

ELECTRICAL

Wiring Systems and Power Management - Repair Instructions - Canyon, Colorado

REPAIR INSTRUCTIONS

GMLAN AND MEDIA ORIENTED SYSTEMS TRANSPORT (MOST) WIRING REPAIRS

Special Tools

- **EL-38125-10** 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 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.

pt the pigtail is damaged, repair the wire by splicing in a new section of wire of the same gauge size (0.5 mm^2 , 0.8 mm^2 , 1.0 mm^2 etc.). Use the DuraSeal splice sleeves and **EL-38125-10** tool. For wiring repair, refer to [Splicing Copper Wire Using Splice Sleeves](#).

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^2 (22 AWG) wire with at least one twist per each $1 \frac{45}{64}$ inch (45 mm) and must not be untwisted for more than $3 \frac{15}{16}$ of an inch (10 cm).

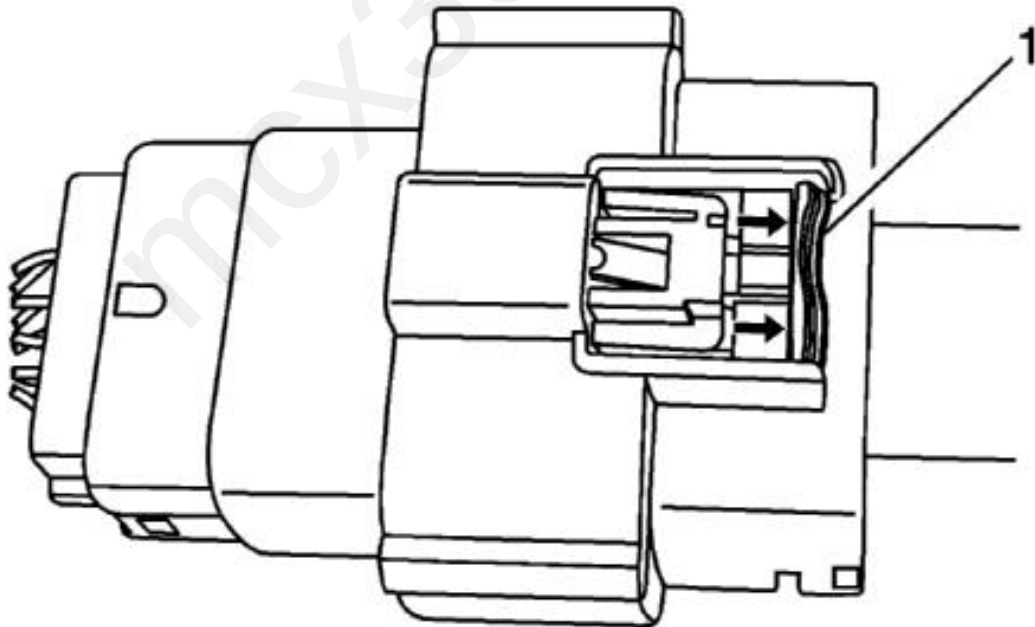
The following conditions need to be met to ensure a valid continuity:

- 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.

CPA CONNECTORS

Connector Removal Procedure



Pulling Out Red CPA (Connector Position Assurance) On Female Chassis Harness Signal Connector

Courtesy of GENERAL MOTORS COMPANY

1. Pull out the red CPA (Connector Position Assurance) [1] on the female chassis harness signal connector.

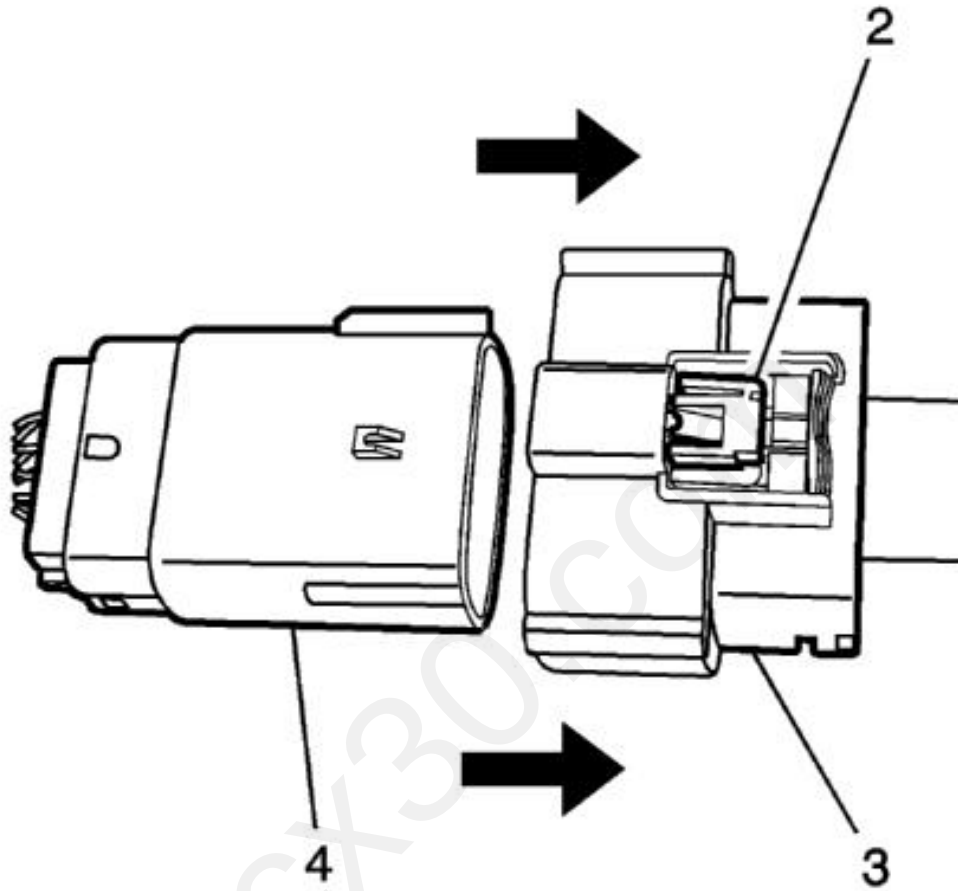


Fig. 2: Locking Tab (Pump Arm) And Male Pigtail Connector

Courtesy of GENERAL MOTORS COMPANY

2. Depress the connector locking tab (pump arm) [2] of this connector [3] to allow it to disengage from the male pigtail connector [4].
3. Pull on the female connector [3] to separate it from the male connector [4].

Connector Installation Procedure

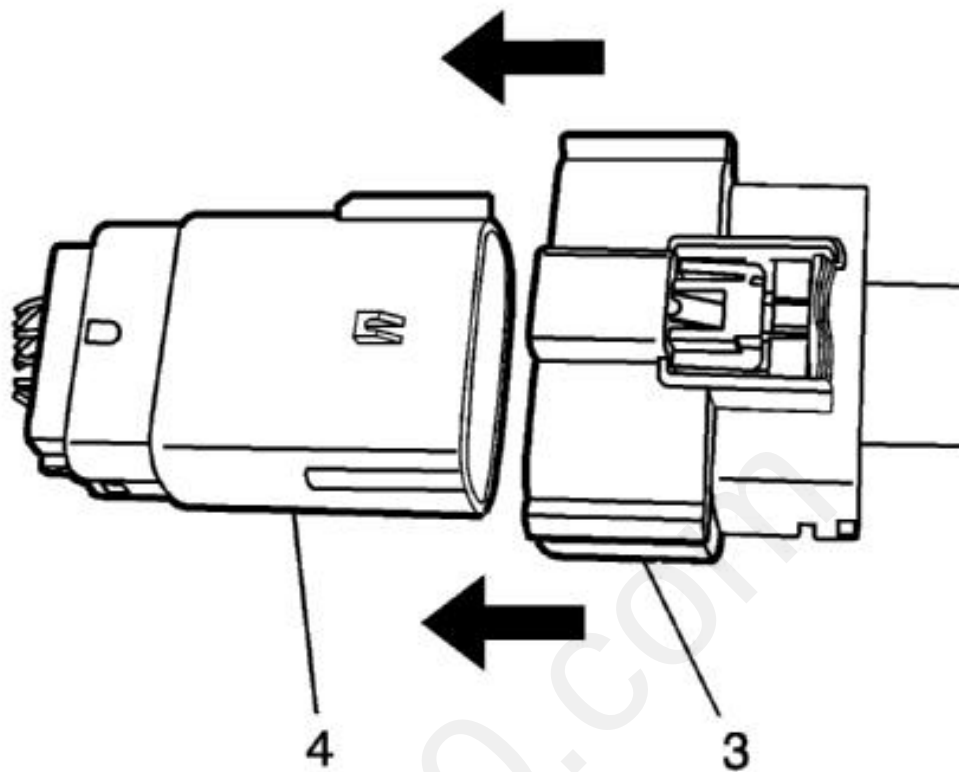


Fig. 3: Female Connector And Male Connector

Courtesy of GENERAL MOTORS COMPANY

1. Align the female connector [3] to the male connector [4] locking feature and push them together until fully engaged.

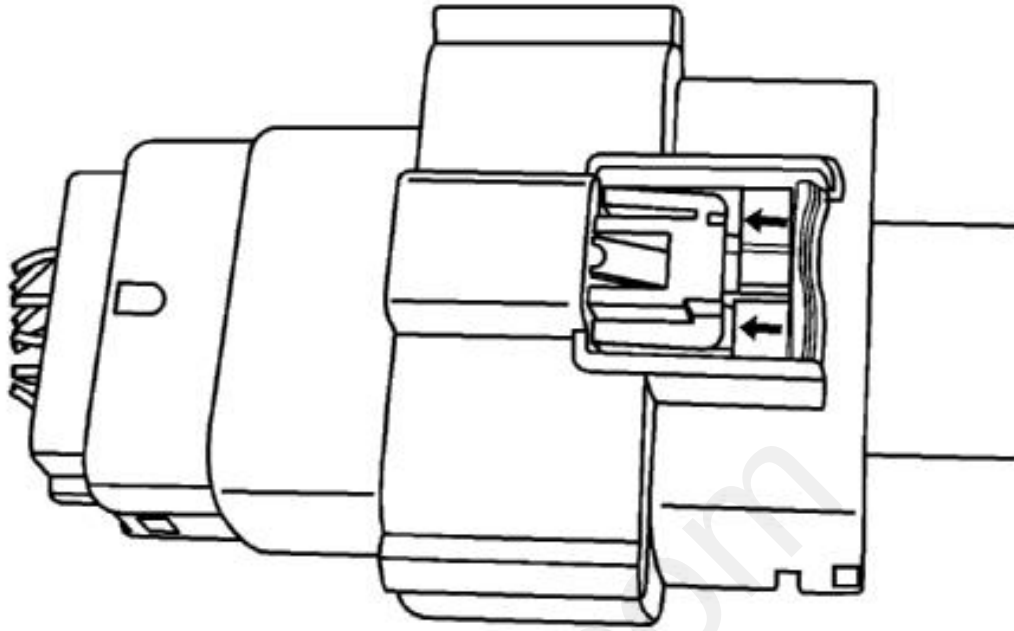


Fig. 4: Red CPA (Connector Position Assurance)

Courtesy of GENERAL MOTORS COMPANY

2. Push in the red CPA (Connector Position Assurance) on the female chassis harness signal connector to lock them securely.

DELPHI 40-WAY SEALED INLINE CONNECTOR REMOVAL

NOTE: This procedure can also be used to remove the yellow Delphi 48-way sealed inline connector.

Connector Removal Procedure

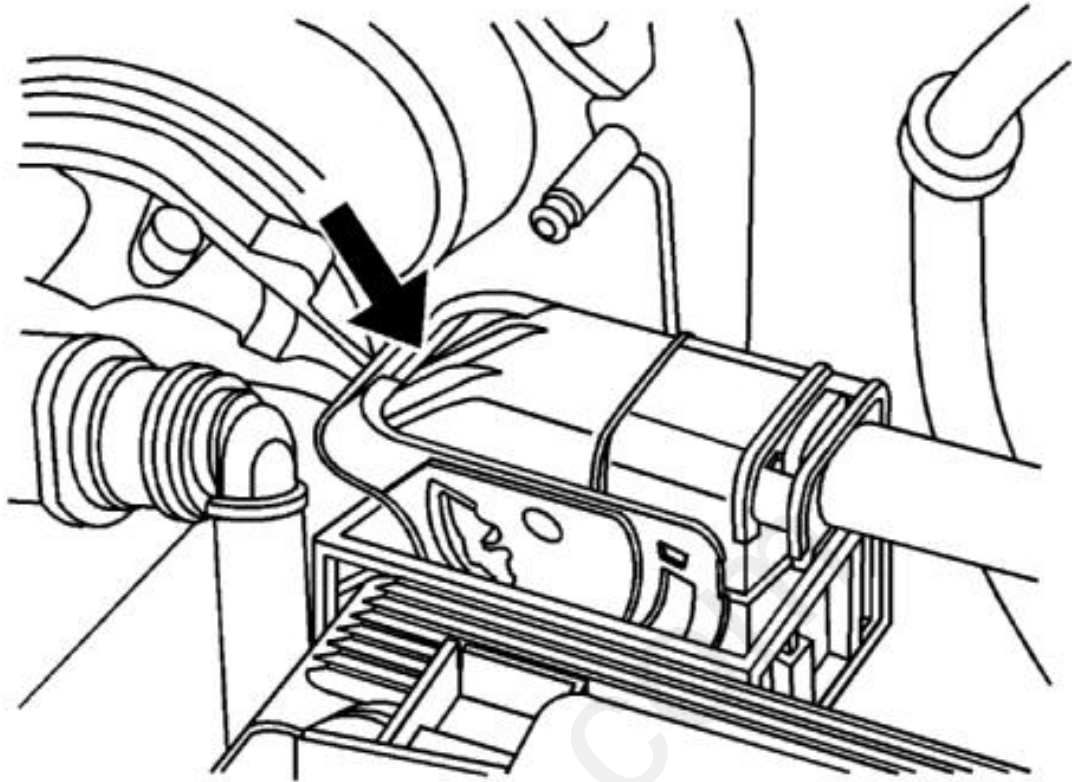


Fig. 5: CPA (Connector Position Assurance) Clip Down
Courtesy of GENERAL MOTORS COMPANY

1. Push CPA (Connector Position Assurance) clip down.

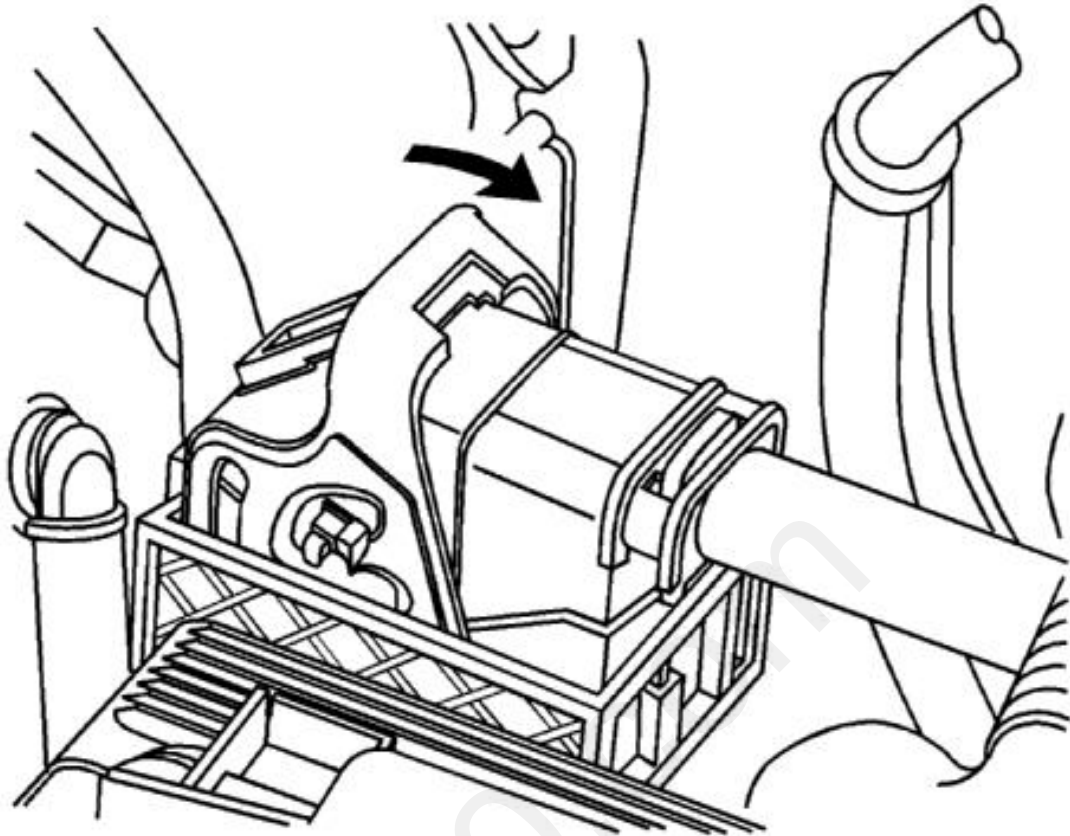


Fig. 6: Pulling Cam Lever Up Until Female Connector Is Disengaged From Its Mating Male Connector

Courtesy of GENERAL MOTORS COMPANY

2. Pull cam lever up until the female connector is disengaged from its mating male connector.

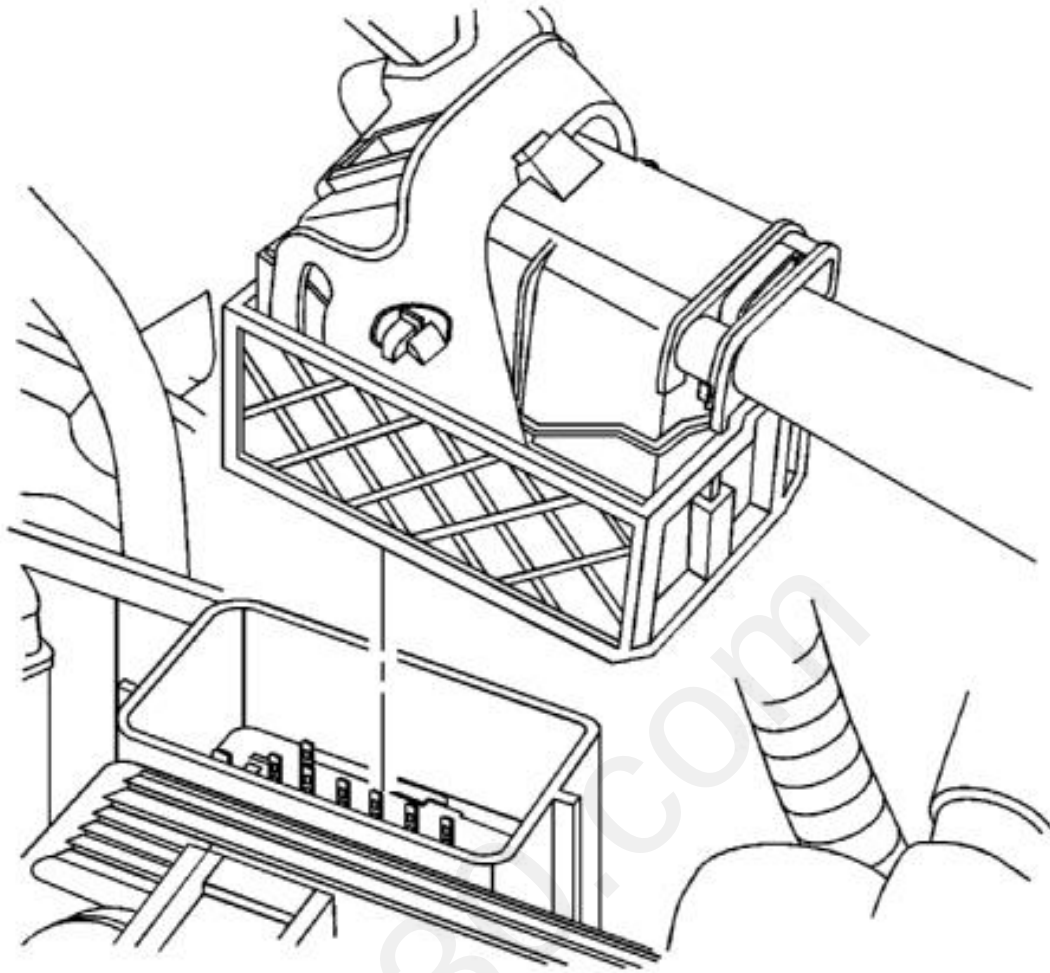


Fig. 7: Removing Female Connector From Male Connector

Courtesy of GENERAL MOTORS COMPANY

3. Remove the female connector from the male connector.

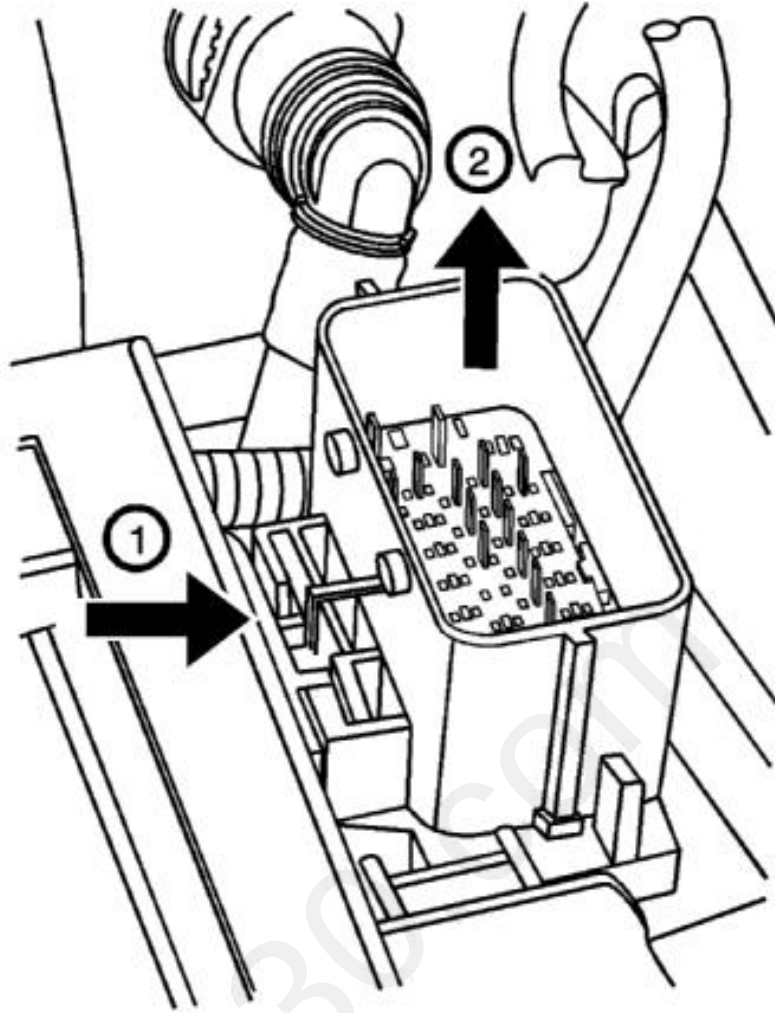


Fig. 8: Pulling Male Connector Up

Courtesy of GENERAL MOTORS COMPANY

4. Push tab in (1) and pull the male connector up (2).

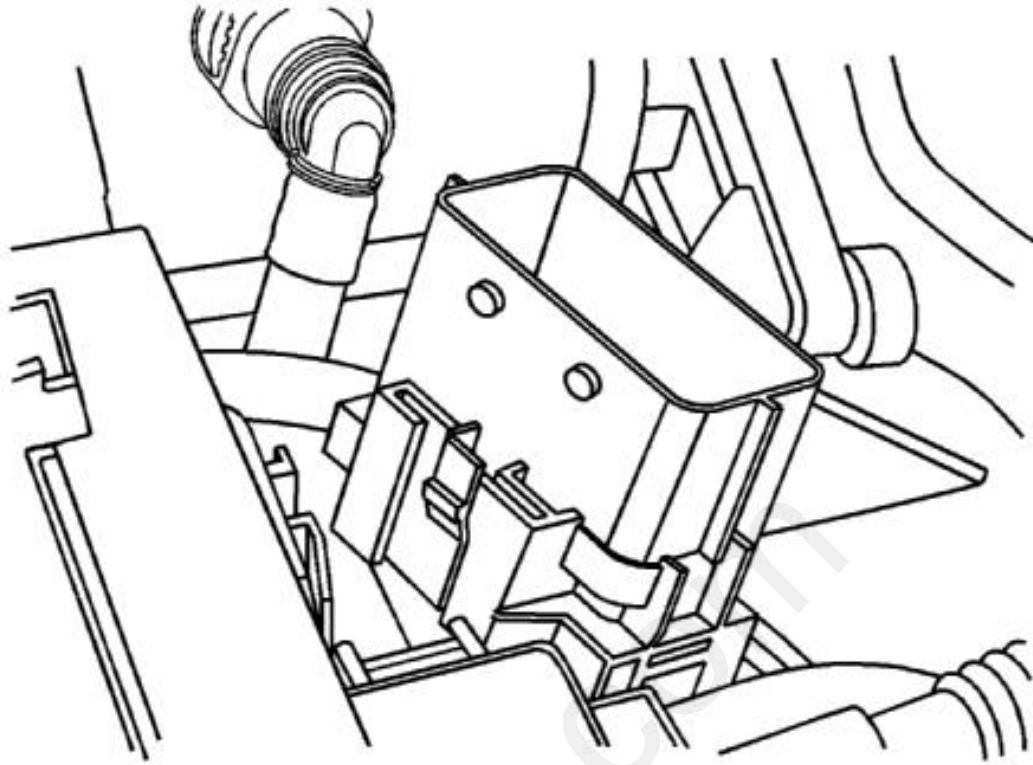


Fig. 9: Male connector is now detached from UBEC
Courtesy of GENERAL MOTORS COMPANY

5. Male connector is now detached from UBEC.

RELAY REPLACEMENT (ATTACHED TO WIRE HARNESS)

Removal Procedure

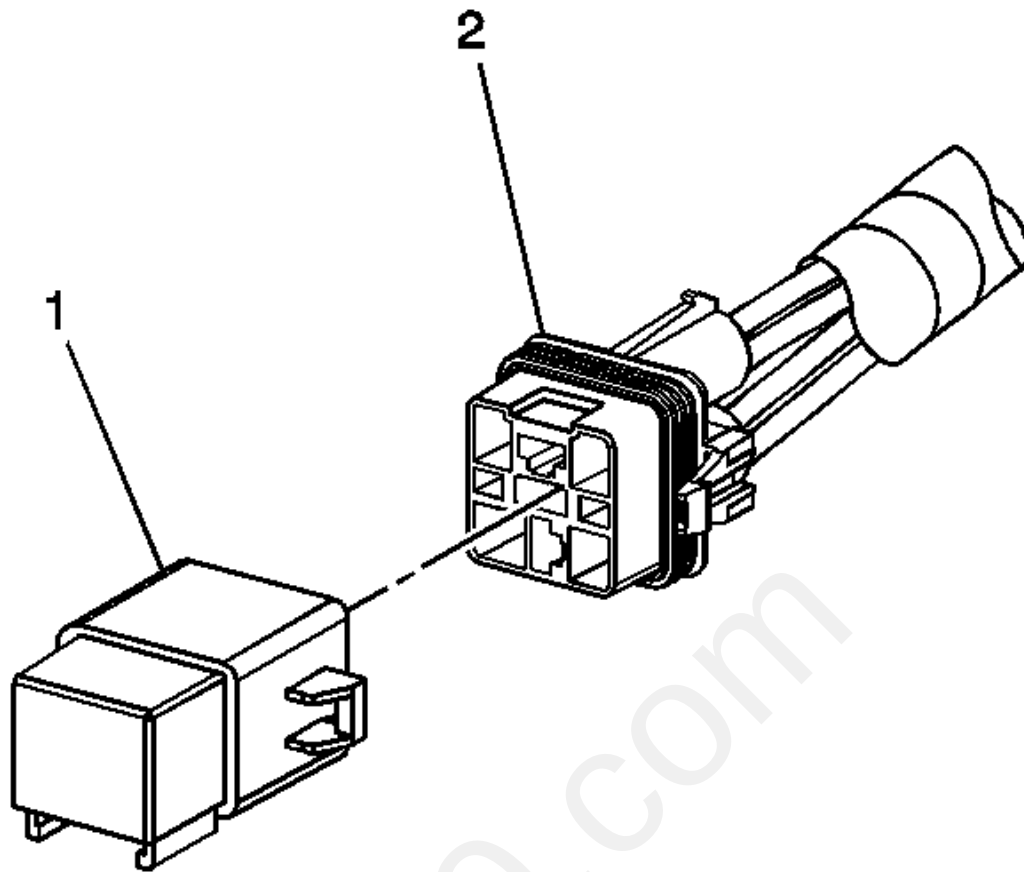


Fig. 10: Identifying Relay & Wire Harness Connector

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

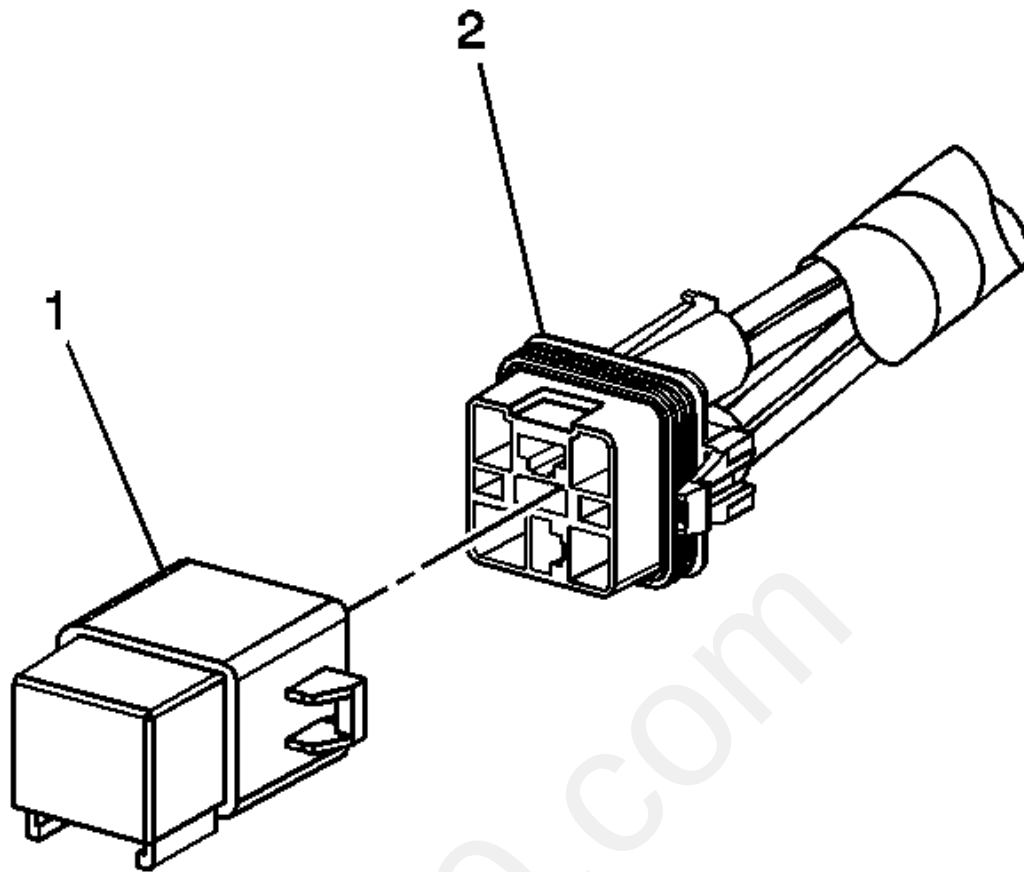


Fig. 11: Identifying Relay & Wire Harness Connector
Courtesy of GENERAL MOTORS COMPANY

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.

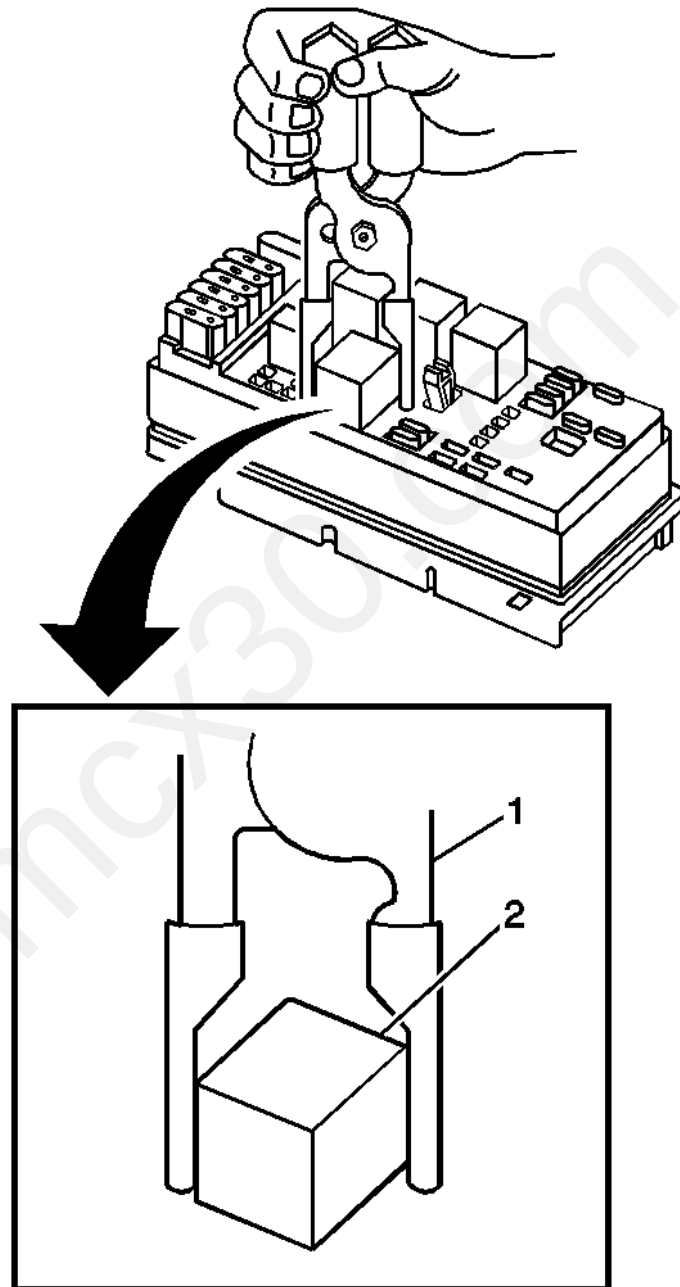


Fig. 12: Relay And Special Tool

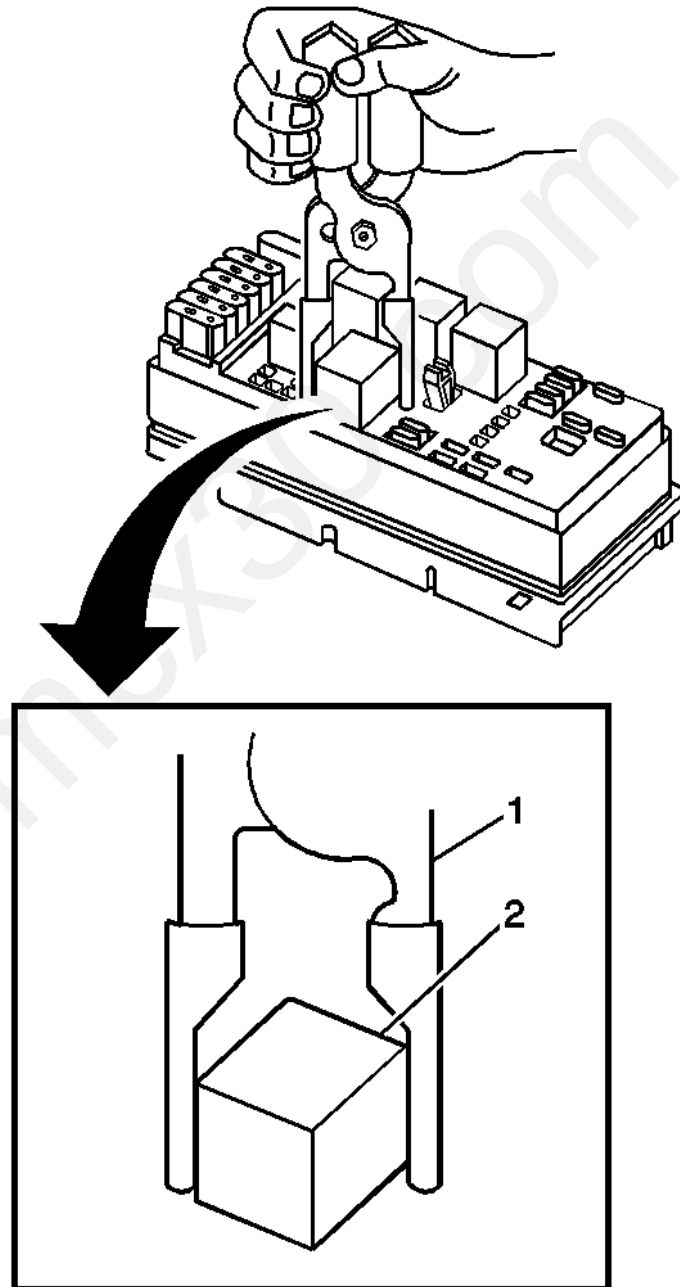
Courtesy of GENERAL MOTORS COMPANY

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



Relay And Special Tool

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.

he 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. [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: [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. [Testing for Intermittent Conditions and Poor Connections](#)
6. Install the electrical ground terminal to the new, conductive M7 bolt.

CAUTION: [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.

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. [Testing for Intermittent Conditions and Poor Connections](#)
8. Install the electrical ground terminal and new, conductive M6 bolt to the ground location.

CAUTION: [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. [Testing for Intermittent Conditions and Poor Connections](#)
8. Install the electrical ground terminal and new, conductive M8 bolt to the ground location.

[Fastener Caution](#)

IN: 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. 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: Fastener Caution

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. [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: [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.

FUSE BLOCK REPLACEMENT

Removal Procedure

1. Disconnect the battery negative cable. Refer to [Battery Negative Cable Disconnection and Connection](#) .

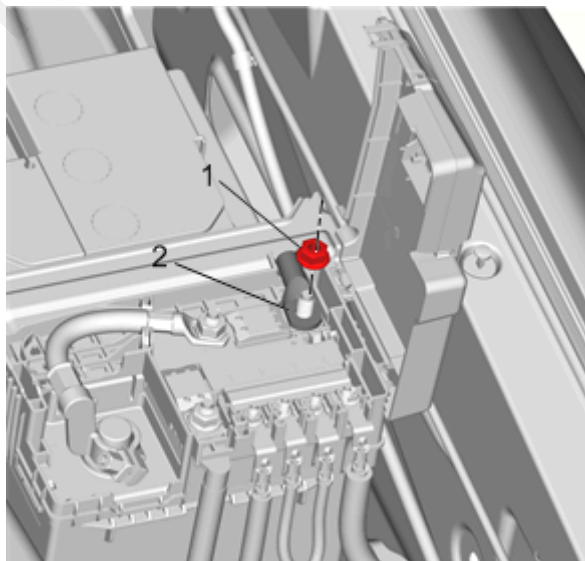


Fig. 14: Generator Cable And Cable Nut
Courtesy of GENERAL MOTORS COMPANY

fuse block cover.

3. Remove the starter and generator cable nut (1).
4. Reposition the starter and generator cable (2).

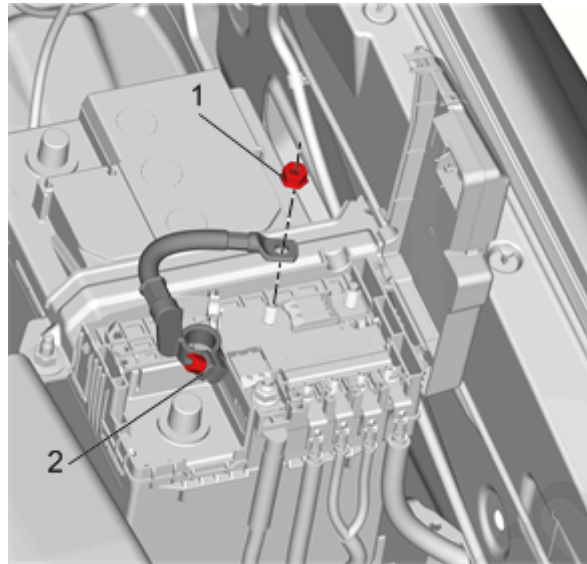


Fig. 15: Positive Battery Cable Nut

Courtesy of GENERAL MOTORS COMPANY

5. Remove the positive battery cable nut (1).
6. Loosen the positive battery cable nut and remove cable (2).

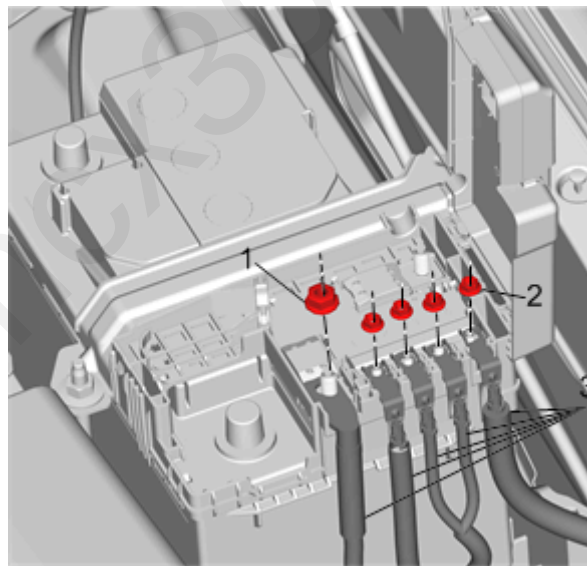


Fig. 16: Engine Wiring Harness Junction Block Cable Nut

Courtesy of GENERAL MOTORS COMPANY

7. Remove engine wiring harness junction block cable nut (1).
8. Remove the fuse block wiring harness terminal nuts (2).
9. Reposition the wiring harness terminals (3).

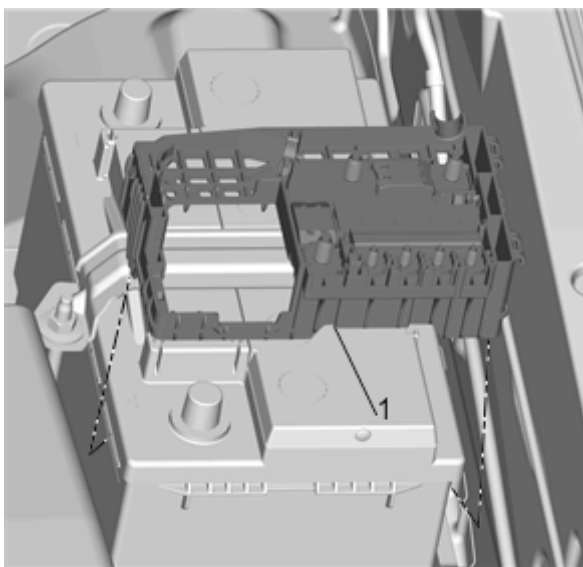


Fig. 17: Fuse Block Tabs

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

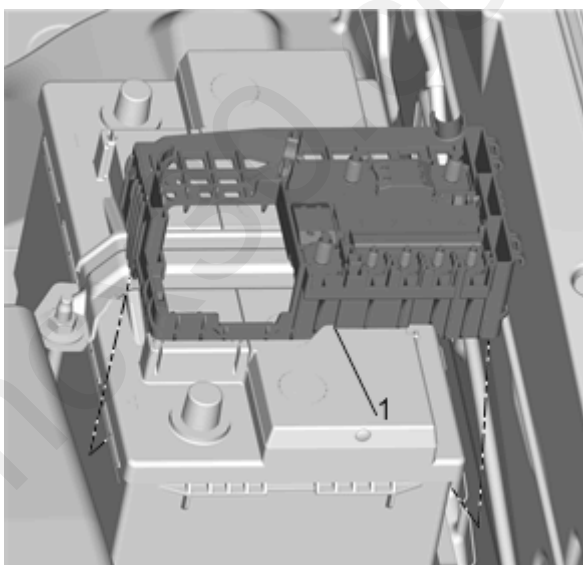


Fig. 18: Fuse Block Tabs

Courtesy of GENERAL MOTORS COMPANY

1. Position the junction block and tabs (1) to the battery.

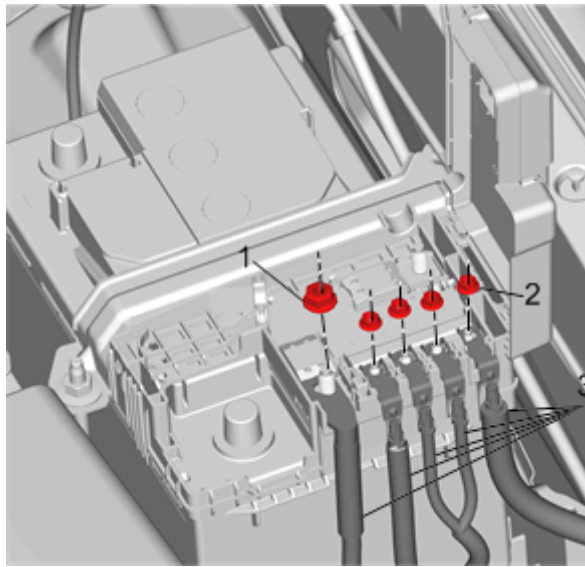


Fig. 19: Engine Wiring Harness Junction Block Cable Nut
 Courtesy of GENERAL MOTORS COMPANY

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

2. Position the fuse block wiring harness terminals to the fuse block (3).
3. Install the fuse block wiring harness terminal nuts (2) and tighten to 4.7 N.m (42 lb in).
4. Install the engine wiring harness junction block cable nut (1) and tighten to 10 N.m (89 lb in).

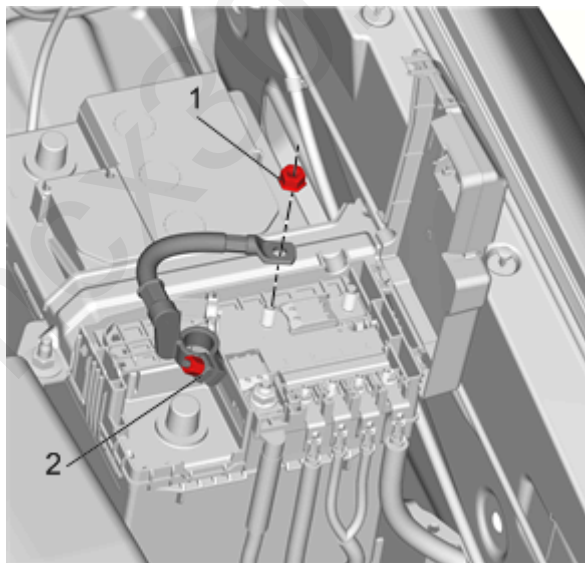


Fig. 20: Positive Battery Cable Nut
 Courtesy of GENERAL MOTORS COMPANY

5. Install the positive battery cable (2).
6. Install the positive battery cable nut (1) and tighten to 4.7 N.m (42 lb in).

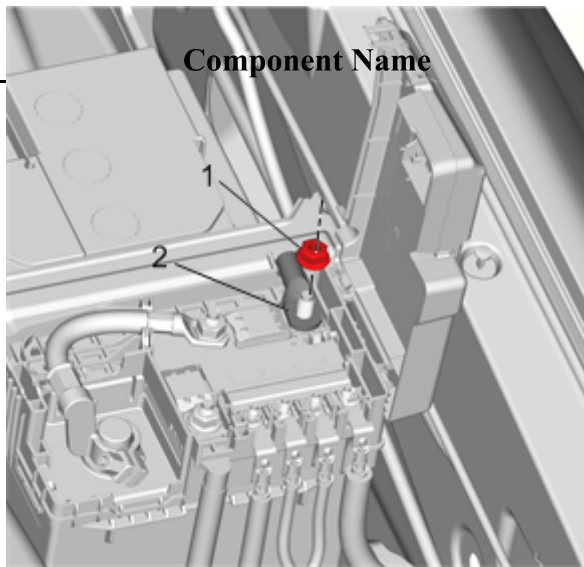


Fig. 21: Generator Cable And Cable Nut

Courtesy of GENERAL MOTORS COMPANY

7. Install the starter and generator cable (2).
8. Install the starter and generator cable nut (1) and tighten to 10 N.m (89 lb in).
9. Close the fuse block cover.
10. Connect the battery negative cable. Refer to [Battery Negative Cable Disconnection and Connection](#).

FRONT COMPARTMENT FUSE BLOCK COVER REPLACEMENT

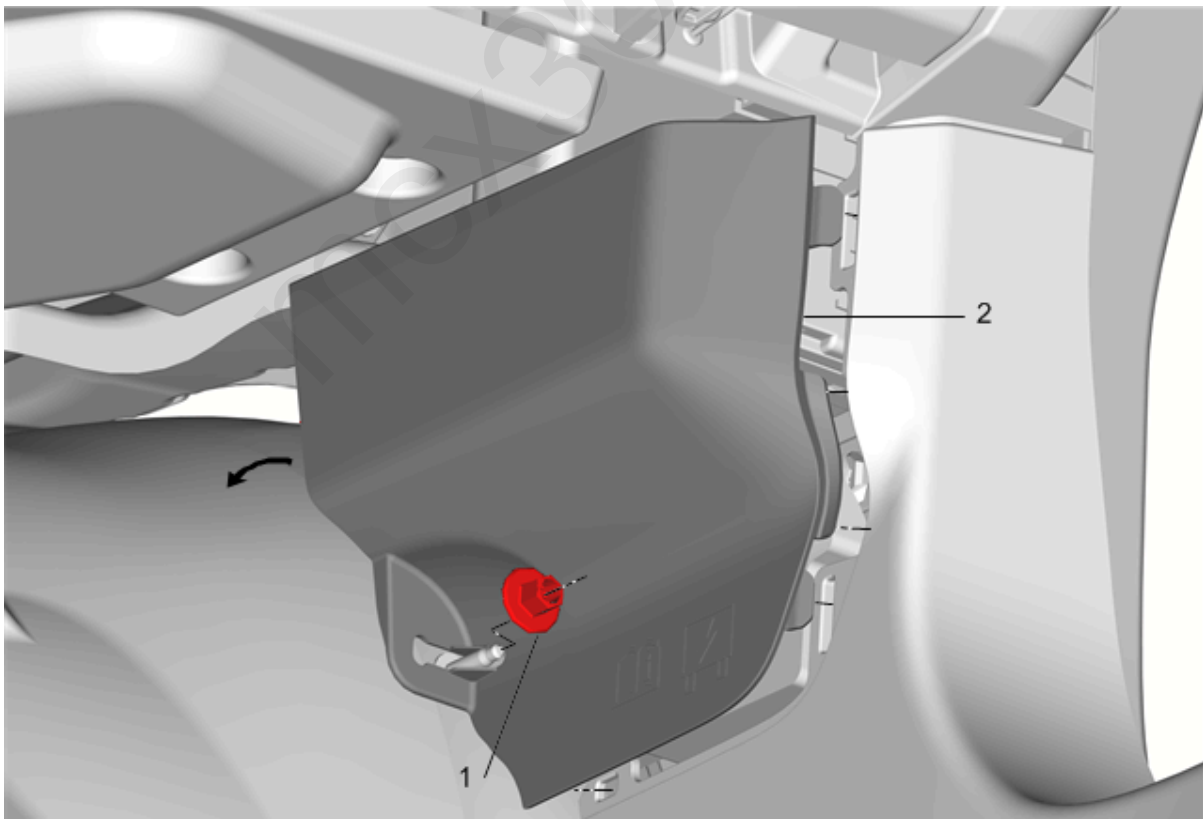


Fig. 22: Front Compartment Fuse Block Cover

Courtesy of GENERAL MOTORS COMPANY

Component Name	
Callout	Component Name
Preliminary Procedure Open the passenger side door to gain access to the front compartment fuse block cover on the right hand side lower hinge pillar.	
1	Front Compartment Fuse Block Cover Nut CAUTION: Refer to Fastener Caution . Tighten: 6 N.m (53 lb in)
2	Front Compartment Fuse Block Cover Procedure Grasp the left hand side of the front compartment fuse block cover and pull slightly to release the tab and swing out to the right and remove.

IGNITION LOCK CYLINDER REPLACEMENT

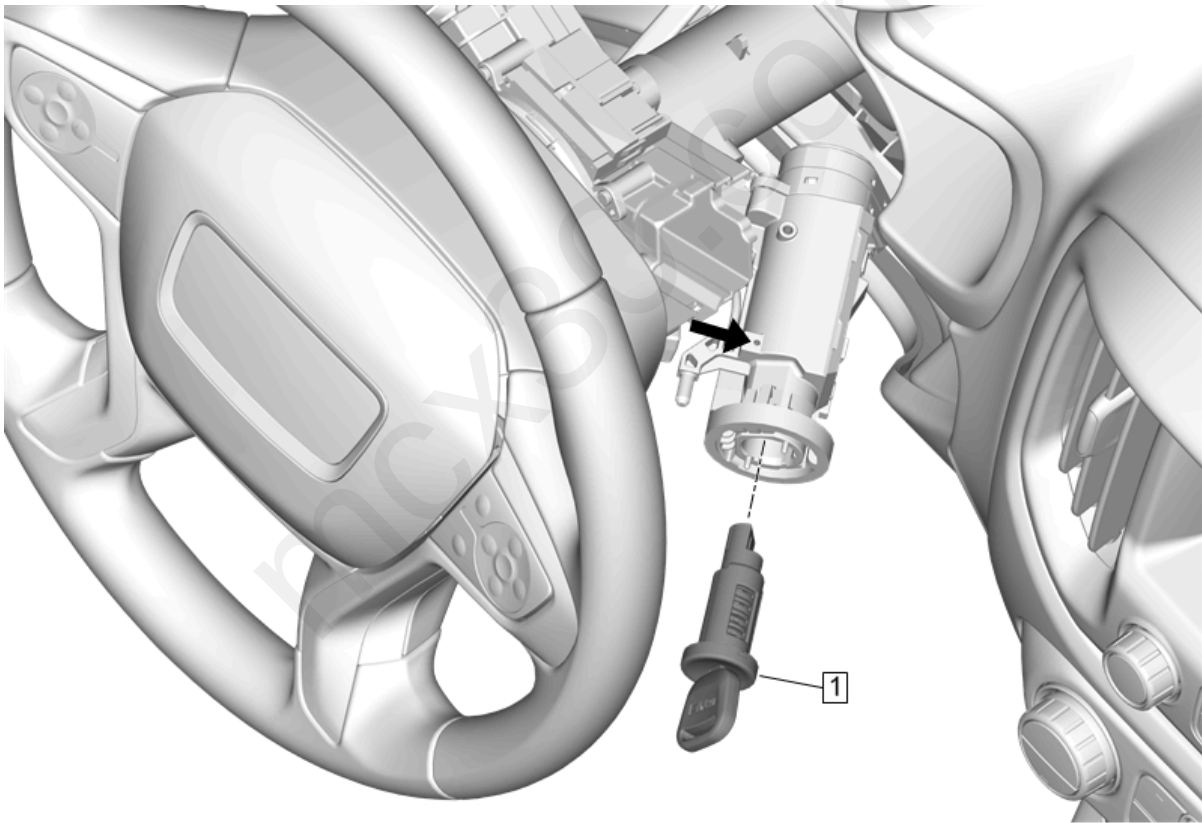


Fig. 23: Ignition Lock Cylinder
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Battery Negative Cable Disconnection and Connection 2. Steering Column Upper Trim Cover Replacement	

Component Name	
1	Ignition Lock Cylinder
	Procedure 1. Turn the ignition key to the RUN position. 2. Insert a pick-type tool into the proper hole on the ignition and start switch housing and press the lock tab on the ignition lock cylinder down while turning the cylinder to the START position. 3. Pull the ignition lock cylinder out of the ignition and start switch housing. 4. Code the NEW ignition lock cylinder. Lock Cylinder Coding - Ignition

IGNITION AND START SWITCH REPLACEMENT

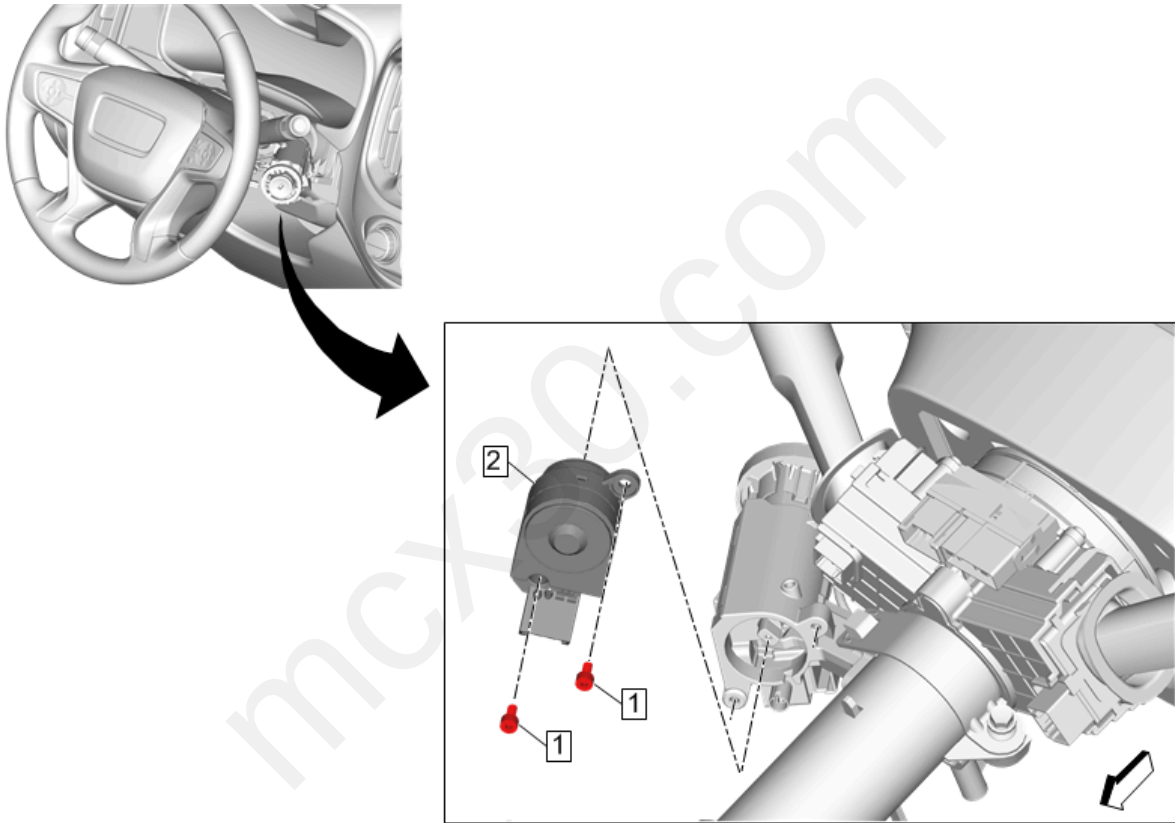


Fig. 24: Ignition and Start Switch

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Battery Negative Cable Disconnection and Connection 2. Steering Column Lower Trim Cover Replacement	

Component Name	
1	Ignition and Start Switch Bolt (Qty: 2) CAUTION: Refer to Fastener Caution . Tighten 2 N.m (18 lb in)
2	Ignition and Start Switch Procedure Disconnect the electrical connector.

IGNITION AND START SWITCH HOUSING REPLACEMENT

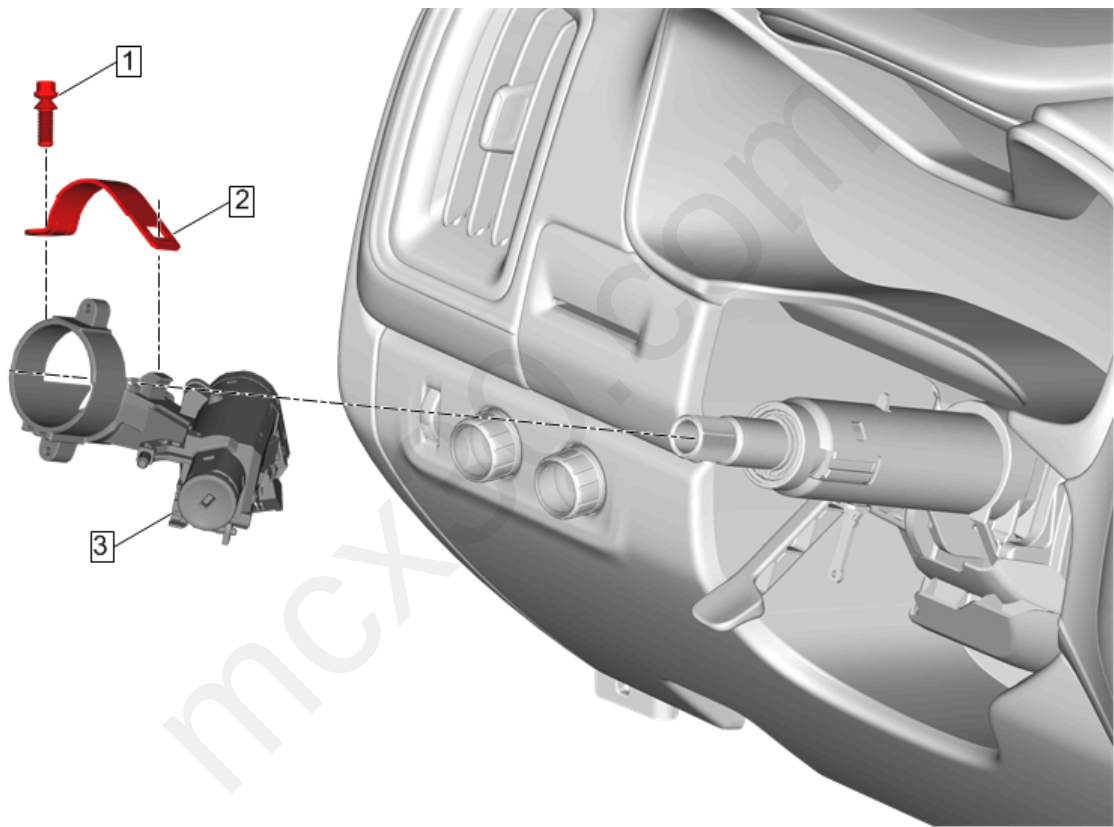


Fig. 25: Ignition and Start Switch Housing
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Turn Signal Switch Bracket Replacement	

Component Name

1	Ignition and Start Switch Housing Bolt CAUTION: Refer to Fastener Caution . Procedure 1. Use a small hammer and chisel to remove the OLD ignition and start switch housing bolt. - DISCARD the bolt. 2. Install the NEW ignition and start switch housing bolt and tighten until the bolt head breaks off.
2	Ignition and Start Switch Housing Strap
3	Ignition and Start Switch Housing Procedure 1. Disconnect the electrical connector. 2. Transfer components as necessary.