Cellular Communication

Specifications

SIE-ID = 812745 Owner = arusse01 LMD = 11-jun-2002 LMB = rwoods01

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Onstar Module Mounting Screws	9 N·m	80 lb in
Global Position Antenna Mounting Screws	2 N·m	18 lb in

Schematic and Routing Diagrams

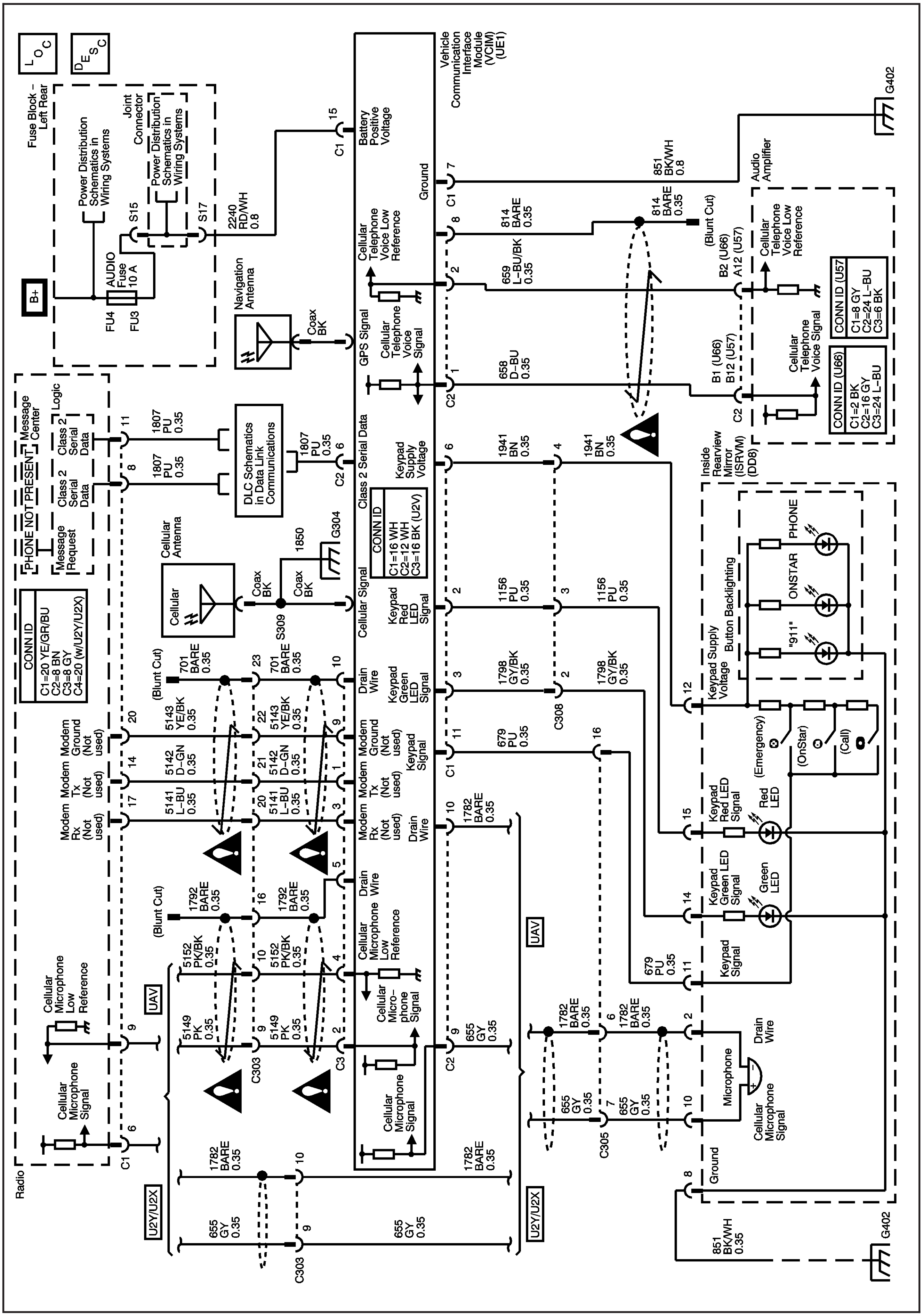
SIE-ID = 1333049 Owner = jsumme01 LMD = 15-may-2003 LMB = jsumme01

Cellular Communication Schematic Icons

Icon	Icon Definition
 296880	**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)

SIE-ID = 1227606 Owner = jsumme01 LMD = 21-jan-2003 LMB = jschro01

OnStar Schematics

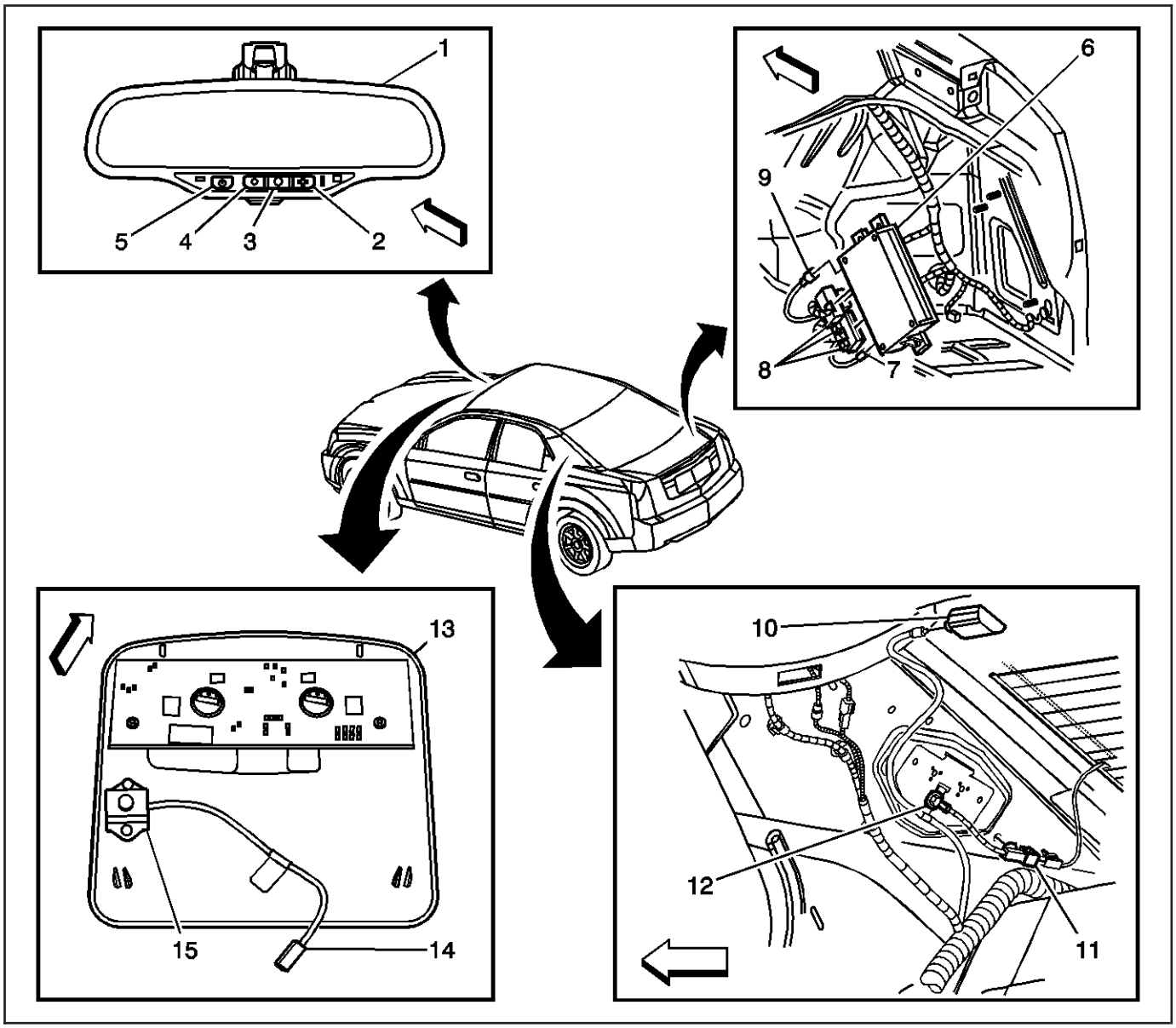


Component Locator

Cellular Communication
Component Views

SIE-ID = 1228037 Owner = jsumme01 LMD = 05-aug-2003 LMB = jsumme01

Cellular Communication Sub-System **SIO-ID = 808750 LMD = 24-jun-2002**

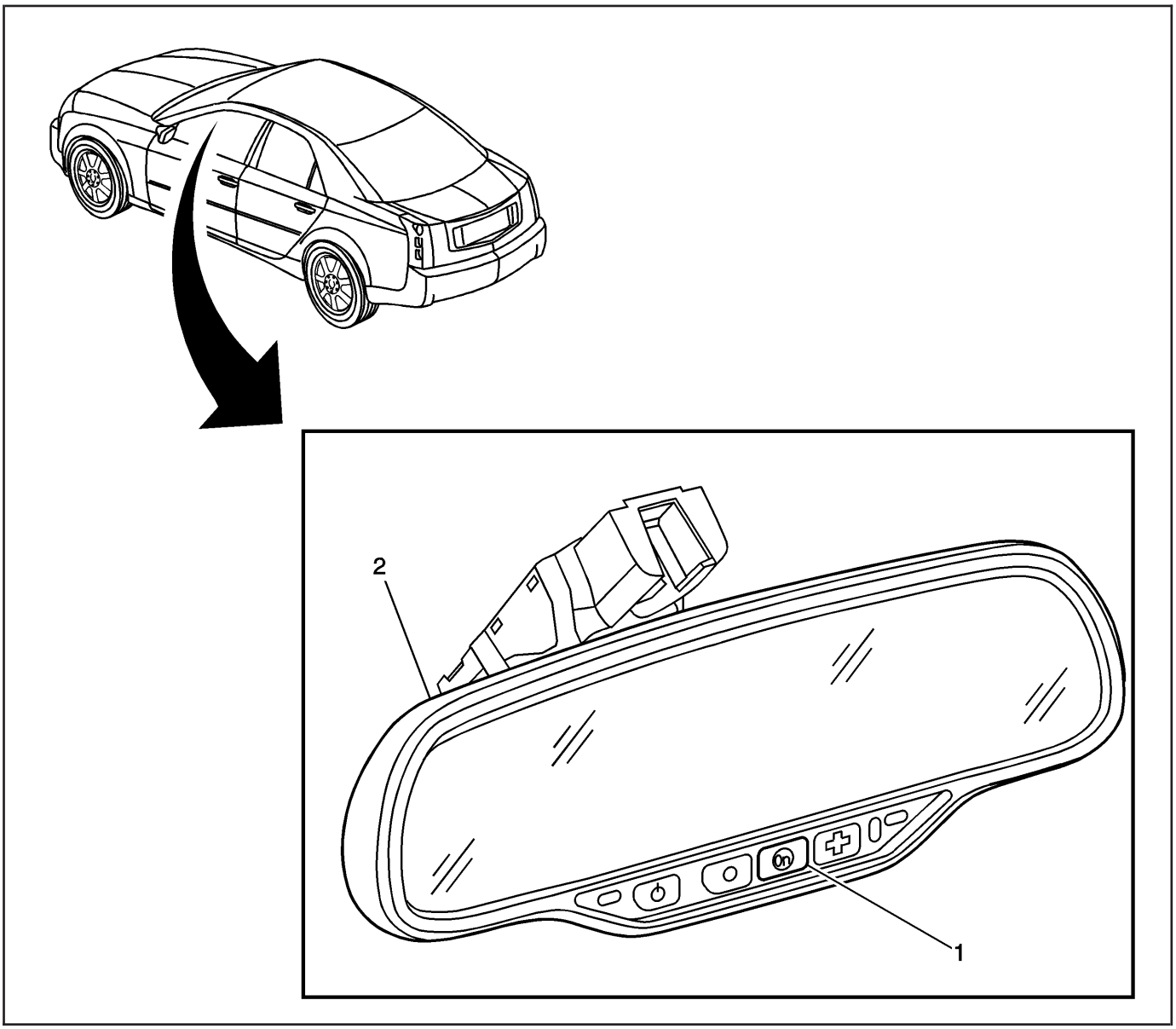


801220

Legend

(1) Inside Rear View Mirror (ISRVM)
(2) Emergency Button
(3) Onstar Button
(4) Onstar Answer/End Call Button
(5) Electrochromatic Mirror Button
(6) Vehicle Communication Interface Module (VCIM)
(7) GPS Antenna Connector
(8) Vehicle Communication Interface Module Connectors
(9) Cellular Antenna
(10) GPS Antenna
(11) Rear Defogger Connector
(12) G303
(13) Overhead Console
(14) Noise Compensation Microphone Connector
(15) Noise Compensation Microphone

OnStar Keypad SIO-ID = 1364257 LMD = 05-aug-2003



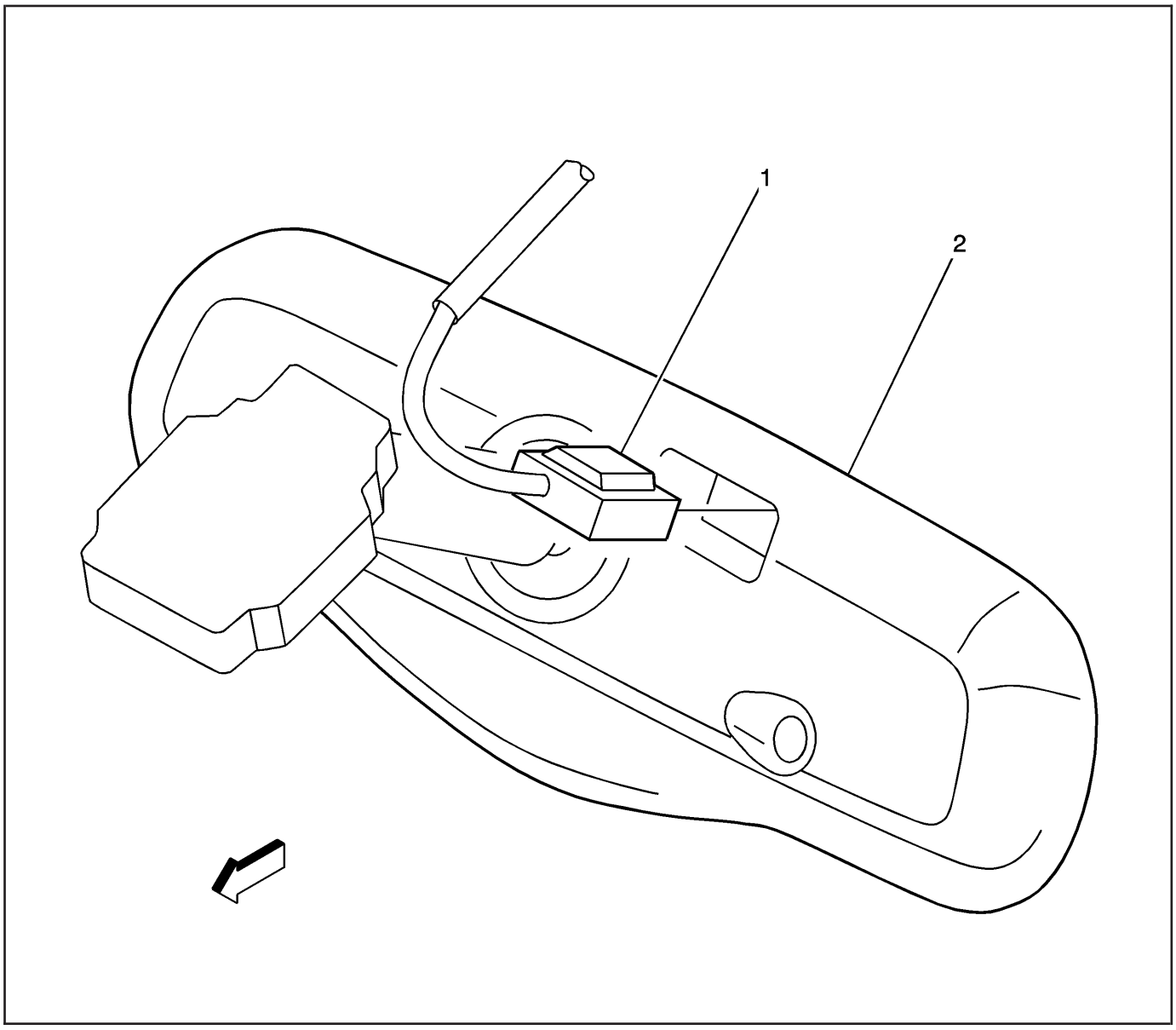
1348817

Legend

(1) OnStar Keypad

(2) Inside Rearview Mirror (ISRVM)

Inside Rearview Mirror (ISRVM) SIO-ID = 1364183 LMD = 05-aug-2003



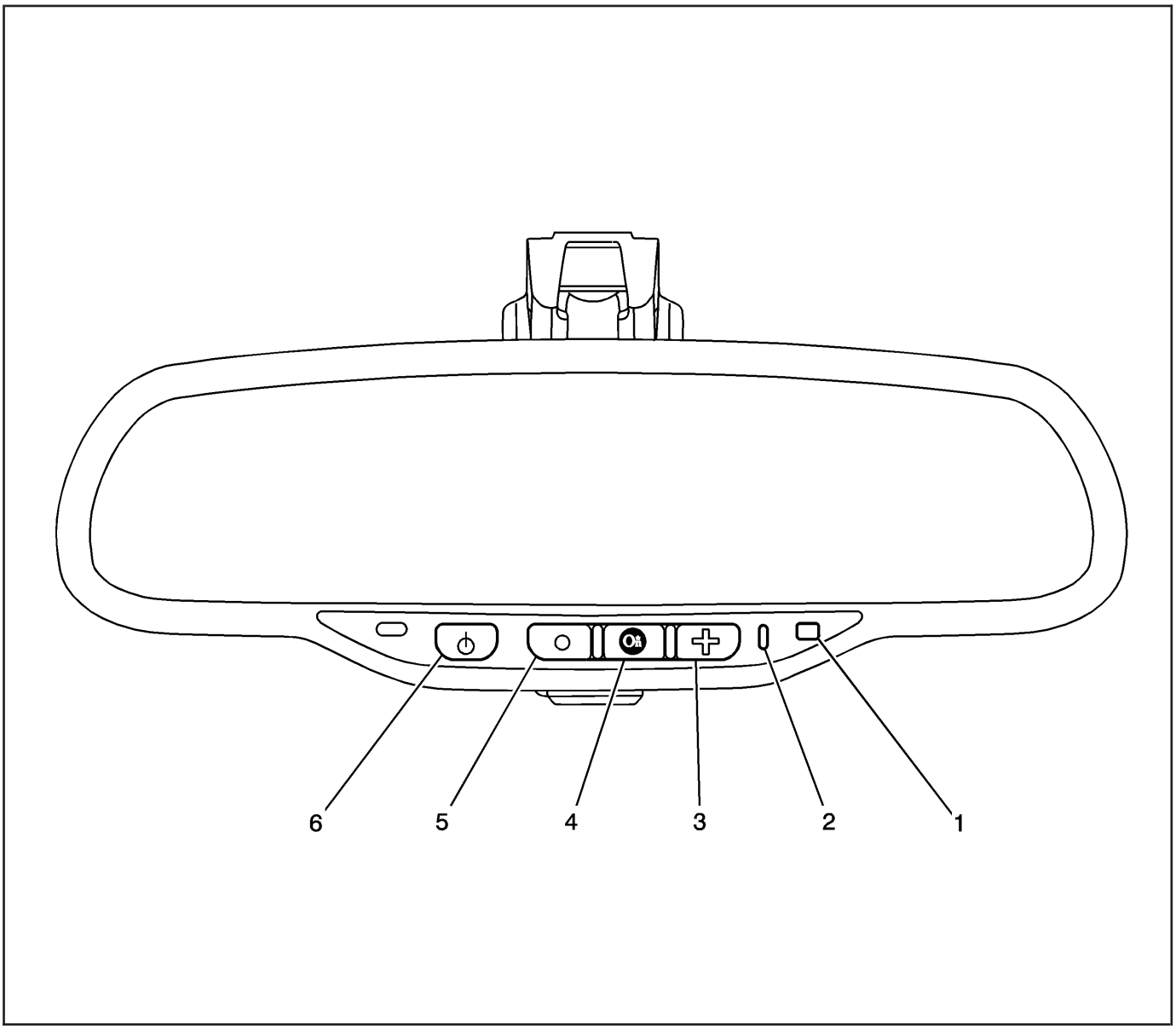
1348815

Legend

(1) ISRVM Connector

(2) Inside Rearview Mirror (ISRVM)

OnStar Keypad Identification SIO-ID = 1364259 LMD = 05-aug-2003



1348819

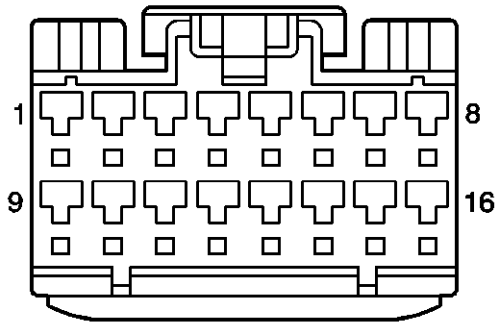
Legend

(1) Automatic Dimming Photo Cell
(2) OnStar Indicator Light
(3) Emergency Button
(4) OnStar Call Button
(5) OnStar Off Button
(6) Electronic Compass Button

Cellular Communication Connector End Views

SIE-ID = 1228039 Owner = jsumme01 LMD = 25-sep-2003 LMB = jsumme01

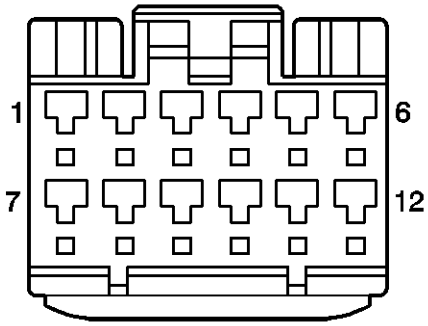
Vehicle Communication Interface Module (VCIM) C1 (UE1)



814530

Connector Part Information	• 917981-1 • 16-Way F MKII Hybrid (WH)		
Pin	**Wire Color**	**Circuit Number**	**Function**
1	—	—	Not Used
2	PU	1156	Keypad Red LED Signal
3	GY/BK	1798	Keypad Green LED Signal
4–5	—	—	Not Used
6	BN	1941	Keypad Supply Voltage
7	BK/WH	851	Ground
8–10	—	—	Not Used
11	PU	679	Keypad Signal
12–14	—	—	Not Used
15	RD/WH	2240	Battery Positive Voltage
16	—	—	Not Used

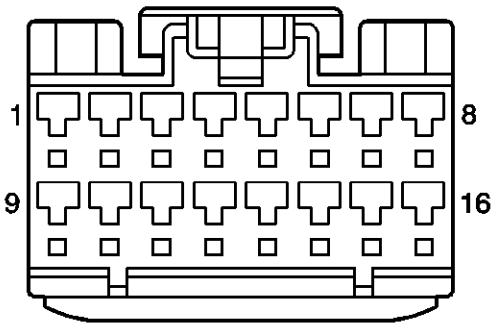
Vehicle Communication Interface Module (VCIM) C2 (UE1)



814532

Connector Part Information	• 917975-1 • 12-Way F MKII Hybrid (WH)		
Pin	**Wire Color**	**Circuit Number**	**Function**
1	D-BU	658	Cellular Telephone Voice Signal
2	L-BU/BK	659	Cellular Telephone Voice Low Reference
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	1782	Drain Wire
11–12	—	—	Not Used

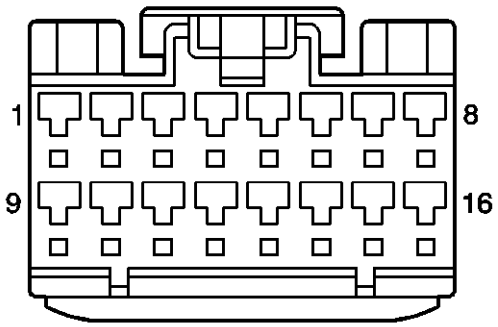
Vehicle Communication Interface Module (VCIM) C3 (UAV)



814531

Connector Part Information	• 917983-2 • 16-Way F MKII Hybrid (BK)		
Pin	**Wire Color**	**Circuit Number**	**Function**
1	D-GN	5142	Modem TX (Not Used)
2	PK	5149	Cellular Microphone Signal
3	L-BU	5141	Modem RX (Not Used)

Vehicle Communication Interface Module (VCIM) C3 (UAV) (cont'd)



814531

Connector Part Information		• 917983-2 • 16-Way F MKII Hybrid (BK)	
Pin	**Wire Color**	**Circuit Number**	**Function**
4	PK/BK	5152	Cellular Microphone Low Reference
5	BARE	1792	Drain Wire
6–8	—	—	Not Used
9	YE/BK	5143	Modem Ground (Not Used)
10	BARE	701	Drain Wire
11–16	—	—	Not Used

Diagnostic Information and Procedures

Diagnostic Starting Point - Cellular Communication

SIE-ID = 740643 Owner = lklenk01 LMD = 14-may-2002 LMB = rwoods01

Begin the system diagnosis with *Diagnostic System Check - Cellular Communication on page 11-11*. 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

SIE-ID = 740644 Owner = lklenk01 LMD = 17-may-2002 LMB = hlogan01

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.
5. 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 on page 8-27* 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 on page 8-28* in Data Link Communications
3	**Important:** The engine may start during the following step. Turn OFF the engine as soon as you have observed the Crank power mode. 1. Access the Class 2 Power Mode in the Diagnostic Circuit Check on the scan tool. 2. Rotate the ignition switch through all positions while observing the ignition switch power mode parameter. Does the ignition switch parameter reading match the ignition switch position for all switch positions?	Go to *Step 4*	Go to *Power Mode Mismatch on page 8-30* in Body Control System
4	Select the display DTCs function on the scan tool. Does the scan tool display any DTCs?	Go to *Step 5*	Go to *OnStar Symptom Diagnosis on page 11-23*
5	Does the scan tool display any DTCs which begin with a ″U″?	Go to *Step 6*	Go to *Step 7*
6	Does the scan tool display DTC U1500?	Go to *Diagnostic Trouble Code (DTC) List on page 11-12*	Go to *Diagnostic Trouble Code (DTC) List on page 8-10* in Data Link Communications
7	Does the scan tool display DTC B1000, B1004, B1007, or B1009?	Go to *Diagnostic Trouble Code (DTC) List on page 8-15* in Body Control System	Go to *Step 8*
8	Does the scan tool display DTC B1327 or B1328?	Go to *Diagnostic Trouble Code (DTC) List on page 6-13* in Engine Electrical	Go to *Diagnostic Trouble Code (DTC) List on page 11-12*

SIE-ID = 891388 Owner = lklenk01 LMD = 12-jun-2003 LMB = ckwiat01

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

SIE-ID = 740649 Owner = lklenk01 LMD = 12-jun-2003 LMB = ckwiat01

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® 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® 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® Call Center.

Year Module Build: This displays the year the module was built.

SIE-ID = 740650 Owner = lklenk01 LMD = 04-apr-2002 LMB = lklenk01

Diagnostic Trouble Code (DTC) List

DTC	Diagnostic Procedure	Module(s)
B2455	*DTC B2455 on page 11-13*	OnStar® VCIM
B2470	*DTC B2470 on page 11-15*	OnStar® VCIM
B2476	*DTC B2476 on page 11-17*	OnStar® VCIM
B2482	*DTC B2482 on page 11-19*	OnStar® VCIM
B2483 or B2484	*DTC B2483 or B2484 on page 11-21*	OnStar® VCIM
U1500	*DTC U1500 on page 11-23*	OnStar® VCIM

DTC B2455

SIE-ID = 873985 Owner = lklenk01 LMD = 28-jan-2003 LMB = ckwiat01

Circuit Description

The Vehicle Communication Interface Module 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 Vehicle Communication Interface Module 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 Vehicle Communication Interface Module will not receive any signal from the microphone.
- Calls can be placed but the caller cannot be heard.
- The OnStar® status LED turns RED.

Conditions for Clearing the DTC

- The Vehicle Communication Interface Module detects the microphone connected for 5 consecutive 100 millisecond cycles.
- A history DTC clears after 50 malfunction free ignition cycles.
- The Vehicle Communication Interface Module 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 Vehicle Communication Interface Module is sending out the proper supply voltage.

DTC B2455

Step	Action	Value(s)	Yes	No
Schematic Reference: *OnStar Schematics on page 11-3* **Connector End View Reference:** *Cellular Communication Connector End Views on page 11-9*				
1	Did you perform the Cellular Communications Diagnostic System Check?	—	Go to *Step 2*	Go to *Diagnostic System Check - Cellular Communication on page 11-11*
2	1. Turn OFF the ignition. 2. Disconnect the inside rear view mirror 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 on page 8-10* and *Wiring Repairs on page 8-16* in Wiring Systems. Did you find and correct the condition?	—	Go to *Step 9*	Go to *Step 6*
4	Test the drain wire circuit for an open. Refer to *Circuit Testing on page 8-10* and *Wiring Repairs on page 8-16* 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 rearview mirror and harness connector of the Vehicle Communication Interface Module. Refer to *Testing for Intermittent and Poor Connections on page 8-14* and *Connector Repairs on page 8-25* in Wiring Systems. Did you find and correct the condition?	—	Go to *Step 9*	Go to *Step 7*

DTC B2455 (cont'd)

Step	Action	Value(s)	Yes	No
6	Inspect for poor connections at the harness connector of the Vehicle Communication Interface Module. Refer to *Testing for Intermittent and Poor Connections on page 8-14* and *Connector Repairs on page 8-25* 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 (UE1) on page 8-25* or *Rearview Mirror Replacement (DD7,DD8) on page 8-26* in Stationary Windows. Did you complete the replacement?	—	Go to *Step 9*	—
8	**Important:** Perform the OnStar® setup procedure. Replace the Vehicle Communication Interface Module. Refer to *Communication Interface Module Replacement on page 11-40*. 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

SIE-ID = 745130 Owner = lklenk01 LMD = 30-sep-2003 LMB = mschaf01

Circuit Description

The cellular antenna is connected to the vehicle communication interface module (VCIM) with a 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® status LED turns RED.
- The vehicle is unable to connect to the OnStar® 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 on page 11-3* **Connector End View Reference:** *Cellular Communication Connector End Views on page 11-9*				
1	Did you perform the Cellular Communications Diagnostic System Check?	—	Go to *Step 2*	Go to *Diagnostic System Check - Cellular Communication on page 11-11*
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 VCIM. 2. Measure the resistance of the cellular antenna coax connector from end to end. Does the resistance measure greater than the specified value?	1 Ω	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 and Poor Connections on page 8-14* and *Connector Repairs on page 8-25* in Wiring Systems. Did you find and correct the condition?	—	Go to *Step 10*	Go to *Step 9*
6	Inspect for poor connections at the harness connector of the cellular antenna. Refer to *Testing for Intermittent and Poor Connections on page 8-14* and *Connector Repairs on page 8-25* in Wiring Systems. Did you find and correct the condition?	—	Go to *Step 10*	Go to *Step 7*

DTC B2470 (cont'd)

Step	Action	Value	Yes	No
7	Replace the cellular antenna. Refer to *Coupling Replacement - Antenna Inner on page 11-36* and *Coupling Replacement - Antenna Outer on page 11-38*. 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 on page 11-40*. 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

SIE-ID = 741708 Owner = lklenk01 LMD = 03-sep-2003 LMB = bharri01

Circuit Description

The OnStar® button assembly consists of three buttons, Call/Answer, OnStar® Call Center and OnStar® 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 keypad signal circuit voltage to the VCIM is less than 2.8 volts or more than 3.2 volts.
- 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® button assembly.
- No calls can be placed.
- The OnStar® status LED turns RED.

Conditions for Clearing the DTC

- The keypad signal circuit voltage is between 2.8 volts and 3.2 volts.
- 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	Value(s)	Yes	No
Schematic Reference: *OnStar Schematics on page 11-3* **Connector End View Reference:** *Cellular Communication Connector End Views on page 11-9*				
1	Did you perform the Cellular Communications Diagnostic System Check?	—	Go to *Step 2*	Go to *Diagnostic System Check - Cellular Communication on page 11-11*
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*
3	Test the keypad supply voltage circuit for an open or short to ground. Refer to *Circuit Testing on page 8-10* and *Wiring Repairs on page 8-16* in Wiring Systems. Did you find and correct the condition?	—	Go to *Step 11*	Go to *Step 8*
4	Test the keypad supply voltage circuit for a short to voltage. Refer to *Circuit Testing on page 8-10* and *Wiring Repairs on page 8-16* 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 on page 8-10* and *Wiring Repairs on page 8-16* 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 on page 8-10* and *Wiring Repairs on page 8-16* in Wiring Systems. Did you find and correct the condition?	—	Go to *Step 11*	Go to *Step 7*

DTC B2476 (cont'd)

Step	Action	Value(s)	Yes	No
7	Inspect for poor connections at the harness connector of the rearview mirror. Refer to *Testing for Intermittent and Poor Connections on page 8-14* and *Connector Repairs on page 8-25* 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 and Poor Connections on page 8-14* and *Connector Repairs on page 8-25* 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 (UE1) on page 8-25* or *Rearview Mirror Replacement (DD7,DD8) on page 8-26* in Stationary Windows. Did you complete the replacement?	—	Go to *Step 11*	—
10	**Important:** Perform the OnStar® setup procedure. Replace the VCIM. Refer to *Communication Interface Module Replacement on page 11-40*. 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

SIE-ID = 743192 Owner = lklenk01 LMD = 19-may-2003 LMB = dostre01

Circuit Description

The OnStar® button assembly consists of three buttons, Call/Answer, OnStar® Call Center and OnStar® 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® button assembly.
- No calls can be placed.
- The OnStar® 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 on page 11-3* **Connector End View Reference:** *Cellular Communication Connector End Views on page 11-9*				
1	Did you perform the Cellular Communications Diagnostic System Check?	—	Go to *Step 2*	Go to *Diagnostic System Check - Cellular Communication on page 11-11*
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 on page 8-10* and *Wiring Repairs on page 8-16* 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 on page 8-10* and *Wiring Repairs on page 8-16* in Wiring Systems. Did you find and correct the condition?	—	Go to *Step 9*	Go to *Step 6*
5	Inspect for poor connections at the harness connector of the rearview mirror. Refer to *Testing for Intermittent and Poor Connections on page 8-14* and *Connector Repairs on page 8-25* 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 and Poor Connections on page 8-14* and *Connector Repairs on page 8-25* in Wiring Systems. Did you find and correct the condition?	—	Go to *Step 9*	Go to *Step 8*

DTC B2482 (cont'd)

Step	Action	Value(s)	Yes	No
7	Replace the rearview mirror. Refer to *Rearview Mirror Replacement (UE1) on page 8-25* or *Rearview Mirror Replacement (DD7,DD8) on page 8-26* 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 on page 11-40*. 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

SIE-ID = 784426 Owner = lklenk01 LMD = 05-feb-2003 LMB = gharts01

Circuit Description

The Navigation Antenna is connected to the Vehicle Communication Interface Module with a RG-174 coax cable. The Vehicle Communication Interface Module 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 Vehicle Communication Interface Module 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® status LED turns RED.
- The OnStar® Call Center cannot locate the vehicle.

Conditions for Clearing the DTC

- The Vehicle Communication Interface Module detects the presence of a Navigation antenna.
- A history DTC clears after 50 malfunction free ignition cycles.
- The Vehicle Communication Interface Module receives the clear DTC command from the scan tool.

DTC B2483 or B2484

Step	Action	Values	Yes	No
Schematic Reference: *OnStar Schematics on page 11-3* **Connector End View Reference:** *Cellular Communication Connector End Views on page 11-9*				
1	Did you perform the Cellular Communication Diagnostic System Check?	—	Go to *Step 2*	Go to *Diagnostic System Check - Cellular Communication on page 11-11*
2	***Notice:*** SIO-ID = 906650 LMD = 08-aug-2002 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. 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 Ω	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 Vehicle Communication Interface Module. Refer to *Testing for Intermittent and Poor Connections on page 8-14* and *Connector Repairs on page 8-25* 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 on page 11-39*. Is the repair complete?	—	Go to *Step 7*	—

DTC B2483 or B2484 (cont'd)

Step	Action	Values	Yes	No
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® setup procedure. Replace the Vehicle Communication Interface Module module. Refer to *Communication Interface Module Replacement on page 11-40*. 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

SIE-ID = 865764 Owner = lklenk01 LMD = 28-feb-2003 LMB = gharts01

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® status LED turns RED.
- The vehicle is unable to connect to the OnStar® 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® systems with single module generations of OnStar® 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® systems use this DTC to denote an internal module failure. The determination of whether a one or 2-module generation of OnStar® is used should be confirmed. Refer to *OnStar Description and Operation on page 11-42*.
- 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 on page 11-11*
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® setup procedure. Replace the VCIM. Refer to *Communication Interface Module Replacement on page 11-40*. 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

SIE-ID = 882081 Owner = lklenk01 LMD = 21-may-2003 LMB = tdedvu01

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® steering wheel control function, technicians should proceed directly to the applicable diagnostic in *Symptoms - Cellular Communication on page 11-25*.

Important: To successfully diagnose and repair the OnStar® system it is necessary to comprehend its operation. Technicians should read and understand the *OnStar Description and Operation on page 11-42* before attempting to repair an OnStar® 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® keypress, the OnStar® 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 on page 11-11*
2	1. Turn ON the ignition, with the engine OFF. 2. Observe the OnStar® status LED. Does the LED turn GREEN?	Go to *Step 3*	Go to *OnStar Button LED Inoperative on page 11-30*
3	1. Turn the radio ON. 2. Set volume to a comfortable level. 3. Press the OnStar® Call Center button. 4. Wait approximately 10 seconds then end the call by pressing the white dot button. Does both the OnStar® LED blink after the OnStar® 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 on page 11-25*
4	After the OnStar® 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 on page 11-31*
5	**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® Call Center button. 2. Wait for the system to either connect or end the call. Is a connection made with OnStar®?	Go to *Step 6*	Go to *Step 9*
6	**Important:** It is necessary to inform the OnStar® Call Center advisor that this call is for vehicle diagnostic purposes. Ask the OnStar® 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 on page 11-28*
7	Ask the OnStar® Call Center advisor if they have received any data from the customer vehicle. Did data transfer of the OnStar® call occur?	Go to *Step 8*	Go to *Step 11*
8	Ask the OnStar® 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® heard?	Go to *Unable to Contact OnStar Call Center on page 11-27*	Go to *Step 12*
10	Ask the OnStar® 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® Call Center match the VIN of the vehicle?	Go to *Step 13*	Go to *Step 15*

OnStar Symptom Diagnosis (cont'd)

Step	Action	Yes	No
11	Ask the OnStar® 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® request ended heard?	Go to Diagnostic Aids	—
13	Ask the OnStar® Call Center advisor to verify your position. Is the location provided by the OnStar® 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 on page 11-32*
14	Ask the OnStar® Call Center advisor if the GPS position is marked as Current. Is the GPS position current?	Go to Diagnostic Aids	Go to *Global Positioning System (GPS) Data Not Current or Inaccurate on page 11-32*
15	Ask the OnStar® 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® Call Center advisor to perform a reconfiguration on the vehicle. Was the reconfiguration successful?	Go to *Step 17*	Ask the OnStar® 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	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

SIE-ID = 1038358 Owner = lklenk01 LMD = 02-oct-2002 LMB = tdedvu01

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

1. Perform the *Diagnostic System Check - Cellular Communication on page 11-11* 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 on page 11-42*.

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the system. Refer to *Checking Aftermarket Accessories on page 8-10* 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 and Poor Connections on page 8-14* 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 on page 11-25*
- *Unable to Contact OnStar Call Center on page 11-27*
- *OnStar Button LED Inoperative on page 11-30*
- *No (or Noisy) OnStar Audio on page 11-31*
- *Microphone Inoperative - Caller Cannot Be Heard on page 11-28*
- *Voice Recognition Inoperative on page 11-29*
- *OnStar Steering Wheel Control Functions Inoperative on page 11-30*
- *Global Positioning System (GPS) Data Not Current or Inaccurate on page 11-32*

SIE-ID = 764934 Owner = lklenk01 LMD = 03-feb-2003 LMB = gharts01

OnStar One or More Buttons Inoperative

Step	Action	Value(s)	Yes	No
Schematic Reference: *OnStar Schematics on page 11-3* **Connector End View Reference:** *Cellular Communication Connector End Views on page 11-9*				
1	Did you perform the Cellular Communication Diagnostic System Check?	—	Go to *Step 2*	Go to *Diagnostic System Check - Cellular Communication on page 11-11*
2	**Important:** Contact the OnStar® 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® 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 and Poor Connections on page 8-14* 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 on page 8-10* and *Wiring Repairs on page 8-16* 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 on page 8-10* and *Wiring Repairs on page 8-16* 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 and Poor Connections on page 8-14* and *Connector Repairs on page 8-25* 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 and Poor Connections on page 8-14* and *Connector Repairs on page 8-25* 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 (UE1) on page 8-25* or *Rearview Mirror Replacement (DD7,DD8) on page 8-26* in Stationary Windows. Did you complete the replacement?	—	Go to *Step 11*	—
10	**Important:** Perform the OnStar® setup procedure. Replace the VCIM. Refer to *Communication Interface Module Replacement on page 11-40*. 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*

Unable to Contact OnStar Call Center

SIE-ID = 785837 Owner = lklenk01 LMD = 21-may-2003 LMB = tdedvu01

Diagnostic Aids

- The customer concern may have been due to a lack of cellular service in a given area. A failure in the National Cellular Network infrastructure at the time of the customers failed connection that has since been repaired may also have been the cause.
- If an OnStar® emergency call is able to successfully connect the vehicle to the OnStar® Call Center when an OnStar® Call Center button press is not, there may be a failure in the ability of the OnStar® system in the vehicle to be recognized by the local cellular carrier.
- If the prompt OnStar® request ended is heard, without pressing the white dot button at the end of the OnStar® keypress, the OnStar® system at one time has made a successful cellular connection, but was unable to complete the call. 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 on page 11-3* **Connector End View Reference:** *Cellular Communication Connector End Views on page 11-9* DEFINITION: When the OnStar® Call Center button is pressed, no connection is made to the OnStar® Call Center.				
1	Did you perform the Cellular Communication Diagnostic System Check?	—	Go to *Step 2*	Go to *Diagnostic System Check - Cellular Communication on page 11-11*
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® Call Center button. 2. Wait for the system to either connect or end the call. Is a connection made with the OnStar® 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®, 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® Call Center should only be made if the diagnosis of the system leads to this step. Immediately after an OnStar® 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® Call Center button press. 2. Press the OnStar® emergency button. Does the emergency keypress call make a connection to the OnStar® Call Center within 10 minutes?	—	Have all messages heard during the course of the 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*

Unable to Contact OnStar Call Center (cont'd)

Step	Action	Value	Yes	No
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 Ω	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 on page 11-36* and *Coupling Replacement - Antenna Outer on page 11-38*. 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*

SIE-ID = 873988 Owner = lklenk01 LMD = 02-sep-2003 LMB = tdedvu01

Microphone Inoperative - Caller Cannot Be Heard

Step	Action	Value(s)	Yes	No
Schematic Reference: *OnStar Schematics on page 11-3* **Connector End View Reference:** *Cellular Communication Connector End Views on page 11-9* DEFINITION: The OnStar® 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 on page 11-11*
2	1. Turn ON the ignition, with the engine OFF. 2. Press the OnStar® Call Center button. 3. Ask the OnStar® operator if your voice can clearly be heard. Does the OnStar® operator hear your voice?	—	Go to *Testing for Intermittent and Poor Connections on page 8-14* in Wiring Systems	Go to *Step 3*
3	1. Turn OFF the ignition. 2. Disconnect the rearview mirror 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. 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 an open or short to ground. Refer to *Circuit Testing on page 8-10* and *Wiring Repairs on page 8-16* in Wiring Systems. Did you find and correct the condition?	—	Go to *Step 13*	Go to *Step 8*
6	Test the drain wire for an open. Refer to *Circuit Testing on page 8-10* and *Wiring Repairs on page 8-16* 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*

Microphone Inoperative - Caller Cannot Be Heard (cont'd)

Step	Action	Value(s)	Yes	No
8	1. Leave the rearview mirror disconnected. 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 rearview mirror. Refer to *Testing for Intermittent and Poor Connections on page 8-14* and *Connector Repairs on page 8-25* 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 communication interface module. Refer to *Testing for Intermittent and Poor Connections on page 8-14* and *Connector Repairs on page 8-25* in Wiring Systems. Did you find and correct the condition?	—	Go to *Step 13*	Go to *Step 11*
11	Replace the rearview mirror assembly. Refer to *Rearview Mirror Replacement (UE1) on page 8-25* or *Rearview Mirror Replacement (DD7,DD8) on page 8-26* in Stationary Windows. Did you complete the replacement?	—	Go to *Step 13*	—
12	**Important:** Perform the OnStar® setup procedure. Replace the VCIM. Refer to *Communication Interface Module Replacement on page 11-40*. 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*

SIE-ID = 788619 Owner = lklenk01 LMD = 27-sep-2001 LMB = lklenk01

Voice Recognition Inoperative

Step	Action	Yes	No
DEFINITION: The OnStar® 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 on page 11-11*
2	**Important:** The vehicle must be located in a quiet area. 1. Turn ON the ignition, with the engine OFF. 2. Press the OnStar® Call Center button. 3. Ask the OnStar® operator if your voice can clearly be heard. Does the OnStar® operator hear your voice?	Go to *Step 3*	Go to *Microphone Inoperative - Caller Cannot Be Heard on page 11-28*
3	1. Press the call answer button. 2. Pronounce all Hands Free commands. Refer to *OnStar Description and Operation on page 11-42* for proper pronunciation. Did the OnStar® 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 on page 11-42* for proper pronunciation. Did the OnStar® system recognize any of the voice commands?	Go to *Step 5*	Go to *OnStar Description and Operation on page 11-42*

Voice Recognition Inoperative (cont'd)

Step	Action	Yes	No
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 on page 11-42*. Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to *Step 2*

OnStar Steering Wheel Control Functions Inoperative

SIE-ID = 1041247 Owner = lklenk01 LMD = 03-oct-2002 LMB = lklenk01

Some vehicles equipped with the OnStar® system have the capability of accessing voice mailboxes and other automated phone systems by means of the steering wheel controls, while the OnStar® Personal Calling (OPC) feature is in use. If the ″Talk″ or ″Mute″ button (depending upon the vehicle) on the steering wheel controls are depressed during an OPC call, the Vehicle Communication Interface Module receives the message on the Class 2 serial data bus from either the radio, driver information module or body control module. This message is interpreted as a request to turn any spoken numbers into Dual Tone Multi-Frequency (DTMF) tones to be delivered over the airwaves to the phone system the user is communicating with. Complete instructions for operation of these features can be found in the information provided to the customer with the OnStar® system.

The steering wheel controls are a resistor network that consist of multiple momentary contact switches and a series of resistors. The switches and resistor network are arranged so that each switch has a different resistance value. When a switch is pressed, a voltage drop occurs in the resistor network, which produces a specific voltage value unique to the switch selected, to be interpreted by either the radio, dash integration module, or body control module. In the event the OnStar® steering wheel control functions are inoperative, technicians should refer to *Diagnostic System Check - Radio/Audio System on page 11-33* in Entertainment to begin diagnosis of the steering wheel control concern.

OnStar Button LED Inoperative

SIE-ID = 764948 Owner = lklenk01 LMD = 28-feb-2003 LMB = gharts01

Test Description

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

3. Determines if the OnStar® status LED has the necessary GREEN LED signal circuit voltage.
5. If the GREEN LED signal is shorted to voltage then the OnStar® 3-button assembly has been damaged and the OnStar® 3-button assembly must be replaced.

OnStar Button LED Inoperative

Step	Action	Value(s)	Yes	No
Schematic Reference: *OnStar Schematics on page 11-3* **Connector End View Reference:** *Cellular Communication Connector End Views on page 11-9* DEFINITION: This procedure is for diagnosing problems with the OnStar® button assembly LED.				
1	Did you perform the Cellular Communications Diagnostic System Check?	—	Go to *Step 2*	Go to *Diagnostic System Check - Cellular Communication on page 11-11*
2	1. Turn the ignition ON, with engine OFF. 2. Observe the OnStar® status LED. Did the OnStar® status LED turn GREEN?	—	Go to *Testing for Intermittent and Poor Connections on page 8-14* and *Connector Repairs on page 8-25* 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 on page 8-10* and *Wiring Repairs on page 8-16* in Wiring Systems. Did you find and correct the condition?	—	Go to *Step 10*	Go to *Step 5*

OnStar Button LED Inoperative (cont'd)

Step	Action	Value(s)	Yes	No
5	Test the keypad GREEN LED signal circuit for a short to voltage. Refer to *Circuit Testing on page 8-10* and *Wiring Repairs on page 8-16* 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 and Poor Connections on page 8-14* and *Connector Repairs on page 8-25* 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 (UE1) on page 8-25* or *Rearview Mirror Replacement (DD7,DD8) on page 8-26* 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 and Poor Connections on page 8-14* and *Connector Repairs on page 8-25* in Wiring Systems. Did you find and correct the condition?	—	Go to *Step 10*	Go to *Step 9*
9	**Important:** Perform the OnStar® setup procedure. Replace the VCIM. Refer to *Communication Interface Module Replacement on page 11-40*. 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

SIE-ID = 764919 Owner = lklenk01 LMD = 19-may-2003 LMB = dostre01

Test Description

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

7. If the Cellular Telephone Voice Low Reference circuit is shorted to voltage the Vehicle Communication Interface Module has been damaged and requires replacement.

No (or Noisy) OnStar Audio

Step	Action	Yes	No
Schematic Reference: *OnStar Schematics on page 11-3* **Connector End View Reference:** *Cellular Communication Connector End Views on page 11-9* DEFINITION: This procedure is for diagnosing problems during OnStar® audio following a button press from the OnStar® button assembly.			
1	Did you perform the Cellular Communication Diagnostic System Check?	Go to *Step 2*	Go to *Diagnostic System Check - Cellular Communication on page 11-11*
2	1. Turn the ignition ON, with the engine OFF. 2. Turn ON the radio. 3. Set volume to a comfortable level. 4. Press the OnStar® 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 4*
3	Test the cellular telephone voice low reference circuit for an open. Refer to *Circuit Testing on page 8-10* and *Wiring Repairs on page 8-16* in Wiring Systems. Did you find and correct the condition?	Go to *Step 10*	Go to *Step 8*
4	Is any distortion heard?	Go to *Step 6*	Go to *Step 5*

No (or Noisy) OnStar Audio (cont'd)

Step	Action	Yes	No
5	Test the cellular telephone voice signal circuit for a short to ground. Refer to *Circuit Testing on page 8-10* and *Wiring Repairs on page 8-16* in Wiring Systems. Did you find and correct the condition?	Go to *Step 10*	Go to *Step 6*
6	Test the cellular telephone voice signal circuit for an open or short to voltage. Refer to *Circuit Testing on page 8-10* and *Wiring Repairs on page 8-16* in Wiring Systems. Did you find and correct the condition?	Go to *Step 10*	Go to *Step 7*
7	Test the cellular telephone voice low reference circuit for a short to voltage. Refer to *Circuit Testing on page 8-10* and *Wiring Repairs on page 8-16* in Wiring Systems. Did you find and correct the condition?	Go to *Step 9*	Go to *Step 8*
8	Inspect for poor connections at the harness connector of the vehicle communication interface module (VCIM). Refer to *Testing for Intermittent and Poor Connections on page 8-14* and *Connector Repairs on page 8-25* in Wiring Systems. Did you find and correct the condition?	Go to *Step 10*	Go to *Step 9*
9	**Important:** Perform the OnStar® setup procedure. Replace the VCIM. Refer to *Communication Interface Module Replacement on page 11-40*. Did you complete the repair?	Go to *Step 10*	—
10	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

SIE-ID = 881949 Owner = lklenk01 LMD = 26-aug-2003 LMB = mschaf01

Diagnostic Aids

- The GPS Signal title on the scan tool will display a ″Yes″ or ″No″ dependant upon whether or not the module sees an increment of the seconds transmitted by GPS signals to the Vehicle Communication Interface Module. Upon entering this screen, the ″GPS Signal″ title will automatically display ″Yes″, regardless of the presence of time increment, for at least 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® 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 on page 11-3* **Connector End View Reference:** *Cellular Communication Connector End Views on page 11-9*				
1	Did you perform the Cellular Communication Diagnostic System Check?	—	Go to *Step 2*	Go to *Diagnostic System Check - Cellular Communication on page 11-11*
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® 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*

Global Positioning System (GPS) Data Not Current or Inaccurate (cont'd)

Step	Action	Values	Yes	No
3	1. Press the OnStar® Call Center button. 2. Ask the OnStar® 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® Call Center advisor to verify your position. Is the location provided by the OnStar® 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® 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 Ω	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 on page 11-39*. Did you complete the replacement?	—	Go to *Step 11*	—
10	Replace the VCIM. Refer to *Communication Interface Module Replacement on page 11-40*. 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

SIE-ID = 1229697 Owner = lklenk01 LMD = 29-may-2003 LMB = lnicos01

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 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 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 system. This action will cause a DTC to set.

1. Install the scan tool. Use the special functions menu in order to perform the OnStar® 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® button to connect to the OnStar® 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 customer's account.
   - Follow any additional instructions from the OnStar® advisor.
   - Ask the advisor to activate the OnStar® 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) on page 10-2* in Programming.

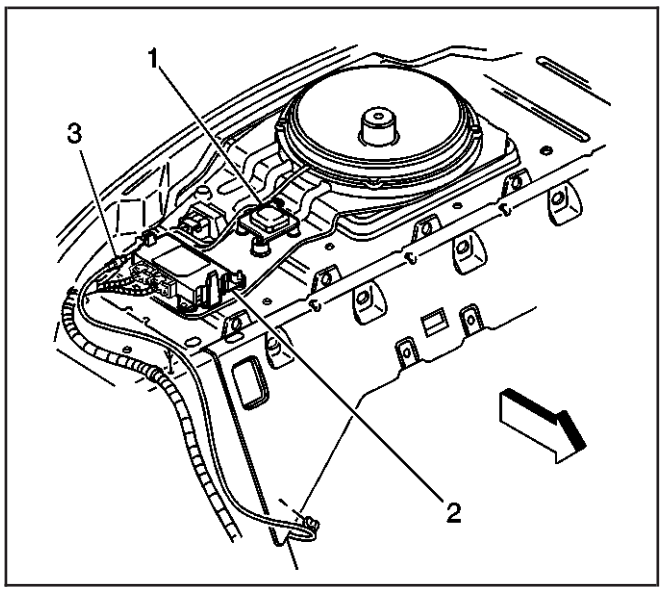
Repair Instructions

Coaxial Cable Replacement - Global Positioning System (GPS)

SIE-ID = 813972 Owner = arusse01 LMD = 11-jun-2002 LMB = rwoods01

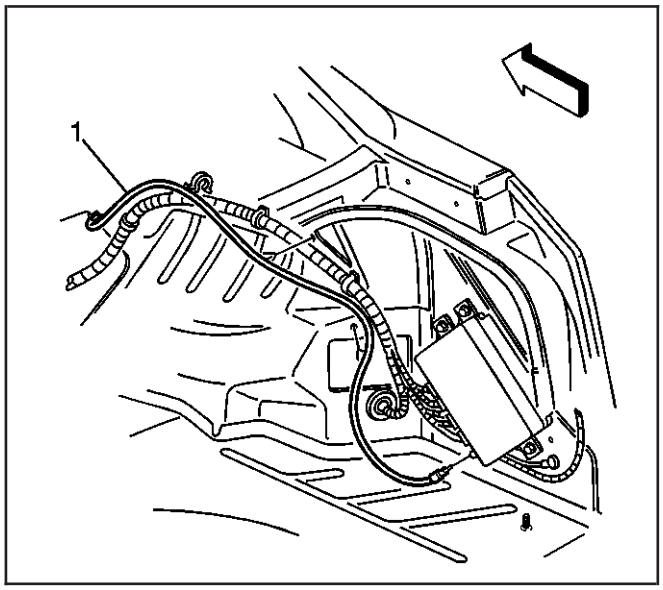
Removal Procedure

1. Remove the rear compartment trim. Refer to *Compartment Trim Panel Replacement - Rear on page 8-14* in Body Rear End.
2. Remove the rear shelf trim cover. Refer to *Trim Panel Replacement - Rear Window Shelf on page 8-33* in Interior Trim.
3. Disconnect the GPS antenna coax cable (3).

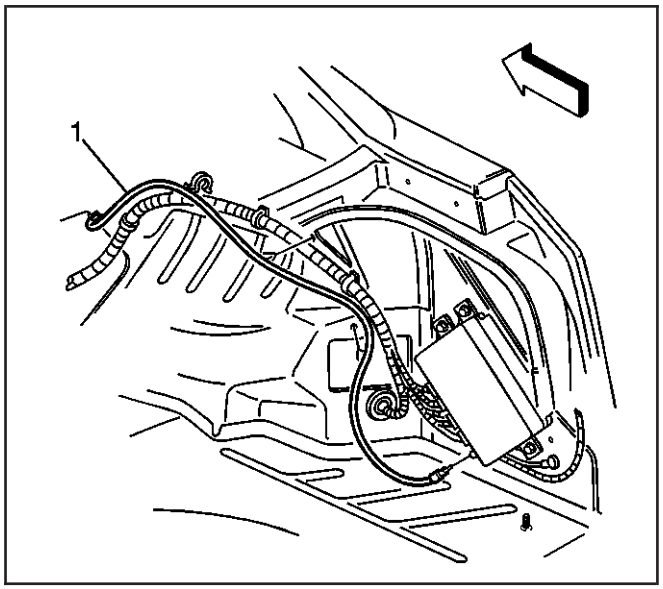


699214

4. Disconnect the coax cable (1) at the interface module.
5. Pull the cable (1) through to the rear compartment.



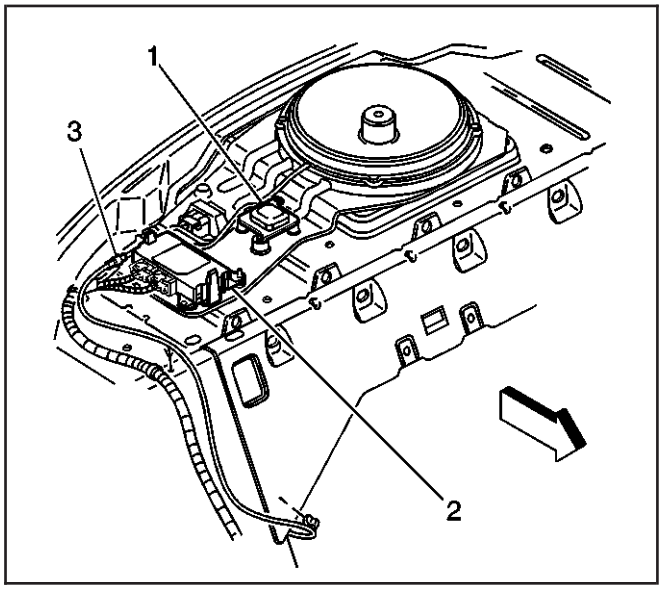
699220



699220

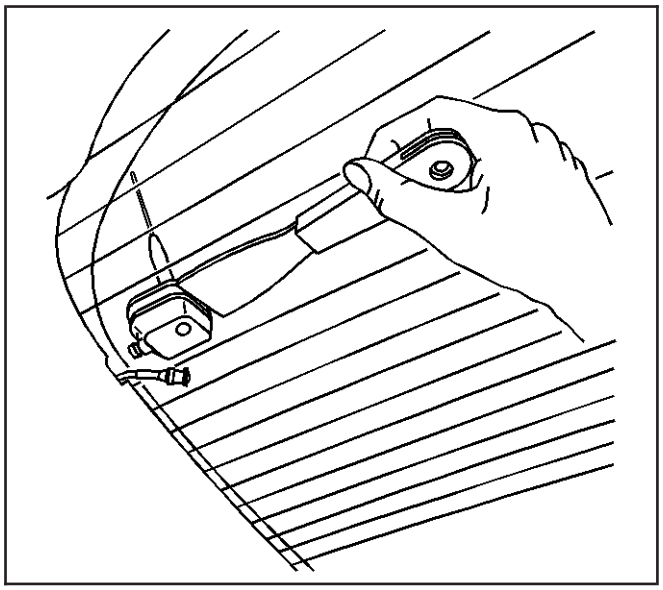
Installation Procedure

1. Connect the cable (1) to the interface module.
2. Push the cable (1) through the rear compartment to the passenger compartment.



699214

3. Connect the cable (3) the GPS antenna.
4. Install the rear shelf trim cover. Refer to *Trim Panel Replacement - Rear Window Shelf on page 8-33* in Interior Trim.
5. Install the rear compartment trim. Refer to *Compartment Trim Panel Replacement - Rear on page 8-14* in Body Rear End.



802692

Coupling Replacement - Antenna Inner

SIE-ID = 804148 Owner = arusse01 LMD = 11-jul-2002 LMB = hinks

Removal Procedure

Important:

- The adhesion promoter must be used to assure adequate bonding of the coupling.
- To obtain maximum adhesion between the new mobile antenna couplings and the glass surface, the couplings and the glass must be kept dry and above 15°C (60°F) during the installation. Allow 6–8 hours, at 15°C (60°F), for the adhesive to cure after installation. Otherwise the new coupling may not adhere.
- Do not use using any type of glue, adhesive tapes, etc. to reinstall the original couplings. Doing so may eliminate the cellular signal transfer

through the glass and reduce the maximum performance of the system, including the air bag deployment notification.

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

Notice: SIO-ID = 738683 LMD = 17-jul-2000 If you use a razor blade or other sharp tool in order to remove the adhesives or foreign objects from the inside of the rear window, use the blade carefully. Damage to the grid lines may result.

2. Use a small wide-bladed plastic tool to cut the double-back tape material while lifting up on the inner antenna coupling.

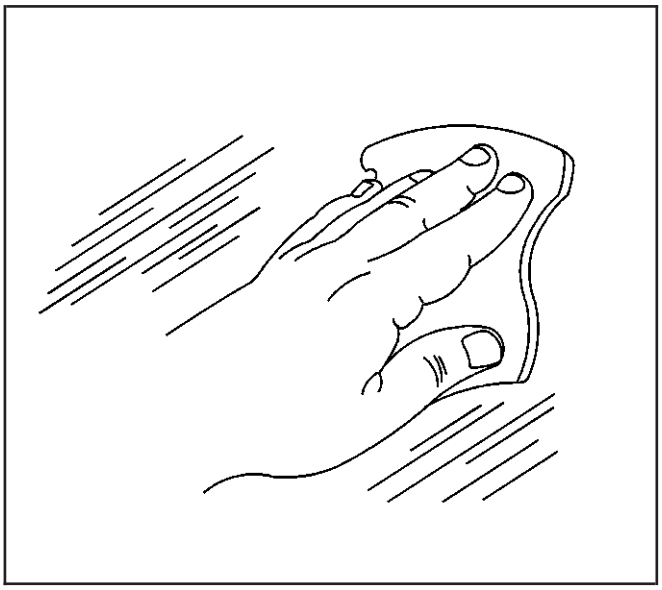
Installation Procedure

1. Clean the inside of the rear window with an alcohol wipe.
2. Dry the glass thoroughly using a lint free cloth.

Important:

- The adhesion promoter must be used to assure adequate bonding of the coupling.
- Mask off or protect areas before applying the adhesion promoter.

3. Apply Glass Adhesion Promoter GM P/N 12378555 (Canadian P/N 88901239) to the rear window in the area where you will install the antenna coupling. Follow the Glass Adhesion Promoter instructions on the product label.

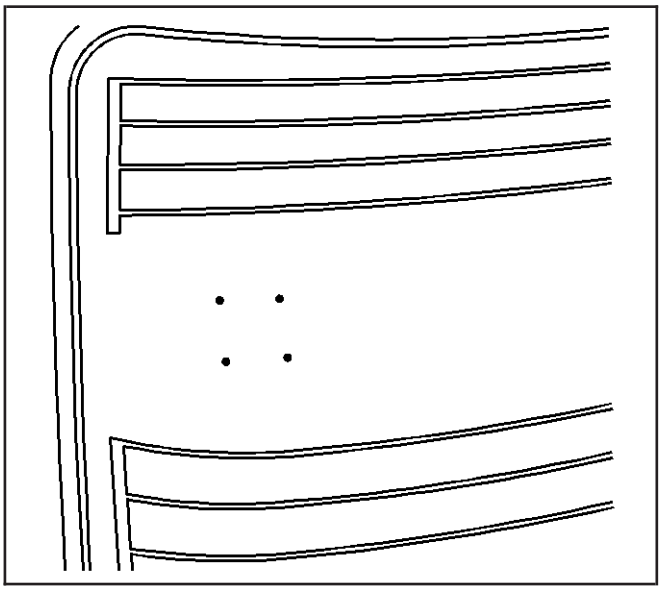


569466

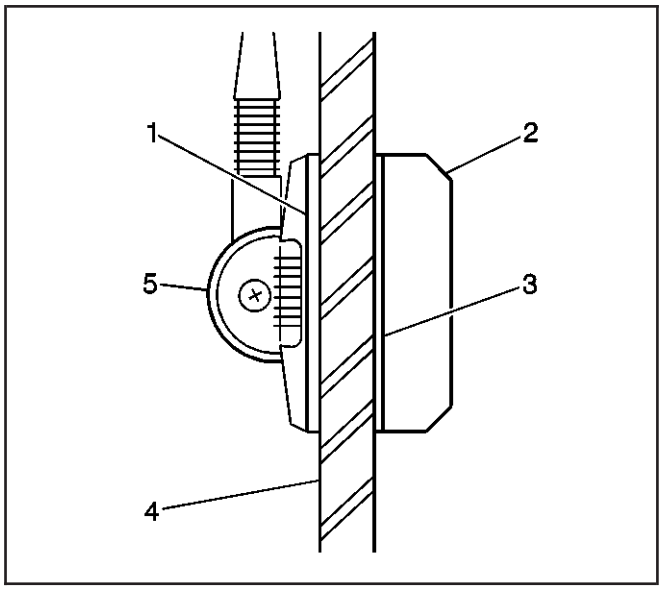
Important:

- The RF connections for the inner antenna coupling should run parallel to the defogger gridline.
- Align the inner and the outer antenna couplings.
- Do not touch the adhesive backing on the antenna coupling.

4. Remove the protective film from the adhesive backing on the inner antenna coupling.
5. Align the inner antenna coupling either to the 4 locating marks on the rear window above the defogger gridline, or to the existing exterior coupling.

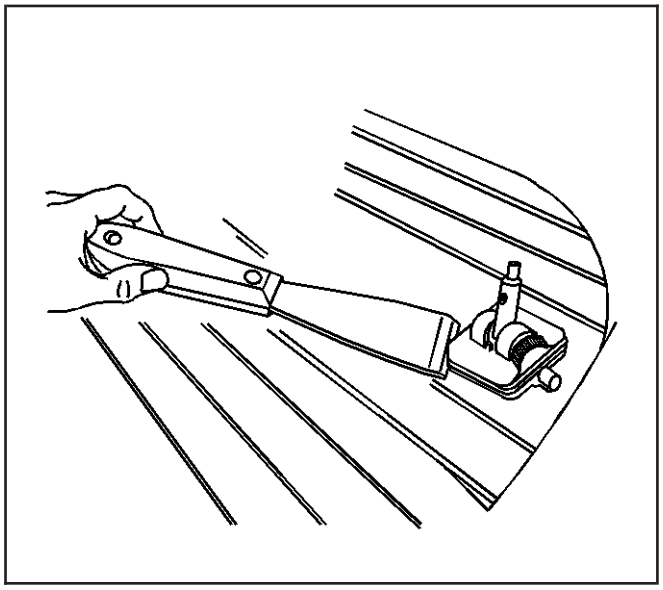


802688



650826

6. Press firmly on all 4 corners and on the center of the antenna inner coupling (2) in order to ensure proper adhesion to the rear window (4). Hold pressure on the inner coupling (2) for 10–30 seconds.
7. Ensure that no gaps occur between the couplings (2,5) and the rear window (4).
8. Connect the coaxial cable to the inner coupling (2).
9. Keep the vehicle dry. Allow 6 to 8 hours, at 15°C (60°F), for the adhesive to cure after installation.



802693

Coupling Replacement - Antenna Outer

SIE-ID = 804149 Owner = arusse01 LMD = 28-feb-2003 LMB = gharts01

Removal Procedure

Important:

- The adhesion promoter must be used to assure adequate bonding of the coupling.
- To obtain maximum adhesion between the new mobile antenna couplings and the glass surface, the adhesion promoter must be used and the couplings and the glass must be kept dry and above 15°C (60°F) during the installation. Allow 6 to 8 hours, at 15°C (60°F), for the adhesive to cure after installation. Otherwise the new couplings may come off.
- Do not use using any type of glue, adhesive tapes, etc. to reinstall the original couplings. Doing so may eliminate the cellular signal transfer through the glass and reduce the maximum performance of the system, including the air bag deployment notification.

1. Install the inner coupling first if both the inner and the outer couplings are to be replaced. Refer to *Coupling Replacement - Antenna Inner on page 11-36*.

Notice: SIO-ID = 738683 LMD = 17-jul-2000 If you use a razor blade or other sharp tool in order to remove the adhesives or foreign objects from the inside of the rear window, use the blade carefully. Damage to the grid lines may result.

2. Use a small wide-bladed plastic tool to cut the double back tape material while lifting up on the outer antenna coupling.

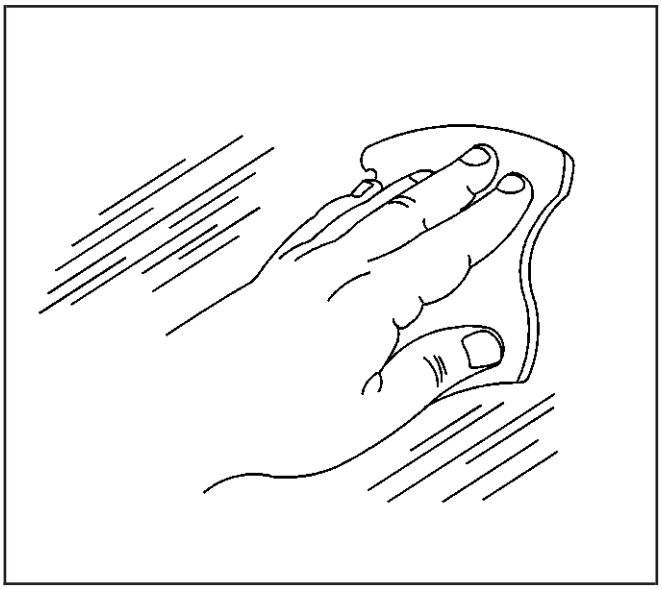
Installation Procedure

1. Clean the rear window with an alcohol wipe.
2. Dry the glass thoroughly using a lint free cloth.

Important:

- The adhesion promoter must be used to assure adequate bonding of the coupling.
- Mask off or protect areas before applying the adhesion promoter.

3. Apply Glass Adhesion Promoter GM P/N 12378555 (Canadian P/N 88901239) to the rear window in the area where you will install the antenna coupling. Follow the Glass Adhesion Promoter instructions on the product label.

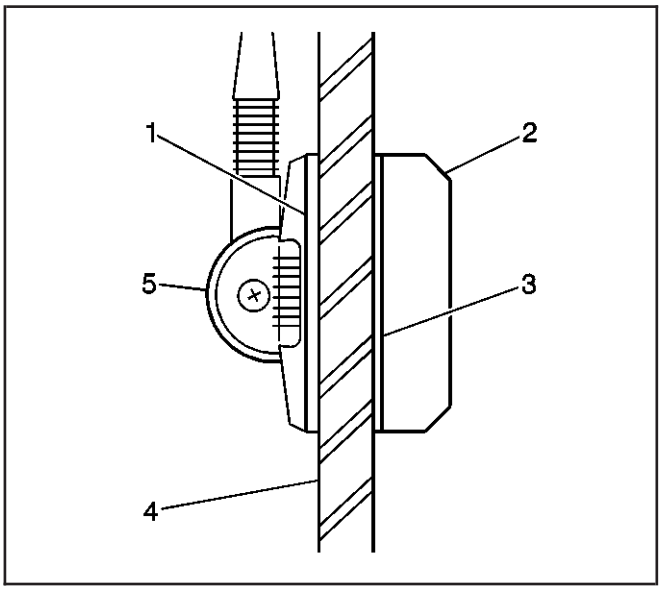


569466

Important:

- Align the inner and the outer antenna couplings.
- Do not touch the adhesive backing on the antenna coupling.

4. Remove the protective film from the adhesive backing on the outer antenna coupling.
5. Align the outer antenna coupling to the inner antenna coupling.
6. Press firmly on all 4 corners and on the center of the antenna outer coupling (5) in order to ensure proper adhesion to the rear window (4). Hold pressure on the outer coupling (5) for 10–30 seconds.
7. Ensure that no gaps occur between the couplings (5, 2) and the rear window (4).
8. Keep the vehicle dry. Allow 6 to 8 hours, at 15°C (60°F), for the adhesive to cure after installation.



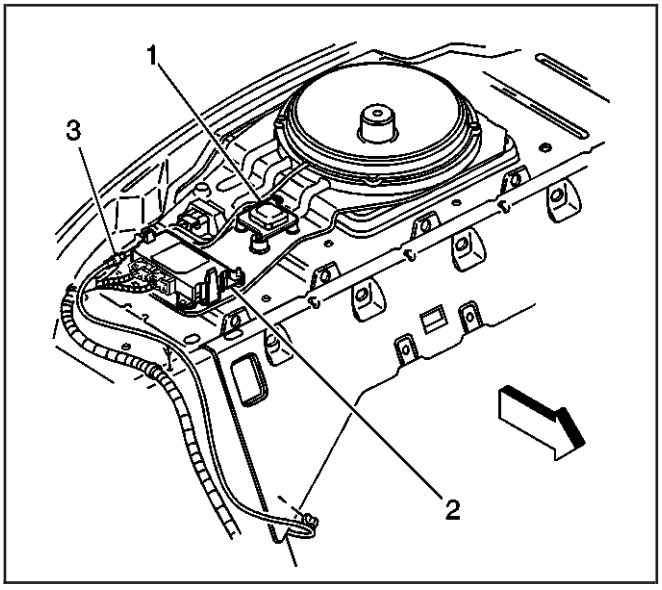
650826

Navigation Antenna Replacement

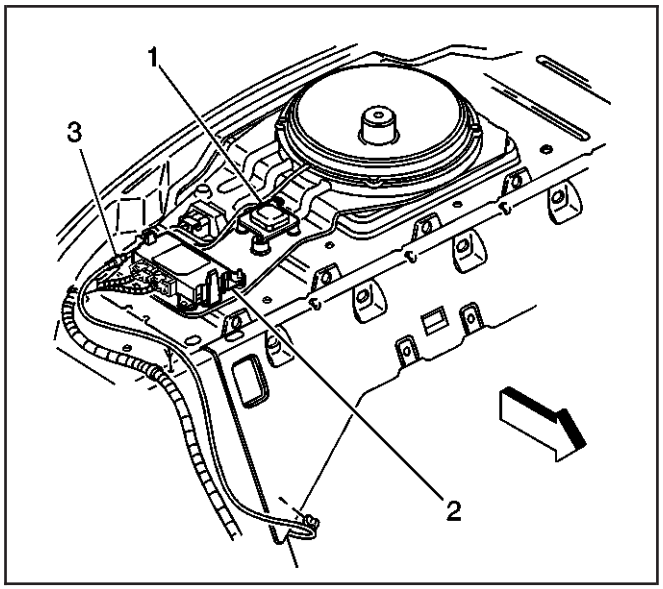
SIE-ID = 805507 Owner = arusse01 LMD = 11-jun-2002 LMB = rwoods01

Removal Procedure

1. Remove the rear shelf trim cover. Refer to *Trim Panel Replacement - Rear Window Shelf on page 8-33* in Interior Trim.
2. Remove the screws securing the GPS antenna (1) to the electrical carrier.
3. Disconnect the GPS antenna harness (3) at the electrical carrier.



699214

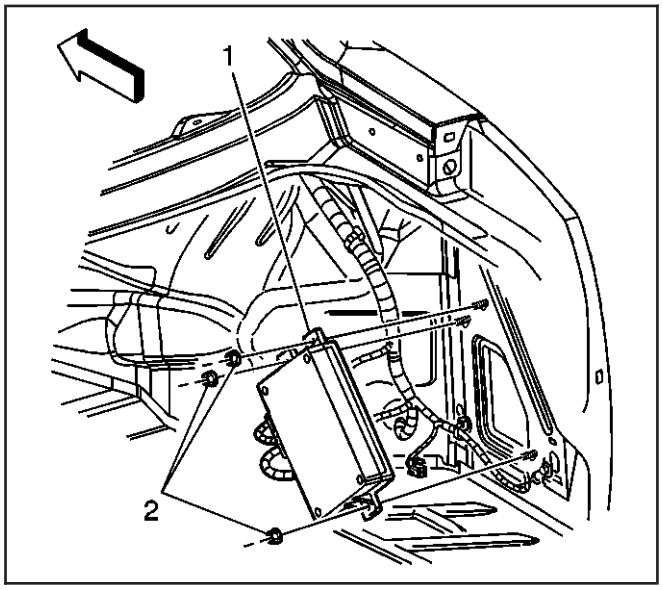


699214

Installation Procedure

Important: In order to verify the GPS system is operational, the vehicle must be parked outside for a minimum of five minutes.

1. Connect the GPS antenna harness (3) at the electrical carrier.
2. Install the screws securing the GPS antenna (1) to the electrical carrier.
3. Install the rear shelf trim cover. Refer to *Trim Panel Replacement - Rear Window Shelf on page 8-33* in Interior Trim.



699211

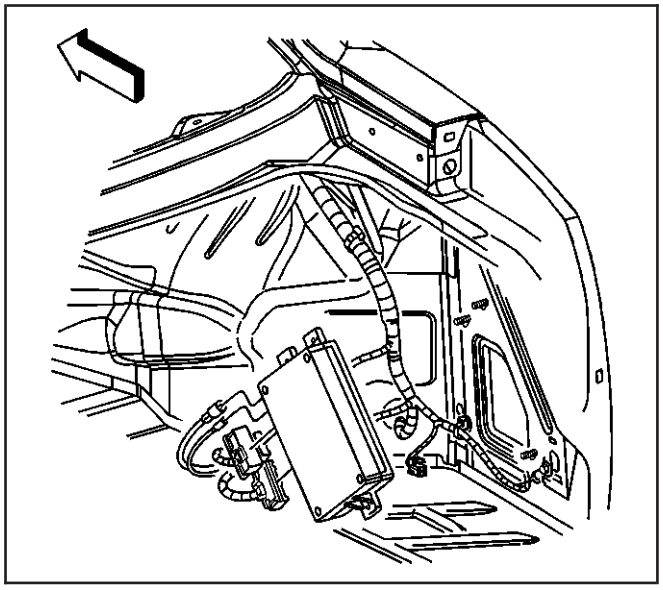
Communication Interface Module Replacement

SIE-ID = 1228685 Owner = arusse01 LMD = 22-jan-2003 LMB = hinks

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® 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 right rear compartment trim. Refer to *Compartment Trim Panel Replacement - Rear on page 8-14* in Body Rear End.
2. Remove the nuts (2) securing the OnStar® module (1) to the vehicle body.

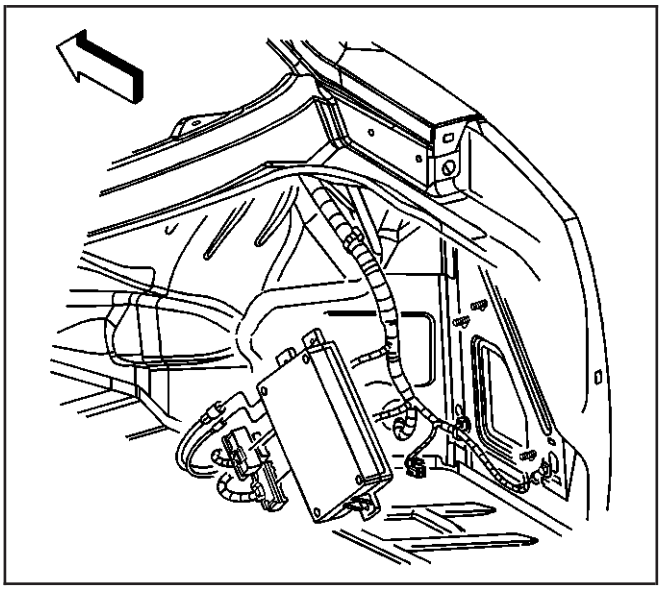


699207

3. Disconnect all the electrical connectors from the module.
4. Remove the module from the vehicle.

Installation procedure

1. When replacing the VCIM, record the 11-digit electronic serial number (ESN) and the 10-digit station identification (STID) number from the label on the new VCIM.
2. Reconnect the electrical connectors the module.



699207

Notice: Refer to *Fastener Notice on page P-7* in Cautions and Notices.

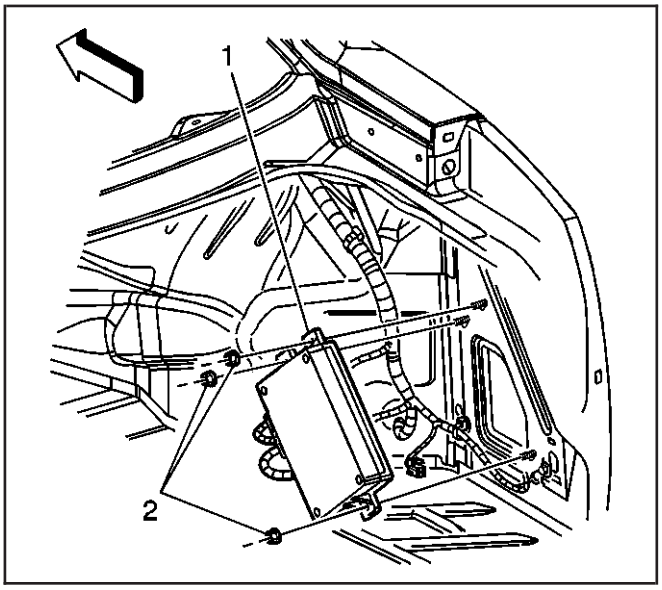
3. Install the module onto the vehicle.

   Tighten

   Tighten the nuts to 9 N·m (80 lb in).

Important: After replacing the vehicle communication interface module, you must reconfigure the OnStar® 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® system. This action will cause a DTC to set.

4. Reconfigure the OnStar® system. Refer to *OnStar Reconfiguration on page 11-33*.



699211

Description and Operation

OnStar Description and Operation

SIE-ID = 859926 Owner = lklenk01 LMD = 09-jun-2003 LMB = ckwiat01

This vehicle uses the Generation 5 version of the OnStar® system. This system consists of the following components:

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

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

Vehicle Communication Interface Module (VCIM)

The 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 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 two 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® 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. Ignition state is determined by the VCIM through class 2 messaging. The module also has the capability of commanding the horn, door lock/unlock and operating the exterior lamps using the class 2 serial data circuit. When an OnStar® keypress is made, a class 2 message is sent to the audio system to mute all radio functions and transmit OnStar® originated audio. After the audio system is muted, the OnStar® 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® 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® Button Assembly

The OnStar® 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® Call Center button, which displays the OnStar® logo, allows the user to connect to the OnStar® call center.
- The Emergency button, which will display either a red or white cross, sends a high priority emergency call to the OnStar® call center when pressed.

The OnStar® 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 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® 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® system is still able to make a call, the LED will flash red during the call. The OnStar® LED is controlled by the VCIM over the keypad red LED signal circuit and the keypad green LED signal circuit.

OnStar® Microphone

The OnStar®, 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 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® 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 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. Current GPS location is collected by the module every time a keypress is made. The OnStar® Call Center also has the capability of pinging the vehicle during an OnStar® call, which commands the module to retrieve the latest GPS location and transmit it to the OnStar® Call Center. A history location of the last recorded position of the vehicle is stored in the module and marked as aged.

In the event the VCP loses or is removed from power, this history location is used by the OnStar® 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® 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 VCIM to perform remote functions (such as door unlock) as commanded over the air by the OnStar® Call Center (when requested by the customer) and continue to maintain an acceptable level of battery electrical drain.

The OnStar® system uses three 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® 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® 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 nine minutes), the system re-enters the Low power state to listen for a call from the OnStar® Call Center for one minute. After this interval, the system will again return to the Sleep state for nine minutes. After these nine minutes, the system will again enter the Low state of power and listen for any incoming calls that the OnStar® Call Center may be sending. In the event a call is being sent, the OnStar® system will receive the call and immediately go into the High power mode to perform any requested functions. If no call is received during the one-minute interval, the system will go back into the sleep mode for another nine minutes. This process will continue for up to 48 hours, after which, the OnStar® 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® 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 GPS signal can be acquired, providing a reference for time. The OnStar® 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® Accounts

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

- During an OnStar® Call Center button press, the customer will be connected to a dedicated sales team who can sell an OnStar® subscription and reactivate the vehicle. Depending on the type of OnStar® hardware in the vehicle, the customer may first hear a demonstration message stating there is no current OnStar® subscription for the vehicle, and directing the customer what to do to activate services.
- During an Emergency button press, a demo message will be played indicating the service has been deactivated.
- OnStar® Personal Calling (OPC) will not be available, as this feature requires the customer to have a current OnStar® account. Attempts to use this feature may result in cellular connection failure messages and the inability to connect to the number dialed.

It is of particular note, that when an OnStar® system is successfully deactivated, it will NOT attempt to connect to the OnStar® 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® account, that have been deactivated, may be unable to establish a connection with the OnStar® Call Center. When normal published diagnostic procedures do not indicate a possible cause for the no connect concern, the vehicle may have been deactivated. For deactivated vehicles, a no connect response should be considered normal operation. Further diagnosis and subsequent repair is only necessary should the customer elect to become an active OnStar® subscriber.

OnStar® Reconfiguration Procedure

Within the VCIM are a set of unique numbers that identify the OnStar® 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® keypress is made and are essential for proper identification and connection to the OnStar® Call Center. In the event the VCIM requires replacement, the OnStar® 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® Call Center. The Reconfiguration process is explained within the Vehicle Communication Interface Module replacement procedure, or the OnStar® Reconfiguration Procedure found in the Cellular Communication diagnostic information and procedures section.

OnStar® Cellular, GPS, and Diagnostic Limitations

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

The cellular operation of the OnStar® 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® 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® Call Center. The OnStar® system may also experience connection issues if the identification numbers for the module, STID and ESN numbers, are not recognized by the cellular carriers local signal receiving towers. OnStar® cellular connection issues such as these require the assistance of the General Motors Technical Assistance Center OnStar® Group, which coordinates with cellular carriers to resolve connection issues.

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

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

OnStar® Personal Calling

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

OPC operates similar to most hand held cellular phones in that the availability for its usage is based on minutes or ″units″. The customer must have a current OnStar® subscription, as this feature cannot be utilized without it. To use OnStar® Personal Calling, the customer must also purchase units as outlined in the owners guide provided with the OnStar® system. When the customer purchases minutes, an OnStar® advisor ″loads″ these minutes into the 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® 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® 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 time transmitted by 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® call. When the answer/end call button is pressed, the audio system will mute; the OnStar® 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 Vehicle Communication Interface Module 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® system, the user should place a call to the OnStar call center to verify proper operation of the microphone. Following this description is an example of the commands and the OnStar system responses. A complete list of commands is supplied in the information provided to the customer with the OnStar® system.

OnStar® Steering Wheel Controls

Some vehicles equipped with the OnStar® system have the capability of accessing voice mailboxes and other automated phone systems by means of the steering wheel controls, while the OnStar Personal Calling (OPC) feature is in use. If the ″Talk″ or ″Mute″ button (depending upon the vehicle) on the steering wheel controls are depressed during an OPC call, the Vehicle Communication Interface Module receives the message on the Class 2 serial data bus from either the radio, driver information module, or body control module. This message is interpreted as a request to turn any spoken numbers into Dual Tone Multi-Frequency (DTMF) tones to be delivered over the airwaves to the phone system the user is communicating with. Complete instructions for operation of these features can be found in the information provided to the customer with the OnStar® system.

The steering wheel controls are a resistor network that consist of multiple momentary contact switches and a series of resistors. The switches and resistor network are arranged so that each switch has a different resistance value. When a switch is pressed, a voltage drop occurs in the resistor network, which produces a specific voltage value unique to the switch selected, to be interpreted by either the radio, driver information module, or body control module.

OPC Features

The following is an abbreviated list of features that may have an impact for the technician when servicing or diagnosing an OnStar® system. For a full list of OnStar® Personal Calling features, consult the owners guide provided to the customer with the OnStar® system.

Voice Feedback

The OPC system has the capability of responding to the user with either an automated voice response or with a tone or ″beep″. These two 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 OPC system by pressing the answer/end call button, speaking ″security″ and entering a four-digit code. Once this process is complete, the user must enter the code before OnStar® Personal Calling is available. In the event the customer cannot remember their code and is unable to use their system, they can press the blue OnStar button and speak to an advisor to unlock the system by means of a discrete cellular call to the vehicle.

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 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® module will require replacement.

Mobile Identification Number and Mobile Directory Number

The Generation 5 VCIM utilizes two numbers for cellular device identification, call routing and connection, a MIN (Mobile Identification Number) and a MDN (Mobile Directory Number). 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 the General Motors Technical Assistance Center (GM TAC).

Dialing a Phone Number Hands Free

Caller Action	OnStar® System Response
Important: If you make a mistake with a number or the OnStar® 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® Speech Recognition Systems

OnStar® 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® 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, two-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 four-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.

General Tips for Better Speech Recognition (cont'd)

Concern	Tip for Better Result
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 four 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.

Personal Calling Commands (cont'd)

Command	Tip for Better Result
'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.