

2017 ELECTRICAL

Power Outlets - Impala

SPECIFICATIONS

FASTENER SPECIFICATIONS

Reusable Threaded Fastener Tightening Specifications

NOTE:

All fasteners listed in this table can be reused after removal.

Application	Specification
	Metric (English)
Wireless Charging System Module Bolt	1 N.m (9 lb in)

SCHEMATIC WIRING DIAGRAMS

CIGAR LIGHTER/POWER OUTLET WIRING SCHEMATICS

12 Volt DC Power Outlets and Wireless Charging

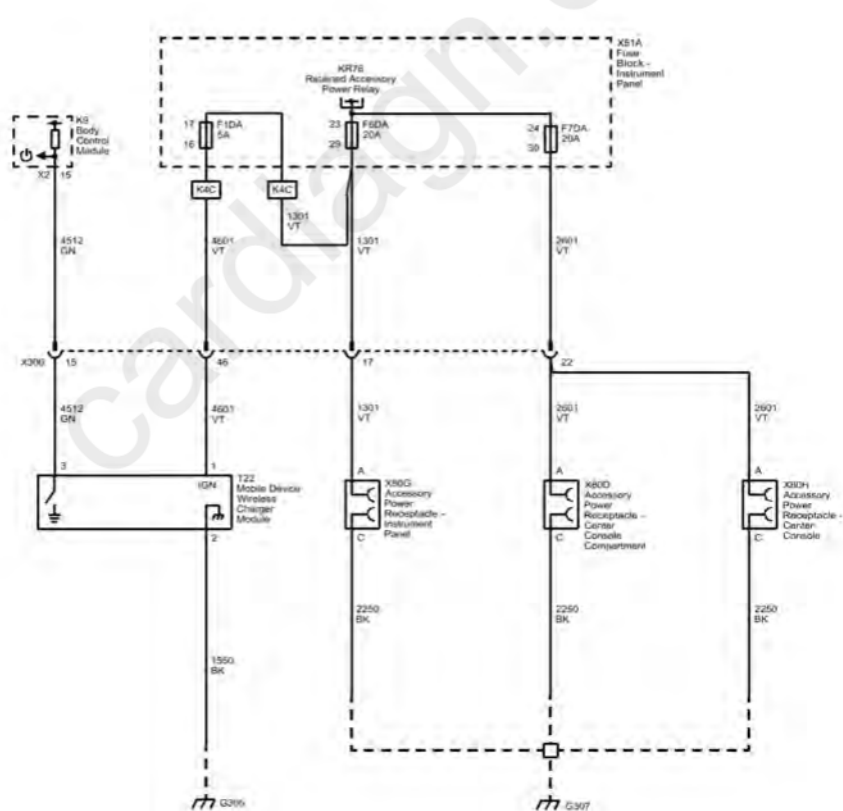


Fig. 1: 12 Volt DC Power Outlets and Wireless Charging
Courtesy of GENERAL MOTORS COMPANY

110V AC Power Outlet (KI6)

SYMPTOMS - MOBILE DEVICE WIRELESS CHARGER

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.
- Review the system description and operation in order to familiarize yourself with the system functions. Refer to [Mobile Device Wireless Charger Description and Operation](#).

Visual/Physical Inspection

- Inspect for aftermarket devices which can affect the operation of the power outlets. Refer to [Checking Aftermarket Accessories](#)
- Inspect the accessible system components or the visible system components for obvious damage or for obvious conditions which can cause the symptom.

Intermittent

Electrical connections or wiring may be the cause of intermittent conditions. Refer to [Testing for Intermittent Conditions and Poor Connections](#)

Symptom List

Refer to [Mobile Device Wireless Charger Malfunction \(with EL-51755\)](#) in order to diagnose the system.

SYMPTOMS - POWER OUTLETS

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.

Visual/Physical Inspection

- Inspect for aftermarket devices which can affect the operation of the power outlets. Refer to [Checking Aftermarket Accessories](#)
- Inspect the accessible system components or the visible system components for obvious damage or for obvious conditions which can cause the symptom.

Intermittent

Electrical connections or wiring may be the cause of intermittent conditions. Refer to [Testing for Intermittent Conditions and Poor Connections](#)

Symptom List

Refer to [Power Outlet Receptacle Malfunction \(12V\)Power Outlet Receptacle Malfunction \(110V\)Power Outlet Receptacle Malfunction \(230V\)](#) in order to diagnose the system.

MOBILE DEVICE WIRELESS CHARGER MALFUNCTION (WITH EL-51755)

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	1	1	-	-
Signal	3	2	-	-
Ground	-	1	-	-
1. T22 Mobile Device Wireless Charger Module=Inoperative 2. Wireless Charging Indicator=Off 3. Wireless Charging Indicator=On				

Circuit/System Description

For an overview of the component/system, refer to: [Mobile Device Wireless Charger Description and Operation](#)

Circuit	Description
Ignition	Supplied from a relay.
Signal	The control module input circuit has an internal resistance connected to 12 V. When the switch is closed it will pull the signal voltage low.
Ground	Chassis Ground

Component	Description
T22 Mobile Device Wireless Charger Module	Inductive charging, also known as "wireless charging", uses a magnetic field to transfer energy between two objects. The wireless charger has an induction coil to create an alternating magnetic field. A second induction coil in a portable device takes power from the magnetic field and converts it back into electric current to charge the battery. The two induction coils in proximity work similar as an electrical transformer.
K9 Body Control Module	The module controls various vehicle functions like lighting, central door locking, power windows, etc. The control module also reads various switches and sensors and makes their values available via serial data.

The T22 Mobile Device Wireless Charger Module is controlled by an ignition operated relay and is operational when the ignition is in the Accessory or On position. When a wireless charging device is placed on the charging pad/pocket the charging of the device battery will start. The K9 Body Control Module detects the device battery is charging and sends a serial data message to the P17 Info Display Module which illuminates the charge indicator.

Diagnostic Aids

- Verify the mobile device can be charged with the proper wireless charging adapter. To check for phone or other device compatibility, refer to GM Total Connect website.
- Verify the charging pad/pocket is free from debris or any obstruction that may impede charging.
- The component T22 contains an internal temperature switch that will open if it exceeds 85Â°C (185Â°F).
- The ambient operating temperature is between -20 and 60Â°C (-4 and 140Â°F) for the charging system and between 0 and 35Â°C (32 and 95Â°F) for the mobile device. If the mobile device temperature exceeds 35Â°C (95Â°F) the mobile device may stop accepting a charge (this may vary with different mobile devices).
- Verify the mobile device is positioned correctly on the charging pad/pocket and there are no foreign objects between the mat and the mobile device. It may be necessary to move the device around slightly or rotate 180 degrees to properly align it on the charging pad/pocket until the device starts to

charge. The use of a protective case may require more precise device placement to allow charging or may inhibit charging. Try removing the protective case.

- The mobile device may not charge if the charge mat is NOT completely flat or has an air gap which can be verified by a finger push at the target graphic located at the center of the mat. If the charge mat is NOT flat, replace the charge mat/rubber liner.
- While operating the vehicle in rough conditions, it is possible for the device to move out of position, repositioning of the device may be necessary.
- If the mobile device battery is fully charged, the charge indicator on the P17 Info Display Module may not illuminate.

Reference Information

Schematic Reference

Cigar Lighter/Power Outlet Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Mobile Device Wireless Charger Description and Operation

Electrical Information Reference

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

Special Tools

EL-51755 Inductive Charging Test Tool

Equivalent regional tools: Special Tools

Circuit/System Verification

WARNING: Remove all objects from the charging pad before charging your mobile device. Objects, such as coins, keys, rings, paper clips, or cards, between the phone and charging pad will become very hot. On the rare occasion that the charging system does not detect an object, and the object gets wedged between the phone and charger, remove the phone and allow the object to cool before removing it from the charging pad, to prevent burns.

1. Ignition - On / Vehicle - In Service Mode
2. Verify the charging pad is clear of any wireless device.

Verify the function: Wireless Charging Indicator=Off

- If the indicator is On

Refer to: Circuit/System Testing

- If the indicator is Off

NOTE: There is a charging coil located in the center of the Charging Pad/Pocket. The EL-51755 Inductive Charging Test Tool has a charging coil in the center of the tool. These coils must be aligned in order for the test tool to illuminate.

To complete successfully, the procedure may need to be repeated 5 times. Between each attempt, remove the tool and wait 3 s.

On a charging pad, align the EL-51755 Inductive Charging Test Tool against the alignment rib. In a pocket, insert the EL-51755 Inductive Charging Test Tool until it stops. For both the pad and pocket, ensure that the flat side (non-LED side) of the EL-51755 Inductive Charging Test Tool aligns against the flat charging surface.

3. Install the special tool: EL-51755 Inductive Charging Test Tool @ Charging Pad/Pocket

Verify the function: Special Tools LED (Light Emitting Diode) = On

- If the special tool is Off

Refer to: Circuit/System Testing

- If the special tool is On

4. Verify the function: Wireless Charging Indicator = On

- If the indicator is Off

Refer to: Circuit/System Testing

- If the indicator is On

NOTE: The customer's device may not be compatible or is defective.

5. All OK.

Circuit/System Testing

NOTE: It may take up to 2 min for all vehicle systems to power down before an accurate ground or low reference circuit continuity test can be performed.

1. Ignition/Vehicle & All vehicle systems - Off

2. Disconnect the electrical connector: T22 Mobile Device Wireless Charger Module

3. Test for less than 10 ohms between the test points: Ground circuit terminal 2 & Ground

- **If 10 ohms or greater**

1. Disconnect ground terminal.

2. Test for less than 2 ohms between the test points: Ground circuit terminal 2 @ Component harness & The other end of the circuit @ Ground terminal

- 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**

4. Ignition - On / Vehicle - In Service Mode

5. Verify a test lamp turns On between the test points: Ignition circuit terminal 1 & Ground

- **If the test lamp does not turn On and the circuit fuse is OK**

1. Remove - Test Lamp

2. Test for less than 2 ohms between the test points: Ignition circuit terminal 1 & Output terminal @ Fuse

- If 2 ohms or greater - Repair the open/high resistance in the circuit.
- If less than 2 ohms Refer to: **Retained Accessory Power Malfunction**

- **If the test lamp does not turn On and the circuit fuse is open**

1. Remove - Test Lamp

2. Test for infinite resistance between the test points: Ignition circuit terminal 1 & Ground

- If less than infinite resistance - Repair the short to ground on the circuit.

- If infinite resistance - Replace the component: T22 Mobile Device Wireless Charger Module.
 - **If the test lamp turns On**
6. Verify the function: Wireless Charging Indicator = Off
 - **If the indicator is On**
 1. Ignition/Vehicle - Off
 2. Disconnect the electrical connector: K9 Body Control Module
 3. Test for infinite resistance between the test points: Signal circuit terminal 3 @ Component harness & Ground
 - If less than infinite resistance - Repair the short to ground on the circuit.
 - If infinite resistance - Replace the component:K9 Body Control Module
 - **If the indicator is Off**
 7. Connect a 3 A fused jumper wire between the test points: Signal circuit terminal 3 & Ground circuit terminal 2
 8. Verify the function: Wireless Charging Indicator = On
 - **If the indicator is Off**
 1. Ignition/Vehicle - Off & Remove - Jumper wire(s)
 2. Disconnect the electrical connector: K9 Body Control Module
 3. Ignition - On / Vehicle - In Service Mode
 4. Test for less than 1 V between the test points: Signal circuit terminal 3 @ Component harness & Ground
 - If 1 V or greater - Repair the short to voltage on the circuit.
 - If less than 1 V
 5. Ignition/Vehicle - Off
 6. Test for less than 2 ohms between the test points: Signal circuit terminal 3 @ Component harness & The other end of the circuit @ Control module harness
 - If 2 ohms or greater - Repair the open/high resistance in the circuit.
 - If less than 2 ohms - Replace the component: K9 Body Control Module
 - **If the indicator is On**
 9. Test or replace the component: T22 Mobile Device Wireless Charger Module

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

[Wireless Charging System Module Replacement](#) - T22 Mobile Device Wireless Charger Module

POWER OUTLET RECEPTACLE MALFUNCTION (12V)

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
 - **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 Ω between the ground circuit terminal C and ground.
 - **If greater than 10 Ω**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
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 Ω in the control circuit end to end.
 - If greater than 2 Ω , repair the open/high resistance in the circuit.

- If less than 2 Ω , 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.

POWER OUTLET RECEPTACLE MALFUNCTION (110V)

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	B1445 02, U152D	1	-	-
AC Terminal 2	1	1	1	-
AC Terminal 7	1	1	1	-
Signal	B1445 02, U152D	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

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.
 - **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 Ω between the ground circuit terminal 11 and ground.
 - **If greater than 10 Ω**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
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 Ω in the B+ circuit end to end.
 - If greater than 2 Ω , repair the open/high resistance in the circuit.
 - If less than 2 Ω , 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 Ω 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 Ω**

Repair the open/high resistance in the AC circuit.

- **If less than 2 Ω**

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 Ω in the control circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , 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 Ω in the signal circuit end to end.
 - If greater than 2 Ω , repair the open/high resistance in the circuit.
 - If less than 2 Ω , 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 Ω between the following terminals:
 - The terminal 3 X2 and the appropriate receptacle terminal
 - The terminal 3 X1 and the appropriate receptacle terminal
 - **If greater than the 2 Ω**
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 Ω between terminal 1 X1 and terminal 1 X2.
 - **If greater than the 5 Ω**
Replace the X81 Accessory Power Receptacle - 110V AC.
 - **If less than 5 Ω**
7. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

[Control Module References](#) for accessory AC/DC power inverter module.

POWER OUTLET RECEPTACLE MALFUNCTION (230V)

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	-	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	B1445 02, U152D	1	-	-
AC Terminal 3	1	1	1	-
AC Terminal 7	1	1	1	-
Signal	B1445 02, U152D	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 220 - 230 V at 50 Hertz (Hz) 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 220 - 230 V AC to the accessory power receptacle - 220V 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 X81B Accessory Power Receptacle - 220V 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.
 - **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 X81B Accessory Power Receptacle - 220V AC, disconnect the harness connector at the T1 Accessory DC/AC Power Inverter Module.
2. Test for less than 10 Ω between the ground circuit terminal 11 and ground.
 - **If greater than 10 Ω**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
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 Ω in the B+ circuit end to end.
 - If greater than 2 Ω , repair the open/high resistance in the circuit.
 - If less than 2 Ω , 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 3
 - 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 3
 - 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 X81B Accessory Power Receptacle - 220V AC.
9. Test for less than 2 Ω between the AC circuit terminals listed below:
 - X81B Accessory Power Receptacle - 220V AC terminal 3 X1 and the T1 Accessory DC/AC Power Inverter Module terminal 3.
 - X81B Accessory Power Receptacle - 220V AC terminal 3 X2 and the T1 Accessory DC/AC Power Inverter Module terminal 7.
 - **If greater than 2 Ω**

Repair the open/high resistance in the AC circuit.
 - **If less than 2 Ω**
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 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If the test lamp illuminates**
12. Ignition OFF, connect all harness connectors at the X81B Accessory Power Receptacle - 220V AC. Connect a 110 V extension cord without a connected device to the X81B Accessory Power Receptacle - 220V 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 Ω in the signal circuit end to end.
 - If greater than 2 Ω , repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the X81B Accessory Power Receptacle - 220V AC.
 - **If the test lamp illuminates**
14. Test or replace the T1 Accessory DC/AC Power Inverter Module.

Component Testing

Accessory Power Outlet 220V AC

1. Ignition OFF, remove the X81B Accessory Power Receptacle - 220V AC.
2. Test for infinite resistance between terminal 3 X2 and terminal 3 X1.
 - **If less than infinite resistance**

Replace X81B Accessory Power Receptacle - 220V AC.
3. Test for less than 2 Ω between the following terminals:
 - The terminal 3 X2 and the appropriate receptacle terminal
 - The terminal 3 X1 and the appropriate receptacle terminal
 - **If greater than the 2 Ω**

Replace the X81B Accessory Power Receptacle - 220V AC.
4. Test for infinite resistance between terminal 1 X1 and terminal 1 X2.
 - **If less than the specified range**

Replace X81B Accessory Power Receptacle - 220V AC.

- **If infinite resistance**

5. Connect a 220 V extension cord without a connected device to the X81B Accessory Power Receptacle - 220V AC.

6. Test for less than 5 Ω between terminal 1 X1 and terminal 1 X2.

- **If greater than the 5 Ω**

Replace the X81B Accessory Power Receptacle - 220V AC.

- **If less than 5 Ω**

7. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- [Control Module References](#) for accessory AC/DC power inverter module replacement, programming and setup.

REPAIR INSTRUCTIONS

ACCESSORY AC AND DC POWER CONTROL MODULE REPLACEMENT

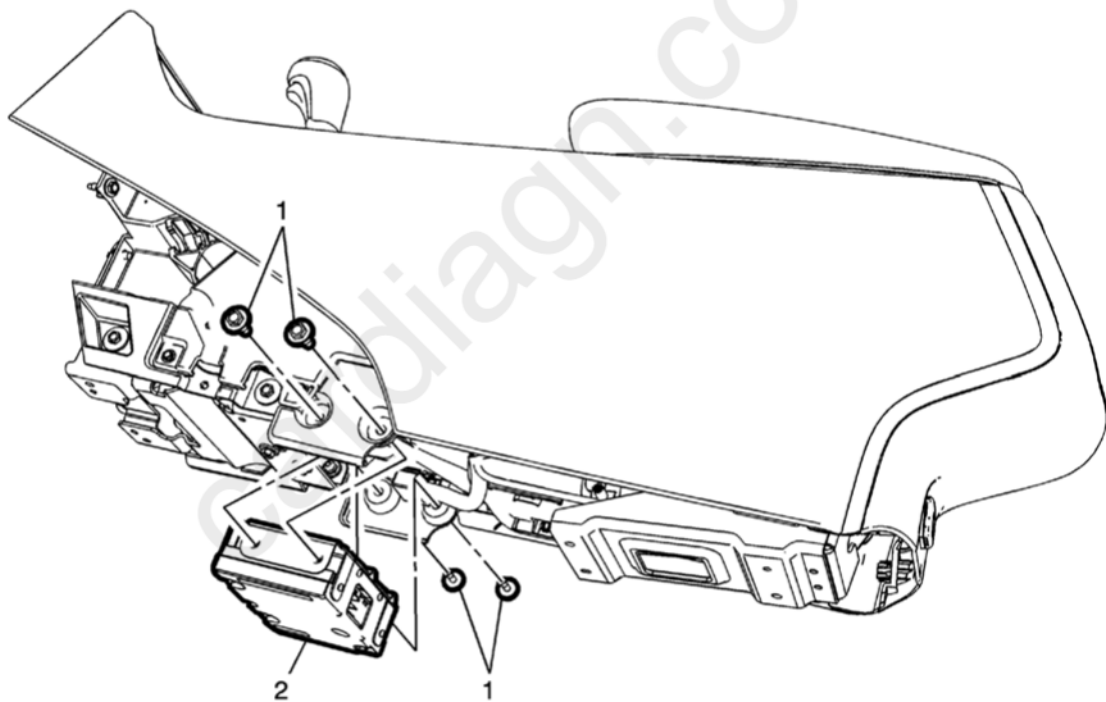


Fig. 4: Accessory AC & DC Power Control Module

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

Callout	Component Name
WARNING: The high intensity discharge system produces high voltage and current. In order to reduce the risk of severe shocks and burns, the battery negative cable must be disconnected any time service work is being performed on or around the high intensity discharge system.	
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 Replacement .	
1	Accessory AC and DC Power Control Module Fastener (Qty: 4) CAUTION: Refer to Fastener Caution .
2	Accessory AC and DC Power Control Module Procedure 1. Disconnect the electrical connector. 2. Program the accessory AC and DC power control module. Refer to Control Module References for programming and set up.

WIRELESS CHARGING SYSTEM MODULE REPLACEMENT

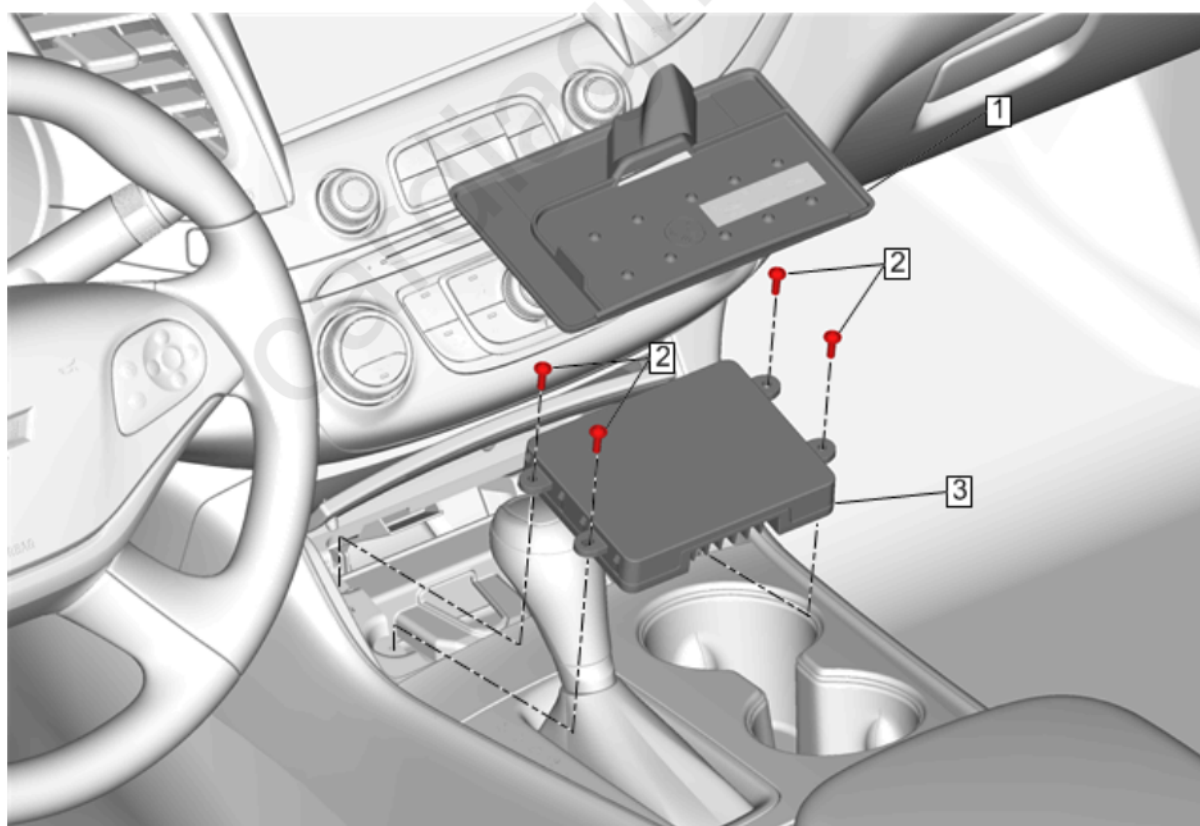


Fig. 5: Wireless Charging System Module
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Open the front floor console compartment door.	
1	Front Floor Console Compartment Liner

Callout	Component Name
2	Wireless Charging System Module Bolt (Qty: 4) CAUTION: Refer to Fastener Caution . Tighten 1 N.m (9 lb in)
3	Wireless Charging System Module Procedure Disconnect the electrical connector.

120-VOLT ACCESSORY POWER RECEPTACLE REPLACEMENT

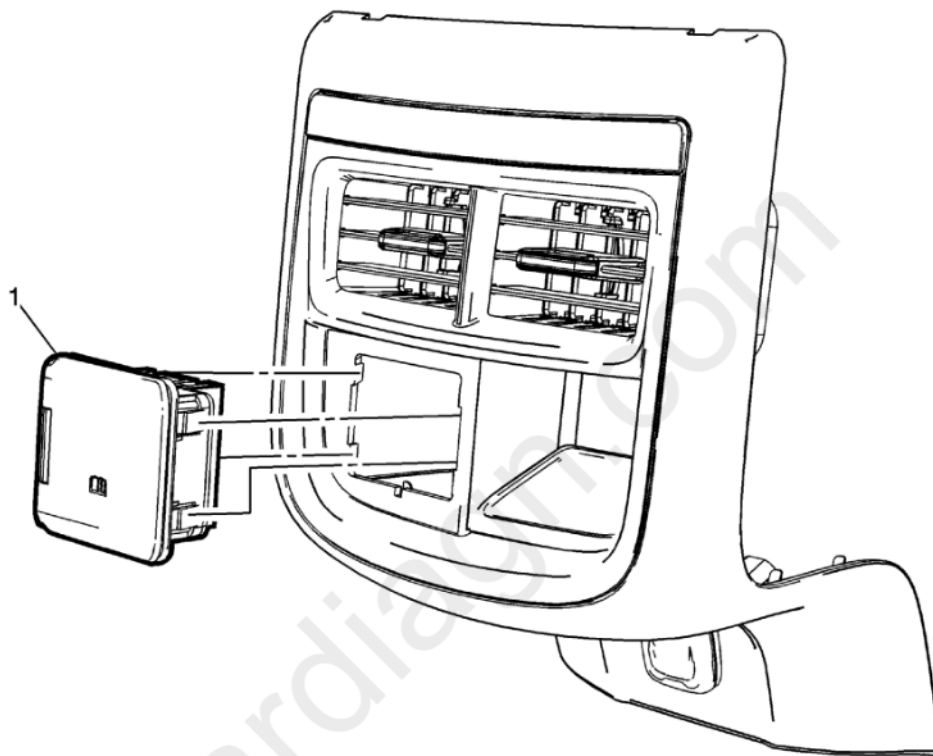


Fig. 6: 120-Volt Accessory Power Receptacle
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the front floor console rear trim panel. Refer to Front Floor Console Rear Trim Panel Replacement .	
1	120 Volt Accessory Power Receptacle Procedure Push in the 4 tabs to release the accessory power receptacle from the rear console trim panel.

ACCESSORY POWER RECEPTACLE REPLACEMENT

Special Tools

EL 42059 Cigar Lighter Socket Remover

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

Removal Procedure

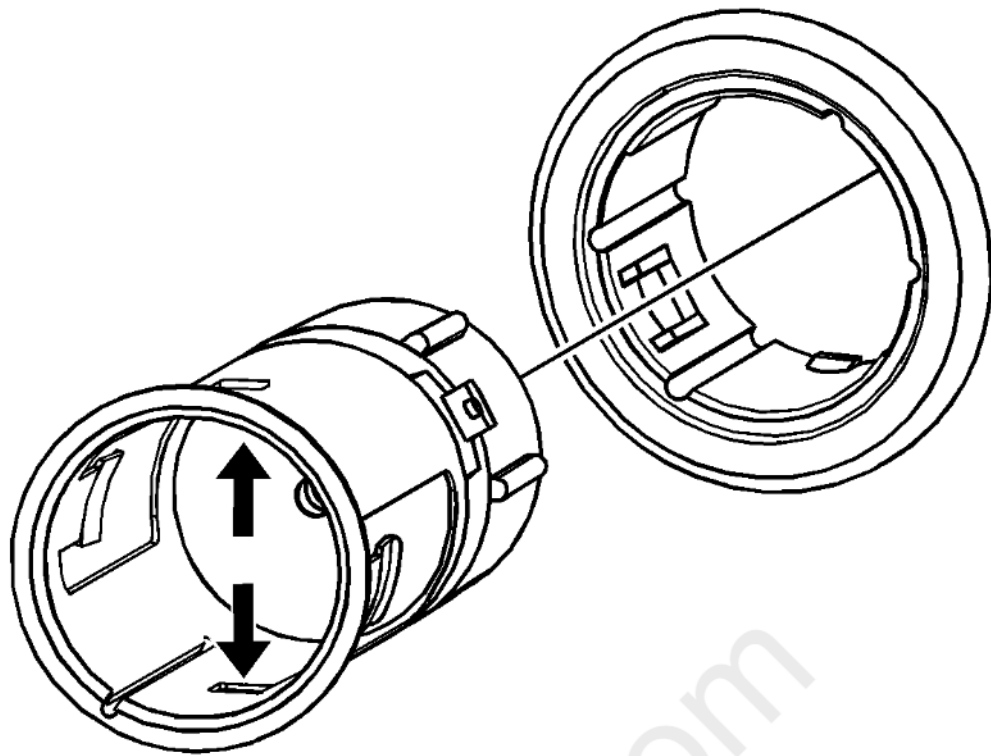


Fig. 7: View Of Cigar Lighter Socket/Accessory Power Outlet
Courtesy of GENERAL MOTORS COMPANY

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.

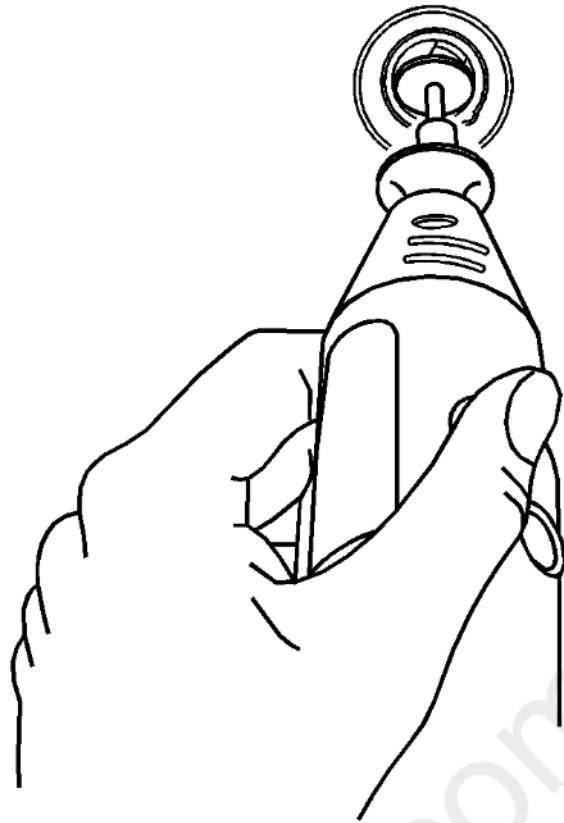


Fig. 8: Removing Cigar Housing Using Grinding Tool

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

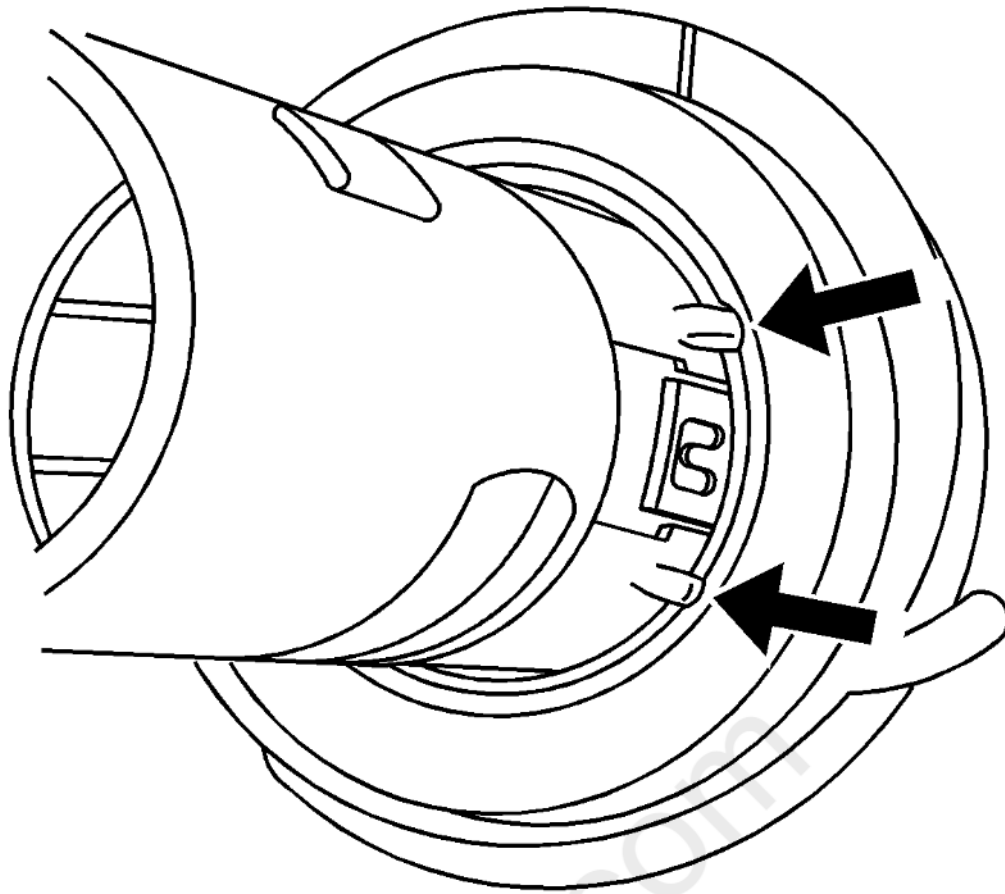


Fig. 9: View Of Receptacle Tabs & Retainer Slots

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.

DESCRIPTION AND OPERATION

MOBILE DEVICE WIRELESS CHARGER DESCRIPTION AND OPERATION

Mobile Device Wireless Charging System

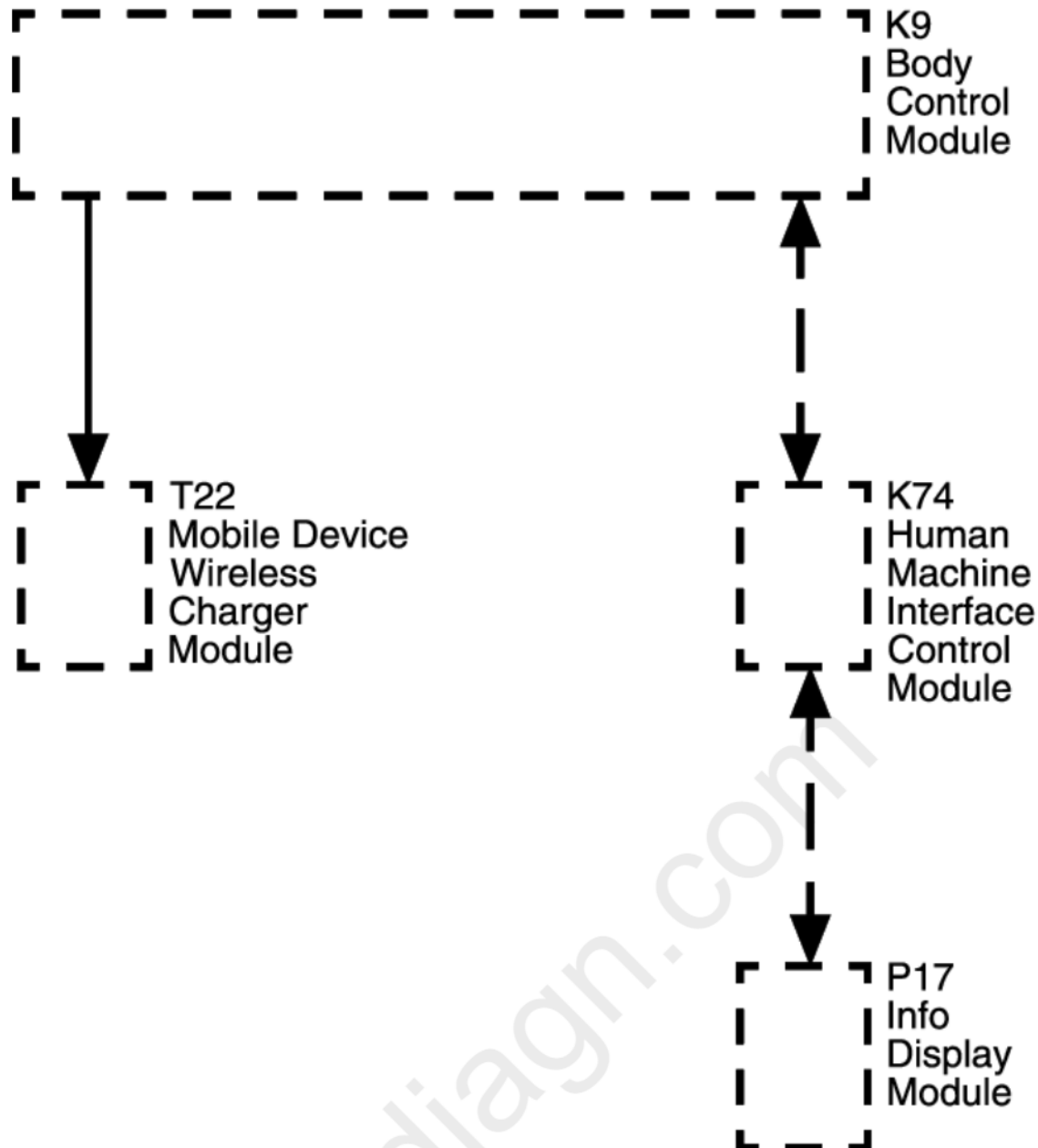


Fig. 10: Mobile Device Wireless Charging System Diagram

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
K9	K9 Body Control Module
T22	Mobile Device Wireless Charger Module
K74	Human Machine Interface Control Module
P17	P17 Info Display Module

The Mobile Device Wireless Charging System (WCS) is an system for wirelessly charging mobile devices. It is capable of charging the batteries of compatible mobile devices. A compatible device is one that is compliant with Power Matters Alliance (PMA) or Wireless Power Consortium (WPC) Standard, meaning that it is equipped with a PMA or WPC wireless charge "receiver" that will work with the charge "transmitter" installed in the vehicle. The devices may utilize built-in charging circuitry or an adapter (external plug-in device which contains the charging circuitry). To check for phone or other device compatibility, refer to GM Total Connect.

WARNING:

Remove all objects from the charging pad before charging your mobile device. Objects, such as coins, keys, rings, paper clips, or cards, between the phone and charging pad will become very hot. On the rare occasion that the charging system does not detect an object, and the object gets wedged between the phone and charger, remove the phone and allow the object to cool before removing it from the charging pad, to prevent burns.

To charge a device, place it on the charging surface in the vehicle. There is a charging coil located in the center of the charging surface. The device has a charging coil typically near the center of the device. These coils must be lined up in order for charging to proceed. When the interruptible retained accessory power (IRAP) relay is closed (this is true typically when vehicle ignition is in Run or Accessory position), the WCS will detect the device, establish communications with the device to confirm it is a compatible device, and then deliver charging power to the device via wireless interface. The WCS will be able to deliver up to 5W of power to compatible devices. It shall only enter a charging state if communication is established and a compatible device is identified.

The WCS shall not enter a charging state if there is no communication established with a compatible device. If a non-compatible device or metallic foreign object is detected, the WCS will not transfer power. The charger monitors its internal temperature and will shut down if the charger temperature exceeds 185F (85C).

Indicator

The body control module will detect the device battery is charging and send a serial data message on the GMLAN bus to the radio display. The radio display will indicate a device is currently charging. When the indicator is toggling on and off this indicates a thermal limit has been reached and the device will not charge. For more information refer to the infotainment owners manual.

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

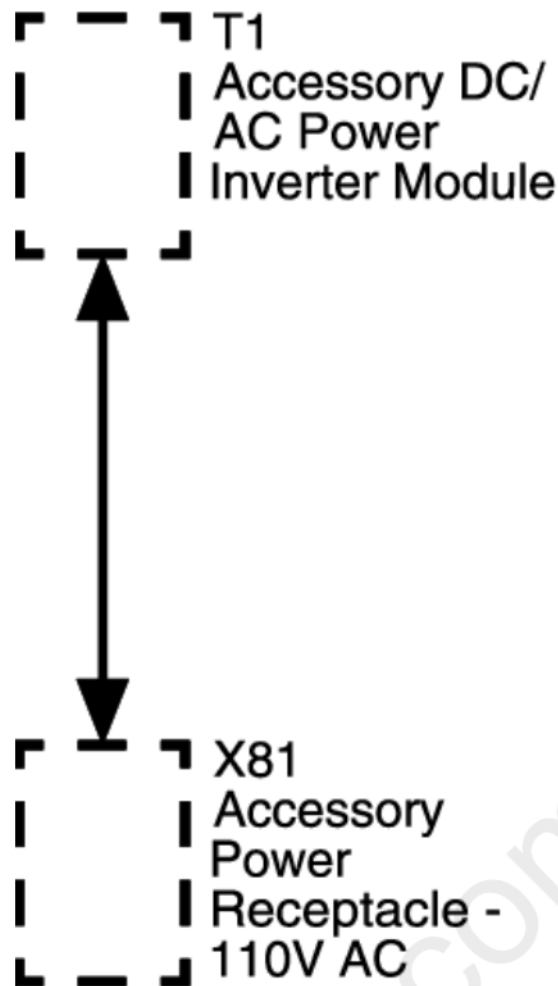


Fig. 11: Power Outlets Block Diagram

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
T1	T1 Accessory DC/AC Power Inverter Module
X81	X81 Accessory Power Receptacle - 110V AC

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.

230 Volt Power Outlet Receptacle System Description

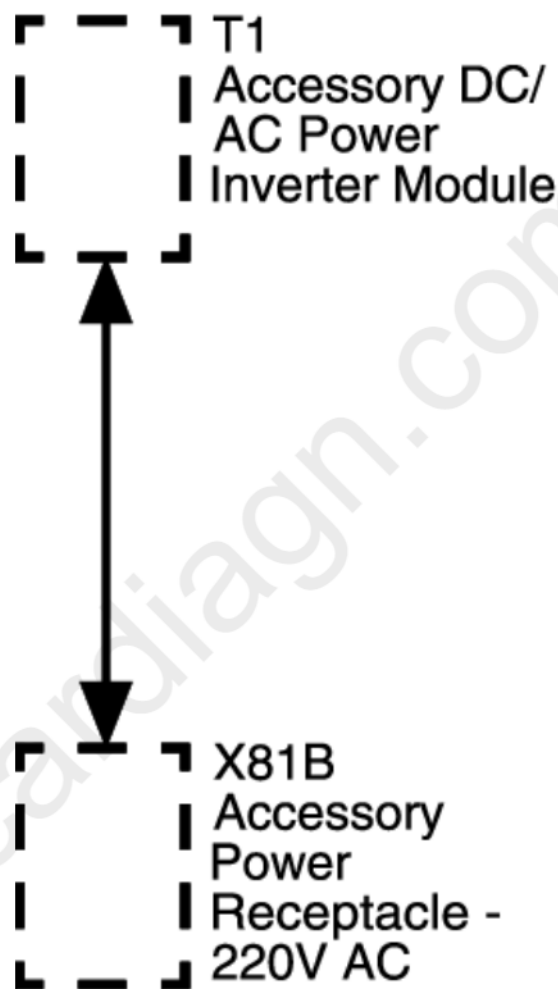


Fig. 12: Power Outlets Block Diagram

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
T1	T1 Accessory DC/AC Power Inverter Module
X81B	X81B Accessory Power Receptacle - 220V AC

The alternating current (AC) accessory power outlet system consists of the accessory DC/AC power inverter module and the accessory power receptacle - 220V AC. The accessory DC/AC power inverter module converts 12 V direct current (DC) battery power to 220 - 230 V at 50 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 - 220V AC provides the usual connection for AC powered devices.

230 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 - 220V 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 - 220V AC, the normally open switch in the accessory power receptacle - 220V AC, closes. When the accessory DC/AC power inverter module detects the voltage from the accessory power receptacle - 220V AC switch, the inverter module begins to supply 220 - 230 V AC to the accessory power receptacle - 220V AC after a 1.5 second delay. The accessory AC power system is protected against circuit overload and circuit shorts to ground.

230 Volt Power Outlet Receptacle Isolation Fault Protection

The accessory DC/AC power inverter module contains a ground fault circuit interrupter (GFCI). GFCI monitors the 230 V circuit for a short to vehicle chassis ground. If a 230 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.

230 Volt Power Outlet Receptacle Overload Shutdown

The accessory AC/DC power control module will turn OFF if the current in the 230 V circuit is greater than 3.8 A for 1 second, or 2.5 A for 10 seconds. 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 second delay.

230 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 accessory power receptacle - 220V AC, and then plugged into the accessory power receptacle - 220V AC.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/ Description

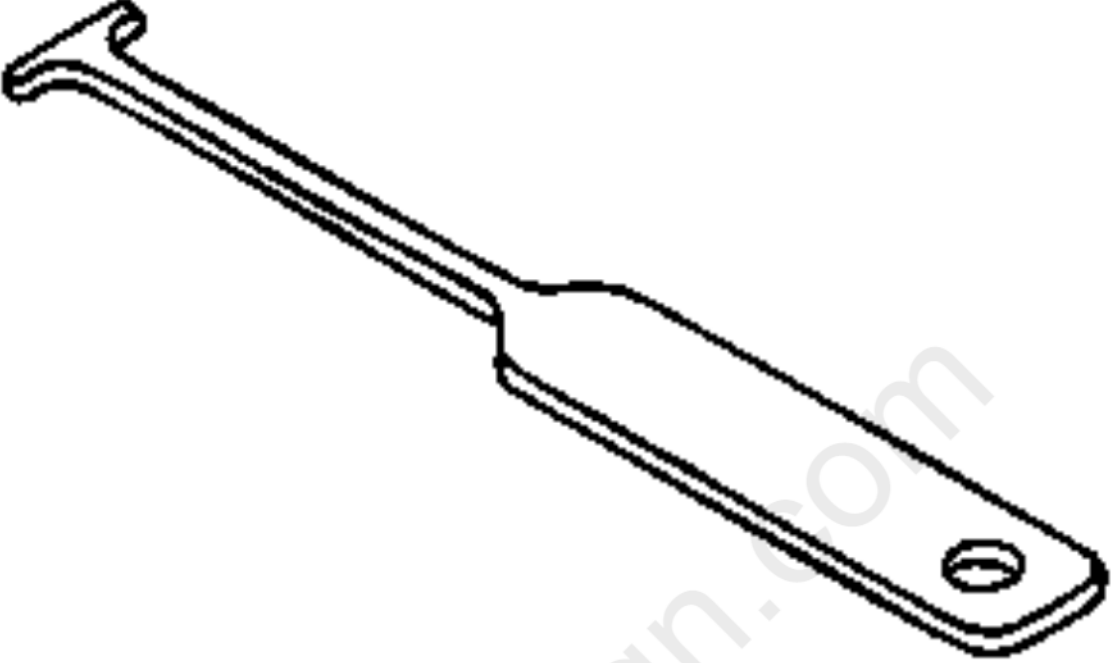
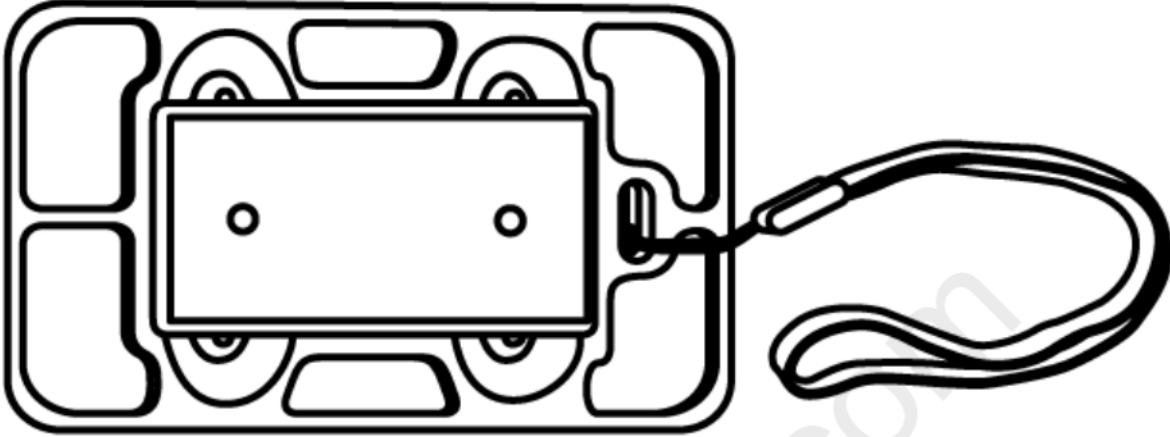
Illustration	Tool Number/ Description
	EL 42059 J 42059 Cigar Lighter Socket Remover

Illustration	Tool Number/ Description
	EL 51755 Inductive Charging Test Tool