ACCESSORIES & EQUIPMENT

Data Communications - Description and Operation - Escalade, Suburban, Tahoe, Yukon

DESCRIPTION AND OPERATION

BODY CONTROL SYSTEM DESCRIPTION AND OPERATION

The body control system consists of the body control module (BCM), communications, and various input and outputs. Some inputs, outputs and messages require other modules to interact with the BCM. The BCM also has discrete input and output terminals to control the vehicle's body functions. The BCM is wired to the high speed GMLAN serial data bus, low speed GMLAN serial data bus and Multiple LIN buses and acts as a gateway between them.

Power Mode Master

This vehicle body control module (BCM) functions as the power mode master (PMM). The ignition switch is a low current switch with multiple discrete ignition switch signals to the PMM for determining the power mode that will be sent over the serial data circuits to the other modules that need this information; the PMM will activate relays and other direct outputs of the PMM as needed. Refer to **Power Mode Description and Operation (With BTM)** **Power Mode Description and Operation (Without BTM)** for a complete description of power mode functions.

Gateway

The body control module (BCM) in this vehicle functions as a gateway or translator. The purpose of the gateway is to translate serial data messages between the GMLAN high speed bus and the GMLAN low speed bus for communication between the various modules. The gateway will interact with each network according to that network's transmission protocol.

All communication between the BCM and a scan tool is on the high speed GMLAN serial data circuits. A lost communication DTC typically is set in modules other than the module with a communication failure.

Body Control

The various body control module (BCM) input and output circuits are illustrated in the corresponding functional areas on the BCM electrical schematics. Refer to the **Body Control System Schematics** for more detailed information.

DATA LINK COMMUNICATIONS DESCRIPTION AND OPERATION

NOTE: **This is an overview of different serial data buses used by GM devices to communicate with each others. Use**

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Data Communication Schematics to find out which serial data buses are configured for a specific vehicle.

Circuit Description

There are many components in a vehicle that rely on information from other sources, transmit information to other sources, or both. Serial data communication networks provide a reliable, cost effective, way for various components of the vehicle to "talk" to one another and share information.

GM uses a number of different communication buses to insure the timely and efficient exchange of information between devices. When compared to each other, some of these buses are different in nature as far as speed, signal characteristics, and behavior. An example of this is the High Speed GMLAN and Low Speed GMLAN buses.

On the other hand, when other buses are compared to each other they have similar characteristics and simply operate in parallel. In this case they are used to group together components which have high interaction. Examples are the High Speed GMLAN, Powertrain Expansion, and Chassis Expansion buses. This allows them to communicate with each other on a bus with reduced message congestion insuring faster and the more timely exchange of information than if all vehicle devices were on a single bus.

The majority of information that exists within a given network generally stays local; however some information will have to be shared on other networks. Control modules designated as Gateway's perform the function of transferring information between the various buses. A Gateway module is connected to at least 2 buses and will interact with each network according to its message strategy and transmission models.

GMLAN provides the capability for a receiving device to monitor message transmissions from other devices in order to determine if messages of interest are not being received. The primary purpose is to allow reasonable default values to be substituted for the information no longer being received. Additionally, a device may set a Diagnostic Trouble Code to indicate that the device it is expecting information from is no longer communicating.

High Speed GMLAN Circuit Description

A High Speed GMLAN Bus is used where data needs to be exchanged at a high enough rate to minimize the delay between the occurrence of a change in sensor value and the reception of this information by a control device using the information to adjust vehicle system performance.

The High Speed GMLAN serial data network consists of two twisted wires. One signal circuit is identified as GMLAN-High and the other signal circuit is identified as GMLAN-Low. At each end of the data bus there is a 120 Ω termination resistor between the GMLAN-High and GMLAN-Low circuits.

Data symbols (1's and 0's) are transmitted sequentially at a rate of 500 Kbit/s. The data to be transmitted over the bus is represented by the voltage difference between the GMLAN-High signal voltage and the GMLAN-Low signal voltage.

When the two wire bus is at rest the GMLAN-High and GMLAN-Low signal circuits are not being driven and this represents a logic "1". In this state

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both signal circuits are at the same voltage of 2.5 V. The differential voltage is approximately 0 V.

When a logic "0" is to be transmitted, the GMLAN-High signal circuit is driven higher to about 3.5 V and the GMLAN-Low circuit is driven lower to about 1.5 V. The differential voltage becomes approximately 2.0 (+/- 0.5) V.

Chassis High Speed GMLAN Circuit Description

The GMLAN Chassis Expansion Bus is basically a copy of the High Speed GMLAN Bus except that its use is reserved for chassis components. This implementation splits message congestion between two parallel buses helping to insure timely message transmission and reception. Sometimes communication is required between the Chassis Expansion Bus and the primary High Speed GMLAN Bus. This is accomplished by using the K17 Electronic Brake Control Module (EBCM) as the Gateway module. Since the High Speed GMLAN Chassis Expansion Bus and primary High Speed GMLAN Bus operate in the same manner, the diagnostics for each are similar.

Powertrain High Speed GMLAN Circuit Description

The GMLAN Powertrain Expansion Bus is basically a copy of the High Speed GMLAN Bus except that its use is reserved for Powertrain components. The bus is optional based upon feature content. Sometimes communication is required between the Powertrain Expansion Bus and the primary High Speed GMLAN Bus. This is accomplished by using the K20 Engine Control Module (ECM) as the Gateway module. Since the High Speed GMLAN Powertrain Expansion Bus and the primary High Speed GMLAN Bus operate in the same manner, the diagnostics for each are similar.

Object High Speed GMLAN Circuit Description

The GMLAN Object Bus is basically a copy of the High Speed GMLAN Bus except that its use is reserved for the enhanced safety system. This implementation is used to isolate the heavy communication among the enhanced safety system devices from the other vehicle buses, reducing congestion. The K124 Active Safety Control Module is connected to the Object Bus as well as the Primary High Speed GMLAN Bus, the Chassis Expansion Bus, and the Low Speed GMLAN Bus. The K124 Active Safety Control Module acts as a Gateway module for all required communication between the Object Bus devices and devices on these other vehicle buses. The GMLAN Object Bus operates in the same manner as the Chassis Expansion and Primary High Speed buses and so the diagnostics are similar. The Object Bus is physically partitioned into a Front Object Bus and a Rear Object Bus with each partition having its own communication enable circuit to activate the partition, but functional operation of both is identical. The Front Object Bus standard devices are the K124 Active Safety Control Module, the K109 Frontview Camera Module, and the B233B Radar Sensor Module - Long Range. The Front Object Bus optional devices are the B233LF Radar Sensor Module - Short Range Left Front and the B233RF Radar Sensor Module - Short Range Right Front. The Rear Object Bus is optional and when present will have the K124 Active Safety Control Module, B233LR Radar Sensor Module - Short Range Left Rear, and B233RR Radar Sensor Module - Short Range Right Rear on the bus. All Object Bus components are powered by the K124 Active Safety Control Module via the communication enable circuits, except the K109 Frontview Camera Module which is powered directly by battery.

Media Oriented Systems Transport (MOST) Circuit Description

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The MOST Infotainment network is a dedicated high speed multimedia streaming data bus independent from GMLAN. The MOST bus will be configured in a physical hardwired loop with each device within the bus sends and receives data on an assigned MOST addresses in a set order. Each device on the MOST bus will be required to have twisted pair copper wires (2 transmit TX, 2 receive RX, and 1 electronic control line which is a 12 V wakeup signal line). The A11 Radio is the MOST Master and will monitor the bus for vehicle configuration, Infotainment data messages and errors on the bus. The MOST initialization consists of a short 100 ms low voltage pulse on the electronic control line (or MOST control line) connected to all devices contained on the MOST ring. This wakeup message once received by each device, will first respond with a generic device response. Once these initial responses on the MOST bus are reported successfully without error to the A11 Radio, the second data request will record the MOST device addresses, their functionality requirements and capabilities within. The A11 Radio will learn this information and also record the address node sequence on the MOST bus at this point. This node address list will now be stored within the A11 Radio as the MOST bus configuration (called "Last Working MOST ID of Node 1 - 9" on scan tool data display).

When MOST receive, transmit, or control line faults are detected, transmit/receive messages will not received as expected from the wakeup request. The A11 Radio and the K74 Human Machine Interface Control Module will then perform diagnostics to isolate these MOST faults. If the MOST control line is shorted low to 0 V for excess amount of time, the A11 Radio will set a U2098 DTC and K74 Human Machine Interface Control Module will set a U0029 02 DTC. At this point the MOST bus will be unable to communicate until the shorted MOST control line is repaired.

Once the shorted MOST control line diagnostics pass, the A11 Radio will attempt to resend the initial short pulse attempts up to 3 times on the MOST control line. If the expected responses are not received, the A11 Radio continues into a failure mode setting a U0028 DTC and will continue on to send one 300 ms long pulse, which will enable the furthest upstream transmitting device to become the surrogate MOST Master in this MOST fault/diagnostic mode. When the A11 Radio receives this new MOST Master identity, the surrogate MOST master device can be identified based on scan tool data parameter "Surrogate MOST Master Node Upstream Position". The scan tool should be used to determine the MOST bus configuration and direction by utilizing the "Last Working MOST ID of Node 1 - 9" parameters from the A11 Radio data display. When a fault is present, it will indicate the newly enabled "Surrogate MOST Master Node Upstream Position" from the A11 Radio. This will assist in determining where the MOST bus/control is at fault. The MOST device upstream from the surrogate MOST master device, transmit, receive, or control lines will be the suspect areas for diagnostics at this point. These faults can be associated with any of the MOST transmit, receive, or control line twisted copper wires or possibly an internal device fault.

The K74 Human Machine Interface Control Module will set a U0029 00 DTC when it diagnoses a MOST bus not communicating properly after one attempt. When the DTC U0029 00 is set by the K74 Human Machine Interface Control Module without the corresponding DTC U0028 from the A11 Radio, it will be an indication of an intermittent wiring/device condition.

Low Speed GMLAN Circuit Description

Low Speed GMLAN Bus is used in applications where a high data rate is not required which allows for the use of less complex components. It is typically used for operator controlled functions where the response time requirements are slower than those required for dynamic vehicle control.

The Low Speed GMLAN Serial Data Network consists of a single wire, ground referenced bus with high side voltage drive. During on road vehicle

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operation data symbols (1's and 0's) are transmitted sequentially at the normal rate of 33.3 Kbit/s. For component programming only, a special high speed data mode of 83.3 Kbit/s may be used.

Unlike the high speed dual wire networks, the single wire low speed network does not use terminating resistors at either end of the network.

The data symbols to be transmitted over the bus are represented by different voltage signals on the bus. When the Low Speed GMLAN Bus is at rest and is not being driven, there is a low signal voltage of approximately 0.2 V. This represents a logic "1". When a logic "0" is to be transmitted, the signal voltage is driven higher to around 4.0 V or higher.

Local Interconnect Network (LIN) Circuit Description

The Local Interconnect Network (LIN) Bus consists of a single wire with a transmission rate of 10.417 Kbit/s. This bus is used to exchange information between a master control module and other smart devices which provide supporting functionality. This type of configuration does not require the capacity or speed of either a High Speed GMLAN Bus or Low Speed GMLAN Bus and is thus relatively simpler.

The data symbols (1's and 0's) to be transmitted are represented by different voltage levels on the communication bus. When the LIN Bus is at rest and is not being driven, the signal is in a high voltage state of approximately Vbatt. This represents a logic "1". When a logic "0" is to be transmitted, the signal voltage is driven low to about ground (0.0 V).

Communication Enable Circuit Description

Devices on High Speed GMLAN Bus enable or disable communication based on the voltage level of the communication enable circuit. When the circuit voltage is high (around 12 V), communications are enabled. When the circuit is low, communications are disabled.

Data Link Connector (DLC)

The X84 Data Link Connector (DLC) is a standardized 16-cavity connector. Connector design and location is dictated by an industry wide standard, and is required to provide the following:

- Terminal 1: Low speed GMLAN communications terminal
- Terminal 3: Object high speed GMLAN serial bus (+) terminal
- Terminal 4: Scan tool power ground terminal
- Terminal 5: Common signal ground terminal
- Terminal 6: High speed GMLAN serial data bus (+) terminal
- Terminal 11: Object high speed GMLAN serial bus (-) terminal
- Terminal 12: Chassis high speed GMLAN serial bus (+) terminal

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- Terminal 13: Chassis high speed GMLAN serial bus (-) terminal
- Terminal 14: High speed GMLAN serial data bus (-) terminal
- Terminal 16: Scan tool power, battery positive voltage terminal

Serial Data Reference

The scan tool communicates over the various buses on the vehicle. When a scan tool is installed on a vehicle, the scan tool will try to communicate with every device that could be optioned into the vehicle. If an option is not installed on the vehicle, the scan tool will display No Comm (or Not Connected) for that optional device. In order to avert misdiagnoses of No Communication with a specific device, refer to **Data Link References** for a list of devices and the buses they communicate with. Use schematics and specific vehicle build RPO codes to determine optional devices.

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ACCESSORIES & EQUIPMENT

Data Communications - Diagnostic Information and Procedures - Escalade, Suburban, Tahoe, Yukon

DIAGNOSTIC INFORMATION AND PROCEDURES

CONTROL MODULE U CODE LIST

This list includes all Data Communications related U-code DTCs in alphanumeric order with descriptors for all devices. Not all DTCs listed will be applicable to all vehicles.

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

DTC	DTC Descriptor
U0001	High Speed CAN Bus Malfunction
U0002	High Speed CAN Bus
U0009	High Speed CAN Bus [-] Shorted to Bus [+]
U0020	Low Speed CAN Bus
U0028	MOST Bus
U0029	MOST Bus Performance
U0073	Control Module Communication Bus A Off
	Control Module Communication High Speed CAN Bus Off
U0074	Control Module Communication Bus B Off
U0075	Control Module Communication Object Detection CAN Bus Off
U0077	Control Module Communication Chassis Expansion CAN Bus Off
U0078	Control Module Communication Low Speed CAN Bus Off
U007A	Control Module Communication High Voltage Energy Management CAN Bus Off
U007B	Control Module Communication High Speed Extension CAN Bus Off
U007C	Control Module Communication High Speed Extension CAN Bus 2 Off
U007D	Control Module Communication Low Speed Extension CAN Bus Off
U007E	Control Module Communication FlexRay 1A Bus Off
U007F	Control Module Communication FlexRay 1B Bus Off
U0100	Lost Communication With Engine Control Module

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DTC	DTC Descriptor
U0101	Lost Communication With Transmission Control Module
U0102	Lost Communication with Transfer Case Control Module
U0103	Lost Communication with Shift Lever Module
U0104	Lost Communication With Cruise Control Module
U0105	Lost Communication with Fuel Injector Control Module
U0106	Lost Communication with Glow Plug Control Module
U0109	Lost Communication with Fuel Pump Control Module *(2013 and prior)*
	Lost Communication with Chassis Control Module *(2014 and beyond)*
U010E	Lost Communication with Reductant Sensor Module
U010F	Lost Communication with Air Conditioning Control Module
U0111	Lost Communication with Battery Energy Control Module
U0112	Lost Communication with Battery Energy Control Module
U0114	Lost Communication with Four Wheel Drive Clutch Control Module
U0115	Lost Communication with Engine Control Module B
U0117	Lost Communication With Power Take-Off Control Module
U0121	Lost Communication With Electronic Brake Control Module
U0122	Lost Communication With Vehicle Stability Control Module
U0123	Lost Communication with Yaw Rate Sensor Module
U0125	Lost Communication With Multi-axis Acceleration Sensor Module
U0126	Lost Communication With Steering Wheel Angle Sensor Module
U0128	Lost Communication With Park Brake Control Module
U0129	Lost Communication with Brake System Control Module
U012A	Lost Communication With Chassis Control Module
U0130	Lost Communication With Electric Power Steering Control Module
U0131	Lost Communication With Power Steering Control Module
U0132	Lost Communication With Suspension Control Module
U0133	Lost Communication With Air Suspension Control Module
U0134	Lost Communication with Power Steering Control Module - Rear
U0136	Lost Communication With Differential Control Module - Rear
U0137	Lost Communication with Trailer Brake Control Module

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DTC	DTC Descriptor
U0139	Lost Communication With Suspension Control Module
U0140	Lost Communication With Body Control Module
U0146	Lost Communication with Serial Data Gateway Module
U0151	Lost Communication With Inflatable Restraint Sensing and Diagnostic Module
U0155	Lost Communication With Instrument Cluster
U0158	Lost Communication With Head-Up Display
U0159	Lost Communication With Parking Assist Control Module
U0160	Lost Communication With Chime Alarm Control Module
U0164	Lost Communication with HVAC Control Module
U0166	Lost Communication with Auxiliary Heater Control Module
U0167	Lost Communication with Immobilizer Control Module
U0168	Lost Communication With Keyless Entry Control Module
U016B	Lost Communication with Electric A/C Compressor Control Module
U0170	Lost Communication with Passenger Presence Detection Sensor Module
U017E	Lost Communication with Seat Belt Retractor Motor Module
U0181	Lost Communication With Headlamp Leveling Control Module
U0182	Lost Communication With Lighting Control Module - Front
U0184	Lost Communication With Radio
U0186	Lost Communication With Speaker Amplifier Module
U0196	Lost Communication With Rear Audio Control Module
U0191	Lost Communication With Television
U0193	Lost Communication With Digital Radio Receiver Control Module
U0197	Lost Communication With Telephone Control Module
U0198	Lost Communication With Telematic Control Module
U019E	Lost Communication With Transmission Range Control Module
U01A0	Lost Communication with Hybrid/EV Battery Interface Control Module 1
U01A1	Lost Communication with Hybrid/EV Battery Interface Control Module 2
U01A2	Lost Communication with Hybrid/EV Battery Interface Control Module 3
U01A3	Lost Communication with Hybrid/EV Battery Interface Control Module 4
U01A4	Lost Communication with Hybrid/EV Battery Interface Control Module 5

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DTC	DTC Descriptor
U01A5	Lost Communication with Hybrid/EV Battery Interface Control Module 6
U01A6	Lost Communication with Hybrid/EV Battery Interface Control Module 7
U01A7	Lost Communication with Hybrid/EV Battery Interface Control Module 8
U01B0	Lost Communication with Battery Monitor Module
U0201	Lost Communication With Transfer Case Control Module
U0203	Lost Communication With Left Rear Door Switch Panel Control Module
U0204	Lost Communication With Right Rear Door Switch Panel Control Module
U0207	Lost Communication With Moveable Roof Control Module
U0208	Lost Communication with Seat Memory Control Module
U0209	Lost Communication With Front Seat Heating Control Module
U0210	Lost Communication With Rear Seat Heating Control Module
U0230	Lost Communication With Liftgate Control Module
U0231	Lost Communication with Rain Sensor Module
U0232	Lost Communication with Side Object Detection Control Module - Left
U0233	Lost Communication with Side Object Detection Control Module - Right
U0236	Lost Communication With Steering Column Lock Module
U0237	Lost Communication With Multimedia Player Interface Module
U023A	Lost Communication With Vehicle Direction Camera Control Module *(without UGN)*
	Lost Communication With Active Safety Control Module 1 *(with UGN)*
U023C	Lost Communication with Night Vision Camera Control Module
U0241	Lost Communication With Left Headlamp High Beam Control Module
U0242	Lost Communication With Right Headlamp High Beam Control Module
U0248	Lost Communication with Remote Accessory Module
U0249	Lost Communication with Entertainment Control Module - Rear
U0250	Lost Communication with Impact Classification System Module
U0252	Lost Communication With Trailer Interface Control Module
U0254	Lost Communication With Remote Start Module
U0255	Lost Communication With Info Display Module
U0256	Lost Communication With Infotainment Faceplate Control Module
U0257	Lost Communication With Info Display Module/Infotainment Faceplate Control Module

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DTC	DTC Descriptor
U025B	Lost Communication with Special Purpose Vehicle Control Module "C"
U0264	Lost Communication With Camera Module - Rear
U0265	Lost Communication with Left Front Short Range Radar Sensor Module
U0268	Lost Communication with Right Front Short Range Radar Sensor Module
U0269	Lost Communication with Front Long Range Object Sensor
U026A	Lost Communication with Frontview Camera Module
U026B	Lost Communication with Rear Short Range Object Sensor
	Lost Communication with Left Rear Short Range Radar Sensor Module
U026C	Lost Communication with Right Rear Short Range Radar Sensor Module
U026D	Lost Communication with Rear Middle Short Range Radar Sensor Module
U0293	Lost Communication with Hybrid/EV Powertrain Control Module
U029D	Lost Communication with NOx Sensor 1 Module
U029E	Lost Communication with NOx Sensor 2 Module
U02A3	Lost Communication With Particulate Matter Sensor Module
U0301	Software Incompatibility with Engine Control Module
U0302	Software Incompatibility with Transmission Control Module
U0305	Software Incompatibility With Cruise Control Module
U0315	Software Incompatibility with Electronic Brake Control Module
U031C	Software Incompatibility With Brake System Control Module 2
U0401	Invalid Data Received From Engine Control Module
U0402	Invalid Data Received From Transmission Control Module
U0403	Invalid Data Received From Transfer Case Control Module
U0405	Invalid Data Received From Cruise Control Module
U0414	Invalid Data Received From Four Wheel Drive Clutch Control Module
U0415	Invalid Data Received From Electronic Brake Control Module
U0416	Invalid Data Received From Vehicle Dynamics Control Module
U0417	Invalid Data Received From Park Brake Control Module
U0418	Invalid Data Received From Brake System Control Module
U0420	Invalid Data Received From Power Steering Control Module
U0421	Invalid Data Received From Suspension Control Module

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DTC	DTC Descriptor
U0422	Invalid Data Received From Body Control Module
U0423	Invalid Data Received From Instrument Cluster
U0424	Invalid Data Received From HVAC Control Module
U0428	Invalid Data Received From Steering Wheel Angle Sensor Module
U042B	Invalid Data Received From Chassis Control Module
U0431	Invalid Data Received From Body Control Module "A"
U0432	Invalid Data Received From Multi-axis Acceleration Sensor Module
U0437	Invalid Data Received From Differential Control Module - Rear
U0438	Invalid Data Received From Trailer Brake Control Module
U0447	Invalid Data Received from Central Gateway Module
U0452	Invalid Data Received From Inflatable Restraint Sensing and Diagnostic Module
U045A	Invalid Data Received From Parking Assist Control Module "A"
U0465	Invalid Data Received From Power Take-Off Control Module
U0499	Invalid Data Received From Telematics Communication Interface Control Module
U0513	Invalid Data Received From Yaw Rate Sensor Module
U053B	Invalid Data Received From Active Safety Control Module 1
U053C	Invalid Data Received From Active Safety Control Module 2
U056B	Invalid Data Received From Frontview Camera Module
U0594	Invalid Data Received From Hybrid/EV Powertrain Control Module
U063E	Lost Communication with Exhaust Heat Exchanger Bypass Valve "A" Actuator
U1343	Chassis Control Module LIN Bus 1
U1347	Engine Control Module LIN Bus 3
U1359	Lost Communication with Transmission Range Indicator
U135A	Lost Communication with Shift to Park Range Actuator
U135B	Lost Communication with Sunload Sensor
U135C	Lost Communication with Start-Stop Capacitor Control Module
U135D	Lost Communication with Transmission Control Module on Chassis Control Module LIN Bus 2
U1501	LIN Bus
U1502	LIN Bus
U1505	LIN Bus

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DTC	DTC Descriptor
U1509	LIN Bus
	A26 HVAC Controls / P17 Info Display Module Lost Communication with K33 HVAC Control Module on LIN Bus
U150E	LIN Bus
	A22 Radio Controls / P17 Info Display Module Lost Communication with A11 Radio on LIN Bus
U150F	LIN Bus
	A22 Radio Controls / P17 Info Display Module Lost Communication with K74 Human Machine Interface Control Module on LIN Bus
	K161 Vehicle Performance Data Recorder Lost Communication with K74 Human Machine Interface Control Module on LIN Bus
U1510	A11 Radio Lost Communication with A20 Radio/HVAC Control / P17 Info Display Module on LIN Bus
	K9 Body Control Module Lost Communication with B67 Ultrasonic Intrusion Sensor / B165 Content Theft Deterrent Sensor Module on LIN Bus
	K20 Engine Control Module Lost Communication with M96 Active Grille Air Shutter Actuator / M60A Active Grille Air Shutter 1 Motor Module on LIN Bus
	K33 HVAC Control Module Lost Communication with A26 HVAC Controls / A20 Radio/HVAC Controls / P17 Info Display Module on LIN Bus
	K33 HVAC Control Module Lost Communication with A34 HVAC Controls - Auxiliary on LIN Bus
	K39 Liftgate Control Module Lost Communication with K171 Hands-Free Liftgate Sensor Control Module / S45A Liftgate Control Switch - Exterior on LIN Bus
	P16 Instrument Cluster Lost Communication with S70D Steering Wheel Controls Switch - Right Upper / S70R Steering Wheel Controls Switch - Right on LIN Bus
U1511	K20 Engine Control Module Lost Communication with M60B Active Grille Air Shutter 2 Motor Module on LIN Bus
	K26 Headlamp Control Module / K28 Headlamp Leveling Control Module Lost Communication with E13L Headlamp - Left on LIN Bus
	K40 Seat Memory Control Module Lost Communication with K99 Steering Column Position Control Module on LIN Bus
U1512	K26 Headlamp Control Module / K28 Headlamp Leveling Control Module Lost Communication with E13R Headlamp - Right on LIN Bus
U1513	K26 Headlamp Control Module / K28 Headlamp Leveling Control Module Lost Communication with E13L Headlamp - Left on LIN Bus

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DTC	DTC Descriptor
U1514	K26 Headlamp Control Module / K28 Headlamp Leveling Control Module Lost Communication with E13R Headlamp - Right on LIN Bus
	K33 HVAC Control Module Lost Communication with A34 HVAC Controls - Auxiliary on LIN Bus
U1515	K9 Body Control Module Lost Communication with M75 Windshield Wiper Motor / M75L Windshield Wiper Motor Module - Left on LIN Bus
U1516	K9 Body Control Module Lost Communication with B110 Battery Sensor Module on LIN Bus
U1517	K9 Body Control Module Lost Communication with K62 Sunroof Sunshade Motor Module on LIN Bus
U1518	P16 Instrument Cluster Lost Communication with K78 Head-Up Display Module / P29 Head-Up Display on LIN Bus
U1519	K40 Seat Memory Control Module Lost Communication with S52 Outside Rearview Mirror Switch on LIN Bus
	K40 Seat Memory Control Module Lost Communication with K96 Mirror Control Module / K96D Mirror Control Module - Driver / K96L Mirror Control Module - Left on LIN Bus
U151A	K9 Body Control Module Lost Communication with B117 Rain Sensor / B177 Rain/Ambient Light Sensor Module / B200 Rain Sensor Module on LIN Bus
U151B	K9 Body Control Module Lost Communication with K61 Sunroof Control Module on LIN Bus
	K40 Seat Memory Control Module Lost Communication with S79P Window Switch - Passenger on LIN Bus
U151C	K33 HVAC Control Module Lost Communication with A34 HVAC Controls - Auxiliary / K33A HVAC Control Module - Auxiliary on LIN Bus
U1520	K9 Body Control Module Lost Communication with P4 Security Siren / P25 Power Sounder Content Theft Deterrent Alarm Module on LIN Bus
	K33 HVAC Control Module Lost Communication with M6CR Air Temperature Door Actuator - Center Console Right Auxiliary on LIN Bus
	K40D Seat Memory Control Module - Driver Lost Communication with K134D Seat Bolster Memory Control Module - Driver on LIN Bus
	K40P Seat Memory Control Module - Passenger Lost Communication with K134P Seat Bolster Memory Control Module - Passenger on LIN Bus
U1521	K9 Body Control Module Lost Communication with S48E Multifunction Switch - Center Console on LIN Bus
	K26 Headlamp Control Module / K28 Headlamp Leveling Control Module Lost Communication with E13L Headlamp - Left on LIN Bus
U1522	K9 Body Control Module Lost Communication with K65 Tire Pressure Indicator Module / B178 Tire Pressure Sensor Locator Module on LIN Bus

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DTC	DTC Descriptor
U1523	K26 Headlamp Control Module / K28 Headlamp Leveling Control Module Lost Communication with E13R Headlamp - Right on LIN Bus
	K33 HVAC Control Module Lost Communication with M6UR Air Temperature Door Actuator - Right Upper Auxiliary on LIN Bus
	K26 Headlamp Control Module / K28 Headlamp Leveling Control Module Lost Communication with E13L Headlamp - Left on LIN Bus
U1524	K9 Body Control Module Lost Communication with K29 Seat Heating Control Module / K29F Seat Heating Control Module - Front on LIN Bus
	K26 Headlamp Control Module / K28 Headlamp Leveling Control Module Lost Communication with E13R Headlamp - Right on LIN Bus
	K33 HVAC Control Module Lost Communication with K10 Coolant Heater Control Module on LIN Bus
U1525	K33 HVAC Control Module Lost Communication with K10 Coolant Heater Control Module on LIN Bus
U1526	K9 Body Control Module Lost Communication with K29R Seat Heating Control Module - Rear on LIN Bus
U1528	K33 HVAC Control Module Lost Communication with M37B Mode Door Actuator - Auxiliary on LIN Bus
	K40D Seat Memory Control Module - Driver Lost Communication with S64D Seat Adjuster Switch - Driver on LIN Bus
	K40P Seat Memory Control Module - Passenger Lost Communication with S64P Seat Adjuster Switch - Passenger on LIN Bus
U152A	K33 HVAC Control Module Lost Communication with M6UL Air Temperature Door Actuator - Left Upper Auxiliary on LIN Bus
U152C	K9 Body Control Module Lost Communication with K18 Compass Module on LIN Bus
	K33 HVAC Control Module Lost Communication with V1 Air Ionizer on LIN Bus
U152D	K9 Body Control Module Lost Communication with P2 Transmission Shift Lever Position Indicator on LIN Bus
U1530	K9 Body Control Module Lost Communication with M35P Window Motor Module - Passenger / M74P Window Motor - Passenger on LIN Bus
U1531	K26 Headlamp Control Module / K28 Headlamp Leveling Control Module Lost Communication with E13LA Headlamp Assembly - Left on LIN Bus
U1532	K26 Headlamp Control Module / K28 Headlamp Leveling Control Module Lost Communication with E13RA Headlamp Assembly - Right on LIN Bus
U1534	K9 Body Control Module Lost Communication with M74D Window Motor - Driver on LIN Bus

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DTC	DTC Descriptor
U1538	K9 Body Control Module Lost Communication with S79D Window Switch - Driver / S146 Window/Outside Rearview Mirror Switch - Driver on LIN Bus
U153A	K9 Body Control Module Lost Communication with S79P Window Switch - Passenger on LIN Bus
U1540	K9 Body Control Module Lost Communication with M74RR Window Motor - Right Rear on LIN Bus
U1544	K9 Body Control Module Lost Communication with M74LR Window Motor - Left Rear on LIN Bus
U1548	K9 Body Control Module Lost Communication with S79LR Window Switch - Left Rear on LIN Bus
U1549	K9 Body Control Module Lost Communication with M45 Rear Wiper Motor on LIN Bus
U154A	K9 Body Control Module Lost Communication with S79RR Window Switch - Right Rear on LIN Bus
U154B	K9 Body Control Module Lost Communication with K49 Rear Seat Control Module on LIN Bus
U1550	K9 Body Control Module Lost Communication with S31D Seat Heating and Cooling Switch - Driver on LIN Bus
U1551	K9 Body Control Module Lost Communication with K33 HVAC Control Module on LIN Bus
U1555	K9 Body Control Module Lost Communication with S100LR Seat Heating/Venting/Cooling Switch - Left Rear on LIN Bus
U1556	K38 Chassis Control Module Lost Communication with K133 Trailer Brake Power Control Module on LIN Bus
U1558	K9 Body Control Module Lost Communication with S31P Seat Heating and Cooling Switch - Passenger on LIN Bus
U155D	K9 Body Control Module Lost Communication with S100RR Seat Heating/Venting/Cooling Switch - Right Rear on LIN Bus
U156D	K38 Chassis Control Module Lost Communication with S3 Transmission Shift Lever on LIN Bus
U15E1	A11 Radio Lost Communication with A26 HVAC Controls / P17 Info Display Module on LIN Bus
U15F0	K74 Human Interface Control Module Lost Communication with P17 Info Display Module on LIN Bus
U15F1	K74 Human Interface Control Module Lost Communication with K188 Human Machine Interface Control Module Bypass Module on LIN Bus
U1653	Chassis Systems High Speed Communication Enable Circuit
U1725	Left Headlamp High Beam Control Module Lost Communication with Left Headlamp Low Beam Control Module
U1726	Right Headlamp High Beam Control Module Lost Communication with Right Headlamp Low Beam Control Module
U1727	Right Headlamp High Beam Control Module Lost Communication with Right Headlamp Leveling Actuator

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DTC	DTC Descriptor
U1728	Left Headlamp High Beam Control Module Lost Communication with Left Headlamp Leveling Actuator
U1729	Right High Beam Control Module Lost Communication with Right Headlamp Horizontal Motor
U172A	Left High Beam Control Module Lost Communication with Left Headlamp Horizontal Motor
U1793	14V Power Module Lost Communication with Hybrid/EV Powertrain Control Module on Powertrain Expansion Communication Bus
U1795	14V Power Module Powertrain Expansion Communication Bus Off
U179A	Lost Communication with Hybrid/EV Powertrain Control Module 2
U179C	Lost Communication with One or More Hybrid/EV Battery Interface Control Modules
U179D	Lost Communication with Brake System Control Module 2 on Chassis Expansion Bus
U1803	Lost Communication with Hybrid/EV Powertrain Control Module 2
U1804	Lost Communication with Inside Rearview Mirror Control Module
U1806	Battery Energy Control Module High Voltage Energy Management CAN Bus Off
U1807	Battery Charger Control Module High Voltage Energy Management CAN Bus Off
U180A	Electric A/C Compressor Control Module High Speed CAN Bus Off
U180B	Battery Energy Control Module High Speed CAN Bus Off
U180C	Battery Charger Control Module High Speed CAN Bus Off
U180D	Electronic Brake Control Module Chassis Expansion CAN Bus Off
U1811	Battery Energy Control Module Powertrain Expansion CAN Bus Off
U1814	Powertrain Wake-Up Communication Circuit
U1815	Lost Communication with Drive Motor Control Module 1 on Bus B
U1816	Lost Communication with Drive Motor Control Module B on Bus B
U1817	Lost Communication with Hybrid/EV Powertrain Control Module on Powertrain Expansion CAN Bus
U1818	Lost Communication with Engine Control Module on Powertrain Expansion Communication Bus
U1821	Lost Communication with 14V Power Module on Powertrain Expansion Communication Bus
U1826	Lost Communication with Multi-Axis Acceleration Sensor Module on Powertrain Expansion CAN Bus
U1827	Lost Communication with Steering Angle Sensor Module on Powertrain Expansion CAN Bus
U182A	Hybrid/EV Powertrain Control Module Lost Communication with Battery Energy Control Module on Powertrain Expansion CAN Bus
U182D	Lost Communication with Hybrid/EV Powertrain Control Module 2 on Powertrain Expansion Communication Bus

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DTC	DTC Descriptor
U182E	Drive Motor Control Module 1 Lost Communication with Hybrid/EV Powertrain Control Module 2 on Powertrain Expansion Communication Bus
U182F	Drive Motor Control Module 2 Lost Communication with Hybrid/EV Powertrain Control Module 2 on Powertrain Expansion Communication Bus
U1831	Drive Motor Control Module 1 Lost Communication with Hybrid/EV Powertrain Control Module on Powertrain Expansion CAN Bus
U1833	Lost Communication with Electronic Brake Control Module on Chassis Expansion CAN Bus
U1838	Lost Communication with Battery Charger Control Module on High Voltage Energy Management CAN Bus
U1839	Auxiliary Transmission Fluid Pump Control Module Lost Communication with Engine Control Module
U183A	Lost Communication with Telematics Communication Interface Control Module on High Speed CAN Bus
U183B	Auxiliary Transmission Fluid Pump Control Module Lost Communication with Transmission Control Module
U183C	Auxiliary Transmission Fluid Pump Control Module Lost Communication with Hybrid/EV Powertrain Control Module 2 on Powertrain Expansion Communication Bus
U183E	Lost Communication with Telematics Communication Interface Control Module on Low Speed CAN Bus
U1844	Battery Energy Control Module Lost Communication with Hybrid/EV Powertrain Control Module on Bus B
U1845	Drive Motor Control Module 1 Lost Communication with Hybrid/EV Powertrain Control Module
U1846	Drive Motor Control Module 2 Lost Communication with Hybrid/EV Powertrain Control Module
U1847	Drive Motor Control Module 1 Lost Communication with Battery Energy Control Module on Powertrain Expansion CAN Bus
U1849	Drive Motor Control Module 1 Lost Communication with Transmission Control Module
U184A	Lost Communication with Body Control Module on Low Speed CAN Bus
U184B	Lost Communication with Remote Heater and Air Conditioning Control Module on Low Speed CAN Bus
U184C	Lost Communication with Instrument Cluster on Low Speed CAN Bus
U184D	Lost Communication with Radio on Low Speed CAN Bus
U184E	Lost Communication with Inflatable Restraint Sensing and Diagnostic Module on Low Speed CAN Bus
U184F	Electric A/C Compressor Control Module Lost Communication with Engine Control Module
U1850	Drive Motor Control Module 2 Lost Communication with Transmission Control Module
U1858	Electronic Brake Control Module Lost Communication with Hybrid/EV Powertrain Control Module on Chassis Expansion CAN Bus
U185A	Lost Communication with Battery Energy Control Module on High Voltage Energy Management CAN Bus

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DTC	DTC Descriptor
U185B	Battery Energy Control Module Lost Communication with Hybrid/EV Powertrain Control Module 2 on High Voltage Energy Management CAN Bus
U185C	Battery Charger Control Module Lost Communication with Hybrid/EV Powertrain Control Module 2 on High Voltage Energy Management CAN Bus
U185D	Fuel Injector Control Module Lost Communication with Engine Control Module
U185E	Fuel Injector Control Module Lost Communication with Body Control Module
U1860	Electric A/C Compressor Control Module Lost Communication with Hybrid/EV Powertrain Control Module 2
U1861	Battery Charger Control Module Lost Communication with Engine Control Module
U186A	Electronic Brake Control Module Lost Communication with Engine Control Module
U186B	Electronic Brake Control Module Lost Communication with Transmission Control Module
U1875	Drive Motor Control Module 1 Lost Communication with Battery Energy Control Module
U1876	Drive Motor Control Module 1 Lost Communication with Engine Control Module
U1879	Drive Motor Control Module 2 Lost Communication with Engine Control Module
U1885	Battery Energy Control Module Lost Communication with Hybrid/EV Powertrain Control Module
U1886	Battery Energy Control Module Lost Communication with Engine Control Module
U1888	Hybrid/EV Powertrain Control Module Lost Communication with Battery Energy Control Module
U18A1	Lost Communication with Coolant Temperature Control Module on High Voltage Energy Management CAN Bus
U18A2	Lost Communication with Fuel Pump Driver Control Module
U18A3	Lost Communication with Human Machine Interface Control Module
U18A4	Lost Communication with Hybrid/EV Battery DC Charging Communications Gateway Module on High Voltage Energy Management CAN Bus
U18A5	Lost Communication with Fuel Injector Control Module on Powertrain Expansion CAN Bus
U18A6	Lost Communication with Right Object Detection Control Module on Dedicated Bus 1
U18A7	Lost Communication with Power Supply Transformer on Powertrain Expansion CAN Bus
U18A9	Lost Communication With Transmission Range Control Module on Chassis Expansion CAN Bus
U18AA	Transmission Range Control Module Lost Communication with Engine Control Module
U18AB	Transmission Range Control Module Lost Communication with Chassis Control Module on High Speed CAN Bus
U18AC	Transmission Range Control Module Lost Communication with Chassis Control Module on Chassis Expansion CAN Bus

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DTC	DTC Descriptor
U18AD	Transmission Range Control Module Lost Communication with Electronic Brake Control Module on Chassis Expansion CAN Bus
U18AE	Lost Communication with Infotainment Control Touchpad on Dedicated Bus 1
U18AF	Lost Communications With Telematics Communications Interface Control Module on Ethernet Bus
U18B0	Lost Communications With Instrument Cluster on Ethernet Bus
U18B1	Lost Communications With Audio Amplifier on Ethernet Bus
U18B2	Lost Communication with Rear Audio Control Module on Ethernet Bus
U18B3	Lost Communications With Navigation Control Module on Ethernet Bus
U18B4	Lost Communication with Radio on Ethernet Bus
U18B5	Lost Communication With Hybrid Powertrain Control Module on Chassis Expansion CAN Bus
U18B9	Primary High Speed CAN Bus Subnet Configuration List
U18BF	Secondary High Speed CAN Bus Subnet Configuration List
U18CA	Lost Communication with Active Safety Control Module 1 on Flexray Bus
U18CB	Lost Communication with Active Safety Control Module 2 on Flexray Bus
U1900	Lost Communication With Speech to Text Interface Module
U1901	Lost Communication with Infotainment Multifunction Switch Module
U2098	MOST Communication Enable Circuit
U2099	High Speed Communication Enable Circuit
U209E	Object Detection Control Module High Speed Communication Enable Circuit 1
U209F	Object Detection Control Module High Speed Communication Enable Circuit 2
U2100	CAN Bus Communication
U2101	CAN Bus Maximum List of Control Modules
U2103	Fewer Controllers On Bus Than Programmed
U2105	Lost Communication with Engine Control Module
U2106	Lost Communication with Transmission Control Module
U2107	Lost Communication with Body Control Module
U2108	Lost Communication with Electronic Brake Control Module
U2125	Lost Communication with Telematic Unit
U2127	Lost Communication with Front HVAC Control Module
U2139	Lost Communication with Column Integration Module

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DTC	DTC Descriptor
U2144	Lost Communication with Distance Sensing Cruise Control Module
U216A	Lost Communication with Front Object Detection Control Module
U216B	Lost Communication with Rear Object Detection Control Module
U2176	Lost Communication with Power Take-Off Control Module
U2178	Lost Communication With Trailer Interface Control Module
U2400	Fuel Injector Control Module High Speed CAN Bus Off
U2401	Battery Energy Control Module Dedicated Bus 1 Off
U2409	Transmission Range Control Module High Speed CAN Bus Off
U240A	Transmission Range Control Module Chassis Expansion CAN Bus Off
U2501	Invalid Data Received From Hybrid/EV Powertrain Control Module 2
U2502	Invalid Data Received From Electronic Brake Control Module on Chassis Expansion CAN Bus
U2503	Invalid Data Received From Object Detection Control Module
U2504	Invalid Data Received From Trailer Brake Driver Control Module
U2505	Invalid Data Received from Human Machine Interface Control Module on MOST Bus
U2506	Invalid Data Received From Dual Battery Control Module
U2507	Invalid Data Received from Instrument Cluster on MOST Bus
U2508	Invalid Data Received from Audio Amplifier on MOST Bus
U250D	Invalid Data Received from Transmission Control Module on Chassis Control Module LIN Bus 2
U2602	Battery Energy Control Module Lost Communication with Hybrid/EV Powertrain Control Module 2
U2603	Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module 1
U2604	Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module 2
U2605	Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module 3
U2606	Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module 4
U2608	Electric A/C Compressor Control Module Lost Communication with Hybrid/EV Powertrain Control Module
U2609	Battery Charger Control Module Lost Communication with Hybrid/EV Powertrain Control Module
U2611	Auxiliary Transmission Fluid Pump Control Module Lost Communication with Hybrid/EV Powertrain Control Module
U2612	Battery Charger Control Module Lost Communication with Hybrid/EV Powertrain Control Module 2
U2613	Drive Motor 1 Control Module Lost Communication with Hybrid/EV Powertrain Control Module 2
U2614	Drive Motor 2 Control Module Lost Communication with Hybrid/EV Powertrain Control Module 2

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DTC	DTC Descriptor
U2615	Auxiliary Transmission Fluid Pump Control Module Lost Communication with Hybrid/EV Powertrain Control Module 2
U2616	Fuel Pump Driver Control Module Lost Communication with ECM
U2617	Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module 5
U2618	Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module 6
U2619	Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module 7
U2620	Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module 8
U2621	Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module 9
U2622	Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module 10
U2623	Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module 11
U2624	Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module 12
U2625	Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module 13
U3000	Control Module
U3001	Control Module Improper Shutdown Performance
U3012	Control Module Improper Wake-up Performance

DTC B1000: ELECTRONIC CONTROL UNIT

Diagnostic Instructions

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

DTC Descriptor

DTC B1000

Electronic Control Unit

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

Circuit/System Description

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The internal fault detection is handled inside the device. The symptom byte information is for engineering reference only. No external circuit diagnosis is involved.

Conditions for Running the DTC

The device runs the program to detect an internal fault when power up is commanded. The only requirements are voltage and ground. This program runs even if the voltage is out of the valid operating range.

Conditions for Setting the DTC

The device has detected an internal malfunction.

Action Taken When the DTC Sets

The device refuses all additional inputs.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold of 50, without a repeat of the malfunction.

Diagnostic Aids

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

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

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Data Link Communications Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify DTC B1000 is not set.
   - **If DTC B1000 is set**

     Replace the device that set the DTC.

   - **If DTC B1000 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 B1001: OPTION CONFIGURATION

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.

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DTC Descriptor

DTC B1001

Option Configuration

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

Circuit/System Description

Some devices must be configured with serial numbers, vehicle options, or other information. If a device was not properly configured after installation that device may set DTC B1001. The symptom byte information is for engineering reference only. No external circuit diagnosis is involved.

Conditions for Running the DTC

Battery voltage is between 9-16 V and data link communications operate normally.

Conditions for Setting the DTC

The device is not configured properly.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold, without a repeat of the malfunction.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Data Link Communications Description and Operation

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Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify DTC B1001 is not set.
    - **If DTC B1001 is set**
    1. Program the device that set the DTC.
    2. Verify the DTC does not set.
        - If the DTC sets, replace the device that set the DTC.
        - If the DTC does not set
    3. All OK.
    - **If DTC B1001 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 B101D: ELECTRONIC CONTROL UNIT HARDWARE

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

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- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- Refer to **Diagnostic Procedure Instructions** to provide an overview of each diagnostic category.

DTC Descriptor

DTC B101D

Electronic Control Unit Hardware

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

Circuit/System Description

The internal fault detection is handled inside the device. The symptom byte information is for engineering reference only. No external circuit diagnosis is involved.

Conditions for Running the DTC

- The device runs the program to detect an internal fault when power up is commanded. The only requirements are voltage and ground. This program runs even if the voltage is out of the valid operating range.
- The keyless entry control module will set this DTC with symptom byte 39 when the keyless entry control module antenna is activated.

Conditions for Setting the DTC

The device has detected an internal malfunction.

Action Taken When the DTC Sets

The device refuses all additional inputs.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold of 50, without a repeat of the malfunction.

Diagnostic Aids

- This DTC may be stored as a history DTC without affecting the operation of the device.
- Do not replace a device based only on DTC B101D being set in history with the exception of the following devices:

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  - K36 Inflatable Restraint Sensing and Diagnostic Module (SDM)
  - K85 Passenger Presence Module
- If DTC B101D is set as current, replace the appropriate device.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Data Link Communications Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify DTC B101D is not set.
   - **If DTC B101D is set**

     Replace the device that set the DTC.

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- **If DTC B101D 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 B101E: ELECTRONIC CONTROL UNIT SOFTWARE

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 B101E

Electronic Control Unit Software

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

Circuit/System Description

Some devices must be configured with specific software, serial numbers, vehicle options, or other information. If a device was not properly configured after installation that module may set DTC B101E. The symptom byte information is for engineering reference only. No external circuit diagnosis is involved.

Conditions for Running the DTC

Battery voltage is between 9-16 V and data link communications operate normally.

Conditions for Setting the DTC

The device is not configured properly.

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Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold, without a repeat of the malfunction.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

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Description and Operation

Data Link Communications Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify that DTC U0028 or U0029 is not set.
    - **If any of the DTCs are set**

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

- **If none of the DTCs are set**

3. Verify DTC B101E is not set.
   - **If DTC B101E is set**
   1. Program the device that set the DTC.
   2. Verify the DTC does not set.
      - If the DTC sets, replace the device that set the DTC.
      - If the DTC does not set
   3. All OK.
   - **If DTC B101E is not set**
4. 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 C056D: ELECTRONIC CONTROL UNIT HARDWARE

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 C056D

Electronic Control Unit Hardware

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

Circuit/System Description

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The internal fault detection is handled inside the device. The symptom byte information is for engineering reference only. No external circuit diagnosis is involved.

Conditions for Running the DTC

The device runs the program to detect an internal fault when power up is commanded. The only requirements are voltage and ground. This program runs even if the voltage is out of the valid operating range.

Conditions for Setting the DTC

The device has detected an internal malfunction.

Action Taken When the DTC Sets

The device refuses all additional inputs.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold of 50, without a repeat of the malfunction.

Diagnostic Aids

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

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

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Data Link Communications Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify DTC C056D is not set.
    - **If DTC C056D is set**

      Replace the device that set the DTC.

    - **If DTC C056D 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 C056E: ELECTRONIC CONTROL UNIT SOFTWARE

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.

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DTC Descriptor

DTC C056E

Electronic Control Unit Software

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

Circuit/System Description

Some devices must be configured with specific software, serial numbers, vehicle options, or other information. If a device was not properly configured after installation that module may set DTC C056E. The symptom byte information is for engineering reference only. No external circuit diagnosis is involved.

Conditions for Running the DTC

Battery voltage is between 9-16 V and data link communications operate normally.

Conditions for Setting the DTC

The device is not configured properly.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold, without a repeat of the malfunction.

Reference Information

Schematic Reference

Data Communication Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Data Link Communications Description and Operation

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Electrical Information Reference

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

Scan Tool References

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify DTC C056E is not set.
    - **If DTC C056E is set**
    1. Program the device that set the DTC.
    2. Verify the DTC does not set.
        - If the DTC sets, replace the device that set the DTC.
        - If the DTC does not set
    3. All OK.
    - **If DTC C056E 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 P0601-P0607, P060A-P060C, P062F, P16E9-P16F0, OR P262B: CONTROL MODULE

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

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- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- Refer to **Diagnostic Procedure Instructions** to provide an overview of each diagnostic category.

DTC Descriptor

DTC P0601

Control Module Read Only Memory Performance

DTC P0602

Control Module Not Programmed

DTC P0603

Control Module Long Term Memory Reset

DTC P0604

Control Module Random Access Memory Performance

DTC P0605

Control Module Programming Read Only Memory Performance

DTC P0606

Control Module Processor Performance

DTC P0607

Control Module Performance

DTC P060A

Control Module Monitoring Processor Performance

DTC P060B

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Control Module Analog to Digital Converter Performance

DTC P060C

Control Module Main Processor Performance

DTC P062F

Control Module Long Term Memory Performance

DTC P16E9

Control Module Serial Peripheral Interface Bus 2

DTC P16EA

Control Module Serial Peripheral Interface Bus 3

DTC P16EB

Control Module Serial Peripheral Interface Bus 4

DTC P16EC

Control Module Serial Peripheral Interface Bus 5

DTC P16ED

Control Module Serial Peripheral Interface Bus 6

DTC P16EE

Control Module Serial Peripheral Interface Bus 7

DTC P16EF

Control Module Serial Peripheral Interface Bus 8

DTC P16F0

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Control Module Serial Peripheral Interface Bus 1

DTC P262B

Control Module Power Off Timer Performance

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

Circuit/System Description

This diagnostic applies to internal microprocessor integrity conditions within the device. This diagnostic also addresses if the device is not programmed. The device monitors its ability to read and write to the memory. It also monitors a timing function. No external circuits are involved.

Conditions for Running the DTC

- The ignition is ON.
- The system voltage is greater than 9.5 V.

Conditions for Setting the DTC

The device detects an internal malfunction or incomplete programming.

Action Taken When the DTC Sets

- DTCs P0601-P0607, P060A-P060C, and P16E9-P16F0 are Type A DTCs.
- DTC P062F is a Type C DTC.
- DTC P262B is a Type B DTC.

Conditions for Clearing the DTC

- DTCs P0601-P0607, P060A-P060C, and P16E9-P16F0 are Type A DTCs.
- DTC P062F is a Type C DTC.
- DTC P262B is a Type B DTC.

Diagnostic Aids

If stored only as a history DTC and not retrieved as a current DTC, do not replace the device.

Reference Information

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Schematic Reference

Data Communication Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Data Link Communications Description and Operation

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 References

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify that DTC P0602 is not set.
    - **If DTC P0602 is set**

    1. Program the device that set the DTC.
    2. Verify that the DTC does not set.
        - If the DTC sets, replace the device that set the DTC.
        - If the DTC does not set

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3. All OK.

- **If DTC P0602 is not set**

3. Verify that DTC P0601, P0603, P0604, P0605, P0606, P0607, P060A, P060B, P060C, P062F, P16E9, P16EA, P16EB, P16EC, P16ED, P16EE, P16EF, P16F0, or P262B is not set.
   - **If any of the DTCs are set**

     Replace the device that set the DTC.

   - **If none of the DTCs are set**
4. 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 U0020: LOW SPEED CAN BUS

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 U0020

Low Speed CAN Bus

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

Circuit/System Description

Devices connected to the GMLAN serial data circuits monitor for serial data communications during normal vehicle operation. Operating information and commands are exchanged among the devices. The devices have programmed information about what messages are needed to be exchanged on the serial data circuits. The messages are also supervised and some periodic messages are used by the receiver device as an availability

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indication of the transmitter device.

Conditions for Running the DTCs

- Supply voltage to the devices is in the normal operating range.
- The vehicle power mode requires serial data communication to occur.
- The DTC U2100 does not have a current status.

Conditions for Setting the DTC

A supervised periodic message that includes the transmitter device availability has not been received.

Action Taken When the DTCs Sets

The device uses a default value for the missing parameter.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold, without a repeat of the malfunction.

Circuit/System Verification

Diagnosis of this DTC is accomplished via the symptom or an additional DTC. Refer to **Scan Tool Does Not Communicate with Low Speed GMLAN Device**, or **Diagnostic Trouble Code (DTC) List - Vehicle** .

DTC U0028: MOST BUS

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 U0028

MOST Bus

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	U0100-U02FF, U0028 00	U0100-U02FF, U0028 00	-	-
Ignition	U0100-U02FF, U1814, U2099, U0028 00	U0100-U02FF, U0028 00	-	-
MOST Control	U2098 00, U2098 02, U0029 02	U0028 00	U2098 00, U2098 02	-
MOST Bus Serial Data (+)	U0028 00	U0028 00	U0028 00	-
MOST Bus Serial Data (-)	U0028 00	U0028 00	U0028 00	-
Ground	-	U0100-U02FF, U0028 00	-	-

Circuit/System Description

The Media Oriented Systems Transport (MOST) bus consists of a physical ring in which multimedia devices share audio, video and infotainment system control data. Each device on the MOST bus transmits and receives data via the MOST Bus Serial Data (+/- transmit/receive) circuits. The MOST bus diagnostic master is the Radio. The MOST control circuit is connected to each device on the MOST bus. Each device provides a 12 V signal on the MOST control circuit. The Radio initiates communication on the MOST bus at Ignition "On" by toggling the MOST control circuit low for 100 ms. Once each device recognizes the wakeup signal from the Radio on the MOST control circuit, they will respond to the Radio on the MOST bus to indicate no faults are present and normal communications will commence.

Conditions for Running the DTC

- The system voltage is between 9-16 V.
- The ignition is ON.

Conditions for Setting the DTC

A fault occurs on transmit, receive, electronic control lines, or internal device failure.

Action Taken When the DTC Sets

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- Some or all of the infotainment system audio and displays may be inoperative.
- While a current U0028 is set, the Radio will continually send 400 ms low pulses on the MOST control circuit every 2.5 s. This is a Ring Break Diagnostic indication to the devices on the ring to report a Surrogate Master Upstream Position Node.

Conditions for Clearing the DTC

The MOST initialization is successful without errors and the MOST bus resumes normal communications.

Diagnostic Aids

- The EL-51578 MOST Bus Diagnostic Tool Kit when utilized will cause false GMLAN DTC's to be set as a result, along with loss of bypassed MOST device infotainment functionality. These DTC's and missing functionality should be ignored unless the system is completely assembled and a DTC or symptom is present during the repair verification steps.
- To troubleshoot the intermittent condition, manipulate or wiggle MOST wiring harness and observe the Radio's DTC U0028 status and the Radio scan tool Number of MOST Communication Breaks parameter value.
- If the issue still exists after performing all verification and test steps in this diagnostic procedure, bypass each MOST device individually on the MOST bus (except the Radio) while monitoring DTC U0028 status. If DTC U0028 remains current after each MOST device has been bypassed, disconnect the Radio MOST harness connector. The entire MOST ring can now be tested with all MOST devices (except the Radio) bypassed to determine if any circuit faults exist.
- The Radio's DTC U0028 will be set current with all MOST devices bypassed.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

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- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-51578 MOST Bus Diagnostic Tool Kit

For equivalent regional tools, refer to Special Tools .

Circuit/System Verification

1. Ignition ON. Radio ON.
2. If equipped, verify that the A33 Media Disc Player is operative by inserting or ejecting a disk.
    - **If the disk can not be inserted or ejected**

      Test the power, ground, and serial data circuits of the A33 Media Disc Player for an open/high resistance.

    - **If the disk can be inserted or ejected**
3. Verify that the scan tool communicates with each MOST device, except the A33 Media Disc Player.
    - **If any MOST device does not communicate with the scan tool**

      Refer to DTC U0100-U02FF to diagnose power, ground, and serial data circuits of that MOST device.

    - **If all MOST devices communicate with the scan tool**
4. Verify that DTC U2098 or DTC U0029 02 is not set.
    - **If any of the DTCs are set**

      Refer to DTC U2098.

    - **If none of the DTCs are set**

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5. Verify that DTC U0028 is not set.
   - **If the DTC U0028 is set**
   1. Using the scan tool, select the MOST Bus Diagnostic Starting Point function from A11 Radio Control Functions menu.
   2. Determine the fault location from A11 Radio scan tool Control Functions, MOST Bus Diagnostic Starting Point. Reference Node Locations of MOST Bus Communication Break parameter value.
   3. Refer to Circuit/System Testing.
   - **If the DTC U0028 is not set**
6. Refer to Repair Verification.

Circuit/System Testing

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

NOTE: **Use the Radio scan tool, schematics and specific vehicle build RPO codes to determine optional devices and to identify the following:**

- **The MOST bus ring configuration**
- **Each MOST device's MOST control and serial data circuit terminals**

NOTE: **If the A11 Radio is the first node position in the "Node Locations of MOST Bus Communication Break" range, proceed to step 8.**

1. Ignition OFF, disconnect the harness connector containing the MOST circuits at the MOST device at the first Node position reported by Node Locations of MOST Bus Communication Break parameter value.
2. Connect the appropriate connector from the EL-51578 MOST Bus Diagnostic Tool Kit to the harness connector of the MOST device to bypass this MOST device.
3. Ignition ON.

NOTE: **MOST control (ECL) voltage will toggle from 9-13 V to 0 V while DTC U0028 is current.**

4. Test for 9-13 V between the ECL connector from the EL-51578 MOST Bus Diagnostic Tool Kit and ground.
   - **If less than 9 V**
   1. Ignition OFF and all vehicle systems OFF, disconnect the harness connectors at the A11 Radio.

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2. Disconnect the EL-51578 MOST Bus Diagnostic Tool Kit from the harness connector of the first Node location MOST device.
3. Test for less than 2 Ω in the MOST control circuit end to end between the MOST device that was just disconnected and the A11 Radio.
    - 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 13 V**

1. Ignition OFF, disconnect the harness connectors at the A11 Radio and all other MOST devices.
2. Disconnect the EL-51578 MOST Bus Diagnostic Tool Kit from the harness connector of the first Node location MOST device, ignition ON.
3. Test for less than 1 V between the MOST control circuit and ground.
    - If 1 V or greater, repair the short to voltage in the circuit.
    - If less than 1 V
4. Ignition OFF, reconnect the harness connectors at the first MOST device, ignition ON.
5. Test for 9-13 V between the MOST control circuit and ground.
    - If greater than 13 V, replace the MOST device that was just connected.
    - If 13 V or less and there are more MOST devices to connect, connect the next MOST device and repeat step 4.4.
    - If 13 V or less and there are no more MOST devices to connect
6. Replace the A11 Radio.

- **If between 9-13 V**

5. Verify that DTC U0028 status remains current.
    - **If the status of DTC U0028 changes from current to history**

      Replace the disconnected MOST device.

    - **If the status of DTC U0028 remains current**
6. Ignition OFF, disconnect the EL-51578 MOST Bus Diagnostic Tool Kit from the harness connector of the first Node location MOST device.
7. Reconnect the harness connector containing the MOST circuits at the first Node location MOST device.

NOTE: **If the A11 Radio is the last node position in the "Node Locations of MOST Bus Communication Break" range, disconnect the harness connector containing MOST circuits at the A11 Radio and proceed to step 13.**

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8. Disconnect the harness connector containing the MOST circuits at the last Node location MOST device of the fault location identified by Node Locations of MOST Bus Communication Break parameter value.
9. Connect the appropriate connector from the EL-51578 MOST Bus Diagnostic Tool Kit to the harness connector of the last Node location MOST device to bypass this MOST device.
10. Ignition ON.
11. Verify that DTC U0028 status remains current.
    - **If the status of DTC U0028 changes from current to history**

      Replace the disconnected MOST device.

    - **If the status of DTC U0028 remains current**
12. Ignition OFF, disconnect the EL-51578 MOST Bus Diagnostic Tool Kit from the harness connector of the last Node location MOST device.
13. Disconnect the harness connector containing the MOST circuits at the first Node location MOST device. The following tests will be performed on the MOST serial data circuits between the two MOST devices that are disconnected.
14. Ignition ON.
15. Test for less than 1 V between each MOST serial data circuit and ground.
    - **If any serial data circuits are 1 V or greater**

      Repair the short to voltage in the circuit.

    - **If each serial data circuits are less than 1 V**
16. Ignition OFF, all access doors closed, and all vehicle systems OFF.
17. Test for infinite resistance between each MOST serial data circuit and ground.
    - **If any serial data circuits are less than infinite resistance**

      Repair the short to ground in the circuit.

    - **If each serial data circuits are infinite resistance**
18. Test for infinite resistance between each pair of the MOST serial data circuits.
    - **If any pair of serial data circuits are less than infinite resistance**

      Repair the short between the circuits.

    - **If each pair of serial data circuits are infinite resistance**

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19. Test for less than 2 Ω in each MOST serial data circuit end to end.
    - **If any serial data circuits are 2 Ω or greater**

      Repair the open/high resistance in the circuit between the two MOST devices.

    - **If each serial data circuits are less than 2 Ω**
20. Replace the A11 Radio.
21. Ignition ON. Radio ON.
22. Verify that DTC U0028 does not set.
    - **If the DTC U0028 sets**

      Refer to Diagnostic Aids.

    - **If the DTC U0028 does not set**
23. All OK.

Repair Instructions

Perform the Repair Verification after completing the repair.

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

Repair Verification

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
2. Install any components or connectors that have been removed or replaced during diagnosis.
3. Ignition ON.
4. Clear the DTCs.
5. Verify the A11 Radio scan tool Surrogate MOST Master Node Upstream Position parameter value is None.
    - **If the value is not None**

      Disconnect the A11 Radio power or the battery cables for 1 min to reset this value to None.

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- **If the value is None**

6. All OK.

DTC U0029: MOST BUS 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 U0029

MOST Bus Performance

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

Circuit/System Description

The Media Oriented Systems Transport (MOST) bus master device shall set DTC U0029 when the MOST bus interruptions lasts long enough to interrupt MOST communication and functions, but not long enough to break the MOST bus ring.

Conditions for Running the DTC

- The system voltage is between 9-16 V.
- The ignition is ON.
- The Radio is ON.

Conditions for Setting the DTC

A current DTC sets when MOST bus communication has been interrupted more than 10 times during the monitoring cycle period.

Action Taken When the DTC Sets

Some or all of the infotainment system may be inoperative for brief periods of time.

Conditions for Clearing the DTC

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A current DTC is cleared when MOST bus communication interruptions are no longer detected and the Number of MOST Communication Breaks counter remains at 0.

Diagnostic Aids

This is an intermittent connection detection DTC. All MOST device connectors should be checked for poor connections on both MOST bus circuits.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

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- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON. Radio ON.
2. Verify DTC U0028 is set.
    - **If the DTC is set**

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Refer to **DTC U0028**.

- **If the DTC is not set**

3. Verify DTC U0029 is not set with symptom byte 02.
   - **If DTC U0029 is set with symptom byte 02**

     Refer to **DTC U2098**.

   - **If DTC U0029 is set with other symptom bytes except 02**
4. Refer to **Testing for Intermittent Conditions and Poor Connections** to test for an intermittent condition.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

DTC U0073 OR U2100: CONTROL MODULE COMMUNICATION BUS A OFF/CAN BUS COMMUNICATION

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 U0073

Control Module Communication Bus A Off

DTC U2100

CAN Bus Communication

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

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Circuit/System Description

The serial data circuits are used to communicate information between the devices. The serial data circuits also connect directly to the data link connector (DLC).

Conditions for Running the DTCs

- Supply voltage to the devices is in the normal operating range.
- The vehicle power mode requires serial data communications.

Conditions for Setting the DTC

The device setting the DTC has attempted to establish communications on the serial data circuits more than 3 times in 5 s.

Action Taken When the DTCs Sets

- The device suspends all message transmission.
- The device uses default values for all parameters received on the serial data circuits.
- In the transmission control module, DTC U0073 will cause the transmission to go into default gears.
- In the engine control module and transmission control module, DTC U0073 will cause the malfunction indicator lamp (MIL) to illuminate.
- If equipped with eAssist, DTC U0073 in the hybrid powertrain control module is a type B DTC and will cause the malfunction indicator lamp to illuminate and result in the engine operating in conventional engine mode and will maintain 14 V module operation.
- The device inhibits the setting of all other communication DTCs.

Conditions for Clearing the DTC

- The engine control module or transmission control module turns OFF the MIL after 4 consecutive ignition cycles that the diagnostic runs and does not fail.
- If equipped with eAssist, the hybrid powertrain control module turns off the MIL after the diagnostic runs and does not fail during subsequent ignition cycles. Normal operation will resume 5 s after subsequent ignition cycle.
- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold of 50, without a repeat of the malfunction.

Circuit/System Verification

1. Refer to **Data Link References** to determine which serial data communication system is used for a specific device.

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2. This DTC may not be retrieved with a current status. Diagnosis is accomplished using the symptom. Refer to **Symptoms - Data Communications**.

DTC U0074: CONTROL MODULE COMMUNICATION POWERTRAIN EXPANSION CAN BUS OFF 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 U0074 00

Control Module Communication Powertrain Expansion CAN Bus Off Malfunction

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Powertrain High Speed CAN Serial Data (+)	U0074	U0074	U0074	-
Powertrain High Speed CAN Serial Data (-)	U0074	U0074	U0074	-

Circuit/System Description

The devices connected to the powertrain high speed CAN serial data circuits monitor for serial data communications during normal vehicle operation. Operating information and commands are exchanged among the devices when the ignition switch is in any position other than OFF. The powertrain high speed CAN serial data bus uses terminating resistors that are in parallel with the powertrain high speed CAN (+) and (-) circuits.

Conditions for Running the DTC

- The system voltage is between 9-16 V.
- The vehicle power mode requires serial data communications.

Conditions for Setting the DTC

A supervised periodic message that includes the transmitter device availability has not been received for more than 450 ms.

Action Taken When the DTC Sets

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DTC U0074 is a type B DTC.

Conditions for Clearing the DTC

DTC U0074 is a type B DTC.

Diagnostic Aids

- Use the **Data Link References** to identify the powertrain high speed CAN devices.
- Sometimes, while diagnosing a specific customer concern or after a repair, you may notice a history U-code present. However, there is no associated "current" or "active" status. Loss-of-communication U-codes such as these can set for a variety of reasons. Many times, they are transparent to the vehicle operator and technician, and/or have no associated symptoms. Eventually, they will erase themselves automatically after a number of fault-free ignition cycles. This condition would most likely be attributed to one of these scenarios:
  - A device on the data communication circuit was disconnected while the communication circuit is awake.
  - Power to one or more devices was interrupted during diagnosis.
  - A low battery condition was present, so some devices stop communicating when battery voltage drops below a certain threshold.
  - Battery power was restored to the vehicle and devices on the communication circuit did not all re-initialize at the same time.
  - If a loss-of-communication U-code appears in history for no apparent reason, it is most likely associated with one of the scenarios above. These are all temporary conditions and should never be interpreted as an intermittent fault, causing you to replace a part.
- Do not replace a device reporting a U code. The U code identifies which device needs to be diagnosed for a communication issue.
- Communication may be available between some devices and the scan tool with the powertrain high speed CAN serial data system inoperative. This condition is due to those devices using multiple serial data communication systems.
- An open in the DLC ground circuit terminal 5 will allow the scan tool to operate but not communicate with the vehicle.
- Technicians may find various Local Area Network (LAN) communication Diagnostic Trouble Codes (DTC).
- Some devices may not have internal protection for specific voltage outputs and may open a battery positive voltage or ignition voltage source fuse. If a voltage input fuse is open and no short is found in that circuit, ensure that no device output voltage circuit is shorted to ground before replacing the device.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

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Connector End View Reference

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DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

NOTE: **Each device may need to be disconnected to isolate a circuit fault.**

Use the schematic to identify the following:

- **Powertrain high speed CAN devices the vehicle is equipped with**
- **Powertrain high speed CAN serial data circuit terminating resistors**
- **Device locations on the powertrain high speed CAN serial data circuits**
- **Each device's ground, B+, ignition, and powertrain high speed CAN serial data circuit terminals**

Some devices with an internal terminating resistor have a loop in the harness that connects the internal terminating resistor to the serial data circuit. When wired this way, test these loop circuits for the appropriate failure mode short to voltage, short to ground, or open/high resistance prior to replacing the device for each of

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the following tests.

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 meters (9.8 feet) away from vehicle. Disconnect the harness connectors with the powertrain high speed CAN serial data circuits at an easily accessible device that is not communicating. It may take up to 2 minutes for all vehicle systems to power down. Refer to **Data Link References** to determine which devices are on the powertrain expansion bus.
2. Ignition ON.
3. Test for less than 4.5 V between each powertrain high speed CAN serial data circuit at the device that was just disconnected and ground.
   - **If 4.5 V or greater**

     Refer to Testing the Serial Data Circuits for a Short to Voltage.

   - **If less than 4.5 V**
4. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 meters (9.8 feet) away from vehicle. It may take up to 2 minutes for all vehicle systems to power down.
5. Test for greater than 100 Ω between each powertrain high speed CAN serial data circuit at the device that was just disconnected and ground.
   - **If 100 Ω or less**

     Refer to Testing the Serial Data Circuits for a Short to Ground.

   - **If greater than 100 Ω**
6. Test for 110-130 Ω between each pair of the powertrain high speed CAN serial data circuits at the device that was just disconnected:
   - **If less than 110 Ω**

     Refer to Testing the Serial Data Circuits for a Short between the Circuits.

   - **If greater than 130 Ω**

     Refer to Testing the Serial Data Circuits for an Open/High Resistance.

   - **If between 110-130 Ω**
7. Refer to Testing the Device Circuits.

Testing the Serial Data Circuits for a Short to Voltage

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1. Ignition OFF, disconnect the harness connectors with the powertrain high speed CAN serial data circuits at another device, in the direction of the circuit shorted to voltage, ignition ON.
2. Test for greater than 4.5 V between each serial data circuit at the device connector that was just disconnected and ground.
    - **If each serial data circuit is 4.5 V or less**
    1. Ignition OFF.
    2. Test for less than 10 Ω between each of the device's ground circuit terminals and ground.
        - If 10 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 10 Ω, replace the device that was disconnected.
    - **If any serial data circuit is greater than 4.5 V**
3. Repeat step 1 until one of the following conditions are isolated:
    - A short to voltage on the serial data circuit between two devices or splice packs, if equipped.
    - A short to voltage on the serial data circuit between a device and a terminating resistor.

Testing the Serial Data Circuits for a Short to Ground

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 meters (9.8 feet) away from vehicle. It may take up to 2 minutes for all vehicle systems to power down.
2. Disconnect the harness connectors with the powertrain high speed CAN serial data circuits at another device, in the direction of the circuit shorted to ground.
3. Test for greater than 100 Ω between each serial data circuit at the device connector that was just disconnected and ground.
    - **If each serial data circuit is 100 Ω or greater**

      Replace the device that was disconnected.

    - **If any serial data circuit is less than 100 Ω**
4. Repeat step 1 until one of the following conditions are isolated:
    - A short to ground on the serial data circuit between two devices or splice packs, if equipped.
    - A short to ground on the serial data circuit between a device and a terminating resistor.

Testing the Serial Data Circuits for a Short between the Circuits

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 meters (9.8 feet) away from vehicle. It may take up to 2 minutes for all vehicle systems to power down.

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2. Connect the harness connectors at the device that was previously disconnected.
3. Disconnect the harness connectors with the powertrain high speed CAN serial data circuits at another device, in the direction of the circuit shorted together.
4. Test for greater than 110 Ω between each pair of serial data circuits at the device connector that was just disconnected.
    - **If each pair of serial data circuits is 110 Ω or greater**

      Replace the device that was disconnected.

    - **If any pair of serial data circuits is less than 110 Ω**
5. Repeat step 1 until one of the following conditions are isolated:
    - Serial data circuits shorted together between two devices or splice packs, if equipped.
    - Serial data circuits shorted together between a device and a terminating resistor.
    - A shorted terminating resistor.

Testing the Serial Data Circuits for an Open/High Resistance

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 meters (9.8 feet) away from vehicle. It may take up to 2 minutes for all vehicle systems to power down.
2. Connect the harness connectors at the device that was previously disconnected.
3. Disconnect the harness connectors with the powertrain high speed CAN serial data circuits at another device, in the direction of the circuit with the open/high resistance.
4. Test for less than 130 Ω between each pair of the serial data circuits at the device connector that was just disconnected.
    - **If each pair of serial data circuits is 130 Ω or less**

      Replace the device that was disconnected.

    - **If any pair of serial data circuits is greater than 130 Ω**
5. Repeat step 1 until one of the following conditions are isolated:
    - An open/high resistance on the serial data circuit between two devices or splice packs, if equipped.
    - An open/high resistance on the serial data circuit between a device and a terminating resistor.
    - An open/high resistance terminating resistor.

Testing the Device Circuits

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1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 meters (9.8 feet) away from vehicle. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 Ω between each ground circuit terminal at the device that was just disconnected and ground.
    - **If 10 Ω or greater**
    1. Ignition OFF.
    2. Test for less than 2 Ω in the ground circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, repair the open/high resistance in the ground connection.
    - **If less than 10 Ω**
3. If equipped, verify a test lamp illuminates between each B+ circuit terminal and ground.
    - **If the test lamp does not illuminate and the circuit fuse is good**
    1. Ignition OFF.
    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.
    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 disconnected device.
    - **If the test lamp illuminates**
4. Ignition ON.
5. If equipped, verify a test lamp illuminates between each ignition circuit terminal, which has a fuse in the circuit, and ground.
    - **If the test lamp does not illuminate and the circuit fuse is good**
    1. Ignition OFF.
    2. Test for less than 2 Ω in the ignition 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 OK and there is voltage at the fuse.
    - **If the test lamp does not illuminate and the circuit fuse is open**

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1. Ignition OFF.
2. Test for infinite resistance between the ignition circuit and ground.
    - If less than infinite resistance, repair the short to ground on the circuit.
    - If infinite resistance, replace the disconnected device.

- **If the test lamp illuminates**

6. If equipped, verify a test lamp illuminates between each ignition circuit terminal, which is controlled by a control module, and ground.

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

1. Ignition OFF, disconnect the harness connectors at the control module that controls the ignition circuit.
2. Test for infinite resistance between the ignition 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 ignition circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω, replace the control module that controls the ignition circuit.

- **If the test lamp illuminates**

7. Replace the device that was disconnected.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

DTC U0075: CONTROL MODULE COMMUNICATION OBJECT DETECTION CAN BUS OFF

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

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DTC U0075 00

Control Module Communication Object Detection CAN Bus Off

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Object High Speed GMLAN Serial Data (+)	U0075	U0075, U0100-U02FF*	U0075	-
Object High Speed GMLAN Serial Data (-)	U0075	U0075, U0100-U02FF*	U0075	-
Ground (Data Link Connector terminal 5)	-	1	-	-
* An open between the Data Link Connector (DLC) and the first splice/device will only affect the communication with the scan tool. The devices will still communicate. An open in only one object high speed GMLAN serial data circuit may allow degraded communication between the devices. 1. No communication with any object high speed GMLAN device.				

Circuit/System Description

The devices connected to the object high speed GMLAN serial data circuits monitor for serial data communications during normal vehicle operation. Operating information and commands are exchanged among the devices when the ignition switch is in any position other than OFF. The object high speed GMLAN serial data bus uses terminating resistors that are in parallel with the object high speed GMLAN (+) and (-) circuits.

Conditions for Running the DTC

The system voltage is between 9-16 V.

Conditions for Setting the DTC

A supervised periodic message that includes the transmitter device availability has not been received.

Action Taken When the DTC Sets

Specific subsystems will not function.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold of 50, without a repeat of the malfunction.

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Diagnostic Aids

- Use the **Data Link References** to identify the object detection high speed GMLAN devices.
- Sometimes, while diagnosing a specific customer concern or after a repair, you may notice a history U code present. However, there is no associated "current" or "active" status. Loss of communication U codes such as these can set for a variety of reasons. Many times, they are transparent to the vehicle operator and technician, and/or have no associated symptoms. Eventually, they will erase themselves automatically after a number of fault-free ignition cycles. This condition would most likely be attributed to one of these scenarios:
  - A device on the data communication circuit was disconnected while the communication circuit is awake.
  - Power to one or more devices was interrupted during diagnosis.
  - A low battery condition was present, so some devices stop communicating when battery voltage drops below a certain threshold.
  - Battery power was restored to the vehicle and devices on the communication circuit did not all re-initialize at the same time.
  - If a loss of communication U code appears in history for no apparent reason, it is most likely associated with one of the scenarios above. These are all temporary conditions and should never be interpreted as an intermittent fault, causing you to replace a part.
- Do not replace a device reporting a U code. The U code identifies which device needs to be diagnosed for a communication issue.
- Communication may be available between some devices and the scan tool with the object high speed GMLAN serial data system inoperative. This condition is due to those devices using multiple serial data communication systems.
- An open in the DLC ground circuit terminal 5 will allow the scan tool to operate but not communicate with the vehicle.
- Technicians may find various Local Area Network (LAN) communication Diagnostic Trouble Codes (DTC).
- Some devices may not have internal protection for specific voltage outputs and may open a battery positive voltage or ignition voltage source fuse. If a voltage input fuse is open and no short is found in that circuit, ensure that no device output voltage circuit is shorted to ground before replacing the device.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

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Data Link Communications Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify two or more devices are not communicating on the object high speed GMLAN serial data circuit. Refer to Data Link References to determine how many devices should be communicating on this bus.
   - **If only one device is not communicating**

     Refer to Circuit/System Testing - Testing the Device Circuits.

   - **If two or more devices are not communicating**
3. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down. Disconnect the scan tool from the X84 Data Link Connector. The following tests will be done at the X84 Data Link Connector.
4. Test for less than 10 Ω between the ground circuit terminal 5 and ground.
   - **If 10 Ω or greater**
   1. Ignition OFF.
   2. Test for less than 2 Ω in the ground circuit end to end.
      - If 2 Ω or greater, repair the open/high resistance in the circuit.
      - If less than 2 Ω, repair the open/high resistance in the ground connection.
   - **If less than 10 Ω**
5. Ignition ON.

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6. Test for less than 4.5 V between the serial data circuits listed below and ground:
    - Terminal 3
    - Terminal 11
    - **If 4.5 V or greater**

      Refer to Circuit/System Testing - Testing the Serial Data Circuits for a Short to Voltage.

    - **If less than 4.5 V**
7. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
8. Test for greater than 100 Ω between the serial data circuits listed below and ground:
    - Terminal 3
    - Terminal 11
    - **If 100 Ω or less**

      Refer to Circuit/System Testing - Testing the Serial Data Circuits for a Short to Ground.

    - **If greater than 100 Ω**
9. Test for 50-70 Ω between the serial data circuit terminals 3 and 11:
    - **If less than 35 Ω**

      Refer to Circuit/System Testing - Testing the Serial Data Circuits for a Short between the Circuits.

    - **If between 35-50 Ω**

      There may be a third terminating resistor between the serial data circuits. This can happen if the incorrect device is installed. Some devices are available with and without the terminating resistors installed to reduce the need of terminating resistors in the wiring harness. Refer to Circuit/System Testing - Testing the Serial Data Circuits for a Short between the Circuits.

    - **If greater than 70 Ω but less than infinite**

      Refer to Circuit/System Testing - Testing the Serial Data Circuits for an Open/High Resistance.

    - **If infinite resistance**

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Repair the open/high resistance in the circuit between the X84 Data Link Connector and the first splice/device in the serial data circuit.

- **If between 50-70 Ω**

10. Refer to Circuit/System Testing - Testing the Device Circuits.

Circuit/System Testing

NOTE: **Some devices with an internal terminating resistor have a loop in the harness that connects the internal terminating resistor to the serial data circuit. When wired this way, test these loop circuits for the appropriate failure mode short to voltage, short to ground, or open/high resistance prior to replacing the device for each of the following tests. Each device may need to be disconnected to isolate a circuit fault. Use the schematics and connector end views to identify the following:**

- **Object high speed GMLAN devices and terminating resistors the vehicle is equipped with**
- **Device locations on the object high speed GMLAN serial data circuits**
- **Each device's ground, B+, ignition, and object high speed GMLAN serial data circuit terminals**

NOTE: **Circuit/System Verification must be performed before proceeding with Circuit/System Testing.**

Testing the Serial Data Circuits for a Short to Voltage

1. Ignition OFF, disconnect the harness connectors with the object high speed GMLAN serial data circuits at an easily accessible device, ignition ON.
2. Test for greater than 4.5 V between each serial data circuit at the device connector that was just disconnected and ground.
   - **If each serial data circuit is 4.5 V or less**
   1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
   2. Test for less than 10 Ω between each of the device's ground circuit terminals and ground.
      - If 10 Ω or greater, repair the open/high resistance in the circuit.
      - If less than 10 Ω, replace the device that was disconnected.
   - **If any serial data circuit is greater than 4.5 V**
3. Ignition OFF, disconnect the harness connectors with the object high speed GMLAN serial data circuits at another device, in the direction of the circuit shorted to voltage, ignition ON.

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4. Test for greater than 4.5 V between each serial data circuit at the device connector that was just disconnected and ground.
    - **If each serial data circuit is 4.5 V or less**
    1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
    2. Test for less than 10 Ω between each of the device's ground circuit terminals and ground.
        - If 10 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 10 Ω, replace the device that was disconnected.
    - **If any serial data circuit is greater than 4.5 V**
5. Repeat step 3 until one of the following conditions are isolated:
    - A short to voltage on the serial data circuit between two devices or splice packs, if equipped.
    - A short to voltage on the serial data circuit between a device and a terminating resistor.

Testing the Serial Data Circuits for a Short to Ground

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down. Disconnect the harness connectors with the object high speed GMLAN serial data circuits at an easily accessible device.
2. Test for greater than 100 Ω between each object high speed GMLAN serial data circuit at the device connector that was just disconnected and ground.
    - **If each serial data circuit is 100 Ω or greater**

      Replace the device that was disconnected.

    - **If any serial data circuit is less than 100 Ω**
3. Disconnect the harness connectors with the object high speed GMLAN serial data circuits at another device, in the direction of the circuit shorted to ground.
4. Test for greater than 100 Ω between each object high speed GMLAN serial data circuit at the device connector that was just disconnected and ground.
    - **If both serial data circuits are 100 Ω or greater**

      Replace the device that was disconnected.

    - **If any serial data circuit is less than 100 Ω**

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5. Repeat step 3 until one of the following conditions are isolated:
    - A short to ground on the serial data circuit between two devices or splice packs, if equipped.
    - A short to ground on the serial data circuit between a device and a terminating resistor.
    - A short to ground on the serial data circuit between the X84 Data Link Connector and the first device or splice pack.

Testing the Serial Data Circuits for a Short between the Circuits

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down. Disconnect the harness connectors with the object high speed GMLAN serial data circuits at an easily accessible device that is not communicating.
2. Test for greater than 110 Ω between each pair of object high speed GMLAN serial data circuits at the device connector that was just disconnected.
    - **If each pair of serial data circuits is 110 Ω or greater**

      Replace the device that was disconnected.

    - **If any pair of serial data circuits is less than 110 Ω**
3. Connect the harness connectors at the device that was disconnected.
4. Disconnect the harness connectors with the object high speed GMLAN serial data circuits at another device, in the direction of the circuit shorted together.
5. Test for greater than 110 Ω between each pair of object high speed GMLAN serial data circuits at the device connector that was just disconnected.
    - **If each pair of serial data circuits is 110 Ω or greater**

      Replace the device that was disconnected.

    - **If any pair of serial data circuits is less than 110 Ω**
6. Repeat step 3 until one of the following conditions are isolated:
    - Serial data circuits shorted together between two devices or splice packs, if equipped.
    - Serial data circuits shorted together between a device and a terminating resistor.
    - Serial data circuits shorted together between the X84 Data Link Connector and the first device or splice pack.
    - A shorted terminating resistor.

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Testing the Serial Data Circuits for an Open/High Resistance

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down. Disconnect the harness connectors with the object high speed GMLAN serial data circuits at an easily accessible device that is not communicating.
2. Test for less than 130 Ω between each pair of object high speed GMLAN serial data circuits at the device connector that was just disconnected.
    - **If each pair of serial data circuits is 130 Ω or less**

      Replace the device that was disconnected.

    - **If any pair of serial data circuits is greater than 130 Ω**
3. Connect the harness connectors at the device that was disconnected.
4. Disconnect the harness connectors with the object high speed GMLAN serial data circuits at another device, in the direction of the circuit with the open/high resistance.
5. Test for less than 130 Ω between each pair of object high speed GMLAN serial data circuits at the device connector that was just disconnected.
    - **If each pair of serial data circuits is 130 Ω or less**

      Replace the device that was disconnected.

    - **If any pair of serial data circuits is greater than 130 Ω**
6. Repeat step 3 until one of the following conditions are isolated:
    - An open/high resistance on the serial data circuit between two devices or splice packs, if equipped.
    - An open/high resistance on the serial data circuit between a device and a terminating resistor.
    - An open/high resistance terminating resistor.

Testing the Device Circuits

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down. Disconnect the harness connectors at an easily accessible device that is not communicating.
2. Test for less than 10 Ω between each ground circuit terminal and ground.
    - **If 10 Ω or greater**
    1. Ignition OFF.
    2. Test for less than 2 Ω in the ground circuit end to end.

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

- **If less than 10 Ω**

3. Ignition ON.
4. If equipped, verify a test lamp illuminates between each B+ circuit terminal 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 disconnected device.
   - **If the test lamp illuminates**
5. If equipped, verify a test lamp illuminates between each ignition circuit terminal, which has a fuse in the circuit, 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 ignition 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 OK 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 ignition circuit and ground.
      - If less than infinite resistance, repair the short to ground on the circuit.
      - If infinite resistance, replace the disconnected device.
   - **If the test lamp illuminates**
6. If equipped, verify a test lamp illuminates between each ignition circuit terminal, which is controlled by a control module, and ground.

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

1. Ignition OFF, remove the test lamp, disconnect the harness connectors at the control module that controls the ignition circuit.
2. Test for infinite resistance between the ignition 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 ignition circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω, replace the control module that controls the ignition circuit.

- **If the test lamp illuminates**

7. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
8. Test for less than 2 Ω in each object high speed GMLAN serial data circuit end to end between the device harness connector and the appropriate X84 Data Link Connector terminals listed below.
    - X84 Data Link Connector terminal 3
    - X84 Data Link Connector terminal 11
    - **If 2 Ω or greater**

      Repair the open/high resistance in the serial data circuit.

    - **If less than 2 Ω**
9. Replace the device that was disconnected.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

DTC U0077: CONTROL MODULE COMMUNICATION CHASSIS EXPANSION CAN BUS OFF

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

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- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- Refer to **Diagnostic Procedure Instructions** to provide an overview of each diagnostic category.

DTC Descriptor

DTC U0077

Control Module Communication Chassis Expansion CAN Bus Off

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Chassis High Speed GMLAN Serial Data (+)	U0077	U0077, U0100-U02FF*	U0077	-
Chassis High Speed GMLAN Serial Data (-)	U0077	U0077, U0100-U02FF*	U0077	-
Ground (DLC, terminal 5)	-	1	-	-
* An open in only one chassis high speed GMLAN serial data circuit may allow degraded communication between the devices. An open between the Data Link Connector (DLC) and the first splice/device will only affect the communication with the scan tool. The devices will still communicate. 1. No communication with any chassis high speed GMLAN device.				

Circuit/System Description

The devices connected to the chassis high speed GMLAN serial data circuits monitor for serial data communications during normal vehicle operation. Operating information and commands are exchanged among the devices when the ignition switch is in any position other than OFF. The chassis high speed GMLAN serial data bus uses terminating resistors that are in parallel with the chassis high speed GMLAN (+) and (-) circuits. The chassis high speed GMLAN serial data circuits connect directly to the Data Link Connector (DLC).

Conditions for Running the DTC

The system voltage is between 9-16 V.

Conditions for Setting the DTC

The device setting the DTC has attempted to establish communications on the chassis high speed GMLAN serial data circuits more than 3 times.

Action Taken When the DTC Sets

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- The device suspends all message transmission.
- The device uses default values for all parameters received on the serial data circuits.
- The device inhibits the setting of all other communication DTCs.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold, without a repeat of the malfunction.

Diagnostic Aids

- Sometimes, while diagnosing a specific customer concern or after a repair, you may notice a history U code present. However, there is no associated "current" or "active" status. Loss of communication U codes such as these can set for a variety of reasons. Many times, they are transparent to the vehicle operator and technician, and/or have no associated symptoms. Eventually, they will erase themselves automatically after a number of fault-free ignition cycles. This condition would most likely be attributed to one of these scenarios:
  - A device on the data communication circuit was disconnected while the communication circuit is awake.
  - Power to one or more devices was interrupted during diagnosis.
  - A low battery condition was present, so some devices stop communicating when battery voltage drops below a certain threshold.
  - Battery power was restored to the vehicle and devices on the communication circuit did not all re-initialize at the same time.
  - If a loss of communication U code appears in history for no apparent reason, it is most likely associated with one of the scenarios above. These are all temporary conditions and should never be interpreted as an intermittent fault, causing you to replace a part.
- A device may have a U code stored in history that does not require any repairs. Issues with late or corrupted messages between devices can be temporary with no apparent symptom or complaint; this does not mean the device is faulty. Do not replace a device based only on a history U code.
- Do not replace a device reporting a U code. The U code identifies which device needs to be diagnosed for a communication issue.
- Communication may be available between the device and the scan tool with one or more GMLAN serial data systems inoperative. This condition is due to the device using multiple GMLAN busses.
- Use **Data Link References** to determine what GMLAN serial data communications the non communicating device uses.
- The device may not have internal protection for specific control circuits and may open a B+ or ignition fuse. If a fuse is open and the B+ or ignition circuit is not shorted to ground, ensure none of the control circuits are shorted to ground before replacing the non communicating device.

Reference Information

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Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Data Link Communications Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify two or more devices are not communicating on the chassis high speed GMLAN serial data circuit. Refer to **Data Link References** to determine how many devices should be communicating on this bus.
   - **If only one device is not communicating**

     Refer to Circuit/System Testing - Testing the Device Circuits.

   - **If two or more devices are not communicating**
3. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down. Disconnect the scan tool from the X84 Data Link Connector. The following tests will be done at the X84 Data Link Connector.

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4. Test for less than 10 Ω between the ground circuit terminal 5 and ground.
    - **If 10 Ω or greater**
    1. Ignition OFF.
    2. Test for less than 2 Ω in the ground circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, repair the open/high resistance in the ground connection.
    - **If less than 10 Ω**
5. Ignition ON.
6. Test for less than 4.5 V between the serial data circuits listed below and ground.
    - Terminal 12
    - Terminal 13
    - **If 4.5 V or greater**

      Refer to Circuit/System Testing - Testing the Serial Data Circuits for a Short to Voltage.

    - **If less than 4.5 V**
7. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
8. Test for greater than 100 Ω between the serial data circuits listed below and ground.
    - Terminal 12
    - Terminal 13
    - **If 100 Ω or less**

      Refer to Circuit/System Testing - Testing the Serial Data Circuits for a Short to Ground.

    - **If greater than 100 Ω**
9. Test for 50-70 Ω between the serial data circuit terminals 12 and 13.
    - **If less than 35 Ω**

      Refer to Circuit/System Testing - Testing the Serial Data Circuits for a Short between the Circuits.

    - **If between 35-50 Ω**

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There may be a third terminating resistor between the serial data circuits. This can happen if the incorrect device is installed. Some devices are available with and without the terminating resistors installed to reduce the need of terminating resistors in the wiring harness. Refer to Circuit/System Testing - Testing the Serial Data Circuits for a Short between the Circuits.

- **If greater than 70 Ω but less than infinite**

  Refer to Circuit/System Testing - Testing the Serial Data Circuits for an Open/High Resistance.

- **If infinite resistance**

  Repair the open/high resistance in the circuit between the X84 Data Link Connector and the first splice/device in the serial data circuit.

- **If between 50-70 Ω**

10. Refer to Circuit/System Testing - Testing the Device Circuits.

Circuit/System Testing

NOTE: **Some devices with an internal terminating resistor have a loop in the harness that connects the internal terminating resistor to the serial data circuit. When wired this way, test these loop circuits for the appropriate failure mode short to voltage, short to ground, or open/high resistance prior to replacing the device for each of the following tests. Each device may need to be disconnected to isolate a circuit fault. Use the schematics and connector end views to identify the following:**

- **Chassis high speed GMLAN devices and terminating resistors the vehicle is equipped with**
- **Device locations on the chassis high speed GMLAN serial data circuits**
- **Each device's ground, B+, ignition, and chassis high speed GMLAN serial data circuit terminals**

NOTE: **Circuit/System Verification must be performed before proceeding with Circuit/System Testing.**

Testing the Serial Data Circuits for a Short to Voltage

1. Ignition OFF, disconnect the harness connectors with the chassis high speed GMLAN serial data circuits at an easily accessible device, ignition ON.
2. Test for greater than 4.5 V between each serial data circuit at the device connector that was just disconnected and ground.
   - **If each serial data circuit is 4.5 V or less**

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1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between each of the device's ground circuit terminals and ground.
    - If 10 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 10 Ω, replace the device that was disconnected.

- **If any serial data circuit is greater than 4.5 V**

3. Ignition OFF, disconnect the harness connectors with the chassis high speed GMLAN serial data circuits at another device, in the direction of the circuit shorted to voltage, ignition ON.
4. Test for greater than 4.5 V between each serial data circuit at the device connector that was just disconnected and ground.

- **If each serial data circuit is 4.5 V or less**

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between each of the device's ground circuit terminals and ground.
    - If 10 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 10 Ω, replace the device that was disconnected.

- **If any serial data circuit is greater than 4.5 V**

5. Repeat step 3 until one of the following conditions are isolated:
    - A short to voltage on the serial data circuit between two devices or splice packs, if equipped.
    - A short to voltage on the serial data circuit between a device and a terminating resistor.

Testing the Serial Data Circuits for a Short to Ground

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down. Disconnect the harness connectors with the chassis high speed GMLAN serial data circuits at an easily accessible device.
2. Test for greater than 100 Ω between each serial data circuit at the device connector that was just disconnected and ground.

- **If each serial data circuit is 100 Ω or greater**

  Replace the device that was disconnected.

- **If any serial data circuit is less than 100 Ω**

3. Disconnect the harness connectors with the chassis high speed GMLAN serial data circuits at another device, in the direction of the circuit

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shorted to ground.

4. Test for greater than 100 Ω between each serial data circuit at the device connector that was just disconnected and ground.
    - **If both serial data circuits are 100 Ω or greater**

      Replace the device that was disconnected.

    - **If any serial data circuit is less than 100 Ω**
5. Repeat step 3 until one of the following conditions are isolated:
    - A short to ground on the serial data circuit between two devices or splice packs, if equipped.
    - A short to ground on the serial data circuit between a device and a terminating resistor.
    - A short to ground on the serial data circuit between the X84 Data Link Connector and the first device or splice pack.

Testing the Serial Data Circuits for a Short between the Circuits

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down. Disconnect the harness connectors with the chassis high speed GMLAN serial data circuits at an easily accessible device that is not communicating.
2. Test for greater than 110 Ω between each pair of serial data circuits at the device connector that was just disconnected.
    - **If each pair of serial data circuits is 110 Ω or greater**

      Replace the device that was disconnected.

    - **If any pair of serial data circuits is less than 110 Ω**
3. Connect the harness connectors at the device that was disconnected.
4. Disconnect the harness connectors with the chassis high speed GMLAN serial data circuits at another device, in the direction of the circuit shorted together.
5. Test for greater than 110 Ω between each pair of serial data circuits at the device connector that was just disconnected.
    - **If each pair of serial data circuits is 110 Ω or greater**

      Replace the device that was disconnected.

    - **If any pair of serial data circuits is less than 110 Ω**
6. Repeat step 3 until one of the following conditions are isolated:
    - Serial data circuits shorted together between two devices or splice packs, if equipped.

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- Serial data circuits shorted together between a device and a terminating resistor.
- Serial data circuits shorted together between the X84 Data Link Connector and the first device or splice pack.
- A shorted terminating resistor.

Testing the Serial Data Circuits for an Open/High Resistance

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down. Disconnect the harness connectors with the chassis high speed GMLAN serial data circuits at an easily accessible device that is not communicating.
2. Test for less than 130 Ω between each pair of serial data circuits at the device connector that was just disconnected.
   - **If each pair of serial data circuit is 130 Ω or less**

     Replace the device that was disconnected.

   - **If any pair of serial data circuits is greater than 130 Ω**
3. Connect the harness connectors at the device that was disconnected.
4. Disconnect the harness connectors with the chassis high speed GMLAN serial data circuits at another device, in the direction of the circuit with the open/high resistance.
5. Test for less than 130 Ω between each pair of serial data circuits at the device connector that was just disconnected.
   - **If each pair of serial data circuits is 130 Ω or less**

     Replace the device that was disconnected.

   - **If any pair of serial data circuits is greater than 130 Ω**
6. Repeat step 3 until one of the following conditions are isolated:
   - An open/high resistance on the serial data circuit between two devices or splice packs, if equipped.
   - An open/high resistance on the serial data circuit between a device and a terminating resistor.
   - An open/high resistance terminating resistor.

Testing the Device Circuits

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down. Disconnect the harness connectors at an easily accessible device that is not communicating.
2. Test for less than 10 Ω between each ground circuit terminal and ground.

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- **If 10 Ω or greater**

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

- **If less than 10 Ω**

3. Ignition ON
4. If equipped, verify a test lamp illuminates between each B+ circuit terminal 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 disconnected device.

- **If the test lamp illuminates**

5. If equipped, verify a test lamp illuminates between each ignition circuit terminal, which has a fuse in the circuit, 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 ignition 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 OK 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 ignition circuit and ground.
    - If less than infinite resistance, repair the short to ground on the circuit.

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- If infinite resistance, replace the disconnected device.
- **If the test lamp illuminates**

6. If equipped, verify a test lamp illuminates between each ignition circuit terminal, which is controlled by a control module, and ground.
   - **If the test lamp does not illuminate**
   1. Ignition OFF, remove the test lamp, disconnect the harness connectors at the control module that controls the ignition circuit.
   2. Test for infinite resistance between the ignition 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 ignition circuit end to end.
      - If 2 Ω or greater, repair the open/high resistance in the circuit.
      - If less than 2 Ω, replace the control module that controls the ignition circuit.
   - **If the test lamp illuminates**
7. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
8. Test for less than 2 Ω in each chassis high speed GMLAN serial data circuit end to end between the device harness connector and the appropriate X84 Data Link Connector terminals listed below.
   - X84 Data Link Connector terminal 12
   - X84 Data Link Connector terminal 13
   - **If 2 Ω or greater**

     Repair the open/high resistance in the serial data circuit.

   - **If less than 2 Ω**
9. Replace the device that was disconnected.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

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DTC U0078: CONTROL MODULE COMMUNICATION LOW SPEED CAN BUS OFF

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 U0078

Control Module Communication Low Speed CAN Bus Off

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

Circuit/System Description

The low speed GMLAN serial data bus is used to communicate information between the devices. The serial data is transmitted over a single wire to the appropriate devices. The low speed GMLAN serial data circuits also connect directly to the data link connector (DLC).

Conditions for Running the DTC

- Supply voltage to the devices are in the normal operating range.
- The vehicle power mode requires serial data communications.

Conditions for Setting the DTC

The device setting the DTC has attempted to establish communications on the serial data circuits more than 3 times in 5 s.

Action Taken When the DTC Sets

- The device suspends all message transmission.
- The device uses default values for all parameters received on the serial data circuits.
- The device inhibits the setting of all other communication DTCs.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.

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- A history DTC clears when the device ignition cycle counter reaches the reset threshold of 50, without a repeat of the malfunction.

Circuit/System Verification

1. Ignition ON.
2. Verify DTC U0078 is not set.
   - **If DTC U0078 is set**

     Refer to **Scan Tool Does Not Communicate with Low Speed GMLAN Device**.

   - **If DTC U0078 is not set**
3. All OK

DTC U0100-U02FF: CONTROL MODULE U CODE LIST

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

For device DTC descriptors, refer to **Control Module U Code List**.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	U0100-U02FF	U0100-U02FF	-	-
Ignition	U0100-U02FF, U1814, U2099	U0100-U02FF	-	-
Object High Speed GMLAN Serial Data (+)	U0075	U0100-U02FF	U0075	-
Object High Speed GMLAN Serial Data (-)	U0075	U0100-U02FF	U0075	-
Chassis High Speed GMLAN Serial Data (+)	U0077	U0100-U02FF	U0077	-
Chassis High Speed GMLAN Serial Data (-)	U0077	U0100-U02FF	U0077	-
High Speed GMLAN Serial Data (+)	U0073, 2	U0100-U02FF	U0073, 2	-

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
High Speed GMLAN Serial Data (-)	U0073, 2	U0100-U02FF	U0073, 2	-
Low Speed GMLAN Serial Data	U0078, 1	U0100-U02FF	U0078, 1	-
Ground	-	U0100-U02FF	-	-
1. Scan tool does not communicate with most low speed GMLAN device 2. Scan tool does not communicate with most high speed GMLAN device				

Circuit/System Description

The serial data circuit is the means by which the devices in the vehicle communicate with each other. Once the scan tool is connected to the serial data circuit through the Data Link Connector (DLC), the scan tool can be used to monitor each device for diagnostic purposes and to check for Diagnostic Trouble Codes (DTC). When the ignition switch is in RUN, each device communicating on the serial data circuit sends a state of health message to ensure that the device is operating properly. When a device stops communicating on the serial data circuit, for example if the device loses power or ground, the state of health message it normally sends on the serial data circuit disappears. Other devices on the serial data circuit, which expect to receive that state of health message, detect its absence; those devices in turn set a DTC associated with the loss of state of health of the non-communicating device. The DTC is unique to the device which is not communicating and one or more devices may set the same exact code. A loss of serial data communications DTC does not represent a failure of the devices that contain the stored code.

Conditions for Running the DTC

The system voltage is between 9-16 V.

Conditions for Setting the DTC

A supervised periodic message that includes the transmitter device availability has not been received.

Action Taken When the DTC Sets

- Specific subsystems will not function.
- DTC U0100 in the Transmission Control Module will cause the transmission to go into default gears.
- Both DTC U0100 in the Transmission Control Module and DTC U0101 in the Engine Control Module will cause the malfunction indicator lamp (MIL) to illuminate.

Conditions for Clearing the DTC

- The Engine Control Module or Transmission Control Module turns OFF the MIL after 4 consecutive ignition cycles that the diagnostic runs and does not fail.

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- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold of 50, without a repeat of the malfunction.

Diagnostic Aids

- Sometimes, while diagnosing a specific customer concern or after a repair, you may notice a history U code present. However, there is no associated "current" or "active" status. Loss of communication U codes such as these can set for a variety of reasons. Many times, they are transparent to the vehicle operator and technician, and/or have no associated symptoms. Eventually, they will erase themselves automatically after a number of fault-free ignition cycles. This condition would most likely be attributed to one of these scenarios:
  - A device on the data communication circuit was disconnected while the communication circuit is awake.
  - Power to one or more devices was interrupted during diagnosis.
  - A low battery condition was present, so some devices stop communicating when battery voltage drops below a certain threshold.
  - Battery power was restored to the vehicle and devices on the communication circuit did not all re-initialize at the same time.
  - If a loss of communication U code appears in history for no apparent reason, it is most likely associated with one of the scenarios above. These are all temporary conditions and should never be interpreted as an intermittent fault, causing you to replace a part.
- A device may have a U code stored in history that does not require any repairs. Issues with late or corrupted messages between devices can be temporary with no apparent symptom or complaint; this does not mean the device is faulty. Do not replace a device based only on a history U code.
- Do not replace a device reporting a U code. The U code identifies which device needs to be diagnosed for a communication issue.
- Communication may be available between some devices and the scan tool with either the low or high speed GMLAN serial data system inoperative. This condition is due to those devices using multiple serial data communication systems.
- Use **Data Link References** to determine what serial data communications the device uses.
- Some devices may not have internal protection for specific control circuits and may open a B+ or ignition fuse. If a fuse is open and the B+ or ignition circuit is not shorted to ground, ensure none of the control circuits are shorted to ground before replacing the device.
- Some intermittent communication concerns may be caused by fretting corrosion on the serial data circuit terminals. Inspect all connectors at the device that set the communication DTC, the device that the communication DTC was set against, and any inline harness connectors between the two devices. Do not replace a device based only on fretting corrosion. Refer to bulletin 09-06-03-004 for assistance with the diagnosis and repair of this condition, if applicable.
- This diagnostic can be used for any device that is not communicating, regardless of the type of serial data circuit it is connected to, providing the vehicle is equipped with the device.
- This diagnostic procedure can be used to diagnose the common no communication DTCs: U0100, U0101, U0102, U0103, U0104, U0105, U0106, U0109, U010E, U010F, U0111, U0112, U0115, U0117, U0121, U0122, U0123, U0125, U0126, U0128, U0129, U012A, U0130, U0131, U0132, U0133, U0136, U0137, U0139, U0140, U0146, U0151, U0155, U0158, U0159, U0160, U0164, U0166, U0167, U0168,

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U016B, U0170, U0181, U0182, U0184, U0186, U0191, U0193, U0196, U0197, U0198, U0201, U0203, U0204, U0207, U0208, U0209, U0210, U0230, U0232, U0233, U0236, U0237, U023A, U0248, U0249, U0250, U0252, U0254, U025B, U0264, U0265, U0268, U0269, U026A, U026B, U0293, U029D, U029E, U02A3, and other DTCs within U0100-U02FF range.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

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Description and Operation

Data Link Communications Description and Operation

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Determine the device that is not communicating. Refer to **Control Module U Code List**.
2. Verify that DTC U0073, U2100, U0074, U0075, U0077, U0078, U1814, U2099, B1325, B1330, B1370, B1380, B1424, B1440, B1441, B1517, C0800, C0899, C12E1, P0560, or P0562 is not set.
    - **If any of the DTCs are set**

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

- **If none of the DTCs are set**

3. Refer to Circuit/System Testing.

Circuit/System Testing

NOTE: **Use the schematics and connector end views to identify the device's ground, B+, ignition, accessory wakeup serial data, serial data communication enable, and serial data circuit terminals.**

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down. Disconnect all the harness connectors at the device that is not communicating.
2. Test for less than 10 Ω between each ground circuit terminal and ground.
   - **If 10 Ω or greater**
   1. Ignition OFF.
   2. Test for less than 2 Ω in the ground circuit end to end.
      - If 2 Ω or greater, repair the open/high resistance in the circuit.
      - If less than 2 Ω, repair the open/high resistance in the ground connection.
   - **If less than 10 Ω**
3. Ignition ON.
4. If equipped, verify a test lamp illuminates between each B+ circuit terminal 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 disconnected device.

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- **If the test lamp illuminates**

5. If equipped, verify a test lamp illuminates between each ignition circuit terminal 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 ignition 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 OK 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 ignition circuit and ground.
      - If less than infinite resistance, repair the short to ground on the circuit.
      - If infinite resistance, replace the disconnected device.
   - **If the test lamp illuminates**

NOTE: **Accessory wakeup serial data and serial data communication enable circuits are ignition circuits controlled by another control module.**

6. If equipped, verify a test lamp illuminates between each ignition circuit terminal, which is controlled by a control module, and ground.
   - **If the test lamp does not illuminate**
   1. Ignition OFF, remove the test lamp, disconnect the harness connectors at the control module that controls the ignition circuit.
   2. Test for infinite resistance between the ignition 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 ignition circuit end to end.
      - If 2 Ω or greater, repair the open/high resistance in the circuit.
      - If less than 2 Ω, replace the control module that controls the ignition circuit.
   - **If the test lamp illuminates**
7. Test for less than 4.5 V between each GMLAN serial data circuit terminal and ground.
   - **If 4.5 V or greater between a low speed GMLAN serial data circuit and ground**

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Refer to **Scan Tool Does Not Communicate with Low Speed GMLAN Device** to test for a short to voltage.

- **If 4.5 V or greater between a high speed GMLAN serial data circuit and ground**

  Refer to **Scan Tool Does Not Communicate with High Speed GMLAN Device** to test for a short to voltage.

- **If less than 4.5 V**

8. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
9. Test for greater than 100 Ω between each GMLAN serial data circuit terminal and ground.
   - **If 100 Ω or less between a low speed GMLAN serial data circuit and ground**

     Refer to **Scan Tool Does Not Communicate with Low Speed GMLAN Device** to test for a short to ground.

   - **If 100 Ω or less between a high speed GMLAN serial data circuit and ground**

     Refer to **Scan Tool Does Not Communicate with High Speed GMLAN Device** to test for a short to ground.

   - **If greater than 100 Ω**
10. Test for less than 2 Ω in each of the GMLAN serial data circuits end to end between the device harness connector and the appropriate X84 Data Link Connector terminals listed below.
    - Low speed GMLAN serial data circuit terminal 1
    - High speed GMLAN serial data circuit terminal 6 or 14
    - Chassis high speed GMLAN serial data circuit terminal 12 or 13
    - Object high speed GMLAN serial data circuit terminal 3 or 11
    - **If 2 Ω or greater**

      Repair the open/high resistance in the serial data circuit between the non communicating device and the device setting the DTC or a serial data splice pack.

    - **If less than 2 Ω**

NOTE: **The following test step is only applicable to a high speed GMLAN device with 2 pairs of serial data circuits or a high speed GMLAN device with an internal terminating resistor.**

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11. Test for 110-130 Ω between each pair of high speed GMLAN serial data circuits.
    - **If less than 110 Ω**

      Refer to **Scan Tool Does Not Communicate with High Speed GMLAN Device** to test for a short to ground or a short between the serial data circuits.

    - **If greater than 130 Ω**

      Refer to **Scan Tool Does Not Communicate with High Speed GMLAN Device** to test for an open/high resistance in the serial data circuit.

    - **If between 110-130 Ω**
12. Replace the device that is not communicating.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

DTC U0300-U0336: CONTROL MODULE U CODE LIST

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

Refer to **Control Module U Code List**.

Circuit/System Description

Some devices must be configured with specific software, serial numbers, vehicle options, or other information. If a device was not properly configured after installation that device may set the appropriate communication DTCs. No external circuit diagnosis is involved.

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Conditions for Running the DTC

Battery voltage is between 9-16 V and data link communications operate normally.

Conditions for Setting the DTC

The device is not configured properly.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold, without a repeat of the malfunction.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

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- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

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Circuit/System Verification

1. Ignition ON.
2. Verify DTC U0300-U0336 is not set.
    - **If DTC U0300-U0336 is set**
    1. Program the device specified by the DTC descriptor.
    2. Verify the DTC does not set.
        - If the DTC sets, replace the device specified by the DTC descriptor.
        - If the DTC does not set
    3. All OK.
    - **If DTC U0300-U0336 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 U0400-U05FF: CONTROL MODULE U CODE LIST

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

Refer to **Control Module U Code List**.

Circuit/System Description

Some devices are constantly receiving information from other devices through serial data communication network. The invalid data code will be set when a receiving device detects a discrepancy in information it receives from another device causing its integrity to be questioned. The symptom byte listed in the DTC Descriptor is for engineering reference only. No external circuit diagnosis is involved.

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Conditions for Running the DTC

Battery voltage is between 9-16 V and data link communications operate normally.

Conditions for Setting the DTC

The device is not configured properly.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold, without a repeat of the malfunction.

Diagnostic Aids

This diagnostic procedure can be used to diagnose these common DTCs: U0400, U0401, U0402, U0403, U0404, U0405, U0406, U0407, U0408, U0409, U040D, U040F, U0410, U0414, U0415, U0416, U0417, U0418, U041B, U041E, U0420, U0421, U0422, U0423, U0424, U0425, U0426, U0427, U0428, U0429, U042B, U042E, U0430, U0431, U0432, U0433, U0435, U0436, U0437, U0438, U0439, U043A, U043B, U043C, U0440, U0447, U0452, U0456, U0459, U045A, U0461, U0462, U0463, U0464, U0465, U0466, U0467, U0468, U0469, U046A, U046B, U046C, U046D, U0481, U0482, U0483, U0485, U0486, U0492, U0493, U0497, U0498, U0499, U04B1, U04B5, U0507, U0508, U0513, U0514, U0515, U052A, U0532, U0533, U0534, U0536, U0537, U053B, U053C, U053D, U0546, U0549, U054B, U0551, U0555, U0558, U0563, U0564, U0565, U056B, U056E, U0585, U0586, U0588, U0594, U0595, U0596, U059B, U05A1, U05A2, and other DTCs within U0400-U05FF range.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Engine running for 10 s.
2. Ignition ON/Vehicle In Service Mode, engine OFF, verify DTC U0400-U05FF is not set.
    - **If DTC U0400-U05FF is set along with other DTCs set or symptoms**

      Diagnose all other DTCs or symptoms first. Refer to Diagnostic Trouble Code (DTC) List - Vehicle , or Symptoms - Vehicle .

    - **If DTC U0400-U05FF is set without other DTCs set or symptoms**

    1. Program the device specified by the DTC descriptor.
    2. Verify the DTC does not set.
        - If the DTC sets, replace the appropriate device.
        - If the DTC does not set
    3. All OK.
    - **If DTC U0400-U05FF 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 U1026: LOST COMMUNICATION WITH TRANSFER CASE CONTROL MODULE

Diagnostic Instructions

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

DTC Descriptors

DTC U1026

Lost Communication with Transfer Case Control Module

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+	U0102, U1026	U0102, U1026	-	-
Ignition	U0102, U1026	U0102, U1026	-	-
Accessory Wake Up Serial Data	U1814, U2099, U0102, U1026	U0102, U1026	-	-
High Speed GMLAN Serial Data (+)	U0073*	U0073, U0102, U1026*	U0073*	-
High Speed GMLAN Serial Data (-)	U0073*	U0073, U0102, U1026*	U0073*	-
Ground	-	U0102, U1026	-	-
* Other DTCs may set with this fault.				

Circuit/System Description

Devices connected to the serial data circuits monitor for serial data communications during normal vehicle operation. Operating information and commands are exchanged among the devices. The devices have prerecorded information about what messages are needed to be exchanged on the serial data circuits, for each virtual network. The messages are supervised and also, some periodic messages are used by the receiver device as an availability indication of the transmitter device. Each message contains the identification number of the transmitter device.

Conditions for Running the DTC

The system voltage is between 9-16 V.

Conditions for Setting the DTC

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A supervised periodic message that includes the transmitter device availability has not been received.

Action Taken When the DTC Sets

Specific subsystems will not function.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold of 50, without a repeat of the malfunction.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

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1. Ignition ON.
2. Verify that DTC U0073, U0074, U0075, U0076, U0077, U0078, U2100, U1814, U2099, B1325, B1330, B1370, B1380, B1424, B1428, B1440, B1441, B1517, C0800, C0899, C12E1, P0560, or P0562 is not set.
   - **If any of the DTCs are set**

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

   - **If none of the DTCs are set**
3. Refer to Circuit/System Testing.

Circuit/System Testing

NOTE: **Use the schematics and connector end views to identify the device's ground, B+, ignition, accessory wakeup serial data, and serial data circuit terminals.**

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. Disconnect the harness connectors at the K69 Transfer Case Control Module. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between each ground circuit terminal and ground.
   - **If 10 Ω or greater**
   1. Ignition OFF.
   2. Test for less than 2 Ω in the ground circuit end to end.
      - If 2 Ω or greater, repair the open/high resistance in the circuit.
      - If less than 2 Ω, repair the open/high resistance in the ground connection.
   - **If less than 10 Ω**
3. Ignition ON.
4. If equipped, verify a test lamp illuminates between each B+ circuit terminal 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**

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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 K69 Transfer Case Control Module.

- **If the test lamp illuminates**

5. If equipped, verify a test lamp illuminates between each ignition circuit terminal 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 ignition 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 OK 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 ignition circuit and ground.
    - If less than infinite resistance, repair the short to ground on the circuit.
    - If infinite resistance, replace the K69 Transfer Case Control Module.

- **If the test lamp illuminates**

6. If equipped, verify a test lamp illuminates between the accessory wakeup serial data circuit terminal and ground.

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

1. Ignition OFF, remove the test lamp, disconnect the harness connectors at the K9 Body Control Module.
2. Test for infinite resistance between the accessory wakeup serial data 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 accessory wakeup serial data circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω, replace the K9 Body Control Module.

- **If the test lamp illuminates**

7. Test for less than 4.5 V between each high speed GMLAN serial data circuit terminal and ground.

- **If 4.5 V or greater**

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Refer to **Scan Tool Does Not Communicate with High Speed GMLAN Device** to test for a short to voltage.

- **If less than 4.5 V**

8. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
9. Test for greater than 100 Ω between each high speed GMLAN serial data circuit terminal and ground.
    - **If 100 Ω or less**

      Refer to **Scan Tool Does Not Communicate with High Speed GMLAN Device** to test for a short to ground.

    - **If greater than 100 Ω**
10. Disconnect the harness connectors at the device setting the DTC.
11. Test for less than 2 Ω in each serial data circuits end to end between the K69 Transfer Case Control Module and the device setting the DTC.
    - **If 2 Ω or greater**

      Repair the open/high resistance in the serial data circuit.

    - **If less than 2 Ω**
12. Replace the K69 Transfer Case Control Module.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

DTC U1500-U15FF: CONTROL MODULE U CODE LIST

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

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For device DTC descriptors, refer to **Control Module U Code List**.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	U1500-U15BF	U1500-U15BF	-	-
Ignition	U1500-U15BF	U1500-U15BF	-	-
LIN Serial Data	U1500-U15BF	U1500-U15BF	U1500-U15BF	-
Ground	-	U1500-U15BF	-	-

Circuit/System Description

The Local Interconnect Network (LIN) Bus consists of a single wire with a transmission rate of 10.417 Kbit/s. The serial data is transmitted over a LIN circuit between a master control module and other LIN devices within a particular subsystem. If serial data communication is lost between any of the LIN devices on the LIN bus network, the master control module will set a no communication code against the non-communicating LIN device.

Conditions for Running the DTC

The system voltage is between 9-16 V.

Conditions for Setting the DTC

A supervised periodic message that includes the transmitter device availability has not been received.

Action Taken When the DTC Sets

Specific subsystems will not function.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold of 50, without a repeat of the malfunction.

Diagnostic Aids

- Sometimes, while diagnosing a specific customer concern or after a repair, you may notice a history U code present. However, there is no associated "current" or "active" status. Loss of communication U codes such as these can set for a variety of reasons. Many times, they are transparent to the vehicle operator and technician, and/or have no associated symptoms. Eventually, they will erase themselves automatically

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after a number of fault-free ignition cycles. This condition would most likely be attributed to one of these scenarios:

  - A device on the data communication circuit was disconnected while the communication circuit is awake.
  - Power to one or more devices was interrupted during diagnosis.
  - A low battery condition was present, so some devices stop communicating when battery voltage drops below a certain threshold.
  - Battery power was restored to the vehicle and devices on the communication circuit did not all re-initialize at the same time.
  - If a loss of communication U code appears in history for no apparent reason, it is most likely associated with one of the scenarios above. These are all temporary conditions and should never be interpreted as an intermittent fault, causing you to replace a part.
- A device may have a U code stored in history that does not require any repairs. Issues with late or corrupted messages between devices can be temporary with no apparent symptom or complaint; this does not mean the device is faulty. Do not replace a device based only on a history U code.
- Do not replace a device reporting a U code. The U code identifies which device needs to be diagnosed for a communication issue.
- Communication will be available between the master control module and the scan tool if there is a loss of communications with any of the other LIN devices on the LIN bus network.
- Some devices may not have internal protection for specific control circuits and may open a B+ or ignition fuse. If a fuse is open and the B+ or ignition circuit is not shorted to ground, ensure none of the control circuits are shorted to ground before replacing the device.
- Some intermittent communication concerns may be caused by fretting corrosion on the serial data circuit terminals. Inspect all connectors at the device that set the communication DTC, the device that the communication DTC was set against, and any inline harness connectors between the two devices. Do not replace a device based only on fretting corrosion. Refer to bulletin 09-06-03-004 for assistance with the diagnosis and repair of this condition, if applicable.
- An open in the LIN bus serial data circuit between the splice pack and a LIN device will only affect that specific LIN device. This type of failure will set a loss of communication DTC for each LIN device affected and the other LIN devices will still communicate.
- This diagnostic procedure can be used to diagnose the common LIN DTCs: U1500, U1501, U1502, U1503, U1504, U1505, U1506, U1507, U1508, U1509, U150E, U150F, U1510, U1511, U1512, U1513, U1514, U1515, U1516, U1517, U1518, U1519, U151A, U151B, U151C, U1520, U1521, U1522, U1523, U1524, U1526, U1528, U152C, U152D, U1530, U1531, U1532, U1534, U1538, U153A, U1540, U1544, U1548, U1549, U154A, U154B, U1550, U1556, U1558, U15E1, U15E3, U15F0, and other DTCs within the U1500-U15FF range.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

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Connector End View Reference

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Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Determine the LIN device that is not communicating. Refer to **Control Module U Code List**.
2. Verify that DTC B1325, B1330, B1370, B1380, B1424, B1440, B1441, B1517, C0800, C0899, C12E1, P0560, P0562, U0028, U0029, U0100-U02FF, or U2098 is not set.
   - **If any of the DTCs are set**

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

   - **If none of the DTCs are set**
3. Refer to Circuit/System Testing.

Circuit/System Testing

NOTE:

- **For some vehicles, both headlamps may be connected to the same LIN circuit through a splice. Or both LIN circuits to the headlamps may be internally connected at the connector of the K26 Headlamp Control Module (or K28 Headlamp Leveling Control Module). A short in one headlamp or its LIN circuit may cause no communication to both headlamps. Ensure to diagnose both LIN circuits and headlamps prior to**

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replacing any headlamp.

- **Use the schematic to identify the following:**
  - **The master control module and the LIN devices on the same LIN serial data circuit**
  - **The master control module's LIN serial data circuit terminal and the LIN device's B+, ignition, ground, and LIN serial data circuit terminals**

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down. Disconnect the harness connector at a LIN device that is not communicating.
2. Test for less than 10 Ω between each ground circuit terminal and ground.
   - **If 10 Ω or greater**
   1. Ignition OFF.
   2. Test for less than 2 Ω in the ground circuit end to end.
      - If 2 Ω or greater, repair the open/high resistance in the circuit.
      - If less than 2 Ω, repair the open/high resistance in the ground connection.
   - **If less than 10 Ω**
3. Ignition ON.
4. If equipped, verify a test lamp illuminates between each B+ circuit terminal 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 disconnected LIN device.
   - **If the test lamp illuminates**
5. If equipped, verify a test lamp illuminates between each ignition circuit terminal and ground.

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- **If the test lamp does not illuminate and the circuit fuse is good**

1. Ignition OFF, remove the test lamp.
2. Test for less than 2 Ω in the ignition 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 OK 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 ignition circuit and ground.
    - If less than infinite resistance, repair the short to ground on the circuit.
    - If infinite resistance, replace the disconnected LIN device.

- **If the test lamp illuminates**

6. If equipped, verify a test lamp illuminates between each ignition circuit terminal, which is controlled by a control module, and ground.
    - **If the test lamp does not illuminate**
    1. Ignition OFF, remove the test lamp, disconnect the harness connectors at the control module that controls the ignition circuit.
    2. Test for infinite resistance between the ignition 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 ignition circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the control module that controls the ignition circuit.
    - **If the test lamp illuminates**

NOTE: **For accurate voltage reading, disconnect the battery charger prior to performing the following test step.**

7. Test for 2-12 V between the LIN serial data circuit terminal and ground.
    - **If less than 2 V**
    1. Ignition OFF, disconnect the harness connector at the control module setting the DTC and all LIN devices that share the same LIN serial data circuit.
    2. Test for infinite resistance between the serial data circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.

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- If infinite resistance

3. Test for less than 2 Ω in the serial data circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω
4. Reconnect the control module that set the DTC, ignition ON.
5. Test for 2-12 V between the LIN serial data circuit terminal and ground.
    - If less than 2 V, replace the control module setting the DTC.
    - If greater than 2 V, replace the LIN device that causes a current DTC to set when connected.

- **If greater than 12 V**

1. Ignition OFF, disconnect the harness connector at the control module setting the DTC and all LIN devices that share the same LIN serial data circuit.
2. Ignition ON.
3. Test for less than 1 V between the serial data circuit and ground.
    - If 1 V or greater, repair the short to voltage on the circuit.
    - If less than 1 V
4. Ignition OFF, reconnect the control module that set the DTC, ignition ON.
5. Test for 2-12 V between the LIN serial data circuit terminal and ground.
    - If greater than 12 V, replace the control module setting the DTC.
    - If less than 12 V, replace the LIN device that causes a current DTC to set when connected.

- **If between 2-12 V**

8. Replace the disconnected LIN device.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

DTC U1814: POWERTRAIN WAKE-UP COMMUNICATION CIRCUIT

Diagnostic Instructions

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

DTC Descriptor

DTC U1814

Powertrain Wake-Up Communication 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
Ignition	U1814 02*	U0100-U02FF	-	-
* Vehicle may not start.				

Circuit/System Description

The body control module (BCM) activates the ignition circuit, when the ignition key is in ACC, ON or START. The ignition circuit wakes up the devices for serial data bus communication.

Conditions for Running the DTC

- The system voltage is between 9-16 V.
- The vehicle power mode master requires serial data communication to occur.

Conditions for Setting the DTC

The BCM senses a short to ground on the ignition circuit.

Action Taken When the DTC Sets

- The output command is turned off while the malfunction is present.
- The devices use a default value for the missing parameters until the next ignition cycle.
- The device(s) is never signaled. Therefore, the specific subsystem(s) will not function.

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- The vehicle will not start while the circuit is shorted to ground.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold of 50, without a repeat of the malfunction.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

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Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

NOTE: **Use the schematic to determine which devices are on the K9 Body Control Module's ignition circuit terminal 22 X4. Use the connector end view to identify the ignition circuit terminal for each of those devices.**

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1. Ignition OFF, disconnect the harness connectors at an easily accessible device that shares the K9 Body Control Module's ignition circuit terminal 22 X4. Ignition ON.
2. Verify that the DTC U1814 remains current.
    - **If the DTC becomes history**

      Replace the device that was just disconnected.

    - **If the DTC remains current**
3. With the prior devices disconnected, repeat steps 1 and 2 for each device on the ignition circuit except the K9 Body Control Module.
4. Ignition OFF, disconnect the X4 harness connector at the K9 Body Control Module.
5. Test for infinite resistance between the ignition circuit terminal 22 X4 at the K9 Body Control Module and ground.
    - **If less than infinite resistance**

      Repair the short to ground on the circuit.

    - **If infinite resistance**
6. Replace the K9 Body Control Module.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

DTC U1833: LOST COMMUNICATION WITH ELECTRONIC BRAKE CONTROL MODULE ON CHASSIS EXPANSION CAN BUS

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 U1833

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Lost Communication with Electronic Brake Control Module on Chassis Expansion CAN Bus

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+	U0121, U0129, U1833	U0121, U0129, U1833	-	-
Ignition	U0121, U0129, U1833	U0121, U0129, U1833	-	-
Serial Data Communication Enable	U1814, U2099	U0121, U0129, U1833	-	-
Chassis High Speed GMLAN Serial Data (+)	U0077*	U0077*	U0077*	-
Chassis High Speed GMLAN Serial Data (-)	U0077*	U0077*	U0077*	-
Ground	-	U0121, U0129, U1833	-	-
* Other DTCs may set with this fault.				

Circuit/System Description

Devices connected to the serial data circuits monitor for serial data communications during normal vehicle operation. Operating information and commands are exchanged among the devices. The devices have prerecorded information about what messages are needed to be exchanged on the serial data circuits, for each virtual network. The messages are supervised and also, some periodic messages are used by the receiver device as an availability indication of the transmitter device. Each message contains the identification number of the transmitter device.

Conditions for Running the DTC

The system voltage is at least 10 V.

Conditions for Setting the DTC

A supervised periodic message that includes the transmitter device availability has not been received.

Action Taken When the DTC Sets

- A driver information center message and/or a warning indicator may be displayed.
- The DTC U1833 is a type B DTC.

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Conditions for Clearing the DTC

The DTC U1833 is a type B DTC.

Diagnostic Aids

- Sometimes, while diagnosing a specific customer concern or after a repair, you may notice a history U code present. However, there is no associated "current" or "active" status. Loss of communication U codes such as these can set for a variety of reasons. Many times, they are transparent to the vehicle operator and technician, and/or have no associated symptoms. Eventually, they will erase themselves automatically after a number of fault-free ignition cycles. This condition would most likely be attributed to one of these scenarios:
  - A device on the data communication circuit was disconnected while the communication circuit is awake.
  - Power to one or more devices was interrupted during diagnosis.
  - A low battery condition was present, so some devices stop communicating when battery voltage drops below a certain threshold.
  - Battery power was restored to the vehicle and devices on the communication circuit did not all re-initialize at the same time.
  - If a loss of communication U code appears in history for no apparent reason, it is most likely associated with one of the scenarios above. These are all temporary conditions and should never be interpreted as an intermittent fault, causing you to replace a part.
- A device may have a U code stored in history that does not require any repairs. Issues with late or corrupted messages between devices can be temporary with no apparent symptom or complaint; this does not mean the device is faulty. Do not replace a device based only on a history U code.
- Do not replace a device reporting a U code. The U code identifies which device needs to be diagnosed for a communication issue.
- Communication may be available between the device and the scan tool with one or more GMLAN serial data systems inoperative. This condition is due to the device using multiple GMLAN busses.
- Use **Data Link References** to determine what GMLAN serial data communications the non communicating device uses.
- The device may not have internal protection for specific control circuits and may open a B+ or ignition fuse. If a fuse is open and the B+ or ignition circuit is not shorted to ground, ensure none of the control circuits are shorted to ground before replacing the non communicating device.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

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Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify that DTC U0073, U0074, U0075, U0076, U0077, U0078, U2100, P06E4, P1EB9, U1814, U2099, B1325, B1330, B1370, B1380, B1424, B1428, B1440, B1441, B1517, C0800, C0899, C12E1, P0560, or P0562 is not set.
   - **If any of the DTCs are set**

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

   - **If none of the DTCs are set**
3. Refer to Circuit/System Testing.

Circuit/System Testing

NOTE: **Use the schematics and connector end views to identify the device's ground, B+, ignition, serial data communication enable, and serial data circuit terminals.**

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down. Disconnect the harness connectors at the K17 Electronic Brake Control Module.

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2. Test for less than 10 Ω between each ground circuit terminal and ground.
    - **If 10 Ω or greater**

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

    - **If less than 10 Ω**

3. Ignition ON.
4. If equipped, verify a test lamp illuminates between each B+ circuit terminal and ground.
    - **If the test lamp does not illuminate and the circuit fuse is good**

    1. Ignition OFF.
    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.
    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 K17 Electronic Brake Control Module.

    - **If the test lamp illuminates**

5. Ignition ON.
6. If equipped, verify a test lamp illuminates between each ignition circuit terminal and ground.
    - **If the test lamp does not illuminate and the circuit fuse is good**

    1. Ignition OFF.
    2. Test for less than 2 Ω in the ignition 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 OK and there is voltage at the fuse.

    - **If the test lamp does not illuminate and the circuit fuse is open**

    1. Ignition OFF.

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2. Test for infinite resistance between the ignition circuit and ground.
    - If less than infinite resistance, repair the short to ground on the circuit.
    - If infinite resistance, replace the K17 Electronic Brake Control Module.
- **If the test lamp illuminates**

7. Ignition ON.
8. If equipped, verify a test lamp illuminates between the serial data communication enable circuit terminal and ground.
    - **If the test lamp does not illuminate**
    1. Ignition OFF, disconnect the harness connectors at the K9 Body Control Module.
    2. Test for infinite resistance between the serial data communication enable 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 serial data communication enable circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the K9 Body Control Module.
    - **If the test lamp illuminates**
9. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down. Disconnect the harness connectors at the device setting the DTC.
10. Test for less than 2 Ω in each chassis high speed GMLAN serial data circuits end to end between the K17 Electronic Brake Control Module and the device setting the DTC.
    - **If 2 Ω or greater**

      Repair the open/high resistance in the serial data circuit.

    - **If less than 2 Ω**
11. Replace the K17 Electronic Brake Control Module.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

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DTC U184A: LOST COMMUNICATION WITH BODY CONTROL MODULE ON LOW SPEED CAN BUS

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 U184A

Lost Communication with Body Control Module on Low Speed CAN Bus

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+	U184A, U0140	U184A, U0140	-	-
Ignition	U184A, U0140	U184A, U0140	-	-
Low Speed GMLAN Serial Data	U0078*	U0078, U184A	U0078*	-
Ground	-	U184A, U0140	-	-
* Scan Tool Does Not Communicate With Low Speed GMLAN Device				

Circuit/System Description

Devices connected to the serial data circuits monitor for serial data communications during normal vehicle operation. Operating information and commands are exchanged among the devices. The devices have prerecorded information about what messages are needed to be exchanged on the serial data circuits, for each virtual network. The messages are supervised and also, some periodic messages are used by the receiver device as an availability indication of the transmitter device. Each message contains the identification number of the transmitter device.

Conditions for Running the DTC

The system voltage is between 9-16 V.

Conditions for Setting the DTC

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A supervised periodic message that includes the transmitter device availability has not been received.

Action Taken When the DTC Sets

The device is never signaled. Therefore, the specific subsystems will not function.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold of 50, without a repeat of the malfunction.

Diagnostic Aids

- Sometimes, while diagnosing a specific customer concern or after a repair, you may notice a history U-code present. However, there is no associated "current" or "active" status. Loss-of- communication U-codes such as these can set for a variety of reasons. Many times, they are transparent to the vehicle operator and technician, and/or have no associated symptoms. Eventually, they will erase themselves automatically after a number of fault-free ignition cycles. This condition would most likely be attributed to one of these scenarios:
  - A device on the data communication circuit was disconnected while the communication circuit is awake.
  - Power to one or more devices was interrupted during diagnosis.
  - A low battery condition was present, so some devices stop communicating when battery voltage drops below a certain threshold.
  - Battery power was restored to the vehicle and devices on the communication circuit did not all re-initialize at the same time.
  - If a loss-of-communication U-code appears in history for no apparent reason, it is most likely associated with one of the scenarios above. These are all temporary conditions and should never be interpreted as an intermittent fault, causing you to replace a part.
- A device may have a U-code stored in history that does not require any repairs. Issues with late or corrupted messages between devices can be temporary with no apparent symptom or complaint; this does not mean the device is faulty. Do not replace a device based only on a history U-code.
- Do not replace a device reporting a U-code. The U-code identifies which device needs to be diagnosed for a communication issue.
- Communication may be available between the device and the scan tool with one or more GMLAN serial data systems inoperative. This condition is due to the device using multiple GMLAN busses.
- Use **Data Link References** to determine what GMLAN serial data communications the non communicating device uses.
- The device may not have internal protection for specific control circuits and may open a B+ or ignition fuse. If a fuse is open and the B+ or ignition circuit is not shorted to ground, ensure none of the control circuits are shorted to ground before replacing the non communicating device.

Reference Information

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Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify that DTC U0073, U0078, B1325, B1330, B1370, B1380, B1424, B1428, B1440, B1441, B1517, C0800, C0899, C12E1, P0560, or P0562 is not set.
   - **If any of the DTCs are set**

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

   - **If none of the DTCs are set**
3. Refer to Circuit/System Testing.

Circuit/System Testing

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NOTE: **Use the schematics and connector end views to identify the device's ground, B+, ignition, and serial data circuit terminals.**

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 meters (9.8 feet) away from vehicle. Disconnect the harness connectors at the K9 Body Control Module. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 Ω between each ground circuit terminal and ground.
    - **If 10 Ω or greater**
    1. Ignition OFF.
    2. Test for less than 2 Ω in the ground circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, repair the open/high resistance in the ground connection.
    - **If less than 10 Ω**
3. Ignition ON.
4. If equipped, verify a test lamp illuminates between each B+ circuit terminal and ground.
    - **If the test lamp does not illuminate and the circuit fuse is good**
    1. Ignition OFF.
    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.
    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 K9 Body Control Module.
    - **If the test lamp illuminates**
5. Ignition ON.
6. If equipped, verify a test lamp illuminates between each ignition circuit terminal and ground.
    - **If the test lamp does not illuminate and the circuit fuse is good**
    1. Ignition OFF.

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2. Test for less than 2 Ω in the ignition 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 OK and there is voltage at the fuse.
- **If the test lamp does not illuminate and the circuit fuse is open**

1. Ignition OFF.
2. Test for infinite resistance between the ignition circuit and ground.
    - If less than infinite resistance, repair the short to ground on the circuit.
    - If infinite resistance, replace the K9 Body Control Module.

- **If the test lamp illuminates**

7. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 meters (9.8 feet) away from vehicle. Disconnect the harness connectors at the device setting the DTC. It may take up to 2 minutes for all vehicle systems to power down.
8. Test for less than 2 Ω in the low speed GMLAN serial data circuits end to end between the K9 Body Control Module and the device setting the DTC.
    - **If 2 Ω or greater**

      Repair the open/high resistance in the serial data circuit.

    - **If less than 2 Ω**
9. Replace the K9 Body Control Module.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

DTC U18A2: LOST COMMUNICATION WITH FUEL PUMP DRIVER CONTROL MODULE

Diagnostic Instructions

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

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DTC Descriptors

DTC U18A2

Lost Communication with Fuel Pump Driver Control Module

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+	U18A2	U18A2	-	-
Ignition	U18A2	U18A2	-	-
Accessory Wake Up Serial Data	U1814, U2099	U18A2	-	-
Powertrain High Speed GMLAN Serial Data (+)	U0074*	U0074*	U0074*	-
Powertrain High Speed GMLAN Serial Data (-)	U0074*	U0074*	U0074*	-
Ground	-	U18A2	-	-
* Other DTCs may set with this fault.				

Circuit/System Description

Devices connected to the serial data circuits monitor for serial data communications during normal vehicle operation. Operating information and commands are exchanged among the devices. The devices have prerecorded information about what messages are needed to be exchanged on the serial data circuits, for each virtual network. The messages are supervised and also, some periodic messages are used by the receiver device as an availability indication of the transmitter device. Each message contains the identification number of the transmitter device.

Conditions for Running the DTC

The system voltage is between 9-16 V.

Conditions for Setting the DTC

A supervised periodic message that includes the transmitter device availability has not been received.

Action Taken When the DTC Sets

Specific subsystems will not function.

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Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold of 50, without a repeat of the malfunction.

Diagnostic Aids

- Sometimes, while diagnosing a specific customer concern or after a repair, you may notice a history U code present. However, there is no associated "current" or "active" status. Loss of communication U codes such as these can set for a variety of reasons. Many times, they are transparent to the vehicle operator and technician, and/or have no associated symptoms. Eventually, they will erase themselves automatically after a number of fault-free ignition cycles. This condition would most likely be attributed to one of these scenarios:
  - A device on the data communication circuit was disconnected while the communication circuit is awake.
  - Power to one or more devices was interrupted during diagnosis.
  - A low battery condition was present, so some devices stop communicating when battery voltage drops below a certain threshold.
  - Battery power was restored to the vehicle and devices on the communication circuit did not all re-initialize at the same time.
  - If a loss-of-communication U code appears in history for no apparent reason, it is most likely associated with one of the scenarios above. These are all temporary conditions and should never be interpreted as an intermittent fault, causing you to replace a part.
- A device may have a U code stored in history that does not require any repairs. Issues with late or corrupted messages between devices can be temporary with no apparent symptom or complaint; this does not mean the device is faulty. Do not replace a device based only on a history U code.
- Do not replace a device reporting a U code. The U code identifies which device needs to be diagnosed for a communication issue.
- Communication may be available between the device and the scan tool with one or more GMLAN serial data systems inoperative. This condition is due to the device using multiple GMLAN busses.
- Use **Data Link References** to determine what GMLAN serial data communications the non communicating device uses.
- The device may not have internal protection for specific control circuits and may open a B+ or ignition fuse. If a fuse is open and the B+ or ignition circuit is not shorted to ground, ensure none of the control circuits are shorted to ground before replacing the non communicating device.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

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Connector End View Reference

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Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify that DTC U0073, U0074, U0075, U0076, U0077, U0078, U2100, U1814, U2099, B1325, B1330, B1370, B1380, B1424, B1428, B1440, B1441, B1517, C0800, C0899, C12E1, P0560, or P0562 is not set.
   - **If any of the DTCs are set**

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

   - **If none of the DTCs are set**
3. Refer to Circuit/System Testing.

Circuit/System Testing

NOTE: **Use the schematics and connector end views to identify the device's ground, B+, ignition, accessory wake up serial data, and serial data circuit terminals.**

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. Disconnect the harness

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connectors at the K111 Fuel Pump Driver Control Module. It may take up to 2 min for all vehicle systems to power down.

2. Test for less than 10 Ω between each ground circuit terminal and ground.
    - **If 10 Ω or greater**
    1. Ignition OFF.
    2. Test for less than 2 Ω in the ground circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, repair the open/high resistance in the ground connection.
    - **If less than 10 Ω**
3. Ignition ON.
4. If equipped, verify a test lamp illuminates between each B+ circuit terminal 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 K111 Fuel Pump Driver Control Module.
    - **If the test lamp illuminates**
5. If equipped, verify a test lamp illuminates between each ignition circuit terminal 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 ignition 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 OK 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.

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2. Test for infinite resistance between the ignition circuit and ground.
    - If less than infinite resistance, repair the short to ground on the circuit.
    - If infinite resistance, replace the K111 Fuel Pump Driver Control Module.

- **If the test lamp illuminates**

6. If equipped, verify a test lamp illuminates between the accessory wakeup serial data circuit terminal and ground.

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

1. Ignition OFF, remove the test lamp, disconnect the harness connectors at the K9 Body Control Module.
2. Test for infinite resistance between the accessory wakeup serial data 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 accessory wakeup serial data circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω, replace the K9 Body Control Module.

- **If the test lamp illuminates**

7. Test for less than 4.5 V between each powertrain high speed GMLAN serial data circuit terminal and ground.

- **If 4.5 V or greater**

  Refer to **DTC U0074** to test for a short to voltage.

- **If less than 4.5 V**

8. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
9. Test for greater than 100 Ω between each powertrain high speed GMLAN serial data circuit terminal and ground.

- **If 100 Ω or less**

  Refer to **DTC U0074** to test for a short to ground.

- **If greater than 100 Ω**

10. Disconnect the harness connectors at the device setting the DTC.
11. Test for less than 2 Ω in each serial data circuits end to end between the K111 Fuel Pump Driver Control Module and the device setting the DTC.

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- **If 2 Ω or greater**

  Repair the open/high resistance in the serial data circuit.

- **If less than 2 Ω**

12. Replace the K111 Fuel Pump Driver Control Module.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

DTC U18A6: LOST COMMUNICATION WITH RIGHT OBJECT DETECTION CONTROL MODULE ON DEDICATED BUS 1

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 U18A6

Lost Communication with Right Object Detection Control Module on Dedicated Bus 1

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+	U18A6	U18A6	-	-
Communication Enable	U18A6	U18A6	-	-
Serial Data (+)	U18A6	U18A6	U18A6	-
Serial Data (-)	U18A6	U18A6	U18A6	-

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ground	-	U18A6	-	-

Circuit/System Description

The side object sensor modules use radar to determine the presence of objects nearby. The left side object sensor is the master that communicates on serial data. There is a private communication network between the left and right sensors. The scan tool can communicate only with the left sensor. Side blind zone alert is active when the vehicle is out of park or the parking brake is off on manual transmission vehicles. If a vehicle is detected in the side blind zone, the warning symbols will illuminate on the appropriate side. The warning symbols will vary brightness based on the ambient light conditions. When an object is detected in the left side blind zone, the side object sensor module sends a message to the right sensor through serial data. The right sensor then supplies voltage to illuminate the visual indicator on the left side outside rear view mirror. When an object is detected in the right side blind zone, the right side object sensor will supply a voltage to illuminate the visual indicator on the right side outside rear view mirror.

Conditions for Running the DTC

The system voltage is between 9-16 V.

Conditions for Setting the DTC

A supervised periodic message that includes the transmitter device availability has not been received.

Action Taken When the DTC Sets

Specific subsystems will not function.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold of 40, without a repeat of the malfunction.

Reference Information

Schematic Reference

- **Object Detection Schematics**
- **Data Communication Schematics**
- **Control Module References**

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Connector End View Reference

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- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Verify that DTC U0073, U0078, B1325, B1330, B1370, B1380, B1424, B1440, B1441, B1517, C0800, C0899, C12E1, P0560, or P0562 is not set.
   - **If any of the DTCs are set**

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

   - **If none of the DTCs are set**
2. Refer to Circuit/System Testing.

Circuit/System Testing

NOTE: **Use the schematics and connector end views to identify the device's ground, B+, and serial data circuit terminals.**

1. Ignition/Vehicle OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. Disconnect the harness connector at the B218R Side Object Sensor Module - Right. It may take up to 2 min for all vehicle systems to power down.

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2. Test for less than 10 Ω between each ground circuit terminal and ground.
    - **If 10 Ω or greater**
    1. Ignition/Vehicle OFF.
    2. Test for less than 2 Ω in the ground circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, repair the open/high resistance in the ground connection.
    - **If less than 10 Ω**
3. Ignition ON/Vehicle In Service Mode.
4. If equipped, verify a test lamp illuminates between each B+ circuit terminal and ground.
    - **If the test lamp does not illuminate and the circuit fuse is good**
    1. Ignition/Vehicle OFF.
    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/Vehicle OFF.
    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 B218R Side Object Sensor Module - Right.
    - **If the test lamp illuminates**
5. If equipped, test for at least 6 V between the communication enable circuit terminal and ground.
    - **If less than 6 V**
    1. Ignition/Vehicle OFF, disconnect the harness connectors at the B218L Side Object Sensor Module - Left.
    2. Test for infinite resistance between the communication enable circuit terminal 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 communication enable circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the B218L Side Object Sensor Module - Left.

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- **If 6 V or greater**

6. Ignition/Vehicle OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. Disconnect the harness connector at the B218L Side Object Sensor Module - Left. It may take up to 2 min for all vehicle systems to power down.
7. Test for less than 1 V between each serial data circuits and ground.
    - **If 1 V or greater**

      Repair the short to voltage in the serial data circuit.

    - **If less than 1 V**
8. Test for infinite resistance between each serial data circuits and ground.
    - **If less than infinite resistance**

      Repair the short to ground in the serial data circuit.

    - **If infinite resistance**
9. Test for infinite resistance between 2 serial data circuits.
    - **If less than infinite resistance**

      Repair the short together between the serial data circuits.

    - **If infinite resistance**
10. Test for less than 2 Ω in each of the serial data circuits end to end between the B218L Side Object Sensor Module - Left and the B218R Side Object Sensor Module - Right.
    - **If 2 Ω or greater**

      Repair the open/high resistance in the serial data circuit.

    - **If less than 2 Ω**

NOTE: **Prior to replacing a module, visually inspect wiring connections to both Side Object Sensor Modules for contamination, deformation, terminal fretting corrosion, terminal tension, and chafing.**

11. Replace the B218R Side Object Sensor Module - Right.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

DTC U18B9-U18BF: PRIMARY HIGH SPEED CAN BUS SUBNET CONFIGURATION LIST/SECONDARY HIGH SPEED CAN BUS SUBNET CONFIGURATION LIST

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 U18B9

Primary High Speed CAN Bus Subnet Configuration List

DTC U18BF

Secondary High Speed CAN Bus Subnet Configuration List

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

Circuit/System Description

Devices on the high speed GMLAN serial data bus and the chassis high speed GMLAN serial data bus must be programmed with software that specifically identifies the correct type and quantity of devices on the bus based on RPO configuration. If a device was not properly configured after installation, the appropriate U Code may be set for that device. No external circuit diagnosis is involved.

Conditions for Running the DTC

- Voltage supplied to the device is in the normal operating voltage range.
- The vehicle power mode requires serial data communication to occur.

Conditions for Setting the DTC

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- The device is not configured properly.
- Control unit recognizes a programming error.
- CAN-Bus configuration is invalid

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold, without a repeat of the malfunction.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

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Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

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1. Ignition ON.
2. Verify DTC U18B9-U18BF is not set.
    - **If DTC U18B9-U18BF is set along with other DTCs set**

      Diagnose all other DTCs first. Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

    - **If DTC U18B9-U18BF is set without other DTCs set**

    1. Program the device that set the DTC.
    2. Ignition OFF, remove the scan tool, open and close the driver door. Wait 60 s.
    3. Verify the DTC does not set.
        - If the DTC sets, replace the appropriate device.
        - If the DTC does not set
    4. All OK.

    - **If DTC U18B9-U18BF 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 U2098: MOST COMMUNICATION 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 Descriptor

DTC U2098 00

MOST Communication Enable Circuit Malfunction

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DTC U2098 02

MOST Communication Enable Circuit Short to Ground

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
MOST Control	U2098 00, U2098 02, U0029 02	U0028 00	-	-

Circuit/System Description

When the ignition is ON, the A11 Radio initializes the Media Oriented Systems Transport (MOST) bus by sending a short 100 ms low voltage pulse on the electronic control line (or MOST control line) connected to all devices contained on the MOST ring. When MOST receive, transmit, or control line faults are detected, transmit/receive messages will not received as expected from the wakeup request. The A11 Radio and the K74 Human Machine Interface Control Module will then perform diagnostics to isolate these MOST faults. If the MOST control line is shorted low to 0 V for excess amount of time, the A11 Radio and the T3 Audio Amplifier, if equipped, will set a U2098 DTC and K74 Human Machine Interface Control Module, if equipped, will set a U0029 02 DTC. At this point the MOST bus will be unable to communicate until the shorted MOST control line is repaired.

Conditions for Running the DTC

- The system voltage is between 9-16 V.
- The ignition is ON.
- The Radio is ON.

Conditions for Setting the DTC

- The Radio senses a short to ground on the MOST control circuit.
- A current DTC is set when a MOST control circuit initialization is invoked and the circuit is detected to be pulled low (0 V) for longer than 1 s.

Action Taken When the DTC Sets

Many or all entertainment components may not function properly.

Conditions for Clearing the DTC

The DTC current status is cleared upon a successful MOST control circuit initialization occurs and the circuit is no longer pulled low.

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Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

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- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

NOTE: **Use the schematics to determine which MOST devices are connected to the A11 Radio's MOST control circuit. Use the connector end views to identify the MOST control circuit terminal for each of those MOST devices.**

1. Ignition OFF, disconnect the harness connectors at an easily accessible MOST device that shares the A11 Radio's MOST control circuit. Ignition ON.
2. Verify that the DTC U2098 or DTC U0029 02 remains current.
   - **If the DTCs become history**

     Replace the MOST device that was just disconnected.

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- **If any of the DTCs remain current**

3. With the prior devices disconnected, repeat steps 1 and 2 for each MOST device on the MOST control circuit except the A11 Radio.
4. Ignition OFF and all vehicle systems OFF, disconnect the X2 harness connector at the A11 Radio.
5. Test for infinite resistance between the MOST control circuit terminal at the A11 Radio and ground.
   - **If less than infinite resistance**

     Repair the short to ground on the circuit.

   - **If infinite resistance**
6. Replace the A11 Radio.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

DTC U2099: HIGH SPEED COMMUNICATION 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 Descriptor

DTC U2099

High Speed Communication 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

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	U2099*	U0100-U02FF	U0100-U02FF	-
* Vehicle may not start.				

Circuit/System Description

The body control module (BCM) activates the ignition circuit, when the ignition key is in ACC, ON or START. The ignition circuit wakes up the devices for serial data bus communication.

Conditions for Running the DTC

- The system voltage is between 9-16 V.
- The vehicle power mode master requires serial data communication to occur.

Conditions for Setting the DTC

The BCM senses a short to ground on the ignition circuit.

Action Taken When the DTC Sets

- The output command is turned off while the malfunction is present.
- The devices use a default value for the missing parameters until the next ignition cycle.
- The device(s) is never signaled. Therefore, the specific subsystem(s) will not function.
- The vehicle will not start while the circuit is shorted to ground.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold of 50, without a repeat of the malfunction.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

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Connector End View Reference

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- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

NOTE: **Use the schematic to determine which devices are on the K9 Body Control Module's ignition circuit terminal 23 X4. Use the connector end view to identify the ignition circuit terminal for each of those devices.**

1. Ignition OFF, disconnect the harness connectors at an easily accessible device that shares the K9 Body Control Module's ignition circuit terminal 23 X4. Ignition ON.
2. Verify that the DTC U2099 remains current.
   - **If the DTC becomes history**

     Replace the device that was just disconnected.

   - **If the DTC remains current**
3. With the prior devices disconnected, repeat steps 1 and 2 for each device on the ignition circuit except the K9 Body Control Module.
4. Ignition OFF, disconnect the X4 harness connector at the K9 Body Control Module.
5. Test for infinite resistance between the ignition circuit terminal 23 X4 at the K9 Body Control Module and ground.
   - **If less than infinite resistance**

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Repair the short to ground on the circuit.

- **If infinite resistance**

6. Replace the K9 Body Control Module.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

DTC U209E: OBJECT DETECTION CONTROL MODULE HIGH SPEED COMMUNICATION ENABLE CIRCUIT 1

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 U209E

Object Detection Control Module High Speed Communication Enable Circuit 1

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	U209E	U0100-U02FF	U0100-U02FF	-

Circuit/System Description

The active safety control module activates the object detection ignition circuit, when the ignition is ON. The object detection ignition circuit wakes up the devices for serial data bus communication.

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Conditions for Running the DTC

- The system voltage is between 9-16 V.
- The vehicle power mode master requires serial data communication to occur.

Conditions for Setting the DTC

The active safety control module senses a short to ground on the object detection ignition circuit.

Action Taken When the DTC Sets

The device(s) is never signaled. Therefore, the specific subsystem(s) will not function.

Conditions for Clearing the DTC

A current DTC clears when the malfunction is no longer present.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

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- **Wiring Repairs**

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Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

NOTE: **Use the schematic to determine which devices are on the K124 active safety control module's ignition circuit 9 X1. Use the connector end view to identify the object detection ignition circuit terminal for each of those devices.**

1. Ignition OFF, disconnect the harness connectors at an easily accessible device that shares the K124 active safety control module's ignition circuit 9 X1. Ignition ON.
2. Verify that the DTC U209E remains current.
   - **If the DTC becomes history**

     Replace the device that was just disconnected.

   - **If the DTC remains current**
3. With the prior devices disconnected, repeat steps 1 and 2 for each device on the ignition circuit except the K124 active safety control module.
4. Ignition OFF, disconnect the X1 harness connector at the K124 active safety control module.
5. Test for infinite resistance between the ignition circuit terminal 9 X1 at the K124 active safety control module and ground.
   - **If less than infinite resistance**

     Repair the short to ground on the circuit.

   - **If infinite resistance**
6. Replace the K124 active safety control module.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

DTC U209F: OBJECT DETECTION CONTROL MODULE HIGH SPEED COMMUNICATION ENABLE CIRCUIT 2

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Diagnostic Instructions

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

DTC Descriptor

DTC U209F

Object Detection Control Module High Speed Communication Enable Circuit 2

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	U209F	U0100-U02FF	U0100-U02FF	-

Circuit/System Description

The active safety control module activates the object detection ignition circuit, when the ignition is ON. The object detection ignition circuit wakes up the devices for serial data bus communication.

Conditions for Running the DTC

- The system voltage is between 9-16 V.
- The vehicle power mode master requires serial data communication to occur.

Conditions for Setting the DTC

The active safety control module senses a short to ground on the object detection ignition circuit.

Action Taken When the DTC Sets

The device(s) is never signaled. Therefore, the specific subsystem(s) will not function.

Conditions for Clearing the DTC

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A current DTC clears when the malfunction is no longer present.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

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- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

NOTE: **Use the schematic to determine which devices are on the K124 active safety control module's ignition circuit 10 X1. Use the connector end view to identify the object detection ignition circuit terminal for each of those devices.**

1. Ignition OFF, disconnect the harness connectors at an easily accessible device that shares the K124 active safety control module's ignition circuit 10 X1. Ignition ON.
2. Verify that the DTC U209F remains current.

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- **If the DTC becomes history**

  Replace the device that was just disconnected.

- **If the DTC remains current**

3. With the prior devices disconnected, repeat steps 1 and 2 for each device on the ignition circuit except the K124 active safety control module.
4. Ignition OFF, disconnect the X1 harness connector at the K124 active safety control module.
5. Test for infinite resistance between the ignition circuit terminal 10 X1 at the K124 active safety control module and ground.
   - **If less than infinite resistance**

     Repair the short to ground on the circuit.

   - **If infinite resistance**
6. Replace the K124 active safety control module.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

DTC U2500-U25FF: CONTROL MODULE U CODE LIST

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

Refer to **Control Module U Code List**.

Circuit/System Description

Some devices are constantly receiving information from other devices through serial data communication network. The invalid data code will be set

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when a receiving device detects a discrepancy in information it receives from another device causing its integrity to be questioned. The symptom byte listed in the DTC Descriptor is for engineering reference only. No external circuit diagnosis is involved.

Conditions for Running the DTC

Battery voltage is between 9-16 V and data link communications operate normally.

Conditions for Setting the DTC

The device is not configured properly.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold, without a repeat of the malfunction.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

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Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

NOTE: **An invalid data DTC is normally set along with another DTC or symptom. Diagnose other DTCs and/or symptoms before replacing any device.**

1. Engine running for 10 s.
2. Ignition ON, engine OFF, verify DTC U2500-U25FF is not set.
   - **If DTC U2500-U25FF is set along with other DTCs set**

     Diagnose all other DTCs first. Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

   - **If DTC U2500-U25FF is set without other DTCs set**
   1. Program the device specified by the DTC descriptor.
   2. Verify the DTC does not set.
      - If the DTC sets, replace the appropriate device.
      - If the DTC does not set
   3. All OK.
   - **If DTC U2500-U25FF 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 U2616: FUEL PUMP DRIVER CONTROL MODULE LOST COMMUNICATION WITH ECM

Diagnostic Instructions

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

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

DTC Descriptors

DTC U2616

Fuel Pump Driver Control Module Lost Communication with ECM

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+	U2616, U0100	U2616, U0100	-	-
Ignition	U2616, U0100	U2616, U0100	-	-
Accessory Wake Up Serial Data	U1814, U2099	U2616, U0100	-	-
Powertrain High Speed GMLAN Serial Data (+)	U0074*	U0074*	U0074*	-
Powertrain High Speed GMLAN Serial Data (-)	U0074*	U0074*	U0074*	-
Ground	-	U2616, U0100	-	-
* Other DTCs may set with this fault.				

Circuit/System Description

Devices connected to the serial data circuits monitor for serial data communications during normal vehicle operation. Operating information and commands are exchanged among the devices. The devices have prerecorded information about what messages are needed to be exchanged on the serial data circuits, for each virtual network. The messages are supervised and also, some periodic messages are used by the receiver device as an availability indication of the transmitter device. Each message contains the identification number of the transmitter device.

Conditions for Running the DTC

The system voltage is between 9-16 V.

Conditions for Setting the DTC

A supervised periodic message that includes the transmitter device availability has not been received.

Action Taken When the DTC Sets

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Specific subsystems will not function.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold of 50, without a repeat of the malfunction.

Diagnostic Aids

- Sometimes, while diagnosing a specific customer concern or after a repair, you may notice a history U code present. However, there is no associated "current" or "active" status. Loss of communication U codes such as these can set for a variety of reasons. Many times, they are transparent to the vehicle operator and technician, and/or have no associated symptoms. Eventually, they will erase themselves automatically after a number of fault-free ignition cycles. This condition would most likely be attributed to one of these scenarios:
  - A device on the data communication circuit was disconnected while the communication circuit is awake.
  - Power to one or more devices was interrupted during diagnosis.
  - A low battery condition was present, so some devices stop communicating when battery voltage drops below a certain threshold.
  - Battery power was restored to the vehicle and devices on the communication circuit did not all re-initialize at the same time.
  - If a loss of communication U code appears in history for no apparent reason, it is most likely associated with one of the scenarios above. These are all temporary conditions and should never be interpreted as an intermittent fault, causing you to replace a part.
- A device may have a U code stored in history that does not require any repairs. Issues with late or corrupted messages between devices can be temporary with no apparent symptom or complaint; this does not mean the device is faulty. Do not replace a device based only on a history U code.
- Do not replace a device reporting a U code. The U code identifies which device needs to be diagnosed for a communication issue.
- Communication may be available between the device and the scan tool with one or more GMLAN serial data systems inoperative. This condition is due to the device using multiple GMLAN busses.
- Use **Data Link References** to determine what GMLAN serial data communications the non communicating device uses.
- The device may not have internal protection for specific control circuits and may open a B+ or ignition fuse. If a fuse is open and the B+ or ignition circuit is not shorted to ground, ensure none of the control circuits are shorted to ground before replacing the non communicating device.

Reference Information

Schematic Reference

- **Data Communication Schematics**

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- **Control Module References**

Connector End View Reference

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- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify that DTC U0073, U0074, U0075, U0076, U0077, U0078, U2100, U1814, U2099, B1325, B1330, B1370, B1380, B1424, B1428, B1440, B1441, B1517, C0800, C0899, C12E1, P0560, or P0562 is not set.
   - **If any of the DTCs are set**

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

   - **If none of the DTCs are set**
3. Refer to Circuit/System Testing.

Circuit/System Testing

NOTE: **Use the schematics and connector end views to identify the device's ground, B+, ignition, accessory wake up serial data, and serial data circuit terminals.**

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1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. Disconnect the harness connectors at the K20 Engine Control Module. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between each ground circuit terminal and ground.
    - **If 10 Ω or greater**
    1. Ignition OFF.
    2. Test for less than 2 Ω in the ground circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, repair the open/high resistance in the ground connection.
    - **If less than 10 Ω**
3. Ignition ON.
4. If equipped, verify a test lamp illuminates between each B+ circuit terminal 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 K20 Engine Control Module.
    - **If the test lamp illuminates**
5. If equipped, verify a test lamp illuminates between each ignition circuit terminal 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 ignition 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 OK and there is voltage at the fuse.
    - **If the test lamp does not illuminate and the circuit fuse is open**

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1. Ignition OFF, remove the test lamp.
2. Test for infinite resistance between the ignition circuit and ground.
    - If less than infinite resistance, repair the short to ground on the circuit.
    - If infinite resistance, replace the K20 Engine Control Module.

- **If the test lamp illuminates**

6. If equipped, verify a test lamp illuminates between the accessory wakeup serial data circuit terminal and ground.

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

1. Ignition OFF, remove the test lamp, disconnect the harness connectors at the K9 Body Control Module.
2. Test for infinite resistance between the accessory wakeup serial data 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 accessory wakeup serial data circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω, replace the K9 Body Control Module.

- **If the test lamp illuminates**

7. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. Disconnect the harness connectors at the K111 Fuel Pump Driver Control Module. It may take up to 2 min for all vehicle systems to power down.
8. Test for less than 2 Ω in each serial data circuits end to end between the K20 Engine Control Module and the K111 Fuel Pump Driver Control Module.

- **If 2 Ω or greater**

  Repair the open/high resistance in the serial data circuit.

- **If less than 2 Ω**

9. Replace the K20 Engine Control Module.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

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SYMPTOMS - DATA COMMUNICATIONS

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

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 Diagnostic Trouble Codes (DTC) set.
   - The devices can communicate via the serial data links.
2. Review the system operation in order to familiarize yourself with the system functions. Refer to **Data Link Communications Description and Operation** .

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the systems. Refer to **Checking Aftermarket Accessories** .
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to **Testing for Intermittent Conditions and Poor Connections** .

Symptom List

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

- **Scan Tool Does Not Power Up**
- **Scan Tool Does Not Communicate with High Speed GMLAN Device**
- **Scan Tool Does Not Communicate with Low Speed GMLAN Device**

SCAN TOOL DOES NOT POWER UP

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

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Data Link Connector B+	1	1	-	-
Data Link Connector Ground	-	1	-	-
1. Scan Tool Does Not Power Up				

Circuit/System Description

The data link connector (DLC) is a standardized 16 cavity connector. Connector design and location is dictated by an industry wide standard, and is required to provide the following:

- Scan tool B+ voltage at terminal 16
- Scan tool ground at terminal 4
- Common ground at terminal 5

Diagnostic Aids

- The scan tool will power up with the ignition OFF. Some devices however, will not communicate unless the ignition is ON and the power mode master device sends the appropriate power mode message.
- If the B+ circuit, ground circuits, and connections of the data link connector are functioning properly, the malfunction must be due to the scan tool.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

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Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 2 Ω between each of the X84 Data Link Connector ground circuit terminals listed below and ground.
    - Ground circuit terminal 4
    - Ground circuit terminal 5
    - **If 2 Ω or greater**
    1. Ignition OFF.
    2. Test for less than 2 Ω in the ground circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, repair the open/high resistance in the ground connection.
    - **If less than 2 Ω**
3. Ignition ON.
4. Verify a test lamp illuminates between the B+ circuit terminal 16 at the X84 Data Link Connector and ground.
    - **If the test lamp does not illuminate and the circuit fuse is good**
    1. Ignition OFF.
    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.

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2. Test for infinite resistance between the B+ circuit and ground.
    - If less than infinite resistance, repair the short to ground on the circuit.
- **If the test lamp illuminates**

5. Refer to the scan tool user guide.

SCAN TOOL DOES NOT COMMUNICATE WITH HIGH SPEED GMLAN DEVICE

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
High Speed GMLAN Serial Data (+)	1	U0100-U02FF*	1	-
High Speed GMLAN Serial Data (-)	1	U0100-U02FF*	1	-
Ground (X84 Data Link Connector terminal 5)	-	1	-	-
* No communications with one or more high speed GMLAN devices. An open in only one high speed GMLAN serial data circuit may allow degraded communication between the devices. An open between the X84 Data Link Connector (DLC) and the first splice/device will only affect the communication with the scan tool. The devices will still communicate. 1. No communication with any high speed GMLAN device				

Circuit/System Description

The devices connected to the high speed GMLAN serial data circuits monitor for serial data communications during normal vehicle operation. The serial data is transmitted on two twisted wires that allow speeds up to 500 kbit/s. The twisted pair is terminated with two 120 Ω resistors, one is internal to the K20 Engine Control Module (ECM) and the other can be a separate resistor in a connector assembly or in another device. The resistors are used as the load for the High Speed GMLAN bus during normal vehicle operation. The high speed GMLAN is a differential bus. The high speed GMLAN serial data bus (+) and high speed GMLAN serial data (-) are driven to opposite extremes from a rest or idle level of approximately 2.5 V. Driving the lines to their extremes, adds 1 V to the high speed GMLAN serial data bus (+) circuit and subtracts 1 V from the high speed GMLAN serial data bus (-) circuit. If serial data is lost, devices will set a no communication code against the non-communicating device. Note that a loss of serial data DTC does not represent a failure of the device that set it.

Diagnostic Aids

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- Sometimes, while diagnosing a specific customer concern or after a repair, you may notice a history U code present. However, there is no associated "current" or "active" status. Loss of communication U codes such as these can set for a variety of reasons. Many times, they are transparent to the vehicle operator and technician, and/or have no associated symptoms. Eventually, they will erase themselves automatically after a number of fault-free ignition cycles. This condition would most likely be attributed to one of these scenarios:
  - A device on the data communication circuit was disconnected while the communication circuit is awake.
  - Power to one or more devices was interrupted during diagnosis.
  - A low battery condition was present, so some devices stop communicating when battery voltage drops below a certain threshold.
  - Battery power was restored to the vehicle and devices on the communication circuit did not all re-initialize at the same time.
  - If a loss of communication U code appears in history for no apparent reason, it is most likely associated with one of the scenarios above. These are all temporary conditions and should never be interpreted as an intermittent fault, causing you to replace a part.
- Do not replace a device reporting a U code. The U code identifies which device needs to be diagnosed for a communication issue.
- Communication may be available between some devices and the scan tool with the high speed GMLAN serial data system inoperative. This condition is due to those devices using multiple serial data communication systems.
- An open in the X84 Data Link Connector ground circuit terminal 5 will allow the scan tool to operate but not communicate with the vehicle.
- The engine will not start when there is a total malfunction of the high speed GMLAN serial data bus.
- Technicians may find various Local Area Network (LAN) communication Diagnostic Trouble Codes (DTC) and no high speed GMLAN communications with the scan tool.
- These conditions may be caused by the installation of an aftermarket navigation radio module (see bulletins). Some customers may comment of one or more of the following concerns:
  - Vehicle will not crank
  - Vehicle cranks but will not start
  - Vehicle stability enhancement system warning lights and messages
  - PRNDL gear indicator position errors
- Some devices may not have internal protection for specific voltage outputs and may open a battery positive voltage or ignition voltage source fuse. If a voltage input fuse is open and no short is found in that circuit, ensure that no device output voltage circuit is shorted to ground before replacing the device.

Reference Information

Schematic Reference

- **Data Communication Schematics**

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- **Control Module References**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Data Link Communications Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

NOTE: **Review and understand how to use the Detected State section of the Data Bus Diagnostic Tool User Guide in service information web site prior to using the Data Bus Diagnostic Tool section in this diagnostic procedure.**

Perform Circuit/System Verification using one of the following two methods:

Verifying the Serial Data Circuits using Data Bus Diagnostic Tool

1. Using schematics and vehicle build information, identify all high speed GMLAN devices the tested vehicle is equipped with, terminating resistors, and each device location on the high speed GMLAN bus.
2. Ignition ON.
3. From Data Circuit input selection, select Terminal 6, 14 to test the high speed GMLAN serial data bus.
4. Start the test and verify the Detected State parameter is displayed as OK.
    - **If the Detected State parameter is displayed as Control Module Not Awake**

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Refer to Circuit/System Testing - Testing the Device Circuits.

- **If the Detected State parameter is displayed as Control Module Ground Connection Malfunction**

  Refer to Circuit/System Testing - Testing the Device Circuits.

- **If the Detected State parameter is displayed as CAN Bus [+] (pin 6) Circuit Shorted to High Voltage or CAN Bus [-] (pin 14) Circuit Shorted to High Voltage**

  Refer to Circuit/System Testing - Testing the Serial Data Circuits for a Short to Voltage.

- **If the Detected State parameter is displayed as CAN Bus [+] (pin 6) Circuit Shorted to Low Voltage or CAN Bus [-] (pin 14) Circuit Shorted to Low Voltage**

  Refer to Circuit/System Testing - Testing the Serial Data Circuits for a Short to Ground.

- **If the Detected State parameter is displayed as CAN Bus [-] Shorted to Bus [+]**

  Refer to Circuit/System Testing - Testing the Serial Data Circuits for a Short between the Circuits.

- **If the Detected State parameter is displayed as CAN Bus Open with one or more non responding high speed GMLAN devices**

  Refer to Circuit/System Testing - Testing the Serial Data Circuits for an Open/High Resistance (Data Bus Diagnostic Tool).

- **If the Detected State parameter is displayed as CAN Bus Open and all high speed GMLAN devices are responding**

  Repair the open/high resistance in the circuit between the external terminating resistor and the closet responding device.

- **If the Detected State parameter is displayed as OK and none of the high speed GMLAN devices are responding**

  Repair the open/high resistance in the circuit between the X84 Data Link Connector and the first splice/device in the serial data circuit. If the circuit tests normal, check the MDI cable and the connection at X84 Data Link Connector prior to replacing the first device or splice pack.

- **If the Detected State parameter is displayed as OK and one or more high speed GMLAN devices are not responding**

  Refer to Circuit/System Testing - Testing the Device Circuits to test the non responding device closest to a responding device.

- **If the Detected State parameter is displayed as OK and all high speed GMLAN devices are responding**

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5. All OK.

Verifying the Serial Data Circuits using Digital Multimeter

1. Ignition ON.
2. Verify two or more devices are not communicating on the high speed GMLAN serial data circuit. Refer to **Data Link References** to determine how many devices should be communicating on the high speed GMLAN bus.
   - **If only one device is not communicating**

     Refer to Circuit/System Testing - Testing the Device Circuits.

   - **If two or more devices are not communicating**
3. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down. Disconnect the scan tool from the X84 Data Link Connector. The following tests will be done at the X84 Data Link Connector.
4. Test for less than 10 Ω between the ground circuit terminal 5 and ground.
   - **If 10 Ω or greater**
   1. Ignition OFF.
   2. Test for less than 2 Ω in the ground circuit end to end.
      - If 2 Ω or greater, repair the open/high resistance in the circuit.
      - If less than 2 Ω, repair the open/high resistance in the ground connection.
   - **If less than 10 Ω**
5. Ignition ON.
6. Test for less than 4.5 V between the serial data circuits listed below and ground.
   - Terminal 6
   - Terminal 14
   - **If 4.5 V or greater**

     Refer to Circuit/System Testing - Testing the Serial Data Circuits for a Short to Voltage.

   - **If less than 4.5 V**
7. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.

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8. Test for greater than 100 Ω between the serial data circuits listed below and ground.
    - Terminal 6
    - Terminal 14
    - **If 100 Ω or less**

      Refer to Circuit/System Testing - Testing the Serial Data Circuits for a Short to Ground.

    - **If greater than 100 Ω**
9. Test for 50-70 Ω between the serial data circuit terminals 6 and 14.
    - **If less than 35 Ω**

      Refer to Circuit/System Testing - Testing the Serial Data Circuits for a Short between the Circuits.

    - **If between 35-50 Ω**

      There may be a third terminating resistor between the serial data circuits. This can happen if the incorrect device is installed. Some devices are available with and without the terminating resistors installed to reduce the need of terminating resistors in the wiring harness. Refer to Circuit/System Testing - Testing the Serial Data Circuits for a Short between the Circuits.

    - **If greater than 70 Ω but less than infinite**

      Refer to Circuit/System Testing - Testing the Serial Data Circuits for an Open/High Resistance (Digital Multimeter).

    - **If infinite resistance**

      Repair the open/high resistance in the circuit between the X84 Data Link Connector and the first splice/device in the serial data circuit.

    - **If between 50-70 Ω**
10. Refer to Circuit/System Testing - Testing the Device Circuits.

Circuit/System Testing

NOTE: **Each device may need to be disconnected to isolate a circuit fault. Use the schematic to identify the following:**

- **High speed GMLAN devices and terminating resistors the vehicle is equipped with**
- **Device locations on the high speed GMLAN serial data circuits**

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- **Each device's ground, B+, ignition, and high speed GMLAN serial data circuit terminals**

Some devices with an internal terminating resistor have a loop in the harness that connects the internal terminating resistor to the serial data circuit. When wired this way, test these loop circuits for the appropriate failure mode short to voltage, short to ground, or open/high resistance prior to replacing the device for each of the following tests.

Testing the Serial Data Circuits for a Short to Voltage

1. Ignition OFF, disconnect the harness connectors with the high speed GMLAN serial data circuits at an easily accessible device, ignition ON.
2. Test for greater than 4.5 V between each serial data circuit at the device connector that was just disconnected and ground.
   - **If each serial data circuit is 4.5 V or less**
   1. Ignition OFF.
   2. Test for less than 10 Ω between each of the device's ground circuit terminals and ground.
      - If 10 Ω or greater, repair the open/high resistance in the circuit.
      - If less than 10 Ω, replace the device that was disconnected.
   - **If any serial data circuit is greater than 4.5 V**
3. Ignition OFF, disconnect the harness connectors with the high speed GMLAN serial data circuits at another device, in the direction of the circuit shorted to voltage, ignition ON.
4. Test for greater than 4.5 V between each serial data circuit at the device connector that was just disconnected and ground.
   - **If each serial data circuit is 4.5 V or less**
   1. Ignition OFF.
   2. Test for less than 10 Ω between each of the device's ground circuit terminals and ground.
      - If 10 Ω or greater, repair the open/high resistance in the circuit.
      - If less than 10 Ω, replace the device that was disconnected.
   - **If any serial data circuit is greater than 4.5 V**
5. Repeat step 3 until one of the following conditions are isolated:
   - A short to voltage on the serial data circuit between two devices or splice packs, if equipped.
   - A short to voltage on the serial data circuit between a device and a terminating resistor.

Testing the Serial Data Circuits for a Short to Ground

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1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
2. Disconnect the harness connectors with the high speed GMLAN serial data circuits at an easily accessible device.
3. Test for greater than 100 Ω between each serial data circuit at the device connector that was just disconnected and ground.
    - **If each serial data circuit is 100 Ω or greater**

      Replace the device that was disconnected.

    - **If any serial data circuit is less than 100 Ω**
4. Disconnect the harness connectors with the high speed GMLAN serial data circuits at another device, in the direction of the circuit shorted to ground.
5. Test for greater than 100 Ω between each serial data circuit at the device connector that was just disconnected and ground.
    - **If both serial data circuits are 100 Ω or greater**

      Replace the device that was disconnected.

    - **If any serial data circuit is less than 100 Ω**
6. Repeat step 4 until one of the following conditions are isolated:
    - A short to ground on the serial data circuit between two devices or splice packs, if equipped.
    - A short to ground on the serial data circuit between a device and a terminating resistor.
    - A short to ground on the serial data circuit between the X84 Data Link Connector and the first device or splice pack.

Testing the Serial Data Circuits for a Short between the Circuits

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
2. Disconnect the harness connectors with the high speed GMLAN serial data circuits at an easily accessible device that is not communicating.
3. Test for greater than 110 Ω between each pair of serial data circuits at the device connector that was just disconnected.
    - **If each pair of serial data circuits is 110 Ω or greater**

      Replace the device that was disconnected.

    - **If any pair of serial data circuits is less than 110 Ω**
4. Connect the harness connectors at the device that was disconnected.

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5. Disconnect the harness connectors with the high speed GMLAN serial data circuits at another device, in the direction of the circuit shorted together.
6. Test for greater than 110 Ω between each pair of serial data circuits at the device connector that was just disconnected.
    - **If each pair of serial data circuits is 110 Ω or greater**

      Replace the device that was disconnected.

    - **If any pair of serial data circuits is less than 110 Ω**
7. Repeat step 4 until one of the following conditions are isolated:
    - Serial data circuits shorted together between two devices or splice packs, if equipped.
    - Serial data circuits shorted together between a device and a terminating resistor.
    - Serial data circuits shorted together between the X84 Data Link Connector and the first device or splice pack.
    - A shorted terminating resistor.

Testing the Serial Data Circuits for an Open/High Resistance (Data Bus Diagnostic Tool)

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
2. Disconnect the harness connectors with the high speed GMLAN serial data circuits at the non responding device closest to the responding device.
3. Disconnect the harness connectors with the high speed GMLAN serial data circuits at the responding device closest to the non responding device.
4. Test for less than 2 Ω in each of the high speed GMLAN serial data circuits end to end between the two devices that was just disconnected.
    - **If 2 Ω or greater**

      Repair the open/high resistance in the serial data circuit.

    - **If less than 2 Ω**
5. Replace the non responding device that was disconnected.

Testing the Serial Data Circuits for an Open/High Resistance (Digital Multimeter)

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.

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2. Disconnect the harness connectors with the high speed GMLAN serial data circuits at an easily accessible device that is not communicating.
3. Test for less than 130 Ω between each pair of serial data circuits at the device connector that was just disconnected.
    - **If each pair of serial data circuits is 130 Ω or less**

      Replace the device that was disconnected.

    - **If any pair of serial data circuits is greater than 130 Ω**
4. Connect the harness connectors at the device that was disconnected.
5. Disconnect the harness connectors with the high speed GMLAN serial data circuits at another device, in the direction of the circuit with the open/high resistance.
6. Test for less than 130 Ω between each pair of serial data circuits at the device connector that was just disconnected.
    - **If each pair of serial data circuits is 130 Ω or less**

      Replace the device that was disconnected.

    - **If any pair of serial data circuits is greater than 130 Ω**
7. Repeat step 4 until one of the following conditions are isolated:
    - An open/high resistance on the serial data circuit between two devices or splice packs, if equipped.
    - An open/high resistance on the serial data circuit between a device and a terminating resistor.
    - An open/high resistance terminating resistor.

Testing the Device Circuits

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
2. Disconnect the harness connectors at a high speed GMLAN device that is not communicating.
3. Test for less than 10 Ω between each ground circuit terminal 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.

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- **If less than 10 Ω**

4. If equipped, verify a test lamp illuminates between each B+ circuit terminal 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 disconnected device.
    - **If the test lamp illuminates**
5. Ignition ON.
6. If equipped, verify a test lamp illuminates between each ignition circuit terminal, which has a fuse in the circuit, 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 ignition 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 OK 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 ignition circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance, replace the disconnected device.
    - **If the test lamp illuminates**
7. If equipped, verify a test lamp illuminates between each ignition circuit terminal, which is controlled by a control module, and ground.
    - **If the test lamp does not illuminate**
    1. Ignition OFF, remove the test lamp, disconnect the harness connectors at the control module that controls the ignition circuit.

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2. Test for infinite resistance between the ignition 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 ignition circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω, replace the control module that controls the ignition circuit.

- **If the test lamp illuminates**

8. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
9. Test for less than 2 Ω in each of the high speed GMLAN serial data circuits end to end between the device harness connector and the appropriate X84 Data Link Connector terminals listed below:
    - Terminal 6
    - Terminal 14
    - **If 2 Ω or greater**

      Repair the open/high resistance in the serial data circuit.

    - **If less than 2 Ω**
10. Replace the device that was disconnected.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

SCAN TOOL DOES NOT COMMUNICATE WITH LOW SPEED GMLAN DEVICE

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.

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Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Low Speed GMLAN Serial Data	1	U0100-U02FF*	1	-
Ground (X84 Data Link Connector terminal 5)	-	1*	-	-
* An open between the X84 Data Link Connector (DLC) and the first splice pack/device will only affect the communication with the scan tool. 1. No communication with any low speed GMLAN device				

Circuit/System Description

The devices connected to the low speed GMLAN serial data circuits monitor for serial data communications during normal vehicle operation. The serial data is transmitted over a single wire to the appropriate devices. The transmission speed for GMLAN low speed is up to 83.33 kbit/s. Under normal vehicle operating conditions, the speed of the bus is 33.33 kbit/s. The devices toggle the serial data circuit between 0-5 V during normal communications. To wake the devices connected to the low speed GMLAN serial data circuit, a voltage wake up pulse of 10 V is sent out. If serial data is lost, devices will set a no communication code against the non-communicating device. A loss of serial data communications DTC does not represent a failure of the device that set it.

Diagnostic Aids

- Sometimes, while diagnosing a specific customer concern or after a repair, you may notice a history U code present. However, there is no associated "current" or "active" status. Loss of communication U codes such as these can set for a variety of reasons. Many times, they are transparent to the vehicle operator and technician, and/or have no associated symptoms. Eventually, they will erase themselves automatically after a number of fault-free ignition cycles. This condition would most likely be attributed to one of these scenarios:
  - A device on the data communication circuit was disconnected while the communication circuit is awake.
  - Power to one or more devices was interrupted during diagnosis
  - A low battery condition was present, so some devices stop communicating when battery voltage drops below a certain threshold.
  - Battery power was restored to the vehicle and devices on the communication circuit did not all re-initialize at the same time.
  - If a loss of communication U code appears in history for no apparent reason, it is most likely associated with one of the scenarios above. These are all temporary conditions and should never be interpreted as an intermittent fault, causing you to replace a part.
- Do not replace a device reporting a U code. The U code identifies which device needs to be diagnosed for a communication issue.
- Communication may be available between the device and the scan tool with the low speed GMLAN serial data system inoperative. This condition is due to the device using both the high and low speed GMLAN systems.
- An open in the low speed GMLAN serial data circuit between the splice pack and a device will only affect that specific device. This type of

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failure will set a loss of communication DTC for each device affected, and the other devices will still communicate.

- An open in the X84 Data Link Connector ground circuit terminal 5 will allow the scan tool to operate but not communicate with the vehicle.
- The engine may not start when there is a total malfunction of the low speed GMLAN serial data circuit.
- Technicians may find various Local Area Network (LAN) communication Diagnostic Trouble Codes (DTC) and no low speed LAN communications with the scan tool.
- These conditions may be caused by the installation of an aftermarket navigation radio device (see bulletins). Some customers may comment of one or more of the following concerns:
  - Vehicle will not crank
  - Vehicle cranks but will not start
  - Vehicle stability enhancement system warning lights and messages
  - PRNDL gear indicator position errors
- Some devices may not have internal protection for specific voltage outputs and may open a battery positive voltage or ignition voltage source fuse. If a voltage input fuse is open and no short is found in that circuit, ensure that no device output voltage circuit is shorted to ground before replacing the device.

Reference Information

Schematic Reference

- **Data Communication Schematics**
- **Control Module References**

Connector End View Reference

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Description and Operation

Data Link Communications Description and Operation

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

NOTE: **Review and understand how to use the Detected State section of the Data Bus Diagnostic Tool User Guide in service information web site prior to using the Data Bus Diagnostic Tool section in this diagnostic procedure.**

Perform Circuit/System Verification using one of the following two methods:

Verifying the Serial Data Circuits using Data Bus Diagnostic Tool

1. Using schematics and vehicle build information, identify all low speed GMLAN devices the tested vehicle is equipped with, and each device location on the low speed GMLAN serial data bus.
2. Ignition ON.
3. From Data Circuit input selection, select Terminal 1 to test the low speed GMLAN serial data bus.
4. Start the test and verify that all applicable low speed GMLAN devices are displayed under the Control Module column of the Detected State tab.
    - **If all low speed GMLAN devices are not responding**

      Refer to step 3 of Circuit/System Verification - Verifying the Serial Data Circuits using Digital Multimeter to test for a short to voltage or short to ground on the low speed GMLAN serial data circuit, or an open/high resistance between the X84 Data Link Connector and the first low speed GMLAN device or splice pack.

    - **If one or more low speed GMLAN devices are not responding**

      Refer to Circuit/System Testing - Testing the Device Circuits to test the non-communicating low speed GMLAN device closest to the X84 Data Link Connector.

    - **If all low speed GMLAN devices are responding**
5. All OK.

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Verifying the Serial Data Circuits using Digital Multimeter

1. Attempt to communicate with all devices on the low speed GMLAN serial data circuit. Refer to **Data Link References** to determine how many devices should be communicating on the low speed GMLAN bus.
2. Verify which devices are communicating on the low speed GMLAN serial data circuit.
    - **If only one device is not communicating**

      Diagnose that device only. Refer to **DTC U0100-U02FF**.

    - **If one or more devices are communicating but not all**

      Refer to Circuit/System Testing - Testing the Serial Data Circuit for an Open/High Resistance.

    - **If none of the devices are communicating**
3. Ignition OFF, all access doors closed, all vehicle systems OFF, all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down. Disconnect the scan tool from the X84 Data Link Connector. The following tests will be done at the X84 Data Link Connector.
4. Test for less than 10 Ω between the ground circuit terminal 5 and ground.
    - **If 10 Ω or greater**
    1. Ignition OFF.
    2. Test for less than 2 Ω in the ground circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, repair the open/high resistance in the ground connection.
    - **If less than 10 Ω**
5. Ignition ON.
6. Test for less than 4.5 V between the serial data circuit terminal 1 and ground.
    - **If 4.5 V or greater**

      Refer to Circuit/System Testing - Testing the Serial Data Circuits for a Short to Voltage.

    - **If less than 4.5 V**
7. Ignition OFF, all access doors closed, all vehicle systems OFF, all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.

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8. Test for greater than 100 Ω between the serial data circuit terminal 1 and ground.
   - **If 100 Ω or less**

     Refer to Circuit/System Testing - Testing the Serial Data Circuits for a Short to Ground.

   - **If greater than 100 Ω**
9. Disconnect the appropriate harness connector at the first splice pack closest in the circuit to the X84 Data Link Connector.
10. Test for less than 2 Ω between the X84 Data Link Connector's serial data circuit terminal 1 and the splice pack harness connectors serial data input terminal.
    - **If 2 Ω or greater**

      Repair the open/high resistance in the serial data circuit.

    - **If less than 2 Ω**
11. Replace the splice pack.

Circuit/System Testing

NOTE: **Each device may need to be disconnected to isolate a circuit fault. Use the schematic to identify the following:**

- **All low speed GMLAN devices the vehicle is equipped with**
- **Low speed GMLAN device and splice pack locations on the low speed GMLAN serial data circuit**
- **The low speed GMLAN serial data circuit terminals for each device or splice pack**

Testing the Serial Data Circuits for a Short to Voltage

1. Ignition OFF, disconnect the appropriate harness connectors at all low speed GMLAN serial data splice packs, ignition ON.
2. Test for less than 4.5 V between the serial data circuit terminal 1 at the X84 Data Link Connector and ground.
   - **If 4.5 V or greater**

     Repair the short to voltage on the serial data circuit.

   - **If less than 4.5 V**
3. Test for less than 4.5 V between each low speed GMLAN serial data circuit at a splice pack and ground.

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- **If any serial data circuit is greater than 4.5 V**

1. Ignition OFF, disconnect all devices on the failed serial data circuit, ignition ON.
2. Test for less than 1 V between each section of the failed serial data circuit and ground.
    - If 1 V or greater, repair the short to voltage in the circuit.
    - If less than 1 V
3. Connect the splice pack and connect the first device on the failed serial data circuit, ignition ON.
4. Verify the scan tool communicates or not with the low speed GMLAN serial data circuit.
    - If the scan tool does not communicate, replace the device that was just connected.
    - If the scan tool communicates and there are more devices to connect, connect the next device and repeat step 3.4.
    - If the scan tool communicates and there are no more devices to connect
5. All OK.

- **If all serial data circuits are less than 4.5 V**

4. All OK.

Testing the Serial Data Circuits for a Short to Ground

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down. Disconnect the appropriate harness connectors at all low speed GMLAN serial data splice packs.
2. Test for infinite resistance between the serial data circuit terminal 1 at the X84 Data Link Connector and ground.
    - **If less than infinite resistance**

      Repair the short to ground on the serial data circuit.

    - **If infinite resistance**
3. Test for greater than 100 Ω between each low speed GMLAN serial data circuit at a splice pack and ground.
    - **If any serial data circuit is 100 Ω or less**

    1. Disconnect all devices on the failed serial data circuit.
    2. Test for infinite resistance between each section of the failed serial data circuit and ground.
        - If less than infinite resistance, repair the short to ground in the circuit.
        - If infinite resistance
    3. Connect the splice pack and connect the first device on the failed serial data circuit, ignition ON.

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4. Verify the scan tool communicates or not with the low speed GMLAN serial data circuit.
    - If the scan tool does not communicate, replace the device that was just connected.
    - If the scan tool communicates and there are more devices to connect, connect the next device and repeat step 3.4.
    - If the scan tool communicates and there are no more devices to connect
5. All OK.

- **If all serial data circuits are greater than 100 Ω**

4. All OK.

Testing the Serial Data Circuit for an Open/High Resistance

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down. Disconnect the splice pack containing the devices that are not communicating on the low speed GMLAN serial data circuit.
2. Test for less than 2 Ω between the X84 Data Link Connector terminal 1 and the disconnected splice pack.
    - **If 2 Ω or greater**

      Repair the open/high resistance in the serial data circuit.

    - **If less than 2 Ω**
3. Disconnect all devices on the failed serial data circuit.
4. Test for less than 2 Ω between each section of the failed serial data circuit end to end.
    - **If 2 Ω or greater**

      Repair the open/high resistance in the serial data circuit.

    - **If less than 2 Ω**
5. Connect the splice pack and connect the first device on the failed serial data circuit.
6. Verify if the device communicates or not with the scan tool.
    - **If the device does not communicates**

      Replace the device.

    - **If the device communicates and there are more devices to connect**

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Connect the next device on the failed serial data circuit and repeat step 6.

- **If all devices are connected and communicating**

7. All OK.

Testing the Device Circuits

1. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
2. Disconnect the harness connectors at a low speed GMLAN device that is not communicating.
3. Test for less than 10 Ω between each ground circuit terminal and ground.
    - **If 10 Ω or greater**
    1. Ignition OFF.
    2. Test for less than 2 Ω in the ground circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, repair the open/high resistance in the ground connection.
    - **If less than 10 Ω**
4. If equipped, verify a test lamp illuminates between each B+ circuit terminal 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 disconnected device.
    - **If the test lamp illuminates**
5. Ignition ON.

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6. If equipped, verify a test lamp illuminates between each ignition circuit terminal, which has a fuse in the circuit, 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 ignition 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 OK 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 ignition circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance, replace the disconnected device.
    - **If the test lamp illuminates**
7. If equipped, verify a test lamp illuminates between each ignition circuit terminal, which is controlled by a control module, and ground.
    - **If the test lamp does not illuminate**
    1. Ignition OFF, remove the test lamp, disconnect the harness connectors at the control module that controls the ignition circuit.
    2. Test for infinite resistance between the ignition 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 ignition circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the control module that controls the ignition circuit.
    - **If the test lamp illuminates**
8. Ignition OFF, all access doors closed, all vehicle systems OFF, and all keys at least 3 m (9.8 ft) away from vehicle. It may take up to 2 min for all vehicle systems to power down.
9. Test for less than 2 Ω in the low speed GMLAN serial data circuit end to end between the device harness connector and the X84 Data Link Connector terminal 1.
    - **If 2 Ω or greater**

      Repair the open/high resistance in the serial data circuit.

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- **If less than 2 Ω**

10. Replace the device that was disconnected.

Repair Instructions

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

- Refer to **GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs**
- Refer to **Control Module References** for device replacement, programming and setup

DATA LINK REFERENCES

This table identifies which serial data link that a particular device uses for in-vehicle data transmission. Some devices may use more than one data link to communicate. Some devices may have multiple communication circuits passing through them without actively communicating on that data link. This table is used to assist in correcting a communication malfunction. Not all devices listed will be applicable to all vehicles. Refer to the schematics to determine which devices apply. For the description and operation of these serial data communication circuits, refer to **Data Link Communications Description and Operation** .

Code	Device	Data Link Type	Diagnostic Procedure
Schematic Reference: Data Communication Schematics			
A11	Radio	• Low Speed GMLAN • MOST Bus • Local Interconnect Network (LIN)	• **Scan Tool Does Not Communicate with Low Speed GMLAN Device** • **DTC U0028** • **DTC U1500-U15FF**
A33	Media Disc Player	• Low Speed GMLAN • MOST Bus	• **Scan Tool Does Not Communicate with Low Speed GMLAN Device** • **DTC U0028**
A34	HVAC Controls - Auxiliary	Local Interconnect Network (LIN)	**DTC U1500-U15FF**
B99	Steering Wheel Angle Sensor	Chassis High Speed GMLAN	**DTC U0077**
B119	Multi-axis Acceleration Sensor	Chassis High Speed GMLAN	**DTC U0077**
B165	Content Theft Deterrent Sensor Module	Local Interconnect Network (LIN)	**DTC U1500-U15FF**

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Code	Device	Data Link Type	Diagnostic Procedure
Schematic Reference: Data Communication Schematics			
B174W	Frontview Camera - Windshield	• High Speed GMLAN • Low Speed GMLAN • Object Bus	• **Scan Tool Does Not Communicate with High Speed GMLAN Device** • **Scan Tool Does Not Communicate with Low Speed GMLAN Device** • **DTC U0075**
B200	Rain Sensor Module	Local Interconnect Network (LIN)	**DTC U1500-U15FF**
B218L	Side Object Sensor Module - Left	Low Speed GMLAN	**Scan Tool Does Not Communicate with Low Speed GMLAN Device**
B233B	Radar Sensor Module - Long Range	Object Bus	**DTC U0075**
B233LF	Radar Sensor Module - Short Range Left Front	Object Bus	**DTC U0075**
B233LR	Radar Sensor Module - Short Range Left Rear	Object Bus	**DTC U0075**
B233RF	Radar Sensor Module - Short Range Right Front	Object Bus	**DTC U0075**
B233RR	Radar Sensor Module - Short Range Right Rear	Object Bus	**DTC U0075**
K4	Assist Step Control Module	Low Speed GMLAN	**Scan Tool Does Not Communicate with Low Speed GMLAN Device**
K9	Body Control Module	• High Speed GMLAN • Low Speed GMLAN • Local Interconnect Network (LIN)	• **Scan Tool Does Not Communicate with High Speed GMLAN Device** • **Scan Tool Does Not Communicate with Low Speed GMLAN Device** • **DTC U1500-U15FF**
K14	Distance Sensing Cruise Control Module	• High Speed GMLAN • Chassis High Speed GMLAN	• **Scan Tool Does Not Communicate with High Speed GMLAN Device** • **DTC U0077**

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Code	Device	Data Link Type	Diagnostic Procedure
Schematic Reference: Data Communication Schematics			
K17	Electronic Brake Control Module	• High Speed GMLAN • Chassis High Speed GMLAN	• Scan Tool Does Not Communicate with High Speed GMLAN Device • DTC U0077
K19	Suspension Control Module	• High Speed GMLAN • Chassis High Speed GMLAN	• Scan Tool Does Not Communicate with High Speed GMLAN Device • DTC U0077
K20	Engine Control Module	• High Speed GMLAN • Powertrain Expansion Bus • Local Interconnect Network (LIN)	• Scan Tool Does Not Communicate with High Speed GMLAN Device • DTC U0074 • DTC U1500-U15FF
K29	Seat Heating Control Module	Local Interconnect Network (LIN)	DTC U1500-U15FF
K29R	Seat Heating Control Module - Rear	Local Interconnect Network (LIN)	DTC U1500-U15FF
K33	HVAC Control Module	• Low Speed GMLAN • Local Interconnect Network (LIN)	• Scan Tool Does Not Communicate with Low Speed GMLAN Device • DTC U1500-U15FF
K36	Inflatable Restraint Sensing and Diagnostic Module	• Chassis High Speed GMLAN • Low Speed GMLAN	• DTC U0077 • Scan Tool Does Not Communicate with Low Speed GMLAN Device
K38	Chassis Control Module	• High Speed GMLAN • Local Interconnect Network (LIN)	• Scan Tool Does Not Communicate with High Speed GMLAN Device • DTC U1500-U15FF
K39	Liftgate Control Module	• Low Speed GMLAN	• Scan Tool Does Not Communicate with Low Speed GMLAN Device

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Code	Device	Data Link Type	Diagnostic Procedure
Schematic Reference: Data Communication Schematics			
		• Local Interconnect Network (LIN)	• DTC U1500-U15FF
K40D	Seat Memory Control Module - Driver	• Low Speed GMLAN • Local Interconnect Network (LIN)	• Scan Tool Does Not Communicate with Low Speed GMLAN Device • DTC U1500-U15FF
K40P	Seat Memory Control Module - Passenger	• Low Speed GMLAN • Local Interconnect Network (LIN)	• Scan Tool Does Not Communicate with Low Speed GMLAN Device • DTC U1500-U15FF
K43	Power Steering Control Module	• High Speed GMALN • Chassis High Speed GMALN	• Scan Tool Does Not Communicate with High Speed GMLAN Device • DTC U0077
K60	Steering Column Lock Module	Low Speed GMLAN	Scan Tool Does Not Communicate with Low Speed GMLAN Device
K69	Transfer Case Control Module	High Speed GMLAN	Scan Tool Does Not Communicate with High Speed GMLAN Device
K71 / T12	Transmission Control Module / Automatic Transmission Assembly	High Speed GMLAN	Scan Tool Does Not Communicate with High Speed GMLAN Device
K73	Telematics Communication Interface Control Module	• High Speed GMALN • Low Speed GMLAN	• Scan Tool Does Not Communicate with High Speed GMLAN Device • Scan Tool Does Not Communicate with Low Speed GMLAN Device
K74	Human Machine Interface Control Module	• High Speed GMALN • MOST Bus • Local Interconnect Network (LIN)	• Scan Tool Does Not Communicate with High Speed GMLAN Device • DTC U0028 • DTC U1500-U15FF

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ACCESSORIES & EQUIPMENT

Data Communications - Repair Instructions - Escalade, Suburban, Tahoe, Yukon

REPAIR INSTRUCTIONS

BODY CONTROL MODULE REPLACEMENT

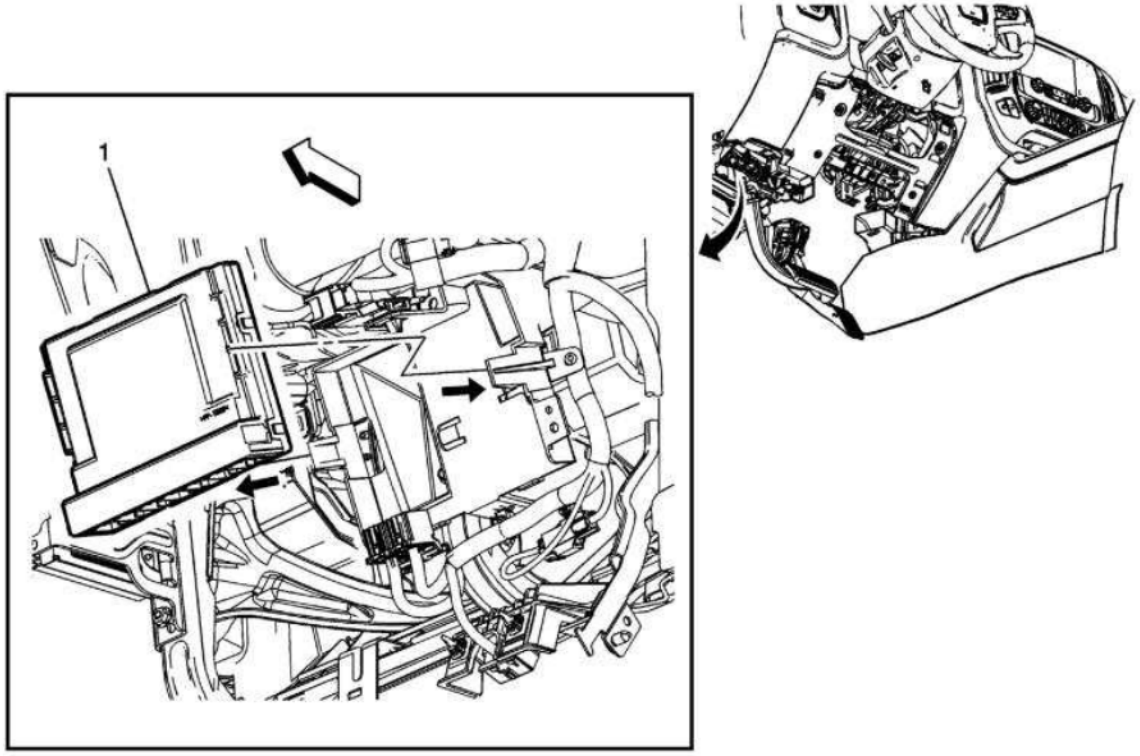


Fig. 1: Body Control Module
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure	
Remove the instrument panel knee bolster. Refer to Instrument Panel Knee Bolster Replacement (Chevrolet / GMC) Instrument Panel	

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Callout	Component Name
Knee Bolster Replacement (Cadillac) .	
1	Body Control Module **Procedure** 1. Disconnect the electrical connectors. 2. Press on the tabs to release the body control module. 3. If a replacement module is installed, program the module. Refer to Control Module References .

BODY CONTROL MODULE BRACKET REPLACEMENT

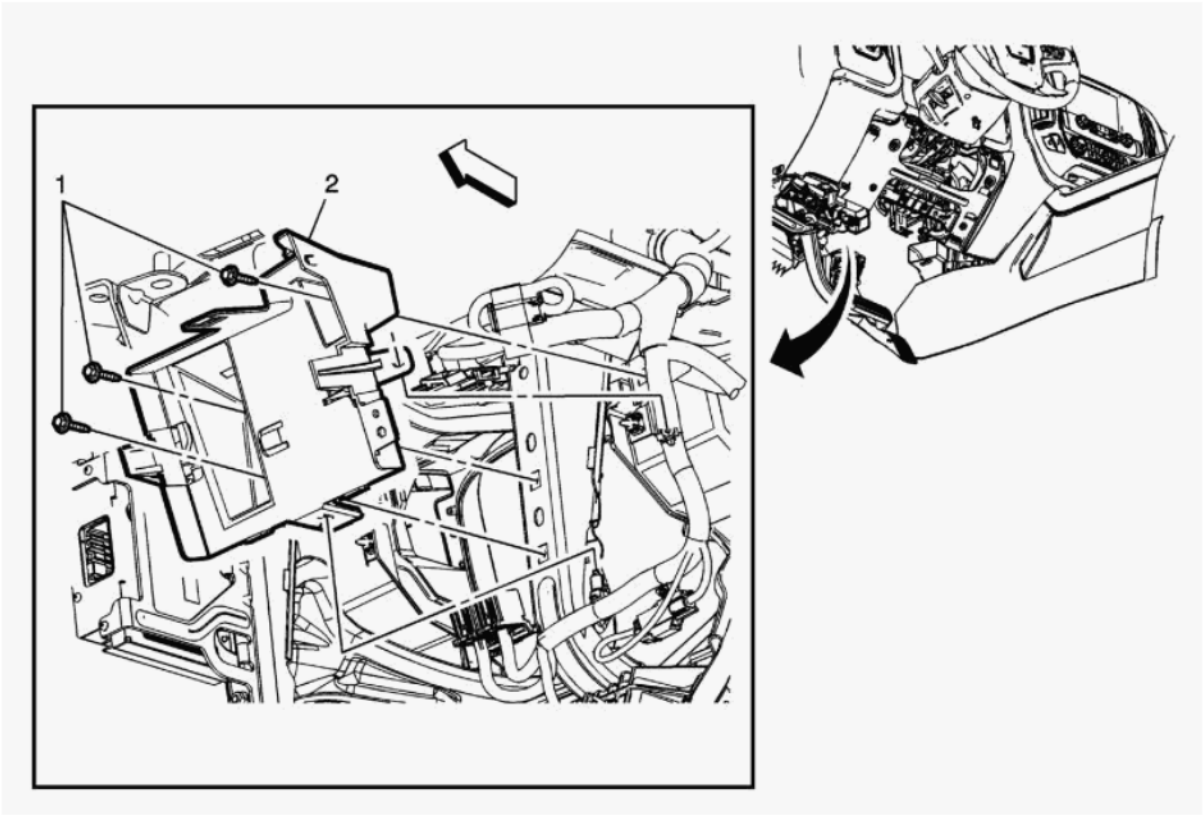


Fig. 2: Body Control Module Bracket

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Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the body control module. Refer to **Body Control Module Replacement**.	
1	Body Control Module Bracket Fasteners (Qty: 3) **CAUTION:** **Refer to** **Fastener** **Caution** . **Tighten** 2 N.m (18 lb in)
2	Body Control Module Bracket **Procedure** Release the instrument panel harness retainer, disconnect and unclip the airbag wiring harness connector from the plastic retainer on the body control module bracket.

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ACCESSORIES & EQUIPMENT

Data Communications - Schematic and Routing Diagrams - Escalade, Suburban, Tahoe, Yukon

SCHEMATIC WIRING DIAGRAMS

DATA COMMUNICATION WIRING SCHEMATICS

Data Link Power and Ground, and Low Speed GMLAN (1 of 2)

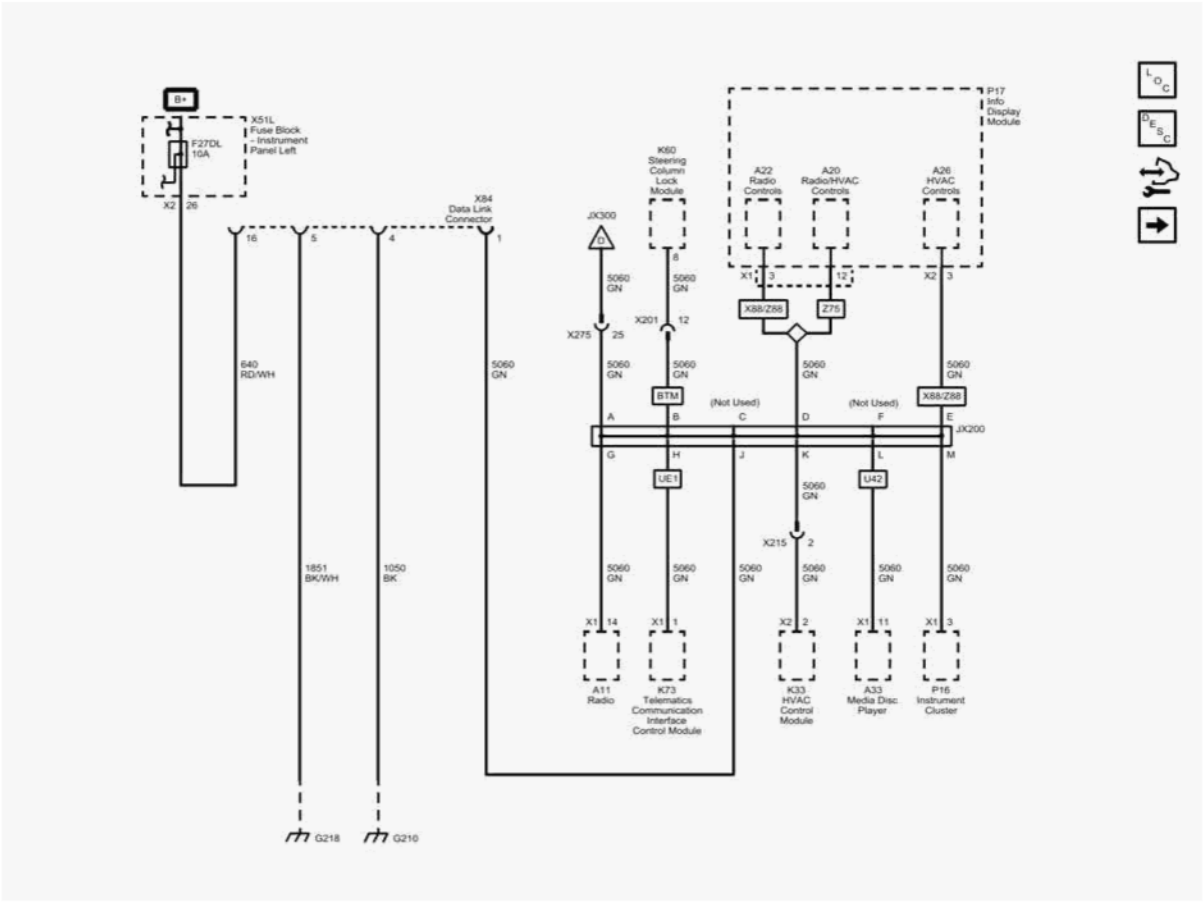


Fig. 1: Data Link Power and Ground, and Low Speed GMLAN (1 of 2)
Courtesy of GENERAL MOTORS COMPANY

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Data Link Power and Ground, and Low Speed GMLAN (2 of 2)

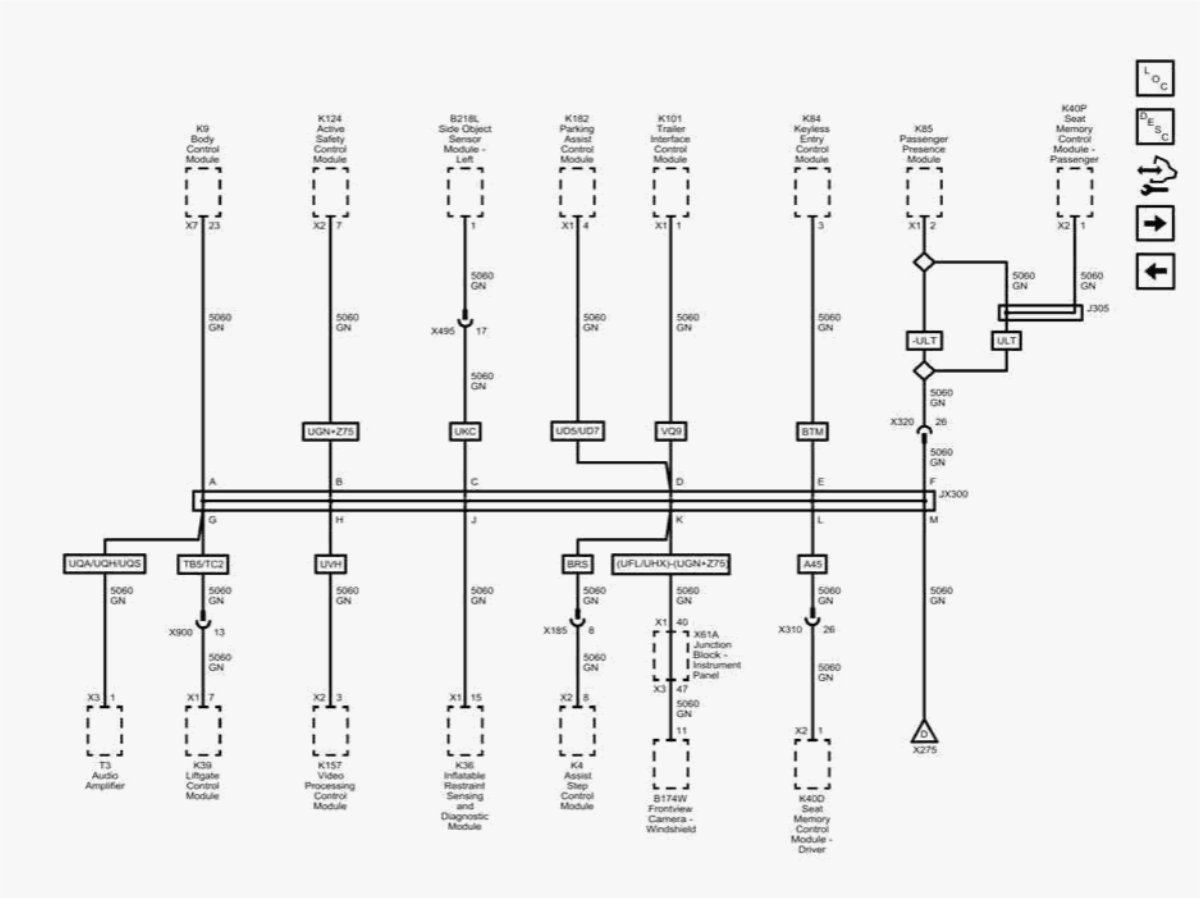


Fig. 2: Data Link Power and Ground, and Low Speed GMLAN (2 of 2)
Courtesy of GENERAL MOTORS COMPANY

High Speed GMLAN (1 of 2)

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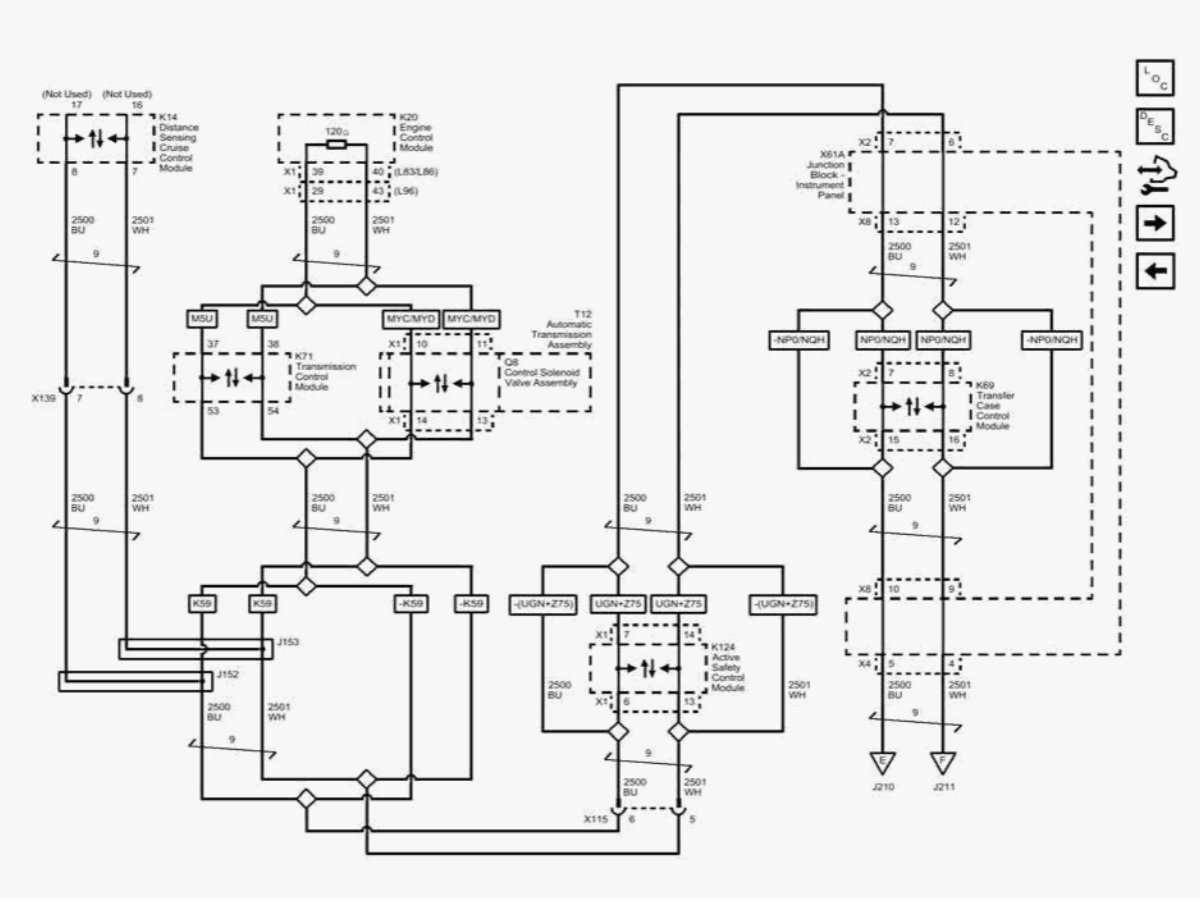


Fig. 3: High Speed GMLAN (1 of 2)
Courtesy of GENERAL MOTORS COMPANY

High Speed GMLAN (2 of 2)

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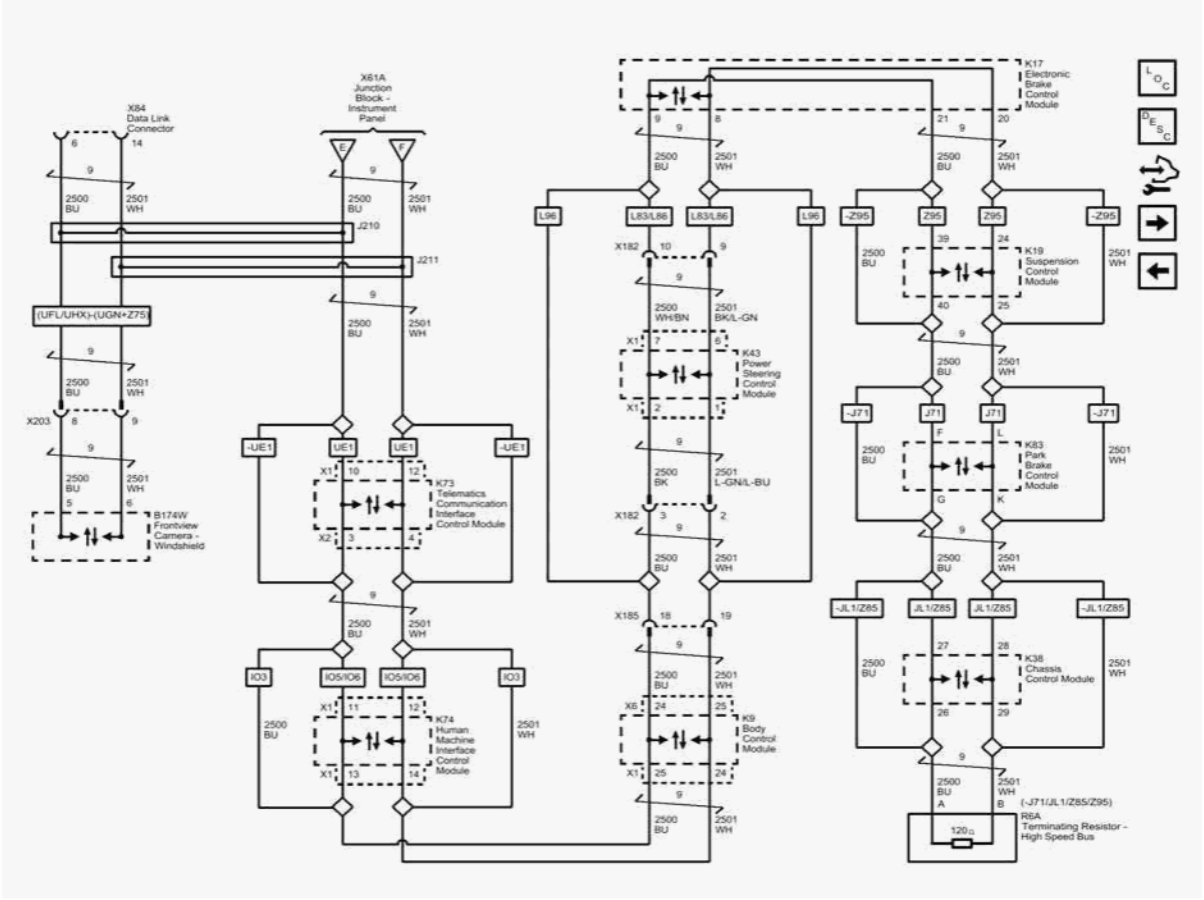


Fig. 4: High Speed GMLAN (2 of 2)
Courtesy of GENERAL MOTORS COMPANY

MOST Communication Bus

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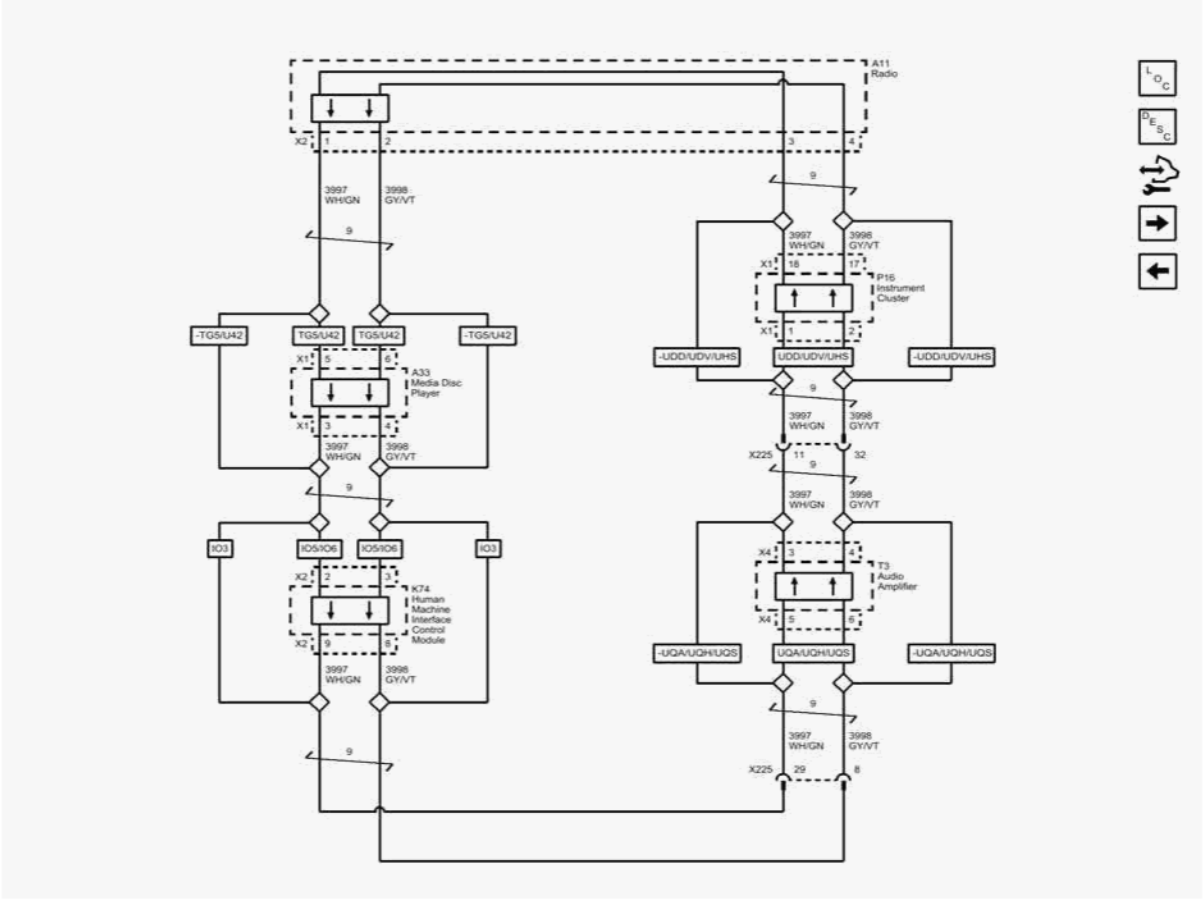


Fig. 5: MOST Communication Bus

Courtesy of GENERAL MOTORS COMPANY

MOST Bus Communications Enable

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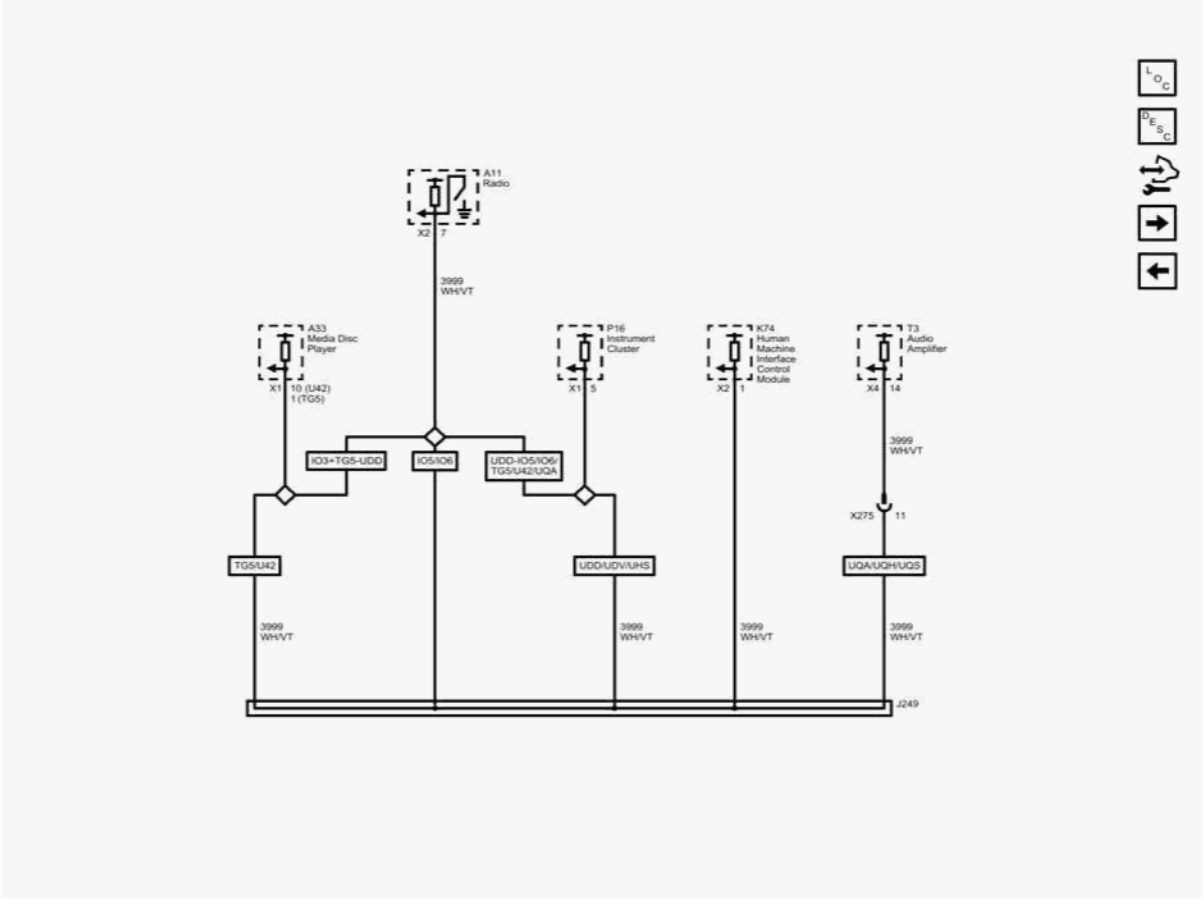


Fig. 6: MOST Bus Communications Enable

Courtesy of GENERAL MOTORS COMPANY

Chassis Expansion Bus (1 of 2)

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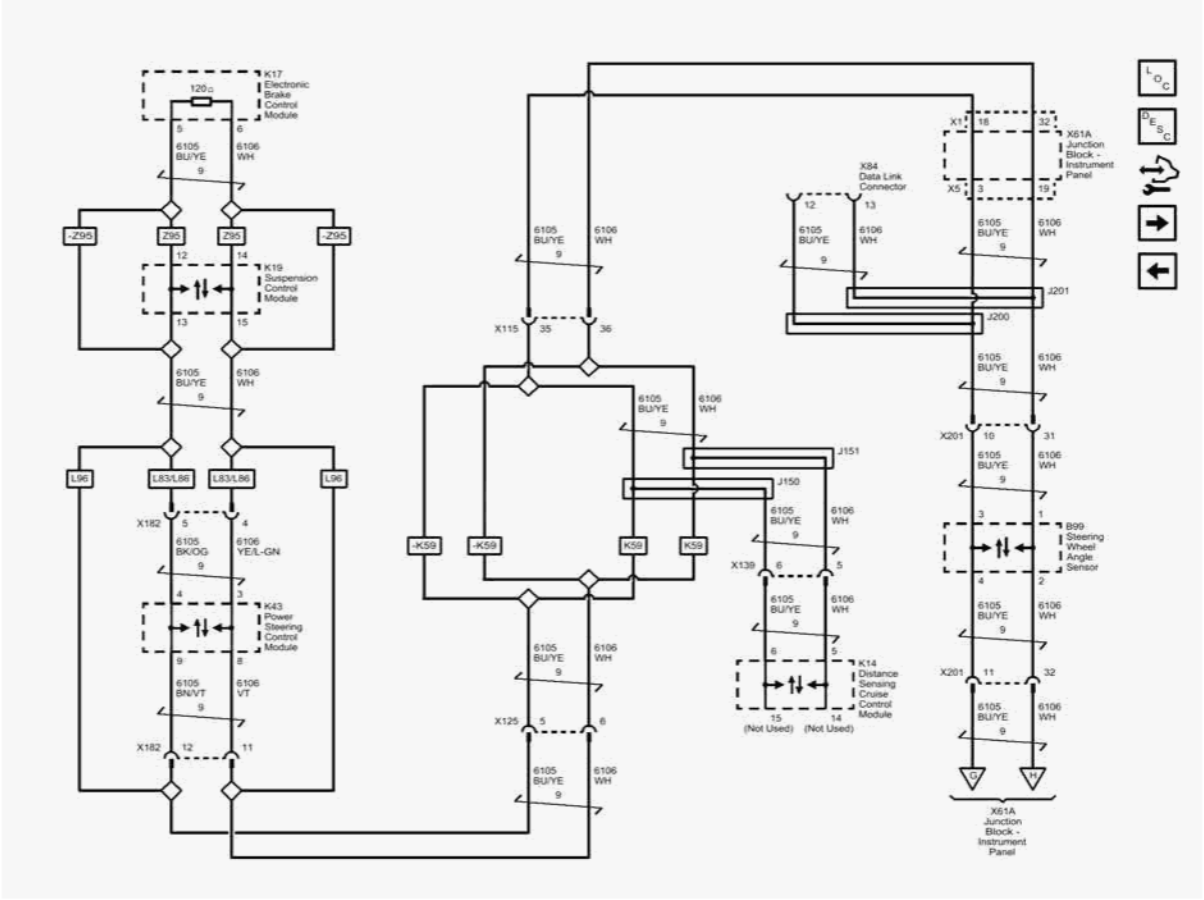


Fig. 7: Chassis Expansion Bus (1 of 2)

Courtesy of GENERAL MOTORS COMPANY

Chassis Expansion Bus (2 of 2)

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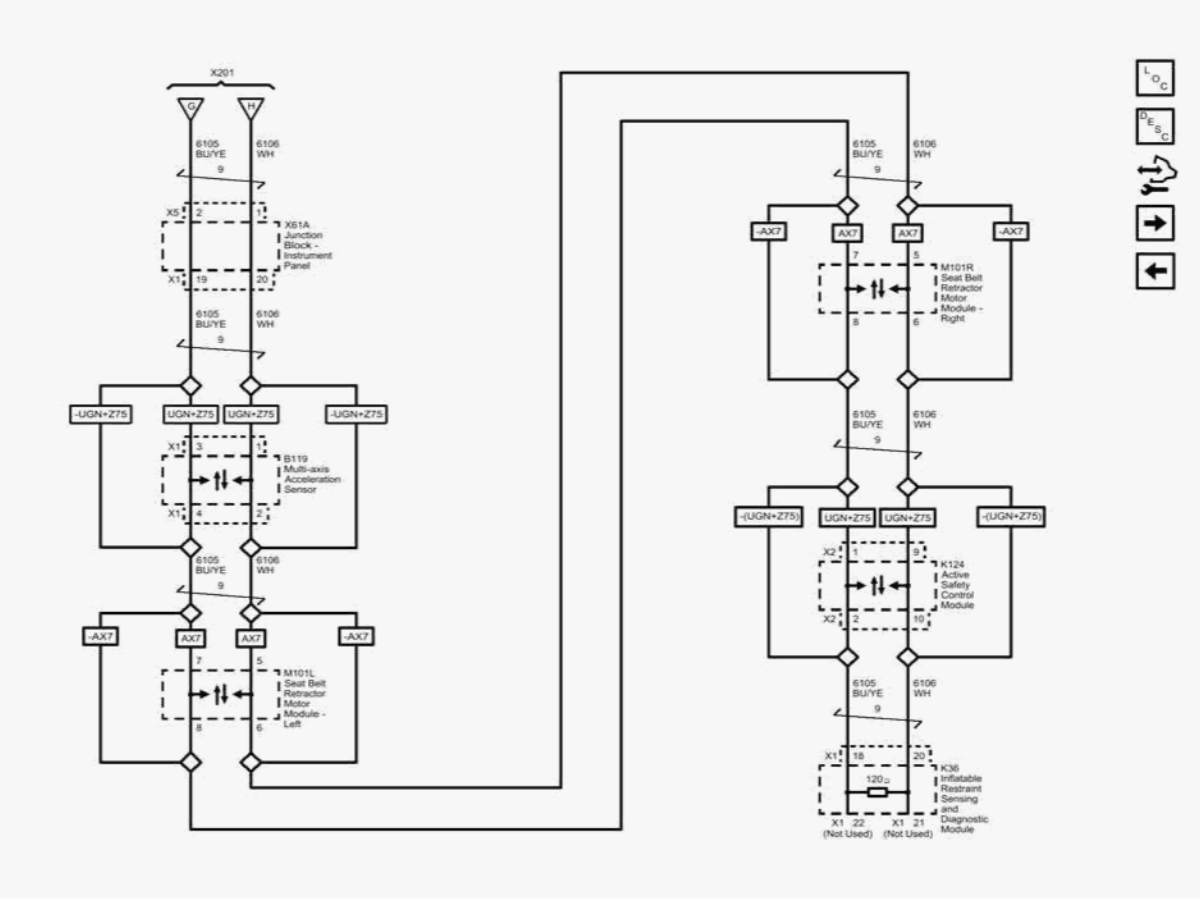


Fig. 8: Chassis Expansion Bus (2 of 2)

Courtesy of GENERAL MOTORS COMPANY

Powertrain Expansion Bus (L83 or L86)

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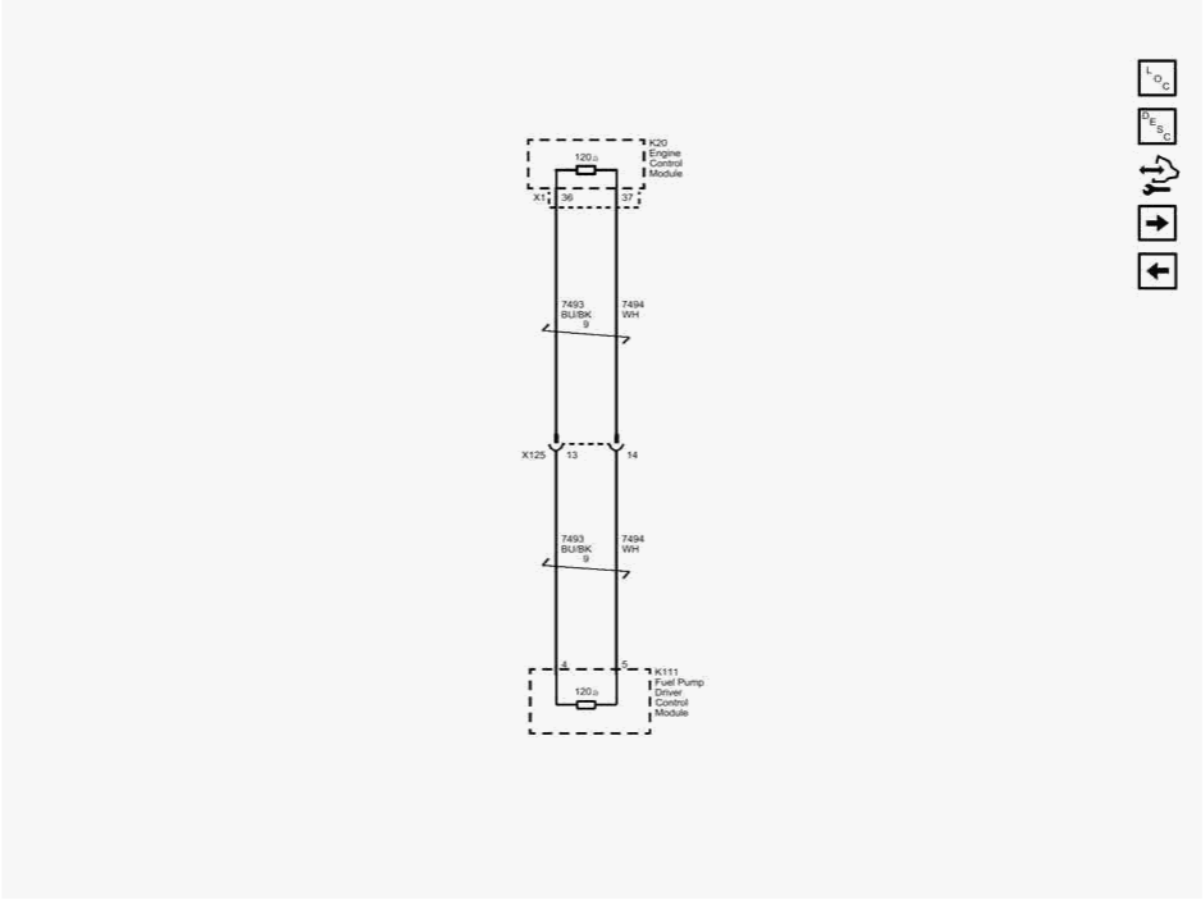


Fig. 9: Powertrain Expansion Bus (L83 or L86)
Courtesy of GENERAL MOTORS COMPANY

Object Detection Bus (UGN+Z75) (1 of 2)

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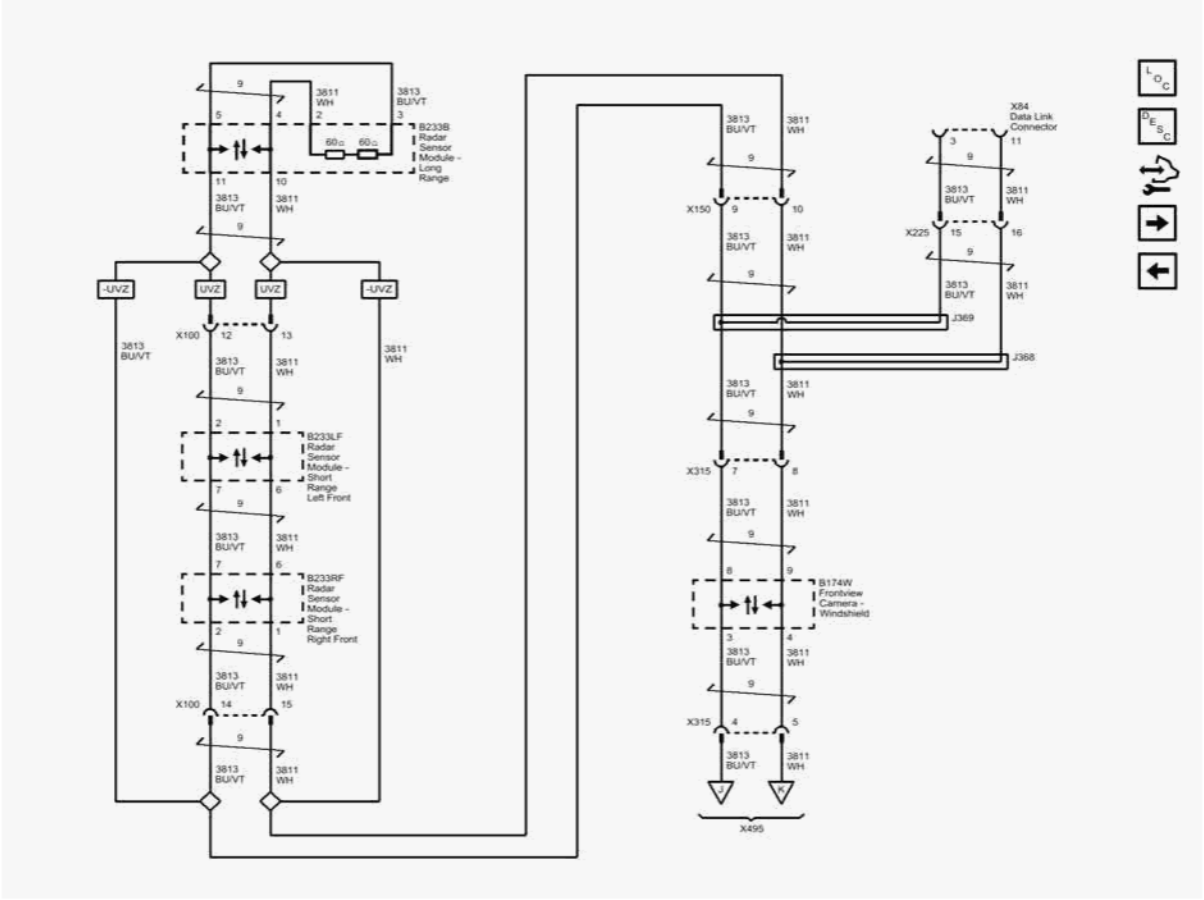


Fig. 10: Object Detection Bus (UGN+Z75) (1 of 2)
Courtesy of GENERAL MOTORS COMPANY

Object Detection Bus (UGN+Z75) (2 of 2)

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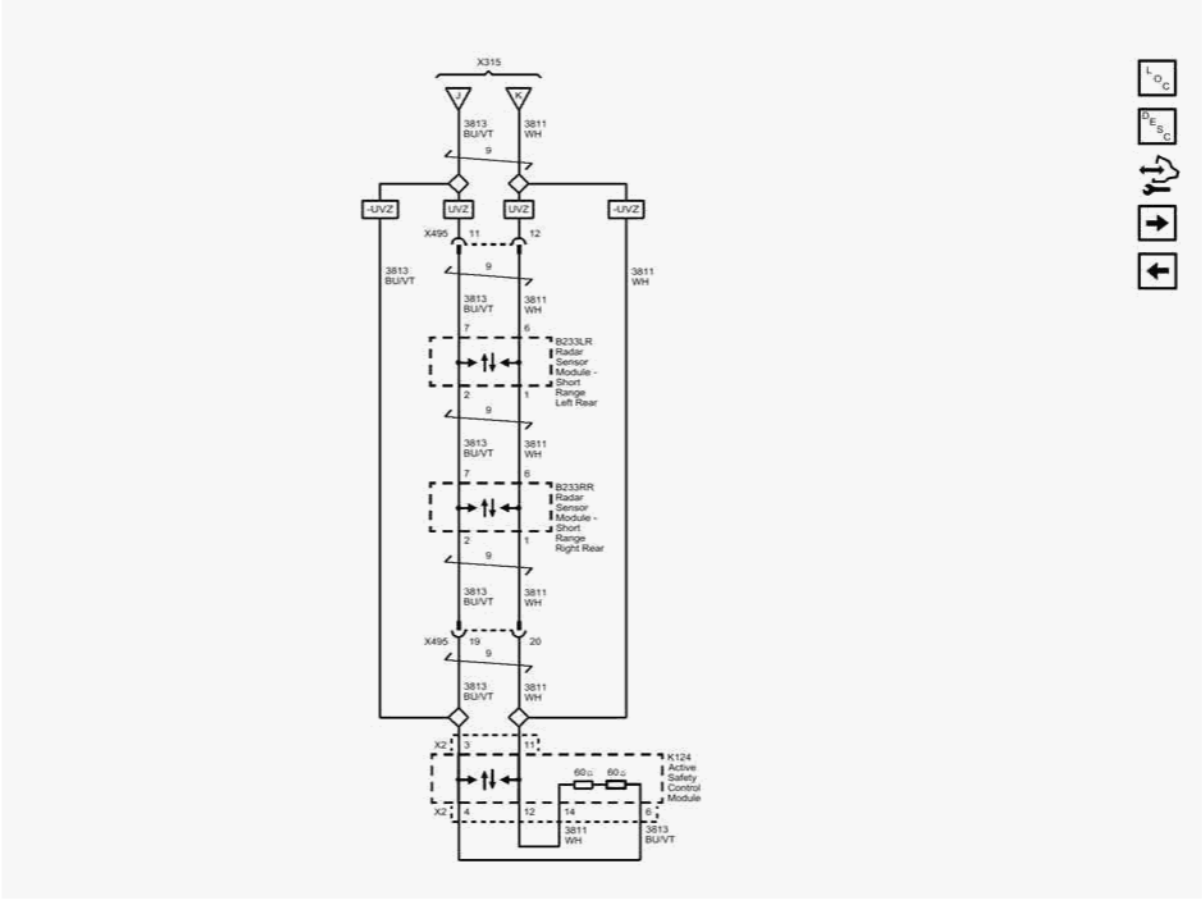


Fig. 11: Object Detection Bus (UGN+Z75) (2 of 2)
Courtesy of GENERAL MOTORS COMPANY

Linear Interconnect Network (LIN) Busses (1 of 3)

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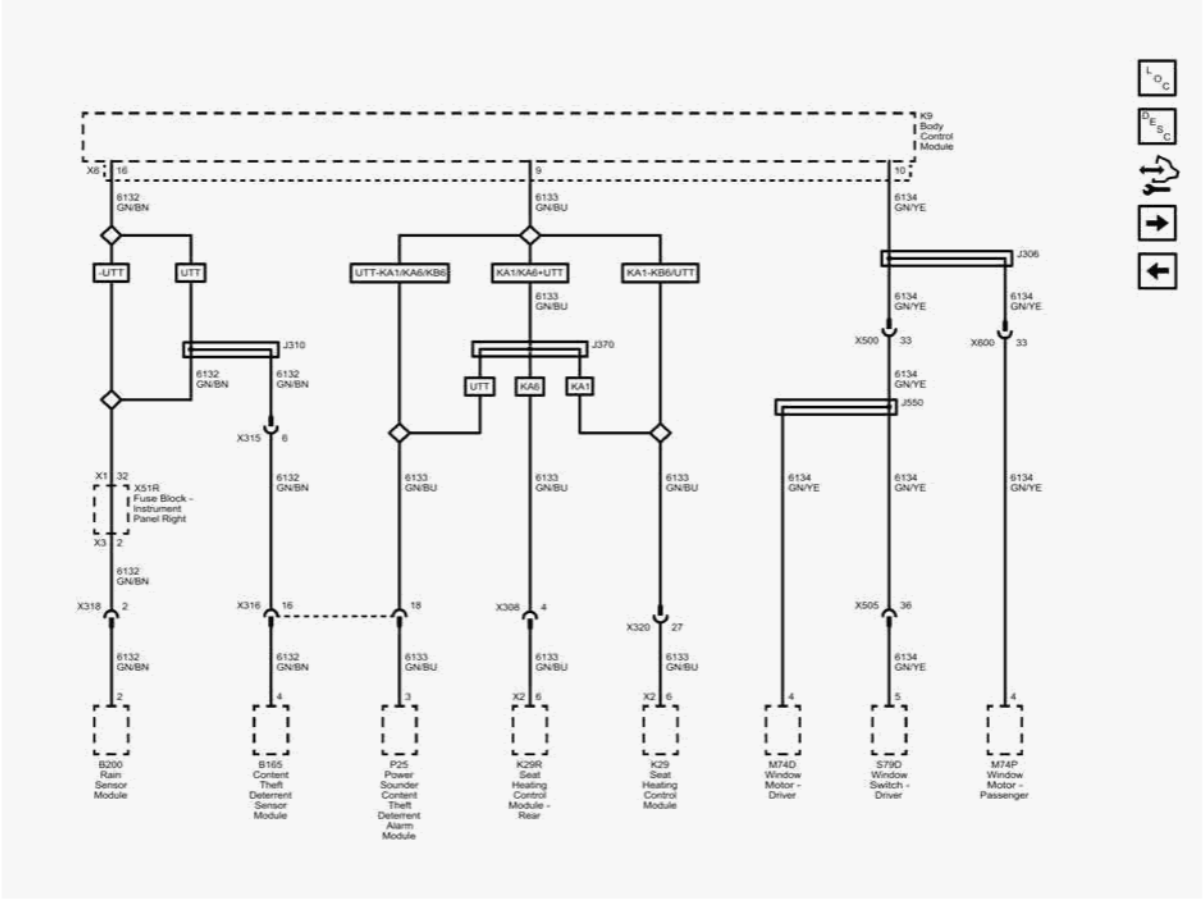


Fig. 12: Linear Interconnect Network (LIN) Busses (1 of 3)
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Linear Interconnect Network (LIN) Busses (2 of 3)

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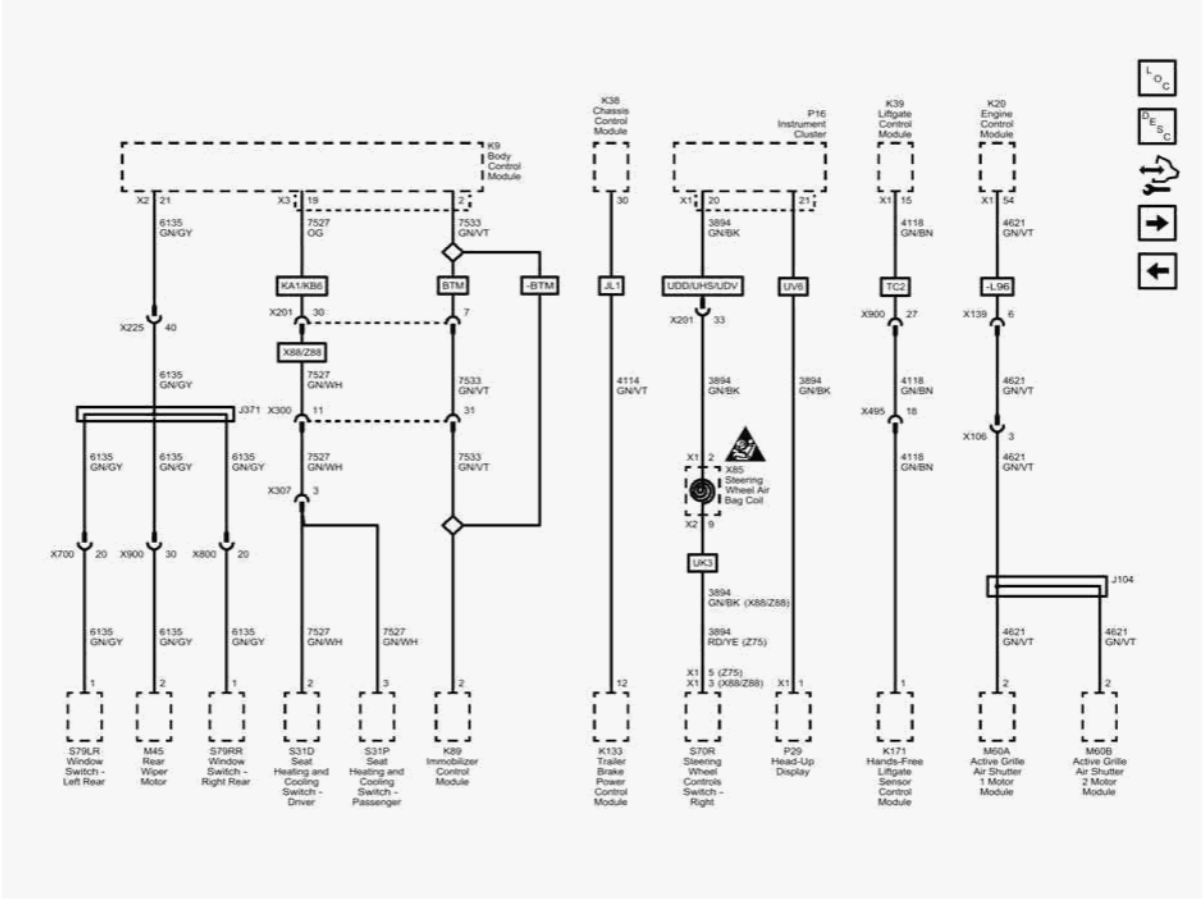


Fig. 13: Linear Interconnect Network (LIN) Busses (2 of 3)
Courtesy of GENERAL MOTORS COMPANY

Linear Interconnect Network (LIN) Busses (3 of 3) (X88 or Z88)

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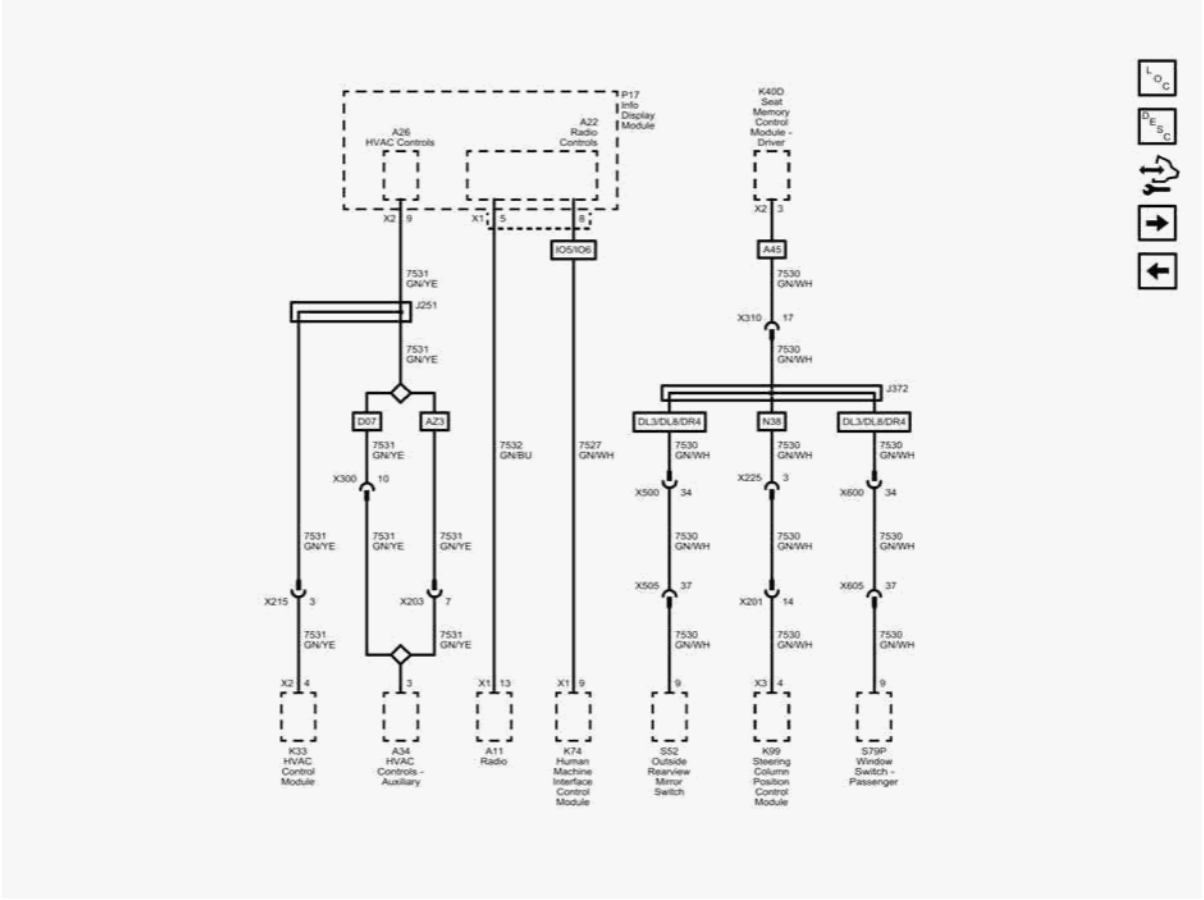


Fig. 14: Linear Interconnect Network (LIN) Busses (3 of 3) (X88 or Z88)
Courtesy of GENERAL MOTORS COMPANY

Linear Interconnect Network (LIN) Busses (3 of 3) (Z75)

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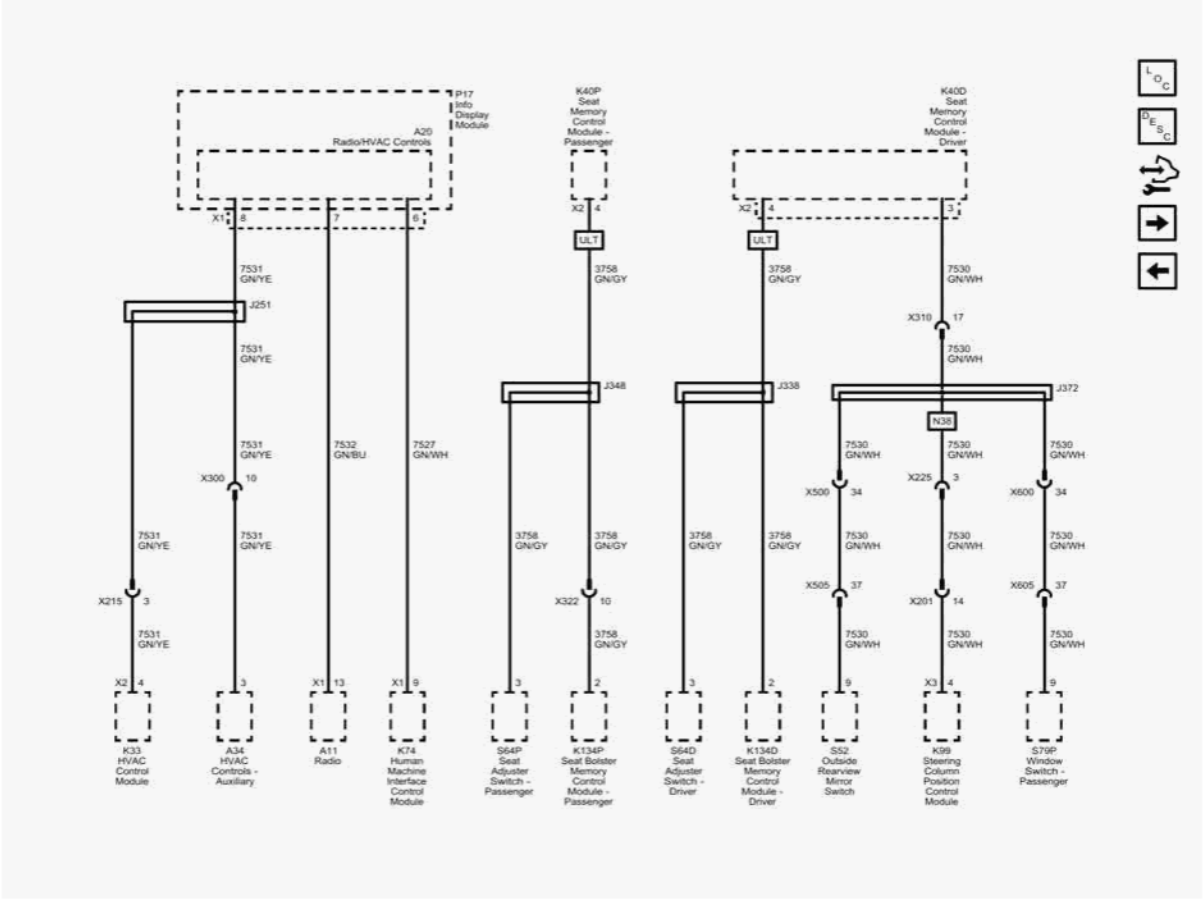


Fig. 15: Linear Interconnect Network (LIN) Busses (3 of 3) (Z75)
Courtesy of GENERAL MOTORS COMPANY

Accessory Wakeup

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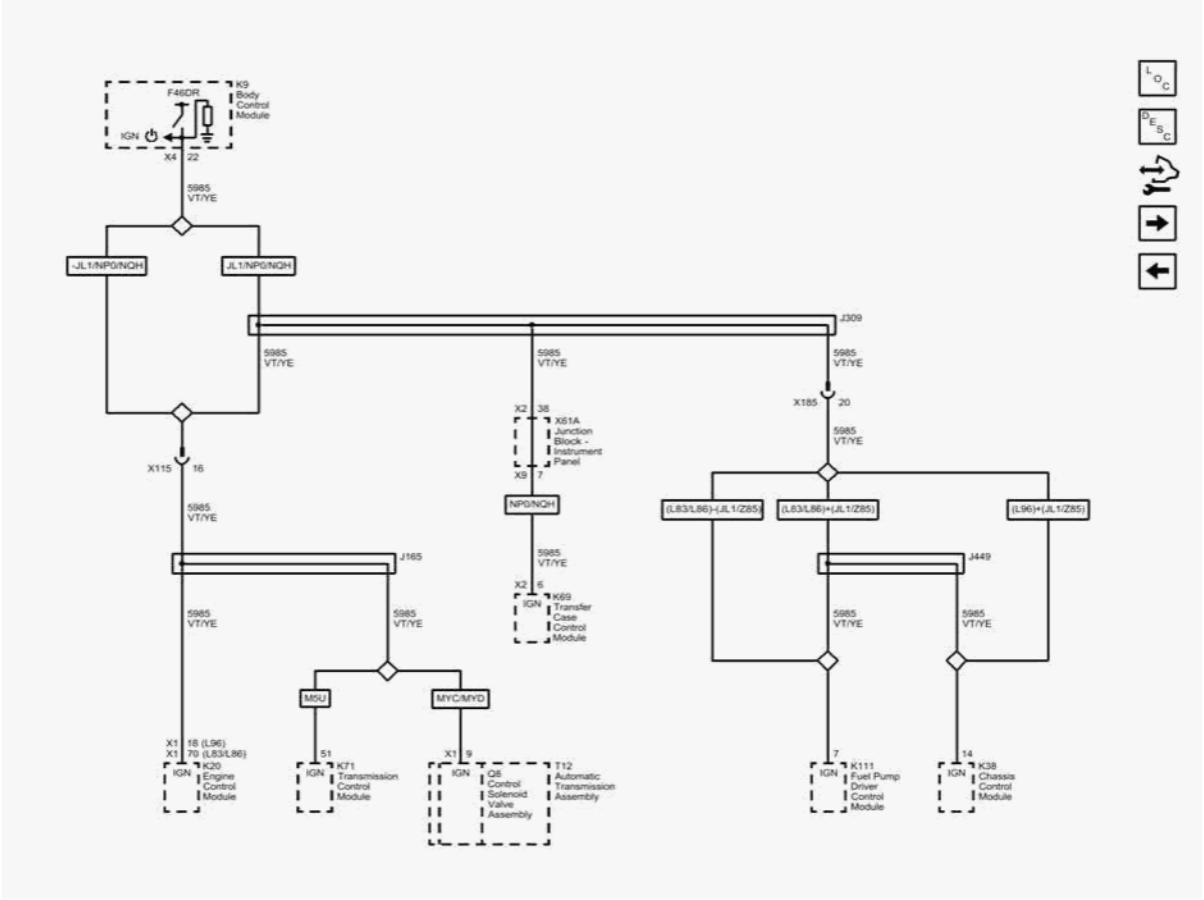


Fig. 16: Accessory Wakeup

Courtesy of GENERAL MOTORS COMPANY

Communications Enable

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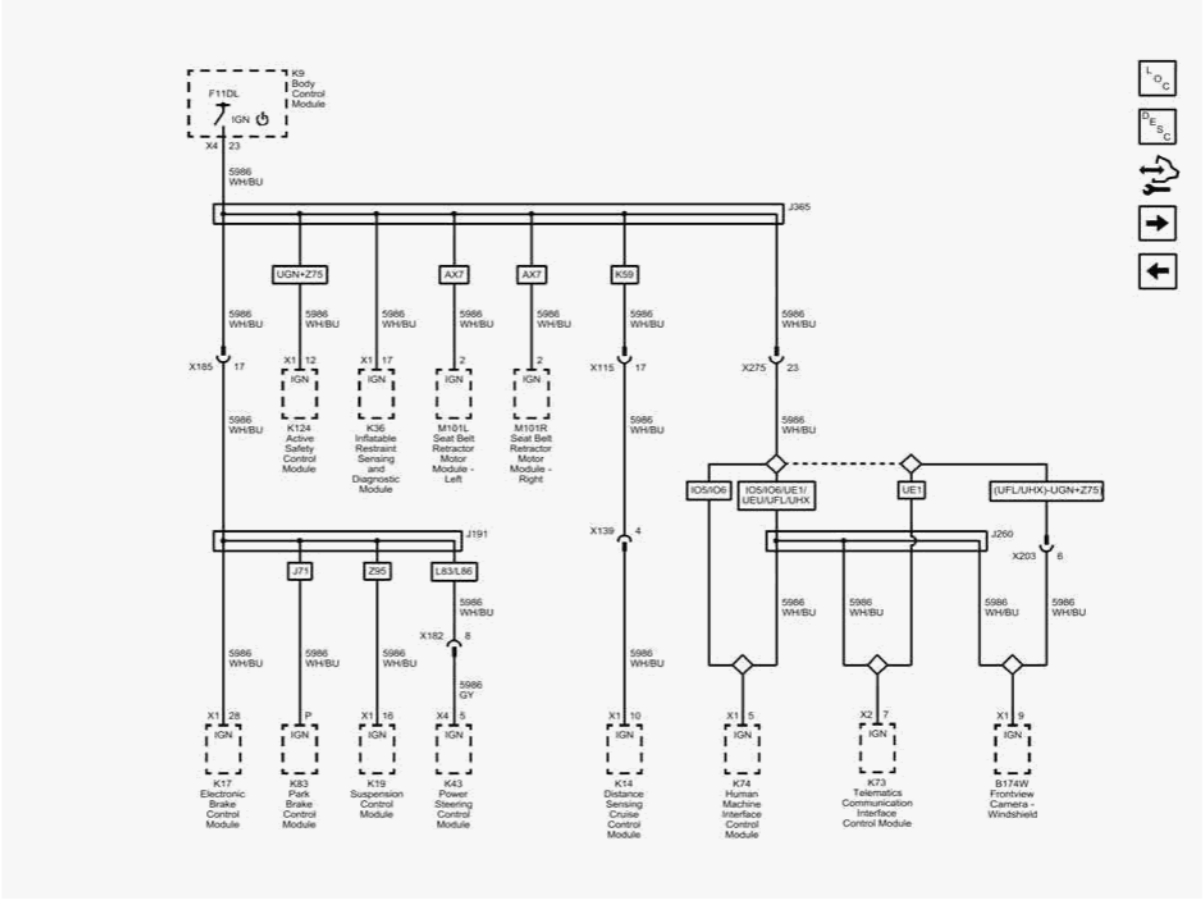


Fig. 17: Communications Enable

Courtesy of GENERAL MOTORS COMPANY

Communications Enable - Object High Speed GMLAN (UGN)

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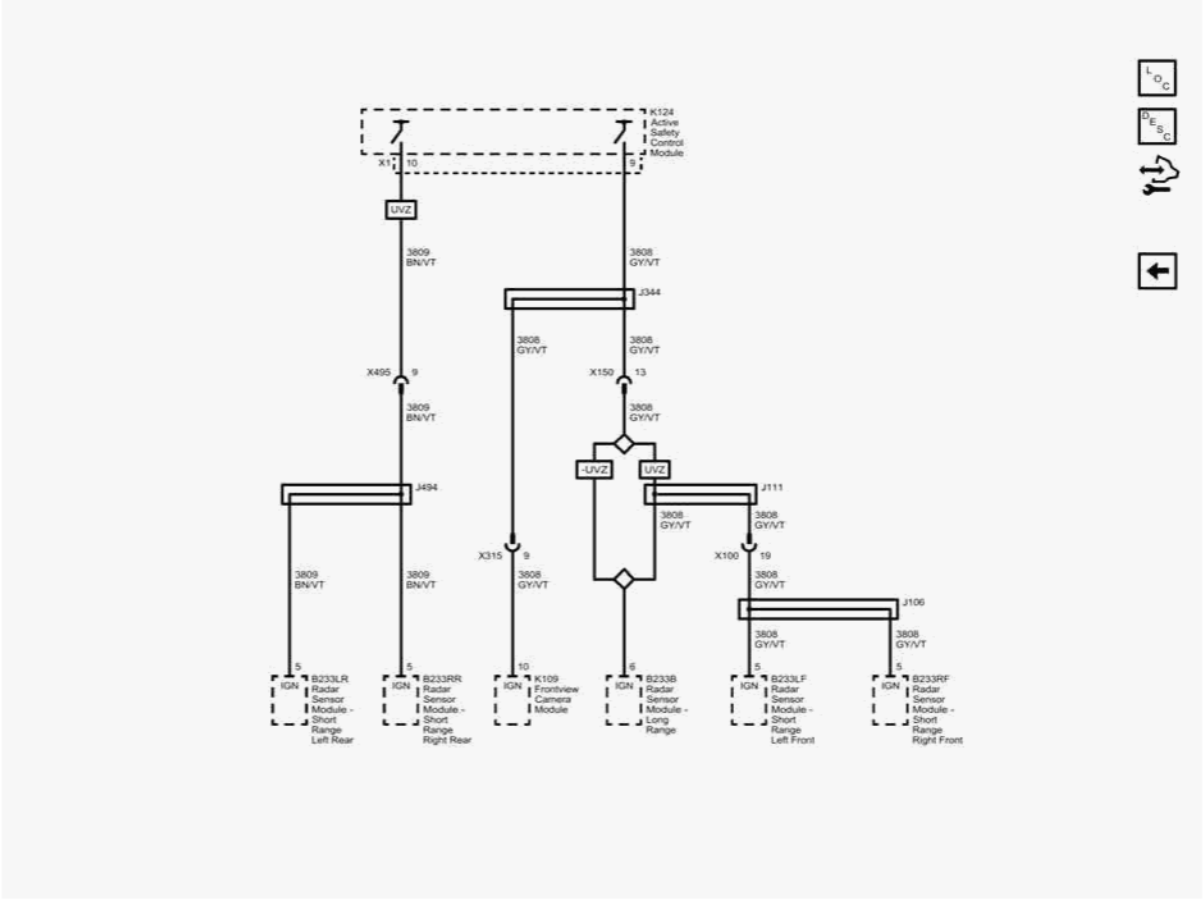


Fig. 18: Communications Enable - Object High Speed GMLAN (UGN)
Courtesy of GENERAL MOTORS COMPANY

BODY CONTROL SYSTEM WIRING SCHEMATICS

Module Power, Ground and Serial Data

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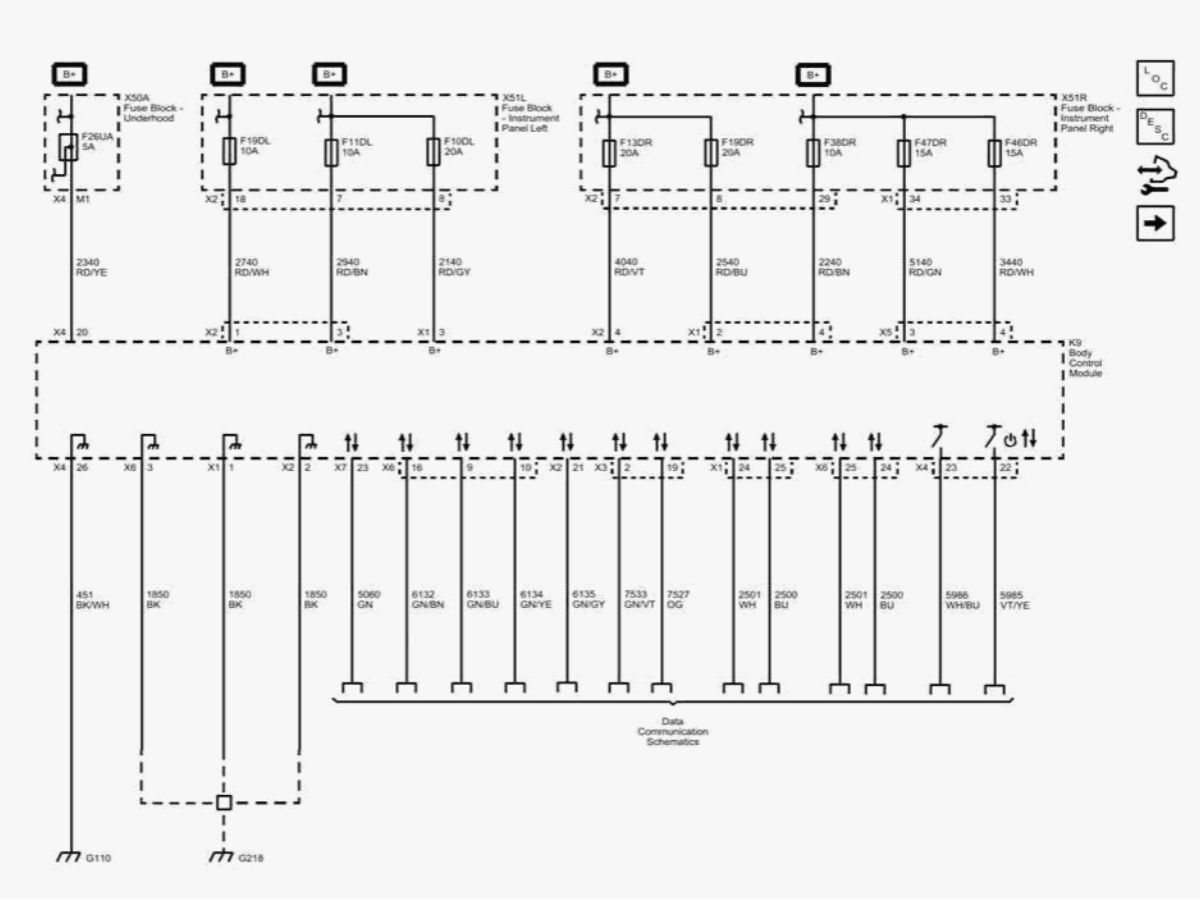


Fig. 19: Module Power, Ground and Serial Data
Courtesy of GENERAL MOTORS COMPANY

Subsystem References (1 of 4)

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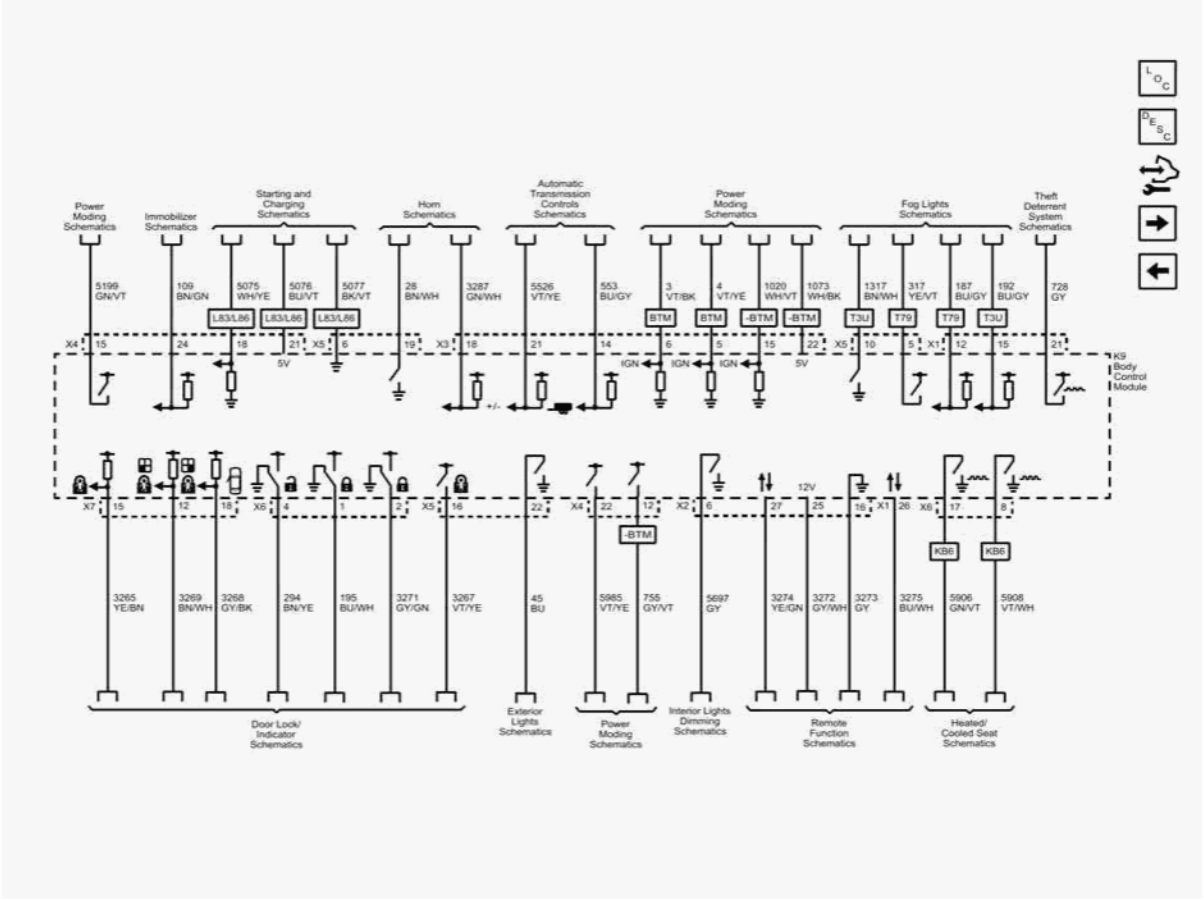


Fig. 20: Subsystem References (1 of 4)

Courtesy of GENERAL MOTORS COMPANY

Subsystem References (2 of 4)

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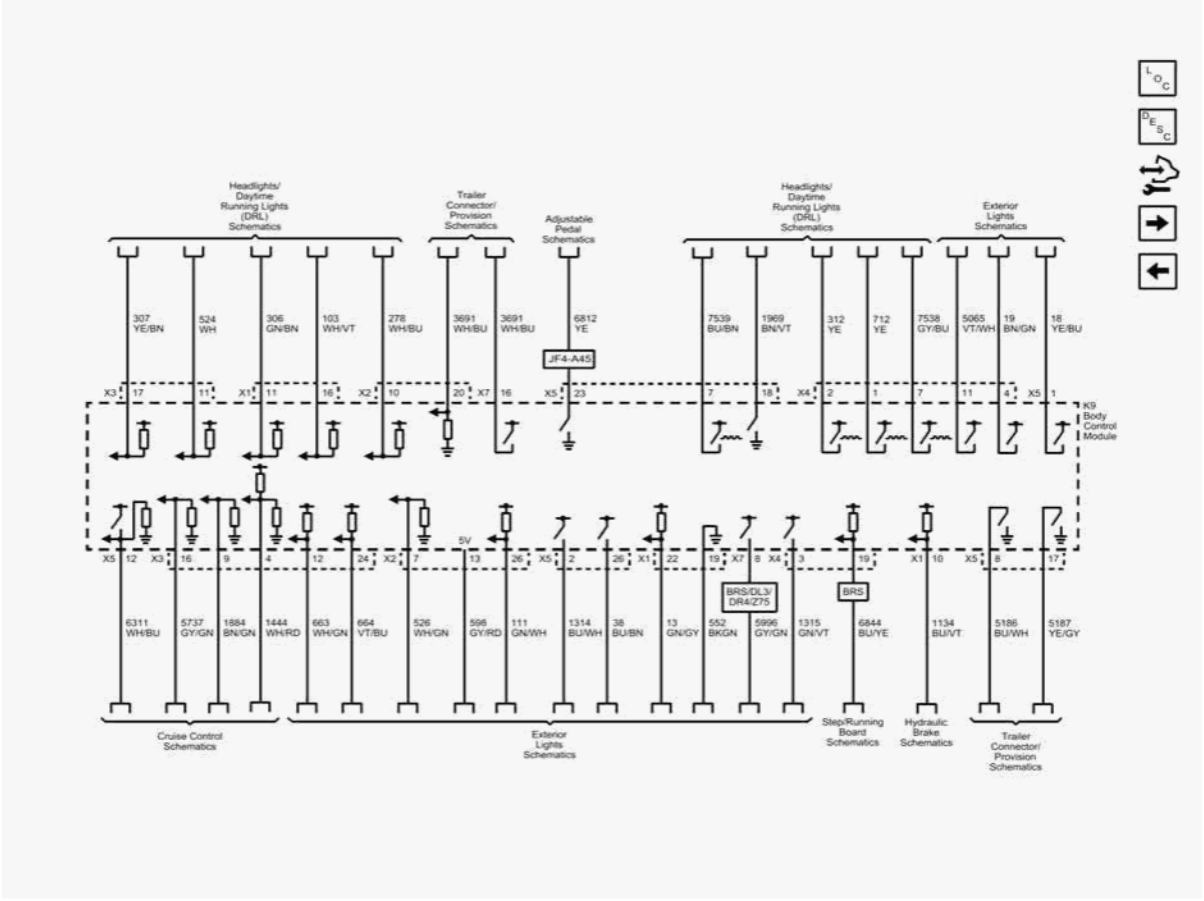


Fig. 21: Subsystem References (2 of 4)

Courtesy of GENERAL MOTORS COMPANY

Subsystem References (3 of 4)

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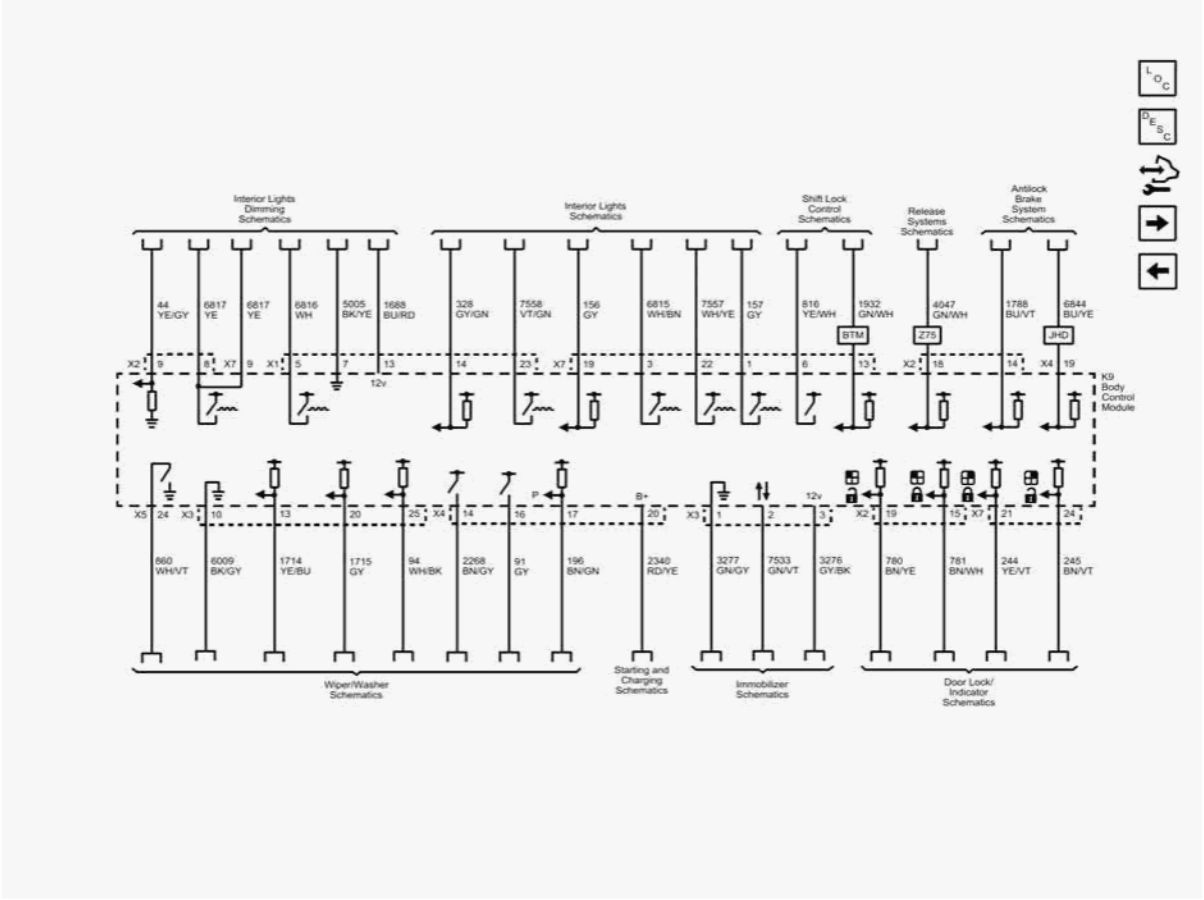


Fig. 22: Subsystem References (3 of 4)
Courtesy of GENERAL MOTORS COMPANY

Subsystem References (4 of 4)

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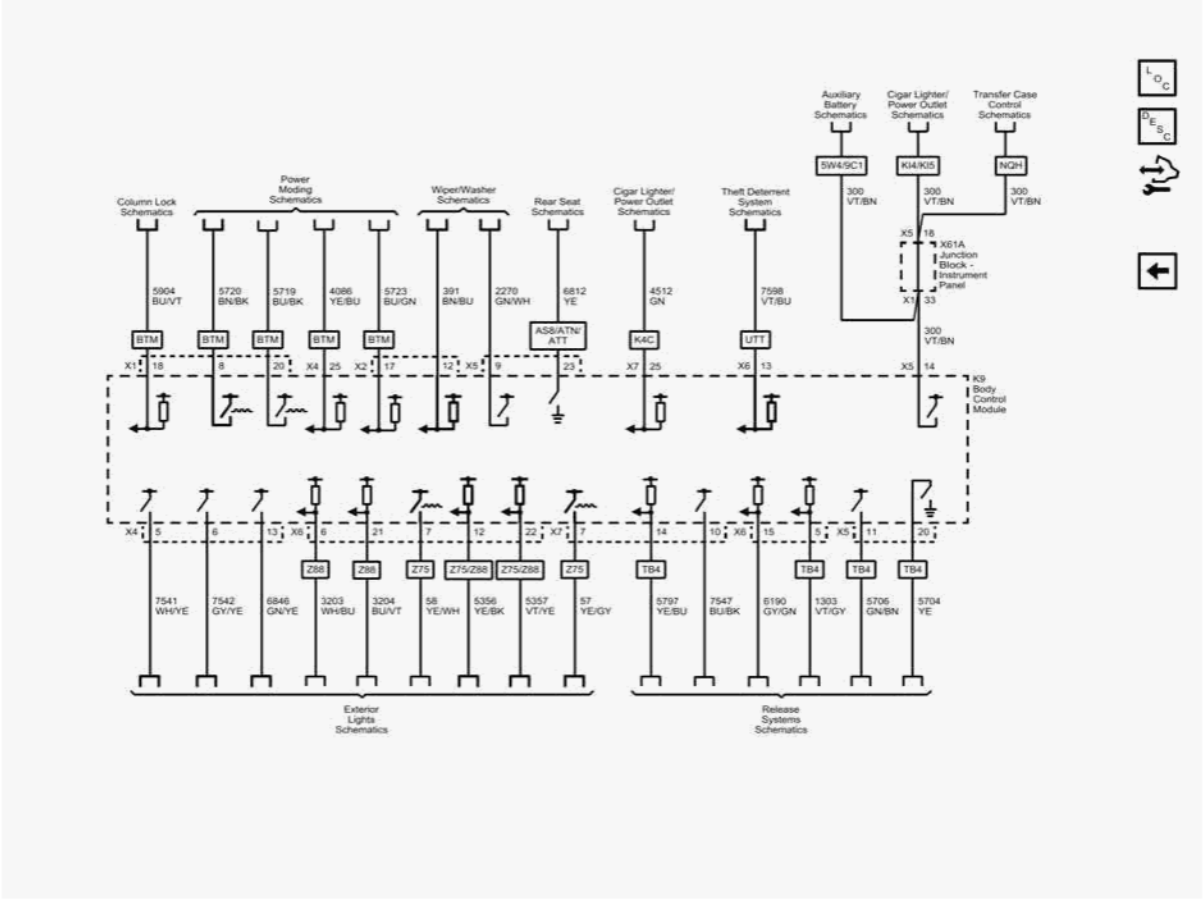


Fig. 23: Subsystem References (4 of 4)
Courtesy of GENERAL MOTORS COMPANY

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ACCESSORIES & EQUIPMENT

Data Communications - Special Tools and Equipment - Special Tools - Escalade, Suburban, Tahoe, Yukon

SPECIAL TOOLS AND EQUIPMENT

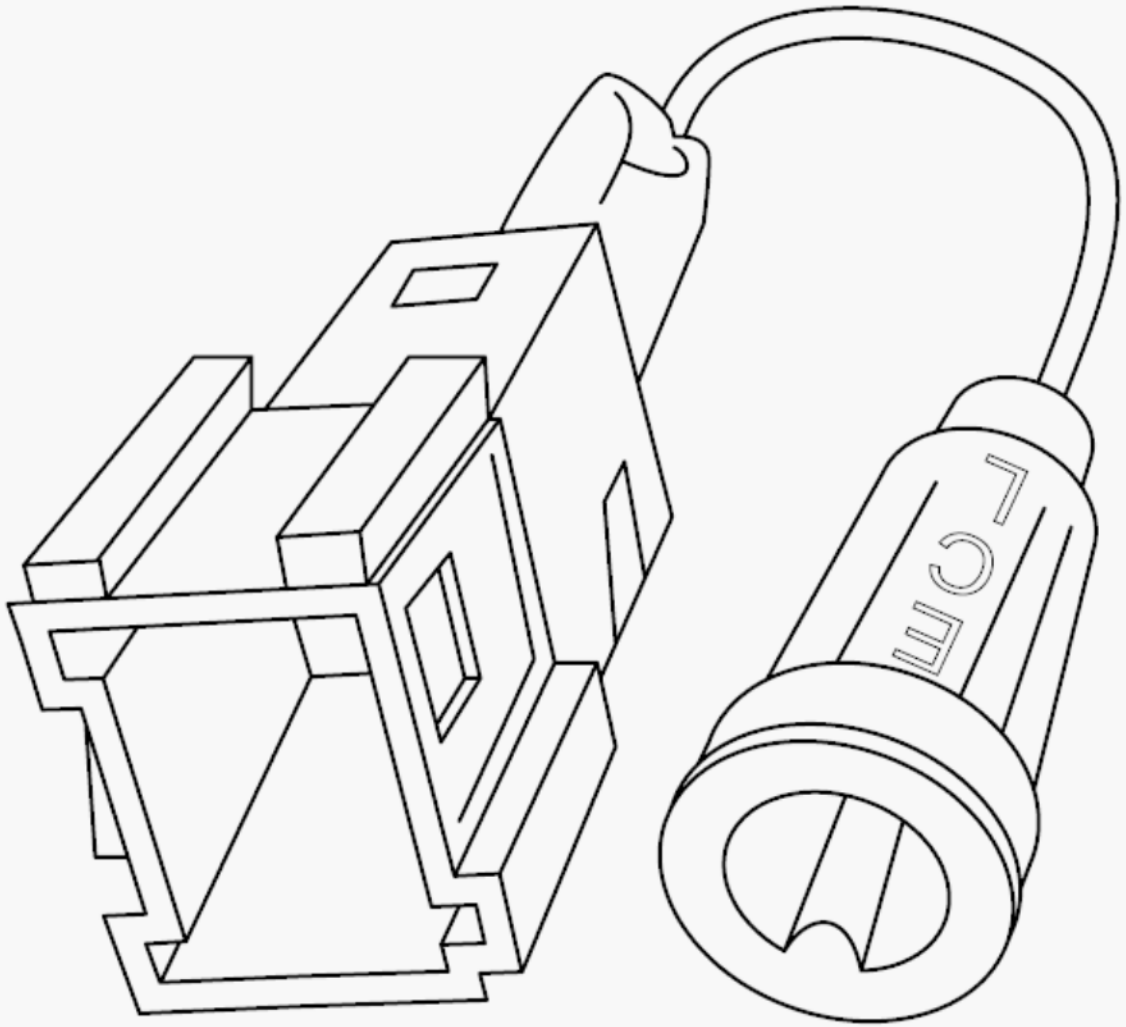
SPECIAL TOOLS

Illustration	Tool Number/Description

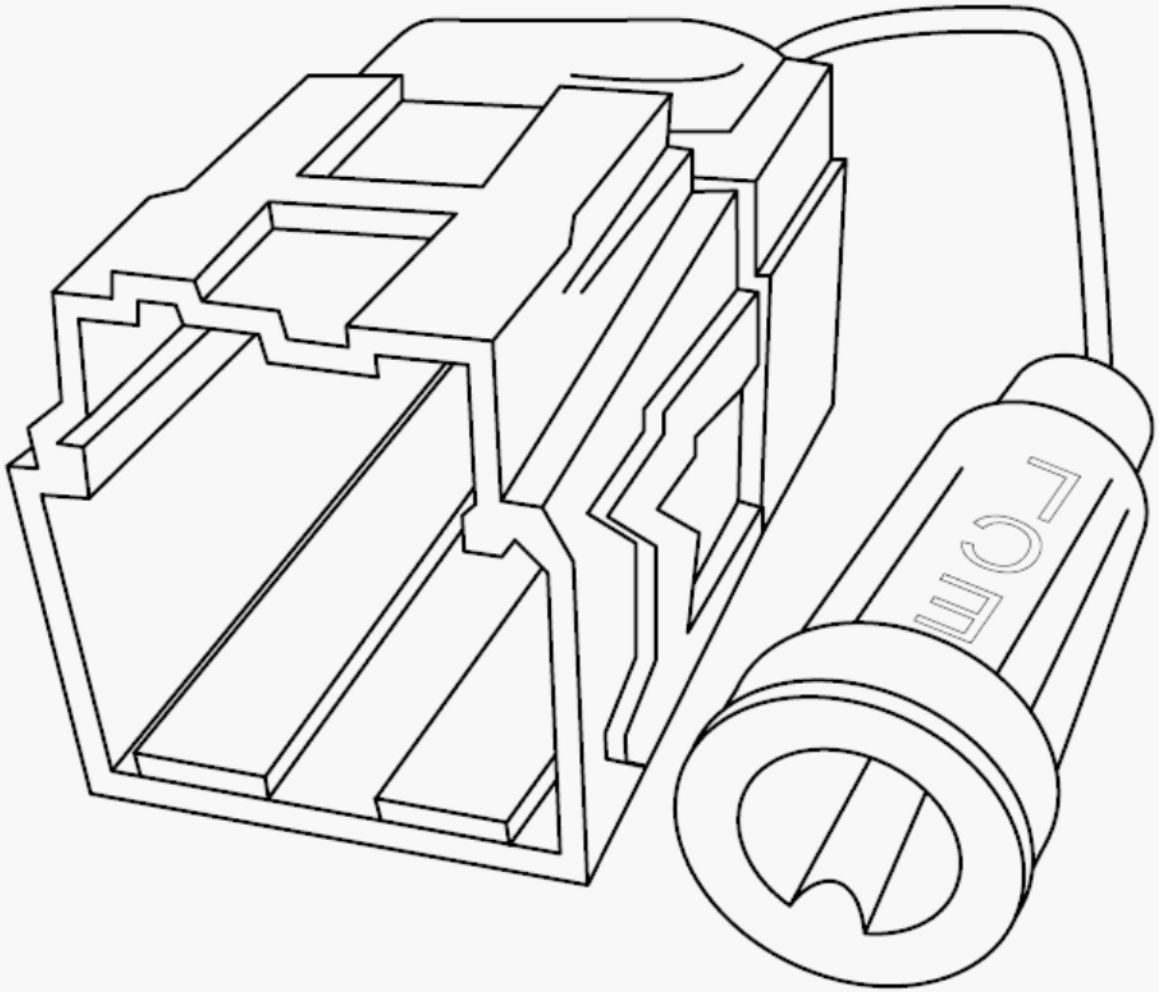
cardiagn.com

Illustration	Tool Number/Description
	EL-51578 MOST Bus Diagnostic Tool Kit

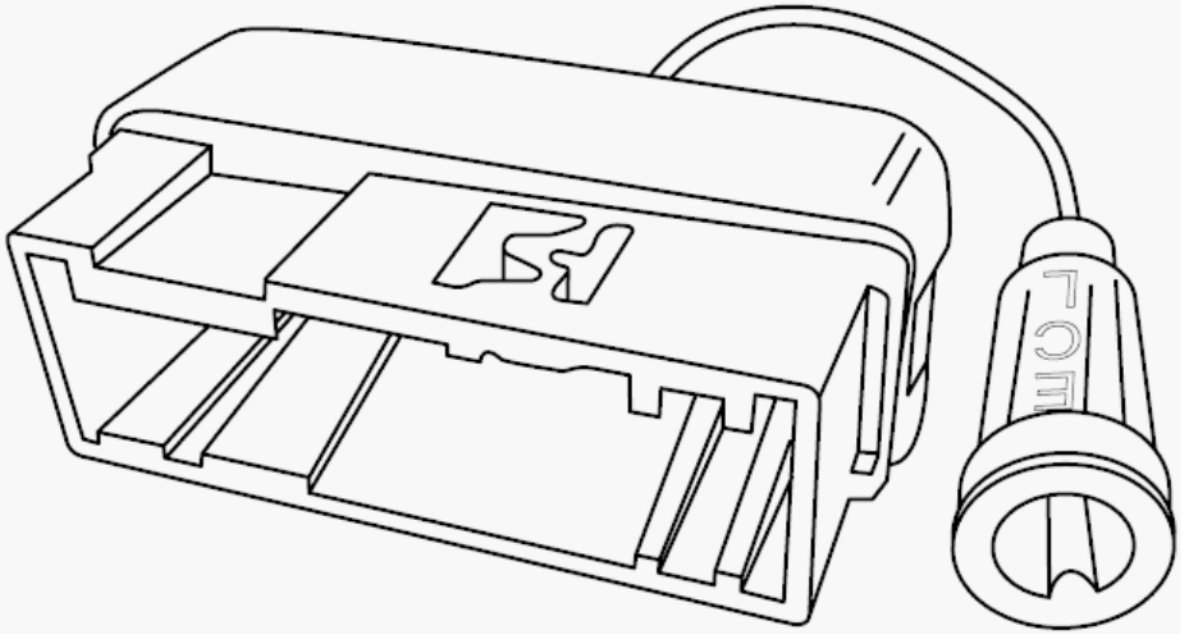
cardiagn.com

Illustration	Tool Number/Description
	EL-51578-1 8-Pin Black Connector Touch Pad

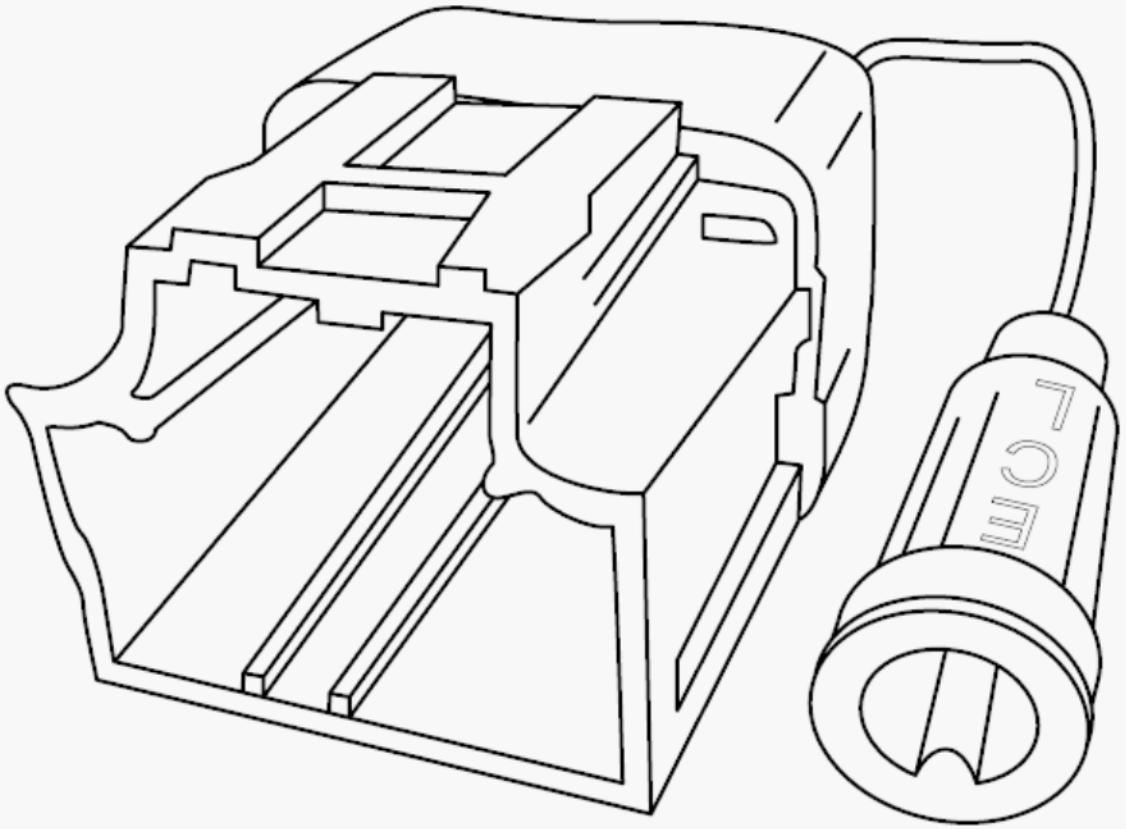
cardiagn.com

Illustration	Tool Number/Description
	EL-51578-2 12-Pin Gray Header HMI Control

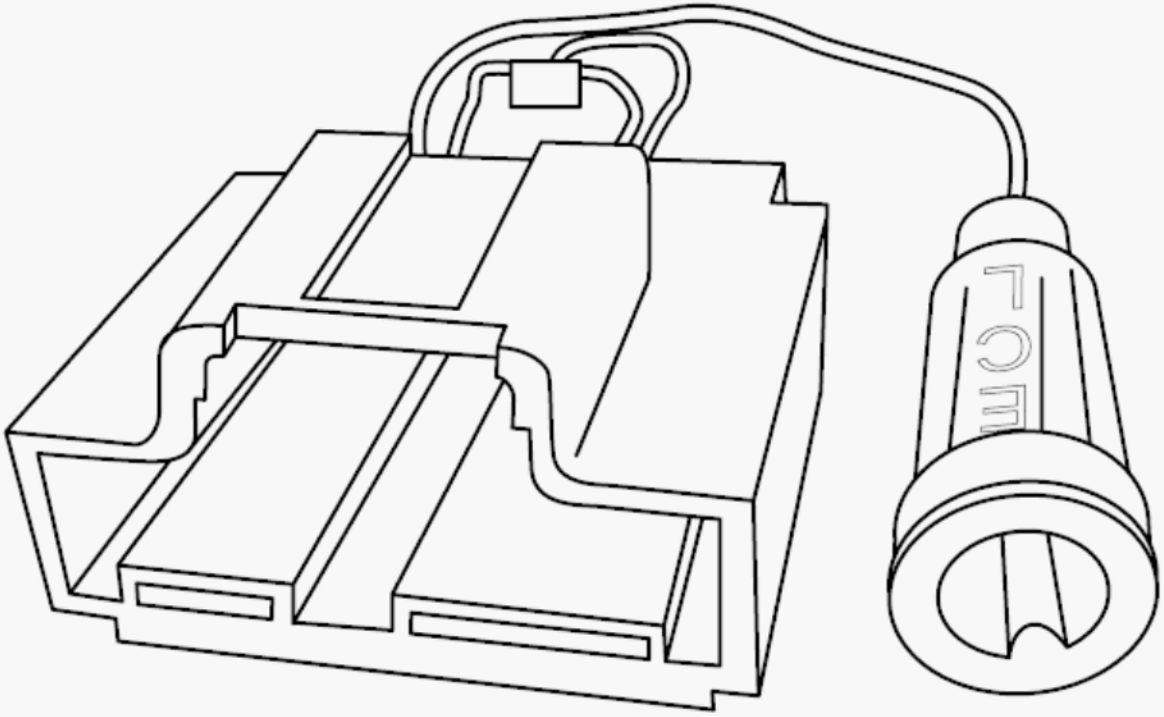
cardiagn.com

Illustration	Tool Number/Description
	EL-51578-3 32-Pin Gray Header IPC

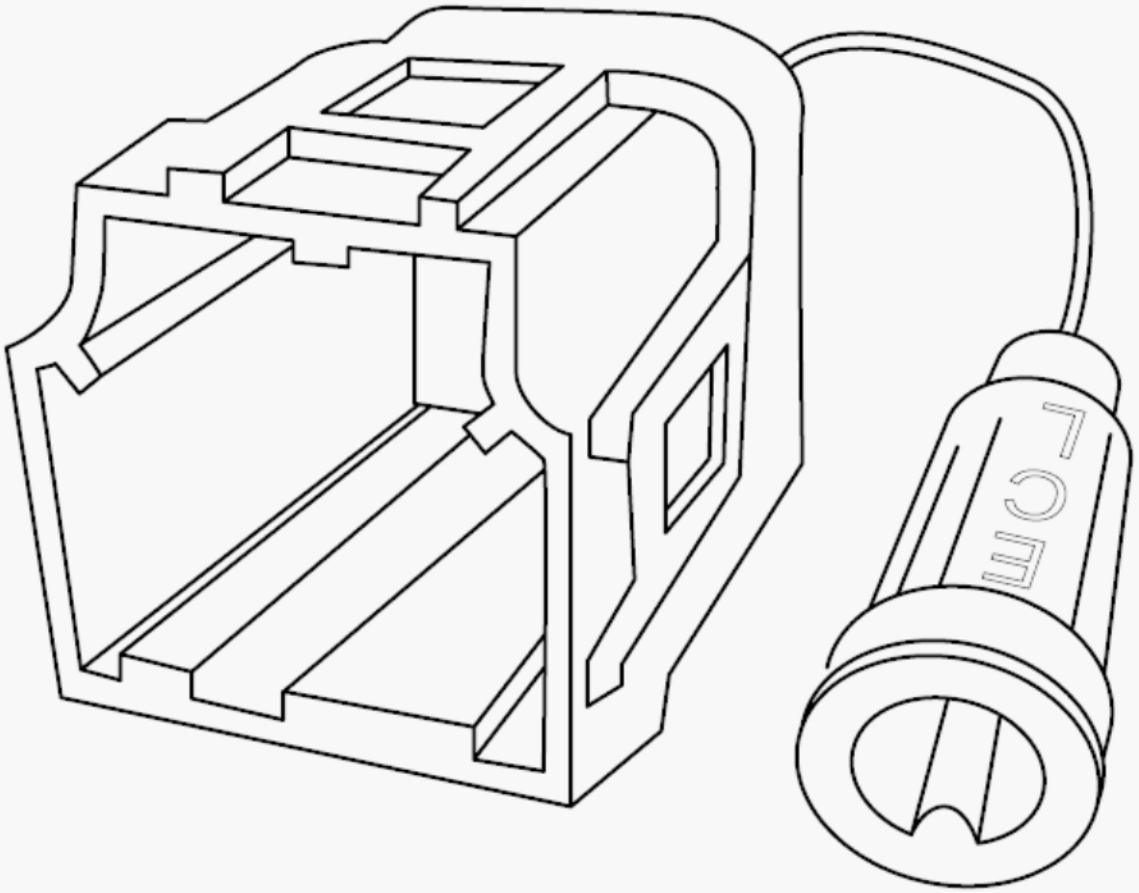
cardiagn.com

Illustration	Tool Number/Description
	EL-51578-4 16-Pin Brown Header AMP

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Illustration	Tool Number/Description
	EL-51578-5 10-Pin Black Connector CD

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Illustration	Tool Number/Description
	EL-51578-6 12-Pin Black Header DVD

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