

2017 ACCESSORIES & EQUIPMENT

Remote Functions - Bolt EV

SPECIFICATIONS

FASTENER SPECIFICATIONS

Reusable Threaded Fastener Tightening Specifications

Application	Specification
	Metric (English)
NOTE: <i>All fasteners listed in this table can be reused after removal.</i>	
Keyless Entry Control Module Bracket Bolt	2.5 N.m (22 lb in)

SCHEMATIC WIRING DIAGRAMS

REMOTE FUNCTION WIRING SCHEMATICS

Keyless Entry - Active

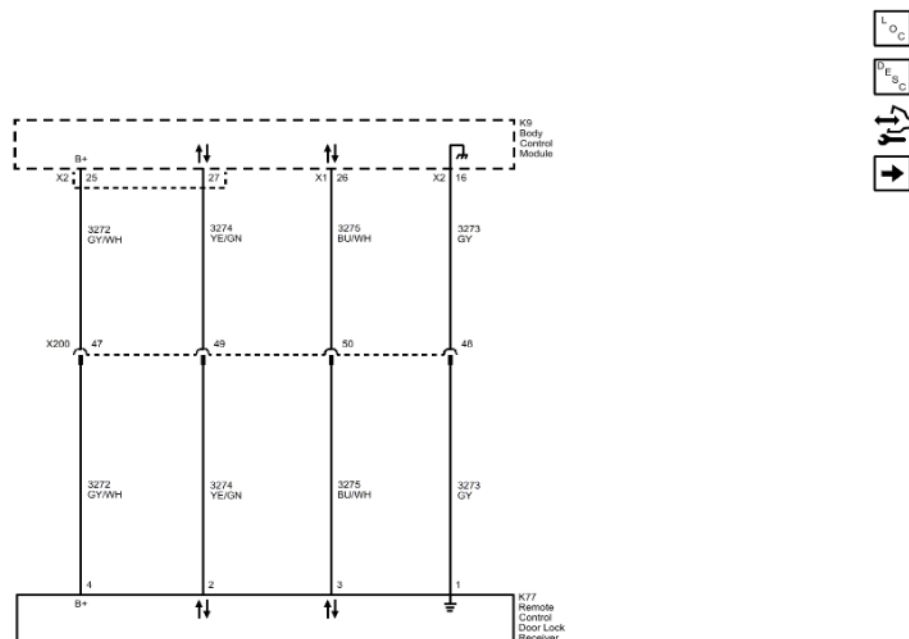


Fig. 1: Keyless Entry - Active

Courtesy of GENERAL MOTORS COMPANY

Keyless Entry - Passive and Keyless Start

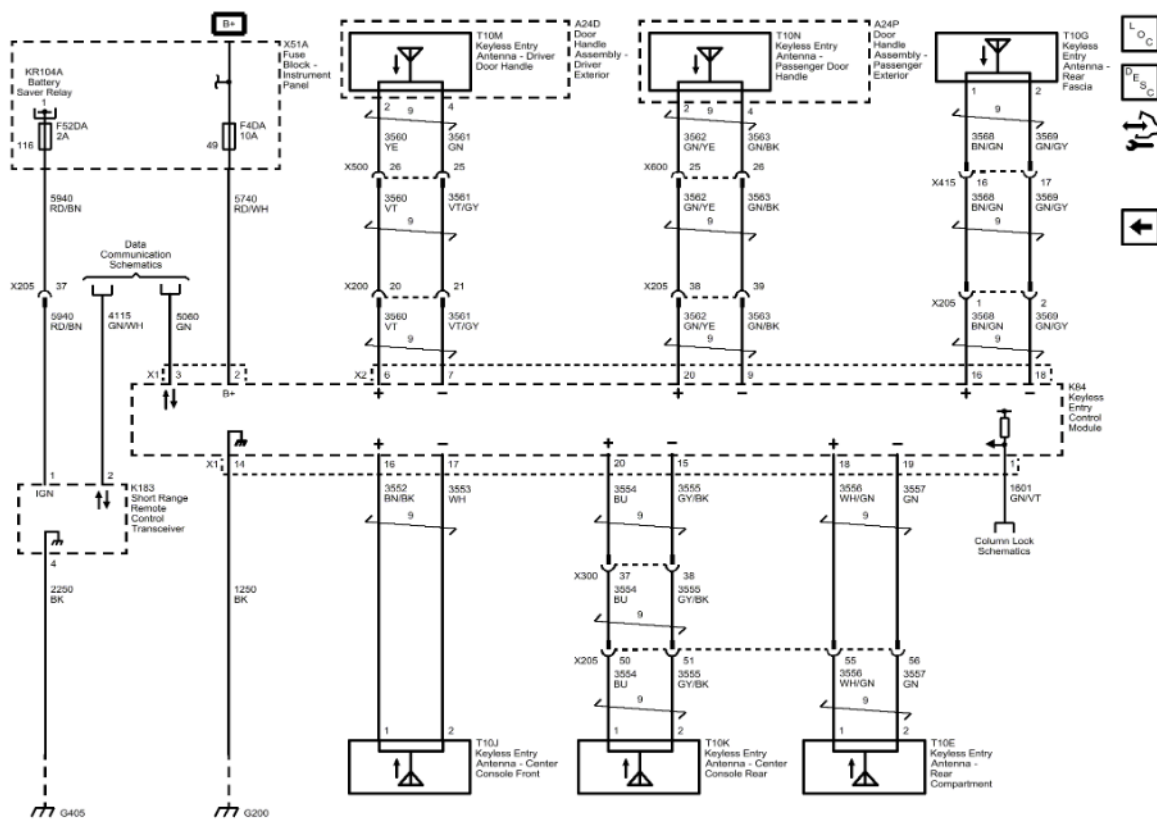


Fig. 2: Keyless Entry - Passive and Keyless Start
Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B305D: CHALLENGE ACTIVE CIRCUIT

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B305D

Challenge Active Circuit

For symptom byte information refer to [Symptom Byte List](#)

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Challenge Active	B305D 02	-	B305D 01	-

Circuit/System Description

The body control module (BCM) communicates with the remote control door lock receiver through the keyless entry challenge active circuit. The challenge active signal is activated by the keyless entry control module and sent to the BCM when active communication between the vehicle and the keyless entry transmitter is initiated.

Conditions for Running the DTC

- System voltage between 9 - 16 V

- Signal output activated by the keyless entry control module

Conditions for Setting the DTC

B305D 01

A short to voltage is detected on the challenge active circuit.

B305DB 02

A short to ground is detected on the challenge active circuit.

Action Taken When the DTC Sets

No action is taken.

Conditions for Clearing the DTC

- The current DTC will clear when the malfunction is no longer present.
- A history DTC will clear after 50 malfunction-free ignition cycles.

Reference Information

Schematic Reference

- [Power Moding Schematics](#)
- [Power Distribution Schematics](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Power Mode Description and Operation

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the KR76 Retained Accessory Power Relay. 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 3 and ground.
 - **If 10 Ω or greater**
 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, connect a test lamp between the control circuit terminal 5 and ground circuit terminal 3.
4. Verify the test lamp turns ON and OFF when switching the ignition ON and OFF.

- **If the test lamp is always OFF**

1. Ignition OFF, remove the test lamp, disconnect the harness connector at the K84 Keyless Entry Control Module.
2. Test for infinite resistance between the control circuit 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 K84 Keyless Entry Control Module.

- **If the test lamp is always ON**

1. Ignition OFF, remove the test lamp, disconnect the harness connector at the K84 Keyless Entry Control Module, ignition ON.
2. Test for less than 1 V between the control circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K84 Keyless Entry Control Module.

- **If the test lamp turns ON and OFF**

5. Test or replace the KR76 Retained Accessory Power Relay.

Repair Instructions

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

- Refer to [Relay Replacement \(Attached to Wire Harness\)](#) [Relay Replacement \(Within an Electrical Center\)](#)
- Refer to [Control Module References](#) for keyless entry control module replacement, programming and setup.

DTC B3101: KEYLESS ENTRY DATA LINK CIRCUIT

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC B3101

Keyless Entry Data Link Circuit

For symptom byte information, refer to [Symptom Byte List](#).

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	B3101 00	B3101 00	-	-
Serial Data - Enable Line	B3101 00	B3101 00	B3101 00	B3101 00
Serial Data - Receive	B3101 00	B3101 00	B3101 00	B3101 00
Low Reference	-	B3101 00	-	-

Circuit/System Description

The body control module communicates with the remote control door lock receiver through the keyless entry serial data circuits. When any button on the keyless entry transmitter is pressed, the transmitter sends a signal to the remote control door lock receiver. The remote control door lock receiver sends a

function request to the body control module, depending on which button is pressed on the transmitter. The body control module receives the message and performs the appropriate function.

Conditions for Running the DTC

The body control module monitors for this DTC at all times.

Conditions for Setting the DTC

No response is received from the remote control door lock receiver after the body control module requests information from or sends configuration commands to the remote control door lock receiver.

Action Taken When the DTC Sets

In the case of power loss, the remote control door lock receiver is disabled for 65 s. Otherwise no action is taken.

Conditions for Clearing the DTC

- A current DTC will clear when the fault is no longer present.
- A history DTC will clear after 40 consecutive ignition cycles without a fault present.

Reference Information

Schematic Reference

Remote Function Schematics

Component Connector End Views

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Keyless Entry System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, scan tool disconnected, disconnect the harness connector at the K77 Remote Control Door Lock Receiver. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 30 Ω between the low reference circuit terminal 1 and ground.
 - **If 30 Ω or greater**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for less than 2 Ω in the low reference 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 less than 30 Ω**
3. Ignition ON.
4. Test for greater than 11.5 V between the B+ circuit terminal 4 and ground.

- **If 11.5 V or less**

1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
2. Test for infinite resistance between the B+ circuit 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 B+ 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 greater than 11.5 V**

5. Test for 1 - 6 V between the serial data circuit terminal 2 and ground.

- **If less than 1 V**

1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
2. Test for infinite resistance between the serial data circuit 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 serial data 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 greater than 6 V**

1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module, ignition ON.
2. Test for less than 1 V between the serial data circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 Body Control Module.

- **If between 1 - 6 V**

6. Ignition OFF, disconnect the X1 and X2 harness connectors at the K9 Body Control Module, ignition ON.
7. Test for less than 1 V between the K9 Body Control Module serial data circuit terminal 26 X1 and ground.

- **If 1 V or greater**

Repair the short to voltage on the circuit.

- **If less than 1 V**

8. Ignition OFF.
9. Test for infinite resistance between the K9 Body Control Module serial data circuit terminal 26 X1 and ground.

- **If less than infinite resistance**

Repair the short to ground on the circuit.

- **If infinite resistance**

10. Test for less than 2 Ω between the K9 Body Control Module serial data circuit terminal 26 X1 and the K77 Remote Control Door Lock Receiver serial data circuit terminal 3.

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **If less than 2 Ω**

11. Replace the K77 Remote Control Door Lock Receiver.

12. Verify DTC B3101 does not set while operating the vehicle under the conditions for running the DTC.

- **If the DTC sets**

- **If the DTC does not set**

13. All OK.

Repair Instructions

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

Refer to [Control Module References](#) for body control module or remote control door lock receiver replacement, programming, and setup.

DTC B3105: KEYLESS ENTRY TRANSMITTERS

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC B3105

Keyless Entry Transmitters

For symptom byte information, refer to [Symptom Byte List](#) .

Circuit/System Description

The body control module monitors the number of keyless entry transmitters programmed. Until at least one transmitter is programmed, the body control module determines a malfunction condition exists.

Conditions for Running the DTC

The body control module has been set up without transmitters being programmed.

Conditions for Setting the DTC

No keyless entry transmitter programmed to the body control module.

Action Taken When the DTC Sets

The keyless entry system is inoperative.

Conditions for Clearing the DTC

A current DTC is cleared when at least one transmitter has been programmed to the body control module.

Reference Information

Schematic Reference

Remote Function Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Keyless Entry System Description and Operation

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Verification

1. Verify that the transmitter is a correct transmitter for the vehicle. This can be accomplished by comparing the part number printed on the transmitter to the appropriate part number in the parts catalog.
 - **If the transmitter is incorrect**
Replace the transmitter.
 - **If the transmitter is correct**
2. Program the transmitter. Refer to [Key with Integrated Transmitter Programming](#).
3. Verify the transmitter has successfully completed the programming procedure.
 - **If the transmitter does not program successfully**
Replace the transmitter.
 - **If the transmitter programs successfully**
4. All OK.

Repair Instructions

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

Refer to [Key with Integrated Transmitter Programming](#)

DTC B3106: KEYLESS ENTRY DATA LINK

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC B3106

Keyless Entry Data Link

For symptom byte information, refer to [Symptom Byte List](#).

Circuit/System Description

The body control module communicates with the remote control door lock receiver through the keyless entry serial data circuits. When any button on the keyless entry transmitter is pressed, the transmitter sends a signal to the remote control door lock receiver. The remote control door lock receiver sends a function request to the body control module, depending on which button is pressed on the transmitter. The body control module receives the message and performs the appropriate function.

Conditions for Running the DTC

A keyless transmitter button is pressed.

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Conditions for Setting the DTC

The transmitter that is sending a signal to the remote control door lock receiver is different from those transmitters stored in the body control module.

Action Taken When the DTC Sets

No action is taken.

Conditions for Clearing the DTC

- A current DTC will clear when the fault is no longer present and the ignition switch is cycled.
- A history DTC will clear after 40 consecutive ignition cycles without a fault present.

Reference Information

Schematic Reference

Remote Function Schematics

Component Connector End Views

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Keyless Entry System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. With a valid and learned transmitter, press and release a button on the transmitter.
2. Verify that DTC B3106 is not set.
 - **If DTC B3106 is set**
Replace the K77 Remote Control Door Lock Receiver.
 - **If DTC B3106 is not set**
3. All OK.

Repair Instructions

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

Refer to **Control Module References** for remote control door lock receiver replacement, programming, and setup.

DTC B3109-B3113: KEYLESS ENTRY TRANSMITTER 1-5 BATTERY

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.
- Refer to **Diagnostic Procedure Instructions** to provide an overview of each diagnostic category.

DTC Descriptors

DTC B3109

Keyless Entry Transmitter 1 Battery

DTC B3110

Keyless Entry Transmitter 2 Battery

DTC B3111

Keyless Entry Transmitter 3 Battery

DTC B3112

Keyless Entry Transmitter 4 Battery

DTC B3113

Keyless Entry Transmitter 5 Battery

For symptom byte information, refer to [Symptom Byte List](#) .

Circuit/System Description

With each press of a keyless entry transmitter button, a message containing the current battery state of the transmitter is sent to the remote control door lock receiver, along with the commanded keyless entry function. The remote control door lock receiver sends this to the body control module to perform the requested function.

Conditions for Running the DTC

A keyless transmitter button is pressed.

Conditions for Setting the DTC

Three consecutive low battery signals are received from the same transmitter.

Action Taken When the DTC Sets

The keyless entry system is inoperative.

Conditions for Clearing the DTC

The DTC is cleared when a normal transmitter voltage signal is received from the transmitter that set the DTC.

Reference Information

Schematic Reference

Remote Function Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Keyless Entry System Description and Operation

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)

- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Verification

1. Verify none of the DTCs listed below are set:
 - DTC B3109
 - DTC B3110
 - DTC B3111
 - DTC B3112
 - DTC B3113
 - **If any of the DTCs are set**
 1. Replace the battery in the appropriate keyless entry transmitter and operate the transmitter three consecutive times.
 2. Verify the DTC does not set.
 - If the DTC sets, replace the keyless entry transmitter.
 - If the DTC does not set
 3. All OK.
 - **If none of the DTCs are set**
2. All OK.

DTC B310D-B310F: KEYLESS ENTRY TRANSMITTER 6-8 BATTERY

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B310D

Keyless Entry Transmitter 6 Battery

DTC B310E

Keyless Entry Transmitter 7 Battery

DTC B310F

Keyless Entry Transmitter 8 Battery

For symptom byte information, refer to [Symptom Byte List](#).

Circuit/System Description

With each press of a keyless entry transmitter button, a message containing the current battery state of the transmitter is sent to the remote control door lock receiver, along with the commanded keyless entry function. The remote control door lock receiver sends this to the body control module to perform the requested function.

Conditions for Running the DTC

A keyless transmitter button is pressed.

Conditions for Setting the DTC

Three consecutive low battery signals are received from the same transmitter.

Action Taken When the DTC Sets

The keyless entry system is inoperative.

Conditions for Clearing the DTC

The DTC is cleared when a normal transmitter voltage signal is received from the transmitter that set the DTC.

Reference Information

Schematic Reference

Remote Function Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Keyless Entry System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Verify none of the DTCs listed below are set:
 - DTC B310D
 - DTC B310E
 - DTC B310F
 - **If any of the DTCs are set**
 1. Replace the battery in the appropriate keyless entry transmitter and operate the transmitter three consecutive times.
 2. Verify the DTC does not set.
 - If the DTC sets, replace the keyless entry transmitter.
 - If the DTC does not set
 3. All OK.
 - **If none of the DTCs are set**
2. All OK.

DTC B3119: KEYLESS ENTRY ANTENNA 1

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.
- Refer to **Diagnostic Procedure Instructions** to provide an overview of each diagnostic category.

DTC Descriptors

DTC B3119

Keyless Entry Antenna 1

For symptom byte information, refer to [Symptom Byte List](#).

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Keyless Entry Antenna Signal - Driver Door	B3119 02	B3119 05	B3119 05	-
Keyless Entry Antenna Low Reference - Driver Door	B3119 02	B3119 05	B3119 05	-

Circuit/System Description

The driver door handle antenna is located in the driver door handle assembly and is used to establish low frequency communications with the keyless entry transmitter. As a vehicle with locked doors is approached with a keyless entry transmitter and the exterior door handle button is pressed, the keyless entry control module communicates with the driver door handle keyless entry antenna.

Conditions for Running the DTC

The exterior driver door handle button is pressed within 15 min of last door closing.

Conditions for Setting the DTC

B3119 02

The keyless entry control module detects a short to ground on the driver door keyless entry antenna signal circuit.

B3119 05

The keyless entry control module detects a short to voltage or an open on the driver door keyless entry antenna signal circuit.

Action Taken When the DTC Sets

Doors will not unlock/lock when the driver exterior door handle button is pressed.

Conditions for Clearing the DTC

- A current DTC will clear when the conditions for setting the DTC are no longer present.
- A history DTC will clear after 40 malfunction-free ignition cycles.

Reference Information

Schematic Reference

Remote Function Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Keyless Entry System Description and Operation

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify DTC B3122, B3123, or B3124 is not set.

- **If any of the DTCs are set**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .

- **If none of the DTCs are set**

3. Refer to Circuit/System Testing.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the T10L Keyless Entry Antenna - Driver Door Handle, ignition ON.
2. Test for less than 1 V between the signal circuit terminal 1 and ground.

- **If 1 V or greater**

1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module, ignition ON.

2. Test for less than 1 V between the signal circuit and ground.

- If 1 V or greater, repair the short to voltage on the circuit.
- If less than 1 V, replace the K84 Keyless Entry Control Module.

- **If less than 1 V**

NOTE: When using the MIN MAX function, autorange on the DMM may not function properly. To ensure accurate test results, turn off autorange and manually set the DMM range to 000.0 V.

3. Ignition OFF, install a DMM between the signal circuit terminal 1 and ground. Set the DMM to capture DC voltage using the MIN MAX function. Turn off autorange and manually set the DMM range to 000.0 V.
4. Lock the vehicle doors using the keyless entry transmitter. Activate the antenna by pressing the exterior door handle button.
5. Verify the MAX voltage captured by the DMM is greater than 1 V.

- **If 1 V or less**

1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module.
2. Test for infinite resistance between the signal circuit 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 signal circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , replace the K84 Keyless Entry Control Module.

- **If greater than 1 V**

6. Test for less than 1 V between the low reference circuit terminal 2 and ground.

- **If 1 V or greater**

1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module, ignition ON.
2. Test for less than 1 V between the low reference circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K84 Keyless Entry Control Module.
- **If less than 1 V**

NOTE: When using the MIN MAX function, autorange on the DMM may not function properly. To ensure accurate test results, turn off autorange and manually set the DMM range to 000.0 V.

7. Install a DMM between the signal circuit terminal 1 and the low reference circuit terminal 2. Set the DMM to capture DC voltage using the MIN MAX function. Turn off autorange and manually set the DMM range to 000.0 V.
8. Lock the vehicle doors using the keyless entry transmitter. Activate the antenna by pressing the exterior door handle button.
9. Verify the MAX voltage captured by the DMM is greater than 1 V.
 - **If 1 V or less**
 1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module.
 2. Test for infinite resistance between the low reference circuit 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 low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K84 Keyless Entry Control Module.
 - **If greater than 1 V**
10. Replace the T10L Keyless Entry Antenna - Driver Door Handle.
11. Lock the vehicle doors using the keyless entry transmitter. Activate the antenna by pressing the exterior door handle button.
12. Verify DTC B3119 is not set.
 - **If DTC B3119 is set**

Replace the K84 Keyless Entry Control Module.
 - **If DTC B3119 is not set**
13. All OK.

Repair Instructions

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

- Refer to [Front Side Door Outside Handle Bracket Replacement](#)
- Refer to [Control Module References](#) for module replacement, programming, and setup

DTC B3120: KEYLESS ENTRY ANTENNA 2

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B3120

For symptom byte information, refer to [Symptom Byte List](#).

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Keyless Entry Antenna Signal - Passenger Door	B3120 02	B3120 05	B3120 05	-
Keyless Entry Antenna Low Reference - Passenger Door	B3120 02	B3120 05	B3120 05	-

Circuit/System Description

The passenger front door handle antenna is located in the passenger front door handle assembly and is used to establish low frequency communications with the keyless entry transmitter. As a vehicle with locked doors is approached with a keyless entry transmitter and the exterior door handle button is pressed, the keyless entry control module communicates with the passenger front door handle keyless entry antenna.

Conditions for Running the DTC

The exterior door handle button in the passenger front door handle is pressed within 15 min of the last change of door ajar status for any door.

Conditions for Setting the DTC

B3120 02

The keyless entry control module detects a short to ground on the passenger front door keyless entry antenna signal circuit.

B3120 05

The keyless entry control module detects a short to B+ or an open on the passenger front door keyless entry antenna signal circuit.

Action Taken When the DTC Sets

Doors will not unlock/unlock when the passenger exterior door handle button is pressed.

Conditions for Clearing the DTC

- A current DTC will clear when the conditions for setting the DTC are no longer present.
- A history DTC will clear after 40 malfunction-free ignition cycles.

Reference Information

Schematic Reference

Remote Function Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Keyless Entry System Description and Operation

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)

- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify that DTC B3122, B3123, or B3124 is not set.

- **If any of the DTCs are set**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .

- **If none of the DTCs are set**

3. Refer to Circuit/System Testing.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the T10R Keyless Entry Antenna - Passenger Door Handle, ignition ON.
2. Test for less than 1 V between the signal circuit terminal 1 and ground.

- **If 1 V or greater**

1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module, ignition ON.
2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K84 Keyless Entry Control Module.

- **If less than 1 V**

NOTE: When using the MIN MAX function, autorange on the DMM may not function properly. To ensure accurate test results, turn off autorange and manually set the DMM range to 000.0 V.

3. Ignition OFF, install a DMM between the signal circuit terminal 1 and ground. Set the DMM to capture DC voltage using the MIN MAX function. Turn off autorange and manually set the DMM range to 000.0 V.
4. Lock the vehicle doors using the keyless entry transmitter. Activate the antenna by pressing the exterior door handle button.
5. Verify the MAX voltage captured by the DMM is greater than 1 V.

- **If 1 V or less**

1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module.
2. Test for infinite resistance between the signal circuit 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 signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K84 Keyless Entry Control Module.

- **If greater than 1 V**

6. Test for less than 1 V between the low reference circuit terminal 2 and ground.

- **If 1 V or greater**

1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module, ignition ON.
2. Test for less than 1 V between the low reference circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.

- If less than 1 V, replace the K84 Keyless Entry Control Module.
- **If less than 1 V**

NOTE: When using the MIN MAX function, autorange on the DMM may not function properly. To ensure accurate test results, turn off autorange and manually set the DMM range to 000.0 V.

7. Install a DMM between the signal circuit terminal 1 and the low reference circuit terminal 2. Set the DMM to capture DC voltage using the MIN MAX function. Turn off autorange and manually set the DMM range to 000.0 V.
8. Lock the vehicle doors using the keyless entry transmitter. Activate the antenna by pressing the exterior door handle button.
9. Verify the MAX voltage captured by the DMM is greater than 1 V.
 - **If 1 V or less**
 1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module.
 2. Test for infinite resistance between the low reference circuit 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 low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K84 Keyless Entry Control Module.
 - **If greater than 1 V**
10. Replace the T10R Keyless Entry Antenna - Passenger Door Handle.
11. Lock the vehicle doors using the keyless entry transmitter. Activate the antenna by pressing the exterior door handle button.
12. Verify DTC B3120 is not set.
 - **If DTC B3120 is set**

Replace the K84 Keyless Entry Control Module.
 - **If DTC B3120 is not set**
13. All OK.

Repair Instructions

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

- Refer to [Front Side Door Outside Handle Bracket Replacement](#)
- Refer to [Control Module References](#) for module replacement, programming, and setup

DTC B3121: KEYLESS ENTRY ANTENNA 3

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B3121

Keyless Entry Antenna 3

For symptom byte information, refer to [Symptom Byte List](#).

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Keyless Entry Antenna Signal - Rear Fascia	B3121 02	B3121 05	B3121 05	-
Keyless Entry Antenna Low Reference - Rear Fascia	B3121 02	B3121 05	B3121 05	-

Circuit/System Description

The rear fascia antenna is located in the rear fascia assembly and is used to establish low frequency communications with the keyless entry transmitter. As a vehicle with locked doors is approached with a keyless entry transmitter and the exterior rear closure touch pad is pressed, the keyless entry control module communicates with the rear fascia keyless entry antenna.

Conditions for Running the DTC

- The rear closure touch pad is pressed.
- The scan tool activates a device control function to simulate the above action.

Conditions for Setting the DTC

B3121 02

The keyless entry control module detects a short to ground on the rear fascia keyless entry antenna signal circuit.

B3121 05

The keyless entry control module detects a short to B+ or an open on the rear fascia keyless entry antenna signal circuit.

Action Taken When the DTC Sets

Rear closure will not open when rear closure touch pad is pressed.

Conditions for Clearing the DTC

- A current DTC will clear when the conditions for setting the DTC are no longer present.
- A history DTC will clear after 40 malfunction-free ignition cycles.

Reference Information

Schematic Reference

Remote Function Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Keyless Entry System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Circuit/System Verification

1. Ignition ON.
2. Verify that DTC B3122, B3123, or B3124 is not set.

- **If any of the DTCs are set**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .

- **If none of the DTCs are set**

3. Refer to Circuit/System Testing.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the T10G Keyless Entry Antenna - Rear Fascia, ignition ON.
2. Test for less than 1 V between the signal circuit terminal 1 and ground.

- **If 1 V or greater**

1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module, ignition ON.
2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K84 Keyless Entry Control Module.

- **If less than 1 V**

NOTE: When using the MIN MAX function, autorange on the DMM may not function properly. To ensure accurate test results, turn off autorange and manually set the DMM range to 000.0 V.

3. Ignition OFF, install a DMM between the signal circuit terminal 1 and ground. Set the DMM to capture DC voltage using the MIN MAX function. Turn off autorange and manually set the DMM range to 000.0 V.
4. Lock the vehicle doors using the keyless entry transmitter. Activate the antenna by pressing the rear closure touch pad.
5. Verify the MAX voltage captured by the DMM is greater than 1 V.

- **If 1 V or less**

1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module.
2. Test for infinite resistance between the signal circuit 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 signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K84 Keyless Entry Control Module.

- **If greater than 1 V**

6. Test for less than 1 V between the low reference circuit terminal 2 and ground.

- **If 1 V or greater**

1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module, ignition ON.
2. Test for less than 1 V between the low reference circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K84 Keyless Entry Control Module.

- **If less than 1 V**

function properly. To ensure accurate test results, turn off autorange and manually set the DMM range to 000.0 V.

7. Install a DMM between the signal circuit terminal 1 and the low reference circuit terminal 2. Set the DMM to capture DC voltage using the MIN MAX function. Turn off autorange and manually set the DMM range to 000.0 V.
8. Lock the vehicle doors using the keyless entry transmitter. Activate the antenna by pressing the rear closure touch pad.
9. Verify the MAX voltage captured by the DMM is greater than 1 V.
 - **If 1 V or less**
 1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module.
 2. Test for infinite resistance between the low reference circuit 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 low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K84 Keyless Entry Control Module.
 - **If greater than 1 V**
10. Replace the T10G Keyless Entry Antenna - Rear Fascia.
11. Lock the vehicle doors using the keyless entry transmitter. Activate the antenna by pressing the rear closure touch pad.
12. Verify DTC B3121 is not set.
 - **If DTC B3121 is set**

Replace the K84 Keyless Entry Control Module.
 - **If DTC B3121 is not set**
13. All OK.

Repair Instructions

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

- Refer to [Low Frequency Rear Bumper Antenna Replacement](#)
- Refer to [Control Module References](#) for keyless entry control module replacement, programming, and setup

DTC B3122: KEYLESS ENTRY ANTENNA 4

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B3122

Keyless Entry Antenna 4

For symptom byte information, refer to [Symptom Byte List](#) .

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Keyless Entry Antenna Signal - Center Console Front	B3122 02	B3122 05	B3122 05	-
Keyless Entry Antenna Low Reference - Center Console Front	B3122 02	B3122 05	B3122 05	-

Circuit/System Description

The front center console antenna is located in front of the center console assembly and is used to establish low frequency communications with the keyless entry transmitter. When the driver attempts to change the ignition status of the vehicle, the keyless entry control module communicates with the front center console antenna.

Conditions for Running the DTC

Pressing the ignition mode switch.

Conditions for Setting the DTC

B3122 02

The keyless entry control module detects a short to ground on the front center console keyless entry antenna signal circuit.

B3122 05

The keyless entry control module detects a short to B+ or an open on the front center console keyless entry antenna signal circuit.

Action Taken When the DTC Sets

Vehicle will not detect the transmitter in some locations inside the vehicle. If the transmitter is not detected then vehicle will not change ignition modes when ignition mode switch is pressed.

Conditions for Clearing the DTC

- A current DTC will clear when the conditions for setting the DTC are no longer present.
- A history DTC will clear after 40 malfunction-free ignition cycles.

Reference Information

Schematic Reference

Remote Function Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Keyless Entry System Description and Operation

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the T10J Keyless Entry Antenna - Center Console Front, ignition ON.
2. Test for less than 1 V between the signal circuit terminal 1 and ground.
 - **If 1 V or greater**
 1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K84 Keyless Entry Control Module.
 - **If less than 1 V**

NOTE: When using the MIN MAX function, autorange on the DMM may not function properly. To ensure accurate test results, turn off autorange and manually set the DMM range to 000.0 V.

3. Ignition OFF, install a DMM between the signal circuit terminal 1 and ground. Set the DMM to capture DC voltage using the MIN MAX function. Turn off autorange and manually set the DMM range to 000.0 V.
4. Activate the antenna by pressing the ignition mode switch.
5. Verify the MAX voltage captured by the DMM is greater than 1 V.
 - **If 1 V or less**
 1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module.
 2. Test for infinite resistance between the signal circuit 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 signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K84 Keyless Entry Control Module.
 - **If greater than 1 V**
6. Test for less than 1 V between the low reference circuit terminal 2 and ground.
 - **If 1 V or greater**
 1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module, ignition ON.
 2. Test for less than 1 V between the low reference circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K84 Keyless Entry Control Module.
 - **If less than 1 V**

NOTE: When using the MIN MAX function, autorange on the DMM may not function properly. To ensure accurate test results, turn off autorange and manually set the DMM range to 000.0 V.

7. Install a DMM between the signal circuit terminal 1 and the low reference circuit terminal 2. Set the DMM to capture DC voltage using the MIN MAX function. Turn off autorange and manually set the DMM range to 000.0 V.
8. Activate the antenna by pressing the ignition mode switch.
9. Verify the MAX voltage captured by the DMM is greater than 1 V.
 - **If 1 V or less**
 1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module.
 2. Test for infinite resistance between the low reference circuit 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 low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K84 Keyless Entry Control Module.
 - **If greater than 1 V**
10. Replace the T10J Keyless Entry Antenna - Center Console Front.
 11. Activate the antenna by pressing the ignition mode switch.
 12. Verify DTC B3122 is not set.
 - **If DTC B3122 is set**

Replace the K84 Keyless Entry Control Module.
 - **If DTC B3122 is not set**
 13. All OK.

Repair Instructions

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

- Refer to [Low Frequency Instrument Panel Antenna Replacement](#)
- Refer to [Control Module References](#) for keyless entry control module replacement, programming, and setup

DTC B3123: KEYLESS ENTRY ANTENNA 5

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B3123

Keyless Entry Antenna 5

For symptom byte information, refer to [Symptom Byte List](#) .

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Keyless Entry Antenna Signal - Center Console Rear	B3123 02	B3123 05	B3123 05	-
Keyless Entry Antenna Low Reference - Center Console Rear	B3123 02	B3123 05	B3123 05	-

Circuit/System Description

The rear center console antenna is located in rear of the center console assembly and is used to establish low frequency communications with the keyless entry transmitter. When the driver attempts to change the ignition status of the vehicle, the keyless entry control module communicates with the rear center console antenna.

Conditions for Running the DTC

Pressing the ignition mode switch.

Conditions for Setting the DTC

B3123 02

The keyless entry control module detects a short to ground on the rear center console keyless entry antenna signal circuit.

B3123 05

The keyless entry control module detects a short to B+ or an open on the rear center console keyless entry antenna signal circuit.

Action Taken When the DTC Sets

Vehicle will not detect the transmitter in some locations inside the vehicle. If the transmitter is not detected then vehicle will not change ignition modes when ignition mode switch is pressed. The exterior door handle buttons will not operate the keyless entry system.

Conditions for Clearing the DTC

- A current DTC will clear when the conditions for setting the DTC are no longer present.
- A history DTC will clear after 40 malfunction-free ignition cycles.

Reference Information

Schematic Reference

Remote Function Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Keyless Entry System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the T10K Keyless Entry Antenna - Center Console Rear, ignition ON.
2. Test for less than 1 V between the signal circuit terminal 1 and ground.
 - **If 1 V or greater**
 1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K84 Keyless Entry Control Module.
 - **If less than 1 V**

NOTE:

When using the MIN MAX function, autorange on the DMM may not function properly. To ensure accurate test results, turn off autorange

and manually set the DMM range to 000.0 V.

3. Ignition OFF, install a DMM between the signal circuit terminal 1 and ground. Set the DMM to capture DC voltage using the MIN MAX function. Turn off autorange and manually set the DMM range to 000.0 V.
4. Activate the antenna by pressing the ignition mode switch.
5. Verify the MAX voltage captured by the DMM is greater than 1 V.

- **If 1 V or less**

1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module.
2. Test for infinite resistance between the signal circuit 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 signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K84 Keyless Entry Control Module.

- **If greater than 1 V**

6. Test for less than 1 V between the low reference circuit terminal 2 and ground.

- **If 1 V or greater**

1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module, ignition ON.
2. Test for less than 1 V between the low reference circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K84 Keyless Entry Control Module.

- **If less than 1 V**

NOTE: When using the MIN MAX function, autorange on the DMM may not function properly. To ensure accurate test results, turn off autorange and manually set the DMM range to 000.0 V.

7. Install a DMM between the signal circuit terminal 1 and the low reference circuit terminal 2. Set the DMM to capture DC voltage using the MIN MAX function. Turn off autorange and manually set the DMM range to 000.0 V.
8. Activate the antenna by pressing the ignition mode switch.
9. Verify the MAX voltage captured by the DMM is greater than 1 V.

- **If 1 V or less**

1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module.
2. Test for infinite resistance between the low reference circuit 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 low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K84 Keyless Entry Control Module.

- **If greater than 1 V**

10. Replace the T10K Keyless Entry Antenna - Center Console Rear.
11. Activate the antenna by pressing the ignition mode switch.
12. Verify DTC B3123 is not set.

- **If DTC B3123 is set**

Replace the K84 Keyless Entry Control Module.

- **If DTC B3123 is not set**

13. All OK.

Repair Instructions

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

- Refer to [Low Frequency Console Antenna Replacement](#)
- Refer to [Control Module References](#) for keyless entry control module replacement, programming, and setup

DTC B3124: KEYLESS ENTRY ANTENNA 6

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B3124

Keyless Entry Antenna 6

For symptom byte information, refer to [Symptom Byte List](#).

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Keyless Entry Antenna Signal - Rear Compartment	B3124 02	B3124 05	B3124 05	-
Keyless Entry Antenna Low Reference - Rear Compartment	B3124 02	B3124 05	B3124 05	-

Circuit/System Description

The rear compartment antenna is located on the rear compartment floor near the seat back, centered, and is used to establish low frequency communications with the keyless entry transmitter. When the driver attempts to change the ignition status of the vehicle, the keyless entry control module communicates with the rear compartment antenna.

Conditions for Running the DTC

Pressing the ignition mode switch.

Conditions for Setting the DTC

B3124 02

The keyless entry control module detects a short to ground on the rear compartment keyless entry antenna signal circuit.

B3124 05

The keyless entry control module detects a short to B+ or an open on the rear compartment keyless entry antenna signal circuit.

Action Taken When the DTC Sets

Vehicle will not detect the transmitter in some locations inside the vehicle. If the transmitter is not detected then vehicle will not change ignition modes when ignition mode switch is pressed.

Conditions for Clearing the DTC

- A current DTC will clear when the conditions for setting the DTC are no longer present.

- A history DTC will clear after 40 malfunction-free ignition cycles.

Reference Information

Schematic Reference

Remote Function Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Keyless Entry System Description and Operation

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the T10E Keyless Entry Antenna - Rear Compartment, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 1 and ground.
 - **If 1 V or greater**
 1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K84 Keyless Entry Control Module.
 - **If less than 1 V**
- NOTE:** When using the MIN MAX function, autorange on the DMM may not function properly. To ensure accurate test results, turn off autorange and manually set the DMM range to 000.0 V.
3. Ignition OFF, install a DMM between the signal circuit terminal 1 and ground. Set the DMM to capture DC voltage using the MIN MAX function. Turn off autorange and manually set the DMM range to 000.0 V.
 4. Activate the antenna by pressing the ignition mode switch.
 5. Verify the MAX voltage captured by the DMM is greater than 1 V.
 - **If 1 V or less**
 1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module.
 2. Test for infinite resistance between the signal circuit 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 signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K84 Keyless Entry Control Module.
 - **If greater than 1 V**

6. Test for less than 1 V between the low reference circuit terminal 2 and ground.

- **If 1 V or greater**

1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module, ignition ON.
2. Test for less than 1 V between the low reference circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K84 Keyless Entry Control Module.

- **If less than 1 V**

NOTE: When using the MIN MAX function, autorange on the DMM may not function properly. To ensure accurate test results, turn off autorange and manually set the DMM range to 000.0 V.

7. Install a DMM between the signal circuit terminal 1 and the low reference circuit terminal 2. Set the DMM to capture DC voltage using the MIN MAX function. Turn off autorange and manually set the DMM range to 000.0 V.

8. Activate the antenna by pressing the ignition mode switch.

9. Verify the MAX voltage captured by the DMM is greater than 1 V.

- **If 1 V or less**

1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module.
2. Test for infinite resistance between the low reference circuit 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 low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K84 Keyless Entry Control Module.

- **If greater than 1 V**

10. Replace the T10E Keyless Entry Antenna - Rear Compartment.

11. Activate the antenna by pressing the ignition mode switch.

12. Verify DTC B3124 is not set.

- **If DTC B3124 is set**

Replace the K84 Keyless Entry Control Module.

- **If DTC B3124 is not set**

13. All OK.

Repair Instructions

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

- Refer to [Low Frequency Rear Compartment Antenna Replacement](#)
- Refer to [Control Module References](#) for module replacement, programming, and setup

SYMPTOMS - REMOTE FUNCTIONS

IMPORTANT: The following steps must be completed before using the symptom tables.

1. Perform [Diagnostic System Check - Vehicle](#) before using the Symptom Tables in order to verify that all of the following are true:

- There are no DTCs set.
- The control modules can communicate via the serial data link.

2. Review the system operation in order to familiarize yourself with the system functions. Refer to [Keyless Entry System Description and Operation](#).

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the Keyless Entry System. Refer to [Checking Aftermarket Accessories](#) .
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

Intermittent

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

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

[Keyless Entry System Malfunction](#)

NO REMOTE DETECTED

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Keyless Entry Antenna Signal - Center Console Front	B3122 02	B3122 05	B3122 05	-
Keyless Entry Antenna Low Reference - Center Console Front	B3122 02	B3122 05	B3122 05	-
Keyless Entry Antenna Signal - Center Console Rear	B3123 02	B3123 05	B3123 05	-
Keyless Entry Antenna Low Reference - Center Console Rear	B3123 02	B3123 05	B3123 05	-
Keyless Entry Antenna Signal - Rear Compartment	B3124 02	B3124 05	B3124 05	-
Keyless Entry Antenna Low Reference - Rear Compartment	B3124 02	B3124 05	B3124 05	-

Circuit/System Description

When a transmitter authentication is requested, the front console, rear console, and rear compartment antennas simultaneously broadcast a challenge within the passenger compartment to the transmitter. If the response from the transmitter via radio frequency (RF) is a valid response, the body control module (BCM) determines there is a transmitter within the vehicle. If no response is received, the BCM determines that no transmitter is in the vehicle, and NO REMOTE DETECTED will be displayed on the DIC.

Diagnostic Aids

A low transmitter battery or radio frequency (RF) interference from aftermarket devices such as 2-way radios, power inverters, cellular phone chargers, computers, 12 V power outlet USB converters, etc. may cause a system malfunction. High RF traffic areas, such as gas stations which use pay-at-the-pump RF transponders, may also cause interference that could lead to a malfunction.

Conditions caused by external influences such as these are considered to be normal. Following this diagnostic will not diagnose an RF interference condition. If RF interference is suspected, question the

customer about the conditions or location where the NO REMOTE DETECTED condition occurs.

Reference Information

Schematic Reference

Remote Function Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Keyless Entry System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

NOTE: This condition may be caused by low vehicle battery voltage. If the battery is not sufficiently charged (above 10 volts), the system will have difficulties detecting the transmitter and the NO REMOTE DETECTED message will be displayed. Correct the low battery voltage condition to eliminate this condition.

1. Verify that DTC B3119, B3120, B3121, B3122, B3123, or B3124 is not set.

- **If any of the DTCs are set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

- **If none of the DTCs are set**

2. Lock the vehicle using the keyless entry transmitter.

3. Verify that each door unlocks and opens by approaching the vehicle with a valid transmitter and operating their respective exterior door handle button.

- **If both doors do not unlock/unlatch and open**

Refer to **Keyless Entry System Malfunction**.

- **If both doors unlock/unlatch and open**

4. Verify the vehicle starts with the transmitter located in the key pocket/slot.

- **If the vehicle does not start**

Perform the **Remote Control Door Lock and Theft Deterrent Transmitter Programming** procedure.

- **If the vehicle starts**

5. Verify the NO REMOTE DETECTED message is not displayed on the DIC while attempting to start the vehicle, placing the keyless entry transmitter in various locations within the vehicle interior at each start attempt. The vehicle should start.

- **If the NO REMOTE DETECTED message is displayed at any time**

- **If the NO REMOTE DETECTED message is not displayed and the vehicle starts**
6. Inspect for any sources of RF interference such as cell phone chargers, power supplies, etc. that would interrupt transmitter and antenna communication. If inspection does not reveal any items causing RF interference, discuss with the customer the conditions or location where the NO REMOTE DETECTED condition occurs. Discuss any devices that are normally kept in the vehicle, such as a laptop or cell phone charger, which may have been removed when the vehicle was brought in for service. It may be necessary to explain to the customer how RF interference degrades the performance of the system.

Circuit/System Testing

NOTE: To determine the appropriate T10 Keyless Entry Antenna to disconnect and diagnose, place the transmitter in various location within the vehicle's interior and attempt to start. The location of the transmitter when the NO REMOTE DETECTED message occurs will correspond with the T10 Keyless Entry Antenna that requires diagnosis.

1. Ignition OFF, disconnect the harness connector at the appropriate T10 Keyless Entry Antenna, ignition ON.
2. Test for less than 1 V between the signal circuit terminal 1 and ground.
 - **If 1 V or greater**
 1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K84 Keyless Entry Control Module.
 - **If less than 1 V**

NOTE: When using the MIN MAX function, autorange on the DMM may not function properly. To ensure accurate test results, turn off autorange and manually set the DMM range to 000.0 V.

3. Ignition OFF, install a DMM between the signal circuit terminal 1 and ground. Set the DMM to capture DC voltage using the MIN MAX function.
4. Activate the antenna by pressing the ignition mode switch.
5. Verify the MAX voltage captured by the DMM is greater than 1 V.
 - **If 1 V or less**
 1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module.
 2. Test for infinite resistance between the signal circuit 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 signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K84 Keyless Entry Control Module.
 - **If greater than 1 V**
6. Test for less than 1 V between the low reference circuit terminal 2 and ground.
 - **If 1 V or greater**
 1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module, ignition ON.
 2. Test for less than 1 V between the low reference circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K84 Keyless Entry Control Module.

- If less than 1 V

NOTE: When using the MIN MAX function, autorange on the DMM may not function properly. To ensure accurate test results, turn off autorange and manually set the DMM range to 000.0 V.

7. Install a DMM between the signal circuit terminal 1 and the low reference circuit terminal 2. Set the DMM to capture DC voltage using the MIN MAX function.
8. Activate the antenna by pressing the ignition mode switch.
9. Verify the MAX voltage captured by the DMM is greater than 1 V.

- **If 1 V or less**

1. Ignition OFF, disconnect the harness connector at the K84 Keyless Entry Control Module.
2. Test for infinite resistance between the low reference circuit 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 low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K84 Keyless Entry Control Module.

- **If greater than 1 V**

10. Replace the appropriate T10 Keyless Entry Antenna.
11. Activate the antenna by pressing the ignition mode switch.
12. Verify the NO REMOTE DETECTED message is not displayed and the vehicle starts.
 - **If the NO REMOTE DETECTED message is displayed and the vehicle does not start**
Replace the K84 Keyless Entry Control Module.
 - **If the NO REMOTE DETECTED message is not displayed and the vehicle starts**
13. All OK.

Repair Instructions

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

- Refer to [Low Frequency Instrument Panel Antenna Replacement](#)
- Refer to [Low Frequency Console Antenna Replacement](#)
- Refer to [Low Frequency Rear Compartment Antenna Replacement](#)
- Refer to [Control Module References](#) for module replacement, programming, and setup

KEYLESS ENTRY SYSTEM MALFUNCTION

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Circuit/System Description

The keyless entry transmitter is part of the vehicle key. The keyless entry system will unlock the vehicle doors or open/unlock the rear compartment when a corresponding button on the keyless entry transmitter is pressed. This is accomplished by the keyless entry transmitter sending a radio frequency to the remote control door lock receiver, which then sends the signal to the body control module (BCM). The BCM interprets the signal and activates the requested function. A low transmitter battery or radio frequency (RF) interference from aftermarket devices such as 2-way radios, power inverters, cellular phone chargers, computers, etc. may cause a system malfunction. High RF traffic areas, such as gas stations which use pay-at-the-pump RF transponders, may also cause interference that could lead to a cardiagn.com malfunction.

Diagnostic Aids

- Unwanted or inadvertent door lock/unlock activation may be requested by the OnStar[®],[®] Remote Link app. It is possible that a customer may be unaware of account usage, result in an unwanted or phantom door lock/unlock. If normal system diagnosis does results in an inability to verify the customer's concern, contact Technical Assistance Center (TAC).
- If available, the EL 43241 Keyless Entry Tester may be used to diagnose a low transmitter battery or a malfunctioning transmitter. To test, place the transmitter on the test pad of the EL 43241 and press each transmitter button one at a time, holding each button for three seconds. If the green light on the tester does not illuminate and a tone does not sound, first replace the transmitter battery and retest. If the malfunction continues after replacing the transmitter battery, replace the transmitter.
- When using the EL 43241 Keyless Entry Tester, first inspect the keyless entry transmitter part number to determine that it is the correct model for the vehicle. An incorrect part number transmitter may pass the test, but it will not activate the keyless entry system.
- When the vehicle key is in the ignition, the keyless entry functions are disabled from all keyless entry transmitters.

Reference Information

Schematic Reference

Remote Function Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Keyless Entry System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for remote control door lock receiver scan tool information

Special Tools

EL 43241 Keyless Entry Tester

Circuit/System Verification

1. Verify that the vehicle key is correct for the vehicle. This can be accomplished by comparing the part number printed on the key to the appropriate part number in the parts catalog.
 - **If the vehicle key is incorrect**
Replace the vehicle key.
 - **If the vehicle key is correct**
2. Verify the K77 Remote Control Door Lock Receiver scan tool 5 V Ignition Switch parameter displays OFF.
 - **If the 5 V Ignition Switch parameter does not display OFF**

Refer to **Vehicle Will Not Change Power Mode** .

- **If the 5 V Ignition Switch parameter displays OFF**
3. Operate the transmitter while observing the scan tool Key Fob Function parameter for the appropriate transmitter.
 4. Verify the K77 Remote Control Door Lock Receiver scan tool Key Fob Function parameter corresponds with the function selected on the transmitter.
 - **If the Key Fob Function parameter does not correspond with the transmitter selection**

NOTE: Before replacing the transmitter, inspect the transmitter battery contacts for any corrosion or damage. If no corrosion or damage is found, replace the transmitter battery and retest before replacing the transmitter.

1. Replace the vehicle key.
2. Operate the new transmitter while observing the K77 Remote Control Door Lock Receiver scan tool Key Fob Function parameter for the transmitter.
3. Verify the K77 Remote Control Door Lock Receiver scan tool Key Fob Function parameter correspond with the function selected on the transmitter.
 - **If the Key Fob Function parameter does not correspond with the transmitter selection**

Perform Circuit/System Testing.

- **If the Key Fob Function parameter corresponds with the transmitter selection**
4. All OK.
 - **If the Key Fob Function parameter corresponds with the transmitter selection**
 5. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, scan tool disconnected, disconnect the harness connector at the K77 Remote Control Door Lock Receiver. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 30 Ω between the low reference circuit terminal 1 and ground.
 - **If 30 Ω or greater**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for less than 2 Ω in the low reference 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 less than 30 Ω**
3. Ignition ON.
4. Test for greater than 11.5 V between the B+ circuit terminal 4 and ground.
 - **If 11.5 V or less**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the B+ circuit 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 B+ 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 greater than 11.5 V**
5. Test for 0.1 - 6 V between the serial data circuit terminal 2 and ground.
 - **If less than 0.1 V**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the serial data circuit 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 serial data 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 greater than 6 V**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 0.1 V between the serial data circuit and ground.
 - If 0.1 V or greater, repair the short to voltage on the circuit.
 - If less than 0.1 V, replace the K9 Body Control Module.
 - **If between 0.1 - 6 V**
 6. Ignition OFF, disconnect the X1 and X2 harness connectors at the K9 Body Control Module, ignition ON.
 7. Test for less than 0.1 V between the K9 Body Control Module serial data circuit terminal 26 X1 and ground.
 - **If 0.1 V or greater**

Repair the short to voltage on the circuit.
 - **If less than 0.1 V**
 8. Ignition OFF.
 9. Test for infinite resistance between the K9 Body Control Module serial data circuit terminal 26 X1 and ground.
 - **If less than infinite resistance**

Repair the short to ground on the circuit.
 - **If infinite resistance**
 10. Test for less than 2 Ω between the K9 Body Control Module serial data circuit terminal 26 X1 and the K77 Remote Control Door Lock Receiver serial data circuit terminal 3.
 - **If 2 Ω or greater**

Repair the open/high resistance in the circuit.
 - **If less than 2 Ω**
 11. Replace the K77 Remote Control Door Lock Receiver.
 12. Verify the keyless entry functions operate.
 - **If the keyless entry functions do not operate**

Replace the K9 Body Control Module
 - **If the keyless entry functions operate**
 13. All OK.

Repair Instructions

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

- Refer to [Key with Integrated Transmitter Programming](#)
- Refer to [Control Module References](#) for module replacement, programming, and setup

REMOTE VEHICLE START MALFUNCTION

Diagnostic Instructions

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- Perform the [Diagnostic System Check - Vehicle](#) prior to using this diagnostic procedure.

- Review [Strategy Based Diagnosis](#) for an overview of each diagnostic approach.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Circuit/System Description

Remote start begins as a radio frequency message sent from a keyless entry transmitter to the remote control door lock receiver. The message is then transferred to the body control module (BCM). The BCM monitors system conditions such as content theft deterrent, hood ajar status, and body DTCs to determine if a remote start event will occur. If conditions are determined to be acceptable, the BCM will activate the appropriate vehicle systems.

Diagnostic Aids

- The scan tool Body Control Module Remote Vehicle Start Disable History 1 Data and Remote Vehicle Start Disable History 2 Data lists can be used to help isolate an intermittent malfunction with remote vehicle starting. These data lists identify the status of various items that may disable remote vehicle starting during the past two remote vehicle start attempts. Any parameters that does not equal the expected result required for remote vehicle starting should be diagnosed in their respective subsection.
- Only the first and second vehicle transmitters are able to control the remote vehicle start function.
- Unwanted or inadvertent door lock/unlock activation may be requested by the OnStar[®] Remote Link application. It is possible that a customer may be unaware of account usage, resulting in an unwanted or phantom door lock/unlock. If normal system diagnosis results in an inability to verify the customer's concern, contact Technical Assistance Center (TAC).
- If the vehicle has a current vehicle DTC that illuminates the malfunction indicator lamp, the cause of the DTC must be diagnosed before proceeding with the remote start malfunction diagnostic.

Reference Information

Schematic Reference

Remote Function Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Keyless Entry System Description and Operation

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Verification

1. Verify the scan tool Body Control Module Push Button Ignition Switch parameter changes between Active and Inactive when pressing and releasing the S38 Vehicle On/Off Switch.
 - **If the parameter does not change**
 Refer to [Vehicle Will Not Change Power Mode](#) .
 - **If the parameter changes**
2. Verify that remote vehicle start is enabled through vehicle personalization.

- **If remote vehicle start is not enabled through vehicle personalization**

Use vehicle personalization to turn on remote vehicle start functionality. Refer to the vehicle owners manual.

- **If remote vehicle start is enabled**

3. Verify that the keyless entry functions operate with all available keyless entry transmitters.

- **If the keyless entry functions do not operate properly**

Refer to [Keyless Entry System Malfunction](#).

- **If the keyless entry functions operate properly**

4. Verify none of the following conditions exist on the vehicle:

- A current vehicle DTC that illuminates the malfunction indicator lamp (MIL)
- The vehicle is in valet mode
- More than two remote starts have been attempted
- The hazard switch is in the ON position
- A current hazard switch DTC is set
- The vehicle hood is ajar
- A current hood ajar DTC is set
- The content theft deterrent system detects an alarm trigger
- Accelerator pedal position greater than 0 percent
- Vehicle not in park
- Immobilizer malfunction
- A current automatic transmission shift lock control system DTC is set
- A vehicle speed sensor signal is detected by the ECM
- The vehicle power moding is being controlled by a backup device
- **If any of the conditions are present**

Refer to the appropriate subsection in which the failure occurred.

- **If none of the conditions are present**

5. All OK.

ELECTRONIC TOLL COLLECTION SYSTEM MALFUNCTION

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
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Ignition	1	1	-
Ground	-	1	1
1. Electronic Toll Collection System Inoperative			

Circuit/System Description

The electronic toll collection system uses power and ground from the inside rearview mirror. The components of the electronic toll collection system are internal to the inside rearview mirror and not serviceable.

Reference Information

Inside Rearview Mirror Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Electronic Toll Collection System Description and Operation

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the A10 Inside Rearview Mirror. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 5 and ground.
 - **If 10 Ω or greater**
 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 a test lamp illuminates between the ignition circuit terminal 2 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 ignition circuit end to end.
 - If 2 Ω or greater, 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 ignition circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the A10 Inside Rearview Mirror.
 - **If the test lamp illuminates**
5. Replace the A10 Inside Rearview Mirror.

Repair Instructions

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

Refer to [Inside Rearview Mirror Replacement](#)

REPAIR INSTRUCTIONS

LOW FREQUENCY INSTRUMENT PANEL ANTENNA REPLACEMENT

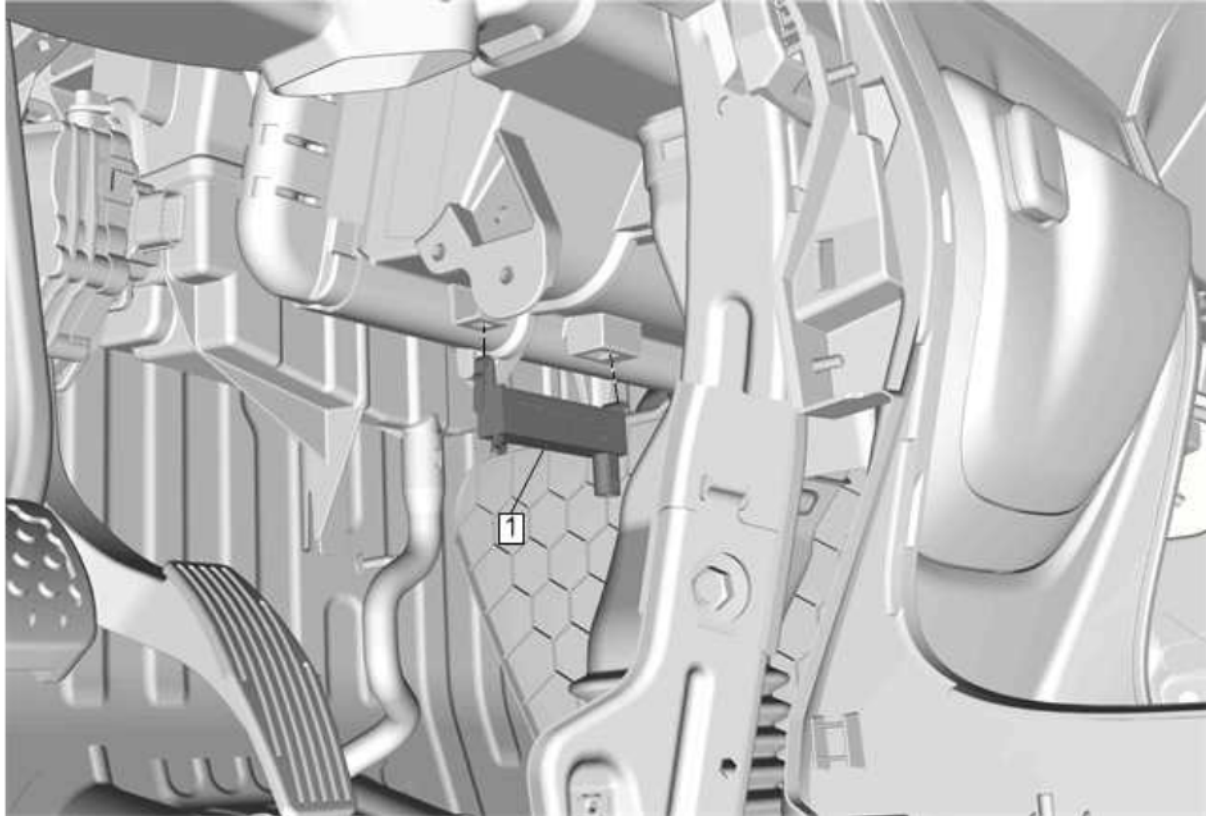


Fig. 3: Low Frequency Instrument Panel Antenna

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Front Floor Console. Refer to Front Floor Console Replacement	
1	Low Frequency Instrument Panel Antenna Procedure Disconnect the electrical connector.

LOW FREQUENCY CONSOLE ANTENNA REPLACEMENT

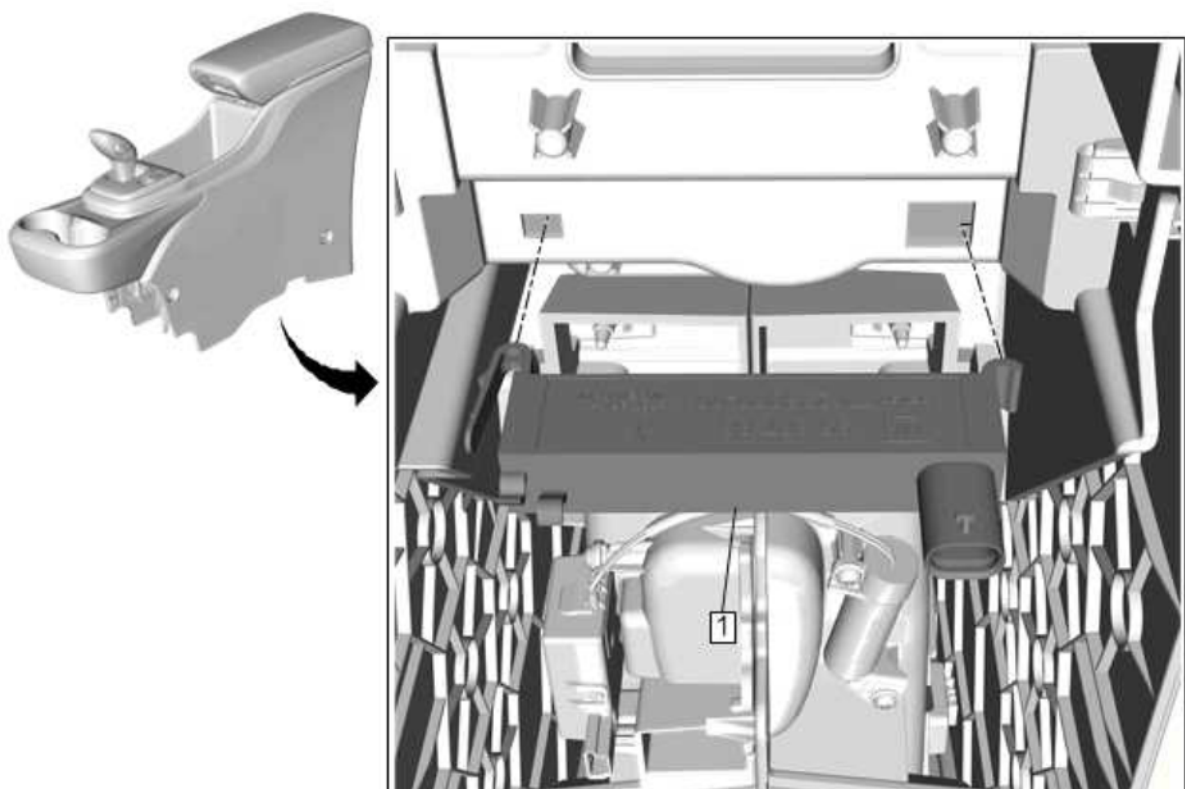


Fig. 4: Low Frequency Console Antenna

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Rear Floor Console. Refer to Rear Floor Console Replacement	
1	Low Frequency Console Antenna Procedure Disconnect the electrical connector.

LOW FREQUENCY REAR COMPARTMENT ANTENNA REPLACEMENT

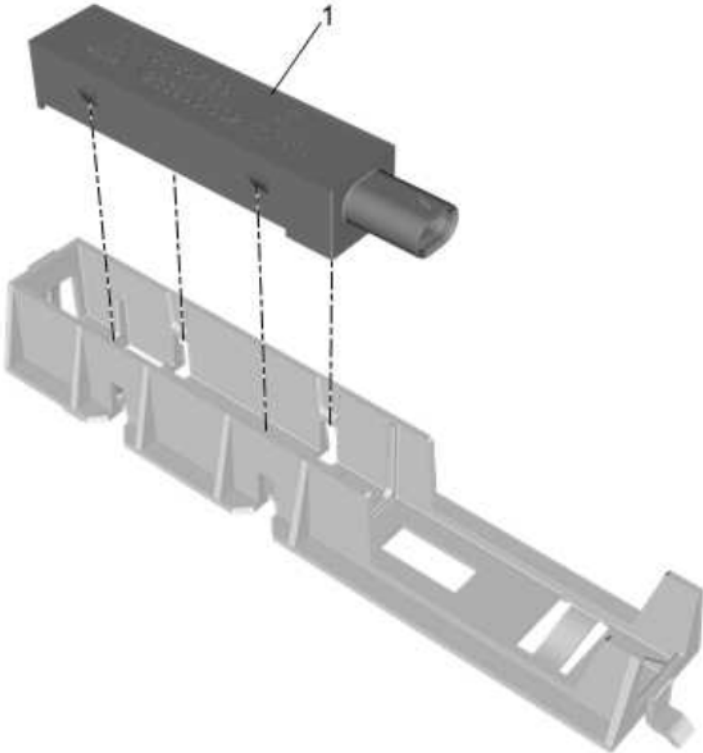


Fig. 5: Low Frequency Rear Compartment Antenna
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Low Frequency Rear Compartment Antenna Bracket. Refer to Low Frequency Rear Compartment Antenna Bracket Replacement	
1	Low Frequency Rear Compartment Antenna Procedure Using a suitable tool, release the retaining tabs and remove the low frequency antenna.

LOW FREQUENCY REAR BUMPER ANTENNA REPLACEMENT

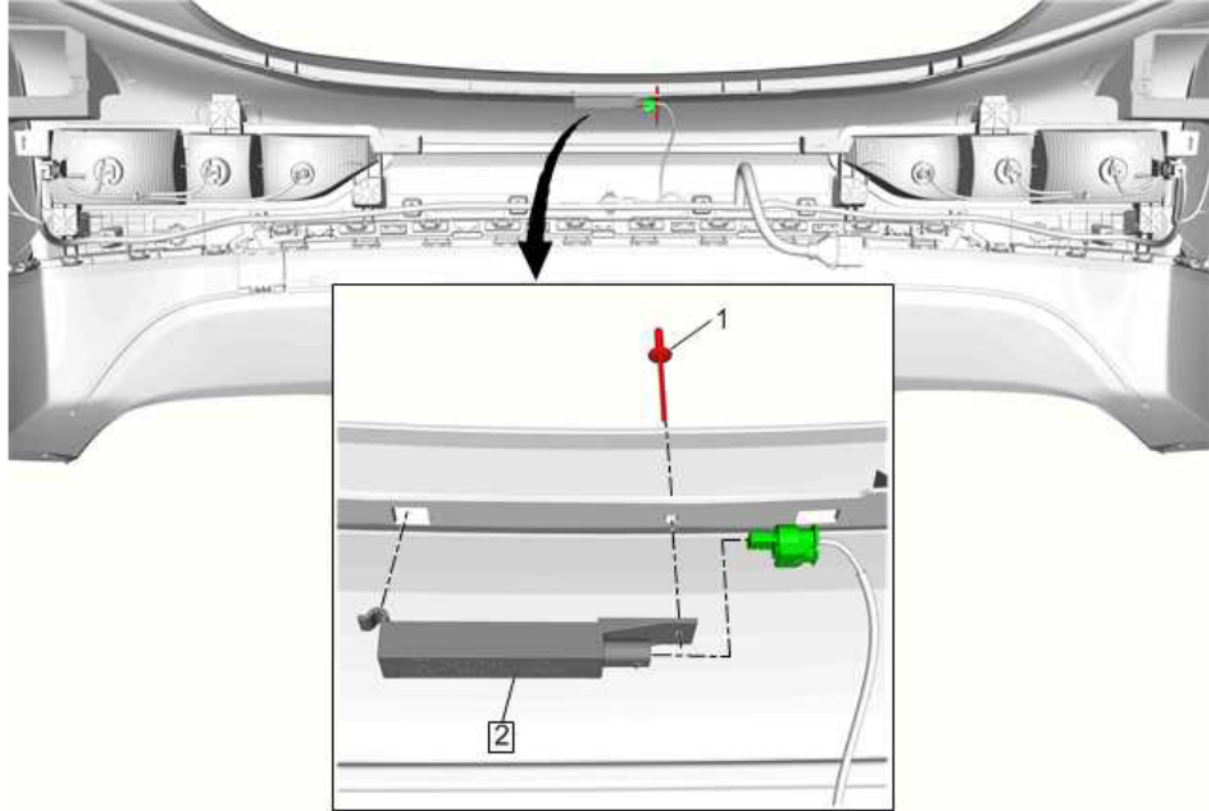


Fig. 6: Low Frequency Rear Bumper Antenna
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Rear Bumper Fascia. Refer to Rear Bumper Fascia Replacement	
1	Low Frequency Rear Bumper Antenna Rivet WARNING: Eye protection must be worn when drilling rivets to reduce the chance of personal injury. Procedure 1. Disconnect the electrical connector. 2. Drill out the rivet on the low frequency rear bumper antenna.
2	Low Frequency Rear Bumper Antenna

KEYLESS ENTRY CONTROL MODULE REPLACEMENT

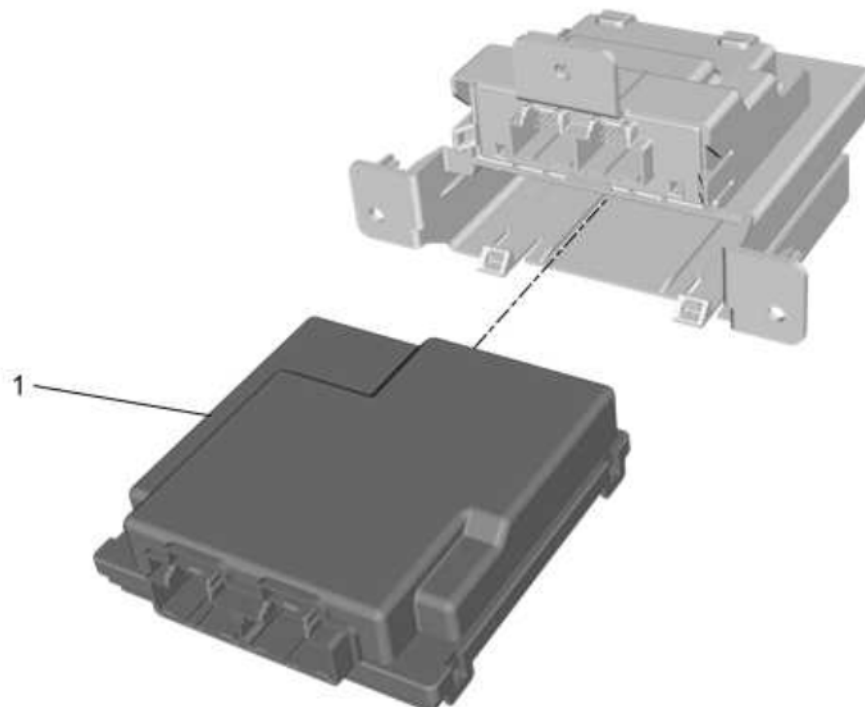


Fig. 7: Keyless Entry Control Module
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Keyless Entry Control Module Bracket. Refer to Keyless Entry Control Module Bracket Replacement	
1	Keyless Entry Control Module Procedure 1. Release the retaining tabs. 2. Perform the necessary programming and setup procedure. Refer to Control Module References

KEYLESS ENTRY CONTROL MODULE BRACKET REPLACEMENT

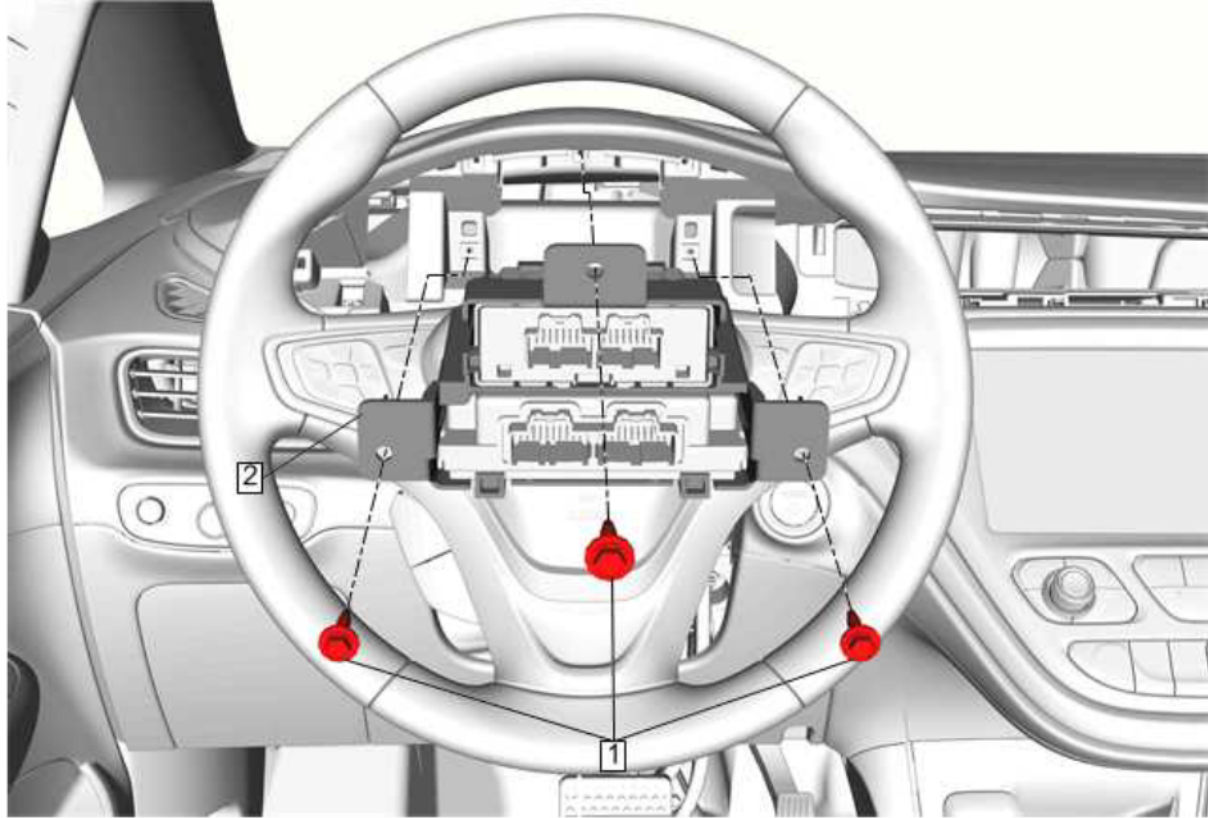


Fig. 8: Keyless Entry Control Module Bracket
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Remove Instrument Cluster. Refer to Instrument Cluster Replacement 2. Disconnect the electrical connectors for keyless entry control module and serial data gateway module.	
1	Keyless Entry Control Module Bracket Bolt (Qty: 3) CAUTION: Refer to Fastener Caution Tighten 2.5 N.m (22 lb in)
2	Keyless Entry Control Module Bracket Procedure Transfer keyless entry control module and serial data gateway module as necessary.

REMOTE CONTROL DOOR LOCK RECEIVER REPLACEMENT

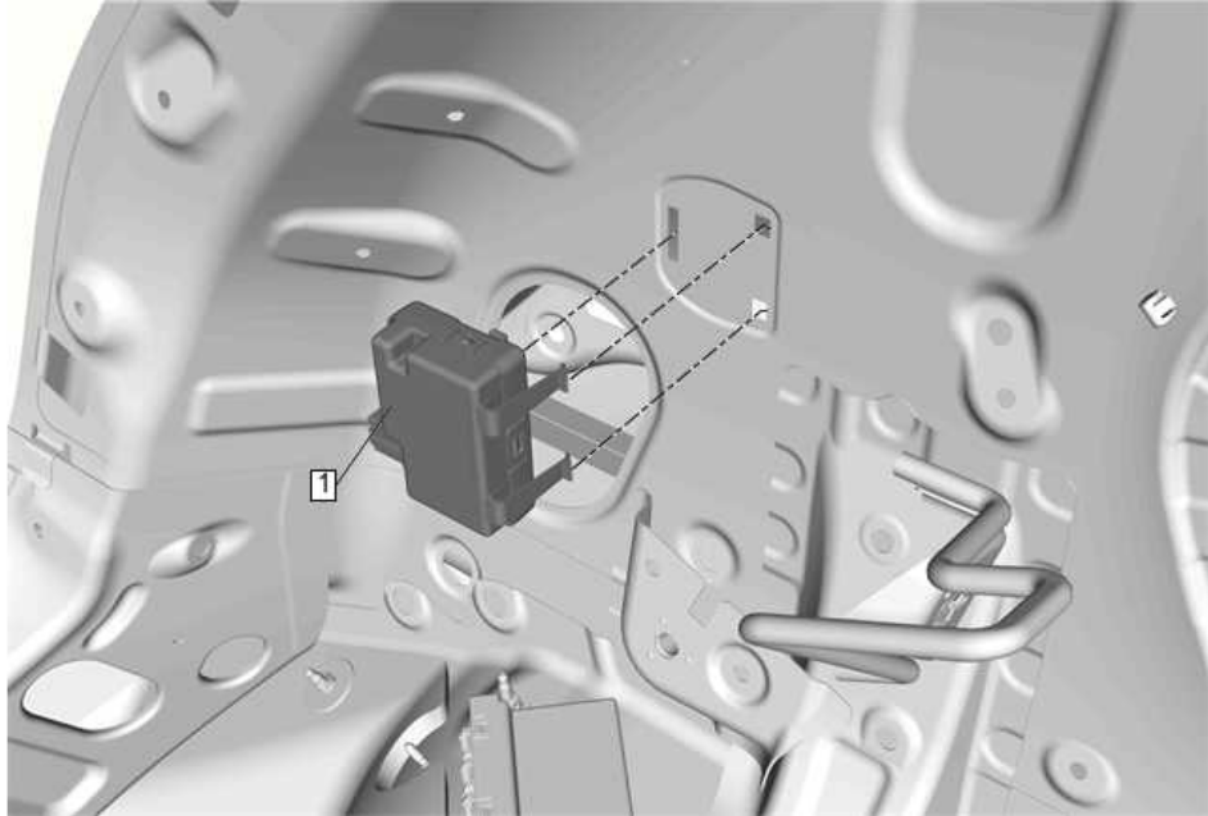


Fig. 9: Remote Control Door Lock Receiver
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Quarter Lower Rear Trim Panel - Left Side. Refer to Quarter Lower Rear Trim Panel Replacement	
1	Remote Control Door Lock Receiver Procedure Disconnect the electrical connector.

UHF SHORT RANGE LOW ENERGY REMOTE CONTROL ACCESS TRANSCEIVER REPLACEMENT

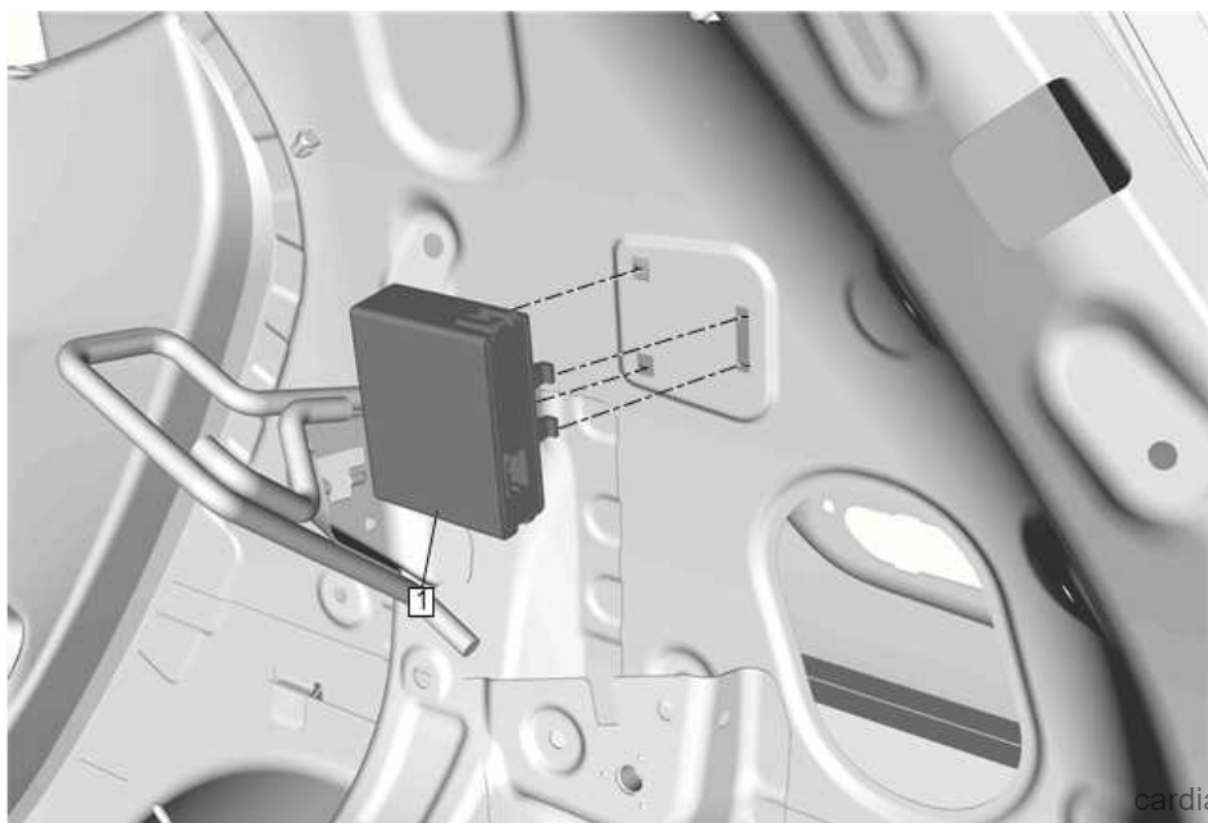


Fig. 10: UHF Short Range Low Energy Remote Control Access Transceiver
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Quarter Lower Rear Trim Panel - Right Side. Refer to Quarter Lower Rear Trim Panel Replacement	
1	UHF Short Range Low Energy Remote Control Access Transceiver Procedure Disconnect the electrical connector.

LOW FREQUENCY REAR COMPARTMENT ANTENNA BRACKET REPLACEMENT

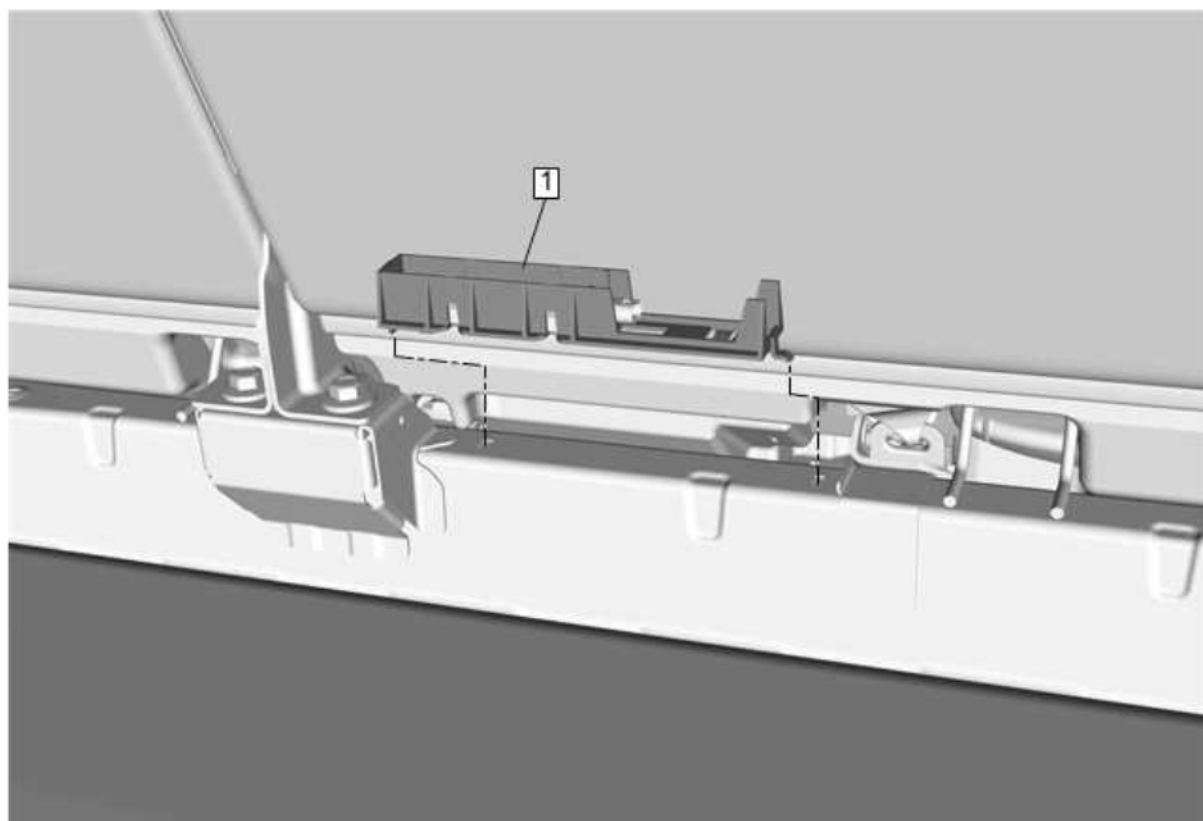


Fig. 11: Low Frequency Rear Compartment Antenna Bracket
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Load Floor Trim Panel. Refer to Load Floor Trim Panel Replacement	
1	Low Frequency Rear Compartment Antenna Bracket Procedure 1. Disconnect the electrical connector. 2. Transfer components as necessary.

REMOTE CONTROL DOOR LOCK AND THEFT DETERRENT TRANSMITTER PROGRAMMING

Keys can be programming in various ways using the procedures outlined below. Using the Replacing Keys procedure will first erase all the known keys from the vehicle. Any existing keys and any new keys will then be programmed. This procedure should be used any time a key is required to be unlearned or erased from a vehicle. If a new key is being learned to a vehicle to replace a damaged, inoperative, missing, or stolen key, the Replacing Keys procedure must be used. This ensures that the old key cannot be used to access or start the vehicle after programming.

The Adding Keys procedure does not erase any keys prior to programming. The procedure will simply program the key into the next available slot. The Adding Keys procedure should only be used when adding an additional keys to the vehicle. The Adding Keys procedure should never be used to program a key to a vehicle that is having a key replaced, regardless of the cause for the replacement.

Replacing Keys (Without SPS)

NOTE:

- This procedure will unlearn all previously learned keys. All keys that are to be programmed must be with the vehicle.
- A total of eight keys maybe be learned to a single vehicle.
- This procedure will only learn the vehicle key information. This procedure will not learn any immobilizer information between the body control module (BCM) and engine control module (ECM).
- This procedure may be used with or without existing learned keys being present. If existing keys are present, keep the keys away from the vicinity of the vehicle. Failure to keep learned keys away from the vehicle will result in the learn changing to the Adding Keys procedure.
- The keys to be learned must duplicate the mechanical cut of the current key.

1. Insert the mechanical key of the new key into the key lock cylinder located on the outside of the driver door and turn the key to the unlock position five times within ten seconds. The Driver Information Center (DIC) will display Remote Learn Pending, Please Wait.
2. After ten minutes, the DIC will display Press Engine Start Button To Learn. Press the ignition mode switch. The DIC will again display Remote Learn Pending, Please Wait.
3. Repeat Step 2 two additional times, for a total of thirty minutes. All previously known keys have now been unlearned. Remaining keys can be learned during the next steps. The DIC display will now display Ready For Remote # 1.

NOTE: The key pocket is located inside the front cupholder.

4. Place the new key into the key pocket.

NOTE: If the programming does not complete or hangs during the programming operation, refer to Unable to Complete Programming below.

5. Press the ignition mode switch. When the key is learned the DIC will indicate that it is ready to program the next key.
6. Remove the key from the key pocket and press the unlock button. To program additional keys, repeat Steps 4 through 6.
7. When all additional keys are programmed, press and hold the ignition mode switch for 5 seconds to exit programming mode.

Replacing Keys (With SPS)

NOTE:

- This procedure will unlearn all previously learned keys. All keys that are to be programmed must be with the vehicle.
- This procedure may be used with or without existing learned keys being present. If no existing keys are available, this procedure must be used.
- A total of eight keys maybe be learned to a single vehicle.
- This procedure will only learn the vehicle key information. This procedure will not learn any immobilizer information between the body control module (BCM) and engine control module (ECM).

- If the battery voltage is low, charge the battery before continuing with the procedure.

1. Connect a scan tool to the vehicle and access SPS.
2. Ensure that all power consuming devices are turned OFF on the vehicle.
3. Select the SPS application and follow the on-screen instructions.
4. Select Reprogram ECU.
5. Select IMMO Immobilizer Learn - Setup.
6. Select the Program Transponder or Remote Key (Delete) function.

NOTE:

- At multiple times during the learn procedure, SPS will instruct you to turn the ignition to the run position. Make sure the vehicle is actually in the run mode before continuing on the SPS terminal. If the ignition is not in the run mode, the learn procedure will fail.
- The key pocket is located inside the front cupholder.

7. Follow the on-screen instructions.

NOTE:

If the programming does not complete or hangs during the programming operation, refer to Unable to Complete Programming below.

8. After programming all keys, Programming Complete, is displayed.
9. Press and hold the ignition mode switch for 15 seconds.
10. Press the lock and unlock button on each key that was programmed. This will awaken each key and allow passive and active keyless entry functions to be established.
11. With a scan tool, clear any DTCs.
12. Verify each key is operating properly. Operate each of the keyless entry functions using the buttons on the key and then start the vehicle. When verifying operation, make sure that no other keys are near the vehicle.

Adding Keys (Without SPS)

NOTE:

- To initiate, this procedure requires that 2 learned keys be available.
- A total of eight keys maybe be learned to a single vehicle.
- This procedure adds keys only. The procedure does not erase previously learned keys.
- The keys to be learned must duplicate the mechanical cut of the current key.

1. Place the recognized keys in the vehicle cupholder.
2. Insert the mechanical key of the new key into the key lock cylinder located on the outside of the driver door and turn the key to the unlock position five times within ten seconds. The Driver Information Center (DIC) will display Ready For Remote #2, 3, 4 or 5.

NOTE:

The key pocket is located inside the front cupholder.

3. Place the new key into the key pocket.
4. Press the ignition mode switch. When the key is learned the DIC will indicate that it is ready to program the next key.

NOTE:

If the programming does not complete or hangs during the programming operation, refer to Unable to Complete Programming [cardiagn.com](https://www.cardiagn.com)

below.

5. Remove the key from the key pocket and press the unlock button. To program additional keys, repeat Steps 3 through 5.
6. When all additional keys are programmed, press and hold the ignition mode switch for 5 seconds to exit programming mode.

Adding Keys (With SPS)

NOTE:

- This procedure may be used with or without existing learned keys being present. If no existing keys are available, this procedure must be used.
- A total of eight keys maybe be learned to a single vehicle.
- This procedure will only learn the vehicle key information.
- If the battery voltage is low, charge the battery before continuing with the procedure.

1. Connect a scan tool to the vehicle and access SPS.
2. Ensure that all power consuming devices are turned OFF on the vehicle.
3. Select the SPS application and follow the on-screen instructions.
4. Select Reprogram ECU.
5. Select IMMO Immobilizer Learn - Setup.
6. Select the Program Transponder or Remote Key (Add) function.

NOTE:

- At multiple times during the learn procedure, SPS will instruct you to turn the ignition to the run position. Make sure the vehicle is actually in the run mode before continuing on the SPS terminal. If the ignition is not in the run mode, the learn procedure will fail.
- The key pocket is located inside the front cupholder.

7. Follow the on-screen instructions.

NOTE:

If the programming does not complete or hangs during the programming operation, refer to Unable to Complete Programming below.

8. After programming all keys, Programming Complete, is displayed.
9. Press and hold the ignition mode switch for 15 seconds.
10. Press the lock and unlock button on each key that was programmed. This will awaken each key and allow passive and active keyless entry functions to be established.
11. With a scan tool, clear any DTCs.
12. Verify each key is operating properly. Operate each of the keyless entry functions using the buttons on the key and then start the vehicle. When verifying operation, make sure that no other keys are near the vehicle.

Unable to Complete Programming

When attempting to program immobilizer components, various conditions may prevent the programming operation from completing. These conditions may be caused by normal system operation, a system malfunction, or an external influence. Common symptoms of a incomplete programming is receiving an error message during the attempt or having the SPS application become unresponsive.

- DTCs are set in the body control module (BCM)

The immobilizer system is a function of the BCM software. If immobilizer DTCs are set in the BCM, such as DTC B2955, a fault has been identified in the immobilizer system. If this is not corrected before attempting to program components, the programming may not complete. Correct all immobilizer DTCs before attempting to program any immobilizer components.

- The key has been programmed to another vehicle or is not the correct type for the vehicle

A key can only be programmed to a single vehicle. Once a key is programming to a vehicle, it is paired for the life of the key. The key can be learned to the same vehicle again and again, but it is not able to be programmed to a different vehicle.

Many vehicle are available with both a base keyless entry system and an optional passive entry system. These keys typically look identical but cannot be substituted for one another. To verify the key is correct, compare the part number that is etched on the key to the part number identified in the parts catalog. The key should be correct for the system installed in the vehicle.

- The theft deterrent module is not properly secured or the key is not properly positioned in the pocket/slot.

A theft deterrent module that is not fully seated or is otherwise not properly secured may prevent a coupling between the transponder located in the key and the theft deterrent module. Being out of place by as little as 1 mm may prevent programming from completing. Make sure the theft deterrent module is properly installed and fully seated in it's clip.

The key should be positioned in the proper orientation so that it lays flat in the pocket. If a large key ring or other item attached to the key prevents the key from laying flat, remove the key ring.

To determine if the theft deterrent module is properly secured, remove the battery from the key and place the key into the pocket/slot. Attempt to change the vehicle mode by pressing the vehicle ON/OFF switch. The vehicle should change modes. If the NO REMOTE DETECTED message is displayed on the DIC, the theft deterrent module may not be properly secured.

- External interference is interrupting the programming operation

External RF interference and EMI may interrupt the low frequency coupling between the key and theft deterrent module. This interference may come from many different locations. Devices plugged into the vehicle power outlets such as cell phone chargers, laptop computers, GPS devices, etc. may cause interference. Vehicle location may also cause interference. Locations near airports and military installations may causer interference. Remove all customer installed devices and, if necessary, move the vehicle if interference is suspected.

DESCRIPTION AND OPERATION

KEYLESS ENTRY SYSTEM DESCRIPTION AND OPERATION

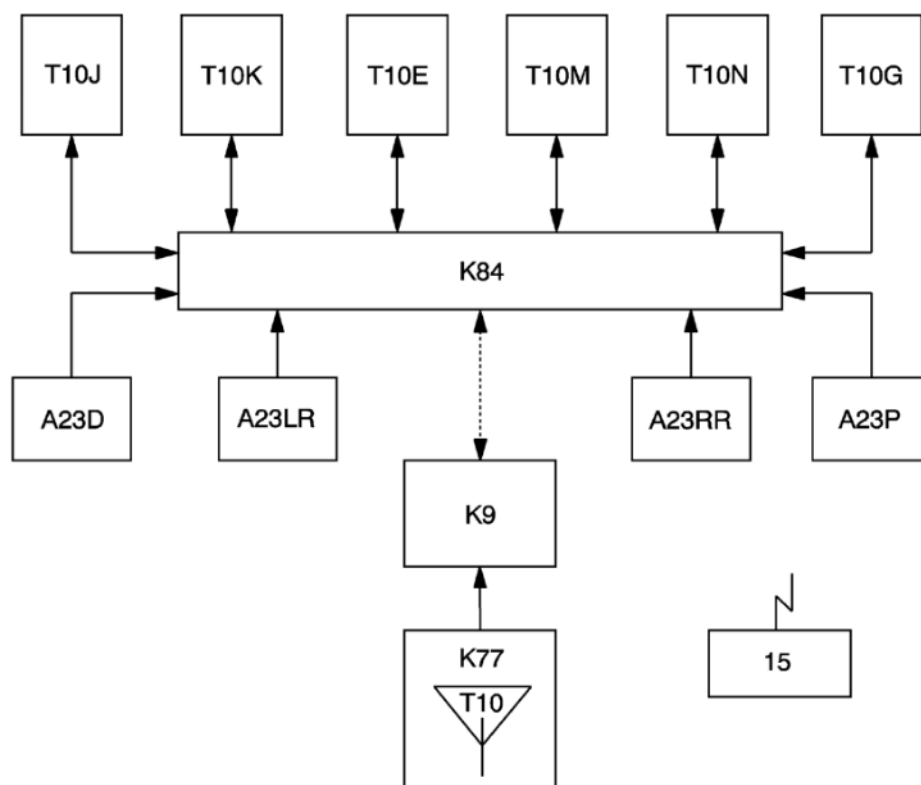


Fig. 12: Keyless Entry System Description And Operation Block Diagram
 Courtesy of GENERAL MOTORS COMPANY

Solid line - Hard Wire I/O	
Dash line - Serial Data	
A23D	Door Latch - Driver
A23LR	Door Latch - Left Rear
A23P	Door Latch - Passenger
A23RR	Door Latch - Right Rear
K9	Body Control Module (BCM)
K77	Remote Control Door Lock Receiver
K84	Keyless Entry Control Module
T10	Keyless Entry Antenna
T10E	Keyless Entry Antenna - Rear Compartment
T10G	Keyless Entry Antenna - Rear Fascia
T10J	Keyless Entry Antenna - Center Console Front
T10K	Keyless Entry Antenna - Center Console Rear
T10M	Keyless Entry Antenna - Driver Door Handle
T10N	Keyless Entry Antenna - Passenger Door Handle
15	Keyless Entry Transmitter

Keyless Entry System Description and Operation - Active

The keyless entry system is a vehicle entry device. The keyless entry system is used in conjunction with the door locks to unlock the vehicle. Keyless entry will lock/unlock the vehicle doors or open the rear compartment lid when a corresponding button on the keyless entry transmitter is pressed. This is accomplished by the transmitter sending a radio frequency to the remote control door lock receiver antenna that has a direct link to the body control module (BCM). The BCM interprets the signal and activates the requested function or requests the appropriate control module to activate the function via a serial data message. A low transmitter battery or radio frequency interference from aftermarket devices, such as 2-way radios, power inverters, computers, etc., may cause a system malfunction. High radio frequency traffic areas, such as gas stations that use pay-at-the-pump radio frequency transponders, may also cause interference that could lead to a malfunction. Keyless entry allows you to operate the following features:

- Door lock/unlock

- Remote start
- Illuminated entry lamps
- Panic alarm/vehicle locator
- Remote vehicle start

Keyless Entry System Description and Operation - Passive

Passive keyless entry allows entry to a locked vehicle without pressing any buttons on the keyless entry transmitter. You must only have the transmitter with you. The passive entry system use low frequency antennas in several different areas on the vehicle to determine the location of the transmitter. When passively opening a locked door or the rear compartment, you must have a programmed transmitter with you in your pocket, purse, or briefcase.

When an exterior door handle button is pressed or the rear compartment touch pad is pressed, the low frequency antenna sends out a challenge to the keyless entry transmitter. Because of the low frequency, communication range is limited. The antenna will emit the challenge in a one meter range. The transmitter must be within this range to receive the challenge. The transmitter receives this challenge and emits it's response as an RF message, which is received by the remote control door lock receiver. If the response is correct, the door or rear compartment will unlock and open.

As a customer convenience feature, the keyless entry system will notify the driver if the transmitter has been left in the vehicle after exiting by chirping the vehicle horn three times. This may be turned off using vehicle personalization. Also, if the transmitter is left in the vehicle after the central door lock switch has been used to lock the vehicle, the driver door will remain unlocked after exiting the vehicle. This is intended to prevent locking the transmitter in the vehicle and being unable to access it.

Keyless Entry System Description and Operation - Keyless Start

The keyless start portion of the keyless entry system allows vehicle starting, having only the transmitter as your key. The keyless start system uses low frequency antennas in three different locations on the vehicle to determine the location of the transmitter. Multiple antennas are used to ensure complete coverage of the vehicle interior and rear compartment. When using the keyless start system, a programmed transmitter must be in the vehicle's interior, such as the driver's pocket, purse, or briefcase.

When the ignition mode switch is pressed, the low frequency antennas emit a challenge to the keyless entry transmitter. The transmitter receives this challenge and emits it's response as an RF message, which is received by the remote control door lock receiver. If the response is correct, vehicle starting will be allowed. If RF communication is interrupted, a "No Remote Detected" message will be displayed on the DIC. In these cases, the extended transmitter key blade can be placed in the transmitter slot located in the upper instrument panel storage compartment, under the rubber mat. The immobilizer antenna coil is located directly beneath the transmitter slot. Placing the extended key blade in the slot will create a low powered coupling between the transmitter and immobilizer antenna, allowing communications to occur and enabling vehicle starting.

The keyless entry system has the following components:

- Vehicle key with integrated keyless entry transmitter
- Driver and front passenger door antennas (part of the door handle assembly)
- Driver and front passenger door handle switches (part of the door handle assembly)
- Rear fascia antenna
- Front instrument panel console antenna
- Center console antenna
- Rear compartment antenna
- Body control module (BCM)
- Keyless entry control module
- Immobilizer antenna coil
- Remote control door lock receiver
- Short range remote control transceiver

Keyless Entry Transmitters

The keyless entry transmitters are used to lock and unlock the vehicle door while away from the immediate area of the vehicle. Keyless entry functions may work at up to 20 m (65 ft) from the vehicle. The keyless entry transmitter is an integral part of the vehicle key.

Keypass

Keypass is a function of the vehicle owner's cell phone. It can perform the same functions as the keyless entry transmitters. In some model year and vehicle applications it can support additional functions.

Door Antenna

The keyless entry door antennas are used to transmit low frequency communications to the keyless entry transmitters.

The keyless entry door antennas are located in the left front and right front exterior door handle bracket. The antennas are serviced as part of the door handle assembly. The antennas are controlled by the keyless entry control module. When the exterior door handle button is pressed, the respective antenna will send out a challenge to the keyless entry transmitter, which begins the passive entry communications.

Rear Fascia Antenna

The rear fascia antenna is used to transmit low frequency communication to the keyless entry transmitters for entry to rear compartment.

The rear fascia antenna is located behind the rear fascia. The antenna is controlled by the keyless entry control module. When the rear compartment touch pad is pressed, the antenna sends out a challenge to the keyless entry transmitter, which begins the passive entry communications.

Front Console Passive (Instrument Panel) Antenna

This antenna is located in the lower instrument panel near the front of the center console.

The front console antenna is used for vehicle starting functions. When the ignition mode switch is pressed, the antenna is energized or "pinged". This emits a low frequency challenge signal that is received by the keyless entry transmitter. The transmitter will then reply to this challenge with a response and, if correct, vehicle starting will occur.

Center Console Antenna

This antenna is located in the rear of the center console.

The rear console antenna is used for vehicle starting functions. When the ignition mode switch is pressed, the antenna is energized or "pinged". This emits a low frequency challenge signal that is received by the keyless entry transmitter. The transmitter will then reply to this challenge with a response and, if correct, vehicle starting will occur.

Rear Compartment Antenna

This antenna is located in the center of the rear compartment metal floor pan, near the seatback.

The rear compartment antenna is used for vehicle starting functions. When the ignition mode switch is pressed, the antenna is energized or "pinged". This emits a low frequency challenge signal that is received by the keyless entry transmitter. The transmitter will then reply to this challenge with a response and, if correct, vehicle starting will occur.

Remote Control Door Lock Receiver

The remote control door lock receiver is located on the vehicle windshield, directly in front of the inside rearview mirror.

The remote control door lock receiver is controlled by and directly communicates with the body control module (BCM). When the transmitter receives a low frequency challenge from an antenna, it responds

with an RF message. This RF message is received by the remote control door lock receiver and communicated to the BCM. If the RF message is a valid response to the low frequency challenge, vehicle access or starting will be allowed.

Immobilizer Antenna Coil Assembly

The keyless entry immobilizer coil assembly is located in the upper instrument panel, directly beneath the upper instrument panel storage compartment. If the transmitter battery is dead, weak, or the RF signal is being interrupted, the extended transmitter key blade can be placed in the transmitter slot located in the upper instrument panel storage compartment, under the rubber mat, to create a low powered coupling between the transmitter and immobilizer antenna, allowing communications to occur and enabling vehicle starting.

The immobilizer antenna coil is controlled by the BCM. The immobilizer control module is also active when learning vehicle keys.

Keyless Entry Control Module

The keyless entry control module is a multi-function module which performs the following keyless entry system functions:

- Activating vehicle antennas for passive keyless entry functions
- Activating vehicle antennas for keyless start functions
- Backup control for the ECM accessory wakeup and the run/crank relay
- If equipped, controls the electronic steering column lock
- Receiver of the exterior door handle switch inputs and door open switch (not the door ajar switch)
- Ignition mode switch monitoring

Short Range Remote Control Transceiver

The short range remote control transceiver is an additional communication device to provide communication between the vehicle owner's cell phone and the keyless entry control module.

OnStar® Remote Link (if equipped)

A vehicle operator may have the ability to perform some of the keyless entry functions using applications on personal devices such as but not limited to smart phones. A condition may appear as if there is a malfunction in the vehicle. If it is suspected that this may be the case contact Technical Assistance if a condition cannot be determined through normal vehicle diagnostics.

Body Control Module (BCM)

The BCM is a multi-function module that performs the following functions:

- Receive and authenticate active transmitter and keyless start signals from the remote control door lock receiver
- Determines the functionality requested by the transmitter signal
- Performs the function requested by the transmitter signal

Unlock Driver Door Only - Active

Momentarily press the transmitter UNLOCK button to perform the following functions:

- Unlock only the driver door
- Illuminate the interior lamps for a determined length of time or until the ignition mode switch is pressed
- Flash the exterior lights, if enabled through personalization
- Disarm the content theft deterrent system
- Deactivate the content theft deterrent system when in the alarm mode

Unlock All Doors - Second Operation - Active

Momentarily press the transmitter UNLOCK button a second time, within 5 seconds of the first press, to perform the following function:

Unlock the remaining doors and rear compartment

Unlock Driver Door Only - Passive

If enabled through personalization, approach the driver door with a valid keyless entry transmitter and press the door handle button to perform the following functions:

- Unlock and open only the driver door when door handle is operated
- Disarm the content theft deterrent system, if equipped
- Deactivate the content theft deterrent system when in the alarm mode

Unlock All Doors - Passive

Approach any non driver door (front or rear) or, if enabled through personalization, the driver door with a valid keyless entry transmitter and press the door handle button to perform the following functions:

- Unlock all vehicle doors and rear compartment
- Disarm the content theft deterrent system, if equipped
- Deactivate the content theft deterrent system when in the alarm mode

Lock All Doors - Active

Press the transmitter LOCK button to perform the following functions:

- Lock all vehicle doors
- Immediately turn off the interior lamps
- Flash the exterior lights, if enabled through personalization
- Chirp the horn, if enabled through personalization
- Arm the content theft deterrent system

Lock All Doors - Passive

Exit the vehicle (with vehicle off) with the keyless entry transmitter to automatically perform the following functions, if equipped.

- Lock all vehicle doors and rear compartment after a delay
- Flash the exterior lights, if enabled through personalization
- Chirp horn, if enabled through personalization
- Arm the content theft deterrent system

When all doors are closed, they can also be locked from the exterior by pressing the door handle button while having a valid transmitter within range.

If more than one keyless entry transmitter is within a vehicle and the keyless entry system detects that one or more transmitters have been left in the vehicle after vehicle is locked, any transmitter left within the vehicle will be temporarily deactivated until:

- A button on the deactivated transmitter is pressed (will only activate the transmitter whose button is pressed)
- A passive unlock of vehicle occurs
- Change in power mode occurs

Rear Compartment Release - Passive

Approach the rear of the vehicle with a valid keyless entry transmitter. Press the trunk release touch pad. The trunk will open.

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Vehicle Locator/Panic Alarm/Active

A single press of the panic button performs the following functions. Some functions may be dependent on personalization settings:

- Pulses the horn three times
- Flashes the exterior lamps three times

A press and hold of the panic button performs the following functions:

- Pulses the horn and flashes the parking lamps for 30 second or until the following conditions occur:
 - The panic button is pressed
 - The ignition mode switch is pressed with a valid key in the vehicle

Remote Start

The remote vehicle start function allows engine starting while not in the vehicle. It also allows the vehicle HVAC system and other vehicle systems to enable, providing a comfortable vehicle upon entry. The remote vehicle start sequence begins by pressing and releasing the lock button and then pressing and holding the remote vehicle start buttons on the keyless entry transmitter. The turn signal lamps will illuminate to indicate the vehicle has received the remote start request. Each time a remote vehicle start is performed, the vehicle doors are locked, however they may then be unlocked/locked with the transmitter at any time. Only the first and second vehicle transmitters are able to control the remote vehicle start function. Any additional remote transmitters programmed to the vehicle will perform all other remote functions. Once activated, the engine is allowed to run for 10 minutes. The remote vehicle start time may be extended by an additional 10 minutes by again pressing and releasing the lock button and then pressing and holding the remote vehicle start buttons on the transmitter. This feature is called a remote vehicle start continue and allows a maximum of 20 minutes of engine running. If the remote vehicle start continue is performed at 7 minutes into the initial 10 minute time-out, a total of 17 minutes of engine running would occur. The remote vehicle start event may be suspended at any time by pressing only the remote vehicle start button on the transmitter or by entering the vehicle and turning ON the hazard lamps.

In between ignition cycles, only two remote start events may occur or be attempted. Once two events or attempts have been made, future remote start events will be suspended until the vehicle is operated using the ignition mode switch.

Enable/Disable Remote Start

Using the driver information center, remote start may be enabled or disabled as a part of vehicle personalization. Refer to the vehicle owners manual for more information.

Remote Start System Disabled

If any of the conditions listed below occur, a remote start event may be aborted or canceled:

- Vehicle is in valet mode
- Vehicle doors are ajar
- Rear compartment lid is ajar
- The hood is open
- The doors are not locked
- The hazard switch is ON
- Vehicle power mode is incorrect
- Vehicle speed is greater than 0
- Transmission is not in P
- Excessive engine coolant temperature
- Low oil pressure
- The malfunction indicator lamp (MIL) is commanded ON
- The low fuel level indicator lamp is commanded ON
- Engine crank time is greater than 30 seconds

- Excessive engine speed
- Accelerator pedal position too high
- Remote start timer equals 0
- Immobilizer system indicates a theft attempt
- Vehicle propulsion system fault conditions
- High voltage battery fault conditions

Keyless Entry Personalization

Vehicle lock/unlock functions and remote start settings may be personalized for the vehicle. For functional descriptions and programming instructions, refer to the vehicle owners manual.

Replace Battery in Remote Key Message

A REPLACE BATTERY IN REMOTE KEY message may be seen on the driver information center when the transmitter's battery voltage has been lower than 2.16 volts for three consecutive ignition cycles.

ELECTRONIC TOLL COLLECTION SYSTEM DESCRIPTION AND OPERATION

The electronic toll collection system is an in vehicle communication system to remotely perform the transaction between a toll road collector and the vehicle operator. The system has a module contained within the mirror assembly. The module uses an antenna to send and receive an RF (radio frequency) signal. The RF message is sent to the toll road's toll collector system and an RF message is sent back to the vehicle telling the electronic toll collection system in the vehicle that the toll requirement has been satisfied. The electronic toll collection system informs the vehicle operator if the toll requirement has not been satisfied.

The electronic toll collection system uses bidirectional RF communication operating at 5.8 GHz.
