

2018 ACCESSORIES & EQUIPMENT

Cellular, Entertainment, And Navigation - Description And Operation - Equinox & Terrain

DESCRIPTION AND OPERATION

ONSTAR DESCRIPTION AND OPERATION (UE1 WITHOUT IOU/IOT/IOR)

This OnStar® system consists of the following components:

- Telematics communication interface control module
- OnStar® three button assembly
- Microphone
- Cellular antenna
- Navigation antenna
- Bluetooth® 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.

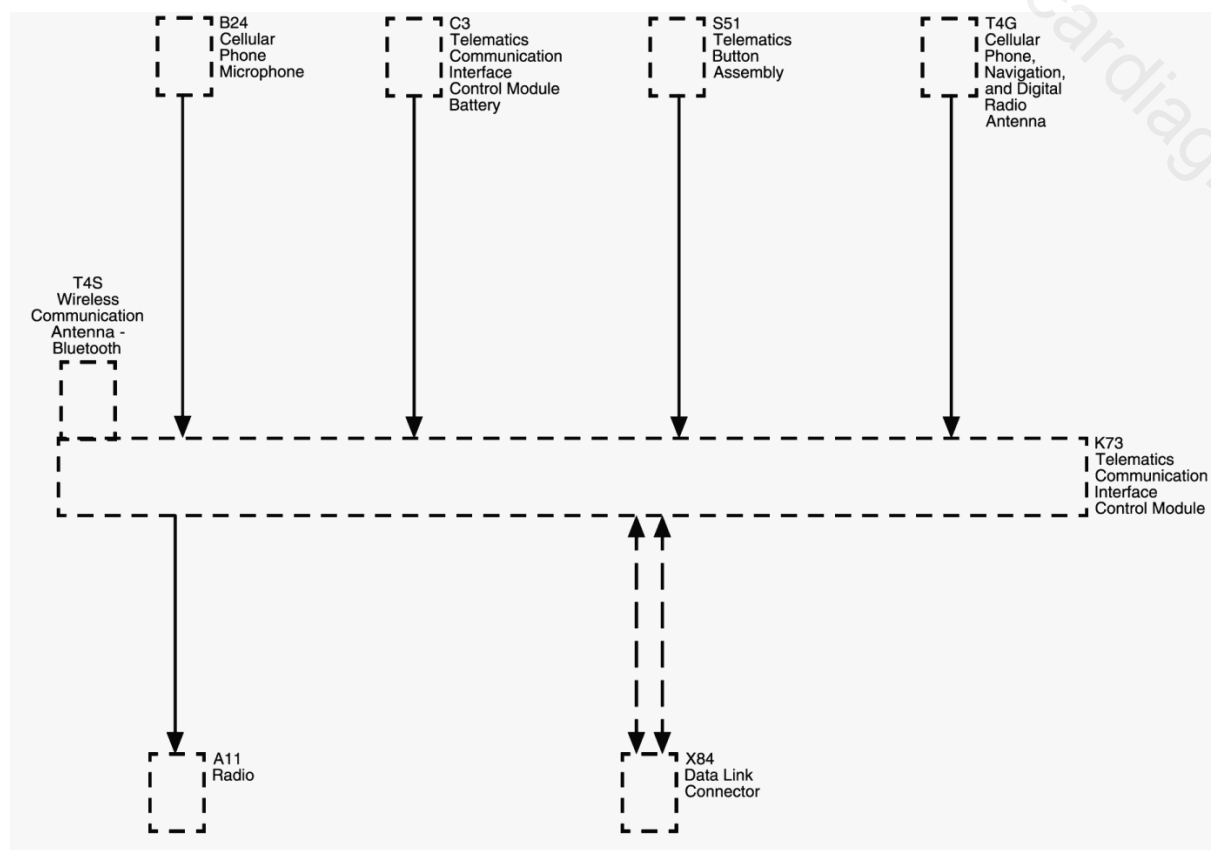


Fig. 1: OnStar System Block Diagram

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

Callout	Component Name
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 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 OnStar® system uses the United 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 starting, initiating door lock/unlock, or activating the exterior lamps using the serial data circuits. These functions can be commanded by the OnStar® Call Center per a customer request 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.

OnStar® Three Button Assembly

- The OnStar® button assembly may be part of the rearview mirror, or a separate, stand alone unit. The button assembly is comprised of 3 buttons 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 OnStar® call center button, which displays the OnStar® logo, allows the user to connect to the OnStar® call center.
 - The emergency button, which displays white letters "SOS" with red background, sends a high priority emergency call to the OnStar® call center when pressed.

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

The telematics communication interface control module supplies 10 volts to the OnStar® button assembly on the keypad supply voltage circuit. When pressed, each button completes a circuit across a resistor allowing a specific voltage to be returned to the 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 OnStar® 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 OnStar® 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 option. Ground for the LED is provided by the wiring harness attached to the button assembly.

Secondary OnStar® Controls

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

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

OnStar® 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 OnStar® 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 Description and Operation for further details.

OnStar® 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's® advanced connected vehicle technology. An active OnStar® account as well as a valid OnStar® username and password are required to use the app. The remote commands must be enabled by logging into the user's OnStar® 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 differential 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.

Bluetooth® (If Equipped)

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

The Bluetooth® antenna is internal to the telematics communication interface control module, radio or human machine interface module and is used to send and receive signals from a Bluetooth® 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 Bluetooth® technology customers can experience hands-free calling as their Bluetooth® capable cellular phones are wirelessly connected to the vehicle. It will allow customers to place and receive calls using the steering wheel controls and voice recognition. The vehicle audio system will allow you to listen to your call through the vehicle speakers and adjust volume through steering wheel or radio controls.

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

Bluetooth® Features Supported

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

- Automatic reconnection - highest priority phone will automatically be connected to vehicle when vehicle ignition is on
- Hands-free dialing- via digits, redial, name tags (phone number saved to a nametag via voice recognition)
- Answering a call
- Ending a call
- Mute a Call
- Rejecting a call - ignore an incoming call

- Call Waiting
- Three-way Calling - initiated from hands-free system
- Send Number During a Call - this is used when calling a menu-driven phone system
- Transfer a Call - transfer call from vehicle to cellular phone and visa versa
- Voice Pass-Thru - allow access to the voice recognition commands on the cellular phone

Pairing a Bluetooth® Cellular Phone to the Vehicle

In order to use hands-free calling, the cellular phone must be paired to the vehicle. Up to five devices can be paired to the vehicle at one time, but only one can be connected at any given time. To pair a phone, the customer must know how to operate the Bluetooth® functionality of their phone. The pairing process must only be done one time for each phone, unless that phone's information is deleted. 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 Bluetooth® cellular phone has been paired with vehicle, it will automatically connect to the vehicle when the ignition is on and the device is on. When more than one paired phone is in the vehicle, the phone with the highest priority will be connected. If the cellular phone is in use while getting into the vehicle, the phone can be switched to hands-free mode with the press of a button. In addition, a call in progress can be transferred from the vehicle hands-free mode to the phone to continue the call as the customer exits the vehicle.

Complete pairing instructions are provided in the Vehicle Owners Manual.

Back-up Battery (If Equipped)

NOTE:

Do not disconnect the main vehicle battery or remove the OnStar® fuse with the ignition key in any position other than OFF. Disconnecting power to the OnStar® module in any way while the ignition is ON or with retained accessory power activated may cause activation of the OnStar® 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 OnStar® 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 OnStar® equipped vehicles may also be equipped with a back-up battery. The back-up battery is a 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. The WiFi Hotspot feature is only available with factory option RPO VV4.

Audio System Interface

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

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

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

OnStar® Sleep Cycle

The OnStar® system uses a unique sleep cycle to allow the system to receive cellular calls while the ignition is in the OFF position and retained accessory power 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 OnStar® Call Center, and to continue to maintain an acceptable level of battery electrical drain.

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

- High power
- Low power
- Sleep
- Digital standby

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

The low power state is in effect when the OnStar® system is idle with the ignition in the ON or RUN position, 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 OnStar® Call Center for 1 minute. After this interval, the system will again return to the sleep state for 9 minutes. If a call is sent during the 1 minute interval, the OnStar® system will receive the call and immediately go into the high power mode to perform any requested functions. If no call is received during the 1 minute interval, the system will go back into the sleep mode for another 9 minutes. This process will continue for up to 48 hours, after which the OnStar® system will turn off until the ignition is turned to the ON or RUN position.

The digital standby power state is entered after the vehicle has been shut off and the retained accessory power has timed out while in a digital cellular area. When in digital standby mode, the OnStar® module is able to perform all remote functions as commanded by an OnStar® advisor at any time, for a continuous 120 hours. After 120 hours, the OnStar® 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 OnStar® system loses battery power while the system is in a standby or sleep mode, the system will remain OFF until battery power is restored and the ignition is turned to the ON or RUN position.

Features

OnStar® Personal Calling

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

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

Turn by Turn Navigation

Turn by Turn Navigation allows the driver to contact OnStar® 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 OnStar® Advisor. Recording is activated by pressing the blue OnStar button during a call; pressing the button a second time stops the recording. The stored information can be played back by pressing the phone button 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 OnStar® Accounts

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

- The OnStar® status LED will not illuminate.

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

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

OnStar® Cellular, GPS, and Diagnostic Limitations

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

The cellular operation of the OnStar® system may be inhibited by factors such as the users range from an analog or digital cellular tower, the state of the cellular carrier's equipment, and the location where the call is placed. Making an OnStar® key press in areas that lack sufficient cellular coverage or have a temporary equipment failure will result in either the inability of a call to complete with a data transfer or the complete inability to connect to the OnStar® Call Center. The OnStar® system may also experience connection issues if the identification numbers for the module, station identification number, 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 OnStar® call which has reached the Call Center without vehicle data.

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

Mobile Identification Number and Mobile Directory Number

The 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 OnStar® Speech Recognition Systems

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

- Personal Calling uses a speech recognition system that resides in the vehicle. When the user presses the phone button, the system states, Ready, and listens for the user's command. The user

can speak commands to control the hands-free phone.

- Virtual advisor is a remote speech recognition system that the caller can access by making a phone call. The user connects to virtual advisor by requesting it during personal calling use. The user is then transferred to the virtual advisor server and talks to it via a cellular connection.

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

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- Telematics communication interface control module
- OnStar® three button assembly
- Microphones
- Cellular antenna
- Navigation antenna
- Back up battery
- WiFi Support
- TTY (Teletypewriter)

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

Telematics Communication Interface Control Module

The OnStar Telecommunications Platform (TCP) system communicates with various infotainment components via Ethernet. The OnStar TCP uses Global System for Mobile Communication (GSM) to communicate data and voice signals over the national cellular network. The telematics communication interface control module supports entertainment WiFi hotspots by providing a connection to the cellular network for internet access. 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 TCP system has two antenna inputs, a primary cellular signal and a combined GPS/secondary cellular signal. The OnStar® system uses the United 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 OnStar® 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, and radio. When equipped, the telematics communication interface control module may contain a back up battery (BUB) which is internal to the control module and replaceable through an access cover. The telematics communication interface control module communicates with the rest of the vehicle over the serial data bus and Ethernet.

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.

OnStar® Three Button Assembly

- The OnStar® button assembly may be part of the rearview mirror, or a separate, stand alone unit. The button assembly is comprised of 3 buttons 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 OnStar® call center button, which displays the OnStar® logo, allows the user to connect to the OnStar® call center.
 - The emergency button, which displays white letters "SOS" with red background, sends a high priority emergency call to the OnStar® call center when pressed.

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

The telematics communication interface control module supplies 10 volts to the OnStar® button assembly on the keypad supply voltage circuit. When pressed, each button completes a circuit across a resistor allowing a specific voltage to be returned to the 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 OnStar® 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 OnStar® 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 option. Ground for the LED is provided by the wiring harness attached to the button assembly.

Secondary OnStar® Controls

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

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

Microphones

This system utilizes two hands free audio microphones, the primary microphone on the driver side and a secondary/reference microphone for the front passenger side. The primary microphone is connected directly to the Telematics Communication Interface Control Module. It is also connected by an analog pass-through circuit to the radio from the Telematics Communication Interface Control Module. The secondary microphone is connected directly to the radio.

The primary microphone is used for emergency and OnStar calls. During normal operating conditions it also provides Bluetooth calls and speech recognition to the radio. The secondary microphone is used as a reference for the primary microphone for passenger interference cancellation during speech recognition and also to enhance the driver side hands free calls. For MY18 and beyond the secondary microphone can also be used for front passenger hands free phone calls.

The front passenger secondary microphone can never be used for an OnStar call. An OnStar call requires the microphone to be directly connected to the Telematics Communication Interface Control Module. During a normal (non-emergency) OnStar call the Telematics Communication Interface Control Module receives an audio signal from the primary microphone and sends the signal to the radio via the

Ethernet connection. The radio processes the OnStar call audio and sends it back to the Telematics Communication Interface Control Module via the Ethernet connection. During an emergency button call the Telematics Communication Interface Control Module contacts the OnStar call center directly and does not send the signal to the radio.

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 OnStar® TCP 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. GPS signals are output from the telematics communication interface control module on Ethernet. Other modules on Ethernet may use the GPS latitude, longitude and satellite time data broadcast by the telematics communication interface control module. Using positioning information from the vehicle Ethernet avoids the use of a coaxial signal splitter to pass the analog GPS signal to other modules. 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. 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.

OnStar® RemoteLink

OnStar® 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's® advanced connected vehicle technology. An active OnStar® account as well as a valid OnStar® username and password are required to use the app. The remote commands must be enabled by logging into the user's OnStar® 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 differential of two locations.

Bluetooth®

With the OnStar TCP system Bluetooth® resides in the radio. Refer to Radio/Audio System Description and Operation for further details.

Back-up Battery

NOTE: Do not disconnect the main vehicle battery or remove the OnStar® fuse with the ignition key in any position other than OFF. Disconnecting power to the OnStar® module in any way while the ignition is ON or with retained accessory power activated may cause activation of the

OnStar® 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 OnStar® 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.

The back-up battery is a 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 internal to the telematics communication interface control module.

WiFi Support

The telematics communication interface control module supports entertainment WiFi hotspots by providing a connection to the cellular network for internet access. The radio acts as the central WiFi router and connects hardwire Ethernet to the telematics communication interface control module. The telematics communication interface control module completes the connection to the internet through the cellular network. It has the ability to connect up to 7 devices at one time.

Audio System Interface

When the OnStar® requires audio output, a serial data message is sent to the audio system to mute all radio functions and transmit OnStar® originated audio. The OnStar® audio is transmitted to the vehicle audio system by the Ethernet and GMLAN circuits.

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

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

OnStar® Sleep Cycle

The OnStar® system uses a unique sleep cycle to allow the system to receive cellular calls while the ignition is in the OFF position and retained accessory power 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 OnStar® Call Center, and to continue to maintain an acceptable level of battery electrical drain.

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

- High power
- Low power
- Sleep

- Digital standby

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

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

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 OnStar® module is able to perform all remote functions as commanded by an OnStar® advisor at any time, for a continuous 120 hours. After 120 hours, the OnStar® 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 OnStar® system loses battery power while the system is in a standby or sleep mode, the system will remain OFF until battery power is restored and the ignition is turned to the ON or RUN position.

Features

OnStar® Personal Calling

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

Turn by Turn Navigation (if equipped)

Turn by Turn Navigation allows the driver to contact OnStar® 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.

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 OnStar® Accounts

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

- The OnStar® status LED will not illuminate.
- The OnStar® system will NOT attempt to connect to the OnStar® Call Center in the event of a collision or if the vehicle's front air bags deploy for any other reason.
- An emergency button press will play a demo message indicating the service has been deactivated.
- An OnStar® Call Center button press will connect the customer with a dedicated sales team who can sell an OnStar® subscription and reactivate the vehicle. Depending on the type of

OnStar® hardware in the vehicle, the customer may first hear a demonstration message stating there is no current OnStar® subscription for the vehicle, and directing the customer what to do to activate services.

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

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

OnStar® Cellular, GPS, and Diagnostic Limitations

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

The cellular operation of the OnStar® system may be inhibited by factors such as the users range from an analog or digital cellular tower, the state of the cellular carrier's equipment, and the location where the call is placed. Making an OnStar® key press in areas that lack sufficient cellular coverage or have a temporary equipment failure will result in either the inability of a call to complete with a data transfer or the complete inability to connect to the OnStar® Call Center. The OnStar® system may also experience connection issues if the identification numbers for the module, station identification number, 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 OnStar® call which has reached the Call Center without vehicle data.

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

Mobile Identification Number and Mobile Directory Number

The 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.

RADIO/AUDIO SYSTEM DESCRIPTION AND OPERATION (I05/I06)

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® (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®
- Steering Wheel Controls (If equipped)
- Auto Volume Control

Data Communications

The infotainment system communicates with other devices on multiple serial data networks during operation.

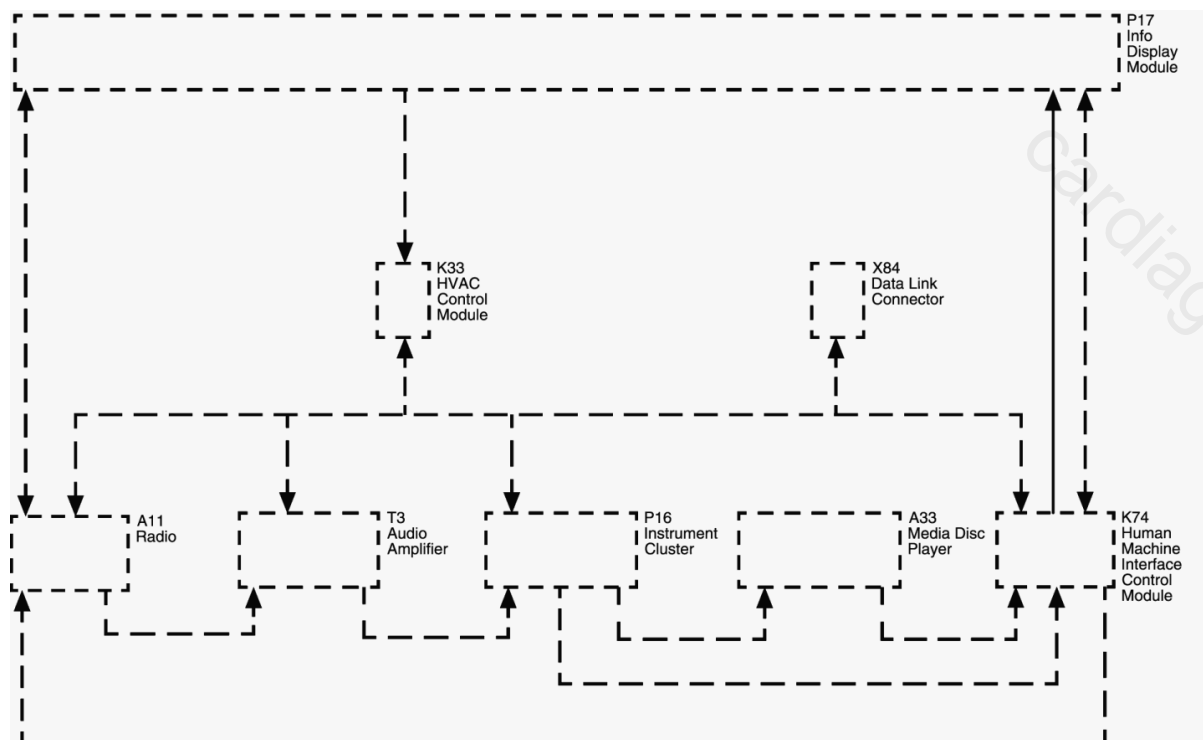


Fig. 2: Infotainment Communications System Block Diagram (IO5/IO6)
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
P17	P17 Info Display Module
K33	K33 HVAC Control Module
X84	X84 Data Link Connector
A11	A11 Radio
T3	T3 Audio Amplifier
P16	P16 Instrument Cluster
A33	Media Disc Player
K74	Human Machine Interface Control Module

Media Oriented Systems Transport (MOST)

At the core of the infotainment system is the Media Oriented Systems Transport (MOST) bus, 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 MOST bus uses a dual wire structure to communicate among these devices.

A MOST communication enable circuit is also connected to all components on the MOST bus. The MOST enable circuit is used to wake the network and trigger network diagnostics. Any component on the MOST bus may assert the enable circuit, but communications are initiated by the MOST bus master.

The MOST bus master is the device responsible for normal wake up and initialization of communication on the network. The MOST bus master receives vehicle power state information from the vehicle power mode master. The MOST bus master uses this information to control the power state of the infotainment system.

The MOST bus master is also responsible for maintaining known good network configuration. The MOST bus master will be the device that reports MOST bus errors/DTCs.

The Remote Radio Receiver, Human Machine Interface Module, Remote Optical Drive, Audio Amplifier and the Instrument Panel Cluster all communicate on the MOST bus.

Local Interconnect Network (LIN)

The Local Interconnect Network (LIN) Bus is a single wire communication system. This bus is used to exchange information between a master control module and other smart devices which provide supporting functionality.

The Remote Radio Receiver, Human Machine Interface Module, Information Display, Infotainment Controls and the Multifunction (tunnel) Controls all communicate on the LIN bus.

GMLAN

The Remote Radio Receiver, Audio Amplifier, and the Human Machine Interface Module communicate with other components and systems in the vehicle via GMLAN.

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

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® , 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 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.

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.

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 information display provides a feedback on the touch screen and certain controls. Buttons pulse when pressed to affirm that the command is being carried out,

When not actively in use, the screen reverts to minimal images. Proximity Sensing awakens the LCD screen when a hand approaches it.

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

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.

Diversity Antenna

The diversity antenna system uses antennas applied as appliques to the rear glass and two antenna amplifiers. The right antenna 1 receives both AM and FM signals, while the left antenna 2 receives FM signals only. The antenna amplifier receives the signals from the glass antenna. Each antenna amplifier is connected to the radio by a coaxial cable.

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

When the AM band is selected on the radio, the antenna 1 amplifier connects the AM antenna to the radio. When the FM band is selected, both antenna amplifiers provide FM signals to the radio. The radio switches between the two FM antennas, monitoring the signal strength and combines the signals to create one stronger signal.

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 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® (If equipped)

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

- The device must be paired to the system to use the available Bluetooth® 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®, 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®, 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 3.5 mm (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 3.5 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.
- 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

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 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). 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.

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 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 (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 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® (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.

Rear Audio Control (If equipped)

The Rear Seat Audio Controls interface to the radio using Low Speed GM LAN and allow the rear seat passengers to control the cabin's audio system. Rear occupants can turn the radio on/off, change the volume, change input sources, seek, and cycle presets. For additional information on Rear Audio Controls, refer to the vehicle owners manual.

RADIO/AUDIO SYSTEM DESCRIPTION AND OPERATION (IOB)

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® (if equipped)
- Auxiliary Audio Input Jack (If equipped)
- USB Port (If equipped)
- OnStar®
- 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 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 (if equipped)

The multi-band antenna is located on the roof of the vehicle. This type of antenna may be used with the AM/FM radio, cellular and GPS signals. 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 (if equipped)

The active antenna system uses an integral antenna applied as an applique 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
- 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:

- 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.
- 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® (If Equipped)

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

The Bluetooth® antenna is internal to the radio and is used to send and receive signals from a Bluetooth® enabled cellular phone. The available features and functions are determined by the software within the device being used and the radio. The operating range of the signal from the vehicle is approximately 30 feet. Note that the operating range is dependent upon the cellular phone being used and battery level of the phone.

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

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

Bluetooth® Features Supported

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

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

Auxiliary Audio Input Jack (If equipped)

The infotainment system may have a 3.5 mm (1/8 in.) auxiliary audio input jack located in the center console or 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 3.5 mm (1/8 in.) input jack the infotainment system automatically switches to that device. If an auxiliary device has already been connected, press the Media or AUX button to select the device.
- 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 (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 (iPOD®®, ZUNE®®, 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® (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

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.

RADIO/AUDIO SYSTEM DESCRIPTION AND OPERATION (IOS/IOT/IOU)

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
- Speaker Operation
- Antenna System
- Radio Reception
- Auto Volume Control (If equipped)
- Microphones
- Bluetooth® (if equipped)
- WiFi
- Back Office Registration
- Applications (if equipped)
- Speech Recognition
- Navigation System Components and Features (if equipped)
- Valet Mode
- Teen Driver
- Theft Deterrent
- Audio Amplifier (If equipped)
- Infotainment Controls and Display
- Steering Wheel Controls (If equipped)
- SD Card Reader, USB and Auxiliary port
- OnStar®
- Compass Data
- Media Disc Player

Data Communications

The infotainment system communicates with other devices on multiple serial data networks during operation.

Ethernet AVB

At the core of the infotainment system is the Radio Ethernet AVB (Audio Video Bridging) switch, which communicates directly to each contributing Infotainment module terminator. The Ethernet harness consists of twisted pair wires from point to point. Each module on the Ethernet infotainment system sends/receives data at 100 megabit per second (Mbps) to/from a specified port at the Radio. The Radio/Ethernet will also be used to program USB S/W update files to the modules connected to the Ethernet ports.

Local Interconnect Network (LIN)

The Local Interconnect Network (LIN) Bus is a single wire communication system. This bus is used to exchange information between a master control module and other smart devices which provide supporting functionality.

The Remote Radio Receiver, Information Display, Infotainment Controls and the Multifunction (tunnel) Controls all communicate on the LIN bus.

GMLAN

The Remote Radio Receiver will communicate with other modules and systems in the vehicle via GMLAN. Diagnostic Trouble Codes will be read on GMLAN to diagnose Ethernet, LIN and system

faults. GMLAN will also be used for programming calibrations.

For additional information refer to [Data Link Communications Description and Operation](#)

Remote Radio Receiver

Overview

The Radio is the Ethernet master. The radio also communicates with other components and systems within the vehicle via GMLAN and LIN. The remote radio receiver 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.

The Radio receiver contains internal antennas for Bluetooth® and WiFi. The Radio must be mounted properly to obtain proper wireless signals and GPS position. The remote radio receiver is responsible for receiving all broadcast audio bands. Broadcast signals from AM, FM, XM and DAB bands are transmitted to the radio via the vehicle antenna systems. The remote radio receiver is also responsible for the following: Video for the infotainment display, Bluetooth®, USB, memory card reader, and speech recognition functions.

The Radio has phone projection capabilities that can transmits information directly to the vehicle infotainment system through Bluetooth or a USB connection. Downloadable applications will be available based on distracted driver safety requirements.

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 Ethernet.

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.

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, GPS signals, and XM, if the vehicle has these features. Keep this antenna clear of snow and ice 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.

Diversity Antenna

The diversity antenna system uses antennas applied as appliques to the rear glass and two antenna amplifiers. The right antenna 1 receives both AM and FM signals, while the left antenna 2 may receive

FM and DAB signals only. The antenna amplifier receives the signals from the glass antenna. Each antenna amplifier is connected to the radio by a coaxial cable.

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

When the AM band is selected on the radio, the antenna 1 amplifier connects the AM antenna to the radio. When the FM band is selected, both antenna amplifiers provide FM signals to the radio. The radio switches between the two FM antennas, monitoring the signal strength and combines the signals to create one stronger signal.

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 remote radio receiver 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 remote radio receiver and the telematics communication interface module.

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

Sirius XM (SXM) Digital Radio Receiver (If equipped)

A service fee is required in order to receive the XM service.

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. Even with repeaters the signal can be compromised resulting in loss of XM.

High Definition (HD) Radio (If equipped)

HD Radio delivers subscription free local broadcasting in a digital format which may include song title, artist name, album art, weather, traffic data, etc., on AM/FM bands. Up to four stations could be available on a single frequency for e.g. if radio station is 96.9 FM, the HD enabled radio would have additional broadcasts on 96.9 HD1, HD2, HD3 and HD4. The digital technology allows for clear reception quality and additional information.

Auto Volume Control (If equipped)

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 Off, Low, Medium-low, Medium, Medium-high or High.

Microphones

This system utilizes two hands free audio microphones, the primary microphone on the driver side and a secondary/reference microphone for the front passenger side. The primary microphone is connected directly to the Telematics Communication Interface Control Module. It is also connected by an analog pass-through circuit to the radio from the Telematics Communication Interface Control Module. The secondary microphone is connected directly to the radio.

The primary microphone is used for emergency and OnStar calls. During normal operating conditions it also provides Bluetooth calls and speech recognition to the radio. The secondary microphone is used as a reference for the primary microphone for passenger interference cancellation during speech recognition and also to enhance the driver side hands free calls. For MY18 and beyond the secondary microphone can also be used for front passenger hands free phone calls.

The front passenger secondary microphone can never be used for an OnStar call. An OnStar call requires the microphone to be directly connected to the Telematics Communication Interface Control Module. During an OnStar call the Telematics Communication Interface Control Module receives an audio signal from the primary microphone and sends the signal to the radio via the Ethernet connection. The radio processes the OnStar call audio and sends it back to the Telematics Communication Interface Control Module via the Ethernet connection.

Bluetooth® (If equipped)

Bluetooth® wireless technology is a short-range communications technology intended to replace the cables connecting portable and/or fixed devices while maintaining high levels of security. 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® hardware is internal to the Remote Radio Receiver and is combined with WiFi antenna. The Remote Radio Receiver supports streaming of data (music, voice, information) from cellular phones and other mobile devices that support those features. The Remote Radio Receiver is also capable of interfacing with cellular phones for hands-free features.

- The device must be paired to the system to use the available Bluetooth® 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 owners manual, supplements, and the device manufacturers information for pairing instructions.

WiFi

The WiFi hardware is internal to the Remote Radio Receiver and is combined with Bluetooth antenna. WiFi expands the abilities of the vehicle as described below:

- Connect to home WiFi to update software

- When used with OnStar 4G LTE HotSpot service, it provides internet access to devices in the vehicle when connected to the HotSpot
- Enables in-vehicle networking between passengers' devices, like home WiFi network
- Allows remote access to external connected device application data for vehicle internet application use
- MY19 > Enables Apple CarPlay and Android Auto without the use of a USB cable

Back Office Registration

The Radio must be registered with the GM Back Office in order to receive downloaded information such as approved applications, module software updates, weather and traffic information for current location. The vehicle must have a Cellular or WiFi connection to complete the initial registration process. This process will verify the assembly plant factory feed data from the BCM, CGM and Radio serial numbers to the VIN and if the security checks are met, then the user must complete the registration process by entering email and required personal information. The registration status can be verified through the Radio "Setting - About selection.

When any of these secured ECU's are replaced, a new serial number will be recorded during the service calibration process and appended to the vehicles history data for uninterrupted back office connection.

If the Radio is replaced, the user can recover settings/applications by reregistering the email account. During the initial registration process the user will enter an email/password. The user will then be sent a follow up verification email link to setup the account completely. If the complete account setup is not performed the password reset security questions will not be entered, which will prevent reregistering this email account in the future if the password is forgotten.

Applications (If equipped)

When the system is equipped with Bluetooth® or WiFi, 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®, WiFi, 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 owners manual and supplements for information on mobile devices, control, and operation.

Speech Recognition

The Speech Recognition feature is implemented only in a Mid/High System Radio-CSM module. There is no Speech Recognition in a Low System. Speech Recognition allows the user to command various features of the radio via voice commands. For addition information refer to the owners manual.

Navigation System Components and Features (if equipped)

The radio receiver provides full navigation functionality, if equipped. The Radio 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 on the SD card 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).
- Periodic Map updates can be performed by inserting an updated SD card, or over the air network in future model years MY18 >

The On-board navigation feature uses an on-board navigation engine with an optimized map display that is calculated and rendered locally.

Route Guidance

The map will display the route to the selected destination. Voice prompts alert the operator of upcoming events (turns) and arrivals at the destination. The navigation system will automatically recalculate if the route is not followed. The remote radio receiver 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 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, dependent 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, it can be sent via Bluetooth to the currently paired phone or the scan tool can be used to clear the Valet Mode Code.

Teen Driver

The teen driver feature puts the vehicle into a mode that can only be unlocked with a valid PIN. It allows various restrictive features for safer driving. Some of the features include Speed Limiter, Speed Warning, Register Key, Report Card, etc. For additional information refer to owners manual.

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.

Audio Amplifier (If equipped)

Amplifier Interface

A fused battery voltage circuit provides the main amplifier power. The audio amplifier (when equipped) is a participant on the Ethernet bus. The audio amplifier receives audio signals and control information from the Radio. The Amplifier receives battery power and ground from the vehicle harness, and also communicates on 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 if equipped. Refer to Active Noise Cancellation Description and Operation for more information.

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 Radio.

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

The information display provides a feedback on the touch screen and certain controls.

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.

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](#).

USB Port, SD Card Reader and Auxiliary port (If equipped)

The infotainment system may contain an assembly that has either a USB port, Auxiliary port, and may even have an SD card reader located within the drivers reach. The assembly interfaces 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 remote radio receiver via a standard USB cable. A Mini type USB connector is used to connect the cable at the USB port and at the remote radio receiver 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 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

On Navigation vehicles the SD card will contain the Map information for the vehicle region. The Map data will be updated quarterly either by replacing the SD card or wireless updates via WiFi on MY18> vehicles

Refer to the owners manual for information on the Navigation system.

Auxiliary Audio Input Jack

The infotainment system may have a 3.5 mm (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 USB.

- 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.
- 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.

OnStar® (If equipped)

When OnStar is activated, a serial data message is sent to the radio that activates default audio settings. The fade will be set to the front, Bass and Treble are set to the mid range, the outputs are mono, when the audio source is OnStar. OnStar takes priority over any other audio source.

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

Compass Data

With the Base Radio the Telematics Control module provides compass and GPS position information on the LS-GMLAN/Info-CAN bus when it is present.

In a Mid/High Radio System configuration without a Telematics Control Module and equipped with GPS, the radio shall provide the GPS and heading information on LS-GMLAN/Info-CAN as shown below.

An external Remote Compass Module (RCM) is required to transmit the heading and position information on LS-GMLAN/Info-CAN if either:

- The Base Radio is present in a system configuration with no Telematics control module.
- The radio variant without GPS is present in a system configuration with no Telematics control module.

Media Disc Player

The Remote Media Player feature sends information through a USB connection to the Rear Seat Infotainment and outputs digital audio/video to vehicle displays and to the Radio over the Ethernet bus. The Rear Seat Infotainment system also has a USB hub with an auxiliary port for digital media file access.

The media disc player receives battery power and ground from the vehicle harness, and also communicates on GMLAN.

RADIO/AUDIO SYSTEM DESCRIPTION AND OPERATION (IOR)

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.

- Radio Circuit Operation
- Information Display and Controls
- Antenna System
- Radio Reception
- Speaker Operation
- Audio Amplifier (If equipped)
- WiFi
- Back Office Registration
- Valet Mode
- Teen Driver
- Theft Deterrent
- Bluetooth® (if equipped)
- USB and Auxiliary port
- OnStar®
- Steering Wheel Controls (If equipped)
- SCV (Speed Compensated Volume)
- FOTA (Firmware Over The Air)
- Active Noise Cancellation

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 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 applique 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
- 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:

- 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.

WiFi

The WiFi hardware is internal to the Remote Radio Receiver and is combined with Bluetooth antenna. Wifi expands the abilities of the vehicle as described below:

- Connect to home WiFi to update software
- When used with OnStar 4G LTE HotSpot service, it provides internet access to devices in the vehicle when connected to the HotSpot
- Enables in-vehicle networking between passengers' devices, like home WiFi network
- Allows remote access to external connected device application data for vehicle internet application use
- MY19>Enables Apple CarPlay and Android Auto without the use of a USB cable

Back Office Registration

The Radio must be registered with the GM Back Office in order to receive downloaded information such as approved applications, module software updates, weather and traffic information for current location. The vehicle must have a Cellular or WiFi connection to complete the initial registration process. This process will verify the assembly plant factory feed data from the BCM, CGM and Radio serial numbers to the VIN and if the security checks are met, then the user must complete the registration process by entering email and required personal information. The registration status can be verified through the Radio "Setting - About selection".

When any of these secured ECU's are replaced, a new serial number will be recorded during the service calibration process and appended to the vehicles history data for uninterrupted back office connection.

If the Radio is replaced, the user can recover settings/applications by reregistering the email account. During the initial registration process the user will enter an email/password. The user will then be sent a follow up verification email link to setup the account completely. If the complete account setup is not performed the password reset security questions will not be entered, which will prevent reregistering this email account in the future if the password is forgotten.

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, dependent 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, it can be sent via Bluetooth to the currently paired phone or the scan tool can be used to clear the Valet Mode Code.

Teen Driver

The teen driver feature puts the vehicle into a mode that can only be unlocked with a valid PIN. It allows various restrictive features for safer driving. Some of the features include Speed Limiter, Speed Warning, Register Key, Report Card, etc. For additional information refer to owners manual.

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® (If Equipped)

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

The Bluetooth® antenna is internal to the telematics communication interface control module, radio or human machine interface module and is used to send and receive signals from a Bluetooth® 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 Bluetooth® technology customers can experience hands-free calling as their Bluetooth® capable cellular phones are wirelessly connected to the vehicle. It will allow customers to place and receive calls using the steering wheel controls and voice recognition. The vehicle audio system will

allow you to listen to your call through the vehicle speakers and adjust volume through steering wheel or radio controls.

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

Bluetooth® Features Supported

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

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

USB Port and Auxiliary port (If equipped)

The infotainment system may contain an assembly that has either a USB port and/or Auxiliary port located within the drivers reach. The assembly interfaces with a hub device, internal to the auxiliary jack, USB, assembly. The auxiliary jack, USB, 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 remote radio receiver via a standard USB cable. A Mini type USB connector is used to connect the cable at the USB port and at the remote radio receiver 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 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.

USB Supported Devices:

- USB Flash Sticks (Thumb Driver)
- Portable USB Hard Drives
- Portable Digital Media Players (iPOD®, ZUNE®, etc)

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

Auxiliary Audio Input Jack

The infotainment system may have a 3.5 mm (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 USB.

- 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.
- 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.

OnStar® (If equipped)

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

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

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.

Active Noise Cancellation

Active Noise Cancellation functionality is controlled within the Radio.

The main components of the Active Noise Cancellation system are:

- 4 microphones in the vehicle headliner.
- A discrete engine speed (RPM) signal from the engine control module to the radio.
- Active Noise Cancellation electronics and software integrated into the radio.
- The vehicle speaker system, connected to the radio to output the desired cancellation frequencies.

The Active Noise Cancellation system is operational under the following conditions:

- The radio has passed all self diagnostic checks
- All doors are closed
- Battery voltage is between 9.5 V and 16 V
- The vehicle cabin temperature is less than 140°F (60°C)
- Engine speed is between 550 and 3000 RPM

The Active Noise Cancellation system is a method used to reduce the perception of certain undesirable sounds generated by the engine into the vehicle cabin. The system uses microphone and engine speed signals, software integrated into the radio, and the vehicle speakers to determine and generate the correct frequencies needed to achieve the desired reduction.

Four microphones are located in the headliner to monitor noise/sounds in the vehicle cabin, and are directly connected to the radio. The radio also receives a discrete engine speed (RPM) signal from the engine control module. The radio processes these inputs to determine the frequency of the undesirable sound. The radio then calculates the appropriate cancellation frequency and outputs a cancellation signal (audio tone) to the vehicle speakers to reduce the perception of undesirable sounds by the vehicle occupants so the vehicle cabin appears quieter and without vibration.

2018 ACCESSORIES & EQUIPMENT

Cellular, Entertainment, And Navigation - Diagnostic Information And Procedures - Equinox & Terrain

DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B0560: ENGINE RPM INPUT CIRCUIT SIGNAL INVALID

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC B0560 08

Engine RPM Input Circuit Signal Invalid

Circuit/System Description

The Radio receives a discrete pulse-width modulated engine speed signal from the Engine Control Module. The Radio uses the engine RPM signal for operating active noise cancellation.

Conditions for Running the DTC

- Engine running, Radio ON
- Battery voltage between 9 - 16 volts.

Conditions for Setting the DTC

- The Radio receives a serial data message that the engine is running.
- The discrete engine speed signal to the Radio indicates the engine speed is less than 300 RPM or greater than 9000 RPM.

Action Taken When the DTC Sets

The active noise cancellation system is disabled.

Conditions for Clearing the DTC

- A current DTC clears when a valid engine speed signal between 300 - 9000 RPM is received.
- 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 Wiring Schematics \(IOB\)](#), [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#), [Radio/Navigation System Wiring Schematics \(IOR\)](#), [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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

NOTE: Diagnose any Engine Control Module DTCs before performing this diagnostic.

1. Ignition OFF, disconnect the X1 harness connector at the A11 Radio.
2. Engine running at 600 RPM,
3. Test for 575-800 Hz AC between the signal circuit terminal 23 and ground.
 - **If not between 575-800 Hz AC**
 1. Ignition OFF, disconnect the harness connector at the K20 Engine 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 infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 5. 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 K20 Engine Control Module.
 - **Go to next step: If between 575-800 Hz AC**
4. Test or replace the A11 Radio.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for Control Module replacement, programming, and setup.

DTC B0997: AUXILIARY ELECTRONIC CONTROL UNIT PERFORMANCE

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC B0997 3A

Auxiliary Electronic Control Unit Performance Incorrect Component Installed

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 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 Wiring Schematics \(IOB\)](#), [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#), [Radio/Navigation System Wiring Schematics \(IOR\)](#), [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#).

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#), [Radio/Audio System Description and Operation \(IOB\)](#), [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#), [Radio/Audio System Description and Operation \(IOR\)](#).

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

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](#) .
 - **Go to next step: If DTC B101E is not set**
3. Verify DTC B0997 is not set
 - **If DTC B0997 is set**

Replace the P17 Info Display Module.
 - **Go to next step: If DTC B0997 is not set**
4. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Radio Control Assembly Replacement \(Equinox\)](#), [Radio Control Assembly Replacement \(Terrain\)](#).

DTC B1024: CIRCUIT BOARD TEMPERATURE SENSOR

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC B1024

Circuit Board Temperature Sensor

Symptom Byte Information: [Symptom Byte List](#)

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

Schematic Reference

[Radio/Navigation System Wiring Schematics \(IOB\)](#), [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#), [Radio/Navigation System Wiring Schematics \(IOR\)](#), [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#).

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#), [Radio/Audio System Description and Operation \(IOB\)](#), [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#), [Radio/Audio System Description and Operation \(IOR\)](#).

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.

- **Go to next step: 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.

- **Go to next step: If the DTC does not set**

4. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the diagnostic procedure.

Refer to [Control Module References](#) for Control module replacement, setup, and programming

DTC B1025, B1035, B1045 OR B1055: AUDIO OUTPUT CIRCUITS (WITHOUT UQA/UZ6)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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.				

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.

Reference Information

Schematic Reference

[Radio/Navigation System Wiring Schematics \(IOB\)](#), **[Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#), **[Radio/Navigation System Wiring Schematics \(IOR\)](#), **[Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)******

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#), **[Radio/Audio System Description and Operation \(IOB\)](#), **[Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#), **[Radio/Audio System Description and Operation \(IOR\)](#)******

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.
 - **Go to next step: 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.
 - 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.
 - **Go to next step: If between 5 - 7 V**
3. Test or replace the P19 Speaker.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Speaker Replacement Reference](#)
- Refer to [Control Module References](#) for radio replacement, programming, and setup.

DTC B1025, B1045, B1065, B1075, B1085, B1095 OR B1105: AUDIO OUTPUT CIRCUITS (UQA 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.
- Refer to [Diagnostic Procedure Instructions](#) to 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

DTC B1105

Audio Output 9 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 Tweeter)	B1085 02	B1085 04	B1085 01	-
Audio Output 8 Signal Circuits (Right Front Tweeter)	B1095 02	B1095 04	B1095 01	-
Audio Output 9 Signal Circuits (Center I/P)	B1105 02	B1105 04	B1105 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, B1045 01, B1065 01, B1075 01, B1085 01, B1095 01, B1105 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, B1105 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, B1105 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, B1105 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, B1105 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, B1105 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 Wiring Schematics (IO5/IO6)

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.
 - **Go to next step: If clear audio is heard from all speakers**
3. All OK.

Circuit/System Testing

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.
 - **Go to next step: If between 5 - 7 V**
3. Test or replace the P19 Speaker.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Speaker Replacement Reference](#)

- Refer to [Control Module References](#) for amplifier replacement, programming, and setup.

DTC B1025, B1035, B1045 OR B1055: AUDIO OUTPUT CIRCUITS (UZ6)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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.				

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

- 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 replicates the high level audio signals from the radio to the speakers. If the module malfunctions, all the speakers may become inop.

Reference Information

Schematic Reference

[Radio/Navigation System Wiring Schematics \(IOB\)](#), **[Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#)**, **[Radio/Navigation System Wiring Schematics \(IOR\)](#)**, **[Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)**.

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#), **[Radio/Audio System Description and Operation \(IOB\)](#)**, **[Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#)**, **[Radio/Audio System Description and Operation \(IOR\)](#)**.

Electrical Information Reference

- **[Circuit Testing](#)**
- **[Connector Repairs](#)**
- **[Testing for Intermittent Conditions and Poor Connections](#)**
- **[Wiring Repairs](#)**

Scan Tool Reference

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 but not all.**

Refer to Circuit/System Testing One Speaker.
 - **If audio is Inoperative from all speakers .**

Refer to Circuit/System Testing All Speakers.
 - **Go to next step: If clear audio is heard from all speakers.**
3. All OK.

Circuit/System Testing

One Speaker

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, 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, disconnect the appropriate harness connector at the K108 Active Noise Cancellation Module/T3 Audio Amplifier.
 2. Test for infinite resistance between the appropriate signal circuits 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 K108 Active Noise Cancellation Module/T3 Audio Amplifier.
 - **If greater than 7 V**
 1. Ignition OFF, disconnect the appropriate harness connector at the K108 Active Noise Cancellation Module/T3 Audio Amplifier.
 2. Ignition ON, A11 Radio ON, mute OFF. Test for less than 1 V between the appropriate signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K108 Active Noise Cancellation Module/T3 Audio Amplifier.
 - **Go to next step: If between 5 - 7 V**
3. Ignition OFF, disconnect the appropriate harness connector at the K108 Active Noise Cancellation Module/T3 Audio Amplifier.
4. Ignition ON, A11 Radio ON, mute OFF. Test for 5 - 7 V between each appropriate audio signal circuit from the A11 Radio and Ground.
 - **If less than 5 V**
 1. Ignition OFF, Disconnect the appropriate speaker harness connector at the A11 Radio.
 2. Test for infinite resistance between the signal circuits 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 appropriate speaker 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.
 - **Go to next step: If between 5 - 7 V**
 5. Test or replace the P19 Speaker.

All Speakers

1. Ignition OFF, disconnect the X1 harness connector at the K108 Active Noise Cancellation Module/T3 Audio Amplifier.
2. Test for less than 10 Ω between the ground circuit terminal 8 and ground.
 - **If 10 Ω or greater**
 1. 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.
 - **Go to next step: If less than 10 Ω**
3. Verify that a test lamp illuminates between the B+ circuit terminal 4 and ground.
 - **If the test lamp does not illuminate**
 1. 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.
 - **Go to next step: If the test lamp illuminates**
4. Ignition ON, A11 Radio ON.
5. Verify that a test lamp illuminates between the control circuit terminal 3 and ground.
 - **If the test lamp does not illuminate**
 1. Ignition 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 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 A11 Radio.
 - **Go to next step: If the test lamp illuminates**
6. Test for 5 - 7 V between any audio signal circuit from the A11 Radio and Ground.
 - **If not between 5 - 7 V**

Test or replace the A11 Radio.
 - **Go to next step: If between 5 - 7 V**
7. Test or replace the K108 Active Noise Cancellation Module/T3 Audio Amplifier.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Speaker Replacement Reference](#)

- Refer to [Control Module References](#) for radio and amplifier replacement, programming, and setup.

DTC B1025, B1045, B1065, B1085, B1095, B1105 OR B1115: AUDIO OUTPUT CIRCUITS (UQA WITH IOS/IOT/IOU)

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.
- Refer to [Diagnostic Procedure Instructions](#) to 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 B1085

Audio Output 7 Circuit

DTC B1095

Audio Output 8 Circuit

DTC B1105

Audio Output 9 Circuit

DTC B1115

Audio Output 10 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 (Center I/P)	B1065 02	B1065 04	B1065 01	-
Audio Output 7 Signal Circuits (Left Rear Door)	B1085 02	B1085 04	B1085 01	-
Audio Output 8 Signal Circuits (Right Rear Door)	B1095 02	B1095 04	B1095 01	-
Audio Output 9 Signal Circuits (Left Front I/P)	B1105 02	B1105 04	B1105 01	-
Audio Output 10 Signal Circuits (Right Front I/P)	B1115 02	B1115 04	B1115 01	-

Circuit/System Description

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. 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.

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, B1085 01, B1095 01, B1105 01, B1115 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, B1085 02, B1095 02, B1105 02, B1115 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, B1085 04, B1095 04, B1105 04, B1115 04

The test is run once during amplifier wake-up.

Conditions for Setting the DTC

DTC B1025 01, B1045 01, B1065 01, B1085 01, B1095 01, B1105 01, B1115 01

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

DTC B1025 02, B1045 02, B1065 02, B1085 02, B1095 02, B1105 02, B1115 02

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

DTC B1025 04, B1045 04, B1065 04, B1085 04, B1095 04, B1105 04, B1115 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 Wiring Schematics (IOS/IOT/IOU)

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.
 - **Go to next step: If clear audio is heard from all speakers**
3. All OK.

Circuit/System Testing

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.
 - **Go to next step: If between 5 - 7 V**
3. Test or replace the P19 Speaker.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Speaker Replacement Reference](#)
- Refer to [Control Module References](#) for audio amplifier replacement, programming, and setup.

DTC B123E: RADIO KEYPAD BUTTON SIGNAL CIRCUIT

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

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

[Radio/Navigation System Wiring Schematics \(IOB\)](#), [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#), [Radio/Navigation System Wiring Schematics \(IOR\)](#), [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#), [Radio/Audio System Description and Operation \(IOB\)](#), [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#), [Radio/Audio System Description and Operation \(IOR\)](#)

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
 - **Go to next step: 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 or 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

• **Go to next step: 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.

• **Go to next step: 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 CIRCUIT (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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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	-	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
USB Cable	B124B	B124B	B124B	-
Ground	-	1	-	-
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 On/Vehicle in Service Mode.
- 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 Wiring Schematics (IO5/IO6)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

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

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.

- **Go to next step: If DTC B124B is not set.**

2. Ignition On/Vehicle in Service Mode. 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

- **Go to next step: 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

- **Go to next step: If the infotainment system can be switched to AUX as the audio source**

6. 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

- **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: 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 harness connector at the K74 Human Machine Interface Control Module and the X83 Auxiliary Audio Input Adapter.

7. 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 K74 Human Machine Interface Control Module and the X83 Auxiliary Audio Input.

8. Ignition On/Vehicle in Service Mode. 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.

- **Go to next step: 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.

- **Go to next step: 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.

- Refer to [Audio Disc Player and USB Receptacle Replacement \(Equinox\)](#), [Audio Disc Player and USB Receptacle Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) for human machine interface control module replacement, programming, and setup.

DTC B124B (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.
- Refer to [Diagnostic Procedure Instructions](#) to 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

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.
- 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

[Radio/Navigation System Wiring Schematics \(IOB\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Description and Operation

[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](#) .

- **Go to next step: 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.

- **If the infotainment system does not switch to AUX as the audio source**

Refer to Circuit/System Testing - Auxiliary Input Jack.

- **Go to next step: 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.

- **Go to next step: If audio is heard from the test tool.**

5. All OK

USB Port

1. Verify no DTCs are present.

- **If any DTCs are present**

- **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: 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.

- 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.

- **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: If less than 5 Ω**

7. Replace the X83 Auxiliary Audio Input. Connect all harness connectors.

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.

- **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: 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**

Replace the console USB cable assembly.

- **Go to next step: 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.

- Refer to [Audio Disc Player and USB Receptacle Replacement \(Equinox\)](#), [Audio Disc Player and USB Receptacle Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) for radio replacement, programming, and setup.

DTC B124B: USB 1 CIRCUIT (IOR)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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, 3	1, 2	-	-
USB Cable	B124B	B124B	B124B	-
Ground	-	1	-	-
1. USB port Inoperative 2. Fault may affect one or more components, dependant on fault location 3. Fault affects multiple components, dependant on vehicle equipment				

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

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.

SD Card Reader

On Navigation vehicles the SD card will contain the map information for the vehicle region. The map data will be updated quarterly either by replacing the SD card or wireless updates via WiFi.

Refer to the owners manual for information on the Navigation system.

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 Wiring Schematics \(IOR\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Description and Operation

[Radio/Audio System Description and Operation \(IOR\)](#)

- [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.

- **Go to next step: 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.

- **Go to next step: 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 3 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.

- **Go to next step: If less than 10 Ω**

3. Verify that a test lamp illuminates between the B+ circuit terminal 1 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.

- **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: 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.

- Refer to [Audio Disc Player and USB Receptacle Replacement \(Equinox\)](#) [Audio Disc Player and USB Receptacle Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) control module replacement, programming, and setup.

DTC B124B (IOS/IOT/IOU)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+ (front floor console compartment USB/SD card reader)	B124B, 1, 3	B124B, 1, 2	-	-
B+ (inside center console USB ports)	B124C, 1, 3	B124C, 1, 2	-	-
USB Cable (front floor console compartment USB/SD card reader)	B124B, 1	B124B, 1	B124B, 1	-
USB Cable (inside center console USB ports)	B124C, 4	B124C, 4	B124C, 4	-
Ground	-	1, 4	-	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
1. Auxiliary Jack, SD Card reader and/or USB port(s) Inoperative 2. Fault may affect one or more components, dependant on fault location 3. Fault affects multiple components, dependant on vehicle equipment 4. Inside center console USB ports inoperative				

Circuit/System Description

The infotainment system has a auxiliary jack, USB, and memory card receptacle assembly located in the front floor console compartment. The auxiliary jack, 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 with the additional USB receptacle via a standard USB cable. A Mini type USB connector is used to connect the cable at the USB receptacle 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.

An additional USB receptacle assembly is available inside the front of the center console. The USB receptacles in the assembly interfaces 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 radio via a standard USB cable.

Auxiliary Audio Input Jack and USB Ports

The Auxiliary Audio Input Jack and USB ports 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 Auxiliary Audio Input Jack or the USB port, the system detects the device and AUX or USB becomes available as an audio source.

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

SD Card Reader

On Navigation vehicles the SD card will contain the Map information for the vehicle region. The Map data will be updated quarterly either by replacing the SD card or wireless updates via WiFi.

Refer to the owners manual for information on the Navigation system.

Diagnostic Aids

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 Ports 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 Wiring Schematics (IOS/IOT/IOU)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IOS/IOT/IOU)

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. Ignition ON, infotainment system ON.
2. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92 USB Receptacle port inside the center console 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**

Refer to Circuit/System Testing - USB Ports (Inside Center Console)

- **Go to next step: If audio is heard from the test tool**
- 4. 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.
- 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, USB Port and SD Card Reader (Front Floor Console).

- **Go to next step: If audio is heard from the test tool.**
- 6. Ignition ON, infotainment system ON.
- 7. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port (Front Floor Console) and select the USB test mode.
- 8. 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 the correct SD card for the vehicle into the SD card slot.
 2. Verify map data can be accessed by selecting Navigation.
 - If the SD card reader cannot be accessed, refer to Circuit/System Testing - Auxiliary Audio Input Jack, USB Port and SD Card Reader (Front Floor Console).
 - If the SD card reader can be accessed, replace the X83 Auxiliary Audio Input.
 - **Go to next step: If audio is heard from the test tool**
- 9. All OK

Circuit/System Testing

NOTE: You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.

USB Ports (Inside Center Console)

1. Ignition OFF, disconnect the X1 harness connector at the X92 USB Receptacle.
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.
 - **Go to next step: 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.
 - **Go to next step: 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.
 - **Go to next step: If no connection problems or cable damage is noted.**
5. Replace the X92 USB Receptacle. Connect all harness connectors.

6. Ignition ON, infotainment system ON.
7. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92 USB Receptacle 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 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 USB cable assembly between the X92 USB receptacle and the A11 Radio. Connect all harness connectors.
 2. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92 USB Receptacle 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.
 - **Go to next step: If audio is heard from the test tool**
9. All OK.

Auxiliary Audio Input Jack, USB Port and SD Card Reader (Front Floor Console)

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 3 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.
 - **Go to next step: If less than 10 Ω**
3. Verify that a test lamp illuminates between the B+ circuit terminal 1 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.
 - **Go to next step: 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.
 - **Go to next step: 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 X92 USB Receptacle and the X83 Auxiliary Audio Input.
7. 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 X92 USB Receptacle 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 following one at a time.
 - X83 Auxiliary Audio Input Auxiliary Jack and select Test Mode
 - X83 Auxiliary Audio Input USB port and select Test Mode
10. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system on both auxiliary jack and USB port while operating the system to play audio

from the test tool.

- **If audio is not heard from the test tool from one or both**

1. Replace the X83 Auxiliary Audio Input. Connect all harness connectors.
2. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the following one at a time.
 - X83 Auxiliary Audio Input Auxiliary Jack and select Test Mode
 - X83 Auxiliary Audio Input USB port and select Test Mode
3. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system on both the auxiliary jack and USB port while operating the system to play audio from the test tool.
 - If audio is not heard from the test tool from one or both, replace the X92 USB Receptacle.
 - If audio is heard from the test tool.
4. All OK.

- **Go to next step: If audio is heard from the test tool**

11. Connect the vehicle USB cable X3 harness connector at the X92 USB Receptacle.
12. 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.
13. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.
14. 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.

- **Go to next step: If audio is heard from the test tool**

15. Replace the console USB cable assembly.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Audio Disc Player and USB Receptacle Replacement \(Equinox\)](#), [Audio Disc Player and USB Receptacle Replacement \(Terrain\)](#).
- Refer to [USB Receptacle Replacement](#)
- Refer to [Control Module References](#) for radio or human machine interface control module replacement, programming, and setup.

DTC B124C: USB 2 CIRCUIT (I05/I06)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC B124C

USB 2 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
B+	B124C, 1, 3	B124C, 1, 2	-	-
USB Cable - USB receptacle X2	B124C, 1	B124C, 1	B124C, 1	-
USB Cable - USB receptacle X3	4	4	4	-
Ground	-	1	-	-
1. Front console and display/controls USB ports inoperative 2. Fault may affect one or more components, dependant on fault location 3. Fault affects multiple components, dependant on vehicle equipment 4. Single USB port behind display/controls inoperative				

Circuit/System Description

The infotainment system has a USB receptacle assembly located in the front of the console. The USB ports 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 human machine interface control 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 control 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.

An additional USB port is located in the storage compartment behind the display/controls. This USB port is part of a USB cable that is connected to the front receptacle assembly, and interfaces through the front receptacle internal hub to connect to the system.

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

B124C 0B

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

B124C 04

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

B124C 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 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.
- The human machine interface control module has two available USB connections. The human machine interface control module calibrations determine what is expected to be connected to each of these connection. USB 1 and USB 2 refers to the connector at the module that the port or hub is connected to.

Reference Information

Schematic Reference

Radio/Navigation System Wiring Schematics (IO5/IO6)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

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

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 B124C 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 B124C is set.**

Refer to Circuit/System Testing.
 - **Go to next step: If DTC B124C is not set.**
2. Ignition ON, infotainment system ON.
3. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92 USB Receptacle 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.

- **Go to next step: If audio is heard from the test tool**

5. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the X1 harness connector at the X92 USB Receptacle.

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.

- **Go to next step: 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 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, replace the X92 USB Receptacle.

- **Go to next step: 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.

- **Go to next step: If no connection problems or cable damage is noted.**

5. Disconnect the vehicle USB cable X4 harness connector at the K74 Human Machine Interface Control Module and the X2 harness connector at the X92 USB Receptacle.

6. 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 X92 USB Receptacle.

7. Ignition ON, infotainment system ON.

8. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92 USB Receptacle 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 X92 USB Receptacle. Connect all harness connectors.

2. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92 USB Receptacle 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.

4. All OK.

- **Go to next step: If audio is heard from the test tool**

10. Connect the vehicle USB cable X4 harness connector at the K74 Human Machine Interface Control Module.
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 X92 USB Receptacle.
12. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92 USB Receptacle 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.

- **Go to next step: 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.

- Refer to [Audio Disc Player and USB Receptacle Replacement \(Equinox\)](#) [Audio Disc Player and USB Receptacle Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) for human machine interface control module replacement, programming, and setup.

DTC B124C: USB 2 CIRCUIT (IOS/IOT/IOU)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC B124C 00

USB 2 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+	B124C, 1, 3	B124C, 1, 2	-	-
USB Cable	B124C	B124C	B124C	-
Ground	-	1	-	-
1. USB ports Inoperative 2. Fault may affect one or more components, dependant on fault location 3. Fault affects multiple components, dependant on vehicle equipment				

Circuit/System Description

The infotainment system has a USB receptacle assembly in the front of the console. The USB receptacles in the assembly 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 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 ports allow 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 infotainment controls.

Not all portable media player devices, storage 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

B124C 00

The radio detects a general failure condition on the USB 5 V circuit.

Action Taken When the DTC Sets

The USB ports 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 Wiring Schematics (IOS/IOT/IOU)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IOS/IOT/IOU)

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

- **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 B124C 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 B124C is set.**

Refer to Circuit/System testing.

- **Go to next step: If DTC B124C is not set.**

2. Ignition ON, infotainment system ON.
3. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92 USB Receptacle 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

- **Go to next step: If audio is heard from the test tool**

5. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the X1 harness connector at the X92 USB Receptacle.
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.

- **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: If no connection problems or cable damage is noted.**

5. Connect the X1 harness connector at the X92 USB Receptacle.
6. Disconnect the vehicle USB cable harness connector at the A11 Radio and the X92 USB Receptacle.
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 A11 Radio and the X92 USB Receptacle.

8. Ignition ON, infotainment system ON.
9. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92 USB Receptacle 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 X92 USB Receptacle. Connect all harness connectors.
 2. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92 USB Receptacle 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.
 - **Go to next step: If audio is heard from the test tool**
11. Replace the USB cable assembly.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Audio Disc Player and USB Receptacle Replacement \(Equinox\)](#) [Audio Disc Player and USB Receptacle Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) for human machine interface control module replacement, programming, and setup.

DTC B124F: UNIVERSAL SERIAL BUS (USB) PROGRAMMING

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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.

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.
 - **Go to next step: If DTC B124F is not set**
3. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for device replacement, programming, and setup.

DTC B125A: ANTENNA SIGNAL CIRCUIT

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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/Vehicle in Service Mode.
- 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 clear 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.

Reference Information

Schematic Reference

[Radio/Navigation System Wiring Schematics \(IOB\)](#), [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#), [Radio/Navigation System Wiring Schematics \(IOR\)](#), [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#), [Radio/Audio System Description and Operation \(IOB\)](#), [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#), [Radio/Audio System Description and Operation \(IOR\)](#)

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

- **Go to next step: If no damage is found**

2. Ignition ON/Vehicle in Service Mode, 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

- **Go to next step: 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 T2RR Antenna - Rear Roof.

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

- **Go to next step: If the coax cable passes the test**

3. Connect the radio antenna coax cable to the A11 Radio.

4. Ignition ON, A11 Radio ON.

5. Verify a test lamp illuminates between the antenna coax cable center terminal at the T2RR Antenna - Rear Roof and chassis ground.

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

Replace the A11 Radio.

- **Go to next step: If the test lamp illuminates**

6. Test or replace the T2RR Antenna - Rear Roof.

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

- **Go to next step: 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

- **Go to next step: 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

- **Go to next step: If infinite resistance**

5. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the diagnostic procedure.

- Refer to [High Frequency Antenna Replacement \(Equinox\)](#), [High Frequency Antenna Replacement \(Terrain\)](#)
- Refer to [Control Module References](#) for radio replacement, programming, and setup.

DTC B125C: SATELLITE ANTENNA CIRCUIT

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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

Schematic Reference

[Radio/Navigation System Wiring Schematics \(IOB\)](#), [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#), [Radio/Navigation System Wiring Schematics \(IOR\)](#), [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#), [Radio/Audio System Description and Operation \(IOB\)](#), [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#), [Radio/Audio System Description and Operation \(IOR\)](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Special Tools

EL-48028 Digital Radio Test Antenna

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.
 - **Go to next step: 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/Vehicle 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/Vehicle in Service Mode, 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.
 - **Go to next step: If DTC B125C is not set as current and XM reception is improved**
4. Ignition OFF/Vehicle OFF, disconnect the digital radio antenna coax cable from the T2RR Antenna - Roof Rear.

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

- **Go to next step: If the coax cable passes the test**

6. Test or replace the T2RR Antenna - Roof Rear.

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

- **Go to next step: 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

- **Go to next step: 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

- **Go to next step: If infinite resistance**

5. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [High Frequency Antenna Replacement \(Equinox\)](#) [High Frequency Antenna Replacement \(Terrain\)](#)
- Refer to [Control Module References](#) for radio replacement, programming, and setup.

DTC B125E: DIGITAL AUDIO BROADCAST (DAB) CIRCUIT

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B125E

Digital Audio Broadcast (DAB) Circuit

For symptom byte information refer to [Symptom Byte List](#).

Circuit/System Description

The digital audio broadcast receiver, located inside the radio, receives digital radio information from the digital radio antenna located on the outside of the vehicle. The digital audio broadcast 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 digital radio has limited or no reception.

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

[Radio/Navigation System Wiring Schematics \(IOB\)](#), [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#), [Radio/Navigation System Wiring Schematics \(IOR\)](#), [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#), [Radio/Audio System Description and Operation \(IOB\)](#), [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#), [Radio/Audio System Description and Operation \(IOR\)](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Circuit/System Testing

1. Ignition OFF/vehicle OFF, disconnect the digital radio antenna coax cable from the T2RR Antenna - Roof Rear and the A11 Radio.
2. 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

- **Go to next step: If the coax cable passes the test**
3. Replace the T2RR Antenna - Roof Rear.
 4. Ignition ON/vehicle in Service Mode, A11 Radio ON, tune to digital band.
 5. Verify DTC B125E is not set as current and digital reception is improved.
 - **If DTC B125E is set as current or digital reception is not improved**
Replace the A11 Radio.
 - **Go to next step: If DTC B125E is not set as current and digital reception is improved**
 6. All OK.

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
 - **Go to next step: 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
 - **Go to next step: 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
 - **Go to next step: If infinite resistance**
5. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Radio Antenna Base Replacement \(Equinox\)](#) [Radio Antenna Base Replacement \(Terrain\)](#)
- Refer to [Control Module References](#) for radio replacement, programming, and setup.

DTC B1265: ENTERTAINMENT SYSTEM REMOTE ENABLE CIRCUIT

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC B1265

Entertainment System Remote Enable 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
Remote Enable	DTC B1265 02, 1	DTC B1265 04, 1	DTC B1265 01, 2	-
1. all components requiring remote enable inoperative 2. components will not power off with infotainment system				

Circuit/System Description

When the radio is on, a discrete 12 V signal is supplied on the entertainment remote enable circuit to the Active Noise Cancellation Module/Audio Amplifier. This signal is used to control the power state of the component.

Conditions for Running the DTC

- The radio is ON.
- The system voltage is 9 - 16 V

Conditions for Setting the DTC

- The radio detects an open, short to ground or short to voltage on the entertainment remote enable circuit.
- The above condition is present for greater than 250 ms.

Action Taken When the DTC Sets

- The radio implements a current limiting mode and disables the output on the entertainment remote enable circuit.
- All components connected on the entertainment remote enable circuit will be inoperative.

Conditions for Clearing the DTC

- The condition for setting the DTC no longer exists.
- After the ignition has been OFF for a sufficient amount of time to allow the radio to enter a low power/sleep state, the radio will re-enable the output on the following ignition cycle and the DTC will become history.
- 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/infotainment systems.
- The radio's current limiting logic may not re-enable the output on the entertainment remote enable circuit until after the radio performs a full power - down. It may be necessary to wait 5 minutes between each test attempt with the key OFF and retained accessory power OFF.

Reference Information

Schematic Reference

[Radio/Navigation System Wiring Schematics \(IOB\)](#), [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#), [Radio/Navigation System Wiring Schematics \(IOR\)](#), [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#) [Radio/Audio System Description and Operation \(IOB\)](#) [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#) [Radio/Audio System Description and Operation \(IOR\)](#)

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, radio OFF. It may take up to 2 min for all vehicle systems to power down.
2. Disconnect the X1 harness connector at the K108 Active Noise Cancellation Module/T3 Audio Amplifier.
3. Test for less than 10 Ω between the ground circuit terminal 8 and ground.
 - **If 10 Ω or greater**
 1. 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.
 - **Go to next step: If less than 10 Ω**
4. Ignition ON, A11 Radio ON.
5. Verify that a test lamp illuminates between the control circuit terminal 3 and ground.
 - **If test lamp does not illuminate**
 1. Ignition 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 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 A11 Radio.
 - **Go to next step: If test lamp illuminates**
6. Ignition OFF, radio OFF. It may take up to 2 min for all vehicle systems to power down.
7. Test for less than 1 V between the control circuit terminal 3 and ground.
 - **If 1 V or greater**
 1. Disconnect the harness connector at the A11 Radio, ignition ON.
 2. Test for less than 1 V between the control circuit and ground.
 - If greater than 1 V, repair the short to voltage on the circuit.
 - If less than 1 V, replace the A11 Radio.
 - **Go to next step: If less than 1 V**
8. Test or replace the K108 Active Noise Cancellation Module/T3 Audio Amplifier.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for radio and active noise cancellation module replacement, programming, and setup

DTC B1271: THEFT PROTECTION ACTIVE 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC B1271 00

Theft Protection Active Malfunction

Circuit/System Description

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

Conditions for Running the DTC

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

Conditions for Setting the DTC

This DTC is generated by the module when the VIN as received over the data communication circuit and the VIN as stored in the module memory do not match. This also occurs if no VIN is received over the data communication circuit.

Action Taken When the DTC Sets

The radio does not function. The radio will display indicate that Theft Lock is active.

Conditions for Clearing the DTC

Re-calibration with the correct calibrations for the vehicle and cycling the radio to OFF then to ON will clear the DTC if there is no damage to the radio.

Diagnostic Aids

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

Reference Information

Schematic Reference

[Radio/Navigation System Wiring Schematics \(IOB\)](#), [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#), [Radio/Navigation System Wiring Schematics \(IOR\)](#), [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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

Perform the appropriate radio programming or setup as directed in Control Module References.

- If the DTC resets, replace the A11 Radio.

Repair Instructions

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

Refer to **Control Module References** for radio replacement, setup and programming

DTC B1277: MICROPHONE 1 INPUT SIGNAL CIRCUIT (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.
- Refer to **Diagnostic Procedure Instructions** to 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**

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 Wiring Schematics (IO5/IO6)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

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

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.
 - **Go to next step: 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.
 - **Go to next step: 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
 - **Go to next step: 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
 - **Go to next step: 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
 - **Go to next step: If the DTC does not set**
- 10. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Mobile Telephone Microphone Replacement \(Equinox\)](#), [Mobile Telephone Microphone Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) for human machine interface control module replacement, programming, and setup.

DTC B1277: CELLULAR PHONE MICROPHONE CIRCUIT (IOS/IOT/IOU)

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.
- Refer to [Diagnostic Procedure Instructions](#) to 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

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 Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Radio/Audio System Description and Operation (IOS/IOT/IOU)

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 B24LF Mobile Telephone Microphone - Left Front, 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.
 - **Go to next step: 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
 - **Go to next step: 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**
 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.

- Go to next step: If greater than 9 V

5. Test or replace the B24LF Mobile Telephone Microphone - Left Front.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Mobile Telephone Microphone Replacement \(Equinox\)](#), [Mobile Telephone Microphone Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) for telematics communication interface control module replacement, programming and setup.

DTC B1277: CELLULAR PHONE MICROPHONE CIRCUIT (IOR)

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.
- Refer to [Diagnostic Procedure Instructions](#) to 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

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 Wiring Schematics (IOR)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IOR)

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 B24LF Mobile Telephone Microphone - Left Front, ignition ON/vehicle in Service Mode.
2. Test for 8.5-9.5 V between the signal circuit terminal B and ground.
 - **If less than 8.5 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 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 9.5 V**
 1. Ignition OFF/vehicle OFF, disconnect the X2 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.
 - **Go to next step: If between 8.5-9.5 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 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
 - **Go to next step: If less than 1 V**
4. Test for greater than 8.5 V between the signal circuit terminal B and the low reference circuit terminal A.
 - **If less than 8.5 V**
 1. Ignition OFF/vehicle OFF, disconnect the X2 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.
 - **Go to next step: If greater than 8.5 V**
5. Test or replace the B24LF Mobile Telephone Microphone - Left Front.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Mobile Telephone Microphone Replacement \(Equinox\)](#), [Mobile Telephone Microphone Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) for telematics communication interface control module replacement, programming and setup.

DTC B127C: MICROPHONE 2 INPUT SIGNAL CIRCUIT (IOS/IOT/IOU)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B127C 02

Microphone 2 Input Signal Circuit Short to Ground

DTC B127C 04

Microphone 2 Input Signal Circuit Open/High Resistance

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	B127C 02	B127C 04	B127C 04	-
Low Reference	B127C 02	B127C 04	B127C 04	-

Circuit/System Description

The radio provides the microphone 2 with a supplied voltage on the microphone high signal circuit. When the microphone is in use, voice data from the user is sent back to the radio on the microphone low signal circuit. This microphone is used for driver side hands free calling enhancement, as well as a reference microphone for the primary microphone.

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 5 s.

Conditions for Setting the DTC

B127C 02

The radio detects a short to ground in the microphone high signal circuit for 5 s or greater.

B127C 04

The following conditions will set this DTC:

- The radio detects an open/high resistance in the 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 microphone.

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 Wiring Schematics (IOS/IOT/IOU)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IOS/IOT/IOU)

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 B24RF Mobile Telephone Microphone - Right Front, 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. 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.
 - **Go to next step: 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. 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
 - **Go to next step: 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**
 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 B24RF Mobile Telephone Microphone - Right Front.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Mobile Telephone Microphone Replacement \(Equinox\)](#). [Mobile Telephone Microphone Replacement \(Terrain\)](#)
- Refer to [Control Module References](#) for telematics communication interface control module replacement, programming and setup.

DTC B127E: FRONT VIDEO DISPLAY OUTPUT SIGNAL (IO5/IO6 WITHOUT MAH/MBC)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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

- 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.

Reference Information

Schematic Reference

Radio/Navigation System Wiring Schematics (IO5/IO6)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

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

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 Verification

1. Verify no DTCs are present.

- **If any DTCs are present**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .

- **Go to next step: If no DTCs are present**

2. Ignition ON, infotainment system ON.

3. Using a scan tool, access the HMI control functions and select Info Display Test.

- **If the Info Display can not display the test image.**

Refer to Circuit/System Testing.

- **Go to next step: If the Info Display can display the test image.**

4. All OK

Circuit/System Testing

1. Vehicle OFF/Ignition OFF.

2. Verify the LVDS interface cable is properly connected at the P17 Info Display Module X2 and the K74 Human Machine Interface Control Module X5 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.

- **Go to next step: 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 X2.

7. Connect the EL-50334-2 Type A female to Mini B male USB Cable to the P17 Info Display Module X2. Connect the EL-50334-14 Infotainment Test Cable to the adapter.

8. Disconnect the LVDS interface cable from the K74 Human Machine Interface Control Module X5. Connect the EL-50334-14 Infotainment Test cable to the K74 Human Machine Interface Module X5.

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/Vehicle in Service Mode, 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 K74 Human Machine Interface Control Module.
- If the P17 Info Display Module displays an image.

4. All OK.

- **Go to next step: If the P17 Info Display Module displays an image.**

11. Replace the vehicle LVDS interface cable from the P17 Info Display Module X2 to the K74 Human Machine Interface Module X5.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Radio Control Assembly Replacement \(Equinox\)](#) [Radio Control Assembly Replacement \(Terrain\)](#)

- Refer to [Control Module References](#) for human machine interface control module replacement, programming, and setup.

DTC B127E: FRONT VIDEO DISPLAY OUTPUT SIGNAL (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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC B127E 00

Front Video Display Output Signal Malfunction

DTC B127E 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

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 Wiring Schematics \(IOB\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Description and Operation

[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.
 - **Go to next step: 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. 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.
 - **Go to next step: 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.

- Refer to [Control Module References](#) for replacement, programming, and setup.

DTC B127E: FRONT VIDEO DISPLAY OUTPUT SIGNAL (IOS/IOT/IOU/IOR)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC B127E 00

Front Video Display Output Signal - General failure

DTC B127E 06

Front Video Display Output Signal - Short to ground or open

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.

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

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 continuously 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 Wiring Schematics \(IOR\)](#), [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IOS/IOT/IOU). Radio/Audio System Description and Operation (IOR)

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. Vehicle OFF/Ignition OFF.
2. Verify the LVDS interface cable is properly connected at the P17 Info Display Module and the A11 Radio 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.**

Replace LVDS interface cable from the P17 Info Display Module to the A11 Radio.

5. Ignition ON/Vehicle in Service Mode, infotainment system ON.
6. Verify the P17 Info Display Module displays an image.
 - **If the P17 Info Display Module does not display an image.**

Replace the P17 Info Display Module.

7. Ignition ON/Vehicle in Service Mode, infotainment system ON.
8. Verify the P17 Info Display Module displays an image.
 - **If the P17 Info Display Module does not display an image.**

Replace A11 Radio.

- **Go to next step: If the P17 Info Display Module displays an image.**

9. All OK.

Repair Instructions

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

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

DTC B127E: FRONT VIDEO DISPLAY OUTPUT SIGNAL (IO5/IO6 WITH MAH/MBC)

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.
- Refer to **Diagnostic Procedure Instructions** to provide an overview of each diagnostic category.

DTC Descriptor

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.

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 a flickering or distorted image or a blank screen.

Using a dry cloth to clean the instrument panel in the area of the Information Display may cause the screen to flicker due to static buildup/discharge. The owner manual recommends using a microfiber cloth dampened with water to remove dust and dirt from the instrument panel.

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 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 Wiring Schematics \(105/106\)](#)

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

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

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. 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 infotainment image.
 - **If the P17 Info Display Module does not display an infotainment image.**

Refer to **Rear Vision Camera System Malfunction (IO5/IO6 with MAH/MBC)**.

- **Go to next step: If the P17 Info Display Module displays an infotainment image.**

All OK.

Repair Instructions

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

- Refer to **Radio Control Assembly Replacement (Equinox)**, **Radio Control Assembly Replacement (Terrain)**.
- Refer to **Control Module References** for control module replacement, programming, and setup.

DTC B1287: AMPLIFIER CONTROL SIGNAL CIRCUIT

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.
- Refer to **Diagnostic Procedure Instructions** to provide an overview of each diagnostic category.

DTC Descriptors

DTC B1287 01

Amplifier Control Signal Circuit Short to Battery

DTC B1287 02

Amplifier Control Signal Circuit Short to Ground

DTC B1287 04

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Amplifier Control	B1287 02	B1287 04	B1287 01*	-
* No audio output.				

Circuit/System Description

The radio amplifier control circuit provides varying pulse width modulated (PWM) signals to control overall muting of the amplifier. The PWM signals are varying duty cycle percentages ranging from 0 - 100 percent. A low duty cycle unmutes all amplifier channels and a high duty cycle mutes all amplifier channels. The amplifier control circuit will measure less than 1 V when the mute function is OFF, and approximately 8 V when at full mute. The radio monitors the amp control circuit for faults.

Conditions for Running the DTC

- The radio is on.
- The system voltage is 9 - 16 V.
- The radio performs the test once during wakeup.

Conditions for Setting the DTC

The radio detects a fault on the amplifier control circuit 400 ms after radio activates the remote enable circuit.

Action Taken When the DTC Sets

Radio sets the DTC and continues to output correct state.

Conditions for Clearing the DTC

- The condition must no longer be present.
- A history DTC clears after 50 malfunction-free ignition cycles.

Reference Information

Schematic Reference

[Radio/Navigation System Wiring Schematics \(IOB\)](#) [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#) [Radio/Navigation System Wiring Schematics \(IOR\)](#) [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#) [Radio/Audio System Description and Operation \(IOB\)](#) [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#) [Radio/Audio System Description and Operation \(IOR\)](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

Circuit/System Testing

NOTE: To prevent misdiagnosis, the door chime must be OFF during testing. Ensure the driver door latch is closed during testing.

1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the T3 Amplifier. Ignition ON/vehicle in Service Mode, A11 Radio ON, mute ON.
2. Test for 7.5 - 8.5 V between the control circuit terminal 3 and ground.
 - **If greater than 8.5 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 control 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 7.5 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 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 A11 Radio.
 - **Go to next step: If between 7.5 - 8.5 V**
3. A11 Radio ON, mute OFF.
4. Test for less than 1 V between the control circuit terminal 3 and ground.
 - **If 1 V or greater**

Replace the A11 Radio.
 - **Go to next step: If less than 1 V**
5. Test or replace the T3 Amplifier.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for radio and amplifier replacement, programming, and setup.

DTC B1446 OR B1447: BACKUP POWER SOURCE (IO5/IO6/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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B1446

Replace Backup Power Source Below Minimum Threshold

DTC B1447

Backup Power Source Open Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Backup Battery B+	-	B1447 04	-	-
Backup Battery Low Reference	-	B1447 04	-	-

Circuit/System Description

The backup power source provides voltage to the telematics communication interface control module, to be able to successfully place a call in the event of a main battery disconnect during a collision event.

Conditions for Running the DTC

B1446 03

- Ignition On/Vehicle in Service Mode.
- System voltage is between 9.5 and 15.5 V.
- DTC B1447 is not set.

B1447 04

- Ignition On/Vehicle in Service Mode.
- System voltage is between 9.5 and 15.5 V.
- The above conditions are present for greater than 10 s.

Conditions for Setting the DTC

B1446 03

The telematics communication interface control module detects that the backup power source voltage has dropped below the minimum threshold value.

B1447 04

The telematics communication interface control module detects no voltage from the backup power source.

Action Taken When the DTC Sets

B1446 03

The OnStar[®] status LED turns red.

B1447 04

- The OnStar[®] status LED turns red.
- The telematics communication interface control module will be unable to place a call in the event of a main battery disconnect during a collision event.

Conditions for Clearing the DTC

- A current DTC B1446 will clear when the telematics communication interface control module detects the voltage of the backup power source is above the minimum threshold value.
- A current DTC B1447 will clear when the telematics communication interface control module detects voltage from the backup power source.
- A history DTC clears after 50 malfunction-free ignition cycles.

Diagnostic Aids

- Shorting the backup power source positive voltage circuit to the backup power source ground circuit or chassis ground will activate the internal circuit protection of the backup power source, rendering the backup power source inoperative.
- DTC B1447 may set if the K73 Telematics Communication Interface Control Module has been incorrectly disconnected or serviced. When disconnecting the K73 Telematics Communication Interface Control Module, disconnect the harness connector X1 at the K73 Telematics Communication Interface Control Module prior to disconnecting any other harness connectors. This will ensure the backup power source is preserved when voltage is removed from the K73 Telematics Communication Interface Control Module.

Reference Information

Schematic Reference

OnStar/Telematics Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation (UE1 without IOU/IOT/IOR). OnStar Description and Operation (UE1 with IOU/IOT/IOR).

Electrical Information Reference

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

Circuit/System Testing

1. Ignition OFF/Vehicle OFF and all vehicle systems OFF, disconnect the X1 harness connector at the K73 Telematics Communication Interface Control Module. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for greater than 12.3 V between the B+ circuit terminal 14 and the low reference circuit terminal 13.
 - **If 12.3 V or less**
 1. Disconnect the C3 Telematics Communication Interface Control Module Battery.
 2. Test for infinite resistance between the circuits listed below and ground.
 - B+ circuit terminal 14
 - Low reference circuit terminal 13.
 - 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 circuits end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the C3 Telematics Communication Interface Control Module Battery.
 - **Go to next step: If greater than 12.3 V**
3. Replace the K73 Telematics Communication Interface Control Module.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

- Refer to Communication Interface Module Battery Replacement

- Refer to [Control Module References](#) for telematics communication interface control module replacement, programming and setup.

DTC B1446 OR B1447: BACKUP POWER SOURCE (IOU/IOS/IOT/IOR)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B1446 03

Replace Backup Power Source Voltage Below Threshold

DTC B1447 04

Backup Power Source Open Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Backup Battery B+	-	B1447 04	-	-
Backup Battery Low Reference	-	B1447 04	-	-

Circuit/System Description

The backup power source provides voltage to the telematics communication interface control module, to be able to successfully place a call in the event of a main battery disconnect during a collision event. The backup power source is under an access cover on the telematics communication interface control module.

Conditions for Running the DTC

B1446

- Vehicle is ON.
- System voltage is between 9.5 and 15.5 V.
- DTC B1447 is not set.

B1447

- Vehicle is ON.
- System voltage is between 9.5 and 15.5 V.
- The above conditions are present for greater than 10 s.
- DTC B1446 is not set.

Conditions for Setting the DTC

B1446 03

The telematics communication interface control module detects that the backup power source voltage has dropped below the minimum threshold value. Threshold voltage is checked once every ignition On cycle. There is a counter in memory which counts the number of passes and fails. On the first fail the DTC sets as current. The counter must record 10 consecutive passes before the DTC current status clears. This counter carries over across ignition On/Off cycles.

B1447 04

The telematics communication interface control module detects no voltage from the backup power source. Voltage is checked every 10 m during ignition On cycle

Action Taken When the DTC Sets

B1446

The OnStar[®] status LED turns red.

B1447

- The OnStar[®] status LED turns red.
- The telematics communication interface control module will be unable to place a call in the event of a main battery disconnect during a collision event.

Conditions for Clearing the DTC

- A current DTC B1446 will clear when the telematics communication interface control module detects the voltage of the backup power source is above the minimum threshold value. This will take 10 consecutive ignition cycles to run the DTC pass/fail tests.
- A current DTC B1447 will clear when the telematics communication interface control module detects voltage from the backup power source. Voltage is checked every 10 m during ignition On cycle.
- A history DTC clears after 40 malfunction-free ignition cycles.

Diagnostic Aids

- Shorting the backup power source positive voltage circuit to the backup power source ground circuit or chassis ground will activate the internal circuit protection of the backup power source, rendering the backup power source inoperative.
- DTC B1447 may set if the K73 Telematics Communication Interface Control Module has been incorrectly disconnected or serviced. When the backup power source mode is enabled due to a loss of vehicle battery power the K73 Telematics Communication Interface Control Module will wait 10 s before placing an emergency call. If an emergency call is deemed not necessary the K73 Telematics Communication Interface Control Module will disconnect the C3 Telematics Communication Interface Control Module Battery preventing the discharge of the backup power source.

Reference Information

Schematic Reference

OnStar/Telematics Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation (UE1 without IOU/IOT/IOR), OnStar Description and Operation (UE1 with IOU/IOT/IOR)

Electrical Information Reference

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

Circuit/System Verification

1. Verify DTC B1446/B1447 is not set.

- **If DTC B1446/B1447 is set**

Test or replace the C3 Telematics Communication Interface Control Module Battery.

2. Verify DTC B1446/B1447 is not set.

- **If DTC B1446/B1447 is set**

Test or replace the K73 Telematics Communication Interface Control Module

- **Go to next step: If DTC B1446/B1447 is not set**

3. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Communication Interface Module Battery Replacement](#)
- Refer to [Control Module References](#) for telematics communication interface control module replacement, programming and setup.

DTC B2455: CELLULAR PHONE MICROPHONE CIRCUIT (IO5/IO6/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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B2455 02

Cellular Phone Microphone Circuit Short to Ground

DTC B2455 04

Cellular Phone Microphone Circuit Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Microphone Signal	B2455 02	B2455 04	B2455 04	-
Microphone Low Signal	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 high 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 microphone low signal circuit.

Conditions for Running the DTC

- The Vehicle must be ON or 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 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 low signal circuit for 10 s or greater.

Action Taken When the DTC Sets

- The OnStar[®] 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 Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation (UE1 without IOU/IOT/IOR). OnStar Description and Operation (UE1 with IOU/IOT/IOR).

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 vehicle K73 Telematics Communication Interface Control Module.
- **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.
- **Go to next step: If between 9.5-10.5 V**
3. Test for less than 1 V between the signal circuit terminal A and ground.
 - **If greater than 1 V**
 1. Ignition OFF/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 in the circuit.
 - If less than 1 V, repair the K73 Telematics Communication Interface Control Module.
 - **Go to next step: 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/Vehicle OFF, disconnect the connector X2 at the K73 telematics communication interface control module.
 2. Test for infinite resistance between the low 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.
 - **Go to next step: 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.

- Refer to [Mobile Telephone Microphone Replacement \(Equinox\)](#), [Mobile Telephone Microphone Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) for telematics communication interface control module replacement, programming and setup.

DTC B2455: CELLULAR PHONE MICROPHONE CIRCUIT (IOR/IOU/IOT/IOS)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B2455 02

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 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 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 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

- 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 Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

OnStar Description and Operation (UE1 without IOU/IOT/IOR) **OnStar Description and Operation (UE1 with IOU/IOT/IOR)**

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 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 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.
 - **If greater than 10.5 V**
 1. Ignition OFF/vehicle OFF, disconnect the X1 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.
 - **Go to next step: 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 X1 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.
 - **Go to next step: 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 X1 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.
- **Go to next step: 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.

- Refer to [Mobile Telephone Microphone Replacement \(Equinox\)](#), [Mobile Telephone Microphone Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) for control module replacement, programming and setup.

DTC B2462: GLOBAL POSITIONING SYSTEM (IO5/IO6 WITH 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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.
- A history DTC will clear once 50 consecutive malfunction-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 Wiring Schematics](#)
- [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

- [OnStar Description and Operation \(UE1 without IOU/IOT/IOR\)](#), [OnStar Description and Operation \(UE1 with IOU/IOT/IOR\)](#)
- [Radio/Audio System Description and Operation \(IO5/IO6\)](#)

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

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**

Refer to Circuit/System Testing With Navigation System.
 - **Go to next step: 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.
 - **Go to next step: 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.
 - **Go to next step: 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.
 - **Go to next step: 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 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.

- **Go to next step: 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 T2RR Antenna - Roof Rear. Refer to component testing.

- **If the coax cable does not pass the test**

Replace the coax cable.

- **Go to next step: If the coax cable passes the test**

5. Test or replace the T2RR Antenna - Roof Rear.

with Navigation System

NOTE: You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.

1. Ignition OFF, disconnect the T2RR Antenna - Roof Rear 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 T2RR Antenna - Roof Rear. 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 T2RR Antenna - Roof Rear.

- **Go to next step: 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 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.

- **Go to next step: 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.

- **Go to next step: If the coax cable passes the test.**
- 9. Ignition 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.
- 12. Verify DTC B2462 is not set or that the NO GPS symbol/message is not displayed on the radio display.
 - **If DTC B2462 is set or the NO GPS symbol/message is displayed**

Replace the K74 Human Machine Interface Control Module
 - **Go to next step: 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 K74 Human Machine Interface Control Module. Refer to Component Testing.
 - **If the coax cable does not pass the test.**

Replace the coax cable.
 - **Go to next step: 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.
 - **Go to next step: 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.
 - **Go to next step: 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.

- **Go to next step: If infinite resistance**

5. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Radio Antenna Base Replacement \(Equinox\)](#), [Radio Antenna Base Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) for Human Machine Interface control module or Telematics Communication Interface Control Module replacement, programming, and setup

DTC B2462: GLOBAL POSITIONING SYSTEM SIGNAL (IO5/IO6 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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.

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 Wiring Schematics (IO5/IO6)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

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

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 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 if the NO GPS symbol is displayed**

Replace the K74 Human Machine Interface Control Module.
 - **Go to next step: 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.
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
 - **Go to next step: If the coax cable passes the test**
6. Test or replace the T2RR Antenna - Roof Rear.

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
 - **Go to next step: 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
 - **Go to next step: 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
 - **Go to next step: If infinite resistance**
5. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the diagnostic procedure.

- Refer to [High Frequency Antenna Replacement \(Equinox\)](#) [High Frequency Antenna Replacement \(Terrain\)](#)
- Refer to [Control Module References](#) for human machine interface control module replacement, programming, and setup.

DTC B2462: GLOBAL POSITIONING SYSTEM (WITHOUT 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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.

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 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 malfunction - 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 Wiring Schematics](#)
- [Radio/Navigation System Wiring Schematics \(IOB\)](#) [Radio/Navigation System Wiring Schematics \(IOR\)](#) [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

- [OnStar Description and Operation \(UE1 without IOU/IOT/IOR\)](#) [OnStar Description and Operation \(UE1 with IOU/IOT/IOR\)](#)
- [Radio/Audio System Description and Operation \(IOB\)](#) [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#) [Radio/Audio System Description and Operation \(IOR\)](#)

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 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, 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.
 - **Go to next step: 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 T2RR Antenna - Roof Rear. Refer to component testing.
 - **If the coax cable does not pass the test**

Replace the coax cable.
 - **Go to next step: If the coax cable passes the test**
5. Test or replace the T2RR Antenna - Roof Rear.

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**
Replace the coax cable.
 - **Go to next step: 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.
 - **Go to next step: 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.
 - **Go to next step: If infinite resistance**
5. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Radio Antenna Base Replacement \(Equinox\)](#) [Radio Antenna Base Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) for radio or telematics communication interface control module replacement, programming, and setup

DTC B2470: CELLULAR PHONE ANTENNA CIRCUIT 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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

Circuit/System Description

The primary cellular phone antenna element is connected to the telematics communication interface control module (violet connector) via a shielded coaxial cable. Cellular communication takes place on both the primary cellular antenna signal circuit and the GPS/secondary cellular antenna signal circuit. This diagnostic only applies to the primary cellular antenna signal circuit. Internal to the antenna on the cellular antenna signal circuit resistance is used to apply a load, which the telematics communication interface control module uses to detect the presence of the antenna.

Conditions for Running the DTC

- Ignition in the RUN or ACC position.
- System voltage is between 9.5 V and 15.5 V.
- 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 primary cellular antenna signal circuit.

B2470 04

- The telematics communication interface control module detects an open or high resistance on the primary cellular antenna signal circuit.
- The above conditions are present for greater than 1 s.

Action Taken When the DTC Sets

The OnStar[®] 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 Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation (UE1 without IOU/IOT/IOR) OnStar Description and Operation (UE1 with IOU/IOT/IOR)

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 ignition ON for the GPS satellites to acquire vehicle signal.

1. Ignition OFF/Vehicle OFF and all vehicle systems OFF, disconnect the violet primary cellular 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.
2. Using the **EL-49903-1** Test Antenna Navn-Cell Comn connect the violet coax cable to the K73 Telematics Communication Interface Control Module. Place the test antenna on the roof of the vehicle, ignition ON/vehicle in Service Mode.
3. Verify the DTC does not set or a call can be completed to the OnStar Call Center while operating the vehicle within the conditions for running the DTC.

- **If the DTC sets or a call can not be completed to the OnStar Call Center**

Replace the K73 Telematics Communications Interface Control Module.

- **Go to next step: If the DTC does not set or a call can be completed to the OnStar Call Center**

4. Ignition OFF/Vehicle OFF.

5. Disconnect the **EL-49903-1** Test Antenna Navn-Cell Comn from the K73 Telematics Communication Interface Control Module

6. Test the coax cable. Refer to Component Testing.

- **If the coax cable does not pass the test**

Replace the coax cable.

- **Go to next step: If the coax cable passes the test**

7. Test or replace the T2RR Antenna - Roof Rear.

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. Test for less than 5 Ω between the coax cable center terminal end to end.

- **If 5 Ω or greater**

Replace the coax cable.

- **Go to next step: If less than 5 Ω**

2. Test for greater than 5 Ω between the coax cable outer shield end to end.

- **If 5 Ω or greater**

Replace the coax cable.

- **Go to next step: If less than 5 Ω**

3. 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.

- **Go to next step: If infinite resistance**

4. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair procedure.

- Refer to [High Frequency Antenna Replacement \(Equinox\)](#) [High Frequency Antenna Replacement \(Terrain\)](#)
- Refer to [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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
10 V Reference	B2476 02	B2476 04	B2476 04	-
Signal Terminal 17	B2476 02	B2476 04	B2476 59	B2476 59, B2482 00
Ground	-	B2476 04	-	-

Circuit/System Description

The OnStar[®] button assembly consists of 3 buttons: Call/Answer, OnStar[®] Call Center, and OnStar[®] Emergency. The telematics communication interface control module supplies the OnStar[®] button assembly with 10 V via the 10 V reference 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 pressed.

Conditions for Running the DTC

- Vehicle in Service Mode/Ignition ON.
- Battery voltage must be between 9 - 16 V.

Conditions for Setting the DTC

B2476 04

The telematics communication interface control module detects an open/high resistance on the keypad supply voltage 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 OnStar[®] 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 OnStar[®] status LED turns red.
- No calls can be placed.
- The telematics communication interface control module will ignore all inputs from the OnStar[®] button assembly.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 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 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 Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation (UE1 without IOU/IOT/IOR) OnStar Description and Operation (UE1 with IOU/IOT/IOR)

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

NOTE:

- **10 V reference circuit measurement may vary with vehicle battery voltage.**
 - **Test for voltage range with vehicle battery measuring at a minimum of 11.5 V**
1. Vehicle OFF/Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the A98 Front Overhead Console Assembly. 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. Vehicle OFF/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.
- **Go to next step: If less than 10 Ω**
3. Vehicle in Service Mode/Ignition ON.
4. Test for 8.0 - 10.5 V between the 10 V reference circuit terminal 16 and ground.
 - **If less than 8.0 V**
 1. Vehicle OFF/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. Vehicle OFF/Ignition OFF, disconnect the harness connector at the K73 Telematics Communication Interface Control Module, vehicle in Service Mode/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.
 - **Go to next step: If between 8.0 - 10.5 V**
5. Vehicle OFF/Ignition OFF.
6. Test for 500 - 900 Ω between the signal circuit terminal 17 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, vehicle in Service Mode/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. Vehicle 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.
- **Go to next step: If between 500 - 900 Ω**
7. Test or replace the A98 Front Overhead Console Assembly.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Roof Console Replacement](#)
- Refer to [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 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 \(UE1 without IOU/IOT/IOR\)](#), [OnStar Description and Operation \(UE1 with IOU/IOT/IOR\)](#).

Visual/Physical Inspection

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

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to [Testing for Intermittent Conditions and Poor Connections](#).

Symptom List

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

- [Bluetooth Malfunction \(IO5/IO6\)](#)[Bluetooth Malfunction \(without IO5/IO6\)](#)
- [No Global Positioning System \(GPS\) Reception \(UE1 with IO5/IO6\)](#)[No Global Positioning System \(GPS\) Reception \(IO5/IO6 without UE1\)](#)[No Global Positioning System \(GPS\) Reception \(without IO5/IO6\)](#)
- [OnStar Microphone Malfunction \(IO5/IO6/IOB\)](#)[OnStar Microphone Malfunction \(IOR/IOU/IOT/IOS\)](#)
- [OnStar Audio Malfunction \(IOB\)](#)[OnStar Audio Malfunction \(without IOB\)](#)
- [OnStar Button LED Malfunction](#)
- [OnStar Call Center Remote Function Requests Malfunction](#)
- [OnStar Button Malfunction](#)
- [Unable to Contact OnStar Call Center](#)
- [OnStar Voice Recognition Malfunction](#)
- [OnStar Steering Wheel Control Functions Malfunction](#)

SYMPTOMS - ENTERTAINMENT

IMPORTANT: 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 \(IO5/IO6\)](#), [Radio/Audio System Description and Operation \(IOB\)](#), [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#), [Radio/Audio System Description and Operation \(IOR\)](#).

Visual/Physical Inspection

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

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to [Testing for 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](#)
- [Auxiliary Audio Input Malfunction \(IOB\)](#)[Auxiliary Audio Input Malfunction \(IO5/IO6\)](#)[Auxiliary Audio Input Malfunction \(IOR\)](#)[Auxiliary Audio Input Malfunction \(IOS/IOT/IOU\)](#)
- [Bluetooth Malfunction \(IO5/IO6\)](#)[Bluetooth Malfunction \(without IO5/IO6\)](#)
- [No Global Positioning System \(GPS\) Reception \(UE1 with IO5/IO6\)](#)[No Global Positioning System \(GPS\) Reception \(IO5/IO6 without UE1\)](#)[No Global Positioning System \(GPS\) Reception \(without IO5/IO6\)](#)
- [Radio Controls Malfunction \(IOB\)](#)[Radio Controls Malfunction \(IOR\)](#)
- [Radio Information Display Malfunction \(IOB\)](#)[Radio Information Display Malfunction \(IO5/IO6 without MAH/MBC\)](#)[Radio Information Display Malfunction \(IOS/IOT/IOU\)](#)[Radio Information Display Malfunction \(IO5/IO6 with MAH/MBC\)](#)[Radio Information Display Malfunction \(IOR\)](#)
- [Radio Poor Reception](#)
- [Speaker Malfunction \(UQA with IO5/IO6\)](#)[Speaker Malfunction \(UZ6\)](#)[Speaker Malfunction \(without UQA/UZ6\)](#)[Speaker Malfunction \(UQA with IOS/IOT/IOU\)](#)

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.
- Refer to [Diagnostic Procedure Instructions](#) to 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 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[®], or via the vehicle USB port.

When a mobile device is connected via Bluetooth[®], some or all of the device controls may be unavailable from the radio controls. This varies dependant upon the device being used. Refer to the vehicle owners manual, supplements, and the device manufacturers information for information on devices, control, and operation.

Refer to the device manufacturers 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 Wiring Schematics \(IOB\)](#) [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#) [Radio/Navigation System Wiring Schematics \(IOR\)](#) [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#) [Radio/Audio System Description and Operation \(IOB\)](#) [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#) [Radio/Audio System Description and Operation \(IOR\)](#)

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 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.

- **Go to next step: 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 website.

- **Go to next step: If the application is operating correctly on the mobile device.**

3. Verify the A11 Radio calibrations are current.

- **If the radio calibrations are not current**

Reprogram the A11 Radio and re-evaluate the concern.

- **Go to next step: If no update calibrations are available**

4. Verify the application is installed on the A11 Radio and is up to date.

- **If the application is not installed or is not up to date.**

Install or update the application on the A11 Radio.

- **Go to next step: If the application is installed on the A11 Radio and is up to date**

5. Ignition ON, A11 Radio ON.

6. Verify the mobile device can connect to the infotainment system. Refer to the owners 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 \(IO5/IO6\)Bluetooth Malfunction \(without IO5/IO6\)](#).
- If unable to connect via USB, refer to [Auxiliary Audio Input Malfunction \(IOB\)Auxiliary Audio Input Malfunction \(IO5/IO6\)Auxiliary Audio Input Malfunction \(IOR\)Auxiliary Audio Input Malfunction \(IOS/IOT/IOU\)](#).
- **Go to next step: If the mobile device connects to the vehicle infotainment system.**

7. Launch the application.

8. Verify the applications operates properly with the vehicle infotainment system.

- **If the application does not function properly**

Refer to diagnostic aids.

- **Go to next step: If the application functions properly**

9. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [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.
- Refer to [Diagnostic Procedure Instructions](#) to 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	-	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
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

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.
- 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 Wiring Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

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 .

- **Go to next step: 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.

- **If the infotainment system does not switch to AUX as the audio source**

Refer to Circuit/System Testing - Auxiliary Input Jack.

- **Go to next step: 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.

- **Go to next step: 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](#) .

- **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: 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.

- 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.
 - **Go to next step: 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.
 - **Go to next step: 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.

 - **Go to next step: 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.

 - **Go to next step: If less than 5 Ω**
7. Replace the X83 Auxiliary Audio Input. Connect all harness connectors.
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.

 - **Go to next step: 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.
 - **Go to next step: 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.
 - **Go to next step: 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**
Replace the console USB cable assembly.
 - **Go to next step: 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.

- Refer to [Audio Disc Player and USB Receptacle Replacement \(Equinox\)](#), [Audio Disc Player and USB Receptacle Replacement \(Terrain\)](#).
- Refer to [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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+ (USB/SD card reader)	B124B, 1, 3	B124B, 1, 2	-	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+ (front console USB ports)	B124C, 1, 3	B124C, 1, 2	-	-
USB Cable	B124B/B124C, 2	B124B/B124C, 2	B124B/B124C, 2	-
Ground	-	1	-	-
1. SD Card reader and/or USB port(s) Inoperative 2. Fault may affect one or more components, dependant on fault location 3. Fault affects multiple components, dependant on vehicle equipment				

Circuit/System Description

Auxiliary Audio Input/USB/SD Card Reader

The infotainment system has a auxiliary jack, USB, and memory card receptacle assembly located in the console storage compartment. 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 human machine interface control 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 control 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.

Front Console USB Ports

The infotainment system has a USB receptacle assembly located in the front of the console. The USB ports 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 human machine interface control 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 control 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.

Reference Information

Schematic Reference

Radio/Navigation System Wiring Schematics (IO5/IO6)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

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

Electrical Information Reference

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

Scan Tool Reference

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](#) .

- **Go to next step: 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, USB Port and SD Card Reader.

- **Go to next step: 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, USB Port and SD Card Reader.

- **Go to next step: If audio is heard from the test tool.**

6. All OK

USB Ports 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.

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 - Auxiliary Audio Input, USB Port and SD Card Reader.

- If the SD card reader can be accessed, replace the X83 Auxiliary Audio Input.

- **Go to next step: 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 - Auxiliary Audio Input, USB Port and SD Card Reader

- **Go to next step: If the SD card reader media can be accessed**

6. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92 USB Receptacle USB port and select the USB test mode.
7. 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 - Front Console USB Ports.

- **Go to next step: If audio is heard from the test tool**

8. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92A USB Receptacle - Instrument Panel Compartment (if equipped) 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**

Refer to Circuit/System Testing - Instrument Panel Compartment USB Port.

- **Go to next step: If audio is heard from the test tool**

10. All OK.

Circuit/System Testing

Auxiliary Audio Input, 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.
 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.
 - **Go to next step: 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.
 - **Go to next step: 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.

- **Go to next step: 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.
 - **Go to next step: 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.
 - **Go to next step: 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.

Front Console USB Ports

1. Ignition OFF, disconnect the X1 harness connector at the X92 USB Receptacle.
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.
 - **Go to next step: 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.
 - **Go to next step: 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.
 - **Go to next step: If no connection problems or cable damage is noted.**
5. Connect the X1 harness connector at the X92 USB Receptacle.
6. Disconnect the vehicle USB cable X4 harness connector at the K74 Human Machine Interface Control Module and the X2 harness connector at the X92 USB Receptacle.
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 X92 USB Receptacle.
8. Ignition ON, infotainment system ON.
9. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92 USB Receptacle 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 X92 USB Receptacle. Connect all harness connectors.
 2. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92 USB Receptacle 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.
 4. All OK.
 - **Go to next step: If audio is heard from the test tool**
11. Connect the vehicle USB cable X4 harness connector at the K74 Human Machine Interface Control Module.
12. 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 X92 USB Receptacle.
13. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92 USB Receptacle USB port and select the USB test mode.
14. 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.
 - **Go to next step: If audio is heard from the test tool**
15. Replace the console USB cable assembly.

Instrument Panel Compartment USB Port (If equipped)

1. 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.
 - **Go to next step: If no connection problems or cable damage is noted.**
2. Disconnect the vehicle USB cable X3 harness connector at the X92 USB Receptacle.
3. Connect the EL-50334-2 Type-A Female to Mini-B Male Cable to the X92 USB Receptacle.
4. Ignition ON, infotainment system ON.
5. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the EL-50334-2 Type-A Female to Mini-B Male Cable and select the USB test mode.
6. 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 X92 USB Receptacle.
 - **Go to next step: If audio is heard from the test tool**
7. Disconnect the console to I/P USB in-line connector.
8. 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 I/P side of the in-line USB cable connector and the X92 USB Receptacle.
9. Ignition ON, infotainment system ON.
10. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92A USB Receptacle - Instrument Panel Compartment and select the USB test mode.

11. 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 X92A USB Receptacle - Instrument Panel Compartment.

- **Go to next step: If audio is heard from the test tool**

12. Replace the USB cable assembly between the X92A USB Receptacle - Instrument Panel Compartment and the X92 USB Receptacle.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Audio Disc Player, USB, Auxiliary In, and Memory Card Receptacle Replacement](#)
- Refer to [Audio Disc Player and USB Receptacle Replacement \(Equinox\)](#) [Audio Disc Player and USB Receptacle Replacement \(Terrain\)](#)
- Refer to [Control Module References](#) for radio or human machine interface control module replacement, programming, and setup.

AUXILIARY AUDIO INPUT MALFUNCTION (IOR)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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, 3	1, 2	-	-
USB Cable	B124B	B124B	B124B	-
Ground	-	1	-	-
1. USB port Inoperative 2. Fault may affect one or more components, dependant on fault location 3. Fault affects multiple components, dependant on vehicle equipment				

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

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.

SD Card Reader

On Navigation vehicles the SD card will contain the map information for the vehicle region. The map data will be updated quarterly either by replacing the SD card or wireless updates via WiFi.

Refer to the owners manual for information on the Navigation system.

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 Wiring Schematics (IOR)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IOR)

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.

- **Go to next step: 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.

- **Go to next step: 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 3 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.

- **Go to next step: If less than 10 Ω**

3. Verify that a test lamp illuminates between the B+ circuit terminal 1 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.

- **Go to next step: 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.

- **Go to next step: 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.
 - **Go to next step: 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.

- Refer to [Audio Disc Player and USB Receptacle Replacement \(Equinox\)](#) [Audio Disc Player and USB Receptacle Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) control module replacement, programming, and setup.

AUXILIARY AUDIO INPUT MALFUNCTION (IOS/IOT/IOU)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+ (front floor console compartment USB/SD card reader)	B124B, 1, 3	B124B, 1, 2	-	-
B+ (inside center console USB ports)	B124C, 1, 3	B124C, 1, 2	-	-
USB Cable (front floor console compartment USB/SD card reader)	B124B, 1	B124B, 1	B124B, 1	-
USB Cable (inside center console USB ports)	B124C, 4	B124C, 4	B124C, 4	-
Ground	-	1, 4	-	-
1. Auxiliary Jack, SD Card reader and/or USB port(s) Inoperative 2. Fault may affect one or more components, dependant on fault location 3. Fault affects multiple components, dependant on vehicle equipment 4. Inside center console USB ports inoperative				

Circuit/System Description

The infotainment system has a auxiliary jack, USB, and memory card receptacle assembly located in the front floor console compartment. The auxiliary jack, 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 with the additional USB receptacle via a standard USB cable. A Mini type USB connector is used to connect the cable at the USB receptacle 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.

An additional USB receptacle assembly is available inside the front of the center console. The USB receptacles in the assembly interfaces 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 radio via a standard USB cable.

Auxiliary Audio Input Jack and USB Ports

The Auxiliary Audio Input Jack and USB ports 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 Auxiliary Audio Input Jack or the USB port, the system detects the device and AUX or USB becomes available as an audio source.

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

SD Card Reader

On Navigation vehicles the SD card will contain the Map information for the vehicle region. The Map data will be updated quarterly either by replacing the SD card or wireless updates via WiFi.

Refer to the owners manual for information on the Navigation system.

Diagnostic Aids

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 Ports 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 Wiring Schematics (IOS/IOT/IOU)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IOS/IOT/IOU)

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. Ignition ON, infotainment system ON.
2. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92 USB Receptacle port inside the center console 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**

Refer to Circuit/System Testing - USB Ports (Inside Center Console)
 - **Go to next step: If audio is heard from the test tool**
4. 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.
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.**

- **Go to next step: If audio is heard from the test tool.**

6. Ignition ON, infotainment system ON.

7. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port (Front Floor Console) and select the USB test mode.

8. 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 the correct SD card for the vehicle into the SD card slot.

2. Verify map data can be accessed by selecting Navigation.

- If the SD card reader cannot be accessed, refer to Circuit/System Testing - Auxiliary Audio Input Jack, USB Port and SD Card Reader (Front Floor Console).

- If the SD card reader can be accessed, replace the X83 Auxiliary Audio Input.

- **Go to next step: If audio is heard from the test tool**

9. All OK

Circuit/System Testing

NOTE: You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.

USB Ports (Inside Center Console)

1. Ignition OFF, disconnect the X1 harness connector at the X92 USB Receptacle.

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.

- **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: If no connection problems or cable damage is noted.**

5. Replace the X92 USB Receptacle. Connect all harness connectors.

6. Ignition ON, infotainment system ON.

7. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92 USB Receptacle 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 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 USB cable assembly between the X92 USB receptacle and the A11 Radio. Connect all harness connectors.
2. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X92 USB Receptacle 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.
 - **Go to next step: If audio is heard from the test tool**
9. All OK.

Auxiliary Audio Input Jack, USB Port and SD Card Reader (Front Floor Console)

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 3 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.
 - **Go to next step: If less than 10 Ω**
3. Verify that a test lamp illuminates between the B+ circuit terminal 1 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.
 - **Go to next step: 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.
 - **Go to next step: 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 X92 USB Receptacle and the X83 Auxiliary Audio Input.
7. 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 X92 USB Receptacle 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 following one at a time.
 - X83 Auxiliary Audio Input Auxiliary Jack and select Test Mode
 - X83 Auxiliary Audio Input USB port and select Test Mode
10. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system on both auxiliary jack and USB port while operating the system to play audio from the test tool.
 - **If audio is not heard from the test tool from one or both**
 1. Replace the X83 Auxiliary Audio Input. Connect all harness connectors.
 2. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the following one at a time.
 - X83 Auxiliary Audio Input Auxiliary Jack and select Test Mode

- X83 Auxiliary Audio Input USB port and select Test Mode
3. Verify the audio from the EL-50334-20 Multi-Media Interface Tester (MIT) is heard through the infotainment system on both the auxiliary jack and USB port while operating the system to play audio from the test tool.
 - If audio is not heard from the test tool from one or both, replace the X92 USB Receptacle.
 - If audio is heard from the test tool.
 4. All OK.
 - **Go to next step: If audio is heard from the test tool**
11. Connect the vehicle USB cable X3 harness connector at the X92 USB Receptacle.
 12. 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.
 13. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select the USB test mode.
 14. 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.

 - **Go to next step: If audio is heard from the test tool**
 15. Replace the console USB cable assembly.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Audio Disc Player and USB Receptacle Replacement \(Equinox\)](#) [Audio Disc Player and USB Receptacle Replacement \(Terrain\)](#)
- Refer to [USB Receptacle Replacement](#)
- Refer to [Control Module References](#) for radio or human machine interface control module replacement, programming, and setup.

BLUETOOTH 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Circuit/System Description

Bluetooth[®] wireless technology is a short-range communications technology intended to replace the cables connecting portable and/or fixed devices while maintaining high levels of security. 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[®] 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

- Verify the mobile device is properly configured for the feature being used. Refer to the device manufacturer's information.
- Verify the device has the latest software available. 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[™],[®] 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.
- For features that require a cellular connection make sure to perform tests in an area where the customer's device has a strong signal.
- The radio will return to the previous screen after a Bluetooth call has ended.

Reference Information

Schematic Reference

Radio/Navigation System Wiring Schematics (IO5/IO6)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

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

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](#) .
 - **Go to next step: 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.
 - **Go to next step: 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 customer's 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.**

1. Perform the 3 vehicle Factory Resets located in Setting > System > Return to Factory Settings.

2. 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.

- **Go to next step: 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 successful but the audio is distorted.**

Refer to [Speaker Malfunction \(UQA with IO5/IO6\)](#)[Speaker Malfunction \(UZ6\)](#)[Speaker Malfunction \(without UQA/UZ6\)](#)[Speaker Malfunction \(UQA with IOS/IOT/IOU\)](#).

- **If the feature test is not successful**

Replace the K74 Human Machine Interface Control Module.

- **Go to next step: If the feature test is successful**

6. Verify the customers device can be paired with the infotainment system.

- **If the device can not be paired with the infotainment system.**

1. Perform a reset on the device. Refer to device manufacture's information.

- Verify the customers device can be paired with the infotainment system.

If the device still will not pair inform the customer the issue is with the device.

- If the device successfully pairs with the infotainment system.

2. Verify audio can be heard while streaming from the device.

- If audio can not be heard while streaming.

Ensure the volume on the device is turned up to an adequate level.

- **Go to next step: If audio can be heard while streaming.**

7. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for human machine interface control module replacement, programming, and setup

BLUETOOTH MALFUNCTION (WITHOUT 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Circuit/System Description

Bluetooth[®] wireless technology is a short-range communications technology intended to replace the cables connecting portable and/or fixed devices while maintaining high levels of security. 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[®] 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

- Verify the mobile device is properly configured for the feature being used. Refer to the device manufacturer's information.
- Verify the device has the latest software available. 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[®] 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.
- For features that require a cellular connection make sure to perform tests in an area where the customer's device has a strong signal.

Reference Information

Schematic Reference

[Radio/Navigation System Wiring Schematics \(IOB\)](#) [Radio/Navigation System Wiring Schematics \(IOR\)](#) [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Description and Operation

[Radio/Audio System Description and Operation \(IOB\)](#) [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#) [Radio/Audio System Description and Operation \(IOR\)](#)

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](#) .

- **Go to next step: If no DTCs are present**
2. Verify the A11 Radio calibrations are current.
 - **If the radio calibrations are not current**
 Reprogram the A11 Radio and re-evaluate the concern.
 - **Go to next step: 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.**
 1. Perform the 3 vehicle Factory Resets located in Setting > System > Return to Factory Settings.
 2. 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.
 - **Go to next step: 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 successful but the audio is distorted.**
 Refer to [Speaker Malfunction \(UZ6\)Speaker Malfunction \(without UQA/UZ6\)Speaker Malfunction \(UQA with IOS/IOT/IOU\)](#).
 - **If the feature test is not successful**
 Replace the A11 Radio.
 - **Go to next step: If the feature test is successful**
6. Verify the customers device can be paired with the infotainment system.
 - If the device can not be paired with the infotainment system.
 Perform a reset on the device. Refer to device manufacture's information.
 - Verify the customers device can be paired with the infotainment system.
 If the device still will not pair inform the customer the issue is with the device.
 - If the device successfully pairs with the infotainment system.
7. Verify audio can be heard while streaming from the device.
 - If audio can not be heard while streaming.
 Ensure the volume on the device is turned up to an adequate level.
 - **Go to next step: If audio can be heard while streaming.**
8. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for radio replacement, programming, and setup

DIGITAL RADIO POOR OR NO RECEPTION (WITHOUT U2Q)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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

Schematic Reference

[Radio/Navigation System Wiring Schematics \(IOB\)](#), [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#), [Radio/Navigation System Wiring Schematics \(IOR\)](#), [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#), [Radio/Audio System Description and Operation \(IOB\)](#), [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#), [Radio/Audio](#)

System Description and Operation (IOR)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Special Tools

EL-48028 Digital Radio Test Antenna

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.
 - **Go to next step: 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/Vehicle 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/Vehicle in Service Mode, 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.
 - **Go to next step: If DTC B125C is not set as current and XM reception is improved**
4. Ignition OFF/Vehicle OFF, disconnect the digital radio antenna coax cable from the T2RR Antenna - Roof Rear.
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
 - **Go to next step: If the coax cable passes the test**
6. Test or replace the T2RR Antenna - Roof Rear.

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
 - **Go to next step: 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
 - **Go to next step: 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
 - **Go to next step: If infinite resistance**
5. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [High Frequency Antenna Replacement \(Equinox\)](#) [High Frequency Antenna Replacement \(Terrain\)](#)
- Refer to [Control Module References](#) for radio replacement, programming, and setup.

DIGITAL RADIO POOR OR NO RECEPTION (U2Q)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B125E

Digital Audio Broadcast (DAB) Circuit

For symptom byte information refer to [Symptom Byte List](#).

Circuit/System Description

The digital audio broadcast receiver, located inside the radio, receives digital radio information from the digital radio antenna located on the outside of the vehicle. The digital audio broadcast 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 digital radio has limited or no reception.

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

[Radio/Navigation System Wiring Schematics \(IOB\)](#) [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#) [Radio/Navigation System Wiring Schematics \(IOR\)](#) [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#) [Radio/Audio System Description and Operation \(IOB\)](#) [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#) [Radio/Audio System Description and Operation \(IOR\)](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Circuit/System Testing

1. Ignition OFF/vehicle OFF, disconnect the digital radio antenna coax cable from the T2RR Antenna - Roof Rear and the A11 Radio.
2. 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

- **Go to next step: If the coax cable passes the test**

3. Replace the T2RR Antenna - Roof Rear.
4. Ignition ON/vehicle in Service Mode, A11 Radio ON, tune to digital band.
5. Verify DTC B125E is not set as current and digital reception is improved.

- **If DTC B125E is set as current or digital reception is not improved**

Replace the A11 Radio.

- **Go to next step: If DTC B125E is not set as current and digital reception is improved**

6. All OK.

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
 - **Go to next step: 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
 - **Go to next step: 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
 - **Go to next step: If infinite resistance**
5. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Radio Antenna Base Replacement \(Equinox\)](#) [Radio Antenna Base Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) for radio replacement, programming, and setup.

PHONE PROJECTION MALFUNCTION (APPLY CARPLAY)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Circuit/System Description

Apple CarPlay is a new phone integration feature that enables iPhone users to display certain apps and functionality from their phone on the vehicles infotainment display. Users can control the apps and functions via the vehicle's infotainment system touchscreen or voice commands.

Diagnostic Aids

- It is not required to download an app to your device for Apple CarPlay.
- It is recommended to use the device's factory provided USB cable. Aftermarket or third - party cables may not work.
- Visit for a list of Apple CarPlay compatible apps. This does not guarantee the functionality of the app.

Reference Information

Schematic Reference

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#) [Radio/Audio System Description and Operation \(IOB\)](#) [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#) [Radio/Audio System Description and Operation \(IOR\)](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Circuit/System Verification

1. Verify no DTC's are present.

- **If any DTC's are present.**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#)

- **Go to next step: If no DTC's are present.**

2. Verify the correct settings on the radio and the connected device that will allow Apple CarPlay functionality.

- **If the settings are not correct.**

Refer to the vehicle and devices owner manual or manufacturers website for details on enabling CarPlay.

- **Go to next step: If the settings are correct.**

3. Verify the software is up to date on the connected device, refer to the device's owner manual or manufacturers website.

- **If the connected device software is not up to date.**

Recommend the customer update their device to the newest software version.

- **Go to next step: If the connected device software has the newest version.**

4. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select USB test mode,

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 [Auxiliary Audio Input Malfunction \(IOB\)](#)[Auxiliary Audio Input Malfunction \(IO5/IO6\)](#)[Auxiliary Audio Input Malfunction \(IOR\)](#)[Auxiliary Audio Input Malfunction \(IOS/IOT/IOU\)](#)

- **Go to next step: If audio is heard from the test tool.**

6. Verify the radio detects the connected device when plugged in by noting a change in the Phone Projection/Apple CarPlay icon on the Home screen.

- **If the radio does not show a change in the Phone Projection/Apple CarPlay icon.**

1. Verify the device's cable is recommended or approved by the device manufacture and there is no damage to the cable or terminals.

- If the cable is not the correct part or damage is noted advise the customer.
 - If no issues with the cable
2. Perform a device rest by holding both the Home and Power buttons on the device.
 3. Attempt to launch the application by pressing the Phone Projection/Apple CarPlay icon within the Home screen.
 - If the application does not launch
 4. Perform the 3 vehicle Factory Resets located in Setting > System > Return to Factory Settings.
 - **Go to next step: If the radio does show a change in the Phone Projection/Apple CarPlay icon.**
7. Attempt to launch the application by pressing the Phone Projection/Apple CarPlay icon within the Home screen.
- **If the application does not launch**
 1. Perform the 3 vehicle Factory Resets located in Setting > System > Return to Factory Settings.
 - **Go to next step: If the application does launch**
- All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Control Module References](#) for control module replacement, programming, and setup.

PHONE PROJECTION MALFUNCTION (ANDROID AUTO)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Circuit/System Description

Android Auto is a new phone integration feature that enables Android users to display certain apps and functionality from their phone on the vehicles infotainment display. Users can control the apps and functions via the vehicle's infotainment system touchscreen, button control or voice commands.

Diagnostic Aids

- Verify the device is Bluetooth paired to the vehicle before launching Android Auto
- Android Auto will only automatically launch the first time it is time it is connected to the system within a key cycle.
- It is required the device be connected to the vehicles USB port. It is recommended to use the device's factory provided USB cable. Aftermarket or third - party cables may not work.
- Before launching Android Auto verify transmission is in park.
- Visit for a list of Android Auto compatible apps. This does not guarantee the functionality of the app.
- Listed below are some common Android Auto Error Messages or Error Codes -
 - Google Play Services error: Android Auto could not connect with Google Play Services

Likely cause: Something went wrong while setting up Android Auto.

Suggested solutions:

- Connect your phone to your vehicle with a USB cable first, before attempting to open the Android Auto app on your phone.

- After you have connected your phone to the vehicle open Android Auto and follow the getting started flow and accept all permissions.
- If it still does not work, uninstall Google Play Services update and re-update then follow the steps above.
- Communication error 8: Authentication failed between the car and the phone.

Likely cause: This is most likely caused by the incorrect date and time on the radio.

Suggested solutions: Disconnect your phone from the vehicle. In radio settings set the correct date, time, time zone, daylight saving. Make sure it matches the settings on your phone.

- Communication error 12: Vehicle is not responding

Likely cause: Transient software failure. If this occurs frequently it could be caused by a faulty USB cable.

Suggested solution: Try a new USB cable approved by the manufacture.

Reference Information

Schematic Reference

[Radio/Navigation System Wiring Schematics \(IOB\)](#), [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#), [Radio/Navigation System Wiring Schematics \(IOR\)](#), [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#), [Radio/Audio System Description and Operation \(IOB\)](#), [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#), [Radio/Audio System Description and Operation \(IOR\)](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Circuit/System Verification

1. Verify no DTC's are present.

- **If any DTC's are present.**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#)

- **Go to next step: If no DTC's are present.**

2. Verify the correct settings on the radio and the connected device that will allow Android Auto functionality.

- **If the settings are not correct.**

Refer to the vehicle and devices owner manual or manufacturers website for details on enabling Android Auto.

- **Go to next step: If the settings are correct.**

3. Verify the software is up to date on the connected device, refer to the device's owner manual or manufacturers website.

- **If the connected device software is not up to date.**

Recommend the customer update their device to the newest software version.

- **Go to next step: If the connected device software has the newest version.**

4. Connect the EL-50334-20 Multi-Media Interface Tester (MIT) to the X83 Auxiliary Audio Input USB port and select USB test mode,
 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 [Auxiliary Audio Input Malfunction \(IOB\)](#)[Auxiliary Audio Input Malfunction \(IO5/IO6\)](#)[Auxiliary Audio Input Malfunction \(IOR\)](#)[Auxiliary Audio Input Malfunction \(IOS/IOT/IOU\)](#)

- **Go to next step: If audio is heard from the test tool.**

6. Verify the radio detects the connected device when plugged in by automatically launching Android Auto or noting a change in the Phone Projection/Android Auto icon on the Home screen.
- **If the radio does not automatically launch Android Auto or no change in the Phone Projection/Android Auto icon.**

NOTE: If the device displays an error message or error code refer to Diagnostic Aids.

7.

1. Verify the device's cable is recommended or approved by the device manufacturer and there is no damage to the cable or terminals.
 - If the cable is not the correct part or damage is noted advise the customer.
 - If no issues with the cable
 2. Perform a device reset by holding both the Home and Power buttons on the device.
 3. Verify the radio detects the connected device when plugged in by automatically launching Android Auto or noting a change in the Phone Projection/Android Auto icon on the Home screen.
 - If the radio does not automatically launch Android Auto or no change in the Phone Projection/Android Auto icon.
 4. Attempt to launch the application by pressing the Phone Projection/Android Auto icon within the Home screen.
 - If the application does not launch
 5. Perform the 3 vehicle Factory Resets located in Setting>System>Return to Factory Settings.
- **Go to next step: If the radio does automatically launch Android Auto.**

All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Control Module References](#) for control module replacement, programming, and setup.

ONSTAR MICROPHONE MALFUNCTION (IO5/IO6/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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B2455 02

Cellular Phone Microphone Circuit Short to Ground

DTC B2455 04

Cellular Phone Microphone Circuit Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Microphone Signal	B2455 02	B2455 04	B2455 04	-
Microphone Low Signal	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 high 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 microphone low signal circuit.

Conditions for Running the DTC

- The Vehicle must be ON or 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 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 low signal circuit for 10 s or greater.

Action Taken When the DTC Sets

- The OnStar[®] 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 Wiring Schematics

Connector End View Reference

Description and Operation

OnStar Description and Operation (UE1 without IOU/IOT/IOR) **OnStar Description and Operation (UE1 with IOU/IOT/IOR)**

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 vehicle K73 Telematics Communication Interface Control Module.
 - **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.
 - **Go to next step: If between 9.5-10.5 V**
3. Test for less than 1 V between the signal circuit terminal A and ground.
 - **If greater than 1 V**
 1. Ignition OFF/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 in the circuit.
 - If less than 1 V, repair the K73 Telematics Communication Interface Control Module.
 - **Go to next step: 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/Vehicle OFF, disconnect the connector X2 at the K73 telematics communication interface control module.
 2. Test for infinite resistance between the low 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.
 - **Go to next step: 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.

- Refer to [Mobile Telephone Microphone Replacement \(Equinox\)](#), [Mobile Telephone Microphone Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) for telematics communication interface control module replacement, programming and setup.

ONSTAR MICROPHONE MALFUNCTION (IOR/IOU/IOT/IOS)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

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 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 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 02

The telematics communication interface control module detects a short to ground in the cellular phone microphone signal circuit for 10 s or greater.

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

- 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 Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation (UE1 with IOU/IOT/IOR)

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 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 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.
- **If greater than 10.5 V**
 1. Ignition OFF/vehicle OFF, disconnect the X1 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.
 - **Go to next step: 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 X1 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.
 - **Go to next step: 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 X1 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.
 - **Go to next step: 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.

- Refer to [Mobile Telephone Microphone Replacement \(Equinox\)](#), [Mobile Telephone Microphone Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) for control module replacement, programming and setup.

ONSTAR AUDIO 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Audio Signal	1	1	1	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Audio Common Signal	-	1	-	-
1. No or noisy OnStar [®] audio				

Circuit/System Description

When an OnStar[®] keypress is made, a serial data message is sent to the audio system to mute all radio functions and output OnStar[®] originated audio. After the audio system is muted, the telematics communication interface control module transmits signals to the audio system on the audio signal and audio common circuits.

Reference Information

Schematic Reference

- [OnStar/Telematics Wiring Schematics](#)
- [Radio/Navigation System Wiring Schematics \(IOB\)](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation (UE1 without IOU/IOT/IOR)

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 \(UQA with IO5/IO6\)](#)[Speaker Malfunction \(UZ6\)](#)[Speaker Malfunction \(without UQA/UZ6\)](#)[Speaker Malfunction \(UQA with IOS/IOT/IOU\)](#)

- **Go to next step: If audio is heard clearly**

3. Verify that the Connecting to OnStar[®] message is heard clearly through the audio system when the OnStar[®] blue button is pressed.

- **If OnStar message is noisy or distorted**

Refer to Circuit/System Testing

- **Go to next step: If OnStar message is heard clearly**

4. All OK.

Circuit/System Testing

1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the A11 Radio and 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 terminals listed below and ground:

- K73 Telematics Communication Interface Control Module signal circuit terminal 1 X2
- K73 Telematics Communication Interface Control Module signal circuit terminal 2 X2
- **If 1 V or greater**

Repair the short to voltage on the circuit.

- **Go to next step: If less than 1 V**

3. Ignition OFF/Vehicle OFF.

4. Test for infinite resistance between the signal circuits listed below and ground:

- K73 Telematics Communication Interface Control Module signal circuit terminal 1 X2
- K73 Telematics Communication Interface Control Module signal circuit terminal 2 X2
- **If less than infinite resistance**

Repair the short to ground on the circuit.

- **Go to next step: If infinite resistance**

5. Test for less than 2 Ω between the signal circuit terminals listed below:

- K73 Telematics Communication Interface Control Module signal circuit terminal 1 X2 and the A11 Radio signal circuit terminal 10 X1
- K73 Telematics Communication Interface Control Module signal circuit terminal 2 X2 and the A11 Radio signal circuit terminal 9 X1
- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **Go to next step: If less than 2 Ω**

6. Replace the K73 Telematics Communication Interface Control Module.

7. Verify that the Connecting to OnStar[®] message is heard clearly through the audio system when the OnStar[®] blue button is pressed.

- **If audio is not heard clearly**

Replace the A11 Radio.

- **Go to next step: If audio is heard clearly**

8. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for module replacement, programming, and setup.

ONSTAR AUDIO MALFUNCTION (WITHOUT 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Audio Signal	1	1	1	-
Audio Common Signal	-	1	-	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
1. No or noisy OnStar [®] audio				

Circuit/System Description

When an OnStar[®] keypress is made, a serial data message is sent to the audio system to mute all radio functions and output OnStar[®] originated audio. After the audio system is muted, the telematics communication interface control module transmits signals to the audio system on the audio signal and audio common circuits.

Reference Information

Schematic Reference

- [OnStar/Telematics Wiring Schematics](#)
- [Radio/Navigation System Wiring Schematics \(IO5/IO6\) Radio/Navigation System Wiring Schematics \(IOR\) Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation (UE1 without IOU/IOT/IOR)

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 \(UQA with IO5/IO6\)Speaker Malfunction \(UZ6\)Speaker Malfunction \(without UQA/UZ6\)Speaker Malfunction \(UQA with IOS/IOT/IOU\)](#)

- **Go to next step: If audio is heard clearly**

3. Verify that the Connecting to OnStar[®] message is heard clearly through the audio system when the OnStar[®] blue button is pressed.

- **If OnStar message is noisy or distorted**

Refer to Circuit/System Testing

- **Go to next step: If OnStar message is heard clearly**

4. All OK.

Circuit/System Testing

1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the A11 Radio and 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 terminals listed below and ground:

- K73 Telematics Communication Interface Control Module signal circuit terminal 1 X2
- K73 Telematics Communication Interface Control Module signal circuit terminal 2 X2
- **If 1 V or greater**

Repair the short to voltage on the circuit.

- **Go to next step: If less than 1 V**

3. Ignition OFF/Vehicle OFF.

4. Test for infinite resistance between the signal circuits listed below and ground:

- K73 Telematics Communication Interface Control Module signal circuit terminal 1 X2
- K73 Telematics Communication Interface Control Module signal circuit terminal 2 X2
- **If less than infinite resistance**

Repair the short to ground on the circuit.

- **Go to next step: If infinite resistance**

5. Test for less than 2 Ω between the signal circuit terminals listed below:

- K73 Telematics Communication Interface Control Module signal circuit terminal 1 X2 and the A11 Radio signal circuit terminal 20 X1
- K73 Telematics Communication Interface Control Module signal circuit terminal 2 X2 and the A11 Radio signal circuit terminal 19 X1
- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **Go to next step: If less than 2 Ω**

6. Replace the K73 Telematics Communication Interface Control Module.

7. Verify that the Connecting to OnStar[®] message is heard clearly through the audio system when the OnStar[®] blue button is pressed.

- **If audio is not heard clearly**

Replace the A11 Radio.

- **Go to next step: If audio is heard clearly**

8. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for 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.
- Review [Strategy Based Diagnosis](#) for an overview of the diagnostic approach.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B2462 02

Global Positioning System Short to Ground

DTC B2462 04

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 an 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 malfunction-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 Wiring Schematics](#)
- [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Description and Operation

- [OnStar Description and Operation \(UE1 without IOU/IOT/IOR\)](#)
- [Radio/Audio System Description and Operation \(IO5/IO6\)](#)

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**

Refer to Circuit/System Testing With Navigation System.
 - **Go to next step: 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.
 - **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: 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 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.

- **Go to next step: 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 T2RR Antenna - Roof Rear. Refer to component testing.

- **If the coax cable does not pass the test**

Replace the coax cable.

- **Go to next step: If the coax cable passes the test**

5. Test or replace the T2RR Antenna - Roof Rear.

with Navigation System

NOTE: You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.

1. Ignition OFF, disconnect the T2RR Antenna - Roof Rear 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 T2RR Antenna - Roof Rear. 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 T2RR Antenna - Roof Rear.

- **Go to next step: 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 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.

- **Go to next step: 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.

- **Go to next step: If the coax cable passes the test.**

9. Ignition 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.

12. Verify DTC B2462 is not set or that the NO GPS symbol/message is not displayed on the radio display.

- **If DTC B2462 is set or the NO GPS symbol/message is displayed**

Replace the K74 Human Machine Interface Control Module

- **Go to next step: 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 K74 Human Machine Interface Control Module. Refer to Component Testing.

- **If the coax cable does not pass the test.**

Replace the coax cable.

- **Go to next step: 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.
 - **Go to next step: 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.
 - **Go to next step: 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.
 - **Go to next step: If infinite resistance**
5. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Radio Antenna Base Replacement \(Equinox\)](#) [Radio Antenna Base Replacement \(Terrain\)](#).
- Refer to [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 (IO5/IO6 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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.

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 Wiring Schematics (IO5/IO6)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

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

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 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 if the NO GPS symbol is displayed**

Replace the K74 Human Machine Interface Control Module.
 - **Go to next step: 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.
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
 - **Go to next step: If the coax cable passes the test**
6. Test or replace the T2RR Antenna - Roof Rear.

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
 - **Go to next step: 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
 - **Go to next step: 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
 - **Go to next step: If infinite resistance**
5. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the diagnostic procedure.

- Refer to [High Frequency Antenna Replacement \(Equinox\)](#), [High Frequency Antenna Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) for human machine interface control module replacement, programming, and setup.

NO GLOBAL POSITIONING SYSTEM (GPS) RECEPTION (WITHOUT 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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.

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 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 malfunction - 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 Wiring Schematics](#)
- [Radio/Navigation System Wiring Schematics \(IOB\)](#) [Radio/Navigation System Wiring Schematics \(IOR\)](#) [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Description and Operation

- [OnStar Description and Operation \(UE1 without IOU/IOT/IOR\)](#) [OnStar Description and Operation \(UE1 with IOU/IOT/IOR\)](#)
- [Radio/Audio System Description and Operation \(IOB\)](#) [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#) [Radio/Audio System Description and Operation \(IOR\)](#)

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 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, 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.

- **Go to next step: 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 T2RR Antenna - Roof Rear. Refer to component testing.

- **If the coax cable does not pass the test**

Replace the coax cable.

- **Go to next step: If the coax cable passes the test**

5. Test or replace the T2RR Antenna - Roof Rear.

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**

Replace the coax cable.

- **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: If infinite resistance**

5. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Radio Antenna Base Replacement \(Equinox\)](#) [Radio Antenna Base Replacement \(Terrain\)](#).
- Refer to [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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
10 V Reference	B2476 02	B2476 04	B2476 04	-
Red LED Control Terminal 14	1	1	2	-
Green LED Control Terminal 15	1	1	2	-
Ground	-	B2476 04	-	-
1. OnStar [®] LED Inoperative 2. LED Illuminated At All Times				

Circuit Description

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

Reference Information

Schematic Reference

[OnStar/Telematics Wiring Schematics](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Description and Operation

[OnStar Description and Operation \(UE1 without IOU/IOT/IOR\)](#) [OnStar Description and Operation \(UE1 with IOU/IOT/IOR\)](#)

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. Vehicle in Service Mode/Ignition ON.

2. Verify no DTCs are set.

- If any DTCs are set

- **Go to next step: If no DTCs are set**

3. Verify that the green LED turns ON and OFF when commanding the Green Indicator ON and OFF with a scan tool.

- **If the green LED does not turn ON and OFF**

Refer to Circuit/System Testing - Green LED Test

- **Go to next step: If the green LED turns ON and OFF**

4. Verify that the red LED turns ON and OFF when commanding the Red Indicator ON and OFF with a scan tool.

- **If the red LED does not turn ON and OFF**

Refer to Circuit/System Testing - Red LED Test

- **Go to next step: If the red LED turns ON and OFF**

5. All OK.

Circuit/System Testing

Green LED Test

1. Vehicle OFF/Ignition OFF, and all vehicle systems OFF, disconnect the harness connector at the A98 Front Overhead Console. It may take up to 2 min for all vehicle systems to power down. Doors closed, courtesy lamps OFF.

2. Test for less than 10 Ω between the ground circuit terminal 5 and ground.

- **If 10 Ω or greater**

1. Vehicle OFF/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.

- **Go to next step: If less than 10 Ω**

3. Vehicle in Service Mode/Ignition ON.

4. Test for less than 1 V between the control circuit terminal 15 and ground while commanding the Green Indicator OFF with a scan tool.

- **If 1 V or greater**

1. Vehicle OFF/Ignition OFF, disconnect the X1 harness connector at the K73 Telematics Communication Interface Control Module, vehicle in Service Mode/Ignition ON.

2. Test for less than 1 V between the control circuit terminal 15 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.

- **Go to next step: If less than 1 V**

5. Test for greater than 8 V between the control circuit terminal 15 and ground while commanding the Green Indicator ON with a scan tool.

- **If 8 V or less**

1. Vehicle OFF/Ignition OFF, disconnect the X1 harness connector at the K73 Telematics Communication Interface Control Module.

2. Test for infinite resistance between the control circuit terminal 15 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.
 - **Go to next step: If greater than 8 V**
6. Test or replace the A98 Front Overhead Console.

Red LED Test

- Vehicle OFF/Ignition OFF, and all vehicle systems OFF, disconnect the harness connector at the A98 Front Overhead Console. It may take up to 2 min for all vehicle systems to power down. Doors closed, courtesy lamps OFF.
- Test for less than 10 Ω between the ground circuit terminal 5 and ground.
 - **If 10 Ω or greater**
 - Vehicle OFF/Ignition OFF.
 - 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.
 - **Go to next step: If less than 10 Ω**
- Vehicle in Service Mode/Ignition ON.
- Test for less than 1 V between the control circuit terminal 14 and ground while commanding the Red Indicator OFF with a scan tool.
 - **If 1 V or greater**
 - Vehicle OFF/Ignition OFF, disconnect the X1 harness connector at the K73 Telematics Communication Interface Control Module, vehicle in Service Mode/Ignition ON.
 - Test for less than 1 V between the control circuit terminal 14 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.
 - **Go to next step: If less than 1 V**
- Test for greater than 8 V between the control circuit terminal 14 and ground while commanding the Red Indicator ON with a scan tool.
 - **If 8 V or less**
 - Vehicle OFF/Ignition OFF, disconnect the X1 harness connector at the K73 Telematics Communication Interface Control Module.
 - Test for infinite resistance between the control circuit terminal 14 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 - 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.
 - **Go to next step: If greater than 8 V**
- Test or replace the A98 Front Overhead Console.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair procedure.

- Refer to [Roof Console Replacement](#)
- Refer to [Control Module References](#) for 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.

- Review [Strategy Based Diagnosis](#) for an overview of the diagnostic approach.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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 OnStar®, Call Center per a customer request.

Diagnostic Aids

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

Reference Information

Schematic Reference

[OnStar/Telematics Wiring Schematics](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Description and Operation

[OnStar Description and Operation \(UE1 without IOU/IOT/IOR\)](#) [OnStar Description and Operation \(UE1 with IOU/IOT/IOR\)](#)

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

1. 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

Refer to [Diagnostic System Check - Vehicle](#) .

- Go to next step: 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 OnStar®, Call Center

Refer to [Unable to Contact OnStar Call Center](#)

- **Go to next step: 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

- **Go to next step: If the remote functions operate when requested**

5. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
10 V Reference	B2476 02	B2476 04	B2476 04	-
Signal Terminal 17	B2476 02	B2476 04	B2476 59	B2476 59, B2482 00
Ground	-	B2476 04	-	-

Circuit/System Description

The OnStar[®] button assembly consists of 3 buttons: Call/Answer, OnStar[®] Call Center, and OnStar[®] Emergency. The telematics communication interface control module supplies the OnStar[®] button assembly with 10 V via the 10 V reference 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 pressed.

Conditions for Running the DTC

- Vehicle in Service Mode/Ignition ON.
- Battery voltage must be between 9 - 16 V.

Conditions for Setting the DTC

B2476 04

The telematics communication interface control module detects an open/high resistance on the keypad supply voltage 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 OnStar[®] 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 OnStar[®] status LED turns red.
- No calls can be placed.
- The telematics communication interface control module will ignore all inputs from the OnStar[®] button assembly.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 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 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 Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation (UE1 without IOU/IOT/IOR) OnStar Description and Operation (UE1 with IOU/IOT/IOR)

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

NOTE:

- 10 V reference circuit measurement may vary with vehicle battery voltage.
- Test for voltage range with vehicle battery measuring at a minimum of 11.5 V

1. Vehicle OFF/Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the A98 Front Overhead Console Assembly. 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. Vehicle OFF/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.
 - **Go to next step: If less than 10 Ω**
3. Vehicle in Service Mode/Ignition ON.
4. Test for 8.0 - 10.5 V between the 10 V reference circuit terminal 16 and ground.
 - **If less than 8.0 V**
 1. Vehicle OFF/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. Vehicle OFF/Ignition OFF, disconnect the harness connector at the K73 Telematics Communication Interface Control Module, vehicle in Service Mode/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.
 - **Go to next step: If between 8.0 - 10.5 V**
5. Vehicle OFF/Ignition OFF.
6. Test for 500 - 900 Ω between the signal circuit terminal 17 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, vehicle in Service Mode/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. Vehicle 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.
 - **Go to next step: If between 500 - 900 Ω**

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Roof Console Replacement](#)
- Refer to [Control Module References](#) for telematics communication interface control module replacement, programming and setup.

ONSTAR STEERING WHEEL CONTROL FUNCTIONS MALFUNCTION

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

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

RADIO 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal terminal 6	B123E 02, 1	B123E 01, 1	B123E 01, 1	-
Signal terminal 5	2	2	2	-
Signal terminal 7	3	3	3	-
signal terminal 8	3	3	3	-
Low Reference terminal 10	-	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 Wiring Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

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

- **Go to next step: 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.

- **Go to next step: 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 A20 Radio/HVAC Controls.

2. Test for less than 10 Ω between the following low reference circuit terminal 10 and ground.

- **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 circuit 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.

- **Go to next step: 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 5 @ A20 Radio/HVAC Controls Harness
- Terminal 6 @ A20 Radio/HVAC Controls Harness
- Terminal 7 @ A20 Radio/HVAC Controls Harness
- Terminal 8 @ A20 Radio/HVAC Controls Harness

- **If less than 2.5 V**

1. Ignition OFF/vehicle OFF, disconnect the X1 & X2 harness connectors at the A11 Radio.
2. Test for infinite resistance between the following signal circuits and ground:
 - Terminal 5 @ A20 Radio/HVAC Controls Harness
 - Terminal 6 @ A20 Radio/HVAC Controls Harness
 - Terminal 7 @ A20 Radio/HVAC Controls Harness
 - Terminal 8 @ A20 Radio/HVAC Controls Harness
 - If less than infinite resistance repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 Ω between the following test points:
 - Terminal 5 @ A20 Radio/HVAC Controls Harness & Terminal 3 X2 @ A11 Radio Harness
 - Terminal 6 @ A20 Radio/HVAC Controls Harness & Terminal 8 X1 @ A11 Radio Harness
 - Terminal 7 @ A20 Radio/HVAC Controls Harness & Terminal 8 X2 @ A11 Radio Harness
 - Terminal 8 @ A20 Radio/HVAC Controls Harness & Terminal 9 X2 @ A11 Radio Harness
 - 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 & X2 harness connectors at the A11 Radio.
2. Test for less than 1 V between the following signal circuits and ground:
 - Terminal 5 @ A20 Radio/HVAC Controls Harness
 - Terminal 6 @ A20 Radio/HVAC Controls Harness
 - Terminal 7 @ A20 Radio/HVAC Controls Harness
 - Terminal 8 @ A20 Radio/HVAC Controls Harness
 - If greater than 1 V repair the short to voltage in the circuit.
 - If less than 1 V replace the A11 Radio.

- **Go to next step: If between 2.5 - 3.5 V**

4. Replace the A20 Radio/HVAC Controls

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for radio or radio control assembly replacement, programming, and setup.

RADIO CONTROLS MALFUNCTION (IOR)

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](#)

Circuit/System Description

For an overview of the component/system, refer to: [Radio/Audio System Description and Operation \(IOR\)](#)

Circuit	Description

Circuit	Description
Signal circuit	The control module input circuit has an internal resistance connected to ground.
Low Reference	Grounded through the control module.

Component	Description
A11 Radio	The radio is used for entertainment and may contain other functions like navigation.
P17 Info Display Module	The info display is the big screen in the center console.
A22 Radio Controls	This device is the user interface to control the HVAC and infotainment systems.

Reference Information

Schematic Reference

Radio/Navigation System Wiring Schematics (IOR)

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](#)

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References

Circuit/System Testing

1. Ignition/Vehicle & All vehicle systems - Off
2. Disconnect the electrical connector: @ A22 Radio Controls
3. Test for less than 10 ohms between the test points: Low Reference circuit terminal 4 & Ground
 - **If 10 ohms or greater**
 1. Disconnect the electrical connector: X1 @ P17 Info Display Module
 2. Test for less than 2 ohms between the test points: Low Reference circuit terminal 4 & The other end of the circuit
 - If 2 ohms or greater - Repair the open/high resistance in the circuit.
 - If less than 2 ohms - Replace the component: P17 Info Display Module
 - **Go to next step: If less than 10 ohms**
4. Ignition/Vehicle - On
5. Test for 3 to 3.5 V between the test points:
 - Signal circuit terminal 3 @ A22 Radio Controls & Ground
 - Signal circuit terminal 6 @ A22 Radio Controls & Ground
 - Signal circuit terminal 7 @ A22 Radio Controls & Ground
 - Signal circuit terminal 8 @ A22 Radio Controls & Ground
 - **If less than 3 V**
 1. Ignition/Vehicle & All vehicle systems - Off

2. Disconnect the electrical connector: X1 @ A11 Radio

3. Test for infinite resistance between the test points:

- Signal circuit terminal 3 @ A22 Radio Controls & Ground
- Signal circuit terminal 6 @ A22 Radio Controls & Ground
- Signal circuit terminal 7 @ A22 Radio Controls & Ground
- Signal circuit terminal 8 @ A22 Radio Controls & Ground
- If less than infinite resistance - Repair the short to ground on the circuit.
- If infinite resistance

4. Test for less than 2 ohms between the test points:

- Signal circuit terminal 3 @ A22 Radio Controls & Terminal 24 X1 @ A11 Radio
- Signal circuit terminal 6 @ A22 Radio Controls & Terminal 25 X1 @ A11 Radio
- Signal circuit terminal 7 @ A22 Radio Controls & Terminal 26 X1 @ A11 Radio
- Signal circuit terminal 8 @ A22 Radio Controls & Terminal 27 X1 @ A11 Radio
- If 2 ohms or greater - Repair the open/high resistance in the circuit.
- If less than 2 ohms - Replace the component: A11 Radio

• **If greater than 3.5 V**

1. Ignition/Vehicle & All vehicle systems - Off

2. Disconnect the electrical connector: X1 @ A11 Radio

3. Test for less than 1 V between the test points:

- Signal circuit terminal 3 @ A22 Radio Controls & Ground
- Signal circuit terminal 6 @ A22 Radio Controls & Ground
- Signal circuit terminal 7 @ A22 Radio Controls & Ground
- Signal circuit terminal 8 @ A22 Radio Controls & Ground
- If greater than 1 V

Repair the short to voltage on the circuit.

- If less than 1 V - Replace the component: A11 Radio

• **Go to next step: If between 3 and 3.5 V**

6. Replace the component: 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](#)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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	-	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
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 flickering or distorted image or a blank screen

Reference Information

Schematic Reference

Radio/Navigation System Wiring Schematics (IOB)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

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 .

- **Go to next step: 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 clearly in the display.**

Refer to Circuit/System Testing - Blank Screen

- **Go to next step: 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

- **Go to next step: 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**

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.

- **Go to next step: 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.

- **Go to next step: 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.**
- **Go to next step: If infinite resistance.**

7. Disconnect the LVDS interface cable from the P17 Info Display Module.

8. 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.

9. Disconnect the LVDS interface cable from the A11 Radio. Connect the EL-50334-14 Infotainment Test cable to the A11 Radio.

10. Ignition ON/Vehicle in Service Mode, infotainment system ON.

11. Verify the P17 Info Display Module displays an image.

- **If the P17 Info Display Module does not display an image**

1. Engine running, parking brake applied, transmission in REVERSE.

2. Verify the P17 Info Display Module displays a rear view image.

- If the P17 Info Display Module displays a rear view image, replace the A11 Radio.
- If the P17 Info Display Module does not display a rear view image.

3. Replace the P17 Info Display Module.

4. Ignition ON, infotainment system ON.

5. 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.

6. All OK.

• **Go to next step: If the P17 Info Display Module displays an image.**

12. Replace the vehicle LVDS interface cable from the P17 Info Display Module to the A11 Radio.

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.

• **Go to next step: If between 1.5 - 2 V**

4. Replace the P17 Info Display Module

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Control Module References](#) for control module replacement, programming, and setup.

RADIO INFORMATION DISPLAY MALFUNCTION (IO5/IO6 WITHOUT MAH/MBC)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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

- 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.

Reference Information

Schematic Reference

Radio/Navigation System Wiring Schematics (IO5/IO6)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

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

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 Verification

1. Verify no DTCs are present.
 - **If any DTCs are present**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .

- **Go to next step: If no DTCs are present**

2. Ignition ON, infotainment system ON.

3. Using a scan tool, access the HMI control functions and select Info Display Test.

- **If the Info Display can not display the test image.**

Refer to Circuit/System Testing.

- **Go to next step: If the Info Display can display the test image.**

4. All OK

Circuit/System Testing

1. Vehicle OFF/Ignition OFF.

2. Verify the LVDS interface cable is properly connected at the P17 Info Display Module X2 and the K74 Human Machine Interface Control Module X5 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.

- **Go to next step: 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 X2.

7. Connect the EL-50334-2 Type A female to Mini B male USB Cable to the P17 Info Display Module X2. Connect the EL-50334-14 Infotainment Test Cable to the adapter.

8. Disconnect the LVDS interface cable from the K74 Human Machine Interface Control Module X5. Connect the EL-50334-14 Infotainment Test cable to the K74 Human Machine Interface Module X5.

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/Vehicle in Service Mode, 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 K74 Human Machine Interface Control Module.
- If the P17 Info Display Module displays an image.

4. All OK.

- **Go to next step: If the P17 Info Display Module displays an image.**

11. Replace the vehicle LVDS interface cable from the P17 Info Display Module X2 to the K74 Human Machine Interface Module X5.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Radio Control Assembly Replacement \(Equinox\)](#) [Radio Control Assembly Replacement \(Terrain\)](#)
- Refer to [Control Module References](#) for human machine interface control module replacement, programming, and setup.

RADIO INFORMATION DISPLAY MALFUNCTION (IOS/IOT/IOU)

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.
- Refer to **Diagnostic Procedure Instructions** to provide an overview of each diagnostic category.

DTC Descriptor

DTC B127E 00

Front Video Display Output Signal - General failure

DTC B127E 06

Front Video Display Output Signal - Short to ground or open

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.

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

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 continuously 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 Wiring Schematics (IOS/IOT/IOU)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Radio/Audio System Description and Operation (IOS/IOT/IOU)

- [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. Vehicle OFF/Ignition OFF.
2. Verify the LVDS interface cable is properly connected at the P17 Info Display Module and the A11 Radio 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.**

Replace LVDS interface cable from the P17 Info Display Module to the A11 Radio.

5. Ignition ON/Vehicle in Service Mode, infotainment system ON.
6. Verify the P17 Info Display Module displays an image.
 - **If the P17 Info Display Module does not display an image.**

Replace the P17 Info Display Module.

7. Ignition ON/Vehicle in Service Mode, infotainment system ON.
8. Verify the P17 Info Display Module displays an image.
 - **If the P17 Info Display Module does not display an image.**

Replace A11 Radio.

- **Go to next step: If the P17 Info Display Module displays an image.**
9. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Control Module References](#) for radio replacement, programming, and setup.

RADIO INFORMATION DISPLAY MALFUNCTION (IO5/IO6 WITH MAH/MBC)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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.

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 a flickering or distorted image or a blank screen.

Using a dry cloth to clean the instrument panel in the area of the Information Display may cause the screen to flicker due to static buildup/discharge. The owner manual recommends using a microfiber cloth dampened with water to remove dust and dirt from the instrument panel.

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 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 Wiring Schematics (IO5/IO6)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

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

- [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. 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 infotainment image.
 - **If the P17 Info Display Module does not display an infotainment image.**
Refer to [Rear Vision Camera System Malfunction \(IO5/IO6 with MAH/MBC\)](#).
 - **Go to next step: If the P17 Info Display Module displays an infotainment image.**
All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Radio Control Assembly Replacement \(Equinox\) Radio Control Assembly Replacement \(Terrain\)](#)
- Refer to [Control Module References](#) for control module replacement, programming, and setup.

RADIO INFORMATION DISPLAY MALFUNCTION (IOR)

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](#)

Circuit/System Description

For an overview of the component/system, refer to: [Radio/Audio System Description and Operation \(IOR\)](#)

Circuit	Description
Signal circuit terminal 6	The control module input circuit has an internal resistance connected to ground.
Control circuit terminal 9	The input voltage varies depending on the switch position.
12 V Reference circuit terminal 1	Regulated voltage supplied by the control module.
Low-Voltage Differential Signaling Cable	Audio and Video Module Cable

Component	Description

Component	Description
A11 Radio	The radio is used for entertainment and may contain other functions like navigation.
P17 Info Display Module	The info display is the big screen in the center console.

Reference Information

Schematic Reference

Radio/Navigation System Wiring Schematics (IOR)

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](#)

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References

Special Tools

- EL-50334-2 USB Type A Female to Type B Mini Male Adapter
- EL-50334-14 Infotainment Test Cable

Circuit/System Verification

1. Ignition - On/Vehicle - In Service Mode - Infotainment System State - ON
2. Verify the component turns On and Off: P17 Info Display Module

- **If the component does not work as specified**

Refer to Circuit/System Testing.

- **Go to next step: If the component works as specified**

All OK.

Circuit/System Testing

1. Ignition/Vehicle & All vehicle systems - Off
2. Disconnect the electrical connector: X1 @ P17 Info Display Module
3. Ignition - On/Vehicle - In Service Mode - Infotainment System State - On
4. Test for greater than 3 V between the test points: Signal circuit terminal 6 & Ground
 - **If less than 3 V**
 1. Ignition/Vehicle & All vehicle systems - Off
 2. Disconnect the electrical connector: X1 @ A11 Radio
 3. Test for infinite resistance between the test points: Signal circuit terminal 6 & Ground
 - If less than infinite resistance - Repair the short to ground on the circuit.
 - If infinite resistance

4. Test for less than 2 ohms between the test points: Signal circuit terminal 6 & The other end of the circuit
 - If 2 ohms or greater - Repair the open/high resistance in the circuit.
 - If less than 2 ohms - Replace the component: A11 Radio
 - **Go to next step: If greater than 3 V**
5. Test for battery voltage between the test points: 12 V Reference circuit terminal 1 & Ground
 - **If less than battery voltage**
 1. Ignition/Vehicle - Off
 2. Disconnect the electrical connector: X1 @ A11 Radio
 3. Test for infinite resistance between the test points: 12 V Reference circuit terminal 1 @ P17 Info Display Module Component harness & Ground
 - If less than infinite resistance - Repair the short to ground on the circuit.
 - If infinite resistance
 4. Test for less than 2 ohms between the test points: 12 V Reference circuit terminal 1 @ P17 Info Display Module Component harness & The other end of the circuit
 - If 2 ohms or greater - Repair the open/high resistance in the circuit.
 - If less than 2 ohms - Replace the component: A11 Radio
 - **Go to next step: If battery voltage**
6. Adjust - Dimmer Switch - High
7. Test for 3 to 3.5 V between the test points: Control circuit terminal 9 & Ground
 - **If less than 3 V**
 1. Ignition/Vehicle - Off
 2. Disconnect the electrical connector: X1 @ A11 Radio
 3. Test for infinite resistance between the test points: Control circuit terminal 9 @ P17 Info Display Module Component harness & Ground
 - If less than infinite resistance - Repair the short to ground on the circuit.
 - If infinite resistance
 4. Test for less than 2 ohms between the test points: Control circuit terminal 9 @ P17 Info Display Module Component harness & The other end of the circuit
 - If 2 ohms or greater - Repair the open/high resistance in the circuit.
 - If less than 2 ohms - Replace the component: A11 Radio
 - **If greater than 3.5 V**
 1. Ignition/Vehicle - Off
 2. Disconnect the electrical connector: X1 @ A11 Radio
 3. Ignition - On/Vehicle - In Service Mode
 4. Test for less than 1 V between the test points: Control circuit terminal 9 @ P17 Info Display Module Component harness & Ground
 - If 1 V or greater - Repair the short to voltage on the circuit.
 - If less than 1 V - Replace the component: A11 Radio
 - **Go to next step: If between 3 and 3.5 V**
 - 8. Connect all electrical connectors.
 - 9. Verify the following conditions do not exist:

Damaged, defective, or loose component: Low-Voltage Differential Signaling Cable

10. Disconnect the electrical connector: Low-Voltage Differential Signaling Cable @ P17 Info Display Module
11. Connect - EL-50334-2 USB Type A Female to Type B Mini Male Adapter @ P17 Info Display Module & EL-50334-14 Infotainment Test Cable
12. Disconnect the electrical connector: Low-Voltage Differential Signaling Cable @ A11 Radio
13. Connect - EL-50334-14 Infotainment Test Cable @ A11 Radio

14. Ignition - On/Vehicle - In Service Mode - Infotainment System State - ON

15. Verify the component works as specified: P17 Info Display Module

- **If the component does not work as specified**

1. Replace the component: P17 Info Display Module - Connect all electrical connectors.

2. Ignition - On/Vehicle - In Service Mode - Infotainment System State - ON

3. Verify the component works as specified: P17 Info Display Module

- If the component does not work as specified

Replace the component: A11 Radio

- If the component works as specified

4. All OK.

- **Go to next step: If the component works as specified**

16. Replace the component: Low-Voltage Differential Signaling Cable

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](#)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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/Vehicle in Service Mode.
- 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 clear 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.

Reference Information

Schematic Reference

[Radio/Navigation System Wiring Schematics \(IOB\)](#) [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#) [Radio/Navigation System Wiring Schematics \(IOR\)](#) [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#) [Radio/Audio System Description and Operation \(IOB\)](#) [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#) [Radio/Audio System Description and Operation \(IOR\)](#)

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

- **Go to next step: If no damage is found**

2. Ignition ON/Vehicle in Service Mode, 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

- **Go to next step: 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 T2RR Antenna - Rear Roof.

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

- **Go to next step: If the coax cable passes the test**

3. Connect the radio antenna coax cable to the A11 Radio.

4. Ignition ON, A11 Radio ON.

5. Verify a test lamp illuminates between the antenna coax cable center terminal at the T2RR Antenna - Rear Roof and chassis ground.

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

Replace the A11 Radio.

- **Go to next step: If the test lamp illuminates**

6. Test or replace the T2RR Antenna - Rear Roof.

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

- **Go to next step: 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

- **Go to next step: 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

- Go to next step: If infinite resistance

5. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the diagnostic procedure.

- Refer to [High Frequency Antenna Replacement \(Equinox\)](#) [High Frequency Antenna Replacement \(Terrain\)](#)
- Refer to [Control Module References](#) for radio replacement, programming, and setup.

SPEAKER REPLACEMENT REFERENCE

Component	Repair Instruction
Center I/P Speaker	Radio Front Center Speaker Replacement (Equinox) Radio Front Center Speaker Replacement (Terrain)
Front Side Door Speakers	Radio Front Side Door Speaker Replacement
Front Tweeter Speakers	Radio Front Speaker Replacement (Equinox) Radio Front Speaker Replacement (Terrain)
Rear Side Door Speakers	Radio Rear Side Door Speaker Replacement

SPEAKER MALFUNCTION (UQA 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.
- Refer to [Diagnostic Procedure Instructions](#) to 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

DTC B1105

Audio Output 9 Circuit

For symptom byte information refer to [Symptom Byte List](#).

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 Tweeter)	B1085 02	B1085 04	B1085 01	-
Audio Output 8 Signal Circuits (Right Front Tweeter)	B1095 02	B1095 04	B1095 01	-
Audio Output 9 Signal Circuits (Center I/P)	B1105 02	B1105 04	B1105 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, B1045 01, B1065 01, B1075 01, B1085 01, B1095 01, B1105 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, B1105 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, B1105 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, B1105 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, B1105 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, B1105 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 Wiring Schematics (IO5/IO6)

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.

- **Go to next step: If clear audio is heard from all speakers**

3. All OK.

Circuit/System Testing

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.
 - **Go to next step: If between 5 - 7 V**
3. Test or replace the P19 Speaker.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Speaker Replacement Reference](#)
- Refer to [Control Module References](#) for amplifier replacement, programming, and setup.

SPEAKER MALFUNCTION (UZ6)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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.				

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

- 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 replicates the high level audio signals from the radio to the speakers. If the module malfunctions, all the speakers may become inop.

Reference Information

Schematic Reference

[Radio/Navigation System Wiring Schematics \(IOB\)](#) [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#) [Radio/Navigation System Wiring Schematics \(IOR\)](#) [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#) [Radio/Audio System Description and Operation \(IOB\)](#) [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#) [Radio/Audio System Description and Operation \(IOR\)](#)

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, 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 but not all.**
Refer to Circuit/System Testing One Speaker.
 - **If audio is Inoperative from all speakers .**
Refer to Circuit/System Testing All Speakers.
 - **Go to next step: If clear audio is heard from all speakers.**
3. All OK.

Circuit/System Testing

One Speaker

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, 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, disconnect the appropriate harness connector at the K108 Active Noise Cancellation Module/T3 Audio Amplifier.

2. Test for infinite resistance between the appropriate signal circuits 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 K108 Active Noise Cancellation Module/T3 Audio Amplifier.

- **If greater than 7 V**

1. Ignition OFF, disconnect the appropriate harness connector at the K108 Active Noise Cancellation Module/T3 Audio Amplifier.

2. Ignition ON, A11 Radio ON, mute OFF. Test for less than 1 V between the appropriate signal circuit and ground.

- If 1 V or greater, repair the short to voltage on the circuit.
- If less than 1 V, replace the K108 Active Noise Cancellation Module/T3 Audio Amplifier.

- **Go to next step: If between 5 - 7 V**

3. Ignition OFF, disconnect the appropriate harness connector at the K108 Active Noise Cancellation Module/T3 Audio Amplifier.

4. Ignition ON, A11 Radio ON, mute OFF. Test for 5 - 7 V between each appropriate audio signal circuit from the A11 Radio and Ground.

- **If less than 5 V**

1. Ignition OFF, Disconnect the appropriate speaker harness connector at the A11 Radio.

2. Test for infinite resistance between the signal circuits 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 appropriate speaker 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.

- **Go to next step: If between 5 - 7 V**

5. Test or replace the P19 Speaker.

All Speakers

1. Ignition OFF, disconnect the X1 harness connector at the K108 Active Noise Cancellation Module/T3 Audio Amplifier.

2. Test for less than 10 Ω between the ground circuit terminal 8 and ground.

- **If 10 Ω or greater**

1. 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.

- **Go to next step: If less than 10 Ω**

3. Verify that a test lamp illuminates between the B+ circuit terminal 4 and ground.

- **If the test lamp does not illuminate**
 1. 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.
 - **Go to next step: If the test lamp illuminates**
- 4. Ignition ON, A11 Radio ON.
- 5. Verify that a test lamp illuminates between the control circuit terminal 3 and ground.
 - **If the test lamp does not illuminate**
 1. Ignition 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 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 A11 Radio.
 - **Go to next step: If the test lamp illuminates**
- 6. Test for 5 - 7 V between any audio signal circuit from the A11 Radio and Ground.
 - **If not between 5 - 7 V**

Test or replace the A11 Radio.
 - **Go to next step: If between 5 - 7 V**
- 7. Test or replace the K108 Active Noise Cancellation Module/T3 Audio Amplifier.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Speaker Replacement Reference](#)
- Refer to [Control Module References](#) for radio and amplifier replacement, programming, and setup.

SPEAKER MALFUNCTION (WITHOUT UQA/UZ6)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Left Front Speaker Output Signal	1	1	1, 2	-
Right Front Speaker Output Signal	1	1	1, 2	-
Left Rear Speaker Output Signal	1	1	1, 2	-
Right Rear Speaker Output Signal	1	1	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 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.

Reference Information

Schematic Reference

[Radio/Navigation System Wiring Schematics \(IOB\)](#) [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#) [Radio/Navigation System Wiring Schematics \(IOR\)](#) [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#) [Radio/Audio System Description and Operation \(IOB\)](#) [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#) [Radio/Audio System Description and Operation \(IOR\)](#)

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.

- **Go to next step: If clear audio is heard from all speakers.**
3. All OK.

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.
 - 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.
 - **Go to next step: If between 5 - 7 V**
3. Test or replace the P19 Speaker.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Speaker Replacement Reference](#)
- Refer to [Control Module References](#) for radio replacement, programming, and setup.

SPEAKER MALFUNCTION (UQA WITH IOS/IOT/IOU)

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.
- Refer to [Diagnostic Procedure Instructions](#) to 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 B1085

Audio Output 7 Circuit

DTC B1095

Audio Output 8 Circuit

DTC B1105

Audio Output 9 Circuit

DTC B1115

Audio Output 10 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 (Center I/P)	B1065 02	B1065 04	B1065 01	-
Audio Output 7 Signal Circuits (Left Rear Door)	B1085 02	B1085 04	B1085 01	-
Audio Output 8 Signal Circuits (Right Rear Door)	B1095 02	B1095 04	B1095 01	-
Audio Output 9 Signal Circuits (Left Front I/P)	B1105 02	B1105 04	B1105 01	-
Audio Output 10 Signal Circuits (Right Front I/P)	B1115 02	B1115 04	B1115 01	-

Circuit/System Description

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. 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.

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, B1085 01, B1095 01, B1105 01, B1115 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, B1085 02, B1095 02, B1105 02, B1115 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, B1085 04, B1095 04, B1105 04, B1115 04

The test is run once during amplifier wake-up.

Conditions for Setting the DTC

DTC B1025 01, B1045 01, B1065 01, B1085 01, B1095 01, B1105 01, B1115 01

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

DTC B1025 02, B1045 02, B1065 02, B1085 02, B1095 02, B1105 02, B1115 02

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

DTC B1025 04, B1045 04, B1065 04, B1085 04, B1095 04, B1105 04, B1115 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 Wiring Schematics (IOS/IOT/IOU)

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

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.
 - **Go to next step: If clear audio is heard from all speakers**
3. All OK.

Circuit/System Testing

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.
 - **Go to next step: If between 5 - 7 V**
3. Test or replace the P19 Speaker.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Speaker Replacement Reference](#)
- Refer to [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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B2470 02

Cellular Phone Antenna Circuit Malfunction Short to Ground

DTC B2470 04

Circuit/System Description

The primary cellular phone antenna element is connected to the telematics communication interface control module (violet connector) via a shielded coaxial cable. Cellular communication takes place on both the primary cellular antenna signal circuit and the GPS/secondary cellular antenna signal circuit. This diagnostic only applies to the primary cellular antenna signal circuit. Internal to the antenna on the cellular antenna signal circuit resistance is used to apply a load, which the telematics communication interface control module uses to detect the presence of the antenna.

Conditions for Running the DTC

- Ignition in the RUN or ACC position.
- System voltage is between 9.5 V and 15.5 V.
- 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 primary cellular antenna signal circuit.

B2470 04

- The telematics communication interface control module detects an open or high resistance on the primary cellular antenna signal circuit.
- The above conditions are present for greater than 1 s.

Action Taken When the DTC Sets

The OnStar[®] 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 Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

OnStar Description and Operation (UE1 without IOU/IOT/IOR) OnStar Description and Operation (UE1 with IOU/IOT/IOR)

Electrical Information Reference

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

Scan Tool Reference

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 ignition ON for the GPS satellites to acquire vehicle signal.

1. Ignition OFF/Vehicle OFF and all vehicle systems OFF, disconnect the violet primary cellular 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.
2. Using the **EL-49903-1** Test Antenna Navn-Cell Comn connect the violet coax cable to the K73 Telematics Communication Interface Control Module. Place the test antenna on the roof of the vehicle, ignition ON/vehicle in Service Mode.
3. Verify the DTC does not set or a call can be completed to the OnStar Call Center while operating the vehicle within the conditions for running the DTC.

- **If the DTC sets or a call can not be completed to the OnStar Call Center**

Replace the K73 Telematics Communications Interface Control Module.

- **Go to next step: If the DTC does not set or a call can be completed to the OnStar Call Center**

4. Ignition OFF/Vehicle OFF.
5. Disconnect the **EL-49903-1** Test Antenna Navn-Cell Comn from the K73 Telematics Communication Interface Control Module
6. Test the coax cable. Refer to Component Testing.

- **If the coax cable does not pass the test**

Replace the coax cable.

- **Go to next step: If the coax cable passes the test**

7. Test or replace the T2RR Antenna - Roof Rear.

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. Test for less than 5 Ω between the coax cable center terminal end to end.
 - **If 5 Ω or greater**

Replace the coax cable.

- **Go to next step: If less than 5 Ω**
- 2. Test for greater than 5 Ω between the coax cable outer shield end to end.
 - **If 5 Ω or greater**

Replace the coax cable.
 - **Go to next step: If less than 5 Ω**
- 3. 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.
 - **Go to next step: If infinite resistance**
- 4. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair procedure.

- Refer to [High Frequency Antenna Replacement \(Equinox\)](#) [High Frequency Antenna Replacement \(Terrain\)](#)
- Refer to [Control Module References](#) for telematics communication interface control module replacement, setup, and programming

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide 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 Wiring Schematics](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Description and Operation

[OnStar Description and Operation \(UE1 without IOU/IOT/IOR\)](#) [OnStar Description and Operation \(UE1 with IOU/IOT/IOR\)](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

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 \(IO5/IO6/IOB\)](#) [OnStar Microphone Malfunction \(IOR/IOU/IOT/IOS\)](#)

- **Go to next step: 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 \(UE1 without IOU/IOT/IOB\)](#) [OnStar Description and Operation \(UE1 with IOU/IOT/IOB\)](#) for tips on proper pronunciation

- **Go to next step: If the OnStar system responds to all voice commands**

4. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair procedure.

Refer to [Control Module References](#) for telematics communication interface control module replacement, programming, and setup.

VOICE RECOGNITION MALFUNCTION (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.
- Refer to [Diagnostic Procedure Instructions](#) to 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 Wiring Schematics \(IOB\)](#) [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#) [Radio/Navigation System Wiring Schematics \(IOR\)](#) [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#) [Radio/Audio System Description and Operation \(IOB\)](#) [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#) [Radio/Audio System Description and Operation \(IOR\)](#)

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 the OnStar[®] voice recognition system is operating normally.
 - If the OnStar[®] voice recognition system is not operating normally.
Refer to [OnStar Voice Recognition Malfunction](#).
 - Go to next step: If the OnStar[®] 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.

- **Go to next step: 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.

- **Go to next step: 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
- **If less than infinite resistance**

Repair the short to ground on the circuit.

- **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: If the infotainment system responds correctly to the command**

10. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

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.

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 Wiring Schematics \(IOB\)](#) [Radio/Navigation System Wiring Schematics \(IO5/IO6\)](#) [Radio/Navigation System Wiring Schematics \(IOR\)](#) [Radio/Navigation System Wiring Schematics \(IOS/IOT/IOU\)](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Radio/Audio System Description and Operation \(IO5/IO6\)](#) [Radio/Audio System Description and Operation \(IOB\)](#) [Radio/Audio System Description and Operation \(IOS/IOT/IOU\)](#) [Radio/Audio System Description and Operation \(IOR\)](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON, infotainment system ON.

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.
 - **Go to next step: 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.
 - **Go to next step: 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.
 - **Go to next step: 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
 - **Go to next step: 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
 - **Go to next step: 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.
 - **Go to next step: If the infotainment system responds correctly to the command.**
11. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Mobile Telephone Microphone Replacement \(Equinox\)](#), [Mobile Telephone Microphone Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) for human machine interface control module replacement, programming, and setup.

RADIO RESET

Radio Reset Procedure

For radio RPO's IOU and IOT this procedure needs to be followed before a radio is removed for replacement.

NOTE: Selecting Continue restores all factory settings

1. In Radio, Settings select Return to Factory Settings.
2. Three options will be listed, select each option below then select Continue to reset.
 - Reset Vehicle Settings
 - Erase Settings and Personal Data
 - Clear Default Applications
3. Wait 2 min then ignition/vehicle OFF.
4. Replace A11 Radio and program, refer to [Control Module References](#)
5. Start engine and allow to run for 3 min.

6. Ignition/Vehicle OFF, open/close driver door.
7. Allow vehicle modules to sleep, this may take up to 5 min.
8. Ignition/vehicle ON, download customers desired applications.

NOTE: **If the Radio Reset is unable to be performed on the original radio due to a blank screen or similar failure follow the steps below:**

1. Replace A11 Radio and program, refer to [Control Module References](#) .
 2. Attempt to download or access any app.
 3. If an error is displayed perform an OnStar Blue Button press and diagnose the issue with the help of an OnStar advisor.
-

2018 ACCESSORIES & EQUIPMENT

Cellular, Entertainment, And Navigation - Repair Instructions - Equinox & Terrain

REPAIR INSTRUCTIONS

MOBILE TELEPHONE MICROPHONE REPLACEMENT (EQUINOX)

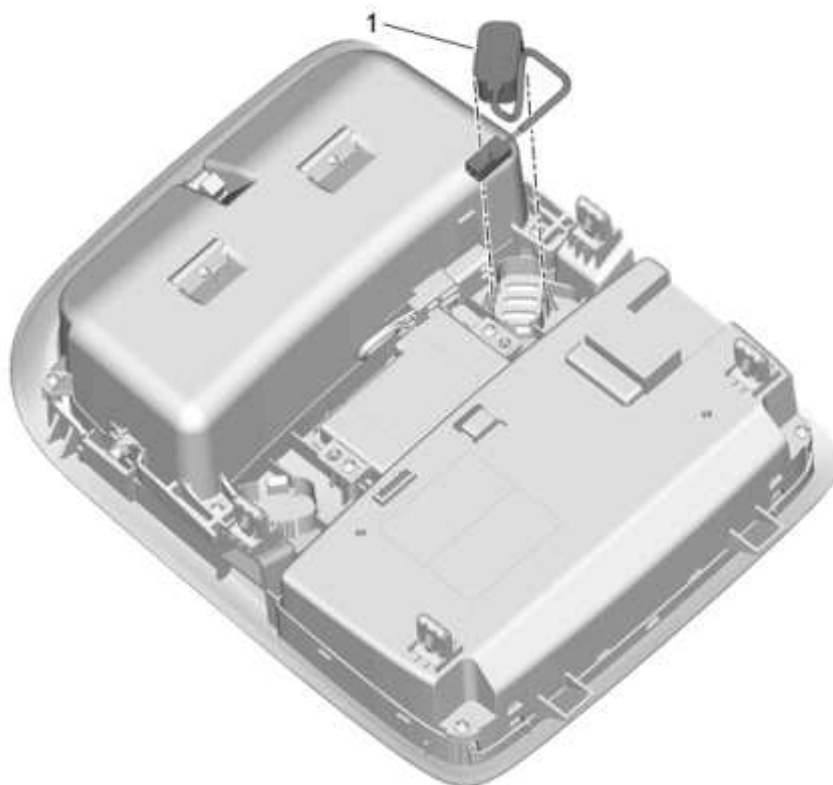


Fig. 1: Mobile Telephone Microphone (Equinox)

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Roof Console Replacement</u>	
1	Mobile Telephone Microphone Procedure Release the retaining tabs.

MOBILE TELEPHONE MICROPHONE REPLACEMENT (TERRAIN)

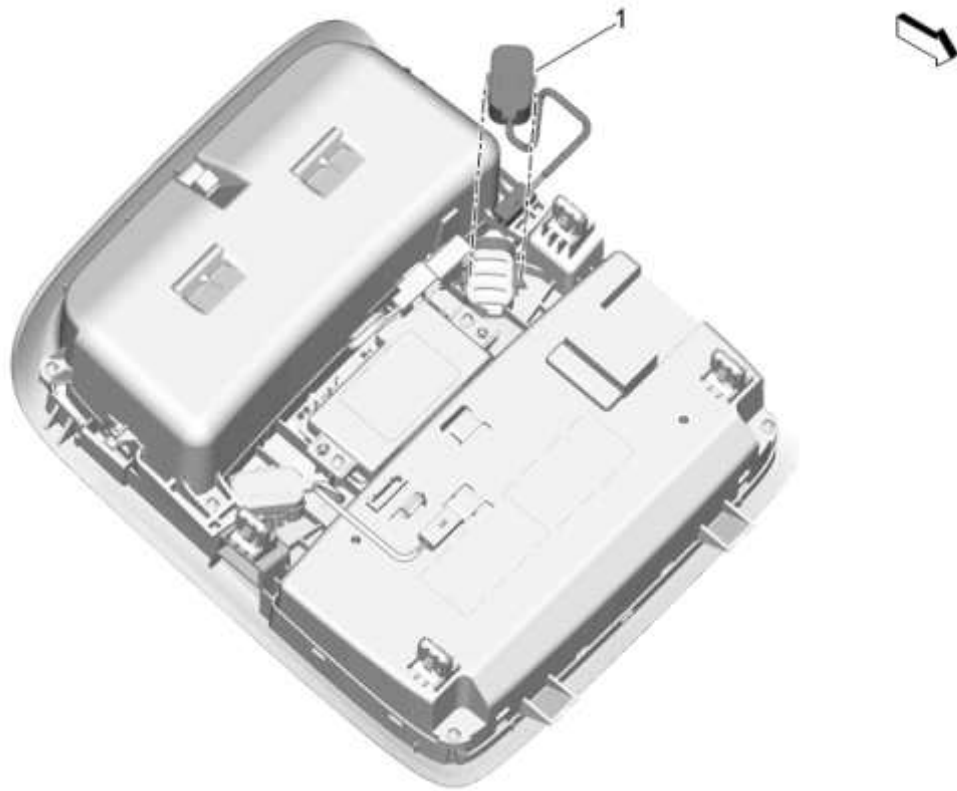


Fig. 2: Mobile Telephone Microphone (Terrain)
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Roof Console Replacement</u>	
1	Mobile Telephone Microphone Procedure Release the retaining tabs.

HUMAN MACHINE INTERFACE CONTROL MODULE REPLACEMENT

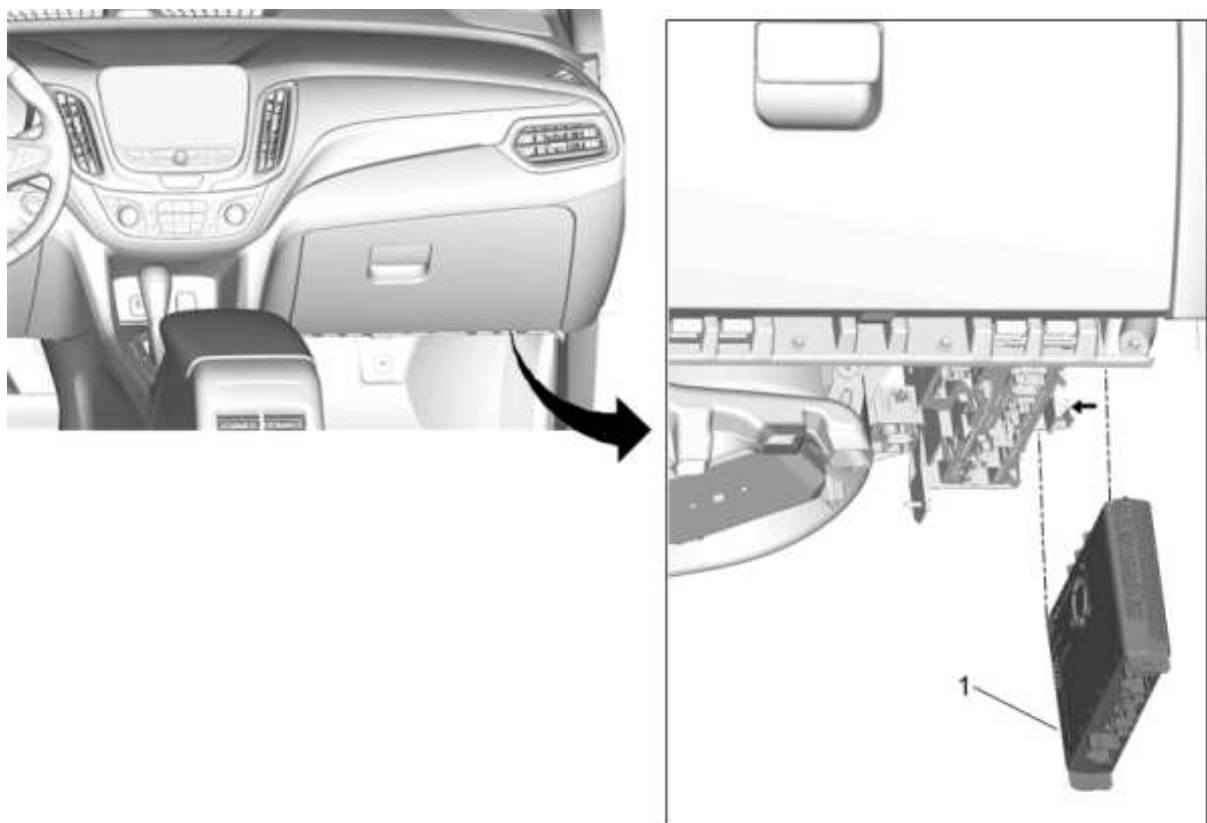


Fig. 3: Human Machine Interface Control Module
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Remove the front side door sill garnish molding - right side. Front Side Door Sill Garnish Molding Replacement (Equinox) Front Side Door Sill Garnish Molding Replacement (Terrain). 2. Reposition the front floor panel carpet as necessary.	
1	Human Machine Interface Control Module Procedure 1. Disconnect the electrical connectors. 2. Release the retaining tab. 3. Perform the necessary programming and setup procedure: Control Module References

COMMUNICATION INTERFACE MODULE MICROPHONE REPLACEMENT



Fig. 4: Communication Interface Module Microphone
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Roof Console Replacement	
1	Communication Interface Module Microphone Procedure 1. Disconnect the electrical connector. 2. Release the retaining tabs.

COMMUNICATION INTERFACE MODULE REPLACEMENT (EQUINOX)

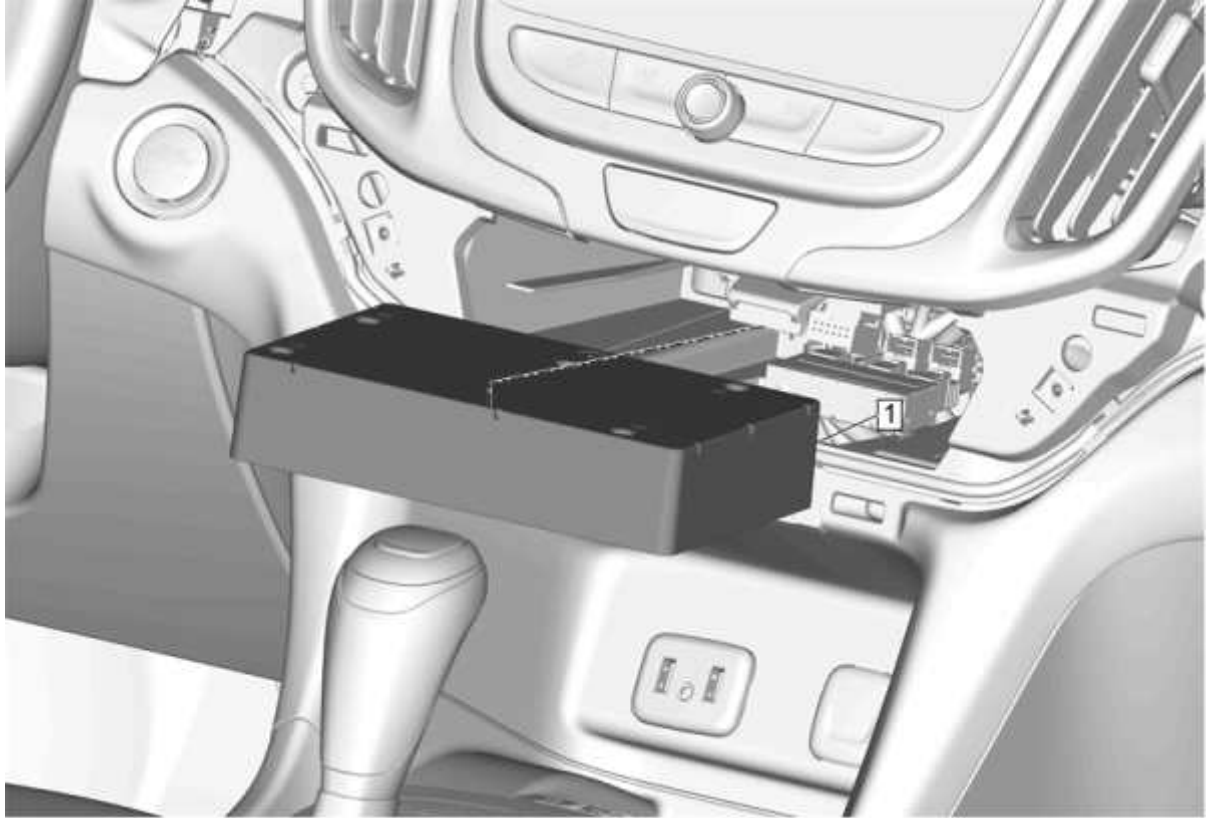


Fig. 5: Communication Interface Module
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Heater and Air Conditioning User Interface Control Replacement (Equinox).</u>	
1	Communication Interface Module Procedure 1. Release the retaining tab. 2. Disconnect the electrical connectors. 3. Perform the necessary programming and setup procedure: <u>Control Module References</u>

COMMUNICATION INTERFACE MODULE REPLACEMENT (TERRAIN WITH IOS, IOT, IOU)

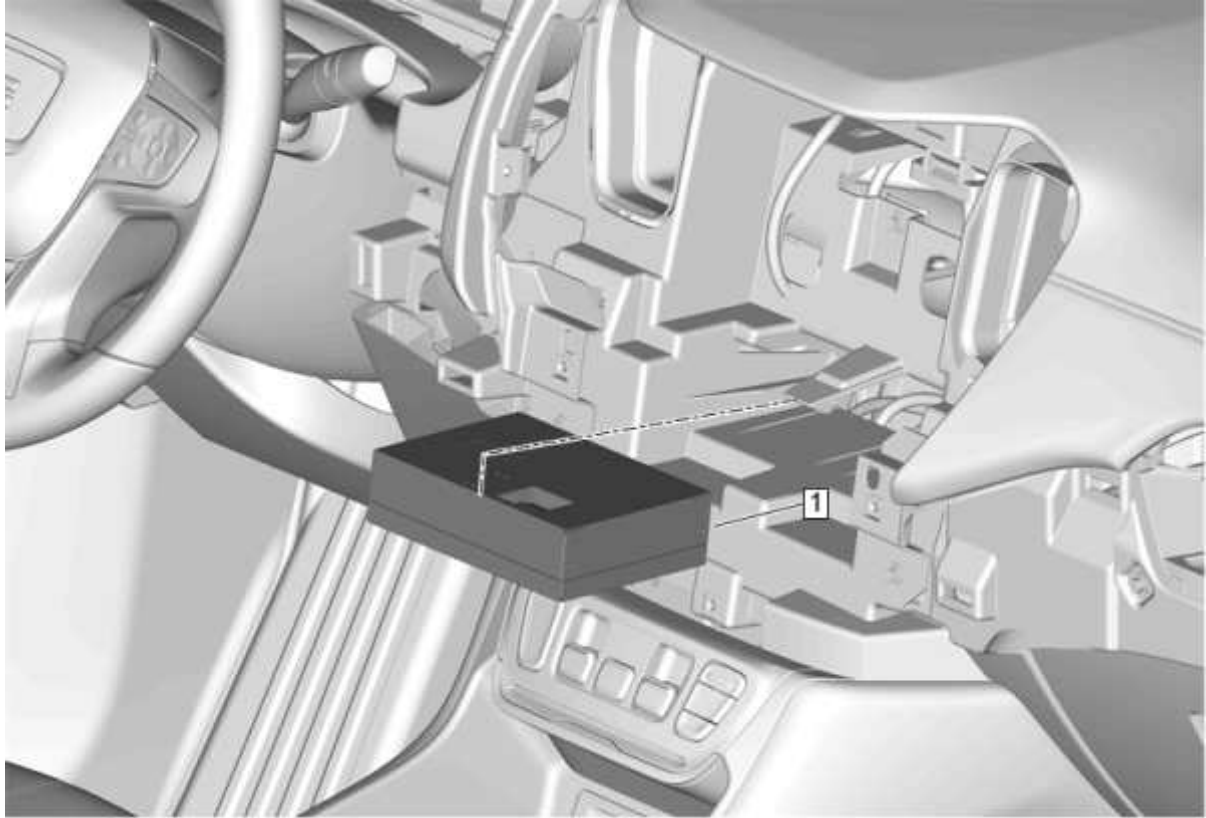


Fig. 6: Communication Interface Module
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Radio Control Assembly Replacement (Terrain)</u>	
1	Communication Interface Module Procedure 1. Release the retaining tab. 2. Disconnect the electrical connectors. 3. Perform the necessary programming and setup procedure: <u>Control Module References</u>

COMMUNICATION INTERFACE MODULE REPLACEMENT (TERRAIN WITH IOR)

Removal Procedure

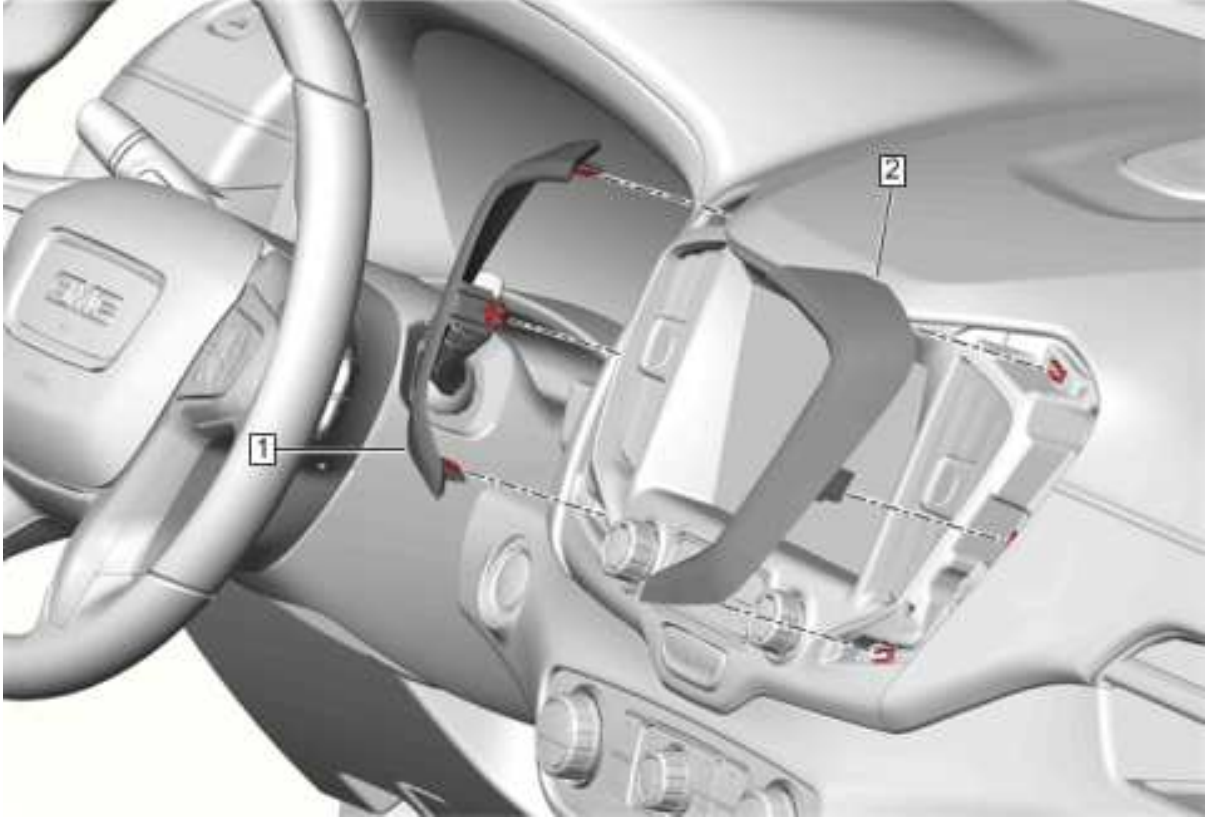


Fig. 7: Instrument Panel Center Trim Plate Applique
 Courtesy of GENERAL MOTORS COMPANY

1. Remove Instrument Panel Center Trim Plate Applique (1, 2) - [Instrument Panel Center Trim Plate Applique Replacement \(Terrain\)](#)

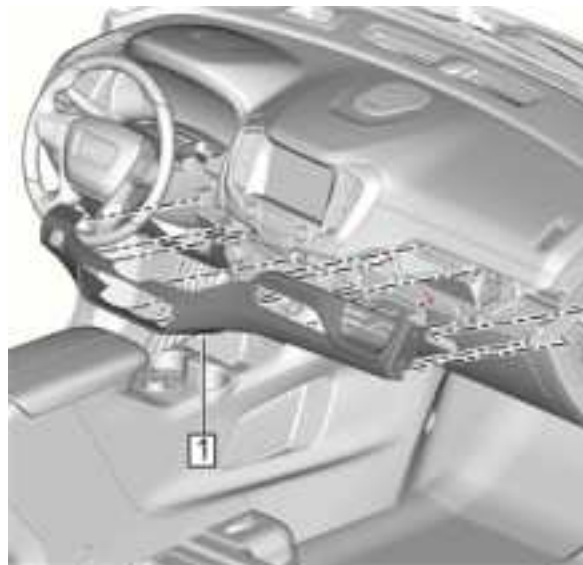


Fig. 8: Instrument Panel Trim Pad
 Courtesy of GENERAL MOTORS COMPANY

2. Remove Instrument Panel Trim Pad - Right Side (1) [Instrument Panel Trim Pad Replacement - Right Side \(Terrain\)](#)



Fig. 9: Radio Control Bolt

Courtesy of GENERAL MOTORS COMPANY

3. Remove Radio Control Bolt (1)



Fig. 10: Instrument Panel Radio Front And Rear Trim Plate Assembly

Courtesy of GENERAL MOTORS COMPANY

NOTE: The instrument panel radio front and rear trim plate, driver information display, heater and air conditioning user interface control, and instrument panel center air outlets comes off as one unit.

4. Remove Instrument Panel Radio Front and Rear Trim Plate Assembly (1)
5. Use a plastic trim tool if necessary.
6. Disconnect the electrical connectors.

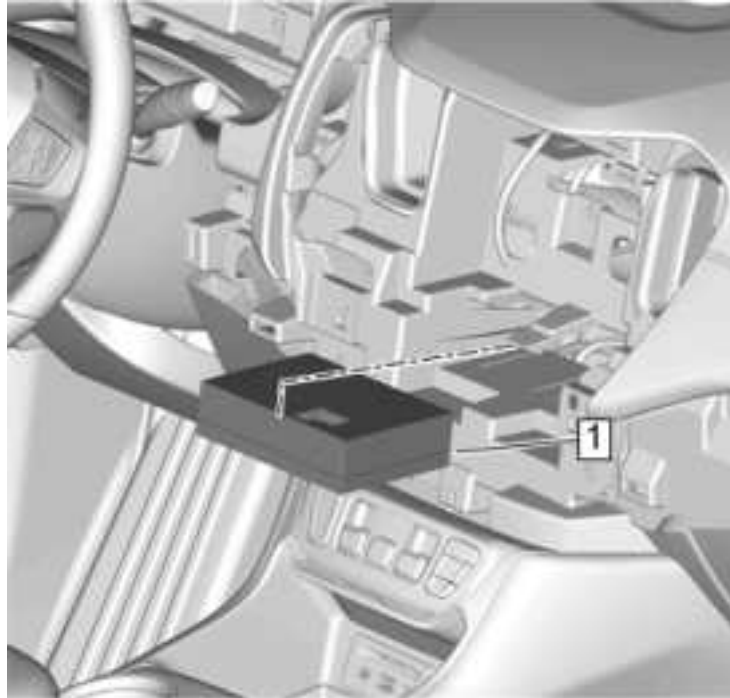


Fig. 11: Communication Interface Module
Courtesy of GENERAL MOTORS COMPANY

7. Release the retaining tab.
8. Remove Communication Interface Module (1)
9. Disconnect the electrical connectors.

Installation Procedure

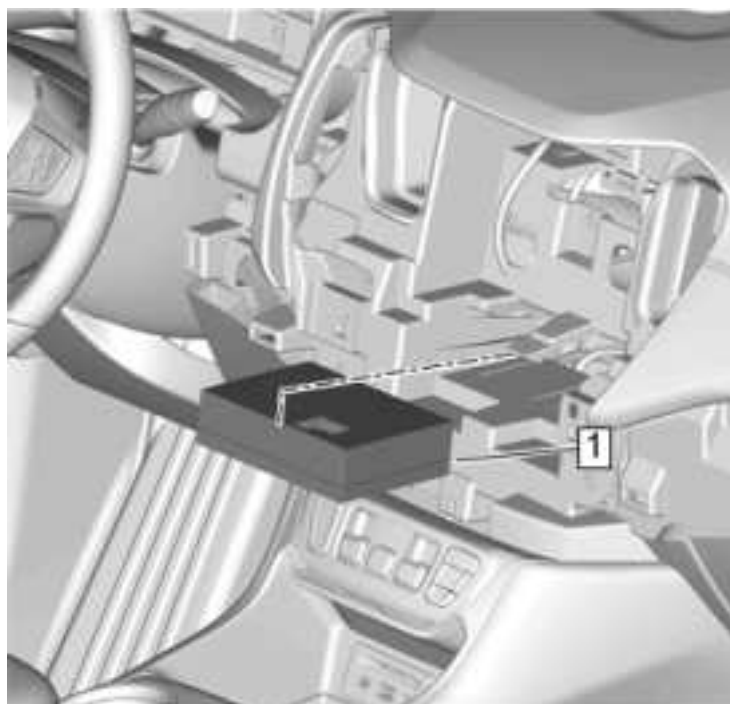


Fig. 12: Communication Interface Module
Courtesy of GENERAL MOTORS COMPANY

1. Connect the electrical connectors.
2. Install Communication Interface Module (1)



Fig. 13: Instrument Panel Radio Front And Rear Trim Plate Assembly
Courtesy of GENERAL MOTORS COMPANY

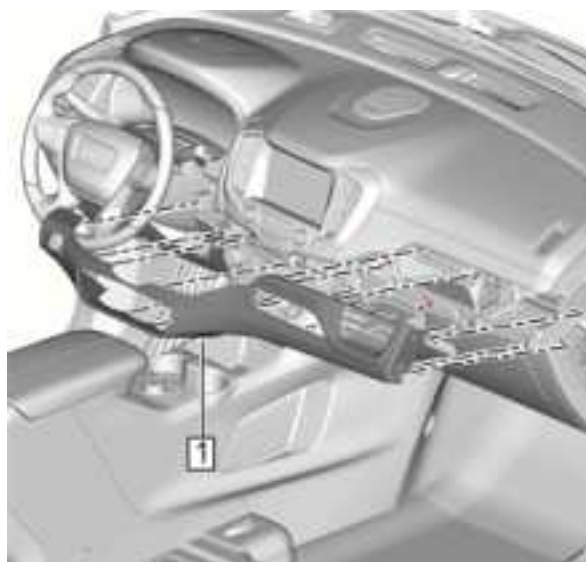
3. Connect the electrical connectors.
4. Install Instrument Panel Radio Front And Rear Trim Plate Assembly (1)



Fig. 14: Radio Control Bolt
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Fastener Caution

5. Install Radio Control Bolt (1) and tighten [7x] 2.5 N.m (22 lb in)



6. Install Instrument Panel Trim Pad - Right Side (1)- **Instrument Panel Trim Pad Replacement - Right Side (Terrain)**

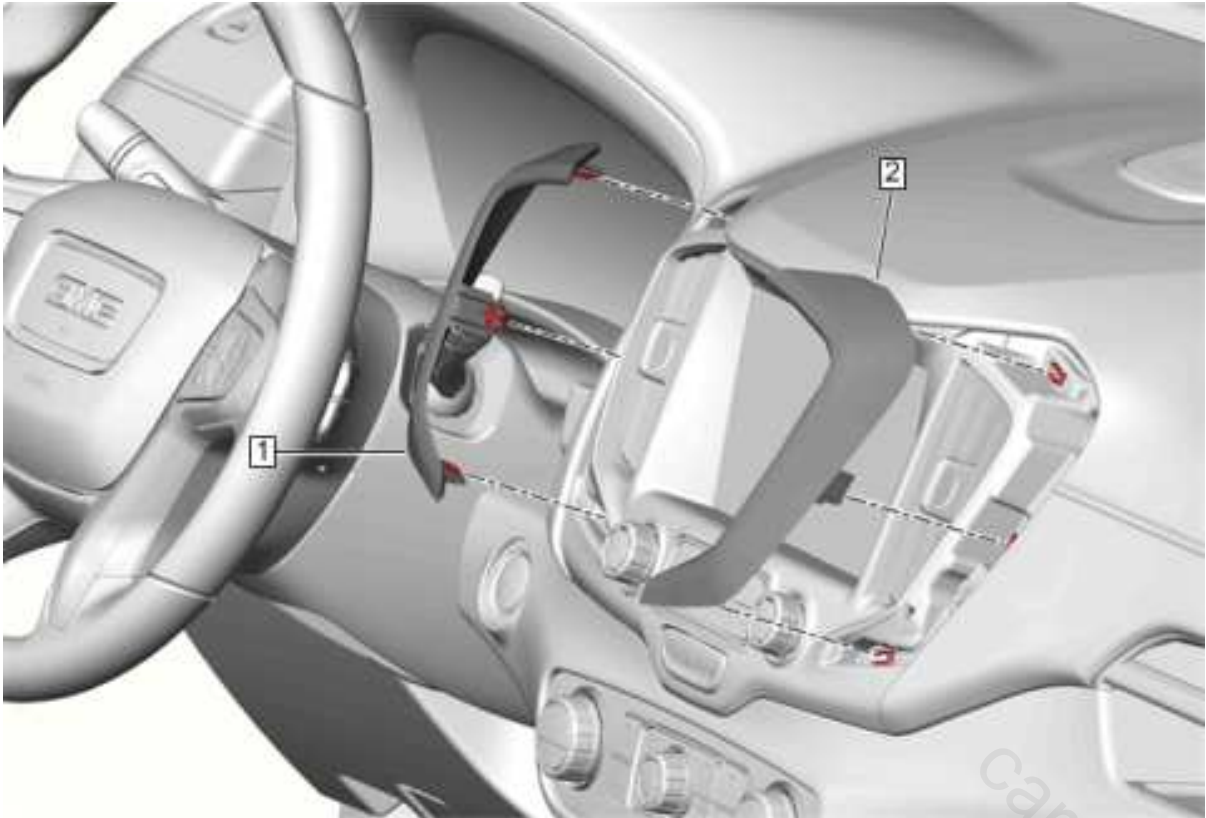


Fig. 16: Instrument Panel Center Trim Plate Applique
Courtesy of GENERAL MOTORS COMPANY

7. Install Instrument Panel Center Trim Plate Applique (1, 2) - **Instrument Panel Center Trim Plate Applique Replacement (Terrain)**
8. Perform the necessary programming and setup procedure: **Control Module References**

COMMUNICATION INTERFACE MODULE BATTERY REPLACEMENT

Removal Procedure

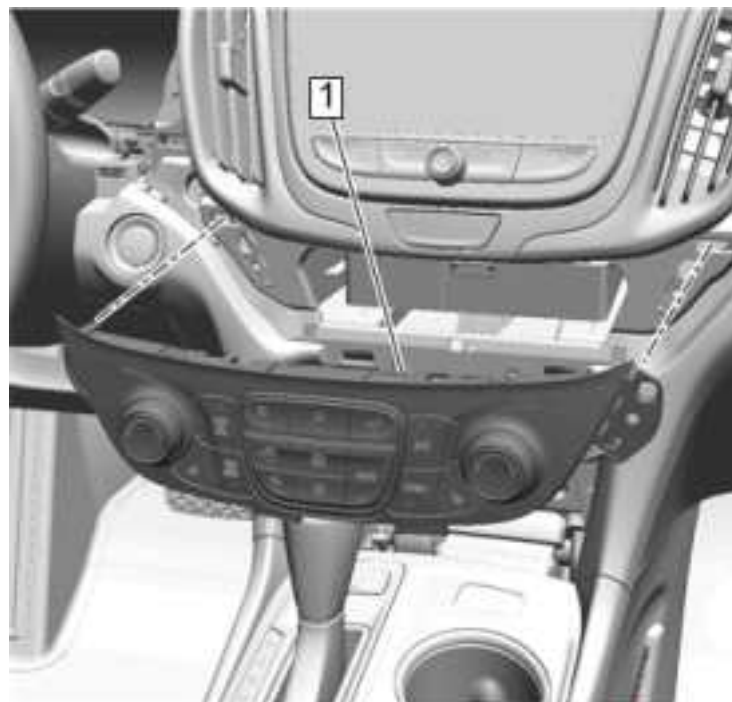


Fig. 17: Heater and Air Conditioning User Interface Control
Courtesy of GENERAL MOTORS COMPANY

1. Remove Heater and Air Conditioning User Interface Control (1) - [Heater and Air Conditioning User Interface Control Replacement \(Equinox\)](#), [Heater and Air Conditioning User Interface Control Replacement \(Terrain\)](#).

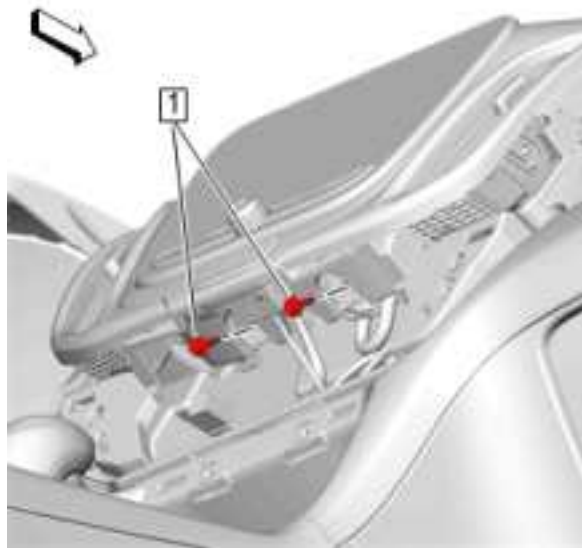


Fig. 18: Radio Control Bracket Bolt

Courtesy of GENERAL MOTORS COMPANY

2. Remove Radio Control Bracket Bolt (1)



Fig. 19: Radio Control Assembly

Courtesy of GENERAL MOTORS COMPANY

3. Remove Radio Control Assembly (1)
4. Use a plastic trim tool if necessary.
5. Disconnect all electrical connectors.

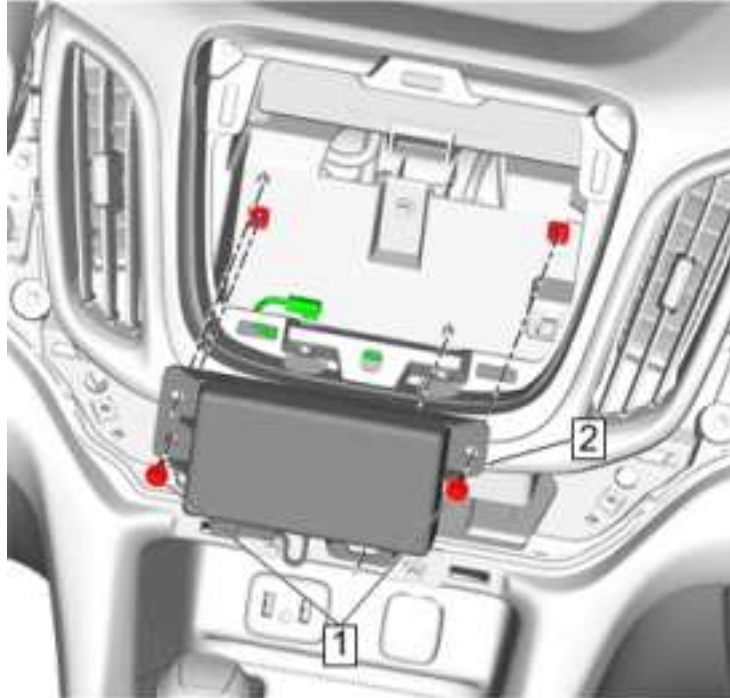


Fig. 20: Communication Interface Module Battery And Bolt
Courtesy of GENERAL MOTORS COMPANY

6. Remove Communication Interface Module Battery Bolt (1)
7. Remove Communication Interface Module Battery (2)

Installation Procedure

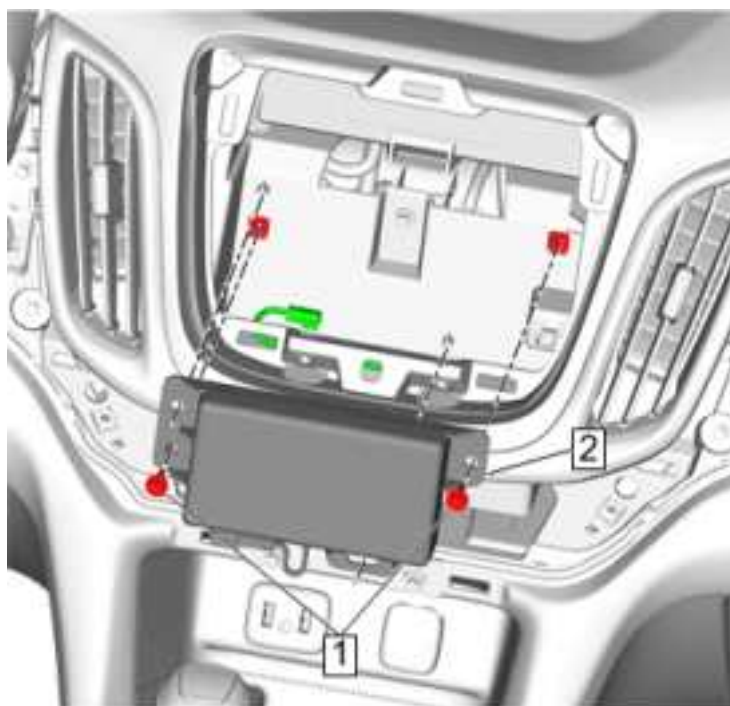


Fig. 21: Communication Interface Module Battery And Bolt
Courtesy of GENERAL MOTORS COMPANY

1. Install Communication Interface Module Battery (2)

CAUTION: Fastener Caution

2. Install Communication Interface Module Battery Bolt (1) and tighten [2x] 2.5 N.m (22 lb in)
3. Connect all electrical connectors.



Fig. 22: Radio Control Assembly
Courtesy of GENERAL MOTORS COMPANY

4. Install Radio Control Assembly (1)

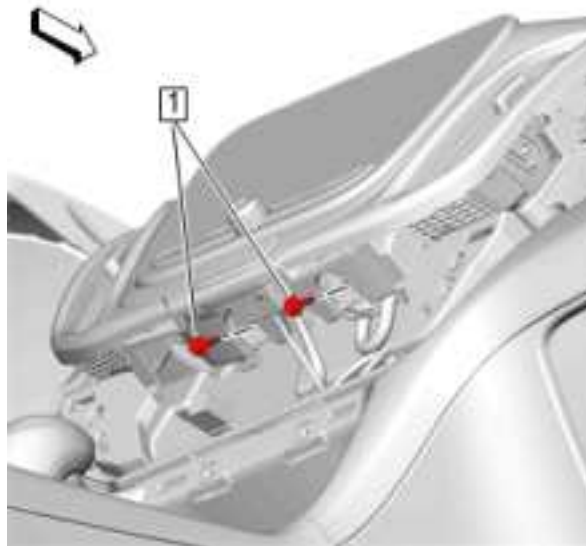


Fig. 23: Radio Control Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

5. Install Radio Control Bracket Bolt (1) and tighten [2x] 2.5 N.m (22 lb in)



Fig. 24: Heater and Air Conditioning User Interface Control
 Courtesy of GENERAL MOTORS COMPANY

6. Install Heater and Air Conditioning User Interface Control (1) - **Heater and Air Conditioning User Interface Control Replacement (Equinox)** **Heater and Air Conditioning User Interface Control Replacement (Terrain)**.

RADIO BRACKET REPLACEMENT (EQUINOX)

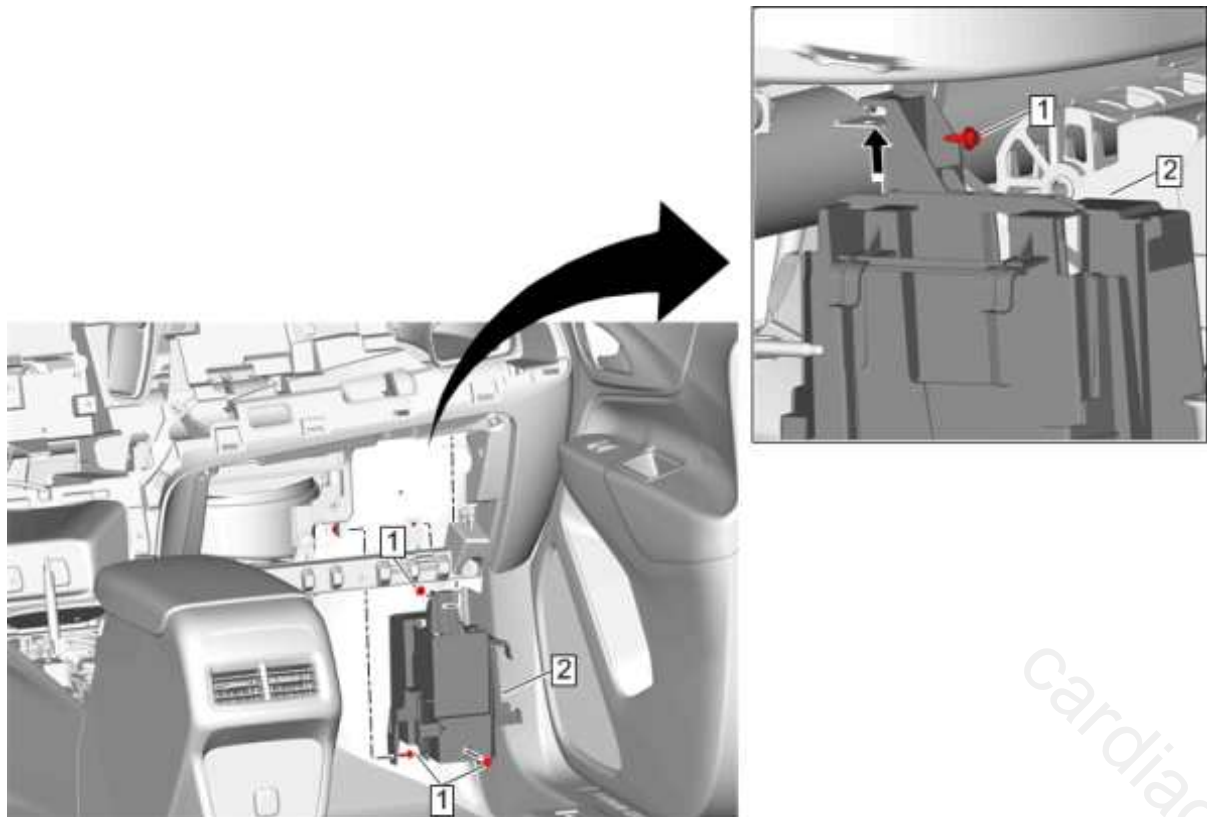


Fig. 25: Radio Bracket
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Instrument Panel Upper Trim Panel Replacement (Equinox)</u>	
1	Radio Bracket Bolt [3x] CAUTION: <u>Fastener Caution</u> Tighten 2.5 N.m (22 lb in)
2	Radio Bracket Procedure 1. Disconnect all electrical connectors. 2. Transfer components as necessary. 3. The top of the bracket has 2 locking tabs on an arm that goes on the instrument panel tie bar bracket, lift the arm up and out of the locking holes to release the bracket.

RADIO BRACKET REPLACEMENT (TERRAIN)

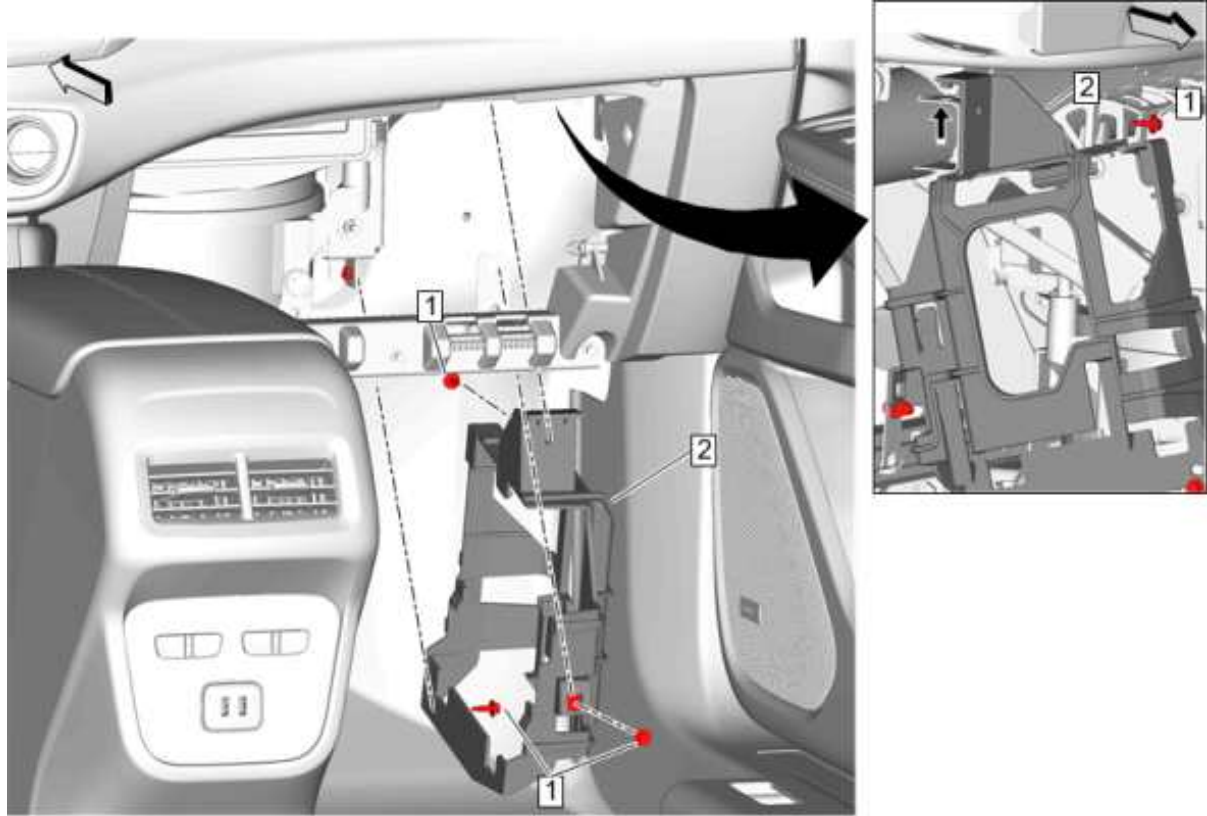


Fig. 26: Radio Bracket

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Instrument Panel Compartment Door Replacement (Terrain).</u>	
1	Radio Bracket Bolt [3x] CAUTION: <u>Fastener Caution</u> Tighten 2.5 N.m (22 lb in)
2	Radio Bracket Procedure 1. Disconnect all electrical connectors. 2. Transfer components as necessary. 3. The top of the bracket has 2 locking tabs on an arm that goes on the instrument panel tie bar bracket, lift the arm up and out of the locking holes to release the bracket.

RADIO CONTROL BRACKET REPLACEMENT (EQUINOX WITH IOB)

Removal Procedure

1. Remove Heater and Air Conditioning User Interface Control - Heater and Air Conditioning User Interface Control Replacement (Equinox).



Fig. 27: Radio Control Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

2. Remove Radio Control Bracket Bolt (1)



Fig. 28: Radio Control Assembly
Courtesy of GENERAL MOTORS COMPANY

3. Remove Radio Control Assembly (1)
4. Use a plastic trim tool if necessary.
5. Disconnect all electrical connectors.

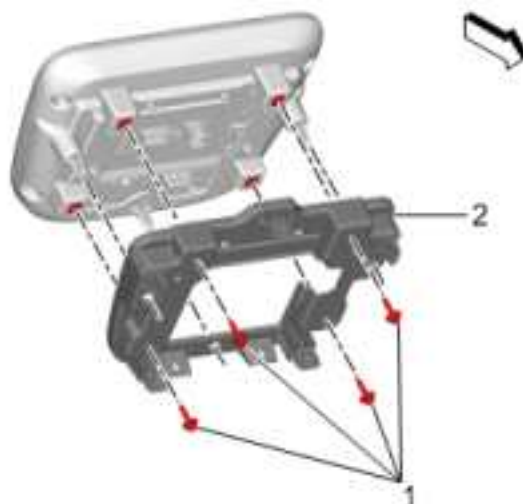


Fig. 29: Radio Control Bracket
Courtesy of GENERAL MOTORS COMPANY

6. Remove Radio Control Bracket Bolt (1)
7. Remove Radio Control Bracket (2)
8. Transfer components as necessary.

Installation Procedure



Fig. 30: Radio Control Bracket
Courtesy of GENERAL MOTORS COMPANY

1. Install Radio Control Bracket (2)

CAUTION: Refer to **Fastener Caution** .

2. Install Radio Control Bracket Bolt (1) and tighten [4x] 2.5 N.m (22 lb in)



Fig. 31: Radio Control Assembly
Courtesy of GENERAL MOTORS COMPANY

3. Connect the electrical connectors.
4. Install Radio Control Assembly (1)



Fig. 32: Radio Control Bracket Bolt

Courtesy of GENERAL MOTORS COMPANY

5. Install Radio Control Bracket Bolt (1) and tighten [2x] 2.5 N.m (22 lb in)
6. Install Heater and Air Conditioning User Interface Control - [Heater and Air Conditioning User Interface Control Replacement \(Equinox\)](#)

RADIO CONTROL BRACKET REPLACEMENT (EQUINOX WITH IO5, IO6)

Removal Procedure

1. Remove Heater and Air Conditioning User Interface Control - [Heater and Air Conditioning User Interface Control Replacement \(Equinox\)](#)

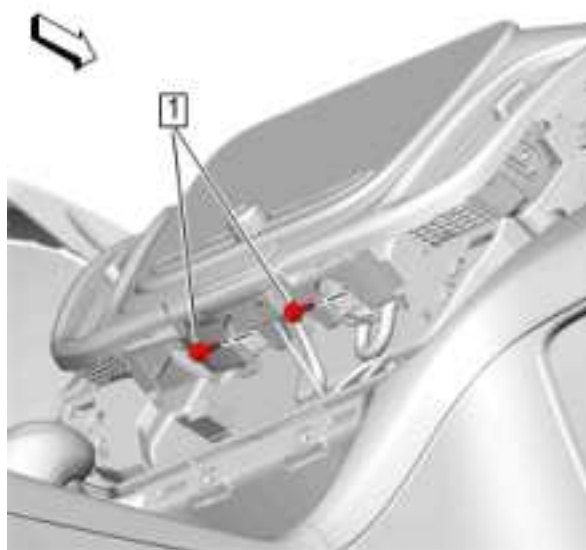


Fig. 33: Radio Control Bracket Bolt

Courtesy of GENERAL MOTORS COMPANY

2. Remove Radio Control Bracket Bolt (1)



Fig. 34: Radio Control Assembly
Courtesy of GENERAL MOTORS COMPANY

3. Remove Radio Control Assembly (1)
4. Use a plastic trim tool if necessary.
5. Disconnect all electrical connectors.

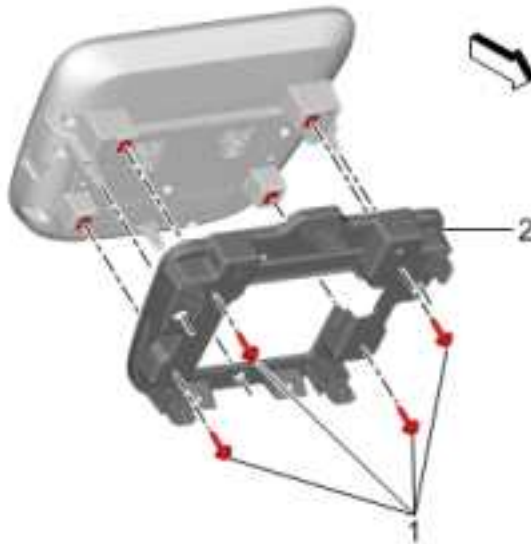


Fig. 35: Radio Control Bracket And Bolt
Courtesy of GENERAL MOTORS COMPANY

6. Remove Radio Control Bracket Bolt (1)
7. Remove Radio Control Bracket (2)
8. Transfer components as necessary.

Installation Procedure

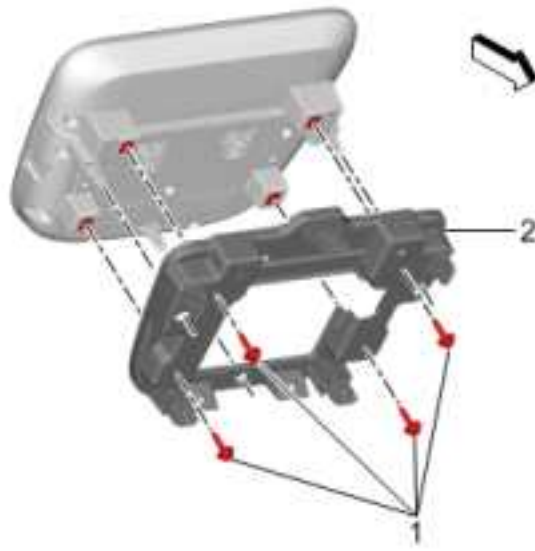


Fig. 36: Radio Control Bracket And Bolt
Courtesy of GENERAL MOTORS COMPANY

1. Install Radio Control Bracket (2)

CAUTION: Refer to [Fastener Caution](#) .

2. Install Radio Control Bracket Bolt (1) and tighten [4x] 2.5 N.m (22 lb in)



Fig. 37: Radio Control Assembly
Courtesy of GENERAL MOTORS COMPANY

3. Connect the electrical connectors.
4. Install Radio Control Assembly (1)

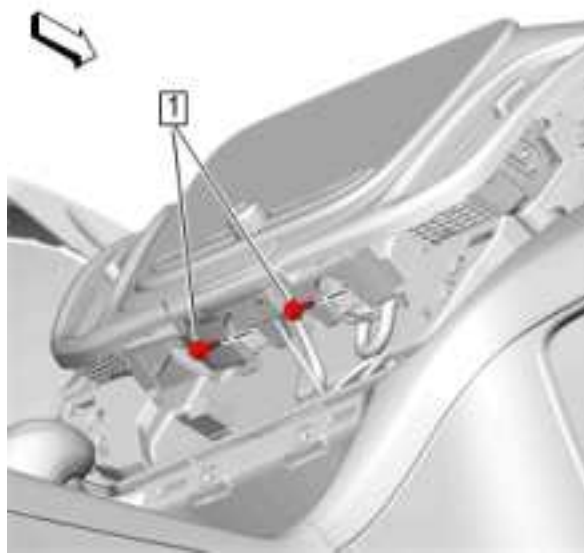


Fig. 38: Radio Control Bracket Bolt
 Courtesy of GENERAL MOTORS COMPANY

5. Install Radio Control Bracket Bolt (1) and tighten [2x] 2.5 N.m (22 lb in)
6. Install Heater and Air Conditioning User Interface Control - [Heater and Air Conditioning User Interface Control Replacement \(Equinox\)](#)

RADIO REPLACEMENT (IO5, IO6, IOB, IOR)

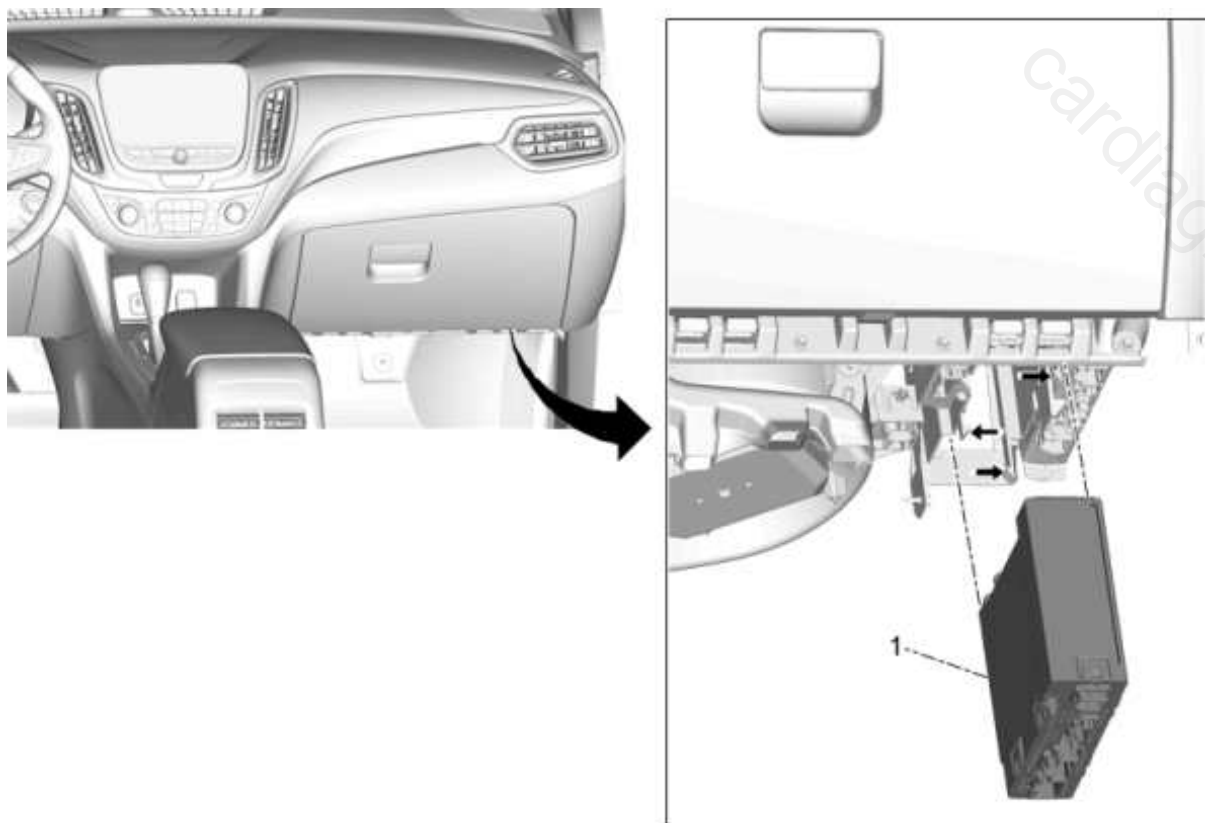


Fig. 39: Radio
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures	
1. Before removing the radio, perform the radio reset. <u>Radio Reset</u> 2. Remove the front side door sill garnish molding - right side. <u>Front Side Door Sill Garnish Molding Replacement (Equinox)</u>, <u>Front Side Door Sill Garnish Molding Replacement (Terrain)</u> 3. Reposition the front floor panel carpet as necessary.	

Callout	Component Name
1	Radio Procedure 1. Disconnect the electrical connectors. 2. Release the retaining tabs. 3. After installing the radio, perform the radio reset. Radio Reset

RADIO REPLACEMENT (IOT, IOU)

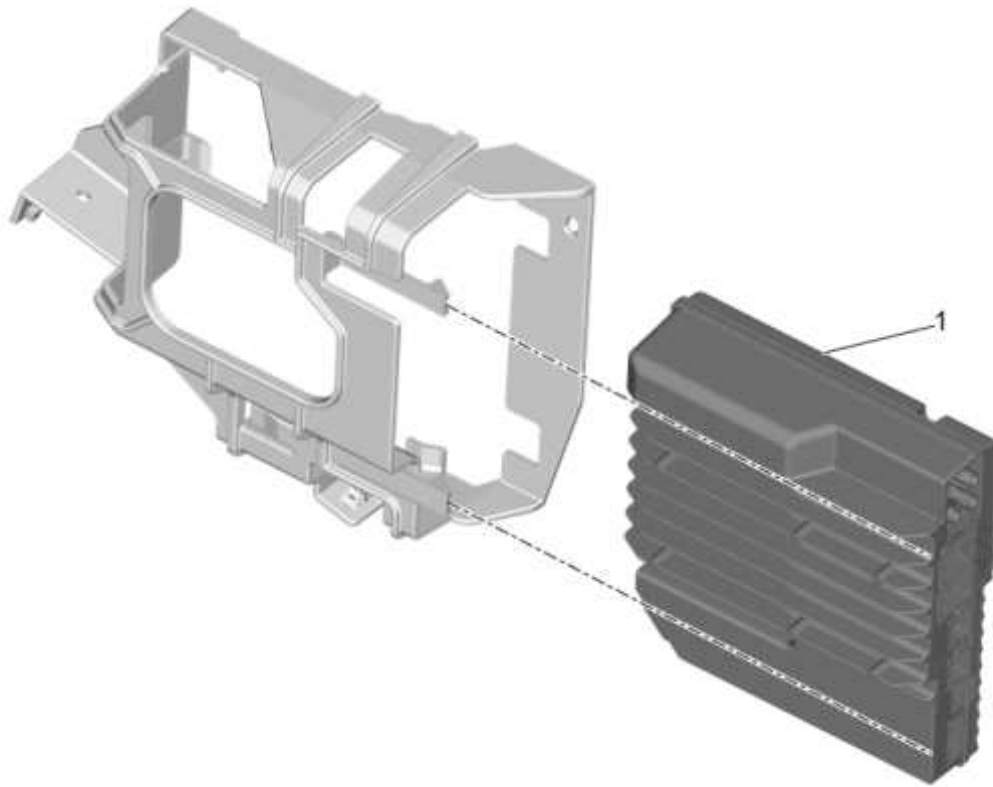


Fig. 40: Radio

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Before removing the radio, perform the radio reset. Radio Reset 2. Radio Bracket Replacement (Equinox)Radio Bracket Replacement (Terrain)	
1	Radio Procedure 1. Release the retaining tabs. 2. After installing the radio, perform the radio reset. Radio Reset

RADIO REPLACEMENT (IOS)

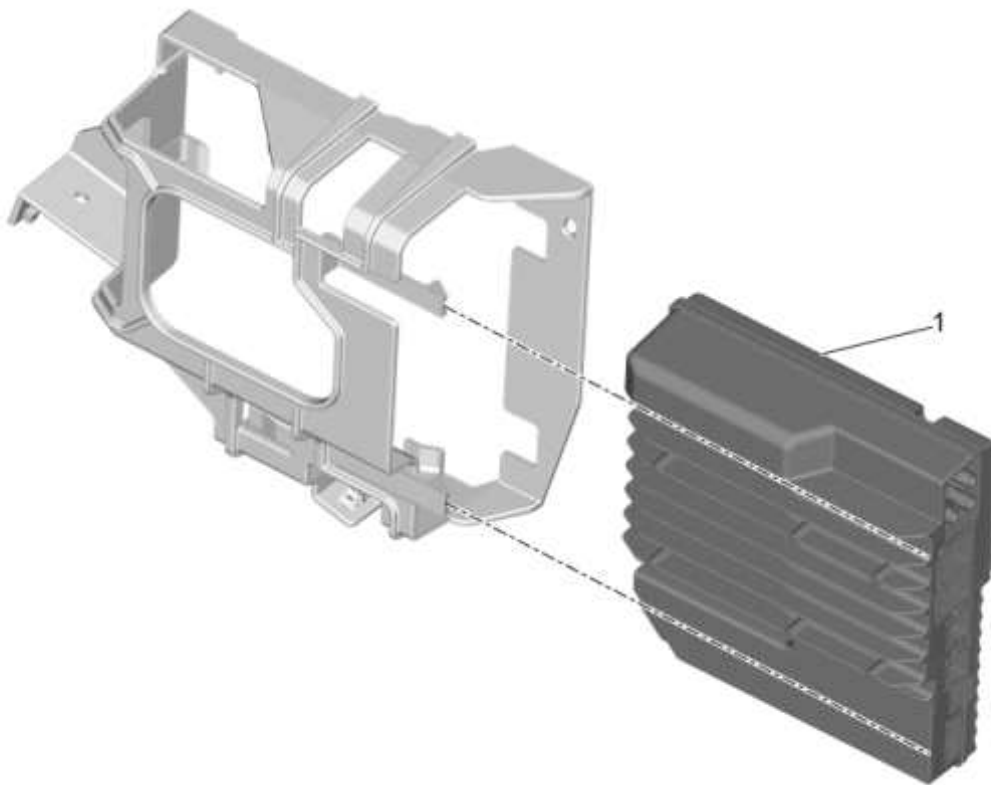


Fig. 41: Radio

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Radio Bracket Replacement (Equinox)</u> <u>Radio Bracket Replacement (Terrain)</u>	
1	Radio Procedure 1. Release the retaining tabs. 2. Perform the necessary programming and setup procedure:<u>Control Module References</u>

RADIO CONTROL ASSEMBLY REPLACEMENT (EQUINOX)

Removal Procedure

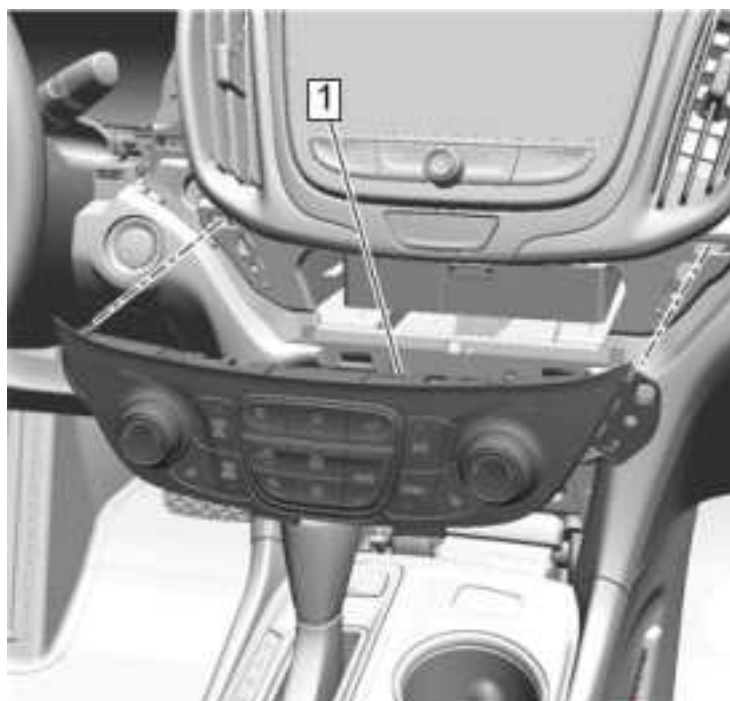


Fig. 42: Heater and Air Conditioning User Interface Control
Courtesy of GENERAL MOTORS COMPANY

1. Remove Heater and Air Conditioning User Interface Control (1) - **Heater and Air Conditioning User Interface Control Replacement (Equinox)**

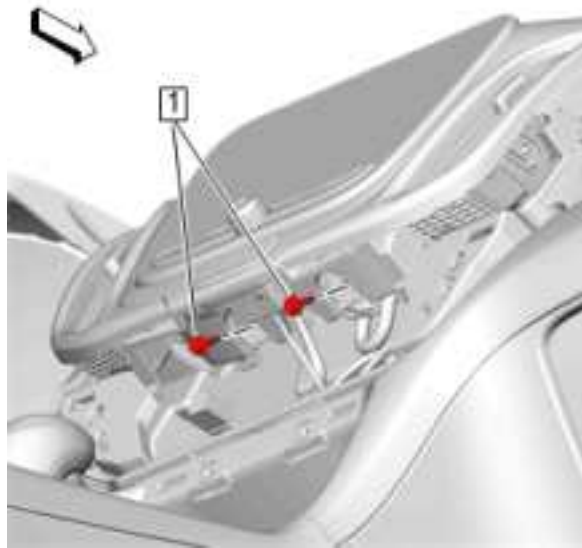


Fig. 43: Radio Control Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

2. Remove Radio Control Bracket Bolt (1)



Fig. 44: Radio Control Assembly
Courtesy of GENERAL MOTORS COMPANY

3. Remove Radio Control Assembly (1)
4. Use a plastic trim tool if necessary.
5. Disconnect all electrical connectors.

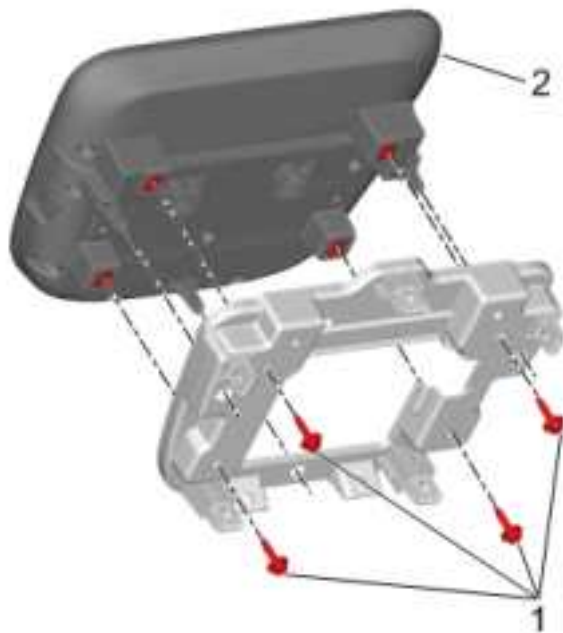


Fig. 45: Radio Control Bracket Assembly And Bolt
Courtesy of GENERAL MOTORS COMPANY

6. Remove Radio Control Bracket Bolt (1)
7. Remove Radio Control Assembly (2)
8. Transfer components as necessary.

Installation Procedure

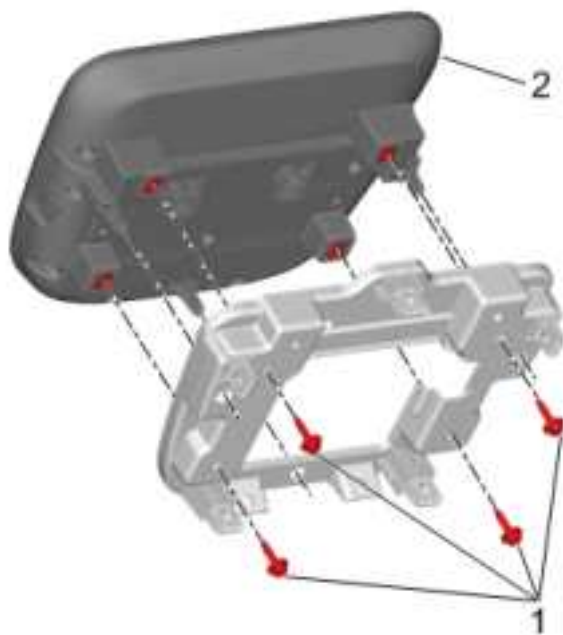


Fig. 46: Radio Control Bracket Assembly And Bolt
Courtesy of GENERAL MOTORS COMPANY

1. Install Radio Control Assembly (2)

CAUTION: **Fastener Caution**

2. Install Radio Control Bracket Bolt (1) and tighten [4x] 2.5 N.m (22 lb in)



Fig. 47: Radio Control Assembly

Courtesy of GENERAL MOTORS COMPANY

3. Connect the electrical connectors.
4. Install Radio Control Assembly (1)

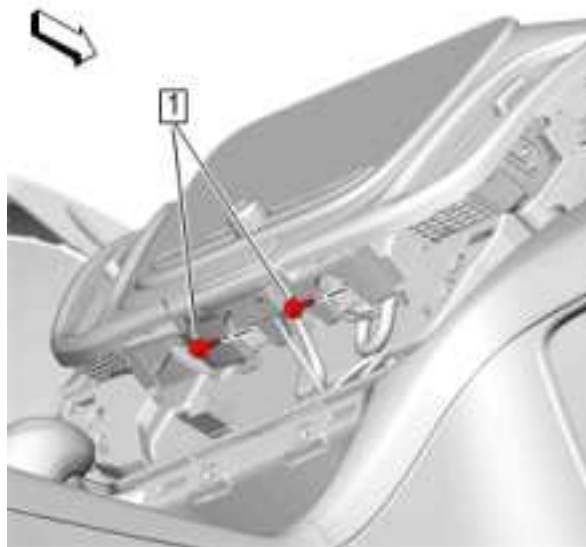


Fig. 48: Radio Control Bracket Bolt

Courtesy of GENERAL MOTORS COMPANY

5. Install Radio Control Bracket Bolt (1) and tighten [4x] 2.5 N.m (22 lb in)



Fig. 49: Heater and Air Conditioning User Interface Control
 Courtesy of GENERAL MOTORS COMPANY

6. Heater and Air Conditioning User Interface Control (1) **Heater and Air Conditioning User Interface Control Replacement (Equinox)**

RADIO CONTROL ASSEMBLY REPLACEMENT (TERRAIN)

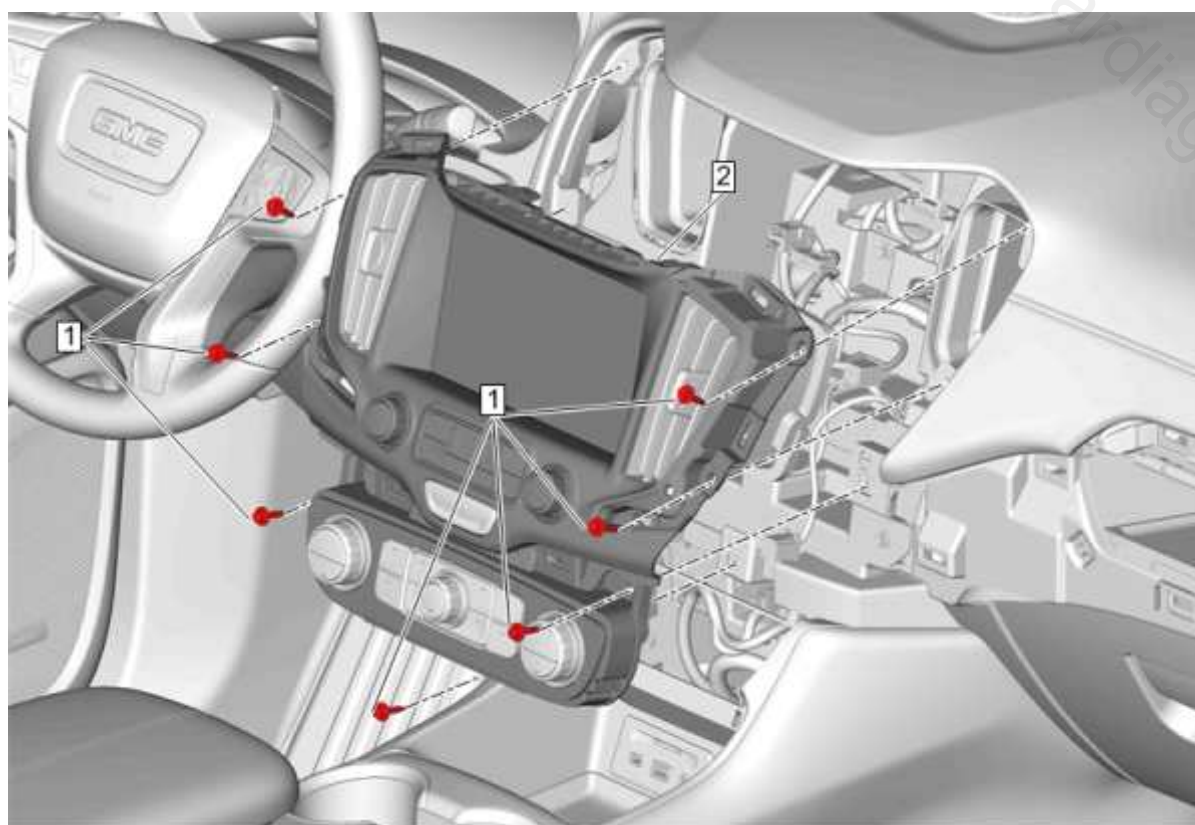


Fig. 50: Radio Control Assembly
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures	
1.	<u>Instrument Panel Center Trim Plate Applique Replacement (Terrain)</u>
2.	<u>Instrument Panel Trim Pad Replacement - Right Side (Terrain)</u>

Callout	Component Name
1	Radio Control Bolt [7x] CAUTION: <u>Fastener Caution</u> Tighten 2.5 N.m (22 lb in)
2	Radio Control Assembly Procedure Disconnect the electrical connectors.

ACTIVE NOISE CANCELLATION MICROPHONE GRILLE REPLACEMENT

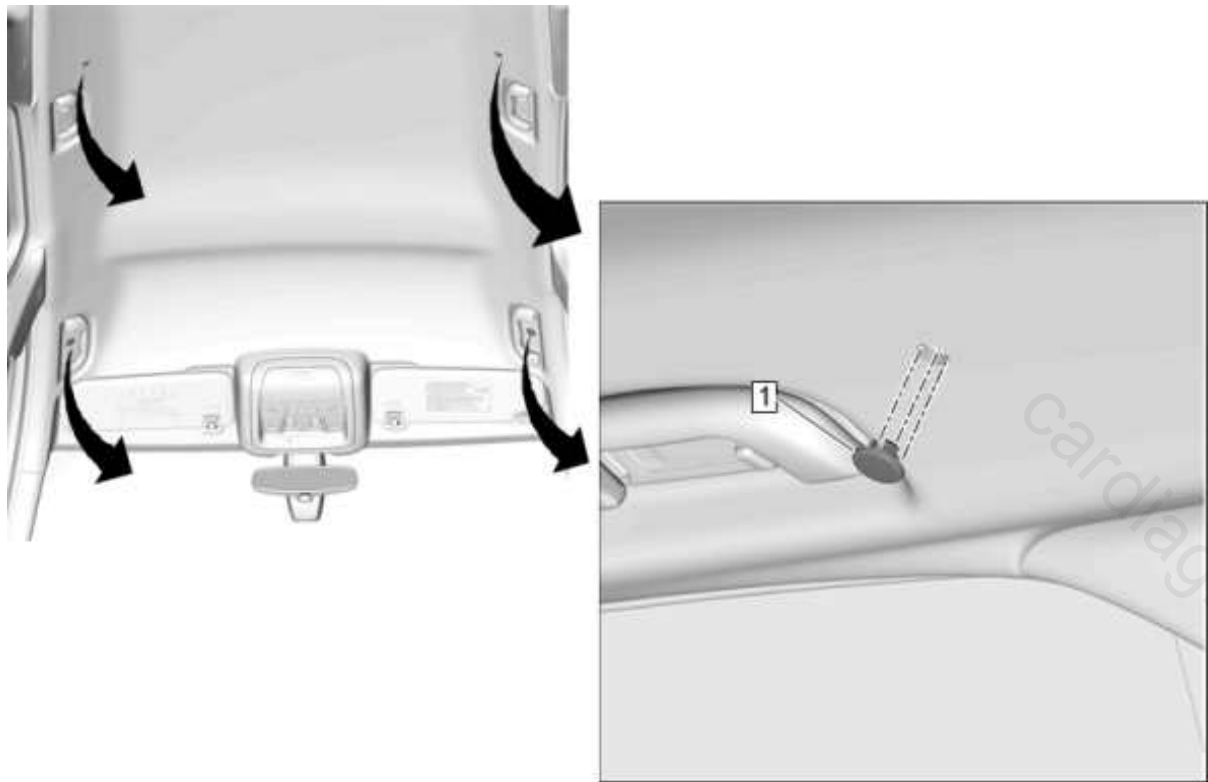


Fig. 51: Active Noise Cancellation Microphone Grille
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Active Noise Cancellation Microphone Grille [4x] Procedure 1. Unlock the retaining tabs. 2. Use a suitable tool.

ACTIVE NOISE CANCELLATION MICROPHONE REPLACEMENT

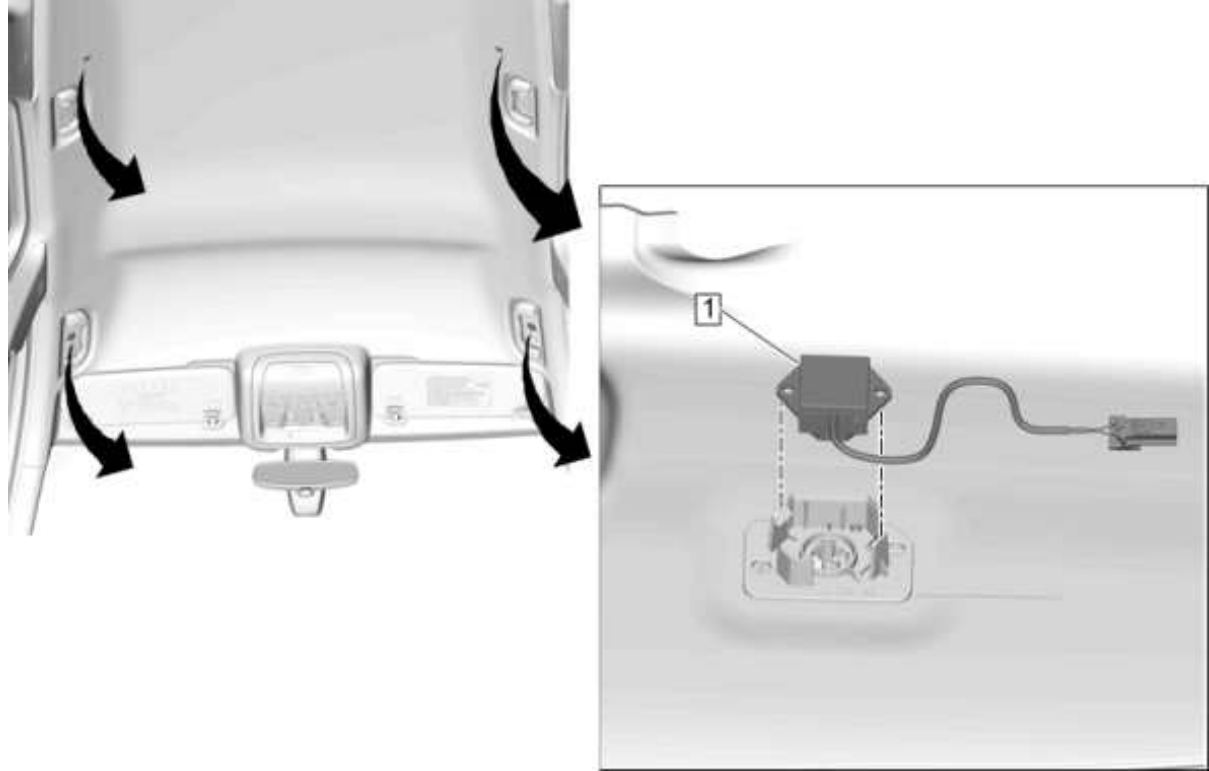


Fig. 52: Active Noise Cancellation Microphone
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure It is only necessary to lower the headlining. Only do those steps in the headlining procedure that will allow access to the component being removed. Headlining Trim Panel Replacement	
1	Active Noise Cancellation Microphone Procedure 1. Disconnect the electrical connector. 2. Release the retaining tabs. 3. Use a suitable tool.

AUDIO DISC PLAYER AND USB RECEPTACLE REPLACEMENT (EQUINOX)

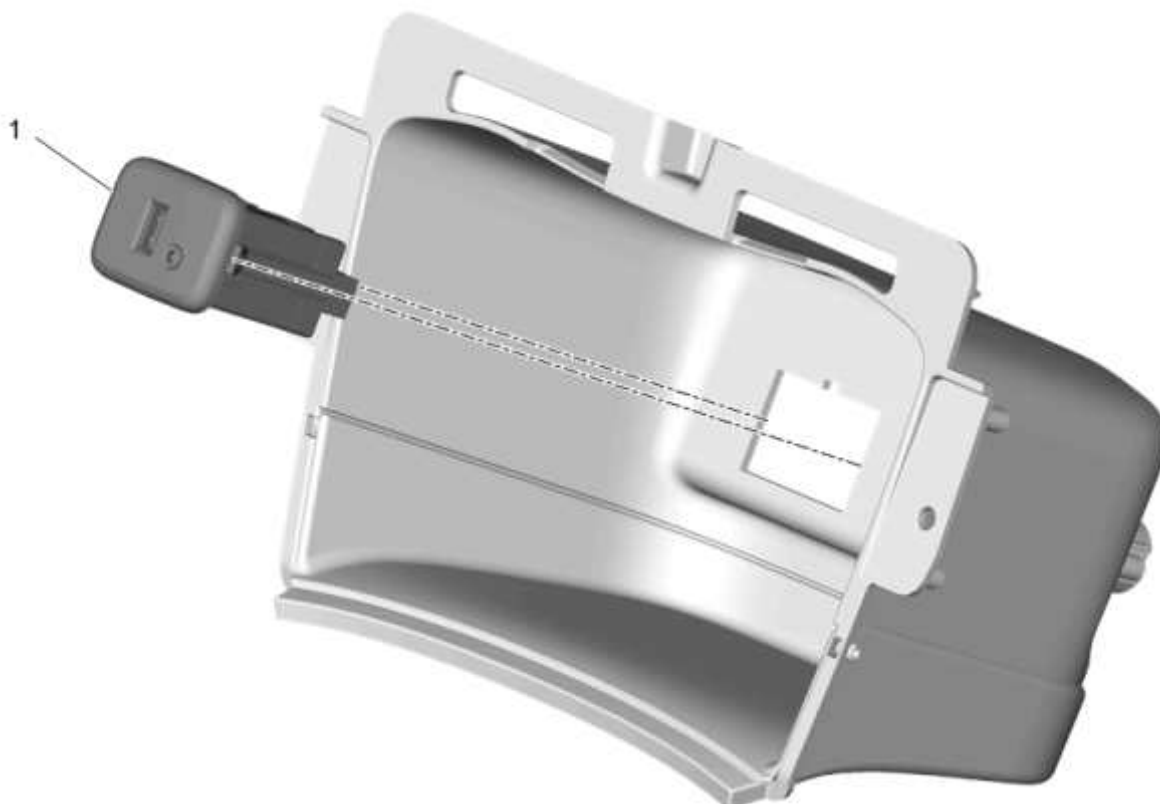


Fig. 53: Audio Disc Player And USB Receptacle
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Instrument Panel Stowage Tray Replacement (Equinox)</u>	
1	Audio Disc Player and USB Receptacle Procedure Release the retaining tabs.

AUDIO DISC PLAYER AND USB RECEPTACLE REPLACEMENT (TERRAIN)

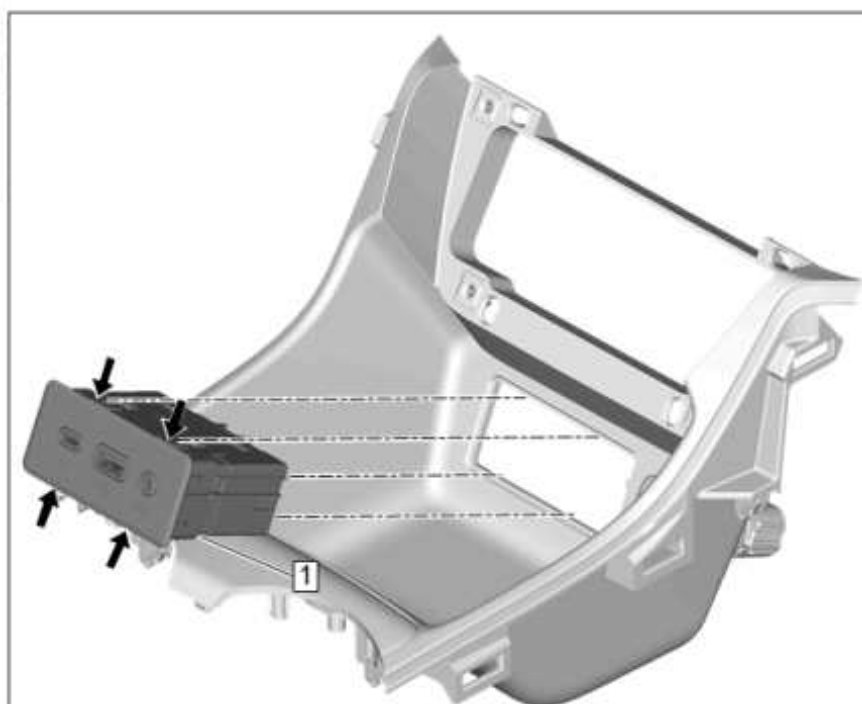


Fig. 54: Audio Disc Player And USB Receptacle
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Front Floor Console Front Compartment Replacement (Terrain)	
1	Audio Disc Player and USB Receptacle Procedure Release the retaining tabs.

AUDIO DISC PLAYER, USB, AUXILIARY IN, AND MEMORY CARD RECEPTACLE REPLACEMENT

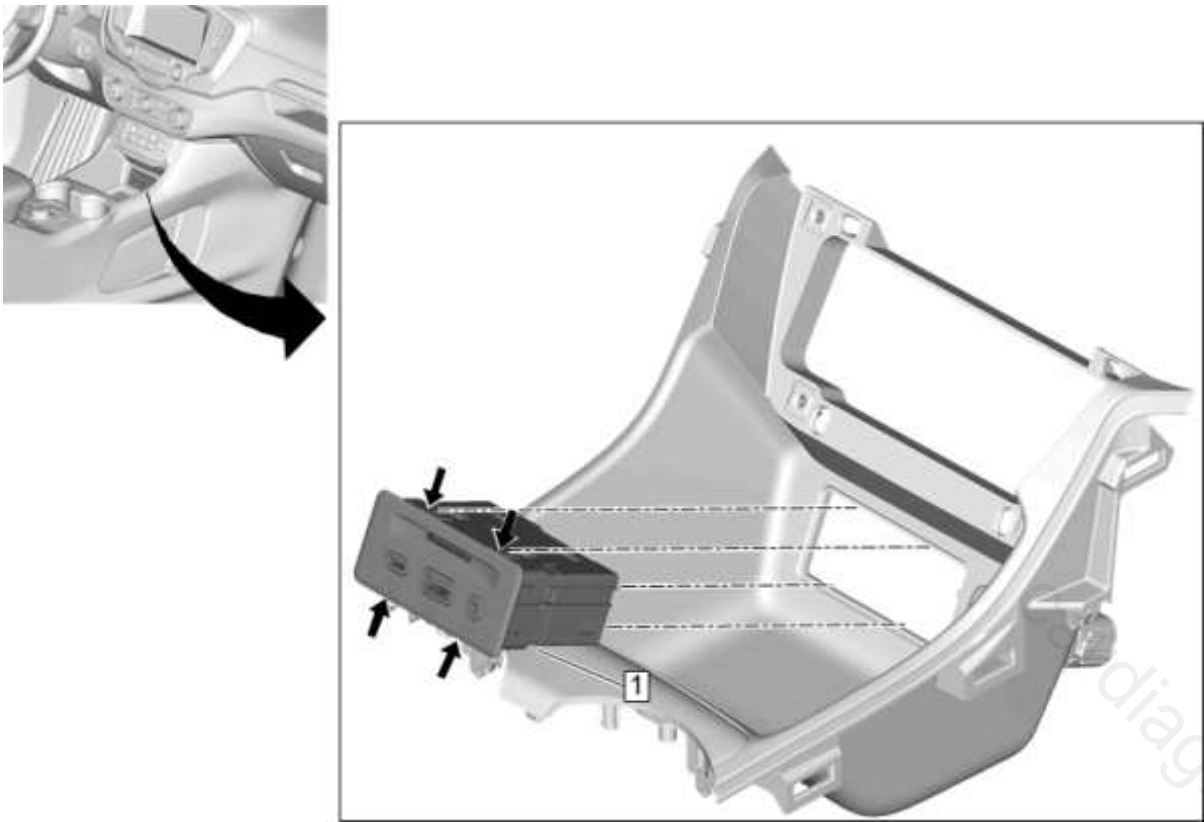


Fig. 55: Audio Disc Player, USB, Auxiliary In, And Memory Card Receptacle
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Front Floor Console Front Compartment Replacement (Terrain)	
1	Audio Disc Player, USB, Auxiliary In, and Memory Card Receptacle Procedure Release the retaining tabs.

RADIO SPEAKER AMPLIFIER REPLACEMENT (EQUINOX)

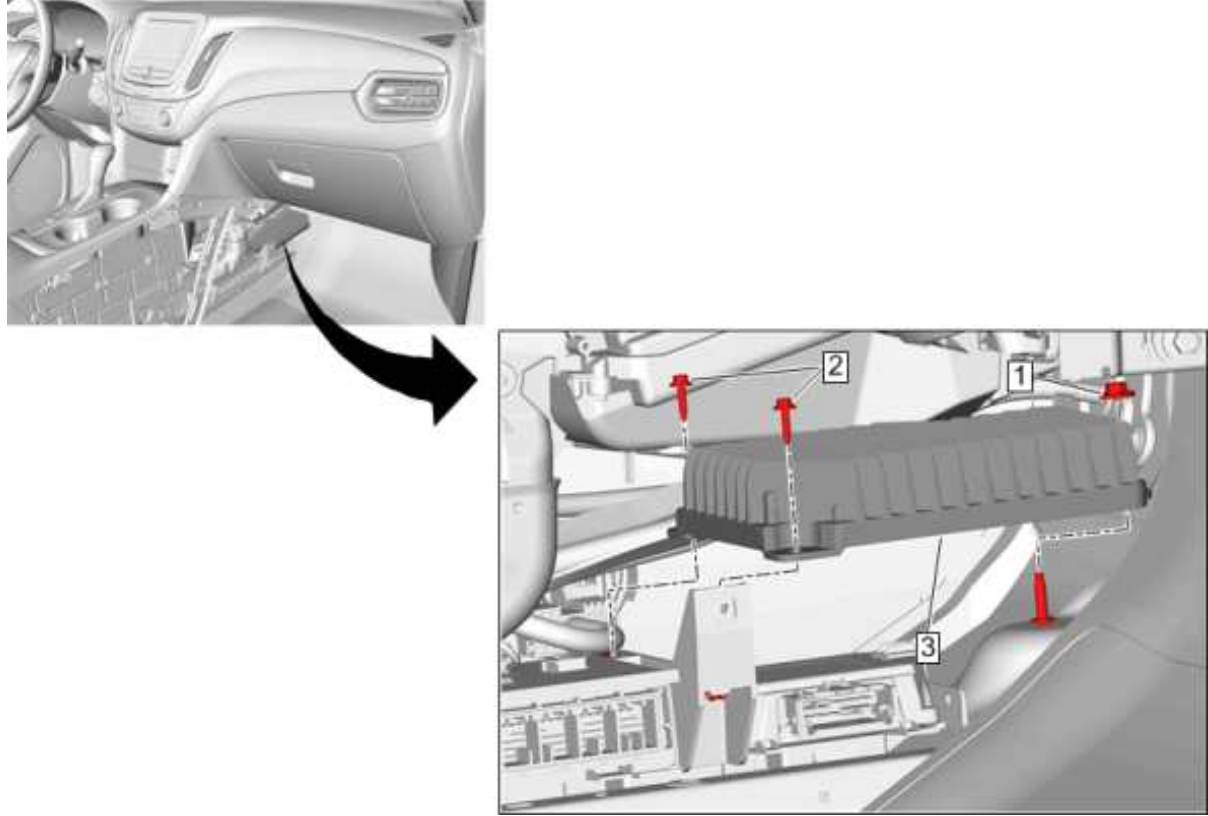


Fig. 56: Radio Speaker Amplifier
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Front Floor Console Extension Panel Replacement - Left Side (Equinox) 2. Front Floor Console Extension Panel Replacement - Right Side (Equinox)	
1	Radio Speaker Amplifier Nut CAUTION: Fastener Caution Tighten 6 N.m (53 lb in)
2	Radio Speaker Amplifier Bolt Tighten 2.5 N.m (22 lb in)
3	Radio Speaker Amplifier Procedure 1. Disconnect the electrical connectors. 2. Perform the necessary programming and setup procedure: Control Module References

RADIO SPEAKER AMPLIFIER REPLACEMENT (TERRAIN)

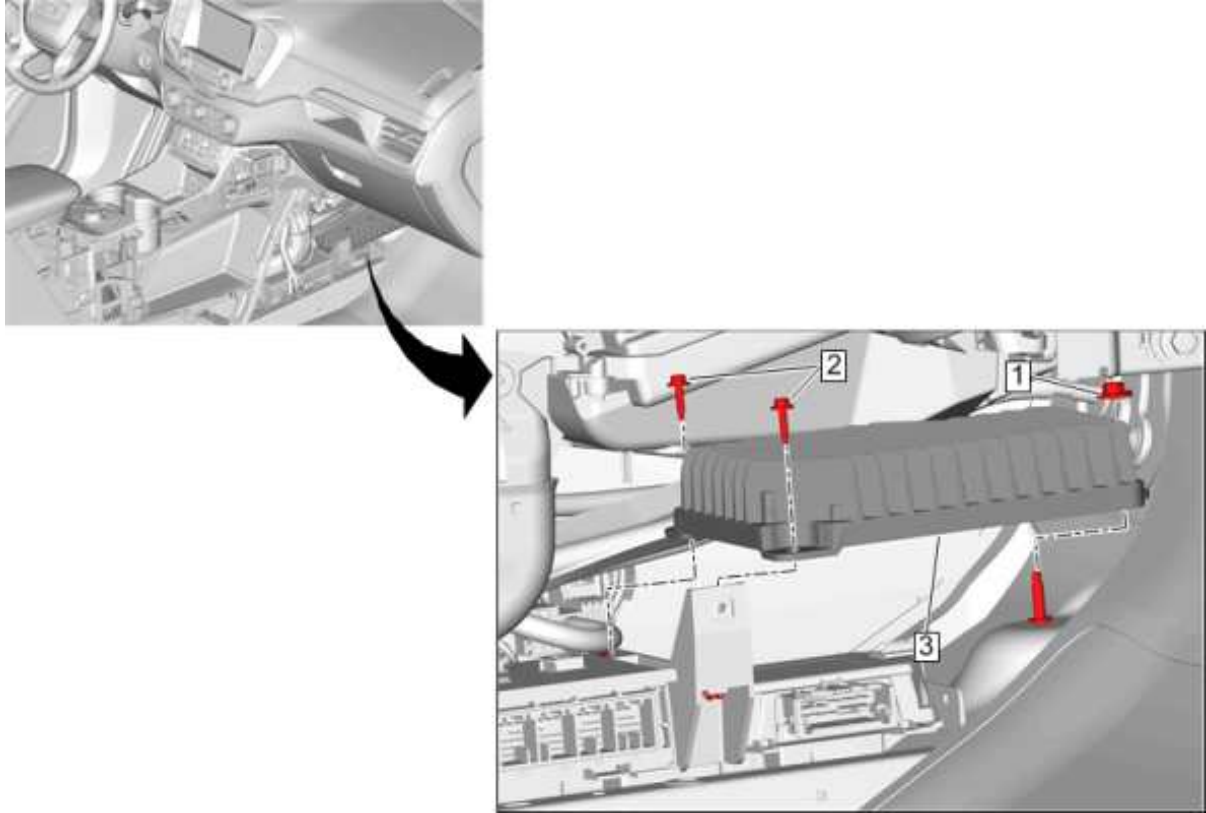


Fig. 57: Radio Speaker Amplifier
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures <u>Front Floor Console Extension Panel Replacement - Left Side (Terrain)</u> <u>Front Floor Console Extension Panel Replacement - Right Side (Terrain)</u>	
1	Radio Speaker Amplifier Nut CAUTION: <u>Fastener Caution</u> Tighten 6 N.m (53 lb in)
2	Radio Speaker Amplifier Bolt [2x] Tighten 2.5 N.m (22 lb in)
3	Radio Speaker Amplifier Procedure - Disconnect the electrical connectors. - Perform the necessary programming and setup procedure: <u>Control Module References</u>

NAVIGATION SIGNAL SPLITTER REPLACEMENT



Fig. 58: Navigation Signal Splitter

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Communication Interface Module Replacement (Equinox) Communication Interface Module Replacement (Terrain with IOS, IOT, IOU) Communication Interface Module Replacement (Terrain with IOR)	
1	Navigation Signal Splitter Procedure Disconnect the electrical connectors.

RADIO ANTENNA BASE REPLACEMENT (EQUINOX)

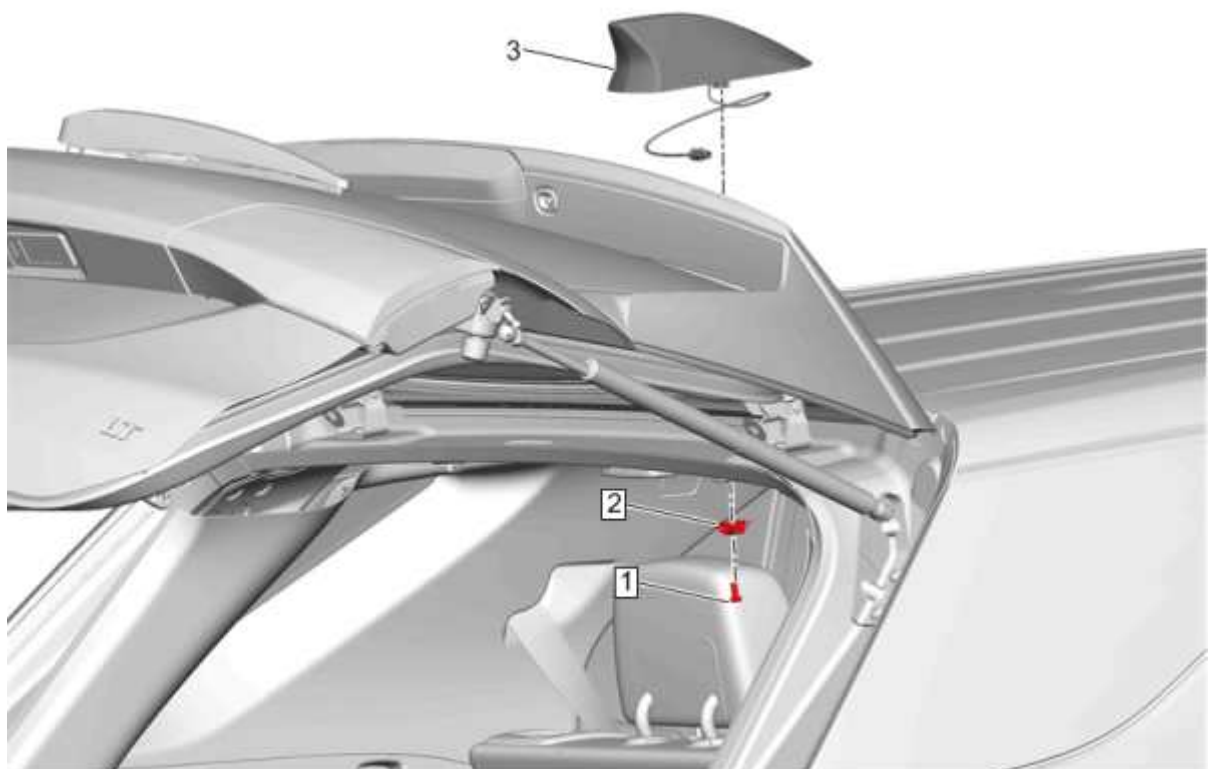


Fig. 59: Radio Antenna Base
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure It is only necessary to lower the headlining. Only do those steps in the headlining procedure that will allow access to the component being removed. <u>Headlining Trim Panel Replacement</u>	
1	Radio Antenna Base Fastener CAUTION: <u>Fastener Caution</u> Tighten 9 N.m (80 lb in)
2	Radio Antenna Base Retainer NOTE: Discard the retainer and replace with a new retainer.
3	Radio Antenna Base 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.

RADIO ANTENNA BASE REPLACEMENT (TERRAIN)

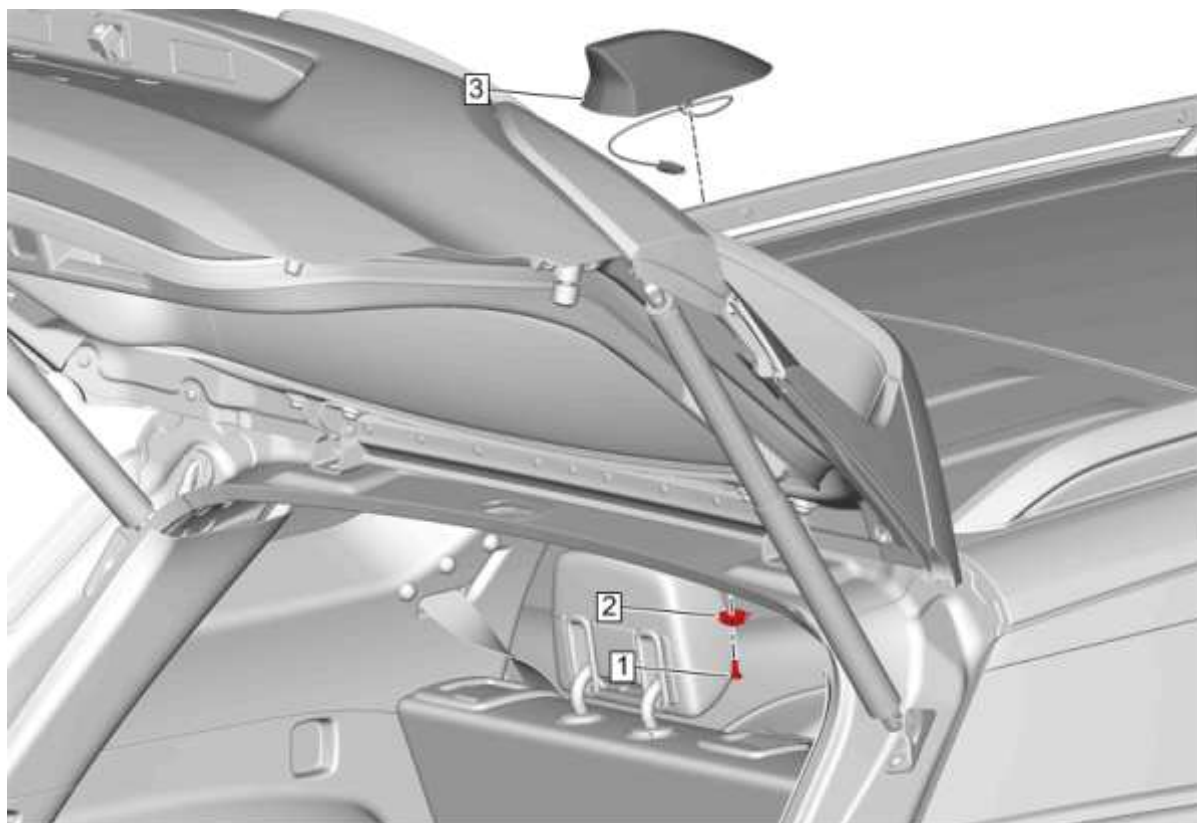


Fig. 60: Radio Antenna Base
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

Callout	Component Name
Preliminary Procedure It is only necessary to lower the headlining. Only do those steps in the headlining procedure that will allow access to the component being removed. Headlining Trim Panel Replacement	
1	Radio Antenna Base Fastener CAUTION: Fastener Caution Tighten 9 N.m (80 lb in)
2	Radio Antenna Base Retainer NOTE: Discard the retainer and replace with a new retainer.
3	Radio Antenna Base 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.

MOBILE TELEPHONE AND VEHICLE LOCATION ANTENNA CABLE REPLACEMENT

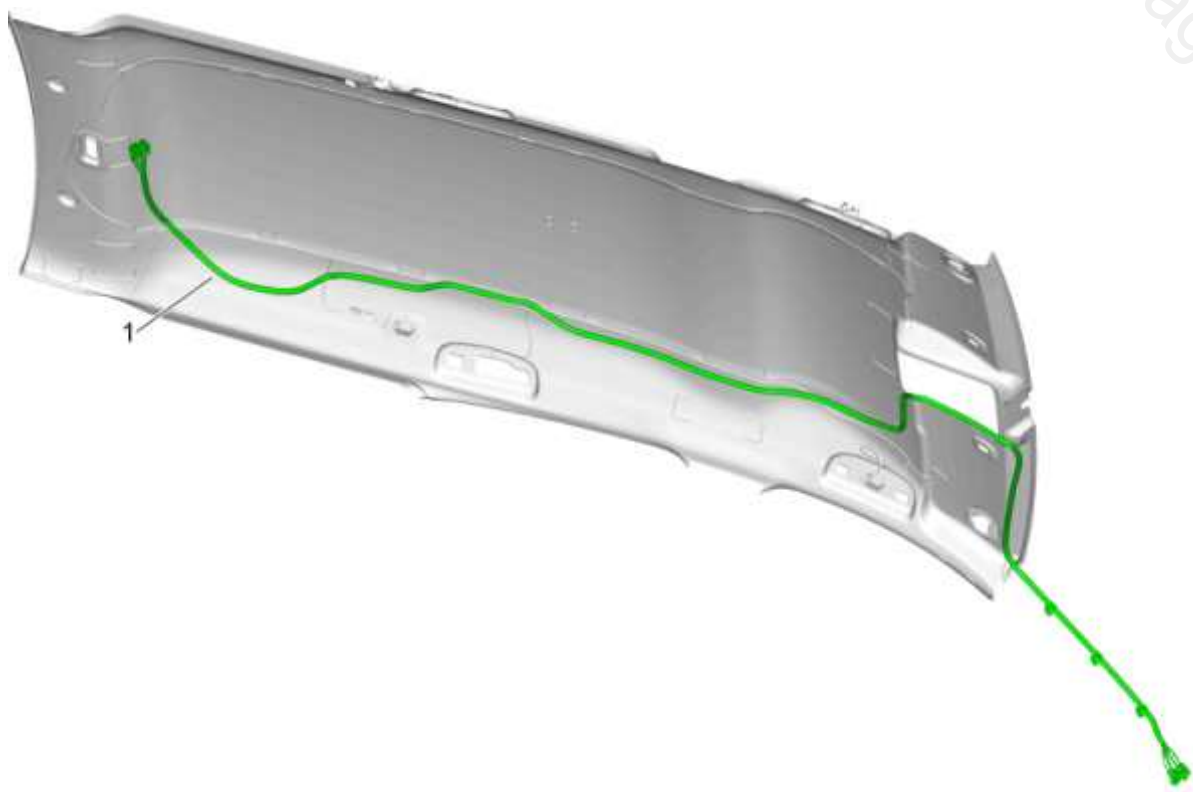


Fig. 61: Mobile Telephone And Vehicle Location Antenna Cable

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Headlining Trim Panel Replacement	

Callout	Component Name
1	Mobile Telephone and Vehicle Location Antenna Cable Procedure Using an adhesive, secure the harness back onto the headlining trim panel. NOTE: Prior to removal, note the routing of the cable to aid in reassembly and ensure proper installation.

RADIO AND MOBILE TELEPHONE ANTENNA CABLE REPLACEMENT

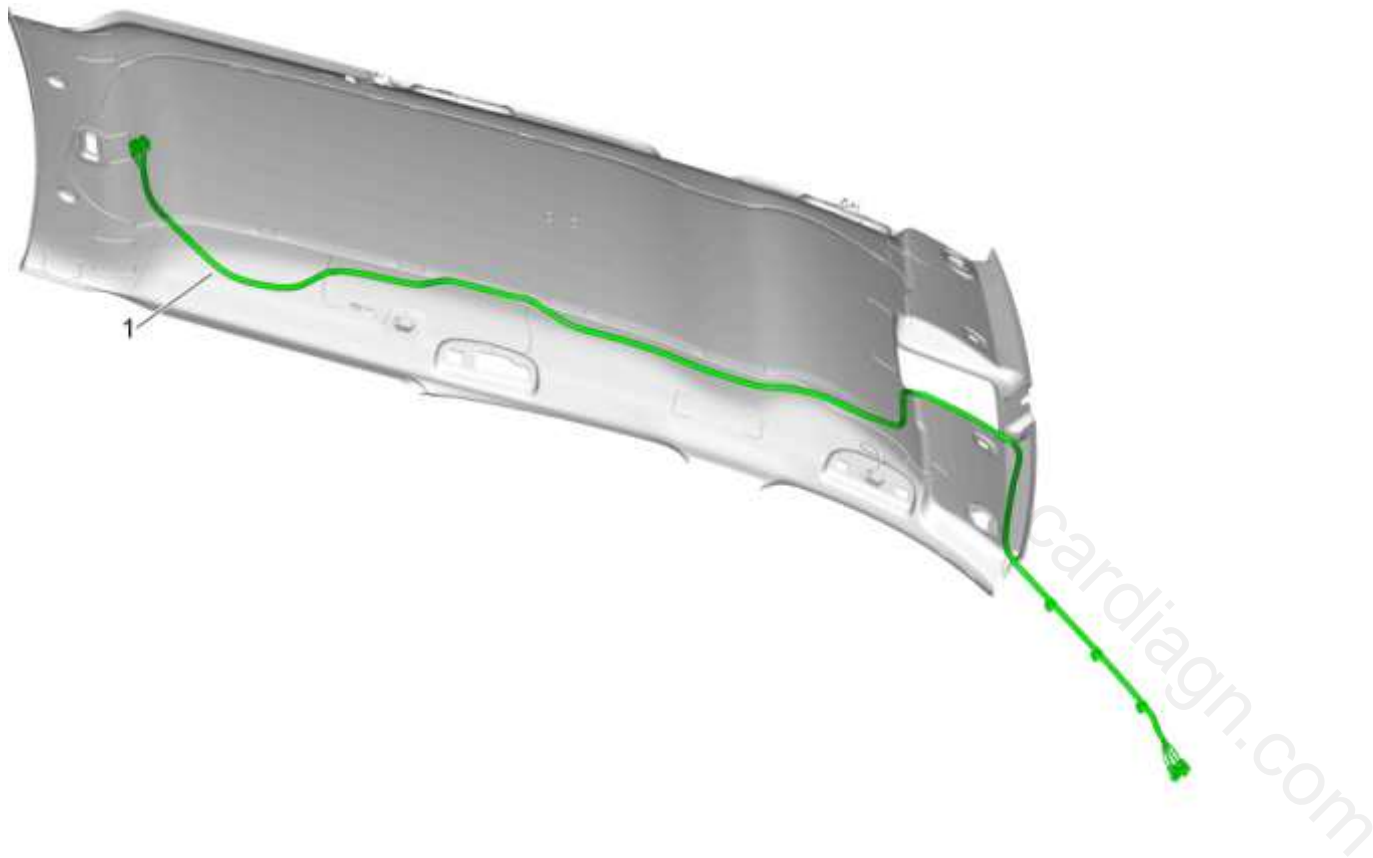


Fig. 62: Radio and Mobile Telephone Antenna Cable
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Headlining Trim Panel Replacement</u>	
1	Radio and Mobile Telephone Antenna Cable Procedure Using an adhesive, secure the harness back onto the headlining trim panel. NOTE: Prior to removal, note the routing of the cable to aid in reassembly and ensure proper installation.

RADIO ANTENNA CABLE REPLACEMENT

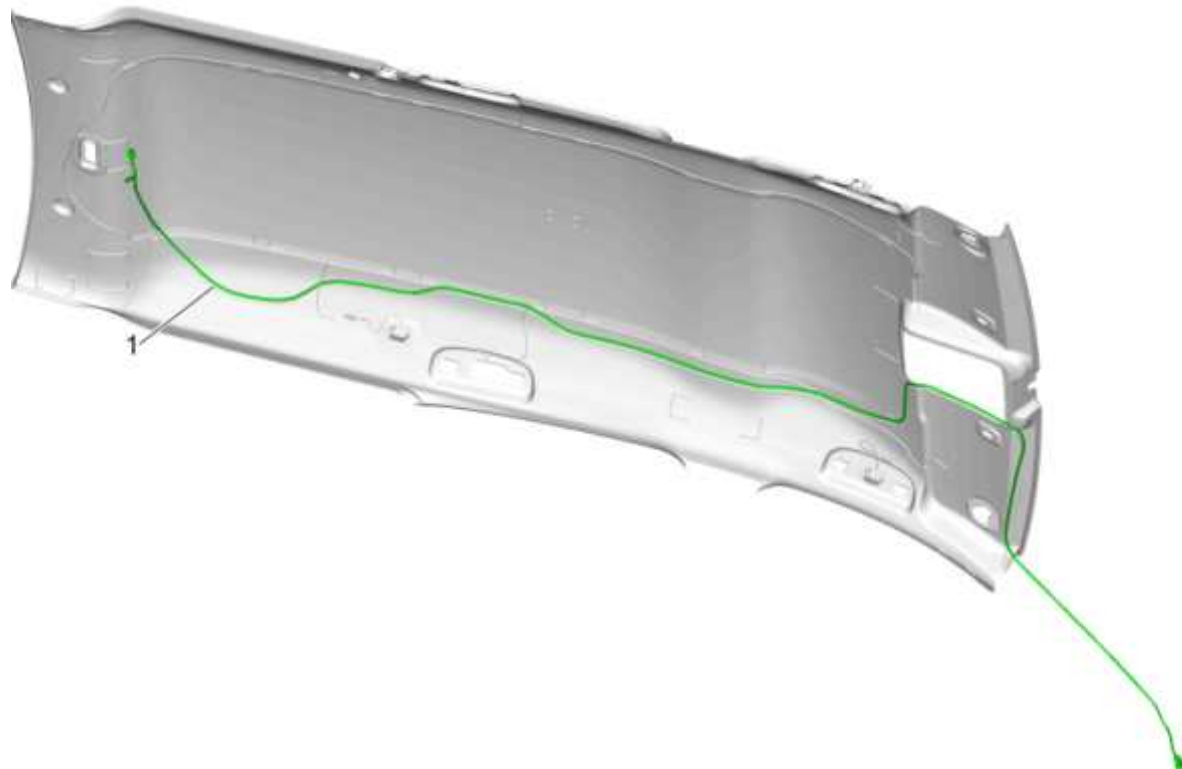


Fig. 63: Radio Antenna Cable

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Headlining Trim Panel Replacement</u>	
1	Radio Antenna Cable Procedure Using an adhesive, secure the harness back onto the headlining trim panel. NOTE: Prior to removal, note the routing of the cable to aid in reassembly and ensure proper installation.

RADIO AND NAVIGATION ANTENNA CABLE REPLACEMENT

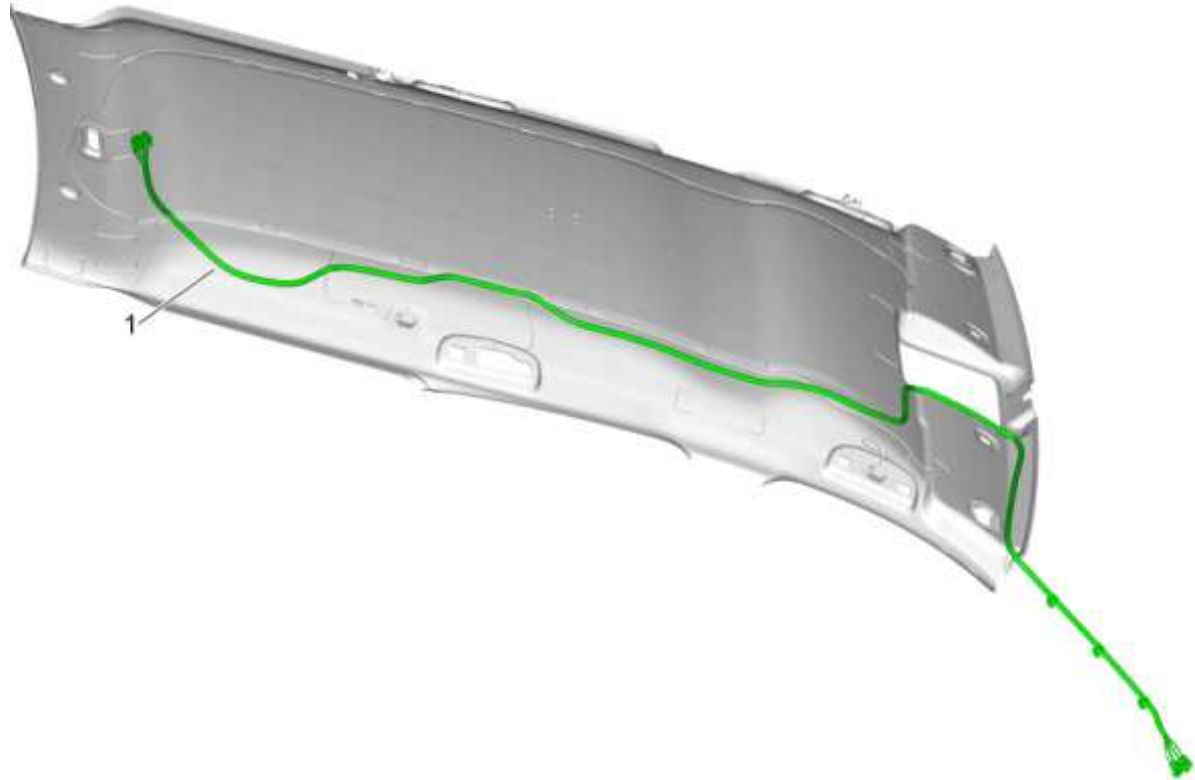


Fig. 64: Radio And Navigation Antenna Cable
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Headlining Trim Panel Replacement</u>	
1	Radio and Navigation Antenna Cable Procedure Using an adhesive, secure the harness back onto the headlining trim panel. NOTE: Prior to removal, note the routing of the cable to aid in reassembly and ensure proper installation.

RADIO FRONT CENTER SPEAKER REPLACEMENT (EQUINOX)

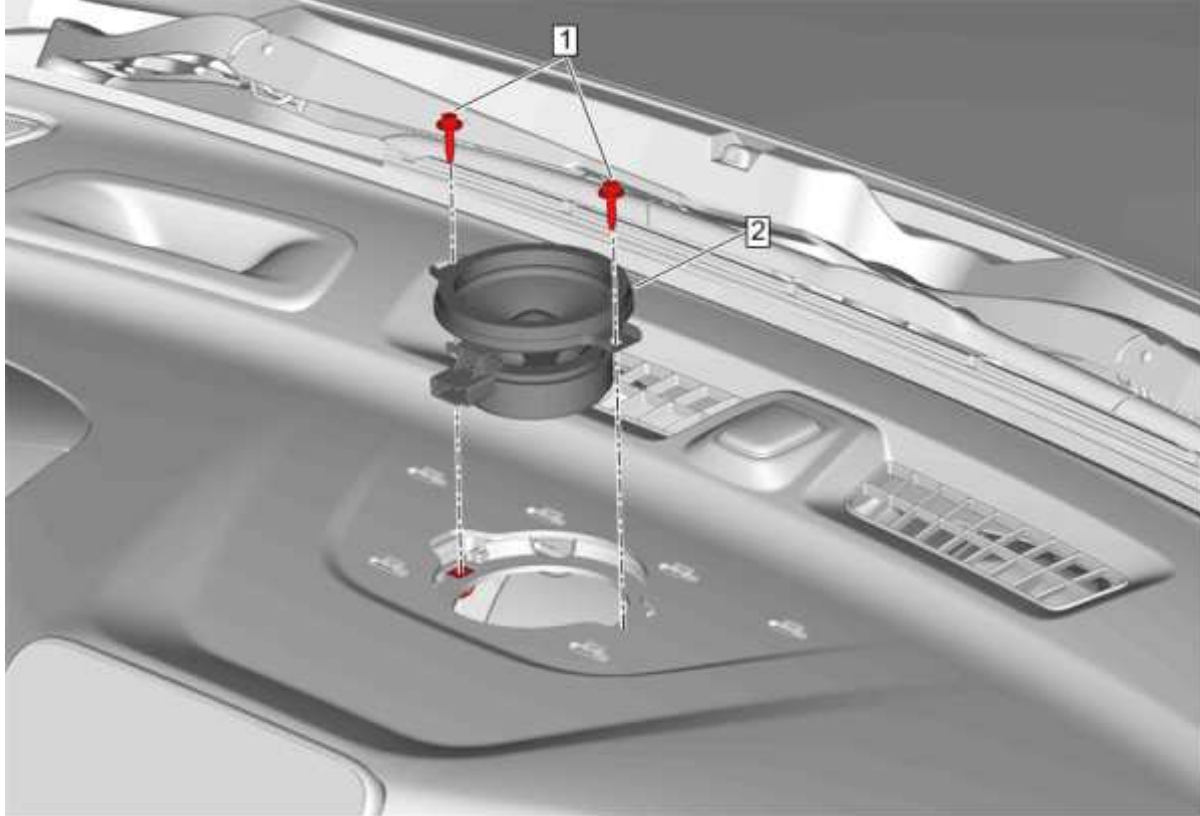


Fig. 65: Radio Front Center Speaker
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Radio Front Center Speaker Grille Replacement (Equinox)	
1	Radio Front Center Speaker Bolt [2x] CAUTION: Fastener Caution Tighten 2.5 N.m (22 lb in)
2	Radio Front Center Speaker Procedure Disconnect the electrical connector.

RADIO FRONT CENTER SPEAKER REPLACEMENT (TERRAIN)



Fig. 66: Radio Front Center Speaker
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Radio Front Center Speaker Grille Replacement (Terrain)</u>	
1	Radio Front Center Speaker Bolt [2x] CAUTION: <u>Fastener Caution</u> Tighten 2.5 N.m (22 lb in)
2	Radio Front Center Speaker Procedure Disconnect the electrical connector.

RADIO FRONT SPEAKER GRILLE REPLACEMENT

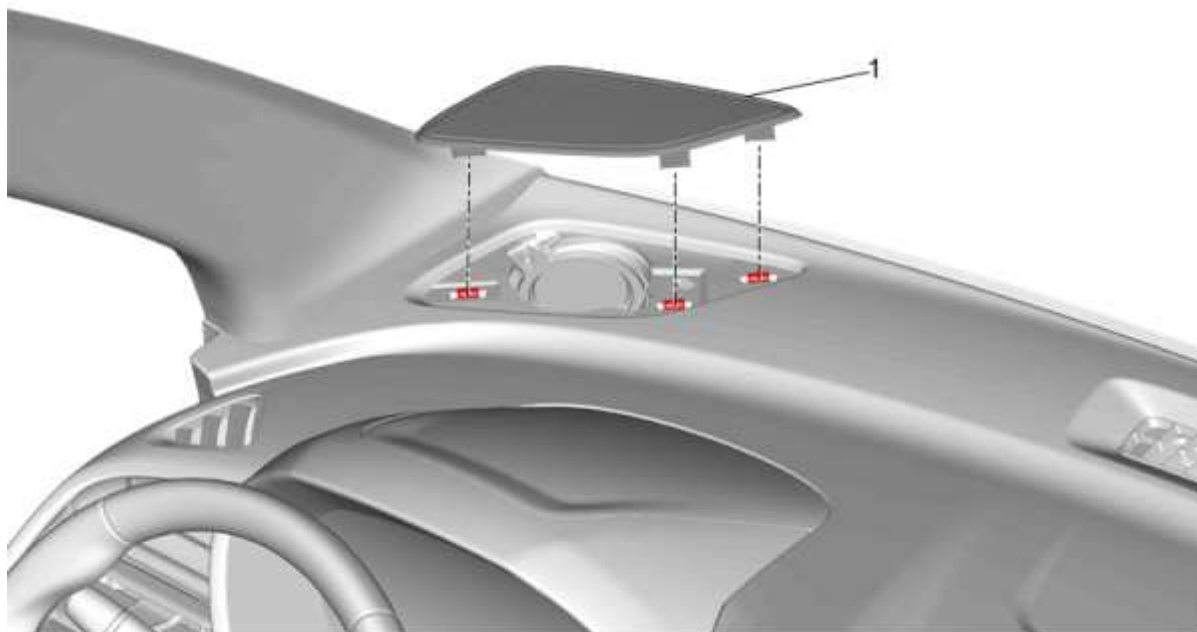


Fig. 67: Radio Front Speaker Grille
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Radio Front Speaker Grille Procedure Use a flat bladed plastic tool to remove.

RADIO FRONT CENTER SPEAKER GRILLE REPLACEMENT (EQUINOX)

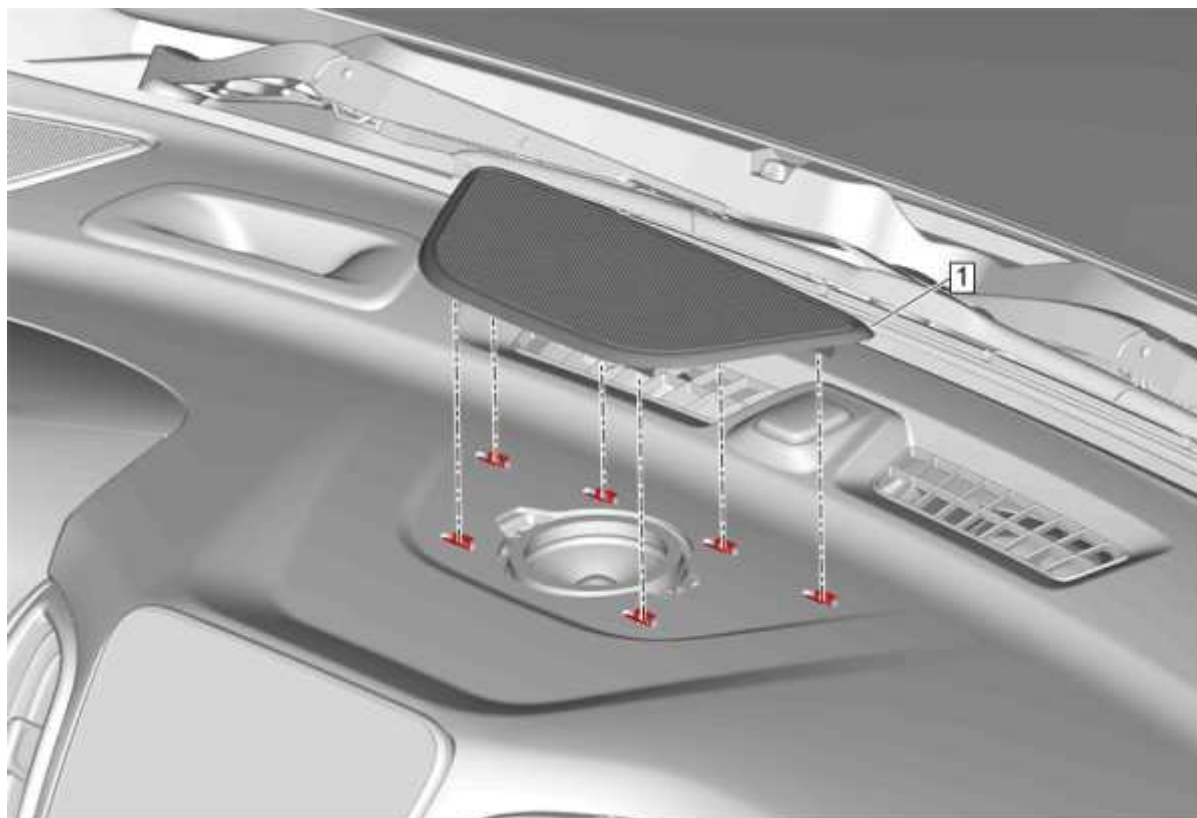


Fig. 68: Radio Front Center Speaker Grille
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

Callout	Component Name
1	Radio Front Center Speaker Grille Procedure Use a flat bladed plastic tool to remove.

RADIO FRONT CENTER SPEAKER GRILLE REPLACEMENT (TERRAIN)



Fig. 69: Radio Front Center Speaker Grille
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Radio Front Center Speaker Grille Procedure Use a flat bladed plastic tool to remove.

RADIO FRONT SPEAKER REPLACEMENT (EQUINOX)

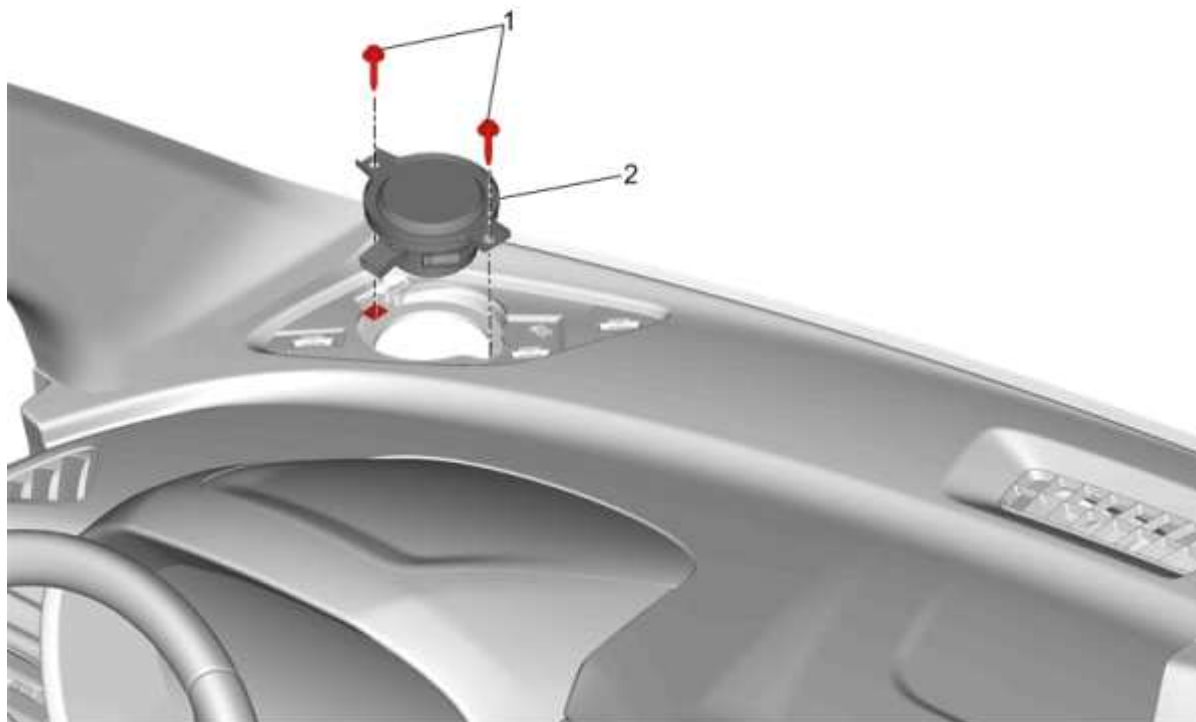


Fig. 70: Radio Front Speaker

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Radio Front Speaker Grille Replacement</u>	
1	Radio Front Speaker Bolt [2x] CAUTION: <u>Fastener Caution</u> Tighten 2.5 N.m (22 lb in)
2	Radio Front Speaker Procedure Disconnect the electrical connector.

RADIO FRONT SPEAKER REPLACEMENT (TERRAIN)

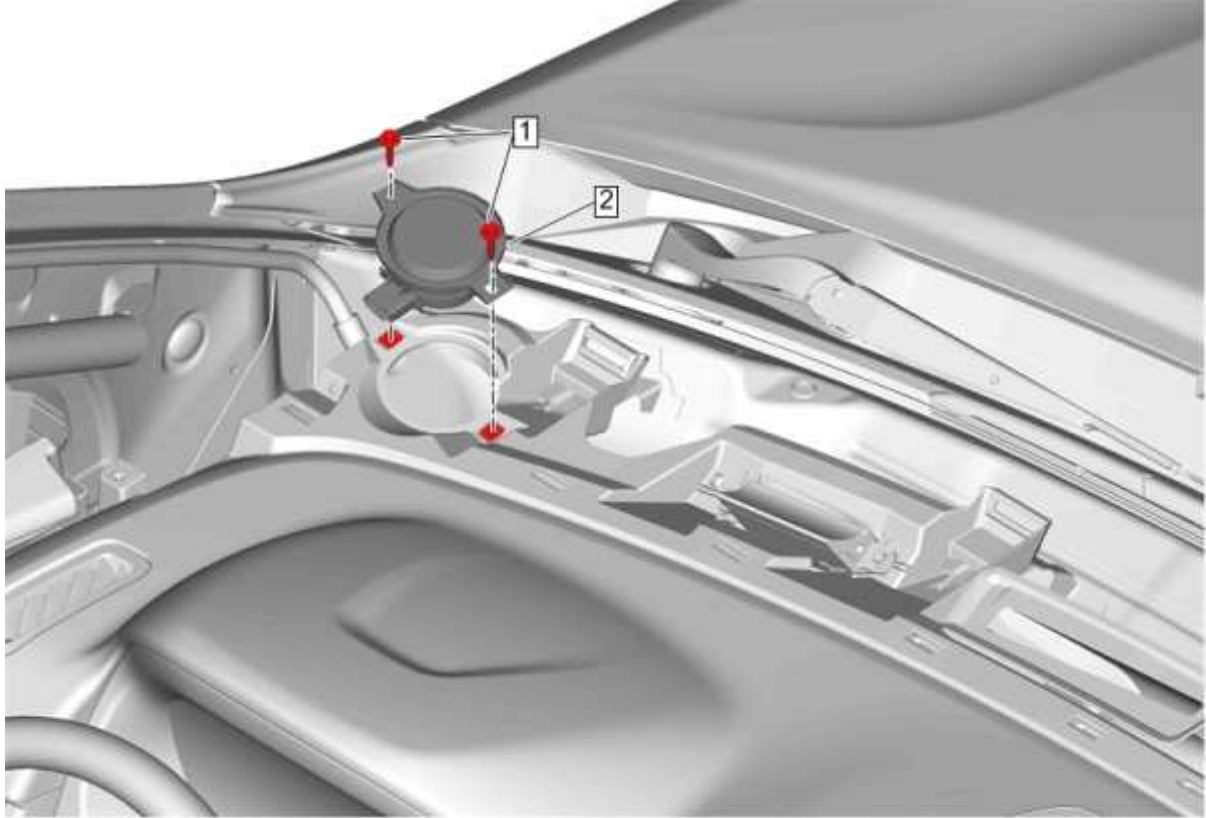


Fig. 71: Radio Front Speaker

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Instrument Panel Extension Replacement (Terrain)</u>	
1	Radio Front Speaker Bolt [2x] CAUTION: <u>Fastener Caution</u> Tighten 2.5 N.m (22 lb in)
2	Radio Front Speaker Procedure Disconnect the electrical connector.

HIGH FREQUENCY ANTENNA REPLACEMENT (EQUINOX)

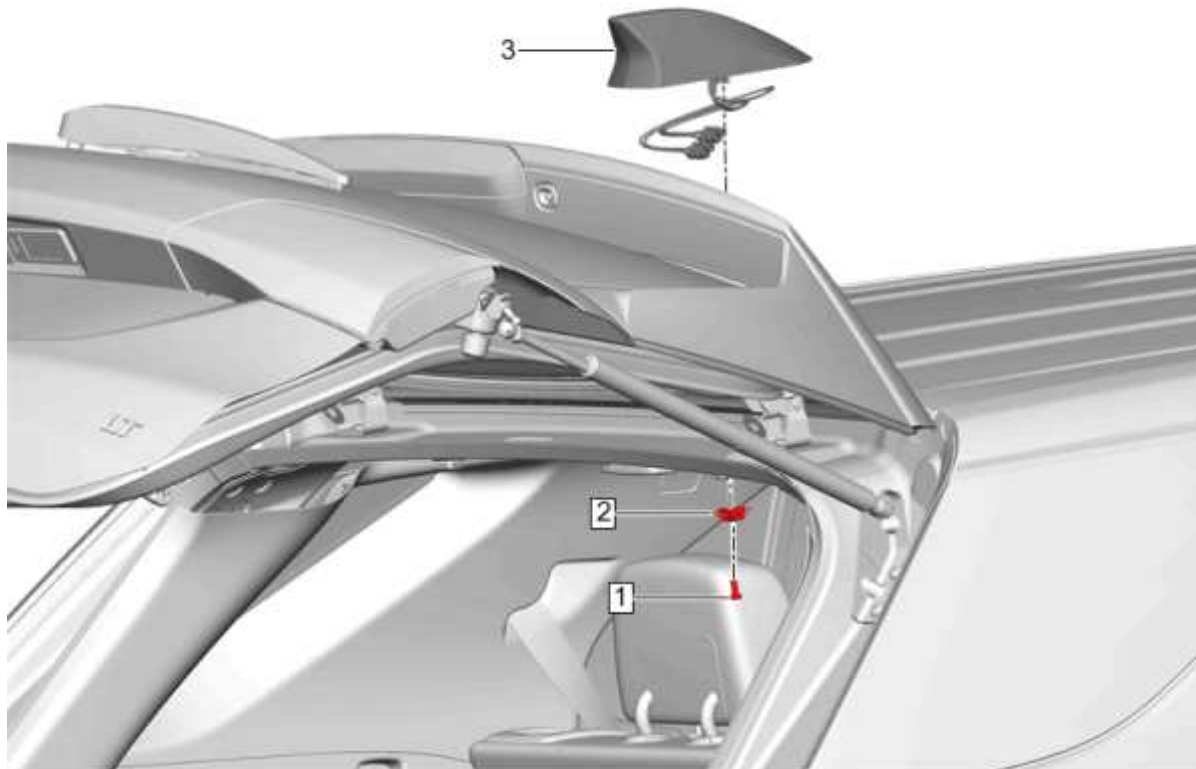


Fig. 72: High Frequency Antenna

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure It is only necessary to lower the headlining. Only do those steps in the headlining procedure that will allow access to the component being removed. Headlining Trim Panel Replacement	
1	High Frequency Antenna Bolt CAUTION: Fastener Caution Tighten 9 N.m (80 lb in)
2	High Frequency Antenna Retainer NOTE: Discard the retainer and replace with a 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.

HIGH FREQUENCY ANTENNA REPLACEMENT (TERRAIN)

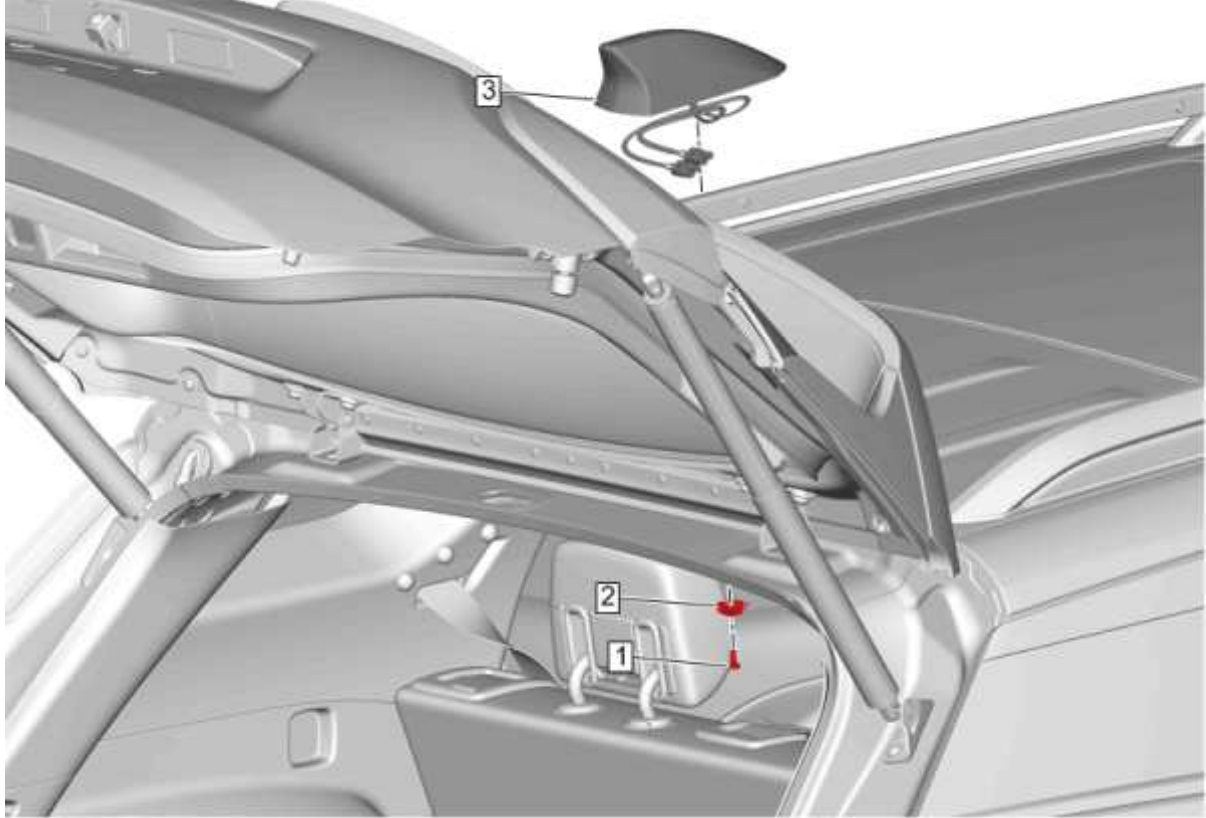


Fig. 73: High Frequency Antenna

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure It is only necessary to lower the headlining. Only do those steps in the headlining procedure that will allow access to the component being removed. Headlining Trim Panel Replacement	
1	High Frequency Antenna Bolt CAUTION: Fastener Caution Tighten 9 N.m (80 lb in)
2	High Frequency Antenna Retainer NOTE: Discard the retainer and replace with a 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

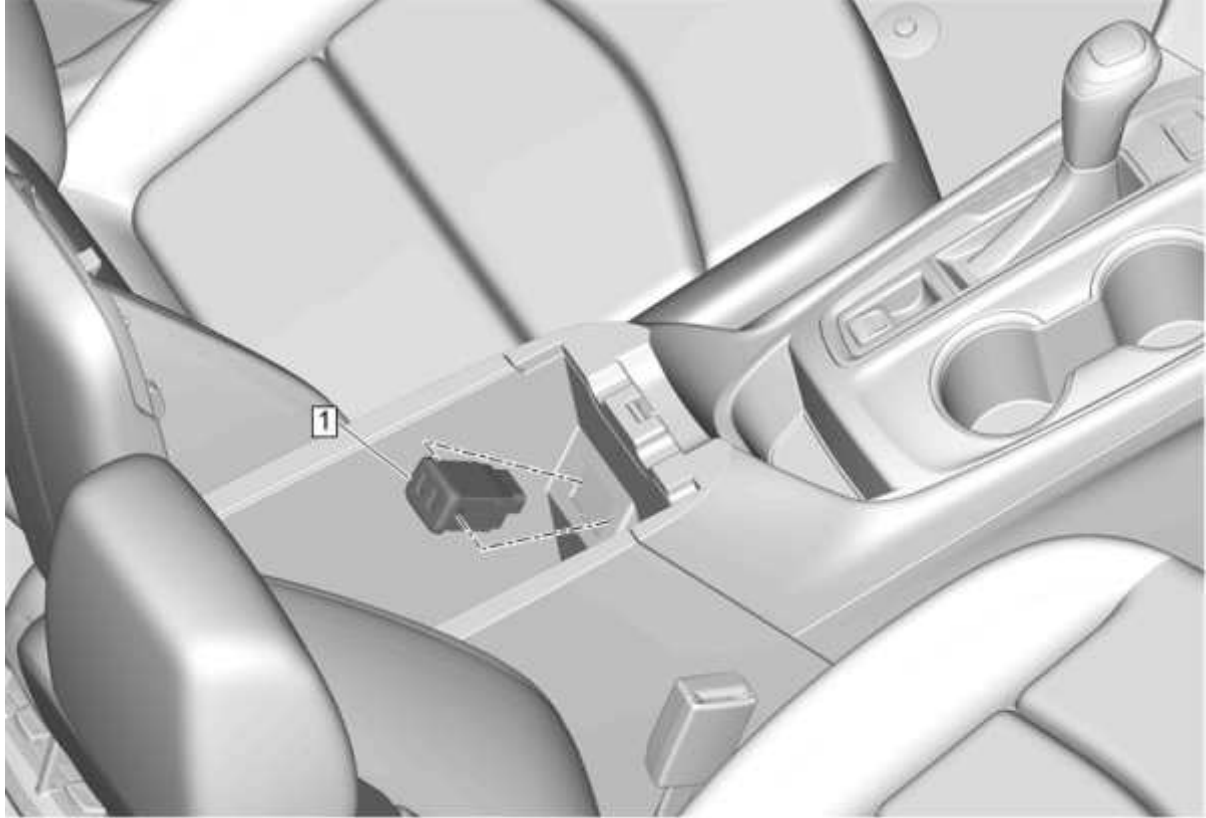


Fig. 74: USB Receptacle

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	USB Receptacle Procedure 1. Depress the tabs on the receptacle to remove. 2. Use a suitable tool. 3. Disconnect the electrical connectors.

RADIO FRONT SIDE DOOR SPEAKER REPLACEMENT



Fig. 75: Radio Front Side Door Speaker
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Front Side Door Trim Replacement (Equinox)</u> <u>Front Side Door Trim Replacement (Terrain)</u>	
1	Radio Front Side Door Speaker Bolt CAUTION: <u>Fastener Caution</u> Tighten 2.5 N.m (22 lb in)
2	Radio Front Side Door Speaker Procedure Disconnect the electrical connector.

RADIO FUNCTION SWITCH REPLACEMENT (EQUINOX)



Fig. 76: Radio Function Switch
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Instrument Panel Radio Front Trim Plate Replacement (Equinox)</u>	
1	Radio Function Switch Procedure Release the retaining tabs.

RADIO FUNCTION SWITCH REPLACEMENT (TERRAIN)

Removal Procedure

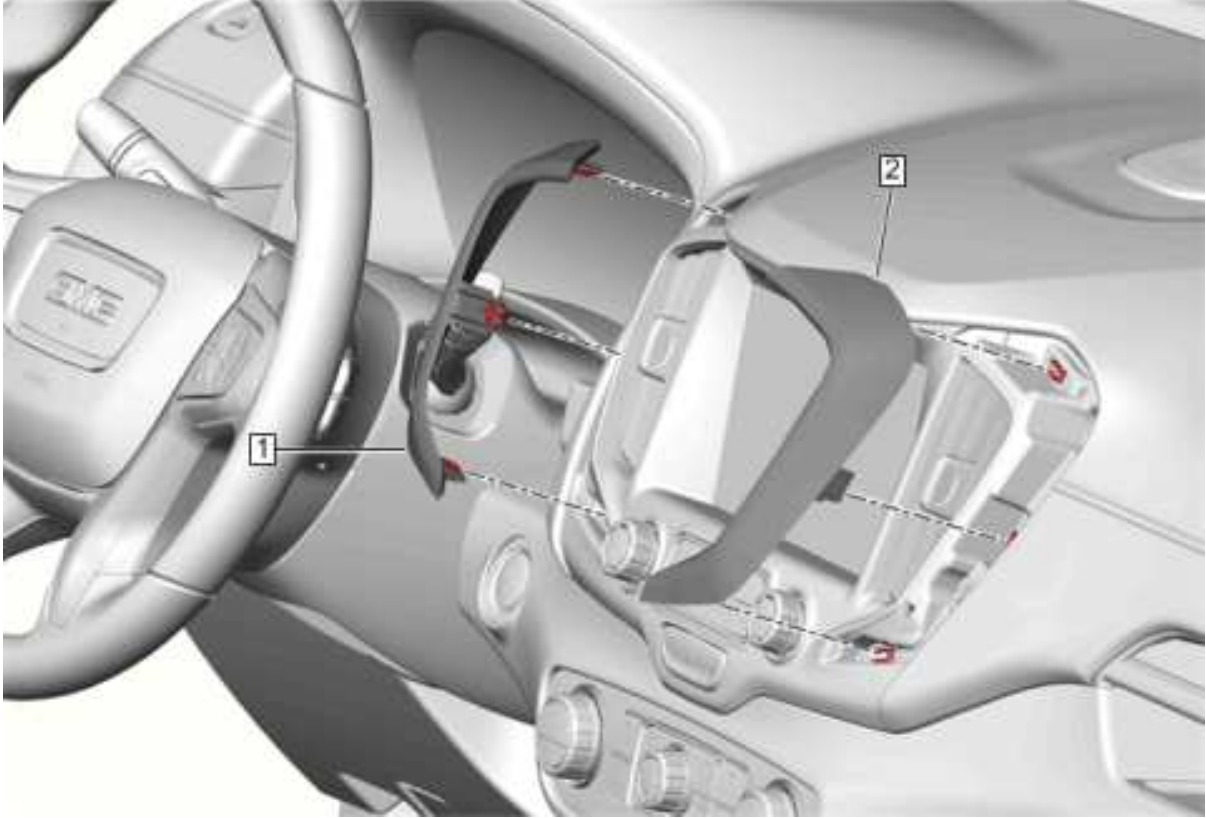


Fig. 77: Instrument Panel Center Trim Plate Applique
 Courtesy of GENERAL MOTORS COMPANY

1. Remove Instrument Panel Center Trim Plate Applique (1, 2) - [Instrument Panel Center Trim Plate Applique Replacement \(Terrain\)](#)

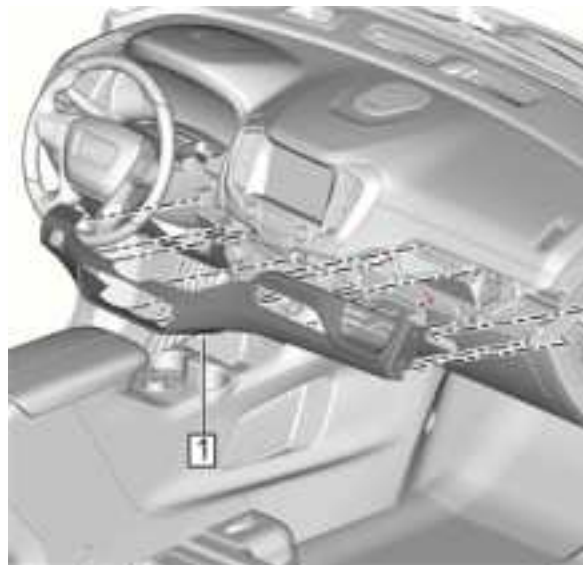


Fig. 78: Instrument Panel Trim Pad
 Courtesy of GENERAL MOTORS COMPANY

2. Remove Instrument Panel Trim Pad - Right Side (1) - [Instrument Panel Trim Pad Replacement - Right Side \(Terrain\)](#)



Fig. 79: Radio Control Bolt

Courtesy of GENERAL MOTORS COMPANY

3. Remove Radio Control Bolt (1)



Fig. 80: Instrument Panel Radio Front And Rear Trim Plate Assembly

Courtesy of GENERAL MOTORS COMPANY

NOTE: The instrument panel radio front and rear trim plate, driver information display, heater and air conditioning user interface control, and instrument panel center air outlets comes off as one unit.

4. Remove Instrument Panel Radio Front and Rear Trim Plate Assembly (1)
5. Use a plastic trim tool if necessary.
6. Disconnect the electrical connectors.

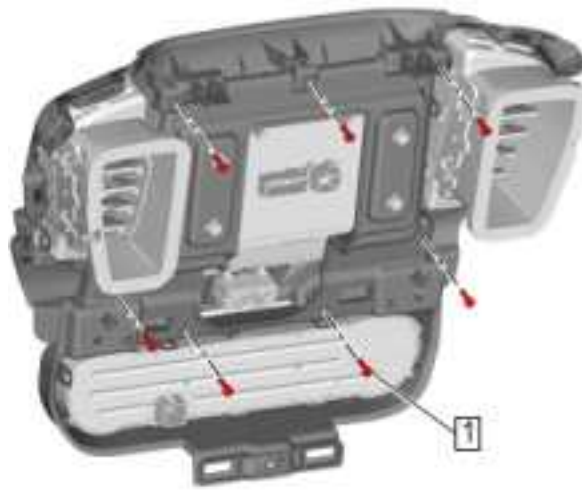


Fig. 81: Radio Control Bolt

Courtesy of GENERAL MOTORS COMPANY

7. Remove Radio Control Bolt (1)



Fig. 82: Instrument Panel Radio Front Trim Plate

Courtesy of GENERAL MOTORS COMPANY

8. Remove Instrument Panel Radio Front Trim Plate (1)



Fig. 83: Radio Function Switch
Courtesy of GENERAL MOTORS COMPANY

9. Remove Radio Control Bolt (1)
10. Remove Radio Function Switch (2)

Installation Procedure



Fig. 84: Radio Function Switch
Courtesy of GENERAL MOTORS COMPANY

1. Install Radio Function Switch (2)

CAUTION: Fastener Caution

2. Install Radio Control Bolt (1) and tighten [2x] 2.5 N.m (22 lb in)



Fig. 85: Instrument Panel Radio Front Trim Plate
Courtesy of GENERAL MOTORS COMPANY

3. Install Instrument Panel Radio Front Trim Plate (1)

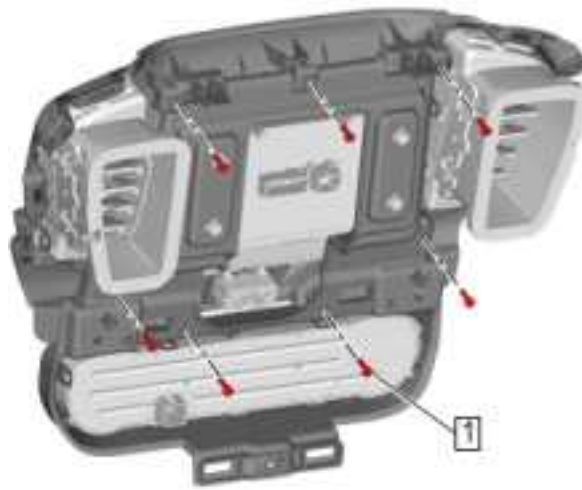


Fig. 86: Radio Control Bolt

Courtesy of GENERAL MOTORS COMPANY

4. Install Radio Control Bolt (1) and tighten [7x] 2.5 N.m (22 lb in)



Fig. 87: Instrument Panel Radio Front And Rear Trim Plate Assembly

Courtesy of GENERAL MOTORS COMPANY

5. Connect the electrical connectors.
6. Install Instrument Panel Radio Front And Rear Trim Plate Assembly (1)



Fig. 88: Radio Control Bolt

Courtesy of GENERAL MOTORS COMPANY

7. Install Radio Control Bolt (1) and tighten [7x] 2.5 N.m (22 lb in)

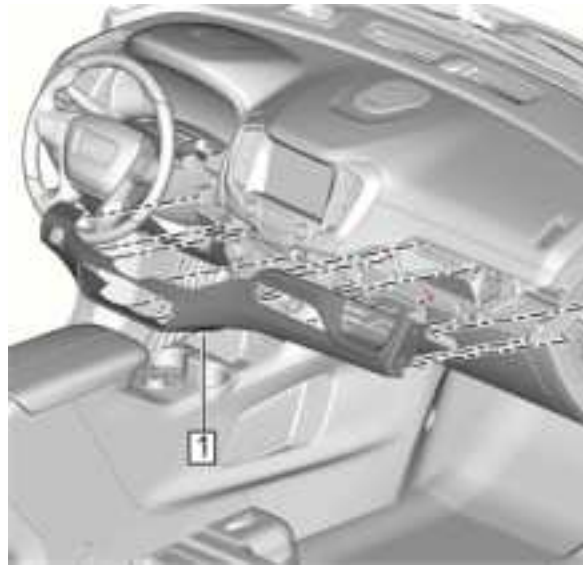


Fig. 89: Instrument Panel Trim Pad

Courtesy of GENERAL MOTORS COMPANY

8. Install Instrument Panel Trim Pad - Right Side (1)- **Instrument Panel Trim Pad Replacement - Right Side (Terrain)**

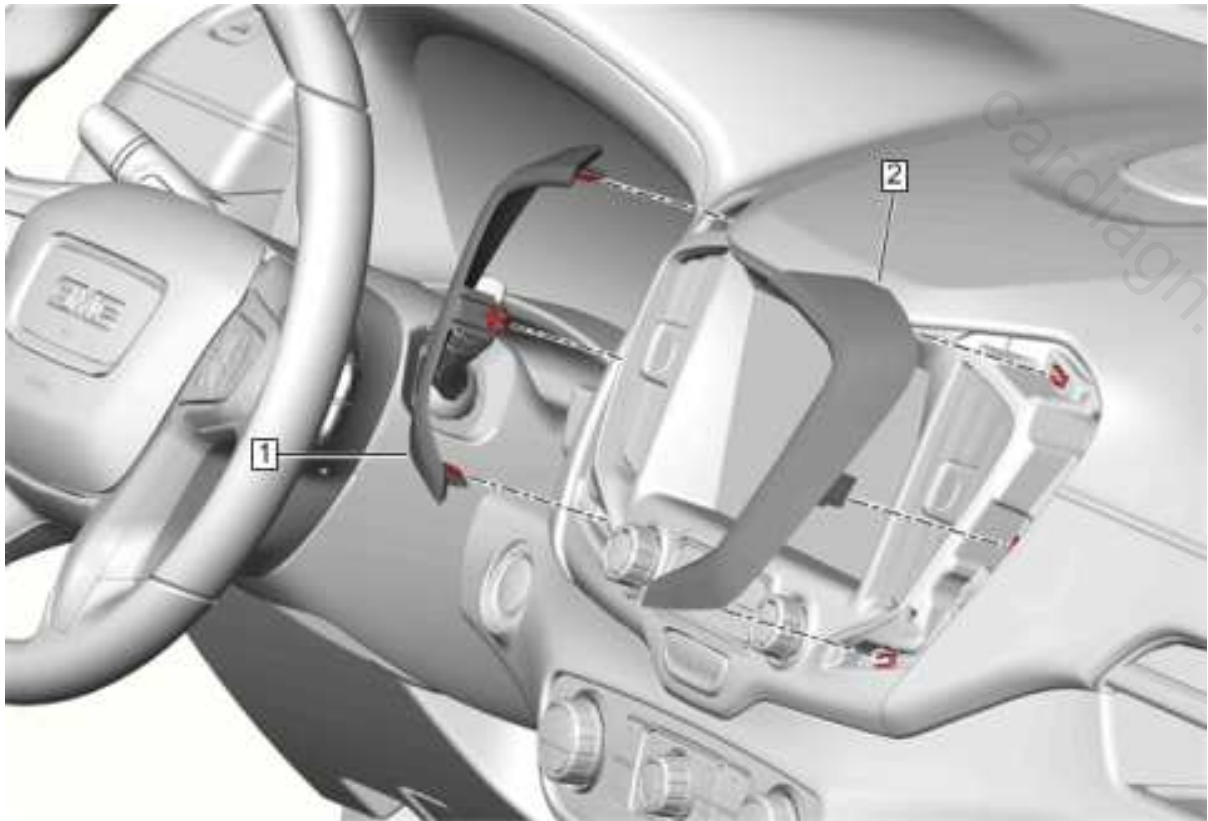


Fig. 90: Instrument Panel Center Trim Plate Applique

Courtesy of GENERAL MOTORS COMPANY

9. Install Instrument Panel Center Trim Plate Applique (1, 2) - **Instrument Panel Center Trim Plate Applique Replacement (Terrain)**

RADIO CONTROL SWITCH REPLACEMENT - STEERING WHEEL (EQUINOX, RIGHT FRONT)

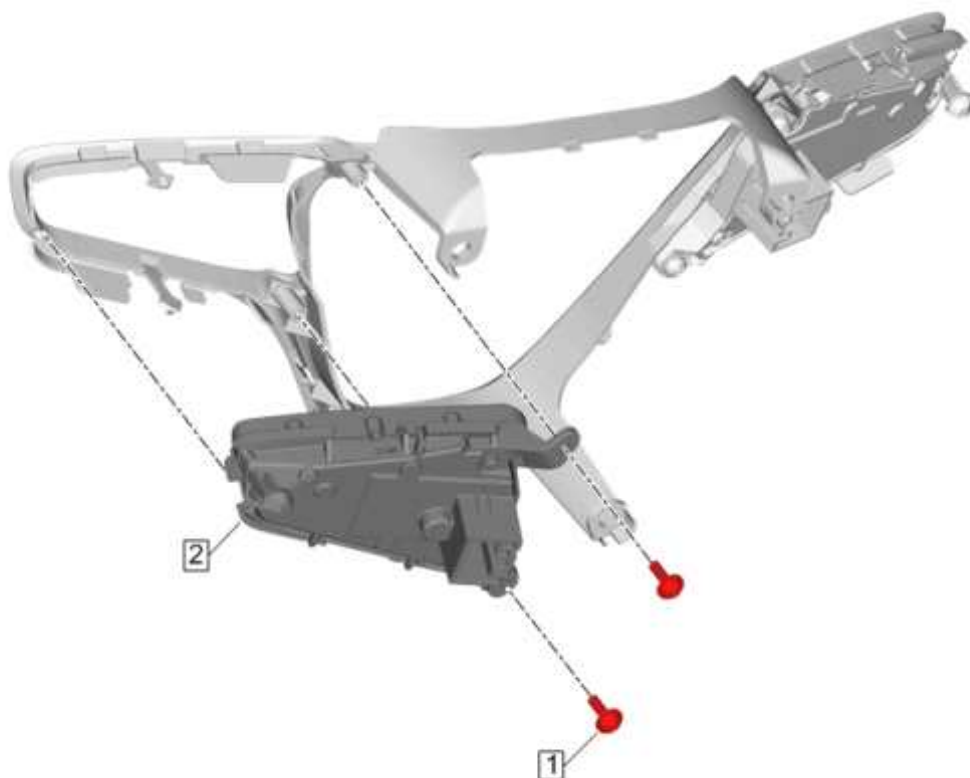


Fig. 91: Radio Control Switch - Steering Wheel
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Steering Wheel Spoke Cover Replacement (Equinox)</u>	
1	Steering Wheel Spoke Cover Fastener [2x] CAUTION: Refer to <u>Fastener Caution</u> . Tighten 1.5 N.m (13 lb in)
2	Radio Control Switch - Steering Wheel Procedure Release the retaining tabs and remove the radio control switch from the steering wheel spoke cover.

RADIO CONTROL SWITCH REPLACEMENT - STEERING WHEEL (EQUINOX, LEFT REAR)

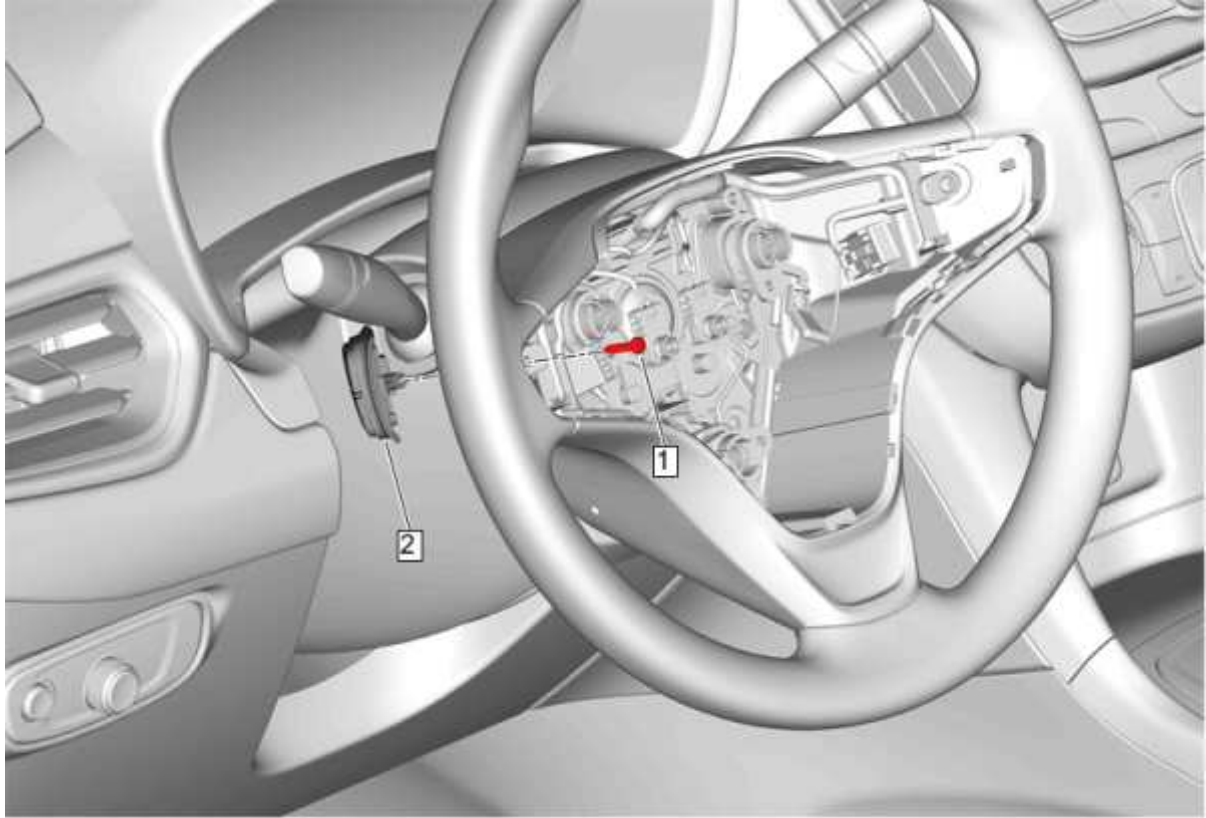


Fig. 92: Radio Control Switch - Steering Wheel
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Steering Wheel Spoke Cover Replacement (Equinox)</u>	
1	Radio Control Switch Bolt CAUTION: Refer to <u>Fastener Caution</u> . Tighten 2.5 N.m (22 lb in)
2	Radio Control Switch - Steering Wheel Procedure Disconnect the electrical connector.

RADIO CONTROL SWITCH REPLACEMENT - STEERING WHEEL (EQUINOX, RIGHT REAR)

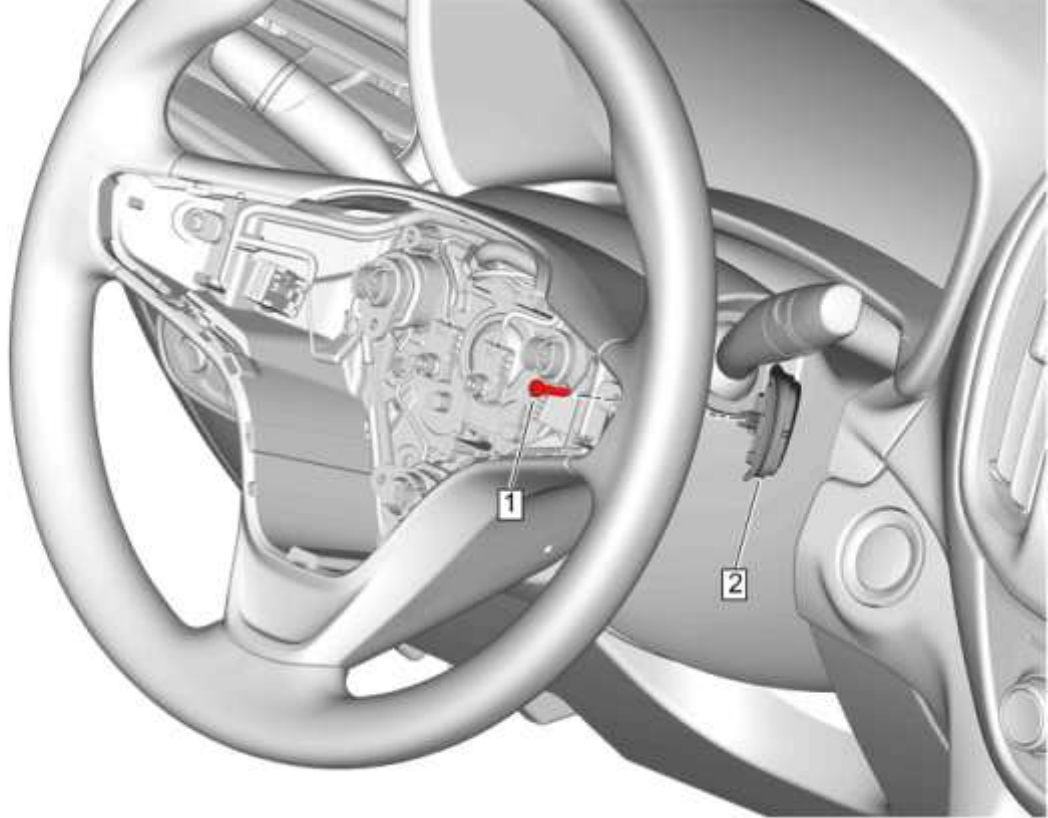


Fig. 93: Radio Control Switch - Steering Wheel
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Steering Wheel Spoke Cover Replacement (Equinox)</u>	
1	Radio Control Switch Bolt CAUTION: Refer to <u>Fastener Caution</u> . Tighten 2.5 N.m (22 lb in)
2	Radio Control Switch - Steering Wheel Procedure Disconnect the electrical connector.

RADIO CONTROL SWITCH REPLACEMENT - STEERING WHEEL (TERRAIN, RIGHT FRONT)

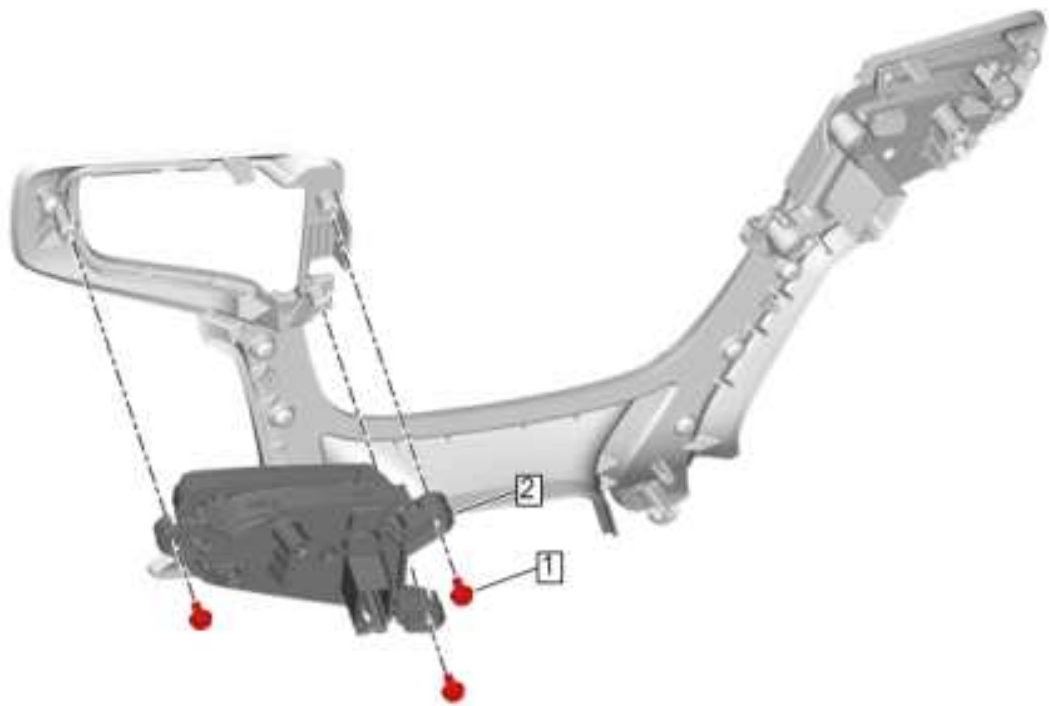


Fig. 94: Radio Control Switch - Steering Wheel
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Steering Wheel Spoke Cover Replacement (Terrain)</u>	
1	Steering Wheel Spoke Cover Fastener [3x] CAUTION: Refer to <u>Fastener Caution</u> . Tighten 1.5 N.m (13 lb in)
2	Radio Control Switch - Steering Wheel Procedure Release the retaining tabs and remove the radio control switch from the steering wheel spoke cover.

RADIO CONTROL SWITCH REPLACEMENT - STEERING WHEEL (TERRAIN, LEFT REAR)

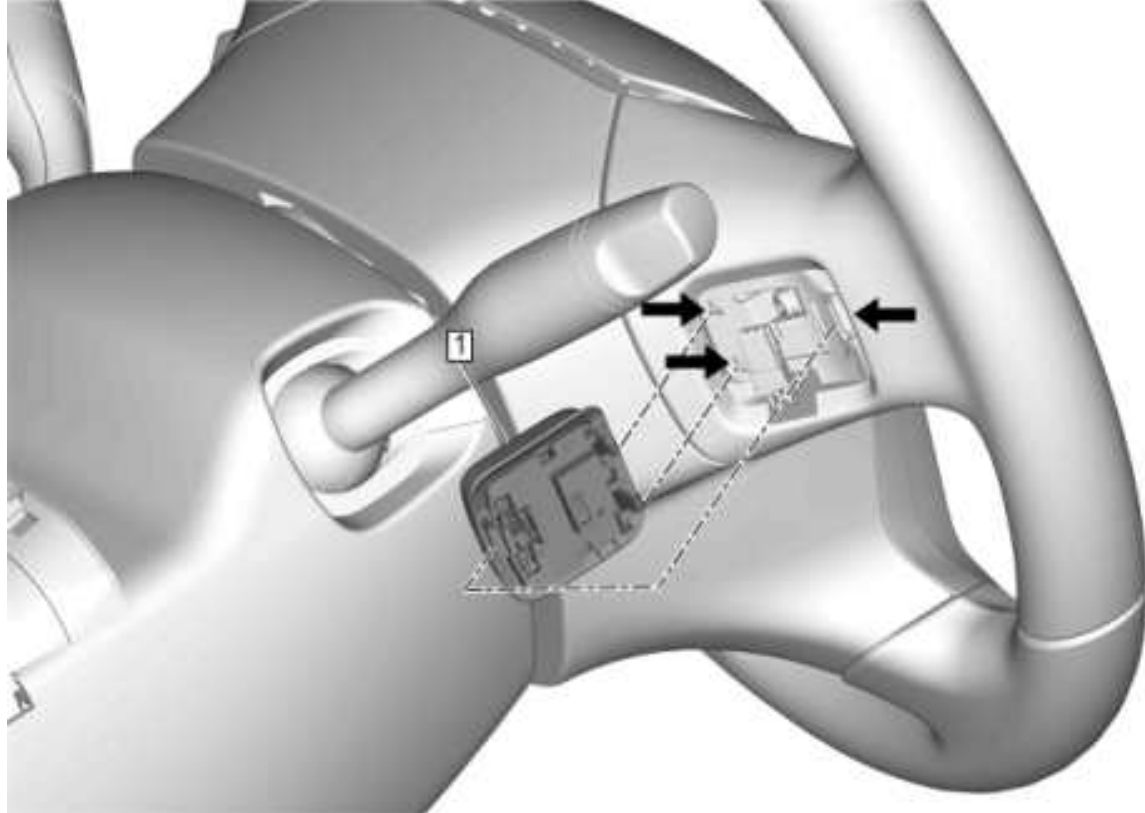


Fig. 95: Radio Control Switch - Steering Wheel
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Radio Control Switch - Steering Wheel Procedure 1. Use a flat bladed plastic tool to remove. 2. Disconnect the electrical connector. NOTE: Use a flat bladed plastic tool to release the steering wheel radio control switch retaining tabs from the bracket attached to the steering wheel.

RADIO CONTROL SWITCH REPLACEMENT - STEERING WHEEL (TERRAIN, RIGHT REAR)

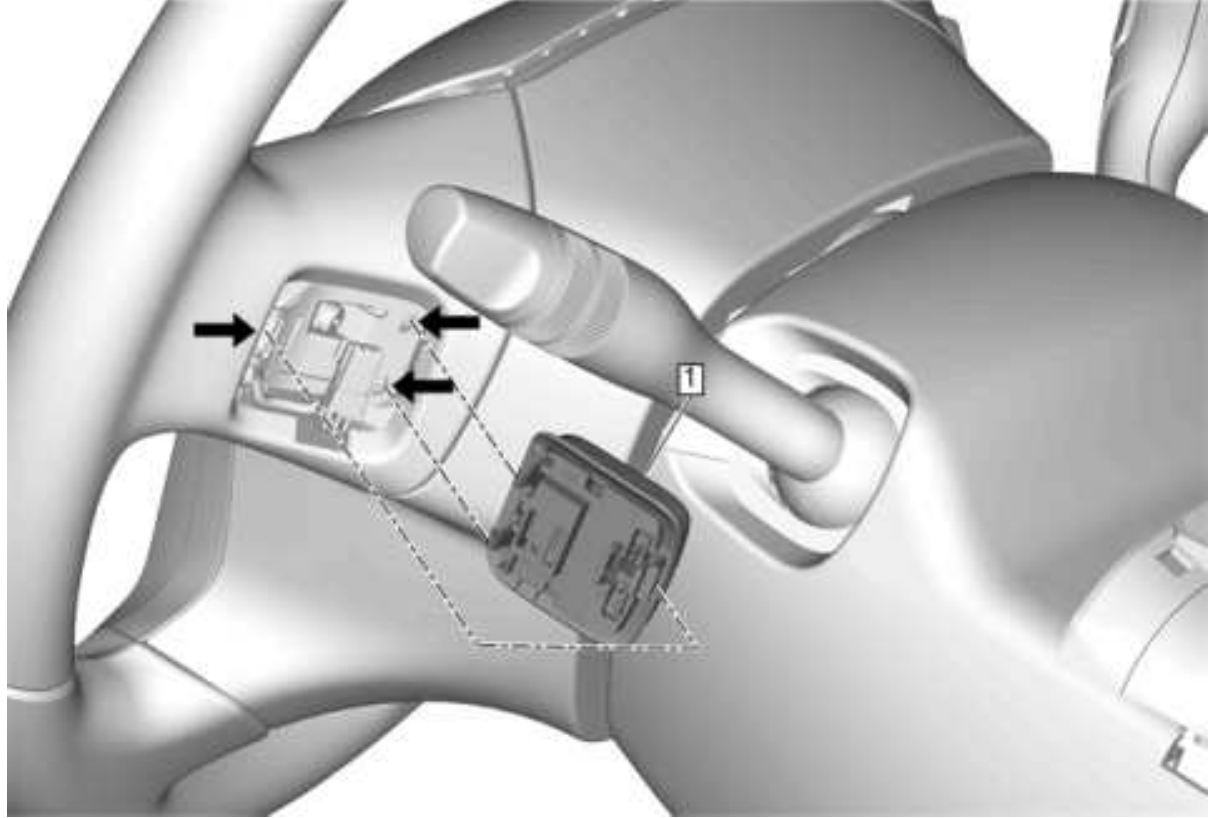


Fig. 96: Radio Control Switch - Steering Wheel
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Radio Control Switch - Steering Wheel Procedure 1. Use a flat bladed plastic tool to remove. 2. Disconnect the electrical connector. NOTE: Use a flat bladed plastic tool to release the steering wheel radio control switch retaining tabs from the bracket attached to the steering wheel.

RADIO REAR SIDE DOOR SPEAKER REPLACEMENT

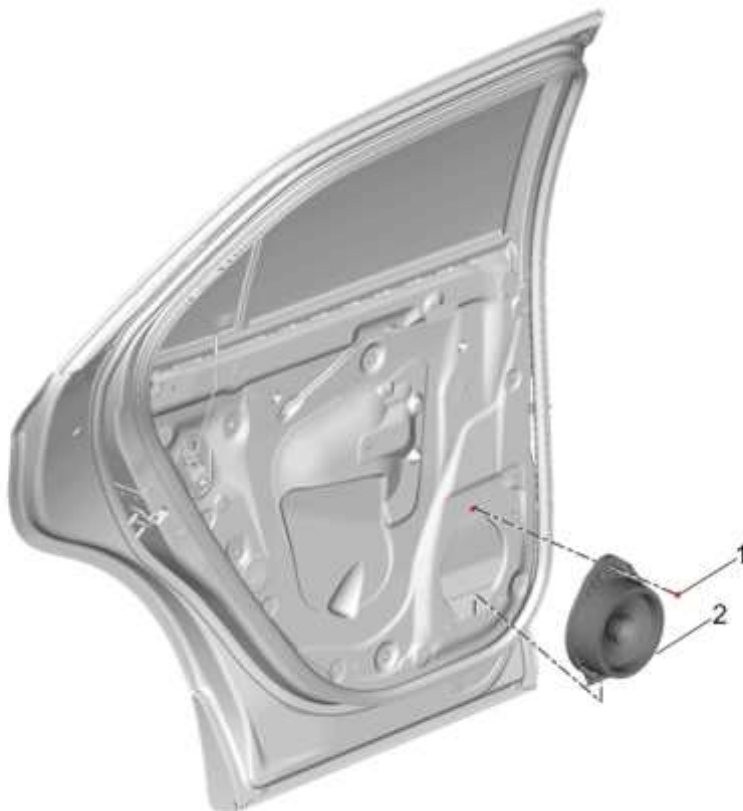


Fig. 97: Radio Rear Side Door Speaker
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Rear Side Door Trim Replacement (Equinox)</u> <u>Rear Side Door Trim Replacement (Terrain)</u>	
1	Radio Rear Side Door Speaker Bolt CAUTION: Fastener Caution Tighten 2.5 N.m (22 lb in)
2	Radio Rear Side Door Speaker Procedure 1. Remove the wiring harness retainer. 2. Disconnect the electrical connector.

FLOOR CONSOLE ACCESSORY FUNCTION SWITCH REPLACEMENT (EQUINOX)

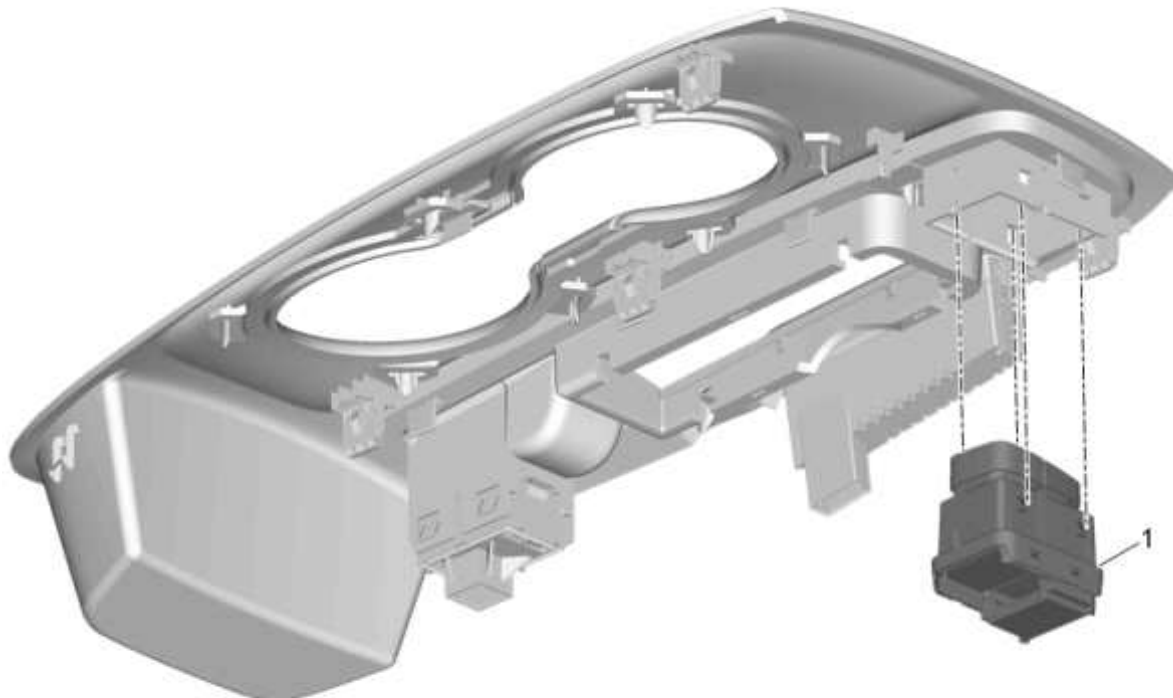


Fig. 98: Floor Console Accessory Function Switch
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Front Floor Console Trim Plate Replacement (Equinox)	
1	Floor Console Accessory Function Switch Procedure 1. Release the retaining tabs. 2. Use a suitable tool.

FLOOR CONSOLE ACCESSORY FUNCTION SWITCH REPLACEMENT (TERRAIN)

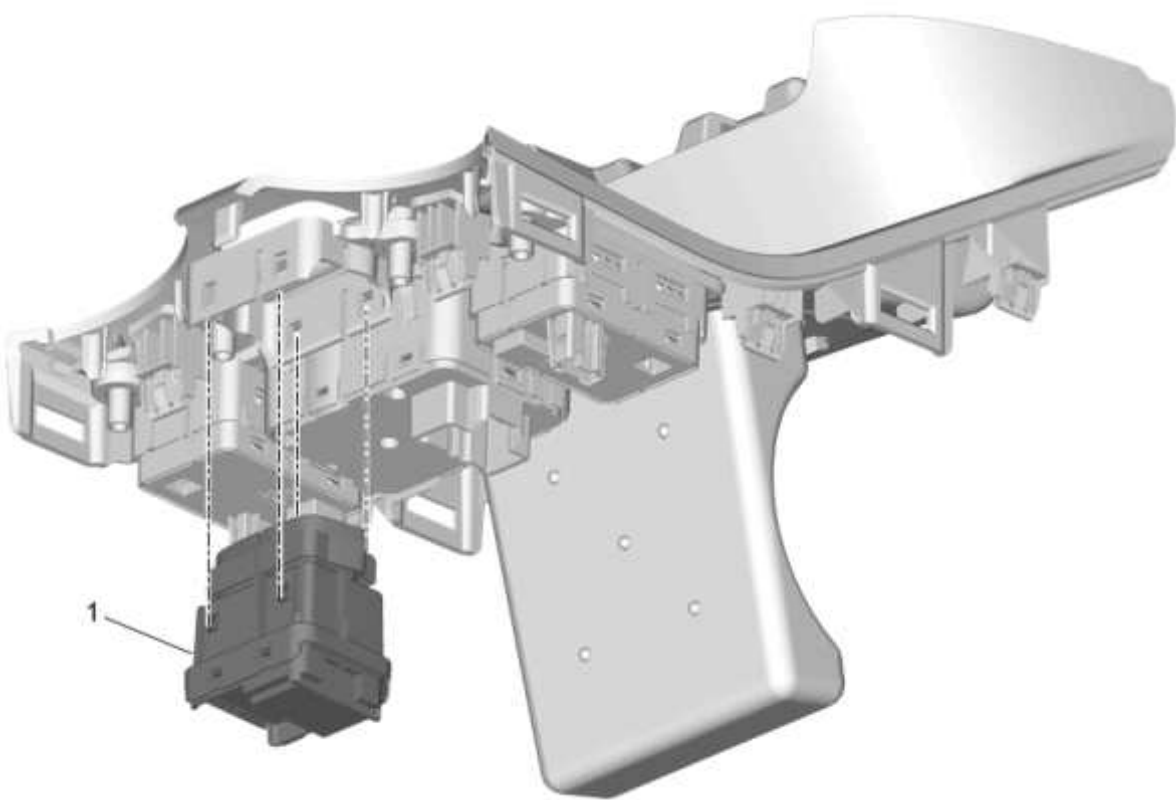


Fig. 99: Floor Console Accessory Function Switch
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Front Floor Console Trim Plate Replacement (Terrain)</u>	
1	Floor Console Accessory Function Switch Procedure 1. Release the retaining tabs. 2. Use a suitable tool.

2018 ACCESSORIES & EQUIPMENT

Cellular, Entertainment, And Navigation - Schematic And Routing Diagrams - Equinox & Terrain

SCHEMATIC WIRING DIAGRAMS

RADIO/NAVIGATION SYSTEM WIRING SCHEMATICS (IOB)

Radio Power, Ground, Data and Controls

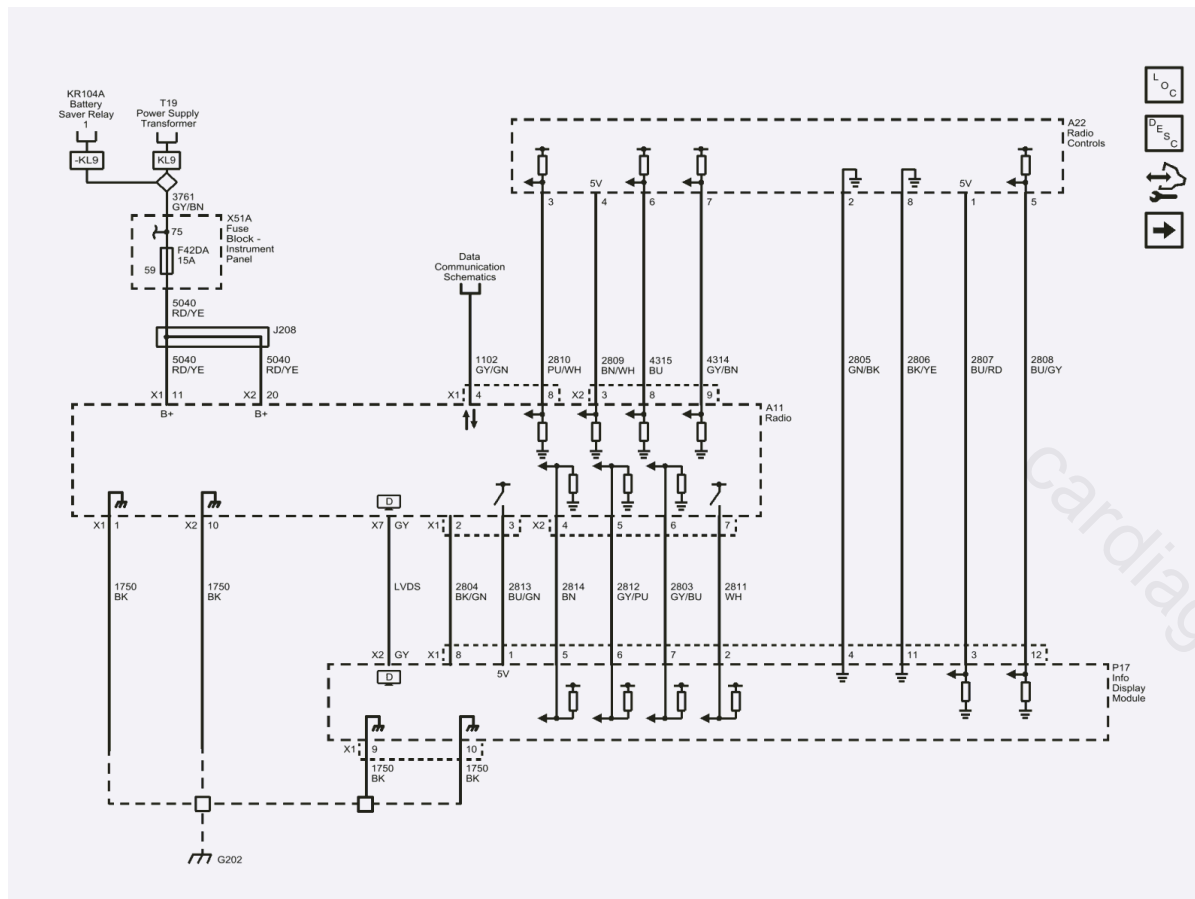


Fig. 1: Radio Power, Ground, Data and Controls

Courtesy of GENERAL MOTORS COMPANY

Speakers (UZ6 without NKC)

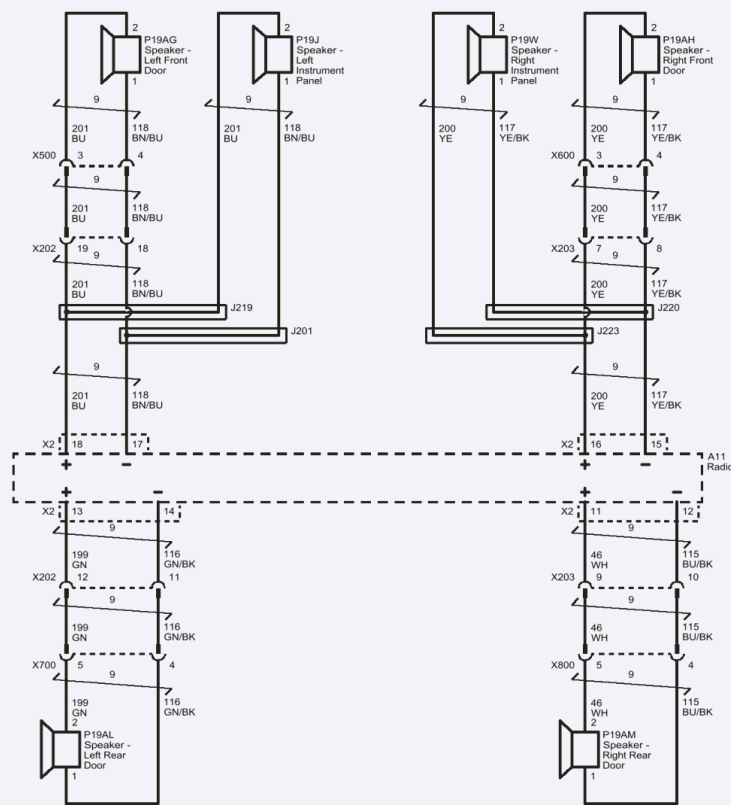


Fig. 2: Speakers (UZ6 without NKC)

Courtesy of GENERAL MOTORS COMPANY

Radio to Active Noise Cancellation Module (UZ6 and NKC)

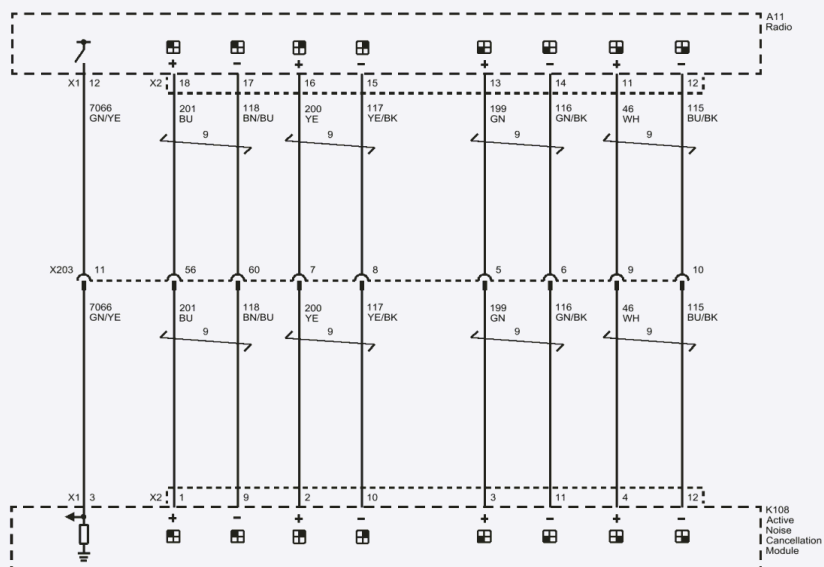


Fig. 3: Radio to Active Noise Cancellation Module (UZ6 and NKC)

Courtesy of GENERAL MOTORS COMPANY

Active Noise Cancellation Module to Speakers (UZ6 and NKC)

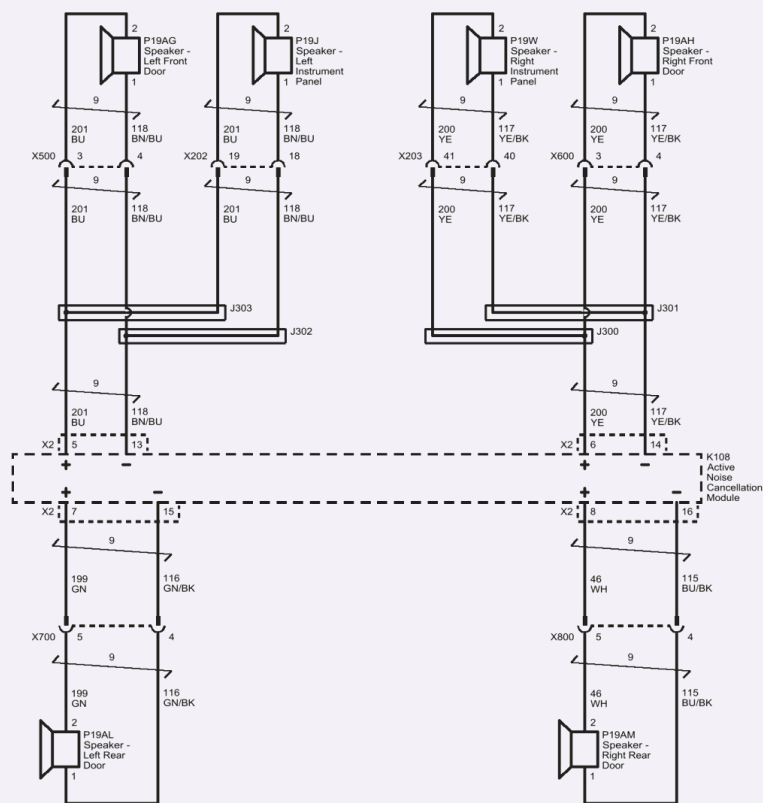


Fig. 4: Active Noise Cancellation Module to Speakers (UZ6 and NKC).
Courtesy of GENERAL MOTORS COMPANY

Antennas

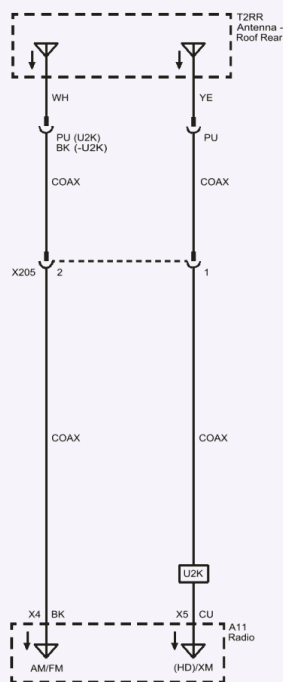


Fig. 5: Antennas
Courtesy of GENERAL MOTORS COMPANY

Auxiliary Inputs

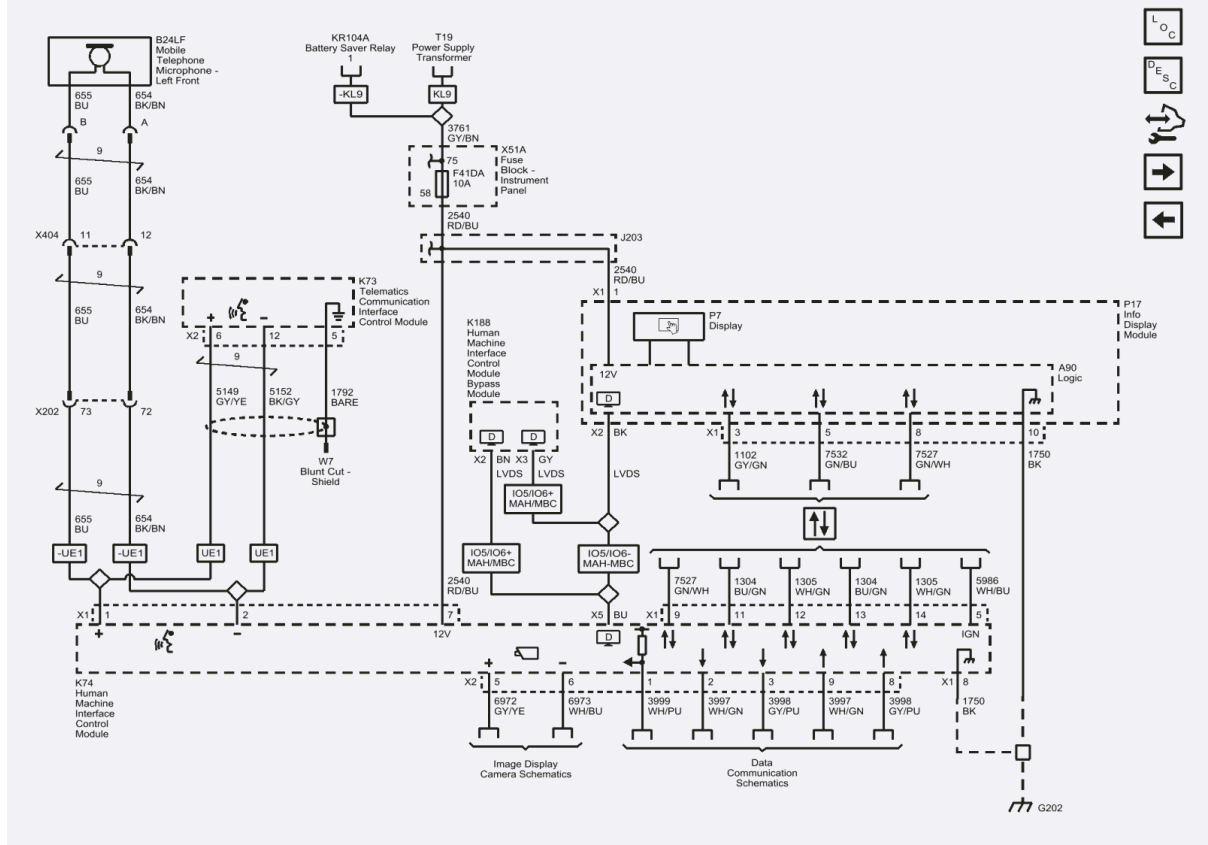


Fig. 8: Human Machine Interface and Display, Power, Ground, Serial Data and Microphone
Courtesy of GENERAL MOTORS COMPANY

Audio Amplifier Power, Ground and Serial Data (UQA)

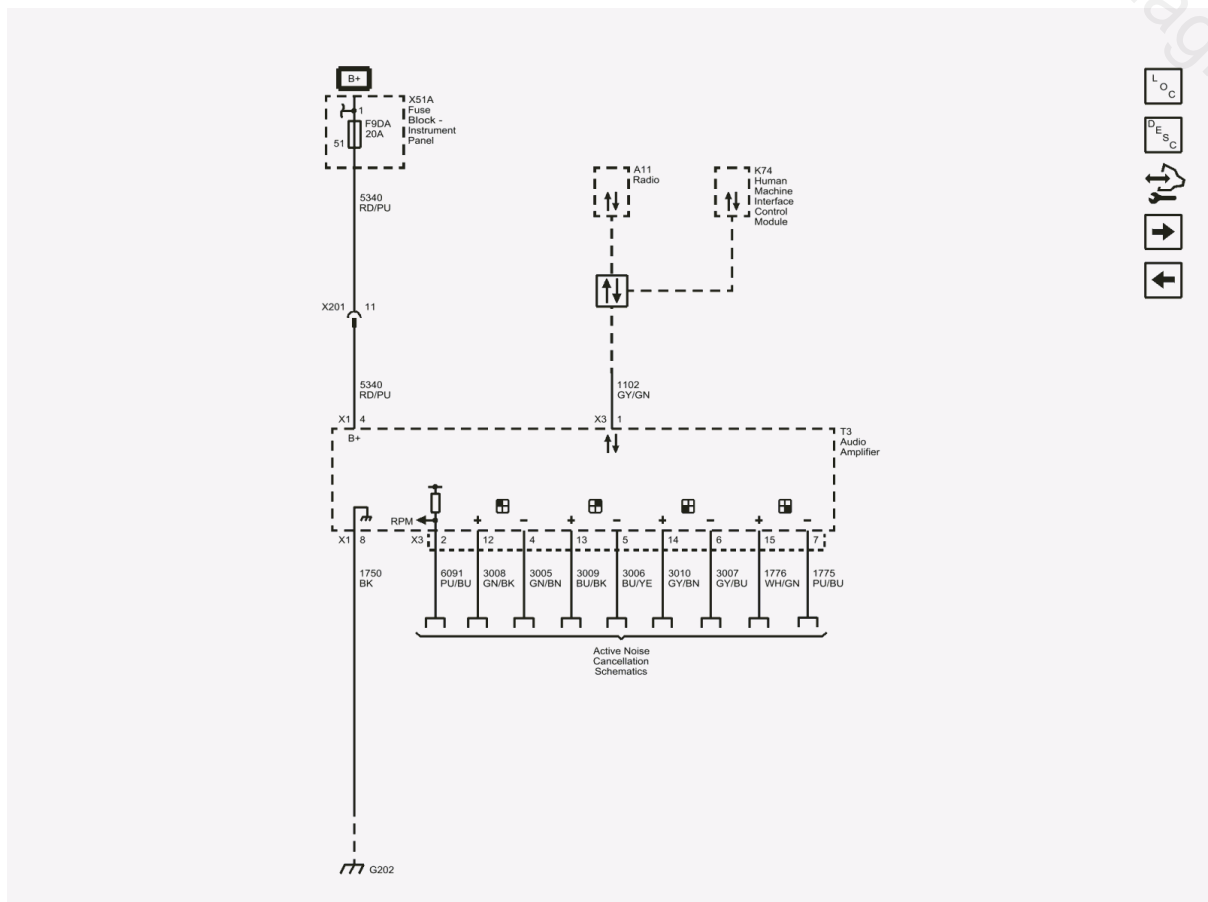


Fig. 9: Audio Amplifier Power, Ground and Serial Data (UQA)
Courtesy of GENERAL MOTORS COMPANY

Radio to Amplifier (UQA)



Courtesy of GENERAL MOTORS COMPANY

19AH
speaker -
Right Front
door



Courtesy of GENERAL MOTORS COMPANY

Radio to Active Noise Cancellation Module (UZ6)

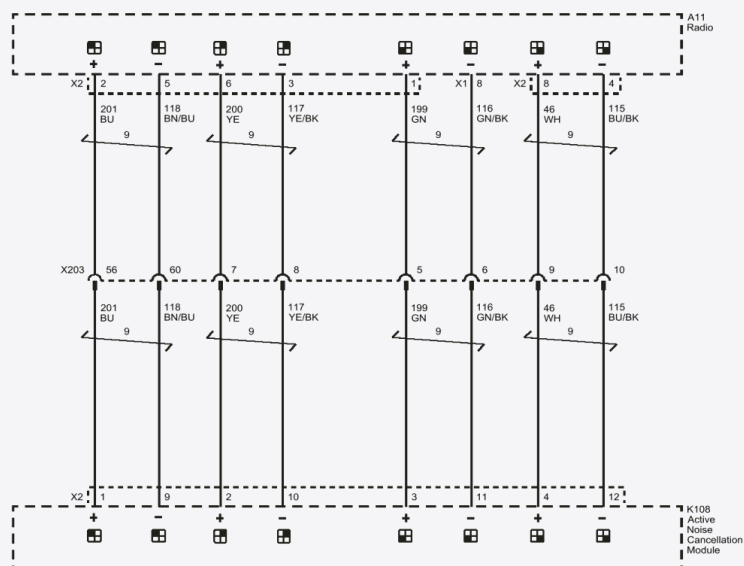


Fig. 12: Radio to Active Noise Cancellation Module (UZ6)
Courtesy of GENERAL MOTORS COMPANY

Active Noise Cancellation Module to Speakers (UZ6)

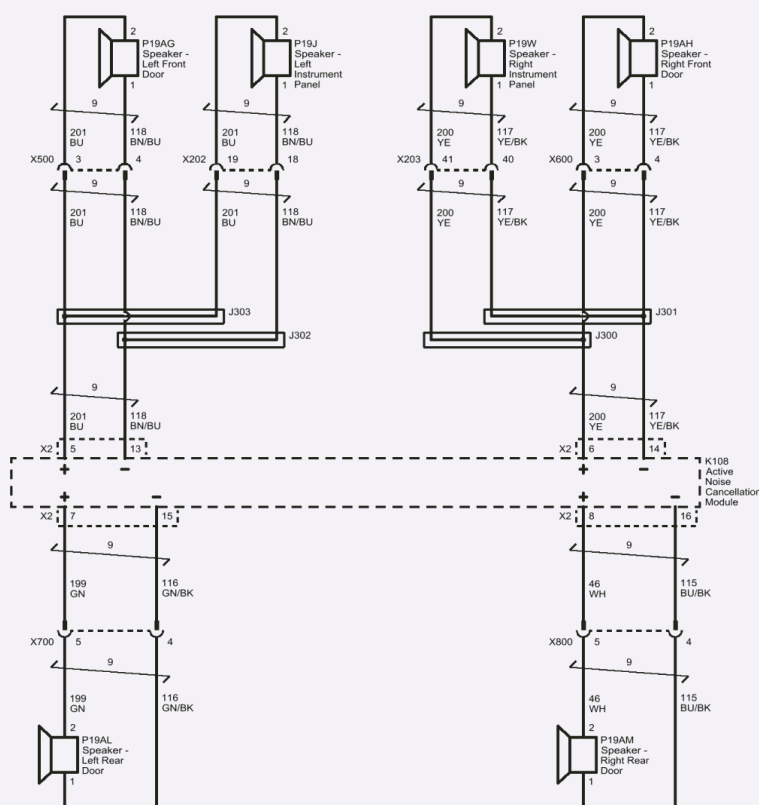


Fig. 13: Active Noise Cancellation Module to Speakers (UZ6)
Courtesy of GENERAL MOTORS COMPANY

Antennas

cardiagn.com

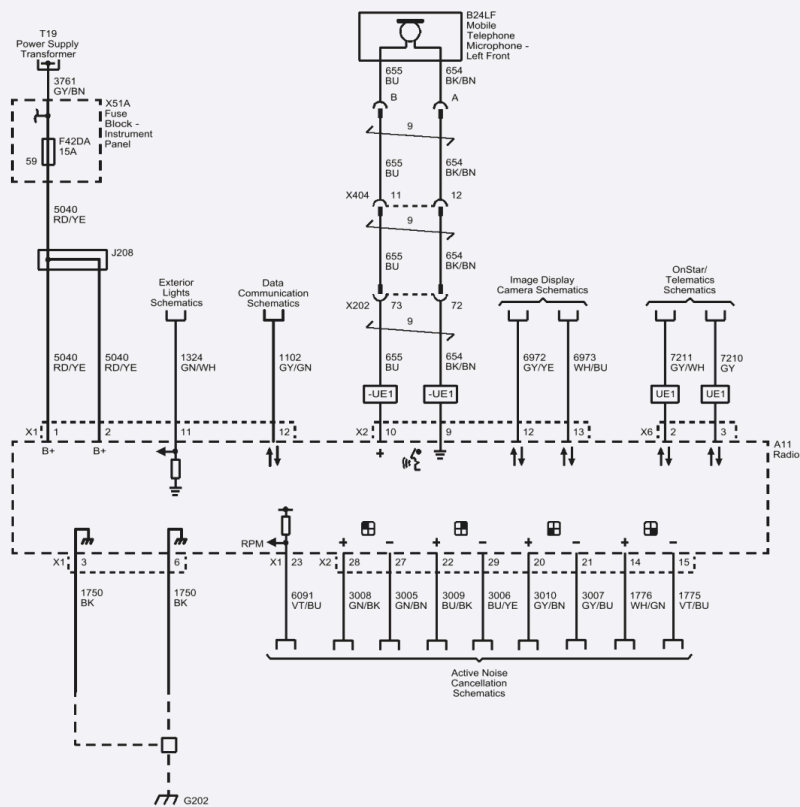


Fig. 16: Radio Power, Ground, and Data
Courtesy of GENERAL MOTORS COMPANY

Radio Controls

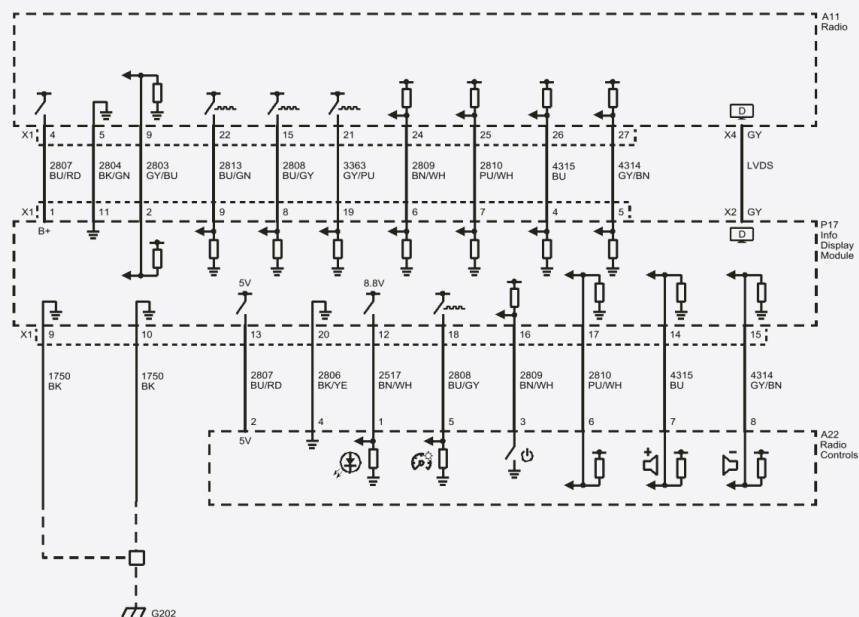


Fig. 17: Radio Controls
Courtesy of GENERAL MOTORS COMPANY

Speakers

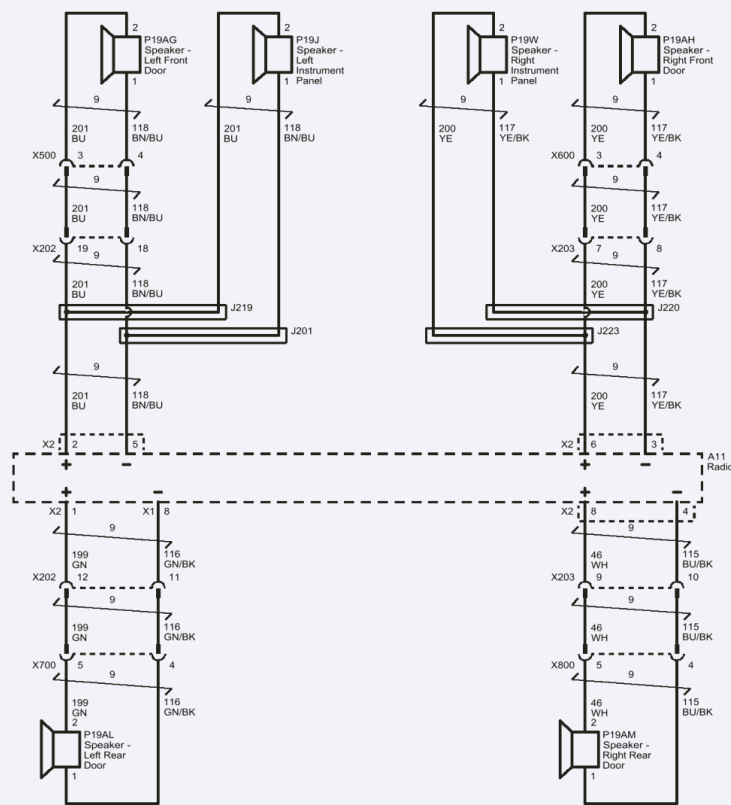


Fig. 18: Speakers

Courtesy of GENERAL MOTORS COMPANY

Antennas

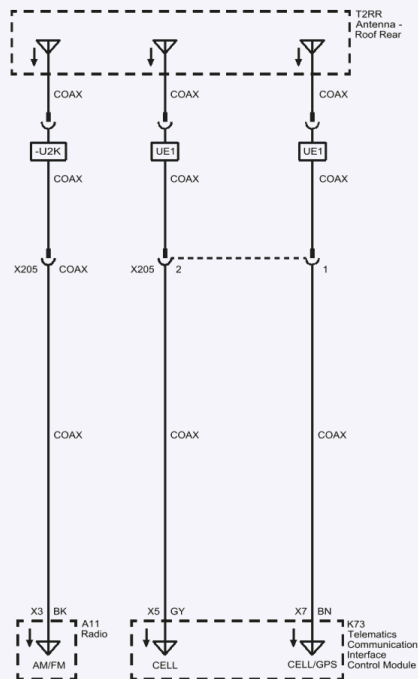


Fig. 19: Antennas

Courtesy of GENERAL MOTORS COMPANY

Auxiliary Inputs

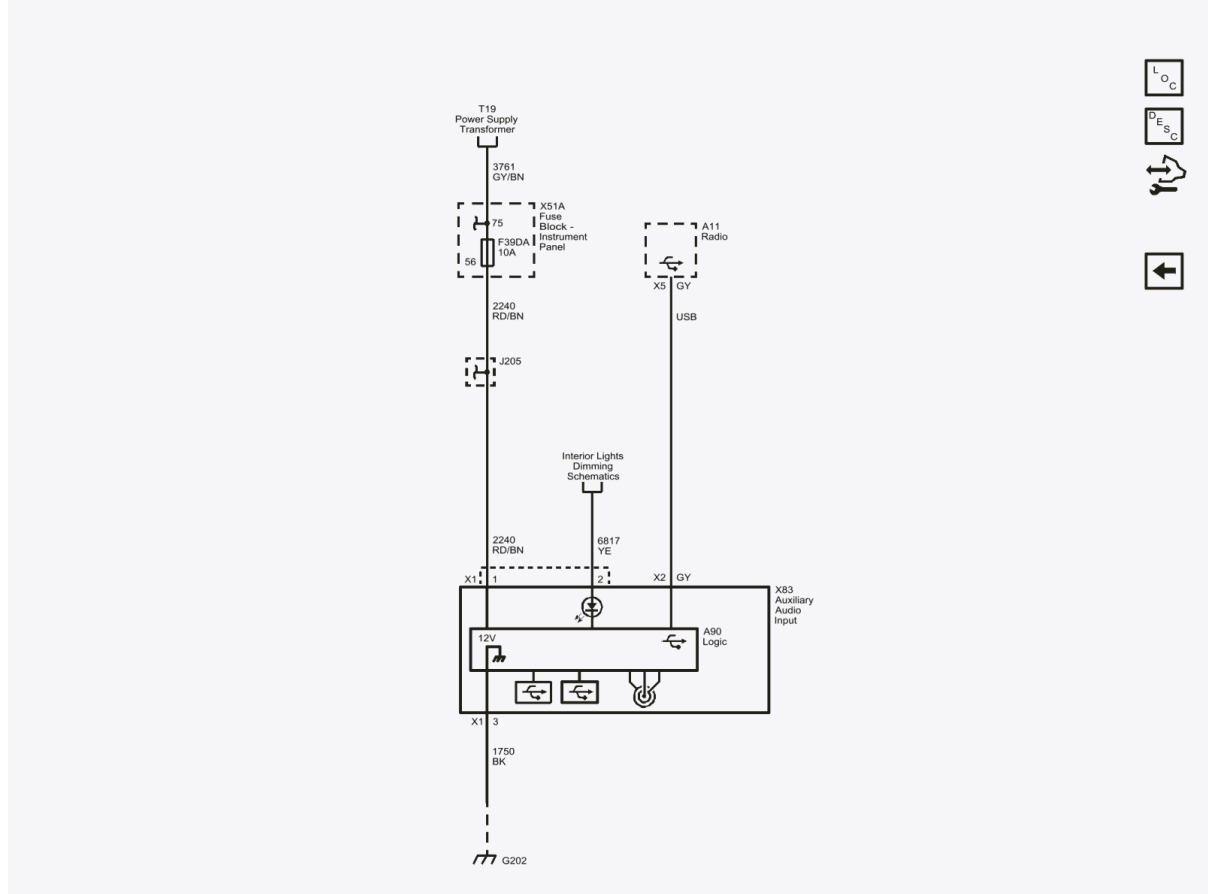


Fig. 20: Auxiliary Inputs

Courtesy of GENERAL MOTORS COMPANY

RADIO/NAVIGATION SYSTEM WIRING SCHEMATICS (IOS/IOT/IOU)

Power, Ground, Serial Data, and Microphones

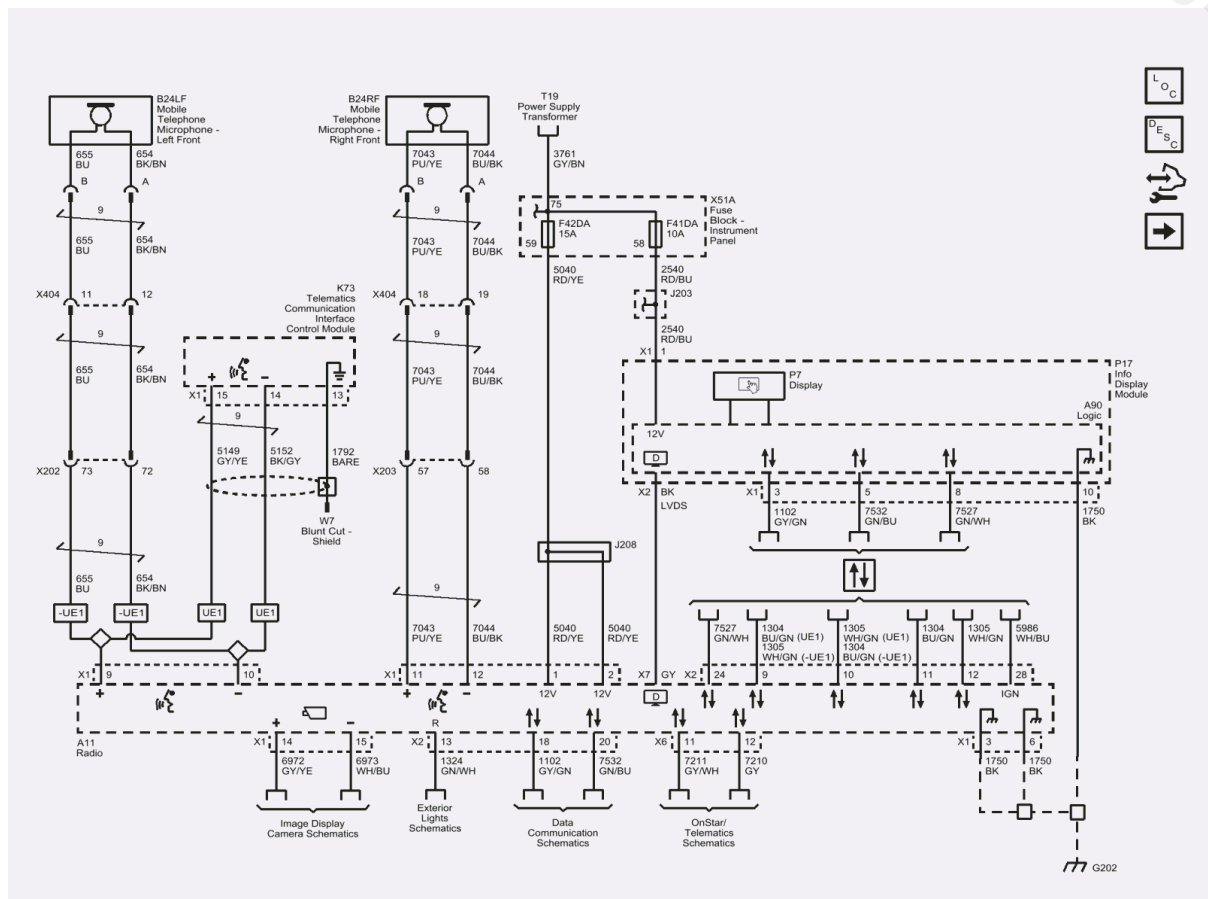


Fig. 21: Power, Ground, Serial Data, and Microphones

Courtesy of GENERAL MOTORS COMPANY

Audio Amplifier Power, Ground, and Serial Data (UQA)

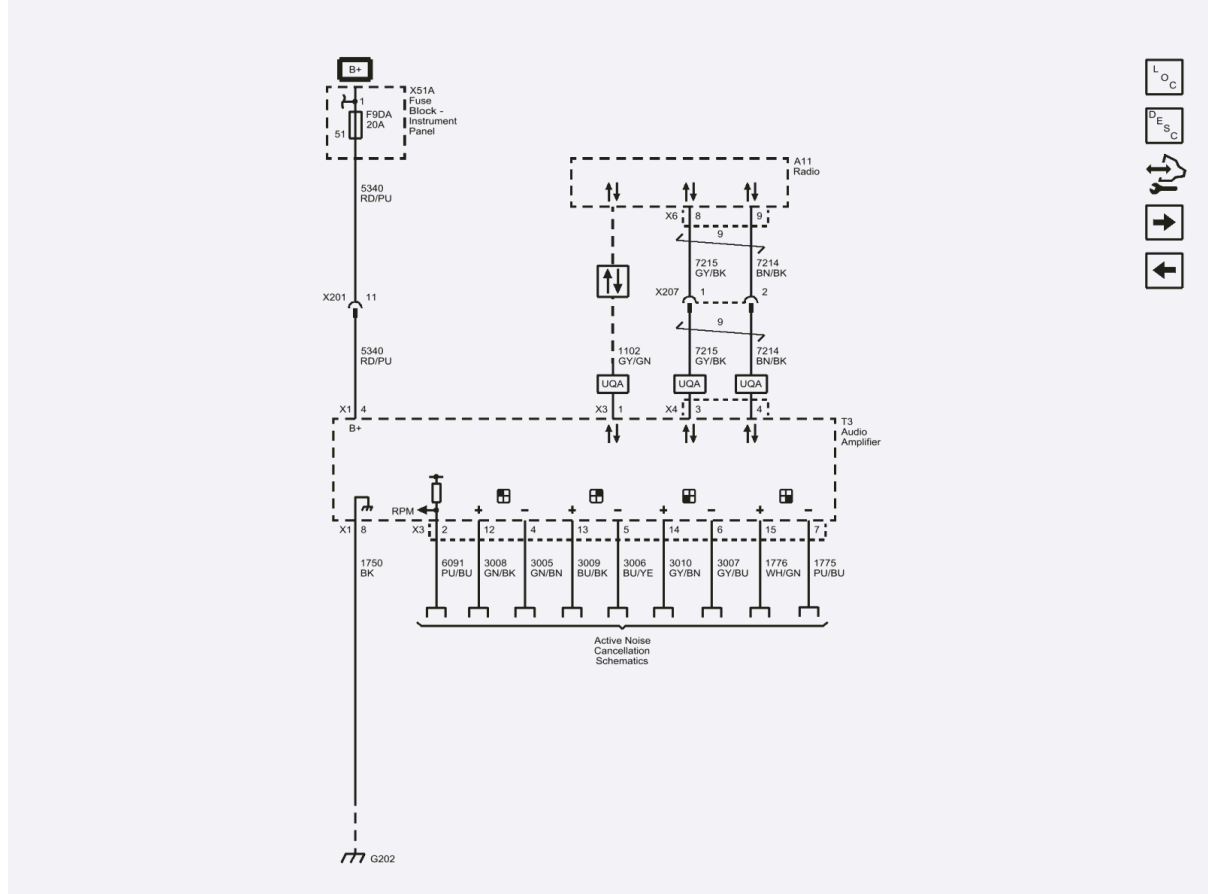


Fig. 22: Audio Amplifier Power, Ground, and Serial Data (UQA)
 Courtesy of GENERAL MOTORS COMPANY

Amplifier to Speakers (UQA)

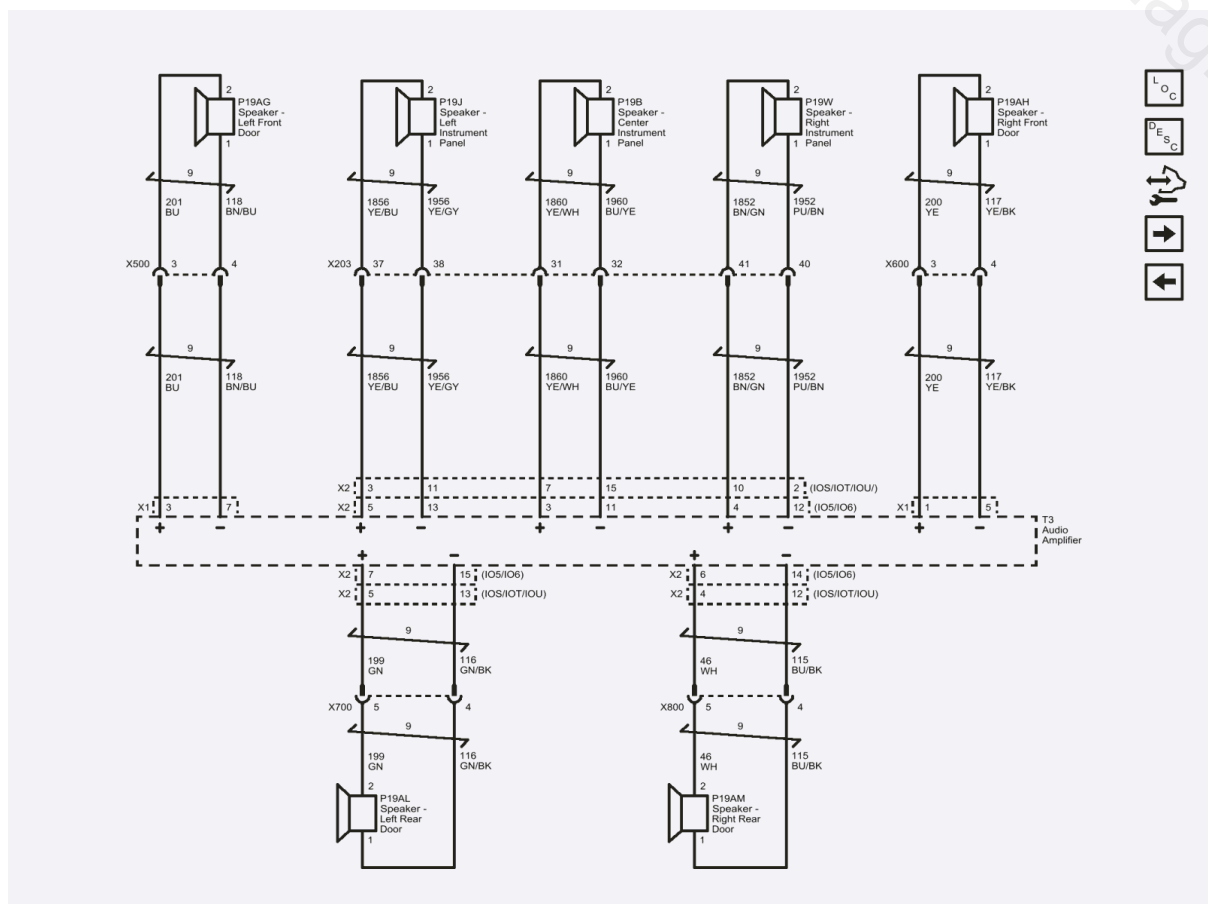


Fig. 23: Amplifier to Speakers (UQA)
 Courtesy of GENERAL MOTORS COMPANY

Radio to Active Noise Cancellation Module (UZ6)

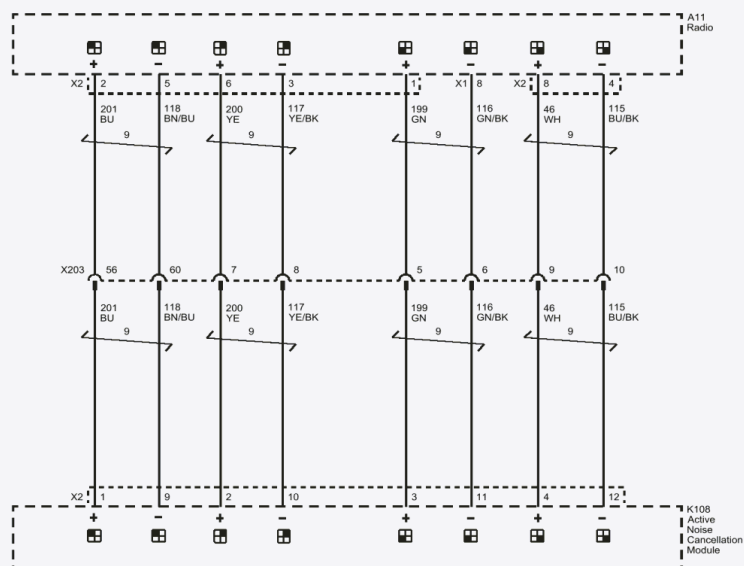


Fig. 24: Radio to Active Noise Cancellation Module (UZ6)
Courtesy of GENERAL MOTORS COMPANY

Active Noise Cancellation Module to Speakers (UZ6)

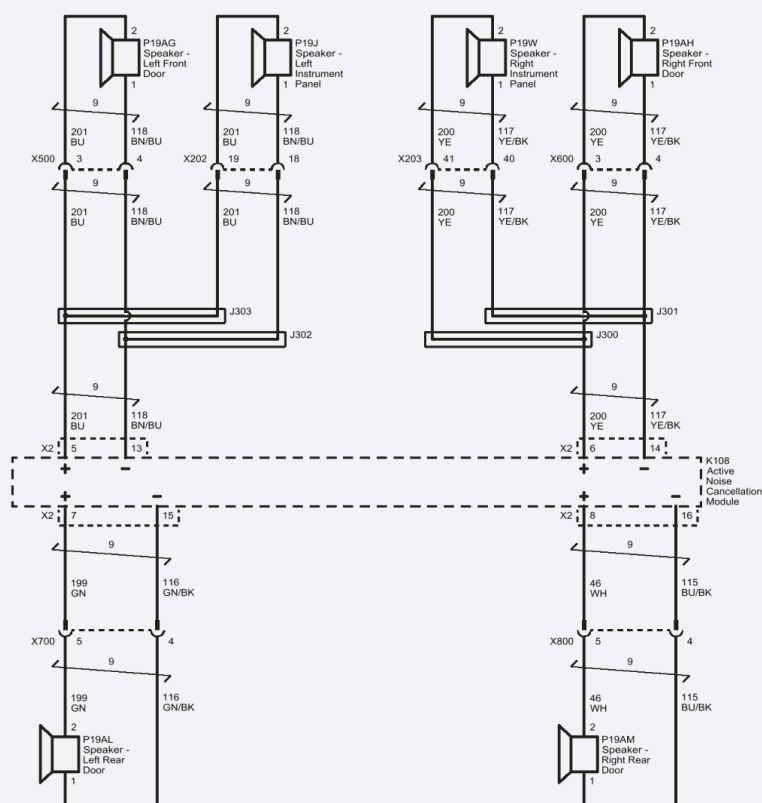


Fig. 25: Active Noise Cancellation Module to Speakers (UZ6)
Courtesy of GENERAL MOTORS COMPANY

Antennas

cardiagn.com



Courtesy of GENERAL MOTORS COMPANY



Courtesy of GENERAL MOTORS COMPANY

Power, Ground, Serial Data, and Antenna

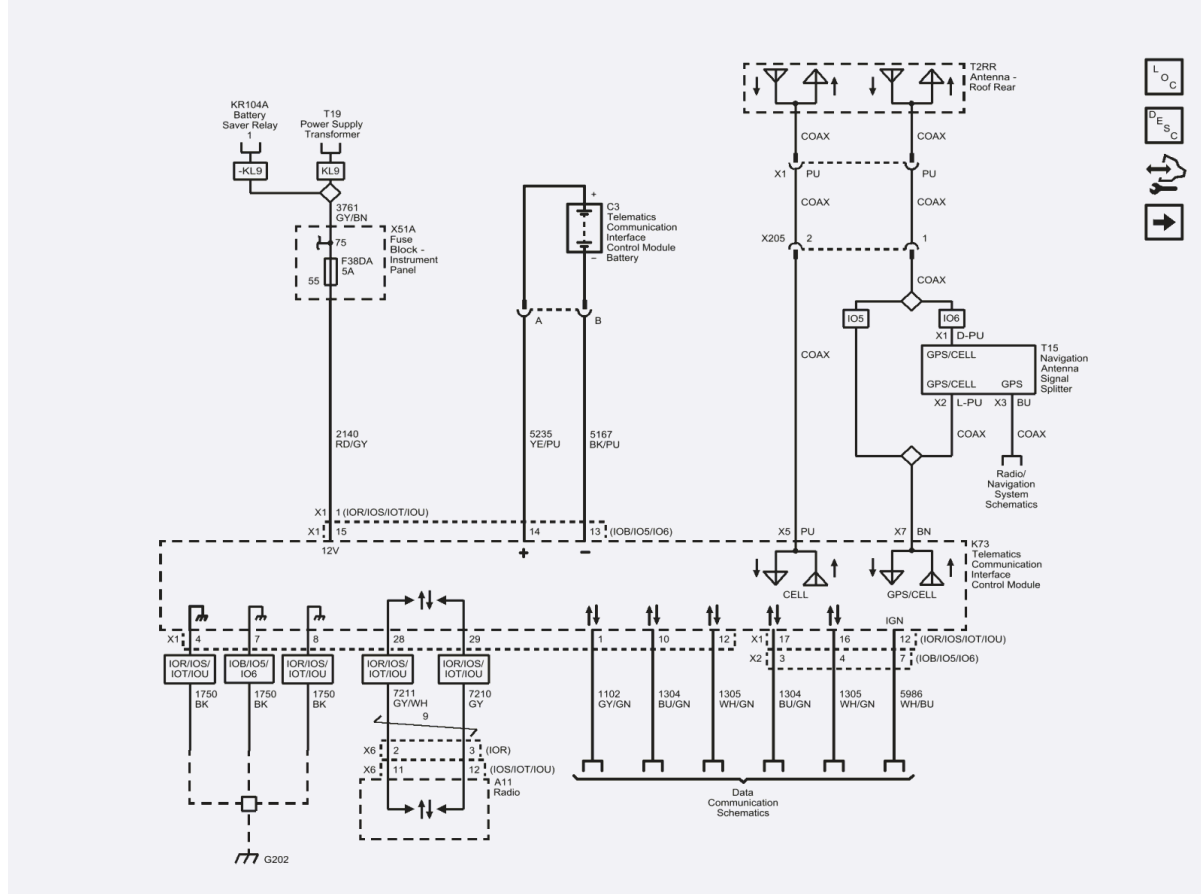


Fig. 28: Power, Ground, Serial Data, and Antenna
Courtesy of GENERAL MOTORS COMPANY

Controls and Audio Signals

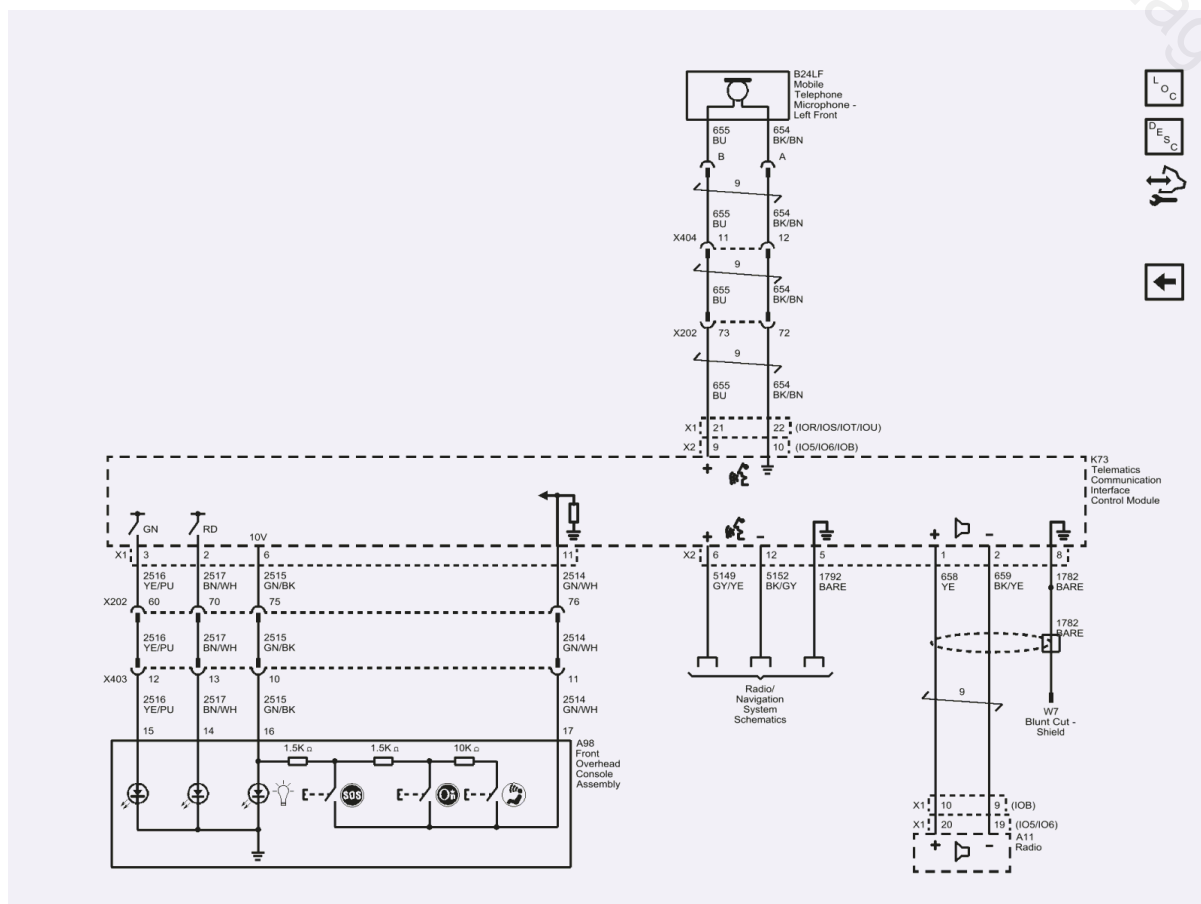


Fig. 29: Controls and Audio Signals
Courtesy of GENERAL MOTORS COMPANY

2018 ACCESSORIES & EQUIPMENT

Cellular, Entertainment, And Navigation - Special Tools And Equipment - Equinox & Terrain

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

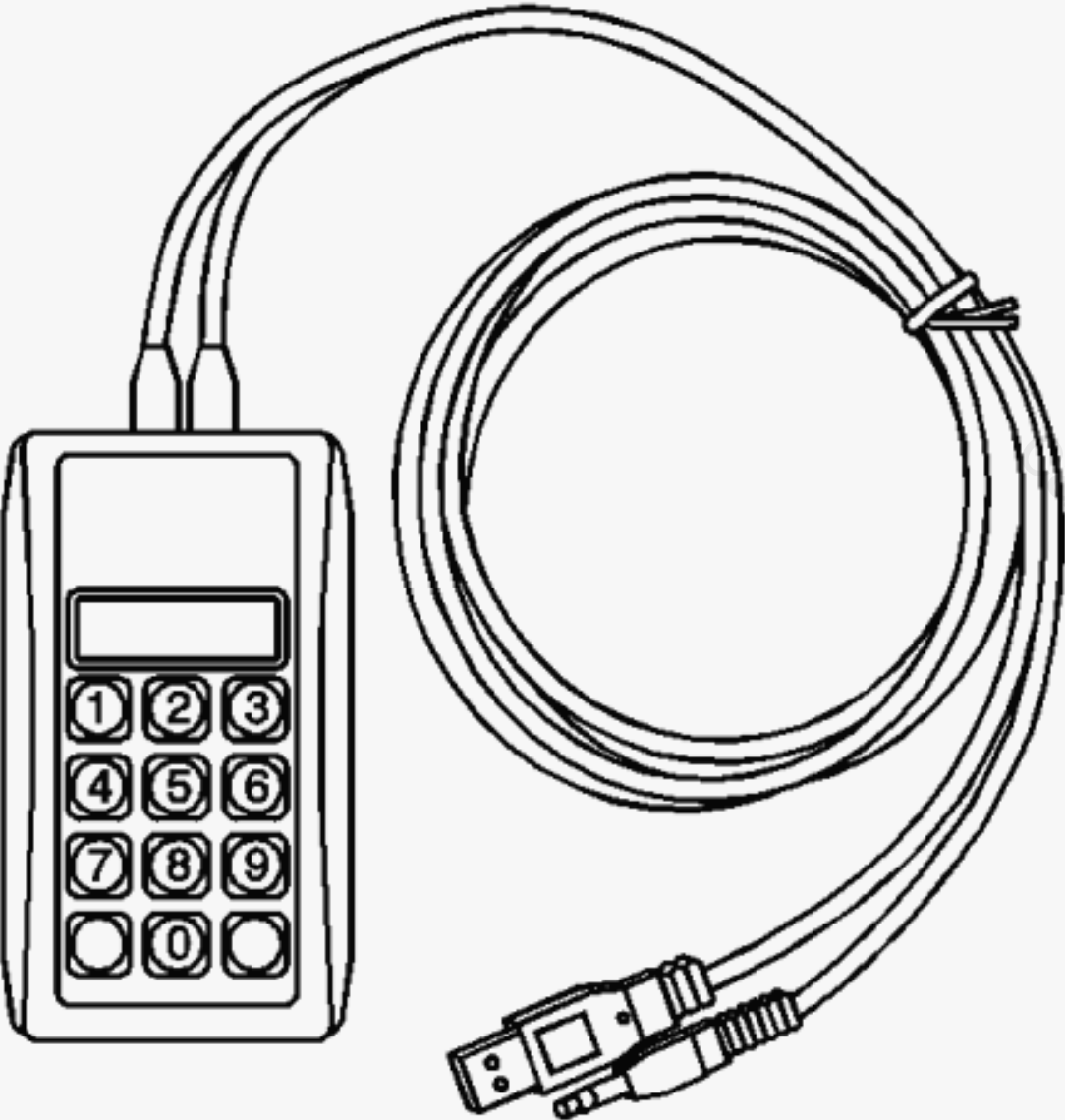
Illustration	Tool Number/Description
 A line drawing of a handheld electronic device, possibly a diagnostic tool, with a numeric keypad (0-9) and a small screen. A coiled cable is connected to the top of the device. The cable has a USB connector on one end and a specialized connector on the other.	EL - 50334 - 20 Multi-Media Interface Tester (MIT)

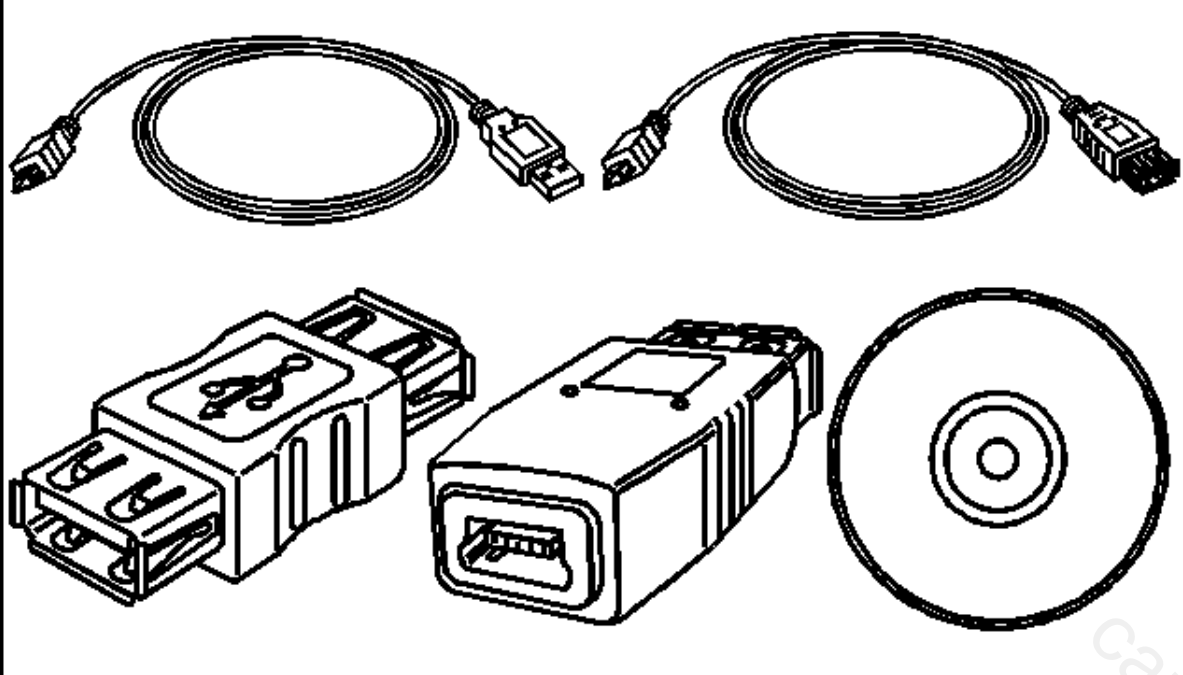
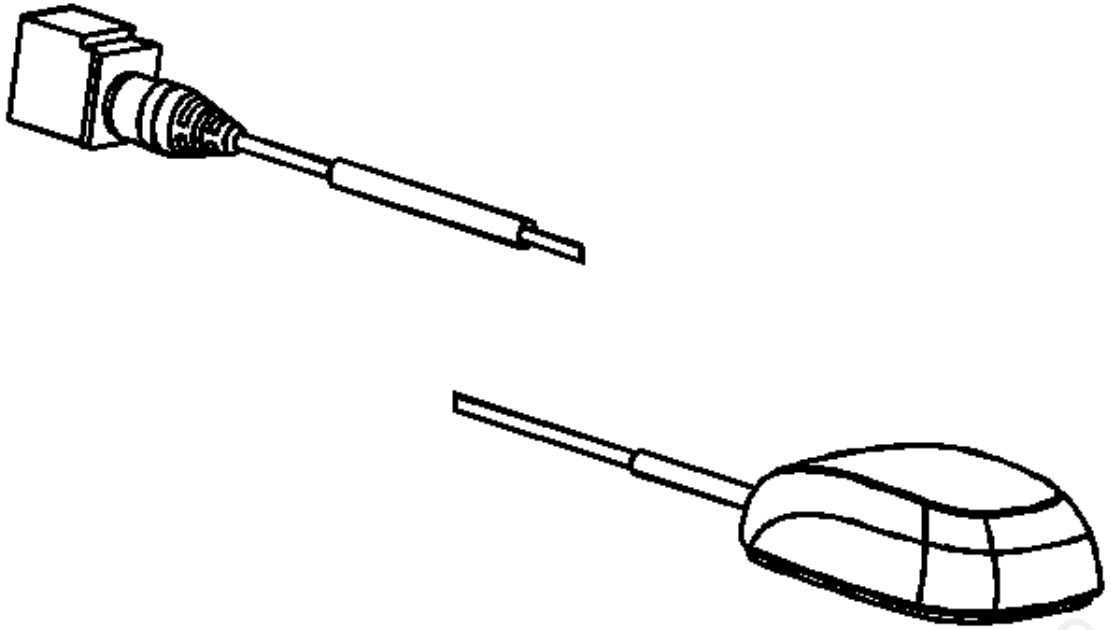
Illustration	Tool Number/Description
 The illustration shows the components of the EL - 50334 - 50 USB Cable and Adapter Kit. At the top, there are two coiled cables. The cable on the left has a standard USB-A connector on one end and a custom connector on the other. The cable on the right has a custom connector on one end and a different custom connector on the other. Below the cables, there are three items: a USB-A to custom connector adapter, a custom connector to custom connector adapter, and a CD-ROM. A faint watermark 'cardiagn.com' is visible diagonally across the bottom right of the illustration area.	EL - 50334 - 50 USB Cable and Adapter Kit

Illustration	Tool Number/Description
	EL-48028 Digital Radio Test Antenna

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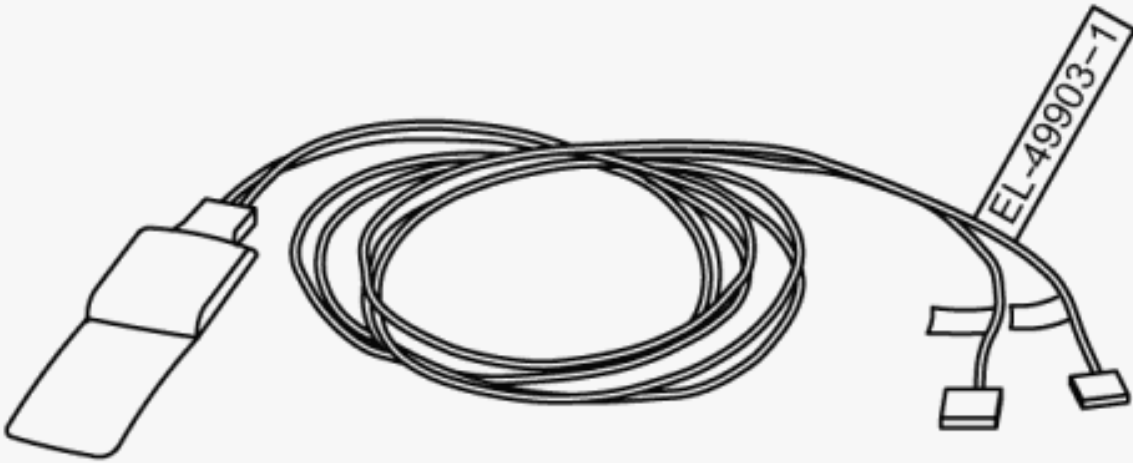
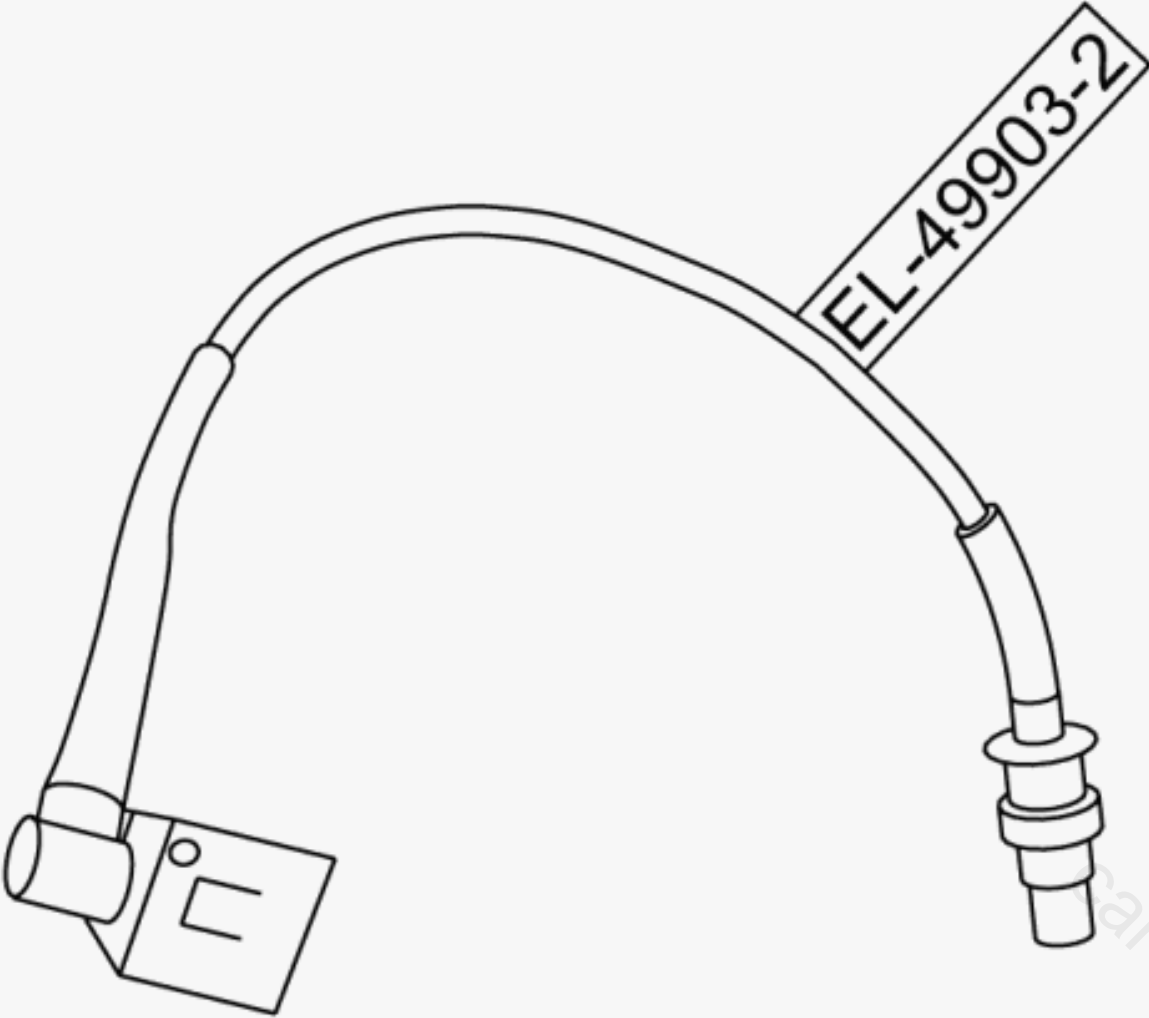
Illustration	Tool Number/Description
	EL-49903 - 1 Test Antenna, Navn- Cell Comn

Illustration	Tool Number/Description
 A line drawing of a cable with a 90-degree right-angle connector on one end and a standard coaxial connector on the other. A label 'EL-49903-2' is attached to the cable. The drawing is set against a light gray background.	EL-49903 - 2 Adapter Cable-UHF RT Angle

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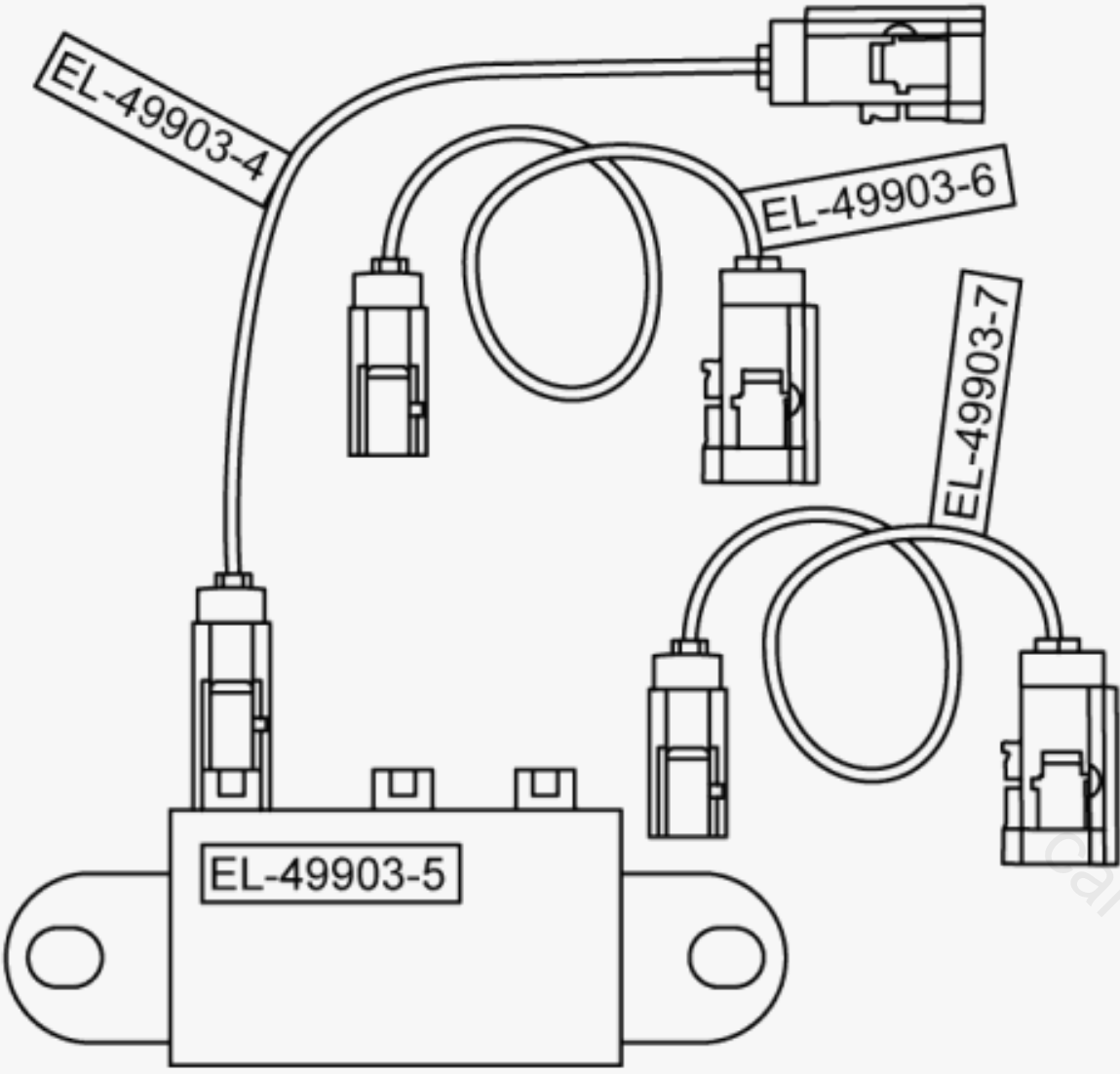
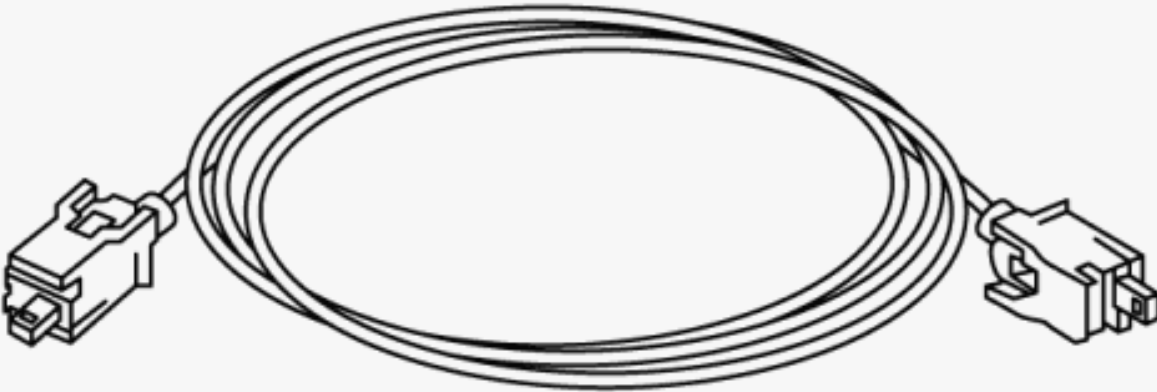
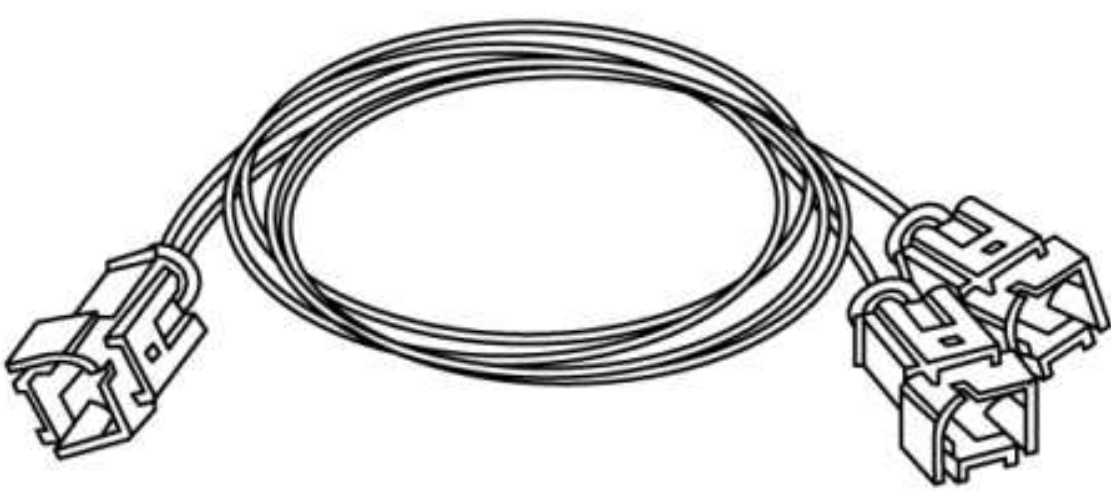
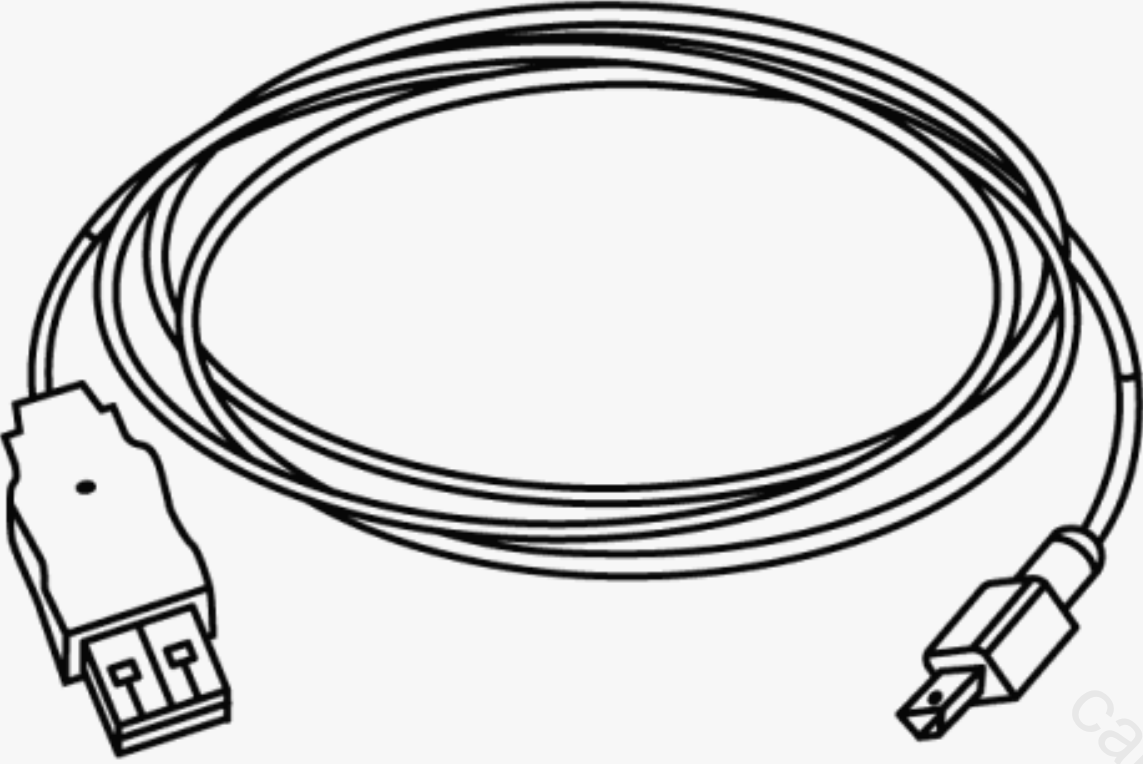
Illustration	Tool Number/Description
	EL-49903 - 3A Combiner Kit, Test Antenna

Illustration	Tool Number/Description
 A technical line drawing of a coiled cable. The cable is shown in a loose, oval-shaped coil. At each end of the cable is a multi-pin connector. The connectors appear to be a type of automotive or industrial plug with several pins protruding from a rectangular housing. The drawing is a simple black line on a light gray background.	EL-50334 - 12 Infotainment Test Cable - RSE

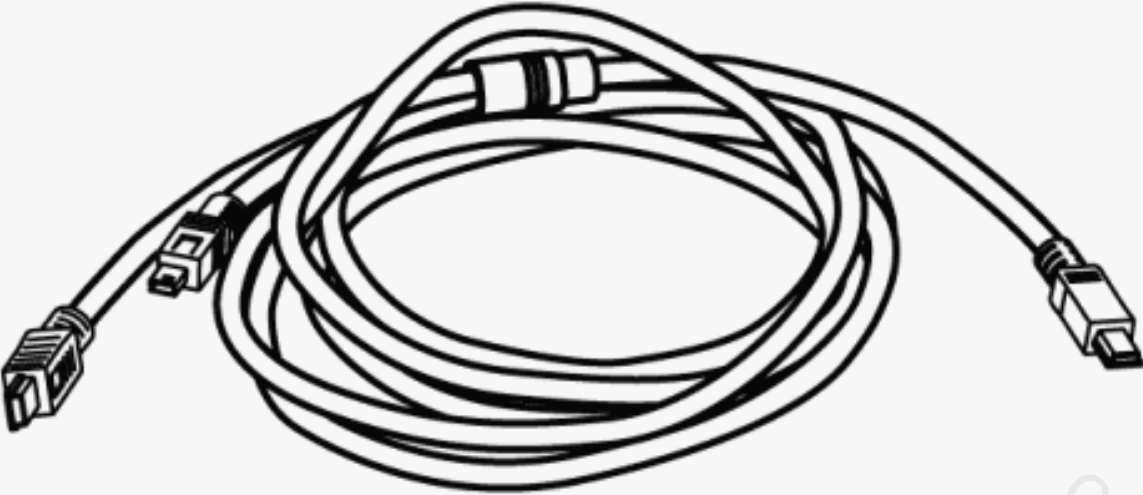
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Illustration	Tool Number/Description
 The illustration shows a coiled cable. On the left end, there is a single connector. On the right end, the cable splits into three separate connectors. The connectors appear to be a specific type of automotive or industrial plug. The cable is shown in a loose coil.	EL-50334 - 13 Infotainment Test Cable - RSE Splitter

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Illustration	Tool Number/Description
 A coiled black cable with a multi-pin connector on the left and a USB connector on the right. The cable is shown in a loop, with the connectors at the ends. The multi-pin connector on the left has several pins visible, and the USB connector on the right is a standard USB-A type. The background is light gray.	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

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 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

- 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.
-

2018 ACCESSORIES & EQUIPMENT

Cellular, Entertainment, And Navigation - Specifications - Fastener Specifications - Equinox & Terrain

SPECIFICATIONS

FASTENER SPECIFICATIONS

Single Use Non-Threaded Fasteners/Components

NOTE: <i>All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.</i>
Application
High Frequency Antenna Retainer
Radio Antenna Base Retainer

Reusable Threaded Fastener Tightening Specifications

NOTE: <i>All fasteners listed in this table can be reused after removal.</i>	
Application	Specification
	Metric (English)
Communication Interface Module Battery Bolt	2.5 N.m (22 lb in)
High Frequency Antenna Bolt	9 N.m (80 lb in)
Radio Antenna Base Fastener	9 N.m (80 lb in)
Radio Bracket Bolt	2.5 N.m (22 lb in)
Radio Control Bolt	2.5 N.m (22 lb in)
Radio Control Bracket Bolt	2.5 N.m (22 lb in)
Radio Control Switch Bolt	2.5 N.m (22 lb in)
Radio Front Center Speaker Bolt	2.5 N.m (22 lb in)
Radio Front Side Door Speaker Bolt	2.5 N.m (22 lb in)
Radio Front Speaker Bolt	2.5 N.m (22 lb in)
Radio Rear Side Door Speaker Bolt	2.5 N.m (22 lb in)
Radio Speaker Amplifier Bolt	2.5 N.m (22 lb in)
Radio Speaker Amplifier Nut	6 N.m (53 lb in)
Steering Wheel Spoke Cover Fastener	1.5 N.m (13 lb in)