

2006 Chevrolet HHR LT

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SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Amplifier Screw	9 N.m	80 lb in
Digital Radio Antenna Bolt	9 N.m	80 lb in
Digital Radio Receiver Nut	10 N.m	89 lb in
Door Speaker Screw	3 N.m	25 lb in
Heater and A/C Control Module Screw	2 N.m	18 lb in
Radio Antenna Bolt	9 N.m	80 lb in
Radio Assembly Screw	2 N.m	18 lb in
Radio Rear Speaker Housing Nut	9 N.m	80 lb in
Radio Speaker Windshield Garnish Molding Screw	2 N.m	18 lb in

SCHEMATIC AND ROUTING DIAGRAMS

ENTERTAINMENT SCHEMATIC ICONS

Entertainment Schematic Icons

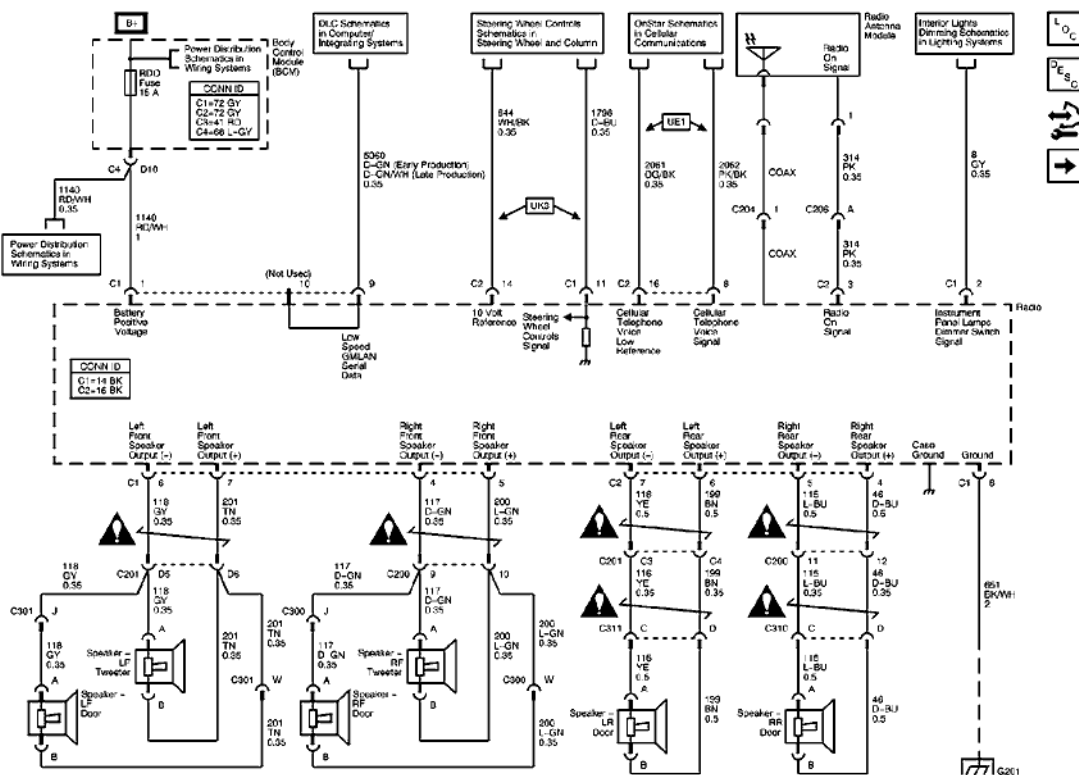
Icon	Icon Definition
	IMPORTANT: Twisted-pair wires provide an effective "shield" that helps protect sensitive electronic components from electrical interference. In order to prevent electrical interference from degrading the performance of the connected components, you must maintain the proper specification when making any repairs to the twisted-pair wires shown : • The wires must be twisted a minimum of 9 turns per 31 cm (12 in) as measured anywhere along the length of the wires. • The outside diameter of the twisted wires must not exceed 6.0 mm (0.2 in).

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RADIO/AUDIO SYSTEM SCHEMATICS



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Fig. 1: Radio w/ UW5
Courtesy of GENERAL MOTORS CORP.

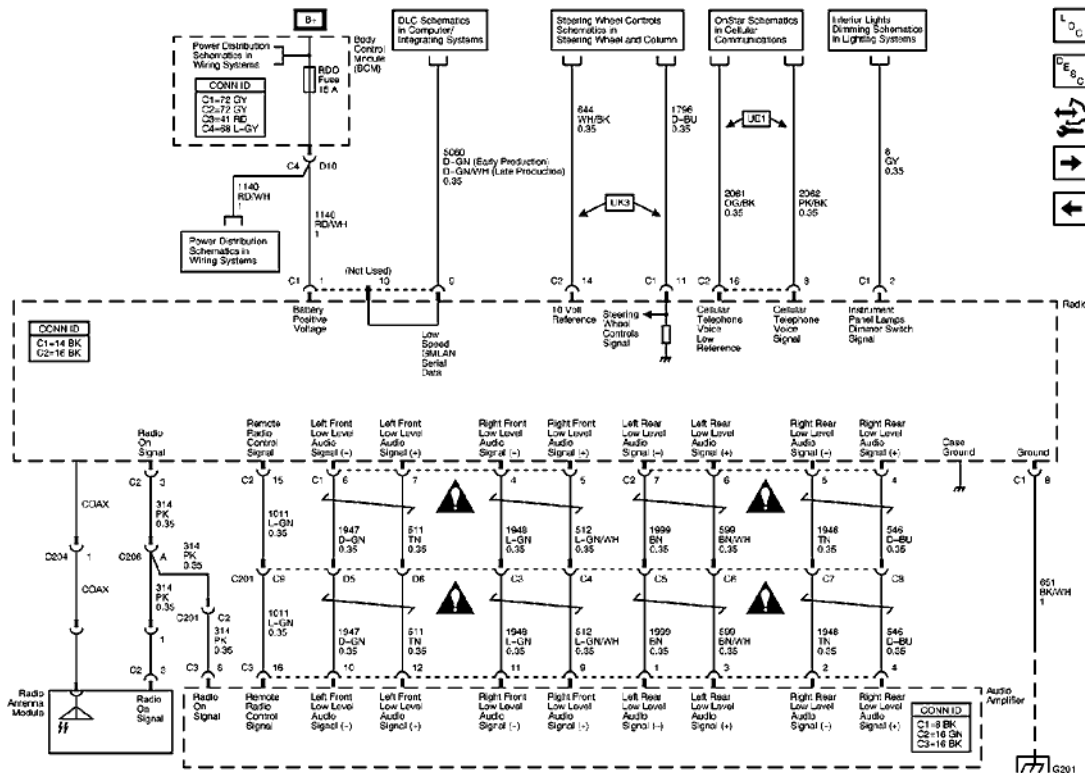


Fig. 2: Radio w/ UQ3 (1 of 2)
Courtesy of GENERAL MOTORS CORP.

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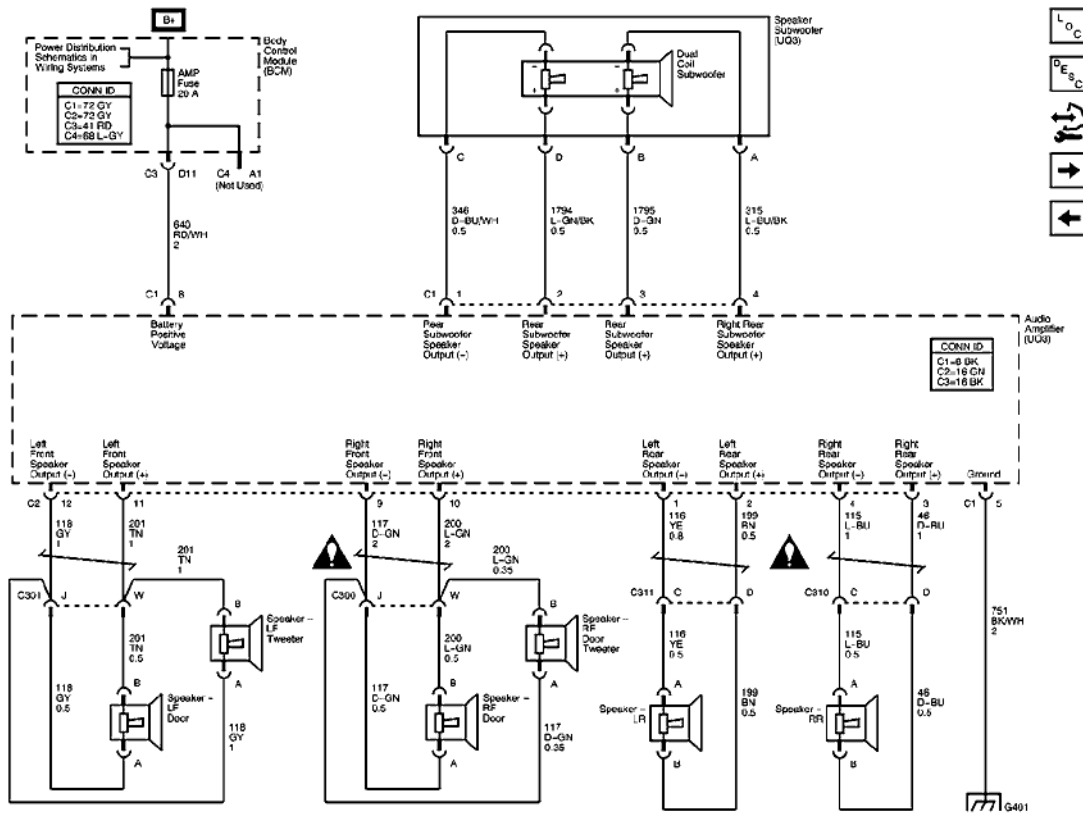
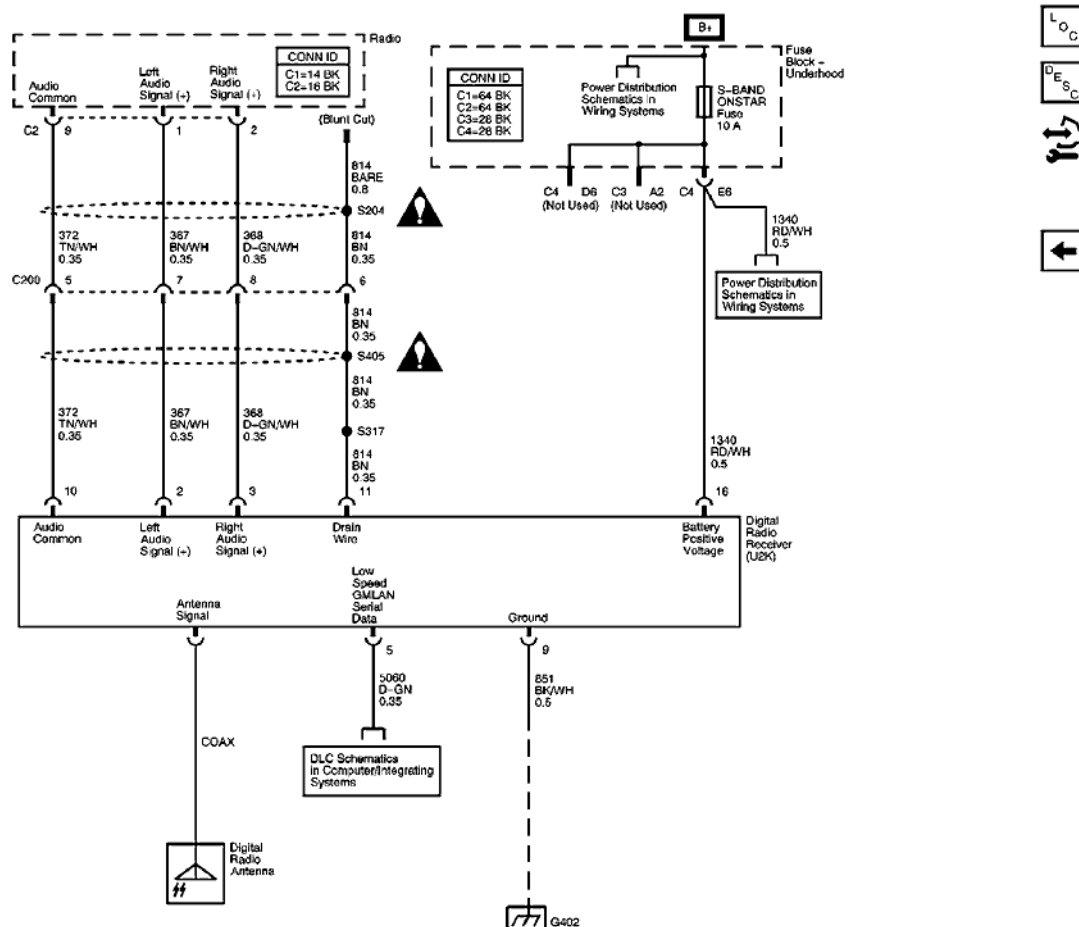


Fig. 3: Radio w/ UQ3 (2 of 2)
 Courtesy of GENERAL MOTORS CORP.

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COMPONENT LOCATOR

ENTERTAINMENT COMPONENT VIEWS

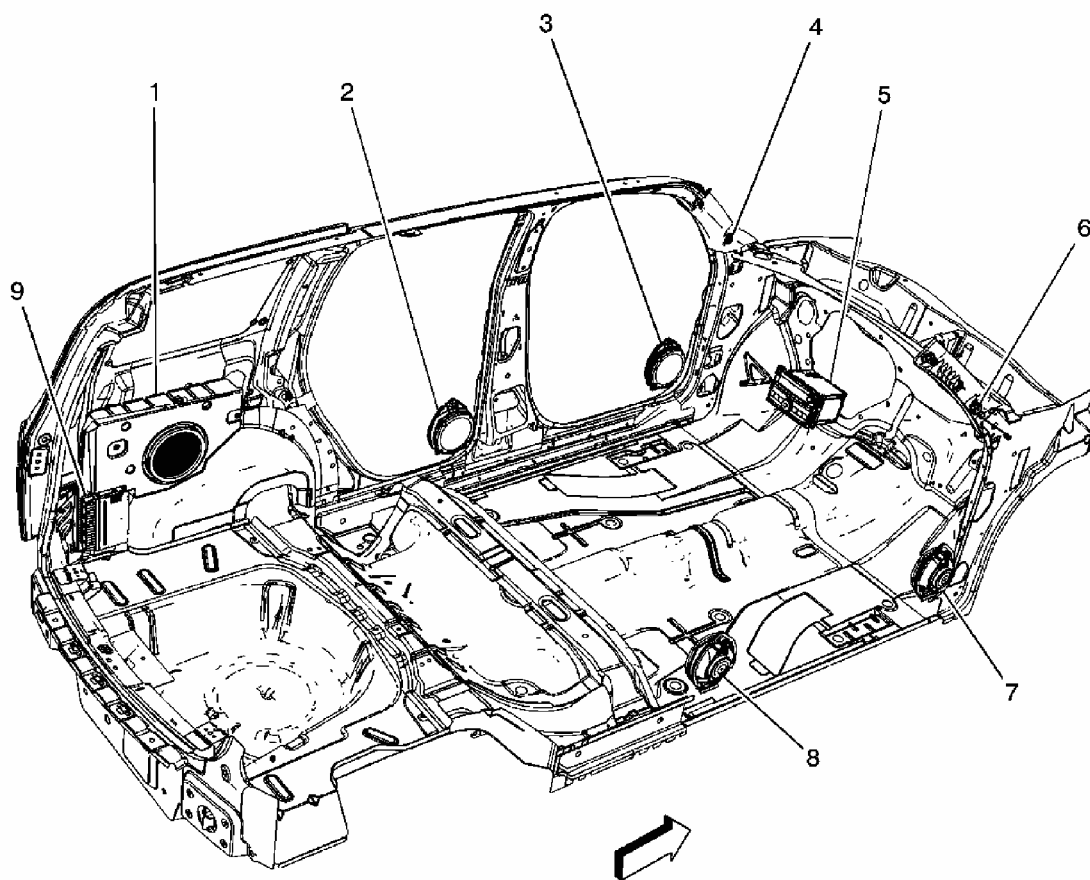


Fig. 5: Audio Components
 Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 5

Callout	Component Name
1	Speaker - Subwoofer (UQ3)
2	Speaker - LR Door
3	Speaker - LF Door
4	Speaker - LF Tweeter
5	Radio
6	Speaker - RF Tweeter
7	Speaker - RF Door
8	Speaker - RR Door
9	Audio Amplifier (UQ3)

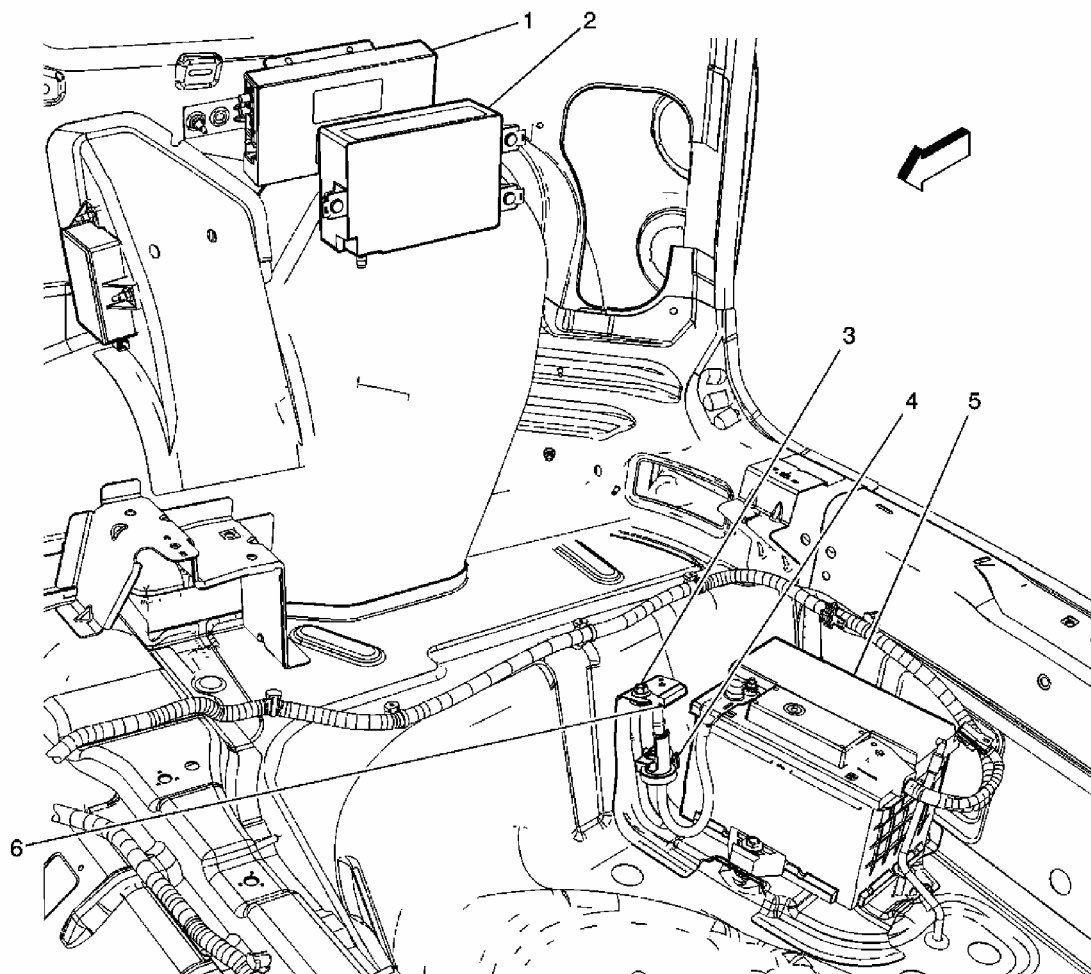


Fig. 6: RR of the Passenger Compartment
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 6

Callout	Component Name
1	Digital Radio Receiver (U2K)
2	Vehicle Communication Interface Module (VCIM) (UE1)
3	G403
4	Battery Current Sensor
5	Battery
6	Floor Pan

ENTERTAINMENT CONNECTOR END VIEWS

Audio Amplifier C1 (UQ3)

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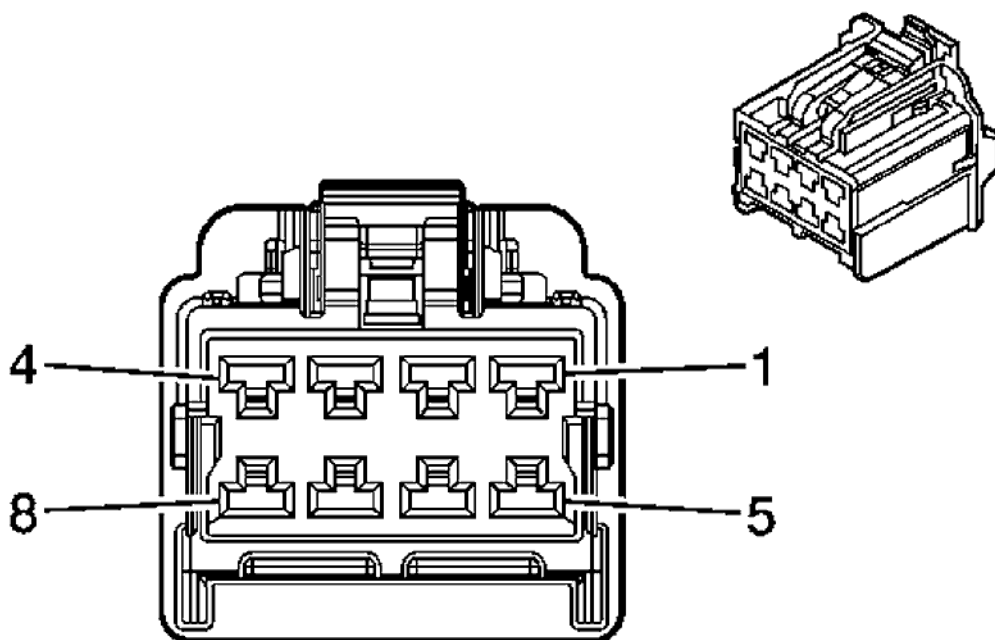


Fig. 7: Audio Amplifier C1 (UQ3) Connector
Courtesy of GENERAL MOTORS CORP.

Entertainment Connector End Views

Connector Part Information

- OEM: 6098-4713
- Service: 88988659
- Description: 8-Way F (BK)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Audio Amplifier C1 (UQ3)

Pin	Wire Color	Circuit No.	Function
1	D-BU/WH	346	Rear Subwoofer Speaker Output (+) (UQ3)

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2	L-GN/BK	1794	Rear Subwoofer Speaker Output (-) (UQ3)
3	D-GN	1795	Rear Subwoofer Speaker Output (+) (UQ3)
4	L-BU/BK	315	Rear Subwoofer Speaker Output (-) (UQ3)
5	BK/WH	751	Ground (UQ3)
6-7	-	-	Not Used
8	RD/WH	640	Battery Positive Voltage (UQ3)

Audio Amplifier C2 (UQ3)

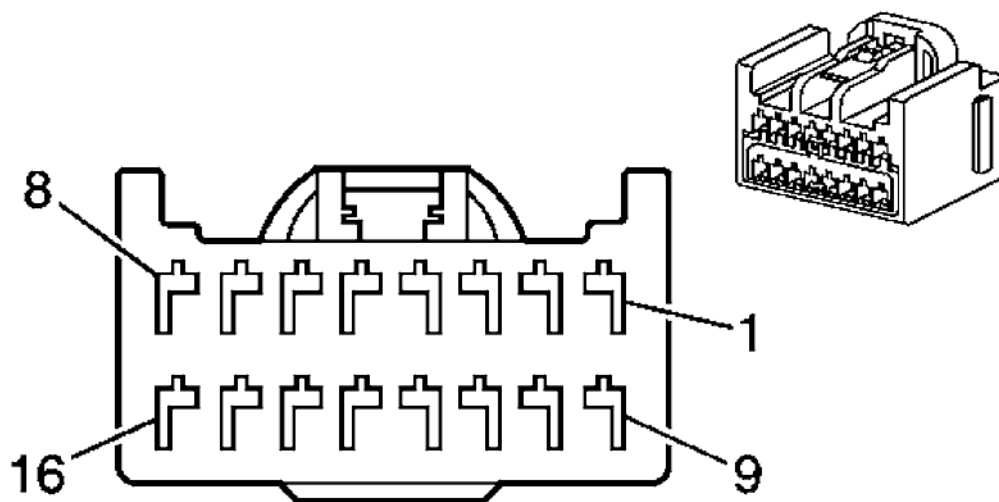


Fig. 8: Audio Amplifier C2 (UQ3) Connector
Courtesy of GENERAL MOTORS CORP.

Entertainment Connector End Views

Connector Part Information

- OEM: 7283-5534-60
- Service: 88952777
- Description: 16-Way M 1.5 Series Sealed (GN)

Terminal Part Information

- Pins:

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- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Audio Amplifier C2 (UQ3)

Pin	Wire Color	Circuit No.	Function
1	YE	116	Left Rear Speaker Output (-) (UQ3)
2	BN	199	Left Rear Speaker Output (+) (UQ3)
3	D-BU	46	Right Rear Speaker Output (+) (UQ3)
4	L-BU	115	Right Rear Speaker Output (-) (UQ3)
5-8	-	-	Not Used
9	D-GN	117	Right Front Speaker Output (-) (UQ3)
10	L-GN	200	Right Front Speaker Output (+) (UQ3)
11	TN	201	Left Front Speaker Output (+) (UQ3)
12	GY	118	Left Front Speaker Output (-) (UQ3)
13-16	-	-	Not Used

Audio Amplifier C3 (UQ3)

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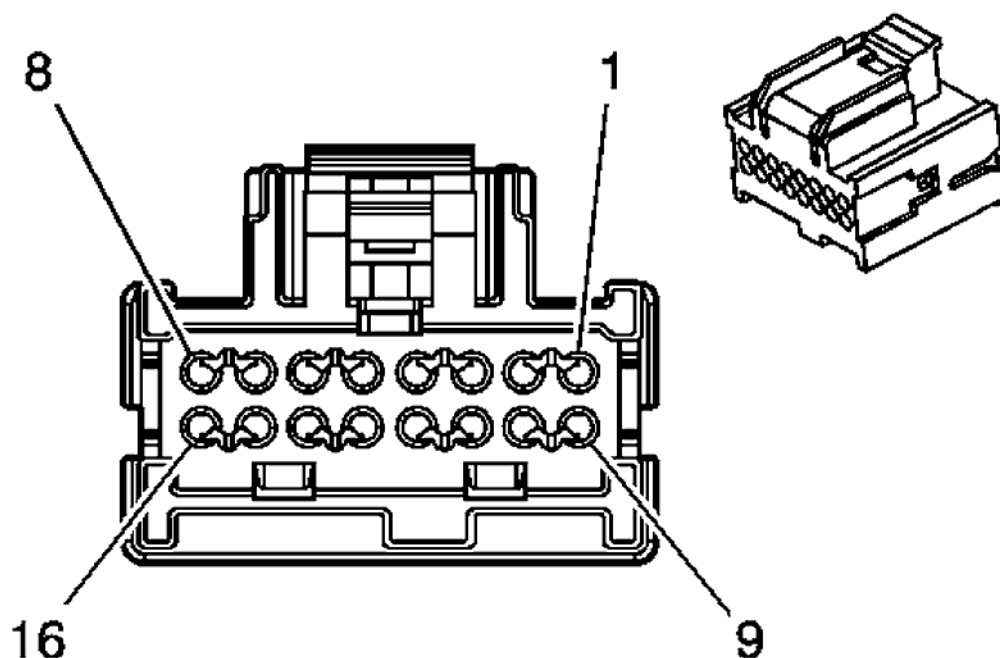


Fig. 9: Audio Amplifier C3 (UQ3) Connector
Courtesy of GENERAL MOTORS CORP.

Entertainment Connector End Views

Connector Part Information

- OEM: 7283-9076-30
- Service: 15136073
- Description: 16-Way F Micro 64 Unsealed (BK)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Audio Amplifier C3 (UQ3)

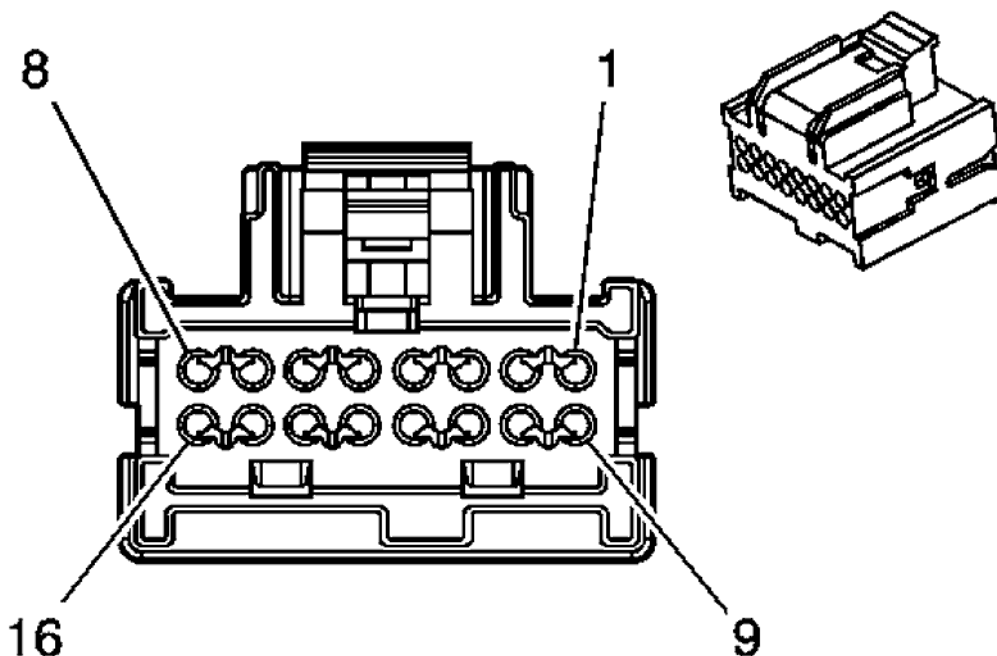
Pin	Wire Color	Circuit No.	Function
1	BN	1999	Left Rear Low Level Audio Signal (-) (UQ3)

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2	TN	1946	Right Rear Low Level Audio Signal (-) (UQ3)
3	BN/WH	599	Left Rear Low Level Audio Signal (+) (UQ3)
4	D-BU	546	Right Rear Low Level Audio Signal (+) (UQ3)
5-7	-	-	Not Used
8	PK	314	Radio On Signal (UQ3)
9	L-GN/WH	512	Right Front Low Level Audio Signal (+) (UQ3)
10	D-GN	1947	Left Front Low Level Audio Signal (-) (UQ3)
11	L-GN	1948	Right Front Low Level Audio Signal (-) (UQ3)
12	TN	511	Left Front Low Level Audio Signal (+) (UQ3)
13-15	-	-	Not Used
16	L-GN	1011	Remote Radio Control Signal (UQ3)

Digital Radio Receiver (U2K)



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Fig. 10: Digital Radio Receiver (U2K) Connector
Courtesy of GENERAL MOTORS CORP.

Entertainment Connector End Views

Connector Part Information

- OEM: 7283-9076-30
- Service: 15394150
- Description: 16-Way F Micro 64 Unsealed (BK)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Digital Radio Receiver (U2K)

Pin	Wire Color	Circuit No.	Function
1	-	-	Not Used
2	BN/WH	367	Remote Radio Left Audio Signal
3	D-GN/WH	368	Remote Radio Right Audio Signal (1)
4	-	-	Not Used
5	D-GN	5060	Low Speed GMLAN Serial Data
6-8	-	-	Not Used
9	BK/WH	851	Signal Ground
10	TN/WH	372	Audio Common
11	BN	814	Drain Wire
12-15	-	-	Not Used
16	RD/WH	1340	Battery Positive Voltage

Radio C1 (UQ3)

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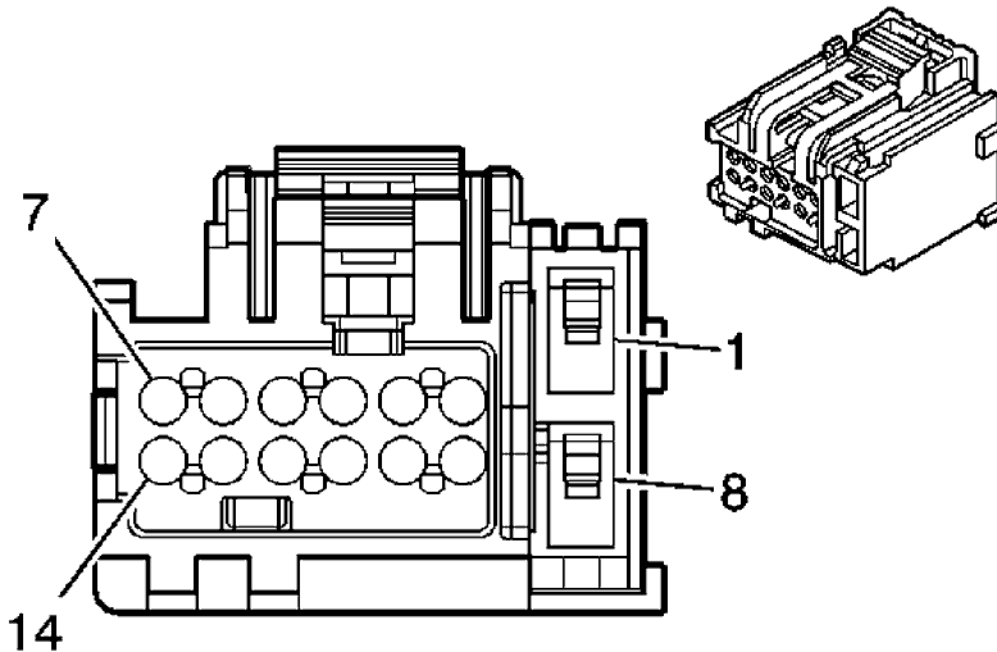


Fig. 11: Radio C1 (UQ3) Connector
Courtesy of GENERAL MOTORS CORP.

Entertainment Connector End Views

Connector Part Information

- OEM: 7283-4490-30
- Service: 88988743
- Description: 14-Way F GT 150 Series/Micro 64 Modular (BK)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Radio C1 (UQ3)

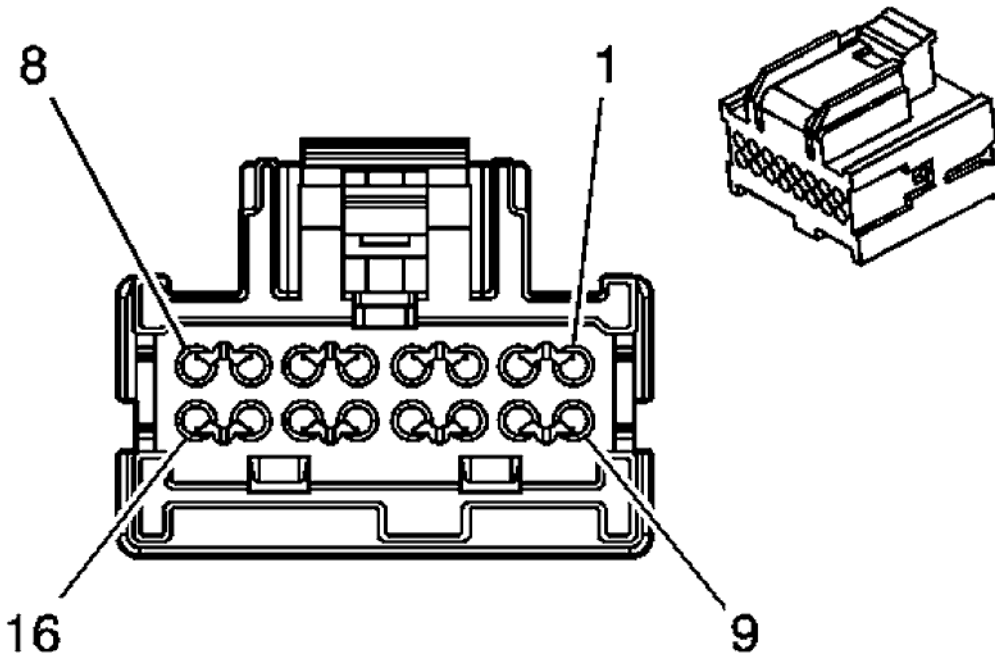
Pin	Wire Color	Circuit No.	Function
1	RD/WH	1140	Battery Positive Voltage
2	GY	8	Instrument Panel Lamps Dimmer

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			Switch Signal
3	-	-	Not Used
4	L-GN	1948	Right Front Low Level Audio Signal (-)
5	L-GN/WH	512	Right Front Low Level Audio Signal (+)
6	D-GN	1947	Left Front Low Level Audio (-)
7	TN	511	Left Front Low Level Audio Signal (+)
8	BK/WH	651	Ground
9	D-GN	5060	Low Speed GMLAN Serial Data (Early Production)
	D-GN/WH	5060	Low Speed GMLAN Serial Data (Late Production)
10	-	-	Not Used
11	D-BU	1796	Steering Wheel Control Signal (UK3)
12-14	-	-	Not Used

Radio C2 (UQ3)



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Fig. 12: Radio C2 (UQ3) Connector
Courtesy of GENERAL MOTORS CORP.

Entertainment Connector End Views**Connector Part Information**

- OEM: 7283-9076-30
- Service: 15394150
- Description: 16-Way F Micro 64 Modular (BK)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Radio C2 (UQ3)

Pin	Wire Color	Circuit No.	Function
1	BN/WH	367	Left Audio Signal (+) (U2K)
2	D-GN/WH	368	Right Audio Signal (+) (U2K)
3	PK	314	Radio On Signal
4	D-BU	546	Right Rear Low Level Audio Signal (+)
5	TN	1946	Right Rear Low Level Audio Signal (-)
6	BN/WH	599	Left Rear Low Level Audio Signal (+)
7	BN	1999	Left Rear Low Level Audio Signal (-)
8	PK/BK	2062	Cellular Telephone Voice Signal (UE1)
9	TN/WH	372	Audio Common (U2K)
10-13	-	-	Not Used
14	WH/BK	644	10-Volt Reference (UK3)
15	L-GN	1011	Remote Radio Control Signal
16	OG/BK	2061	Cellular Telephone Voice Low Reference (UE1)

Radio C1 (UW5)

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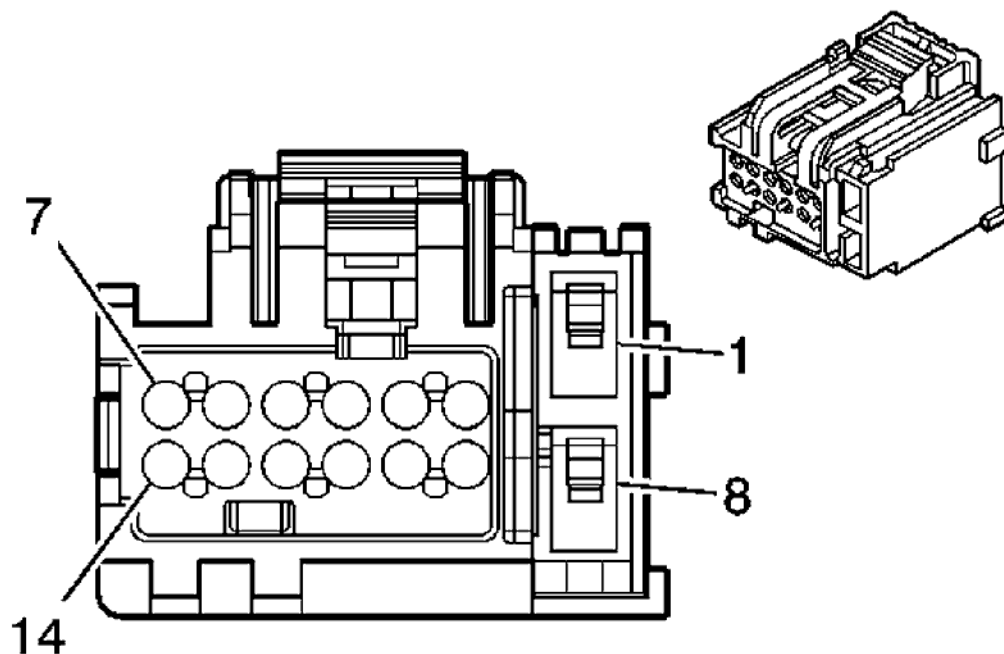


Fig. 13: Radio C1 (UW5) Connector
Courtesy of GENERAL MOTORS CORP.

Entertainment Connector End Views

Connector Part Information

- OEM: 7283-4490-30
- Service: 88988743
- Description: 14-Way F GT 150 Series/Micro 64 Modular (BK)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Radio C1 (UW5)

Pin	Wire Color	Circuit No.	Function
1	RD/WH	1140	Battery Positive Voltage
2	GY	8	Instrument Panel Lamp Dimmer

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			Switch Signal
3	-	-	Not Used
4	D-GN	117	Right Front Speaker Output 1 (-)
5	L-GN	200	Right Front Speaker Output (+)
6	GY	118	Left Front Speaker Output (-)
7	TN	201	Left Front Speaker Output (+)
8	BK/WH	651	Ground
9	D-GN	5060	Low Speed GMLAN Serial Data (Early Production)
	D-GN/WH	5060	Low Speed GMLAN Serial Data (Late Production)
10	-	-	Not Used
11	D-BU	1796	Steering Wheel Control Signal (UK3)
12-14	-	-	Not Used

Radio C2 (UW5)

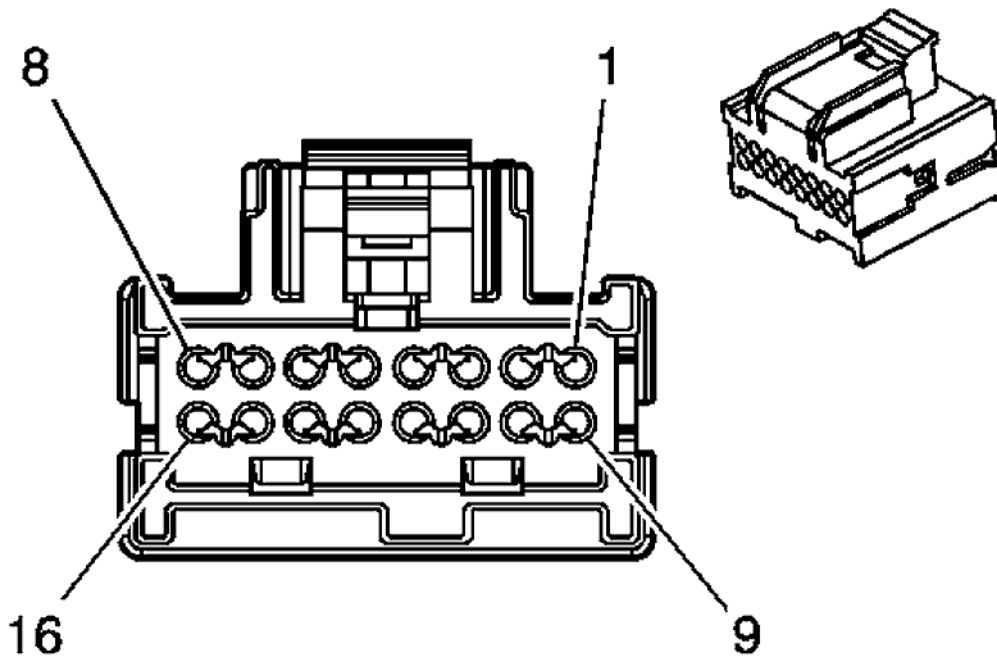


Fig. 14: Radio C2 (UW5) Connector
Courtesy of GENERAL MOTORS CORP.

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Entertainment Connector End Views

Connector Part Information

- OEM: 7283-9076-30
- Service: 15394150
- Description: 16-Way F MICRO 64 MODULAR (BK)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Radio C2 (UW5)

Pin	Wire Color	Circuit No.	Function
1	BN/WH	367	Remote Radio Left Audio Signal (+) (U2K)
2	D-GN/WH	368	Remote Radio Right Audio Signal (+) (U2K)
3	PK	314	Radio On Signal
4	D-BU	46	Right Rear Speaker Output (+)
5	L-BU	115	Right Rear Speaker Output (-)
6	BN	199	Left Rear Speaker Output (+)
7	YE	116	Left Rear Speaker Output (-)
8	PK/BK	2062	Cellular Telephone Voice Signal (UE1)
9	TN/WH	372	Audio Common (U2K)
10-13	-	-	Not Used
14	WH/BK	644	10-Volt Reference (UK3)
15	-	-	Not Used
16	OG/BK	2061	Cellular Telephone Voice Low Reference (UE1)

Speaker - LF Door

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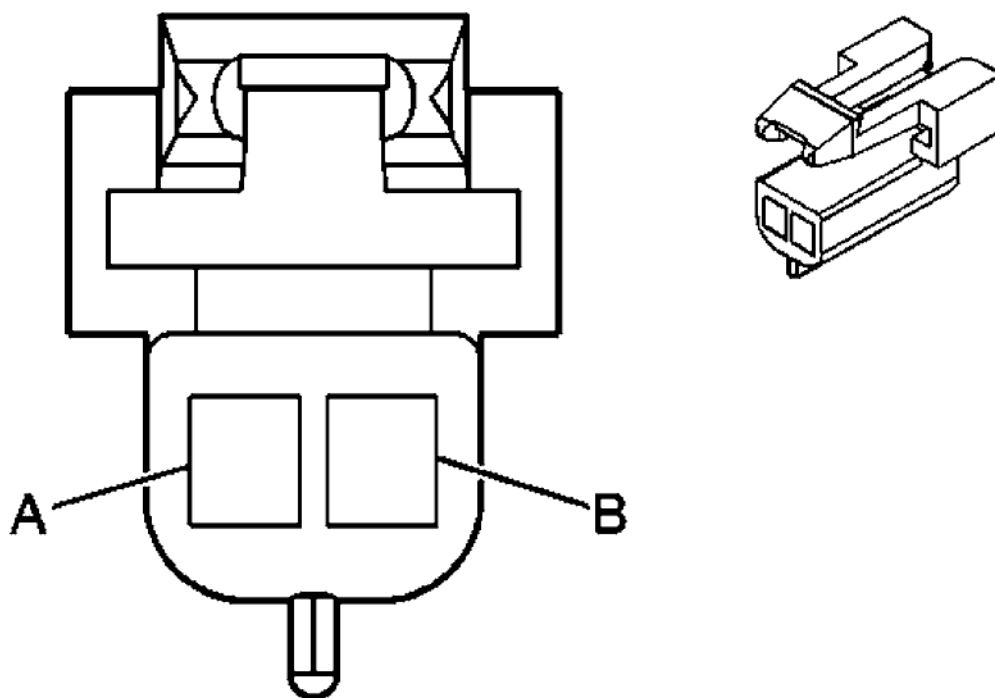


Fig. 15: Speaker - LF Door Connector
Courtesy of GENERAL MOTORS CORP.

Entertainment Connector End Views

Connector Part Information

- OEM: 12052832
- Service: 12101825
- Description: 2-Way F Metri-Pack 150 Series (BK)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Speaker - LF Door

Pin	Wire Color	Circuit No.	Function
A	GY	118	Left Front Speaker Output (-)

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B

TN

201

Left Front Speaker Output (+)

Speaker - LF Tweeter

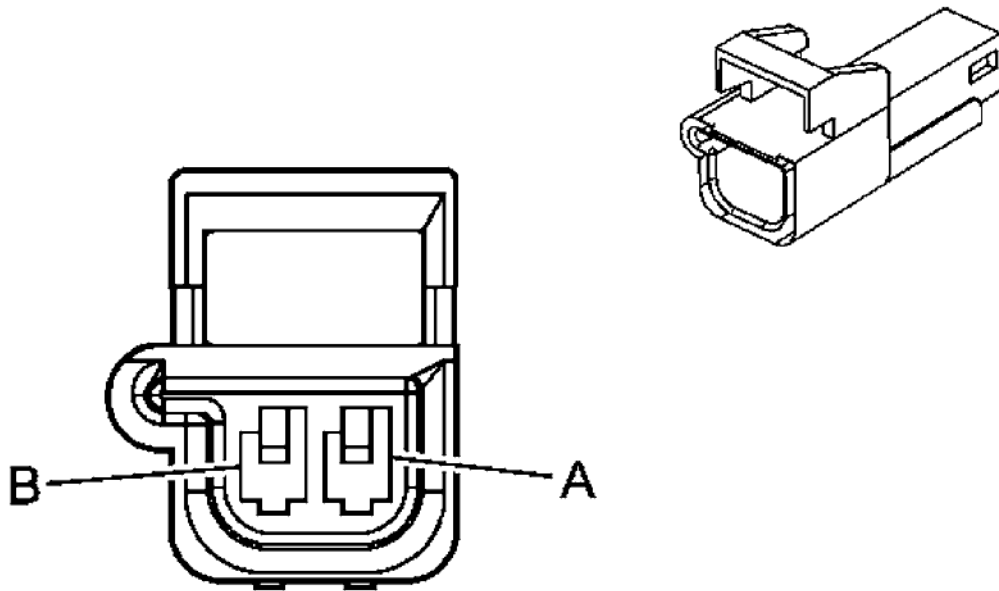


Fig. 16: Speaker - LF Tweeter Connector
Courtesy of GENERAL MOTORS CORP.

Entertainment Connector End Views

Connector Part Information

- OEM: 12103021
- Service: 12106048
- Description: 2-Way M Metri-Pack 150 Series (BU)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Speaker - LF Tweeter

Pin	Wire Color	Circuit No.	Function

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A	GY	118	Left Front Speaker Output (-)
B	TN	201	Left Front Speaker Output (+)

Speaker - LR Door

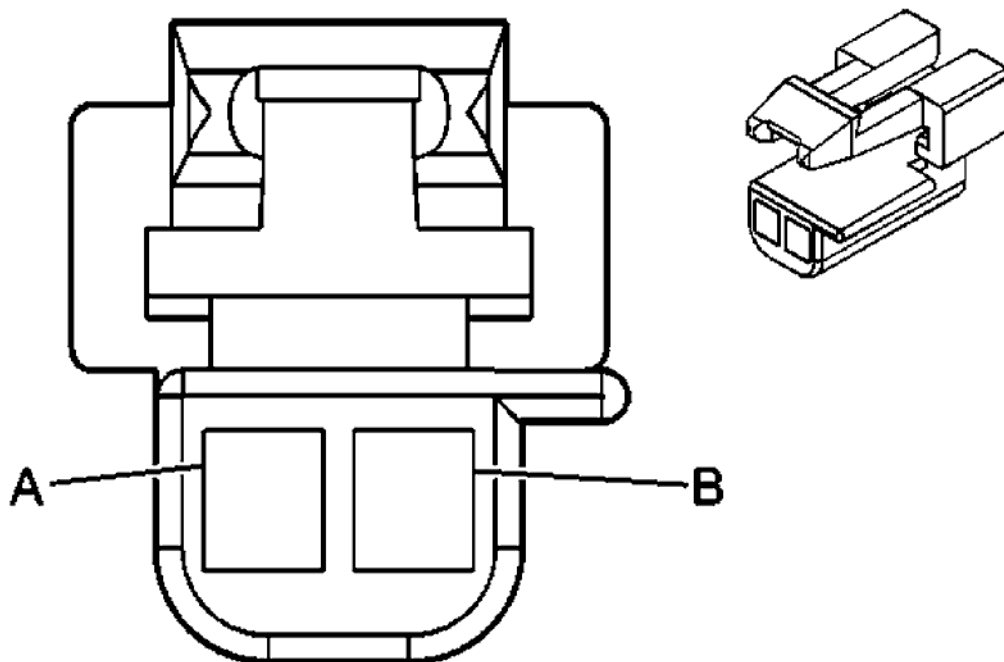


Fig. 17: Speaker - LR Door Connector
Courtesy of GENERAL MOTORS CORP.

Entertainment Connector End Views

Connector Part Information

- OEM: 12064867
- Service: 88987981
- Description: 2-Way F Metri-Pack 150 Series (NA)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

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Speaker - LR Door

Pin	Wire Color	Circuit No.	Function
A	YE	116	Left Rear Speaker Output (-)
B	BN	199	Left Rear Speaker Output (+)

Speaker - RF Door

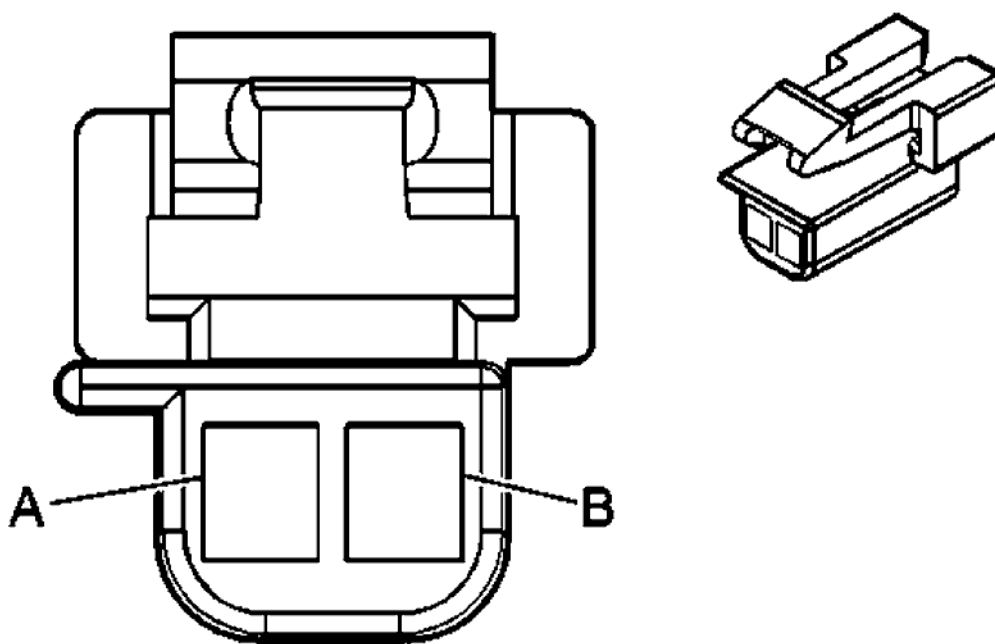


Fig. 18: Speaker - RF Door Connector
Courtesy of GENERAL MOTORS CORP.

Entertainment Connector End Views

Connector Part Information

- OEM: 12064869
- Service: 12117323
- Description: 2-Way F Metri-Pack 150 Series (BU)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:

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- Release Tool/Test Probe:

Speaker - RF Door

Pin	Wire Color	Circuit No.	Function
A	D-GN	117	Right Front Speaker Output (-)
B	L-GN	200	Right Front Speaker Output (+)

Speaker - RF Tweeter

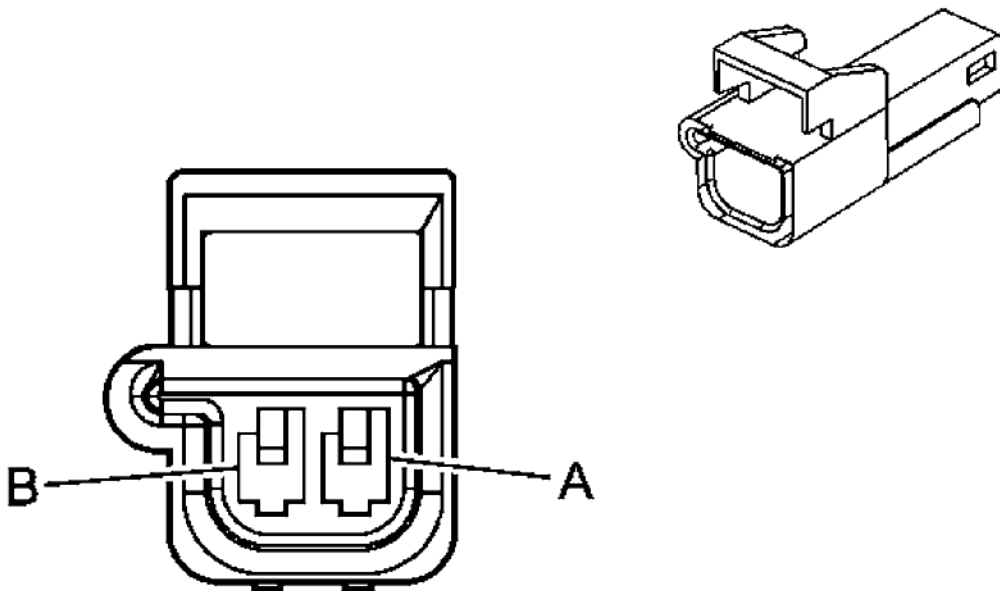


Fig. 19: Speaker - RF Tweeter Connector
Courtesy of GENERAL MOTORS CORP.

Entertainment Connector End Views

Connector Part Information

- OEM: 12103021
- Service: 12106048
- Description: 2-Way M Metri-Pack 150 Series (BU)

Terminal Part Information

- Pins:
- Terminal:

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- Core/Insulation Crimp:
- Release Tool/Test Probe:

Speaker - RF Tweeter

Pin	Wire Color	Circuit No.	Function
A	D-GN	117	Right Front Speaker Output (-)
B	L-GN	200	Right Front Speaker Output (+)

Speaker - RR Door

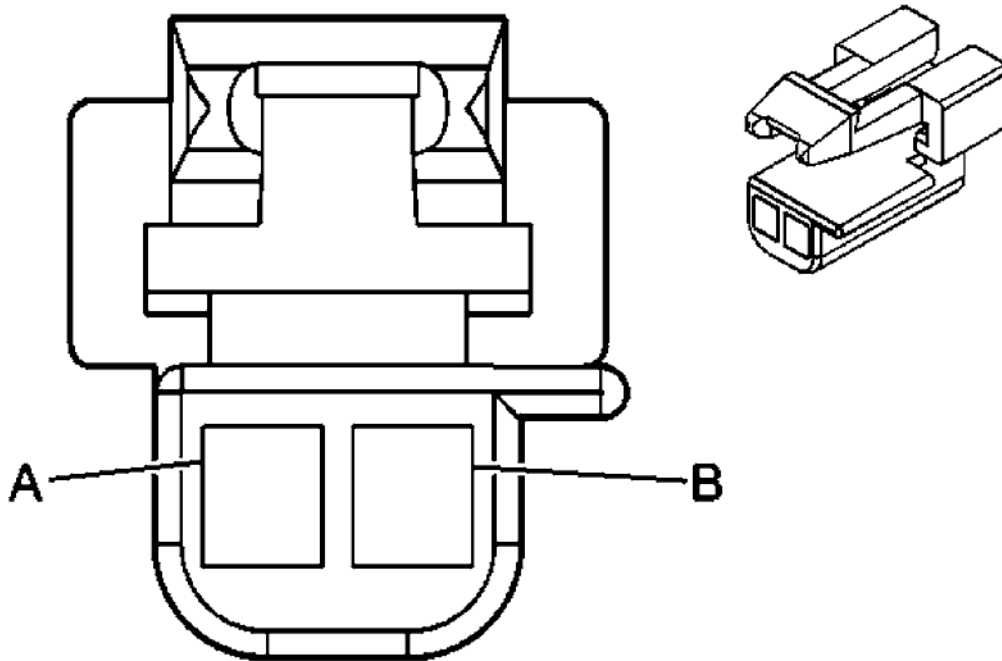


Fig. 20: Speaker - RR Door Connector
Courtesy of GENERAL MOTORS CORP.

Entertainment Connector End Views

Connector Part Information

- OEM: 12064867
- Service: 88987981
- Description: 2-Way F Metri-Pack 150 Series (NA)

Terminal Part Information

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- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Speaker - RR Door

Pin	Wire Color	Circuit No.	Function
A	L-BU	115	Right Rear Speaker Output (-)
B	D-BU	46	Right Rear Speaker Output (+)

Speaker - Subwoofer (UQ3)

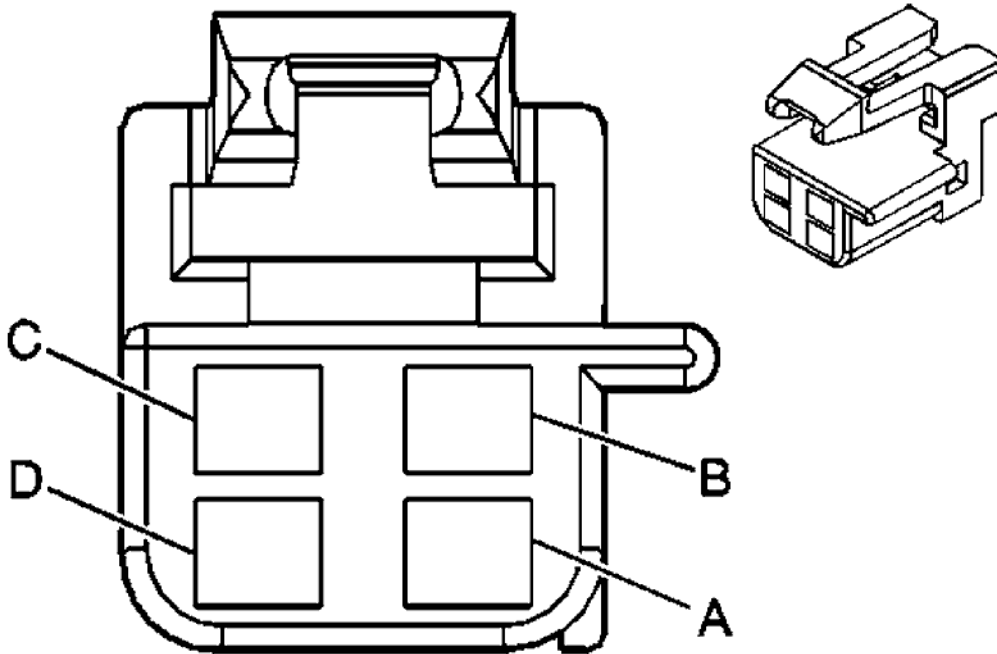


Fig. 21: Speaker - Subwoofer (UQ3) Connector
Courtesy of GENERAL MOTORS CORP.

Entertainment Connector End Views

Connector Part Information

- OEM: 12064760
- Service: 12085208

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- Description: 4-Way F Metri-Pack 150 Series (BK)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Speaker - Subwoofer (UQ3)

Pin	Wire Color	Circuit No.	Function
A	L-BU/BK	315	Rear Subwoofer Speaker (-)
B	D-GN	1795	Rear Subwoofer Speaker (+)
C	D-BU/WH	346	Rear Subwoofer Speaker (-)
D	L-GN/BK	1794	Rear Subwoofer Speaker (-)

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
DTC B1001	B1001 Option Configuration Error
DTC B1025, B1035, B1045, or B1055	** MULTIPLE VALUES **
DTC B1259	Antenna Ground Circuit
DTC B1287	**DESCRIPTION NOT COLLECTED **

DIAGNOSTIC STARTING POINT - ENTERTAINMENT

Begin the system diagnosis with **Diagnostic System Check - Vehicle** in Vehicle DTC Information. 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 diagnostic trouble codes (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.

SCAN TOOL DATA LIST

Radio

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Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Ignition ON/Engine OFF/Radio ON			
Antenna Module	Data	Enabled/Disabled	Enabled
Auxiliary Video Input	Data	Present/Not Present	Not Present
Battery Voltage Signal	Data	Volts	11.8 Volts
CD H/W Level	CD/DVD/MAP Information	Numeric	Varies
CD S/W Level	CD/DVD/MAP Information	Numeric	Varies
DVD H/W Part Number	CD/DVD/MAP Information	Numeric	Varies
DVD S/W Part Number	CD/DVD/MAP Information	Numeric	Varies
Navigation Software Version	CD/DVD/MAP Information	Numeric	Varies
Navigation Hardware Level	CD/DVD/MAP Information	Numeric	Varies
Component Serial No. 13 - 16	Module Information	Numeric	Varies
End Model Part Number	Module Information	Numeric	Varies
Base Model Part Number	Module Information	Numeric	Varies
DRR	Data	Present/Not Present	Present
Ign. Cycles Since Last DTC	Data	Numeric	Varies
Software Part Number	Module Information	Numeric	Varies
Year Module Built	Module Information	Numeric	Varies
Julian Date of Build	Module Information	Numeric	Varies
Phone Signal	Data	Present/Not Present	Present
Power Mode	Data	Off/Accessory/Run/Crank Request	Varies
Power Mode Config.	Data	Normal Mode/Bench Mode	Normal Mode
Signal Strength	Data	dBuV	19 dBuV
Video Display	Data	Present/Not Present	Not Present

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Theft Armed	Data	Learned VIN/No VIN	Learned VIN
Theft Lock Status	Data	Active/Inactive	Inactive

Digital Radio Receiver

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Ignition ON/Engine OFF/Radio ON			
Battery Voltage	Data	Volts	12.2 Volts
Digital Radio Antenna	Data	mV	1400 mV
Ignition Counter	Data	Numeric	98
Julian Date of Build	Module Information	Numeric	043
Power Mode	Data	Run/Crank/ Accessory/ RAP/Off Awake	Run
Year Module Built	Module Information	Numeric	varies

SCAN TOOL DATA DEFINITIONS

Base Model Part Number

Information used during SPS programming to identify a unique combination of ECU hardware and all non-reprogrammable software (e.g. Boot software).

Battery Voltage Signal

The scan tool displays 0-25.5 volts. The displayed value is calculated from a circuit connected to source voltage.

CD H/W Level

The scan tool displays a numeric value that represents the hardware level the internal CD Changer contains.

CD S/W Level

The scan tool displays a numeric value that represents the software level the internal CD Changer contains.

Component Serial No. 13-16

The scan tool displays a numeric value that represents the modules serial number.

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Digital Radio Antenna

The scan tool displays millivolts. This parameter indicates the amount of current being used by the digital radio antenna by measuring the voltage drop across an internal resistor. Typical value is 1,200-1,800 mV.

DRR

The scan tool displays Present/Not Present. The scan tool displays Present when the digital radio receiver (DRR) is connected to the radio.

End Model Part Number

Part number used in service to uniquely identify the combination of hardware/software/calibrations programmed into the ECU at the time the part is ordered.

Julian Date of Build

The scan tool displays 0-999. This represents the day of year the module was manufactured.

Phone Signal

The scan tool displays Present/Not Present. The scan tool displays Present when a phone is connected.

Power Mode

The scan tool displays what power mode the module is in.

Power Mode Config

The diagnostic state the radio is in.

Radio Signal Strength

The scan tool displays 0-300. The signal from the antenna is measured in dBuV.

Theft Armed

The scan tool displays Learned VIN/No VIN. The scan tool displays Learned VIN indicating the radio received a valid VIN.

Theft Lock Status

The scan tool displays Active/Inactive. The scan tool displays Inactive, indicating the radio received the correct VIN and the Theft Lock Mode is not enabled.

DTC B1001**Circuit Description**

The radio receives GMLAN messages, containing VIN digits 3 and 4, when the ignition cycles from OFF to ON and the radio is active. The specific VIN data is sent from another module on the GMLAN serial data circuit. The VIN data needs to match the calibration platform ID stored in the radio memory in order for the radio to operate normally.

DTC Descriptor

This diagnostic procedure supports the following DTC:

B1001 Option Configuration Error

This vehicle has DTCs which include DTC Symptoms. For more information on DTC Symptoms, refer to **DTC Symptom Description**.

DTC B1001

DTC Symptom	DTC Symptom Descriptor
00	No Additional Information

Conditions for Running the DTC

The following conditions must be present in order for the radio to enable the diagnostics:

- The radio transitions from OFF to ON. This may be in response to the radio power switch or an ignition key cycle.
- The system voltage is at least 9 volts and no more than 16 volts.

Conditions for Setting the DTC

The radio detects the calibration platform ID does not match the VIN data sent to the radio with GMLAN messages.

Action Taken When the DTC Sets

The radio does not function properly. The radio displays "CALIBRATE".

Conditions for Clearing the DTC

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

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- The radio receives the clear code command from the scan tool.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: Clear all DTCs and cycle the ignition to verify that the DTC did not falsely set.

3: Clear all DTCs after the repair procedure is complete.

DTC B1001

Step	Action	Yes	No
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With the scan tool, perform the VIN relearn procedure. On the scan tool, go to Module Replacement/Setup and select Radio. 4. Turn OFF the ignition. 5. Turn ON the ignition, with the engine OFF. Does the DTC reset?	Go to Step 3	System OK
3	1. Replace the radio. Refer to Radio Replacement for service procedure. 2. Perform the VIN Relearn procedure with a scan tool. On the scan tool, go to Module Replacement/Setup and select Radio. Did you complete the replacement?	Go to Step 4	-
4	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

DTC B1025, B1035, B1045, OR B1055**DTC Descriptor**

DTC B1025

LF Audio Output Circuit

DTC B1035

RF Audio Output Circuit

DTC B1045

LR Audio Output Circuit

DTC B1055

RR Audio Output Circuit

Diagnostic Fault Information

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

Circuit/System Description

The radio head unit provides four discrete channels to the speakers. Each channel consists of two wires that connect to a speaker. During normal operation, the radio applies approximately 5-6 volts to the plus (+) and minus (-) terminals at the speaker. The terminals attach to the speaker voice coil.

In order for the speaker to produce sound, the amplifier in the radio will raise the voltage on one terminal and lower the voltage on the opposite terminal, then quickly reverse the polarity. The constant switching of the electrical signal causes the voice coil and speaker cone to move rapidly in two directions. The movement of the speaker cone produces sound.

Conditions for Running the DTC

The following are conditions that must be present in order for the radio to enable the diagnostics.

- The radio is in the ACCESSORY, RUN, or RAP power mode.
- The system voltage is at least 9.0 volts and no more than 16.0 volts.

Conditions for Setting the DTC

The following conditions are present for 250 ms or longer.

- One of the speaker output circuits is shorted to battery.

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- One of the speaker output circuits is shorted to ground.

Action Taken When the DTC Sets

The radio disables the audio output to the speaker with the current fault, producing no sound from the speaker.

Conditions for Clearing the DTC

- The conditions for setting the DTC are no longer present.
- A history DTC clears after 100 malfunction free ignition cycles.
- The radio receives the clear code command from the scan tool.

Diagnostic Aids

With the use of Co-axial speakers, some sound (Bass or Treble) may be coming from the speakers depending on what circuit has been affected. Adjusting the bass and treble accordingly to identify faulty circuit may help with diagnosis.

Reference Information

Schematic Reference

Radio/Audio System Schematics

Connector End View Reference

Entertainment Connector End Views

Electrical Information Reference

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

Scan Tool Reference

Special Tools

Special Tools Required

J 39916-A CD and Cassette Diagnostic Audio Kit. See Special Tools.

Circuit/System Verification

Verify customer complaint by adjusting speaker outputs through the radio controls, fade

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and/or balance.

Circuit/System Testing

1. Test the speaker circuits for an open, short to voltage, or short to ground.
 - o Test for 5-6 V on speaker signal (+) and return (-) circuits during the short condition
2. If the circuit tests normal, test or replace the radio.

Repair Instructions

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

Radio Replacement

DTC B1259

Circuit Description

The digital radio antenna is connected to the digital radio receiver (DRR) by 2 coax cables. One coax carries the satellite signal, the other coax carries the terrestrial signal. The antenna cable for the satellite antenna also provides a path for DC current for powering the antenna.

DTC Descriptor

This diagnostic procedure supports the following DTC:

DTC B1259 Antenna Ground Circuit

Conditions for Running the DTC

This test is run every 300 milliseconds.

Conditions for Setting the DTC

The DRR detects an antenna fault.

Action Taken When the DTC Sets

The radio displays "No XM Signal."

Conditions for Clearing the DTC

- The condition must be corrected.
- The DTC clears after 100 malfunction-free ignition cycles.

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Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: Early design modules support the mV reading while later design modules support the mA reading.

3: Due to current limiting capabilities in the module, an antenna cable shorted to ground could still show 1200-1800 mV.

DTC B1259

Step	Action	Values	Yes	No
Schematic Reference: <u>Radio/Audio System Schematics</u> Connector End Views Reference: <u>Entertainment Connector End Views</u>				
1	Did you perform the Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	With a scan tool, observe the digital radio antenna in the digital radio receiver (DRR) data list. Does the scan tool indicate that the digital radio antenna is within the specified range?	1200-1800 mV or 42-118 mA	Go to Step 3	Go to Step 4
3	Test the antenna cables for a short to ground. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 10	Go to Step 8
4	1. Disconnect the antenna cables from the DRR. 2. Measure the voltage from the center conductor of the inboard antenna connector on the DRR to one of the case screws. Does the voltage measure within the specified range?	4.5-5.5 V	Go to Step 5	Go to Step 6
5	Test the antenna cables for an open or a high resistance. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 10	Go to Step 8
	Inspect for poor connections at the DRR. Refer to Testing for Intermittent			

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6	Conditions and Poor Connections and Connector Repairs . Did you find and correct the condition?	-	Go to Step 10	Go to Step 7
7	Replace the DRR. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	-	Go to Step 10	-
8	Inspect for poor connections at the digital radio antenna. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs . Did you find and correct the condition?	-	Go to Step 10	Go to Step 9
9	Replace the digital radio antenna. Refer to Antenna Replacement - Cellular Communications/Digital Radio . Did you complete the replacement?	-	Go to Step 10	-
10	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	-	Go to Step 2	System OK

DTC B1287

DTC Descriptor

DTC B1287

External Amp Control

Diagnostic Fault Information

IMPORTANT: Always perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

DTC B1287

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Remote Radio Control Signal	2	2	1	-
1. No audio output 2. Four Channel unmute, possible noise in speakers when radio muted or turned off.				

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Circuit/System Description

The radio provides a remote amp mute output circuit to control overall muting of remote non-GMLAN 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 Diagnostic Sense circuit internal to the radio monitors the remote amp mute circuit for faults and sets the appropriate DTC when detected.

Conditions for Running the DTC

The following are conditions that must be present in order for the radio to enable the diagnostics:

- The radio is in ACCESSORY, RUN, or RAP power mode.
- The system voltage is at least 9.0 volts and no more than 16.0 volts.

Conditions for Setting the DTC

Circuit failure 400 ms after radio activates Remote Enable.

Action Taken When the DTC Sets

The radio sets the DTC and continues normal operation.

Conditions for Clearing the DTC

- The condition must be corrected.
- A history DTC clears after 100 malfunction free ignition cycles.

Reference Information

Schematic Reference

Radio/Audio System Schematics

Connector End View Reference

Entertainment Connector End Views

Electrical Information Reference

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

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Circuit/System Verification

Verify the audio system performance by adjusting the fade and balance of the speaker outputs.

Circuit/System Testing

1. Ignition off, test the speaker output circuits between the amplifier and speakers for an open, a short to voltage or a short to ground.
2. If the circuit tests normal, test or replace the amplifier.

Repair Instructions

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

Amplifier Replacement

SYMPTOMS - ENTERTAINMENT

- IMPORTANT:**
1. Perform the Diagnostic System Check - Vehicle before using the Symptom Tables in order to verify that all of the following conditions 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 Radio/Audio System Description and Operation.

Visual/Physical Inspection

- Inspect for aftermarket devices which may 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 may 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:

- Audio System Troubleshooting Hints
- Radio Poor Reception
- Digital Radio Poor or No Reception
- Audio Distortion - One or More Speakers
- Speakers Inoperative - One or More

AUDIO SYSTEM TROUBLESHOOTING HINTS

Many conditions that affect radio operation may be corrected without removing the radio from the car. Verify the condition, and follow the diagnostic procedures in order to isolate and correct the condition. In order to properly diagnose any audio system problems, ensure that you have a fully charged battery.

Preliminary Inspections

Tools Required

J 39916-A CD and Cassette Diagnostic Audio Kit. See Special Tools.

IMPORTANT: When testing the audio system for poor reception or noise, the vehicle should be outside away from metal buildings and utility lines, with the hood and rear compartment closed.

- Inspect for aftermarket electronic equipment that may have been installed on the vehicle. Temporarily disconnect the aftermarket electronic equipment to determine if it is the source of the noise.
- For reception concerns, first determine if the customer is within the listening area of the stations they are attempting to receive.
- Stations at the lower end of the FM band are more susceptible to audio noises than stations at the higher end.
- Ignition noise on the FM band may be an indication of an ignition system problem.
- Inspect the antenna coaxial connectors for corrosion or poor connections.
- Inspect all antenna, radio, and chassis grounds to ensure they are tight and free of corrosion.
- Inspect the rear defogger grid lines for large breaks or dark spots.
- Inspect the connections at the radio antenna module, if equipped, to ensure that they are clean and tight.
- If the noise is only from one speaker check for the following before speaker replacement:

- Isolate the noise using the **J 39916-A** . See **Special Tools**.
- Inspect the speaker connections to ensure they are clean and tight. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems.
- Inspect for a loose or incorrectly installed speaker or surrounding trim. Loose trim can cause a buzz or flutter which sounds like a malfunctioning speaker.
- Compare the customers vehicle to another similar model vehicle (with a similar audio system) to determine if the condition is abnormal.

Identifying Concerns

In order to isolate the source of the noise/poor reception, identify the ignition switch position that the concern is most noticeable.

1. Turn the ignition switch to the accessory position.
2. Turn ON the radio.
3. Seek up 88 to 108 FM then 550 to 1600 AM.
4. Record the number of valid radio stations where the tuner stops.
5. Listen for various noise problems.

Repeat these steps with the ignition switch in the ON position. Then repeat these steps again but with the engine running.

1. Return the ignition switch to the position that the concern was most noticeable.
2. Remove fuses or circuit breakers one at a time until the noise has been eliminated.
3. Identify what systems or components are powered by the fuse.
4. Reinstall all fuses and circuit breakers.
5. Disconnect the components powered by the fuse one at a time until the concern has been eliminated.
6. Refer to corrective action for tips on eliminating noise concerns.

For noise concerns not identified using prior procedure, perform the following.

1. Turn the ignition switch to the position the concern was most noticeable.
2. Turn ON the radio.
3. Slowly remove the radio from the mounting bracket.
4. If noise is greatly reduced, the noise is most likely caused by wiring harnesses or hoses behind or on top of radio or antenna coax cable. The harness or hoses need to be rerouted or wrapped with aluminum or nickel tape to shield. Refer to corrective action for additional tips on eliminating noise concerns.

For noise concerns not identified using prior procedure, perform the following:

1. Turn the ignition switch to the position the concern was most noticeable.
2. Turn ON the radio.
3. Remove the radio and unplug the antenna coax cable from the radio.
4. If noise is eliminated, the noise is most likely caused by a degraded antenna system (poor antenna ground plane, radio case ground or corrosion at antenna coax cable connection). Refer to **Radio Poor Reception**.
5. Other causes include defective relays, solenoids or switches. Refer to corrective action for additional tips on eliminating noise concerns.

Corrective Action

- Inspect the ground integrity of the component or system causing the noise.
- Malfunctioning and marginal components such as relays and solenoids may cause noise and/or poor reception.
- Always use a braided ground strap when applying additional grounds and keep the ground strap as short as possible. Total resistance of the braided ground strap should be 0.05 ohms or less.
- If the noise source is found to be coming from the vehicle harness:
 - Route the antenna cable separately from the wire harness that is emitting the noise.
 - Use aluminum or nickel tape in order to shield the antenna cable. Try variations of the following repairs:
 - Try adding only aluminum or nickel tape before adding a ground strap to the tape.
 - Wrap a ground strap 360 degrees around the tape, securing the other end of the strap to chassis ground.

IMPORTANT: When installing suppression devices, signal wires such as sensor and communication circuits should not be suppressed. Battery and ignition voltage circuits are the best choices for suppressing.

- Capacitors work best on switch pops and low frequency noise.
- Filters work best on high frequency whines and static.
- After adding a suppression device, inspect all vehicle systems related or not related to the audio system for proper operation and function.
- Whenever possible, make a test harness that includes filters or capacitors. Always inspect the effectiveness and operation before permanent installation.
- If an audible pop is caused due to operating a switch, perform the following repairs as

necessary:

- Add a capacitor across the contacts of the switch.
- If an audible pop is still present, add a capacitor from the battery positive voltage (B+) side of the switch to chassis ground.
- If an audible pop is still present, add a capacitor from the ground side of the switch to chassis ground.

Refer to the table for available noise suppression devices:

Audio System Troubleshooting Hints

Part Number	Description	Use
1227895	220 micro farad 50 volt capacitor	This capacitor works well for ignition system related noise.
1227894	0.47 micro farad capacitor	This capacitor works well for a switch pop concern on switches and relays.
477371	Radio blower motor capacitor	This capacitor works well for high current situations.
1224205	Universal alternator whine filter package	This filter package works well for low current situations.
12016624	53 cm (21 in) braided ground strap	Braided ground straps provide a better ground.
6286800	48 cm (19 in) braided ground strap	Braided ground straps provide a better ground.
15194426	27 cm (10.5 in) braided ground strap	Braided ground straps provide a better ground.
12091511	21.5 cm (8.5 in) braided ground strap	Braided ground straps provide a better ground.

Generator Whine Concerns

1. Inspect the ground terminal and cable for high resistance.
2. Inspect the generator and brackets for loose or coated mounting bolts.
3. Inspect that the ground straps between the engine and the frame are clean and tight.
4. If the noise is still present, inspect the charging system for proper operation. Refer to **Symptoms - Engine Electrical** in Engine Electrical.
5. Install filter GM P/N 1224205 in the battery voltage feed circuit to the radio.
6. If the noise is still present, install the filter in each of the following variations:
 - Install the filter with the single wire side toward the radio and the ground wire attached to chassis ground.
 - Remove the ground to the filter.

- Reverse the filter so the two wire side is toward the radio with the ground wire attached to chassis ground.
 - Remove the ground from the filter.
7. If the installation of this filter causes a delay when turning the radio ON or OFF, or other noticeable performance problems, remove the filter and install a .47 micro farad capacitor (P/N 1227894) to chassis ground.
 8. Before reassembling the vehicle, remove any unneeded filters.
 9. Test the functionality of all the vehicle systems, including those not related to the audio system, for proper operation and function.

RADIO POOR RECEPTION

Schematic Reference: Radio/Audio System Schematics

Antenna System Test

The length of the antenna coax cable lead-in and antenna body determines the total system ground measurement.

IMPORTANT: Always zero out the DMM before taking a resistance measurement in order to ensure an accurate reading.

1. Disconnect the antenna lead-in connector from the radio receiver.
2. Measure the resistance from the negative battery post to the coax outer conductor connector.
3. The resistance measured should be as follows:
 - Cable less than 5 ft-No more than 0.035 ohms
 - Cable 5-13 ft-No more than 0.060 ohms
 - Cable 13-20 ft-No more than 0.085 ohms
4. Test the following when the resistance is greater than specified:
 - Base of the antenna for a poor connection to body ground.
 - The coaxial cable interconnects for a poor connection or corrosion.
 - Test for an open or high resistance from the battery negative cable to the body. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.
 - Do not use black (phosphate-coated) hardware for antenna mounting purposes. This type of fastener is unreliable in making good connections.
5. After finding and correcting the condition, operate the system in order to verify the repair.

Perform the Antenna Checking Procedures after confirming the integrity of the antenna ground.

Antenna Checking Procedures

Perform the following tests for the type of antenna on the vehicle.

Using a Test Antenna

Use a test mast antenna to check for poor vehicle antenna operation. Unplug antenna lead-in connector from radio receiver and plug the test antenna into radio. Make sure the test antenna base is grounded to the vehicle chassis and keep hands off the mast. Check radio reception in an area away from electrical interferences. Tune to several weak and strong AM and FM stations. If the radio reception improved, the problem exists with the vehicle antenna and/or lead-in cable. If the reception is still poor, refer to **Audio System Troubleshooting Hints**.

Antenna Coaxial Cable Testing

Disconnect the antenna coax cable connector from the radio receiver and perform the following measurements.

IMPORTANT: Always zero out the DMM before taking a resistance measurement in order to ensure an accurate reading.

1. Measure the resistance from the coax cable center conductor to center conductor or antenna mast.
2. Total resistance from end to end of center conductor:
 - RG-58/RG-59 type cable-Less than 0.20 ohms
 - RG-62/RG-62M type cable-Less than 3.5 ohms
3. When checking the resistance, cautiously wiggle the lead-in tip and cable. Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.
4. Measure the resistance from the cable center conductor to metal case. Reading should be infinite.
5. Replace the antenna and/or lead-in cable when the above readings are not obtained.

Radio Antenna Module System

IMPORTANT: The following information lists the most probable cause of the concern to the least probable cause followed by the appropriate test for that condition. If the test leads to the replacement of a component, always inspect for a poor connection before proceeding with the replacement. Refer to **Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems.**

This antenna system consists of an antenna module and a grid separate from the heated grid

element.

Perform the Antenna System Test and test the antenna coax cable prior to performing the following tests:

- The radio antenna module is not grounded properly. The module grounding screws should be clean and tight. Measure the resistance from the antenna module base plate to a good ground. Resistance should be 0.020 ohms or less. Find and correct the condition if the resistance is out of specification.
- The antenna module supply voltage circuit to the radio antenna module is open or shorted to ground. Test the antenna module supply voltage circuit for an open or short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.
- No antenna module supply voltage output from the radio. Disconnect the radio antenna module connector. Turn ON the radio and measure the voltage from the antenna module supply voltage circuit of the radio to a good ground. Voltage measured should be near 12 volts. If no voltage is measured, replace the radio. Refer to **Radio Replacement** for service procedure. Perform the VIN Relearn procedure after replacing the radio. On the scan tool, go to Module Replacement/Setup in Vehicle Control Systems and select Radio.
- Defective radio antenna module. Replace the radio antenna module.
- After finding and correcting the condition, operate the system in order to verify the repair.

DIGITAL RADIO POOR OR NO RECEPTION

Digital Radio Poor or No Reception

Step	Action	Values	Yes	No
Schematic Reference: Radio/Audio System Schematics				
Connector End View Reference: Entertainment Connector End Views				
1	Did you perform the Diagnostic System Check-Vehicle?	-	Go to Step 2	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information
2	1. Make sure the vehicle is outside in an area with an unobstructed view of the southern sky. 2. Turn ON the ignition, with the engine OFF.	-		

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	3. Turn ON the radio. 4. Tune the radio to satellite channel 1. Is the reception clear?		Go to Step 3	Go to Step 5
3	Tune the radio to several other satellite channels. Is the reception clear?	-	Go to Audio System Troubleshooting Hints	Go to Step 4
4	Contact XM at 1-800-852-9696 to verify customer account status or possible network problems. Did you find and correct the condition?	-	Go to Step 14	Go to Step 10
5	Contact XM at 1-800-852-9696 to verify possible network problems. Did you find and correct the condition?	-	Go to Step 14	Go to Step 6
6	With a scan tool, observe the digital radio antenna in the digital radio receiver data list. Does the scan tool indicate that the digital radio antenna is within the specified range?	1200-1800 mV or 42-118 mA	Go to Step 10	Go to Step 7
7	1. Disconnect the antenna cables from the digital radio receiver. 2. Measure the voltage from the center conductor of the inboard antenna connector on the digital radio receiver to one of the case screws. Does the voltage measure within the specified range?	4.5-5.5 V	Go to Step 8	Go to Step 10
8	Test the antenna cables for an open, short, or high resistance. Refer to Testing for Intermittent Conditions and Poor Connections in Wiring Systems. Did you find the condition?	-	Go to Step 9	Go to Step 11
	Replace the antenna cable. Refer to Coaxial Cable Replacement -			

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9	Digital Radio. Did you complete the replacement?	-	Go to Step 14	-
10	Inspect for poor connections at the digital radio receiver. Refer to Testing for Intermittent Conditions and Poor Connections in Wiring Systems. Did you find and correct the condition?	-	Go to Step 14	Go to Step 12
11	Inspect for poor connections at the digital radio antenna. Refer to Testing for Intermittent Conditions and Poor Connections in Wiring Systems. Did you find and correct the condition?	-	Go to Step 14	Go to Step 13
12	Replace the digital radio receiver. Refer to Control Module References in Computer/Integrating Systems for replacement, setup, and programming. Did you complete the replacement?	-	Go to Step 14	-
13	Replace the digital radio antenna. Refer to Antenna Replacement - Digital Radio. Did you complete the replacement?	-	Go to Step 14	-
14	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to Step 2

AUDIO DISTORTION - ONE OR MORE SPEAKERS**Schematic Reference: Radio/Audio System Schematics****Diagnostic System Check - Entertainment System**

Always perform the Vehicle Diagnostic System Check before proceeding with these diagnostic procedures. Refer to **Diagnostic System Check - Vehicle** .

Speaker(s) - Reduced Volume/Audio Distortion

IMPORTANT: The following information lists the most probable cause of the concern to the least probable cause. If the list leads to the replacement of a component, always inspect for a poor

connection before proceeding with replacement. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs .

With RPO U1C

- Speaker output circuit high resistance or shorted to ground-Test the speaker output circuits for high resistance or short to ground. Refer to Circuit Testing and Wiring Repairs .
- Defective speaker-Replace the appropriate speaker. Refer to Speaker Replacement Reference.

IMPORTANT: The following procedure assumes all speakers are operative for all modes of operation except digital radio.

With RPO U2K

- Audio common circuit open-Test the audio common circuit for an open. Refer to Circuit Testing and Wiring Repairs .
- Speaker output circuit high resistance or shorted to ground-Test the speaker output circuits for high resistance or short to ground. Refer to Circuit Testing and Wiring Repairs .
- No audio output from the digital radio receiver-Replace the digital radio receiver. Refer to Receiver Replacement - Digital Radio and Digital Radio Receiver Setup.
- No digital radio audio output from the radio-Replace the radio. Refer to Radio Replacement.

SPEAKERS INOPERATIVE - ONE OR MORE

Schematic Reference: Radio/Audio System Schematics

Diagnostic System Check - Entertainment System

Always perform the Vehicle Diagnostic System Check before proceeding with these diagnostic procedures. Refer to Diagnostic System Check - Vehicle .

One Speaker Inoperative

IMPORTANT: The following information lists the most probable cause of the concern to the least probable cause. If the list leads to the replacement of a component, always inspect for a poor connection before proceeding with replacement. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs .

With RPO U1C

- Speaker output open-Test the appropriate speaker output circuits for an open. Refer to **Circuit Testing** and **Wiring Repairs** .
- No audio output from the radio-Disconnect speaker harness connector from speaker. Turn On the radio and adjust volume approximately 50 percent. Measure the A/C voltage across the speaker harness connector terminals. Replace the speaker if A/C voltage is present. Refer to **Speaker Replacement Reference**.
- If no A/C voltage is present, replace the radio. Refer to **Control Module References** for replacement, setup, and programming.
- Perform the vehicle identification number (VIN) Relearn procedure with a scan tool. On the scan tool, go to Module Replacement/Setup in Vehicle Control Systems and select Radio.

With RPO UQ3

1. Speaker output circuit from amplifier open or shorted-Test the appropriate speaker output circuits for an open or short. Refer to **Circuit Testing** and **Wiring Repairs** .
2. No low level audio output from the radio-Test for any AC voltage between the appropriate low level output circuits at the amplifier harness connector, disconnected with the radio volume adjusted to an audible level. If no A/C voltage is present, replace the radio. Refer to **Radio Replacement**.
3. No audio output from the amplifier-Test for any A/C voltage between the appropriate speaker output circuits at the speaker harness connector, disconnected with the radio volume adjusted to an audible level. If A/C voltage is present, replace the speaker. If no A/C voltage is present, replace the amplifier. Refer to **Amplifier Replacement**.

Speakers - One Channel Inoperative

IMPORTANT: The following information lists the most probable cause of the concern to the least probable cause. If the list leads to the replacement of a component, always inspect for a poor connection before proceeding with replacement. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** .

IMPORTANT: The following procedure assumes all speakers are operative for all modes of operation except digital radio.

With RPO U2K

- Audio signal circuit open-Test the appropriate audio signal circuit between the radio and digital radio receiver (DRR) for an open, short to ground, or short to battery. Refer

to **Circuit Testing** and **Wiring Repairs** .

- No audio output from the DRR-Measure the voltage from the DRR audio signal circuit with the radio ON. Replace the DRR if no voltage is measured. Refer to **Receiver Replacement - Digital Radio** and **Digital Radio Receiver Setup**.
- No audio input to the radio-Measure the voltage from the radio audio signal circuit with the radio ON. Replace the radio if voltage is measured and symptom is still present. Refer to **Control Module References** for replacement, setup, and programming.
- After replacing the radio, perform the VIN Relearn procedure. On the scan tool, go to Module Replacement/Setup in Vehicle Control Systems and select Radio.

RADIO SETUP

1. To setup a new radio for the vehicle, complete the Module Replacement/Setup procedure under the Radio menu of the scan tool.
2. Cycle ignition when complete.

DIGITAL RADIO RECEIVER SETUP

IMPORTANT: The digital radio receiver setup option does not contain a submenu. Digital radio receiver setup will configure the following systems:

- DTCs
- GMLAN and class 2 radio messages

To setup the digital radio receiver, complete the setup procedure under the Special Functions menu of the scan tool, then cycle ignition.

XM Activation

IMPORTANT: After replacement of an XM receiver, call XM radio to deactivate the receiver that has been removed from the vehicle and activate the new XM radio receiver. The vehicle must be parked in view of a satellite within 24 hours after an activation call.

1. Turn the radio ON, tune to the XM channel 0, and record the radio ID. The radio ID will be needed for activation of the new receiver.
2. Call XM radio at 1-800-556-3600 to deactivate the faulty receiver and activate the new receiver.
3. Park the vehicle outside in an area with an unobstructed view of the southern sky.
4. Leave the vehicle outside with the ignition switch in the ACC position and the radio on for 30 minutes to activate XM service.
5. Once activated, the radio will receive the remaining XM channels.

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SPEAKER REPLACEMENT REFERENCE

Speaker Replacement Reference

Component	Repair Instruction
Front Door Speaker	Refer to <u>Speaker Replacement - Front Door</u>
Front Door Upper Speaker	Refer to <u>Speaker Replacement - Front Upper</u>
Rear Door Speaker	Refer to <u>Speaker Replacement - Rear Door</u>
Rear Quarter Speaker	Refer to <u>Speaker Replacement - Rear Quarter</u>

REPAIR INSTRUCTIONS

AMBIENT AIR TEMPERATURE GAGE SENSOR REPLACEMENT

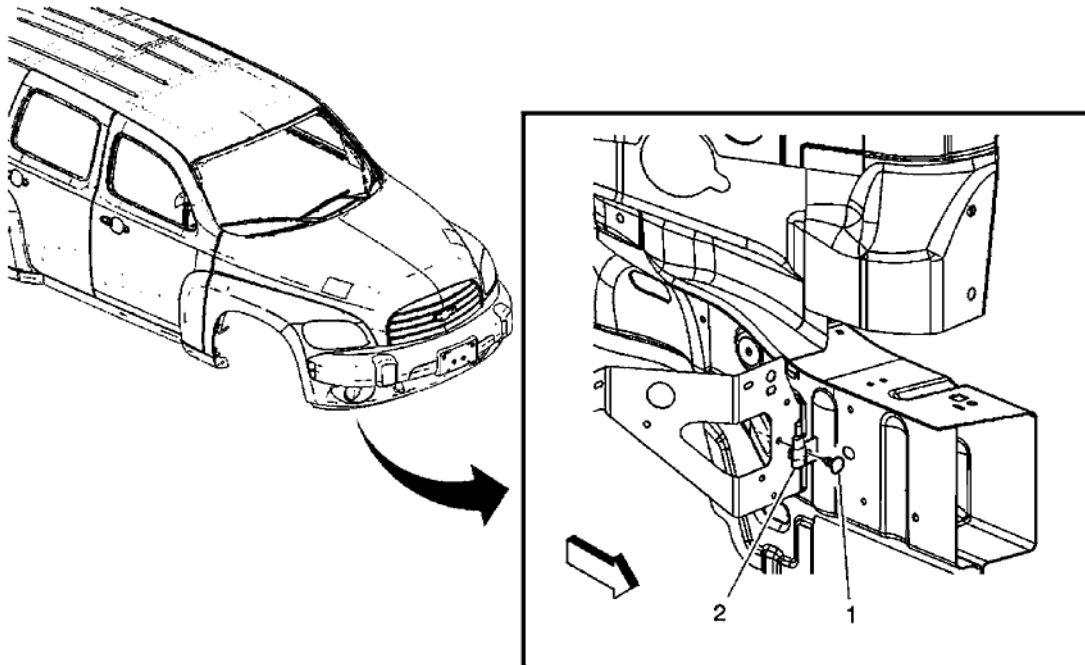


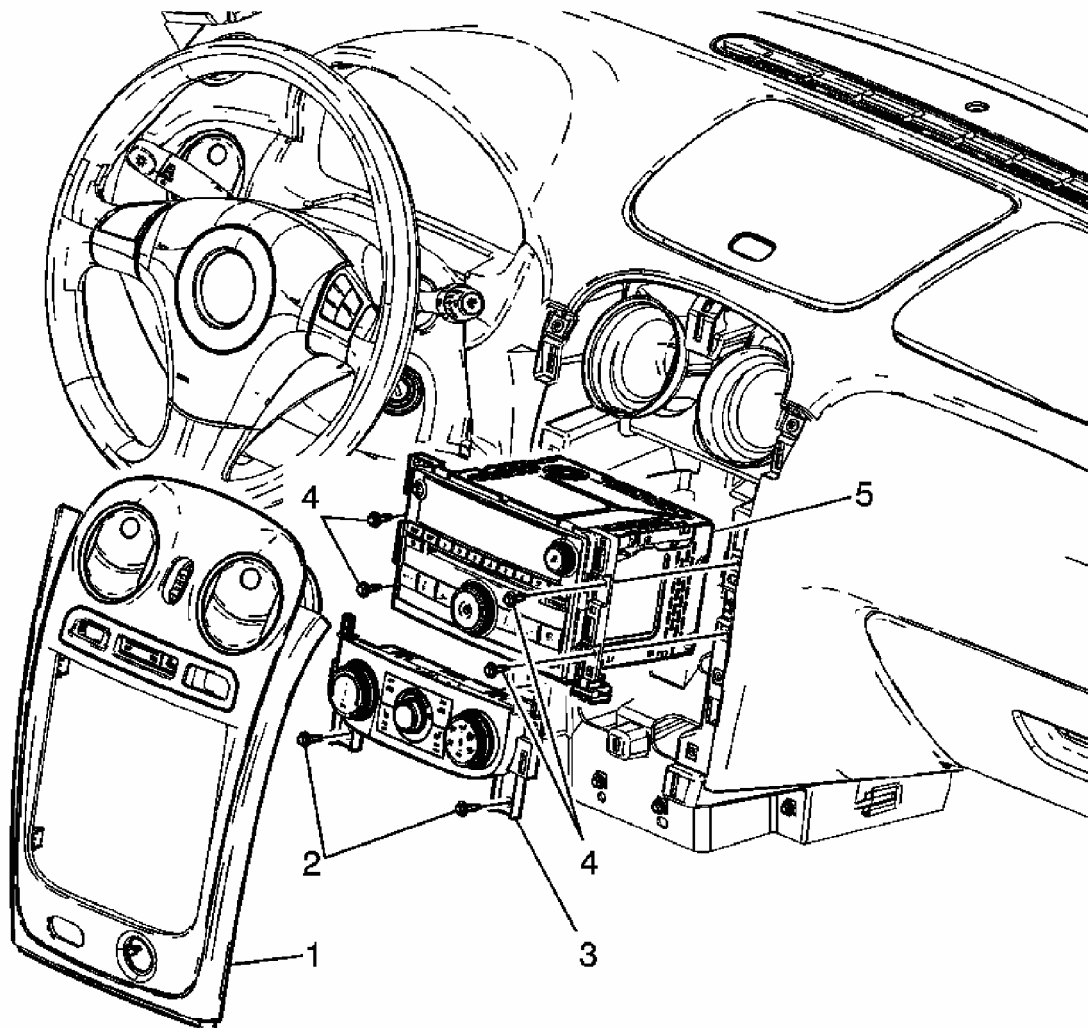
Fig. 22: Ambient Air Temperature Gage Sensor Replacement
Courtesy of GENERAL MOTORS CORP.

Ambient Air Temperature Gage Sensor Replacement

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u>	

Fastener Tightening Specifications: Refer to **Fastener Tightening Specifications.**

1	Sensor, Ambient Air Temperature Assembly
2	Fastener, Ambient Air Temperature Sensor

RADIO REPLACEMENT**Fig. 23: Radio Replacement**

Courtesy of GENERAL MOTORS CORP.

Radio Replacement

Callout	Component Name
NOTE: Refer to Fastener Notice .	
Fastener Tightening Specifications Refer to Fastener Tightening Specifications.	
	Plate Assembly, Instrument Panel Accessory Trim

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1	Tip: Pull away from the instrument panel to disengage the retainers and disconnect the electrical connectors.
2	Screw, Heater and A/C Control Assembly (Qty: 2) Tighten: 2 N.m (18 lb in)
3	Heater and A/C Control Assembly Tip: Disconnect the electrical connector.
4	Screw, Radio Assembly (Qty: 4) Tighten: 2 N.m (18 lb in)
5	Radio Assembly • Disconnect the electrical connector. • Disconnect the antenna cable. • Reprogram the radio after installation. Refer to Control Module References.

RECEIVER REPLACEMENT - DIGITAL RADIO

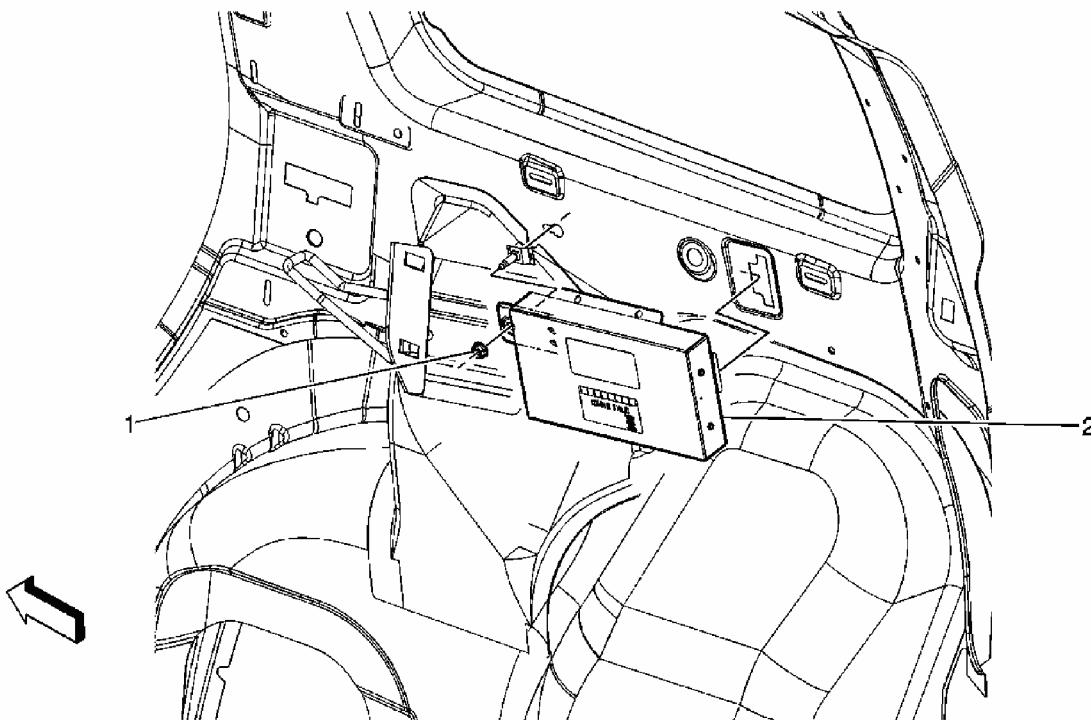


Fig. 24: Receiver Replacement - Digital Radio
Courtesy of GENERAL MOTORS CORP.

Receiver Replacement - Digital Radio

Callout	Component Name
---------	----------------

NOTE:

Refer to **Fastener Notice** .

Fastener Tightening Specifications: Refer to **Fastener Tightening Specifications**. **Preliminary Procedures:** Remove the right rear quarter upper trim panel. Refer to **Trim Panel Replacement - Rear Quarter Upper** .

1	Digital Radio Receiver Nut Tighten: 10 N.m (89 lb in)
2	Digital Radio Receiver Assembly Tip: 1. Disconnect the antenna cable. 2. Reprogram the digital radio receiver after installation. Refer to Control Module References .

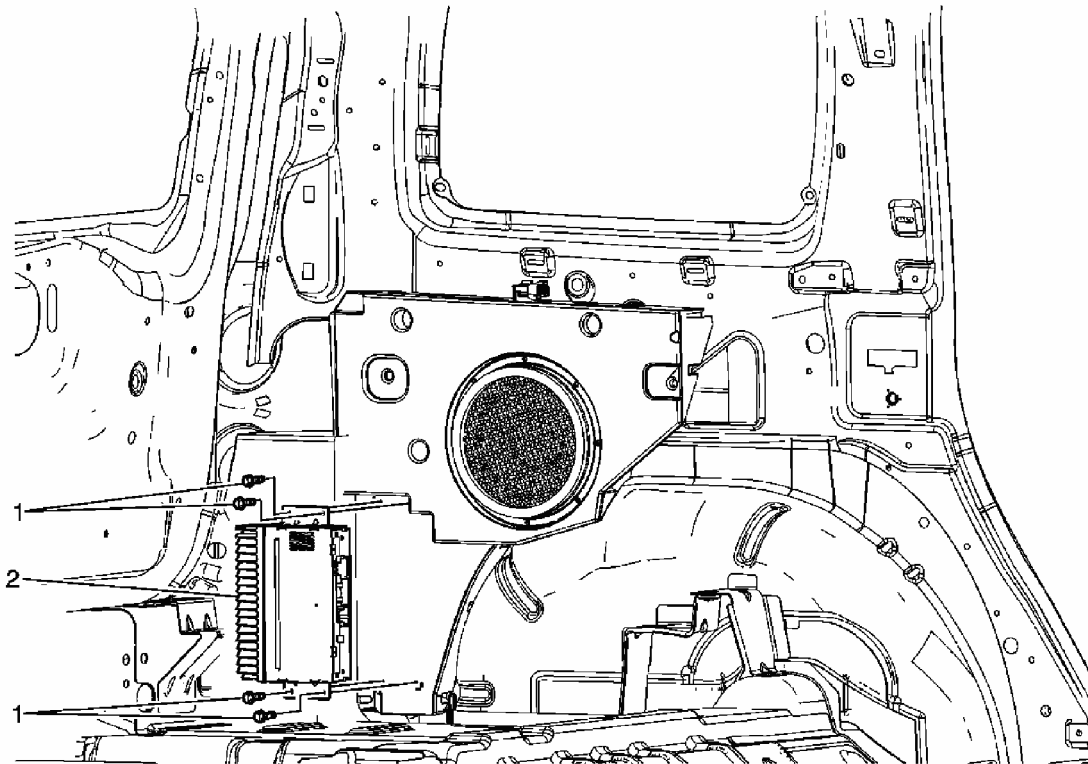
AMPLIFIER REPLACEMENT

Fig. 25: Amplifier Replacement
Courtesy of GENERAL MOTORS CORP.

Amplifier Replacement

Callout	Component Name
NOTE: Refer to Fastener Notice . Fastener Tightening Specifications: Refer to Fastener Tightening Specifications . Preliminary Procedures 1. Remove the rear seat. Refer to Seat Replacement - Rear . 2. Remove the left quarter lower trim panel. Refer to Trim Panel Replacement - Rear Quarter Lower .	
1	Screw, Amplifier (Qty: 4) Tighten: 9 N.m (80 lb in)
2	Amplifier Assembly, Radio Speaker Tip: Disconnect the electrical connectors.

COMPACT DISC CARE AND CLEANING

Care of CDs

Handle CDs carefully. Store them in their original cases or other protective cases and away from direct sunlight and dust. The CD player scans the bottom surface of the disc. If the surface of a CD is damaged, such as cracked, broken, scratched, or wrinkled labeling, the CD will not play properly or not at all. If the surface of a CD is soiled, take a soft, lint free cloth or dampen a clean, soft cloth in a mild, neutral detergent solution mixed with water, and clean it. Make sure the wiping process starts from the center to the edge. Do not touch the bottom side of a CD while handling it. This could damage the surface. Pick up CDs by grasping the outer edges or the edge of the hole and the outer edge.

Care of the CD Player

The use of CD lens cleaners for CD players is not advised, due to the risk of contaminating the internal lens of the CD optics with lubricants.

Stuck CDs

Interrupting the battery power by pulling the fuse will sometimes release a stuck CD. If a CD is stuck, and removed, inspect it for warps, cracks, etc. If the CD is damaged, do not replace the radio.

Labeling CDs

Paper labels can eventually warp and wrinkle, and this will cause the disc to jam inside the CD player. Try labeling the top of the discs with a soft magic marker instead.

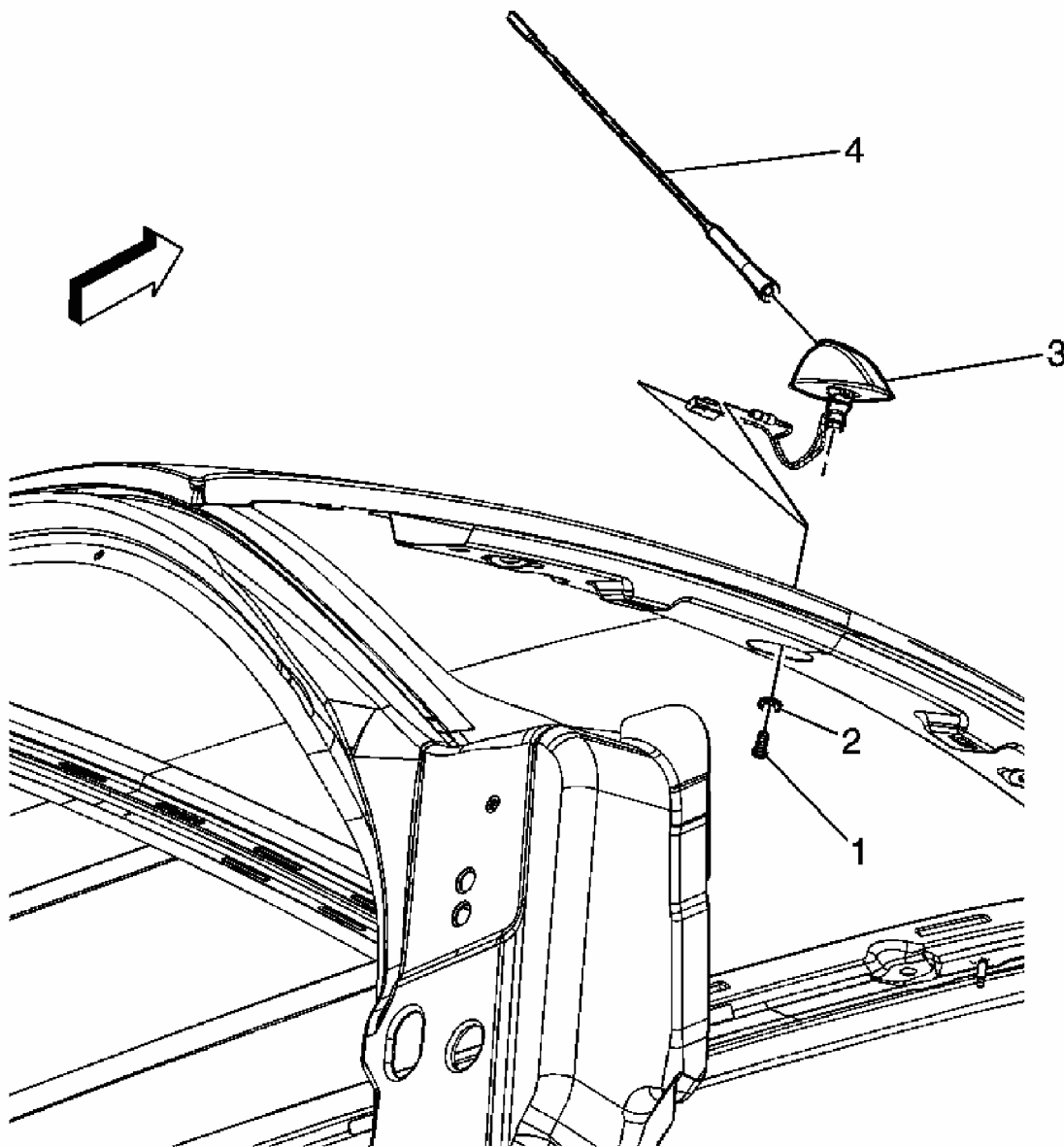
FIXED ANTENNA REPLACEMENT

Fig. 26: Fixed Antenna Replacement
Courtesy of GENERAL MOTORS CORP.

Fixed Antenna Replacement

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications Refer to <u>Fastener Tightening Specifications</u> . Preliminary Procedure: Lower the front of the headliner. Refer to <u>Headliner Replacement</u> .	

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1	Radio Antenna Bolt Tighten: 9 N.m (80 lb in)
2	Radio Antenna Assembly Expansion Sleeve
3	Radio Antenna Assembly Tip: Disconnect the antenna cable.
4	Fixed Mast Antenna

ANTENNA REPLACEMENT - DIGITAL RADIO

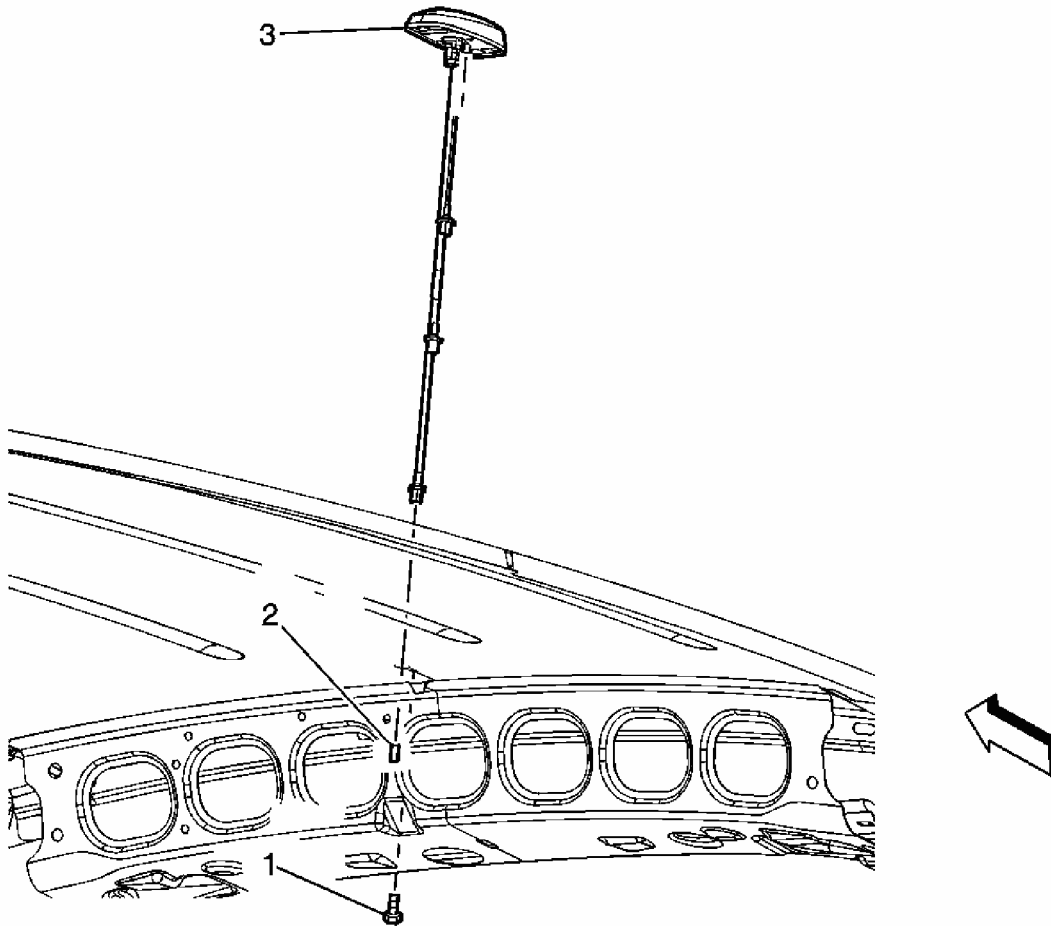


Fig. 27: Antenna Replacement - Digital Radio
Courtesy of GENERAL MOTORS CORP.

Antenna Replacement - Digital Radio

Callout	Component Name
NOTE: Refer to Fastener	

Notice .

Fastener Tightening Specifications Refer to **Fastener Tightening Specifications**. **Preliminary Procedure:** Lower the rear of the headliner. Refer to **Headliner Replacement** .

1	Bolt, Digital Radio Antenna Assembly
	Tighten: 9 N.m (80 lb in)
2	Expansion Sleeve, Digital Radio Antenna Assembly
3	Antenna Assembly, Digital Radio

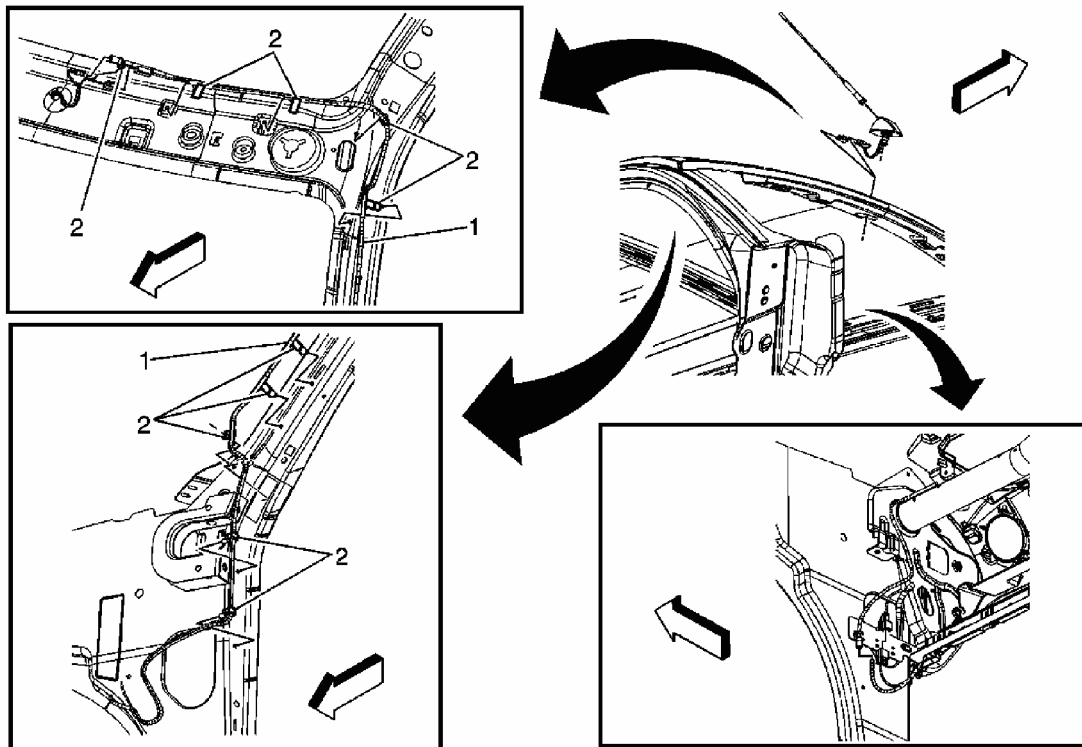
ANTENNA CABLE REPLACEMENT

Fig. 28: Antenna Cable Replacement
 Courtesy of GENERAL MOTORS CORP.

Antenna Cable Replacement

Callout	Component Name
NOTE: Refer to Fastener Notice . Fastener Tightening Specifications Refer to Fastener Tightening Specifications.	

Preliminary Procedure

1. Lower the front of the headliner. Refer to **Headliner Replacement** .
2. Remove the windshield pillar molding. Refer to **Windshield Garnish Molding Replacement** .
3. Remove the left instrument panel insulator. Refer to **Insulator Replacement - Instrument Panel (I/P)** .

1	Cable Assembly, Radio Antenna Tip: Disconnect the cable at the antenna and at the instrument panel.
2	Clip, Radio Antenna Cable

COAXIAL CABLE REPLACEMENT - DIGITAL RADIO

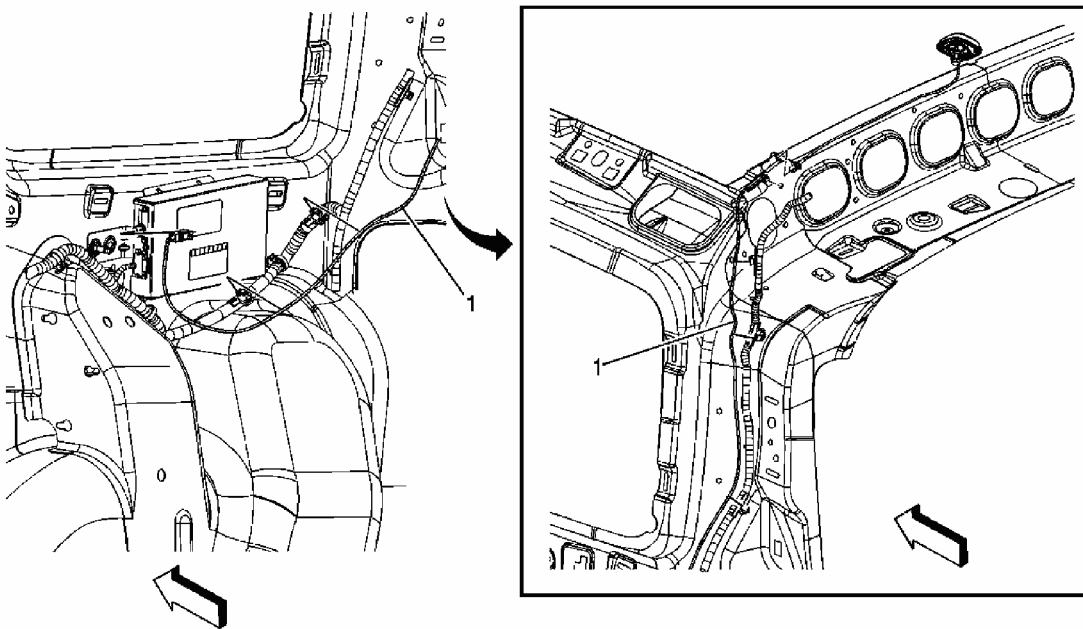


Fig. 29: Coaxial Cable Replacement - Digital Radio
Courtesy of GENERAL MOTORS CORP.

Coaxial Cable Replacement - Digital Radio

Callout	Component Name
NOTE: Refer to Fastener Notice . Fastener Tightening Specifications: Refer to Fastener Tightening Specifications. Preliminary Procedures	

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1. Remove the rear seat. Refer to **Seat Replacement - Rear** .
2. Remove the right rear quarter upper trim panel. Refer to **Trim Panel Replacement - Rear Quarter Upper** .
3. Remove the right rear quarter lower trim panel. Refer to **Trim Panel Replacement - Rear Quarter Lower** .
4. Remove the rear corner garnish molding. Refer to **Garnish Molding Replacement - Rear Corner** .
5. Remove the rear door opening upper trim. Refer to **Garnish Molding Replacement - Rear Door Opening Upper Frame** .

1

Cable Assembly, Digital Radio

Tip: Disconnect the cable at the digital radio receiver and at the antenna.

SPEAKER REPLACEMENT - FRONT DOOR

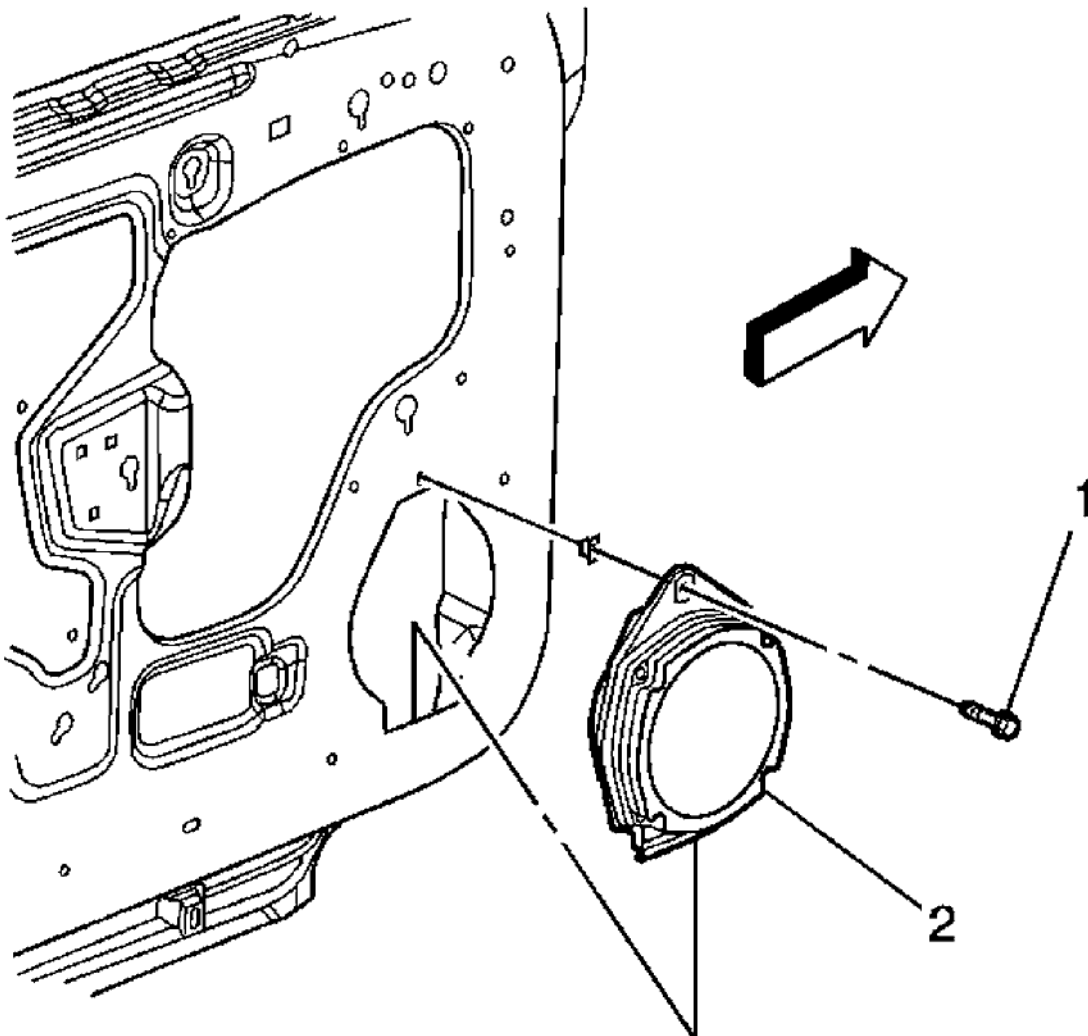


Fig. 30: Speaker Replacement - Front Door

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Courtesy of GENERAL MOTORS CORP.

Speaker Replacement - Front Door

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> . Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> . Preliminary Procedure: Remove the front door inner trim panel. Refer to <u>Trim Panel Replacement - Side Front Door</u> .	
1	Screw, Front Door Speaker Tighten: 3 N.m (25 lb in)
2	Speaker, Front Door

SPEAKER REPLACEMENT - FRONT UPPER

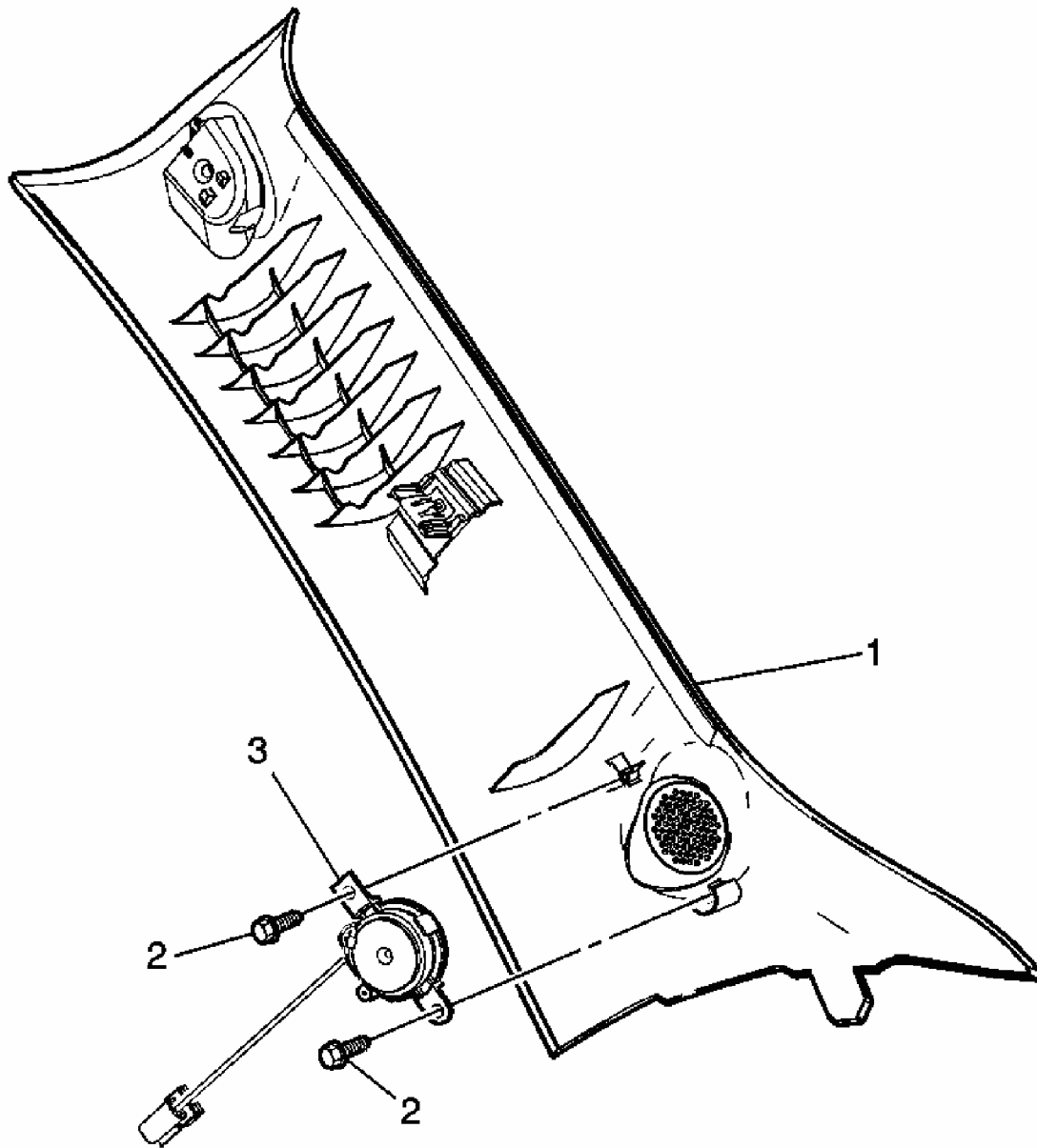


Fig. 31: Speaker Replacement - Front Upper
Courtesy of GENERAL MOTORS CORP.

Speaker Replacement - Front Upper

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
1	Molding, Windshield Side Garnish Refer to Windshield Garnish Molding Replacement .
	Screw, Radio Speaker Windshield Side Garnish Molding (Qty: 2)

2	Tighten: 2 N.m (18 lb in)
3	Speaker Assembly, Radio Windshield Side Garnish Molding

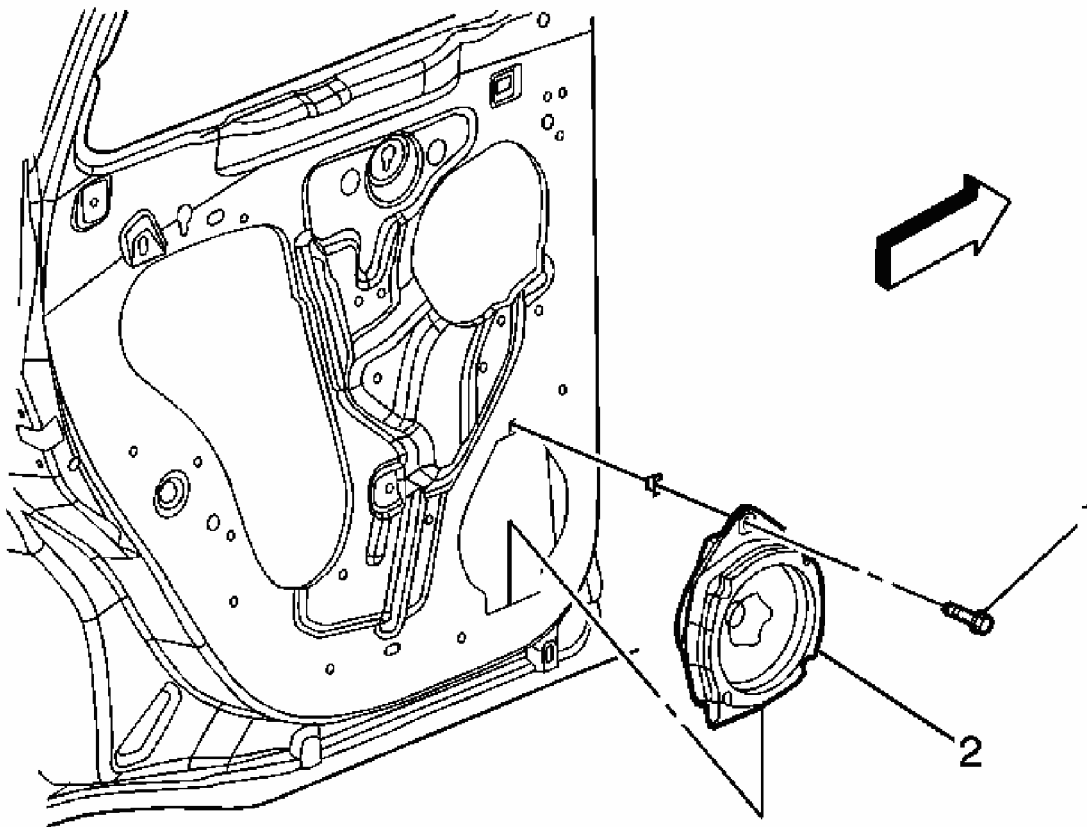
SPEAKER REPLACEMENT - REAR DOOR

Fig. 32: Speaker Replacement - Rear Door
Courtesy of GENERAL MOTORS CORP.

Speaker Replacement - Rear Door

Callout	Component Name
NOTE: Refer to Fastener Notice .	
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications . Preliminary Procedure: Remove the rear door inner trim panel. Refer to Trim Panel Replacement - Side Rear Door .	
1	Screw, Rear Door Speaker Tighten: 3 N.m (25 lb in)
2	Speaker, Rear Door

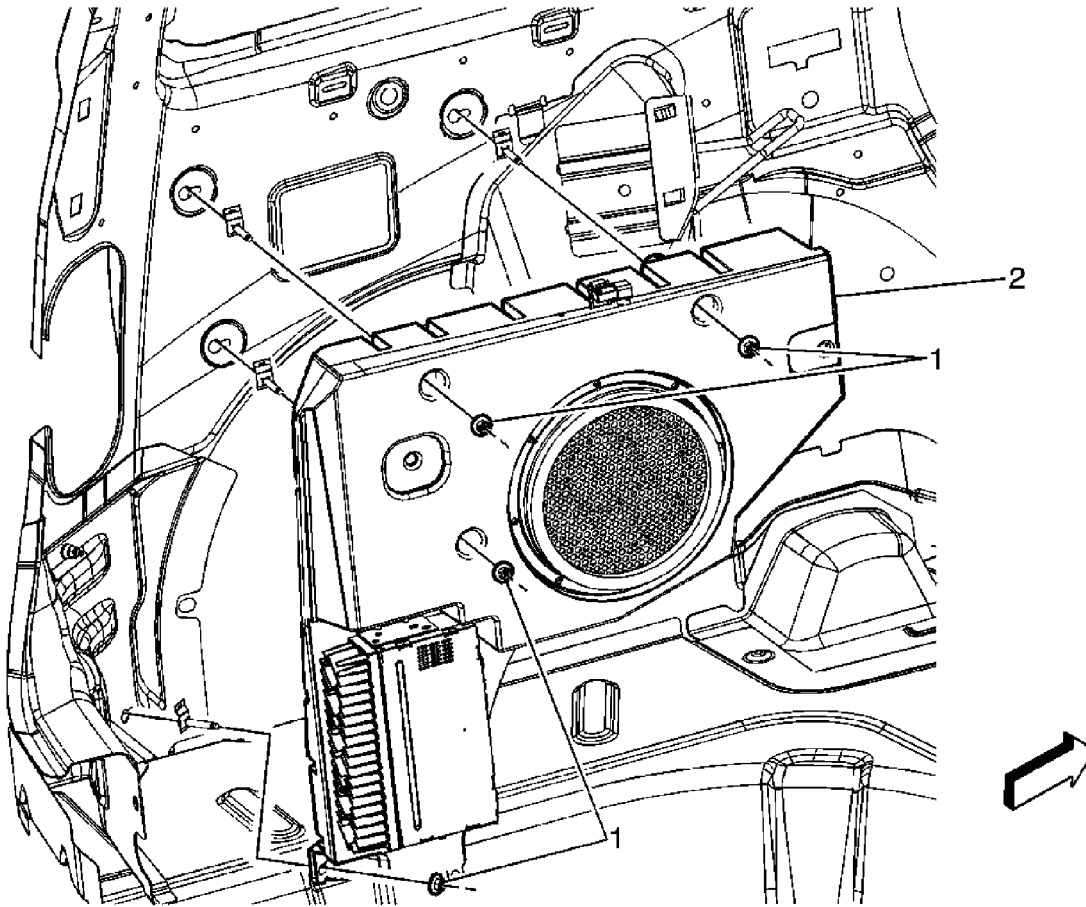
SPEAKER REPLACEMENT - REAR QUARTER

Fig. 33: Speaker Replacement - Rear Quarter
Courtesy of GENERAL MOTORS CORP.

Speaker Replacement - Rear Quarter

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedures	
1. Remove the rear seat. Refer to <u>Seat Replacement - Rear</u> .	
2. Remove the left quarter lower trim panel. Refer to <u>Trim Panel Replacement - Rear Quarter Lower</u> .	
1	Nut, Speaker Housing Rear (Qty: 3)

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	Tighten: 9 N.m (80 lb in)
2	Housing Assembly, Radio Rear Speaker Tip: Disconnect the electrical connectors.

DESCRIPTION AND OPERATION

RADIO/AUDIO SYSTEM DESCRIPTION AND OPERATION

Contents

- RPO options
- Circuit description
- Component description
- Theft deterrent feature

RPO Options

The entertainment system on this vehicle is configured with either a base or uplevel audio system. Both the base and uplevel audio systems contain a radio, antenna, and speakers. The following shows the Entertainment RPOs that are available for this vehicle:

- (U1C) AM/FM Stereo CD
- (US8) AM/FM Stereo, CD, MP3, RDS, EQ
- (US9) AM/FM Stereo, 6-Disc CD, MP3, RDS, EQ
- (UW5) Base Six Speaker
- (UQ3) Uplevel Six Speaker
- (U2K) Digital Radio

Circuit Operation

Radio Power

The main radio power is supplied by a 15A RADIO fuse located in the body control module (BCM). The radio does not require a discrete ignition feed circuit for power moding. The power moding is accomplished using a structure of Virtual Networks (VN). The Power Mode Master (PMM) transmits the GMLAN power mode signals.

The radio supports the following signals:

- System Power Mode
- Infotainment Operation Allowed

The radio also supports the following GMLAN Vehicle Power Modes:

- OFF
- ACCESSORY
- RUN
- CRANK REQUEST

Radio Ground

A wire in the main radio connector that is connected to battery negative at all times provides the main radio ground. Resistance between the ground pin and the vehicle battery negative terminal must not exceed 0.05 ohm.

Radio Speaker Outputs

At low volume, the plus (+) and minus (-) speaker outputs circuits measure approximately 7-8 volts. If a plus or minus circuit for any speaker output is shorted to ground or voltage, the radio disables the circuit for component protection and sets a diagnostic trouble code (DTC). The radio sets the speaker circuit DTC on non - amplified systems only. As the radio volume increases the voltage on the plus and minus circuits change to create a voltage difference between each other. The difference in voltage is what drives the voice coil of the speaker producing sound.

Radio Head Unit Dimming

GMLAN signal data received by the radio determines the radio dimming and backlighting levels. The radio sets the backlight and VF display dimming to the value indicated by the interior dimming level and interior dimming display level signals in the GMLAN dimming information frame. The radio provides faceplate and control/graphics backlighting in the OFF (RAP inactive) when the exterior lighting virtual network (VN) is activated. The radio display is consistent then with the surrounding devices that use analog PWM dimming to backlight their control/graphics when the power mode is OFF and the park lights are ON.

Amplifier Interface

The main amplifier power is provided by a 20A RADIO AMP 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-GMLAN 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.

Radio/Audio System Description and Operation

% 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 Radio Speaker Inputs

The low-level audio signals (LF, RF, LR, and RR) from the radio are the inputs to the amplifier. The amplifier boosts these inputs and outputs them to the vehicle speakers. If one speaker plus or minus low level audio signal circuit is open between the radio and the amplifier, the input to the amplifier is approximately half. The speakers for that channel then operate at approximately half the normal volume or in some cases no volume.

The low level audio signals from the radio to the amplifier typically measure in the 4-5 V range.

Amplifier Speaker Outputs

At a low volume, the plus (+) and minus (-) speaker outputs circuits measure approximately 2-7 V AC or 7-8 V DC at the speaker connector when testing a normal working system. If a plus or minus for any speaker output is shorted to ground or voltage, the amplifier circuitry will turn OFF the front outputs or rear outputs for component protection.

Repeat speaker failure can be caused by a damaged amplifier. Test for a damaged quad bridge output in the amplifier if the wiring between the amplifier and speaker test negative for a short to voltage. Prolonged exposure to DC voltage can cause a speaker coil to short. An early indication of a shorted speaker coil is distortion/noise and eventual failure.

Remote Radio Audio Signal Inputs (UE1 only)

Audio output from the OnStar(R) communications module connects to the remote audio signal inputs of the radio. When the cellular telephone mute signal goes to 0 volts, the radio over-rides any other audio signal and uses these inputs as the source for the output to the speakers.

Cellular Telephone Mute (UE1 only)

The OnStar(R) communications module uses the cellular telephone mute signal circuit to over-ride the radio for OnStar(R) communication. When cellular telephone mute is not active, this circuit is held at 1-volt by the radio. When the cellular telephone mute signal is

pulled to ground, the radio over-rides any other audio signal and uses the remote audio signals as the source for output to the speakers. If the radio was OFF when this circuit is pulled low, the radio will turn ON. Additionally, the radio fades the speakers to full front, adjusts the volume to an initial audible level, and sets an Auto Tone designed for optimal use with OnStar(R). When the mute signal is no longer pulled to ground, the radio returns to the mode it was in previously.

Component Description

Antenna System

The antenna system receives broadcast AM or FM stereo signals from free space and sends the signals to the radio receiver for processing via a coaxial antenna cable. Good antenna grounding is important for good radio reception.

Radio

The operator interfaces with the radio system through the radio display and controls. Through these controls the operator is able to control system power, volume, fade, balance, bass, and treble equalizations. Control on the integrated CD, MP3, or XM Satellite Radio system is also available when equipped with these options. A VFD (vacuum florescent display) provides system feedback to the operator.

The radio processes the AM and FM signals from the antenna system or the information from the CD media, amplifies that information and sends the output to the speaker system.

The radio is located in the instrument panel center stack area and is fastened to the instrument panel by fasteners. A rear bullet type guide pin is provided to aid in aligning the radio. An electrical connection to the radio is a 30-way connector that is part of the I/P harness, antenna lead connector, and an additional 16-way harness connector is present on OnStar(R) equipped vehicles. Additional service length is provided in the radio harnesses to allow connection prior to radio installation.

Radio amplifier outputs to the speakers are protected from damage should speaker leads become shorted to ground or shorted to vehicle power. The radio will sense these conditions and shut down the amplifier outputs in a non-destructive manner. After the short condition is removed, the radio will return to normal operation.

Speakers

The speaker system consists of six speakers, two 6 inch speakers mounted in the doors. Two 3.5 inch speakers mounted in the back panels. Two one-inch tweeter speakers mounted in the A-pillars. The amplified speaker system adds a subwoofer and amplifier.

Subwoofer

The premium audio system includes a subwoofer that is mounted in the rear of the vehicle.

The subwoofer is a single speaker designed for low frequency response. The subwoofer speaker is a dual coil design. The amplifier, which is included with the premium audio package amplifies the low frequency and outputs it to the subwoofer.

Auxiliary Jack Socket

The AM/FM Stereo CD radio shall provide a 3.5 mm Auxiliary stereo jack that will allow playback of audio signals from remote devices (e.g., portable tape player, IPOD, MP3 playback device, etc.).

OnStar(R)

OnStar(R) equipped (RPO UE1) vehicles use the radio amplifier and speaker system for voice communication from the OnStar(R) operator to the vehicle. Voice communication from the vehicle to the OnStar(R) operator is through the OnStar(R) microphone and module, which is not a part of the radio system.

When OnStar(R) begins operation, the radio volume is set to a preset level, auto tone preset for OnStar(R) becomes active and the fade control is adjusted to the full front speakers. The radio volume control can then be used to adjust the volume to a desired level.

The radio system and OnStar(R) system are connected through the 16-way connector at the back of the radio. Left and right channel OnStar(R) audio, mute control of radio functions by OnStar(R) and the audio signal ground are the circuits provided in the 16-way connector. Disconnecting the 16-way connector from the radio will isolate the radio system from the OnStar(R) system.

Voice communication from the vehicle to the OnStar(R) operator could be possible under this condition. However, the vehicle occupant will not be able to hear the OnStar(R) operator.

For more information regarding radio operation problems, refer to **Symptoms - Entertainment** and **Diagnostic System Check - Vehicle**. For further information regarding OnStar(R) operation, refer to the OnStar(R) section of this service manual.

Theft Deterrent

The radio theft deterrent system is intended to disable 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 in a GMLAN frame form.

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

- No VIN Mode - A radio that has not received or learned a VIN. In this mode the radio has limited functionality.
- 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.
- 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.

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:

- The power output, or 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
- Which 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, or skip, off of the ionosphere

The AM frequencies have longer range due to the ground wave. The ground wave follows the curvature of the earth and is affected 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 mi).

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 mi). 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

XM Reception

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.

XM Satellite Radio

XM is a national satellite radio service that offers up to 100 coast to coast channels including music, news, sports, talk and children's programming. XM provides digital quality audio and text information, including song title and artist name. A service fee is required in order to receive the XM service. For more information, contact XM at www.xmradio.com or call 1-800-852-9696.

Digital Radio Receiver

The radio controls communicate with the digital radio receiver via the class 2 communication circuit. The digital radio receiver sends remote radio audio signals to the radio.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Special Tools

Illustration	Tool Number/Description
	J 39916-A CD and Cassette Diagnostic Audio Kit

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