

2013 ELECTRICAL

Power Outlets - Malibu

SCHEMATIC WIRING DIAGRAMS

CIGAR LIGHTER/POWER OUTLET WIRING SCHEMATICS

Accessory Power Receptacle Wiring Schematics

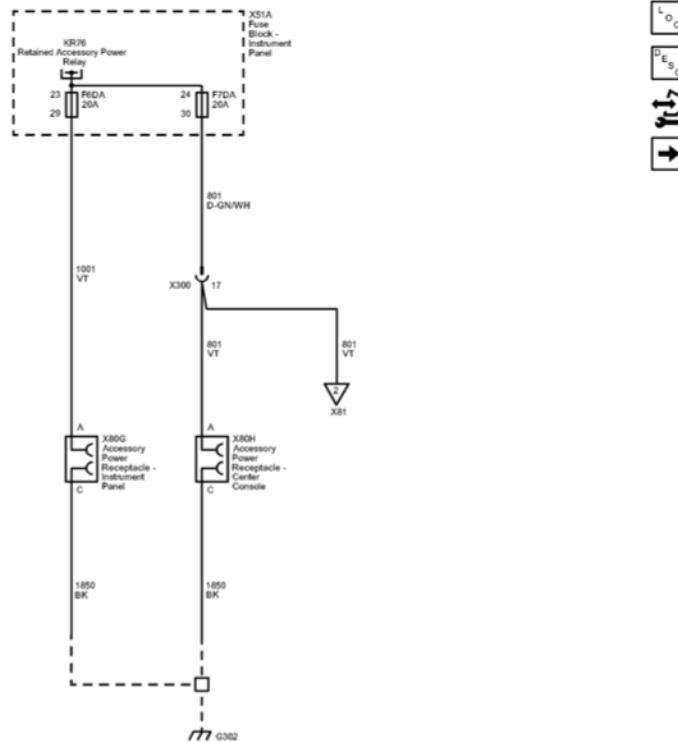


Fig. 1: Accessory Power Receptacle Wiring Schematics
Courtesy of GENERAL MOTORS COMPANY

110V AC Outlet (KV1) Wiring Schematics

Conditions and Poor Connections

Symptom List

Refer to **Power Outlet Receptacle Malfunction (12 Volt)**, **Power Outlet Receptacle Malfunction (110 Volt)** in order to diagnose the system.

POWER OUTLET RECEPTACLE MALFUNCTION (12 VOLT)

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	1	1	-	-
Ground	-	1	1	-
1. Accessory Power Receptacle Malfunction				

Circuit/System Description

The vehicle is fitted with a 12 V accessory power receptacle. The accessory power outlets are controlled by an ignition operated relay. The accessory power receptacle is operational when the ignition is turned to either the On or the Accessories positions.

Diagnostic Aids

It may be helpful to discuss with the customer the usage of any device that may have drawn too much current and caused an open fuse.

Reference Information

Schematic Reference

Cigar Lighter/Power Outlet Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Power Outlets Description and Operation

Electrical Information Reference

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

Circuit/System Verification

1. Ignition ON, connect an appropriate device to the X80 Accessory Power Receptacle.
2. Verify the device is powered by the X80 Accessory Power Receptacle.
 - **If the device is not powered**

Refer to Circuit/System Testing below

- **If the device is powered**
3. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the appropriate X80 Accessory Power Receptacle. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal C and ground.
 - **If greater than 10 ohms**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify that a test lamp illuminates between the control circuit terminal A and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the control circuit end to end.
 - If greater than 2 ohms, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is not open and there is voltage at the fuse. Refer to **Retained Accessory Power Malfunction** .
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Ignition OFF.
 2. Test for infinite resistance between the control circuit terminal A and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.

- If infinite resistance, replace the appropriate X80 Accessory Power Receptacle.
- **If the test lamp illuminates**

5. Test or replace the X80 Accessory Power Receptacle.

Repair Instructions

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

Accessory Power Receptacle Replacement (Cigar Lighter), Accessory Power Receptacle Replacement (120 Volt).

POWER OUTLET RECEPTACLE MALFUNCTION (110 VOLT)

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	1	1	-	-
Ignition	1	1	-	-
AC Terminal 2	1	1	1	-
AC Terminal 7	1	1	1	-
Signal	1	1	2	-
Ground	-	1	-	-
1. Accessory DC/AC Power Inverter Module Always OFF 2. Accessory DC/AC Power Inverter Module Always ON				

Circuit/System Description

The accessory DC/AC power inverter module converts 12 V direct current (DC) battery voltage to 110-120 V alternating current (AC) in order to operate AC powered devices. The accessory DC/AC power inverter module provides up to 150 watts of power. The accessory DC/AC power inverter module is connected to a chassis ground circuit and receives fuse protected battery voltage.

The accessory power receptacle has an internal switch, that detects when an AC powered device is plugged into the receptacle. When the ignition is ON and an AC powered device is plugged into the accessory power receptacle, the normally open switch in the accessory power receptacle, closes. When the accessory DC/AC power inverter module detects the voltage from the accessory power receptacle switch, the inverter module begins to supply 110-120 V AC to the accessory power receptacle - 110V AC after a 1.5 s delay.

Reference Information

Schematic Reference

Cigar Lighter/Power Outlet Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Power Outlets Description and Operation

Electrical Information Reference

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

Circuit/System Verification

1. Ignition ON.
2. Connect an AC powered device to the X81 Accessory Power Receptacle - 110V AC.
3. Verify the T1 Accessory DC/AC Power Inverter Module is turned ON and the device works as expected.
 - **If the device is not powered**

Refer to Circuit/System Testing below.
 - **If the device is powered**
4. All OK.

Circuit/System Testing

WARNING: To help avoid personal injury, always treat the accessory power receptacle, accessory DC/AC power inverter module, AC circuit wires, and connectors as if AC high-voltage is present.

1. Ignition OFF, scan tool disconnected, ignition key removed. Wait for 2 min. Nothing plugged into the X81 Accessory Power Receptacle - 110V AC, disconnect the harness connector at the T1 Accessory DC/AC Power Inverter Module.
2. Test for less than 10 ohms between the ground circuit terminal 11 and ground.
 - **If greater than 10 ohms**
 1. Ignition OFF.

2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Verify that a test lamp illuminates between the B+ circuit terminal 6 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the B+ circuit end to end.
 - If greater than 2 ohms, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is not open and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Ignition OFF.
 2. Test for infinite resistance between the B+ circuit terminal 6 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the T1 Accessory DC/AC Power Inverter Module.
 - **If the test lamp illuminates**
4. Test for less than 1 V between the signal circuit terminal 12 and ground.
 - **If greater than 1 V**

Repair the short to voltage in the signal circuit.
 - **If less than 1 V**
5. Test for infinite resistance between the signal circuit terminal 12 and ground.
 - **If less than infinite resistance**

Repair the short to ground in the signal circuit.
 - **If infinite resistance**
6. Test for less than 1 V between the AC circuit terminals listed below and ground.
 - AC Terminal 2
 - AC Terminal 7
 - **If greater than 1 V**

Repair the short to voltage in the AC circuit.
 - **If less than 1 V**
7. Test for infinite resistance between the AC circuit terminals listed below and ground:
 - AC Terminal 2
 - AC Terminal 7
 - **If less than infinite resistance**

Repair the short to ground in the AC circuit.

- **If infinite resistance**

8. Disconnect X1 and X2 harness connectors at the X81 Accessory Power Receptacle - 110V.
9. Test for less than 2 ohms between the AC circuit terminals listed below:
 - X81 Accessory Power Receptacle - 110V AC terminal 3 X1 and the T1 Accessory DC/AC Power Inverter Module terminal 2.
 - X81 Accessory Power Receptacle - 110V AC terminal 3 X2 and the T1 Accessory DC/AC Power Inverter Module terminal 7.

- **If greater than 2 ohms**

Repair the open/high resistance in the AC circuit.

- **If less than 2 ohms**

10. Ignition ON.
11. Verify that a test lamp illuminates between the ignition voltage circuit terminal 1 X1 and ground.
 - **If the test lamp does not illuminate**
 1. Ignition OFF, disconnect the X4 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the control circuit terminal 12 X4 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If the test lamp illuminates**
12. Ignition OFF, connect all harness connectors at the X81 Accessory Power Receptacle - 110V AC. Connect a 110 V extension cord without a connected device to the X81 Accessory Power Receptacle - 110V AC, ignition ON.
13. Verify that a test lamp illuminates between the T1 Accessory DC/AC Power Inverter Module signal circuit terminal 12 and ground.
 - **If the test lamp does not illuminate**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the signal circuit end to end.
 - If greater than 2 ohms, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the X81 Accessory Power Receptacle - 110V AC.
 - **If the test lamp illuminates**
14. Test or replace the T1 Accessory DC/AC Power Inverter Module.

Component Testing

Accessory Power Outlet 110V AC

1. Ignition OFF, remove the X81 Accessory Power Receptacle - 110V AC.
2. Test for infinite resistance between terminal 3 X2 and terminal 3 X1.

- **If less than infinite resistance**

Replace X81 Accessory Power Receptacle - 110V AC.

3. Test for less than 2 ohms between the following terminals:
 - The terminal 3 X2 and the applicable receptacle terminal
 - The terminal 3 X1 and the applicable receptacle terminal
- **If greater than the 2 ohms**

Replace the X81 Accessory Power Receptacle - 110V AC.

4. Test for infinite resistance between terminal 1 X1 and terminal 1 X2.
 - **If less than the specified range**

Replace X81 Accessory Power Receptacle - 110V AC.

- **If infinite resistance**

5. Connect a 110 V extension cord without a connected device to the X81 Accessory Power Receptacle - 110V AC.
6. Test for less than 5 ohms between terminal 1 X1 and terminal 1 X2.
 - **If greater than the 5 ohms**

Replace the X81 Accessory Power Receptacle - 110V AC.

- **If less than 5 ohms**

7. All OK

Repair Instructions

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

Accessory AC and DC Power Control Module Replacement

REPAIR INSTRUCTIONS

ACCESSORY AC AND DC POWER CONTROL MODULE REPLACEMENT

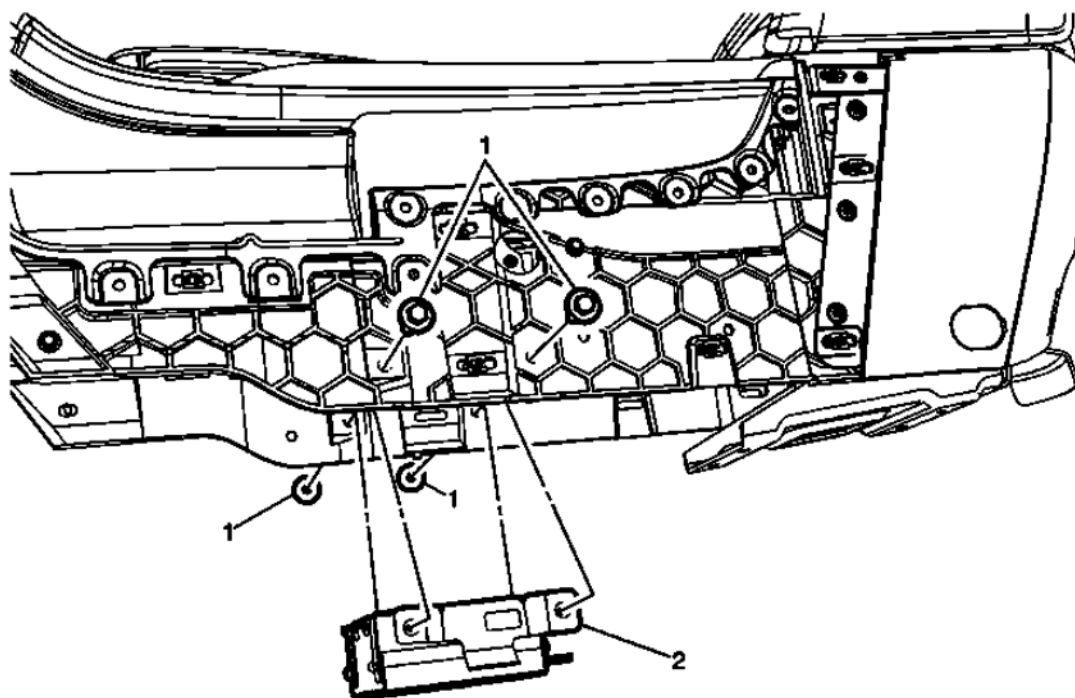


Fig. 3: Accessory AC and DC Power Control Module
 Courtesy of GENERAL MOTORS COMPANY

Accessory AC and DC Power Control Module Replacement

Callout	Component Name
Preliminary Procedures	
1. Disconnect the battery negative cable. Refer to Battery Negative Cable Disconnection and Connection . 2. Remove the front floor console. Refer to Front Floor Console Assembly Replacement .	
1	Accessory AC and DC Power Control Module Fastener (Qty: 4)
2	Accessory AC and DC Power Control Module Procedure 1. Disconnect the electrical connector. 2. Transfer components as necessary. 3. Program the accessory AC and DC power control module. Refer to Control Module References for programming and set up.

ACCESSORY POWER RECEPTACLE REPLACEMENT (CIGAR LIGHTER)

Special Tools

EL 42059 Cigar Lighter Socket Remover

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

Removal Procedure

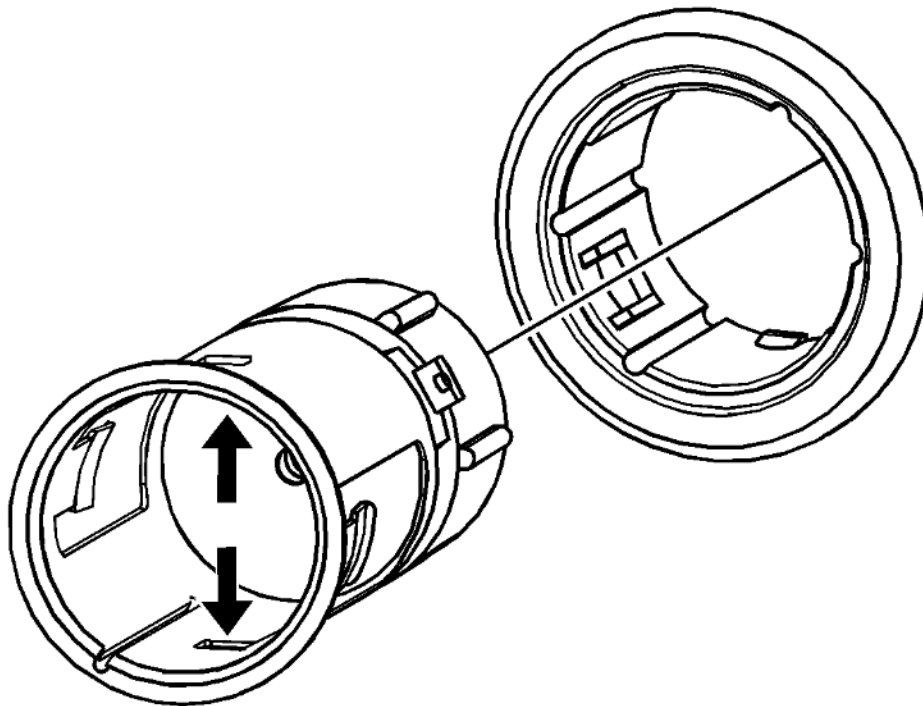


Fig. 4: View Of Cigar Lighter Socket/Accessory Power Outlet
Courtesy of GENERAL MOTORS COMPANY

1. Remove the auxiliary power outlet fuse from the fuse block.
2. Remove the receptacle:
 1. Look into the receptacle. There are two 3 mm (0.11 in) tab windows 12 mm (0.47 in) from the front of the receptacle. The **EL 42059** Remover pushes the plastic latches from these tab windows and the receptacle can be pulled straight out.
 2. Place one side of the "T" portion of the **EL 42059** Remover into the tab window. The **EL 42059** Remover will not fit straight into the receptacle. Angle the **EL 42059** Remover slightly for insertion into the receptacle.
 3. Insert the other side of the "T" into the opposite tab window.

You must move the **EL 42059** Remover handle toward horizontal to engage the other tab window.

4. Use the **EL 42059** Remover to pull the receptacle straight out.

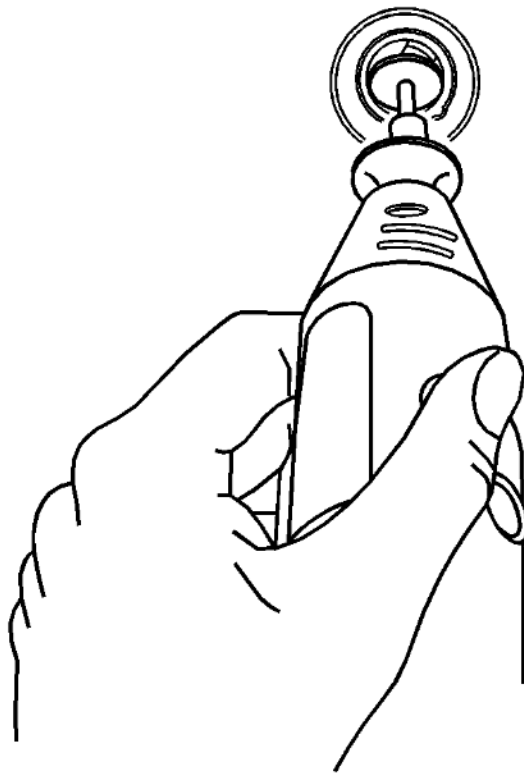


Fig. 5: Removing Cigar Housing Using Grinding Tool
Courtesy of GENERAL MOTORS COMPANY

3. If **EL 42059** Remover tool fails to release the lighter socket from the retainer, perform the following alternate method:
 1. Insert a small grinding tool with a cutoff wheel into the socket.
 2. Remove the plastic latches in the 3 mm (0.11 in) square windows.
 3. Use the **EL 42059** Remover as directed above to remove the socket.

Installation Procedure

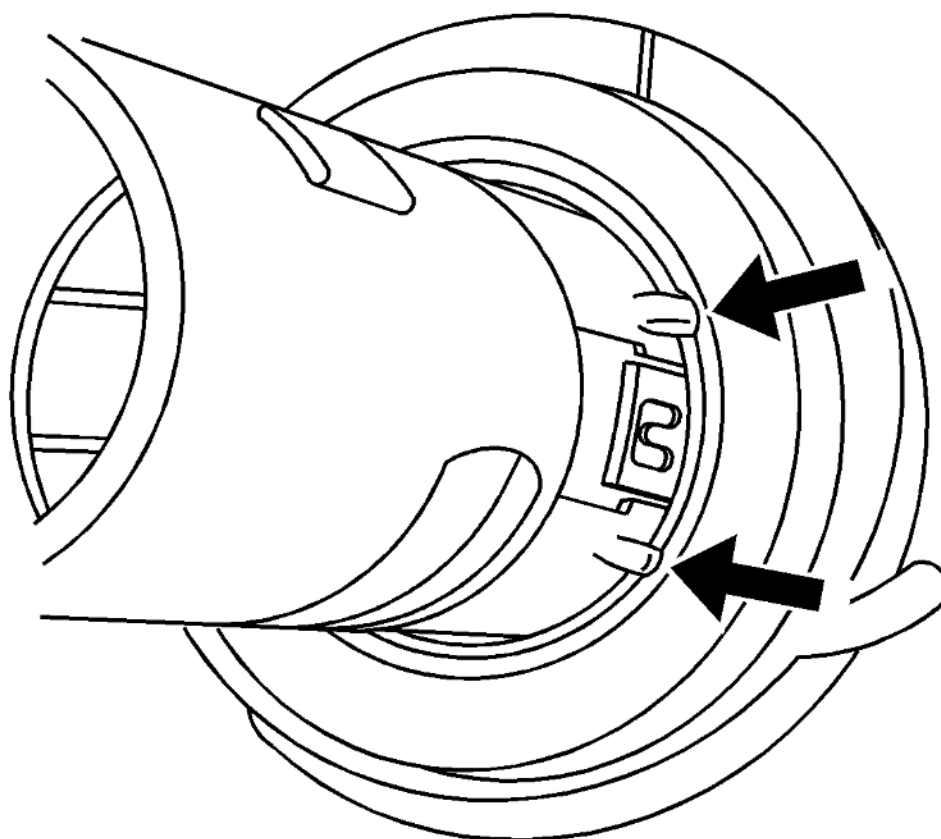


Fig. 6: View Of Receptacle Tabs & Retainer Slots
Courtesy of GENERAL MOTORS COMPANY

1. Route the connector through the retainer. Align the accessory power receptacle retainer to the slot in the opening.
2. Install the retainer by pressing into place fully seated.
3. Connect the electrical connector to the receptacle.
4. Align the tabs on the receptacle to the slots in the retainer. Install the accessory power receptacle by pressing into place until fully seated.
5. Install the accessory power receptacle fuse.

ACCESSORY POWER RECEPTACLE REPLACEMENT (120 VOLT)

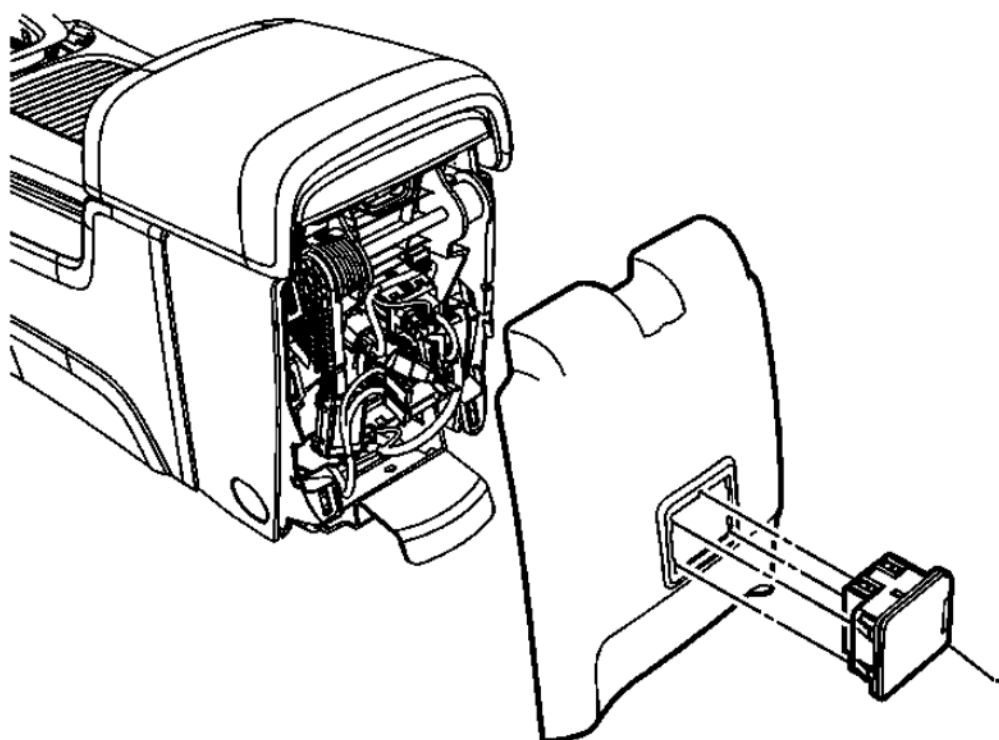


Fig. 7: Accessory Power Receptacle (120 Volt)
 Courtesy of GENERAL MOTORS COMPANY

Accessory Power Receptacle Replacement (120 Volt)

Callout	Component Name
Preliminary Procedure Remove the front floor console rear trim panel. Refer to <u>Front Floor Console Rear Trim Panel Replacement</u> .	
1	Accessory Power Receptacle Procedure 1. Disconnect the electrical connector. 2. Push in the tabs to release the accessory power receptacle.

DESCRIPTION AND OPERATION

POWER OUTLETS DESCRIPTION AND OPERATION

12 Volt Power Outlet Receptacle Description and Operation

The 12 V accessory power receptacles are supplied with power by the accessory relay.

The vehicle is fitted with a cigarette lighter and/or with a 12 V accessory power receptacle. The cigarette lighter and accessory power outlets are controlled by an ignition operated relay. The accessory power receptacle and

cigarette lighter are operational when the ignition is turned to either the On or the Accessories positions. To operate the cigarette lighter, press in the lighter knob. When the element is hot, the lighter automatically pops out and is ready for use.

110 Volt Power Outlet Receptacle System Description

Power Outlets Block Diagram

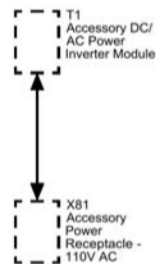


Fig. 8: Power Outlets Block Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
HW	Hard-Wired
T1	
X81	

The alternating current (AC) accessory power outlet system consists of the accessory DC/AC power inverter module and the accessory power receptacle - 110 V AC. The accessory DC/AC power inverter module converts 12 V direct current (DC) battery power to 110 V at 60 Hertz (Hz) AC power to operate AC powered devices. The accessory DC/AC power inverter module provides up to 150 watts of power. The accessory power receptacle - 110 V AC provides the usual connection for AC powered devices.

110 Volt Power Outlet Receptacle System Operation

The accessory DC/AC power inverter module receives fuse protected battery voltage and is connected to the 12 V electrical system ground. The accessory power receptacle - 110 V AC has an internal switch, that detects when an AC powered device is plugged into the outlet. When the ignition is ON, and an AC powered device is plugged into the accessory power receptacle - 110 V AC, the normally open switch in the accessory power receptacle - 110 V AC, closes. When the accessory DC/AC power inverter module detects the voltage from the accessory power receptacle - 110 V AC switch, the inverter module begins to supply 110 V AC to the accessory power receptacle - 110 V AC after a 1.5 s delay. The accessory AC power system is protected against circuit overload and circuit shorts to ground.

110 Volt Power Outlet Receptacle Isolation Fault Protection

The accessory DC/AC power inverter module contains a ground fault circuit interrupter (GFCI). GFCI monitors the 110 V circuit for a short to vehicle chassis ground. If a 110 V AC short to ground is detected, the accessory DC/AC power inverter module will turn OFF. The module remains OFF, until the AC powered device is unplugged from the outlet, and then plugged into the outlet after a 3 s delay.

110 Volt Power Outlet Receptacle Overload Shutdown

The accessory DC/AC power inverter module will turn OFF if the current in the 110 V circuit is greater than 3.8 A for 1 s, or 2.5 A for 10 s. The module will turn ON again, when the AC powered device is unplugged from the outlet, and then plugged into the outlet after a 3 s delay.

110 Volt Power Outlet Receptacle Internal Shutdown

The accessory DC/AC power inverter module will turn OFF if the B+ supply voltage is greater than 16.5 V or less than 11 V. The module will also turn OFF if the device temperature is greater than 85°C (185°F). The module will turn ON again, after the shutdown condition is corrected, and the AC powered device is unplugged from the outlet, and then plugged into the outlet.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/ Description
	EL 42059 Cigar Lighter Socket Remover