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ACCESSORIES & EQUIPMENT

Remote Functions - Escalade, Suburban, Tahoe, Yukon

SCHEMATIC WIRING DIAGRAMS

REMOTE FUNCTION WIRING SCHEMATICS

Keyless Entry - Active

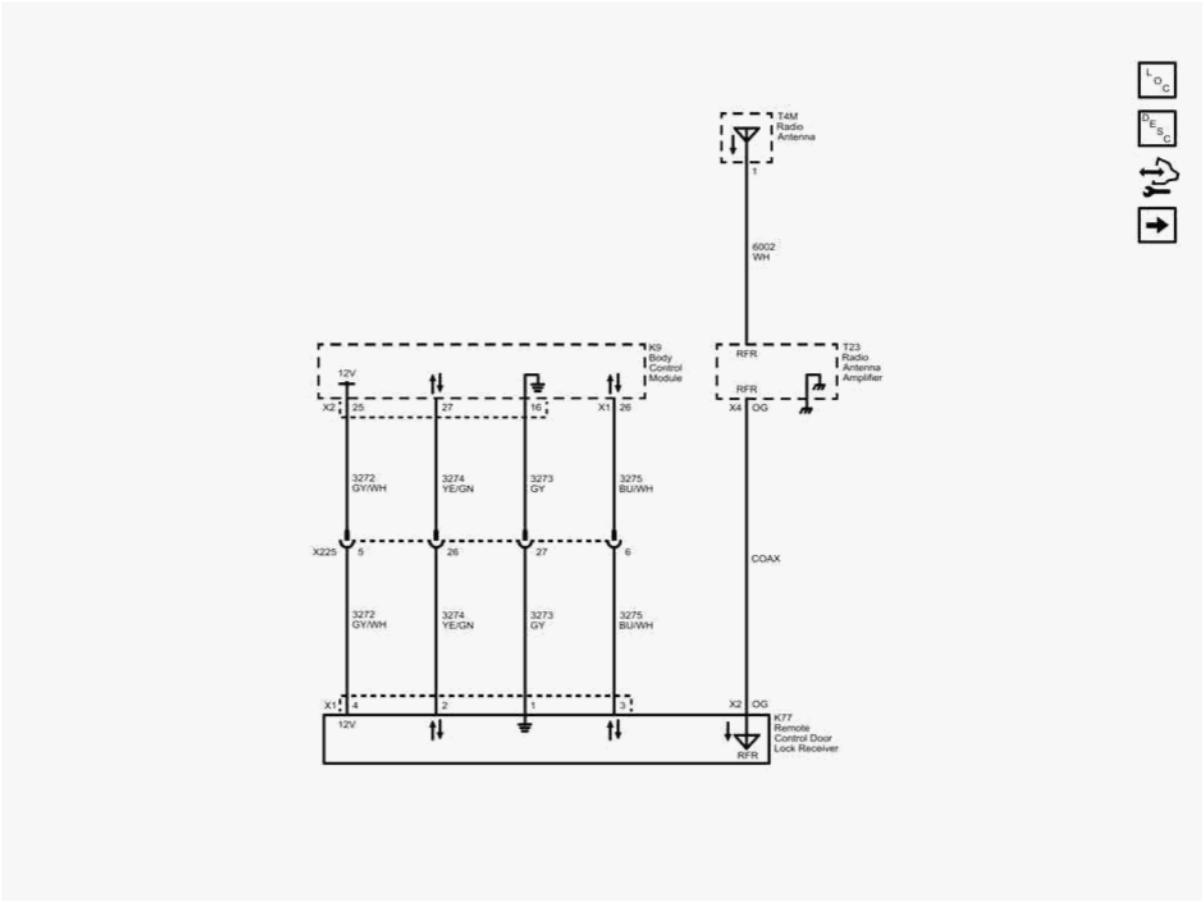

Fig. 1: Keyless Entry - Active
Courtesy of GENERAL MOTORS COMPANY

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Keyless Entry - Passive, and Keyless Start

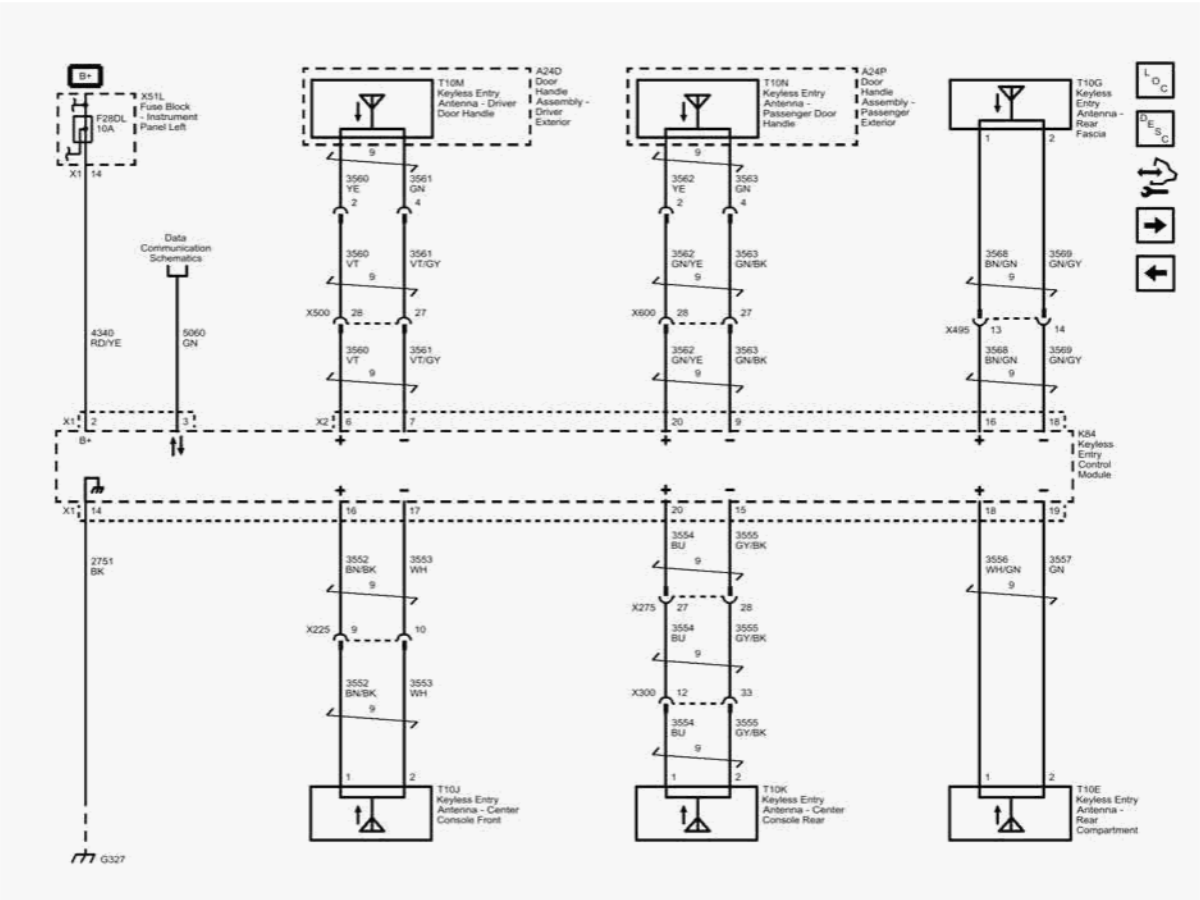

Fig. 2: Keyless Entry - Passive, and Keyless Start
Courtesy of GENERAL MOTORS COMPANY

Garage Door Opener (UG1)

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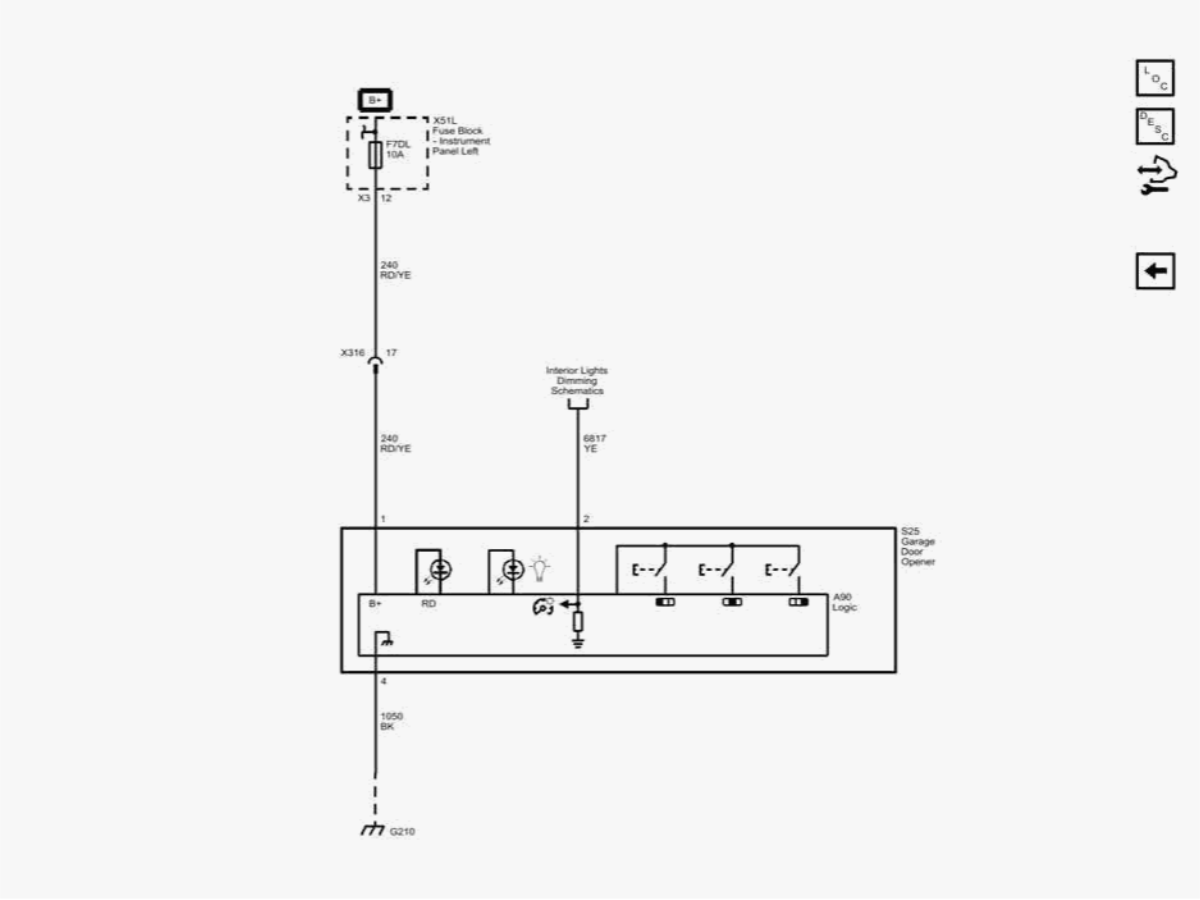

Fig. 3: Garage Door Opener (UG1)
Courtesy of GENERAL MOTORS COMPANY

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.

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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.

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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 (With BTM) **Power Mode Description and Operation (Without BTM)**

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**

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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

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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	B3101 00	B3101 00	B3101 00	B3101 00
Serial Data	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.

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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 (Without ATH)Keyless Entry System Description and Operation (With ATH)

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.

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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 3 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.

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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 3-6 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 27 X2 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 27 X2 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 27 X2 and the K77 Remote Control Door Lock Receiver serial data circuit terminal 2.
    - **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**

      Replace the K9 Body Control Module

    - **If the DTC does not set**
13. All OK.

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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

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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 (Without ATH)Keyless Entry System Description and Operation (With ATH)

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 **Remote Control Door Lock Transmitter Learn (without BTM)Remote Control Door Lock Transmitter Learn (with BTM)**.

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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 **Remote Control Door Lock Transmitter Learn (without BTM)Remote Control Door Lock Transmitter Learn (with BTM)**

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

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A keyless transmitter button is pressed.

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 (Without ATH)Keyless Entry System Description and Operation (With ATH)

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

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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

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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

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COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Keyless Entry System Description and Operation (Without ATH)Keyless Entry System Description and Operation (With ATH)

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.

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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

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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 (Without ATH)Keyless Entry System Description and Operation (With ATH)

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

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- **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

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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 (Without ATH)Keyless Entry System Description and Operation (With ATH)

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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 T10M 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**

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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.

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- **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 T10M 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 keyless entry control 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.

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DTC Descriptors

DTC B3120

Keyless Entry Antenna 2

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.

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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

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Description and Operation

Keyless Entry System Description and Operation (Without ATH)Keyless Entry System Description and Operation (With ATH)

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** .

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- **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 T10N 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.

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- **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 T10N 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**

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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.

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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

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Keyless Entry System Description and Operation (Without ATH)Keyless Entry System Description and Operation (With ATH)

Electrical Information Reference

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- **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 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.**

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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**

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 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.

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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 **Ignition Lock Key Transmitter Antenna Replacement - Rear Bumper Fascia**
- 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

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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
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

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- 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

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Description and Operation

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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 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.

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- 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

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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 **Ignition Lock Key Transmitter Antenna Replacement - Instrument Panel (Chevrolet/GMC)Ignition Lock Key Transmitter Antenna Replacement - Instrument Panel (Cadillac)**
- Refer to **Control Module References** for keyless entry control module replacement, programming, and setup

DTC B3123: KEYLESS ENTRY ANTENNA 5

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 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

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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

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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

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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.

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- 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.

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- Refer to **Ignition Lock Key Transmitter Antenna Replacement - Floor Console (Chevrolet / GMC)Ignition Lock Key Transmitter Antenna Replacement - Floor Console (Cadillac)**
- 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.

Diagnostic Aids

- Objects in the trunk may block the reception of the rear mounted antennas. Verify the trunk is free of large metal objects before performing any

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diagnostics.

- The keyless entry transmitter must be properly located within the range of an 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

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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.

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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.

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- **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 **Ignition Lock Key Transmitter Antenna Replacement - Rear Compartment**
- Refer to **Control Module References** for programming and setup

SYMPTOMS - REMOTE FUNCTIONS

NOTE: **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 (Without ATH)Keyless Entry System Description and Operation (With ATH)**.

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, wiring, terminals, connectors, poor voltage and ground connections, temperature sensitivity, electromagnetic

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interference, electrical noise and/or incorrect control module installed 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:

- **Garage Door Opener Malfunction**
- **No Remote Detected**
- **Keyless Entry System Malfunction (Passive)Keyless Entry System Malfunction (Active)**
- **Remote Vehicle Start Malfunction**

GARAGE DOOR OPENER 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	Signal Performance
B+	1	1	-	-
Ground	-	1	-	-
1. Universal Home Remote Malfunction				

Circuit/System Description

The universal home remote is a transmitter operating between 288 and 434 MHz. The universal home remote has three buttons that may be programmed for individual transmitter/receiver combinations to control up to three garage doors, security gates, lighting systems, etc. Each button represents a unique transmitter code section, which operates independently of the other buttons, and may be considered a separate transmitter.

Reference Information

Schematic Reference

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Remote Function Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Garage Door Opener Description and Operation

Electrical Information Reference

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

Special Tools

J 41540 Universal Home Remote Tester

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the S25 Garage Door Opener.
2. Test for less than 10 Ω between the ground circuit terminal 3 and ground.
    - **If 10 Ω or greater**

      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 B+ circuit terminal 1 and ground.
    - **If the test lamp does not illuminate and the circuit fuse is good**

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1. Ignition OFF.
2. 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, verify the fuse is not open and there is voltage at the fuse.

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

1. Ignition OFF.
2. Test for infinite resistance between the B+ circuit and ground.
    - If less than infinite resistance, repair the short to ground on the circuit.
    - If infinite resistance, replace the S25 Garage Door Opener.

- **If the test lamp illuminates**

5. Verify the LED on the S25 Garage Door Opener illuminates or flashes when each button on the S25 Garage Door Opener is pressed.
    - **If the LED does not illuminate or flash when each button is pressed**

      Replace the S25 Garage Door Opener.

    - **If the LED illuminates or flashes when each button is pressed**

NOTE: **This step will clear any learned transmitters from the S25 Garage Door Opener. This will require reprogramming by the customer to reestablish universal home remote functionality.**

6. Press and hold the two outer buttons on the S25 Garage Door Opener for greater than 30 s. The LED on the S25 Garage Door Opener will illuminate for 20 s, then begin to flash quickly for another 10 s. When the LED stops flashing, the system has been cleared and placed into default mode.
7. Place the **J 41540** Universal Home Remote Tester so that it is adjacent to the S25 Garage Door Opener.
8. Verify the appropriate **J 41540** Universal Home Remote Tester Indicator Lights illuminate when each button on S25 Garage Door Opener the is pressed, one at a time
    - **If the tester does not respond to each button press**

      Replace the S25 Garage Door Opener.

    - **If the tester responds to each button press**
9. Using the Hand Held Transmitter from the **J 41540** Universal Home Remote Tester kit, program a single button on the S25 Garage Door Opener. Refer to the instructions provided with the **J 41540** Universal Home Remote Tester for programming instructions.

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NOTE: **When performing step 10, press the button that was programmed in step 9.**

10. Verify the Programmed indicator on the **J 41540** Universal Home Remote Tester illuminates when the programmed button on the S25 Garage Door Opener is pressed.
    - **If the Programmed indicator does not illuminate when the programmed button is pressed**

      Replace the S25 Garage Door Opener.

    - **If the Programmed indicator illuminates when the programmed button is pressed**
11. Instruct the customer to program the S25 Garage Door Opener to their device. Refer to the vehicle owners manual. If further malfunction occurs, a possible rolling code or incompatibility with the S25 Garage Door Opener will prevent programming.

Repair Instructions

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

Refer to **Control Module References** for garage door opener replacement, programming, and setup

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	-

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
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 adapters, 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 are 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

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Keyless Entry System Description and Operation (Without ATH)Keyless Entry System Description and Operation (With ATH)

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.
   - **If the doors do not lock**

     Refer to **Keyless Entry System Malfunction (Passive)Keyless Entry System Malfunction (Active)** (Active).

   - **If the doors lock**
3. Verify that each door unlocks and opens by approaching the vehicle with a valid transmitter and operating their respective exterior door handle.
   - **If both doors do not unlock/unlatch and open**

     Refer to **Keyless Entry System Malfunction (Passive)Keyless Entry System Malfunction (Active)** (Passive).

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

4. Verify the vehicle starts with the transmitter located in the transmitter pocket/slot.
   - **If the vehicle does not start**

     Perform the **Remote Control Door Lock Transmitter Learn (without BTM)Remote Control Door Lock Transmitter Learn (with BTM)** 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**

     Refer to Circuit/System Testing.

   - **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.

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- 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

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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 **Ignition Lock Key Transmitter Antenna Replacement - Instrument Panel (Chevrolet/GMC)Ignition Lock Key Transmitter Antenna Replacement - Instrument Panel (Cadillac)**
- Refer to **Ignition Lock Key Transmitter Antenna Replacement - Floor Console (Chevrolet / GMC)Ignition Lock Key Transmitter Antenna Replacement - Floor Console (Cadillac)**
- Refer to **Ignition Lock Key Transmitter Antenna Replacement - Rear Compartment**
- Refer to **Control Module References** for keyless entry control module replacement, programming, and setup

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KEYLESS ENTRY SYSTEM MALFUNCTION (PASSIVE)

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 - Driver Door	B3119 02	B3119 05	B3119 05	-
Keyless Entry Antenna Low Reference - Driver Door	B3119 02	B3119 05	B3119 05	-
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	-
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 keyless entry antennas are used as short range low frequency transmitters. As a vehicle with locked doors is approached with a keyless entry transmitter and the exterior door handle/rear closure touch pad is pressed, the keyless entry antenna broadcasts a challenge to the transmitter in an approximate one meter range. If the response from the transmitter via radio frequency (RF) is valid, the locked door will be passively unlocked/unlatched and allow the door to be opened. 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 malfunction.

Diagnostic Aids

Unwanted or inadvertent door lock/unlock activation may be requested by the OnStarÂ® 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).

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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 (Without ATH)Keyless Entry System Description and Operation (With ATH)

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 B3119, B3120, or B3121 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. Verify that the keyless entry transmitter is correct 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 keyless entry transmitter is incorrect**

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Replace the keyless entry transmitter.

- **If the keyless entry transmitter is correct**

4. Verify the scan tool Exterior Driver Door Handle Switch, Exterior Passenger Door Handle Switch, and Trunk Lid Exterior Unlatch Switch parameters change between Active and Inactive while operating their respective exterior door handle/rear closure touch pad.
   - **If any of the parameters does not change**

     Refer to **Exterior Door Handle Switch Malfunction** .

   - **If all of the parameters change**
5. Lock the vehicle using the keyless entry transmitter.
6. Verify that each door and the rear compartment unlocks and opens by approaching the vehicle with a valid transmitter and operating their respective exterior door handle/rear closure touch pad.
   - **If both doors and the rear compartment do not unlock/unlatch and open**

     Refer to Passive Transmitter Malfunction in Circuit/System Testing.

   - **If only one door or the rear compartment does not unlock/unlatch and open**

     Refer to Antenna Circuit Malfunction in Circuit/System Testing.

   - **If both doors and the rear compartment unlocks/unlatches and opens**
7. All OK.

Circuit/System Testing

Passive Transmitter Malfunction

1. Lock the vehicle using the keyless entry transmitter.
2. Verify that each door and rear compartment unlocks and opens by approaching the vehicle with a valid transmitter and operating their exterior door handle/rear closure touch pad.
   - **If both doors and the rear compartment do not unlock/unlatch and open**
   1. Replace the transmitter battery.
   2. Lock the vehicle using the keyless entry transmitter.
   3. Verify that each door and rear compartment unlocks and opens by approaching the vehicle with a valid transmitter and operating their

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respective release handle/touch pad.

- If both doors and the rear compartment do not unlock/unlatch and open, replace the keyless entry transmitter.
- If both doors and the rear compartment unlock/unlatch and open

4. All OK.

- **If both doors and the rear compartment unlock/unlatch and open**

3. The concern may be caused by temporary RF interference. Discuss the conditions in which the concern occurs with the customer. 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 malfunction.

Antenna Circuit Malfunction

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. 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 operating the appropriate exterior door handle/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.

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- 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 operating the appropriate exterior door handle/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.

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- **If greater than 1V**

10. Replace the appropriate T10 Keyless Entry Antenna.
11. Lock the vehicle doors using the keyless entry transmitter. Activate the antenna by operating the appropriate exterior door handle/rear closure touch pad.
12. Verify that the door/rear compartment unlocks and opens when the exterior door handle/rear closure touch pad is operated.
    - **If the door/rear compartment does not unlock and open**

      Replace the K84 Keyless Entry Control Module.

    - **If the door/rear compartment unlocks and opens**
13. All OK.

Repair Instructions

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

- Refer to **Remote Control Door Lock Transmitter Learn (without BTM)Remote Control Door Lock Transmitter Learn (with BTM)**
- Refer to **Front Side Door Outside Handle Bracket Replacement**
- Refer to **Ignition Lock Key Transmitter Antenna Replacement - Rear Bumper Fascia**
- Refer to **Control Module References** for keyless entry control module replacement, programming, and setup

KEYLESS ENTRY SYSTEM MALFUNCTION (ACTIVE)

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 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

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cause interference that could lead to a malfunction.

Diagnostic Aids

- Unwanted or inadvertent door lock/unlock activation may be requested by the OnStarÂ® 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.

Reference Information

Schematic Reference

Remote Function Schematics

Connector End View Reference

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Keyless Entry System Description and Operation (Without ATH)Keyless Entry System Description and Operation (With ATH)

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

Scan Tool Reference

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Control Module References for scan tool information

Special Tools

EL 43241 Keyless Entry Tester

Circuit/System Testing

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. Ignition OFF, disconnect the keyless entry antenna coax cable from the K77 Remote Control Door Lock Receiver and from the K46 Radio Antenna Module.
3. Verify the antenna coax cable passes the coax cable component test. Refer to Component Testing.
    - **If the coax cable does not pass the test**

      Replace the antenna coax cable.

    - **If the coax cable passes the test**
4. Connect the antenna coax cable to the K77 Remote Control Door Lock Receiver, ignition ON.
5. Test for greater than 4.5 V between the antenna coax cable center terminal and ground.
    - **If 4.5 V or less**

      Replace the K77 Remote Control Door Lock Receiver.

    - **If greater than 4.5 V**
6. Connect the antenna coax cable to the K46 Radio Antenna Module.
7. Operate the transmitter while observing the scan tool Key Fob Function parameter for the appropriate transmitter.
8. Verify the 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**

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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 scan tool Key Fob Function parameter for the transmitter.
3. Verify the 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, replace the K77 Remote Control Door Lock Receiver
    - 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**

9. All OK.

Repair Instructions

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

- Refer to **Remote Control Door Lock Transmitter Learn (without BTM)Remote Control Door Lock Transmitter Learn (with BTM)**
- Refer to **Control Module References** for replacement, programming, and setup

REMOTE VEHICLE START MALFUNCTION

Diagnostic Instructions

- 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 vehicle start begins as a radio frequency message received by the body control module (BCM) from a keyless entry transmitter. The BCM monitors system conditions such as content theft deterrent, hood ajar status, and body DTCs to determine if a remote vehicle start event will occur. If conditions are determined to be acceptable, the remote vehicle start message is sent to the engine control module (ECM). The ECM monitors system conditions such as engine control parameters and vehicle theft deterrent to determine if engine starting will be allowed. If conditions are acceptable,

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the ECM will initiate engine starting. During the engine run time in a remote vehicle start attempt, before the operator enters the vehicle, the ECM may discontinue engine operation if system conditions require it or a message is received from the BCM requesting the engine be turned OFF.

Diagnostic Aids

- Unwanted or inadvertent door lock/unlock activation may be requested by the OnStarÂ® 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 DTC that illuminates the malfunction indicator lamp (MIL), the cause of the DTC must be diagnosed before proceeding with the Remote Vehicle Start Inoperative diagnostic.
- Only the first and second vehicle transmitters are able to control the remote vehicle start function.
- The remote vehicle start system will not operate if any of the following conditions are present:
  - A current vehicle DTC that illuminates the malfunction indicator lamp (MIL)
  - The vehicle is in valet mode
  - More than 2 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
  - Incorrect BCM software is installed and vehicle start is not enabled
  - The content theft deterrent system detects an alarm trigger
  - Excessive engine RPM
  - Excessive coolant temperature
  - Accelerator pedal position greater than 0 percent
  - Vehicle not in park
  - Vehicle theft deterrent malfunction
  - A current automatic transmission shift lock control system DTC is set
  - A vehicle speed sensor signal is detected by the ECM

Reference Information

Schematic Reference

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Remote Function Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Keyless Entry System Description and Operation (Without ATH)Keyless Entry System Description and Operation (With ATH)

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 keyless entry functions operate with all available keyless entry transmitters.
   - **If any keyless entry functions do not operate properly**

     Refer to **Keyless Entry System Malfunction (Passive)Keyless Entry System Malfunction (Active)**.

   - **If all keyless entry functions operate properly**
2. Verify that no Diagnostic Status History or Start Disable items are present in the scan tool BCM Remote Start Diagnostic Status History and the ECM Remote Vehicle Start Disable History parameters.
   - **If remote vehicle start disable history items are present**

     Refer to the appropriate subsection in which the malfunction occurred.

   - **If remote vehicle start disable history items are not present**
3. Verify all scan tool BCM Content Theft Trigger History parameters display None.

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- **If any BCM Content Theft Trigger History parameter does not display None**

  Refer to **Content Theft Deterrent Malfunction** .

- **If all BCM Content Theft Trigger History parameters display None**

4. All OK.

REPAIR INSTRUCTIONS

IGNITION LOCK KEY TRANSMITTER ANTENNA REPLACEMENT - INSTRUMENT PANEL (CHEVROLET/GMC)

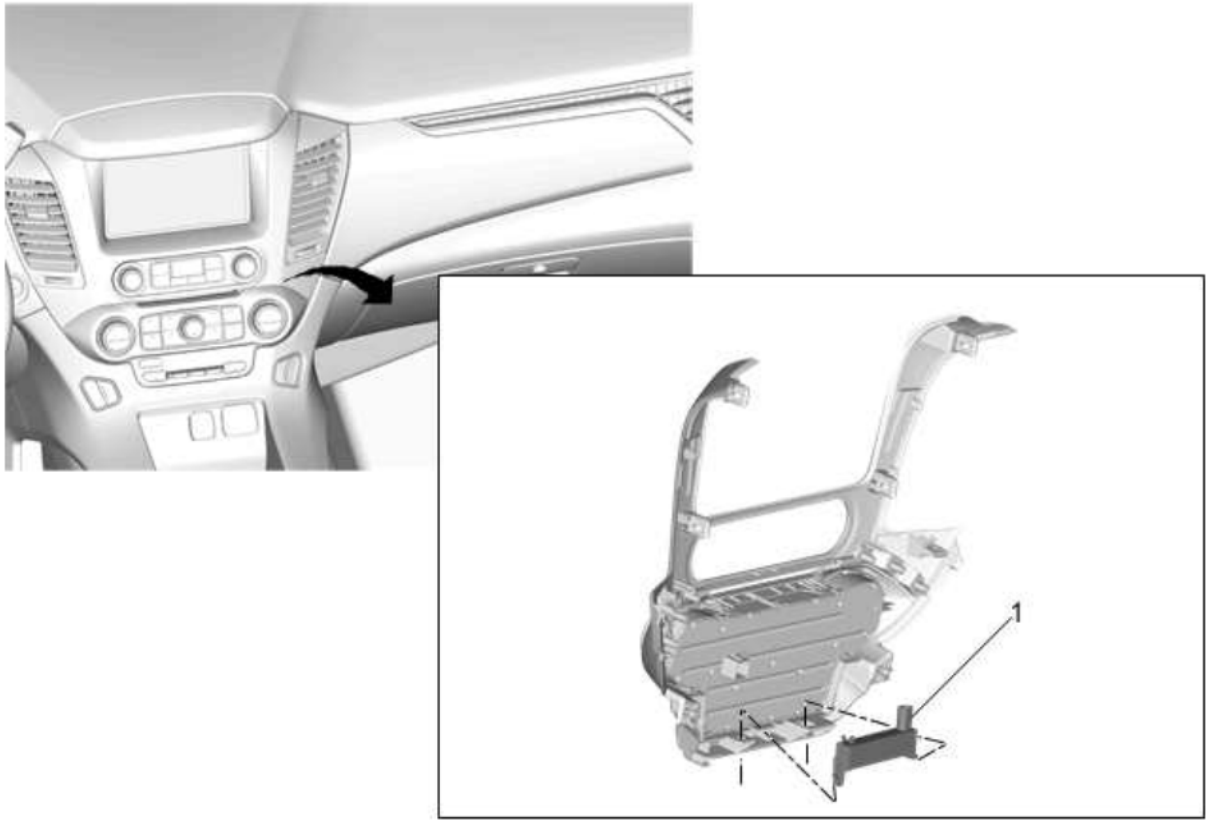

Fig. 4: Ignition Lock Key Transmitter Antenna - Instrument Panel (Chevrolet/GMC)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

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Callout	Component Name
Preliminary Procedure Remove the instrument panel accessory center trim plate. Refer to **Instrument Panel Accessory Center Trim Plate Replacement (Chevrolet / GMC)** .	
1	Ignition Lock Key Transmitter Antenna **Procedure** Unsnap antenna from the instrument panel accessory trim plate.

IGNITION LOCK KEY TRANSMITTER ANTENNA REPLACEMENT - INSTRUMENT PANEL (CADILLAC)

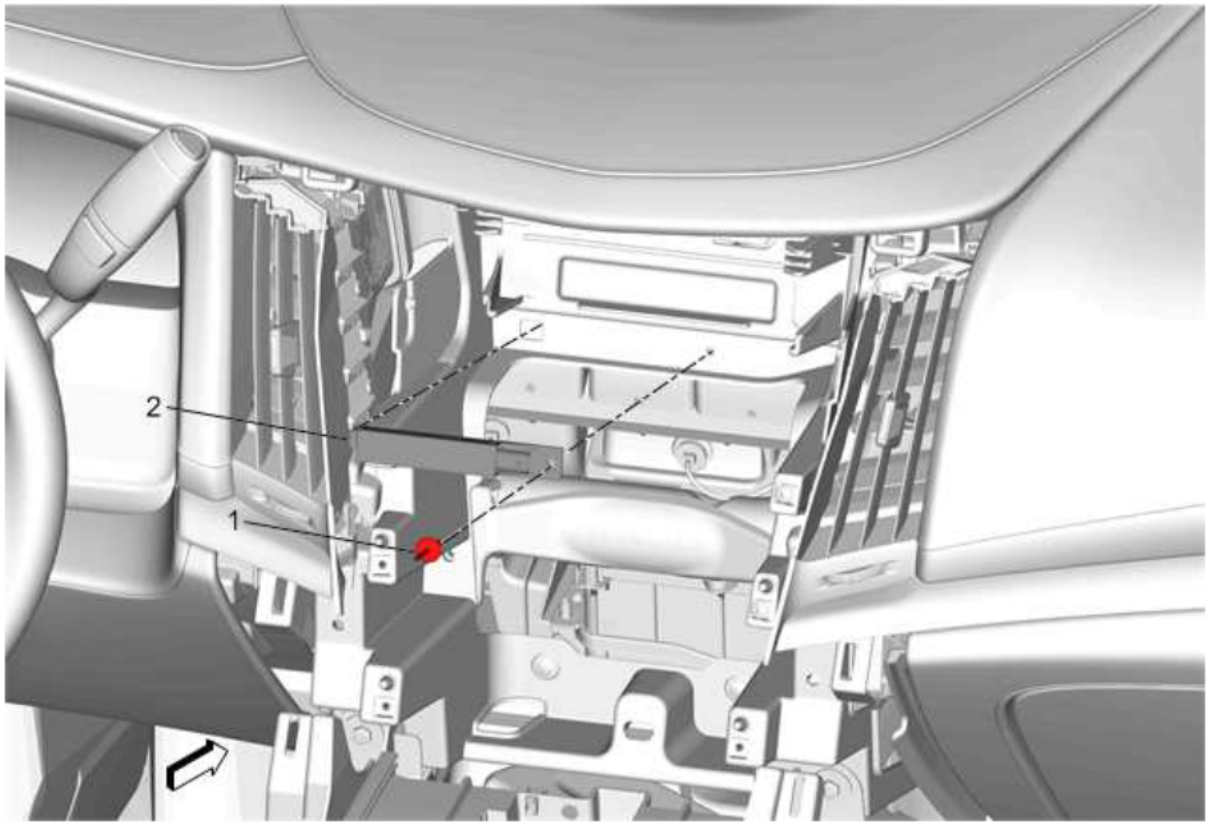

Fig. 5: Ignition Lock Key Transmitter Antenna - Instrument Panel (Cadillac)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

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Callout	Component Name
WARNING: Refer to Eye Protection Warning .	**Preliminary Procedure** Remove the radio. Refer to Radio Replacement (Cadillac with NGI) Radio Replacement (Cadillac with IOB) .
1	Ignition Lock Key Transmitter Antenna Rivet
2	Ignition Lock Key Transmitter Antenna **Procedure** Disconnect the electrical connector.

IGNITION LOCK KEY TRANSMITTER ANTENNA REPLACEMENT - FLOOR CONSOLE (CHEVROLET / GMC)

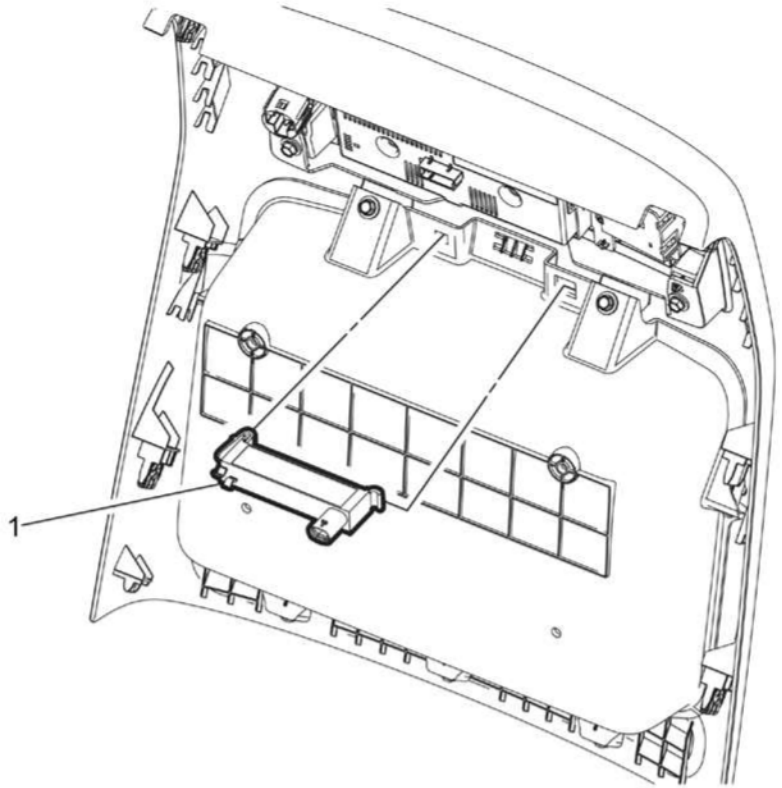

Fig. 6: Ignition Lock Key Transmitter Antenna - Floor Console (Chevrolet / GMC)
Courtesy of GENERAL MOTORS COMPANY

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Callout	Component Name
Preliminary Procedure Remove the front floor console rear trim panel. Refer to **Front Floor Console Rear Trim Panel Replacement (Chevrolet / GMC)** **Front Floor Console Rear Trim Panel Replacement (Storage Structure)** .	
1	Ignition Lock Key Transmitter Antenna **Procedure** Unsnap antenna from the floor console trim panel.

IGNITION LOCK KEY TRANSMITTER ANTENNA REPLACEMENT - FLOOR CONSOLE (CADILLAC)

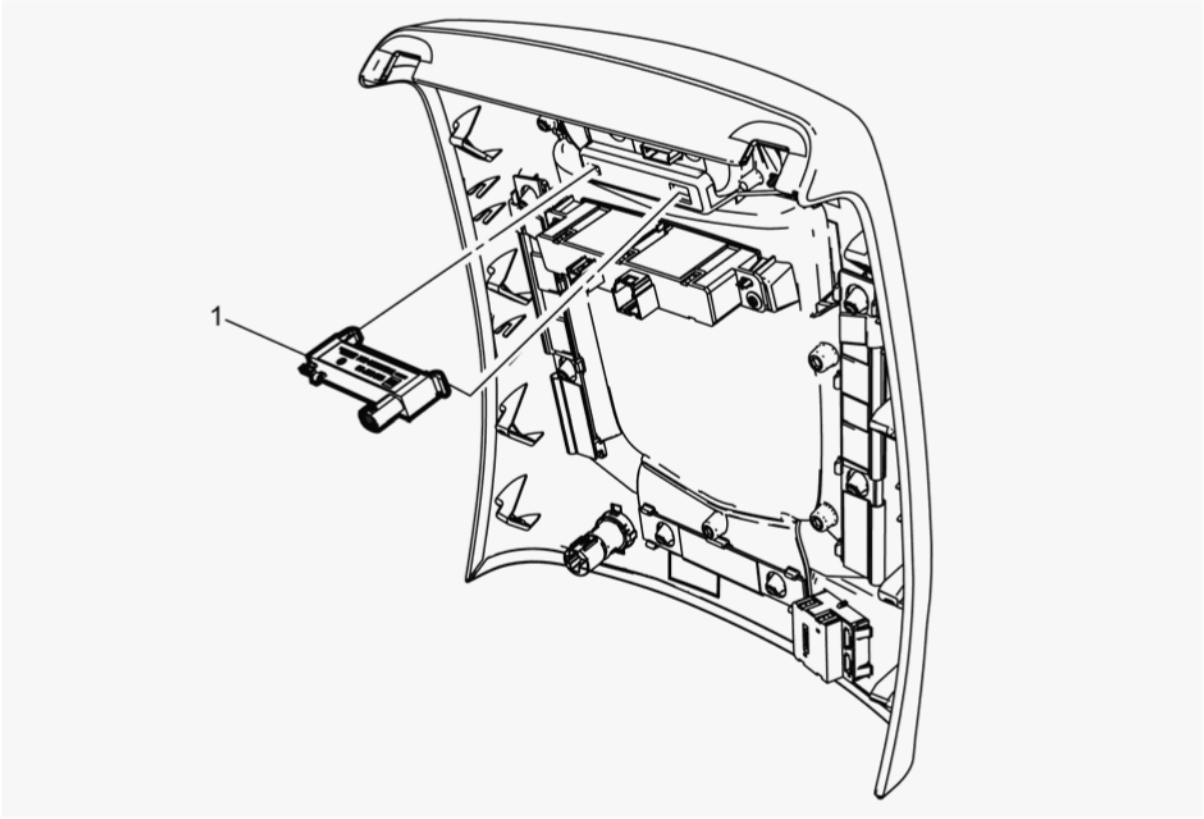

Fig. 7: Ignition Lock Key Transmitter Antenna - Floor Console (Cadillac)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

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Callout	Component Name
Preliminary Procedure Remove the front floor console rear trim panel. Refer to **Front Floor Console Rear Trim Panel Replacement (Cadillac)** **Front Floor Console Rear Trim Panel Replacement (Storage Structure)** .	
1	Ignition Lock Key Transmitter Antenna **Procedure** Unsnap antenna from the floor console trim panel.

IGNITION LOCK KEY TRANSMITTER ANTENNA REPLACEMENT - REAR COMPARTMENT

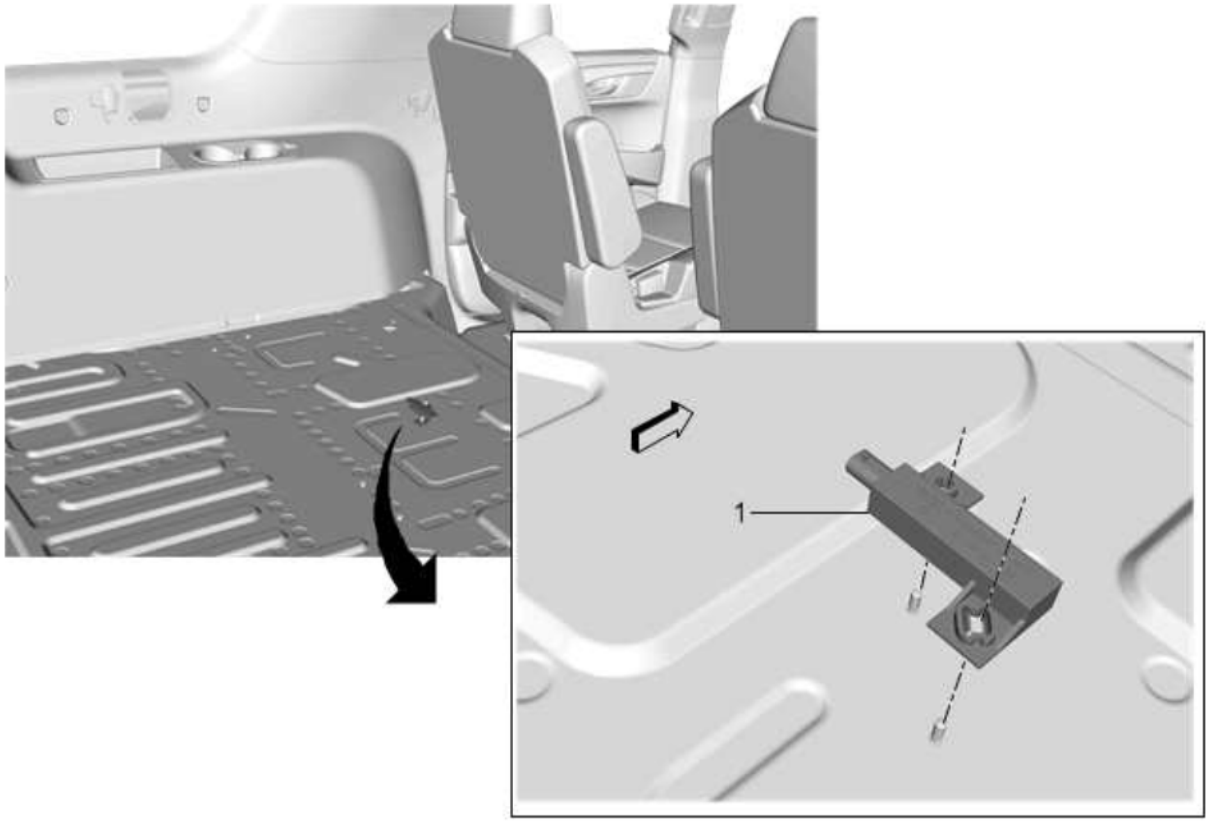

Fig. 8: Ignition Lock Key Transmitter Antenna - Rear Compartment
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

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Callout	Component Name
Preliminary Procedure Remove the rear floor panel carpet. Refer to **Rear Floor Panel Carpet Replacement** .	
1	Ignition Lock Key Transmitter Antenna **Procedure** 1. Disconnect the electrical connector. 2. Remove antenna from the two weld studs on the rear floor panel.

IGNITION LOCK KEY TRANSMITTER ANTENNA REPLACEMENT - REAR BUMPER FASCIA

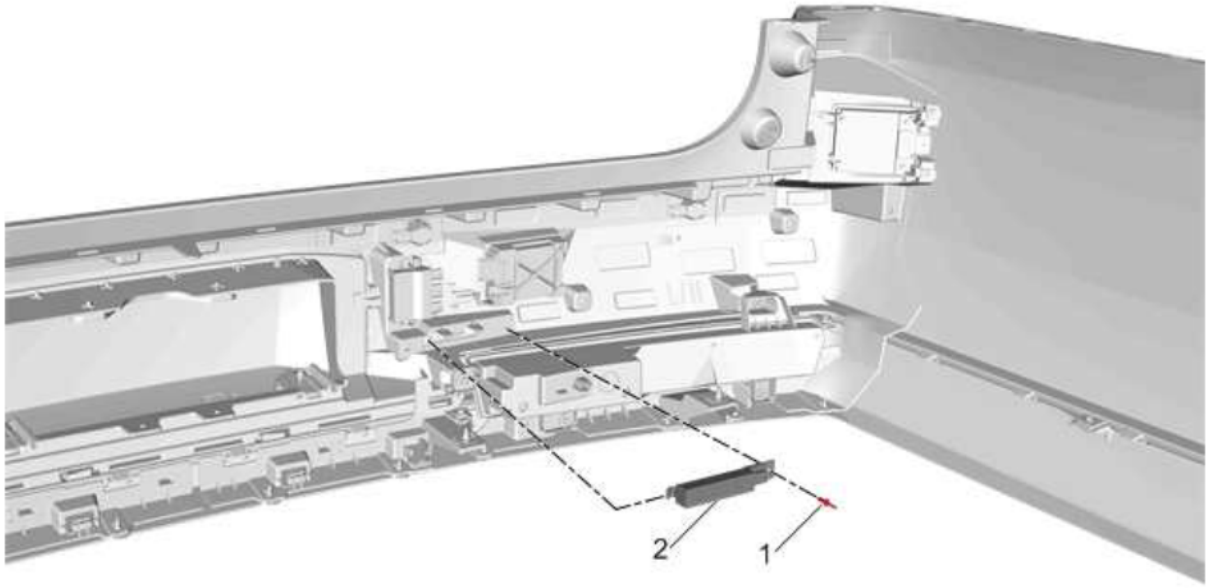

Fig. 9: Ignition Lock Key Transmitter Antenna - Rear Bumper Fascia

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Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
WARNING: **Refer to Eye Protection Warning .** **Preliminary Procedure** Remove the rear bumper fascia. Refer to **Rear Bumper Fascia Replacement (Chevrolet, GMC)** **Rear Bumper Fascia Replacement (Cadillac)** .	
1	Ignition Lock Key Transmitter Antenna Rivet
2	Ignition Lock Key Transmitter Antenna **Procedure** Disconnect the electrical connector.

KEYLESS ENTRY CONTROL MODULE REPLACEMENT

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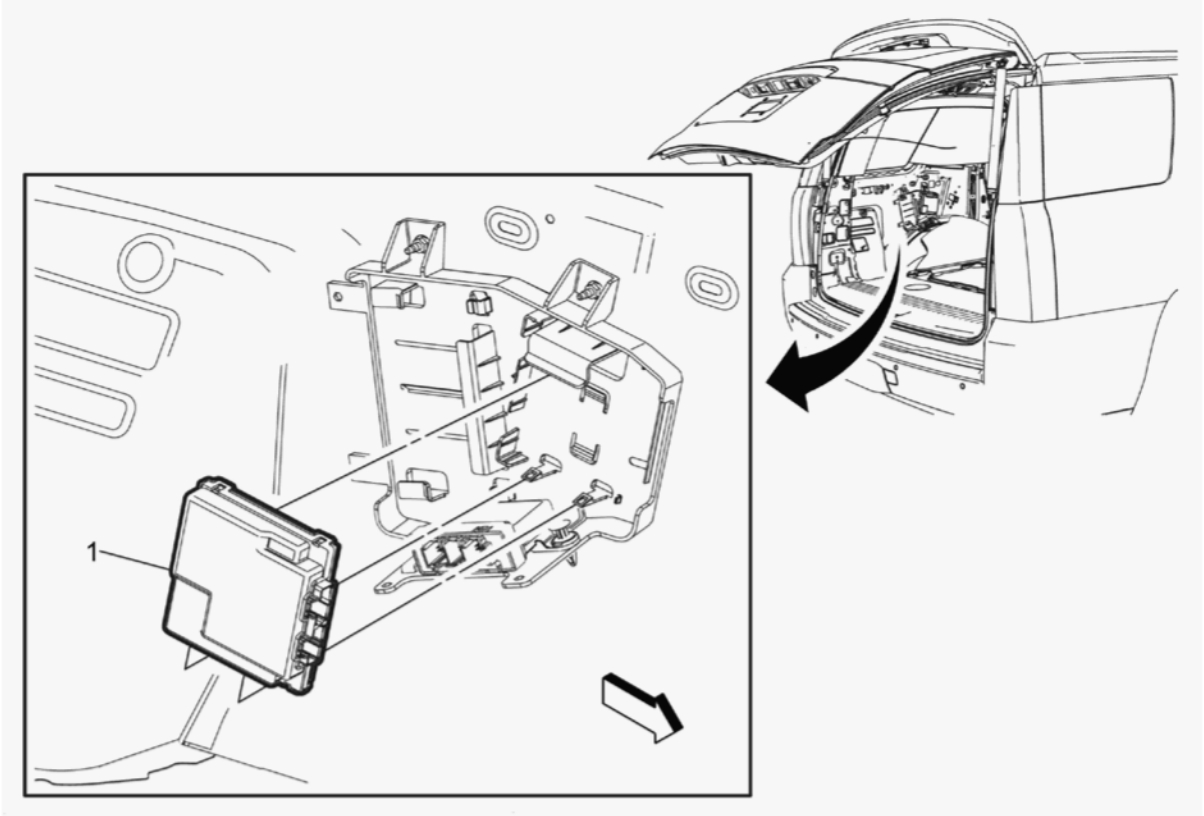

Fig. 10: Keyless Entry Control Module
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure 1. Remove the left hand quarter lower rear trim door from the left quarter lower rear trim panel. 2. Remove the body side rear trim panel stowage compartment tray from the left quarter lower rear trim panel, if vehicle is a long wheelbase. 3. Remove the body side rear trim panel cup holder from the quarter lower rear trim panel, if the vehicle is a short wheelbase.	
1	Keyless Entry Control Module **Procedure**

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Callout	Component Name
	1. Disconnect the electrical connectors. 2. Release module from retaining tabs on bracket. 3. For programming and set up information, refer to **Control Module References** .

KEYLESS ENTRY CONTROL MODULE BRACKET REPLACEMENT

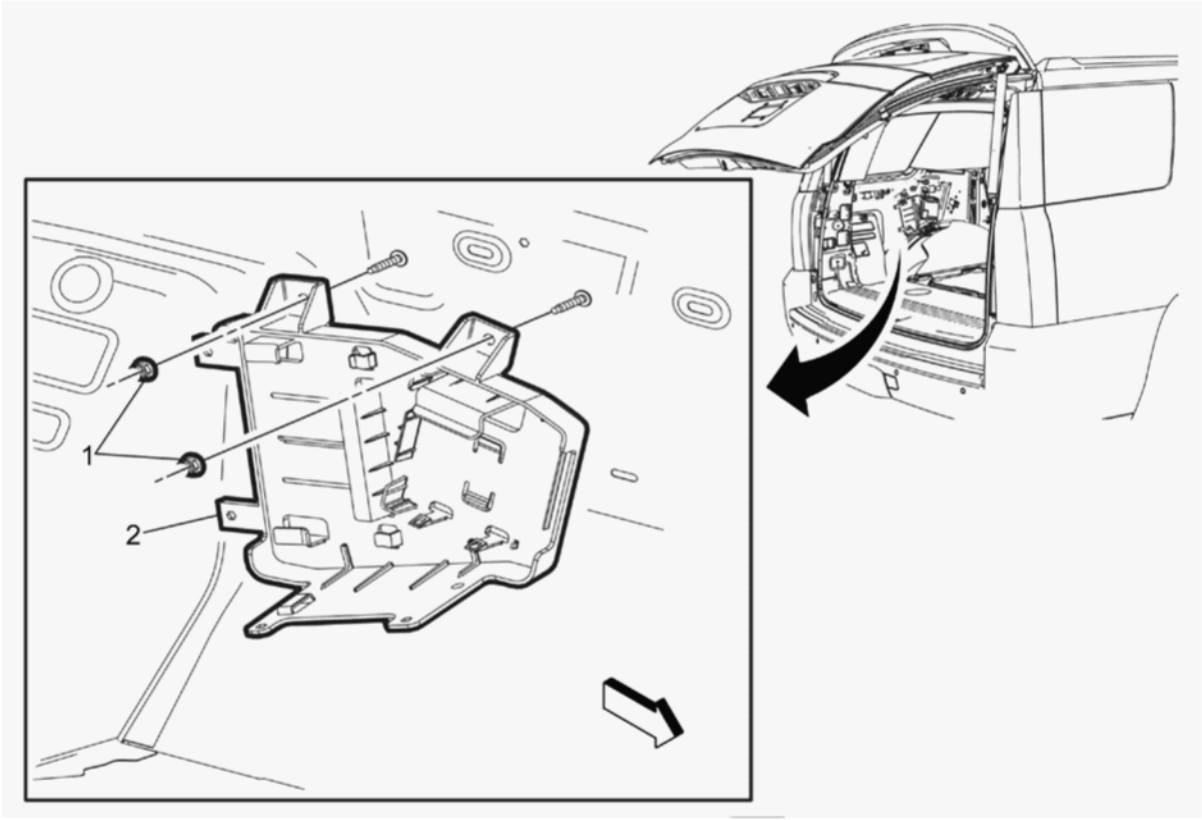

Fig. 11: Keyless Entry Control Module Bracket
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure	
Remove the quarter lower rear trim panel - left side. Refer to **Quarter Lower Rear Trim Panel Replacement (Left Side, Standard**	

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Callout	Component Name
Wheelbase) Quarter Lower Rear Trim Panel Replacement (Left Side, Extended Wheelbase) .	
1	Keyless Entry Control Module Bracket Fasteners (Qty: 2) **CAUTION:** **Refer to** **Fastener Caution** . **Tighten** 9 N.m (80 lb in)
2	Keyless Entry Control Module Bracket **Procedure** 1. Disconnect the electrical connections. 2. Transfer components as necessary.

REMOTE CONTROL DOOR LOCK RECEIVER REPLACEMENT

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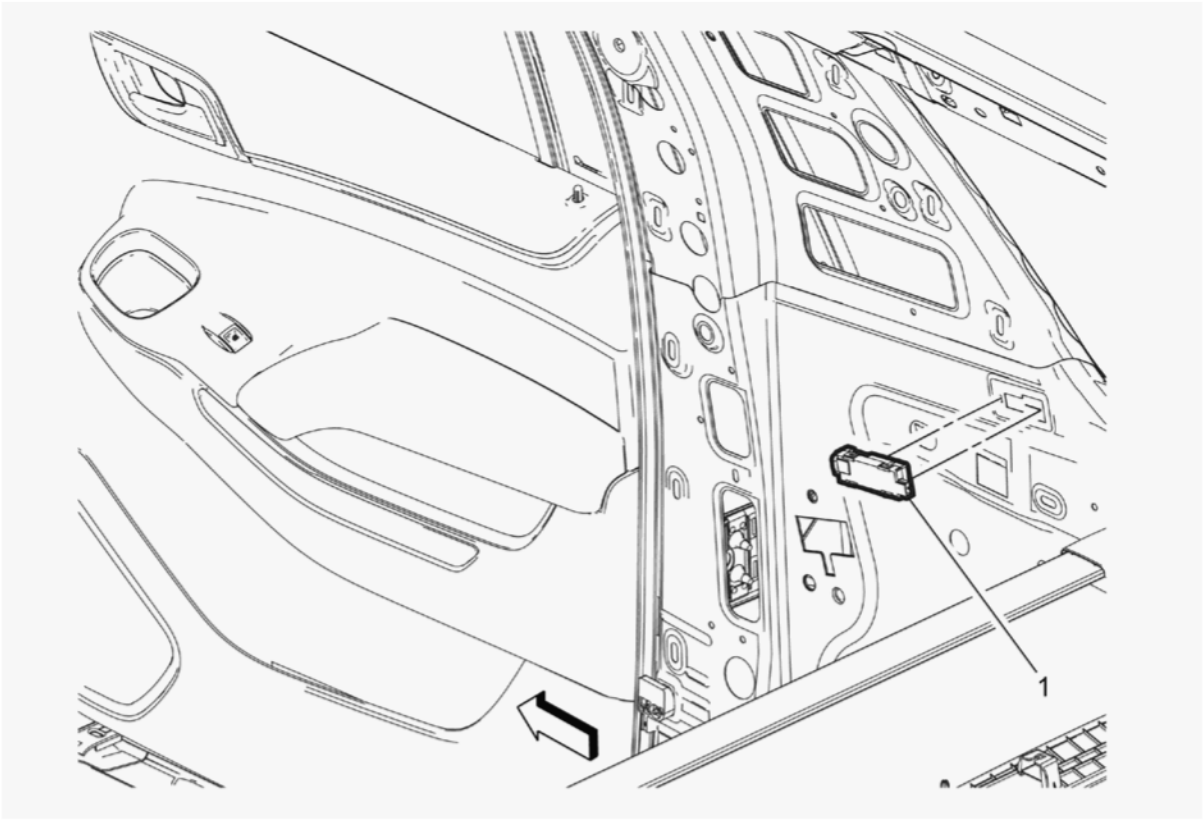

Fig. 12: Remote Control Door Lock Receiver
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the quarter lower rear trim panel - right side. Refer to **Quarter Lower Rear Trim Panel Replacement (Right Side, Standard Wheelbase)** **Quarter Lower Rear Trim Panel Replacement (Right Side, Extended Wheelbase)** .	
1	Remote Control Door Lock Receiver **Procedure** 1. Disconnect the electrical connector and the radio antenna extension cable. 2. Slide the receiver rearward to release. 3. For programming and set up, refer to **Control Module References** .

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GARAGE DOOR OPENER TRANSMITTER REPLACEMENT

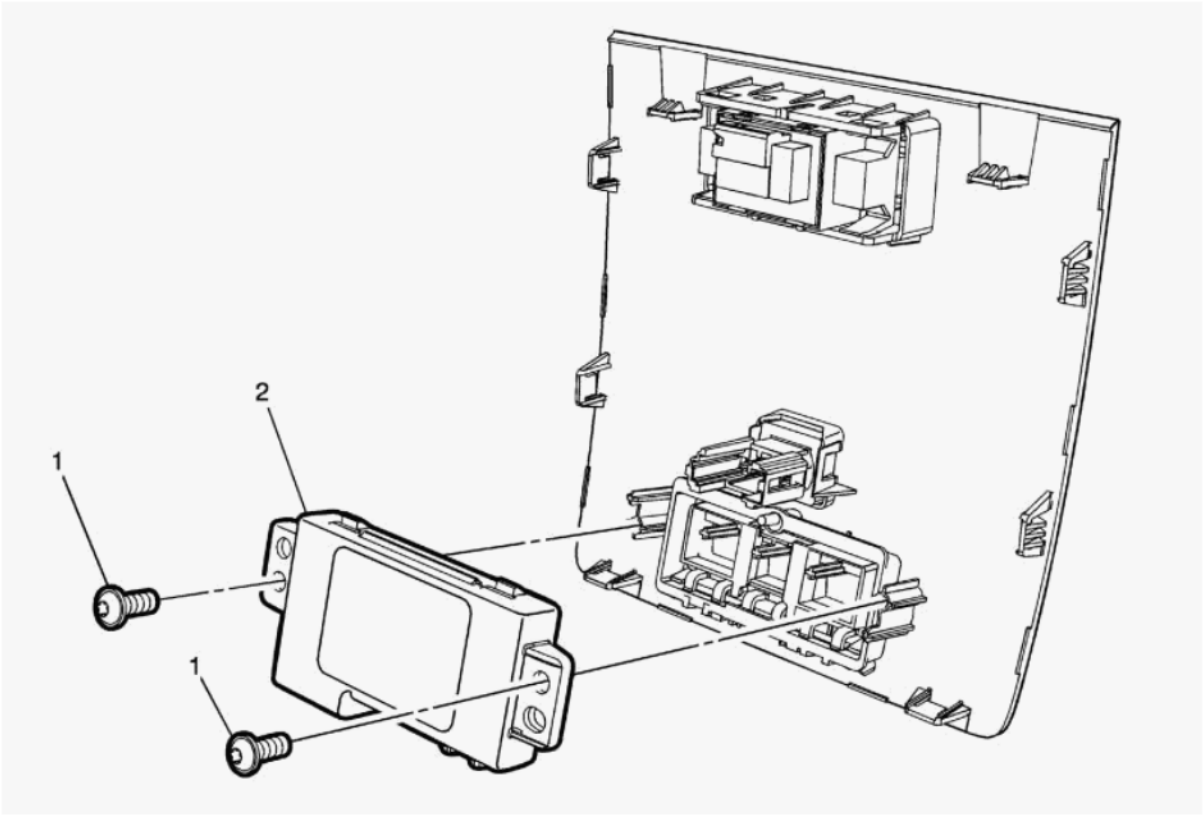

Fig. 13: Garage Door Opener Transmitter
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the roof console opening trim plate. Refer to **Roof Console Opening Trim Plate Replacement** .	
1	Garage Door Opener Transmitter Fasteners (Qty: 2) **CAUTION:** **Refer to** **Fastener** **Caution**

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Callout	Component Name
2	Garage Door Opener Transmitter **Procedure** Refer to **Control Module References** for programming and set-up procedures.

GARAGE DOOR OPENER TRANSMITTER PUSHBUTTON REPLACEMENT

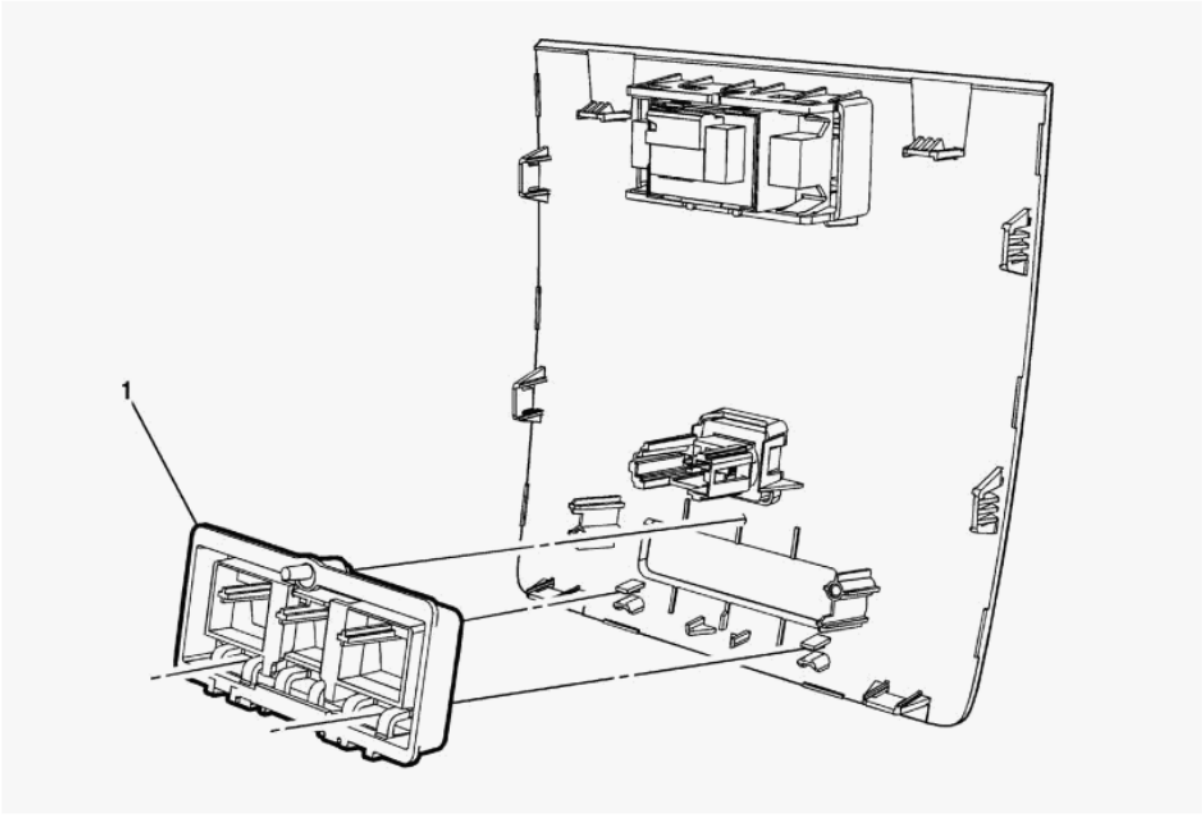

Fig. 14: Garage Door Opener Transmitter Pushbutton
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the garage door opener transmitter. Refer to **Garage Door Opener Transmitter Replacement**.	
1	Garage Door Opener Transmitter Pushbutton

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REMOTE CONTROL DOOR LOCK TRANSMITTER LEARN (WITHOUT BTM)

Erase/Program All Key Fobs

NOTE:

- **Verify all mechanical keys operate correctly before beginning any programming procedures.**
- **All transmitters must be programmed in a single programming sequence. Once the Erase/Program All Key Fobs selection is made, all learned transmitters will be erased. If all the existing transmitters associated with the vehicle are not learned at this time, they will become inoperative and require additional programming.**
- **Do not operate or program the transmitters in the vicinity of other vehicles that are in the transmitter program mode. This will prevent the programming of the transmitters to the incorrect vehicle.**

This procedure will first erase all known keyless entry transmitters. After all transmitters are erased, the procedure will begin to program keyless entry transmitters in sequential order, beginning with transmitter 1.

1. With a scan tool, access the Body Control Module Configuration/Reset Functions menu. Select Add/Replace Key Fobs.
2. Select Erase/Program Fobs. This will erase all learned transmitters and prepare the BCM to learn new transmitters. Follow the on-screen instructions.
3. When all the desired transmitters have been programmed, cycle the ignition from ON to OFF, and exit the vehicle.
4. Verify each transmitter and key is operating properly. Operate each of the keyless entry functions using the buttons on the transmitter. On vehicles with a keyed ignition switch, verify the mechanical key by starting the vehicle using the ignition switch. When verifying operation, make sure that no other transmitters are near the vehicle.

Next Available Slot

NOTE:

- **Verify all mechanical keys operate correctly before beginning any programming procedures.**
- **Do not operate or program the transmitters in the vicinity of other vehicles that are in the transmitter program mode. This will prevent the programming of the transmitters to the incorrect vehicle.**

This procedure will program keyless entry transmitters in sequential order. If two transmitters are currently learned to the vehicle as transmitters 1 and 2, using this procedure will learn the next transmitter are transmitter 3, and so on.

1. With a scan tool, access the Body Control Module Configuration/Reset Functions menu. Select Add/Replace Key Fobs.

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2. Select Next Available Slot. Follow the on-screen instructions.
3. When all the desired transmitters have been programmed, cycle the ignition from ON to OFF, and exit the vehicle.
4. Verify each transmitter and key is operating properly. Operate each of the keyless entry functions using the buttons on the transmitter. On vehicles with a keyed ignition switch, verify the mechanical key by starting the vehicle using the ignition switch. When verifying operation, make sure that no other transmitters are near the vehicle.

Slot Programming

NOTE:

- **Verify all mechanical keys operate correctly before beginning any programming procedures.**
- **If a slot already has a transmitter programmed to it, programming will not occur. A transmitter will only program to an open slot with no transmitter already programmed to it.**
- **Do not operate or program the transmitters in the vicinity of other vehicles that are in the keyless entry program mode. This prevents the programming of the transmitters to the incorrect vehicle.**

Transmitter slot programming allows a single transmitter to be programmed into a specific slot without affecting any of the other programmed transmitters.

1. With a scan tool, access the Body Control Module Configuration/Reset Functions menu. Select Add/Replace Key Fobs.
2. Select the desired slot in the on-screen menu. Follow the on-screen instructions.
3. When all the desired transmitters have been programmed, cycle the ignition from ON to OFF, and exit the vehicle.
4. Verify each transmitter and key is operating properly. Operate each of the keyless entry functions using the buttons on the transmitter. On vehicles with a keyed ignition switch, verify the mechanical key by starting the vehicle using the ignition switch. When verifying operation, make sure that no other transmitters are near the vehicle.

REMOTE CONTROL DOOR LOCK TRANSMITTER LEARN (WITH BTM)

Programming Transmitters

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

The Adding Transmitters procedure does not erase any transmitters prior to programming. The procedure will simply program the transmitter into the

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next available slot. The Adding Transmitters procedure should only be used when adding an additional transmitter to the vehicle. The Adding Keys procedure should never be used to program a transmitter to a vehicle that is having a transmitter replaced, regardless of the cause for the replacement.

Replacing Transmitters (Without SPS)

NOTE:

- **Verify all mechanical keys operate correctly before beginning any programming procedures.**
- **This procedure will unlearn all previously learned transmitters. All transmitters that are to be programmed must be with the vehicle at the time of service.**
- **This procedure will take approximately 35 minutes to complete.**
- **A total of 8 transmitters can be learned to a single vehicle.**
- **This procedure will only learn the vehicle transmitter 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 transmitters being present. If existing transmitters are present, keep the transmitters away from the vicinity of the vehicle. Failure to keep learned transmitters away from the vehicle will result in the learn changing to the Adding Transmitters procedure.**

1. Insert the mechanical key of the new transmitter 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 will display Remote Learn Pending, Please Wait.
2. After ten minutes, the driver information center will display Press Engine Start Button To Learn. Press the ignition mode switch. The driver information center will again display Remote Learn Pending, Please Wait.
3. Repeat Step 2 two additional times, for a total of thirty minutes. All previously known transmitters have now been unlearned. Remaining transmitters can be relearned during the next steps. The driver information center display will now display Ready For Remote #1.

NOTE: **The transmitter pocket is located inside the center console storage area, near the front of the storage compartment. If a large keyring prevents the transmitter from being placed fully into the pocket, remove the keyring and place the transmitter in the pocket. Failure to lay the transmitter fully into the pocket may result in an inability to program.**

4. Place the new transmitter into the transmitter pocket.
5. Press and release the ignition mode switch. When the transmitter is learned, the driver information center will indicate that it is ready to program the next transmitter.
6. Remove the transmitter from the transmitter pocket and press the unlock button. To program additional transmitters, repeat Steps 4 through 6.

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7. When all additional transmitters are programmed, press and hold the ignition mode switch for 15 seconds to exit programming mode.
8. Verify each transmitter and key is operating properly. Operate each of the keyless entry functions using the buttons on the transmitter. On vehicles with a keyed ignition switch, verify the mechanical key by starting the vehicle using the ignition switch. When verifying operation, make sure that no other transmitters are near the vehicle.

Replacing Transmitters (With SPS)

NOTE:

- **Verify all mechanical keys operate correctly before beginning any programming procedures.**
- **This procedure will unlearn all previously learned transmitters. All transmitters that are to be programmed must be with the vehicle.**
- **This procedure may be used with or without existing learned transmitters being present.**
- **This procedure will take more than 15 minutes to complete.**
- **A total of eight transmitters can be learned to a single vehicle.**
- **This procedure will only learn the vehicle transmitter 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 vehicle is not in the run mode, the learn procedure will fail. To verify the vehicle is in Run mode, verify the green LED is illuminated on the ignition mode switch.**
- **The transmitter pocket is located inside the center console storage area, near the front of the storage compartment. If a large keyring prevents the transmitter from being placed fully into the pocket, remove the keyring and place the transmitter in the pocket. Failure to lay the transmitter fully into the pocket may result in an inability to program.**

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7. Follow the on-screen instructions.
8. After programming all transmitters, Programming Complete, is displayed.
9. Press and hold the ignition mode switch for 15 seconds.
10. Press the lock and unlock button on each transmitter that was programmed. This will awaken each transmitter and allow passive and active keyless entry functions to be established.
11. With a scan tool, clear any DTCs.
12. Verify each transmitter and key is operating properly. Operate each of the keyless entry functions using the buttons on the transmitter. On vehicles with a keyed ignition switch, verify the mechanical key by starting the vehicle using the ignition switch. When verifying operation, make sure that no other transmitters are near the vehicle.

Adding Transmitters (Without SPS)

NOTE:

- **Verify all mechanical keys operate correctly before beginning any programming procedures.**
- **To initiate, this procedure requires that 1 learned transmitter be available.**
- **A total of eight transmitters can be learned to a single vehicle.**
- **This procedure adds transmitters only. The procedure does not erase previously learned transmitters.**

1. Place the recognized transmitter(s) in the vehicle cupholder.
2. Insert the mechanical key of the new transmitter 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 will display Ready For Remote #2, 3, 4, etc.

NOTE: **The transmitter pocket is located inside the center console storage area, near the front of the storage compartment. If a large keyring prevents the transmitter from being placed fully into the pocket, remove the keyring and place the transmitter in the pocket. Failure to lay the transmitter fully into the pocket may result in an inability to program.**

3. Place the new transmitter into the transmitter pocket.
4. Press and release the ignition mode switch. When the transmitter is learned, the driver information center will indicate that it is ready to program the next transmitter.
5. Remove the transmitter from the transmitter pocket and press the transmitter unlock button. To program additional transmitters, repeat Steps 3 through 5.
6. When all additional transmitters are programmed, press and hold the ignition mode switch for 15 seconds to exit programming mode.

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7. Verify each transmitter and key is operating properly. Operate each of the keyless entry functions using the buttons on the transmitter. On vehicles with a keyed ignition switch, verify the mechanical key by starting the vehicle using the ignition switch. When verifying operation, make sure that no other transmitters are near the vehicle.

Adding Transmitters (With SPS)

NOTE:

- **Verify all mechanical keys operate correctly before beginning any programming procedures.**
- **This procedure may be used with or without existing learned transmitters being present.**
- **This procedure will take more than 15 minutes to complete.**
- **A total of eight transmitters can be learned to a single vehicle.**
- **This procedure will only learn the vehicle transmitter 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 (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 vehicle is not in the run mode, the learn procedure will fail. To verify the vehicle is in Run mode, verify the green LED is illuminated on the ignition mode switch.**
- **The transmitter pocket is located inside the center console storage area, near the front of the storage compartment. If a large keyring prevents the transmitter from being placed fully into the pocket, remove the keyring and place the transmitter in the pocket. Failure to lay the transmitter fully into the pocket may result in an inability to program.**

7. Follow the on-screen instructions.
8. After programming all transmitters, Programming Complete, is displayed.

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9. Press and hold the ignition mode switch for 15 seconds.
10. Press the lock and unlock button on each transmitter that was programmed. This will awaken each transmitter and allow passive and active keyless entry functions to be established.
11. With a scan tool, clear any DTCs.
12. Verify each transmitter and key is operating properly. Operate each of the keyless entry functions using the buttons on the transmitter. On vehicles with a keyed ignition switch, verify the mechanical key by starting the vehicle using the ignition switch. When verifying operation, make sure that no other transmitters are near the vehicle.

DESCRIPTION AND OPERATION

GARAGE DOOR OPENER DESCRIPTION AND OPERATION

The garage door opener is fixed and rolling code capable. Rolling code is a system that allows the code that the customers receiver receives from the garage door opener to change every time the garage door opener is used within operating range of the receiver. Rolling code programming requires the customer to push a learn/program button on the garage door opener receiver at their home. This button is usually located on the receiver unit under a cover (light cover) on one end of the unit. The customer must follow the garage door opener manufacturers instructions to program/learn the receiver to accept the Universal Home Remote System as an authorized opener for their unit. When the receiver and the garage door opener are initially programmed together, a code is established and a new code is created for every new transmission. The software in the receiver recognizes the garage door opener and accepts the new code.

The garage door opener is compatible with most, but not all types and brands of transmitters.

The garage door opener is a transmitter operating between 288-434 MHz. The power and range of the transmitter is limited to comply with laws governing the generation of radio frequency interference. The transmitter is programmed by the user to accept the signal generated by the user's transmitters.

The garage door opener has 3 buttons that may be programmed for individual transmitter/receiver combinations to control up to 3 garage door openers, security gates, lighting systems, etc. Each button represents a transmitter code section of the transmitter, which operates separately from any other button, and may be considered a separate transmitter. Operation consists of simply pressing a button to activate the corresponding transmitter.

NOTE: **Do not use the garage door opener (GDO) with any garage door opener that does not have the stop and reverse safety feature. This includes any garage door opener model manufactured before April 1, 1982.**

KEYLESS ENTRY SYSTEM DESCRIPTION AND OPERATION (WITHOUT ATH)

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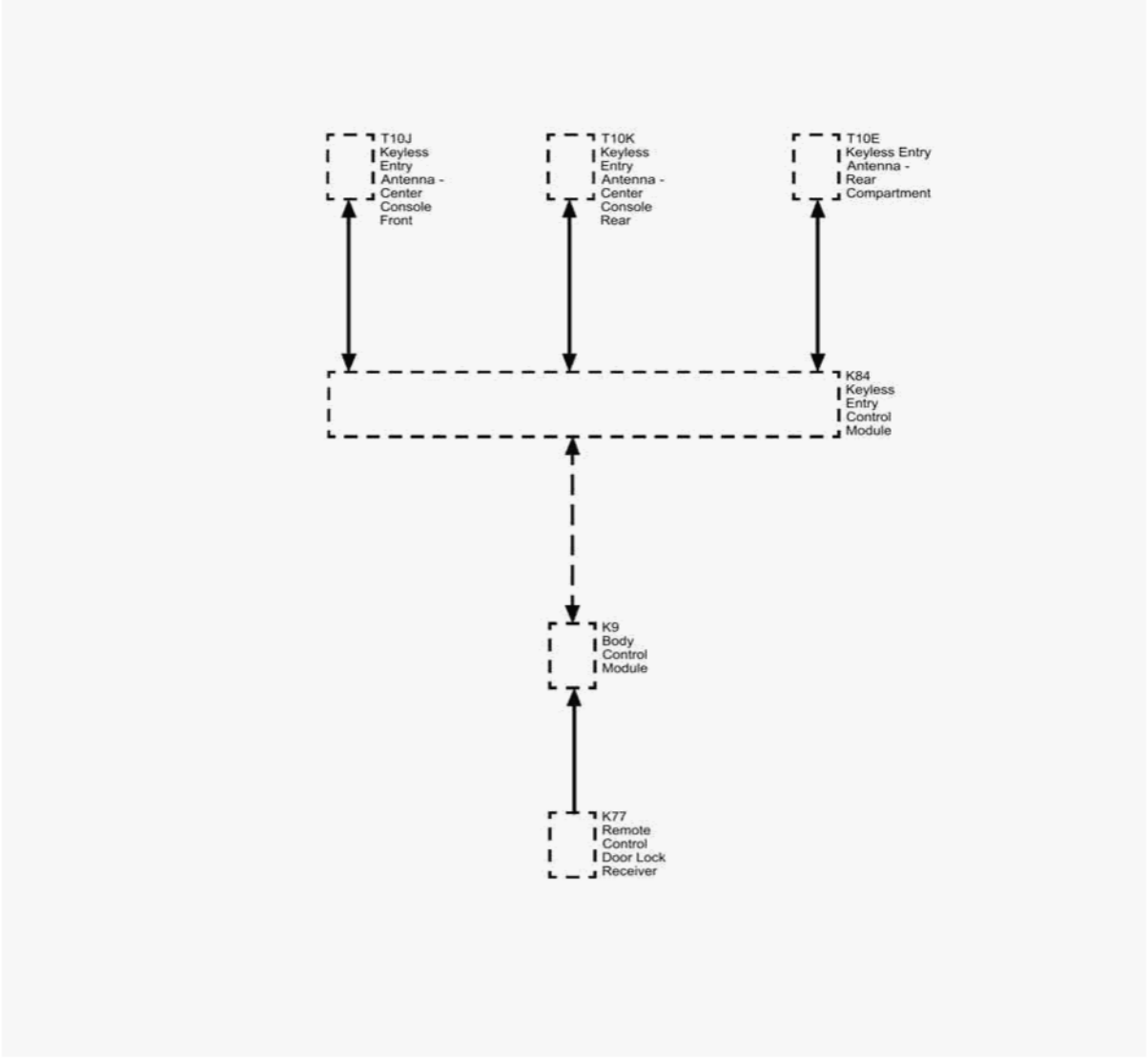

Fig. 15: Keyless Entry System Block Diagram (Without ATH)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
T10J	T10J Keyless Entry Antenna - Center Console Front
T10K	T10K Keyless Entry Antenna - Center Console Rear
T10E	T10E Keyless Entry Antenna - Rear Compartment

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Callout	Component Name
K84	K84 Keyless Entry Control Module
K9	K9 Body Control Module
K77	K77 Remote Control Door Lock Receiver

Keyless Entry System Description and Operation

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
- Liftgate lock/unlock
- Power liftgate, if equipped
- Illuminated entry lamps
- Panic alarm/vehicle locator
- Remote vehicle start

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 use 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, in 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 transmitter can be placed in the transmitter pocket located in the center console, under the storage tray. The immobilizer antenna coil is located directly beneath the transmitter pocket. Placing the transmitter in the pocket will create a low powered coupling between the transmitter and immobilizer antenna, allowing communications to occur and enabling vehicle starting.

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The keyless entry system has the following components:

- Keyless entry transmitter
- Front console antenna
- Rear console antenna
- Rear compartment antenna
- Body control module (BCM)
- Keyless entry control module
- Immobilizer antenna coil assembly
- Remote control door lock receiver

Keyless Entry Transmitter

The keyless entry transmitters are used to perform various entry functions while away from the immediate area of the vehicle. Keyless entry functions may work at up to 20 m (65 ft) away from the vehicle. Ambient conditions may affect the performance of the keyless entry transmitter and reduce the range at which keyless entry functions operate. Up to eight transmitters may be programmed to a single vehicle.

When pressing the ignition mode switch to change power mode or start the vehicle, a nearby transmitter is challenged by a passive keyless entry antenna. The transmitter will send an RF response to the remote control door lock receiver, which communicates with the BCM. The BCM will interpret this communication and if the transmitter response is valid, allow the vehicle to change power mode or start the vehicle.

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.

Rear 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.

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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 control 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 starting will be allowed.

Immobilizer Antenna Coil Assembly

The keyless entry immobilizer coil assembly is located in the center console, directly beneath the transmitter pocket. If the transmitter battery is dead, weak, or the RF signal is being interrupted, the transmitter may be placed in the pocket 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 transmitters.

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 keyless start functions
- Backup control for the ECM accessory wakeup and the run/crank relay
- Redundant power moding, in addition to the BCM
- Ignition mode switch monitoring

OnStarÂ® Remote Link

A vehicle operator may have the ability to perform some of the keyless entry functions using applications on personal devices such as smart phones. Refer to **OnStar Description and Operation** .

Body Control Module (BCM)

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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

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

- Unlock only the driver door
- Illuminate the interior lamps for a determined length of time, or until the ignition is turned ON
- 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

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 liftgate

Lock All Doors

Press the transmitter LOCK button to perform the following functions:

- Lock all vehicle doors and the liftgate
- 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

Power Liftgate, if equipped

Press and hold the power liftgate button to perform the following functions:

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- Open or close the liftgate using the power liftgate function
- Flash the tail lamps
- Sound the interior power liftgate chime

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:

- 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 is turned to the RUN position with a valid keyless entry transmitter

Remote Vehicle Start/Active

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 vehicle start events may occur or be attempted. Once two events or attempts have been made, future remote vehicle start events will be suspended until the vehicle is started using the ignition.

Enable/Disable Remote Vehicle Start/Active

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On some vehicles, remote vehicle start may be enabled or disabled as a part of vehicle personalization by using the driver information center controls. Refer to the vehicle owners manual for more information.

Hood Ajar Switch/Active

The hood switch provides status of the hood to the BCM for remote vehicle start purposes. The switch is integrated into the hood latch assembly. The hood ajar switch provides 2 separate inputs to the BCM. These separate inputs allow the BCM to actively monitor for a hood ajar switch fault.

Remote Vehicle Start Circuit Description/Active

The BCM receives a signal from the keyless entry transmitter indicating a remote vehicle start request. The BCM uses the following inputs to verify the system is ready for a remote vehicle start event:

- Vehicle is not in valet mode
- All vehicle doors are closed
- Rear compartment lid is not ajar
- The hood is closed
- The doors are locked
- The hazard switch is OFF
- Battery reconnect has not occurred
- Vehicle power mode is correct

When the BCM determines all conditions meet those required for a remote vehicle start event, a message is sent via serial data to the ECM. The ECM relies on the remote vehicle start message from the BCM to enable remote vehicle start when the crank request signal is received. If the ECM does not receive a valid remote vehicle start message, it will not ground the control circuit of the crank relay and start the engine. While the ECM is in remote vehicle start mode it will cut fuel to the engine if any of the following additional conditions occur:

- 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
- Engine crank time is greater than 30 seconds
- Excessive engine speed

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- Accelerator pedal position too high
- Remote start timer equals 0
- Immobilizer system indicates a theft attempt

Keyless Entry Personalization

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

KEYLESS ENTRY SYSTEM DESCRIPTION AND OPERATION (WITH ATH)

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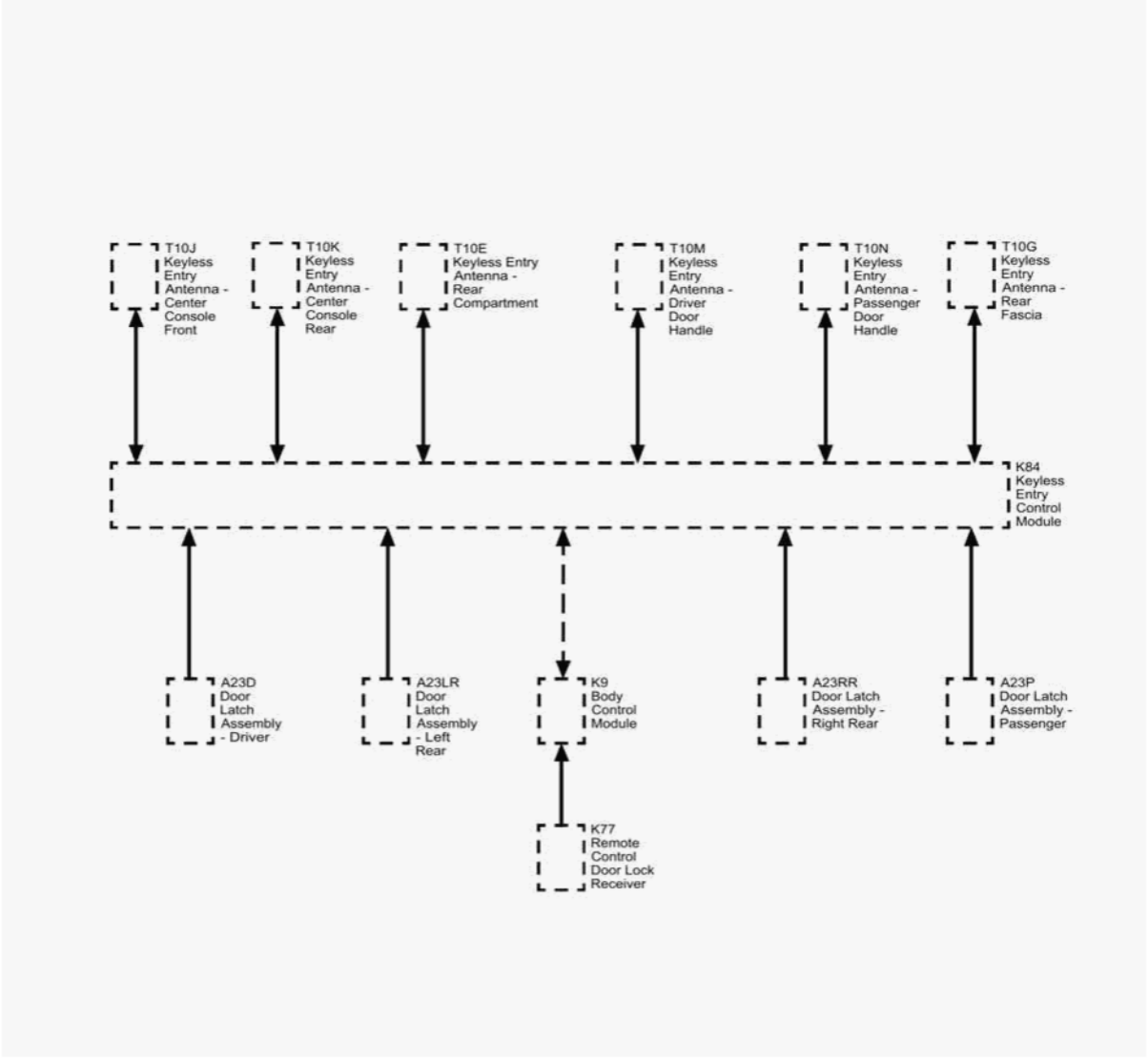

Fig. 16: Keyless Entry System Block Diagram (With ATH)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
T10J	T10J Keyless Entry Antenna - Center Console Front
T10K	T10K Keyless Entry Antenna - Center Console Rear
T10E	T10E Keyless Entry Antenna - Rear Compartment

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Callout	Component Name
T10M	T10M Keyless Entry Antenna - Driver Door Handle
T10N	T10N Keyless Entry Antenna - Passenger Door Handle
T10G	T10G Keyless Entry Antenna - Rear Fascia
A23D	A23D Door Latch Assembly - Driver
A23LR	A23LR Door Latch Assembly - Left Rear
A23RR	A23RR Door Latch Assembly - Right Rear
A23P	A23P Door Latch Assembly - Passenger
K84	K84 Keyless Entry Control Module
K9	K9 Body Control Module
K77	K77 Remote Control Door Lock Receiver

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 a door 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 ECU 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
- Rear compartment lid release
- Illuminated entry lamps
- Panic alarm/vehicle locator
- Remote vehicle start
- Automatic window express down, if equipped. Automatic window express up, if equipped

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. 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 within a one meter range.

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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, entry into the vehicle will be allowed.

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 unlock 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 use low frequency antennas in three different locations on the vehicle to determine the location of the transmitter. Multiple antenna 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, in 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 transmitter can be placed in the transmitter pocket located in the center console, under the cupholder. The immobilizer antenna coil is located directly beneath the transmitter pocket. Placing the transmitter in the pocket 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:

- Keyless entry integrated key/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 console antenna
- Rear console antenna
- Trunk antenna (rear compartment)
- Body control module (BCM)
- Keyless entry control module

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- Immobilizer antenna coil assembly
- Remote control door lock receiver

Keyless Entry Transmitters

By operating any of the exterior door handle buttons, a nearby transmitter is challenged by a keyless entry antenna. The transmitter will send an RF response to the remote control door lock receiver, which communicates with the BCM. The BCM will interpret this communication and either allow entry into the vehicle or deny it.

Door Antennas

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.

Rear 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.

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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.

Immobilizer Antenna Coil Assembly

The immobilizer coil assembly is located in the center console, directly beneath the transmitter pocket. If the transmitter battery is dead, weak, or the RF signal is being interrupted, the transmitter may be placed in the pocket 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

OnStarÂ® Remote Link

A vehicle operator may have the ability to perform some of the keyless entry functions using applications on personal devices such as smart phones. Refer to **OnStar Description and Operation** .

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

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- 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 in order to perform the following functions:

- Unlock only the driver door
- Illuminate the interior lamps for a determined length of time, or until the ignition is turned ON
- Flash the exterior lights, if enabled through personalization
- Disarm the Content Theft Deterrent (CTD) system
- Deactivate the CTD 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

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
- Disarm the CTD system, if equipped
- Deactivate the CTD 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
- Disarm the CTD system, if equipped
- Deactivate the CTD system when in the alarm mode

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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 CTD system

Lock All Doors - Passive

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

- Lock all vehicle doors after a delay
- Flash the exterior lights, if enabled through personalization
- Chirp horn, if enabled through personalization
- Arm the CTD system

When all doors are closed, they can also be locked from the exterior by pressing a front 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 key fob is pressed (will only activate the fob whose button is pressed)
- A passive unlock of vehicle occurs
- Change in power mode occurs

Rear Compartment Lid Release - Active

If the vehicle transaxle is in PARK or NEUTRAL and the ignition is in the OFF position, a single press of the transmitter rear compartment release button will open the rear compartment lid.

Rear Compartment Lid Release - Passive

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

If vehicle is not equipped with trunk antenna, a keyless entry transmitter left inside the trunk will allow the trunk to be reopened at any time. This feature will not allow a customer to lock the transmitter in the trunk.

If vehicle has a trunk antenna and one or more transmitters are left in the trunk or interior of the vehicle, those transmitter(s) will be deactivated when the vehicle becomes locked.

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 switch is turned to the RUN position with a valid key

Remote Vehicle Start/Active

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 vehicle start events may occur or be attempted. Once two events or attempts have been made, future

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remote vehicle start events will be suspended until the vehicle is started using the ignition.

Enable/Disable Remote Vehicle Start/Active

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

Hood Ajar Switch/Active

The hood switch provides status of the hood to the BCM for remote vehicle start purposes. The switch is integrated into the hood latch assembly. The hood ajar switch provides 2 separate inputs to the BCM. These separate inputs allow the BCM to actively monitor for a hood ajar switch fault.

Remote Vehicle Start Circuit Description/Active

The BCM receives a signal from the keyless entry transmitter indicating a remote vehicle start request. The BCM uses the following inputs to verify the system is ready for a remote vehicle start event:

- Vehicle is not in valet mode
- All vehicle doors are closed
- Rear compartment lid is not ajar
- The hood is closed
- The doors are locked
- The hazard switch is OFF
- Battery reconnect has not occurred
- Vehicle power mode is correct

When the BCM determines all conditions meet those required for a remote vehicle start event, a message is sent via serial data to the ECM. The ECM relies on the remote vehicle start message from the BCM to enable remote vehicle start when the crank request signal is received. If the ECM does not receive a valid remote vehicle start message, it will not ground the control circuit of the crank relay and start the engine. While the ECM is in remote vehicle start mode it will cut fuel to the engine if any of the following additional conditions occur:

- Vehicle speed is greater than 0
- Transmission is not in P
- Excessive engine coolant temperature
- Low oil pressure

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- The malfunction indicator lamp (MIL) 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

Keyless Entry Personalization

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

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/Description

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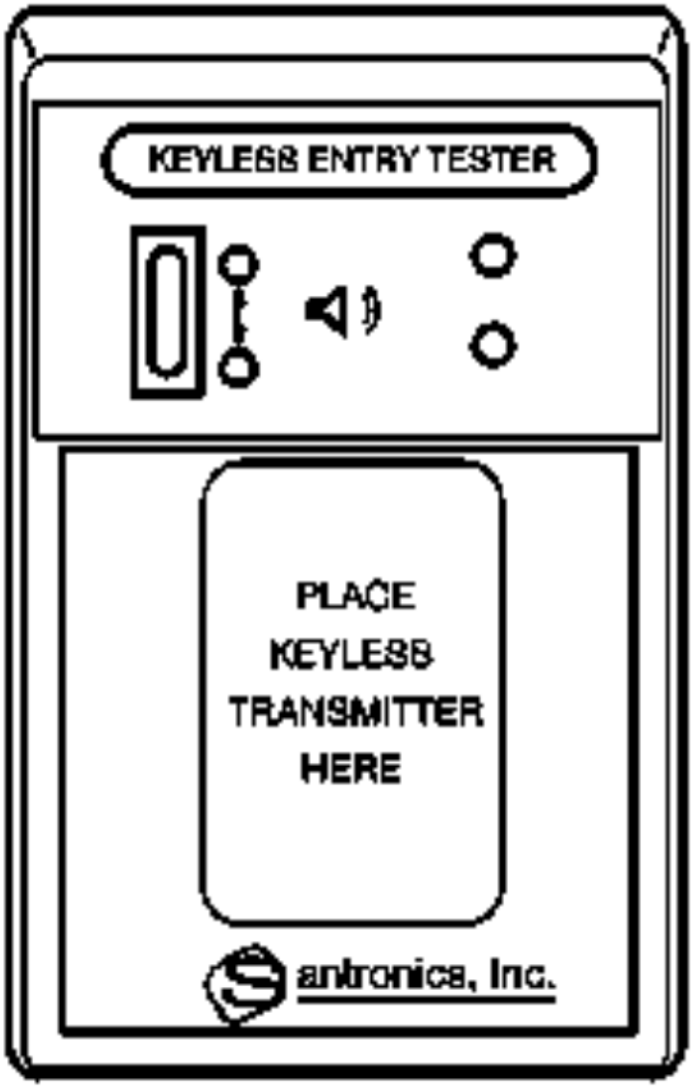
Illustration	Tool Number/Description
	EL 43241 Keyless Entry Tester

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