2009 ACCESORIES & EQUIPMENT

Cellular, Entertainment, and Navigation - Avalanche, Escalade, Suburban, Tahoe & Yukon

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Amplifier Screw	9 N.m	80 lb in
Antenna Assembly Screw	5 N.m	44 lb in
Antenna Mast	6 N.m	53 lb in
Antenna Module Bolt	9 N.m	80 lb in
Antenna Module Ground Strap	2 N.m	18 lb in
Communication Interface Module Screw	2 N.m	18 lb in
Digital Radio Antenna Retaining Bolt	9 N.m	80 lb in
Front Floor Console Screw	9 N.m	80 lb in
Front Floor Console Bracket Screw	9 N.m	80 lb in
Front Floor Console Speaker Nut	9 N.m	80 lb in
Front Speaker Screw	6 N.m	53 lb in
Front Door Speaker Screw	3 N.m	25 lb in
Mobile Telephone Antenna Screw	2 N.m	18 lb in
Radio Retaining Screws	2 N.m	18 lb in
Rear Speaker Screw	3 N.m	25 lb in
Rear Door Speaker Screw	3 N.m	25 lb in
Roof Console Screw	2 N.m	18 lb in
Video Display Assembly Screw	2 N.m	18 lb in

SCHEMATIC AND ROUTING DIAGRAMS

RADIO/NAVIGATION SYSTEM SCHEMATICS

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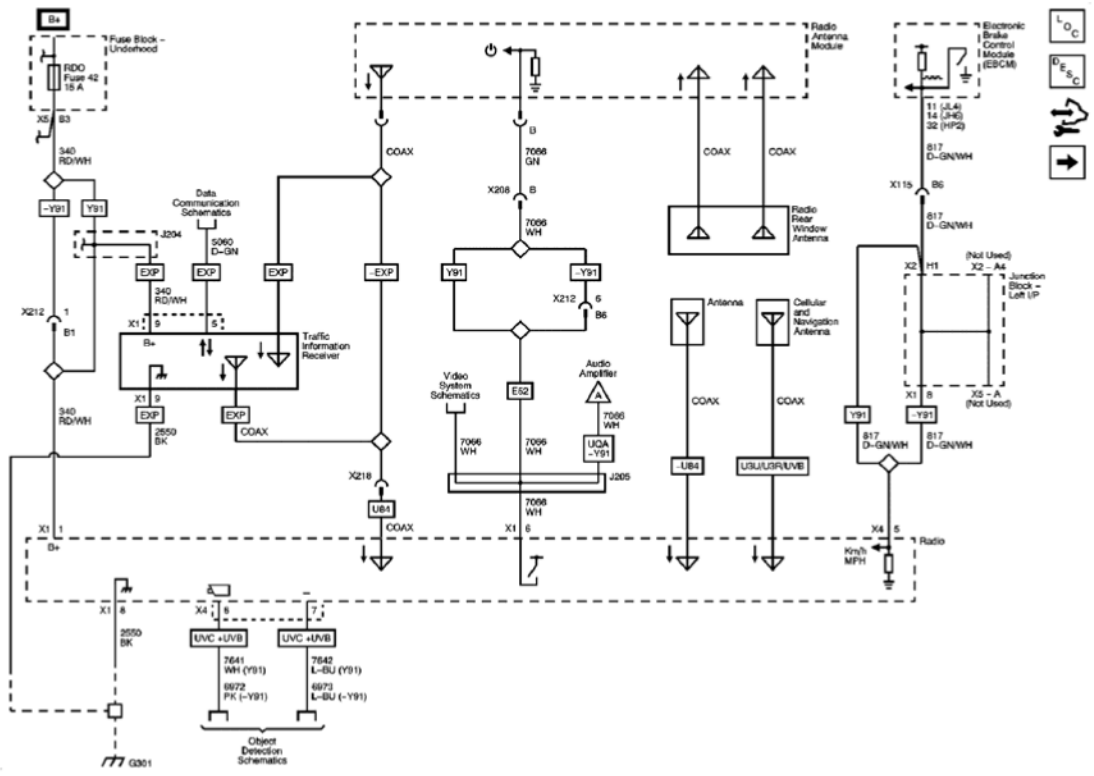


Fig. 1: Radio Power, Ground, Serial Data, and Antenna Signals
Courtesy of GENERAL MOTORS CORP.

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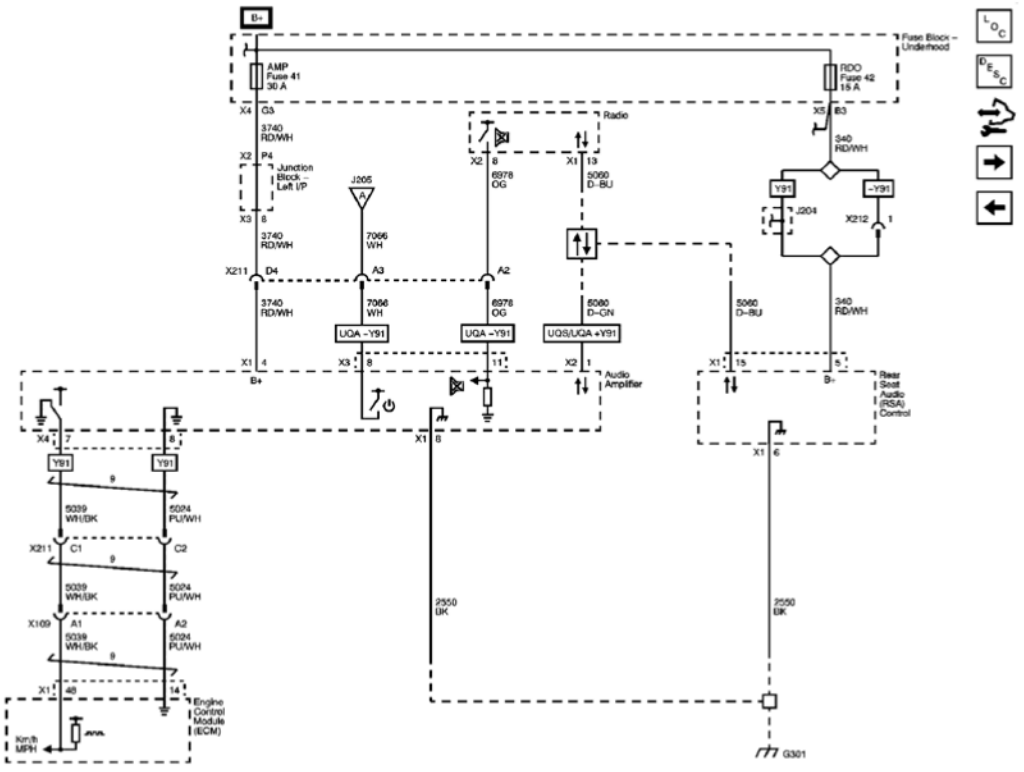


Fig. 2: Amplifier (UQA or UQS) and Rear Seat Audio (UK6) Power, Ground, and Serial Data
Courtesy of GENERAL MOTORS CORP.

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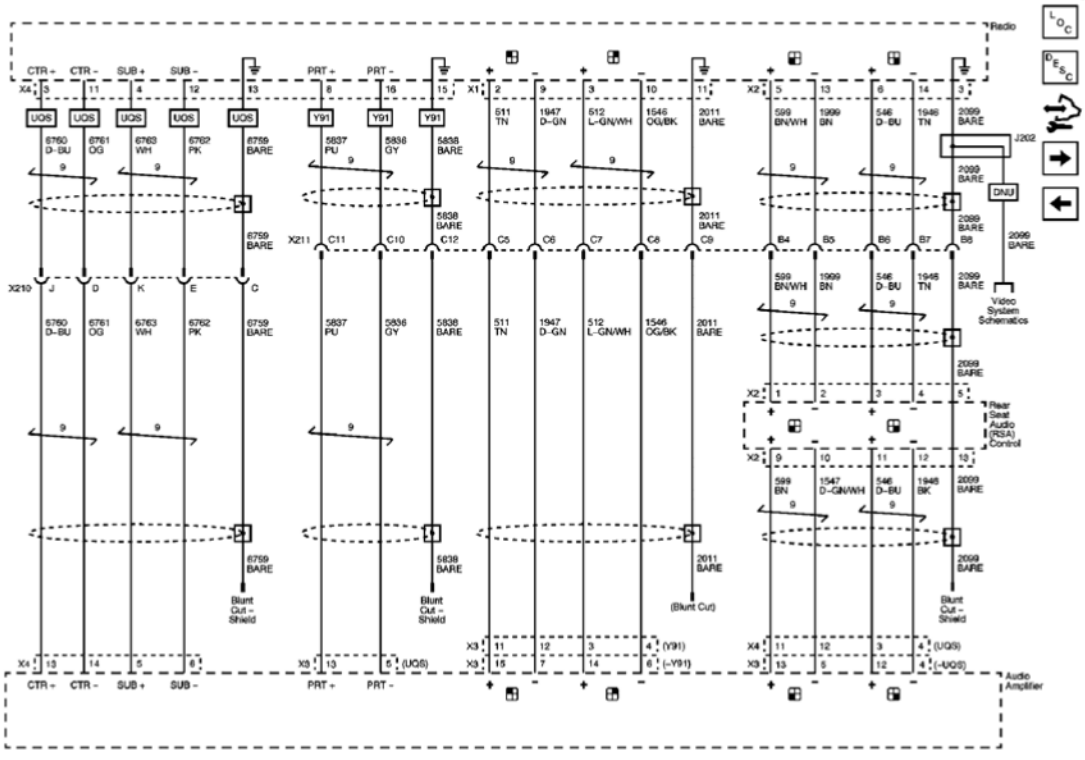


Fig. 3: Amplifier Inputs - UQA/UQS
Courtesy of GENERAL MOTORS CORP.

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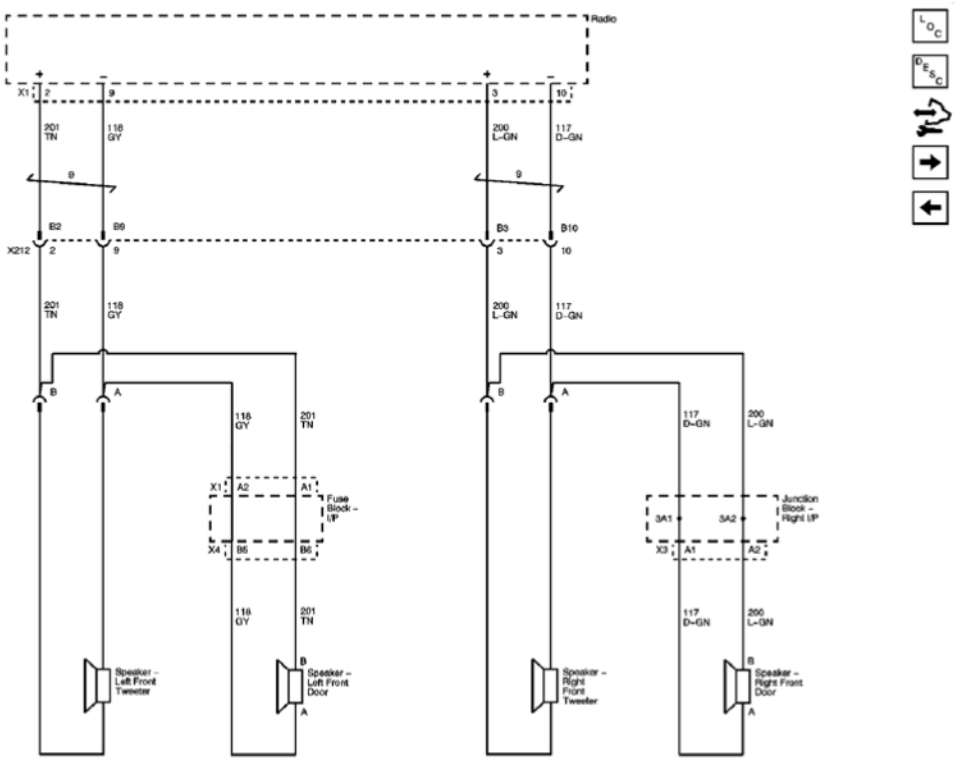


Fig. 4: Front Speakers - UQ3
Courtesy of GENERAL MOTORS CORP.

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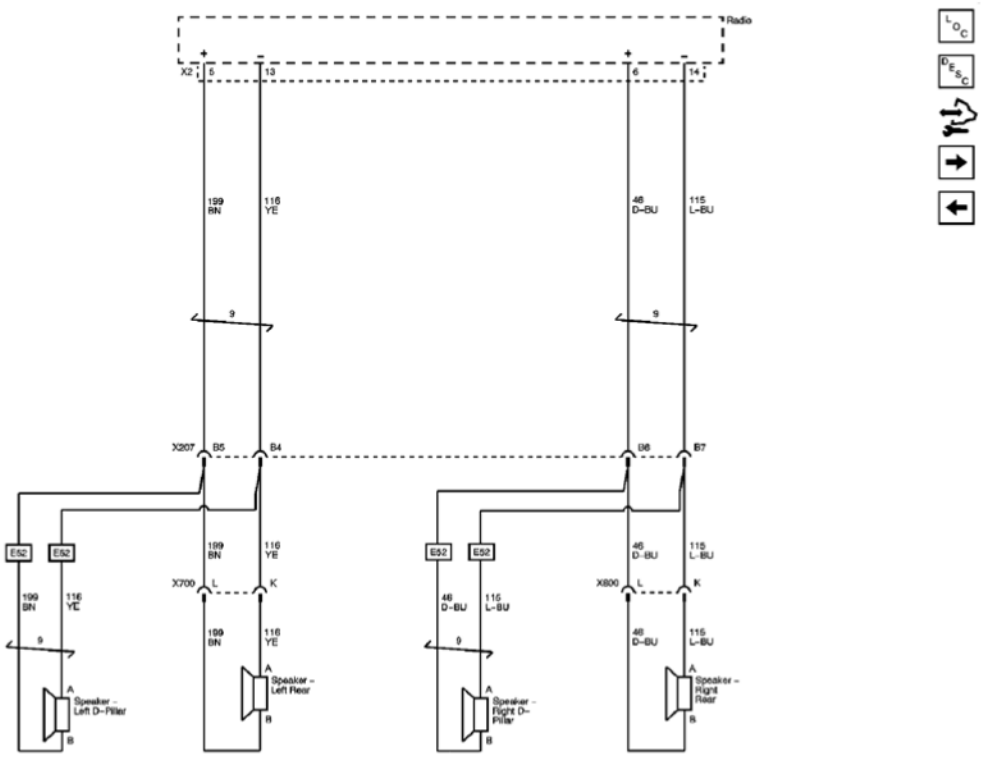


Fig. 5: Rear Speakers UQ3 Except UK6
Courtesy of GENERAL MOTORS CORP.

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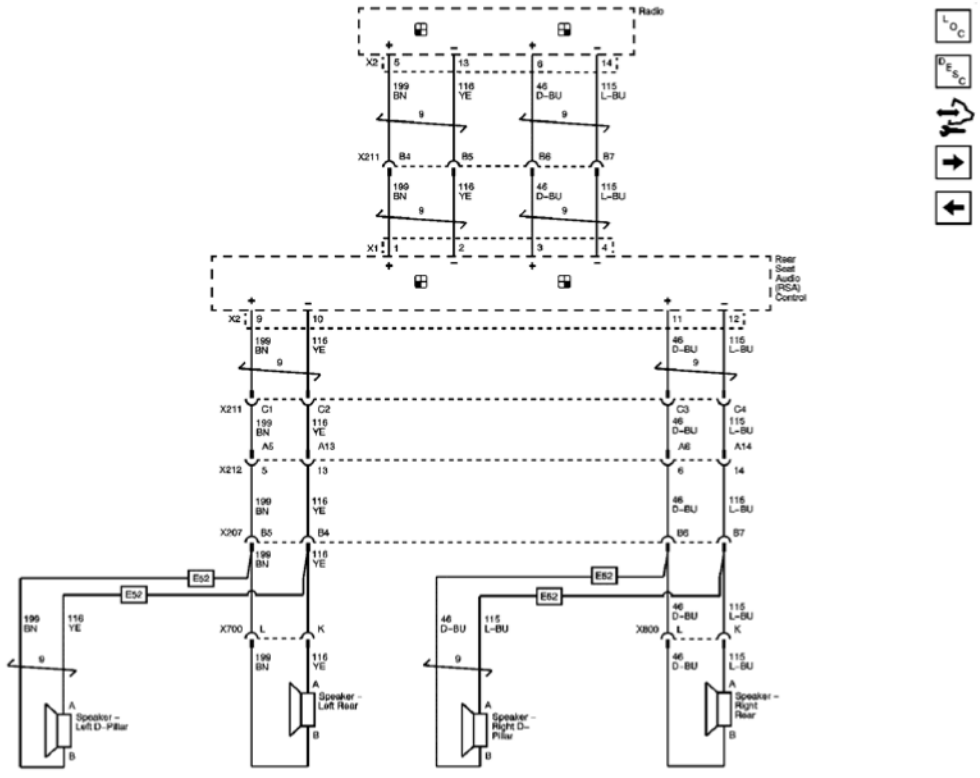


Fig. 6: Rear Speakers - UQ3 with UK6
Courtesy of GENERAL MOTORS CORP.

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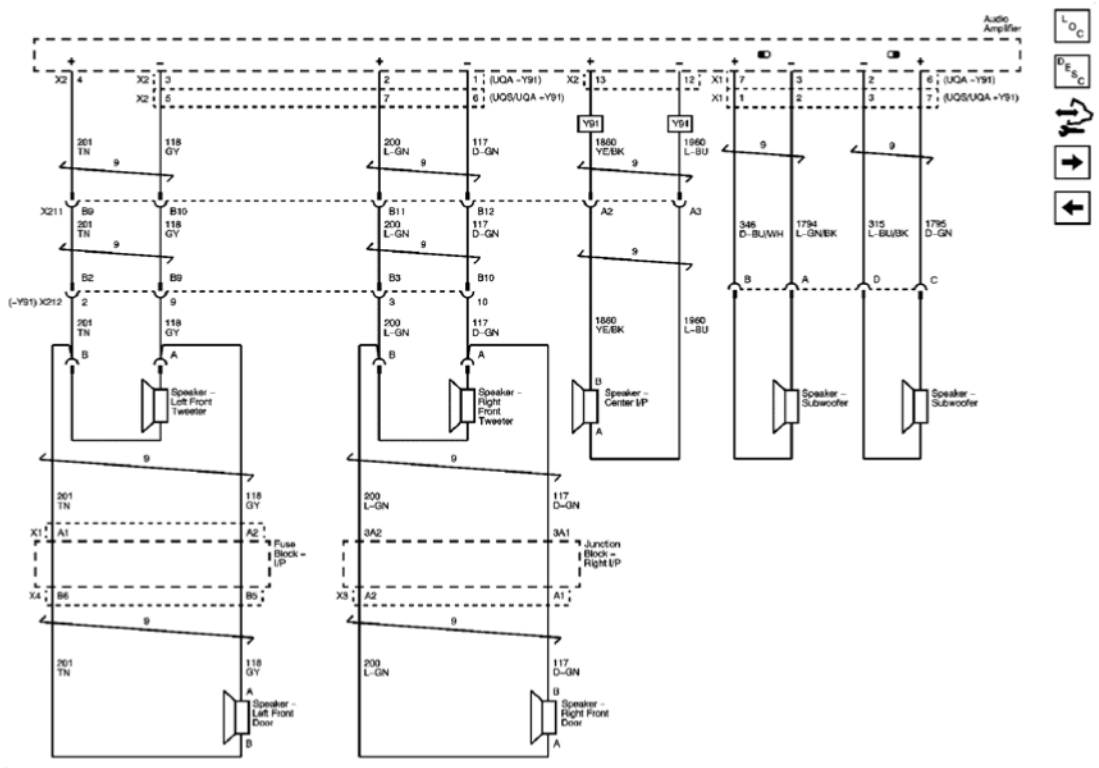


Fig. 7: Front Speakers - UQA/UQS
Courtesy of GENERAL MOTORS CORP.

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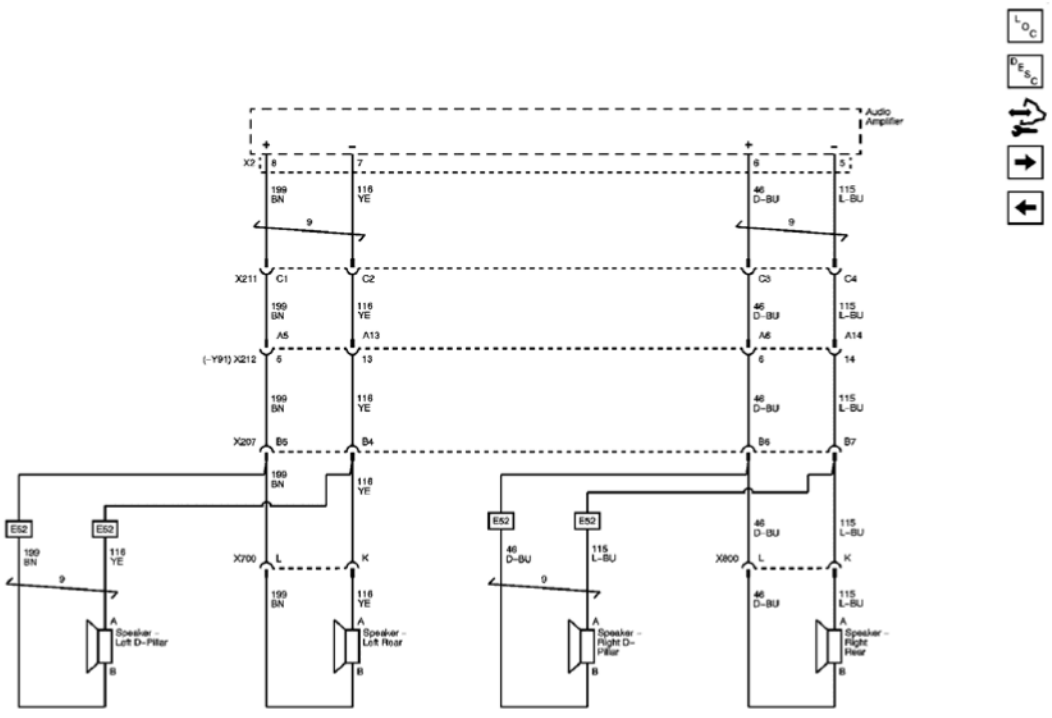


Fig. 8: Rear Speakers - UQA
Courtesy of GENERAL MOTORS CORP.

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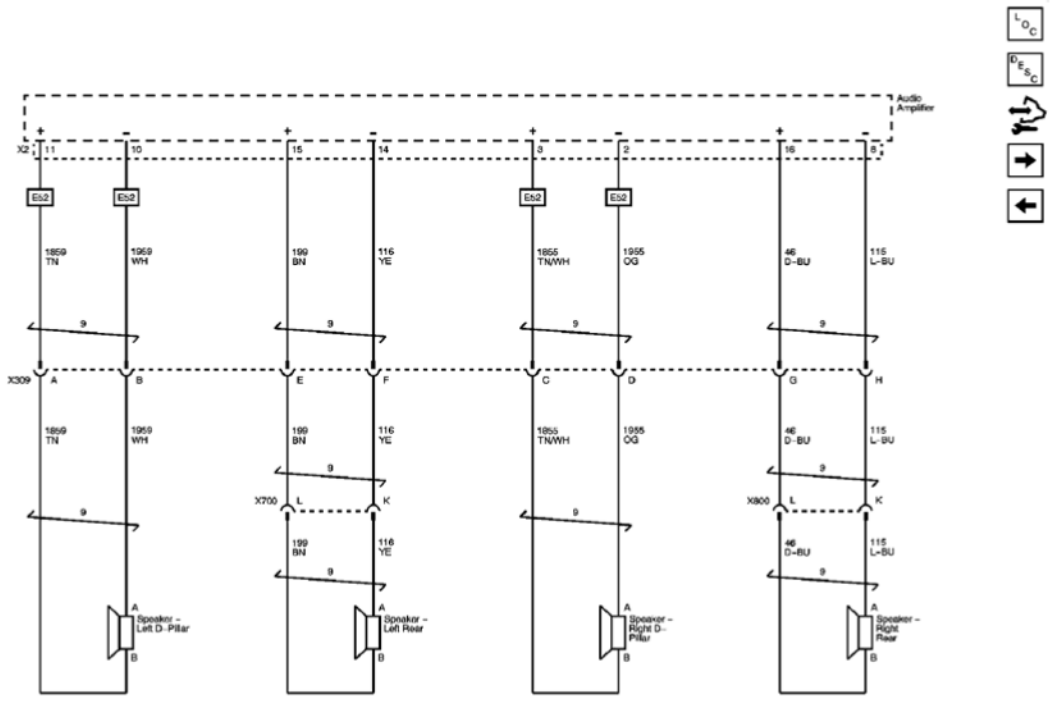


Fig. 9: Rear Speakers - UQS
Courtesy of GENERAL MOTORS CORP.

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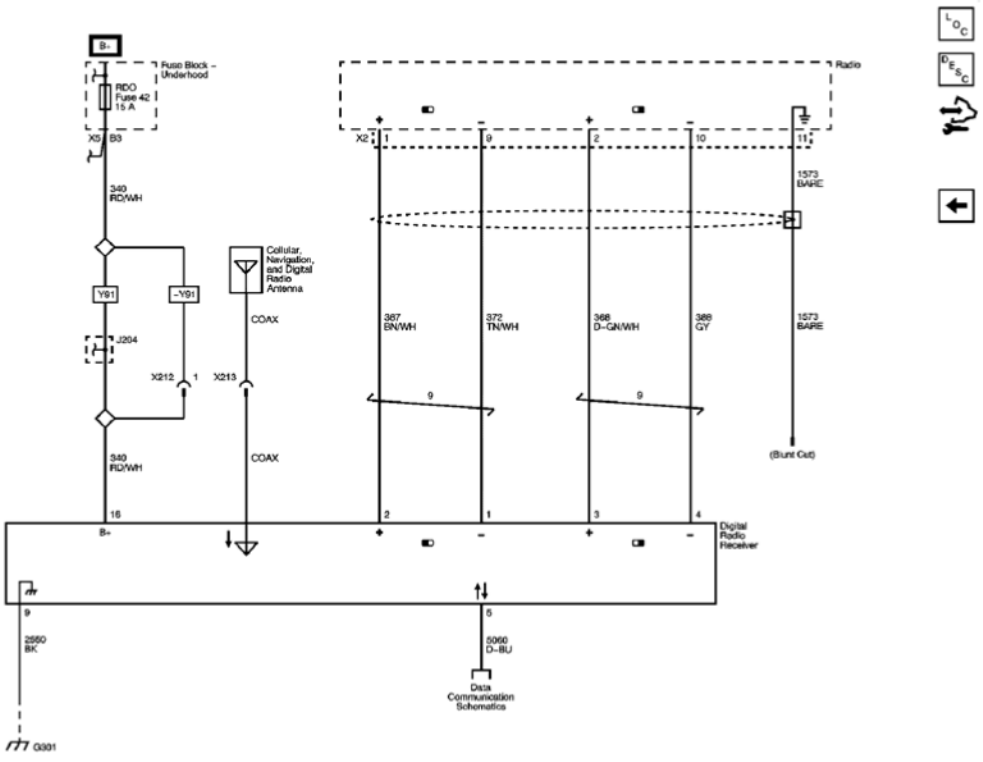


Fig. 10: Digital Radio Receiver - U2K
Courtesy of GENERAL MOTORS CORP.

ONSTAR SCHEMATICS

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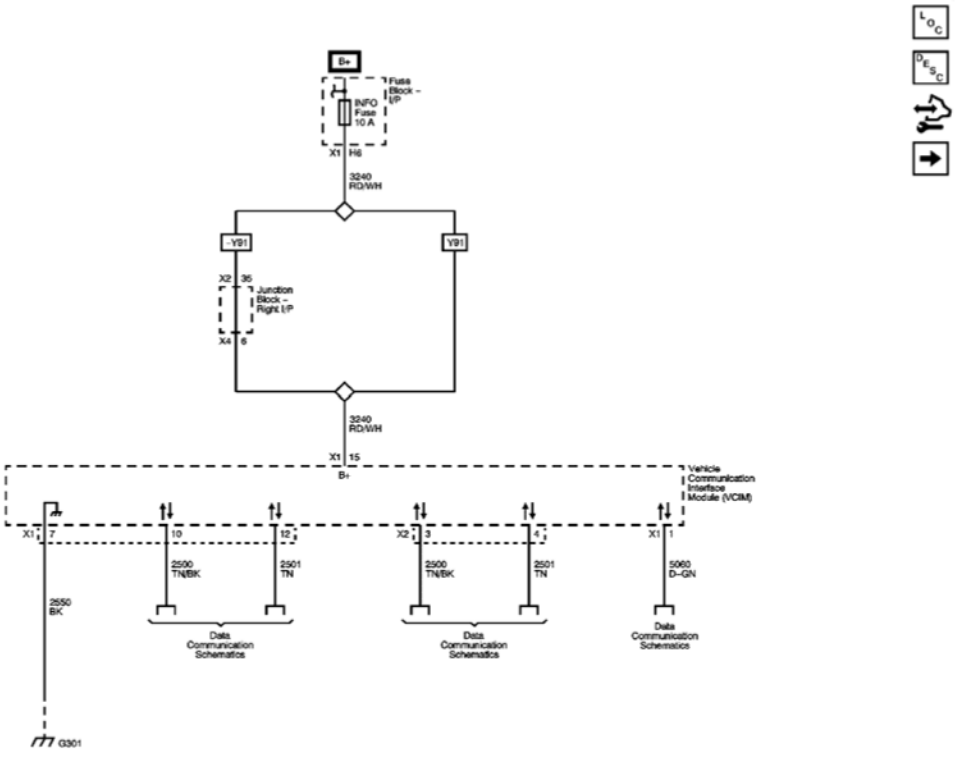


Fig. 11: Module Power, Ground, and Serial Data
Courtesy of GENERAL MOTORS CORP.

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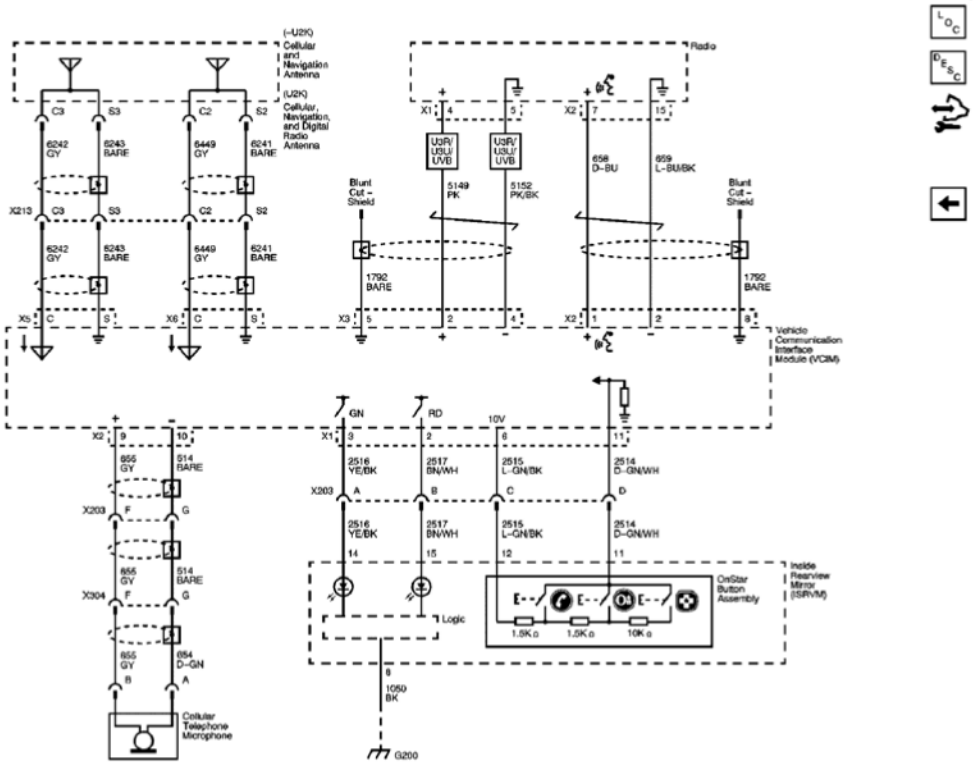


Fig. 12: Communication Signals and Control
Courtesy of GENERAL MOTORS CORP.

VIDEO SYSTEM SCHEMATICS

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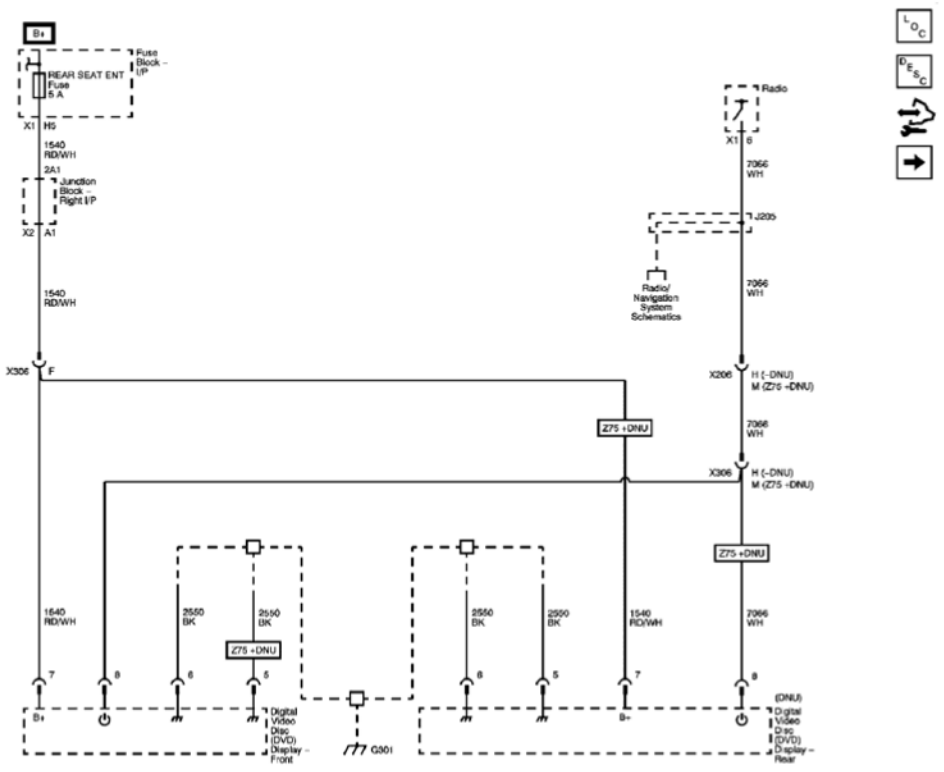


Fig. 13: Display Power and Ground
Courtesy of GENERAL MOTORS CORP.

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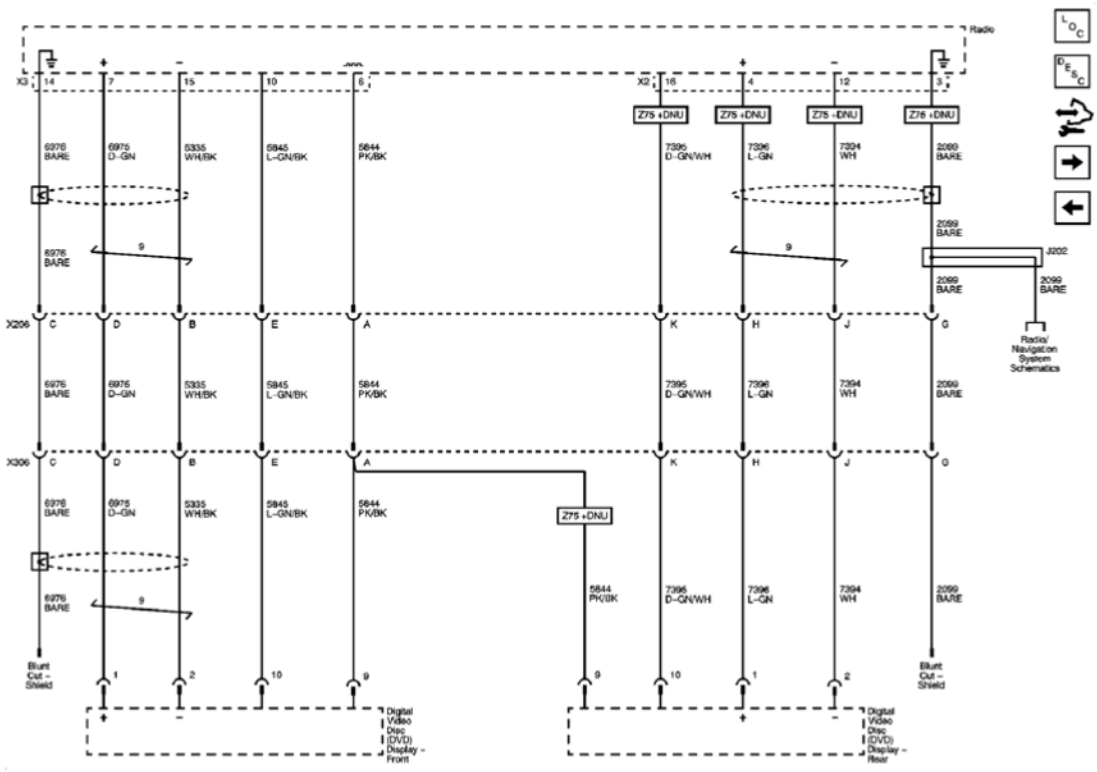


Fig. 14: Video Signals
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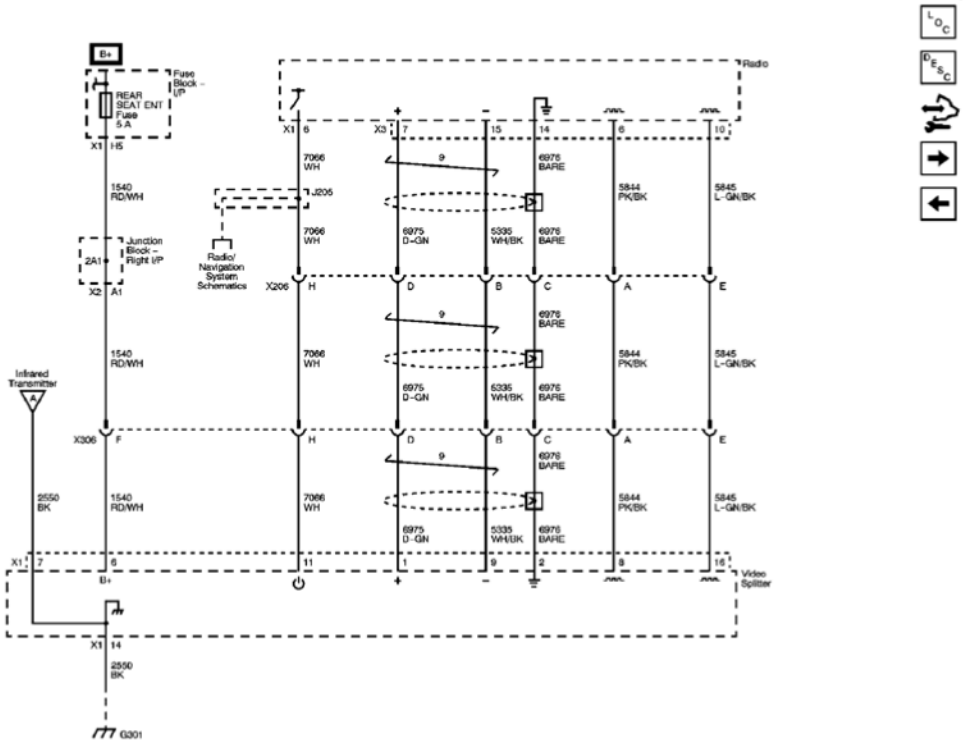


Fig. 15: Video Splitter Power, Ground and Video Input - X88 or Z88, with DNU
Courtesy of GENERAL MOTORS CORP.

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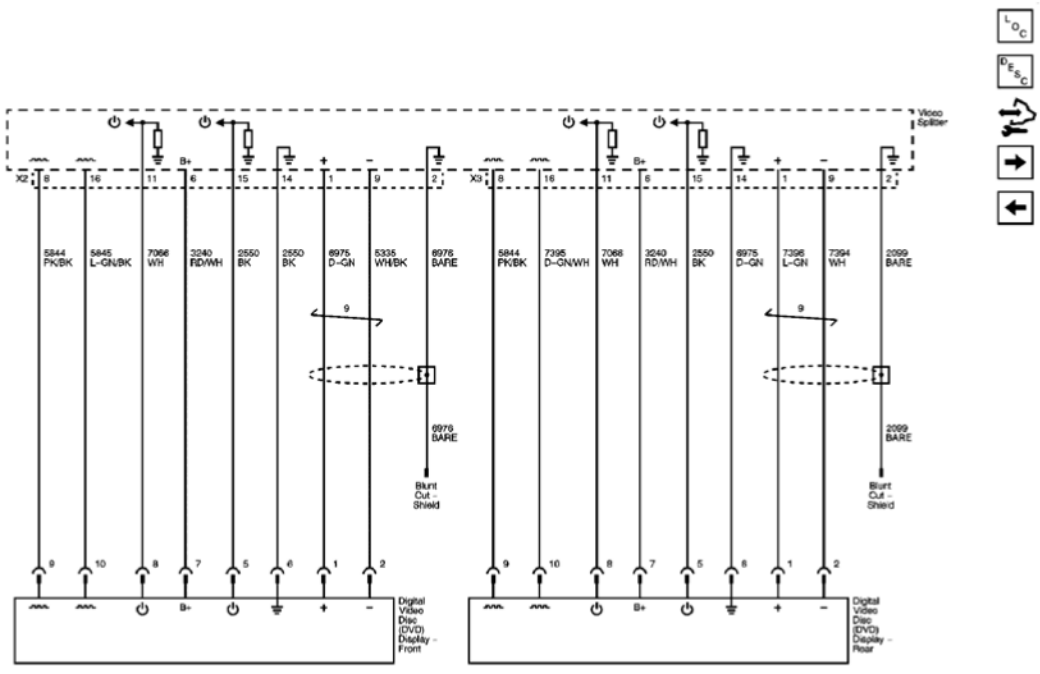


Fig. 16: Video Signals - X88 or Z88, with DNU
Courtesy of GENERAL MOTORS CORP.

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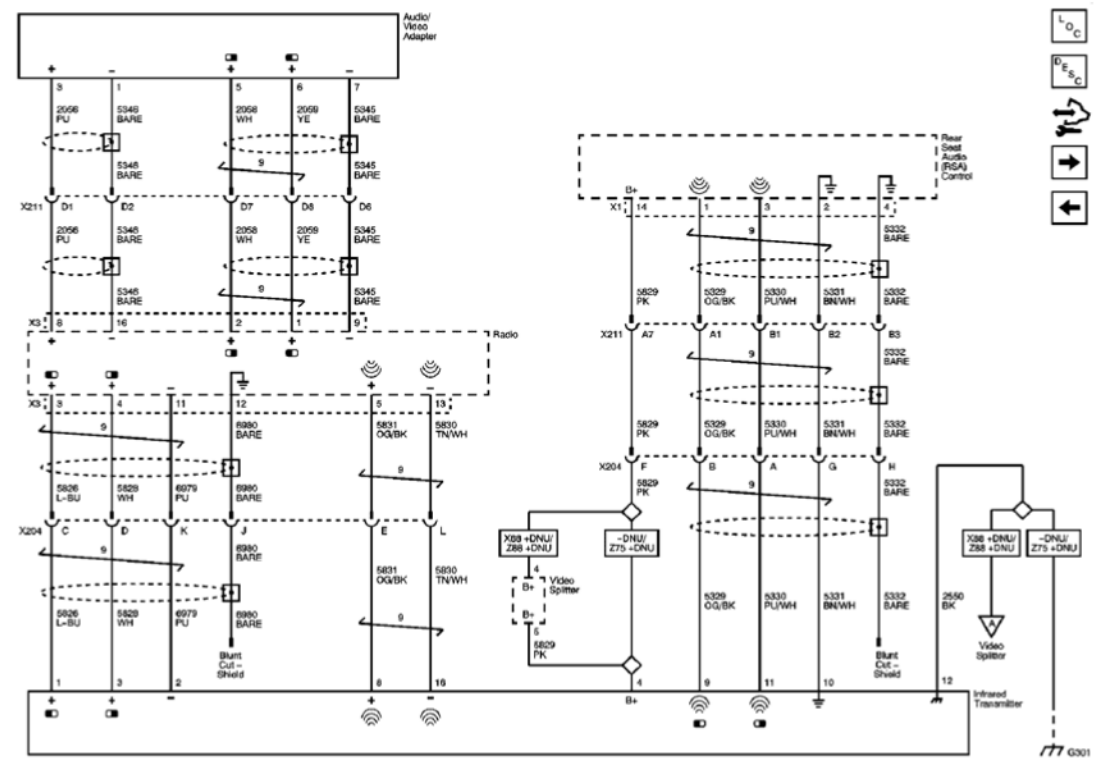


Fig. 17: Audio Signals
Courtesy of GENERAL MOTORS CORP.

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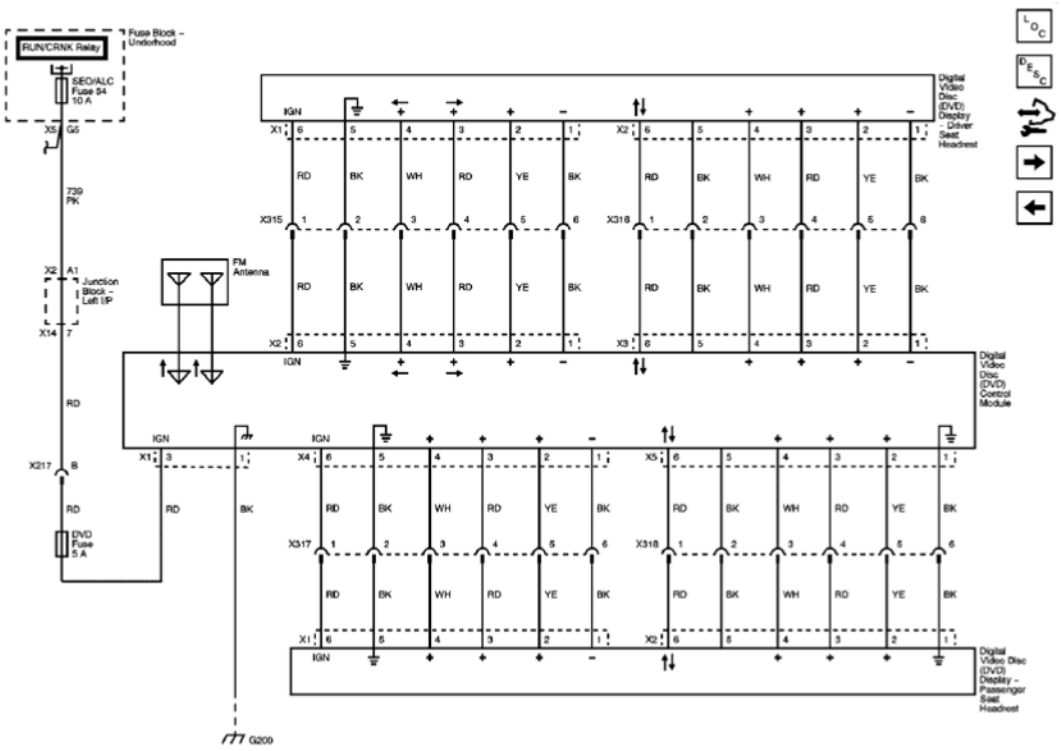


Fig. 18: Dual DVD Headrest System
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DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
DTC B0000	B0000 5A: Vehicle Speed Information Circuit Plausibility Failure
DTC B1024	B1024 11: Circuit Board Temperature Sensor Above Maximum Threshold
DTC B1025-B1095	B1025 01: Audio Output 1 Left Front Circuit Short to Battery B1025 02: Audio Output 1 Left Front Circuit Short to Ground B1025 04: Audio Output 1 Left Front Circuit Open B1035 01: Audio Output 2 Right Front Circuit Short to Battery B1035 02: Audio Output 2 Right Front Circuit Short to Ground B1035 04: Audio Output 2 Right Front Circuit Open B1045 01: Audio Output 3 Left Rear Circuit Short to Battery B1045 02: Audio Output 3 Left Rear Circuit Short to Ground B1045 04: Audio Output 3 Left Rear Circuit Open B1055 01: Audio Output 4 Right Rear Circuit Short to Battery

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	B1055 02: Audio Output 4 Right Rear Circuit Short to Ground B1055 04: Audio Output 4 Right Rear Circuit Open B1065 01: Audio Output 5 Circuit Short to Battery (Center IP) B1065 02: Audio Output 5 Circuit Short to Ground (Center IP) B1065 04: Audio Output 5 Circuit Open (Center IP) B1075 01: Audio Output 6 Circuit Short to Battery (Subwoofer) B1075 02: Audio Output 6 Circuit Short to Ground (Subwoofer) B1075 04: Audio Output 6 Circuit Open (Subwoofer) B1085 01: Audio Output 7 Circuit Short to Battery (LR D-Pillar) B1085 02: Audio Output 7 Circuit Short to Ground (LR D-Pillar) B1085 04: Audio Output 7 Circuit Open (LR D-Pillar) B1095 01: Audio Output 8 Circuit Short to Battery (RR D-Pillar) B1095 02: Audio Output 8 Circuit Short to Ground (RR D-Pillar) B1095 04: Audio Output 8 Circuit Open (RR D-Pillar)
DTC B1259	B1259 02: Antenna Ground Circuit Short to Ground B1259 05: Antenna Ground Circuit Short to Battery or Open
DTC B1287	B1287 01: Amplifier Control Signal Circuit Short to Battery B1287 02: Amplifier Control Signal Circuit Short to Ground B1287 04: Amplifier Control Signal Circuit Open
DTC B1288	B1288 01: Video Display Mode Control Signal Short to Battery B1288 02: Video Display Mode Control Signal Short to Ground B1288 04: Video Display Mode Control Signal Open Circuit
DTC B1289	B1289 01: Video Display Brightness Control Signal Short to Battery B1289 02: Video Display Brightness Control Signal Short to Ground B1289 04: Video Display Brightness Control Signal Open Circuit
DTC B1449	B1449 03: Remote Device Voltage Below Threshold B1449 07: Remote Device Voltage Above Threshold
DTC B2455	B2455 04: Cellular Phone Microphone Circuit Malfunction Open Circuit
DTC B2462 (Navigation Radio)	B2462 02: Global Positioning System (GPS) Short to Ground B2462 04: Global Positioning System (GPS) Open Circuit
DTC B2462 (Communication Interface Module)	B2462 02: Global Positioning System (GPS) Antenna Malfunction Short to Ground B2462 04: Global Positioning System (GPS) Antenna Malfunction Open Circuit
DTC B2470	B2470 04: Cellular Phone Antenna Circuit Malfunction Open Circuit
DTC B2474	B2474 07: Navigation Display Head Backlighting Performance
DTC B2476 or B2482	B2476 00: Cellular Phone Select Service Switch B2482 00: Cellular Phone Select Service Switch Range/Performance
DTC B2485	B2485 02: Wireless Communication Antenna Circuit (Bluetooth) Short to Ground B2485 04: Wireless Communication Antenna Circuit (Bluetooth) Open Circuit

DIAGNOSTIC STARTING POINT - CELLULAR, ENTERTAINMENT, AND NAVIGATION

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Begin the system diagnosis with the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** . The Diagnostic System Check - Vehicle will provide the following information:

- The identification of the control modules which command the system
- The ability of the control modules to communicate through the serial data circuit
- The identification of any stored DTCs and their status

The use of the Diagnostic System Check - Vehicle will identify the correct procedure for diagnosing the system and where the procedure is located.

DTC B0000

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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 B0000 5A

Vehicle Speed Information Circuit Plausibility Failure

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Vehicle Speed Signal	B0000 5A	B0000 5A	B0000 5A	B0000 5A

Circuit/System Description

The radio receives a vehicle speed signal from the electronic brake control module (EBCM) in order to correlate actual vehicle speed to the movement of the vehicle calculated by the navigation system and reported serial data.

Conditions for Running the DTC

- Radio ON.
- Battery voltage must be between 9-16 volts.

Conditions for Setting the DTC

- Vehicle speed from serial data is more than 5 km/h (3 mph) and vehicle speed pulse from the EBCM is 0

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km/h (0 mph).

- Vehicle speed calculated from the navigation processing software is more than 36 km/h (22 mph) and vehicle speed pulse from the EBCM is 0 km/h (0 mph) for 10 seconds continuously.

Action Taken When the DTC Sets

- Turn by turn route navigation may be inoperative.
- Vehicle indicated location may be inaccurate.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC clears after 100 malfunction-free ignition cycles.

Reference Information

Schematic Reference

Radio/Navigation System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Navigation System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

IMPORTANT: Diagnose any antilock brake system (ABS) related DTCs before performing this diagnostic.

1. Ignition OFF, disconnect the X4 harness connector at the radio.

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2. Ignition ON, operate the vehicle drive wheels at 5 mph. Test for 3-7 Hertz between the VSS circuit terminal 5 and ground.
    - If not within the specified range, test the VSS circuit for an open, high resistance, short to ground or short to voltage. If the circuit tests normal replace the EBCM.
3. If the circuit tests normal, replace the radio.

Repair Procedures

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

Control Module References for radio or EBCM replacement, setup, and programming

DTC B1024

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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 B1024 11

Circuit Board Temperature Sensor Above Maximum Threshold

Circuit/System Description

The audio amplifier monitors the internal circuitry for excessive temperature. When the amplifier senses an internal circuitry temperature greater than 95°C (203°F), the amplifier will set DTC B1024 11 and shut down until the internal circuitry cools below 90°C (194°F).

Conditions for Running the DTC

- Radio ON.
- Battery voltage must be between 9-16 volts.

Conditions for Setting the DTC

The audio amplifier detects an over-heat condition greater than 95°C (203°F) of the internal amplifier circuitry.

Action Taken When the DTC Sets

The audio amplifier will shut down and all speakers will be inoperative.

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Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

Diagnostic Aids

Extended use or extremely high volume especially in warm weather conditions may cause this DTC to set. Under these conditions it may be normal for this DTC to set to prevent permanent damage to the audio amplifier circuitry.

Reference Information

Schematic Reference

Radio/Navigation System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Radio/Audio System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

NOTE: Allow the entertainment system to cool if the ambient temperature inside the vehicle is in excess before proceeding with this diagnostic procedure.

1. Ignition ON, with a scan tool clear all DTCs.
2. Radio ON, operate the system within the Condition for Running the DTC.
    - If the DTC resets, replace the audio amplifier.

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Repair Procedures

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

Control Module References for audio amplifier replacement, setup, and programming

DTC B1025-B1095

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provide an overview of each diagnostic category.

DTC Descriptors

DTC B1025 01

Audio Output 1 Left Front Circuit Short to Battery

DTC B1025 02

Audio Output 1 Left Front Circuit Short to Ground

DTC B1025 04

Audio Output 1 Left Front Circuit Open

DTC B1035 01

Audio Output 2 Right Front Circuit Short to Battery

DTC B1035 02

Audio Output 2 Right Front Circuit Short to Ground

DTC B1035 04

Audio Output 2 Right Front Circuit Open

DTC B1045 01

Audio Output 3 Left Rear Circuit Short to Battery

DTC B1045 02

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Audio Output 3 Left Rear Circuit Short to Ground

DTC B1045 04

Audio Output 3 Left Rear Circuit Open

DTC B1055 01

Audio Output 4 Right Rear Circuit Short to Battery

DTC B1055 02

Audio Output 4 Right Rear Circuit Short to Ground

DTC B1055 04

Audio Output 4 Right Rear Circuit Open

DTC B1065 01

Audio Output 5 Circuit Short to Battery (Center IP)

DTC B1065 02

Audio Output 5 Circuit Short to Ground (Center IP)

DTC B1065 04

Audio Output 5 Circuit Open (Center IP)

DTC B1075 01

Audio Output 6 Circuit Short to Battery (Subwoofer)

DTC B1075 02

Audio Output 6 Circuit Short to Ground (Subwoofer)

DTC B1075 04

Audio Output 6 Circuit Open (Subwoofer)

DTC B1085 01

Audio Output 7 Circuit Short to Battery (LR D-Pillar)

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DTC B1085 02

Audio Output 7 Circuit Short to Ground (LR D-Pillar)

DTC B1085 04

Audio Output 7 Circuit Open (LR D-Pillar)

DTC B1095 01

Audio Output 8 Circuit Short to Battery (RR D-Pillar)

DTC B1095 02

Audio Output 8 Circuit Short to Ground (RR D-Pillar)

DTC B1095 04

Audio Output 8 Circuit Open (RR D-Pillar)

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Left Front Speaker Signal Circuits (Front Door and Tweeter)	B1025 02*	B1025 04*	B1025 01*	-
Right Front Speaker Signal Circuits (Front Door and Tweeter)	B1035 02*	B1035 04*	B1035 01*	-
Left Rear Speaker Signal Circuits (Rear Door)	B1045 02*	B1045 04*	B1045 01*	-
Right Rear Speaker Signal Circuits (Rear Door)	B1055 02*	B1055 04*	B1055 01*	-
Front Center Speaker Signal Circuits (Center IP)	B1065 02*	B1065 04*	B1065 01*	-
Subwoofer Low Level Audio Signal Circuits (Center Console)	B1075 02*	B1075 04*	B1075 01*	-
Left Midrange Speaker Signal Circuits (LR D-Pillar)	B1085 02*	B1085 04*	B1085 01*	-
Right Midrange Speaker Signal Circuits (RR D-Pillar)	B1095 02*	B1055 04*	B1095 01*	-
* Noticeable audio distortion possible.				

Circuit/System Description

Each of the audio output channel circuits (+) and (-), at the radio and audio amplifier have a DC bias voltage

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that is one half of the battery voltage. When using a DMM, each of the audio output channel circuits will measure approximately 6.5V DC. The audio being played on the system is produced by a varying AC voltage that is centered around the DC bias voltage on the same circuit. The AC voltage is what causes the speaker cone to move and produce sound. This voltage will vary depending on what type of audio is being listened to, talk or music, and type of music, as well as the volume setting of the system. Low volume and talk settings will measure around 1V AC and less, where constant music may measure 3V AC and slightly higher.

Conditions for Running the DTC

The radio is ON.

Conditions for Setting the DTC

Set by Radio

The radio sets a current status for this DTC when a short to ground, short to voltage or an open is detected on any of the speaker channel outputs from the radio.

Set by Bose Amplifier

The DTC will not set during normal amplifier operation. The vehicle must have the ignition OFF for several hours and the fault must be present during amplifier power-up.

DTC B1025 01, B1035 01, B1045 01, B1055 01, B1065 01, B1075 01, B1085 01, B1095 01

A short to voltage is detected on the specified (+) or (-) signal circuit

DTC B1025 02, B1035 02, B1045 02, B1055 02, B1065 02, B1075 02, B1085 02, B1095 02

A short to ground is detected on the specified (+) or (-) signal circuit

DTC B1025 04, B1035 04, B1045 04, B1055 04, B1065 04, B1075 04, B1085 04, B1095 04

An open is detected on the specified (+) or (-) signal circuit

Action Taken When the DTC Sets

No sound is present from one or more of the speakers.

Conditions for Clearing the DTC

Set by Radio

The fault condition becomes history if not present for 0.25 seconds.

Set by Bose Amplifier

The fault condition becomes history after the vehicle ignition has been OFF for several hours and then the

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ignition turns ON.

Diagnostic Aids

Speakers located in the front A-pillar are connected to the same channel as the speaker in the door. A DTC will only set after the amplifier only on up-level radios.

Reference Information

Schematic Reference

Radio/Navigation System Schematics

Connector End View Reference

Component Connector End Views

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

Radio ON, adjust the fade and balance controls on the radio to test all four channels individually. Each of the four channels should produce clear and even sound.

Circuit/System Testing

IMPORTANT: This DTC can be set by either the radio or the amplifier. If the DTC was set by the radio, diagnose the appropriate audio output circuits to the speakers or the low level inputs to the amplifier (if equipped). If the DTC was set by the amplifier, diagnose audio output signals to the speakers from the amplifier. If equipped with rear seat audio (RSA) (U42), the RSA must be turned off to perform proper speaker testing.

Without Amplifier

1. Ignition OFF, disconnect the harness connector at the appropriate speaker.
2. Radio ON, test for 5.0-7.5 volts between the signal circuit terminal A and ground.

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- If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the radio.
- 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 radio.

3. Test for 5.0-7.5 volts between the signal circuit terminal B and ground.
   - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the radio.
   - 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 radio.
4. If all circuits test normal, replace the speaker.

DTC Set By The Radio UQA

1. Ignition OFF, disconnect the X3 harness connector at the amplifier.
2. Radio ON, test for 5.0-7.5 volts between the appropriate signal circuit terminal listed below and ground.
   - Left front low level audio signal (+) - terminal 15
   - Left front low level audio signal (-) - terminal 7
   - Right front low level audio signal (+) - terminal 14
   - Right front low level audio signal (-) - terminal 6
   - Left rear low level audio signal (+) - terminal 13
   - Left rear low level audio signal (-) - terminal 5
   - Right rear low level audio signal (+) - terminal 12
   - Right rear low level audio signal (-) - terminal 4
   - 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 radio.
   - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the radio.
3. If all circuits test normal, replace the amplifier.

DTC Set By Radio UQA with U42

1. Ignition OFF, disconnect the X3 harness connector at the amplifier.
2. Radio ON, test for 5.0-7.5 volts between the appropriate signal circuit terminal listed below and ground.
   - Left front low level audio signal (+) - terminal 15
   - Left front low level audio signal (-) - terminal 7
   - Right front low level audio signal (+) - terminal 14
   - Right front low level audio signal (-) - terminal 6
   - 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 radio.
   - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests

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normal, replace the radio.

3. Ignition OFF, reconnect the X3 harness connector at the amplifier.
4. Disconnect the X2 harness connector at the rear seat audio (RSA) module.
5. Radio ON, test for 5.0-7.5 volts between the appropriate signal circuit terminal listed below and ground.
    - Left rear low level audio signal (+) - terminal 1
    - Left rear low level audio signal (-) - terminal 2
    - Right rear low level audio signal (+) - terminal 3
    - Right rear low level audio signal (-) - terminal 4
    - 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 rear seat audio (RSA) module.
    - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the rear seat audio (RSA) module.
6. Ignition OFF, reconnect the X2 harness connector at the rear seat audio (RSA) module.
7. Disconnect the X3 harness connector at the amplifier.
8. Radio ON, test for 5.0-7.5 volts between the appropriate signal circuit terminal listed below and ground.
    - Left rear low level audio signal (+) - terminal 13
    - Left rear low level audio signal (-) - terminal 5
    - Right rear low level audio signal (+) - terminal 12
    - Right rear low level audio signal (-) - terminal 4
    - 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 rear seat audio (RSA) module.
    - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the rear seat audio (RSA) module.
9. If all circuits test normal, replace the amplifier.

DTC Set By Radio UQA with Y91 and U42 or UQS and U42

1. Ignition OFF, disconnect the X3 and X4 harness connectors at the amplifier.
2. Radio ON, test for 5.0-7.5 volts between the appropriate signal circuit terminal listed below and ground.
    - Left front low level audio signal (+) - terminal 11 X3
    - Left front low level audio signal (-) - terminal 12 X3
    - Right front low level audio signal (+) - terminal 3 X3
    - Right front low level audio signal (-) - terminal 4 X3
    - Left rear low level audio signal (+) - terminal 11 X4
    - Left rear low level audio signal (-) - terminal 12 X4
    - Right rear low level audio signal (+) - terminal 3 X4
    - Right rear low level audio signal (-) - terminal 4 X4
    - Subwoofer low level audio signal (+) - terminal 5 X4
    - Subwoofer low level audio signal (-) - terminal 6 X4

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- Center Channel low level audio signal (+) - terminal 13 X4
- Center Channel low level audio signal (-) - terminal 14 X4
  - 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 radio.
  - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the radio.

3. If all circuits test normal, replace the amplifier.

DTC Set By Radio UQA with Y91 and U42 or UQS and U42

1. Ignition OFF, disconnect the X3 and X4 harness connector at the amplifier.
2. Radio ON, test for 5.0-7.5 volts between the appropriate signal circuit terminal listed below and ground.
   - Left front low level audio signal (+) - terminal 11 X3
   - Left front low level audio signal (-) - terminal 12 X3
   - Right front low level audio signal (+) - terminal 3 X3
   - Right front low level audio signal (-) - terminal 4 X3
   - Subwoofer low level audio signal (+) - terminal 5 X4
   - Subwoofer low level audio signal (-) - terminal 6 X4
   - Center Channel low level audio signal (+) - terminal 13 X4
   - Center Channel low level audio signal (-) - terminal 14 X4
     - 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 radio.
     - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the radio.
3. Ignition OFF, reconnect the X3 harness connector at the amplifier.
4. Disconnect the X2 harness connector at the rear seat audio (RSA) module.
5. Radio ON, test for 5.0-7.5 volts between the appropriate signal circuit terminal listed below and ground.
   - Left rear low level audio signal (+) - terminal 1
   - Left rear low level audio signal (-) - terminal 2
   - Right rear low level audio signal (+) - terminal 3
   - Right rear low level audio signal (-) - terminal 4
     - 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 rear seat audio (RSA) module.
     - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the rear seat audio (RSA) module.
6. Ignition OFF, reconnect the X2 harness connector at the rear seat audio (RSA) module.
7. Disconnect the X2 harness connector at the amplifier.
8. Radio ON, test for 5.0-7.5 volts between the appropriate signal circuit terminal listed below and ground.
   - Left rear low level audio signal (+) - terminal 15

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- Left rear low level audio signal (-) - terminal 14
- Right rear low level audio signal (+) - terminal 16
- Right rear low level audio signal (-) - terminal 8
  - 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 rear seat audio (RSA) module.
  - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the rear seat audio (RSA) module.

9. If all circuits test normal, replace the amplifier.

DTC Set by Audio Amplifier UQA

1. Ignition OFF, disconnect the X1 and X2 connectors at the amplifier.
2. Radio ON, test for less than 1 volt between the appropriate signal circuit terminal listed below and ground:
   - Left front speaker output (+) - terminal 4 X2
   - Left front speaker output (-) - terminal 3 X2
   - Right front speaker output (+) - terminal 2 X2
   - Right front low speaker output (-) - terminal 1 X2
   - Left rear speaker output (+) - terminal 8 X2
   - Left rear speaker output (-) - terminal 7 X2
   - Right rear speaker output (+) - terminal 6 X2
   - Right rear speaker output (-) - terminal 5 X2
   - Left or rear subwoofer speaker output (+) - terminal 7 X1
   - Left or rear subwoofer speaker output (-) - terminal 3 X1
   - Right subwoofer speaker output (+) - terminal 6 X1
   - Right subwoofer speaker output (-) - terminal 2 X1
   - If greater than the specified range, test both circuits of the affected speaker for a short to voltage.
3. Radio OFF, test for infinite resistance between the appropriate signal circuit terminal listed below and ground:
   - Left front speaker output (+) - terminal 4 X2
   - Left front speaker output (-) - terminal 3 X2
   - Right front speaker output (+) - terminal 2 X2
   - Right front low speaker output (-) - terminal 1 X2
   - Left rear speaker output (+) - terminal 8 X2
   - Left rear speaker output (-) - terminal 7 X2
   - Right rear speaker output (+) - terminal 6 X2
   - Right rear speaker output (-) - terminal 5 X2
   - Left or rear subwoofer speaker output (+) - terminal 7 X1
   - Left or rear subwoofer speaker output (-) - terminal 3 X1

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- Right subwoofer speaker output (+) - terminal 6 X1
- Right subwoofer speaker output (-) - terminal 2 X1
  - If less than the specified value, test both circuits of the affected speaker for a short to ground.

4. If all circuits test normal, reconnect all harness connectors at the amplifier.
5. Ignition ON, radio ON, disconnect the appropriate speaker.
6. Test for 5.0-7.5 volts between the signal circuit terminals and ground.
   - If less then the specified range test the circuit for an open/high resistance. If the circuit tests normal, replace the amplifier.
   - If greater then the specified range test the circuit for a short to voltage. If the circuit tests normal, replace the amplifier.
7. If the circuit tests normal, replace the appropriate speaker.

DTC Set by Audio Amplifier UQA with Y91 or UQS

1. Ignition OFF, disconnect the X1 and X2 connectors at the amplifier.
2. Radio ON, test for less than 1 volt between the appropriate signal circuit terminal listed below and ground:
   - Left front speaker output (+) - terminal 4 X2
   - Left front speaker output (-) - terminal 5 X2
   - Right front speaker output (+) - terminal 7 X2
   - Right front speaker output (-) - terminal 6 X2
   - Left rear speaker output (+) - terminal 15 X2
   - Left rear speaker output (-) - terminal 14 X2
   - Right rear speaker output (+) - terminal 16 X2
   - Right rear speaker output (-) - terminal 8 X2
   - Front center speaker output (+) - terminal 13 X2
   - Front center speaker output (-) - terminal 12 X2
   - Right rear midrange speaker output (+) - terminal 3 X2
   - Right rear midrange speaker output (-) - terminal 2 X2
   - Left rear midrange speaker output (+) - terminal 11 X2
   - Left rear midrange speaker output (-) - terminal 10 X2
   - Left or rear subwoofer speaker output (+) - terminal 1 X1
   - Left or rear subwoofer speaker output (-) - terminal 2 X1
   - Right subwoofer speaker output (+) - terminal 7 X1
   - Right subwoofer speaker output (-) - terminal 3 X1
   - If greater than the specified range, test both circuits of the affected speaker for a short to voltage.
3. Radio OFF, test for infinite resistance between the appropriate signal circuit terminal listed below and ground:
   - Left front speaker output (+) - terminal 4 X2

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- Left front speaker output (-) - terminal 5 X2
- Right front speaker output (+) - terminal 7 X2
- Right front speaker output (-) - terminal 6 X2
- Left rear speaker output (+) - terminal 15 X2
- Left rear speaker output (-) - terminal 14 X2
- Right rear speaker output (+) - terminal 16 X2
- Right rear speaker output (-) - terminal 8 X2
- Front center speaker output (+) - terminal 13 X2
- Front center speaker output (-) - terminal 12 X2
- Right rear midrange speaker output (+) - terminal 3 X2
- Right rear midrange speaker output (-) - terminal 2 X2
- Left rear midrange speaker output (+) - terminal 11 X2
- Left rear midrange speaker output (-) - terminal 10 X2
- Left or rear subwoofer speaker output (+) - terminal 1 X1
- Left or rear subwoofer speaker output (-) - terminal 2 X1
- Right subwoofer speaker output (+) - terminal 7 X1
- Right subwoofer speaker output (-) - terminal 3 X1
  - If less than the specified value, test both circuits of the affected speaker for a short to ground.

4. If all circuits test normal, reconnect all harness connectors at the amplifier.
5. Radio ON, disconnect the appropriate speaker.
6. Test for 5.0-7.5 volts between the signal circuit terminals and ground.
   - If less then the specified range test the circuit for an open/high resistance. If the circuit tests normal, replace the amplifier.
   - If greater then the specified range test the circuit for a short to voltage. If the circuit tests normal, replace the amplifier.
7. If the circuit tests normal, replace the appropriate speaker.

Repair Procedures

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

- **Speaker Replacement Reference**
- **Control Module References** for Amplifier and Radio replacement, setup, and programming

DTC B1259

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** prior to using this diagnostic procedure.

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- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC B1259 02

Antenna Ground Circuit Short to Ground

DTC B1259 05

Antenna Ground Circuit Short to Battery or Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+ Voltage	-	1	-	-
Left Audio Signal (+)	2	2	2	-
Left Audio Signal (-)	2	2	2	-
Right Audio Signal (+)	3	3	3	-
Right Audio Signal (-)	3	3	3	-
Digital Radio Antenna Coax	B1259 02	B1259 05	B1259 05	-
Ground	-	1	-	-
1. No communication with DRR/XM not available 2. No or distorted audio from left side speakers when listening to digital radio 3. No or distorted audio from right side speakers when listening to digital radio				

Circuit/System Description

The digital radio receiver (DRR) receives an XM satellite radio signal via the digital radio antenna. This signal is passed to the DRR through the digital radio antenna coax. The DRR sends a varying AC mV signal through separate left and right audio circuits (+ and -) to the radio. The voltage amount and rate of change is dependent upon the type of signal being received. The radio then processes these signals and passes the audio to the appropriate speakers or amplifier.

Conditions for Running the DTC

The ignition is ON.

Conditions for Setting the DTC

B1259 02

The DRR detects a short to ground in the antenna circuit.

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B1259 05

The DRR detects a short to voltage or an open in the antenna circuit.

Action Taken When the DTC Sets

The radio displays No XM Signal.

Conditions for Clearing the DTC

- A current DTC will clear when the conditions for setting the DTC are no longer present.
- A history DTC clears after 100 malfunction-free ignition cycles.

Diagnostic Aids

When diagnosing digital radio concerns, the vehicle should be located outside with an unobstructed view of the southern sky to ensure proper reception of the satellite signal. Reception may limited, intermittent or not possible inside structures or under heavy cover.

Reference Information

Schematic Reference

Radio/Navigation System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Radio/Audio System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

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EL-48028 Digital Radio Test Antenna. See **Special Tools**.

Circuit System Verification

With the vehicle outside in an area with an unobstructed view of the southern sky, tune to XM. Verify XM reception is clear and the No XM Signal message is not displayed on the radio.

Circuit/System Testing

1. Ignition OFF, disconnect the antenna coax from the DRR. Connect the **EL-48028** to the DRR. See **Special Tools**.
2. Radio ON, tuned to XM, verify DTC B1259 is not set as current.
   - If the DTC is current, replace the DRR.
3. Ignition OFF, reconnect the antenna coax to the DRR, disconnect the digital radio antenna coax from the digital radio antenna.
4. Ignition ON, test for 4.5-5.5 volts between the antenna coax center terminal and the coax outer shield.
   - If not within the specified range, replace the antenna coax.
5. If all circuits test normal, replace the digital radio antenna.

Repair Procedures

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

- **Cellular Communications/Digital Radio Antenna Replacement**
- **Control Module References** for DRR replacement, setup, and programming

DTC B1287

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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 B1287 01

Amplifier Control Signal Circuit Short to Battery

DTC B1287 02

Amplifier Control Signal Circuit Short to Ground

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DTC B1287 04

Amplifier Control Signal Circuit Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Amplifier Control	B1287 02	B1287 04	B1287 01	-

Circuit/System Description

The radio provides a remote amplifier mute output circuit to control overall muting of the remote amplifier. The amplifier receives pulse width modulated (PWM) signals on the control circuit at varying duty cycle percentages for controlling muted and unmuted functions of the amplifier. Circuitry internal to the radio monitors the remote amplifier mute circuit for faults and sets the appropriate DTC when faults are detected.

Conditions for Running the DTC

- Radio is ON
- The system voltage is at between 9 volts and 16 volts

Conditions for Setting the DTC

A short to voltage, short to ground, or an open is seen on the remote enable circuit

Action Taken When the DTC Sets

Amplifier functions are disabled

Conditions for Clearing the DTC

- A current DTC clears when the condition for setting the DTC is no longer present
- A history DTC clears after 100 malfunction-free ignition cycles

Reference Information

Schematic Reference

Radio/Navigation System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

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Radio/Audio System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Radio ON, adjust the fade and balance control to verify audio is present at each individual channel.

Circuit/System Testing

1. Ignition OFF, disconnect the X3 harness connector at the audio amplifier.
2. Ignition ON, radio ON and un-muted, test for 0.5-1.0 volts between the signal circuit terminal 11 and ground.
    - If greater than the specified value, test the signal circuit for a short to voltage. If the circuit tests normal, replace the radio.
    - If less than the specified value, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the radio.
3. If all circuits test normal, replace the amplifier.

Repair Procedures

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

Control Module References for radio or amplifier replacement

DTC B1288

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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

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DTC B1288 01

Video Display Mode Control Signal Short to Battery

DTC B1288 02

Video Display Mode Control Signal Short to Ground

DTC B1288 04

Video Display Mode Control Signal Open Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
DVD Display B+	1	1	1	-
Radio ON Signal	1	1	1	-
Video Display Brightness Signal	B1289 02	B1289 04	B1289 01	-
Video Display Mode Control	B1288 02	B1288 04	B1288 01	-
Video High Signal	1	1	1	-
Video Low Signal	1	1	1	-
DVD Display Ground	-	1	-	-
1. Video Entertainment System Inoperative.				

Circuit/System Description

The radio can control the video display mode on vehicles equipped with rear seat entertainment (RSE) video. The radio varies a pulse with modulated (PWM) signal to the rear entertainment video screen to command the display mode.

Conditions for Running the DTC

- Ignition ON.
- Battery voltage must be between 9-16 volts.

Conditions for Setting the DTC

The DTC will set when the radio detects a short to voltage, short to ground, or an open/high resistance in the video display mode control circuit 400 ms after the radio activates the remote enable circuit.

Action Taken When the DTC Sets

The radio sets the DTC and defaults the video display to normal mode.

Conditions for Clearing the DTC

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- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

Video System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Video Entertainment System Description and Operation (Non-Headrest DVD Systems) or **Video Entertainment System Description and Operation (Dual Headrest DVD Systems)**

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 rear video display.
2. Ignition ON, test for 100-300 Hz at the control circuit terminal 10.
    - If not within the specified range, test the control circuit for a short to voltage, short to ground, or an open/high resistance. If the circuit tests normal, replace the radio.
3. If all circuits test normal, replace the rear video display.

Repair Procedures

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

- **Video Display Replacement (Second Row)** or **Video Display Replacement (Third Row)**
- **Control Module References** for Radio replacement, setup, and programming

DTC B1289

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Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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 B1289 01

Video Display Brightness Control Signal Short to Battery

DTC B1289 02

Video Display Brightness Control Signal Short to Ground

DTC B1289 04

Video Display Brightness Control Signal Open Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
DVD Display B+	1	1	1	-
Radio ON Signal	1	1	1	-
Video Display Brightness Control	B1289 02	B1289 04	B1289 01	-
Video Display Mode Control	B1288 02	B1288 04	B1288 01	-
Video High Signal	1	1	1	-
Video Low Signal	1	1	1	-
DVD Display Ground	-	1	-	-
1. Video Entertainment System Inoperative.				

Circuit/System Description

The radio can control the video display brightness on vehicles equipped with rear seat entertainment (RSE) video. The radio varies a pulse with modulated (PWM) signal to the rear entertainment video screen to command the screen brightness to the desired level.

Conditions for Running the DTC

- Ignition ON.
- Battery voltage must be between 9-16 volts.

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Conditions for Setting the DTC

The DTC will set when the radio detects a short to voltage, short to ground, or an open/high resistance in the video display brightness control circuit 400 ms after the radio activates the remote enable circuit.

Action Taken When the DTC Sets

The radio sets the DTC and defaults the video display to full brightness.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

Video System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Video Entertainment System Description and Operation (Non-Headrest DVD Systems) or **Video Entertainment System Description and Operation (Dual Headrest DVD Systems)**

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 rear video display.
2. Ignition ON, test for 100-300 Hz at the control circuit terminal 9.
    - If not within the specified range, test the control circuit for a short to voltage, short to ground, or an open/high resistance. If the circuit tests normal, replace the radio.

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3. If all circuits test normal, replace the rear video display.

Repair Procedures

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

- **Video Display Replacement (Second Row)** or **Video Display Replacement (Third Row)**
- **Control Module References** for Radio replacement, setup, and programming

DTC B1449

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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 B1449 03

Remote Device Voltage Below Threshold

DTC B1449 07

Remote Device Voltage Above Threshold

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Infrared Module Voltage Signal	B1449 03	B1449 03	B1449 07	-

Circuit/System Description

The infrared module is supplied with 10.5 volts from the rear audio/HVAC module when the rear audio system is active. The infrared module is permanently grounded at G300.

Conditions for Running the DTC

- Ignition ON.
- Battery voltage must be between 9-16 volts.

Conditions for Setting the DTC

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The DTC will set when the rear audio/HVAC module detects a short to voltage, short to ground, or an open/high resistance in the infrared module voltage signal circuit.

Action Taken When the DTC Sets

The rear audio/HVAC module sets the DTC and the infrared module will be disabled.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

Radio/Navigation System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Video Entertainment System Description and Operation (Non-Headrest DVD Systems) or **Video Entertainment System Description and Operation (Dual Headrest DVD Systems)**

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 infrared module.
2. Ignition OFF, test for less than 5.0 ohms between the ground circuit terminal 12 and ground.
    - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Ignition ON, rear audio ON, test for 10.0-11.0 volts between the supply voltage circuit terminal 4 and ground.

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- If less than the specified range, test the voltage supply circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the rear audio/HVAC module.
- If greater than the specified range, test the voltage supply circuit for a short to voltage. If the circuit tests normal, replace the rear audio/HVAC module.

4. If all circuits test normal, replace the infrared module.

Repair Procedures

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

- **Audio System Transceiver Module Replacement**
- **Control Module References** for Rear Audio/HVAC Module replacement, setup, and programming

DTC B2455

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provide an overview of each diagnostic category.

DTC Descriptor

DTC B2455 04

Cellular Phone Microphone Circuit Malfunction Open Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Cellular Microphone Signal	B2455 04	B2455 04	B2455 04	-
Cellular Microphone Low Reference	-	B2455 04	1	-
1. OnStar Microphone Inoperative - Caller Cannot Be Heard				

Circuit/System Description

The communication interface module (CIM) provides the cellular microphone with a supplied voltage on the cellular microphone signal circuit. When the microphone is in use, voice data from the user is sent back to the CIM on the signal circuit. The CIM provides a ground for the microphone via the low reference circuit.

Conditions for Running the DTC

- The ignition must be in the RUN or ACC position.

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- The system voltage is at least 9.5 volts and no more than 15.5 volts.
- All the above conditions are present for greater than 10 seconds.

Conditions for Setting the DTC

- The CIM detects an open, short to ground or short to voltage in the cellular microphone signal circuit for 10 seconds or greater.
- The CIM detects an open/high resistance in the drain wire circuit for 10 seconds or greater.

Actions Taken When the DTC Sets

- The OnStar® status LED turns red.
- The CIM will not receive a signal from the microphone.
- Calls can be placed but the caller cannot be heard.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 50 consecutive malfunction-free ignition cycles have occurred.

Schematic Reference

OnStar Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

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1. Ignition OFF, disconnect the harness connector at the cellular microphone.
2. Test for less than 10 ohms between the low reference circuit terminal A and ground.
   - If greater than the specified range, test the circuit for an open/high resistance.
3. Ignition ON, test for 9.5-10.5 V between the signal circuit terminal B and ground.
   - If less than the specified range, test the circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the CIM.
   - If greater than the specified range, test the circuit for a short to voltage. If the circuit tests normal, replace the CIM.
4. If all circuits test normal, replace the cellular microphone.

Repair Procedures

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

- **Mobile Telephone Microphone Replacement**
- **Control Module References** for CIM replacement, setup, and programming

DTC B2462 (NAVIGATION RADIO)

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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 B2462 02

Global Positioning System (GPS) Short to Ground

DTC B2462 04

Global Positioning System (GPS) Open Circuit

Circuit Description

The global positioning system (GPS) antenna is connected to the navigation radio by a coaxial cable. The antenna cable also provides a path for DC current for powering the antenna.

Conditions for Running the DTC

- Radio ON

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- Battery voltage between 9-16 volts
- The navigation radio tests the GPS antenna every 10 seconds

Conditions for Setting the DTC

B2462 02

The navigation radio detects a short to ground in the GPS antenna signal circuit.

B2462 04

The navigation radio detects an open/high resistance in the GPS antenna signal circuit.

Actions Taken When the DTC Sets

- The radio uses the last reported position and the vehicle speed signal to calculate the vehicle position.
- Route guidance may be inaccurate.
- Turn by turn navigation may be inaccurate or inoperative.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 50 consecutive malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

Radio/Navigation System Schematics

Connector End View Reference

Component Connector End Views

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 Testing

IMPORTANT: The global positioning system (GPS) requires a clear line of sight to the sky to operate properly. In most cases the GPS will not have reception near tall buildings or inside structures.

1. Ignition OFF, disconnect the GPS antenna coax cable from the navigation radio.
2. Ignition ON, test for 4.5-5.5 volts between the coax cable connection center conductor at the radio and ground.
    - If not within the specified range, replace the radio.
3. If all circuits test normal, replace the GPS antenna.

Repair Procedures

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

- **Electronic Navigation Antenna Replacement**
- **Control Module References** for radio replacement, setup, and programming

DTC B2462 (COMMUNICATION INTERFACE MODULE)

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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 B2462 02

Global Positioning System (GPS) Antenna Malfunction Short to Ground

DTC B2462 04

Global Positioning System (GPS) Antenna Malfunction Open Circuit

Circuit/System Description

The communication interface module (CIM) receives information from a specific navigation antenna located on the outside of the vehicle. The navigation antenna is connected to the CIM via a shielded coaxial cable. The antenna cable also provides a path for DC current for powering the antenna.

Conditions for Running the DTC

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- Ignition is in the RUN or ACC position.
- Battery voltage is between 9-16 volts.

Conditions for Setting the DTC

B2462 02

The CIM detects a short to ground on the navigation antenna signal circuit.

B2462 04

The CIM detects an open/high resistance on the navigation antenna signal circuit.

Action Taken When the DTC Sets

- The OnStar® status LED turns red.
- The OnStar® Call Center cannot locate the vehicle.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 50 consecutive malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

OnStar Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

OnStar Description and Operation

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. Disconnect the navigation antenna coax cable from the CIM.
2. Ignition ON, test for 4.5-5.5 V between the CIM coax cable center conductor terminal at the module and ground.
    - If not within the specified range, replace the CIM.
3. Reconnect the coax cable to the CIM. Disconnect the coax cable from the navigation antenna.
4. Test for 4.5-5.5 V between the coax cable center conductor and the outer shield.
    - If not within the specified range, replace the coax cable.
5. If all circuits test normal, replace the navigation antenna.

Repair Procedures

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

- **Cellular Communications/Digital Radio Antenna Replacement**
- **Control Module References** for CIM replacement, setup, and programming

DTC B2470

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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 B2470 04

Cellular Phone Antenna Circuit Malfunction Open Circuit

Circuit/System Description

The cellular antenna is connected to the communication interface module (CIM) with a RG-58 coax cable. The CIM polls the data from the cellular antenna once every second.

Conditions for Running the DTC

- Ignition in the RUN or ACC position.
- System voltage is between 9.5 volts and 15.5 volts.
- The above conditions are present for greater than 1 second.

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Conditions for Setting the DTC

- The CIM does not detect the presence of a cellular antenna.
- The above conditions are present for greater than 1 second.

Action Taken When the DTC Sets

- The vehicle is unable to connect to the OnStar® Call Center.
- The OnStar® status LED turns red.

Conditions for Clearing the DTC

- The CIM detects the presence of a cellular antenna.
- A history DTC clears after 50 malfunction-free ignition cycles.

Reference Information

Schematic Reference

OnStar Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Verify that the cellular antenna and cellular antenna coupling assembly are not damaged.

- If the antenna assembly is damaged, replace the cellular antenna.

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Circuit/System Testing

1. Ignition OFF, disconnect the cellular antenna coax from the CIM module and the cellular antenna.
2. Ignition ON, test for less than 1 volt between the antenna coax center terminal and ground.
    - If greater than the specified range, replace the antenna coax.
3. Ignition ON, test for less than 1 volt between the antenna coax outer shield and ground.
    - If greater than the specified range, replace the antenna coax.
4. Test for infinite resistance between the antenna coax center terminal and ground.
    - If less than the specified value, replace the antenna coax
5. Test for infinite resistance between the antenna coax outer shield and ground.
    - If less than the specified value, replace the antenna coax
6. Test for less than 5 ohms at the cellular antenna coax center terminal from end to end.
    - If greater than specified value, replace the cellular antenna coax cable.
7. Test for less than 5 ohms at the cellular antenna coax outer shield from end to end.
    - If greater than specified value, replace the cellular antenna coax cable.
8. Test for infinite resistance between the antenna coax center terminal and the outer shield.
    - If less than specified value, replace the cellular antenna coax cable.
9. If coax cable tests normal, replace the cellular antenna.
10. Clear the DTCs and operate the vehicle within the conditions for running the DTC. Verify DTC B2470 does not set.
    - If the DTC sets, replace the CIM.

Repair Procedures

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

- **Cellular Communications/Digital Radio Antenna Replacement**
- **Control Module References** for CIM replacement, setup, and programming

DTC B2474

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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 B2474 07

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Navigation Display Head Backlighting Performance

Circuit Description

The internal backlighting of the navigation display screen located in the navigation radio.

Conditions for Running the DTC

- Radio ON.
- Battery voltage must be between 9-16 volts.

Conditions for Setting the DTC

- The navigation radio tests the navigation display backlighting every 1 second.
- The radio determines there is a malfunction or overheat condition in the navigation display backlighting.

Action Taken When the DTC Sets

Navigation backlighting may be too bright, dim or blank.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 50 consecutive malfunction-free ignition cycles have occurred.

Diagnostic Aids

Occasionally it is possible to overheat the navigation display backlighting due to excessive ambient heat inside the vehicle. In this instance it may be necessary to allow time for the display to cool.

Reference Information

Schematic Reference

Radio/Navigation System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Navigation System Description and Operation

Electrical Information Reference

- **Circuit Testing**

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition OFF, allow the navigation display to cool if the ambient temperature inside the vehicle is excessive and the radio is hot to the touch. Verify the navigation display is cool and the DTC has cleared and gone to history.
2. Ignition ON, with a scan tool, clear all DTCs and operate the audio/navigation system within the Conditions for Running the DTC. Verify the DTC does not reset.
    - If the DTC resets, replace the radio.

Repair Procedures

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

Control Module References for Radio replacement, setup, and programming

DTC B2476 OR B2482

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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 B2476 00

Cellular Phone Select Service Switch

DTC B2482 00

Cellular Phone Select Service Switch Range/Performance

Diagnostic Fault Information

	Short to	Open/High	Short to	Signal

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Circuit	Ground	Resistance	Voltage	Performance
Keypad Supply Voltage	B2476 00	B2476 00	B2476 00	-
Keypad Green LED Signal	1	1	2	-
Keypad Red LED Signal	1	1	2	-
Keypad Signal	3	3	-	B2482 00
Inside Rearview Mirror Ground	-	1	-	-
1. OnStar® LED Inoperative 2. LED Illuminated At All Times 3. OnStar® Buttons Inoperative				

Circuit/System Description

The OnStar® button assembly consists of 3 buttons, Call/Answer, OnStar® Call Center, and OnStar® Emergency. The communication interface module (CIM) supplies the OnStar® button assembly with 10 volts via the keypad supply voltage circuit. Each of the buttons, when pressed, completes the circuit across a resistor allowing a specific voltage to be returned to the CIM over the keypad signal circuit. Depending upon the voltage range returned, the CIM is able to identify which button has been activated.

Conditions for Running the DTC

- Ignition ON.
- Battery voltage must be between 9-16 volts.

Conditions for Setting the DTC

B2476

The CIM detects a short to voltage, short to ground, or an open/high resistance on the keypad supply voltage circuit.

B2482

The CIM detects a valid signal on the keypad signal circuit for longer than 15 seconds. If one of the OnStar® buttons is held or stuck for 15 seconds or greater, the CIM will set this DTC.

Action Taken When the DTC Sets

- The OnStar® status LED turns red.
- No calls can be placed.
- The CIM will ignore all inputs from the OnStar® button assembly.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

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Reference Information

Schematic Reference

OnStar Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the inside rearview mirror.
2. Test for less than 10 ohms between the mirror ground circuit terminal 8 and ground.
    - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Ignition ON, test for less than 1 V between the keypad signal circuit terminal 11 and ground.
    - If greater than the specified range, test the keypad signal circuit for a short to voltage. If the circuit tests normal, replace the CIM.
4. Ignition OFF, test for 600 K - 800 K ohms between the keypad signal circuit terminal 11 and ground.
    - If less than the specified range, test the keypad signal circuit for a short to ground. If the circuit tests normal, replace the CIM.
    - If greater than the specified range, test the keypad signal circuit for an open/high resistance. If the circuit tests normal, replace the CIM.
5. Ignition ON, test for 9.5-10.5 V between the keypad supply voltage circuit terminal 12 and ground.
    - If less than the specified range, test the supply voltage circuit for a short to ground or open/high resistance. If the circuit tests normal, replace the CIM.
    - If greater than the specified range, test the supply voltage circuit for a short to voltage. If the circuit tests normal, replace the CIM.

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6. If all circuits test normal, test or replace the button assembly.

Component Testing

1. Ignition OFF, disconnect the harness connector at the inside rearview mirror.
2. Test for infinite resistance between the keypad supply voltage terminal 12 and the keypad signal terminal 11.
   - If less than the specified range, replace the inside rearview mirror.
3. Test for 1.4 K - 1.6 K ohms between the keypad supply voltage terminal 12 and the keypad signal terminal 11 while pressing the red emergency button.
   - If not within the specified range, replace the inside rearview mirror.
4. Test for 2.7 K - 3.3 K ohms between the keypad supply voltage terminal 12 and the keypad signal terminal 11 while pressing the blue On-Star® button.
   - If not within the specified range, replace the inside rearview mirror.
5. Test for 12.5 K - 13.5 K ohms between the keypad supply voltage terminal 12 and the keypad signal terminal 11 while pressing the black phone button.
   - If not within the specified range, replace the inside rearview mirror.

Repair Procedures

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

- **Inside Rearview Mirror Replacement**
- **Control Module References** for CIM replacement, setup, and programming

DTC B2485

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provide an overview of each diagnostic category.

DTC Descriptors

DTC B2485 02

Wireless Communication Antenna Circuit (Bluetooth) Short to Ground

DTC B2485 04

Wireless Communication Antenna Circuit (Bluetooth) Open Circuit

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Circuit/System Description

The Bluetooth ® antenna is a small fixed antenna connected directly to the communication interface module (CIM) and is used to send and receive signals from a Bluetooth ® enabled cellular phone. The antenna utilizes no cabling and is not external to the vehicle.

Conditions for Running the DTC

- Ignition ON.
- Battery voltage must be between 9-16 volts.
- The CIM tests the antenna once every second.

Conditions for Setting the DTC

B2485 02

The CIM detects a short to ground in the Bluetooth ® antenna.

B2485 04

The CIM detects an open/high resistance in the Bluetooth ® antenna.

Actions Taken When the DTC Sets

- The OnStar ® status LED turns red.
- Bluetooth ® functionality is disabled.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

Schematic Reference

OnStar Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

OnStar Description and Operation

Electrical Information Reference

- **Circuit Testing**

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- **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. Verify the Bluetooth ® antenna is properly connected to the CIM and is not damaged.
   - If the antenna is disconnected or damaged, repair or replace as necessary.
2. Ignition ON, verify the DTC B2485 is not set.
   - If the DTC is set, replace the Bluetooth ® antenna. Clear the DTC and cycle the ignition OFF then back ON. If the DTC resets as current, replace the CIM.

Repair Procedures

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

- **Wireless Communication Interface Antenna Replacement**
- **Control Module References** for CIM replacement, setup, and programming

SYMPTOMS - CELLULAR COMMUNICATION

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

1. Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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 **OnStar Description and Operation**.

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the Radio/Audio System. Refer to **Checking Aftermarket Accessories** .
- Inspect for easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to **Testing for**

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Intermittent Conditions and Poor Connections .

Symptom List

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

- **Bluetooth Malfunction**
- **OnStar Global Positioning System (GPS) Data Not Current or Inaccurate**
- **OnStar Microphone Malfunction**
- **OnStar Audio Malfunction**
- **OnStar Button LED Malfunction**
- **OnStar Call Center Remote Function Requests Malfunction**
- **OnStar Button Malfunction**
- **Unable to Contact OnStar Call Center**
- **OnStar Voice Recognition Malfunction**
- **OnStar Steering Wheel Control Functions Malfunction**

SYMPTOMS - ENTERTAINMENT

IMPORTANT: Review the system operation in order to familiarize yourself with the system functions. Refer to Radio/Audio System Description and Operation.

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the Radio/Audio system. Refer to **Checking Aftermarket Accessories** .
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to **Testing for Intermittent Conditions and Poor Connections** .

Symptom List

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

- **Speaker Malfunction**
- **Audio/Video Player Adapter - Audio or Video Malfunction**
- **Dual DVD Rear Seat Entertainment Headrest Display Malfunction**
- **Dual DVD Rear Seat Entertainment Headrest Audio Malfunction**
- **Dual DVD Rear Seat Entertainment Headrest Wireless Headphones Malfunction**

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- **Dual DVD Rear Seat Entertainment Headrest Remote Malfunction**
- **Noise Compensated Volume Malfunction**
- **Radio Audio Malfunction at Rear Seat Audio (RSA) Control**
- **Radio Displays LOC, LOCKED, or CODE**
- **Radio Displays CAL or CAL ERR**
- **Radio Poor Reception**
- **Rear Seat Radio Controls Inoperative**
- **Video Display Malfunction**
- **Video Entertainment System Malfunction**
- **Video Entertainment System Remote Control Malfunction**
- **Video Entertainment System Wireless Headphone Malfunction**

SYMPTOMS - NAVIGATION SYSTEMS

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

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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.
- Review **Navigation System Description and Operation** in order to familiarize yourself with the system functions.

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the navigation system components. Refer to **Checking Aftermarket Accessories** .
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to **Testing for Intermittent Conditions and Poor Connections** .

Symptom List

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

- **No Global Positioning System (GPS) Reception**
- **Navigation System - Voice Recognition Malfunction**
- For radio/audio related symptoms, refer to **Symptoms - Entertainment**.

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AUDIO/VIDEO PLAYER ADAPTER - AUDIO OR VIDEO MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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
Right Auxiliary Audio Signal	1	1	1	-
Left Auxiliary Audio Signal	2	2	2	-
Auxiliary Audio Common Ground	-	1, 2	-	-
Auxiliary Video Ground	-	3	-	-
Auxiliary Video High Signal	3	3	3	-
1. No or distorted right side audio 2. No or distorted left side audio 3. No or distorted video				

Circuit/System Description

The audio/video adaptor allows the connection of audio and video signals from an external device such as a camcorder, video game console or MP3 player to the rear seat entertainment system. The middle jack is for left audio (white), the right jack is for right audio (red), and the left jack is for video (yellow). The system requires standard RCA cables to connect your external device to the RCA jacks. The auxiliary audio and video circuits are connected to the radio.

Diagnostic Aids

Verify the external audio or video device is operating normally before performing this diagnostic procedure.

Reference Information

Schematic Reference

Video System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

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Video Entertainment System Description and Operation (Non-Headrest DVD Systems) or **Video Entertainment System Description and Operation (Dual Headrest DVD Systems)**

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

IMPORTANT: Verify the DVD player in the radio is operating normally before performing this diagnostic procedure. If there is any problems with operating the DVD player, refer to Symptoms - Entertainment

1. Ignition OFF, disconnect the X3 harness connector at the radio.
2. Ignition ON, test for less then 1 volt between the appropriate signal circuit terminals listed below and ground.
    - Auxiliary audio left signal (+) - terminal 1
    - Auxiliary audio right signal (+) - terminal 2
    - Auxiliary audio drain wire (-) - terminal 9
    - Auxiliary video signal (+) - terminal 8
    - Auxiliary video drain wire (+) - terminal 16
    - If greater then specified range, test the circuit for a short to voltage.
3. Test for infinite resistance between the terminals listed below and ground.
    - Auxiliary audio left signal (+) - terminal 1
    - Auxiliary audio right signal (+) - terminal 2
    - Auxiliary audio drain wire (-) - terminal 9
    - Auxiliary video signal (+) - terminal 8
    - Auxiliary video drain wire (+) - terminal 16
    - If less then the specified value, test the circuit for a short to ground.
4. Test for less then 5 ohm between the terminals on the radio X3 harness connector and the external terminals on the audio/video adaptor listed below:
    - Auxiliary audio left signal (+) - terminal 1 and the inside of the center (white) jack
    - Auxiliary audio right signal (+) - terminal 2 and the inside of the right (red) jack
    - Auxiliary audio drain wire (-) - terminal 9 and the outside of both the center (white), and the right

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(red) jacks
- Auxiliary video signal (+) - terminal 8 and the inside of the left (yellow) jack
- Auxiliary video drain wire (+) - terminal 16 and the outside of the left (yellow) jack
  - If greater then the specified value, test the circuit for an open/high resistance. If the circuit tests normal, replace the adaptor.

5. If all circuits test normal, replace the radio.

Repair Procedures

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

- **Audio/Video Disc Player Adapter Replacement (Except Cadillac)** or **Audio/Video Disc Player Adapter Replacement (Cadillac)**
- **Control Module References** for Radio replacement, setup, and programming

BLUETOOTH MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provide an overview of each diagnostic category.

Circuit/System Description

The Bluetooth ® antenna is a small fixed antenna connected directly to the communication interface module (CIM) and is used to send and receive signals from a Bluetooth ® enabled cellular phone. The antenna utilizes no cabling and is not external to the vehicle.

In order to use hands-free calling, the cellular phone must be paired to the vehicle. Up to five devices can be paired to the vehicle at one time, but only one can be connected at any given time. To pair a phone, the customer must know how to operate the Bluetooth ® functionality of their phone. The pairing process must only be done one time for each phone, unless that phone's information is deleted. For safety reasons, the pairing process is disabled while the vehicle is moving.

Diagnostic Aids

- The purpose of this diagnostic is to verify the ability of the CIM to pair to a Bluetooth ® device.
- Before performing this test, verify compatibility of the cellular phone(s) the customer is attempting to use with the vehicle. Based on the cellular phone's service provider and the manufacturer's implementation of Bluetooth ®, not all phones support all available Bluetooth ® functionality. A vehicle and feature compatibility list will be provided via the GM Bluetooth ® website: http://www.gm.com/vc/bluetooth/
- If the vehicle passes the following tests and a compatible device is being used, the concern may be due to a device malfunction or an incomplete/improper pairing attempt.

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- A Bluetooth ® test tool or equivalent can also be used to verify the ability of the customers cellular phone (s) to pair with another device.

Schematic Reference

OnStar Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Verify DTC B2485 is not set.
   - If DTC B2485 is set, refer to **DTC B2485**
2. Set up A Bluetooth ® test tool or equivalent.
3. Ignition ON, perform the discovery/search operation with the test tool. Verify the vehicle appears in the list of available devices.
   - If the vehicle is not in the list of available devices, repeat the discovery/search operation. If the vehicle is still not in the list of available devices, replace the CIM.
4. Follow the instructions provided in the Vehicle Owners Manual for pairing a device. Verify successful pairing with the test tool.
   - If pairing is not successful, repeat the pairing process. If pairing is still not successful, replace the CIM.
5. Refer to Diagnostic Aids in this test procedure.

Repair Procedures

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

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Control Module References for CIM replacement, setup, and programming

DIGITAL RADIO MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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+ Voltage	-	1	-	-
Left Audio Signal (+)	2	2	2	-
Left Audio Signal (-)	2	2	2	-
Right Audio Signal (+)	3	3	3	-
Right Audio Signal (-)	3	3	3	-
Digital Radio Antenna Coax	B1259 02	B1259 05	B1259 05	-
Ground	-	1	-	-
1. No communication with DRR/XM not available 2. No or distorted audio from left side speakers when listening to digital radio 3. No or distorted audio from right side speakers when listening to digital radio				

Circuit/System Description

The digital radio receiver (DRR) receives an XM satellite radio signal via the digital radio antenna. This signal is passed to the DRR through the digital radio antenna coax. The DRR sends a varying AC mV signal through separate left and right audio circuits (+ and -) to the radio. The voltage amount and rate of change is dependent upon the type of signal being received. The radio then processes these signals and passes the audio to the appropriate speakers or amplifier.

Diagnostic Aids

When diagnosing digital radio concerns, the vehicle should be located outside with an unobstructed view of the southern sky to ensure proper reception of the satellite signal. Reception may limited, intermittent or not possible inside structures or under heavy cover.

Reference Information

Schematic Reference

Radio/Navigation System Schematics

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Connector End View Reference

Component Connector End Views

Description and Operation

Radio/Audio System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-48028 Digital Radio Test Antenna. See **Special Tools**.

Circuit/System Verification

1. Tune to a strong AM or FM station and verify each speaker is producing clear and even sound, with no distortion.
    - If any speaker is not producing sound or the sound produced is distorted, refer to **Speaker Malfunction**.
2. With the vehicle outside in an area with an unobstructed view of the southern sky, tune to XM. Verify XM reception is clear and the No XM Signal message is not displayed on the radio.
    - If the No XM Signal message is displayed or XM reception is poor, refer to Digital Radio Antenna Circuit Malfunction below.
3. Radio tuned to XM, use the radio balance function to transfer audio between the left and right side of the vehicle. Verify clear and even sound is heard from each side of the vehicle.
    - If either side of the vehicle is not producing sound or the sound produced is distorted, refer to Digital Radio Output Circuit Malfunction below.

Circuit/System Testing

Digital Radio Antenna Circuit Malfunction

1. Ignition OFF, disconnect the antenna coax from the digital radio receiver (DRR). Connect the **EL-48028** to the DRR. See **Special Tools**.
2. Ignition ON, radio tuned to XM, verify XM reception is clear and uninterrupted.

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- If reception is not clear, replace the DRR.

3. Ignition OFF, reconnect the antenna coax to the DRR, disconnect the digital radio antenna coax from the digital radio antenna.
4. Ignition ON, test for 4.5-5.5 volts between the antenna coax center terminal and the coax outer shield.
   - If not within the specified range, replace the antenna coax.
5. If all circuits test normal, replace the digital radio antenna.

Digital Radio Output Circuit Malfunction

1. Ignition OFF, disconnect the X2 harness connector at the radio.
2. Ignition ON, radio ON and tuned to XM, test for varying mV AC voltage between the following signal circuit terminals listed below and ground:
   - Left audio signal (+) - connector X2, terminal 1
   - Right audio signal (+) - connector X2, terminal 2
   - Left audio signal (-) - connector X2, terminal 9
   - Right audio signal (-) - connector X2, terminal 10
   - If the varying mV A/C voltage is not present, test the signal circuit for a short to voltage, short to ground, or an open/high resistance. If the circuit tests normal, replace the DRR.
3. If all circuits test normal, replace the radio.

Repair Procedures

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

- **Cellular Communications/Digital Radio Antenna Replacement**
- **Control Module References** for radio or DRR replacement, setup, and programming

DUAL DVD REAR SEAT ENTERTAINMENT HEADREST DISPLAY MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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
DVD Control Module B+	-	1	-	-
Left Display B+	2	2	2	-

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Right Display B+	3	3	3	-
Left Audio Signal (+)	4	5	4	-
Right Audio Signal (+)	6	7	6	-
Left DVD Video Signal (+)	8	8	8	-
Right DVD Video Signal (+)	9	9	9	-
Left Display Video Ground	8	8	8	-
Right Display Video Ground	9	9	9	-
Left Display Ground	-	2	2	-
Right Display Ground	-	3	3	-
DVD Control Module Ground	-	1	-	-

1. DVD Control Module inoperative, both displays inoperative.
2. Left display inoperative.
3. Right display inoperative.
4. Left audio distorted.
5. No sound from left audio.
6. Right audio distorted.
7. No sound from right audio.
8. Left display blank.
9. Right display blank.

Circuit Description

The DVD displays are grounded and powered by the DVD control module. When a movie is playing, the video signals are sent from the player, to the DVD control module, and back to the display. This allows the other monitor to source the same video as the player with the disc.

Reference Information

Schematic Reference

Video System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Video Entertainment System Description and Operation (Non-Headrest DVD Systems) or **Video Entertainment System Description and Operation (Dual Headrest DVD Systems)**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

One Display Inoperative

1. Ignition OFF, disconnect the X1 harness connector at the appropriate display.
2. Ignition ON, test for less than 5 ohms between the ground circuit terminal 5 and ground.
    - If greater than the specified range, test the ground circuit for an open/high resistance. If the circuit tests normal, replace the DVD control module.
3. Ignition ON, test for B+ between the ignition voltage circuit terminal 6 and ground.
    - If less than the specified value, B+ circuit for an open/high resistance. If the circuit tests normal, replace the DVD control module.
4. Ignition OFF, reconnect the X1 harness connector, and disconnect the X2 harness connector at the display.
5. Ignition ON, test for 4.5-5.5 V between the terminals listed below and ground:
    - I2C Clock Signal - terminal 5
    - I2C Data - terminal 6
    - If less than specified range, test the signal circuit for a short to ground or open/high resistance. If the circuit tests normal, replace the DVD control module.
    - If greater than specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the DVD control module.
6. If all circuits test normal, replace the appropriate display.

Both Displays Inoperative

1. Ignition OFF, disconnect the X1 harness connector at the DVD control module.
2. Test for less 5 ohms between the ground circuit terminal 3 and ground.
    - If the greater than the specified range, test the ground circuit for an open/high resistance.
3. Ignition ON, test for B+ between the accessory voltage circuit terminal and ground.
    - If less than the specified value, test the B+ circuit for a short to ground or an open/high resistance.
4. Ignition OFF, Reconnect the X1 harness connector at the DVD control module
5. Disconnect the X1 harness connector at the driver seat headrest.
6. Ignition ON, test for less than 5 ohms between the ground circuit terminal 5 and ground.
    - If greater than the specified range, test the ground circuit for an open/high resistance. If the circuit tests normal, replace the DVD control module.

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7. Ignition ON, test for B+ between the ignition voltage circuit terminal 6 and ground.
    - If less than the specified value, B+ circuit for an open/high resistance. If the circuit tests normal, replace the DVD control module.
8. Ignition OFF, reconnect the X1 harness connector, and disconnect the X2 harness connector at the display.
9. Ignition ON, test for 4.5-5.5 V between the terminals listed below and ground:
    - I2C Clock Signal - terminal 5
    - I2C Data - terminal 6
    - If less than specified range, test the signal circuit for a short to ground or open/high resistance. If the circuit tests normal, replace the DVD control module.
    - If greater than specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the DVD control module.
10. If all circuits test normal, replace the appropriate display.

DUAL DVD REAR SEAT ENTERTAINMENT HEADREST AUDIO MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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 Description

The infrared transmitter is internal to the DVD display and is grounded and powered by the DVD control module. When listening to the headphones, the infrared transmitter sends an infrared signal to the headphones. There are two channels on the headphones, the first channel is dedicated to the driver side video screen, and the other channel is dedicated to the passenger side. The audio that is sent over the DVD audio signal circuits is a varying AC voltage.

Reference Information

Schematic Reference

Video System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Video Entertainment System Description and Operation (Non-Headrest DVD Systems) or **Video**

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Entertainment System Description and Operation (Dual Headrest DVD Systems)

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

Dual DVD Rear Seat Entertainment Audio Malfunction - With FM Antenna

1. Turn ON the ignition, tune the radio to station 88.3, 88.7, 89.1, 89.5, 89.9, or 90.3MHz. Chose the station that has the least amount of regular audible radio reception.
2. Headrest DVD displays ON, insert a DVD and operate the DVD player in play mode.
3. DVD playing, DVD Surround Sound ON, set the DVD Player to the same station as the radio. Verify audio can be heard through the radio.
    - If the DVD audio can be heard review the system operation with the customer.
4. Verify the DVD player is in play mode.
5. At the DVD control module, test for AC voltage between terminal 6 and terminal 3 or 4 with a DMM at the back of the black or red connector.
    - If AC voltage is present replace the DVD control module.
6. Turn the DVD player off and disconnect both connectors from the DVD display that was playing the DVD.
7. Swap the two connectors on the display and swap the two corresponding connectors at the DVD control module. Verify the DVD audio now operates normally.
    - If the DVD audio now operates normally, replace the DVD display harness.
    - It the DVD audio is still inoperative replace the suspect DVD display.

Dual DVD Rear Seat Entertainment Audio Malfunction - Without FM Antenna

1. Turn ON the ignition, tune the radio to station 88.3, 88.7, 89.1, 89.5, 89.9, or 90.3MHz. Chose the station that has the least amount of regular audible radio reception.
2. Press the power button on the headrest DVD displays. Insert a DVD and operate the DVD player in play mode. Verify the DVD audio is distorted on one of the above stations.
    - If the DVD audio can be heard review the system operation with the customer.
3. Turn the DVD player off and disconnect both connectors from the DVD display that was playing the DVD.

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4. Swap the two connectors on the display and swap the two corresponding connectors at the DVD control module. Verify the DVD audio now operates normally.
    - If the DVD audio now operates normally, replace the DVD display harness.
    - If the DVD audio distortion persists, replace the DVD control module.

DUAL DVD REAR SEAT ENTERTAINMENT HEADREST WIRELESS HEADPHONES MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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 Description

The infrared transmitter is internal to the DVD display and is grounded and powered by the DVD control module. When listening to the headphones, the infrared transmitter sends an infrared signal to the headphones. There are two channels on the headphones, the first channel is dedicated to the driver side video screen, and the other channel is dedicated to the passenger side. The audio that is sent over the DVD audio signal circuits is a varying AC voltage.

Reference Information

Schematic Reference

Video System Schematics

Connector End View Reference

Component Connector End Views

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

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NOTE: Test or replace the headphone batteries before performing Circuit/System Verification.

1. Verify there are no obstructions that may block the infra-red port located above the video display screen.
2. Radio ON, DVD playing, verify all of the headphones are working properly and the power indicator illuminates.
    - If all of the headphones are inoperative, or the sound is distorted, refer to **Circuit/System Testing**.
    - If only one of the headphones is not producing sound on either channel, or the sound is distorted, replace the appropriate set of headphones.
3. Using a known good pair of wired headphones, plug them into both of the headphone jacks on the front of each DVD Monitor.
    - If there is audio emitted from the wired headphones, and not the wireless headphones, replace the appropriate display.

Circuit/System Testing

NOTE: Select both channels by switching the channel selector located on the side of the headphones and verify the volume is turned up. Also verify that the headphones are not in mute mode. Press the Sound Around ON/OFF button on the remote to change audio muting status.

1. Ignition OFF, disconnect the appropriate seat headrest X2 connector at the monitor.
2. Ignition ON, DVD playing, test for 15-40 mV A/C between the terminals on the monitor listed below and ground.
    - Right Audio Signal - terminal 3
    - Left Audio Signal - terminal 4
    - If the not within the specified range, replace the appropriate DVD display.
3. Ignition OFF, reconnect the harness connector at the monitor.
4. Disconnect the appropriate seat headrest X2 connector at the DVD control module.
5. Ignition ON, DVD playing, test for 15-40 mV A/C between the terminals on the monitor listed below and ground.
    - Right Audio Signal - terminal 3
    - Left Audio Signal - terminal 4
    - If the not within the specified range, replace the wiring harness.
6. If all circuits test normal, replace the DVD control module.

DUAL DVD REAR SEAT ENTERTAINMENT HEADREST REMOTE MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** prior to using this diagnostic procedure.

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- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Circuit Description

The infrared transmitter is internal to the DVD display and is grounded and powered by the DVD control module. When listening to the remote control, the remote sends an infrared signal to the infrared receiver. No external circuits are involved.

Reference Information

Schematic Reference

Video System Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

NOTE: Test or replace the remote batteries before performing Circuit/System Verification.

1. Verify there are no obstructions that may block the infra-red port located above the video display screen.
2. DVD playing, press multiple buttons on the remote control and verify the remote operatives properly at both monitors.
    - If remote fails to operate either DVD monitor, replace the remote.
    - If remote operates only one DVD monitor, replace the inoperative monitor.

ONSTAR GLOBAL POSITIONING SYSTEM (GPS) DATA NOT CURRENT OR INACCURATE

Diagnostic Instructions

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- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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 communication interface module (CIM) receives information from a specific navigation antenna located on the outside of the vehicle. The navigation antenna is connected to the CIM via a shielded coaxial cable. The antenna cable also provides a path for DC current for powering the antenna.

Diagnostic Aids

- The GPS signal title on the scan tool will display a Yes or No dependant upon whether or not the module sees an increment of the seconds transmitted by GPS signals to the vehicle communication interface module. Upon entering this screen, the GPS signal title will automatically display Yes, regardless of the presence of time increment, for at least 2 seconds, while the algorithm in the scan tool determines the status of the clock. If increment is found, Yes is continually displayed. If the clock remains static, No is displayed. The scan tool looks for increment every second, regardless of current display.
- Inaccurate or aged GPS position concerns which are no longer present may have been due to the temporary loss of GPS signal reception by the vehicle. Conditions such as driving through tunnels or parking structures while making an OnStar® keypress will restrict the navigation antenna from a clear view of the satellites in the sky and may have caused this temporary data loss.

Reference Information

Schematic Reference

OnStar Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

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Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

IMPORTANT: It is important to have the vehicle in an open outside area where a cellular call can be successfully placed and GPS data can be received from the satellites. It is also necessary to inform the OnStar® Call Center advisor that this call is for vehicle diagnostic purposes.

1. Ignition ON, observe the GPS signal status indicator for at least 10 seconds with a scan tool. The indicator should display Yes.
   - If the indicator does not display Yes, refer to **Circuit/System Testing**.
2. Call and verify the OnStar advisor has received the GPS data.
   - If the advisor did not receive the GPS data and the call was a "fail to voice", contact the GM Technical Assistance Center.
   - If the advisor did not receive the GPS data and the call was not a "fail to voice", refer to **Circuit/System Testing**.
3. Verify with the OnStar Call Center advisor that your actual position is within a reasonable distance from the actual location of the vehicle.
   - If your actual position is not within a reasonable distance from the actual location of the vehicle, replace the CIM.

Circuit/System Testing

1. Disconnect the navigation antenna coax cable from the CIM.
2. Ignition ON, test for 4.5-5.5 V between the CIM coax cable center conductor terminal at the module and ground.
   - If not within the specified range, replace the CIM.
3. Reconnect the coax cable to the CIM. Disconnect the coax cable from the navigation antenna.
4. Test for 4.5-5.5 V between the coax cable center conductor and the outer shield.
   - If not within the specified range, replace the coax cable.
5. If all circuits test normal, replace the navigation antenna.

Repair Procedures

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

- **Cellular Communications/Digital Radio Antenna Replacement**
- **Control Module References** for CIM replacement, setup, and programming

IPOD AUDIO MALFUNCTION

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Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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
PAL B+	-	1	-	-
Left Audio Signal (+)	2	3	2	-
Left Audio Signal (-)	2	3	2	-
Right Audio Signal (+)	4	5	4	-
Right Audio Signal (-)	4	5	4	-
PAL Ground	-	1	-	-
1. PAL module inoperative. No Communication with PAL or DRR, XM can not be selected from radio. BCM DTC U2172, Radio DTC U0194, LED on PAL does not illuminate. 2. No sound from left speakers when PAL or XM™ is sourced on radio. 3. No sound from left speakers when only PAL is sourced on radio. 4. No sound from right speakers when PAL or XM™ is sourced on radio. 5. No sound from right speakers when only PAL is sourced on radio.				

Circuit Description

The Apple iPod® is connected to the personal audio link (PAL) through a dedicated interface cable. The cable allows the iPod the ability to share serial data communication, audio signals, power and ground with the vehicle. The T-harness used to connect the PAL module shares the same power and grounds as the radio. The audio signal circuits are shared with the Digital Radio Receiver audio circuits. The PAL module receives Data communication by connecting inline with the DRR.

Diagnostic Aids

- After PAL is installed, it is only possible to communicate with the DRR when the radio is ON and XM band selected.
- If radio is OFF, or tuned to any other band a NO COMM message for DRR is displayed on Tech2 (Vehicle DTC Check).
- PAL module maintains a persistent B1000 code that cannot be cleared, and does not affect operation.
- If PAL module loses power or ground, BCM and Radio set DTCs for loss of communication with DRR.
- The iPod® interface connector is susceptible to vibration and movement damage. It is recommended that excessive movement of the iPod® and cable be avoided while driving.

Reference Information

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Schematic Reference

Radio/Navigation System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Radio/Audio System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

NOTE: Verify that the iPod® is in good working order and visually inspect the iPod® connector cavity for any signs of damage before performing this diagnostic. Verify the most up to date software has been downloaded from http://www.apple.com/support/ipod/ to the iPod® before performing this diagnostic.

1. Tune to a strong AM or FM station and verify each speaker is producing clear and even sound, with no distortion.
    - If any speaker is not producing sound or the sound produced is distorted, refer to **Speaker Malfunction**.
2. Ignition ON, Observe the PAL red LED lamp. Verify the red LED lamp is illuminated.
    - If the PAL red LED is not illuminated, go to Circuit/System Testing.
3. Set the radio to the iPod® interface menu and attempt to operate audio from the iPod®.
4. Inspect the interface harness at the connection to the iPod® and verify that audio quality from the iPod® is not changed when the harness is bent in multiple directions.
    - If the audio changes quality or drops out, inspect the iPod® connector cavity or interface cable for damage. If no damage found, replace the iPod® interface cable.

Circuit/System Testing

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1. Ignition OFF, disconnect the harness connector at the PAL module.
2. Test for less than 5 ohms between terminal 9 and ground.
    - If greater than specified value, test the ground circuit for an open/high resistance.
3. Ignition ON, verify that a test lamp illuminates between terminal 16 and ground.
    - If the test lamp does not illuminate, test the B+ circuit for an open/high resistance.
4. Ignition OFF, reconnect the harness connector at the PAL module.
5. Disconnect the X2 harness connector at the radio.
6. Radio ON, iPod sourced and playing, test for a varying mV AC voltage between the following signal circuit terminals listed below and ground.
    - Left audio signal (+) - terminal 1
    - Right audio signal (+) - terminal 2
    - Left audio signal (-) - terminal 9
    - Right audio signal (-) - terminal 10
    - If the varying mV A/C voltage is not present, test the signal circuit for a short to voltage, short to ground, or an open/high resistance. If the circuits tests normal, replace the PAL module.
7. If all circuits test normal, replace the radio.

Circuit/System Testing

PAL LED Indicator Malfunction

1. Ignition OFF, disconnect the PAL harness connector.
2. Ignition ON, verify that a test lamp illuminates between the PAL B+ circuit terminal and ground.
    - If the test lamp does not illuminate, test the B+ circuit for an open/high resistance.
3. Verify that a test lamp illuminates at both PAL ground circuit terminals and B+.
    - If the test lamp does not illuminate, test the ground circuits for an open/high resistance.
4. If all circuits test normal, replace the PAL.

Repair Procedures

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

- For PAL replacement, refer to Ipod® interface installation instructions.
- **Control Module References** for radio replacement, setup, and programming

ONSTAR MICROPHONE MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.

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- **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
Cellular Microphone Signal	B2455 04	B2455 04	B2455 04	-
Cellular Microphone Low Reference	-	B2455 04	1	-
1. OnStar Microphone Inoperative - Caller Cannot Be Heard				

Circuit/System Description

The communication interface module (CIM) provides the cellular microphone with a supplied voltage on the cellular microphone signal circuit. When the microphone is in use, voice data from the user is sent back to the CIM on the signal circuit. The CIM provides a ground for the microphone via the low reference circuit.

Reference Information

Schematic Reference

OnStar Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the cellular microphone.
2. Test for less than 10 ohms between the low reference circuit terminal A and ground.

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- If greater than the specified range, test the circuit for an open/high resistance.

3. Ignition ON, test for 9.5-10.5 V between the signal circuit terminal B and ground.
   - If less than the specified range, test the circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the CIM.
   - If greater than the specified range, test the circuit for a short to voltage. If the circuit tests normal, replace the CIM.
4. If all circuits test normal, replace the cellular microphone.

Repair Procedures

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

- **Mobile Telephone Microphone Replacement**
- **Control Module References** for CIM replacement, setup, and programming

NAVIGATION SYSTEM - VOICE RECOGNITION MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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.

Reference Information

Schematic Reference

OnStar Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Circuit/System Testing

1. Verify the OnStar® voice recognition is operating normally.

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- If the OnStar® voice recognition is inoperative, refer to **OnStar Microphone Malfunction**.

2. Ignition OFF, disconnect the radio harness connector X1 and CIM harness connector X3.
3. Test for less than 1 volt on the voice recognition audio signal circuit radio harness connector terminal 4 and ground.
   - If greater than specified value, test the circuit for a short to voltage.
4. Test for greater than 1 ohm between the voice recognition audio signal circuit radio harness connector terminal 4 and ground.
   - If less than specified value, test the circuit for a short to ground.
5. Test for less than 1 ohm between the voice recognition audio signal circuit radio harness connector terminal 4 and the voice recognition audio signal circuit CIM harness connector terminal 2.
   - If greater than specified value, test the circuit for an open/high resistance.
6. Test for less than 1 volt on the voice recognition audio low reference circuit radio harness connector terminal 5 and ground.
   - If greater than specified value, test the circuit for a short to voltage..
7. Test for greater than 1 ohm between the voice recognition audio low reference circuit radio harness connector terminal 5 and ground.
   - If less than specified value, test the circuit for a short to ground.
8. Test for less than 1 ohm between the voice recognition audio low reference circuit radio harness connector terminal 5 and the voice recognition audio low reference signal circuit CIM harness connector terminal 4.
   - If greater than specified value, test the circuit for an open/high resistance.
9. If all circuits test normal, replace the radio.

Repair Procedures

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

Control Module References for radio replacement, setup, and programming

ONSTAR AUDIO MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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

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Cellular Telephone Voice Signal	1	1	1	-
Cellular Telephone Voice Low Reference	-	1	-	-
1. No (or Noisy) OnStar® Audio				

Circuit/System Description

When an OnStar® keypress is made, a serial data message is sent to the audio system to mute all radio functions and output OnStar® originated audio. After the audio system is muted, the communication interface module (CIM) transmits signals to the audio system on the cellular telephone voice signal and cellular telephone voice low reference circuits.

Reference Information

Schematic Reference

- **OnStar Schematics**
- **Radio/Navigation System Schematics**

Connector End View Reference

Component Connector End Views

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Tune radio to a known good station and verify the audio is heard clearly through all speaker channels.
   - If audio is not heard clearly, refer to **Speaker Malfunction**.
2. Ignition ON, radio ON, set volume to comfortable level and press OnStar® Call Center button. Verify Connecting to OnStar® message is heard clearly through the audio system.
   - If OnStar® message is noisy or distorted, refer to **Circuit/System Testing**.

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Circuit/System Testing

1. Ignition OFF, disconnect the X2 harness connector at the radio.
2. Ignition ON, test for a varying AC voltage between the following signal circuit terminals listed below and ground when the OnStar® Call Center button is pressed.
    - Audio Signal Circuit- terminal 7
    - Audio Common Circuit- terminal 15
    - If AC voltage was not present, test the circuit for a short to voltage, short to ground, or an open/high resistance. If the circuit tests normal, replace the CIM.
3. If all circuits test normal, replace the radio.

Repair Procedures

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

Control Module References for radio or CIM replacement, setup, and programming.

NO GLOBAL POSITIONING SYSTEM (GPS) RECEPTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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 Description

The global positioning system (GPS) antenna is connected to the navigation radio by a shielded coaxial cable. The antenna cable also provides a path for DC current for powering the GPS antenna.

Reference Information

Schematic Reference

Radio/Navigation System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Navigation System Description and Operation

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Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

NOTE: **The global positioning system (GPS) requires a clear line of sight to the sky to operate properly. In most cases the GPS will not have reception near tall buildings or inside structures.**

1. Ignition OFF, disconnect the GPS antenna coax cable from the navigation radio.
2. Ignition ON, test for 4.5-5.5 V between the coax cable center conductor terminal at the radio and ground.
    - If not within the specified range, replace the radio.
3. If all circuits test normal, replace the GPS antenna.

Repair Procedures

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

- **Electronic Navigation Antenna Replacement**
- **Control Module References** for Radio replacement, setup, and programming

NOISE COMPENSATED VOLUME MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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.

Reference Information

Schematic Reference

Radio/Navigation System Schematics

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Connector End View Reference

Component Connector End Views

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

IMPORTANT: Noise compensated volume only available on vehicles equipped with Y91 or UQS.

1. Turn the ignition ON. Disconnect the noise compensation microphone.
2. Measure for 7-9 volts between the noise compensation microphone supply circuit terminal A and the drain circuit terminal B.
    - If the voltage is less than the specified range, test the circuits for a short to ground, or an open/high resistance. If the circuit tests normal, replace the auido amplifier.
    - If the voltage is greater than the specified range, test the circuits for a short to voltage. If the circuit tests normal, replace the audio amplifier.
3. If all circuits test normal, replace the noise compensation microphone.

Repair Procedures

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

Control Module References for radio replacement, setup, and programming

ONSTAR BUTTON LED MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Keypad Supply Voltage	B2476 00	B2476 00	B2476 00	-
Keypad Green LED Signal	1	1	2	-
Keypad Red LED Signal	1	1	2	-
Keypad Signal	3	3	-	-
Inside Rearview Mirror Ground	-	1	-	-
1. OnStar® LED Inoperative 2. LED Illuminated At All Times 3. OnStar® Buttons Inoperative				

Circuit Description

The OnStar® status LEDs are located with the OnStar buttons. The green LED is illuminated when the system is ON and operating normally. When the green LED is green and flashing, it is an indication that a call is in progress. When the red LED is illuminated, a system malfunction is present. In the event there is a system malfunction and the OnStar® system is still able to make a call, the LED will flash red during the call. The OnStar® LEDs are controlled by the communication interface module (CIM) via the keypad green LED signal circuit and the keypad red LED signal circuit.

Reference Information

Schematic Reference

OnStar Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

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Circuit/System Verification

1. Ignition ON, command the Green LED ON and OFF with a scan tool while observing the green LED on the inside rearview mirror. The green LED should turn ON and OFF when commanded.
2. Command the red LED ON and OFF with a scan tool while observing the red LED on the inside rearview mirror. The red LED should turn ON and OFF when commanded.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the inside rearview mirror.
2. Doors closed, courtesy lamps OFF, test for less than 5 ohms between the ground circuit terminal 8 and ground.
    - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Ignition ON, command the green LED OFF with a scan tool. Test for less than 1 volt between the control circuit terminal 14 and ground.
    - If greater than the specified range, test the control circuit for a short to voltage. If the circuit tests normal, replace the CIM.
4. Command the green LED ON with a scan tool. Test for greater than 9 volts between the control circuit terminal 14 and ground.
    - If less than the specified range, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the CIM.
5. Command the red LED OFF with a scan tool. Test for less than 1 volt between the control circuit terminal 15 and ground.
    - If greater than the specified range, test the control circuit for a short to voltage. If the circuit tests normal, replace the CIM.
6. Command the red LED ON with a scan tool. Test for greater than 9 volts between the control circuit terminal 15 and ground.
    - If less than the specified range, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the CIM.
7. If all circuits test normal, replace the inside rearview mirror.

Repair Procedures

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

- **Inside Rearview Mirror Replacement**
- **Control Module References** for CIM replacement, setup, and programming

ONSTAR CALL CENTER REMOTE FUNCTION REQUESTS MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** prior to using this diagnostic procedure.

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- 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 communication interface module (CIM) has the capability of commanding the horn, initiating door lock/unlock, or operating the exterior lamps using the serial data circuits. These functions are commanded by the OnStar® Call Center per a customer request.

Diagnostic Aids

The customer concern may have been due to a lack of cellular service in a given area. A failure in the National Cellular Network infrastructure that has since been corrected.

Reference Information

Schematic Reference

OnStar Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

IMPORTANT:

- **It is necessary to inform the OnStar® Call Center advisor that this call is for vehicle diagnostic purposes.**
- **It is necessary to have the vehicle in an open outside area where a cellular call can be successfully placed and GPS data can be received from**

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satellites.

1. Verify that the horn, lights, and the doors locks on the vehicle operate properly.
   - If the applicable system does not operate properly, refer to **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** .
2. Contact the OnStar® Call Center by pressing the blue OnStar® button. Verify with the OnStar® advisor that all of the remote functions (door locks, lights, or horn) work.
   - If unable to connect with the OnStar® call center, refer to **Unable to Contact OnStar Call Center**.
   - If the remote functions do not operate when requested, replace the CIM.

Repair Procedures

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

Control Module References for CIM replacement, setup, and programming

ONSTAR BUTTON MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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
Keypad Supply Voltage	B2476 00	B2476 00	B2476 00	-
Keypad Green LED Signal	1	1	2	-
Keypad Red LED Signal	1	1	2	-
Keypad Signal	3	3	-	B2482 00
Inside Rearview Mirror Ground	-	1	-	-
1. OnStar® LED Inoperative 2. LED Illuminated At All Times 3. OnStar® Buttons Inoperative				

Circuit/System Description

The OnStar® button assembly consists of 3 buttons, Call/Answer, OnStar® Call Center, and OnStar® Emergency. The communication interface module (CIM) supplies the OnStar® button assembly with 10 volts via the keypad supply voltage circuit. Each of the buttons, when pressed, completes the circuit across a resistor

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allowing a specific voltage to be returned to the CIM over the keypad signal circuit. Depending upon the voltage range returned, the CIM is able to identify which button has been activated.

Reference Information

Schematic Reference

OnStar Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

IMPORTANT: Contact the OnStar® Call Center first before pressing the emergency button in order to notify them of the test.

Ignition ON, press the OnStar® Call buttons one at the time. Verify that all of the OnStar® buttons operate normally.

- If some OnStar® buttons are inoperative but not all, replace the inside rearview mirror.
- If none of the OnStar® buttons operate, refer to circuit/system testing below.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the inside rearview mirror.
2. Test for less than 10 ohms between the mirror ground circuit terminal 8 and ground.
   - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Ignition ON, test for less than 1 V between the keypad signal circuit terminal 11 and ground.

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- If greater than the specified range, test the keypad signal circuit for a short to voltage. If the circuit tests normal, replace the CIM.

4. Ignition OFF, test for 600 K-800 K ohms between the keypad signal circuit terminal 11 and ground.
   - If less than the specified range, test the keypad signal circuit for a short to ground. If the circuit tests normal, replace the CIM.
   - If greater than the specified range, test the keypad signal circuit for an open/high resistance. If the circuit tests normal, replace the CIM.
5. Ignition ON, test for 9.5-10.5 V between the keypad supply voltage circuit terminal 12 and ground.
   - If less than the specified range, test the supply voltage circuit for a short to ground or open/high resistance. If the circuit tests normal, replace the CIM.
   - If greater than the specified range, test the supply voltage circuit for a short to voltage. If the circuit tests normal, replace the CIM.
6. If all circuits test normal, test or replace the button assembly.

Component Testing

1. Ignition OFF, disconnect the harness connector at the inside rearview mirror.
2. Test for infinite resistance between the keypad supply voltage terminal 12 and the keypad signal terminal 11.
   - If less than the specified range, replace the inside rearview mirror.
3. Test for 1.4 K-1.6 K ohms between the keypad supply voltage terminal 12 and the keypad signal terminal 11 while pressing the red emergency button.
   - If not within the specified range, replace the inside rearview mirror.
4. Test for 2.7 K-3.3 K ohms between the keypad supply voltage terminal 12 and the keypad signal terminal 11 while pressing the blue On-Star® button.
   - If not within the specified range, replace the inside rearview mirror.
5. Test for 12.5 K-13.5 K ohms between the keypad supply voltage terminal 12 and the keypad signal terminal 11 while pressing the black phone button.
   - If not within the specified range, replace the inside rearview mirror.

Repair Procedures

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

- **Inside Rearview Mirror Replacement**
- **Control Module References** for CIM replacement, setup, and programming

ONSTAR STEERING WHEEL CONTROL FUNCTIONS MALFUNCTION

Some vehicles equipped with the OnStar® system have the capability of accessing voice mailboxes and other automated phone systems by means of the steering wheel controls, while the OnStar® Personal Calling (OPC) feature is in use. If the "Talk" or "Mute" button (depending upon the vehicle) on the steering wheel controls is depressed during an OPC call, the communication interface module (CIM) receives the message on the serial

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data bus from either the radio or body control module (BCM). This message is interpreted as a request to turn any spoken numbers into dual tone multi-frequency (DTMF) tones to be delivered over the airwaves to the phone system the user is communicating with. Complete instructions for operation of these features can be found in the information provided to the customer with the OnStar® system.

The steering wheel controls are a resistor network that consist of multiple momentary contact switches and a series of resistors. The switches and resistor network are arranged so that each switch has a different resistance value. When a switch is pressed, a voltage drop occurs in the resistor network, which produces a specific voltage value unique to the switch selected, to be interpreted by either the radio or BCM. In the event the OnStar® steering wheel control functions are inoperative, technicians should refer to **Steering Wheel Controls Malfunction** , to begin diagnosis of the steering wheel control concern.

RADIO AUDIO MALFUNCTION AT REAR SEAT AUDIO (RSA) CONTROL

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provide an overview of each diagnostic category.

Reference Information

Schematic Reference

Radio/Navigation System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Radio/Audio System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

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Circuit/System Verification

1. Radio ON, verify clear audio is heard from each audio speaker with the RSA system OFF.
    - If audio is inoperative from one or all speakers, refer to **Speaker Malfunction**.
2. Using a known good pair of wired headphones, plug them into both of the headphone jacks on the RSA controller.
3. Radio ON, RSA ON, cycle through several sources and listen for audio. Adjust appropriate volume control.
    - If no audio is heard through the headphones, replace the RSA controller.

Repair Procedures

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

Rear Seat Audio Control Replacement

REAR SEAT RADIO CONTROLS INOPERATIVE

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provide an overview of each diagnostic category.

Reference Information

Schematic Reference

Radio/Navigation System Schematics

Connector End View Reference

Component Connector End Views

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

Radio ON, verify clear audio is heard from each audio speaker with the RSA system OFF.

- If audio is inoperative from one or all speakers, refer to **Speaker Malfunction**.

Circuit/System Testing

1. Ignition OFF, disconnect the X1 harness connector at the rear seat audio (RSA) controller.
2. Test for less than 5 ohms between the ground circuit terminal 6 and ground.
   - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Radio ON, test for battery voltage between the battery positive voltage circuit terminal 5 and ground.
   - If less than the specified range, test the voltage circuit for a short to ground or an open/high resistance.
4. If all circuits test normal, replace the rear seat audio controller.

Repair Procedures

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

Rear Seat Audio Control Replacement

RADIO DISPLAYS CAL OR CAL ERR

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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.

Reference Information

Schematic Reference

Radio/Navigation System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Radio/Audio System Description and Operation

cardiagn.com

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 the CAL or CAL ERROR is not displayed on radio.

- If the radio displays CAL or CAL ERROR, reprogram the radio. If the radio still displays CAL or CAL ERR after performing the reprogramming procedure, replace the radio.

Repair Procedures

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

Control Module References for Radio replacement, setup, and programming

RADIO DISPLAYS LOC, LOCKED, OR CODE

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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 Description

Theft Lock is activated when the VIN as received over the data communication circuit and the VIN as stored in the module memory do not match. This also occurs when no VIN is received over the data communication circuit. The only circuit required is the communication line.

Diagnostic Aids

This symptom may be an indication that an incorrect radio is installed in the vehicle, or that the radio was replaced without reprogramming with the new information.

Reference Information

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Schematic Reference

Radio/Navigation System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Radio/Audio System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Verify LOC, LOCKED, or CODE is not displayed on radio.

- If the radio displays LOC, LOCKED, or CODE, reprogram the radio. If the radio still displays LOC, LOCKED, or CODE after performing the reprogramming procedure, replace the radio.

Repair Procedures

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

Control Module References for Radio replacement, setup, and programming

RADIO DOES NOT INTERFACE WITH IPOD

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
PAL B+	-	1	-	-
Left Audio Signal (+)	2	3	2	-
Left Audio Signal (-)	2	3	2	-
Right Audio Signal (+)	4	5	4	-
Right Audio Signal (-)	4	5	4	-
PAL Ground	-	1	-	-
1. PAL module inoperative. No Communication with PAL or DRR, XM can not be selected from radio. BCM DTC U2172, Radio DTC U0194, LED on PAL does not illuminate. 2. No sound from left speakers when PAL or XM™ is sourced on radio. 3. No sound from left speakers when only PAL is sourced on radio. 4. No sound from right speakers when PAL or XM™ is sourced on radio. 5. No sound from right speakers when only PAL is sourced on radio.				

Circuit Description

The Apple iPod® is connected to the personal audio link (PAL) through a dedicated interface cable. The cable allows the iPod the ability to share serial data communication, audio signals, power and ground with the vehicle. The T-harness used to connect the PAL module shares the same power and grounds as the radio. The audio signal circuits are shared with the Digital Radio Receiver audio circuits. The PAL module receives Data communication by connecting inline with the DRR.

Diagnostic Aids

- After PAL is installed, it is only possible to communicate with the DRR when the radio is ON and XM band selected.
- If radio is OFF, or tuned to any other band a NO COMM message for DRR is displayed on Tech2 (Vehicle DTC Check).
- PAL module maintains a persistent B1000 code that cannot be cleared, and does not affect operation.
- If PAL module loses power or ground, BCM and Radio set DTCs for loss of communication with DRR.
- The iPod® interface connector is susceptible to vibration and movement damage. It is recommended that excessive movement of the iPod® and cable be avoided while driving.

Reference Information

Schematic Reference

Radio/Navigation System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

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Radio/Audio System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

NOTE: Verify that the iPod® is in good working order and visually inspect the iPod® connector cavity for any signs of damage before performing this diagnostic. Verify the most up to date software has been downloaded from http://www.apple.com/support/ipod/ to the iPod® before performing this diagnostic.

1. Tune to a strong AM or FM station and verify each speaker is producing clear and even sound, with no distortion.
   - If any speaker is not producing sound or the sound produced is distorted, refer to **Symptoms - Entertainment**.
2. Ignition ON, Observe the PAL red LED lamp. Verify the red LED lamp is illuminated.
   - If the PAL red LED is not illuminated, go to Circuit/System Testing.
3. Set the radio to the iPod® interface menu and attempt to operate audio from the iPod®.
4. Inspect the interface harness at the connection to the iPod® and verify that audio quality from the iPod® is not changed when the harness is bent in multiple directions.
   - If the audio changes quality or drops out, inspect the iPod® connector cavity or interface cable for damage. If no damage found, replace the iPod® interface cable.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the PAL module.
2. Test for less than 5 ohms between terminal 9 and ground.
   - If greater than specified value, test the ground circuit for an open/high resistance.
3. Ignition ON, verify that a test lamp illuminates between terminal 16 and ground.
   - If the test lamp does not illuminate, test the B+ circuit for an open/high resistance.
4. Ignition OFF, reconnect the harness connector at the PAL module.
5. Ignition ON, set the radio to the iPod® interface menu and attempt to operate audio from the iPod®.
   - If the iPod® fails to communicate with the radio, replace the interface cable.

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6. Near the BCM connector, verify the serial data circuit from PAL is properly spliced to the serial data circuit.
    - If the serial data circuit is not connected, reconnect the circuit.
7. Ignition OFF, disconnect the PAL module and the X1 radio harness connector.
8. Test for less than 1 ohms between terminal 9 at the X1 radio harness connector and terminal 5 at the X1 PAL module harness connector.
    - If greater than specified value, replace the T-harness.
9. If all systems test normal, replace the PAL module.

Repair Procedures

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

For PAL replacement, refer to Ipod® interface installation instructions.

RADIO POOR RECEPTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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

AM and FM radio reception is dependent on the following components:

- Radio antenna
- Coax cable between the radio antenna and the radio antenna module
- Radio antenna module
- Coax cable between the radio antenna module and the radio
- Radio

Diagnostic Aids

NOTE: Radio systems with the antenna(s) in the glass are subject to possible interference when an aftermarket window tint is applied, especially when there is a metallic present in the film.

Poor AM and FM radio reception is dependent on multiple influences, some of which may not be vehicle related. Areas which have high RF traffic or block the signal path may cause a degradation in radio reception. Radio reception may also be influenced by items within the vehicle, but not part of the radio system. Such examples are aftermarket electrical accessories or other items which may generate noise in the vehicle electrical

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system.

AM reception is highly dependent on the antenna module receiving battery voltage from the radio and being properly grounded. The antenna module has a built in antenna amplifier that boosts both AM and FM reception. When the antenna module does not receive power, AM stations will not be received and FM reception will be limited. If the module is not properly grounded, excessive interference in the signal may occur, or reception may be limited.

Reference Information

Schematic Reference

Radio/Navigation System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Radio/Audio System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Inspect the antenna for proper mounting or physical damage.
    - If damage is found, repair or replace as necessary
2. Radio ON, tune to several known FM, AM, and XM (if equipped) stations, and play a known good CD.
    - If audio output is poor from all sources, refer to **Speaker Malfunction**.

Circuit/System Testing

Rear Glass Antenna Testing

1. Inspect the antenna on the rear glass. Verify all branches of the antenna are intact, with no scratches or

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other damage.
    - If damage is found, repair or replace as necessary.
2. Verify the connector at the back glass is properly secured and free of any damage.
    - If damage is found, repair or replace as necessary.
3. Inspect the radio antenna module grounding surfaces and the mounting hardware for any corrosion that may cause a poor ground.
    - If corrosion is noted, clean the grounding surfaces or hardware.
4. Ignition OFF, disconnect the harness connector at the radio antenna module.
5. Ignition ON, radio ON, test for B+ between the signal circuit terminal 1 and ground.
    - If less than the specified value, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the radio.
6. Disconnect the antenna coax from the radio and the radio antenna module.
7. Test for infinite resistance between the antenna coax center terminal and ground.
    - If less than the specified value, replace the antenna coax.
8. Test for infinite resistance between the coax center terminal and the outer shield.
    - If less than the specified value, replace the antenna coax.
9. Test for less than 5 ohms on the antenna coax center terminal from end to end.
    - If greater than the specified value, replace the antenna coax.
10. Test for less than 5 ohms on the antenna coax outer shield from end to end.
    - If greater than the specified value, replace the antenna coax.
11. If all circuits test normal, replace the antenna module. Reconnect the antenna coax.
12. Ignition ON, radio ON, verify radio reception has improved.
    - If reception is still poor, replace the radio.

Fixed Mast Antenna Testing

1. Ignition OFF, disconnect the radio antenna coax cable from the radio and the radio antenna.
2. Test for infinite resistance between the antenna coax center terminal and ground.
    - If less than the specified value, replace the antenna coax.
3. Test for infinite resistance between the coax center terminal and the outer shield.
    - If less than the specified value, replace the antenna coax.
4. Test for less than 5 ohms on the antenna coax center terminal from end to end.
    - If greater than the specified range, replace the antenna coax.
5. Test for less than 5 ohms on the antenna coax outer shield from end to end.
    - If greater than the specified range, replace the antenna coax.
6. Reconnect the coax to the radio antenna. Test for infinite resistance on the coax at the radio between the center terminal and the outer shield.
    - If less then specified value, replace the antenna.
7. Test for less than 10 ohms on the coax at the radio between the outer shield and ground.

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- If greater than specified value, clean the mounting surface of the antenna ground plane. If no corrosion found, replace the antenna.

8. If all circuits test normal, replace the radio.

Repair Procedures

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

- **Radio Antenna Module Replacement**
- **Antenna Cable Replacement (W/O Fixed Antenna)**
- **Radio Antenna Cable Extension Cable Replacement (Avalanche/Escalade EXT)**
- **Radio Antenna Replacement**
- **Control Module References** for radio replacement, setup, and programming

SPEAKER REPLACEMENT REFERENCE

Component	Repair Instruction
Front Floor Console Speaker	Refer to **Radio Front Floor Console Speaker Replacement**
Front Speakers	Refer to **Radio Front Speaker Replacement**
Front Door Speakers	Refer to **Radio Front Side Door Speaker Replacement**
Front Pillar Speakers	Refer to **Front Upper Speaker Replacement**
Rear Pillar Speakers	Refer to **Rear Pillar Speaker Replacement**
Rear Door Speakers	Refer to **Radio Rear Side Door Speaker Replacement**

SPEAKER MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Left Front Speaker Signal Circuits (Front Door and Tweeter)	B1025 02*	B1025 04*	B1025 01*	-
Right Front Speaker Signal Circuits	B1035 02*	B1035 04*	B1035 01*	-

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(Front Door and Tweeter)				
Left Rear Speaker Signal Circuits (Rear Door)	B1045 02*	B1045 04*	B1045 01*	-
Right Rear Speaker Signal Circuits (Rear Door)	B1055 02*	B1055 04*	B1055 01*	-
Front Center Speaker Signal Circuits (Center IP)	B1065 02*	B1065 04*	B1065 01*	-
Subwoofer Low Level Audio Signal Circuits (Center Console)	B1075 02*	B1075 04*	B1075 01*	-
Left Midrange Speaker Signal Circuits (LR D-Pillar)	B1085 02*	B1085 04*	B1085 01*	-
Right Midrange Speaker Signal Circuits (RR D-Pillar)	B1095 02*	B1055 04*	B1095 01*	-
* Noticeable audio distortion possible.				

Circuit/System Description

Each of the audio output channel circuits (+) and (-), at the radio and audio amplifier have a DC bias voltage that is one half of the battery voltage. When using a DMM, each of the audio output channel circuits will measure approximately 6.5V DC. The audio being played on the system is produced by a varying AC voltage that is centered around the DC bias voltage on the same circuit. The AC voltage is what causes the speaker cone to move and produce sound. This voltage will vary depending on what type of audio is being listened to, talk or music, and type of music, as well as the volume setting of the system. Low volume and talk settings will measure around 1V AC and less, where constant music may measure 3V AC and slightly higher.

Diagnostic Aids

- Improper speaker mounting or loose trim may cause an audible buzz or distortion. Inspect the appropriate speaker and the surrounding interior trim for proper and secure mounting. If the speaker or surrounding interior trim is found to be loose or improperly secured, correctly secure the item.
- When equipped with an amplifier, it is possible for some individual circuit faults to affect more than one speakers operation. Perform diagnostic tests in the sequence listed to avoid misdiagnosis.
- The front tweeter speakers are connected to the same channel as the front door speakers.

Reference Information

Schematic Reference

Radio/Navigation System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

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Radio/Audio System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Radio ON, Rear Seat Audio (RSA) OFF (if equipped), adjust the fade and balance controls on the radio to test all four channels individually. Each of the four channels should produce clear and even sound.

Without Amplifier

Radio ON, verify clear audio is heard from each audio speaker.

- If audio is inoperative from all speakers, replace the radio.
- If audio is inoperative from one or more, but not all, speakers or the audio emitted from the speakers is not clear, refer to Speaker Circuit Malfunction - without Amplifier below.

With Amplifier

Radio ON, verify clear audio is heard from each audio speaker.

- If audio is inoperative from all speakers, refer to Amplifier Circuit Malfunction.
- If audio is inoperative from one or more, but not all, speakers or the audio emitted from the speakers is not clear, refer to speaker output tests below.

Circuit/System Testing

Speaker Circuit Malfunction - without Amplifier

1. Ignition OFF, disconnect the harness connector at the appropriate speaker.
2. Radio ON, test for 5.0-7.5 volts between the signal circuit terminal A and ground.
   - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the radio.
   - 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 radio.
3. Test for 5.0-7.5 volts between the signal circuit terminal B and ground.

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- If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the radio.
- 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 radio.

4. If all circuits test normal, replace the speaker.

Amplifier Circuit Malfunction

1. Ignition OFF, disconnect the X1 harness connector at the audio amplifier.
2. Ignition OFF, test for less than 1 volt between the ground circuit terminal 8 and ground.
   - If greater than the specified range, test the ground circuit for an short to voltage.
3. Ignition OFF, test for less than 10 ohms between the ground circuit terminal 8 and ground.
   - If greater than the specified range, test the ground circuit for an open/high resistance.
4. Ignition ON, test for B+ between the B+ circuit terminal 4 and ground.
   - If less then specified value, test the circuit for a short to ground, or an open/high resistance.
5. Ignition OFF, disconnect the X3 harness connector at the audio amplifier.
6. For vehicles without RPO code Y91 only: Radio ON, test for B+ between the amplifier control circuit terminal 11 and ground.
   - If less than the specified range, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the radio.
7. If all circuits test normal, replace the audio amplifier.

Speaker Malfunction Radio Output Testing UQA

1. Ignition OFF, disconnect the X3 harness connector at the amplifier.
2. Radio ON, test for 5.0-7.5 volts between the appropriate signal circuit terminal listed below and ground.
   - Left front low level audio signal (+) - terminal 15
   - Left front low level audio signal (-) - terminal 7
   - Right front low level audio signal (+) - terminal 14
   - Right front low level audio signal (-) - terminal 6
   - Left rear low level audio signal (+) - terminal 13
   - Left rear low level audio signal (-) - terminal 5
   - Right rear low level audio signal (+) - terminal 12
   - Right rear low level audio signal (-) - terminal 4
   - 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 radio.
   - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the radio.
3. If all circuits test normal, replace the amplifier.

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Speaker Malfunction Radio Output Testing UQS or UQA with Y91

1. Ignition OFF, disconnect the X3 and X4 harness connectors at the amplifier.
2. Radio ON, test for 5.0-7.5 volts between the appropriate signal circuit terminal listed below and ground.
    - Left front low level audio signal (+) - terminal 11 X3
    - Left front low level audio signal (-) - terminal 12 X3
    - Right front low level audio signal (+) - terminal 3 X3
    - Right front low level audio signal (-) - terminal 4 X3
    - Left rear low level audio signal (+) - terminal 11 X4
    - Left rear low level audio signal (-) - terminal 12 X4
    - Right rear low level audio signal (+) - terminal 3 X4
    - Right rear low level audio signal (-) - terminal 4 X4
    - Subwoofer low level audio signal (+) - terminal 5 X4
    - Subwoofer low level audio signal (-) - terminal 6 X4
    - Center Channel low level audio signal (+) - terminal 13 X4
    - Center Channel low level audio signal (-) - terminal 14 X4
    - 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 radio.
    - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the radio.
3. If all circuits test normal, replace the amplifier.

Speaker Malfunction Radio Output Testing UQA with U42

1. Ignition OFF, disconnect the X3 harness connector at the amplifier.
2. Radio ON, test for 5.0-7.5 volts between the appropriate signal circuit terminal listed below and ground.
    - Left front low level audio signal (+) - terminal 15
    - Left front low level audio signal (-) - terminal 7
    - Right front low level audio signal (+) - terminal 14
    - Right front low level audio signal (-) - terminal 6
    - 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 radio.
    - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the radio.
3. Ignition OFF, reconnect the X3 harness connector at the amplifier.
4. Disconnect the X2 harness connector at the rear seat audio (RSA) module.
5. Radio ON, test for 5.0-7.5 volts between the appropriate signal circuit terminal listed below and ground.
    - Left rear low level audio signal (+) - terminal 1
    - Left rear low level audio signal (-) - terminal 2

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- Right rear low level audio signal (+) - terminal 3
- Right rear low level audio signal (-) - terminal 4
  - 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 rear seat audio (RSA) module.
  - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the rear seat audio (RSA) module.

6. Ignition OFF, reconnect the X2 harness connector at the rear seat audio (RSA) module.
7. Disconnect the X3 harness connector at the amplifier.
8. Radio ON, test for 5.0-7.5 volts between the appropriate signal circuit terminal listed below and ground.
   - Left rear low level audio signal (+) - terminal 13
   - Left rear low level audio signal (-) - terminal 5
   - Right rear low level audio signal (+) - terminal 12
   - Right rear low level audio signal (-) - terminal 4
     - 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 rear seat audio (RSA) module.
     - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the rear seat audio (RSA) module.
9. If all circuits test normal, replace the amplifier.

Speaker Malfunction Radio Output Testing UQA with Y91 or UQS

1. Ignition OFF, disconnect the X3 and X4 harness connectors at the amplifier.
2. Radio ON, test for 5.0-7.5 volts between the appropriate signal circuit terminal listed below and ground.
   - Left front low level audio signal (+) - terminal 11 X3
   - Left front low level audio signal (-) - terminal 12 X3
   - Right front low level audio signal (+) - terminal 3 X3
   - Right front low level audio signal (-) - terminal 4 X3
   - Left rear low level audio signal (+) - terminal 11 X4
   - Left rear low level audio signal (-) - terminal 12 X4
   - Right rear low level audio signal (+) - terminal 3 X4
   - Right rear low level audio signal (-) - terminal 4 X4
   - Subwoofer low level audio signal (+) - terminal 5 X4
   - Subwoofer low level audio signal (-) - terminal 6 X4
   - Center Channel low level audio signal (+) - terminal 13 X4
   - Center Channel low level audio signal (-) - terminal 14 X4
     - 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 radio.
     - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the radio.

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3. If all circuits test normal, replace the amplifier.

Speaker Malfunction Radio Output Testing UQA with Y91 and with U42 or UQS with U42

1. Ignition OFF, disconnect the X3 and X4 harness connector at the amplifier.
2. Radio ON, test for 5.0-7.5 volts between the appropriate signal circuit terminal listed below and ground.
    - Left front low level audio signal (+) - terminal 11 X3
    - Left front low level audio signal (-) - terminal 12 X3
    - Right front low level audio signal (+) - terminal 3 X3
    - Right front low level audio signal (-) - terminal 4 X3
    - Subwoofer low level audio signal (+) - terminal 5 X4
    - Subwoofer low level audio signal (-) - terminal 6 X4
    - Center Channel low level audio signal (+) - terminal 13 X4
    - Center Channel low level audio signal (-) - terminal 14 X4
    - 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 radio.
    - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the radio.
3. Ignition OFF, reconnect the X3 harness connector at the amplifier.
4. Disconnect the X2 harness connector at the rear seat audio (RSA) module.
5. Radio ON, test for 5.0-7.5 volts between the appropriate signal circuit terminal listed below and ground.
    - Left rear low level audio signal (+) - terminal 1
    - Left rear low level audio signal (-) - terminal 2
    - Right rear low level audio signal (+) - terminal 3
    - Right rear low level audio signal (-) - terminal 4
    - 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 rear seat audio (RSA) module.
    - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the rear seat audio (RSA) module.
6. Ignition OFF, reconnect the X2 harness connector at the rear seat audio (RSA) module.
7. Disconnect the X2 harness connector at the amplifier.
8. Radio ON, test for 5.0-7.5 volts between the appropriate signal circuit terminal listed below and ground.
    - Left rear low level audio signal (+) - terminal 15
    - Left rear low level audio signal (-) - terminal 14
    - Right rear low level audio signal (+) - terminal 16
    - Right rear low level audio signal (-) - terminal 8
    - 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 rear seat audio (RSA) module.
    - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests

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normal, replace the rear seat audio (RSA) module.

9. If all circuits test normal, replace the amplifier.

Speaker Malfunction Amplifier Output Testing UQA

1. Ignition OFF, disconnect the X1 and X2 connectors at the amplifier.
2. Radio ON, test for less than 1 volt between the appropriate signal circuit terminal listed below and ground:
    - Left front speaker output (+) - terminal 4 X2
    - Left front speaker output (-) - terminal 3 X2
    - Right front speaker output (+) - terminal 2 X2
    - Right front low speaker output (-) - terminal 1 X2
    - Left rear speaker output (+) - terminal 8 X2
    - Left rear speaker output (-) - terminal 7 X2
    - Right rear speaker output (+) - terminal 6 X2
    - Right rear speaker output (-) - terminal 5 X2
    - Left or rear subwoofer speaker output (+) - terminal 7 X1
    - Left or rear subwoofer speaker output (-) - terminal 3 X1
    - Right subwoofer speaker output (+) - terminal 6 X1
    - Right subwoofer speaker output (-) - terminal 2 X1
    - If greater than the specified range, test both circuits of the affected speaker for a short to voltage.
3. Radio OFF, test for infinite resistance between the appropriate signal circuit terminal listed below and ground:
    - Left front speaker output (+) - terminal 4 X2
    - Left front speaker output (-) - terminal 3 X2
    - Right front speaker output (+) - terminal 2 X2
    - Right front low speaker output (-) - terminal 1 X2
    - Left rear speaker output (+) - terminal 8 X2
    - Left rear speaker output (-) - terminal 7 X2
    - Right rear speaker output (+) - terminal 6 X2
    - Right rear speaker output (-) - terminal 5 X2
    - Left or rear subwoofer speaker output (+) - terminal 7 X1
    - Left or rear subwoofer speaker output (-) - terminal 3 X1
    - Right subwoofer speaker output (+) - terminal 6 X1
    - Right subwoofer speaker output (-) - terminal 2 X1
    - If less than the specified range, test both circuits of the affected speaker for a short to ground.
4. If all circuits test normal, reconnect all harness connectors at the amplifier.
5. Radio ON, disconnect the appropriate speaker.
6. Test for 5.0-7.5 volts between the signal circuit terminals and ground.

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- If less then the specified range test the circuit for an open/high resistance. If the circuit tests normal, replace the amplifier.
- If greater then the specified range test the circuit for a short to voltage. If the circuit tests normal, replace the amplifier.

7. If the circuit tests normal, replace the appropriate speaker.

Speaker Malfunction Amplifier Output Testing UQA with Y91 or UQS

1. Ignition OFF, disconnect the X1 and X2 connectors at the amplifier.
2. Radio ON, test for less than 1 volt between the appropriate signal circuit terminal listed below and ground:
   - Left front speaker output (+) - terminal 4 X2
   - Left front speaker output (-) - terminal 5 X2
   - Right front speaker output (+) - terminal 7 X2
   - Right front speaker output (-) - terminal 6 X2
   - Left rear speaker output (+) - terminal 15 X2
   - Left rear speaker output (-) - terminal 14 X2
   - Right rear speaker output (+) - terminal 16 X2
   - Right rear speaker output (-) - terminal 8 X2
   - Front center speaker output (+) - terminal 13 X2
   - Front center speaker output (-) - terminal 12 X2
   - Right rear midrange speaker output (+) - terminal 3 X2
   - Right rear midrange speaker output (-) - terminal 2 X2
   - Left rear midrange speaker output (+) - terminal 11 X2
   - Left rear midrange speaker output (-) - terminal 10 X2
   - Left or rear subwoofer speaker output (+) - terminal 1 X1
   - Left or rear subwoofer speaker output (-) - terminal 2 X1
   - Right subwoofer speaker output (+) - terminal 7 X1
   - Right subwoofer speaker output (-) - terminal 3 X1
   - If greater than the specified range, test both circuits of the affected speaker for a short to voltage.
3. Radio OFF, test for infinite resitance between the appropriate signal circuit terminal listed below and ground:
   - Left front speaker output (+) - terminal 4 X2
   - Left front speaker output (-) - terminal 5 X2
   - Right front speaker output (+) - terminal 7 X2
   - Right front speaker output (-) - terminal 6 X2
   - Left rear speaker output (+) - terminal 15 X2
   - Left rear speaker output (-) - terminal 14 X2
   - Right rear speaker output (+) - terminal 16 X2

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- Right rear speaker output (-) - terminal 8 X2
- Front center speaker output (+) - terminal 13 X2
- Front center speaker output (-) - terminal 12 X2
- Right rear midrange speaker output (+) - terminal 3 X2
- Right rear midrange speaker output (-) - terminal 2 X2
- Left rear midrange speaker output (+) - terminal 11 X2
- Left rear midrange speaker output (-) - terminal 10 X2
- Left or rear subwoofer speaker output (+) - terminal 1 X1
- Left or rear subwoofer speaker output (-) - terminal 2 X1
- Right subwoofer speaker output (+) - terminal 7 X1
- Right subwoofer speaker output (-) - terminal 3 X1
  - If less than the specified range, test both circuits of the affected speaker for a short to ground.

4. If all circuits test normal, reconnect all harness connectors at the amplifier.
5. Radio ON, disconnect the appropriate speaker.
6. Test for 5.0-7.5 volts between the signal circuit terminals and ground.
   - If less then the specified range test the circuit for an open/high resistance. If the circuit tests normal, replace the amplifier.
   - If greater then the specified range test the circuit for a short to voltage. If the circuit tests normal, replace the amplifier.
7. If the circuit tests normal, replace the appropriate speaker.

Repair Procedures

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

- **Speaker Replacement Reference**
- **Control Module References** for Amplifier and Radio replacement, setup, and programming

UNABLE TO CONTACT ONSTAR CALL CENTER

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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 communication interface module (CIM) is a cellular device that allows the user to communicate data and voice signals over the national cellular network. When an OnStar keypress is made, the CIM activates and connects the system to the cellular carriers communication system by interacting with the national cellular

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infrastructure. The module sends and receives all cellular communications over the cellular antenna and cellular antenna coax.

Diagnostic Aids

- The customer concern may have been due to a lack of cellular service in a given area. A failure in the National Cellular Network infrastructure at the time of the customers failed connection that has since been repaired may also have been the cause.
- If an OnStar® emergency call is able to successfully connect the vehicle to the OnStar® Call Center when an OnStar® Call Center button press is not, there may be a failure in the ability of the OnStar® system in the vehicle to be recognized by the local cellular carrier.
- If the prompt "OnStar® Request Ended" is heard, without pressing the white dot button at the end of the OnStar® keypress, the OnStar® system at one time has made a successful cellular connection, but was unable to complete the call.
- It is important to have the vehicle in an open outside area where a cellular call can be successfully placed and GPS data can be received from satellites.

Reference Information

Schematic Reference

OnStar Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Verify that the cellular antenna and cellular antenna coupling assembly are not damaged.

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- If damage is found, repair or replace as necessary.

2. Ignition ON, press the OnStar® Call Center button. Verify the system activates and the message Connecting to OnStar® is heard.
   - If the system does not activate and the message is not heard, refer to **OnStar Button Malfunction**.
3. If the system activates but does not connect with the OnStar® call center, refer to Circuit/System testing below.

Circuit/System Testing

1. Ignition OFF, disconnect the cellular antenna coax from the CIM module and the cellular antenna.
2. Ignition ON, test for less than 1 volt between the antenna coax center terminal and ground.
   - If greater than the specified range, replace the antenna coax.
3. Ignition ON, test for less than 1 volt between the antenna coax outer shield and ground.
   - If greater than the specified range, replace the antenna coax.
4. Test for infinite resistance between the antenna coax center terminal and ground.
   - If less than the specified value, replace the antenna coax.
5. Test for infinite resistance between the antenna coax outer shield and ground.
   - If less than the specified value, replace the antenna coax.
6. Test for less than 5 ohms at the cellular antenna coax center terminal from end to end.
   - If greater than specified value, replace the cellular antenna coax cable.
7. Test for less than 5 ohms at the cellular antenna coax outer shield from end to end.
   - If greater than specified value, replace the cellular antenna coax cable.
8. Test for infinite resistance between the antenna coax center terminal and the outer shield.
   - If less than specified value, replace the cellular antenna coax cable.
9. If coax cable tests normal, replace the cellular antenna.
10. Press the OnStar® Call Center button. Verify the system connects to OnStar® call center.
    - If a connection is not made to the OnStar® call center, replace the CIM.

Repair Procedures

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

- **Cellular Communications/Digital Radio Antenna Replacement**
- **Control Module References** for CIM replacement, setup, and programming

VIDEO DISPLAY MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** prior to using this diagnostic procedure.

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- 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
DVD Display B+	1	1	-	-
Radio ON Signal	1	1	-	-
Video Display Brightness Signal	2	B1289 04	2	-
Video Mode Signal	1	B1288 04	1	-
Video High Signal (+)	3	3	1	-
Video Low Signal (-)	1	3	4	-
DVD Display Ground	-	1	-	-
1. Video Entertainment System Inoperative. 2. Video Brightness can not be adjusted. 3. Backlight only - NO image shown. 4. Serious damage to radio can occur.				

Circuit Description

The rear seat entertainment (RSE) system utilizes the vehicle radio to play DVD movies and transmit video signals to the rear digital video disc (DVD) display. When the radio is turned ON, the DVD display receives a voltage signal from the radio via the entertainment remote enable signal circuit indicating the system status. The video high and low signal circuits are used to transmit the DVD images to the rear DVD display. The video high (+) voltage will vary as the brightness and the speed of the image varies. A typical voltage reading for the video high (+) is 1 to 2.5V at the disconnected at the video display.

Reference Information

Schematic Reference

Video System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Video Entertainment System Description and Operation (Non-Headrest DVD Systems) or **Video Entertainment System Description and Operation (Dual Headrest DVD Systems)**

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON, vehicle in Park. Operate the DVD entertainment system using several known good DVD disks.
    - If the radio does not display the DVD, replace the radio.
2. RSE ON and observe the rear DVD screen. Verify the rear video display is operational.
    - If rear video display does not turn ON, refer to **Video Entertainment System Malfunction**.
    - If the rear video display turns ON, but is blank, or the video is poor quality, refer to circuit testing.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the appropriate DVD display.
2. Ignition OFF, test for less than 5.0 ohms between the ground circuit terminals listed below and ground.
    - Ground terminal 6
    - Ground terminal 5 (DNU)
    - If greater than specified range, test the ground circuit for an open/high resistance.
3. Ignition ON, DVD playing, test for B+ between the entertainment remote enable B+ circuit terminal 8 and ground.
    - If less than specified value, test the B+ circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the radio.
4. Ignition ON, test for B+ between the battery positive voltage circuit terminal 7 and ground.
    - If less than specified value, test the voltage supply circuit for a short to ground or an open/high resistance.
5. Ignition ON, DVD playing, test for 1-8 volts between the video bright control circuit terminal 9, and ground.
    - If greater then specified range, test the control circuit for a short to voltage. If the circuit tests normal, replace the radio.
    - If less then specified range, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the radio.
6. Ignition ON, DVD playing, test for 0.1-3.0 volts between the video mode signal circuit terminal 10, and ground.
    - If greater then specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the radio.

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- If less then specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the radio.

7. Ignition ON, DVD playing, test for 1-3 volts between the video signal (+) circuit terminal 1, and ground.
   - If greater then specified range, test the control circuit for a short to voltage. If the circuit tests normal, replace the radio.
   - If less then specified range, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the radio.
8. If all circuits test normal, replace the DVD display.

Repair Procedures

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

- **Video Display Replacement (Second Row)** or **Video Display Replacement (Third Row)**
- **Control Module References** for radio replacement, setup, and programming

VIDEO ENTERTAINMENT SYSTEM MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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
DVD Display B+	1	1	-	-
Radio ON Signal	1	1	-	-
Video Display Brightness Signal	2	B1289 04	2	-
Video Mode Signal	1	B1288 04	1	-
Video High Signal (+)	3	3	1	-
Video Low Signal (-)	1	3	4	-
DVD Display Ground	-	1	-	-
1. Video Entertainment System Inoperative. 2. Video Brightness can not be adjusted. 3. Backlight only - NO image shown. 4. Serious damage to radio can occur.				

Circuit Description

The rear seat entertainment (RSE) system utilizes the vehicle radio to play DVD movies and transmit video

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signals to the rear digital video disc (DVD) display. When the radio is turned ON, the DVD display receives a voltage signal from the radio via the entertainment remote enable signal circuit indicating the system status. The video high and low signal circuits are used to transmit the DVD images to the rear DVD display. The video high (+) voltage will vary as the brightness and the speed of the image varies. A typical voltage reading for the video high (+) is 1 to 2.5V at the disconnected at the video display.

Reference Information

Schematic Reference

Video System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Video Entertainment System Description and Operation (Non-Headrest DVD Systems) or **Video Entertainment System Description and Operation (Dual Headrest DVD Systems)**

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON, vehicle in Park. Operate the DVD entertainment system using several known good DVD disks.
    - If the radio does not display the DVD, replace the radio.
2. RSE ON, observe the rear DVD screen. Verify the rear video display operates normally.
    - If the rear video display does not operate normally, refer to circuit testing below.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the appropriate DVD display.
2. Ignition OFF, test for less than 5.0 ohms between the ground circuit terminals listed below and ground.
    - Ground terminal 6

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- Ground terminal 5 (DNU)
  - If greater than specified range, test the ground circuit for an open/high resistance.

3. Ignition ON, DVD playing, test for B+ between the entertainment remote enable B+ circuit terminal 8 and ground.
   - If less than specified value, test the B+ circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the radio.
4. Ignition ON, test for B+ between the battery positive voltage circuit terminal 7 and ground.
   - If less than specified value, test the voltage supply circuit for a short to ground or an open/high resistance.
5. Ignition ON, DVD playing, test for 1-8 volts between the video bright control circuit terminal 9, and ground.
   - If greater then specified range, test the control circuit for a short to voltage. If the circuit tests normal, replace the radio.
   - If less then specified range, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the radio.
6. Ignition ON, DVD playing, test for 0.1-3.0 volts between the video mode signal circuit terminal 10, and ground.
   - If greater then specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the radio.
   - If less then specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the radio.
7. Ignition ON, DVD playing, test for 1-3 volts between the video signal (+) circuit terminal 1, and ground.
   - If greater then specified range, test the control circuit for a short to voltage. If the circuit tests normal, replace the radio.
   - If less then specified range, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the radio.
8. If all circuits test normal, replace the DVD display.

Repair Procedures

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

- **Video Display Replacement (Second Row)** or **Video Display Replacement (Third Row)**
- **Control Module References** for radio replacement, setup, and programming

VIDEO ENTERTAINMENT SYSTEM REMOTE CONTROL MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.

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- **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
Infra Red Module Control	1	1	-	-
Remote Infra Red Signal (+)	2	2	2	-
Remote Infra Red Signal (-)	2	2	2	-
Infra Red Module Ground	-	1	-	-
1. Infra Red Module Inoperative - remote control inoperative. 2. Remote control inoperative.				

Circuit Description

The infrared transmitter is grounded and powered by the rear seat audio (RSA) module. When a key on the remote is pressed, the remote control sends an infrared message to infrared transmitter. The infrared transmitter will convert these infrared signals into a frequency and send that message to the radio via the remote infrared signal circuits (+) and (-).

Reference Information

Schematic Reference

Video System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Video Entertainment System Description and Operation (Non-Headrest DVD Systems) or **Video Entertainment System Description and Operation (Dual Headrest DVD Systems)**

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 Testing

NOTE: Test or replace the remote batteries before performing the circuit/system test.

1. Ignition OFF, disconnect the harness connector at the infrared transmitter.
2. Ignition OFF, test for less than 5.0 ohms between the ground circuit terminal 12 and ground.
   - If greater than specified range, test the ground circuit for an open/high resistance.
3. Ignition ON, DVD playing, test for B+ between the infra red module control circuit terminal 4 and ground.
   - If less than specified value, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the rear seat audio module.
4. Ignition ON, DVD playing, test for 0.75-2 volts between the remote infra red signal (+) circuit and ground.
   - If less than specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the radio.
   - If greater than specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the radio.
5. Ignition ON, DVD playing, test for less than 1 volt between the remote infra red signal (-) circuit and ground.
   - If greater than specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the radio.
6. Reconnect the harness connector at the infrared transmitter, and disconnect the X3 harness connector at the radio.
7. Ignition ON, DVD playing, test for 4-6 mV AC between the remote infra red signal (+) circuit and ground.
   - If less than specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the infrared transmitter.
   - If greater than specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the infrared transmitter.
8. Ignition ON, DVD playing, test for 4-6 mV AC between the remote infra red signal (-) circuit and ground.
   - If less than specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the infrared transmitter.
   - If greater than specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the infrared transmitter.
9. Ignition ON, DVD playing, press any button on the remote control aimed at the infrared transmitter and test for 300-330 MHz between the remote infra red signal (+) circuit and ground.
   - If not within the specified range, replace the remote control.
10. If all circuits test normal, replace the radio.

Repair Procedures

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

- **Audio System Transceiver Module Replacement**
- **Control Module References** for Radio and RSA replacement, setup, and programming

VIDEO ENTERTAINMENT SYSTEM WIRELESS HEADPHONE MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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
Infra Red Module Control	1	1	-	-
Left DVD Audio Signal (+)	2	2	2	-
Right DVD Audio Signal (+)	3	3	3	-
DVD Audio Common Signal (-)	4	4	4	-
Left Infra Red Audio Signal (+)	5	5	5	-
Right Infra Red Audio Signal (+)	6	6	6	-
Infra Red Audio Low Reference (+)	7	7	7	-
Infra Red Module Ground	-	1	-	-

1. Infra Red Module Inoperative - headphones inoperative.
2. No or distorted left audio when listening to DVD.
3. No or distorted right audio when listening to DVD.
4. No or distorted audio on both channels when listening to DVD.
5. No or distorted left audio when listening to rear seat audio.
6. No or distorted right audio when listening to rear seat audio.
7. No or distorted audio on both channels when listening to rear seat audio.

Circuit Description

The infrared transmitter is grounded and powered by the rear seat audio (RSA) module. When listening to the headphones, the infrared transmitter sends an infrared signal to the headphones. There are two channels on the headphones, channel 1 is dedicated to the video screen, and channel 2 is dedicated to the rear seat audio (RSA). The audio that is sent over the DVD and rear seat audio signal circuits is a varying AC voltage.

Reference Information

Schematic Reference

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Video System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Video Entertainment System Description and Operation (Non-Headrest DVD Systems) or **Video Entertainment System Description and Operation (Dual Headrest DVD Systems)**

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

NOTE: Test or replace the headphone batteries before performing the circuit/system verification.

1. Turn ON the wireless headphones. Verify the power indicator lamp on the wireless headphone illuminates.
   - If the power indicator lamp does not illuminate, replace the wireless headphones.
2. With the Radio ON, RSA ON, and DVD playing, verify all of the headphones are working properly.
   - If all of the headphones are inoperative, or the sound is distorted, refer to Circuit/System Testing below.
   - If only one of the headphones is not producing sound, or the sound is distorted, replace the appropriate set of headphones.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the infrared transmitter.
2. Test for less than 5.0 ohms between the ground circuit terminal 12 and ground.
   - If greater than specified range, test the ground circuit for an open/high resistance.
3. Ignition ON, DVD playing, test for B+ between the infra red module control circuit terminal 4 and ground.
   - If less than specified value, test the control circuit for a short to ground or an open/high resistance.

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If the circuit tests normal, replace the rear seat audio module.

4. Ignition ON, DVD playing, test for AC voltage between the following signal circuit terminals listed below and ground.
   - Left DVD audio signal (+) - terminal 1
   - DVD audio common (-) - terminal 2
   - Right DVD audio signal (+) - terminal 3
   - If AC voltage is not present, test the signal circuit for a short to voltage, short to ground, or an open/high resistance. If the circuit tests normal, replace the radio.
5. Ignition ON, RSA ON, test for AC voltage between the following signal circuit terminals listed below and ground.
   - Left infra red audio signal (+) - terminal 9
   - Infra red audio low reference (-) - terminal 10
   - Right infra red audio signal (+) - terminal 11
   - If AC voltage is not present, test the signal circuit for a short to voltage, short to ground, or an open/high resistance. If the circuit tests normal, replace the RSA.
6. If all circuits test normal, test or replace the infrared transmitter.

Repair Procedures

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

- **Control Module References** for radio and RSA replacement, setup, and programming
- **Audio System Transceiver Module Replacement**

ONSTAR VOICE RECOGNITION MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle (with HP2)** or **Diagnostic System Check - Vehicle (without HP2)** 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 CIM is capable of interpreting voice commands recieved over the cellular microphone circuits. Speech recognition allows the user to speak to one computer in the vehicle, and one reached over the cellular communication network. The module attempts to understand the users command, and responds by speaking back, or by taking the appropriate action, e.g. dialing the phone.

Reference Information

Schematic Reference

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OnStar Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Circuit/System Verification

IMPORTANT:

- **It is necessary to have the vehicle in an open outside area where a cellular call can be successfully placed and GPS data can be received from satellites.**
- **The vehicle should be located in a quiet area.**

1. Ignition ON, press OnStar® Call button. Verify that your voice is heard clearly by the OnStar® Call Center.
   - If your voice can not be heard clearly, refer to **OnStar Microphone Malfunction**.
2. Press the OnStar® Call answer button. Attempt to operate the OnStar® system using multiple different voice commands. Verify the system responds appropriately to all voice commands.
   - If the OnStar® system does not respond to any voice commands, replace the CIM.
3. If the system is operational, but does not respond appropriately to certain commands refer to **OnStar Description and Operation** for tips on proper pronunciation.

Repair Procedures

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

Control Module References for VCIM replacement, setup, and programming

REPAIR INSTRUCTIONS

MOBILE TELEPHONE MICROPHONE REPLACEMENT

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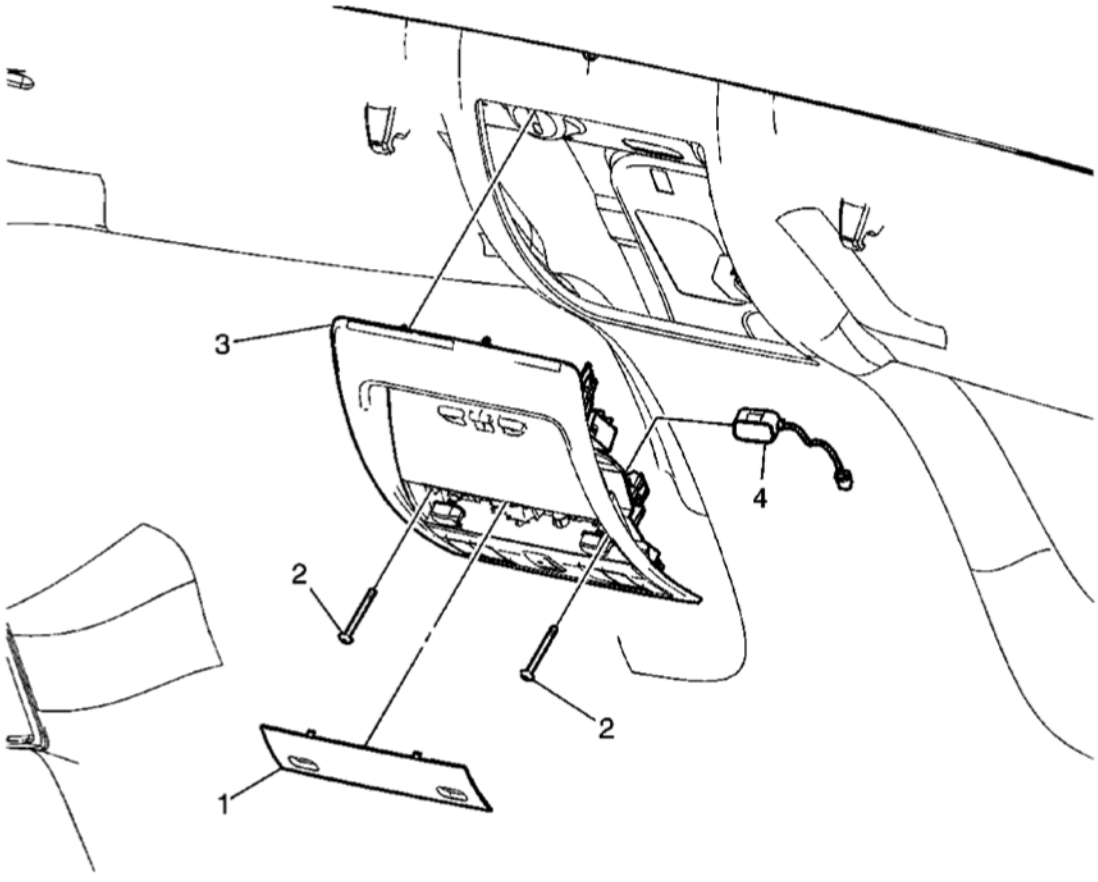


Fig. 19: View Of Mobile Telephone Microphone Assembly, Roof Console Assembly & Components
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Front Overhead Console Lens
2	Roof Console Screw (Qty: 2) **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 2 N.m (18 lb in)
3	Roof Console Assembly **Tip:** Disconnect electrical connectors.
4	Mobile Telephone Microphone Assembly

COMMUNICATION INTERFACE MODULE REPLACEMENT (CADILLAC)

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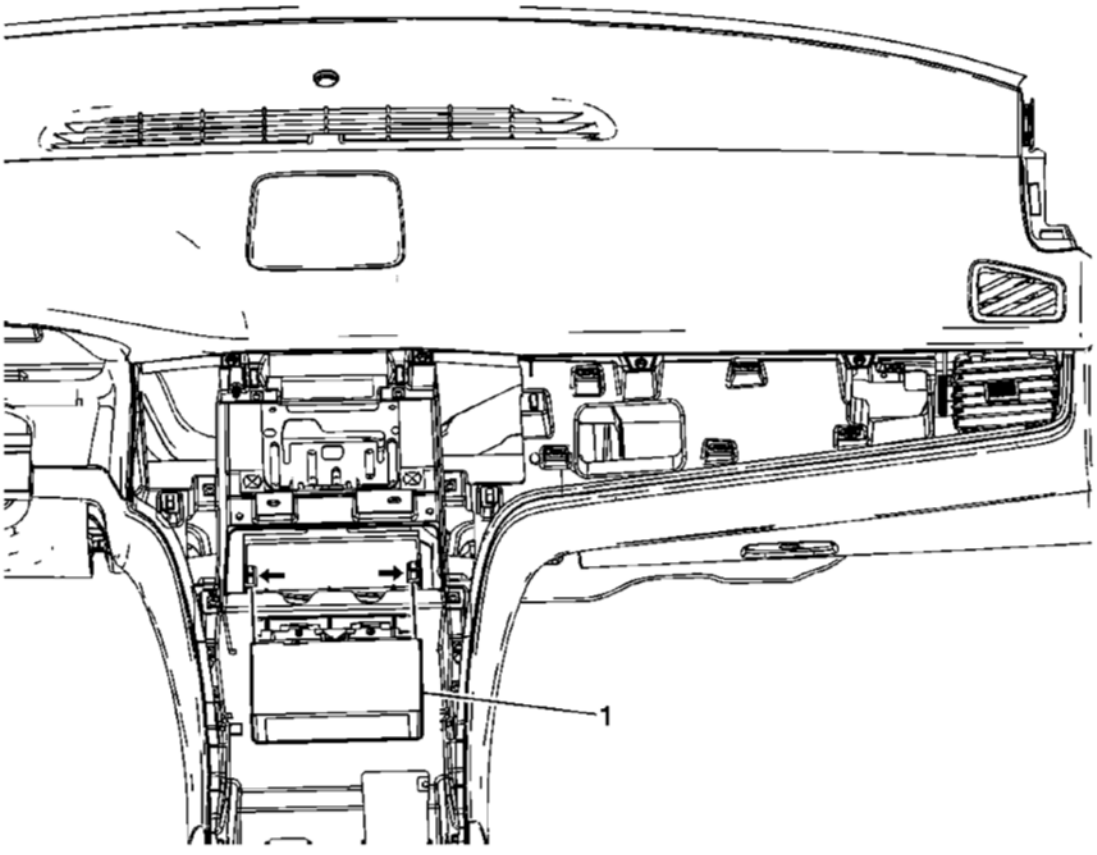


Fig. 20: View Of Communication Interface Module
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure 1. Remove the instrument Panel Accessory Trim Plate. Refer to **Instrument Panel Accessory Trim Plate Replacement (Cadillac)** or **Instrument Panel Accessory Trim Plate Replacement (Except Cadillac)** . 2. Remove the radio. Refer to **Radio Replacement (Except Cadillac)** or **Radio Replacement (Cadillac)**. 3. Remove the HVAC Control Module. Refer to **HVAC Control Module Replacement** or **HVAC Control Module Replacement** .	
1	Communication Interface Module **Tip:** • Push outward on the two tabs to release the communication interface module from the bracket. • Disconnect the electrical connectors. • When replacing the communication interface module be sure to transfer Bluetooth

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	Antenna, if equipped. • Reprogram the communication interface module after replacement. Refer to **Control Module References** .

COMMUNICATION INTERFACE MODULE REPLACEMENT (EXCEPT CADILLAC)

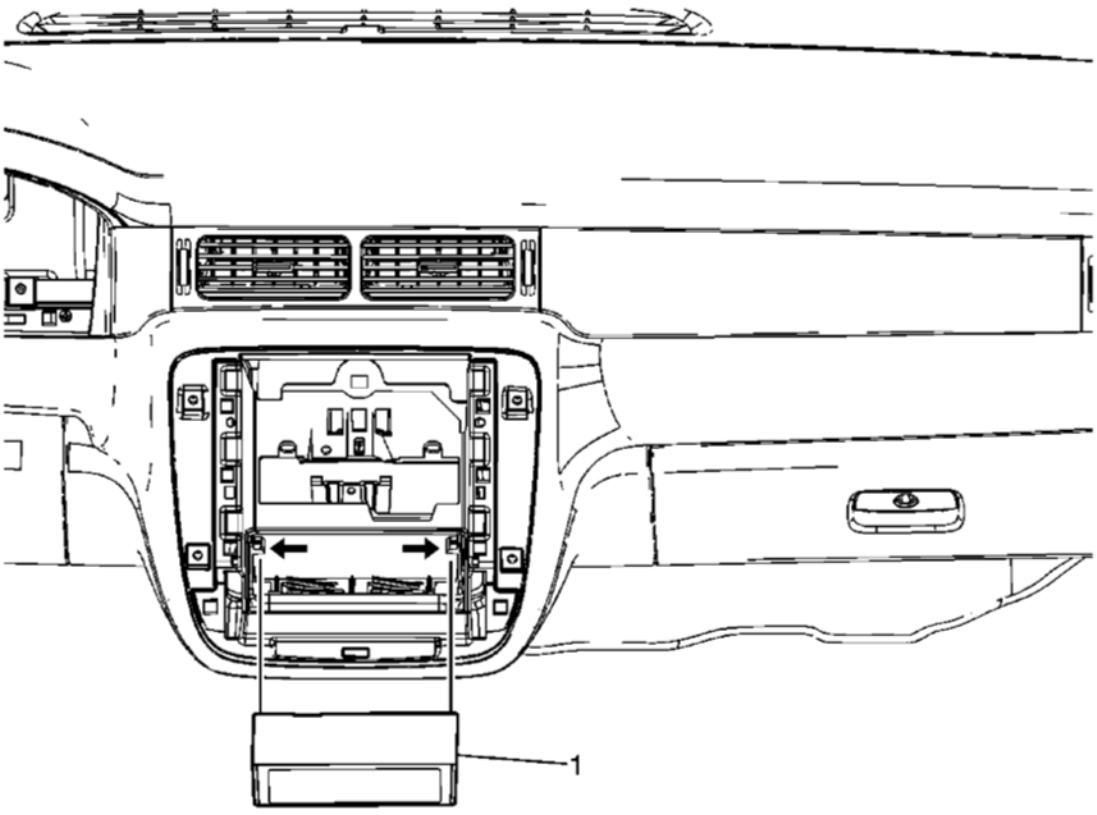


Fig. 21: View Of Communication Interface Module
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure 1. Remove the instrument Panel Accessory Trim Plate. Refer to **Instrument Panel Accessory Trim Plate Replacement (Cadillac)** or **Instrument Panel Accessory Trim Plate Replacement (Except Cadillac)** . 2. Remove the HVAC Control Module. Refer to **HVAC Control Module Replacement** or **HVAC Control Module Replacement** . 3. Remove the radio. Refer to **Radio Replacement (Except Cadillac)** or **Radio Replacement (Cadillac)**.	
	Communication Interface Module **Tip:**

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1	• Push outward on the two tabs to release the communication interface module from the bracket. • Disconnect the electrical connectors. • When replacing the communication interface module be sure to transfer Bluetooth Antenna, if equipped. • Reprogram the communication interface module after replacement. Refer to **Control Module References** .

WIRELESS COMMUNICATION INTERFACE ANTENNA REPLACEMENT

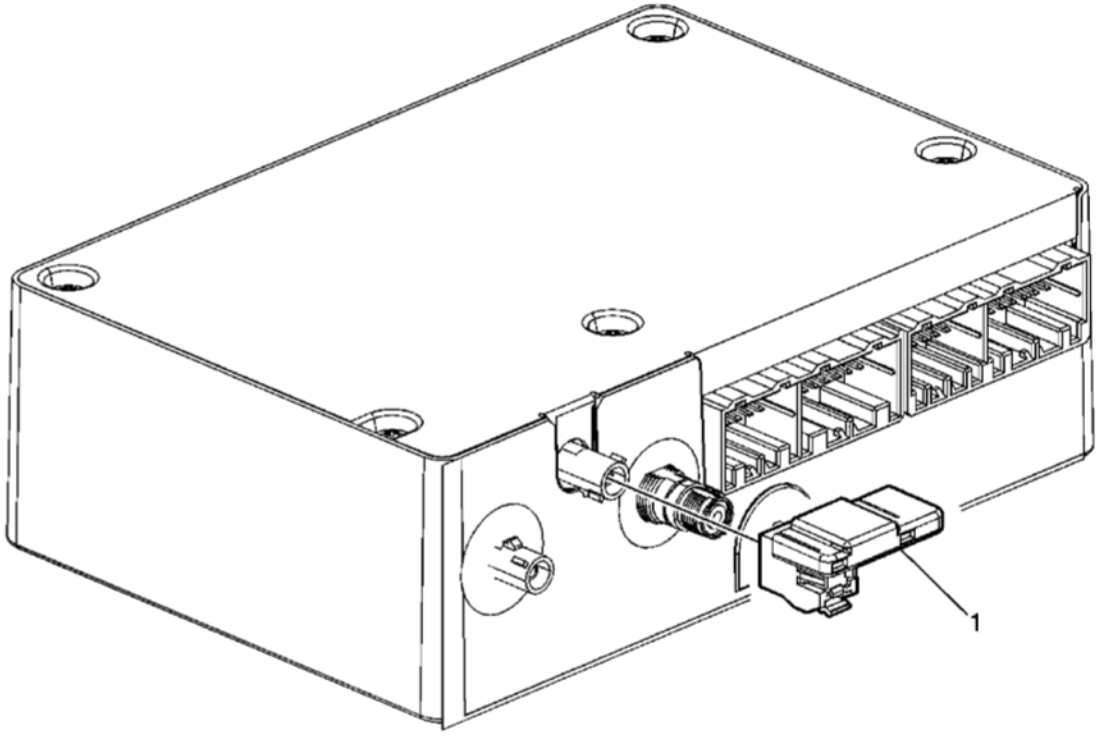


Fig. 22: Wireless Communication Interface Antenna Replacement
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the communication interface module. Refer to **Communication Interface Module Replacement (Cadillac)** or **Communication Interface Module Replacement (Except Cadillac)**	
1	Wireless Communication Interface Antenna Bluetooth Module **Procedure:** Unsnap the Antenna from Communication Module.

RADIO REPLACEMENT (EXCEPT CADILLAC)

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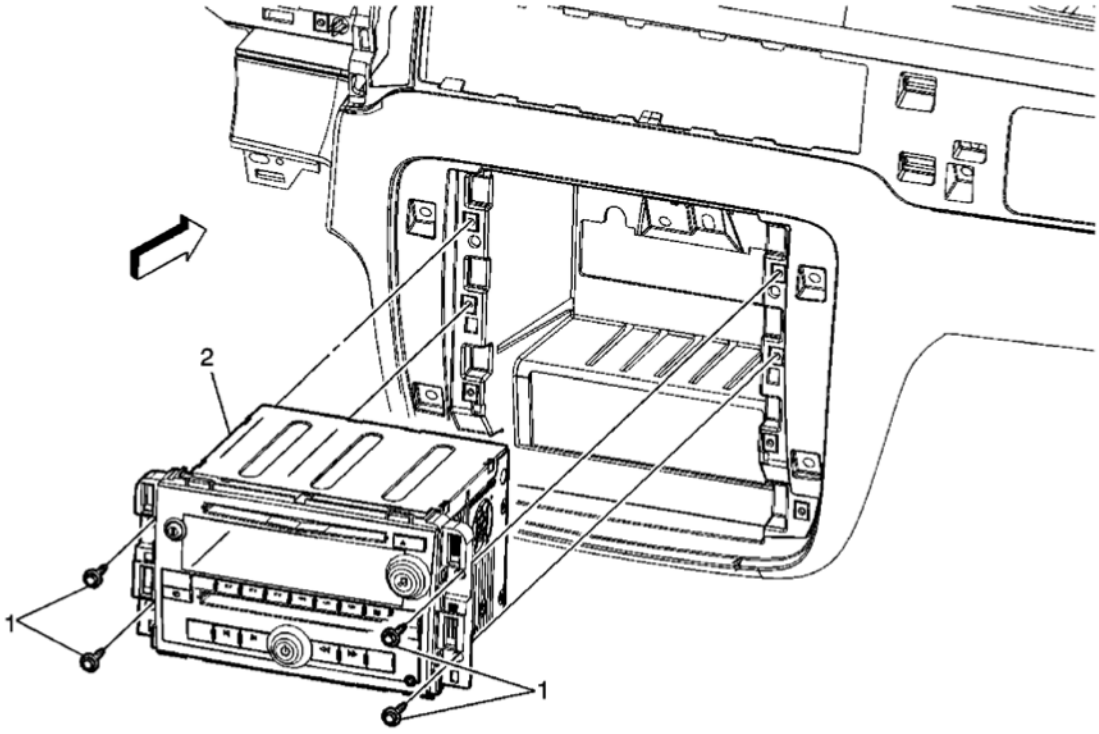


Fig. 23: View Of Radio Assembly & Screws
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
NOTE: **Use a scan tool to retrieve the radio part number before removing the radio from the vehicle.** **Preliminary Procedures** 1. Remove the accessory switch assembly. Refer to **Accessory Switch Replacement (Except Cadillac)** or **Accessory Switch Replacement (Cadillac)** . 2. Remove the HVAC control module. Refer to **HVAC Control Module Replacement** or **HVAC Control Module Replacement** .	
1	Radio Screw (Qty: 4) **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 2 N.m (18 lb in)
2	Radio Assembly **Tip:** • Disconnect the electrical connector.

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	• Disconnect the antenna cable. • Reprogram the radio after replacement. Refer to **Control Module References** .

RADIO REPLACEMENT (CADILLAC)

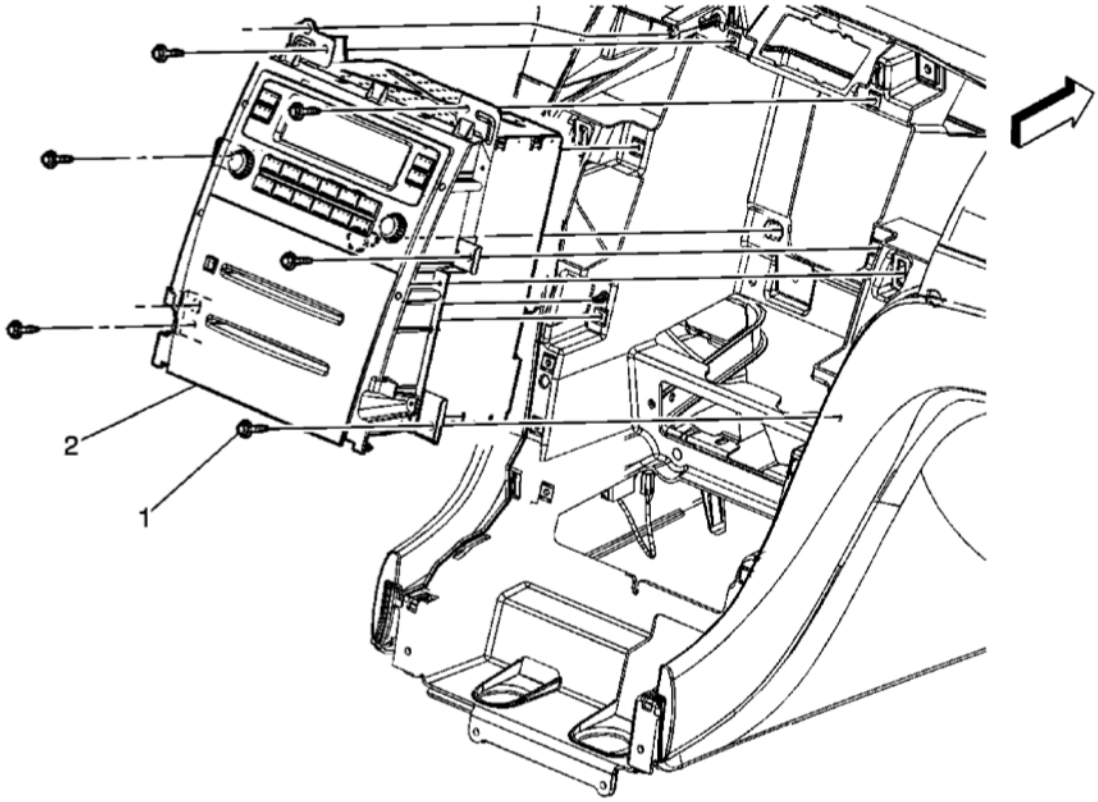


Fig. 24: View Of Radio Assembly & Screws
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
NOTE: **Use a scan tool to retrieve the radio part number before removing the radio from the vehicle.** **Preliminary Procedure:** Remove the instrument panel accessory trim plate. Refer to **Instrument Panel Accessory Trim Plate Replacement (Cadillac)** or **Instrument Panel Accessory Trim Plate Replacement (Except Cadillac)** .	
1	Radio Screw (Qty: 6) **CAUTION:** **Refer to Fastener Caution .**

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	Tighten: 2 N.m (18 lb in)
2	Radio Assembly **Tip:** • Disconnect the 4 electrical connectors. • Disconnect the antenna cable. • Reprogram the radio after replacement. Refer to **Control Module References** .

DIGITAL RADIO RECEIVER REPLACEMENT

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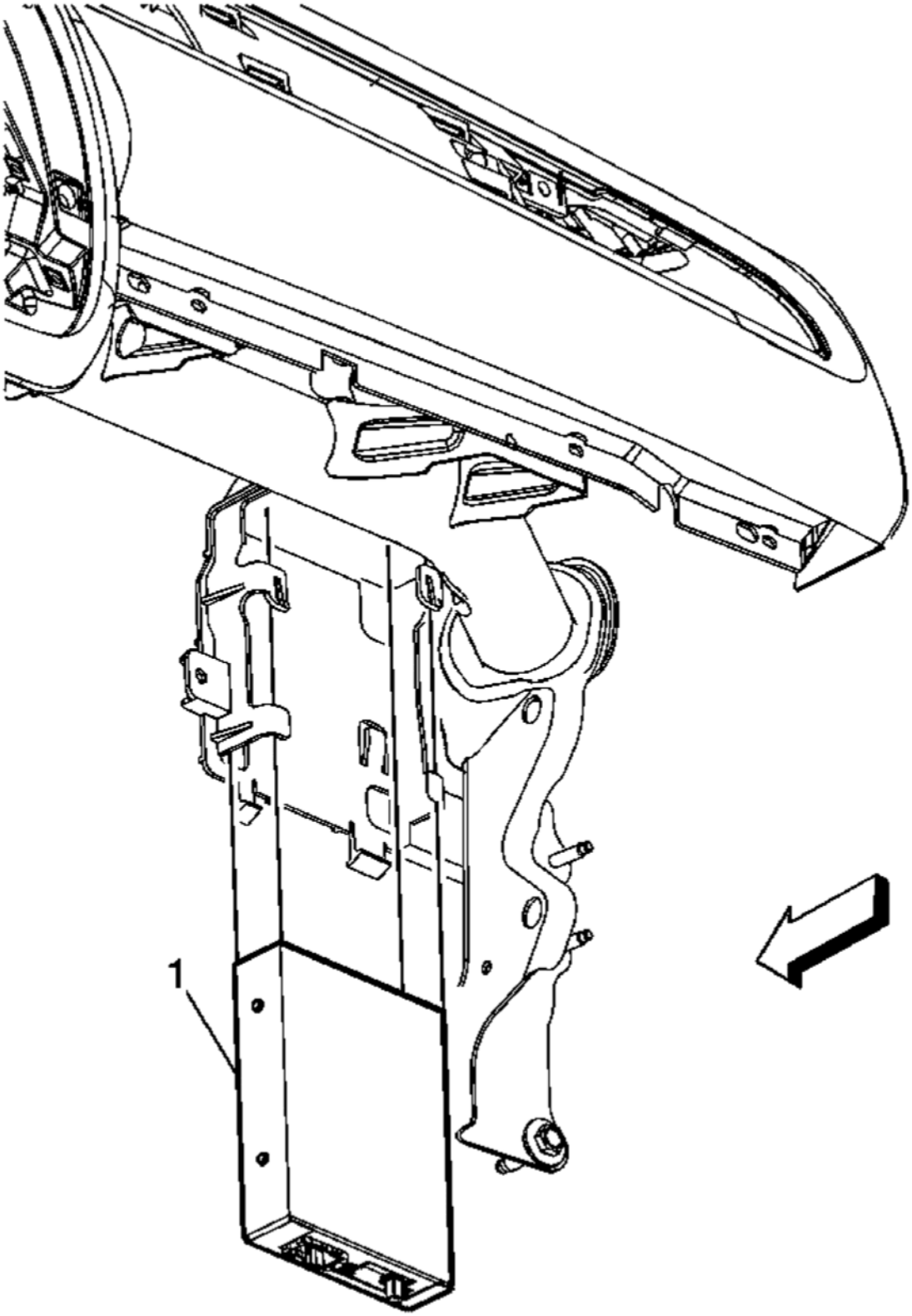


Fig. 25: View Of Digital Radio Receiver

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Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the right instrument panel insulator. Refer to **Instrument Panel Insulator Replacement (Cadillac)** or **Instrument Panel Insulator Replacement (Except Cadillac)** .	
1	Digital Radio Receiver **Tip:** 1. Disconnect the electrical connectors. 2. Push in on the 2 tabs and pull down to remove the receiver. 3. Perform the Digital Radio Receiver Setup. Refer to **Control Module References** .

RADIO VOLUME COMPENSATOR INTERIOR NOISE MICROPHONE REPLACEMENT

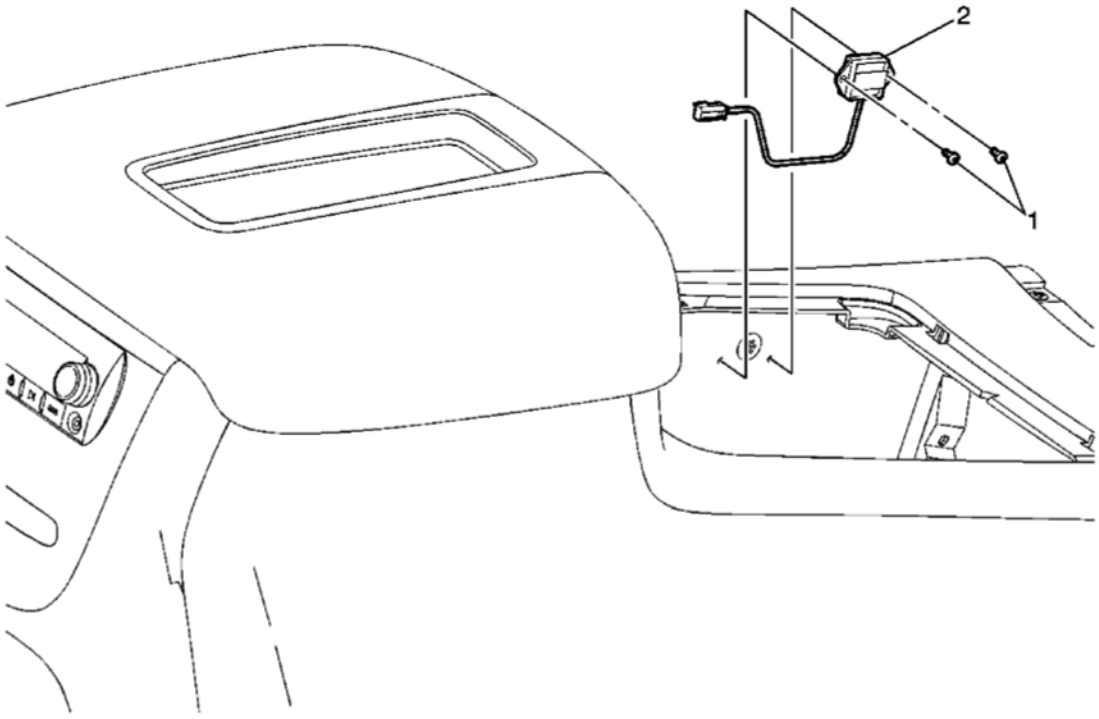


Fig. 26: Radio Volume Compensator Interior Noise Microphone
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the Front Floor Console Bezel. Refer to **Front Floor Console Compartment Bezel Replacement (Except Cadillac)** or **Front Floor Console Compartment Bezel Replacement (Cadillac)**	
	Radio Volume Compensator Interior Noise Microphone (Qty: 2)

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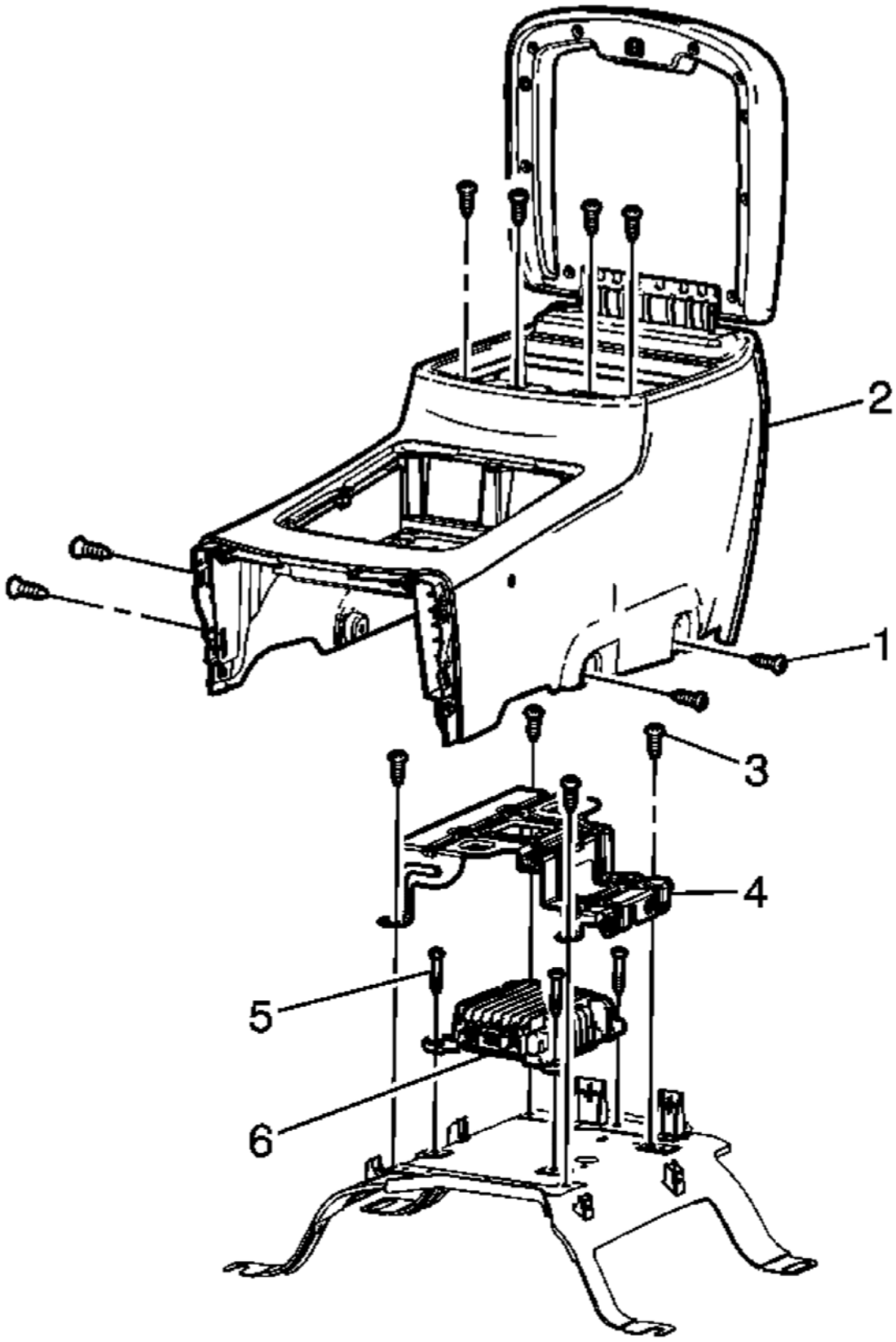
1	**CAUTION:** **Refer to Fastener Caution .** **Tighten:** 2 N.m (18 lb in)
2	Radio Volume Compensator Interior Noise Microphone Assembly

RADIO SPEAKER AMPLIFIER REPLACEMENT (EXCEPT CADILLAC)

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2009 Cadillac Escalade

2009 ACCESORIES & EQUIPMENT Cellular, Entertainment, and Navigation - Avalanche, Escalade, Suburban, Tahoe & Yukon



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Fig. 27: View Of Radio Speaker Amplifier Assembly & Components
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Front Floor Console Screw (Qty: 8) **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 9 N.m (80 lb in)
2	Front Floor Console Assembly Refer to **Front Floor Console Replacement (Except Cadillac)** or **Front Floor Console Replacement (Cadillac)** .
3	Front Floor Console Bracket Screw (Qty: 4) **Tighten:** 9 N.m (80 lb in)
4	Front Floor Console Bracket
5	Amplifier Screw (Qty: 3) **Tighten:** 9 N.m (80 lb in)
6	Radio Speaker Amplifier Assembly **Tip:** • Disconnect the electrical connectors. • If installing a replacement amplifier, program the amplifier. Refer to **Control Module References** .

RADIO SPEAKER AMPLIFIER REPLACEMENT (CADILLAC)

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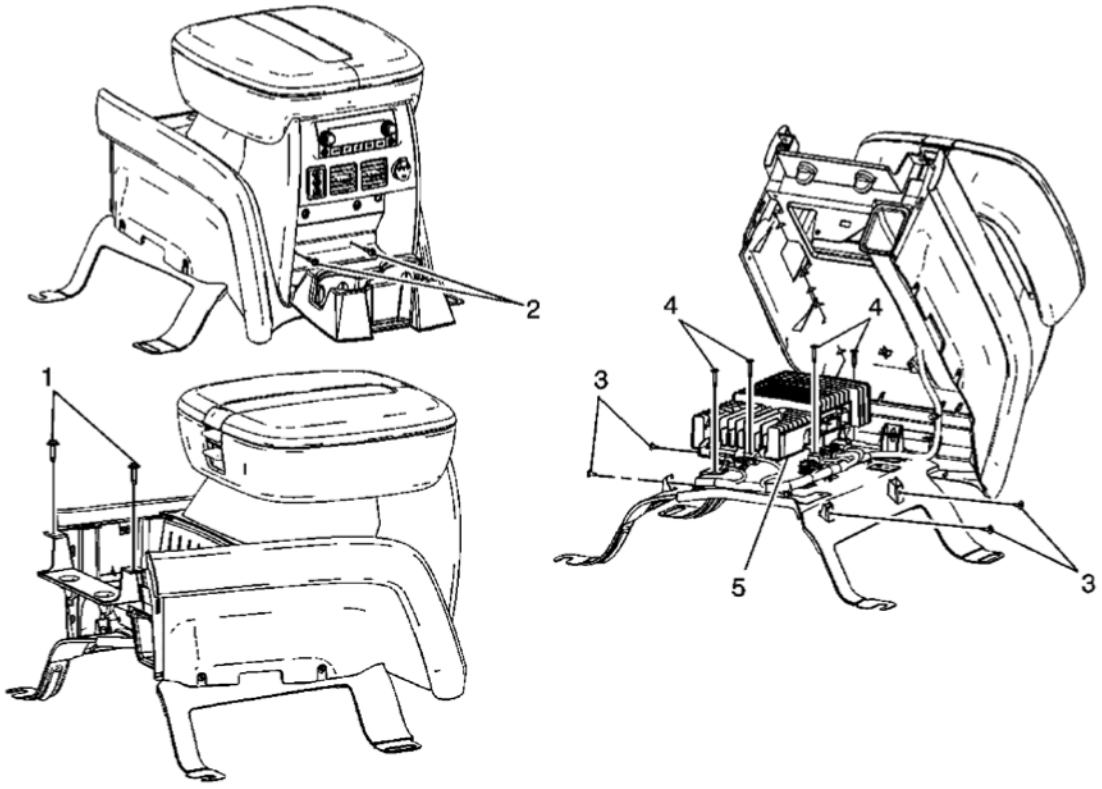


Fig. 28: View Of Radio Speaker Amplifier Assembly & Components
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Remove the floor console bezel. Refer to **Floor Console Bezel Replacement (Except Cadillac)** or **Floor Console Bezel Replacement (Cadillac)** . 2. Remove instrument panel lower center trim panels. Refer to **Instrument Panel Lower Center Trim Replacement (Cadillac)** .	
1	Front Floor Console Bolt (Qty: 2) **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 2 N.m (18 lb in)
2	Front Floor Console Rear Screw (Qty: 2) **Tip:** Open the rear cupholder to access the screws. **Tighten:** 2 N.m (18 lb in)
	Front Floor Console Lower Screw (Qty: 4)

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3	**Tip:** 1. Move the seats forward or rearward to access the screws as needed. 2. Rotate the upper portion of the console assembly rearward to access the amplifier. **Tighten:** 9 N.m (80 lb in)
4	Amplifier Screw (Qty: 4) **Tighten:** 9 N.m (80 lb in)
5	Radio Speaker Amplifier Assembly **Tip:** • Disconnect the electrical connectors. • If installing a replacement amplifier, program the amplifier. Refer to **Control Module References** .

AUDIO/VIDEO INTERFACE MODULE REPLACEMENT (AYE)

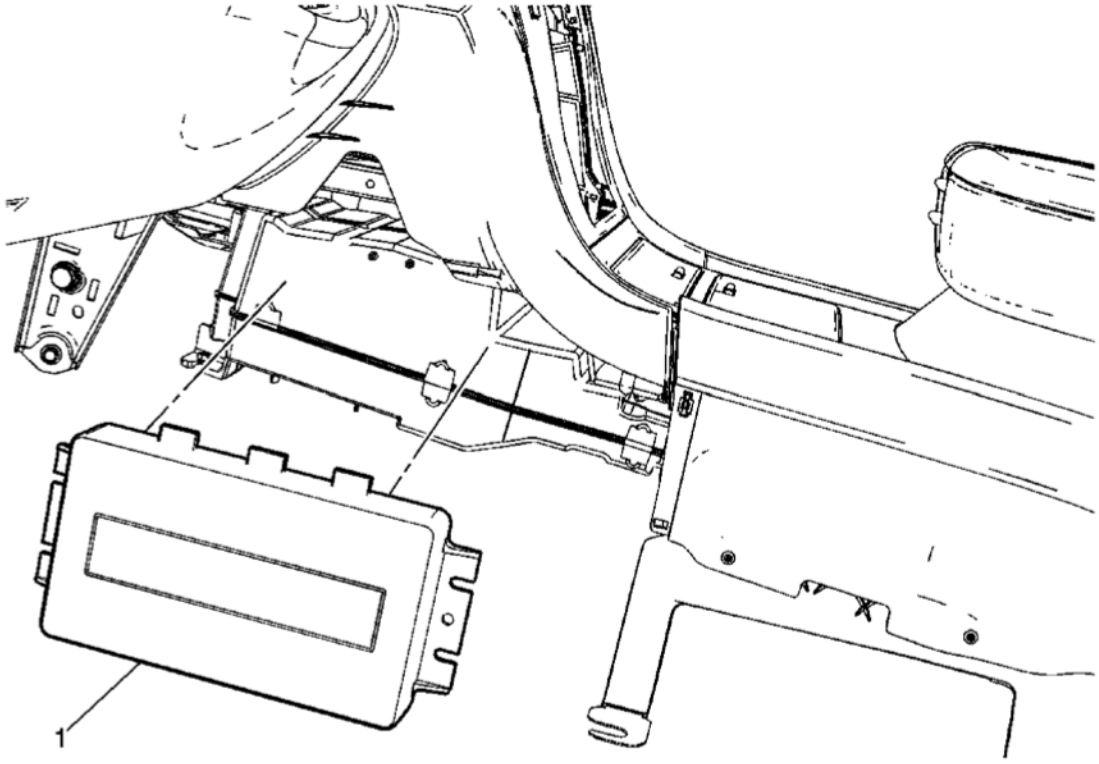


Fig. 29: Audio/Video Interface Module (AYE)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name

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Preliminary Procedure: Remove the Instrument Panel Lower Center Trim. Refer to **Instrument Panel Lower Center Trim Replacement (Cadillac)** .	
1	Audio Video Interface Module **Procedure** 1. Remove the foam tape covering the module. 2. Disconnect the electrical connectors. 3. Remove the module from the hook and loop fastener on the console.

CELLULAR COMMUNICATIONS/DIGITAL RADIO ANTENNA REPLACEMENT

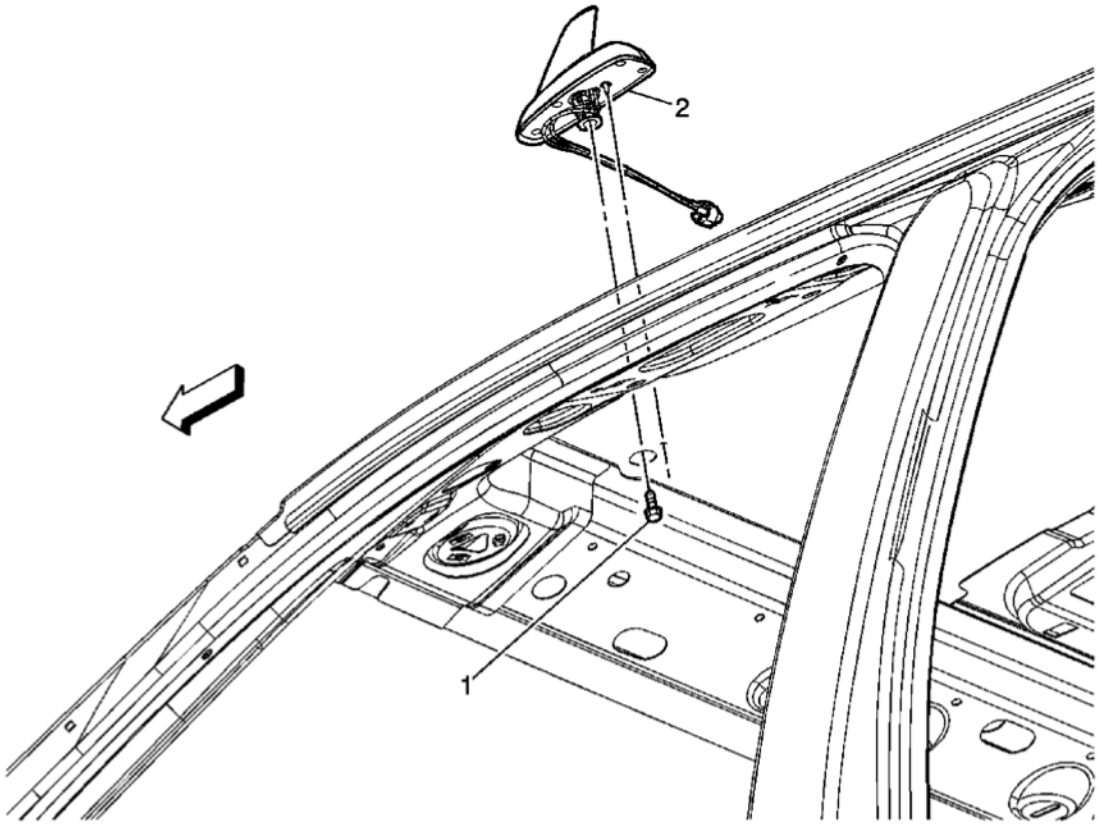


Fig. 30: View Of Mobile Telephone & Navigation Antenna Assembly & Bolt
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Lower the front of the headliner. Refer to **Headlining Trim Panel Replacement (Avalanche/Escalade EXT w/CF5 and U42)** or **Headlining Trim Panel Replacement (Avalanche/Escalade EXT w/CF5**	

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w/o U42) or **Headlining Trim Panel Replacement (Avalanche w/CJ2 w/o CF5 and U42)** or **Headlining Trim Panel Replacement (Avalanche/Escalade EXT w/CJ3)** or **Headlining Trim Panel Replacement (Avalanche/Escalade EXT w/U24 w/o CF5)** or **Headlining Trim Panel Replacement (LWB w/CF5 and U42)** or **Headlining Trim Panel Replacement (LWB w/CF5 w/o U42)** or **Headlining Trim Panel Replacement (LWB w/CJ2)** or **Headlining Trim Panel Replacement (LWB w/CJ3)** or **Headlining Trim Panel Replacement (LWB w/U42 w/o CF5)** or **Headlining Trim Panel Replacement (SWB w/CF5 and U42)** or **Headlining Trim Panel Replacement (SWB w/CF5 w/o U42)** or **Headlining Trim Panel Replacement (SWB w/CJ3)** or **Headlining Trim Panel Replacement (SWB w/o CF5 and U42)** or **Headlining Trim Panel Replacement (SWB w/U42 w/o CF5)** .	
1	Mobile Telephone Antenna Bolt **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 9 N.m (80 lb in)
2	Mobile Telephone and Navigation Antenna Assembly **Tip:** Disconnect the antenna cable.

RADIO ANTENNA REPLACEMENT

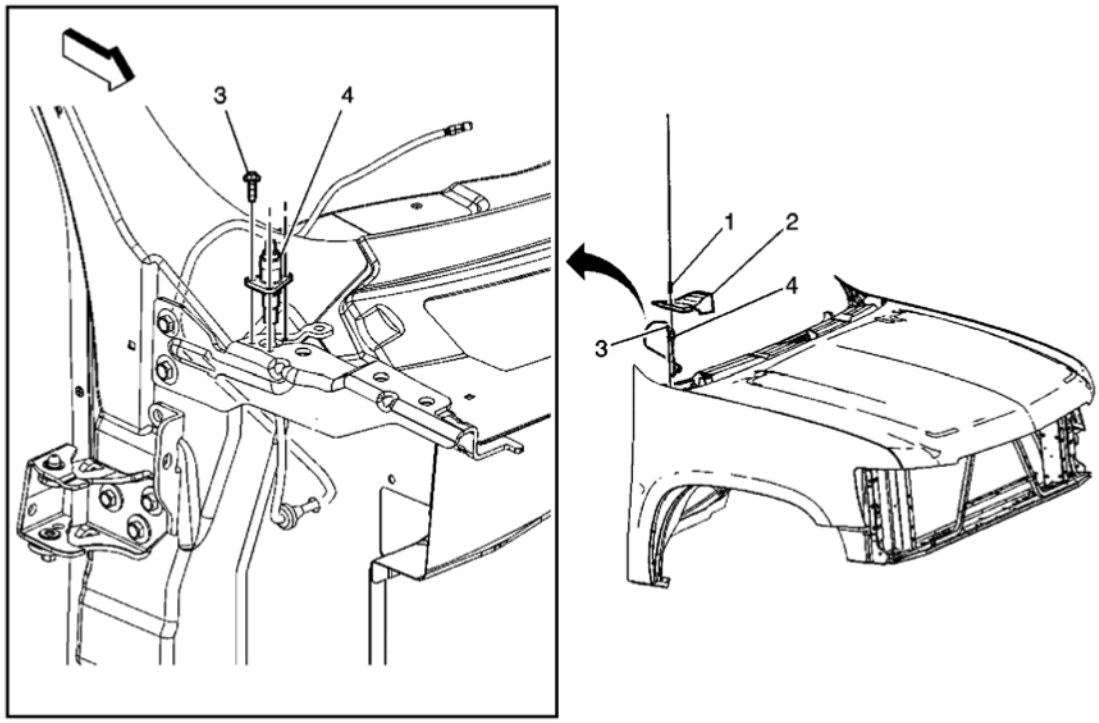


Fig. 31: View Of Radio Antenna Assembly & Components
Courtesy of GENERAL MOTORS CORP.

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Callout	Component Name
Preliminary Procedures 1. Remove the battery. Refer to **Battery Replacement** . 2. Remove the instrument panel (I/P) upper trim pad. Refer to **Instrument Panel Upper Trim Panel with Windshield Defroster Nozzle Grille Replacement (Cadillac)** or **Instrument Panel Upper Trim Panel with Windshield Defroster Nozzle Grille Replacement (Except Cadillac)** . 3. Disconnect the upper intermediate steering shaft. Refer to **Upper Intermediate Steering Shaft Replacement** . 4. Remove the 4 I/P bolts to body bolts. 5. Disconnect the 5 electrical connections on the passenger side. 6. Pull the passenger side of the I/P back approximately 760 mm (2.5 ft) pivoting on the drivers side. Set on floor or seat. 7. Remove the 2 screws from the HVAC recirculation door and push door towards the center of the vehicle. Refer to **Air Inlet Assembly Replacement** . 8. Disconnect the coaxial cable at the junction. 9. Insert a shim between the HVAC and side metal approximately 38 mm (1.5 in). 10. Tape pull wire to the coaxial cable.	
1	Radio Antenna Mast **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 6 N.m (53 lb in)
2	Air Inlet Grille Outer Cover
3	Radio Antenna Assembly Screw (Qty: 3) **Tighten:** 5 N.m (44 lb in)
4	Radio Antenna Assembly **Tip:** 1. Remove the cable grommet from the body using the screwdriver from top down. 2. Tie a long wire to the antenna cable to aid in installation of new antenna. Use a screwdriver to guide the cable from the inside. 3. Tape a long pull wire to the antenna cable to aid in installation of the new antenna. Use the screwdriver to guide the wire from the inside. 4. Lubricate the grommet to aid in installation.

RADIO ANTENNA MODULE REPLACEMENT

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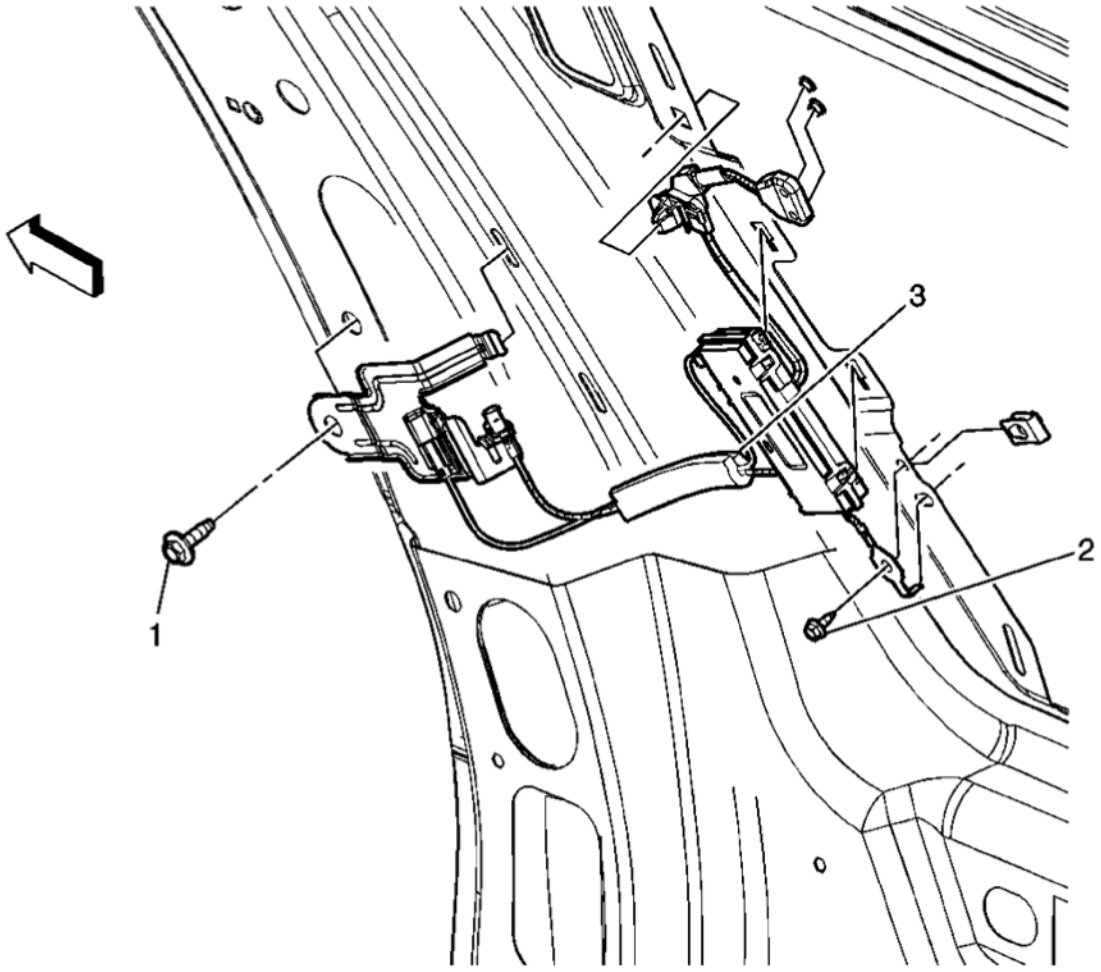


Fig. 32: View Of Radio Antenna Module & Components
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure 1. Remove the right lock pillar garnish molding. Refer to **Body Lock Pillar Garnish Molding Replacement (Avalanche/Escalade EXT)** or **Body Lock Pillar Garnish Molding Replacement (Extended Wheelbase)** or **Body Lock Pillar Garnish Molding Replacement (Standard Wheelbase)** . 2. Remove the screw from the HVAC duct and reposition the duct away from the module to allow access. 3. Remove the right rear quarter trim panel. Refer to **Rear Quarter Trim Panel Replacement - Right Side (Standard Wheelbase)** or **Rear Quarter Trim Panel Replacement - Right Side (Extended Wheelbase)** .	
	Radio Antenna Module Bolt

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1	**CAUTION:** **Refer to Fastener Caution .** **Tighten:** 9 N.m (80 lb in)
2	Radio Antenna Ground Strap Screw **Tighten:** 2 N.m (18 lb in)
3	Radio Antenna Module **Tip:** • Slide the module up to release module retainers from the key slot. • Disconnect the electrical connectors. • Disconnect the antenna leads to the window. • Use a small flat-bladed screw driver or pick tool to release the plastic retaining tab tongue on cable. The retaining clip is not removable after glass installation, caution must be used to ensure it is not broken.

ELECTRONIC NAVIGATION ANTENNA REPLACEMENT

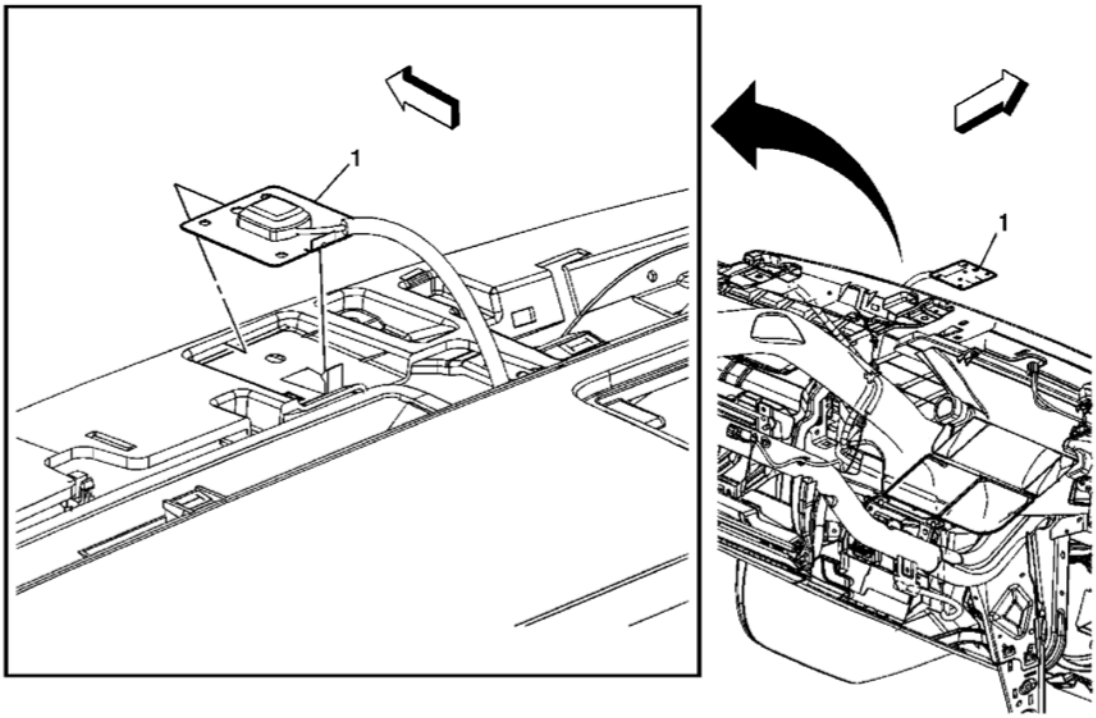


Fig. 33: View Of Radio Antenna Module Assembly
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name

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Preliminary Procedure 1. Remove the instrument panel upper trim pad. Refer to **Instrument Panel Upper Trim Panel with Windshield Defroster Nozzle Grille Replacement (Cadillac)** or **Instrument Panel Upper Trim Panel with Windshield Defroster Nozzle Grille Replacement (Except Cadillac)** . 2. Remove the radio. Refer to **Radio Replacement (Except Cadillac)** or **Radio Replacement (Cadillac)**. 3. Remove the instrument panel center trim panel. Refer to **Instrument Panel Center Trim Panel Replacement (Cadillac)** or **Instrument Panel Center Trim Panel Replacement (Except Cadillac)** .	
1	Radio Antenna Module Assembly **Tip:** • Disconnect the antenna module from the radio. • Disconnect the extension cable from the center HVAC duct.

DIGITAL RADIO ANTENNA CABLE REPLACEMENT

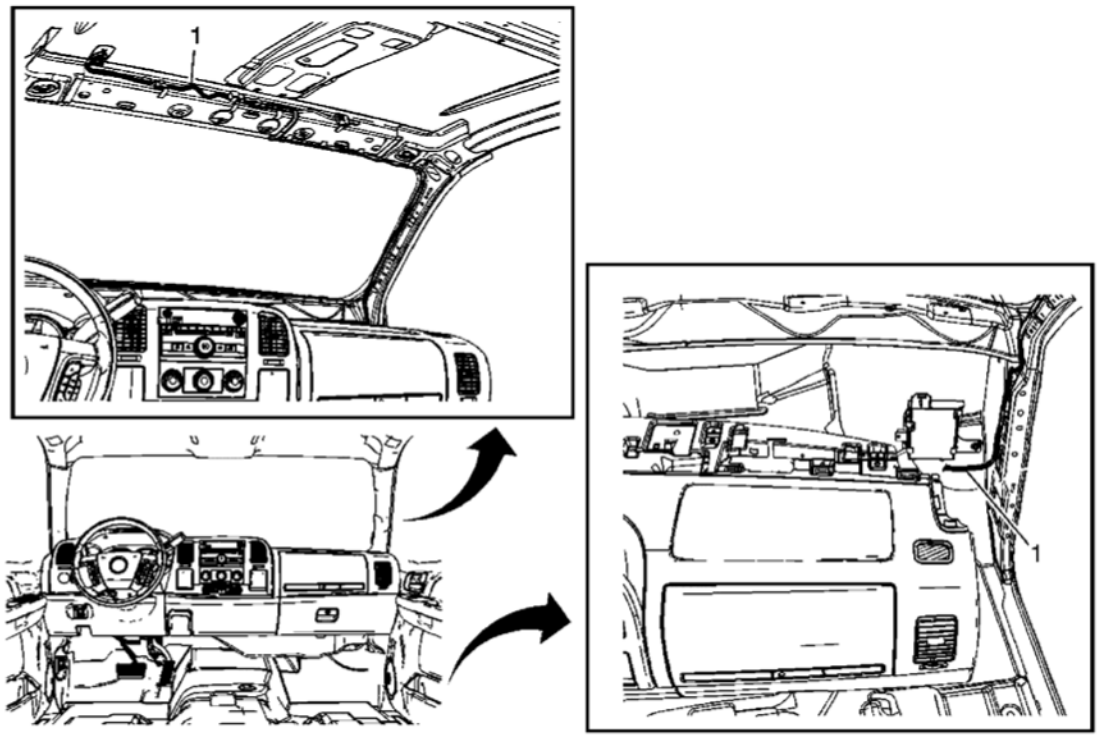


Fig. 34: View Of Digital Radio Coaxial Cable
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure	

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1. Lower the front of the headliner. Refer to **Headlining Trim Panel Replacement (Avalanche/Escalade EXT w/CF5 and U42)** or **Headlining Trim Panel Replacement (Avalanche/Escalade EXT w/CF5 w/o U42)** or **Headlining Trim Panel Replacement (Avalanche w/CJ2 w/o CF5 and U42)** or **Headlining Trim Panel Replacement (Avalanche/Escalade EXT w/CJ3)** or **Headlining Trim Panel Replacement (Avalanche/Escalade EXT w/U24 w/o CF5)** or **Headlining Trim Panel Replacement (LWB w/CF5 and U42)** or **Headlining Trim Panel Replacement (LWB w/CF5 w/o U42)** or **Headlining Trim Panel Replacement (LWB w/CJ2)** or **Headlining Trim Panel Replacement (LWB w/CJ3)** or **Headlining Trim Panel Replacement (LWB w/U42 w/o CF5)** or **Headlining Trim Panel Replacement (SWB w/CF5 and U42)** or **Headlining Trim Panel Replacement (SWB w/CF5 w/o U42)** or **Headlining Trim Panel Replacement (SWB w/CJ3)** or **Headlining Trim Panel Replacement (SWB w/o CF5 and U42)** or **Headlining Trim Panel Replacement (SWB w/U42 w/o CF5)** .
2. Remove the upper instrument panel (I/P) defroster grille. Refer to **Instrument Panel Upper Trim Panel with Windshield Defroster Nozzle Grille Replacement (Cadillac)** or **Instrument Panel Upper Trim Panel with Windshield Defroster Nozzle Grille Replacement (Except Cadillac)** .
3. Remove the right I/P side cover. Refer to cell **Instrument Panel Outer Trim Cover Replacement (Cadillac)** or **Instrument Panel Outer Trim Cover Replacement (Except Cadillac)** .
4. Lower the I/P compartment door. Refer to **Instrument Panel Compartment Door Replacement (Except Cadillac)** or **Instrument Panel Compartment Door Replacement (Cadillac)** .

1	Digital Radio Coaxial Cable **Tip:** 1. If the digital antenna cable is taped in the roof wiring harness then just cut the ends off at the digital receiver and the antenna connection and route the new harness next to the old and use tie straps as needed to secure routing. 2. If needed use a piece of mechanics wire or suitable equivalent to route new cable through windshield pillar and I/P area.

ANTENNA CABLE REPLACEMENT (W/O FIXED ANTENNA)

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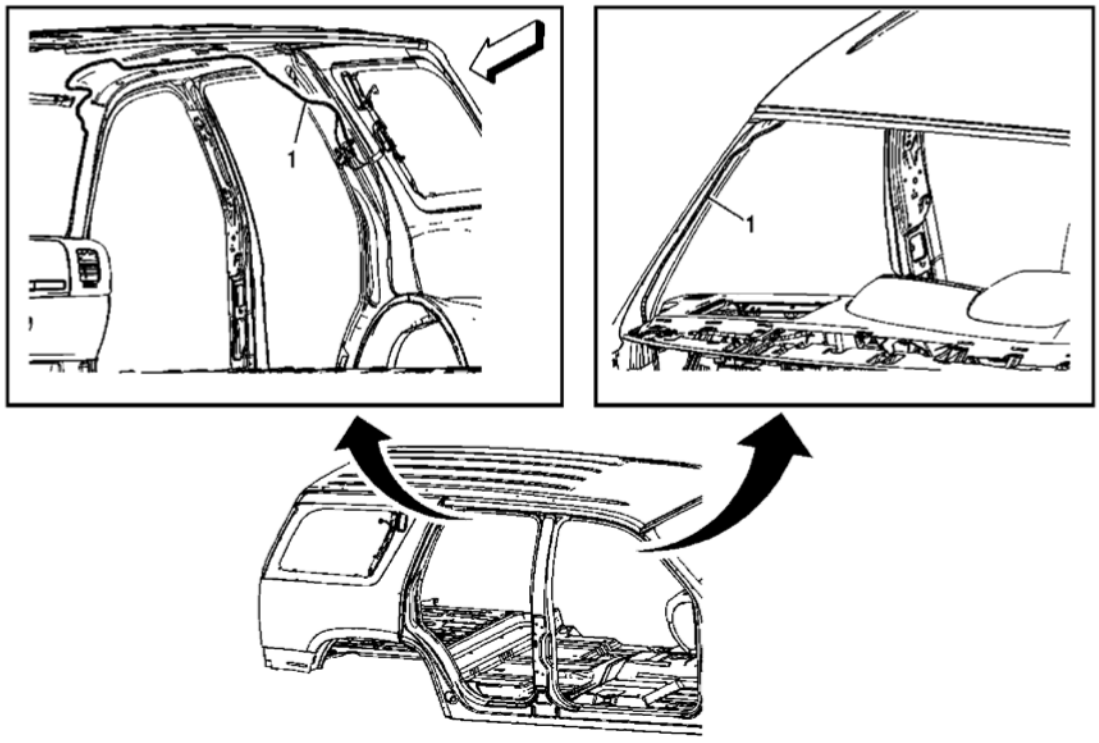


Fig. 35: View Of Radio Antenna Cable
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name

Preliminary Procedure

1. Remove the right windshield pillar molding. Refer to **Windshield Pillar Garnish Molding Replacement** .
2. Remove the instrument panel upper trim pad. Refer to **Instrument Panel Upper Trim Panel with Windshield Defroster Nozzle Grille Replacement (Cadillac)** or **Instrument Panel Upper Trim Panel with Windshield Defroster Nozzle Grille Replacement (Except Cadillac)** .
3. Remove the right lock pillar garnish molding. Refer to **Body Lock Pillar Garnish Molding Replacement (Avalanche/Escalade EXT)** or **Body Lock Pillar Garnish Molding Replacement (Extended Wheelbase)** or **Body Lock Pillar Garnish Molding Replacement (Standard Wheelbase)** .
4. Remove the screw from the HVAC duct and reposition the duct away from the antenna module to allow access.
5. Remove the right rear quarter trim panel. Refer to **Rear Quarter Trim Panel Replacement - Right Side (Standard Wheelbase)** or **Rear Quarter Trim Panel Replacement - Right Side (Extended Wheelbase)** .
6. Lower the headliner. Refer to **Headlining Trim Panel Replacement (Avalanche/Escalade EXT w/CF5 and U42)** or **Headlining Trim Panel Replacement (Avalanche/Escalade EXT w/CF5 w/o U42)** or **Headlining Trim Panel Replacement (Avalanche w/CJ2 w/o CF5 and U42)** or

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	Headlining Trim Panel Replacement (Avalanche/Escalade EXT w/CJ3) or **Headlining Trim Panel Replacement (Avalanche/Escalade EXT w/U24 w/o CF5)** or **Headlining Trim Panel Replacement (LWB w/CF5 and U42)** or **Headlining Trim Panel Replacement (LWB w/CF5 w/o U42)** or **Headlining Trim Panel Replacement (LWB w/CJ2)** or **Headlining Trim Panel Replacement (LWB w/CJ3)** or **Headlining Trim Panel Replacement (LWB w/U42 w/o CF5)** or **Headlining Trim Panel Replacement (SWB w/CF5 and U42)** or **Headlining Trim Panel Replacement (SWB w/CF5 w/o U42)** or **Headlining Trim Panel Replacement (SWB w/CJ3)** or **Headlining Trim Panel Replacement (SWB w/o CF5 and U42)** or **Headlining Trim Panel Replacement (SWB w/U42 w/o CF5)** .
1	Radio Antenna Cable **Tip:** 1. Disconnect the antenna cable from the extension cable located on the top of the instrument panel on the right side. 2. Disconnect the antenna cable from the antenna module. 3. Note the routing of the antenna cable on the headliner for aid in installation. 4. Remove the antenna cable from the headliner.

RADIO ANTENNA CABLE EXTENSION CABLE REPLACEMENT (AVALANCHE/ESCALADE EXT)

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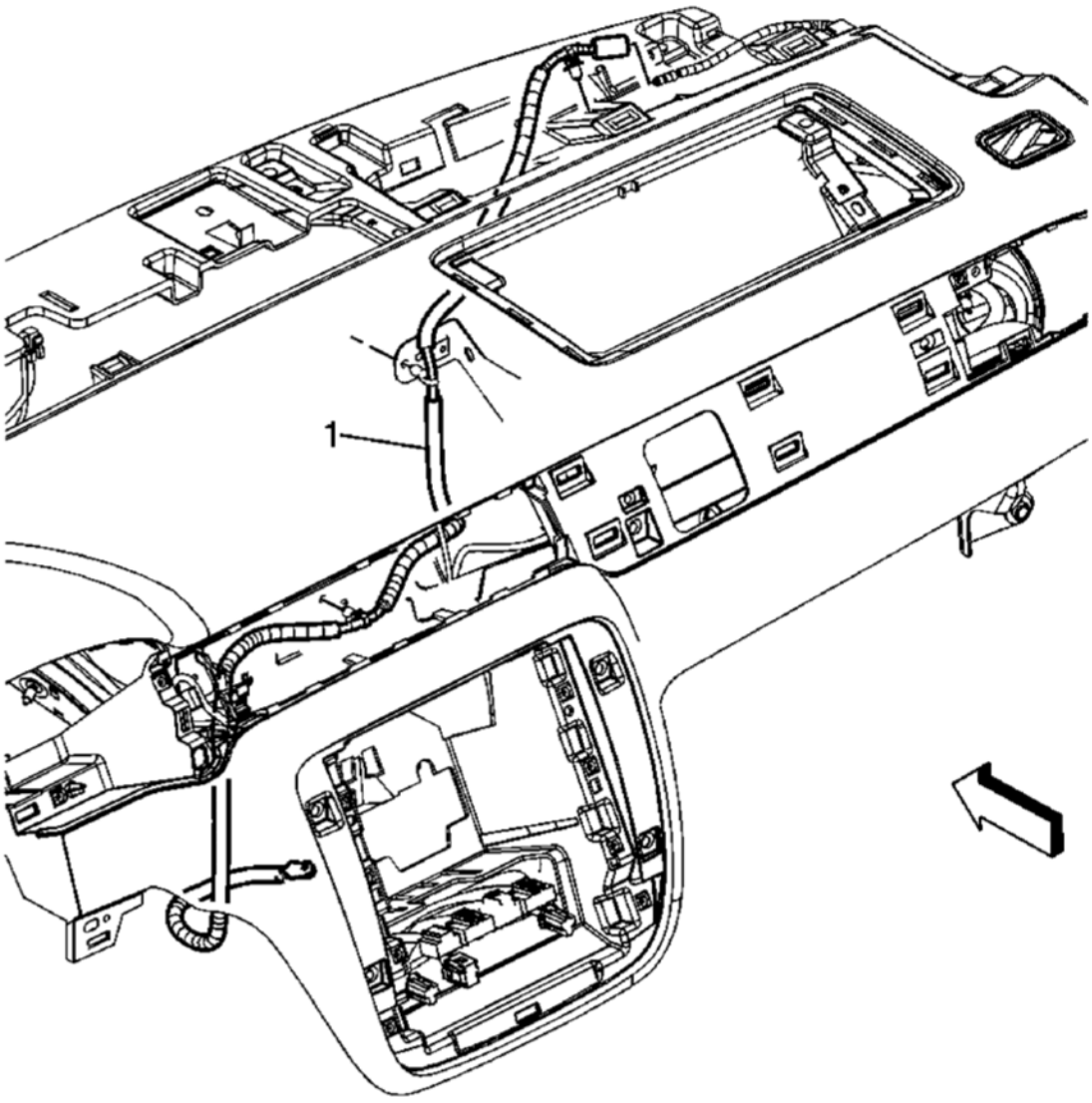


Fig. 36: View Of Radio Antenna Extension Cable Assembly
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure	
1. Remove the instrument panel upper trim pad. Refer to **Instrument Panel Upper Trim Panel with Windshield Defroster Nozzle Grille Replacement (Cadillac)** or **Instrument Panel Upper Trim Panel with Windshield Defroster Nozzle Grille Replacement (Except Cadillac)** .	
2. Remove the radio. Refer to **Radio Replacement (Except Cadillac)** or **Radio Replacement (Cadillac)**.	
3. Remove the instrument panel center trim panel. Refer to **Instrument Panel Center Trim Panel Replacement (Cadillac)** or **Instrument Panel Center Trim Panel Replacement (Except**	

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	Cadillac) .
1	Radio Antenna Extension Cable Assembly **Tip:** • Disconnect the extension cable from the antenna. • Disconnect the extension cable from the radio. • Disconnect the extension cable from the center HVAC duct.

MOBILE TELEPHONE AND NAVIGATION ANTENNA COAXIAL CABLE REPLACEMENT

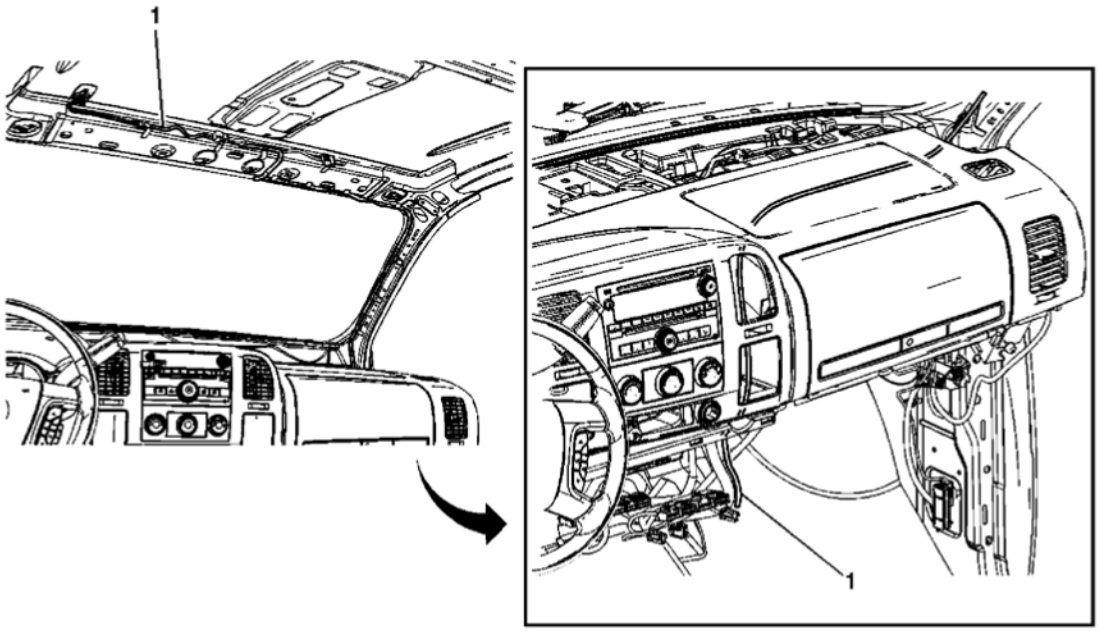


Fig. 37: View Of Navigation/Cellular Coaxial Cable
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure	
1.	Lower the front of the headliner. Refer to **Headlining Trim Panel Replacement (Avalanche/Escalade EXT w/CF5 and U42)** or **Headlining Trim Panel Replacement (Avalanche/Escalade EXT w/CF5 w/o U42)** or **Headlining Trim Panel Replacement (Avalanche w/CJ2 w/o CF5 and U42)** or **Headlining Trim Panel Replacement (Avalanche/Escalade EXT w/CJ3)** or **Headlining Trim Panel Replacement (Avalanche/Escalade EXT w/U24 w/o CF5)** or **Headlining Trim Panel Replacement (LWB w/CF5 and U42)** or **Headlining Trim Panel Replacement (LWB w/CF5 w/o U42)** or **Headlining Trim Panel Replacement (LWB w/CJ2)** or **Headlining Trim Panel Replacement (LWB w/CJ3)** or **Headlining Trim Panel Replacement (LWB w/U42 w/o CF5)** or **Headlining Trim Panel Replacement (SWB w/CF5 and U42)** or **Headlining Trim Panel Replacement**

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	(SWB w/CF5 w/o U42) or **Headlining Trim Panel Replacement (SWB w/CJ3)** or **Headlining Trim Panel Replacement (SWB w/o CF5 and U42)** or **Headlining Trim Panel Replacement (SWB w/U42 w/o CF5)** . 2. Remove the upper instrument panel (I/P) defroster grille. Refer to **Instrument Panel Upper Trim Panel with Windshield Defroster Nozzle Grille Replacement (Cadillac)** or **Instrument Panel Upper Trim Panel with Windshield Defroster Nozzle Grille Replacement (Except Cadillac)** . 3. Remove the instrument panel compartment door. Refer to **Instrument Panel Compartment Door Replacement (Except Cadillac)** or **Instrument Panel Compartment Door Replacement (Cadillac)** . 4. Remove the interface communication module. Refer to **Communication Interface Module Replacement (Cadillac)** or **Communication Interface Module Replacement (Except Cadillac)**.
1	Navigation/Cellular Coaxial Cable **Tip:** 1. If the coaxial antenna cable is taped in the wiring harness then just cut the ends off at the interface communication module and the antenna connection and route the new harness next to the old and use tie straps as needed to secure routing. 2. If needed use a piece of mechanics wire or suitable equivalent to route new cable through windshield pillar and I/P area.

AUDIO SYSTEM TRANSCEIVER MODULE REPLACEMENT

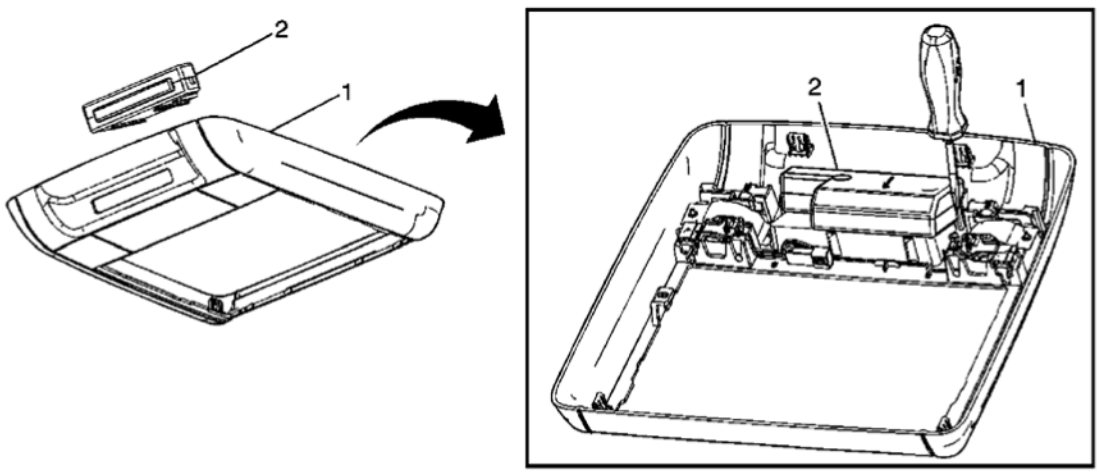


Fig. 38: View Of Audio System Transceiver Module
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the video display assembly. Refer to **Video Display Replacement (Second Row)** or **Video Display Replacement (Third Row)**.	
	Roof Console Assembly

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1	Refer to **Roof Rear Console Replacement (w/o DVD)** or **Roof Rear Console Replacement (with DVD)** .
2	Audio System Transceiver Module Assembly **Tip:** 1. Disconnect the electrical connector. 2. Use a flat bladed tool to release the tabs that secure the module to the roof console on each side of the module. 3. Slide forward and up to release from the roof console.

VIDEO DISPLAY REPLACEMENT (SECOND ROW)

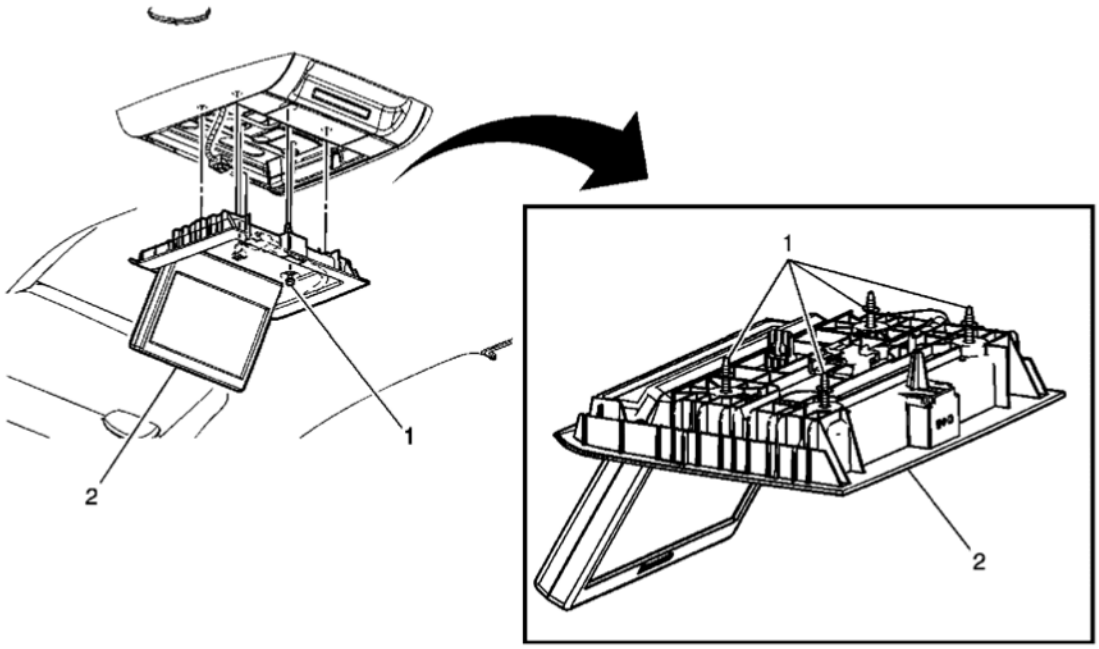


Fig. 39: View Of Video Display & Screws
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Video Display Assembly Screw (Qty: 4) **CAUTION:** **Refer to Fastener Caution .** **Tip:** Make sure that all 4 washers on the 4 mounting screws are accounted for. If any washers are off the screw and loose, discard to prevent a rattle. The washers were required only for assembly plant installation, and can be used if still on the screw or they can be

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	discarded. **Tighten:** 2 N.m (18 lb in)
2	Video Display Assembly **Tip:** 1. Pull down to disengage the retainer clip and remove from the vehicle. 2. Disconnect the electrical connector.

VIDEO DISPLAY REPLACEMENT (THIRD ROW)

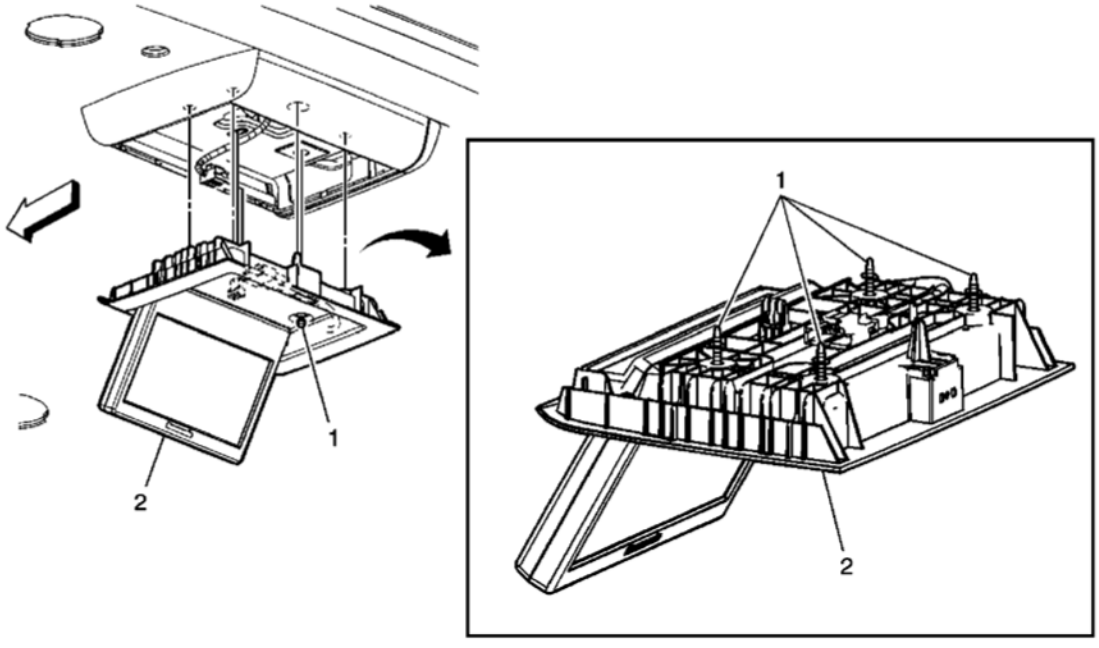


Fig. 40: View Of Video Display Assembly & Screws
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Video Display Assembly Screw (Qty: 4) **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 2 N.m (18 lb in) **Tip:** Make sure that all 4 washers on the 4 mounting screws are accounted for. If any washers are off the screw and loose, discard to prevent a rattle. The washers were required

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	only for assembly plant installation, and can be used if still on the screw or they can be discarded.
2	Video Display Assembly **Tip:** 1. Pull down to disengage the retainer clip and remove from the vehicle. 2. Disconnect the electrical connector.

REAR SEAT AUDIO CONTROL REPLACEMENT

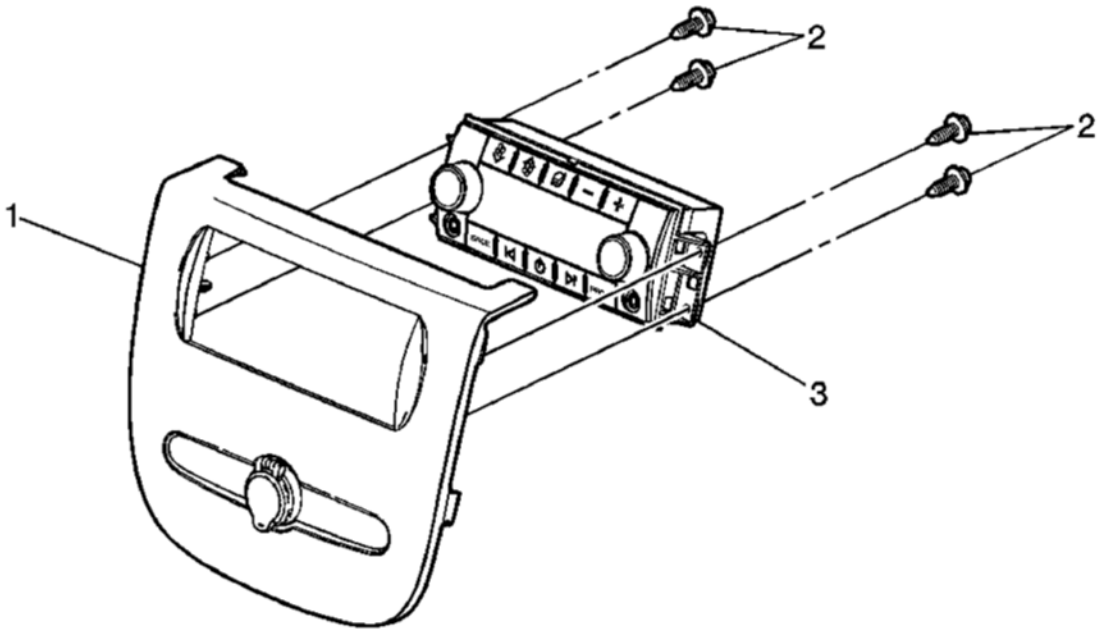


Fig. 41: View Of Rear Radio Control Assembly & Screws
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Front Floor Console Compartment Bezel Assembly Refer to **Front Floor Console Compartment Bezel Replacement (Except Cadillac)** or **Front Floor Console Compartment Bezel Replacement (Cadillac)** .
2	Rear Radio Control Assembly Screw (Qty: 4) **CAUTION:** **Refer to Fastener Caution .** **Tip:** Tighten the fasteners equally to ensure the control assembly seats evenly.

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	Tighten: 1.5 N.m (13 lb in)
3	Rear Radio Control Assembly **Procedure:** Disconnect the electrical connectors from the rear radio control assembly.

AUDIO/VIDEO DISC PLAYER ADAPTER REPLACEMENT (EXCEPT CADILLAC)

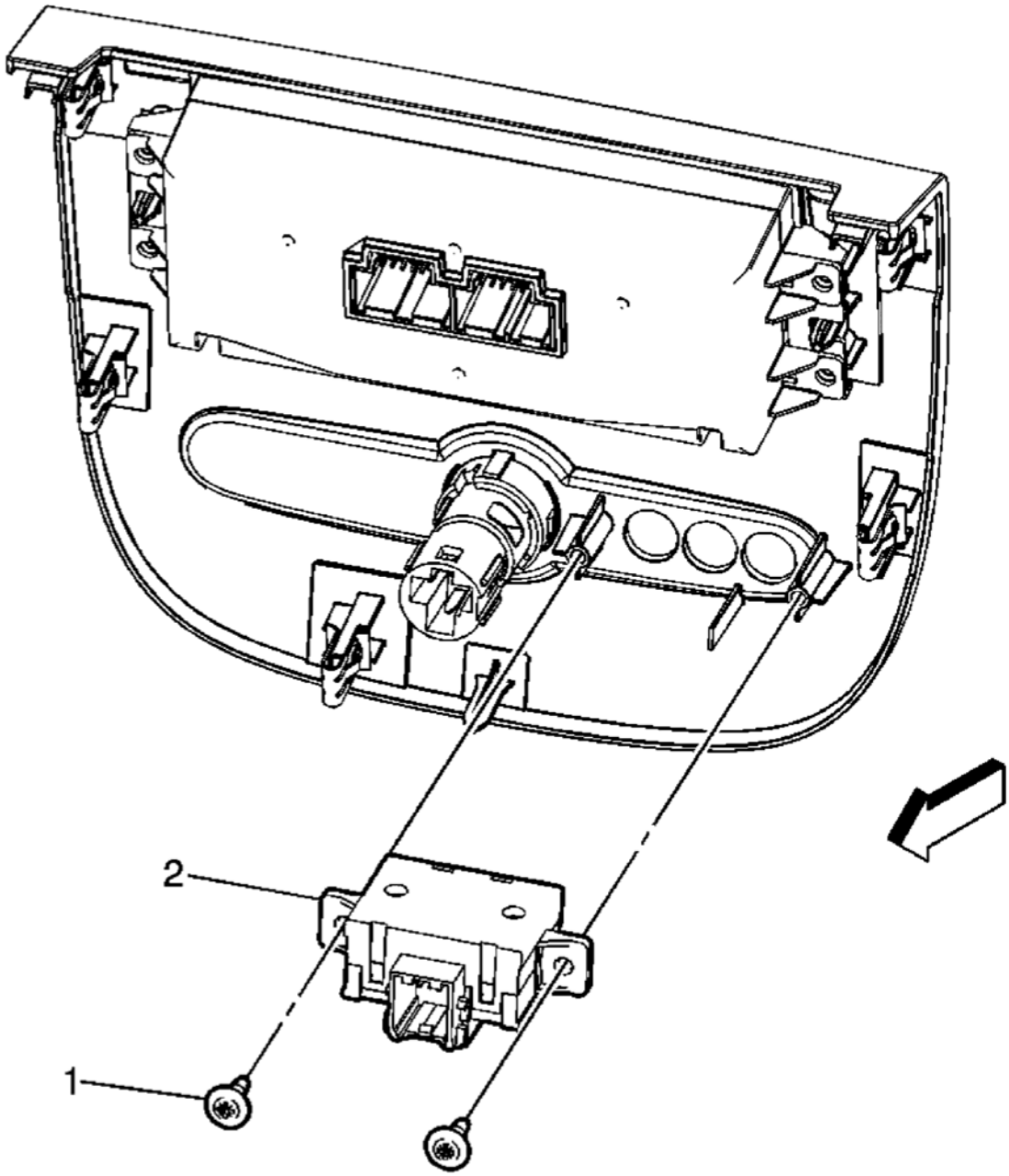


Fig. 42: View Of Audio/Video Disc Player Adapter Assembly & Screws
Courtesy of GENERAL MOTORS CORP.

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Callout	Component Name
Preliminary Procedure: Remove the front floor console compartment bezel. Refer to **Front Floor Console Compartment Bezel Replacement (Except Cadillac)** or **Front Floor Console Compartment Bezel Replacement (Cadillac)** .	
1	Audio/Video Disc Player Adapter Assembly Screw (Qty: 2) **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 2 N.m (18 lb in)
2	Audio/Video Disc Player Adapter Assembly

AUDIO/VIDEO DISC PLAYER ADAPTER REPLACEMENT (CADILLAC)

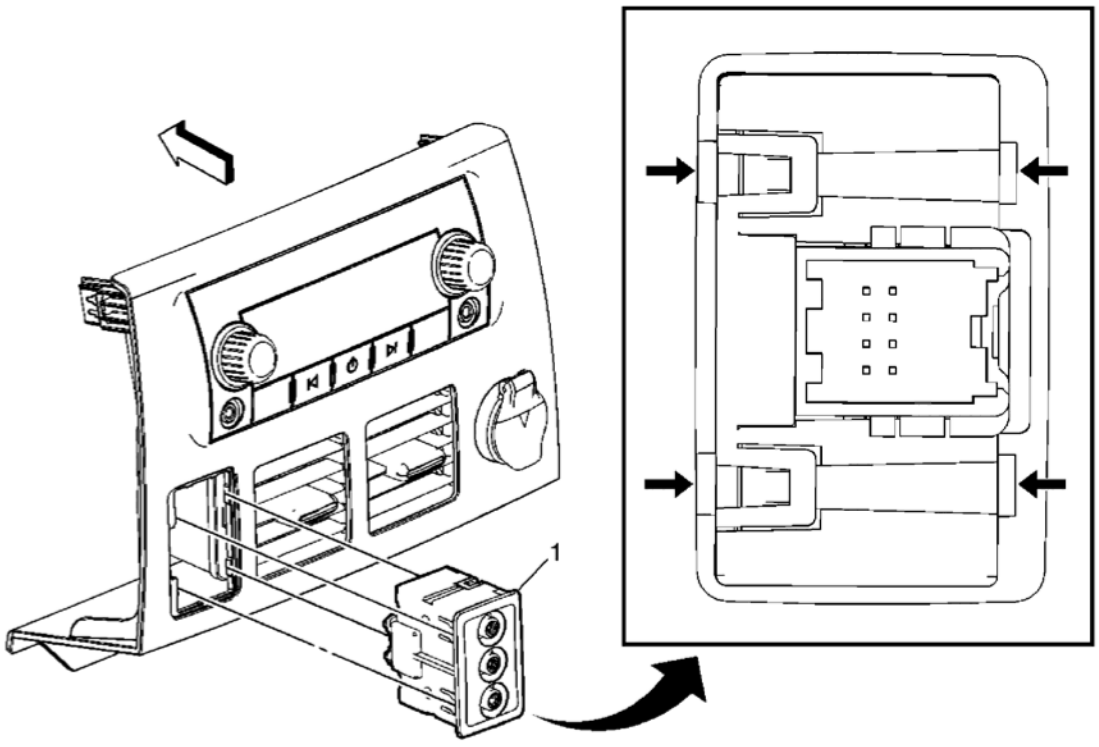


Fig. 43: View Of Audio/Video Disc Player Adapter Assembly
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the front floor console compartment bezel. Refer to **Front Floor Console Compartment Bezel Replacement (Except Cadillac)** or **Front Floor Console Compartment Bezel Replacement (Cadillac)** .	

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1	Audio/Video Disc Player Adapter Assembly **Tip:** Depress the four tabs and remove from the bezel.

RADIO FRONT SPEAKER GRILLE REPLACEMENT

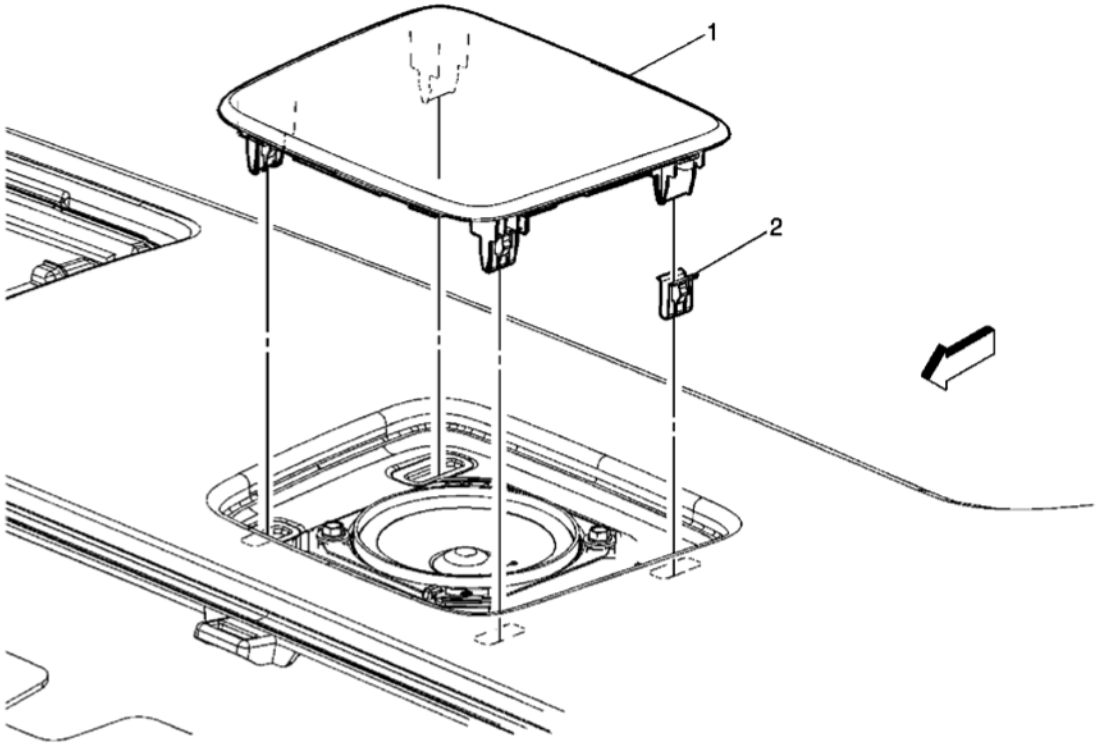


Fig. 44: View Of Front Speaker Grille & Retainer Clips
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Front Speaker Grille
2	Front Speaker Grille Retainer Clip (Qty: 4)

RADIO FRONT SPEAKER REPLACEMENT

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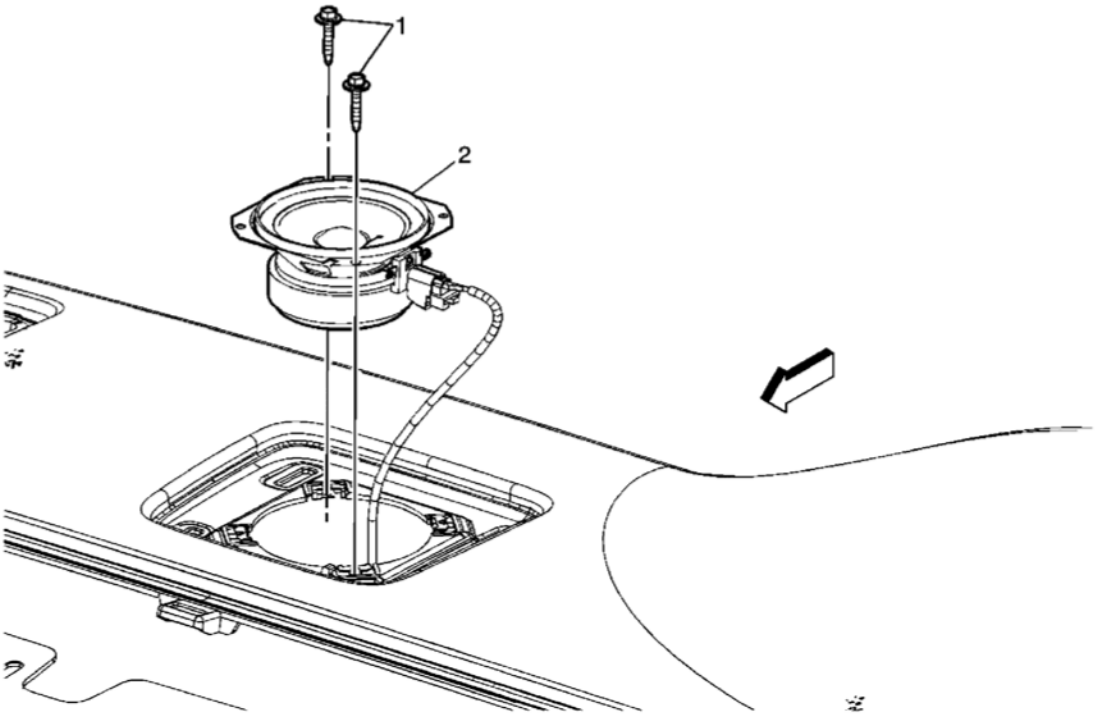


Fig. 45: View Of Front Speaker Assembly & Screws
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the front speaker grille. Refer to **Radio Front Speaker Grille Replacement**.	
1	Front Speaker Screw (Qty: 2) **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 6 N.m (53 lb in)
2	Front Speaker Assembly **Tip:** Disconnect the electrical connector.

FRONT UPPER SPEAKER REPLACEMENT

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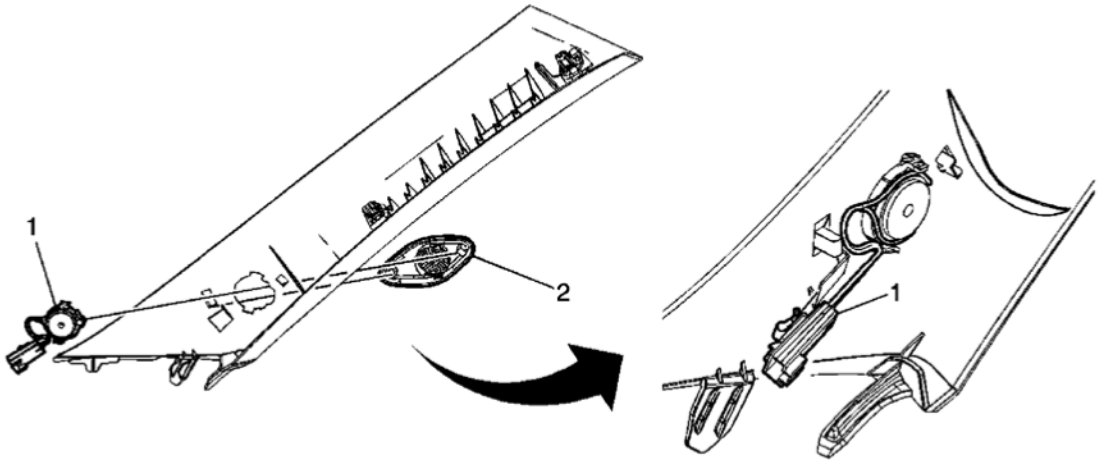


Fig. 46: View Of Radio Windshield Side Garnish Molding Speaker Assembly & Grille
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the windshield pillar garnish molding. Refer to **Windshield Pillar Garnish Molding Replacement** .	
1	Speaker Assembly, Radio Windshield Side Garnish Molding **Tip:** Press in the tabs on the speaker to release from the windshield pillar.
2	Speaker Grille, Radio Windshield Side Garnish Molding **Tip:** Press in on the tabs of the speaker grille to release from the windshield pillar.

RADIO FRONT SIDE DOOR SPEAKER REPLACEMENT

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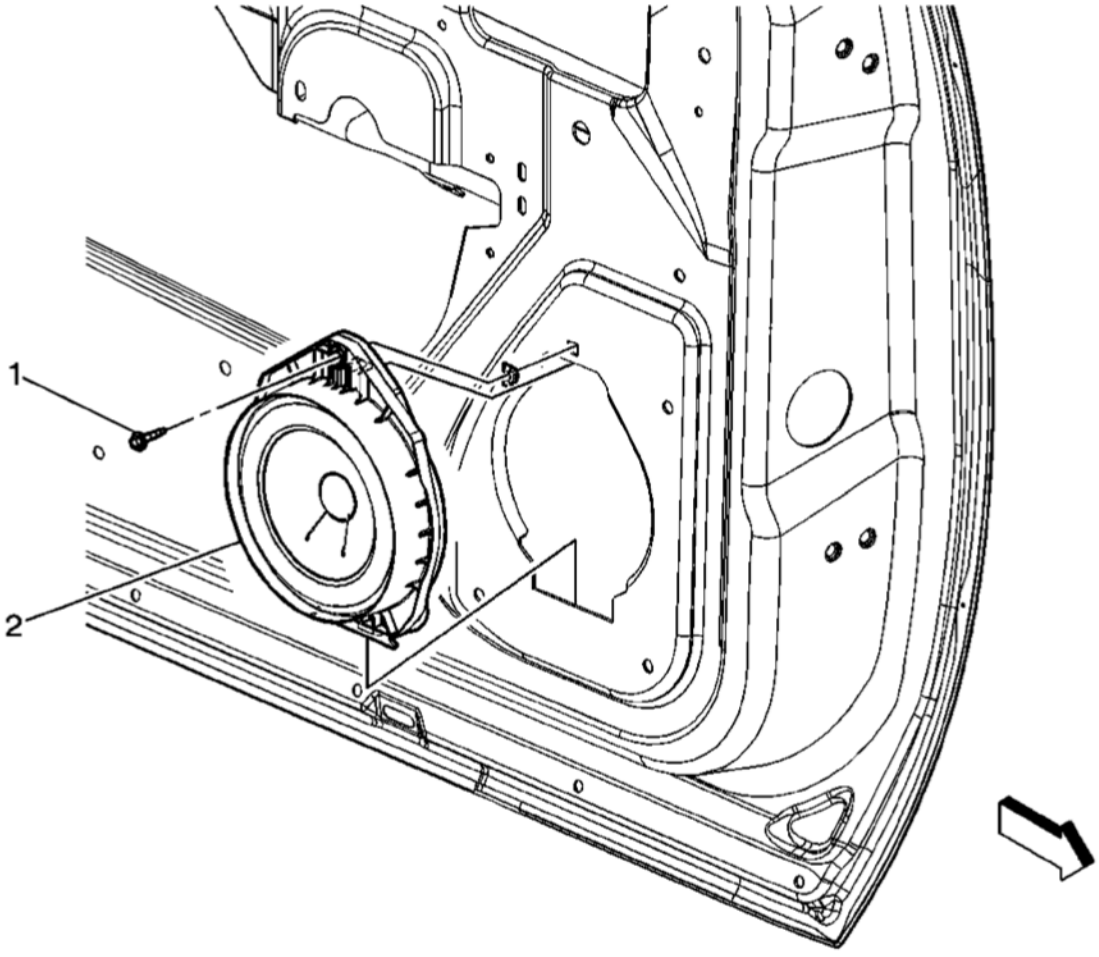


Fig. 47: View Of Front Door Speaker & Screws
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the front door inner trim panel. Refer to **Front Side Door Trim Panel Replacement** .	
1	Front Door Speaker Screw **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 3 N.m (25 lb in) **Tip:** Disconnect the electrical connectors.
2	Front Door Speaker

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RADIO FRONT FLOOR CONSOLE SPEAKER REPLACEMENT

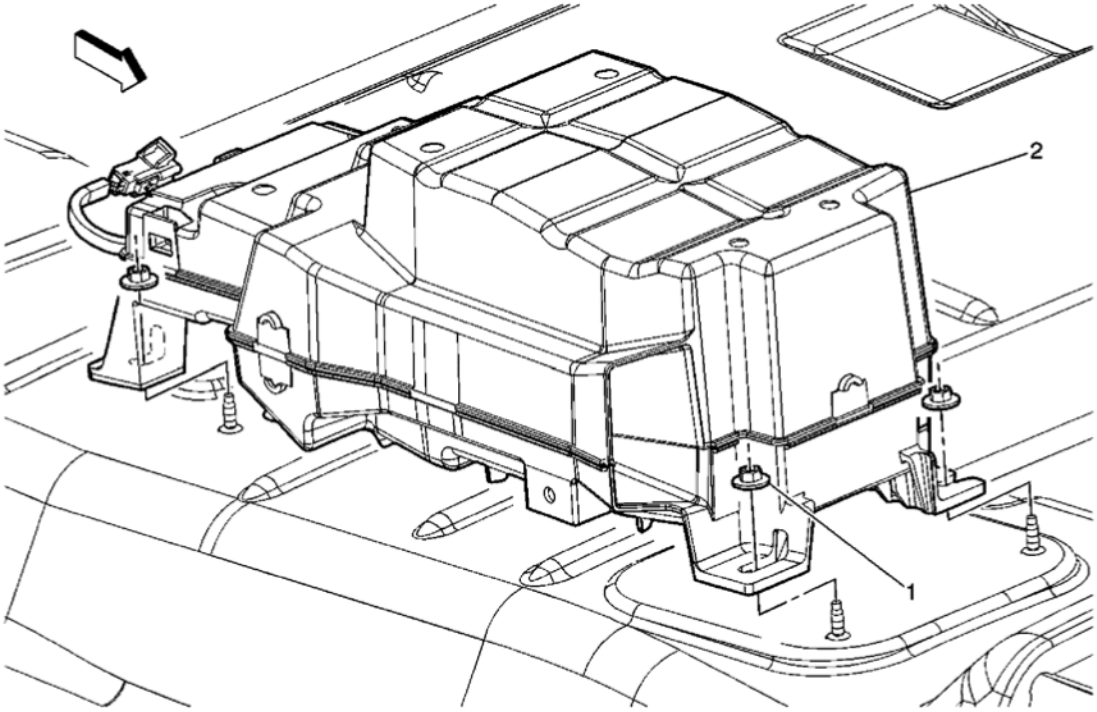


Fig. 48: View Of Front Floor Console Speaker Assembly & Nuts
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the front floor console assembly. Refer to **Front Floor Console Replacement (Except Cadillac)** or **Front Floor Console Replacement (Cadillac)** .	
1	Speaker Assembly Nut (Qty: 3) **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 9 N.m (80 lb in)
2	Front Floor Console Speaker Assembly **Tip:** Disconnect the electrical connectors.

RADIO REAR SIDE DOOR SPEAKER REPLACEMENT

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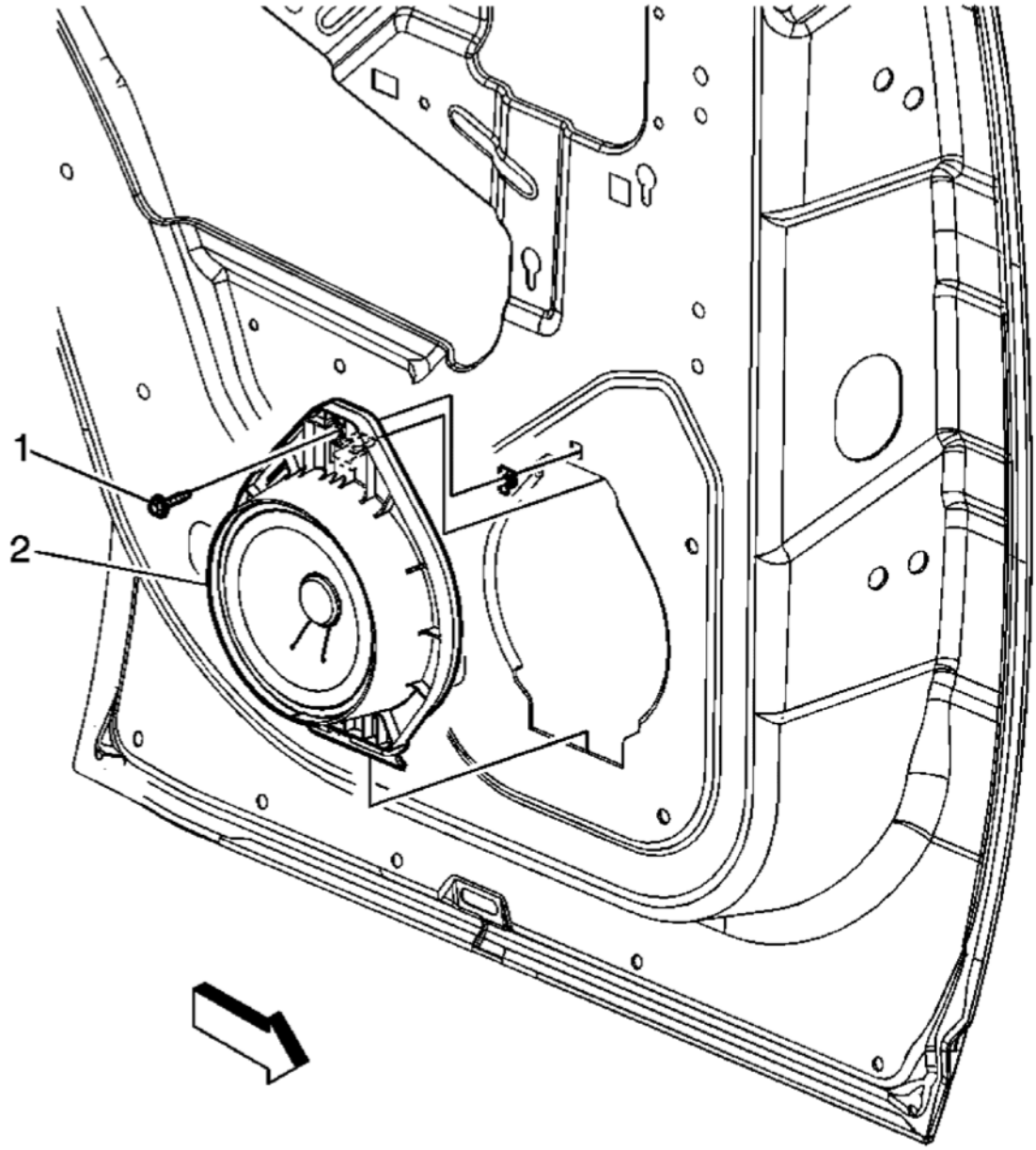


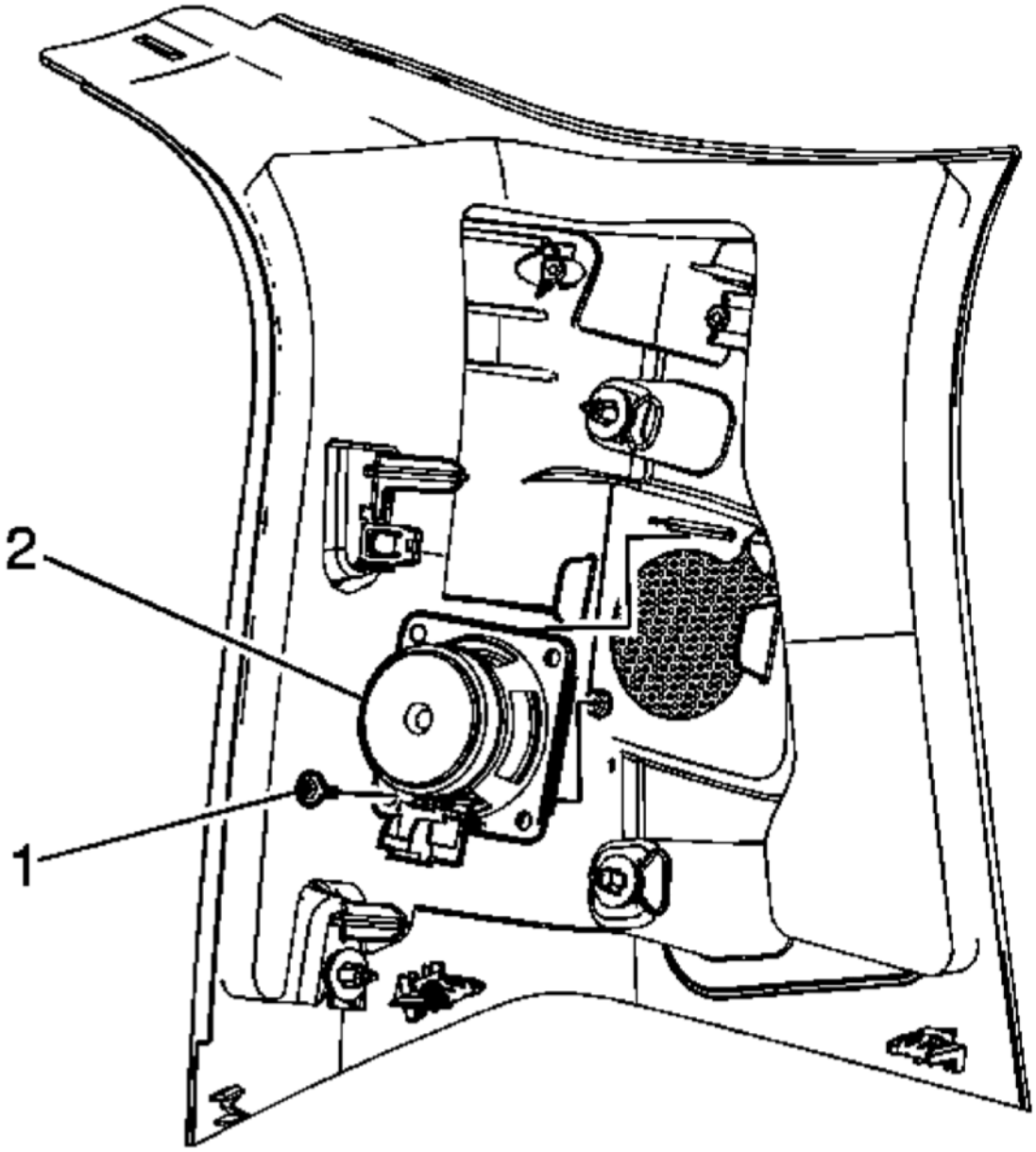
Fig. 49: View Of Rear Door Speaker & Screw
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the rear door inner trim panel. Refer to **Rear Side Door Trim Panel Replacement (Standard Wheelbase)** or **Rear Side Door Trim Panel Replacement (Extended Wheelbase)** .	
	Rear Door Speaker Screw **CAUTION:**

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1	**Refer to Fastener Caution .** **Tighten:** 3 N.m (25 lb in) **Tip:** Disconnect the electrical connectors.
2	Rear Door Speaker

REAR PILLAR SPEAKER REPLACEMENT



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Fig. 50: View Of Radio Rear Speaker Assembly & Screw
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the rear corner garnish molding. Refer to **Body Rear Corner Garnish Molding Replacement - Right Side** or **Body Rear Corner Garnish Molding Replacement - Left Side (w/o E61)** or **Body Rear Corner Garnish Molding Replacement - Left Side (w/E61)** .	
1	Radio Rear Speaker Assembly Screw **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 3 N.m (25 lb in)
2	Radio Rear Speaker Assembly

DESCRIPTION AND OPERATION

NAVIGATION SYSTEM DESCRIPTION AND OPERATION

Each item in the list below represents topics covered in detail below.

- Audio System Description
- Navigation System Components
- Navigation Radio
- Global Positioning System (GPS) Antenna
- Route Guidance
- Auxiliary RCA Video Jacks (If Equipped)
- Voice Recognition
- Points of Interest

Audio System Description

The Navigation radio operates similar to a traditional radio. For information on the audio description and operation, refer to **Radio/Audio System Description and Operation**.

Navigation System Components

The navigation system contains the following components:

- Navigation Radio
- GPS Antenna
- Auxiliary RCA Video Jacks (If Equipped)

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Navigation Radio

This component acts as the operator interface for the navigation system, provides the data input from the operator to the navigation system and provides navigation information to the operator via the display screen. The navigation radio is located in the center of the instrument panel. The navigation radio provides the following:

- A display screen-All navigation, audio and TV functions are displayed on this screen.
- Soft key buttons on the display to allow selection from menus and to operate the navigation system and the audio system
- The DVD provides map data for navigation and map route guidance.
- The navigation system map with routing information displayed on the navigation radio screen
- Provides verbal guidance to the operator
- Connection to the GPS antenna, which provides the vehicle position information

Global Positioning System (GPS) Antenna

The GPS antenna is located in the upper center of the I/P. The GPS antenna is powered through the same coaxial cable used to send the signals to the NAV radio. Interference to the system may occur if any of the following exist:

- Signals are obstructed by objects such as, tall buildings or trees.
- Metallic objects located on the dashboard
- Aftermarket glass tinting has been applied to the vehicles windshield.

Route Guidance

The map will display the route to the selected destination. Voice prompts alert the operator of upcoming events, turns and arrivals at the destination. The navigation system will automatically recalculate if the route is not followed. The navigation radio uses data received from the GPS satellites as well as the vehicle speed signal to accurately display the current position of the vehicle. The map DVD must be in the NAV radio for route guidance.

Auxiliary RCA Video Jacks (If Equipped)

The auxiliary RCA video jacks are used to attach a remote video device. These connections may be used to provide audio and video input from a remote device such as a video game console or camera to the rear seat entertainment system.

Voice Recognition

The Navigation System voice recognition allows for hands-free operation of navigation and audio system features. The voice recognition can be used when the ignition is in accessory or ON, or when retained accessory power (RAP) is active. This feature only works if the map DVD is inserted and the AGREE button has been pressed. For a complete list of available commands, refer to the Owners Manual Navigation Supplement and/or Personalization in the Owners manual.

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Points of Interest

Points of interests (POI) are locations that are frequently visited. Points of interest can be can be displayed on the map or set as a destination. The following are some of the available POI:

- Gas Station
- Restaurant
- College
- Police Station

ONSTAR DESCRIPTION AND OPERATION

This OnStar® system consists of the following components:

- Communication Interface Module (CIM)
- OnStar® button assembly
- Microphone
- Cellular antenna
- Navigation antenna
- Bluetooth ® antenna (If Equipped)
- Back Up Battery (BUB) (If Equipped)

This system also interfaces with the factory installed vehicle audio system.

Communication Interface Module (CIM)

The communication interface module (CIM) is a cellular device that allows the user to communicate data and voice signals over the national cellular network. Power is provided by a dedicated, fused B+ circuit. Ground is provided through the vehicle wiring harness attached to the module. The ignition state is determined by the CIM through serial data messaging.

Dedicated circuits are used to connect the CIM to a microphone, the button assembly, and to command the status LED. The CIM communicates with the rest of the vehicle over the serial data bus.

The module houses 2 technology systems, one to process GPS data, and another for cellular information. The cellular system connects the OnStar® system to the cellular carrier's communication system by interacting with the national cellular infrastructure. The module sends and receives all cellular communications over the cellular antenna and cellular antenna coax. GPS satellites orbiting earth are constantly transmitting signals of their current location. The OnStar® system uses the GPS signals to provide location on demand.

The module also has the capability of activating the horn, initiating door lock/unlock, or activating the exterior lamps using the serial data circuits. These functions can be commanded by the OnStar® Call Center per a customer request.

OnStar® Button Assembly

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The OnStar® button assembly may be part of the rearview mirror, or a separate, stand alone unit. The button assembly is comprised of 3 buttons and a status LED. The buttons are defined as follows:

- The answer/end call button, which is black with a white phone icon, allows the user to answer and end calls or initiate speech recognition.
- The blue OnStar® call center button, which displays the OnStar® logo, allows the user to connect to the OnStar® call center.
- The emergency button, which displays a white cross with a red background, sends a high priority emergency call to the OnStar® call center when pressed.

The CIM supplies 10 volts to the OnStar® button assembly on the keypad supply voltage circuit. When pressed, each button completes a circuit across a resistor allowing a specific voltage to be returned to the CIM on the keypad signal circuit. Depending upon the voltage range returned the CIM is able to identify which button has been pressed.

The OnStar® status LED is located with the button assembly. The LED is green when the system is ON and operating normally. When the status LED is green and flashing, it is an indication that a call is in progress. When the LED is red, this indicates a system malfunction is present. In the event there is a system malfunction and the OnStar® system is still able to make a call, the LED will flash red during the call.

If the LED does not illuminate, this may indicate that the customers OnStar® subscription is not active or has expired. Push the blue OnStar button to connect to an advisor who can then verify the account status.

Each LED is controlled by the CIM over dedicated LED signal circuits. Ground for the LED is provided by the wiring harness attached to the button assembly.

Secondary OnStar® Controls

Some vehicles may have an additional button that when pushed can engage the OnStar® system. The button may be a symbol of a face with sound waves, or may say MUTE, or be a symbol of a radio speaker with a slash through it.

By engaging the OnStar® system with this feature, the user can interact with the system by use of voice commands. A complete list of these commands is supplied in the information provided to the customer. If the information is not available for reference, at any command prompt the user can say "HELP" and the CIM will return an audible list of available commands.

OnStar® Microphone

The OnStar®, or cellular microphone, can be a part of the rearview mirror assembly, or on some vehicle lines, a separate, stand alone unit. In either case, the CIM supplies approximately 10 volts to the microphone on the cellular microphone signal circuit, and voice data from the user is sent back to the CIM over the same circuit. A cellular microphone low reference circuit or a drain wire provides a ground for the microphone.

Cellular and GPS Antennas

This vehicle will be equipped with one of the following types of antennas:

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- Separate, standalone cellular and navigation antennas
- A combination cellular and navigation antenna, which brings the functions of both into a single part
- A cellular, GPS, and digital radio receiver (DRR) antenna, which also incorporates the functionality of the DRR satellite antenna (XM).
- A cellular, GPS, and DRR antenna, which also incorporates the AM/FM antenna.

The cellular antenna is the component that allows the OnStar® system to send and receive data over airwaves by means of cellular technology. The antenna is connected at the base to a coax cable that plugs directly into the CIM.

The GPS antenna is used to collect the signals of the orbiting GPS satellites. Within the antenna is housed a low noise amplifier that allows for a more broad and precise reception of this data. The antenna is connected at the base to a coax cable that plugs directly into the CIM. The cable also provides a path for DC current for powering the antenna.

The OnStar® Call Center also has the capability of communicating with the vehicle during an OnStar® call to retrieve the latest GPS location and transmit it to the OnStar® Call Center. A history location of the last recorded position of the vehicle is stored in the module and marked as aged, for as long as the module power is not removed. Actual GPS location may take up to 10 minutes to register in the event of a loss of power.

Bluetooth ® (If Equipped)

Bluetooth ® wireless technology is a short-range communications technology intended to replace the cables connecting portable and/or fixed devices while maintaining high levels of security. Only vehicles with steering wheel controls will have Bluetooth ® functionality. In order to utilize the vehicle's Bluetooth ® system, a Bluetooth ® equipped cellular phone is required.

The Bluetooth ® antenna is a small fixed antenna connected directly to the CIM and is used to send and receive signals from a Bluetooth ® enabled cellular phone. The antenna utilizes no cabling and is not external to the vehicle. The available features and functions are determined by the software within the device being used and the CIM. The operating range of the signal from the vehicle is approximately 30 feet. Note that the operating range is dependent upon the cellular phone being used and battery level of the phone.

With Bluetooth ® technology customers can experience hands-free calling as their Bluetooth ® capable cellular phones are wirelessly connected to the vehicle. It will allow customers to place and receive calls using the steering wheel controls and voice recognition. The vehicle audio system will allow you to listen to your call through the vehicle speakers and adjust volume through steering wheel or radio controls.

Not all Bluetooth ® cellular phones are guaranteed to work with the vehicle's Bluetooth ® system. Based on the cellular phone's service provider and the manufacturer's implementation of Bluetooth ®, not all phones support all available Bluetooth ® functionality. Bluetooth ® enabled cellular phones will be tested for vehicle compatibility and a feature compatibility list will be provided via the GM Bluetooth ® website: http://www.gm.com/vc/bluetooth/

Bluetooth ® Features Supported

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The following is a list of features supported by the Bluetooth ® system. Note that not all devices will support all of the listed functions.

- Automatic reconnection - highest priority phone will automatically be connected to vehicle when vehicle ignition is on
- Hands-free dialing- via digits, redial, name tags (phone number saved to a nametag via voice recognition)
- Answering a call
- Ending a call
- Mute a Call
- Rejecting a call - ignore an incoming call
- Call Waiting
- Three-way Calling - initiated from hands-free system
- Send Number During a Call - this is used when calling a menu-driven phone system
- Transfer a Call - transfer call from vehicle to cellular phone and visa versa
- Voice Pass-Thru - allow access to the voice recognition commands on the cellular phone

Pairing a Bluetooth ® Cellular Phone to the Vehicle

In order to use hands-free calling, the cellular phone must be paired to the vehicle. Up to five devices can be paired to the vehicle at one time, but only one can be connected at any given time. To pair a phone, the customer must know how to operate the Bluetooth ® functionality of their phone. The pairing process must only be done one time for each phone, unless that phone's information is deleted. For safety reasons, the pairing process is disabled while the vehicle is moving.

Once the Bluetooth ® cellular phone has been paired with vehicle, it will automatically connect to the vehicle when the ignition is on and the device is on. When more than one paired phone is in the vehicle, the phone with the highest priority will be connected. If the cellular phone is in use while getting into the vehicle, the phone can be switched to hands-free mode with the press of a button. In addition, a call in progress can be transferred from the vehicle hands-free mode to the phone to continue the call as the customer exits the vehicle.

Complete pairing instructions are provided in the Vehicle Owners Manual.

Back-up Battery (BUB) (If Equipped)

IMPORTANT: Do not disconnect the main vehicle battery or remove the OnStar® fuse with the ignition key in any position other than OFF. Disconnecting power to the OnStar® module in any way while the ignition is ON or with RAP activated may cause activation of the OnStar® Back-Up Battery (BUB). This action is per design as the BUB is designed to provide power to the CIM so an emergency notification call can be made after a vehicle collision where the main battery is disabled. Once the Back-Up Battery is activated it will stay on until it has completely discharged. The BUB is not rechargeable and once activated the BUB must be replaced.

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Certain OnStar® equipped vehicles may also be equipped with a back-up battery (BUB). The BUB is a non-rechargeable, lithium battery intended to provide an auxiliary power source for the communication interface module (CIM) in the event of a vehicle collision where power from the main vehicle battery is lost.

The BUB is intended to have a limited life span of approximately 4 years and is designed to maintain an open circuit voltage between 16V and 9V throughout this period. This allows the battery to power the basic functions of the CIM for least one 200 second (5 minute) call at the end of the 4 year span, should a main vehicle battery loss collision occur.

The BUB is connected to the CIM through the back-up battery positive voltage circuit and back-up battery ground circuit and is protected from a short circuit by means of an internal fuse. In the event the BUB battery positive voltage circuit is shorted to the BUB ground circuit or chassis ground, the fuse will open and render the back-up battery permanently inoperable. The status of the back-up battery and its associated wiring is monitored by the CIM.

Audio System Interface

When the OnStar® requires audio output, a serial data message is sent to the audio system to mute all radio functions and transmit OnStar® originated audio. The OnStar® audio is transmitted to the vehicle audio system by a dedicated signal circuit and a low reference circuit.

The audio system will mute and an audible ring will be heard though the speakers if the vehicle receives a call with the radio ON.

On some vehicles, the HVAC blower speed may be reduced when the OnStar® system is active to aid in reducing interior noise. When the system is no longer active, the blower speed will return to its previous setting.

OnStar® Sleep Cycle

The OnStar® system uses a unique sleep cycle to allow the system to receive cellular calls while the ignition is in the OFF position and retained accessory power (RAP) mode has ended. This cycle enables the CIM to perform remote functions, such as door unlock, as commanded over the air by the OnStar® Call Center, and to continue to maintain an acceptable level of battery electrical drain.

The OnStar® system uses 4 states of readiness, depending upon the type of cellular market the vehicle is in when the ignition is put into the OFF state:

- High power
- Low power
- Sleep
- Digital standby

The high power state is in effect whenever the ignition is in the ON or RUN position, or RAP is enabled, and the OnStar® system is sending or receiving calls or when the system is performing a remote function.

The low power state is in effect when the OnStar® system is idle with the ignition in the ON or RUN position,

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or with RAP enabled.

The sleep state is entered after the vehicle has been shut off and the RAP has timed out while in an analog cellular area. At a predetermined time recorded within the CIM, the system re-enters the low power state to listen for a call from the OnStar® Call Center for 1 minute. After this interval, the system will again return to the sleep state for 9 minutes. If a call is sent during the 1 minute interval, the OnStar® system will receive the call and immediately go into the high power mode to perform any requested functions. If no call is received during the 1 minute interval, the system will go back into the sleep mode for another 9 minutes. This process will continue for up to 48 hours, after which the OnStar® system will turn off until the ignition is turned to the ON or RUN position.

The digital standby power state is entered after the vehicle has been shut off and the RAP has timed out while in a digital cellular area. When in digital standby mode, the OnStar® module is able to perform all remote functions as commanded by an OnStar® advisor at any time, for a continuous 48 hours. After 48 hours, the OnStar® module will go into sleep mode until a wake up signal from the vehicle is seen by the CIM. If the OnStar module loses the digital cellular signal it will revert to analog mode and follow the standard sleep state (9 minutes OFF, 1 minute standby) based on the time of the GPS signals, this will continue until a digital cellular signal is again received.

If the OnStar® system loses battery power while the system is in a standby or sleep mode, the system will remain OFF until battery power is restored and the ignition is turned to the ON or RUN position.

Features

OnStar® Personal Calling (OPC)

The hands free, OnStar® personal calling (OPC) cellular phone feature is an additional feature of the OnStar® system. This feature is embedded within the CIM; however it must be activated by an OnStar® advisor. OPC operates similar to most hand held cellular phones in that the availability for its usage is based on minutes or units. The customer must have a current OnStar® subscription, as this feature cannot be utilized without it. To use OPC, the customer must also purchase units (minutes) as outlined in the owners guide provided with the OnStar® system. Units begin to deplete, 1 unit is equal to 1 minute, as the customer makes outbound phone calls, answers inbound phone calls, or while connected to the OnStar® virtual advisor. In addition, units may also have an expiration date, depending upon the type of units purchased.

Customers have the ability to store telephone numbers within the module, referenced by a nametag for the convenience of frequently dialed numbers. After storing a nametag, the user can dial this number by initiating the OPC feature, speaking the word "call," and repeating the nametag assigned.

Customers have the capability to lock their OPC system by pressing the answer/end call button, speaking "security" and entering a 4-digit code. Once this process is complete, the user must enter the code before OnStar® personal calling is available. In the event the customer cannot remember their code and is unable to use their system, they can press the blue OnStar® button and speak to an advisor to unlock the system by means of a discrete cellular call to the vehicle.

Turn by Turn Navigation

Turn by Turn Navigation allows the driver to contact OnStar® to obtain directions for driving from a current

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location to a desired location. The Turn by Turn Navigation system stores your planned route and continually checks your position along that route, when you deviate from the planned route, the system will recognize this and prompt the driver with verbal prompts for how to proceed. The driver then responds verbally to direct the system to continue the current routing or to recalculate the route because of a missed turn. On some vehicles, the Turn by Turn Navigation instructions may be displayed to the driver in the radio display or the driver information center (DIC).

Advisor Record Feature

The Advisor Record Feature allows the user to store any information given during a call with an OnStar® Advisor. Recording is activated by pressing the blue OnStar button during a call; pressing the button a second time stops the recording. The stored information can be played back by pressing the phone button and using the voice command "Advisor Playback".

Deactivated OnStar® Accounts

In the event a customer has not renewed their OnStar® account after expiration or the account was never activated, OnStar® will make a discrete cellular call to the vehicle to deactivate the OnStar® system. Before taking this action, customers are notified that the OnStar® system in their vehicle will be deactivated unless they elect to renew the account. After the OnStar® account has been deactivated, customers will experience the following:

- The OnStar® status LED will not illuminate.
- The OnStar® system will NOT attempt to connect to the OnStar® Call Center in the event of a collision or if the vehicle's front air bags deploy for any other reason.
- An emergency button press will play a demo message indicating the service has been deactivated.
- An OnStar® Call Center button press will connect the customer with a dedicated sales team who can sell an OnStar® subscription and reactivate the vehicle. Depending on the type of OnStar® hardware in the vehicle, the customer may first hear a demonstration message stating there is no current OnStar® subscription for the vehicle, and directing the customer what to do to activate services.
- OPC will not be available, as this feature requires the customer to have a current OnStar® account. Attempts to use this feature may result in cellular connection failure messages and the inability to connect to the number dialed.

Certain vehicles that have never had an active OnStar® account, or that have been deactivated, may be unable to establish a connection with the OnStar® Call Center. When normal published diagnostic procedures do not indicate a possible cause for the no connect concern, the vehicle may have been deactivated. For deactivated vehicles, a no connect response should be considered normal operation. Further diagnosis and subsequent repair is only necessary should the customer elect to become an active OnStar® subscriber or renew the account subscription.

OnStar® Cellular, GPS, and Diagnostic Limitations

The proper operation of the OnStar® System is dependent on several elements outside the components integrated into the vehicle. These include the National Cellular Network Infrastructure, the cellular telephone carriers within the network, and the GPS.

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The cellular operation of the OnStar® system may be inhibited by factors such as the users range from an analog or digital cellular tower, the state of the cellular carrier's equipment, and the location where the call is placed. Making an OnStar® key press in areas that lack sufficient cellular coverage or have a temporary equipment failure will result in either the inability of a call to complete with a data transfer or the complete inability to connect to the OnStar® Call Center. The OnStar® system may also experience connection issues if the identification numbers for the module, station identification number (STID), electronic serial number (ESN) or manufacturers electronic ID (MEID), are not recognized by the cellular carriers local signal receiving towers.

The satellites that orbit earth providing the OnStar system with GPS data have almost no failures associated with them. In the event of a no GPS concern, the failure will likely lie with the inability of the system to gain GPS signals because of its location, i.e. in a parking structure, hardware failure, or being mistaken with an OnStar® call which has reached the Call Center without vehicle data.

During diagnostic testing of the OnStar® system, the technician should ensure the vehicle is located in an area that has a clear unobstructed view of the open sky, and preferably, an area where analog or digital cellular calls have been successfully placed. These areas can be found by successfully making an OnStar® keypress in a known good OnStar® equipped vehicle and confirming success with the OnStar® Call Center advisor. Such places can be used as a permanent reference for future OnStar® testing.

Mobile Identification Number and Mobile Directory Number

The communication interface module (CIM) utilizes 2 numbers for cellular device identification, call routing and connection, a mobile identification number (MIN) and a mobile directory number (MDN). The MIN represents the number used by the cellular carrier for call routing purposes while the MDN represents the number dialed to reach the cellular device.

Operation of the OnStar® Speech Recognition Systems

OnStar® users communicate with 2 speech recognition systems. Speech recognition allows the user to speak to one computer in the vehicle, and one reached over a phone line. The computer tries to understand the users command, and responds by speaking back, or by taking the appropriate action, e.g. dialing the phone.

- Personal Calling uses a speech recognition system that resides in the vehicle. When the user presses the phone button, the system states, Ready, and listens for the user's command. The user can speak commands to control the hands-free phone.
- Virtual advisor is a remote speech recognition system that the caller can access by making a phone call. The user connects to virtual advisor by requesting it during personal calling use. The user is then transferred to the virtual advisor server and talks to it via a cellular connection.

The OnStar® speech recognition systems use speech technology that is designed to understand a wide range of American English speakers. Although there is no one right way to speak English, the system will work best when users try to modify their pronunciation should they encounter difficulty. Users who do not obtain good results are advised to try the tips and workarounds found in this section.

General Tips for Better Speech Recognition

Concern	Tip for Better Result
Noise	Noise may confuse the speech recognition system. You usually get better

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	performance from the system in quieter conditions: • The HVAC fan creates noise. Turn it down or OFF for better speech system performance. • Driving at high speeds creates louder engine noise and wind noise. You may get better results at lower speeds. • An open window or an open sunroof allows more noise to enter the vehicle. Close all windows for better results. • Noisy rainstorms can also reduce performance. • If passengers are talking while you use the speech system, it may be confused by their speech. You will get better results if all occupants of the vehicle are quiet while the system is listening for commands.
When to Speak	In Personal Calling, the system is only listening after it prompts you to speak. • When the system prompts you to speak, you have about 5 seconds to respond. If the system does not hear a response, it will prompt you again, or cancel the transaction. • If you begin to speak too soon, it will tell you "Slower, please." Try pausing for a half second before speaking. • In the Virtual Advisor, the system is always listening for commands, even while it is speaking.
How to Speak	Speak forcefully, and clearly. • The noisier the environment, the louder you need to speak. If you are in the driver seat, speak facing the front of the car. If you are a passenger, speak facing the rearview mirror. • Speak calmly, and naturally. The system may sometimes fail your repeated attempts to give a command. If your speech is distorted by shouting or frustration, this may cause more errors. • People with high-pitched voices may have better results by speaking in a deeper, lower-pitched voice. However, do not lower the volume of the voice. • Avoid speaking with a rising intonation, like asking a question. Use a flat or falling intonation, like giving an answer.
What to Say	Personal Calling: One-word commands • The Personal Calling system listens for only one word at a time. There are some exceptions, 2-word phrases that are spoken and understood as a single word, e.g. "virtual advisor", "voice feedback", and "my number". You can enter phone numbers only one digit at a time, and the system repeats each digit as it hears it. • Say "Help" at the Ready prompt to hear the list of Personal Calling commands.

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	• Virtual Advisor can understand sentences with more than one word. It also expects to hear a 4-digit number all at once when it asks for your PIN. • Say, "What are my choices?" to hear a list of commands that the Virtual Advisor understands.
Entering a phone number	• If you have trouble getting numbers correctly into the system, store your frequently-called number in the directory, so the system will remember them. After you have stored a number with a nametag, then you simply say "call" and the nametag in order to call the number. • If the system cannot understand your numbers, ask another person to help you enter your frequently-called numbers. This person can speak the numbers, then you can speak the nametag.
Storing or dialing a number	When you have finished speaking your phone number, you do not need to say "store" or "dial" to indicate that you are done. If you pause and say nothing, the system will ask you if you want to store or dial. Say "yes".
Creating nametags	• Short nametags that are similar may be easily confused by the system. You may get better recognition of your nametags if you make them longer, for example "George Washington" without pause, instead of "George" only. • If you want to use nametags while driving, it is best to store the nametag with some vehicle noise in the background. If you are in park while you are storing nametags, you can turn the fan on low or open windows in order to create some background noise.
Virtual Advisor 4-digit PIN	Say the 4 digits in a natural way, without pausing between digits.
Interrupting	• When the Virtual Advisor is speaking, you can interrupt it with another command. The first word in your command helps to get its attention. • If the Virtual Advisor has trouble understanding your commands when you interrupt, try speaking the first word loudly and clearly, then pause for an instant, then continue with the rest of the command. For example: "Get .. my weather" or "Lookup... a quote for General Motors".

RADIO/AUDIO SYSTEM DESCRIPTION AND OPERATION

The entertainment system on this vehicle may have several different configurations available to it. To determine the specific configuration of the vehicle, please see the Service Parts ID Label, and refer to **RPO Code List (Avalanche and Escalade)** or **RPO Code List (Escalade ESV, Suburban, and Yukon XL)** or **RPO Code List (Tahoe and Yukon)** .

The entertainment system on this vehicle is configured with either a base or an uplevel system. The base and uplevel systems each contain a radio, antenna, speakers, and on some systems an audio amplifier. The uplevel system differs from the base system by providing the customer with enhanced audio system features. Some of

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those features may include the radio data system (RDS), an audio amplifier, programmable equalizer (EQ), and digital satellite radio (U2K).

Each item in the list below represents topics covered in detail below.

- Radio Circuit Operation
- Antenna System
- AM/FM Reception
- Digital Radio Receiver
- Speaker Operation
- Audio Amplifier
- Radio Data System (RDS)
- Radio Data System (RDS) Messages
- MP3/CD Formatting Information for MP3/CD Radios (If equipped)
- Integral Multi Disc CD Changer (IMDX)
- Rear Seat Audio (RSA)
- Rear Seat Entertainment (RSE)
- Radio Error Messages
- Theft Deterrent
- OnStar ®
- Steering Wheel Controls
- Auxiliary Input Jack
- Personal Auido Link (PAL)
- Noise Compensation
- Speed Compensated Volume (SCV)

Radio Circuit Operation

Radio Power

The radio is supplied power by a fused B+ circuit. The radio does not use a discrete ignition feed circuit for power moding. The power mode master (PMM) provides the system power mode to the radio via serial data messages. The PMM determines the system power mode by processing power mode information from ignition switch inputs. Serial data power modes supported by the radio are OFF, ACCESSORY, RUN, and CRANK REQUEST.

Radio Grounds

The vehicle harness provides a ground for the radio circuits. The radio may also be case grounded.

Radio Data Link Communication

The radio communicates with other modules via serial data.

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Radio Outputs

At minimum volume, the plus (+) and minus (-) speaker outputs are approximately half battery voltage, measured to vehicle ground. As the volume increases, the plus and minus change to create a voltage difference between each other either driving the voice coil of the speaker, or being fed to an amplifier.

Radio Head Dimming

Dimming and backlighting levels are determined by the serial data messages the radio receives.

Antenna System

IMPORTANT: Radio systems with the antenna(s) in the glass are subject to possible interference when an aftermarket window tint is applied.

Backglass Antenna (If Equipped)

The AM-FM antenna is on the backglass with the rear window defogger, at the top of the rear window.

Antenna Module (If Equipped)

The radio antenna is connected to the antenna module. The antenna module is powered by a battery voltage circuit supplied by the radio. The antenna module boosts the received signal and transmits the signal to the radio via a coaxial cable.

Fixed Mast Antenna (If Equipped)

The fixed mast antenna can withstand most car washes without being damaged. If the mast should ever become slightly bent, straighten it out by hand. If the mast is badly bent, replace it.

Check occasionally to make sure the mast is still tightened to its base. If tightening is required, tighten by hand, then with a wrench one quarter turn.

Multi-Band Antenna

The multi-band antenna is located on the roof of the vehicle. This type of antenna may be used with the AM/FM radio, but is primarily for OnStar® and the XM™ Satellite Radio Service System, if the vehicle has these features. Keep this antenna clear of snow and ice build up for clear reception. If the vehicle has a sunroof, the performance of the system may be affected if the sunroof is open. Loading items onto the roof of the vehicle can interfere with the performance of the system, ensure the multi-band antenna is not obstructed.

AM/FM Reception

Radio Signal

The radio signal is sent from a broadcast station and is then received by an antenna. The strength of the signal received depends on the following:

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- The power output (wattage) of the broadcasting station
- The location of the vehicle (or receiver) relative to the broadcast tower.
- Obstacles between the tower and the receiver
- Atmospheric conditions
- What band (AM or FM) the station is broadcasting
- Type of antenna and the ground plane

AM Reception

The AM band has a lower frequency range than the FM band. These longer wavelengths:

- Bend around Obstacles
- Follow the curvature of the earth
- May reflect off the ionosphere (skip)

The AM frequencies have longer range due to the ground wave. The ground wave follows the curvature of the earth and is effected by its conductivity. Greater conductivity equates to less signal loss thus transmission over water is better than over land. The AM band has a range of 80-320 km (50-200 miles).

FM Reception

The shorter wavelengths of the higher frequency FM band:

- Reflect off obstacles
- Are absorbed by the ground
- Penetrate the ionosphere

Broadcasts in the FM band are limited to line of sight reception which is typically 40 km (25 miles). Even when out of a direct line of sight, the signal may be reflected into areas that would be in a shadow otherwise. Factors which affect the line of sight include:

- Height of the broadcast antenna
- Height of the receiving antenna
- Terrain and buildings in the broadcast path

Digital Radio Receiver (If Equipped)

XM satellite radio provides digital radio reception. The XM signal is broadcast from two satellites and, where necessary, terrestrial repeaters. The high power satellites allow the antenna to receive the XM signal even when foliage and other partial obstructions block the antennas view of the satellite. Terrestrial repeaters are used in dense urban areas. These repeaters will receive the satellite signal and re-broadcast them at much higher power levels in order to ensure reception in areas with densely packed tall buildings. A service fee is required in order to receive the XM service.

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The radio communicates with the digital radio receiver (DRR) via serial data. During XM operation the audio signals are sent over the left and right audio signal circuits from the DRR to the radio.

Speaker Operation

Speakers turn electrical energy into mechanical energy to move air, using a permanent magnet and an electromagnet. The electromagnet is energized when the radio or amplifier (if equipped) delivers current to the voice coil on the speaker. The voice coil will form a north and south pole that will cause the voice coil and the speaker cone to move in relation to the permanent magnet. The current delivered to the speaker is rapidly changing alternating current (A/C). This causes the speaker cone to move in two directions producing sound. When the speaker is at rest, such as when the volume at a minimum value, the voltage applied to each side of the speaker is 1/2 ignition system voltage. This way, the speaker cone can be moved in either direction.

Audio Amplifier (If Equipped)

Amplifier Interface UQA without Y91

The main amplifier power is provided by a fuse located in the body control module (BCM). A discrete switched 12-volt output is used to control the power state of the amplifier. To respond quickly to audio input and control signals, the amplifier is ON in all vehicle power modes except OFF and CRANK Request. However, when the amplifier is asleep it still must allow chime functionality. The internal amplifier bridges are fully powered and unmuted when the amplifier receives the switched 12-volt input.

The radio provides a remote amp mute output circuit to control overall muting of remote non-serial data amplifiers with rear seat audio (RSA) applications. The amplifier receives PWM signals on the circuit at varying duty cycle percentages for controlling the muted and unmuted functions of the amplifier. The RSA Enable circuit in the radio enables the rear seat channel muting of the amplifier. A Diag Sense circuit internal to the radio monitors the remote amp mute circuit for faults and sets the appropriate DTC when detected.

The function table below shows the four possible amplifier mute functions.

% Duty Cycle Out	Function
0% (Vlow Vdc)	FOUR_CHANNEL_UNMUTE
50%	REAR_MUTE (input must be 2-channel)
75%	SIX_CHANNEL_UNMUTE
100% (Vhigh Vdc)	ALL_MUTE

Amplifier Interface UQA with Y91 or UQS (Serial Data)

The main amplifier power is provided by a fuse located in the underhood fuse block. The radio controls both the overall muting and the rear seat muting via serial data messaging. For vehicles equipped with UQA, the radio commands the amplifier to perform the following functions through serial data communication.

- Volume
- Balance
- Fade

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- Bass
- Midrange
- Treble
- DSP Modes
- Volume Compensation
- Chime Output

Amplifier Operation

The purpose of the amplifier is to increase the power of a voltage or current signal. The output signal of an amplifier may consist of the same frequencies as the input signal or it may consist of only a portion of the frequencies as in the case of a subwoofer or midrange speaker. The radio creates a low level stereo audio output signal, which is sent at the user-defined volume level to the audio amplifier. The audio amplifier amplifies the signal and sends it to the appropriate speakers.

Radio Data System (RDS) (If Equipped)

The radio may be equipped with the Radio Data System (RDS). The RDS feature is available only on FM stations that broadcast RDS information. This system relies upon receiving specific information from these stations and only works when the information is available. While the radio is tuned to an FM-RDS station, the station name or call letters display.

RDS data is carried in what is known as a "subcarrier". A subcarrier is a frequency that the FM broadcaster is authorized to use to send data that is not audible in the main audio program.

- RDS functions will only work with FM broadcast stations that are broadcasting RDS data.
- Not all FM Broadcast stations broadcast RDS data or offer all of the RDS services.
- The information displayed is dependent upon the information broadcast by the particular station. The information may vary greatly between stations.
- RDS functions may not work properly when reception is weak, reception is of poor quality, or RDS is not implemented properly by the FM Broadcaster.
- In some cases, a radio station broadcasting incorrect information may cause the RDS features of the radio to appear to work improperly.

With RDS, the radio can do the following:

- Seek to stations broadcasting the selected type of programming
- Receive announcements concerning local and national emergencies
- Display messages from radio stations

RDS may display text information such as:

- The name of the station.
- The type of program.

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- General information such as artist and song title, call in phone numbers, etc.

RDS Messages

- ALERT!: Alert warns of local or national emergencies. When an alert announcement comes on the current radio station, ALERT! displays. You will hear the announcement, even if the volume is low or a CD is playing. If a CD is playing, play stops during the announcement. Alert announcements cannot be turned off. ALERT! is not affected by tests of the emergency broadcast system. This feature is not supported by all RDS stations.
- INFO (Information): If the current station has a message, the information symbol or INFO displays. Press this button to see the message. The message can display the artist, song title, call in phone numbers, etc. If the entire message can not be displayed, parts of the message appear every three seconds. To scroll through the message, press and release the INFO button. A new group of words displays after every press of this button. Once the complete message has displayed, the information symbol or INFO disappears from the display until another new message is received. The last message is displayed by pressing the INFO button. View the last message until a new message is received or you tune to a different station.

MP3/CD Formatting Information for MP3/CD Radios

The MP3/CD equipped radios will play standard audio CDs, and MP3/WMA files that were recorded on a CD-R or CD-RW disc. Customers who record their own music CDs should be aware of the following:

- The radio will only play audio from a CD-R/RW, it cannot record audio.
- Standard audio and MP3/WMA files should not be mixed on a disc.
- Song title, artist name, and album can display when files are recorded using ID3 tags version 1 and 2.
- Long file, folder, or playlist names, or a combination of a large number of files and folders, or playlists can cause the player to be unable to play up to the maximum number of files, folders, playlists, or sessions.
- The radio supports multi-session discs, but only the files from the last session will be played.

Integral Multi Disc CD Changer (IMDX) (If Equipped)

The integral multi disc CD changer has the capability of storing and playing up to six (6) compact discs. The integral multi disc CD changer has a shock-absorbing system. Only under extreme operating temperatures or severe shock or vibration should the compact disc player skip or mute. If the customer travels an abnormally rough road, a skip condition may be normal. Test drive the vehicle on a normal road with a known good CD. If the condition is still present, replace the radio. The use of CD lens cleaner discs is not advised, due to the risk of contaminating the lens of the CD optics with lubricants internal to the CD mechanism.

The CD mechanism within the ICDX radio will begin an initialization routine after a battery connect (e.g., connecting radio connector X1). The initialization process takes approximately 25 seconds to complete. It is very critical that the initialization is completed before removing battery power from the radio, in order for the complex moving parts of the CD mechanism to be positioned properly before shipping and/or handling purposes. Damage may result to the moving parts of the CD mechanism if battery power is removed during the initialization routine. The damage occurs to the CD mechanism during subsequent shipping or handling operations. The extent of the damage causes the CD mechanism not to recover and the mechanism becomes

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inoperative.

Rear Seat Audio (RSA) (If Equipped)

The rear seat audio (RSA) feature allows rear seat passengers to listen to a different audio program than the front seat passengers. When RSA is ON, the rear vehicle speakers are muted, and the rear passengers can select their own audio program to listen to using the headphones.

The rear seat passengers can only control the sources that are not being listened by the front seat passengers. For example, rear seat passengers can listen to and control CDs or DVDs through the headphones while the driver listens to the radio through the front speakers. The front seat audio controls always have priority over the RSA controls. If the front seat passengers switch the source for the main radio to a remote source, the RSA is not able to control the source. The rear seat audio can be operated while the main radio is OFF, and the key is ON/RUN, ACC/ACCESSORY, or when Retained Accessory Power (RAP) is active. The rear seat passengers have control of the volume for each set of headphones.

Depending on the audio system, the rear speakers may continue to play when the RSA is active through the headphones.

Rear Seat Entertainment (RSE) (If Equipped)

On some vehicles, there may be a video entertainment system for the rear passengers. This system will play DVD's and may have auxiliary inputs for connecting devices such as a camcorder or a video game console to your RSE system just as you would to a television. For a full description of RSE see **Video Entertainment System Description and Operation (Non-Headrest DVD Systems)** or **Video Entertainment System Description and Operation (Dual Headrest DVD Systems)**.

Theft Deterrent

The radio theft deterrent system is intended to disable or limit radio functionality if incorrect vehicle information is received by the radio. The radio disables functionality if the VIN information received by the radio does not match the VIN information that has been learned by the radio. A VIN sequence is the last 6 digits of the VIN. The radio receives this information via serial data. A possible cause of incorrect VIN info could be the radio was originally installed in another vehicle.

The radio has the following theft operating modes as part of the theft deterrent system:

- Normal Mode-A radio has received a VIN sequence. The radio only learns the VIN sequence if the VIN sequence contained all 6 digits. In this mode the radio has full functionality.
- No VIN Mode-A radio that has not received or learned a VIN. In this mode the radio has limited functionality.
- Theft Detected Mode-A radio that had previously learned a VIN sequence and subsequently received a VIN sequence not matching the learned sequence. In this mode the radio has limited functionality.

Radio Error Messages

The Radio may display the following Error Messages (Not all messages may be applicable):

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- ERR: This message is displayed when the radio is unable to play the inserted cassette or CD
- LOC: This message is displayed when the radio has entered Theft mode.
- CAL/CAL ERR: This message is displayed when the radio has detected an invalid calibration.
- CDX ERR: Displays if communication is lost with the remote CD changer.
- CHECK CD: Displays when the player encounters a focus or tracking error.
- CHK CDXX: Displays when the CD changer encounters a focus or tracking error.
- CHK TAPE: Displays if a tape has been inserted but is unable to be played due to an error.
- DOOR OPEN: Displays when the CD changer door has been left open.
- NO DISC: Displays when the radio expected a disc to be inserted.
- NONE: Displays when the radio is unable to detect the vehicle speed data information via the serial data circuit.

If an error message is displayed, perform the appropriate diagnostics.

OnStar ® (If Equipped)

When OnStar is activated, a serial data message is sent to the radio that activates a software program. When the software begins its process, the fade goes to the front, Bass and Treble are set to the mid range, the outputs are mono, and the audio source is OnStar. OnStar takes priority over any other audio source. All of these actions are preset values stored in the radio.

For additional OnStar information, refer to **OnStar Description and Operation**.

Steering Wheel Controls (If Equipped)

Some audio functions are available using the steering wheel controls. The steering wheel controls duplicate the function of the primary controls available on the radio.

For additional information on steering wheel controls, refer to **Steering Wheel Controls Description and Operation** .

Using the Auxiliary Input Jack (If Equipped)

The radio system may have a 3.5 mm auxiliary input jack located on the faceplate. An external audio device such as an MP3 player, CD changer, laptop computer, cassette tape player, etc. can be connected to the auxiliary input jack for use as another source for audio listening. This is not an audio output; do not plug a headphone set into the front auxiliary input jack.

To use a portable audio player, connect a 3.5 mm (1/8 inch) cable to the radio's front auxiliary input jack. While a device is connected, press the radio CD/AUX button to begin playing audio from the device over the vehicle speakers. If there is a CD in the player, pressing the button once will play the CD, pressing again will switch it to the AUX feature.

Personal Auido Link (PAL)

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The Personal Audio Link (PAL) module is a dealer installed accessory that allows the radio to control an Apple iPod® with the latest software installed. The installation kit included with the PAL module includes a T-harness that connects inline behind the radio. The radio sees the PAL module as another Digital Radio Receiver (DRR), or XM radio. The audio circuits are shared between the DRR (if equipped), and the PAL. The power and ground circuits are shared with the radio and the PAL. By pressing the BAND button on the radio, the radio will cycle through AM, FM, and XM. The XM band alternates between XM and the PAL. The CAT button will allow access to the PAL menu screens. While the iPod® is connected, the PAL module will charge it.

Noise Compensation (If Equipped)

A microphone mounted in the vehicle passenger compartment monitors background noise (such as wind noise from a window being opened) and digitally modifies the system's volume and equalization to ensure optimal sound and performance. This option comes with RPO Y91.

Speed Compensated Volume (If Equipped)

With Speed Compensated Volume (SCV), the audio system will adjust automatically to make up for road and wind noise as you drive, by increasing the volume as vehicle speed increases. To use SCV, set the volume at the desired level, and then select either Low, Medium, or High. To turn SCV off, select the Off screen button. This option comes standard with the vehicle unless the vehicle is equipped with RPO Y91.

VIDEO ENTERTAINMENT SYSTEM DESCRIPTION AND OPERATION (NON-HEADREST DVD SYSTEMS)

Each item in the list below represents topics covered in detail below.

- Rear Seat Entertainment Circuit Operation
- Rear Entertainment System Components
- DVD Player
- Playing a Disc
- DVD Messages
- Parental Control
- Video Screen
- Remote Control
- Wireless Headphones
- Stereo RCA Jacks
- Rear Seat Audio (RSA)
- Audio Outputs
- Wired Headphone Jacks

Rear Seat Entertainment Circuit Operation

RSE Power

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The rear seat entertainment (RSE) uses a switched battery voltage feed circuit for power moding. The radio outputs power to this circuit via the entertainment remote enable signal circuit.

RSE Grounds

The vehicle harness provides a ground for the RSE circuits.

RSE Data Link Communication

The RSE does not communicate with serial data.

RSE Outputs

At minimum volume, the plus (+) and minus (-) audio signals are approximately half battery voltage, measured to vehicle ground. These audio signals are sent from the radio to the Infrared Module, most systems have a common minus (-) signal.

Rear Seat Entertainment Components

The RSE system includes:

- A Digital Versatile Disc (DVD) player
- A video display screen
- Two sets of wireless infrared headphones
- A remote control
- Stereo audio and video inputs in the overhead console for playing an auxiliary device

DVD Player

The DVD player is interated into the radio, and will display on the rear screen. The DVD player can be controlled by both the buttons on the DVD player and by the buttons on the remote control. The DVD player power may be turned on when the ignition is in the run, accessory, or retained accessory power (RAP) power modes. DVDs are manufactured with different region codes based on the country in which they are sold. Therefore, the RSE system DVD player is only compatible with the region code where the vehicle is sold. The DVD region code is printed on the jacket of most DVDs. Home recorded CDs, CD-R or CD-RW formats, may not play in the DVD player.

Playing a Disc

To play a disc, gently insert the disc with the label side up, into the loading slot. The DVD player will continue to load the disc and the player will automatically start if the vehicle ignition is in an enabled power mode. If a disc is already in the player, press the play/pause button on the face of the DVD player or on the remote control. Some DVDs will not allow the user to fast forward or skip the copyright or previews. Some DVDs will automatically begin to play after the previews have finished. If the DVD does not begin to play the main title, refer to the on-screen instructions, and press play on the DVD player buttons or on the remote control.

DVD Messages

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The following errors may be displayed on the video screen monitor.

Disc Format Error

This message will be displayed if a disc is inserted upside down, the disc is not able to be read, or if the disc format is not compatible with the DVD player.

Load / Eject Error

This message will be displayed if the disc is not able to properly load or eject.

Disc Play Error

This message will be displayed if the DVD player cannot play the disc. Severely damaged discs will cause this error.

Region Code Error

This message will be displayed if the region code of the DVD media is not compatible with the DVD player.

No Disc

This message will be displayed if the play button is pressed and there is no disc in the DVD player.

Parental Control

The RSE system may have a Parental Control feature, depending on which radio the vehicle has. To start Parental Control, press and hold the radio power button for more than two seconds to stop all system features such as: radio, video screen, RSA, DVD and/or CD. While Parental Control is on, a padlock icon displays. The radio can be turned back on with a single press of the power button, but the RSE system will remain under Parental Control. To turn Parental Control off, press and hold the radio power button for more than two seconds. The RSE returns from where it was previously left and the padlock icon disappears from the radio display. Parental Control can also be turned off by inserting or ejecting any disc, pressing the play icon on the radio DVD display menu, or changing an ignition position.

Video Screen

The rear display screen shows video from either DVD movies, or an AUX input device, such as a video game console or camera. Each video screen has a dedicated video signal circuit to the radio.

Remote Control

To use the remote control, aim it at the infrared window below the video screen and press the desired remote control button. Direct sunlight or very bright light may affect the ability of the entertainment system to receive signals from the remote control. If the remote control does not seem to be working, the batteries may need to be replaced. Objects blocking the line of sight may affect the function of the remote control.

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If the remote control is to be stored for a long period of time, remove the batteries and keep them in a cool, dry place. Do not store the remote control in heat or direct sunlight. This could damage the remote control. Keep the remote control stored in a cool, dry place.

Wireless Headphones

Wireless headphones are optional and allow for rear seat passengers to use the RSE or RSA functions without disturbing the listening of front seat passengers. The wireless headphones receive audio signals from the infrared (IR) transmitters on the overhead console. This transmission is line of sight only, so audio quality will be degraded if anything blocks the transmitter signal from reaching the headphones. On some models, the infrared transmitter will have red LEDs illuminated when the RSE is activated.

The wireless headphones include 2 channels. This allows rear seat passengers to utilize both RSE and RSA functions without disturbing one another. The toggle switch on the right side headphone earpiece switches between channel one and channel 2. RSE is broadcast on channel one, and RSA on channel 2.

Each set of headphones has a rotary volume control. To adjust the volume, adjust this control. The headphones may automatically turn OFF if they lose the infrared signal from the system for approximately 4 minutes in order to preserve their battery power. The signal may be lost if the system is turned off or if the headphones are out of range of the infrared signal transmitters that are located near the video display screen.

AUX Inputs

The AUX input jacks are standard color-coded RCA-style jacks. Video is yellow, right audio is red, and left audio is white. The jacks are located on the rear of the center console. A number of devices may be plugged into the AUX jacks, including, but not limited to video game consoles, digital cameras, camcorders, or other devices. Audio only sources can be played through the AUX jacks from portable audio devices. Turn on the RSA, press the SOURCE key repeatedly until AUX is selected or touch the AUX screen button. An auxiliary device must be connected for the AUX screen button to appear as an option to select on the radio.

Rear Seat Audio (RSA)

The RSA is integrated into the rear HVAC control module. Audio, video source are controlled by the radio through serial data communication. Some sources are; radio (AM/FM), XM™ (if equipped), CD, and if the vehicle has these features, DVD, front auxiliary, and rear auxiliary.

The rear speaker channels pass through the RSA. The rear seat audio can be muted by the RSA when in use. The RSE system includes a radio with a DVD player, a video display screen, 2 wireless headphones, and a remote control.

Audio Outputs

Audio from the DVD player or auxiliary inputs may be heard through the following possible sources:

- Wireless infrared headphones
- Vehicle speakers
- Vehicle wired headphone jacks on rear seat audio controller (if equipped)

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The RSE system will always transmit the audio signal by infrared to the wireless headphones, if there is audio available. The RSE system is capable of outputting audio to the vehicle speakers. Once the RSE system is selected as an audio source on the radio you may adjust the speaker volume on the radio to control the volume of the audio to the speakers.

The RSE system is capable of outputting audio to the wired headphone jacks on the rear seat audio controller if the vehicle is so equipped. The RSE system may be selected as an audio source on the Rear Seat Audio controller if the RSE system power is on.

Wired Headphone Jacks

The RSA controller is equipped with two 2.5 mm jacks for wired headphones. The headphones can be used to listen to either the RSE or RSA functions. If both RSE and RSA are used at the same time, the wired headphones may receive only RSA audio.

To use the wired headphones, plug the headphones into the jacks. The left knob controls the left headphones and the right knob controls the right headphones.

VIDEO ENTERTAINMENT SYSTEM DESCRIPTION AND OPERATION (DUAL HEADREST DVD SYSTEMS)

Each item in the list below represents topics covered in detail below.

- Dual Headrest DVD Circuit Operation
- Dual Headrest DVD System Components
- Dual Headrest DVD Player
- Playing a Disc
- DVD Messages
- Parental Control
- Video Screen
- Remote Control
- Wireless Headphones
- AUX Inputs
- Audio Outputs
- Wired Headphone Jacks

Dual Headrest DVD Circuit Operation

Dual Headrest DVD Power

The Dual Headrest DVD uses a switched battery voltage feed circuit for power moding.

Dual Headrest DVD Grounds

The vehicle harness provides a ground for the Dual Headrest DVD system.

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Dual Headrest DVD Data Link Communication

The Dual Headrest DVD system does not communicate with serial data.

Dual Headrest DVD Outputs

The Dual Headrest DVD system can only output video to each screen and through the AV output for external devices such as a camcorder.

Dual Headrest DVD Components

The Dual Headrest DVD system includes:

- Two video display screens
- DVD Control Module
- A Digital Versatile Disc (DVD) player built into each monitor - If equipped with Dual Player
- Two sets of wireless infrared headphones
- A remote control
- Stereo audio and video inputs for playing an auxiliary device

Dual Headrest DVD Player

The DVD players are integrated the display screen. The DVD player can be controlled by both the buttons on the DVD player and by the buttons on the remote control. The DVD player power may be turned on when the ignition is in the run, accessory, or retained accessory power (RAP) power modes. DVDs are manufactured with different region codes based on the country in which they are sold. Therefore, the DVD player is only compatible with the region code where the vehicle is sold. The DVD region code is printed on the jacket of most DVDs. Home recorded CDs, CD-R or CD-RW formats, may not play in the DVD player.

Playing a Disc

To play a disc, gently insert the disc with the label side facing the back of the vehicle, into the loading slot. The DVD player will continue to load the disc and the player will automatically start if the vehicle ignition is in an enabled power mode. If a disc is already in the player, press the play/pause button on the face of the DVD player or on the remote control. Some DVDs will not allow the user to fast forward or skip the copyright or previews. Some DVDs will automatically begin to play after the previews have finished. If the DVD does not begin to play the main title, refer to the on-screen instructions, and press play on the DVD player buttons or on the remote control.

DVD Messages

The following errors may be displayed on the video screen monitor.

Disc Format Error

This message will be displayed if a disc is inserted upside down, the disc is not able to be read, or if the

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disc format is not compatible with the DVD player.

Load / Eject Error

This message will be displayed if the disc is not able to properly load or eject.

Disc Play Error

This message will be displayed if the DVD player cannot play the disc. Severely damaged discs will cause this error.

Region Code Error

This message will be displayed if the region code of the DVD media is not compatible with the DVD player.

No Disc

This message will be displayed if the play button is pressed and there is no disc in the DVD player. If the disc is inserted wrong, the DVD player automatically ejects the disc and No Disc displays.

Parental Control

Part of the SETUP MENU lets users control the type of movie rating content (from G to Adult) that can be viewed and is only accessible when no disc is loaded. The parental control feature limits viewing to the selected preference. If a disc is inserted into the DVD compartment slot and it exceeds the Parental Setting, the following message appears on display: "The Parental Setting of this player prohibits play. Would you like to allow this disc to play?"

If yes if selected, the six digit password must be entered for the disc to play. If the wrong password is entered, the following message appears: " This movie will not play due to the Parental Setting of the player. To create a six digit password, use the numeric keypad on the remote control. Press the ENTER button to confirm." The default password is 136900.

Video Screen

The rear display screen shows video from either DVD player, or an AUX input device, such as a video game console or camera. Each video screen has a dedicated video signal circuit to the DVD control. If the vehicle is equipped with rear seat entertainment, there is no way to source the movie from the rear seat entertainment to the Dual Headrest DVD screens.

DVD Control Module

The two video screens are linked together by the DVD Control Module. This module allows screen 1 to source the media being played on screen 2. Video, audio, power, and remote signals are sent from the DVD Control Module, to each of the video screens. Video and audio signals are sent from the screen to the control module, and then to both screens.

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Remote Control

To use the remote control, aim it at the infrared window above the video screen and press the desired remote control button. Direct sunlight or very bright light may affect the ability of the entertainment system to receive signals from the remote control. If the remote control does not seem to be working, the batteries may need to be replaced. Objects blocking the line of sight may affect the function of the remote control.

If the remote control is to be stored for a long period of time, remove the batteries and keep them in a cool, dry place. Do not store the remote control in heat or direct sunlight. This could damage the remote control. Keep the remote control stored in a cool, dry place.

Wireless Headphones

Wireless headphones allow for rear seat passengers to use the Dual Headrest DVD player without disturbing the listening of front seat passengers. The wireless headphones receive audio signals from the infrared (IR) transmitters on the overhead console. This transmission is line of sight only, so audio quality will be degraded if anything blocks the transmitter signal from reaching the headphones, or if the headphones are placed in the front of the vehicle. On some models, the infrared transmitter will have red LEDs illuminated when activated.

The wireless headphones include 2 channels. This allows rear seat passengers to utilize both screens individually without disturbing one another.

Each set of headphones has a rotary volume control. To adjust the volume, adjust this control. The headphones may automatically turn OFF if they lose the infrared signal from the system for approximately 4 minutes in order to preserve their battery power. The signal may be lost if the system is turned off or if the headphones are out of range of the infrared signal transmitters that are located near the video display screen.

AUX Inputs

The AUX input jacks are standard color-coded RCA-style jacks. Video is yellow, right audio is red, and left audio is white. The jacks are located on the front of the monitor. A number of devices may be plugged into the AUX jacks, including, but not limited to video game consoles, digital cameras, camcorders, or other devices. Audio only sources can be played through the AUX jacks from portable audio devices.

Audio Outputs

Audio from the DVD player or auxiliary inputs may be heard through the following possible sources:

- Wireless infrared headphones
- Vehicle speakers - via the FM transmitter (if equipped)
- Wired headphone jacks on each monitor

The Dual Headrest DVD system will always transmit the audio signal by infrared to the wireless headphones, if there is audio available. The Dual Headrest DVD system may be capable of outputting audio to the vehicle speakers via the FM transmitter. Once the correct FM frequency is selected as an audio source on the radio you may adjust the speaker volume on the radio to control the volume of the audio to the speakers. Only one audio source can be heard through the vehicle's speakers at a time. The audio source being used is specified by the

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A/V (audio/video) source selected on the driver side head restraint monitor.

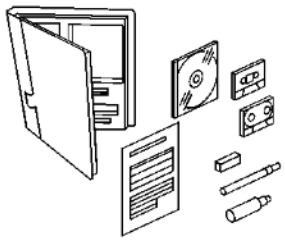
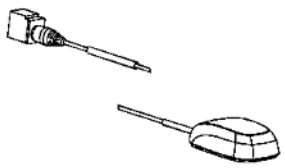
The Dual Headrest DVD system is capable of outputting audio through the wired headphone jacks on the monitors.

Wired Headphone Jacks

Each headrest monitor is equipped with a 2.5 mm jack for wired headphones. To use the wired headphones, plug the headphones into the jacks. The headphones can be used to listen to any source the Dual Headrest DVD system can source.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/Description
	J 39916-A CD and Cassette Diagnostic Audio Kit
	EL-48028 Digital Radio Test Antenna

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