DESCRIPTION AND OPERATION

ONSTAR DESCRIPTION AND OPERATION

This OnStarÂ® system consists of the following components:

- Telematics communication interface control module
- OnStarÂ® three button assembly
- Microphone
- Cellular antenna
- Navigation antenna
- BluetoothÂ® antenna (If equipped)
- Back up battery (If equipped)
- WiFi Hotspot (If equipped)
- TTY (Teletypewriter)

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

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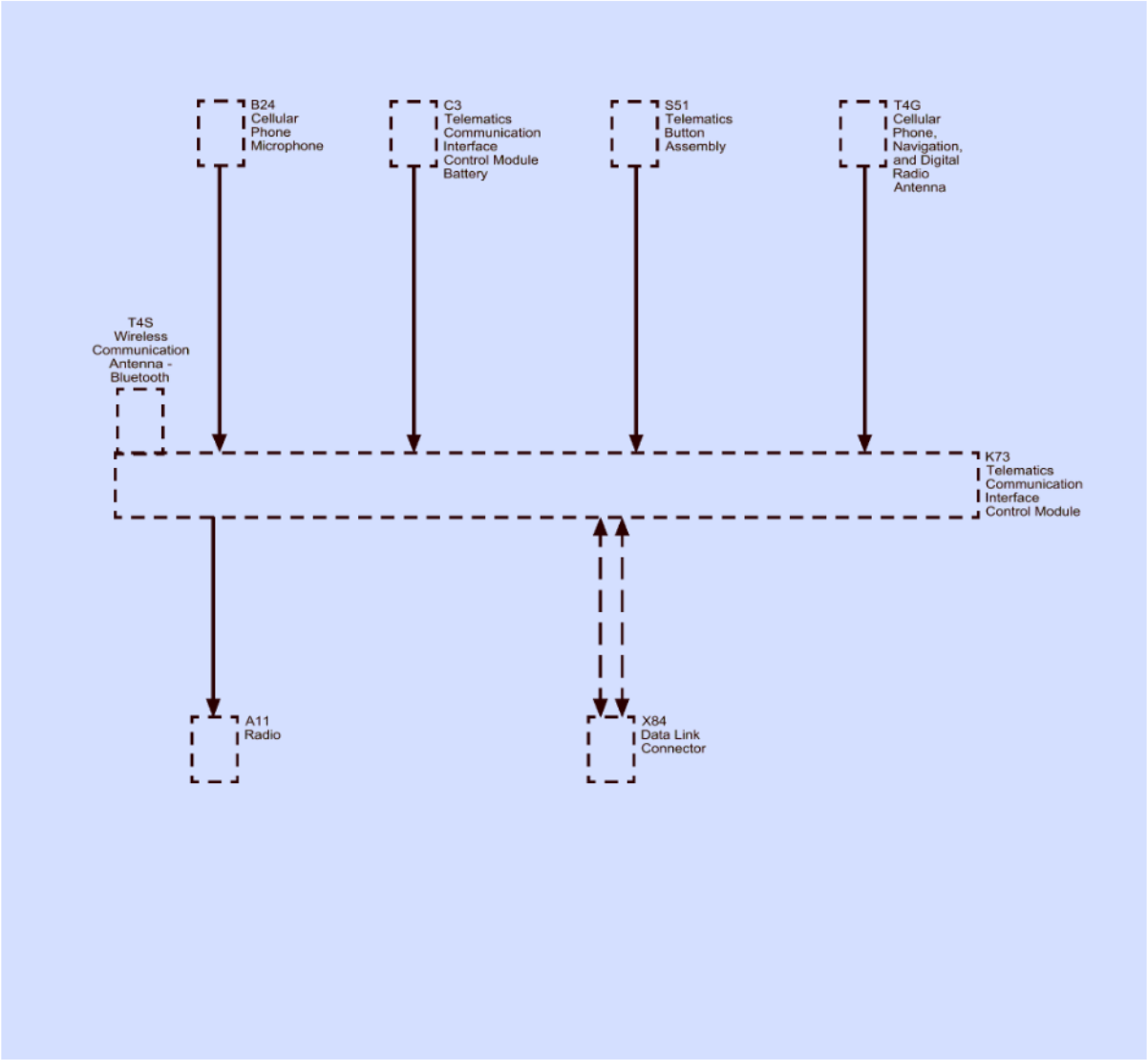


Fig. 1: Identifying Onstar Block Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
B24	B24 Cellular Phone Microphone
C3	C3 Telematics Communication Interface Control Module Battery
S51	S51 Telematics Button Assembly
T4G	T4G Cellular Phone, Navigation, and Digital Radio Antenna
T4S	T4S Wireless Communication Antenna - Bluetooth
K73	K73 Telematics Communication Interface Control Module
A11	A11 Radio
X84	X84 Data Link Connector

Telematics Communication Interface Control Module

The OnStar Generation 10 system uses Global System for Mobile Communication (GSM) to communicate data and voice signals over the national cellular network. The module may also have the ability to act as a Wireless Local Area Network (WLAN) Wi-Fi hotspot similar to a home wireless router. The module houses an internal WLAN antenna enabling hotspot connectivity and streaming high speed media to the entertainment system. The

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module also may enable Teletypewriter (TTY) and be capable of Bluetooth communication utilizing an internal antenna. The module is capable of up to 4G LTE speeds and houses 2 technology systems, one to process Global Positioning System (GPS) data, and another for cellular information. The module sends and receives all cellular communications over two cellular antennas and cellular antenna coax cables.

The OnStar Gen 10 system has two antenna inputs, a primary cellular signal and a combined GPS/secondary cellular signal. The OnStarÂ® system uses the Unitied States Global Positioning System (GPS) signals to provide location on demand. GPS is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near Earth where there is an unobstructed line of sight to four or more GPS satellites.

The module also has the capability of activating certain features such as, the horn, remote engine starting, initiating door lock/unlock, or activating the exterior lamps using the serial data circuits. These functions can be commanded by the OnStarÂ® Call Center per a customer request or mobile device app depending on vehicle and customer subscription.

Dedicated circuits are used to connect the telematics communication interface control module to a microphone, the button assembly, radio, and if equipped the Back Up Battery (BUB). The telematics communication interface control module communicates with the rest of the vehicle over the serial data bus.

Power is provided by a dedicated, fused B+ circuit. Ground is provided through the vehicle wiring harness attached to the module. The power mode state is determined by the telematics communication interface control module through serial data messaging.

OnStarÂ® Three Button Assembly

- The OnStarÂ® button assembly may be part of the rearview mirror, or a separate, stand alone unit. The button assembly is comprised of 3 buttons or 3 capacitive touch buttons and status LED's or an error indicator. The buttons are defined as follows:
  - The answer/end button, which is black with a white phone icon or a white driver figure seated with voice signals near its face, allows the user to answer and end calls or initiate speech recognition.
  - The blue OnStarÂ® call center button, which displays the OnStarÂ® logo, allows the user to connect to the OnStarÂ® call center.
  - The emergency button, which displays white letters "SOS" with red background, sends a high priority emergency call to the OnStarÂ® call center when pressed.

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

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

The OnStarÂ® status LED or error indicator is located near the buttons. The LED is green when the system is ON and operating normally. When any indicator is illuminated 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 OnStarÂ® system is still able to make a call, the LED will flash red during the call.

Each LED or error indicator is controlled by either the telematics communication interface control module over dedicated LED signal circuits or by low speed GM LAN serial data depending on the inside rearview mirror

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option. Ground for the LED is provided by the wiring harness attached to the button assembly.

Secondary OnStarÂ® Controls

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

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

OnStarÂ® Microphone

The cellular microphone can be part of the rearview mirror assembly, or a stand-alone unit in the headliner or roof console. In either case, the telematics communication interface control module supplies approximately 10V to the microphone on the cellular microphone signal circuit. The microphone modifies the 10V depending on the volume and voice being detected. A cellular microphone low reference circuit or a drain wire provides a ground for the microphone. The microphone signal circuits pass through the telematics communication interface control module to support entertainment voice recognition.

Cellular and GPS Antennas

The combination antenna will have any of the following antenna elements when equipped with OnStar:

- Primary cellular element
- Secondary cellular element
- GPS element
- Digital radio element
- AM/FM element

The Gen 10 OnStarÂ® system uses 2 cellular antenna elements to send and receive cellular data, the primary cellular element and the secondary cellular element. The primary cellular signal is carried by a coax cable that connects the antenna directly to the telematics communication interface control module. Details of the secondary cellular signal are further described below.

The GPS antenna element is used to collect the signals of the orbiting GPS satellites. Within the antenna is housed a low noise amplifier that allows for a more broad and precise reception of this data. Also housed within the antenna is circuitry to combine the GPS signal and the secondary cellular signal. Without navigation, the combination GPS/secondary cellular signal is carried by a coax cable that connects directly to the telematics communication interface control module. The cable also provides a path for DC current for powering the antenna. With navigation, the combination GPS/secondary cellular signal is carried by a coax cable that connects to the navigation signal splitter. The splitter supplies the GPS signal to the navigation/entertainment system and the GPS/cellular signal to the telematics communication interface control module.

The digital radio element collects digital radio signals from two satellites and where necessary terrestrial repeaters. The digital radio signal is carried by a coax cable and connected to the digital radio receiver. Refer to Radio/Audio System Description and Operation for further details.

The radio signal is sent from a broadcast station and is then received by the AM/FM radio antenna element. The AM/FM radio signal is carried by a coax cable and is connected to the radio. Refer to Radio/Audio System

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Description and Operation for further details.

OnStarÂ® RemoteLink

OnStarÂ® RemoteLink is a mobile app to link mobile devices to a vehicle for limited diagnostics and feature controls. After downloading the app and registering the device, vehicle owners with an eligible vehicle can use their mobile devices to access real-time data from their vehicle and perform specific commands remotely.

All communication between the app and the vehicle is powered by OnStar'sÂ® advanced connected vehicle technology. An active OnStarÂ® account as well as a valid OnStarÂ® username and password are required to use the app. The remote commands must be enabled by logging into the user's OnStarÂ® account prior to using the app. Refer to the owners manual for available vehicle data and control features.

Compass Heading

The telematics communication interface module has a compass feature to calculate vehicle direction which is displayed via the instrument panel cluster or designated display. The compass heading is determined by dead reckoning until the GPS 3d fix is established. The dead reckoning is accomplished by using the yaw rate sensors and wheel ticks to determine heading changes from a GPS known heading. The GPS 3d fix heading is determined by the deferential of two locations. If "CAL" is displayed on the Instrument Panel Cluster or designated display refer to the owners manual for steps to calibrate the compass.

BluetoothÂ® (If Equipped)

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

The BluetoothÂ® antenna is internal to the telematics communication interface control module, radio or human machine interface module and is used to send and receive signals from a BluetoothÂ® enabled cellular phone. The available features and functions are determined by the software within the device being used and the telematics communication interface control module. The operating range of the signal from the vehicle is approximately 30 feet. Note that the operating range is dependent upon the cellular phone being used and battery level of the phone.

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

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

BluetoothÂ® Features Supported

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

- Automatic reconnection - highest priority phone will automatically be connected to vehicle when vehicle

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ignition is on

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

Pairing a BluetoothÂ® Cellular Phone to the Vehicle

In order to use hands-free calling, the cellular phone must be paired to the vehicle. Up to five devices can be paired to the vehicle at one time, but only one can be connected at any given time. To pair a phone, the customer must know how to operate the BluetoothÂ® functionality of their phone. The pairing process must only be done one time for each phone, unless that phone's information is deleted. The system will always generate a password and will provide that password if the device you are pairing does not support Secure Simple Pairing (SSP). If the device being paired does support SSP the system will not provide the password and automatically pair the device. For safety reasons, the pairing process is disabled while the vehicle is moving.

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

Complete pairing instructions are provided in the Vehicle Owners Manual.

Back-up Battery (If Equipped)

NOTE: **Do not disconnect the main vehicle battery or remove the OnStarÂ® fuse with the ignition key in any position other than OFF. Disconnecting power to the OnStarÂ® module in any way while the ignition is ON or with retained accessory power activated may cause activation of the OnStarÂ® Back-Up Battery. This action is per design as the back-up battery is designed to provide power to the telematics communication interface control module so an emergency notification call can be made after an event where the main battery is disabled. Once the Back-Up Battery is activated it will stay on until the power is restored back to the telematics communication interface control module. The telematics communication interface control module naturally chooses the main supply voltage as it's default supply, but if the main supply is removed or lost for any reason the OnStarÂ® module will use the Back-Up Battery as a power supply as long as the default supply can not be detected. The back-up battery is not rechargeable and once discharged below 9.5 volts the back-up battery must be replaced.**

Certain OnStarÂ® equipped vehicles may also be equipped with a back-up battery. The back-up battery is a

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non-rechargeable, lithium battery intended to provide an auxiliary power source for the telematics communication interface control module in the event where power from the main vehicle battery is lost.

The back-up battery is intended to have a limited life span of approximately 4 years and is designed to maintain an open circuit voltage between 16 V and 9 V throughout this period. This allows the battery to power the basic functions of the telematics communication interface control module for least one 200 second (5 minute) call at the end of the 4 year span, should the main vehicle battery be lost. In the case of a vehicle losing vehicle battery power, OnStar will switch over to the backup battery based on an internal algorithm. It will look for an air-bag deploy, or near-deploy, messages from the SDM. If there are no messages the OnStar module will stay wake for a few minutes longer and monitor the buttons in the mirror. If not pressed, the modules will power down and shut off completely.

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

WiFi Hotspot

The telematics communication interface control module acts as a Wireless Local Area Network (WLAN) WiFi hotspot router and uses direct 4G LTE connectivity to the internet. It has the ability to connect up to 7 devices at one time. A data plan is required and when purchased, a security default password is established. There are several ways to change the SSID or password, by placing a call to the OnStar Call Center, by using the Gen 10 mobile app or through the scan tool.

The system utilizes a secure autoconnect feature between the telematics communication interface control module and the radio/HMI. No user interaction is required, it is always available and ready to connect to a dedicated in car device. The ignition must be in Run, Accessory or RAP for WiFi to operate.

Audio System Interface

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

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

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

OnStarÂ® Sleep Cycle

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

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

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- High power
- Low power
- Sleep
- Digital standby

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

The low power state is in effect when the OnStarÂ® system is idle with the ignition in the ON or RUN position, or with retained accessory power enabled.

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

The digital standby power state is entered after the vehicle has been shut off and the retained accessory power has timed out while in a digital cellular area. When in digital standby mode, the OnStarÂ® module is able to perform all remote functions as commanded by an OnStarÂ® advisor at any time, for a continuous 120 hours. After 120 hours, the OnStarÂ® module will go into sleep mode until a wake up signal from the vehicle is seen by the telematics communication interface control module. If the OnStar module loses the digital cellular signal it will revert to analog mode and follow the standard sleep state (9 minutes OFF, 1 minute standby) based on the time of the GPS signals, this will continue until a digital cellular signal is again received.

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

Features

OnStarÂ® Personal Calling

The hands free, OnStarÂ® personal calling cellular phone feature is an additional feature of the OnStarÂ® system. This feature is embedded within the telematics communication interface control module; however it must be activated by an OnStarÂ® advisor. OnStarÂ® personal calling 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 OnStarÂ® subscription, as this feature cannot be utilized without it. To use OnStarÂ® personal calling, the customer must also purchase units (minutes) as outlined in the owners guide provided with the OnStarÂ® system. Units begin to deplete, 1 unit is equal to 1 minute, as the customer makes outbound phone calls, answers inbound phone calls, or while connected to the OnStarÂ® virtual advisor. In addition, units may also have an expiration date, depending upon the type of units purchased.

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

Turn by Turn Navigation

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Turn by Turn Navigation allows the driver to contact OnStarÂ® to obtain directions for driving from a current location to a desired location. The Turn by Turn Navigation system stores your planned route and continually checks your position along that route, when you deviate from the planned route, the system will recognize this and prompt the driver with verbal prompts for how to proceed. The driver then responds verbally to direct the system to continue the current routing or to recalculate the route because of a missed turn.

Advisor Record Feature

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

Teletypewriter (TTY) Users

OnStar has the ability to communicate to deaf, hard-of-hearing, or speech-impaired customers while in the vehicle. The available dealer-installed TTY system can provide in-vehicle access to all of the OnStar services, except Virtual Advisor and OnStar Turn-by-Turn Navigation.

Deactivated OnStarÂ® Accounts

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

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

Certain vehicles that have never had an active OnStarÂ® account, or that have been deactivated, may be unable to establish a connection with the OnStarÂ® 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 OnStarÂ® subscriber or renew the account subscription.

OnStarÂ® Cellular, GPS, and Diagnostic Limitations

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

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

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

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

Mobile Identification Number and Mobile Directory Number

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

Operation of the OnStarÂ® Speech Recognition Systems

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

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

The OnStarÂ® 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 the Infotainment System Manual or the Owners Manual.

RADIO/AUDIO SYSTEM DESCRIPTION AND OPERATION (IO3)

The entertainment system on this vehicle may have several different configurations available to it. To determine the specific configuration of the vehicle, please see the Service Parts ID Label, and refer to **RPO Code List** .

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

- Data Communications

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- Remote Radio Receiver
- Media Disc Player
- Audio Amplifier (If equipped)
- Speaker Operation
- Infotainment Controls and Display
- Antenna System
- Radio Reception
- Theft Deterrent
- Auxiliary Audio Input Jack
- USB Port and SD Card Reader
- Valet Mode
- OnStar Â®
- Steering Wheel Controls (If equipped)
- Auto Volume Control

Data Communications

The infotainment system communicates with other devices on multiple serial data networks during operation. The infotainment system utilizes the Media Oriented Systems Transport (MOST) bus, Local Interconnect Network (LIN) and GMLAN to establish communications. For additional information refer to **Data Link Communications Description and Operation**

Remote Radio Receiver

The radio is the MOST BUS master. The radio also communicates with other components and systems within the vehicle via GMLAN.

The remote radio receiver is responsible for receiving all broadcast audio bands. Broadcast signals from AM, FM, and XM bands are transmitted to the radio via the vehicle antenna systems.

Radio Power

The radio receives battery power and ground from the vehicle harness.

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

Radio Audio Outputs

When not equipped with an amplifier, the radio outputs all audio signals to the speakers via the vehicle wiring harness.

When equipped with an amplifier, the radio outputs all audio signals digitally over the MOST bus.

Media Disc Player

The media disc player is responsible for playing optical media for the infotainment system.

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The media disc player receives control information and outputs digital audio over the MOST bus.

The media disc player receives battery power and ground from the vehicle harness.

Audio Amplifier (If equipped)

Amplifier Interface

A fused battery voltage circuit provides the main amplifier power. The audio amplifier is a participant on the MOST network. The audio amplifier receives audio signals and control information from the MOST bus. The audio amplifier also communicates with other components and systems within the vehicle via GMLAN.

Amplifier Operation

The purpose of the amplifier is to increase the power of a voltage or current signal. The output signal of an amplifier may consist of the same frequencies as the input signal or it may consist of only a portion of the frequencies as in the case of a subwoofer or midrange speaker. The audio amplifier amplifies the signal and sends it to the appropriate speakers.

Each of the audio output channel circuits (+) and (-), at the audio amplifier have a DC bias voltage that is approximately one half of the battery voltage. When using a DMM, each of the audio output channel circuits will measure approximately 6.5V DC. The audio being played on the system is produced by a varying AC voltage that is centered around the DC bias voltage on the same circuit. The AC voltage is what causes the speaker cone to move and produce sound. Both the DC bias voltage and the AC voltage signals are needed for the audio system to properly produce sound.

The audio amplifier is also responsible for operation of active noise cancellation. Refer to **Active Noise Cancellation Description and Operation** for more information.

Speaker Operation

Speakers turn electrical energy into mechanical energy to move air, using a permanent magnet and an electromagnet. The electromagnet is energized when the radio or amplifier (if equipped) delivers current to the voice coil on the speaker. The voice coil will form a north and south pole that will cause the voice coil and the speaker cone to move in relation to the permanent magnet. The current delivered to the speaker is rapidly changing alternating current (A/C). This causes the speaker cone to move in two directions producing sound.

Infotainment Controls and Display

The infotainment display and controls are a separate component from the radio, combined into an assembly. The assembly contains the control knobs and buttons for all audio and HVAC functions and the information display. The assembly is supplied battery voltage and ground from the vehicle harness.

The radio communicates with the assembly via a LIN serial data circuit. Messages communicated include the following:

- Wake-up/power state messages
- Diagnostic information
- Button presses/knob rotations
- Commands for the state of indicators
- Back-lighting dimming level

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The radio sends the display digital video data for on-screen display through a dedicated video cable.

HVAC data for controls and status indicators is communicated between the HVAC controls and the HVAC control module with a separate LIN serial data circuit. HVAC status screen information from the HVAC control module is transmitted to the radio on the GMLAN serial data circuit.

Antenna System

Mast Antenna

The mast antenna is responsible for AM and FM radio reception. The antenna is attached to a base. The coaxial cable is connected to the base, and this cable is connected to the radio.

Multi-Band Antenna

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

Radio Reception

AM/FM Radio Signal

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

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

Digital Radio Receiver (If equipped)

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

Radio Data System (RDS)

The RDS feature is available only on FM stations that broadcast RDS information. This system relies upon receiving specific information from these stations and only works when the information is available. While the radio is tuned to an FM-RDS station, the station name or call letters display. RDS data is carried in what is

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

RDS functions will only work with FM broadcast stations that are broadcasting RDS data. Not all FM Broadcast stations broadcast RDS data or offer all of the RDS services.

The information displayed is dependent upon the information broadcast by the particular station. The information may vary greatly between stations. RDS functions may not work properly when reception is weak, reception is of poor quality, or RDS is not implemented properly by the FM Broadcaster. In some cases, a radio station broadcasting incorrect information may cause the RDS features of the radio to appear to work improperly.

With RDS, the radio can do the following:

- Display text information such as: station identification, type of programming, and general information (artist and song title, station messages, call in phone numbers, etc.).
- Seek to stations broadcasting the selected type of programming
- Receive announcements concerning local and national emergencies
- Receive alert warnings of local or national emergencies. When an alert announcement comes on the current radio station, ALERT! displays. You will hear the announcement, even if the volume is low or a CD is playing. If a CD is playing, play stops during the announcement. Alert announcements cannot be turned off. ALERT! is not affected by tests of the emergency broadcast system. This feature is not supported by all RDS stations.

Theft Deterrent

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

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

- Normal Mode: The radio has learned a correct VIN sequence and the VIN information received via serial data matches the learned VIN sequence. In this mode the radio has full functionality.
- No VIN Mode: The radio has not received or learned a correct VIN sequence. In this mode the radio has limited functionality.
- Theft Detected Mode: The radio has learned a correct VIN sequence and the VIN information received via serial data does NOT match the learned VIN sequence. In this mode the radio may be disabled or have limited functionality. The radio display will indicate that theft protection is active.

Auxiliary Audio Input Jack (If equipped)

The infotainment system may have a 3.5mm (1/8 in.) auxiliary audio input jack located in the center console. The auxiliary audio input jack interfaces directly with the radio. When a portable audio playback device is connected to the auxiliary jack, an internal switch detects the connection and the radio will switch to AUX as the audio source. Audio signals from the device are sent to the radio from the auxiliary jack via the left, right, and common audio signal circuits.

- When a device is first connected to the 3.5mm (1/8 in.) input jack the infotainment system automatically

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switches to that device. If an auxiliary device has already been connected, press the AUX or CD/AUX button to select the device.

- Playback of an audio device that is connected to the 3.5mm jack can only be controlled using the controls on the device.
- The volume control on the device may need to be adjusted to ensure sufficient playback volume through the infotainment system.

USB Port and SD Card Reader

The USB port and the card reader slot interface with a hub device, internal to the auxiliary jack, USB, and memory card receptacle assembly. The auxiliary jack, USB, and memory card receptacle assembly receives fused battery voltage and ground from the harness to power the internal hub device as well as providing additional amperage to power USB devices.

The internal hub device interfaces directly with the radio via a standard USB cable. A Mini type USB connector is used to connect the cable at the USB port and at the radio and at the auxiliary jack, USB, and memory card receptacle. Standard USB male to female connections are typically used for connecting USB cables together where an in-line connection is required. An in-line cable connection is typically found between the console and I/P harness.

USB Port

The USB port allows connectivity to the infotainment system from portable media players or a USB storage device (memory stick/ flash drive). When a device is connected to the USB port, the system detects the device and switches to USB as the audio source. Once connected, the device can be controlled from the radio controls.

Not all portable media player devices or file types are compatible. Connection to USB HUB devices is not supported.

Refer to the owner's manual for information on USB devices, control, and operation.

SD Card Reader

The infotainment system uses the SD card reader as a mass storage device, similar to a USB storage device.

Refer to the owners manual for information on media types supported via the SD card reader.

Valet Mode

Valet Mode is a customer enabled feature of the infotainment system, found in the settings menu, if equipped. The customer creates and inputs a four digit code using the infotainment controls. Confirming the code and selecting LOCK will lock the infotainment system, steering wheel controls and other vehicle features, dependant on vehicle equipment. The vehicle will remain in valet mode until the same four digit code is reentered.

In the event that the four digit code is forgotten, the scan tool can be used to clear the Valet Mode Code.

OnStar Â® (If equipped)

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

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

Steering Wheel Controls (If equipped)

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

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

Auto Volume Control

With auto volume control, the audio system will adjust automatically to make up for road and wind noise as you drive, by increasing the volume as vehicle speed increases. To use auto volume control, set the volume at the desired level, and then select either Low, Medium, or High. To turn auto volume control off, select the Off screen button.

RADIO/AUDIO SYSTEM DESCRIPTION AND OPERATION (IO5/IO6)

The entertainment system on this vehicle may have several different configurations available to it. To determine the specific configuration of the vehicle, please see the Service Parts ID Label, and refer to **RPO Code List** .

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

- Data Communications
- Remote Radio Receiver
- Human Machine Interface Module
- Media Disc Player
- Audio Amplifier (If equipped)
- Speaker Operation
- Infotainment Controls and Display
- Antenna System
- Radio Reception
- Theft Deterrent
- Bluetooth Â® (if equipped)
- Applications (if equipped)
- Auxiliary Audio Input Jack
- USB Port and SD Card Reader
- Navigation System Components and Features (if equipped)
- Valet Mode
- OnStar Â®
- Steering Wheel Controls (If equipped)
- Auto Volume Control

Data Communications

The infotainment system communicates with other devices on multiple serial data networks during operation. The infotainment system utilizes the Media Oriented Systems Transport (MOST) bus, Local Interconnect

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Network (LIN) and GMLAN to establish communications. For additional information refer to **Data Link Communications Description and Operation**

Remote Radio Receiver

The radio is the MOST BUS master. The radio also communicates with other components and systems within the vehicle via GMLAN.

The remote radio receiver is responsible for receiving all broadcast audio bands. Broadcast signals from AM, FM, and XM bands are transmitted to the radio via the vehicle antenna systems.

Radio Power

The radio receives battery power and ground from the vehicle harness.

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

Radio Audio Outputs

When not equipped with an amplifier, the radio outputs all audio signals to the speakers via the vehicle wiring harness.

When equipped with an amplifier, the radio outputs all audio signals digitally over the MOST bus.

Human Machine Interface Module

The human machine interface module is responsible for the following: Video for the infotainment display, Bluetooth Â®, USB, memory card reader, and speech recognition functions.

The human machine interface module communicates with the info display module via the LIN bus for control information, touch communications and dimming level. Digital video data is sent to the display through a dedicated video cable.

Media Disc Player

The media disc player is responsible for playing optical media for the infotainment system.

The media disc player receives control information and outputs digital audio over the MOST bus.

The media disc player receives battery power and ground from the vehicle harness.

Audio Amplifier (If equipped)

Amplifier Interface

The amplifier receives battery power and ground from the vehicle harness. . The audio amplifier is a participant on the MOST network. The audio amplifier receives audio signals and control information from the MOST bus.

Amplifier Operation

The purpose of the amplifier is to increase the power of a voltage or current signal. The output signal of an

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amplifier may consist of the same frequencies as the input signal or it may consist of only a portion of the frequencies as in the case of a subwoofer or midrange speaker. The audio amplifier amplifies the signal and sends it to the appropriate speakers.

Each of the audio output channel circuits (+) and (-), at the audio amplifier have a DC bias voltage that is approximately one half of the battery voltage. When using a DMM, each of the audio output channel circuits will measure approximately 6.5V DC. The audio being played on the system is produced by a varying AC voltage that is centered around the DC bias voltage on the same circuit. The AC voltage is what causes the speaker cone to move and produce sound. Both the DC bias voltage and the AC voltage signals are needed for the audio system to properly produce sound.

The audio amplifier is also responsible for operation of active noise cancellation. Refer to **Active Noise Cancellation Description and Operation** for more information.

Speaker Operation

Speakers turn electrical energy into mechanical energy to move air, using a permanent magnet and an electromagnet. The electromagnet is energized when the radio or amplifier (if equipped) delivers current to the voice coil on the speaker. The voice coil will form a north and south pole that will cause the voice coil and the speaker cone to move in relation to the permanent magnet. The current delivered to the speaker is rapidly changing alternating current (A/C). This causes the speaker cone to move in two directions producing sound.

Infotainment Controls and Display

The infotainment display and controls are a separate component from the radio, combined into an assembly. The assembly contains the control knobs and buttons for all audio and HVAC functions and the information display. The assembly is supplied battery voltage and ground from the vehicle harness.

Control information, touch communications and dimming level for the display are communicated via a LIN serial data circuit to the human machine interface module.

The human machine interface module sends the display digital video data for on-screen display through a dedicated video cable.

The controls communicate via a LIN serial data circuit with the remote radio receiver . Messages communicated include the following:

- Wake-up/power state messages
- Diagnostic information
- Button presses/knob rotations
- Commands for the state of indicators
- Back-lighting dimming level

HVAC data for controls and status indicators is communicated between the HVAC controls and the HVAC control module with a separate LIN serial data circuit. HVAC status screen information from the HVAC control module is transmitted to the radio on the GMLAN serial data circuit. The radio communicates the desired screen information to the human machine interface module to be sent to the information display using the video data circuits.

Antenna System

Mast Antenna

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The mast antenna is responsible for AM and FM radio reception. The antenna is attached to a base. The coaxial cable is connected to the base, and this cable is connected to the radio.

Multi-Band Antenna

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

Radio Reception

AM/FM Radio Signal

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

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

Digital Radio Receiver (If equipped)

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

Radio Data System (RDS)

The RDS feature is available only on FM stations that broadcast RDS information. This system relies upon receiving specific information from these stations and only works when the information is available. While the radio is tuned to an FM-RDS station, the station name or call letters display. RDS data is carried in what is known as a "subcarrier". A subcarrier is a frequency that the FM broadcaster is authorized to use to send data that is not audible in the main audio program.

RDS functions will only work with FM broadcast stations that are broadcasting RDS data. Not all FM Broadcast stations broadcast RDS data or offer all of the RDS services.

The information displayed is dependent upon the information broadcast by the particular station. The information may vary greatly between stations. RDS functions may not work properly when reception is weak, reception is of poor quality, or RDS is not implemented properly by the FM Broadcaster. In some cases, a radio station broadcasting incorrect information may cause the RDS features of the radio to appear to work

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improperly.

With RDS, the radio can do the following:

- Display text information such as: station identification, type of programming, and general information (artist and song title, station messages, call in phone numbers, etc.).
- Seek to stations broadcasting the selected type of programming
- Receive announcements concerning local and national emergencies
- Receive alert warnings of local or national emergencies. When an alert announcement comes on the current radio station, ALERT! displays. You will hear the announcement, even if the volume is low or a CD is playing. If a CD is playing, play stops during the announcement. Alert announcements cannot be turned off. ALERT! is not affected by tests of the emergency broadcast system. This feature is not supported by all RDS stations.

Theft Deterrent

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

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

- Normal Mode: The radio has learned a correct VIN sequence and the VIN information received via serial data matches the learned VIN sequence. In this mode the radio has full functionality.
- No VIN Mode: The radio has not received or learned a correct VIN sequence. In this mode the radio has limited functionality.
- Theft Detected Mode: The radio has learned a correct VIN sequence and the VIN information received via serial data does NOT match the learned VIN sequence. In this mode the radio may be disabled or have limited functionality. The radio display will indicate that theft protection is active.

Bluetooth Â® (If equipped)

Bluetooth Â® wireless technology is a short-range communications technology intended to replace the cables connecting portable and/or fixed devices while maintaining high levels of security. The operating range of the signal is approximately 30 feet.

The available features and functions are determined by the type of device and the software within the devices being used. For a feature or function to operate, it must be supported in both devices.

The first connection between devices is established through a process called pairing. In order to pair two devices, a password (passkey) has to be exchanged between the two devices. One device will generate the password, the other device accepts the password to complete the process. Once the devices are paired, future connections between the devices will occur automatically when the devices are on and within range of each other.

The Bluetooth Â® hardware is internal to the human machine interface module. The human machine interface module supports streaming of data (music, voice, information) from cellular phones and other mobile devices that support those features. The human machine interface module is also capable of interfacing with cellular phones for hands-free features.

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- The device must be paired to the system to use the available Bluetooth Â® feature(s). The pairing process must only be performed once for each device, unless that device's information is deleted.
- Up to five devices can be paired, but only one can be connected at any given time.
- Streaming Audio allows playing music from the mobile device wirelessly. Music stored on the mobile device can be viewed and controlled from the display.
- To stream audio from a mobile device, the device must be unlocked, and any additional applications should be closed.

Refer to the vehicle owners manual, supplements, and the device manufacturers information for pairing instructions.

Applications (If equipped)

When the system is equipped with Bluetooth Â®, the system is capable of using applications, commonly referred to as apps.

The term application refers to any piece of software that works on a system (hardware) that is being operated by it's own software. Applications are typically small software programs which uses the hardware to perform a specific task, as opposed to operating the entire system.

- For an application to be used, it must be installed on both the vehicle infotainment system and a compatible mobile device.
- The device must be connected to the system. this may be done wirelessly via Bluetooth Â®, or via the vehicle USB port. Refer to the device manufacturers information for the proper connection method.
- When the device is connected, the vehicle infotainment system is used to remotely access and control the application on the mobile device.
- The application must work correctly on the device to work with the vehicle infotainment system.
- The user may be required to log-in to the application on the mobile device before using the application from the vehicle controls.
- Using applications will use the device's data plan.
- The device must be unlocked, and any additional applications should be closed.

Refer to the owner's manual and supplements for information on mobile devices, control, and operation.

Auxiliary Audio Input Jack (If equipped)

The infotainment system may have a 3.5mm (1/8 in.) auxiliary audio input jack located in the center console. The auxiliary audio input jack interfaces directly with the radio. Audio signals from the device are sent to the radio from the auxiliary jack via the left, right, and common audio signal circuits.

- If an auxiliary device has already been connected, press the AUX or CD/AUX button to select the device.
- Playback of an audio device that is connected to the 3.5mm jack can only be controlled using the controls on the device.
- The volume control on the device may need to be adjusted to ensure sufficient playback volume through the infotainment system.

USB Port and SD Card Reader

The USB port and the card reader slot interface with a hub device, internal to the auxiliary jack, USB, and memory card receptacle assembly. The auxiliary jack, USB, and memory card receptacle assembly receives

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fused battery voltage and ground from the harness to power the internal hub device as well as providing additional amperage to power USB devices.

The internal hub device interfaces directly with the human machine interface module via a standard USB cable. A Mini type USB connector is used to connect the cable at the USB port and at the human machine interface module and at the auxiliary jack, USB, and memory card receptacle. Standard USB male to female connections are typically used for connecting USB cables together where an in-line connection is required. An in-line cable connection is typically found between the console and I/P harness.

USB Port

The USB port allows connectivity to the infotainment system from portable media players or a USB storage device (memory stick/ flash drive). Once connected, the device can be controlled from the radio controls.

Not all portable media player devices or file types are compatible. Connection to USB HUB devices is not supported.

Refer to the owner's manual for information on USB devices, control, and operation.

SD Card Reader

The infotainment system uses the SD card reader as a mass storage device, similar to a USB storage device.

Refer to the owners manual for information on media types supported via the SD card reader.

Navigation System Components and Features (if equipped)

The human machine interface module provides navigation functionality, if equipped. The human machine interface module provides the following:

- Connection to the global positioning system (GPS) antenna, which provides the vehicle position information.
- Map data for navigation and map route guidance, stored in the human machine interface modules internal memory.
- Route guidance with verbal prompts to the operator.
- Traffic and weather information for display on the navigation system map (with active subscription, where available).

Global Positioning System (GPS) Antenna

The global positioning system (GPS) antenna is part of the multi-band antenna located on the roof of the vehicle. The GPS antenna is used to collect the signals of the orbiting GPS satellites. Within the antenna is housed a low noise amplifier that allows for a more broad and precise reception of this data. The GPS antenna amplifier is powered through the coaxial cable.

The antenna is connected to the human machine interface module directly, or through a signal splitter. The signal splitter is a component for dividing the navigation signal into two paths without any transmission loss. This allows the use of a single GPS antenna to provide a signal to both the human machine interface module and the telematics communication interface module.

Route Guidance

The map will display the route to the selected destination. Voice prompts alert the operator of upcoming events

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(turns) and arrivals at the destination. The navigation system will automatically recalculate if the route is not followed. The human machine interface module uses data received from the global positioning system (GPS) satellites, the vehicle speed signal. and serial data information to accurately display the current position of the vehicle.

Points of Interest

The map database provides point of interest information. Points of interests are locations that are frequently visited. Points of interest can be can be displayed on the map or set as a destination. The following are some of the available Points of interests:

- Gas Station
- Restaurant
- College
- Police Station

Valet Mode

Valet Mode is a customer enabled feature of the infotainment system, found in the settings menu, if equipped. The customer creates and inputs a four digit code using the infotainment controls. Confirming the code and selecting LOCK will lock the infotainment system, steering wheel controls and other vehicle features, dependant on vehicle equipment. The vehicle will remain in valet mode until the same four digit code is reentered.

In the event that the four digit code is forgotten, the scan tool can be used to clear the Valet Mode Code.

OnStar Â® (If equipped)

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

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

Steering Wheel Controls (If equipped)

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

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

Auto Volume Control

With auto volume control, the audio system will adjust automatically to make up for road and wind noise as you drive, by increasing the volume as vehicle speed increases. To use auto volume control, set the volume at the desired level, and then select either Low, Medium, or High. To turn auto volume control off, select the Off screen button.

RADIO/AUDIO SYSTEM DESCRIPTION AND OPERATION (IOB)

The entertainment system on this vehicle may have several different configurations available to it. To determine

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the specific configuration of the vehicle, please see the Service Parts ID Label, and refer to **RPO Code List** .

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

- Radio Circuit Operation
- Information Display and Controls
- Antenna System
- Radio Reception
- Speaker Operation
- Audio Amplifier (If equipped)
- Theft Deterrent
- Bluetooth Â® (if equipped)
- Auxiliary Audio Input Jack (If equipped)
- USB Port (If equipped)
- OnStar Â®
- Steering Wheel Controls (If equipped)
- SCV (Speed Compensated Volume)
- FOTA (Firmware Over The Air)

Radio Circuit Operation

Radio Power

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

Radio Retained Accessory Power

The radio retained accessory power system is controlled by serial data. The activation/termination is the same as relay operation (see Retained Accessory Power Description and Operation) with one exception; the only door switch that will turn off the radio during retained accessory power is the driver door open switch.

Radio Grounds

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

Radio Data Link Communication

The radio communicates with other modules via serial data.

Radio Audio Outputs

Each of the audio output channel circuits (+) and (-), at the radio have a DC bias voltage that is approximately one half of battery voltage. The audio being played on the system is produced by a varying AC voltage that is centered around the DC bias voltage on the same circuit. The AC voltage is what causes the speaker cone to move and produce sound. The frequency (Hz) of the AC voltage signal is directly related to the frequency of the

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input (audio source playing) to the audio system. Both the DC bias voltage and the AC voltage signals are needed for the audio system to properly produce sound.

Information Display and Controls

The info display module and radio controls can be separate components from the radio or combined with the radio into one assembly.

When the info display module and radio controls are separate the radio controls communicate radio control inputs directly to the radio through discrete circuits for volume up, volume down and power ON button. It also uses a series of resistors through a single signal circuit when the home, seek up, seek down and phone buttons are pressed. After receiving the message the radio will perform the requested function. The info display module receives digital video data from the radio for on-screen display information through the LVDS (Low Voltage Differential Signal) cable. The radio communicates with the info display module over the radio display touch interrupt request signal for touch screen inputs.

Antenna System

Multi-Band Antenna

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

Active Antenna

The active antenna system uses an integral antenna applied as an appliqu e to the rear glass. The antenna module receives both AM and FM signals from the rear glass antenna. The antenna is part of the rear window and looks similar to the defogger grid. One antenna receives AM signals while the other antenna receives FM signals. Any damage to the antenna requires replacing the glass.

The radio antenna module is enabled when the radio is turned on. The radio provides battery voltage to the antenna module using the center conductor of the antenna coaxial cable. When a 12 V signal is seen by the module on the center conductor of the antenna coax, both AM and FM signals are amplified.

Radio Reception

AM/FM Radio Signal

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

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

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- Type of antenna and the ground plane

Radio Data System (RDS)

The RDS feature is available only on FM stations that broadcast RDS information. This system relies upon receiving specific information from these stations and only works when the information is available. While the radio is tuned to an FM-RDS station, the station name or call letters display. RDS data is carried in what is known as a "subcarrier". A subcarrier is a frequency that the FM broadcaster is authorized to use to send data that is not audible in the main audio program.

RDS functions will only work with FM broadcast stations that are broadcasting RDS data. Not all FM Broadcast stations broadcast RDS data or offer all of the RDS services.

The information displayed is dependent upon the information broadcast by the particular station. The information may vary greatly between stations. RDS functions may not work properly when reception is weak, reception is of poor quality, or RDS is not implemented properly by the FM Broadcaster. In some cases, a radio station broadcasting incorrect information may cause the RDS features of the radio to appear to work improperly.

With RDS, the radio can do the following:

- Display text information such as: station identification, type of programming, and general information (artist and song title, station messages, call in phone numbers, etc.).
- Seek to stations broadcasting the selected type of programming
- Receive announcements concerning local and national emergencies
- Receive alert warnings of local or national emergencies. When an alert announcement comes on the current radio station, ALERT! displays. You will hear the announcement, even if the volume is low or if an auxiliary device is playing. If an auxiliary device is playing, play stops during the announcement. Alert announcements cannot be turned off. ALERT! is not affected by tests of the emergency broadcast system. This feature is not supported by all RDS stations.

Digital Radio Receiver (If equipped)

The vehicle may have one of two digital radio options, satellite transmitted (XM-Sirius) or terrestrial Digital Audio Broadcast (DAB) depending on geographical area.

XM-Sirius

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

Digital Audio Broadcast (DAB)

The DAB receiver is integrated into the radio. DAB radio provides digital radio reception. The DAB signal is broadcast from terrestrial transmitters. Services available can include: main radio stations, additional stations (news, sports, etc..) and data services (digital images, video and other data). The availability of services is dependent upon broadcasters in the area. The strength of the DAB signal depends on the following:

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- The power output (wattage) of the broadcasting station
- Location of the vehicle (or receiver) relative to the broadcast tower
- Height of the broadcast antenna
- Height of the receiving antenna
- Obstacles between the tower and the receiver
- Type of antenna and the ground plane

Speaker Operation

Speakers turn electrical energy into mechanical energy to move air, using a permanent magnet and an electromagnet. The electromagnet is energized when the radio or amplifier (if equipped) delivers current to the voice coil on the speaker. The voice coil will form a north and south pole that will cause the voice coil and the speaker cone to move in relation to the permanent magnet. The current delivered to the speaker is rapidly changing alternating current (A/C). This causes the speaker cone to move in two directions producing sound.

Audio Amplifier (If equipped)

Amplifier Interface

A fused battery voltage circuit provides the main amplifier power. A switched 12 V output from the radio is used to control the power - state of the amplifier. To respond quickly to audio input and control signals, the amplifier is ON in all vehicle power modes except OFF and CRANK Request. The internal amplifier bridges are fully powered and unmuted when the amplifier receives the switched 12 V input.

Amplifier Operation

The purpose of the amplifier is to increase the power of a voltage or current signal. The output signal of an amplifier may consist of the same frequencies as the input signal or it may consist of only a portion of the frequencies as in the case of a subwoofer or midrange speaker. The radio creates a low level stereo audio output signal, which is sent at the user-defined volume level to the audio amplifier. The audio amplifier amplifies the signal and sends it to the appropriate speakers. Each of the audio output channel circuits (+) and (-), from the amplifier have a DC bias voltage that is approximately one half of battery voltage. The audio being played on the system is produced by a varying AC voltage that is centered around the DC bias voltage on the same circuit. The AC voltage is what causes the speaker cone to move and produce sound. The frequency (Hz) of the AC voltage signal is directly related to the frequency of the input (audio source playing) to the audio system. Both the DC bias voltage and the AC voltage signals are needed for the audio system to properly produce sound.

Theft Deterrent

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

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

- Normal Mode: The radio has learned a correct VIN sequence and the VIN information received via serial data matches the learned VIN sequence. In this mode the radio has full functionality.
- No VIN Mode: The radio has not received or learned a correct VIN sequence. In this mode the radio has limited functionality.

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- Theft Detected Mode: The radio has learned a correct VIN sequence and the VIN information received via serial data does NOT match the learned VIN sequence. In this mode the radio may be disabled or have limited functionality. The radio display will indicate that theft protection is active.

BluetoothÂ® (If Equipped)

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

The BluetoothÂ® antenna is internal to the telematics communication interface control module, radio or human machine interface module and is used to send and receive signals from a BluetoothÂ® enabled cellular phone. The available features and functions are determined by the software within the device being used and the telematics communication interface control module. The operating range of the signal from the vehicle is approximately 30 feet. Note that the operating range is dependent upon the cellular phone being used and battery level of the phone.

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

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

BluetoothÂ® Features Supported

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

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

Auxiliary Audio Input Jack (If equipped)

The infotainment system may have a 3.5mm (1/8 in.) auxiliary audio input jack located in the center console or

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on the radio faceplate. The auxiliary audio input jack interfaces directly with the radio. When a portable audio playback device is connected to the auxiliary jack, an internal switch detects the connection and the radio will switch to AUX as the audio source. Audio signals from the device are sent to the radio from the auxiliary jack via the left, right, and common audio signal circuits.

- When a device is first connected to the 3.5mm (1/8 in.) input jack the infotainment system automatically switches to that device. If an auxiliary device has already been connected, press the Media or AUX button to select the device.
- Playback of an audio device that is connected to the 3.5mm jack can only be controlled using the controls on the device.
- The volume control on the device may need to be adjusted to ensure sufficient playback volume through the infotainment system.

USB Port (If Equipped)

The infotainment system may have a USB connector located in the center console. The USB connector interfaces directly with the radio. The USB connector supports both USB standards 1.1 and 2.0.

USB Supported Devices:

- USB Flash Sticks (Thumb Drives)
- Portable USB Hard Drives
- Portable Digital Media Players (iPODÂ®, ZUNEÂ®, etc)

Depending on the USB device, some devices may not be recognized, or some features/functions may not be able to be controlled with the radio controls. USB HUB devices are not supported.

Refer to the owner's manual for information on USB devices, control, and operation.

OnStar Â® (If equipped)

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

Steering Wheel Controls (If equipped)

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

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

Speed Compensated Volume

With Speed Compensated Volume the audio system will adjust automatically to make up for road and wind noise as you drive, by increasing the volume as vehicle speed increases. To use speed compensated volume, set the volume to the desired level, then select either Low, Medium, or High. To turn SCV off select the Off screen button.

Firmware Over The Air

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The Firmware Over The Air feature was designed to reflash software remotely. Remote reflash is an in-vehicle feature that enables the installation of a software package to update the infotainment system without requiring service test equipment to be physically connected to the vehicle. Remote reflash will utilize a long range or short range connection from the host module to a remote IT system.

VIDEO ENTERTAINMENT SYSTEM DESCRIPTION AND OPERATION

Each item in the list below represents topics covered below:

- Rear Seat Entertainment System Components
- Media Disc Player
- Video Display Screens
- Remote Control
- Wireless Headphones
- Wired Headphone Jack
- Auxiliary Inputs

Rear Seat Entertainment System Components

The rear seat entertainment system includes:

- The disc player for playing optical media.
- A video display screen
- An infrared module located in the rear video display
- Two sets of wireless infrared headphones
- A wireless infrared remote control
- An auxiliary input assembly

Media Disc Player

The media disc player is responsible for playing optical media for the infotainment system, refer to the Owners Manual for supported media types.

The media disc player is a separate component from the radio. The media disc player receives power, ground and serial data from the vehicle harness. The media disc player receives control information and outputs audio to the infotainment system over the MOST bus. The media disc player provides a discrete circuit to control the power state of the rear displays.

The media disc player is also the control module for the rear seat entertainment system, responsible for video output, infrared audio, screen controls and source selections for the system. All information to the video screen is communicated over the LVDS cable. One cable is connected to the front display, and a second cable is connected to the rear display.

Video Display Screens

Front Display

When the vehicle is in PARK, the front display is capable of showing video sourced from the media disc player. Information is transmitted to the display from the media disc player via the blue LVDS cable. On screen controls are available to provide the operator with playback controls and other options.

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Rear Display

The second row overhead display is located in the headliner. The display screen shows video from the media disc player, or an AUX input device.

The display receives power and ground from the vehicle harness. A discrete control circuit from the media disc player is used to control the power state of the display. The display receives all other video, audio, and control information via the LVDS cable.

The display contains the infrared transmitters for the wireless headphones and the remote control. During operation, the infrared transmitters may be visible as illuminated LEDs.

Remote Control

The wireless remote control is used to operate the system from the rear seat. Infrared signals from the remote control are received by the infrared receivers in display. The remote control can be used to turn the rear screen on or off, to change system settings, and to select the source for the screen from the media available to the infotainment system. Refer to the Owners Manual for additional information on remote control functions.

Direct sunlight or very bright light may affect the ability of the infrared receivers to respond to signals from the remote control. Objects blocking the line of sight may also affect the function of the remote control.

Wireless Headphones

Wireless headphones allow for rear seat passengers to listen to an audio source without disturbing the listening of front seat passengers. The wireless headphones receive audio signals from the infrared transmitter in the display. This transmission is line of sight only, so audio quality may be degraded if anything blocks the transmitter signal from reaching the headphones.

A power button on the headphone is used to turn the headphone on. A red LED illuminates when the headphone is turned ON. The headphones automatically turn OFF if they lose the infrared signal from the system for approximately 4 minutes in order to preserve their battery power. The signal may be lost if the system is turned off or if the headphones are out of range of the infrared signal transmitters.

Each set of headphones has a rotary volume control on one of the earpieces. To adjust the volume, adjust this control.

Audio to the wireless headphones is provided over 2 channels. Audio for channel 1 or channel 2 is selected from one of the available sources using the remote control. Pressing the button in the center of the headphone volume control will switch the headphone between channels.

Auxiliary Inputs

The rear seat entertainment system has an auxiliary input assembly that contains a USB port, an SD card reader, RCA type audio/video jacks, and a wired headphone jack with volume control. Refer to the Owners Manual for information on compatible devices and supported media types/formats.

USB port and SD Card Reader

The USB port and SD card reader slot interface with a hub device, internal to the assembly. The assembly receives fused battery voltage and ground from the harness to power the internal hub device as well as providing additional amperage to power USB devices.

The internal hub device interfaces directly with the media disc player via a standard USB cable. A Mini type

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USB connector is used to connect the cable at the media disc player and the auxiliary input assembly. Mini type USB male to female connections are used for connecting USB cables together where an in-line connection is required. An in-line cable connection is typically found between the console and I/P harness.

The USB port allows connectivity to the rear seat entertainment system from portable media players or a USB storage device (memory stick/ flash drive). The rear seat entertainment uses the SD card reader as a mass storage device, similar to a USB storage device.

Once a supported device is connected to the USB port or SD card reader, the device may be sourced to one or both of the rear displays using the remote control.

Video

The local video input is the standard yellow RCA color-coded jacks. A composite video signal from a device can be attached to this input and is then available to be sourced to one or both of the rear screens. To use this video input, connect the auxiliary device cables to the RCA jacks and power ON both the auxiliary device and the rear seat entertainment system.

Power for the device is not supplied by this connection. The rear seat entertainment system cannot control the operation of devices connected to the RCA jacks. All operation of the device must be done using the controls available on the device.

Wired Headphone Jack

The wired headphone jack is used to connect an additional set of headphones to the system. Audio for the wired headphone jack can be from either the left or the right screen source, and is selected using the remote control.

Audio to the wired headphone jack is transmitted through the vehicle harness from the media disc player. A rotary control near the headphone jack is used to adjust the volume.

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DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B0997: AUXILIARY ELECTRONIC CONTROL UNIT

Diagnostic Instructions

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

DTC Descriptor

DTC B0997 3A

Auxiliary Electronic Control Unit Performance Incorrect Component Installed

DTC B0997 39

Auxiliary Electronic Control Unit Performance Internal Electronic Failure

Circuit/System Description

The Info Display Module monitors itself for internal failures and reports its condition to the Human Machine Interface Control Module when requested. The info display also reports electronic identification information when requested.

Conditions for Running DTC

- Ignition On/Vehicle in Service Mode.
- The system voltage is 9-16 V
- DTC B101E is not set as current in the Human Machine Interface Control Module
- The test is run once during Human Machine Interface Control Module wake up

Conditions for Setting the DTC

B0997 3A

The Info Display Module has reported identification information that differs from the information calibrated in the Human Machine Interface Control Module.

B0997 39

The Info Display Module reports an internal malfunction.

Action Taken When DTC Sets

The Human Machine Interface Control Module will set the DTC and the Info Display Module will have limited

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or no functionality.

Conditions for Clearing the DTC

The Human Machine Interface Control Module detects a compatible Info Display Module with no internal malfunctions reported.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition On/Vehicle in Service Mode. Infotainment system ON.
2. Verify DTC B101E is not set
   - **If DTC B101E is set**

     Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

   - **If DTC B101E is not set**
3. Verify DTC B0997 is not set
   - **If DTC B0997 is set**

     Replace the P17 Info Display Module.

   - **If DTC B0997 is not set**
4. All OK

Repair Instructions

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Perform the **Diagnostic Repair Verification** after completing the repair.

Radio Control Assembly Replacement

DTC B1024: CIRCUIT BOARD TEMPERATURE SENSOR (AUDIO AMPLIFIER)

Diagnostic Instructions

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

DTC Descriptor

DTC B1024 11

Circuit Board Temperature Sensor Above Maximum Threshold

Circuit/System Description

The audio amplifier monitors the internal circuitry for excessive temperature. When the amplifier senses an internal circuitry temperature greater than 95Â°C (203Â°F), the amplifier will set DTC B1024 11 and shut down until the internal circuitry cools below 90Â°C (194Â°F). No external circuit diagnosis is involved.

Conditions for Running the DTC

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

Conditions for Setting the DTC

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

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Diagnostic Aids

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

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) **Radio/Navigation System Schematics (IO5, IO6)**

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Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) **Radio/Audio System Description and Operation (IO5/IO6)** **Radio/Audio System Description and Operation (IOB)**

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

NOTE: **Allow the vehicle cabin to cool if the temperature inside the vehicle is excessive before proceeding with this diagnostic procedure.**

1. Verify the DTC sets outside of the Conditions for Running and Setting. Since most occurrences of this DTC are caused by extreme vehicle cabin temperatures due to ambient conditions, review with the customer the conditions under which the DTC set.
   - **If the DTC sets within the Conditions for Running and Setting.**

     The system is operating as designed, All OK.

   - **If the DTC sets outside the Conditions for Running and Setting.**
2. Using the scan tool, clear the DTC.
3. Verify the DTC does not set while operating the infotainment system under the conditions the customer experienced the concern.
   - **If the DTC sets**

     Replace the T3 Audio Amplifier

   - **If the DTC does not set**
4. All OK.

Repair Instructions

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

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

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DTC B1024: CIRCUIT BOARD TEMPERATURE SENSOR (RADIO)

Diagnostic Instructions

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

DTC Descriptor

DTC B1024 11

Circuit Board Temperature Sensor Above Maximum Threshold

DTC B1024 53

Circuit Board Temperature Sensor Low

DTC B1024 54

Circuit Board Temperature Sensor High

Circuit/System Description

The internal module circuitry temperature is monitored. If the an over-heat condition which exceeds the maximum threshold of the internal circuitry or a malfunctioning temperature sensor is detected, the module will shut down until the internal circuitry cools.

Conditions for Running the DTC

- The radio is in the ON or ACCY position
- The system voltage is at least 9 volts and no more than 16 volts.

Conditions for Setting the DTC

The module detects an over-heat condition or a malfunctioning sensor.

Action Taken When the DTC Sets

Module functionality is suspended.

Conditions for Clearing the DTC

- A current DTC clears when the module temperature returns to an acceptable level.
- A history DTC clears after 100 malfunction-free ignition cycles.

Diagnostic Aids

Extended use of extremely high volume, especially in warm weather conditions, may cause this DTC to set in the Control module. Under these conditions, it may be normal for this DTC to set to prevent permanent damage to the Control module circuitry and no repair should be attempted.

Reference Information

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Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Circuit/System Verification

NOTE: Allow the vehicle cabin to cool if the temperature inside the vehicle is excessive before proceeding with this diagnostic procedure.

1. Verify the DTC sets outside of the Conditions for Running and Setting. Since most occurrences of this DTC are caused by extreme vehicle cabin temperatures due to ambient conditions, review with the customer the conditions under which the DTC set.
   - **If the DTC sets within the Conditions for Running and Setting.**

     The system is operating as designed, All OK.

   - **If the DTC sets outside the Conditions for Running and Setting.**
2. Using the scan tool, clear the DTC.
3. Verify the DTC does not set while operating the infotainment system under the conditions the customer experienced the concern.
   - **If the DTC sets**

     Replace the appropriate module.

   - **If the DTC does not set**
4. All OK.

Repair Instructions

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

Control Module References for Control module replacement, setup, and programming

DTC B1024: CIRCUIT BOARD TEMPERATURE SENSOR (HUMAN MACHINE INTERFACE

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CONTROL MODULE)

Diagnostic Instructions

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

DTC Descriptor

DTC B1024 53

Circuit Board Temperature Sensor Below Minimum Threshold

DTC B1024 54

Circuit Board Temperature Sensor Above Maximum Threshold

Circuit/System Description

The human machine interface control module monitors the internal circuitry for excessive temperature. When a temperature outside of the range is detected, the module sets the DTC and limits its operation to avoid damage.

Conditions for Running the DTC

- Ignition On/Vehicle in Service Mode.
- The system voltage is 9-16 V
- The test is run once per second when the infotainment system is operating

Conditions for Setting the DTC

B1024 53

The module senses an internal temperature less than -40Â°C (-40Â°F).

B1024 54

The module senses an internal temperature greater than 69Â°C (156Â°F).

Action Taken When the DTC Sets

- The human machine interface control module sets the DTC.
- A message is displayed indicating that the system performance is being impacted by the excessive temperature condition.
- The module stops communicating on the MOST Bus network, but does not interrupt communication on the network.
- The infotainment system and the Info Display Module will have limited or no functionality.
- Components or other subsystems that interface with the infotainment system may have limited or no functionality.

Conditions for Clearing the DTC

- The internal temperature is between -40Â°C (-40Â°F) and 69Â°C (156Â°F).

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- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

Diagnostic Aids

Under certain conditions it may be normal for this DTC to set to prevent permanent damage to the module.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

NOTE: **Allow the vehicle cabin to cool if the temperature inside the vehicle is excessive before proceeding with this diagnostic procedure.**

1. Verify the DTC sets outside of the Conditions for Running and Setting. Since most occurrences of this DTC are caused by extreme vehicle cabin temperatures due to ambient conditions, review with the customer the conditions under which the DTC set.
   - **If the DTC sets within the Conditions for Running and Setting.**

     The system is operating as designed, All OK.

   - **If the DTC sets outside the Conditions for Running and Setting.**
2. Using the scan tool, clear the DTC.
3. Verify the DTC does not set while operating the infotainment system under the conditions the customer experienced the concern.
   - **If the DTC sets**

     Replace the K74 Human Machine Interface Control Module

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- **If the DTC does not set**

4. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for human machine interface control module replacement, programming, and setup.

DTC B1025-B1135: AUDIO OUTPUT (UQ3/UQ5)

Diagnostic Instructions

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

DTC Descriptors

DTC B1025

Left Front Audio Output Circuit

DTC B1035

Right Front Audio Output Circuit

DTC B1045

Left Rear Audio Output Circuit

DTC B1055

Right Rear Audio Output Circuit

For symptom byte information refer to **Symptom Byte List** .

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Left Front Speaker Output Signal	B1025 02, 1	B1025 04, 1	B1025 01, 1, 2	-
Right Front Speaker Output Signal	B1035 02, 1	B1035 04, 1	B1035 01, 1, 2	-
Left Rear Speaker Output Signal	B1045 02, 1	B1045 04, 1	B1045 01, 1, 2	-
Right Rear Speaker Output Signal	B1055 02, 1	B1055 04, 1	B1055 01, 1, 2	-
1. No or reduced audio from speaker(s) on the affected audio circuit. 2. Noticeable audio distortion may be present.				

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Circuit/System Description

Each of the audio output channel circuits (+) and (-), at the radio have a DC bias voltage that is approximately one half of battery voltage. When using a DMM, each of the audio output channel circuits will measure approximately 6.5 V DC. The audio being played on the system is produced by a varying AC voltage that is centered around the DC bias voltage on the same circuit. The AC voltage is what causes the speaker cone to move and produce sound. The frequency (Hz) of the AC voltage signal is directly related to the frequency of the input (audio source playing) to the audio system. Both the DC bias voltage and the AC voltage signals are needed for the audio system to properly produce sound.

Conditions for Running the DTC

- Vehicle in Service Mode/Ignition is ON or in the ACC position
- The system voltage is 9-16 V
- The test is run once during radio wake up

Conditions for Setting the DTC

B1025 01, B1035 01, B1045 01, B1055 01

The radio detects a short to voltage on the specified audio (+) or (-) circuit.

B1025 02, B1035 02, B1045 02, B1055 02

The radio detects a short to ground on the specified audio (+) or (-) circuit.

B1025 04, B1035 04, B1045 04, B1055 04

The radio detects an open on the specified audio (+) or (-) circuit.

Action Taken When the DTC Sets

The radio continues to send the output signal to the speaker signal circuit with the current fault.

Conditions for Clearing the DTC

- A current DTC clears when the conditions for setting the DTC are no longer present and the ignition has been cycled from OFF to ON.
- A history DTC clears after 50 malfunction-free ignition cycles.

Diagnostic Aids

- Improper speaker mounting or loose trim may cause an audible buzz or distortion. Inspect the appropriate speaker and the surrounding interior trim for proper and secure mounting.
- The EL-50334-6 Audio System Diagnostic CD contains audio tracks that can be used to duplicate and isolate such concerns. Tracks 11 and 12 contain audio sweep tones for testing for speaker and grill rattles.
- The test tones on the CD may be copied to a USB drive or other device to use during testing.
- If the speaker or surrounding interior trim is found to be loose or improperly secured, correctly secure the item.
- If equipped with an Active Noise Cancellation system that utilizes an ANC module, the module acts as a pass-through for the high level audio signals from the radio to the speakers.

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Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON/vehicle in Service Mode, A11 Radio ON, mute OFF.
2. Verify clear audio is heard from each speaker, adjusting fade and balance controls to test each speaker individually.
   - **If audio is inoperative from one or more speakers, or the audio emitted is not clear.**

     Refer to Circuit/System Testing.

   - **If clear audio is heard from all speakers.**
3. All OK.

Circuit/System Testing

NOTE: **Some circuits supply audio signals to more than one speaker. It may be necessary to disconnect all speakers on the affected audio circuit when performing circuit tests.**

1. Ignition OFF/vehicle OFF, disconnect the harness connector at the appropriate P19 Speaker. Ignition ON, A11 Radio ON, mute OFF.
2. Test for 5-7 V between each audio signal circuit terminal 1 and terminal 2 and ground.
   - **If less than 5 V**
   1. Ignition OFF/vehicle OFF, disconnect the appropriate speaker harness connector at the A11 Radio.
   2. Test for infinite resistance between the signal circuits and ground.

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- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance

3. Test for less than 2 Ω in the signal circuit end to end.
   - If 2 Ω or greater, repair the open/high resistance in the circuit.
   - If less than 2 Ω, replace the A11 Radio.

- **If greater than 7 V**

1. Ignition OFF/vehicle OFF, disconnect the appropriate speaker harness connector at the A11 Radio. Ignition ON/vehicle in Service Mode.
2. Test for less than 1 V between the signal circuit and ground.
   - If 1 V or greater, repair the short to voltage on the circuit.
   - If less than 1 V, replace the A11 Radio.

- **If between 5-7 V**

3. Test or replace the P19 Speaker.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Speaker Replacement Reference**
- **Control Module References** for radio replacement, programming, and setup.

DTC B1025-B1135: AUDIO OUTPUT (UQG)

Diagnostic Instructions

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

DTC Descriptors

DTC B1025

Audio Output 1 Circuit

DTC B1035

Audio Output 2 Circuit

DTC B1065

Audio Output 5 Circuit

DTC B1075

Audio Output 6 Circuit

For symptom byte information refer to **Symptom Byte List** .

Diagnostic Fault Information

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Audio Output 1 Signal Circuits (Left Front Door and I/P)	B1025 02	B1025 04	B1025 01	-
Audio Output 2 Signal Circuits (Right Front Door and I/P)	B1035 02	B1035 04	B1035 01	-
Audio Output 5 Signal Circuits (Left Rear Door)	B1065 02	B1065 04	B1065 01	-
Audio Output 6 Signal Circuits (Right Rear Door)	B1075 02	B1075 04	B1075 01	-

Circuit/System Description

The Media Oriented Systems Transport (MOST) is a high-speed multimedia network technology. The serial MOST bus uses a ring topology and synchronous data communication to transmit audio, video, data and control information between any devices attached.

The audio amplifier is a participant on the MOST network. The audio amplifier receives audio inputs and control information from the MOST bus.

Each of the audio output channel circuits (+) and (-), at the audio amplifier have a DC bias voltage that is approximately one half of the battery voltage. When using a DMM, each of the audio output channel circuits will measure approximately 6.5V DC. The audio being played on the system is produced by a varying AC voltage that is centered around the DC bias voltage on the same circuit. The AC voltage is what causes the speaker cone to move and produce sound.

Diagnostic Aids

- Improper speaker mounting or loose trim may cause an audible buzz or distortion. Inspect the appropriate speaker and the surrounding interior trim for proper and secure mounting.

  The EL-50334-6 Audio System Diagnostic CD contains audio tracks that can be used to duplicate and isolate such concerns. Tracks 11 and 12 contain audio sweep tones for testing for speaker and grill rattles.

  If the speaker or surrounding interior trim is found to be loose or improperly secured, correctly secure the item.

- The test tones on the CD may be copied to a USB drive or other device to use during testing.
- Some audio output circuits are connected to more than one speaker, dependant on vehicle equipment. It may be necessary to disconnect one or more speakers during testing of some circuits.

Conditions for Running the DTC

NOTE: **DTC B1325 must not be set as current for the amplifier to run any of the following tests.**

DTC B1025 01, B1035 01, B1065 01, B1075 01,

The test is run initially upon amplifier wake-up, and periodically every one second after amplifier operation begins.

DTC B1025 02, B1035 02, B1065 02, B1075 02,

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The test is run initially upon amplifier wake-up, and periodically every one second after amplifier operation begins.

DTC B1025 04, B1035 04, B1065 04, B1075 04,

The test is run once during amplifier wake-up.

Conditions for Setting the DTC

DTC B1025 01, B1035 01, B1065 01, B1075 01,

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

DTC B1025 02, B1035 02, B1065 02, B1075 02,

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

DTC B1025 04, B1035 04, B1065 04, B1075 04,

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

Action Taken When the DTC Sets

The amplifier mutes the output channel and no sound is present from the speaker(s) that have a current circuit fault.

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

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EL-50334-50 USB Cable and Adapter Kit

Circuit/System Verification

1. Ignition ON, infotainment system ON, mute OFF.
2. Verify clear audio is heard from each speaker, adjusting fade and balance controls to test each speaker individually.
    - **If audio is inoperative from one or more speakers, or the audio emitted is not clear**

      Refer to Circuit/System Testing.

    - **If clear audio is heard from all speakers**
3. All OK.

Circuit/System Testing

NOTE: **Some circuits supply audio signals to more than one speaker. It may be necessary to disconnect all speakers on the affected audio circuit when performing circuit tests.**

1. Ignition OFF, disconnect the harness connector at the appropriate P19 Speaker. Ignition ON, infotainment system ON, mute OFF.
2. Test for 5-7 V between each audio signal circuit terminal 1 and terminal 2 and ground.
    - **If less than 5 V**
    1. Ignition OFF, disconnect the X1 and X2 harness connectors at the T3 Audio Amplifier.
    2. Test for infinite resistance between the signal circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the signal circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the T3 Audio Amplifier.
    - **If greater than 7 V**
    1. Ignition OFF, disconnect the X1 and X2 harness connectors at the T3 Audio Amplifier. Ignition ON.
    2. Test for less than 1 V between the signal circuit and ground.
        - If 1 V or greater, repair the short to voltage on the circuit.
        - If less than 1 V, replace the T3 Audio Amplifier.
    - **If 5-7 V**
3. Test or replace the P19 Speaker.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Speaker Replacement Reference**
- **Control Module References** for audio amplifier replacement, programming, and setup.

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DTC B1025-B1135: AUDIO OUTPUT (UQA WITH FRONT BENCH SEAT)

Diagnostic Instructions

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

DTC Descriptors

DTC B1025

Audio Output 1 Circuit

DTC B1045

Audio Output 3 Circuit

DTC B1065

Audio Output 5 Circuit

DTC B1075

Audio Output 6 Circuit

DTC B1085

Audio Output 7 Circuit

DTC B1095

Audio Output 8 Circuit

For symptom byte information refer to **Symptom Byte List** .

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Audio Output 1 Signal Circuits (Left Front Door)	B1025 02	B1025 04	B1025 01	-
Audio Output 3 Signal Circuits (Right Front Door)	B1045 02	B1045 04	B1045 01	-
Audio Output 5 Signal Circuits (Left Rear Door)	B1065 02	B1065 04	B1065 01	-
Audio Output 6 Signal Circuits (Right Rear Door)	B1075 02	B1075 04	B1075 01	-
Audio Output 7 Signal Circuits (Left Front I/P)	B1085 02	B1085 04	B1085 01	-
Audio Output 8 Signal Circuits (Right Front I/P)	B1095 02	B1095 04	B1095 01	-

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Circuit/System Description

The Media Oriented Systems Transport (MOST) is a high-speed multimedia network technology. The serial MOST bus uses a ring topology and synchronous data communication to transmit audio, video, data and control information between any devices attached.

The audio amplifier is a participant on the MOST network. The audio amplifier receives audio inputs and control information from the MOST bus.

Each of the audio output channel circuits (+) and (-), at the audio amplifier have a DC bias voltage that is approximately one half of the battery voltage. When using a DMM, each of the audio output channel circuits will measure approximately 6.5V DC. The audio being played on the system is produced by a varying AC voltage that is centered around the DC bias voltage on the same circuit. The AC voltage is what causes the speaker cone to move and produce sound.

Diagnostic Aids

- Improper speaker mounting or loose trim may cause an audible buzz or distortion. Inspect the appropriate speaker and the surrounding interior trim for proper and secure mounting.

  The EL-50334-6 Audio System Diagnostic CD contains audio tracks that can be used to duplicate and isolate such concerns. Tracks 11 and 12 contain audio sweep tones for testing for speaker and grill rattles.

  If the speaker or surrounding interior trim is found to be loose or improperly secured, correctly secure the item.

- The test tones on the CD may be copied to a USB drive or other device to use during testing.
- Some audio output circuits are connected to more than one speaker, dependant on vehicle equipment. It may be necessary to disconnect one or more speakers during testing of some circuits.

Conditions for Running the DTC

NOTE: **DTC B1325 must not be set as current for the amplifier to run any of the following tests.**

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

The test is run initially upon amplifier wake-up, and periodically every one second after amplifier operation begins.

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

The test is run initially upon amplifier wake-up, and periodically every one second after amplifier operation begins.

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

The test is run once during amplifier wake-up.

Conditions for Setting the DTC

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

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

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

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

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

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

Action Taken When the DTC Sets

The amplifier mutes the output channel and no sound is present from the speaker(s) that have a current circuit fault.

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-50334-50 USB Cable and Adapter Kit

Circuit/System Verification

1. Ignition ON, infotainment system ON, mute OFF.
2. Verify clear audio is heard from each speaker, adjusting fade and balance controls to test each speaker individually.
    - **If audio is inoperative from one or more speakers, or the audio emitted is not clear**

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Refer to Circuit/System Testing.

- **If clear audio is heard from all speakers**

3. All OK.

Circuit/System Testing

NOTE: **Some circuits supply audio signals to more than one speaker. It may be necessary to disconnect all speakers on the affected audio circuit when performing circuit tests.**

1. Ignition OFF, disconnect the harness connector at the appropriate P19 Speaker. Ignition ON, infotainment system ON, mute OFF.
2. Test for 5-7 V between each audio signal circuit terminal 1 and terminal 2 and ground.
   - **If less than 5 V**
   1. Ignition OFF, disconnect the X1 and X2 harness connectors at the T3 Audio Amplifier.
   2. Test for infinite resistance between the signal circuit and ground.
      - If less than infinite resistance, repair the short to ground on the circuit.
      - If infinite resistance
   3. Test for less than 2 Ω in the signal circuit end to end.
      - If 2 Ω or greater, repair the open/high resistance in the circuit.
      - If less than 2 Ω, replace the T3 Audio Amplifier.
   - **If greater than 7 V**
   1. Ignition OFF, disconnect the X1 and X2 harness connectors at the T3 Audio Amplifier. Ignition ON.
   2. Test for less than 1 V between the signal circuit and ground.
      - If 1 V or greater, repair the short to voltage on the circuit.
      - If less than 1 V, replace the T3 Audio Amplifier.
   - **If 5-7 V**
3. Test or replace the P19 Speaker.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Speaker Replacement Reference**
- **Control Module References** for audio amplifier replacement, programming, and setup.

DTC B1025-B1135: AUDIO OUTPUT (UQA WITH FRONT BUCKET SEATS)

Diagnostic Instructions

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

DTC Descriptors

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DTC B1025

Audio Output 1 Circuit

DTC B1035

Audio Output 2 Circuit

DTC B1045

Audio Output 3 Circuit

DTC B1065

Audio Output 5 Circuit

DTC B1075

Audio Output 6 Circuit

DTC B1085

Audio Output 7 Circuit

DTC B1095

Audio Output 8 Circuit

For symptom byte information refer to **Symptom Byte List** .

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Audio Output 1 Signal Circuits (Left Front Door)	B1025 02	B1025 04	B1025 01	-
Audio Output 2 Signal Circuits (Right Front Door)	B1035 02	B1035 04	B1035 01	-
Audio Output 3 Signal Circuits (Subwoofer)	B1045 02	B1045 04	B1045 01	-
Audio Output 5 Signal Circuits (Left Rear Door)	B1065 02	B1065 04	B1065 01	-
Audio Output 6 Signal Circuits (Right Rear Door)	B1075 02	B1075 04	B1075 01	-
Audio Output 7 Signal Circuits (Left Front I/P)	B1085 02	B1085 04	B1085 01	-
Audio Output 8 Signal Circuits (Right Front I/P)	B1095 02	B1095 04	B1095 01	-

Circuit/System Description

The Media Oriented Systems Transport (MOST) is a high-speed multimedia network technology. The serial

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MOST bus uses a ring topology and synchronous data communication to transmit audio, video, data and control information between any devices attached.

The audio amplifier is a participant on the MOST network. The audio amplifier receives audio inputs and control information from the MOST bus.

Each of the audio output channel circuits (+) and (-), at the audio amplifier have a DC bias voltage that is approximately one half of the battery voltage. When using a DMM, each of the audio output channel circuits will measure approximately 6.5V DC. The audio being played on the system is produced by a varying AC voltage that is centered around the DC bias voltage on the same circuit. The AC voltage is what causes the speaker cone to move and produce sound.

Diagnostic Aids

- Improper speaker mounting or loose trim may cause an audible buzz or distortion. Inspect the appropriate speaker and the surrounding interior trim for proper and secure mounting.

  The EL-50334-6 Audio System Diagnostic CD contains audio tracks that can be used to duplicate and isolate such concerns. Tracks 11 and 12 contain audio sweep tones for testing for speaker and grill rattles.

  If the speaker or surrounding interior trim is found to be loose or improperly secured, correctly secure the item.

- The test tones on the CD may be copied to a USB drive or other device to use during testing.
- Some audio output circuits are connected to more than one speaker, dependant on vehicle equipment. It may be necessary to disconnect one or more speakers during testing of some circuits.

Conditions for Running the DTC

NOTE: **DTC B1325 must not be set as current for the amplifier to run any of the following tests.**

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

The test is run initially upon amplifier wake-up, and periodically every one second after amplifier operation begins.

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

The test is run initially upon amplifier wake-up, and periodically every one second after amplifier operation begins.

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

The test is run once during amplifier wake-up.

Conditions for Setting the DTC

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

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

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

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

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

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

Action Taken When the DTC Sets

The amplifier mutes the output channel and no sound is present from the speaker(s) that have a current circuit fault.

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-50334-50 USB Cable and Adapter Kit

Circuit/System Verification

1. Ignition ON, infotainment system ON, mute OFF.
2. Verify clear audio is heard from each speaker, adjusting fade and balance controls to test each speaker individually.
    - **If audio is inoperative from one or more speakers, or the audio emitted is not clear**

      Refer to Circuit/System Testing.

    - **If clear audio is heard from all speakers**

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3. All OK.

Circuit/System Testing

NOTE: **Some circuits supply audio signals to more than one speaker. It may be necessary to disconnect all speakers on the affected audio circuit when performing circuit tests.**

1. Ignition OFF, disconnect the harness connector at the appropriate P19 Speaker. Ignition ON, infotainment system ON, mute OFF.
2. Test for 5-7 V between each audio signal circuit terminal 1 and terminal 2 and ground.
    - **If less than 5 V**
    1. Ignition OFF, disconnect the X1 and X2 harness connectors at the T3 Audio Amplifier.
    2. Test for infinite resistance between the signal circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the signal circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the T3 Audio Amplifier.
    - **If greater than 7 V**
    1. Ignition OFF, disconnect the X1 and X2 harness connectors at the T3 Audio Amplifier. Ignition ON.
    2. Test for less than 1 V between the signal circuit and ground.
        - If 1 V or greater, repair the short to voltage on the circuit.
        - If less than 1 V, replace the T3 Audio Amplifier.
    - **If 5-7 V**
3. Test or replace the P19 Speaker.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Speaker Replacement Reference**
- **Control Module References** for audio amplifier replacement, programming, and setup.

DTC B123E: RADIO KEYPAD BUTTON SIGNAL

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: **Diagnostic System Check - Vehicle**
- Review the description of Strategy Based Diagnosis:**Strategy Based Diagnosis**
- An overview of each diagnostic category can be found here: **Diagnostic Procedure Instructions**

DTC Descriptor

DTC B123E

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Radio Keypad Button Signal Circuit

Symptom Byte Information: Symptom Byte List

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	B123E 02	B123E 01	B123E 01	-
Ground Return Terminal 2	-	1	-	-
Low Reference Terminal 8	-	1	-	-
1. Radio Control buttons inoperative				

Circuit/System Description

The radio controls communicate radio control inputs directly to the radio through a discrete circuit for volume up, volume down and power button. It also uses a series of resistors through a signal circuit when the home, seek up, seek down and phone buttons are pressed. After receiving the message the radio will perform the requested function. Messages communicated between the radio and the radio controls include the following:

- Button presses/knob rotations
- Commands for the state of indicators
- Controls back-lighting

Conditions for Running the DTC

- Vehicle in Service Mode/Ignition is ON or in the ACC position
- The system voltage is 9-16 V
- The infotainment system is ON
- The test is run once every 250 ms when the infotainment system is operating

Conditions for Setting the DTC

B123E 01

The radio detects an open/high resistance or short to voltage on the radio controls key signal circuit

B123E 02

The radio detects a short to ground on the radio controls key signal circuit

Actions Taken When the DTC Sets

Radio control buttons will be inoperative

Conditions for Clearing the DTC

The condition for setting the DTC is no longer detected for 250 ms.

Reference Information

Schematic Reference

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Radio/Navigation System Schematics (IO3) **Radio/Navigation System Schematics (IO5, IO6)** **Radio/Navigation System Schematics (IOB)**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) **Radio/Audio System Description and Operation (IO5/IO6)** **Radio/Audio System Description and Operation (IOB)**

Electrical Information Reference

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

Scan Tool Reference

Control Module References

Circuit/System Verification

1. Ignition On/vehicle in Service Mode.
2. Verify that each button on the A22 radio controls operates normally by pressing each button individually.
    - **If none of the buttons operate normally**

      Refer to Circuit/System Testing

    - **If some, but not all, of the buttons operate normally**

      Test or replace the A22 radio controls

    - **If all of the buttons operate normally**
3. All OK

Circuit/System Testing

1. Ignition OFF/vehicle OFF and all vehicle systems OFF. Disconnect the harness connector at the A22 radio controls. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the following circuits and ground.
    - Ground return terminal 2
    - Low reference terminal 8
    - **If 10 Ω of greater**
    1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the P17 Info Display Module.
    2. Test for less than 2 Ω in the circuits end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the P17 Info Display Module

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- **If less than 10 Ω**

3. Ignition ON/vehicle in Service Mode.
4. Test for 2.5-3.5 V on the signal circuit terminal 3 @ the A 22 Radio Controls and ground.
    - **If less than 2.5 V**
    1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the A11 Radio.
    2. Test for infinite resistance between the signal circuit and ground.
        - If less than infinite resistance, repair the short to ground.
        - If infinite resistance
    3. Test for less than 2 Ω in the signal circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the A11 Radio.
    - **If greater than 3.5 V**
    1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the A11 Radio.
    2. Ignition ON/vehicle in Service Mode, test for less than 1 V between the signal circuit and ground.
        - If 1 V or greater, repair the short to voltage on the circuit.
        - If less than 1 V, replace the A11 radio.
    - **If between 2.5-3.5 V**
5. Test or replace the A22 Radio Controls

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: **Diagnostic Repair Verification**

- For control module replacement, programming, and setup refer to: **Control Module References**

DTC B124B: USB 1 (IO3)

Diagnostic Instructions

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

DTC Descriptor

DTC B124B

USB 1 Circuit

For symptom byte information refer to **Symptom Byte List** .

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	B124B, 1, 6	1, 5	-	-
Auxiliary Audio Common Signal	-	8	-	-

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Auxiliary Detection Signal	7	8	-	-
Left Auxiliary Audio Signal	2	2	2, 4	-
Right Auxiliary Audio Signal	3	3	3, 4	-
USB Cable	B124B	B124B	B124B	-
Ground	-	1	-	-

1. SD Card reader and USB port Inoperative
2. No left side audio from device connected to AUX jack
3. No right side audio from device connected to AUX jack
4. Noticeable distortion may be present in affected audio channel
5. Fault may affect one or more components, dependant on fault location
6. Fault affects multiple components, dependant on vehicle equipment
7. Radio does not detect auxiliary device connection, AUX not available as input selection
8. AUX always available as an input selection, with or without auxiliary device connected

Circuit/System Description

The infotainment system has a USB port and SD card reader slot located in the center console. The USB port and the card reader slot interface with a hub device, internal to the auxiliary jack, USB, and memory card receptacle assembly. The auxiliary jack, USB, and memory card receptacle assembly receives fused battery voltage and ground from the harness to power the internal hub device as well as providing additional amperage to power USB devices.

The internal hub device interfaces directly with the radio via a standard USB cable. A mini type USB connector is used to connect the cable at the USB port and at the radio and at the auxiliary jack, USB, and memory card receptacle. Standard USB male to female connections are typically used for connecting USB cables together where an in-line connection is required. An in-line cable connection is typically found between the console and I/P harness.

USB Port

The USB port allows connectivity to the infotainment system from portable media players or a USB storage device (memory stick/ flash drive). When a device is connected to the USB port, the system detects the device and switches to USB as the audio source. Once connected, the device can be controlled from the radio controls.

Not all portable media player devices or file types are compatible. Refer to the owner's manual for information on USB devices, control, and operation.

SD Card Reader

The infotainment uses the SD card reader as a mass storage device, similar to a USB storage device.

Refer to the owners manual for information on media types supported via the SD card reader.

Conditions for Running the DTC

- Ignition is ON or in the ACC position
- The system voltage is 9-16 V
- The infotainment system is ON
- The test is run once per second when the infotainment system is operating

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Conditions for Setting the DTC

The radio detects an excessive current condition on the USB 5 V circuit.

Action Taken When the DTC Sets

The USB port and SD card reader are inoperative while the DTC is current.

Conditions for Clearing the DTC

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

Diagnostic Aids

This DTC may be set due to the connection of an incompatible or faulty USB device.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) **Radio/Navigation System Schematics (IO5, IO6)** **Radio/Navigation System Schematics (IOB)**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) **Radio/Audio System Description and Operation (IO5/IO6)** **Radio/Audio System Description and Operation (IOB)**

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

- **EL-50334-20** Multi-Media Interface Tester (MIT)
- **EL-50334-50** USB Cable and Adapter Kit
- **EL-50334-14** Infotainment Test Cable

Circuit/System Verification

1. Verify DTC B124B is not set. Since occurrences of this DTC can be caused by an incompatible or faulty

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USB device, review with the customer the conditions under which their concern occurred.

- **If DTC B124B is set.**

  Refer to Circuit/System testing.

- **If DTC B124B is not set.**

2. Ignition ON, infotainment system ON.
3. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.
4. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
   - **If audio is not heard from the test tool**
   1. Insert an SD card with compatible media into the SD card slot.
   2. Verify the media on the SD card can be accessed while operating the system to connect to the SD card.
   - If the SD card reader cannot be accessed, refer to Circuit/System testing.
   - If the SD card reader can be accessed, replace the X83 Auxiliary Audio Input.
   - **If audio is heard from the test tool**
5. Insert an SD card with compatible media into the SD card slot.
6. Verify the media on the SD card can be accessed while operating the system to connect to the SD card.
   - **If the SD card reader media cannot be accessed**

     Refer to Circuit/System testing

   - **If the SD card reader media can be accessed**
7. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the X1 harness connector at the X83 Auxiliary Audio Input.
2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.
   - **If 10 Ω or greater**
   1. Ignition OFF.
   2. Test for less than 2 Ω in the ground circuit end to end.
      - If 2 Ω or greater, repair the open/high resistance in the circuit.
      - If less than 2 Ω, repair the open/high resistance in the ground connection.
   - **If less than 10 Ω**
3. Verify that a test lamp illuminates between the B+ circuit terminal 6 and ground.
   - **If the test lamp does not illuminate**
   1. Ignition OFF, remove the test lamp.
   2. Test for less than 2 Ω in the B+ circuit end to end.
      - If 2 Ω or greater, repair the open/high resistance in the circuit.
   - **If the test lamp illuminates**
4. Verify the USB cable is properly connected at all components and in-line connections, and there is no

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damage to the cable or connections.

- **If connection problems or cable damage is noted.**

  Perform the appropriate repair or replacement to correct any issues.

- **If no connection problems or cable damage is noted.**

5. Disconnect the vehicle USB cable at the A11 Radio and the X83 Auxiliary Audio Input.
6. Connect the EL-50334-14 Infotainment Test Cable and the EL-50334-2 Type-A Female to Mini-B Male Cable together. Connect the assembled test cable to the A11 Radio and the X83 Auxiliary Audio Input.
7. Ignition ON, infotainment system ON.
8. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.
9. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
   - **If audio is not heard from the test tool**
   1. Replace the X83 Auxiliary Audio Input. Connect all harness connectors.
   2. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.
   3. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
      - If audio is not heard from the test tool, replace the A11 Radio.
      - If audio is heard from the test tool.
   4. All OK.
   - **If audio is heard from the test tool**
10. Connect the vehicle USB cable at the A11 Radio.
11. Disconnect the console to I/P USB in-line connector. Connect the assembled test cable to the I/P side of the in-line USB cable connector and the X83 Auxiliary Audio Input.
12. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.
13. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
    - **If audio is not heard from the test tool**

      Replace the I/P USB cable assembly.

    - **If audio is heard from the test tool**
14. Replace the console USB cable assembly.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Audio Disc Player, USB, Auxiliary In, and Memory Card Receptacle Replacement**
- **Control Module References** for radio replacement, programming, and setup.

DTC B124B: USB 1 (IOB)

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Diagnostic Instructions

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

DTC Descriptor

DTC B124B

USB 1 Circuit

For symptom byte information refer to **Symptom Byte List** .

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	B124B, 1, 6	1, 5	-	-
Auxiliary Audio Common Signal	-	8	-	-
Auxiliary Detection Signal	7	8	-	-
Left Auxiliary Audio Signal	2	2	2, 4	-
Right Auxiliary Audio Signal	3	3	3, 4	-
USB Cable	B124B	B124B	B124B	-
Ground	-	1	-	-

1. USB port Inoperative
2. No left side audio from device connected to AUX jack
3. No right side audio from device connected to AUX jack
4. Noticeable distortion may be present in affected audio channel
5. Fault may affect one or more components, dependant on fault location
6. Fault affects multiple components, dependant on vehicle equipment
7. Radio does not detect auxiliary device connection, AUX not available as input selection
8. AUX always available as an input selection, with or without auxiliary device connected

Circuit/System Description

The infotainment system has a auxiliary jack and USB receptacle assembly. The auxiliary jack and USB receptacle assembly receives fused battery voltage and ground from the harness to power the internal hub device as well as providing additional amperage to power USB devices. The internal hub device interfaces directly with the radio via a standard USB cable.

Auxiliary Audio Input Jack

When a portable audio playback device is connected to the 3.5 mm (1/8 in.) auxiliary audio input jack an internal switch opens the detection signal circuit . The radio detects the device and AUX becomes available as an audio source. Audio signals from the device are sent to the radio from the auxiliary input jack via the left, right, and common audio signal circuits.

USB Port

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The USB receptacle interfaces directly with the radio via a standard USB cable. A Mini type USB connector is used to connect the cable at the radio and at the auxiliary jack and USB receptacle assembly. USB male to female connections are typically used for connecting USB cables together where an in-line connection is required. An in-line cable connection is typically found between the console and I/P harness.

The USB port allows connectivity to the infotainment system from portable media players or a USB storage device (memory stick/ flash drive). When a device is connected to the USB port, the system detects the device and USB becomes available as an audio source. Once connected, the device can be controlled from the radio controls.

Not all portable media player devices or file types are compatible. Refer to the owner's manual for information on USB devices, control, and operation.

Conditions for Running the DTC

- Ignition is ON or in the ACC position
- The system voltage is 9-16 V
- The infotainment system is ON
- The test is run once per second when the infotainment system is operating

Conditions for Setting the DTC

The radio detects an excessive current condition on the USB 5 V circuit.

Action Taken When the DTC Sets

The USB port is inoperative while the DTC is current.

Conditions for Clearing the DTC

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

Diagnostic Aids

This DTC may be set due to the connection of an incompatible or faulty USB device.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

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Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

- **EL-50334-20** Multi-Media Interface Tester (MIT)
- **EL-50334-50** USB Cable and Adapter Kit
- **EL-50334-14** Infotainment Test Cable

Circuit/System Verification

1. Verify DTC B124B is not set. Since occurrences of this DTC can be caused by an incompatible or faulty USB device, review with the customer the conditions under which their concern occurred.
   - **If DTC B124B is set.**

     Refer to Circuit/System testing.

   - **If DTC B124B is not set.**
2. Ignition ON, infotainment system ON.
3. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.
4. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
   - **If audio is not heard from the test tool**

     Refer to Circuit/System Testing.

   - **If audio is heard from the test tool**
5. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the X1 harness connector at the X83 Auxiliary Audio Input.
2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.
   - **If 10 Ω or greater**

   1. Ignition OFF.
   2. Test for less than 2 Ω in the ground circuit end to end.
      - If 2 Ω or greater, repair the open/high resistance in the circuit.
      - If less than 2 Ω, repair the open/high resistance in the ground connection.

   - **If less than 10 Ω**

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3. Verify that a test lamp illuminates between the B+ circuit terminal 6 and ground.
    - **If the test lamp does not illuminate**
    1. Ignition OFF, remove the test lamp.
    2. Test for less than 2 Ω in the B+ circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - **If the test lamp illuminates**
4. Verify the USB cable is properly connected at all components and any in-line connections, and there is no damage to the cable or connections.
    - **If connection problems or cable damage is noted.**

      Perform the appropriate repair or replacement to correct any issues.

    - **If no connection problems or cable damage is noted.**
5. Disconnect the vehicle USB cable at the A11 Radio and the X83 Auxiliary Audio Input.
6. Connect the EL-50334-14 Infotainment Test Cable and the EL-50334-2 Type-A Female to Mini-B Male Cable together. Connect the assembled test cable to the A11 Radio and the X83 Auxiliary Audio Input.
7. Ignition ON, infotainment system ON.
8. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.
9. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
    - **If audio is not heard from the test tool**
    1. Replace the X83 Auxiliary Audio Input. Connect all harness connectors.
    2. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.
    3. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
        - If audio is not heard from the test tool, replace the A11 Radio.
        - If audio is heard from the test tool.
    4. All OK.
    - **If audio is heard from the test tool**
10. Replace the USB cable assembly.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Audio Disc Player, USB, Auxiliary In, and Memory Card Receptacle Replacement**
- **Control Module References** for control module replacement, programming, and setup.

DTC B124B: USB 1 (IO5/IO6)

Diagnostic Instructions

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

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

DTC Descriptor

DTC B124B

USB 1 Circuit

For symptom byte information refer to **Symptom Byte List** .

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	B124B, 2	B124B, 1	-	-
USB Cable	B124B	B124B	B124B	-
Ground	-	Â	-	-
1. Fault may affect one or more components, dependant on fault location 2. Fault affects multiple components, dependant on vehicle equipment				

Circuit/System Description

The infotainment system has a USB port and a Auxiliary Audio Input Jack located in the center console. The receptacle assembly receives fused battery voltage and ground from the harness to power the internal hub device as well as providing additional amperage to power USB devices.

The internal hub device interfaces directly with the human machine interface control module via a standard USB cable. A Mini type USB connector is used to connect the human machine interface control module and the USB receptacle. Standard USB male to female connections are typically used for connecting USB cables together where an in-line connection is required. An in-line cable connection is typically found between the console and I/P harness.

Auxiliary Audio Input Jack

When a portable audio playback device is connected to the 3.5 mm (1/8 in.) auxiliary audio input jack an internal switch opens the detection signal circuit within the hub. The HMI detects the device and AUX becomes available as an audio source. Audio signals from the device are converted from analog to digital, these signals are then sent to the HMI from the auxiliary input jack via USB.

USB Port

The USB port allows connectivity to the infotainment system from portable media players or a USB storage device (memory stick/ flash drive). When a device is connected to the USB port, the system detects the device and switches to USB as the audio source. Once connected, the device can be controlled from the radio controls.

Not all portable media player devices or file types are compatible. Refer to the owner's manual for information on USB devices, control, and operation.

Conditions for Running the DTC

- Ignition is ON or in the ACC position
- The system voltage is 9-16 V

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- The infotainment system is ON
- The test is run once per second when the infotainment system is operating

Conditions for Setting the DTC

B124B 0B

The human machine interface control module detects an excessive current condition on the USB 5 V circuit.

B124B 04

The human machine interface control module does not detect the vehicle hub device.

B124B 11

The human machine interface control module detects an additional hub device attached to the vehicle USB port.

Action Taken When the DTC Sets

The USB port is inoperative while the DTC is current.

Conditions for Clearing the DTC

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

Diagnostic Aids

- This DTC may be set due to the connection of an incompatible or faulty USB device.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

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Scan Tool Reference

Control Module References for scan tool information

Special Tools

- **EL-50334-20** Multi-Media Interface Tester (MIT)
- **EL-50334-50** USB Cable and Adapter Kit
- **EL-50334-14** Infotainment Test Cable

Circuit/System Verification

1. Verify DTC B124B is not set. Since occurrences of this DTC can be caused by an incompatible or faulty USB device, review with the customer the conditions under which their concern occurred.
   - **If DTC B124B is set.**

     Refer to Circuit/System Testing.

   - **If DTC B124B is not set.**
2. Ignition ON, infotainment system ON.
3. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.
4. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
   - **If audio is not heard from the test tool**

     Refer to Circuit/System Testing

   - **If audio is heard from test tool**
5. Verify the infotainment system can be switched to AUX as the audio source with the EL-50334-20 Multi-Media Interface Tester (MIT) connected to the auxiliary audio input jack.
   - **If the infotainment system can not be switched to AUX as the audio source**

     Refer to Circuit/System Testing

   - **If the infotainment system can be switched to AUX as the audio source**
6. Verify the audio from the EL-50334-20 Multi-Meida Interface Tester (MIT) is heard through the vehicle infotainment system while operating the test tool to begin audio playback.
   - **If audio is not heard from the test tool.**

     Refer to Circuit/System Testing

   - **If audio is heard from the test tool.**
7. All OK

Circuit/System Testing

1. Ignition OFF, disconnect the X1 harness connector at the X83 Auxiliary Audio Input.
2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.
   - **If 10 Ω or greater**

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1. Ignition OFF.
2. Test for less than 2 Ω in the ground circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω, repair the open/high resistance in the ground connection.

- **If less than 10 Ω**

3. Verify that a test lamp illuminates between the B+ circuit terminal 6 and ground.

- **If the test lamp does not illuminate**

1. Ignition OFF, remove the test lamp.
2. Test for less than 2 Ω in the B+ circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.

- **If the test lamp illuminates**

4. Verify the USB cable is properly connected at all components and in-line connections, and there is no damage to the cable or connections.

- **If connection problems or cable damage is noted.**

  Perform the appropriate repair or replacement to correct any issues.

- **If no connection problems or cable damage is noted.**

5. Connect the X1 harness connector at the X83 Auxiliary Audio Input.
6. Disconnect the vehicle USB cable X3 harness connector at the K74 Human Machine Interface Control Module and the X83 Auxiliary Audio Input Adapter.
7. Connect the EL-50034-14 Infotainment Test Cable and the EL-50334-2 Type-A Female to Mini-B Male Cable together. Connect the assembled test cable to the K74 Human Machine Interface Control Module and the X83 Auxiliary Audio Input.
8. Ignition ON, infotainment system ON.
9. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.
10. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.

- **If audio is not heard from the test tool**

1. Replace the X83 Auxiliary Audio Input Adapter. Connect all harness connectors.
2. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.
3. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
    - If audio is not heard from the test tool, replace the K74 Human Machine Interface Control Module.

- **If audio is heard from the test tool**

11. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input AUX port and select the AUX test mode.
12. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.

- **If audio is not heard from the test tool**

1. Replace the X83 Auxiliary Audio Input Adapter. Connect all harness connectors.

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- **If audio is heard from the test tool.**

13. Replace the vehicle USB cable between the K74 Human Machine Interface Control Module and the X83 Auxiliary Audio Input Adapter.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Audio Disc Player, USB, Auxiliary In, and Memory Card Receptacle Replacement**
- **Control Module References** for human machine interface control module replacement, programming, and setup.

DTC B124F: UNIVERSAL SERIAL BUS (USB)

Diagnostic Instructions

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

DTC Descriptor

DTC B124F

Universal Serial Bus (USB) Programming

For symptom byte information, refer to **Symptom Byte List** .

Circuit/System Description

Certain devices in the entertainment system must be programmed with specific software and other information to operate correctly. This DTC is the result of an unsuccessful USB programming event of the device. The symptom byte information is for engineering reference only. No external circuit diagnosis is involved

Conditions for Running the DTC

Once upon each USB Programming Event.

Conditions for Setting the DTC

The programming event was incomplete, or completed with errors.

Action Taken When the DTC Sets

The entertainment system has limited or no functionality.

Conditions for Clearing the DTC

The programming event completes successfully.

Diagnostic Aids

DTC B124F could set if a programming attempt was made when the module already had the latest update available installed.

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Circuit/System Verification

1. Ignition ON/vehicle in Service Mode.
2. Verify DTC B124F is not set.
    - **If DTC B124F is set**
    1. Program the device that set the DTC.
    2. Verify the DTC does not set.
        - If DTC is set, replace the device that set the DTC.
        - If the DTC is not set
    3. All OK.
    - **If DTC B124F is not set**
3. All OK

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for device replacement, programming, and setup.

DTC B125A: ANTENNA SIGNAL

Diagnostic Instructions

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

DTC Descriptors

DTC B125A 02

Antenna Signal Circuit Short to Ground

DTC B125A 04

Antenna Signal Circuit Open Circuit

DTC B125A 01

Antenna Signal Circuit Short to Battery

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Radio Antenna Coax	B125A 02	B125A 04	B125A 01	-

Circuit/System Description

The radio antenna for AM and FM radio reception is connected to the radio with a coaxial cable.

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Conditions for Running the DTC

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

Conditions for Setting the DTC

B125A 02

The radio detects a short to ground in the antenna signal circuit center conductor.

B125A 04

The radio detects an open in the antenna signal circuit center conductor.

B125A 01

The radio detects a short to battery in the antenna signal circuit center conductor.

Action Taken When the DTC Sets

Radio reception may be poor or not available.

Conditions for Clearing the DTC

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

Diagnostic Aids

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

It is very important to remove all devices plugged into any 12 V Outlet and Auxiliary Input, including any in the rear seats and rear cargo area (if equipped).

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

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Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Inspect the antenna for proper mounting or physical damage.
    - **If damage is found**

      Repair or replace as necessary

    - **If no damage is found**
2. Ignition ON, A11 Radio ON.
3. Verify station reception is normal when tuned to several known good AM and FM stations.
    - **If AM or FM reception is poor.**

      Refer to Circuit/System Testing

    - **If reception is normal**
4. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the radio antenna coax cable from the A11 Radio and from the T4M Radio Antenna.
2. Verify the antenna coax cable passes the coax cable component test. Refer to Component Testing.
    - **If the coax cable does not pass the test**

      Replace the antenna coax cable

    - **If the coax cable passes the test**
3. Connect the antenna coax cable to the T4M Radio Antenna.
4. Test for infinite resistance between the coax cable center terminal and the coax cable outer shield at the radio end of the coax cable.
    - **If less than infinite resistance**

      Replace the radio antenna base.

    - **If infinite resistance**
5. Test for less than 10 Ω between the coax cable outer shield and ground at the radio end of the coax cable.
    - **If 10 Ω or greater**
    1. Clean the mounting surface of the radio antenna base.

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2. Connect the antenna coax cable to the T4M Radio Antenna.
3. Test for less than 10 Ω between the coax cable outer shield and ground at the radio end of the coax cable.
    - If 10 Ω or greater, replace the antenna base.
    - If less than 10 Ω, connect all harness connectors. Verify station reception is normal when tuned to several known good AM and FM stations. If AM or FM reception concerns are still present, replace the A11 Radio.
- **If less than 10 Ω**

6. Test or replace the A11 Radio.

Component Testing

CAUTION: **Refer to Test Probe Caution .**

NOTE: **Before testing the coax cable, check the cable exterior for being pinched, cut, damaged, or having loose connections at the components, which can cause reception issues.**

To prevent false reading when testing the center coax terminals, use care not to ground the test probe on the outer housing/shield.

Coax Cable Test

1. Ignition OFF, disconnect the coax cable at both components.
2. Test for less than 5 Ω between coax cable center terminal end to end.
    - **If 5 Ω or greater**

      Replace the coax cable

    - **If less than 5 Ω**
3. Test for less than 5 Ω between the coax cable outer shield end to end.
    - **If 5 Ω or greater**

      Replace the coax cable

    - **If less than 5 Ω**
4. Test for infinite resistance between the coax cable center terminal and the coax cable outer shield.
    - **If less than infinite resistance**

      Replace the coax cable

    - **If infinite resistance**
5. All OK

Repair Instructions

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

- **Radio Antenna Base Replacement**

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- **Control Module References** for radio replacement, programming, and setup.

DTC B125C: SATELLITE ANTENNA

Diagnostic Instructions

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

DTC Descriptors

DTC B125C 01

Satellite Antenna Circuit Short to Battery

DTC B125C 02

Satellite Antenna Circuit Short to Ground

DTC B125C 04

Satellite Antenna Circuit Open

Circuit/System Description

The digital radio receiver, located inside the radio, receives digital radio information from the digital radio antenna located on the outside of the vehicle. The digital radio receiver is connected to the digital radio antenna via a shielded coax cable. The digital radio antenna contains an amplifier which is powered by the radio through the coax cable.

Conditions for Running the DTC

This DTC is run every 300 milliseconds.

Conditions for Setting the DTC

The radio detects a circuit fault in the digital radio antenna.

Action Taken When the DTC Sets

The radio displays No XM Signal or Check Antenna.

Conditions for Clearing the DTC

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

Diagnostic Aids

The digital radio antenna requires a clear line of sight to the sky to operate properly. Reception may be limited, intermittent, or unavailable inside structures.

Reference Information

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Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Special Tools

EL-48028 Digital Radio Test Antenna

For equivalent regional tools, refer to **Special Tools Special Tools (MIT Tool Instructions)** .

Circuit/System Verification

1. With the vehicle outside in an area with an unobstructed view of the southern sky, tune to XM.
2. Verify DTC B125C is not set as current and the No XM Signal message is not displayed on the radio.
    - **If DTC B125C is set as current or the No XM Signal message is displayed.**

      Refer to Circuit/System Testing.

    - **If DTC B125C is not set as current and the No XM Signal message is not displayed.**
3. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the digital radio antenna coax cable from the A11 Radio. Connect the **EL-48028** Digital Radio Test Antenna to the radio and place on the roof of the vehicle.
2. Ignition ON, radio tuned to XM channel 1.
3. Verify DTC B125C is not set as current and XM reception is improved.
    - **If DTC B125C is set as current or XM reception is not improved**

      Replace the A11 Radio.

    - **If DTC B125C is not set as current and XM reception is improved**
4. Ignition OFF, disconnect the digital radio antenna coax cable from the T4G Cellular Phone, Navigation, and Digital Radio Antenna.

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5. Verify the digital radio antenna coax cable passes the coax cable component test. Refer to Component Testing.
    - **If the coax cable does not pass the test**

      Replace the antenna coax cable

    - **If the coax cable passes the test**
6. Test or replace the T4G Cellular Phone, Navigation, and Digital Radio Antenna.

Component Testing

CAUTION: **Refer to Test Probe Caution .**

NOTE: **Before testing the coax cable, check the cable exterior for being pinched, cut, damaged, or having loose connections at the components, which can cause reception issues.**

To prevent false reading when testing the center coax terminals, use care not to ground the test probe on the outer housing/shield.

Coax Cable Test

1. Ignition OFF, disconnect the coax cable at both components.
2. Test for less than 5 Ω between coax cable center terminal end to end.
    - **If 5 Ω or greater**

      Replace the coax cable

    - **If less than 5 Ω**
3. Test for less than 5 Ω between the coax cable outer shield end to end.
    - **If 5 Ω or greater**

      Replace the coax cable

    - **If less than 5 Ω**
4. Test for infinite resistance between the coax cable center terminal and the coax cable outer shield.
    - **If less than infinite resistance**

      Replace the coax cable

    - **If infinite resistance**
5. All OK

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **High Frequency Antenna Replacement**
- **Control Module References** for radio replacement, programming, and setup.

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DTC B1271: THEFT PROTECTION ACTIVE

Diagnostic Instructions

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

DTC Descriptor

DTC B1271 00

Theft Protection Active

Circuit/System Description

When the radio is initially installed in the vehicle, the radio receives VIN information via serial data. The radio stores a portion of the VIN and compares this sequence to the VIN information received each time the radio powers on. The VIN in the radio is a single one-time learn.

The radio theft deterrent system is intended to disable or limit radio functionality if incorrect vehicle information is received by the radio. The radio disables functionality if the VIN information received by the radio does not match the VIN information that has been learned by the radio. This DTC is generated by the module when the Theft Protection is activated.

Conditions for Running the DTC

This DTC test runs when the radio changes from OFF to ON.

Conditions for Setting the DTC

The radio has learned a correct VIN sequence and the VIN information received via serial data does NOT match the learned VIN sequence.

Action Taken When the DTC Sets

- The radio may be disabled or have limited functionality.
- The radio display will indicate that theft protection is active.

Conditions for Clearing the DTC

The radio receives the correct VIN information via serial data.

Diagnostic Aids

A possible cause of incorrect VIN info could be the radio was originally installed in another vehicle.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) **Radio/Navigation System Schematics (IO5, IO6)** **Radio/Navigation System Schematics (IOB)**

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Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON, A11 Radio ON.
2. Verify DTC B1271 is not set.
    - **If DTC B1271 is set**

      Replace the A11 Radio.

    - **If DTC B1271 is not set**
3. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for Radio replacement, programming, and setup

DTC B1277: MICROPHONE 1 (IO5/IO6)

Diagnostic Instructions

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

DTC Descriptors

DTC B1277

Microphone 1 Input Signal Circuit

For symptom byte information refer to **Symptom Byte List**

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Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Microphone Signal	B1277 02	B1277 04	B1277 04	-
Microphone Low Reference	B1277 02	B1277 04	-	-

Circuit/System Description

The human machine interface control module uses the cellular telephone microphone for voice recognition and cellular features. The human machine interface control module provides a bias voltage to each microphone (+) and (-) signal circuits for operation of the microphone.

Conditions for Running the DTC

The human machine interface control module performs a self diagnostic of the microphone circuits once after initial power up.

Conditions for Setting the DTC

B1277 02

The human machine interface control module detects an short to ground in the cellular phone microphone high signal circuit.

B1277 04

The following conditions will set this DTC:

- The human machine interface control module detects an open/high resistance in the cellular phone microphone high signal circuit.
- The human machine interface control module detects an open/high resistance in the microphone low signal circuit.

Action Taken When the DTC Sets

The voice recognition system malfunctions or is inoperative.

Conditions for Clearing the DTC

- A current DTC clears when the self diagnostic passes on the next ignition cycle.
- A history DTC clears when the ignition cycle counter reaches the reset threshold without a repeat of the malfunction.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

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COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the B24 Cellular Phone Microphone. Ignition On/Vehicle in Service Mode.
2. Test for 9-11 V between the signal circuit terminal B and ground.
    - **If less than 9 V**
    1. Ignition OFF, disconnect the X1 harness connector at the K74 Human Machine Interface Control Module.
    2. Test for infinite resistance between the signal circuit and ground.
        - If less than infinite resistance, repair the short to ground in the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the signal circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the K74 Human Machine Interface Control Module.
    - **If greater than 11 V**
    1. Ignition OFF, disconnect the X1 harness connector at the K74 Human Machine Interface Control Module. Ignition On/Vehicle in Service Mode.
    2. Test for less than 1 V between the signal circuit and ground.
        - If 1 V or greater, repair the short to voltage on the circuit.
        - If less than 1 V, replace the K74 Human Machine Interface Control Module.
    - **If between 9-11 V**
3. Test for less than 1 V between the signal circuit terminal A and ground.
    - **If greater than 1 V**
    1. Ignition OFF, X1 harness connector at the K74 Human Machine Interface Control Module. Ignition On/Vehicle in Service Mode.
    2. Test for less than 1 V between the signal circuit and ground.
        - If 1 V or greater, repair the short to voltage in the circuit.
        - If less than 1 V, replace the K74 Human Machine Interface Control Module.

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- **If less than 1 V**

4. Ignition OFF, disconnect the X1 harness connector at the K74 Human Machine Interface Control Module.
5. Test for infinite resistance between the B24 Cellular Phone Microphone signal circuit terminal A and ground.
    - **If less than infinite resistance**

      Repair the short to ground in the circuit

    - **If infinite resistance**
6. Test for less than 2 Ω in the signal circuit end to end.
    - **If 2 Ω or greater**

      Repair the open/high resistance in the circuit

    - **If less than 2 Ω**
7. Replace the B24 Cellular Phone Microphone.
8. Ignition On/Vehicle in Service Mode.
9. Verify the DTC does NOT set.
    - **If the DTC sets**

      Replace the K74 Human Machine Interface Control Module

    - **If the DTC does not set**
10. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Mobile Telephone Microphone Replacement**
- **Control Module References** for human machine interface control module replacement, programming, and setup.

DTC B1277: CELLULAR PHONE MICROPHONE (IOB)

Diagnostic Instructions

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

DTC Descriptors

DTC B1277 02

Cellular Phone Microphone Circuit Short to Ground

DTC B1277 04

Cellular Phone Microphone Circuit Open/High Resistance

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Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	B1277 02	B1277 04	B1277 04	-
Low Reference	B1277 02	B1277 04	B1277 04	-

Circuit/System Description

The radio provides the cellular phone microphone with a supplied voltage on the cellular phone microphone high signal circuit. When the microphone is in use, voice data from the user is sent back to the radio on the cellular microphone low signal circuit.

Conditions for Running the DTC

- The ignition must be in the RUN or ACC position/vehicle in Service Mode.
- The system voltage is at least 9.5 V and no more than 15.5 V.
- All the above conditions are present for greater than 10 s.

Conditions for Setting the DTC

B1277 02

The radio detects a short to ground in the cellular phone microphone high signal circuit for 10 s or greater.

B1277 04

The following conditions will set this DTC:

- The radio detects an open/high resistance in the cellular phone microphone high signal circuit for 10 s or greater.
- The radio detects an open/high resistance in the microphone low signal circuit for 10 s or greater.

Action Taken When the DTC Sets

- The radio will not receive a signal from the cellular phone microphone.
- Calls can be placed but the caller cannot be heard.

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF/vehicle OFF, disconnect the harness connector at the B24 Cellular Phone Microphone, ignition ON/vehicle in Service Mode.
2. Test for 9-11 V between the signal circuit terminal B and ground.
    - **If less than 9 V**
    1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the A11 Radio.
    2. Test for infinite resistance between the signal circuit and ground.
        - If less than infinite resistance, repair the short to ground in the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the signal circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the A11 Radio.
    - **If greater than 11 V**
    1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the A11 Radio .
    2. Ignition ON/vehicle in Service Mode, test for less than 1 V between the signal circuit and ground.
        - If 1 V or greater, repair the short to voltage on the circuit.
        - If less than 1 V, replace the A11 Radio .
    - **If between 9-11 V**
3. Test for less than 1 V between the low reference circuit terminal A and ground.
    - **If greater than 1 V**
    1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the A11 Radio .
    2. Ignition ON/vehicle in Service Mode, test for less than 1 V between the low reference circuit and ground.
        - If 1 V or greater, repair the short to voltage in the circuit.
        - If less than 1 V, replace the A11 Radio
    - **If less than 1 V**
4. Test for greater than 9 V between the signal circuit terminal B and the low reference circuit terminal A.
    - **If less than 9 V**

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1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the A11 Radio.
2. Test for infinite resistance between the low reference circuit and ground.
    - If less than infinite resistance, repair the short to ground in the circuit.
    - If infinite resistance
3. Test for less than 2 Ω in the signal circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω, replace the A11 Radio.

- **If greater than 9 V**

5. Test or replace the B24 Cellular Phone Microphone.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Mobile Telephone Microphone Replacement**
- **Control Module References** for telematics communication interface control module replacement, programming and setup.

DTC B127A: AUXILIARY VIDEO INPUT SIGNAL

Diagnostic Instructions

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

DTC Descriptor

DTC B127A 04

Auxiliary Video Input Signal Circuit Open Circuit

Circuit/System Description

The rear seat entertainment system has an auxiliary input assembly that contains a USB port, an SD card reader, RCA type audio/video jacks, and a wired headphone jack with volume control. Refer to the Owners Manual for information on compatible devices and supported media types/formats.

The USB port and SD card reader slot interface with a hub device, internal to the assembly. The assembly receives fused battery voltage and ground from the harness to power the internal hub device as well as providing additional amperage to power USB devices.

The internal hub device interfaces directly with the disc player via a standard USB cable. A Mini type USB connector is used to connect the cable at the disc player and the auxiliary input assembly. Mini type USB male to female connections are used for connecting USB cables together where an in-line connection is required. An in-line cable connection is typically found between the console and I/P harness.

The USB port allows connectivity to the rear seat entertainment system from portable media players or a USB storage device (memory stick/ flash drive). The rear seat entertainment uses the SD card reader as a mass storage device, similar to a USB storage device.

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Once a supported device is connected to the USB port or SD card reader, the device may be sourced to one or both of the rear displays using the remote control.

Conditions for Running the DTC

- Ignition is ON or in the ACC position
- The system voltage is 9-16 V
- The rear seat entertainment system is ON
- The test is run once per second when the rear seat entertainment system is operating.

Conditions for Setting the DTC

The Media Disc Player does not detect the vehicle hub device.

Action Taken When the DTC Sets

The USB port and SD card reader are inoperative while the DTC is current.

Conditions for Clearing the DTC

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

Diagnostic Aids

This DTC may be set due to the connection of an incompatible or faulty device.

Reference Information

Schematic Reference

Video System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Video Entertainment System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

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EL-50334-20 Multi-Media Interface Tester (MIT)

Circuit/System Verification

1. Verify DTC B127A is not set. Since occurrences of this DTC can be caused by an incompatible or faulty USB device, review with the customer the conditions under which their concern occurred.
    - **If DTC B127A is set.**

      Refer to Circuit/System Testing.

    - **If DTC B127A is not set.**
2. Ignition ON, rear seat entertainment system ON.
3. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the rear seat entertainment system USB port and select the USB test mode.
4. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the rear seat entertainment system while operating the system to play audio from the test tool.
    - **If audio is not heard from the test tool**
    1. Insert an SD card with compatible media into the SD card slot.
    2. Verify the media on the SD card can be accessed while operating the system to connect to the SD card.
    - If the SD card reader cannot be accessed, refer to Circuit/System testing.
    - If the SD card reader can be accessed, replace the X82 Audio/Video Input Adapter.
    - **If audio is heard from the test tool**
5. Insert an SD card with compatible media into the SD card slot.
6. Verify the media on the SD card can be accessed while operating the system to connect to the SD card.
    - **If the SD card reader cannot be accessed**

      Refer to Circuit/System testing

    - **If the SD card reader can be accessed**
7. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the X1 harness connector at the X82 Audio/Video Input Adapter.
2. Test for less than 10 Ω between the ground circuit terminal 1 and ground.
    - **If 10 Ω or greater**
    1. Ignition OFF.
    2. Test for less than 2 Ω in the ground circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, repair the open/high resistance in the ground connection.
    - **If less than 10 Ω**
3. Verify that a test lamp illuminates between the B+ circuit terminal 7 and ground.
    - **If the test lamp does not illuminate**
    1. Ignition OFF, remove the test lamp.
    2. Test for less than 2 Ω in the B+ circuit end to end.

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- If 2 Ω or greater, repair the open/high resistance in the circuit.

- **If the test lamp illuminates**

4. Verify the USB cable is properly connected at the X82 Audio/Video Input Adapter, A33 Media Disc Player and the console to I/P in-line connector, and there is no damage to the cable or connections.
   - **If connection problems or cable damage is noted.**

     Perform the appropriate repair or replacement to correct any issues.

   - **If no connection problems or cable damage is noted.**
5. Replace the X82 Audio/Video Input Adapter. Connect all harness connectors.
6. Ignition ON, rear seat entertainment system ON.
7. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X82 Audio/Video Input Adapter USB port and select the USB test mode.
8. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the rear seat entertainment system while operating the system to play audio from the test tool.
   - **If audio is not heard from the test tool**
   1. Replace the A33 Media Disc Player.
   2. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X82 Audio/Video Input Adapter USB port and select the USB test mode.
   3. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the rear seat entertainment system while operating the system to play audio from the test tool.
      - If audio is not heard from the test tool, replace the USB cable connected to the X82 Audio/Video Input Adapter. Verify audio is heard from the test tool. If audio is not heard from the test tool, replace the USB cable connected to the A33 Media Disc Player.
      - If audio is heard from the test tool.
   4. All OK
   - **If audio is heard from the test tool**
9. All OK

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Audio Disc Player and USB Receptacle Replacement**
- **Control Module References** for media disc player replacement, programming, and setup.

DTC B127E: FRONT VIDEO DISPLAY (IO3)

Diagnostic Instructions

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

DTC Descriptor

DTC B127E 00

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Front Video Display Output Signal

Circuit/System Description

The infotainment display and controls are a separate component from the radio, combined into an assembly. The assembly is supplied battery voltage and ground from the vehicle harness. The radio communicates digital video data for on-screen display through a dedicated cable containing the LVDS data circuits.

If the radio detects the display is not responding to the output on the LVDS circuits, the radio sets the DTC.

Conditions for Running the DTC

- Ignition is ON or in the ACC position
- The system voltage is 9-16 V
- The infotainment system is ON
- The test is run once every 14 ms when the infotainment system is operating

Conditions for Setting the DTC

The radio detects the display is not responding to the output on the LVDS circuits.

Action Taken When the DTC Sets

- The radio sets this DTC
- No images are shown on the info display module

Conditions for Clearing the DTC

- The radio detects a properly synced digital video signal.
- A history DTC will clear once 50 consecutive malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

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- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Special Tools

- EL-50334-2 Type A female to Mini B male USB Cable
- EL-50334-14 Infotainment Test Cable

Circuit/System Testing

1. Ignition OFF.
2. Verify the LVDS interface cable is properly connected at the P17 Info Display Module and the A11 Radio connections and there is no damage to the cable or connections.
3. Ignition ON/Vehicle in Service Mode, infotainment system ON.
4. Verify the P17 Info Display Module does not display an image.
    - **If the P17 Info Display Module displays an image.**

      All OK.

    - **If the P17 Info Display Module does not display an image.**
5. Vehicle OFF/Ignition OFF.
6. Disconnect the LVDS interface cable from the P17 Info Display Module.
7. Connect the EL-50334-2 Type A female to Mini B male USB Cable to the P17 Info Display Module. Connect the EL-50334-14 Infotainment Test Cable to the adapter.
8. Disconnect the LVDS interface cable from the A11 Radio. Connect the EL-50334-14 Infotainment Test cable to the A11 Radio.
9. Ignition ON/Vehicle in Service Mode, infotainment system ON.
10. Verify the P17 Info Display Module displays an image.
    - **If the P17 Info Display Module does not display an image**
    1. Replace the P17 Info Display Module. Connect all harness connectors.
    2. Ignition ON, infotainment system ON.
    3. Verify the P17 Info Display Module displays an image.
        - If the P17 Info Display Module still does not display an image, replace the A11 Radio.
        - If the P17 Info Display Module displays an image.
    4. All OK.
    - **If the P17 Info Display Module displays an image.**
11. Replace the vehicle LVDS interface cable from the P17 Info Display Module to the A11 Radio.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Radio Control Assembly Replacement**
- **Control Module References** for radio replacement, programming, and setup.

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DTC B127E: FRONT VIDEO DISPLAY (IOB)

Diagnostic Instructions

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

DTC Descriptor

DTC B127 00

Front Video Display Output Signal Malfunction

DTC B127 01

Front Video Display Output Signal Short to Battery

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Radio Display LVDS Lock Signal	B127E 00	-	-	-
Radio Display LVDS Error Signal	B127E 00	-	-	-
LVDS cable	B127E 00	B127E 00	B127E 01	-

Circuit/System Description

The infotainment display and controls are separate components from the radio. The components are supplied battery voltage and ground from the vehicle harness. The radio communicates digital video data for on-screen display through a dedicated cable containing the LVDS data circuits.

If the radio detects the display is not responding to the output on the LVDS circuits, the radio sets the DTC.

Conditions for Running the DTC

- Ignition is ON or in the ACC position
- The system voltage is 9-16 V
- The infotainment system is ON
- The test is run once every 14 ms when the infotainment system is operating

Conditions for Setting the DTC

The radio detects the display is not responding to the output on the LVDS circuits.

Action Taken When the DTC Sets

- The radio sets this DTC
- No images are shown on the info display module

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Conditions for Clearing the DTC

- The radio detects a properly synced digital video signal.
- A history DTC will clear once 50 consecutive malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

- EL-50334-2 Type A female to Mini B male USB Cable
- EL-50334-14 Infotainment Test Cable

Circuit/System Testing

1. Vehicle OFF/Ignition OFF, disconnect the X1 harness connector at the P17 Info Display Module
2. Test for infinite resistance between the signal circuits listed below and ground:
    - Radio display LVDS lock signal circuit terminal 5
    - Radio display LVDS error signal circuit terminal 6
    - **If less than infinite resistance**

      Repair the short to ground on the circuit.

    - **If infinite resistance**
3. Reconnect the X1 harness connector at the P17 Info Display Module.
4. Disconnect the LVDS interface cable from the P17 Info Display Module.
5. Connect the EL-50334-2 Type A female to Mini B male USB Cable to the P17 Info Display Module.

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Connect the EL-50334-14 Infotainment Test Cable to the adapter.

6. Disconnect the LVDS interface cable from the A11 Radio. Connect the EL-50334-14 Infotainment Test cable to the A11 Radio.
7. Ignition ON/Vehicle in Service Mode, infotainment system ON.
8. Verify DTC B127E is not set as current.
   - **If DTC B127E is set as current**
   1. Replace the P17 Info Display Module. Connect all harness connectors.
   2. Ignition ON, infotainment system ON.
   3. Verify DTC B127E is not set as current.
      - If DTC B127E is still set as current, replace the A11 Radio.
      - If DTC B127E is not set.
   4. All OK.
   - **If DTC B127E is not set as current.**
9. Replace the vehicle LVDS interface cable from the P17 Info Display Module to the A11 Radio.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Control Module References** for replacement, programming, and setup.

DTC B127E: FRONT VIDEO DISPLAY (IO5/IO6)

Diagnostic Instructions

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

DTC Descriptor

DTC B127E 00

Front Video Display Output Signal

Circuit/System Description

The infotainment display and controls are a separate component from the radio, combined into an assembly. The assembly is supplied battery voltage and ground from the vehicle harness. The human machine interface control module communicates digital video data for on-screen display through a dedicated cable containing the LVDS data circuits.

Control information, touch communications and dimming level for the display are communicated via a LIN serial data circuit to the human machine interface control module.

If the human machine interface control module detects the display is not responding to the output on the LVDS circuits, the human machine interface control module sets the DTC.

Conditions for Running the DTC

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- Ignition is ON or in the ACC position
- The system voltage is 9-16 V
- The infotainment system is ON
- The test is continuously when the infotainment system is operating

Conditions for Setting the DTC

The human machine interface control module detects the display is not responding to the output on the LVDS circuits.

Action Taken When the DTC Sets

- The human machine interface control module sets this DTC
- No images are shown on the Info Display Module

Conditions for Clearing the DTC

- The human machine interface control module detects a properly synced digital video signal.
- A history DTC will clear once 50 consecutive malfunction-free ignition cycles have occurred.

Diagnostic Aids

Extended exposure to high temperatures, especially when in direct sunlight may result in the display becoming inoperative. Under these conditions, it may be normal for the display to shut down to prevent permanent damage to the circuitry. Display should return to normal operating condition when temperatures cool.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) **Radio/Navigation System Schematics (IO5, IO6)** **Radio/Navigation System Schematics (IOB)**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) **Radio/Audio System Description and Operation (IO5/IO6)** **Radio/Audio System Description and Operation (IOB)**

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

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Circuit/System Verification

1. Vehicle OFF/Ignition OFF.
2. Verify the LVDS interface cable is properly connected at the P17 Info Display Module, K188 Human Machine Interface Control Module Bypass Module, and the K74 Human Machine Interface Control Module and there is no damage to the cable or connections.
3. Ignition ON/Vehicle in Service Mode, infotainment system ON.
4. Verify the P17 Info Display Module does display an image.
    - **If the P17 Info Display Module does not display an image.**

      Refer to **Rear Vision Camera System Malfunction (with IO3)** **Rear Vision Camera System Malfunction (with IO5/IO6 without Rear Seat Enterainment)** **Rear Vision Camera System Malfunction (with IO5/IO6 with Rear Seat Entertainment)** **Rear Vision Camera System Malfunction (with IOB)**

    - **If the P17 Info Display Module displays an image.**

      All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Radio Control Assembly Replacement**
- **Control Module References** for control module replacement, programming, and setup.

DTC B1280: REAR SEAT ENTERTAINMENT INPUT SIGNAL

Diagnostic Instructions

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

DTC Descriptor

DTC B1280 18

Rear Seat Entertainment Input Signal Circuit Signal Amplitude < Minimum

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Rear Seat Entertainment Display B+	B1280 18*	B1280 18*	-	-
Rear Seat Entertainment Display Control	B1280 18*	B1280 18*	-	-
Rear Seat Entertainment Display Enable Ground	-	B1280 18*	-	-
LVDS Cable	B1280 18*	B1280 18*	B1280 18*	-

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
* One or both rear seat entertainment displays inoperative				

Circuit/System Description

The rear display is located in the headliner. The display screen shows video from the disc player.

The display receives power and ground from the vehicle harness. A discrete control circuit from the media disc player is used to control the power state of the display. The display receives all other video, audio, and control information via the LVDS cable.

If the media disc player detects that the rear display is not responding to the output on the LVDS circuits, the media disc player sets the DTC. When this DTC is set, the display will not power on with the system.

Diagnostic Aids

The media disc player supplies a current limited voltage signal on the control circuit to the rear display. When tested at the display, the voltage measured will be approximately 10% less than the available battery voltage. For example, with the battery at 12.6 volts, the expected measurement would be approximately 11.3 volts.

Although the voltage is near battery voltage, the limited amperage on the circuit is insufficient to light a test lamp.

Conditions for Running the DTC

- Ignition is ON or in the ACC position
- The system voltage is 9-16 V
- The rear seat entertainment system is ON
- The test is run continuously when the rear seat entertainment is operating

Conditions for Setting the DTC

The Media Disc Player detects that the rear display is not responding to the output on the LVDS circuits.

Action Taken When the DTC Sets

- The Media Disc Player sets the DTC
- Information is not shown on the rear display

Conditions for Clearing the DTC

- The Media Disc Player detects a properly synced digital video signal.
- A history DTC will clear once 50 consecutive malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

Video System Schematics

Connector End View Reference

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COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Video Entertainment System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

- **EL-50334-2** Type A female to Mini B male USB Cable
- **EL-50334-4** Type A female to Mini B female Adapter
- **EL-50334-12** Infotainment Test Cable - RSE
- **EL-50334-13** Infotainment Test Cable - RSE Splitter
- **EL-50334-14** Infotainment Test Cable
- **EL-50334-15** Mini B Male USB to Mini B Male USB

Circuit/System Verification

1. Ignition ON.
2. Verify no other DTCs are set.
    - **If any other DTCs are set**

      Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

    - **If no other DTCs are set.**
3. Ignition ON, rear seat entertainment system ON.
4. Verify rear display turns on with the system.
    - **If does not turn on**

      Refer to Circuit/System Testing- Rear Video Display Inoperative

    - **If screen turns on with the system.**
5. Source media from the rear video display to the front radio display.
    - **If media is not seen on front radio display**

      Refer to Circuit/System Testing- Front Radio Display Inoperative

    - **If media is seen on front radio display**
6. All OK.

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Circuit/System Testing

Rear Video Display Inoperative

1. Ignition OFF.
2. Disconnect the X2 harness connector at the P22A Video Display- 2nd Row.
3. Test for less than 10 Ω between the ground circuit terminal 8 and ground.
    - **If 10 Ω or greater.**
    1. Ignition OFF.
    2. Test for less than 2 Ω in the ground circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, repair the open/high resistance in the ground connection.
    - **If less than 10 Ω.**
4. Verify that a test lamp illuminates between the B+ circuit terminal 10 and ground.
    - **If the test lamp does not illuminate and the circuit fuse is good**
    1. Ignition OFF, remove the test lamp.
    2. Test for less than 2 Ω in the B+ circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, verify the fuse is not open and there is voltage at the fuse.
    - **If the test lamp does not illuminate and the circuit fuse is open**
    1. Ignition OFF, remove the test lamp.
    2. Test for infinite resistance between the B+ circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance
    3. Test for infinite resistance between the signal circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance, replace the P22A Video Display- 2nd Row.
    - **If the test lamp illuminates**
5. Ignition ON, rear seat entertainment system ON.
6. Test for 5 V or greater between the control circuit terminal 9 and ground.
    - **If less than 5 V.**
    1. Ignition OFF, disconnect the X1 harness connector at the A33 Media Disc Player.
    2. Test for infinite resistance between the control circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the control circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the A33 Media Disc Player.
    - **If 5 V or greater.**
7. Ignition OFF.
8. Verify the LVDS cable is properly connected at the P22A Video Display- 2nd Row, A33 Media Disc Player and all in-line connectors, and there is no damage to the cable or connections.

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- **If connection problems or cable damage is noted.**

  Perform the appropriate repair or replacement to correct any issues.

- **If no connection problems or cable damage is noted.**

9. Disconnect the X4 harness connector at the A33 Media Disc Player and the X1 harness connector at the P22A Video Display- 2nd Row.

NOTE: **In the following steps, the test tools are assembled and used to bypass the vehicle LVDS cable assembly to determine if there is an output from the A33 Media Disc player on LVDS.**

10. Connect the EL-50334-12 Infotainment Test Cable - RSE to the A33 Media Disc Player. Connect the EL-50334-13 Infotainment Test Cable - RSE Splitter to the EL-50334-12 Infotainment Test Cable - RSE . Connect the EL-50334-14 Infotainment Test Cable and the EL-50334-2 Type A female to Mini B male USB Cable together. Connect the assembled test cables to the longer end of the EL-50334-13 Infotainment Test Cable - RSE Splitter and the P22A Video Display- 2nd Row.
11. Ignition ON, rear seat entertainment system ON.
12. Verify the P22A Video Display- 2nd Row does NOT turn on.
    - **If the P22A Video Display- 2nd Row turns on.**
    1. Replace the LVDS cable connected to the A33 Media Disc Player. Connect all harness connectors.
    2. Ignition ON, rear seat entertainment system ON.
    3. Verify the P22A Video Display- 2nd Row turns on.
        - If the P22A Video Display- 2nd Row does not turn on, replace the LVDS cable connected to the P22A Video Display- 2nd Row.
        - If the P22A Video Display- 2nd Row turns on.
    4. All OK.
    - **If the P22A Video Display- 2nd Row does NOT turn on.**
13. Replace the P22A Video Display- 2nd Row.
14. Ignition ON, rear seat entertainment system ON.
15. Verify the P22A Video Display- 2nd Row turns on.
    - **If the P22A Video Display- 2nd Row turns on.**

      All OK.

    - **If the P22A Video Display- 2nd Row does NOT turn on.**
16. Test or replace the A33 Media Disc Player.

Front Radio Display Inoperative

1. Ignition OFF.
2. Disconnect the X3 harness connector at the P17 Info Display, X5 at the Human Machine Interface, and X5 at the A33 Media Disc Player
3. Connect the EL-50334-15 Mini B Male USB to Mini B Male USB orange end to the P17 Info Display Module, Connect the EL-50334-15 Mini B Male USB to Mini B Male USB (short end) to the K74 Human Machine Interface Module, and Connect the EL-50334-15 Mini B Male USB to Mini B Male USB (long end) to the A33 Media Disc Player.

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4. Ignition ON, rear seat entertainment system ON.
5. Source media from the rear video display to the front radio display.
6. Verify media is seen on the front radio display.
    - **If media is not seen on front radio display.**

      Replace the A33 Media Disc Player

    - **If media is seen on front radio display.**
7. Replace the LVDS cable that is connected to the P17 Info Display, K74 Human Machine Interface, and the A33 Media Disc Player.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Video Display Replacement**
- **Control Module References** for media disc player replacement, programming, and setup.

DTC B12A4: INFOTAINMENT FACEPLATE CONTROL MODULE A

Diagnostic Instructions

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

DTC Descriptor

DTC B12A4 39

Infotainment Faceplate Control Module A Internal Electronic Failure

DTC B12A4 45

Infotainment Faceplate Control Module A Build Variant not Programmed

Circuit/System Description

The radio communicates with the radio controls via serial data. This DTC indicates a fault in the radio controls. No external circuits are involved. The radio may continue to respond normally to faceplate functions when this DTC is set.

Conditions for Running the DTC

- Ignition is ON or in the ACC position.
- The system voltage is at least 9.5 V and no more than 15.5 V.
- All the above conditions are present for greater than 10 seconds.

Conditions for Setting the DTC

The radio receives an improper status response indicating an internal ECU fault in the radio controls.

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Action Taken when the DTC Sets

No action is taken.

Conditions for Clearing the DTC

- A current DTC clears when the radio receives a proper status response message back from the radio control assembly.
- A history DTC clears after 50 malfunction-free ignition cycles.

Diagnostic Aids

- This DTC may be stored as a history DTC without affecting the operation of the radio controls.
- If stored only as a history DTC and not retrieved as a current DTC, do not replace the radio controls.
- If this DTC is retrieved as both a current and history DTC, replace the radio controls.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify DTC B12A4 39 is not set.
    - **If DTC B12A4 39 is set**

      Replace the P17 Info Display Module.

    - **If DTC B12A4 39 is not set**

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3. Verify DTC B12A4 45 is not set.
    - **If DTC B12A4 45 is set**
    1. Verify the A20 Radio/HVAC Controls or A22 Radio Controls can be programmed using Service Programming System (SPS). Refer to **Control Module References** .
        - If Service Programming System (SPS) programming is supported, program the A20 Radio/HVAC Controls or A22 Radio Controls and verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC. If the DTC sets, replace the P17 Info Display Module.
        - If Service Programming System (SPS) programming is not supported.
    2. Replace the P17 Info Display Module.
    - **If DTC B12A4 45 is not set**
4. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for Info Display Module replacement, programming, and setup

DTC B12A6: INFO DISPLAY MODULE

Diagnostic Instructions

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

DTC Descriptor

DTC B12A6 39

Info Display Module Internal Malfunction

Circuit/System Description

The radio communicates with the Info Display Module via serial data. This DTC indicates a fault in the Info Display Module. No external circuits are involved.

Conditions for Running the DTC

- Ignition is ON or in the ACC position.
- The system voltage is at least 9.5 V and no more than 15.5 V.
- All the above conditions are present for greater than 10 seconds.

Conditions for Setting the DTC

The radio receives an improper status response indicating an internal ECU fault in the Info Display Module.

Action Taken when the DTC Sets

No action is taken.

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Conditions for Clearing the DTC

- A current DTC clears when the radio receives a proper status response message back from the Info Display Module.
- A history DTC clears after 50 malfunction-free ignition cycles.

Diagnostic Aids

- This DTC may be stored as a history DTC without affecting the operation of the Info Display Module.
- If stored only as a history DTC and not retrieved as a current DTC, do not replace the Info Display Module.
- If this DTC is retrieved as both a current and history DTC, replace the Info Display Module.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) **Radio/Navigation System Schematics (IO5, IO6)** **Radio/Navigation System Schematics (IOB)**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) **Radio/Audio System Description and Operation (IO5/IO6)** **Radio/Audio System Description and Operation (IOB)**

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify DTC B12A6 39 is not set.
    - **If DTC B12A6 39 is set**

      Replace the P17 Info Display Module.

    - **If DTC B12A6 39 is not set**
3. All OK.

Repair Instructions

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Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for info display module replacement, programming, and setup.

DTC B12A8: OPTICAL MEDIA DRIVE THEFT LOCKED

Diagnostic Instructions

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

DTC Descriptor

DTC B12A8 00

Optical Media Drive Theft Locked

Circuit/System Description

When the Media Disc Player is initially installed in the vehicle, it receives VIN information via serial data. The Media Disc Player stores a portion of the VIN and compares this sequence to the VIN information received each time the Media Disc Player powers on. The VIN in the Media Disc Player is a single one-time learn.

The Media Disc Player theft deterrent system is intended to disable or limit Media Disc Player functionality if incorrect vehicle information is received by the Media Disc Player. The Media Disc Player disables functionality if the VIN information received by the Media Disc Player does not match the VIN information that has been learned by the Media Disc Player. This DTC is generated by the module when the Theft Protection is activated.

Conditions for Running the DTC

This test runs once per second while the Media Disc Player is being accessed.

Conditions for Setting the DTC

The Media Disc Player has learned a correct VIN sequence and the VIN information received via serial data does NOT match the learned VIN sequence.

Action Taken When the DTC Sets

The Media Disc Player may be disabled or have limited functionality.

Conditions for Clearing the DTC

The Media Disc Player receives the correct VIN information via serial data.

Diagnostic Aids

A possible cause of incorrect VIN information could be the Media Disc Player was originally installed in another vehicle.

Reference Information

Schematic Reference

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Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition On/Vehicle in Service Mode.
2. Verify DTC B12A8 is not set.
    - **If DTC B12A8 is set**

      Replace the A33 Media Disc Player.

    - **If DTC B12A8 is not set**
3. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

Control Module References for media disc player replacement, programming, and setup.

DTC B2455: CELLUALR PHONE MICROPHONE

Diagnostic Instructions

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

DTC Descriptors

DTC B2455 01

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Cellualr Phone Microphone Circuit Short to Battery

DTC B2455 02

Cellular Phone Microphone Circuit Short to Ground

DTC B2455 04

Cellular Phone Microphone Circuit Open/High Resistance

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal Terminal B	B2455 02	B2455 04	-	-
Low Reference Terminal A	-	B2455 04	B2455 01	-

Circuit/System Description

The telematics communication interface control module provides the cellular phone microphone with a supplied voltage on the cellular phone microphone signal circuit. When the microphone is in use, voice data from the user is sent back to the telematics communication interface control module on the cellular microphone low reference circuit.

Conditions for Running the DTC

- Ignition ON/Vehicle in Service Mode.
- The system voltage is at least 9.5 V and no more than 15.5 V.
- All the above conditions are present for greater than 10 s.

Conditions for Setting the DTC

B2455 01

The telematics communication interface control module detects a short to voltage in the cellular phone microphone signal circuit for 10 s or greater.

B2455 02

The telematics communication interface control module detects a short to ground in the cellular phone microphone signal circuit for 10 s or greater.

B2455 04

The following conditions will set this DTC:

- The telematics communication interface control module detects an open/high resistance in the cellular phone microphone signal circuit for 10 s or greater.
- The telematics communication interface control module detects an open/high resistance in the microphone low reference circuit for 10 s or greater.

Action Taken When the DTC Sets

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- The telematics status LED turns red.
- The telematics communication interface control module will not receive a signal from the cellular phone microphone.
- Calls can be placed but the caller cannot be heard.

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

OnStar/Telematics Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF/vehicle OFF, disconnect the harness connector at the B24 Cellular Phone Microphone, ignition ON/vehicle in Service Mode.
2. Test for 8.0-10.5 V between the signal circuit terminal B and ground.
    - **If less than 8.0 V**
    1. Ignition OFF/vehicle OFF, disconnect the X2 harness connector at the K73 Telematics Communication Interface Control Module.
    2. Test for infinite resistance between the signal circuit and ground.
        - If less than infinite resistance, repair the short to ground in the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the signal circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the K73 Telematics Communication Interface Control Module.

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- **If greater than 10.5 V**

1. Ignition OFF/vehicle OFF, disconnect the X2 harness connector at the K73 Telematics Communication Interface Control Module, ignition ON/vehicle in Service Mode.
2. Test for less than 1 V between the signal circuit and ground.
    - If 1 V or greater, repair the short to voltage on the circuit.
    - If less than 1 V, replace the K73 Telematics Communication Interface Control Module.

- **If between 8.0-10.5 V**

3. Test for less than 1 V between the low reference circuit terminal A and ground.
    - **If greater than 1 V**

    1. Ignition OFF/vehicle OFF, disconnect the X2 harness connector at the K73 Telematics Communication Interface Control Module, ignition ON/vehicle in Service Mode.
    2. Test for less than 1 V between the low reference circuit and ground.
        - If 1 V or greater, repair the short to voltage in the circuit.
        - If less than 1 V, replace the K73 Telematics Communication Interface Control Module.

    - **If less than 1 V**

4. Test for greater than 8 V between the signal circuit terminal B and the low reference circuit terminal A.
    - **If less than 8 V**

    1. Ignition OFF/vehicle OFF, disconnect the X2 harness connector at the K73 Telematics Communication Interface Control Module.
    2. Test for infinite resistance between the low reference circuit and ground.
        - If less than infinite resistance, repair the short to ground in the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the signal circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the vehicle K73 Telematics Communication Interface Control Module.

    - **If greater than 8 V**

5. Test or replace the B24 Cellular Phone Microphone.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Mobile Telephone Microphone Replacement**
- **Control Module References** for control module replacement, programming and setup.

DTC B2462: GLOBAL POSITIONING SYSTEM (UE1 WITH IO5/IO6)

Diagnostic Instructions

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

DTC Descriptors

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DTC B2462 02

Global Positioning System Short to Ground

DTC B2462 04

Global Positioning System Open

Circuit/System Description

The navigation antenna is connected to the Telematics Communication Interface Control Module. The module supplies 5 V to the antenna to power the internal amplifier through the center conductor of the antenna coax cable.

When the vehicle is equipped with the optional navigation system, a Navigation Antenna Signal Splitter is installed to distribute the navigation signal to both the Telematics Communication Interface Control Module and the Human Machine Interface Control Module. The Human Machine Interface Control Module supplies 5 V through the coax cable to power the Navigation Antenna Signal Splitter.

Conditions for Running the DTC

- Radio On.
- System voltage is greater than 9 V and less than 16 V.
- The navigation system/telematics communication interface control module tests the GPS antenna every 10 s.

Conditions for Setting the DTC

B2462 02

The Telematics Communication Interface Control Module or Human Machine Interface Control Module detects a short to ground on the GPS antenna signal circuit.

B2462 04

The Telematics Communication Interface Control Module or Human Machine Interface Control Module detects a open/high resistance on the GPS antenna signal circuit.

Action Taken When the DTC Sets

- The Telematics Communication Interface Control Module or Human Machine Interface Control Module uses the last reported position and the vehicle speed signal to calculate the vehicle position.
- Route guidance may be inaccurate.
- Turn by turn navigation may be inaccurate or inoperative.

Conditions for Clearing the DTC

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

Diagnostic Aids

- The scan tool Telematics Communication Interface Control Module GPS signal parameter will display a

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Yes or No dependent upon whether or not the module sees an increment of the seconds transmitted by GPS signals to the Telematics Communication Interface Control Module. Upon entering this screen, the GPS signal title will initially display Yes, regardless of the presence of time increment, for at least 2 seconds, while the algorithm in the scan tool determines the status of the clock. If increment is found, Yes is continually displayed. If the clock remains static, No is displayed. The scan tool looks for increment every second, regardless of current display.

- Inaccurate or aged GPS position concerns which are no longer present may have been due to the temporary loss of GPS signal reception by the vehicle. Conditions such as tunnels or parking structures will restrict the cellular phone and navigation antenna from a clear view of the satellites in the sky and may have caused this temporary data loss.
- The GPS requires a clear line of sight to the sky to operate properly. In most cases the GPS will not have reception near tall buildings or inside structures.

Reference Information

Schematic Reference

- **OnStar/Telematics Schematics**
- **Radio/Navigation System Schematics (IO3)** **Radio/Navigation System Schematics (IO5, IO6)** **Radio/Navigation System Schematics (IOB)**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

- **OnStar Description and Operation**
- **Radio/Audio System Description and Operation (IO3)** **Radio/Audio System Description and Operation (IO5/IO6)** **Radio/Audio System Description and Operation (IOB)**

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-49903 OnStar Antenna Diagnostic Tool Kit

Circuit/System Verification

NOTE: **The following verification requires the vehicle to be outside with an unobstructed view of the southern sky. Allow 5 minutes after turning the ignition ON for the vehicle to acquire the GPS satellites signal.**

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1. Ignition ON/vehicle in Service Mode.
2. Verify that DTC B2462 is not set in the Telematics Communication Interface Control Module.
    - **If DTC B2462 is set in the Telematics Communication Interface Control Module and the vehicle is not equipped with a navigation system**

      Refer to Circuit/System Testing Without Navigation System.

    - **If DTC B2462 is set in the Telematics Communication Interface Control Module and the vehicle is equipped with a navigation system**

      Refer to Circuit/System Testing With Navigation System.

    - **If DTC B2462 is not set in the Telematics Communication Interface Control Module**
3. Verify an OnStar advisor can locate the vehicle after performing a blue button press.
    - **If the advisor can not locate the vehicle and the vehicle is not equipped with a navigation system**

      Refer to Circuit/System Testing Without Navigation System

    - **If the advisor can not locate the vehicle and the vehicle is equipped with a navigation system**

      Refer to Circuit/System Testing With Navigation System.

    - **If the advisor can locate the vehicle**
4. Verify DTC B2462 is not set in the Human Machine Interface Control Module.
    - **If DTC B2462 is set in the Human Machine Interface Control Module**

      Refer to Circuit/System Testing With Navigation System - Step 9.

    - **If DTC B2462 is not set in the Human Machine Interface Control Module**
5. Verify that the NO GPS symbol/message is not displayed on the radio display.
    - **If the NO GPS symbol/message is displayed**

      Refer to Circuit/System Testing With Navigation System - Step 9.

    - **If the NO GPS symbol/message is not displayed**
6. All OK.

Circuit/System Testing

without Navigation System

> **NOTE:** **You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.**

1. Ignition OFF/vehicle OFF, disconnect the GPS and cellular coax cable connector at the K73 Telematics Communication Interface Control Module.
2. Attach both leads of the EL-49903-1 OnStar test antenna to the EL-49903-5 combiner. Using the EL-49903-6 coax cable attach the grey connector to the combiner and the brown connector to the K73 Telematics Communication Interface Control Module. Place the test antenna on the roof of the vehicle,

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ignition ON.

3. Verify DTC B2462 is not set or that the OnStar advisor can locate the vehicle.
   - **If DTC B2462 is set or the advisor can not locate the vehicle**

     Replace the K73 Telematics Communication Interface Control Module.

   - **If DTC B2462 is not set or the advisor can locate the vehicle**
4. Test the coax cable between the K73 Telematics Communication Interface Control Module and the T4G Cellular Phone, Navigation, and Digital Radio Antenna. Refer to component testing.
   - **If the coax cable does not pass the test**

     Replace the coax cable.

   - **If the coax cable passes the test**
5. Test or replace the T4G Cellular Phone, Navigation, and Digital Radio Antenna.

with Navigation System

NOTE: **You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.**

1. Ignition OFF/vehicle OFF, disconnect the T4G Cellular Phone, Navigation, and Digital Radio Antenna coax cable at the T15 Navigation Antenna Signal Splitter.
2. Attach both leads of the EL-49903-1 OnStar test antenna to the EL-49903-5 combiner. Using the EL-49903-7 coax cable attach one grey connector to the combiner and the other grey connector to the T15 Navigation Antenna Signal Splitter. Place the test antenna on the roof of the vehicle, ignition ON.
3. Verify DTC B2462 is not set or that the OnStar advisor can locate the vehicle.
   - **If DTC B2462 is not set or the advisor can locate the vehicle**
   1. Test the coax cable between the T15 Navigation Antenna Signal Splitter and the T4G Cellular Phone, Navigation, and Digital Radio Antenna. Refer to Component Testing.
      - If the coax cable does not pass the test

        Replace the coax cable.

      - If the coax cable passes the test
   2. Replace the T4G cellular phone, navigation and digital radio antenna.
   - **If DTC B2462 is set or if the advisor can not locate the vehicle**
4. Ignition OFF/vehicle OFF, disconnect the GPS and cellular coax cable connector at the K73 Telematics Communication Interface Control Module.
5. Attach both leads of the EL-49903-1 OnStar test antenna to the EL-49903-5 combiner. Using the EL-49903-6 coax cable attach the grey connector to the combiner and the brown connector to the K73 Telematics Communication Interface Control Module. Place the test antenna on the roof of the vehicle, ignition ON.
6. Verify DTC B2462 is not set or that the OnStar advisor can locate the vehicle.
   - **If DTC B2462 is set or the advisor can not locate the vehicle.**

     Replace the K73 Telematics Communication Interface Control Module.

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- **If DTC B2462 is not set or the advisor can locate the vehicle.**

7. Ignition OFF/vehicle OFF.
8. Test the coax cable between the T15 Navigation Antenna Signal Splitter and the K73 Telematics Communication Interface Control Module. Refer to Component Testing.
   - **If the coax cable does not pass the test.**

     Replace the coax cable.

   - **If the coax cable passes the test.**
9. Ignition OFF/vehicle OFF, disconnect the blue GPS coax cable connector at the K74 Human Machine Interface Control Module.
10. Attach the EL-49903-1 OnStar test antenna blue connector to the K74 Human Machine Interface Control Module and place the test antenna on the roof of the vehicle.
11. Ignition ON/vehicle in Service Mode.
12. Verify DTC B2462 is not set or that the NO GPS symbol/message is not displayed on the radio.
    - **If DTC B2462 is set or the NO GPS symbol/message is displayed**

      Replace the K74 Human Machine Interface Control Module

    - **If DTC B2462 is not set or if the NO GPS symbol/message is not displayed.**
13. Ignition OFF/vehicle OFF.
14. Test the coax cable between the T15 Navigation Antenna Signal Splitter and the K74 Human Machine Interface Control Module. Refer to Component Testing.
    - **If the coax cable does not pass the test.**

      Replace the coax cable.

    - **If the coax cable passes the test.**
15. Test or replace the T15 Navigation Antenna Signal Splitter.

Component Testing

CAUTION: **Refer to Test Probe Caution .**

NOTE:

- **Before testing the coax cable, check the cable exterior for being pinched, cut, damaged, or having loose connections at the components, which can cause reception issues.**
- **To prevent false reading when testing the center coax terminals, use care not to ground the test probe on the outer housing/shield.**
- **The vehicle may be equipped with sectioned coax. Test each section and replace only the faulty section, not the entire length of coax.**

Coax Cable Test

1. Ignition OFF/vehicle OFF, disconnect the coax cable at both components.
2. Test for less than 5 Ω between the coax cable center terminal end to end.
   - **If 5 Ω or greater**

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Replace the coax cable.

- **If less than 5 Ω**

3. Test for greater than 5 Ω between the coax cable outer shield end to end.
   - **If 5 Ω or greater**

     Replace the coax cable.

   - **If less than 5 Ω**
4. Test for infinite resistance between the coax cable center terminal and the coax cable outer shield.
   - **If less than infinite resistance**

     Replace the coax cable.

   - **If infinite resistance**
5. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **High Frequency Antenna Replacement**
- **Control Module References** for Human Machine Interface control module or Telematics Communication Interface Control Module replacement, programming, and setup.

DTC B2462: GLOBAL POSITIONING SYSTEM (WITHOUT UE1)

Diagnostic Instructions

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

DTC Descriptors

DTC B2462

Global Positioning System Signal

For symptom byte information refer to **Symptom Byte List** .

Circuit Description

The navigation antenna is connected to the human machine interface control module by a shielded coaxial cable. The human machine interface control module supplies 5 V through the coax cable to power the internal antenna amplifier.

Conditions for Running the DTC

- Radio On.
- System voltage is greater than 9 V and less than 16 V.
- The human machine interface control module tests the GPS antenna every 10 seconds.

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Conditions for Setting the DTC

B2462 01

The human machine interface control module detects a short to B+ on the GPS antenna signal circuit.

B2462 02

The human machine interface control module detects a short to ground on the GPS antenna signal circuit.

B2462 04

The human machine interface control module detects an open/high resistance on the GPS antenna signal circuit.

Actions Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Diagnostic Aids

The navigation antenna requires a clear line of sight to the sky to operate properly. The GPS may have limited, intermittent, or no reception near tall buildings or inside structures.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

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Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-49903 OnStar Antenna Diagnostic Tool Kit

Circuit/System Testing

1. Ignition OFF/vehicle OFF, disconnect the navigation antenna coax cable connector at the K74 Human Machine Interface Control Module. Connect the **EL-49903** GM OnStar antenna diagnostic tool kit to the K74 Human Machine Interface Control Module, place the test antenna on the roof of the vehicle.
2. Ignition ON/vehicle in Service Mode, infotainment system ON, navigation selected.
3. Verify DTC B2462 is not set or the NO GPS symbol is not displayed on the information display.
   - **If DTC B2462 is set or the NO GPS symbol is displayed**

     Replace the K74 Human Machine Interface Control Module.

   - **If DTC B2462 is not set or the NO GPS symbol is not displayed**
4. Ignition OFF/vehicle OFF, disconnect the radio navigation coax cable at the T4G Cellular Phone, Navigation, and Digital Radio Antenna.
5. Verify the radio navigation coax cable passes the coax cable component test. Refer to Component Testing.
   - **If the coax cable does not pass the test**

     Replace the coax cable

   - **If the coax cable passes the test**
6. Test or replace the T4G Cellular Phone, Navigation, and Digital Radio Antenna.

Component Testing

CAUTION: **Refer to Test Probe Caution .**

NOTE: **Before testing the coax cable, check the cable exterior for being pinched, cut, damaged, or having loose connections at the components, which can cause reception issues.**

To prevent false reading when testing the center coax terminals, use care not to ground the test probe on the outer housing/shield.

Coax Cable Test

1. Ignition OFF/vehicle OFF, disconnect the coax cable at both components.
2. Test for less than 5 Ω between coax cable center terminal end to end.
   - **If 5 Ω or greater**

     Replace the coax cable

   - **If less than 5 Ω**

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3. Test for less than 5 Ω between the coax cable outer shield end to end.
    - **If 5 Ω or greater**

      Replace the coax cable

    - **If less than 5 Ω**
4. Test for infinite resistance between the coax cable center terminal and the coax cable outer shield.
    - **If less than infinite resistance**

      Replace the coax cable

    - **If infinite resistance**
5. All OK

Repair Instructions

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

- **High Frequency Antenna Replacement**
- **Control Module References** for human machine interface control module replacement, programming, and setup.

DTC B2462: GLOBAL POSITIONING SYSTEM (UE1 WITH IOB)

Diagnostic Instructions

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

DTC Descriptors

DTC B2462 01

Global Positioning System Short to Battery

DTC B2462 02

Global Positioning System Short to Ground

DTC B2462 04

Global Positioning System Open

Circuit/System Description

The navigation antenna is connected to the Telematics Communication Interface Control Module. The module supplies 5 V to the antenna to power the internal amplifier through the center conductor of the antenna coax cable.

When the vehicle is equipped with the optional navigation system, a Navigation Antenna Signal Splitter is installed to distribute the navigation signal to both the Telematics Communication Interface Control Module and

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the navigation radio. The radio supplies 5 V through the coax cable to power the Navigation Antenna Signal Splitter.

Conditions for Running the DTC

- Radio On.
- System voltage is greater than 9 V and less than 16 V.
- The navigation system/telematics communication interface control module tests the GPS antenna every 10 s.

Conditions for Setting the DTC

B2462 01

The telematics communication interface control module detects a short to voltage on the GPS antenna signal circuit.

B2462 02

The telematics communication interface control module detects a short to ground on the GPS antenna signal circuit.

B2462 04

The telematics communication interface control module detects a open/high resistance on the GPS antenna signal circuit.

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Diagnostic Aids

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

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- The GPS requires a clear line of sight to the sky to operate properly. In most cases the GPS will not have reception near tall buildings or inside structures.

Reference Information

Schematic Reference

- **OnStar/Telematics Schematics**
- **Radio/Navigation System Schematics (IO3)** **Radio/Navigation System Schematics (IO5, IO6)** **Radio/Navigation System Schematics (IOB)**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

- **OnStar Description and Operation**
- **Radio/Audio System Description and Operation (IO3)** **Radio/Audio System Description and Operation (IO5/IO6)** **Radio/Audio System Description and Operation (IOB)**

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-49903 OnStar Antenna Diagnostic Tool Kit

Circuit/System Verification

NOTE: **The following verification requires the vehicle to be outside with an unobstructed view of the southern sky. Allow 5 minutes after turning the ignition ON for the vehicle to acquire the GPS satellites signal.**

1. Ignition ON.
2. Verify that DTC B2462 is not set in the Telematics Communication Interface Control Module.
   - **If DTC B2462 is set in the Telematics Communication Interface Control Module and the vehicle is not equipped with a navigation system**

     Refer to Circuit/System Testing Without Navigation System.

   - **If DTC B2462 is set in the Telematics Communication Interface Control Module and the vehicle is equipped with a navigation system**

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Refer to Circuit/System Testing With Navigation System.

- **If DTC B2462 is not set in the Telematics Communication Interface Control Module**

3. Verify an OnStar advisor can locate the vehicle after performing a blue button press.
   - **If the advisor can not locate the vehicle and the vehicle is not equipped with a navigation system**

     Refer to Circuit/System Testing Without Navigation System

   - **If the advisor can not locate the vehicle and the vehicle is equipped with a navigation system**

     Refer to Circuit/System Testing With Navigation System.

   - **If the advisor can locate the vehicle**
4. Verify DTC B2462 is not set in the radio.
   - **If DTC B2462 is set in the radio**

     Refer to Circuit/System Testing With Navigation System - Step 9.

   - **If DTC B2462 is not set in the radio**
5. Verify that the NO GPS symbol/message is not displayed on the radio.
   - **If the NO GPS symbol/message is displayed**

     Refer to Circuit/System Testing With Navigation System - Step 9.

   - **If the NO GPS symbol/message is not displayed**
6. All OK.

Circuit/System Testing

without Navigation System

NOTE: **You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.**

1. Ignition OFF, disconnect the GPS and cellular coax cable connector at the K73 Telematics Communication Interface Control Module.
2. Attach the EL-49903-1 OnStar test antenna to the EL-49903-5 combiner. Using the EL-49903-6 brown -F coax cable attach the combiner to the K73 Telematics Communication Interface Control Module. Place the test antenna on the roof of the vehicle, ignition ON.
3. Verify DTC B2462 is not set or that the OnStar advisor can locate the vehicle.
   - **If DTC B2462 is set or the advisor can not locate the vehicle**

     Replace the K73 Telematics Communication Interface Control Module.

   - **If DTC B2462 is not set or the advisor can locate the vehicle**
4. Test the coax cable between the K73 Telematics Communication Interface Control Module and the T4G Cellular Phone, Navigation, and Digital Radio Antenna. Refer to component testing.
   - **If the coax cable does not pass the test**

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Replace the coax cable.

- **If the coax cable passes the test**

5. Test or replace the T4G Cellular Phone, Navigation, and Digital Radio Antenna.

with Navigation System

NOTE: **You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.**

1. Ignition OFF, disconnect the T4G Cellular Phone, Navigation, and Digital Radio Antenna coax cable at the T15 Navigation Antenna Signal Splitter.
2. Attach the EL-49903-1 OnStar test antenna to the EL-49903-5 combiner. Using the EL-49903-7 grey - G coax cable attach the combiner to the T15 Navigation Antenna Signal Splitter. Place the test antenna on the roof of the vehicle, ignition ON.
3. Verify DTC B2462 is not set or that the OnStar advisor can locate the vehicle.
   - **If DTC B2462 is not set or the advisor can locate the vehicle**
   1. Test the coax cable between the T15 Navigation Antenna Signal Splitter and the T4G Cellular Phone, Navigation, and Digital Radio Antenna. Refer to Component Testing.
      - If the coax cable does not pass the test

        Replace the coax cable.

      - If the coax cable passes the test
   2. Replace the T4G cellular phone, navigation and digital radio antenna.
   - **If DTC B2462 is set or if the advisor can not locate the vehicle**
4. Ignition OFF, disconnect the GPS and cellular coax cable connector at the K73 Telematics Communication Interface Control Module.
5. Attach the EL-49903-1 OnStar test antenna to the EL-49903-5 combiner. Using the EL-49903-6 brown -F coax cable attach the combiner to the K73 Telematics Communication Interface Control Module. Place the test antenna on the roof of the vehicle, ignition ON.
6. Verify DTC B2462 is not set or that the OnStar advisor can locate the vehicle.
   - **If DTC B2462 is set or the advisor can not locate the vehicle.**

     Replace the K73 Telematics Communication Interface Control Module.

   - **If DTC B2462 is not set or the advisor can locate the vehicle.**
7. Ignition OFF.
8. Test the coax cable between the T15 Navigation Antenna Signal Splitter and the K73 Telematics Communication Interface Control Module. Refer to Component Testing.
   - **If the coax cable does not pass the test.**

     Replace the coax cable.

   - **If the coax cable passes the test.**
9. Ignition OFF, disconnect the GPS coax cable at the A11 Radio.
10. Attach the EL-49903-1 OnStar test antenna to the A11 Radio and place the test antenna on the roof of the

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vehicle.

11. Ignition ON.
12. Verify DTC B2462 is not set or that the NO GPS symbol/message is not displayed on the radio.
    - **If DTC B2462 is set or the NO GPS symbol/message is displayed**

      Replace the A11 Radio

    - **If DTC B2462 is not set or if the NO GPS symbol/message is not displayed.**
13. Ignition OFF.
14. Test the coax cable between the T15 Navigation Antenna Signal Splitter and the A11 Radio. Refer to Component Testing.
    - **If the coax cable does not pass the test.**

      Replace the coax cable.

    - **If the coax cable passes the test.**
15. Test or replace the T15 Navigation Antenna Signal Splitter.

Component Testing

CAUTION: **Refer to Test Probe Caution .**

NOTE:

- **Before testing the coax cable, check the cable exterior for being pinched, cut, damaged, or having loose connections at the components, which can cause reception issues.**
- **To prevent false reading when testing the center coax terminals, use care not to ground the test probe on the outer housing/shield.**
- **The vehicle may be equipped with sectioned coax. Test each section and replace only the faulty section, not the entire length of coax.**

Coax Cable Test

1. Ignition OFF, disconnect the coax cable at both components.
2. Test for less than 5 Ω between the coax cable center terminal end to end.
    - **If 5 Ω or greater**

      Replace the coax cable.

    - **If less than 5 Ω**
3. Test for greater than 5 Ω between the coax cable outer shield end to end.
    - **If 5 Ω or greater**

      Replace the coax cable.

    - **If less than 5 Ω**
4. Test for infinite resistance between the coax cable center terminal and the coax cable outer shield.
    - **If less than infinite resistance**

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Replace the coax cable.

- **If infinite resistance**

5. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **High Frequency Antenna Replacement**
- **Control Module References** for radio or telematics communication interface control module replacement, programming, and setup

DTC B2470: CELLULAR PHONE ANTENNA

Diagnostic Instructions

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

DTC Descriptors

DTC B2470 02

Cellular Phone Antenna Circuit Malfunction Short to Ground

DTC B2470 04

Cellular Phone Antenna Circuit Malfunction Open Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	B2470 02	B2470 04	-	-

Circuit/System Description

The cellular phone and navigation antenna is connected to the telematics communication interface control module. This module supplies 5 V to the cellular phone and navigation antenna to power the internal amplifier. When the vehicle is equipped with the optional navigation radio, a navigation antenna signal splitter is installed to distribute the GPS signal to both the telematics communication interface control module and the navigation radio. The navigation radio supplies 5 V through the GPS antenna coaxial cable to the navigation antenna signal splitter to power the internal navigation radio signal amplifier.

Conditions for Running the DTC

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

Conditions for Setting the DTC

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B2470 02

The telematics communication interface control module detects a short to ground on the cellular antenna signal circuit.

B2470 04

The telematics communication interface control module detects a open or high resistance on the cellular antenna signal circuit.

The above conditions are present for greater than 1 s.

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

- The telematics communication interface control module detects the presence of a cellular antenna.
- A history DTC clears after 50 malfunction-free ignition cycles.

Reference Information

Schematic Reference

OnStar/Telematics Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-49903-1 Test Antenna, Navn-Cell Comn

Circuit/System Testing

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NOTE:

- **The vehicle may be equipped with sectioned coax. Test each section and replace only the faulty section, not the entire length of coax.**
- **The following verification requires the vehicle to be outside with an unobstructed view of the southern sky. Allow 5 min after turning the ignition ON for the GPS satellites to acquire vehicle signal.**

1. Verify the OnStar Generation you are working on by using a scan tool under Selected Vehicle Configuration/Telematics Communication Interface Control Module. Failure to use the correct document will result in incorrect diagnoses.
2. Ignition OFF and all vehicle systems OFF, disconnect the cellular GPS coax cable connector at the K73 Telematics Communication Interface Control Module. It may take up to 2 min for all vehicle systems to power down.
3. Connect the **EL-49903-1** Test Antenna, Navn-Cell Comn to the K73 Telematics Communication Interface Control Module. Place the test antenna on the roof of the vehicle, ignition ON.
4. Verify the DTC does not set while operating the vehicle within the conditions for running the DTC.
   - **If the DTC sets**

     Replace the K73 Telematics Communications Interface Control Module.

   - **If the DTC does not set**
5. Ignition OFF.
6. Disconnect the **EL-49903-1** Test Antenna, Navn-Cell Comn from the K73 Telematics Communication Interface Control Module
7. Disconnect the GPS and cellular coax cable connector at the T4G Cellular Phone, Navigation, and Digital Radio Antenna.

   Test the coax cable. Refer to Component Testing.

8. Test the coax cable between the K73 Telematics Communication Interface Control Module and the T4G Cellular Phone, Navigation, and Digital Radio Antenna. Refer to Component Testing.
   - **If the coax cable does not pass the test**

     Replace the coax cable.

   - **If the coax cable passes the test**
9. Test or replace the Cellular Phone and GPS Antenna.

Component Testing

CAUTION: **Refer to Test Probe Caution**

NOTE:

- **Before testing the coax cable, check the cable exterior for being pinched, cut, damaged, or having loose connections at the components, which can cause reception issues.**
- **To prevent false readings when testing the center coax terminals, use care not to ground the test probe on the outer housing/shield.**

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Coax Cable Test

1. Ignition OFF, disconnect the coax cable at both components.
2. Test for less than 5 Ω between the coax cable center terminal end to end.
    - **If 5 Ω or greater**

      Replace the coax cable.

    - **If less than 5 Ω**
3. Test for greater than 5 Ω between the coax cable outer shield end to end.
    - **If 5 Ω or greater**

      Replace the coax cable.

    - **If less than 5 Ω**
4. Test for infinite resistance between the coax cable center terminal and the coax cable outer shield.
    - **If less than infinite resistance**

      Replace the coax cable.

    - **If infinite resistance**
5. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **High Frequency Antenna Replacement**
- **Control Module References** for telematics communication interface control module replacement, setup, and programming

DTC B2476 OR B2482: CELLULAR PHONE SELECT SERVICE SWITCH

Diagnostic Instructions

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

DTC Descriptors

DTC B2476 04

Cellular Phone Select Service Switch Open

DTC B2476 59

Cellular Phone Select Service Switch Protection Time-out

DTC B2482 00

Cellular Phone Select Service Switch Range/Performance

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Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
10 V Reference	1	B2476 04	B2476 04	-
Signal	1	1	B2476 59	B2476 59, B2482 00
Ground	-	B2476 04	-	-
1. OnStarÂ® Buttons Inoperative				

Circuit/System Description

The OnStarÂ® button assembly consists of 3 buttons: Call/Answer, OnStarÂ® Call Center, and OnStarÂ® Emergency. The telematics communication interface control module supplies the OnStarÂ® button assembly with 10 V via the 10 V reference circuit. Each of the buttons, when pressed, completes the circuit across a resistor or set of resistors allowing a specific voltage to be returned to the telematics communication interface control module over the signal circuit. Depending upon the voltage range returned, the telematics communication interface control module is able to identify which button has been pressed.

Conditions for Running the DTC

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

Conditions for Setting the DTC

B2476 04

The telematics communication interface control module detects a short to voltage or an open/high resistance on the 10 V reference circuit.

B2482 and B2476 59

The telematics communication interface control module detects a valid signal on the keypad signal circuit for longer than 15 s. If one of the OnStarÂ® buttons is held or stuck for 15 s or greater, the telematics communication interface control module will set this DTC.

Action Taken When the DTC Sets

- The OnStarÂ® status LED turns red.
- No calls can be placed.
- The telematics communication interface control module will ignore all inputs from the OnStarÂ® button assembly.

Conditions for Clearing the DTC

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

Diagnostic Aids

After any repair is made to the 10 V reference circuit or button signal circuit the fuse to the telematics

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communication interface control module must be removed for 30 s to reset the control module. Failure to do so could result in incorrect diagnosis.

Reference Information

Schematic Reference

OnStar/Telematics Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

NOTE: **Contact the OnStarÂ® Call Center first before pressing the emergency button in order to notify them of the test.**

1. Ignition ON.
2. Verify that each button of the S51 Telematics Button Assembly operates normally by pressing each button individually.
    - **If none of the buttons operate normally**

      Refer to Circuit/System Testing

    - **If some, but not all, of the buttons operate normally**

      Test or replace the A10 Inside Rearview Mirror

    - **If all of the buttons operate normally**
3. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the A10 Inside Rearview Mirror. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 5 and ground.

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- **If 10 Ω or greater**

1. Ignition OFF.
2. Test for less than 2 Ω in the ground circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω, repair the open/high resistance in the ground connection.

- **If less than 10 Ω**

3. Ignition ON.
4. Test for 8.0-10.5 V between the 10 V reference circuit terminal 4 and ground.

- **If less than 8.0 V**

1. Ignition OFF, disconnect the harness connector at the K73 Telematics Communication Interface Control Module.
2. Test for infinite resistance between the 10 V reference circuit and ground.
    - If less than infinite resistance, repair the short to ground on the circuit.
    - If infinite resistance
3. Test for less than 2 Ω in the 10 V reference circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω, replace the K73 Telematics Communication Interface Control Module.

- **If greater than 10.5 V**

1. Ignition OFF, disconnect the harness connector at the K73 Telematics Communication Interface Control Module, ignition ON.
2. Test for less than 1 V between the 10 V reference circuit and ground.
    - If 1 V or greater, repair the short to voltage on the circuit.
    - If less than 1 V, replace the K73 Telematics Communication Interface Control Module.

- **If between 8.0-10.5 V**

5. Ignition OFF and all vehicle systems OFF.
6. Test for 500-900 Ω between the signal circuit terminal 3 and ground.

- **If less than 500 Ω**

1. Disconnect the X1 harness connector at the K73 Telematics Communication Interface Control Module.
2. Test for infinite resistance between the signal circuit and ground.
    - If less than infinite resistance, repair the short to ground on the circuit.
    - If infinite resistance, replace the K73 Telematics Communication Interface Control Module.

- **If greater than 900 Ω**

1. Disconnect the X1 harness connector at the K73 Telematics Communication Interface Control Module, ignition ON.
2. Test for less than 1 V between the signal circuit and ground.
    - If 1 V or greater, repair the short to voltage on the circuit.
    - If less than 1 V
3. Ignition OFF.
4. Test for less than 2 Ω in the signal circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.

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- If less than 2 Ω, replace the K73 Telematics Communication Interface Control Module.
- **If between 500-900 Ω**

7. Test or replace the A10 Inside Rearview Mirror.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Inside Rearview Mirror Replacement (With UE1)** **Inside Rearview Mirror Replacement (Without UE1)**
- **Control Module References** for telematics communication interface control module replacement, programming, and setup.

DTC B2485: WIRELESS COMMUNICATION (BT) ANTENNA

Diagnostic Instructions

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

DTC Descriptors

DTC B2485 02

Wireless Communication (BT) Antenna Circuit Short to Ground

DTC B2485 04

Wireless Communication (BT) Antenna Circuit Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	B2485 02	B2485 04	-	-

Circuit/System Description

Bluetooth Â® wireless technology is a short-range communications technology intended to replace the cables connecting portable and/or fixed devices while maintaining high levels of security. The operating range of the signal is approximately 30 feet.

The Bluetooth Â® antenna is a small fixed antenna connected directly to the telematics communication interface control module and is used to send and receive signals from a Bluetooth Â® enabled cellular phone.

Conditions for Running the DTC

- The ignition is in OFF, ACCESSORY or RUN position.
- The system voltage is between 9-16 V.
- The telematics communication interface control module tests the antenna once every second.

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Conditions for Setting the DTC

B2485 02

- The signal voltage is less than 1 V.
- The above conditions must be met for 500 ms.

B2485 04

- The signal voltage is greater than 2 V.
- The above conditions must be met for 500 ms.

Actions Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Diagnostic Aids

- Verify the mobile device is properly configured for the feature being used. Refer to the device manufacturers information.
- Verify the function/feature that is being used is supported by the mobile device.
- The device must be paired to the telematics communication interface control module to use the available Bluetooth Â® feature(s). The pairing process must only be performed once for each device, unless that device's information is deleted.
- The system can store pairing information for multiple devices, but can only be actively connected to one at any given time.

Reference Information

Schematic Reference

OnStar/Telematics Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

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- **Wiring Repairs**

Special Tools

EL-50334-20 Multi-Media Interface Tester (Multi-Media Interface Tool)

Circuit/System Testing

1. Verify that the T4S Wireless Communication Antenna - Bluetooth Â® is properly connected to the K73 Telematics Communication Interface Control Module and is not damaged.
    - **If the antenna is disconnected**

      Connect the T4S Wireless Communication Antenna - Bluetooth Â® to the module.

    - **If the antenna is damaged**

      Test or replace the T4S Wireless Communication Antenna - Bluetooth Â® .

    - **If the antenna is connected and not damaged**

NOTE: **The Multi-Media Interface Tool tool can be used to test either cellular phone or streaming audio functions. Refer to the tool instructions, and perform the appropriate test(s) related to the customers concern in the following steps.**

2. Ignition ON, infotainment system ON.
3. Verify the infotainment system successfully pairs with the Multi-Media Interface Tool.
    - **If the infotainment system does not successfully pair with the Multi-Media Interface Tool.**
    1. Test or replace the T4S Wireless Communication Antenna - Bluetooth Â®.
    2. Clear the DTC, ignition OFF.
    3. Ignition ON.
    4. Verify the DTC is not set.
        - If the DTC is set, replace the K73 Telematics Communication Interface Control Module.
        - If the DTC is not set
    5. All OK.
    - **If the infotainment system successfully pairs with the Multi-Media Interface Tool.**
4. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for telematics communication interface control module replacement, programming and setup.

SYMPTOMS - CELLULAR COMMUNICATION

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

1. Perform the **Diagnostic System Check - Vehicle** before using the Symptom Tables in order to verify that

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all of the following are true:

- There are no DTCs set.
- The control modules can communicate via the serial data link.

2. Review the system operation in order to familiarize yourself with the system functions. Refer to **OnStar Description and Operation** .

Visual/Physical Inspection

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

Intermittent

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

Symptom List

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

- **No Global Positioning System (GPS) Reception (UE1 with IO5/IO6)No Global Positioning System (GPS) Reception (without UE1)No Global Positioning System (GPS) Reception (UE1 with IOB)**
- **OnStar Microphone Malfunction**
- **OnStar Audio Malfunction**
- **OnStar Button LED Malfunction**
- **OnStar Call Center Remote Function Requests Malfunction**
- **OnStar Button Malfunction**
- **Unable to Contact OnStar Call Center**
- **OnStar Voice Recognition Malfunction**
- **OnStar Steering Wheel Control Functions Malfunction**

SYMPTOMS - ENTERTAINMENT

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

1. Perform the **Diagnostic System Check - Vehicle** before using the Symptom Tables in order to verify that all of the following are true:
   - There are no DTCs set.
   - The control modules can communicate via the serial data link.
2. Review the system operation in order to familiarize yourself with the system functions. Refer to **Radio/Audio System Description and Operation (IO3)** **Radio/Audio System Description and Operation (IO5/IO6)** **Radio/Audio System Description and Operation (IOB)** .

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the Radio/Audio System. Refer to **Checking Aftermarket Accessories** .

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- Inspect for easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

Intermittent

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

Symptom List

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

- **Application Malfunction**
- **Audio/Video Player Adapter - Audio or Video Malfunction**
- **Auxiliary Audio Input Malfunction (IO3)Auxiliary Audio Input Malfunction (IOB)Auxiliary Audio Input Malfunction (IO5/IO6)**
- **Bluetooth Malfunction (with UPF)Bluetooth Malfunction (IO5/IO6 without UPF)Bluetooth Malfunction (IOB without UPF)**
- **Media Disc Player Malfunction (without U42)Media Disc Player Malfunction (with U42)**
- **Digital Radio Poor or No Reception**
- **No Global Positioning System (GPS) Reception (UE1 with IO5/IO6)No Global Positioning System (GPS) Reception (without UE1)No Global Positioning System (GPS) Reception (UE1 with IOB)**
- **Radio Poor Reception**
- **Speaker Malfunction (UQ3/UQ5)Speaker Malfunction (UQG)Speaker Malfunction (UQA with Front Bench Seat)Speaker Malfunction (UQA with Front Bucket Seats)**
- **Video Entertainment System Remote Control Malfunction**
- **Video Entertainment System Wireless Headphone Malfunction**
- **Video Display Malfunction**
- **Radio Information Display Malfunction (IOB)Radio Information Display Malfunction (IO5/IO6)Radio Information Display Malfunction (IO3)**
- **Voice Recognition Malfunction (with UE1)Voice Recognition Malfunction (without UE1)**

APPLICATION MALFUNCTION

Diagnostic Instructions

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

Circuit/System Description

The term application refers to any piece of software that works on a system (hardware) that is being operated by its own software. Applications are typically small software programs which uses the hardware to perform a specific task, as opposed to operating the entire system.

Diagnostic Aids

- For an application to be used, it must be installed on both the vehicle infotainment system and a

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compatible mobile device.

- The application must work correctly on the device to work with the vehicle infotainment system.
- The user may be required to log-in to the application on the mobile device before using the application from the vehicle controls.
- Applications use the mobile device and connection to a service provider to operate. Connection quality issues, or service provider data transmission issues can give the appearance of a vehicle malfunction.
- The device must be connected to the system. This may be done wirelessly via Bluetooth Â®, or via the vehicle USB port.

  When a mobile device is connected via BluetoothÂ®, some or all of the device controls may be unavailable from the radio controls. This varies dependent upon the device being used. Refer to the vehicle owner manual, supplements, and the device manufacturer's information for information on devices, control, and operation.

  Refer to the device manufacturer's information for the preferred connection method.

- The device must be unlocked, and any additional applications should be closed.
- If the device has any sound enhancement features such as noise reduction or echo control, these features should be turned off.
- A low battery condition in the mobile device may not allow the device to connect to the system, or can create communication issues with the device. Verify the device battery state of charge and re-charge or replace as needed.
- If a 'Please See Device' or similar type error message is displayed, this may indicate the device has lost its connection to the vehicle, or the device has lost its external data connection.
- If a cable is used for connection, attempt to connect the device using a different cable; cables can deteriorate over time or become damaged.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

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Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Verify the application is installed on the mobile device and is up to date.
   - **If the application is not installed or is not up to date.**

     Install or update the application on the device.

   - **If the application is installed on the mobile device and is up to date**
2. Verify the application operates correctly on the mobile device.
   - **If the application is not operating correctly on the mobile device.**

     Refer to the application web site.

   - **If the application is operating correctly on the mobile device.**
3. Verify the K74 Human Machine Interface Control Module calibrations are current.
   - **If the calibrations are not current**

     Reprogram the K74 Human Machine Interface Control Module and re-evaluate the concern.

   - **If no update calibrations are available**
4. Verify the application is installed on the K74 Human Machine Interface Control Module and is up to date.
   - **If the application is not installed or is not up to date.**

     Install or update the application and re-evaluate the concern.

   - **If the application is installed and is up to date**
5. Ignition On/Vehicle in Service Mode. Infotainment system ON.
6. Verify the mobile device can connect to the infotainment system. Refer to the owner manual for information on the preferred connection method for the device.
   - **If the mobile device cannot connect to the vehicle infotainment system.**
   - If unable to connect via Bluetooth, refer to **Bluetooth Malfunction (with UPF)Bluetooth Malfunction (IO5/IO6 without UPF)Bluetooth Malfunction (IOB without UPF)**.
   - If unable to connect via USB, refer to **Auxiliary Audio Input Malfunction (IO3)Auxiliary Audio Input Malfunction (IOB)Auxiliary Audio Input Malfunction (IO5/IO6)**.
   - **If the mobile device connects to the vehicle infotainment system.**
7. Launch the application.
8. Verify the application operates properly with the vehicle infotainment system.
   - **If the application does not function properly**

     Refer to diagnostic aids.

   - **If the application functions properly**
9. All OK.

Repair Instructions

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Perform the **Diagnostic Repair Verification** after completing the repair.

AUDIO/VIDEO PLAYER ADAPTER - AUDIO OR VIDEO MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	5	4	-	-
Left Auxiliary Audio Input Signal	2	2	2	-
Right Auxiliary Audio Input Signal	1	1	1	-
Auxiliary Audio Input Common Signal	-	1, 2	-	-
Auxiliary Video Input High Signal	3	3	3	-
Auxiliary Video Input Low Signal	-	3	-	-
Rear Wired Headphone - Left Audio Signal	6	6	6	-
Rear Wired Headphone - Right Audio Signal	7	7	7	-
Rear Wired Headphone - Audio Common Signal	8	8	-	-
USB cable	4	B127A, 4	-	-
Ground	-	4	-	-

1. No or distorted right side audio
2. No or distorted left side audio
3. No or distorted video from auxiliary device
4. Rear seat entertainment USB/SD Card reader inoperative
5. Fault affects multiple components, multiple DTCs set
6. No, reduced, or distorted left side audio from rear wired headphone
7. No, reduced, or distorted right side audio from rear wired headphone
8. No, reduced, or distorted audio from rear wired headphone

Circuit/System Description

The rear seat entertainment system has an auxiliary input assembly that contains a USB port, an SD card reader, RCA type audio/video jacks, and a wired headphone jack with volume control. Refer to the Owners Manual for information on compatible devices and supported media types/formats.

USB Port and SD Card Reader

The USB port and SD card reader slot interface with a hub device, internal to the assembly. The assembly receives fused battery voltage and ground from the harness to power the internal hub device as well as providing additional amperage to power USB devices.

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The internal hub device interfaces directly with the media disc player via a standard USB cable. A Mini type USB connector is used to connect the cable at the media disc player and the auxiliary input assembly. Mini type USB male to female connections are used for connecting USB cables together where an in-line connection is required. An in-line cable connection is typically found between the console and I/P harness.

The USB port allows connectivity to the rear seat entertainment system from portable media players or a USB storage device (memory stick/ flash drive). The rear seat entertainment uses the SD card reader as a mass storage device, similar to a USB storage device.

Once a supported device is connected to the USB port or SD card reader, the device may be sourced to on or both of the rear displays using the remote control.

Audio/Video Input

The local video input is the standard yellow RCA color-coded jacks. A composite video signal from a device can be attached to this input and is then available to be sourced to one or both of the rear screens. To use this video input, connect the auxiliary device cables to the RCA jacks and power ON both the auxiliary device and the rear seat entertainment system.

Power for the device is not supplied by this connection. The rear seat entertainment system cannot control the operation of devices connected to the RCA jacks. All operation of the device must be done using the controls available on the device.

Wired Headphone Jack

The wired headphone jack is used to connect an additional set of headphones to the system. Audio for the wired headphone jack can be from either the left or the right screen source, and is selected using the remote control.

Audio to the wired headphone jack is transmitted through the vehicle harness from the media disc player. A rotary control near the headphone jack is used to adjust the volume.

Diagnostic Aids

- Refer to the owners manual or supplements for information on operating the rear seat entertainment system, compatible media, and compatible devices.
- Verify the external audio or video device is operating normally before performing this diagnostic procedure.

Reference Information

Schematic Reference

Video System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Video Entertainment System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-50334-20 Multi-Media Interface Tester (MIT)

Circuit/System Verification

1. Verify no DTCs are present.
   - **If any DTCs are present**

     Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

   - **If no DTCs are present**
2. Ignition ON, rear seat entertainment system ON.
3. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the rear seat entertainment system USB port and select the USB test mode.
4. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the rear seat entertainment system while operating the system to play audio from the test tool.
   - **If audio is not heard from the test tool**
   1. Insert an SD card with compatible media into the SD card slot.
   2. Verify the media on the SD card can be accessed while operating the system to connect to the SD card.
   - If the SD card reader cannot be accessed, refer to Circuit/System Testing- USB Port and SD Card Reader.
   - If the SD card reader can be accessed, replace the X82 Audio/Video Input Adapter.
   - **If audio is heard from the test tool**
5. Insert an SD card with compatible media into the SD card slot.
6. Verify the media on the SD card can be accessed while operating the system to connect to the SD card.
   - **If the SD card reader cannot be accessed**

     Refer to Circuit/System Testing- USB Port and SD Card Reader

   - **If the SD card reader can be accessed**
7. Connect a compatible device to the X82 Audio/Video Input Adapter RCA jacks. Operate the rear seat entertainment system to connect to the RCA jacks as the source.
8. Verify that audio and video from the device can be accessed while operating the device.
   - **If the audio or video from the device cannot be accessed**

     Refer to Circuit/System Testing- Audio/Video Input

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- **If the audio or video from the device can be accessed**

9. Connect a wired headphone to the X82 Audio/Video Input Adapter headphone jack. Operate the rear seat entertainment system to connect an available audio source to the wired headphone jack.
10. Verify that audio from the source can be heard with the wired headphones, adjusting the rotary volume control as necessary.
    - **If the audio cannot be heard**

      Refer to Circuit/System Testing- Wired Headphone Jack

    - **If the audio can be heard**
11. Verify the wired headphone audio volume increases and decreases while operating the rotary volume control.
    - **If the wired headphone audio volume cannot be adjusted**

      Test or replace the X82 Audio/Video Input Adapter

    - **If the wired headphone audio volume can be adjusted**
12. All OK.

Circuit/System Testing

USB Port and SD Card Reader

1. Ignition OFF, disconnect the X1 harness connector at the X82 Audio/Video Input Adapter.
2. Test for less than 10 Ω between the ground circuit terminal 1 and ground.
    - **If 10 Ω or greater**
    1. Ignition OFF.
    2. Test for less than 2 Ω in the ground circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, repair the open/high resistance in the ground connection.
    - **If less than 10 Ω**
3. Verify that a test lamp illuminates between the B+ circuit terminal 7 and ground.
    - **If the test lamp does not illuminate**
    1. Ignition OFF, remove the test lamp.
    2. Test for less than 2 Ω in the B+ circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - **If the test lamp illuminates**
4. Verify the USB cable is properly connected at the X82 Audio/Video Input Adapter, A33 Media Disc Player and the console to I/P in-line connector, and there is no damage to the cable or connections.
    - **If connection problems or cable damage is noted.**

      Perform the appropriate repair or replacement to correct any issues.

    - **If no connection problems or cable damage is noted.**
5. Replace the X82 Audio/Video Input Adapter. Connect all harness connectors.
6. Ignition ON, rear seat entertainment system ON.

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7. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X82 Audio/Video Input Adapter USB port and select the USB test mode.
8. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the rear seat entertainment system while operating the system to play audio from the test tool.
    - **If audio is not heard from the test tool**
    1. Replace the A33 Media Disc Player.
    2. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X82 Audio/Video Input Adapter USB port and select the USB test mode.
    3. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the rear seat entertainment system while operating the system to play audio from the test tool.
        - If audio is not heard from the test tool, replace the USB cable connected to the X82 Audio/Video Input Adapter. Verify audio is heard from the test tool. If audio is not heard from the test tool, replace the USB cable connected to the A33 Media Disc Player.
        - If audio is heard from the test tool.

          All OK.

    - **If audio is heard from the test tool**
9. All OK

Audio/Video Input

1. Ignition OFF, disconnect the X1 harness connector at the X82 Audio/Video Input Adapter and the X2 harness connector at the A33 Media Disc Player. Ignition ON.
2. Test for less then 1 V between the signal circuit terminals listed below and ground:
    - A33 Media Disc Player terminal 11 X2
    - A33 Media Disc Player terminal 12 X2
    - A33 Media Disc Player terminal 13 X2
    - A33 Media Disc Player terminal 15 X2
    - A33 Media Disc Player terminal 16 X2
    - **If 1 V or greater.**

      Repair the short to voltage on the circuit.

    - **If less than 1 V.**
3. Ignition OFF.
4. Test for infinite resistance between the signal circuit terminals listed below and ground:
    - A33 Media Disc Player terminal 11 X2
    - A33 Media Disc Player terminal 12 X2
    - A33 Media Disc Player terminal 13 X2
    - A33 Media Disc Player terminal 15 X2
    - A33 Media Disc Player terminal 16 X2
    - **If less than infinite resistance.**

      Repair the short to ground on the circuit.

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- **If infinite resistance.**

5. Test for less then 2 Ω between signal circuit terminals listed below and ground:
   - A33 Media Disc Player terminal 11 X2 and the X82 Audio/Video Input Adapter terminal 5 X1
   - A33 Media Disc Player terminal 12 X2 and the X82 Audio/Video Input Adapter terminal 4 X1
   - A33 Media Disc Player terminal 13 X2 and the X82 Audio/Video Input Adapter terminal 11 X1
   - A33 Media Disc Player terminal 15 X2 and the X82 Audio/Video Input Adapter terminal 6 X1
   - A33 Media Disc Player terminal 16 X2 and the X82 Audio/Video Input Adapter terminal 12 X1
   - **If 2 Ω or greater.**

     Repair the open/high resistance in the circuit.

   - **If less then 2 Ω.**
6. Replace the X82 Audio/Video Input Adapter.
7. Connect all harness connectors. Ignition ON, rear seat entertainment system ON.
8. Connect a compatible device to the X82 Audio/Video Input Adapter RCA jacks. Operate the rear seat entertainment system to connect to the RCA jacks as the source.
9. Verify that audio and video from the device can be accessed while operating the device.
   - **If the audio or video from the device cannot be accessed**

     Test or replace the A33 Media Disc Player.

   - **If the audio or video from the device can be accessed**
10. All OK.

Wired Headphone Jack

1. Ignition OFF, disconnect the X1 harness connector at the X82 Audio/Video Input Adapter. Ignition ON, infotainment system ON.
2. Test for less than 1 V between the signal circuits listed below and ground:
   - Left audio headphone signal circuit terminal 3
   - Right audio headphone signal circuit terminal 9
   - Audio common headphone signal circuit terminal 10
   - **If 1 V or greater**
   1. Ignition OFF, disconnect the X2 harness connector at the A33 Media Disc Player. Ignition ON.
   2. Test for less than 1 V between the signal circuit and ground.
      - If 1 V or greater, repair the short to voltage on the circuit.
      - If less than 1 V, replace the A33 Media Disc Player.
   - **If less than 1 V**
3. Ignition OFF, disconnect the X2 harness connector at the A33 Media Disc Player.
4. Test for infinite resistance between the signal circuits listed below and ground:
   - Left audio headphone signal circuit terminal 1
   - Right audio headphone signal circuit terminal 2
   - Audio common headphone signal circuit terminal 3
   - **If less than infinite resistance**

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Repair the short to ground on the circuit.

- **If infinite resistance**

5. Test for less than 5 Ω between the signal circuit terminals listed below:
   - A33 Media Disc Player signal circuit terminal 1 X2 and the X82 Audio/Video Input Adapter signal circuit terminal 3 X1
   - A33 Media Disc Player signal circuit terminal 2 X2 and the X82 Audio/Video Input Adapter signal circuit terminal 9 X1
   - A33 Media Disc Player signal circuit terminal 3 X2 and the X82 Audio/Video Input Adapter signal circuit terminal 10 X1
   - **If 5 Ω or greater**

     Repair the open/high resistance in the circuit.

   - **If less than 5 Ω**
6. Replace the X82 Audio/Video Input Adapter. Connect all harness connectors.
7. Connect a wired headphone to the X82 Audio/Video Input Adapter headphone jack. Operate the rear seat entertainment system to connect an available audio source to the wired headphone jack.
8. Verify that audio from the source can be heard with the wired headphones, adjusting the rotary volume control as necessary.
   - **If the audio cannot be heard**

     Test or replace the A33 Media Disc Player.

   - **If the audio can be heard**
9. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Audio Disc Player and USB Receptacle Replacement**
- **Control Module References** for media disc player replacement, programming, and setup.

AUXILIARY AUDIO INPUT MALFUNCTION (IO3)

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	B124B, 1, 6	1, 5	-	-
Auxiliary Audio Common Signal	-	8	-	-

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Auxiliary Detection Signal	7	8	-	-
Left Auxiliary Audio Signal	2	2	2, 4	-
Right Auxiliary Audio Signal	3	3	3, 4	-
USB Cable	B124B	B124B	B124B	-
Ground	-	1	-	-

1. SD Card reader and USB port Inoperative
2. No left side audio from device connected to AUX jack
3. No right side audio from device connected to AUX jack
4. Noticeable distortion may be present in affected audio channel
5. Fault may affect one or more components, dependant on fault location
6. Fault affects multiple components, dependant on vehicle equipment
7. Radio does not detect auxiliary device connection, AUX not available as input selection
8. AUX always available as an input selection, with or without auxiliary device connected

Circuit/System Description

The infotainment system has a auxiliary jack, USB, and memory card receptacle assembly located in the center console. The two USB ports and the card reader slot interface with a hub device, internal to the assembly. The assembly receives fused battery voltage and ground from the harness to power the internal hub device as well as providing additional amperage to power USB devices.

The internal hub device interfaces directly with the radio via a standard USB cable. A Mini type USB connector is used to connect the cable at the radio and at the auxiliary jack, USB, and memory card receptacle assembly. Standard USB male to female connections are typically used for connecting USB cables together where an in-line connection is required. An in-line cable connection is typically found between the console and I/P harness.

Auxiliary Audio Input Jack

The 3.5 mm (1/8 in.) auxiliary audio input jack is located in the console. When a portable audio playback device is connected to the auxiliary jack, an internal switch opens the detection signal circuit . The radio detects the device and AUX becomes available as an audio source. Audio signals from the device are sent to the radio from the auxiliary input jack via the left, right, and common audio signal circuits.

USB Port

The USB port allows connectivity to the infotainment system from portable media players or a USB storage device (memory stick/ flash drive). When a device is connected to the USB port, the system detects the device and USB becomes available as an audio source. Once connected, the device can be controlled from the radio controls.

Not all portable media player devices or file types are compatible. Refer to the owner's manual for information on USB devices, control, and operation.

SD Card Reader

The infotainment uses the SD card reader as a mass storage device, similar to a USB storage device.

Refer to the owners manual for information on media types supported via the SD card reader.

Diagnostic Aids

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3.5 mm (1/8 in.) Input Jack

- If the system detects the device, but the audio is not heard or is not clear, attempt to connect the device using a different cable; cables can deteriorate over time or become damaged.
- Playback of an audio device that is connected to the 3.5 mm jack can only be controlled using the controls on the device.
- The volume control on the device may need to be adjusted to ensure sufficient playback volume through the infotainment system.

USB Port and SD Card Reader

- A low battery condition in a portable media player may not allow the device to connect to the system, or can create communication issues with the device. Verify the device battery state of charge and re-charge or replace as needed.
- Connect the device directly to the USB port if possible. Only use a cable if it is required to connect the device. The use of extension cables can cause communication issues.
- If a cable is required for connection, attempt to connect the device using a different cable; cables can deteriorate over time or become damaged.
- Attempt audio playback from multiple USB devices when diagnosing USB concerns. Device compatibility can vary based on vehicle equipment. If the infotainment system is capable of operating any USB type device, the cause of the concern is not with the vehicle system. The inoperative device(s) may be incompatible or contain no recognized media types.
- If a 'Device Not Supported' or similar type error message is displayed, this indicates the system has connected to the device but cannot communicate with it properly. This does not indicate an issue with the vehicle system. The device may be incompatible, may require a 'reset', or may require an update to its software/firmware.
- If a 'No Supported Data Found' or similar type error message is displayed, this indicates the system has connected to the device and is communicating, but cannot find any compatible files/data. This does not indicate an issue with the vehicle system. Verify the device contains compatible media/file types.
- Poor connections or damaged USB cables can cause intermittent or no operation of USB devices. Inspect connectors, terminals, and cables for damage and replace components as necessary. Ensure all USB inline connections and connections at components are fully seated and connector position retainers/locks are secure.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

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Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

- **EL-50334-20** Multi-Media Interface Tester (MIT)
- **EL-50334-50** USB Cable and Adapter Kit
- **EL-50334-14** Infotainment Test Cable

Circuit/System Verification

Auxiliary Audio Input Jack

1. Verify no DTCs are present.
   - **If any DTCs are present**

     Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

   - **If no DTCs are present**
2. Ignition ON, infotainment system ON.
3. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input 3.5 mm (1/8 in.) input jack and select the AUX test mode.
4. Verify that AUX becomes an available media selection to the infotainment system.
   - **If AUX does not become an available media selection**

     Refer to Circuit/System Testing - Auxiliary Audio Input Jack.

   - **If AUX becomes an available media selection**
5. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
   - **If audio is not heard from the test tool.**

     Refer to Circuit/System Testing - Auxiliary Audio Input Jack.

   - **If audio is heard from the test tool.**
6. All OK

USB Port and SD Card Reader

1. Ignition ON, infotainment system ON.
2. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.

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3. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
    - **If audio is not heard from the test tool**
    1. Insert an SD card with compatible media into the SD card slot.
    2. Verify the media on the SD card can be accessed while operating the system to connect to the SD card.
    - If the SD card reader cannot be accessed, refer to Circuit/System Testing - USB Port and SD Card Reader.
    - If the SD card reader can be accessed, replace the X83 Auxiliary Audio Input.
    - **If audio is heard from the test tool**
4. Insert an SD card with compatible media into the SD card slot.
5. Verify the media on the SD card can be accessed while operating the system to connect to the SD card.
    - **If the SD card reader media cannot be accessed**

      Refer to Circuit/System Testing - USB Port and SD Card Reader

    - **If the SD card reader media can be accessed**
6. All OK.

Circuit/System Testing

Auxiliary Audio Input Jack

1. Ignition OFF, disconnect the X1 harness connector at the X83 Auxiliary Audio Input. Ignition ON, infotainment system ON.
2. Test for 2.5-3.5 V between the signal circuit terminal 5 and ground.
    - **If less than 2.5 V**
    1. Ignition OFF, disconnect the X1 harness connector at the A11 Radio.
    2. Test for infinite resistance between the signal circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the signal circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the A11 Radio.
    - **If greater than 3.5 V**
    1. Ignition OFF, disconnect the X1 harness connector at the A11 Radio, ignition ON.
    2. Test for less than 1 V between the detection circuit and ground.
        - If 1 V or greater, repair the short to voltage on the circuit.
        - If less than 1 V, replace the A11 Radio.
    - **If between 2.5-3.5 V**
3. Test for less than 1 V between the signal circuits listed below and ground:
    - Left auxiliary audio signal circuit terminal 1
    - Right auxiliary audio signal circuit terminal 2
    - Auxiliary audio common signal circuit terminal 3

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- **If 1 V or greater**

1. Ignition OFF, disconnect the X1 harness connector at the A11 Radio. Ignition ON.
2. Test for less than 1 V between the signal circuit and ground.
    - If 1 V or greater, repair the short to voltage on the circuit.
    - If less than 1 V, replace the A11 Radio.

- **If less than 1 V**

4. Ignition OFF, disconnect the X1 harness connector at the A11 Radio.
5. Test for infinite resistance between the signal circuits listed below and ground:
    - Auxiliary audio common signal circuit terminal 8
    - Left auxiliary audio signal circuit terminal 9
    - Right auxiliary audio signal circuit terminal 10
    - **If less than infinite resistance**

      Repair the short to ground on the circuit.

    - **If infinite resistance**
6. Test for less than 5 Ω between the signal circuit terminals listed below:
    - A11 Radio signal circuit terminal 9 X1 and the X83 Auxiliary Audio Input signal circuit terminal 1 X1
    - A11 Radio signal circuit terminal 10 X1 and the X83 Auxiliary Audio Input signal circuit terminal 2 X1
    - A11 Radio signal circuit terminal 8 X1 and the X83 Auxiliary Audio Input signal circuit terminal 3 X1
    - **If 5 Ω or greater**

      Repair the open/high resistance in the circuit.

    - **If less than 5 Ω**
7. Replace the X83 Auxiliary Audio Input. Connect all harness connectors.
8. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input 3.5 mm (1/8 in.) input jack and select the AUX test mode.
9. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
    - **If audio is not heard from the test tool**

      Replace the A11 Radio.

    - **If audio is heard from the test tool**
10. All OK.

USB Port and SD Card Reader

1. Ignition OFF, disconnect the X1 harness connector at the X83 Auxiliary Audio Input.
2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.
    - **If 10 Ω or greater**

    1. Ignition OFF.

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2. Test for less than 2 Ω in the ground circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω, repair the open/high resistance in the ground connection.
- **If less than 10 Ω**

3. Verify that a test lamp illuminates between the B+ circuit terminal 6 and ground.
    - **If the test lamp does not illuminate**
    1. Ignition OFF, remove the test lamp.
    2. Test for less than 2 Ω in the B+ circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - **If the test lamp illuminates**
4. Verify the USB cable is properly connected at all components and in-line connections, and there is no damage to the cable or connections.
    - **If connection problems or cable damage is noted.**

      Perform the appropriate repair or replacement to correct any issues.

    - **If no connection problems or cable damage is noted.**
5. Disconnect the vehicle USB cable at the A11 Radio and the X83 Auxiliary Audio Input.
6. Connect the EL-50334-14 Infotainment Test Cable and the EL-50334-2 Type-A Female to Mini-B Male Cable together. Connect the assembled test cable to the A11 Radio and the X83 Auxiliary Audio Input.
7. Ignition ON, infotainment system ON.
8. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.
9. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
    - **If audio is not heard from the test tool**
    1. Replace the X83 Auxiliary Audio Input. Connect all harness connectors.
    2. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.
    3. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
        - If audio is not heard from the test tool, replace the A11 Radio.
        - If audio is heard from the test tool.
    4. All OK.
    - **If audio is heard from the test tool**
10. Connect the vehicle USB cable at the A11 Radio.
11. Disconnect the console to I/P USB in-line connector. Connect the assembled test cable to the I/P side of the in-line USB cable connector and the X83 Auxiliary Audio Input.
12. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.
13. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
    - **If audio is not heard from the test tool**

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Replace the I/P USB cable assembly.

- **If audio is heard from the test tool**

14. Replace the console USB cable assembly.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Audio Disc Player, USB, Auxiliary In, and Memory Card Receptacle Replacement**
- **Control Module References** for radio replacement, programming, and setup.

AUXILIARY AUDIO INPUT MALFUNCTION (IOB)

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	B124B, 1, 6	1, 5	-	-
Auxiliary Audio Common Signal	-	8	-	-
Auxiliary Detection Signal	7	8	-	-
Left Auxiliary Audio Signal	2	2	2, 4	-
Right Auxiliary Audio Signal	3	3	3, 4	-
USB Cable	B124B	B124B	B124B	-
Ground	-	1	-	-

1. USB port Inoperative
2. No left side audio from device connected to AUX jack
3. No right side audio from device connected to AUX jack
4. Noticeable distortion may be present in affected audio channel
5. Fault may affect one or more components, dependant on fault location
6. Fault affects multiple components, dependant on vehicle equipment
7. Radio does not detect auxiliary device connection, AUX not available as input selection
8. AUX always available as an input selection, with or without auxiliary device connected

Circuit/System Description

Auxiliary Audio Input Jack

The 3.5 mm (1/8 in.) auxiliary audio input jack is located in the console. All circuits from the auxiliary jack are connected directly to the radio. When a device is connected to the auxiliary jack an internal switch opens. The radio detects the device and switches to AUX as the audio source. Audio signals from the device are sent to the radio from the auxiliary input jack via the left, right, and common audio signal circuits.

USB Port

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The vehicle may be equipped with a USB port in the console. This port allows USB connectivity to the infotainment system from portable media players or a USB storage device (memory stick/flash drive). When a device is connected to the USB port, the system detects the device and switches to USB as the audio source. Once connected, the device can be controlled from the radio controls.

The USB port is connected to the radio via a standard USB cable. Mini type USB connectors are used to connect the cable at the USB port and at the radio or multimedia player interface module. Standard USB male to female connections are typically used for connecting USB cables together where an in-line connection is required. An in-line cable connection is typically found between the console and I/P harness.

Not all portable media player devices are compatible. Refer to the owner's manual for information on USB devices, control, and operation.

Diagnostic Aids

Auxiliary Audio Input Jack

- When a device is first connected to the 3.5 mm (1/8 in.) input jack the infotainment system automatically switches to that device. If an auxiliary device has already been connected, press the AUX or CD/AUX button to select the device.
- If the system detects the device, but the audio is not heard or is not clear, attempt to connect the device using a different cable; cables can deteriorate over time or become damaged.
- Playback of an audio device that is connected to the 3.5 mm jack can only be controlled using the controls on the device.
- The volume control on the device may need to be adjusted to ensure sufficient playback volume through the infotainment system.

USB

- When a device is first connected to the USB port, the infotainment system automatically switches to that device. If an auxiliary device has already been connected, press the AUX or CD/AUX button to select the device.
- A low battery condition in a portable media player may not allow the device to connect to the system, or can create communication issues with the device. Verify the device battery state of charge and re-charge or replace as needed.
- Connect the device directly to the USB port if possible. Only use a cable if it is required to connect the device. The use of extension cables can cause communication issues.
- If a cable is required for connection, attempt to connect the device using a different cable; cables can deteriorate over time or become damaged.
- Attempt audio playback from multiple USB devices when diagnosing USB concerns. Device compatibility can vary based on vehicle equipment. If the infotainment system is capable of operating any USB type device, the cause of the concern is not with the vehicle system. The inoperative device(s) may be incompatible or contain no recognized media types.
- If a 'Device Not Supported' or similar type error message is displayed, this indicates the system has connected to the device but cannot communicate with it properly. This does not indicate an issue with the vehicle system. The device may be incompatible, may require a 'reset', or may require an update to its software/firmware.
- If a 'No Supported Data Found' or similar type error message is displayed, this indicates the system has connected to the device and is communicating, but cannot find any compatible files/data. This does not indicate an issue with the vehicle system. Verify the device contains compatible media/file types.

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- Poor connections or damaged USB cables can cause intermittent or no operation of USB devices. Inspect connectors, terminals, and cables for damage and replace components as necessary. Ensure all USB inline connections and connections at components are fully seated and connector position retainers/locks are secure.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

- **EL-50334-20** Multi-Media Interface Tester (MIT)
- **EL-50334-50** USB Cable and Adapter Kit

For equivalent regional tools, refer to **Special Tools Special Tools (MIT Tool Instructions)**

Circuit/System Verification

Auxiliary Audio Input Jack

1. Verify no DTCs are present.
   - **If any DTCs are present**

     Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

   - **If no DTCs are present**
2. Ignition ON/vehicle in Service Mode, radio ON.
3. Verify the infotainment system switches to AUX as the audio source with the **EL-50334-20** Multi-Media Interface Tester (MIT) connected to the auxiliary audio input jack.

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- **If the infotainment system does not switch to AUX as the audio source**

  Refer to Circuit/System Testing - Auxiliary Input Jack.

- **If the infotainment system switches to AUX as the audio source**

4. Verify the audio from the **EL-50334-20** Multi-Media Interface Tester (MIT) is heard through the vehicle infotainment system while operating the test tool to begin audio playback.
   - **If audio is not heard from the test tool.**

     Refer to Circuit/System Testing - Auxiliary Input Jack.

   - **If audio is heard from the test tool.**
5. All OK

USB Port

1. Verify no DTCs are present.
   - **If any DTCs are present**

     Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

   - **If no DTCs are present**
2. Ignition ON/vehicle in Service Mode, radio ON.
3. Verify the infotainment system switches to USB as the audio source with the **EL-50334-20** Multi-Media Interface Tester (MIT) connected to the USB port.
   - **If the infotainment system does not switch to USB as the audio source**

     Refer to Circuit/System Testing - USB Port.

   - **If the infotainment system switches to USB as the audio source**
4. Verify the audio from the **EL-50334-20** Multi-Media Interface Tester (MIT) is heard through the vehicle infotainment system while operating the system to play audio from the test tool.
   - **If audio is not heard from the test tool.**

     Refer to Circuit/System Testing - USB Port.

   - **If audio is heard from the device**
5. All OK.

Circuit/System Testing

Auxiliary Audio Input Jack

1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the X83 Auxiliary Audio Input. Ignition ON/vehicle in Service Mode, radio ON.
2. Test for 2.5-3.5 V between the signal circuit terminal 5 and ground.
   - **If less than 2.5 V**
   1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the A11 Radio.
   2. Test for infinite resistance between the signal circuit and ground.

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- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance

3. Test for less than 2 Ω in the signal circuit end to end
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω, replace the A11 Radio.

- **If greater than 3.5 V**

1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the A11 Radio, ignition ON/vehicle in Service Mode.
2. Test for less than 1 V between the detection circuit and ground.
    - If 1 V or greater, repair the short to voltage on the circuit.
    - If less than 1 V, replace the A11 Radio.

- **If between 2.5-3.5 V**

3. Test for less than 1 V between the signal circuits listed below and ground:
    - Left auxiliary audio signal circuit terminal 1
    - Right auxiliary audio signal circuit terminal 2
    - Auxiliary audio common signal circuit terminal 3
    - **If 1 V or greater**

    1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the A11 Radio. Ignition ON/vehicle in Service Mode.
    2. Test for less than 1 V between the signal circuit and ground.
        - If 1 V or greater, repair the short to voltage on the circuit.
        - If less than 1 V, replace the A11 Radio.

    - **If less than 1 V**

4. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the A11 Radio.
5. Test for infinite resistance between the signal circuits listed below and ground:
    - Auxiliary audio common signal circuit terminal 18
    - Left auxiliary audio signal circuit terminal 19
    - Right auxiliary audio signal circuit terminal 20
    - **If less than infinite resistance**

      Repair the short to ground on the circuit.

    - **If infinite resistance**
6. Test for less than 5 Ω between the signal circuit terminals listed below:
    - A11 Radio terminal 19 X1 and the X83 Auxiliary Audio Input terminal 1 X1
    - A11 Radio terminal 20 X1 and the X83 Auxiliary Audio Input terminal 2 X1
    - A11 Radio terminal 18 X1 and the X83 Auxiliary Audio Input terminal 3 X1
    - **If 5 Ω greater**

      Repair the open/high resistance in the circuit.

    - **If less than 5 Ω**
7. Replace the X83 Auxiliary Audio Input. Connect all harness connectors.

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8. Connect and operate the **EL-50334-20** Multi-Media Interface Tester (MIT).
9. Verify the audio from the test tool is heard through the vehicle infotainment system.
    - **If audio is not heard from the test tool**

      Replace the A11 Radio.

    - **If audio is heard from the test tool**
10. All OK.

USB Port

1. Ignition OFF/vehicle OFF, disconnect the USB cable connection at the A11 Radio.

    NOTE: USB cables and adapters for the following tests are found in the EL-50334-50 USB Cable and Adapter Kit.

2. Connect the EL-50334-1 Type A male to Mini A male USB Cable to the A11 Radio. Connect the EL-50334-3 Type A female to Type A female adapter to the EL-50334-1 Cable.
3. Ignition ON/vehicle in Service Mode, radio ON, connect the **EL-50334-20** Multi-Media Interface Tester (MIT) to the EL-50334-3 adapter.
4. Verify the infotainment system switches to USB as the audio source.
    - **If the infotainment system does not switch to USB as the audio source**

      Replace the A11 Radio.

    - **If the infotainment system switches to USB as the audio source**
5. Ignition OFF/vehicle OFF, connect the vehicle USB cable to the A11 Radio. Disconnect the I/P to floor console inline USB cable connector.

    NOTE: The EL-50334-3 or EL-50334-4 adapter may be required for the following test.

6. Ignition ON/vehicle in Service Mode, radio ON, connect the **EL-50334-20** Multi-Media Interface Tester (MIT) to the I/P side of the inline USB cable connector.
7. Verify the infotainment system switches to USB as the audio source.
    - **If the infotainment system does not switch to USB as the audio source**

      Replace the I/P USB cable assembly.

    - **If the infotainment system switches to USB as the audio source**
8. Ignition OFF/vehicle OFF, connect the I/P to floor console inline USB cable connector.
9. Disconnect the USB cable at the X83 Auxiliary Audio Input. Connect the EL-50334-4 Type A female to Mini B female adapter to the USB cable.
10. Ignition ON/vehicle in Service Mode, radio ON, connect the **EL-50334-20** Multi-Media Interface Tester (MIT) to the EL-50334-4 adapter.
11. Verify the infotainment system switches to USB as the audio source.
    - **If the infotainment system does not switch to USB as the audio source**

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Replace the console USB cable assembly.

- **If the infotainment system switches to USB as the audio source**

12. Test or replace the X83 Auxiliary Audio Input.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Audio Disc Player, USB, Auxiliary In, and Memory Card Receptacle Replacement**
- **Control Module References** for radio replacement, programming, and setup.

AUXILIARY AUDIO INPUT MALFUNCTION (IO5/IO6)

Diagnostic Instructions

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

DTC Descriptor

DTC B124B

USB 1 Circuit

For symptom byte information refer to **Symptom Byte List** .

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	B124B, 2	B124B, 1	-	-
USB Cable	B124B	B124B	B124B	-
Ground	-	Â	-	-
1. Fault may affect one or more components, dependant on fault location 2. Fault affects multiple components, dependant on vehicle equipment				

Circuit/System Description

The infotainment system has a USB port and a Auxiliary Audio Input Jack located in the center console. The receptacle assembly receives fused battery voltage and ground from the harness to power the internal hub device as well as providing additional amperage to power USB devices.

The internal hub device interfaces directly with the human machine interface control module via a standard USB cable. A Mini type USB connector is used to connect the human machine interface control module and the USB receptacle. Standard USB male to female connections are typically used for connecting USB cables together where an in-line connection is required. An in-line cable connection is typically found between the console and I/P harness.

Auxiliary Audio Input Jack

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When a portable audio playback device is connected to the 3.5 mm (1/8 in.) auxiliary audio input jack an internal switch opens the detection signal circuit within the hub. The HMI detects the device and AUX becomes available as an audio source. Audio signals from the device are converted from analog to digital, these signals are then sent to the HMI from the auxiliary input jack via USB.

USB Port

The USB port allows connectivity to the infotainment system from portable media players or a USB storage device (memory stick/ flash drive). When a device is connected to the USB port, the system detects the device and switches to USB as the audio source. Once connected, the device can be controlled from the radio controls.

Not all portable media player devices or file types are compatible. Refer to the owner's manual for information on USB devices, control, and operation.

Conditions for Running the DTC

- Ignition is ON or in the ACC position
- The system voltage is 9-16 V
- The infotainment system is ON
- The test is run once per second when the infotainment system is operating

Conditions for Setting the DTC

B124B 0B

The human machine interface control module detects an excessive current condition on the USB 5 V circuit.

B124B 04

The human machine interface control module does not detect the vehicle hub device.

B124B 11

The human machine interface control module detects an additional hub device attached to the vehicle USB port.

Action Taken When the DTC Sets

The USB port is inoperative while the DTC is current.

Conditions for Clearing the DTC

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

Diagnostic Aids

- This DTC may be set due to the connection of an incompatible or faulty USB device.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

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Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

- **EL-50334-20** Multi-Media Interface Tester (MIT)
- **EL-50334-50** USB Cable and Adapter Kit
- **EL-50334-14** Infotainment Test Cable

Circuit/System Verification

1. Verify DTC B124B is not set. Since occurrences of this DTC can be caused by an incompatible or faulty USB device, review with the customer the conditions under which their concern occurred.
   - **If DTC B124B is set.**

     Refer to Circuit/System Testing.

   - **If DTC B124B is not set.**
2. Ignition ON, infotainment system ON.
3. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.
4. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
   - **If audio is not heard from the test tool**

     Refer to Circuit/System Testing

   - **If audio is heard from test tool**
5. Verify the infotainment system can be switched to AUX as the audio source with the EL-50334-20 Multi-Media Interface Tester (MIT) connected to the auxiliary audio input jack.
   - **If the infotainment system can not be switched to AUX as the audio source**

     Refer to Circuit/System Testing

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- **If the infotainment system can be switched to AUX as the audio source**

6. Verify the audio from the EL-50334-20 Multi-Meida Interface Tester (MIT) is heard through the vehicle infotainment system while operating the test tool to begin audio playback.
   - **If audio is not heard from the test tool.**

     Refer to Circuit/System Testing

   - **If audio is heard from the test tool.**
7. All OK

Circuit/System Testing

1. Ignition OFF, disconnect the X1 harness connector at the X83 Auxiliary Audio Input.
2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.
   - **If 10 Ω or greater**
   1. Ignition OFF.
   2. Test for less than 2 Ω in the ground circuit end to end.
      - If 2 Ω or greater, repair the open/high resistance in the circuit.
      - If less than 2 Ω, repair the open/high resistance in the ground connection.
   - **If less than 10 Ω**
3. Verify that a test lamp illuminates between the B+ circuit terminal 6 and ground.
   - **If the test lamp does not illuminate**
   1. Ignition OFF, remove the test lamp.
   2. Test for less than 2 Ω in the B+ circuit end to end.
      - If 2 Ω or greater, repair the open/high resistance in the circuit.
   - **If the test lamp illuminates**
4. Verify the USB cable is properly connected at all components and in-line connections, and there is no damage to the cable or connections.
   - **If connection problems or cable damage is noted.**

     Perform the appropriate repair or replacement to correct any issues.

   - **If no connection problems or cable damage is noted.**
5. Connect the X1 harness connector at the X83 Auxiliary Audio Input.
6. Disconnect the vehicle USB cable X3 harness connector at the K74 Human Machine Interface Control Module and the X83 Auxiliary Audio Input Adapter.
7. Connect the EL-50034-14 Infotainment Test Cable and the EL-50334-2 Type-A Female to Mini-B Male Cable together. Connect the assembled test cable to the K74 Human Machine Interface Control Module and the X83 Auxiliary Audio Input.
8. Ignition ON, infotainment system ON.
9. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.
10. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
    - **If audio is not heard from the test tool**

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1. Replace the X83 Auxiliary Audio Input Adapter. Connect all harness connectors.
2. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.
3. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
    - If audio is not heard from the test tool, replace the K74 Human Machine Interface Control Module.
- **If audio is heard from the test tool**

11. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input AUX port and select the AUX test mode.
12. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system while operating the system to play audio from the test tool.
    - **If audio is not heard from the test tool**
    1. Replace the X83 Auxiliary Audio Input Adapter. Connect all harness connectors.
    - **If audio is heard from the test tool.**
13. Replace the vehicle USB cable between the K74 Human Machine Interface Control Module and the X83 Auxiliary Audio Input Adapter.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Audio Disc Player, USB, Auxiliary In, and Memory Card Receptacle Replacement**
- **Control Module References** for human machine interface control module replacement, programming, and setup.

BLUETOOTH MALFUNCTION (WITH UPF)

Diagnostic Instructions

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

Circuit/System Description

The Bluetooth Â® antenna is internal to, or is a small fixed antenna connected directly to, the telematics communication interface control module and is used to send and receive signals from a Bluetooth Â® enabled cellular phone. The antenna utilizes no cabling and is not external to the vehicle.

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

Diagnostic Aids

- The purpose of this diagnostic is to verify the ability of the telematics communication interface control module to pair to a Bluetooth Â® device.

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

Schematic Reference

OnStar/Telematics Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-50334-20 Multi-Media Interface Tester (Multi-Media Interface Tool)

Circuit/System Verification

1. Ignition ON.
2. Verify no DTCs are set.
   - **If any DTCs are set**

     Refer to **Diagnostic Trouble Code (DTC) List - Vehicle**

   - **If no DTCs are set**

NOTE: **The Multi-Media Interface Tool can be used to test either cellular phone or streaming audio functions. Refer to the tool instructions, and perform the appropriate test(s) related to the customers concern in the following steps.**

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3. Ignition ON, infotainment system ON.
4. Verify the infotainment system successfully pairs with the Multi-Media Interface Tool.
    - **If the infotainment system does not successfully pair with the Multi-Media Interface Tool.**
    1. Verify the vehicle is equipped with an external BluetoothÂ® Antenna.
        - If not equipped with an external BluetoothÂ® Antenna, replace the K73 Telematics Communication Interface Control Module
        - If equipped with an external BluetoothÂ® Antenna
    2. Replace the BluetoothÂ® Antenna.
    3. Verify the infotainment system successfully pairs with the Multi-Media Interface Tool.
        - If the infotainment system does not successfully pair with the Multi-Media Interface Tool, replace the K73 Telematics Communication Interface Control Module.
        - If the infotainment system successfully pairs with the Multi-Media Interface Tool.
    4. All OK.
    - **If the infotainment system successfully pairs with the Multi-Media Interface Tool.**
5. All OK.

Repair Instructions

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

Control Module References for telematics communication interface control module replacement, programming, and setup.

BLUETOOTH MALFUNCTION (IO5/IO6 WITHOUT UPF)

Diagnostic Instructions

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

Circuit/System Description

Bluetooth Â® wireless technology is a short-range communications technology intended to replace the cables connecting portable and/or fixed devices while maintaining high levels of security. The operating range of the signal is approximately 30 feet.

The available features and functions are determined by the type of device and the software within the devices being used. For a feature or function to operate, it must be supported in both devices.

The Bluetooth Â® hardware is internal to the human machine interface control module. The human machine interface control module supports streaming of data (music, voice, information) from cellular phones and other mobile devices that support those features. The human machine interface control module is also capable of interfacing with cellular phones for hands-free features.

Refer to the vehicle owner manual, supplements, and the device manufacturer's information for information on devices, control, operation. and pairing instructions.

Diagnostic Aids

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- Verify the mobile device is properly configured for the feature being used. Refer to the device manufacturer's information.
- Verify the function/feature that is being used is supported by the mobile device.
- The device must be paired to the system to use the available Bluetooth Â® feature(s). The pairing process must only be performed once for each device, unless that device's information is deleted.
- The system can store pairing information for multiple devices, but can only be actively connected to one at any given time.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) **Radio/Navigation System Schematics (IO5, IO6)** **Radio/Navigation System Schematics (IOB)**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) **Radio/Audio System Description and Operation (IO5/IO6)** **Radio/Audio System Description and Operation (IOB)**

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-50334-20 Multi-Media Interface Tester (MIT)

Circuit/System Verification

1. Verify no DTCs are present.
   - **If any DTCs are present**

     Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

   - **If no DTCs are present**
2. Verify the K74 Human Machine Interface Control Module calibrations are current.
   - **If the K74 Human Machine Interface Control Module calibrations are not current**

     Reprogram the K74 Human Machine Interface Control Module and re-evaluate the concern.

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- **If no update calibrations are available**

NOTE: **The MIT tool can be used to test either cellular phone or streaming audio functions. Refer to the tool instructions, and perform the appropriate test(s) related to the customers concern in the following steps.**

3. Ignition On/Vehicle in Service Mode. Infotainment system ON.
4. Verify the infotainment system successfully pairs with the MIT tool.
   - **If the infotainment system does not successfully pair with the MIT tool.**

     Replace the K74 Human Machine Interface Control Module.

   - **If the infotainment system successfully pairs with the MIT tool.**
5. Verify the infotainment system successfully completes the desired feature test using the MIT tool.
   - **If the feature test is not successful**

     Replace the K74 Human Machine Interface Control Module.

   - **If the feature test is successful**
6. All OK. Refer to Diagnostic Aids.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for human machine interface control module replacement, programming, and setup

BLUETOOTH MALFUNCTION (IOB WITHOUT UPF)

Diagnostic Instructions

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

Circuit/System Description

Bluetooth Â® wireless technology is a short-range communications technology intended to replace the cables connecting portable and/or fixed devices while maintaining high levels of security. The operating range of the signal is approximately 30 feet.

The available features and functions are determined by the type of device and the software within the devices being used. For a feature or function to operate, it must be supported in both devices.

The Bluetooth Â® hardware is internal to the radio. The radio supports interfacing with cellular phones for hands-free features.

Refer to the vehicle owner manual, supplements, and the device manufacturer's information for information on devices, control, operation. and pairing instructions.

Diagnostic Aids

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- Verify the mobile device is properly configured for the feature being used. Refer to the device manufacturer's information.
- Verify the function/feature that is being used is supported by the mobile device.
- The device must be paired to the radio to use the available Bluetooth Â® feature(s). The pairing process must only be performed once for each device, unless that device's information is deleted.
- The system can store pairing information for multiple devices, but can only be actively connected to one at any given time.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) **Radio/Navigation System Schematics (IO5, IO6)** **Radio/Navigation System Schematics (IOB)**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) **Radio/Audio System Description and Operation (IO5/IO6)** **Radio/Audio System Description and Operation (IOB)**

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-50334-20 Multi-Media Interface Tester (MIT)

For equivalent regional tools, refer to **Special Tools** **Special Tools (MIT Tool Instructions)** .

Circuit/System Verification

1. Verify no DTCs are present.
   - **If any DTCs are present**

     Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

   - **If no DTCs are present**
2. Verify the A11 Radio calibrations are current.
   - **If the radio calibrations are not current**

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Reprogram the A11 Radio and re-evaluate the concern.

- **If no update calibrations are available**

NOTE: **The MIT tool can be used to test either cellular phone or streaming audio functions. Refer to the tool instructions, and perform the appropriate test(s) related to the customers concern in the following steps.**

3. Ignition ON, infotainment system ON.
4. Verify the infotainment system successfully pairs with the MIT tool.
   - **If the infotainment system does not successfully pair with the MIT tool.**

     Replace the A11 Radio.

   - **If the infotainment system successfully pairs with the MIT tool.**
5. Verify the infotainment system successfully completes the desired feature test using the MIT tool.
   - **If the feature test is not successful**

     Replace the A11 Radio.

   - **If the feature test is successful**
6. All OK. Refer to Diagnostic Aids.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for radio replacement, programming, and setup

DIGITAL RADIO POOR OR NO RECEPTION

Diagnostic Instructions

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

DTC Descriptors

DTC B125C 01

Satellite Antenna Circuit Short to Battery

DTC B125C 02

Satellite Antenna Circuit Short to Ground

DTC B125C 04

Satellite Antenna Circuit Open

Circuit/System Description

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The digital radio receiver, located inside the radio, receives digital radio information from the digital radio antenna located on the outside of the vehicle. The digital radio receiver is connected to the digital radio antenna via a shielded coax cable. The digital radio antenna contains an amplifier which is powered by the radio through the coax cable.

Conditions for Running the DTC

This DTC is run every 300 milliseconds.

Conditions for Setting the DTC

The radio detects a circuit fault in the digital radio antenna.

Action Taken When the DTC Sets

The radio displays No XM Signal or Check Antenna.

Conditions for Clearing the DTC

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

Diagnostic Aids

The digital radio antenna requires a clear line of sight to the sky to operate properly. Reception may be limited, intermittent, or unavailable inside structures.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Special Tools

EL-48028 Digital Radio Test Antenna

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For equivalent regional tools, refer to **Special Tools** **Special Tools (MIT Tool Instructions)** .

Circuit/System Verification

1. With the vehicle outside in an area with an unobstructed view of the southern sky, tune to XM.
2. Verify DTC B125C is not set as current and the No XM Signal message is not displayed on the radio.
   - **If DTC B125C is set as current or the No XM Signal message is displayed.**

     Refer to Circuit/System Testing.

   - **If DTC B125C is not set as current and the No XM Signal message is not displayed.**
3. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the digital radio antenna coax cable from the A11 Radio. Connect the **EL-48028** Digital Radio Test Antenna to the radio and place on the roof of the vehicle.
2. Ignition ON, radio tuned to XM channel 1.
3. Verify DTC B125C is not set as current and XM reception is improved.
   - **If DTC B125C is set as current or XM reception is not improved**

     Replace the A11 Radio.

   - **If DTC B125C is not set as current and XM reception is improved**
4. Ignition OFF, disconnect the digital radio antenna coax cable from the T4G Cellular Phone, Navigation, and Digital Radio Antenna.
5. Verify the digital radio antenna coax cable passes the coax cable component test. Refer to Component Testing.
   - **If the coax cable does not pass the test**

     Replace the antenna coax cable

   - **If the coax cable passes the test**
6. Test or replace the T4G Cellular Phone, Navigation, and Digital Radio Antenna.

Component Testing

CAUTION: **Refer to Test Probe Caution .**

NOTE: **Before testing the coax cable, check the cable exterior for being pinched, cut, damaged, or having loose connections at the components, which can cause reception issues.**

To prevent false reading when testing the center coax terminals, use care not to ground the test probe on the outer housing/shield.

Coax Cable Test

1. Ignition OFF, disconnect the coax cable at both components.
2. Test for less than 5 Ω between coax cable center terminal end to end.

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- **If 5 Ω or greater**

  Replace the coax cable

- **If less than 5 Ω**

3. Test for less than 5 Ω between the coax cable outer shield end to end.
   - **If 5 Ω or greater**

     Replace the coax cable

   - **If less than 5 Ω**
4. Test for infinite resistance between the coax cable center terminal and the coax cable outer shield.
   - **If less than infinite resistance**

     Replace the coax cable

   - **If infinite resistance**
5. All OK

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **High Frequency Antenna Replacement**
- **Control Module References** for radio replacement, programming, and setup.

ONSTAR MICROPHONE MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal Terminal 9 X2	B2455 02	B2455 04	B2455 04	-
Signal Terminal 10 X2	B2455 02	B2455 04	B2455 04	-

Circuit/System Description

The telematics communication interface control module provides the Cellular Phone Microphone with a supplied voltage on the cellular phone microphone signal circuit. When the cellular phone microphone is in use, voice data from the user is sent back to the telematics communication interface control module on the signal circuit.

Reference Information

Schematic Reference

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OnStar/Telematics Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify that DTC B2455 is not set.
   - **If DTC B2455 is set**

     Refer to **DTC B2455**.

   - **If DTC B2455 is not set**
3. Verify that a successful OnStar voice command can be made.
   - **If your voice can not be heard clearly.**

     Refer to Circuit/System Testing - Microphone Malfunction.

   - **If your voice can be heard clearly**
4. All OK.

Circuit/System Testing

Microphone Malfunction

1. Ignition OFF, disconnect the harness connector at the B24 Cellular Phone Microphone, ignition ON.
2. Test for 8.0-10.5 V between the signal circuit terminal B and ground.
   - **If less than 8.0 V**
   1. Ignition OFF, disconnect the X2 harness connector at the K73 Telematics Communication Interface Control Module.
   2. Test for infinite resistance between the signal circuit and ground.
      - If less than infinite resistance, repair the short to ground in the circuit.
      - If infinite resistance

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3. Test for less than 2 Ω in the signal circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω, replace the vehicle K73 Telematics Communication Interface Control Module.
- **If greater than 10.5 V**

1. Ignition OFF, disconnect the X2 harness connector at the K73 Telematics Communication Interface Control Module, ignition ON.
2. Test for less than 1 V between the signal circuit and ground.
    - If 1 V or greater, repair the short to voltage on the circuit.
    - If less than 1 V, replace the K73 Telematics Communication Interface Control Module.

- **If between 8.0-10.5 V**

3. Test for less than 1 V between the signal circuit terminal A and ground.
    - **If greater than 1 V**

    1. Ignition OFF, disconnect the X2 harness connector at the K73 Telematics Communication Interface Control Module, ignition ON.
    2. Test for less than 1 V between the signal circuit and ground.
        - If 1 V or greater, repair the short to voltage in the circuit.
        - If less than 1 V, repair the K73 Telematics Communication Interface Control Module.

    - **If less than 1 V**

4. Test for greater than 8 V between the signal circuit terminal B and the signal circuit terminal A.
    - **If less than 8 V**

    1. Ignition OFF, disconnect the X2 harness connector at the K73 Telematics Communication Interface Control Module.
    2. Test for infinite resistance between the signal circuit and ground.
        - If less than infinite resistance, repair the short to ground in the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the signal circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the vehicle K73 Telematics Communication Interface Control Module.

    - **If greater than 9 V**

5. Test or replace the B24 Cellular Phone Microphone.

Repair Instructions

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

- **Mobile Telephone Microphone Replacement**
- **Control Module References** for radio or telematics communication interface control module replacement, programming, and setup.

MEDIA DISC PLAYER MALFUNCTION (WITHOUT U42)

Diagnostic Instructions

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

Circuit/System Description

The media disc player is a separate component in the infotainment system. The media disc player receives power, ground and serial data from the vehicle harness.

Control information and digital audio output is communicated over the MOST bus.

Diagnostic Aids

- Scratched or damaged discs may reduce audio quality or create other playback issues, or create disc loading errors.
- Labels applied to discs can get caught and create disc loading or ejection issues.
- Always use a known good compatible disc when evaluating disc player concerns. The **EL-50334-50** USB Cable and Adapter Kit contains a compact disc that can be used for evaluation purposes and other tests.
- Refer to the owners manual for compatible disc and format types.
- Disc player power, ground and MOST communication circuit issues will create DTCs stored in other modules and will affect the entire infotainment system. The purpose of this diagnostic is to address disc player only concerns where the remaining system functions normally.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) **Radio/Navigation System Schematics (IO5, IO6)** **Radio/Navigation System Schematics (IOB)**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) **Radio/Audio System Description and Operation (IO5/IO6)** **Radio/Audio System Description and Operation (IOB)**

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

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EL-50334-50 USB Cable and Adapter Kit

Circuit/System Verification

1. Verify no DTCs are present.
    - **If any DTCs are present**

      Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

    - **If no DTCs are present**
2. Using a known good compact disc, verify the A33 Media Disc Player loads the disc.
    - **If the A33 Media Disc Player does not load the disc**

      Replace the A33 Media Disc Player.

    - **If the A33 Media Disc Player loads the disc**
3. Verify the infotainment system successfully plays the audio from the disc.
    - **If the infotainment system does not play the audio from the disc.**
    1. Attempt to playback audio from another disc
        - If audio cannot be played from any disc, replace the A33 Media Disc Player.
        - If the infotainment system plays the audio from the disc.
    - **If the infotainment system plays the audio from the disc.**
4. Verify the A33 Media Disc Player ejects the disc.
    - **If the A33 Media Disc Player does not eject the disc**

      Replace the A33 Media Disc Player.

    - **If the A33 Media Disc Player ejects the disc**
5. All OK. Refer to Diagnostic Aids.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for media disc player replacement, programming, and setup.

MEDIA DISC PLAYER MALFUNCTION (WITH U42)

Diagnostic Instructions

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

Circuit/System Description

The media disc player is a separate component in the infotainment system. The media disc player receives power, ground and serial data from the vehicle harness.

Control information and digital audio output is communicated over the MOST bus. The media disc player also

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communicates on low speed GMLAN.

The media disc player is also the control module for the rear seat entertainment system, responsible for video output, infrared audio, screen controls and source selections for the system. All information to the video screens is communicated over the LVDS cables. One cable is connected to the front display, and a second cable is connected to both rear displays.

Diagnostic Aids

- Scratched or damaged discs may reduce audio quality or create other playback issues, or create disc loading errors.
- Labels applied to discs can get caught and create disc loading or ejection issues.
- Always use a known good compatible disc when evaluating disc player concerns. The **EL-50334-50** USB Cable and Adapter Kit contains a compact disc that can be used for audio evaluation purposes and other tests.
- Refer to the owners manual for compatible disc and format types.
- Disc player power, ground and MOST communication circuit issues will create DTCs stored in other modules and will affect the entire infotainment system. The purpose of this diagnostic is to address disc player only concerns where the remaining system functions normally.
- If the disc player wakes on GMLAN but does not receive a wake signal on the MOST communication enable circuit, the disc player will operate in MOST bypass mode. The disc player will allow MOST data communications to pass through, but will not actively communicate on the MOST bus. The infotainment system will operate, but audio disc playback and the rear seat entertainment system will not function. No DTCs will be set if this occurs. A short to ground or short to voltage on the MOST communication enable circuit will create DTCs stored in other modules and will affect the entire infotainment system.
- If the disc player cannot communicate on low speed GMLAN, but is awake and communicating on MOST, the infotainment system will operate normally, including all disc player and rear seat entertainment functions. If this occurs, no DTCs will be set but the scan tool will be unable to communicate with the disc player.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

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- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-50334-50 USB Cable and Adapter Kit

Circuit/System Verification

1. Verify no DTCs are present.
   - **If any DTCs are present**

     Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

   - **If no DTCs are present**
2. Using a known good compact disc, verify the A33 Media Disc Player loads the disc.
   - **If the A33 Media Disc Player does not load the disc**

     Replace the A33 Media Disc Player.

   - **If the A33 Media Disc Player loads the disc**
3. Verify the infotainment system successfully plays the audio from the disc.
   - **If the infotainment system does not play the audio from the disc.**
   1. Attempt to playback audio from another disc
      - If audio cannot be played from any disc, refer to Circuit/System testing.
   - **If the infotainment system plays the audio from the disc.**
4. Verify the A33 Media Disc Player ejects the disc.
   - **If the A33 Media Disc Player does not eject the disc**

     Replace the A33 Media Disc Player.

   - **If the A33 Media Disc Player ejects the disc**
5. All OK. Refer to Diagnostic Aids.

Circuit/System Testing

1. Ignition OFF, disconnect the X1 harness connector at the A33 Media Disc Player.
2. Test for less than 10 Ω between the ground circuit terminal 7 and ground.
   - **If 10 Ω or greater**
   1. Ignition OFF.
   2. Test for less than 2 Ω in the ground circuit end to end.
      - If 2 Ω or greater, repair the open/high resistance in the circuit.
      - If less than 2 Ω, repair the open/high resistance in the ground connection.
   - **If less than 10 Ω**
3. Verify that a test lamp illuminates between the B+ circuit terminal 1 and ground.

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- **If the test lamp does not illuminate and the circuit fuse is good**

1. Ignition OFF, remove the test lamp.
2. Test for less than 2 Ω in the B+ circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω, verify the fuse is not open and there is voltage at the fuse.

- **If the test lamp does not illuminate and the circuit fuse is open**

1. Ignition OFF, remove the test lamp.
2. Test for infinite resistance between the B+ circuit and ground.
    - If less than infinite resistance, repair the short to ground on the circuit.

- **If the test lamp illuminates**

4. Ignition On/Vehicle in Service Mode.
5. Test for 9-13 V between the control circuit terminal 10 and ground.
    - **If not 9-13 V.**

      Repair the open/high resistance in the circuit.

    - **If 9-13 V.**
6. Replace the A33 Media Disc Player.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for media disc player replacement, programming, and setup.

ONSTAR AUDIO MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Audio High Signal terminal 1	1	1	1	-
Audio Low Signal terminal 2	1	1	1	-
1. No (or Noisy) OnStarÂ® Audio				

Circuit/System Description

When an OnStarÂ® keypress is made, a serial data message is sent to the audio system to mute all radio functions and output OnStarÂ® originated audio. After the audio system is muted, the telematics communication interface control module transmits signals to the audio system on the audio signal and audio common circuits.

Reference Information

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Schematic Reference

- **OnStar/Telematics Schematics**
- **Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON/vehicle in Service Mode, radio ON.
2. Verify that audio is heard clearly through all speaker channels when tuning radio to a known good station.
   - **If audio is not heard clearly**

     Refer to **Speaker Malfunction (UQ3/UQ5)Speaker Malfunction (UQG)Speaker Malfunction (UQA with Front Bench Seat)Speaker Malfunction (UQA with Front Bucket Seats)**

   - **If audio is heard clearly**
3. Verify that the Connecting to OnStarÂ® message is heard clearly through the audio system when the OnStarÂ® blue button is pressed.
   - **If OnStar message is noisy or distorted**

     Refer to Circuit/System Testing

   - **If OnStar message is heard clearly**
4. All OK.

Circuit/System Testing

1. Ignition OFF/vehicle OFF, and all vehicle systems OFF, disconnect the X2 harness connector at the K73 Telematics Communication Interface Control Module, ignition ON/vehicle in Service Mode.
2. Test for less than 4 V between each of the signal circuits listed below and ground:
   - Terminal 1

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- Terminal 2
- **If 4 V or greater**

1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the A11 Radio, ignition ON/vehicle in Service Mode.
2. Test for less than 1 V between the signal circuits and ground.
    - If greater than 1 V, repair the short to voltage on the circuit.
    - If less then 1 V, replace the A11 Radio.

- **If less than 4 V**

3. Ignition OFF/vehicle OFF.
4. Test for infinite resistance between each of the signal circuits listed below and ground:
    - Terminal 1
    - Terminal 2
    - **If less than infinite resistance**

      Repair the short to ground on the circuit.

    - **If infinite resistance**
5. Disconnect the X1 harness connector at the A11 Radio.
6. Test for less than 2 Ω in each of the signal circuits listed below end to end:
    - K73 Telematics Communication Interface Control Module Terminal 1 X2
    - K73 Telematics Communication Interface Control Module Terminal 2 X2
    - **If 2 Ω or greater**

      Repair the open/high resistance on the circuit.

    - **If less than 2 Ω**
7. Replace the K73 Telematics Communication Interface Control Module.
8. Verify that the Connecting to OnStarÂ® message is heard clearly through the audio system when the OnStarÂ® blue button is pressed.
    - **If audio is not heard clearly**

      Replace the A11 Radio.

    - **If audio is heard clearly**
9. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for radio or telematics communication interface control module replacement, programming, and setup.

NO GLOBAL POSITIONING SYSTEM (GPS) RECEPTION (UE1 WITH IO5/IO6)

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

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

DTC Descriptors

DTC B2462 02

Global Positioning System Short to Ground

DTC B2462 04

Global Positioning System Open

Circuit/System Description

The navigation antenna is connected to the Telematics Communication Interface Control Module. The module supplies 5 V to the antenna to power the internal amplifier through the center conductor of the antenna coax cable.

When the vehicle is equipped with the optional navigation system, a Navigation Antenna Signal Splitter is installed to distribute the navigation signal to both the Telematics Communication Interface Control Module and the Human Machine Interface Control Module. The Human Machine Interface Control Module supplies 5 V through the coax cable to power the Navigation Antenna Signal Splitter.

Conditions for Running the DTC

- Radio On.
- System voltage is greater than 9 V and less than 16 V.
- The navigation system/telematics communication interface control module tests the GPS antenna every 10 s.

Conditions for Setting the DTC

B2462 02

The Telematics Communication Interface Control Module or Human Machine Interface Control Module detects a short to ground on the GPS antenna signal circuit.

B2462 04

The Telematics Communication Interface Control Module or Human Machine Interface Control Module detects a open/high resistance on the GPS antenna signal circuit.

Action Taken When the DTC Sets

- The Telematics Communication Interface Control Module or Human Machine Interface Control Module uses the last reported position and the vehicle speed signal to calculate the vehicle position.
- Route guidance may be inaccurate.
- Turn by turn navigation may be inaccurate or inoperative.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.

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- A history DTC will clear once 50 consecutive malifunction-free ignition cycles have occurred.

Diagnostic Aids

- The scan tool Telematics Communication Interface Control Module GPS signal parameter will display a Yes or No dependent upon whether or not the module sees an increment of the seconds transmitted by GPS signals to the Telematics Communication Interface Control Module. Upon entering this screen, the GPS signal title will initially display Yes, regardless of the presence of time increment, for at least 2 seconds, while the algorithm in the scan tool determines the status of the clock. If increment is found, Yes is continually displayed. If the clock remains static, No is displayed. The scan tool looks for increment every second, regardless of current display.
- Inaccurate or aged GPS position concerns which are no longer present may have been due to the temporary loss of GPS signal reception by the vehicle. Conditions such as tunnels or parking structures will restrict the cellular phone and navigation antenna from a clear view of the satellites in the sky and may have caused this temporary data loss.
- The GPS requires a clear line of sight to the sky to operate properly. In most cases the GPS will not have reception near tall buildings or inside structures.

Reference Information

Schematic Reference

- **OnStar/Telematics Schematics**
- **Radio/Navigation System Schematics (IO3)** **Radio/Navigation System Schematics (IO5, IO6)** **Radio/Navigation System Schematics (IOB)**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

- **OnStar Description and Operation**
- **Radio/Audio System Description and Operation (IO3)** **Radio/Audio System Description and Operation (IO5/IO6)** **Radio/Audio System Description and Operation (IOB)**

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-49903 OnStar Antenna Diagnostic Tool Kit

Circuit/System Verification

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NOTE: **The following verification requires the vehicle to be outside with an unobstructed view of the southern sky. Allow 5 minutes after turning the ignition ON for the vehicle to acquire the GPS satellites signal.**

1. Ignition ON/vehicle in Service Mode.
2. Verify that DTC B2462 is not set in the Telematics Communication Interface Control Module.
   - **If DTC B2462 is set in the Telematics Communication Interface Control Module and the vehicle is not equipped with a navigation system**

     Refer to Circuit/System Testing Without Navigation System.

   - **If DTC B2462 is set in the Telematics Communication Interface Control Module and the vehicle is equipped with a navigation system**

     Refer to Circuit/System Testing With Navigation System.

   - **If DTC B2462 is not set in the Telematics Communication Interface Control Module**
3. Verify an OnStar advisor can locate the vehicle after performing a blue button press.
   - **If the advisor can not locate the vehicle and the vehicle is not equipped with a navigation system**

     Refer to Circuit/System Testing Without Navigation System

   - **If the advisor can not locate the vehicle and the vehicle is equipped with a navigation system**

     Refer to Circuit/System Testing With Navigation System.

   - **If the advisor can locate the vehicle**
4. Verify DTC B2462 is not set in the Human Machine Interface Control Module.
   - **If DTC B2462 is set in the Human Machine Interface Control Module**

     Refer to Circuit/System Testing With Navigation System - Step 9.

   - **If DTC B2462 is not set in the Human Machine Interface Control Module**
5. Verify that the NO GPS symbol/message is not displayed on the radio display.
   - **If the NO GPS symbol/message is displayed**

     Refer to Circuit/System Testing With Navigation System - Step 9.

   - **If the NO GPS symbol/message is not displayed**
6. All OK.

Circuit/System Testing

without Navigation System

NOTE: **You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.**

1. Ignition OFF/vehicle OFF, disconnect the GPS and cellular coax cable connector at the K73 Telematics

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Communication Interface Control Module.

2. Attach both leads of the EL-49903-1 OnStar test antenna to the EL-49903-5 combiner. Using the EL-49903-6 coax cable attach the grey connector to the combiner and the brown connector to the K73 Telematics Communication Interface Control Module. Place the test antenna on the roof of the vehicle, ignition ON.
3. Verify DTC B2462 is not set or that the OnStar advisor can locate the vehicle.
   - **If DTC B2462 is set or the advisor can not locate the vehicle**

     Replace the K73 Telematics Communication Interface Control Module.

   - **If DTC B2462 is not set or the advisor can locate the vehicle**
4. Test the coax cable between the K73 Telematics Communication Interface Control Module and the T4G Cellular Phone, Navigation, and Digital Radio Antenna. Refer to component testing.
   - **If the coax cable does not pass the test**

     Replace the coax cable.

   - **If the coax cable passes the test**
5. Test or replace the T4G Cellular Phone, Navigation, and Digital Radio Antenna.

with Navigation System

NOTE: **You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.**

1. Ignition OFF/vehicle OFF, disconnect the T4G Cellular Phone, Navigation, and Digital Radio Antenna coax cable at the T15 Navigation Antenna Signal Splitter.
2. Attach both leads of the EL-49903-1 OnStar test antenna to the EL-49903-5 combiner. Using the EL-49903-7 coax cable attach one grey connector to the combiner and the other grey connector to the T15 Navigation Antenna Signal Splitter. Place the test antenna on the roof of the vehicle, ignition ON.
3. Verify DTC B2462 is not set or that the OnStar advisor can locate the vehicle.
   - **If DTC B2462 is not set or the advisor can locate the vehicle**
   1. Test the coax cable between the T15 Navigation Antenna Signal Splitter and the T4G Cellular Phone, Navigation, and Digital Radio Antenna. Refer to Component Testing.
      - If the coax cable does not pass the test

        Replace the coax cable.

      - If the coax cable passes the test
   2. Replace the T4G cellular phone, navigation and digital radio antenna.
   - **If DTC B2462 is set or if the advisor can not locate the vehicle**
4. Ignition OFF/vehicle OFF, disconnect the GPS and cellular coax cable connector at the K73 Telematics Communication Interface Control Module.
5. Attach both leads of the EL-49903-1 OnStar test antenna to the EL-49903-5 combiner. Using the EL-49903-6 coax cable attach the grey connector to the combiner and the brown connector to the K73 Telematics Communication Interface Control Module. Place the test antenna on the roof of the vehicle, ignition ON.
6. Verify DTC B2462 is not set or that the OnStar advisor can locate the vehicle.

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- **If DTC B2462 is set or the advisor can not locate the vehicle.**

  Replace the K73 Telematics Communication Interface Control Module.

- **If DTC B2462 is not set or the advisor can locate the vehicle.**

7. Ignition OFF/vehicle OFF.
8. Test the coax cable between the T15 Navigation Antenna Signal Splitter and the K73 Telematics Communication Interface Control Module. Refer to Component Testing.
   - **If the coax cable does not pass the test.**

     Replace the coax cable.

   - **If the coax cable passes the test.**
9. Ignition OFF/vehicle OFF, disconnect the blue GPS coax cable connector at the K74 Human Machine Interface Control Module.
10. Attach the EL-49903-1 OnStar test antenna blue connector to the K74 Human Machine Interface Control Module and place the test antenna on the roof of the vehicle.
11. Ignition ON/vehicle in Service Mode.
12. Verify DTC B2462 is not set or that the NO GPS symbol/message is not displayed on the radio.
    - **If DTC B2462 is set or the NO GPS symbol/message is displayed**

      Replace the K74 Human Machine Interface Control Module

    - **If DTC B2462 is not set or if the NO GPS symbol/message is not displayed.**
13. Ignition OFF/vehicle OFF.
14. Test the coax cable between the T15 Navigation Antenna Signal Splitter and the K74 Human Machine Interface Control Module. Refer to Component Testing.
    - **If the coax cable does not pass the test.**

      Replace the coax cable.

    - **If the coax cable passes the test.**
15. Test or replace the T15 Navigation Antenna Signal Splitter.

Component Testing

CAUTION: Refer to Test Probe Caution .

NOTE:

- **Before testing the coax cable, check the cable exterior for being pinched, cut, damaged, or having loose connections at the components, which can cause reception issues.**
- **To prevent false reading when testing the center coax terminals, use care not to ground the test probe on the outer housing/shield.**
- **The vehicle may be equipped with sectioned coax. Test each section and replace only the faulty section, not the entire length of coax.**

Coax Cable Test

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1. Ignition OFF/vehicle OFF, disconnect the coax cable at both components.
2. Test for less than 5 Ω between the coax cable center terminal end to end.
    - **If 5 Ω or greater**

      Replace the coax cable.

    - **If less than 5 Ω**
3. Test for greater than 5 Ω between the coax cable outer shield end to end.
    - **If 5 Ω or greater**

      Replace the coax cable.

    - **If less than 5 Ω**
4. Test for infinite resistance between the coax cable center terminal and the coax cable outer shield.
    - **If less than infinite resistance**

      Replace the coax cable.

    - **If infinite resistance**
5. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **High Frequency Antenna Replacement**
- **Control Module References** for Human Machine Interface control module or Telematics Communication Interface Control Module replacement, programming, and setup.

NO GLOBAL POSITIONING SYSTEM (GPS) RECEPTION (WITHOUT UE1)

Diagnostic Instructions

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

DTC Descriptors

DTC B2462

Global Positioning System Signal

For symptom byte information refer to **Symptom Byte List** .

Circuit Description

The navigation antenna is connected to the human machine interface control module by a shielded coaxial cable. The human machine interface control module supplies 5 V through the coax cable to power the internal antenna amplifier.

Conditions for Running the DTC

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- Radio On.
- System voltage is greater than 9 V and less than 16 V.
- The human machine interface control module tests the GPS antenna every 10 seconds.

Conditions for Setting the DTC

B2462 01

The human machine interface control module detects a short to B+ on the GPS antenna signal circuit.

B2462 02

The human machine interface control module detects a short to ground on the GPS antenna signal circuit.

B2462 04

The human machine interface control module detects an open/high resistance on the GPS antenna signal circuit.

Actions Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Diagnostic Aids

The navigation antenna requires a clear line of sight to the sky to operate properly. The GPS may have limited, intermittent, or no reception near tall buildings or inside structures.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-49903 OnStar Antenna Diagnostic Tool Kit

Circuit/System Testing

1. Ignition OFF/vehicle OFF, disconnect the navigation antenna coax cable connector at the K74 Human Machine Interface Control Module. Connect the **EL-49903** GM OnStar antenna diagnostic tool kit to the K74 Human Machine Interface Control Module, place the test antenna on the roof of the vehicle.
2. Ignition ON/vehicle in Service Mode, infotainment system ON, navigation selected.
3. Verify DTC B2462 is not set or the NO GPS symbol is not displayed on the information display.
   - **If DTC B2462 is set or the NO GPS symbol is displayed**

     Replace the K74 Human Machine Interface Control Module.

   - **If DTC B2462 is not set or the NO GPS symbol is not displayed**
4. Ignition OFF/vehicle OFF, disconnect the radio navigation coax cable at the T4G Cellular Phone, Navigation, and Digital Radio Antenna.
5. Verify the radio navigation coax cable passes the coax cable component test. Refer to Component Testing.
   - **If the coax cable does not pass the test**

     Replace the coax cable

   - **If the coax cable passes the test**
6. Test or replace the T4G Cellular Phone, Navigation, and Digital Radio Antenna.

Component Testing

CAUTION: **Refer to Test Probe Caution .**

NOTE: **Before testing the coax cable, check the cable exterior for being pinched, cut, damaged, or having loose connections at the components, which can cause reception issues.**

To prevent false reading when testing the center coax terminals, use care not to ground the test probe on the outer housing/shield.

Coax Cable Test

1. Ignition OFF/vehicle OFF, disconnect the coax cable at both components.
2. Test for less than 5 Ω between coax cable center terminal end to end.

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- **If 5 Ω or greater**

  Replace the coax cable

- **If less than 5 Ω**

3. Test for less than 5 Ω between the coax cable outer shield end to end.
   - **If 5 Ω or greater**

     Replace the coax cable

   - **If less than 5 Ω**

4. Test for infinite resistance between the coax cable center terminal and the coax cable outer shield.
   - **If less than infinite resistance**

     Replace the coax cable

   - **If infinite resistance**

5. All OK

Repair Instructions

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

- **High Frequency Antenna Replacement**
- **Control Module References** for human machine interface control module replacement, programming, and setup.

NO GLOBAL POSITIONING SYSTEM (GPS) RECEPTION (UE1 WITH IOB)

Diagnostic Instructions

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

DTC Descriptors

DTC B2462 01

Global Positioning System Short to Battery

DTC B2462 02

Global Positioning System Short to Ground

DTC B2462 04

Global Positioning System Open

Circuit/System Description

The navigation antenna is connected to the Telematics Communication Interface Control Module. The module

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supplies 5 V to the antenna to power the internal amplifier through the center conductor of the antenna coax cable.

When the vehicle is equipped with the optional navigation system, a Navigation Antenna Signal Splitter is installed to distribute the navigation signal to both the Telematics Communication Interface Control Module and the navigation radio. The radio supplies 5 V through the coax cable to power the Navigation Antenna Signal Splitter.

Conditions for Running the DTC

- Radio On.
- System voltage is greater than 9 V and less than 16 V.
- The navigation system/telematics communication interface control module tests the GPS antenna every 10 s.

Conditions for Setting the DTC

B2462 01

The telematics communication interface control module detects a short to voltage on the GPS antenna signal circuit.

B2462 02

The telematics communication interface control module detects a short to ground on the GPS antenna signal circuit.

B2462 04

The telematics communication interface control module detects a open/high resistance on the GPS antenna signal circuit.

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Diagnostic Aids

- The scan tool Telematics Communication Interface Control Module GPS signal parameter will display a Yes or No dependent upon whether or not the module sees an increment of the seconds transmitted by GPS signals to the Telematics Communication Interface Control Module. Upon entering this screen, the GPS signal title will initially display Yes, regardless of the presence of time increment, for at least 2 seconds, while the algorithm in the scan tool determines the status of the clock. If increment is found, Yes is continually displayed. If the clock remains static, No is displayed. The scan tool looks for increment

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every second, regardless of current display.

- Inaccurate or aged GPS position concerns which are no longer present may have been due to the temporary loss of GPS signal reception by the vehicle. Conditions such as tunnels or parking structures will restrict the cellular phone and navigation antenna from a clear view of the satellites in the sky and may have caused this temporary data loss.
- The GPS requires a clear line of sight to the sky to operate properly. In most cases the GPS will not have reception near tall buildings or inside structures.

Reference Information

Schematic Reference

- **OnStar/Telematics Schematics**
- **Radio/Navigation System Schematics (IO3)** **Radio/Navigation System Schematics (IO5, IO6)** **Radio/Navigation System Schematics (IOB)**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

- **OnStar Description and Operation**
- **Radio/Audio System Description and Operation (IO3)** **Radio/Audio System Description and Operation (IO5/IO6)** **Radio/Audio System Description and Operation (IOB)**

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-49903 OnStar Antenna Diagnostic Tool Kit

Circuit/System Verification

NOTE: **The following verification requires the vehicle to be outside with an unobstructed view of the southern sky. Allow 5 minutes after turning the ignition ON for the vehicle to acquire the GPS satellites signal.**

1. Ignition ON.
2. Verify that DTC B2462 is not set in the Telematics Communication Interface Control Module.
    - **If DTC B2462 is set in the Telematics Communication Interface Control Module and the vehicle is not equipped with a navigation system**

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Refer to Circuit/System Testing Without Navigation System.

- **If DTC B2462 is set in the Telematics Communication Interface Control Module and the vehicle is equipped with a navigation system**

  Refer to Circuit/System Testing With Navigation System.

- **If DTC B2462 is not set in the Telematics Communication Interface Control Module**

3. Verify an OnStar advisor can locate the vehicle after performing a blue button press.
   - **If the advisor can not locate the vehicle and the vehicle is not equipped with a navigation system**

     Refer to Circuit/System Testing Without Navigation System

   - **If the advisor can not locate the vehicle and the vehicle is equipped with a navigation system**

     Refer to Circuit/System Testing With Navigation System.

   - **If the advisor can locate the vehicle**
4. Verify DTC B2462 is not set in the radio.
   - **If DTC B2462 is set in the radio**

     Refer to Circuit/System Testing With Navigation System - Step 9.

   - **If DTC B2462 is not set in the radio**
5. Verify that the NO GPS symbol/message is not displayed on the radio.
   - **If the NO GPS symbol/message is displayed**

     Refer to Circuit/System Testing With Navigation System - Step 9.

   - **If the NO GPS symbol/message is not displayed**
6. All OK.

Circuit/System Testing

without Navigation System

NOTE: **You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.**

1. Ignition OFF, disconnect the GPS and cellular coax cable connector at the K73 Telematics Communication Interface Control Module.
2. Attach the EL-49903-1 OnStar test antenna to the EL-49903-5 combiner. Using the EL-49903-6 brown -F coax cable attach the combiner to the K73 Telematics Communication Interface Control Module. Place the test antenna on the roof of the vehicle, ignition ON.
3. Verify DTC B2462 is not set or that the OnStar advisor can locate the vehicle.
   - **If DTC B2462 is set or the advisor can not locate the vehicle**

     Replace the K73 Telematics Communication Interface Control Module.

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- **If DTC B2462 is not set or the advisor can locate the vehicle**

4. Test the coax cable between the K73 Telematics Communication Interface Control Module and the T4G Cellular Phone, Navigation, and Digital Radio Antenna. Refer to component testing.
   - **If the coax cable does not pass the test**

     Replace the coax cable.

   - **If the coax cable passes the test**
5. Test or replace the T4G Cellular Phone, Navigation, and Digital Radio Antenna.

with Navigation System

NOTE: **You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.**

1. Ignition OFF, disconnect the T4G Cellular Phone, Navigation, and Digital Radio Antenna coax cable at the T15 Navigation Antenna Signal Splitter.
2. Attach the EL-49903-1 OnStar test antenna to the EL-49903-5 combiner. Using the EL-49903-7 grey - G coax cable attach the combiner to the T15 Navigation Antenna Signal Splitter. Place the test antenna on the roof of the vehicle, ignition ON.
3. Verify DTC B2462 is not set or that the OnStar advisor can locate the vehicle.
   - **If DTC B2462 is not set or the advisor can locate the vehicle**
   1. Test the coax cable between the T15 Navigation Antenna Signal Splitter and the T4G Cellular Phone, Navigation, and Digital Radio Antenna. Refer to Component Testing.
      - If the coax cable does not pass the test

        Replace the coax cable.

      - If the coax cable passes the test
   2. Replace the T4G cellular phone, navigation and digital radio antenna.
   - **If DTC B2462 is set or if the advisor can not locate the vehicle**
4. Ignition OFF, disconnect the GPS and cellular coax cable connector at the K73 Telematics Communication Interface Control Module.
5. Attach the EL-49903-1 OnStar test antenna to the EL-49903-5 combiner. Using the EL-49903-6 brown -F coax cable attach the combiner to the K73 Telematics Communication Interface Control Module. Place the test antenna on the roof of the vehicle, ignition ON.
6. Verify DTC B2462 is not set or that the OnStar advisor can locate the vehicle.
   - **If DTC B2462 is set or the advisor can not locate the vehicle.**

     Replace the K73 Telematics Communication Interface Control Module.

   - **If DTC B2462 is not set or the advisor can locate the vehicle.**
7. Ignition OFF.
8. Test the coax cable between the T15 Navigation Antenna Signal Splitter and the K73 Telematics Communication Interface Control Module. Refer to Component Testing.
   - **If the coax cable does not pass the test.**

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Replace the coax cable.

- **If the coax cable passes the test.**

9. Ignition OFF, disconnect the GPS coax cable at the A11 Radio.
10. Attach the EL-49903-1 OnStar test antenna to the A11 Radio and place the test antenna on the roof of the vehicle.
11. Ignition ON.
12. Verify DTC B2462 is not set or that the NO GPS symbol/message is not displayed on the radio.
    - **If DTC B2462 is set or the NO GPS symbol/message is displayed**

      Replace the A11 Radio

    - **If DTC B2462 is not set or if the NO GPS symbol/message is not displayed.**
13. Ignition OFF.
14. Test the coax cable between the T15 Navigation Antenna Signal Splitter and the A11 Radio. Refer to Component Testing.
    - **If the coax cable does not pass the test.**

      Replace the coax cable.

    - **If the coax cable passes the test.**
15. Test or replace the T15 Navigation Antenna Signal Splitter.

Component Testing

CAUTION: **Refer to Test Probe Caution .**

NOTE:

- **Before testing the coax cable, check the cable exterior for being pinched, cut, damaged, or having loose connections at the components, which can cause reception issues.**
- **To prevent false reading when testing the center coax terminals, use care not to ground the test probe on the outer housing/shield.**
- **The vehicle may be equipped with sectioned coax. Test each section and replace only the faulty section, not the entire length of coax.**

Coax Cable Test

1. Ignition OFF, disconnect the coax cable at both components.
2. Test for less than 5 Ω between the coax cable center terminal end to end.
    - **If 5 Ω or greater**

      Replace the coax cable.

    - **If less than 5 Ω**
3. Test for greater than 5 Ω between the coax cable outer shield end to end.
    - **If 5 Ω or greater**

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Replace the coax cable.

- **If less than 5 Ω**

4. Test for infinite resistance between the coax cable center terminal and the coax cable outer shield.
   - **If less than infinite resistance**

     Replace the coax cable.

   - **If infinite resistance**
5. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **High Frequency Antenna Replacement**
- **Control Module References** for radio or telematics communication interface control module replacement, programming, and setup

ONSTAR BUTTON LED MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Control Terminal 6	1	1	2	-
Control Terminal 7	1	1	2	-
Ground	-	1	-	-
1. OnStarÂ® Indicator Inoperative 2. Indicator Illuminated At All Times				

Circuit Description

The OnStarÂ® status Indicators are located in the button assembly. The green indicator is illuminated when the system is ON and operating normally. When the green indicator is green and flashing, it is an indication that a call is in progress. When the red indicator is illuminated, a system malfunction is present. In the event there is a system malfunction and the OnStarÂ® system is still able to make a call, the Indicator will flash red during the call. The OnStarÂ® indicators are controlled by the telematics communication interface control module via the keypad green indicator control circuit and the keypad red indicator control circuit.

Reference Information

Schematic Reference

OnStar/Telematics Schematics

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Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

NOTE: **If the green LED is off with the ignition ON and the LED does not function when commanded with the scan tool, contact the OnStar Center to confirm the vehicle has a current subscription.**

1. Ignition ON.
2. Verify no DTCs are set.
   - **If any DTCs are set**

     Refer to **Diagnostic Trouble Code (DTC) List - Vehicle**

   - **If no DTCs are set**
3. Verify that the green indicator turns ON and OFF when commanding the green indicator ON and OFF with a scan tool.
   - **If the green indicator does not turn ON and OFF**

     Refer to Circuit/System Testing - Green Indicator Test

   - **If the green indicator turns ON and OFF**
4. Verify that the red indicator turns ON and OFF when commanding the red indicator ON and OFF with a scan tool.
   - **If the red indicator does not turn ON and OFF**

     Refer to Circuit/System Testing - Red Indicator Test

   - **If the red indicator turns ON and OFF**
5. All OK.

Circuit/System Testing

Green Indicator Test

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1. Ignition OFF, and all vehicle systems OFF, disconnect the harness connector at the A10 Inside Rearview Mirror. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 5 and ground.
    - **If 10 Ω or greater**
    1. Ignition OFF.
    2. Test for less than 2 Ω in the ground circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, repair the open/high resistance in the ground connection.
    - **If less than 10 Ω**
3. Ignition ON.

NOTE: **After performing the following step wait one minute for the reading to stabilize.**

4. Test for less than 1 V between the control circuit terminal 6 and ground.
    - **If 1 V or greater**
    1. Ignition OFF, disconnect the X1 harness connector at the K73 Telematics Communication Interface Control Module, ignition ON.
    2. Test for less than 1 V between the control circuit and ground.
        - If 1 V or greater, repair the short to voltage on the circuit.
        - If less than 1 V, replace the K73 Telematics Communication Interface Control Module.
    - **If less than 1 V**
5. Test for greater than 8 V between the control circuit terminal 6 and ground while commanding the Green Indicator ON with a scan tool.
    - **If 8 V or less**
    1. Ignition OFF, disconnect the X1 harness connector at the K73 Telematics Communication Interface Control Module.
    2. Test for infinite resistance between the control circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the control circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the K73 Telematics Communication Interface Control Module.
    - **If greater than 8 V**
6. Test or replace the A10 Inside Rearview Mirror.

Red Indicator Test

1. Ignition OFF, and all vehicle systems OFF, disconnect the harness connector at the A10 Inside Rearview Mirror . It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 5 and ground.
    - **If 10 Ω or greater**
    1. Ignition OFF.

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2. Test for less than 2 Ω in the ground circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω, repair the open/high resistance in the ground connection.
- **If less than 10 Ω**

3. Ignition ON.

NOTE: **After performing the following step wait one minute for the reading to stabilize.**

4. Test for less than 1 V between the control circuit terminal 7 and ground while commanding the Red Indicator OFF with a scan tool.
    - **If 1 V or greater**
    1. Ignition OFF, disconnect the X1 harness connector at the K73 Telematics Communication Interface Control Module, ignition ON.
    2. Test for less than 1 V between the control circuit and ground.
        - If 1 V or greater, repair the short to voltage on the circuit.
        - If less than 1 V, replace the K73 Telematics Communication Interface Control Module.
    - **If less than 1 V**
5. Test for greater than 8 V between the control circuit terminal 7 and ground while commanding the Red Indicator ON with a scan tool.
    - **If 8 V or less**
    1. Ignition OFF, disconnect the X1 harness connector at the K73 Telematics Communication Interface Control Module.
    2. Test for infinite resistance between the control circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the control circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the K73 Telematics Communication Interface Control Module.
    - **If greater than 8 V**
6. Test or replace the A10 Inside Rearview Mirror.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Inside Rearview Mirror Replacement (With UE1)** **Inside Rearview Mirror Replacement (Without UE1)**
- **Control Module References** for telematics communication interface control module replacement, programming and setup.

ONSTAR CALL CENTER REMOTE FUNCTION REQUESTS MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

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

Circuit/System Description

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

Diagnostic Aids

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

Reference Information

Schematic Reference

OnStar/Telematics Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

NOTE:

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

1. Ignition ON/vehicle in Service Mode.
2. Verify that the horn, lights, and the door locks on the vehicle operate properly.
    - **If an applicable vehicle system does not operate properly**

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Refer to **Diagnostic System Check - Vehicle** .

- **If all applicable vehicle systems operate properly**

3. Verify that a call can be successfully placed to the OnStar Call Center by pressing the blue OnStar button.
   - **If unable to contact the OnStarÂ® call center**

     Refer to **Unable to Contact OnStar Call Center**

   - **If able to contact the OnStar Call Center**
4. Verify with the OnStar advisor that all remote functions (door locks, lights, and horn) work.
   - **If the remote functions do not operate when requested**

     Replace the K73 Telematics Communication Interface Control Module

   - **If the remote functions operate when requested**
5. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for telematics communication interface control module replacement, programming and setup.

ONSTAR BUTTON MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
10 V Reference	1	B2476 04	B2476 04	-
Signal	1	1	B2476 59	B2476 59, B2482 00
Ground	-	B2476 04	-	-
1. OnStarÂ® Buttons Inoperative				

Circuit/System Description

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

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Reference Information

Schematic Reference

OnStar/Telematics Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

NOTE: **Contact the OnStarÂ® Call Center first before pressing the emergency button in order to notify them of the test.**

1. Ignition ON.
2. Verify no DTCs are set.
   - **If any DTCs are set**

     Refer to **Diagnostic Trouble Code (DTC) List - Vehicle**

   - **If no DTCs are set**
3. Verify that each button of the S51 Telematics Button Assembly operates normally by pressing each button individually.
   - **If none of the buttons operate normally**

     Refer to Circuit/System Testing.

   - **If some, but not all, of the buttons operate normally**

     Test or replace the S51 Telematics Button Assembly.

   - **If all of the buttons operate normally**
4. All OK.

Circuit/System Testing

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1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the A10 Inside Rearview Mirror. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 5 and ground.
    - **If 10 Ω or greater**
    1. Ignition OFF.
    2. Test for less than 2 Ω in the ground circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, repair the open/high resistance in the ground connection.
    - **If less than 10 Ω**
3. Ignition ON.
4. Test for 8.0-10.5 V between the 10 V reference circuit terminal 4 and ground.
    - **If less than 8.0 V**
    1. Ignition OFF, disconnect the harness connector at the K73 Telematics Communication Interface Control Module.
    2. Test for infinite resistance between the 10 V reference circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the 10 V reference circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the K73 Telematics Communication Interface Control Module.
    - **If greater than 10.5 V**
    1. Ignition OFF, disconnect the harness connector at the K73 Telematics Communication Interface Control Module, ignition ON.
    2. Test for less than 1 V between the 10 V reference circuit and ground.
        - If 1 V or greater, repair the short to voltage on the circuit.
        - If less than 1 V, replace the K73 Telematics Communication Interface Control Module.
    - **If between 8.0-10.5 V**
5. Ignition OFF and all vehicle systems OFF.
6. Test for 500-900 Ω between the signal circuit terminal 3 and ground.
    - **If less than 500 Ω**
    1. Disconnect the X1 harness connector at the K73 Telematics Communication Interface Control Module.
    2. Test for infinite resistance between the signal circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance, replace the K73 Telematics Communication Interface Control Module.
    - **If greater than 900 Ω**
    1. Disconnect the X1 harness connector at the K73 Telematics Communication Interface Control Module, ignition ON.
    2. Test for less than 1 V between the signal circuit and ground.
        - If 1 V or greater, repair the short to voltage on the circuit.
        - If less than 1 V

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3. Ignition OFF.
4. Test for less than 2 Ω in the signal circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω, replace the K73 Telematics Communication Interface Control Module.
- **If between 500-900 Ω**

7. Test or replace the A10 Inside Rearview Mirror.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Inside Rearview Mirror Replacement (With UE1)** **Inside Rearview Mirror Replacement (Without UE1)**
- **Control Module References** for telematics communication interface control module replacement, programming and setup.

ONSTAR STEERING WHEEL CONTROL FUNCTIONS MALFUNCTION

Some vehicles equipped with the OnStarÂ® system have the capability of accessing voice mailboxes and other automated phone systems by means of the steering wheel controls, while the OnStarÂ® Personal Calling feature is in use. If the "Talk" or "Mute" button (depending upon the vehicle) on the steering wheel controls is depressed during an OnStarÂ® Personal Calling call, the telematics communication interface control module receives the message on the serial data bus from either the radio or body control module. This message is interpreted as a request to turn any spoken numbers into dual tone multi-frequency 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 OnStarÂ® system.

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

RADIO CONTROLS MALFUNCTION (IOB)

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal terminal 3	B123E 02, 1	B123E 01, 1	B123E 01, 1	-
Signal terminal 4	2	2	2	-
Signal terminal 6	3	3	3	-
Signal terminal 7	3	3	3	-

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Low Reference terminal 2	-	4	-	-
Low Reference terminal 8	-	4	-	-
1. Home, Seek Up, Seek Down, and/or Phone button will not function 2. Power Button will not function 3. Unable to adjust volume 4. All Radio Control buttons may not function				

Circuit/System Description

The radio info display module, radio controls and radio are all separate components. The radio controls communicate radio control inputs directly to the radio through a discrete circuit for volume up, volume down and power ON button. It also uses a series of resistors through a single signal circuit when the home, seek up, seek down and phone buttons are pressed. After receiving the message the radio will perform the requested function. The info display module receives digital video data from the radio for on-screen display information through the LVDS (Low Voltage Differential Signal) cable. The radio communicates with the info display module over the radio display touch interrupt request signal for touch screen inputs.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) **Radio/Navigation System Schematics (IO5, IO6)** **Radio/Navigation System Schematics (IOB)**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) **Radio/Audio System Description and Operation (IO5/IO6)** **Radio/Audio System Description and Operation (IOB)**

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Verify DTC B123E is not set.
   - **If DTC B123E is set**

     Refer to **Diagnostic Trouble Code (DTC) List - Vehicle**

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- **If DTC B123E is not set**

2. Ignition ON/vehicle in Service Mode, A11 Radio ON.
3. Verify that all radio controls operate and perform the correct function.
    - **If all or some of the radio controls are inoperative**

      Refer to Circuit/System Testing.

    - **If all radio controls operate and perform the correct function.**
4. All OK.

Circuit/System Testing

1. Ignition OFF/vehicle OFF, disconnect the harness connector at the A22 Radio Controls.
2. Test for less than 10 Ω between the following low reference circuit terminals and ground.
    - terminal 2
    - terminal 8
    - **If 10 Ω or greater**
    1. Disconnect the X1 harness connector at the P17 Info Display Module.
    2. Test for less than 2 Ω in the low reference circuits end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the P17 Info Display Module.
    - **If less than 10 Ω**
3. Ignition ON/vehicle in Service Mode, test for 2.5-3.5 V between the following signal circuit terminals and ground:
    - terminal 3
    - terminal 4
    - terminal 6
    - terminal 7
    - **If less than 2.5 V**
    1. Ignition OFF/vehicle OFF, disconnect the X2 harness connector at the A11 Radio.
    2. Test for infinite resistance between the control circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω on the control circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the A11 Radio.
    - **If greater than 3.5 V**
    1. Ignition OFF/vehicle OFF, disconnect the X2 harness connector at the A11 Radio.
    2. Test for less than 1 V between the control circuit and ground
        - If greater than 1 V, repair the short to voltage in the circuit.
        - If less than 1 V, replace the A11 Radio.
    - **If between 2.5-3.5 V**
4. Replace the A22 Radio Controls

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Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for radio or radio control assembly replacement, programming, and setup

RADIO INFORMATION DISPLAY MALFUNCTION (IOB)

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
5 V reference 3 X1	1	-	-	-
Signal terminal 1 X1	1, 2	1, 2	-	-
Signal terminal 7 X1	2	2	2	-
Signal LVDS X2	B127E 00	B127E 00	B127E 00	-
Ground terminal 9 X1	-	1	-	-
Ground terminal 10 X1	-	1	-	-
1. Display blank 2. Touch screen does not function				

Circuit/System Description

The radio info display module, radio controls and radio are all separate components. The radio controls communicate radio control inputs directly to the radio through a discrete circuit for volume up, volume down and power ON button. It also uses a series of resistors through a single signal circuit when the home, seek up, seek down and phone buttons are pressed. After receiving the message the radio will perform the requested function. The info display module receives digital video data from the radio for on-screen display information through the LVDS (Low Voltage Differential Signal) cable. The radio communicates with the info display module over the radio display touch interrupt request signal for touch screen inputs..

Diagnostic Aids

Malfunctions may include a blank screen

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) **Radio/Navigation System Schematics (IO5, IO6)** **Radio/Navigation System Schematics (IOB)**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Verify DTC B127E is not set.
   - **If DTC B127E is set.**

     Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

   - **If DTC B127E is not set.**
2. Ignition ON/vehicle in Service Mode, A11 Radio ON.
3. Verify the P17 Info Display Module turns on and information is shown on the display.
   - **If the P17 Info Display Module does not turn on, or information is not shown in the display.**

     Refer to Circuit/System Testing- Blank Screen

   - **If the P17 Info Display Module turns on and information is shown on the display.**
4. Verify the touch screen feature functions by touching a selection on the display.
   - **If the display does not respond to the touch screen selection**

     Refer to Circuit/System Testing- Touch Screen

   - **If the display responds to the touch screen selection**
5. All OK.

Circuit/System Testing

Blank Screen

1. Ignition OFF/vehicle OFF and all vehicle systems OFF, disconnect the X1 harness connector at the P17 Info Display Module. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the following ground circuit terminals and ground:
   - terminal 9
   - terminal 10
   - **If 10 Ω or greater**

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1. Test for less than 2 Ω in the ground circuits end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than, 2 Ω repair the open/high resistance in the ground connection.
- **If less than 10 Ω**

3. Ignition ON/vehicle in Service Mode.
4. Test for 5 V or greater between control circuit terminal 1 and ground.
    - **If less than 5 V**
    1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the A11 Radio.
    2. Test for infinite resistance between the control circuit and ground.
        - If less than infinite resistance repair the short to ground on the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω on the control circuit end to end.
        - If 2 Ω or greater repair the open/high resistance in the circuit.
        - If less than 2 Ω replace the A11 Radio.
    - **If 5 V or greater.**
5. Disconnect the harness connector at the A22 Radio Controls.
6. Test for infinite resistance between the P17 Info Display Module harness connector X1 terminal 3 and ground.
    - If less than infinite resistance repair the short to ground on the circuit.
    - If infinite resistance.
7. Replace the P17 Info Display Module.

Touch Screen

1. Ignition OFF/vehicle OFF and all vehicle systems OFF, disconnect the X1 harness connector at the P17 Info Display Module. It may take up to 2 min for all vehicle systems to power down.
2. Ignition ON/vehicle in Service Mode.
3. Test for 1.5-2 V between the signal circuit terminal 7 and ground.
    - **If less than 1.5 V**
    1. Ignition OFF/vehicle OFF, disconnect the X2 harness connector at the A11 radio.
    2. Test for infinite resistance between the signal circuit and ground.
        - If less than infinite resistance repair the short to ground on the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω on the signal circuit end to end.
        - If 2 Ω or greater repair the open/high resistance in the circuit.
        - If less than 2 Ω replace the A11 Radio.
    - **If greater than 2 V**
    1. Ignition OFF/vehicle OFF, disconnect the X2 harness connector at the A11 Radio.
    2. Test for less than 1 V between the signal circuit and ground.
        - If greater than 1 V repair the short to voltage in the circuit.
        - If less than 1 V replace the A11 Radio.
    - **If between 1.5-2 V**

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4. Replace the P17 Info Display Module

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Control Module References** for control module replacement, programming, and setup.

RADIO INFORMATION DISPLAY MALFUNCTION (IO5/IO6)

Diagnostic Instructions

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

Circuit/System Description

The infotainment display and controls are a separate component from the radio, combined into an assembly. The assembly is supplied battery voltage and ground from the vehicle harness. The human machine interface control module communicates digital video data for on-screen display through a dedicated cable containing the LVDS data circuits.

Control information, touch communications and dimming level for the display are communicated via a LIN serial data circuit to the human machine interface control module.

Diagnostic Aids

Extended exposure to high temperatures, especially when in direct sunlight may result in the display becoming inoperative. Under these conditions, it may be normal for the display to shut down to prevent permanent damage to the circuitry. Display should return to normal operating condition when temperatures cool.

Malfunctions may include blank screen.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Vehicle OFF/Ignition OFF.
2. Verify the LVDS interface cable is properly connected at the P17 Info Display Module, K188 Human Machine Interface Control Module Bypass Module, and the K74 Human Machine Interface Control Module and there is no damage to the cable or connections.
3. Ignition ON/Vehicle in Service Mode, infotainment system ON.
4. Verify the P17 Info Display Module displays an image.
    - **If the P17 Info Display Module does not display an image.**

      Refer to **Rear Vision Camera System Malfunction (with IO3)** **Rear Vision Camera System Malfunction (with IO5/IO6 without Rear Seat Enterainment)** **Rear Vision Camera System Malfunction (with IO5/IO6 with Rear Seat Entertainment)** **Rear Vision Camera System Malfunction (with IOB)**

    - **If the P17 Info Display Module displays an image.**

      All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Control Module References** for control module replacement, programming, and setup.

RADIO INFORMATION DISPLAY MALFUNCTION (IO3)

Diagnostic Instructions

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

Circuit/System Description

The infotainment display and controls are a separate component from the radio, combined into an assembly. The assembly is supplied battery voltage and ground from the vehicle harness. The radio communicates digital video data for on-screen display through a dedicated cable containing the LVDS data circuits.

Diagnostic Aids

Malfunctions may include blank screen.

Reference Information

Schematic Reference

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Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

- EL-50334-2 Type A female to Mini B male USB Cable
- EL-50334-14 Infotainment Test Cable

Circuit/System Testing

1. Ignition OFF.
2. Verify the LVDS interface cable is properly connected at the P17 Info Display Module and the A11 Radio connections and there is no damage to the cable or connections.
3. Ignition ON/Vehicle in Service Mode, infotainment system ON.
4. Verify the P17 Info Display Module does not display an image.
    - **If the P17 Info Display Module displays an image.**

      All OK.

    - **If the P17 Info Display Module does not display an image.**
5. Vehicle OFF/Ignition OFF.
6. Disconnect the LVDS interface cable from the P17 Info Display Module.
7. Connect the EL-50334-2 Type A female to Mini B male USB Cable to the P17 Info Display Module. Connect the EL-50334-14 Infotainment Test Cable to the adapter.
8. Disconnect the LVDS interface cable from the A11 Radio. Connect the EL-50334-14 Infotainment Test cable to the A11 Radio.
9. Ignition ON/Vehicle in Service Mode, infotainment system ON.
10. Verify the P17 Info Display Module displays an image.
    - **If the P17 Info Display Module does not display an image**

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1. Replace the P17 Info Display Module. Connect all harness connectors.
2. Ignition ON, infotainment system ON.
3. Verify the P17 Info Display Module displays an image.
    - If the P17 Info Display Module still does not display an image, replace the A11 Radio.
    - If the P17 Info Display Module displays an image.
4. All OK.

- **If the P17 Info Display Module displays an image.**

11. Replace the vehicle LVDS interface cable from the P17 Info Display Module to the A11 Radio.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Radio Control Assembly Replacement**
- **Control Module References** for radio replacement, programming, and setup.

RADIO POOR RECEPTION

Diagnostic Instructions

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

DTC Descriptors

DTC B125A 02

Antenna Signal Circuit Short to Ground

DTC B125A 04

Antenna Signal Circuit Open Circuit

DTC B125A 01

Antenna Signal Circuit Short to Battery

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Radio Antenna Coax	B125A 02	B125A 04	B125A 01	-

Circuit/System Description

The radio antenna for AM and FM radio reception is connected to the radio with a coaxial cable.

Conditions for Running the DTC

- Ignition ON.

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- Battery voltage must be between 9-16 V.

Conditions for Setting the DTC

B125A 02

The radio detects a short to ground in the antenna signal circuit center conductor.

B125A 04

The radio detects an open in the antenna signal circuit center conductor.

B125A 01

The radio detects a short to battery in the antenna signal circuit center conductor.

Action Taken When the DTC Sets

Radio reception may be poor or not available.

Conditions for Clearing the DTC

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

Diagnostic Aids

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

It is very important to remove all devices plugged into any 12 V Outlet and Auxiliary Input, including any in the rear seats and rear cargo area (if equipped).

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Inspect the antenna for proper mounting or physical damage.
    - **If damage is found**

      Repair or replace as necessary

    - **If no damage is found**
2. Ignition ON, A11 Radio ON.
3. Verify station reception is normal when tuned to several known good AM and FM stations.
    - **If AM or FM reception is poor.**

      Refer to Circuit/System Testing

    - **If reception is normal**
4. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the radio antenna coax cable from the A11 Radio and from the T4M Radio Antenna.
2. Verify the antenna coax cable passes the coax cable component test. Refer to Component Testing.
    - **If the coax cable does not pass the test**

      Replace the antenna coax cable

    - **If the coax cable passes the test**
3. Connect the antenna coax cable to the T4M Radio Antenna.
4. Test for infinite resistance between the coax cable center terminal and the coax cable outer shield at the radio end of the coax cable.
    - **If less than infinite resistance**

      Replace the radio antenna base.

    - **If infinite resistance**
5. Test for less than 10 Ω between the coax cable outer shield and ground at the radio end of the coax cable.
    - **If 10 Ω or greater**
    1. Clean the mounting surface of the radio antenna base.
    2. Connect the antenna coax cable to the T4M Radio Antenna.

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3. Test for less than 10 Ω between the coax cable outer shield and ground at the radio end of the coax cable.
    - If 10 Ω or greater, replace the antenna base.
    - If less than 10 Ω, connect all harness connectors. Verify station reception is normal when tuned to several known good AM and FM stations. If AM or FM reception concerns are still present, replace the A11 Radio.
- **If less than 10 Ω**

6. Test or replace the A11 Radio.

Component Testing

CAUTION: **Refer to Test Probe Caution .**

NOTE: **Before testing the coax cable, check the cable exterior for being pinched, cut, damaged, or having loose connections at the components, which can cause reception issues.**

To prevent false reading when testing the center coax terminals, use care not to ground the test probe on the outer housing/shield.

Coax Cable Test

1. Ignition OFF, disconnect the coax cable at both components.
2. Test for less than 5 Ω between coax cable center terminal end to end.
    - **If 5 Ω or greater**

      Replace the coax cable

    - **If less than 5 Ω**
3. Test for less than 5 Ω between the coax cable outer shield end to end.
    - **If 5 Ω or greater**

      Replace the coax cable

    - **If less than 5 Ω**
4. Test for infinite resistance between the coax cable center terminal and the coax cable outer shield.
    - **If less than infinite resistance**

      Replace the coax cable

    - **If infinite resistance**
5. All OK

Repair Instructions

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

- **Radio Antenna Base Replacement**
- **Control Module References** for radio replacement, programming, and setup.

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SPEAKER REPLACEMENT REFERENCE

Component	Repair Instruction
Front Door Speaker	Radio Front Side Door Speaker Replacement
Instrument Panel Speaker	Radio Speaker Replacement
Rear Door Speaker	Radio Rear Side Door Speaker Replacement
Rear Trim Panel Speaker	Radio Rear Speaker Replacement
Subwoofer Speaker	Radio Front Floor Console Speaker Replacement

SPEAKER MALFUNCTION (UQ3/UQ5)

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Left Front Speaker Output Signal	B1025 02, 1	B1025 04, 1	B1025 01, 1, 2	-
Right Front Speaker Output Signal	B1035 02, 1	B1035 04, 1	B1035 01, 1, 2	-
Left Rear Speaker Output Signal	B1045 02, 1	B1045 04, 1	B1045 01, 1, 2	-
Right Rear Speaker Output Signal	B1055 02, 1	B1055 04, 1	B1055 01, 1, 2	-
1. No or reduced audio from speaker(s) on the affected audio circuit. 2. Noticeable audio distortion may be present.				

Circuit/System Description

Each of the audio output channel circuits (+) and (-), at the radio have a DC bias voltage that is approximately one half of battery voltage. When using a DMM, each of the audio output channel circuits will measure approximately 6.5 V DC. The audio being played on the system is produced by a varying AC voltage that is centered around the DC bias voltage on the same circuit. The AC voltage is what causes the speaker cone to move and produce sound. The frequency (Hz) of the AC voltage signal is directly related to the frequency of the input (audio source playing) to the audio system. Both the DC bias voltage and the AC voltage signals are needed for the audio system to properly produce sound.

Diagnostic Aids

- Improper speaker mounting or loose trim may cause an audible buzz or distortion. Inspect the appropriate speaker and the surrounding interior trim for proper and secure mounting.
- The EL-50334-6 Audio System Diagnostic CD contains audio tracks that can be used to duplicate and isolate such concerns. Tracks 11 and 12 contain audio sweep tones for testing for speaker and grill rattles.
- The test tones on the CD may be copied to a USB drive or other device to use during testing.
- If the speaker or surrounding interior trim is found to be loose or improperly secured, correctly secure the

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item.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) Radio/Audio System Description and Operation (IO5/IO6) Radio/Audio System Description and Operation (IOB)

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-50334-50 USB Cable and Adapter Kit

Circuit/System Verification

1. Ignition ON, A11 Radio ON, mute OFF.
2. Verify clear audio is heard from each speaker, adjusting fade and balance controls to test each speaker individually.
    - **If audio is inoperative from one or more speakers, or the audio emitted is not clear**

      Refer to Circuit/System Testing.

    - **If clear audio is heard from all speakers**
3. All OK.

Circuit/System Testing

NOTE: **Some circuits supply audio signals to more than one speaker. It may be necessary to disconnect all speakers on the affected audio circuit when performing circuit tests.**

1. Ignition OFF, disconnect the harness connector at the appropriate P19 Speaker. Ignition ON, radio ON,

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mute OFF.

2. Test for 5-7 V between each audio signal circuit terminal 1 and terminal 2 and ground.
    - **If less than 5 V**

    1. Ignition OFF, disconnect the X1 harness connector at the A11 Radio.
    2. Test for infinite resistance between the signal circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the signal circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the A11 Radio.

    - **If greater than 7 V**

    1. Ignition OFF, disconnect the X1 harness connector at the A11 Radio. Ignition ON.
    2. Test for less than 1 V between the signal circuit and ground.
        - If 1 V or greater, repair the short to voltage on the circuit.
        - If less than 1 V, replace the A11 Radio.

    - **If between 5-7 V**

    NOTE: In the following tests, audio signal frequencies (Hz) will be tested. To prevent misdiagnosis, the door chime must be OFF during testing. Ensure the driver door latch is closed during testing.

3. Insert the EL-50334-6 Audio Test CD from the **EL-50334-50** USB cable and adapter kit. Play track number three (50 Hz bass test tone) from the test CD.
4. Test for 49-51 Hz between each signal circuit terminal 1 and terminal 2 and ground.
    - **If not between 49-51 Hz**

      Replace the A11 Radio.

    - **If between 49-51 Hz**
5. Test or replace the P19 Speaker.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Speaker Replacement Reference**
- **Control Module References** for radio replacement, programming, and setup.

SPEAKER MALFUNCTION (UQG)

Diagnostic Instructions

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

DTC Descriptors

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DTC B1025

Audio Output 1 Circuit

DTC B1035

Audio Output 2 Circuit

DTC B1065

Audio Output 5 Circuit

DTC B1075

Audio Output 6 Circuit

For symptom byte information refer to **Symptom Byte List** .

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Audio Output 1 Signal Circuits (Left Front Door and I/P)	B1025 02	B1025 04	B1025 01	-
Audio Output 2 Signal Circuits (Right Front Door and I/P)	B1035 02	B1035 04	B1035 01	-
Audio Output 5 Signal Circuits (Left Rear Door)	B1065 02	B1065 04	B1065 01	-
Audio Output 6 Signal Circuits (Right Rear Door)	B1075 02	B1075 04	B1075 01	-

Circuit/System Description

The Media Oriented Systems Transport (MOST) is a high-speed multimedia network technology. The serial MOST bus uses a ring topology and synchronous data communication to transmit audio, video, data and control information between any devices attached.

The audio amplifier is a participant on the MOST network. The audio amplifier receives audio inputs and control information from the MOST bus.

Each of the audio output channel circuits (+) and (-), at the audio amplifier have a DC bias voltage that is approximately one half of the battery voltage. When using a DMM, each of the audio output channel circuits will measure approximately 6.5V DC. The audio being played on the system is produced by a varying AC voltage that is centered around the DC bias voltage on the same circuit. The AC voltage is what causes the speaker cone to move and produce sound.

Diagnostic Aids

- Improper speaker mounting or loose trim may cause an audible buzz or distortion. Inspect the appropriate speaker and the surrounding interior trim for proper and secure mounting.

  The EL-50334-6 Audio System Diagnostic CD contains audio tracks that can be used to duplicate and isolate such concerns. Tracks 11 and 12 contain audio sweep tones for testing for speaker and grill rattles.

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If the speaker or surrounding interior trim is found to be loose or improperly secured, correctly secure the item.

- The test tones on the CD may be copied to a USB drive or other device to use during testing.
- Some audio output circuits are connected to more than one speaker, dependant on vehicle equipment. It may be necessary to disconnect one or more speakers during testing of some circuits.

Conditions for Running the DTC

NOTE: DTC B1325 must not be set as current for the amplifier to run any of the following tests.

DTC B1025 01, B1035 01, B1065 01, B1075 01,

The test is run initially upon amplifier wake-up, and periodically every one second after amplifier operation begins.

DTC B1025 02, B1035 02, B1065 02, B1075 02,

The test is run initially upon amplifier wake-up, and periodically every one second after amplifier operation begins.

DTC B1025 04, B1035 04, B1065 04, B1075 04,

The test is run once during amplifier wake-up.

Conditions for Setting the DTC

DTC B1025 01, B1035 01, B1065 01, B1075 01,

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

DTC B1025 02, B1035 02, B1065 02, B1075 02,

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

DTC B1025 04, B1035 04, B1065 04, B1075 04,

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

Action Taken When the DTC Sets

The amplifier mutes the output channel and no sound is present from the speaker(s) that have a current circuit fault.

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

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Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-50334-50 USB Cable and Adapter Kit

Circuit/System Verification

1. Ignition ON, infotainment system ON, mute OFF.
2. Verify clear audio is heard from each speaker, adjusting fade and balance controls to test each speaker individually.
    - **If audio is inoperative from one or more speakers, or the audio emitted is not clear**

      Refer to Circuit/System Testing.

    - **If clear audio is heard from all speakers**
3. All OK.

Circuit/System Testing

NOTE: **Some circuits supply audio signals to more than one speaker. It may be necessary to disconnect all speakers on the affected audio circuit when performing circuit tests.**

1. Ignition OFF, disconnect the harness connector at the appropriate P19 Speaker. Ignition ON, infotainment system ON, mute OFF.
2. Test for 5-7 V between each audio signal circuit terminal 1 and terminal 2 and ground.
    - **If less than 5 V**
    1. Ignition OFF, disconnect the X1 and X2 harness connectors at the T3 Audio Amplifier.
    2. Test for infinite resistance between the signal circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the signal circuit end to end.

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- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, replace the T3 Audio Amplifier.

- **If greater than 7 V**

1. Ignition OFF, disconnect the X1 and X2 harness connectors at the T3 Audio Amplifier. Ignition ON.
2. Test for less than 1 V between the signal circuit and ground.
   - If 1 V or greater, repair the short to voltage on the circuit.
   - If less than 1 V, replace the T3 Audio Amplifier.

- **If 5-7 V**

3. Test or replace the P19 Speaker.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Speaker Replacement Reference**
- **Control Module References** for audio amplifier replacement, programming, and setup.

SPEAKER MALFUNCTION (UQA WITH FRONT BENCH SEAT)

Diagnostic Instructions

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

DTC Descriptors

DTC B1025

Audio Output 1 Circuit

DTC B1045

Audio Output 3 Circuit

DTC B1065

Audio Output 5 Circuit

DTC B1075

Audio Output 6 Circuit

DTC B1085

Audio Output 7 Circuit

DTC B1095

Audio Output 8 Circuit

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For symptom byte information refer to **Symptom Byte List** .

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Audio Output 1 Signal Circuits (Left Front Door)	B1025 02	B1025 04	B1025 01	-
Audio Output 3 Signal Circuits (Right Front Door)	B1045 02	B1045 04	B1045 01	-
Audio Output 5 Signal Circuits (Left Rear Door)	B1065 02	B1065 04	B1065 01	-
Audio Output 6 Signal Circuits (Right Rear Door)	B1075 02	B1075 04	B1075 01	-
Audio Output 7 Signal Circuits (Left Front I/P)	B1085 02	B1085 04	B1085 01	-
Audio Output 8 Signal Circuits (Right Front I/P)	B1095 02	B1095 04	B1095 01	-

Circuit/System Description

The Media Oriented Systems Transport (MOST) is a high-speed multimedia network technology. The serial MOST bus uses a ring topology and synchronous data communication to transmit audio, video, data and control information between any devices attached.

The audio amplifier is a participant on the MOST network. The audio amplifier receives audio inputs and control information from the MOST bus.

Each of the audio output channel circuits (+) and (-), at the audio amplifier have a DC bias voltage that is approximately one half of the battery voltage. When using a DMM, each of the audio output channel circuits will measure approximately 6.5V DC. The audio being played on the system is produced by a varying AC voltage that is centered around the DC bias voltage on the same circuit. The AC voltage is what causes the speaker cone to move and produce sound.

Diagnostic Aids

- Improper speaker mounting or loose trim may cause an audible buzz or distortion. Inspect the appropriate speaker and the surrounding interior trim for proper and secure mounting.

  The EL-50334-6 Audio System Diagnostic CD contains audio tracks that can be used to duplicate and isolate such concerns. Tracks 11 and 12 contain audio sweep tones for testing for speaker and grill rattles.

  If the speaker or surrounding interior trim is found to be loose or improperly secured, correctly secure the item.

- The test tones on the CD may be copied to a USB drive or other device to use during testing.
- Some audio output circuits are connected to more than one speaker, dependant on vehicle equipment. It may be necessary to disconnect one or more speakers during testing of some circuits.

Conditions for Running the DTC

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NOTE: **DTC B1325 must not be set as current for the amplifier to run any of the following tests.**

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

The test is run initially upon amplifier wake-up, and periodically every one second after amplifier operation begins.

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

The test is run initially upon amplifier wake-up, and periodically every one second after amplifier operation begins.

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

The test is run once during amplifier wake-up.

Conditions for Setting the DTC

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

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

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

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

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

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

Action Taken When the DTC Sets

The amplifier mutes the output channel and no sound is present from the speaker(s) that have a current circuit fault.

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-50334-50 USB Cable and Adapter Kit

Circuit/System Verification

1. Ignition ON, infotainment system ON, mute OFF.
2. Verify clear audio is heard from each speaker, adjusting fade and balance controls to test each speaker individually.
    - **If audio is inoperative from one or more speakers, or the audio emitted is not clear**

      Refer to Circuit/System Testing.

    - **If clear audio is heard from all speakers**
3. All OK.

Circuit/System Testing

NOTE: **Some circuits supply audio signals to more than one speaker. It may be necessary to disconnect all speakers on the affected audio circuit when performing circuit tests.**

1. Ignition OFF, disconnect the harness connector at the appropriate P19 Speaker. Ignition ON, infotainment system ON, mute OFF.
2. Test for 5-7 V between each audio signal circuit terminal 1 and terminal 2 and ground.
    - **If less than 5 V**
    1. Ignition OFF, disconnect the X1 and X2 harness connectors at the T3 Audio Amplifier.
    2. Test for infinite resistance between the signal circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the signal circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the T3 Audio Amplifier.
    - **If greater than 7 V**
    1. Ignition OFF, disconnect the X1 and X2 harness connectors at the T3 Audio Amplifier. Ignition ON.
    2. Test for less than 1 V between the signal circuit and ground.
        - If 1 V or greater, repair the short to voltage on the circuit.

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- If less than 1 V, replace the T3 Audio Amplifier.
- **If 5-7 V**

3. Test or replace the P19 Speaker.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Speaker Replacement Reference**
- **Control Module References** for audio amplifier replacement, programming, and setup.

SPEAKER MALFUNCTION (UQA WITH FRONT BUCKET SEATS)

Diagnostic Instructions

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

DTC Descriptors

DTC B1025

Audio Output 1 Circuit

DTC B1035

Audio Output 2 Circuit

DTC B1045

Audio Output 3 Circuit

DTC B1065

Audio Output 5 Circuit

DTC B1075

Audio Output 6 Circuit

DTC B1085

Audio Output 7 Circuit

DTC B1095

Audio Output 8 Circuit

For symptom byte information refer to **Symptom Byte List** .

Diagnostic Fault Information

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Audio Output 1 Signal Circuits (Left Front Door)	B1025 02	B1025 04	B1025 01	-
Audio Output 2 Signal Circuits (Right Front Door)	B1035 02	B1035 04	B1035 01	-
Audio Output 3 Signal Circuits (Subwoofer)	B1045 02	B1045 04	B1045 01	-
Audio Output 5 Signal Circuits (Left Rear Door)	B1065 02	B1065 04	B1065 01	-
Audio Output 6 Signal Circuits (Right Rear Door)	B1075 02	B1075 04	B1075 01	-
Audio Output 7 Signal Circuits (Left Front I/P)	B1085 02	B1085 04	B1085 01	-
Audio Output 8 Signal Circuits (Right Front I/P)	B1095 02	B1095 04	B1095 01	-

Circuit/System Description

The Media Oriented Systems Transport (MOST) is a high-speed multimedia network technology. The serial MOST bus uses a ring topology and synchronous data communication to transmit audio, video, data and control information between any devices attached.

The audio amplifier is a participant on the MOST network. The audio amplifier receives audio inputs and control information from the MOST bus.

Each of the audio output channel circuits (+) and (-), at the audio amplifier have a DC bias voltage that is approximately one half of the battery voltage. When using a DMM, each of the audio output channel circuits will measure approximately 6.5V DC. The audio being played on the system is produced by a varying AC voltage that is centered around the DC bias voltage on the same circuit. The AC voltage is what causes the speaker cone to move and produce sound.

Diagnostic Aids

- Improper speaker mounting or loose trim may cause an audible buzz or distortion. Inspect the appropriate speaker and the surrounding interior trim for proper and secure mounting.

  The EL-50334-6 Audio System Diagnostic CD contains audio tracks that can be used to duplicate and isolate such concerns. Tracks 11 and 12 contain audio sweep tones for testing for speaker and grill rattles.

  If the speaker or surrounding interior trim is found to be loose or improperly secured, correctly secure the item.

- The test tones on the CD may be copied to a USB drive or other device to use during testing.
- Some audio output circuits are connected to more than one speaker, dependant on vehicle equipment. It may be necessary to disconnect one or more speakers during testing of some circuits.

Conditions for Running the DTC

NOTE: **DTC B1325 must not be set as current for the amplifier to run any of the following tests.**

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

The test is run initially upon amplifier wake-up, and periodically every one second after amplifier operation begins.

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

The test is run initially upon amplifier wake-up, and periodically every one second after amplifier operation begins.

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

The test is run once during amplifier wake-up.

Conditions for Setting the DTC

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

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

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

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

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

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

Action Taken When the DTC Sets

The amplifier mutes the output channel and no sound is present from the speaker(s) that have a current circuit fault.

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) Radio/Navigation System Schematics (IO5, IO6) Radio/Navigation System Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Electrical Information Reference

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

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- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-50334-50 USB Cable and Adapter Kit

Circuit/System Verification

1. Ignition ON, infotainment system ON, mute OFF.
2. Verify clear audio is heard from each speaker, adjusting fade and balance controls to test each speaker individually.
    - **If audio is inoperative from one or more speakers, or the audio emitted is not clear**

      Refer to Circuit/System Testing.

    - **If clear audio is heard from all speakers**
3. All OK.

Circuit/System Testing

NOTE: **Some circuits supply audio signals to more than one speaker. It may be necessary to disconnect all speakers on the affected audio circuit when performing circuit tests.**

1. Ignition OFF, disconnect the harness connector at the appropriate P19 Speaker. Ignition ON, infotainment system ON, mute OFF.
2. Test for 5-7 V between each audio signal circuit terminal 1 and terminal 2 and ground.
    - **If less than 5 V**
    1. Ignition OFF, disconnect the X1 and X2 harness connectors at the T3 Audio Amplifier.
    2. Test for infinite resistance between the signal circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the signal circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the T3 Audio Amplifier.
    - **If greater than 7 V**
    1. Ignition OFF, disconnect the X1 and X2 harness connectors at the T3 Audio Amplifier. Ignition ON.
    2. Test for less than 1 V between the signal circuit and ground.
        - If 1 V or greater, repair the short to voltage on the circuit.
        - If less than 1 V, replace the T3 Audio Amplifier.
    - **If 5-7 V**
3. Test or replace the P19 Speaker.

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Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Speaker Replacement Reference**
- **Control Module References** for audio amplifier replacement, programming, and setup.

UNABLE TO CONTACT ONSTAR CALL CENTER

Diagnostic Instructions

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

DTC Descriptors

DTC B2470 02

Cellular Phone Antenna Circuit Malfunction Short to Ground

DTC B2470 04

Cellular Phone Antenna Circuit Malfunction Open Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	B2470 02	B2470 04	-	-

Circuit/System Description

The cellular phone and navigation antenna is connected to the telematics communication interface control module. This module supplies 5 V to the cellular phone and navigation antenna to power the internal amplifier. When the vehicle is equipped with the optional navigation radio, a navigation antenna signal splitter is installed to distribute the GPS signal to both the telematics communication interface control module and the navigation radio. The navigation radio supplies 5 V through the GPS antenna coaxial cable to the navigation antenna signal splitter to power the internal navigation radio signal amplifier.

Conditions for Running the DTC

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

Conditions for Setting the DTC

B2470 02

The telematics communication interface control module detects a short to ground on the cellular antenna signal circuit.

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B2470 04

The telematics communication interface control module detects a open or high resistance on the cellular antenna signal circuit.

The above conditions are present for greater than 1 s.

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

- The telematics communication interface control module detects the presence of a cellular antenna.
- A history DTC clears after 50 malfunction-free ignition cycles.

Reference Information

Schematic Reference

OnStar/Telematics Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-49903-1 Test Antenna, Navn-Cell Comn

Circuit/System Testing

NOTE:

- **The vehicle may be equipped with sectioned coax. Test each section and replace only the faulty section, not the entire length of coax.**
- **The following verification requires the vehicle to be outside with an unobstructed view of the southern sky. Allow 5 min after turning the**

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ignition ON for the GPS satellites to acquire vehicle signal.

1. Verify the OnStar Generation you are working on by using a scan tool under Selected Vehicle Configuration/Telematics Communication Interface Control Module. Failure to use the correct document will result in incorrect diagnoses.
2. Ignition OFF and all vehicle systems OFF, disconnect the cellular GPS coax cable connector at the K73 Telematics Communication Interface Control Module. It may take up to 2 min for all vehicle systems to power down.
3. Connect the **EL-49903-1** Test Antenna, Navn-Cell Comn to the K73 Telematics Communication Interface Control Module. Place the test antenna on the roof of the vehicle, ignition ON.
4. Verify the DTC does not set while operating the vehicle within the conditions for running the DTC.
   - **If the DTC sets**

     Replace the K73 Telematics Communications Interface Control Module.

   - **If the DTC does not set**
5. Ignition OFF.
6. Disconnect the **EL-49903-1** Test Antenna, Navn-Cell Comn from the K73 Telematics Communication Interface Control Module
7. Disconnect the GPS and cellular coax cable connector at the T4G Cellular Phone, Navigation, and Digital Radio Antenna.

   Test the coax cable. Refer to Component Testing.

8. Test the coax cable between the K73 Telematics Communication Interface Control Module and the T4G Cellular Phone, Navigation, and Digital Radio Antenna. Refer to Component Testing.
   - **If the coax cable does not pass the test**

     Replace the coax cable.

   - **If the coax cable passes the test**
9. Test or replace the Cellular Phone and GPS Antenna.

Component Testing

CAUTION: **Refer to Test Probe Caution**

NOTE:

- **Before testing the coax cable, check the cable exterior for being pinched, cut, damaged, or having loose connections at the components, which can cause reception issues.**
- **To prevent false readings when testing the center coax terminals, use care not to ground the test probe on the outer housing/shield.**

Coax Cable Test

1. Ignition OFF, disconnect the coax cable at both components.
2. Test for less than 5 Ω between the coax cable center terminal end to end.

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- **If 5 Ω or greater**

  Replace the coax cable.

- **If less than 5 Ω**

3. Test for greater than 5 Ω between the coax cable outer shield end to end.
   - **If 5 Ω or greater**

     Replace the coax cable.

   - **If less than 5 Ω**
4. Test for infinite resistance between the coax cable center terminal and the coax cable outer shield.
   - **If less than infinite resistance**

     Replace the coax cable.

   - **If infinite resistance**
5. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **High Frequency Antenna Replacement**
- **Control Module References** for telematics communication interface control module replacement, setup, and programming

VIDEO DISPLAY MALFUNCTION

Diagnostic Instructions

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

DTC Descriptor

DTC B1280 18

Rear Seat Entertainment Input Signal Circuit Signal Amplitude < Minimum

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Rear Seat Entertainment Display B+	B1280 18*	B1280 18*	-	-
Rear Seat Entertainment Display Control	B1280 18*	B1280 18*	-	-
Rear Seat Entertainment Display Enable Ground	-	B1280 18*	-	-

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
LVDS Cable	B1280 18*	B1280 18*	B1280 18*	-
* One or both rear seat entertainment displays inoperative				

Circuit/System Description

The rear display is located in the headliner. The display screen shows video from the disc player.

The display receives power and ground from the vehicle harness. A discrete control circuit from the media disc player is used to control the power state of the display. The display receives all other video, audio, and control information via the LVDS cable.

If the media disc player detects that the rear display is not responding to the output on the LVDS circuits, the media disc player sets the DTC. When this DTC is set, the display will not power on with the system.

Diagnostic Aids

The media disc player supplies a current limited voltage signal on the control circuit to the rear display. When tested at the display, the voltage measured will be approximately 10% less than the available battery voltage. For example, with the battery at 12.6 volts, the expected measurement would be approximately 11.3 volts.

Although the voltage is near battery voltage, the limited amperage on the circuit is insufficient to light a test lamp.

Conditions for Running the DTC

- Ignition is ON or in the ACC position
- The system voltage is 9-16 V
- The rear seat entertainment system is ON
- The test is run continuously when the rear seat entertainment is operating

Conditions for Setting the DTC

The Media Disc Player detects that the rear display is not responding to the output on the LVDS circuits.

Action Taken When the DTC Sets

- The Media Disc Player sets the DTC
- Information is not shown on the rear display

Conditions for Clearing the DTC

- The Media Disc Player detects a properly synced digital video signal.
- A history DTC will clear once 50 consecutive malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

Video System Schematics

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Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Video Entertainment System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Special Tools

- **EL-50334-2** Type A female to Mini B male USB Cable
- **EL-50334-4** Type A female to Mini B female Adapter
- **EL-50334-12** Infotainment Test Cable - RSE
- **EL-50334-13** Infotainment Test Cable - RSE Splitter
- **EL-50334-14** Infotainment Test Cable
- **EL-50334-15** Mini B Male USB to Mini B Male USB

Circuit/System Verification

1. Ignition ON.
2. Verify no other DTCs are set.
    - **If any other DTCs are set**

      Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

    - **If no other DTCs are set.**
3. Ignition ON, rear seat entertainment system ON.
4. Verify rear display turns on with the system.
    - **If does not turn on**

      Refer to Circuit/System Testing- Rear Video Display Inoperative

    - **If screen turns on with the system.**
5. Source media from the rear video display to the front radio display.
    - **If media is not seen on front radio display**

      Refer to Circuit/System Testing- Front Radio Display Inoperative

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- **If media is seen on front radio display**

6. All OK.

Circuit/System Testing

Rear Video Display Inoperative

1. Ignition OFF.
2. Disconnect the X2 harness connector at the P22A Video Display- 2nd Row.
3. Test for less than 10 Ω between the ground circuit terminal 8 and ground.
    - **If 10 Ω or greater.**
    1. Ignition OFF.
    2. Test for less than 2 Ω in the ground circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, repair the open/high resistance in the ground connection.
    - **If less than 10 Ω.**
4. Verify that a test lamp illuminates between the B+ circuit terminal 10 and ground.
    - **If the test lamp does not illuminate and the circuit fuse is good**
    1. Ignition OFF, remove the test lamp.
    2. Test for less than 2 Ω in the B+ circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, verify the fuse is not open and there is voltage at the fuse.
    - **If the test lamp does not illuminate and the circuit fuse is open**
    1. Ignition OFF, remove the test lamp.
    2. Test for infinite resistance between the B+ circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance
    3. Test for infinite resistance between the signal circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance, replace the P22A Video Display- 2nd Row.
    - **If the test lamp illuminates**
5. Ignition ON, rear seat entertainment system ON.
6. Test for 5 V or greater between the control circuit terminal 9 and ground.
    - **If less than 5 V.**
    1. Ignition OFF, disconnect the X1 harness connector at the A33 Media Disc Player.
    2. Test for infinite resistance between the control circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the control circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the A33 Media Disc Player.
    - **If 5 V or greater.**

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7. Ignition OFF.
8. Verify the LVDS cable is properly connected at the P22A Video Display- 2nd Row, A33 Media Disc Player and all in-line connectors, and there is no damage to the cable or connections.
    - **If connection problems or cable damage is noted.**

      Perform the appropriate repair or replacement to correct any issues.

    - **If no connection problems or cable damage is noted.**
9. Disconnect the X4 harness connector at the A33 Media Disc Player and the X1 harness connector at the P22A Video Display- 2nd Row.

NOTE: **In the following steps, the test tools are assembled and used to bypass the vehicle LVDS cable assembly to determine if there is an output from the A33 Media Disc player on LVDS.**

10. Connect the EL-50334-12 Infotainment Test Cable - RSE to the A33 Media Disc Player. Connect the EL-50334-13 Infotainment Test Cable - RSE Splitter to the EL-50334-12 Infotainment Test Cable - RSE . Connect the EL-50334-14 Infotainment Test Cable and the EL-50334-2 Type A female to Mini B male USB Cable together. Connect the assembled test cables to the longer end of the EL-50334-13 Infotainment Test Cable - RSE Splitter and the P22A Video Display- 2nd Row.
11. Ignition ON, rear seat entertainment system ON.
12. Verify the P22A Video Display- 2nd Row does NOT turn on.
    - **If the P22A Video Display- 2nd Row turns on.**
    1. Replace the LVDS cable connected to the A33 Media Disc Player. Connect all harness connectors.
    2. Ignition ON, rear seat entertainment system ON.
    3. Verify the P22A Video Display- 2nd Row turns on.
        - If the P22A Video Display- 2nd Row does not turn on, replace the LVDS cable connected to the P22A Video Display- 2nd Row.
        - If the P22A Video Display- 2nd Row turns on.
    4. All OK.
    - **If the P22A Video Display- 2nd Row does NOT turn on.**
13. Replace the P22A Video Display- 2nd Row.
14. Ignition ON, rear seat entertainment system ON.
15. Verify the P22A Video Display- 2nd Row turns on.
    - **If the P22A Video Display- 2nd Row turns on.**

      All OK.

    - **If the P22A Video Display- 2nd Row does NOT turn on.**
16. Test or replace the A33 Media Disc Player.

Front Radio Display Inoperative

1. Ignition OFF.
2. Disconnect the X3 harness connector at the P17 Info Display, X5 at the Human Machine Interface, and X5 at the A33 Media Disc Player

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3. Connect the EL-50334-15 Mini B Male USB to Mini B Male USB orange end to the P17 Info Display Module, Connect the EL-50334-15 Mini B Male USB to Mini B Male USB (short end) to the K74 Human Machine Interface Module, and Connect the EL-50334-15 Mini B Male USB to Mini B Male USB (long end) to the A33 Media Disc Player.
4. Ignition ON, rear seat entertainment system ON.
5. Source media from the rear video display to the front radio display.
6. Verify media is seen on the front radio display.
    - **If media is not seen on front radio display.**

      Replace the A33 Media Disc Player

    - **If media is seen on front radio display.**
7. Replace the LVDS cable that is connected to the P17 Info Display, K74 Human Machine Interface, and the A33 Media Disc Player.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Video Display Replacement**
- **Control Module References** for media disc player replacement, programming, and setup.

VIDEO ENTERTAINMENT SYSTEM REMOTE CONTROL MALFUNCTION

Diagnostic Instructions

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

Circuit/System Description

The second row overhead display is located in the headliner. The display screen shows video from the media disc player, or an AUX input device.

The display receives power and ground from the vehicle harness. A discrete control circuit from the media disc player is used to control the power state of the display. The display receives all other video, audio, and control information via the LVDS cable.

The display contains the infrared transmitters for the wireless headphones and the remote control. During operation, the infrared transmitters may be visible as illuminated LEDs.

The wireless remote control is used to operate the system from the rear seat. Infrared signals from the remote control are received by the infrared receivers in display. The remote control can be used to turn the rear screen on or off, to change system settings, and to select the source for the screen from the media available to the infotainment system. Refer to the Owners Manual for additional information on remote control functions.

Reference Information

Schematic Reference

Video System Schematics

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Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Video Entertainment System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

NOTE: **Test or replace the remote control batteries before performing the circuit/system verification.**

1. Verify no DTCs are present.
   - **If any DTCs are present**

     Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

   - **If no DTCs are present**
2. Ignition ON, rear seat entertainment system ON.
3. Verify that all remote control buttons operate and perform the correct function.
   - **If some, but not all, controls operate.**

     Replace the remote control.

   - **If all controls are inoperative.**
   1. Replace the P22A Video Display- 2nd Row. Ignition ON, rear seat entertainment system ON.
   2. Verify that all remote control buttons operate and perform the correct function.
      - If some, but not all, controls operate, replace the remote control.
      - If all controls are inoperative, replace the A33 Media Disc Player.
      - If all controls operate and perform the correct function.
   3. All OK.
   - **If all controls operate and perform the correct function.**
4. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

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- **Video Display Replacement**
- **Control Module References** for media disc player replacement, programming, and setup.

VIDEO ENTERTAINMENT SYSTEM WIRELESS HEADPHONE MALFUNCTION

Diagnostic Instructions

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

Circuit/System Description

The second row overhead display is located in the headliner. The display screen shows video from the media disc player, or an AUX input device.

The display receives power and ground from the vehicle harness. A discrete control circuit from the media disc player is used to control the power state of the display. The display receives all other video, audio, and control information via the LVDS cable.

The display contains the infrared transmitters for the wireless headphones and the remote control. During operation, the infrared transmitters may be visible as illuminated LEDs.

A power button on the headphone is used to turn the headphone on. A red LED illuminates when the headphone is turned ON. The headphones automatically turn OFF if they lose the infrared signal from the system for approximately 4 minutes in order to preserve their battery power. The signal may be lost if the system is turned off or if the headphones are out of range of the infrared signal transmitters.

Each set of headphones has a rotary volume control on one of the earpieces. To adjust the volume, adjust this control.

Audio to the wireless headphones is provided over 2 channels. Audio for channel 1 or channel 2 is selected from one of the available sources using the remote control. Pressing the button in the center of the headphone volume control will switch the headphone between channels.

Reference Information

Schematic Reference

Video System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Video Entertainment System Description and Operation

Electrical Information Reference

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

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

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

1. Verify no DTCs are present.
   - **If any DTCs are present**

     Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

   - **If no DTCs are present**
2. Turn ON the wireless headphones.
3. Verify the power indicator lamp on all wireless headphone illuminates.
   - **If the power indicator lamp does not illuminate on all wireless headphones.**

     Replace the inoperative headphone.

   - **If the power indicator lamp illuminates on all wireless headphones.**
4. Ignition ON, rear seat entertainment system ON. Using the remote control, select an audio source for channel 1.
5. Verify that audio is heard from channel 1 on each headphone, using the headphone controls to select channel 1.
   - **If audio is heard from some, but not all, headphones.**

     Replace the inoperative headphone.

   - **If audio is not heard from any headphones, or the audio heard is not clear.**
   1. Replace the P22A Video Display- 2nd Row.
   2. Ignition ON, rear seat entertainment system ON. Using the remote control, select an audio source for channel 1.
   3. Verify that audio is heard from channel 1 on each headphone, using the headphone controls to select channel 1.
      - If audio is heard from some, but not all, headphones, replace the inoperative headphone.
      - If audio is not heard from any headphones, or the audio heard is not clear, replace the A33 Media Disc Player.
      - If audio is heard from all headphones.
   4. All OK.
   - **If audio is heard from all headphones.**
6. Using the remote control, select an audio source for channel 2.
7. Verify that audio is heard from channel 2 on each headphone, using the headphone controls to select

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channel 2.

- **If audio is heard from some, but not all, headphones.**

  Replace the inoperative headphone.

- **If audio is not heard from any headphones, or the audio heard is not clear.**

1. Replace the P22A Video Display- 2nd Row.
2. Ignition ON, rear seat entertainment system ON. Using the remote control, select an audio source for channel 2.
3. Verify that audio is heard from channel 2 on each headphone, using the headphone controls to select channel 2.
   - If audio is heard from some, but not all, headphones, replace the inoperative headphone.
   - If audio is not heard from any headphones, or the audio heard is not clear, replace the A33 Media Disc Player.
   - If audio is heard from all headphones.
4. All OK.

- **If clear audio is heard from all headphones.**

8. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Video Display Replacement**
- **Control Module References** for media disc player replacement, programming, and setup.

ONSTAR VOICE RECOGNITION MALFUNCTION

Diagnostic Instructions

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

Circuit/System Description

The telematics communication interface control module is capable of interpreting voice commands received over the cellular microphone circuit. Speech recognition allows the user to speak to one computer in the vehicle, and one reached over the cellular communication network. The module attempts to understand the users command, and responds by speaking back, or by taking the appropriate action, e.g. dialing the phone.

Reference Information

Schematic Reference

OnStar/Telematics Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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Description and Operation

OnStar Description and Operation

Electrical Information Reference

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

Circuit/System Verification

NOTE:

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

1. Ignition ON/vehicle in Service Mode, press the blue OnStar Call button.
2. Verify that your voice is heard clearly by the OnStar Call center.
   - **If your voice can not be heard clearly**

     Refer to **OnStar Microphone Malfunction**

   - **If your voice can be heard clearly**
3. Verify that the system responds appropriately to all voice commands by pressing the voice command button and attempting to operate the system using multiple voice commands.
   - **If the OnStar system does not respond to any voice commands**

     Replace the K73 Telematics Communication Interface Control Module

   - **If the OnStar system responds to some, but not all voice commands**

     Refer to **OnStar Description and Operation** for tips on proper pronunciation

   - **If the OnStar system responds to all voice commands**
4. All OK.

Repair Instructions

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

Control Module References for telematics communication interface control module replacement, programming, and setup.

VOICE RECOGNITION MALFUNCTION (WITH UE1)

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Voice Recognition Audio Signal	1	1	1	-
Voice Recognition Audio Low Reference	-	1	-	-
1. infotainment system voice recognition inoperative				

Circuit/System Description

When voice recognition for the infotainment system is started, voice signals from the cellular phone microphone are passed through the telematics communication interface control module to the Human Machine Interface Control Module via the voice recognition audio circuits.

Diagnostic Aids

- Refer to the Owners Manual and/or the Navigation System Owners Manual for voice recognition use and commands.
- When the system recognizes the command the system will either perform the function or ask to confirm the choice by clearly saying "yes" or "no".
- If experiencing difficulty with the system recognizing a command, confirm that the command is correct.
- Background noise such as a climate control fan positioned on high, open windows, or very loud outside noises, can cause voice commands to be misunderstood.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) **Radio/Navigation System Schematics (IO5, IO6)** **Radio/Navigation System Schematics (IOB)**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) **Radio/Audio System Description and Operation (IO5/IO6)** **Radio/Audio System Description and Operation (IOB)**

Electrical Information Reference

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

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Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Verify the OnStar Â® voice recognition system is operating normally.
    - **If the OnStar Â® voice recognition system is not operating normally.**

      Refer to **OnStar Voice Recognition Malfunction**.

    - **If the OnStar Â® voice recognition system is operating normally.**
2. Ignition On/Vehicle in Service Mode. Infotainment system ON.

    NOTE: Refer to the Owners Manual and/or the Navigation System Owners Manual for voice recognition use and commands.

3. Begin voice recognition for the infotainment system and clearly speak one of the available commands.
4. Verify the infotainment system responds correctly to the command.
    - **If the infotainment system does not respond correctly to the command.**
    1. Clearly speak a different command.
    2. Verify the infotainment system responds correctly to the command.
        - If the infotainment system does not respond correctly to any commands, refer to Circuit/System Testing.
        - If the infotainment system responds correctly to the command.
    3. Refer to the Owners Manual and/or the Navigation System Owners Manual for hints on speaking commands.
    - **If the infotainment system responds correctly to the command.**
5. All OK

Circuit/System Testing

1. Ignition OFF, disconnect the X1 harness connector at the K74 Human Machine Interface Control Module.
2. Disconnect the X2 harness connector at the K73 Telematics Communication Interface Control Module. Ignition On/Vehicle in Service Mode.
3. Test for less than 1 V between the signal circuit terminal listed below and ground.
    - Voice recognition audio signal terminal 6
    - Voice recognition audio low reference terminal 12
    - **If 1 V greater**

      Repair the short to voltage on the circuit.

    - **If less than 1 V**
4. Ignition OFF.
5. Test for infinite resistance between the signal circuits listed below and ground:
    - Voice recognition audio signal terminal 6
    - Voice recognition audio low reference terminal 12

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- **If less than infinite resistance**

  Repair the short to ground on the circuit.

- **If infinite resistance**

6. Test for less than 5 Ω between the terminals listed below:
   - K74 Human Machine Interface Control Module signal circuit terminal 1 X1 and the K73 Telematics Communication Interface Control Module signal circuit terminal 6 X2
   - K74 Human Machine Interface Control Module low reference circuit terminal 2 X1 and the K73 Telematics Communication Interface Control Module low reference circuit terminal 12 X2
   - **If 5 Ω greater**

     Repair the open/high resistance in the circuit.

   - **If less than 5 Ω**
7. Replace the K74 Human Machine Interface Control Module. Connect all harness connectors.

NOTE: **Refer to the Owners Manual and/or the Navigation System Owners Manual for voice recognition use and commands.**

8. Begin voice recognition for the infotainment system and clearly speak one of the available commands.
9. Verify the infotainment system responds correctly to the command.
   - **If the infotainment system does not respond correctly to the command**
   1. Clearly speak a different command.
   2. Verify the infotainment system responds correctly to the command.
      - If the infotainment system does not respond correctly to any commands, replace the K73 Telematics Communication Interface Control Module.
   - **If the infotainment system responds correctly to the command**
10. All OK

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for human machine interface control module or telematics communication interface control replacement, programming and setup.

VOICE RECOGNITION MALFUNCTION (WITHOUT UE1)

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Microphone Signal	B1277 02	B1277 04	B1277 04	-
Microphone Low Reference	B1277 02	B1277 04	-	-

Circuit/System Description

The human machine interface control module uses the cellular telephone microphone for voice recognition and cellular features. The human machine interface control module provides a bias voltage to each microphone (+) and (-) signal circuits for operation of the microphone.

Diagnostic Aids

- Refer to the Owners Manual and/or the Navigation System Owners Manual for voice recognition use and commands.
- When the system recognizes the command the system will either perform the function or ask to confirm the choice by clearly saying "yes" or "no".
- If experiencing difficulty with the system recognizing a command, confirm that the command is correct.
- Background noise such as a climate control fan positioned on high, open windows, or very loud outside noises, can cause voice commands to be misunderstood.

Reference Information

Schematic Reference

Radio/Navigation System Schematics (IO3) **Radio/Navigation System Schematics (IO5, IO6)** **Radio/Navigation System Schematics (IOB)**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IO3) **Radio/Audio System Description and Operation (IO5/IO6)** **Radio/Audio System Description and Operation (IOB)**

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON, infotainment system ON.

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NOTE: **Refer to the Owners Manual and/or the Navigation System Owners Manual for voice recognition use and commands.**

2. Begin voice recognition for the infotainment system and clearly speak one of the available commands.
3. Verify the infotainment system responds correctly to the command.
    - **If the infotainment system does not respond correctly to the command.**
    1. Clearly speak a different command.
    2. Verify the infotainment system responds correctly to the command.
        - If the infotainment system does not respond correctly to any commands, refer to Circuit/System Testing.
        - If the infotainment system responds correctly to the command.
    3. Refer to the Owners Manual and/or the Navigation System Owners Manual for hints on speaking commands.
    - **If the infotainment system responds correctly to the command.**
4. All OK

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the B24 Cellular Phone Microphone. Ignition ON.
2. Test for 9-11 V between the signal circuit terminal B and ground.
    - **If less than 9 V**
    1. Ignition OFF, disconnect the X1 harness connector at the K74 Human Machine Interface Control Module.
    2. Test for infinite resistance between the signal circuit and ground.
        - If less than infinite resistance, repair the short to ground in the circuit.
        - If infinite resistance
    3. Test for less than 2 Ω in the signal circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the K74 Human Machine Interface Control Module.
    - **If greater than 11 V**
    1. Ignition OFF, disconnect the X1 harness connector at the K74 Human Machine Interface Control Module. Ignition ON.
    2. Test for less than 1 V between the signal circuit and ground.
        - If 1 V or greater, repair the short to voltage on the circuit.
        - If less than 1 V, replace the K74 Human Machine Interface Control Module.
    - **If between 9-11 V**
3. Test for less than 1 V between the signal circuit terminal A and ground.
    - **If greater than 1 V**
    1. Ignition OFF, X1 harness connector at the K74 Human Machine Interface Control Module. Ignition ON.
    2. Test for less than 1 V between the signal circuit and ground.
        - If 1 V or greater, repair the short to voltage in the circuit.
        - If less than 1 V, replace the K74 Human Machine Interface Control Module.

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- **If less than 1 V**

4. Ignition OFF, disconnect the X1 harness connector at the K74 Human Machine Interface Control Module.
5. Test for infinite resistance between the B24 Cellular Phone Microphone signal circuit terminal A and ground.
    - **If less than infinite resistance**

      Repair the short to ground in the circuit

    - **If infinite resistance**
6. Test for less than 2 Ω in the signal circuit end to end.
    - **If 2 Ω or greater**

      Repair the open/high resistance in the circuit

    - **If less than 2 Ω**
7. Replace the B24 Cellular Phone Microphone.
8. Ignition ON, infotainment system ON.
9. Begin voice recognition for the infotainment system and clearly speak one of the available commands.
10. Verify the infotainment system responds correctly to the command.
    - **If the infotainment system does not respond correctly to the command.**
    1. Clearly speak a different command.
    2. Verify the infotainment system responds correctly to the command.
        - If the infotainment system does not respond correctly to any commands, replace the K74 Human Machine Interface Control Module.
        - If the infotainment system responds correctly to the command.
    3. Refer to the Owners Manual and/or the Navigation System Owners Manual for hints on speaking commands.
    - **If the infotainment system responds correctly to the command.**
11. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Mobile Telephone Microphone Replacement**
- **Control Module References** for human machine interface control module replacement, programming, and setup.

Article GUID: A00854625

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SPECIFICATIONS

FASTENER SPECIFICATIONS

Single Use Non-Threaded Fasteners/Components

NOTE:

All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.

Application
High Frequency Antenna Retainer

Reusable Threaded Fastener Tightening Specifications

NOTE:

All fasteners listed in this table can be reused after removal.

Application	Specification
	Metric (English)
Disc Player Bolt	2.5 N.m (22 lb lb in)
High Frequency Antenna Fastener	9 N.m (80 lb in)
Human Machine Interface Control Module Bracket Fastener	2.5 N.m (22 lb in)
Radio Antenna Base Fastener	5.5 N.m (49 lb in)
Radio Bracket Bolt	1.5 N.m (13 lb in)
Radio Control Bolt	2.5 N.m (22 lb lb in)
Radio Speaker Amplifier Fastener	9 N.m (80 lb in)

Article GUID: A00854645

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REPAIR INSTRUCTIONS

MOBILE TELEPHONE MICROPHONE REPLACEMENT

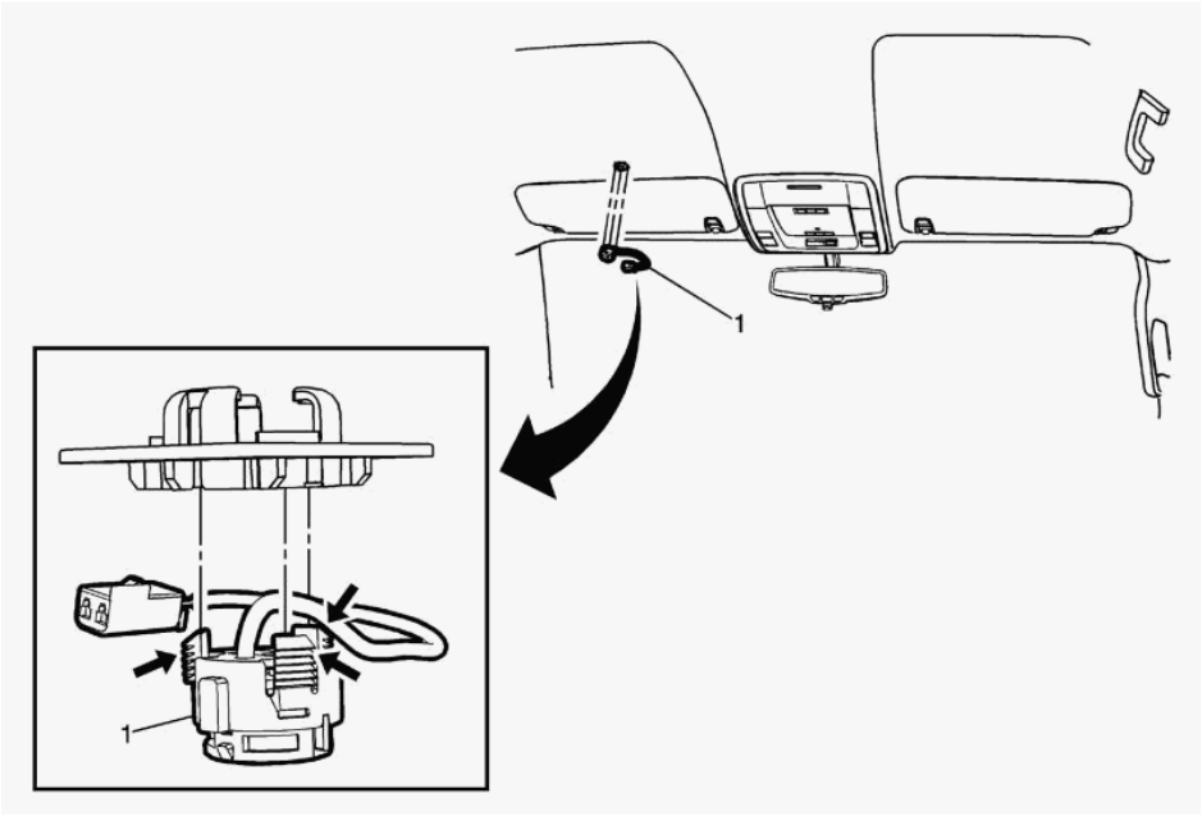


Fig. 1: Mobile Telephone Microphone
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Lower the front of the headlining trim panel to access the microphone. Refer to Headlining Trim Panel Replacement (Crew Cab Without Sunroof) Headlining Trim Panel Replacement (Crew Cab With Sunroof) Headlining Trim Panel Replacement (Extended Cab) Headlining Trim Panel Replacement (Regular Cab) .	
1	Mobile Telephone Microphone **Procedure** 1. Disconnect the electrical connector. 2. Depress tabs on microphone to release from microphone trim plate. 3. Transfer the microphone grille, if necessary.

HUMAN MACHINE INTERFACE CONTROL MODULE REPLACEMENT

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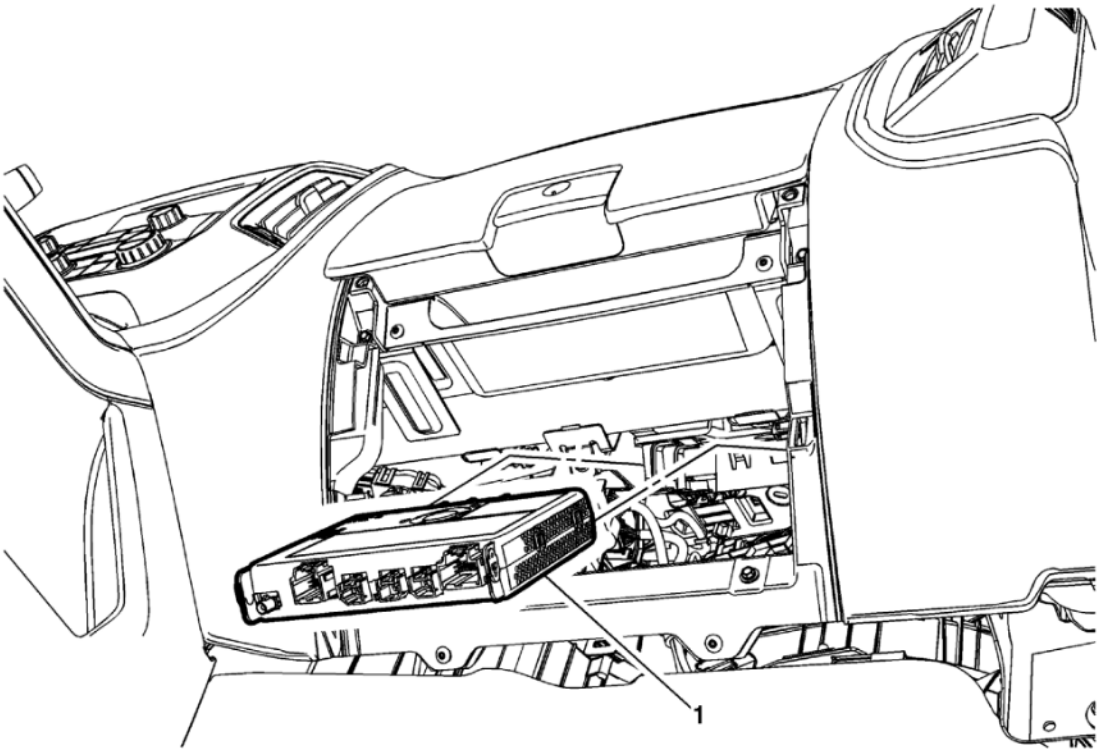


Fig. 2: Human Machine Interface Control Module
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the instrument panel compartment. Refer to **Instrument Panel Compartment Replacement** .	
1	Human Machine Interface Control Module **Procedure** 1. Disconnect the electrical connections. 2. Slide module rearward to release from bracket. 3. Refer to **Control Module References** for programming and setup information. **NOTE:** **Ensure the module is installed with the parts ID tag towards the rear of the vehicle, and the back of the human machine interface**

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Callout	Component Name
	control module towards the front of the vehicle.

HUMAN MACHINE INTERFACE CONTROL MODULE BRACKET REPLACEMENT

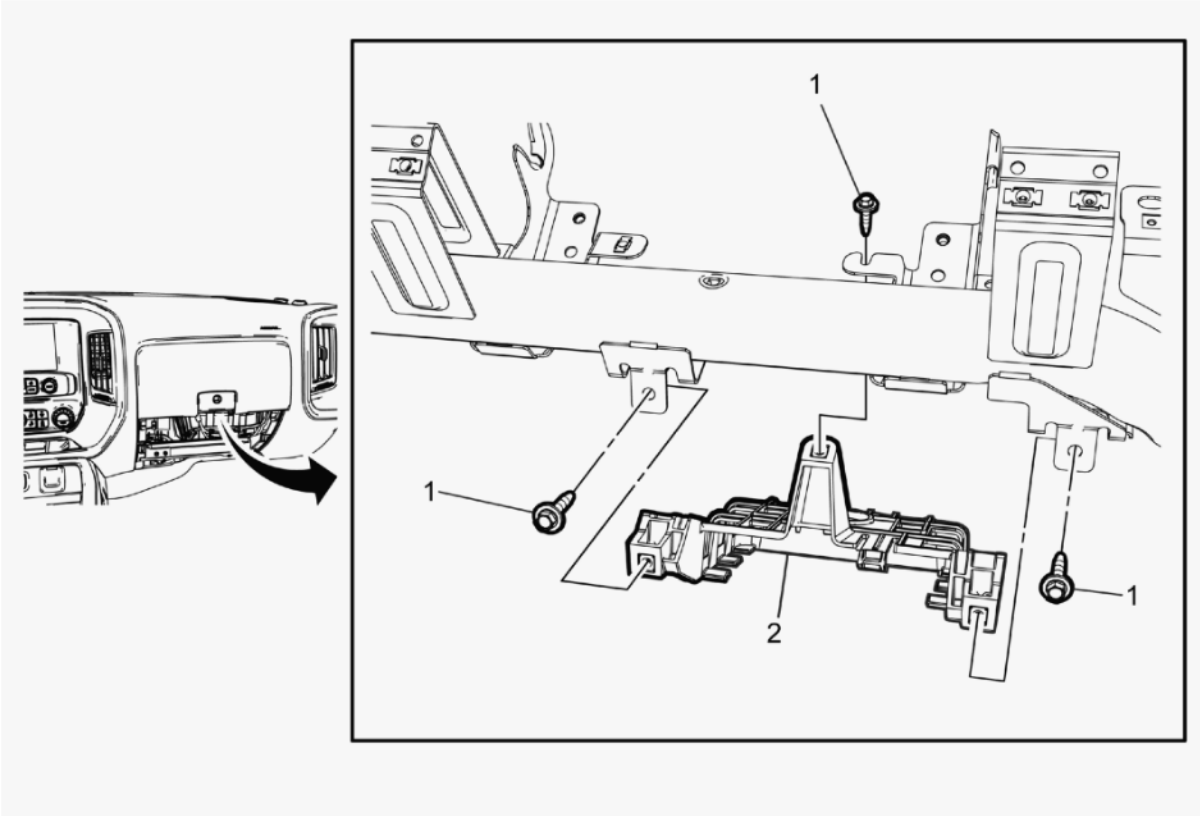


Fig. 3: Human Machine Interface Control Module Bracket
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the instrument panel compartment. Refer to **Instrument Panel Compartment Replacement** .	
1	Human Machine Interface Control Module Bracket Fasteners (Qty: 3) **CAUTION:** **Refer to Fastener Caution .** **Tighten** 2.5 N.m (22 lb in)

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Callout	Component Name
2	Human Machine Interface Control Module Bracket **Procedure** Transfer components, as necessary.

COMMUNICATION INTERFACE MODULE REPLACEMENT

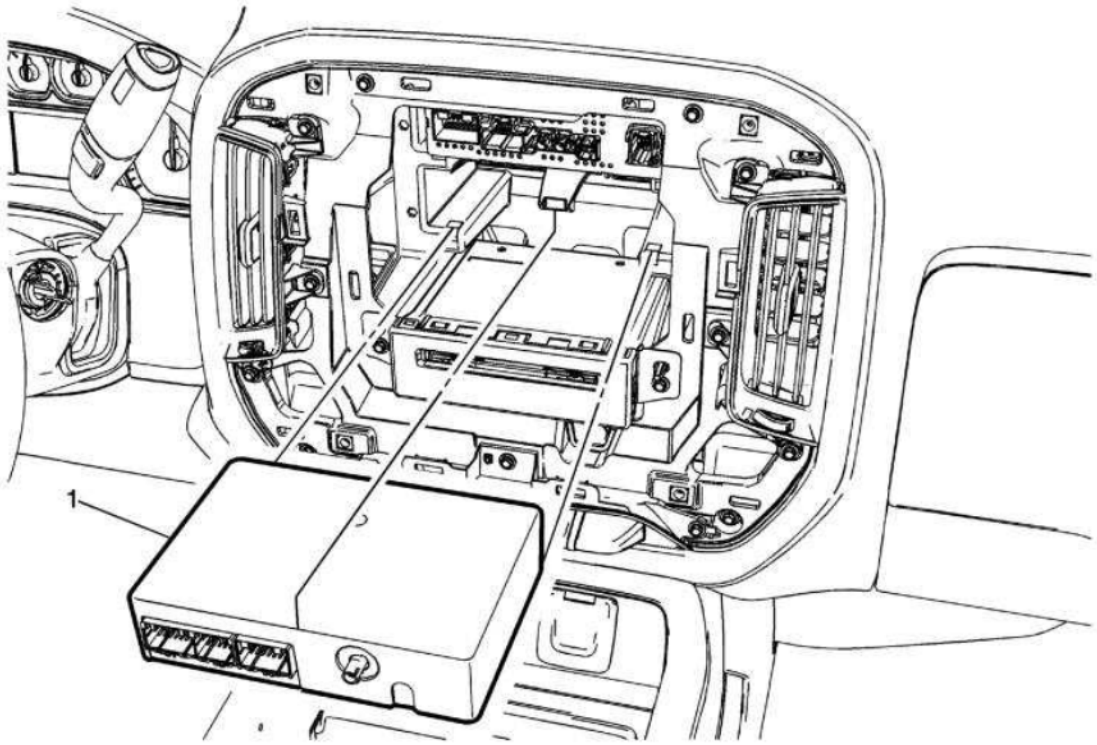


Fig. 4: Communication Interface Module
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the radio control assembly. Refer to **Radio Control Assembly Replacement**.	
1	Communication Interface Module **Procedure** 1. Unsnap the module from the bracket. 2. Disconnect the electrical connectors. 3. Reprogram the communication interface module after installation. Refer to **Control Module References** .

RADIO REPLACEMENT (WITH I03, I05, I06)

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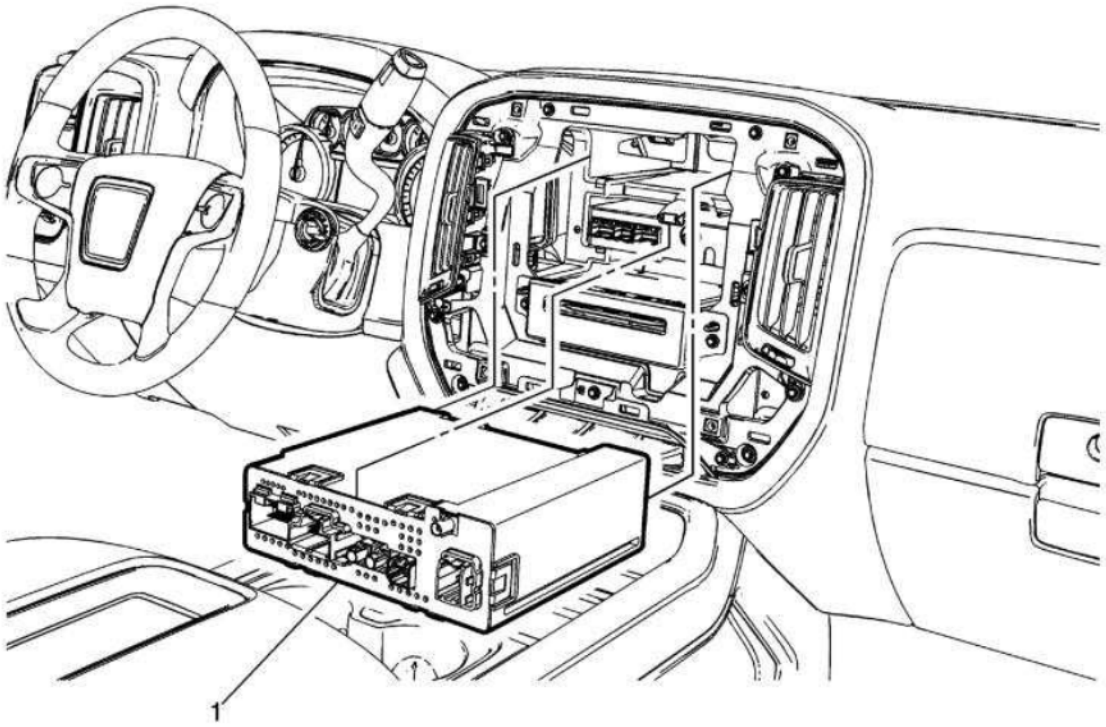


Fig. 5: Radio (With I03, I05, I06)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the radio control assembly. Refer to **Radio Control Assembly Replacement** .	
1	Radio **Procedure** 1. Disconnect the electrical connections. 2. Slide module rearward to release from bracket. 3. Refer to **Control Module References** for programming and setup information.

RADIO REPLACEMENT (WITH IOB)

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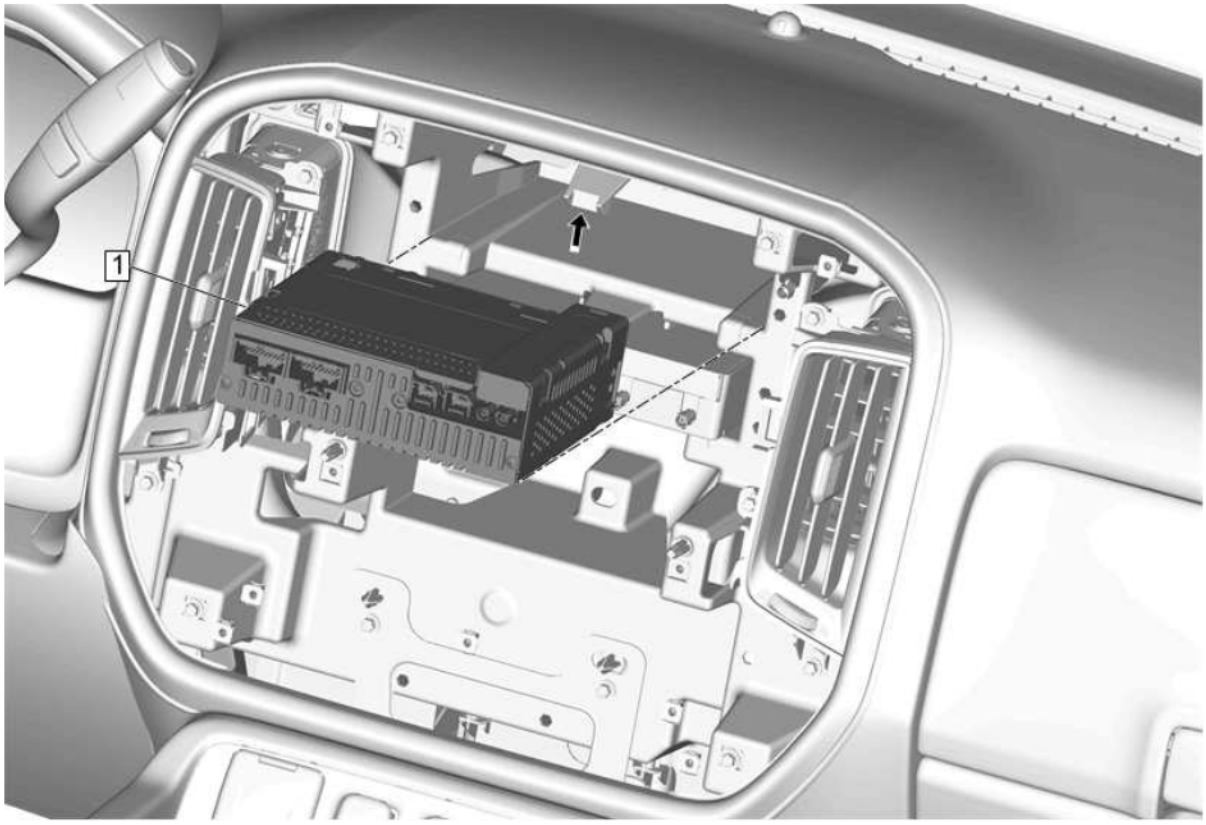


Fig. 6: Radio (With IOB)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure **Driver Information Display Replacement**	
1	Radio **Procedure** 1. Release the retaining tab. 2. Disconnect the electrical connectors. 3. Perform the necessary programming and setup procedure:**Control Module References**

RADIO CONTROL ASSEMBLY REPLACEMENT

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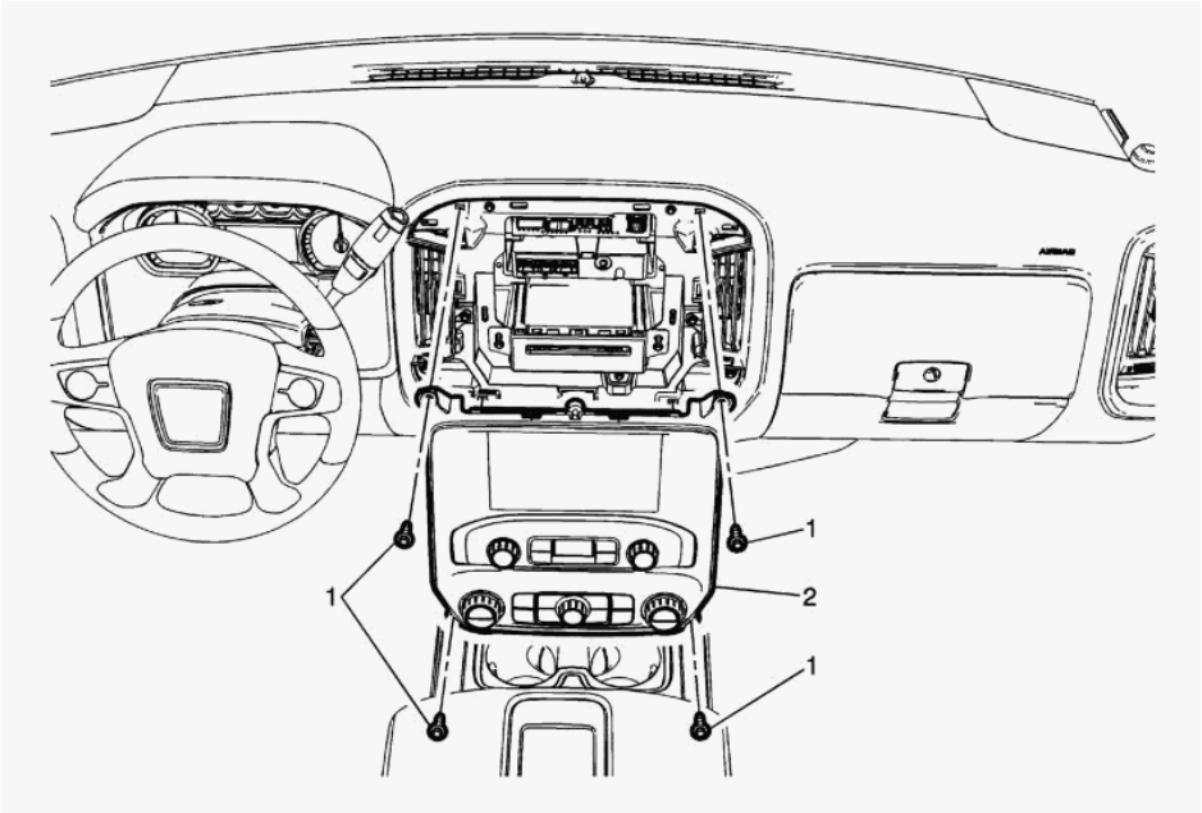


Fig. 7: Radio Control Assembly
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the instrument panel accessory bezel. Refer to **Instrument Panel Accessory Bezel Replacement** .	
1	Radio Control Fastener (Qty: 4) **CAUTION:** **Refer to** **Fastener Caution** .
2	Radio Control Assembly **Procedure** 1. Disconnect the electrical connections. 2. When replacing the radio control assembly, transfer all necessary components.

RADIO VOLUME COMPENSATOR INTERIOR NOISE MICROPHONE REPLACEMENT

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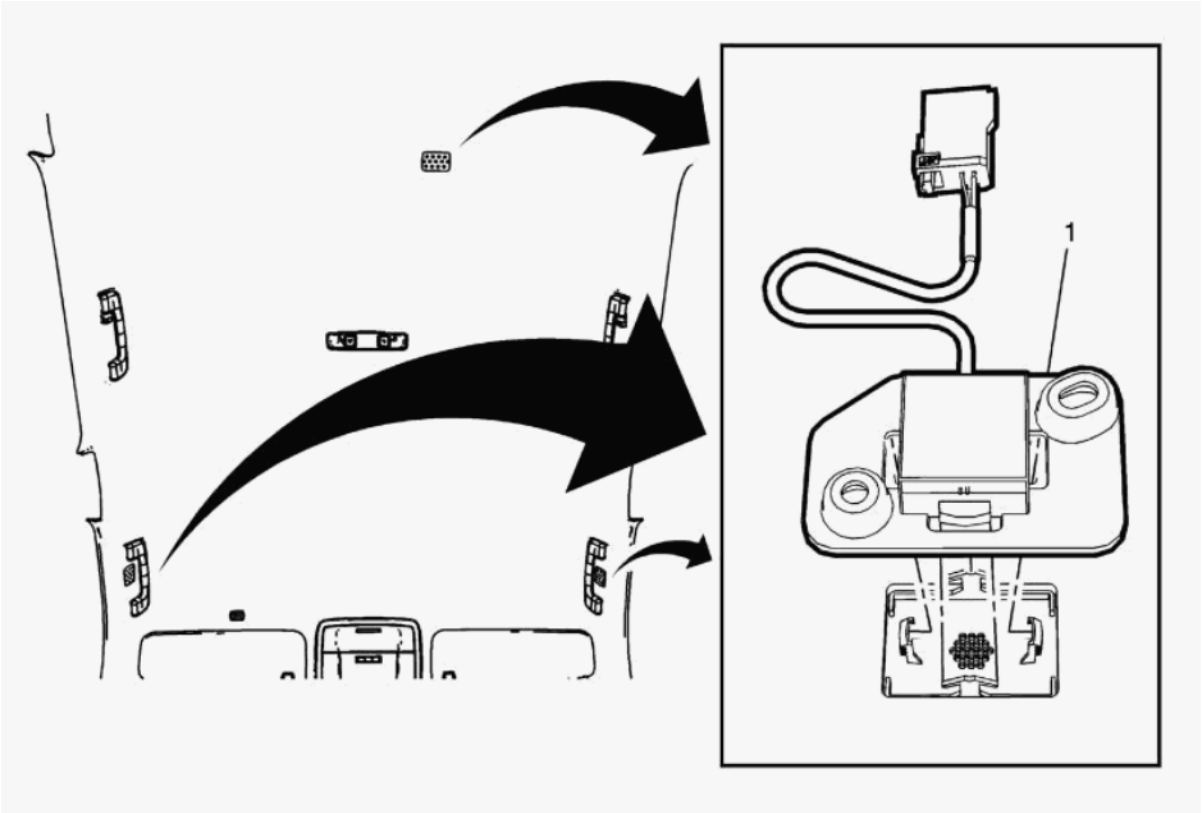


Fig. 8: Radio Volume Compensator Interior Noise Microphone
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Lower the front or rear of the headlining trim panel enough to gain access to the microphone. Refer to **Headlining Trim Panel Replacement (Crew Cab Without Sunroof)** **Headlining Trim Panel Replacement (Crew Cab With Sunroof)** **Headlining Trim Panel Replacement (Extended Cab)** **Headlining Trim Panel Replacement (Regular Cab)** .	
1	Radio Volume Compensator Interior Noise Microphone (Qty: 3) **Procedure** 1. Disconnect the electrical connectors. 2. Unsnap the microphone from the grille.

DRIVER INFORMATION DISPLAY REPLACEMENT

Removal Procedure

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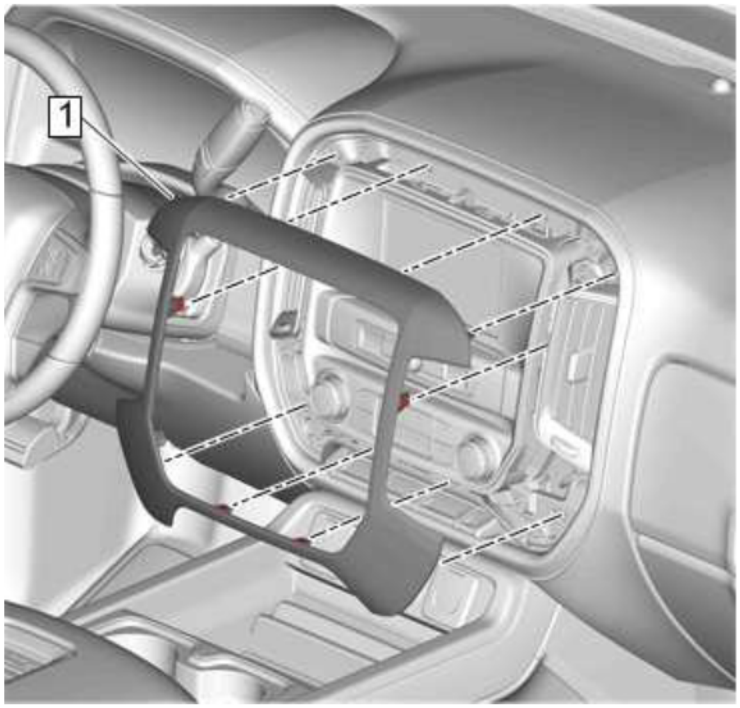


Fig. 9: Instrument Panel Accessory Bezel
Courtesy of GENERAL MOTORS COMPANY

1. Use a flat bladed plastic trim tool in order to release the retainer clips securing the instrument panel accessory bezel (1)to the instrument panel assembly.
2. Instrument Panel Accessory Bezel (1) - Remove

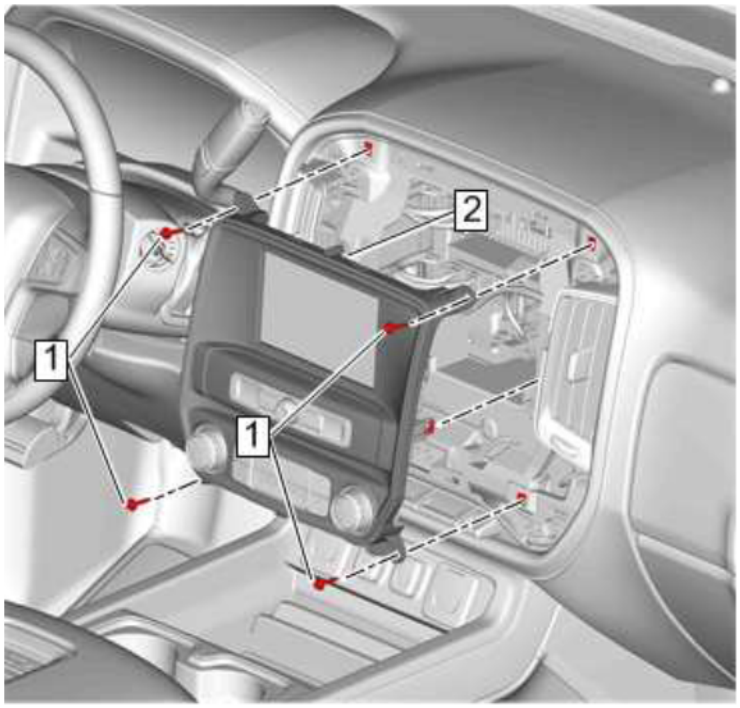


Fig. 10: Radio Control Bolts And Instrument Panel Accessory Bezel
Courtesy of GENERAL MOTORS COMPANY

3. Radio Control Bolt (1) - Remove
4. Disconnect the electrical connectors.

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5. Instrument Panel Accessory Bezel (2) - Remove

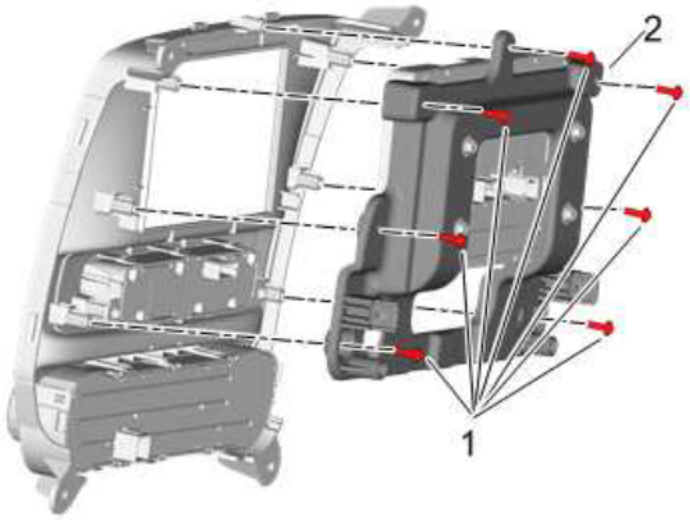


Fig. 11: Radio Control Bracket
Courtesy of GENERAL MOTORS COMPANY

6. Radio Bracket Bolt (1) - Remove
7. Radio Control Bracket (2) - Remove

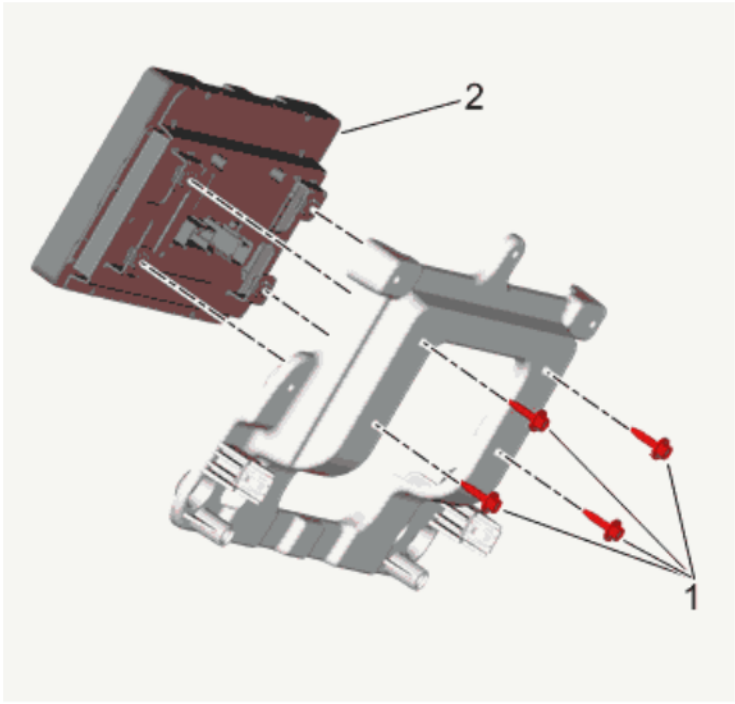


Fig. 12: Driver Information Display
Courtesy of GENERAL MOTORS COMPANY

8. Radio Control Bolt (1) - Remove

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9. Driver Information Display (2) - Remove

Installation Procedure

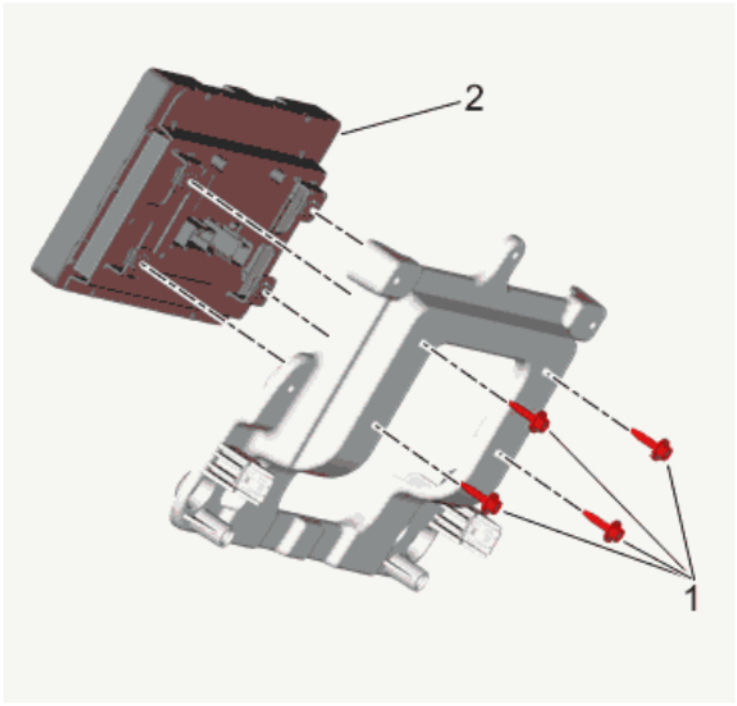
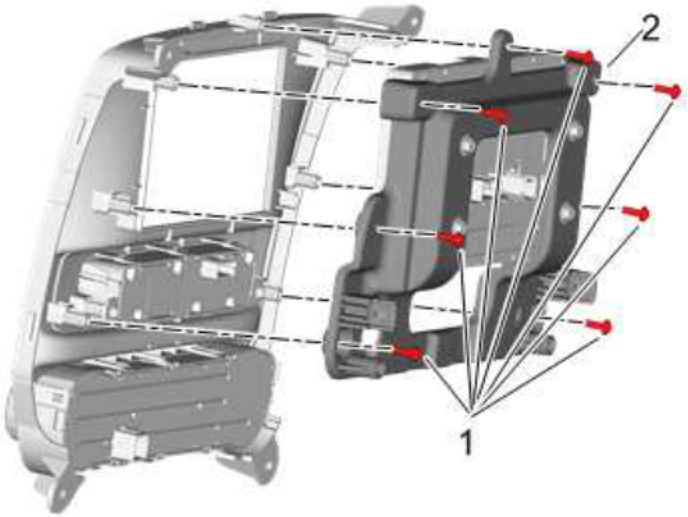


Fig. 13: Driver Information Display
Courtesy of GENERAL MOTORS COMPANY

1. Driver Information Display (2) - Install

CAUTION: **Fastener Caution**

2. Radio Control Bolt (1) - Install and tighten 2.5 N.m (22 lb in)



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Fig. 14: Radio Control Bracket
Courtesy of GENERAL MOTORS COMPANY

3. Radio Control Bracket (2) - Install
4. Radio Bracket Bolt (1) - Install and tighten 1.5 N.m (13 lb in)
5. Connect the electrical connectors.

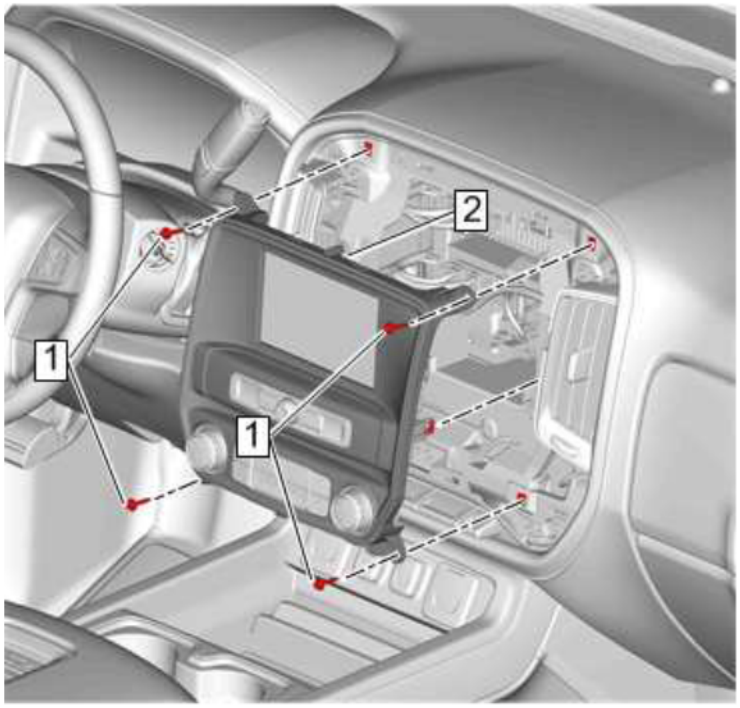


Fig. 15: Radio Control Bolts And Instrument Panel Accessory Bezel
Courtesy of GENERAL MOTORS COMPANY

6. Instrument Panel Accessory Bezel (2) - Install
7. Radio Control Bolt (1) - Install and tighten 2.5 N.m (22 lb in)

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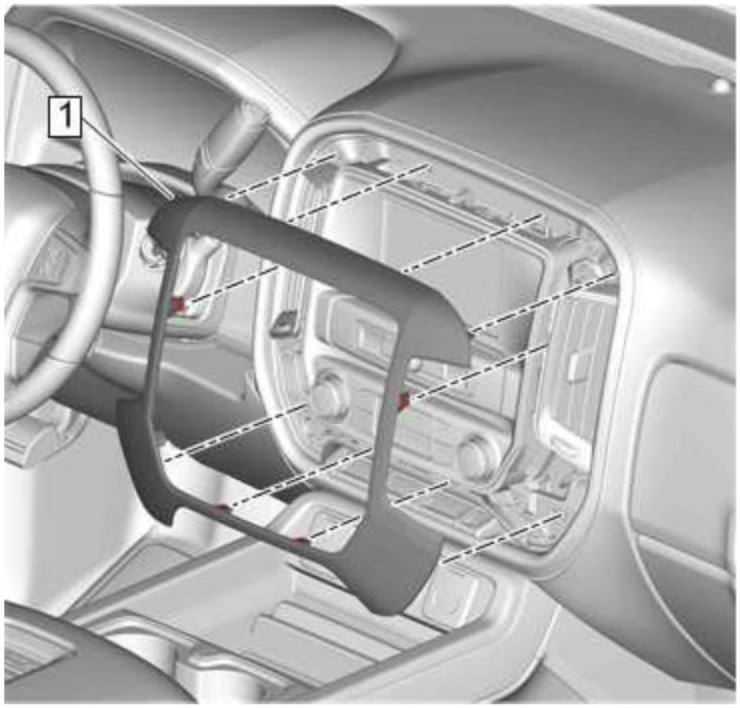


Fig. 16: Instrument Panel Accessory Bezel
Courtesy of GENERAL MOTORS COMPANY

8. Instrument Panel Accessory Bezel (1) - Install

DISC PLAYER REPLACEMENT (WITH IO3, IO5, IO6)

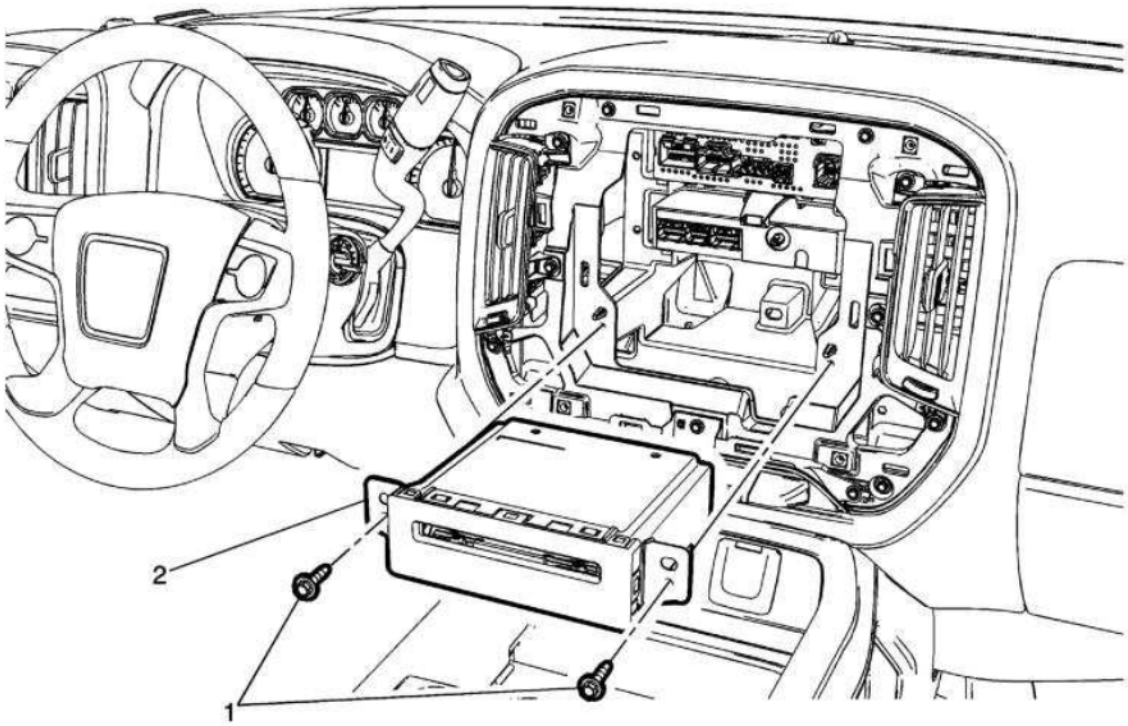


Fig. 17: Audio Disc Player
Courtesy of GENERAL MOTORS COMPANY

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Callout	Component Name
Preliminary Procedure Remove the radio control assembly. Refer to **Radio Control Assembly Replacement**.	
1	Disc Player Bolt (Qty: 2) **CAUTION:** **Refer to** **Fastener** **Caution** .
2	Disc Player **Procedure** Disconnect the electrical connectors.

DISC PLAYER REPLACEMENT (WITH IOB)

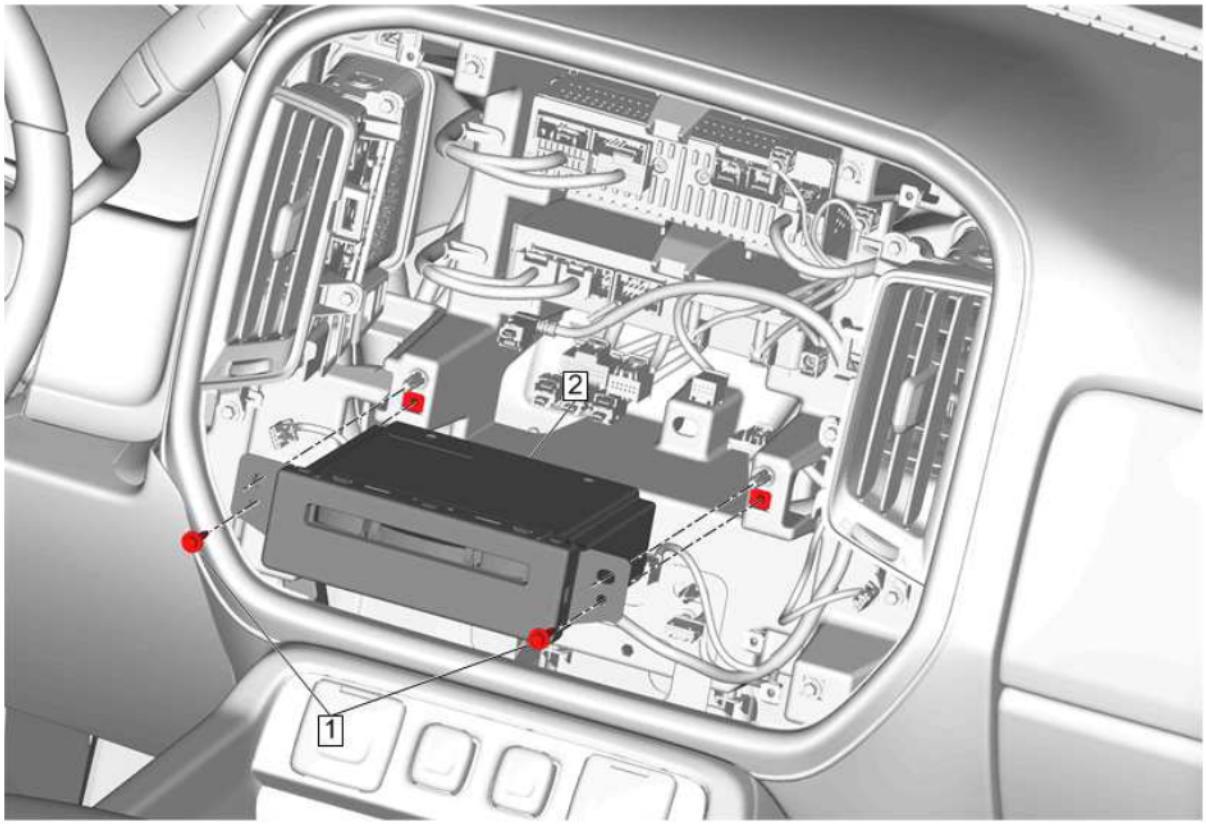


Fig. 18: Disc Player (With IOB)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure **Driver Information Display Replacement**	
1	Disc Player Bolt **CAUTION:** **Fastener** **Caution**

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Callout	Component Name
	Tighten 2.5 N.m (22 lb in)
2	Disc Player **Procedure** Disconnect the electrical connectors.

AUDIO DISC PLAYER AND USB RECEPTACLE REPLACEMENT

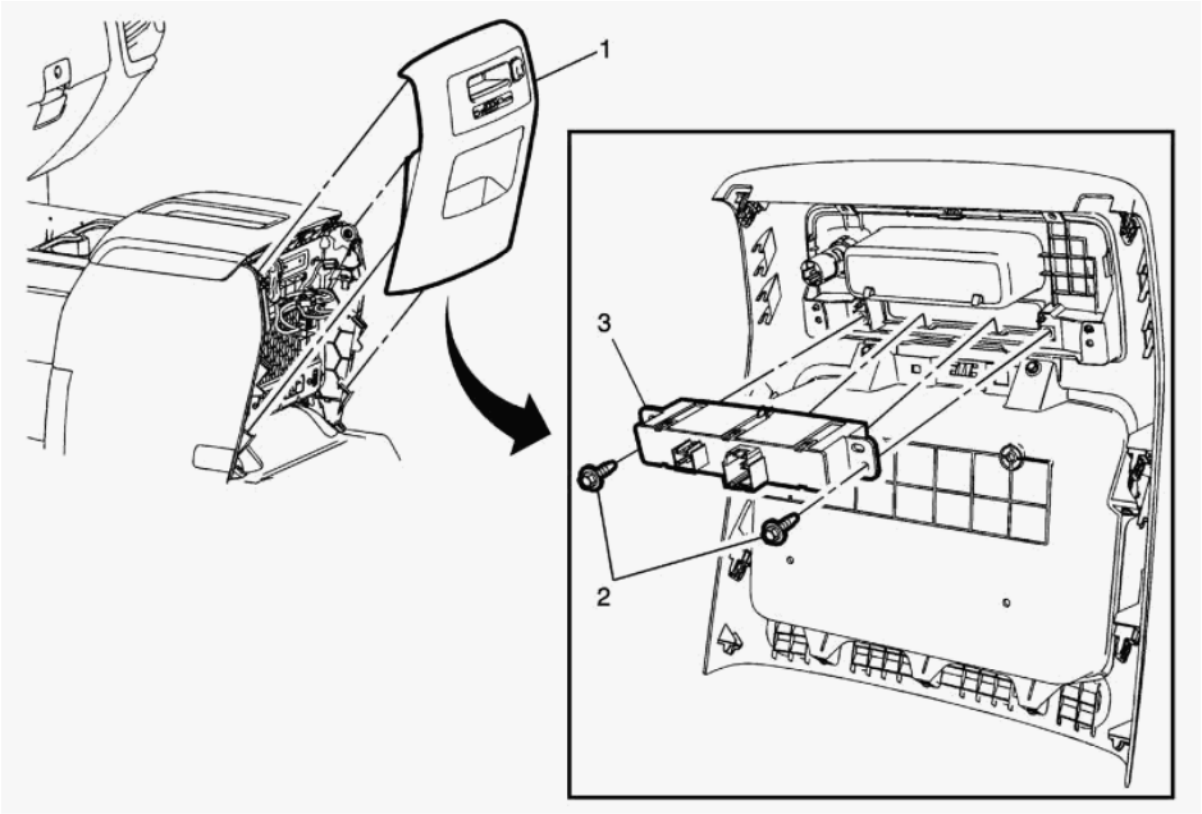


Fig. 19: Audio Disc Player and USB Receptacle
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Front Floor Console Rear Trim Panel Remove the front floor console rear trim panel. Refer to **Front Floor Console Rear Trim Panel Replacement** .
2	Audio Disc Player and USB Receptacle Fasteners (Qty: 2) **CAUTION:** **Refer to Fastener Caution** .
3	Audio Disc Player and USB Receptacle

AUDIO DISC PLAYER, USB, AUXILIARY IN, AND MEMORY CARD RECEPTACLE REPLACEMENT

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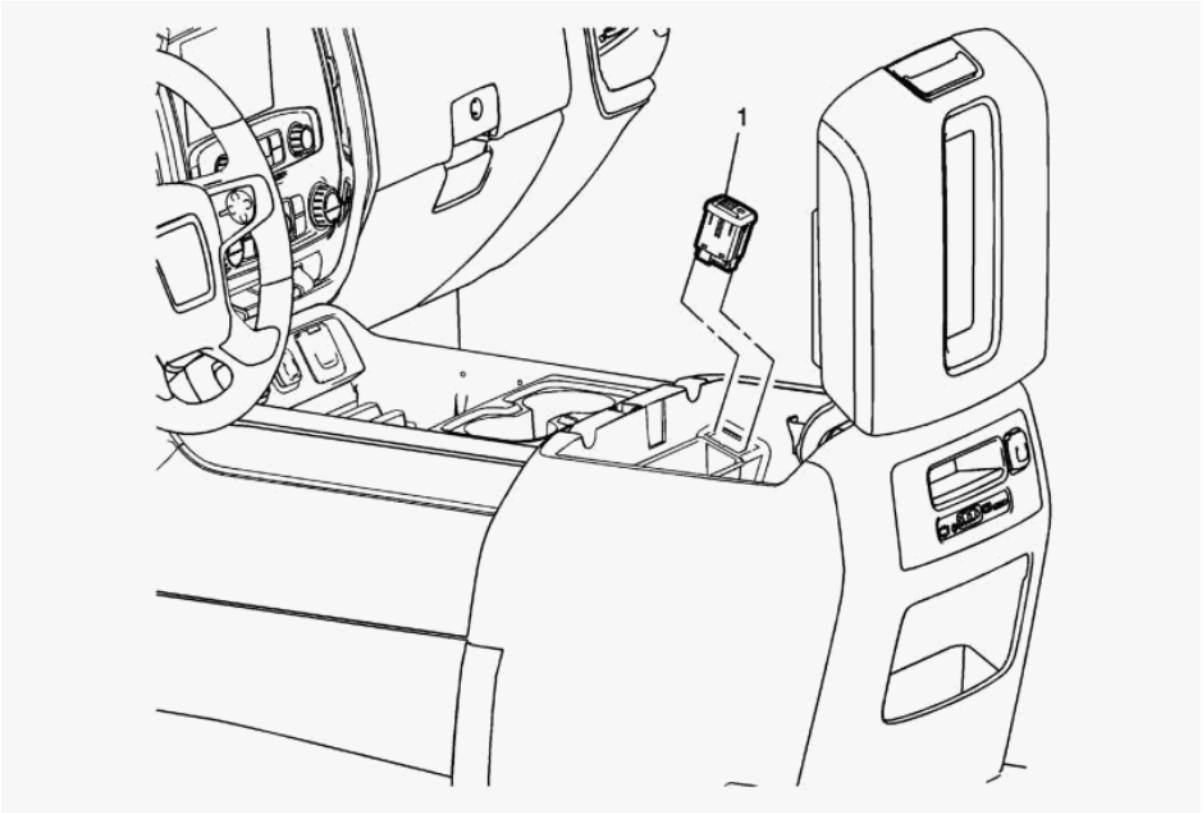


Fig. 20: USB Receptacle
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Audio Disc Player and USB and Auxiliary In and Memory card Receptacle **Procedure** 1. Open the front floor console armrest and using a small flat bladed tool, release the receptacle. 2. Disconnect electrical connector.

RADIO SPEAKER REPLACEMENT

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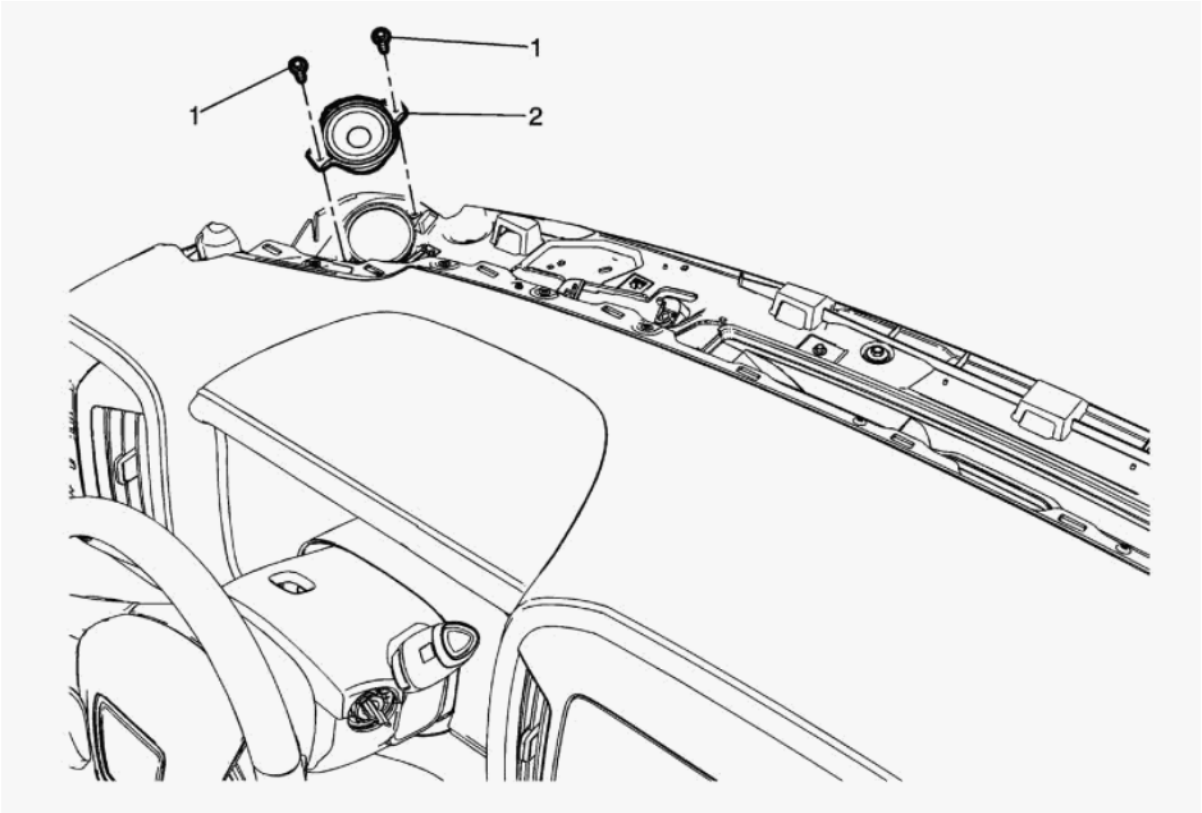


Fig. 21: Radio Speaker
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the instrument panel extension assembly. Refer to **Instrument Panel Extension Replacement** .	
1	Radio Speaker Fastener (Qty: 2) **CAUTION:** **Refer to** **Fastener** **Caution** .
2	Radio Speaker **Procedure** Disconnect the electrical connector.

RADIO SPEAKER AMPLIFIER REPLACEMENT

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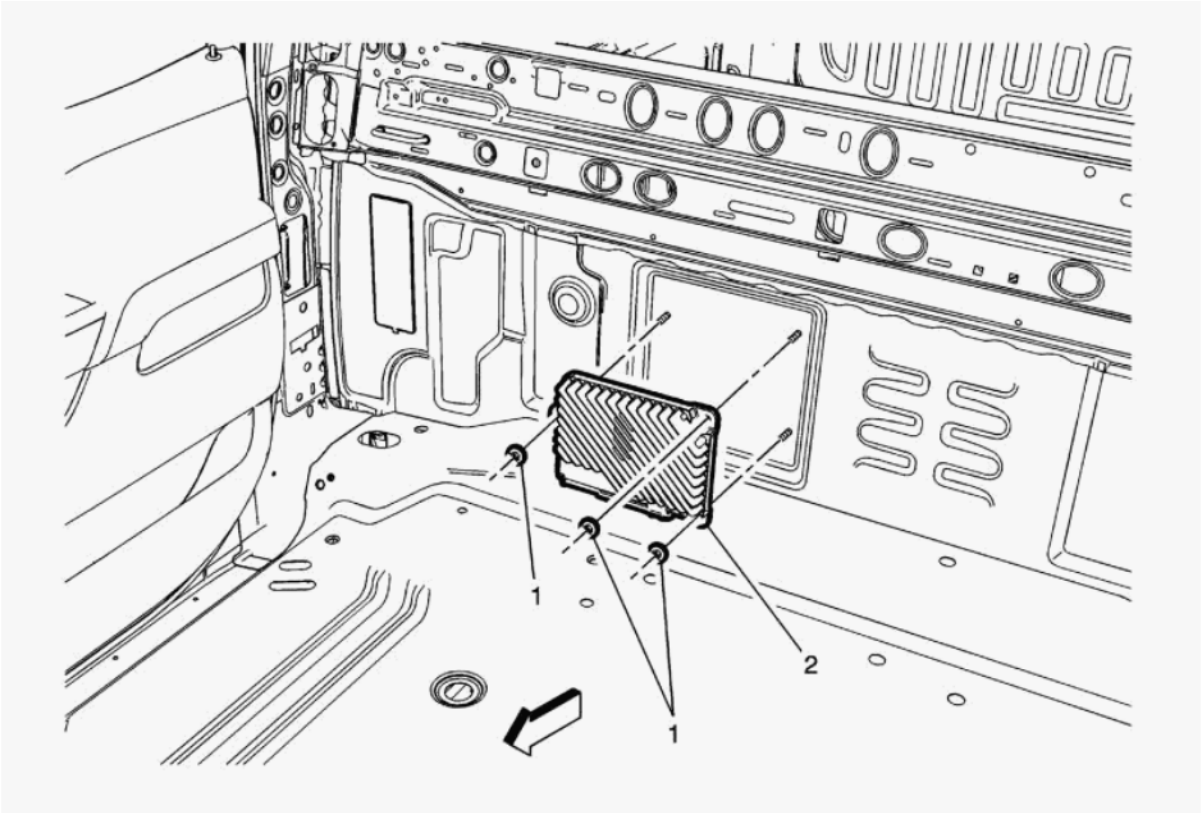


Fig. 22: Radio Speaker Amplifier
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure 1. Remove the rear seat. Refer to **Rear Seat Removal and Installation (Extended Cab with AM7)** **Rear Seat Removal and Installation (Heavy Duty Crew Cab with A68)** **Rear Seat Removal and Installation (Light Duty Crew Cab with A68)** **Rear Seat Removal and Installation (Extended Cab with A68)** . 2. Remove the body rear panel insulator. Refer to **Body Rear Panel Insulator Replacement** .	
1	Radio Speaker Amplifier Fasteners (Qty: 3) **CAUTION:** **Refer to** **Fastener Caution** . **Tighten** 9 N.m (80 lb in)
2	Radio Speaker Amplifier **Procedure** Disconnect the electrical connections.

MULTIMEDIA RECEPTACLE REPLACEMENT

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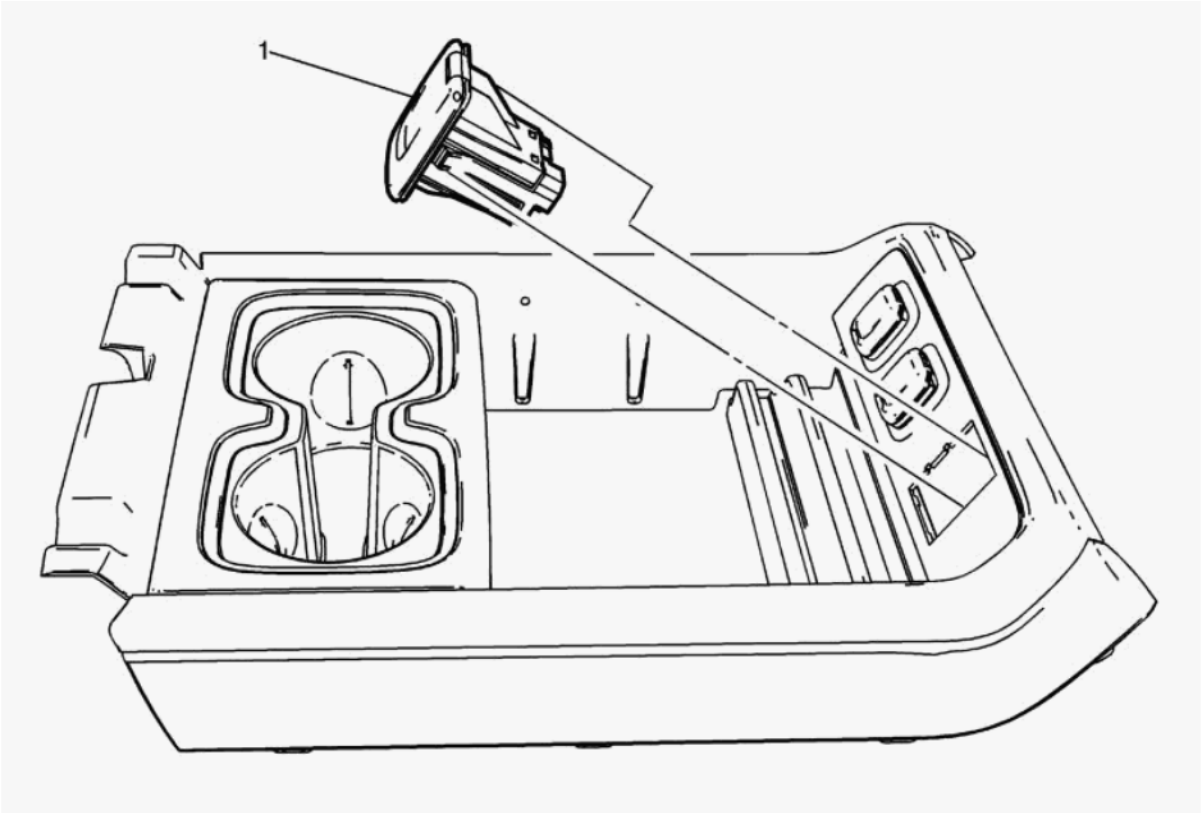


Fig. 23: Multimedia Receptacle
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the front floor console trim plate. Refer to **Front Floor Console Trim Plate Replacement** .	
1	Multimedia Receptacle **Procedure** Use the appropriate tool to depress the tabs on the receptacle to remove from the trim plate.

NAVIGATION SIGNAL SPLITTER REPLACEMENT

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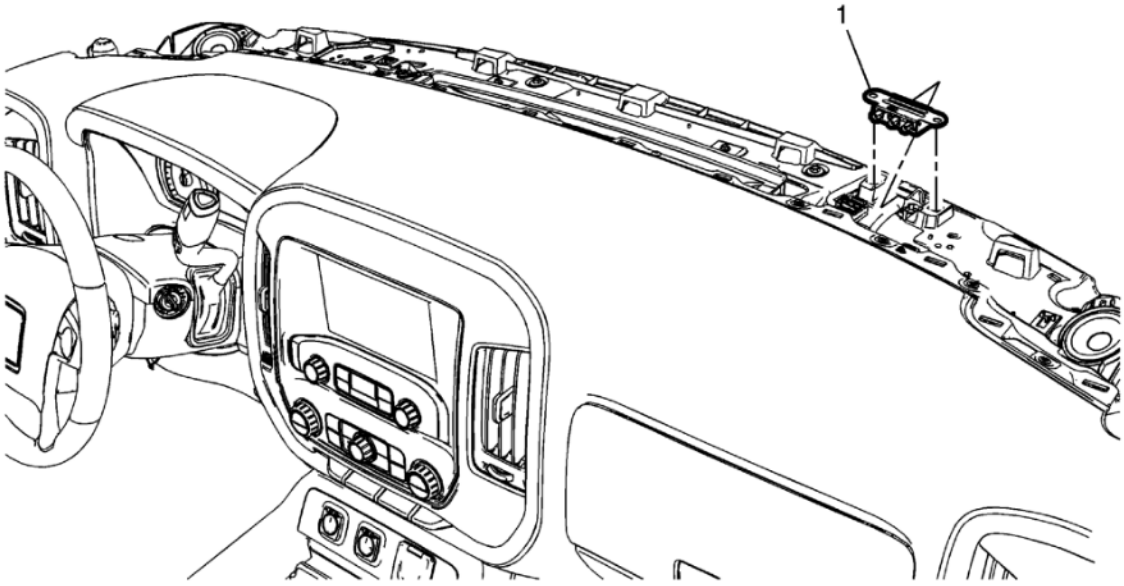


Fig. 24: Navigation Signal Splitter
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the instrument panel extension assembly. Refer to **Instrument Panel Extension Replacement** .	
1	Navigation Signal Splitter **Procedure** 1. Disconnect the electrical connections. 2. Slide splitter from retaining tabs on the bracket to remove.

RADIO ANTENNA BASE REPLACEMENT

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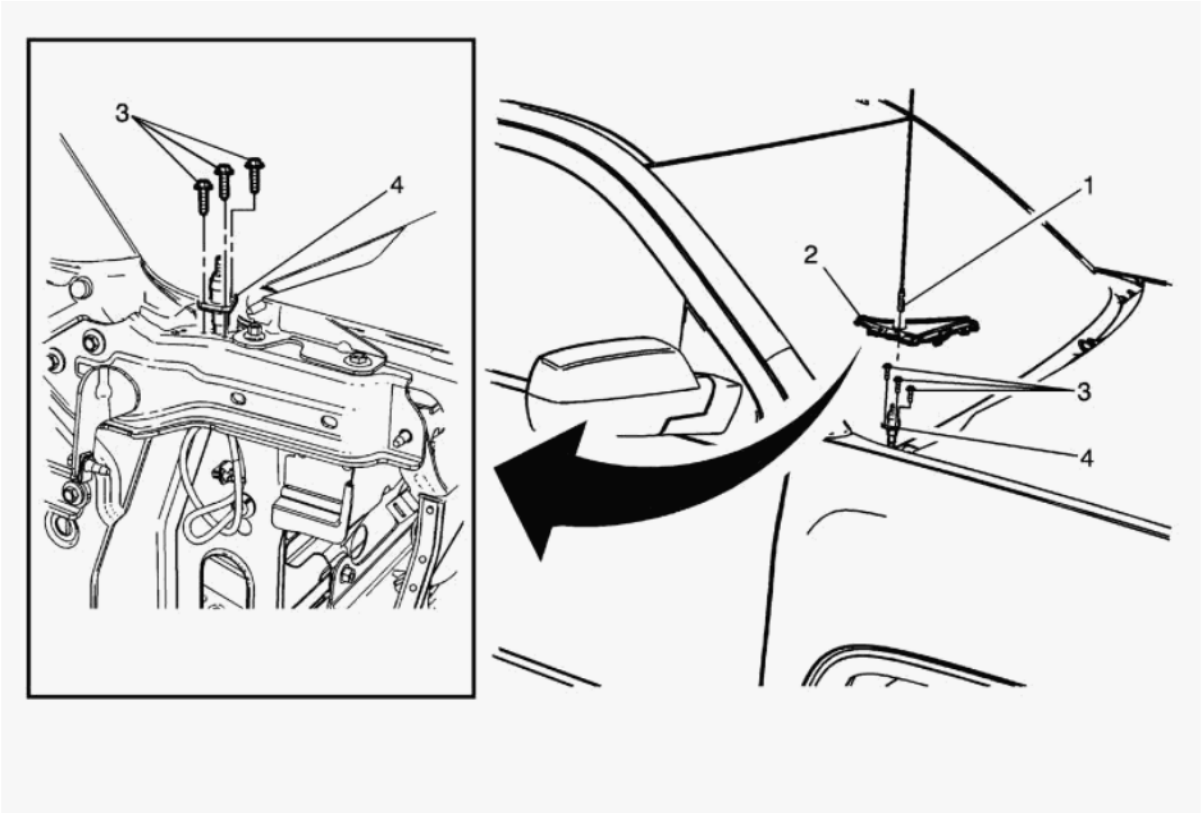


Fig. 25: Radio Antenna Base (With U73)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Remove the battery. Refer to **Battery Replacement (Gas)** **Battery Replacement (Diesel)** . 2. Remove the instrument panel extension assembly. Refer to **Instrument Panel Extension Replacement** . 3. Remove the instrument panel bolts to body bolts. 4. Disconnect the electrical connections on the passenger side. 5. Pull the passenger side of the instrument panel back, pivoting on the drivers side. 6. Disconnect the coaxial cable at the junction. 7. Tape pull wire to the coaxial cable.	
1	Radio Antenna Refer to **Radio Antenna Replacement**.
2	Air Inlet Grille Panel - RH
3	Radio Antenna Base Fasteners (Qty: 3) **Tighten** 5.5 N.m (49 lb in)
4	Radio Antenna Base **Procedure** 1. Remove the cable grommet from the body using the appropriate tool.

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Callout	Component Name
	2. Tape a long pull wire to the antenna cable to aid in installation of the new antenna. Use the appropriate tool to guide the wire from the inside. 3. Tape the new antenna cable and pull cable back inside the vehicle. Lubricate the grommet to aid in installation. 4.

RADIO ANTENNA REPLACEMENT

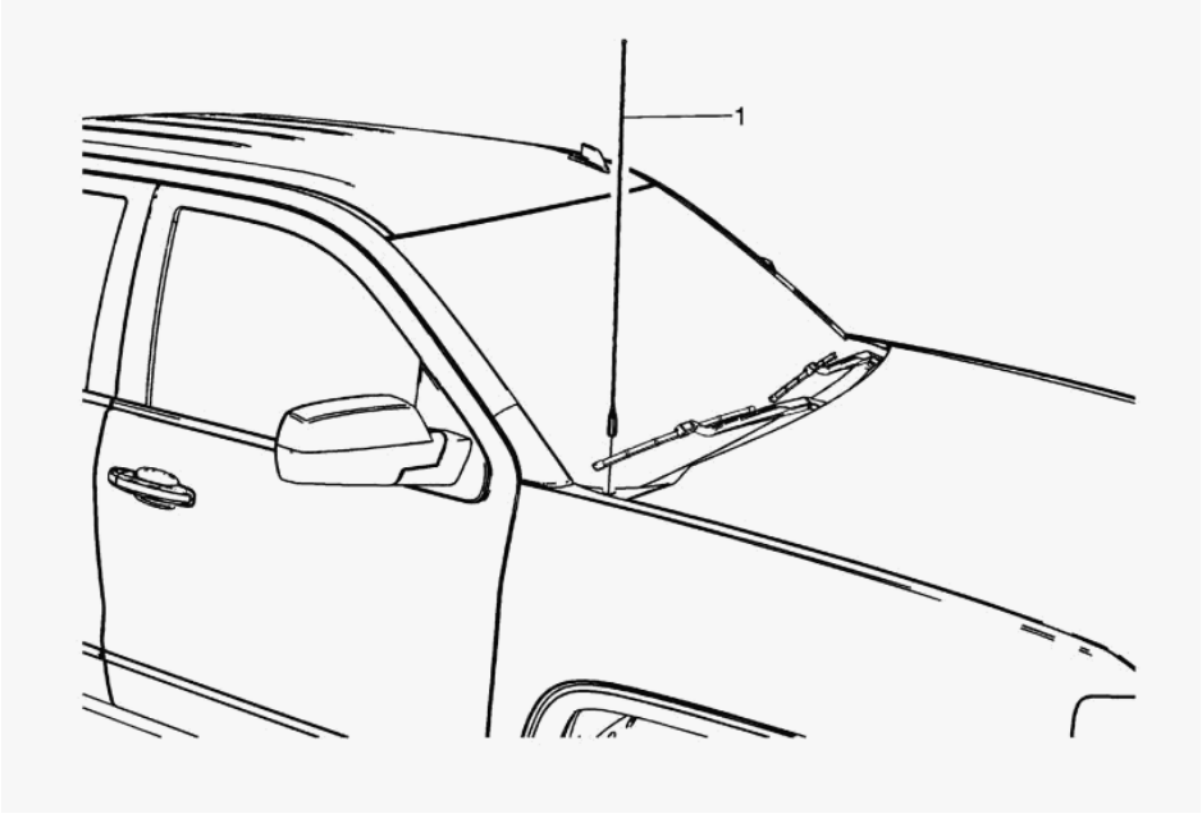


Fig. 26: Radio Antenna
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Radio Antenna **Procedure** Rotate the mast counterclockwise in order to release the mast from the antenna base.

AUDIO AND VIDEO MODULE CABLE REPLACEMENT

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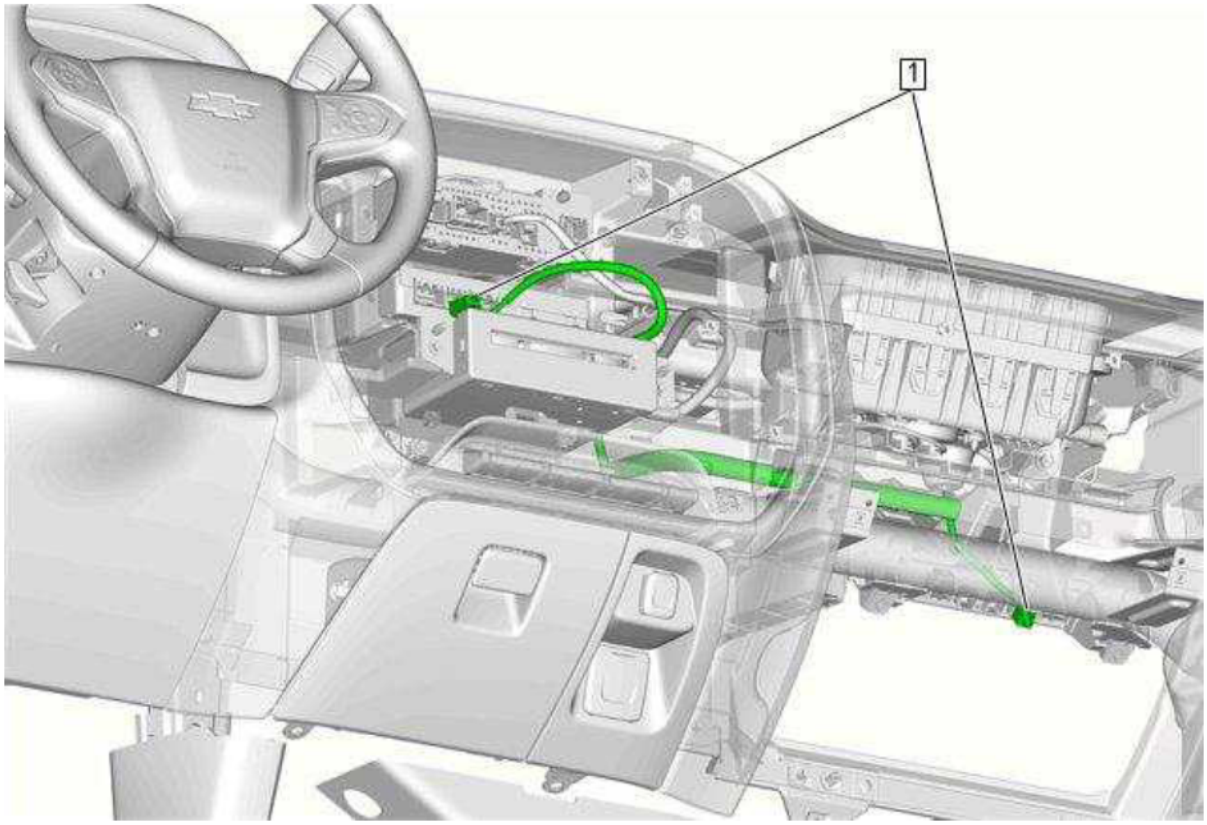


Fig. 27: Audio and Video Module Cable
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure 1. **Instrument Panel Upper Compartment Replacement** 2. **Radio Control Assembly Replacement**	
1	Audio and Video Module Cable **Procedure** 1. Disconnect the electrical connectors. 2. If the cable is taped into the wiring harness, cut the ends off the old cable and route the new cable as close to the old one as possible. Use tie straps to secure the new cable.

VEHICLE LOCATION ANTENNA CABLE REPLACEMENT

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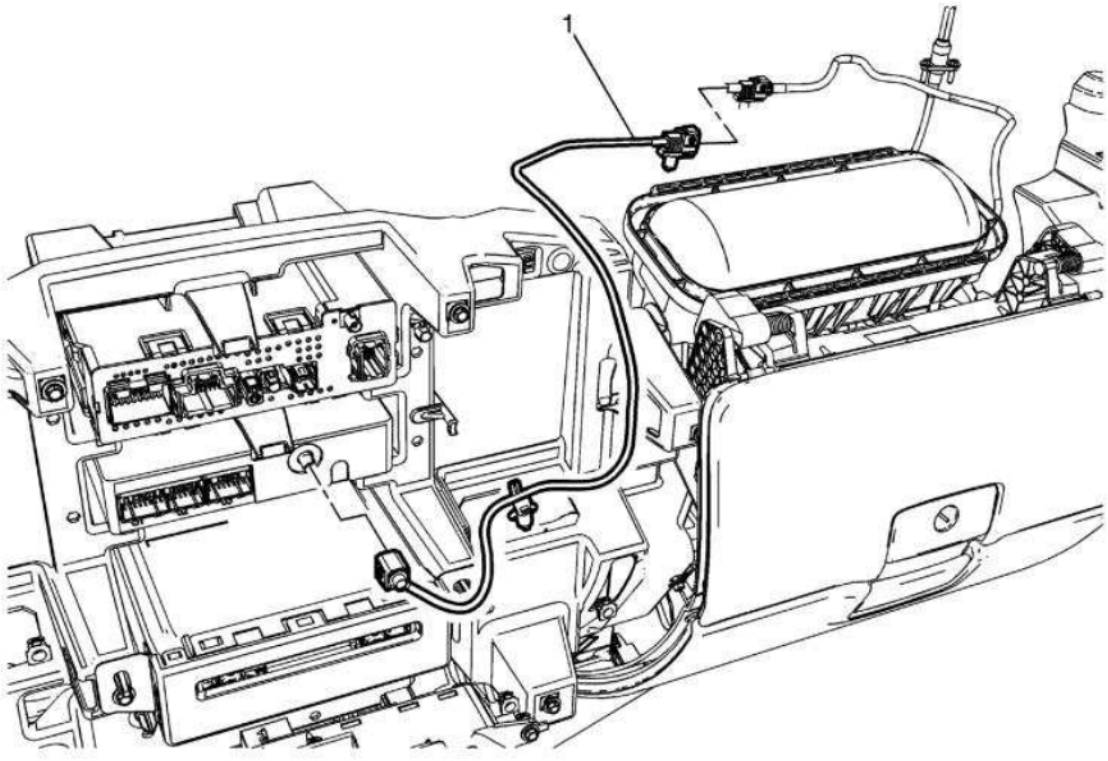


Fig. 28: Vehicle Location Antenna Cable
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure 1. Remove the instrument panel extension. Refer to **Instrument Panel Extension Replacement** . 2. Remove the radio control assembly. Refer to **Radio Control Assembly Replacement**.	
1	Vehicle Location Antenna Cable **Procedure** 1. Disconnect the extension cable from the antenna. 2. Disconnect the extension cable from the communication interface module.

RADIO ANTENNA CABLE EXTENSION RADIO END CABLE REPLACEMENT

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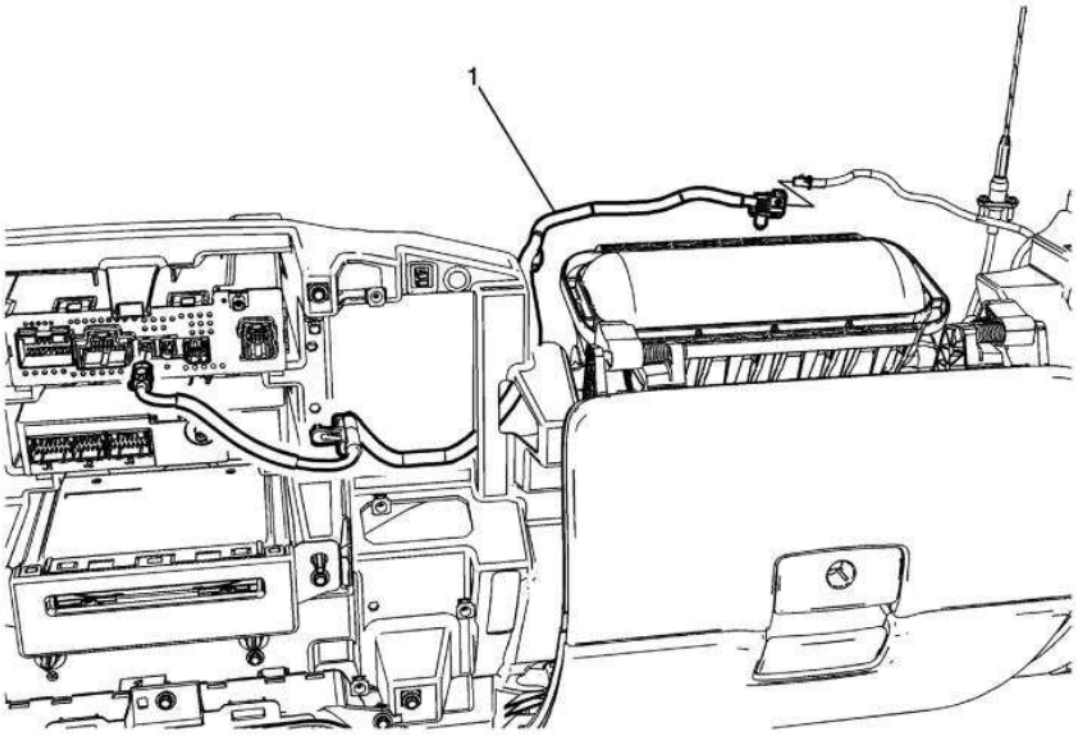


Fig. 29: Radio Antenna Cable Extension Radio End Cable
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure 1. Remove the instrument panel extension. Refer to **Instrument Panel Extension Replacement** . 2. Remove the radio control assembly. Refer to **Radio Control Assembly Replacement**.	
1	Radio Antenna Cable Extension Radio End Cable **Procedure** 1. Disconnect the extension cable from the antenna. 2. Disconnect the extension cable from the radio.

VIDEO DISPLAY REPLACEMENT

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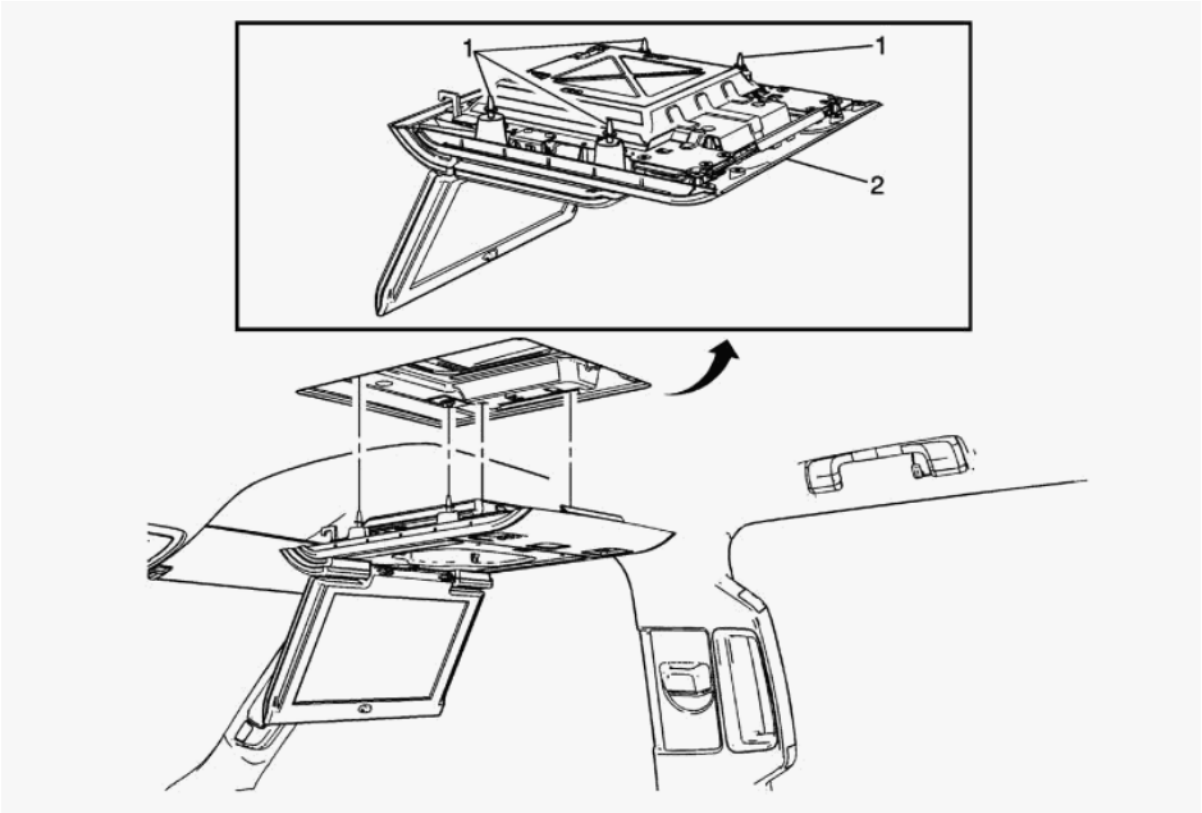


Fig. 30: Video Display
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Video Display Fasteners (Qty: 4) **CAUTION:** **Refer to Fastener Caution .** **NOTE:** **Make sure that all 4 washers on the 4 mounting screws are accounted for. If any washers are off the screw and loose, discard to prevent a rattle. The washers**

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

VIDEO DISPLAY BRACKET REPLACEMENT

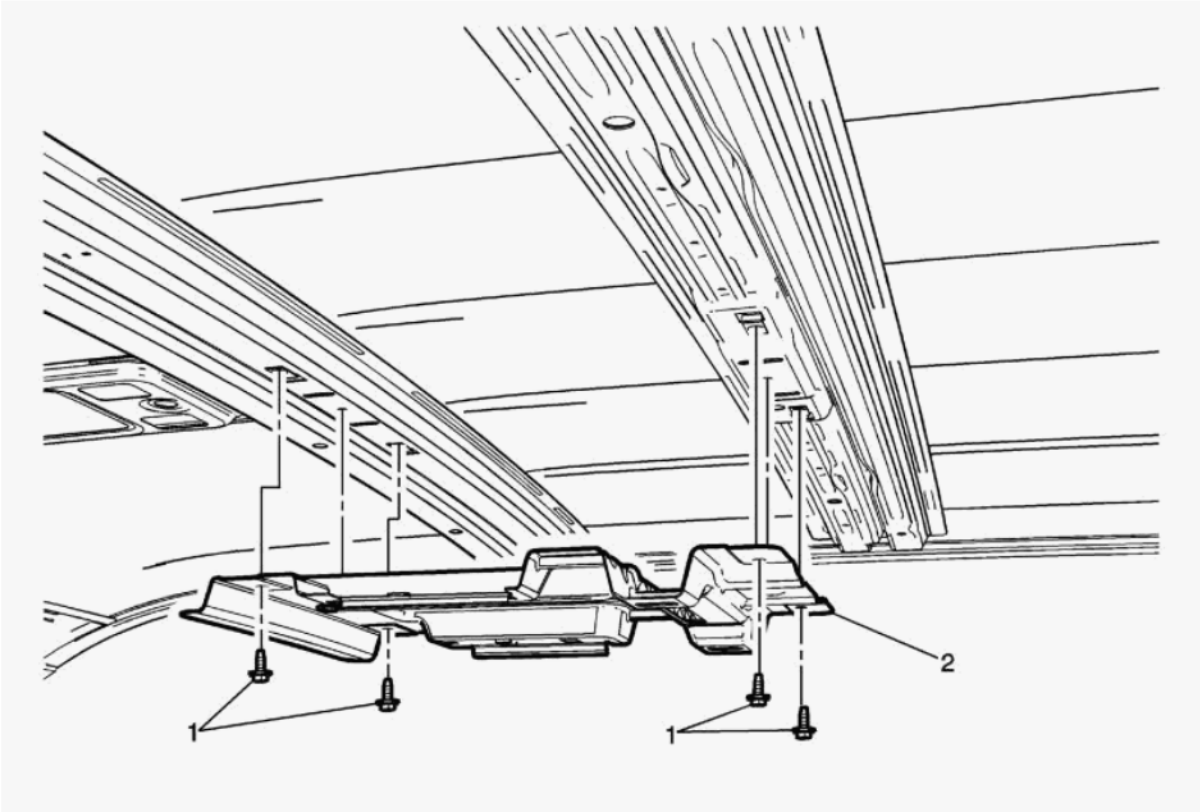


Fig. 31: Video Display Bracket
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure	

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Callout	Component Name
Lower the headlining trim panel only. Perform the steps only necessary to gain access to the part. Refer to **Headlining Trim Panel Replacement (Crew Cab Without Sunroof)** **Headlining Trim Panel Replacement (Crew Cab With Sunroof)** **Headlining Trim Panel Replacement (Extended Cab)** **Headlining Trim Panel Replacement (Regular Cab)** .	
1	Video Display Bracket Fasteners (Qty: 4) **CAUTION:** **Refer to** **Fastener Caution** .
2	Video Display Bracket **Procedure** After removal of the fasteners, pull downward to release two integral retainers.

HIGH FREQUENCY ANTENNA REPLACEMENT

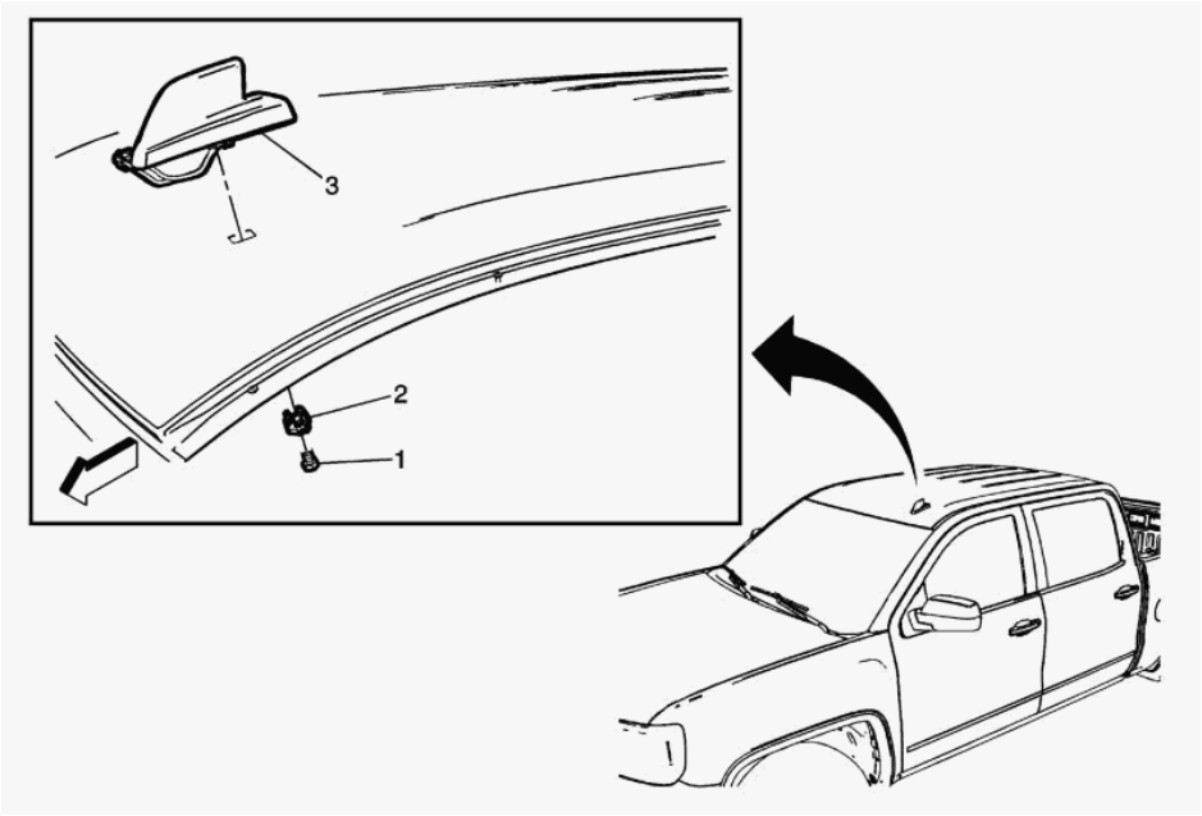


Fig. 32: High Frequency Antenna
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Lower the front of the headlining trim panel. Refer to **Headlining Trim Panel Replacement (Crew Cab Without Sunroof)** **Headlining Trim Panel Replacement (Crew Cab With Sunroof)** **Headlining Trim Panel Replacement (Extended Cab)** **Headlining Trim Panel Replacement (Regular Cab)** .	

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Callout	Component Name
1	High Frequency Antenna Fastener **CAUTION:** **Refer to Fastener Caution .** **Tighten** 9 N.m (80 lb in)
2	High Frequency Antenna Retainer **NOTE:** **Discard retainer and replace with new retainer.**
3	High Frequency Antenna **Procedure** 1. Disconnect the electrical connectors. 2. Fully remove the old bolt and retainer prior to removing antenna through roof. 3. New antenna bolt and retainer will fit through roof opening prior to tightening the bolt and compressing the retainer.

USB RECEPTACLE REPLACEMENT

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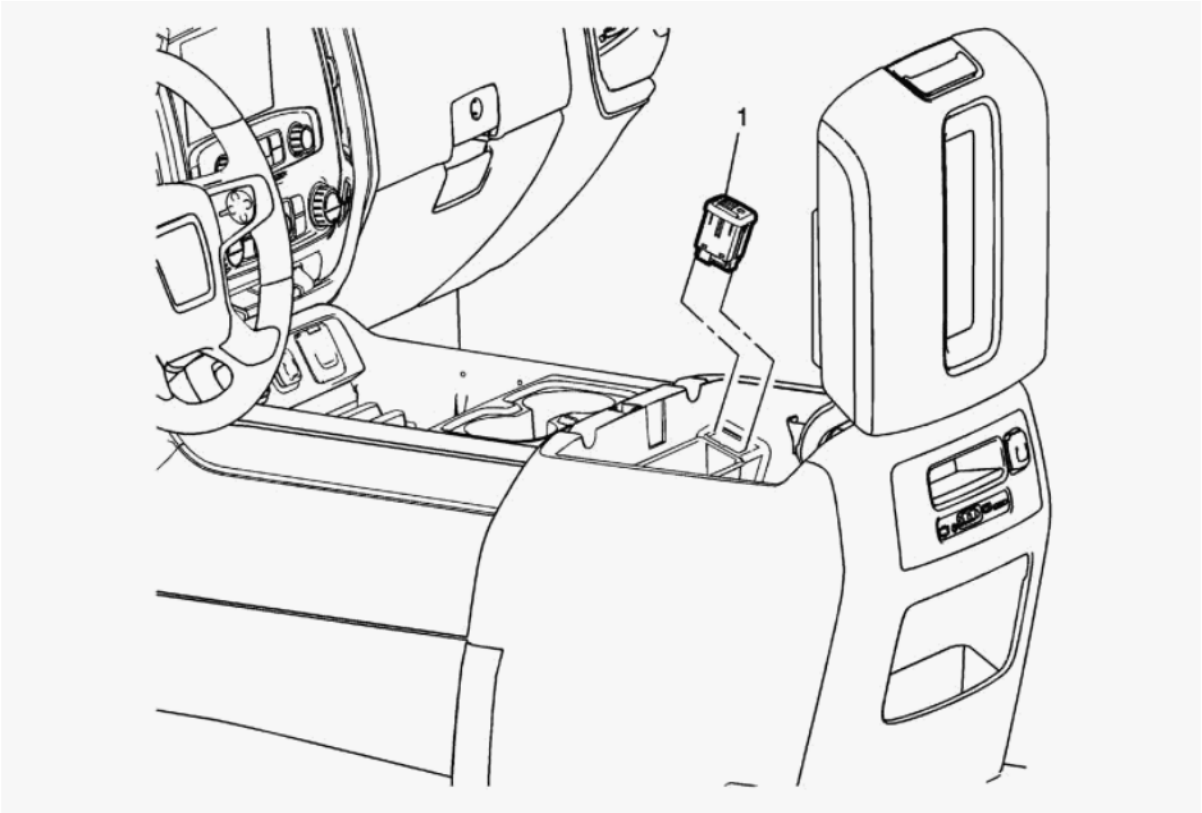


Fig. 33: USB Receptacle
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	USB Receptacle **Procedure** 1. Open the front floor console armrest and using a small flat bladed tool, release the receptacle. 2. Disconnect electrical connector.

RADIO FRONT SIDE DOOR SPEAKER REPLACEMENT

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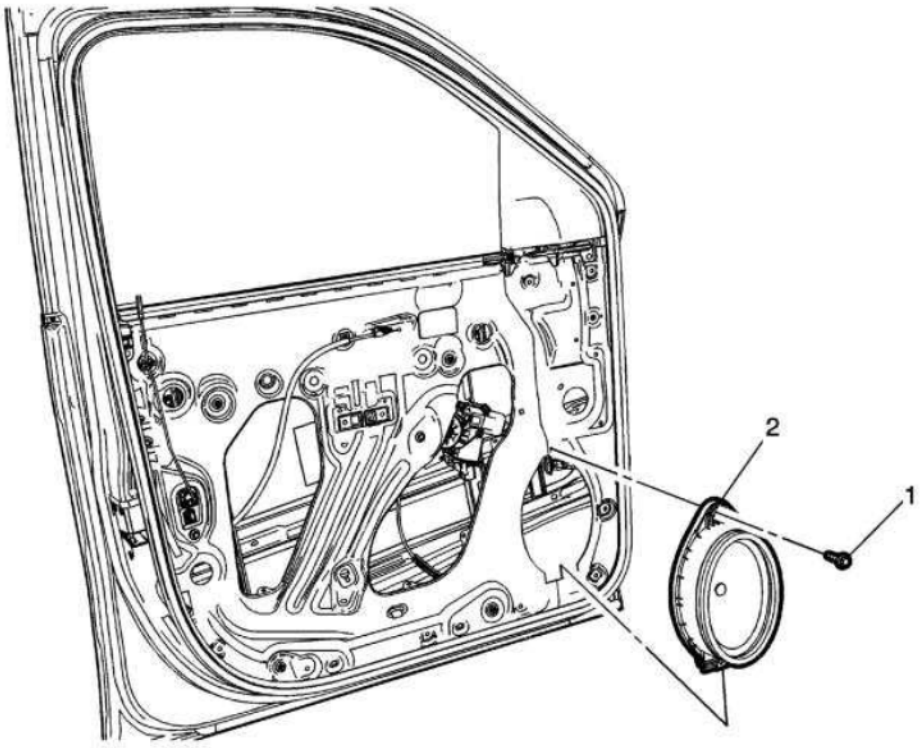


Fig. 34: Radio Front Side Door Speaker
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the front side door trim. Refer to **Front Side Door Trim Replacement (With A31)** **Front Side Door Trim Replacement (Without A31)** .	
1	Radio Front Side Door Speaker Fastener **CAUTION:** **Refer to** **Fastener Caution** .
2	Radio Front Side Door Speaker **Procedure** Disconnect the electrical connector.

RADIO FRONT FLOOR CONSOLE SPEAKER REPLACEMENT

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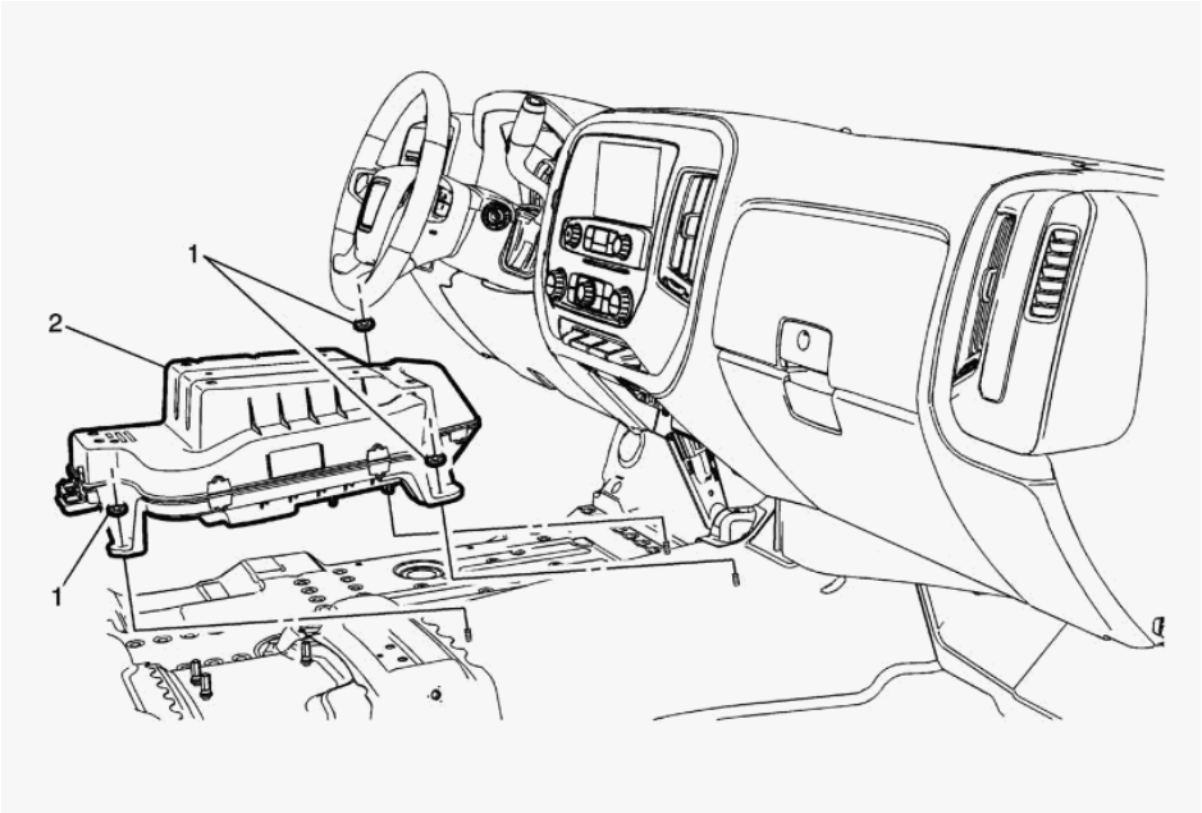


Fig. 35: Radio Front Floor Console Speaker
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the floor console assembly. Refer to **Front Floor Console Assembly Replacement (without HP5)** **Front Floor Console Assembly Replacement (with HP5)** .	
1	Radio Front Floor Console Speaker Fasteners (Qty: 3) **CAUTION:** **Refer to** **Fastener** **Caution** .
2	Radio Front Floor Console Speaker **Procedure** Disconnect the electrical connectors.

RADIO REAR SPEAKER REPLACEMENT

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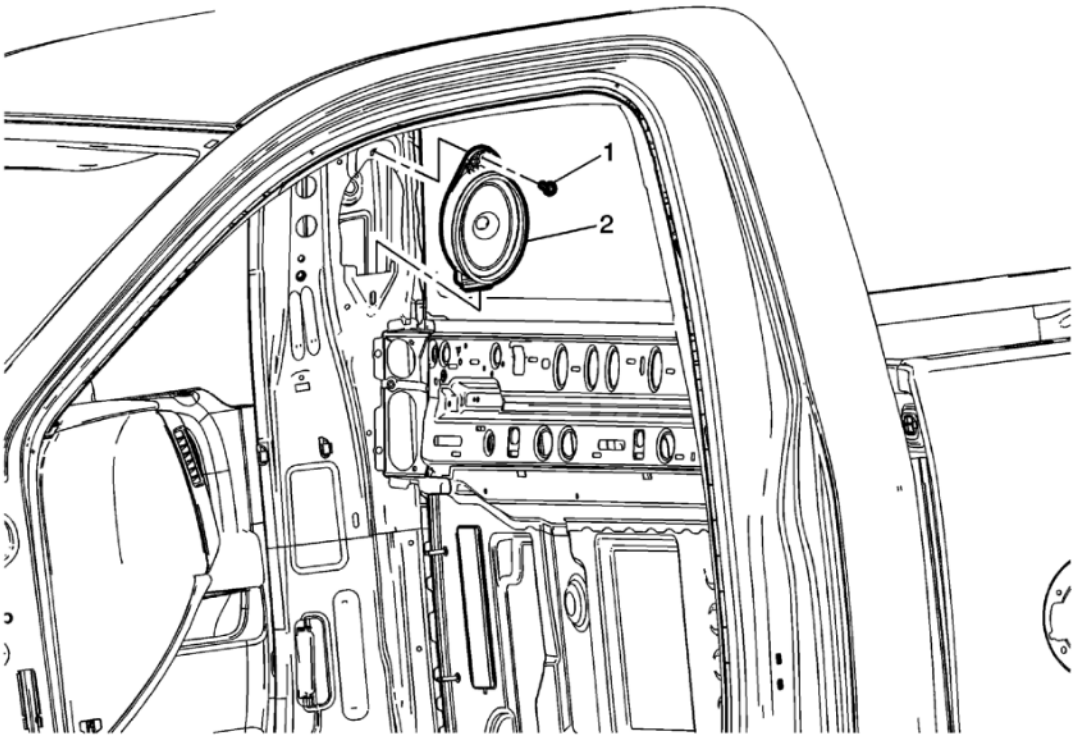


Fig. 36: Radio Rear Speaker
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the body lock pillar garnish molding. Refer to **Body Lock Pillar Garnish Molding Replacement (Crew Cab, Extended Cab)** **Body Lock Pillar Garnish Molding Replacement (Regular Cab)** .	
1	Radio Rear Speaker Fastener **CAUTION:** **Refer to** **Fastener Caution** .
2	Radio Rear Speaker **Procedure** Disconnect the electrical connector.

RADIO FUNCTION SWITCH REPLACEMENT

Removal Procedure

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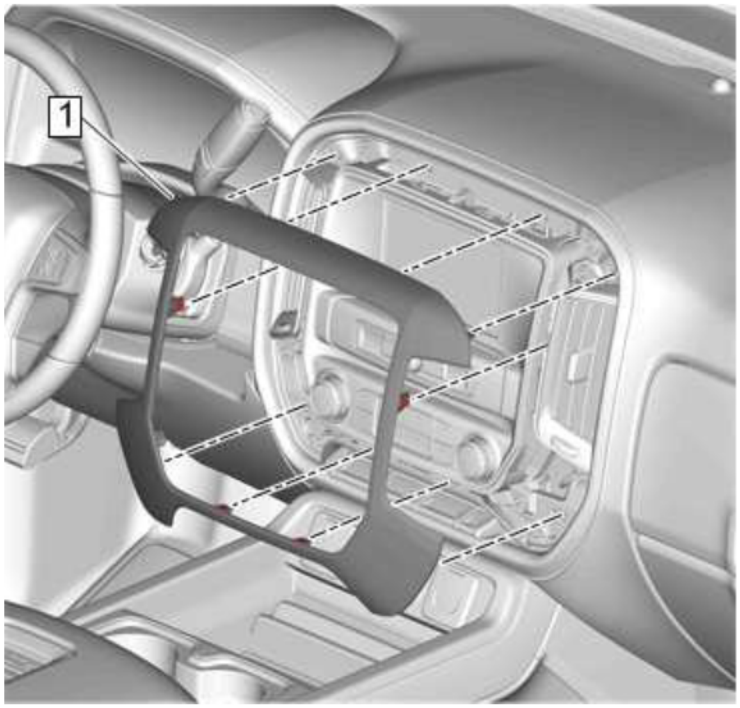


Fig. 37: Instrument Panel Accessory Bezel
Courtesy of GENERAL MOTORS COMPANY

1. Use a flat bladed plastic trim tool in order to release the retainer clips securing the instrument panel accessory bezel (1) to the instrument panel assembly.
2. Instrument Panel Accessory Bezel (1) - Remove

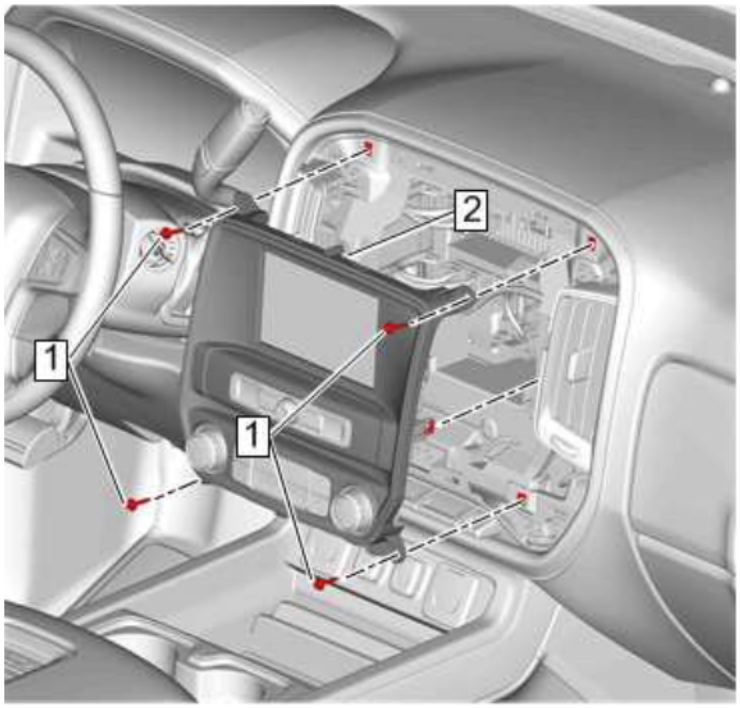


Fig. 38: Radio Control Bolts And Instrument Panel Accessory Bezel
Courtesy of GENERAL MOTORS COMPANY

3. Radio Control Bolt (1) - Remove
4. Disconnect the electrical connectors.

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5. Instrument Panel Accessory Bezel (2) - Remove

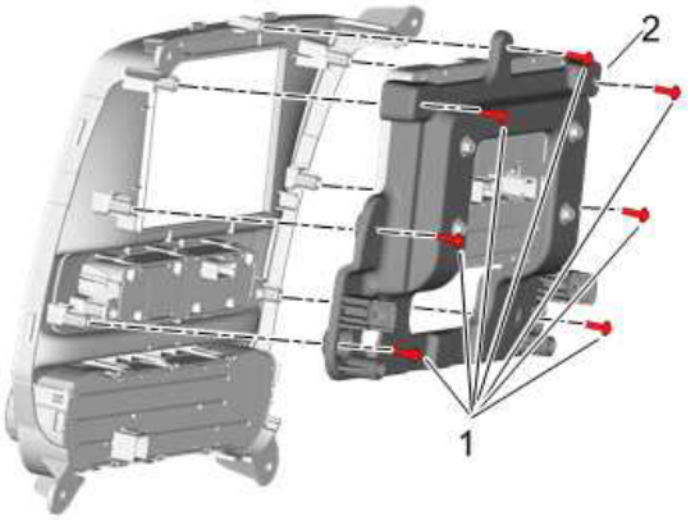


Fig. 39: Radio Control Bracket
Courtesy of GENERAL MOTORS COMPANY

6. Radio Bracket Bolt (1) - Remove
7. Radio Control Bracket (2) - Remove

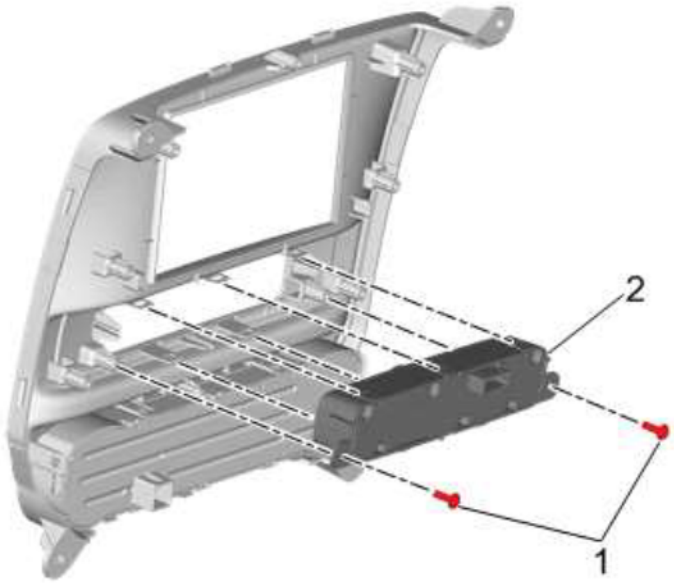


Fig. 40: Radio Function Switch
Courtesy of GENERAL MOTORS COMPANY

8. Radio Bracket Bolt (1) - Remove

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9. Release the retaining tabs.
10. Radio Function Switch (2) - Remove

Installation Procedure

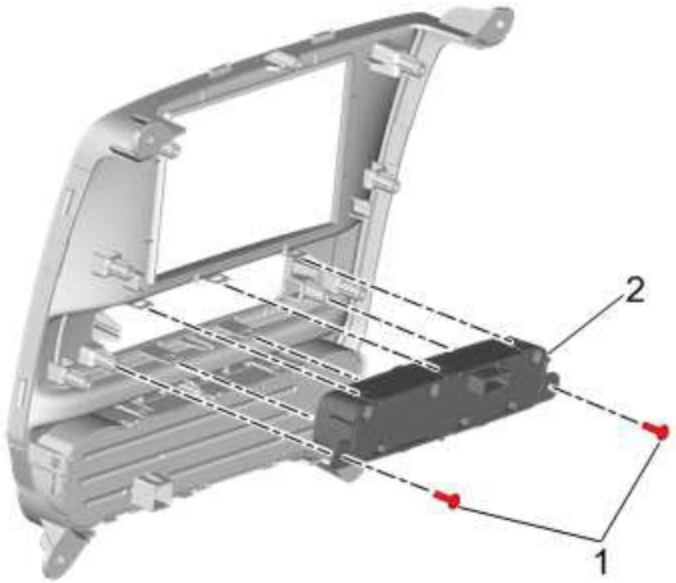


Fig. 41: Radio Function Switch
Courtesy of GENERAL MOTORS COMPANY

1. Radio Function Switch (2) - Install

CAUTION: **Fastener Caution**

2. Radio Bracket Bolt (1) - Install and tighten 1.5 N.m (13 lb in)

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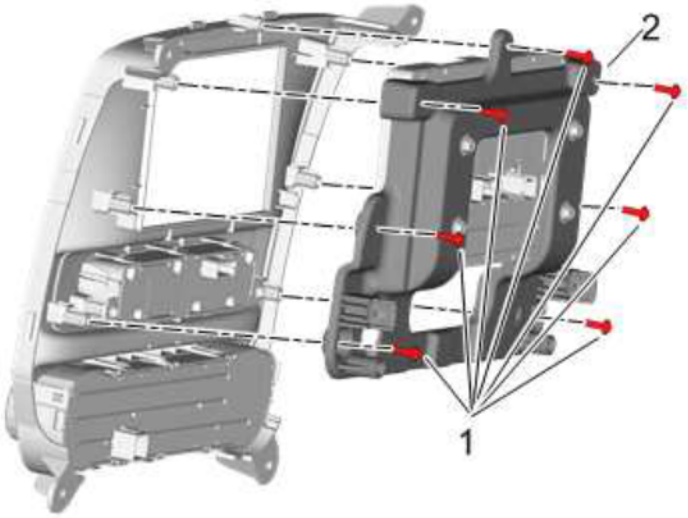


Fig. 42: Radio Control Bracket
Courtesy of GENERAL MOTORS COMPANY

3. Radio Control Bracket (2) - Install
4. Radio Bracket Bolt (1) - Install and tighten 1.5 N.m (13 lb in)
5. Connect the electrical connectors.

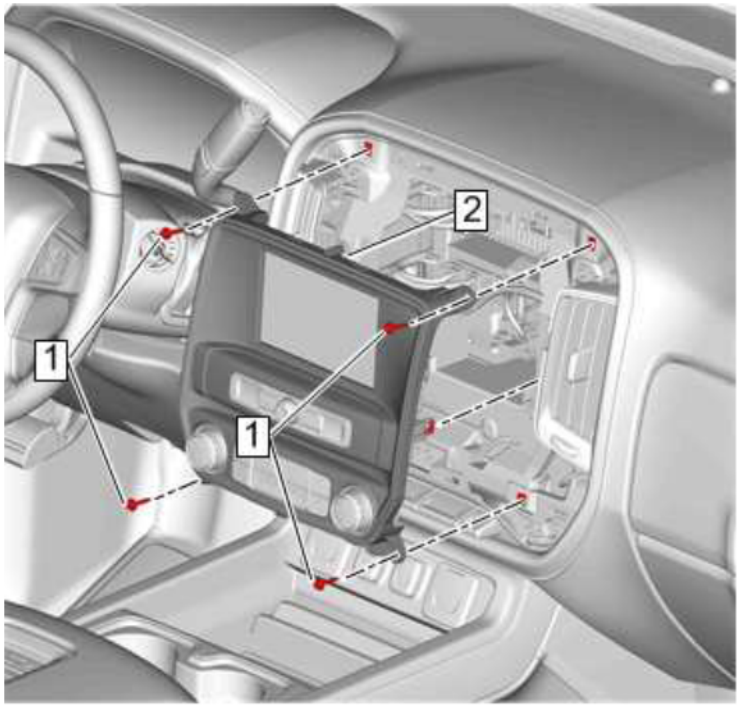


Fig. 43: Radio Control Bolts And Instrument Panel Accessory Bezel
Courtesy of GENERAL MOTORS COMPANY

6. Instrument Panel Accessory Bezel (2) - Install

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7. Radio Control Bolt (1) - Install and tighten 2.5 N.m (22 lb in)

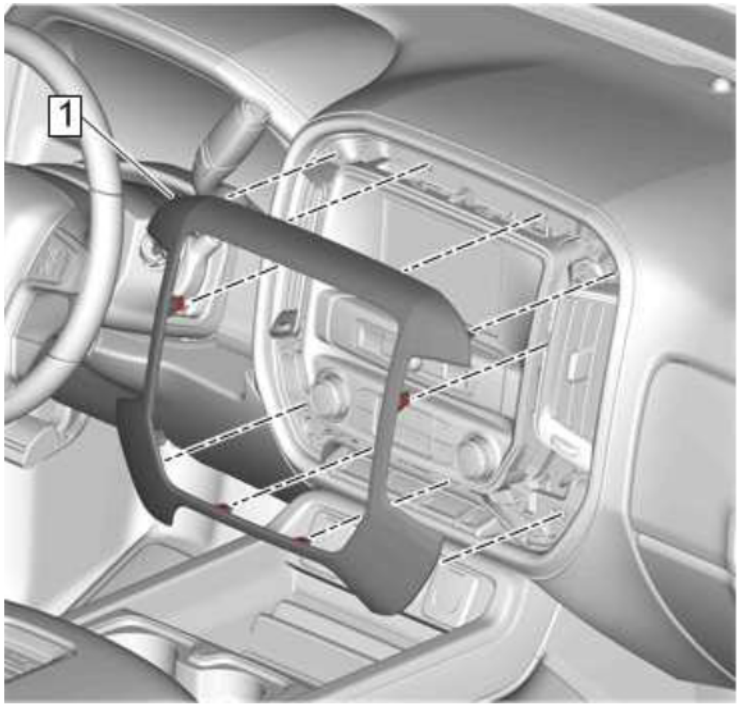
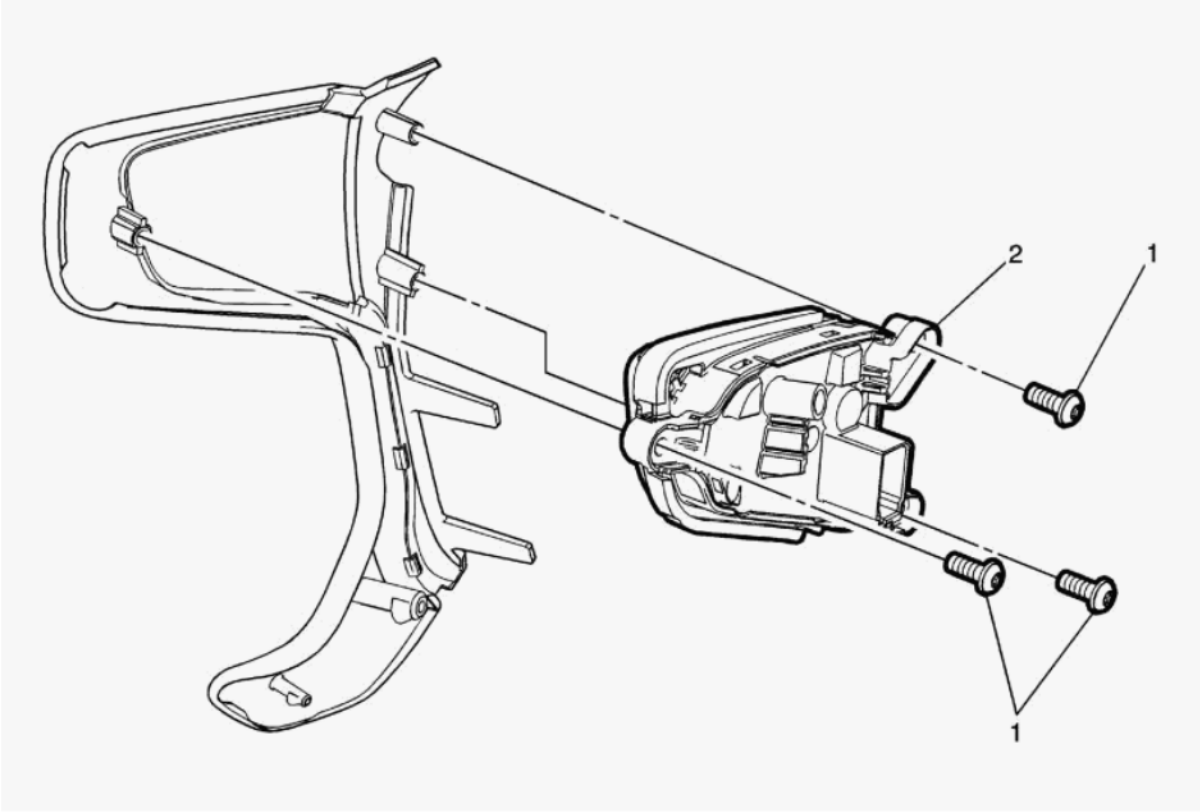


Fig. 44: Instrument Panel Accessory Bezel
Courtesy of GENERAL MOTORS COMPANY

8. Instrument Panel Accessory Bezel (1) - Install

RADIO CONTROL SWITCH REPLACEMENT - STEERING WHEEL



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Fig. 45: Radio Control Switch - Steering Wheel
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Steering Wheel Spoke Cover Replacement (LH with Cruise Control Switch) Steering Wheel Spoke Cover Replacement (RH with Radio Control Switch)	
1	Steering Wheel Spoke Cover Fastener **CAUTION:** **Refer to Fastener Caution .**
2	Radio Control Switch

RADIO CONTROL SWITCH REPLACEMENT - REAR

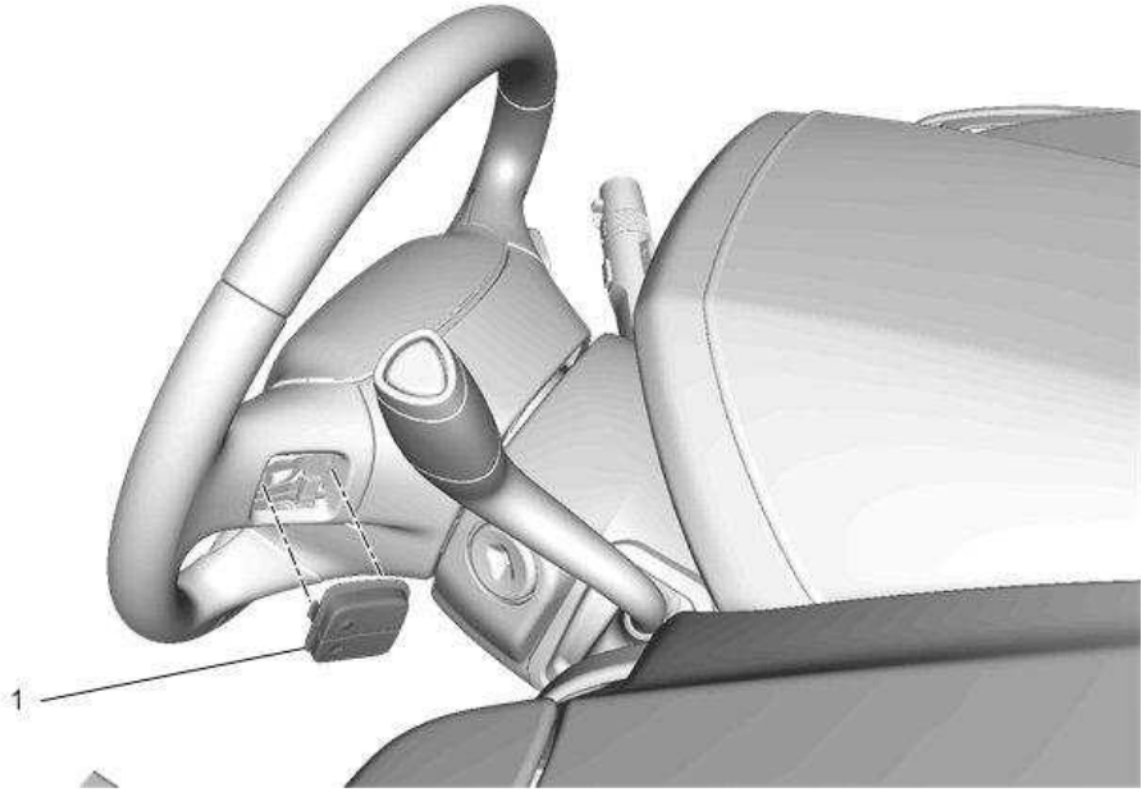


Fig. 46: Radio Control Switch - Rear
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Radio Control Switch - Rear **Procedure** 1. Use the appropriate tool to gently release the switch from the rear of the steering wheel.

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Callout	Component Name
	2. Disconnect the electrical connector.

RADIO REAR SIDE DOOR SPEAKER REPLACEMENT

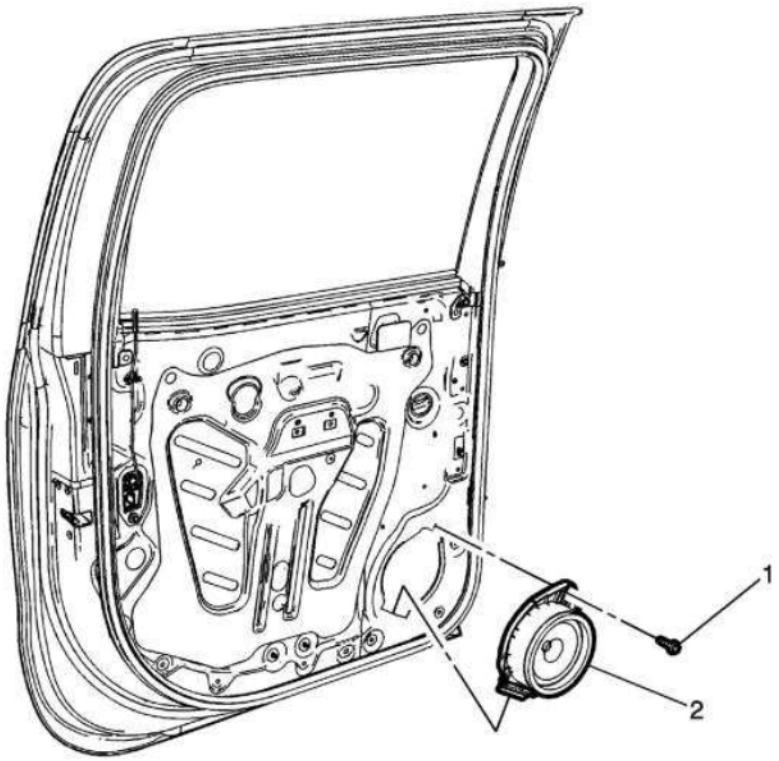


Fig. 47: Radio Rear Side Door Speaker
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the rear side door trim panel. Refer to **Rear Side Door Trim Panel Replacement (Crew Cab, Extended Cab)** .	
1	Radio Rear Side Door Speaker Fastener **CAUTION:** **Refer to** **Fastener Caution** .
2	Radio Rear Side Door Speaker **Procedure** Disconnect the electrical connector.

Article GUID: A00854567

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SCHEMATIC WIRING DIAGRAMS

RADIO/NAVIGATION SYSTEM WIRING SCHEMATICS (IO3)

Radio Power, Ground, Serial Data and Antenna

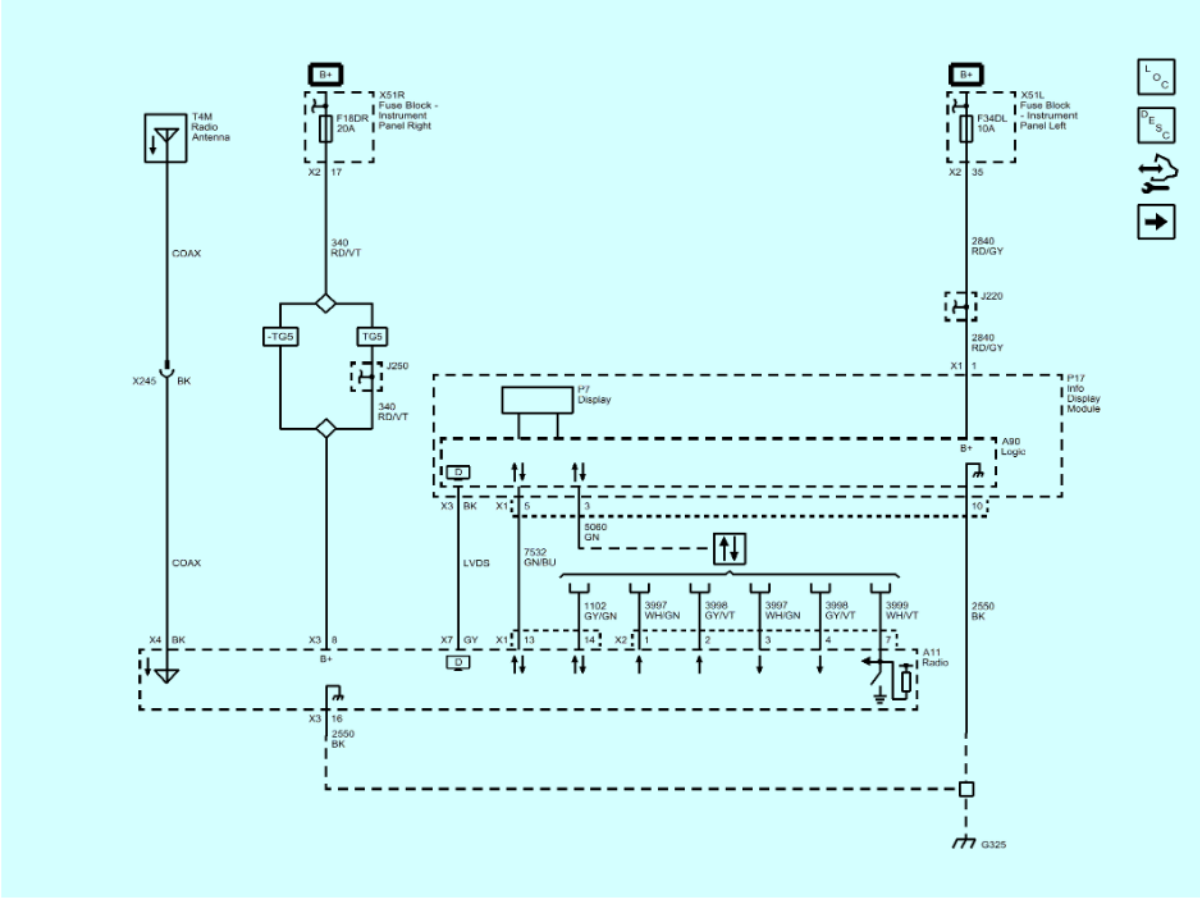


Fig. 1: Radio Power, Ground, Serial Data and Antenna
Courtesy of GENERAL MOTORS COMPANY

Media Disc Player Power, Ground and Serial Data (TG5)

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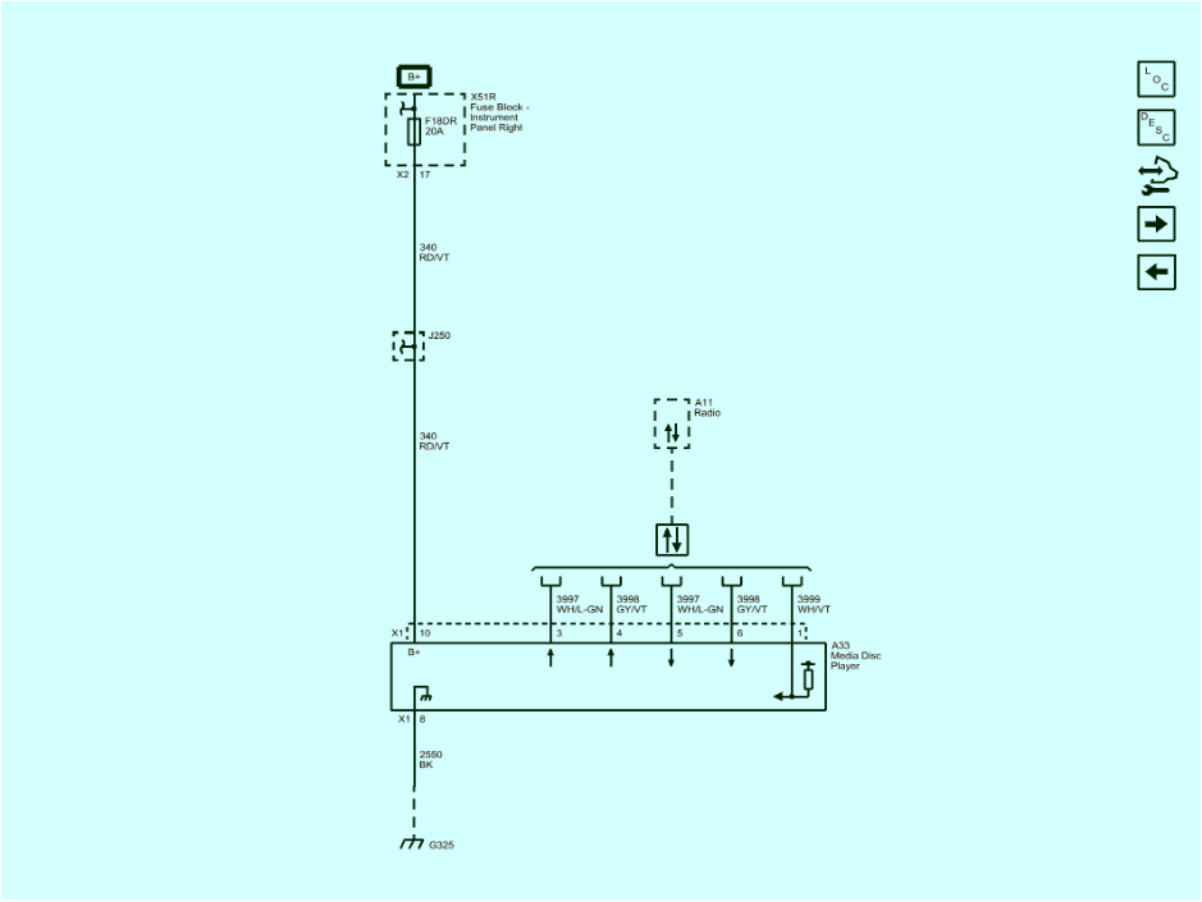


Fig. 2: Media Disc Player Power, Ground and Serial Data (TG5)
Courtesy of GENERAL MOTORS COMPANY

Speakers (UQ3 or UQ5)

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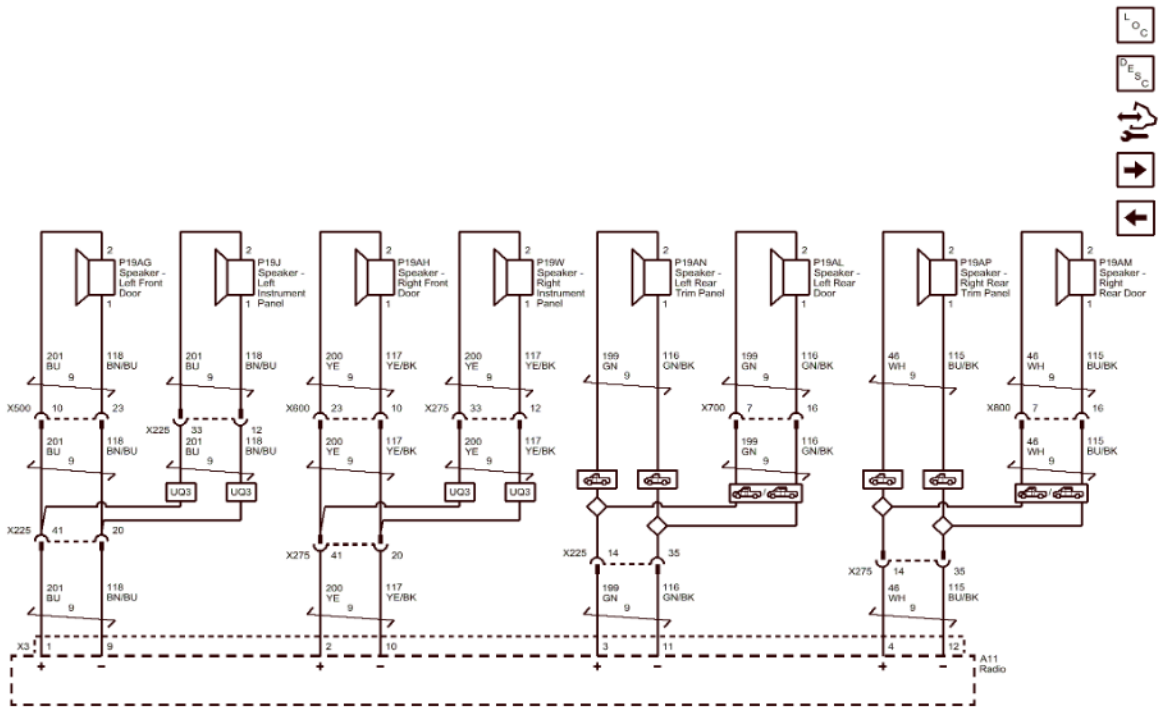


Fig. 3: Speakers (UQ3 or UQ5)
Courtesy of GENERAL MOTORS COMPANY

Auxiliary Inputs

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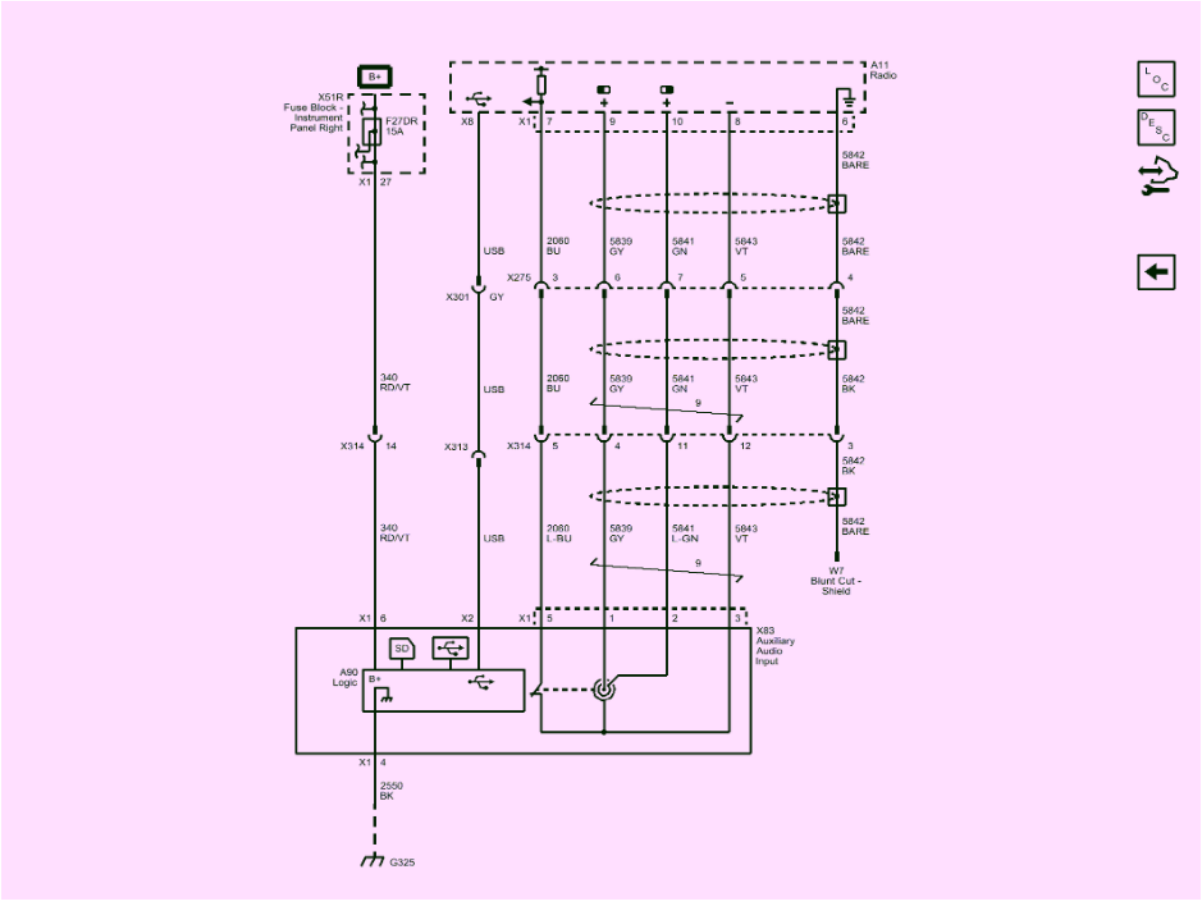


Fig. 4: Auxiliary Inputs

Courtesy of GENERAL MOTORS COMPANY

RADIO/NAVIGATION SYSTEM WIRING SCHEMATICS (IO5, IO6)

Radio Power, Ground and Serial Data

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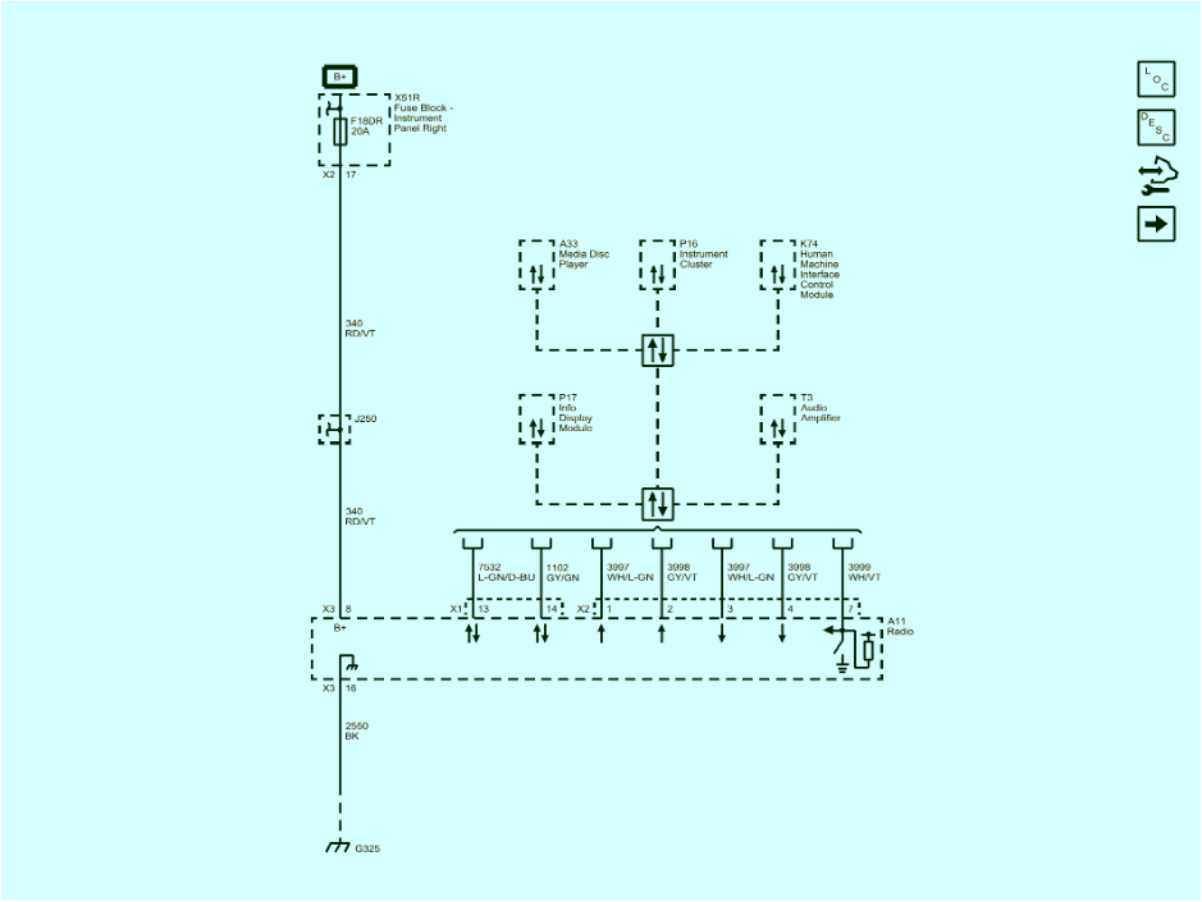


Fig. 5: Radio Power, Ground and Serial Data
Courtesy of GENERAL MOTORS COMPANY

Media Disc Player Power, Ground and Serial Data (TG5 or U42)

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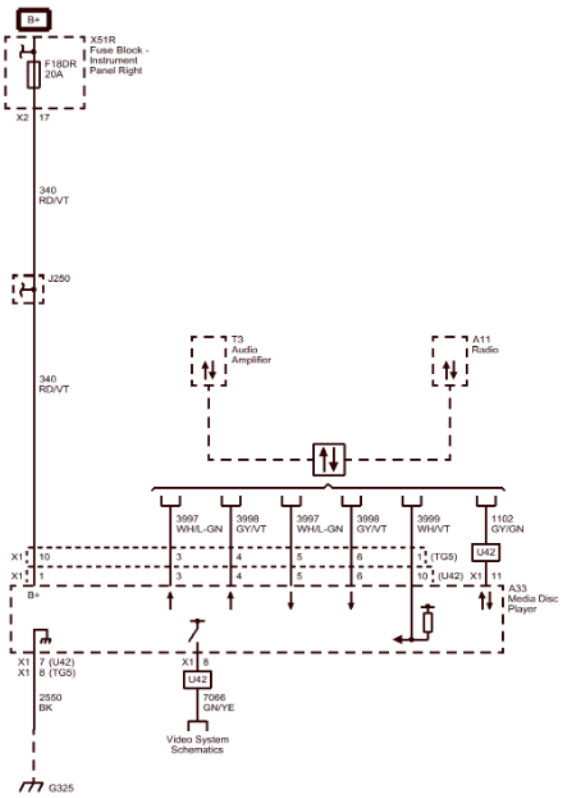


Fig. 6: Media Disc Player Power, Ground and Serial Data (TG5 or U42)
Courtesy of GENERAL MOTORS COMPANY

Human Machine Interface, Display, Cellular Microphone, Power, Ground and Serial Data

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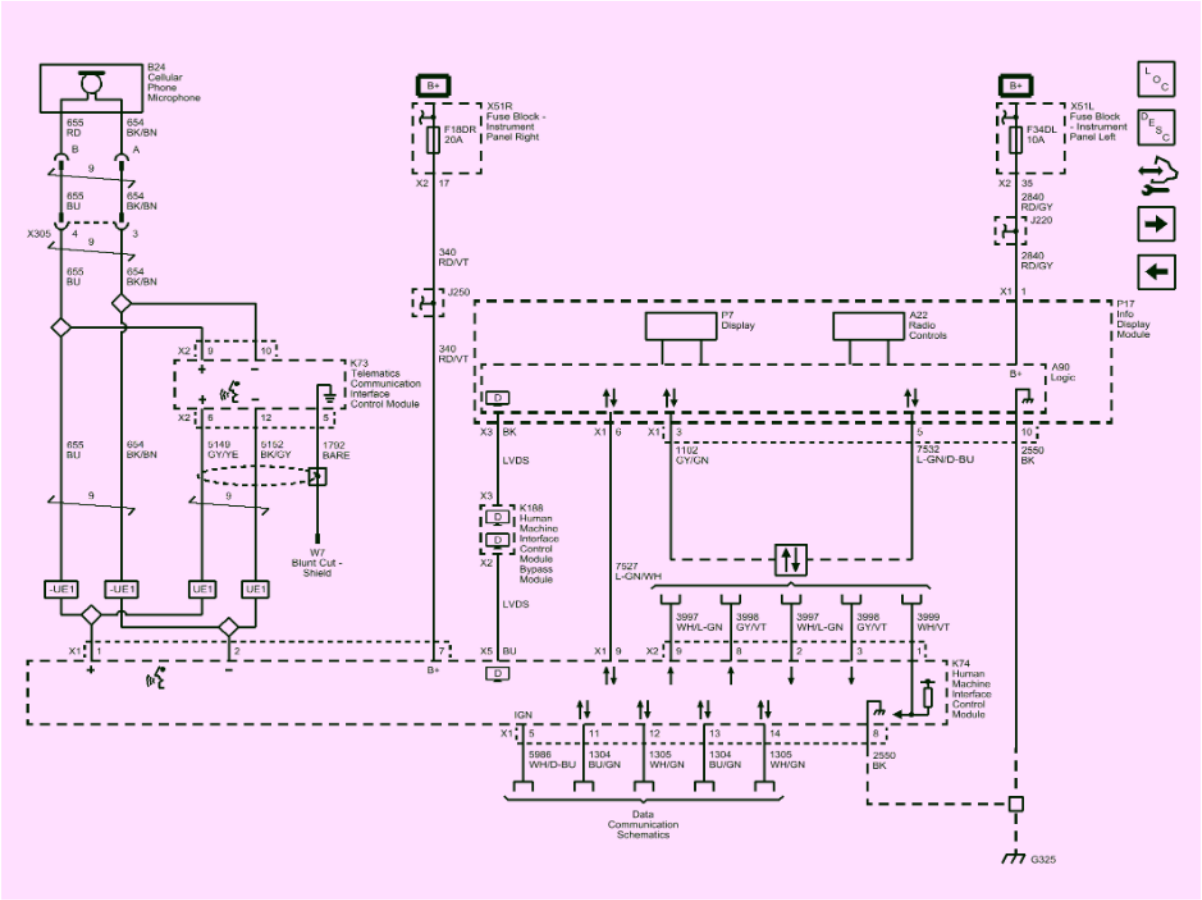


Fig. 7: Human Machine Interface, Display, Cellular Microphone, Power, Ground and Serial Data
Courtesy of GENERAL MOTORS COMPANY

Antennas

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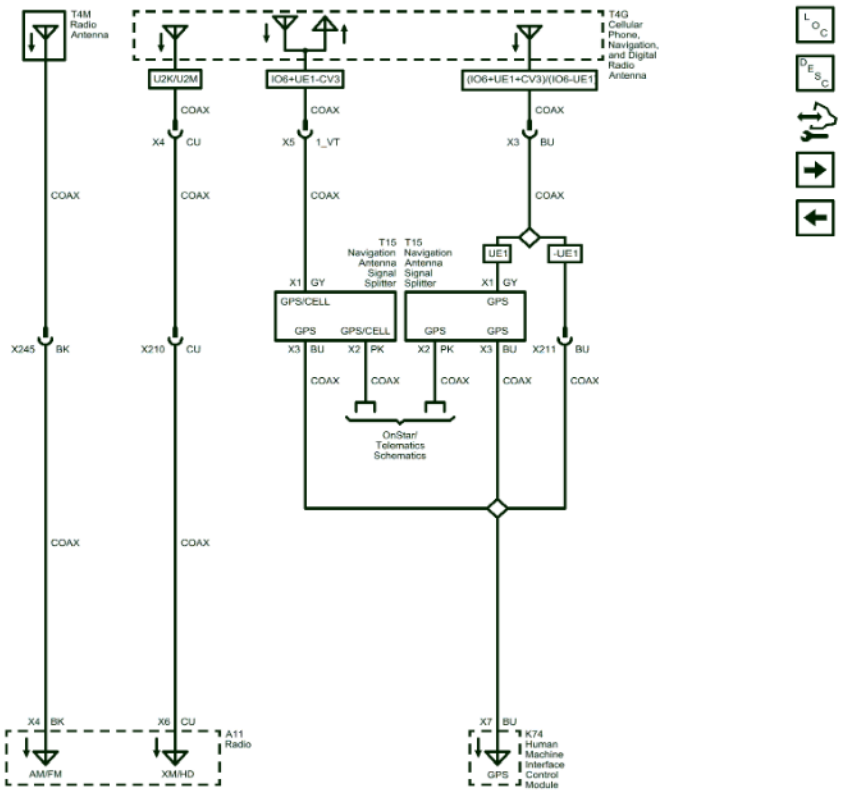


Fig. 8: Antennas
Courtesy of GENERAL MOTORS COMPANY

Audio Amplifier Power, Ground and Serial Data (UQA or UQG)

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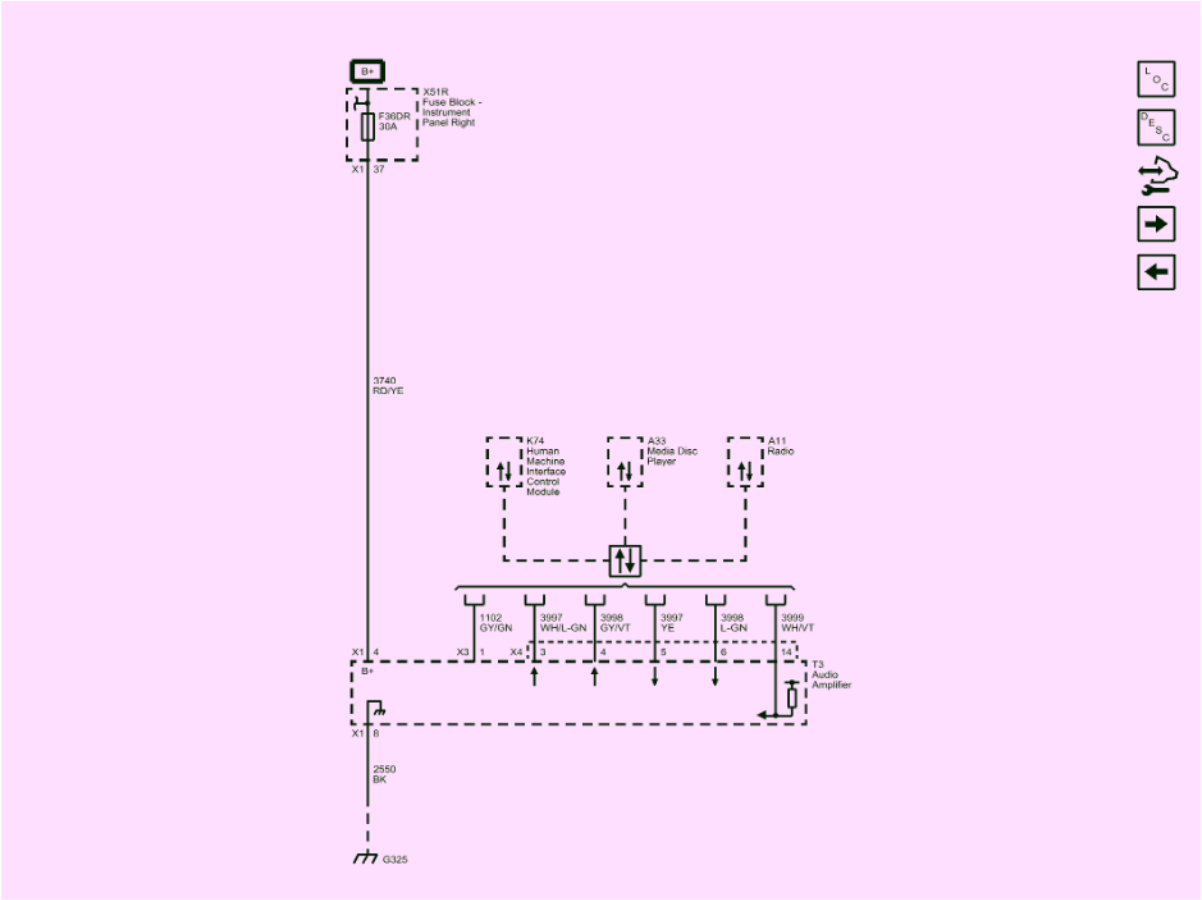


Fig. 9: Audio Amplifier Power, Ground and Serial Data (UQA or UQG)
Courtesy of GENERAL MOTORS COMPANY

Speakers (UQ3 or UQ5)

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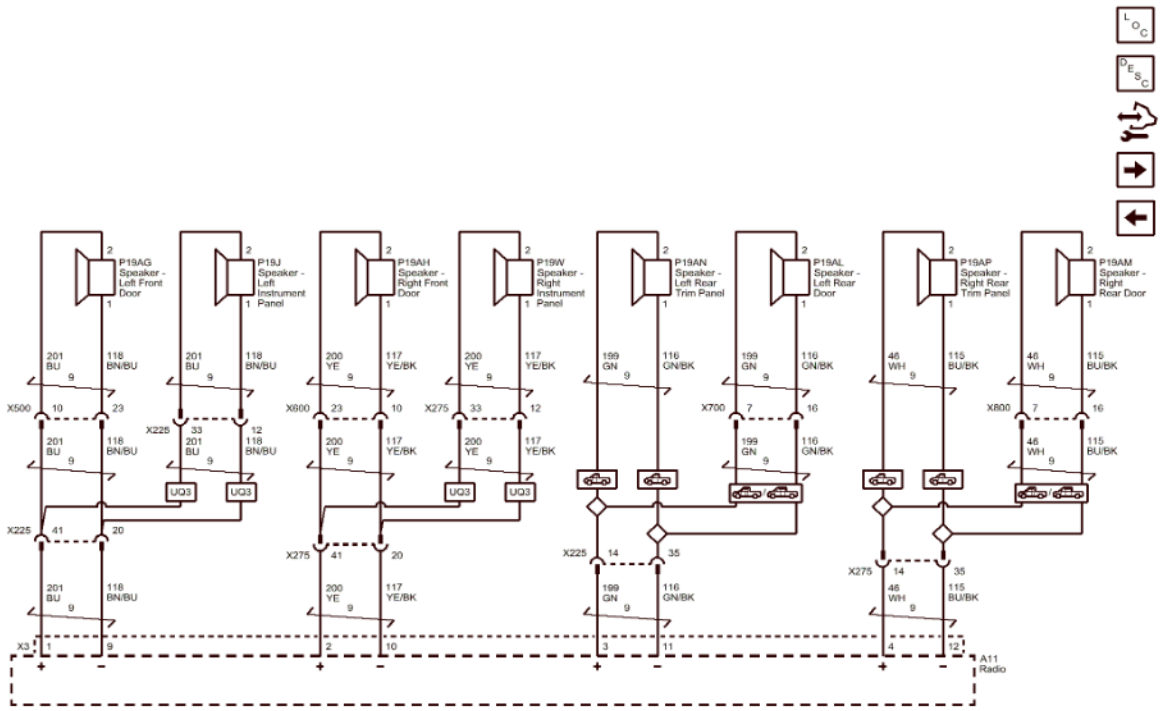


Fig. 10: Speakers (UQ3 or UQ5)
Courtesy of GENERAL MOTORS COMPANY

Speakers (UQG)

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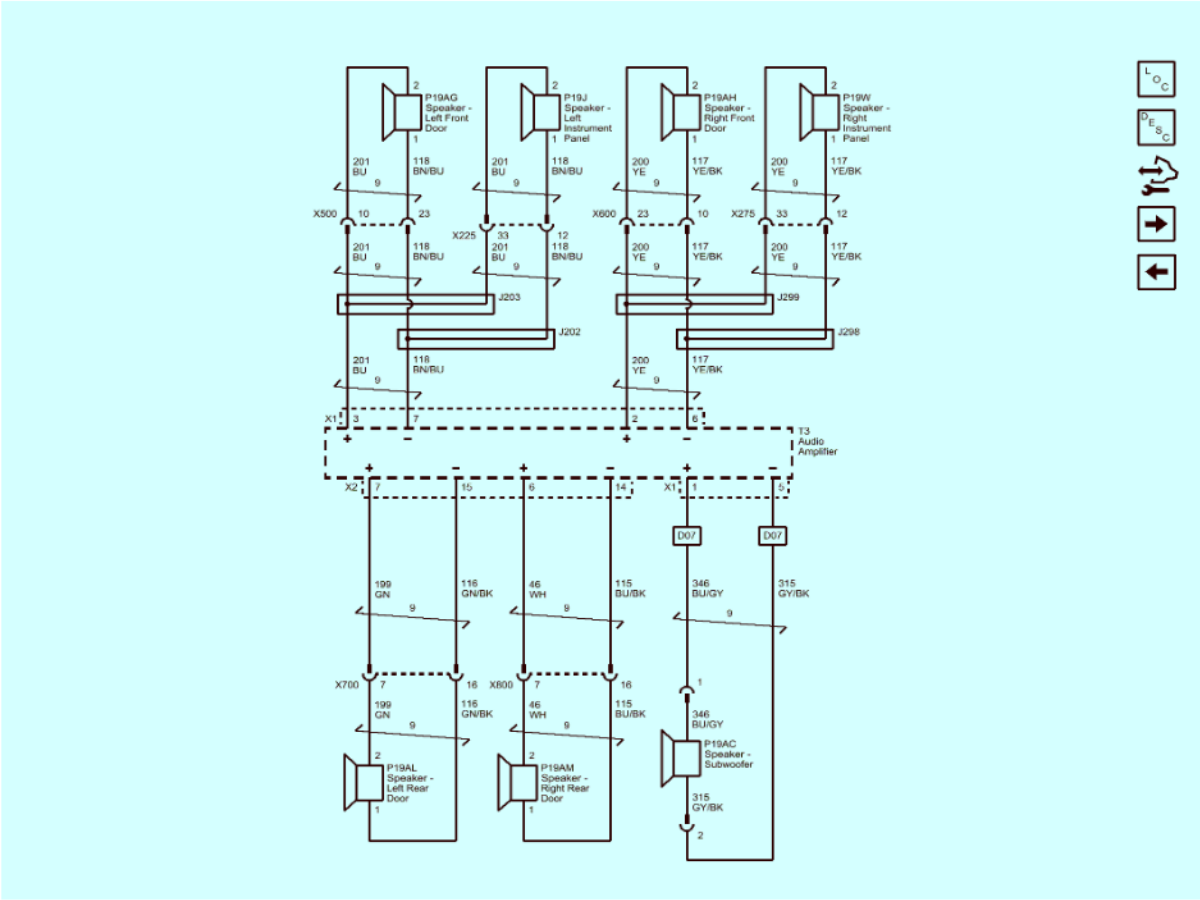


Fig. 11: Speakers (UQG)
Courtesy of GENERAL MOTORS COMPANY

Speakers (UQA)

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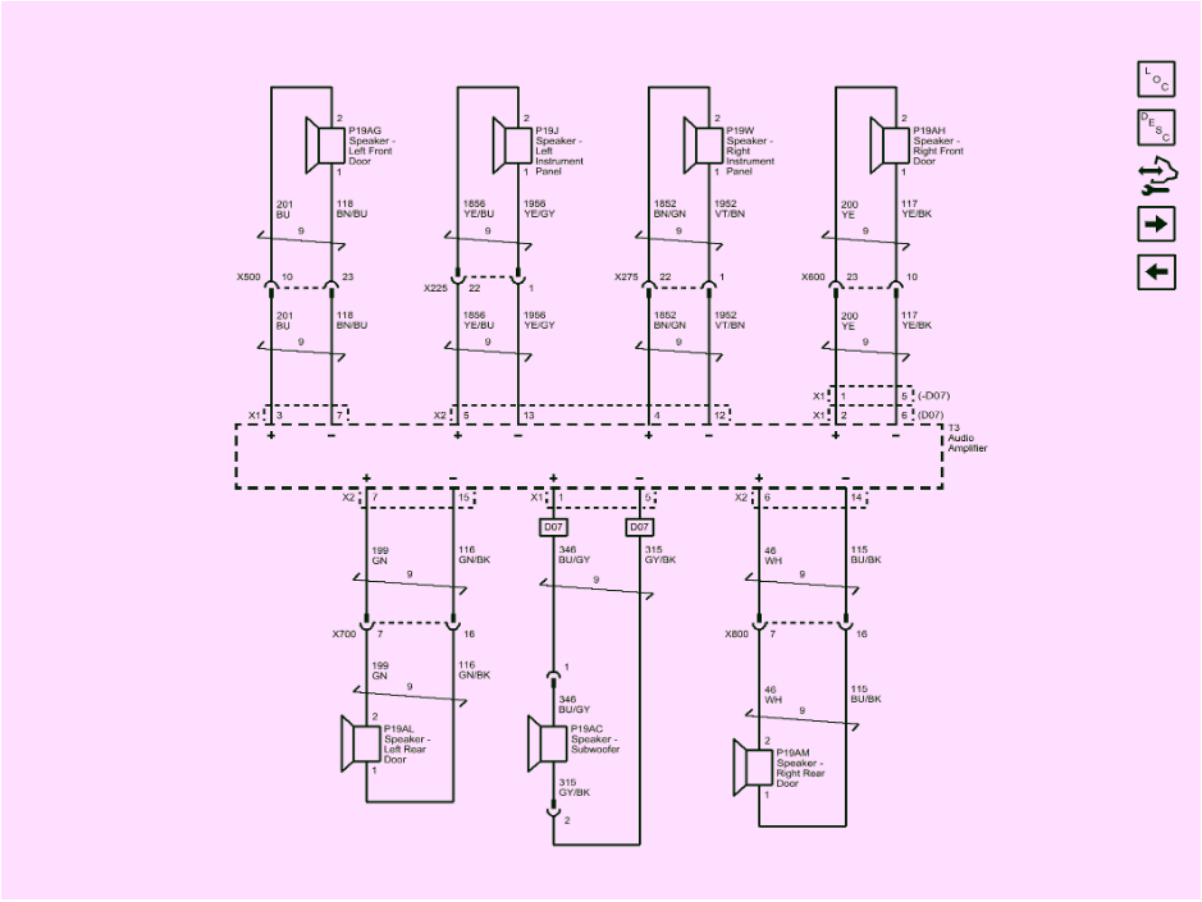


Fig. 12: Speakers (UQA)
Courtesy of GENERAL MOTORS COMPANY

Auxiliary Inputs (D07)

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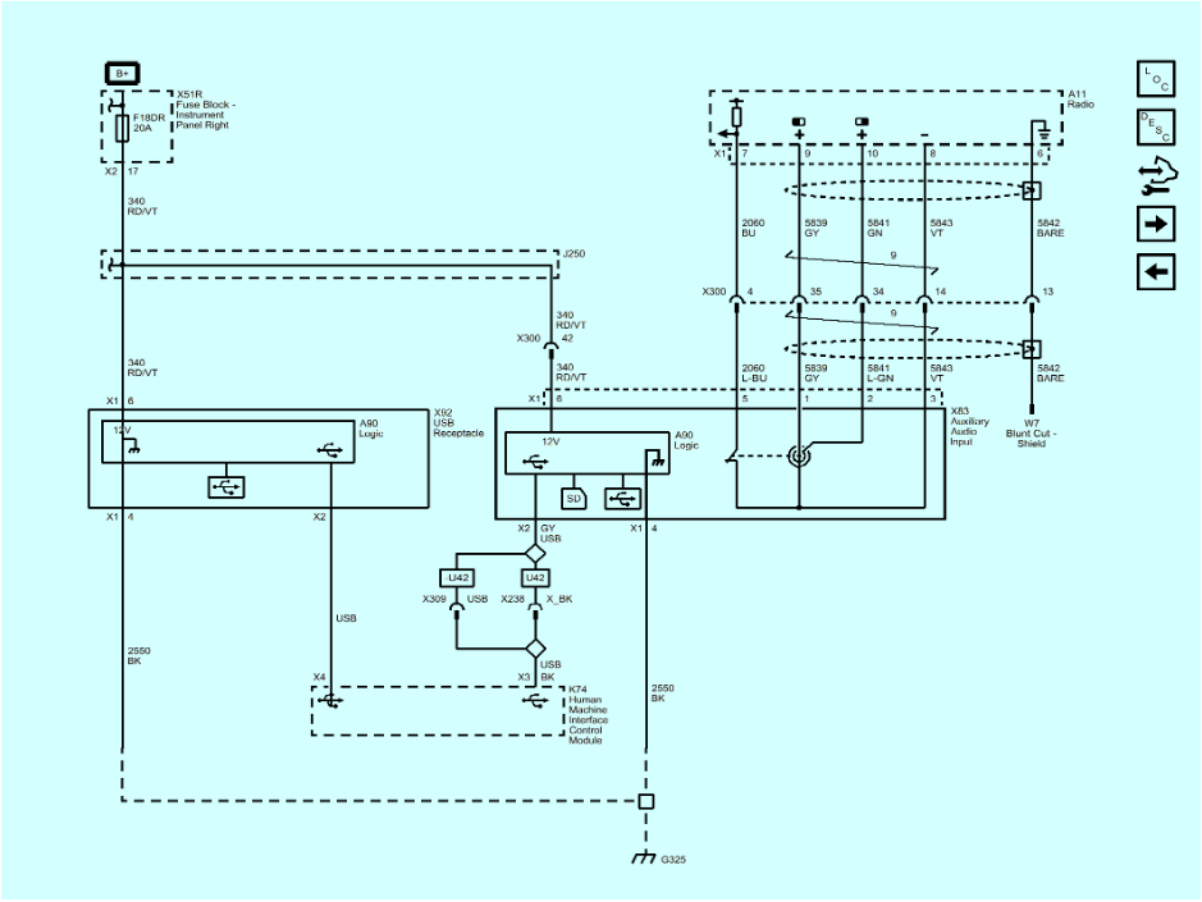


Fig. 13: Auxiliary Inputs (D07)
Courtesy of GENERAL MOTORS COMPANY

Auxiliary Inputs (D09)

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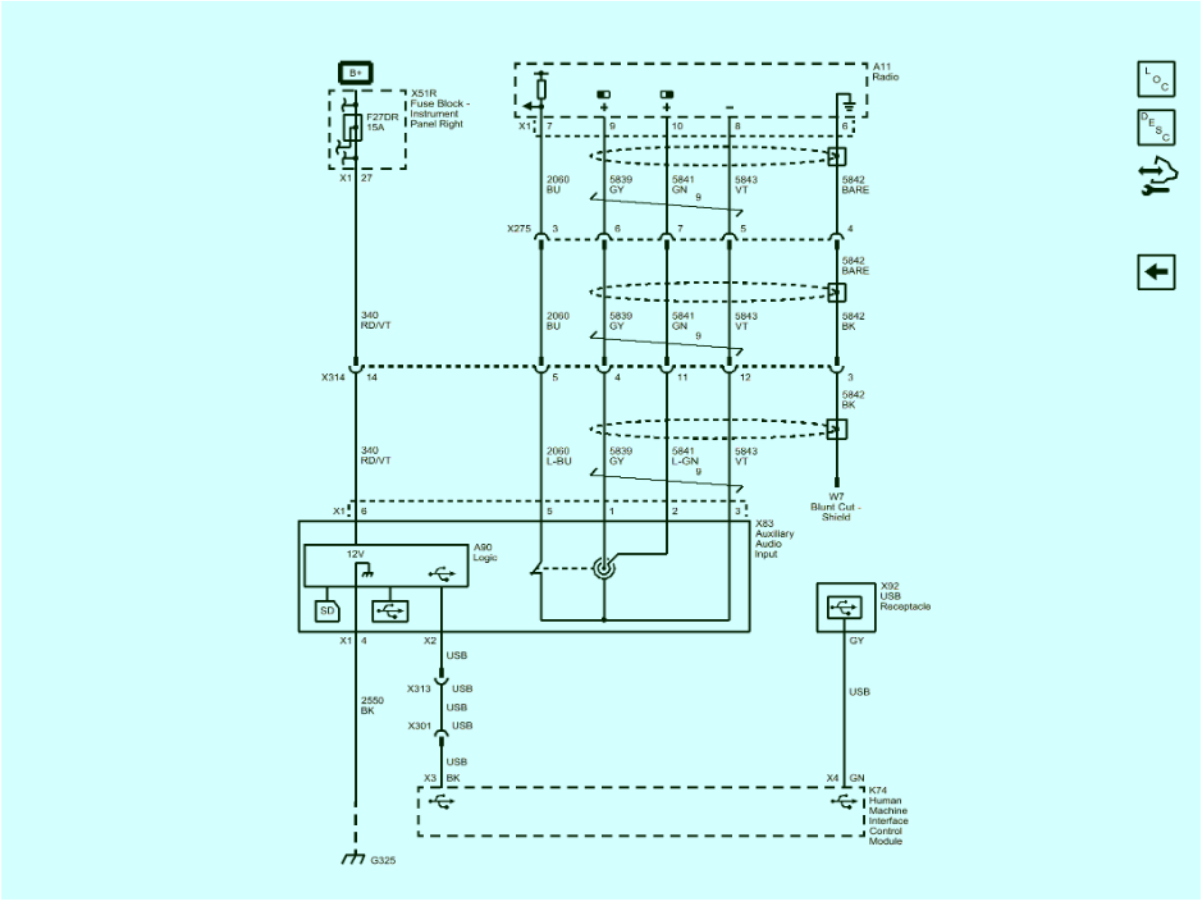


Fig. 14: Auxiliary Inputs (D09)
Courtesy of GENERAL MOTORS COMPANY

RADIO/NAVIGATION SYSTEM WIRING SCHEMATICS (IOB)

Radio Power, Ground, Serial Data and Antenna

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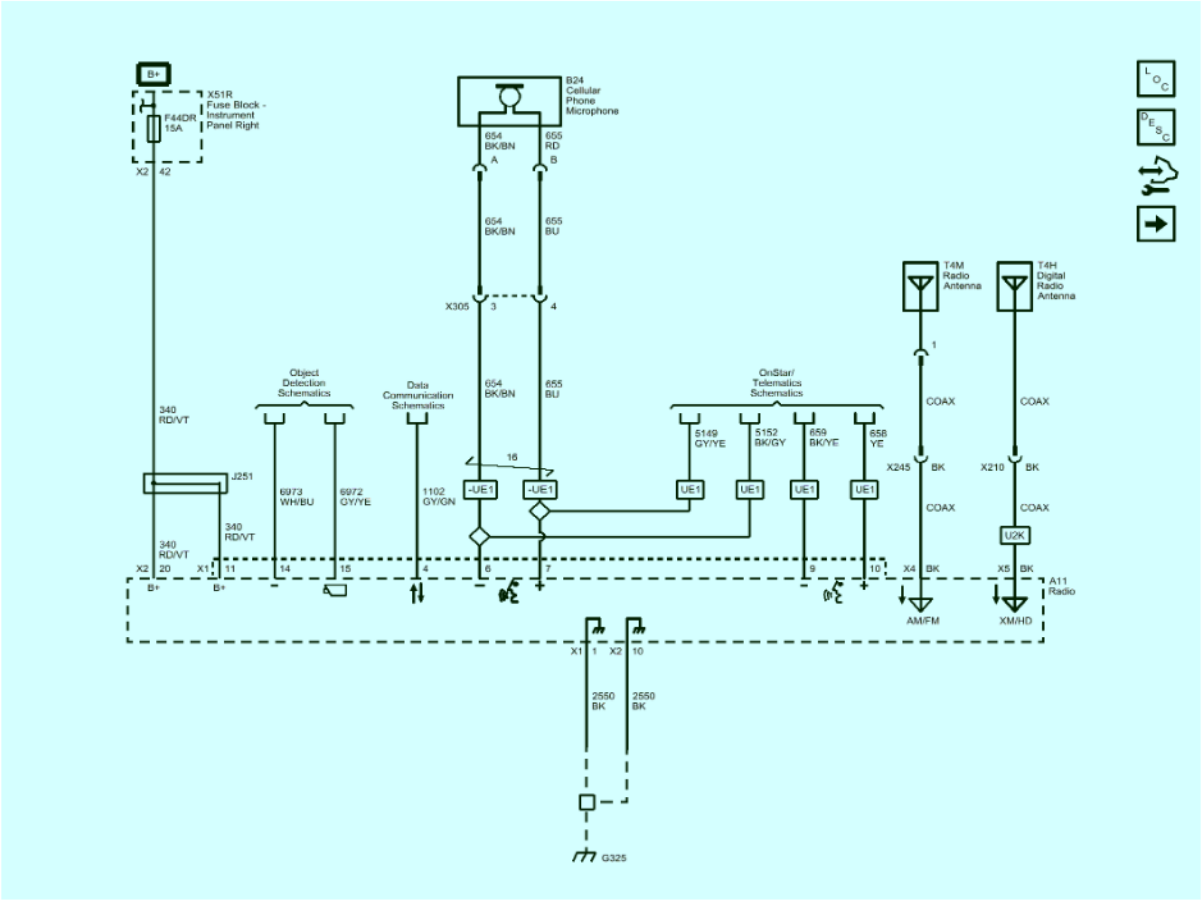


Fig. 15: Radio Power, Ground, Serial Data and Antenna
Courtesy of GENERAL MOTORS COMPANY

Media Disc Player Power, Ground and Serial Data (TG5)

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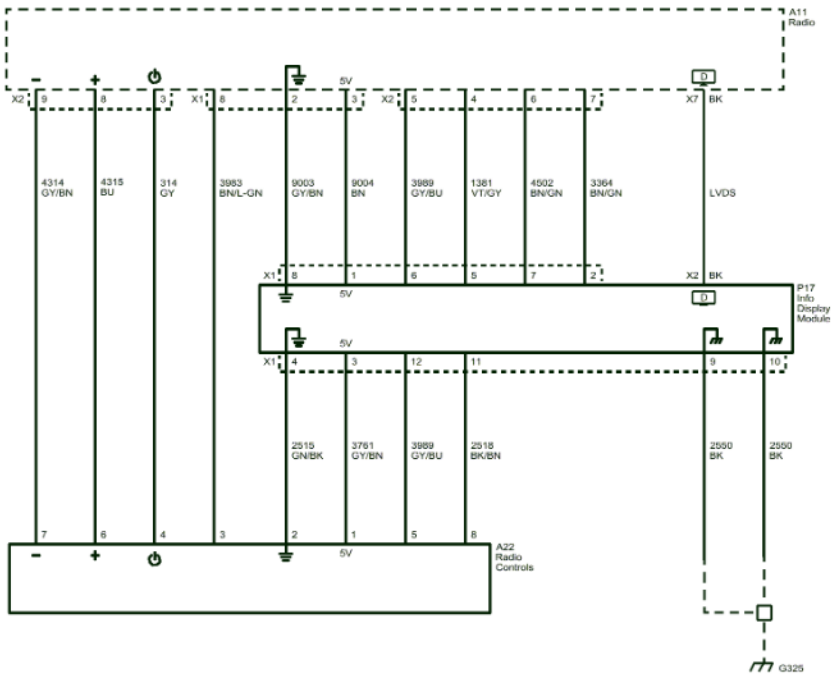


Fig. 16: Media Disc Player Power, Ground and Serial Data (TG5)
Courtesy of GENERAL MOTORS COMPANY

Speakers (UQ3 or UQ5)

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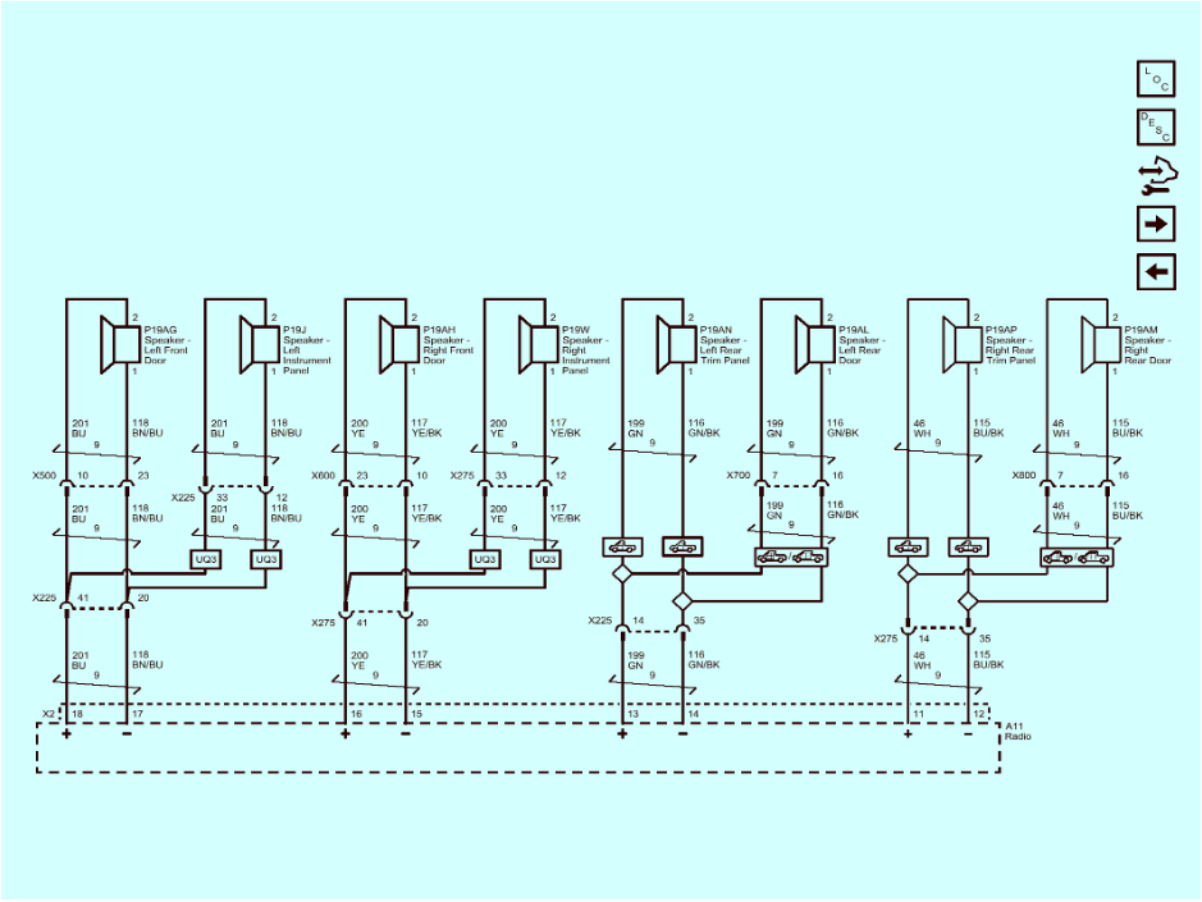


Fig. 17: Speakers (UQ3 or UQ5)
Courtesy of GENERAL MOTORS COMPANY

Auxiliary Inputs

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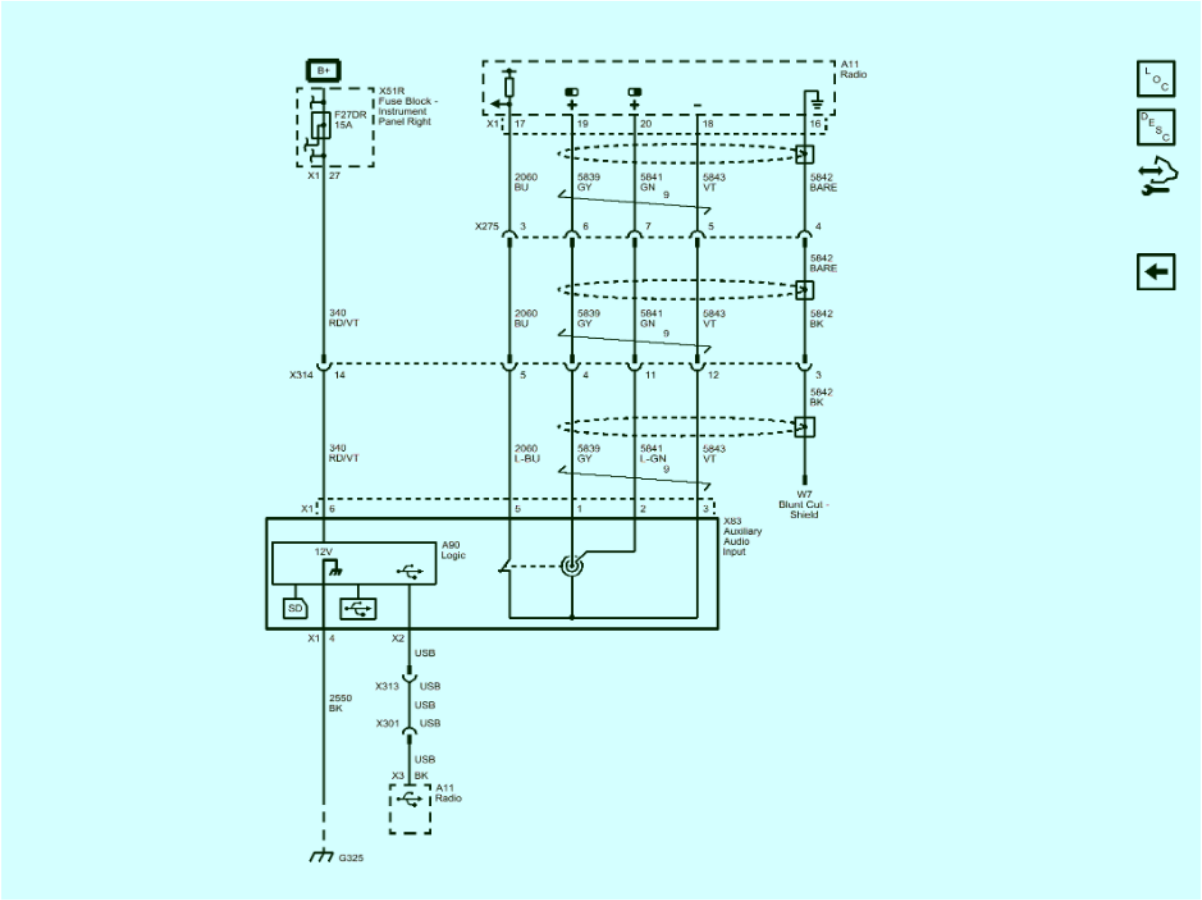


Fig. 18: Auxiliary Inputs

Courtesy of GENERAL MOTORS COMPANY

ONSTAR/TELEMATICS WIRING SCHEMATICS

Power, Ground, Serial Data and Antennas (UE1)

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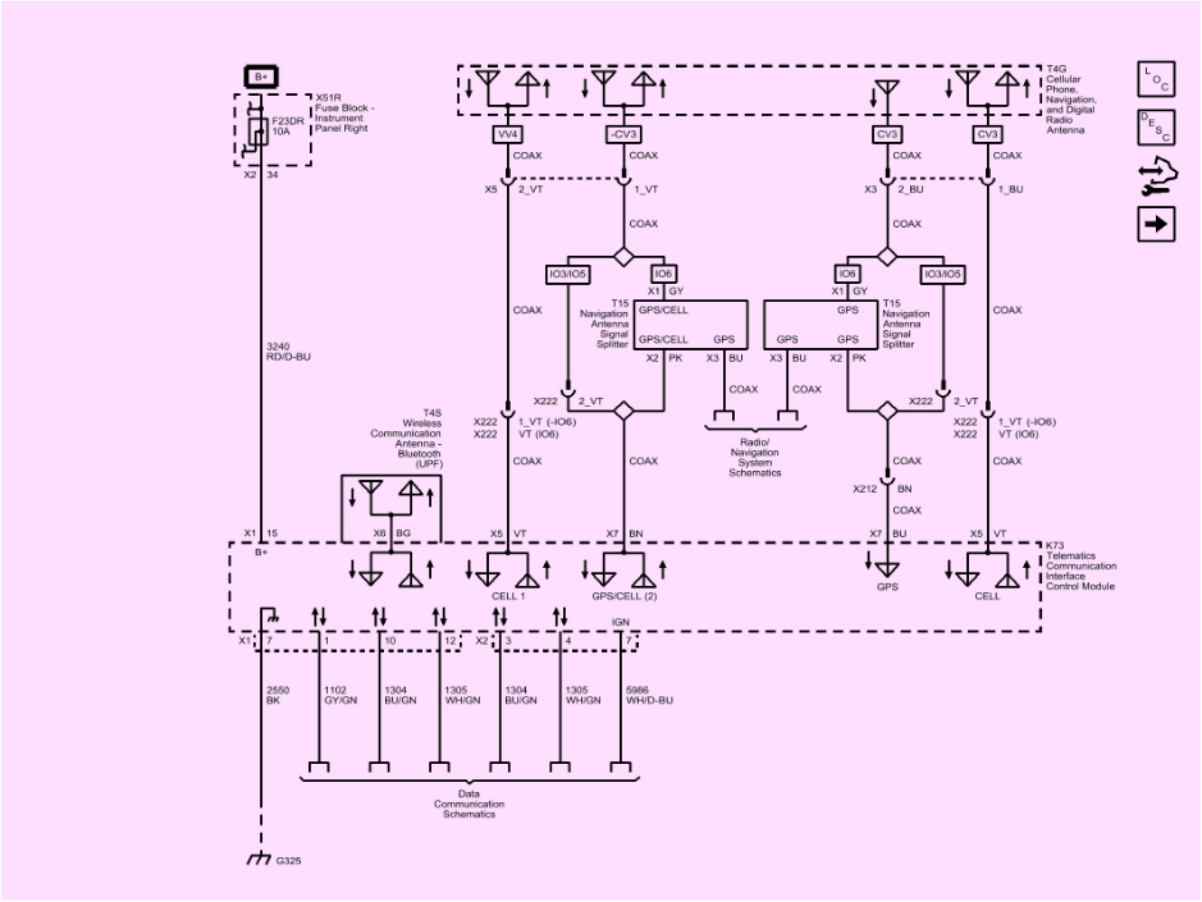


Fig. 19: Power, Ground, Serial Data and Antennas (UE1)
Courtesy of GENERAL MOTORS COMPANY

Controls and Audio Signals (UE1)

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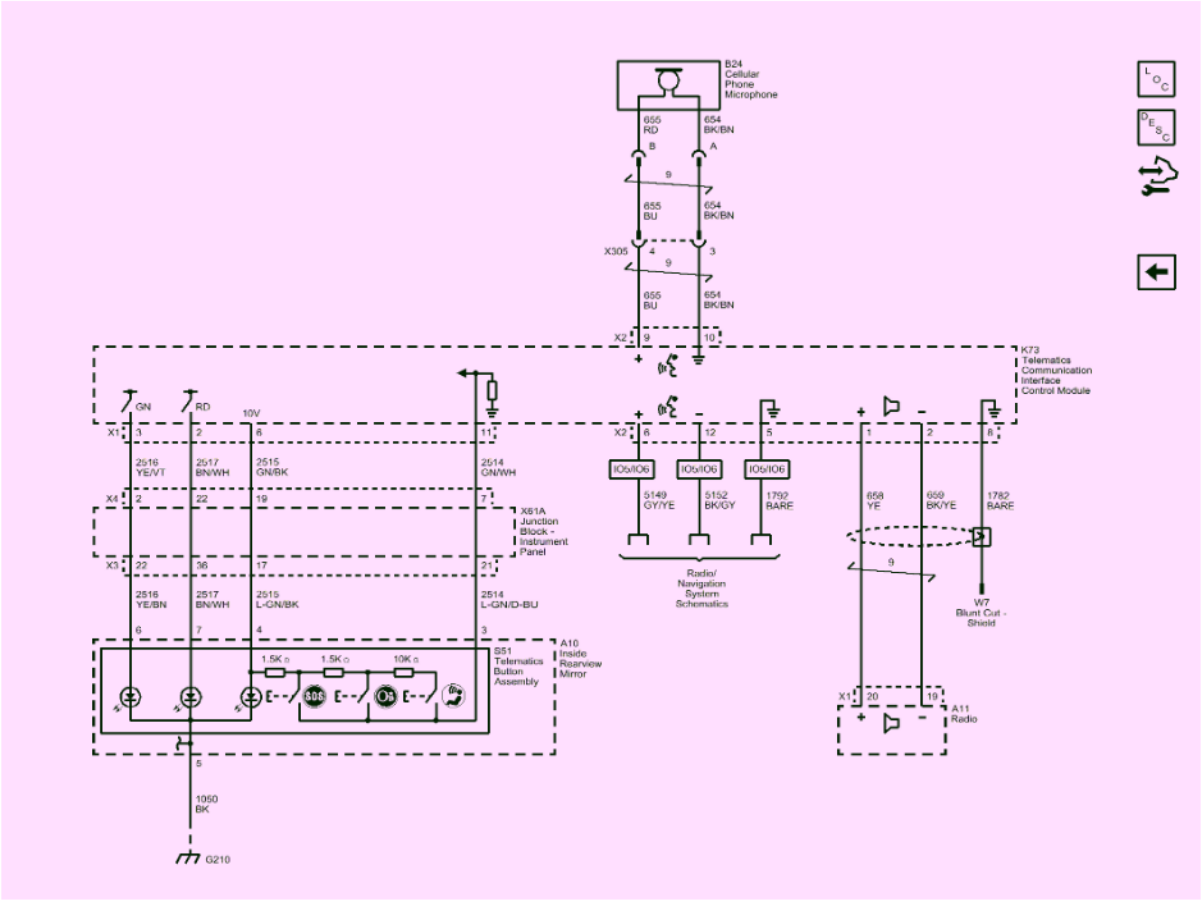


Fig. 20: Controls and Audio Signals (UE1)
Courtesy of GENERAL MOTORS COMPANY

VIDEO SYSTEM WIRING SCHEMATICS

Video Display - 2nd Row Power and Ground

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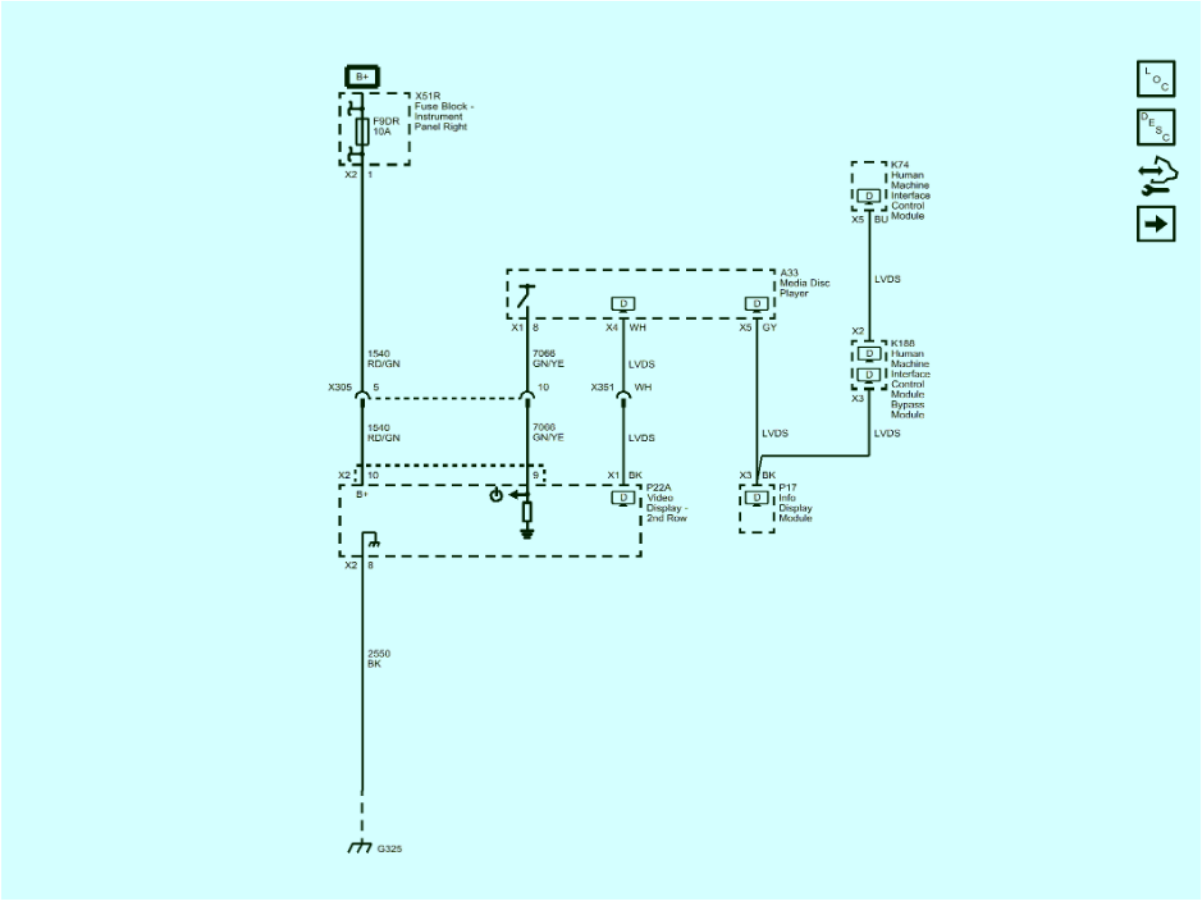


Fig. 21: Video Display - 2nd Row Power and Ground
Courtesy of GENERAL MOTORS COMPANY

Video Inputs

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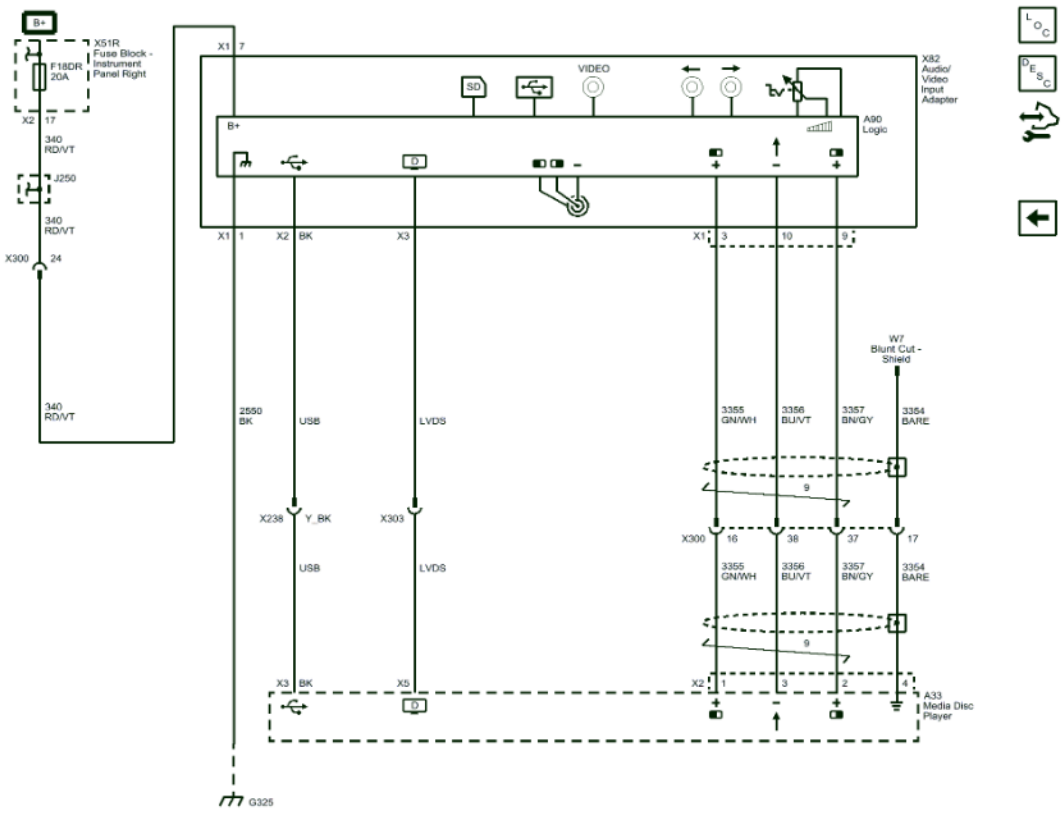


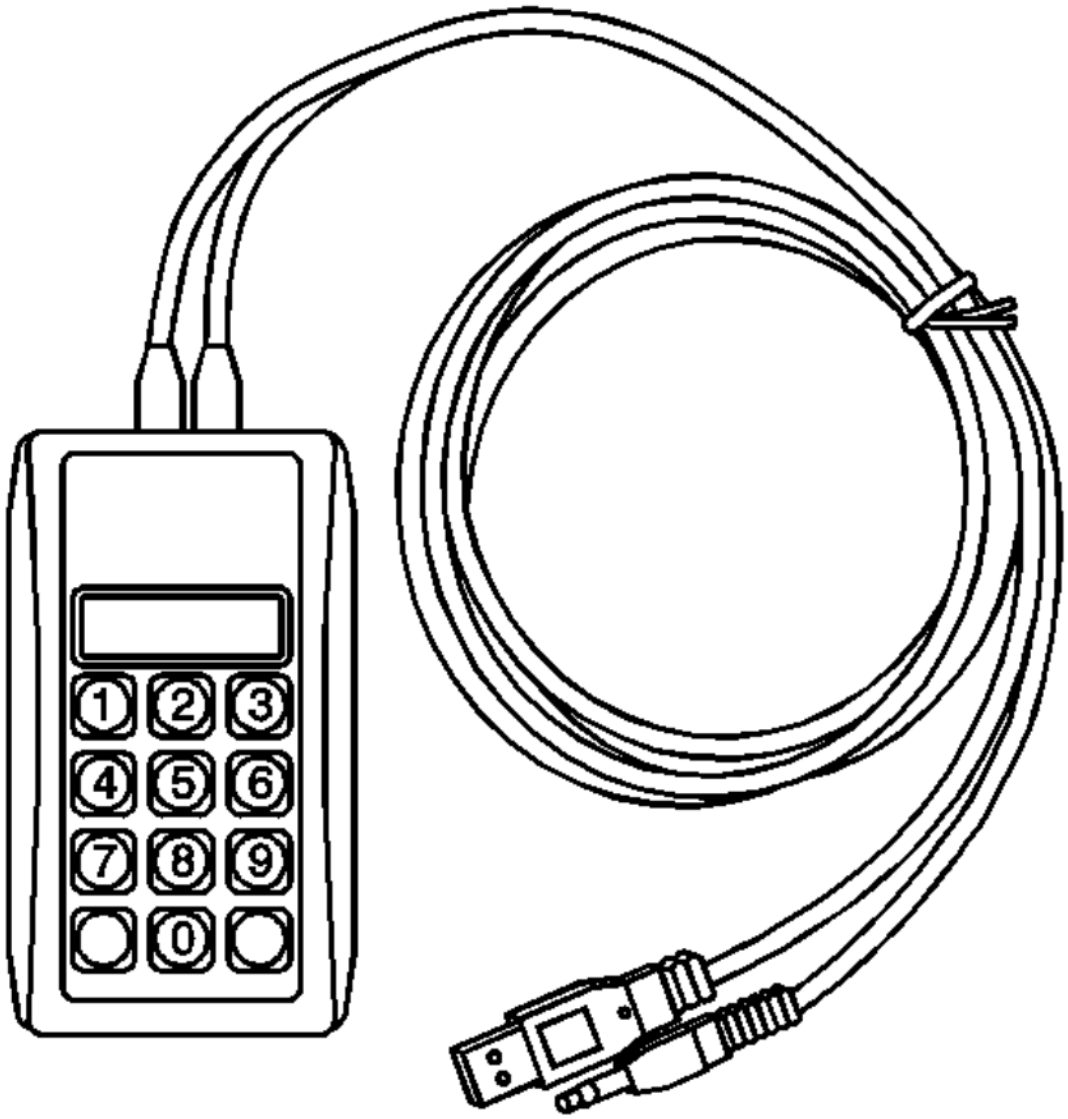
Fig. 22: Video Inputs
Courtesy of GENERAL MOTORS COMPANY

Article GUID: A00854646

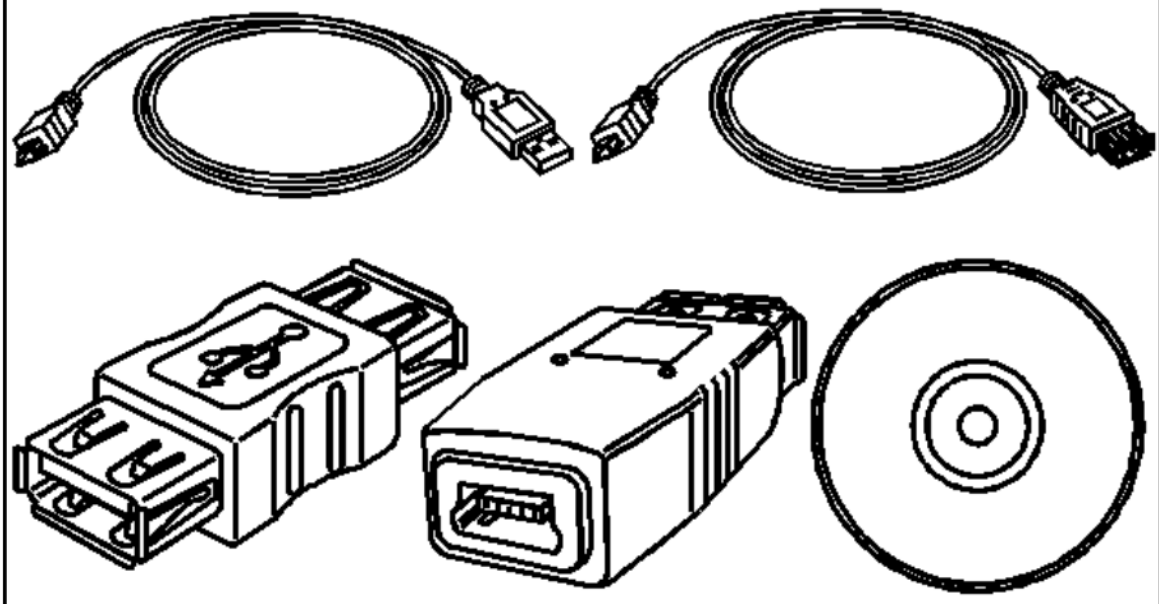
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SPECIAL TOOLS AND EQUIPMENT

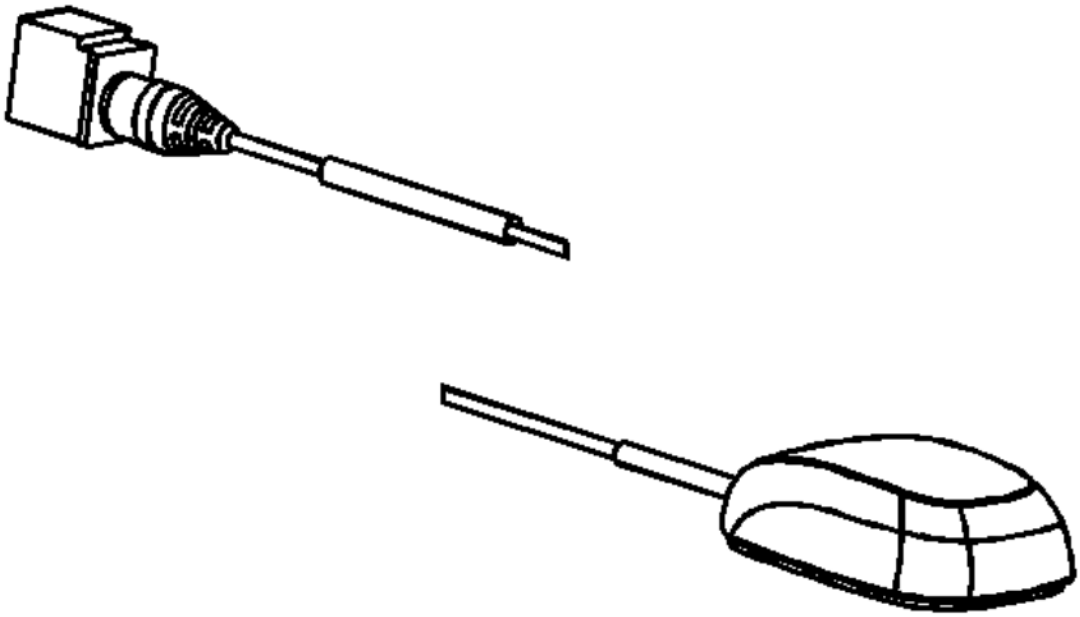
SPECIAL TOOLS

Illustration	Tool Number/Description
	EL-50334-20 Multi-Media Interface Tester (MIT)

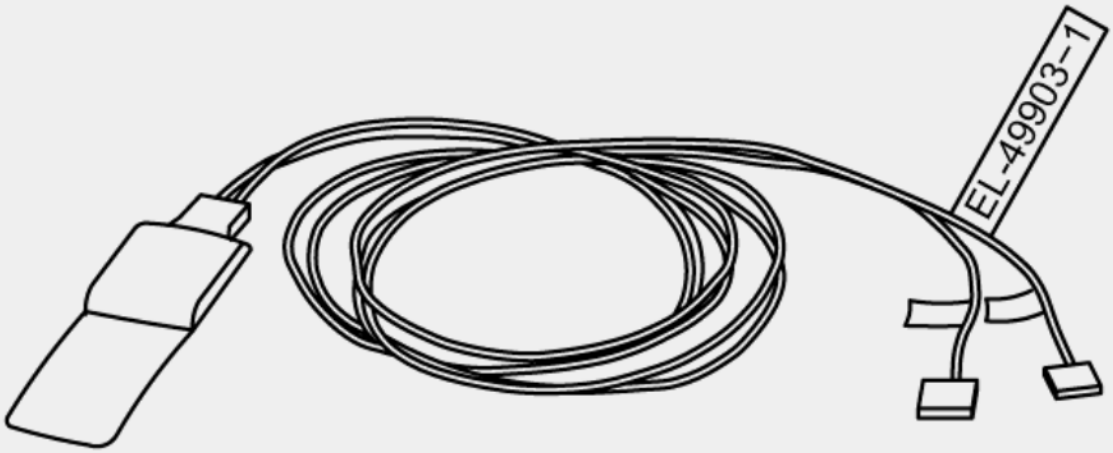
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Illustration	Tool Number/Description
	EL-50334-50 USB Cable and Adapter Kit

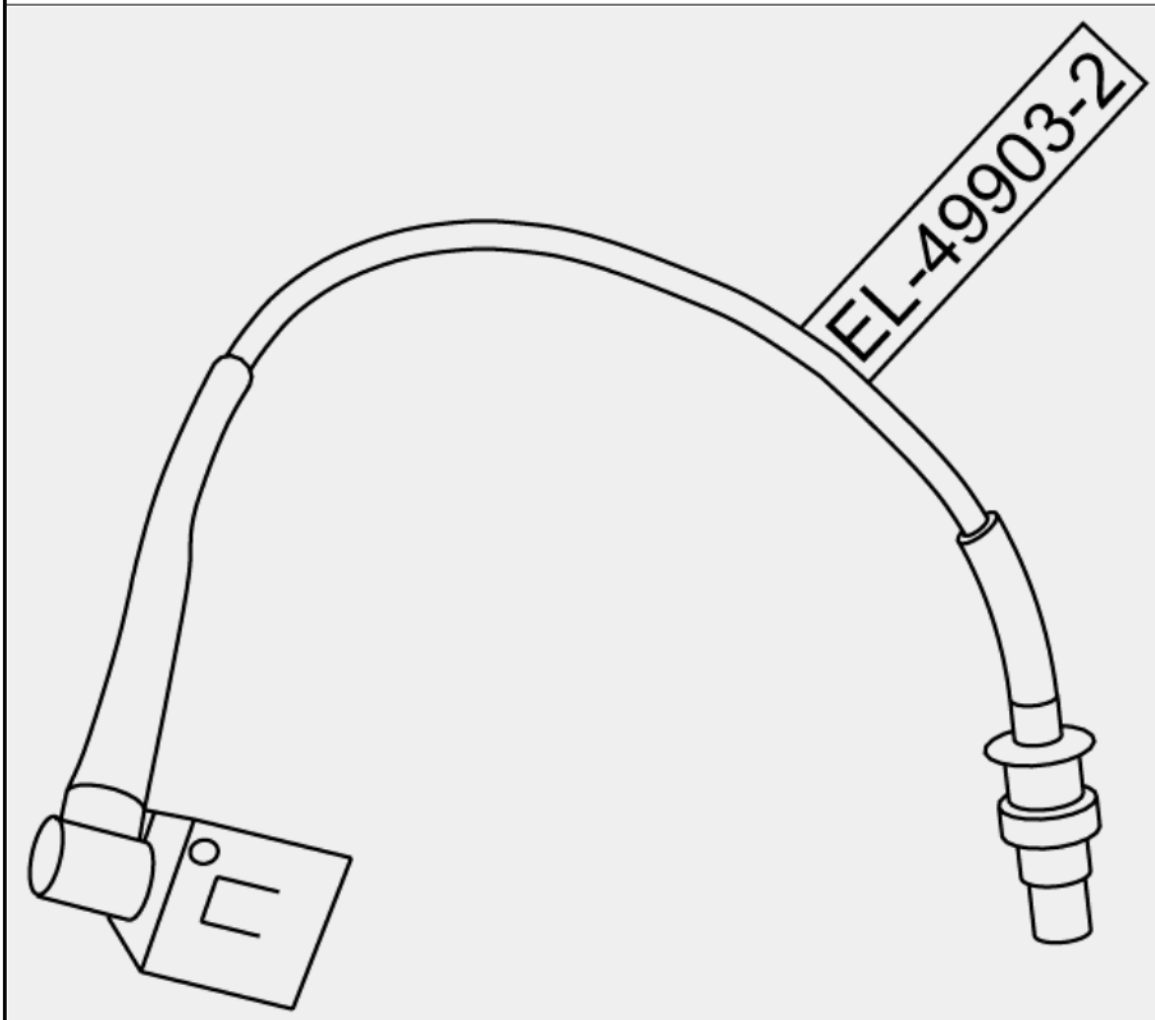
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Illustration	Tool Number/Description
	EL-48028 Digital Radio Test Antenna

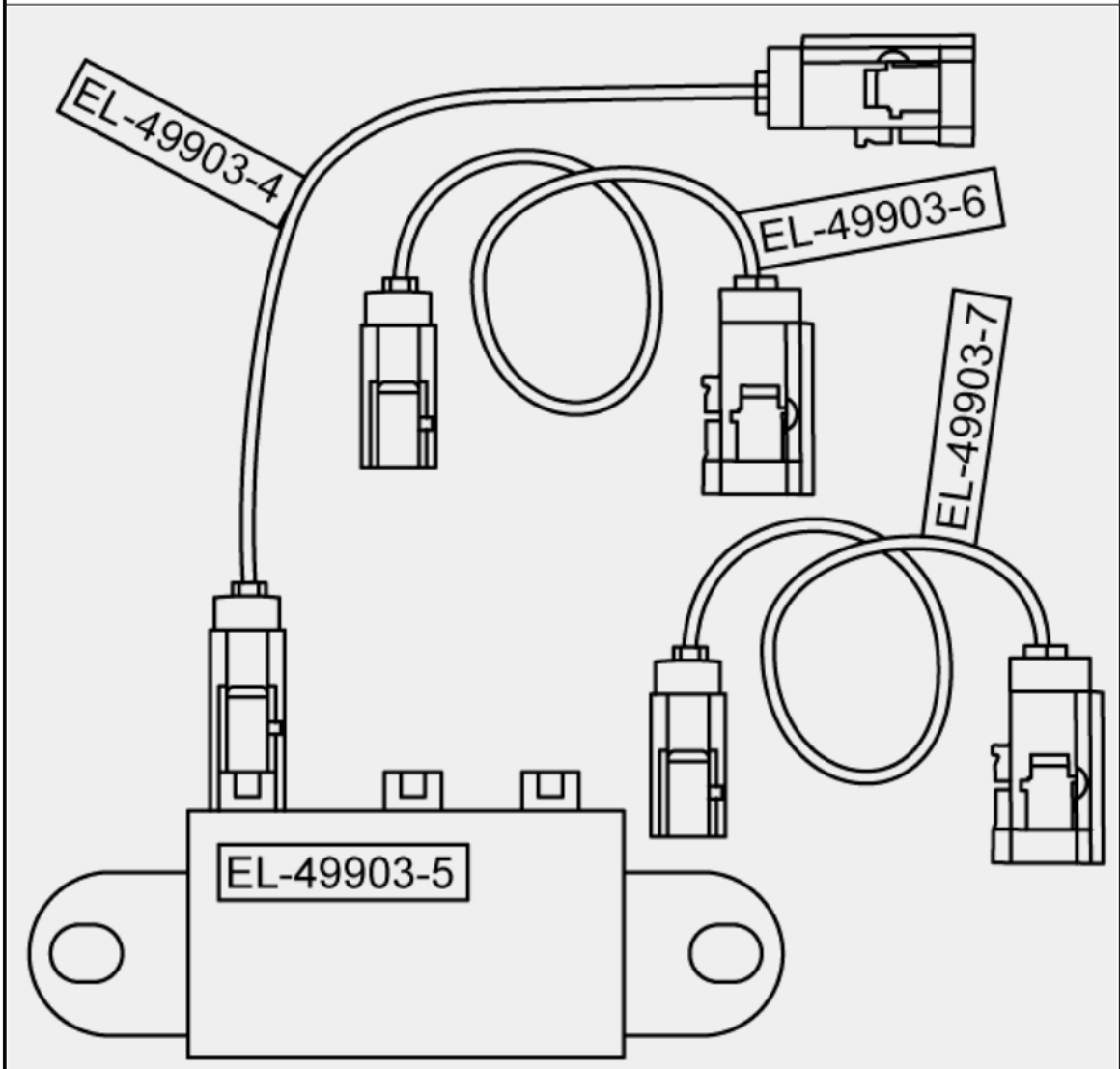
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Illustration	Tool Number/Description
	EL-49903-1 Test Antenna, Navn-Cell Comn

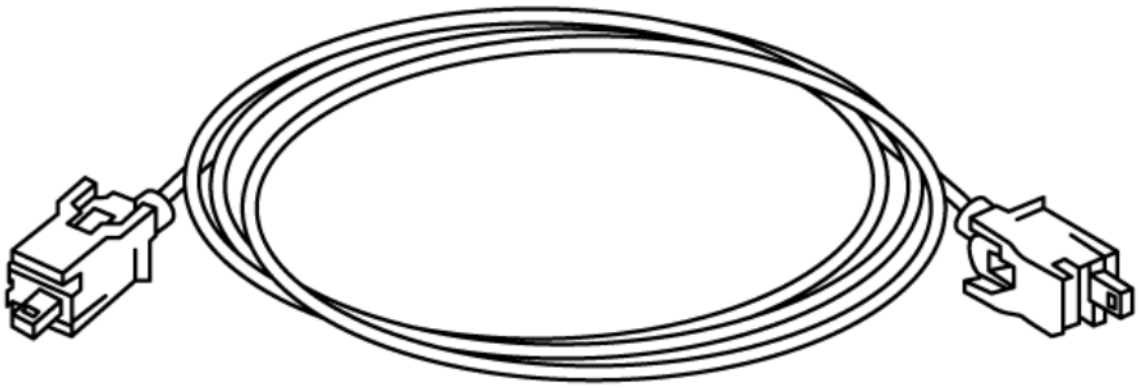
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Illustration	Tool Number/Description
	EL-49903-2 Adapter Cable-UHF RT Angle

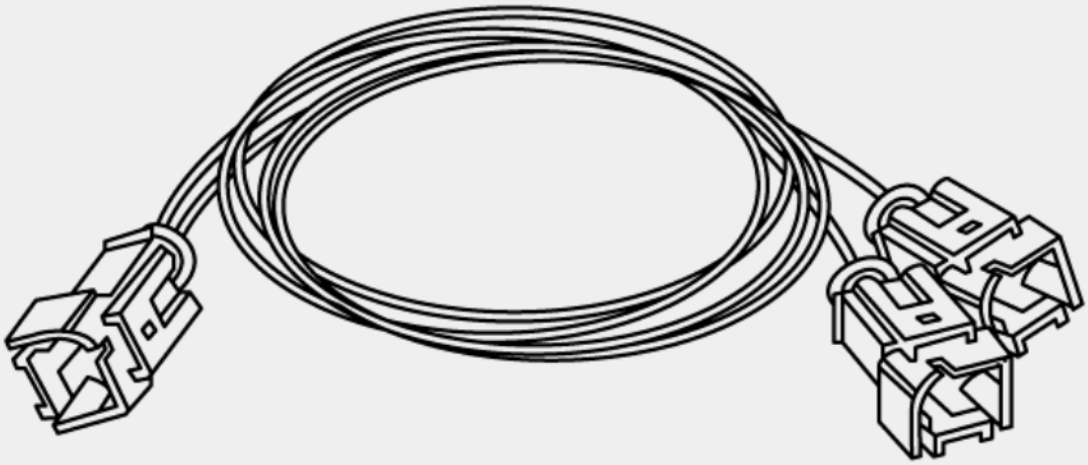
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Illustration	Tool Number/Description
	EL-49903-3A Combiner Kit, Test Antenna

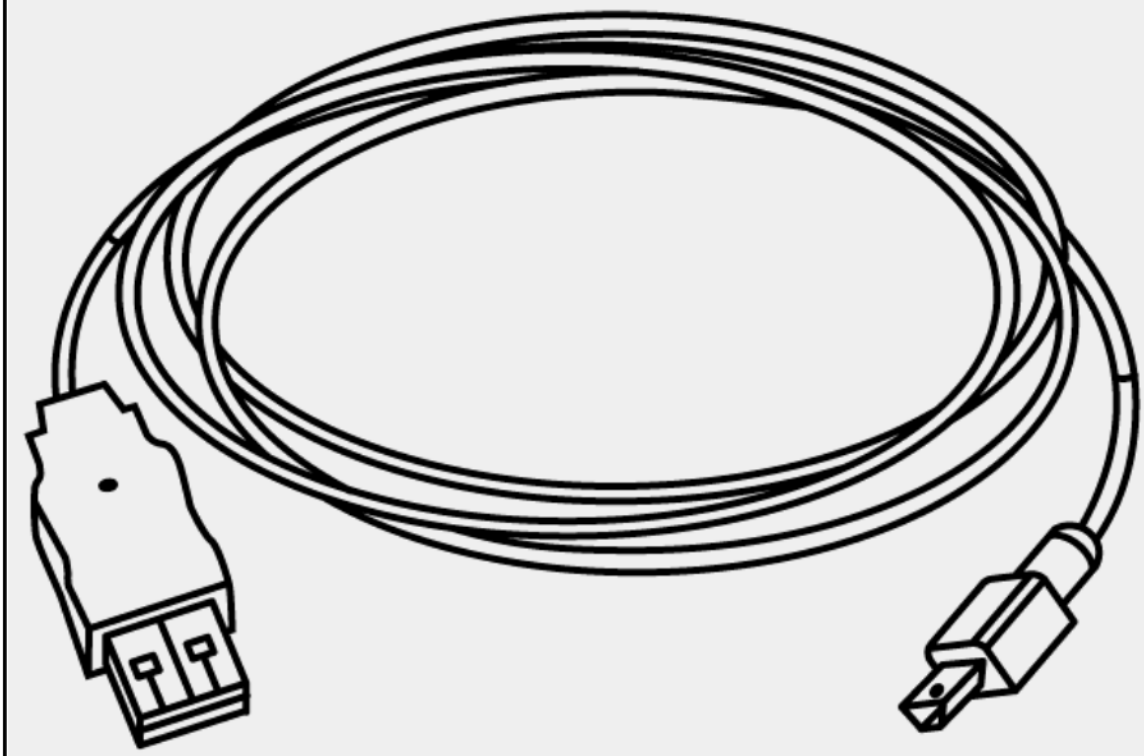
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Illustration	Tool Number/Description
	EL-50334-12 Infotainment Test Cable - RSE

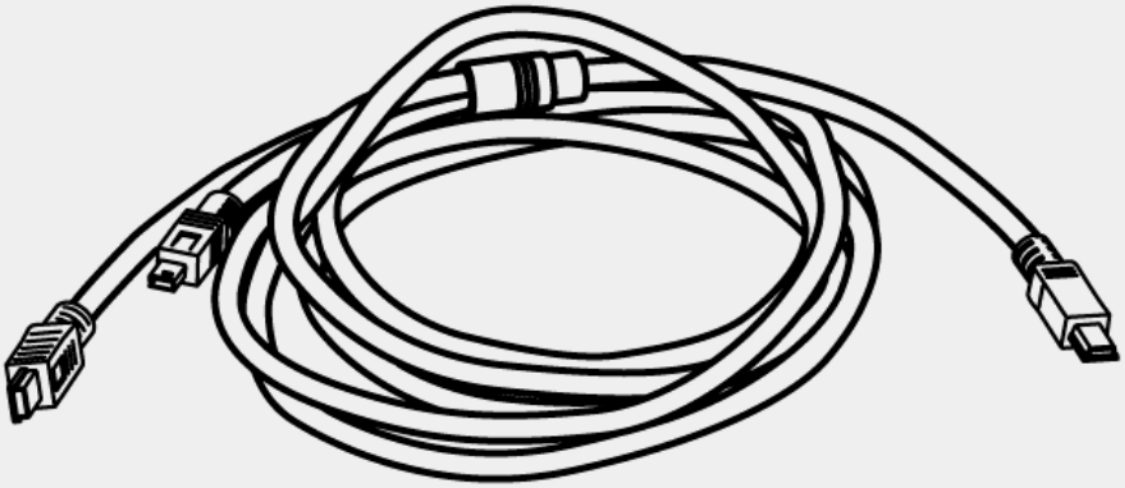
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Illustration	Tool Number/Description
	EL-50334-13 Infotainment Test Cable - RSE Splitter

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Illustration	Tool Number/Description
	EL-50334-14 Infotainment Test Cable

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Illustration	Tool Number/Description
	EL-50334-15 Video Bypass Cable

SPECIAL TOOLS (MIT TOOL INSTRUCTIONS)

Bluetooth Pairing for Vehicles with Radio RPO: UF7

Either reset the pin code on the radio to 0000, or go under Device Info on the radio and see what the pin code is (to enter it later on the MIT).

1. Turn the BT discoverable ON in the radio Bluetooth settings.
2. Press Pair Device on radio (DO NOT PRESS SEARCH BLUETOOTH DEVICES ON THE RADIO).
3. Press the Pair button on the MIT.
4. When the three LED lights begin flashing on the MIT, enter the pin code (either 0000 if you reset it to that or what the radio pin code was).
5. MIT will then automatically connect with the radio and should show "MIT Connected" message.

   Make test call and the audio streaming test.

Holden Radio Bluetooth Pairing Instructions

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1. Using the radio controls, place the radio into "Discoverable Mode".
2. Place the MIT into Bluetooth mode by pressing TEST SELECTOR until the Bluetooth LED is illuminated.
3. With the MIT in Bluetooth mode Press and Release the #1 button (the Bluetooth LED will begin to slowly blink).
4. Now Press and release the PAIR/CALL button on the MIT (the Bluetooth LED will begin to blink a little faster).
5. On the radio Enter the PASSKEY when prompted: (press "0000" then Press "OK").
6. The MIT and radio will PAIR and CONNECT (the Bluetooth LED will be Fast Flashing).
7. Use as regular MIT at this point.

For all other Radios

Testing the Bluetooth Function

1. Verify connection of the MIT to the USB port.
2. Press and release the TEST SELECTOR button until the Bluetooth LED illuminates.
3. Disable all other Bluetooth devices present in the vehicle (ie. cell phones, laptops, etc.).

Standard Bluetooth Pairing/Bonding

1. Use the vehicle controls to place the radio into Bluetooth Pairing mode. The vehicle will prompt you with a security code.
2. Press and release the PAIR/CALL button. The Bluetooth LED will blink slowly while preparing to have a security code entered.
3. Wait for the all three LEDs to blink confirming it is ready to have the security code entered.
4. Enter the code with the MIT keypad and hit ENTER.
5. The Bluetooth LED will blink slowly while pairing/bonding and move to a quick flash once paired/bonded.

   The vehicle should confirm pairing/bonding is complete.

Streaming Audio

1. Confirm pairing/bonding is complete - the Bluetooth LED will be in a quick flash mode.
2. On some radios the MIT automatically begins streaming audio via A2DP. The audio playback will confirm that the Bluetooth connection using streaming and the audio is working correctly.
3. On other radios you will need to select Bluetooth Audio from the Source menu to verify Audio Streaming.
4. Audio playback confirms that the Bluetooth connection using Streaming Audio is working correctly.
5. Placing a test call will temporarily stop the streaming audio function, but upon disconnection of that test call,

   the streaming audio from the MIT will resume.

To Place a Test Call

1. Confirm pairing/bonding is complete - the Bluetooth LED will be in a quick flash mode. If the vehicle is equipped with streaming audio, and the radio is set to play a Bluetooth audio file, the streaming audio playback will be audible.
2. Press and release PAIR/CALL button to place a test call. Streaming audio will be temporarily turned off.
3. Use the vehicle controls to answer the call.

NOTE: **If the call is not answered within several rings, the MIT's audio files will not**

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transmit, even though an active call is occurring.

4. Audio playback confirms that the Bluetooth connectivity is working correctly.

NOTE: **The MIT will remain paired/bonded when the call is ended by the vehicle. To re-test the call function, place the MIT in Bluetooth mode and press and release the Pair button to reconnect. When testing is completed, delete MIT from the audio system before returning the vehicle to the customer.**

5. Use the vehicle controls to end the call. If applicable, streaming audio will resume.

Testing the AUX/Line-In Function

1. Verify connection of the MIT as stated above.
2. Press and release the TEST SELECTOR button until the MIT AUX LED illuminates.
3. Use the vehicle controls to put the audio system into Audio (Line-In) mode.
4. Audio playback confirms that the audio input is working correctly.

Testing the USB Function

1. Verify connection of the MIT as stated above.
2. Press and release the TEST SELECTOR button until the MIT USB LED illuminates.
3. Use the vehicle controls to put the audio system into USB mode.

NOTE: **Volume levels may vary dependent upon vehicle audio system.**

4. Audio playback confirms that the USB is working correctly.

Troubleshooting Guide

If the MIT unit is still not working properly after following the below troubleshooting, the unit is malfunctioning and should be repaired or replaced.

Unit not Working

- Verify the MIT is powered on correctly as indicated by the green Power LED.
- If Power LED is not illuminated, verify USB power source is working properly.
- If USB power adapter is being used to power the MIT, check and, if necessary, replace the fuse in adapter.

Problem with Aux/Line-In Test

- Verify Aux/Line- In test cable is inserted properly into the vehicle audio input jack. Verify the MIT is in Aux/Line-In mode as indicated by the red AUX LED.
- Verify the vehicle audio system is in Auxiliary or Line-in mode. Verify the vehicle audio system volume is turned up and not in mute mode.

Problem with USB Test

- Verify MIT is in USB mode as indicated by the red USB LED. Verify the vehicle audio system is in USB mode.
- Verify the vehicle audio system volume is turned up and not in mute mode.

Problem with Bluetooth Pairing

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- Delete previous devices stored in the device list of the radio and the pair the MIT
- Remove USB cable, and then reconnect to reset the MIT. Carefully follow the bonding instructions for the correct Passkey procedure.

Problem with Bluetooth Test Call Audio

- Verify the MIT is paired with the vehicle. This is indicated by the quick flashing Bluetooth LED.
- Audio system should have indicated the MIT is bonded.

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