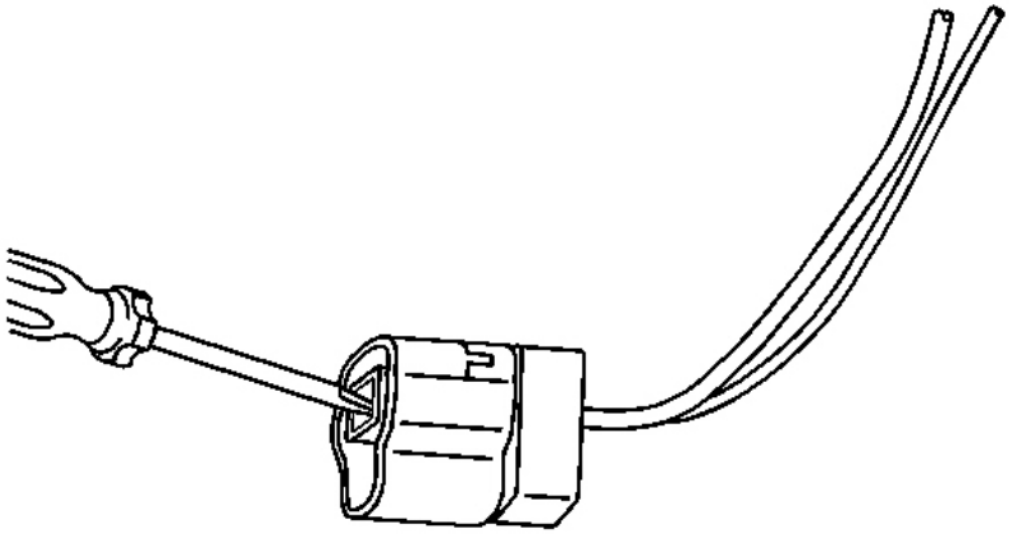


Fig. 137: Pulling Terminal Out Of Connector (Yakazi)
Courtesy of GENERAL MOTORS CORP.

6. Gently pry the plastic terminal retainer down and carefully pull the terminal out of the connector. Always remember never use force when pulling a terminal out of a connector. If the terminal is difficult to remove, repeat the entire procedure.

TERMINAL REPAIR PROCEDURE

Use the appropriate terminal and follow the instructions in the **J-38125** . See **Special Tools** .

YAZAKI CONNECTORS (16-WAY)

TOOLS REQUIRED

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

REMOVAL PROCEDURE

1. While depressing the lock, pull the two connector halves apart.

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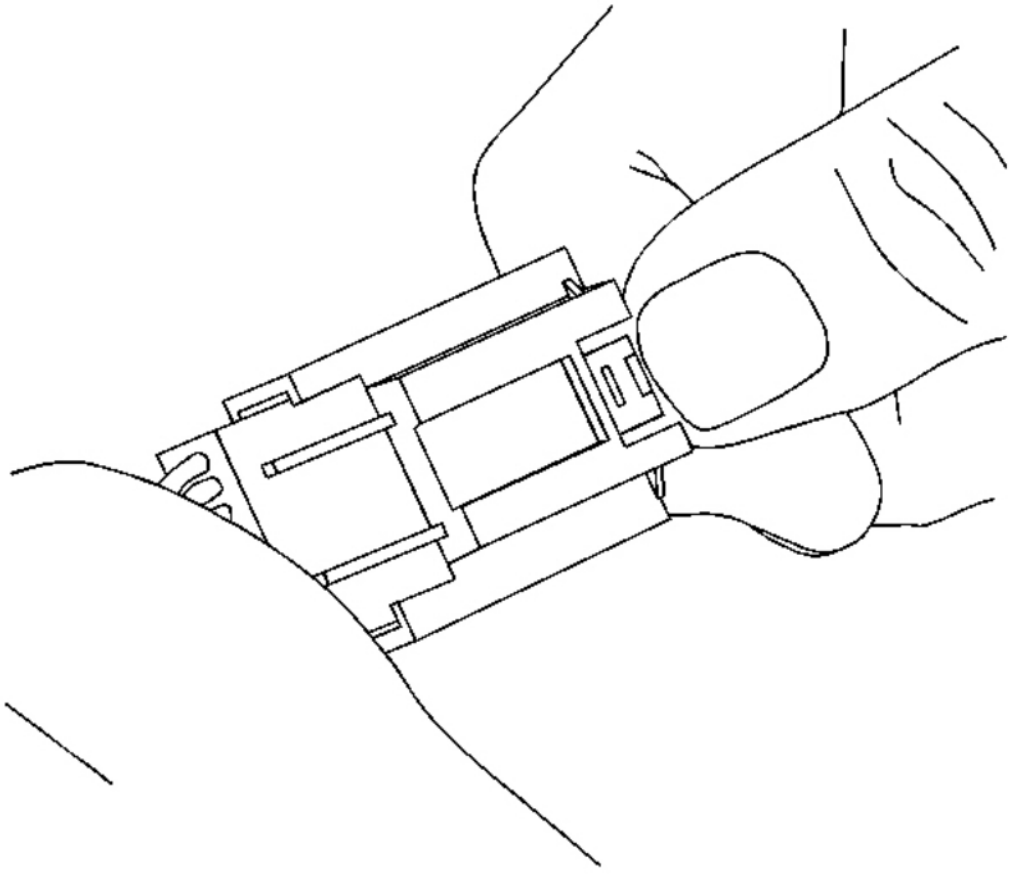


Fig. 138: Pulling Two Connector Halves Apart
Courtesy of GENERAL MOTORS CORP.

2. Use a small flat-blade tool to very carefully push the terminal position assurance (TPA) towards the face of the connector on both sides of the connector.

IMPORTANT: The TPA is fragile and may break if not done carefully.

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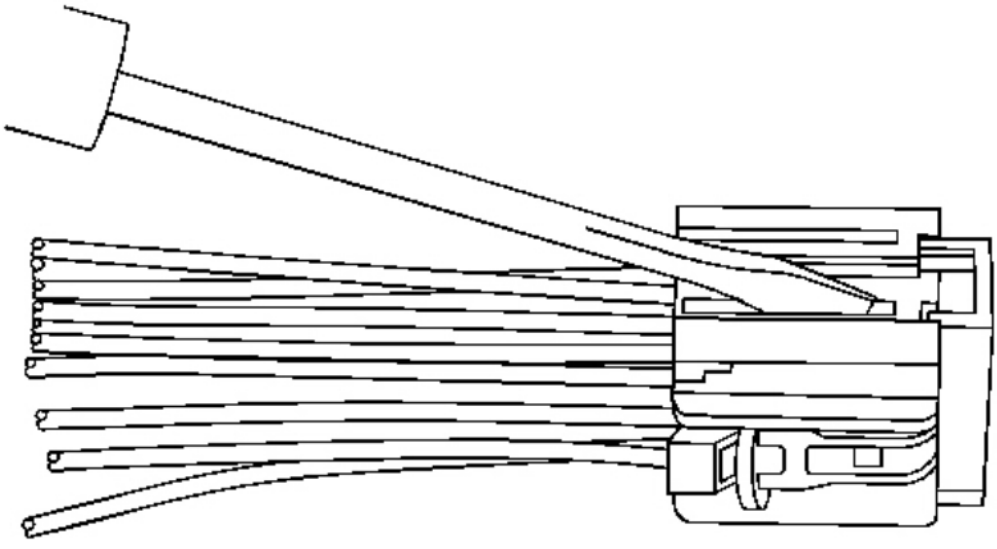


Fig. 139: View Of Male Connector Half & Female Terminals
Courtesy of GENERAL MOTORS CORP.

View of the male half of the connector with female terminals.

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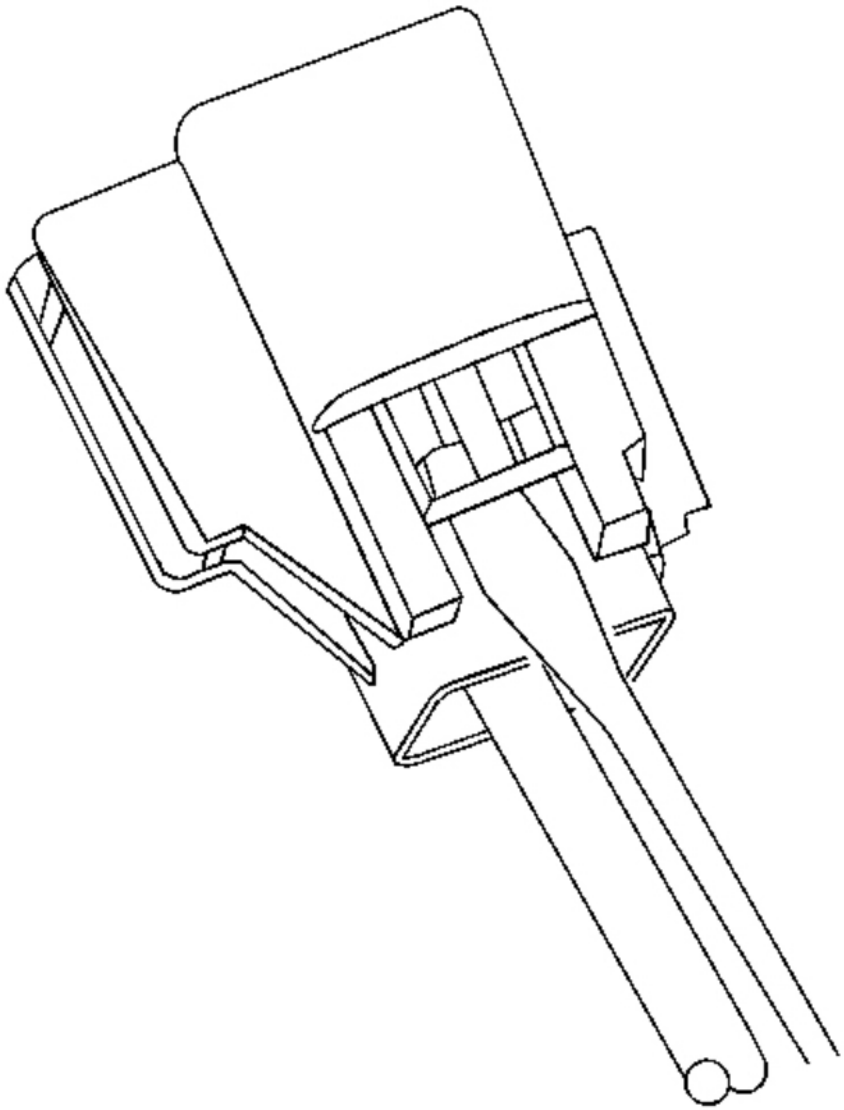


Fig. 140: View Of Female Half Of Connector With Male Terminals
Courtesy of GENERAL MOTORS CORP.

View of the female half of the connector with male terminals.

3. Use the J 38125-215 tool to release the terminals by inserting the tool into the terminal release cavity. See the release tool cross reference in the Reference Guide of the **J-38125** to ensure that the correct release tool is used. See **Special Tools** .

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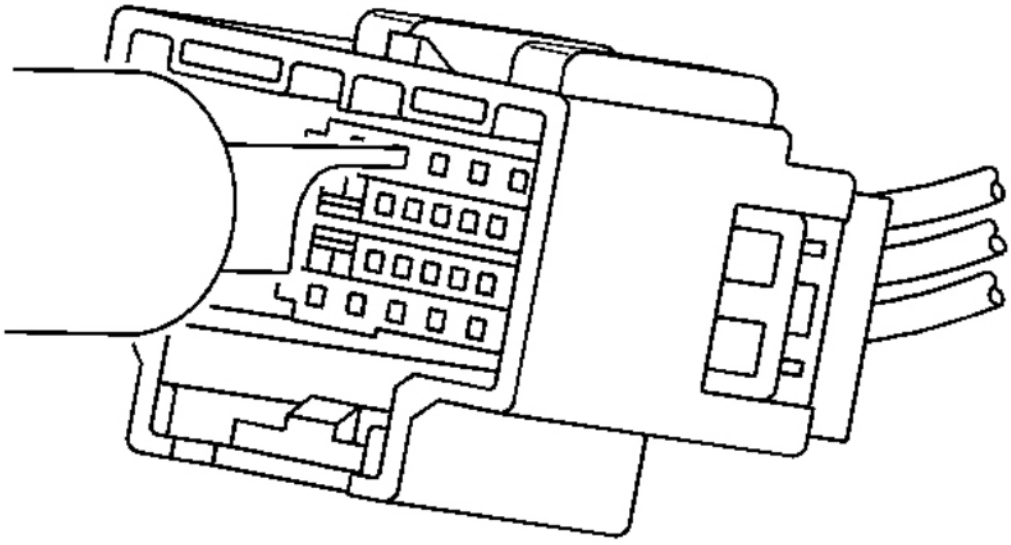
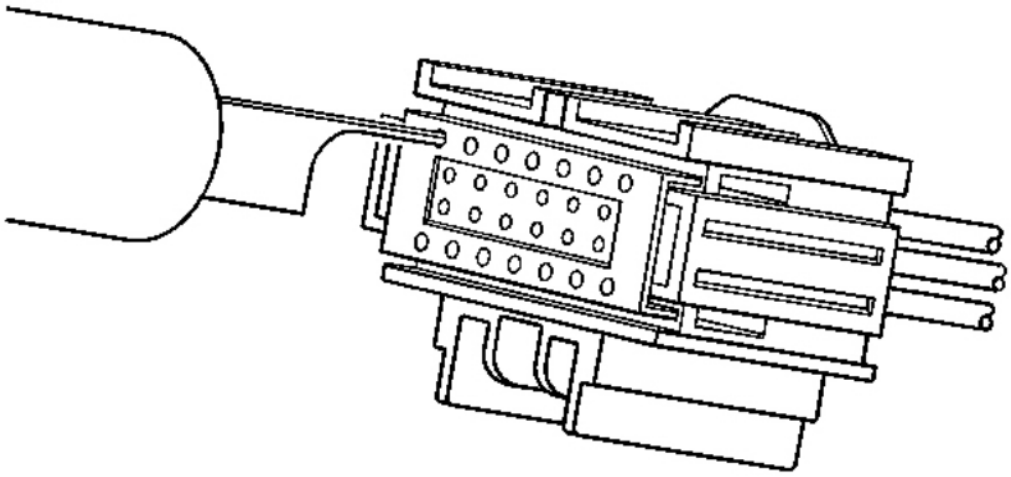


Fig. 141: Using Removal Tool On Female Half Of Connector
Courtesy of GENERAL MOTORS CORP.

View of the female half of the connector with male terminals.



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Fig. 142: Using Removal Tool On Male Half Of Connector
Courtesy of GENERAL MOTORS CORP.

View of the male half of the connector with female terminals.

4. 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.

REPAIR PROCEDURE

Use the appropriate terminal and follow the instructions in the **J-38125** . See **Special Tools** .

Location of the terminal in the repair tray and the proper crimp tool can be found in the appropriate connector end view.

REPAIRING CONNECTOR TERMINALS

TOOLS REQUIRED

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

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** .

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 gage 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.

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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.

IGNITION KEY CANNOT BE REMOVED FROM THE IGNITION LOCK CYLINDER

Ignition Key Cannot Be Removed from the Ignition Lock Cylinder

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation?	Go to **Step 2**	Go to **Steering Wheel and Column Description and Operation**
2	Verify that the key cannot be removed from the lock cylinder. Does the lock system operate normally?	Go to **Step 3**	System OK
3	Is the vehicle equipped with a manual transmission?	Go to **Step 7**	Go to **Step 4**
4	Turn the ignition key to the OFF position. Can the key be turned to the OFF position and be removed?	Go to **Step 7**	Go to **Step 5**
5	Verify the adjustment of the automatic transmission cable. Refer to the appropriate procedure: • **Automatic Transmission Range Selector Lever Cable Adjustment** for the 4L60-E/4L65-E/4L70-E transmission • **Automatic Transmission Range Selector Lever Cable Adjustment** for the 4L80-E/4L85-E transmission • **Automatic Transmission Range Selector Lever Cable Adjustment** for the 6L50/6L80/6L90 transmission Can the key be turned to the OFF position?	System OK	Go to **Step 6**
6	Inspect the linear shift assembly and cable for damage. Is the linear shift assembly or cable damaged?	Go to **Step 9**	Go to **Step 7**
7	Inspect for a faulty lock cylinder. Is the lock cylinder damaged?	Go to **Step 10**	Go to **Step 8**
8	Inspect the ignition lock cylinder case. Is the case worn, damaged or loose?	Go to **Step 11**	Go to **Step 12**
9	Replace the linear shift assembly. Refer to **Linear Shift Assembly Replacement** . Did you complete the repair?	Go to **Step 12**	-

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10	Replace the ignition lock cylinder. Refer to **Ignition Lock Cylinder Replacement** . Did you complete the repair?	Go to **Step 12**	-
11	Replace the ignition lock cylinder case housing. Refer to **Ignition Lock Cylinder Case Replacement** . Did you complete the repair?	Go to **Step 12**	-
12	Operate the system to verify the repair. Did you correct the condition?	System OK	Go to **Step 2**

IGNITION KEY CANNOT TURN OR STICKS IN ANY POSITION

Ignition Key Cannot Turn or Sticks in Any Position

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column System Description and perform the necessary inspections?	Go to **Step 2**	Go to **Steering Wheel and Column Description and Operation**
2	Verify that the key sticks or cannot turn in any position. Is the key functioning correctly?	System OK	Go to **Step 3**
3	Inspect for an incorrect, worn, or damaged key. Is the key incorrect, worn, or damaged?	Go to **Step 7**	Go to **Step 4**
4	Inspect for a faulty lock cylinder. Is the lock cylinder damaged?	Go to **Step 8**	Go to **Step 5**
5	Inspect the ignition switch assembly for damage. Is the ignition switch assembly damaged?	Go to **Step 9**	Go to **Step 6**
6	Inspect the lock cylinder case for looseness. Is the lock cylinder case loose?	Go to **Step 10**	Go to **Step 11**
7	Replace the key. Refer to **Key and Lock Cylinder Coding** . Did you complete the repair?	Go to **Step 11**	-
8	Replace the ignition lock cylinder. Refer to **Ignition Lock Cylinder Replacement** . Did you complete the repair?	Go to **Step 11**	-
9	Replace the ignition switch. Refer to **Ignition and Start Switch Replacement** . Did you complete the repair?	Go to **Step 11**	-
10	Tighten or replace the ignition lock cylinder case. Refer to **Ignition Lock Cylinder Case Replacement** . Did you complete the repair?	Go to **Step 11**	-
11	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 2**

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