2010 ACCESSORIES E UIPMENT

Remote Functions SRX

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
arage Door Opener Transmitter Bolts	2.5 N.m	22 lb in

SC EMATIC AND ROUTING DIAGRAMS

REMOTE FUNCTION SCHEMATICS

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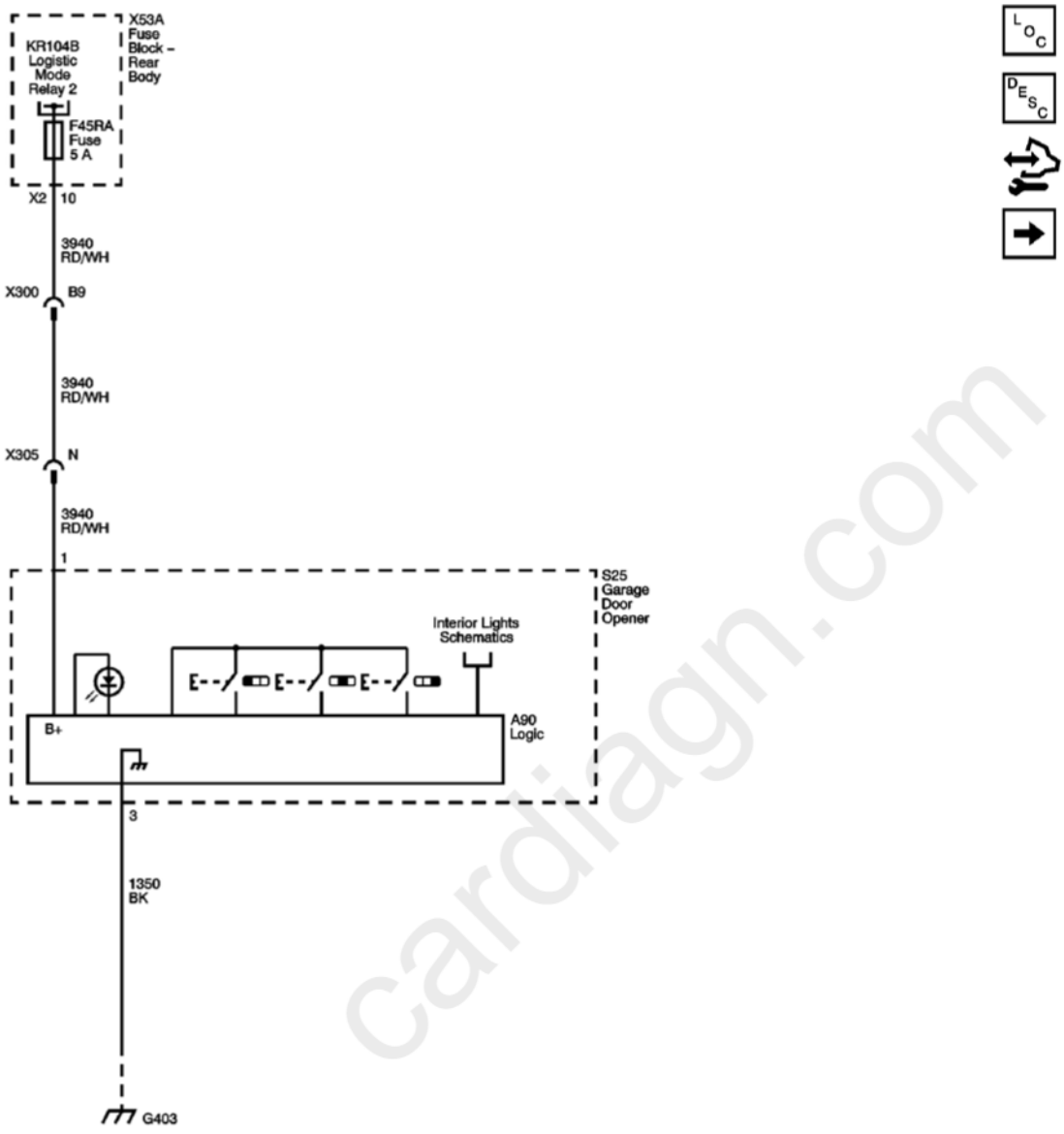


Fig. 1: Garage Door Opener Circuit Schematic (GDO)
Courtesy of GENERAL MOTORS CORP.

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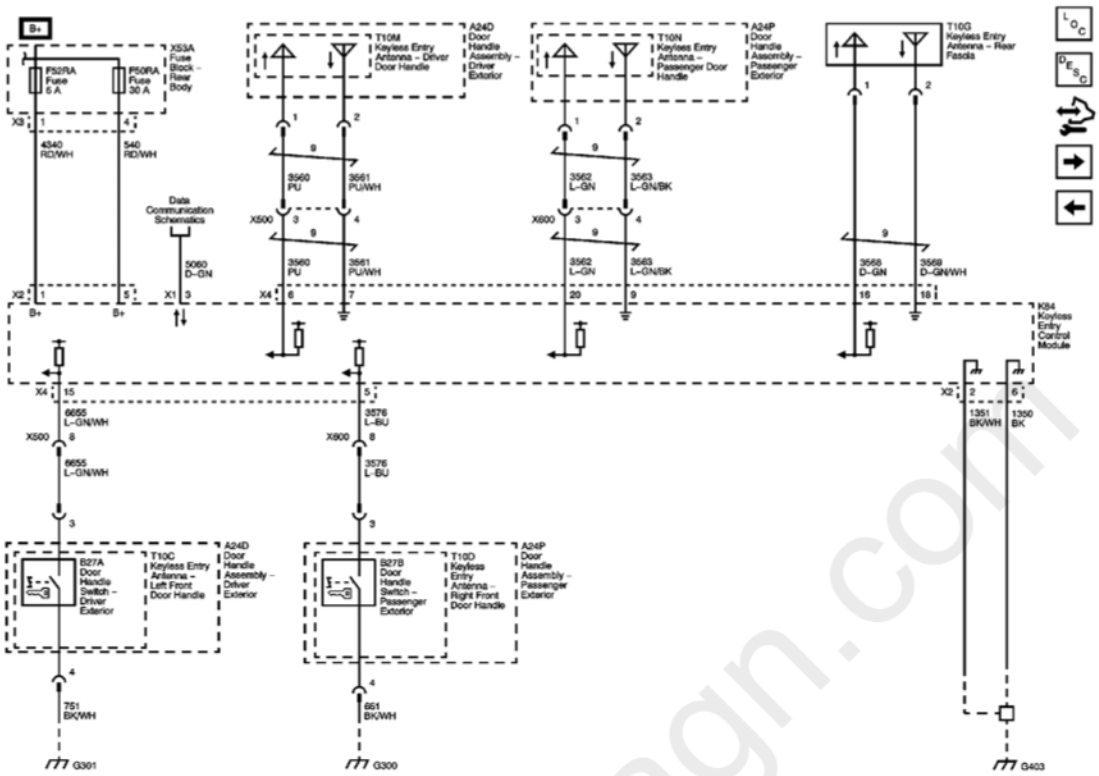


Fig. 2: Passive Entry Circuit Schematic (ATH - 1 Of 2)
Courtesy of GENERAL MOTORS CORP.

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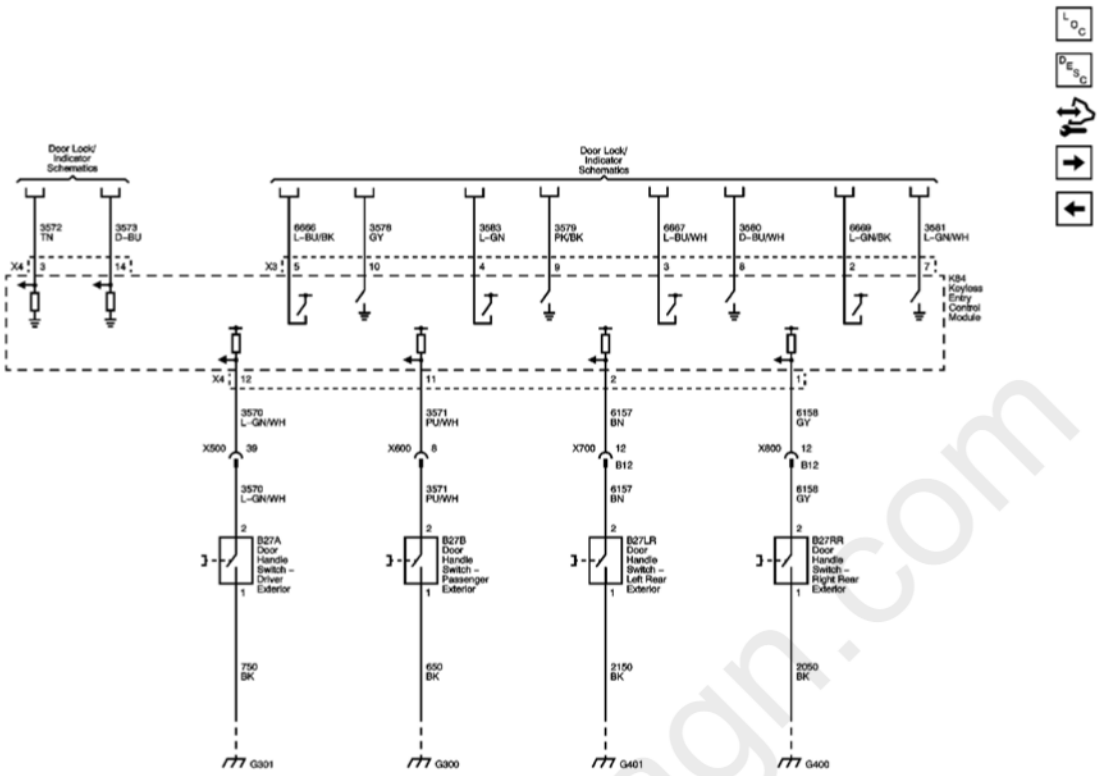


Fig. 3: Passive EntryCircuit Schematic (ATH - 2 Of 2)
Courtesy of GENERAL MOTORS CORP.

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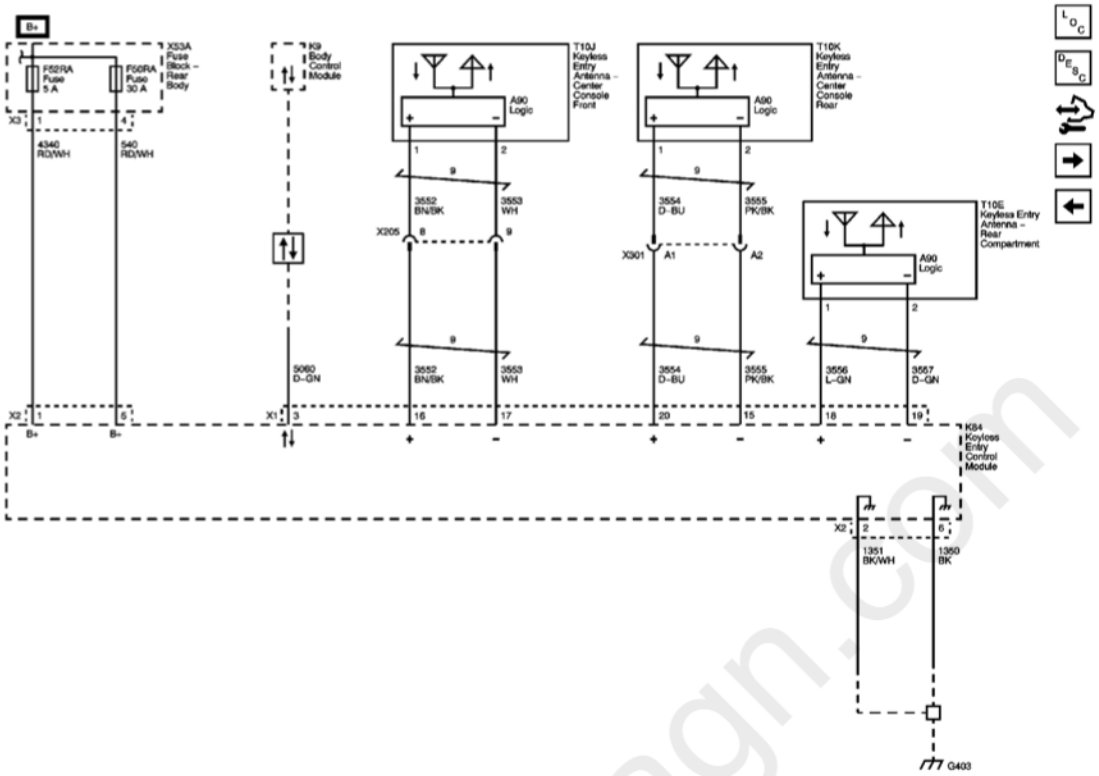


Fig. 4: Passive Start Circuit Schematic
Courtesy of GENERAL MOTORS CORP.

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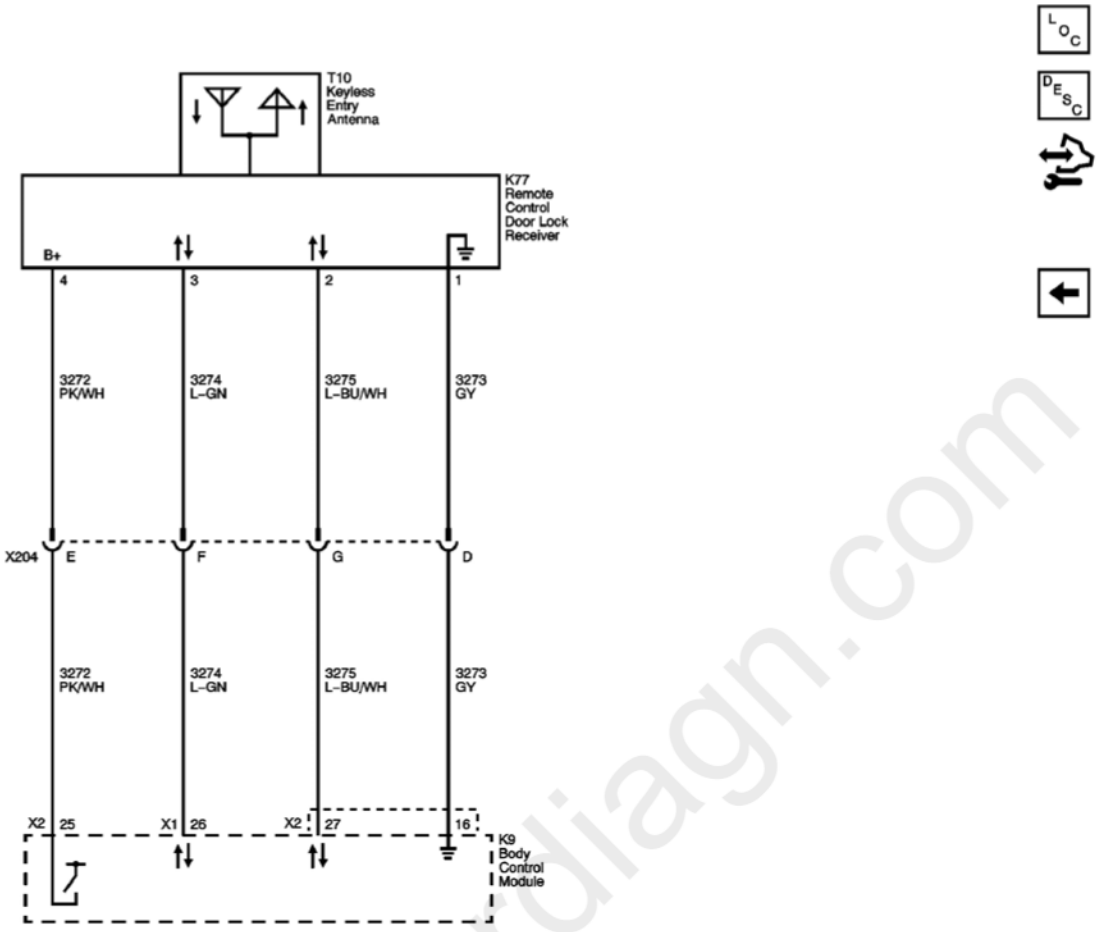


Fig 5 Remote Keyless Entry Circuit Schematic (RKE) Without ATH
Courtesy of GE ERAL MOTORS CORP

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAG OSTIC CODE I DE

DIAG OSTIC CODE I DE

DTC	Description
DTC B09 B	B097B 02 Power Mode Start Switch Circuit Short to round B097B 05 Power Mode Start Switch Circuit igh Voltage/Open B097B 08 Power Mode Start Switch Circuit Performance - Signal Invalid B097B 61 Power Mode Start Switch Circuit Stuck
DTC B3101	B3101 00 Keyless Entry Data Link Circuit
DTC B3105	B3105 00 Keyless Entry System Transmitters
DTC B310	B3106 00 Keyless Entry Data Link
DTC B3109-B3113	B3109 00 Keyless Entry Transmitter 1 Battery

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	B3110 00 Keyless Entry Transmitter 2 Battery B3111 00 Keyless Entry Transmitter 3 Battery B3112 00 Keyless Entry Transmitter 4 Battery B3113 00 Keyless Entry Transmitter 5 Battery
DTC B310D-B310F	B310D 00 Keyless Entry Transmitter 6 Battery B310E 00 Keyless Entry Transmitter 7 Battery B310F 00 Keyless Entry Transmitter 8 Battery
DTC B3119	B3119 02 Keyless Entry Antenna 1 Short to round B3119 05 Keyless Entry Antenna 1 igh Voltage/Open
DTC B3120	B3120 02 Keyless Entry Antenna 2 Short to round B3120 05 Keyless Entry Antenna 2 igh Voltage/Open
DTC B3121	B3121 02 Keyless Entry Antenna 3 Short to round B3121 05 Keyless Entry Antenna 3 igh Voltage/Open
DTC B3122	B3122 02 Keyless Entry Antenna 4 Short to round B3122 05 Keyless Entry Antenna 4 igh Voltage/Open
DTC B3123	B3123 02 Keyless Entry Antenna 5 Short to round B3123 05 Keyless Entry Antenna 5 igh Voltage/Open
DTC B312	B3124 02 Keyless Entry Antenna 6 Short to round B3124 05 Keyless Entry Antenna 6 igh Voltage/Open

DTC B09 B

Diagnostic Instructions

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

DTC Descriptors

DTC B09 B 02

Power Mode Start Switch Circuit Short to round

DTC B09 B 05

Power Mode Start Switch Circuit igh Voltage/Open

DTC B09 B 0

Power Mode Start Switch Circuit Performance - Signal Invalid

DTC B09 B 1

Power Mode Start Switch Circuit Stuck

Circuit/System Description

NOTE: Depending on the vehicle build date and BCM software level, the method to place the vehicle in the run mode will be different. Early vehicles that have not had the BCM replaced or reprogrammed will require two presses of the igniting mode switch to enter run mode. Late vehicles and vehicles that have had the BCM replaced or reprogrammed require the ignition mode switch be pressed and held for 5 seconds to enter run mode.

The ignition mode switch has two LEDs that indicate the vehicle power mode. When the vehicle is in the off mode, both LEDs will be off. Pressing the ignition mode switch button once, without the brake pedal applied, will enter the accessory mode and the amber LED will illuminate. Pressing the ignition mode switch button a second time or pressing and holding the ignition mode switch, without the brake pedal applied, will enter the run mode and the green LED will illuminate. With the ignition off and the brake pedal applied, pressing the ignition mode switch button once, the vehicle will enter run/start mode and the green LED will illuminate. This will start the engine.

The keyless entry control module supplies the ignition mode switch a constant B+ signal on the ignition switch run signal circuit. The keyless entry control module monitors this signal to determine the igniting mode. When the ignition mode switch is not pressed, voltage on the signal circuit is pulled down through two resistors in the switch. When the ignition mode switch is pressed, voltage on the signal circuit is pulled down through only one resistor, changing the voltage seen at the keyless entry control module and indicating that the ignition mode switch is pressed.

Conditions for Running the DTC

Voltage supplied to the module is in the normal operating voltage range of 9-16 V.

Conditions for Setting the DTC

B09 B 02

- The keyless entry control module detects a short to ground in the respective circuit, when the output is inactive.
- The above condition exists for more than 1 second.

B09 B 05

- The keyless entry control module detects a open in the ignition mode circuit
- The above condition exists for more than 1 second.

B09 B 0

- The keyless entry control module detects a change in the ignition mode without observing a switch press.
- The above condition occurs four consecutive times.

B09 B 1

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- The keyless entry control module detects a continuously closed ignition mode switch.
- The above condition exists for more than 1 minute.

Action Taken When the DTC Sets

No action is taken.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the module ignition cycle counter reaches the reset threshold, without a repeat of the malfunction.

Reference Information

Schematic Reference

Power Moding Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

- **Retained Accessory Power Description and Operation**
- **Power Mode Description and Operation**
- **Keyless Entry System Description and Operation (without ATH)** or **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 DTC B097B 08 or B097B 61 is not set.
    - If any of the DTCs are set, test or replace the S38 ignition mode switch.

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2. With the brake pedal released, press the ignition mode switch once. The amber LED should illuminate and the vehicle should be in the accessory power mode.
3. With the brake pedal released, press the ignition mode switch a second time or press and hold the ignition mode switch for 5 seconds. The green LED should illuminate and the vehicle should be in the run power mode.
4. With the brake pedal pressed, press the ignition mode switch once. The green LED should illuminate and the vehicle should start.

Circuit/System Testing

1. Ignition OFF, disconnect the X1 harness connector at the K84 keyless entry control module.
2. Ignition ON, test for less than 1 V between the signal circuit terminal 11 and ground.
   - If greater than the specified range, test the signal circuit for a short to voltage.
3. Ignition OFF, connect the X1 harness connector at the K84 keyless entry control module. Disconnect the harness connector at the S38 ignition mode switch.
4. Wait 2 minutes, test for less than 15 ohms between the low reference circuit terminal 7 and ground.
   - If greater than specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the K84 keyless entry control module.
5. Verify that a test lamp illuminates between signal circuit terminal 3 and ground.
   - If the test lamp does not illuminate, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K84 keyless entry control module.
6. If all circuits test normal, test or replace the S38 ignition mode switch.

Component Testing

1. Ignition OFF, disconnect the harness at the S38 ignition mode switch.
2. With the button released, test for 4.5-5.5 Kohms between the signal terminal 3 and the low reference terminal 7.
   - If not within the specified range, replace the S38 ignition mode switch.
3. With the button pressed, test for 1-1.5 Kohms between the signal terminal 3 and the low reference terminal 7.
   - If not within the specified range, replace the S38 ignition mode switch.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Ignition and Start Switch Replacement**
- **Control Module References** for keyless entry control module replacement, setup, and programming

DTC B3101

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.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC B3101 00

Keyless Entry Data Link Circuit

Diagnostic Fault Information

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

Circuit/System Description

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

Conditions for Running the DTC

A button is pressed on the keyless entry transmitter.

Conditions for Setting the DTC

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

Action Taken When the DTC Sets

In the case of power failure, the remote control door lock receiver is disabled for 65 seconds, 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.

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Reference Information

Schematic Reference

Remote Function Schematics

Component Connector End Views

Component Connector End Views

Description and Operation

Keyless Entry System Description and Operation (without ATH) or **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, disconnect the harness connector at the K77 remote control door lock receiver.
2. Ignition OFF, test for less than 20 ohms between the low reference circuit terminal 1 and ground.
    - If greater than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the K9 BCM.
3. Ignition ON, verify that a test lamp illuminates between the B+ circuit terminal 4 and ground.
    - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K9 BCM.
4. Test for 3-6 V between the serial data circuit terminal 3 and ground.
    - If greater than the specified range, test the serial data circuit for a short to voltage. If the circuit tests normal, replace the K9 BCM.
    - If less than the specified range, test the serial data circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K9 BCM.
5. Ignition OFF, disconnect the X1 and X2 harness connectors at the K9 BCM.
6. Ignition ON, test for less than 1 V between the serial data circuit terminal 27 and ground.
    - If greater than the specified range, test the serial data circuit for a short to voltage.
7. Ignition OFF, test for infinite resistance between the serial data circuit terminal 27 and ground.

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- If not the specified value, test the serial data circuit for a short to ground.

8. Test for less than 2 ohms between the K9 BCM serial data circuit terminal 27 X2 and the K77 remote control door lock receiver serial data circuit terminal 2.
   - If greater than the specified range, test the serial data circuit for an open/high resistance.
9. If all circuits test normal, replace the K77 remote control door lock receiver. Verify DTC B3101 is not set.
   - If the DTC is set, replace the K9 BCM.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for BCM or remote control door lock receiver replacement, programming and setup

DTC B3105

Diagnostic Instructions

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

DTC Descriptor

DTC B3105 00

Keyless Entry System Transmitters

Circuit/System Description

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

Conditions for Running the DTC

The BCM has been set up without transmitters being programmed.

Conditions for Setting the DTC

No keyless entry transmitter programmed to the BCM.

Action Taken When the DTC Sets

The keyless entry system is inoperative.

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Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

Remote Function Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Keyless Entry System Description and Operation (without ATH) or **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

Attempt to program a transmitter. Refer to **Replacing Keys** . The transmitter should program.

Circuit/System Testing

1. Verify that the transmitter is the 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 not correct, replace the transmitter.
2. Attempt to program the transmitter. Refer to **Replacing Keys** . The transmitter should program.
    - If the transmitter does not program, replace the transmitter.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

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Control Module References for BCM replacement, setup, and programming

DTC B310

Diagnostic Instructions

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

DTC Descriptor

DTC B310 00

Keyless Entry Data Link

Circuit/System Description

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

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 BCM.

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

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Description and Operation

Keyless Entry System Description and Operation (without ATH) or **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. With a valid transmitter, press a button on the transmitter.
2. Verify that DTC B3106 is not set.
    - If the DTC is set, replace the K77 remote control door lock receiver.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for remote control door lock receiver replacement, setup and programming

DTC B3109-B3113

Diagnostic Instructions

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

DTC Descriptors

DTC B3109 00

Keyless Entry Transmitter 1 Battery

DTC B3110 00

Keyless Entry Transmitter 2 Battery

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DTC B3111 00

Keyless Entry Transmitter 3 Battery

DTC B3112 00

Keyless Entry Transmitter 4 Battery

DTC B3113 00

Keyless Entry Transmitter 5 Battery

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 (BCM) to perform the requested function.

Conditions for Running the DTC

A keyless transmitter button is pressed.

Conditions for Setting the DTC

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

Action Taken When the DTC Sets

The keyless entry system is inoperative.

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

Remote Function Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Keyless Entry System Description and Operation (without ATH) or **Keyless Entry System Description**

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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

Verify none of the following DTCs are set:

- DTC B3109
- DTC B3110
- DTC B3111
- DTC B3112
- DTC B3113

  - If any of the DTCs are set, replace the battery in the appropriate keyless entry transmitter. Operate the transmitter 3 consecutive times. If the DTC resets, replace the keyless entry transmitter.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Replacing Keys

DTC B310D-B310F

Diagnostic Instructions

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

DTC Descriptors

DTC B310D 00

Keyless Entry Transmitter 6 Battery

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DTC B310E 00

Keyless Entry Transmitter 7 Battery

DTC B310F 00

Keyless Entry Transmitter 8 Battery

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 (BCM) to perform the requested function.

Conditions for Running the DTC

A keyless transmitter button is pressed.

Conditions for Setting the DTC

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

Action Taken When the DTC Sets

The keyless entry system is inoperative.

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

Remote Function Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Keyless Entry System Description and Operation (without ATH) or **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

Verify none of the following DTCs are set:

- DTC B310D
- DTC B310E
- DTC B310F

  - If any of the DTCs are set, replace the battery in the appropriate keyless entry transmitter. Operate the transmitter 3 consecutive times. If the DTC resets, replace the keyless entry transmitter.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Replacing Keys

DTC B3119

Diagnostic Instructions

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

DTC Descriptors

DTC B3119 02

Keyless Entry Antenna 1 Short to round

DTC B3119 05

Keyless Entry Antenna 1 High Voltage/Open

Diagnostic Fault Information

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Keyless Entry Antenna Signal - Driver Door	B311 02	B311 05	B311 05	-
Keyless Entry Antenna Low Reference - Driver Door	-	B311 05	-	-

Circuit/System Description

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

Conditions for Running the DTC

- The touch pad in the driver door handle is touched within 15 minutes of last door closing.
- The front or rear door handle on the driver side is pulled.

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 when front or rear driver handle is pulled. Doors will not lock with touch pad.

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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Component Connector End Views

Description and Operation

Keyless Entry System Description and Operation (without ATH) or **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

Verify DTC B3122, B3123, or B3124 is not set.

- If any of the DTCs are set, refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

Circuit/System Testing

NOTE: The A2 D driver e terior door handle assembl has two harness connectors. Of these two harness connectors, ma e sure that onl the T10M driver door handle e less entr antenna harness connector is disconnected. Disconnecting both harness connectors will result in the inabilit to activate the antenna and cause an improper diagnosis.

1. Ignition OFF, disconnect the harness connector at the T10M driver door handle keyless entry antenna.
2. Ignition ON, test for less than 1 V between the signal circuit terminal 1 and ground.
   - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the K84 keyless entry control module.
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. Lock the vehicle doors using the keyless entry transmitter.
5. Activate the antenna by pulling the driver exterior door handle. Verify the MAX voltage captured by the DMM is greater than .5 V.
   - If less than the specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K84 keyless entry control module.
6. 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.

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7. Lock the vehicle doors using the keyless entry transmitter.
8. Activate the antenna by pulling the driver exterior door handle. Verify the MAX voltage captured by the DMM is greater than .5 V.
    - If less than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the K84 keyless entry control module.

NOTE: Install the A2 D driver e terior door handle assembl and verif correct s stem operation E ORE painting the assembl . If the assembl does not correct the concern, return the unpainted part.

. If all circuits test normal, replace the A24D driver exterior door handle assembly. Verify DTC B311 is not set.
    - If the DTC is set, replace the K84 keyless entry control module.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Front Side Door Outside Handle Bracket Replacement**
- **Control Module References** for keyless entry control module replacement, setup, and programming

DTC B3120

Diagnostic Instructions

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

DTC Descriptors

DTC B3120 02

Keyless Entry Antenna 2 Short to Ground

DTC B3120 05

Keyless Entry Antenna 2 High Voltage/Open

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	-

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Keyless Entry Antenna Low Reference - Passenger Door	-	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 is pulled, the keyless entry control module communicates with the passenger front door handle keyless entry antenna.

Conditions for Running the DTC

- The touch pad in the passenger front door handle is touched within 15 minutes of the last change of door ajar status for any door.
- The front or rear door handle on the passenger side is pulled.

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 when front passenger handle is pulled. Doors will not lock with passenger touch pad.

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

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Description and Operation

Keyless Entry System Description and Operation (without ATH) or **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

Verify DTC B3122, B3123, or B3124 is not set.

- If any of the DTCs are set, refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

Circuit/System Testing

NOTE: The A2 P passenger e terior door handle assembl has two harness connectors. Of these two harness connectors, ma e sure that onl the T10N passenger door handle e less entr antenna harness connector is disconnected. Disconnecting both harness connectors will result in the inabilit to activate the antenna and cause an improper diagnosis.

1. Ignition OFF, disconnect the harness connector at the T10N passenger door handle keyless entry antenna.
2. Ignition ON, test for less than 1 V between the signal circuit terminal 1 and ground.
   - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the K84 keyless entry control module.
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. Lock the vehicle doors using the keyless entry transmitter.
5. Activate the antenna by pulling the passenger exterior door handle. Verify the MAX voltage captured by the DMM is greater than .5 V.
   - If less than the specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K84 keyless entry control module.
6. 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.
7. Lock the vehicle doors using the keyless entry transmitter.

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8. Activate the antenna by pulling the passenger exterior door handle. Verify the MAX voltage captured by the DMM is greater than .5 V.
    - If less than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the K84 keyless entry control module.

NOTE: Install the A2 P passenger e terior door handle assembl and verif correct s stem operation E ORE painting the assembl . If the assembl does not correct the concern, return the unpainted part.

. If all circuits test normal, replace the A24P passenger exterior door handle assembly. Verify DTC B3120 is not set.
    - If the DTC is set, replace the K84 keyless entry control module.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Front Side Door Outside Handle Replacement**
- **Control Module References** for keyless entry control module replacement, setup, and programming

DTC B3121

Diagnostic Instructions

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

DTC Descriptors

DTC B3121 02

Keyless Entry Antenna 3 Short to Ground

DTC B3121 05

Keyless Entry Antenna 3 High Voltage/Open

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	-	B3121 05	-	-

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Reference - Rear Fascia				

Circuit/System Description

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

Conditions for Running the DTC

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

Conditions for Setting the DTC

B3121 02

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

B3121 05

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

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

Remote Function Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

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Keyless Entry System Description and Operation (without ATH) or **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

Verify DTC B3122, B3123, or B3124 is not set.

- If any of the DTCs are set, refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the T10G rear fascia keyless entry antenna.
2. Ignition ON, test for less than 1 V between the signal circuit terminal 1 and ground.
   - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the K84 keyless entry control module.
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. Lock the vehicle using the keyless entry transmitter.
5. Activate the antenna by pressing the rear closure touch pad. Verify the MAX voltage captured by the DMM is greater than .5 V.
   - If less than the specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K84 keyless entry control module.
6. 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.
7. Lock the vehicle using the keyless entry transmitter.
8. Activate the antenna by pressing the rear closure touch pad. Verify the MAX voltage captured by the DMM is greater than .5 V.
   - If less than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the K84 keyless entry control module.

. If all circuits test normal, replace the T10G rear fascia keyless entry antenna. Verify DTC B3121 is not set.
   - If the DTC is set, replace the K84 keyless entry control module.

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Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Ignition Lock Key Transmitter Antenna Replacement - Rear Bumper Fascia**
- **Control Module References** for keyless entry control module replacement, setup, and programming

DTC B3122

Diagnostic Instructions

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

DTC Descriptors

DTC B3122 02

Keyless Entry Antenna 4 Short to Ground

DTC B3122 05

Keyless Entry Antenna 4 High Voltage/Open

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 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

- The touch pad in the driver door or passenger door handle is touched within 15 minutes of any door ajar status changing.
- Any exterior door handle or handles is pulled.
- The last door becomes closed.

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- Pressing the start/stop 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 start/stop 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

Description and Operation

Keyless Entry System Description and Operation (without ATH) or **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

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Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the T10J center console front keyless entry antenna.
2. Ignition ON, test for less than 1 V between the signal circuit terminal 1 and ground.
    - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the K84 keyless entry control module.
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. Verify the MAX voltage captured by the DMM is OL or is greater than .5 V.
    - If less than the specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K84 keyless entry control module.
5. 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.
6. Activate the antenna by pressing the rear closure touch pad. Verify the MAX voltage captured by the DMM is greater than .5 V.
    - If less than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the K84 keyless entry control module.
7. If all circuits test normal, replace the T10J center console front keyless entry antenna. Verify DTC B3122 is not set.
    - If the DTC is set, replace the K84 keyless entry control module.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Ignition Lock Key Transmitter Antenna Replacement - Instrument Panel**
- **Control Module References** for keyless entry control module replacement, setup, and programming

DTC B3123

Diagnostic Instructions

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

DTC Descriptors

DTC B3123 02

Keyless Entry Antenna 5 Short to Ground

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DTC B3123 05

Keyless Entry Antenna 5 High Voltage/Open

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 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

- The touch pad in the driver door or passenger door handle is touched within 15 minutes of any door ajar status changing.
- Any exterior door handle or handles is pulled.
- The last door becomes closed.
- Pressing the start/stop switch.

Conditions for Setting the DTC

B3123 02

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

B3123 05

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

Action Taken When the DTC Sets

Vehicle will not detect the transmitter in some locations inside the vehicle. If the transmitter is not detected then vehicle will not change ignition modes when start/stop button is pressed.

Conditions for Clearing the DTC

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

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- 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

Description and Operation

Keyless Entry System Description and Operation (without ATH) or **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, disconnect the harness connector at the T10K center console rear keyless entry antenna.
2. Ignition ON, test for less than 1 V between the signal circuit terminal 1 and ground.
    - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the K84 keyless entry control module.
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. Verify the MAX voltage captured by the DMM is OL or is greater than .5 V.
    - If less than the specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K84 keyless entry control module.
5. 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.
6. Activate the antenna by pressing the rear closure touch pad. Verify the MAX voltage captured by the DMM is greater than .5 V.

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- If less than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the K84 keyless entry control module.

7. If all circuits test normal, replace the T10K center console rear keyless entry antenna. Verify DTC B3123 is not set.
   - If the DTC is set, replace the K84 keyless entry control module.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Ignition Lock Key Transmitter Antenna Replacement - Floor Console**
- **Control Module References** for keyless entry control module replacement, setup, and programming

DTC B312

Diagnostic Instructions

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

DTC Descriptors

DTC B312 02

Keyless Entry Antenna 6 Short to Ground

DTC B312 05

Keyless Entry Antenna 6 High Voltage/Open

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 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.

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Conditions for Running the DTC

- The touch pad in the driver door or passenger door handle is touched within 15 minutes of any door ajar status changing.
- Any exterior door handle or handles is pulled.
- The last door becomes closed.
- Pressing the start/stop switch.

Conditions for Setting the DTC

B312 02

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

B312 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 start/stop 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

Description and Operation

Keyless Entry System Description and Operation (without ATH) or **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 Testing

1. Ignition OFF, disconnect the harness connector at the T10E rear compartment keyless entry antenna.
2. Ignition ON, test for less than 1 V between the signal circuit terminal 1 and ground.
   - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the K84 keyless entry control module.
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. Verify the MAX voltage captured by the DMM is OL or is greater than .5 V.
   - If less than the specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K84 keyless entry control module.
5. 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.
6. Activate the antenna by pressing the rear closure touch pad. Verify the MAX voltage captured by the DMM is greater than .5 V.
   - If less than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the K84 keyless entry control module.
7. If all circuits test normal, replace the T10E rear compartment keyless entry antenna. Verify DTC B3124 is not set.
   - If the DTC is set, replace the K84 keyless entry control module.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Ignition Lock Key Transmitter Antenna Replacement - Rear Compartment**
- **Control Module References** for keyless entry control module replacement, setup, and programming

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)** or **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 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**
- **Keyless Entry System Malfunction (Active)** or **Keyless Entry System Malfunction (Passive)**
- **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.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B	1	1	-	-
round	-	1	-	-
1. Universal Home Remote Malfunction				

Circuit/System Description

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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

Remote Function Schematics

Connector End View Reference

Component Connector End Views

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 41 4 Universal Home Remote Tester

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the S25 garage door opener.
2. Ignition OFF, test for less than 5 ohms between the ground circuit terminal 3 and ground.
   - If greater than the specified value, test the ground circuit for an open/high resistance.
3. Ignition ON, verify a test lamp illuminates between the B circuit terminal 1 and ground.
   - If the test lamp does not illuminate, test the B circuit for a short to ground or an open/high resistance.

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.

4. Hold the two outer buttons on the S25 garage door opener for 10 seconds. The LEDs will flash quickly indicating it has entered the diagnostic mode. Place the **J 41 4** adjacent to the S25 garage door opener

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and press each button of the universal home remote one at a time. The tester should indicate when each button is pressed.

5. Using the Hand Held Transmitter from the **J 41 4** kit, program a single button on the S25 garage door opener. Verify the Programmed LED on the test tool lights with the newly programmed vehicle universal home remote. This verifies the transmitter can learn a new function.
    - If the tester indicates that one or more of the buttons does not respond, replace the S25 garage door opener.
6. Instruct the customer to program the S25 garage door opener. 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 Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for universal home remote replacement, setup, and programming

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.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Circuit/System Description

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

Diagnostic Aids

- When using the **J 43241** Keyless Entry Tester, first inspect the keyless entry transmitter part number to determine that it is the correct model for the vehicle. See **Special Tools**. An incorrect part number transmitter may pass the test, but it will not activate the keyless entry system.
- When the vehicle key is in the ignition, the keyless entry functions are disabled from the keyless entry transmitter.

Reference Information

Schematic Reference

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Remote Function Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Keyless Entry System Description and Operation (without ATH) or **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

Special Tools

J 43241 Keyless Entry Tester. See **Special Tools**.

Circuit/System Verification

Attempt to program the keyless entry transmitter, refer to **Replacing Keys** . The transmitter should program.

Circuit/System Testing

1. Verify that the transmitter is the correct transmitter for the vehicle.
    - If not the correct transmitter, replace the transmitter.
2. Place the transmitter on the test pad of the **J 43241** and press each transmitter button one at a time. See **Special Tools**. The tester should sound a tone and illuminate a green light with each button press.
    - If one or more buttons does not sound the tone and illuminate the green light, replace the transmitter battery and retest with the **J 43241** . See **Special Tools**. If the condition continues after battery replacement, replace the transmitter.
3. Operate the transmitter while observing the appropriate scan tool Key Fob Function parameter for the appropriate transmitter. The parameter should correspond with the function selected on the transmitter.
    - If the parameter does not match the function selected on the transmitter, replace the transmitter and retest. If the conditions continues after transmitter replacement, replace the K9 BCM.

Repair Procedures

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Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Replacing Keys**
- **Control Module References** for BCM replacement, setup, and programming

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.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

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 is pulled, the keyless entry antenna broadcasts a challenge to the transmitter in an approximate 1 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. The front doors will open with one pull of the front door handle. 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.

Reference Information

Schematic Reference

Remote Function Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Keyless Entry System Description and Operation (without ATH) or **Keyless Entry System Description and Operation (with ATH)**

Electrical Information Reference

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

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Scan Tool Reference

Control Module References for scan tool information

Special Tools

J 43241 Keyless Enter Tester. See **Special Tools**.

Circuit/System Verification

1. Verify DTC B3119, B3120, or B3121 is not set.
   - If any of the DTCs are set, refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .
2. Ignition ON, observe the scan tool Exterior Driver Door Handle Switch, Exterior Passenger Door Handle Switch, and Trunk Lid Exterior Unlatch Switch parameters while operating their respective release handle/touch pad. The parameter should change between Active and Inactive as commanded.
   - If the parameter does not cycle between the specified values, refer to **Power Door Locks Malfunction (Without Dead Locks)** or **Power Door Locks Malfunction (Dead Lock)** .
3. With the vehicle locked, attempt to passively unlock and access the vehicle at the left door, right door, and rear compartment by approaching the vehicle with a valid transmitter and operating their respective release handle/touch pad. Each door and the rear compartment should unlock/unlatch and open.
   - If both doors and the rear compartment do not unlock/unlatch and open, refer to **Passive Transmitter Malfunction**.
   - If only one door or the rear compartment does not unlock/unlatch and open, refer to **Antenna Circuit Malfunction**Antenna Circuit Malfunction.

Circuit/System Testing

Passive Transmitter Malfunction

Place the keyless entry transmitter on the **J 43241** and approach the vehicle. See **Special Tools**. Operate the release handle/touch pad. Verify the **J 43241** sounds a tone. See **Special Tools**.

- If the tone does not sound, replace the transmitter battery and retest with the **J 43241** . See **Special Tools**. If the condition continues after battery replacement, replace the keyless entry transmitter.

Antenna Circuit Malfunction

1. Ignition OFF, disconnect the harness connector at the inoperative T10 handle keyless entry antenna.
2. Ignition ON, test for less than 1 V between the signal circuit terminal 1 and ground.
   - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the K84 keyless entry control module.
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. Lock the vehicle doors using the keyless entry transmitter.
5. Activate the antenna by pulling/pressing the exterior door handle/touch pad. Verify the MAX voltage

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captured by the DMM is greater than .5 V.

- If less than the specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K84 keyless entry control module.

6. 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.
7. Lock the vehicle doors using the keyless entry transmitter.
8. Activate the antenna by pulling/pressing the exterior door handle/touch pad. Verify the MAX voltage captured by the DMM is greater than .5 V.
   - If less than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the K84 keyless entry control module.
9. If all circuits test normal, replace the T10 handle keyless entry antenna.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Front Side Door Outside Handle Bracket Replacement**
- **Ignition Lock Key Transmitter Antenna Replacement - Rear Bumper Fascia**
- **Control Module References** for keyless entry control module replacement, setup, and programming

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.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Circuit/System Description

Remote vehicle start begins as an radio frequency message received by the BCM (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, 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

NOTE: If the vehicle has a current vehicle 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.

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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.
- 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

Remote Function Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Keyless Entry System Description and Operation (without ATH) or **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. Verify that remote vehicle start is enabled through vehicle personalization.
   - If remote vehicle start is not enabled, use vehicle personalization to turn on remote vehicle start functionality. Refer to the vehicle owners manual.
2. Verify that the keyless entry functions operate with all available keyless entry transmitters.
   - If the keyless entry system does not function properly, refer to **Keyless Entry System Malfunction (Active)** or **Keyless Entry System Malfunction (Passive)**.
3. Observe the scan tool BCM Remote Start Diagnostic Status History and the ECM Remote Vehicle Start Disable History parameters. Verify that no Diagnostic Status History or Start Disable items are present.
   - If remote vehicle start disable history items are present, refer to the appropriate subsection in which the failure occurred.
4. Verify the scan tool BCM Content Theft Trigger History parameters displays None.
   - If not specified value, refer to **Content Theft Deterrent Malfunction (with UA6)** or **Content Theft Deterrent Malfunction (with UA2 or UTC)** .

REPAIR INSTRUCTIONS

IGNITION LOCK KEY TRANSMITTER ANTENNA REPLACEMENT - INSTRUMENT PANEL

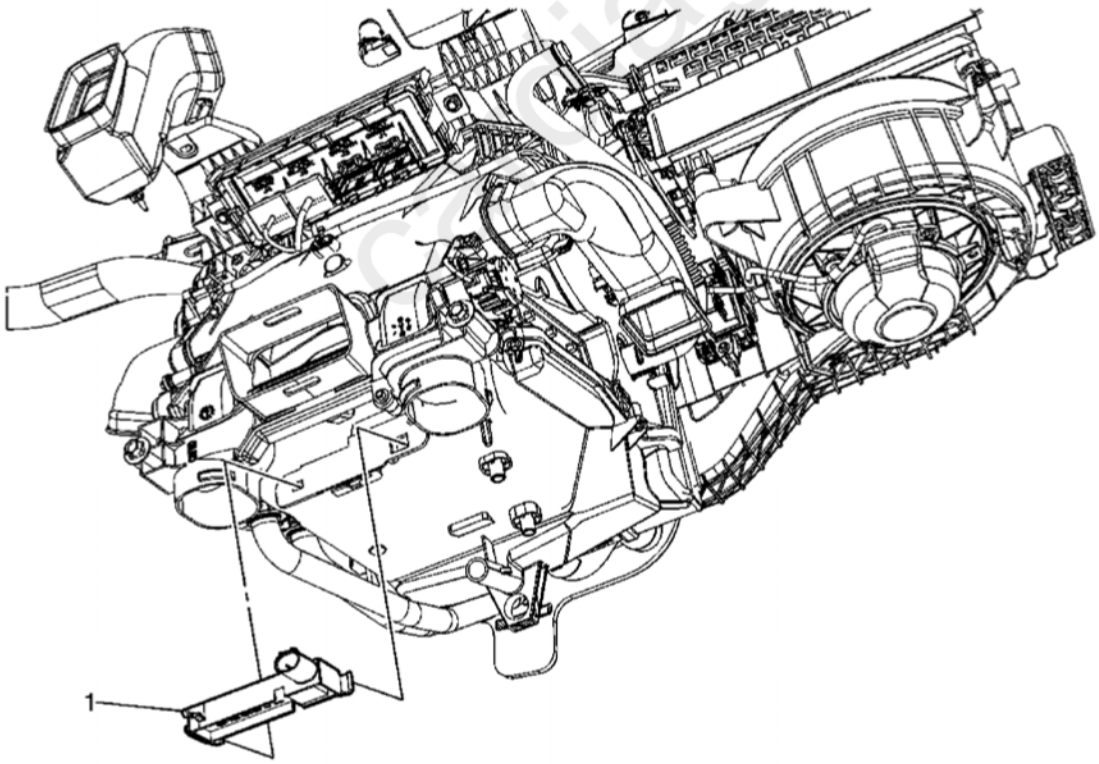
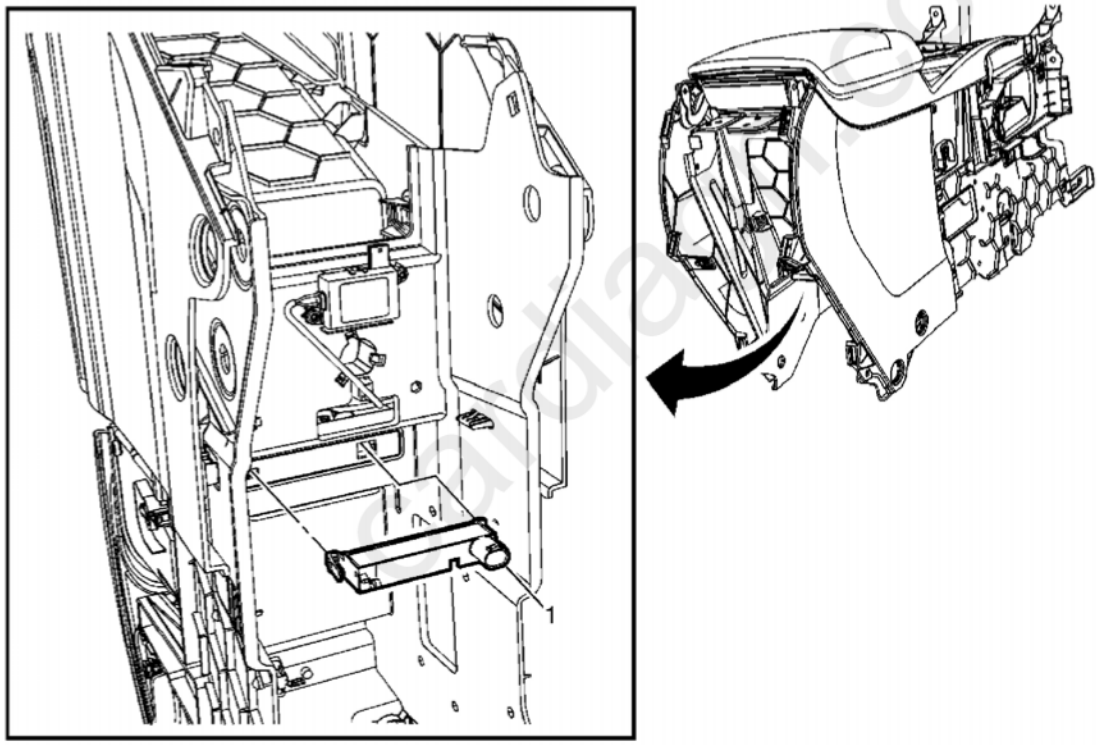


Fig. 6: Identifying Ignition Lock Key Transmitter Antenna - Instrument Panel
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure Remove the front floor console. Refer to **__ront __loor Console Replacement**	
1	Ignition Lock Key Transmitter Antenna Assembly **Procedure** 1. Reposition air duct as required. 2. Disconnect the electrical connector. 3. Unsnap antenna from the heater module.

I NITION LOCK KEY TRANSMITTER ANTENNA REPLACEMENT - LOOR CONSOLE

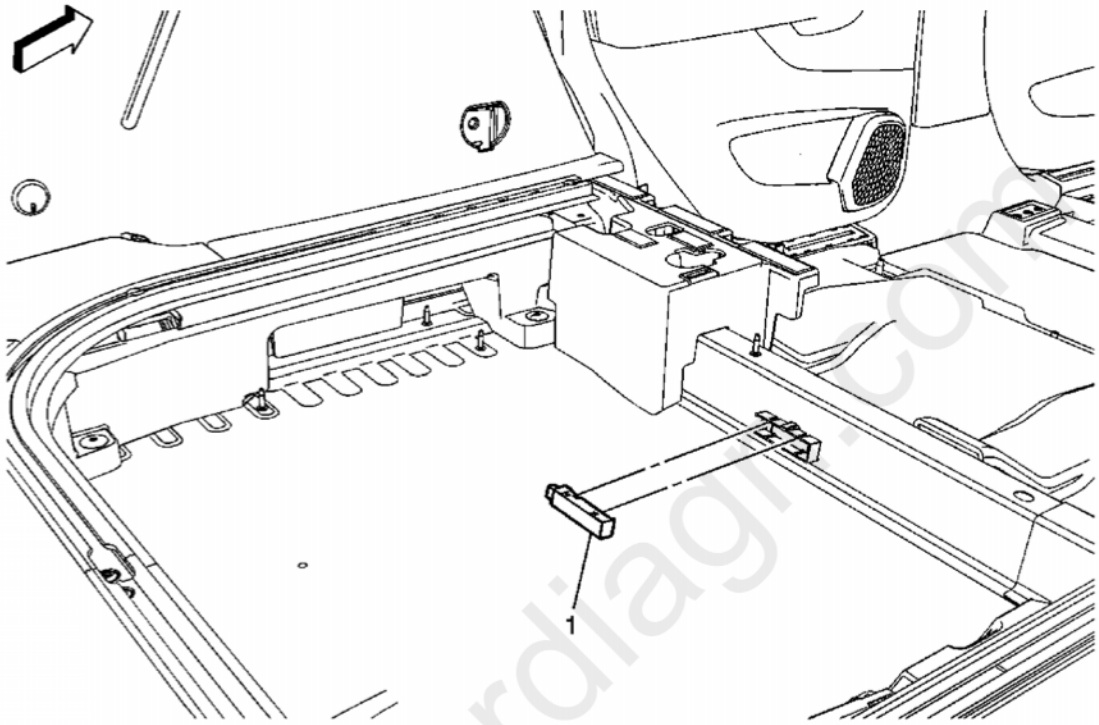


__ig __ Identifying Ignition Lock Key Transmitter Antenna - __loor Console
Courtesy of ENERAL MOTORS CORP

Callout	Component Name
Preliminary Procedure Remove the front floor console. Refer to **__ront __loor Console Replacement**	
1	Ignition Lock Key Transmitter Antenna Assembly **Procedure**

	1. Disconnect the electrical connector. 2. Unsnap antenna from the floor console.

I NITION LOCK KEY TRANSMITTER ANTENNA REPLACEMENT - REAR COMPARTMENT

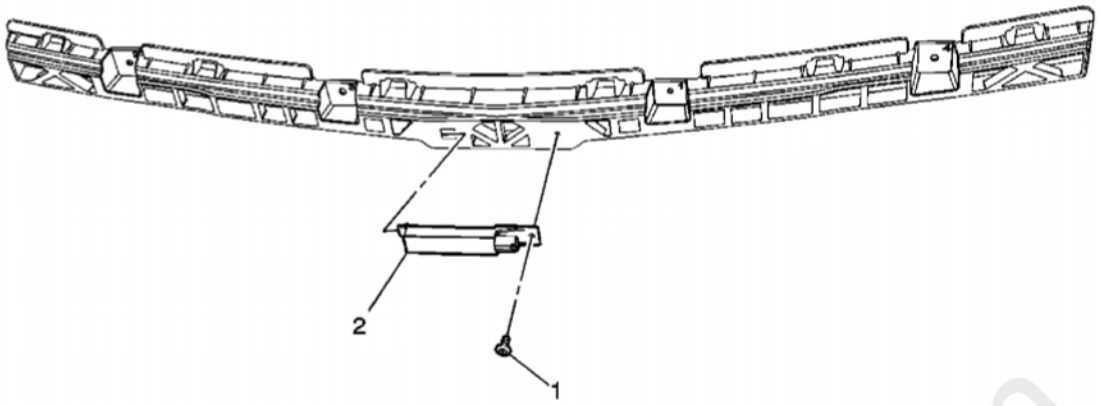


ig Identifying Ignition Lock Key Transmitter Antenna - Rear Compartment
Courtesy of ENERAL MOTORS CORP

Callout	Component Name
Preliminary Procedure Remove the rear compartment floor stowage compartment tray. Refer to **Rear Compartment loor Stowage Compartment Tray Replacement** .	
1	Ignition Lock Key Transmitter Antenna **Procedure** 1. Disconnect the electrical connectors. 2. Unsnap the ignition lock key transmitter antenna from the bracket on the floor panel bar.

I NITION LOCK KEY TRANSMITTER ANTENNA REPLACEMENT - REAR BUMPER ASCIA

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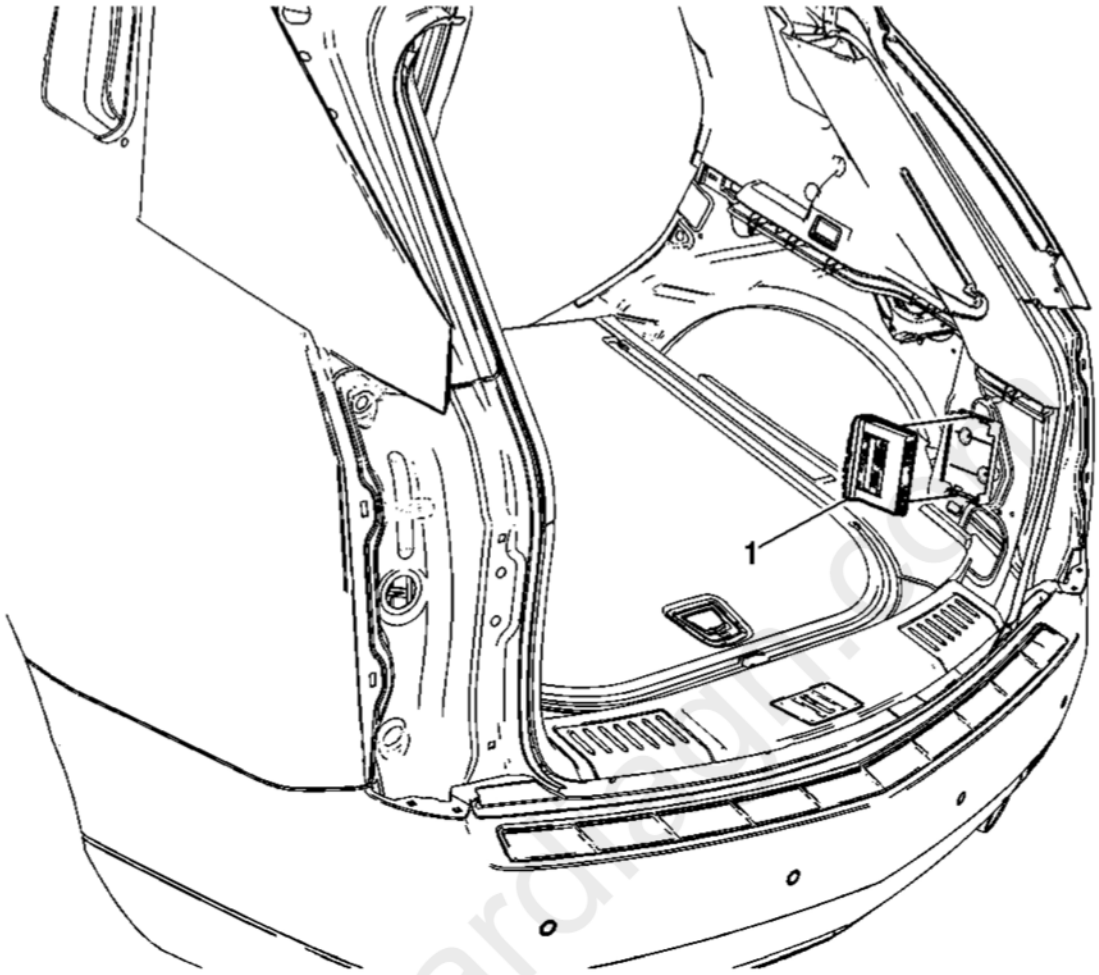


ig Identifying Ignition Lock Key Transmitter Antenna - Rear Bumper ascia
Courtesy of ENERAL MOTORS CORP

Callout	Component Name
ARNIN **R E P ci a i** **Preliminary Procedure** Remove the rear bumper fascia. Refer to **Rear Bumper ascia Replacement** .	
1	Ignition Lock Key Transmitter Antenna Rivet
2	Ignition Lock Key Transmitter Antenna **Procedure** Disconnect the electrical connectors.

KEYLESS ENTRY CONTROL MODULE REPLACEMENT

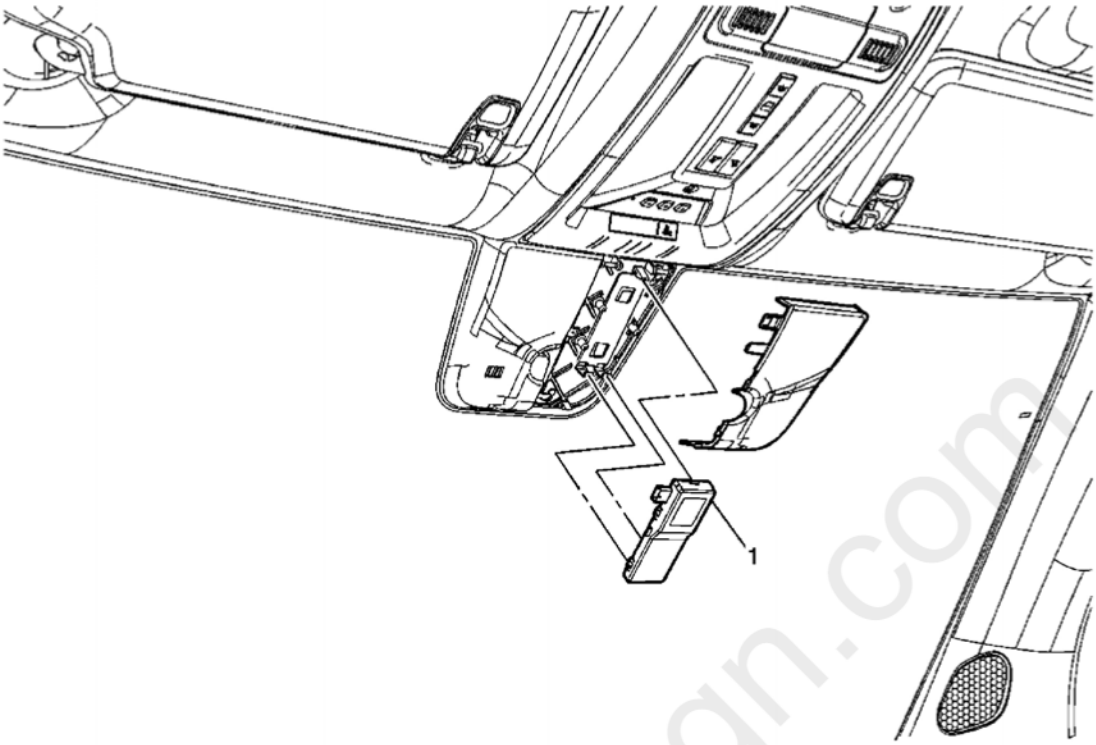
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ig Locating Keyless Entry Control Module
Courtesy of ENERAL MOTORS CORP

Callout	Component Name
Preliminary Procedure Remove the right body side trim panel. Refer to **Body Side Trim Panel Replacement** .	
1	Keyless Entry Control Module **Procedure** 1. Disconnect the electrical connectors. 2. Unsnap the receiver from the bracket. 3. For programming and set up, refer to **Control Module References**

REMOTE CONTROL DOOR LOCK RECEIVER REPLACEMENT



ig Locating Remote Control Door Lock Receiver
Courtesy of ENERAL MOTORS CORP

Callout	Component Name
Preliminary Procedure Remove the inside rear view mirror mount plate cover.	
1	Remote Control Door Lock Receiver **Procedure** 1. Disconnect the electrical connector. 2. Unsnap the receiver from the windshield bracket. 3. For programming and set up, refer to **Control Module References**

ARA E DOOR OPENER TRANSMITTER REPLACEMENT

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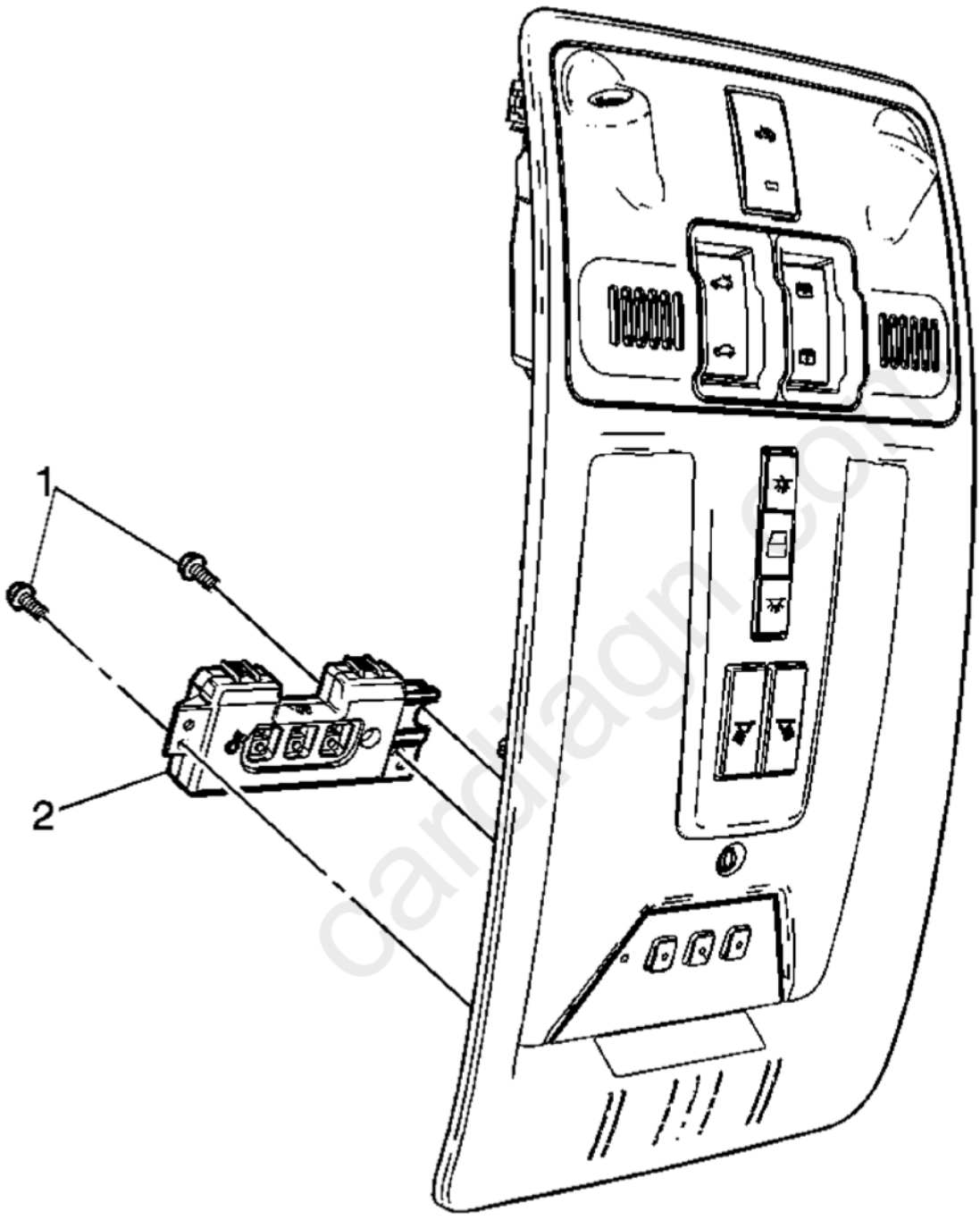


Fig. 12: Identifying Garage Door Opener Transmitter
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the roof console. Refer to **Roof Console Replacement** .	
	arage Door Opener Transmitter Bolts (ty: 2)

1	**CAUTION:** **Refer to Fastener Caution** **Tighten:** 2.5 N.m (22 lb in)
2	arage Door Opener Transmitter **Procedure** 1. Disconnect the electrical connectors. 2. Refer to **Control Module References** for programming and set-up procedures.

GARAGE DOOR OPENER TRANSMITTER PUSH-BUTTON REPLACEMENT

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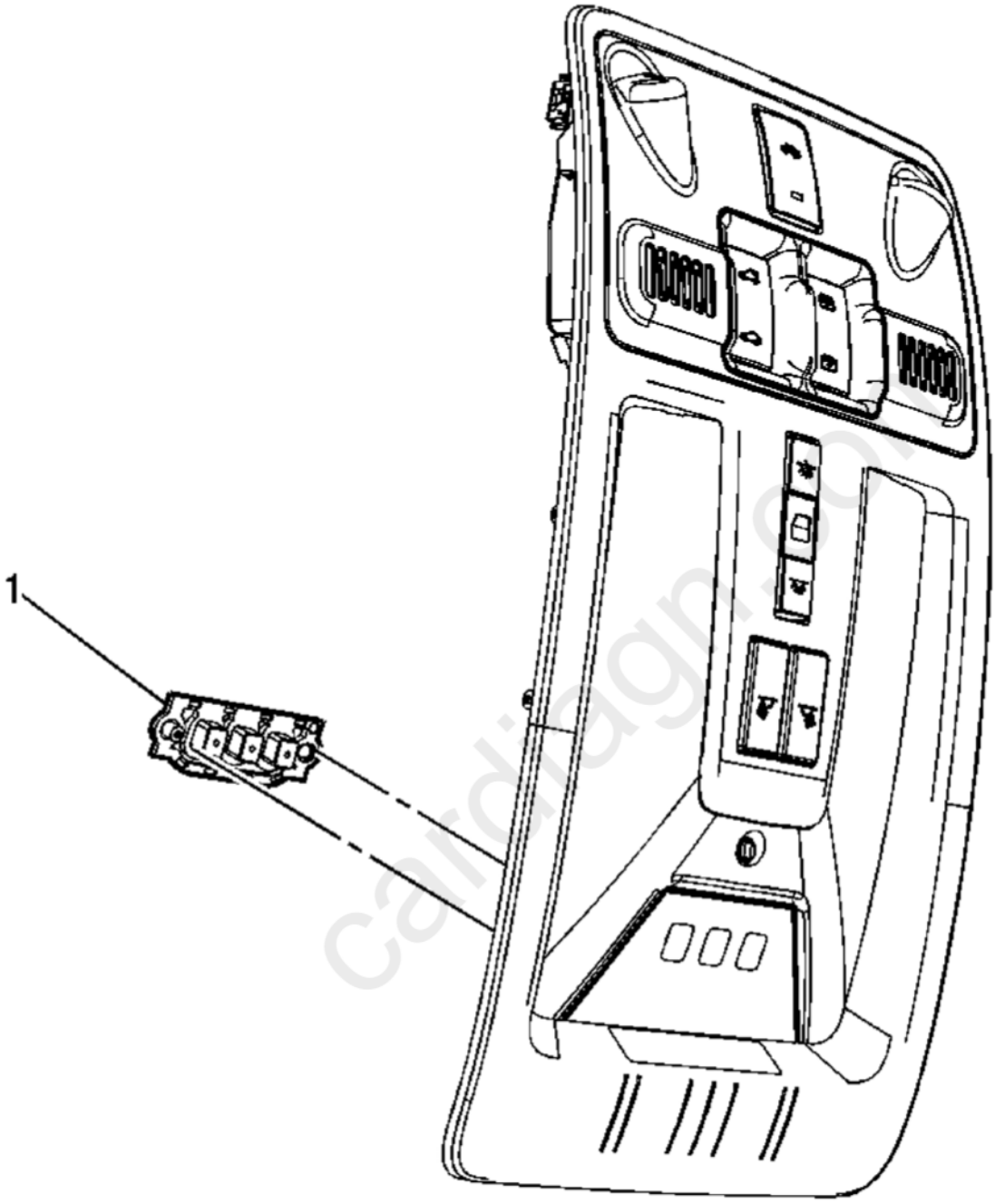


Fig. 13: Identifying Garage Door Opener Transmitter Push-button
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the garage door opener transmitter. Refer to **Garage Door Opener Transmitter Replacement**.	
1	arage Door Opener Transmitter Push-button

REMOTE CONTROL DOOR LOCK TRANSMITTER LEARN

Because the keyless entry transmitter and the vehicle key are integrated as one unit, the transmitter is learned during the normal key learn procedure. Except for the vehicle key learn, there is no specific learn procedure for the keyless entry transmitter. Refer to the appropriate procedure for learning vehicle keys:

- **Adding Keys**
- **Replacing Keys**

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 2 - 3 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.

KEYLESS ENTRY SYSTEM DESCRIPTION AND OPERATION (WITHOUT ATH)

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 request 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
- Power liftgate, if equipped
- Liftglass, 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 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 presses, the low frequency antennas send out a challenge to the keyless entry transmitter. If the challenge is met, the transmitter will respond, allowing the vehicle to start.

The keyless entry system has the following components:

- Vehicle key with integrated keyless entry transmitter
- Front console antenna
- Rear console antenna
- Rear compartment antenna
- Body control module (BCM)
- Keyless entry control module
- Immobilizer control module
- Remote control door lock receiver

Keyless Entry Transmitters

The keyless entry transmitters are used to lock and unlock the vehicle door while away from the immediate are of the vehicle. Vehicles without remote start will operate at a distance of up to 20 m (5 ft) away. Vehicles with remote start will operate at a distance of up to 0 m (195 ft) away. The keyless entry transmitter is an integral part of the vehicle key.

Front Console Passive (Instrument Panel) Antenna

This antenna is located in the lower instrument panel near the very front end of 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

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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 end of the console.

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

Rear Compartment Antenna

This antenna is located in the trunk in the center of the 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 Coil Assembly

The keyless entry immobilizer coil assembly is located in the center console. It has a small pocket above where the key fob can be inserted if the key fobs battery is dead, weak, or the radio frequency signal is being interrupted.

The immobilizer control module will send a low frequency radio frequency challenge to the key when the start button is pressed. The immobilizer 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 keyless start functions
- Backup control for the ECM accessory wake up and the run/crank relay
- Redundant power moding, in addition to the BCM
- Ignition mode switch monitoring

Body Control Module (BCM)

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

- Receive active transmitter and keyless start signals from the transmitters
- Authenticates the active and keyless start signals from the transmitters

- 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

Lock All Doors

Press the transmitter LOCK button to perform the following functions:

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

Power Liftgate, if equipped

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

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

Liftglass Release, if equipped

Press the transmitter liftglass release button to perform the following function:

Open the liftglass

Vehicle Locator/Panic Alarm/Active

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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 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. Remote vehicle start functions have an operating range of up to 195 feet, depending on conditions. 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 or vehicle key at any time. Once activated, the engine is allowed to run for 10 minutes. The remote vehicle start time may be extended by an additional 10 minute 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

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 an 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.
- 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)

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, operate the power lift gate (if equipped), or release the lift glass (if equipped) 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 request 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
- Liftgate lock
- Power liftgate, if equipped
- Liftglass, if equipped
- 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. You must only have the transmitter with you. This passive system is also part of the vehicle starting system. It allows you to start and run the vehicle having only the transmitter as your key. The passive entry and starting 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 liftgate, you must have a programmed transmitter with you in your pocket, purse, or briefcase. As a customer opens the door handle or presses the liftgate touch pad, the low frequency antenna sends out a challenge to the keyless entry transmitter. The transmitter should be in a one meter range of the door or liftgate in order to receive the challenge. If the challenge is met, the transmitter will respond, allowing the door to be unlocked and opened. Passive entry allows you to operate the following features:

- Passive door unlock/unlatch and lock
- Passive liftgate release
- Illuminated interior lamps
- Vehicle starting

Transition to off or transition from one or multiple doors open to all doors close, vehicle will sounds three horn chirps if key is left in vehicle - upon next door opening will get a DIC message and interior chime.

Lock out deterrent, in off power mode, one or multiple doors become open, press the interior courtesy lock switch, close all doors, if transmitter remains in the vehicle the driver door will unlock.

The keyless entry system has the following components:

- Vehicle key with integrated keyless entry transmitter
- Driver and front Passenger door antennas (part of the door handle assembly)
- Driver and front Passenger door lock sensors (part of the door handle assembly)

- Rear fascia antenna
- Front console antenna
- Rear console antenna
- Rear compartment antenna
- Body Control Module (BCM)
- Keyless entry control module
- Immobilizer control module
- Remote Control Door Lock Receiver

Keyless Entry Transmitters

By operating any of the exterior door handles, a nearby transmitter is challenged by a keyless entry antenna. The transmitter will passively send a request to the BCM. The BCM will interpret this communication and either allow entry into the vehicle or deny it.

This is accomplished by the transmitter sending a radio frequency to the antenna that has a direct link to the body control module (BCM). The BCM interprets the signal and activates the requested function or request the appropriate ECU to activate the function via a serial data message.

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 molded into the vehicles left front and right front exterior door handles. 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 is operated, the respective antennas sends 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 under the rear fascia and is accessed from under the vehicle. The antenna is controlled by the Keyless Entry Control Module. When the liftgate 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 very front end of console.

The keyless entry front console (instrument panel) antenna is used for both keyless entry and vehicle starting functions. For both functions, it is used to locate any keyless entry transmitters within the vehicle.

Rear Console Antenna

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This antenna is located in the rear of the console.

The keyless entry rear console antenna is used for both keyless entry and vehicle starting functions. For keyless entry functions, it is used to locate any keyless entry transmitters within the vehicle.

For keyless start function, when the "start/stop" button is pressed, this antenna sends out a challenge to the keyless entry transmitter which begins the passive start communications.

Rear Compartment Antenna

This antenna is located in the trunk in the center of the metal floor pan near the seatback.

The keyless entry trunk antenna is used for both keyless entry and vehicle starting functions. For both functions, it is used to locate any keyless entry transmitters within the vehicle.

Immobilizer Coil Assembly

The keyless entry immobilizer coil assembly is located in the center console. It has a small pocket above where the transmitter can be inserted if the transmitter battery is dead, weak, or the radio frequency signal is being interrupted.

The purpose of the immobilizer coil is to send a low frequency radio frequency challenge to a learned key when the start button is pressed. The immobilizer coil is controlled by the Body Control Module.

The other function of the immobilizer coil is for learning the keys to the vehicle.

Keyless Entry Control Module

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

- Transmitting vehicle antennas for passive keyless entry functions
- Activating vehicle antennas for keyless start functions
- Backup control for the ECM accessory wake up and the run/crank relay
- If equipped, acts as the low side driver for the electronic steering column lock
- Receiver of the door handle switch inputs and the lock sensor inputs and door open switch (not the door ajar switch)
- Driver for the unlatch motors - happens when the BCM unlatch enable signal is active and when the appropriate door handle is pulled
- Ignition mode switch monitoring

Body Control Module (BCM)

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

- Receive active and passive signals from transmitters

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- Authenticates the active and passive signals from the integrated key/transmitter
- 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 enable through personalization
- Disarm the content theft deterrent system
- Deactivate the content theft deterrent system when in the alarm mode

Unlock All Doors - Second Operation - Active

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

Unlock the remaining doors

Unlock Driver Door Only - Passive

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

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

Unlock All Doors - Passive

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

- Unlock all vehicle doors when the approached door handle is operated
- Only opens door whose door handle is pulled
- Disarm the content theft deterrent system, if equipped
- Deactivate the content theft deterrent system when in the alarm mode

Lock All Doors - Active

Press the transmitter LOCK button to perform the following functions:

- Lock all vehicle doors

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

Lock All Doors - Passive

Exit the vehicle (with 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 content theft deterrent system

When all doors are closed, they can also be locked from the exterior by touching the lock sensor on the outside of a front door handle while having a valid transmitter in range. This function is only active for several minutes after all doors are closed to save battery life.

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

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

Power Liftgate, if equipped

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

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

Liftglass Release, if equipped

Press the transmitter liftglass release button to perform the following function:

Open the liftglass

Liftgate Release - Passive

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

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liftgate will open.

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 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. Remote vehicle start functions have an operating range of up to 195 feet, depending on conditions. 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 or vehicle key at any time. Once activated, the engine is allowed to run for 10 minutes. The remote vehicle start time may be extended by an additional 10 minute 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

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

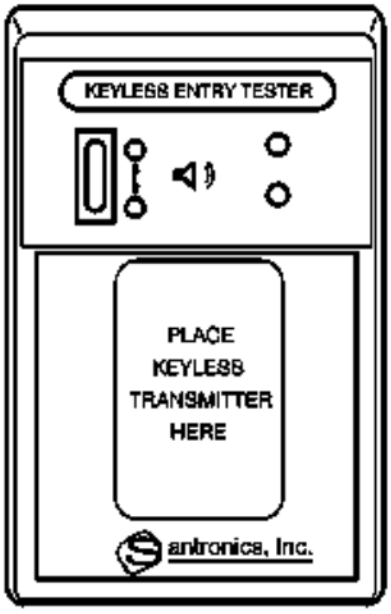
Keyless Entry Personalization

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

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Illustration	Tool Number/Description
	J 43241 Keyless Entry Tester

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