SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Communications Interface Module-to-Mounting Bracket Screws	10 N.m	89 lb in
GPS Antenna Bracket-to-Roof Screw	10 N.m	89 lb in

SCHEMATIC AND ROUTING DIAGRAMS

CELLULAR COMMUNICATION SCHEMATIC ICONS

Cellular Communication Schematic Icons

Icon	Icon Definition
	**IMPORTANT:** **Twisted-pair wires provide an effective "shield" that helps protect sensitive electronic components from electrical interference. If the wires were covered with shielding, install new shielding.** **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 10 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 (0.25 in)**

ONSTAR SCHEMATICS

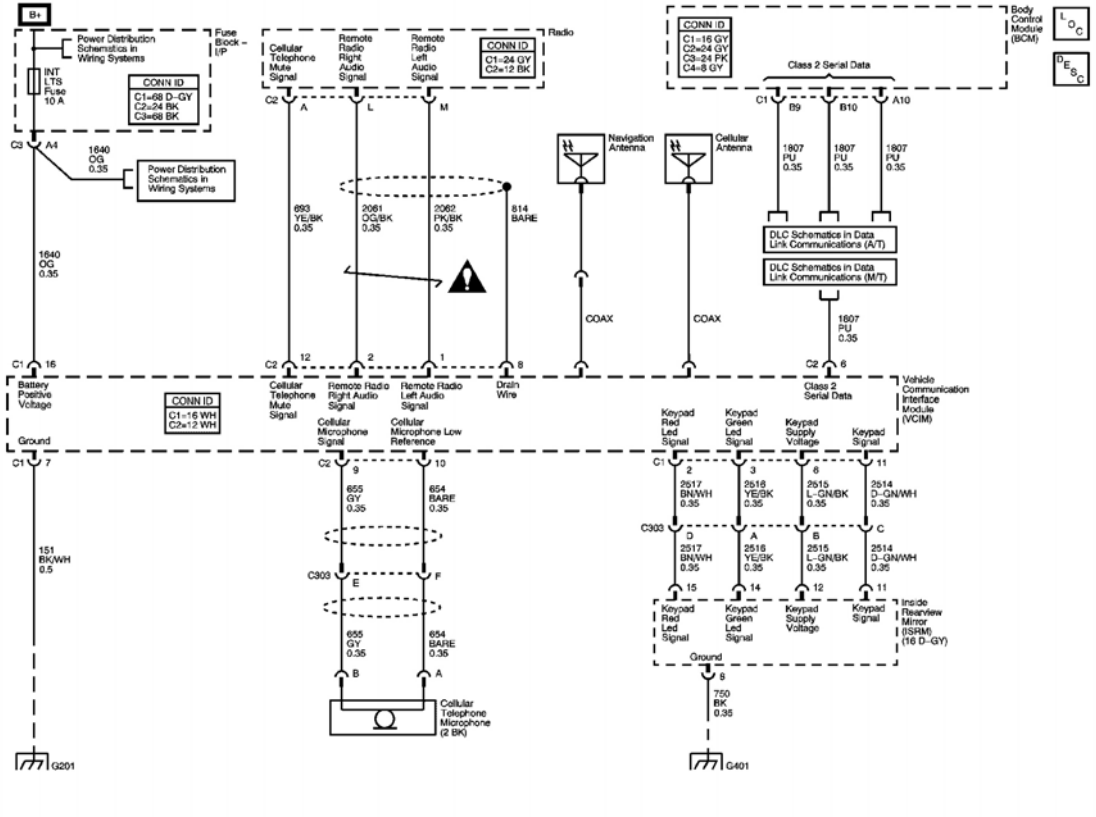


Fig. 1: OnStar Schematic
Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

CELLULAR COMMUNICATION COMPONENT VIEWS

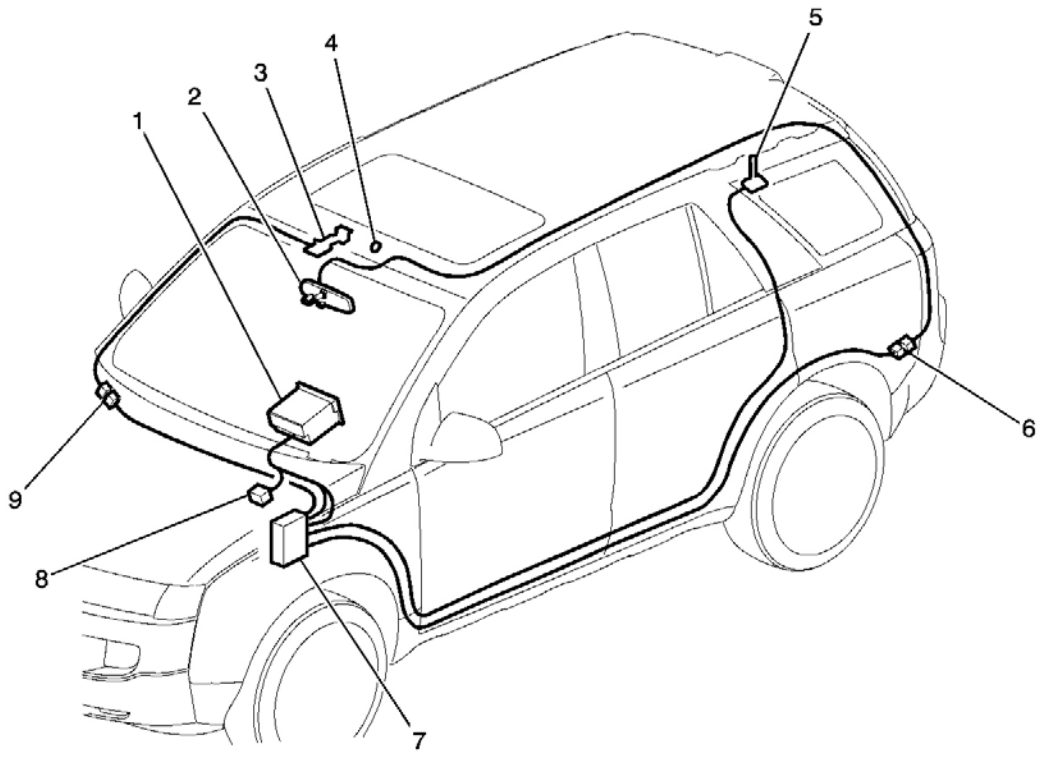


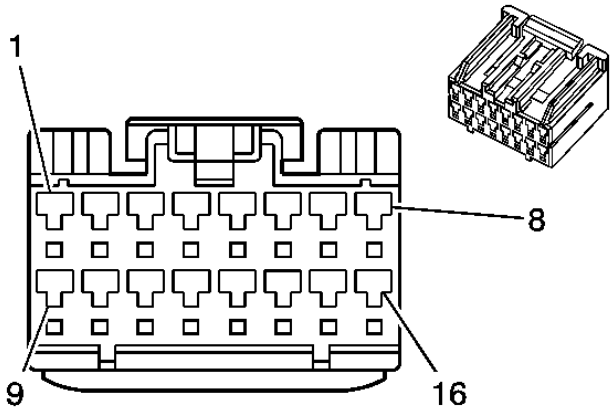
Fig. 2: Onstar Components View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 2

Callout	Component Name
1	Radio
2	Inside Rearview Mirror (ISRM) (w/ Onstar Switches)
3	GPS Antenna
4	Cellular Telephone Microphone
5	Cellular Antenna
6	C300 and C303
7	Vehicle Communication Interface Module (VCIM)
8	Hazard Switch, Dimmer Switch, Traction Control Switch Connectors
9	GPS Antenna Coax Lead Connection

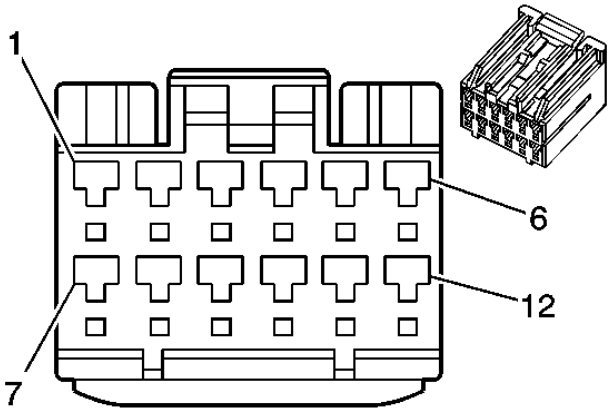
CELLULAR COMMUNICATION CONNECTOR END VIEWS

Vehicle Communication Interface Module (VCIM) C1 Connector End View



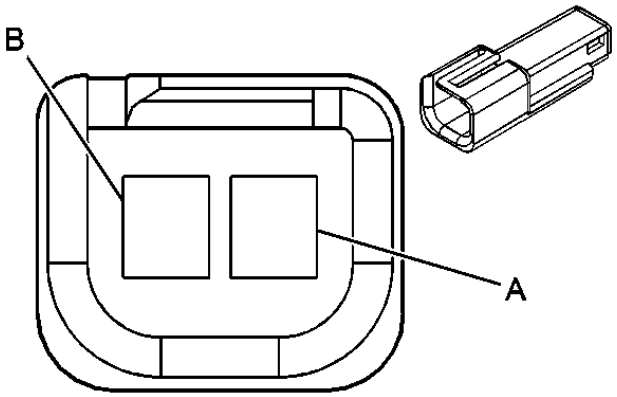
Connector Part Information		• 917981-1 • 16-Way M MK 11 Hybrid (WH)	
Pin	**Wire Color**	**Circuit No.**	**Function**
1	-	-	Not Used
2	BN/WH	2517	Keypad Red LED Signal
3	YE/BK	2516	Keypad Green LED Signal
4-5	-	-	Not Used
6	L-GN/BK	2515	Keypad Supply Voltage
7	BK/WH	151	Ground
8-10	-	-	Not Used
11	D-GN/WH	2514	Keypad Signal
12-15	-	-	Not Used
16	OG	1640	Battery Positive Voltage

Vehicle Communication Interface Module (VCIM) C2 Connector End View



Connector Part Information		• 917975-1 • 12-Way M MK11 Hybrid (WH)	
Pin	**Wire Color**	**Circuit No.**	**Function**
1	PK/BK	2062	Remote Radio Left Audio Signal
2	OG/BK	2061	Remote Radio Right Audio Signal
3-5	-	-	Not Used
6	PU	1807	Class 2 Serial Data
7	-	-	Not Used
8	BARE	814	Drain Wire
9	GY	655	Cellular Microphone Signal
10	BARE	654	Cellular Microphone Low Reference
11	-	-	Not Used
12	YE/BK	693	Cellular Telephone Mute Signal

Cellular Telephone Microphone Connector End View



Connector Part Information		• 12047663/12047662 • 2-Way M Metri-Pack 150 Series (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	BARE	654	Cellular Microphone Low Reference
B	GY	655	Cellular Microphone Signal

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - CELLULAR COMMUNICATION

Begin the system diagnosis with **Diagnostic System Check - Cellular Communication** . The Diagnostic System Check 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 will identify the correct procedure for diagnosing the system and where the procedure is located.

DIAGNOSTIC SYSTEM CHECK - CELLULAR COMMUNICATION

Test Description

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

2: Lack of communication may be due to a partial malfunction or a total malfunction of the class 2 serial data circuit. The specified procedure will determine the condition.

4: The presence of DTCs which begin with U indicate some other system control module is not

communicating.

Diagnostic System Check - Cellular Communication

Step	Action	Yes	No
1	Install a scan tool. Does the scan tool power up?	Go to **Step 2**	Go to **Scan Tool Does Not Power Up** in Data Link Communications
2	1. Turn ON the ignition, with the engine OFF. 2. Attempt to establish communication with the vehicle communication interface module (VCIM). Does the scan tool communicate with the VCIM?	Go to **Step 3**	Go to **Scan Tool Does Not Communicate with Class 2 Device** in Data Link Communications
3	Select the display DTCs function on the scan tool. Does the scan tool display any DTCs?	Go to **Step 4**	Go to **OnStar Symptom Diagnosis**
4	Does the scan tool display any DTCs which begin with a U?	Go to **Step 5**	Go to **Step 6**
5	Does the scan tool display DTC U1500?	Go to **Diagnostic Trouble Code (DTC) List**	Go to **Diagnostic Trouble Code (DTC) List** in Data Link Communications
6	Does the scan tool display DTC B1000, B1004, B1007, or B1009?	Go to **Diagnostic Trouble Code (DTC) List** in Body Control System	Go to **Step 7**
7	Does the scan tool display DTC B1327 or B1328?	Go to **Diagnostic Trouble Code (DTC) List** in Engine Electrical	Go to **Diagnostic Trouble Code (DTC) List**

SCAN TOOL DATA LIST

Scan Tool Data List

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Ignition ON with engine OFF			
8-Digit GM Part Number	Module 2	8 Digits	93807890
Component Serial Number 13-16	Module 1	4 Digits	0007
Electronic Serial Number	Module 2	11 Digits	16832516749
Julian Date of Build	Module 1	3 Digits	067
Module I.D.	Module 2	10 Digits	Generation 4/5
Software I.D.	Module 1	3 Digits	146

VCI Module Station I.D.	Module 2	10 Digits	0002086783
Year Module Built	Module 1	4 Digits	2001

SCAN TOOL DATA DEFINITIONS

8 Digit GM Part Number

This displays the part number for the VCIM.

Component Serial Number 13-16

This is the third partition of the serial number.

Electronic Serial Number

This is the electronic serial number stored in the VCIM which is used by the OnStar(R) Call Center.

Julian Date of Build

This displays the day of the year the module was built.

Module I.D.

This displays the version of OnStar(R) which the vehicle is equipped with.

Software I.D.

This displays the 3-digit number of the software version used on the OnStar VCIM.

VCI Module Station I.D.

This is the station identification number stored in the VCIM which is used by the OnStar(R) Call Center.

Year Module Build

This displays the year the module was built.

DIAGNOSTIC TROUBLE CODE (DTC) LIST

Diagnostic Trouble Code (DTC) List

DTC	Diagnostic Procedure	Module(s)
B2455	**DTC B2455**	OnStar(R) VCIM
B2470	**DTC B2470**	OnStar(R) VCIM
B2476	**DTC B2476**	OnStar(R) VCIM
B2482	**DTC B2482**	OnStar(R) VCIM

B2483 or B2484	**DTC B2483 or B2484**	OnStar(R) VCIM
U1500	**DTC U1500**	OnStar(R) VCIM

DTC B2455

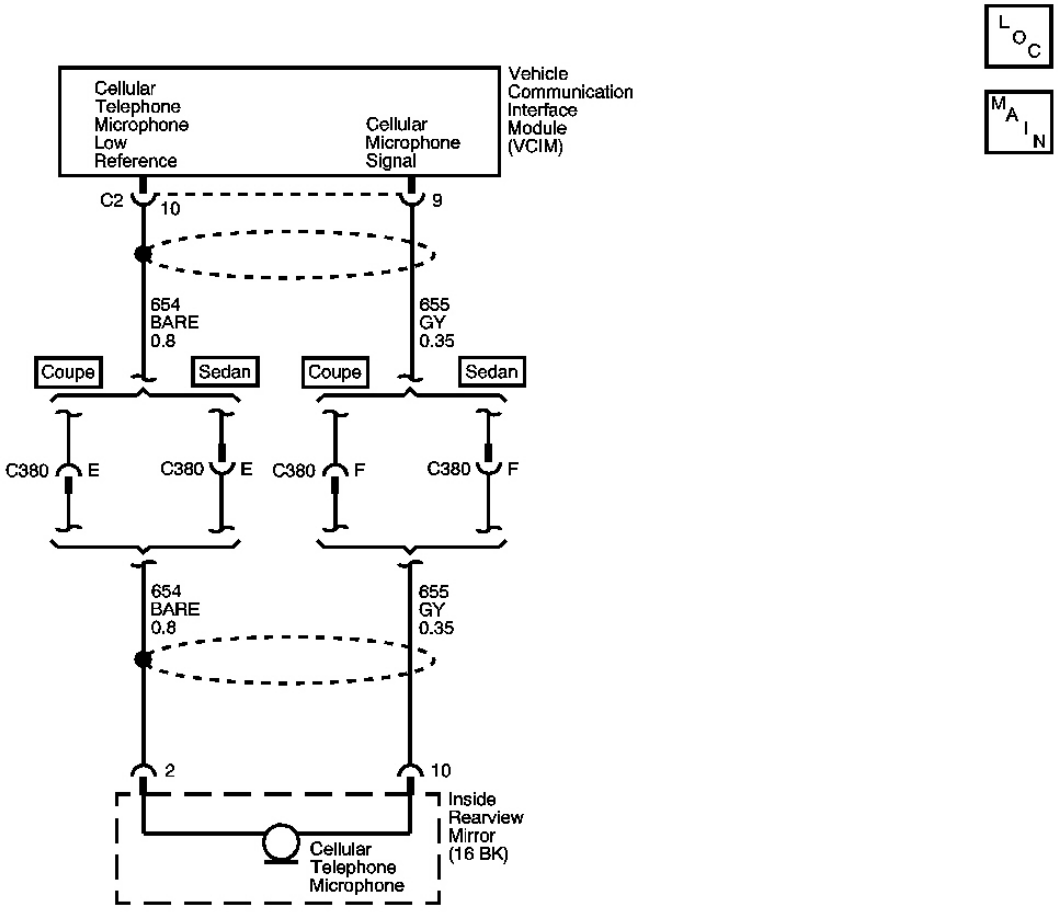


Fig. 3: DTC B2455 Circuit
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The vehicle communication interface module (VCIM) detects that the cellular microphone is connected through the cellular microphone signal circuit and the drain wire.

Conditions for Running the DTC

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

- 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 VCIM detects an open in the drain wire circuit or a short to voltage in the cellular microphone signal circuit.
- The above conditions are present for greater than 10 seconds.

Action Taken When the DTC Sets

- The VCIM will not receive any signal from the microphone.
- Calls can be placed but the caller cannot be heard.
- The OnStar(R) status LED turns RED.

Conditions for Clearing the DTC

- The VCIM detects the microphone connected for 5 consecutive 100 millisecond cycles.
- A history DTC clears after 50 malfunction free ignition cycles.
- The VCIM receives the clear DTC command from the scan tool.

Test Description

The number below refers to the step number on the diagnostic table.

2: This step checks that the VCIM is sending out the proper supply voltage.

DTC B2455

Step	Action	Value (s)	Yes	No
Schematic Reference:OnStar Schematics **Connector End View Reference:Cellular Communication Connector End Views**				
1	Did you perform the Cellular Communications Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Cellular Communication**
2	1. Turn OFF the ignition. 2. Disconnect the cellular microphone connector. 3. Turn ON the ignition, with the engine OFF. 4. Measure the voltage from the cellular microphone signal circuit to a good ground. Does the voltage measure greater than the specified value?	9 V	Go to **Step 4**	Go to **Step 3**

3	Test the cellular microphone signal circuit for an open or short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 9**	Go to **Step 6**
4	Test the cellular microphone low reference circuit for an open. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 9**	Go to **Step 5**
5	Inspect for poor connections at the harness connector of the cellular microphone and harness connector of the vehicle communication interface module (VCIM). Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 9**	Go to **Step 7**
6	Inspect for poor connections at the harness connector of the VCIM. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 9**	Go to **Step 8**
7	Replace the cellular microphone. Refer to **OnStar Microphone Replacement** . Did you complete the replacement?	-	Go to **Step 9**	-
8	**IMPORTANT:** **Perform the OnStar(R) setup procedure.** Replace the VCIM. Refer to **Communication Interface Module Replacement** .Did you complete the replacement?	-	Go to **Step 9**	-
9	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 B2470

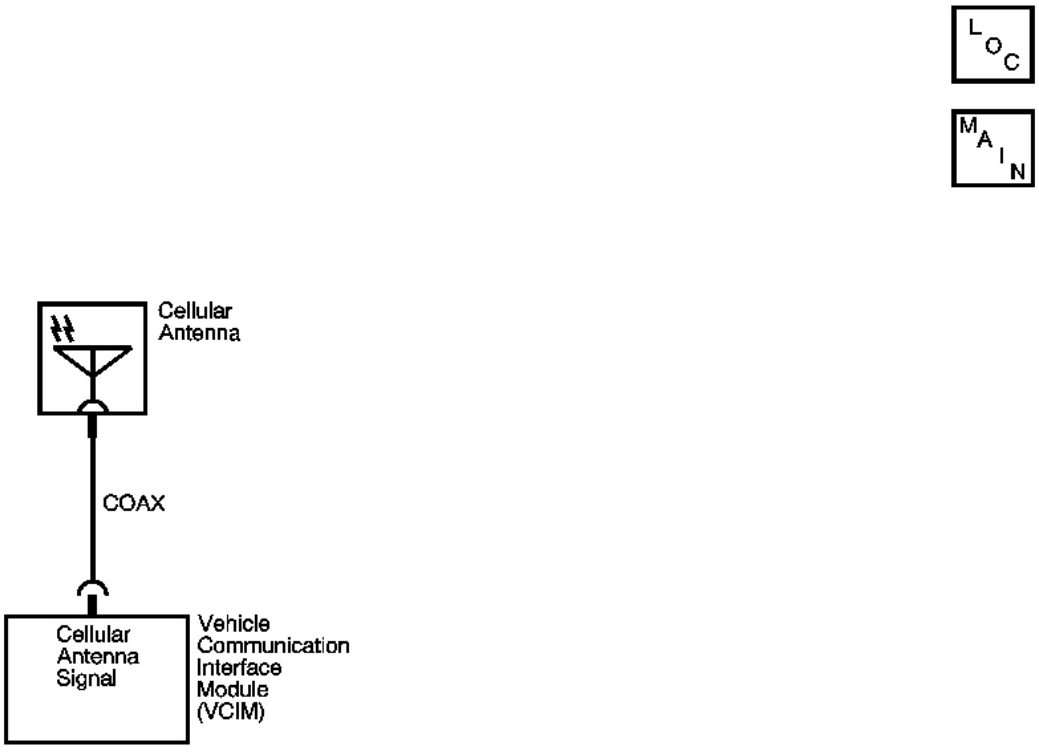


Fig. 4: DTC B2470 Circuit
Courtesy of GENERAL MOTORS CORP.

Circuit Description

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

Conditions for Running the DTC

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

Conditions for Setting the DTC

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

Action Taken When the DTC Sets

- The OnStar(R) status LED turns RED.
- The vehicle is unable to connect to the OnStar(R) Call Center.

Conditions for Clearing the DTC

- The VCIM detects the presence of a cellular antenna.
- A history DTC clears after 50 malfunction free ignition cycles.
- The VCIM receives the clear DTC command from the scan tool.

Test Description

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

2: This step tests the condition of the cellular antenna.

3: This step tests the condition of the cellular antenna coax and for proper ground of the cellular antenna.

DTC B2470

Step	Action	Value	Yes	No
Schematic Reference:OnStar Schematics **Connector End View Reference:Cellular Communication Connector End Views**				
1	Did you perform the Cellular Communications Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Cellular Communication**
2	Inspect the cellular antenna and cellular antenna coupling assembly for damage. Is the antenna assembly damaged?	-	Go to **Step 7**	Go to **Step 3**
3	1. Disconnect the cellular antenna coax from the vehicle communication interface module (VCIM). 2. Measure the resistance between the center conductor and the outer metal shield. Does the meter read out of limits?	-	Go to **Step 4**	Go to **Step 5**
4	1. Disconnect the cellular antenna coax from the cellular antenna coupling assembly. 2. Measure the resistance of the cellular antenna coax center conductor from end to end. Does the resistance measure greater than the specified value?	1 ohm	Go to **Step 8**	Go to **Step 6**
5	Inspect for poor connections at the harness connector of the VCIM. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems.	-	Go to **Step**	

	Did you find and correct the condition?		**10**	Go to **Step 9**
6	Inspect for poor connections at the harness connector of the cellular antenna. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 10**	Go to **Step 7**
7	Replace the cellular antenna. Refer to **Coupling Replacement - Antenna Inner** and **Coupling Replacement - Antenna Outer** . Did you complete the replacement?	-	Go to **Step 10**	-
8	Replace the cellular antenna coax. Did you complete the replacement?	-	Go to **Step 10**	-
9	Replace the VCIM. Refer to **Communication Interface Module Replacement** . 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 B2476

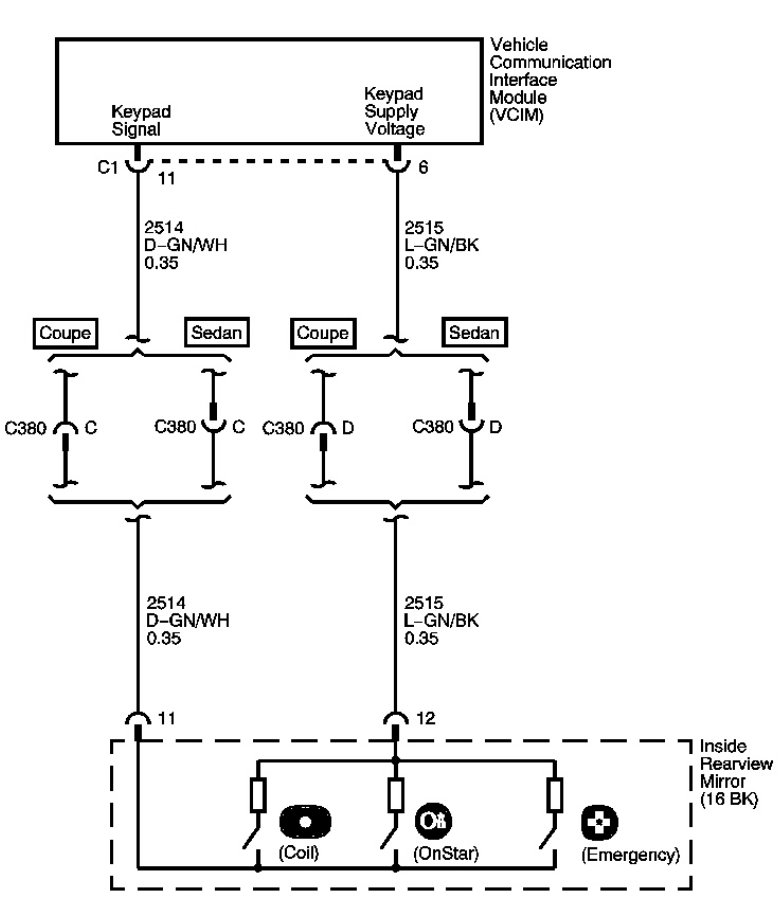


Fig. 5: DTC B2476 Circuit
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The OnStar(R) button assembly consists of three buttons: Call/Answer, OnStar(R) Call Center and OnStar(R) Emergency. Ten volts is supplied to the button assembly on the keypad supply voltage circuit. Each of the buttons, when pressed, completes the circuit across a resister allowing a specific voltage to be returned to the vehicle communication interface module (VCIM) on the keypad signal circuit. Depending upon the voltage range returned, the VCIM is able to identify which button has been pressed.

Conditions for Running the DTC

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

Conditions for Setting the DTC

- The VCIM powers the button assembly through the keypad supply voltage circuit for 11.5 ms, turns the power off, then waits for 50 ms and sees a voltage value greater than 1.8 volts on this circuit.
- The above conditions are present for greater than 300 ms.

Action Taken When the DTC Sets

- The VCIM will ignore all inputs from the OnStar(R) button assembly.
- No calls can be placed.
- The OnStar(R) status LED turns RED.

Conditions for Clearing the DTC

- The VCIM powers the button assembly through the keypad supply voltage circuit for 11.5 ms, turns the power off, then waits for 50 ms and sees a voltage value less than 1.8 volts on this circuit.
- A history DTC clears after 50 malfunction free ignition cycles.
- The VCIM receives the clear DTC command from the scan tool.

Test Description

The number below refers to the step number on the diagnostic table.

2: This step checks that the VCIM is sending out the proper supply voltage.

DTC B2476

Step	Action	Values	Yes	No
Schematic Reference:OnStar Schematics **Connector End View Reference:Cellular Communication Connector End Views**				
1	Did you perform the Cellular Communications Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Cellular Communication**
2	1. Turn the ignition OFF. 2. Disconnect the rearview mirror assembly connector. 3. Turn the ignition ON, with the engine OFF. 4. Measure the voltage from the keypad supply voltage circuit to a good ground. Does the voltage measure greater than the specified value?	9 V	Go to **Step 4**	Go to **Step 3**
	Test the keypad supply voltage circuit for an open or short to ground. Refer to **Circuit Testing** and **Wiring**		Go to	

3	**Repairs** in Wiring Systems. Did you find and correct the condition?	-	**Step 11**	Go to **Step 8**
4	Test the keypad supply voltage circuit for a short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 5**
5	Test the keypad ground circuit for an open. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 6**
6	Test the keypad signal circuit for a short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 7**
7	Inspect for poor connections at the harness connector of the rear view mirror. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 9**
8	Inspect for poor connections at the harness connector of the vehicle communication interface module (VCIM). Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 10**
9	Replace the rearview mirror. Refer to **Rearview Mirror Replacement** in Stationary Windows. Did you complete the replacement?	-	Go to **Step 11**	-
10	**IMPORTANT:** **Perform the OnStar(R) setup procedure.** Replace the VCIM. Refer to **Communication Interface Module Replacement** .Did you complete the replacement?	-	Go to **Step 11**	-
11	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 B2482

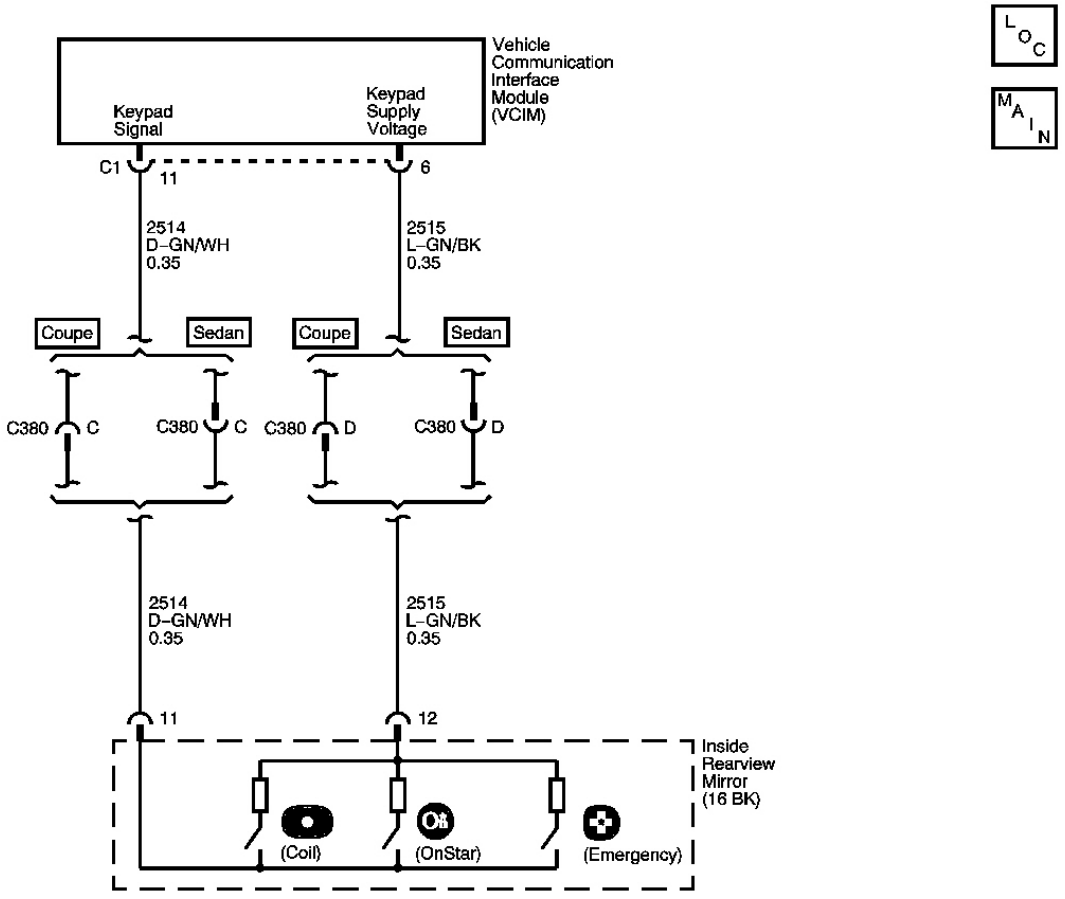


Fig. 6: DTC B2482 Circuit
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The OnStar(R) button assembly consists of 3 buttons: Call/Answer, OnStar(R) Call Center and OnStar(R) Emergency. Ten volts is supplied to the button assembly on the keypad supply voltage circuit. Each of the buttons, when pressed, completes the circuit across a resister allowing a specific voltage to be returned to the vehicle communication interface module (VCIM) on the keypad signal circuit. Depending upon the voltage range returned, the VCIM is able to identify which button has been pressed.

Conditions for Running the DTC

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

Conditions for Setting the DTC

- A button is pressed or stuck for more than 15 seconds.
- The above conditions are present for greater than 15 seconds.

Action Taken When the DTC Sets

- The VCIM will ignore all inputs from the OnStar(R) button assembly.
- No calls can be placed.
- The OnStar(R) status LED turns RED.

Conditions for Clearing the DTC

- The button will be declared unstuck after a 50 ms normal cycle.
- A history DTC clears after 50 malfunction free ignition cycles.
- The VCIM receives the clear DTC command from the scan tool.

Test Description

The number below refers to the step number on the diagnostic table.

2: This step tests the at rest state of the keypad signal circuit.

DTC B2482

Step	Action	Value (s)	Yes	No
Schematic Reference:OnStar Schematics **Connector End View Reference:Cellular Communication Connector End Views**				
1	Did you perform the Cellular Communications Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Cellular Communication**
2	1. Turn the ignition ON, with the engine OFF. 2. Measure the voltage from the keypad signal circuit at the vehicle communication interface module (VCIM) connector to a good ground. Does the voltage measure greater than the specified value?	0 V	Go to **Step 3**	Go to **Step 4**
3	Test the keypad signal circuit for a short to voltage or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 9**	Go to **Step 5**
4	Test the keypad supply voltage circuit for an open or short. Refer to **Circuit Testing** and **Wiring Repairs** in	-	Go to	

	Wiring Systems. Did you find and correct the condition?		**Step 9**	Go to **Step 6**
5	Inspect for poor connections at the harness connector of the rearview mirror. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 9**	Go to **Step 7**
6	Inspect for poor connections at the harness connector of the VCIM. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 9**	Go to **Step 8**
7	Replace the rearview mirror. Refer to **Rearview Mirror Replacement** in Stationary Windows. Did you complete the replacement?	-	Go to **Step 9**	-
8	**IMPORTANT:** **Perform the OnStar setup procedure.** Replace the VCIM. Refer to **Communication Interface Module Replacement** .Did you complete the replacement?	-	Go to **Step 9**	-
9	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 B2483 OR B2484

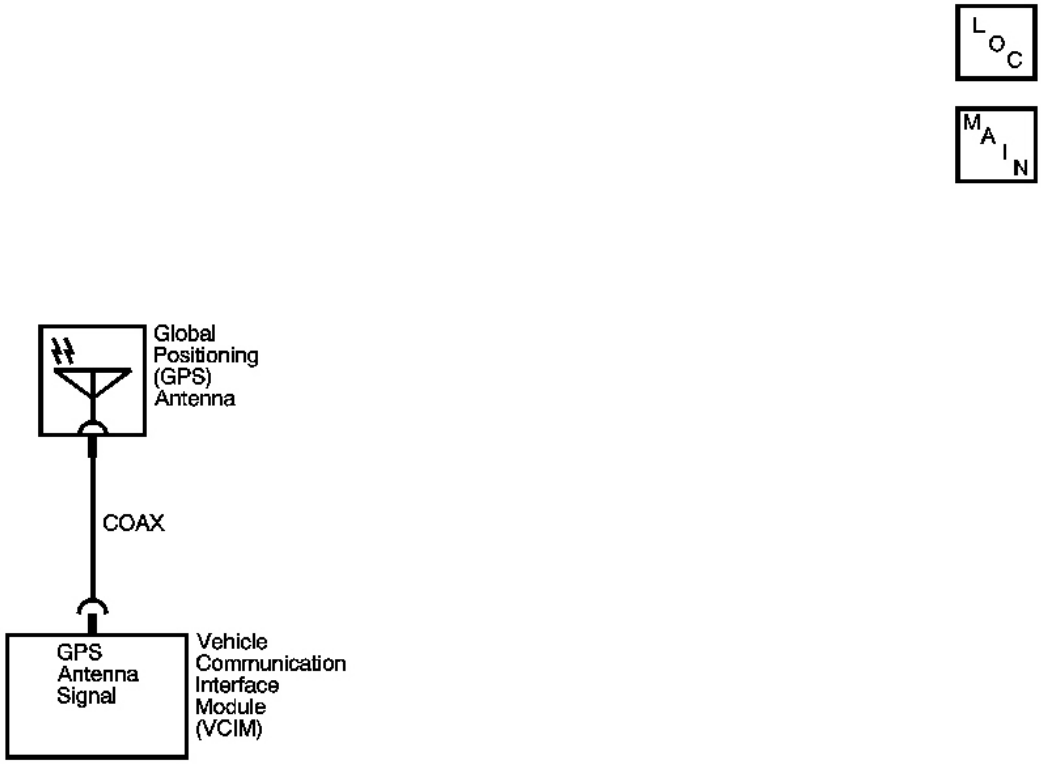


Fig. 7: DTC B2483 or B2484 Circuit
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The navigation antenna is connected to the vehicle communication interface module (VCIM) with an RG-174 coax cable. The VCIM polls the data from the navigation antenna once every second.

Conditions for Running the DTC

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

Conditions for Setting the DTC

- The VCIM does not detect a navigation signal.
- All the above conditions are present for greater than 1 second.

Action Taken When the DTC Sets

- The OnStar(R) status LED turns RED.
- The OnStar(R) Call Center cannot locate the vehicle.

Conditions for Clearing the DTC

- The VCIM detects the presence of a navigation antenna.
- A history DTC clears after 50 malfunction free ignition cycles.
- The VCIM receives the clear DTC command from the scan tool.

DTC B2483 or B2484

Step	Action	Values	Yes	No
Schematic Reference:OnStar Schematics **Connector End View Reference:Cellular Communication Connector End Views**				
1	Did you perform the Cellular Communication Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Cellular Communication**
2	**NOTE:** **Using a DMM to measure the resistance of the navigation antenna coax from the center conductor to the outer shield while the antenna is still connected will damage the navigation antenna.** 1. Disconnect the navigation antenna coax connector from the navigation antenna. 2. Disconnect the navigation antenna from the vehicle communication interface module (VCIM). 3. Measure the resistance from the center conductor of the coax to the metal outer shield. Does the meter read out of limits?	-	Go to **Step 3**	Go to **Step 4**
3	Measure the resistance of the navigation antenna coax center conductor from end to end. Does the resistance measure greater than the specified value?	1.0 ohm	Go to **Step 4**	Go to **Step 5**
4	Replace the navigation antenna coax. Did you complete the replacement?	-	Go to **Step 7**	-
5	Inspect for poor connections at the navigation antenna and the harness connector of the VCIM. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 7**	Go to **Step 6**
6	Replace the Navigation antenna. Refer to **Navigation Antenna Replacement** .	-	Go to **Step**	

	Is the repair complete?		**7**	-
7	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 8**	System OK
8	**IMPORTANT:** **Perform the OnStar(R) setup procedure.** Replace the VICM. Refer to **Communication Interface Module Replacement** . 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**	-

DTC U1500

Circuit Description

This DTC indicates an internal fault and is set within the vehicle communication interface module (VCIM). No external circuits are involved.

Conditions for Running the DTC

The microprocessor runs the program to detect an internal fault during module power up and every 10 seconds thereafter until the module re-enters the sleep mode.

Conditions for Setting the DTC

The VCIM detects an internal communication malfunction.

Action Taken When DTC Sets

- The OnStar(R) status LED turns RED.
- The vehicle is unable to connect to the OnStar(R) Call Center.

Conditions for Clearing the DTC

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

Diagnostic Aids

- The diagnostic procedure used for DTC U1500 in OnStar(R) systems with single module generations of OnStar(R) differ greatly from previous generations with 2 modules. While these older generations denoted a failure of the 3-wire bus between the modules by setting a U1500, single module OnStar(R) systems use this DTC to denote an internal module failure. The determination of whether a one or 2-module generation of OnStar(R) is used should be confirmed. Refer to **OnStar Description and Operation** .
- This DTC may be stored as a history DTC without affecting the operation of the module. If stored only as a history DTC and not retrieved as a current DTC, do not replace the VCIM.
- If this DTC is retrieved as both a current and history DTC, replace the VCIM.

DTC U1500

Step	Action	Yes	No
1	Did you perform the Cellular Communication Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Cellular Communication**
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. Retrieve DTCs from the vehicle communication interface module (VCIM). Is the DTC retrieved as a current DTC?	Go to **Step 3**	Go to Diagnostic Aids
3	**IMPORTANT:** **Perform the OnStar(R) setup procedure.** Replace the VCIM. Refer to **Communication Interface Module Replacement** .Did you complete the replacement?	Go to **Step 4**	-
4	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

ONSTAR SYMPTOM DIAGNOSIS

System Description

This symptom table will enable the user to verify the customer complaint and narrow it to its source. If there is a concern with voice recognition or OnStar(R) steering wheel control function, technicians should proceed directly to the applicable diagnostic in **Symptoms - Cellular Communication** .

IMPORTANT: To successfully diagnose and repair the OnStar(R) system it is necessary to

comprehend its operation. Technicians should read and understand the OnStar Description and Operation before attempting to repair an OnStar(R) system.

Diagnostic Aids

- The customer concern may have been due to a lack of cellular service in a given area or a failure in the National Cellular Network infrastructure that has since been corrected.
- If the prompt OnStar request ended is heard without pressing the white dot button at the end of an OnStar (R) keypress, the OnStar(R) system at one time has made a successful cellular connection, but was unable to complete the call. If repeated calls are placed with this result, contact the General Motors Technical Assistance Center.
- Inaccurate or aged global positioning system (GPS) position may have been due to the temporary loss of GPS signal reception by the vehicle in instances such as driving through tunnels or parking structures which restrict the navigation antenna from a clear view of the satellites in the sky.

OnStar Symptom Diagnosis

Step	Action	Yes	No
1	Did you perform the Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Cellular Communication**
2	1. Turn ON the ignition, with the engine OFF. 2. Observe the OnStar(R) status LED. Does the LED turn GREEN?	Go to **Step 3**	Go to **OnStar Button LED Inoperative**
3	1. Turn the radio ON. 2. Set volume to a comfortable level. 3. Press the OnStar(R) Call Center button. 4. Wait approximately 10 seconds then end the call by pressing the white dot button. Does both the OnStar(R) LED blink after the OnStar(R) keypress is made and the call ended after pressing the white dot button?	Go to **Step 4**	Go to **OnStar One or More Buttons Inoperative**
4	After the OnStar(R) keypress, does both the radio mute and is the Connecting to OnStar message heard playing through the audio system?	Go to **Step 5**	Go to **No (or Noisy) OnStar Audio**
	IMPORTANT:		

5	**It is important to have the vehicle in an open outside area where a cellular call can be successfully placed and Global Positioning System (GPS) data can be received from satellites.** 1. Press the OnStar(R) Call Center button. 2. Wait for the system to either connect or end the call. Is a connection made with OnStar(R)?	Go to **Step 6**	Go to **Step 9**
6	**IMPORTANT:** **It is necessary to inform the OnStar (R) Call Center advisor that this call is for vehicle diagnostic purposes.** Ask the OnStar(R) Call Center advisor if your voice can clearly be heard.Does the advisor clearly hear your voice?	Go to **Step 7**	Go to **Microphone Inoperative - Caller Cannot Be Heard**
7	Ask the OnStar(R) Call Center advisor if they have received any data from the customer vehicle. Did data transfer of the OnStar(R) call occur?	Go to **Step 8**	Go to **Step 11**
8	Ask the OnStar(R) Call Center advisor if the vehicle has ever been configured. Has the vehicle been configured?	Go to **Step 10**	Go to **Step 16**
9	Is the audio prompt Unable to Contact OnStar(R) heard?	Go to **Unable to Contact OnStar Call Center**	Go to **Step 12**
10	Ask the OnStar(R) Call Center advisor to verify the vehicle identification number (VIN) which they have on record and ensure it matches the actual VIN. Does the VIN number at the OnStar (R) Call Center match the VIN of the vehicle?	Go to **Step 13**	Go to **Step 15**
11	Ask the OnStar(R) Call Center advisor if this call was a fail to voice. Was this call a fail to voice?	Use the scan tool to access the STID and ESN and contact the General Motors	

		Technical Assistance Center	-
12	Is the audio prompt OnStar(R) request ended heard?	Go to Diagnostic Aids	-
13	Ask the OnStar(R) Call Center advisor to verify your position. Is the location provided by the OnStar (R) Call Center advisor within a reasonable distance from the actual location of the vehicle?	Go to **Step 14**	Go to **Global Positioning System (GPS) Data Not Current or Inaccurate**
14	Ask the OnStar(R) Call Center advisor if the GPS position is marked as Current. Is the GPS position current?	Go to **Step 17**	Go to **Global Positioning System (GPS) Data Not Current or Inaccurate**
15	Ask the OnStar(R) Call Center advisor to update the customer account with the correct information. Has the customer account been updated?	Go to **Step 16**	-
16	Ask the OnStar(R) Call Center advisor to perform a reconfiguration on the vehicle. Was the reconfiguration successful?	Go to **Step 18**	Ask the OnStar(R) Call Center advisor why the reconfiguration was not successful, use the scan tool to access the STID and ESN and contact the General Motors Technical Assistance Center
17	Is the customer concern with the inability of the OnStar(R) Call Center to perform the remote functions?	Go to **OnStar Call Center Remote Function Requests Inoperative**	Go to Diagnostic Aids
18	Operate the system in order to verify the customer concern has been corrected. Has the customer concern been corrected?	System OK	Go to **Step 2**

SYMPTOMS - CELLULAR COMMUNICATION

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

1. Perform the **Diagnostic System Check - Cellular Communication** before using the Symptom Tables in order to verify that all of the following are true:
   - There are no DTCs set.
   - The control module 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 system. Refer to **Checking Aftermarket Accessories** in Wiring Systems.
- 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** in Wiring Systems.

Symptom List

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

- **OnStar One or More Buttons Inoperative**
- **Unable to Contact OnStar Call Center**
- **Microphone Inoperative - Caller Cannot Be Heard**
- **Voice Recognition Inoperative**
- **OnStar Button LED Inoperative**
- **No (or Noisy) OnStar Audio**
- **Global Positioning System (GPS) Data Not Current or Inaccurate**
- **OnStar Call Center Remote Function Requests Inoperative**

ONSTAR ONE OR MORE BUTTONS INOPERATIVE

OnStar One or More Buttons Inoperative

Step	Action	Value (s)	Yes	No
Schematic Reference:OnStar Schematics Connector End View Reference:Cellular Communication Connector End Views				
1	Did you perform the Cellular Communication Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Cellular Communication**
2	**IMPORTANT:** **Contact the OnStar(R) Call Center first before pressing the emergency button in order to notify them of the test.** 1. Turn ON the ignition, with the engine OFF. 2. Press each OnStar(R) button one at a time. Are all buttons inoperative?	-	Go to **Step 4**	Go to **Step 3**

3	Are any buttons intermittent or inoperative?	-	Go to **Step 7**	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems
4	1. Turn OFF the ignition. 2. Disconnect the rear view mirror. 3. Turn ON the ignition, with the engine OFF. 4. Measure the voltage from the keypad supply voltage circuit to a good ground. Does the voltage measure greater than the specified value?	9 V	Go to **Step 6**	Go to **Step 5**
5	Test the keypad supply voltage circuit for an open or short. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 8**
6	Test the keypad signal circuit for an open or short. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 9**
7	Inspect for poor connections at the harness connector of the rearview mirror. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 9**
8	Inspect for poor connections at the harness connector of the vehicle communication interface module (VCIM). Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 10**
9	Replace the rearview mirror. Refer to **Rearview Mirror Replacement** in Stationary Windows. Did you complete the replacement?	-	Go to **Step 11**	-
10	**IMPORTANT:** **Perform the OnStar(R) setup procedure.** Replace the VCIM. Refer to **Communication Interface Module Replacement** .Did you complete the replacement?	-	Go to **Step 11**	-
11	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to **Step 2**

ONSTAR CALL CENTER REMOTE FUNCTION REQUESTS INOPERATIVE

Diagnostic Aids

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

OnStar Call Center Remote Function Requests Inoperative

Step	Action	Yes	No
Schematic Reference:OnStar Schematics **Connector End View Reference:Cellular Communication Connector End Views**			
1	Did you perform the Cellular Communication Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Cellular Communication**
2	Attempt to honk the horn, operate the lights and lock or unlock the doors on the vehicle. Does the applicable system operate properly?	Go to **Step 3**	Go to • **Diagnostic Starting Point - Horns** in Horns • **Diagnostic Starting Point - Lighting Systems** in Lighting Systems • **Diagnostic Starting Point - Doors** in Doors
3	**IMPORTANT:** **It is necessary to inform the OnStar(R) Call Center advisor that this call is for vehicle diagnostic purposes.** 1. Contact the OnStar(R) Call Center by pressing the blue OnStar(R) button. 2. Ask the OnStar(R) advisor to perform a remote function (door lock/unlock, light flash, or horn honk). Was the attempt successful?	Go to Diagnostic Aids	Use the scan tool to access the STID and ESN and contact the General Motors Technical Assistance Center

UNABLE TO CONTACT ONSTAR CALL CENTER

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(R) emergency call is able to successfully connect the vehicle to the OnStar(R) Call Center when an OnStar(R) Call Center button press is not, there may be a failure in the ability of the OnStar(R)

system in the vehicle to be recognized by the local cellular carrier.

- If the prompt OnStar(R) request ended is heard, without pressing the white dot button at the end of the OnStar(R) keypress, the OnStar(R) system at one time has made a successful cellular connection, but was unable to complete the call. If repeated calls are placed with this result, contact General Motors Technical Assistance Center.

Unable to Contact OnStar Call Center

Step	Action	Value	Yes	No
Schematic Reference:OnStar Schematics **Connector End View Reference:Cellular Communication Connector End Views** DEFINITION: When the OnStar(R) Call Center button is pressed, no connection is made to the OnStar (R) Call Center.				
1	Did you perform the Cellular Communication Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Cellular Communication**
2	**IMPORTANT:** **It is important to have the vehicle in an open outside area where a cellular call can be successfully placed and global positioning system (GPS) data can be received from satellites.** 1. Press the OnStar(R) Call Center button. 2. Wait for the system to either connect or end the call. Is a connection made with the OnStar(R) Call Center?	-	Go to Diagnostic Aids	Go to **Step 3**
3	Other than the normal progression tones of the system and the prompt Unable to Contact OnStar(R), were any other tones or cellular messages heard?	-	Go to **Step 4**	Go to **Step 5**
4	**IMPORTANT:** **Placing an emergency call to the OnStar(R) Call Center should only be made if the diagnosis of the system leads to this step. Immediately after an OnStar(R) advisor picks up the call, they should be told that this call is for diagnostic purposes only and there is no emergency.** 1. Record all messages heard from the OnStar(R) Call Center button	-	Have all messages heard during the course of the	

	press. 2. Press the OnStar(R) emergency button. Does the emergency keypress call make a connection to the OnStar(R) Call Center within 10 minutes?		tests available, use the scan tool to access the STID, ESN and Transceiver I.D. and contact the General Motors Technical Assistance Center	Go to **Step 5**
5	Inspect the cellular antenna for exterior damage. Is the antenna assembly damaged?	-	Go to **Step 9**	Go to **Step 6**
6	1. Disconnect the cellular antenna coax from the vehicle communication interface module (VCIM). 2. Disconnect the cellular antenna coax from the cellular antenna. 3. Measure the resistance from the center conductor of the coax to the metal outer shield. Does the meter read out of limits?	-	Go to **Step 7**	Go to **Step 8**
7	Measure the resistance of the cellular antenna coax center conductor from end to end. Does the resistance measure greater than the specified value?	1 ohm	Go to **Step 8**	Use the scan tool to access the STID, ESN and Transceiver I.D. and contact the General Motors Technical Assistance Center
8	Replace the cellular antenna coax. Did you complete the replacement?	-	Go to **Step 10**	-
9	Replace the cellular antenna assembly. Refer to **Coupling Replacement - Antenna Inner** and **Coupling Replacement - Antenna Outer** . Did you complete the replacement?	-	Go to **Step 10**	-
10	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to **Step 2**

MICROPHONE INOPERATIVE - CALLER CANNOT BE HEARD

Microphone Inoperative - Caller Cannot Be Heard

Step	Action	Value (s)	Yes	No
Schematic Reference:OnStar Schematics				

Connector End View Reference:Cellular Communication Connector End Views
DEFINITION: The OnStar(R) Call Center operator can clearly be heard but the operator is unable to hear the caller.

1	Did you perform the Cellular Communication Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Cellular Communication**
2	1. Turn ON the ignition, with the engine OFF. 2. Press the OnStar(R) Call Center button. 3. Ask the OnStar(R) operator if your voice can clearly be heard. Does the OnStar(R) operator hear your voice?	-	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	1. Turn OFF the ignition. 2. Disconnect the cellular microphone connector. 3. Turn ON the ignition, with the engine OFF. 4. Measure the voltage from the cellular microphone signal circuit to a good ground. Does the voltage measure greater than the specified value?	9 V	Go to **Step 4**	Go to **Step 5**
4	Measure the voltage from the cellular microphone signal circuit to the drain wire circuit. Does the voltage measure greater than the specified value?	9 V	Go to **Step 7**	Go to **Step 6**
5	Test the cellular microphone signal circuit for a short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 13**	Go to **Step 8**
6	Test the drain wire circuit for an open or short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 13**	Go to **Step 9**
7	Test the drain wire for a short to ground. Did you find and correct the condition?	-	Go to **Step 13**	Go to **Step 10**
	1. Leave the microphone disconnected.			

8	2. Disconnect the vehicle communication interface module (VCIM) connector C2. 3. Test the cellular microphone signal circuit and drain wire circuit for a short together. Did you find and correct the condition?	-	Go to **Step 13**	Go to **Step 9**
9	Inspect for poor connections at the harness connector of the cellular microphone. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 13**	Go to **Step 12**
10	Inspect for poor connections at the harness connector of the VCIM. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 13**	Go to **Step 11**
11	Replace the cellular microphone. Refer to **OnStar Microphone Replacement** . Did you complete the replacement?	-	Go to **Step 13**	-
12	**IMPORTANT:** **Perform the OnStar(R) setup procedure.** Replace the VCIM. Refer to **Communication Interface Module Replacement** .Did you complete the replacement?	-	Go to **Step 13**	-
13	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to **Step 2**

VOICE RECOGNITION INOPERATIVE

Voice Recognition Inoperative

Step	Action	Yes	No
DEFINITION: The OnStar(R) personal calling feature may not be able to understand some or all words spoken.			
1	Did you perform the Cellular Communication Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Cellular Communication**
	IMPORTANT:		

2	**The vehicle must be located in a quiet area.** 1. Turn ON the ignition, with the engine OFF. 2. Press the OnStar(R) Call Center button. 3. Ask the OnStar(R) operator if your voice can clearly be heard. Does the OnStar(R) operator hear your voice?	Go to **Step 3**	Go to **Microphone Inoperative - Caller Cannot Be Heard**
3	1. Press the call answer button. 2. Pronounce all Hands Free commands. Refer to **OnStar Description and Operation** for proper pronunciation. Did the OnStar(R) system recognize any of the voice commands?	Go to **Step 5**	Go to **Step 4**
4	1. Press the call answer button. 2. Have another person pronounce all Hands Free commands. Refer to **OnStar Description and Operation** for proper pronunciation. Did the OnStar(R) system recognize any of the voice commands?	Go to **Step 5**	Go to **OnStar Description and Operation**
5	The system is operational, but cannot identify certain word commands due to pronunciation. For tips on proper pronunciation refer to **OnStar Description and Operation** . Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 2**

ONSTAR BUTTON LED INOPERATIVE

Test Description

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

3: Determines if the OnStar(R) status LED has the necessary GREEN LED signal circuit voltage.

5: If the GREEN LED signal is shorted to voltage then the OnStar(R) 3-button assembly has been damaged and the OnStar(R) 3-button assembly must be replaced.

OnStar Button LED Inoperative

Step	Action	Value (s)	Yes	No
Schematic Reference:OnStar Schematics **Connector End View Reference:Cellular Communication Connector End Views**				

DEFINITION: This procedure is for diagnosing problems with the OnStar(R) button assembly LED.

1	Did you perform the Cellular Communications Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Cellular Communication**
2	1. Turn the ignition ON, with engine OFF. 2. Observe the OnStar(R) status LED. Did the OnStar(R) status LED turn GREEN?	-	Go to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems	Go to **Step 3**
3	Measure the voltage from the keypad GREEN LED signal circuit to a good ground. Does the voltage measure near the specified value?	7 V	Go to **Step 6**	Go to **Step 4**
4	Test the keypad GREEN LED signal circuit for an open, high resistance or a short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 10**	Go to **Step 5**
5	Test the keypad GREEN LED signal circuit for a short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 7**	Go to **Step 8**
6	Inspect for poor connections at the harness connector of the rearview mirror. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 10**	Go to **Step 7**
7	Replace the rearview mirror. Refer to **Rearview Mirror Replacement** in Stationary Windows. Did you complete the repair?	-	Go to **Step 10**	-
8	Inspect for poor connections at the harness connector of the vehicle communication interface module (VCIM). Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 10**	Go to **Step 9**
	IMPORTANT: **Perform the OnStar(R) setup procedure.**			

9	Replace the VCIM. Refer to **Communication Interface Module Replacement** .Did you complete the repair?	-	Go to **Step 10**	-
10	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to **Step 2**

NO (OR NOISY) ONSTAR AUDIO

Test Description

The number below refers to the step number on the diagnostic table.

9: If the remote radio audio output (-) circuit is shorted to voltage, then the vehicle communication interface module (VCIM) has been damaged and requires replacement.

No (or Noisy) OnStar Audio

Step	Action	Yes	No
Schematic Reference:OnStar Schematics **Connector End View Reference:Cellular Communication Connector End Views** DEFINITION: This procedure is for diagnosing problems during OnStar(R) audio following a button press from the OnStar(R) button assembly.			
1	Did you perform the Cellular Communication Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Cellular Communication**
2	1. Turn ON the ignition, with the engine OFF. 2. Turn ON the radio. 3. Set volume to a comfortable level. 4. Press the OnStar(R) Center Call button. Can the Connecting to OnStar message be heard playing through the audio system at all?	Go to **Step 3**	Go to **Step 5**
3	Tune the radio to a known good station. Can the audio be heard through all speaker channels?	Go to **Step 4**	Refer to **Diagnostic Starting Point - Entertainment** in Entertainment
4	Test the remote radio audio output (-) circuit for an open. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 15**	Go to **Step 12**
5	Does the radio mute once the OnStar(R) Call Center button is pressed?	Go to **Step 6**	Go to **Step 10**
6	Is any distortion heard?	Go to **Step 8**	Go to **Step 7**

7	Test the remote radio left audio signal circuit for a short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 15**	Go to **Step 8**
8	Test the remote radio left audio signal circuit for an open or short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 15**	Go to **Step 9**
9	Test the remote radio audio output (-) circuit for a short to voltage. Refer to **Circuit Testing** and**Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 12**
10	1. Turn OFF the ignition. 2. Disconnect the vehicle communication interface module (VCIM) connector C2. 3. Turn ON the ignition, with the engine OFF. 4. Turn ON the radio. 5. Set volume to a comfortable level. 6. Using a fused jumper, short the cellular mute signal circuit to a good ground. Does the radio mute?	Go to **Step 14**	Go to **Step 11**
11	Test the cellular mute signal circuit for an open. Did you find and correct the condition?	Go to **Step 15**	Go to **Step 13**
12	Inspect for poor connections at the harness connector of the VCIM. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 15**	Go to **Step 14**
13	Replace the radio. Refer to **Radio Replacement** in Entertainment. Did you complete the repair?	Go to **Step 15**	-
14	**IMPORTANT:** **Perform the OnStar(R) setup procedure.** Replace the VCIM. Refer to **Communication Interface Module Replacement** .Did you complete the repair?	Go to **Step 15**	-
15	Operate the system in order to verify the repair. Did you find and correct the condition?	System OK	Go to **Step 2**

GLOBAL POSITIONING SYSTEM (GPS) DATA NOT CURRENT OR INACCURATE

Diagnostic Aids

- The GPS Signal title on the scan tool will display a "Yes" or "No" dependent 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 two 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 made by a customer 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(R) keypress will restrict the navigation antenna from a clear view of the satellites in the sky and may have caused this temporary data loss.

Global Positioning System (GPS) Data Not Current or Inaccurate

Step	Action	Values	Yes	No
Schematic Reference:OnStar Schematics **Connector End View Reference:Cellular Communication Connector End Views**				
1	Did you perform the Cellular Communication Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Cellular Communication**
2	**IMPORTANT:** **It is important to have the vehicle in an open outside area where a cellular call can be successfully placed and global positioning system (GPS) data can be received from satellites. It is also necessary to inform the OnStar(R) Call Center advisor that this call is for vehicle diagnostic purposes.** With a scan tool, observe the GPS signal status indicator in the GPS Data Display menu, for at least 10 seconds.Does the indicator display "Yes"?	-	Go to **Step 3**	Go to **Step 6**
3	1. Press the OnStar(R) Call Center button. 2. Ask the OnStar(R) Call Center advisor if they have received GPS data. Has the advisor received GPS data?	-	Go to **Step 4**	Go to **Step 5**
4	Ask the OnStar(R) Call Center advisor to verify your position. Is the location provided by the OnStar(R) Call Center advisor within a reasonable distance from the actual location of the vehicle?	-	Go to Diagnostic Aids	Go to **Step 10**
5	Ask the OnStar(R) Call Center advisor if this call was a fail to voice. Was the call a fail to voice?	-	Contact the General Motors Technical	

			Assistance Center	Go to **Step 6**
6	1. Disconnect the navigation antenna coax from the navigation antenna within the wiring harness. 2. Disconnect the navigation antenna from the vehicle communication interface module (VCIM). 3. Measure the resistance from the center conductor of the coax to the metal outer shield. Does the meter read out of limits?	-	Go to **Step 7**	Go to **Step 8**
7	Measure the resistance of the navigation antenna coax center conductor from end to end. Does the resistance measure greater than the specified value?	1 ohm	Go to **Step 8**	Go to **Step 9**
8	Replace the navigation antenna coax. Did you complete the replacement?	-	Go to **Step 11**	-
9	Replace the navigation antenna assembly. Refer to **Navigation Antenna Replacement** . Did you complete the replacement?	-	Go to **Step 11**	-
10	Replace the VCIM. Refer to **Communication Interface Module Replacement** . Did you complete the replacement?	-	Go to **Step 11**	-
11	Operate the system in order to verify the repair. Did you correct the condition?	-	Go to **Step 2**	-

ONSTAR RECONFIGURATION

IMPORTANT: The vehicle communication interface module (VCIM) has a specific set of unique numbers that tie the module to the vehicle it resides in. These numbers, the 10-digit station identification and 11-digit electronic serial number, are used by the National Cellular Network and OnStar(R) to identify the specific vehicle. Because these numbers are tied to the vehicle identification number of the vehicle, these parts should NOT be exchanged with those of another vehicle. After replacing the VCIM, it is essential to reconfigure the OnStar(R) system. Failure to reconfigure the system will result in an additional customer visit for repair. In addition, pressing and holding the white dot button on the keypad will not reset this version of the OnStar(R) system. This action will cause a DTC to set.

1. Install the scan tool. Use the special functions menu in order to perform the VCIM setup procedure for this vehicle.

2. Move the vehicle to an open area that is away from tall buildings with a clear view of unobstructed sky. Allow the vehicle to run for 10 minutes.
3. Use the ID information menu on the scan tool to access the new station ID (STID) and the electronic serial number (ESN) from the new VCIM.
4. Press the blue OnStar(R) button to connect to the OnStar(R) Call Center. Tell the advisor that this vehicle has received a new VCIM and ask the advisor to perform the following procedure:
    - Add the new STID and the ESN to update the customers account.
    - Follow any additional instructions from the OnStar(R) advisor.
    - Ask the advisor to activate the OnStar(R) Personal Calling feature, if available.
5. The default language for voice recognition in the generation 5 OnStar module is English. To change the language resident in the module, refer to **Service Programming System (SPS)** in Programming and Setup.

REPAIR INSTRUCTIONS

COUPLING REPLACEMENT - ANTENNA INNER

IMPORTANT: A new cellular communication antenna design was introduced during the 2003 model year. These new antenna parts are NOT interchangeable with the parts used in the previous design. If the parts from the two designs are interchanged, the performance of the cellular communications system will be adversely affected.

IMPORTANT: If both couplings are to be replaced, install the outer coupling first. Refer to Coupling Replacement - Antenna Outer .

1. Disconnect the coaxial cable from the inner coupling of the mobile communication antenna.

IMPORTANT: If you use a razor blade or other sharp tool to remove the adhesive, use the blade carefully. Damage to the grid lines may result.

2. If you need to remove the antenna coupling, use a small wide-bladed plastic tool to cut the double back tape.
3. Verify that all components are stabilized to 20°C (68°F) minimum.

IMPORTANT: Do NOT use any other cleaning tools which may contain products that will adversely affect the adhesion of the antenna.

4. Clean the inside of the window with the alcohol prep pad included in the kit. Clean a minimum area of 60 x 60 mm (2 3/8 x 2 3/8 in) around the target location.
5. Dry the glass thoroughly using a lint-free clean disposable cloth. Moisture on the glass will weaken the adhesive bond.
6. Mask off or protect the glass areas where you will be working.

7. Apply Glass Adhesion Promoter P/N 12378555 (Canadian P/N 88901239) to the window in the area where you will install the antenna coupling. Follow the instructions on the product label.
8. Dry the glass as instructed above.
9. Remove the protective film from the protective backing on the inner antenna coupling. Be careful not to touch the adhesive.
10. Align the inner antenna coupling using the template provided and with the correct orientation. If the outer coupling is still attached to the window, align the inner coupling to the outer coupling.

    Apply firm, consistent pressure to the center and the perimeter of the coupling for approximately 30 seconds.

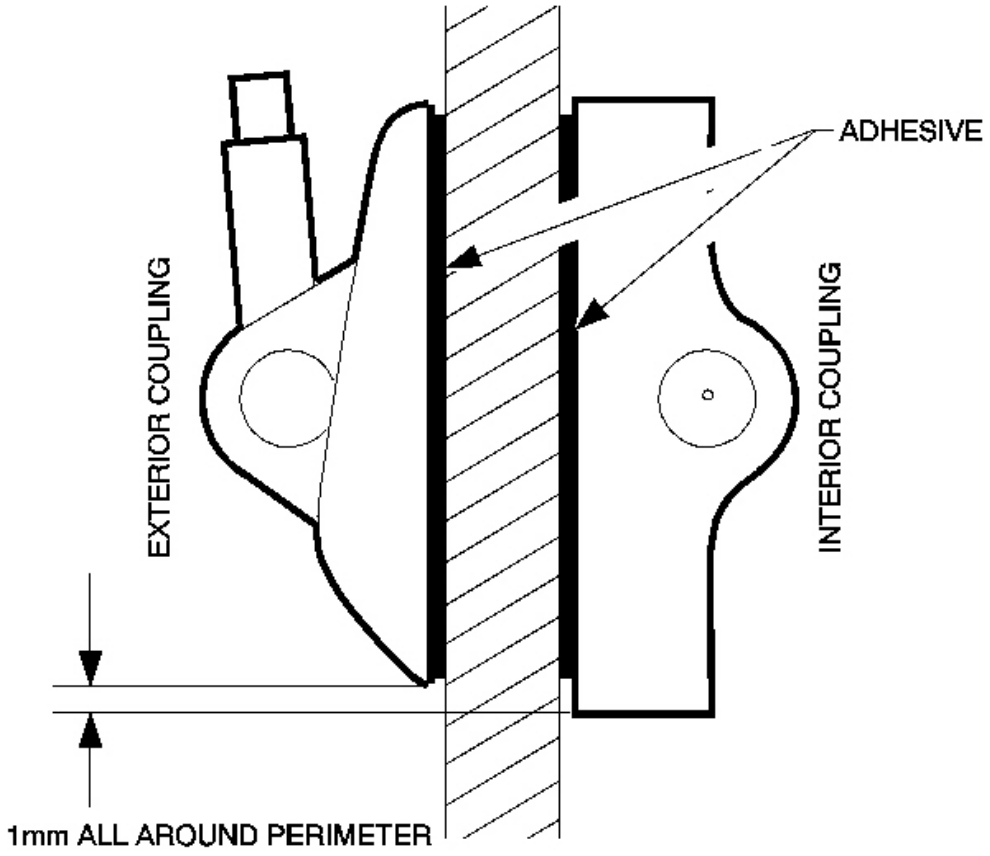


Fig. 8: View Of Antenna Components

Courtesy of GENERAL MOTORS CORP.

11. Keep the vehicle dry. Allow 4 hours at 20°C (60°F) for the adhesive to cure after installation. After 4 hours, connect the interior coaxial cable to the coupling.

COUPLING REPLACEMENT - ANTENNA OUTER

IMPORTANT: A new cellular communication antenna design was introduced during the 2003 model year. These new antenna parts are NOT interchangeable with the parts used in the previous design. If the parts from the two designs are interchanged, the performance of the cellular communications system will be adversely affected.

IMPORTANT: If both couplings are to be replaced, install the outer coupling first.

IMPORTANT: If you use a razor blade or other sharp tool to remove the adhesive, use the blade carefully. Damage to the grid lines may result.

1. If you need to remove the antenna coupling, use a small wide-bladed plastic tool to cut the double back tape.
2. Verify that all components are stabilized to 20°C (68°F) minimum.

IMPORTANT: Do NOT use any other cleaning tools which may contain products that will adversely affect the adhesion of the antenna.

3. Clean the outside of the window with the alcohol prep pad included in the kit. Clean a minimum area of 60 x 60 mm (2 3/8 x 2 3/8 in) around the target location.
4. Dry the glass thoroughly using a lint-free clean disposable cloth. Moisture on the glass will weaken the adhesive bond.
5. Mask off or protect the glass areas where you will be working.
6. Apply Glass Adhesion Promoter P/N 12378555 (Canadian P/N 88901239) to the window in the area where you will install the antenna coupling. Follow the instructions on the product label.
7. Dry the glass as instructed above.
8. Remove the protective film from the protective backing on the outer antenna coupling. Be careful not to touch the adhesive.
9. Align the outer antenna coupling using the template provided and with the correct orientation. If the inner coupling is still attached to the window, align the outer coupling to the inner coupling.

   Apply firm, consistent pressure to the center and the perimeter of the coupling for approximately 30 seconds.

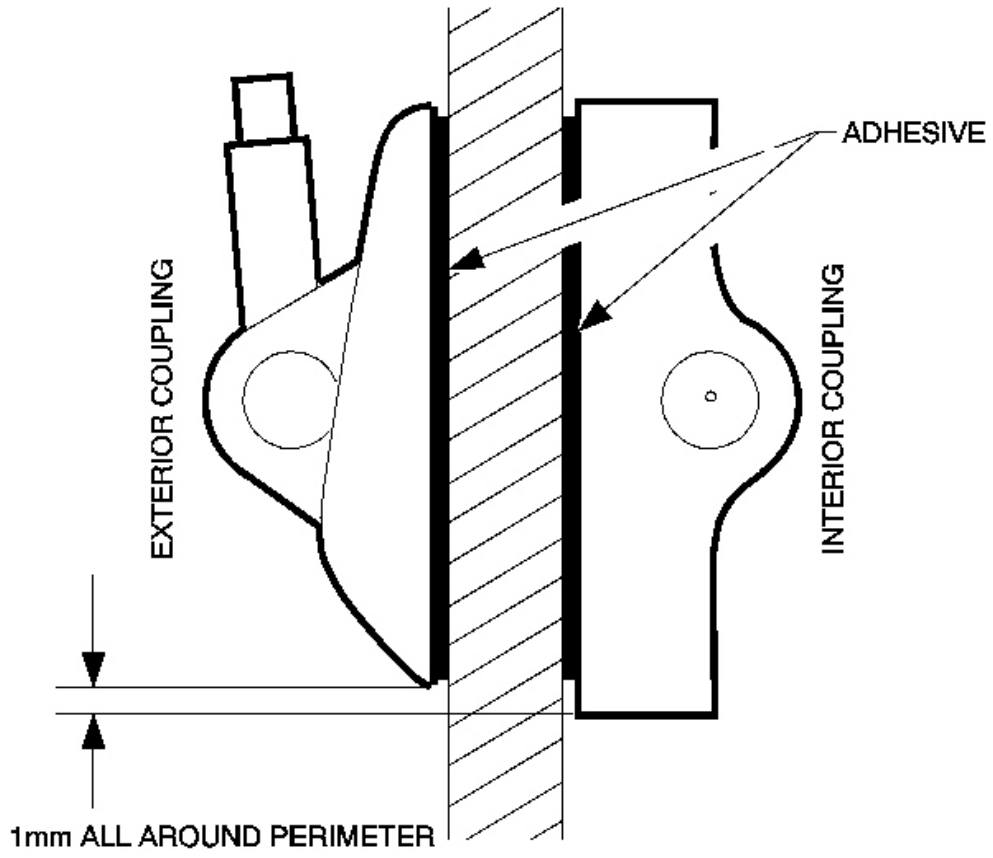


Fig. 9: View Of Antenna Components
Courtesy of GENERAL MOTORS CORP.

10. Inspect for bubbles by viewing the exterior coupling from the interior of the vehicle. It may be necessary to continue applying pressure to the coupling in order to remove all of the bubbles.

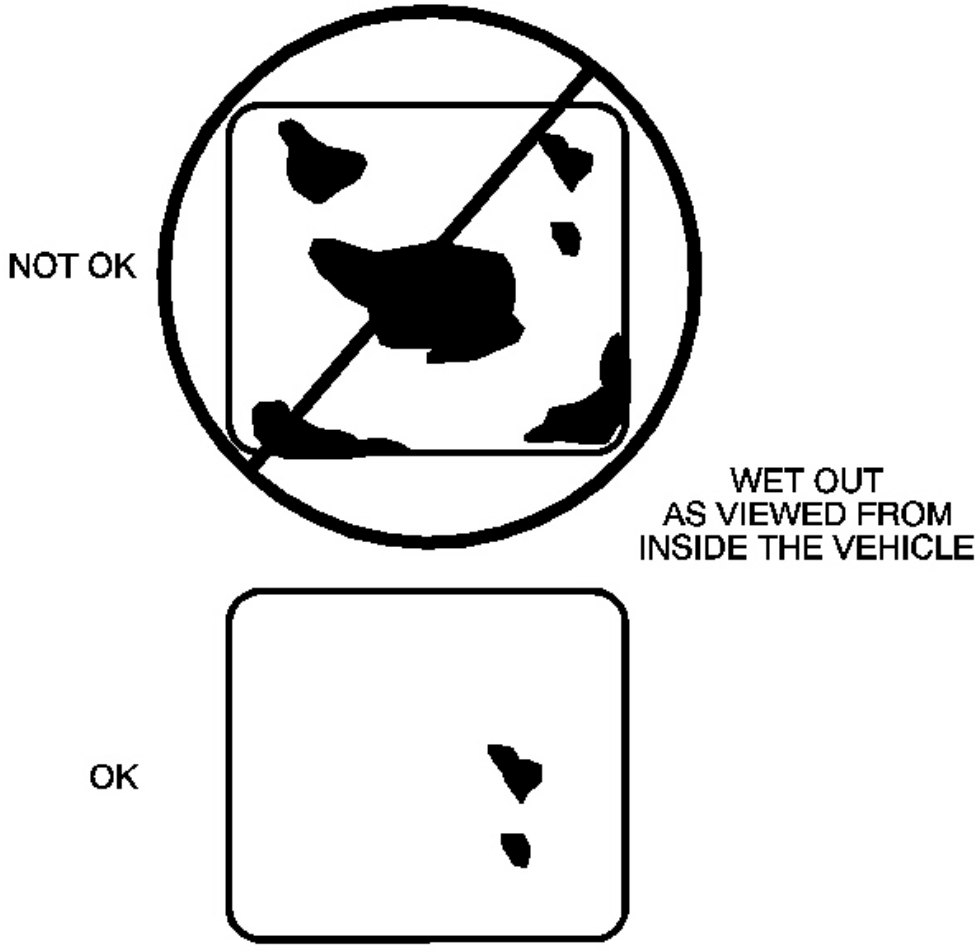


Fig. 10: Inspecting Exterior Coupling For Bubbles
Courtesy of GENERAL MOTORS CORP.

11. Keep the vehicle dry. Allow 4 hours at 20°C (60°F) for the adhesive to cure after installation.

NAVIGATION ANTENNA REPLACEMENT

Removal Procedure

1. Lower the headliner. Refer to **Headliner Replacement** in Interior Trim.
2. Disconnect the GPS coax from the antenna.
3. Slide the GPS antenna forward toward the front of the vehicle.

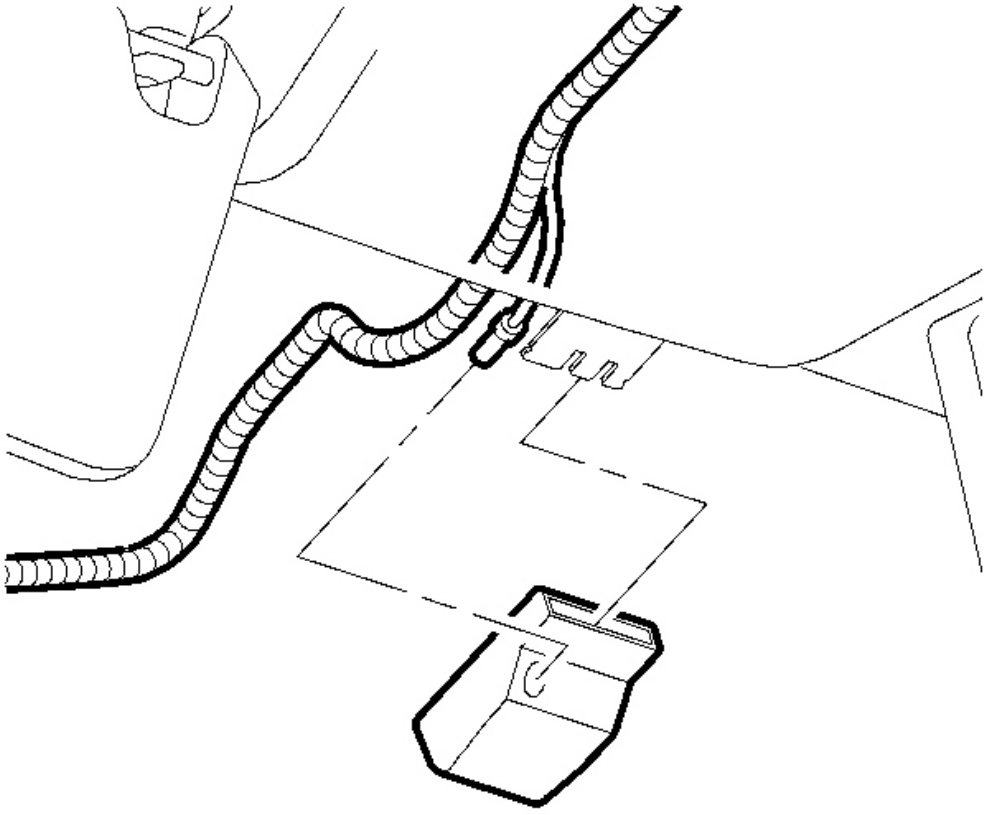


Fig. 11: View Of GPS Coax & Antenna
Courtesy of GENERAL MOTORS CORP.

4. Remove the GPS bracket fastener and remove the GPS bracket.

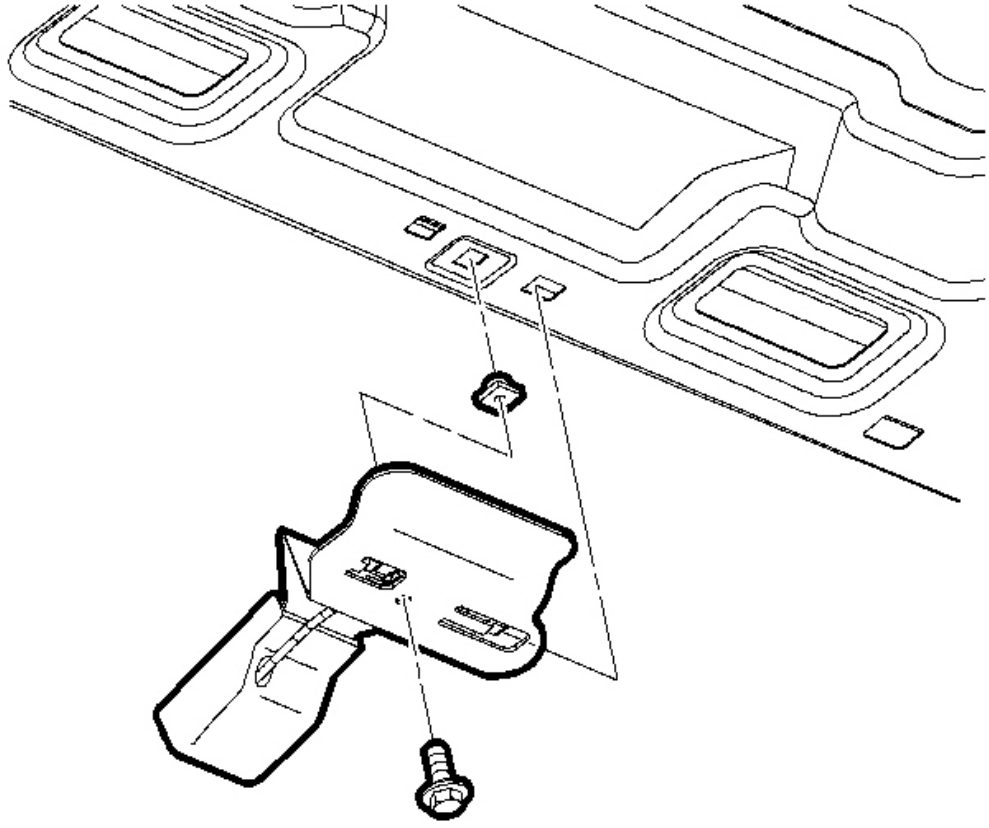


Fig. 12: View Of GPS Bracket & Fastener
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Slide the GPS bracket into position and install the bracket fastener.

   Tighten: Tighten the fastener to 10 N.m (89 lb in).

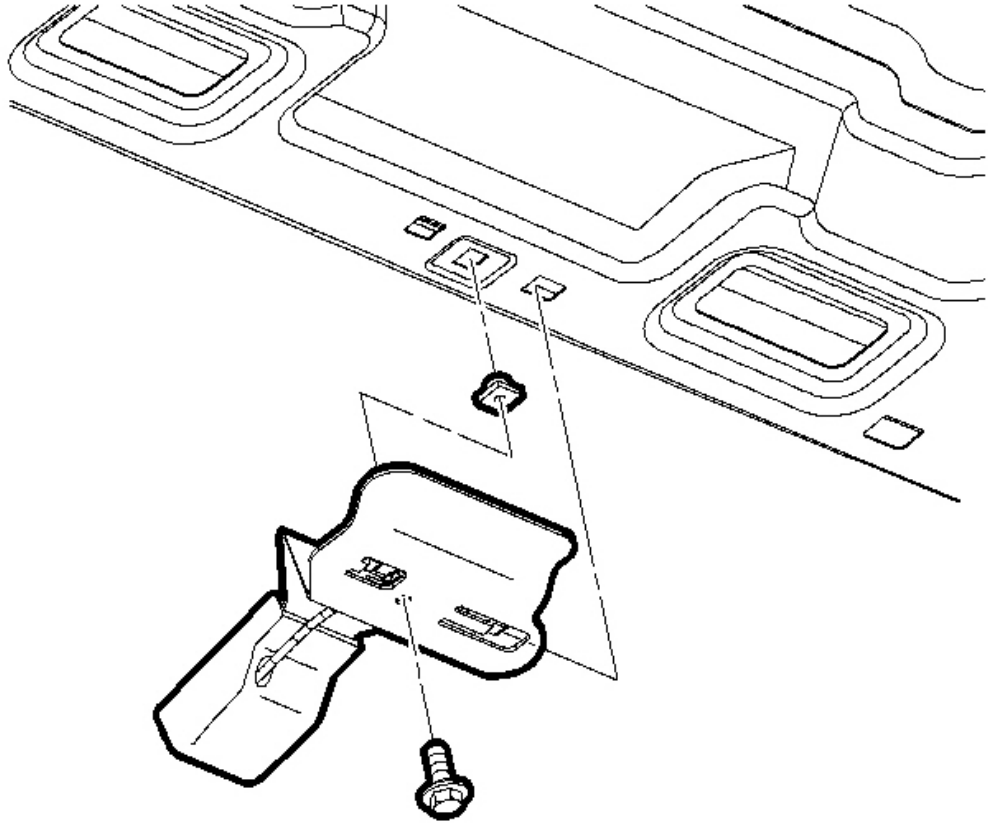


Fig. 13: View Of GPS Bracket & Fastener
Courtesy of GENERAL MOTORS CORP.

2. Slide the GPS antenna onto the bracket and connect the coax.

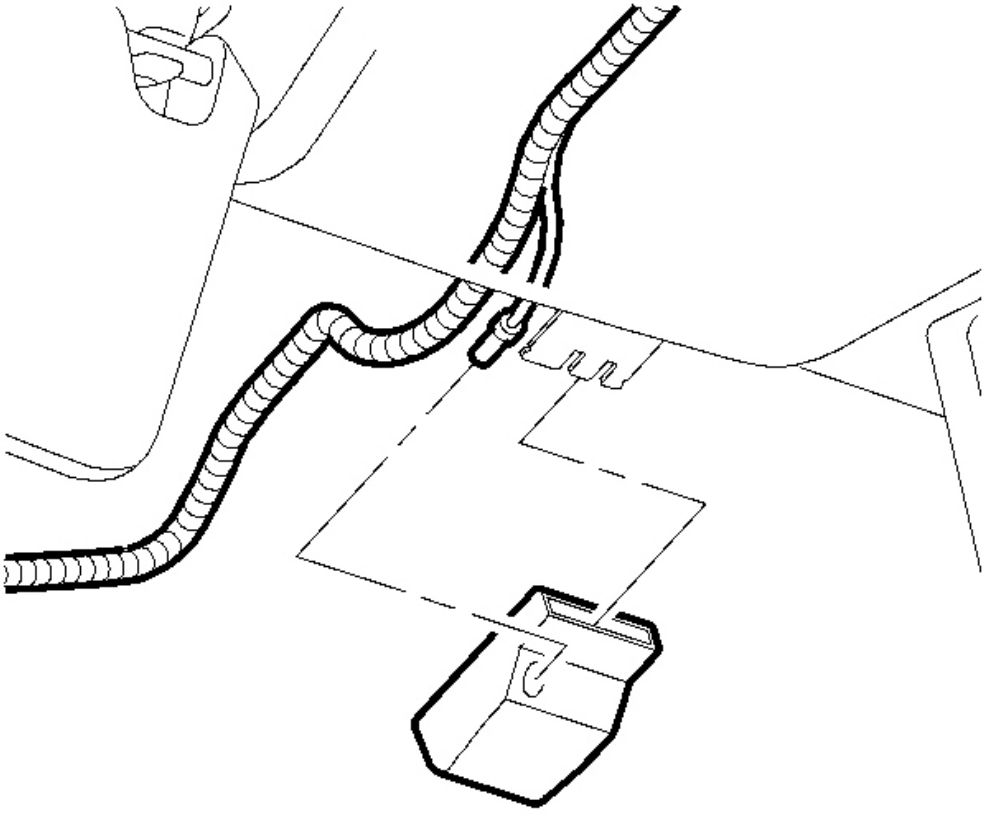


Fig. 14: View Of GPS Coax & Antenna
Courtesy of GENERAL MOTORS CORP.

3. Install the headliner. Refer to **Headliner Replacement** in Interior Trim.

COMMUNICATION INTERFACE MODULE REPLACEMENT

Removal Procedure

IMPORTANT: The vehicle communication interface module (VCIM) has a specific set of unique numbers that tie the module to each vehicle. These numbers, the 10-digit station identification and the 11-digit electronic serial number, are used by the National Cellular Network and OnStar(R) to identify the

specific vehicle. Because these numbers are tied to the vehicle identification number of the vehicle, you must never exchange these parts with those of another vehicle.

1. Remove the fastener located on the bottom of the OnStar(R) bracket.
2. Tilt the module inboard to the center of the vehicle and pull down the communication interface module (CIM)

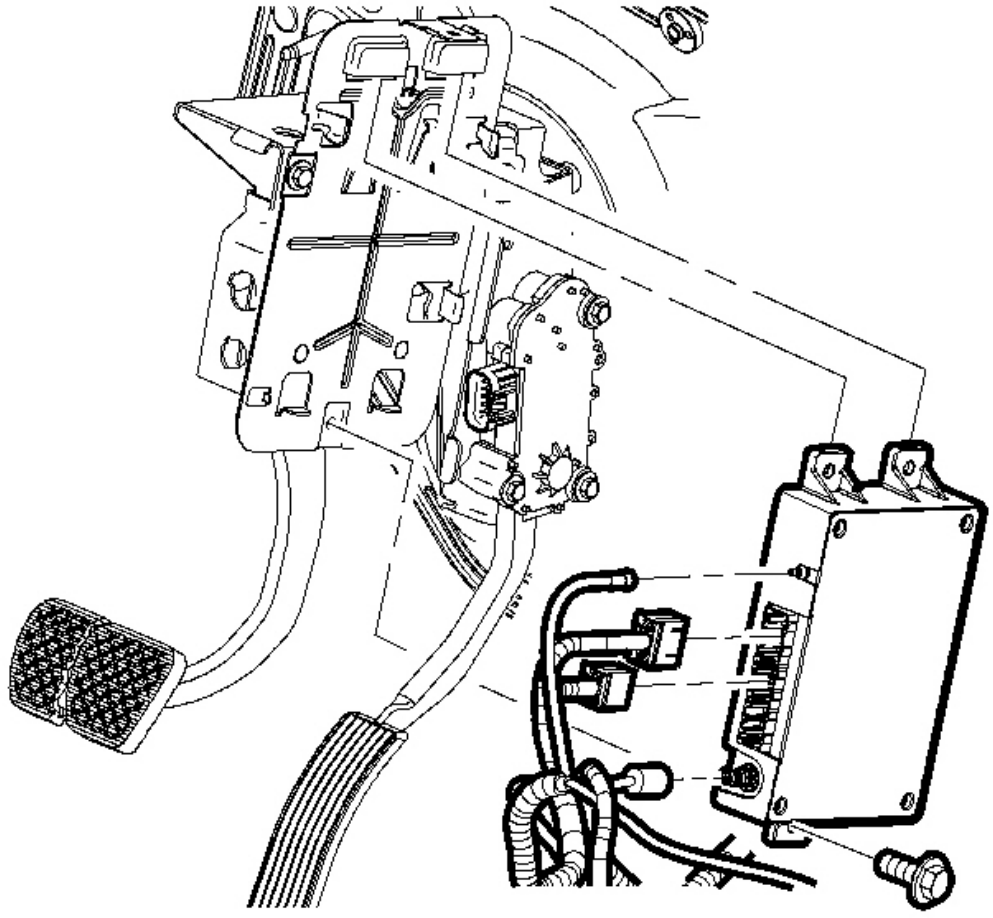


Fig. 15: View Of Communication Interface Module (CIM) & Fastener
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the electrical connectors, the GPS antenna, and the cellular coax cable.

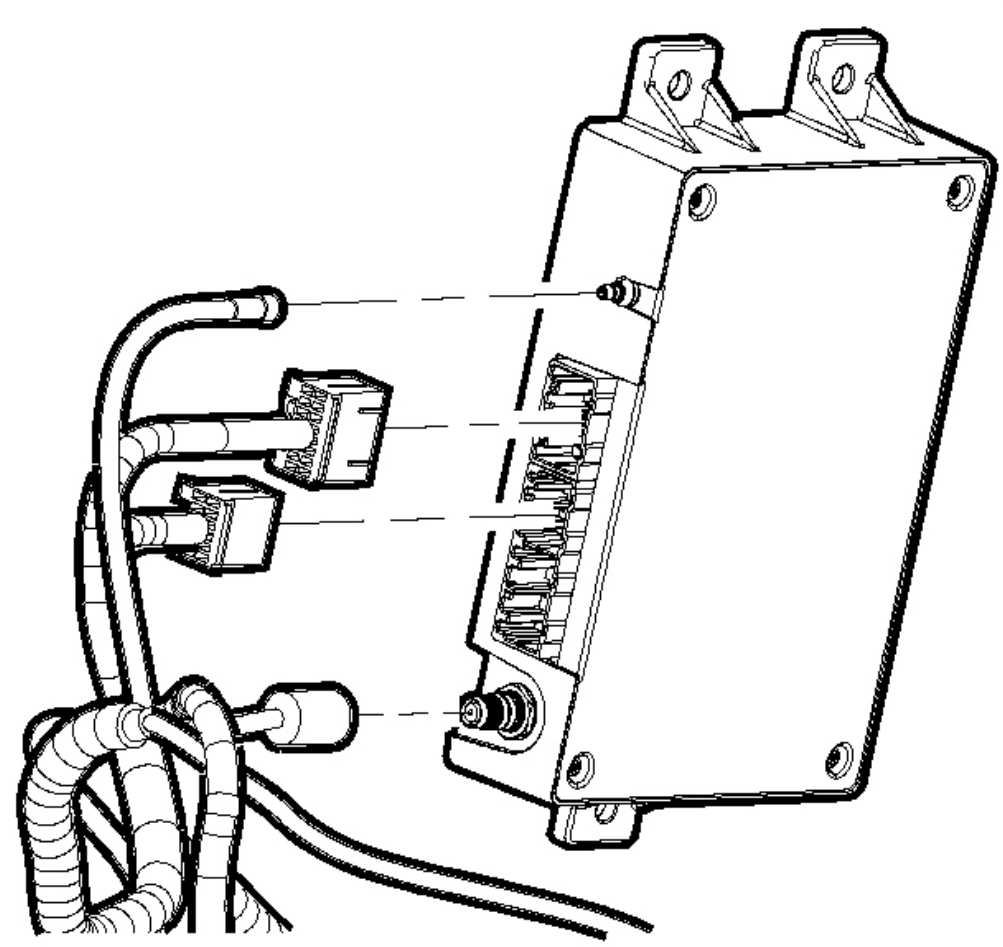


Fig. 16: View Of Electrical Connectors, GPS Antenna & Cellular Coax Cable
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. If replacing the VCIM, record the 10-digit STID number, and the 11-digit ESN number from the labels on the new module.
2. Connect the electrical connectors, the GPS antenna, and the cellular coax cable.

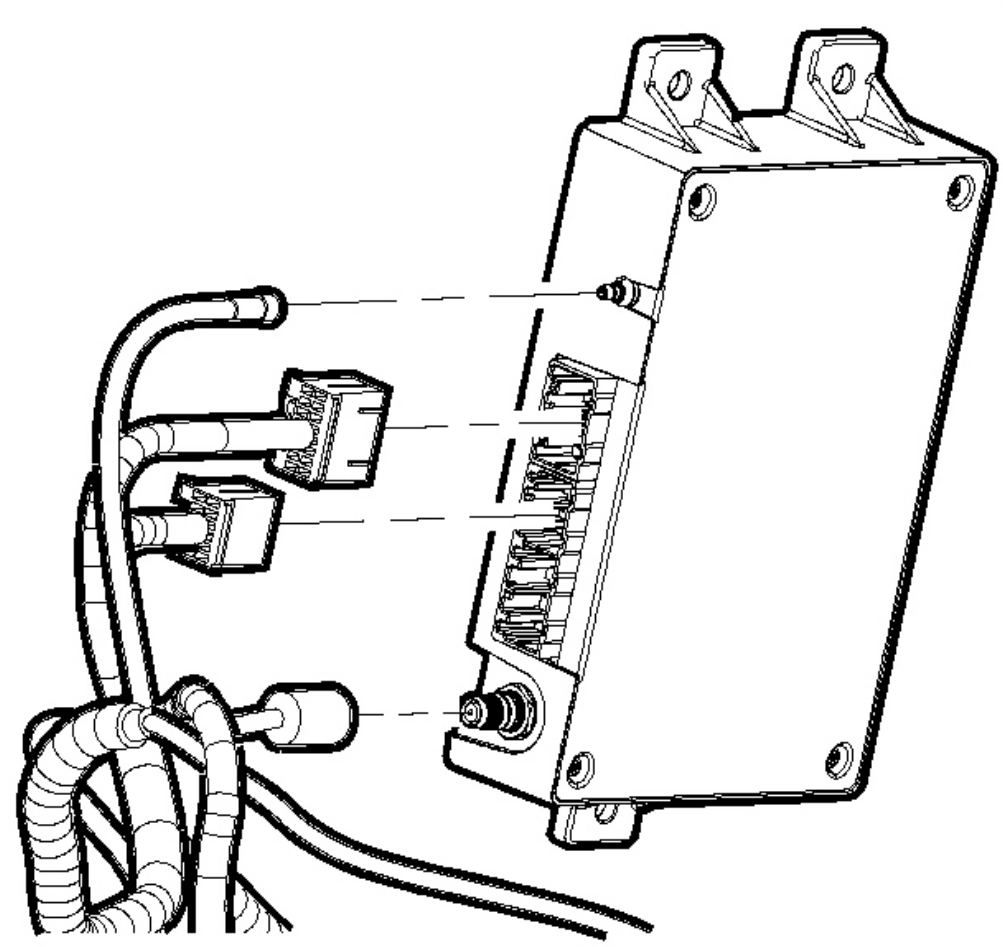


Fig. 17: View Of Electrical Connectors, GPS Antenna & Cellular Coax Cable
Courtesy of GENERAL MOTORS CORP.

3. Tilt the CIM inboard and install the CIM.

NOTE: **Refer to Fastener Notice in Cautions and Notices.**

4. Install the CIM fastener.

Tighten: Tighten the fastener to 10 N.m (89 lb in).

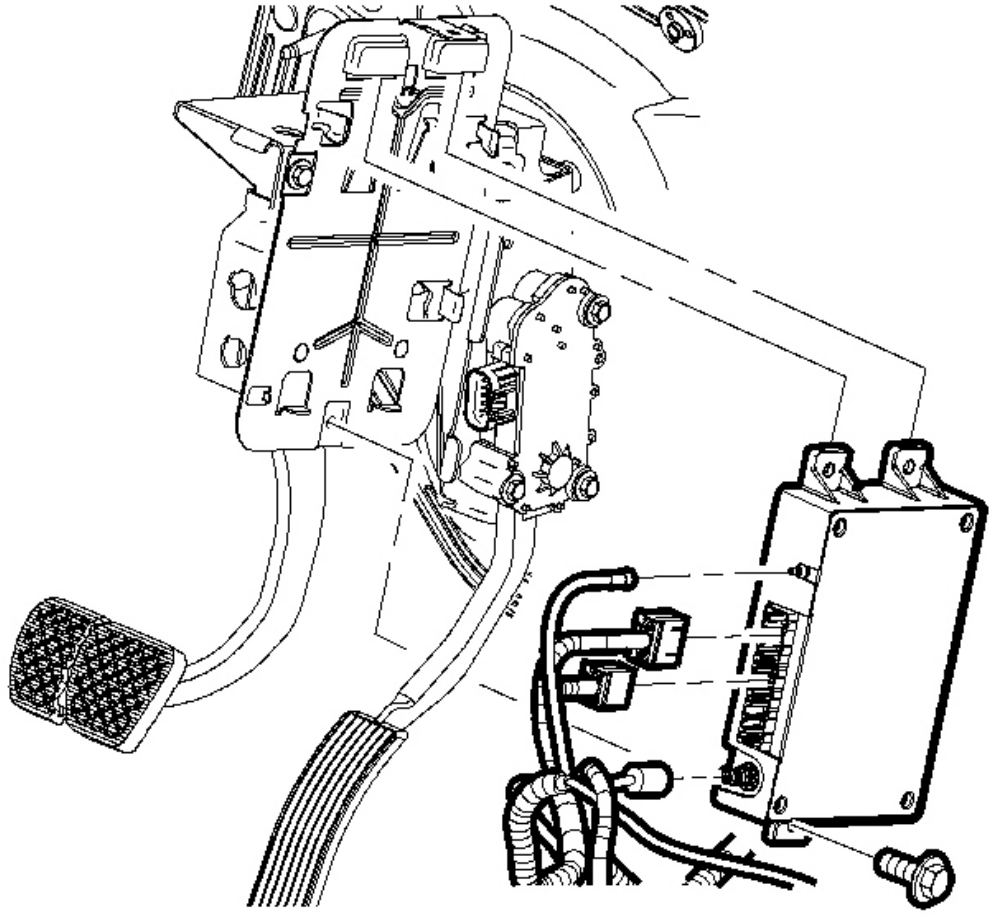


Fig. 18: View Of Communication Interface Module (CIM) & Fastener
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: After replacing the vehicle communication interface module, you must reconfigure the OnStar(R) system. Failure to reconfigure the system will result in an additional customer visit for repair. In addition, pressing and holding the white dot button on the keypad will NOT reset this version of the OnStar(R) system. This action will cause a DTC to set.

5. Reconfigure the OnStar(R) system. Refer to **OnStar Reconfiguration** .

ONSTAR MICROPHONE REPLACEMENT

Removal Procedure

1. Using a small, flat-bladed tool, pry at the forward edge of the reading lamp cover to disengage the forward clips. Slide the cover forward to disengage the rearward hooks.

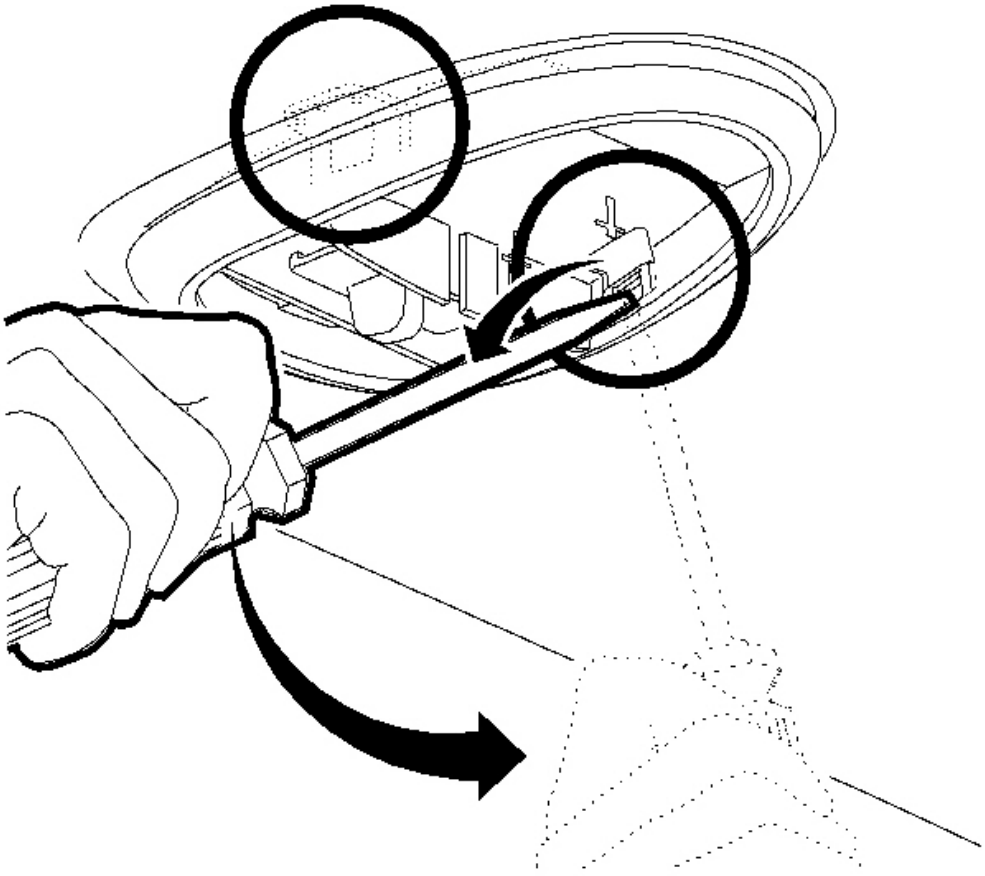


Fig. 19: View Of Reading Lamp Cover
Courtesy of GENERAL MOTORS CORP.

2. Disconnect the OnStar(R) microphone harness.
3. Depress the microphone snap tabs.
4. Push on the rear face of the microphone to remove the microphone from the cover.

Installation Procedure

1. Position the OnStar(R) microphone in the cover.
2. Install the microphone by snapping into place.
3. Connect the wiring harness.
4. Snap the cover to engage the snap tabs.
5. Slide the cover rearward to engage the rear hooks.
6. Snap the reading lamp cover into place.

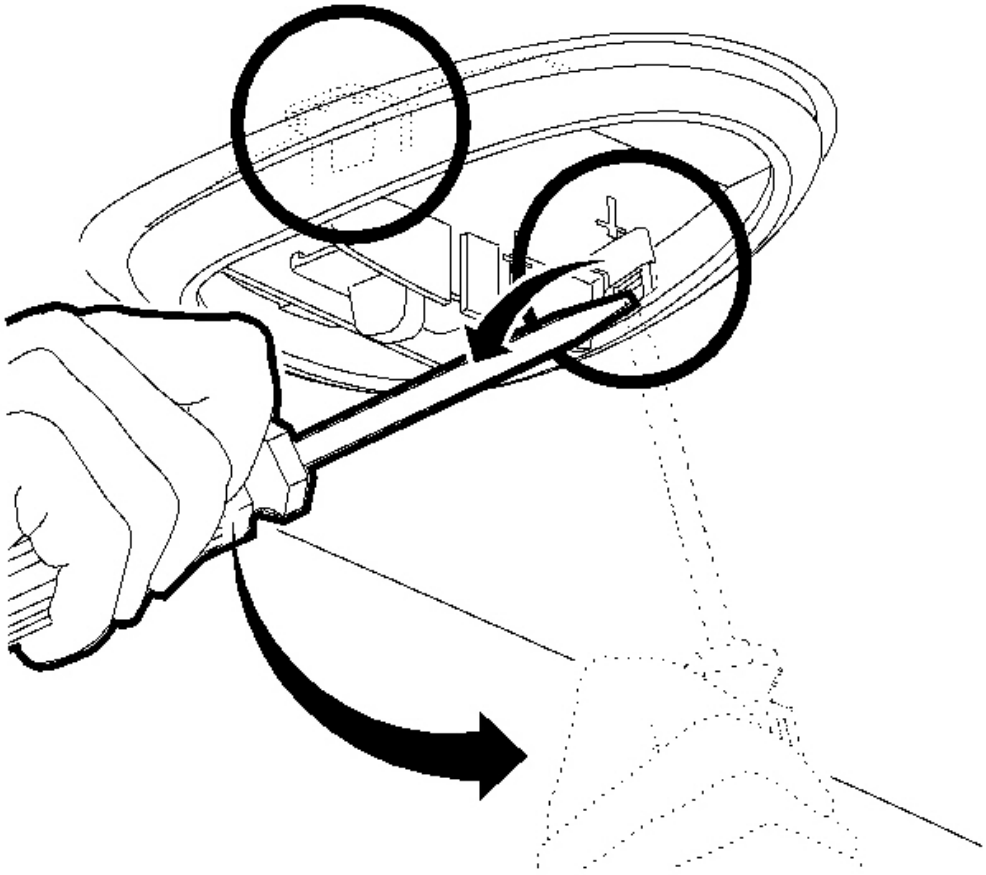


Fig. 20: View Of Reading Lamp Cover
Courtesy of GENERAL MOTORS CORP.

DESCRIPTION AND OPERATION

ONSTAR DESCRIPTION AND OPERATION

This vehicle uses the Generation 5 version of the OnStar(R) System. This system consists of the following components:

- Vehicle communication interface module (VCIM)
- OnStar(R) button assembly
- Microphone
- Cellular antenna
- Navigation antenna

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

Vehicle Communication Interface Module (VCIM)

The vehicle communication interface module (VCIM) is a 3-watt cellular device that allows the user to communicate data and voice signals over the national cellular network. It is powered by a fused, battery positive, voltage circuit connected through the vehicle wiring to the 3-button assembly and the radio, and attached by means of coax cables to the cellular and navigation antennas. Ground for the module is accomplished by means of dedicated circuits that are routed with body wiring systems to chassis ground points.

The module houses 2 modems, one to process Global Positioning System (GPS) data, and the other for cellular information. Satellites orbiting earth are constantly transmitting signals of their current location, from which the OnStar(R) System is able to pinpoint its own location. The navigation antenna receives these GPS signals and provides the data to the VCIM to be processed. The VCIM communicates with the rest of the vehicle over the Class 2 serial data bus. The ignition state is determined by the VCIM through Class 2 messaging.

The module also has the capability of commanding the horn, initiating door lock/unlock and operating the exterior lamps using the Class 2 serial data circuit. When an OnStar(R) keypress is made, a Class 2 message is sent to the audio system to mute all radio functions and transmit OnStar(R) originated audio. After the audio system is muted, the OnStar(R) signals are transmitted to the audio system on the cellular telephone voice signal circuit, and returned to the module on the cellular telephone voice low reference circuit. The cellular modem connects the OnStar(R) 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.

OnStar(R) Button Assembly

The OnStar(R) button assembly may be part of the rearview mirror on some vehicles or a separate unit on others. 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 dot allows the user to answer and end calls or initiate the personal calling feature, if equipped.
- The blue OnStar(R) Call Center button, which displays the OnStar(R) logo, allows the user to connect to the OnStar(R) Call Center.
- The emergency button, which will display either a red or white cross, sends a high priority emergency

call to the OnStar(R) Call Center when pressed.

The OnStar(R) button assembly receives 10 volts on the keypad supply voltage circuit. When pressed, each button completes a circuit across a resister allowing a specific voltage to be returned to the vehicle communication interface module (VCIM) on the keypad signal circuit. Depending upon the voltage range returned, the VCIM is able to identify which button has been pressed.

The OnStar(R) status LED is located to the right of the emergency button on a mirror-mounted assembly and to the left of the answer/end call button when the assembly is mounted on the dash or overhead console. 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(R) System is still able to make a call, the LED will flash red during the call. The OnStar(R) LED is controlled by the VCIM over the keypad red LED signal circuit and the keypad green LED signal circuit.

OnStar(R) Microphone

The OnStar(R), or cellular microphone can be part of the rearview mirror assembly, or on some vehicle lines, can be a separate, stand alone unit. In either case, the microphone is supplied voltage on the cellular microphone signal circuit, while voice data from the user is sent back to the vehicle communication interface module (VCIM) by means of either a cellular microphone low reference circuit or a drain wire.

Cellular and Navigation Antennas

This vehicle will be equipped with either separate cellular and navigation antennas, or a combination cellular and navigation antenna, which brings the functions of both into a single part.

The cellular antenna is the component that allows the OnStar(R) System to send and receive data over airwaves by means of cellular technology. This antenna is connected at the base to a coax cable that plugs directly into the vehicle communication interface module (VCIM). The navigation antenna is used to collect the constant signals of the orbiting satellites. Within the antenna, is housed a low noise amplifier that allows for a more broad and precise reception of this data. The current Global Positioning System (GPS) location is collected by the module every time a keypress is made. The OnStar(R) Call Center also has the capability of pinging the vehicle during an OnStar(R) call, which commands the module to retrieve the latest GPS location and transmit it to the OnStar(R) Call Center.

A history location of the last recorded position of the vehicle is stored in the module and marked as aged. In the event the VCP loses, or is removed from power, this history location is used by the OnStar(R) Call Center as a default. Actual GPS location may take up to 10 minutes to register in the event of a loss of power. This antenna requires a clear and unobstructed path to the satellites in the sky. Window tinting on vehicles may interfere with the GPS sensor functions, depending upon the amount of darkening and/or metallic particles that are embedded in the film of the tinting material.

OnStar Sleep Cycle

The OnStar(R) System uses a unique sleep cycle to allow the system to receive cellular calls while the ignition is in the OFF position. This cycle enables the vehicle communication interface module (VCIM) to perform

remote functions, such as door unlock, as commanded over the air by the OnStar(R) Call Center, when requested by the customer, and to continue to maintain an acceptable level of battery electrical drain.

The OnStar(R) System uses 3 states of readiness:

- High power
- Low power
- Sleep

The high power state is in effect whenever the ignition is in the ON or RUN position, and enables the OnStar(R) System to send and receive cellular calls and perform all remote functions. The low power state is entered once the vehicle ignition is placed in the OFF position and the retained accessory power (RAP) function has been turned OFF, or times out. This state will last for one minute and allows incoming cellular calls to be received. After the one minute window, the OnStar(R) System moves to the sleep state. This state will not recognize or receive incoming cellular calls. At a predetermined time recorded within the VCIM, up to 9 minutes, the system re-enters the low power state to listen for a call from the OnStar(R) Call Center for one minute. After this interval, the system will again return to the sleep state for 9 minutes. After these 9 minutes, the system will again enter the low state of power and listen for any incoming calls that the OnStar(R) Call Center may be sending.

In the event a call is being sent, the OnStar(R) 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 one 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(R) System will permanently enter the sleep state until the ignition is once again turned to the ON or RUN position.

In the event the OnStar(R) System loses, or is temporarily removed from battery power, the system will remain in the sleep state while the key in the OFF position. It will not begin to cycle until the vehicle passes into an open outside area with the ignition ON, where a Global Positioning System (GPS) signal can be acquired, providing a reference for time. The OnStar(R) Call Center is able to maintain a record of exactly what time each vehicle will enter the one minute low power state by synchronizing their clocks with those of the vehicle, based on GPS signals.

Deactivated OnStar(R) Accounts

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

- During an OnStar(R) Call Center button press, the customer will be connected to a dedicated sales team who can sell an OnStar(R) subscription and reactivate the vehicle. Depending on the type of OnStar(R) hardware in the vehicle, the customer may first hear a demonstration message stating there is no current OnStar(R) subscription for the vehicle, and directing the customer what to do to activate services.
- During an emergency button press, a demo message will be played indicating the service has been

deactivated.

- OnStar(R) personal calling (OPC) will not be available, as this feature requires the customer to have a current OnStar(R) account. Attempts to use this feature may result in cellular connection failure messages and the inability to connect to the number dialed.

It is of particular note, that when an OnStar(R) System is successfully deactivated, it will NOT attempt to connect to the OnStar(R) Call Center in the event of a collision or if the vehicles front air bags deploy for any other reason.

Certain vehicles that have never had an active OnStar(R) account, that have been deactivated, may be unable to establish a connection with the OnStar(R) 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(R) subscriber.

OnStar(R) Reconfiguration Procedure

Within the vehicle communication interface module (VCIM) are a set of unique numbers that identify the OnStar(R) customer and the specific vehicle the module resides in. These numbers, the station identification number (STID) and the electronic serial number (ESN) are transmitted over the cellular network when an OnStar(R) keypress is made and are essential for proper identification and connection to the OnStar(R) Call Center. In the event the VCIM requires replacement, the OnStar(R) reconfiguration procedure must be performed. This procedure allows for the new STID and ESN within the replacement module to overwrite the old numbers and update customer and vehicle information at the OnStar(R) Call Center. The reconfiguration process is explained within the VCIM replacement procedure, or the OnStar(R) Reconfiguration Procedure found in the Cellular Communication diagnostic information and procedures section.

OnStar(R) Cellular, GPS, and Diagnostic Limitations

The proper operation of the OnStar(R) 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 Global Positioning System (GPS) system.

The cellular operation of the OnStar(R) System may be inhibited by factors such as the user's range from an analog cellular tower, the state of the cellular carriers' equipment, and the location where the call is placed. Making an OnStar(R) keypress 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(R) Call Center. The OnStar(R) System may also experience connection issues if the identification numbers for the module, station identification number (STID) and electronic serial number (ESN), are not recognized by the cellular carriers local signal receiving towers. OnStar(R) cellular connection issues such as these require the assistance of the General Motors Technical Assistance Center OnStar(R) Group, which coordinates with cellular carriers to resolve connection issues.

The satellites that orbit earth providing the OnStar(R) 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(R) call which has reached the Call Center without vehicle data.

During diagnostic testing of the OnStar(R) 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 cellular calls have been successfully placed. These areas can be found by successfully making an OnStar(R) keypress in a known good OnStar(R) equipped vehicle and confirming success with the OnStar(R) Call Center advisor. Such places can be used as a permanent reference for future OnStar(R) testing.

OnStar(R) Personal Calling

The hand free, OnStar(R) personal calling (OPC) cellular phone feature is an additional option to the OnStar(R) System. This feature is already embedded within the vehicle communication interface module (VCIM), however, it must be activated by an OnStar(R) advisor. This is done most often during the initial OnStar(R) configuration, if the home location of the vehicle is in a geographic area where OnStar(R) personal calling is available. In the event this feature is not enabled, customers may connect to the OnStar(R) Call Center by pressing the blue OnStar(R) button, and asking an advisor if OPC is available in their area. Users of the Generation 5 OnStar(R) system can verify the system has been configured for OnStar(R) Personal Calling by pressing the answer/end call button, waiting for the system to respond "OnStar Ready" then speaking the word "dial." If the system responds "phone unavailable" the system has not been configured for OPC. All other responses confirm that OPC has been enabled.

Operation of the Hands Free Cellular Phone

Onstar(R) personal calling (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(R) subscription, as this feature cannot be utilized without it. To use OPC, the customer must also purchase units as outlined in the owners guide provided with the OnStar(R) System. When the customer purchases minutes, an OnStar(R) advisor loads these minutes into the vehicle communication interface module (VCIM) over the airwaves at the time of the request, or through a discrete cellular call to the vehicle at a later time. Once loaded into the module, the units may be used for non-international, outbound cellular phone calls, and connection with the OnStar(R) virtual advisor. Units begin to deplete, one unit is equal to one minute, as the customer makes outbound phone calls, answers inbound phone calls, or while connected to the OnStar(R) virtual advisor. In addition, units also have an expiration date, depending upon the type of units purchased. This date is established when the download is performed, and any remaining units expire when the date within the VCIM, which is based on current date and the time transmitted by Global Positioning System (GPS) satellites, has passed. At any time, the user can press the answer/end call button, say "Units" and verify the number of units remaining.

During a hands free call, the microphone and audio system operate the same way as a standard OnStar(R) call. When the answer/end call button is pressed, the audio system will mute; the OnStar(R) System will then return the prompt "OnStar Ready." At this point there are specific commands set to initiate a cellular call. If the vehicle receives a call when the radio is ON, the audio system will mute and an audible ring will be heard though the speakers. The call will be answered when the answer/end call button is pressed.

The VCIM interprets all of the voice-activated commands. A complete list of these commands is supplied in the information provided to the customer. If the information is not available to reference, at any command prompt the caller can say "HELP" and the VCIM will return an audible list of available commands. If the customer concern is not being understood or not being heard by the OnStar(R) System, the user should place a call to the OnStar(R) Call Center to verify proper operation of the microphone. Following this description is an example of the commands and the OnStar(R) System responses. A complete list of commands is supplied in the

information provided to the customer with the OnStar(R) System.

OnStar(R) Steering Wheel Controls

Some vehicles equipped with the OnStar(R) System have the capability of accessing voice mailboxes and other automated phone systems by means of the steering wheel controls, while the OnStar(R) personal calling (OPC) feature is in use. If the Talk or Mute button, depending upon the vehicle, on the steering wheel controls are depressed during an OPC call, the vehicle communication module (VCIM) receives the message on the Class 2 serial data bus from either the radio, the driver information module, or the 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(R) 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, driver information module, or BCM.

OPC Features

The following is an abbreviated list of features that may have an impact for the technician when servicing or diagnosing an OnStar(R) System. For a full list of OnStar(R) Personal Calling features, consult the owner's guide provided to the customer with the OnStar(R) System.

Voice Feedback

The OnStar(R) Personal Calling (OPC) System has the capability of responding to the user with either an automated voice response or with a tone or beep. These 2 types of responses can be switched back and forth by pressing the answer/end call button, waiting for the system to respond "OnStar Ready" and speaking the phrase "voice feedback." The system will then respond, "voice feedback is now on/off."

OPC Security/System Lock

Customers have the capability to lock their OnStar(R) Personal Calling (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(R) 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(R) button and speak to an advisor to unlock the system by means of a discrete cellular call to the vehicle.

Nametags

Customers have the ability to store telephone numbers within the module, referenced by a nametag for the convenience of frequently dialed numbers. This process is initiated by pressing the answer/end call button, waiting for the system response, then speaking the response "store". The system will respond with "number please" at which time the user should enter the number desired to be stored. Once complete, saying the word "store" again lets the system know you are finished entering the number. At this time, the system will elicit the

user to assign a nametag to that number. From this point forward, the user can dial this number by initiating the OnStar(R) personal calling (OPC) feature, speaking the word "call," and repeating the nametag assigned. To delete a nametag, the user should initiate OPC, say "delete" then speak the nametag to be removed. In the event a nametag cannot be deleted in spite of repeated attempts from several speakers, the OnStar(R) module will require replacement.

Mobile Identification Number and Mobile Directory Number

The Generation 5 vehicle communication interface module (VCIM) 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 devise. Although technicians have the capability to change these numbers by means of the scan tool, this should ONLY be done at the direction of and with explicit instruction from General Motors Technical Assistance Center (GM TAC).

Dialing a Phone Number Hands Free

Caller Action	OnStar(R) System Response
IMPORTANT: **If you make a mistake with a number or the OnStar(R) system misunderstands you, say "clear." This will erase the last number said.**	
Press the Answer/End Call button.	"OnStar Ready."
Dial	"Number please."
Say each number clearly, pausing until the system confirms receipt of the number.	The system will repeat the number stated. If the number was not heard or understood, the system will state the word "number" prompting the user to repeat the last number.
Dial	"Dialing" or "Dialing" plus the phone number given.

Operation of the OnStar(R) Speech Recognition Systems

OnStar(R) Generation 5 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 user's 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 dot 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 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(R) 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 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's 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.

	• 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".

Personal Calling Commands

Command	Tip for Better Result
'add'	Emphasize the 'd' at the end of the word.
'call'	Emphasize the 'l' at the end of the word.
'cancel'	Emphasize the 'l' at the end of the word. If you are speaking the 'can' syllable very quickly, try to lengthen it a little.
'clear'	Emphasize the 'r' at the end of the word.
'delete'	Emphasize the 't' at the end of the word. Do not swallow the 'd' at the start of the word.
'dial'	Emphasize the 'l' at the end of the word.
'directory'	Speak all four syllables clearly. Do not swallow the last part of the word.
'help'	Emphasize the 'h' sound at the start of the word. Emphasize the 'p' sound at the end of the

	word
'my number'	Emphasize all three syllables.
'no'	Speak loudly and slowly. Emphasize the 'n' sound at the start of the word. Draw out the 'o' sound at the end of the word.
'redial'	Try to emphasize and lengthen the first syllable: reee-dial
'security'	Speak four syllables clearly. Do not swallow the 'i' sound in the middle of the word.
'store'	Emphasize the 'o' sound in the middle of the word in order to distinguish from 'star'. Emphasize the 'st' sound at the start of the word in order to distinguish from 'four'.
'units'	Speak loudly and clearly.
'verify'	Speak three syllables clearly. Do not swallow the 'i' sound in the middle of the word.
'Virtual Advisor'	Emphasize both words.
'voice feedback'	Emphasize both words.
'yes'	Emphasize the 'y' sound at the start of the word. Emphasize the 's' sound at the end of the word.
'zero', 'oh'	If the system does not understand 'oh', try 'zero', or vice versa.
'one'	Emphasize the 'n' at the end of the word.
'two'	Round your lips for the 'ooo' part of the word. If you are clipping the 'ooo' very short, try to lengthen it, but do not draw it out excessively. Speak in a low pitch. Do not use a rising tone like asking a question; a falling tone like giving an answer is better.
'three'	End the word 'three' in a smile, to draw back your lips. Lengthen the 'eee' sound if you are clipping it very short.
'four'	Emphasize the 'r' at the end of the word.
'five'	Emphasize the 'v' sound.
'six'	Emphasize the 'ks' sound at the end of the word.
'seven'	Emphasize the 'n' at the end of the word. Lengthen the 'sev' syllable.
'eight'	Emphasize the 't' at the end of the word. Lengthen the 'eee' sound at the start of the word.
'nine'	Emphasize the 'n' sounds to distinguish from 'five'.
'star'	Emphasize the 'r' at the end of the word. Emphasize the 'ah' sound in order to distinguish from 'store'.
'pound'	Emphasize the 'p' at the start of the word. Emphasize the 'd' at the end of the word.

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Antenna Bracket Fastener	10 N.m	89 lb in
Antenna Mast	10 N.m	89 lb in
Front Speaker Screw	2.5 N.m	22 lb in
Radio Screw	2.5 N.m	22 lb in
Rear Speaker Screw	2.5 N.m	22 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).**

RADIO/AUDIO SYSTEM SCHEMATICS (W/U2K)

Refer to Radio in System Wiring Diagrams .

RADIO/AUDIO SYSTEM SCHEMATICS (W/U1C/UM7)

Refer to Radio in System Wiring Diagrams .

RADIO/AUDIO SYSTEM SCHEMATICS (W/WBM)

Refer to Radio in System Wiring Diagrams .

VIDEO SYSTEM SCHEMATICS

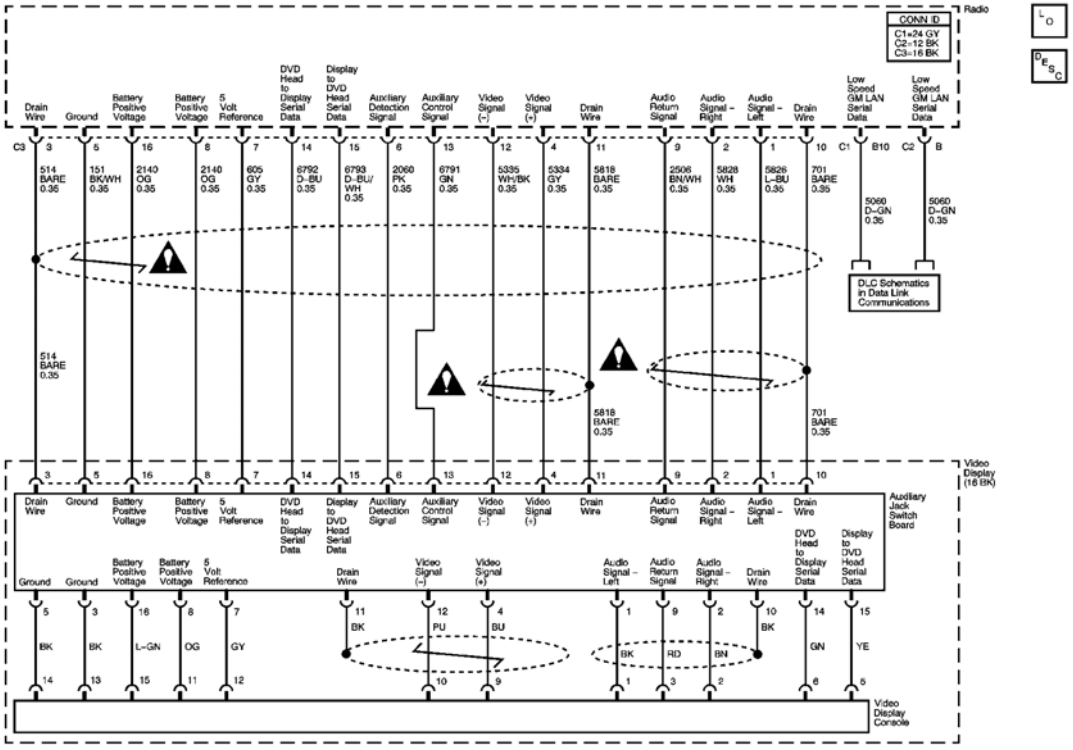


Fig. 1: Video System Schematic
Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

ENTERTAINMENT COMPONENT VIEWS

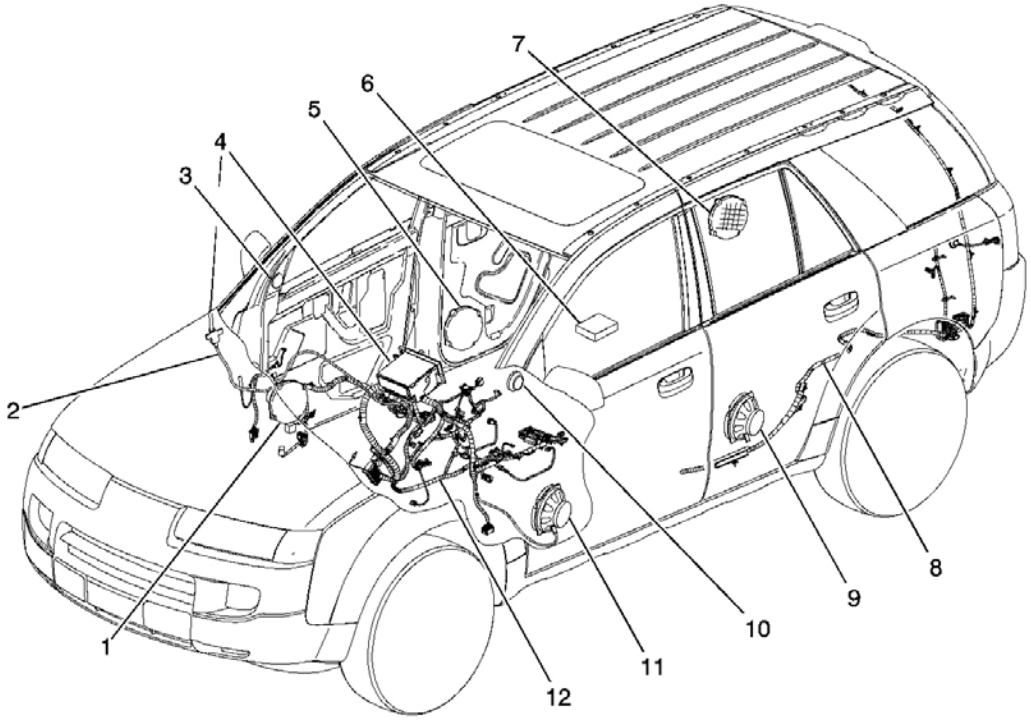


Fig. 2: Radio System Components End View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 2

Callout	Component Name
1	Speaker - RF
2	Radio Antenna Lead
3	Speaker - RF (Tweeter - UW6/WBM)
4	Radio
5	Speaker - RR
6	Amplifier (WBM w/ UR9/UP0)
7	Speaker - Subwoofer (WBM UR9/UP0)
8	Body Harness
9	Speaker - LR
10	Speaker - LF (Tweeter - UW6/WBM)
11	Speaker - LF
12	I/P Harness

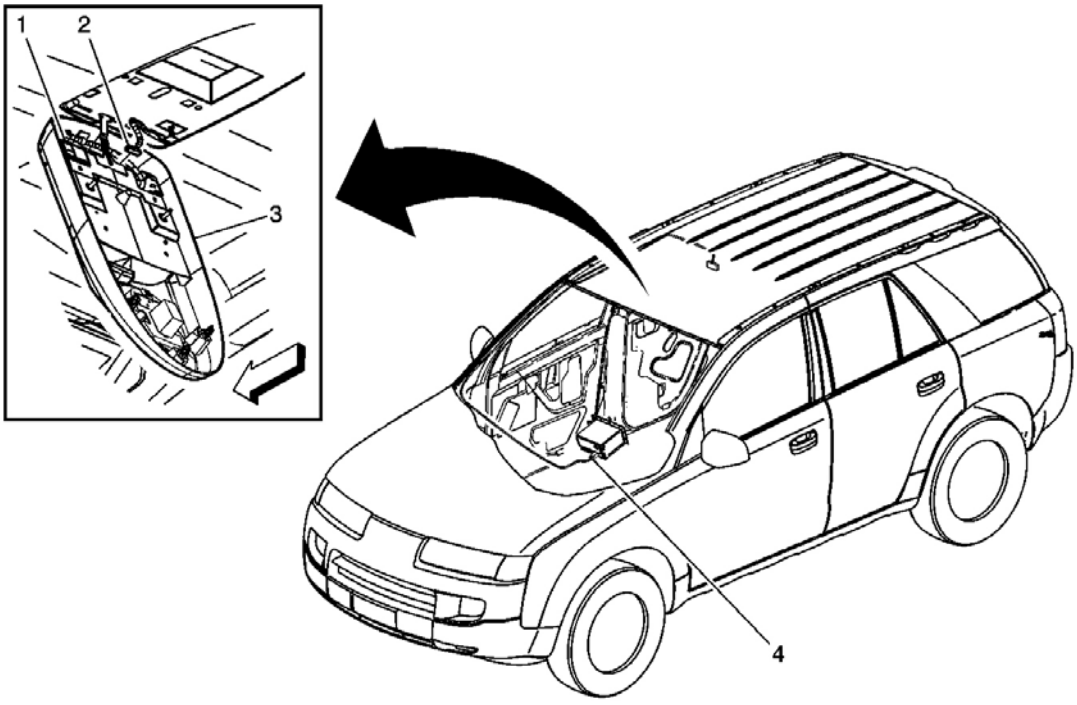


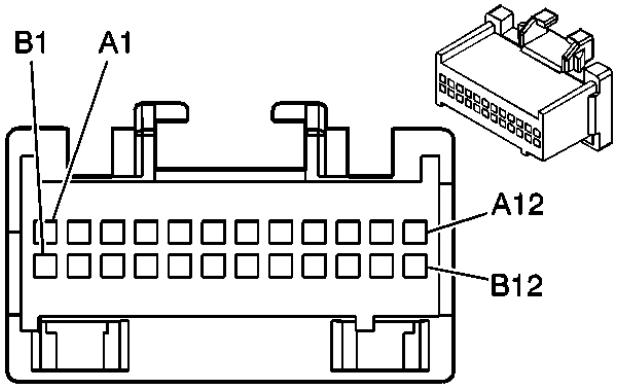
Fig. 3: Video System Components End View (w/U32)
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 3

Callout	Component Name
1	Auxiliary Jack Switch Board Connector (Part of the Video Display)
2	Video Display (16 BK)
3	Video Display Console
4	Radio C3 (16 BK)

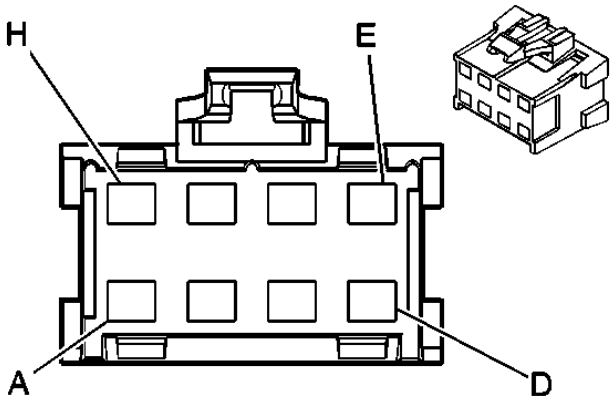
ENTERTAINMENT CONNECTOR END VIEWS

Amplifier C1 (w/WBM) Connector End View



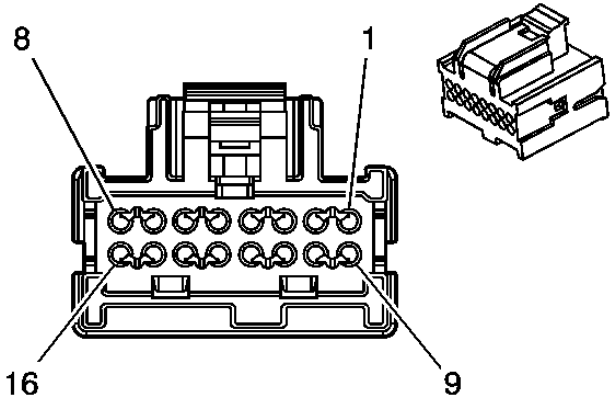
Connector Part Information		• 12110088 • 24-Way F Micro-Pack 100 Series (GY)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A1	D-GN	117	RF Speaker (-)
A2	L-GN	200	RF Speaker Output (+)
A3	L-BU	115	RR Speaker Output (-)
A4	D-BU	46	RR Speaker Output (+)
A5	OG	360	AMP Control
A6	OG	1950	AMP Sense
A7-A8	-	-	Not Used
A9	D-GN	117	RF Speaker Output (-)
A10	L-GN	200	RF Speaker Output (+)
A11	L-BU	115	RR Speaker Output (-)
A12	D-BU	46	RR Speaker Output (+)
B1	GY	118	LF Speaker Output (-)
B2	TN	201	LF Speaker Output (+)
B3	YE	116	LR Speaker Output (-)
B4	BN	199	LR Speaker Output (+)
B5-B8	-	-	Not Used
B9	GY	118	LF Speaker Output (-)
B10	TN	201	LF Speaker Output (+)
B11	YE	116	LR Speaker Output (-)
B12	BN	199	LR Speaker Output (+)

Amplifier C2 (w/WBM) Connector End View



Connector Part Information		• 12110626 • 8-Way F Metri-Pack 280 Series, Flexlock (GY)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	L-GN/BK	1794	Subwoofer Speaker Coil 2 Output (-)
B	D-BU/WH	346	Subwoofer Speaker Coil 2 Output (+)
C	BK	850	Ground
D	OG	2340	Battery Positive Voltage
E-F	-	-	Not Used
G	D-GN	1795	Subwoofer Speaker Coil 1 Output (+)
H	L-BU/BK	315	Subwoofer Speaker Coil 1 Output (-)

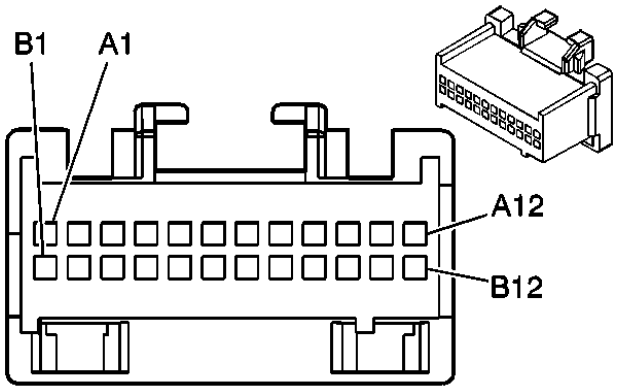
Digital Radio Receiver (w/U2K) Connector End View



	• **Assembly - 15394150**

Connector Part Information		• Assembly w/o CPA - 15416970 • Connector Body - 15411434 • 16-Way F Micro-Pack (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
1	-	-	Not Used
2	BN/WH	367	Left Audio Signal (+)
3	D-GN/WH	368	Right Audio Signal (+)
4	-	-	Not Used
5	D-GN	5060	Low Speed GMLAN Serial Data
6-8	-	-	Not Used
9	BK/WH	151	Ground
10	BK/WH	372	Audio Common
11	BARE	813	Drain Wire
12-15	-	-	Not Used
16	OG	440	Battery Positive Voltage

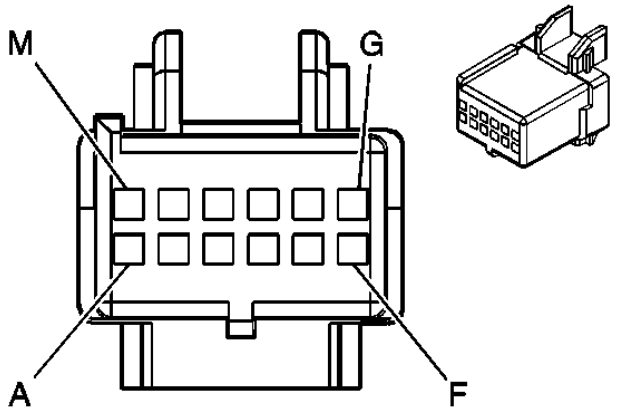
Radio C1 Connector End View



Connector Part Information		• 12110088 • 24-Way F Micro-Pack 100 Series (GY)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A1	GY	118	LF Speaker Output (-)
A2	TN	201	LF Speaker Output (+)
A3	L-BU	115	RR Speaker Output (-)
A4	D-BU	46	RR Speaker Output (+)
A5	BN	199	LR Speaker Output (+)
A6	YE	116	LR Speaker Output (-)
A7	L-GN	200	RF Speaker Output (+)

A8	D-GN	117	RF Speaker Output (-)
A9-A10	-	-	Not Used
A12	BK/WH	151	Ground
B1	OG	2140	Battery Positive Voltage
B2	OG	2140	Battery Positive Voltage
B3-B5	-	-	Not Used
B6	OG	360	Amplifier Control (w/WBM/UR9/UP0)
B7	GY	8	I/P Lamps Dimmer Switch Signal
B8	BN	9	Park Lamps Supply Voltage
B9	-	-	Not Used
B10	D-GN	5060	Low Speed GM LAN Serial Data
B11	YE	43	Accessory Voltage

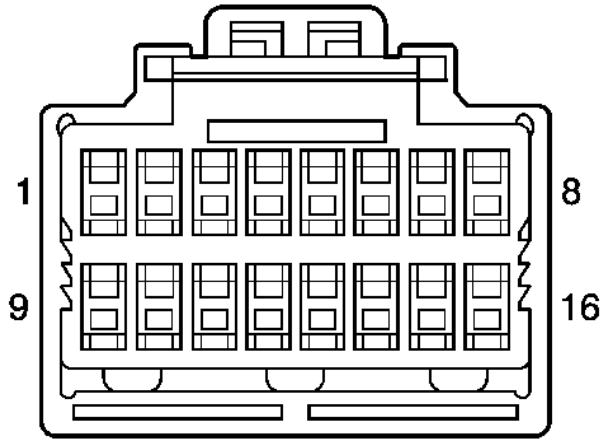
Radio C2 (w/UE1) Connector End View



Connector Part Information		• **12064799** • **12-Way F Micro-Pack 100 Series (BK)**	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	YE/BK	693	Mute Signal
B	D-GN	5060	Low Speed GM LAN Serial Data
C-E	-	-	Not Used
F	BK/WH	151	Ground
G	-	-	Not Used
H	D-GN/WH	368	Right Audio Signal (+)
J	BN/WH	367	Left Audio Signal (+)
K	BK/WH	372	Audio Common
L	OG/BK	2061	Navigation Mono Audio Signal (-)

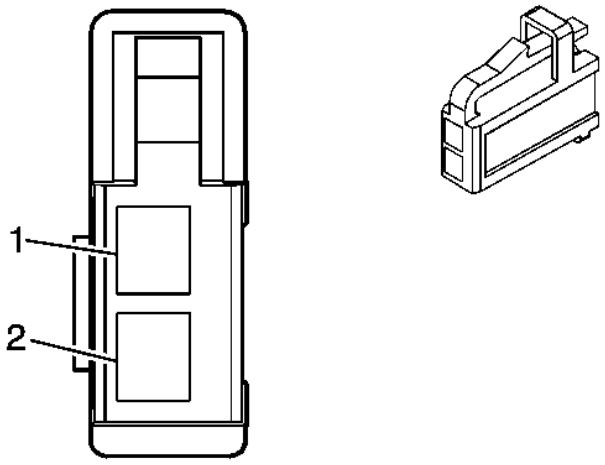
M	PK/BK	2062	Navigation Mono Audio Signal (+)

Radio C3 (w/U32) Connector End View



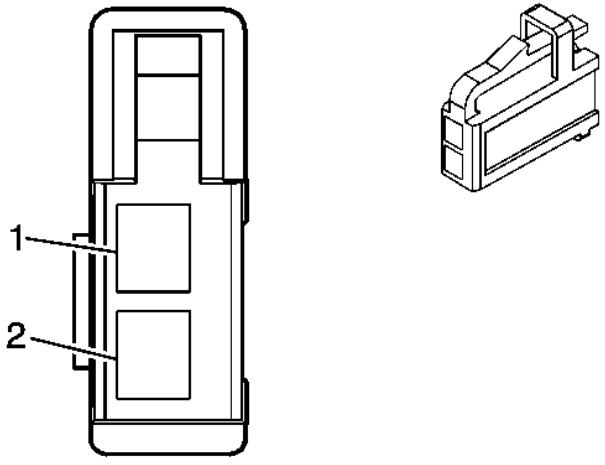
Connector Part Information		• 175966-2 • 16-Way M Multi-Lock (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
1	L-BU	5826	Audio Signal - Left
2	WH	5828	Audio Signal - Right
3	BARE	514	Drain Wire
4	YE/BK	5334	Video Signal (+)
5	BK/WH	151	Ground
6	PK	2060	Video Detection Signal
7	GY	605	5-Volt Reference
8	OG	2140	Battery Positive Voltage
9	BN/WH	2506	Audio Return Signal
10	BARE	701	Drain Wire
11	BARE	5818	Drain Wire
12	WH/BK	5335	Video Signal (-)
13	YE/RD	6791	DVD Control Signal
14	D-BU	6792	DVD Head to Display Serial Data
15	D-BU/WH	6793	Display to DVD Head Serial Data
16	OG	2140	Battery Positive Voltage

Speaker Connector End View - LF



Connector Part Information		• 12186719 • 2-Way F (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	GY	118	LF Speaker Output (-)
B	TN	201	LF Speaker Output (+)

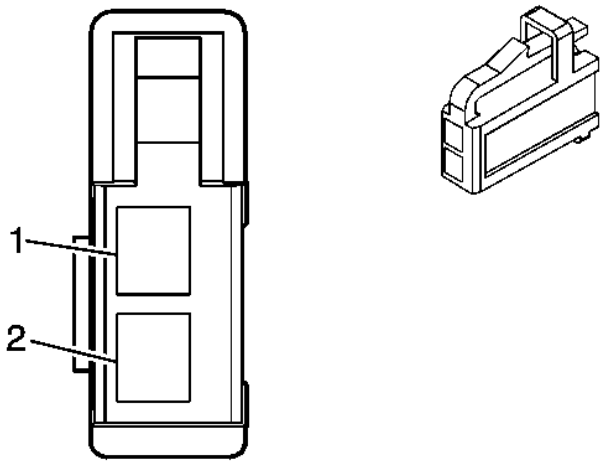
Speaker Connector End View - LR



Connector Part Information		• 12186719 • 2-Way F (BK)	

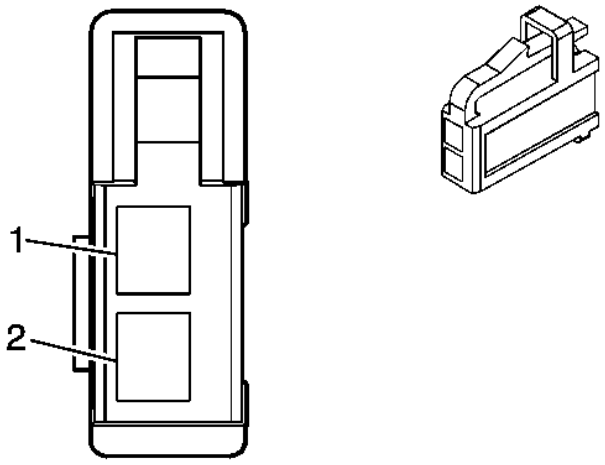
Pin	Wire Color	Circuit No.	Function
A	YE	116	LR Speaker Output (-)
B	BN	199	LR Speaker Output (+)

Speaker Connector End View - RF



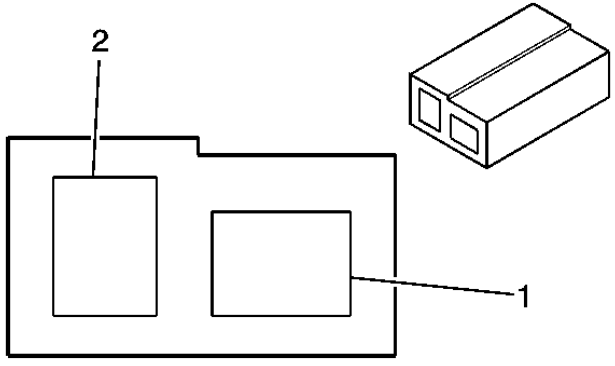
Connector Part Information		• 12186719 • 2-Way F (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	D-GN	117	RF Speaker Output (-)
B	L-GN	200	RF Speaker Output (+)

Speaker Connector End View - RR



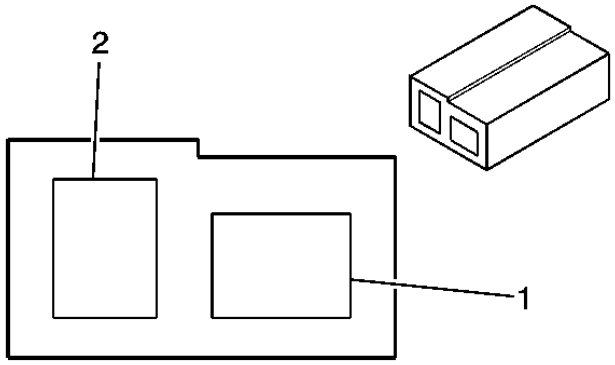
Connector Part Information		• 12186719 • 2-Way F (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	L-BU	115	RR Speaker Output (-)
B	D-BU	46	RR Speaker Output (+)

Speaker Connector End View - LF (Tweeter) (w/WBM or UR9/UP0)



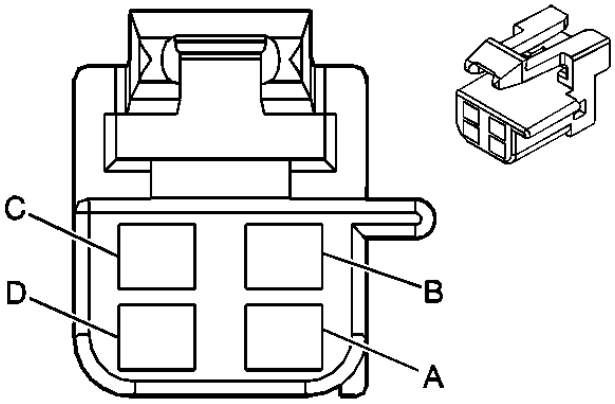
Connector Part Information		• 15305566 • 2-Way F (NA)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	GY	118	LF Speaker Output (-)
B	TN	201	LF Speaker Output (+)

Speaker Connector End View - RF (Tweeter) (w/WBM or UR9/UP0)



Connector Part Information		• 15305566 • 2-Way F (NA)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	D-GN	117	RF Speaker Output (-)
B	L-GN	200	RF Speaker Output (+)

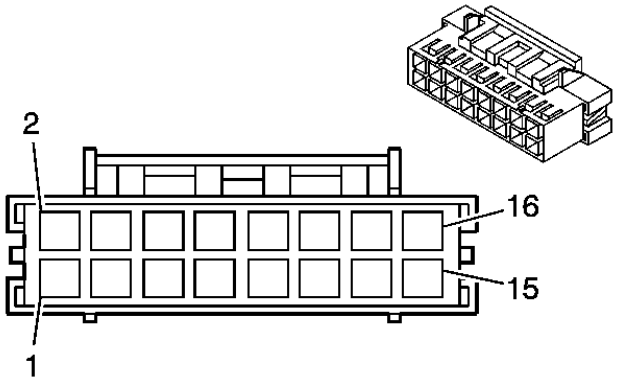
Speaker Connector End View - Subwoofer (w/WBM)



Connector Part Information		• 12064760 • 4-Way F Metri-Pack 150 Series (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	L-GN/BK	1794	Subwoofer Speaker Coil 2 Output (-)
B	D-BU/WH	346	Subwoofer Speaker Coil 2 Output (+)
C	L-BU/BK	315	Subwoofer Speaker Coil 1 Output (-)

D	D-GN	1795	Subwoofer Speaker Coil 1 Output (+)

Video Display (w/U32) Connector End View



Connector Part Information		• XADRP-16V • 16-Way F Multi-Lock (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
1	L-BU	5826	Audio Signal - Left
2	WH	5828	Audio Signal - Right
3	BARE	514	Drain Wire
4	YE/BK	5334	Video Signal (+)
5	BK/WH	151	Ground
6	PK	2060	DVD Detection Signal
7	GY	605	5-Volt Reference
8	OG	2140	Battery Positive Voltage
9	BN/WH	2506	Audio Return Signal
10	BARE	701	Drain Wire
11	BARE	5818	Drain Wire
12	WH/BK	5335	Video Signal (-)
13	YE/RD	6791	DVD Control Signal
14	D-GN	6792	DVD Head to Display Serial Data
15	OG	6793	Display to DVD Head Serial Data
16	OG	2140	Battery Positive Voltage
13	YE/RD	6791	DVD Control Signal
13	YE/RD	6791	DVD Control Signal
14	D-GN	6792	DVD Head to Display Serial Data
15	OG	6793	Display to DVD Head Serial Data
16	OG	2140	Battery Positive Voltage

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - ENTERTAINMENT

Begin the system diagnosis with **Diagnostic System Check - Entertainment System** . The Entertainment System Diagnostic System Check 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 Entertainment System Diagnostic System Check will identify the correct procedure for diagnosing the system and where the procedure is located.

DIAGNOSTIC SYSTEM CHECK - ENTERTAINMENT SYSTEM

Test Description

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

2: Lack of communication may be due to a partial malfunction of the GM LAN serial data circuit or due to a total malfunction of the GM LAN serial data circuit. The specified procedure will determine the particular condition.

3: The symptom list in Symptoms will determine the correct diagnostic procedure to use.

4: The presence of DTCs which begin with U indicate some other module is not communicating. The specified procedure will compile all the available information before tests are performed.

Diagnostic System Check - Entertainment System

Step	Action	Yes	No
1	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. Does the scan tool power up?	Go to **Step 2**	Go to **Scan Tool Does Not Power Up** in Data Link Communications
2	Attempt to establish communication with the following: • Radio • Digital Radio Receiver (U2K)		

	Does the scan tool communicate with all devices present?	Go to **Step 3**	Go to **Scan Tool Does Not Communicate with Low Speed GMLAN Device** in Data Link Communications
3	Select the following display DTC functions on the scan tool: • Radio • Digital Radio Receiver (U2K) Does the scan tool display any DTCs?	Go to **Step 4**	Go to **Symptoms - Entertainment**
4	Does the scan tool display any DTCs which begin with a U?	Go to **Scan Tool Does Not Communicate with Low Speed GMLAN Device** in Data Link Communications	Go to **Step 5**
5	Does the scan tool display DTC B1000?	Go to **Diagnostic Trouble Code (DTC) List** in Body Control System	Go to **Step 6**
6	Does the scan tool display DTC B1325?	Go to **Diagnostic Trouble Code (DTC) List** in Engine Electrical	Go to **Diagnostic Trouble Code (DTC) List**

SCAN TOOL OUTPUT CONTROLS

Scan Tool Output Controls

Scan Tool Output Control	Additional Menu Selection(s)	Description
Display(s) Test	-	Commanding the Display(s) test ON will illuminate all elements in the radio display. Commanding the Display(s) test OFF will turn off all elements in the radio display.
Left Front Speaker	Front Speakers	Commanding the speaker ON turns off all speakers except this one. Commanding the speaker OFF turns off all speakers.
Left Rear Speaker	Rear Speakers	Commanding the speaker ON turns off all speakers except this one. Commanding the speaker OFF turns off all speakers.
Right Front Speaker	Front Speakers	Commanding the speaker ON turns off all speakers except this one. Commanding the speaker OFF turns off all speakers.
Right Rear Speaker	Rear Speakers	Commanding the speaker ON turns off all speakers except this one. Commanding the speaker OFF turns off all speakers.

SCAN TOOL DATA LIST

Radio Scan Tool Data List

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Ignition ON/Engine OFF/Radio ON/CD Playing			
8-Digit GM Part Number	Module Information	Numeric	Varies
Amplifier Present	System Configuration	Yes/No	Varies
EQ Setting	System Configuration	VUE, VUE w/amp, ION Cpe, ION Cpe w/wamp, ION Sed, ION Sed w/amp	Varies
VIN	System Configuration	Alpha Numeric	Varies
Band	Playback Information	FM1, FM2, AM, XM1, XM2	Varies
Preset	Playback Information	Preset #, Not a Preset	Varies
Volume Control	Playback Information	Numeric Percent	Varies
Bass Control	Playback Information	Percent	Varies
Source Status	Playback Information	Off/Tuner/CD/RDS/OnStar/Remote Dig Aud Broadcast Receiver	CD
Total Radio Hours	Playback Information	Hrs	Varies
Total CD Hours	Playback Information	Hrs	Varies
Treble Control	Playback Information	Percent	Varies
Fade Control Front	Playback Information	Percent	Varies
Fade Control Rear	Playback Information	Percent	Varies
Balance Control Left	Playback Information	Percent	Varies
Balance Control Right	Playback Information	Percent	Varies
Received RDS Program Info	Playback Information	Alpha Numeric	Varies
Current RDS Program Info	Playback Information	Alpha Numeric	Varies
User Selected CAT	Playback Information	POP/EASY/TALK/CNTRY/CLASS/JAZZ	Varies
Received CAT	Playback Information	Varies	
	Playback		

CAT Mode	Information	Off/On	Varies
Traf Announce	Playback Information	Disable/Enable	Varies
CAT Interrupt	Playback Information	Disable/Enable	Varies
TRAF Interrupt Cancel	Playback Information	Yes/No	Varies
CAT Interrupt Cancel	Playback Information	Yes/No	Varies
Signal Status	Playback Information	Numeric	Varies

Radio Input Keys Scan Tool Data List

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Ignition ON/Engine OFF/ Radio ON			
Fast Forward Button	Input Keys	On/Off	Varies
Reverse Button	Input Keys	On/Off	Varies
Repeat Button	Input Keys	On/Off	Varies
Random Button	Input Keys	On/Off	Varies
Seek Up Button	Input Keys	On/Off	Varies
Seek Down Button	Input Keys	On/Off	Varies
No. 1 Preset Button	Input Keys	On/Off	Varies
No. 2 Preset Button	Input Keys	On/Off	Varies
No. 3 Preset Button	Input Keys	On/Off	Varies
No. 4 Preset Button	Input Keys	On/Off	Varies
No. 5 Preset Button	Input Keys	On/Off	Varies
No. 6 Preset Button	Input Keys	On/Off	Varies
Recall Button	Input Keys	On/Off	Varies
AM/FM button	Input Keys	On/Off	Varies
Auto Tone Up Button	Input Keys	On/Off	Varies
Auto Tone Down Button	Input Keys	On/Off	Varies
POWER button	Input Keys	On/Off	Varies
TUNE button	Input Keys	On/Off	Varies
Category Up Button	Input Keys	On/Off	Varies
Category Down Button	Input Keys	On/Off	Varies
RDS Button	Input Keys	On/Off	Varies
CD Eject Button	Input Keys	On/Off	Varies
CD Load Button	Input Keys	On/Off	Varies
Mute Status	Input Keys	On/Off	Varies
Information Button	Input Keys	On/Off	Varies
Aux. Button	Input Keys	On/Off	Varies

Digital Radio Receiver Scan Tool Data List

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Ignition ON/Engine OFF/Radio ON			
8-Digit GM Part Number	ID Information/Module Information	Numeric	Varies
Battery Voltage	Data	Volts	Varies
Component Serial Number	ID Information/Module Information	Numeric	Varies
Day	ID Information/DSP Software Version ID	Numeric	Varies
Day	ID Information/XM Software Version ID	Numeric	Varies
Digital Radio Antenna	Data	Millivolts or Milliamps	Varies
Ignition Counter	Data	Numeric	Varies
Month	ID Information/DSP Software Version ID	Numeric	Varies
Month	ID Information/XM Software Version ID	Numeric	Varies
Power Mode	Data	Alphanumeric	Run
Radio ID	ID Information/Module Information	Numeric	Varies
Software Version	ID Information/DSP Software Version ID	Numeric	Varies
Software Version	ID Information/XM Software Version ID	Numeric	Varies
Year	ID Information/DSP Software Version ID	Numeric	Varies
Year	ID Information/XM Software Version ID	Numeric	Varies

SCAN TOOL DATA DEFINITIONS

8-Digit GM Part Number

The scan tool displays an 8-digit numeric number. The part number of the module.

AM/FM Button

The scan tool displays On or Off. The scan tool will display On if the AM/FM button is pressed.

Amplifier Present

The scan tool displays Yes or No. The scan tool will display Yes if the radio has been programmed for a

vehicle equipped with an amplifier. The scan tool will display No if the radio has been programmed for a vehicle that is not equipped with an amplifier.

Antenna Connected

The scan tool displays Yes or No. The scan tool will display Yes if the digital radio receiver antenna is properly connected.

Auto Tone Up Button

The scan tool will display On or Off. The scan tool will display On if the left side of the AUTO EQ rocker button is pressed.

Auto Tone Down Button

The scan tool will display On or Off. The scan tool will display ON if the right side of the AUTO EQ rocker button is pressed.

AUX

The scan tool will display On or Off. The scan tool will display ON if the AUX button is pressed.

Balance Control Left

The scan tool will display a numeric percent. This percent reflects the position of the balance setting. If the balance is adjusted all the way to the left, the scan tool will display 100%. If the balance is adjusted all the way to the right, the scan tool will display 0%.

Balance Control Right

The scan tool will display a numeric percent. This percent reflects the position of the balance setting. If the balance is adjusted all the way to the right, the scan tool will display 100%. If the balance is adjusted all the way to the left, the scan tool will display 0%.

Band

The scan tool displays FM1, FM2, AM, XM1, or XM2. The scan tool displays the band to which the radio is currently tuned.

Bass Control

The scan tool displays a numeric percent. If the bass is adjusted to maximum level, the scan tool will display 100%. If the bass is adjusted to a minimum level, the scan tool will display 0%.

Battery Voltage

The scan tool will display 0-25.5 volts. The scan tool will display the voltage as measured from the modules battery positive voltage circuit to the modules ground circuit.

Calibration ID

The scan tool will display 0-9999. The number designates what calibration is contained within the module.

Category Down Button

The scan tool will display On or Off. The scan tool will display On when the right side of the Category rocker button is pressed.

Category Up Button

The scan tool will display On or Off. The scan tool will display On when the left side of the Category rocker button is pressed.

Category Interrupt

The scan tool will display Disable or Enable. The scan tool will display Enable when the Category interrupt function is enabled.

Category Interrupt Cancel

The scan tool will display Yes or No. The scan tool will display Yes if the category interrupt function has been cancelled.

Category Mode

The scan tool will display On or Off. The scan tool will display On when the category mode is enabled.

CD Deck Hardware Level

The scan tool will display a numeric number. The number designates the modules CD deck hardware level.

CD Deck Software Level

The scan tool will display a numeric number. The number designates the modules CD deck software level.

CD Eject Button

The scan tool will display On or Off. The scan tool will display On when the CD Eject button is pressed.

CD Load Button

The scan tool will display On or Off. The scan tool will display On when the CD Load button is pressed.

Component Serial Number

The scan tool displays the serial number of the module.

Current RDS Program Info

The scan tool will display the RDS program information being currently received.

Digital Radio Antenna

This parameter indicates the amount of current being used by the digital radio antenna by measuring the voltage drop across an internal resistor. Early modules support the mV reading, while later modules support the mA reading.

DSP Software Version

The scan tool will display a numeric number. The scan tool will display the current DSP software version number.

EQ Setting

The scan tool will display VUE; VUE w/amp; ION cpe; ION cpe w/amp; ION sed; or ION sed w'/amp. The scan tool will display the current configuration of the radio, which was programmed during the radio setup.

Fade Control Front

The scan tool will display a numeric percent. This percent reflects the position of the fade setting. If the fade is adjusted all the way to the front, the scan tool will display 100%. If the fade is adjusted all the way to the rear, the scan tool will display 0%.

Fade Control Rear

The scan tool will display a numeric percent. This percent reflects the position of the fade setting. If the fade is adjusted all the way to the rear, the scan tool will display 100%. If the fade is adjusted all the way to the front, the scan tool will display 0%.

Fast Forward Button

The scan tool will display On or Off. The scan tool will display On when the FFWD button is pressed.

Information Button

The scan will display On or Off. The scan tool will display On when the INFO button is pressed.

Mute Status

The scan tool will display On or Off. The scan tool will display On when the OnStar system is activated and provides a ground to the discrete mute circuit on the radio.

POWER button

The scan tool will display On or Off. The scan tool will display on when the POWER button is pressed.

Power Mode

The scan tool will display Off- Asleep/ Off-Awake/Accessory/Run/Crank/RAP. The scan tool will display the current power mode.

Preset

The scan tool will display a Preset #/ Not a Preset. The scan tool will display the current Preset number to which the radio is tuned, or display Not a Preset if the station is not stored in the preset memory of the radio.

No. 1 Preset Button

The scan tool will display On or Off. The scan tool will display On when the Preset 1 button is pressed.

No. 2 Preset Button

The scan tool will display On or Off. The scan tool will display On when the Preset 2 button is pressed.

No. 3 Preset Button

The scan tool will display On or Off. The scan tool will display On when the Preset 3 button is pressed.

No. 4 Preset Button

The scan tool will display On or Off. The scan tool will display On when the Preset 4 button is pressed.

No. 5 Preset Button

The scan tool will display On or Off. The scan tool will display On when the Preset 5 button is pressed.

No. 6 Preset Button

The scan tool will display On or Off. The scan tool will display On when the Preset 6 button is pressed.

Prom ID

The scan tool displays 0-999. The number is the identification number of the module's internal PROM.

Radio Signal Strength

The scan tool will display No Signal/ Weak Signal/Marginal Signal/Good Signal.

Source Status

The scan tool will display Off/Tuner/ CD/RDS Interrupt/DRR Tuner/OnStar. The display will depend on the current source of the audio signal.

Recall Button

The scan tool will display On/Off. The scan tool will display On when the RCL button is pressed.

Random Button

The scan tool will display On/Off. The scan tool will display On when the RDM button is pressed.

RDS Button

The scan tool will display On/Off. The scan tool will display On when the RDS button is pressed.

Received Category

The scan tool will display the program category that is received from the broadcasting station, if available.

Received RDS Program Info

The scan tool will display the RDS program information received from the broadcasting station, if available.

Reverse Button

The scan tool will display On/Off. The scan tool will display On when the REV button is pressed.

Repeat Button

The scan tool will display On/Off. The scan tool will display On when the RPT button is pressed.

Seek Down Button

The scan tool will display On/Off. The scan tool will display On when the right side of the SEEK rocker

button is pressed.

Seek Up Button

The scan tool will display On/Off. The scan tool will display On when the left side of the SEEK rocker button is pressed.

Signal Status

The scan tool will display a numeric representation of the radio signal status.

Software Version

The scan tool displays the release version of the software contained in the Digital Radio Receiver.

Theft Active

The scan tool will display Yes/No. The scan tool will display Yes if the radio is locked as a result of the theft deterrent feature.

Total CD Hours of Operation

The scan tool will display the number of hours which the CD player has operated.

Total Radio Hours of Operation

The scan tool will display the number of hours which the radio has operated.

Traf Announce

The scan tool will display Enable/Disable. The scan tool will display Enable if the traffic announcement feature has been enabled.

Traf Interrupt Cancel

The scan tool will display Yes/No. The scan tool will display Yes if the traffic interrupt feature has been cancelled.

Treble Control

The scan tool displays a numeric percent. If the treble is adjusted to maximum level, the scan tool will display 100%. If the treble is adjusted to a minimum level, the scan tool will display 0%.

TUNE button

The scan tool will display On or Off. The scan tool will display On if the TUNE button is pressed.

User Selected Category

The scan tool will display POP/EASY/TALK/CNTRY/CLASS/JAZZ. The scan tool will display the user selected RDS category.

VIN

The scan tool will display the vehicle's identification number.

VIN Learned

The scan tool will display Yes or No. The scan tool will display Yes if the radio has been programmed with the VIN.

Volume Control

The scan tool displays a numeric percent. If the volume is adjusted to maximum level, the scan tool will display 100%. If the volume is adjusted to a minimum level, the scan tool will display 0%.

DIAGNOSTIC TROUBLE CODE (DTC) LIST

Diagnostic Trouble Code (DTC) List

DTC	Diagnostic Procedure	Module(s)
B1025, B1035, B1045, or B1055	**DTC B1025, B1035, B1045, or B1055 (w/out RPO WBM)** or **DTC B1025, B1035, B1045, or B1055 (w/ RPO WBM)**	Radio
B1030, B1040, B1050, or B1060	**DTC B1030, B1040, B1050, or B1060 (w/ out RPO WBM)** or **DTC B1030, B1040, B1050, or B1060 (w/ RPO WBM)**	Radio
B1259	**DTC B1259**	Digital Radio Receiver

DTC B1025, B1035, B1045, OR B1055 (W/OUT RPO WBM)

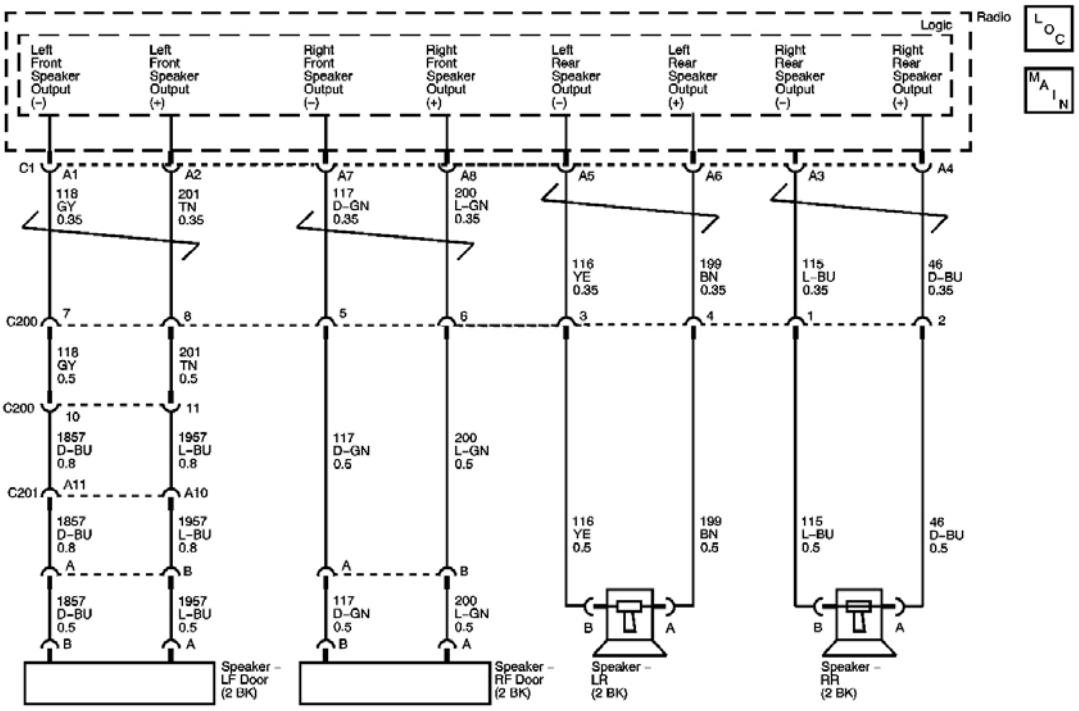


Fig. 4: DTC B1025, B1035, B1045, or B1055 Circuit (w/out RPO WBM)
Courtesy of GENERAL MOTORS CORP.

Circuit Description

When the radio is set at minimum volume, the plus (+) and minus (-) speaker outputs are approximately 5-6 volts measured to vehicle ground. As the volume increases, the plus and minus change to create a voltage difference between each other. This drives the voice coil of the speaker producing sound.

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

- DTC B1025 LF Audio Output (+) Circuit
- DTC B1035 RF Audio Output (+) Circuit
- DTC B1045 LR Audio Output (+) Circuit
- DTC B1055 RR Audio Output (+) Circuit

DTC B1025, B1035, B1045, or B1055 Symptoms (w/out RPO WBM)

DTC Symptom	DTC Symptom Descriptor
01	Short to Battery
02	Short to Ground
04	Open Circuit

Conditions for Running the DTC

B1025 - B1055 01, 02, and 04

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

- The vehicle power mode is ACCESSORY, RUN, or RAP.
- The system voltage is at least 9.0 V and no more than 16.0 V.
- All the above conditions are present for greater than 250 ms.

Conditions for Setting the DTC

The following conditions are present for 250 ms or longer:

B1025 - B1055 01

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

B1025 - B1055 02

The speaker positive output circuit is shorted to ground.

B1025 - B1055 04

The speaker positive output circuit is open.

Action Taken When the DTC Sets

The radio disables the audio output to the speaker with the current fault.

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.

Test Description

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

2: This step verifies that the DTC is still present.
3: This step isolates the fault condition.

DTC B1025, B1035, B1045, or B1055 (w/out RPO WBM)

Step	Action	Yes	No
Schematic Reference:Radio/Audio System Schematics (w/U2K) or **Radio/Audio System Schematics**			

(w/U1C/UM7) or **Radio/Audio System Schematics (w/WBM)** **Connector End View Reference:Entertainment Connector End Views**			
1	Did you review the Description and Operation?	Go to **Step 2**	Go to **Radio/Audio System Description and Operation**
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With the scan tool, monitor the DTC Information for DTC B1025, B1035, B1045, or B1055. Does the scan tool indicate that DTC B1025, B1035, B1045, or B1055 is current?	Go to **Step 3**	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems
3	Test the affected speaker output channel from the radio to the speaker for a short to ground, short to voltage or an open circuit. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 6**	Go to **Step 4**
4	Inspect for poor connections at the harness connector of the radio. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 6**	Go to **Step 5**
5	**IMPORTANT:** **Perform the radio set up procedure for the radio.** Replace the radio. Refer to **Radio Replacement** and to **Radio Setup** .Did you complete the replacement?	Go to **Step 6**	-
6	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 (W/ RPO WBM)

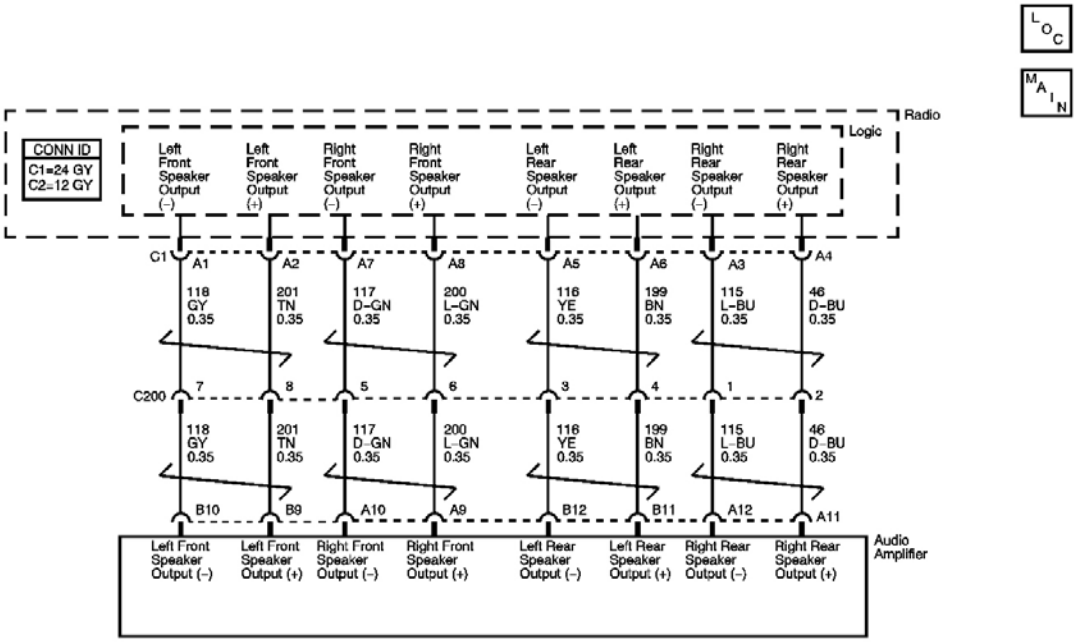


Fig. 5: DTC B1025, B1035, B1045, or B1055 Circuit (w/ RPO WBM)
Courtesy of GENERAL MOTORS CORP.

Circuit Description

When the radio is set at minimum volume, the plus (+) and minus (-) speaker outputs are approximately 5-6 volts measured to vehicle ground. As the volume increases, the plus and minus change to create a voltage difference between each other. This drives the voice coil of the speaker producing sound.

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

- DTC B1025 LF Audio Output (+) Circuit
- DTC B1035 RF Audio Output (+) Circuit
- DTC B1045 LR Audio Output (+) Circuit
- DTC B1055 RR Audio Output (+) Circuit

DTC B1025, B1035, B1045, or B1055 Symptoms (w/ RPO WBM)

DTC Symptom	DTC Symptom Descriptor
01	Short to Battery
02	Short to Ground
04	Open Circuit

Conditions for Running the DTC

B1025 - B1055 01, 02, and 04

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

- The vehicle power mode is ACCESSORY, RUN, or RAP.
- The system voltage is at least 9.0 V and no more than 16.0 V.
- All the above conditions are present for greater than 250 ms.

Conditions for Setting the DTC

The following conditions are present for 250 ms or longer:

B1025 - B1055 01

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

B1025 - B1055 02

The speaker positive output circuit is shorted to ground.

B1025 - B1055 04

The speaker positive output circuit is open.

Action Taken When the DTC Sets

The radio disables the audio output to the speaker with the current fault.

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.

Test Description

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

2: This step verifies that the DTC is still present.

3: This step isolates the fault condition.

DTC B1025, B1035, B1045, or B1055 (w/ RPO WBM)

Step	Action	Yes	No
Schematic Reference:Radio/Audio System Schematics (w/U2K) or **Radio/Audio System Schematics (w/U1C/UM7)** or **Radio/Audio System Schematics (w/WBM)** **Connector End View Reference:Entainment Connector End Views**			

1	Did you review the Description and Operation?	Go to **Step 2**	Go to **Radio/Audio System Description and Operation**
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With the scan tool, monitor the DTC Information for DTC B1025, B1035, B1045, or B1055. Does the scan tool indicate that DTC B1025, B1035, B1045, or B1055 is current?	Go to **Step 3**	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems
3	Test the affected speaker output channel from the radio to the amplifier for a short to ground, short to voltage or an open circuit. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 6**	Go to **Step 4**
4	Inspect for poor connections at the harness connector of the radio. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 6**	Go to **Step 5**
5	**IMPORTANT:** **Perform the radio set up procedure for the radio.** Replace the radio. Refer to **Radio Replacement** and to **Radio Setup** .Did you complete the replacement?	Go to **Step 6**	-
6	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 2**

DTC B1030, B1040, B1050, OR B1060 (W/ OUT RPO WBM)

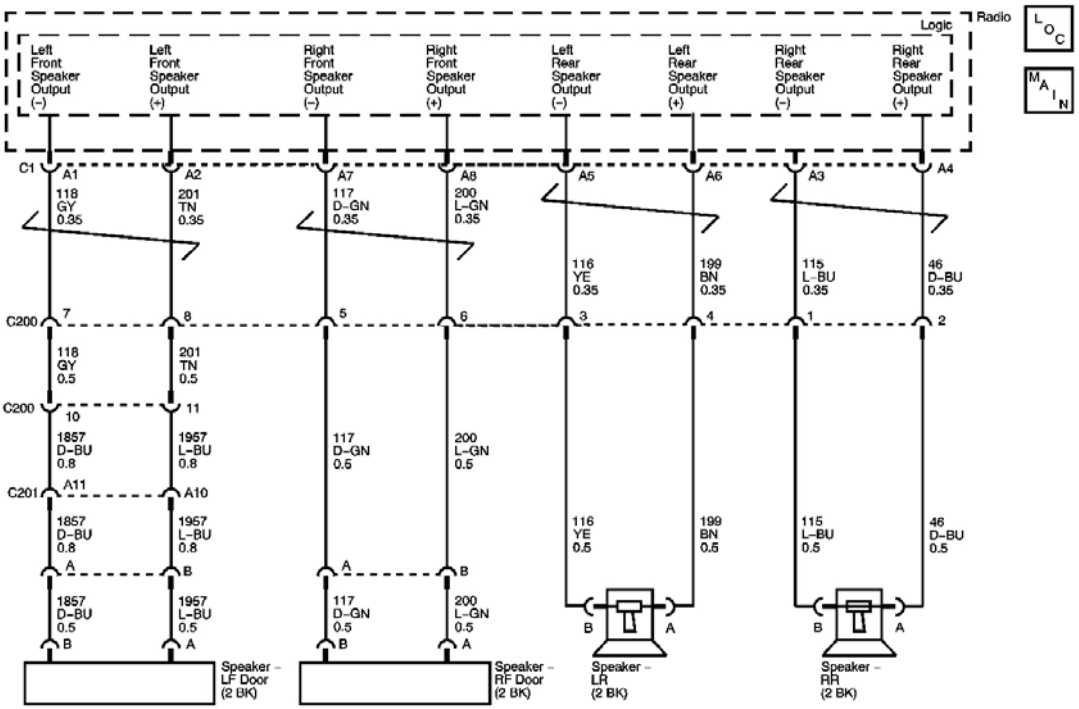


Fig. 6: DTC B1025, B1035, B1045, or B1055 Circuit (w/ out RPO WBM)
Courtesy of GENERAL MOTORS CORP.

Circuit Description

When the radio is set at minimum volume, the plus (+) and minus (-) speaker outputs are approximately 5-6 volts measured to vehicle ground. As the volume increases, the plus and minus change to create a voltage difference between each other. This drives the voice coil of the speaker producing sound.

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

- DTC B1030 LF Audio Output (-) Circuit
- DTC B1040 RF Audio Output (-) Circuit
- DTC B1050 LR Audio Output (-) Circuit
- DTC B1060 RR Audio Output (-) Circuit

DTC B1030, B1040, B1050, or B1060 Symptoms (w/ out RPO WBM)

DTC Symptom	DTC Symptom Descriptor
01	Short to Battery
02	Short to Ground
04	Open Circuit

Conditions for Running the DTC

B1030 - B1060 01, 02, and 04

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

- The vehicle power mode is ACCESSORY, RUN, or RAP.
- The system voltage is at least 9.0 V and no more than 16.0 V.
- All the above conditions are present for greater than 250 ms.

Conditions for Setting the DTC

The following conditions are present for 250 ms or longer:

B1030 - B1060 01

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

B1030 - B1060 02

The speaker negative output circuit is shorted to ground.

B1030 - B1060 04

The speaker negative output circuit is open.

Action Taken When the DTC Sets

The radio disables the audio output to the speaker with the current fault.

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.

Test Description

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

2: This step verifies that the DTC is still present.
3: This step isolates the fault condition.

DTC B1030, B1040, B1050, or B1060 (w/ out RPO WBM)

Step	Action	Yes	No
Schematic Reference:Radio/Audio System Schematics (w/U2K) or **Radio/Audio System Schematics**			

(w/U1C/UM7) or **Radio/Audio System Schematics (w/WBM)** **Connector End View Reference:Entertainment Connector End Views**			
1	Did you review the Description and Operation?	Go to **Step 2**	Go to **Radio/Audio System Description and Operation**
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With the scan tool, monitor the DTC Information for DTC B1030, B1040, B1050, or B1060. Does the scan tool indicate that DTC B1030, B1040, B1050, or B1060 is current?	Go to **Step 3**	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems
3	Test the affected speaker output channel from the radio to the speaker for a short to ground, short to voltage or open circuit. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 6**	Go to **Step 4**
4	Inspect for poor connections at the harness connector of the radio. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 6**	Go to **Step 5**
5	**IMPORTANT:** **Perform the radio set up procedure for the radio.** Replace the radio. Refer to **Radio Replacement** and to **Radio Setup** .Did you complete the replacement?	Go to **Step 6**	-
6	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 2**

DTC B1030, B1040, B1050, OR B1060 (W/ RPO WBM)

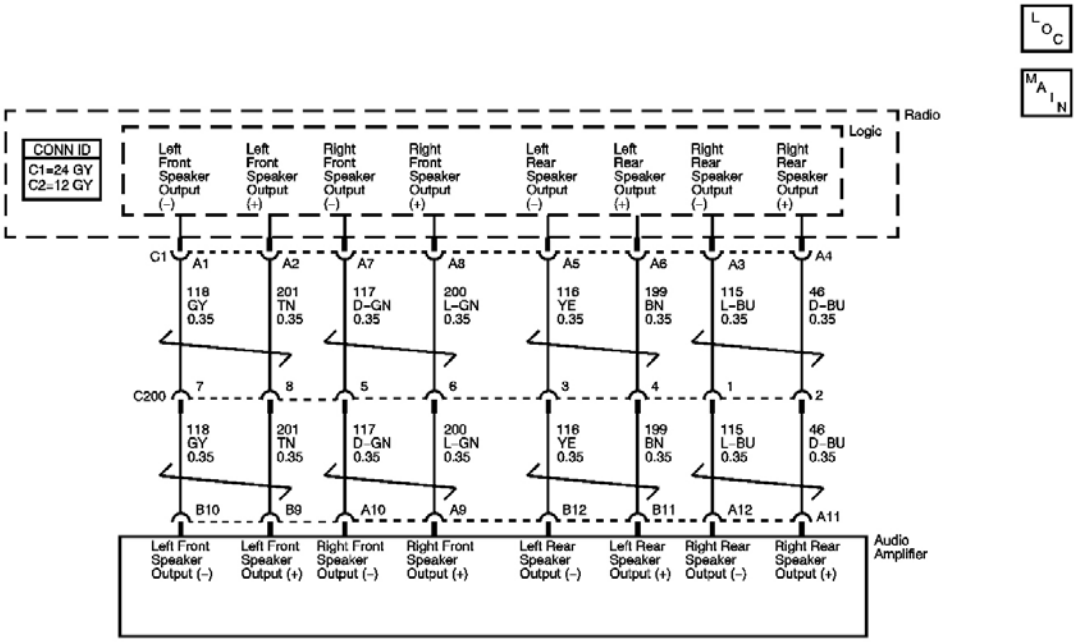


Fig. 7: DTC B1030, B1040, B1050, or B1060 Circuit (w/ RPO WBM)
Courtesy of GENERAL MOTORS CORP.

Circuit Description

When the radio is set at minimum volume, the plus (+) and minus (-) speaker outputs are approximately 5-6 volts measured to vehicle ground. As the volume increases, the plus and minus change to create a voltage difference between each other. This drives the voice coil of the speaker producing sound.

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

- DTC B1030 LF Audio Output (-) Circuit
- DTC B1040 RF Audio Output (-) Circuit
- DTC B1050 LR Audio Output (-) Circuit
- DTC B1060 RR Audio Output (-) Circuit

DTC B1030, B1040, B1050, or B1060 Symptoms (w/ RPO WBM)

DTC Symptom	DTC Symptom Descriptor
01	Short to Battery
02	Short to Ground
04	Open Circuit

Conditions for Running the DTC

B1030 - B1060 01, 02, and 04

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

- The vehicle power mode is ACCESSORY, RUN, or RAP.
- The system voltage is at least 9.0 V and no more than 16.0 V.
- All the above conditions are present for greater than 250 ms.

Conditions for Setting the DTC

The following conditions are present for 250 ms or longer:

B1030 - B1060 01

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

B1030 - B1060 02

The speaker negative output circuit is shorted to ground.

B1030 - B1060 04

The speaker negative output circuit is open.

Action Taken When the DTC Sets

The radio disables the audio output to the speaker with the current fault.

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.

Test Description

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

2: This step verifies that the DTC is still present.

3: This step isolates the fault condition.

DTC B1030, B1040, B1050, or B1060 (w/ RPO WBM)

Step	Action	Yes	No
Schematic Reference:Radio/Audio System Schematics (w/U2K) or **Radio/Audio System Schematics (w/U1C/UM7)** or **Radio/Audio System Schematics (w/WBM)** **Connector End View Reference:Entainment Connector End Views**			

1	Did you review the Description and Operation?	Go to **Step 2**	Go to **Radio/Audio System Description and Operation**
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With the scan tool, monitor the DTC Information for DTC B1030, B1040, B1050, or B1060. Does the scan tool indicate that DTC B1030, B1040, B1050, or B1060 is current?	Go to **Step 3**	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems
3	Test the affected speaker output channel from the radio to the amplifier for a short to ground, short to voltage or open circuit. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 6**	Go to **Step 4**
4	Inspect for poor connections at the harness connector of the radio. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 6**	Go to **Step 5**
5	**IMPORTANT:** **Perform the radio set up procedure for the radio.** Replace the radio. Refer to **Radio Replacement** and to **Radio Setup** .Did you complete the replacement?	Go to **Step 6**	-
6	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 2**

DTC B1259

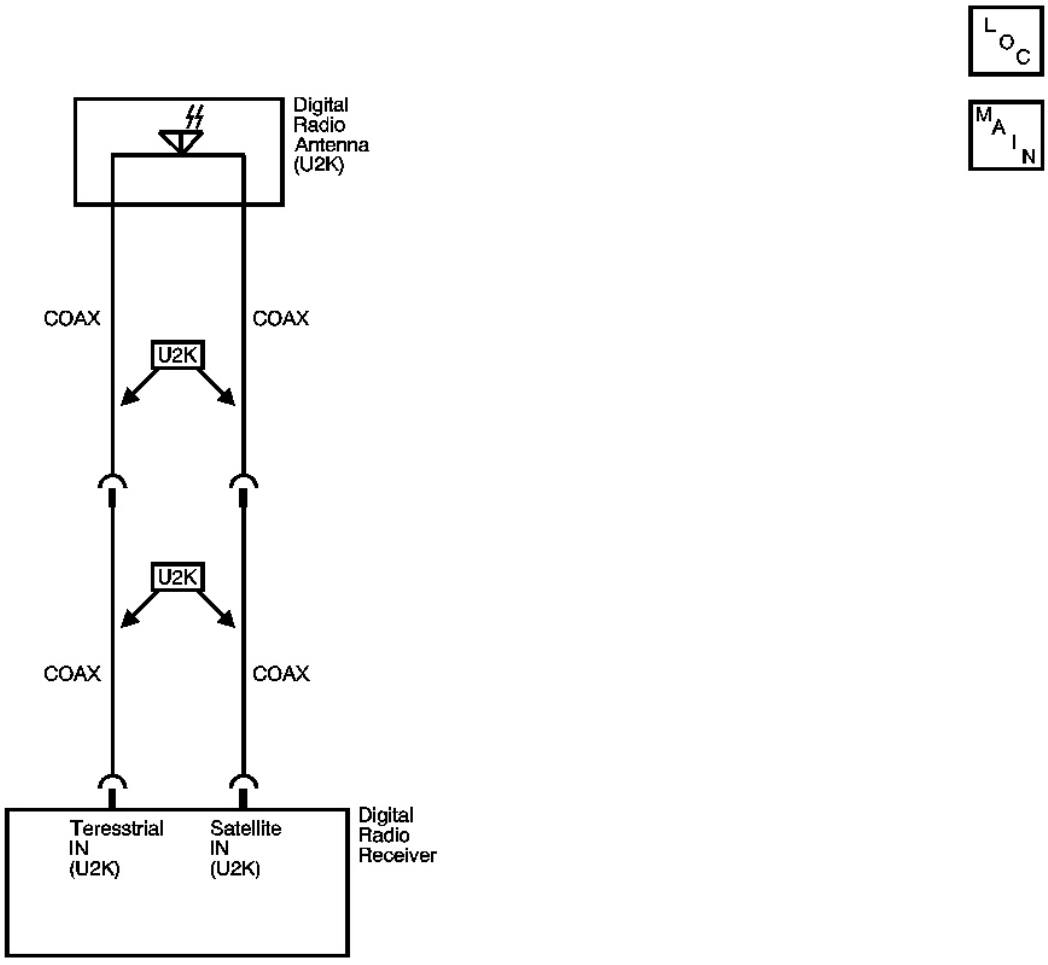


Fig. 8: DTC B1259 Circuit
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The digital radio antenna is connected to the digital radio receiver 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 DTC current for powering the antenna.

Conditions for Running the DTC

This test is run every 300 milliseconds.

Conditions for Setting the DTC

The digital radio receiver 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.

Test Description

The number below refers to the step number on the diagnostic table.

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:Radio/Audio System Schematics (w/U2K) or **Radio/Audio System Schematics (w/U1C/UM7)** or **Radio/Audio System Schematics (w/WBM)** **Connector End Views Reference:Entertainment Connector End Views**				
1	Did you perform the Entertainment System Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Entertainment System**
2	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	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** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 10**	Go to **Step 8**
4	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 5**	Go to **Step 6**
5	Test the antenna cables for an open, or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 10**	Go to **Step 8**
	Inspect for poor connections at the digital radio			

6	receiver. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 10**	Go to **Step 7**
7	**IMPORTANT:** **Always perform the setup procedure for the digital radio receiver. Refer to Digital Radio Receiver Setup .** Replace the digital radio receiver. Refer to **Receiver Replacement - Digital Radio** .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** in Wiring Systems. 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 - 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

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** in Wiring Systems.
- 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** in Wiring Systems.

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**
- **Reduced Volume - One or More Speakers**
- **Speakers Inoperative - One or More**
- **Speakers Inoperative - All**
- **Radio Displays Err1, Err2, ----, or LOCK**
- **Speakers Inoperative - Subwoofer**
- **Video Entertainment System Troubleshooting Hints**
- **Video Entertainment System Inoperative**
- **Video Entertainment System Wireless Headphone Inoperative**
- **Video Display is Poor or Blank**
- **Video Entertainment System Remote Control Inoperative**
- **Auxiliary Video Display is Poor or Blank**

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

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.

- Check for any aftermarket equipment that may have been installed on the vehicle. If aftermarket equipment is found, disconnect it and check if the audio noise is still present.
- Inspect that the antenna connector and the antenna coaxial cable are clean and tight.
- 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.
- If the noise is only from one speaker check for the following before speaker replacement:
  - Isolate the noise using the on-board diagnostics test tone feature or using the SA9412G .
  - Inspect the speaker connections to ensure they are clean and tight. Refer to **Testing for Intermittent Conditions and Poor Connections** 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.

- Ignition noise on the FM band may be an indication of an ignition system problem.
- Inspect that all vehicle grounds are clean, tight and free of corrosion.
- Compare the customers vehicle to another of similar model and audio system to determine if the condition is abnormal.

Identifying Concerns

1. 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. Repeat these steps with the ignition ON, and the engine OFF then again with the engine running.
2. Return the ignition switch to the position that the concern was most noticeable.
3. Remove fuses or circuit breakers one at a time until the noise has been eliminated.
4. Identify what systems or components are powered by the fuse.
5. Reinstall all fuses and circuit breakers.
6. Disconnect the components powered by the fuse one at a time until the concern has been eliminated.

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.
- 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 any suppression device, inspect all of the vehicle systems, including those 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.
  - Add a capacitor from the battery positive voltage (B+) side of the switch to chassis ground.
  - Add a capacitor from the ground side of the switch to chassis ground.
- Use the following available noise suppression devices:
  - 220 micro farad (50 V) capacitor GM P/N 1227895 - Works well for ignition system related noise.
  - 0.47 micro farad capacitor GM P/N 1227894 - Works well for switches and relays.
  - Feed through capacitor GM P/N 3906145- Works well for high current situations.
  - Filter package GM P/N 1224205 - Works well for low current situations.
  - Fuel pump suppressor GM P/N 25027405
  - 21 in braided ground strap GM P/N 8910791
  - 19 in braided ground strap GM P/N 6286800
  - 10.5 in braided ground strap GM P/N 6287160
  - 8.5 in braided ground strap GM P/N 12091511

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 **Diagnostic System Check - Engine Electrical** in Engine Electrical.
5. Install a filter GM P/N 1224205 in the battery voltage feed circuit to the radio.
6. If the noise is not eliminated, install the filter in each following variation:
   - 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 2-wire side is toward the radio with the ground wire attached to chassis ground.
   - Remove the ground from the filter.
7. If the filter GM P/N 1224205 causes a delay when turning the radio ON or OFF, or other problems, remove the filter and install a 0.47 micro farad capacitor to chassis ground.
8. Before reassembling the vehicle, remove any unneeded filters.

9. Test the functionality of all of the vehicle systems, including those not related to the audio system, for proper operation and function.

RADIO POOR RECEPTION

Diagnostic System Check - Entertainment System

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

Using a Test Antenna

Use a test mast antenna to quickly check for poor vehicle antenna operation. Unplug antenna lead-in connector from radio receiver and plug a 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 Ground Test

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

1. Disconnect the negative battery cable.
2. Disconnect the antenna lead-in connector from the radio receiver.
3. Measure the resistance from the negative battery cable to the coaxial cable, outer conductor, connector.
4. The resistance measured should be 0.20 ohms or less.
5. Test the following when the resistance is greater than 0.20 ohms.
    - 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.
6. After finding and correcting the condition, operate the system in order to verify the repair.

Antenna Coaxial Cable Testing

Use the appropriate chart and diagram to test the antenna coaxial cable resistances for the antenna system on the vehicle. Refer to the table when testing the antenna and/or lead-in cable.

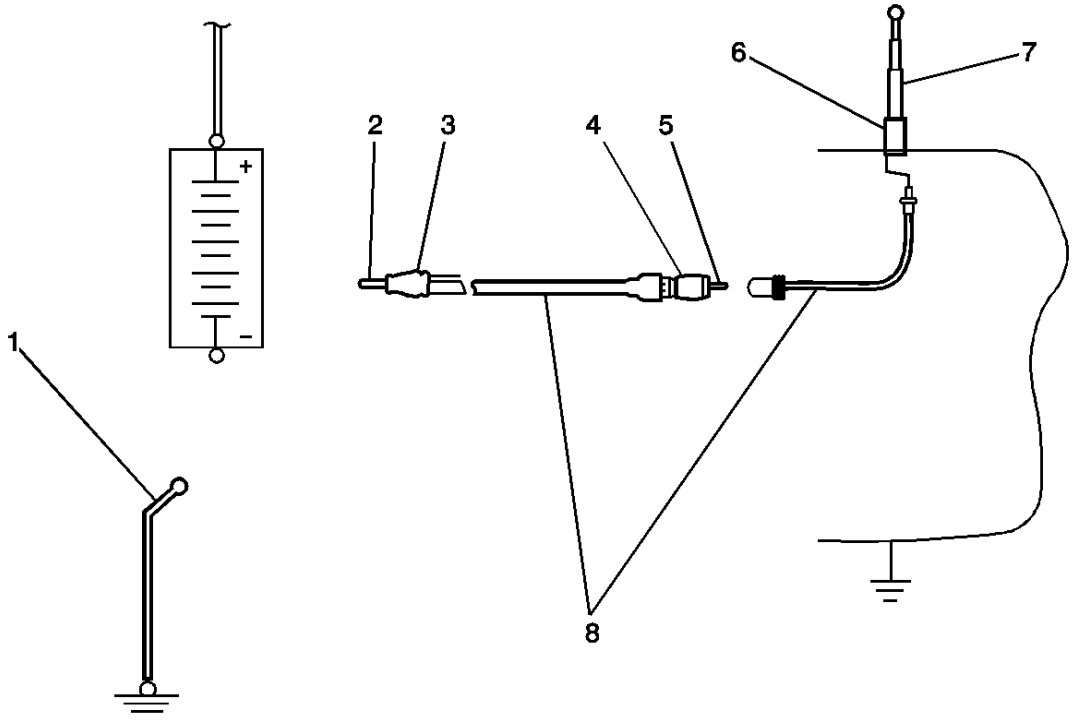


Fig. 9: View of Mast Antenna System
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 15

Callout	Component Name
1	Negative Battery Cable
2	Coaxial Cable Conductor - Radio End
3	Coaxial Cable Metal Outer Shield - Radio End
4	Coaxial Cable Metal Outer Shield - Antenna End
5	Coaxial Cable Conductor - Antenna End
6	Antenna Base
7	Antenna Mast
8	Antenna Coaxial Cable

Radio Poor Reception

Ohmmeter Probes At Points	Resistance Measured In Ohms
1 and 3	Less than 0.2
1 and 4	Less than 0.2
1 and 6	Less than 0.2
1 and 2	Infinite
1 and 5	Infinite

1 and 7	Infinite
2 and 3	Infinite
2 and 4	Infinite
2 and 6	Infinite
3 and 4	Less than 0.2
3 and 6	Less than 0.2
3 and 5	Infinite
3 and 7	Infinite

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 center conductor to antenna mast, ohmmeter probes at points 2 and 7.
2. Total resistance from end to end of center conductor-ohmmeter probes at points 2 and 5:
   - RG-58/RG-59 type cable - less than 0.20 ohms per foot
   - RG-62/RG-62M type cable - less than 3.5 ohms per foot
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. Replace the antenna and/or lead-in cable when the above readings are not obtained. Refer to **Fixed Antenna Replacement** or **Antenna Cable Replacement** for service procedure.

Power Type Antennas

The following chart and diagram show ohmmeter readings which should be obtained.

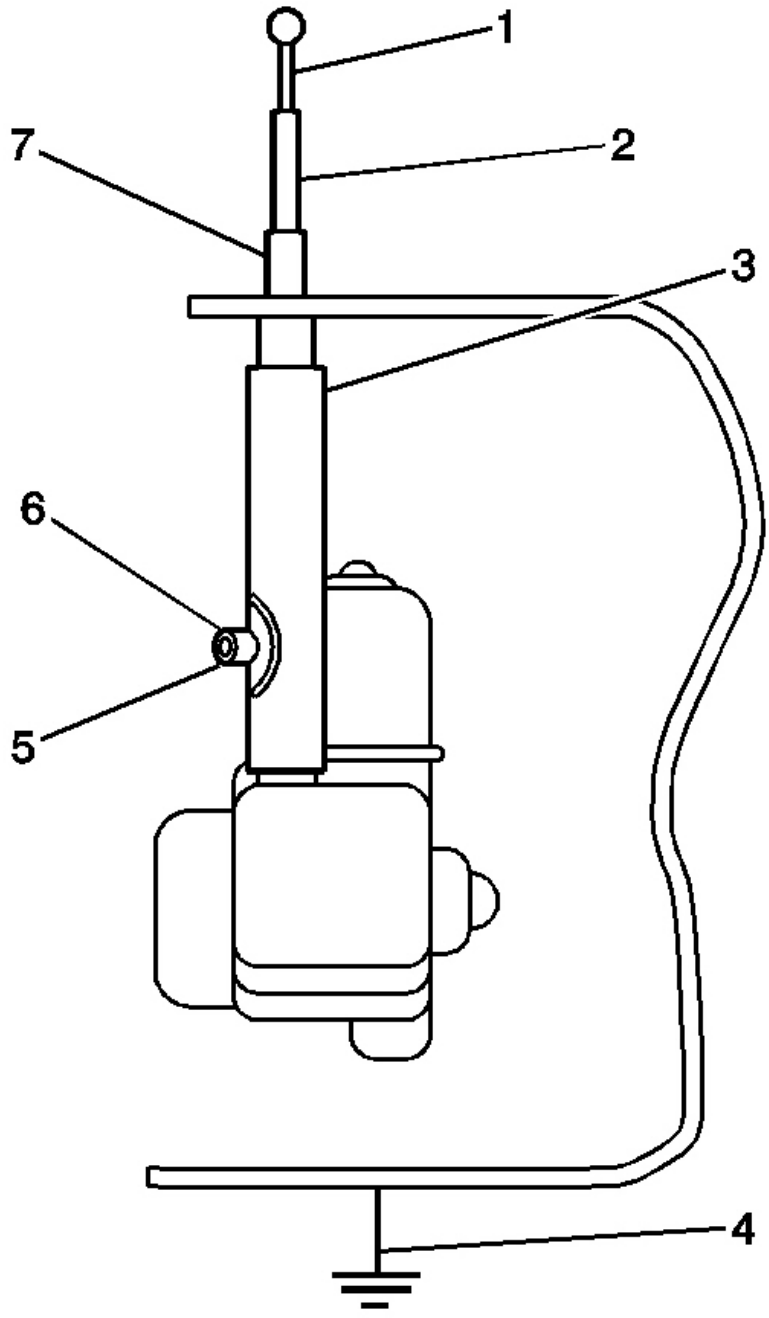


Fig. 10: View of Power Antenna System
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 16

Callout	Component Name
1	Top Antenna Mast Section
2	Middle Antenna Mast Section
3	Antenna Metal Housing Case
4	Body Ground
5	Antenna Lead-in Connector, Outer
6	Antenna Lead-in Connector, Inner
7	Lower Antenna Mast Section

Radio Poor Reception

Ohmmeter Probes At Points	Resistance Measured In Ohms
1 and 6	Less than 0.2
2 and 6	Less than 0.2
7 and 6	Less than 0.2
5 and 4	Less than 0.2
1 and 4	Infinite
2 and 4	Infinite
7 and 4	Infinite

Refer to the table when testing the power antenna.

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

1. Disconnect the negative battery cable.
2. Measure the resistance at the points specified in the table.
3. With the ohmmeter probes fastened to each point, wiggle the separate mast section and antenna housing case.
4. The resistance readings specified in the table should always be obtained. Test and/or replace the following when the resistance readings are out of specification.
   - Replace antenna mast section.
   - Test the ground for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.
5. After finding and correcting the antenna condition, make sure the antenna lead-in connector is corrosion free and properly fastened.
6. Operate the system in order to verify the repair.

Windshield Type Antennas

Inspect the antenna connector wire at base of windshield. Make sure the wire is not pinched or broken and is fully seated into the lead-in receptacle.

Inspect dipole wires within the windshield for breaks. Use the figure and table for the mast antenna as a guide to test for continuity within the antenna coaxial cable. Repair or replace any portion of the coaxial cable that does not meet the resistance measurements. If test antenna indicates radio is OK and lead-in checks fine, the windshield may need to be replaced. A defective windshield antenna results in loss of sensitivity, particularly on AM.

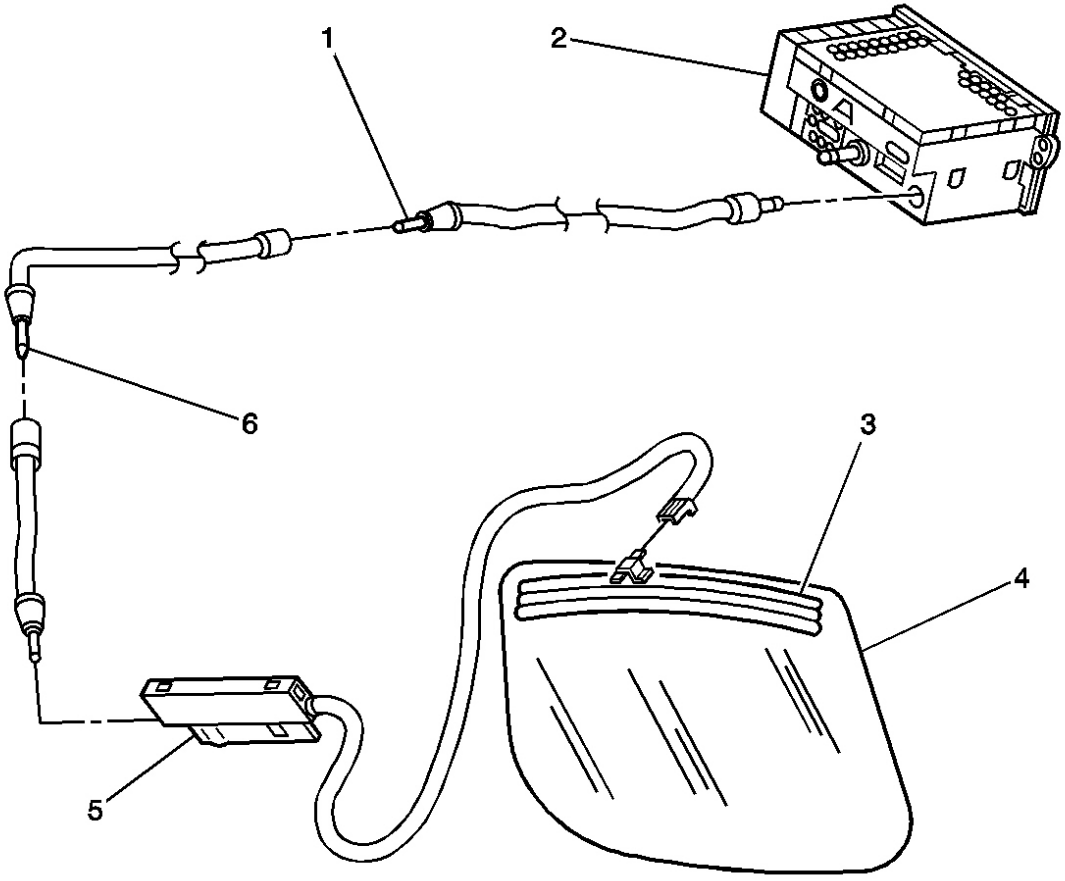


Fig. 11: View of Windshield Antenna System
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 17

Callout	Component Name
1	Antenna Coaxial Lead-in Connector
2	Radio Chassis
3	Window Antenna Grid, Front or Rear
4	Window Glass, Front or Rear
5	Antenna Module
6	Antenna Coaxial Lead-in Connector

Rear Defogger Antenna 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 uses the existing rear defogger grid as an antenna. Using the defogger as an antenna requires the circuitry in the radio antenna module to decouple the RF from the DC heater current.

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

1. 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 0.20 ohms or less. Find and correct the condition if the resistance is out of specification.
2. The antenna relay coil supply voltage circuit to the radio antenna module is open or shorted to ground. Test the antenna relay coil supply voltage circuit for an open or short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.
3. Defective radio antenna module. Replace the radio antenna module.
4. No antenna relay coil supply voltage output from the radio. Disconnect the radio antenna module connector. Turn ON the radio and measure the voltage from the antenna relay coil 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.
5. If noise is present when the rear defogger is on, inspect the rear defogger grid for breaks. Repair as necessary.
6. After finding and correcting the condition, operate the system in order to verify the repair.

Diversity Antenna 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 uses two antennas to form a diversity system. The primary antenna is part of the rear window. The primary antenna receives both AM and FM signals. The secondary antenna is located on the passenger side of the windshield. The secondary antenna receives only FM signals. The radio antenna module processes the antenna reception signals and phase aligns them to create one strong signal.

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

1. 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 0.20 ohms or less. Find and correct the condition if the resistance is out of specification.
2. The antenna enable signal circuit to the radio antenna module is open or shorted to ground. Test the antenna enable signal circuit for an open or short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.
3. The FM composite signal circuit to the radio antenna module is open or shorted to ground. Test the FM composite signal circuit for an open or short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.
4. Improper retention of the antenna cable in the floating retainer. Poor or no connection with the radio will result when the radio is installed if the antenna cable is not properly attached in the floating retainer. Inspect the antenna cable for movement in the floating retainer. Replace the antenna cable if movement is found. Refer to LINK 46832 for service procedure.
5. Defective radio antenna module. Replace radio antenna module.
6. No FM composite signal voltage output from the radio. Disconnect the radio antenna module connector. Turn ON the radio and tune the radio to the FM band. Measure the voltage from the FM composite signal circuit of the radio antenna module to a good ground. Voltage measured should be near 8 volts. If no voltage is measured, replace the radio. Refer to **Radio Replacement** for service procedure.
7. 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 (w/U2K) or Radio/Audio System Schematics (w/U1C/UM7) or Radio/Audio System Schematics (w/WBM) **Connector End View Reference: Entertainment Connector End Views**				
1	Did you perform the Entertainment System Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Entertainment System**
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. 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 1-800-556-3600 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 1-800-556-3600 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	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**
9	Replace the antenna cable. Refer to **Coaxial Cable Replacement - 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**
	IMPORTANT: **Always perform the setup procedure for the digital radio receiver. Refer to Digital Radio Receiver Setup .**			

12	Replace the digital radio receiver. Refer to **Receiver Replacement - Digital Radio** .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 (w/U2K) or Radio/Audio System Schematics (w/U1C/UM7) or Radio/Audio System Schematics (w/WBM)

Connector End Views Reference: Entertainment Connector End Views

Diagnostic System Check - Radio/Audio System

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

Speakers - 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 in Wiring Systems.

With RPO WBM

1. Low level audio circuit open. Test the appropriate low level audio circuit for an open. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.
2. Defective speaker - Replace the appropriate speaker. Refer to **Speaker Replacement Reference** .

With RPO U2K

Audio output signal circuit from digital radio receiver open. Test left, right, and audio common signal circuits for opens. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.

RADIO DISPLAYS ERR1, ERR2, ----, OR LOCK

Refer to Theft Deterrent Feature in **Radio/Audio System Description and Operation** .

REDUCED VOLUME - ONE OR MORE SPEAKERS

Schematic Reference:Radio/Audio System Schematics (w/U2K) or **Radio/Audio System Schematics (w/U1C/UM7)** or **Radio/Audio System Schematics (w/WBM)**

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 list 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.

Without RPO UZ6

- Speaker output circuit resistance high-Test the appropriate speaker output circuits for high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.
- Defective Speaker-Replace the appropriate speaker. Refer to **Speaker Replacement Reference** .

With RPO UZ6

- Speaker output circuit resistance high-Test the appropriate speaker output circuits from the amplifier for high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.
- Low level audio circuit open-Test the appropriate low level audio output circuits from the radio to the amplifier for an open. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.
- Defective speaker-Replace the appropriate speaker. Refer to **Speaker Replacement Reference** .

SPEAKERS INOPERATIVE - ONE OR MORE

Schematic Reference:Radio/Audio System Schematics (w/U2K) or **Radio/Audio System Schematics (w/U1C/UM7)** or **Radio/Audio System Schematics (w/WBM)**

Only Front Speakers or Only Rear Speakers Inoperative (ION- RPO UZ6 only) (VUE- RPO WBM only)

IMPORTANT: The following information lists the most probable cause of the concern to the least probable cause, followed by the appropriate test for the condition. If the list 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.

Audio output from amplifier to speaker shorted to ground or shorted to battery positive voltage.

Test the affected audio output circuits from the amplifier for a short to ground or a short to positive battery voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.

Speaker Inoperative - One or More

Without RPO UZ6 (ION) or RPO WBM (VUE)

1. No audio output from the radio.

   Test for any AC voltage between the audio signal circuits at the affected speaker connector with the radio volume adjusted to 50 percent. If no AC voltage is present, check for shorts to battery positive voltage or shorts to ground on all speaker output circuits from the radio. If no shorts are located, replace the radio. Refer to **Radio Replacement** .

2. Speaker output open.

   Test the appropriate speaker outputs for an open. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.

3. Defective speaker.

   Replace the appropriate speaker. Refer to **Speaker Replacement Reference** .

With RPO UZ6 (ION) or RPO WBM (VUE)

1. Speaker output from amplifier open.

   Test the appropriate speaker outputs for an open. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.

2. Defective speaker.

   Replace the appropriate speaker. Refer to **Speaker Replacement Reference** .

3. No audio output from the amplifier.

   Test for any AC voltage between the audio signal circuits at the affected speaker connector with the radio volume adjusted to 50 percent. If no AC voltage is present, check for shorts to battery positive voltage or shorts to ground on the affected speaker outputs. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. If no shorts are located, replace the amplifier. Refer to **Amplifier Replacement** .

SPEAKERS INOPERATIVE - ALL

Schematic Reference:Radio/Audio System Schematics (w/U2K) or **Radio/Audio System Schematics (w/U1C/UM7)** or **Radio/Audio System Schematics (w/WBM)**

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 list 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.

Without RPO UZ6 (ION) or RPO WBM (VUE)

No audio output from the radio.

Test for any AC voltage between the left front audio signal circuits at the left front speaker connector with the radio volume adjusted to 50 percent. If no AC voltage is present, check for shorts to battery positive or shorts to ground on any speaker output circuit from the radio. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. If no shorts are located, replace the radio. Refer to **Radio Replacement** .

With RPO UZ6 (ION) or RPO WBM (VUE)

1. Battery positive voltage to the amplifier open.

   Test the battery positive circuit to the amplifier for an open. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.

2. Ground to the amplifier open.

   Test the ground circuit to the amplifier for an open. Refer to **Circuit Testing** and**Wiring Repairs** in Wiring Systems.

3. No low level audio output from the radio.

   Test for any AC voltage between the left front low level audio signal circuits at the amplifier connector with the radio volume adjusted to 50 percent. If no AC voltage is present, check for shorts to battery positive or shorts to ground on any speaker output circuit from the radio. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. If no shorts are located, replace the radio. Refer to **Radio Replacement** .

4. No radio on signal to the amplifier

   Test the radio on signal circuit to the amplifier for an open. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.

5. Defective amplifier

   Replace the amplifier. Refer to **Amplifier Replacement** .

SPEAKERS INOPERATIVE - SUBWOOFER

Schematic Reference: **Radio/Audio System Schematics (w/U2K)** or **Radio/Audio System Schematics (w/U1C/UM7)** or **Radio/Audio System Schematics (w/WBM)**

IMPORTANT: If the list 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.

1. Defective subwoofer - Replace the subwoofer. Refer to **Speaker Replacement Reference** .
2. No audio output from amplifier - Test for any AC voltage between the 2 pairs of audio signal circuits at the subwoofer speaker connector with the radio volume adjusted to 50 percent. If no AC voltage is present, check for shorts to battery positive or shorts to ground on the affected speaker output circuits from the amplifier. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. If no shorts are located, replace the amplifier. Refer to **Amplifier Replacement** .

VIDEO ENTERTAINMENT SYSTEM TROUBLESHOOTING HINTS

Schematic Reference: Video System Schematics

- Many conditions that affect video system operation may be corrected without removing the radio or the video entertainment overhead console from the vehicle. Make sure to understand all features of system operation before beginning the diagnosis of the system. Verify the condition and follow the diagnostic procedures in order to isolate and correct the condition.
- Be sure the vehicle battery is fully charged before beginning video system diagnosis.
- If there is no DVD playing from the DVD player, or auxiliary input, the video display backlighting turns off.
- If there are concerns with DVD headphone audio or display video signal quality, check the drain wires and shielding for the audio and video circuits.

VIDEO ENTERTAINMENT SYSTEM INOPERATIVE

Diagnostic System Check - Entertainment

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

Video Entertainment System Inoperative

IMPORTANT: The following information lists the most probable cause of the concern to the least probable cause, followed by the appropriate test for the condition. If the list 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.

Schematic Reference:Video System Schematics

- Ground circuit open.

Test ground circuit for an open. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.

- Battery Positive Circuit Open.

  Test battery positive circuit system voltage. If voltage is not present, check battery positive circuits for an open. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. If no open is found, replace radio. Refer to **Radio Replacement** in Entertainment.

- 5 Volt Reference Circuit open or shorted to ground.

  Test 5 volt reference circuit for 5 volts. If voltage is not present, check circuit for an open or short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. If no open is found, replace radio. Refer to **Radio Replacement** in Entertainment.

- DVD Head to Display Serial Data circuit open or shorted to battery positive.

  At the overhead display connector, check for varying DC voltage on the DVD Head to Display Serial Data circuit. If no varying DC voltage is found, check for an open or a short to battery positive. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. If no open or short to battery positive is found, replace the radio. Refer to **Radio Replacement** in Entertainment.

- Display to DVD Head Serial Data circuit shorted to battery positive or ground.

  Check the Display to DVD Head Serial Data circuit for a short to battery postive or ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. If no short to battery postive or ground is found, replace the overhead console. Refer to **Overhead Console - VES Replacement** in Entertainment.

VIDEO ENTERTAINMENT SYSTEM WIRELESS HEADPHONE INOPERATIVE

Diagnostic System Check - Entertainment

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

Video Entertainment System Wireless Headphone Inoperative

Schematic Reference:Video System Schematics

IMPORTANT: The following information lists the most probable cause of the concern to the least probable cause, followed by the appropriate test for the condition. If the list 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.

1. Headphone audio adjusted all the way down

Adjust the affected headphone audio to an audible level.

2. Headphone battery drained

   Install new batteries in the affected wireless headphone.

3. No audio output from the radio.

   Test for any AC voltage between the left or right audio signal circuits and the audio return signal circuit at the overhead console connector. If no AC voltage is present, check for opens, shorts to battery positive, or shorts to ground on audio output circuits from the radio. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. If there is no AC voltage, and no opens or shorts are found, replace radio. Refer to **Radio Replacement** in Entertainment.

4. Overhead console faulty.

   Replace overhead console. Refer to **Overhead Console - VES Replacement** in Entertainment.

VIDEO DISPLAY IS POOR OR BLANK

Diagnostic System Check - Entertainment

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

Video Display is Poor or Blank

IMPORTANT: The following information lists the most probable cause of the concern to the least probable cause, followed by the appropriate test for the condition. If the list 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.

Schematic Reference:Video System Schematics

- Video postive circuit open, shorted to battery positive, or shorted to ground

  Test the Video (+) circuit for an open, short to battery positive, or a short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.

- Video (-) circuit open or shorted to battery positive.

  Test the Video (-) circuit for an open or a short to battery positive. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.

- Auxiliary Control circuit open or shorted to ground.

  Test the Auxiliary Control circuit for an open or a short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.

- DVD Head to Display Serial Data circuit shorted to ground

  At the overhead display connector, check for varying DC voltage on the DVD Head to Display Serial Data circuit. If no varying DC voltage is found, check for a short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. If no short to ground is found, replace the radio. Refer to **Radio Replacement** in Entertainment.

- Display to DVD Head Serial Data circuit open.

  Check the Display to DVD Head Serial Data circuit for an open. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. If no open is found, replace the overhead console. Refer to **Overhead Console - VES Replacement** in Entertainment.

VIDEO ENTERTAINMENT SYSTEM REMOTE CONTROL INOPERATIVE

Diagnostic System Check - Entertainment

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

Video Entertainment System Remote Control Inoperative

Schematic Reference:Video System Schematics

IMPORTANT: The following information lists the most probable cause of the concern to the least probable cause, followed by the appropriate test for the condition. If the list 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.

1. Remote battery drained

   Install new batteries in the remote.

2. Bus Data from Display Circuit shorted to ground

   Test the Bus Data from Display circuit from the radio for a short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.

3. Overhead console faulty.

Replace overhead console. Refer to **Overhead Console - VES Replacement** in Entertainment.

AUXILIARY VIDEO DISPLAY IS POOR OR BLANK

Diagnostic System Check - Entertainment

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

Schematic Reference:Video System Schematics

Auxiliary Video Display is Poor or Blank

IMPORTANT: The following information lists the most probable cause of the concern to the least probable cause, followed by the appropriate test for the condition. If the list 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.

- Auxiliary Detect Signal circuit open, shorted to ground, or shorted to battery positive.

  Test Auxiliary Detect signal circuit for resistance to ground with key in off position. With no auxiliary device connected to red RCA input jack, resistance to ground should be 270k ohm. With auxiliary device connected to red RCA input jack, resistance to ground should be 50k ohm. If resistance values are not correct, check for open, short to battery positive, or short to ground on auxiliary detect signal circuit. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.

- Auxiliary Control Signal circuit open or shorted to battery positive.

  Test the Auxiliary Control circuit from the radio for an open or a short to battery positive. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.

- Overhead console faulty.

  Test Auxiliary Detect signal circuit for resistance to ground with key in off position. With no auxiliary device connected to red RCA input jack, resistance to ground should be 270k ohm. With auxiliary device connected to red RCA input jack, resistance to ground should be 50k ohm. If resistance values are not correct, check for open, short to battery positive, or short to ground on auxiliary detect signal circuit. Replace overhead console.

- Radio faulty.

  Replace radio. Refer to **Radio Replacement** in Entertainment.

RADIO SETUP

IMPORTANT: After replacing U32 radio (DVD) only, perform both the radio setup and reprogram vehicle information number (VIN) under the Special Functions Menu in the Tech 2. For US8 and US9 radios, only the radio setup needs to be performed after radio replacement.

Complete the following procedure, using a scan tool, in order to properly set up communication:

1. At the Main Menu screen, select: Diagnostics.
2. At the Vehicle Identification screen, select the following options:
   - Model Year
   - Saturn
   - Model
3. At the System Selection Menu screen, select: Body.
4. At the Body screen, select: Radio.
5. At the Radio screen, select: Special Functions.
6. At the Special Functions screen, select: Radio Setup.
7. At the Radio Setup screen, press ENTER. The following screen will set up a new or existing radio.
8. Select the proper amplifier setting for the radio:
   - VUE
   - VUE with amplifier
   - ION coupe
   - ION coupe with amplifier
   - ION sedan
   - ION sedan with amplifier
9. Verify the setting is correct in Data Display/ System Configuration/ EQ Setting
10. Press EXIT on the scan tool and cycle the ignition.

IMPORTANT: The radio setup will configure the radio amplifier and internal equalization settings.

Without following the setup procedure, the radio will display a calibrate message (CALIBRATE), and the sound quality and volume may be degraded.

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.

SPEAKER REPLACEMENT REFERENCE

Speaker Replacement Reference

Component	Repair Instruction
Front Door Speaker	Refer to **Speaker Replacement - Front Door**
Front Side Door Upper Speaker	Refer to **Speaker Replacement - Front Side Door Upper**
Rear Door Speaker	Refer to **Speaker Replacement - Rear Door**
Rear Speaker	Refer to **Speaker Replacement - Rear**

REPAIR INSTRUCTIONS

RADIO REPLACEMENT

Removal Procedure

1. Remove the I/P center trim bezel. Refer to **Trim Bezel Replacement - Center** in Instrument Panel, Gages, and Console.

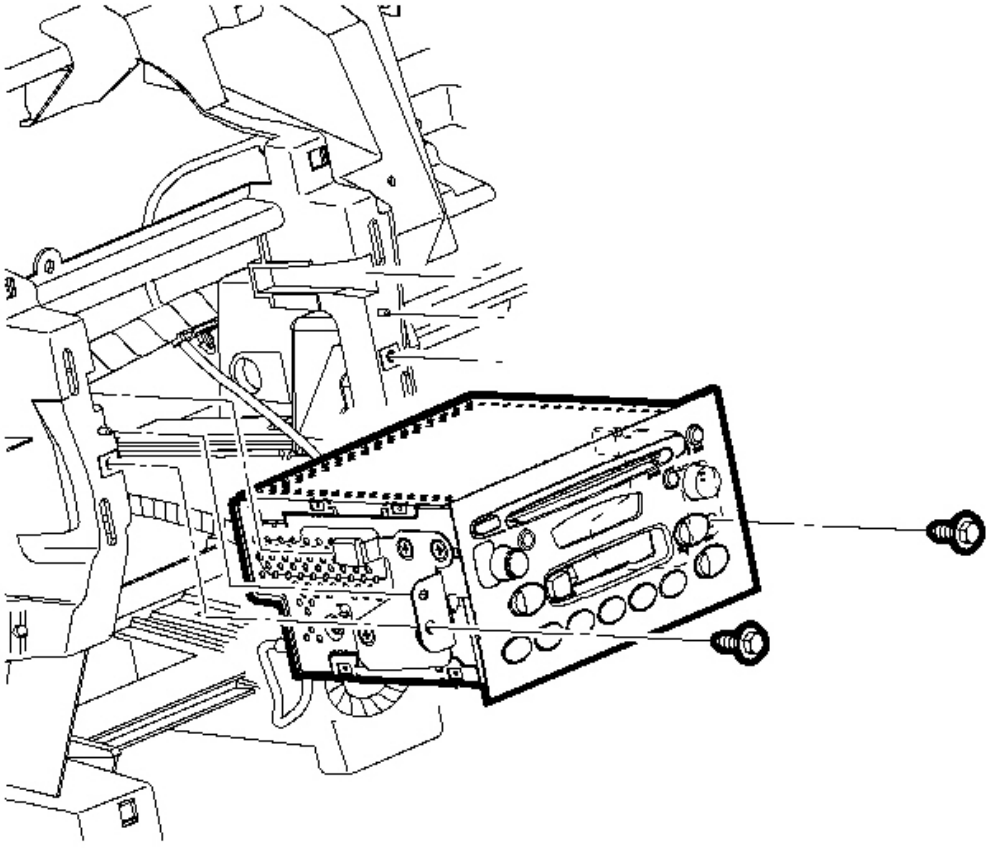


Fig. 12: View of Radio & Screws
Courtesy of GENERAL MOTORS CORP.

2. Remove the radio screws.

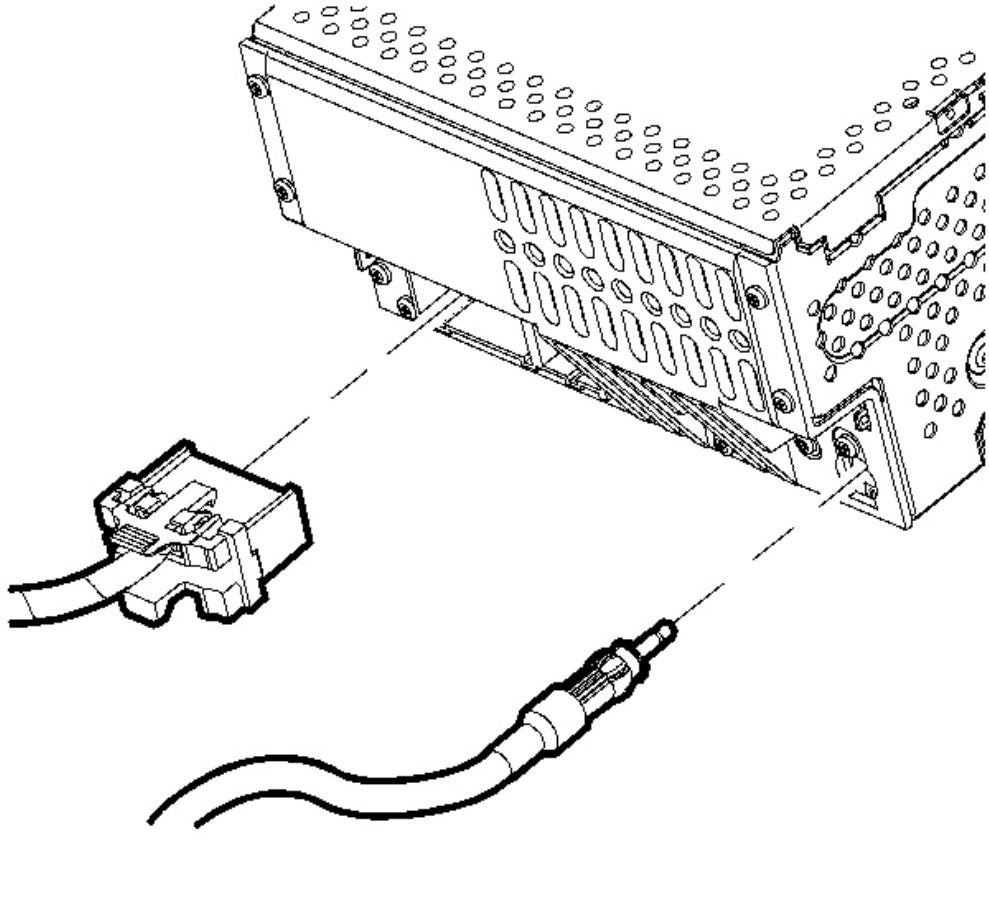


Fig. 13: View of Radio Electrical Connectors & Antenna
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the radio electrical connectors and the antenna.

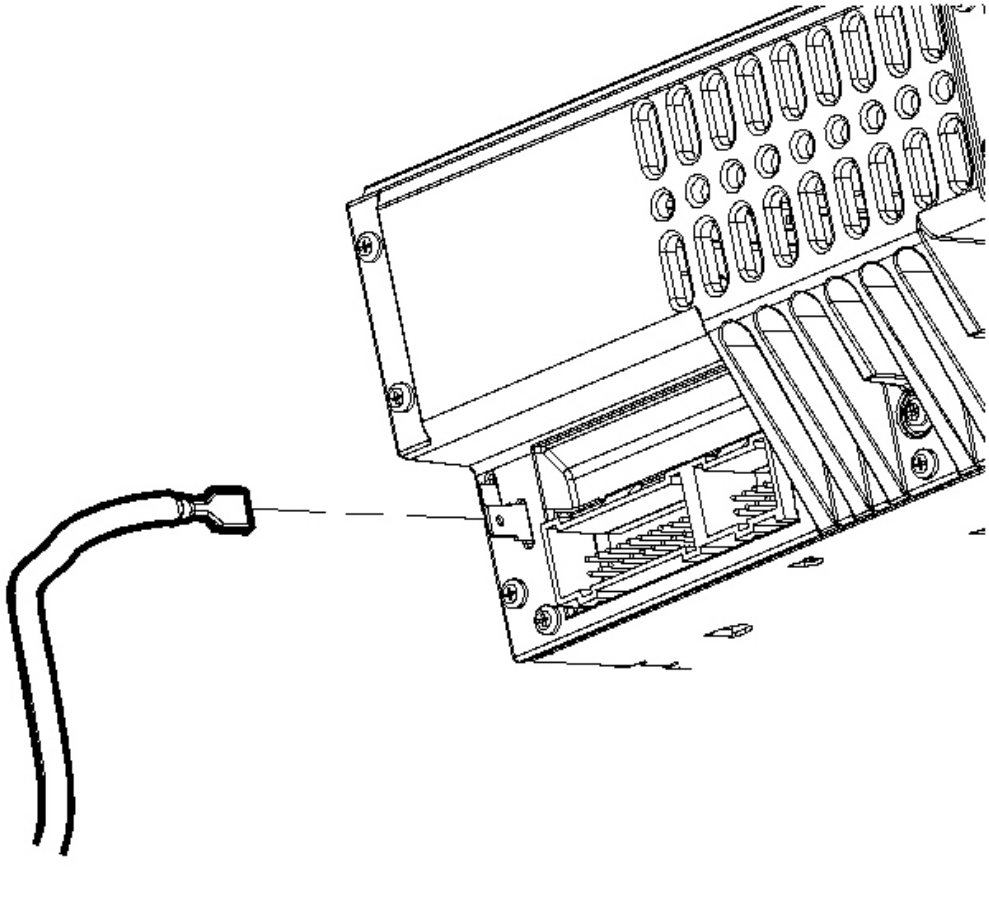


Fig. 14: View of Ground Strap
Courtesy of GENERAL MOTORS CORP.

4. Disconnect the ground strap.
5. Remove the radio.

Installation Procedure

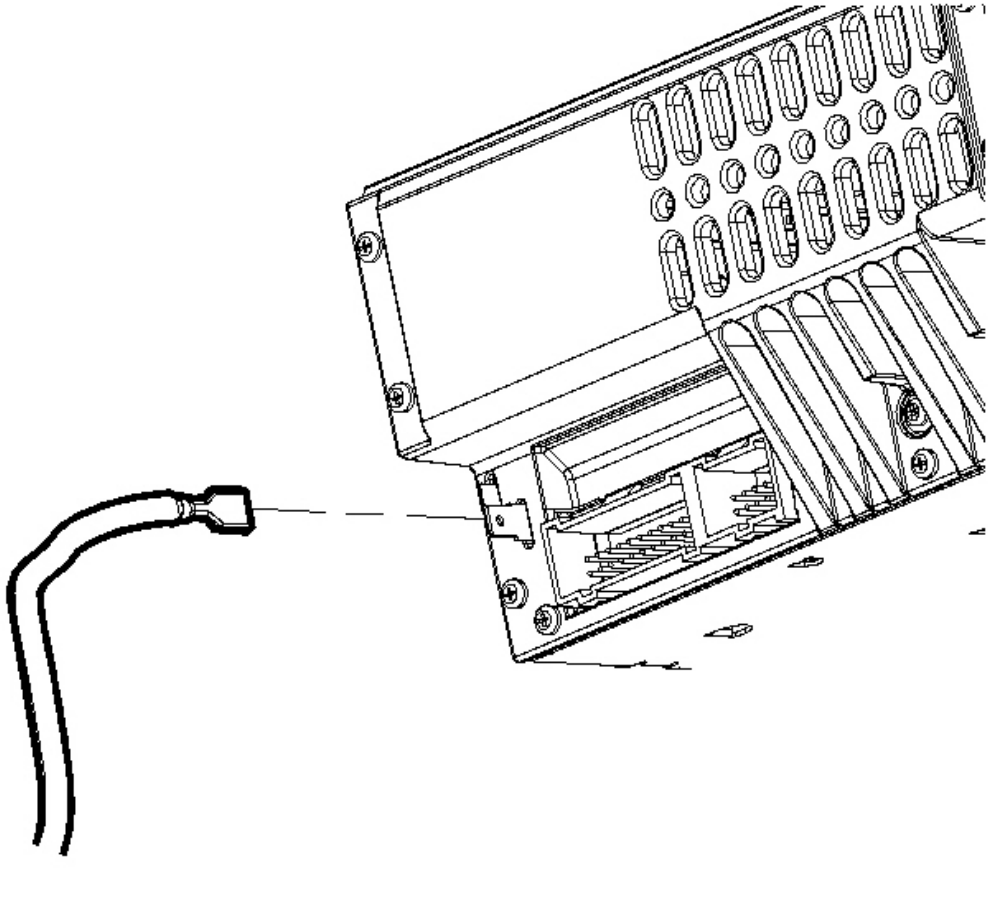


Fig. 15: View of Ground Strap
Courtesy of GENERAL MOTORS CORP.

1. Position the radio in the vehicle.
2. Connect the ground strap.

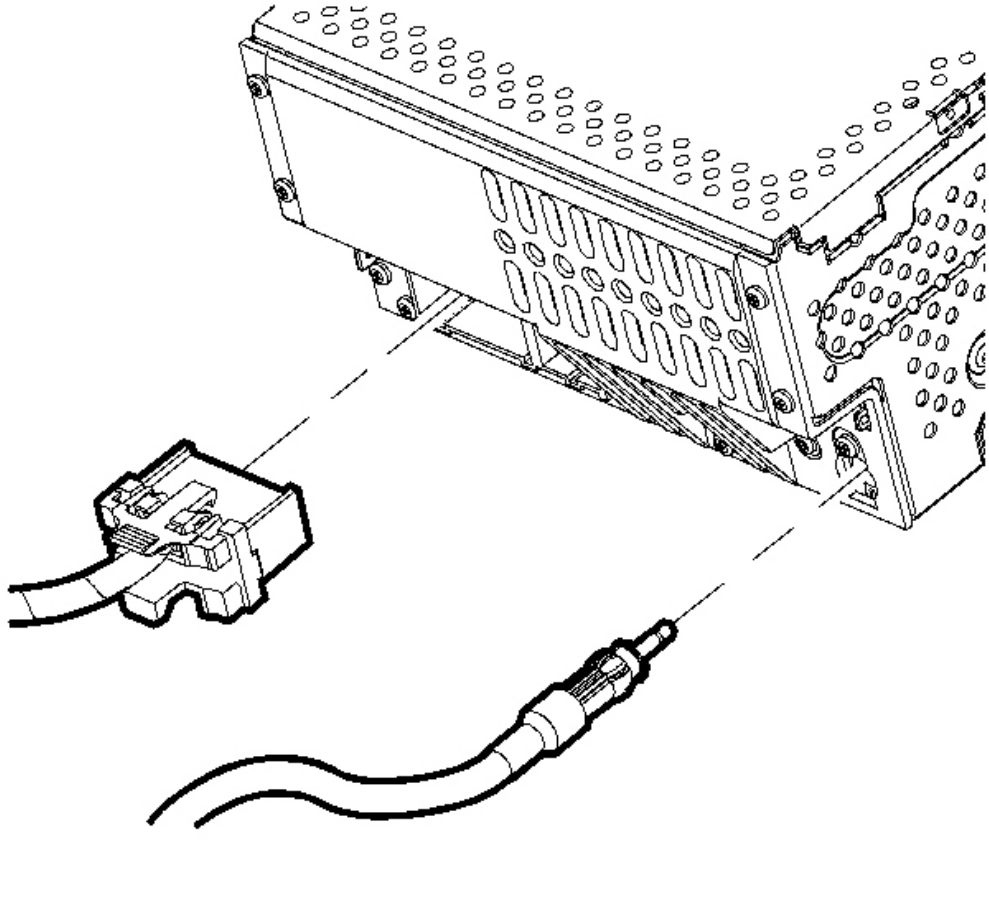


Fig. 16: View of Radio Electrical Connectors & Antenna
Courtesy of GENERAL MOTORS CORP.

3. Connect the electrical connectors and the antenna.

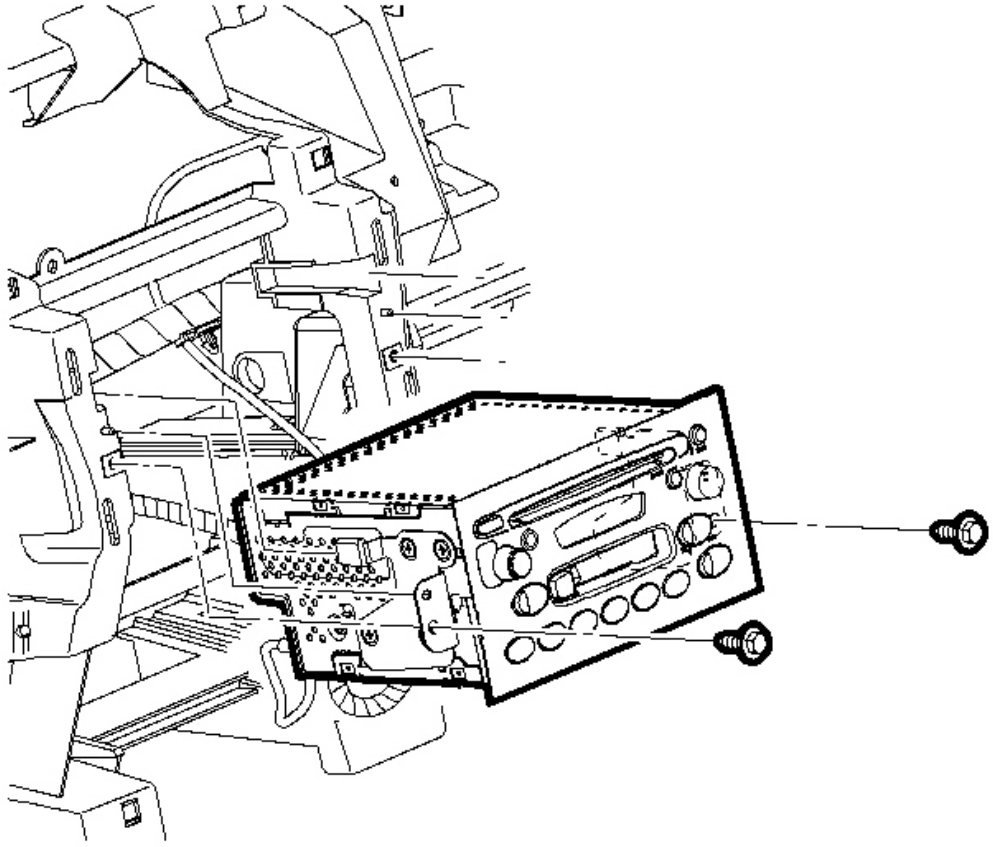


Fig. 17: View of Radio & Screws
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

4. Install the radio screws.

   Tighten: Tighten the screws to 2.5 N.m (22 lb in).

5. Install the I/P center trim bezel. Refer to **Trim Bezel Replacement - Center** in Instrument Panel, Gages, and Console.
6. Set up the radio. Refer to **Radio Setup** .

RECEIVER REPLACEMENT - DIGITAL RADIO

Removal Procedure

IMPORTANT: Do not swap digital radio receivers between vehicles. Swapping digital receivers between vehicles will activate the digital radio Theftlock, "XM Theftlock" will be displayed.

1. Remove the rear seat. Refer to **Seat Replacement - Rear** in Seats.

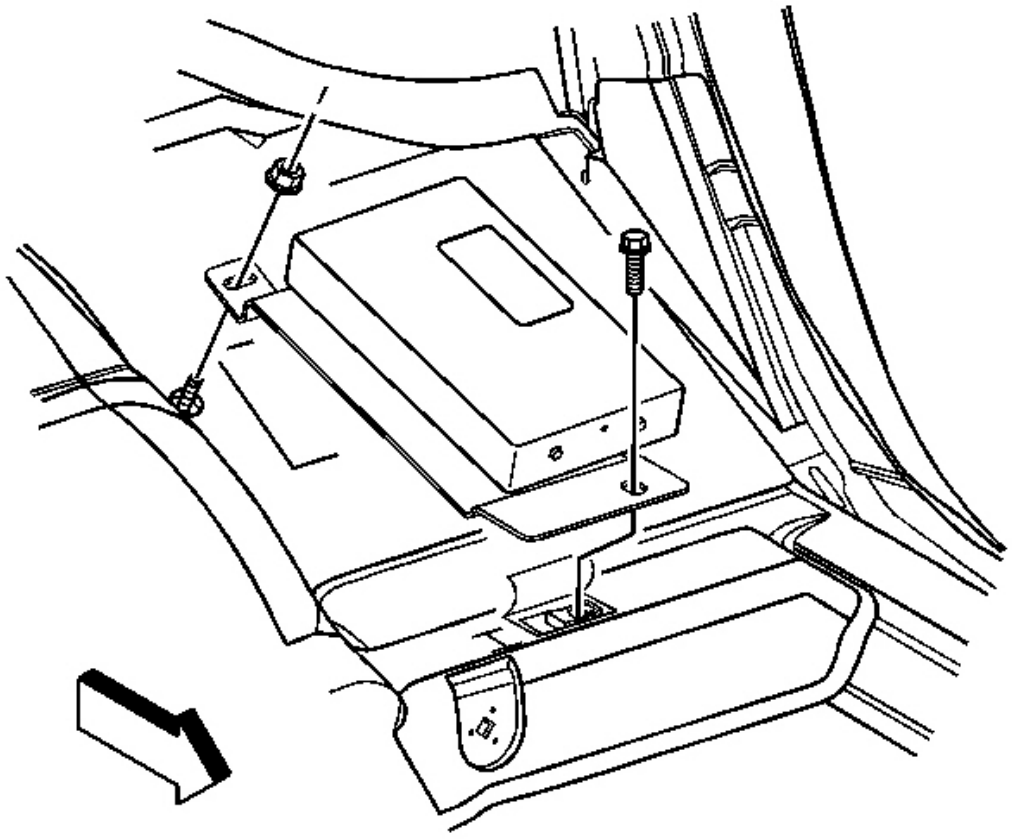


Fig. 18: View of Receiver Fasteners & Receiver
Courtesy of GENERAL MOTORS CORP.

2. Disconnect the electrical connector.
3. Remove the receiver fasteners.
4. Remove the receiver from the vehicle.

Installation Procedure

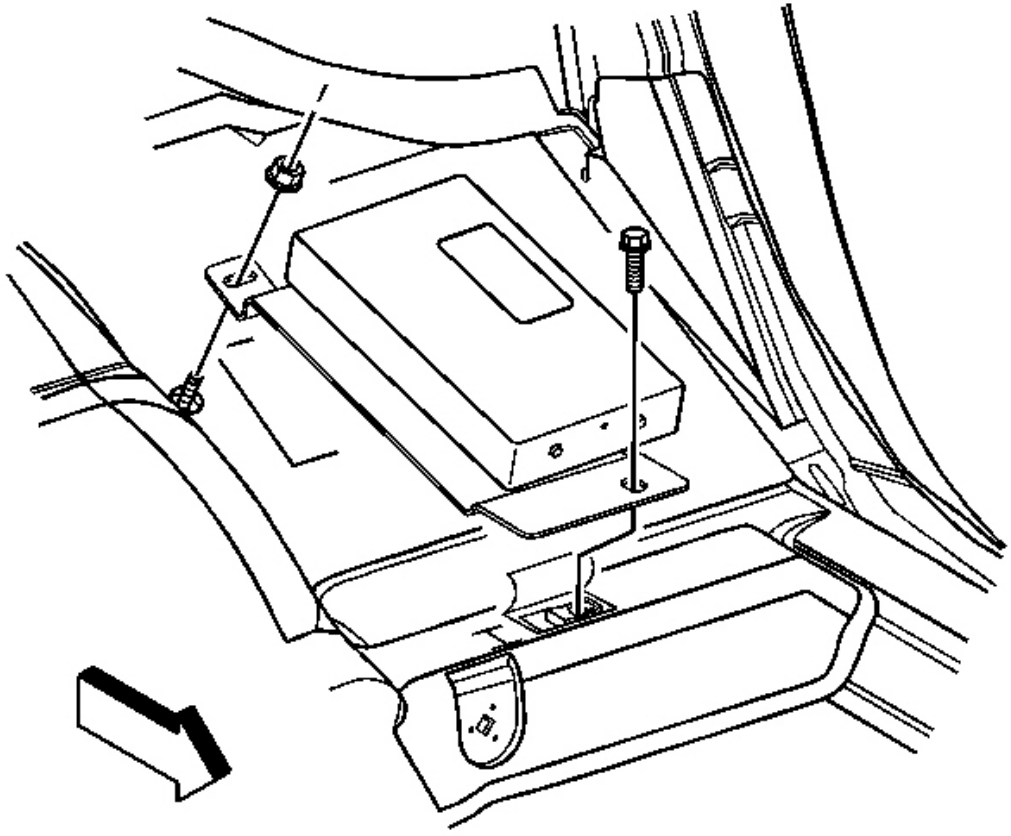


Fig. 19: View of Receiver Fasteners & Receiver
Courtesy of GENERAL MOTORS CORP.

1. Install the receiver to the vehicle.

   NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the receiver fasteners.

   Tighten: Tighten the fasteners to 3 N.m (26 lb in).

3. Connect the electrical connector.
4. Install the rear seat. Refer to **Seat Replacement - Rear** in Seats.
5. Perform the setup procedure for the digital radio receiver. Refer to **Digital Radio Receiver Setup** .

AMPLIFIER REPLACEMENT

Removal Procedure

1. Remove the rear seat. Refer to **Seat Replacement - Rear** in Seats.

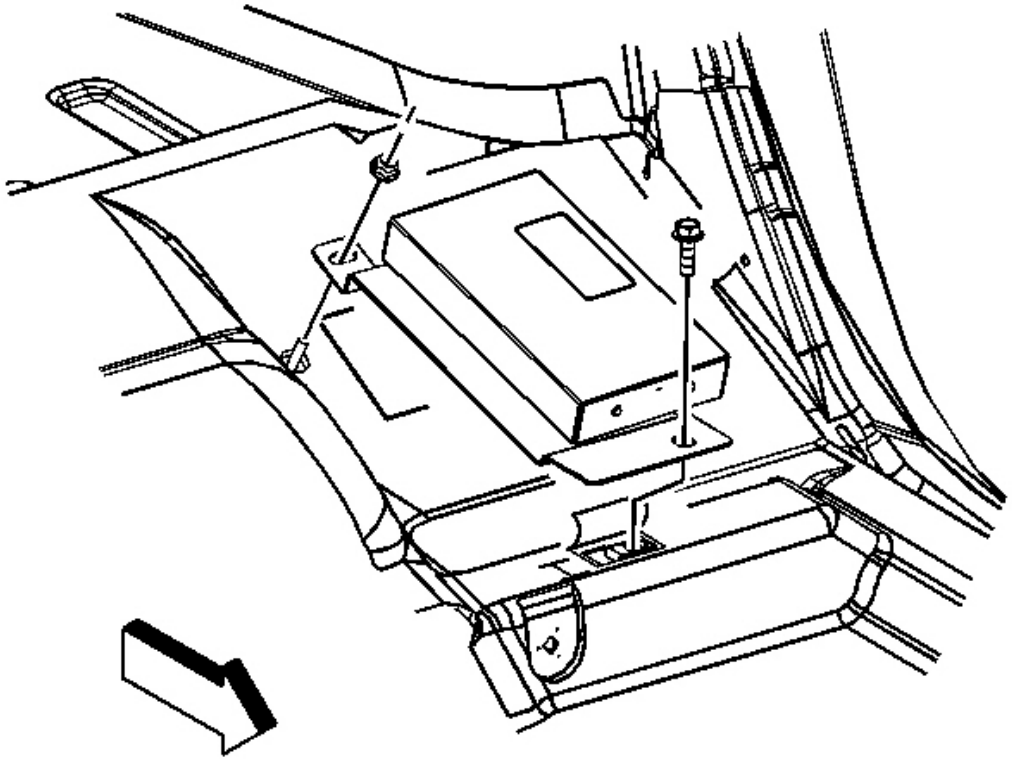


Fig. 20: View of Amplifier & Fasteners
Courtesy of GENERAL MOTORS CORP.

2. Remove the fasteners that hold the amplifier.
3. Disconnect the electrical connectors from the amplifier.
4. Remove the amplifier from the vehicle.

Installation Procedure

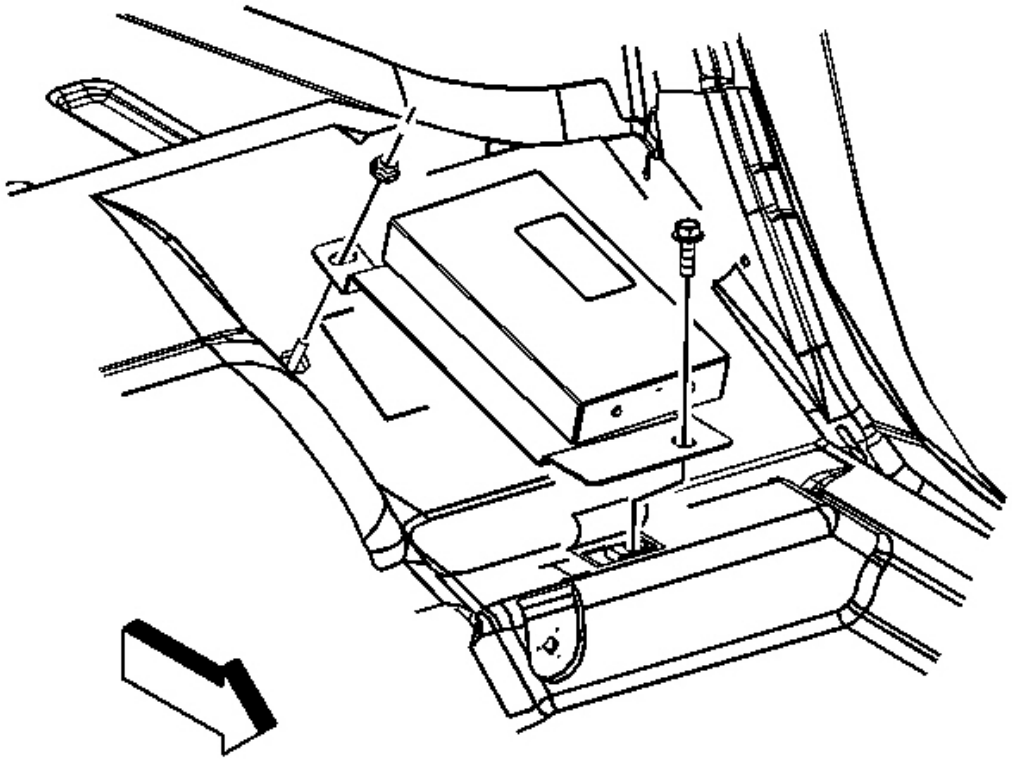


Fig. 21: View of Amplifier & Fasteners
Courtesy of GENERAL MOTORS CORP.

1. Install the amplifier in the vehicle
2. Install the electrical connectors to the amplifier.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the fasteners to the amplifier.

   Tighten: Tighten the fasteners to 3 N.m (26 lb in).

4. Install the rear seat. Refer to **Seat Replacement - Rear** in Seats.

FIXED ANTENNA MAST REPLACEMENT

Removal Procedure

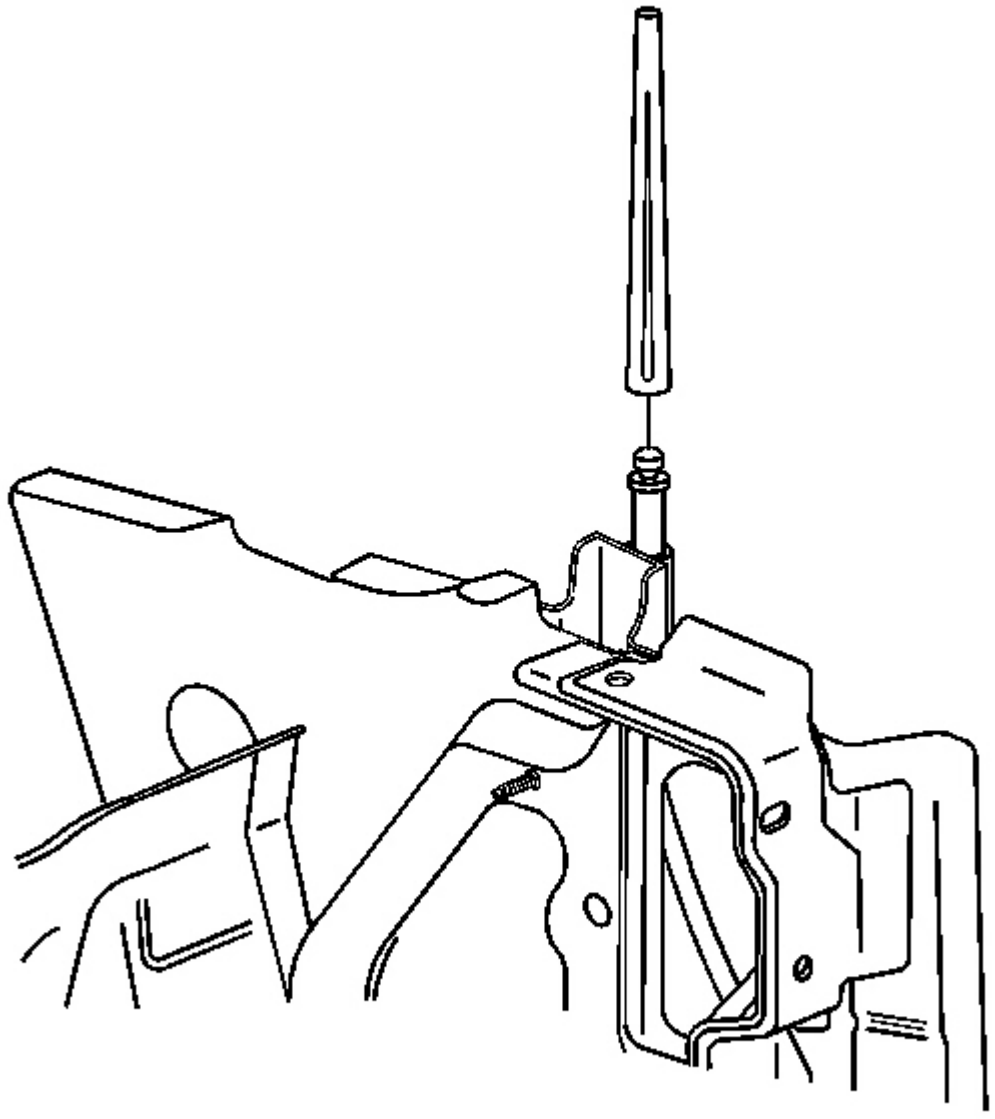


Fig. 22: View of Fixed Antenna Mast
Courtesy of GENERAL MOTORS CORP.

Turn the antenna mast counterclockwise to remove the mast.

Installation Procedure

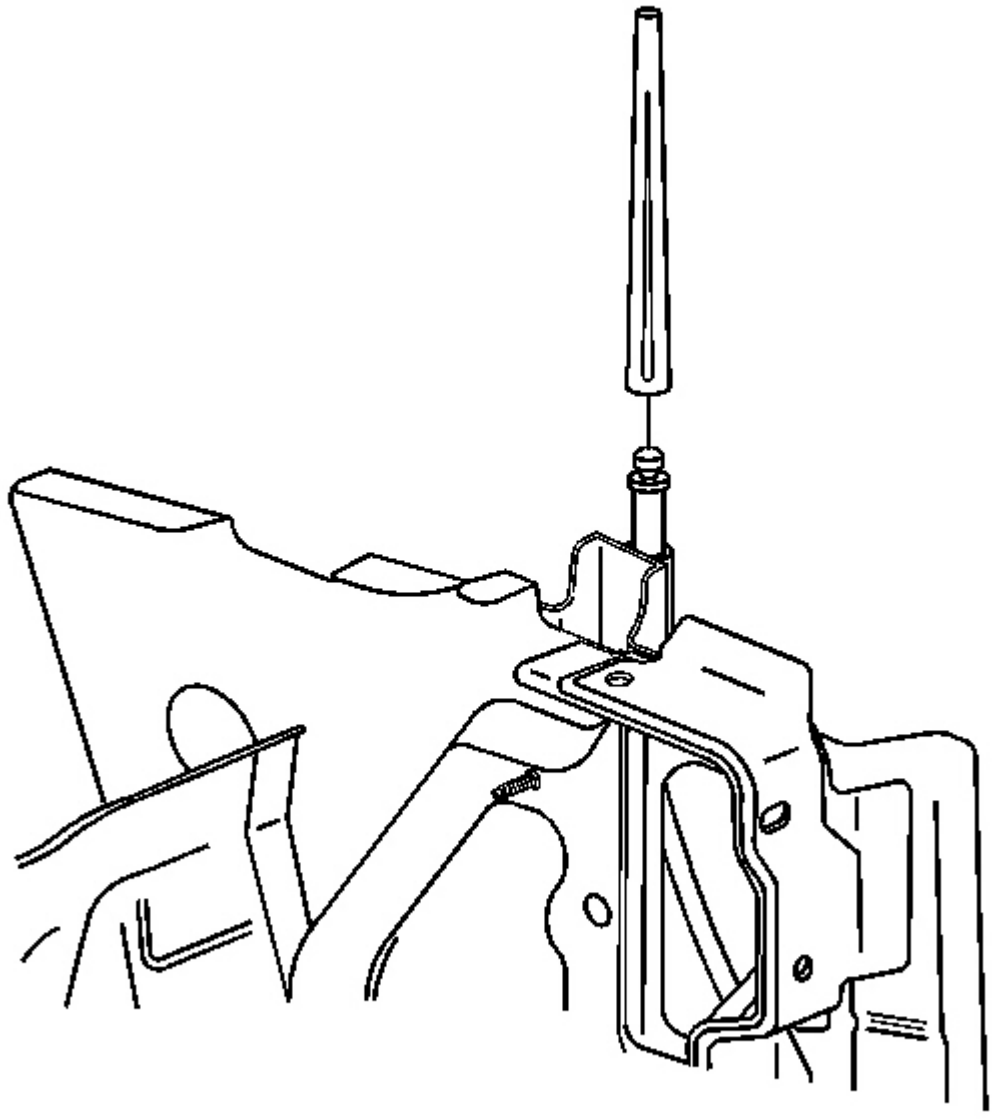


Fig. 23: View of Fixed Antenna Mast
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

Install the antenna mast. Turn the mast clockwise to tighten.

Tighten: Tighten the mast to 10 N.m (89 lb in).

FIXED ANTENNA REPLACEMENT

Removal Procedure

1. Remove the front fender. Refer to **Fender Replacement - Front** in Body Front End.

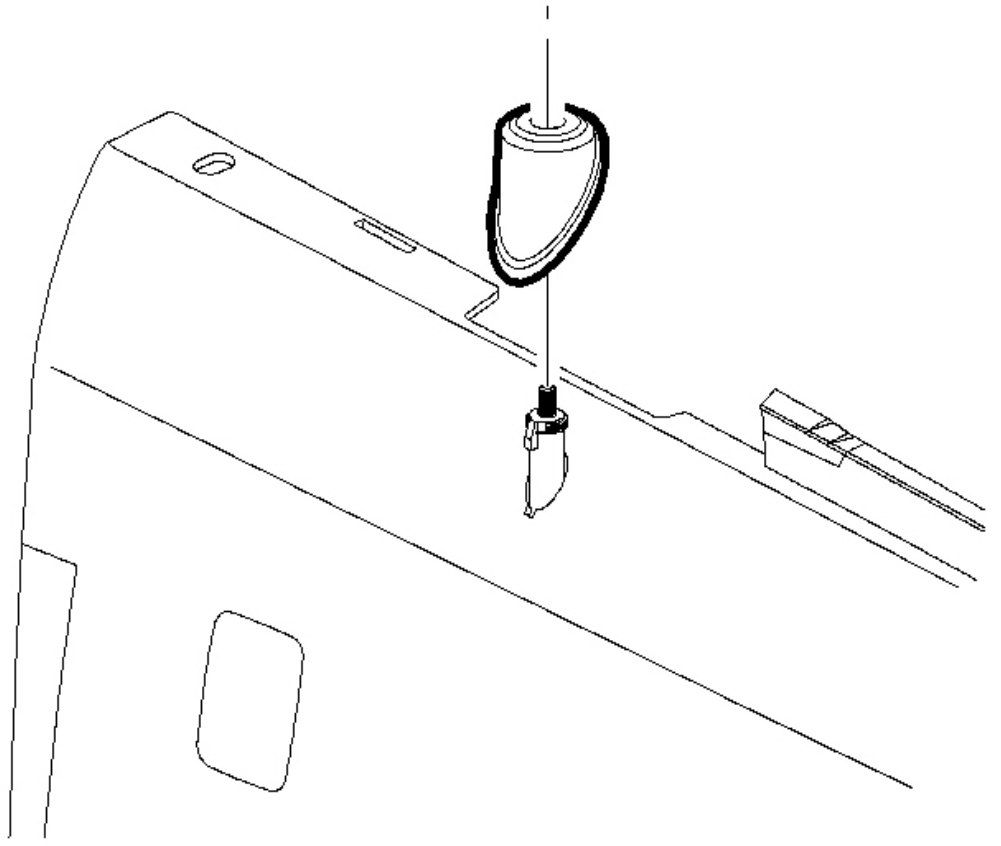


Fig. 24: View of Antenna Mast Bezel
Courtesy of GENERAL MOTORS CORP.

2. Pull to remove the antenna mast bezel.

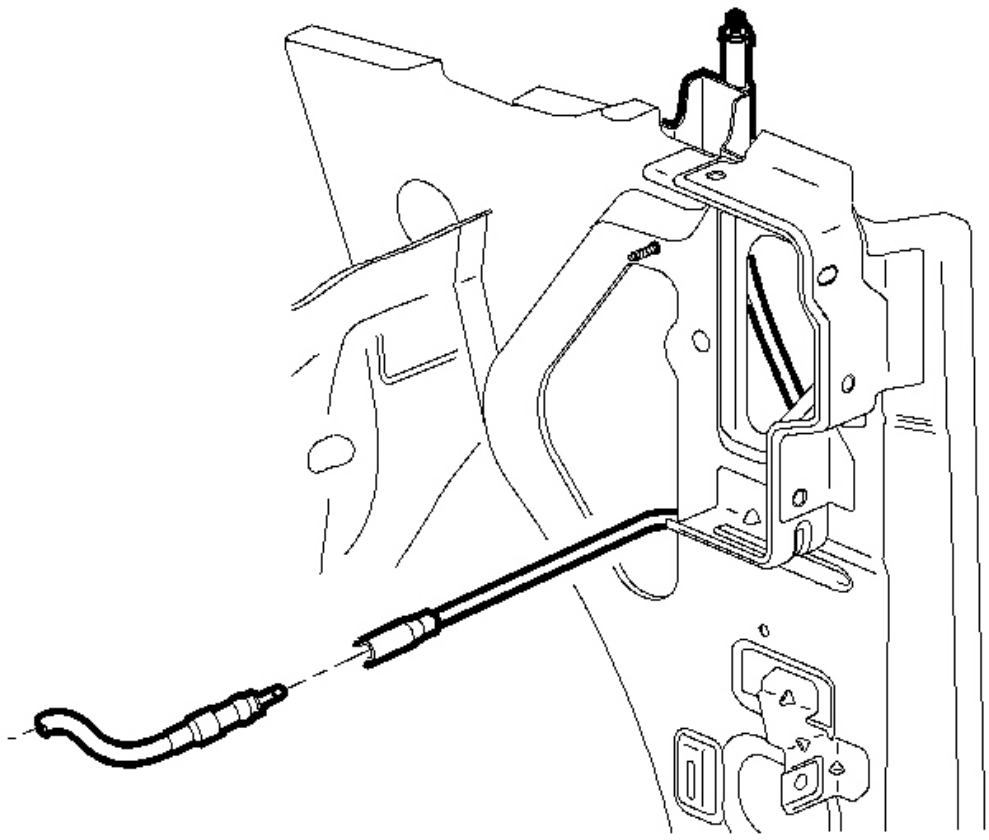


Fig. 25: View of Antenna Lead-in To Antenna Base
Courtesy of GENERAL MOTORS CORP.

3. Remove the antenna mast from the antenna base by turning counterclockwise.
4. Disconnect the antenna lead-in from the antenna base.

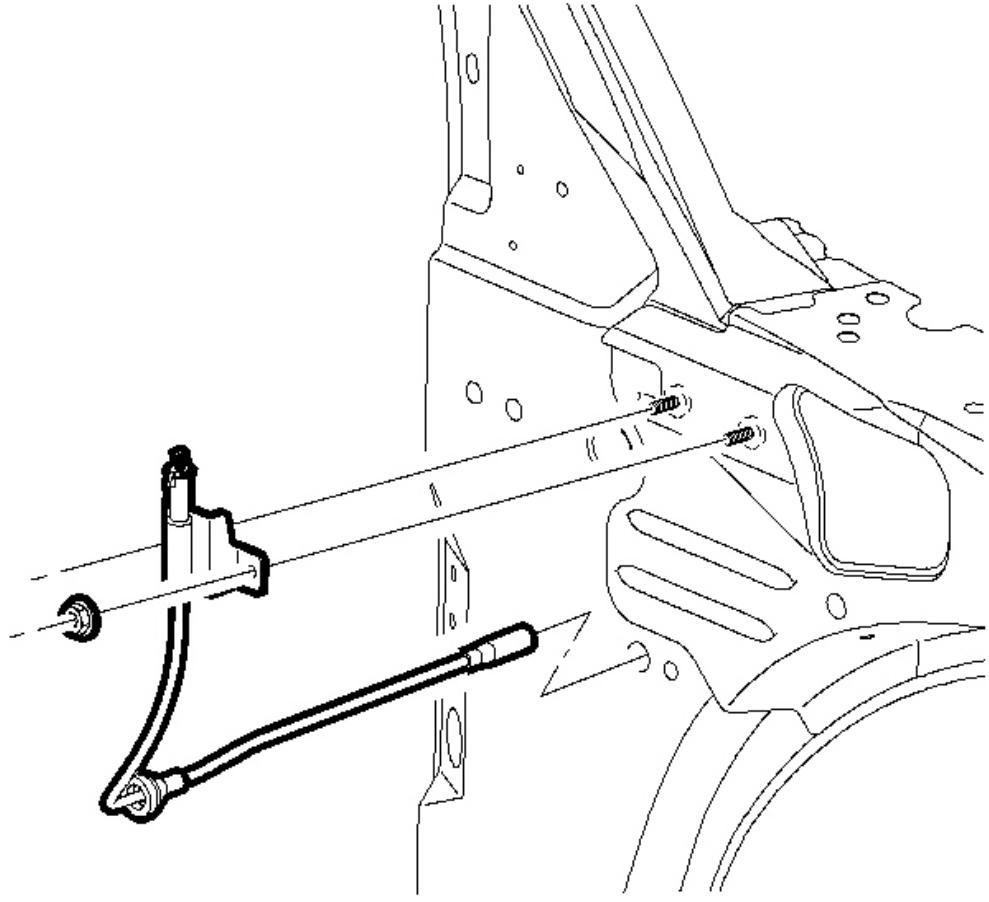


Fig. 26: View of Antenna Base & Fasteners
Courtesy of GENERAL MOTORS CORP.

5. Remove the antenna base fasteners from the bracket on the antenna base.
6. Remove the antenna base.

Installation Procedure

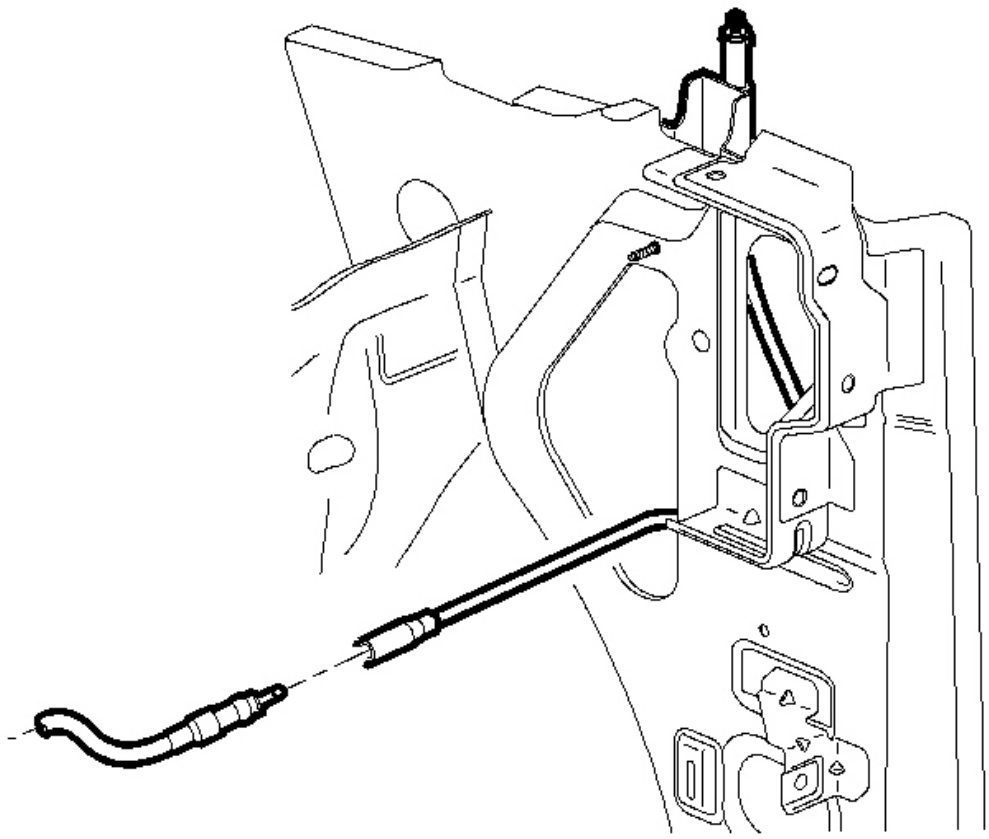


Fig. 27: View of Antenna Lead-in To Antenna Base
Courtesy of GENERAL MOTORS CORP.

1. Connect the antenna lead-in to the antenna base.

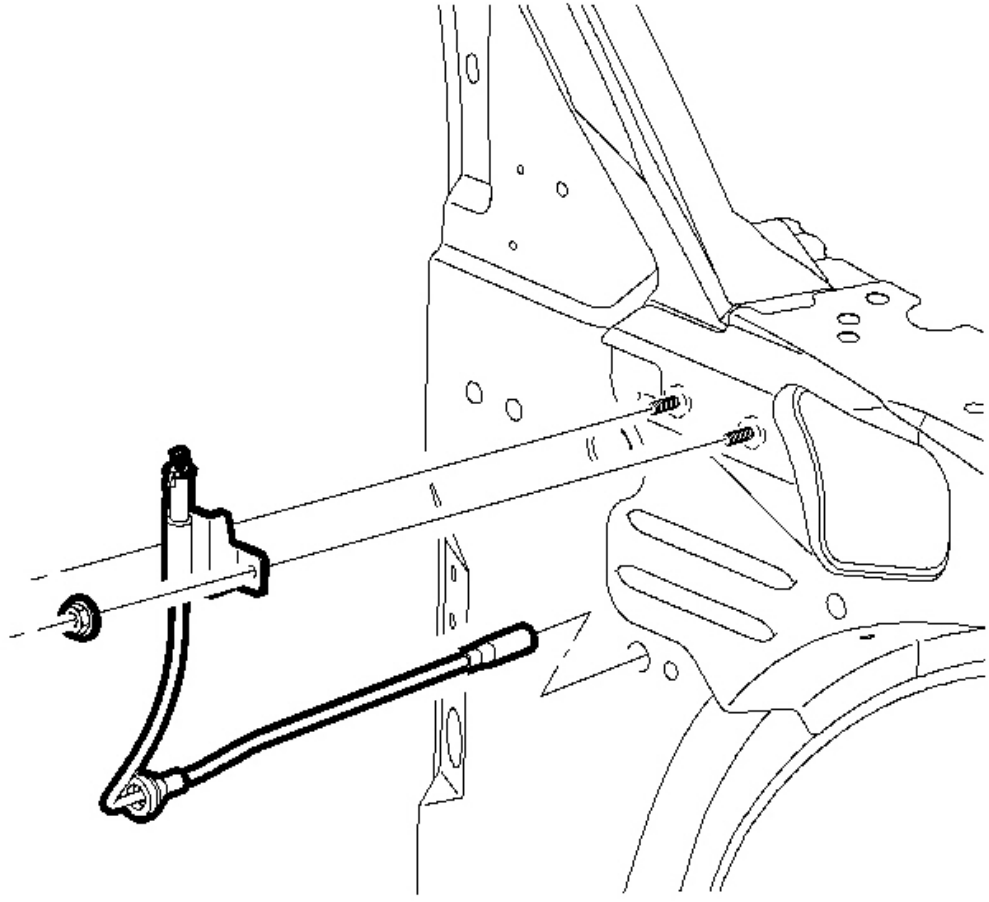


Fig. 28: View of Antenna Base & Fasteners
Courtesy of GENERAL MOTORS CORP.

2. Install the antenna base.

NOTE: **Refer to Fastener Notice in Cautions and Notices.**

3. Install the screws to the bracket on the antenna base.

Tighten: Tighten the screws to 10 N.m (89 lb in).

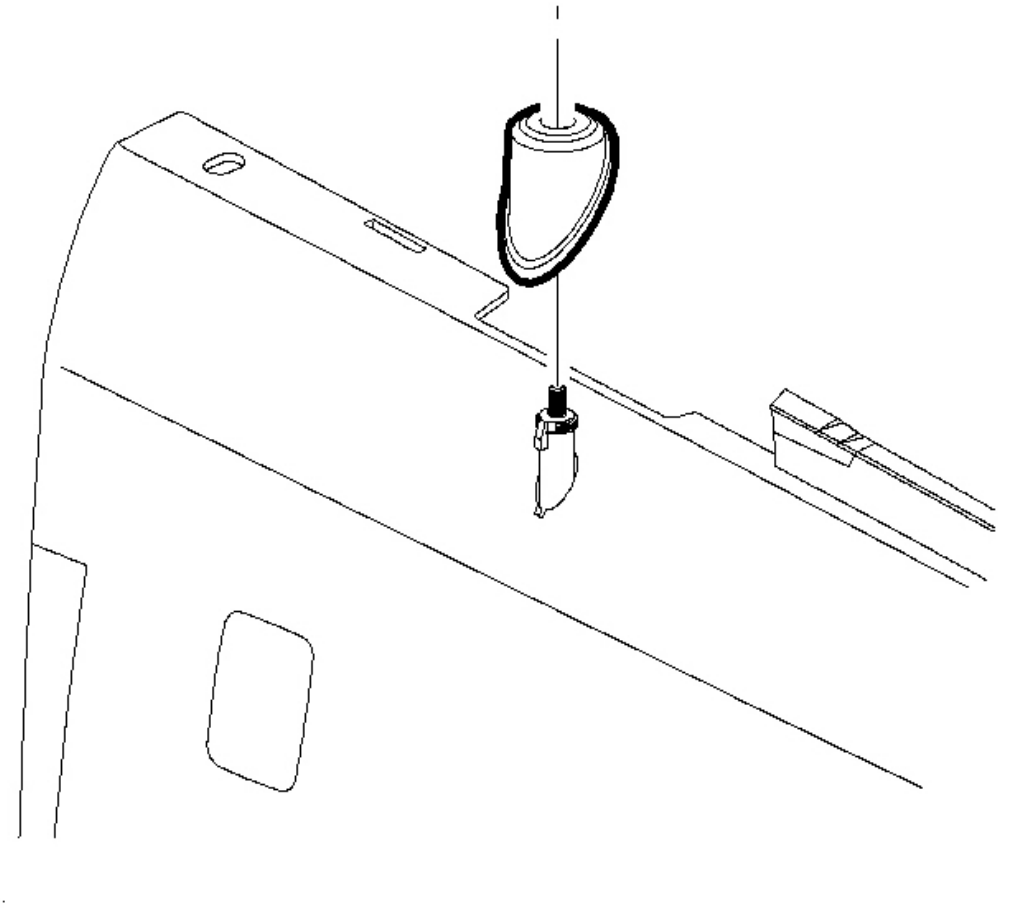


Fig. 29: View of Antenna Mast Bezel
Courtesy of GENERAL MOTORS CORP.

4. Install the antenna bezel.
5. Install the antenna mast to the antenna base by turning clockwise.

   Tighten: Tighten the mast to 10 N.m (89 lb in).

6. Install the front fender. Refer to **Fender Replacement - Front** in Body Front End.

ANTENNA REPLACEMENT - DIGITAL RADIO

Removal Procedure

1. Remove the headliner. Refer to **Headliner Replacement** in Interior Trim.
2. Remove the attachment nut from the antenna.
3. Disconnect the cable from the antenna.

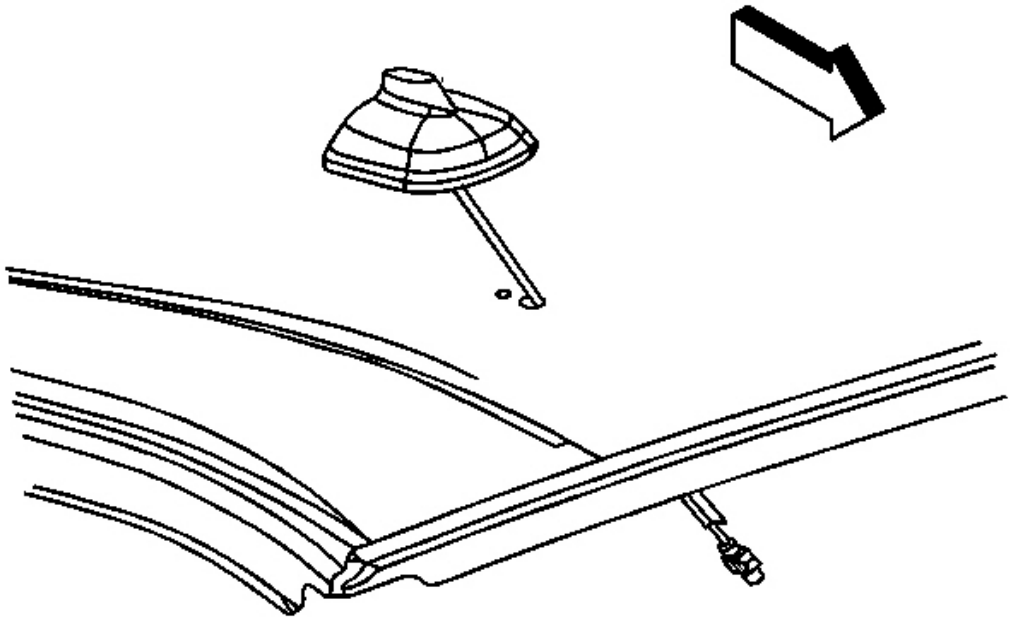


Fig. 30: View of Digital Radio Antenna
Courtesy of GENERAL MOTORS CORP.

4. Remove the antenna from the vehicle.

Installation Procedure

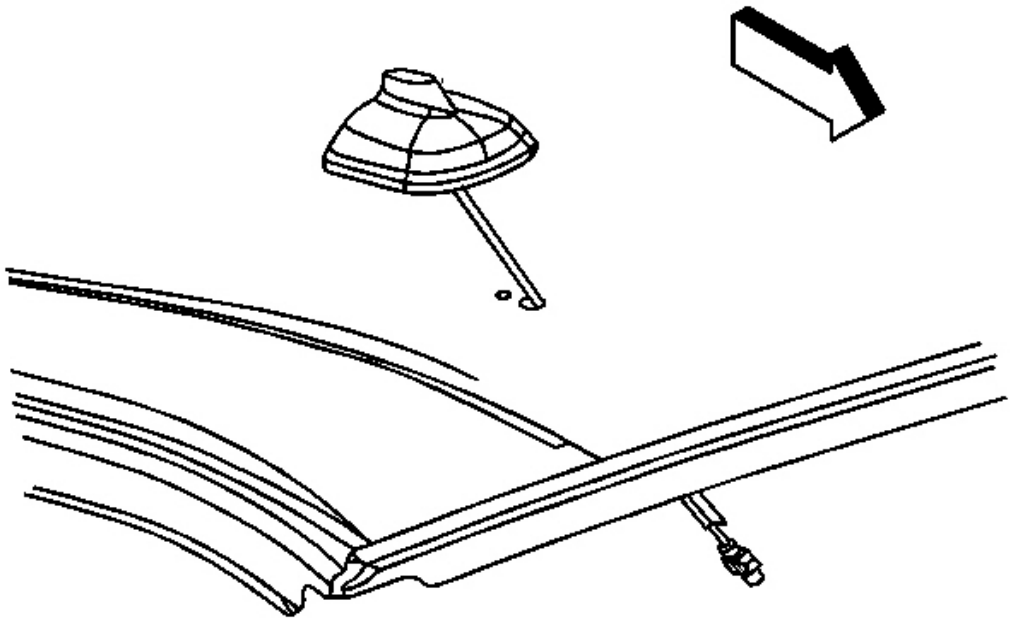


Fig. 31: View of Digital Radio Antenna
Courtesy of GENERAL MOTORS CORP.

1. Install the antenna to the vehicle.

   NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the attachment nut to the antenna.

   Tighten: Tighten the nut to 5 N.m (44 lb in).

3. Connect the cable to the antenna.
4. Install the headliner. Refer to **Headliner Replacement** in Interior Trim.

ANTENNA CABLE REPLACEMENT

Removal Procedure

1. Remove the instrument panel center trim plate. Refer to **Trim Bezel Replacement - Center** in Instrument Panel, Gages, and Console.

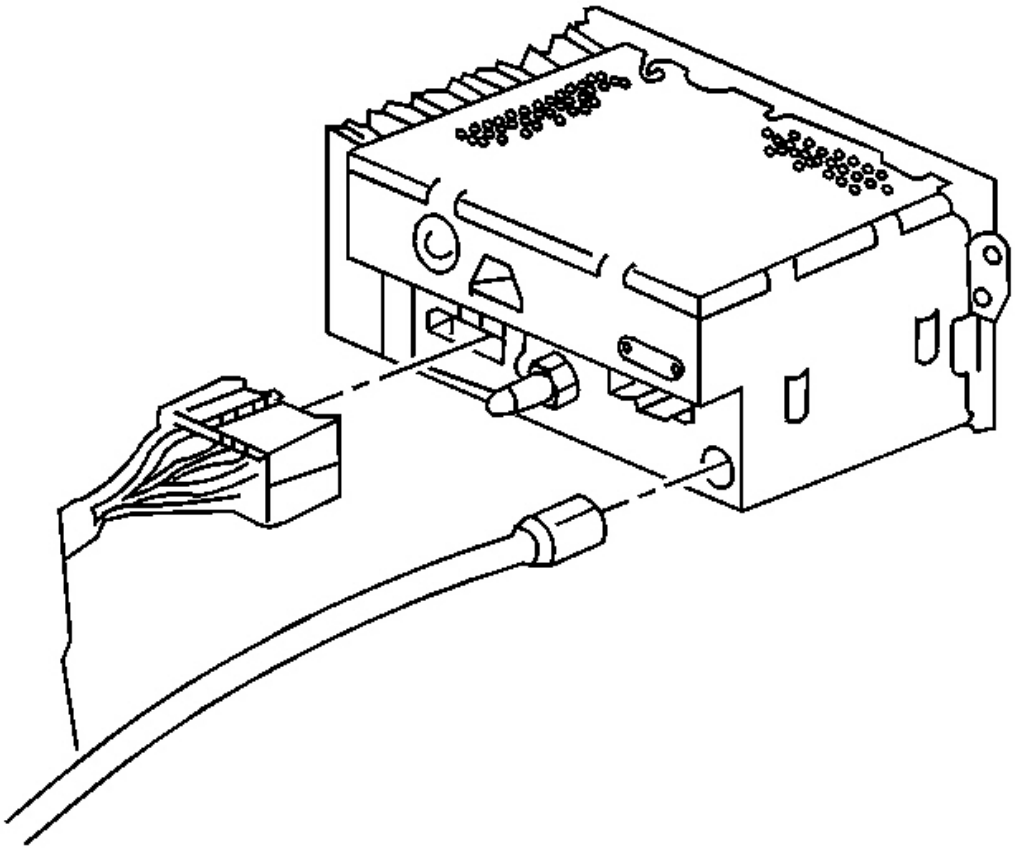


Fig. 32: View of Extension Cable to Radio
Courtesy of GENERAL MOTORS CORP.

2. Disconnect the extension cable from the radio.

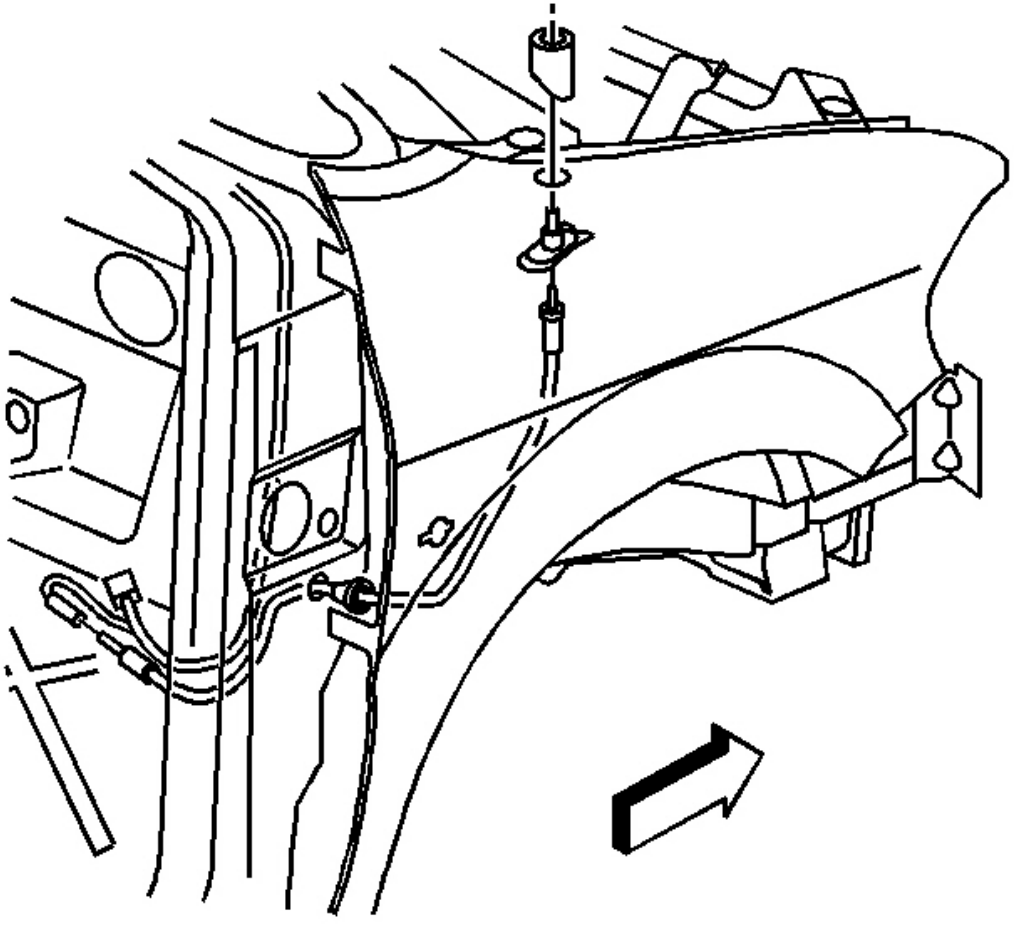


Fig. 33: View of Extension Cable to Antenna
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the extension cable from the antenna. Refer to **Fixed Antenna Replacement** .

Installation Procedure

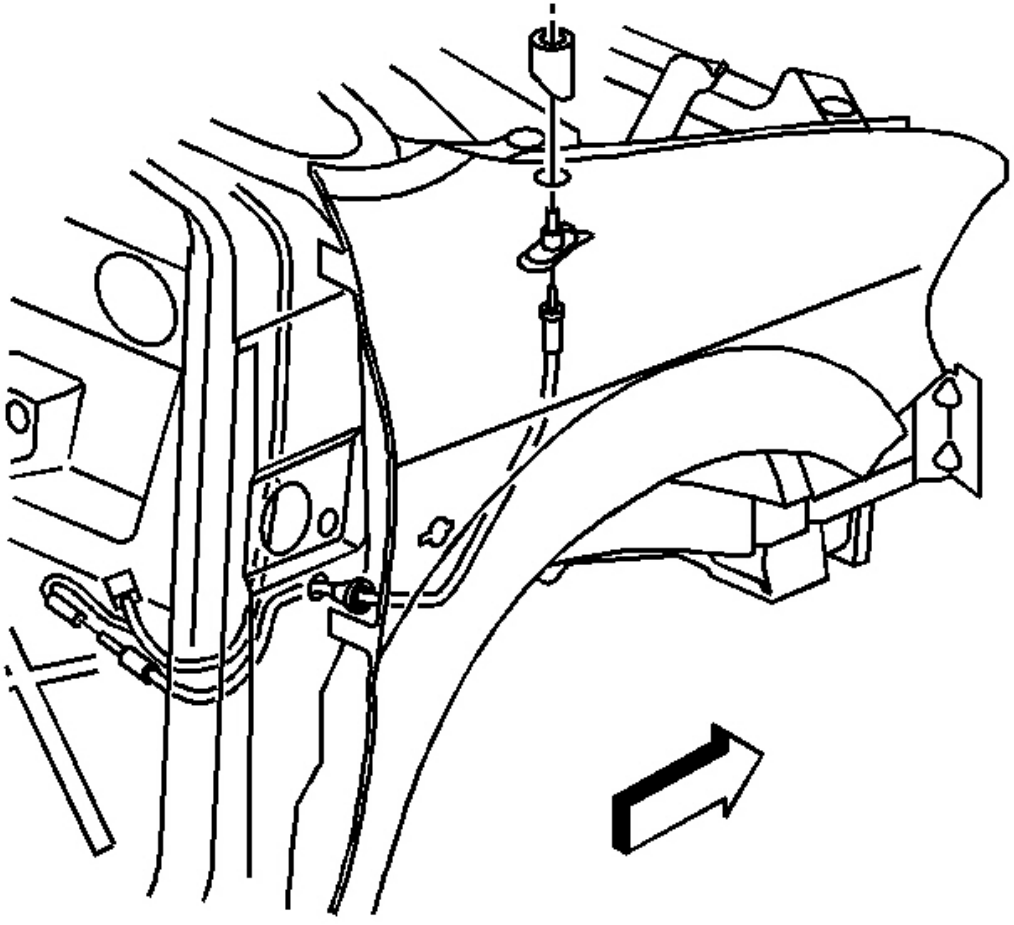


Fig. 34: View of Extension Cable to Antenna
Courtesy of GENERAL MOTORS CORP.

1. Connect the extension cable to the antenna. Refer to **Fixed Antenna Replacement** .

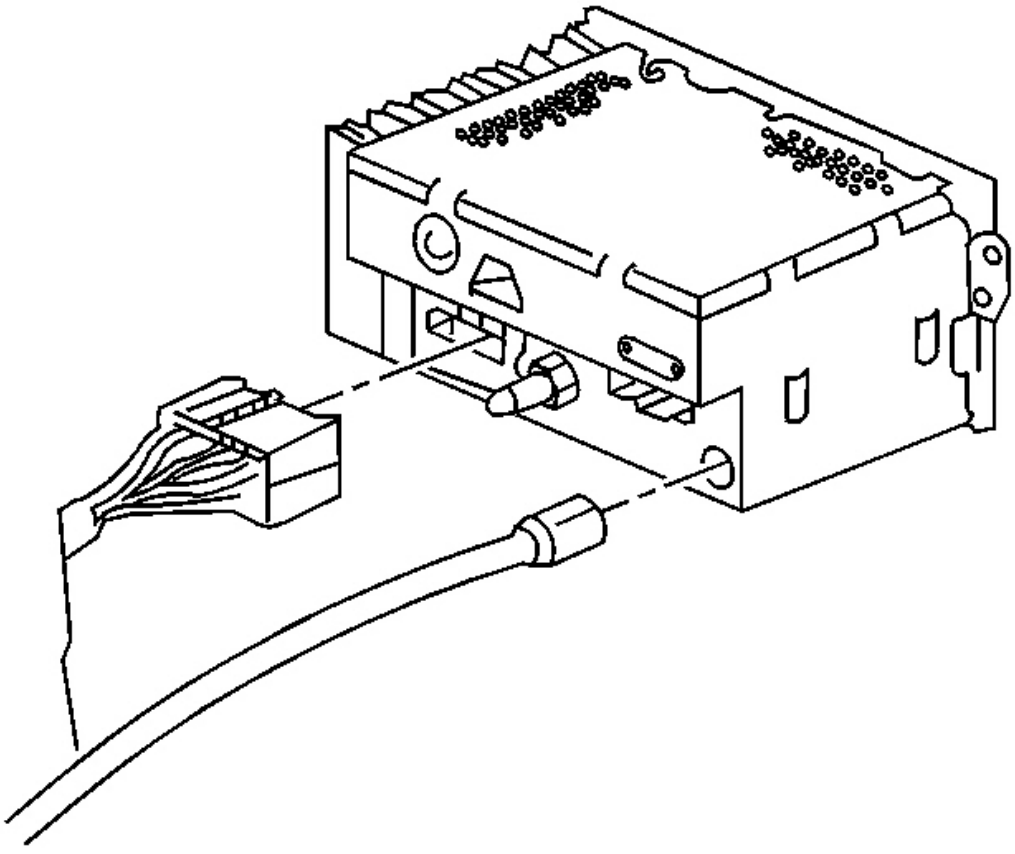


Fig. 35: View of Extension Cable to Radio
Courtesy of GENERAL MOTORS CORP.

2. Connect the extension cable to the radio.
3. Install the instrument panel center trim plate. Refer to **Trim Bezel Replacement - Center** in Instrument Panel, Gages, and Console.

COAXIAL CABLE REPLACEMENT - DIGITAL RADIO

Removal Procedure

1. Remove the instrument panel center trim plate. Refer to **Trim Bezel Replacement - Center** in Instrument Panel, Gages, and Console.

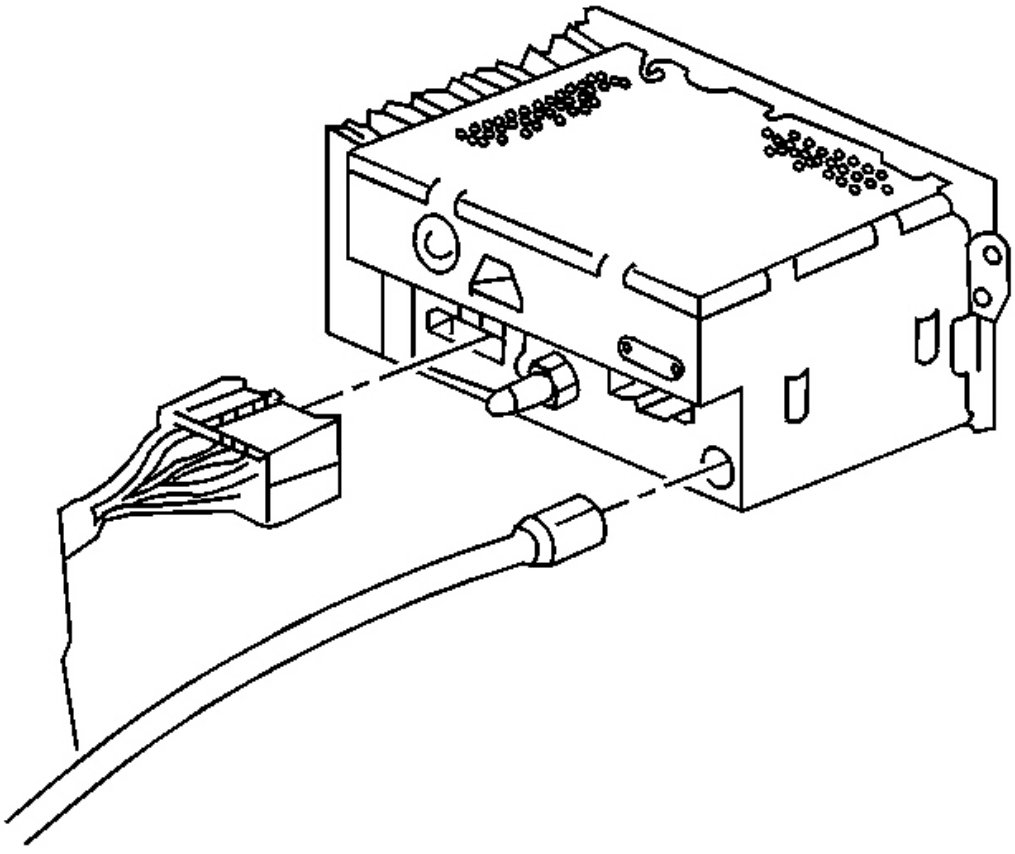


Fig. 36: View of Extension Cable to Radio
Courtesy of GENERAL MOTORS CORP.

2. Disconnect the cable from the radio.

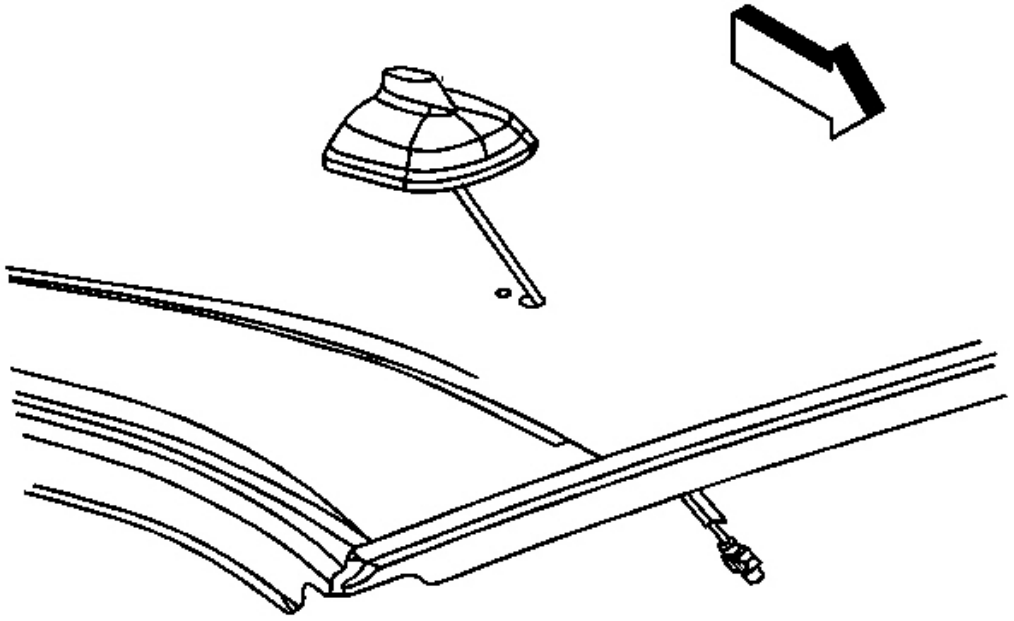


Fig. 37: View of Digital Radio Antenna
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the digital radio cable from the antenna. Refer to **Antenna Replacement - Digital Radio** .

Installation Procedure

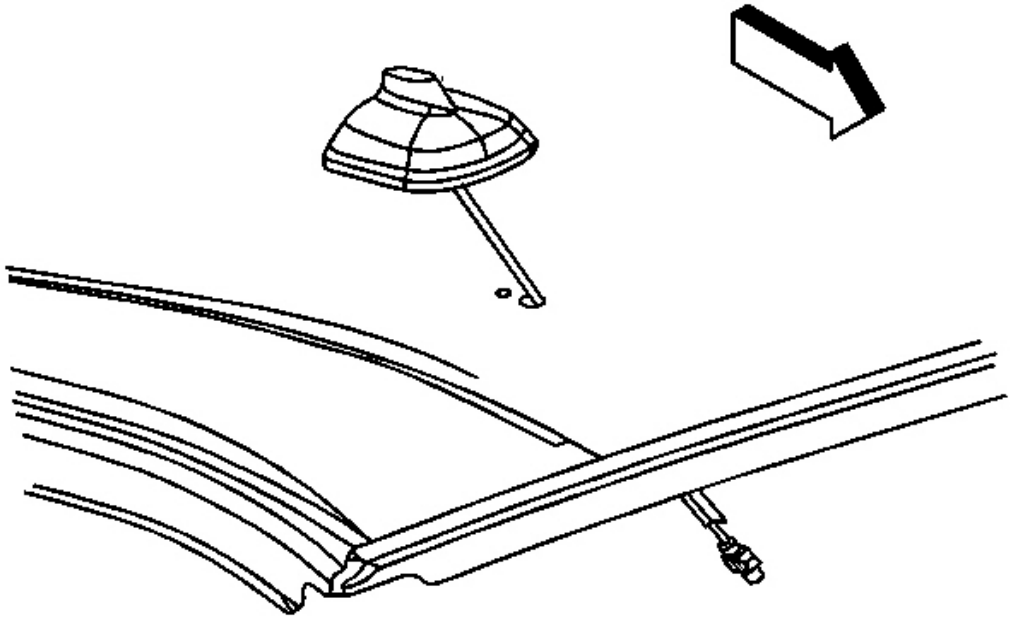


Fig. 38: View of Digital Radio Antenna
Courtesy of GENERAL MOTORS CORP.

1. Connect the digital radio cable to the antenna. Refer to **Antenna Replacement - Digital Radio** .

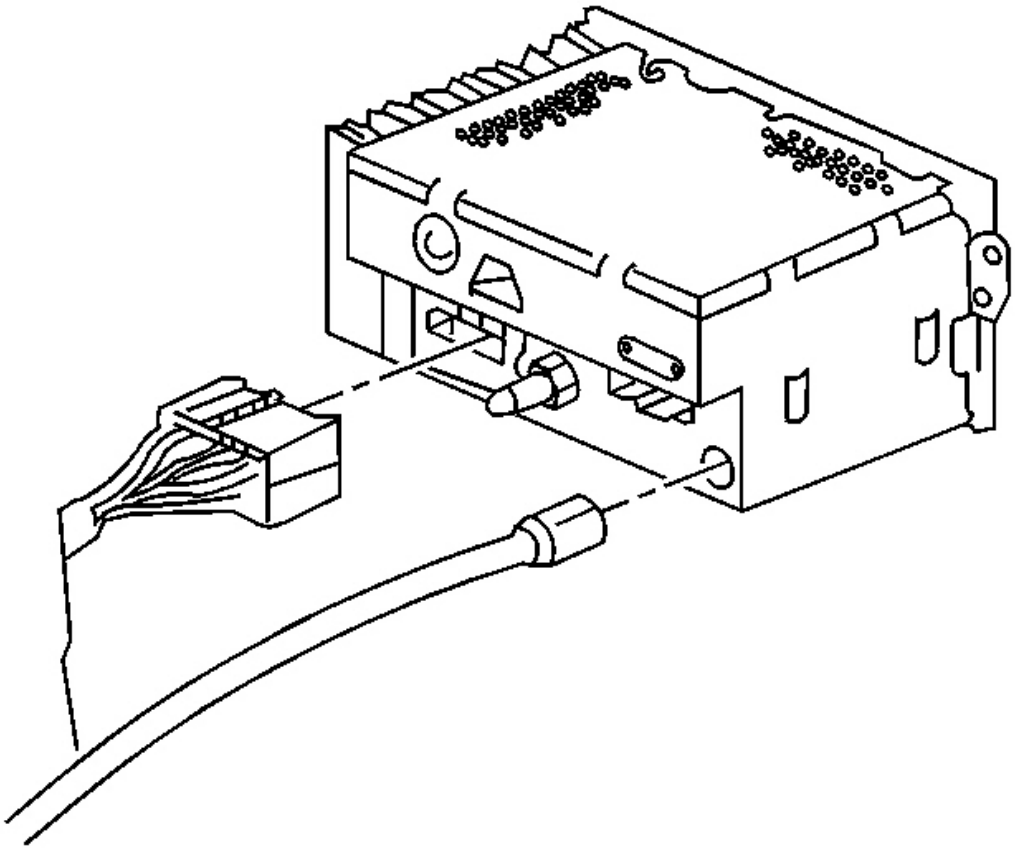


Fig. 39: View of Extension Cable to Radio
Courtesy of GENERAL MOTORS CORP.

2. Connect the cable to the radio.
3. Install the instrument panel center trim plate. Refer to **Trim Bezel Replacement - Center** in Instrument Panel, Gages, and Console.

SPEAKER REPLACEMENT - FRONT DOOR

Removal Procedure

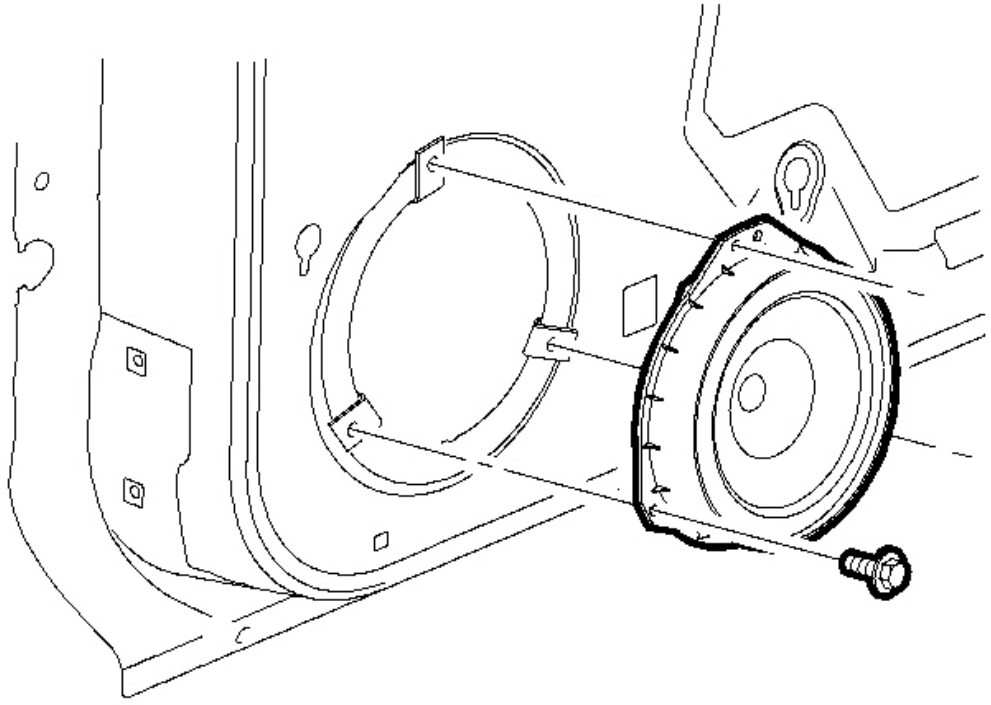


Fig. 40: View of Front Door Speaker & Screws
Courtesy of GENERAL MOTORS CORP.

1. Remove the front door trim panel. Refer to **Trim Panel Replacement - Side Front Door (Early Production)** in Doors.
2. Remove the front door speaker screws.
3. Disconnect the electrical connector from the speaker.
4. Remove the speaker from the front door.

Installation Procedure

1. Connect the electrical connector to the speaker.

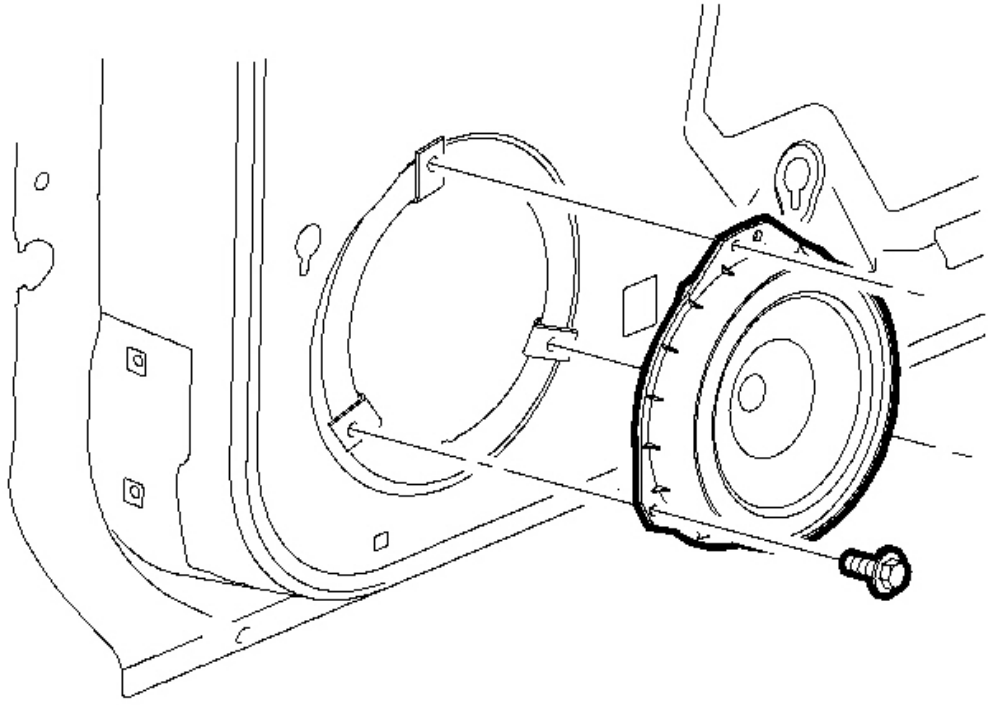


Fig. 41: View of Front Door Speaker & Screws
Courtesy of GENERAL MOTORS CORP.

2. Install the speaker to the front door.

NOTE: **Refer to Fastener Notice in Cautions and Notices.**

3. Install the screws to the speaker.

Tighten: Tighten the screws to 2.5 N.m (22 lb in).

4. Install the front door trim panel. Refer to **Trim Panel Replacement - Side Front Door (Early Production)** in Doors.

SPEAKER REPLACEMENT - FRONT SIDE DOOR UPPER

Removal Procedure

1. Remove the upper extension of the door trim panel.
    1. Pull at the top of the trim panel to disengage the trim clip.
    2. Lift up to remove the lower tabs from behind the door trim.
    3. Disconnect the speaker wiring harness.

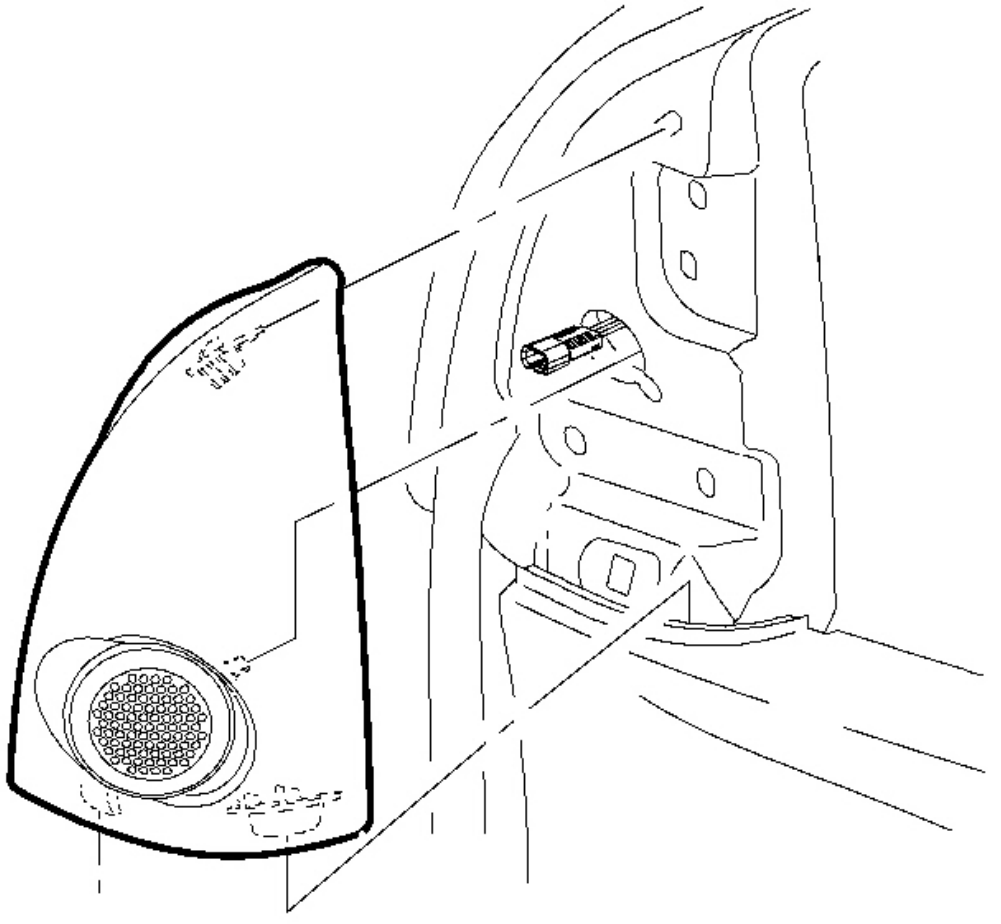


Fig. 42: View of Upper Extension of Door Trim Panel
Courtesy of GENERAL MOTORS CORP.

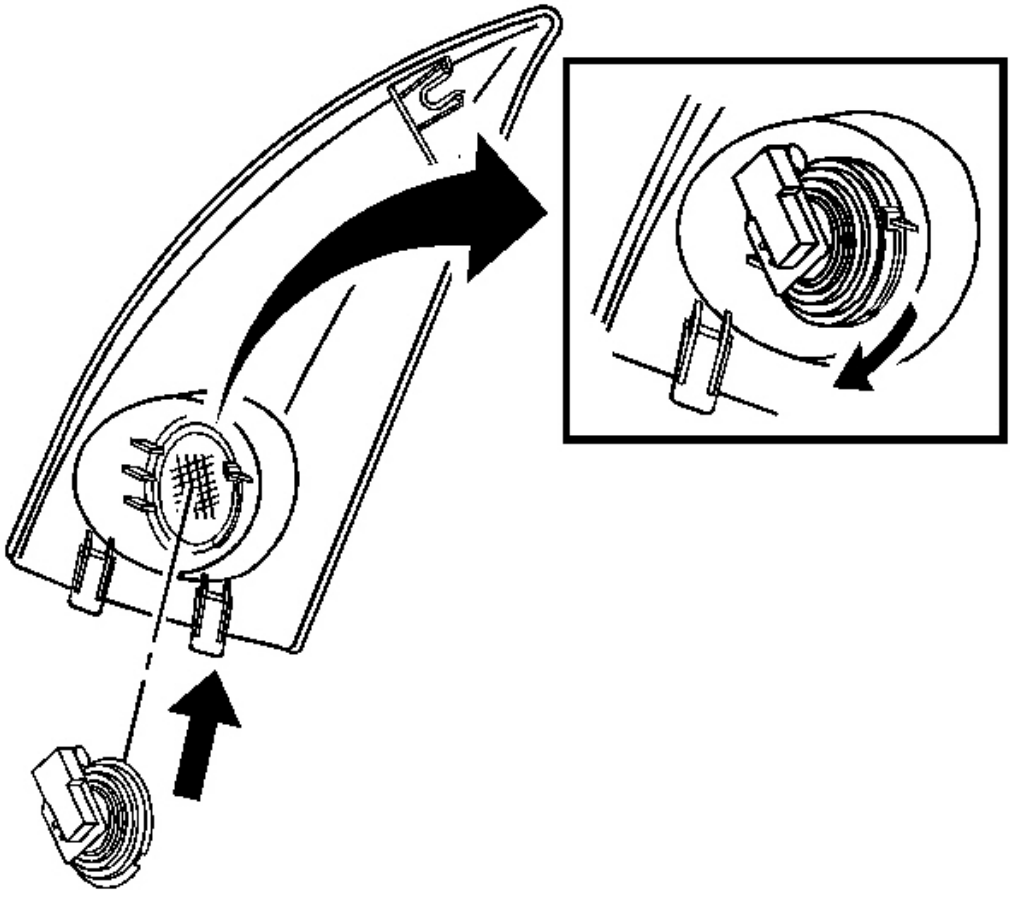


Fig. 43: View of Tweeter
Courtesy of GENERAL MOTORS CORP.

2. Rotate and remove the tweeter from the trim panel.
3. Remove the speaker.

Installation Procedure

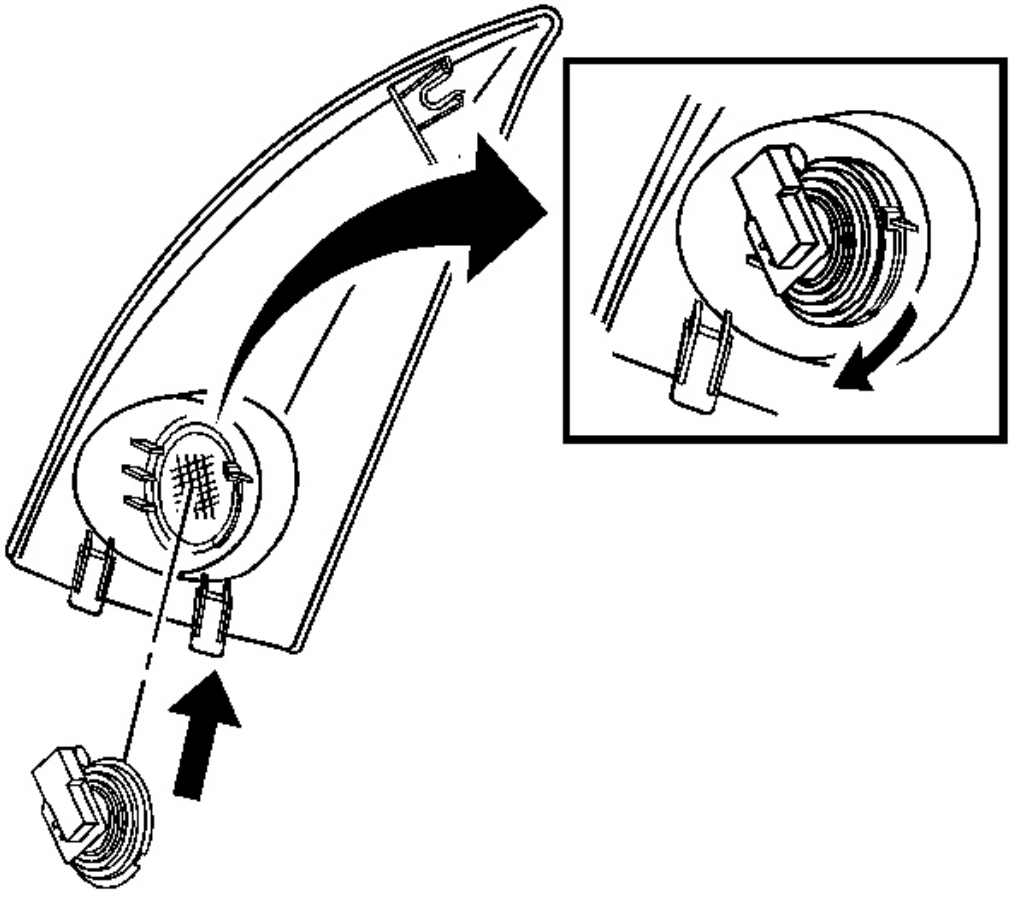


Fig. 44: View of Tweeter
Courtesy of GENERAL MOTORS CORP.

1. Position the speaker on the trim panel and twist to install the speaker.
2. Connect the speaker wiring harness.

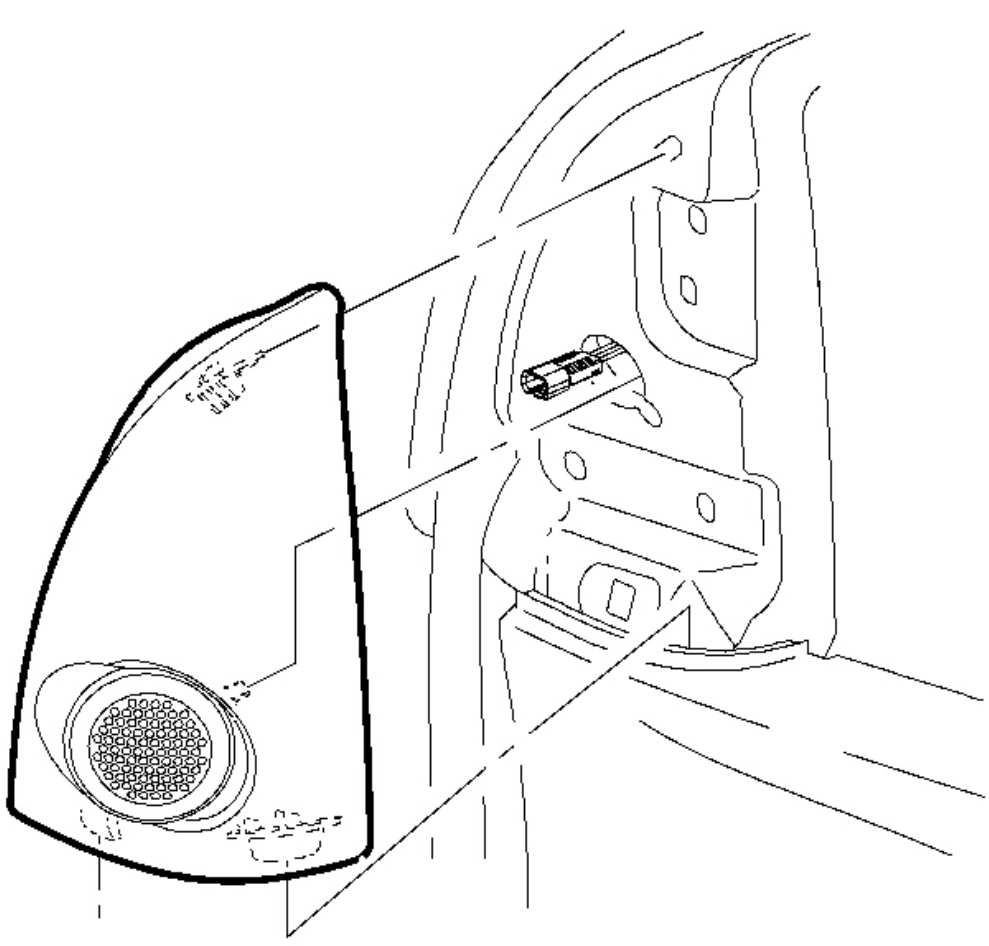


Fig. 45: View of Upper Extension of Door Trim Panel
Courtesy of GENERAL MOTORS CORP.

3. Install the upper extension of the door trim panel.
    1. Insert the tabs behind the door trim.
    2. Push to engage the clip.

SPEAKER REPLACEMENT - REAR DOOR

Removal Procedure

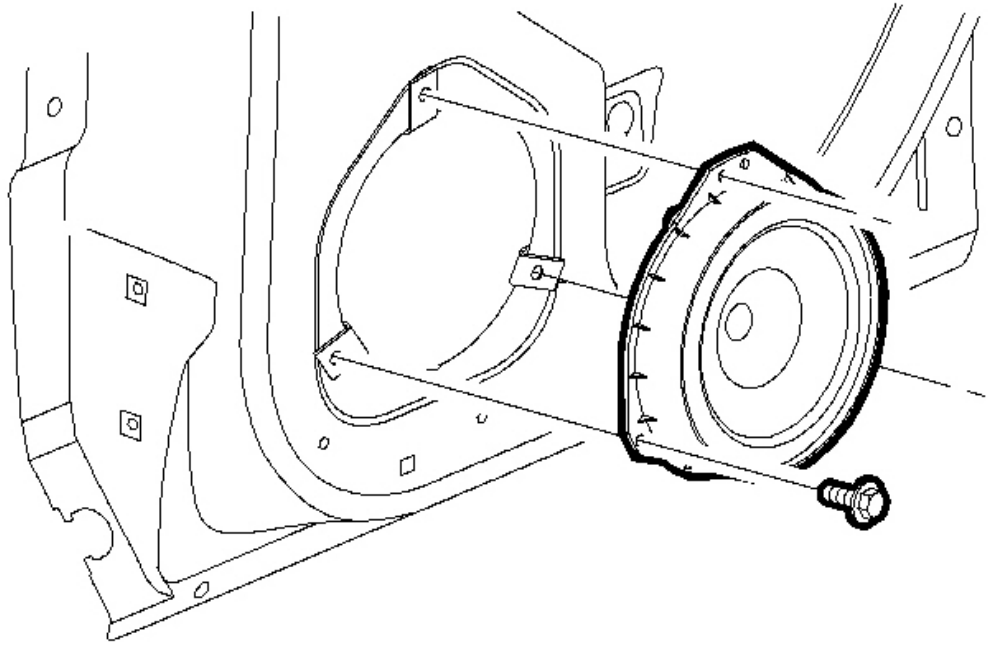


Fig. 46: View of Rear Door Speaker & Screws
Courtesy of GENERAL MOTORS CORP.

1. Remove the rear door trim panel. Refer to **Trim Panel Replacement - Side Rear Door** in Doors.
2. Remove the speaker screws.
3. Disconnect the electrical connector from the speaker.
4. Remove the speaker from the rear door.

Installation Procedure

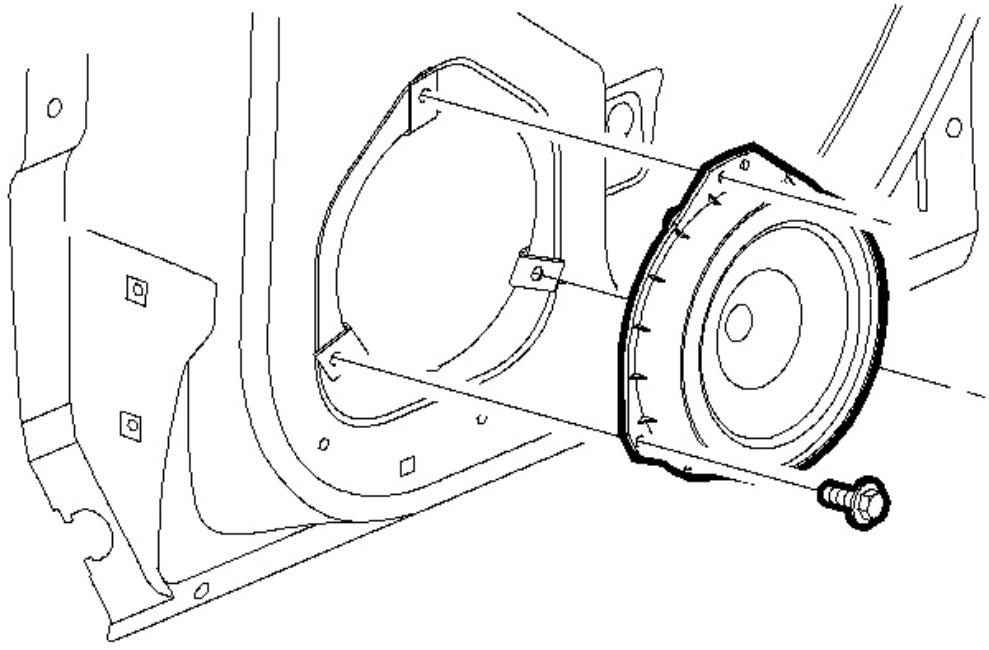


Fig. 47: View of Rear Door Speaker & Screws
Courtesy of GENERAL MOTORS CORP.

1. Connect the electrical connector to the speaker.
2. Install the speaker to the rear door.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the screws to the speaker.

Tighten: Tighten the screws to 2.5 N.m (22 lb in).

4. Install the rear door trim panel. Refer to **Trim Panel Replacement - Side Rear Door** in Doors.

SPEAKER REPLACEMENT - REAR

Removal Procedure

1. Remove the rear quarter trim panel. Refer to **Trim Panel Replacement - Rear Quarter Lower** .

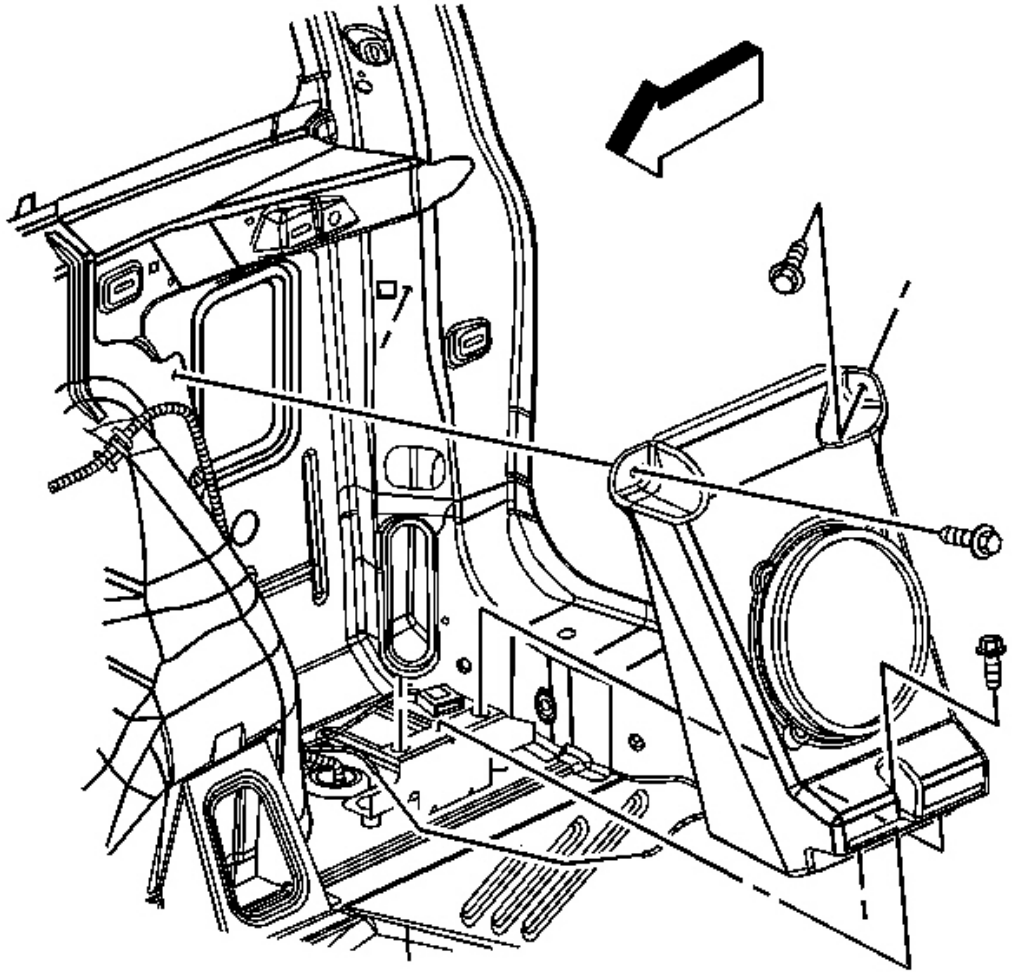


Fig. 48: View of Rear Speaker & Fasteners
Courtesy of GENERAL MOTORS CORP.

2. Remove the rear speaker fasteners.

3. Disconnect the electrical connectors from the speaker.
4. Remove the speaker from the vehicle.

Installation Procedure

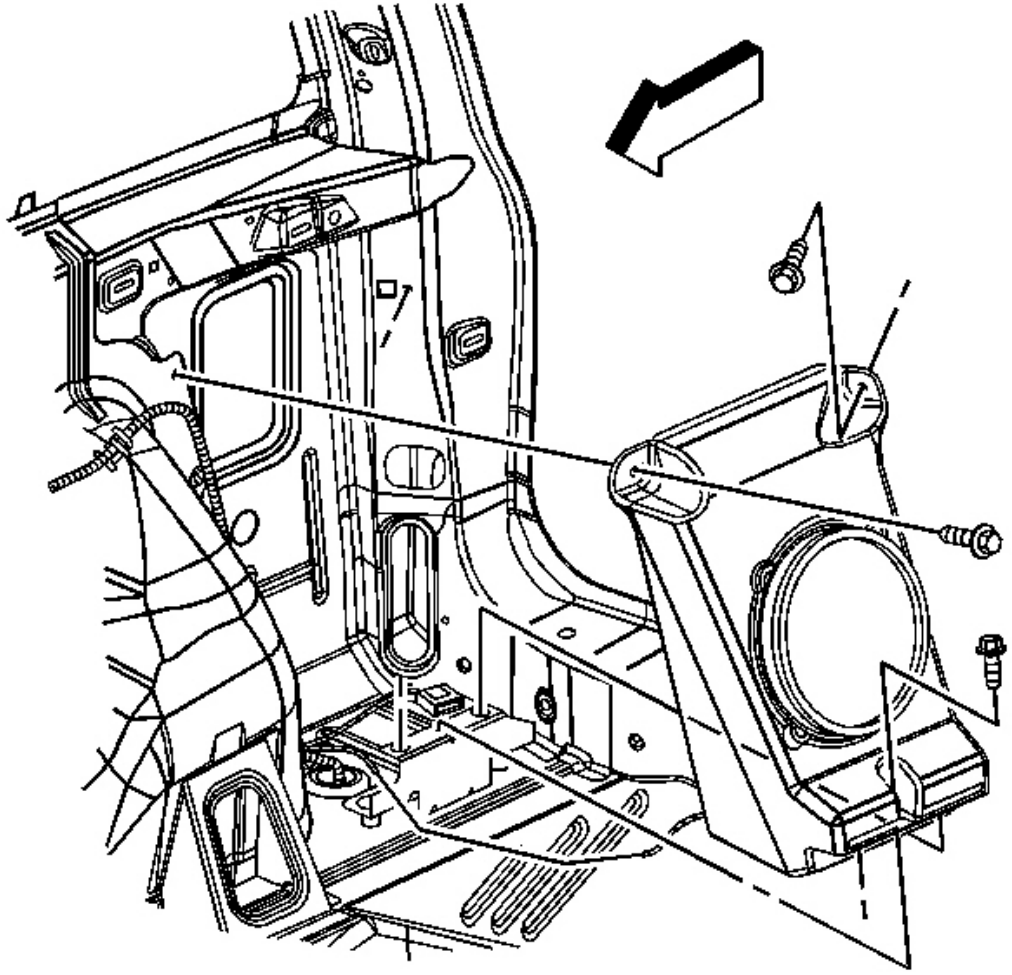


Fig. 49: View of Rear Speaker & Fasteners
Courtesy of GENERAL MOTORS CORP.

1. Install the speaker into the vehicle.
2. Connect the electrical connectors to the speaker.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the fasteners to the speaker.

   Tighten: Tighten the fasteners to 2.5 N.m (22 lb in).

4. Install the rear quarter trim panel. Refer to **Trim Panel Replacement - Rear Quarter Lower** .

OVERHEAD CONSOLE - VES REPLACEMENT

Removal Procedure

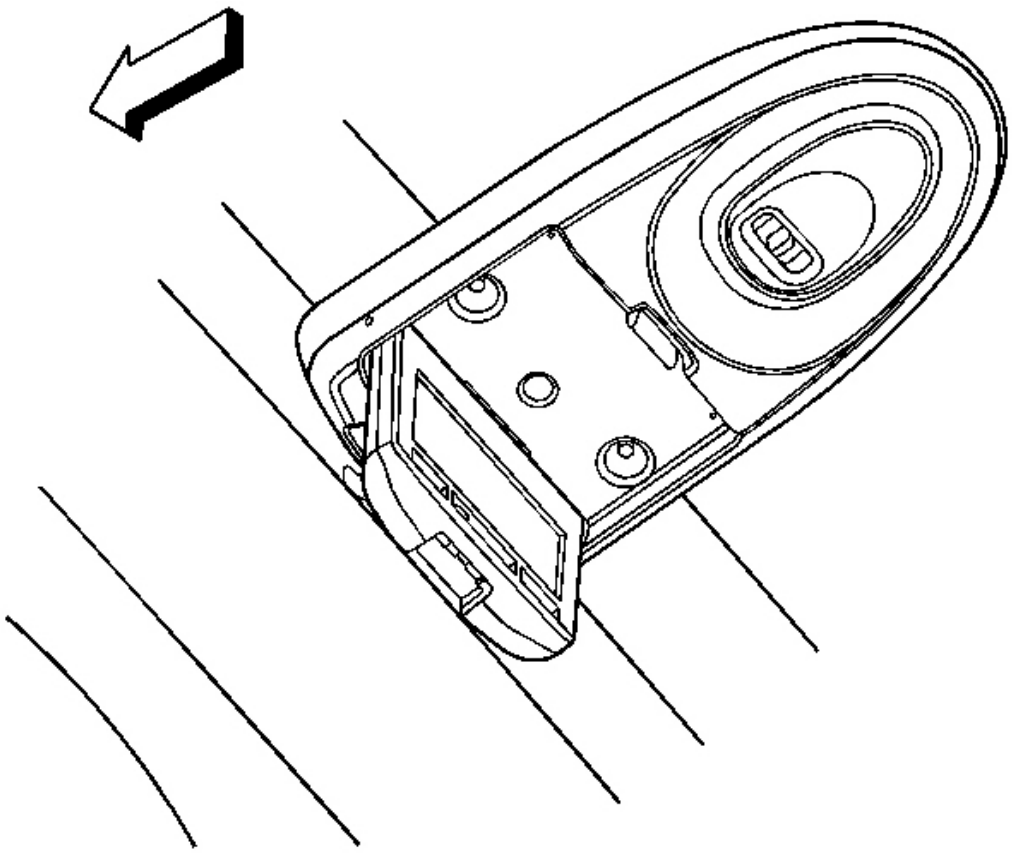


Fig. 50: View of Display Screen
Courtesy of GENERAL MOTORS CORP.

1. Flip down the display screen and remove the fasteners.

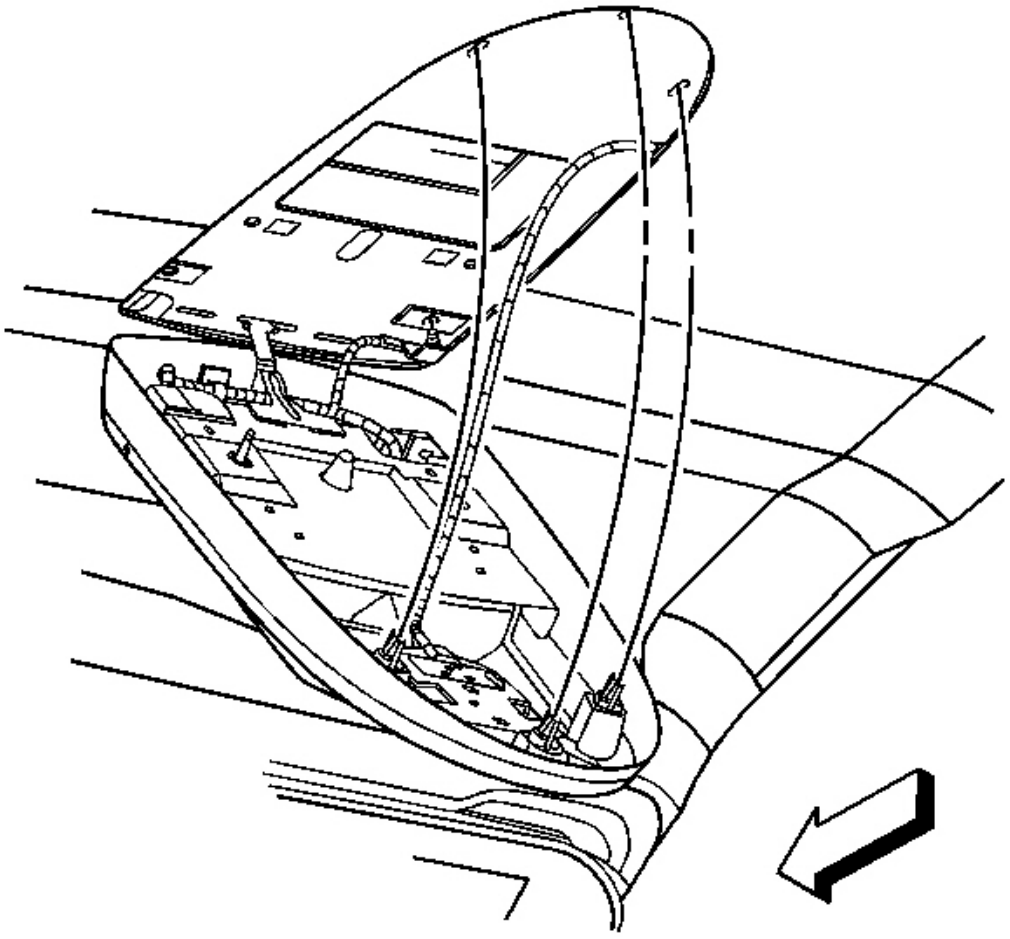


Fig. 51: View of Overhead Console Retaining Clips
Courtesy of GENERAL MOTORS CORP.

2. Pull down on the rear of the console to disengage the retaining clips.

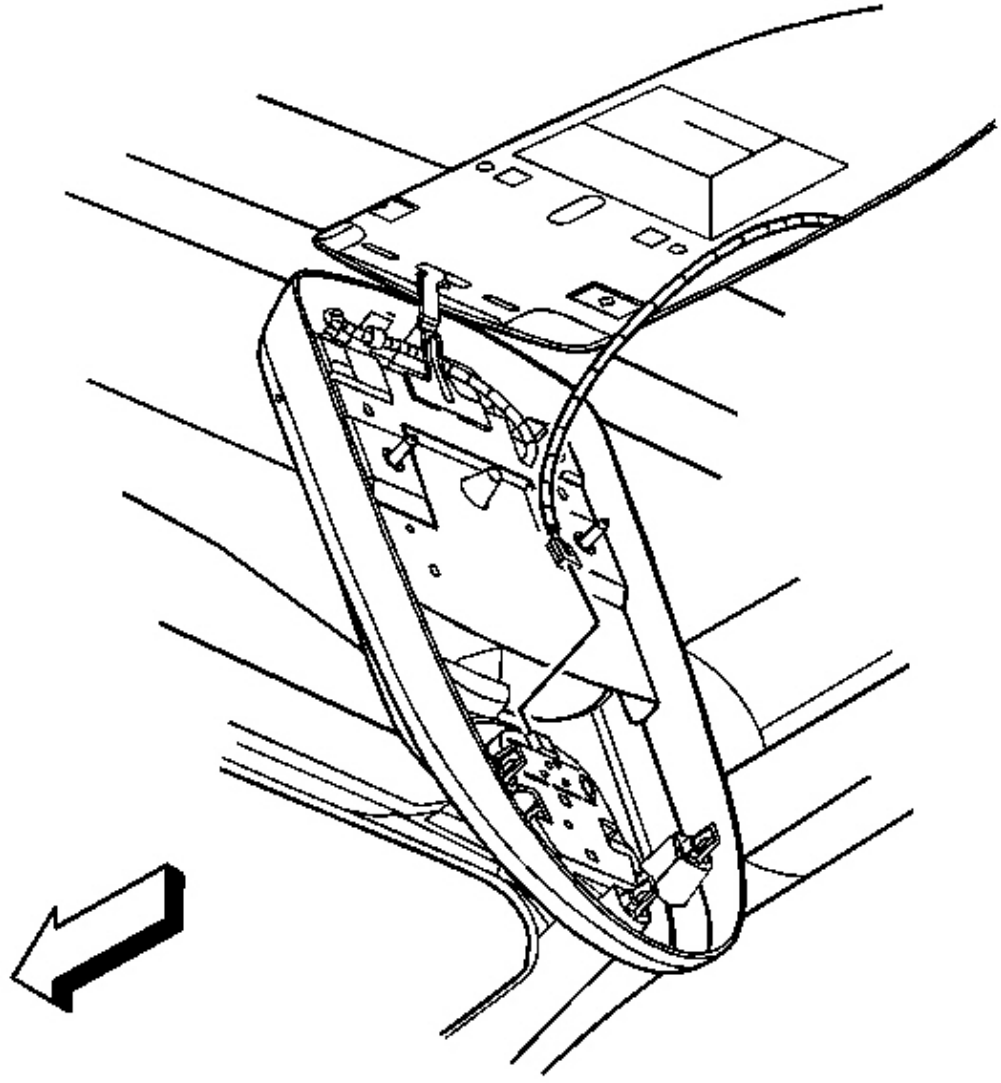


Fig. 52: View of Electrical Connections
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the electrical connections.

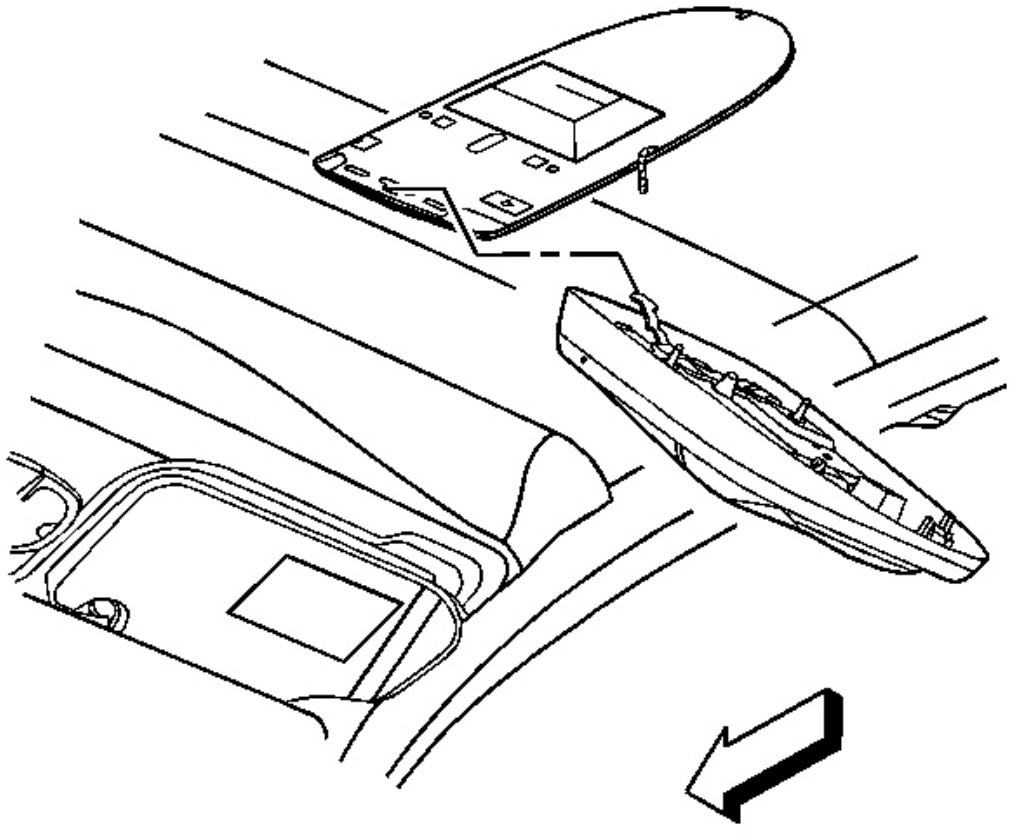


Fig. 53: View of Overhead Console
Courtesy of GENERAL MOTORS CORP.

4. Remove the retaining tab from the slot and remove the console from the vehicle.

Installation Procedure

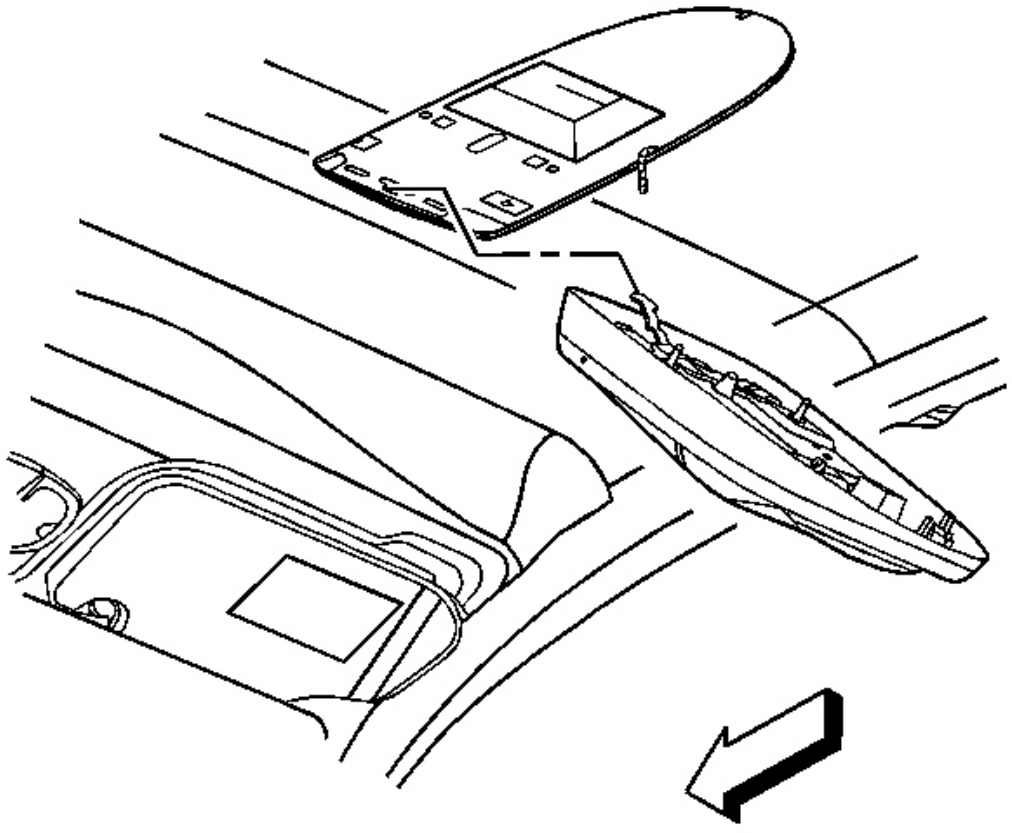


Fig. 54: View of Overhead Console
Courtesy of GENERAL MOTORS CORP.

1. Install the console and slide the retaining tab into the slot.

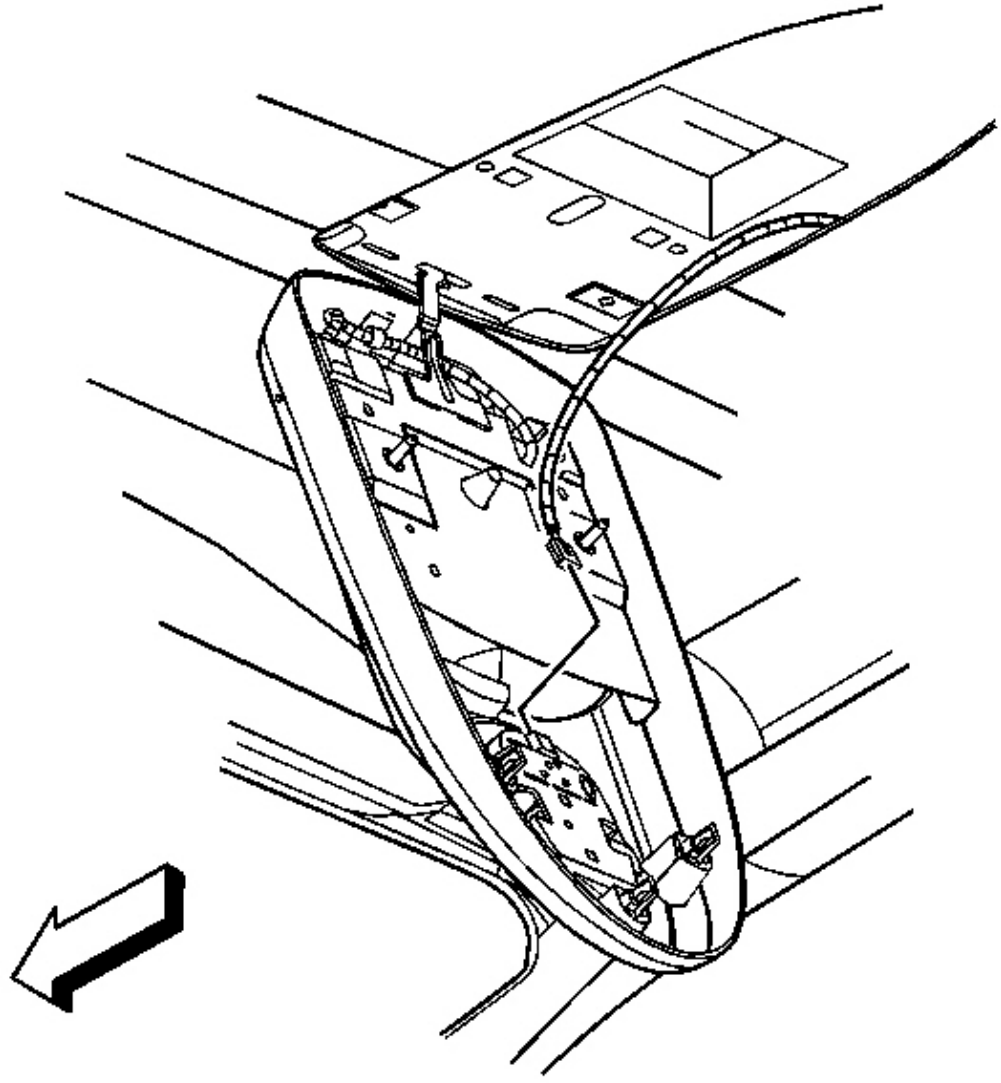


Fig. 55: View of Electrical Connections
Courtesy of GENERAL MOTORS CORP.

2. Connect the electrical connectors.

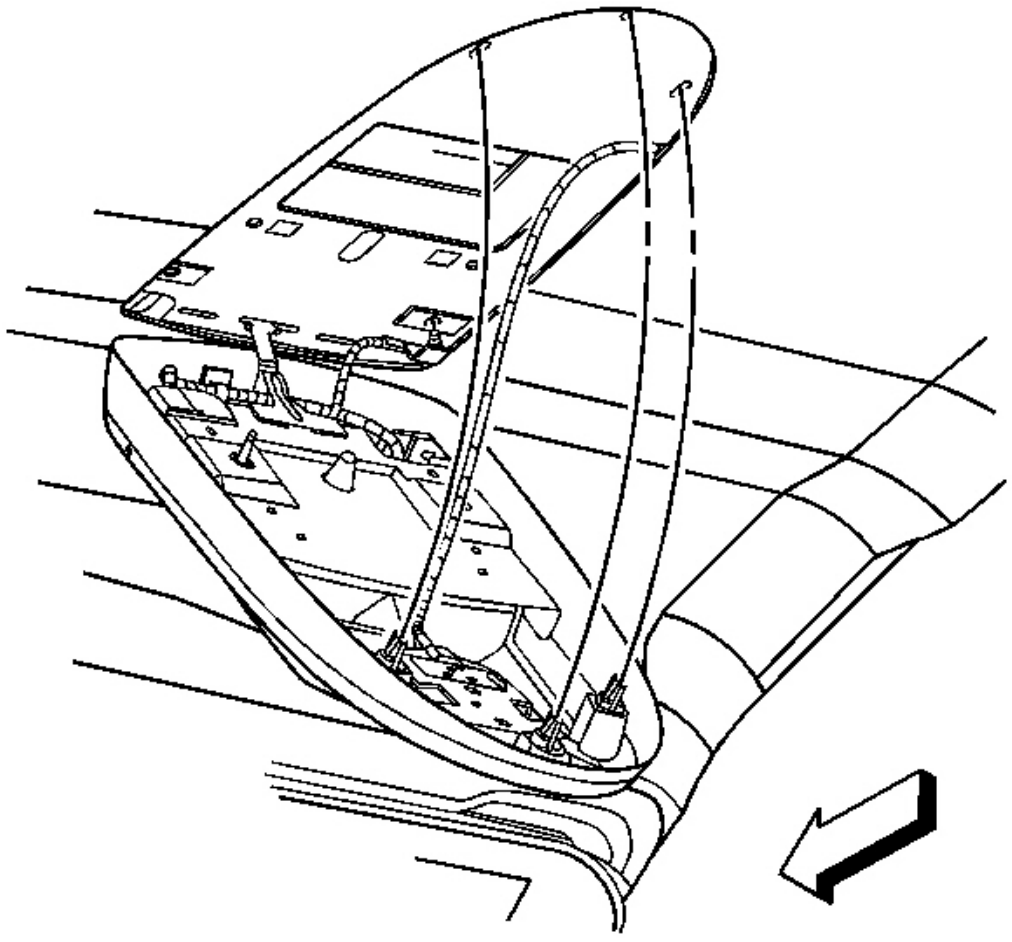


Fig. 56: View of Overhead Console Retaining Clips
Courtesy of GENERAL MOTORS CORP.

3. Push up on the rear of the console to engage the retaining clips.

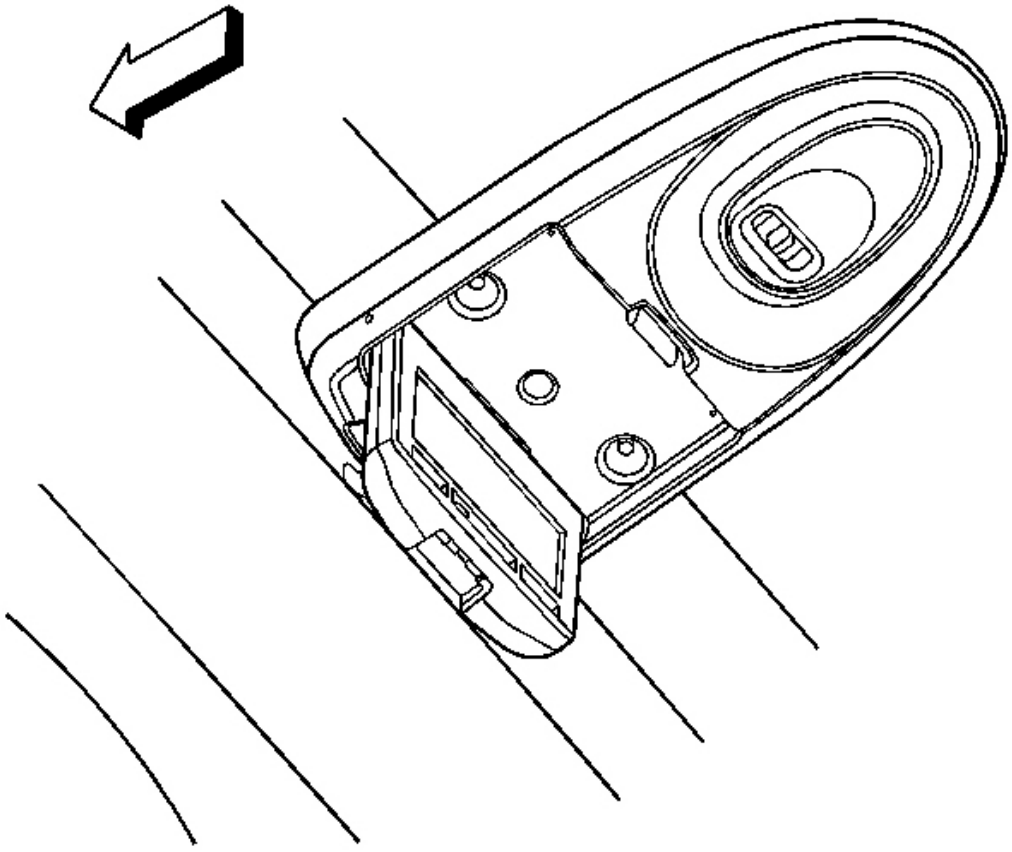


Fig. 57: View of Display Screen
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

4. Install the fasteners and fold up the display screen.

   Tighten: Tighten the fasteners to 2 N.m (18 lb in).

DESCRIPTION AND OPERATION

RADIO/AUDIO SYSTEM DESCRIPTION AND OPERATION

Contents

- RPO options

- Features
- Circuit description
- Component description
- Customer tips
- On board diagnostics
- 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:

- (UM7) AM/FM Stereo
- (U1C) AM/FM Stereo CD
- (US8) AM/FM Stereo, CD, MP3, RDS, EQ
- (US9) AM/FM Stereo, 6-Disc CD, MP3, RDS, EQ
- (UXQ4) Base Four Speaker
- (U79) Uplevel Four Speaker
- (WBM) Premium Audio
- (U2K) Digital Radio

Radio Features

Controls	AM/FM Radio (UM7)	AM/FM CD Radio (U1C)	AM/FM Single CD/MP3 (US8)	AM/FM 6 Disc CD/MP3 (US9)
Power	Push the VOL Knob			
Volume	Rotate the VOL knob			
Recall	Push the RCL button			
Recall Preset	Push station preset rocker buttons 1-6	Push station present buttons 1-6.		
Save Preset	Tune Radio to desired frequency. Push and hold desired preset button until tone is heard.			
Band	Press AM/FM	Press AM/FM. If listening to CD, will change function from CD to radio.	Press AM/FM. If listening to CD or XM, will change function to radio.	
A. Set	Press and hold AM/FM button until tone is generated. The radio will automatically scan and preset the strongest stations. Press and hold again to cancel.			
Balance	Lightly pull out on VOL knob. Detent signifies center of balance.	Press MODE button until BAL is displayed, then use +	Press BASS/TREB/FAD/BAL button until BAL is displayed. Rotate knob to desired setting.	

		or - button to adjust.	
Fade	Rotate the FADE ring. Detent signifies center of balance.	Press MODE button until FAD is displayed, then use + or - button to adjust.	Press BASS/TREB/FAD/BAL button until FAD is displayed. Rotate knob to desired setting.
Bass	Press BASS/TREB knob to release. Rotate to change amount of bass in audio.	Press MODE button until BAS is displayed, then use + or - button to adjust.	Press BASS/TREB/FAD/BAL button until BASS is displayed. Rotate knob to desired setting.
Treble	Press BASS/TREB knob to release. Lightly pull outward. Rotate to change amount of treble in audio.	Press MODE button until TREB is displayed, then use + or - button to adjust.	Press BASS/TREB/FAD/BAL knob until TREB is displayed. Rotate knob to desired setting.
Tune	TUNE/SEEK rocker manually increases or decreases frequency.	TUNE/SEEK rocker manually increases or decreases frequency.	Rotate TUNE knob to manually increase or decrease station frequency.
Seek	Hold TUNE/SEEK rocker until tone sounds. Radio will automatically increase or decrease frequency to next receivable station.		Momentarily press the SEEK rocker to automatically increase or decrease frequency to next receivable station.
Scan	Press SCN button to automatically scan through all stations sequentially, pausing at each one for five seconds.		Press SEEK rocker button until tone is generated to automatically scan through, in either ascending or descending order, pausing at each receivable station.
Tone Control	-	-	Use either side of the AUTO TONE rocker to scroll through the preset tone options.
Setting Clock	1. Push and hold RCL button. 2. While holding RCL, push the left side of the TUNE/SEEK rocker button until the correct hour appears. 3. While holding RCL, push the right side of the TUNE/SEEK rocker until the correct minute appears. 4. Release the RCL button when finished.		1. Push and hold RCL button. 2. While holding RCL, push the left side of the auto tone rocker button until the correct hour appears. 3. While holding RCL, push the right side of the auto tone rocker until the correct minute appears. 4. Release the RCL button when finished.

CD Player Features

Controls	AM/FM Radio (UM7)	AM/FM CD Radio (U1C)	AM/FM Single CD/MP3 (US8)	AM/FM 6 Disc CD/MP3 (US9)
Change Modes	-	Press CD button to change function from radio to CD. CD begins to play automatically.	Press AUX button to change between CD/MP3 and XM (if available). Operation only available if CD is	Press AUX button to change between CD/MP3 and XM (if available). Operation only available if CD is already loaded.

			already loaded.	
Play CD	-	CD will automatically begin to play when one is inserted.	CD will automatically begin to play when one is loaded.	
Eject SINGLE CD	-	Press the EJECT button.		Press the EJECT button. Then press the preset button when prompted to indicate which CD should ejected, or which slot should be loaded.
Eject ALL CDs	-	-	-	Press and hold the EJECT button and all discs are ejected in order."LOAD" is then displayed.
Load Single CD	-	-	Insert CD into empty player, or press CD button and insert disc when prompted.	Press CD button for less than three seconds. Radio will prompt use to select which location to load a CD. User selects location by pressing preset/disc buttons 1-6.
Load ALL CDs	-	-	-	Press and hold CD button for at least 3 seconds. The radio will prompt user to insert discs to fill all empty slots.
Previous Track	-	Press the PRV button.	Press preset 1 button, or rotate TUNE knob clockwise.	
Next Track	-	Press the NXT button.	Press preset 2 button, or rotate TUNE knob counterclockwise.	
Rewind	-	Press and hold REV button.	Press and hold left side of <<CAT>> button.	
Fast Forward	-	Press and hold FWD button.	Press and hold right side of <<CAT>> button.	
Random Track Order	-	Press the RDM button. Press again to cancel.	Press the RDM button. Press again to cancel.	Press RDM to random play current disc. Press and hold for 2 seconds to random play all discs. Press again to cancel.
Repeat	-	Press the RPT button to repeat the current track. Press again to cancel.		Press the RPT button to repeat the current disc. Press again to cancel.
Previous Disc	-	-	-	Press left side of SEEK rocker button.
Next Disc	-	-	-	Press right side of SEEK rocker button

MP3 Features

	AM/FM Radio	AM/FM CD	AM/FM Single CD/MP3	AM/FM 6 Disc CD/MP3

Controls	(UM7)	Radio (U1C)	(US8)	(US9)
Change Folder	-	-	Press <<CAT>> rocker button to scroll through available folders	
Previous Track	-	-	Press preset 1 button	
Next Track	-	-	Press preset 2 button	
Pause/Play	-	-	Press preset 3 button	
Random	-	-	Press RDM to random play current disc. Press and hold for more than 2 seconds to random play current directory. Press again to cancel.	
Repeat	-	-	Press RPT button to repeat one track. Press again to cancel.	Press RPT to repeat entire disc. Press again to cancel.
Info	-	-	Press left side of i/TRAF button to scroll through available track information, including Song Title, Artist Name, Album Name, Filename, and Directory Name.	
Fast Forward	-	-	Hold right side of <<CAT>> button.	
Fast Reverse	-	-	Hold left side of <<CAT>> button.	
Scan	-	-	Press and hold SEK rocker button to play first 10 seconds of each song in ascending or descending order.	
Display	-	-	To change the default display of "ELAPSED" and the track time: 1. Press the left side of the i/TRAF button to scroll through the available information 2. Once the desired information is displayed, press and hold the RCL button for 5 seconds and the radio will use the current information as the default display.	

Circuit Operation

Radio Power

The main radio power is supplied by the 10A RADIO (BATT1) fuse in the body control module (BCM). Radio switch-on power, 12 volts in ACC, RUN or RAP, is supplied by the 10A RADIO (ACC.) in the BCM.

Radio Grounds

The main radio ground provides a ground for the radio circuits. An additional braided ground strap provides a shielding radio case ground to reduce EMI noise. Both grounds are connected together inside the radio.

Radio Speaker Outputs

At zero volume, the plus (+) and minus (-) speaker outputs are both approximately 5-6 volts, measured to vehicle ground. If a plus or minus for any speaker output is shorted to ground or voltage, the radio circuitry will turn OFF all 4 speaker outputs for component protection. Above zero volume, the plus and minus change to create a voltage difference between each other, to drive the voice coil of the speaker.

Radio Park Lamp Input

The radio park lamp input allows the radio to sense when the vehicle parking lamps are ON. When the parking lamps are ON, this circuit goes to battery voltage, and the radio display back-lighting switches from full bright to the brightness level determined by the I/P illumination input.

Radio I/P Illumination Input

A pulse width modulated (PWM) voltage for instrument panel (I/P) illumination is provided to the radio I/P illumination input. The Radio uses this input to directly illuminate the radio buttons and adjust the radio display back-lighting when the park lamp input is ON.

Amplifier Power

The main amplifier power is provided by the 20A PREM AUDIO fuse in the instrument panel fuse block..

Amplifier Radio Speaker Inputs (WBM only)

The radio speaker outputs, at a reduced output level for amplified systems, are the amplifier inputs. The amplifier boosts these inputs and outputs them to the vehicle speakers. Speaker plus and minus circuits from the radio change to create a voltage difference between each other. If one speaker plus or minus is open between the radio and the amplifier, the input to the amplifier is approximately half because only one of the circuits is changing. The speaker for that channel then operates at approximately only half the normal volume.

Amplifier Speaker Outputs (WBM only)

At zero volume, the plus (+) and minus (-) speaker outputs are both approximately 5-6 volts, measured to vehicle ground. If a plus or minus for any speaker output is shorted to ground or voltage, the amplifier circuitry will turn OFF either the front outputs or rear outputs for component protection. Above zero volume, the plus and minus change to create a voltage difference between each other, to drive the voice coil of the speaker.

Amplifier Radio-On (WBM only)

When the radio is ON, this circuit is pulled to 12 volts by the radio. The amplifier switches ON when this circuit is 12 volts and switches OFF when this signal is 0 volts.

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 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 2 volts 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 AutoTone 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.

The antenna base and mast should be installed to the torque specifications provided in the **Antenna Replacement - Digital Radio** procedures.

The antenna mast is a single 1/4 wave design located at the right front fender.

Ground Strap

The braided ground strap, which is connected between the radio case and the instrument panel fuse block (IPFB), is provided to improve reception and deter noise from entering the audio system.

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 two fasteners. Guide pins are provided to aid in aligning the radio. Electrical connections to the radio are a 24-way connector from the I/P harness, antenna lead connector and braided ground strap. An additional 12-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.

Clock time is displayed continuously on the UM7 and U1C radios when the ignition is off. Pressing the RCL provides momentary backlighting. Time is not displayed on the US8 and US9 radios when the ignition is off. Pressing RCL will temporarily display the time.

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 four speakers, mounted in the doors. The optional speaker system (RPO UQ6) includes an additional speaker mounted in the front driver and passenger door mirror trim panel. The premium audio system (RPO WBM) adds a subwoofer and amplifier.

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, autotone 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 12-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 12-way connector.

Disconnecting the 12-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 - Entertainment System** in this section. For further information regarding OnStar(R) operation, refer to the OnStar(R) section of this service manual.

Amplifier

Vehicles equipped with Premium Audio (RPO WBM) include an amplifier. The amplifier has low level inputs from the radio for the four speaker channels and amplifies the sound. The amplifier receives a radio ON signal from the radio. This signal is delayed momentarily at initial key on to prevent any speaker pops during startup.

The purpose of an 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 of the input signal, as in the case of a subwoofer or a mid-range amplifier.

Subwoofer

The premium audio system includes a subwoofer, which 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 RPO WBM premium audio package amplifies the low frequency and outputs it to the subwoofer.

Customer Tips

Radio Reception - FM

Select Stations Within Range: The best FM fidelity will be obtained from stations within a 16-64 km (10-40 mile) range. Noise or distortion may become apparent when attempting to receive stations at distances greater than this range.

Suggestion: Reduce treble response when attempting to receive fringe stations.

Tall Structures: Tall buildings or hills may cause degrading or loss of signal. FM stations tend to travel "line of sight." Buildings or hills can interrupt the FM signal.

Suggestion: Reduce treble response.

Interference from another station: Although receiver circuits are among the most advanced type available, there are instances where a radio station can be interfered with by another station.

Suggestion: Select another station or switch to a cassette or CD.

Radio Reception - AM

Static Interference During Weather Disturbances: AM reception is sensitive to storm disturbances such as lightning.

Suggestion: Reduce treble response or select an FM station for weather related information.

Care of Compact Discs

- Handle compact discs (CDs) carefully. Touch only the outer edges of the CD or the edge of the hole in the center of the CD. Never touch the glossy side of the CD. Fingerprints and scratches will interrupt the "reading" of the information on the disc.
- Store CDs in their protective cases. Store CDs away from sunlight, dirt, dust, and debris.
- Do not attach a label or tape to a CD.
- Always check for scratches and signs of wear on both sides of the CD.
- Never place any marks on the CD with a marker.
- If a CD becomes contaminated, clean it with a clean, damp, soft, lint-free cloth and mild detergent. Wipe the CD in a straight line from the center hole outward. Do not use cleaning solutions which may damage the CD, such as chemically treated cleaning cloths, benzene, or paint thinners.

Compact Discs Not Appropriate to Use

These CD players were designed to be compatible with round digital audio CDs with the "Compact Disc Digital Audio" label. Other CDs may be incompatible, causing a no-play condition, excessive skips, "ERR" shown on the radio display or a jam in the loading mechanism. Some incompatible CD types are:

- Special-shaped CDs (any that are not round)
- Re-Writeable CDs (CD-RW type are incompatible)
- Recordable CDs (CD-R type are incompatible, except with US8 or US9 radios)
- Library CDs (with thick bar code labels)
- CD with User-applied labels

On Board Diagnostic Mode (U1C only)

Follow the instructions below to enter and properly utilize the On Board Diagnostics:

To Enter On Board Diagnostic Mode

1. Key ON, engine OFF, radio in AM/FM mode.
2. Press and hold RCL button, preset 1 button, and preset 6 button.
3. While holding these buttons, press the VOL knob.
4. A beep sounds when the radio enters On Board Diagnostic Mode.

Use the Seek button to advance to the desired mode:

- (T-01) Diagnostic Trouble Code Mode (if available)
- (T-02) Test Tone Mode
- (T-03) LCD Display Segment Mode
- (T-04) Key Test Mode (if available)
- (T-05) Antenna Signal Meter Mode (if available)
- (T-06) Clear Diagnostic Trouble Code Mode (if available)

Press the AM/FM button to select the desired mode. Refer to the Diagnostic Mode descriptions.

Press the RCL button to return to OBD menu or press VOL knob to exit OBD Mode.

Diagnostic Trouble Code Mode

The diagnostic trouble code mode is available to provide DTCs and the number of times each code has set. Refer to Enter On Board Diagnostic Mode procedure prior to referencing this information.

To use the DTC Mode:

AM/FM CD Radio - Diagnostic trouble code E04 and the number of times it has set will be displayed first. Codes E01 through E03 do not apply to this radio. Use SEEK rocker button to tab through error codes E04, E05, and E06. Press the RCL button to return to the OBD menu. Press VOL knob to exit OBD.

Diagnostic Trouble Codes

Diagnostic Trouble Code	Possible Causes	Procedure
E04- CD Eject Error	CD is warped or cracked.	Inspect the CD. Remove any burrs. Avoid using cracked or deformed CDs. If using an 8 cm (3 in) disc, check for correct installation of adapter. Do not use adapters with broken hooks.
	CD player opening is blocked by foreign material.	Remove foreign material. If material cannot be removed, replace the radio. Refer to **Radio Replacement** .
	CD Player failure.	Refer to **Radio Replacement** .
E05- CD Play Error	CD is upside down.	CD will eject after loading. Insert CD label side up.
	CD is scratched.	The CD will skip, eject unexpectedly, eject after loading, or mute intermittently. Inspect CD for dirt, scratches, or pinholes. Clean CD, refer to Handling CDs in this section. Do not use any chemicals and avoid touching the CD surface.
	CD is dirty.	Clean CD. Refer to Handling CDs in this section.
	CD optics obscured by condensation.	Use car air conditioning system or car heater blower motor to help evaporate any condensation.
	CD Player failure.	Refer to **Radio Replacement** .
E06- CD Insertion Error	CD is scratched.	The CD will skip, eject unexpectedly, eject after loading, or mute intermittently. Inspect CD for dirt, scratches, or pinholes. Clean CD, refer to Handling CDs in this service manual. Do not use any chemicals and avoid touching the CD surface.
	CD is warped or cracked.	Inspect the CD. Remove any burrs. Avoid using cracked or deformed CDs. If using an 8 cm (3 in) disc, check for correct installation of adapter. Do not use adapters with broken hooks.
	CD is upside down.	CD will eject after loading. Insert CD label side up.
	CD Player failure.	Refer to **Radio Replacement** .

Test Tone Mode

The Test Tone Mode is available to check for proper speaker function. Once Test Tone mode has been selected, a tone alternating between 100 Hz and 3 kHz will automatically begin to sound. Refer to Enter On Board Diagnostic Mode procedure prior to referencing this information.

To use the Test Tone Mode:

- The display with show "1" indicating the left front speaker is selected.
- Use the SEEK rocker button to move between speakers, "2" indicates right front, "3" indicates left rear, and "4" indicates right rear.
- Press RCL button to return to OBD menu.

If no test tone is heard audibly, increase the volume using the VOL knob. If any of the test tones are not heard from one or more speakers, refer to **Speakers Inoperative - One or More**

LCD Display Segment Mode

The LCD Display Segment Mode is available to verify that all display segments are operating properly. Refer to Enter On Board Diagnostic Mode procedure prior to referencing this information. If any display segments are not displayed, replace the radio. Refer to **Radio Replacement** . Press the appropriate button to return to the OBD menu.

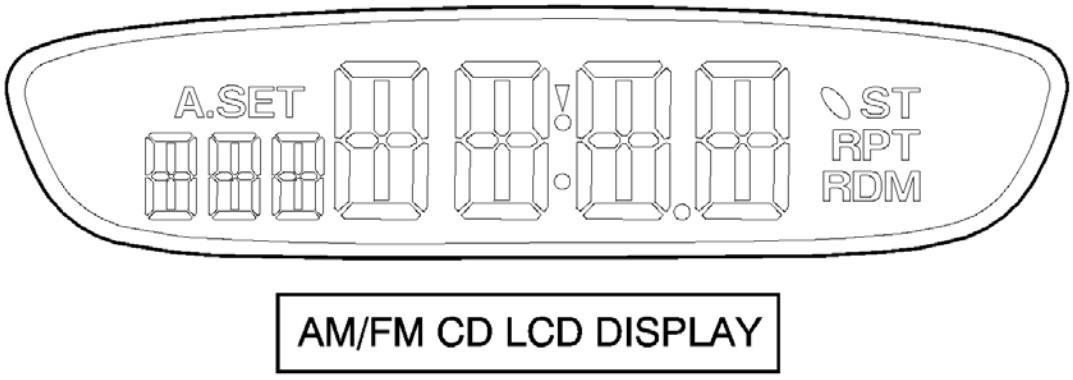


Fig. 58: AM/FM CD LCD Display Segment
Courtesy of GENERAL MOTORS CORP.

Key Test Mode

The Key Test Mode is available to verify that each button will function. Refer to Enter On Board Diagnostic Mode procedure prior to referencing this information. A tone is generated each time a button is pressed, to confirm button operation. If a button is pressed and a tone is not generated, replace the radio. Refer to **Radio Replacement** .

IMPORTANT: The RCL button and VOL knob will not produce a tone in this test, as performance of their function is known once the On Board Diagnostic Mode and Key Test Mode have been entered. When the key test is complete, press the appropriate button to return to the OBD menu.

Antenna Signal Meter Mode

The antenna signal meter mode is available to evaluate signal strength. Refer to Enter On Board Diagnostic Mode procedure prior to referencing this information. Once this mode is entered, the audio of the last tuned station is played while the signal strength is displayed. This function may be useful for performing a side-by-side, vehicle-to-vehicle comparison, for evaluating audio system reception complaints. Press the appropriate button to return to the OBD menu.

Clear Diagnostic Trouble Code Mode

The Clear Diagnostic Trouble Code Mode is available to clear the diagnostic trouble code counters. Refer to Enter On Board Diagnostic Mode procedure prior to referencing this information. Once this mode is selected, press and hold RCL for 2 seconds, a tone will be generated and the DTC counters will reset. Press the appropriate button to return to the OBD menu.

Theft Deterrent Feature

The U1C, US8, and US9 are equipped with a programmable theft deterrent feature. When the radio has the SEC (armed) mode activated, the radio will enter the LOCK (locked) mode if the power between the battery and the radio is interrupted for more than 20 seconds. While in the locked mode, "LOCK" appears on the radio display and all radio functions are disabled.

When the vehicle is first purchased or the radio is new or remanufactured, the theft deterrent feature is unarmed. If desired, the customer must program a 4-digit code into the radio to activate the theft deterrent feature.

Operating Modes

The theft deterrent feature causes 3 operating modes:

- VULNERABLE (UNARMED) MODE -The radio does not have a 4-digit code stored. If stolen, the radio will operate normally when power is applied.
- SECURE (ARMED) MODE - The radio has a 4-digit code stored. The radio will enter the LOCK (locked) mode if the power between the battery and the radio is interrupted for more than 20 seconds.
- LOCK (LOCKED) MODE - The radio has been removed from power for more than 20 seconds or the wrong four-digit code has been entered while in the SEC (armed) mode.

IMPORTANT: Before performing service on a vehicle, verify the theft deterrent feature is in the VULNERABLE (unarmed) mode. This check is made by the following steps:

1. **Turn the ignition ON. Radio OFF.**
2. **Press and hold preset buttons "1'" and "2" for 5 seconds.**
3. **If SEC (armed), a 4-digit number will appear on the radio display. This number is NOT the customer's code. Ask the customer to disarm the feature by following the procedure given in the owner's manual. The procedure is the same procedure used for activating the theft deterrent feature.**
4. **If no number appears, the theft deterrent feature is VULNERABLE (unarmed) and service may be performed.**

Activating Theft Deterrent

To arm the theft deterrent feature, perform the following:

1. Turn the ignition ON. Radio OFF.

2. Press and hold preset buttons 5 and 6, at the same time, for 5 seconds. The radio will display "- - - -".
3. Have the customer select a 4-digit code. (Suggest to use a number that is familiar to them.)
4. Enter the 4-digit code by using the SEEK/SCAN and TUNE rocker buttons. The numbers will start at 0000 and will increase on the display each time the corresponding side of the rocker button is pushed.
    1. Press the down arrow side of the SEEK/SCAN rocker button to change the left digit.
    2. Press the up arrow side of the SEEK/SCAN rocker button to change the second to left digit.
    3. Press the down arrow side of the TUNE rocker button to change the third to left digit.
    4. Press the up arrow side of the TUNE rocker button to change the fourth to left digit.
5. Push the AM/FM button. The display will show "REP" (repeat), requesting the 4-digit code to be entered again to verify correct entry.
6. Again, enter the same four-digit code, using the SEEK/SCAN and TUNE rocker buttons.
    1. Press the down arrow side of the SEEK/SCAN rocker button to change the left digit.
    2. Press the up arrow side of the SEEK/SCAN rocker button to change the second to left digit.
    3. Press the down arrow side of the TUNE rocker button to change the third to left digit.
    4. Press the up arrow side of the TUNE rocker button to change the fourth to left digit.
7. Push the AM/FM button to store the code.
8. The display will show "SEC" indicating the radio is armed and the radio will return to normal operation.

If the radio displays "Err1", "Err2", or "LOCK", then the radio was already in the secure state and is armed with a different code than the one that was entered. Proceed to the appropriate part of this Theft Deterrent section to deactivate the system if deactivation is desired.

Deactivating the Theft Deterrent Feature - Radio in "SEC" (ARMED) MODE

To deactivate the theft deterrent feature, enter the customer's code or the factory unlock code using steps 1-7 of the "Activating Theft Deterrent" procedure in this section. After completing those steps, the display will show no number. This indicates the theft deterrent feature is in the VULNERABLE (unarmed) mode and service may be performed.

When the vehicle is returned to the customer, remind the customer to reactivate the theft deterrent feature using the procedure given in the owner's manual.

Deactivating Theft Deterrent - Radio in "LOCK" or "- - - -" MODE (CODE KNOWN)

When the theft deterrent feature is in the SEC (armed) mode, the radio can enter the locked state if the power is removed for greater than 20 seconds or an incorrect code entry is attempted three times. An error message is displayed after every wrong entry.

When the radio is in the LOCK (locked) mode, "LOCK" is displayed and all radio functions are disabled.

Before another attempt at the correct code can be made, the radio must be ON and the display must show "LOCK" for and hour. After an hour, "- - - -" will be displayed and the correct code may be entered using the following steps.

1. Turn the ignition ON.
2. Press the power button on the radio. The display will show "- - - -".
3. Enter the 4-digit code by using the SEEK/SCAN and TUNE rocker buttons. The numbers will start at 0000 and will increase on the display each time the corresponding side of the rocker button is pushed.
    1. Press the down arrow side of the SEEK/SCAN rocker button to change the left digit.
    2. Press the up arrow side of the SEEK/SCAN rocker button to change the second to left digit.
    3. Press the down arrow side of the TUNE rocker button to change the third to left digit.
    4. Press the up arrow side of the TUNE rocker button to change the fourth to left digit.
4. Press the AM/FM button after entering the 4-digit code. If the incorrect code has been entered, the radio will return to the SEC (armed) mode and normal operation will return. If the wrong code is entered, the display will show an error message and display "- - - -" indicating another attempt at the correct code can be made.

Deactivating Theft Deterrent - Radio in "LOCK" or "- - - -" Mode (Code Unknown)

When the theft deterrent feature is armed or secure (SEC), the radio can enter the locked state if the power is removed from the radio for greater than 20 seconds or an incorrect code is attempted 3 times. An error message is displayed after every wrong entry.

When the radio is in the LOCK (locked) mode, "LOCK" is displayed and all radio functions are disabled.

Before another attempt at the correct code can be made, the radio must be ON and the display must show "LOCK" for an hour. After an hour, "- - - -" will be displayed and the correct code may be entered using the following steps:

If the customer code is unknown, perform the following steps to retrieve the customer code:

1. Turn ignition ON.
2. Turn radio power OFF.
3. Press and hold preset buttons "1" and "2" for 5 seconds. A 4-digit code will be displayed. This number is not the customer's code. Record this number as it is needed before technical support is called.
4. Using a touch tone phone only, call the technical support system at 1-888-225-2306 (USA & Canada). When advised, give the following information:
    1. Your retailer code.
    2. The 4-digit radio display code obtained in step 3.
    3. In response, you will receive the factory unlock code; record this number.

        NOTE: The factory unlock code received is the same as the code that was entered by the customer.

5. Turn ignition ON.
6. Press the radio power button. The display will show "- - - -".
7. Enter the four-digit code by using the SEEK/SCAN and TUNE rocker buttons. The numbers will start at 0000 and will increase on the display each time the corresponding side of the rocker button is pushed.

1. Press the down arrow side of the SEEK/SCAN rocker button to change the left digit.
2. Press the up arrow side of the SEEK/SCAN rocker button to change the second to left digit.
3. Press the down arrow side of the TUNE rocker button to change the third to left digit.
4. Press the up arrow side of the TUNE rocker button to change the fourth to left digit.

8. Press the AM/FM button after entering the 4-digit code. If the correct code has been entered, the radio will return to the SEC (armed) mode and normal operation will return. If the wrong code has been entered, the display will show an error message and display "- - - -" indicating another attempt at the correct code can be made.

Radio Data System (RDS)

The CD/MP3 audio systems are equipped with technology known as the Radio Data System (RDS). RDS is a system that sends data along with the audio of the FM station you are currently tuned to. RDS is a standard that defines how a FM broadcast station may send digital data along with the audio program. Think of it as a one way wireless modem, allowing the broadcaster to send information about the program to your receiver.

RDS Basic Information

- RDS functions are provided in the FM broadcast band only.
- 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.
- RDS functions may not work properly when reception is weak, reception is of poor quality, or the FM Broadcaster does not implement RDS properly.

In some cases, a radio station broadcasting incorrect information may cause the RDS features of the radio to appear to work improperly.

Displaying RDS Information

The RDS feature is always on. When tuned to a non-RDS station, the radio will display frequency information as you would normally expect. When tuned to an RDS station, the radio can operate as follows:

- The radio will change from displaying the frequency of the FM station to displaying the call letters of the station or display the nickname of the station.
- Display the type of program.
- Display general information such as artist and song title, call in phone numbers, etc.

Viewing and Selecting RDS Information for Display

Press the RCL button once for less than 2 seconds when the radio displays the program service (PS) name and the frequency of the station will be displayed. Press the button again, and the program type (P-Type) will be displayed. Pressed again, and the program type (PTY) name will be displayed, if the broadcaster is broadcasting one. The PTY name is an eight-character name that the broadcaster may use to further identify the type of programming currently being broadcast. Should you decide that Frequency, P-Type or PTY name is more desirable to display when tuned to an RDS station than the PS name, press the RCL button until the desired

information is displayed, then press and hold for more than 2 seconds. A beep should be heard and the radio will now display the selected information whenever tuned to an RDS broadcaster. The radio will display frequency for all non-RDS broadcast stations.

Using RDS Program Types to Tune Radio

Listed are several ways on how to tune your radio using RDS program types. The radio will now be configured to tune based on RDS data rather than frequency

Finding a RDS Station By Specific Program Type

1. Press the PROG TYPE or P-TYPE button, the radio will display the current P-Type to search for.
2. Press the CAT rocker button until the desired program type is shown in the display.
3. Press the SEEK button and the radio will now seek the first RDS Broadcaster of the selected P-Type.

If the radio cannot find the desired P-Type, the radio displays "NOT FOUND" and will return to the last station you were listening to.

Using the INFO Feature

When the INFO icon appears in the radio display, a new text message is available for viewing. These text messages are from the RDS broadcaster to the listening public and may be general information such as artist and song title, call in phone numbers, etc.

How to View the INFO Message

- To view the message when the INFO icon appears, press the INFO button to display the text message. If you do not press the INFO button again, the text message will automatically be displayed 8 characters at a time, 3 seconds between updates.
- To view the text message faster, press the INFO button for less than 1 second to scroll through the message at your own speed.
- The INFO icon disappears as soon as you press the INFO button. The INFO icon will appear when a new different message is received.
- To view the most recent received message, press the INFO icon at any time, even if the icon does not appear in the display.

Controlling the Radio

The user can activate RDS to control the radio by using data the received to:

- Interrupt the playback of your CD for traffic or emergency bulletins
- Search for stations by type of program.
- Set your clock to the time that the RDS broadcast station broadcasts.

Using the RDS Traffic Feature

Some RDS broadcasters may carry traffic information programming to inform you of current traffic conditions in your listening area and is indicated by the TA icon in the radio display. Not all FM broadcasters will use this RDS feature. RDS enables the broadcaster to get this information to you even when you are listening to a tape or compact disc. This feature can be enabled or disabled by the listener. Press the TRAF button to find a station that claims to carry traffic information. You may do this even when playing a cassette tape or compact disc.

This action will operate in the background without interrupting the current playback. If the radio is not currently tuned to an RDS traffic station, the radio will immediately seek an RDS traffic station. If the radio finds an RDS traffic station, the "TA" icon will appear on the radio display, as will brackets around the [TA] icon. If the radio cannot find an RDS traffic station after searching through the entire FM band, the radio will display "NO TRAFFIC".

Traffic Interrupt Feature

Whenever the TA icon is displayed, the current FM station may also broadcast traffic announcements. Traffic announcements are reports of the current traffic conditions in the listening area of the tuned FM broadcasters.

Your radio can interrupt the playback of a compact disc by use of the traffic interrupt feature. The traffic interrupt feature is enabled when the TRAF icon is displayed.

If the broadcaster sends out a traffic announcement while you are listening to FM or in the playback mode, "TRAFFIC" will be displayed on the radio and the audio from the broadcaster will be heard. At the conclusion of the traffic announcement, the radio will return to the previous playback mode.

During the time the radio displays "TRAFFIC", you can adjust the volume of the traffic announcement. This will be the volume at which all future traffic announcements will be heard until the volume during another traffic announcement is adjusted.

You can also interrupt a traffic announcement interrupt by pressing the TRAF button.

During a national or local emergency, a special program type interrupt message "ALERT!" is displayed. This special announcement will cancel all other RDS features that are in progress, such as a traffic announcement.

RDS Clock TIme

Broadcasters can choose to send clock time information in the RDS data. This information can be used to update the clock time on the radio. RDS clock time is broadcasted once a minute. To set the clock using RDS clock data perform the following:

- Press and hold the RCL and RDS buttons together for two or more seconds to update the time.
- The display will show "SET RDS TIME" after receiving the broadcasted time data.
- If the broadcaster is not broadcasting the time data, the radio will display "NO RDS TIME SET" and the time remains unchanged.

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.

Viewing Messages

Press the DISP or RCL button while in XM mode to view various pieces of information related to the current song or channel. By pressing and releasing the DISP or RCL button, you may view four different categories of information: Artist Name/Feature, Song/Program Title, Channel Category, and other Additional Information that may be broadcast on that channel. Additional Information messages may not always be available. If an Additional Information message is being broadcast on the tuned channel, the INFO icon will appear on the display. Each of the four information types may have multiple pages of text. To reach a category, press and release the DISP or RCL button consecutively until the desired type is displayed. If there are multiple pages of text for the selected information type, the radio will automatically display all the pages for that type at a rate of approximately one page every three seconds before timing out and returning to the default display. You may override this feature by pressing the DISP or RCL button to review all of the pages at your own pace.

XM Advisory Messages

Radio Display Message	Condition
Updating	Updating encryption code
No Signal	Loss of signal
Loading XM	Acquiring channel audio (after 4 second delay)
CH Off Air	Channel not in service
CH Unavail	Channel no longer available
No Info	Artist Name/Feature not available
No Info	Song/Program Title not available
No Info	Category name not available
Not Found	No channel available for the chosen category
No Info	No text/informational message available
XM Locked	Theft Lock active
Radio ID	Electronic serial number (ESN) channel 0
Unknown	Radio ID not known (should only be if hardware failure
Chk XMRcvr	Hardware failure

Technical Information for the MP3/CD Radios (US8, US9)

The US8 and US9 radios will play both standard audio CDs and CD-Rs or CD-RWs. The CD-R/RWs may contain either standard audio (*.cda) or compressed audio (*.mp3).

Customers who record their own music CD-R/RWs should be aware of the following:

- The files can be recorded on a CD-R/RW disc with a maximum capacity of 700 MB.
- The radio will play only compressed audio files recorded in the *.mp3 format. It also supports playlists that can be made and saved with popular MP3 software (in the *.m3u format). A playlist name must be no more than 32 characters in length. If the name of a playlist is longer than 32 characters, the radio will ignore the playlist.
- The radio will only play audio from a CD-R/RW, it cannot record audio.
- The radio will play a mixed mode CD-R/RW (one recorded with both *.cda and *.mp3 files). If a mixed mode CD is inserted in the radio,, the radio will assign the standard CD audio to a directory which is listed as ROM audio directory.
- The radio supports multi-session discs, but only the files from the last session will be played.
- There are a total of 20 directories (folders) allowed on a disc. The file structure can be 0-4 directories deep (a folder within a folder, within a folder, etc). Anything more than 20 directories will be ignored. Each directory may have up to 99 files contained within it. Files not having the *.mp3 extension will not be played, but still count toward the maximum. Anything more than the first 99 files within a directory will be ignored. A single disc may have up to 254 files and directories. Anything beyond the 254 limit will be ignored.
- MP3 files must be written to a CD-R/RW in one of the following industry-standard formats:
  - ISO 9660 Level 1
  - ISO 9660 Level 2
  - Joliet
  - Romeo
- ID3 tag information is displayed by the radio, if available. The ID3 tag information can either be version 1 or 2. The radio will display the filename, song name, artist name, album name, directory name, and playlist name..

If the customer does not follow these guidelines when recording a CD-R/RW, the disc may not play in the US8 or US9 radio.

VIDEO ENTERTAINMENT SYSTEM DESCRIPTION AND OPERATION

Rear Seat Entertainment

DVD Player

On this vehicle the DVD player is integral to the radio, which uses the same slot loading single disc player for audio CDs and MP3 CDs. The DVD player is designed to be compatible with digital video discs (DVD) authorized for use in the United States and Canada (Region Code 1). Regular audio compact discs (CD) can also be played by the DVD Player. Home-recorded CDs (CD-R) or home-recorded DVDs may not play in this player.

Auxiliary input jacks are provided to connect video and audio from other devices. For example, video games or cameras can be connected to use the video display and headphone audio. Or, a portable CD or digital media player can be connected to the audio inputs to use the wireless headphones.

The DVD player sends the video signal to the roof console for video display. Video sound is output to the vehicle speakers and the roof console for headphone sound.

The DVD player can be controlled by the remote control. Remote control commands are transmitted by infrared (IR) signal to the roof console IR transceiver. The roof console IR transceiver sends the IR signal to the DVD player through the wire harness.

Power and grounds for the roof mounted DVD screen come from the Radio.

Roof Console

The roof console houses the video display screen, infrared (IR) transceiver and video/audio electronics. Video signals from the DVD player are processed and displayed on the video display screen. Audio from the DVD player is converted to infrared (IR) output signal to the headphones. Only DVD player audio is available through the IR headphones.

IR signals form the remote control are sent by the roof console IR transceiver to the DVD player through the wire harness.

The video display screen activates when either a DVD is inserted or selected as the source from the radio head/DVD player; or when an auxiliary device is connected.

Power and ground to the roof console is provided by the DVD player through the wire harness.

AUX Devices

The roof console has RCA-style jacks for connecting auxiliary devices. The jacks are color coded. The yellow jack is for video signals, and the red and white connectors are for right and left audio, respectively. The radio/DVD player utilizes a microswitch in the red jack to detect the connection of an auxiliary device, which will cause the radio to turn on the display screen. In order for an auxiliary device to work, an audio cable must be connected to the red jack (either the red cable or mono sound cable). If a DVD is inserted into the player, AUX devices will not work.

The audio from an auxiliary device will only be played over the wireless headphones, not the vehicle speakers.

OnStar(R)

If the vehicle is also equipped with OnStar(R), DVD audio will be interrupted during an OnStar(R) call. During an OnStar(R) call, the mute line is low, ground, and the radio switches to play the OnStar(R) audio to the vehicle speakers. In OnStar(R) AUX mode, the radio displays PHONE and the fade is fixed at full-front, balance control is fixed at center, and the tone control is fixed at a pre-set equalization. Volume level can be adjusted as needed or desired.

Headphones

The wireless headphones receive audio from infrared (IR) signals sent by the roof console IR transceiver. The headphones only receive audio from the DVD player or an auxiliary device.

Strong sunlight may interfere with the IR signal and headphone sound operation.

Remote Control

The remote control sends infrared (IR) signals to the roof console IR transceiver. These command signals are converted and sent to the DVD player through the wire harness.

Parental Control

Parental control will pause DVD playback, mute the audio, and display "Parental Control On" with an otherwise blank display screen when turned on. The driver may press the RSE button on the radio/DVD player to initiate or cancel parental control.