

**2018 ELECTRICAL****Wiring Systems And Power Management - Repair Instructions - Equinox & Terrain****REPAIR INSTRUCTIONS****REPAIRING DAMAGED WIRE INSULATION**

If the wire insulation has been chafed, or broken, enough to show the conductive portion of the wire, and the wire is not damaged, determine the length of insulation that needs to be repaired. If the repair is less than 280 mm (11 in), cut the wire within the damaged area. Then slide the appropriate heat shrink tubing (listed below) over the wire, and repair the wire by splicing the wires together. Refer to [Wire to Wire Repair](#). Once the wire is spliced together slide heat shrink tubing over the damaged area and apply heat to seal the repaired wire.

If the wire is damaged, or the damaged area is larger than 280 mm (11 in), then replace the damaged wire by splicing in a new section of wire. Refer to [Wire to Wire Repair](#).

**Heat Shrink Tubing Selection**

| GM Part Number | Diameter |          | Description         | Color | Length |         |
|----------------|----------|----------|---------------------|-------|--------|---------|
|                | Metric   | English  |                     |       | Metric | English |
| 12355010       | 3.2 mm   | 0.125 in | Tubing, Shrink 1/8  | Black | 305 mm | 12 in   |
| 12355003       | 9.5 mm   | 0.375 in | Tubing, Shrink 3/8  | Black | 305 mm | 12 in   |
| 12355005       | 12.7 mm  | 0.5 in   | Tubing, Shrink 1/2  | Black | 305 mm | 12 in   |
| 12355011       | 19.1 mm  | 0.75 in  | Tubing, Shrink 3/4  | Black | 305 mm | 12 in   |
| 12355008       | 25.4 mm  | 1.0 in   | Tubing, Shrink 1.00 | Black | 305 mm | 12 in   |

**Wire Size Conversion**

| Metric Wire Sizes (mm 2) | AWG Sizes |
|--------------------------|-----------|
| 0.13                     | 26        |
| 0.21                     | 24        |
| 0.35                     | 22        |
| 0.5                      | 20        |
| 0.8                      | 18        |
| 1.31                     | 16        |
| 2.09                     | 14        |
| 3.31                     | 12        |
| 5.27                     | 10        |
| 8.37                     | 8         |
| 13.3                     | 6         |
| 21.2                     | 4         |
| 33.6                     | 2         |
| 53.5                     | 1/0       |

**COAXIAL CABLE REPAIRS**

The GM global coaxial (coax) cable repair strategy uses coaxial cables, connectors and jumpers to repair coaxial cables. The intent is to install the new service cable in vehicle, but removal of the old cable is not necessary. There are several repair scenarios:

- New cables, jumpers, and connector housing are required.
- Only new cables are required while it is possible to reuse the existing connector housing in vehicle. A jumper may or may not be needed.
- Only new connector housing are required, while it is possible to reuse the existing cable in the vehicle.
- A new cable would need to be installed from source to destination and by-pass the inline connector in some cases when an inline connector is unrepairable (Example: a cracked male end of a 1-way connector).

### Coaxial Cable Kits

Four different kits will be available to repair coaxial cables. Components of each kit cannot be ordered separately from the kit.

- **Communication Interface Module Antenna Cable Kit** (Kit #13581174) is used to repair Cellular coaxial cables. This kit uses RG58 low loss coaxial cables that are available in four lengths. The coaxial cables can be attached together in various lengths to closely match the length of the faulty/damaged coaxial cable.
- **Digital Radio and Vehicle Locator Antenna Coaxial Cable Kit** (Kit #13581173) is used to repair XM and GPS coaxial cables. For vehicles that have a combined GPS and Cellular/OnStar signal on one cable, use Kit #13581174. This kit uses RG316 low loss coaxial cables that are available in three lengths. The coaxial cables can be attached together in various lengths to closely match the length of the faulty/damaged coaxial cable.
- **Digital Radio, Mobile Telephone and Vehicle Locator Antenna Coaxial Cable Kit** (Kit #19119056) is used with OnStar, XM, and GPS cables. This kit consists of jumpers and connectors. The jumpers are used to adapt different types of connectors together (to attach 2-way and 3-way connector onto the long 7, 5, and 3 foot cables). The connectors are used to replace existing connectors. The 1-way and 2-way connectors in the kit are in water-blue color (different than what the vehicle is built with) and are non-keyed (universal fit). The 3-way connectors in the kit are in the same color as in the vehicle.
- **Communication Interface Module Antenna Cable Kit** (Kit #22803854) is used for the OnStar module on some vehicles built before the 2011 model year.

### Coaxial Cable Repair Kits

| Repair Kit Name                                                             | Description                                                  |
|-----------------------------------------------------------------------------|--------------------------------------------------------------|
| Communication Interface Module Antenna Cable Kit (Kit #13581174)            | RG58 coaxial cable with female/female connectors - 7ft/2.1m  |
|                                                                             | RG58 coaxial cable with female/male connectors - 5ft/1.5m    |
|                                                                             | RG58 coaxial cable with female/male connectors - 3.5ft/1.1m  |
|                                                                             | RG58 coaxial cable with female/male connectors - 3.5ft/1.1m  |
| Digital Radio and Vehicle Locator Antenna Coaxial Cable Kit (Kit #13581173) | RG316 coaxial cable with female/female connectors - 7ft/2.1m |
|                                                                             | RG316 coaxial cable with female/male connectors - 5ft/1.5m   |
|                                                                             | RG316 coaxial cable with female/male connectors - 3.5ft/1.1m |
|                                                                             |                                                              |

| Repair Kit Name                                                                               |                                                                         | Description                                                                                                |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| Digital Radio, Mobile Telephone and Vehicle Locator Antenna Coaxial Cable Kit (Kit #19119056) | 3-way Gen 1 sub-kit                                                     | 1-way to 3-way Gen 1 jumper for female connector - Part #13581154 - 4in/10cm                               |
|                                                                                               |                                                                         | 1-way to 3-way Gen 1 jumper for male connector - Part #19119052 - 4in/10cm                                 |
|                                                                                               |                                                                         | White female connector                                                                                     |
|                                                                                               |                                                                         | White male connector                                                                                       |
|                                                                                               |                                                                         | Blue female connector                                                                                      |
|                                                                                               |                                                                         | Blue male connector                                                                                        |
|                                                                                               | 3-way Gen 2 sub-kit                                                     | 1-way to 3-way Gen 2 jumper for female connector - Part #13581155 - 4in/10cm                               |
|                                                                                               |                                                                         | 1-way to 3-way Gen 2 jumper for male connector - Part #19119058 - 4in/10cm                                 |
|                                                                                               |                                                                         | Tan female connector                                                                                       |
|                                                                                               |                                                                         | Tan male connector                                                                                         |
|                                                                                               |                                                                         | Gray female connector                                                                                      |
|                                                                                               |                                                                         | Gray male connector                                                                                        |
|                                                                                               | 2-way Gen 1 sub-kit                                                     | 1-way to 2-way Gen 1 jumper for female connector - Part #13581156 - 4in/10cm                               |
|                                                                                               |                                                                         | Water-blue female connector                                                                                |
|                                                                                               | 2-way Gen 2 sub-kit (wide)                                              | 1-way to 2-way Gen 2 jumper for female connector - Part #13581157 - 4in/10cm                               |
|                                                                                               |                                                                         | 1-way to 2-way Gen 2 jumper for male connector - Part #13581158 - 4in/10cm                                 |
|                                                                                               |                                                                         | Water-blue female connector                                                                                |
|                                                                                               |                                                                         | Water-blue male connector                                                                                  |
|                                                                                               | 2-way Gen 2 and 3 sub-kit (narrow)                                      | 1-way to 2-way Gen 2 and 3 jumper for female connector - Part #13582468 - 4in/10cm                         |
|                                                                                               |                                                                         | Use the 1-way to 2-way Gen 2 jumper for female connector 19119058 - 4in/10cm from the 2-way Gen 2 sub-kit. |
|                                                                                               |                                                                         | Water-blue female connector                                                                                |
|                                                                                               |                                                                         | Water-blue male connector                                                                                  |
|                                                                                               | Right-angle jumper with water-blue universal 1-way connector - 4in/10cm |                                                                                                            |
| Communication Interface Module Antenna Cable Kit (Kit #22803854)                              |                                                                         | 1-way to mini UHF jumper - 4in/10cm                                                                        |

### Connector Housing Repair Procedure

The connector housings (available in Digital Radio, Mobile Telephone and Vehicle Locator Antenna Coaxial Cable Kit) are available for 1-way housings, 2-way housings and 3-way housings. Determine the connector housing required:

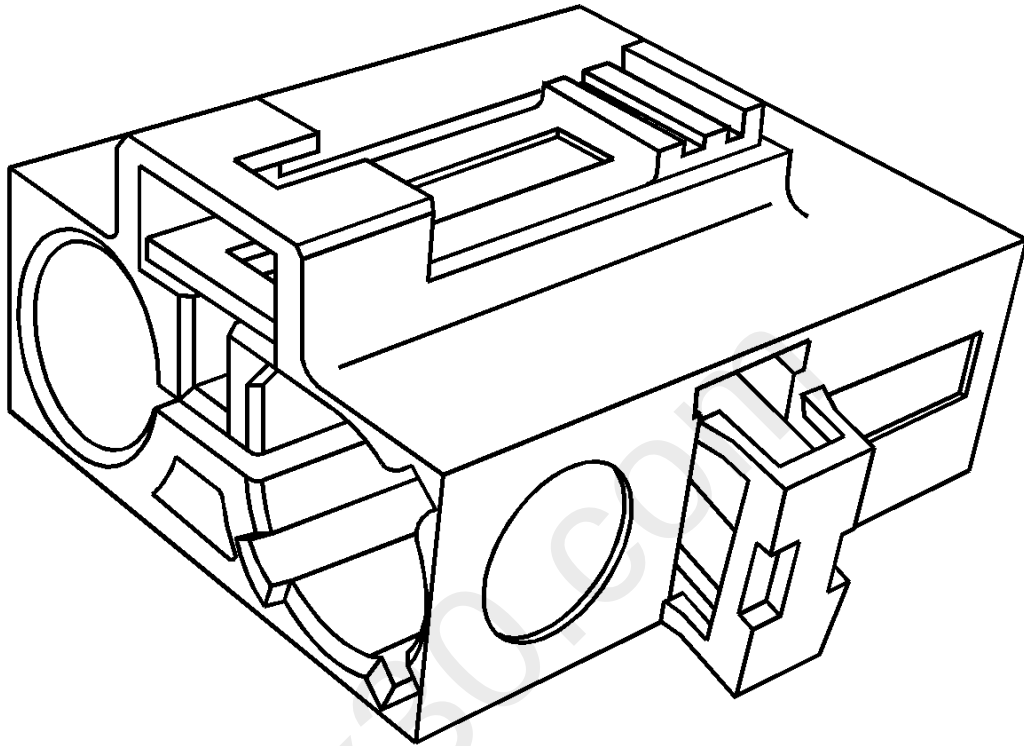
#### 1-way housing

No change to the service coaxial cable is necessary in order to install the new coaxial cable into the vehicle.

#### 2-way housing

A 4-inch jumper is required.

1. Determine the appropriate generation (1, 2, or 3) and/or size (12.7 mm or 8 mm) of the 2-way housing that is in the vehicle.
2. Remove the faulty/damaged coaxial cable from the 2-way connector housing by removing the terminal position assurance (TPA) from the connector housing and then slide the cable out of the connector.



**Fig. 1: Connector Housing**

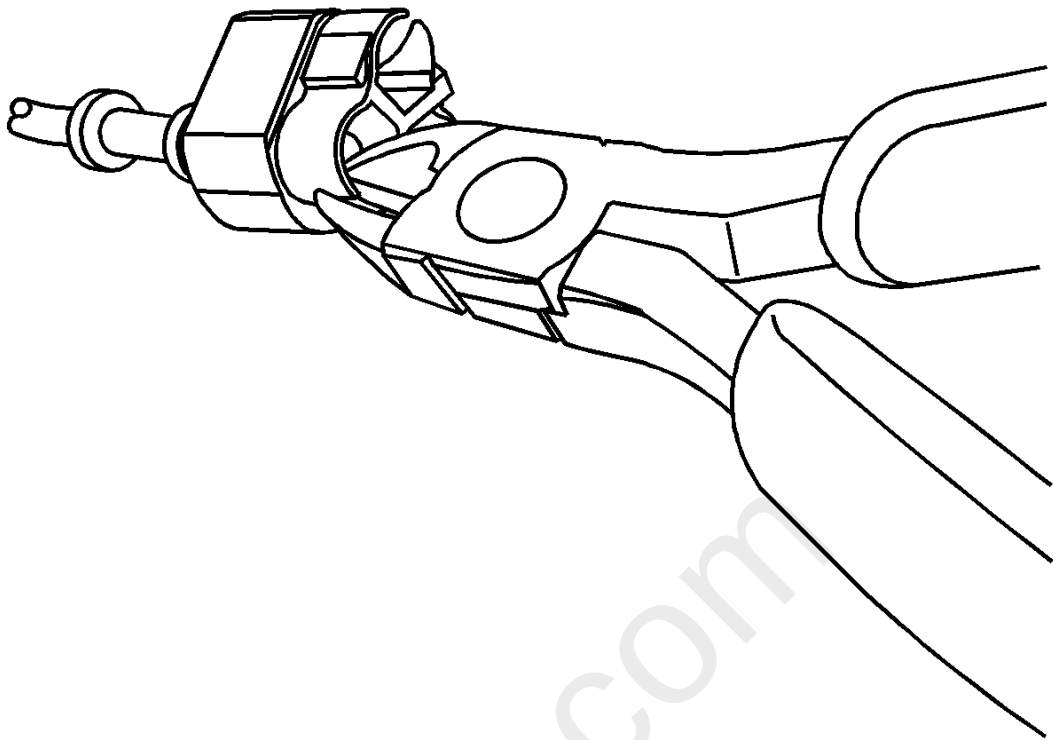
**Courtesy of GENERAL MOTORS COMPANY**

3. Install the new service coaxial cable into the vehicle. Use the 4-inch jumper for the appropriate 2-way connector housing to connect the new service coaxial cable to the connector housing.
4. If the issue is found to be the connector housing and not cable, a new connector housing may be installed while reusing all other components.

### **3-way housing**

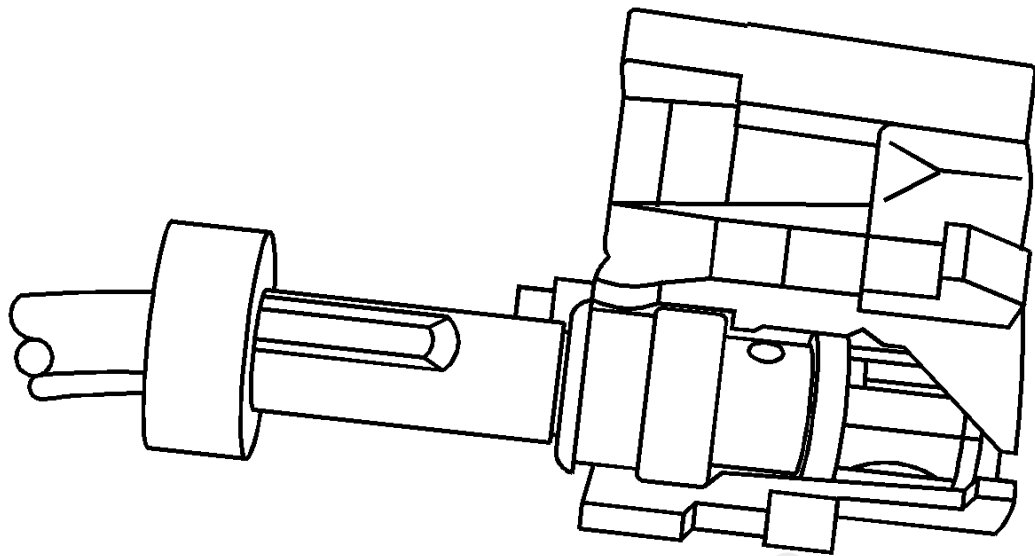
A 4-inch jumper is required.

1. Determine the appropriate generation (1 or 2) and keyed 3-way connector housing based on the connector housing color.
2. Note the locations of each of the cables in 3-way housing, as it is important for new cables be placed in the appropriate terminal location in the new connector. The connector housing colors are not interchangeable.
3. Remove the faulty/damaged coaxial cable from the 3-way connector housing by using a pair of side/diagonal cutters to nip and break away the housing.



**Fig. 2: Using Side/Diagonal Cutters To Nip And Break Away Connector Housing**  
Courtesy of GENERAL MOTORS COMPANY

4. Use caution not to damage the conductive ends of the coaxial cables inside the connector housing. Do not bend or force the terminal out or it could be damaged.

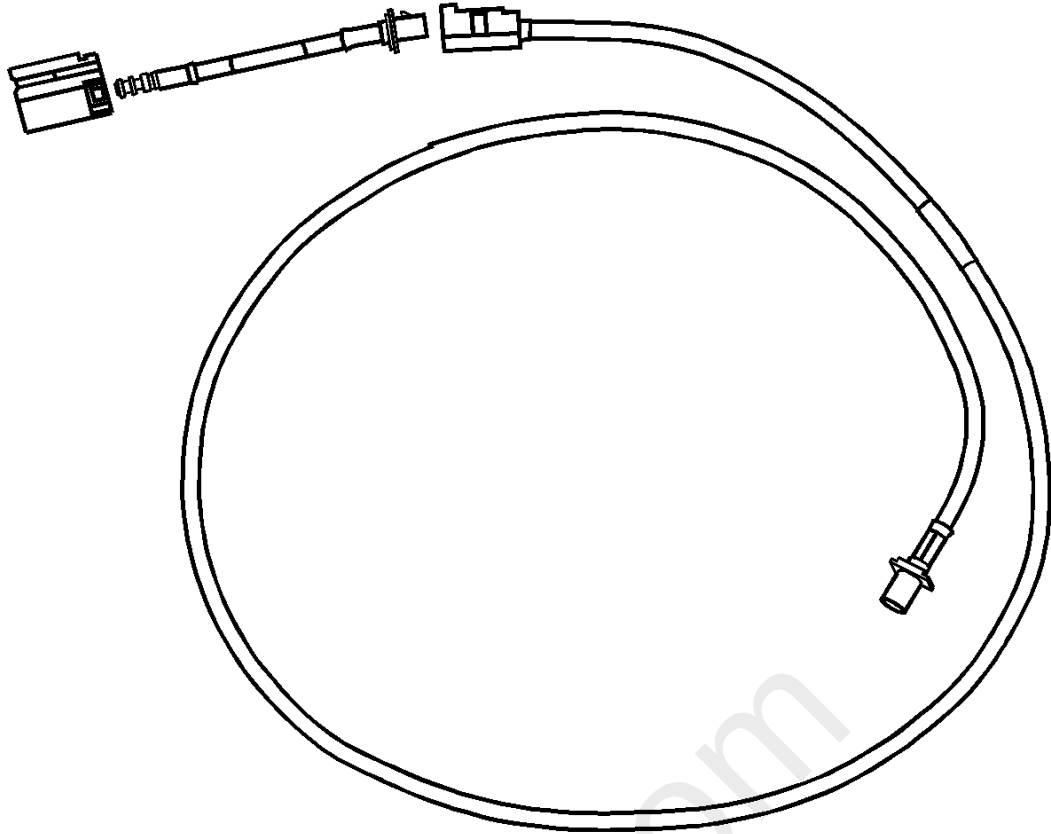


**Fig. 3: Connecting New Service Coaxial Cable To New 3-Way Connector Housing**  
Courtesy of GENERAL MOTORS COMPANY

5. Install the new service coaxial cable into the vehicle. Use the 4-inch jumper for the appropriate color 3-way connector housing to connect the new service coaxial cable to the new 3-way connector housing.
6. If the issue is found to be the connector housing and not cable, a new connector housing may be installed while reusing all other components.

#### **Coaxial Cable Repair Procedure**

1. Identify the faulty/damaged coaxial cable.
2. Disconnect the faulty/damaged coaxial cable and leave it in the vehicle.
3. Identify the type of coaxial cable to be replaced and match up with the appropriate pieces to repair the damaged coaxial cable. Match up the type of coaxial cable, cable length and connector types. In some cases there may be extra length of cable left over.



**Fig. 4: Coaxial Cable**

Courtesy of GENERAL MOTORS COMPANY

**NOTE:**

- Avoid routing the new coaxial cable near sharp edges that can damage the new coaxial cable.
- In some instances, it may be necessary to pass the new coaxial cable through the dash panel harness grommet:
  - If the dash panel grommet has a service port nipple, cut or pierce a small hole in the nipple. With the assistance of a fishing tool, insert the coaxial cable through the hole created in the nipple and pull the coaxial cable through the grommet and into the vehicle interior. Seal the nipple with an appropriate sealant to prevent moisture and noise intrusion into the vehicle interior.
  - If the dash panel grommet does not have a service port nipple, cut or pierce a small hole in the grommet with a suitable tool such as a small drill bit. With the assistance of a fishing tool, insert the coaxial cable through the hole created in the grommet and pull the coaxial cable through the grommet and into the vehicle interior. Seal the hole with an appropriate sealant to prevent moisture and noise intrusion into the vehicle interior.

4. Install the new coaxial cable in the vehicle.

Use tie-straps to attach the new service coaxial cable to existing harnesses or brackets. Use felt tape/foam to reduce rattles, as necessary.

**NOTE:**

**To avoid permanent damage, do not pinch the cable or bend it tighter**

than a 2 inch (5 centimeter) radius.

5. Remove the faulty/damaged connectors, if applicable.
6. Install new connectors or jumpers, as needed. Refer to Connector Housing Repair Procedure.
7. Verify the repair by operating the system with the engine running.

## FLAT WIRE REPAIRS

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.

## FOLDED-OVER WIRE REPAIR

### Special Tools

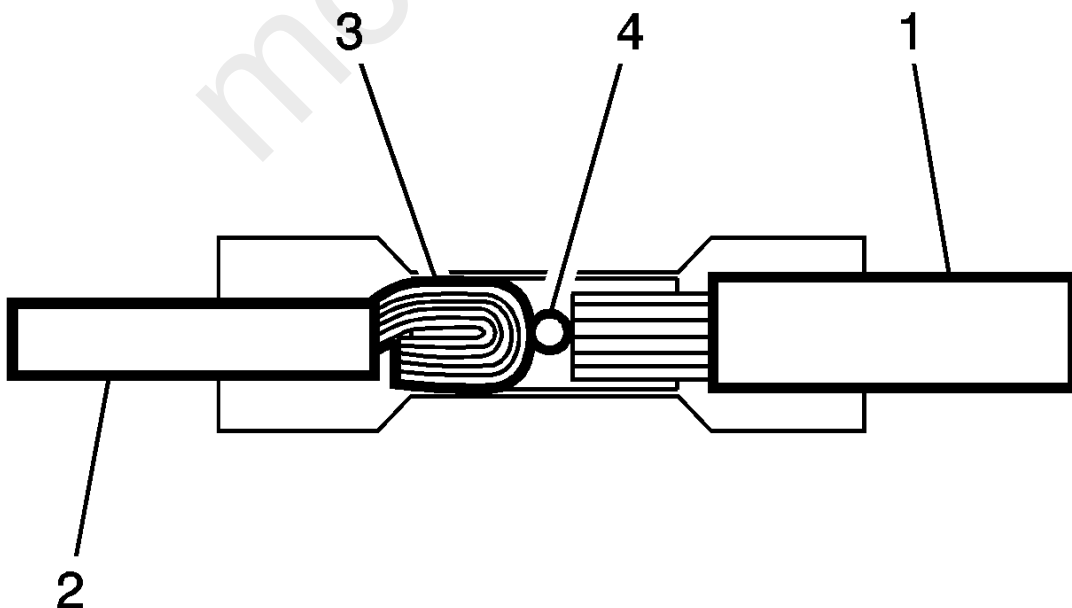
- **EL-38125-10** Splice Sleeve Crimping Tool (non GMNA)
- **J-38125-5A** Ultra Torch Special Tool
- **J-38125-8** Splice Sleeve Crimping Tool (GMNA)

For equivalent regional tools, refer to [Special Tools](#) .

The GM global wire repair strategy uses connector assemblies (pigtails) and terminated leads to repair wiring harnesses.

To reduce and manage GM Service Parts proliferation, the service pigtails and terminated leads are designed with the largest wire gauge size that can be held by either the terminal or the connector housing.

The folded over wire repair technique, in which the copper wire strands are folded over before being installed into a splice sleeve, allows the service part to be used when repairing a smaller gauge size wire in a vehicle. This technique has passed all GM testing standards.



**Fig. 5: Stripped Wires In Splice Sleeve Connector**  
**Courtesy of GENERAL MOTORS COMPANY**

The larger harness size wires (1) will be placed in one side of the splice sleeve and match the splice sleeve closely in size. The wires are moved into the splice sleeve until they hit the stop (4) in the splice sleeve. The smaller harness size wires (2) will be placed in the other side of the splice sleeve. The smaller harness size wires will be folded over (3) to match up with the splice sleeve size.

Use the folded over wire repair for:

**NOTE:** Increasing the amount of copper strands in the smaller gauge size will allow for a better crimp

- Splicing wires of 0.35 mm or less (22, 24, 26 gauge sizes)

**NOTE:** Vehicle side needs to be of same or less gauge size (not greater than the service part's gauge size)

- Splicing wires of different gauges

Use the Service Information (SI) connector end-views to determine:

- Gauge size of wiring harness
- Recommended Repair: Terminated Lead or Pigtail

The following table lists the acceptable variance within the gauge size

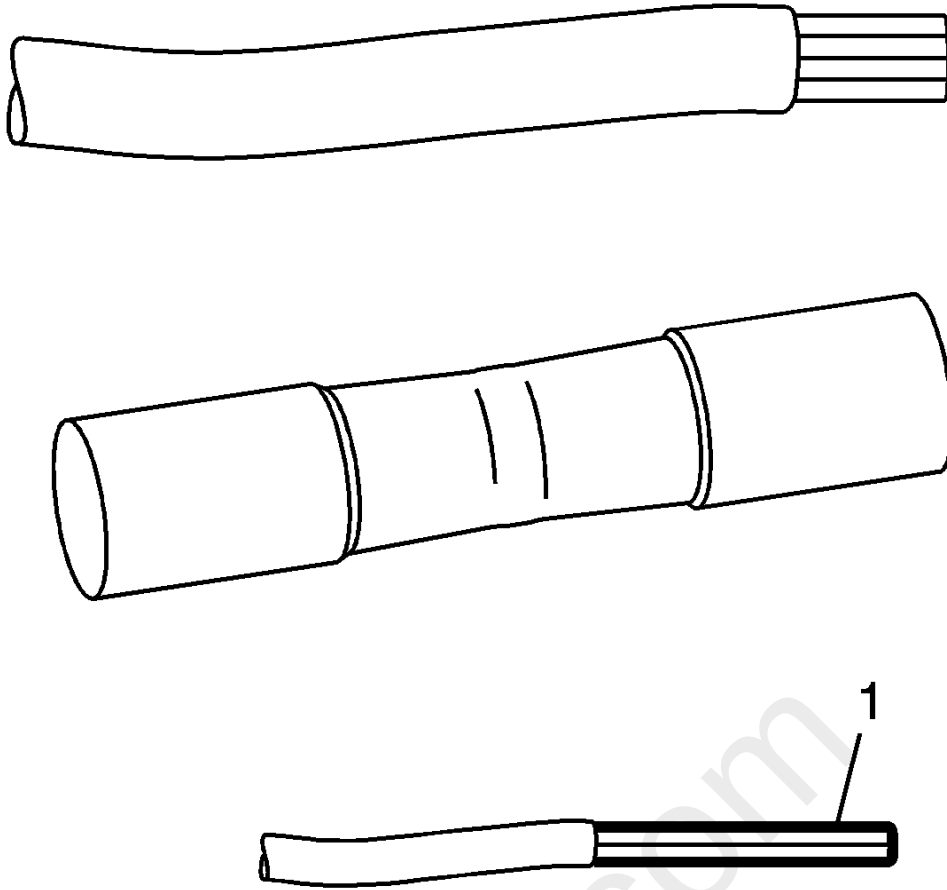
**Folded-Over Wire Selection Table**

| Harness Wire Gauge |                  | Connector Assembly (Pigtail) or Terminated Lead Wire Gauge Size |                       |                          |                            |
|--------------------|------------------|-----------------------------------------------------------------|-----------------------|--------------------------|----------------------------|
| -                  |                  | Salmon Color Splice Sleeve                                      |                       | Blue Color Splice Sleeve | Yellow Color Splice Sleeve |
| Metric             | -                | 0.35 mm                                                         | 0.5 - 0.8 mm          | 1.0 - 2.0 mm             | 3.0 - 6.0 mm               |
| -                  | Wire Gauge (AWG) | 22                                                              | 20 - 18               | 16 - 14                  | 12 - 10                    |
| 0.13 mm            | 26               | Fold Over Wire                                                  | Double Fold Over Wire | Not Acceptable           | Not Acceptable             |
| 0.22 mm            | 24               | Fold Over Wire                                                  | Fold Over Wire        | Not Acceptable           | Not Acceptable             |
| 0.35 mm            | 22               | Fold Over Wire                                                  | Fold Over Wire        | Double Fold Over Wire    | Not Acceptable             |
| 0.5 mm             | 20               | Not Acceptable                                                  | Wire to Wire          | Fold Over Wire           | Not Acceptable             |
| 0.75 mm            | -                | Not Acceptable                                                  | Wire to Wire          | Fold Over Wire           | Double Fold Over Wire      |
| 0.8 mm             | 18               | Not Acceptable                                                  | Wire to Wire          | Fold Over Wire           | Double Fold Over Wire      |
| 1.0 mm             | 16               | Not Acceptable                                                  | Not Acceptable        | Wire to Wire             | Double Fold Over Wire      |
| 1.5 mm             | -                | Not Acceptable                                                  | Not Acceptable        | Wire to Wire             | Fold Over Wire             |
| 2.0 mm             | 14               | Not Acceptable                                                  | Not Acceptable        | Wire to Wire             | Fold Over Wire             |
| 2.5 mm             | -                | Not Acceptable                                                  | Not Acceptable        | Wire to Wire             | Fold Over Wire             |
| 3.0-6.0 mm         | 12 - 10          | Not Acceptable                                                  | Not Acceptable        | Not Acceptable           | Wire to Wire               |

**Example**

For an IP Harness of 0.22 mm (24 gauge on left side of table) wire size, the SI connector end-view recommends a pigtail with leads of 0.8 mm (18 gauge on the top of the table) with a salmon colored DuraSeal splice sleeve of 0.5 - 1.0 mm (20 - 16 gauge).

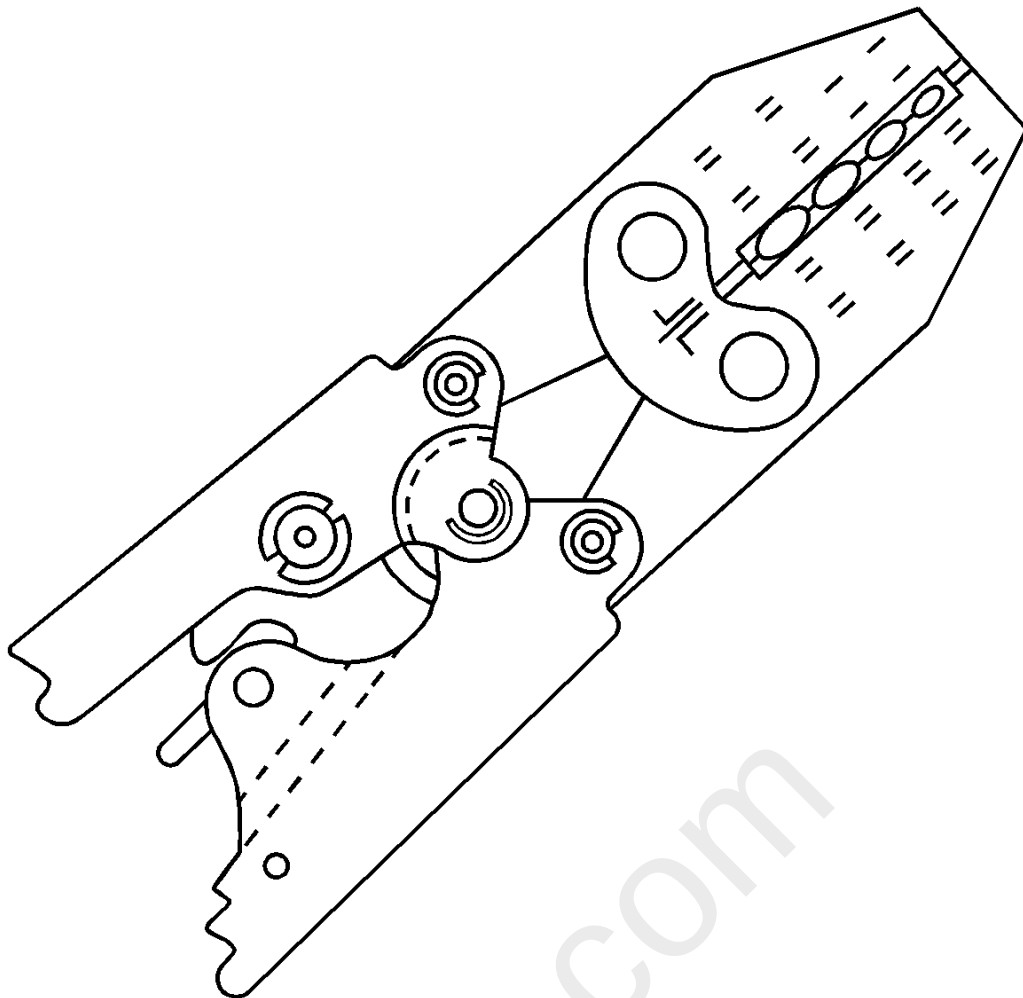
Follow these steps to use the folded over wire (1) technique on an IP Harness.



**Fig. 6: Stripped Wires**

**Courtesy of GENERAL MOTORS COMPANY**

Strip twice the amount of insulation on the smaller (1) wire (IP Harness is the lower wire) than normally required. Normally, the terminated leads have 5 mm of insulation stripped off the wire.

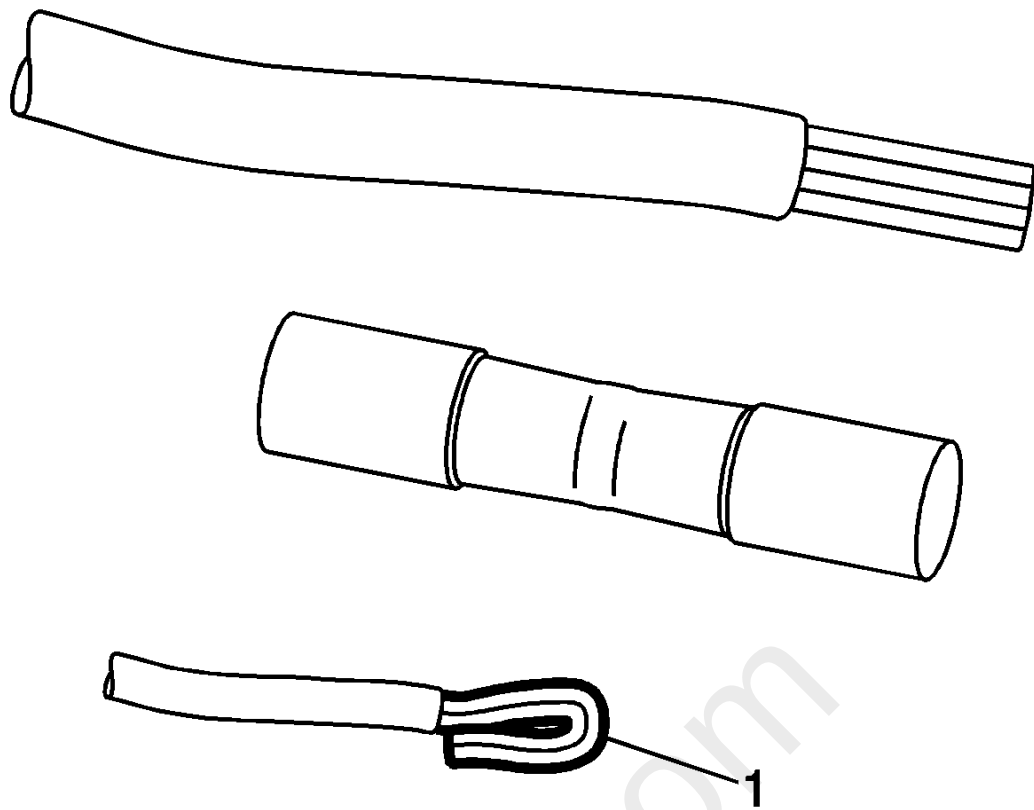


**Fig. 7: Splice Sleeve Crimping Tool**

Courtesy of GENERAL MOTORS COMPANY

**NOTE:** Use EL-38125-10 splice sleeve crimping tool (non GMNA) or J-38125-8 splice sleeve crimping tool (GMNA).

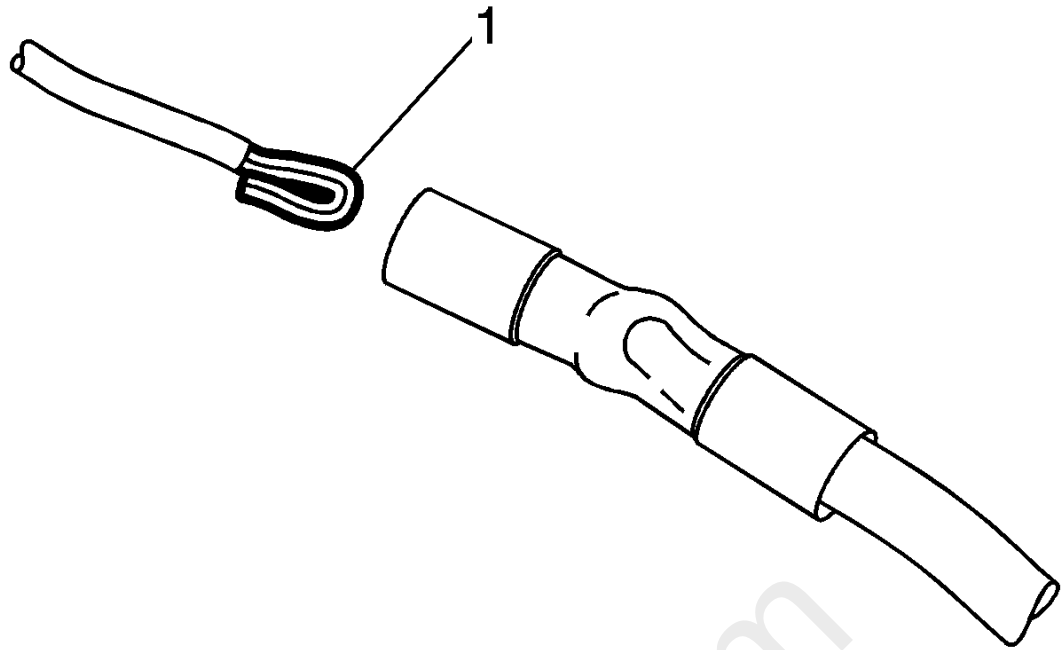
1. For wiring repair, refer to [Wire to Wire Repair](#).



**Fig. 8: Twisted And Folded Wire To Length**

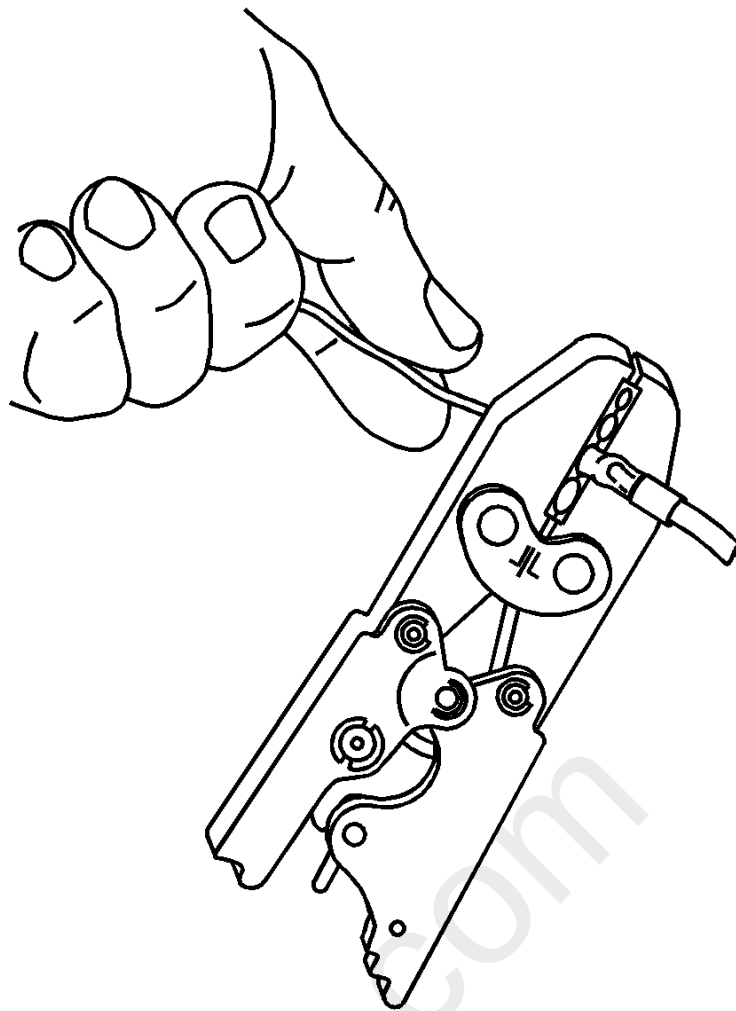
**Courtesy of GENERAL MOTORS COMPANY**

2. Twist the wires before you fold them over to prevent the wire strands from opening up. Fold over the copper wire strands of the smaller (1) gauge wire so that it is the same length as the non-folded wire.



**Fig. 9: Folded Wire And Splice Sleeve**  
**Courtesy of GENERAL MOTORS COMPANY**

3. Insert the folded over wire (1) into the splice sleeve.



**Fig. 10: Crimping Splice Sleeve**  
Courtesy of GENERAL MOTORS COMPANY

4. Use the proper crimp tool to crimp the splice sleeve to the smaller wire (harness side of repair). Complete the crimp as usual (using the heat tool to shrink the tube).

## **SERIAL DATA CIRCUIT WIRING REPAIRS**

### **Special Tools**

- **J-38125-8** Splice Sleeve Crimping Tool
- DuraSeal splice sleeves
- A wire stripping tool

For equivalent regional tools, refer to [Special Tools](#) .

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 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.

### **GMLAN Repairs**

**NOTE:** 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**

**NOTE:** A terminated lead 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.

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**

**NOTE:** Refer to Wiring Repairs in the service information connector end views or the vehicle wiring schematics in order to determine the correct wire size for the circuit you are repairing. You must obtain this information in order to ensure circuit integrity.

If any wire except the pigtail is damaged, repair the wire by splicing in a new section of wire of the same gauge size (0.5 mm<sup>2</sup>, 0.8 mm<sup>2</sup>, 1.0 mm<sup>2</sup> etc.). Use the DuraSeal splice sleeves and EL-38125-10 tool. For wiring repair, refer to [Wire to Wire Repair](#).

### **Media Oriented Systems Transport (MOST) Wiring Repair**

**NOTE:** If harness repair/analysis is performed, MOST bus Twist Pair unshielded wire should be 0.35 mm<sup>2</sup> (22 AWG) wire with at least one twist per each 1 45/64 inch (45 mm) and must not be untwisted for more than 3 15/16 of an inch (10 cm).

The following conditions need to be met to ensure a valid continuity:

- Untwisted length for all MOST 50 circuits at each wire harness connector should be no longer 50 mm max (25 mm preferred).
- When wire repairs are made, a minimum 25 twists/meter for all MOST 50 circuits.
- MOST 50 has specific receive and transmit I/O.

The transmit of one module is connected to receive of the next module in ring topology.

### **HEATED OXYGEN SENSOR WIRING REPAIRS**

**CAUTION:** 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.

## HIGH TEMPERATURE WIRING REPAIRS

**NOTE:** All wiring repairs need to be 200 mm from the heat zone. Areas of consideration would be any area located near the exhaust manifolds, catalytic converter, exhaust pipes, and turbocharged engines.

### Items Required

- DuraSeal splice sleeves to crimp and seal connections
- High temperature SCT1 shrink tubing to protect the splice sleeves
- Terminated leads or pigtails
- The correct tools to remove the terminals from the connectors

Use high temperature bulk wire rated at 150°C (302°F) continuous temperature of the same or larger gauge size as the original wire when repair damage wire. Also replace any reflective tape that you remove during the repair.

### 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.
- After making a wiring repair, ensure that the location of the wiring is not moved closer to the heat source.

### Identifying High Temperature Wiring

**NOTE:** High temperature areas would be areas located near exhaust manifolds, catalytic converters, exhaust pipes, and turbocharged engines.

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 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.

## SIR/SRS WIRING REPAIRS

**NOTE:** Refer to [SIR Service Precautions](#) .

### For European Regions

**CAUTION:** If the SIR/SRS wiring, connector, or terminal is damaged, the affected wiring harness must be replaced. Do not attempt to repair the wiring, connector, or terminals. Any attempt to repair the wires, connectors, or

terminals could result in performance problems of the SIR/SRS System. Operations on restraint systems must only be performed by trained and qualified personnel.

## For Non-European Regions

### Special Tools

Splice Sleeve Crimping Tool, refer to [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.

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

**NOTE:** 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 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.

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. Terminated leads can be used to replace damaged terminals when replacing the connector body.

### SIR/SRS Component Wire Pigtail Repair

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

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

### SIR/SRS Wire Repair

**CAUTION:** Do not install more than 2 DuraSeal splice sleeves per SIR deployment loop. A deployment loop consists of both wires from the K36 Inflatable Restraint Sensing and Diagnostic Module to the deployable component. If more than 2 DuraSeal splice sleeves are required for any SIR deployment loop, the complete circuit of the loop must be replaced. More than 2 DuraSeal splice sleeves per deployment loop may increase the resistance in the circuit causing a DTC to be set.

**NOTE:** Refer to Wiring Repairs in the service information connector end views or the vehicle wiring schematics in order to determine the correct wire size for the circuit you are repairing. You must obtain this information in order to ensure circuit integrity.

If any wire except the pigtail is damaged, repair the wire by splicing in a new section of wire of the same gauge size (0.5 mm, 0.8 mm, 1.0 mm etc.). Use the DuraSeal splice sleeves and the appropriate splice sleeve crimping tool. For wiring repair, refer to [Wire to Wire Repair](#).

For connector position assurance (CPA), refer to [Connector Position Assurance Locks](#).

For terminal position assurance (TPA), refer to [Terminal Position Assurance Locks](#).

## SPLICING INLINE HARNESS DIODES

Many vehicle electrical systems use a diode to isolate circuits and protect the components from voltage spikes. When installing a new diode use the following procedure.

1. Open the harness.
  - If the harness is taped, remove the tape.
  - To avoid wiring insulation damage, use a sewing seam ripper (available from sewing supply stores) 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.

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

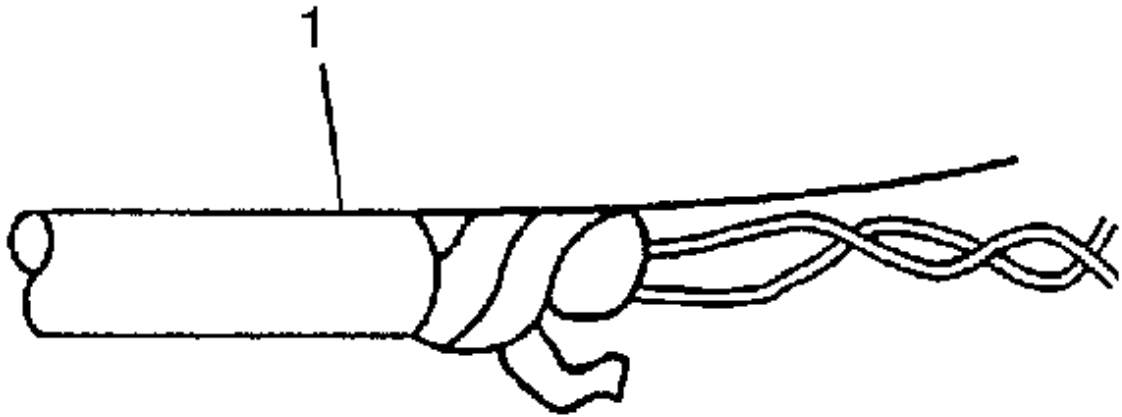
5. Carefully strip away a section of insulation next to the old soldered portion of the wire(s). Do not remove any more than is needed to attach the new diode.
6. Check current flow direction of the new diode, being sure to install the diode with correct bias. Reference the appropriate service information 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.

**NOTE:**      **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.

## **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.



**Fig. 11: Outer Wiring Jacket**

**Courtesy of GENERAL MOTORS COMPANY**

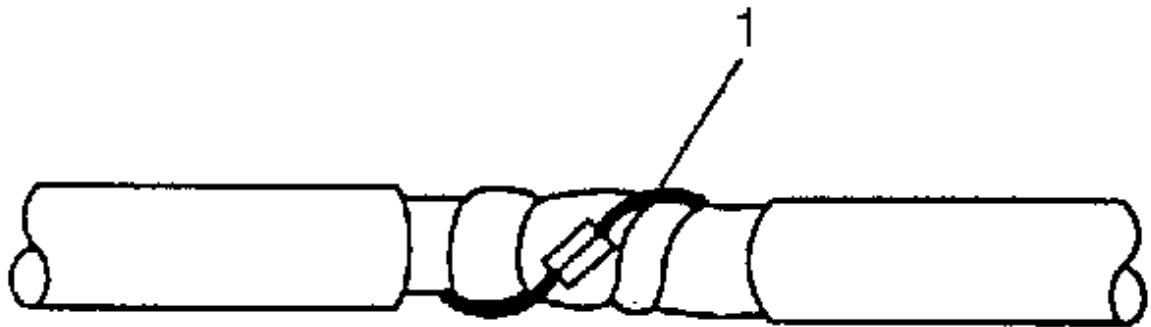
1. Remove the outer jacket (1). Use care not to cut into the drain wire of the mylar tape.
2. Unwrap the tape. Do not remove the tape. Use the tape in order to rewrap the twisted conductors after the splice is made.



**Fig. 12: Preparing Splice**

**Courtesy of GENERAL MOTORS COMPANY**

3. Prepare the splice. Untwist the conductors and follow the instructions for **Wire to Wire Repair**. Staggering the splices by 65 mm (2.5 in) is recommended.



**Fig. 13: Drain Wire**

Courtesy of GENERAL MOTORS COMPANY

**NOTE:** Apply the mylar tape with the aluminum side inward. This ensures good electrical contact with the drain wire.

4. Re-assemble the cable.

- Rewrap the conductors with the mylar tape. If the mylar tape is damaged, use 3M product AL-36FR to replace the damaged 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 electrical tape to replace the outer insulation.



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

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

## **WIRE TO WIRE REPAIR**

### **Special Tools**

- **EL-38125-10** Splice Sleeve Crimping Tool (non GMNA)
- **J-38125-5A** Ultra Torch Special Tool
- **J-38125-8** Splice Sleeve Crimping Tool (GMNA)

For equivalent regional tools, refer to [Special Tools](#).

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

**NOTE:** If the wiring harness internal to the transmission is damaged, the wiring harness must be replaced. The use of splice sleeves in an attempt to

repair the internal transmission wires, connectors, or terminals could result in performance issues.

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

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

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

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

### Splice Sleeve Selection

| Splice Sleeve Color              | Crimp Tool Nest Color    |               | Wire Gauge mm <sup>2</sup> / (AWG) |
|----------------------------------|--------------------------|---------------|------------------------------------|
|                                  | 3 Crimp Nests            | 4 Crimp Nests |                                    |
| Salmon (Yellow-Pink)<br>19300089 | Red (1) or Red/Green (1) | Red (2)       | 0.22 - 0.8/(18 - 26)               |
| Blue<br>19168447                 | Blue (2)                 | Blue (3)      | 1.0 - 2.0/(14 - 16)                |
| Yellow<br>19168448               | Yellow (3)               | Yellow (4)    | 3.0 - 5.0/(10 - 12)                |

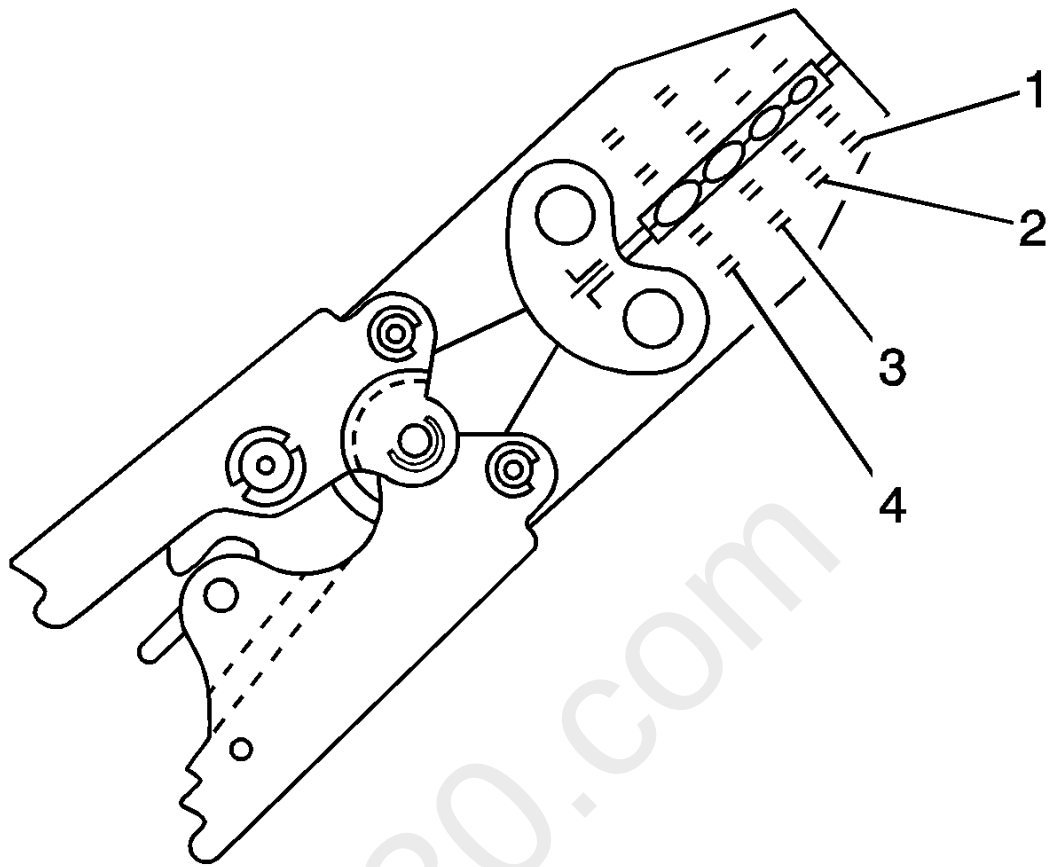
**NOTE:** You must perform the following procedures in the listed order. Repeat the procedure if any wire strands are damaged. You must obtain a clean strip with all of the wire strands intact.

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

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

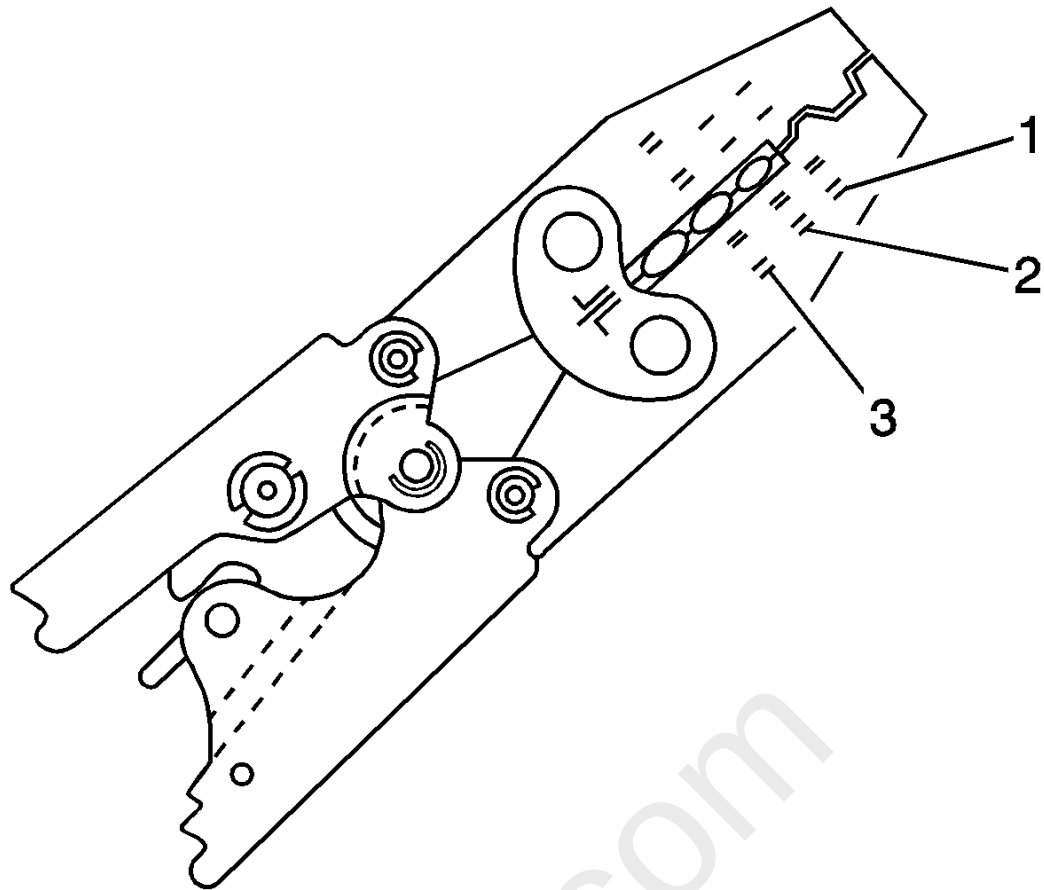
3. Strip the insulation:
  - When adding a length of wire to the existing harness, use the same size wire as the original wire.
  - Perform one of the following items in order to find the correct wire size:
    - Find the wire on the schematic and convert to regional wiring gauge size.
    - If you are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

5. Select the proper DuraSeal splice sleeve according to the wire size. Refer to the above table at the beginning of the repair procedure for the color coding of the DuraSeal splice sleeves and the crimp tool nests.



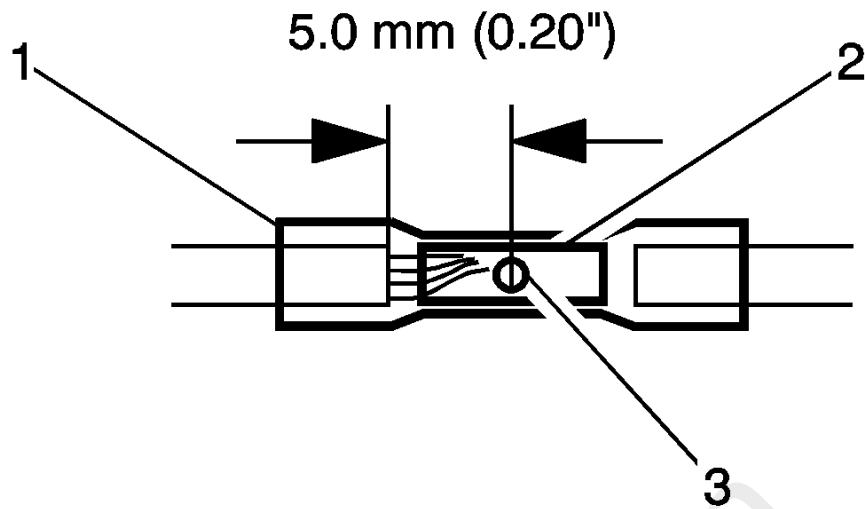
**Fig. 15: Splice Sleeve Crimping Tool With 4 Crimp Nests**  
**Courtesy of GENERAL MOTORS COMPANY**

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



**Fig. 16: Splice Sleeve Crimping Tool With 3 Crimp Nests**  
**Courtesy of GENERAL MOTORS COMPANY**

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



**Fig. 17: Identifying DuraSeal Splice Sleeve**  
**Courtesy of GENERAL MOTORS COMPANY**

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



**Fig. 18: Crimped DuraSeal Splice Sleeve**

**Courtesy of GENERAL MOTORS COMPANY**

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

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



**Fig. 19: Heated Splice Sleeve**

Courtesy of GENERAL MOTORS COMPANY

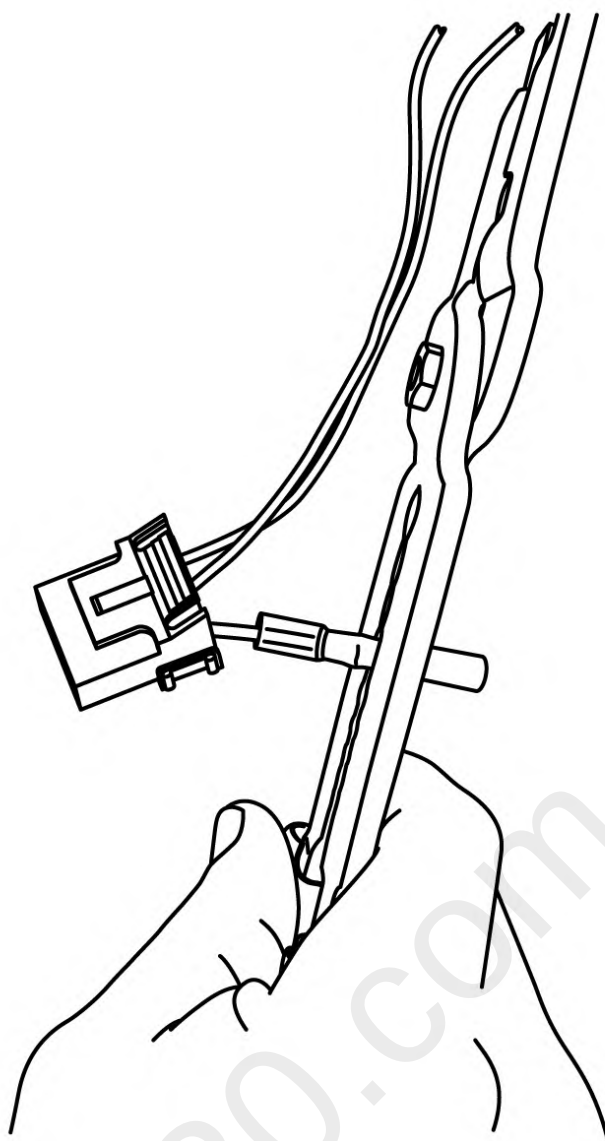
12. Using the heat torch, apply heat to the crimped area of the barrel.
13. Start in the middle and gradually move the heat barrel to the open ends of the tubing:
  - The tubing will shrink completely as the heat is moved along the insulation.
  - A small amount of sealant will come out of the end of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

#### **Weatherpack™ Wiring Repair**

**NOTE:**

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

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

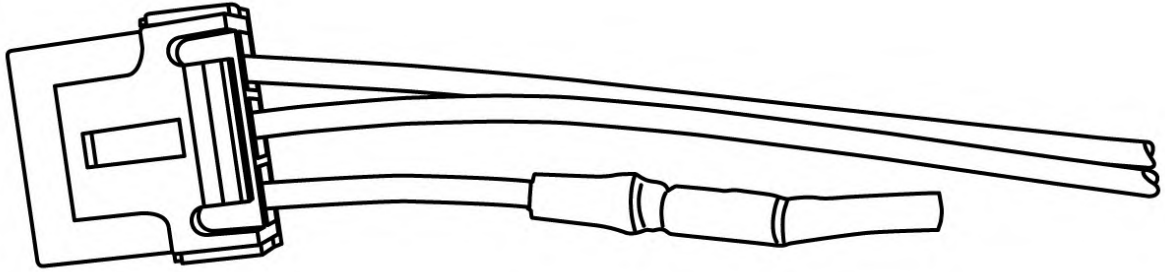


**Fig. 20: Tightly Close Handles Of Crimp Tool**  
**Courtesy of GENERAL MOTORS COMPANY**

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

The crimper handles will not open until you apply the proper amount of pressure to the DuraSeal splice sleeve. Holding the DuraSeal with one hand gently tug on the wire to ensure it is crimped in the DuraSeal.

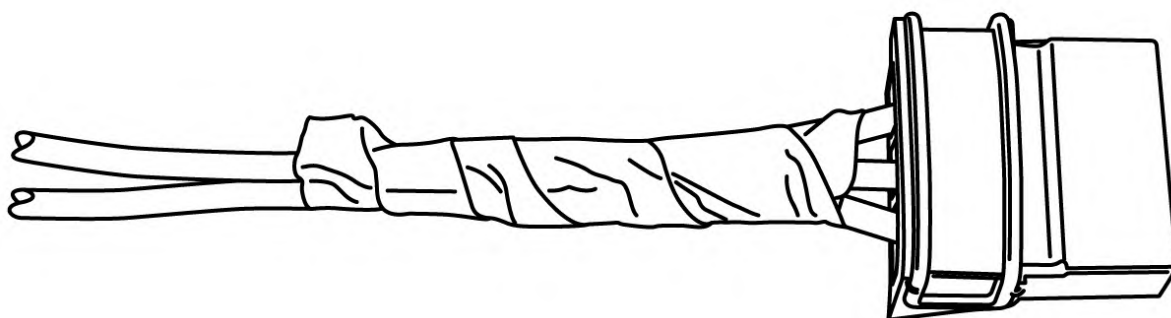
3. Using the heat torch, apply heat to the crimped area of the barrel.



**Fig. 21: Heat To Crimped Area Of Barrel**

**Courtesy of GENERAL MOTORS COMPANY**

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



**Fig. 22: Taping Extra Terminated Leads Back Into Harness**  
Courtesy of GENERAL MOTORS COMPANY

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

### High Temperature Wiring Repairs

Use the following procedures to perform high temperature wiring repairs:

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

### CONNECTOR POSITION ASSURANCE LOCKS

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

### TERMINAL POSITION ASSURANCE LOCKS

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

from the connector body unless you remove a terminal for replacement. If the TPA is removed, be sure to reinstall it before reconnecting the connector.

## **AFL/EPC CONNECTORS**

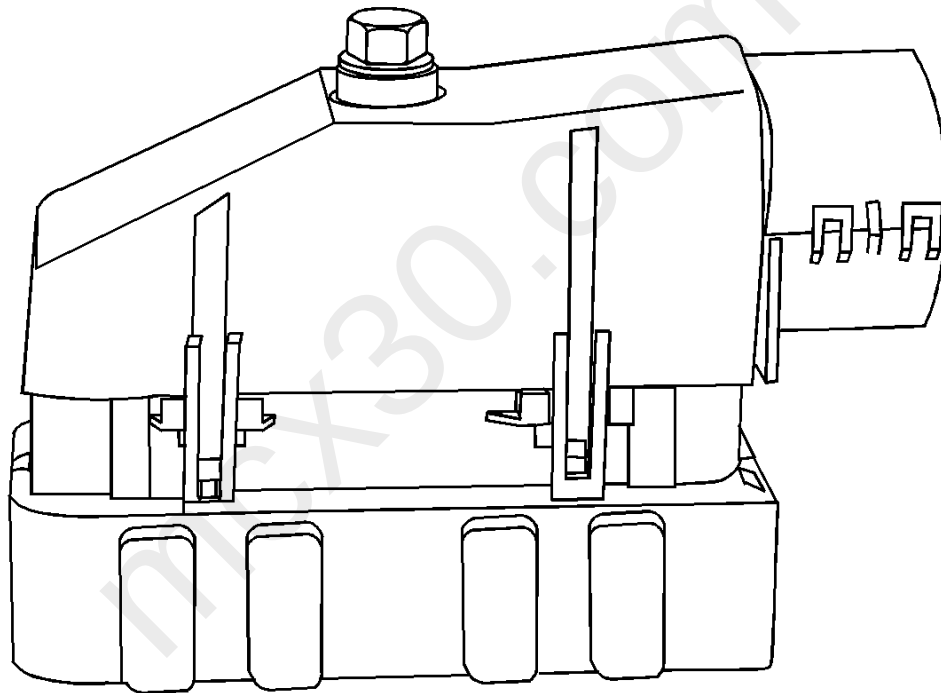
### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-12A** Terminal Release Tool
- **J-38125-216** Terminal Release Tool

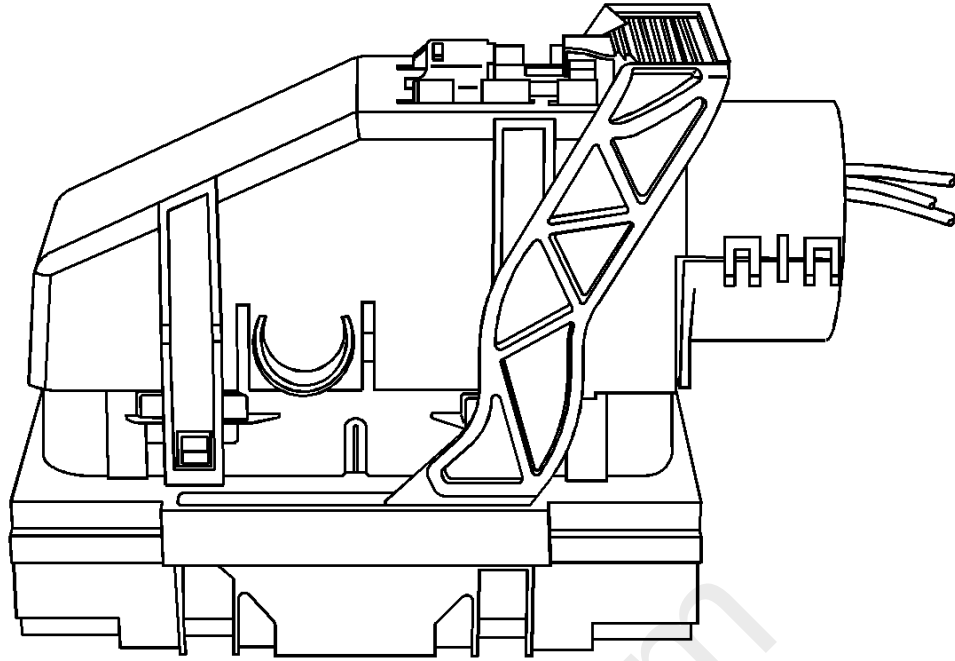
For equivalent regional tools, refer to [\*\*Special Tools\*\*](#) .

### **Terminal Removal Procedure**

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

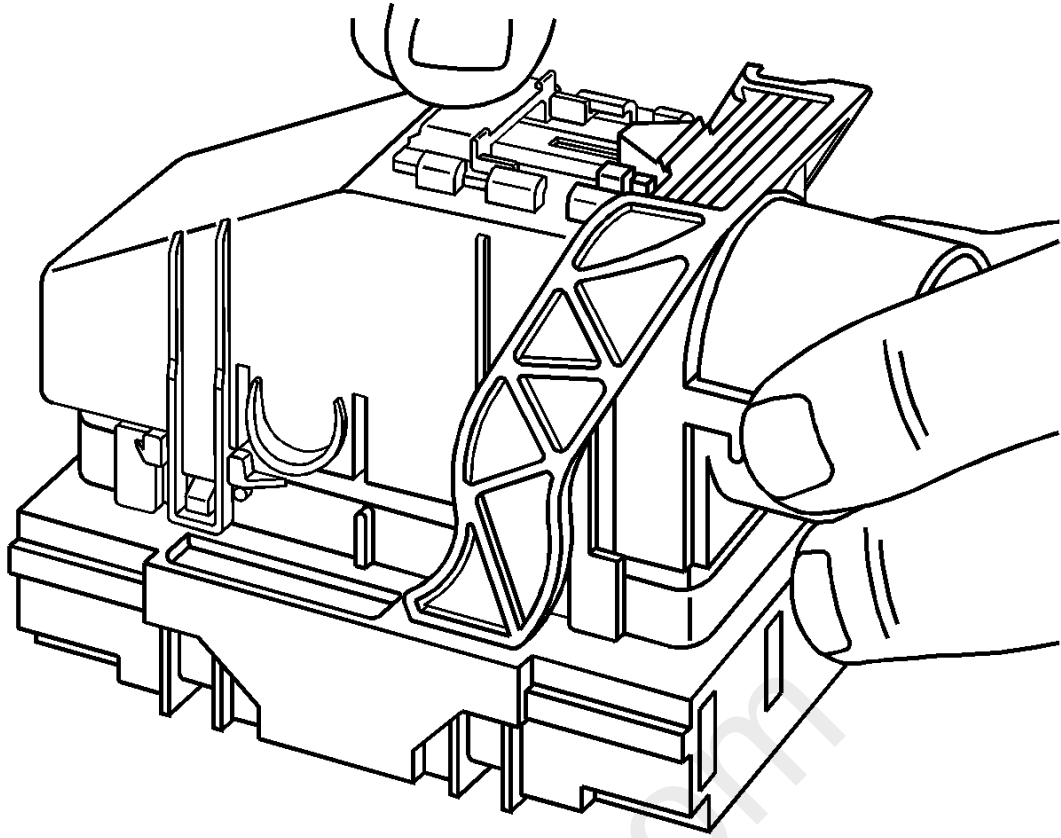


**Fig. 23: Bolt On Connector Cover**  
Courtesy of GENERAL MOTORS COMPANY



**Fig. 24: Connector Position Assurance (CPA)**  
Courtesy of GENERAL MOTORS COMPANY

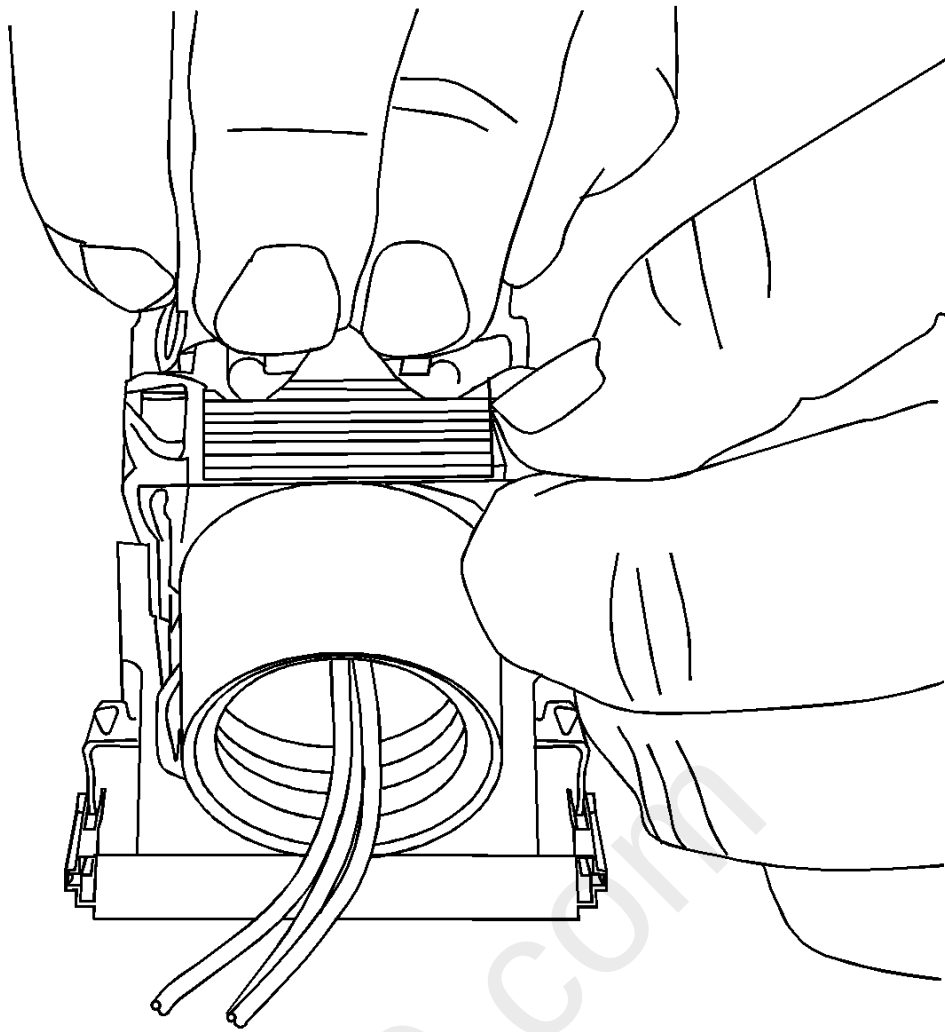
1. For connectors with a bolt in the dress cover, turn the bolt counterclockwise to remove the connector from the component.
2. Locate the connector position assurance (CPA) on the top of the wire dress cover. Slide the CPA forward.



**Fig. 25: Lever Lock And Lever Lock Release Tab**

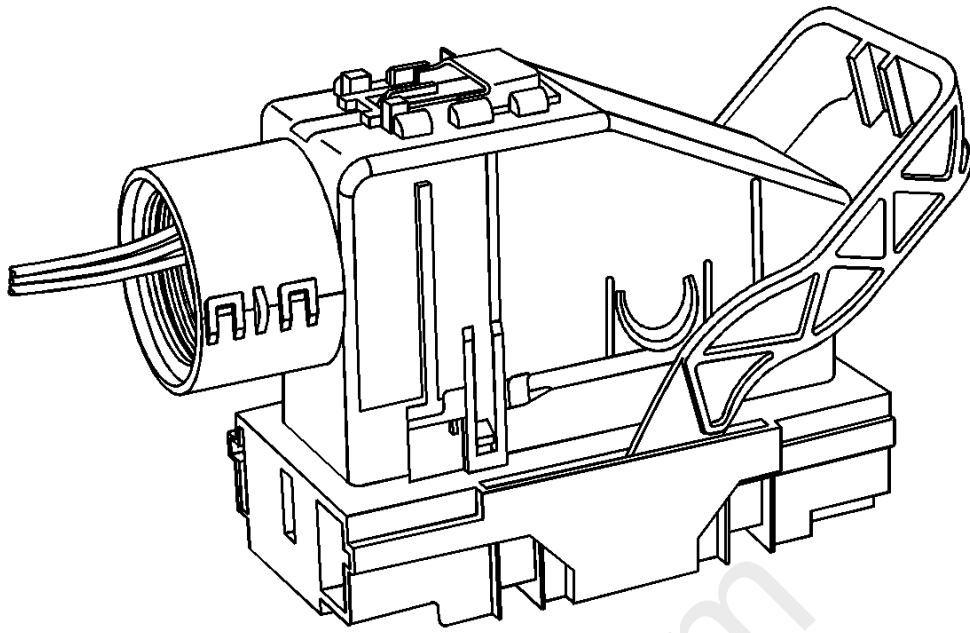
Courtesy of GENERAL MOTORS COMPANY

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



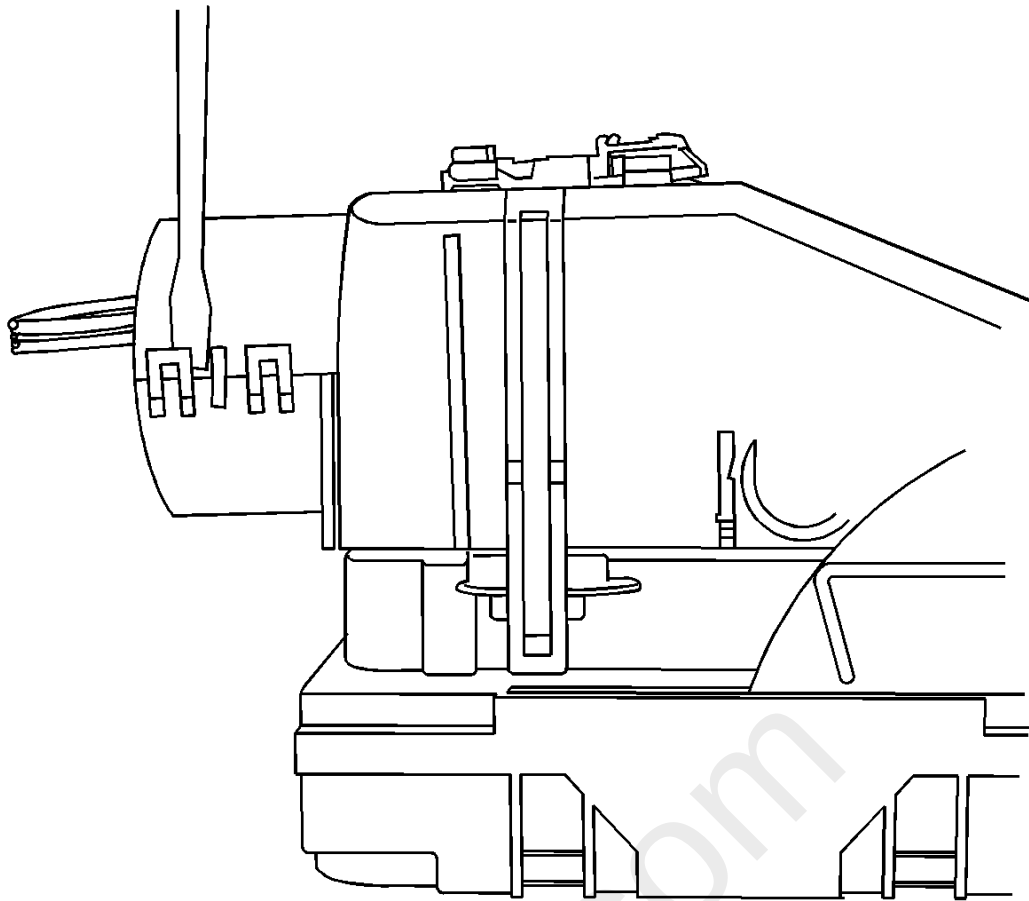
**Fig. 26: Depressing Lever Lock Release Tab**  
Courtesy of GENERAL MOTORS COMPANY

4. View showing depressing of the lever lock release tab.



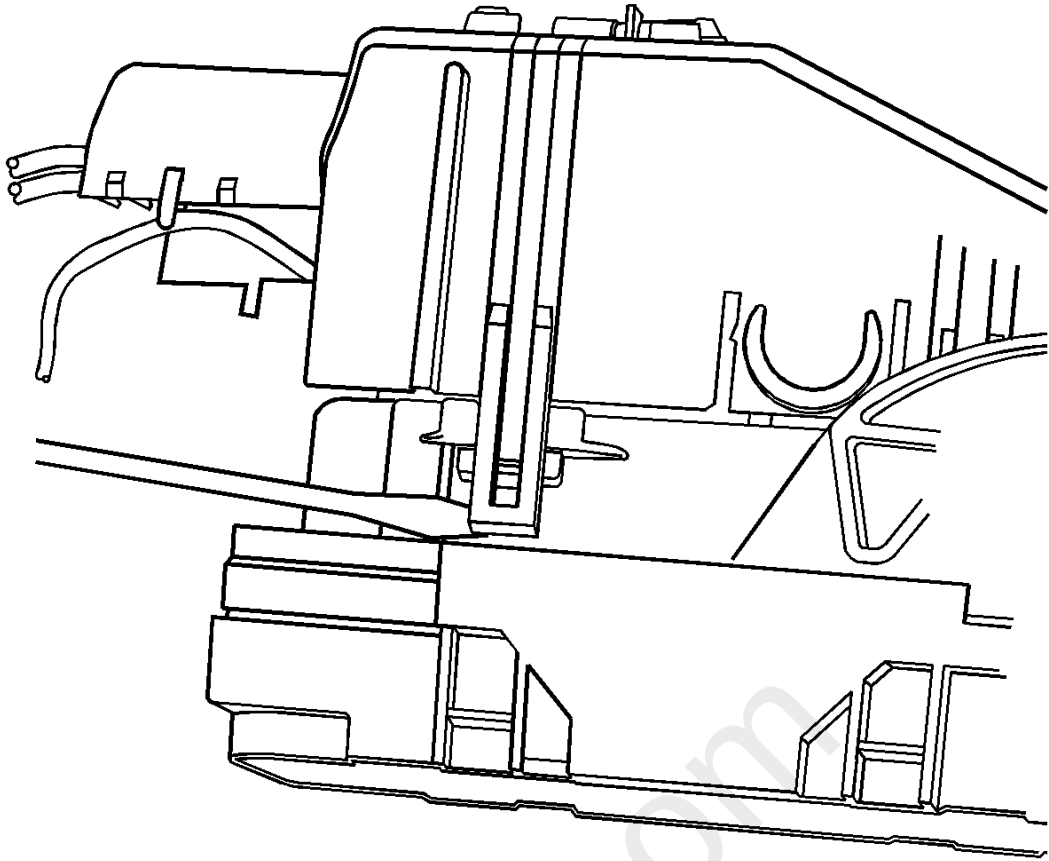
**Fig. 27: Connector In Released Position**  
Courtesy of GENERAL MOTORS COMPANY

5. View of connector in released position.
6. Disconnect the connector from the component.
7. 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.



**Fig. 28: Releasing Rear Lower Half Of Wiredress Cover**  
Courtesy of GENERAL MOTORS COMPANY

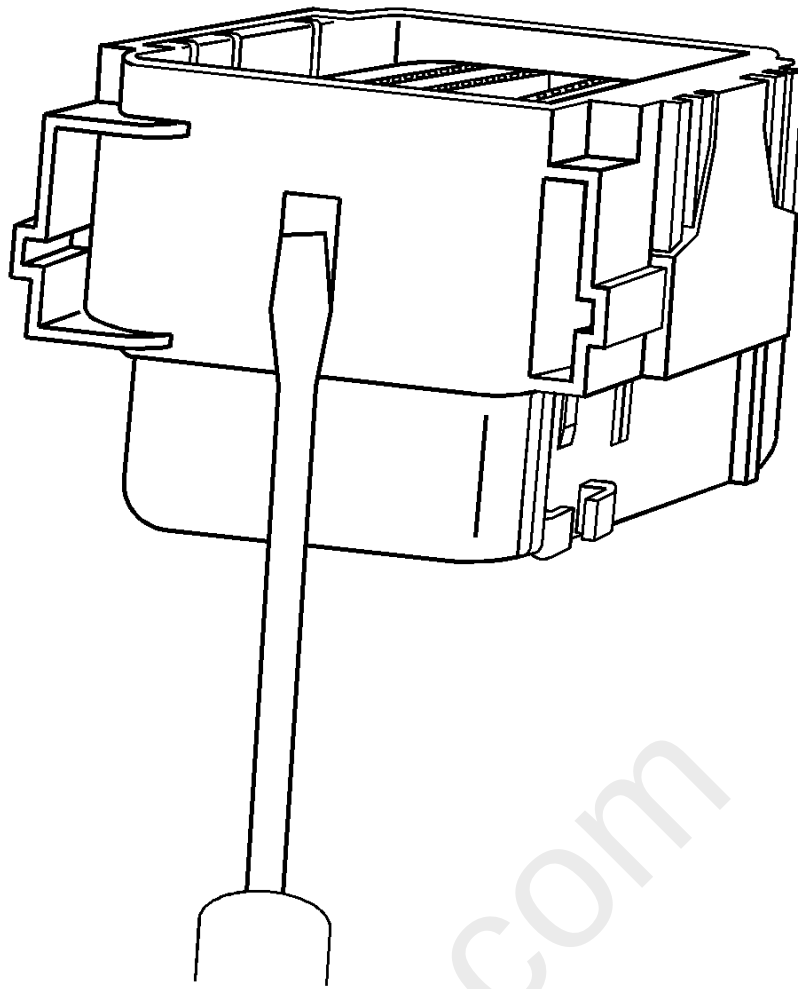
8. Release the rear lower half of the wiredress cover.



**Fig. 29: Releasing Tabs Holding Wiredress Cover**

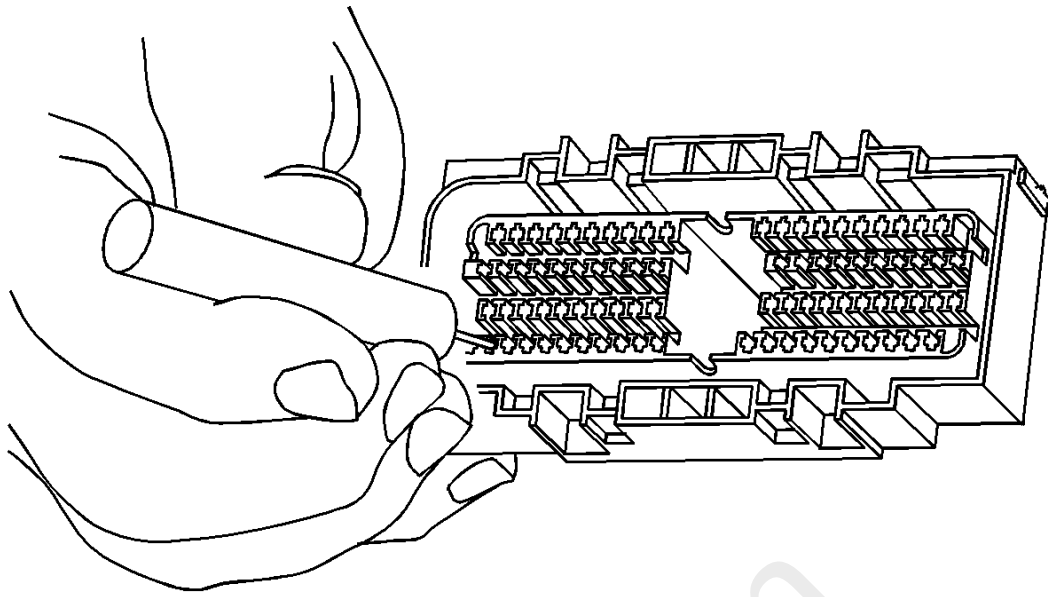
**Courtesy of GENERAL MOTORS COMPANY**

9. Release the tabs that are holding the wiredress cover to the connector body.
10. 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.



**Fig. 30: Removing Nose Piece Using Flat-Blade Tool**  
Courtesy of GENERAL MOTORS COMPANY

11. Use the J-38125-12A tool to release the terminals by lifting the terminal retaining tabs on the inside of the connector.



**Fig. 31: Releasing Terminals**

Courtesy of GENERAL MOTORS COMPANY

12. 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.
13. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#)[Repairing Connector Terminals \(Terminal Repair\)](#) procedure.
14. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

## **BOSCH CONNECTORS (BSK)**

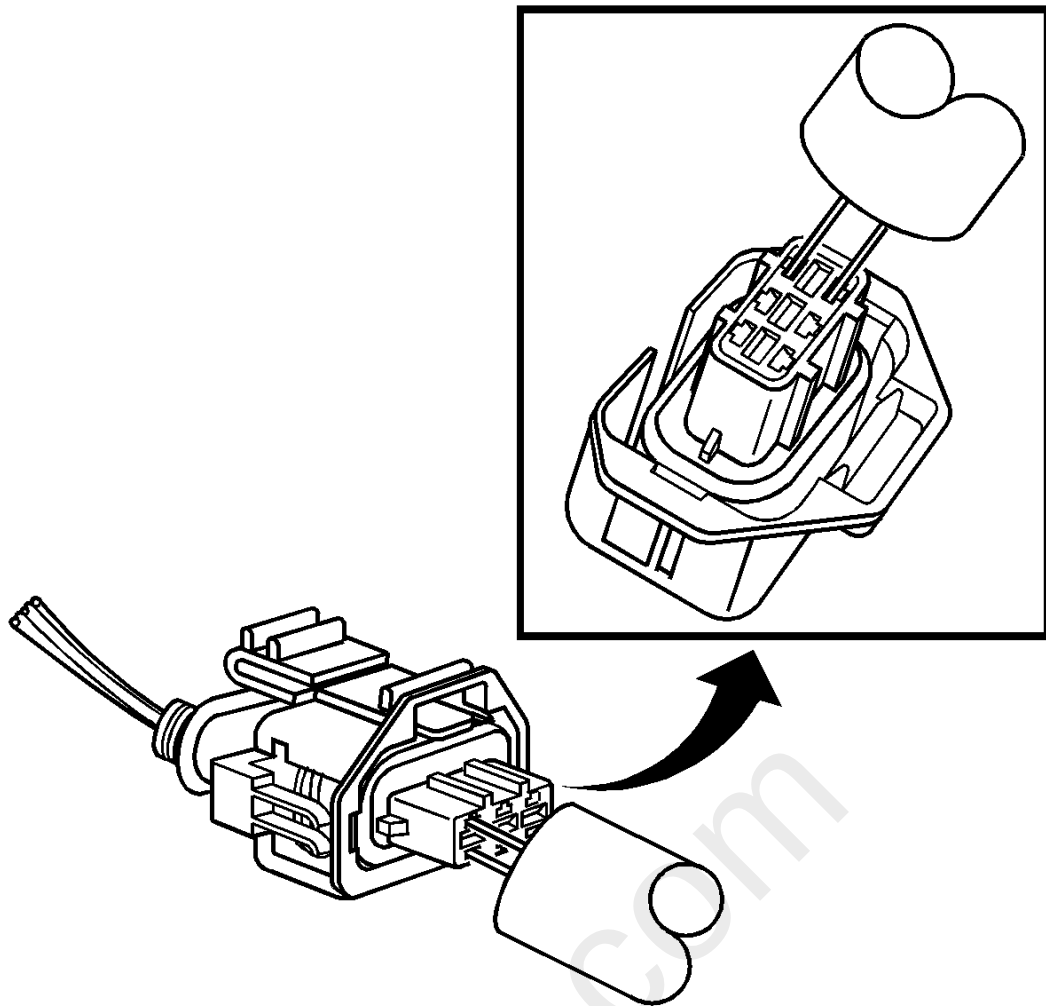
### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-561** Terminal Release Tool

For equivalent regional tools, refer to [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.



**Fig. 32: Disengaging Terminal Retainers**

Courtesy of GENERAL MOTORS COMPANY

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.
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.
6. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#) procedure.
7. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

## **BOSCH CONNECTORS (0.64)**

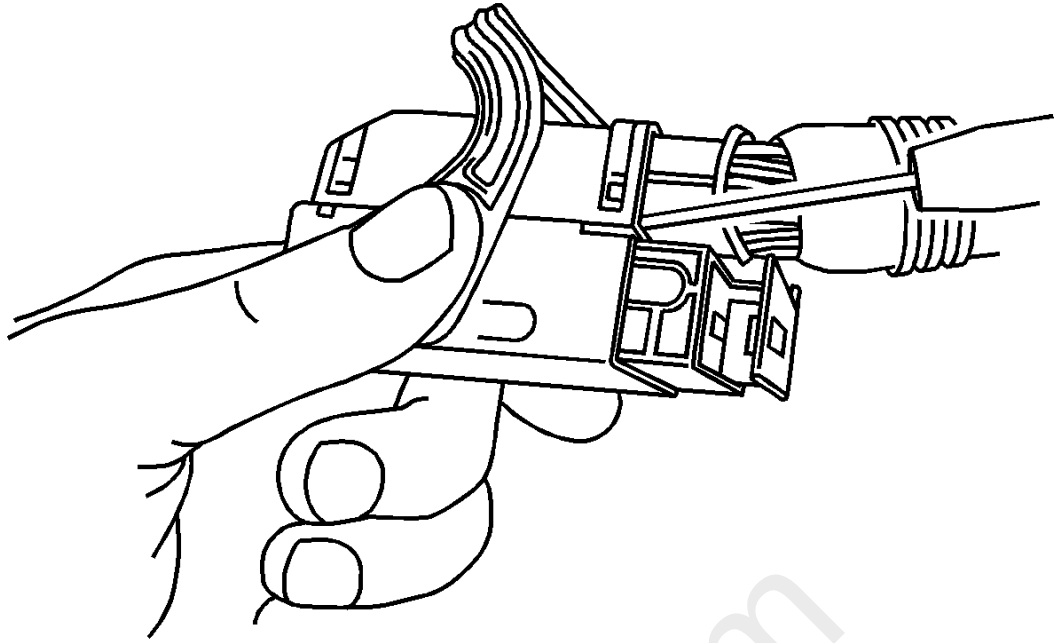
### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-560** Terminal Release Tool

For equivalent regional tools, refer to [Special Tools](#) .

### **Terminal Removal Procedure**

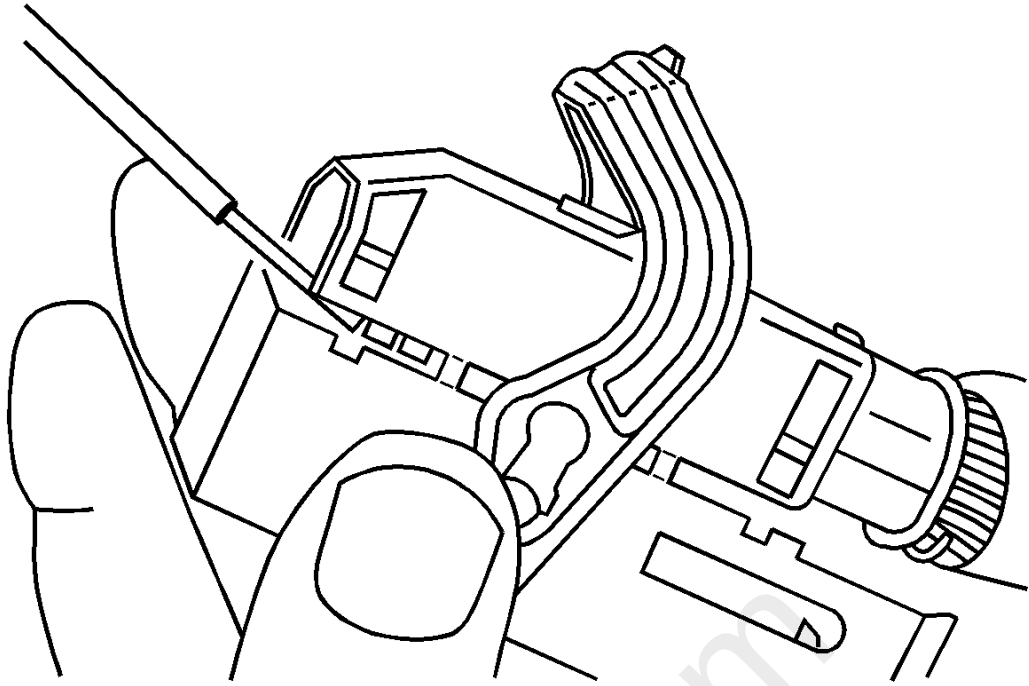
1. Locate the lever lock on the wire dress cover. While pressing the lock, pull the lever over and past the lock until the lever is at the end of its travel.
2. Disconnect the connector from the component.
3. Pull the rubber boot that covers the wires back to expose the end of the connector dress cover.
4. Place the connector locking lever in the center of the connector.



**Fig. 33: Inserting Flat-Bladed Tool Between Cover And Connector Body.**

**Courtesy of GENERAL MOTORS COMPANY**

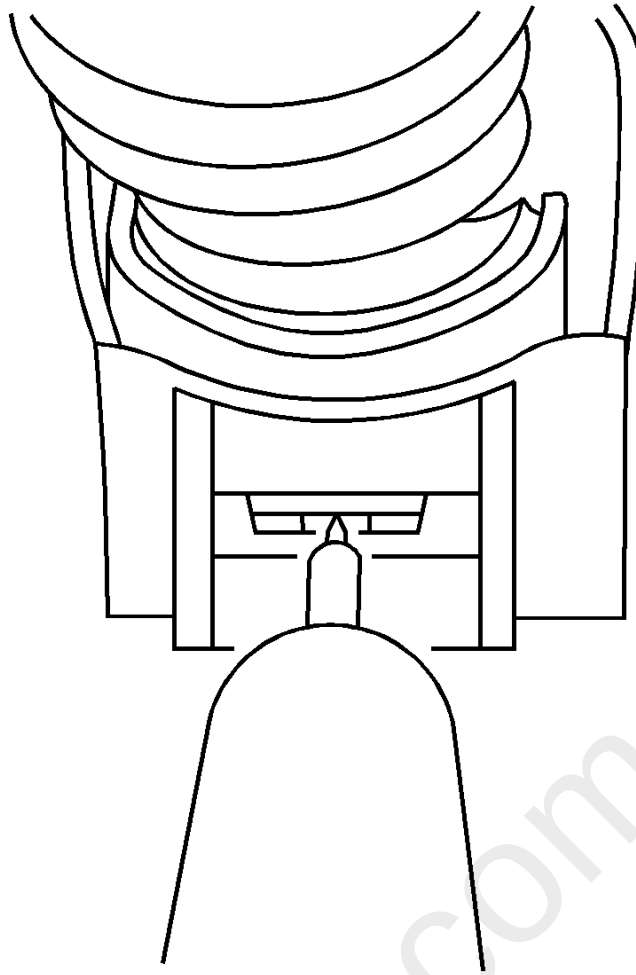
5. Locate the 2 dress cover locking tabs that are on the wire end of the connector. Insert a small flat-bladed tool between the cover and connector body and pry up.



**Fig. 34: Inserting Flat-Bladed Tool Between Cover And Connector End**

**Courtesy of GENERAL MOTORS COMPANY**

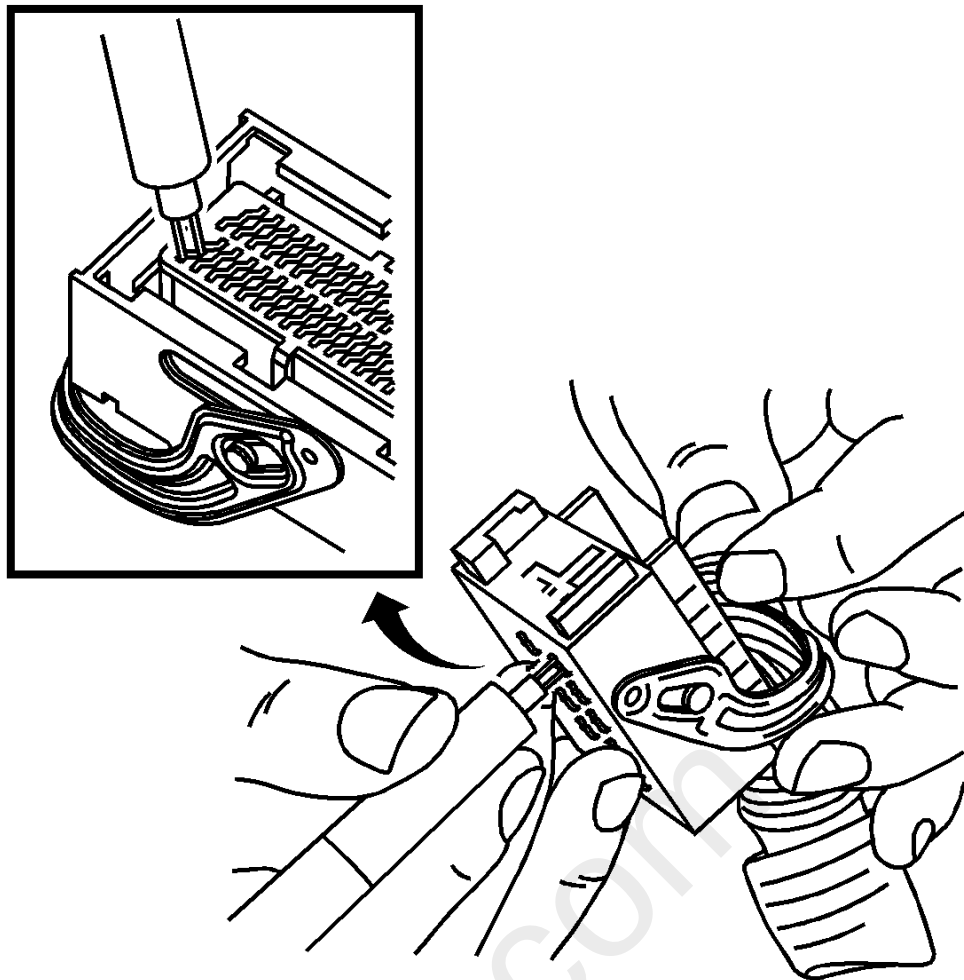
6. Locate the 2 dress cover locking tabs located on the opposite side of the connector. Insert a small flat-bladed tool between the cover at the connector end and pry up.
7. Remove the dress cover.
8. Cut the tie wrap on the wire bundle.



**Fig. 35: Removing Terminal Position Assurance (TPA)**

**Courtesy of GENERAL MOTORS COMPANY**

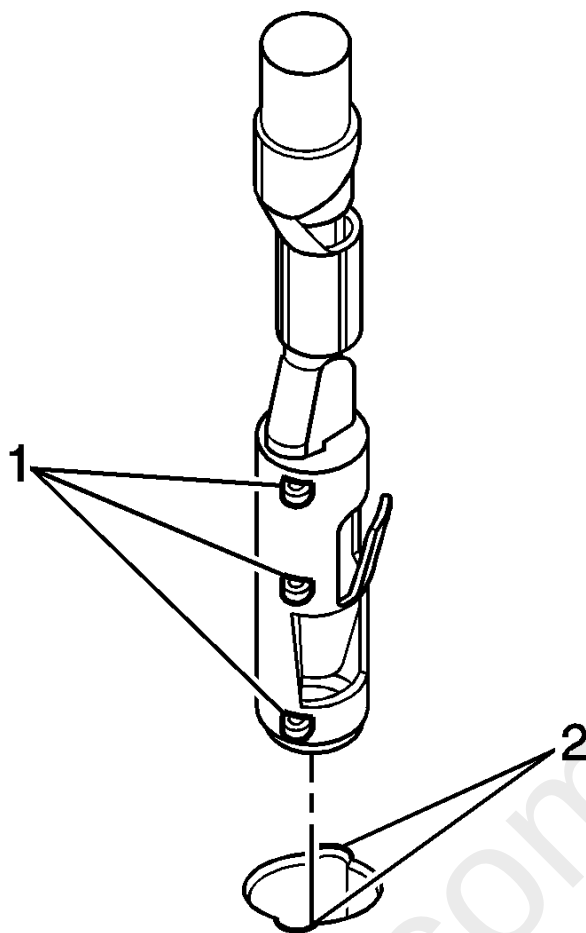
9. Remove the terminal position assurance (TPA) by inserting a small flat-bladed tool into the small slot in the end of the slider and pushing on the TPA until it comes out of the connector. When the TPA exits the opposite side of the connector, grasp the TPA and pull it completely out of the connector.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



**Fig. 36: Terminal Release Tool Being Inserted Into Triangular Cavities**  
Courtesy of GENERAL MOTORS COMPANY

11. Insert the J-38125-560 into the 2 triangular cavities on each side of the terminal at the front of the connector.
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.
13. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)Repairing Connector Terminals \(Terminal Repair\)](#) procedure.
14. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

#### **Terminal Insertion Procedure**



**Fig.37: Aligning Coding Lugs With Connector Coding Grooves**  
 Courtesy of GENERAL MOTORS COMPANY

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

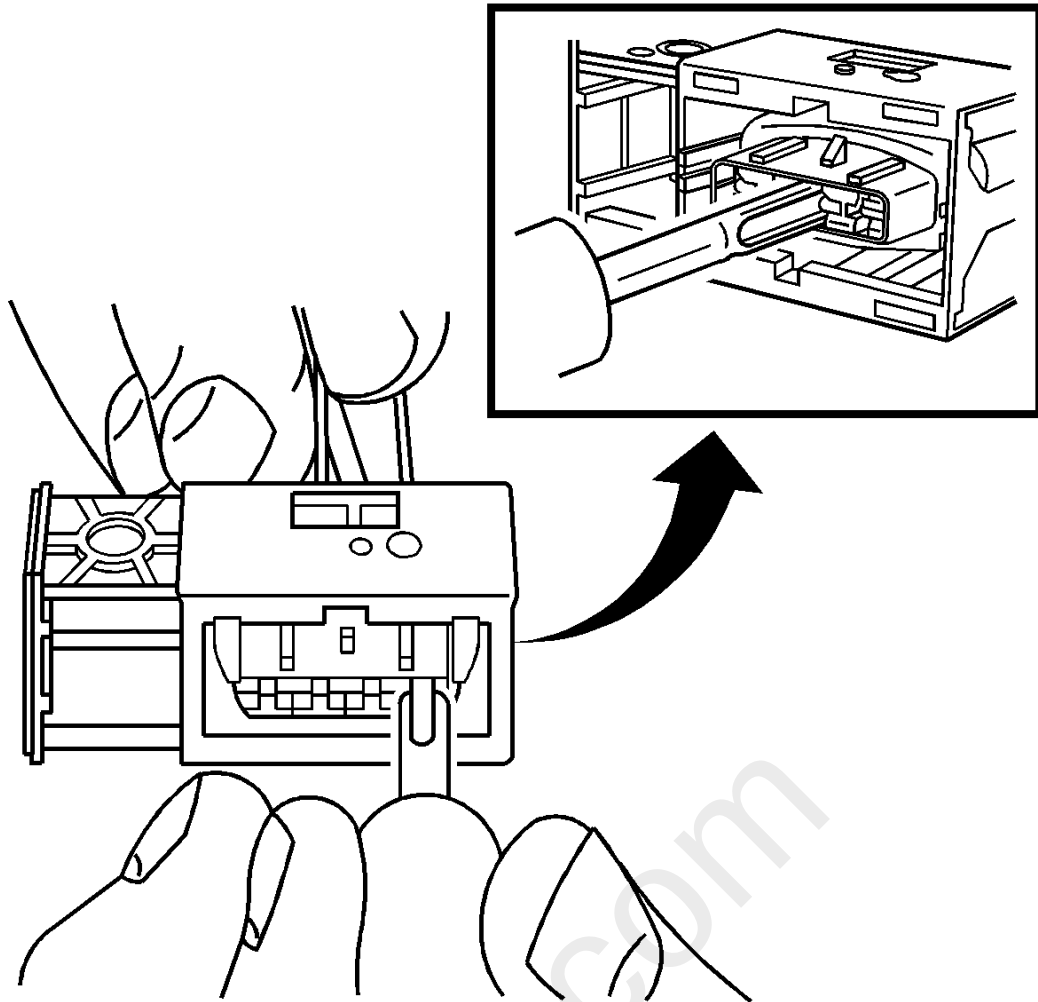
### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-557** Terminal Release Tool

For equivalent regional tools, refer to [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.



**Fig. 38: Disengaging Terminal Retainers**

Courtesy of GENERAL MOTORS COMPANY

5. Insert the J-38125-557 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.
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.
7. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#) procedure.
8. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

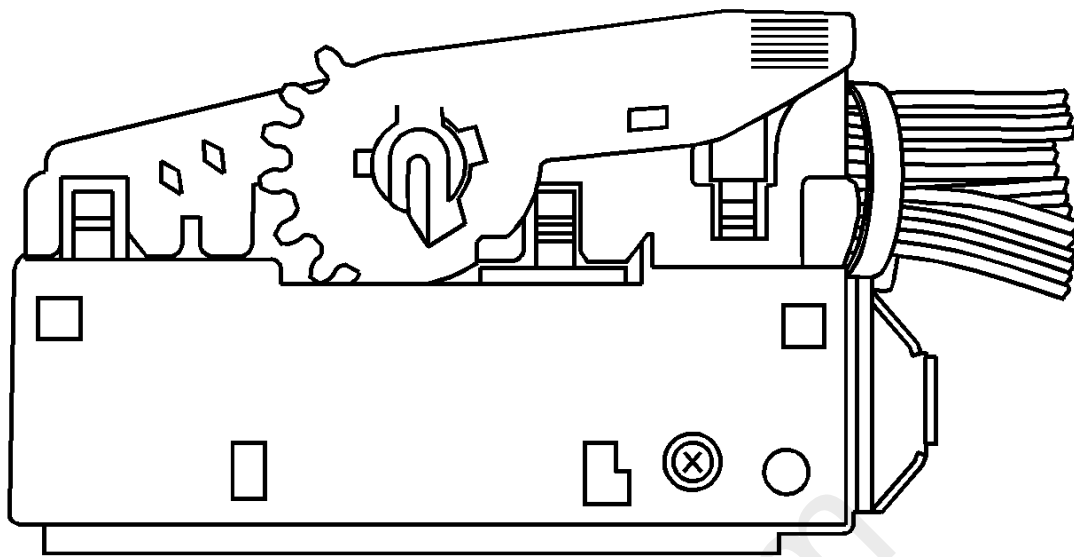
## **BOSCH CONNECTORS (ECM)**

### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-213** Terminal Release Tool
- **J-38125-556** Terminal Release Tool

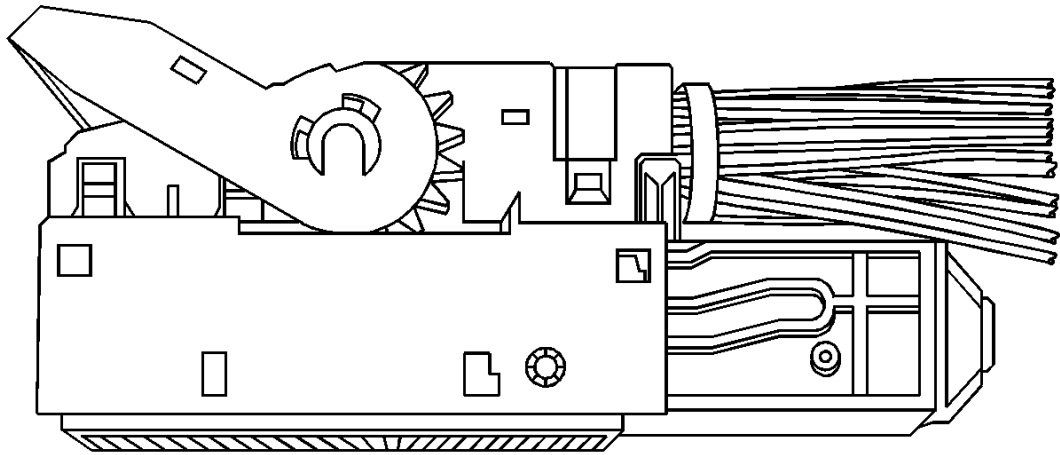
For equivalent regional tools, refer to [Special Tools](#) .

### **Terminal Removal Procedure**



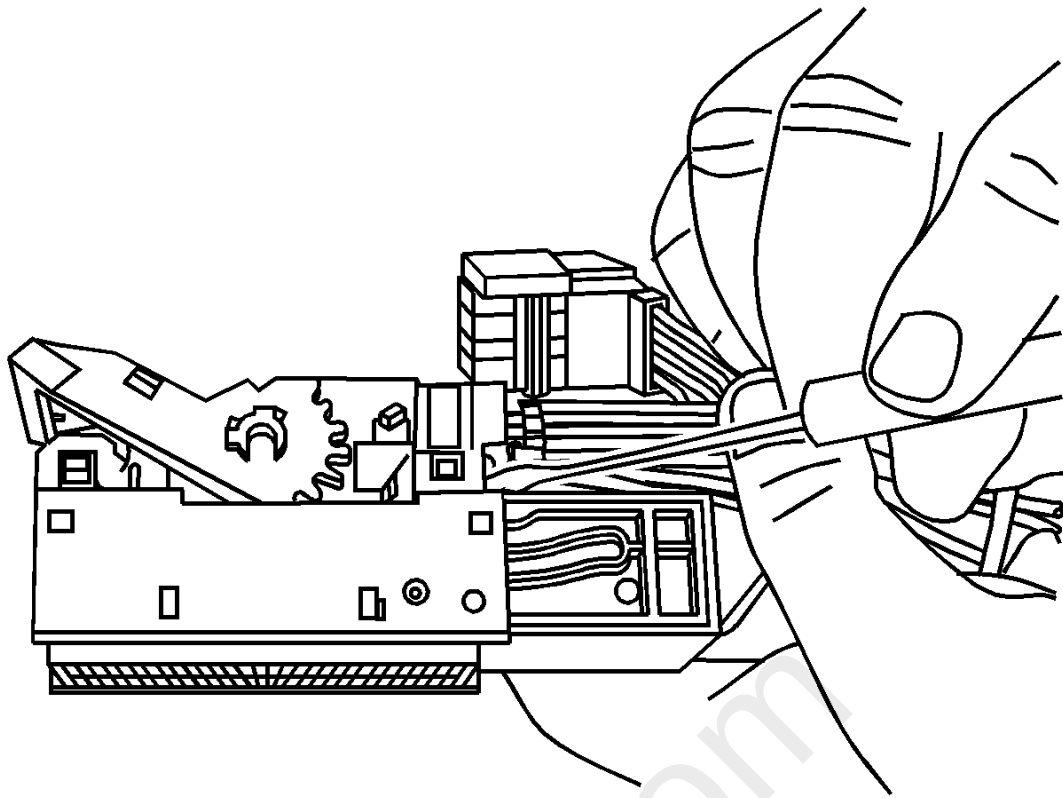
**Fig. 39: Identifying Bosch Connector (ECM).**  
**Courtesy of GENERAL MOTORS COMPANY**

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



**Fig. 40: Assist Lever In Forward Position**  
**Courtesy of GENERAL MOTORS COMPANY**

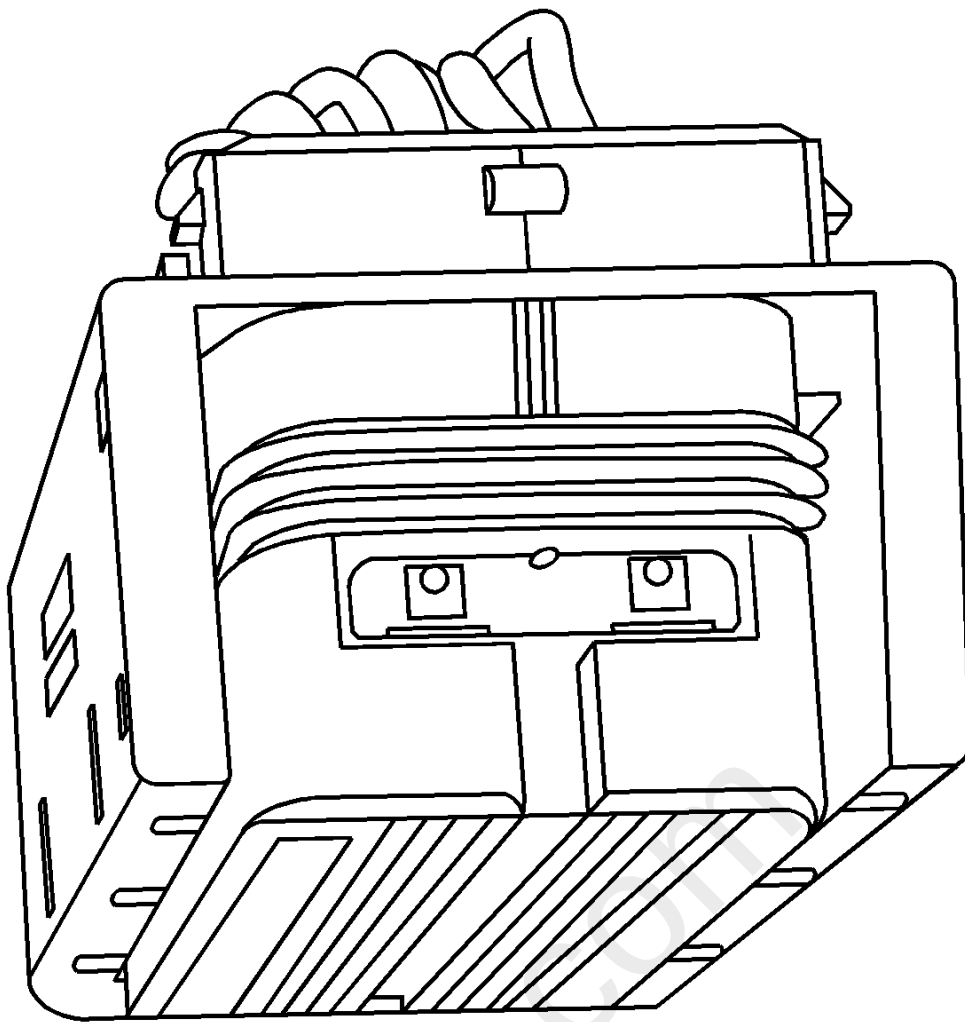
2. Disconnect the connector from the component.



**Fig. 41: Releasing Locking Tabs To Remove Dress Cover**

**Courtesy of GENERAL MOTORS COMPANY**

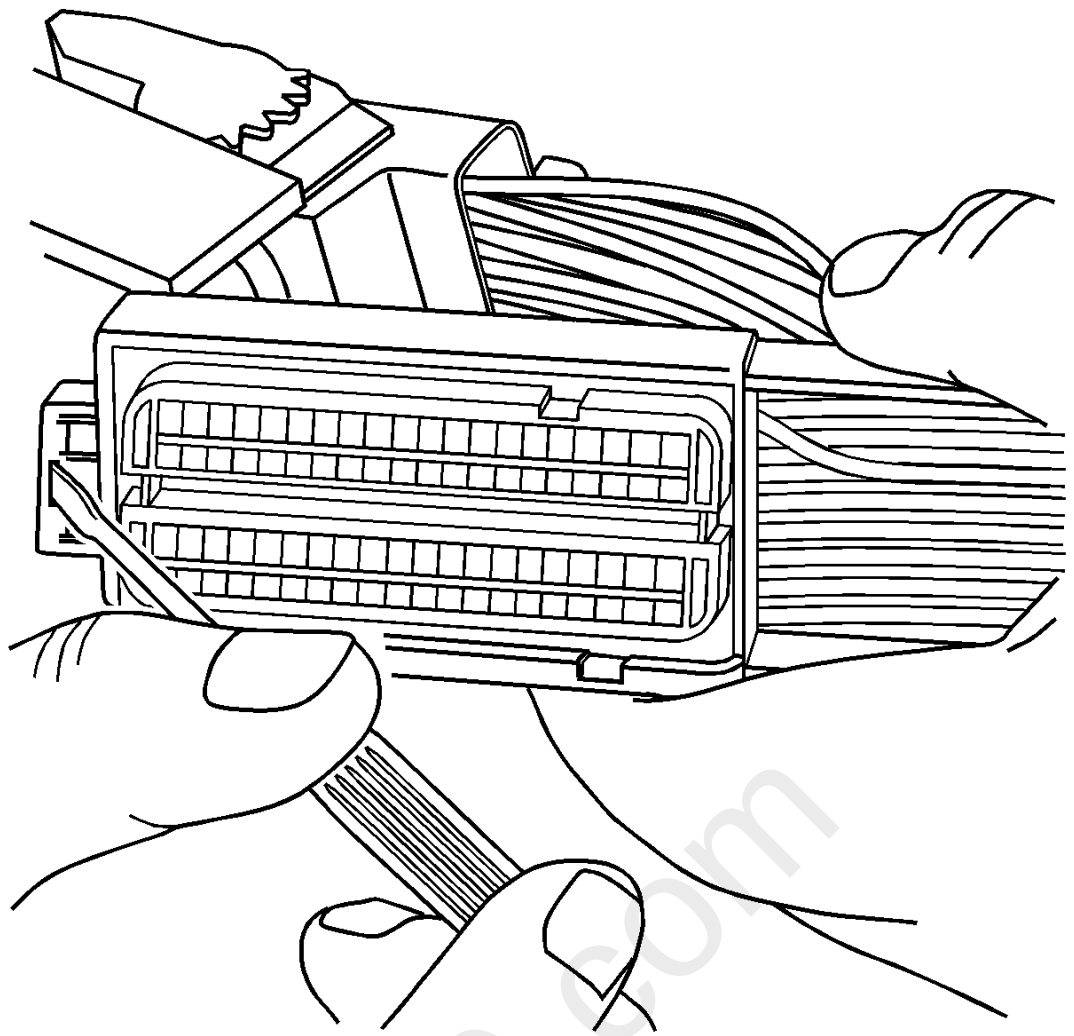
3. Locate the dress cover locking tabs at the corners of the connector. Use a small flat-blade tool to release the locking tabs and remove the dress cover.



**Fig. 42: Locating Terminal Positive Assurance (TPA).**

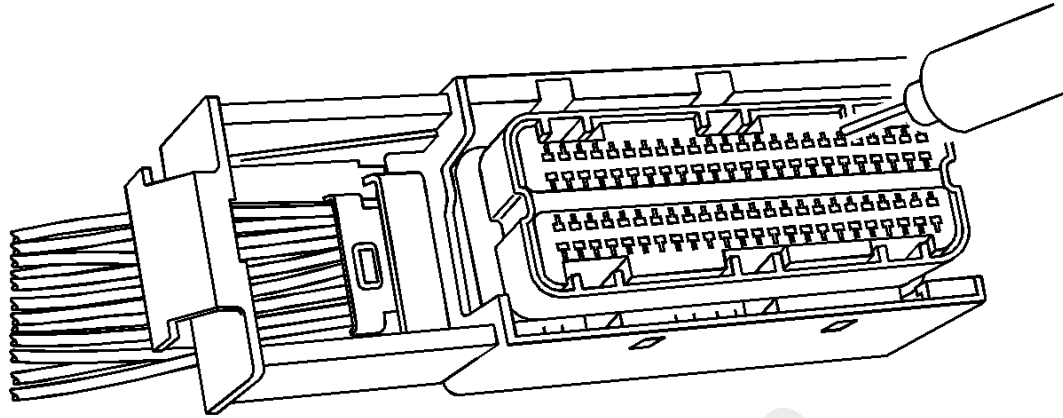
**Courtesy of GENERAL MOTORS COMPANY**

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



**Fig. 43: Removing TPA From Connector**  
Courtesy of GENERAL MOTORS COMPANY

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



**Fig. 44: Releasing Terminals**

Courtesy of GENERAL MOTORS COMPANY

6. Use the J-38125-213 or the J-38125-556 tool to release the terminals by inserting the tool into the terminal release cavity.
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.
8. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#) procedure.
9. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

**NOTE:** 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.

10. Reconnect the connector bodies.

## **DELPHI CONNECTORS (WEATHER PACK)**

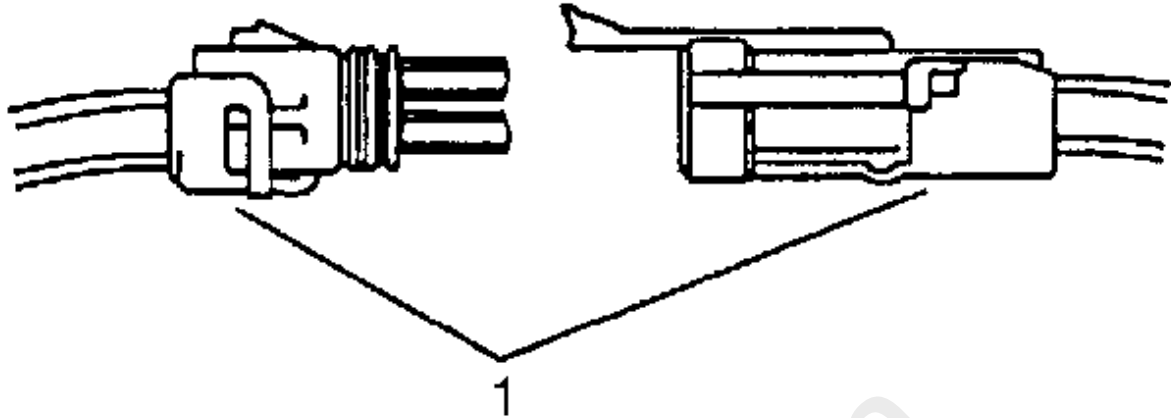
### **Special Tools**

- EL-38125-550 Terminal Release Tool Kit
- EL-38125-580 Terminal Release Tool Kit
- J-38125-10A Terminal Release Tool

For equivalent regional tools, refer to [Special Tools](#) .

### **Terminal Removal Procedure**

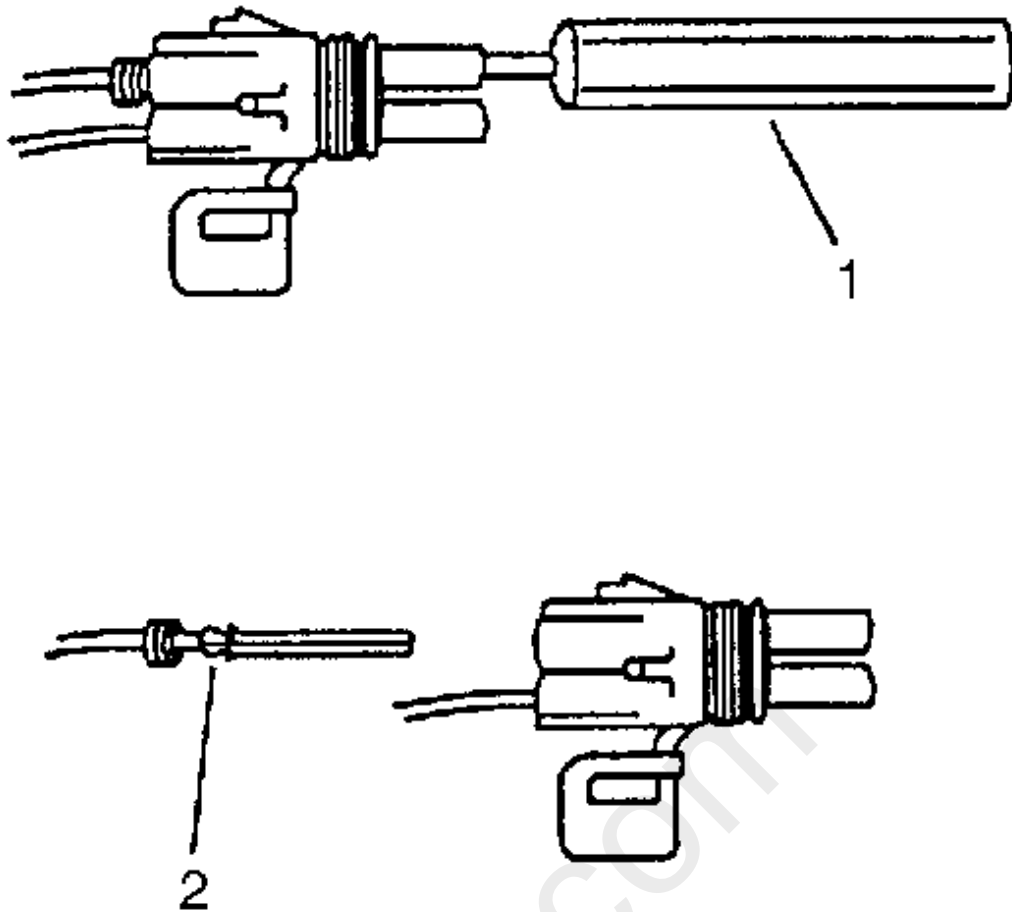
The following is the proper procedure for the repair of Weather Pack® Connectors.



**Fig. 45: Separating Connector Halves**

**Courtesy of GENERAL MOTORS COMPANY**

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



**Fig. 46: Removing Cable & Terminal From Connector**

Courtesy of GENERAL MOTORS COMPANY

4. Insert the Weather Pack® terminal removal tool J-38125-10A 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).

**NOTE:** 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 \(Terminated Lead Repair\)](#) [Repairing Connector Terminals \(Terminal Repair\)](#).
7. Reform the lock tang (2) and reset terminal in connector body.
8. Close secondary locks and join connector halves.
9. Verify that circuit is complete and working satisfactorily.
10. Perform system check.
11. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#) [Repairing Connector Terminals \(Terminal Repair\)](#) procedure.
12. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

## **DELPHI CONNECTORS (PUSH TO SEAT)**

### **Special Tools**

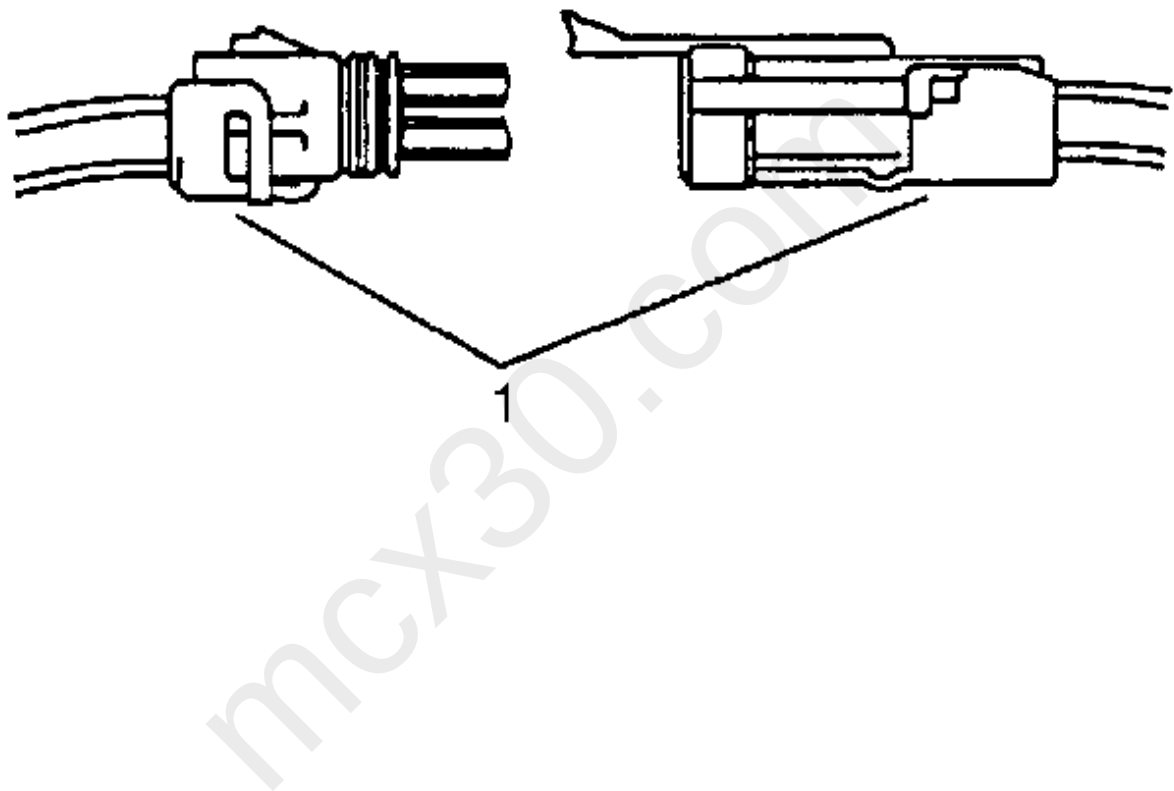
- EL-38125-550 Terminal Release Tool Kit
- EL-38125-580 Terminal Release Tool Kit

For equivalent regional tools, refer to [Special Tools](#).

### Terminal Removal Procedure

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

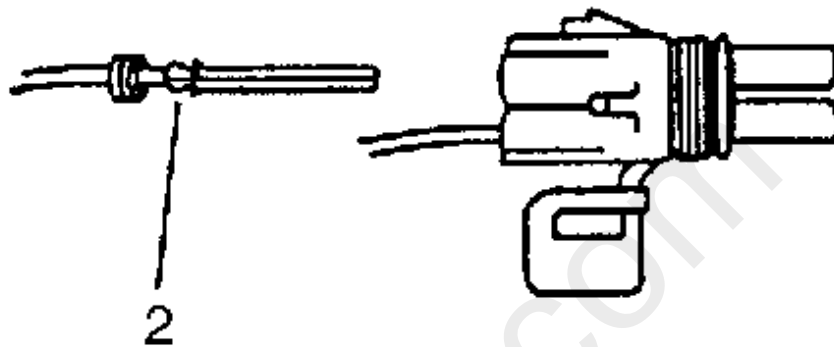
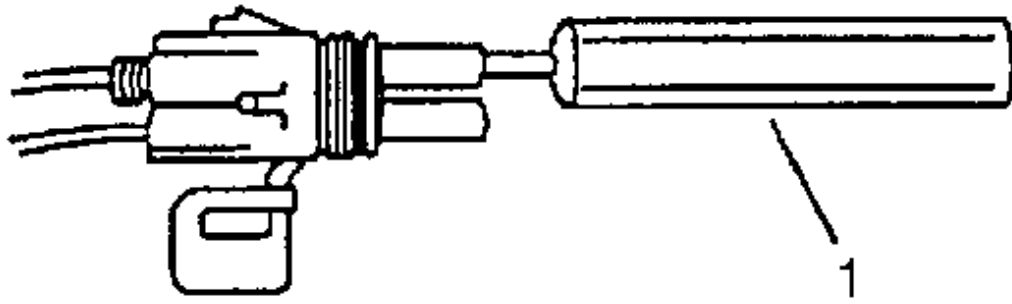
1. Remove the terminal position assurance (TPA) device, the connector position assurance (CPA) device, and/or the secondary lock.



**Fig. 47: Separating Connector Halves**

**Courtesy of GENERAL MOTORS COMPANY**

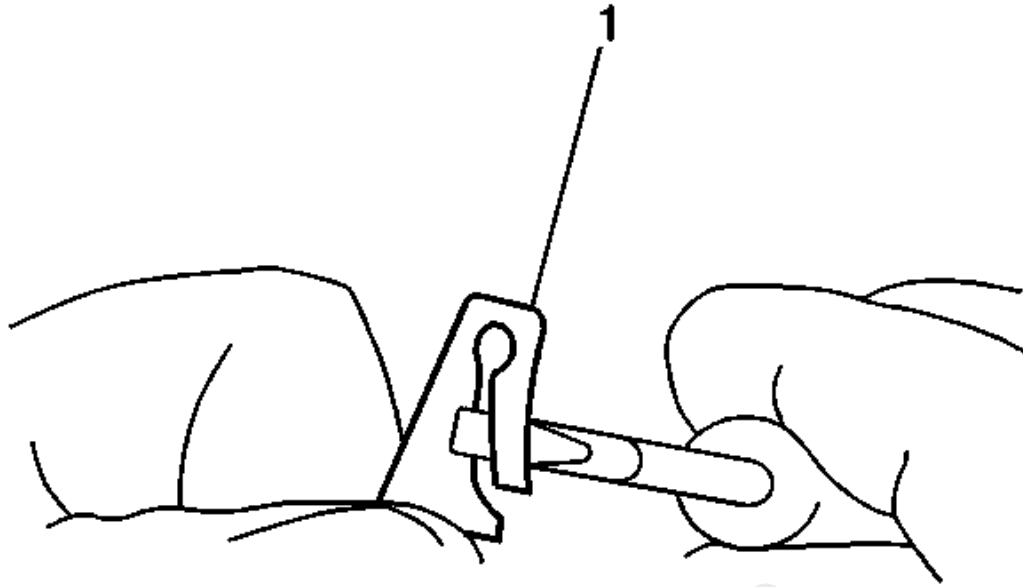
2. Separate the connector halves (1).



**Fig. 48: Removing Cable & Terminal From Connector**

**Courtesy of GENERAL MOTORS COMPANY**

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



**Fig. 49: Reforming Locking Device**

Courtesy of GENERAL MOTORS COMPANY

5. Re-form the locking device if you are going to reuse the terminal (1).
6. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#) procedure.
7. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

#### **Terminal Insertion Procedure**

1. In order to reuse a terminal or lead assembly, refer to [Wiring Repairs](#).
2. Ensure that the cable seal is kept on the terminal side of the splice.
3. Insert the lead from the back until it catches.
4. Install the TPA, CPA, and/or the secondary locks.

#### **DELPHI CONNECTORS (PULL TO SEAT)**

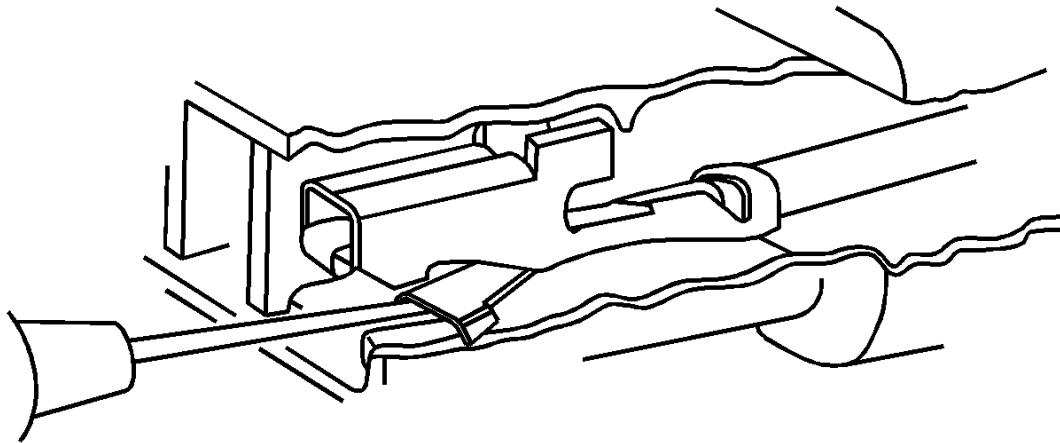
##### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit

For equivalent regional tools, refer to [Special Tools](#).

##### **Terminal Removal Procedure**

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



**Fig. 50: Aligning Removal Tool**

Courtesy of GENERAL MOTORS COMPANY

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

1. Remove the connector position assurance (CPA) device and/or the secondary lock.
2. Disconnect the connector from the component or separate the connectors for in-line connectors.
3. Remove the terminal position assurance (TPA) device.
4. Review the connector end view to determine the proper test probe and release tool.
5. Insert the release tool into the front of the connector body.
6. Grasp the wire at the back of the connector body and gently push the terminal out the front of the connector body.
7. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#)[Repairing Connector Terminals \(Terminal Repair\)](#) procedure.
8. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

#### **Terminal Insertion Procedure**

1. Align the terminal and pull the wire from the back of the connector in order to seat the terminal.
2. If the connector is outside of the passenger compartment, apply dielectric grease to the connector.
3. Install the TPA, CPA, and/or the secondary locks.

#### **DELPHI CONNECTORS (MICRO-PACK 100W)**

##### **Special Tools**

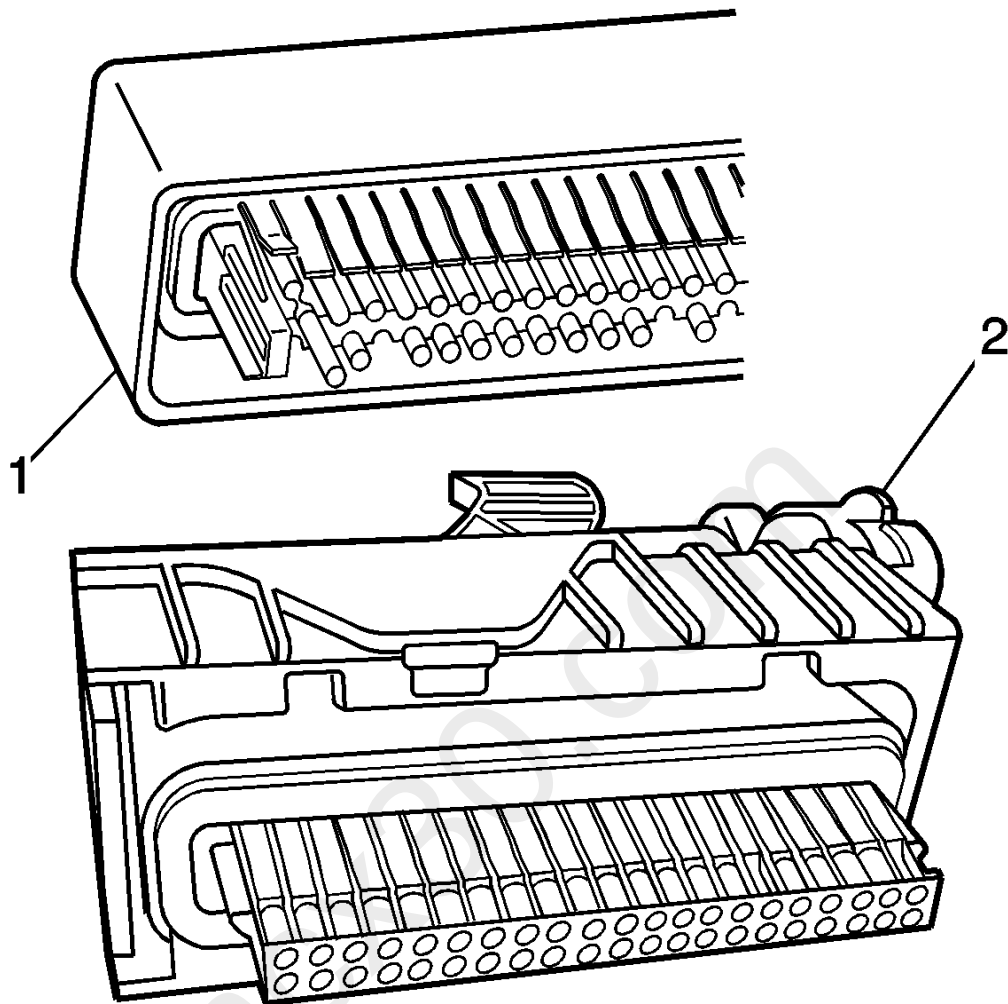
- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit

- J-38125-12A Terminal Release Tool

For equivalent regional tools, refer to [Special Tools](#) .

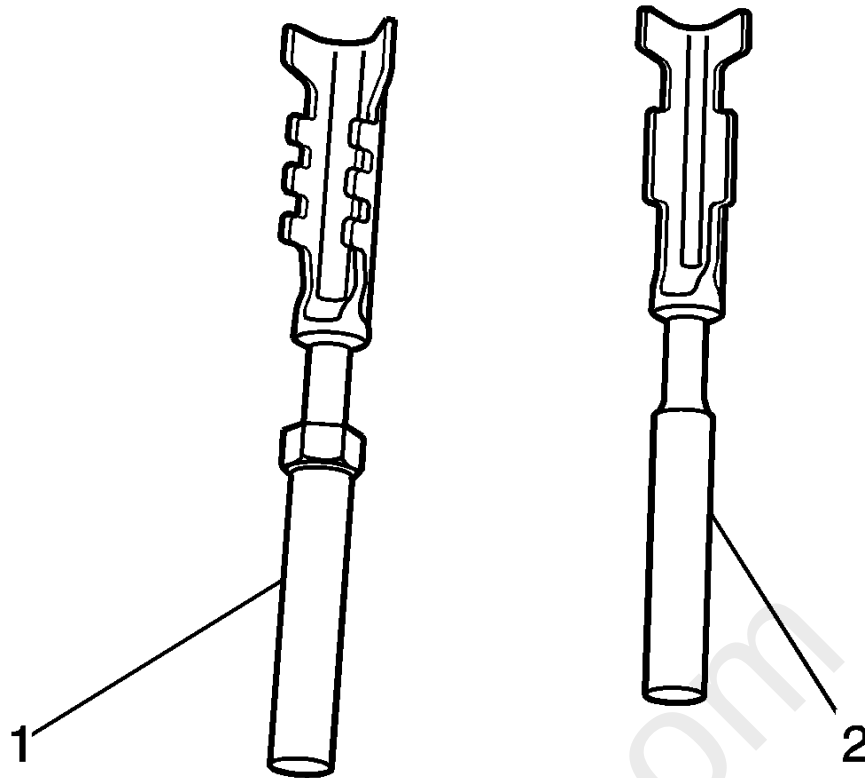
### Terminal Removal Procedure

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.



**Fig. 51: Identifying Micro-Pack 100W First & Second Connector Designs**  
Courtesy of GENERAL MOTORS COMPANY

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 terminal 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.

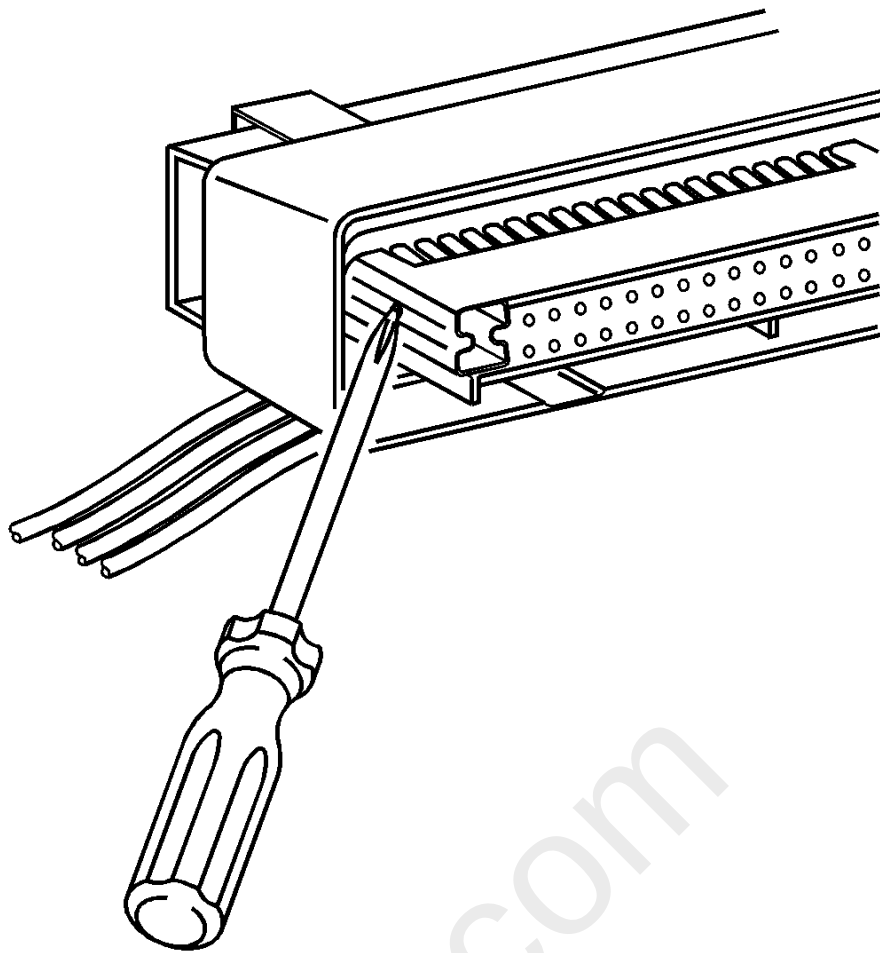


**Fig. 52: Micro-Pack 100W Short And Long Terminals**  
Courtesy of GENERAL MOTORS COMPANY

**NOTE:** 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.

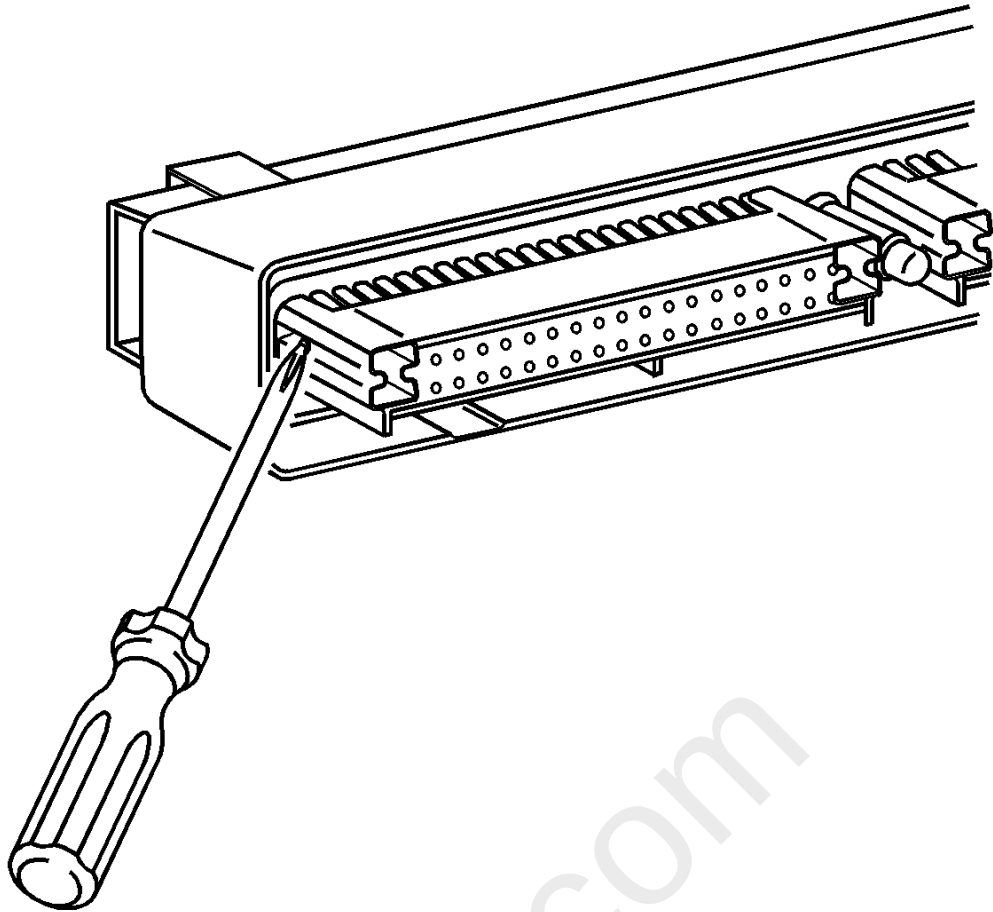
Follow the steps below in order to remove terminals from Micro-Pack 100W connectors. Some Micro-Pack 100W connector disassembly procedures will vary. Use this procedure as a guide.

1. Disconnect the connector from the component.



**Fig. 53: Locating Nose Piece Locking Tabs**  
Courtesy of GENERAL MOTORS COMPANY

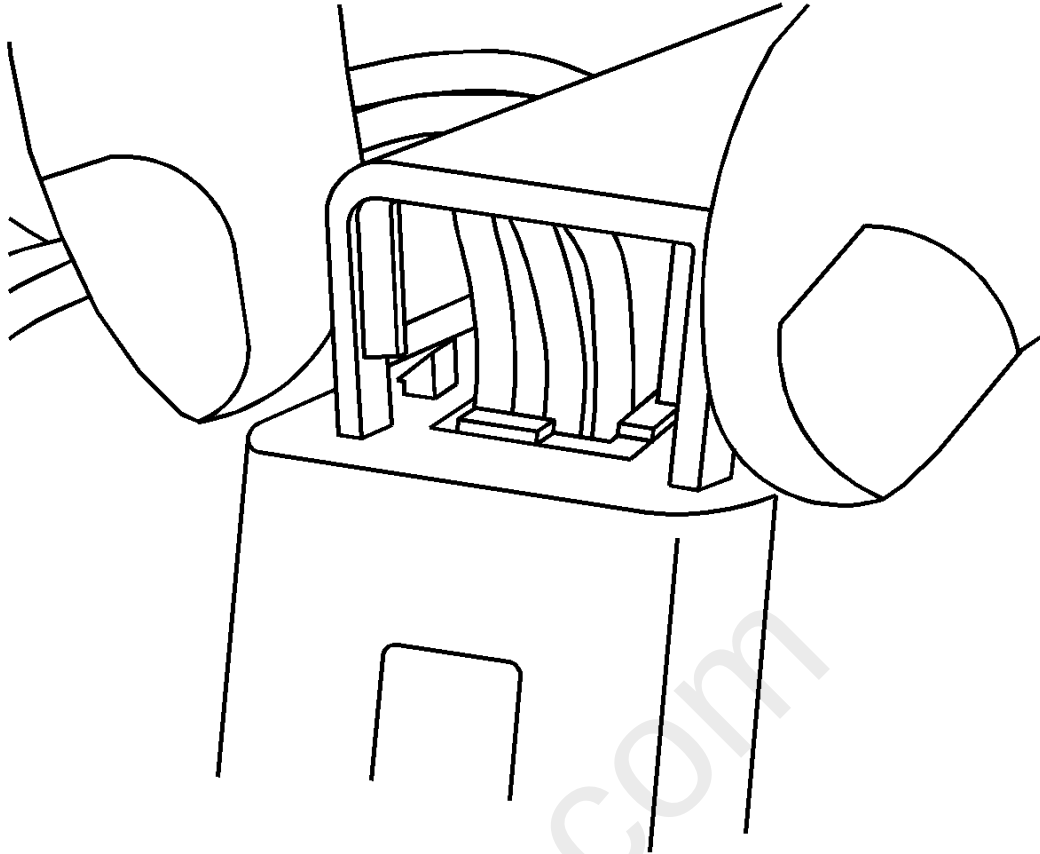
2. Locate the nose piece locking tabs that are positioned on the side of the connector nose piece. The connector nose piece acts as a terminal positive assurance (TPA) and may be referred to as such.



**Fig. 54: Pushing In Nose Piece Locking Tabs**

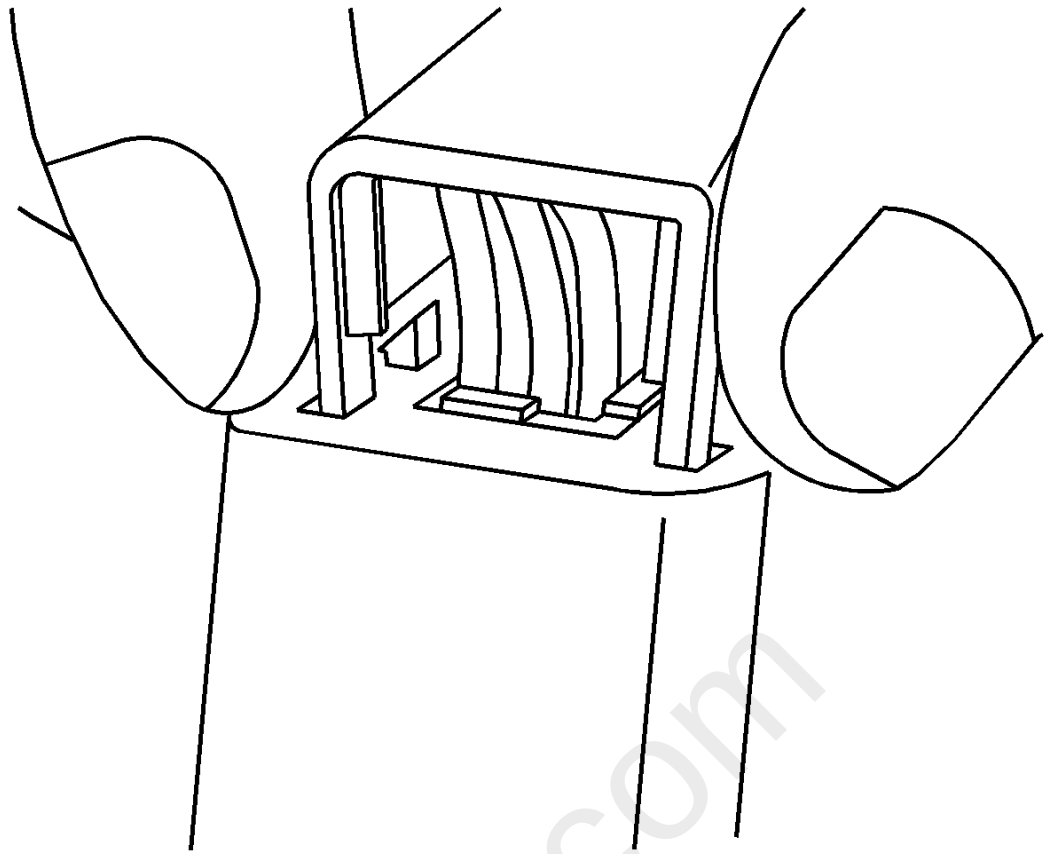
**Courtesy of GENERAL MOTORS COMPANY**

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.



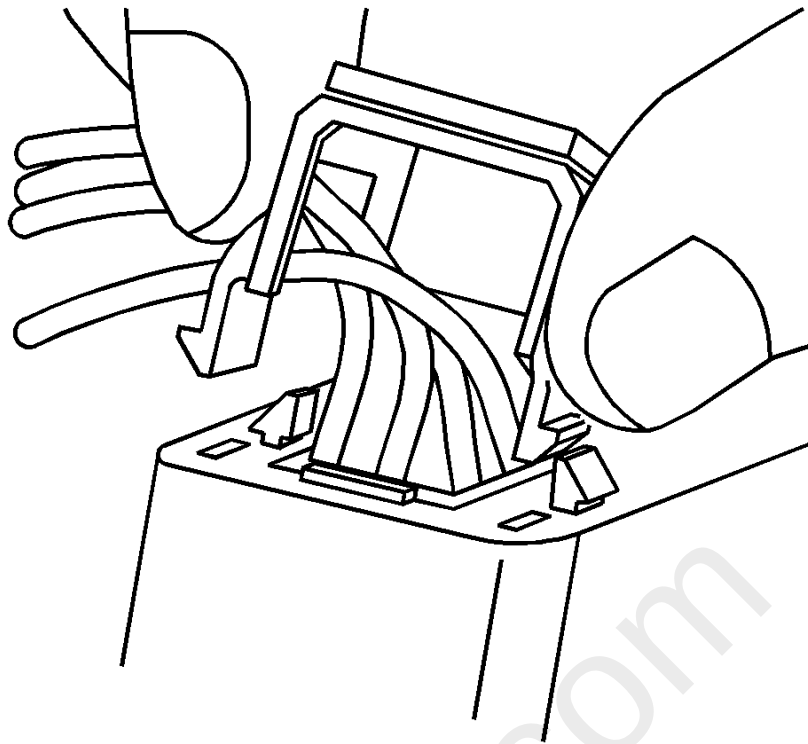
**Fig. 55: Squeezing Cover Locking Legs**  
Courtesy of GENERAL MOTORS COMPANY

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



**Fig. 56: Unseating Locking Leg**  
Courtesy of GENERAL MOTORS COMPANY

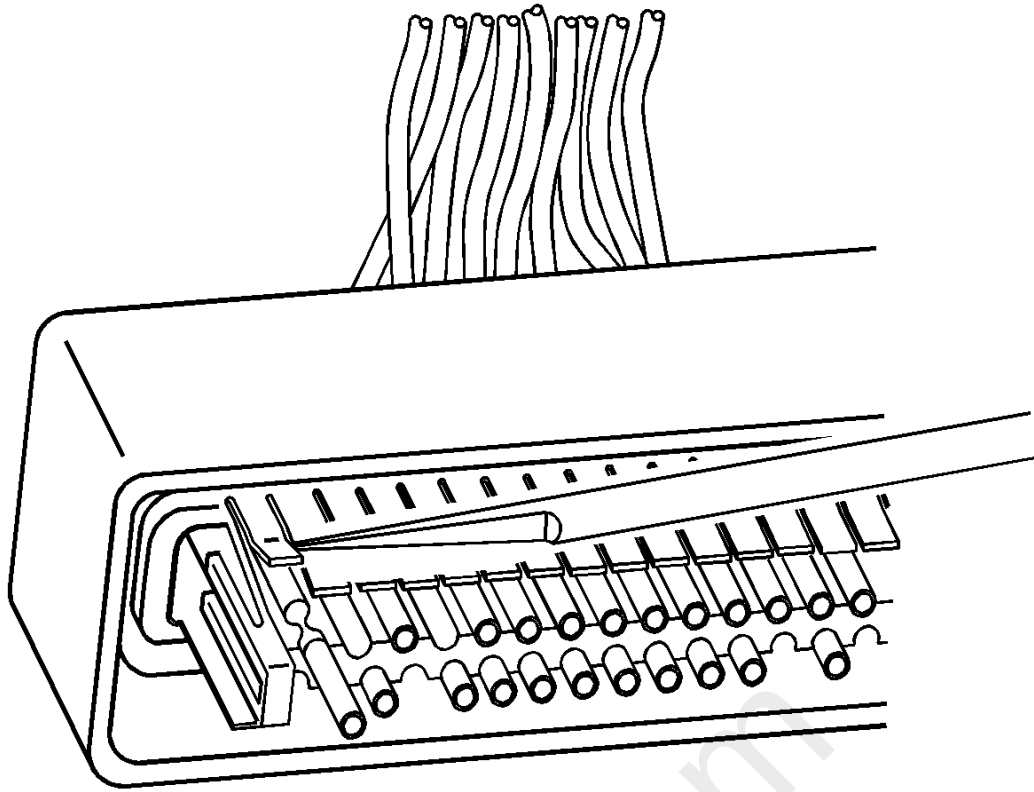
7. Apply pressure and gently rock the cover until one locking leg is unseated.



**Fig. 57: Removing Cover**

**Courtesy of GENERAL MOTORS COMPANY**

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



**Fig. 58: Identifying Terminal Retaining Tab**

Courtesy of GENERAL MOTORS COMPANY

9. Use J-38125-12A 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.
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.
11. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#)[Repairing Connector Terminals \(Terminal Repair\)](#) procedure.
12. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

#### **Terminal Insertion Procedure**

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 (MICRO.64)**

##### **Special Tools**

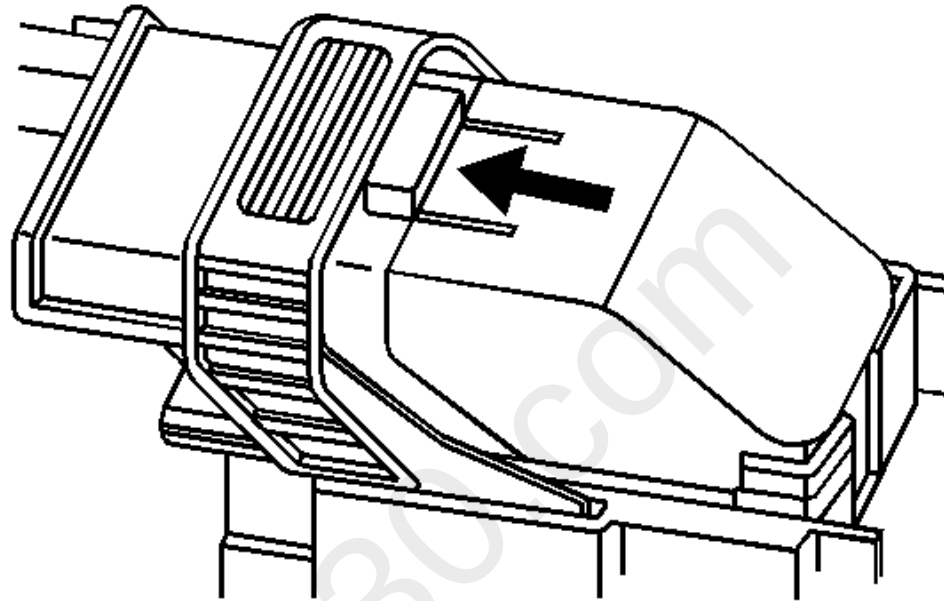
- **EL-38125-550** Terminal Release Tool Kit

- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-21** Terminal Release Tool

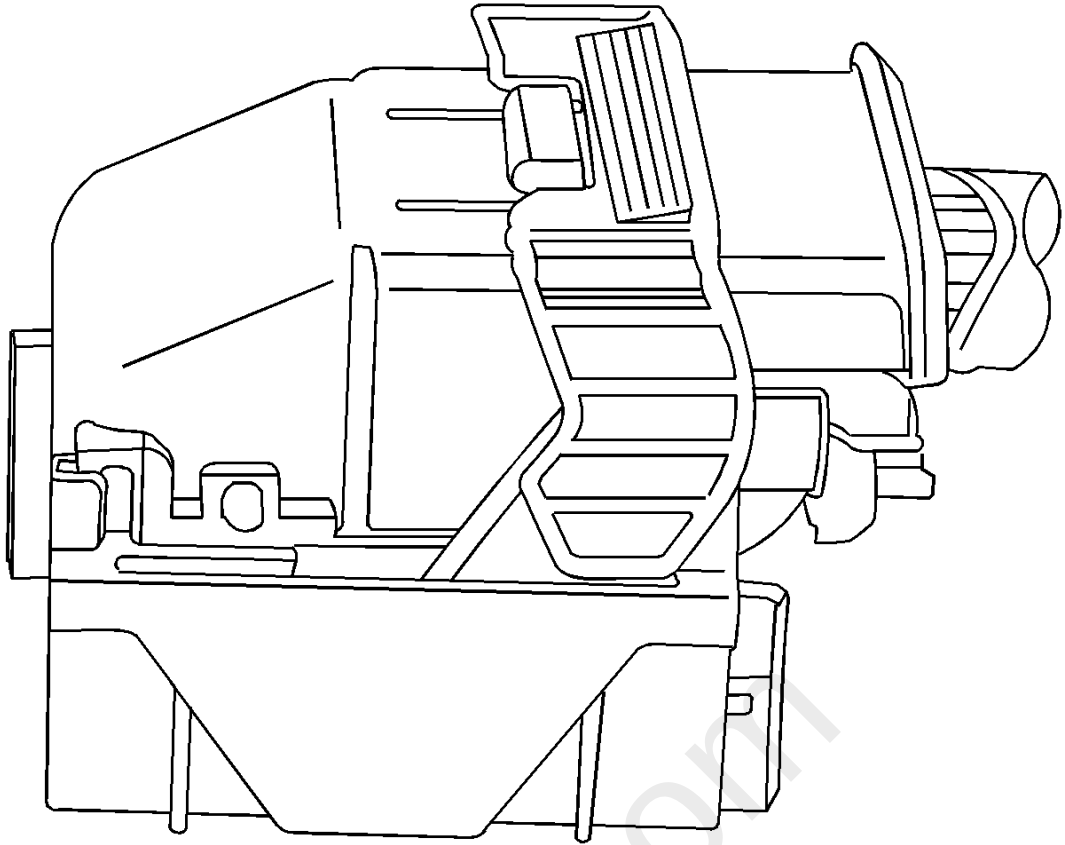
For equivalent regional tools, refer to [Special Tools](#) .

#### **Terminal Removal Procedure**

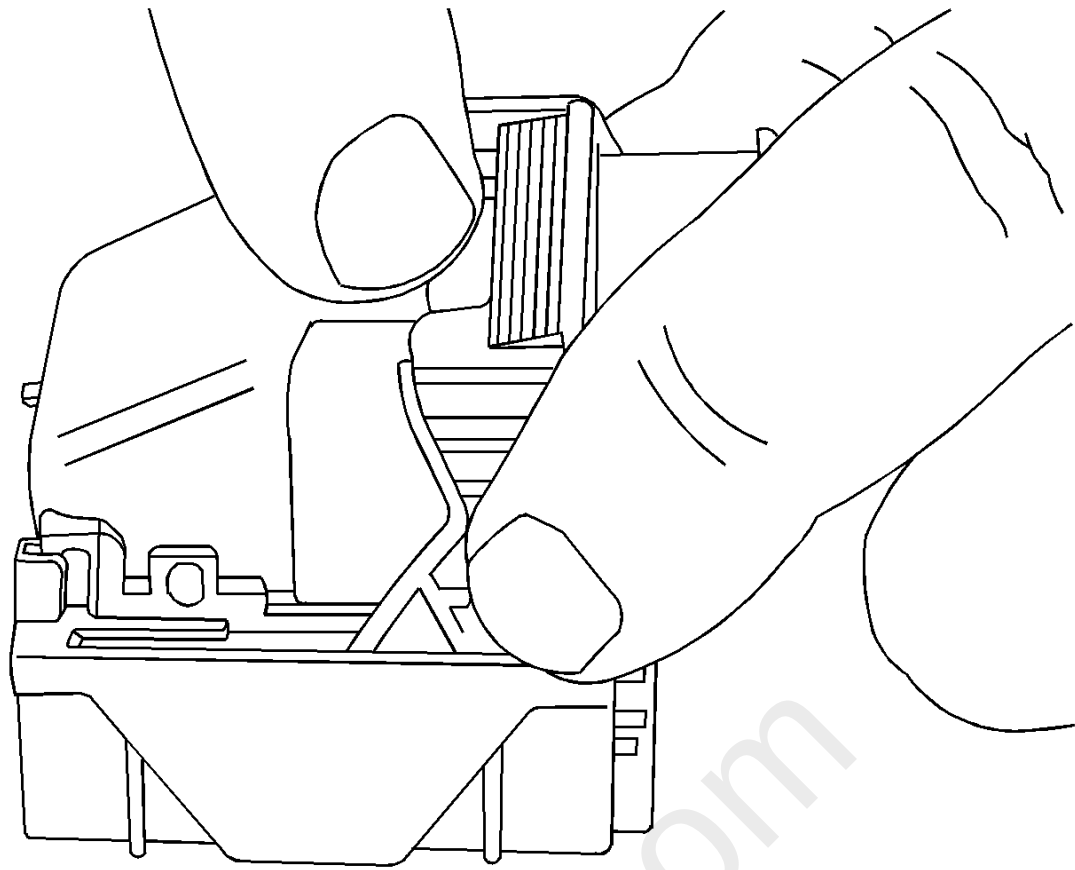
Follow the steps below in order to remove terminals from Micro.64 connectors.



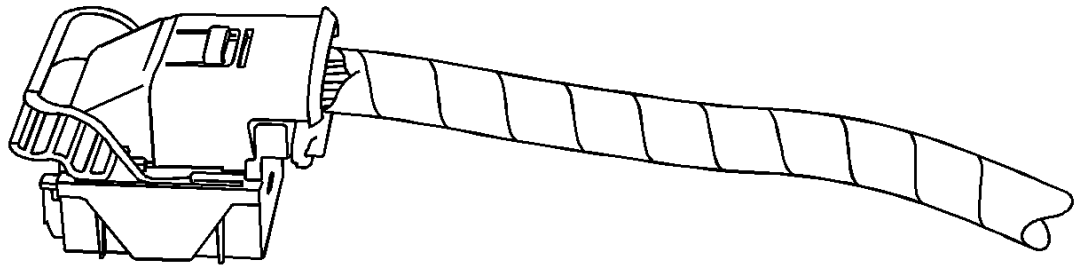
**Fig. 59: Wire Dress Cover Lever Lock**  
Courtesy of GENERAL MOTORS COMPANY



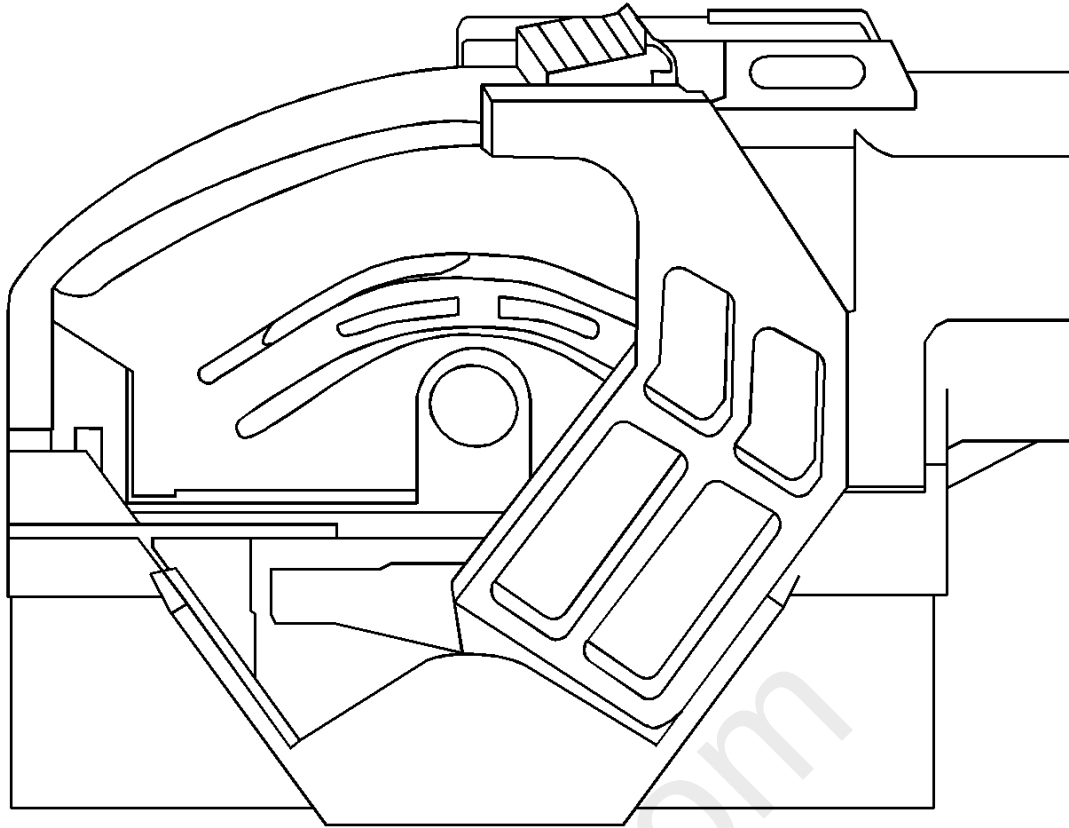
**Fig. 60: Typical Micro 64 Connector**  
**Courtesy of GENERAL MOTORS COMPANY**



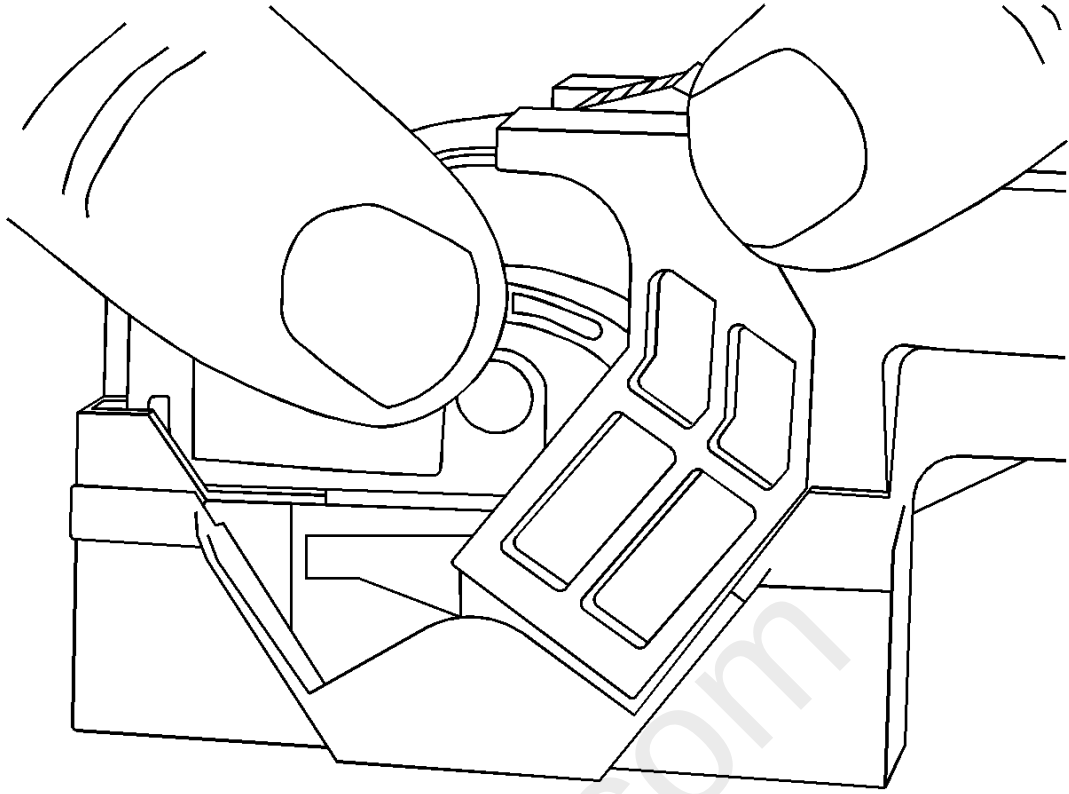
**Fig. 61: Depressing Lock And Pulling Lever**  
Courtesy of GENERAL MOTORS COMPANY



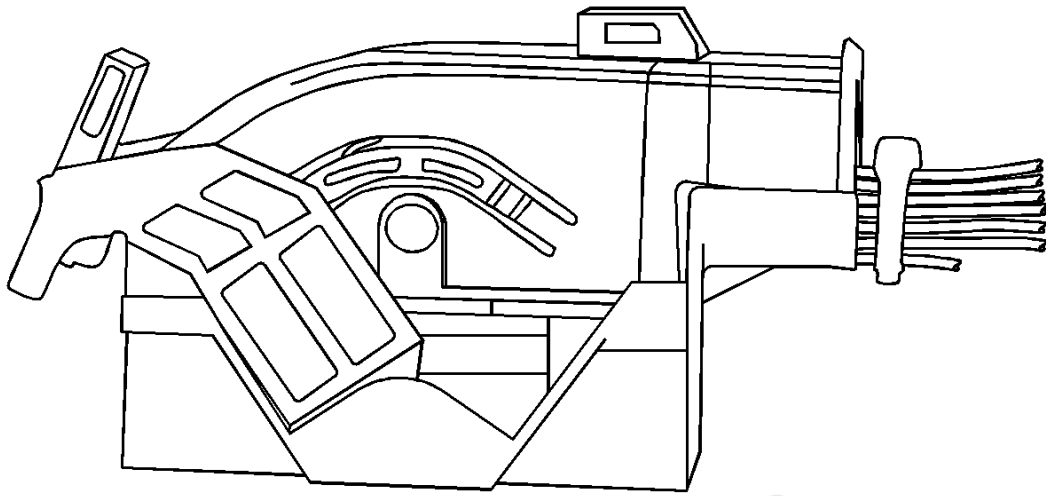
**Fig. 62: Connector Released From Component**  
Courtesy of GENERAL MOTORS COMPANY



**Fig. 63: Another Type Of Micro 64 Connector**  
**Courtesy of GENERAL MOTORS COMPANY**



**Fig. 64: Locating Locks On Both Sides Of Wiredress Cover**  
Courtesy of GENERAL MOTORS COMPANY



**Fig. 65: Connector Released From Component**

**Courtesy of GENERAL MOTORS COMPANY**

1. Locate the lever lock on the wire dress cover. While depressing the lock, pull the lever over and past the lock. The lever lock may be located on the top or sides of the wire dress cover.

View of a typical Micro 64 connector.

Depress the lock and pull the lever over and past the lock.

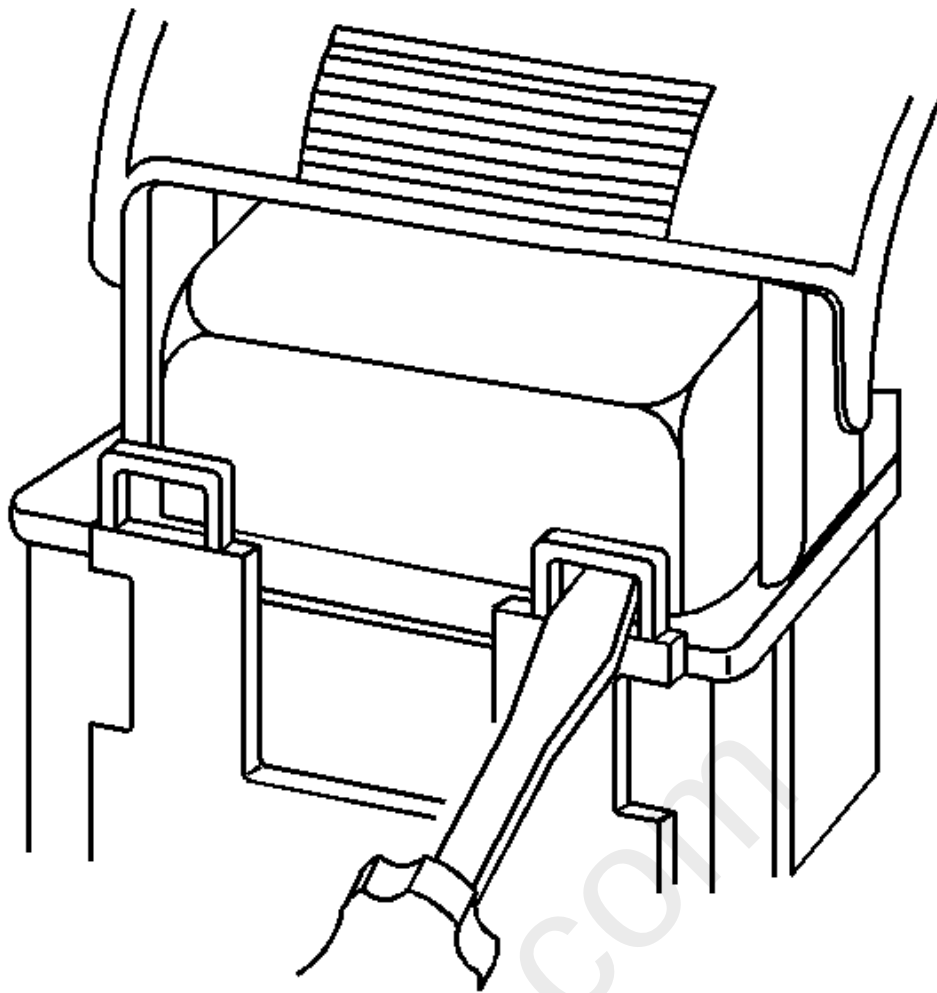
View of the connector when released from the component.

View of another type of Micro 64 connector.

Depress the locks that are located on both sides of the wire dress cover and pull the lever over and past the locks.

View of the connector when released from the component.

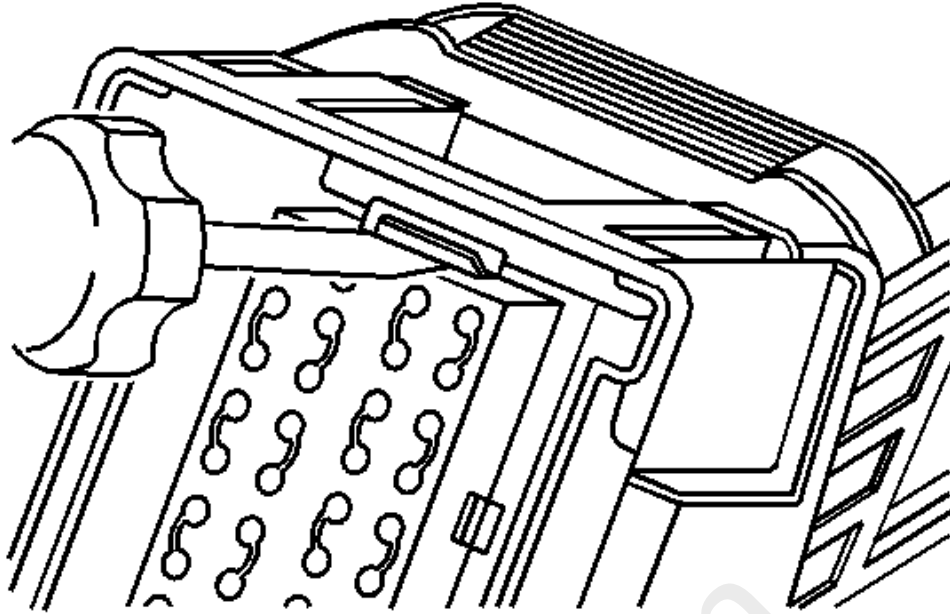
2. Disconnect the connector from the component.



**Fig. 66: Releasing Dress Cover Locking Tabs**

**Courtesy of GENERAL MOTORS COMPANY**

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

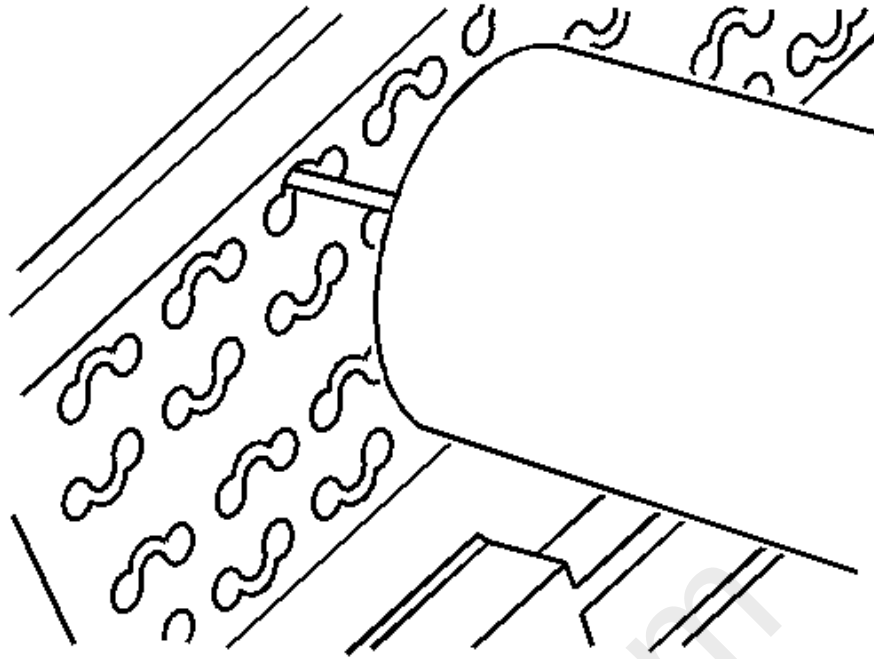


**Fig. 67: Removing Terminal Position Assurance**

Courtesy of GENERAL MOTORS COMPANY

**NOTE:** 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 small slot on the TPA and pushing down until the TPA releases. Gently pry the TPA out of the connector.

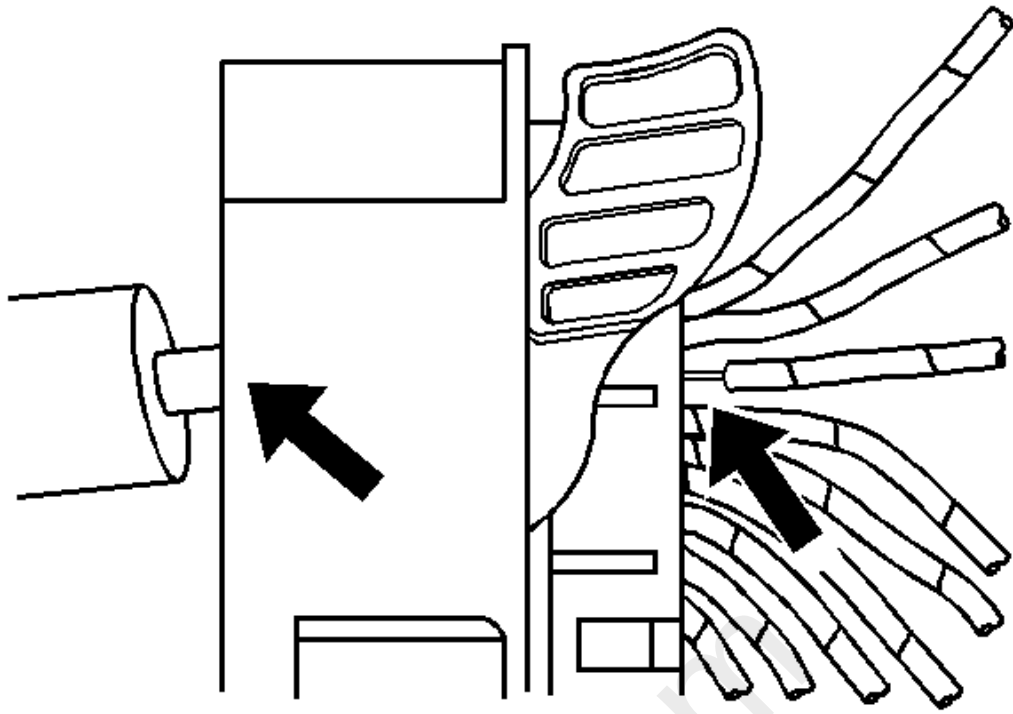


**Fig. 68: Identifying Terminal Release Tool**

Courtesy of GENERAL MOTORS COMPANY

**NOTE:** Be careful not to angle or rock the J-38125-21 tool when inserting it into the connector or the tool may break.

6. Insert the J-38125-21 tool into the round canal between the terminals cavities at the front of the connector.



**Fig. 69: Removing Wire From Back Of Connector**

Courtesy of GENERAL MOTORS COMPANY

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.
8. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#)[Repairing Connector Terminals \(Terminal Repair\)](#) procedure.
9. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

## **DELPHI CONNECTORS (12-WAY)**

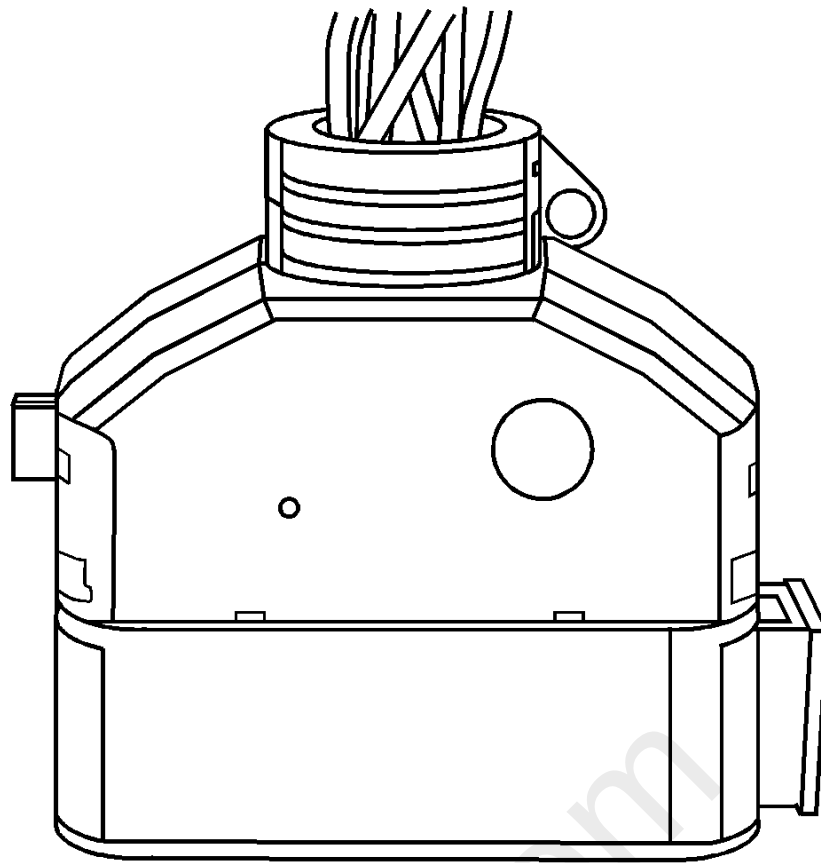
### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-12A** Terminal Release Tool

For equivalent regional tools, refer to [Special Tools](#) .

### **Terminal Removal Procedure**

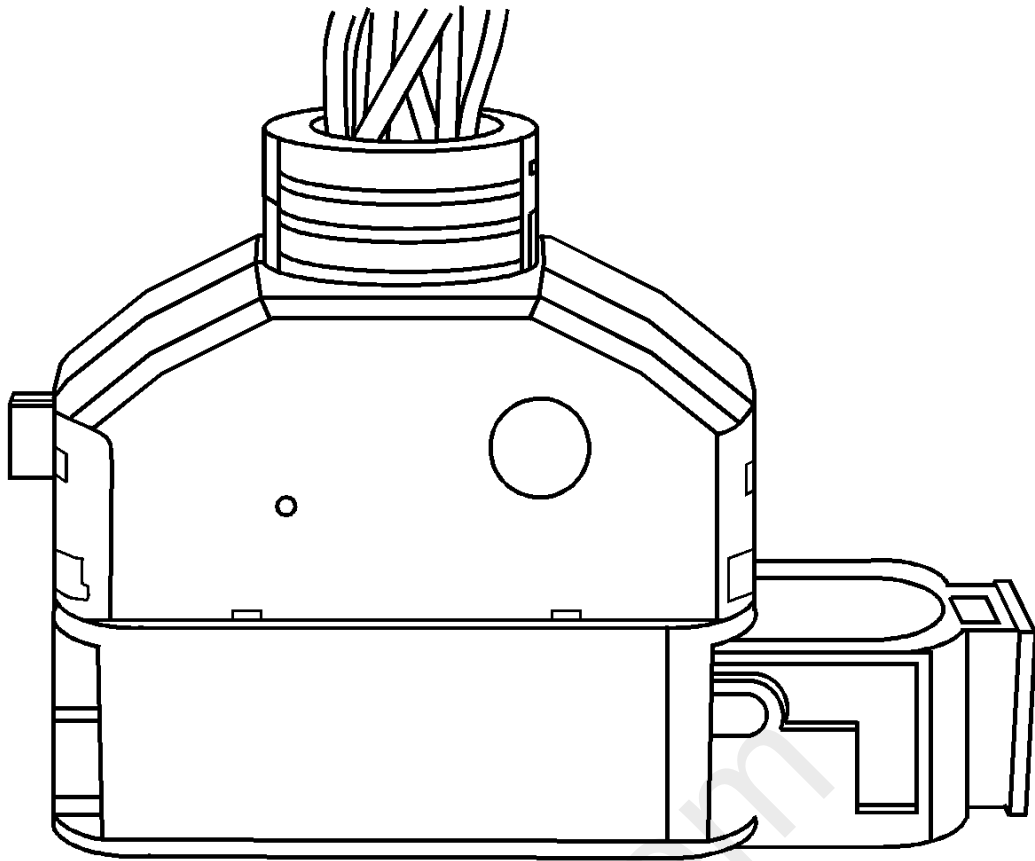
Follow the steps below in order to remove terminals from the connector.



**Fig. 70: Lever Lock**

**Courtesy of GENERAL MOTORS COMPANY**

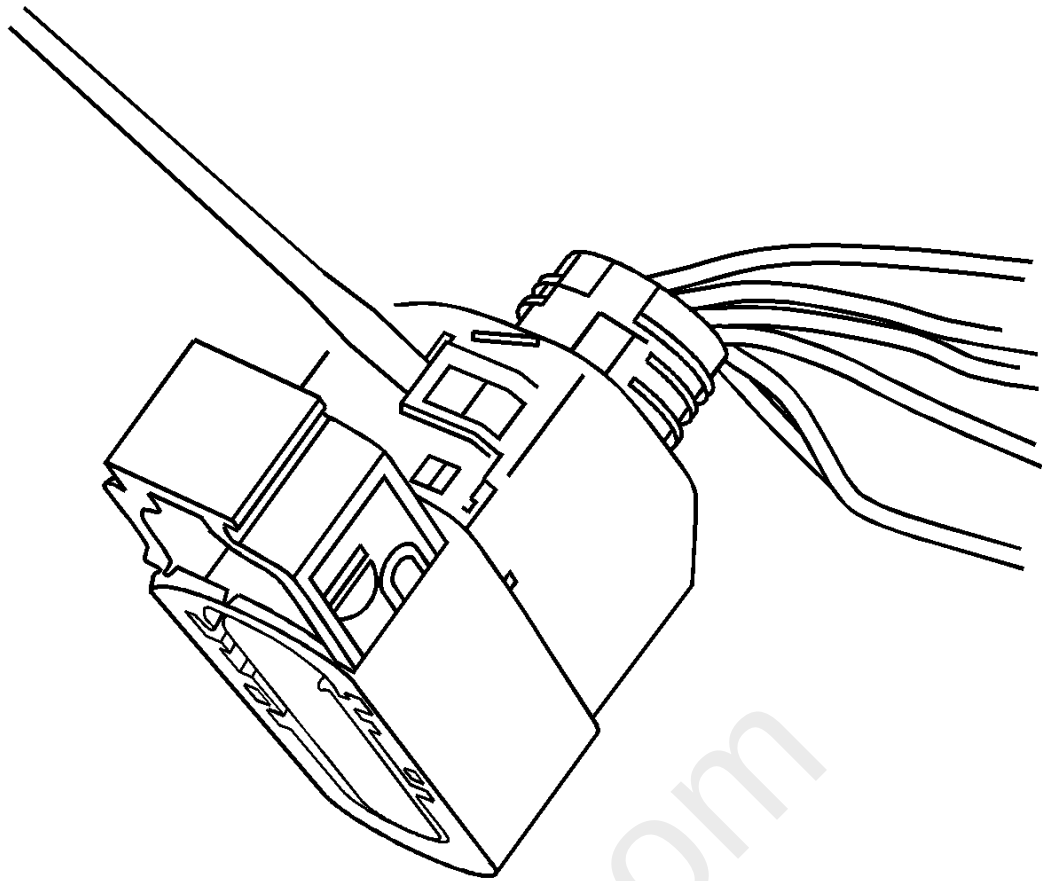
1. Locate the lever lock on the wire dress cover. Remove the connector position assurance (CPA) and slide the lever lock away from the connector body.
2. Disconnect the connector from the component.



**Fig. 71: Lever Lock Slid Away From Connector Body.**

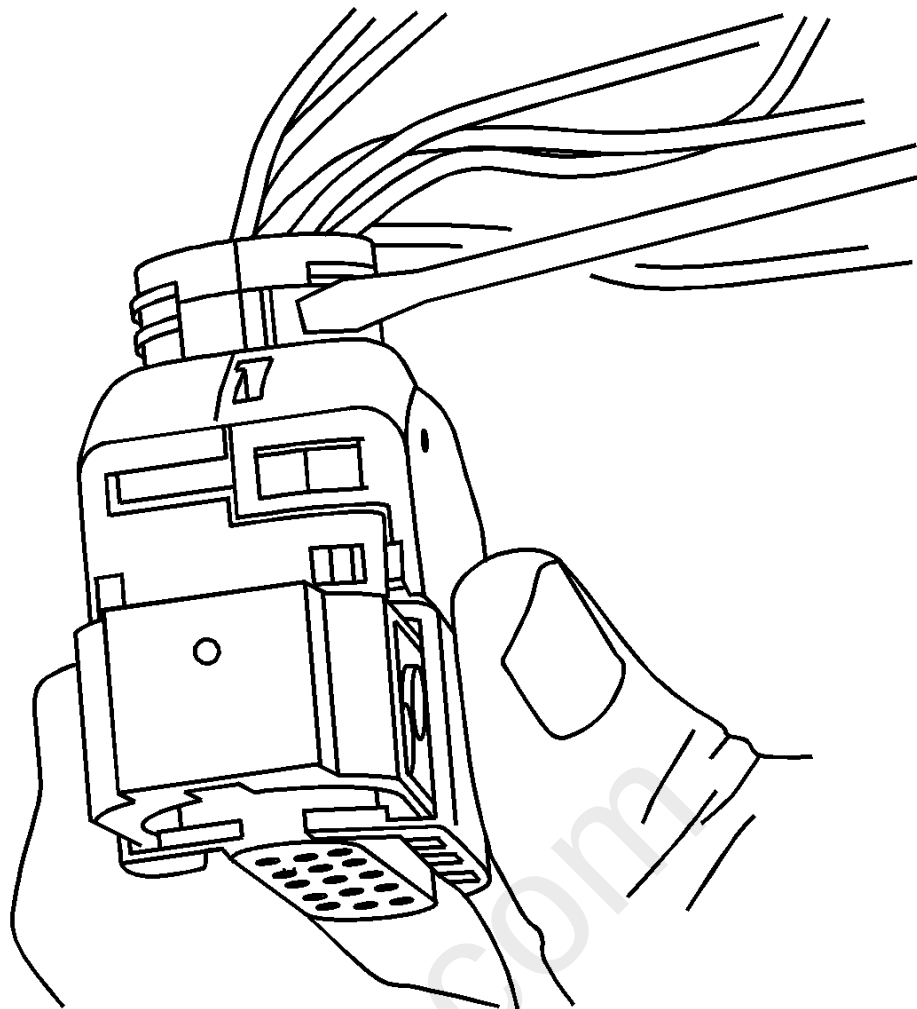
**Courtesy of GENERAL MOTORS COMPANY**

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.



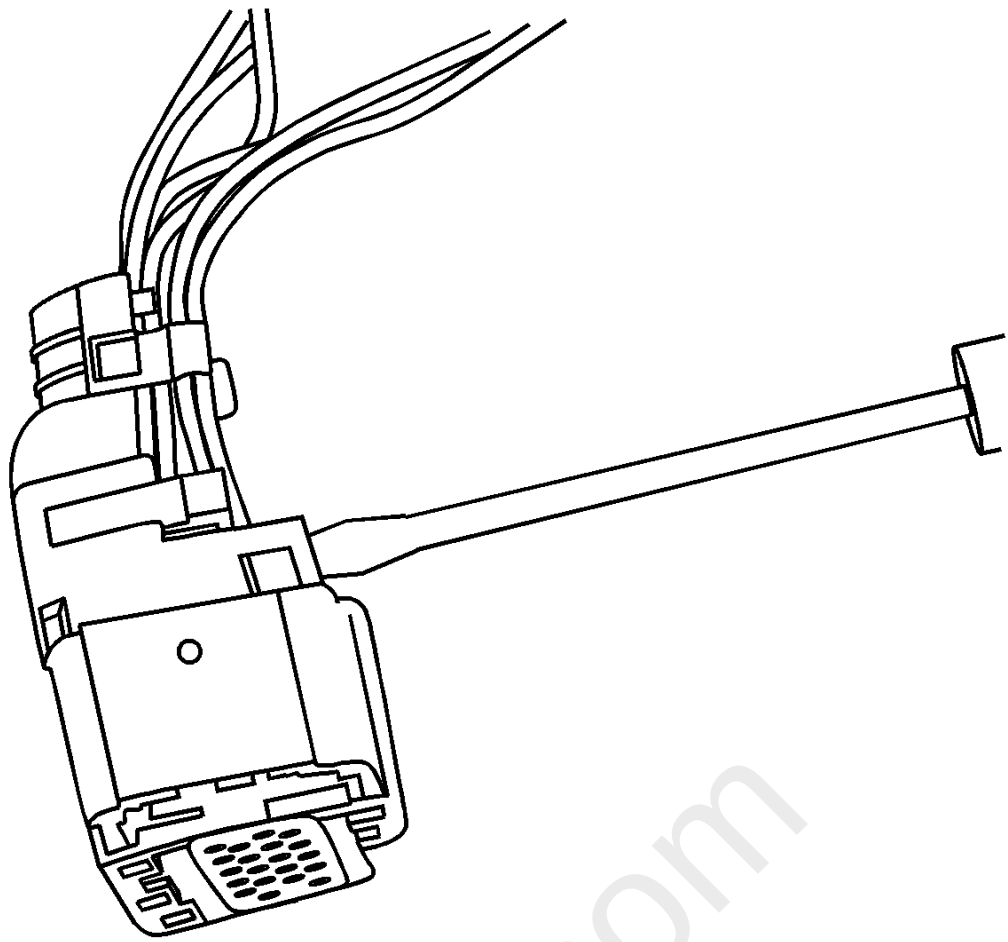
**Fig. 72: Releasing Lower Wire Dress Cover Locking Tab**  
Courtesy of GENERAL MOTORS COMPANY

4. Release the lower wire dress cover locking tab.



**Fig. 73: Releasing Upper Wiredress Cover Locking Tab**  
Courtesy of GENERAL MOTORS COMPANY

5. Release the upper wire dress cover locking tab.
6. Once the locks are unlocked, lift the dress cover off.

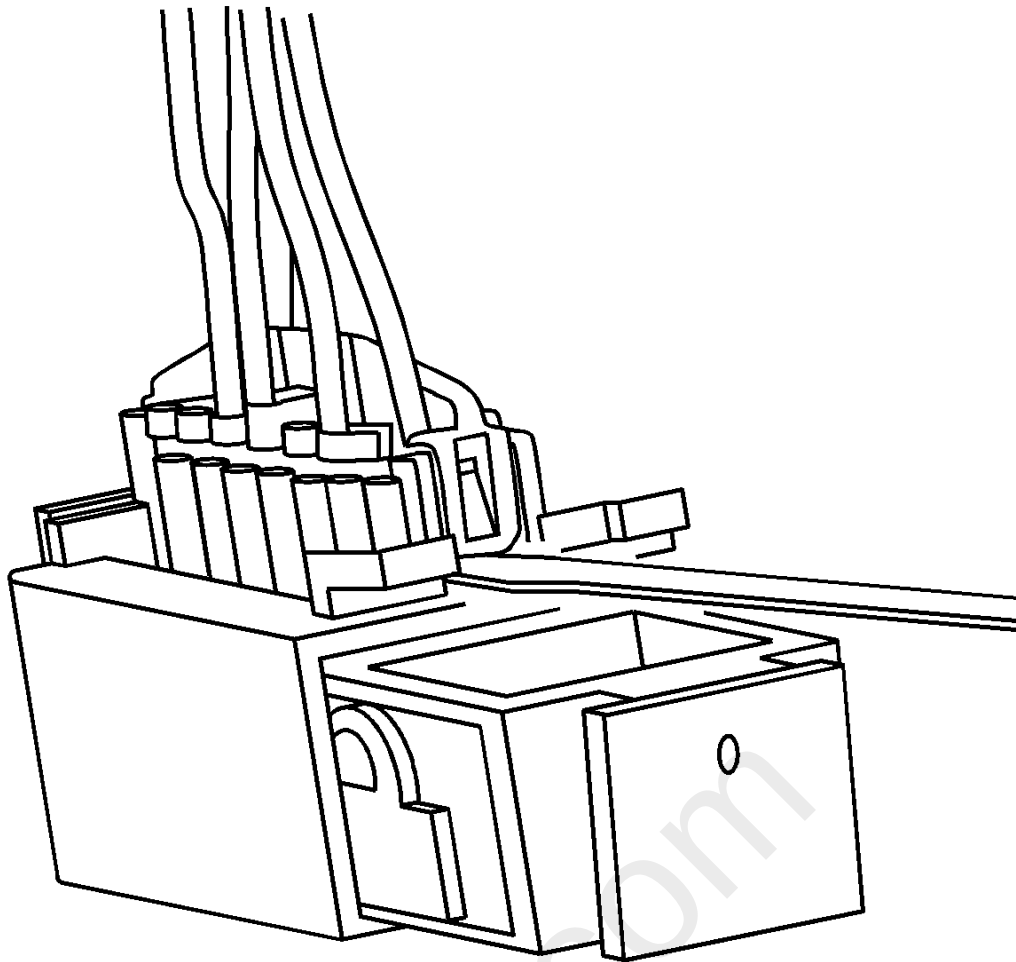


**Fig. 74: Gently Prying TPA Out Of Connector**

Courtesy of GENERAL MOTORS COMPANY

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

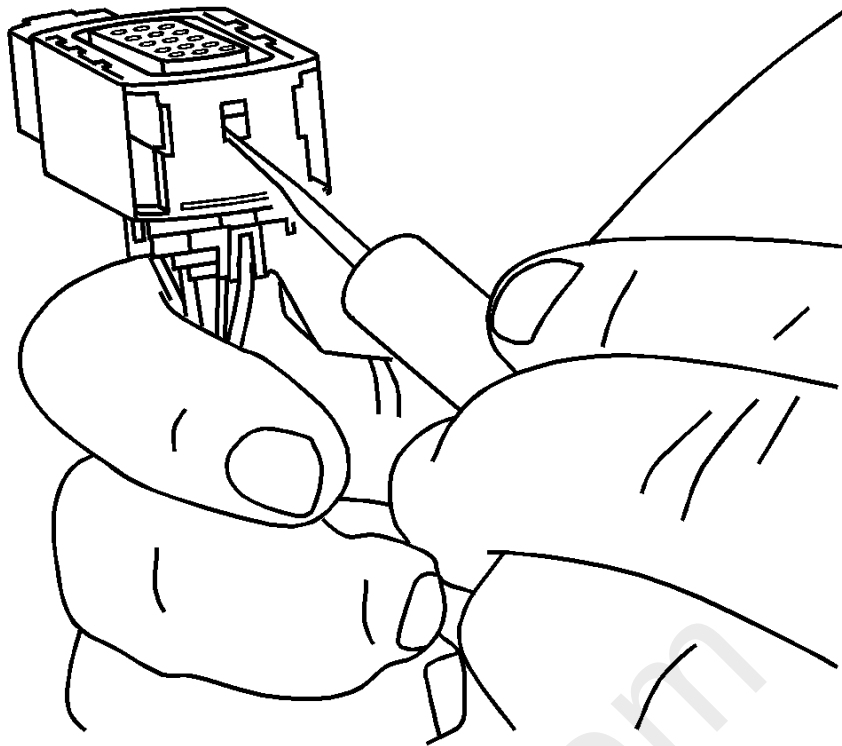
7. Remove the TPA by inserting a small flat-blade tool into the locking tabs on both sides of the TPA. Gently pry the TPA out of the connector.



**Fig. 75: Removing Nose Piece**

**Courtesy of GENERAL MOTORS COMPANY**

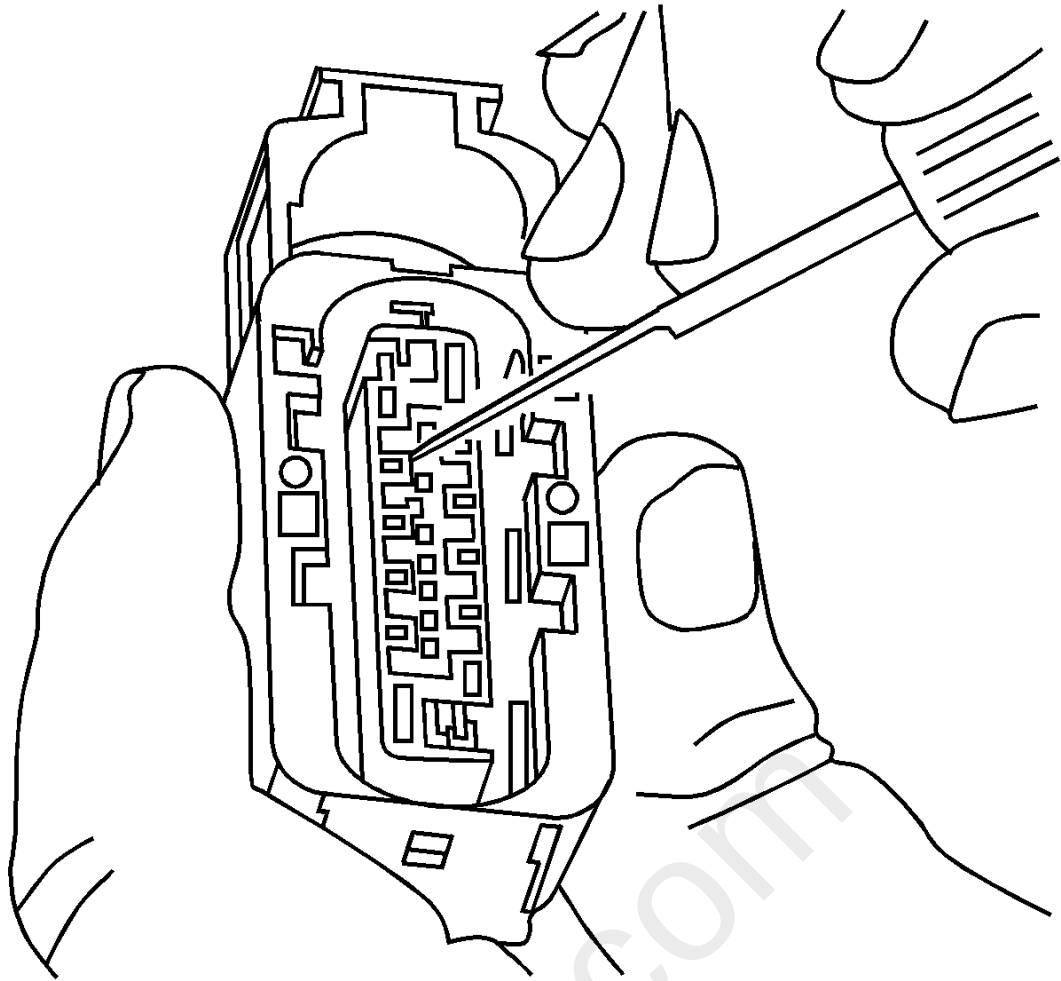
8. Remove the nose piece by inserting a small flat-blade tool into the locking tabs on both sides of the nose piece. Gently pry the nose piece out of the connector.



**Fig. 76: Inserting Special Tool Into Terminal Release Cavity.**

**Courtesy of GENERAL MOTORS COMPANY**

9. Insert the J-38125-12A tool to release the terminals by inserting the tool into the terminal release cavity.



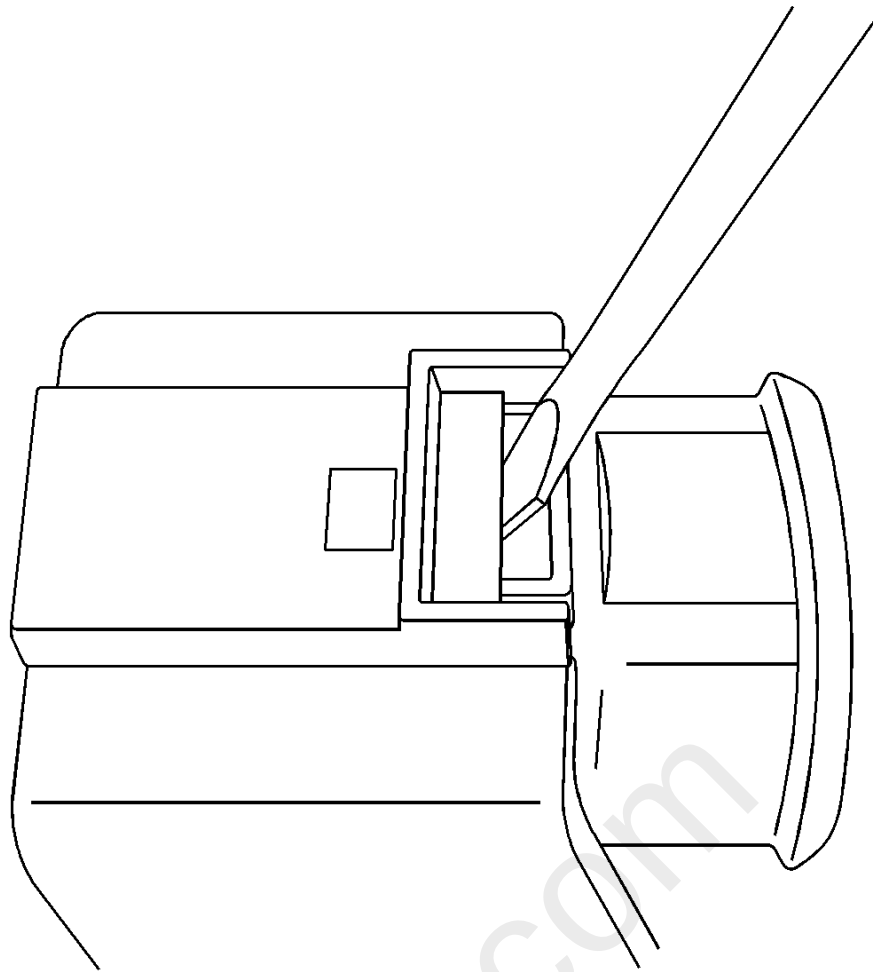
**Fig. 77: Holding Removal Tool In Place**

Courtesy of GENERAL MOTORS COMPANY

10. 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.
11. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#)[Repairing Connector Terminals \(Terminal Repair\)](#) procedure.
12. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

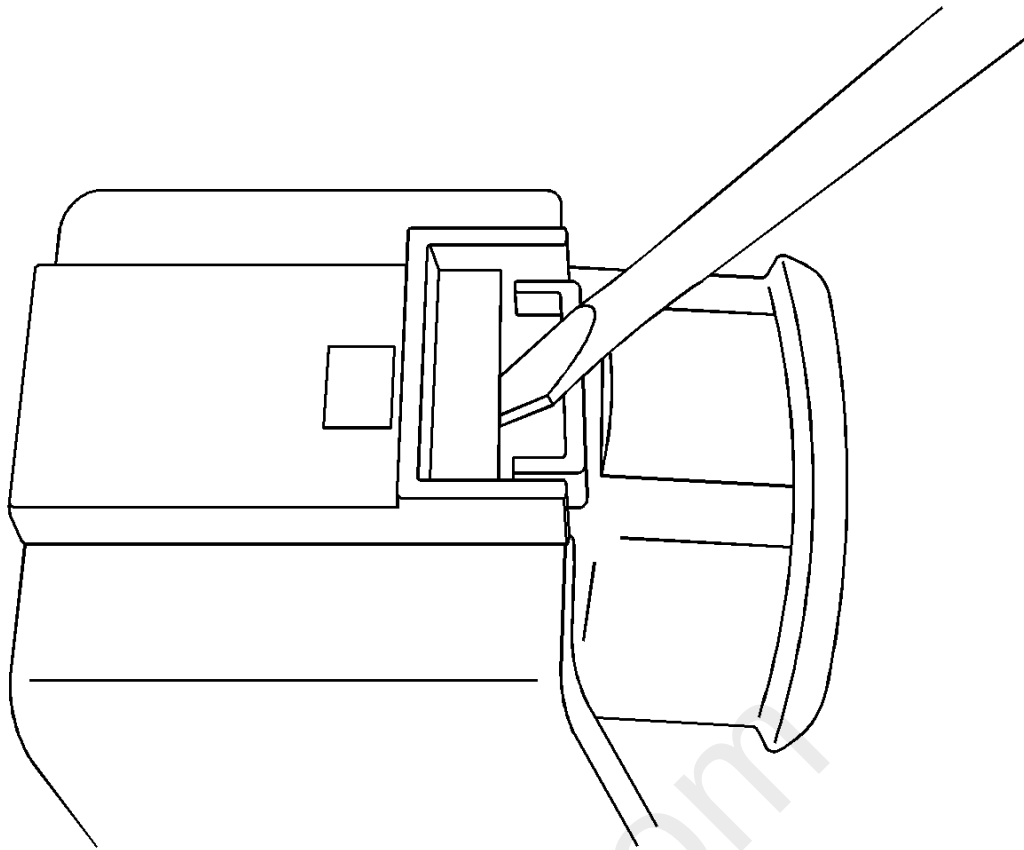
## **DELPHI CONNECTORS (STEERING GEAR)**

### **Removal Procedure**



**Fig. 78: Releasing Locking Tab On Connector**  
Courtesy of GENERAL MOTORS COMPANY

1. Use a small flat-bladed tool to release the locking tab on the connector.



**Fig. 79: Releasing Connector**

Courtesy of GENERAL MOTORS COMPANY

2. Push down the locking tab to release the connector. The small flat-bladed tool may need to be pushed down and angled back slightly to depress the locking tab. Pull on the connector body while releasing the locking tab to disconnect the connector.

## **FCI CONNECTORS (LEVER LOCK)**

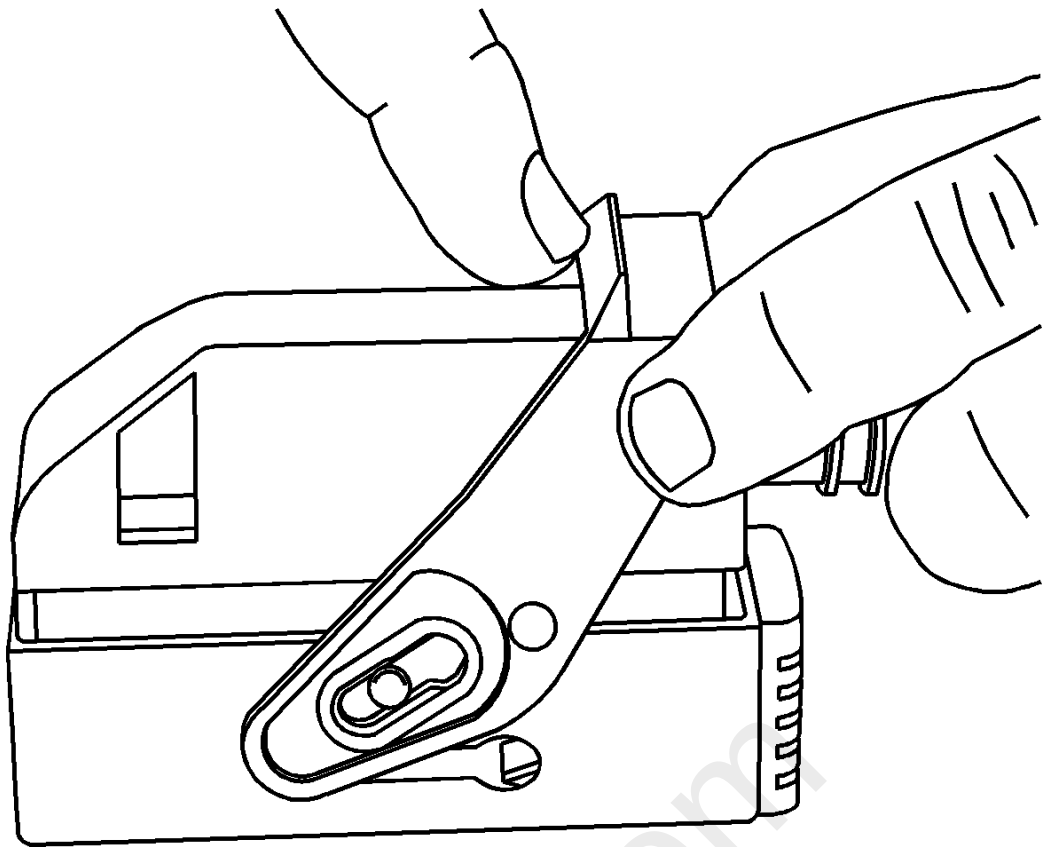
### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-556** Terminal Release Tool
- **J-38125-560** Terminal Release Tool

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

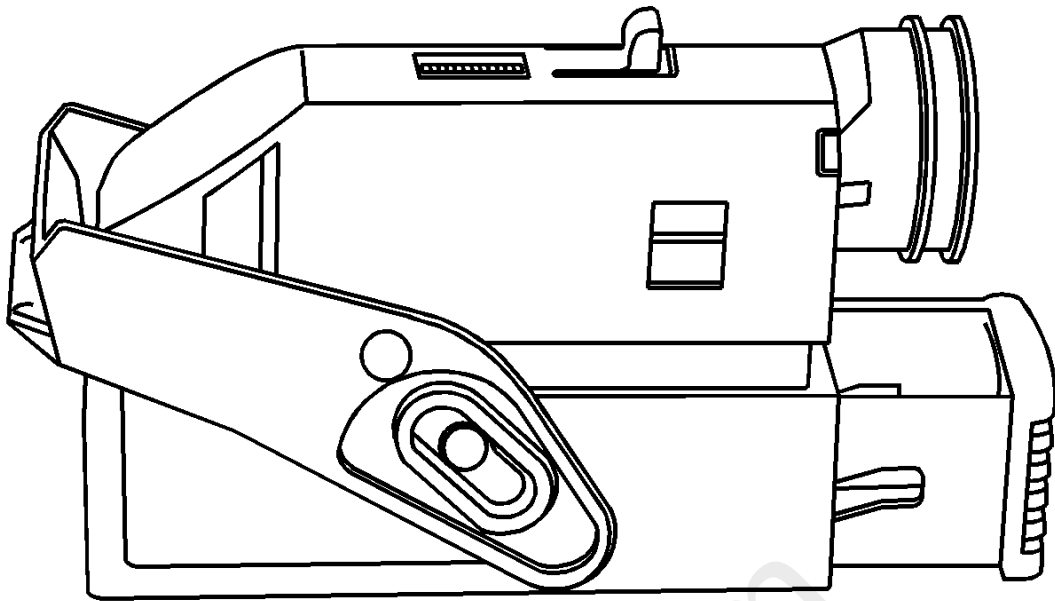
### **Terminal Removal Procedure**

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



**Fig. 80: Pressing Down On Lever Lock Release Tab**  
Courtesy of GENERAL MOTORS COMPANY

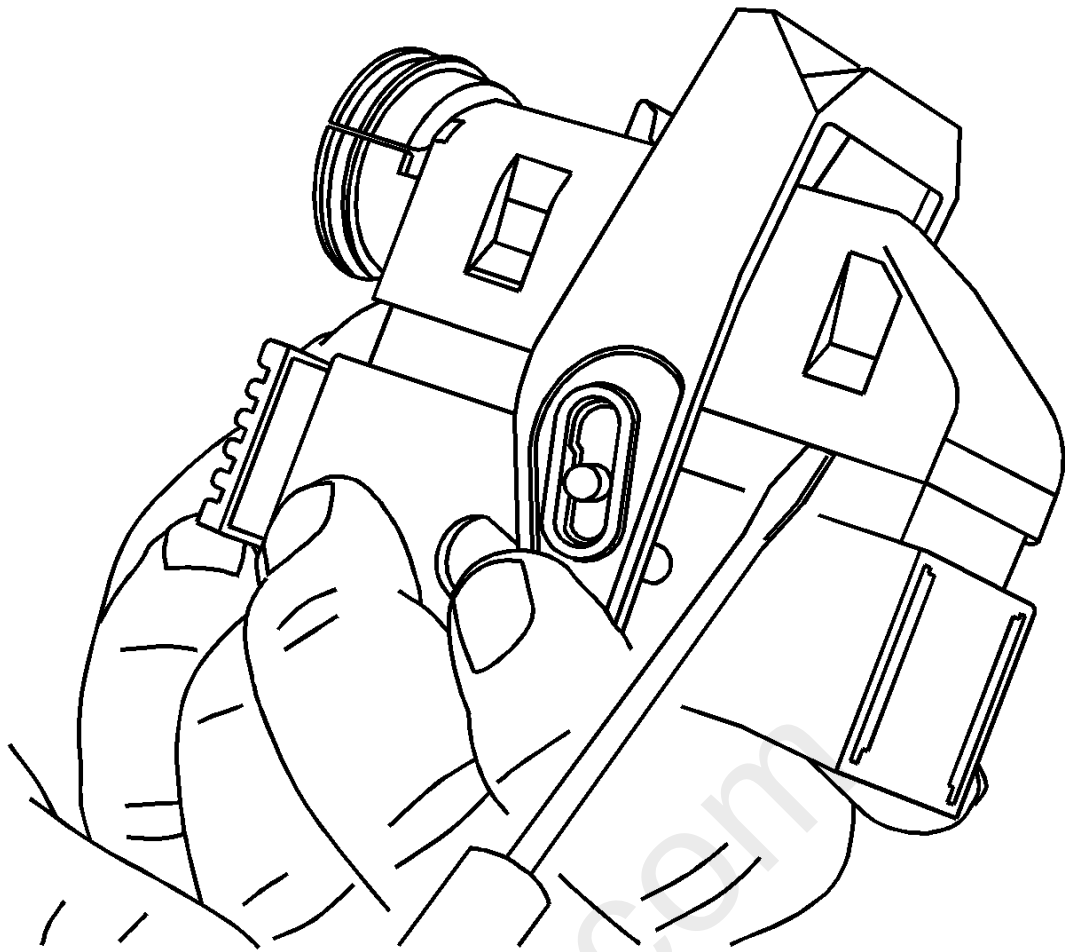
1. Slide the lever lock forward while pressing down on the lever lock release tab.
2. The release tab is located on the top of the wiredress cover.



**Fig. 81: Connector In Released Position**

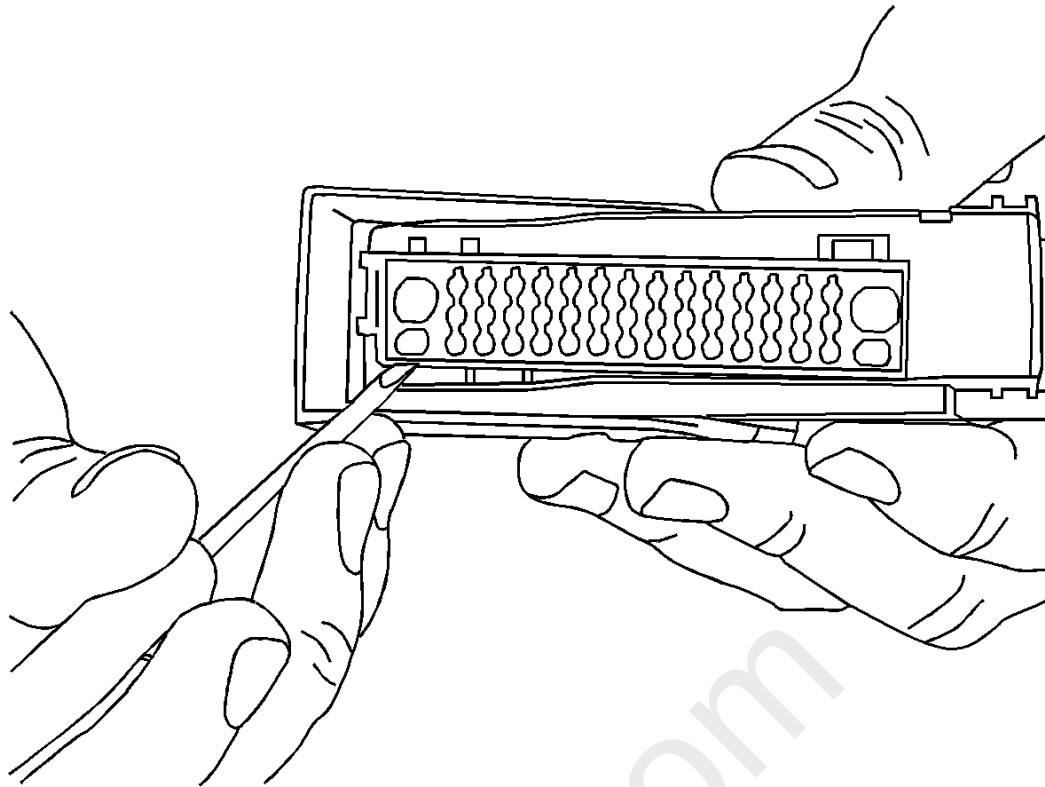
**Courtesy of GENERAL MOTORS COMPANY**

3. 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.



**Fig. 82: Sliding Terminal Position Assurance (TPA) Up One Notch**  
Courtesy of GENERAL MOTORS COMPANY

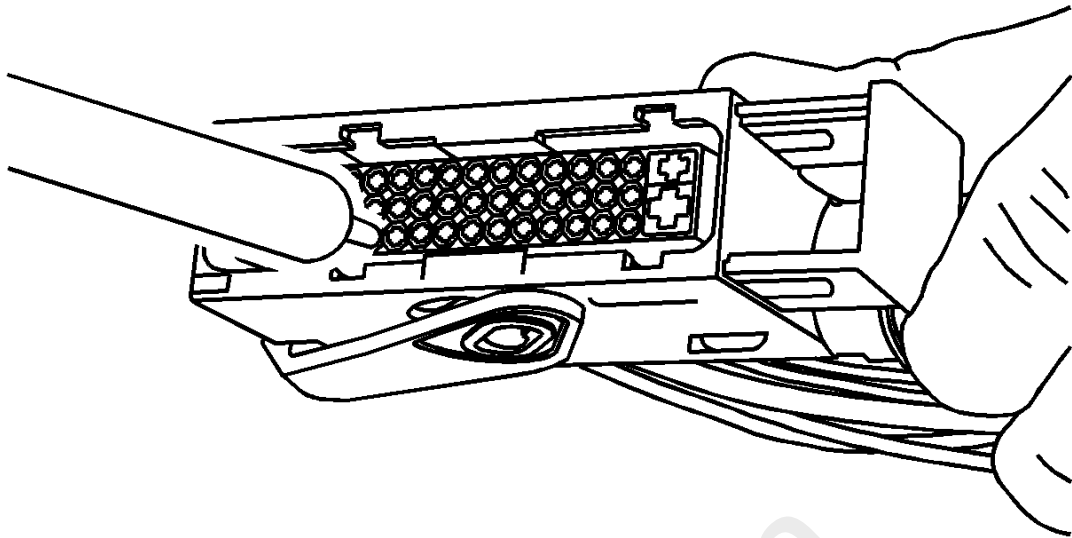
6. Use a small flat-blade tool to slide the terminal position assurance (TPA) up one notch on both ends of the connector. The TPA is located underneath the wire dress cover.



**Fig. 83: Releasing Terminals With Proper Tool**

**Courtesy of GENERAL MOTORS COMPANY**

7. For the larger terminals insert the J-38125-556 tool to release the terminals by inserting the tool into the terminal release cavity. For the smaller terminals insert the J-38125-560 tool to release the terminals by inserting the tool into the terminal release cavity.



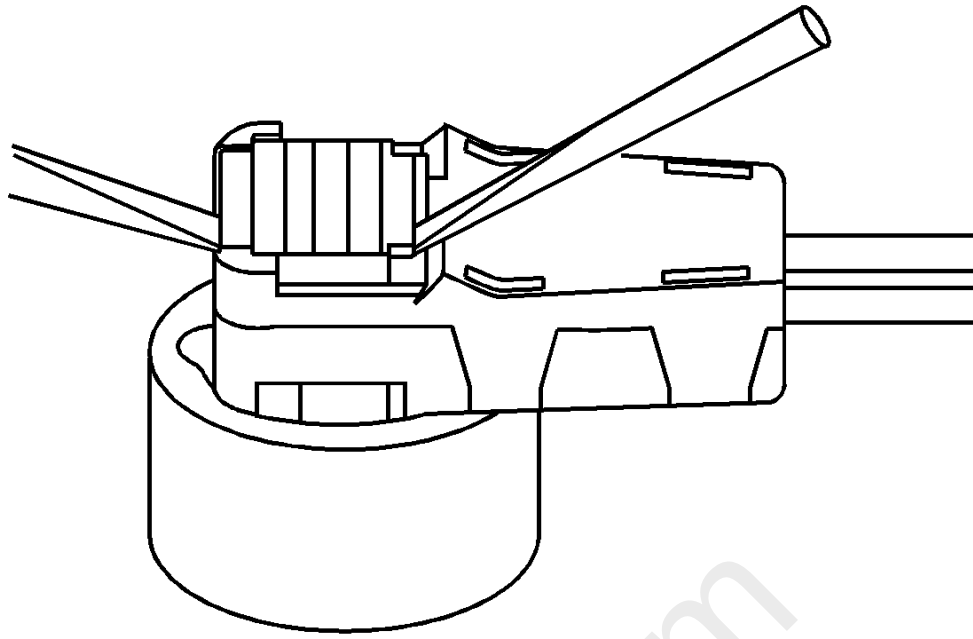
**Fig. 84: Holding Removal Tool In Place, Gently Pull Wire Out Of Back Of Connector**  
Courtesy of GENERAL MOTORS COMPANY

8. While holding the removal tool in place, gently pull the wire out of the back of the connector. Always remember never use force when pulling a terminal out of a connector.
9. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#)[Repairing Connector Terminals \(Terminal Repair\)](#) procedure.
10. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

## **FCI CONNECTORS (SIR)**

### **Removal Procedure**

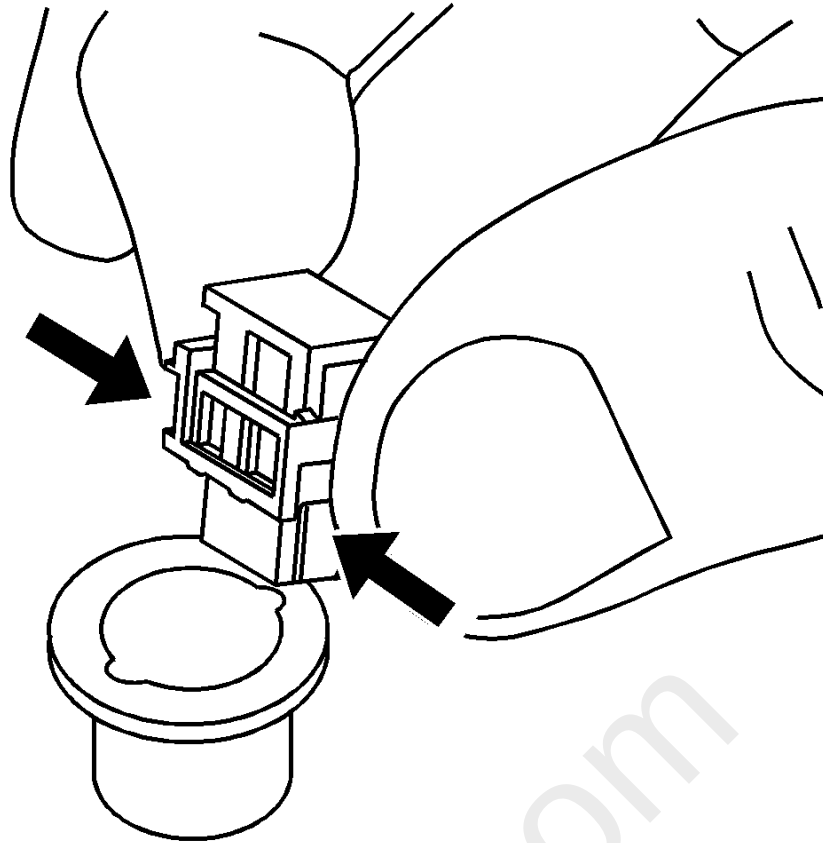
**NOTE:** The orange or yellow connector position assurance (CPA) must be released first to disconnect or to connect the connector.



**Fig. 85: Lifting Orange CPA**

**Courtesy of GENERAL MOTORS COMPANY**

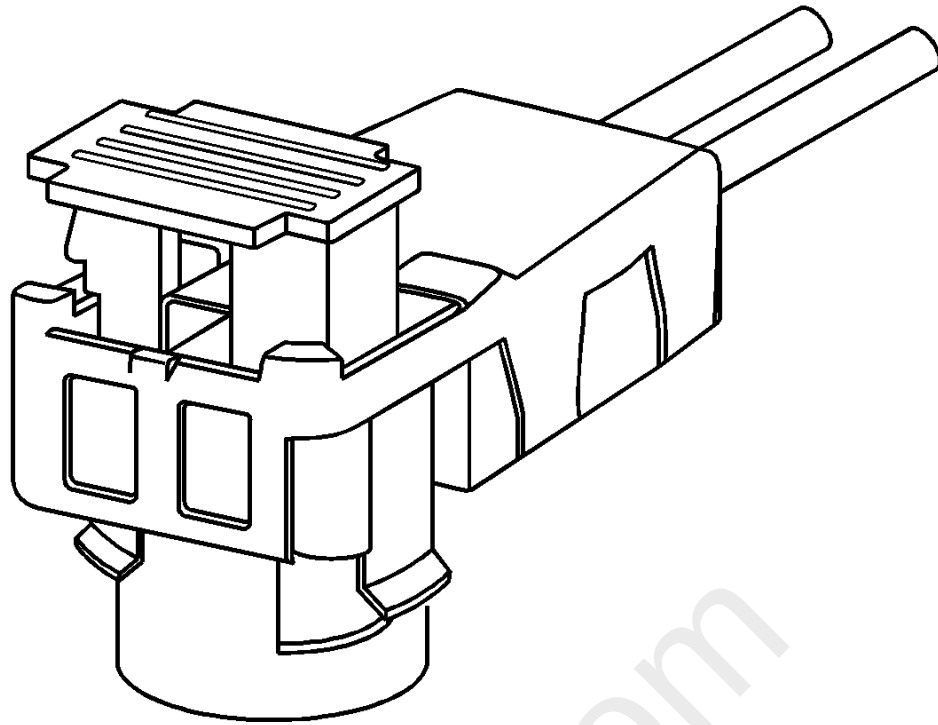
1. Lift the orange or yellow CPA vertically (avoid lifting on an angle to the connector) approximately 4 mm to release the connector. Use a small flat-bladed tool to help release the CPA. The CPA may also be released manually without any tools.



**Fig. 86: Grabbing Connector On Both Sides**  
Courtesy of GENERAL MOTORS COMPANY

2. Grab the connector on both sides and lift vertically to disconnect the connector.

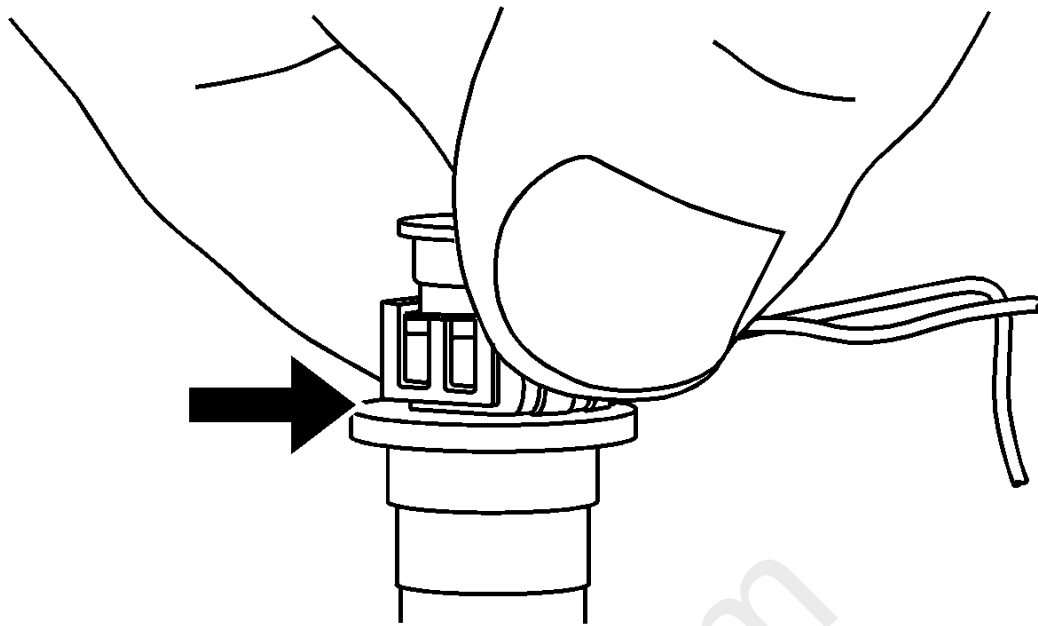
#### **Installation Procedure**



**Fig. 87: Lifting Orange CPA**

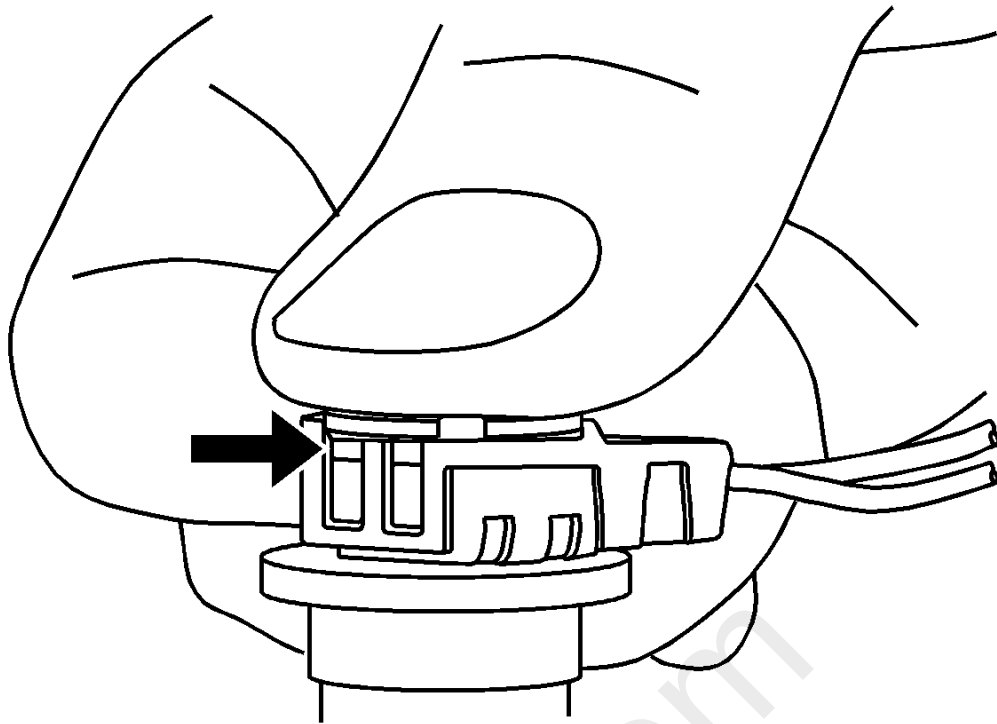
**Courtesy of GENERAL MOTORS COMPANY**

1. The CPA should be approximately 4 mm above the yellow cover before installing the connector. If not, use a small flat-bladed tool to help release the CPA. The CPA may also be released manually without any tools.



**Fig. 88: Seating Connector Sub-Assembly.**  
**Courtesy of GENERAL MOTORS COMPANY**

2. Line up the connector key tabs with the initiator key slots. Grab the connector on both sides and push down into the initiator connector sub assembly until fully seated.



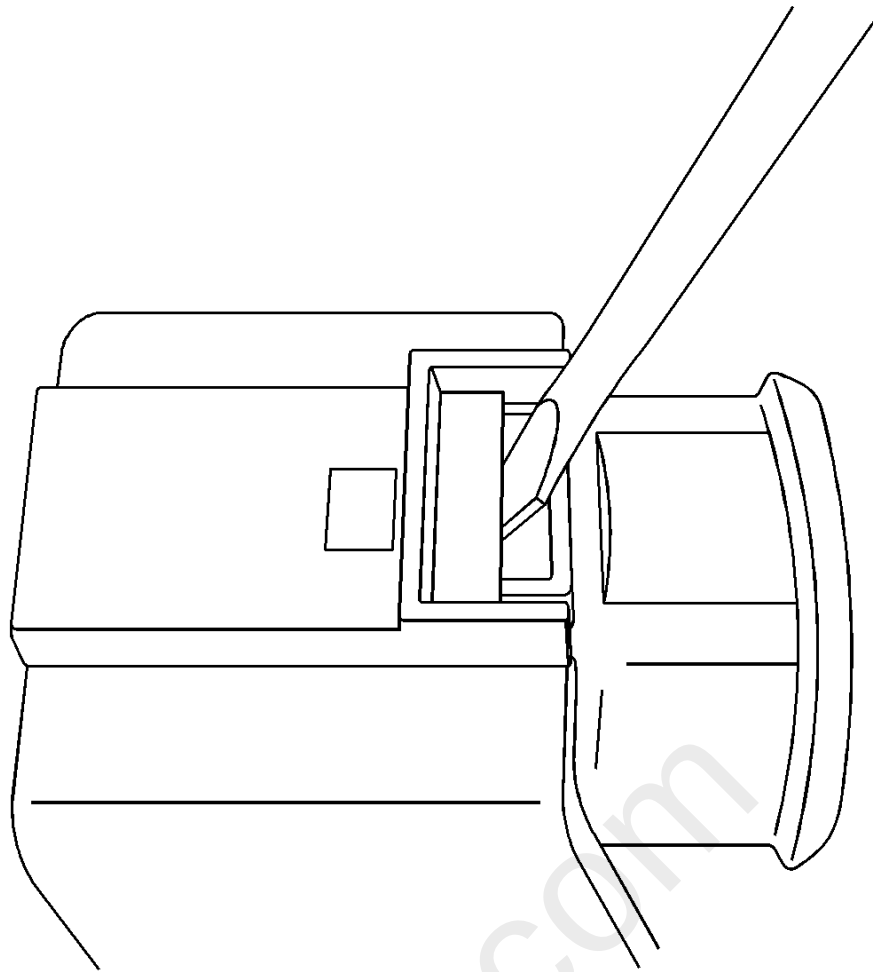
**Fig. 89: Pushing CPA Down**

Courtesy of GENERAL MOTORS COMPANY

3. After the connector is fully seated, push the CPA down with your thumb until the CPA is touching the yellow cover on the connector.
4. After the CPA is seated, lightly pull on the connector, it should not pull off if the connector and CPA are properly engaged.

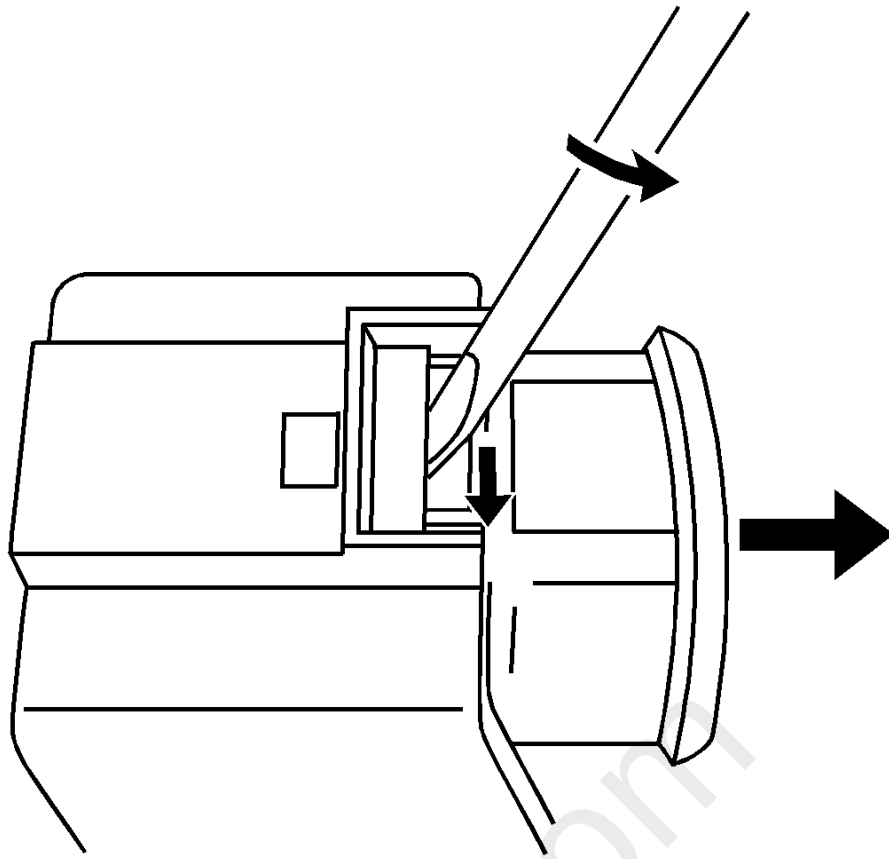
## **FEP CONNECTORS (STEERING GEAR)**

### **Removal Procedure**



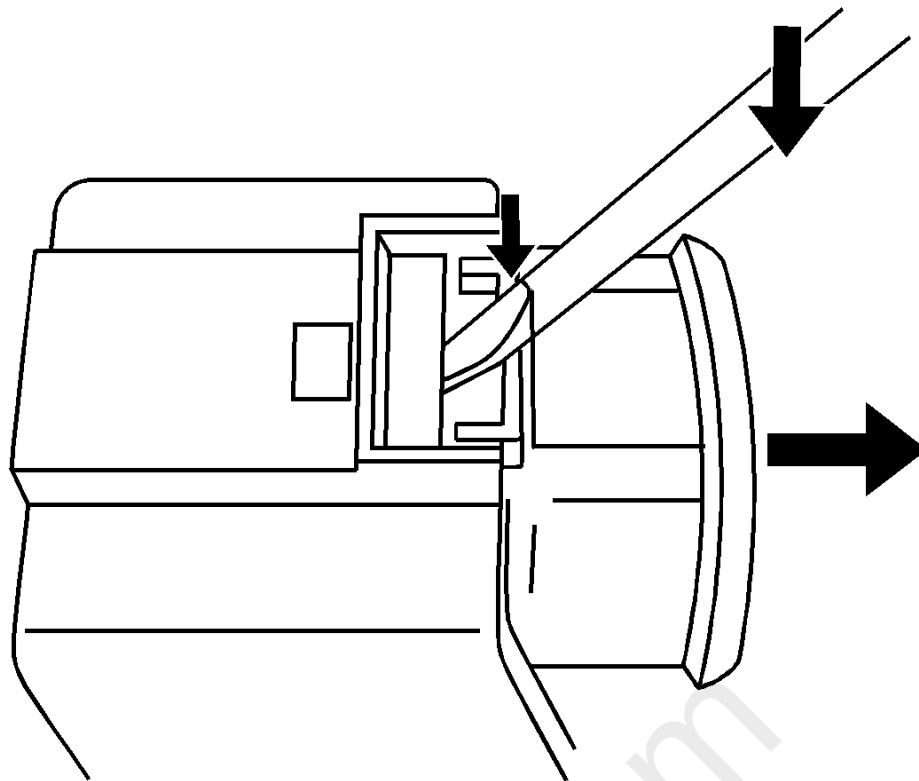
**Fig. 90: Releasing Locking Tab On Connector**  
Courtesy of GENERAL MOTORS COMPANY

1. Use a flat-bladed tool to release the locking tab on the connector.



**Fig. 91: Twisting Flat-Bladed Tool To Push Top Of Locking Tab Inward**  
Courtesy of GENERAL MOTORS COMPANY

2. Option 1: Twist the flat-bladed tool to push the top of the locking tab inward while pulling the connector body out.



**Fig. 92: Using Flat-Bladed Tool To Depress Locking Tab**  
 Courtesy of GENERAL MOTORS COMPANY

3. Option 2: Pry using the flat-bladed tool to depress the locking tab while pulling the connector body out.

## **JST CONNECTORS**

### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-553** Terminal Release Tool

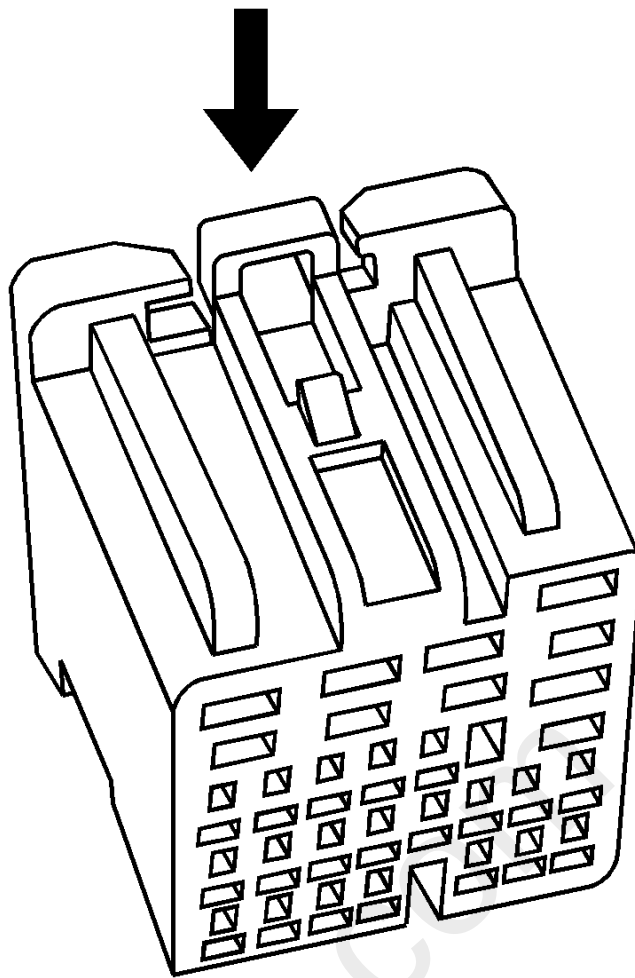
For equivalent regional tools, refer to [Special Tools](#) .

### **Terminal Removal Procedure**

The JST connector family consists of seven unique connector housings differentiated by color and keying. This connector family is designed to use both 0.64 and 2.8 sized terminals.

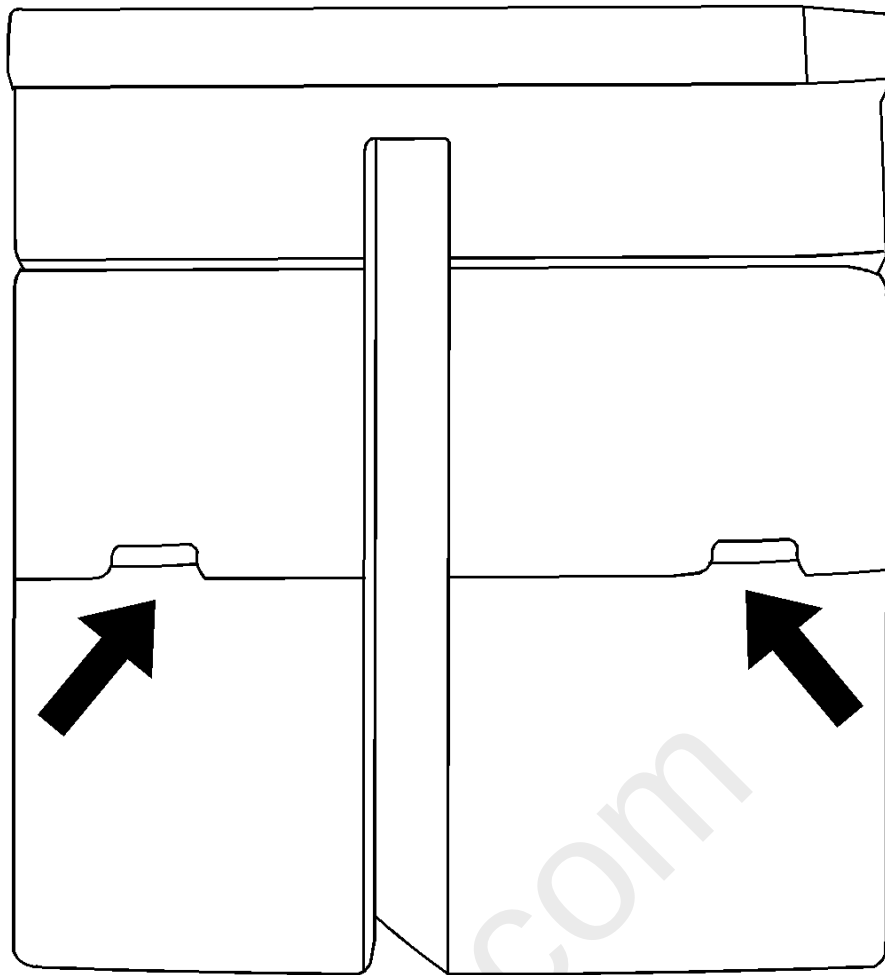
### **JST BCM Connector**

| GM Service Part # | Color    |
|-------------------|----------|
| 88988806          | Gray     |
| 88988837          | Brown    |
| 88988838          | Lt Green |
| 88988839          | Natural  |
| 88988840          | Lt Blue  |
| 88988841          | Black    |
| 88988842          | Pink     |



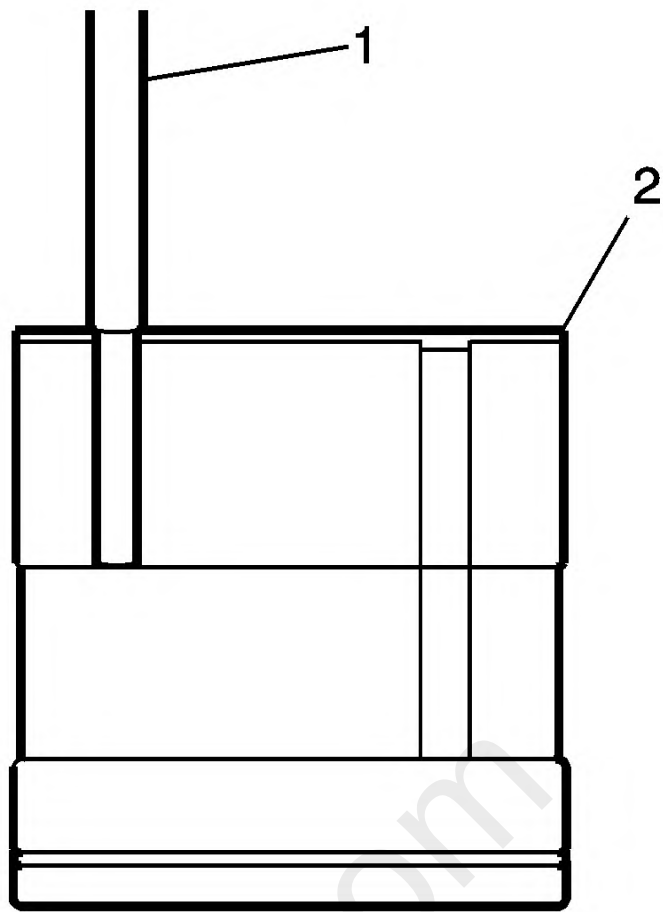
**Fig. 93: Locating Connector Lock**  
Courtesy of GENERAL MOTORS COMPANY

1. While depressing the lock, remove the connector from the component.



**Fig. 94: Terminal Position Assurance Indents**  
**Courtesy of GENERAL MOTORS COMPANY**

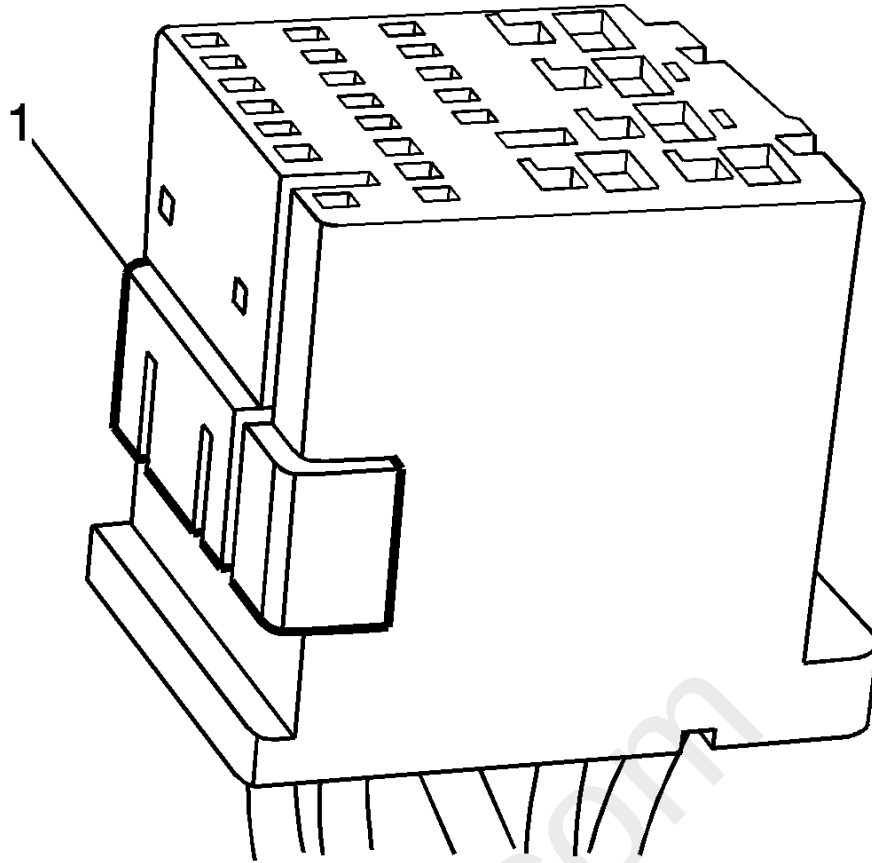
2. Unlock the terminal position assurance (TPA):
  - Position connector as shown (above) and locate TPA staging cavities.



**Fig. 95: Terminal Release Tool**

**Courtesy of GENERAL MOTORS COMPANY**

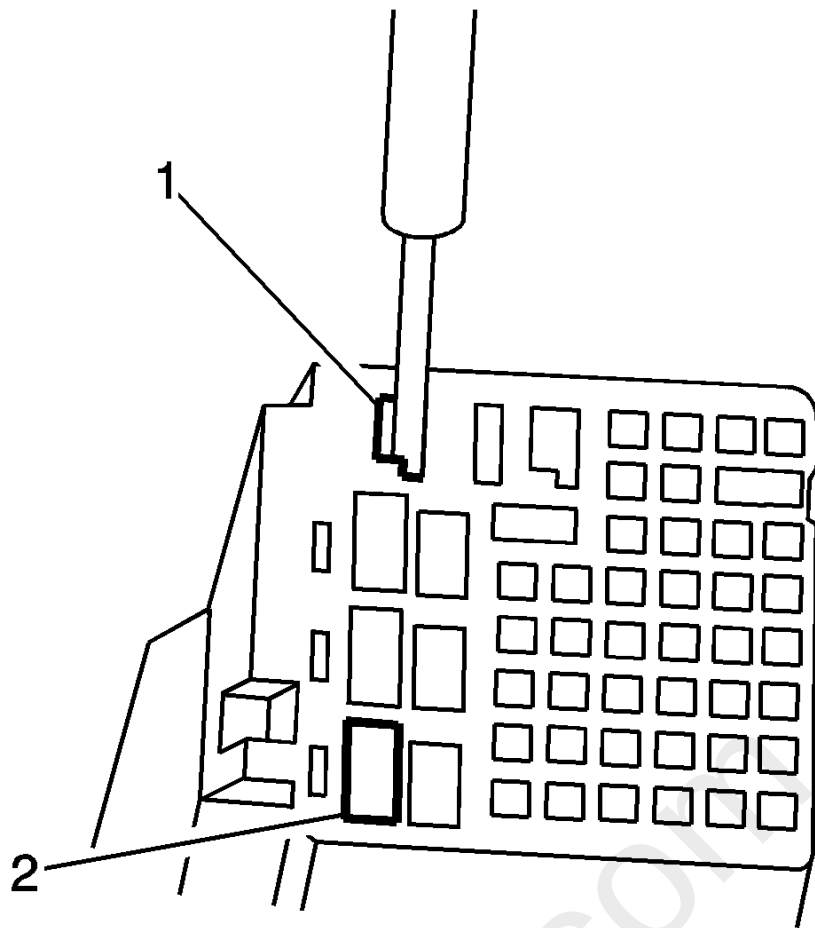
- Using connector terminal release tool J-38125-553 (1) lift the TPA into the staged position. Perform this step on both sides of the TPA.



**Fig. 96: TPA In Staged Position**

**Courtesy of GENERAL MOTORS COMPANY**

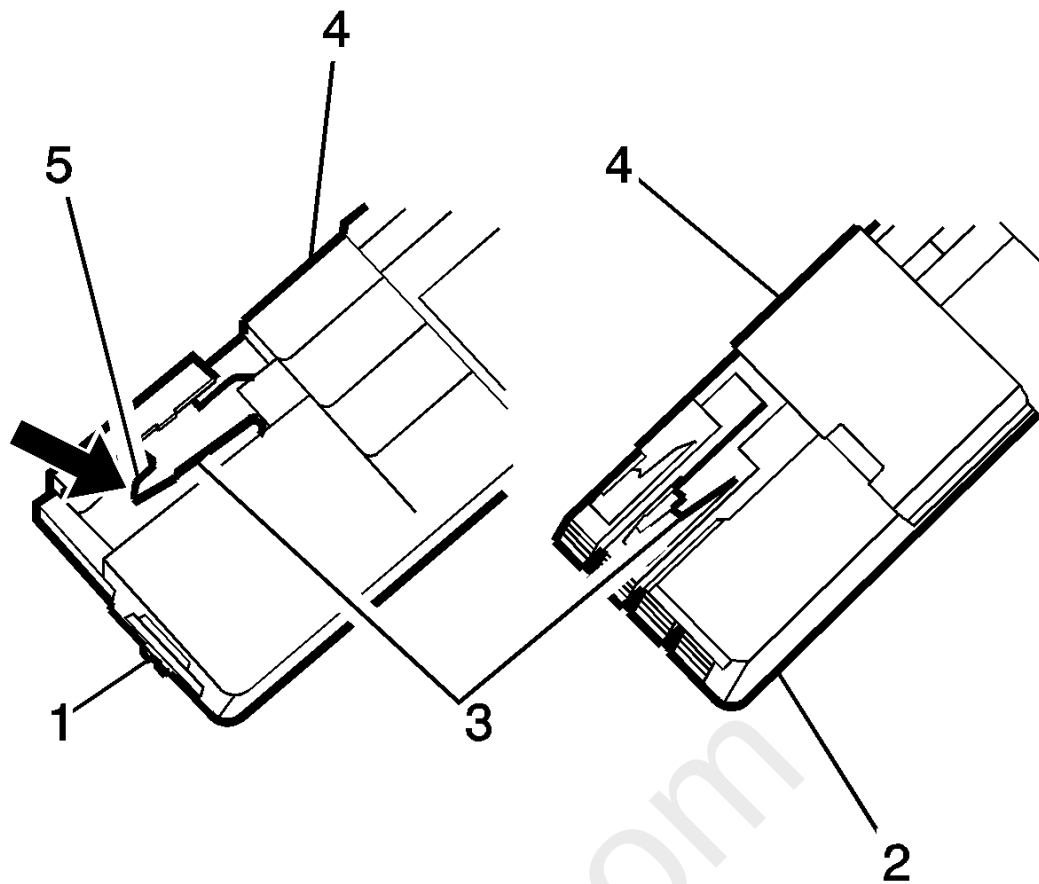
- You will feel the TPA click into place when fully extended into the staged position. The figure above shows the TPA (1) in the staged position.



**Fig. 97: Connector Terminal Release Tool**  
Courtesy of GENERAL MOTORS COMPANY

3. Release the terminal from the connector:

- Position the connector as shown (above) and locate the terminal release entry canal (1) of the suspect terminal.
- Insert the connector terminal release tool J-38125-553 into the entry canal with the angled side of the tool facing the connector wall containing cavity 4 (2).



**Fig. 98: Identifying Connector Lance And TPA**  
 Courtesy of GENERAL MOTORS COMPANY

- The cavity on the left (1) is a 2.8 mm<sup>2</sup> cavity and the cavity on the right (2) is a 0.64 mm<sup>2</sup> cavity.
  - Place the tip of the connector terminal release tool onto the connector lance (3) and deflect the lance to the right (5) to release the lock. Hold this released position.
  - Holding the lance in the released position, slightly pull on the suspect terminal to remove it from the connector housing. The side TPA (4) is a secondary lock.
4. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#) procedure.
  5. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

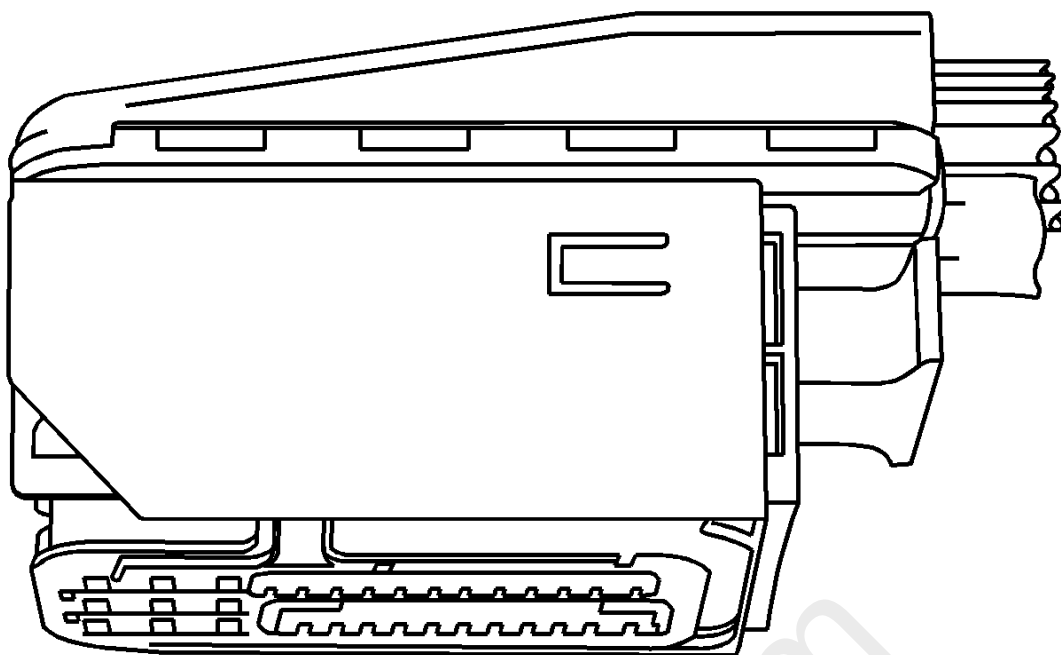
## **KOSTAL CONNECTORS (GLOW PLUG CONTROL MODULE)**

### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-24** Terminal Release Tool
- **J-38125-560** Terminal Release Tool

For equivalent regional tools, refer to [Special Tools](#) .

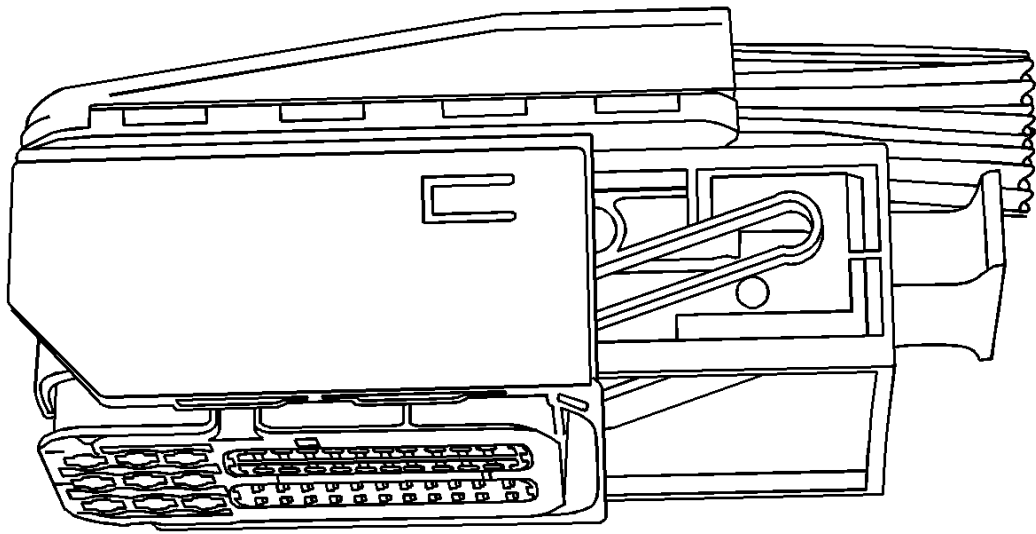
### **Terminal Removal Procedure**



**Fig. 99: Typical Kostal Connector**

**Courtesy of GENERAL MOTORS COMPANY**

View of typical connector.

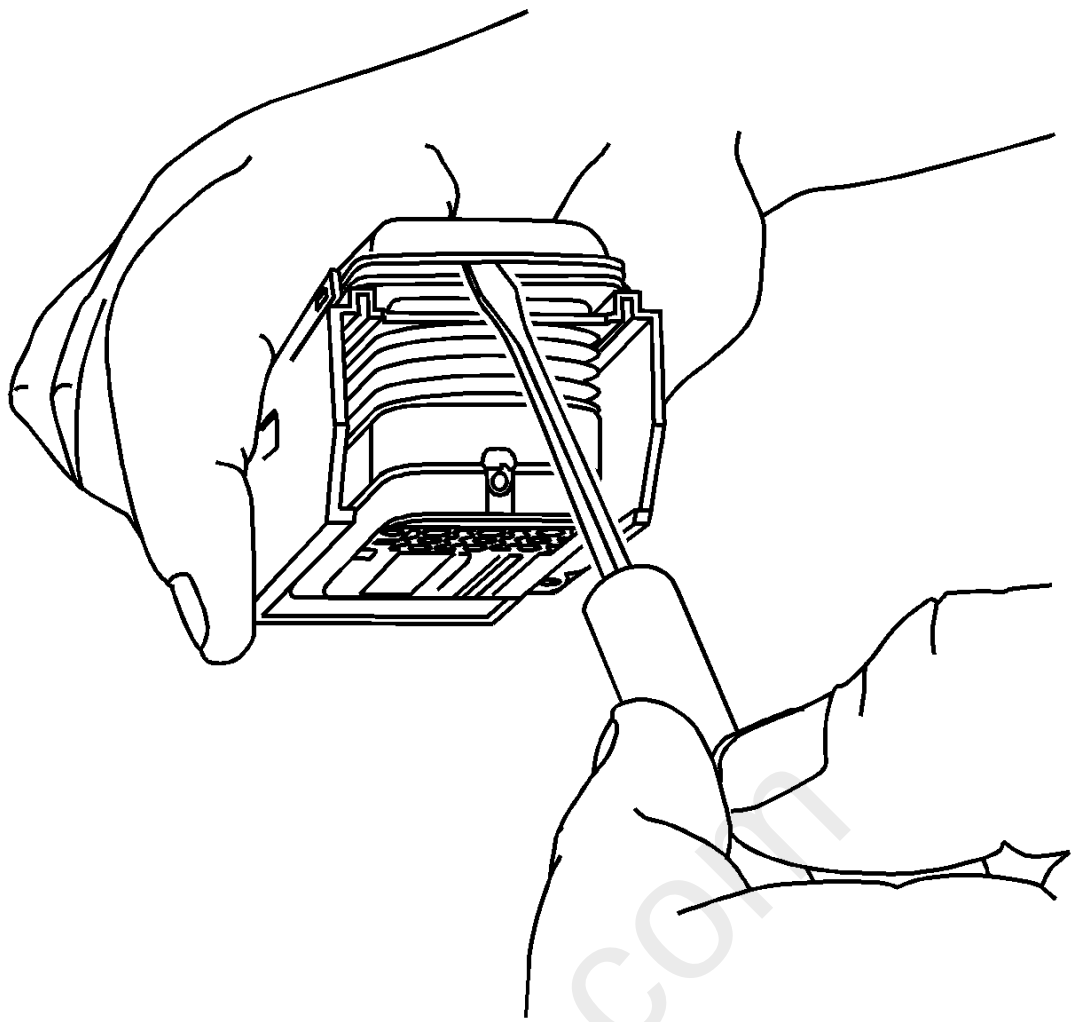


**Fig. 100: Connector In Released Position**

**Courtesy of GENERAL MOTORS COMPANY**

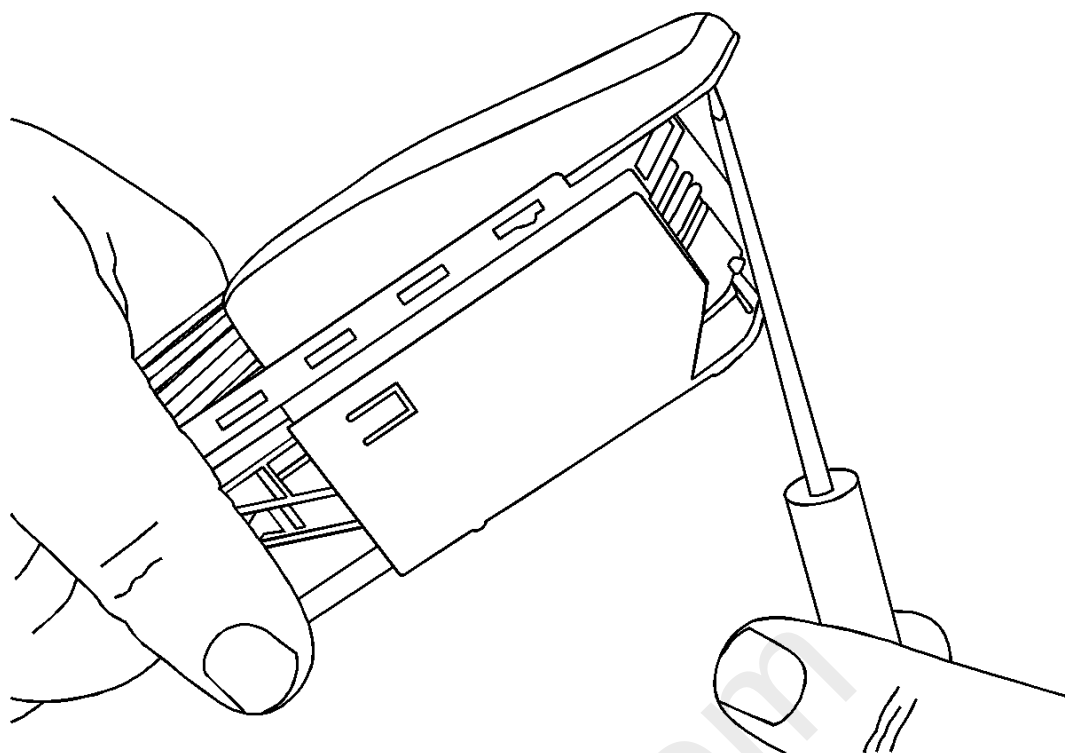
View of connector in released position.

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.



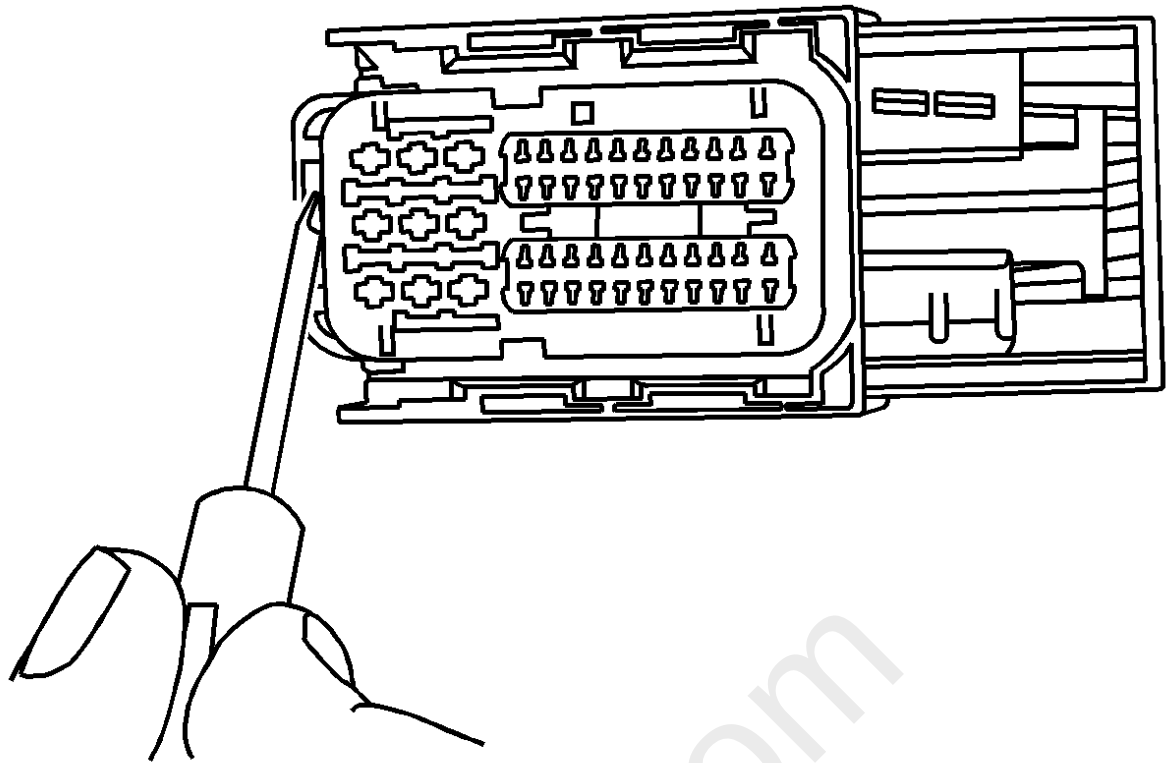
**Fig. 101: Using Small Flat-Blade Tool To Remove Dress Cover**  
Courtesy of GENERAL MOTORS COMPANY

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



**Fig. 102: Slide Dress Cover Forward And Off Of Connector**  
Courtesy of GENERAL MOTORS COMPANY

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



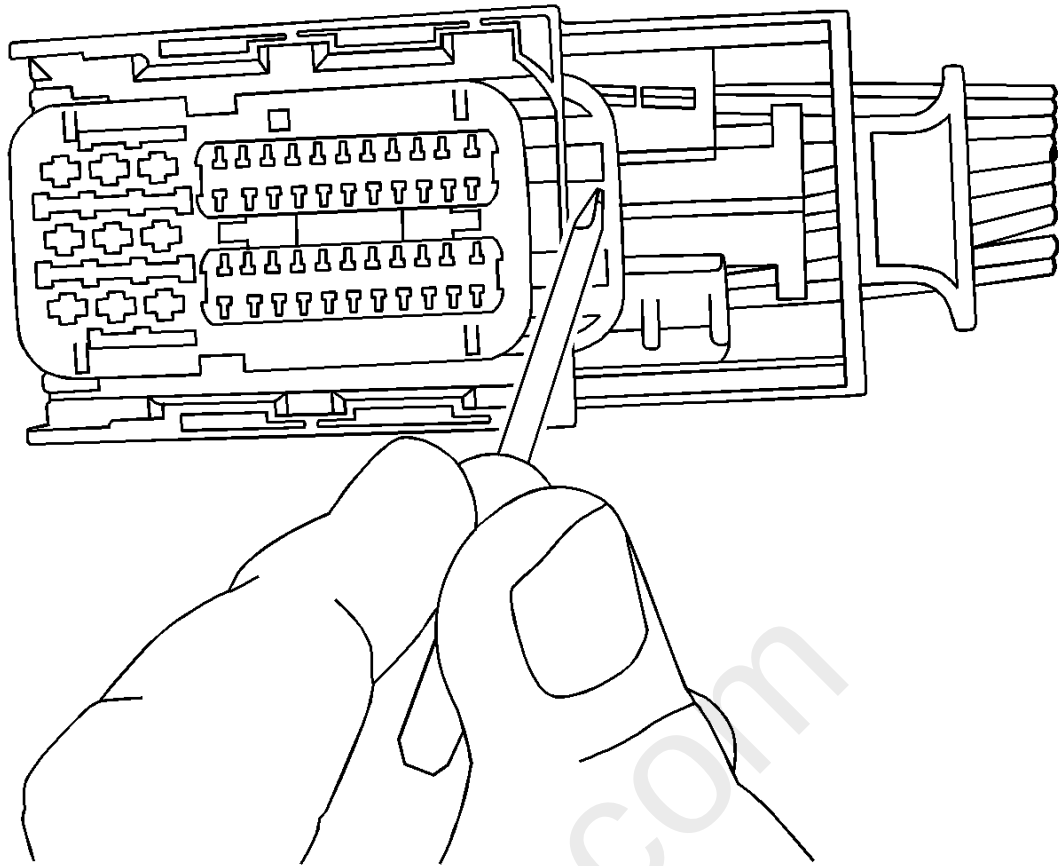
**Fig. 103: Moving Front TPA To Preset Position**

Courtesy of GENERAL MOTORS COMPANY

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

**NOTE:** The front TPA cannot be removed from the connector. Only move it to the preset position.

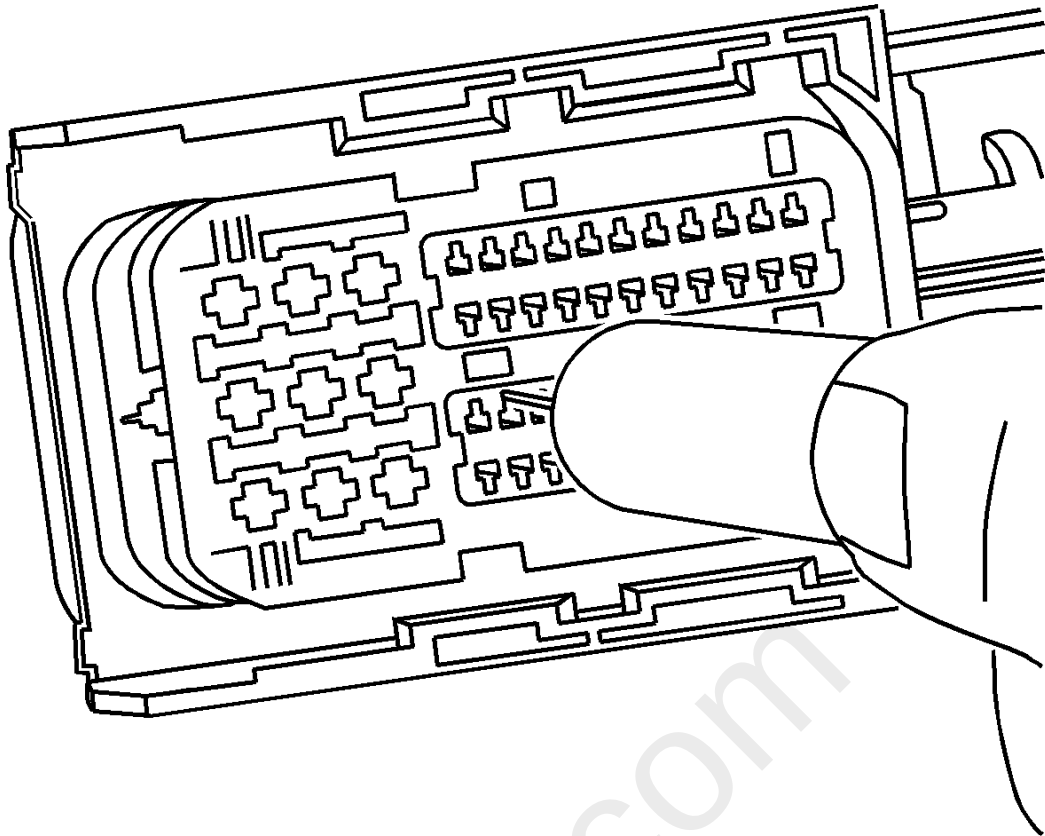
6. Use a small flat-blade tool to move the front TPA to the preset position, outboard approximately 0.125 in. (3 mm).



**Fig. 104: Using Small Flat-Blade Tool To Remove Rear TPA**

**Courtesy of GENERAL MOTORS COMPANY**

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



**Fig. 105: Using Special Tool To Release Terminals**

Courtesy of GENERAL MOTORS COMPANY

8. Use the J-38125-24 or the J-38125-560 tool to release the terminals by inserting the tool into the terminal release cavity.
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.
10. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#)[Repairing Connector Terminals \(Terminal Repair\)](#) procedure.

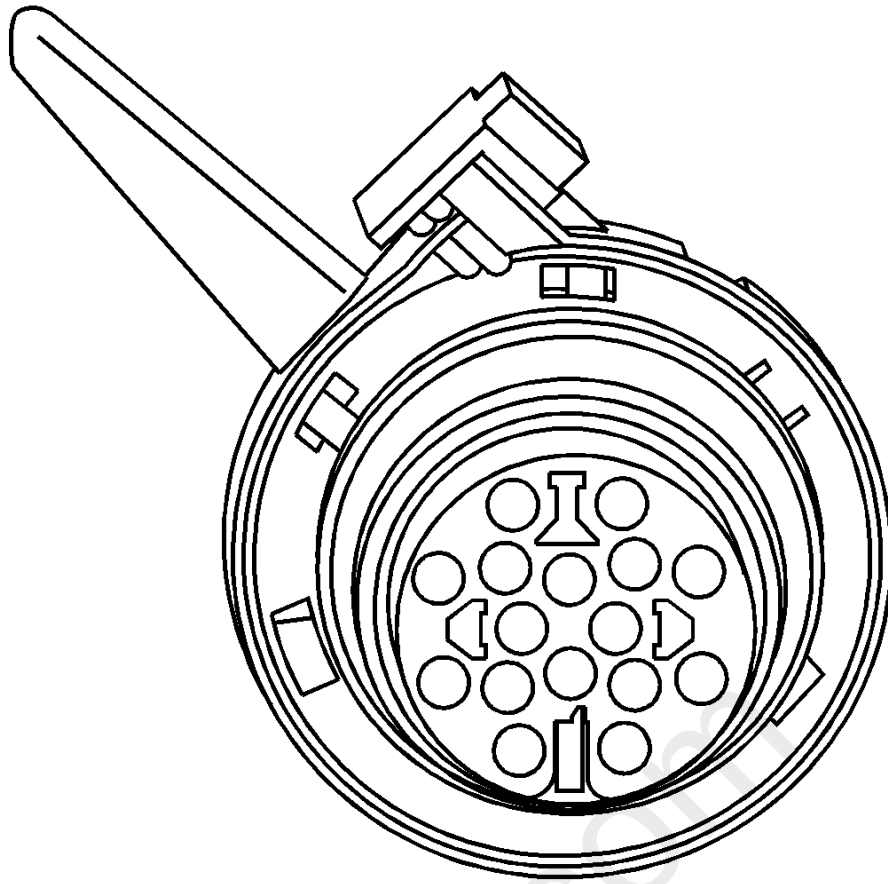
## **KOSTAL CONNECTORS (TRANSMISSION)**

### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-28** Terminal Release Tool

For equivalent regional tools, refer to [Special Tools](#) .

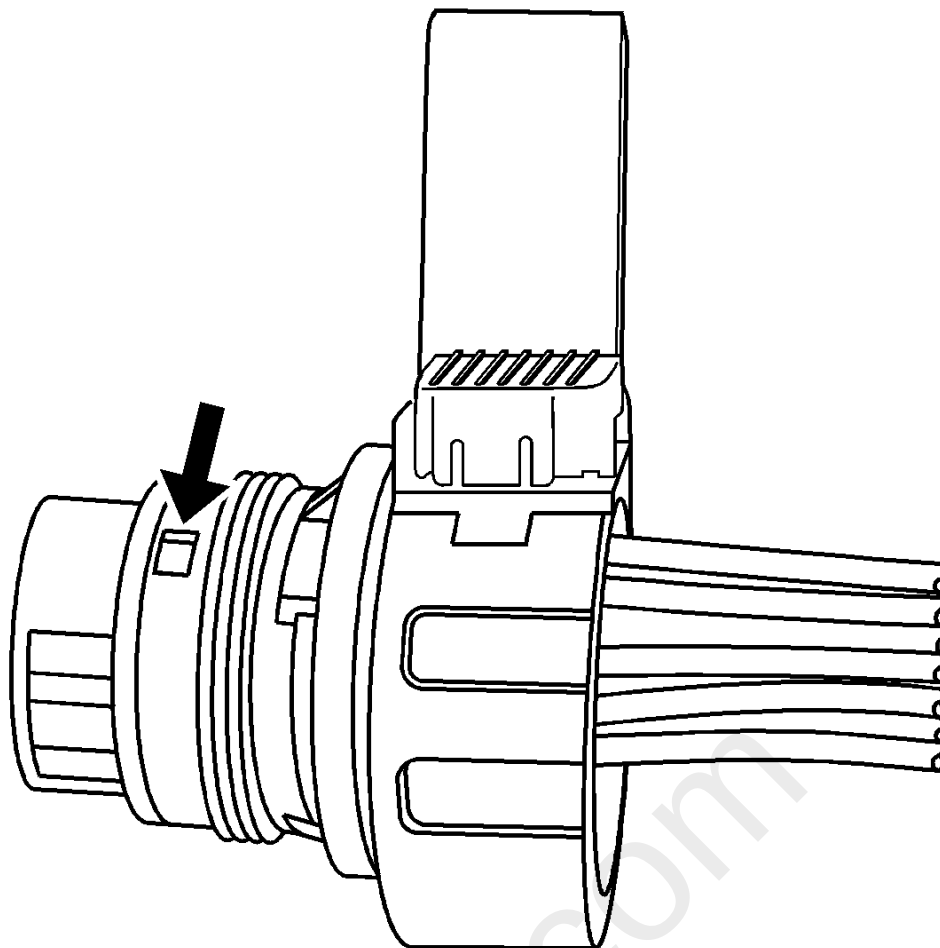
### **Terminal Removal Procedure**



**Fig. 106: Connector And Lock**

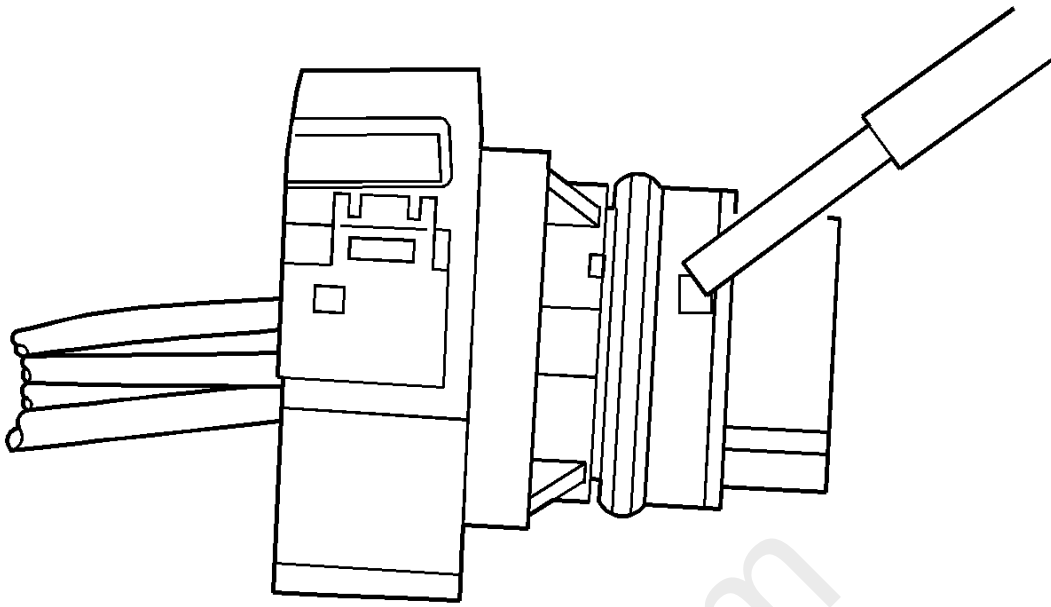
**Courtesy of GENERAL MOTORS COMPANY**

1. While depressing the lock, twist and remove the connector from the component.



**Fig. 107: Locating Terminal Position Assurance (TPA)**  
Courtesy of GENERAL MOTORS COMPANY

2. Locate the terminal position assurance (TPA).

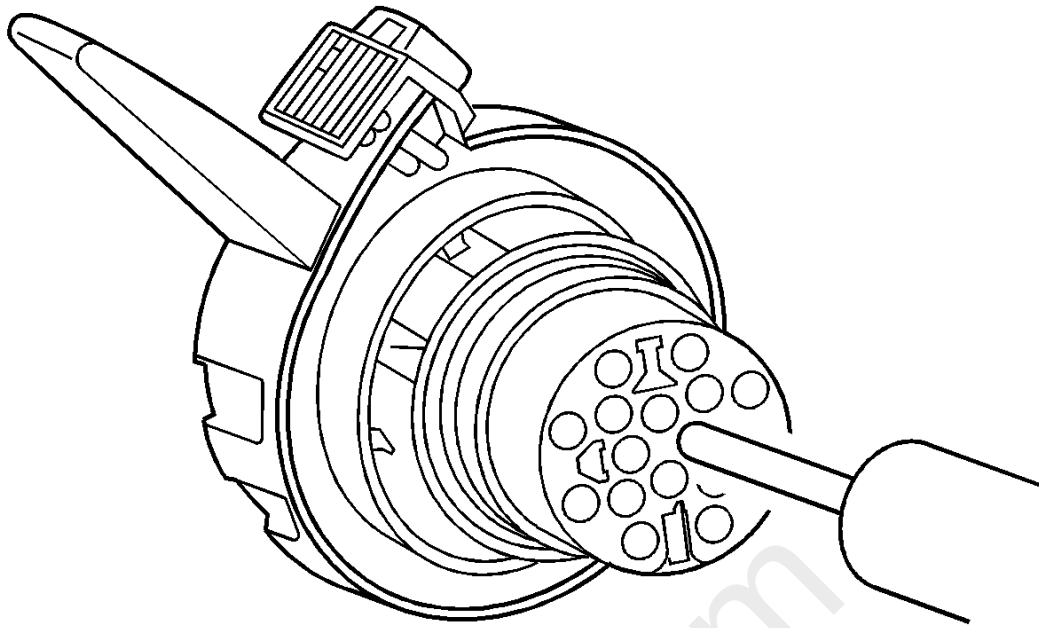


**Fig. 108: Pushing TPA**

Courtesy of GENERAL MOTORS COMPANY

**NOTE:** The TPA cannot be removed from the connector while there are terminals present in the connector body.

3. Use a small flat-blade tool to push the TPA until it bottoms out.



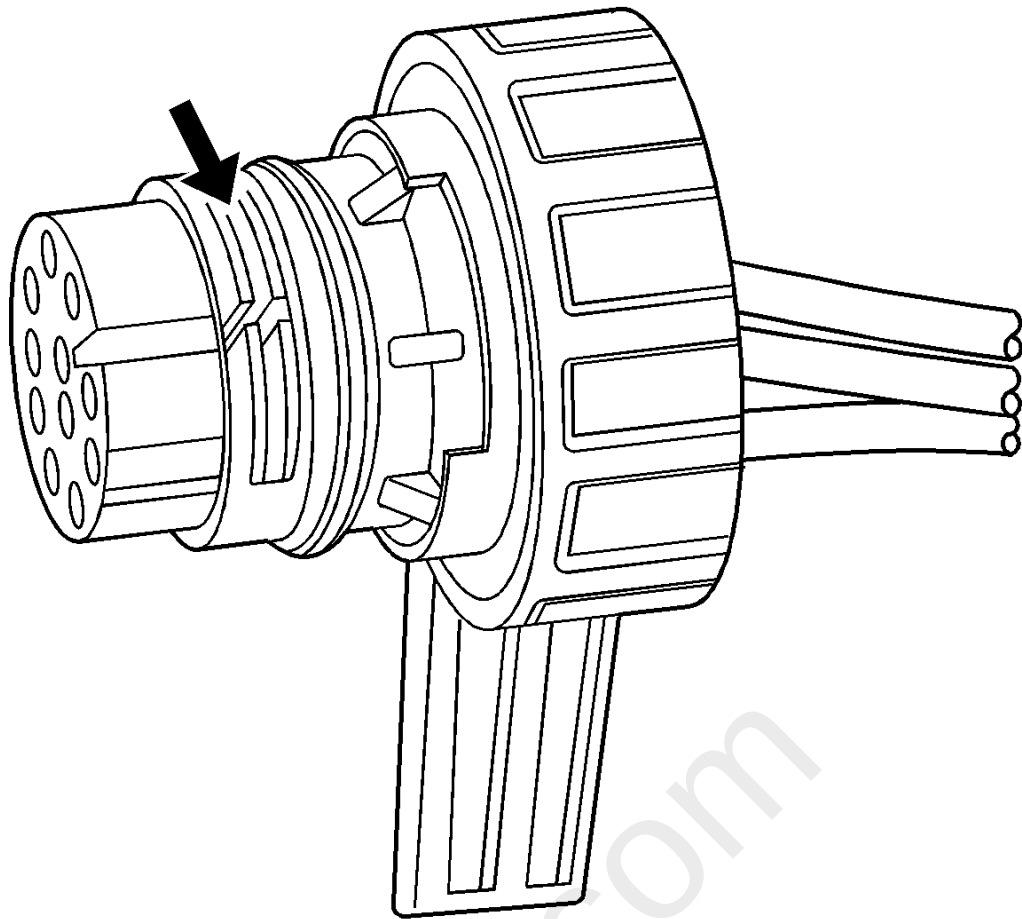
**Fig. 109: Using Special Tool To Release Terminals**  
Courtesy of GENERAL MOTORS COMPANY

4. Use the J-38125-28 tool to release the terminals by inserting the tool into the terminal cavity as shown in the graphic.
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.
6. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#)[Repairing Connector Terminals \(Terminal Repair\)](#) procedure.

#### **Terminal Insertion Procedure**

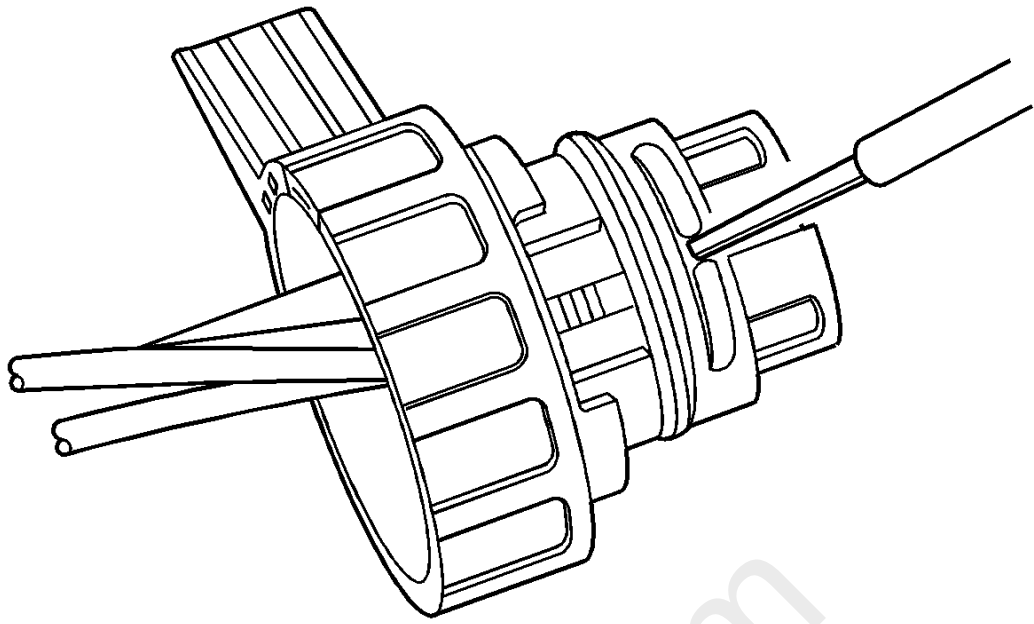
After the terminal is replaced, perform the following procedure in order to insert the terminal.

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. Ensure that the terminal is locked in place by gently pulling on the wire.



**Fig. 110: Locating Terminal Position Assurance (TPA).**  
Courtesy of GENERAL MOTORS COMPANY

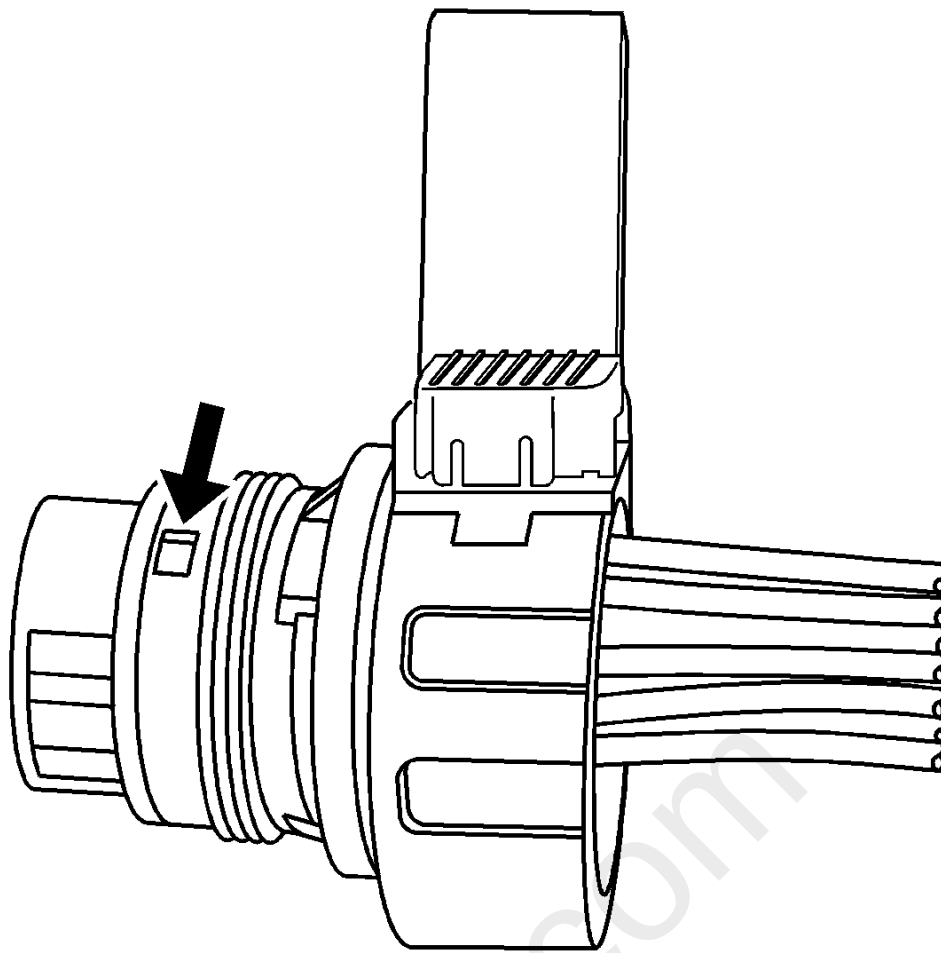
3. Locate the TPA.



**Fig.111: Pushing TPA**

**Courtesy of GENERAL MOTORS COMPANY**

4. Use a small flat-blade tool to push the TPA until it bottoms out.



**Fig. 112: Fully Seated Terminal Position Assurance (TPA).**  
Courtesy of GENERAL MOTORS COMPANY

5. Ensure the TPA is fully seated. The TPA should be centered and flush with the connector body when viewed.

### **MOLEX CONNECTORS (LEVER LOCK)**

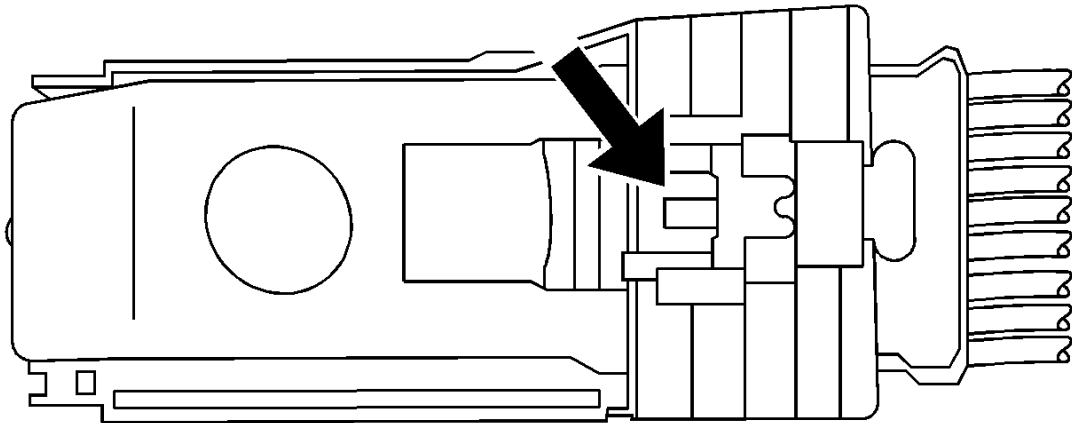
#### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-213** Terminal Release Tool

For equivalent regional tools, refer to [\*\*Special Tools\*\*](#) .

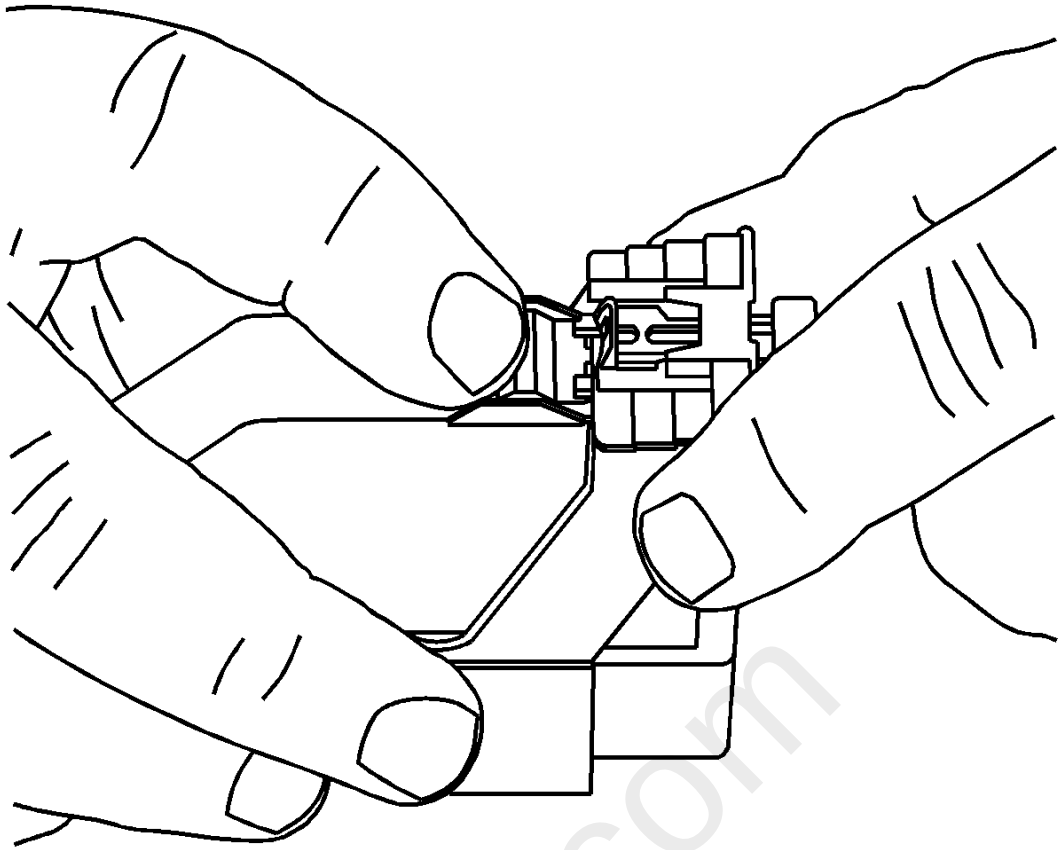
#### **Terminal Removal Procedure**

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



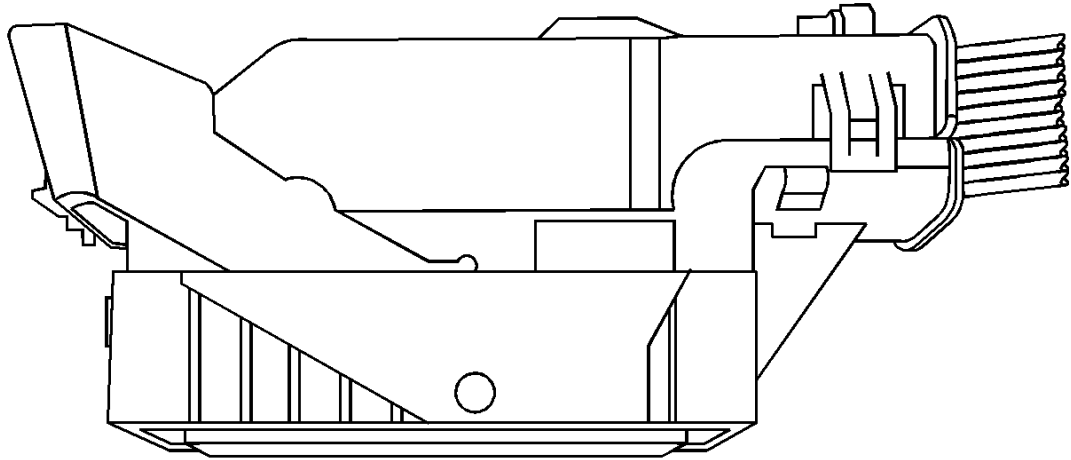
**Fig. 113: Identifying Lever Lock Release Tab**  
Courtesy of GENERAL MOTORS COMPANY

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



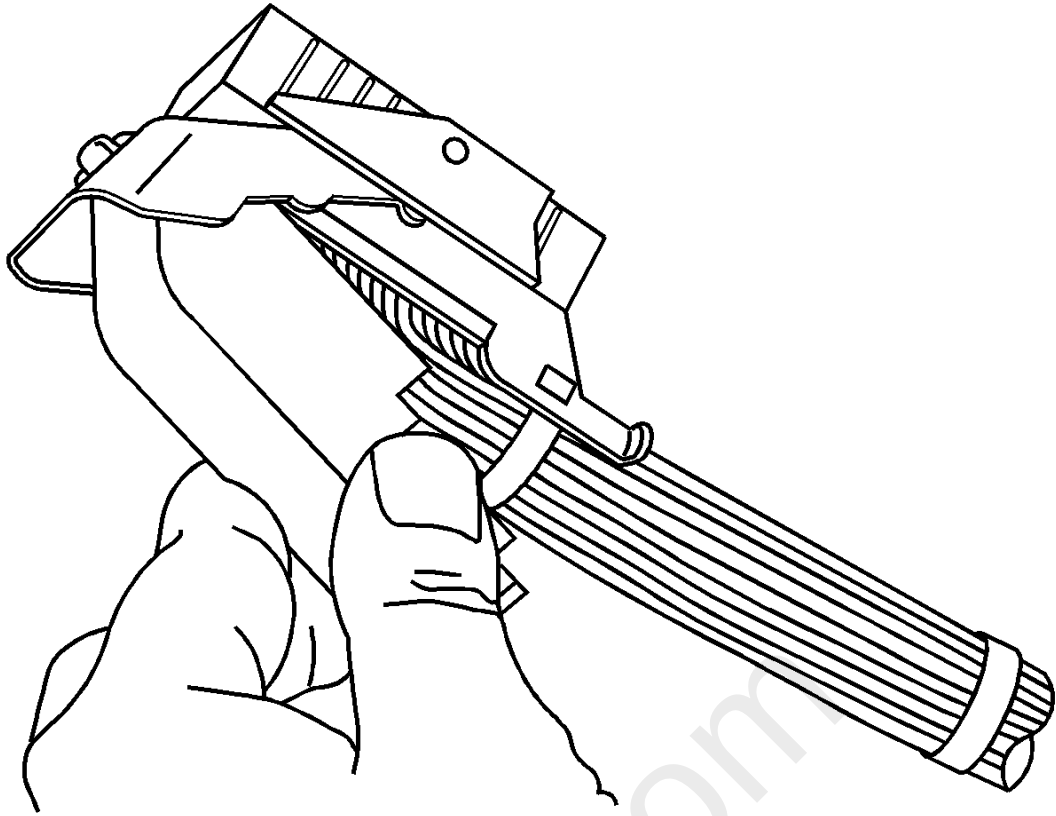
**Fig. 114: Pressing Lever Lock Release Tab**  
Courtesy of GENERAL MOTORS COMPANY

3. The lever should be in the full forward position.



**Fig. 115: Connector Released From Component**  
Courtesy of GENERAL MOTORS COMPANY

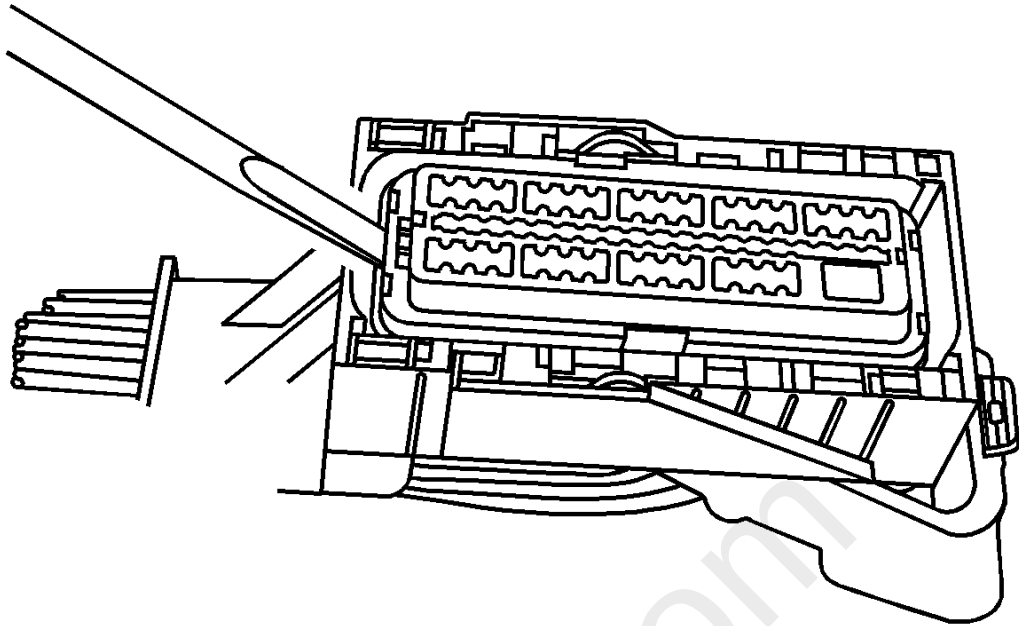
4. Disconnect the connector from the component.



**Fig. 116: Removing Dress Cover**

**Courtesy of GENERAL MOTORS COMPANY**

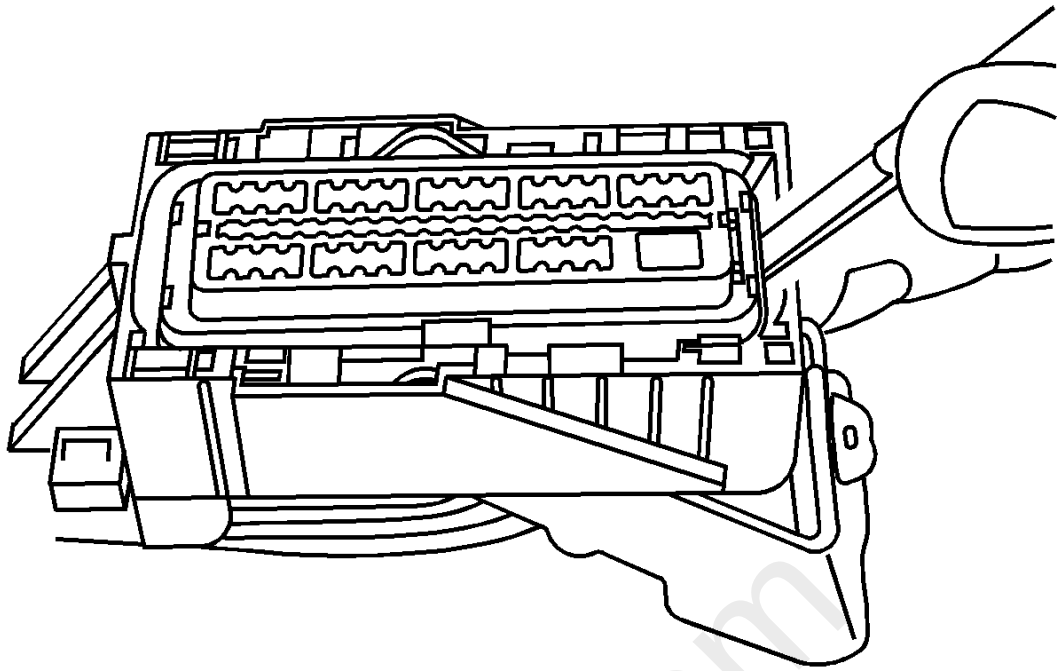
5. Remove the dress cover by using a flat bladed tool to release the dress cover locking tabs and lift up on the dress cover.
6. Cut the tie wrap that holds the wires to the connector body.



**Fig. 117: Prying One Side Of Nose Piece**

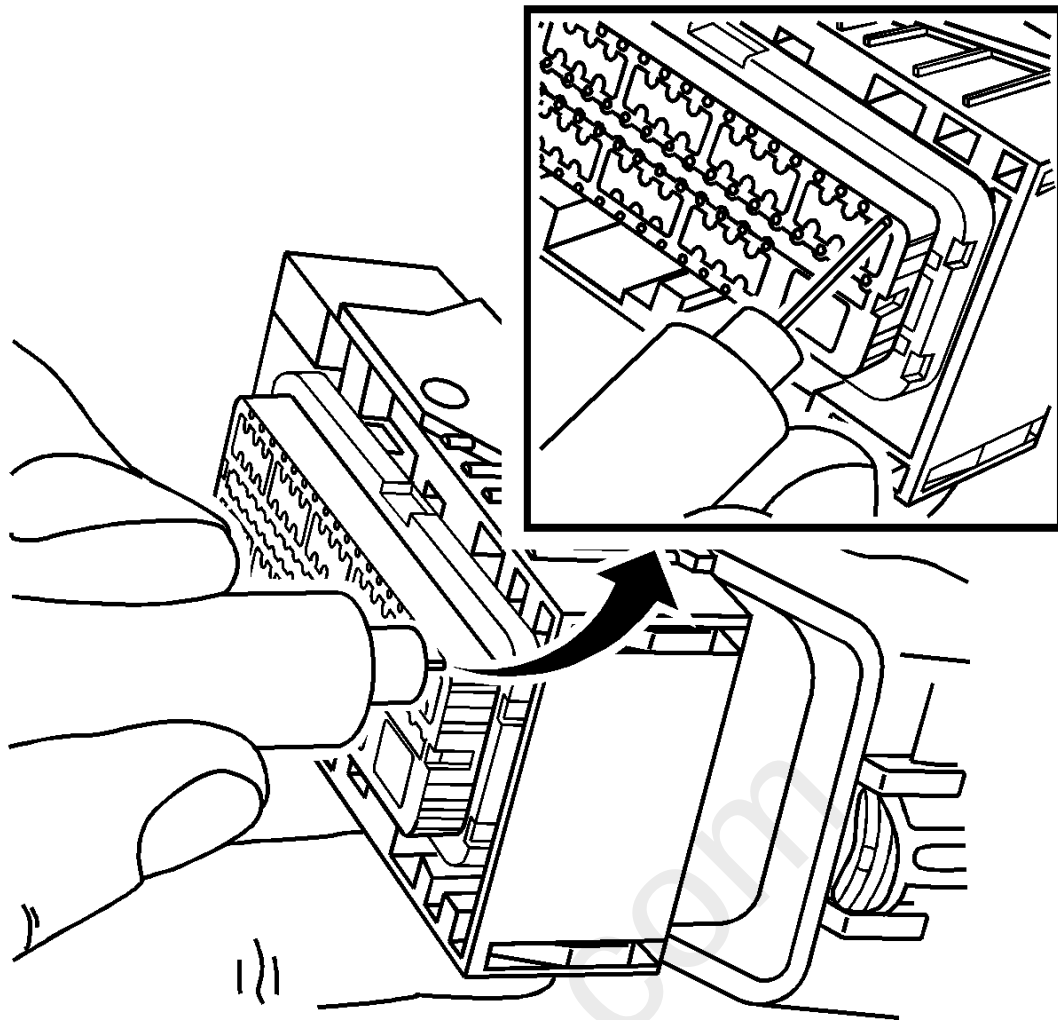
**Courtesy of GENERAL MOTORS COMPANY**

7. 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.



**Fig. 118: Prying Other Side Of Nose Piece**  
Courtesy of GENERAL MOTORS COMPANY

8. 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.



**Fig. 119: Inserting Special Tool Into Small Terminal Release Hole**  
 Courtesy of GENERAL MOTORS COMPANY

9. Insert the J-38125-213 into the small terminal release hole on the nose piece and gently pull on the back of the wire.
10. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#) procedure.
11. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

#### **Terminated Lead Repair**

1. Remove the terminal.
2. Find the appropriate terminated lead.
3. Use the appropriate splice sleeves depending on the gauge size.
4. Refer to [Wire to Wire Repair](#).

#### **Terminal Insertion Procedure**

After the terminal is replaced, perform the following procedure in order to insert the terminal.

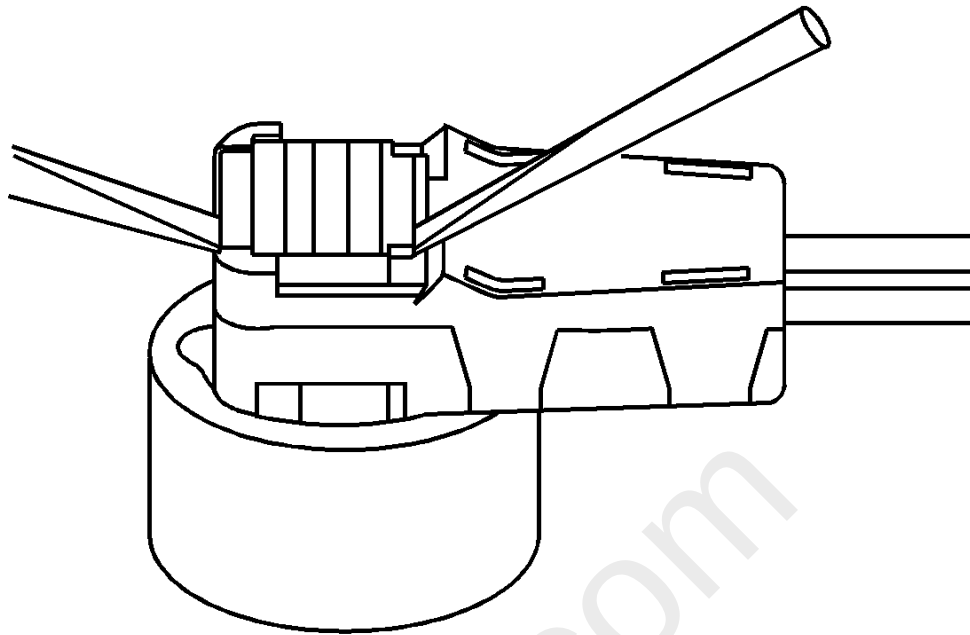
1. Slide the new terminal into the correct cavity at the back of the connector.
2. Push the terminal into the connector until it locks into place. The new terminal should be even with the other terminals. Insure that the terminal is locked in place by gently pulling on the wire.
3. To assemble the connector, reverse the connector disassembly procedure.

### **MOLEX CONNECTORS (SIR)**

#### **Removal Procedure**

**NOTE:**

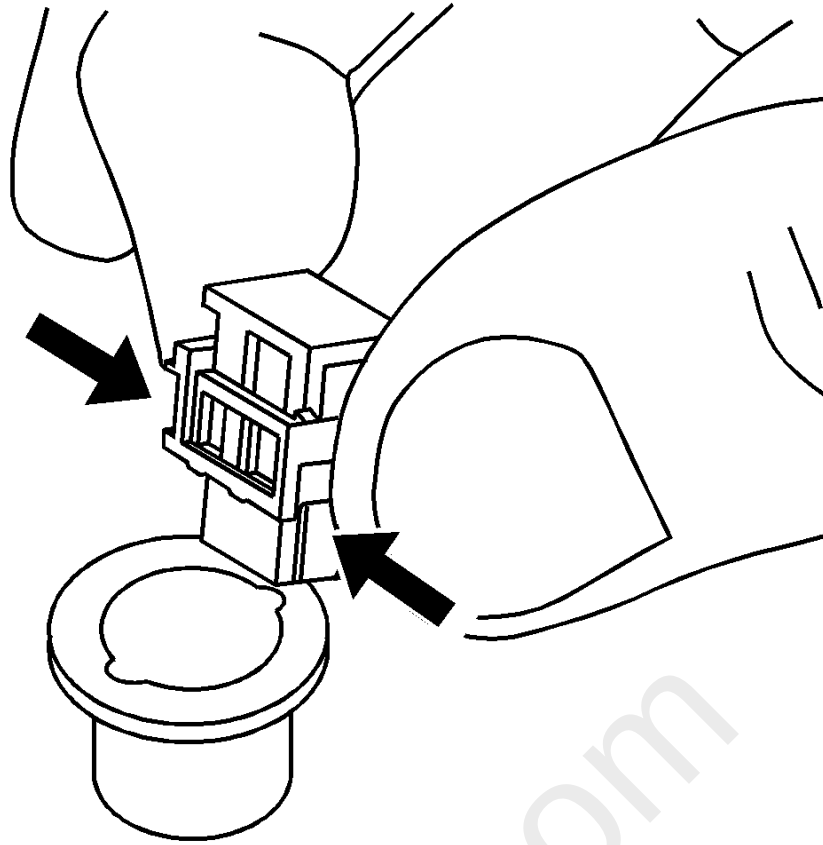
The orange or yellow connector position assurance (CPA) must be released first to disconnect or to connect the connector.



**Fig. 120: Lifting Orange CPA**

**Courtesy of GENERAL MOTORS COMPANY**

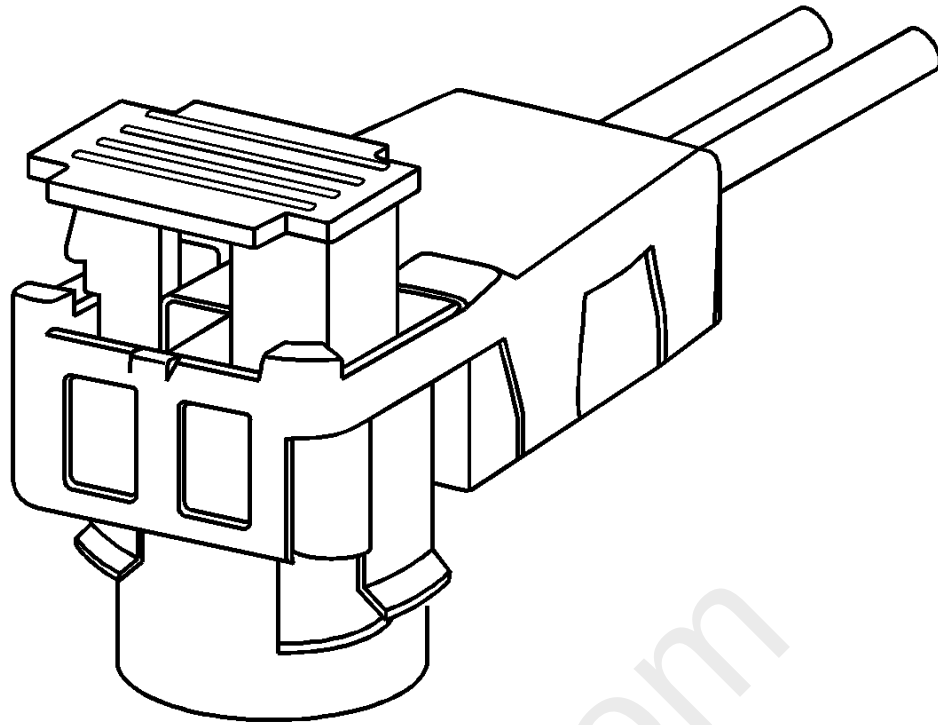
1. Lift the orange or yellow CPA vertically (avoid lifting on an angle to the connector) approximately 4 mm to release the connector. Use a small flat-bladed tool to help release the CPA. The CPA may also be released manually without any tools.



**Fig. 121: Grabbing Connector On Both Sides**  
Courtesy of GENERAL MOTORS COMPANY

2. Grab the connector on both sides and lift vertically to disconnect the connector.

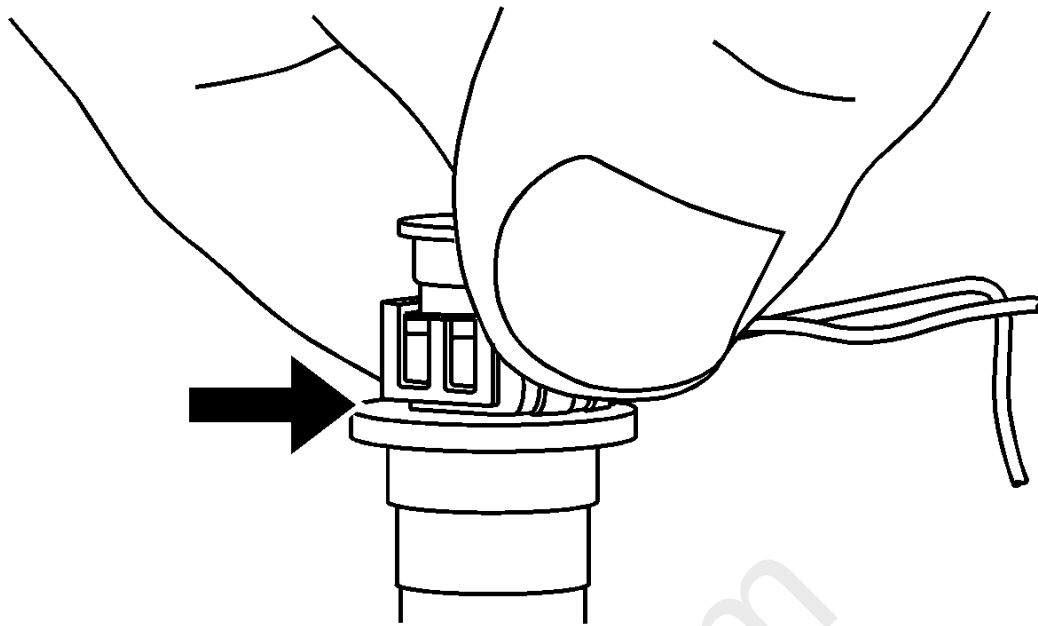
#### **Installation Procedure**



**Fig. 122: Lifting Orange CPA**

**Courtesy of GENERAL MOTORS COMPANY**

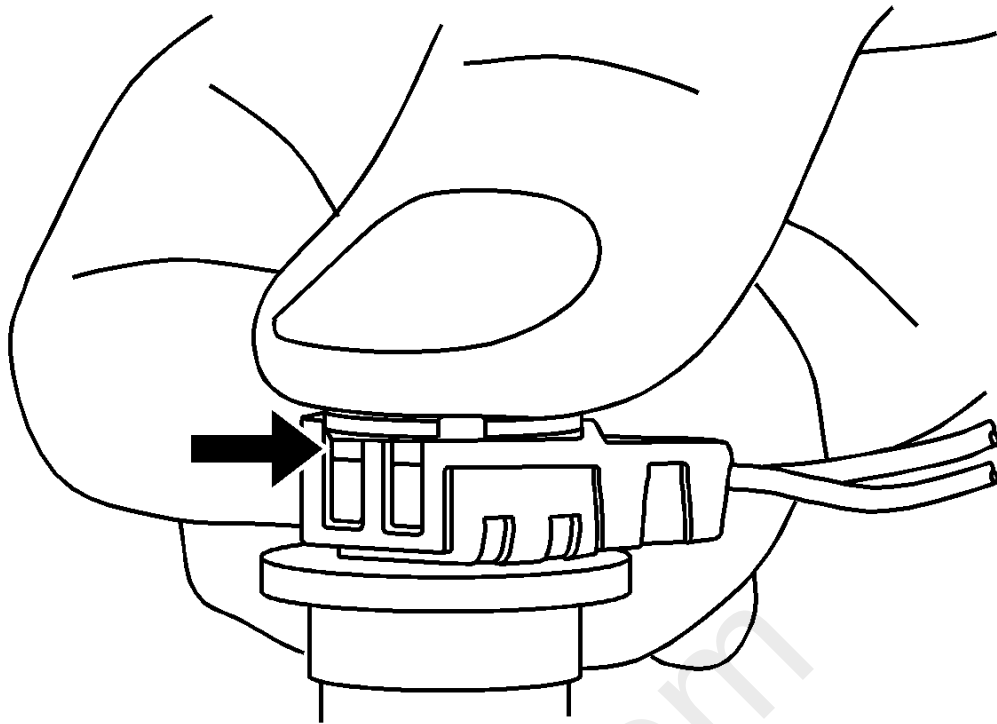
1. The CPA should be approximately 4 mm above the yellow cover before installing the connector. If not, use a small flat-bladed tool to help release the CPA. The CPA may also be released manually without any tools.



**Fig. 123: Seating Connector Sub-Assembly.**

**Courtesy of GENERAL MOTORS COMPANY**

2. Line up the connector key tabs with the initiator key slots. Grab the connector on both sides and push down into the initiator connector sub assembly until fully seated.



**Fig. 124: Pushing CPA Down**

Courtesy of GENERAL MOTORS COMPANY

3. After the connector is fully seated, push the CPA down with your thumb until the CPA is touching the yellow cover on the connector.

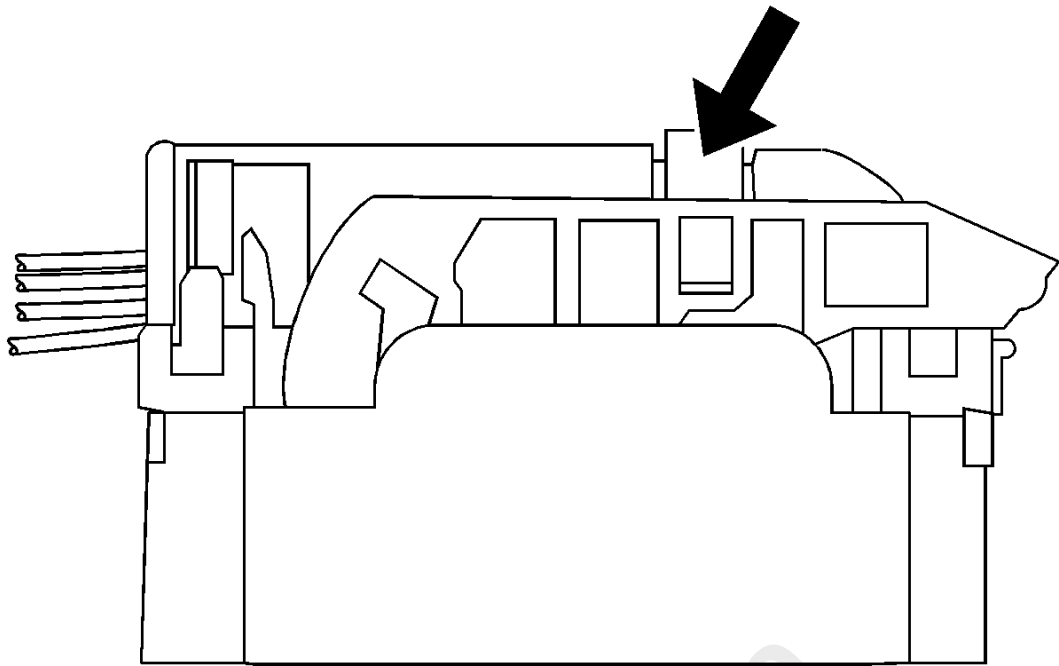
## **SUMITOMO CONNECTORS**

### **Special Tools**

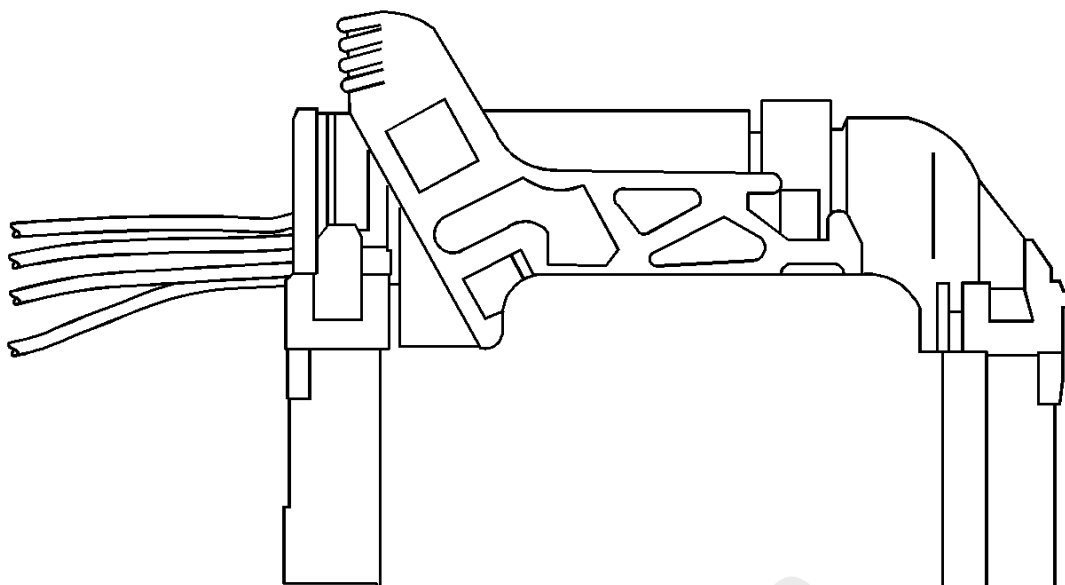
- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-12A** Terminal Release Tool
- **J-38125-552** Terminal Release Tool
- **J-38125-553** Terminal Release Tool

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

### **Terminal Removal Procedure**

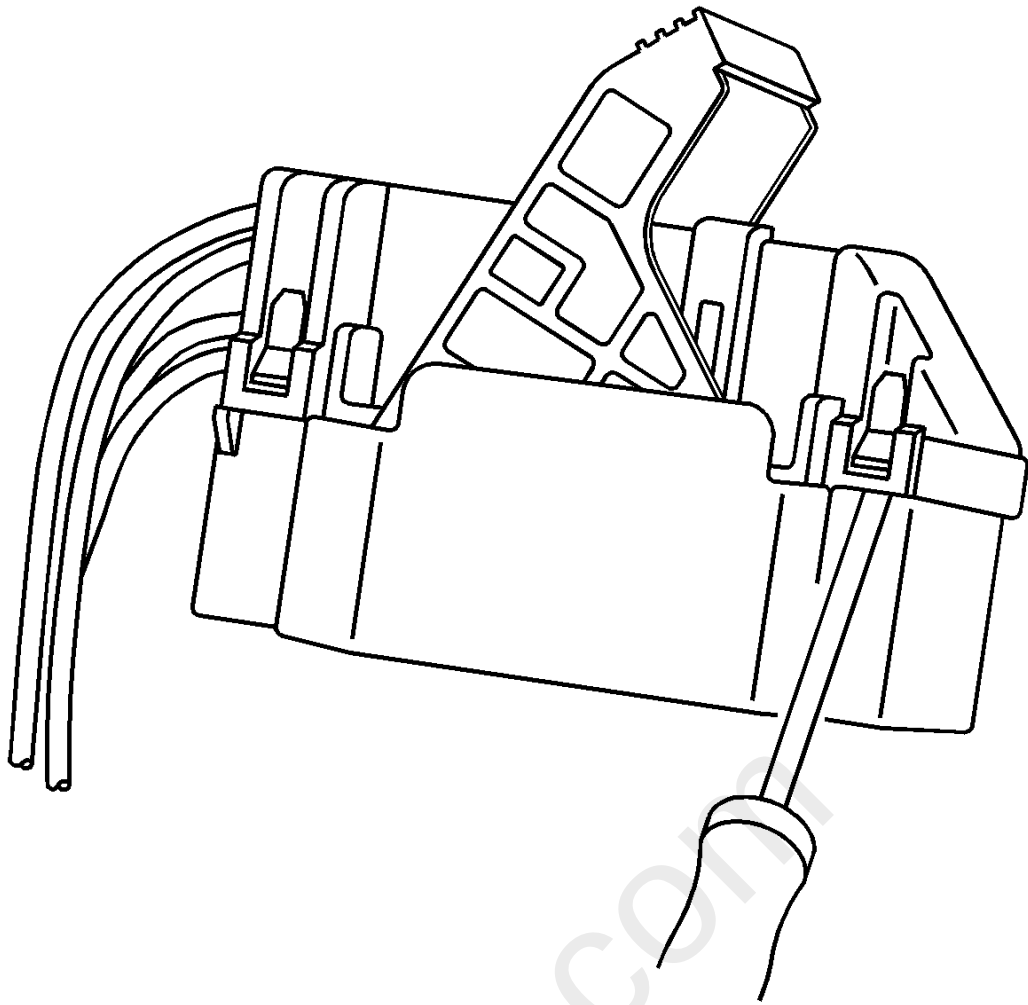


**Fig. 125: Identifying Lever Lock**  
Courtesy of GENERAL MOTORS COMPANY



**Fig. 126: Lever Lock In Forward Position**  
**Courtesy of GENERAL MOTORS COMPANY**

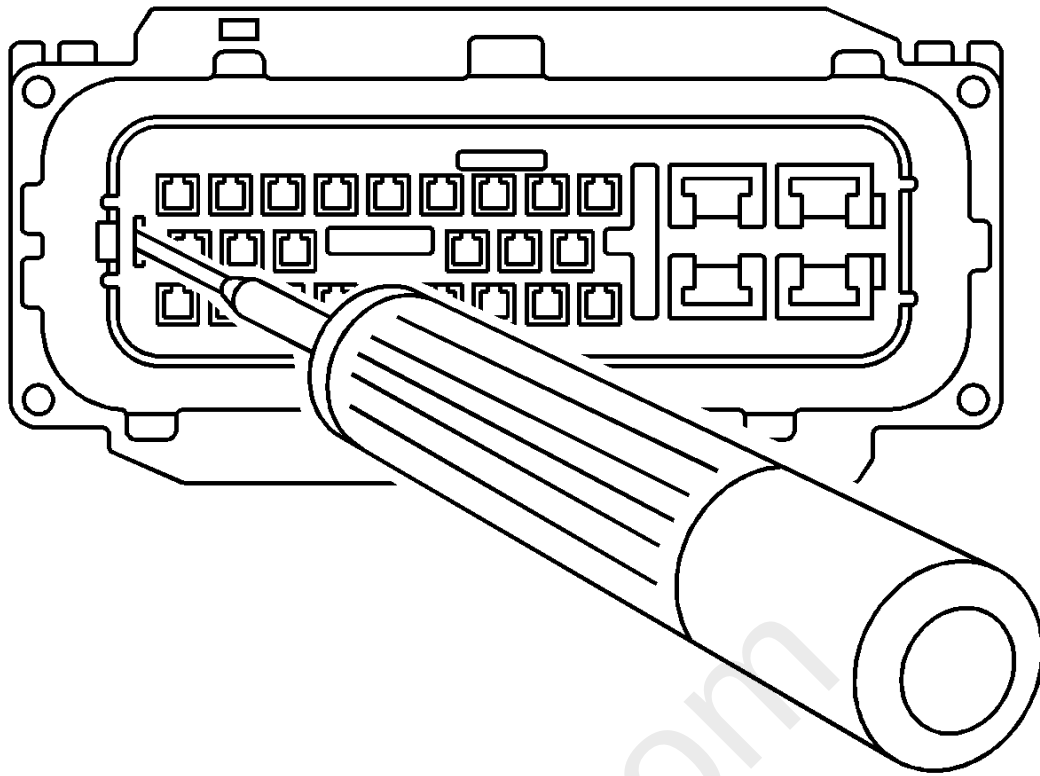
1. Slide the lever lock forward while pressing down on the lever lock release tab.
2. Disconnect the connector from the component.



**Fig. 127: Releasing Connector Locking Tabs**

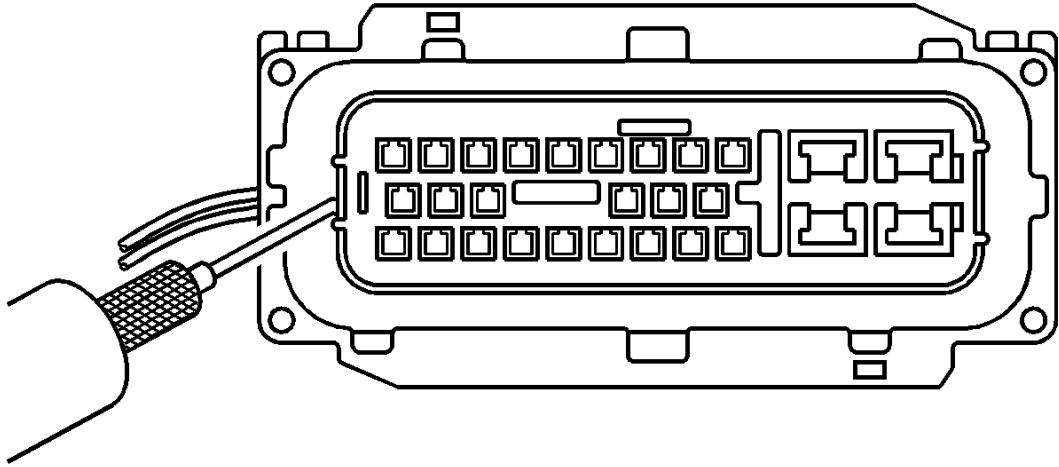
**Courtesy of GENERAL MOTORS COMPANY**

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



**Fig. 128: Inserting Tool Into Single Retainer Slot**  
Courtesy of GENERAL MOTORS COMPANY

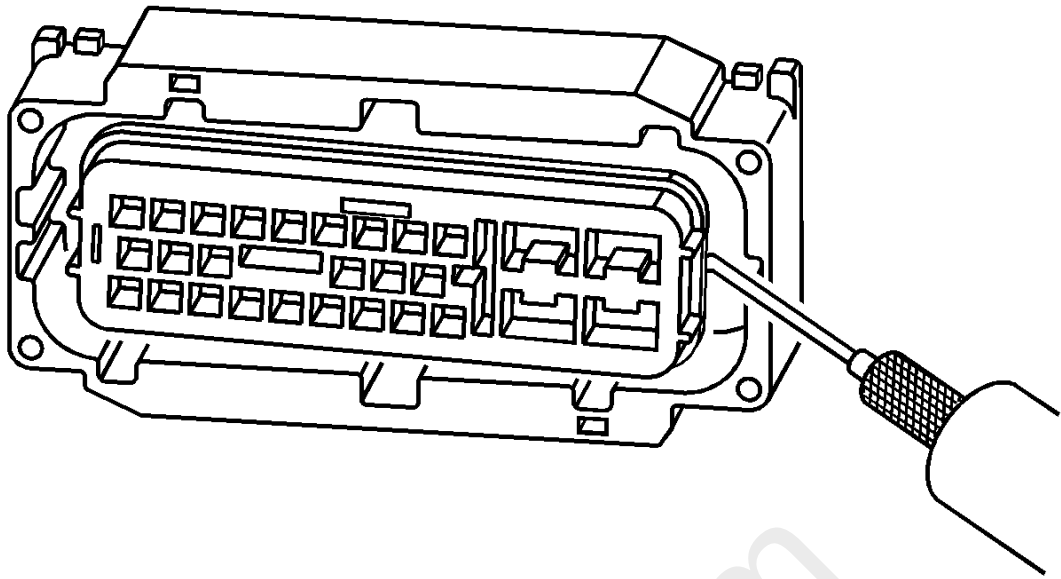
4. Relieve the tension on the nose piece retainers by inserting J-38125-12A into the single retainer slot on the end of the nose piece and gently prying out the locking tab. Repeat the process for both of the nose piece locking tabs on the opposite side of the nose piece.



**Fig. 129: Pulling Up One End Of Nose Piece (1st Side)**

**Courtesy of GENERAL MOTORS COMPANY**

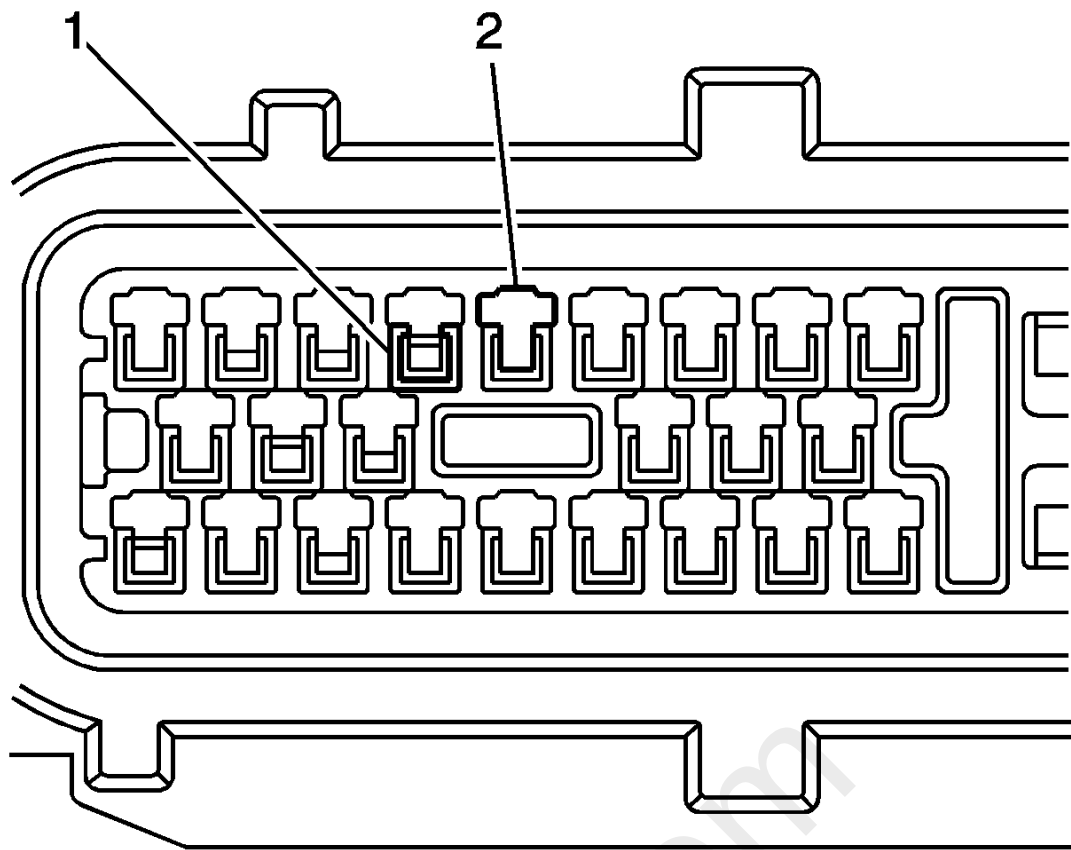
5. Once the nose piece retainers are relaxed, use the J-38125-552 to pull up the nose piece by hooking the tool under the nose piece and pulling up. The nose piece should raise slightly.



**Fig. 130: Pulling Up One End Of Nose Piece (2nd Side).**

**Courtesy of GENERAL MOTORS COMPANY**

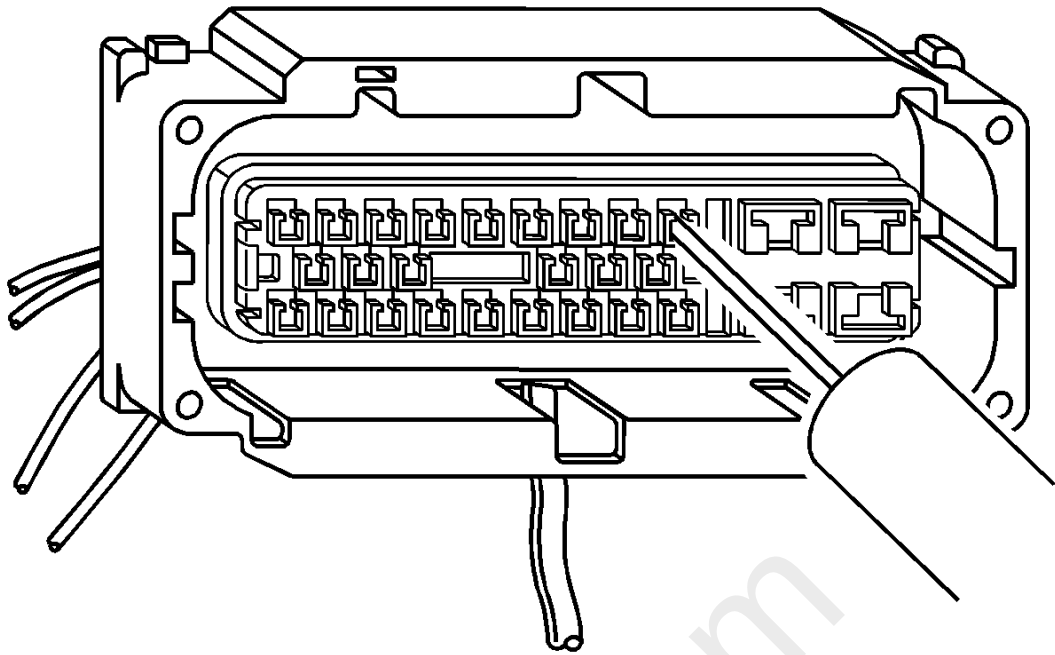
6. On the opposite side of the nose piece, use the J-38125-552 pull up the nose piece by hooking the tool under the nose piece and pulling up. The nose piece should release completely. If the nose piece does not come off, repeat the procedure on the opposite side.



**Fig. 131: Terminal And Entry Canal**

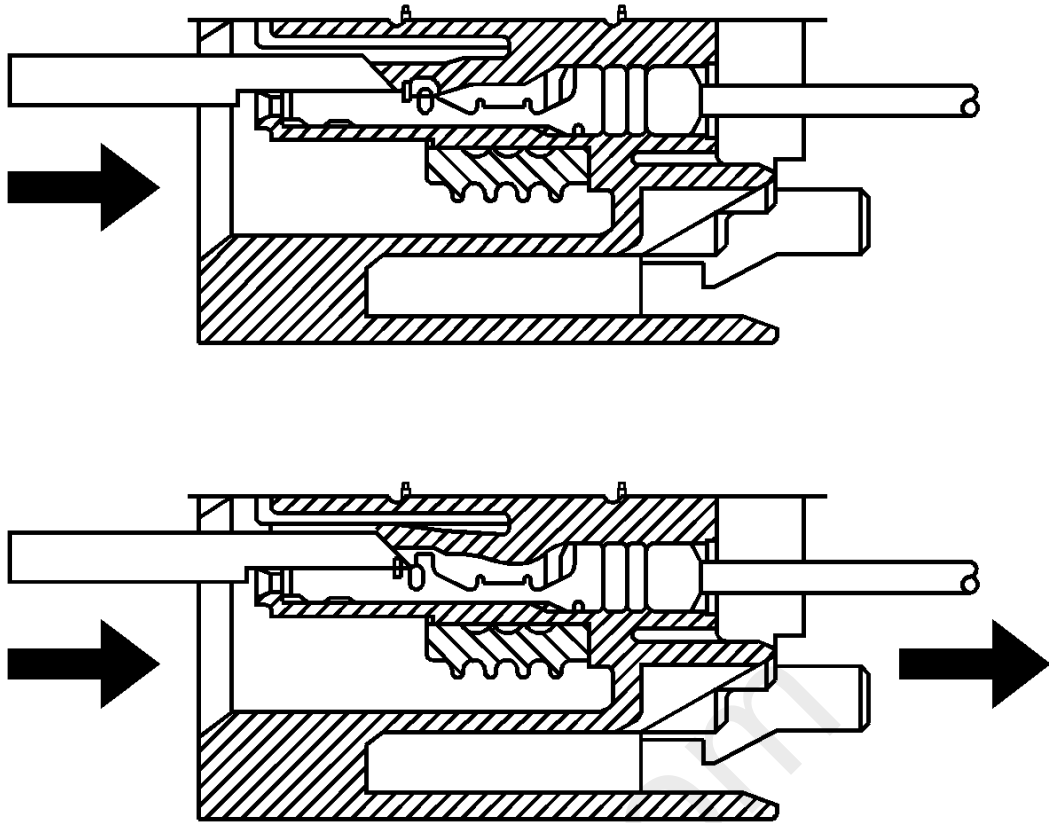
**Courtesy of GENERAL MOTORS COMPANY**

7. The illustration above identifies the entry canal where the terminal release tool will be inserted, and the terminal cavity.
- Terminal (1)
  - Entry Canal (2)



**Fig. 132: Inserting Terminal Release Tool Into Entry Canal**  
Courtesy of GENERAL MOTORS COMPANY

8. Insert the J-38125-553 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.



**Fig. 133: Cutaway View Of Connector**

Courtesy of GENERAL MOTORS COMPANY

9. The illustration shows a cutaway view of the connector to aid the technician in releasing the terminal retainer.
10. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#) procedure.
11. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

#### **Terminal Insertion Procedure**

After the terminal is replaced, perform the following procedure in order to insert 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. Ensure 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 (CM 42-WAY)**

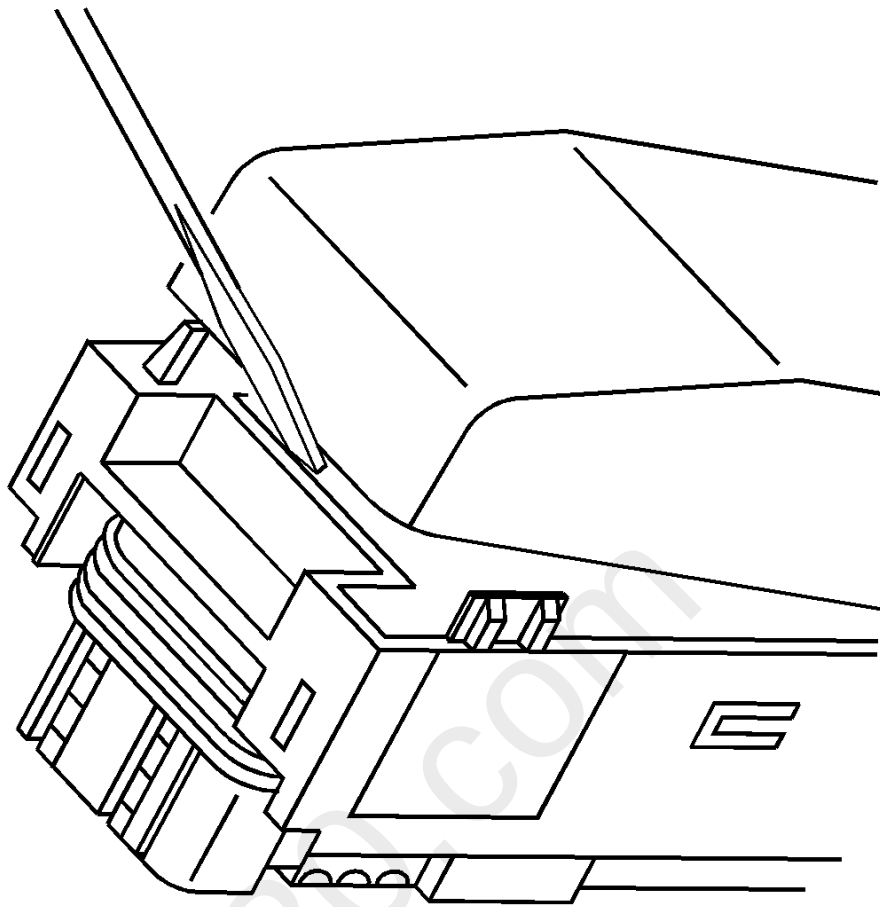
##### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-12A** Terminal Release Tool

For equivalent regional tools, refer to [Special Tools](#) .

##### **Terminal Removal Procedure**

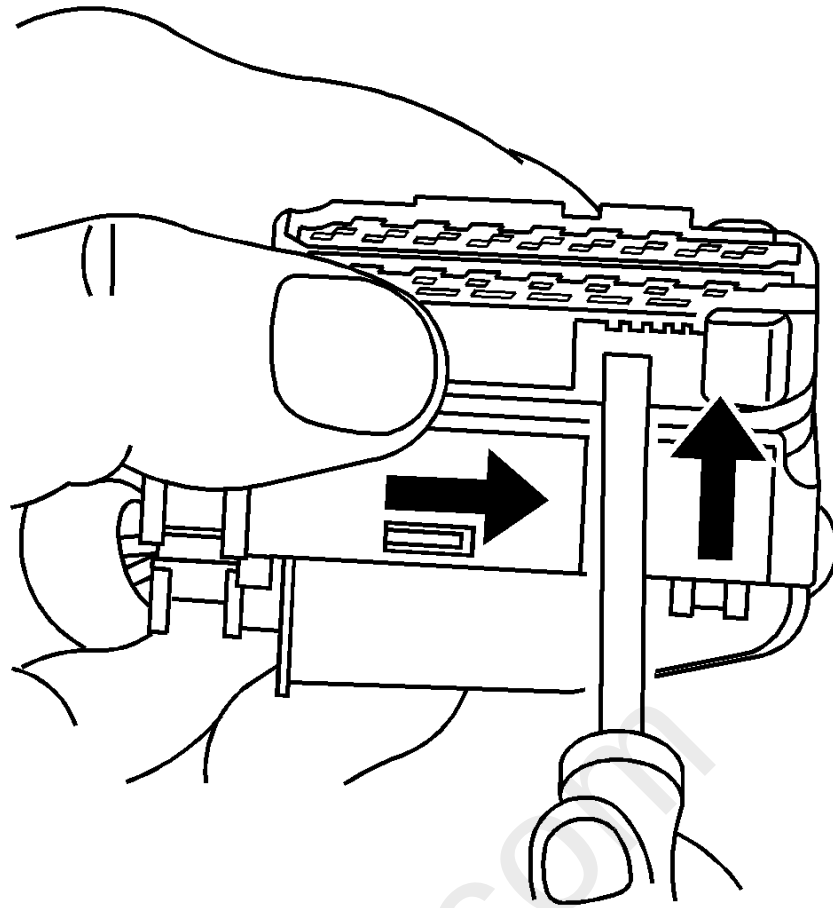
1. Locate the connector position assurance (CPA) on the connector body and pull the CPA out. The CPA is on the wire harness side of connector.
2. Disconnect the connector from the component.



**Fig. 134: Removing Dress Cover**

**Courtesy of GENERAL MOTORS COMPANY**

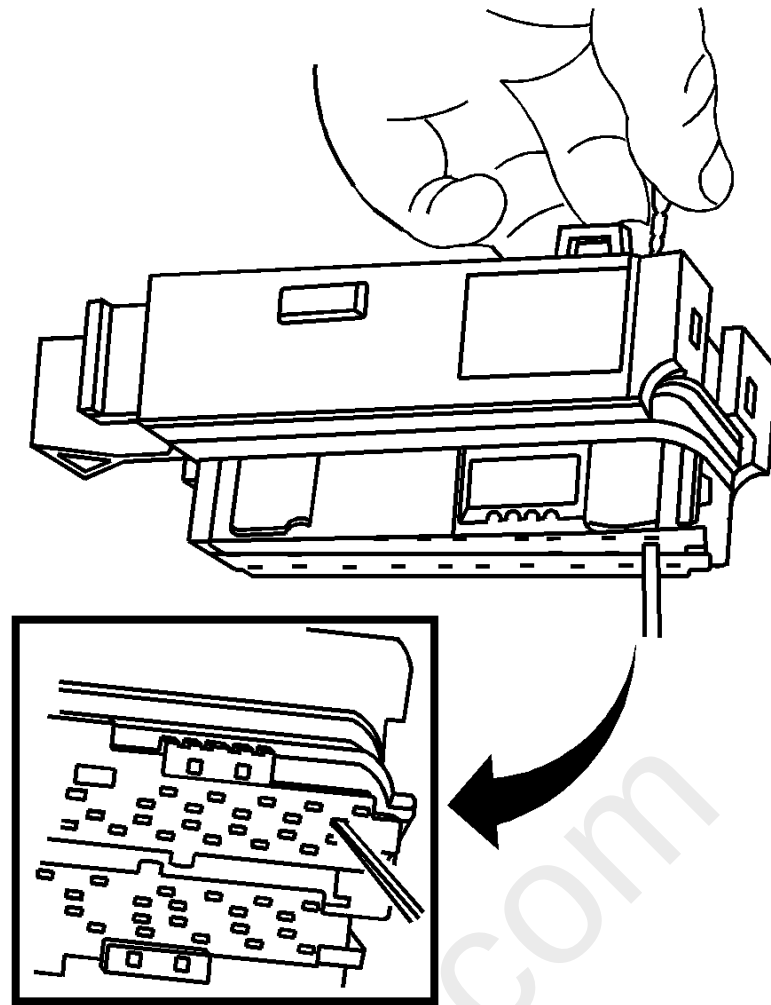
3. Use a small flat-bladed tool to gently pry off the dress cover by inserting the tool under the cover opposite the harness side and prying up.
4. Remove the cover.



**Fig. 135: Releasing Terminal Position Assurance (TPA).**

**Courtesy of GENERAL MOTORS COMPANY**

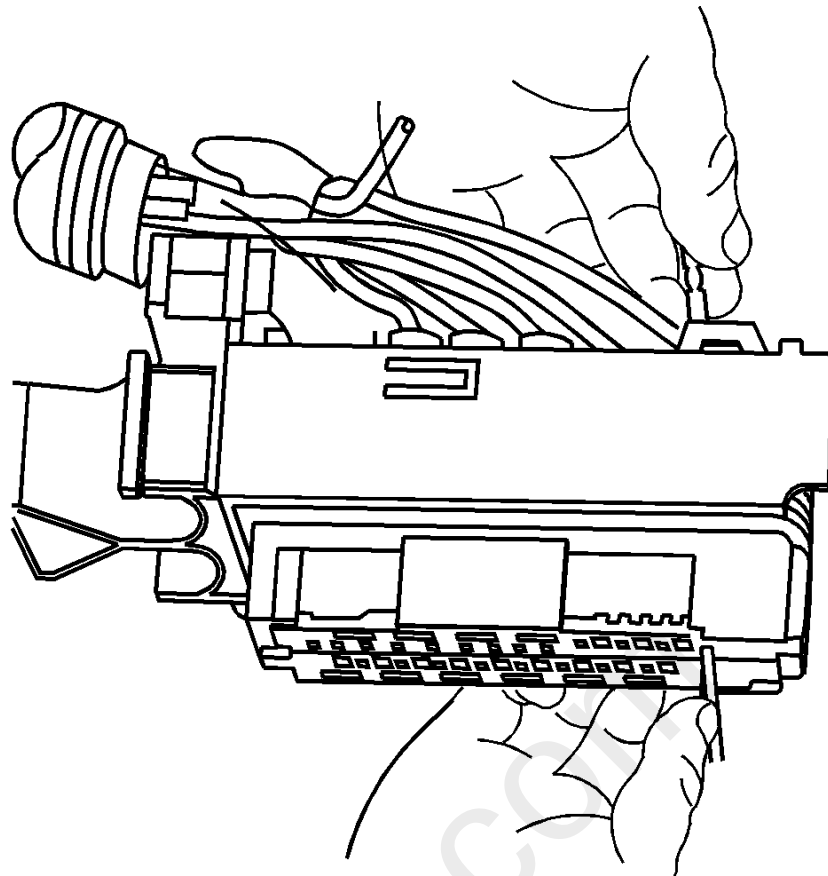
5. Using a small flat-bladed tool, push on the side of the nose piece retainer while pushing the nose piece forward with your thumb. This will release the terminal position assurance (TPA).



**Fig. 136: Inserting Special Tool Into Terminal Release Cavity.**

Courtesy of GENERAL MOTORS COMPANY

6. Insert the **J-38125-12A** tool into the corresponding terminal release cavity. The release cavities are the 2 center rows of cavities on one half of the connector.



**Fig. 137: Holding Special Tool In Place, Gently Pull Wire From Back Of Connector**  
Courtesy of GENERAL MOTORS COMPANY

7. Pressing the **J-38125-12A** 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.
8. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#)[Repairing Connector Terminals \(Terminal Repair\)](#) procedure.
9. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

## **TYCO/AMP CONNECTORS (SENSOR)**

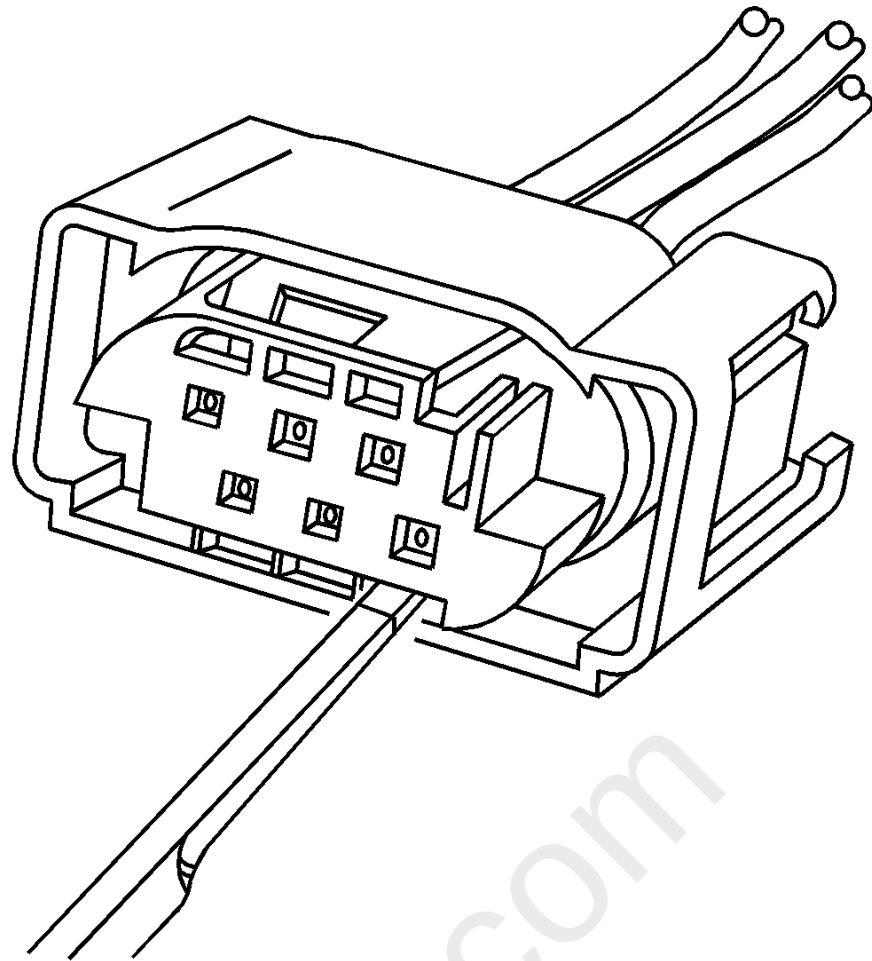
### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-11A** Terminal Release Tool

For equivalent regional tools, refer to [Special Tools](#) .

### **Terminal Removal Procedure**

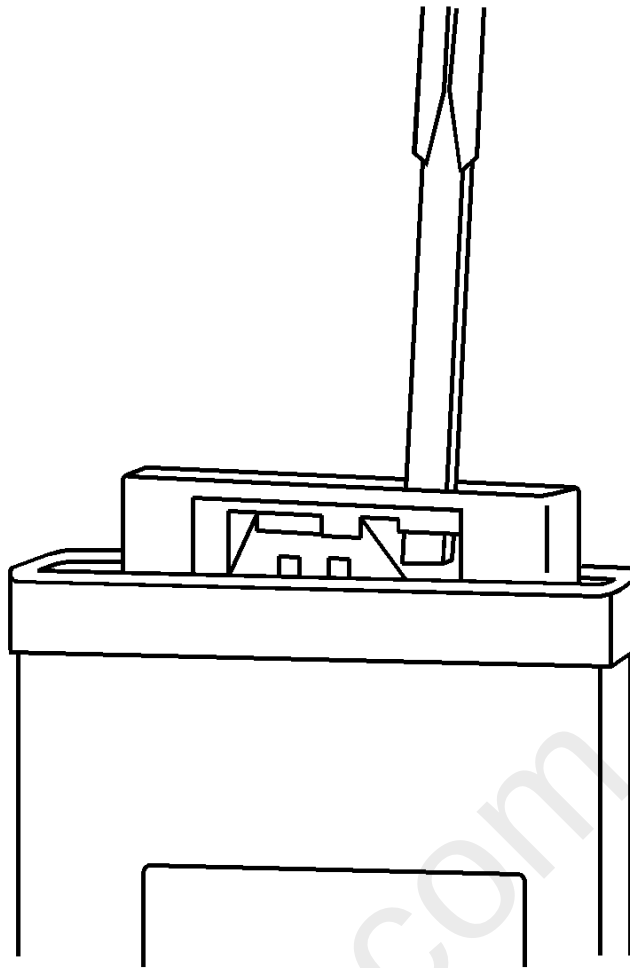
1. Disconnect the connector from the component.



**Fig. 138: Inserting Special Tool Into Lower Right Hand Face Cavity.**

**Courtesy of GENERAL MOTORS COMPANY**

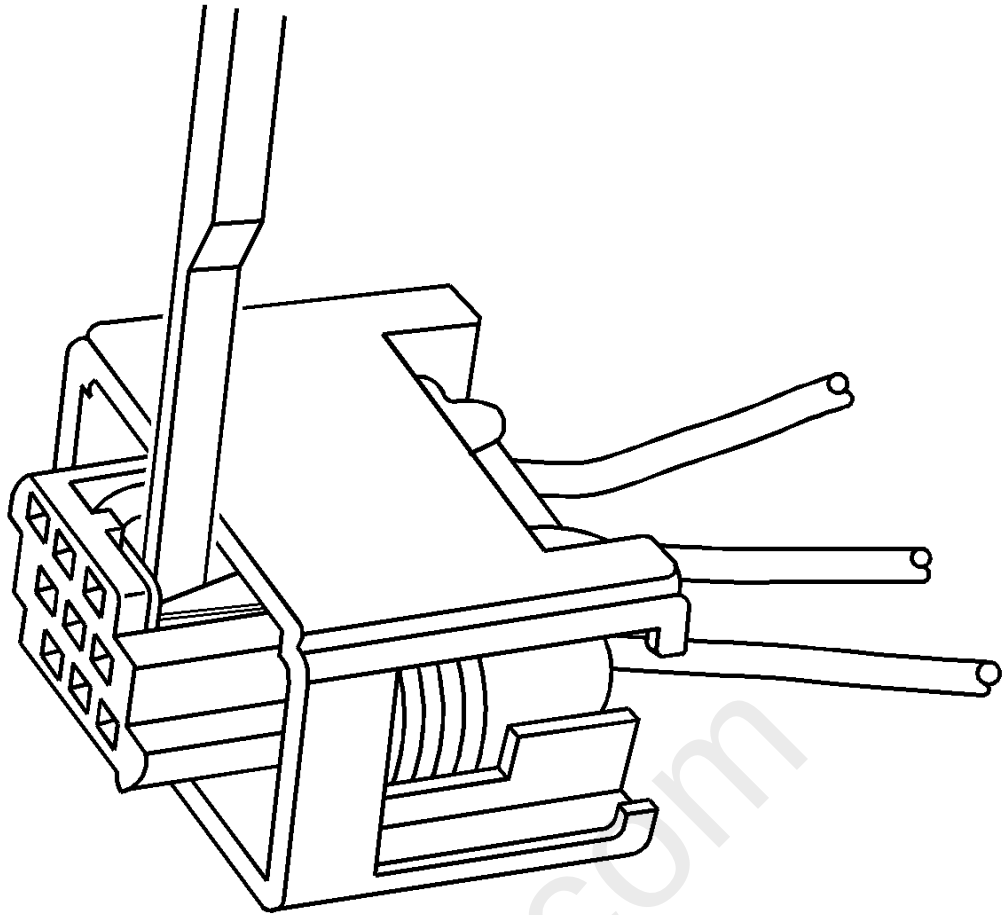
2. Insert the J-38125-11A tool into the cavity on the lower right hand face of the connector until the terminal release tang access panel slides over.



**Fig. 139: Pushing Wire Side Of Terminal Toward Connector**

**Courtesy of GENERAL MOTORS COMPANY**

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.



**Fig. 140: Inserting Tool Into Terminal Release Tang Access Slot (Sensor)**  
**Courtesy of GENERAL MOTORS COMPANY**

5. Insert the J-38125-11A 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.
6. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#) procedure.
7. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

## **TYCO/AMP CONNECTORS (0.25 CAP)**

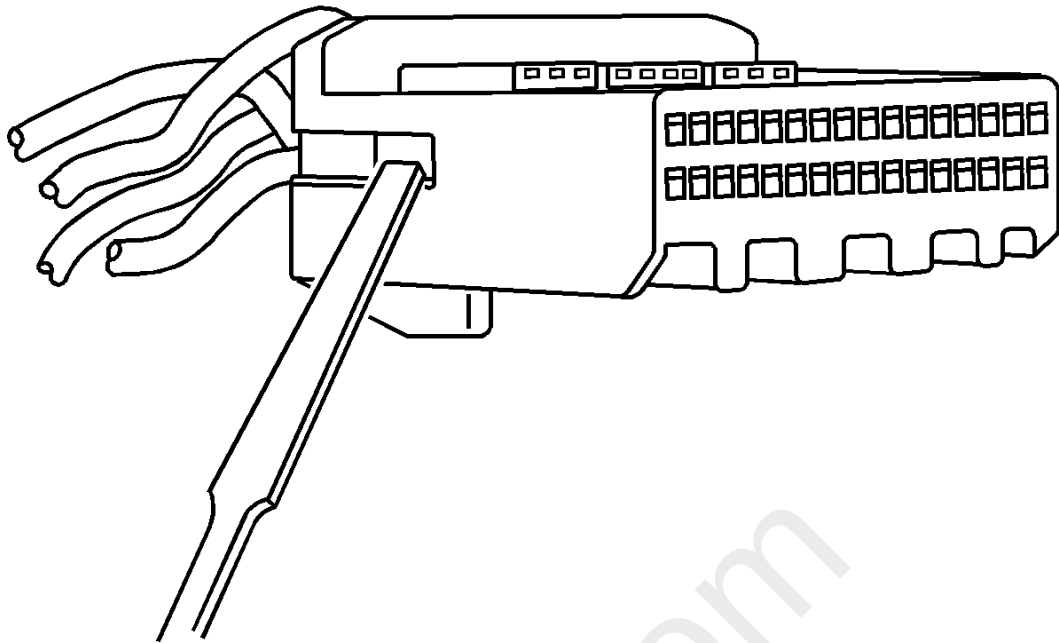
### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-24** Terminal Release Tool

For equivalent regional tools, refer to [Special Tools](#) .

### **Terminal Removal Procedure**

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

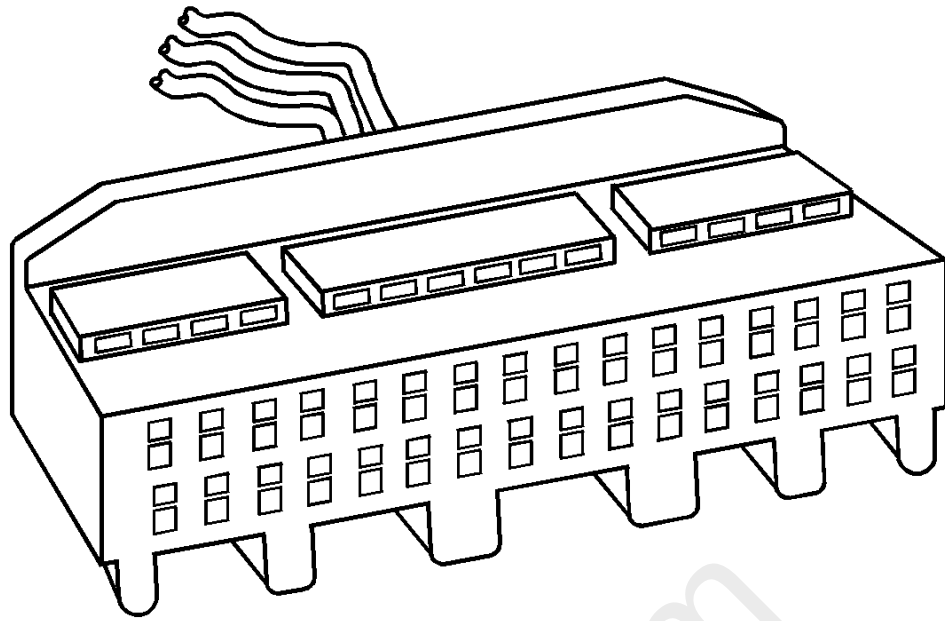


**Fig. 141: Releasing TPA Using Small Flat-Bladed Tool**

Courtesy of GENERAL MOTORS COMPANY

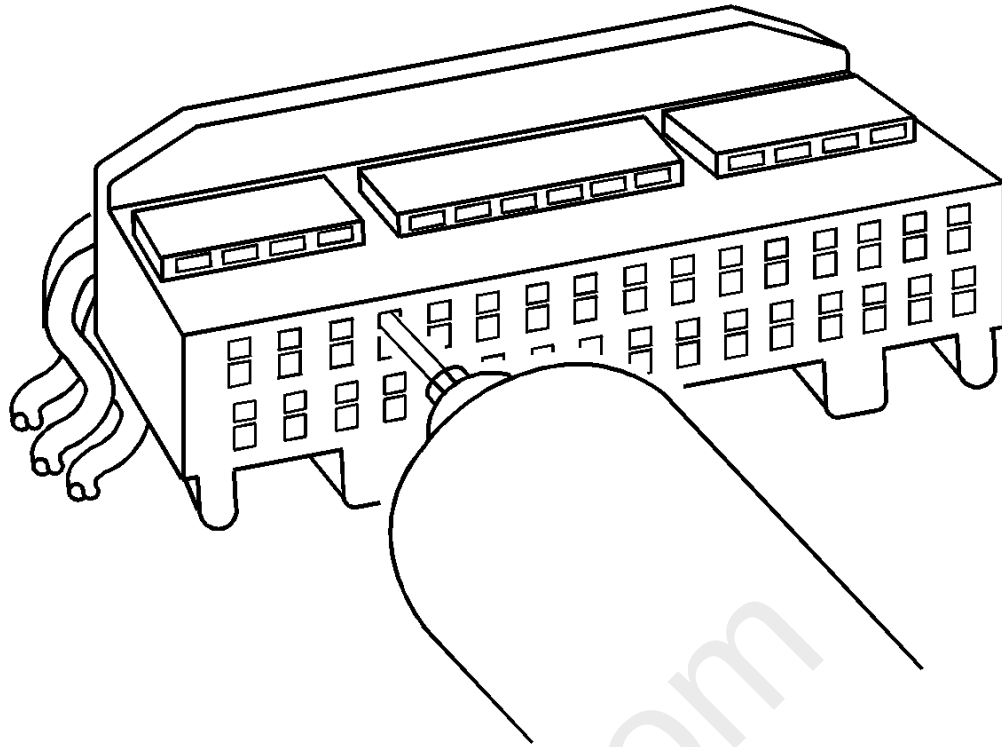
**NOTE:** The TPA on this connector cannot be removed unless the terminals are removed first. The TPA will come out of the connector body, but only slightly. When the TPA is slightly raised the terminals can be removed. Using excessive force to remove the TPA with the terminals still in the connector 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. 142: Terminal Position Assurance**  
Courtesy of GENERAL MOTORS COMPANY

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



**Fig. 143: Inserting Special Tool Into Release Cavity.**  
Courtesy of GENERAL MOTORS COMPANY

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.
6. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#)[Repairing Connector Terminals \(Terminal Repair\)](#) procedure.
7. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

## **TYCO/AMP CONNECTORS (43-WAY)**

### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-12A** Terminal Release Tool
- **J-38125-13A** Terminal Release Tool

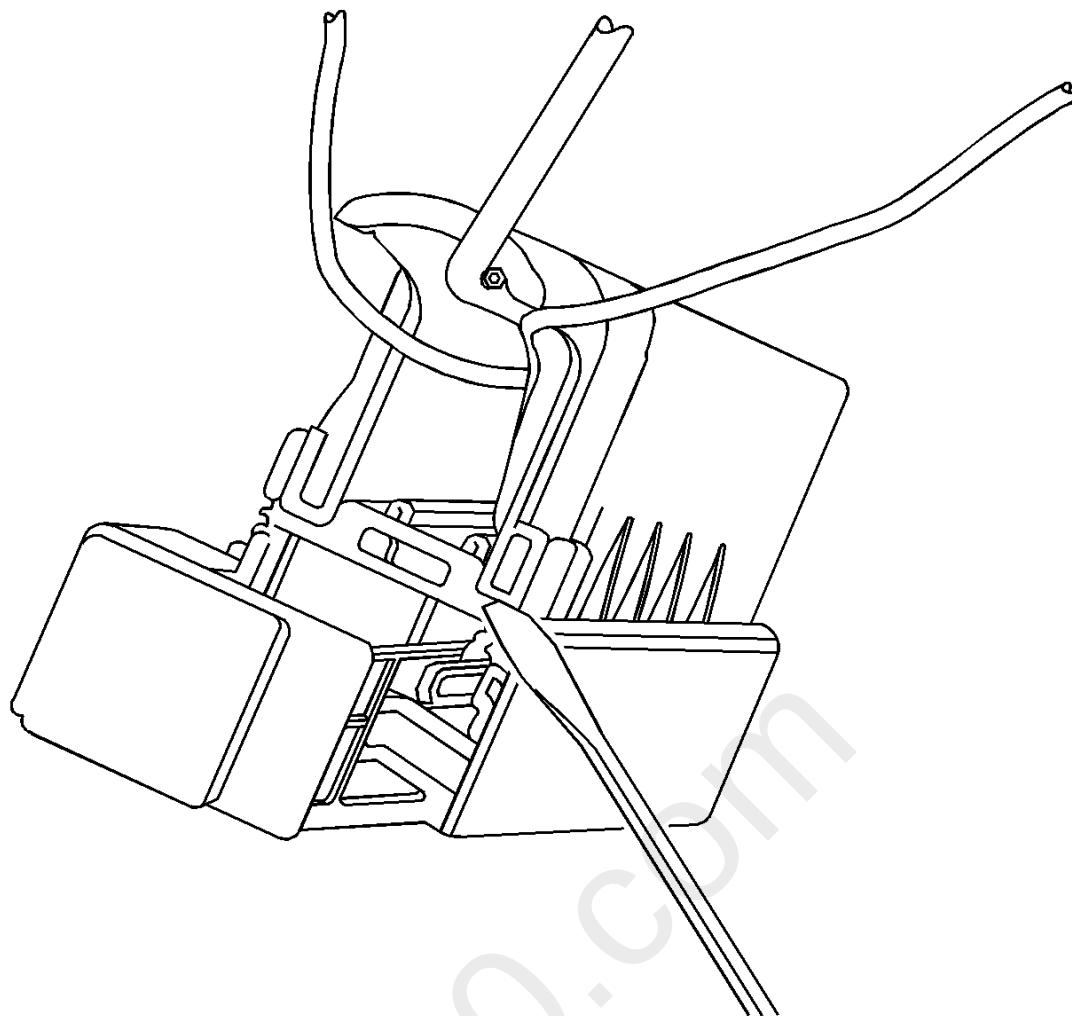
For equivalent regional tools, refer to [Special Tools](#) .

### **Terminal 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-bladed tool release all of the locking tabs.

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

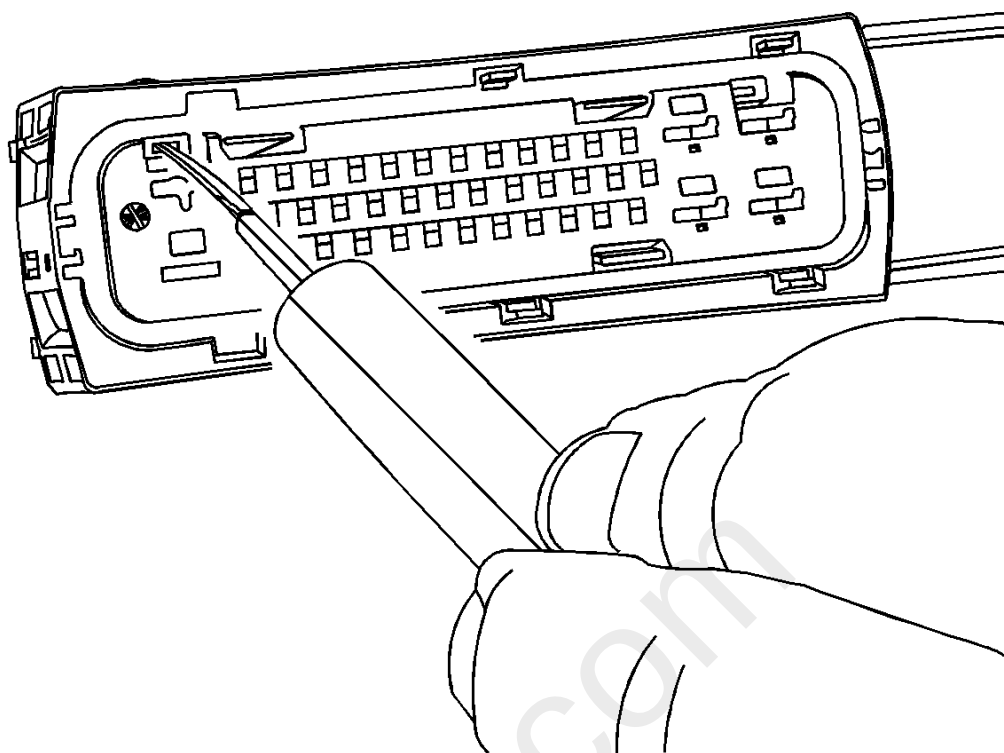


**Fig. 144: Releasing TPA**

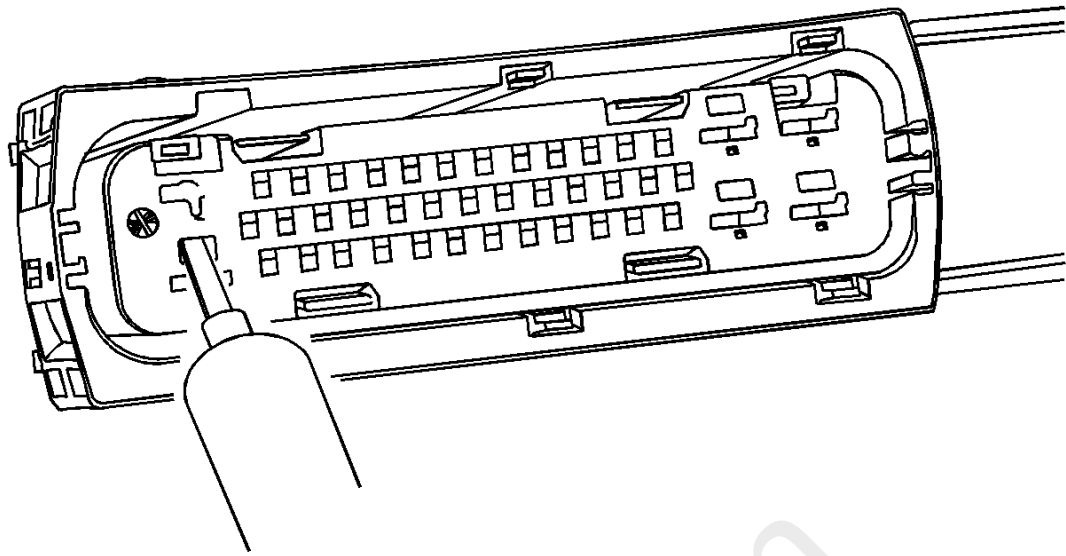
Courtesy of GENERAL MOTORS COMPANY

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

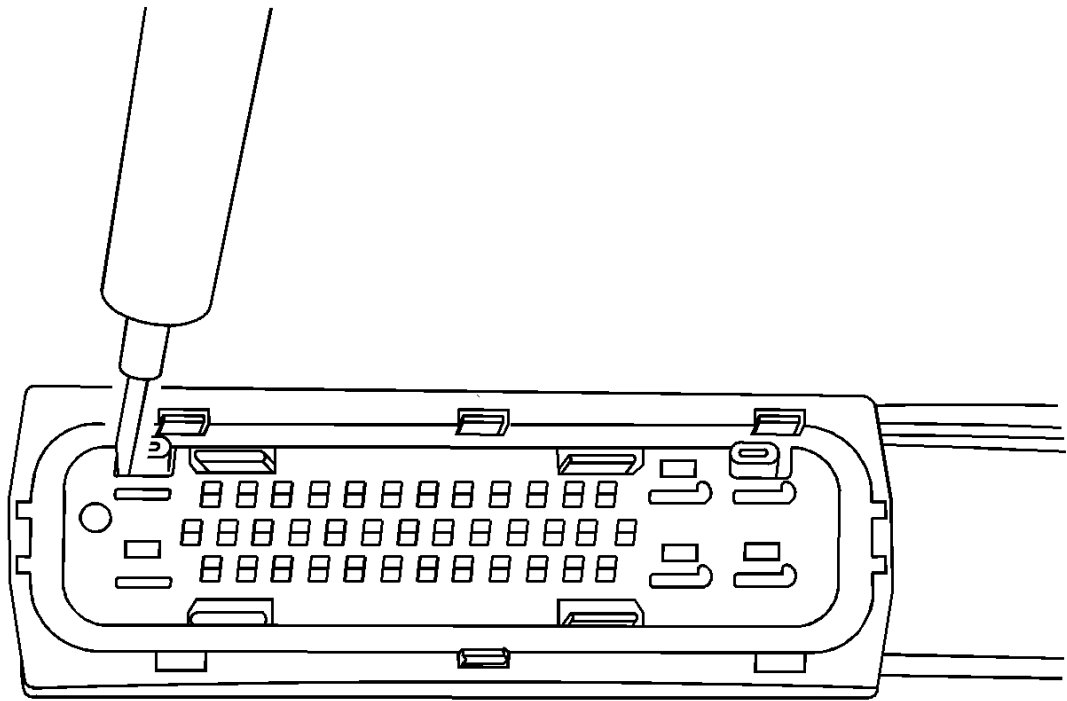
5. Release the TPA by inserting a small flat-bladed tool into the blue locking tabs on both ends of the connector. Gently slide the TPA up to the released position on both ends.



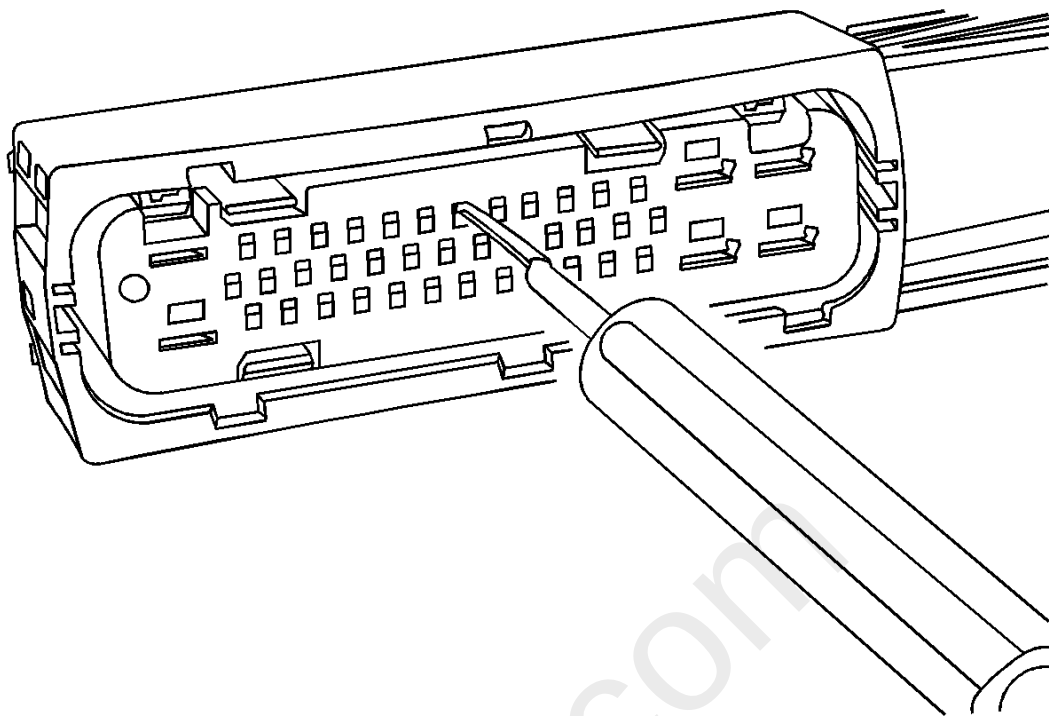
**Fig.145: Inserting Special Tool Into Terminal Release Cavity.**  
Courtesy of GENERAL MOTORS COMPANY



**Fig. 146: Release Tool Being Used For Larger Terminals**  
Courtesy of GENERAL MOTORS COMPANY



**Fig. 147: Release Tool Being Used For Larger Terminals**  
Courtesy of GENERAL MOTORS COMPANY



**Fig. 148: Release Tool Being Used For Smaller Terminals**  
 Courtesy of GENERAL MOTORS COMPANY

6. For the larger terminals insert the **J-38125-13A** tool to release the terminals by inserting the tool into the terminal release cavity. For the smaller terminals insert the **J-38125-12A** tool to release the terminals by inserting the tool into the terminal release cavity.

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.
8. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#) procedure.
9. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

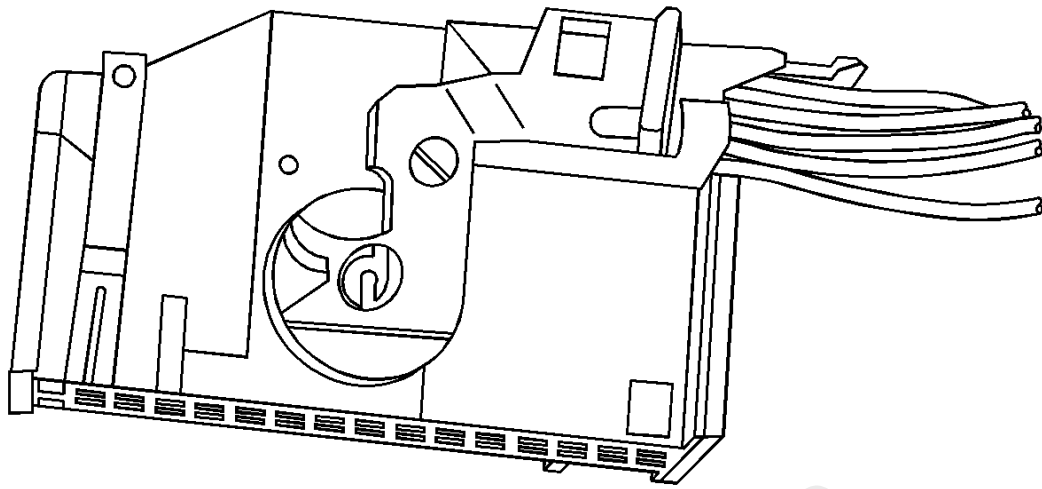
## **TYCO/AMP CONNECTORS (DOOR MODULE)**

### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-12A** Terminal Release Tool

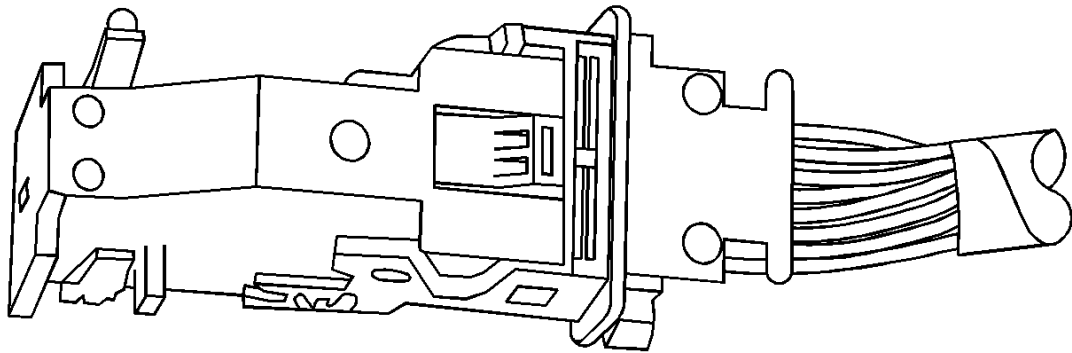
For equivalent regional tools, refer to [Special Tools](#).

### **Terminal Removal Procedure**



**Fig. 149: Side View Of Tyco/AMP Connector**  
**Courtesy of GENERAL MOTORS COMPANY**

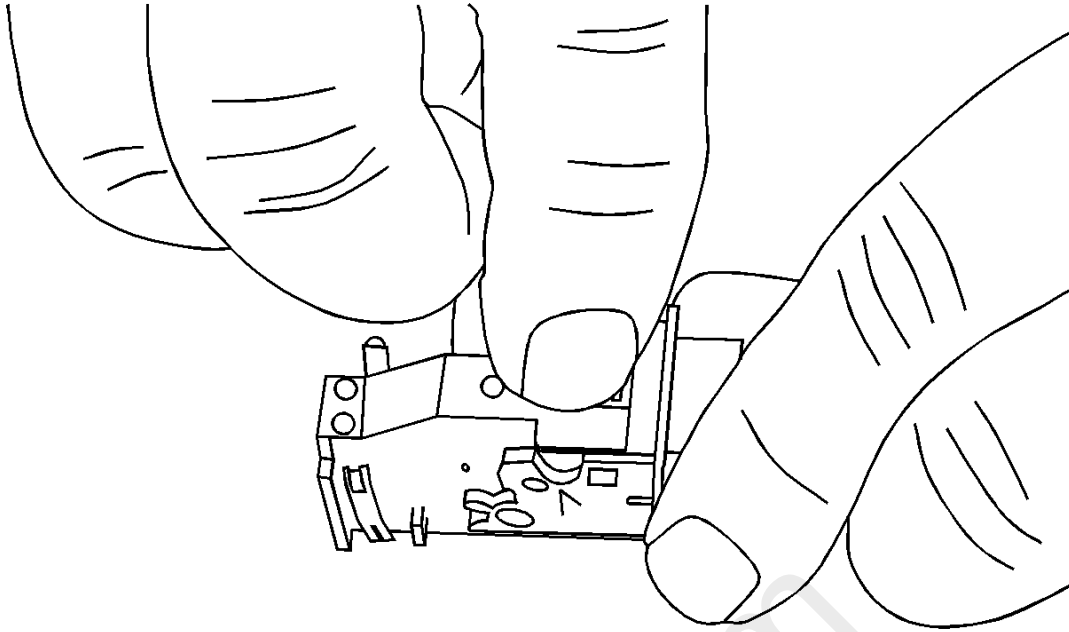
Side view of connector.



**Fig. 150: Top View Of Tyco/AMP Connector**  
**Courtesy of GENERAL MOTORS COMPANY**

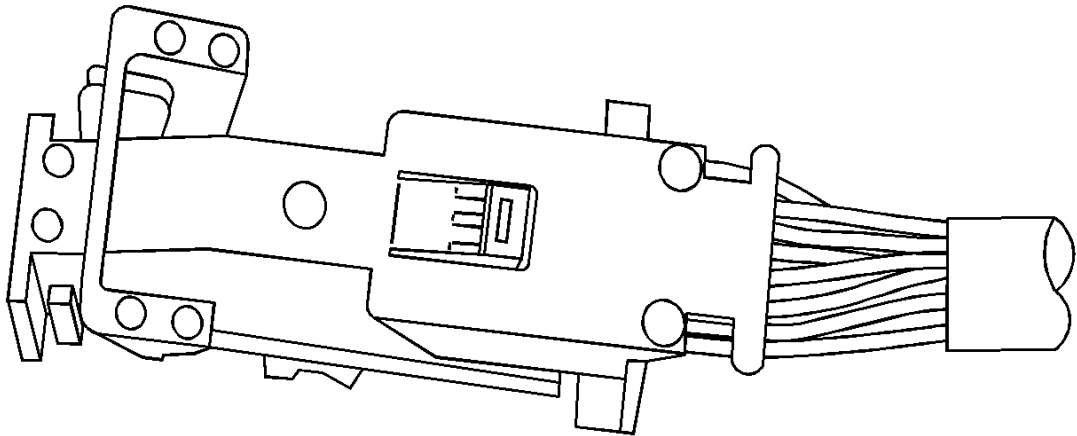
View of top of connector.

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



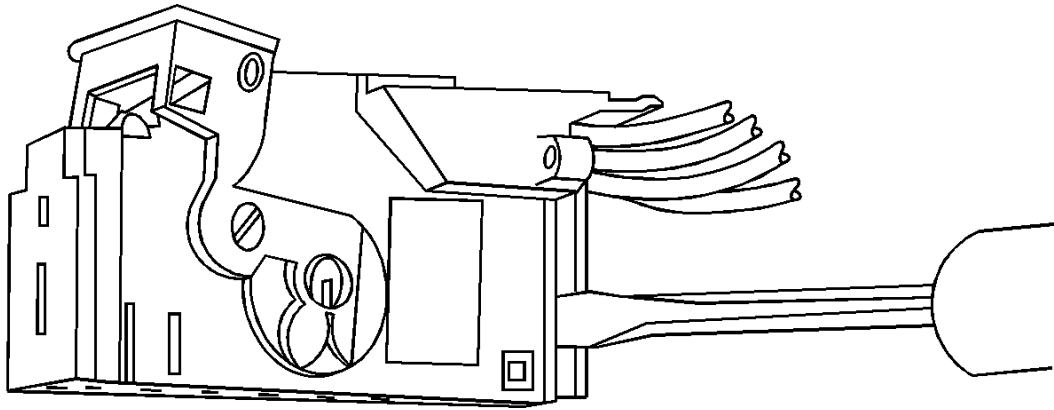
**Fig.151: Depressing Lock & Pulling Assist Lever**  
**Courtesy of GENERAL MOTORS COMPANY**

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



**Fig.152: Connector Released From Component**  
Courtesy of GENERAL MOTORS COMPANY

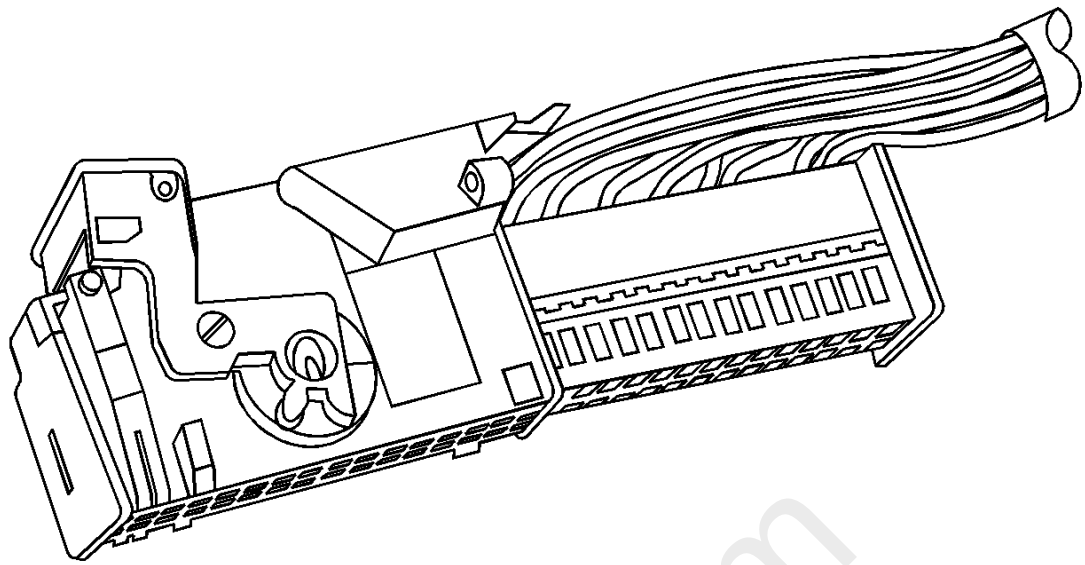
3. Disconnect the connector from the component.



**Fig. 153: Releasing Locking Tabs**

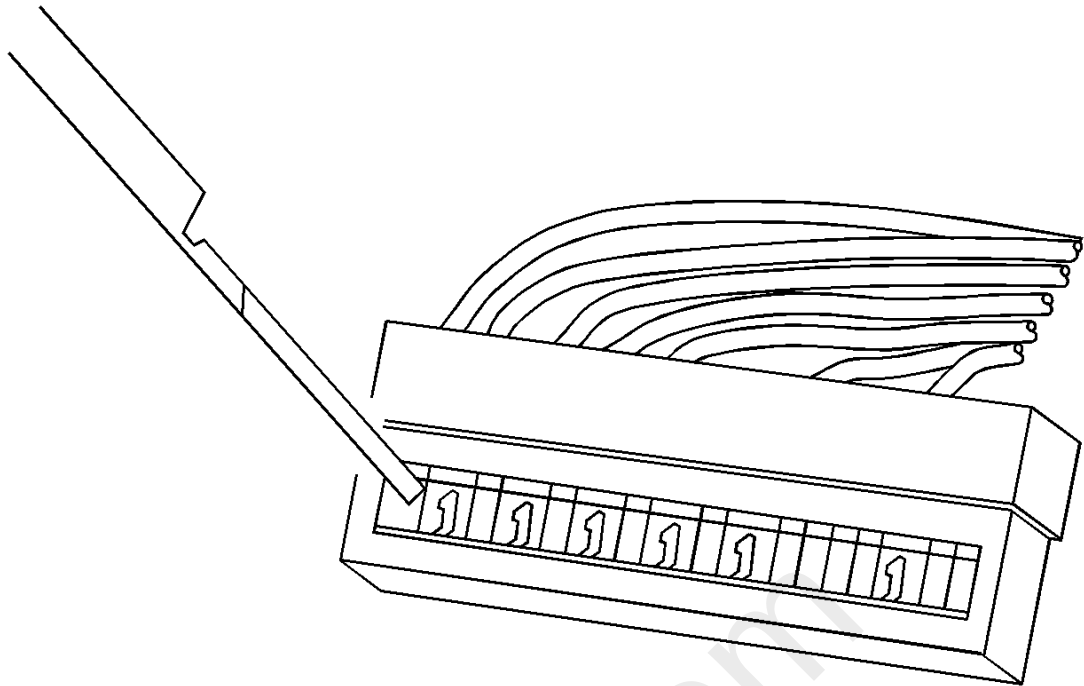
**Courtesy of GENERAL MOTORS COMPANY**

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. 154: Sliding Inner Connector Out Of Connector Housing**  
Courtesy of GENERAL MOTORS COMPANY

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



**Fig. 155: Using Special Tool To Release Terminals**  
Courtesy of GENERAL MOTORS COMPANY

6. Use the J-38125-12A tool to release the terminals by pressing on the tang.
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.
8. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#) procedure.
9. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

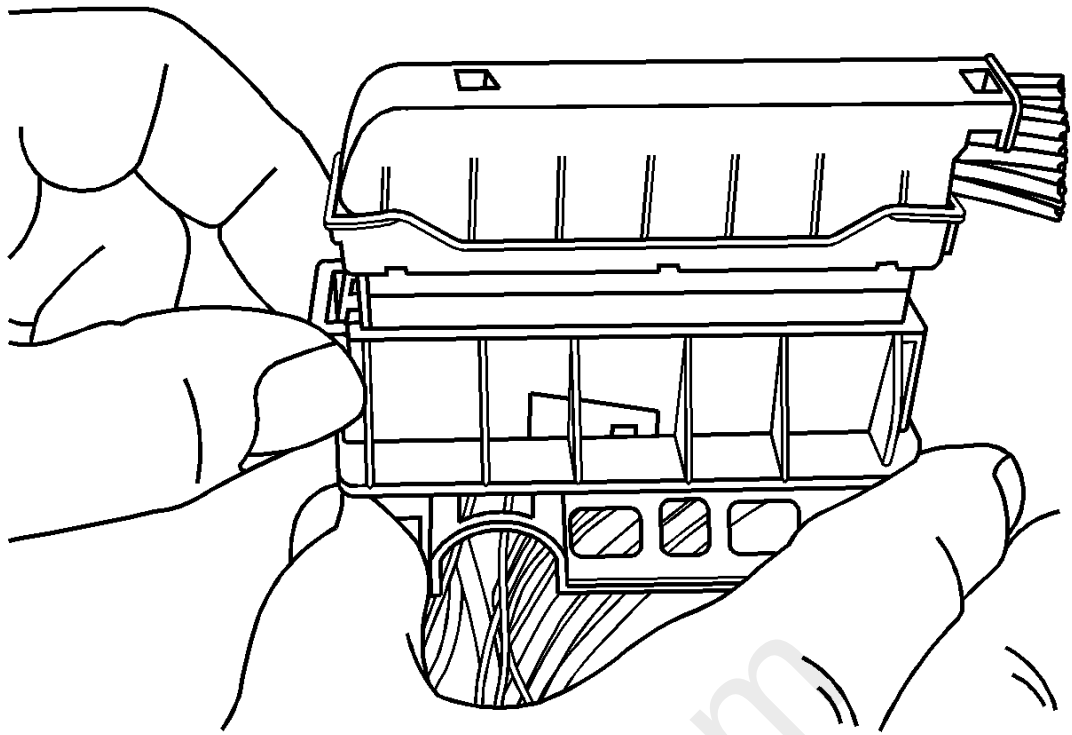
## **TYCO/AMP CONNECTORS (SEAT)**

### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-11A** Terminal Release Tool
- **J-38125-212** Terminal Release Tool
- **J-38125-556** Terminal Release Tool
- **J-38125-560** Terminal Release Tool

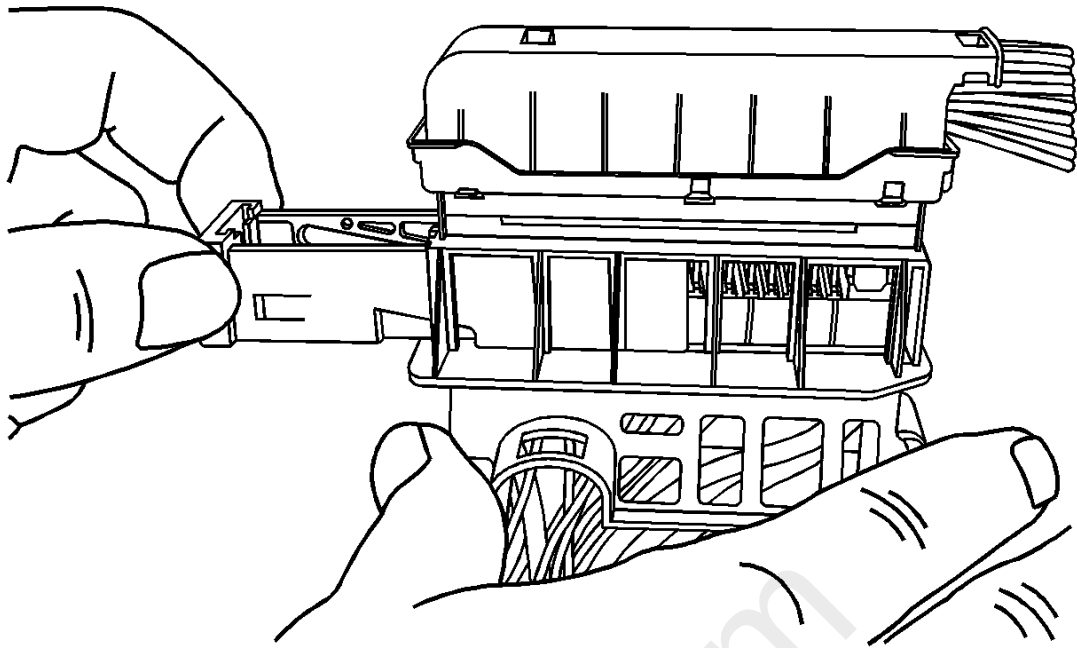
For equivalent regional tools, refer to [Special Tools](#) .

### **Terminal Removal Procedure**



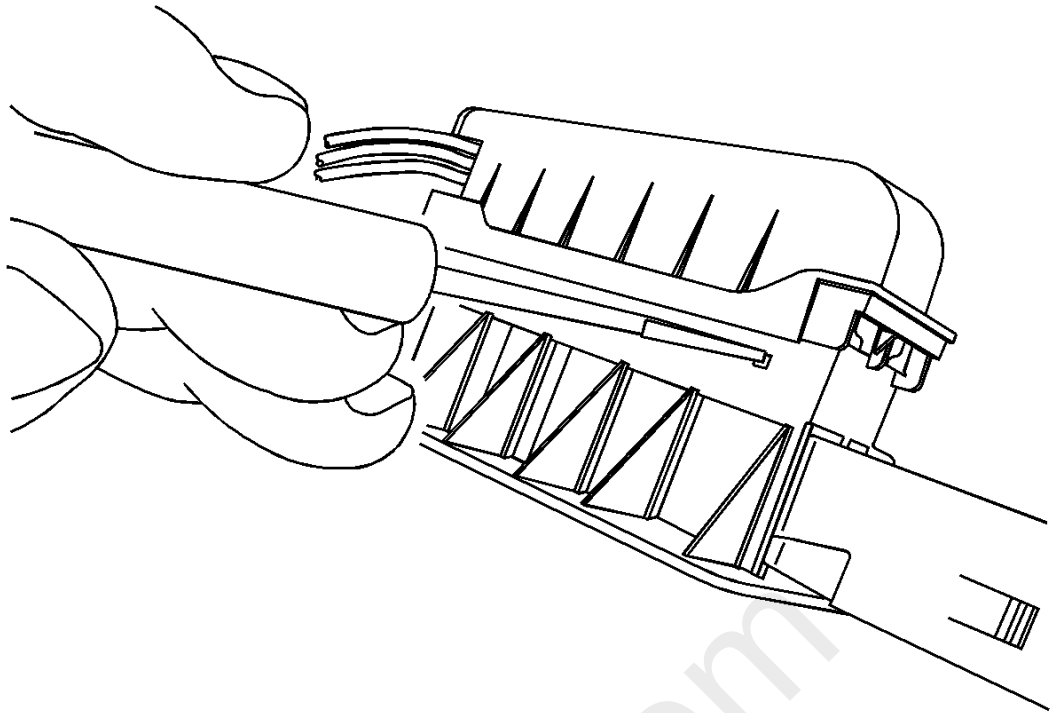
**Fig. 156: Grasping Locking Slide Lever**  
Courtesy of GENERAL MOTORS COMPANY

1. Grasp the locking slide lever and pull outward from the end of the connector.



**Fig. 157: Pulling Slide Lever Out Of Mating Connector**  
Courtesy of GENERAL MOTORS COMPANY

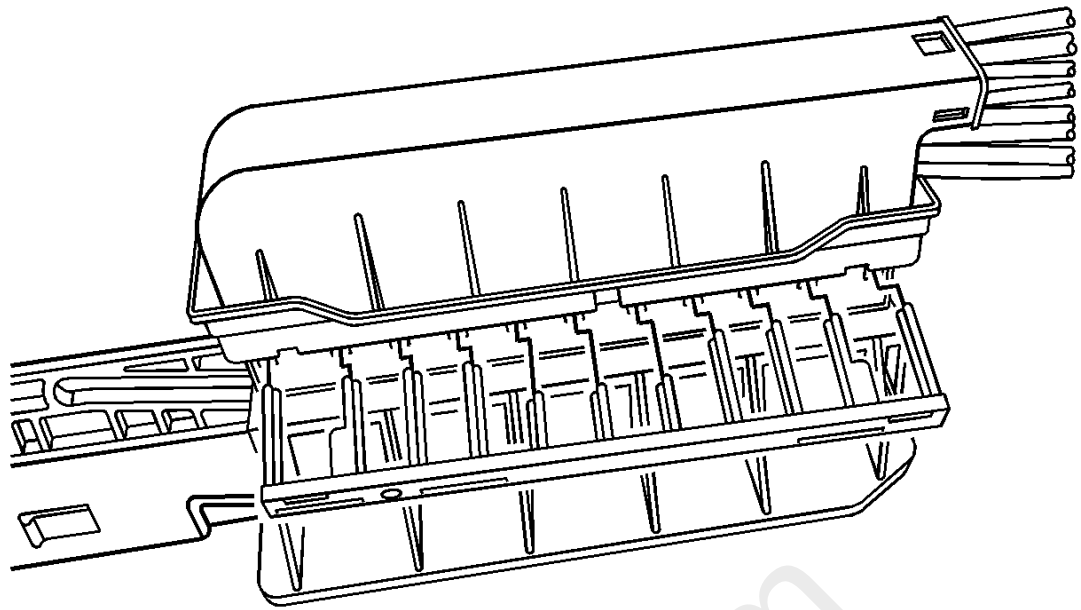
2. As the slide lever is pulled out the mating connector is lifted from the seated position.



**Fig. 158: Pushing TPA Tabs Into Connector Body.**  
Courtesy of GENERAL MOTORS COMPANY

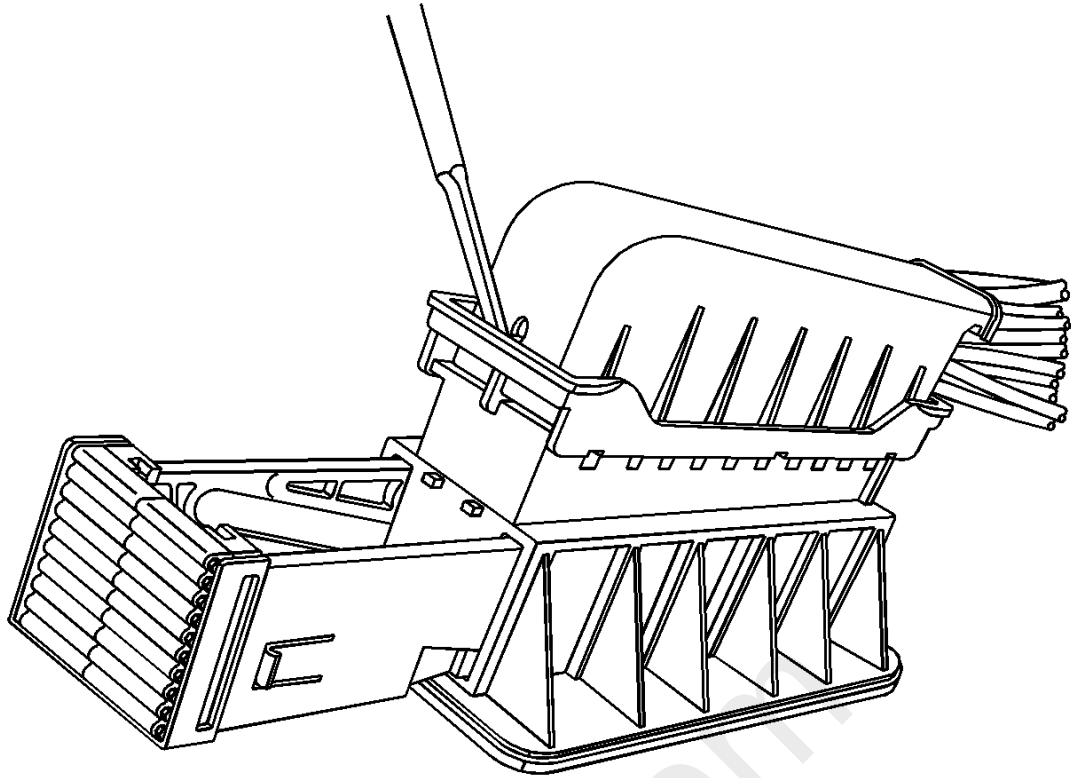
**NOTE:** Terminal position assurance (TPA) is keyed and can only be inserted in one direction.

3. Using terminal release tool J-38125-11A or equivalent, push the TPA tabs into the connector body.



**Fig.159: Pulling TPA From Connector Body.**  
Courtesy of GENERAL MOTORS COMPANY

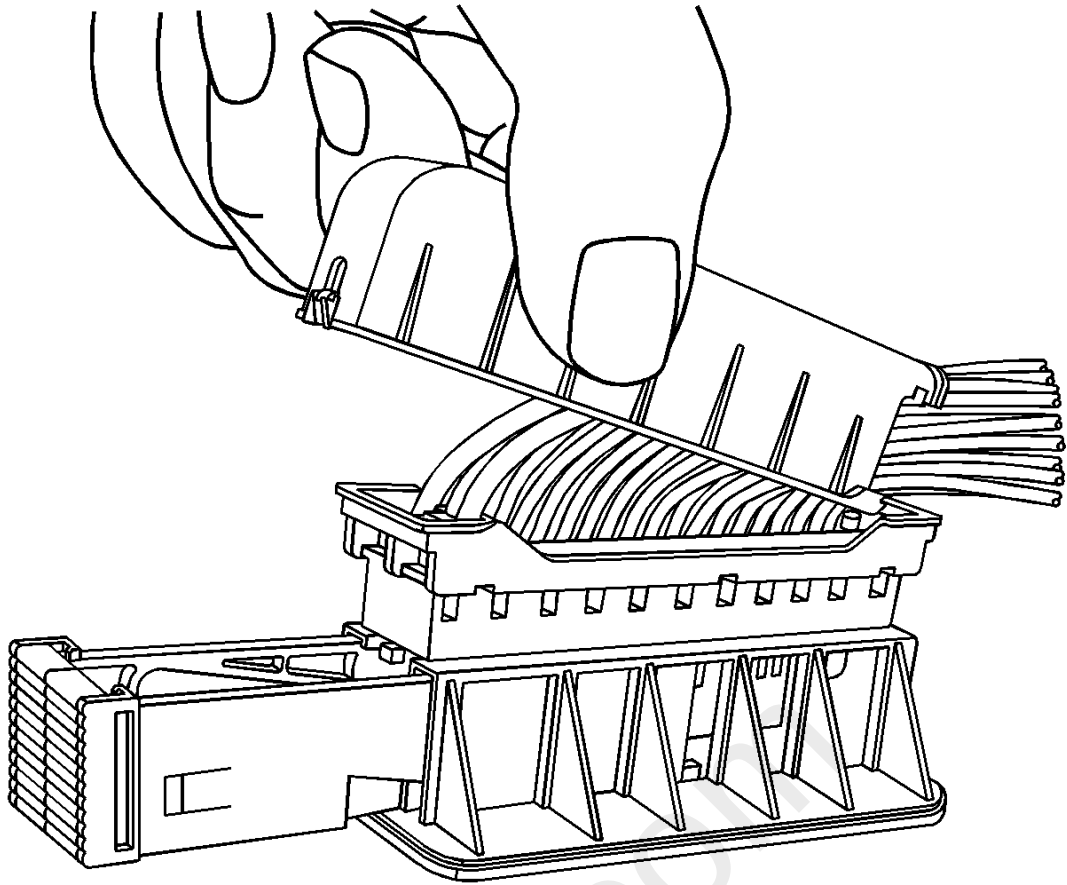
4. Pull the TPA from the connector body.



**Fig. 160: Releasing Connector Wire Dress Cover Locking Tab**

**Courtesy of GENERAL MOTORS COMPANY**

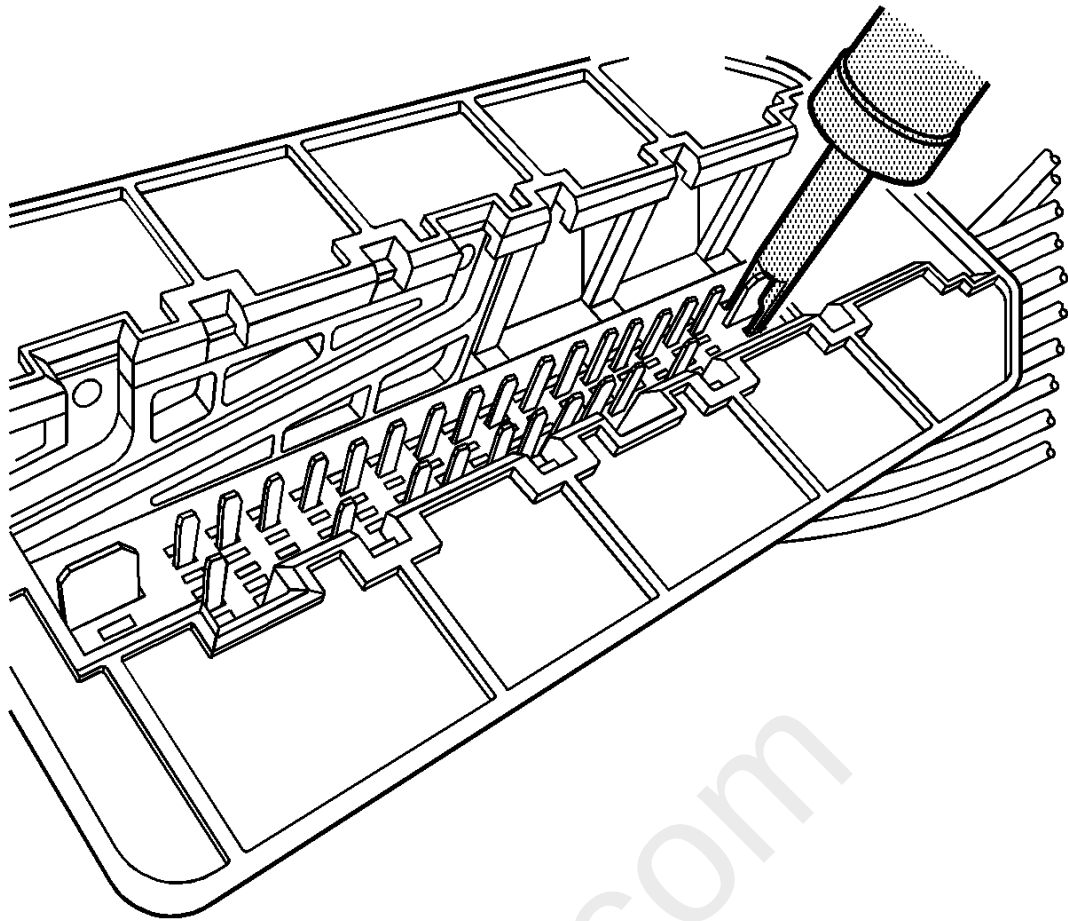
5. Using terminal release tool J-38125-11A or equivalent, release the connector wire dress cover locking tab.



**Fig. 161: Lifting Connector Wire Dress Cover From Connector Body.**

**Courtesy of GENERAL MOTORS COMPANY**

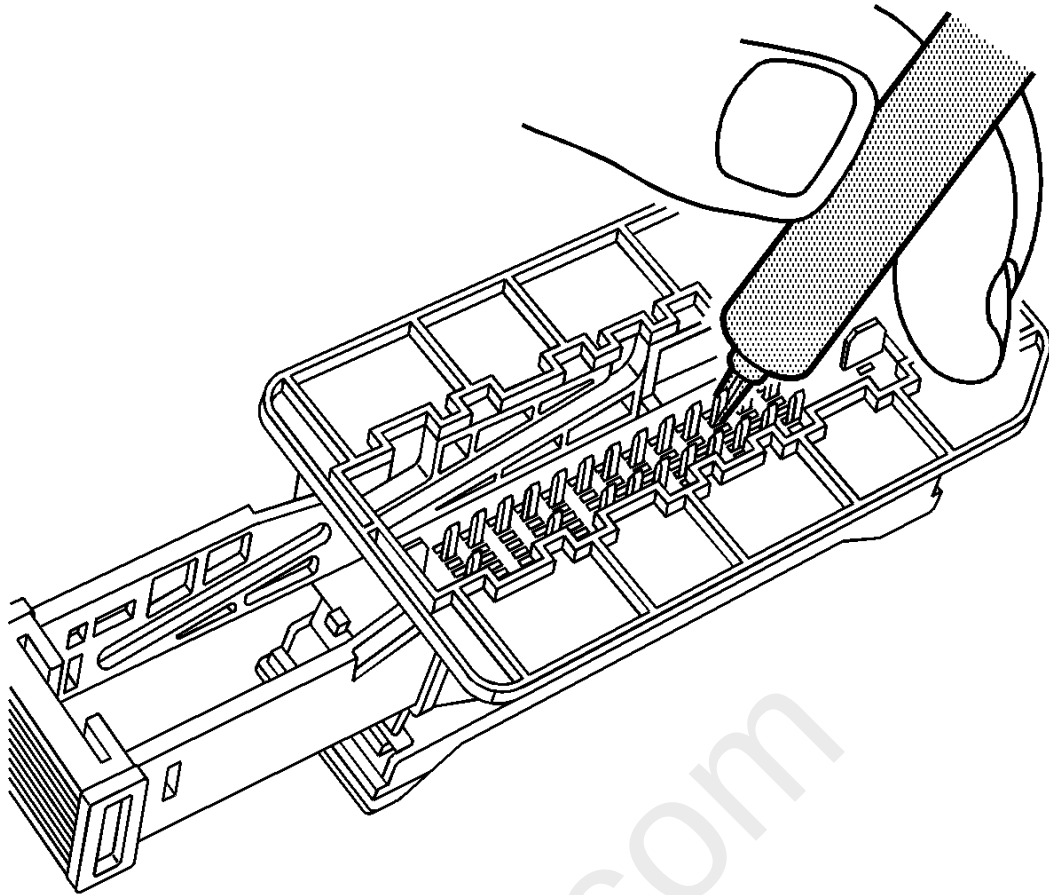
6. With the lock tab released, lift the connector wire dress cover from the connector body.



**Fig. 162: Using Terminal Release Tool To Release Lock Tabs**

**Courtesy of GENERAL MOTORS COMPANY**

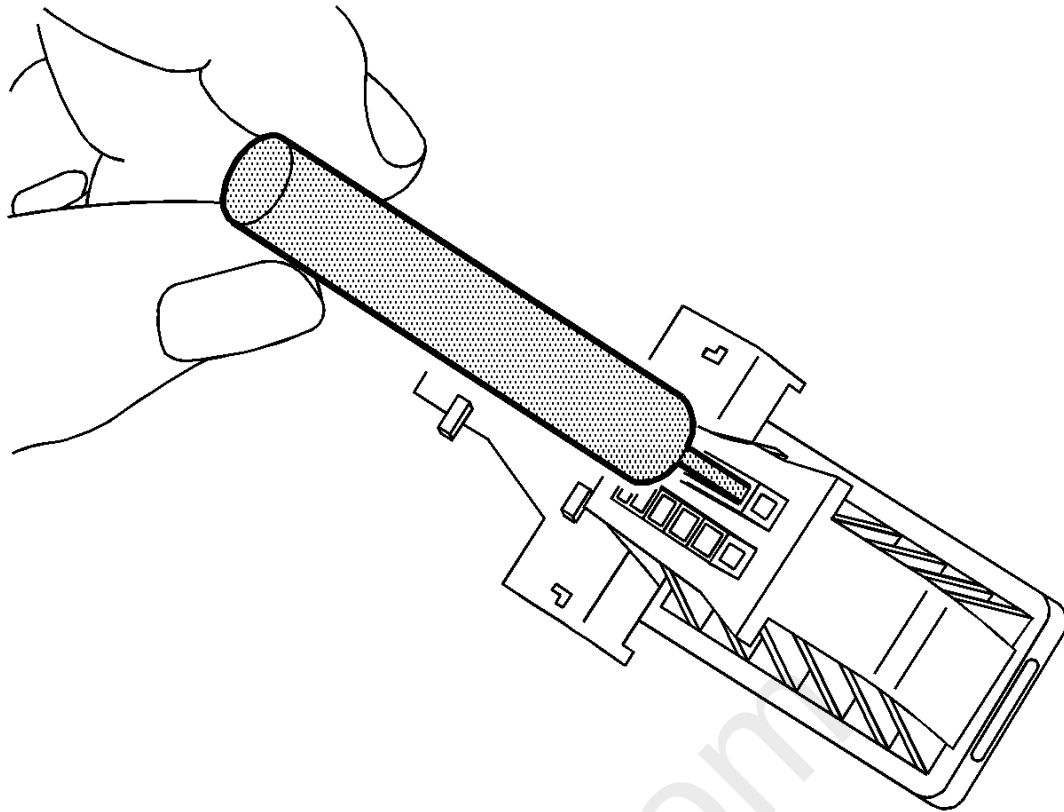
7. Using terminal release tool J-38125-212, press the prongs into the holes each side of the terminal to be removed to release the lock tabs and pull the terminal out of the connector body.



**Fig. 163: Using Terminal Release Tool To Release Lock Tabs**

**Courtesy of GENERAL MOTORS COMPANY**

8. Using terminal release tool J-38125-560, press the prongs into the holes on each side of the terminal to be removed to release the lock tabs and pull the terminal out of the connector body.



**Fig. 164: Using Terminal Release Tool To Release Lock Tabs**  
Courtesy of GENERAL MOTORS COMPANY

9. Using terminal release tool J-38125-556, press the prongs into the holes on each side of the terminal to be removed to release the lock tabs and pull the terminal out of the connector body.
10. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#)[Repairing Connector Terminals \(Terminal Repair\)](#) procedure.
11. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

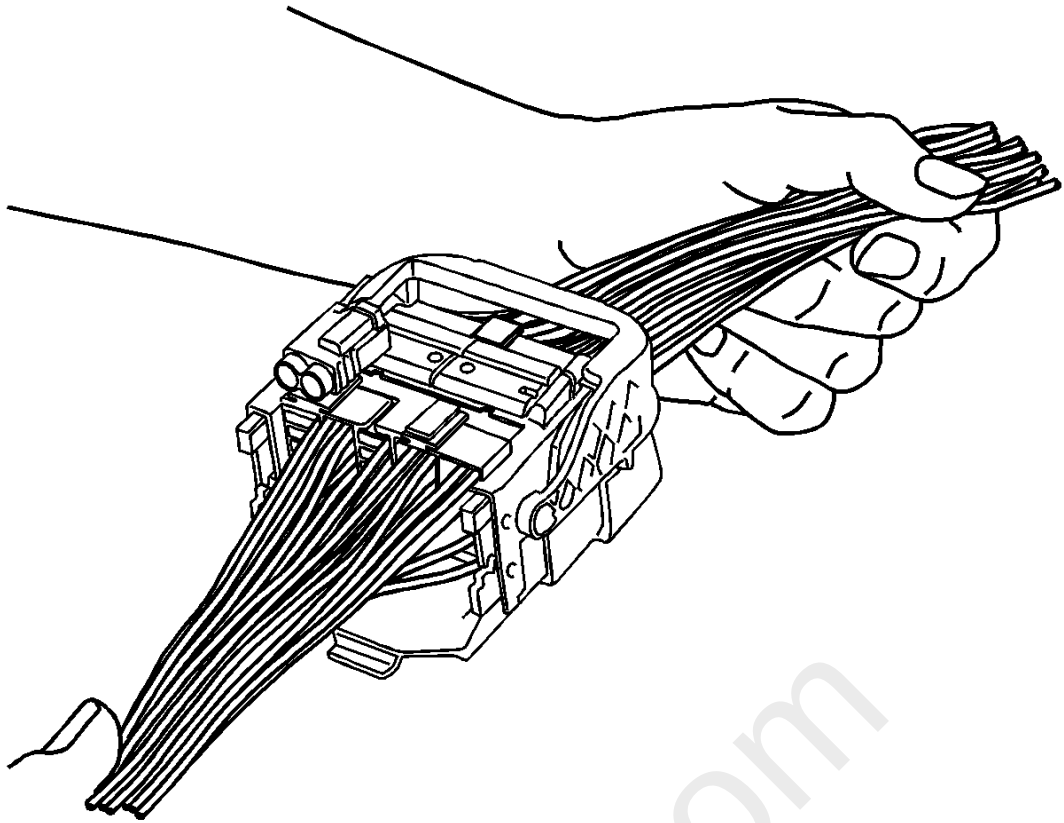
## **TYCO/AMP CONNECTORS (102-WAY INLINE)**

### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-11A** Terminal Release Tool
- **J-38125-212** Terminal Release Tool
- **J-38125-216** Terminal Release Tool
- **J-38125-221** Terminal Release Tool
- **J-38125-560** Terminal Release Tool
- **J-38125-566** Terminal Release Tool

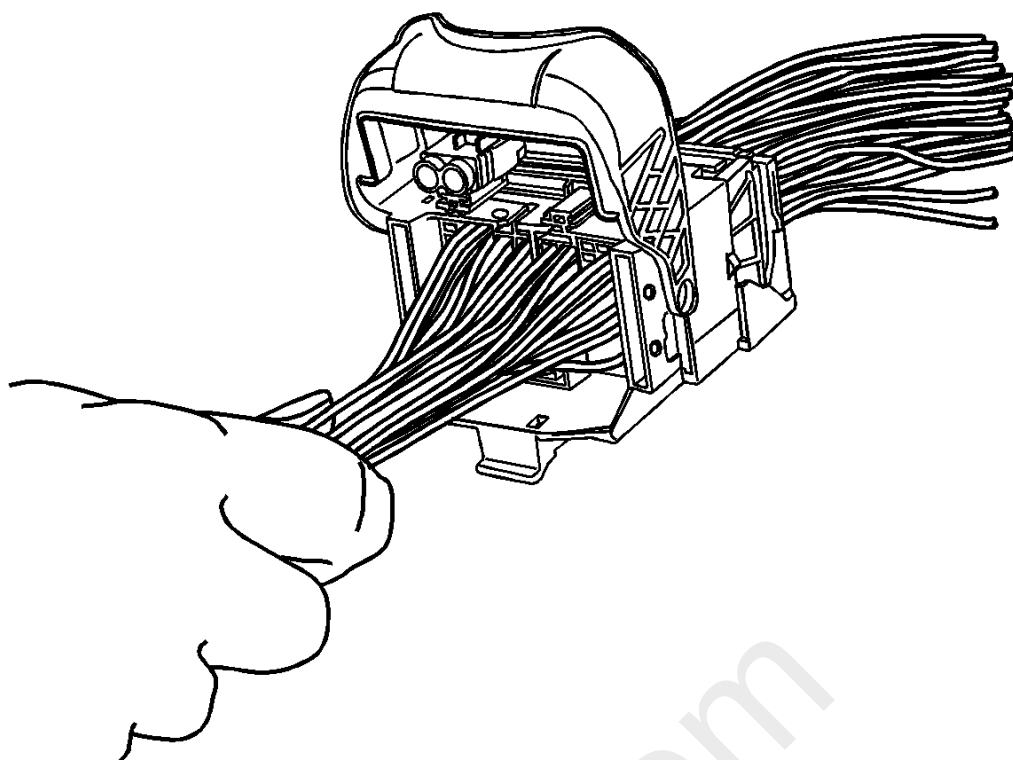
For equivalent regional tools, refer to [Special Tools](#) .

### **Terminal Removal Procedure**



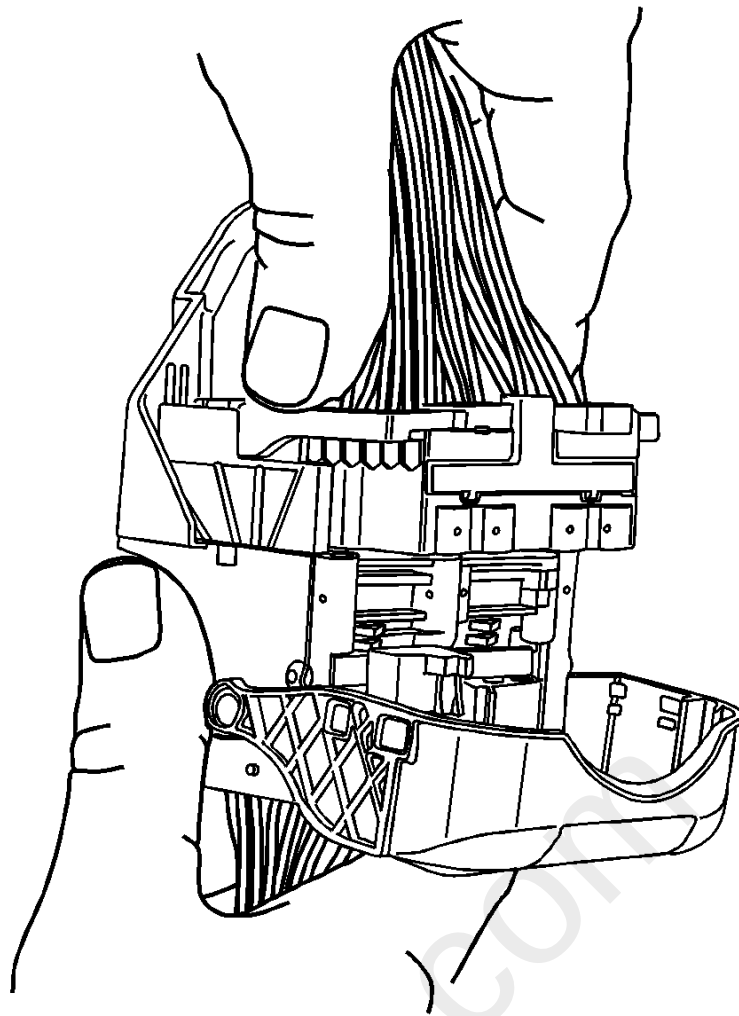
**Fig.165: Typical Connector In Assembled Position**  
**Courtesy of GENERAL MOTORS COMPANY**

View of a typical connector in the assembled position.



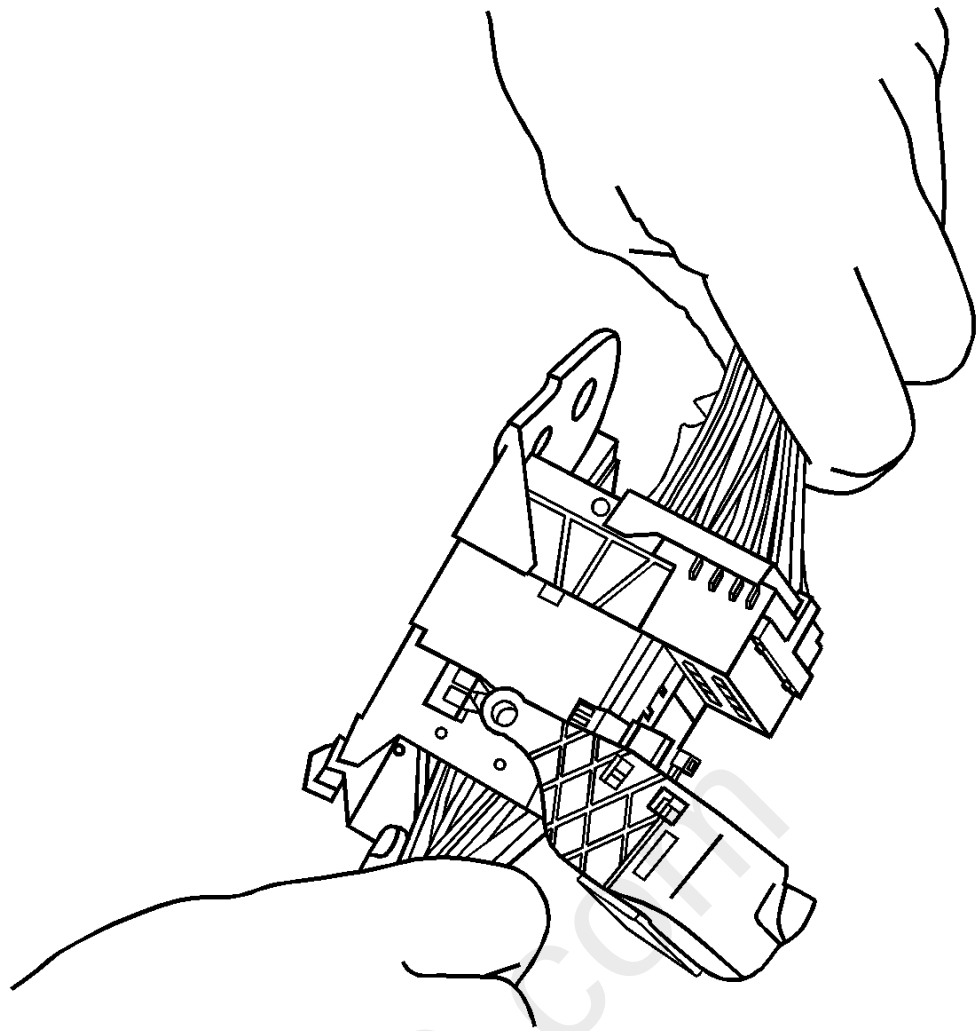
**Fig. 166: Locking Lever At 90 Degrees From Connector Body.**  
Courtesy of GENERAL MOTORS COMPANY

1. Pull the locking lever to the 90 degree position from the connector body.



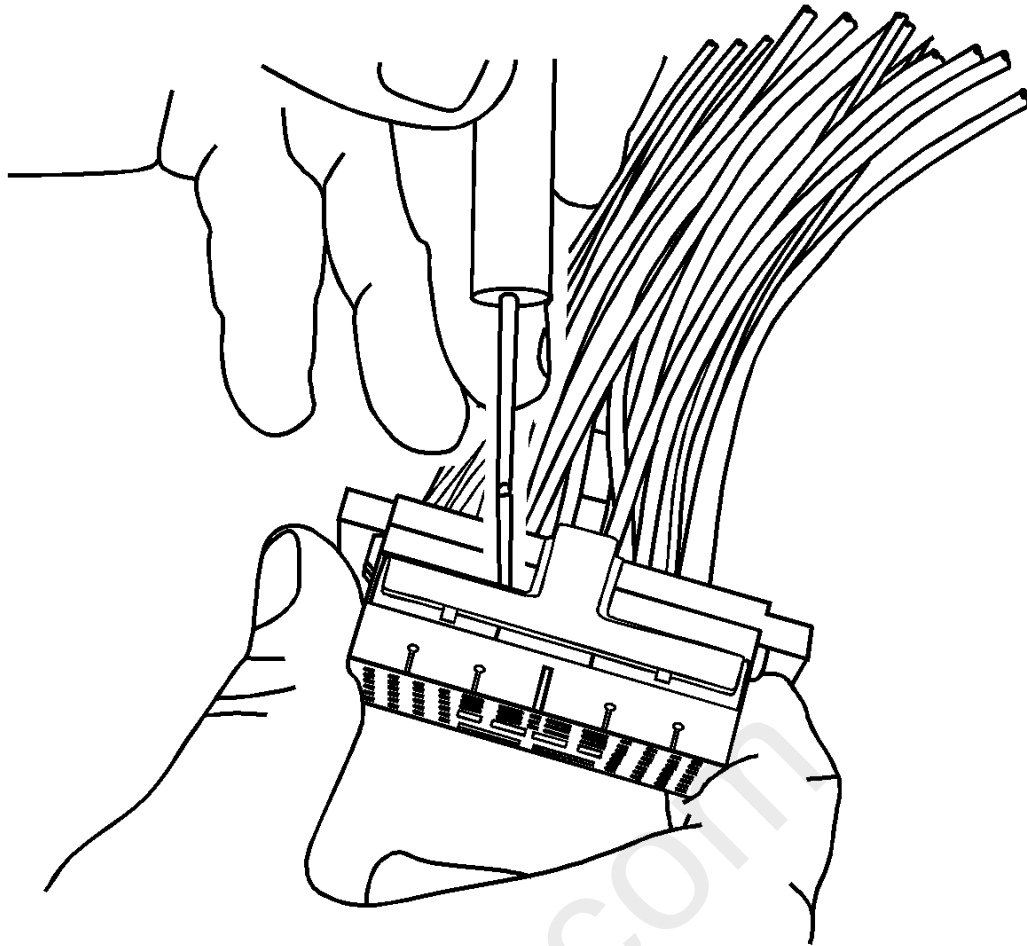
**Fig. 167: Sliding Male Connector Body Outward**  
Courtesy of GENERAL MOTORS COMPANY

2. With the locking lever in the 90 degree position and the male connector body separated, it can be slid outward for removal.



**Fig. 168: Sliding Male Connector Body Away From Guide Plates**  
Courtesy of GENERAL MOTORS COMPANY

3. Slide the male connector body out away from the guide plates.

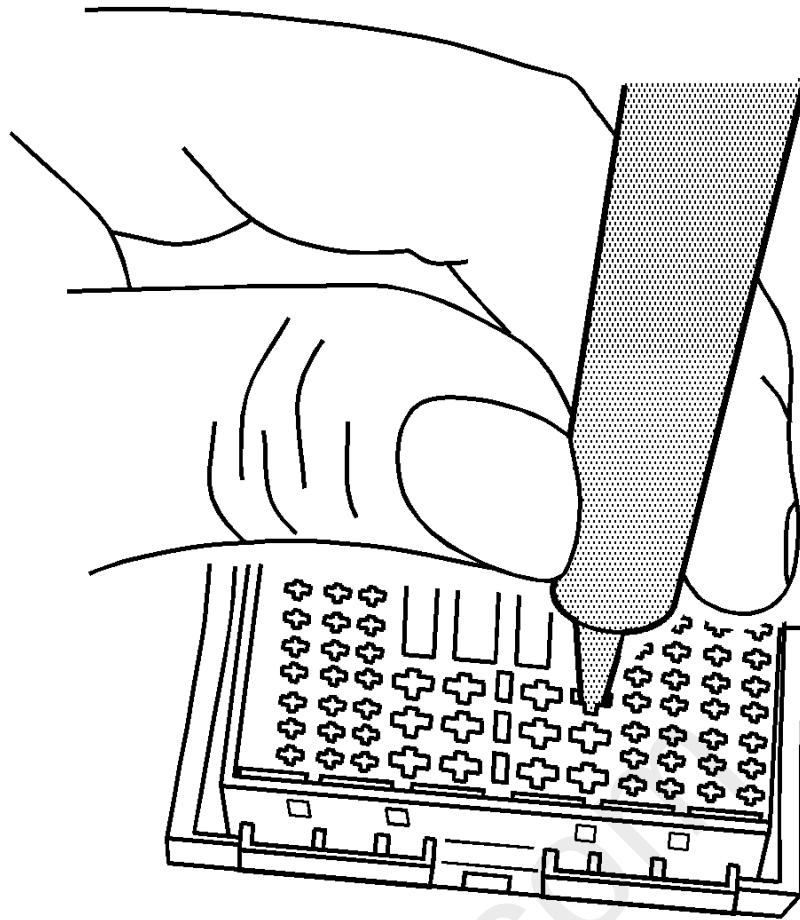


**Fig. 169: Removing TPA From Connector Body.**

Courtesy of GENERAL MOTORS COMPANY

**NOTE:** During assembly the terminal position assurance (TPA) will not fully seat if any terminal is not fully seated.

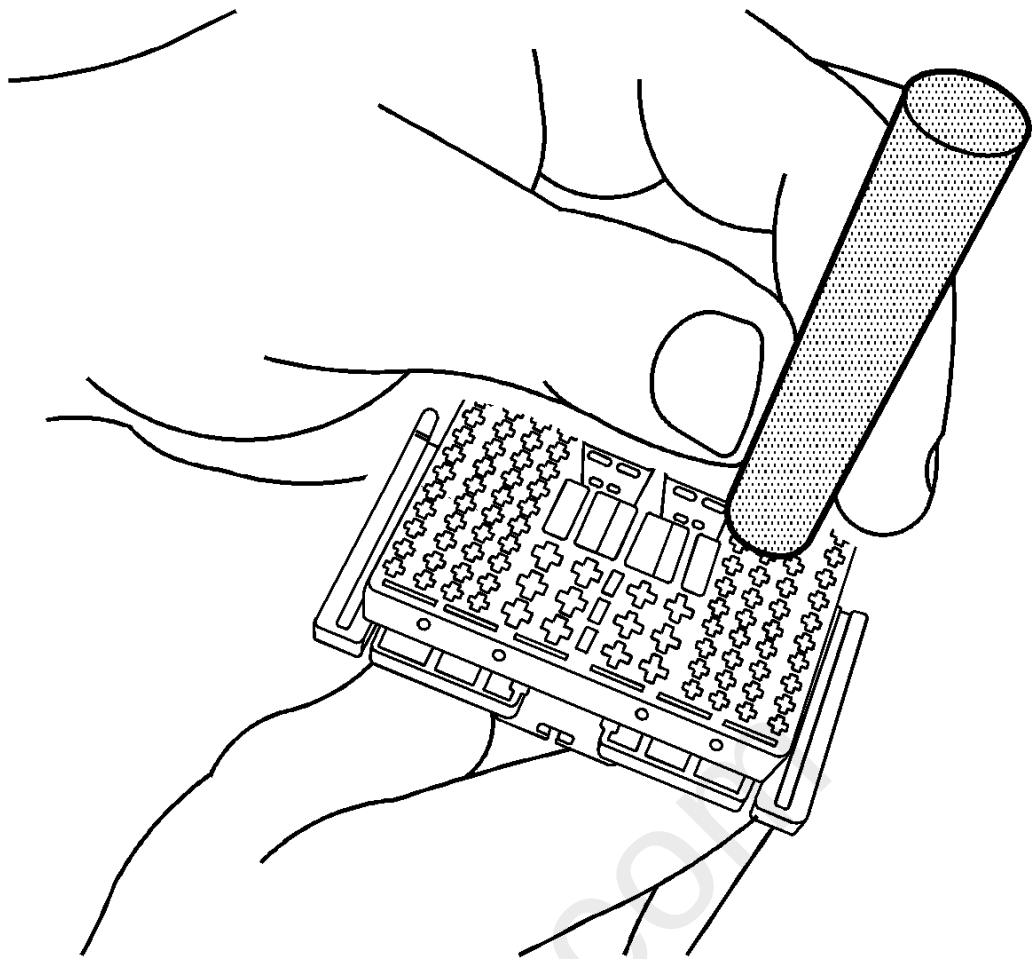
4. Using terminal release tool J-38125-11A or equivalent, remove the TPA from the connector body.



**Fig. 170: Using Terminal Release Tool To Release Lock Tabs**

**Courtesy of GENERAL MOTORS COMPANY**

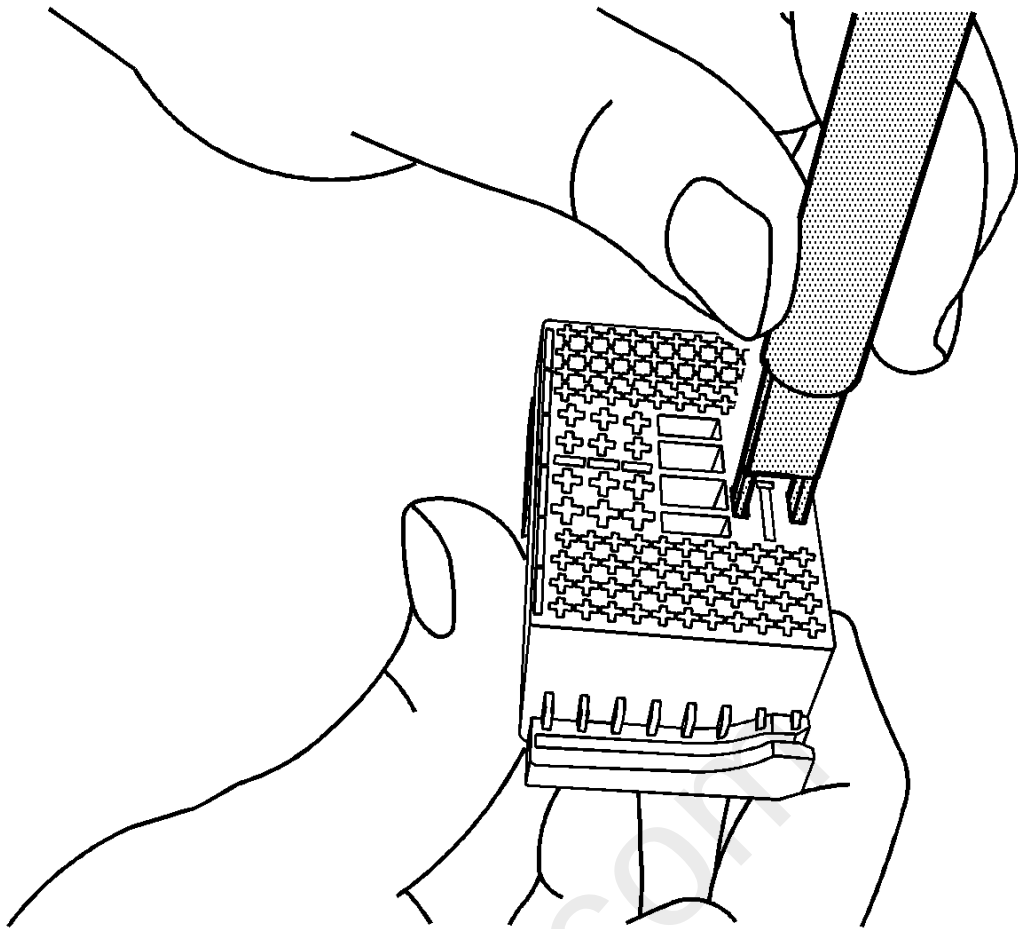
5. Using terminal release tool J-38125-566, press the prongs into the holes on each side of the terminal to be removed to release the lock tabs and pull the terminal out of the connector body.



**Fig. 171: Using Terminal Release Tool To Release Lock Tabs**

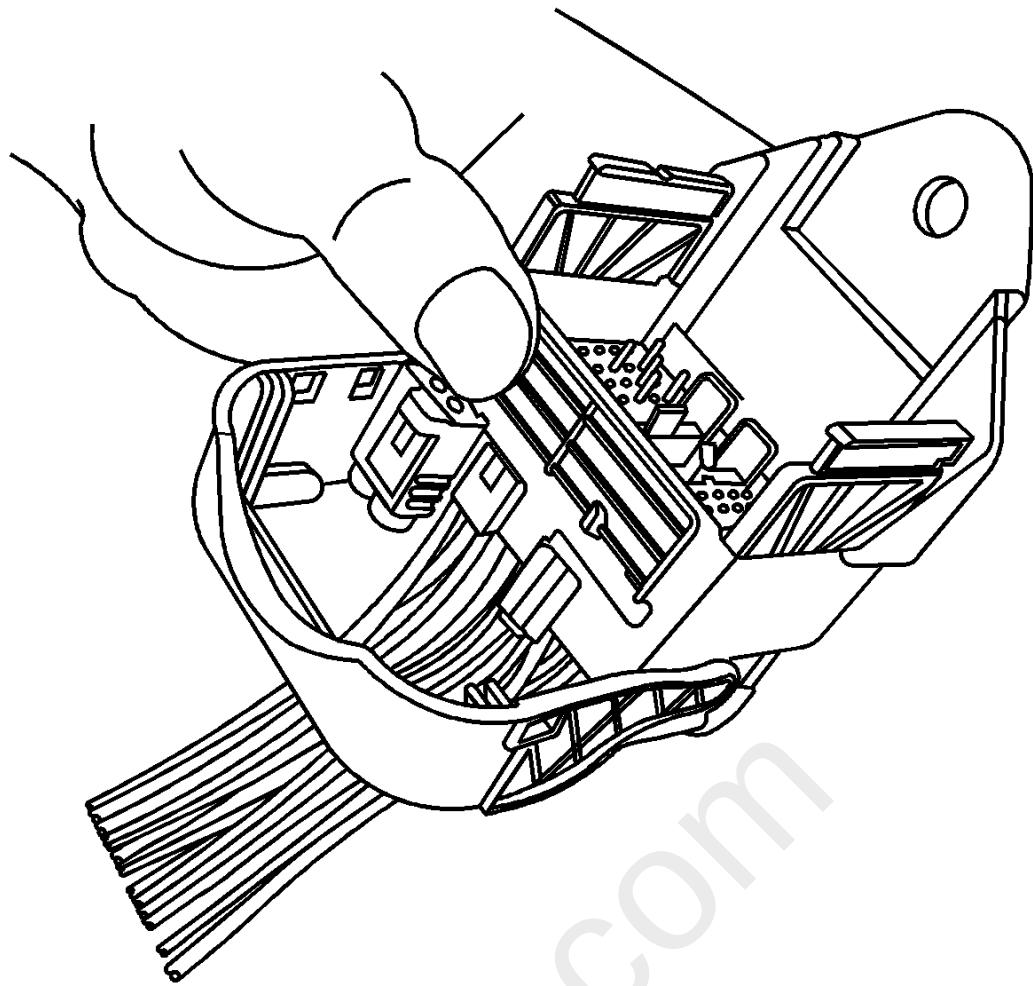
**Courtesy of GENERAL MOTORS COMPANY**

6. Using terminal release tool J-38125-560, press the prongs into the holes on each side of the terminal to be removed to release the lock tabs and pull the terminal out of the connector body.



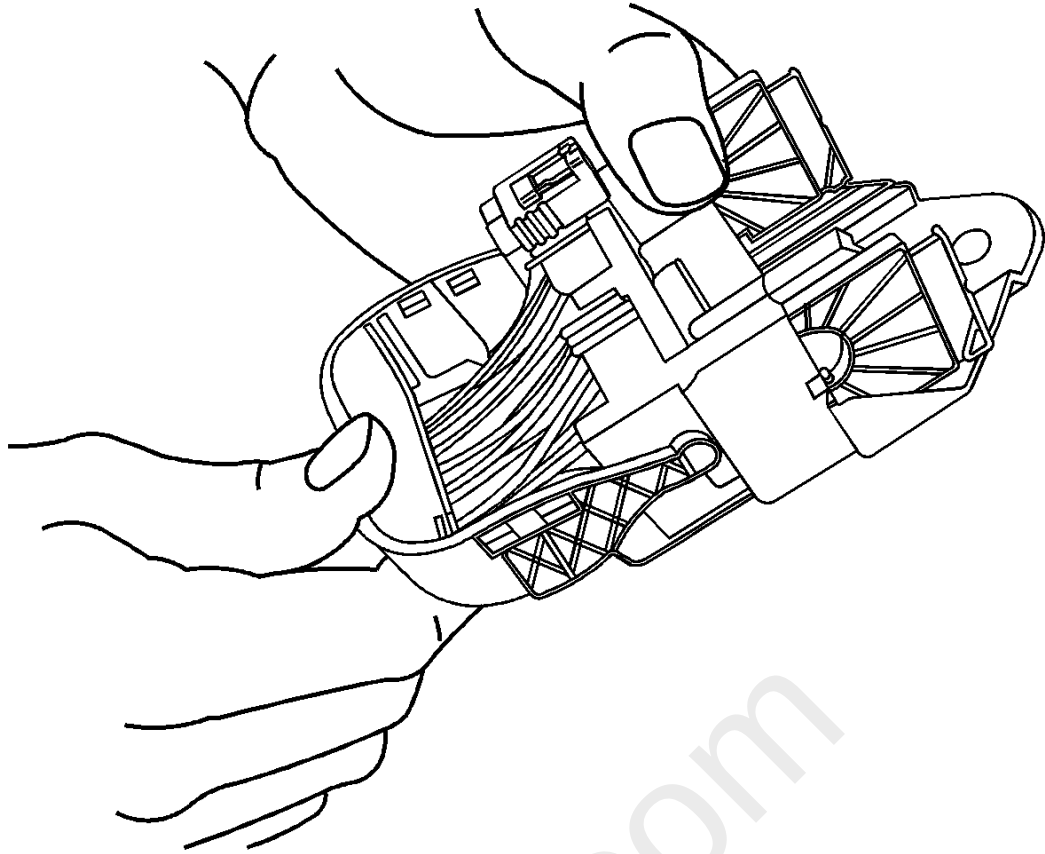
**Fig. 172: Using Terminal Release Tool To Release Lock Tabs**  
Courtesy of GENERAL MOTORS COMPANY

7. Using terminal release tool J-38125-221, press the prongs into the holes on each side of the terminal to be removed to release the lock tabs and pull the terminal out of the connector body.



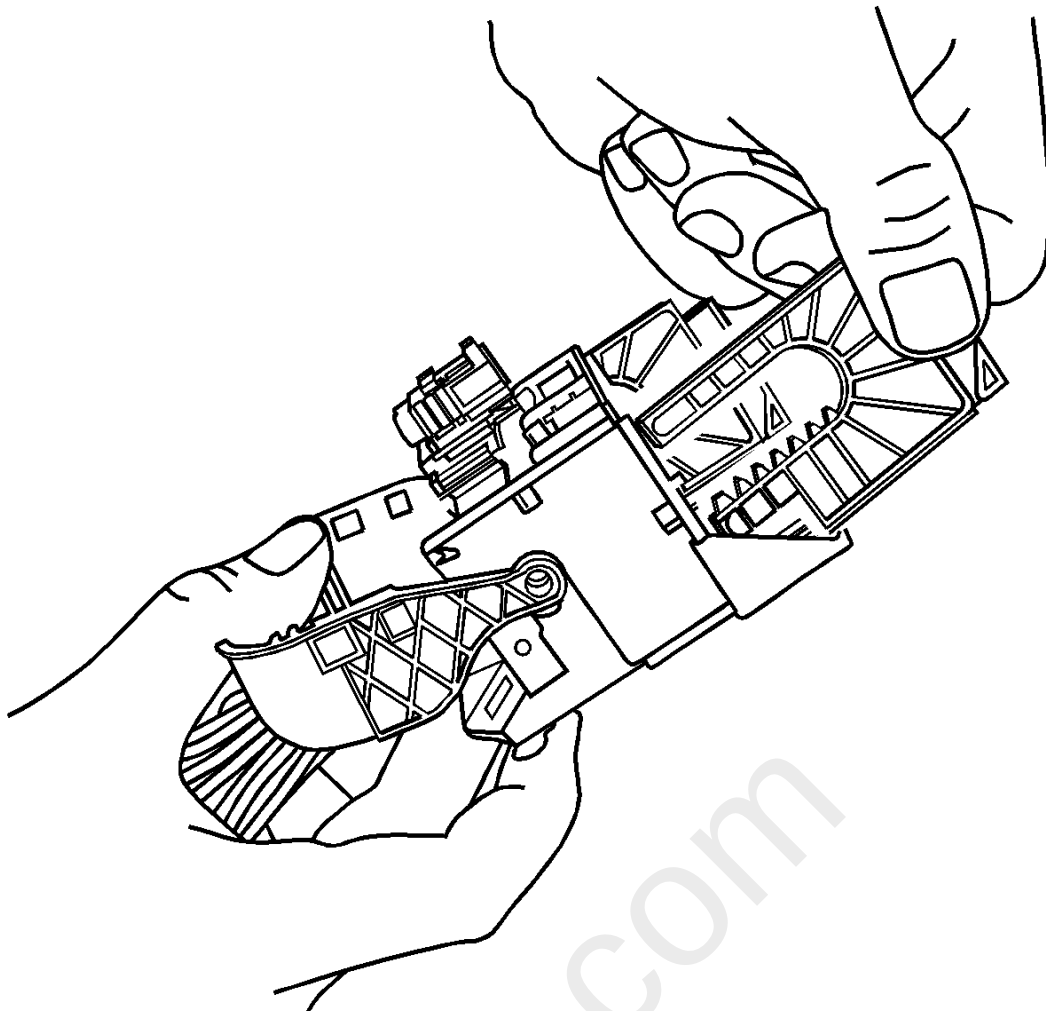
**Fig. 173: Sliding Connector Off Female Body.**  
Courtesy of GENERAL MOTORS COMPANY

8. The female connector body may have an additional connector hooked to the edge of the body. Use terminal release tool J-38125-11A or equivalent to release the locking tab and slide the connector off the female body.



**Fig. 174: Moving Locking Lever 180 Degrees From Connected Position**  
Courtesy of GENERAL MOTORS COMPANY

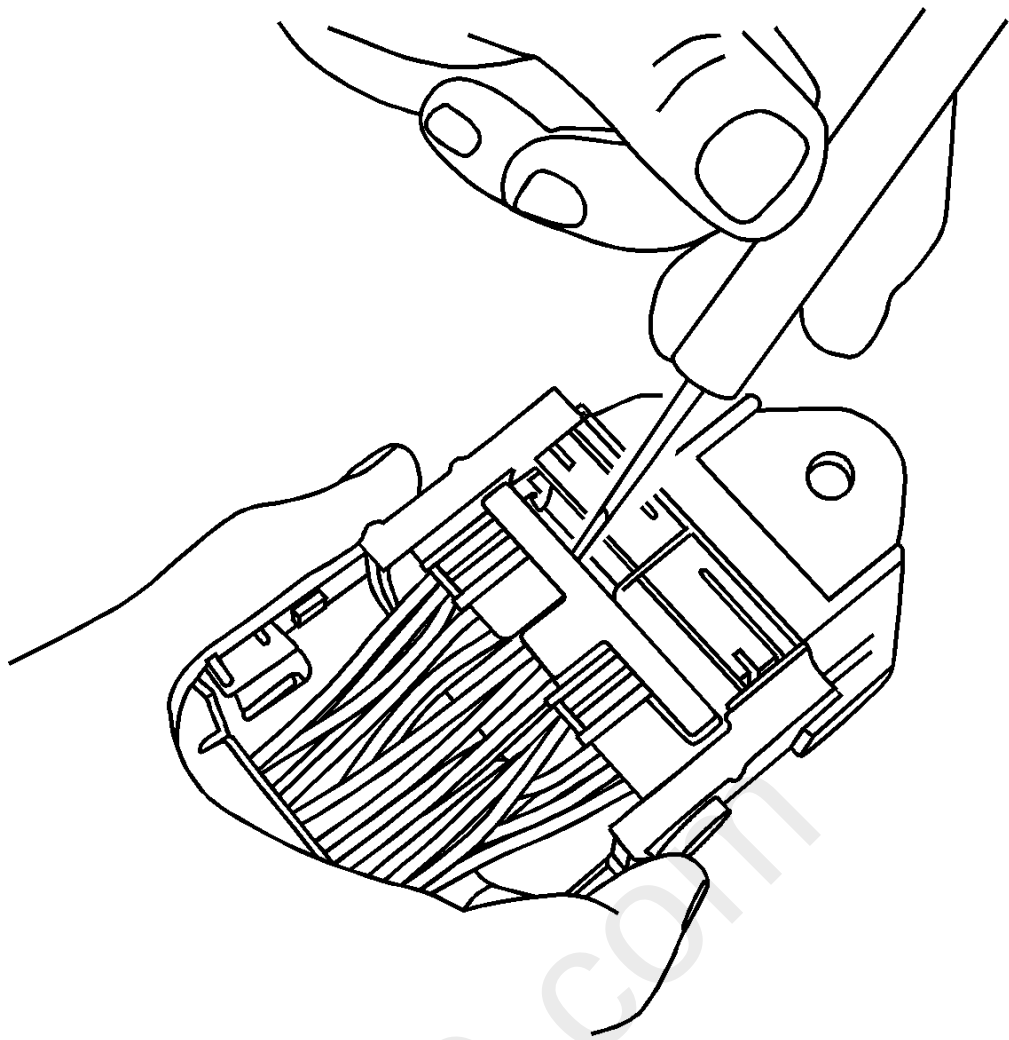
9. Move the locking lever 180 degrees from the connected position.



**Fig. 175: Removing Guide Plates From Connector Body.**

**Courtesy of GENERAL MOTORS COMPANY**

10. With the locking lever in the 180 degree position the guide plates can be removed from the connector body.

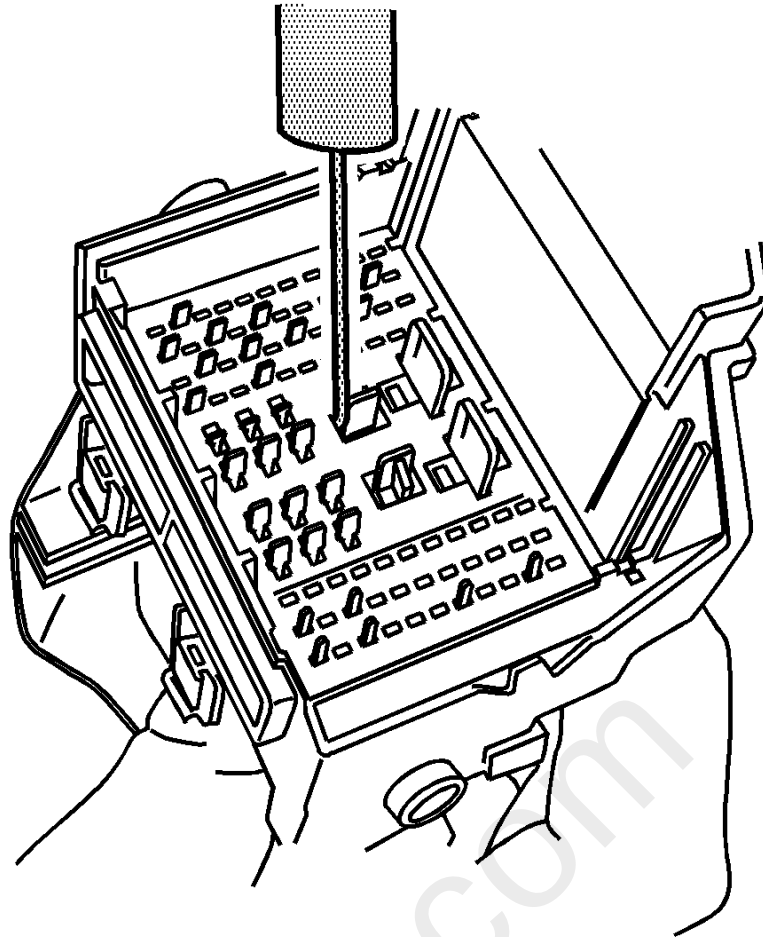


**Fig. 176: Removing TPA From Connector Body.**  
Courtesy of GENERAL MOTORS COMPANY

**NOTE:** During assembly the TPA will not fully seat if any terminal is not fully seated.

11. Using terminal release tool J-38125-11A or equivalent, remove the TPA from the connector body.

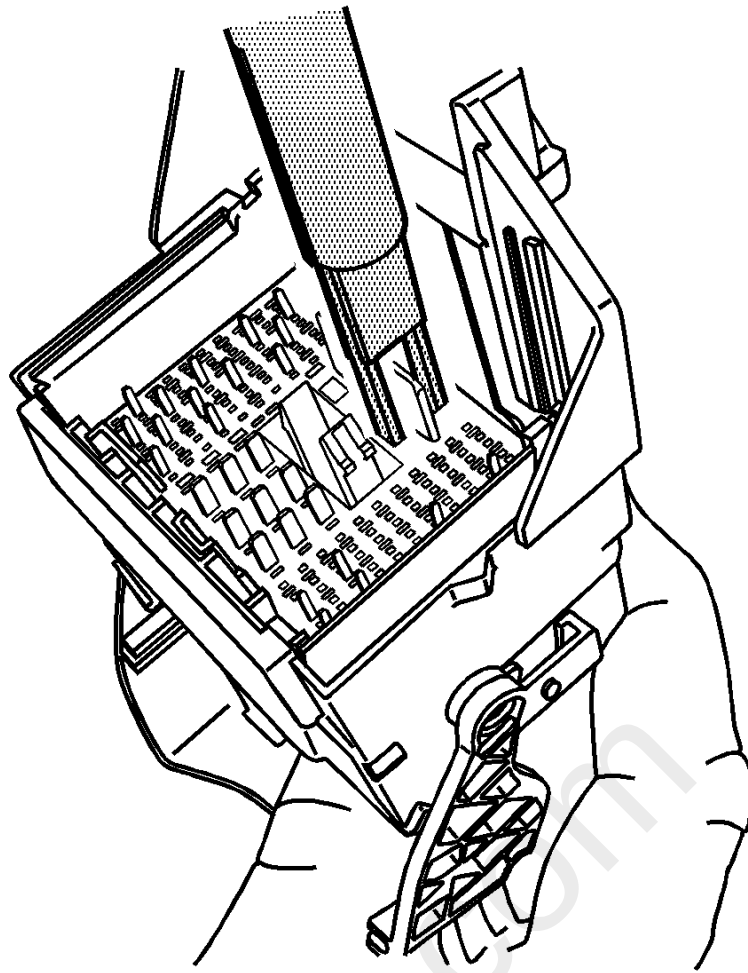




**Fig. 178: Terminal Plate**

Courtesy of GENERAL MOTORS COMPANY

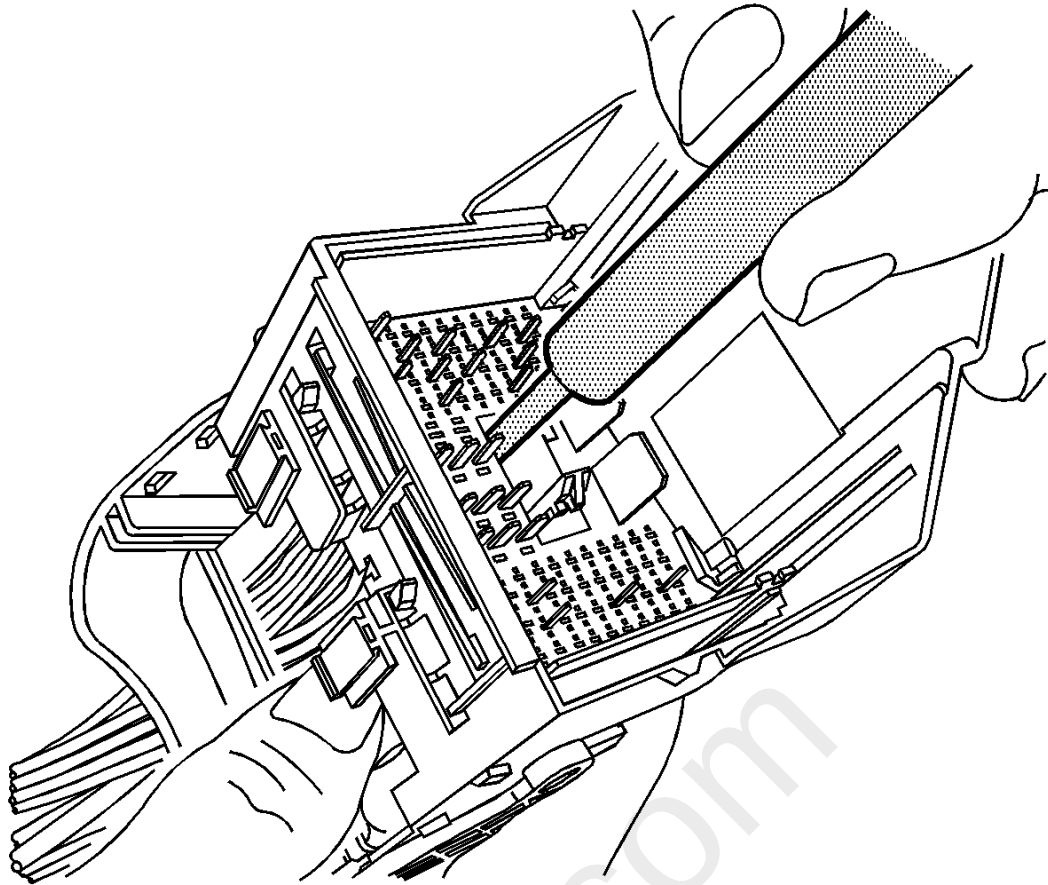
13. Terminal plate will bind slightly on each corner.



**Fig. 179: Using Terminal Release Tool To Release Lock Tabs**

**Courtesy of GENERAL MOTORS COMPANY**

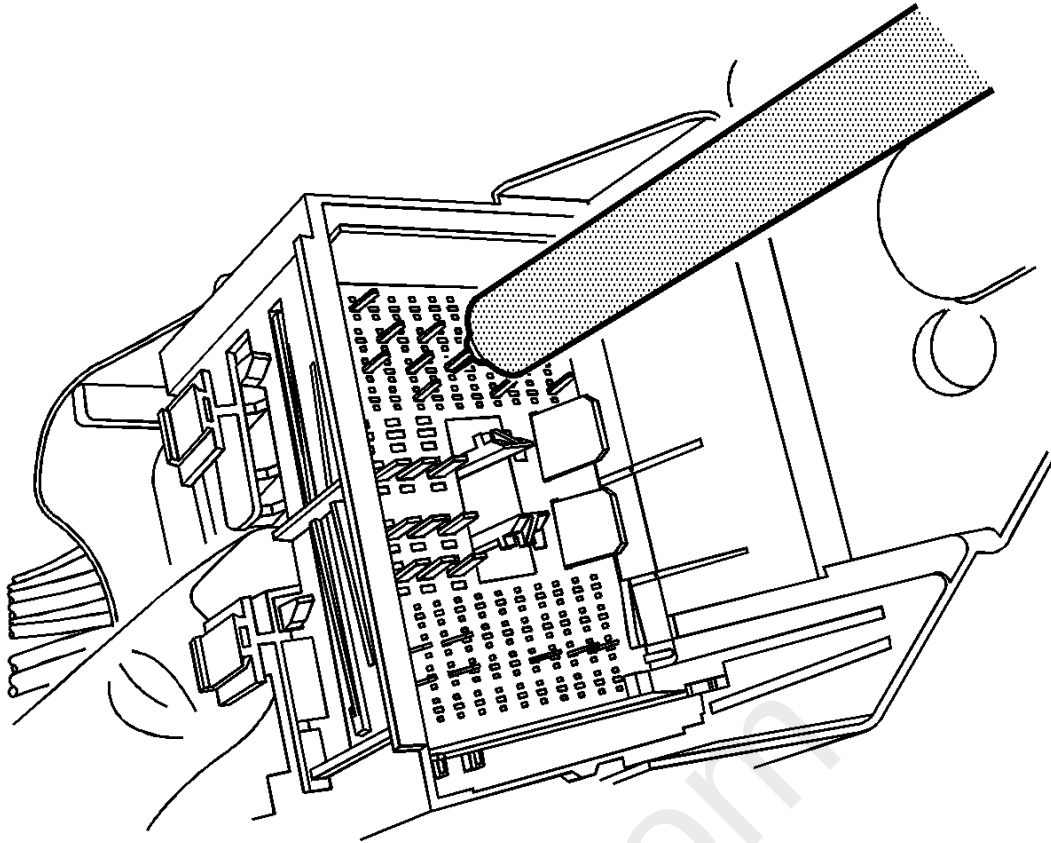
14. Using terminal release tool J-38125-221, press the prongs into the holes on each side of the terminal to be removed to release the lock tabs and pull the terminal out of the connector body.



**Fig. 180: Using Terminal Release Tool To Release Lock Tabs**

**Courtesy of GENERAL MOTORS COMPANY**

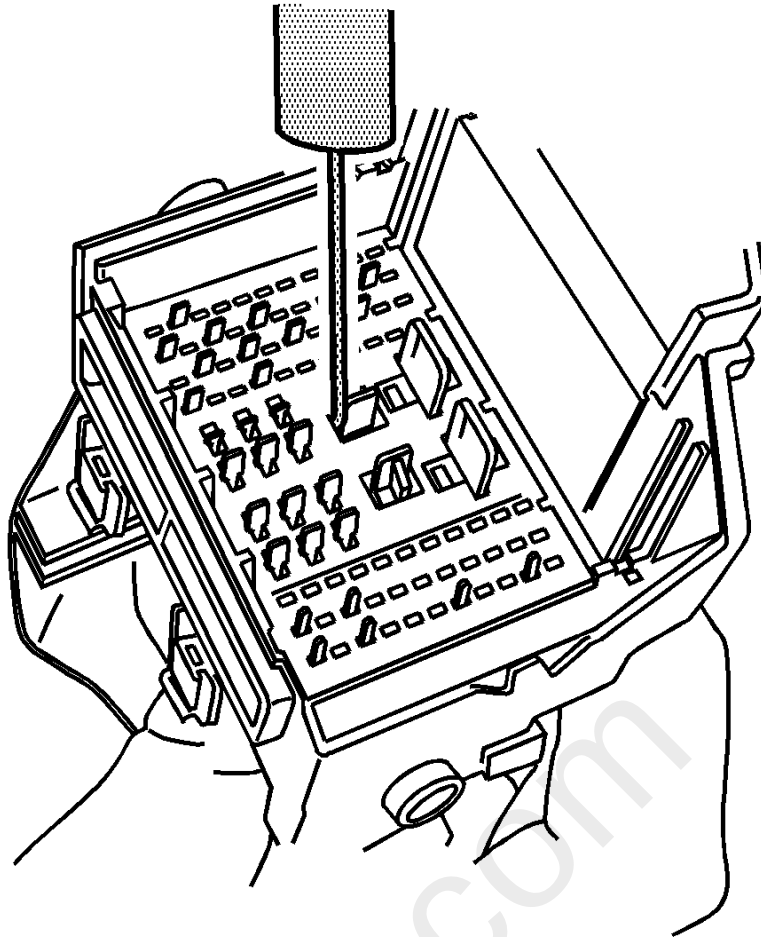
15. Using terminal release tool J-38125-212, press the prongs into the holes on each side of the terminal to be removed to release the lock tabs and pull the terminal out of the connector body.



**Fig. 181: Using Terminal Release Tool To Release Lock Tabs**

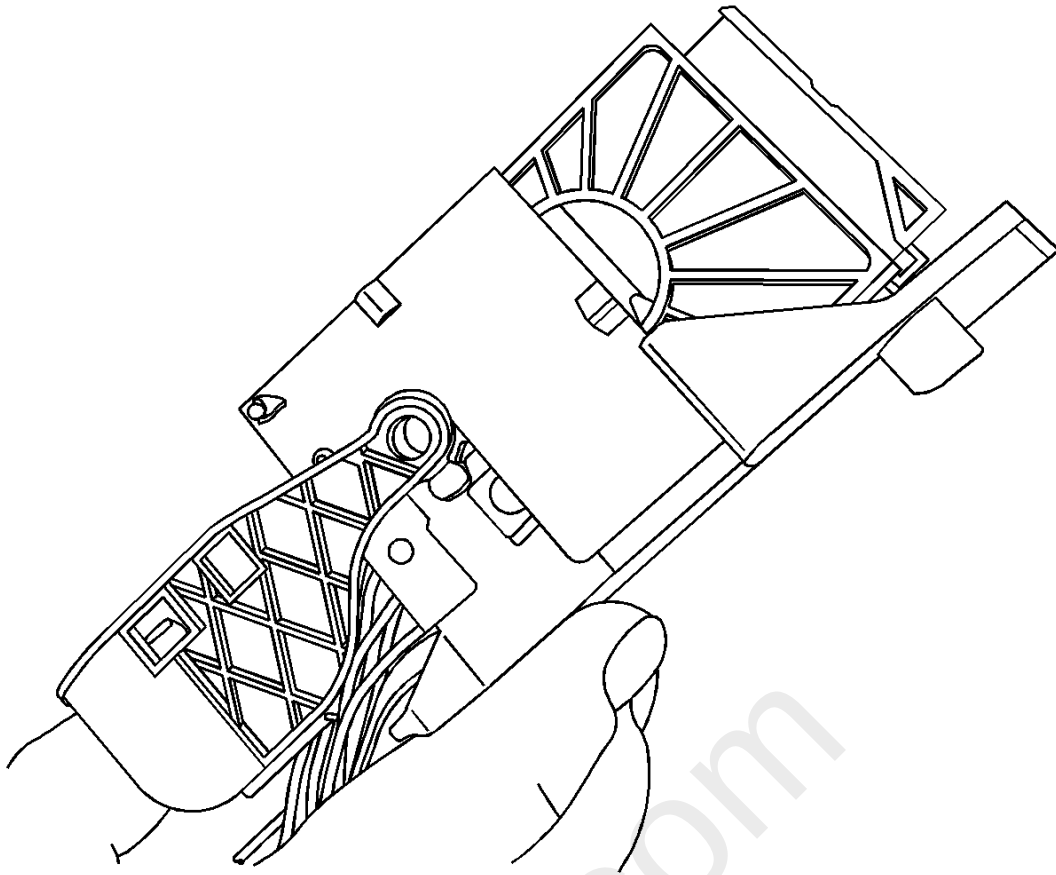
**Courtesy of GENERAL MOTORS COMPANY**

16. Using terminal release tool J-38125-560, press the prongs into the holes on each side of the terminal to be removed to release the lock tabs and pull the terminal out of the connector body.



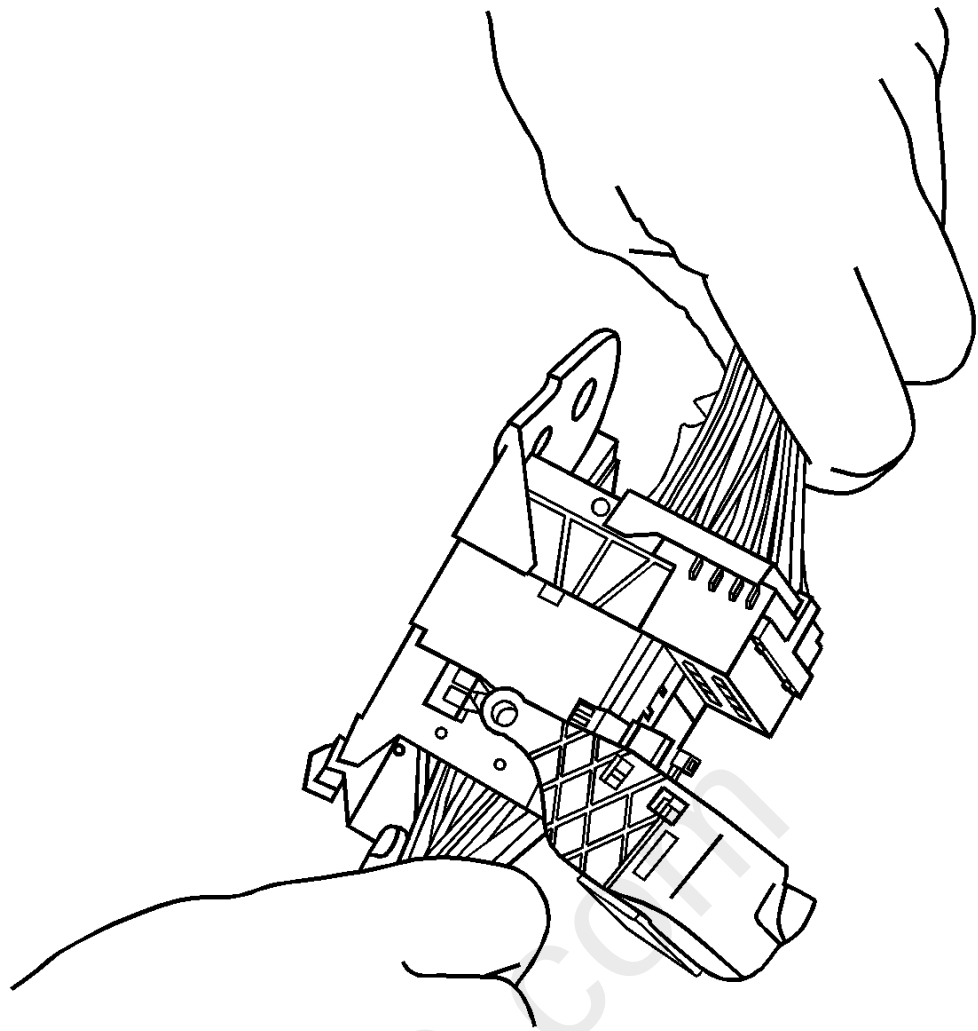
**Fig. 182: Pressing Terminal Plate Into Female Connector To Preset Position**  
Courtesy of GENERAL MOTORS COMPANY

17. Press the terminal plate back into the female connector to the preset position. The plate will bind slightly on each corner.



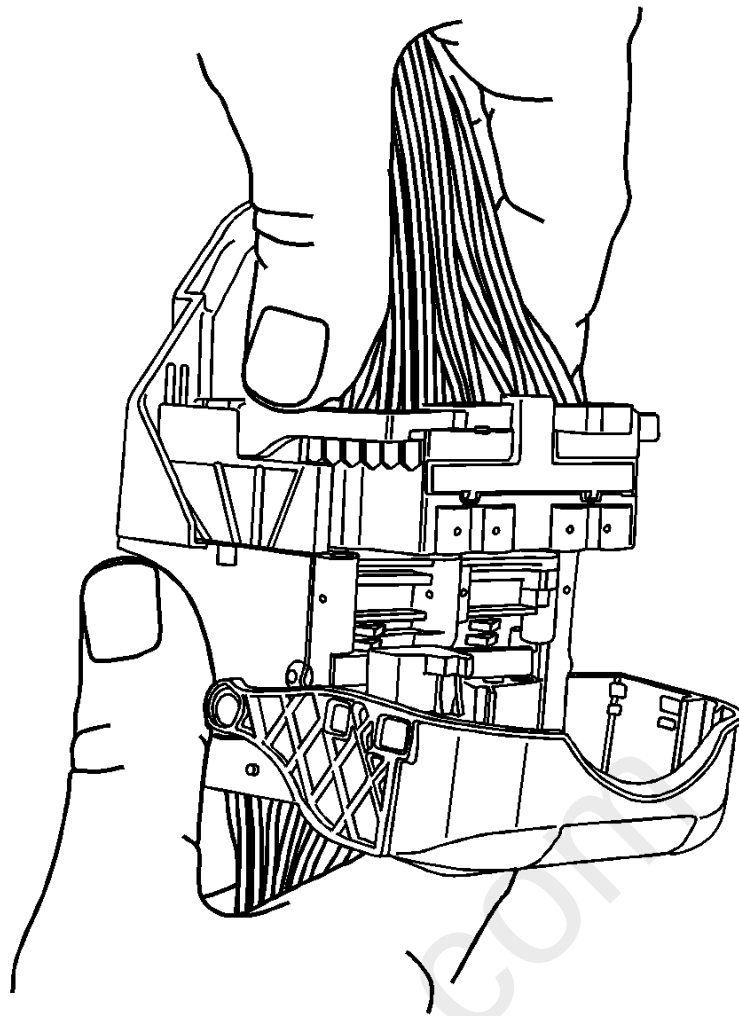
**Fig. 183: Aligning Guide Plates To Mesh With Locking Lever Gears**  
Courtesy of GENERAL MOTORS COMPANY

18. With the locking lever in the 180 degree position, align the guide plates to mesh with the gears on the locking lever.



**Fig. 184: Slide Male Connector Body Back Inward Toward Guide Plates**  
Courtesy of GENERAL MOTORS COMPANY

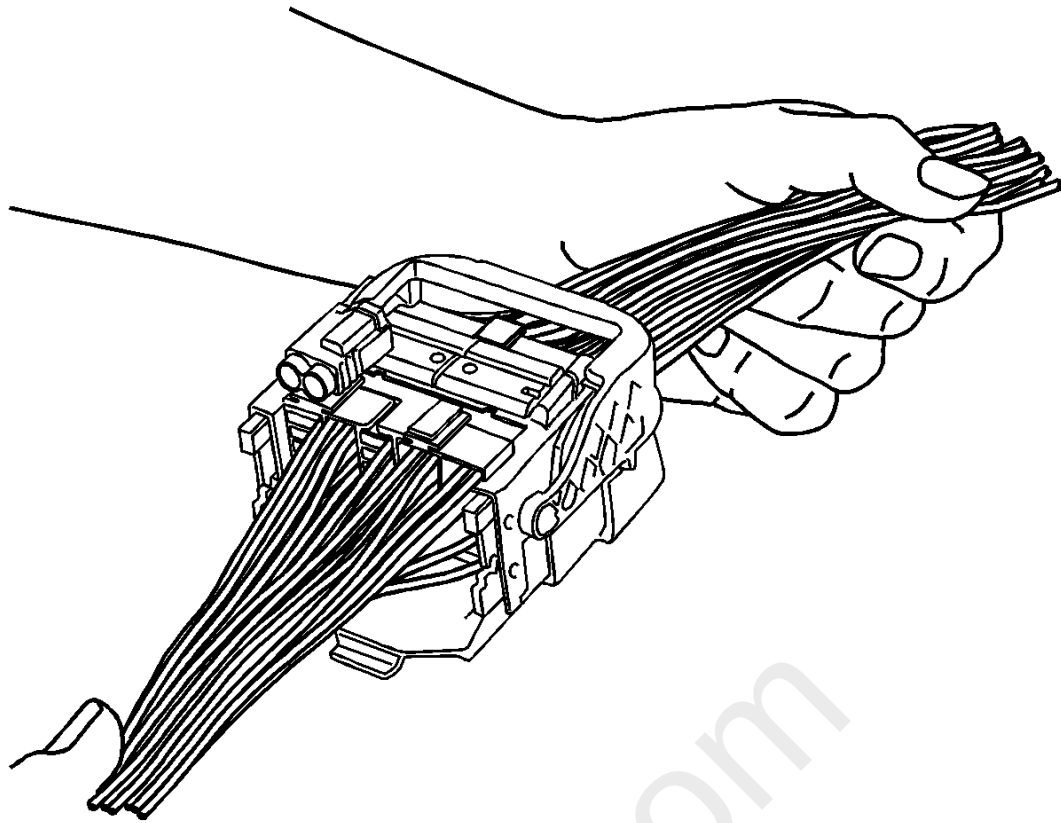
19. Slide the male connector body back inward toward the guide plates.



**Fig.185: Sliding Male Connector Body Inward**

**Courtesy of GENERAL MOTORS COMPANY**

20. With the locking lever in the 90 degree position and the male connector body connected, it can be slid inward for assembly.



**Fig. 186: Typical Connector In Assembled Position**

Courtesy of GENERAL MOTORS COMPANY

21. Move the lever into the locked position or in the assembled position. This will pull the male connector down into the female connector.
22. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#) [Repairing Connector Terminals \(Terminal Repair\)](#) procedure.
23. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

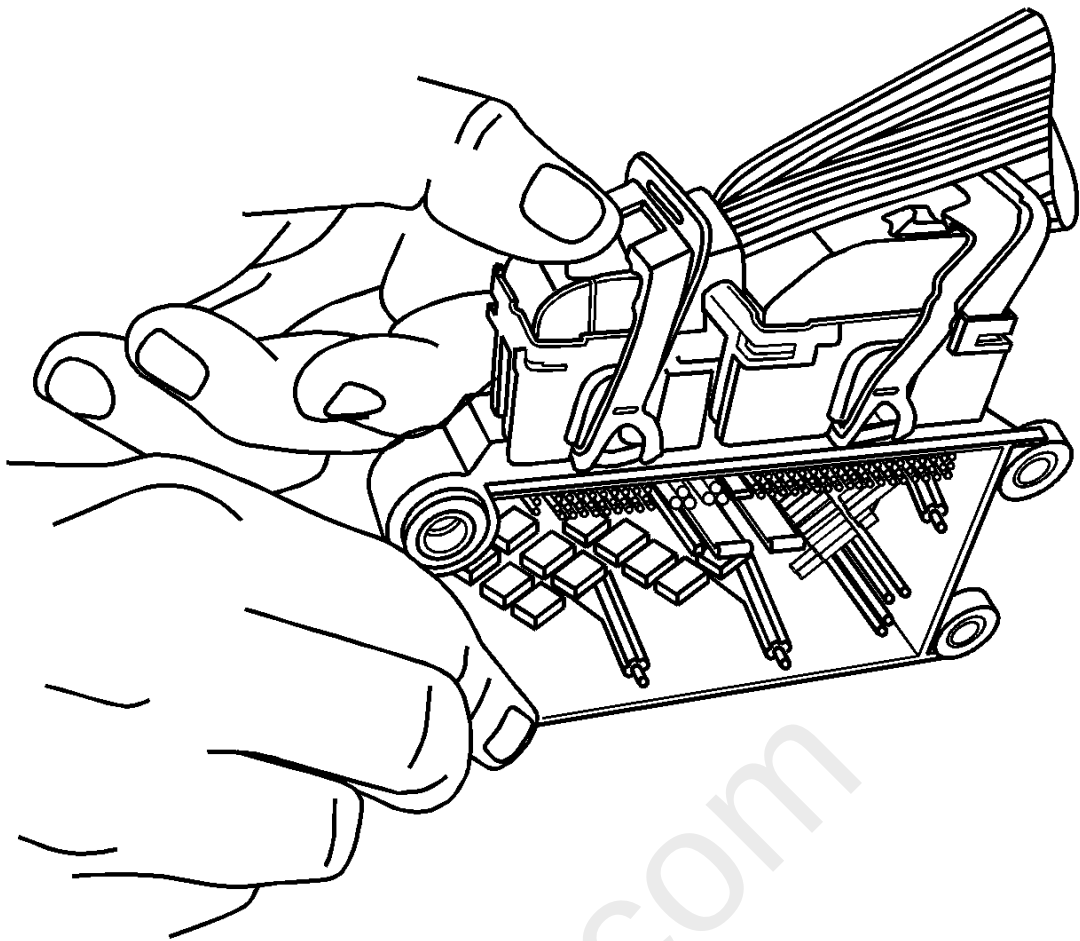
## **TYCO/AMP CONNECTORS (SIR)**

### **Special Tools**

- EL-38125-550 Terminal Release Tool Kit
- EL-38125-580 Terminal Release Tool Kit
- J-38125-11A Terminal Release Tool
- J-38125-215A Terminal Release Tool

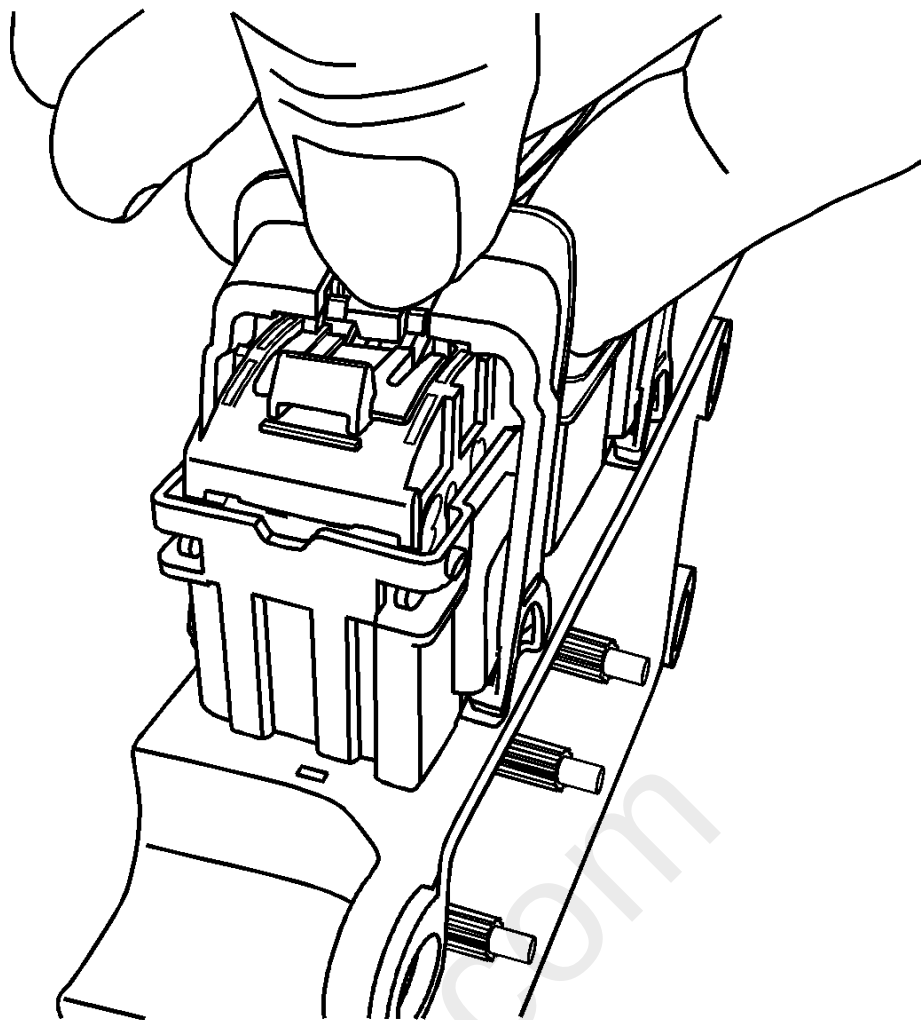
For equivalent regional tools, refer to [Special Tools](#) .

### **Removal Procedure**



**Fig. 187: Sliding Red CPA Away From Connector Lever**  
Courtesy of GENERAL MOTORS COMPANY

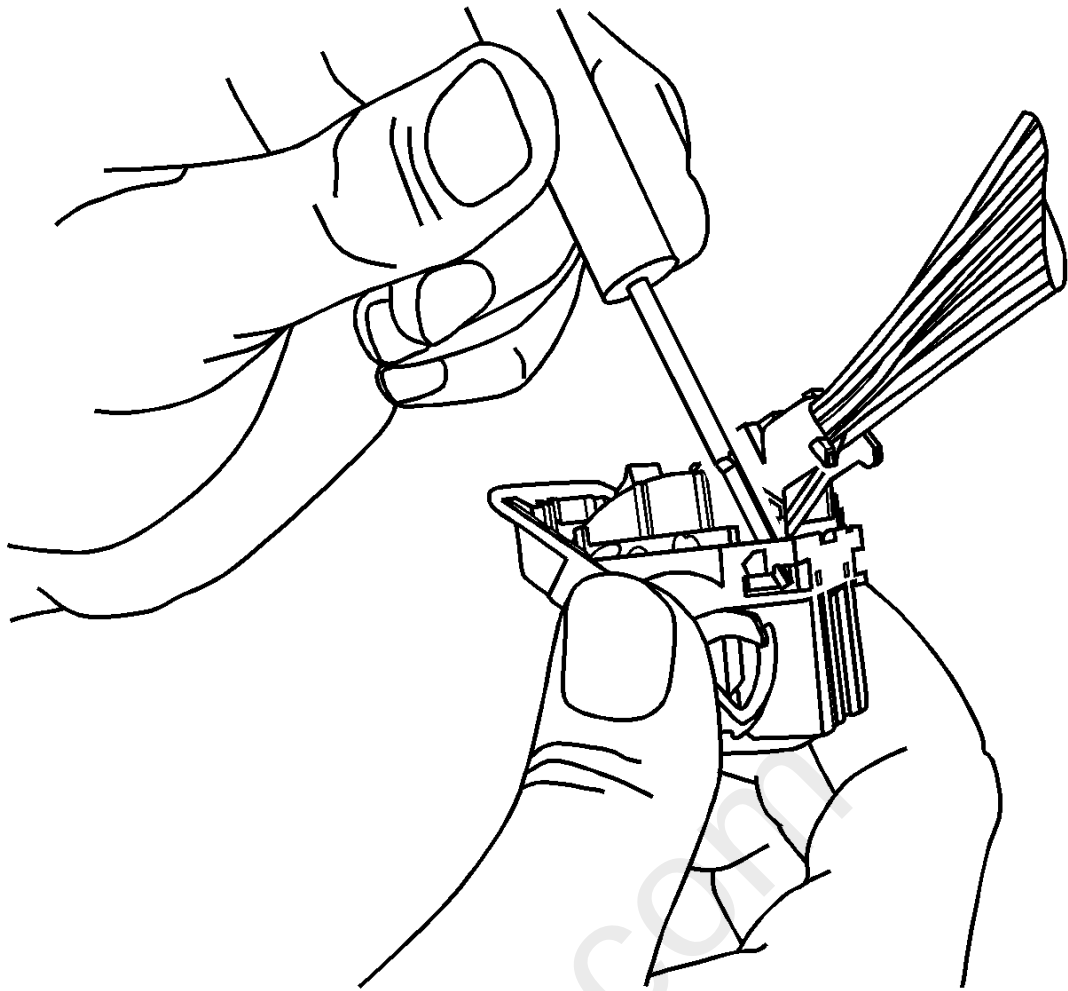
1. Using your thumbs press down and slide the red CPA away from the connector lever.



**Fig. 188: Moving Lever To Released Position**

**Courtesy of GENERAL MOTORS COMPANY**

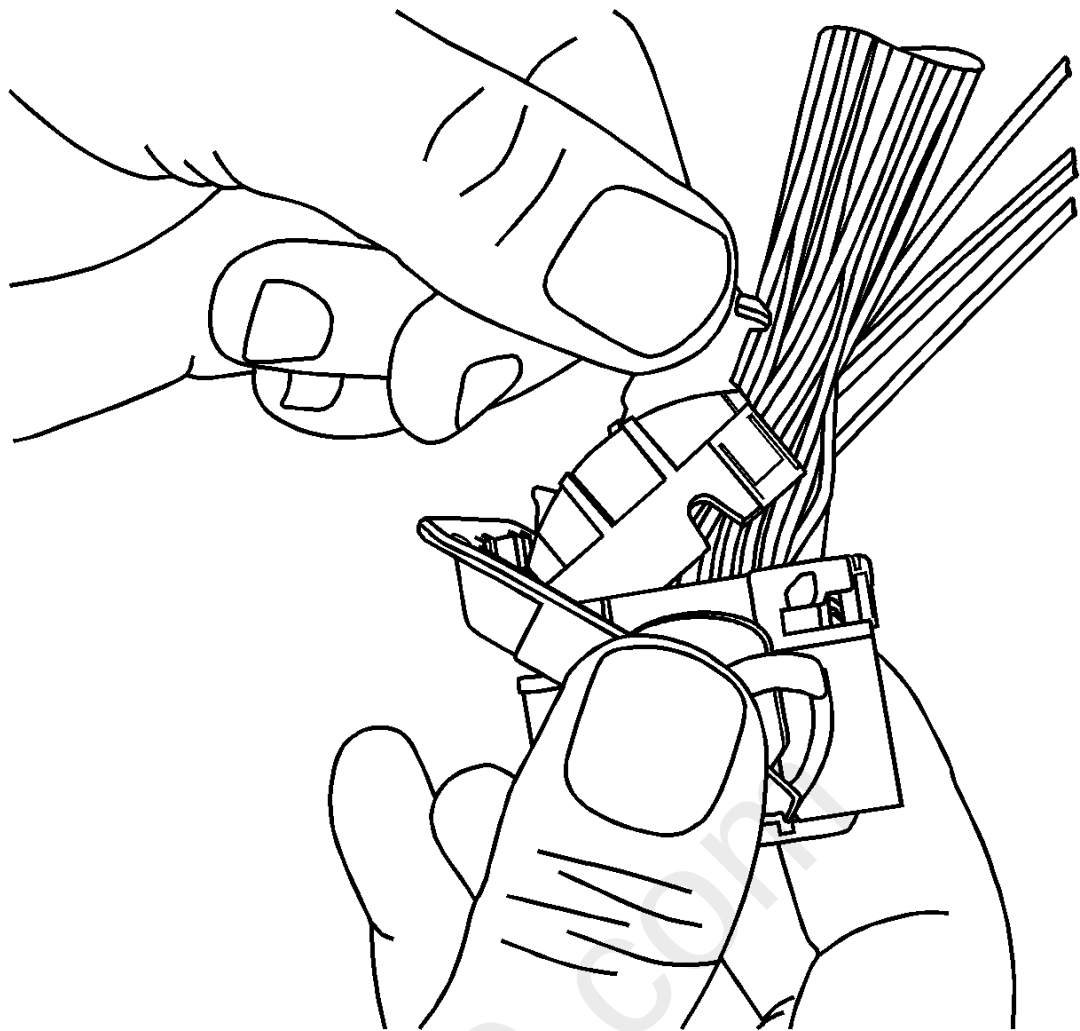
2. Using your thumb press down on the locking tab and move the lever to the released position.



**Fig. 189: Releasing Wire Dress Cover Locking Tabs**

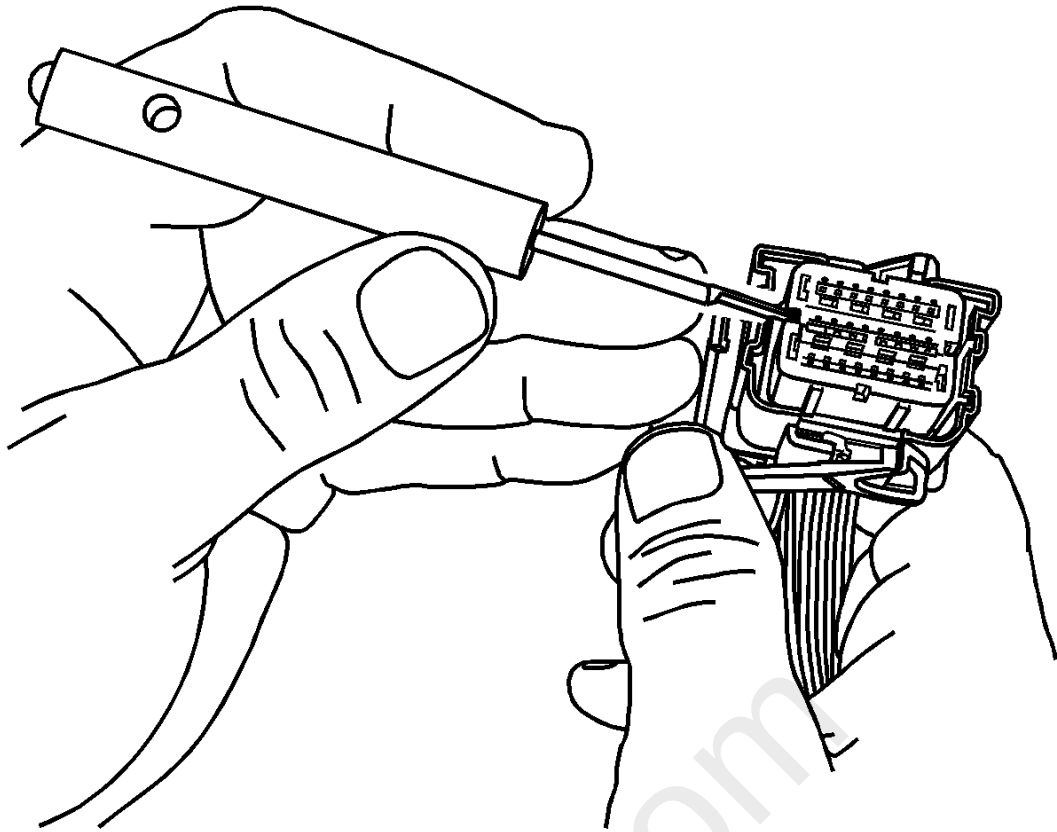
**Courtesy of GENERAL MOTORS COMPANY**

3. Using terminal tool J-38125-11A or equivalent, release the wire dress cover locking tabs.



**Fig. 190: Pivoting Connector Wire Dress Cover**  
Courtesy of GENERAL MOTORS COMPANY

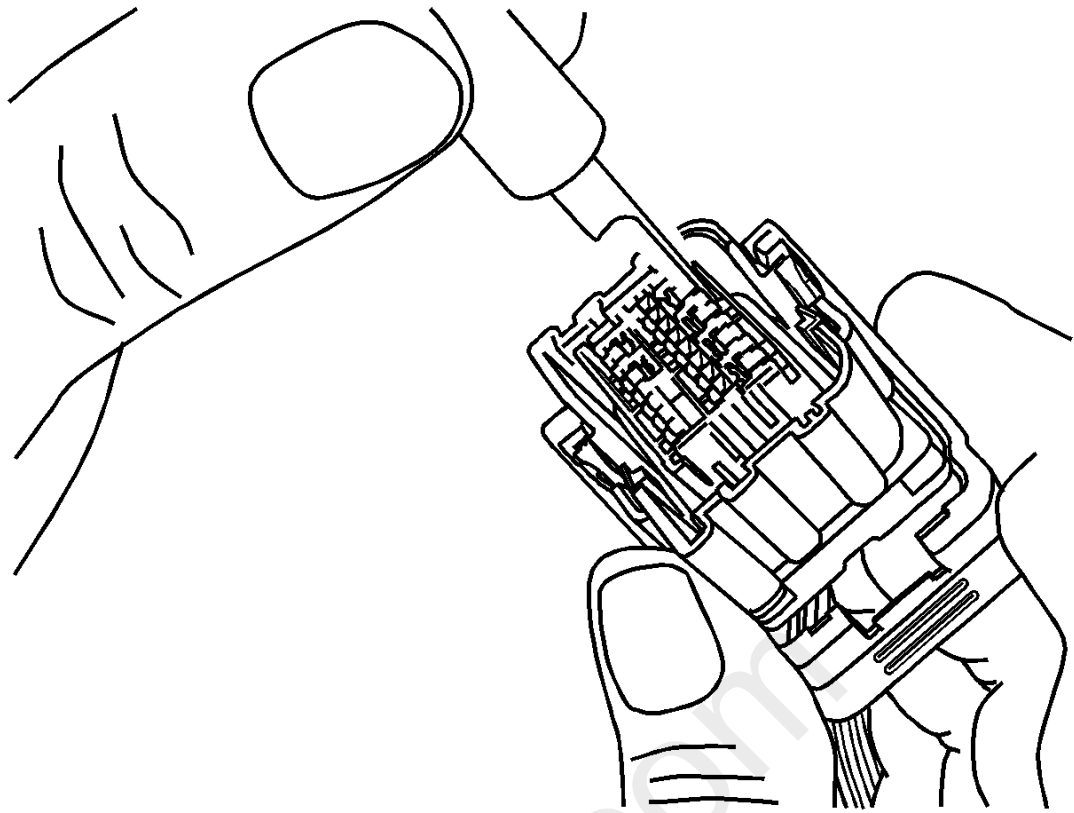
4. Pivot connector wire dress cover while removing from the connector body.



**Fig. 191: Removing TPA**

**Courtesy of GENERAL MOTORS COMPANY**

5. Using terminal tool J-38125-11A or equivalent, remove the TPA by lifting straight off the connector body.



**Fig. 192: Removing Rear Of Connector Body.**  
Courtesy of GENERAL MOTORS COMPANY

6. Using terminal release tool J-38125-215A, place the tip of the tool on the outside edge next to the terminal and depress the lock tab and remove the rear of the connector body.

#### **Terminal Repair Procedure**

Use the appropriate terminal and crimper in order to replace the terminal.

#### **YAZAKI CONNECTORS (2-WAY)**

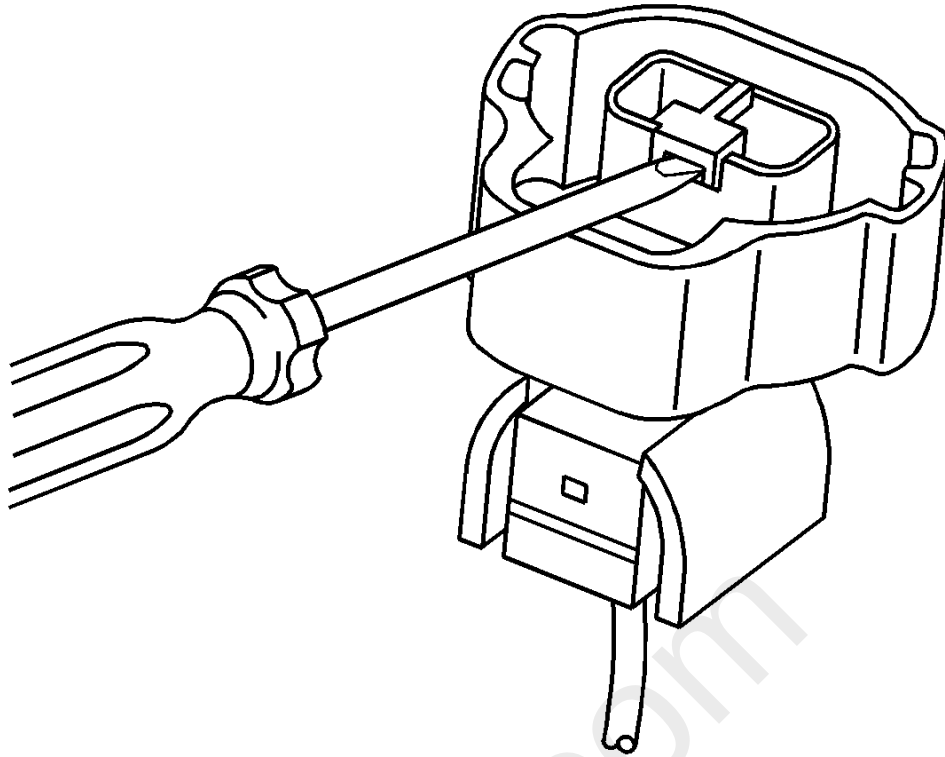
##### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-553** Terminal Release Tool

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

##### **Terminal Removal Procedure**

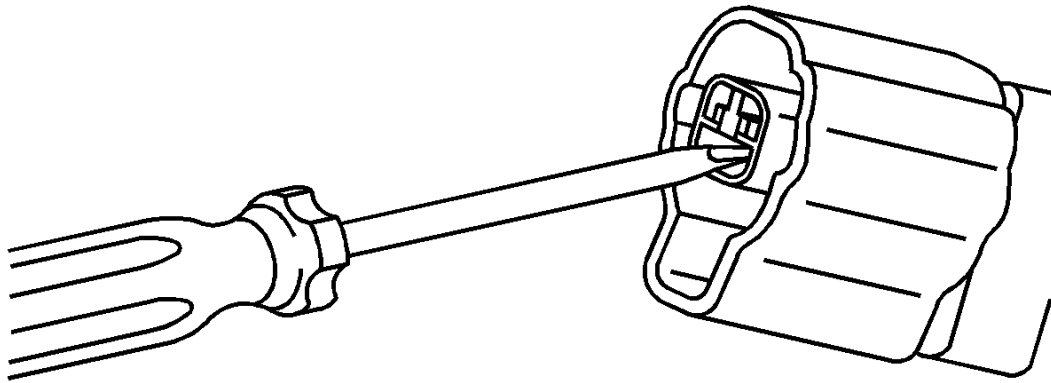
1. Disconnect the connector from the component.



**Fig. 193: Removing Terminal Position Assurance (Yazaki)**

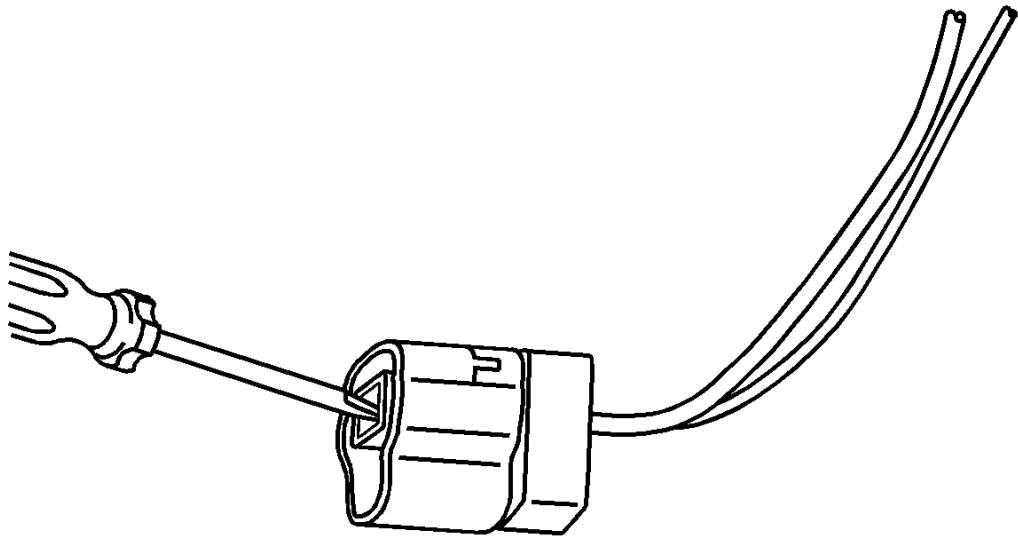
**Courtesy of GENERAL MOTORS COMPANY**

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.



**Fig. 194: Inserting Tool Into Terminal Cavity.**  
Courtesy of GENERAL MOTORS COMPANY

5. Insert the J-38125-553 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.



**Fig. 195: Pulling Terminal Out Of Connector**  
Courtesy of GENERAL MOTORS COMPANY

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.
7. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#)[Repairing Connector Terminals \(Terminal Repair\)](#) procedure.
8. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

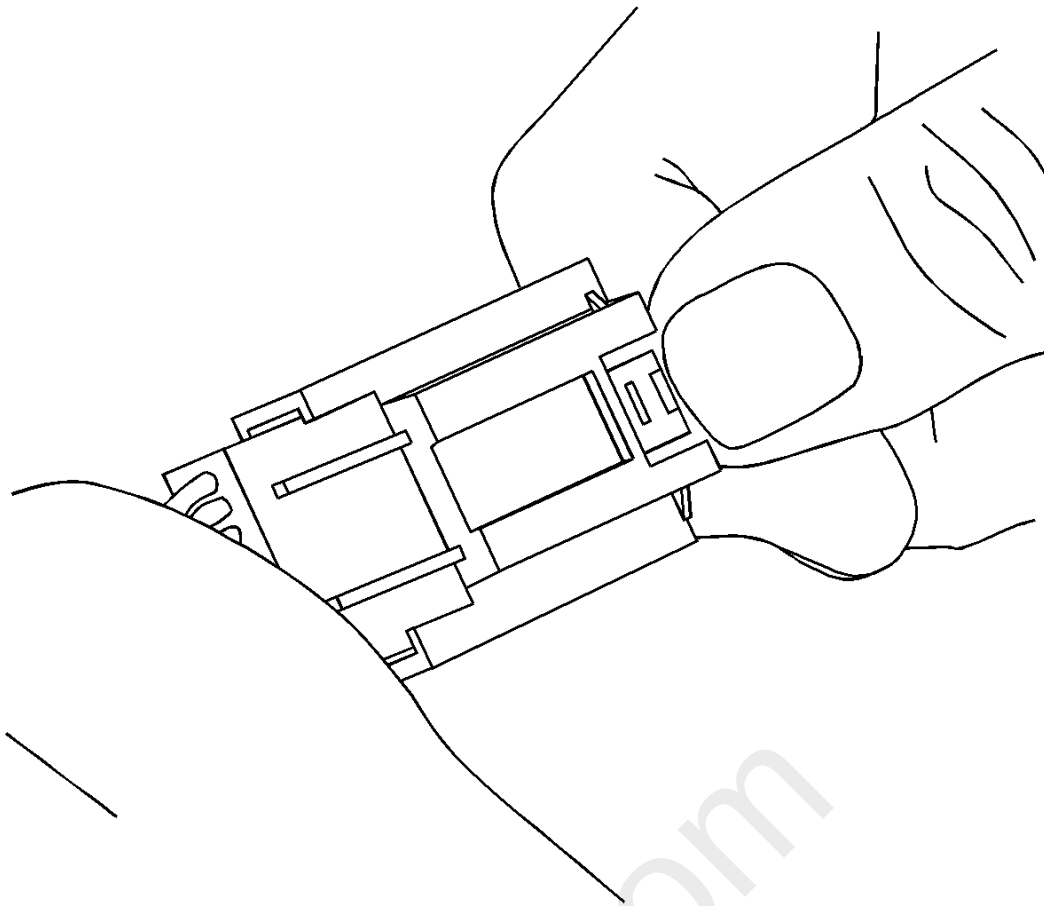
## **YAZAKI CONNECTORS (16-WAY)**

### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **J-38125-215** Terminal Release Tool

For equivalent regional tools, refer to [Special Tools](#) .

### **Terminal Removal Procedure**

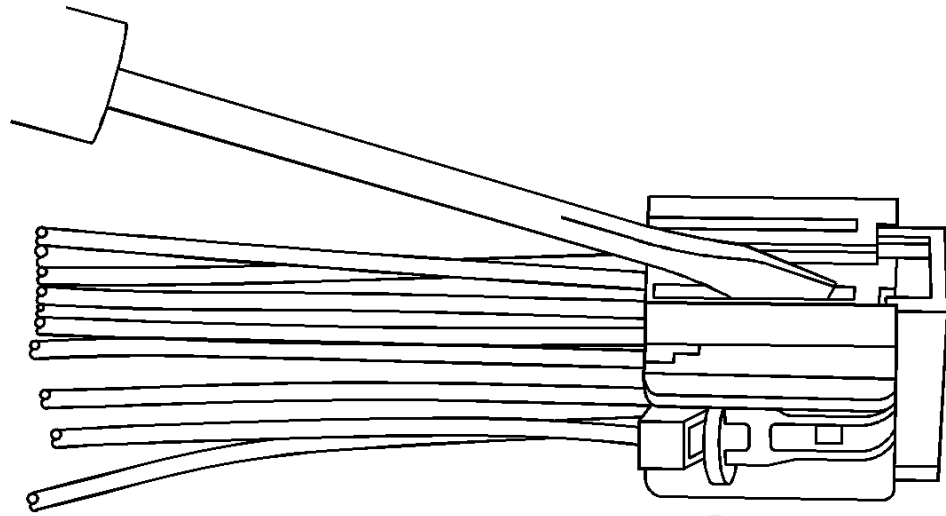


**Fig. 196: Pulling Connector Halves Apart**  
Courtesy of GENERAL MOTORS COMPANY

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

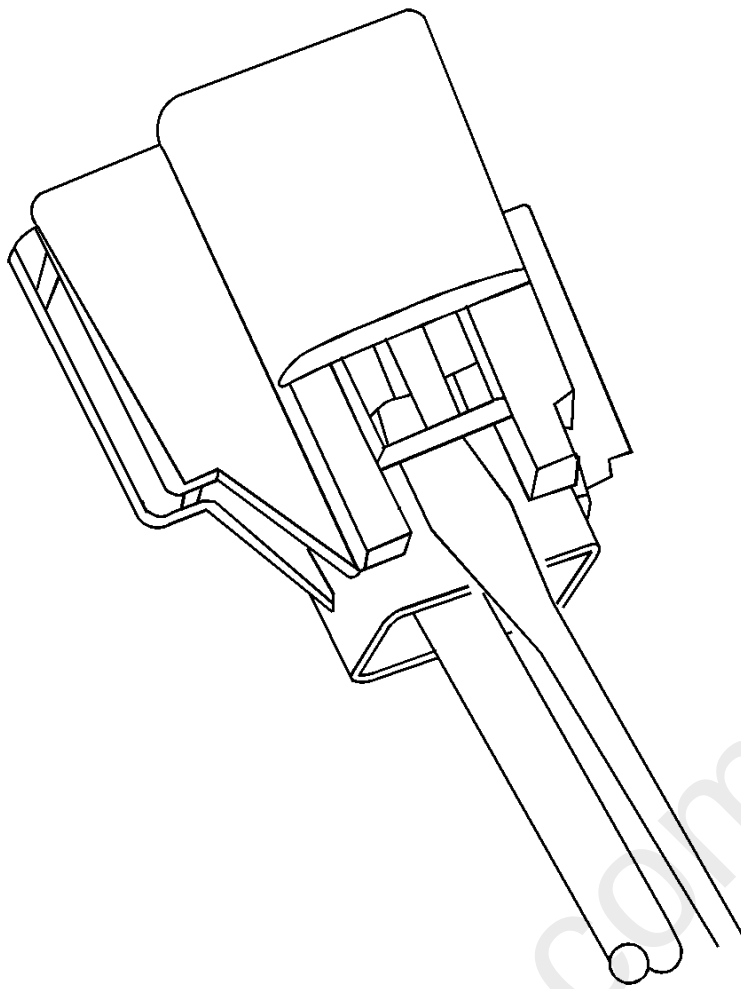
**NOTE:** The terminal position assurance (TPA) is fragile and may break if not done carefully.

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



**Fig. 197: Male Half Of Connector With Female Terminals**  
Courtesy of GENERAL MOTORS COMPANY

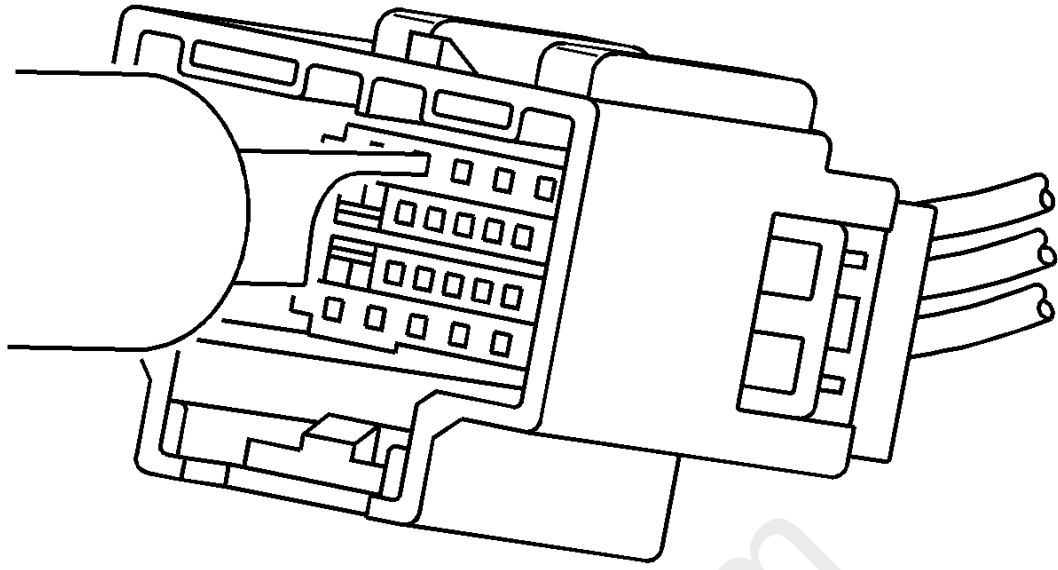
3. View of the male half of the connector with female terminals.



**Fig. 198: Female Half Of Connector With Male Terminals**

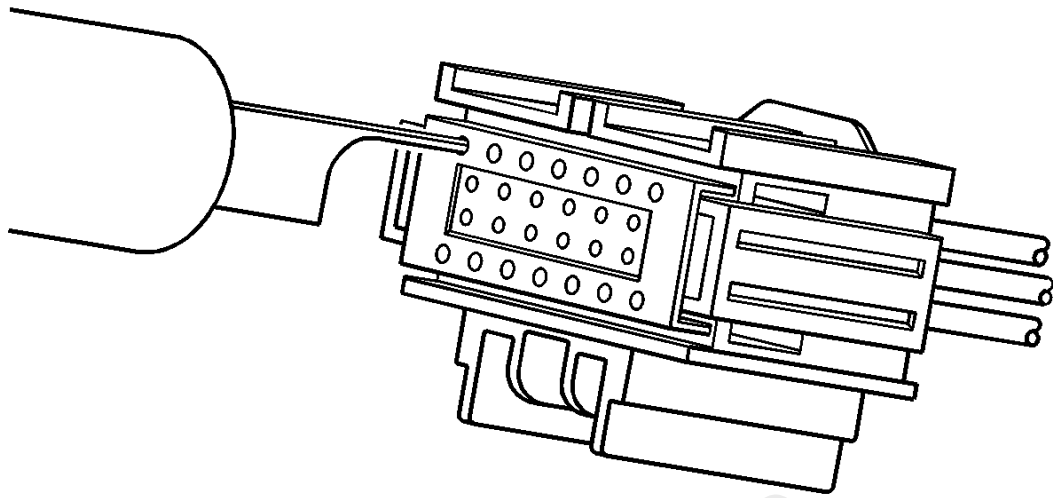
**Courtesy of GENERAL MOTORS COMPANY**

4. View of the female half of the connector with male terminals.
5. Use the J-38125-215 tool to release the terminals by inserting the tool into the terminal release cavity.



**Fig. 199: Using Removal Tool On Female Half Of Connector**  
Courtesy of GENERAL MOTORS COMPANY

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



**Fig. 200: Using Removal Tool On Male Half Of Connector**  
 Courtesy of GENERAL MOTORS COMPANY

7. View of the male half of the connector with female terminals.
8. While holding the removal tool in place, gently pull the wire out of the back of the connector. Always remember never use force when pulling a terminal out of a connector.
9. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#) procedure.
10. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

## **REPAIRING CONNECTOR TERMINALS (TERMINATED LEAD REPAIR)**

### **Special Tools**

**EL-38125-10** Splice Sleeve Crimp Tool

For equivalent regional tools, refer to [Special Tools](#) .

**NOTE:** All repairs near the engine manifold, turbo engine and all exhaust pipes should follow the High Temperature Wiring Repairs procedures.

For high temperature wiring repairs, refer to [High Temperature Wiring Repairs](#).

Terminated leads are terminals that are crimped onto wires. The terminated lead can be used throughout the vehicle since it is designed for temperatures up to 150°C. The length of the wire is 450 mm.

1. Use the connector end view to identify the correct terminated lead.
2. The terminated lead package should include a DuraSeal splice sleeve. If not, use the chart to in Splicing Copper Wire Using Splice Sleeves to identify the correct DuraSeal splice sleeve, refer to

## REPAIRING CONNECTOR TERMINALS (TERMINAL REPAIR)

### Special Tools

- **J-38125-580** Terminal Repair Kit
- **J-38125-6** Crimp Tool
- **J-38125-7** Crimp Tool
- **J-38125-8** Crimp Tool
- **J-38125-64** Crimp Tool
- **J-38125-101** Crimp Tool
- **J-38125-641** Crimp Tool
- **J-38125-642** Crimp Tool
- **J-38125-643** Crimp Tool

For equivalent regional tools, refer to [Special Tools](#) .

Use the following repair procedures to repair each type of terminal:

- For push to seat terminals, refer to [Delphi Connectors \(Weather Pack\)](#)[Delphi Connectors \(Push To Seat\)](#)[Delphi Connectors \(Pull To Seat\)](#)[Delphi Connectors \(Micro-Pack 100W\)](#)[Delphi Connectors \(Micro.64\)](#)[Delphi Connectors \(12-Way\)](#)[Delphi Connectors \(Steering Gear\)](#).
- For pull to seat terminals, refer to [Delphi Connectors \(Weather Pack\)](#)[Delphi Connectors \(Push To Seat\)](#)[Delphi Connectors \(Pull To Seat\)](#)[Delphi Connectors \(Micro-Pack 100W\)](#)[Delphi Connectors \(Micro.64\)](#)[Delphi Connectors \(12-Way\)](#)[Delphi Connectors \(Steering Gear\)](#).

**NOTE:**        **The first step for all terminal repairs is to find the connector end view in the service information.**

### Cable Seal Terminals

1. Cut off the terminal between the core and the insulation crimp to minimize any wire loss.
2. Remove the old seal.
3. Apply the correct cable seal, per the wire gauge size, from the kit. Slide the seal back along the wire to enable removal of the insulation.
4. To minimize wire loss, remove only the insulation required.
5. Using the connector end view, determine the correct crimp tool and crimp jaw.
6. Align the seal with the end of the cable insulation.
7. Position the stripped wire and seal in the terminal.
8. Hand Crimp the core wings first.
9. Hand Crimp the insulation wings around the seal and the cable.

### Unsealed Terminals

1. Cut off the terminal between the core and the insulation crimp to minimize any wire loss.
2. To minimize wire loss, remove only the insulation required.
3. Position the stripped wire in the terminal.
4. Hand Crimp the core wings first.
5. Hand Crimp the insulation wings around the cable.

### Micro-Pack 100W Size Terminal

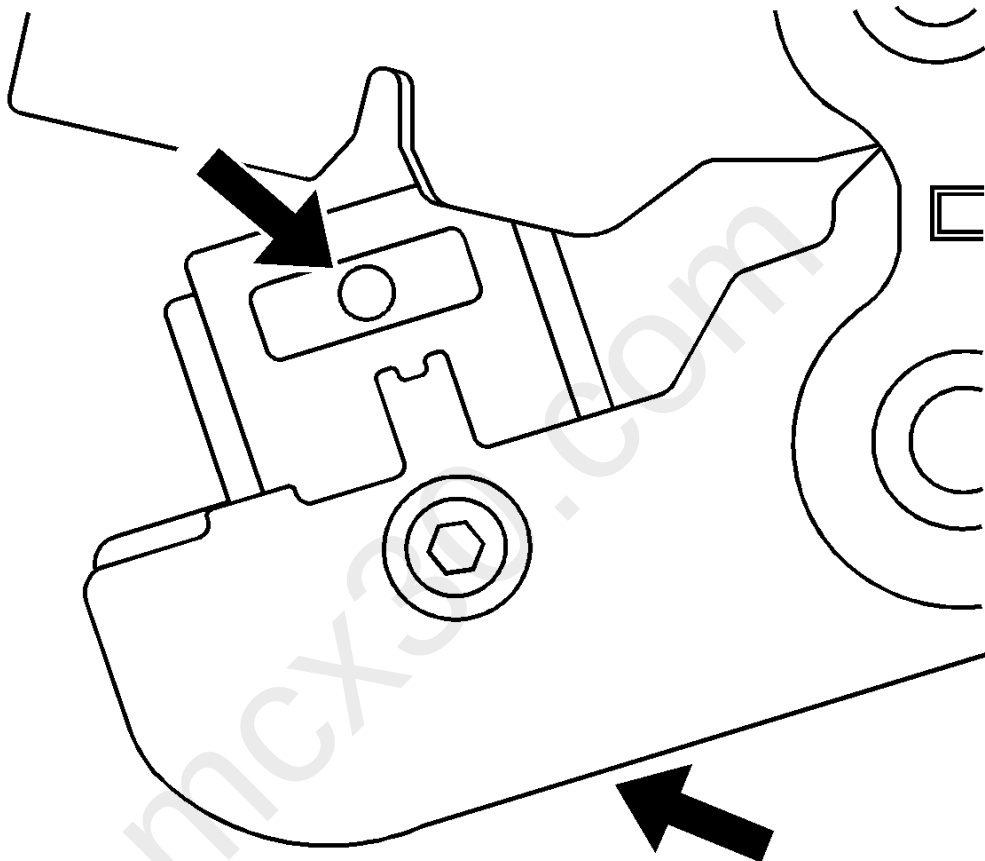
The Micro-Pack 100W connectors have small terminals that are difficult to handle and hold when crimping. In order to aid the technician when crimping these terminals, a new crimping tool was developed. The J 38125-101 (W jaw) crimping tool was developed to crimp Micro-Pack 100W terminals. The J 38125-101 (W jaw) crimping tool has a terminal holding block that will hold the terminal in place

while the terminal is being 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.

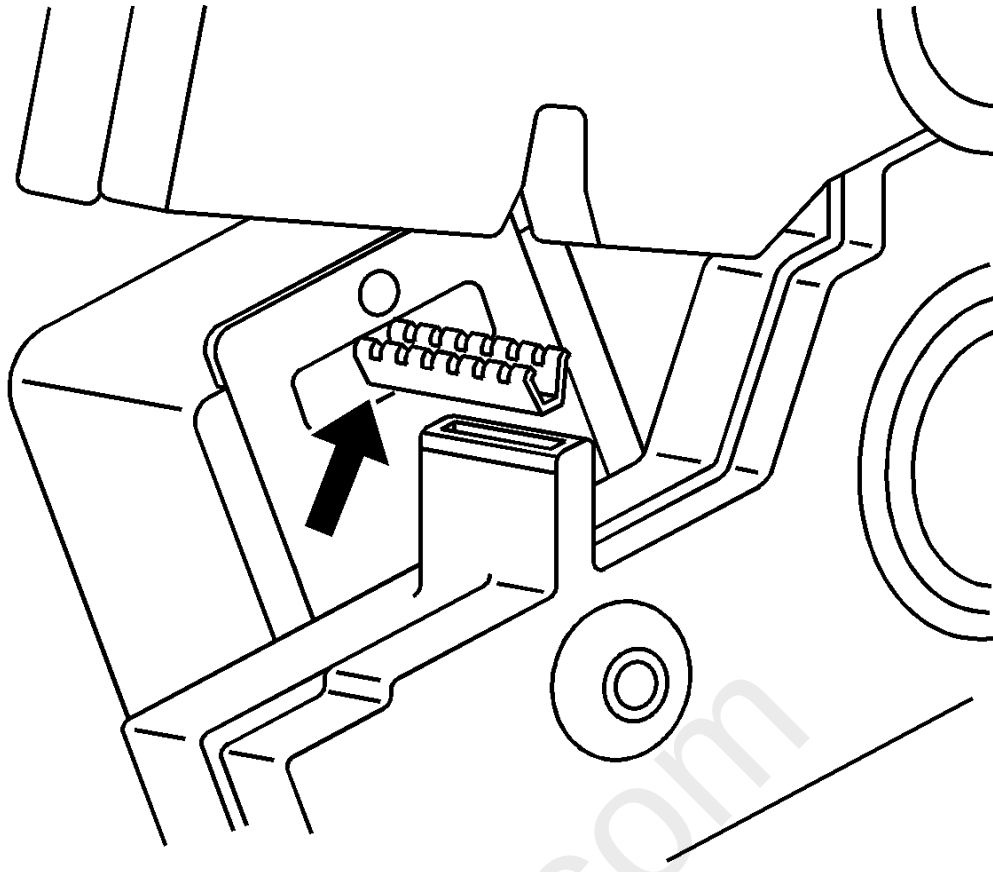
**NOTE:** After cutting the damaged terminal from the wire, determine if the remaining wire is long enough to reach the connector without putting a strain on the wire. If the wire is not long enough, splice a small length of the same gauge wire to the existing wire, then crimp the new terminal on the added wire.

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



**Fig. 201: Crimping Tool Spring Loaded Locator**  
Courtesy of GENERAL MOTORS COMPANY

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



**Fig. 202: Locating Terminal In Crimping Tool**  
 Courtesy of GENERAL MOTORS COMPANY

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.

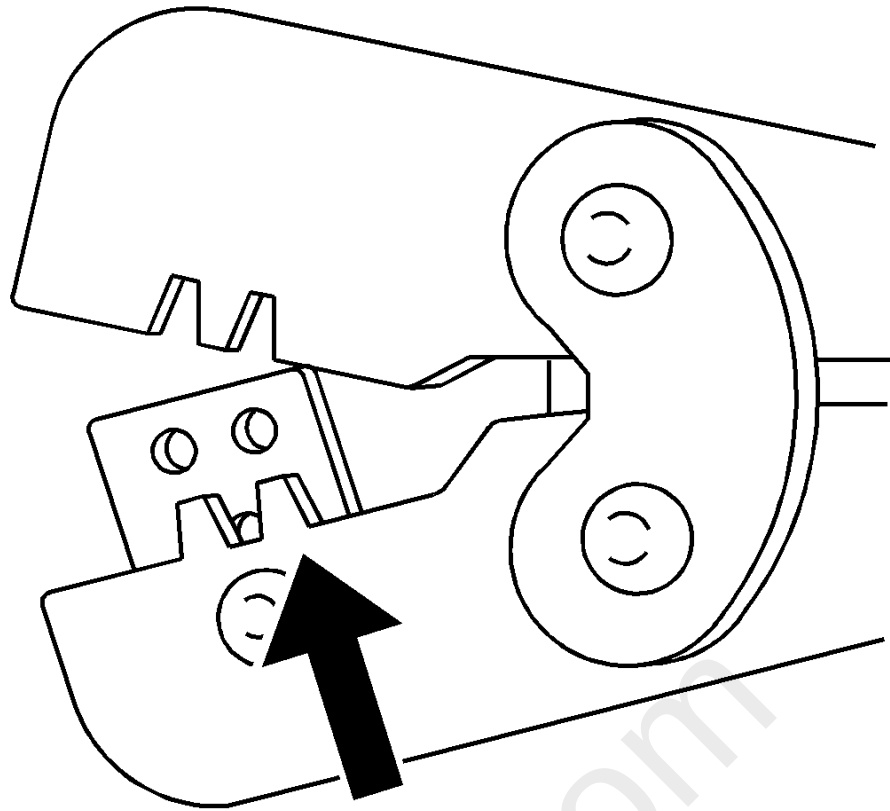
#### **Micro 0.64 Size Terminal**

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

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

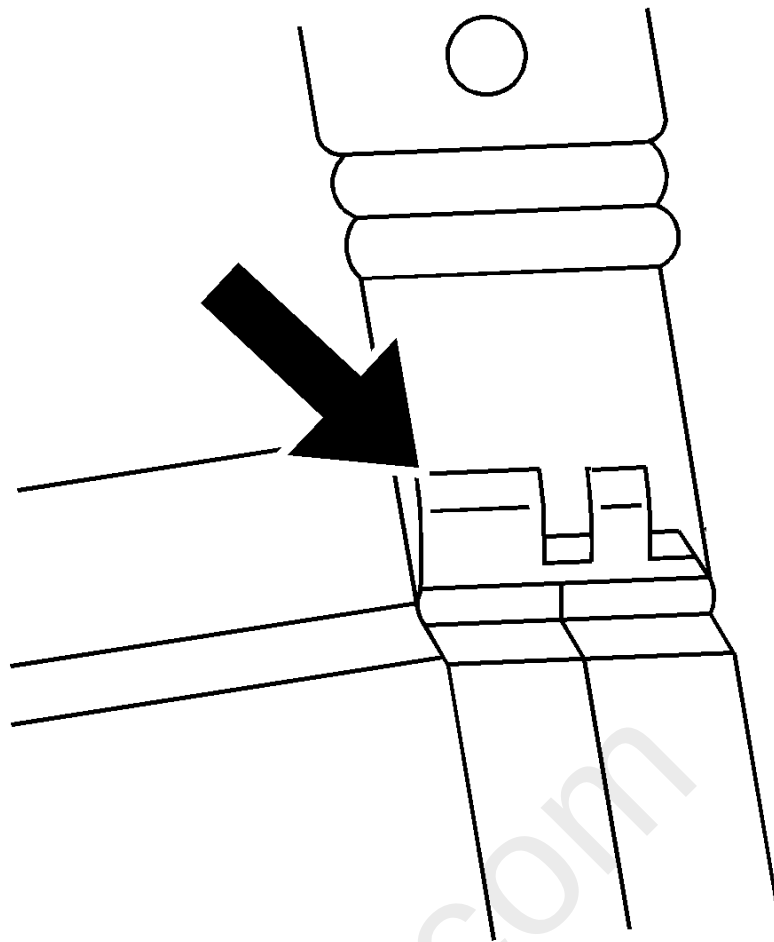
**NOTE:** After cutting the damaged terminal from the wire, determine if the remaining wire is long enough to reach the connector without putting a strain on the wire. If the wire is not long enough, splice a small length of the same gauge wire to the existing wire, then crimp the new terminal on the added wire.

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



**Fig. 203: Crimping Tool Spring Loaded Locator**  
Courtesy of GENERAL MOTORS COMPANY

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



**Fig. 204: Inserting Terminal Into Terminal Holder**  
Courtesy of GENERAL MOTORS COMPANY

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

## **TERMINAL REMOVAL**

### **Special Tools**

- **EL-38125-550** Terminal Release Tool Kit
- **EL-38125-580** Terminal Release Tool Kit
- **EL-35616** Terminal Test Probe Kit

For equivalent regional tools, refer to [Special Tools](#) .

**NOTE:** All repairs near the engine manifold, turbo engine and all exhaust pipes should follow the High Temperature Wiring Repair procedures.

1. Find the appropriate connector end view within the connector end view section. The connector end view has the following information:
  - Diagnostic probe tool
  - Terminal release tool
  - Terminal/terminated lead part numbers

**NOTE:** Not using the proper test kit probe may cause damage to the terminal(s) that are probed.

2. Determine if a terminal is damaged.
  1. Locate the diagnostic probe tool from the connector end view. The connector end view describes the color and part number to help the technician find and use the correct tool.
  2. Connect the probe tool to the Digital Multimeter.
  3. Insert the probe tool into the cavity and follow the procedures from the [Troubleshooting with a Digital Multimeter](#).
3. Disconnect the connector body to perform the repair.
4. Use the following procedure to remove the terminal from the connector body.

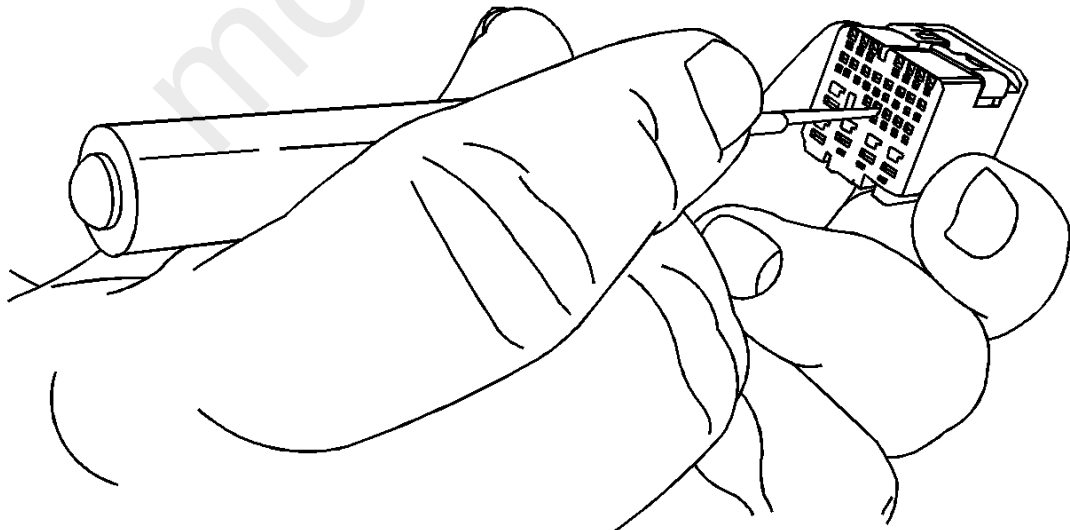
**NOTE:** Several procedures for specific connector bodies are called out in the Wiring Repairs section.

1. The terminal position assurance (TPA) and connector position assurance (CPA) should be removed before releasing the terminal for the connector body.
2. Look at the connector end view to locate the cavity of the damaged terminal and find the proper terminal release tool from the terminal release tool kit.

**NOTE:** Using the incorrect terminal release tool can damage the connector body.

**NOTE:** Some terminals have a lever that must be disengaged before the terminal can be released.

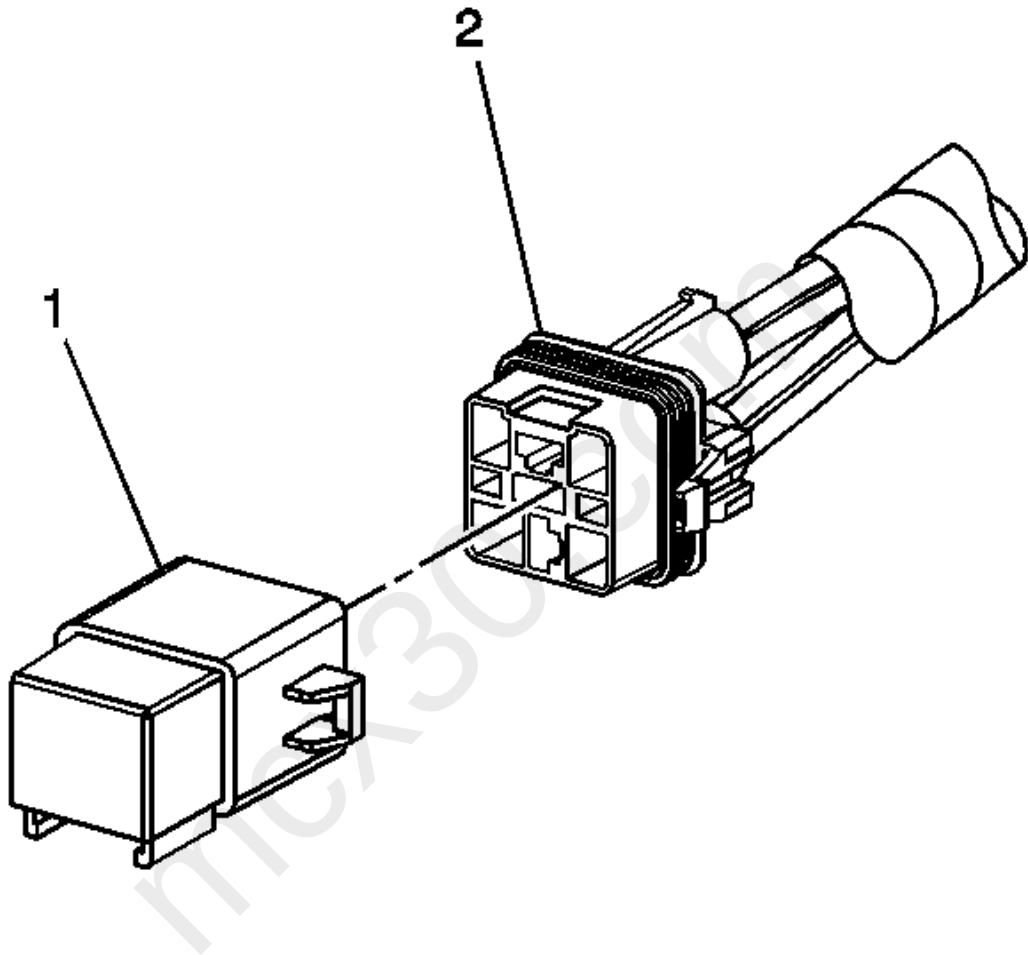
3. Insert the terminal release tool into the cavity.



5. Gently pull the wire out of the back of the connector.
6. Repair the terminal by following the [Repairing Connector Terminals \(Terminated Lead Repair\)](#)[Repairing Connector Terminals \(Terminal Repair\)](#) procedure.
7. Insert the repaired terminal back into the cavity. Repeat the diagnostic procedure to verify the repair and reconnect the connector bodies.

## **RELAY REPLACEMENT (ATTACHED TO WIRE HARNESS)**

### **Removal Procedure**



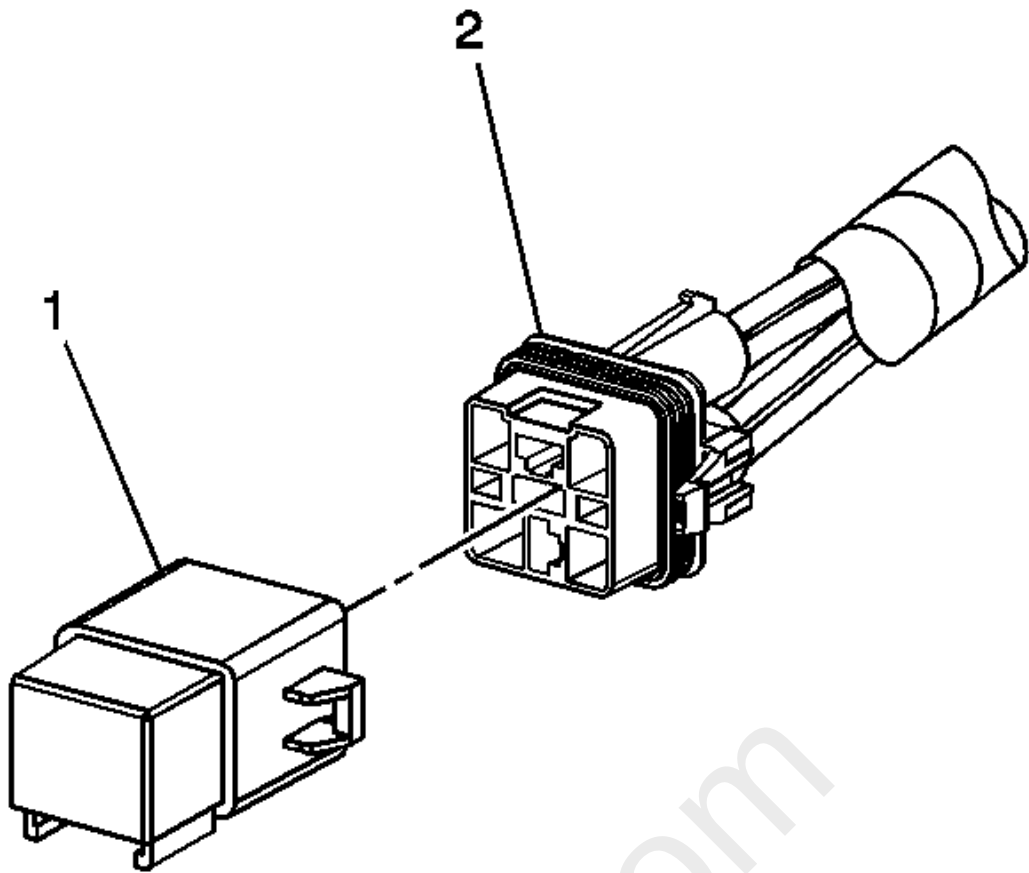
**Fig. 206: Relay And Wire Harness Connector**  
Courtesy of GENERAL MOTORS COMPANY

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

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

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

### **Installation Procedure**



**Fig. 207: Relay And Wire Harness Connector**  
Courtesy of GENERAL MOTORS COMPANY

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

### **RELAY REPLACEMENT (WITHIN AN ELECTRICAL CENTER)**

#### **Special Tools**

**EL-43244** Relay Puller Pliers

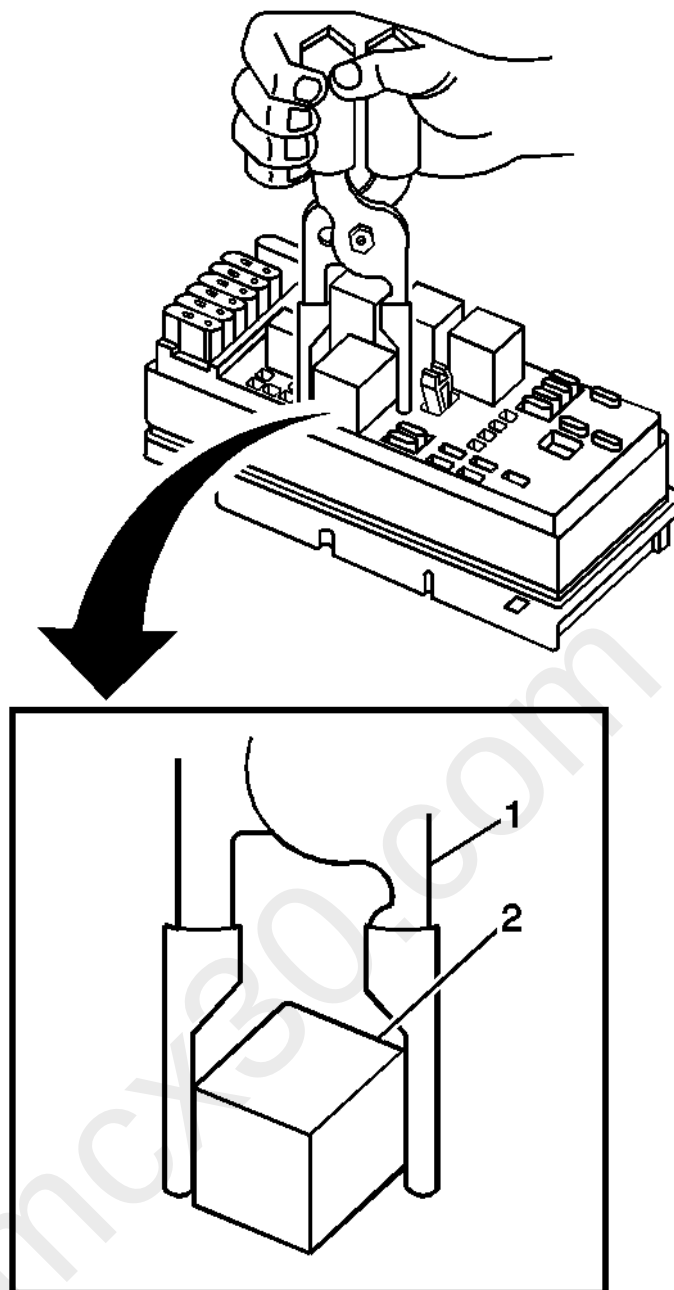
#### **Removal Procedure**

1. Remove the electrical center cover.

#### **NOTE:**

- Always note the orientation of the relay.
- If equipped with a notch style relay; observe the location of the notch on the old relay to verify the new relay is installed with the notch in the same location.
- Ensure that the electrical center is secure, as not to put added stress on the wires or terminals.

2. Locate the relay. Refer to [Electrical Center Identification Views](#) to locate the electrical center where the relay exists.



**Fig. 208: Removing/Installing Relay.**

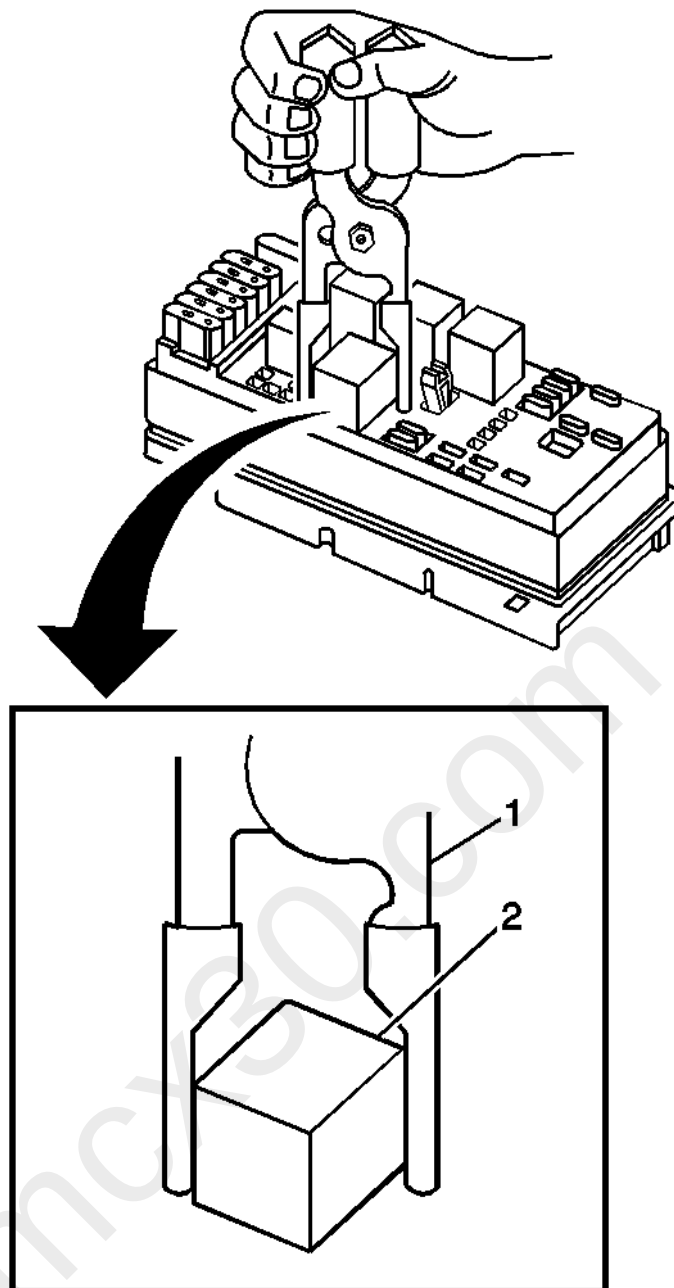
Courtesy of GENERAL MOTORS COMPANY

3. Using the EL-43244 (1) position the tool on opposing corners of the relay (2).

**CAUTION:** Use EL-43244 to pull the relay straight out from the electrical center terminals. The use of pliers or a flat bladed tool could damage the electrical center.

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

#### Installation Procedure



**Fig. 209: Removing/Installing Relay.**  
Courtesy of GENERAL MOTORS COMPANY

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

## **GROUND REPAIR**

### **Electrical Grounds**

Proper electrical system function relies on secure, positive, corrosion-free ground connections. Loose, stripped, or corroded connections increase the possibility of improper system function and loss of module communication. These conditions may also lead to unnecessary repairs and component replacements.

In general, electrical ground connections are accomplished using one, or a combination of, three attachment methods:

- Welded M6 stud and nut
- Welded M6 nut and bolt
- Welded M8 nut and bolt

**CAUTION:** Use GM approved replacement fasteners with conductive finish for electrical ground repair.

Determine which attachment method is used, and carry out the appropriate repair.

### M6 Weld Stud Replacement

1. Select a location adjacent the damaged or missing M6 ground stud having 20 mm (0.79 in) clearance behind the panel surface and 20 mm (0.79 in) clearance surrounding the M6 rivet stud flange.
2. Using GM approved residue-free solvent or equivalent, remove any grease from the repair site and allow to dry.

**NOTE:** Ensure 20 mm (0.79 in) clearance is maintained behind the panel to be drilled.

3. Drill a 10 mm (0.40 in) diameter hole through the panel.
4. Carefully remove paint and primer from the area surrounding the rivet stud flange until bare metal is visible.

**CAUTION:** Use GM approved replacement fasteners with conductive finish for electrical ground repair.

5. Select a replacement conductive M6 rivet stud. Reference the GM parts catalog for the correct part number and application.
6. Using a rivet stud installer, install the replacement conductive M6 rivet stud.
7. Ensure the new rivet stud is securely fastened, with no detectable movement.

**NOTE:** The rivet stud and surrounding panel area must be properly refinished prior to the installation of the ground terminal and nut to maintain positive electrical grounding.

8. Completely wrap the threads of the rivet stud with painters tape or equivalent.
9. Refinish the repair area using an anti-corrosion primer.
10. Allow the refinished repair area to cure sufficiently before removing the protective material applied to the rivet stud threads.
11. Remove the painters tape or equivalent from the rivet stud threads.
12. Using GM approved residue-free solvent or equivalent, thoroughly clean the rivet stud threads to remove any adhesive and allow to dry.
13. Carefully remove any corrosion from the electrical ground wire terminal. Refer to [Testing for Intermittent Conditions and Poor Connections](#)
14. Using a small brush, apply Dielectric Lubricant GM P/N 12377900 (Canadian P/N 10953529) to the new conductive M6 rivet stud threads.
15. Install the ground terminal to the new rivet stud.
16. Select a new, conductive M6 nut. Reference the GM parts catalog for the correct part number and application.

**CAUTION:** Refer to [Fastener Caution](#)

17. Install the conductive M6 nut and tighten to 8 N.m (71 lb in).
18. Check for proper system operation.

### M6 Weld Nut

**CAUTION:** Use GM approved replacement fasteners with conductive finish for electrical ground repair.

1. If the M6 weld nut at the electrical ground location is damaged or stripped, a new, conductive self-threading M7 bolt may be used to secure the ground terminal. Reference the GM parts catalog for the correct part number and application.
2. Using GM approved residue-free solvent or equivalent, remove any grease from the surface surrounding the weld nut and allow to dry.
3. Remove any loose metal particles from the damaged or stripped weld nut with a stiff brush.
4. Using a small brush, apply Dielectric Lubricant GM P/N 12377900 (Canadian P/N 10953529) to the new, conductive, self-threading M7 bolt threads.
5. Carefully remove any corrosion from the electrical ground terminal. Refer to [Testing for Intermittent Conditions and Poor Connections](#)
6. Install the electrical ground terminal to the new, conductive M7 bolt.

**CAUTION:** Refer to [Fastener Caution](#)

7. Install the conductive M7 bolt and tighten to 9 N.m (80 lb in).
8. Check for proper system operation.

### M6 Weld Nut (Alternative Repair)

**CAUTION:** Use GM approved replacement fasteners with conductive finish for electrical ground repair.

1. If the electrical ground location is accessible from both sides of the panel, a conductive M6 bolt and a conductive M6 nut may be used to secure the electrical ground terminal. Reference the GM parts catalog for the correct part number and application.
2. Select a location adjacent the damaged M6 weld nut having 20 mm (0.79) clearance behind the panel surface and 20 mm (0.79 in) clearance surrounding the new electrical ground site.
3. Using GM approved residue-free solvent or equivalent, remove any grease from the surface surrounding the ground location and allow to dry.

**NOTE:** Ensure 20 mm (0.79 in) clearance is maintained behind the panel to be drilled.

4. Drill a 10 mm (0.40 in) diameter hole through the panel.
5. Carefully remove paint and primer from the area surrounding the new ground site until bare metal is visible.
6. Using a small brush, apply Dielectric Lubricant GM P/N 12377900 (Canadian P/N 10953529) to the new, conductive M6 bolt threads.
7. Carefully remove any corrosion from the electrical ground terminal. Refer to [Testing for Intermittent Conditions and Poor Connections](#)
8. Install the electrical ground terminal and new, conductive M6 bolt to the ground location.

**CAUTION:** Refer to [Fastener Caution](#)

9. Install the conductive M6 nut and tighten to 8 N.m (71 lb in).

**NOTE:** The repair area must be properly refinished to maintain positive electrical grounding.

10. Refinish the repair area using an anti-corrosion primer.
11. Check for proper system operation.

### M8 Weld Nut

**CAUTION:** Use GM approved replacement fasteners with conductive finish for

## electrical ground repair.

1. If the M8 weld nut electrical ground location is accessible from both sides of the panel, a conductive M8 bolt and a conductive M8 nut may be used to secure the ground terminal. Reference the GM parts catalog for the correct part number and application.
2. Select a location adjacent to M8 weld nut having 20 mm (0.79 in) clearance behind the panel surface and 20 mm (0.79 in) clearance surrounding the new electrical ground site.
3. Using GM approved residue-free solvent or equivalent, remove any grease from the surface surrounding the ground location and allow to dry.

**NOTE:** Ensure 20 mm (0.79 in) clearance is maintained behind the panel to be drilled.

4. Drill a 10 mm (0.40 in) diameter hole through the panel.
5. Carefully remove paint and primer from the area surrounding the new ground site until bare metal is visible.
6. Using a small brush, apply Dielectric Lubricant GM P/N 12377900 (Canadian P/N 10953529) to the new, conductive M8 bolt threads.
7. Carefully remove any corrosion from the electrical ground terminal. Refer to [Testing for Intermittent Conditions and Poor Connections](#)
8. Install the electrical ground terminal and new, conductive M8 bolt to the ground location.

**CAUTION:** Refer to [Fastener Caution](#)

9. Install the conductive M8 nut and tighten to 22 N.m (16 lb ft).

**NOTE:** The repair area must be properly refinished to maintain positive electrical grounding.

10. Refinish the repair area using an anti-corrosion primer.
11. Check for proper system operation.

### M8 Weld Nut (Alternative Repair)

**CAUTION:** Use GM approved replacement fasteners with conductive finish for electrical ground repair.

1. If the M8 weld nut electrical ground location is not accessible from both sides of the panel, a conductive M6 rivet stud and a conductive M6 nut may be used to secure the ground terminal. Reference the GM parts catalog for the correct part number and application.
2. Select a location adjacent the damaged M8 weld nut having 20 mm (0.79 in) clearance behind the panel surface and 20 mm (0.79 in) clearance surrounding the new, conductive M6 rivet stud flange.
3. Using GM approved residue-free solvent or equivalent, remove any grease from the repair site and allow to dry.

**NOTE:** Ensure 20 mm (0.79 in) clearance is maintained behind the panel to be drilled.

4. Drill a 10 mm (0.40 in) diameter hole through the panel.
5. Carefully remove paint and primer from the area surrounding the rivet stud flange until bare metal is visible.
6. Using a rivet stud installer, install the replacement conductive M6 rivet stud.
7. Ensure the new rivet stud is securely fastened, with no detectable movement.

**NOTE:** The rivet stud and surrounding panel area must be properly refinished prior to the installation of the ground terminal and nut to maintain positive electrical grounding.

8. Completely wrap the threads of the rivet stud with painters tape or equivalent.
9. Refinish the repair area using an anti-corrosion primer.
10. Allow the refinished repair area to cure sufficiently before removing the protective material applied to the rivet stud threads.
11. Remove the painters tape or equivalent from the rivet stud threads.
12. Using GM approved residue-free solvent or equivalent, thoroughly clean the rivet stud threads to remove any adhesive and allow to dry.
13. Carefully remove any corrosion from the electrical ground wire terminal. Refer to [Testing for Intermittent Conditions and Poor Connections](#)
14. Using a small brush, apply Dielectric Lubricant GM P/N 12377900 (Canadian P/N 10953529) to the new conductive M6 rivet stud threads.
15. Install the ground terminal to the new, conductive M6 rivet stud.

**CAUTION:** Refer to [Fastener Caution](#)

16. Install the conductive M6 nut and tighten to 8 N.m (71 lb in).
17. Check for proper system operation.

### Securing Loose Electrical Ground Connections

If the electrical ground connection is loose and the ground attachments are not damaged, properly securing the loose electrical ground may be all that is necessary. Carry out the following procedure to secure loose electrical ground connections.

**CAUTION:** Use GM approved replacement fasteners with conductive finish for electrical ground repair.

1. Using GM approved residue-free solvent or equivalent, thoroughly clean the ground stud threads and allow to dry.
2. Carefully remove any corrosion from the electrical ground wire terminal. Refer to [Testing for Intermittent Conditions and Poor Connections](#)
3. Using a small brush, apply Dielectric Lubricant GM P/N 12377900 (Canadian P/N 10953529) to the ground stud threads.
4. Install the ground wire terminal to the ground stud.

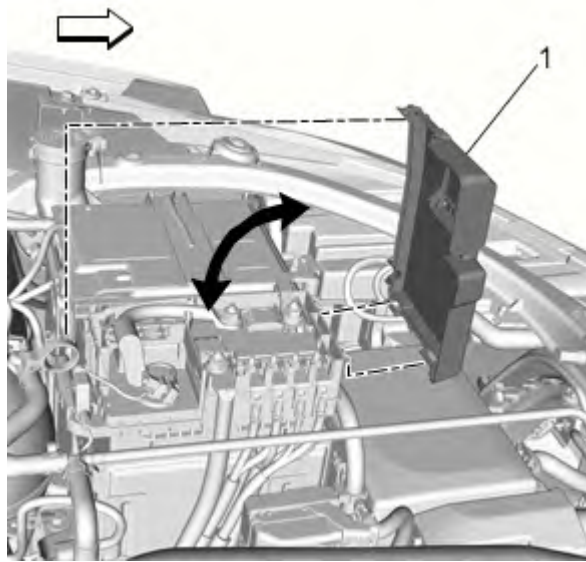
**CAUTION:** Refer to [Fastener Caution](#)

5. Install the appropriate conductive nut.
  - Conductive M6 nut: Tighten to 8 N.m (71 lb in)
  - Conductive M8 nut: Tighten to 22 N.m (16 lb ft)
  - Conductive M10 nut: Tighten to 45 N.m (33 lb ft)
6. Check for proper system operation.

## BATTERY DISTRIBUTION ENGINE COMPARTMENT FUSE BLOCK REPLACEMENT

### Removal Procedure

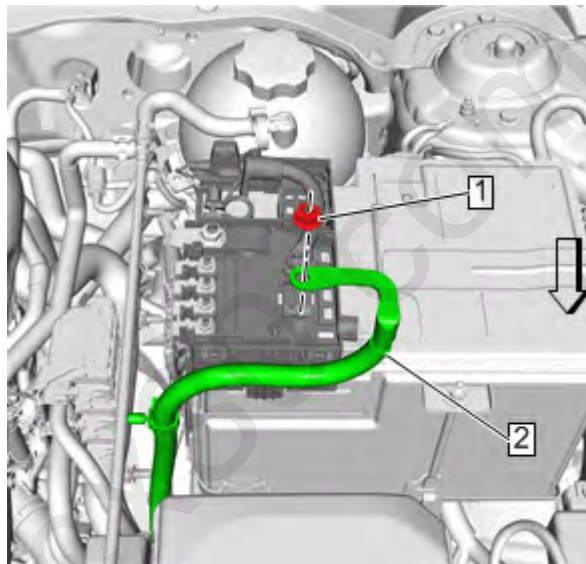
1. Disconnect Battery Negative Cable. Refer to [Battery Negative Cable Disconnection and Connection \(KL9\)](#).



**Fig. 210: Fuse Block Cover**

Courtesy of GENERAL MOTORS COMPANY

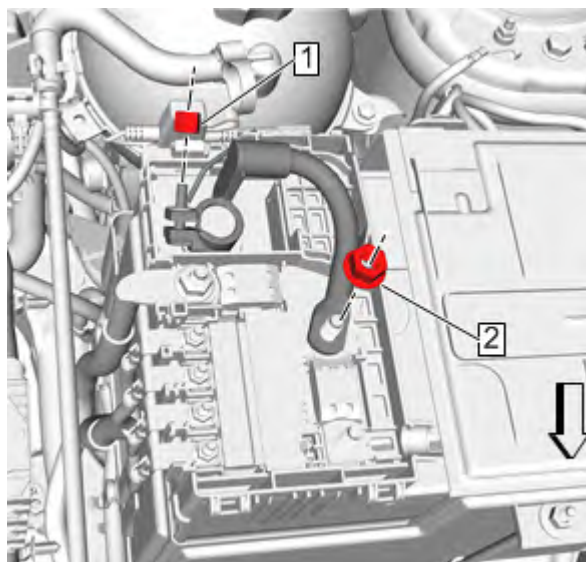
2. Remove Fuse Block Cover (1)



**Fig. 211: Starter Solenoid Cable And Nut**

Courtesy of GENERAL MOTORS COMPANY

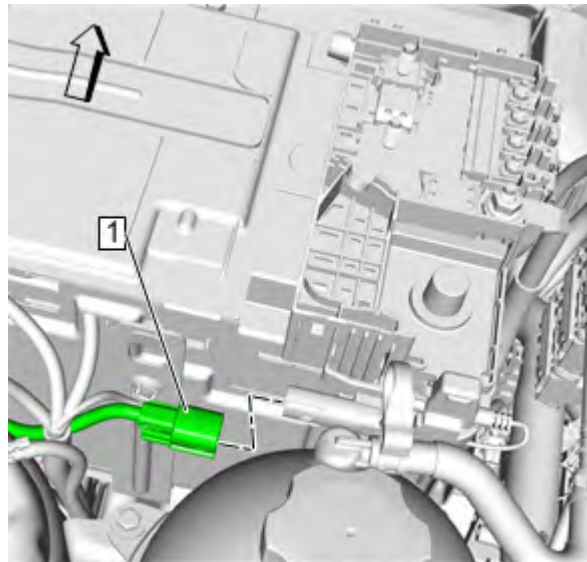
3. Remove Starter Solenoid Cable Nut (1)
4. Reposition Starter Solenoid Cable (2)



**Fig. 212: Battery Positive Cable And Nut**

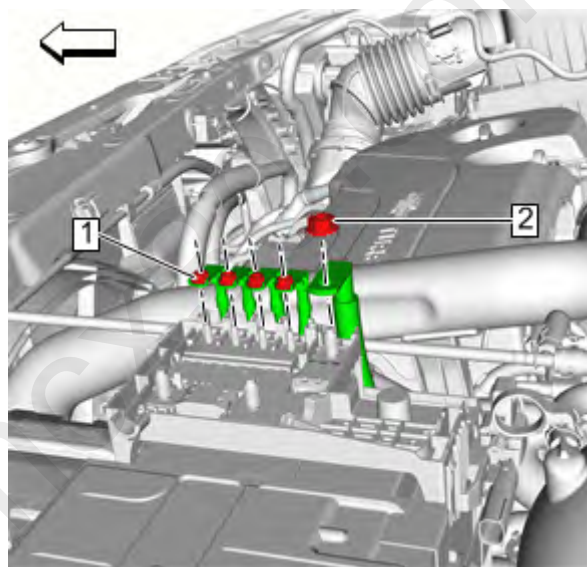
Courtesy of GENERAL MOTORS COMPANY

5. Remove Battery Positive Cable Nut (1)
6. Remove the small wire.
7. Remove Battery Positive Cable (2)



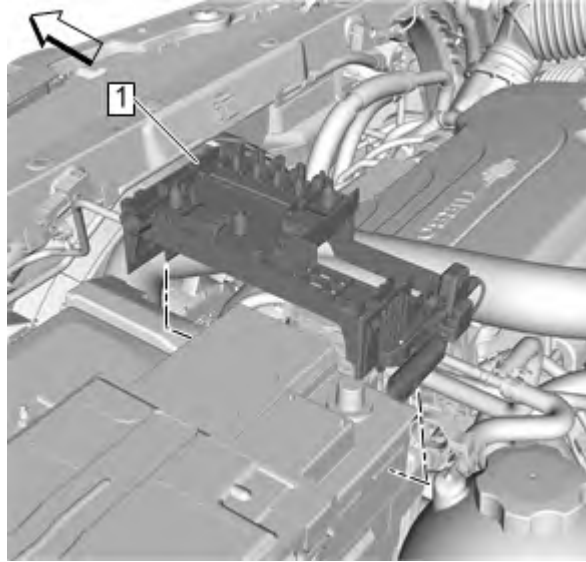
**Fig. 213: Body Wiring Harness Connector**  
Courtesy of GENERAL MOTORS COMPANY

8. Disconnect the body wiring harness connector. (1)



**Fig. 214: Body Wiring Harness Terminals And Nuts**  
Courtesy of GENERAL MOTORS COMPANY

9. Remove Body Wiring Harness Terminal Nut (1) (Qty: 4)
10. Remove Generator and Starter Nut (2)
11. Remove Wiring Harness Terminals (Qty: 5)

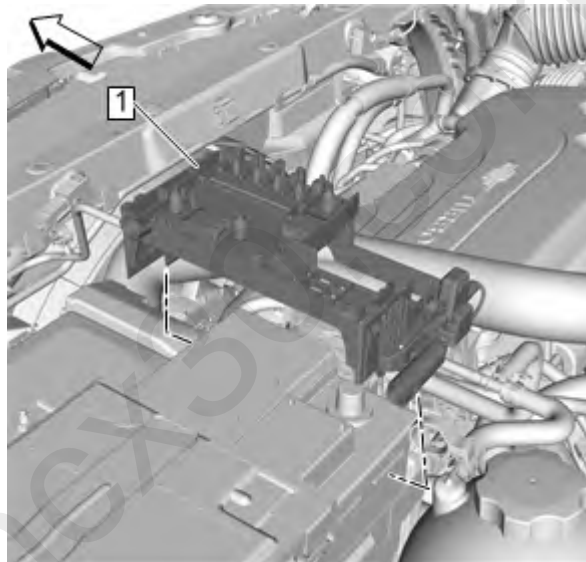


**Fig. 215: Fuse Block Tabs**

Courtesy of GENERAL MOTORS COMPANY

12. Unclip the fuse block tabs (1) and remove from the battery.

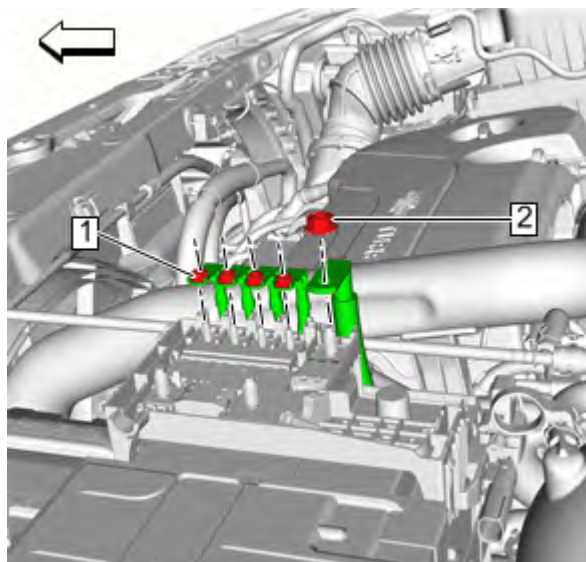
#### Installation Procedure



**Fig. 216: Fuse Block Tabs**

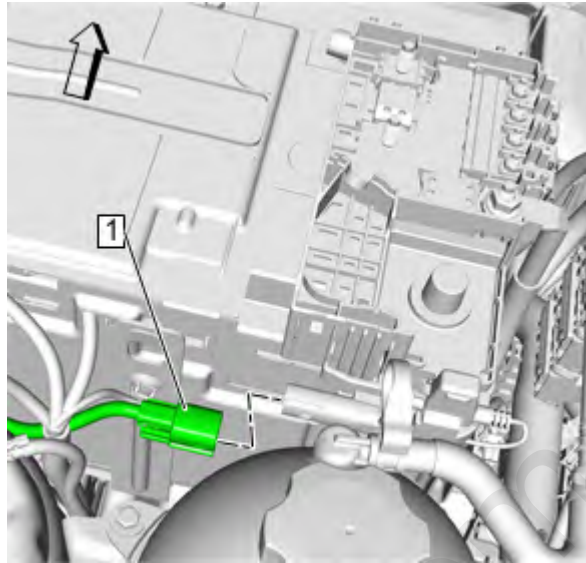
Courtesy of GENERAL MOTORS COMPANY

1. Install fuse block and tabs (1) to the battery.



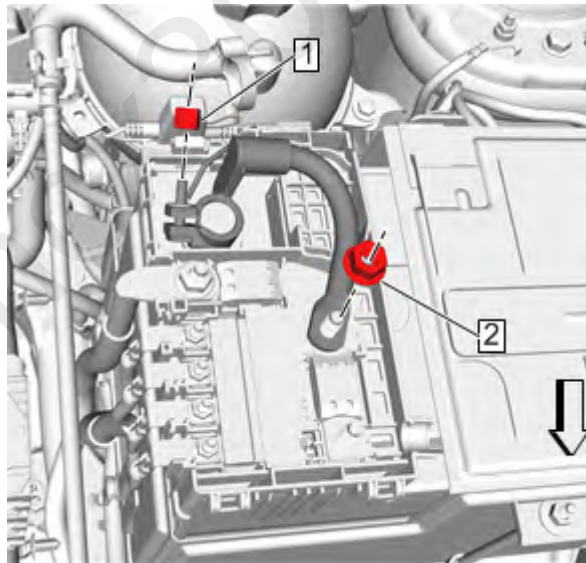
**CAUTION:** Refer to **Fastener Caution** .

2. Install Fuse Block Wiring Harness Terminals (Qty: 5)
3. Install and tighten Body Wiring Harness Terminal Nuts (1) (Qty: 4) to 9 N.m (80 lb in)
4. Install and tighten Starter and Generator Positive Cable Nut (2) to 12 N.m (106 lb in)



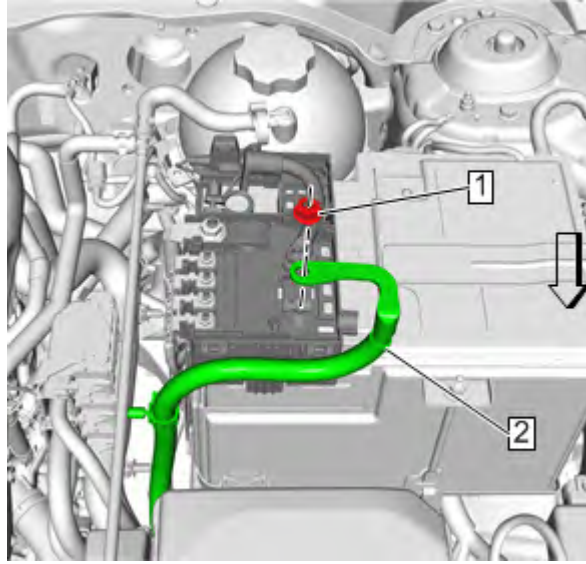
**Fig. 218: Body Wiring Harness Connector**  
Courtesy of GENERAL MOTORS COMPANY

5. Connect the body wiring harness connector. (1)



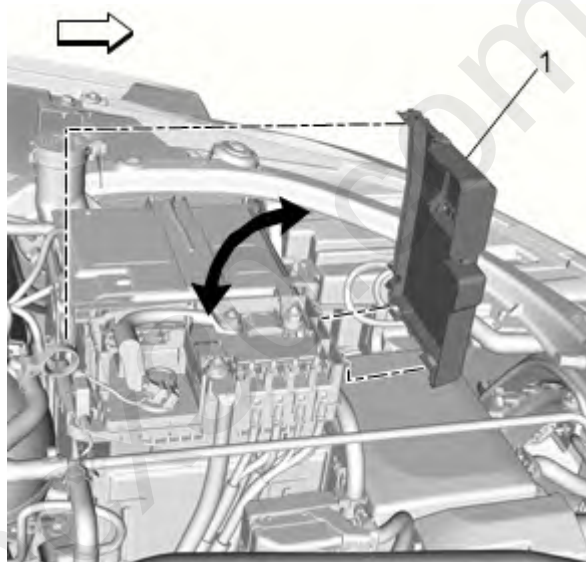
**Fig. 219: Battery Positive Cable And Nut**  
Courtesy of GENERAL MOTORS COMPANY

6. Install Battery Positive Cable
7. Install and tighten Battery Positive Cable and Nut (2) to 9 N.m (80 lb in)
8. Install the small wire.
9. Install and tighten Positive Battery Cable Nut (1) to 9 N.m (80 lb in).



**Fig. 220: Starter Solenoid Cable And Nut**  
 Courtesy of GENERAL MOTORS COMPANY

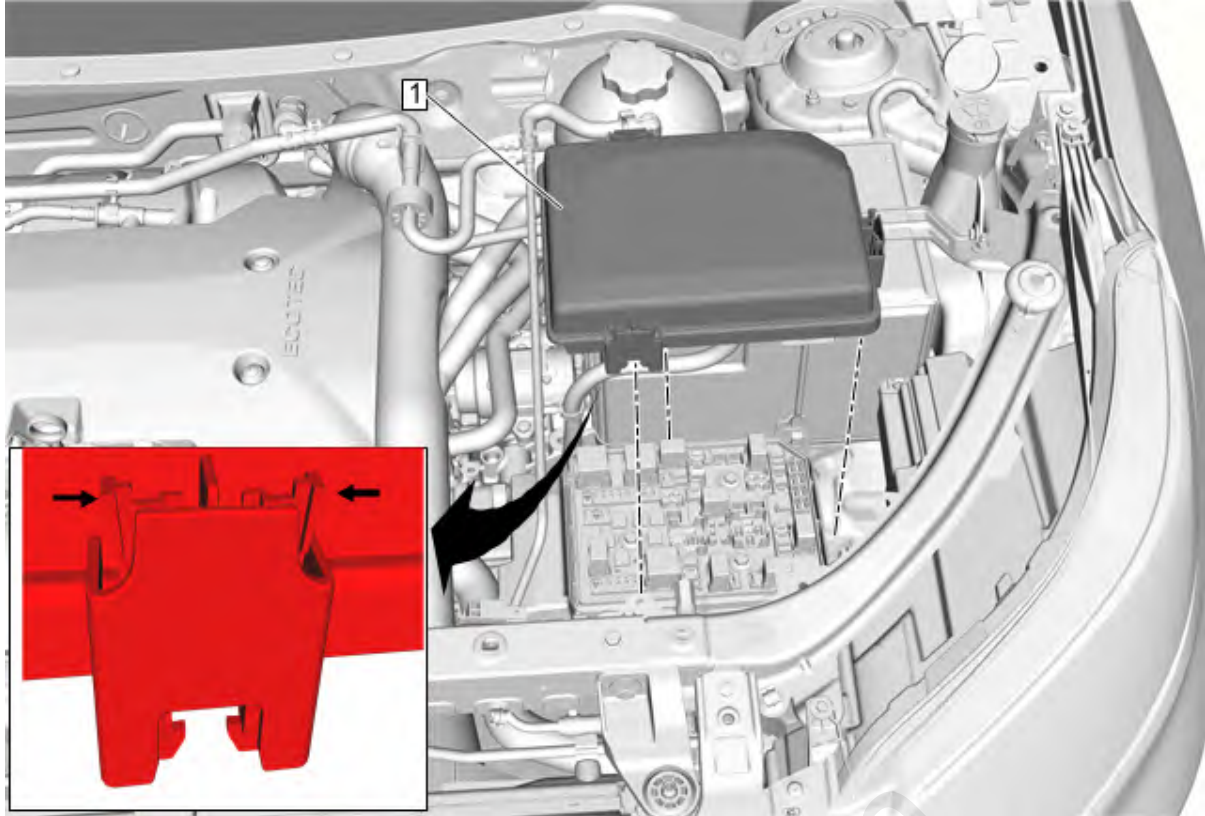
10. Install Starter Solenoid Cable (2)
11. Install and tighten Starter Solenoid Cable Nut (1) to 12 N.m (106 lb in).



**Fig. 221: Fuse Block Cover**  
 Courtesy of GENERAL MOTORS COMPANY

12. Install Fuse Block Cover (1)
13. Connect Battery Negative Cable. Refer to [Battery Negative Cable Disconnection and Connection \(KL9\)](#).

## **FRONT COMPARTMENT FUSE BLOCK COVER REPLACEMENT**



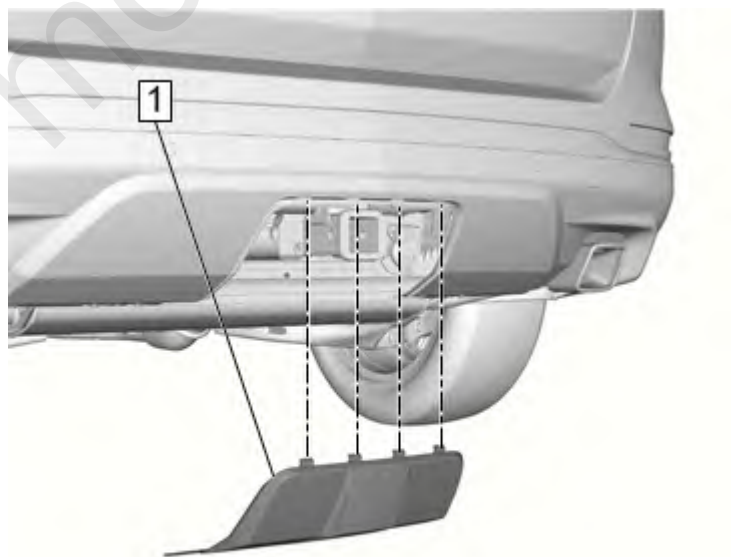
**Fig. 222: Front Compartment Fuse Block Cover**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout | Component Name                                                                                 |
|---------|------------------------------------------------------------------------------------------------|
| 1       | Front Compartment Fuse Block Cover<br><b>Procedure</b><br>Squeeze the 3 tabs to release cover. |

## **TOW VEHICLE ELECTRICAL RECEPTACLE REPLACEMENT**

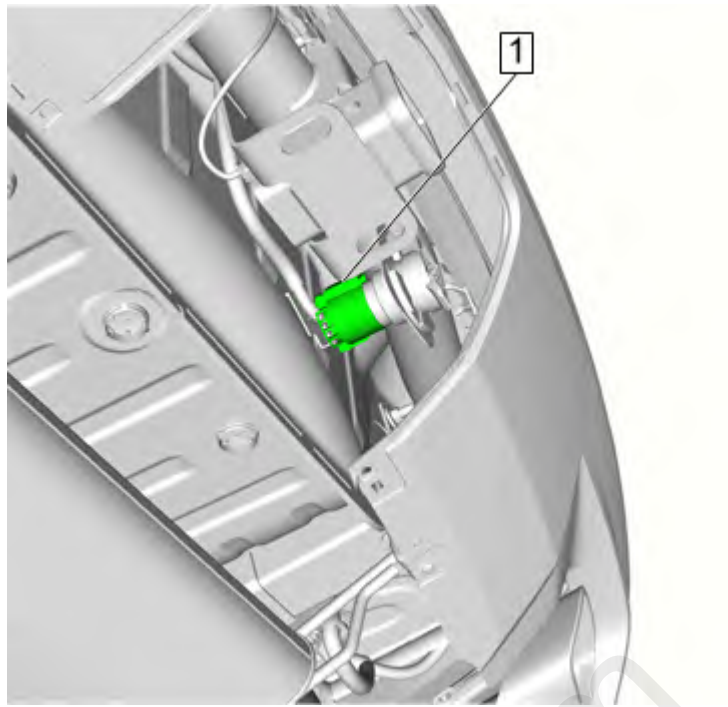
### **Removal Procedure**

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle**



**Fig. 223: Rear Bumper Fascia Trailer Hitch Access Hole Cover**  
 Courtesy of GENERAL MOTORS COMPANY

2. Remove Rear Bumper Fascia Trailer Hitch Access Hole Cover (1). Refer to [Rear Bumper Fascia Trailer Hitch Access Hole Cover Replacement \(Equinox\)](#), [Rear Bumper Fascia Trailer Hitch Access Hole Cover Replacement \(Terrain\)](#).



**Fig. 224: Electrical Connector**

Courtesy of GENERAL MOTORS COMPANY

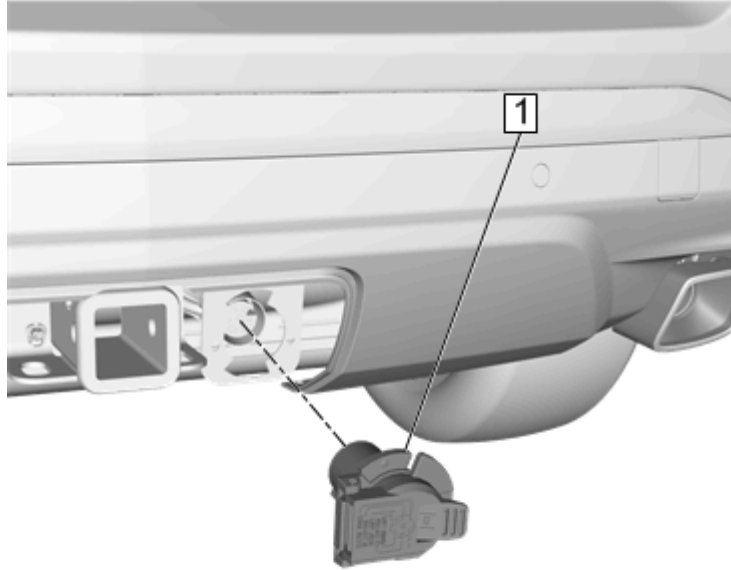
3. Disconnect Electrical Connector (1)



**Fig. 225: Tow Vehicle Electrical Receptacle**

Courtesy of GENERAL MOTORS COMPANY

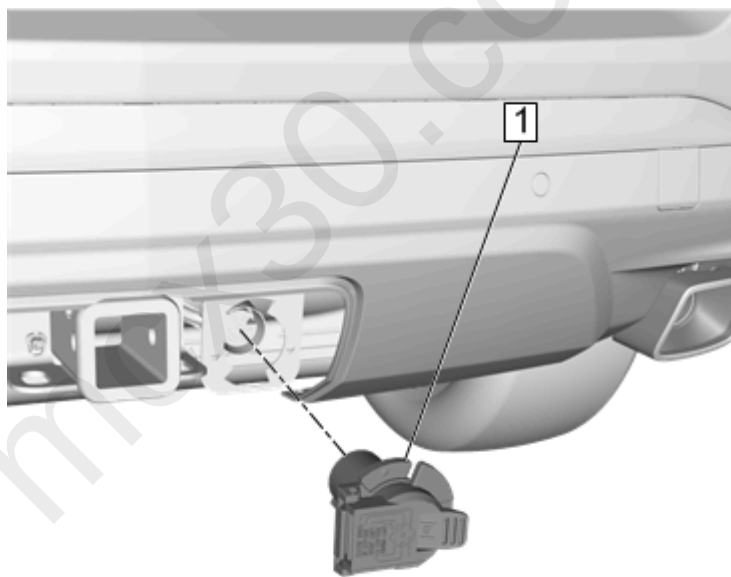
4. Rotate Tow Vehicle Electrical Receptacle (1) Counterclockwise 90 degrees



**Fig. 226: Tow Vehicle Electrical Receptacle**  
Courtesy of GENERAL MOTORS COMPANY

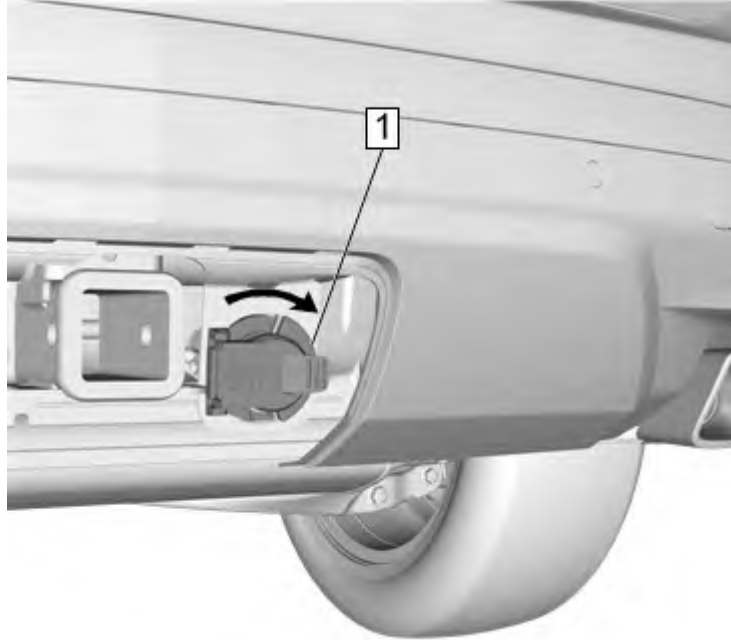
5. Remove Tow Vehicle Electrical Receptacle (1)

**Installation Procedure**



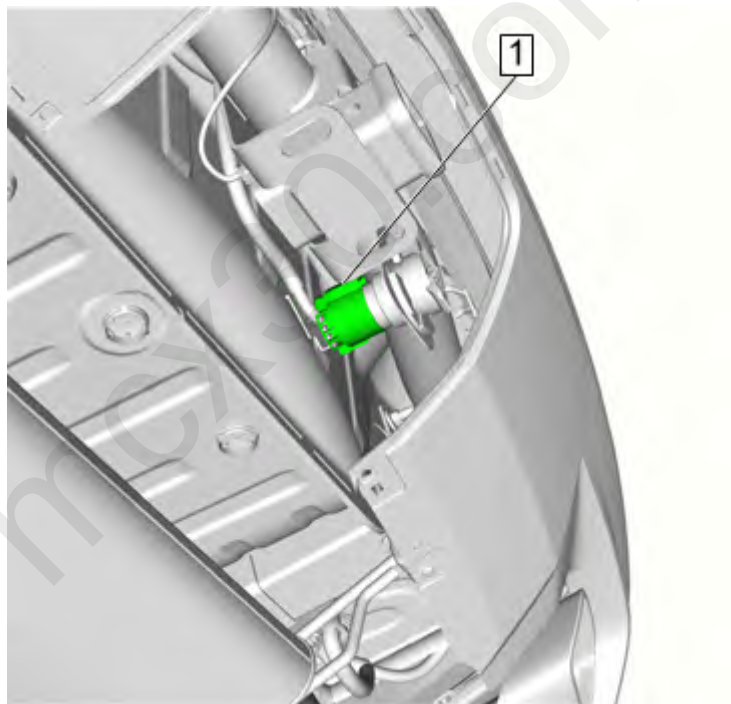
**Fig. 227: Tow Vehicle Electrical Receptacle**  
Courtesy of GENERAL MOTORS COMPANY

1. Install Tow Vehicle Electrical Receptacle (1)



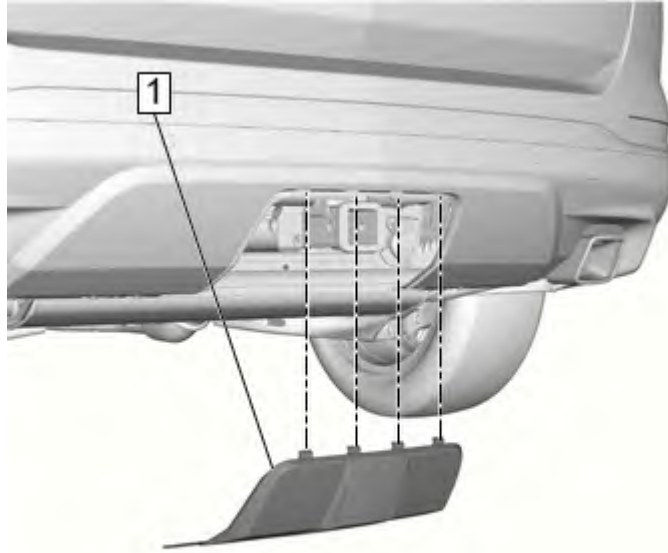
**Fig. 228: Tow Vehicle Electrical Receptacle**  
Courtesy of GENERAL MOTORS COMPANY

2. Rotate Tow Vehicle Electrical Receptacle (1) Clockwise 90 degrees



**Fig. 229: Electrical Connector**  
Courtesy of GENERAL MOTORS COMPANY

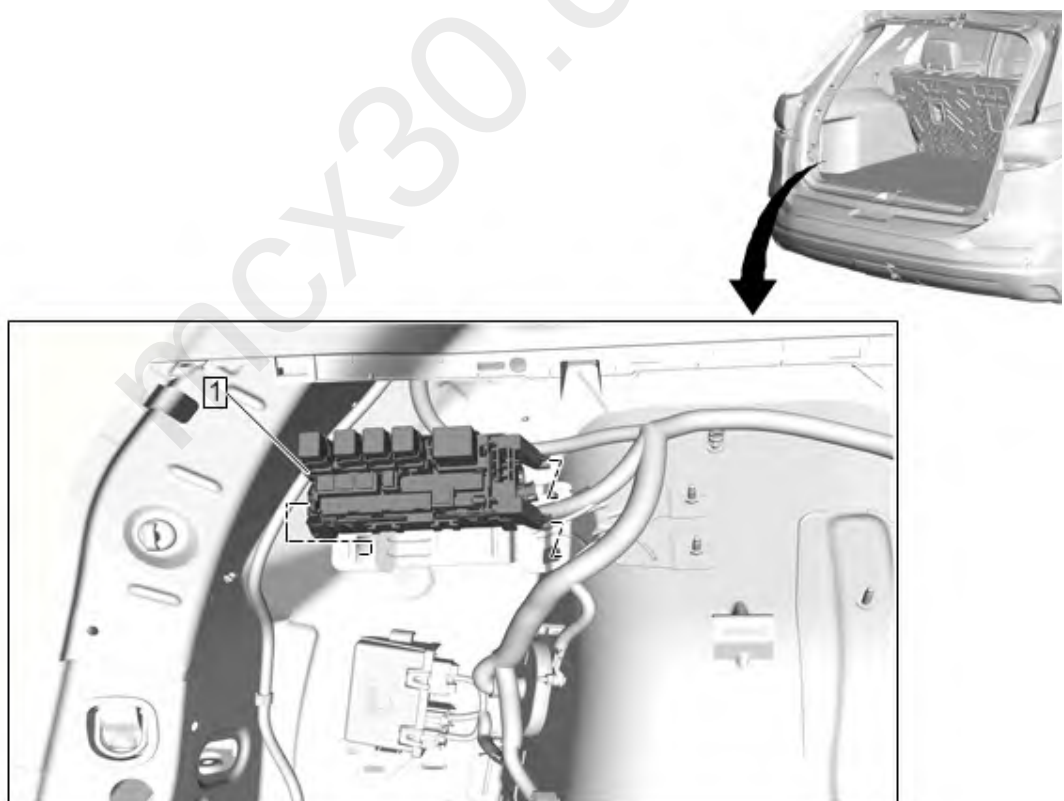
3. Connect Electrical Connector (1)



**Fig. 230: Rear Bumper Fascia Trailer Hitch Access Hole Cover**  
 Courtesy of GENERAL MOTORS COMPANY

4. Install Rear Bumper Fascia Trailer Hitch Access Hole Cover (1). Refer to [Rear Bumper Fascia Trailer Hitch Access Hole Cover Replacement \(Equinox\)](#), [Rear Bumper Fascia Trailer Hitch Access Hole Cover Replacement \(Terrain\)](#).

### **REAR BODY FUSE BLOCK REPLACEMENT (EQUINOX)**

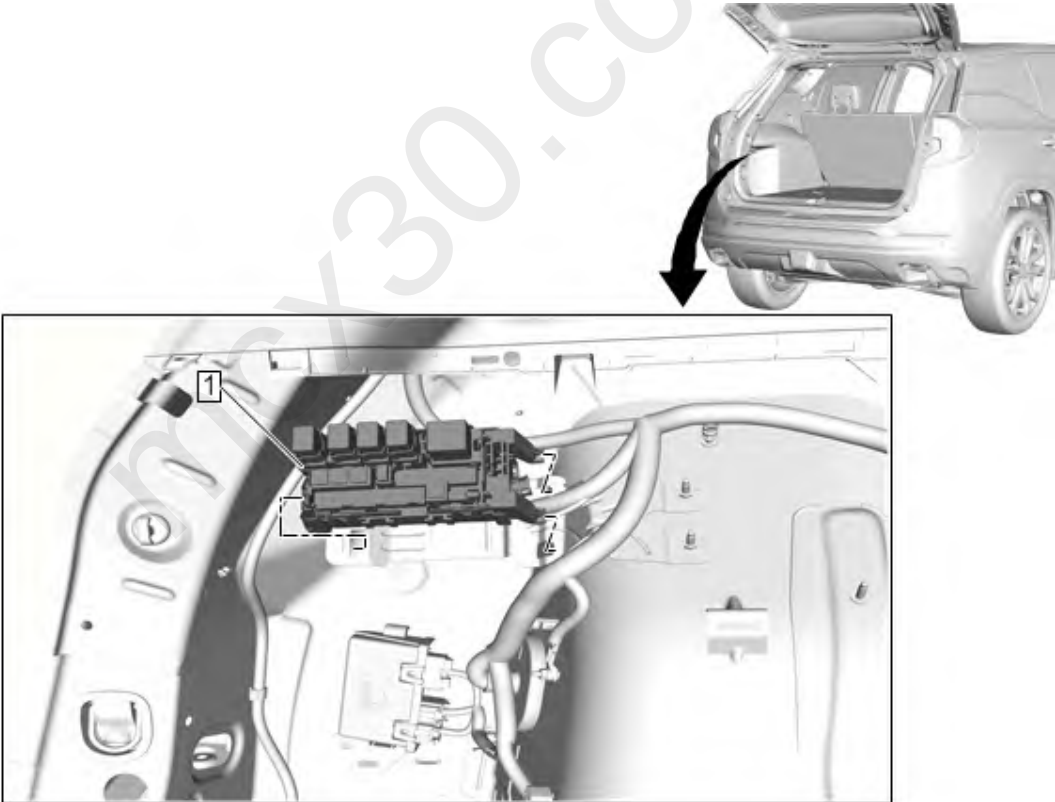


**Fig. 231: Rear Body Fuse Block (Equinox)**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout | Component Name |
|---------|----------------|
|         |                |

| Callout                                                                                                                                                                                                                                                                                                                                                  | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b> <ol style="list-style-type: none"> <li>1. Disconnect Battery Negative Cable. Refer to <a href="#">Battery Negative Cable Disconnection and Connection (KL9)</a>.</li> <li>2. Remove the left side quarter lower rear trim panel. Refer to <a href="#">Quarter Lower Rear Trim Panel Replacement (Left Side)</a>.</li> </ol> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 1                                                                                                                                                                                                                                                                                                                                                        | Rear Body Fuse Block <p><b>Procedure</b></p> <ol style="list-style-type: none"> <li>1. Release the rear retainer tab.</li> <li>2. Rotate the rear fuse block up and back to remove the fuse block from the bracket.</li> <li>3. Release the fuse block terminals. Refer to <a href="#">Terminal Removal</a></li> <li>4. Connect Battery Negative Cable. Refer to <a href="#">Battery Negative Cable Disconnection and Connection (KL9)</a>.</li> </ol> <p><b>NOTE:</b><br/>The rear fuse block is part of the body harness.</p> |

**REAR BODY FUSE BLOCK REPLACEMENT (TERRAIN)**

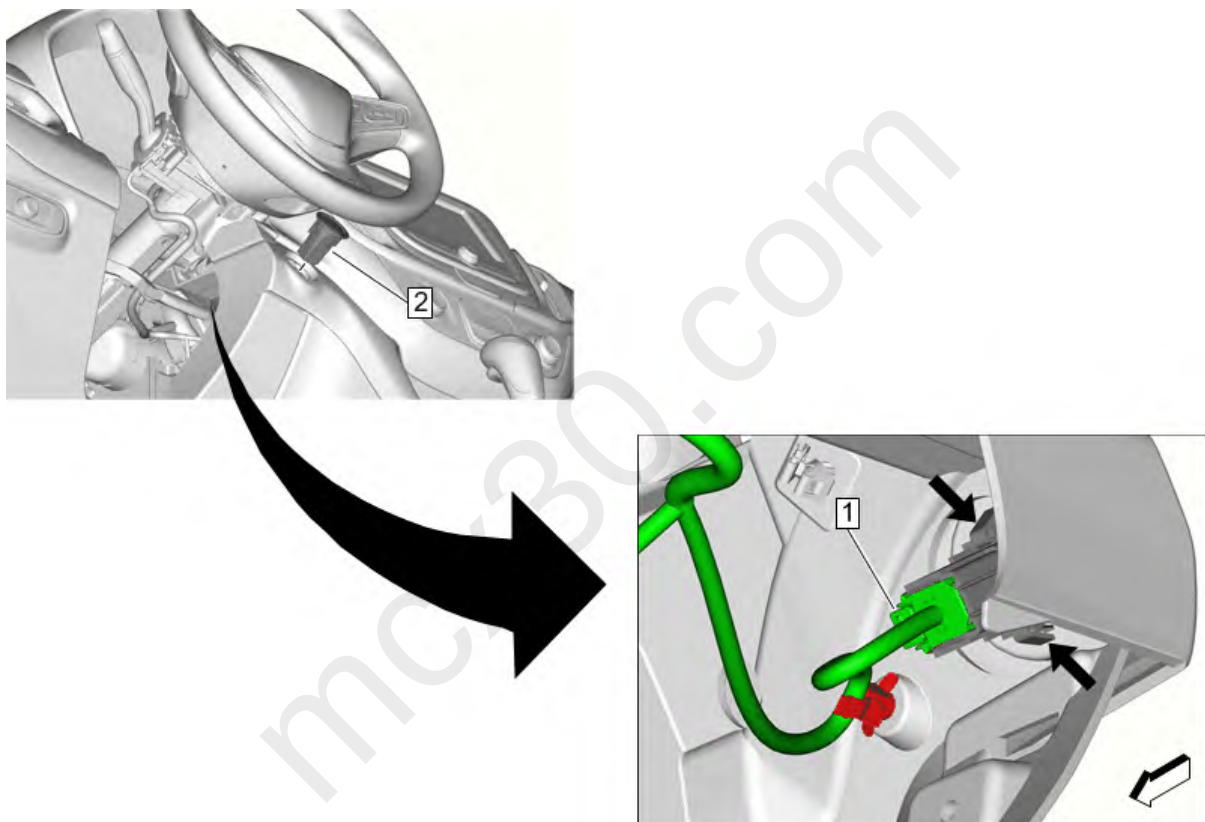


**Fig. 232: Rear Body Fuse Block (Terrain).**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                                                                                                                                                                                                                                                      | Component Name |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>Preliminary Procedure</b> <ol style="list-style-type: none"> <li>1. Disconnect the battery negative cable. Refer to <a href="#">Battery Negative Cable Disconnection and Connection (KL9)</a>.</li> <li>2. Remove the left side quarter lower rear trim panel. Refer to <a href="#">Quarter Lower Rear Trim Panel Replacement (Left Side)</a>.</li> </ol> |                |

| Callout | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | <p>Rear Body Fuse Block</p> <p><b>Procedure</b></p> <ol style="list-style-type: none"> <li>1. Release the rear retainer tab.</li> <li>2. Rotate the rear fuse block up and back to remove the fuse block from the bracket.</li> <li>3. Release the fuse block terminals. Refer to <a href="#">Terminal Removal</a></li> <li>4. Connect the battery negative cable. Refer to <a href="#">Battery Negative Cable Disconnection and Connection (KL9)</a></li> </ol> <p><b>NOTE:</b><br/>The rear fuse block is part of the body harness.</p> |

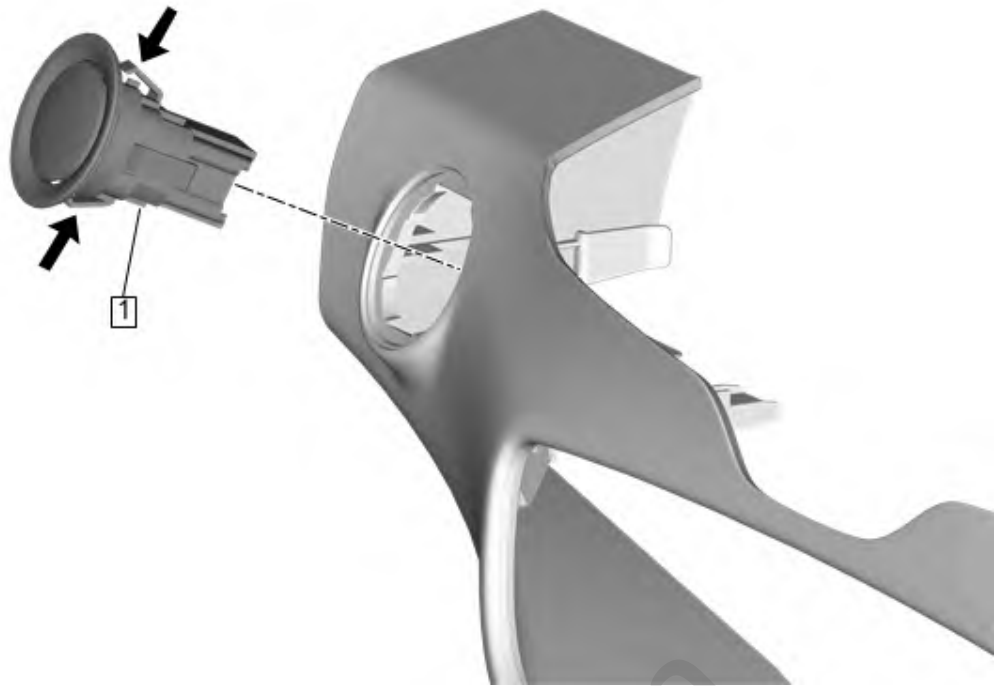
## IGNITION AND START SWITCH REPLACEMENT (EQUINOX)



**Fig. 233: Ignition And Start Switch (Equinox)**  
Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                                                          | Component Name                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Preliminary Procedure</b><br/>Remove Steering Column Lower Trim Cover. Refer to <a href="#">Steering Column Lower Trim Cover Replacement (Equinox)</a></p> |                                                                                                                                                             |
| 1                                                                                                                                                                | <p>Electrical Connector</p> <p><b>Procedure</b><br/>Disconnect the electrical connector.</p>                                                                |
| 2                                                                                                                                                                | <p>Ignition and Start Switch</p> <p><b>Procedure</b><br/>Squeeze the retaining tabs and push the ignition and start switch out of the instrument panel.</p> |

## IGNITION AND START SWITCH REPLACEMENT (TERRAIN)



**Fig. 234: Ignition And Start Switch (Terrain)**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                                                                | Component Name                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br>Remove Instrument Panel Trim Pad - Right Side. Refer to <a href="#">Instrument Panel Trim Pad Replacement - Right Side (Terrain)</a> . |                                                                                                                                           |
| 1                                                                                                                                                                      | Ignition and Start Switch<br><b>Procedure</b><br>Squeeze the retaining tabs and push the ignition and start switch out of the trim piece. |