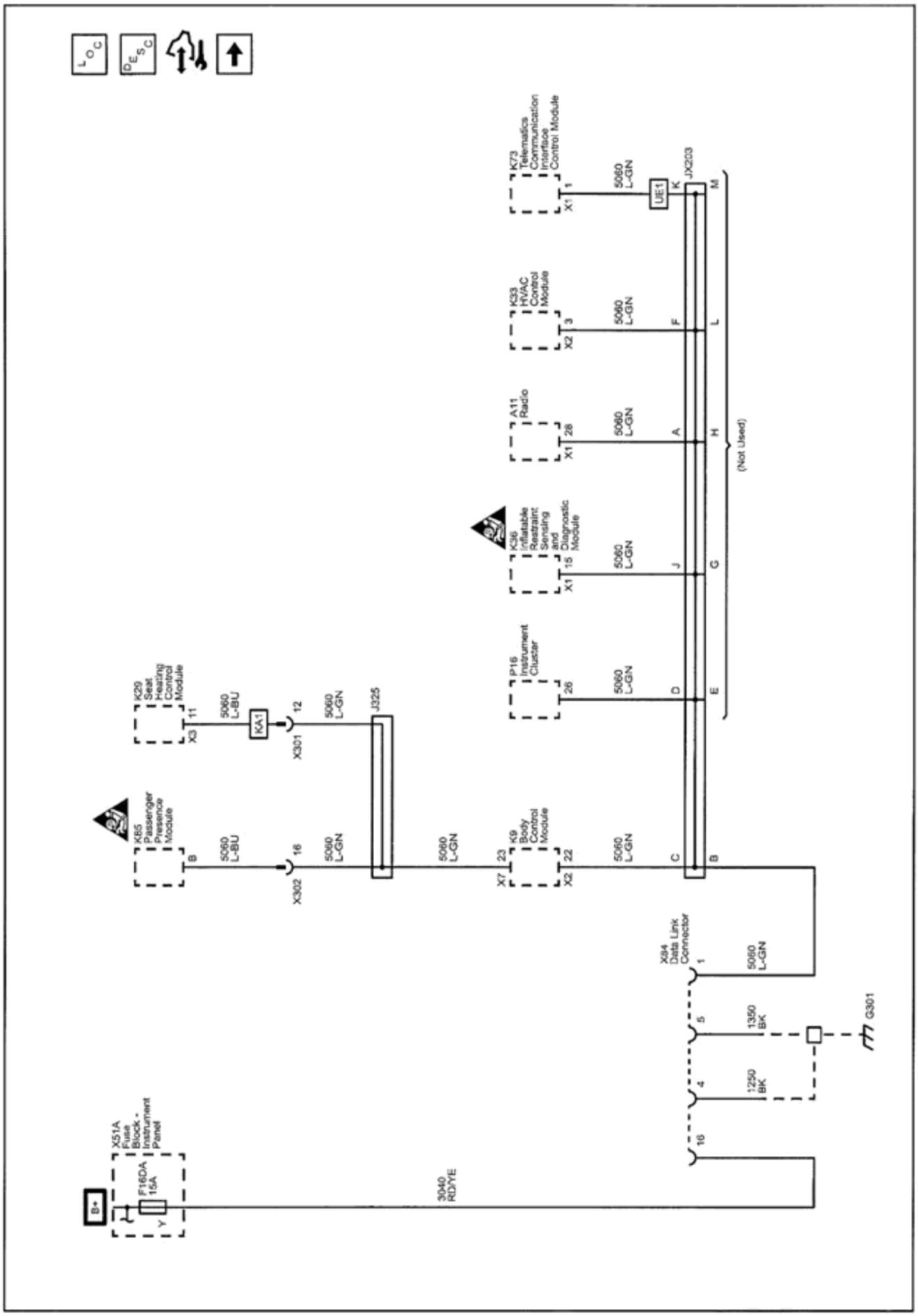
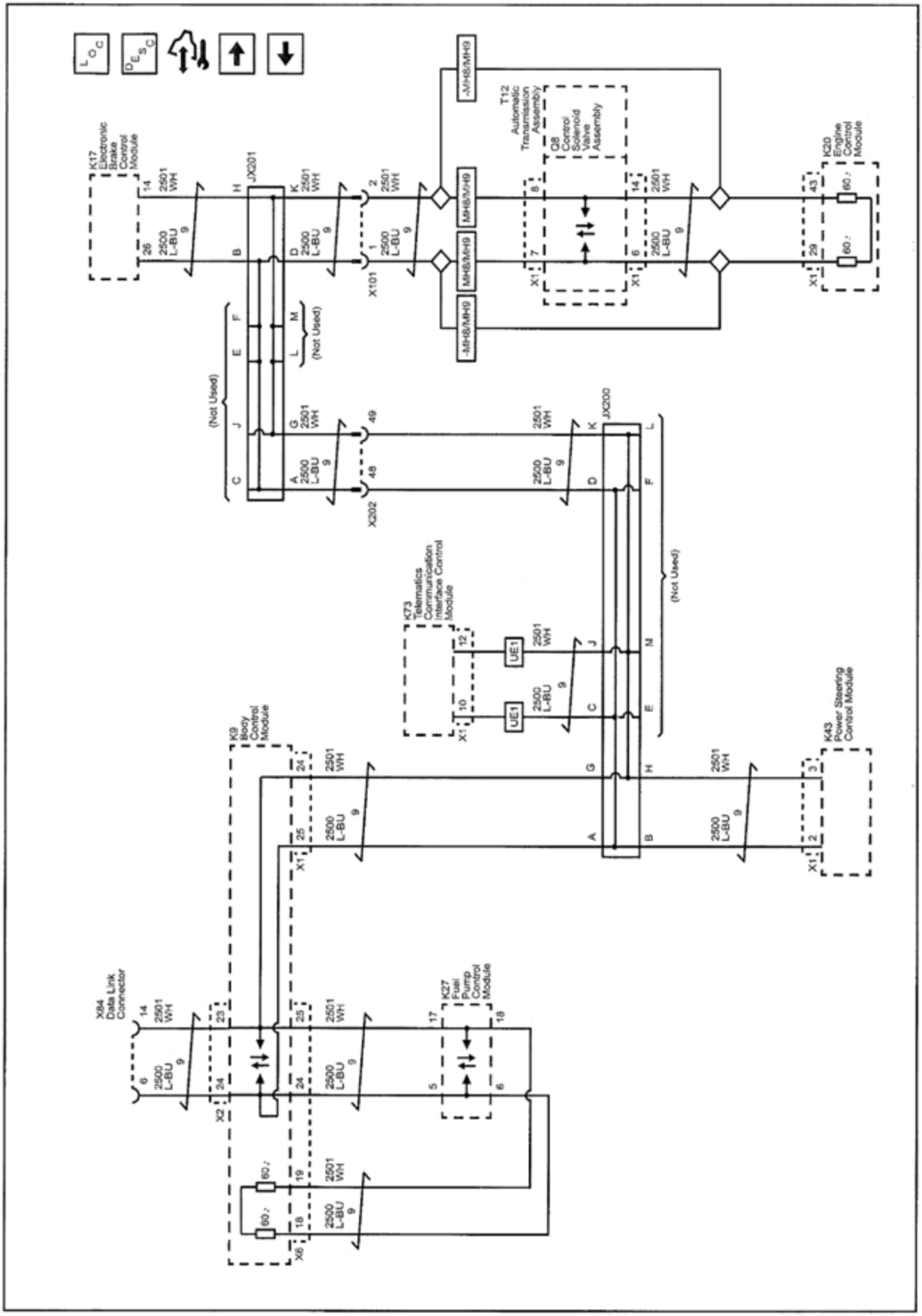
# Data Communications

## Schematic and Routing Diagrams

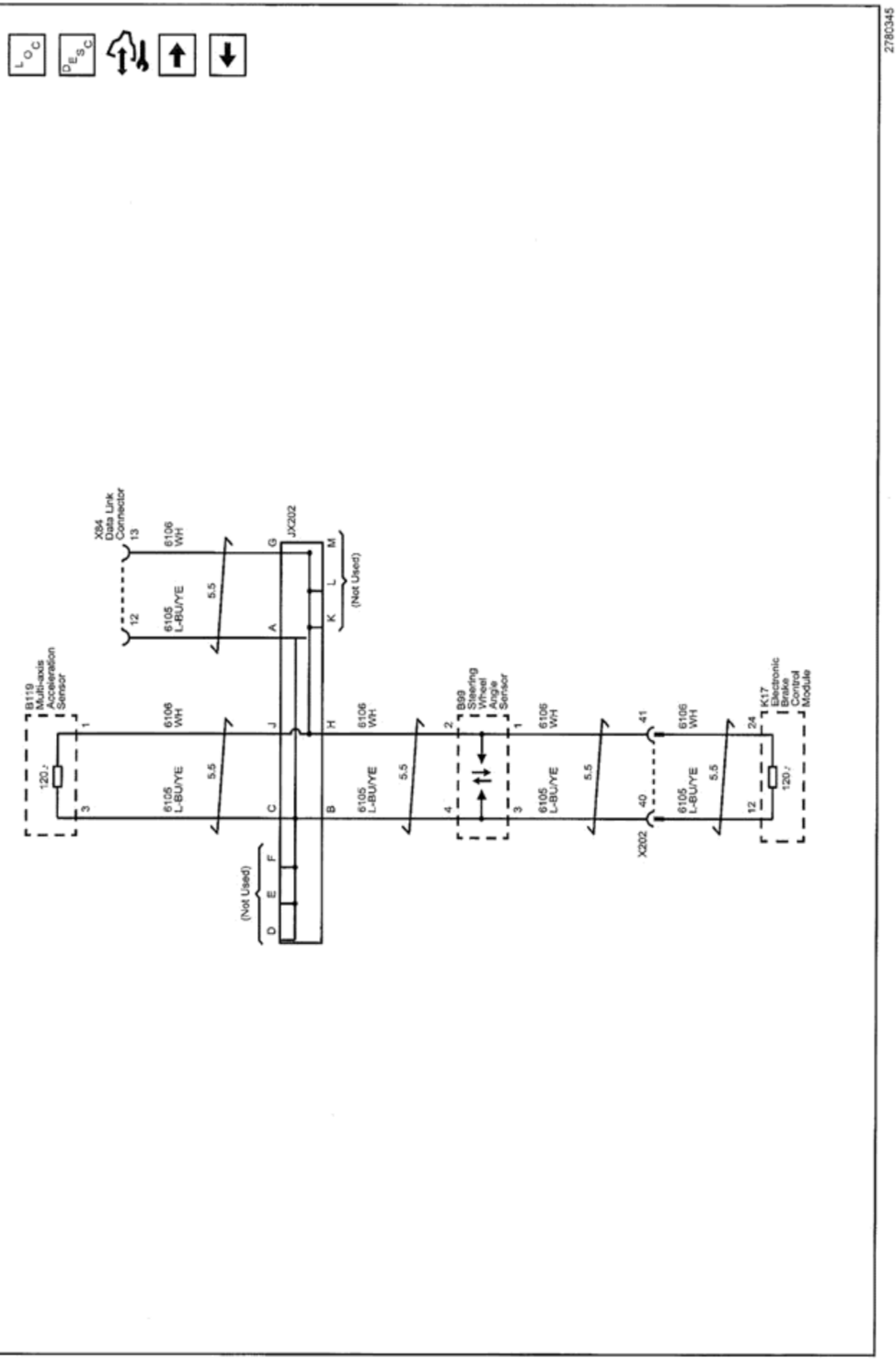
## Data Communication Schematics (Power, Ground, and Low Speed GMLAN)



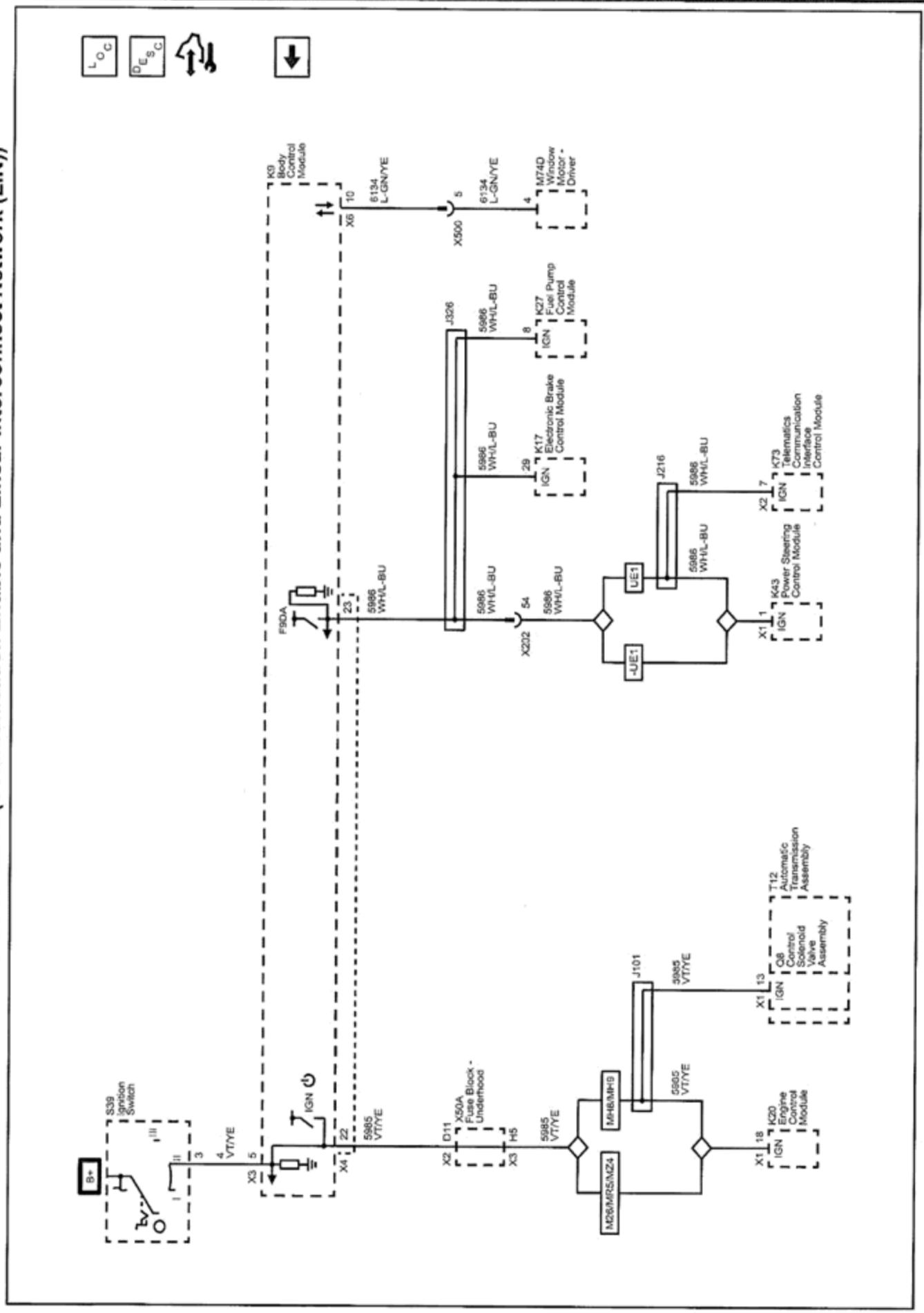
## Data Communication Schematics (High Speed GMLAN)



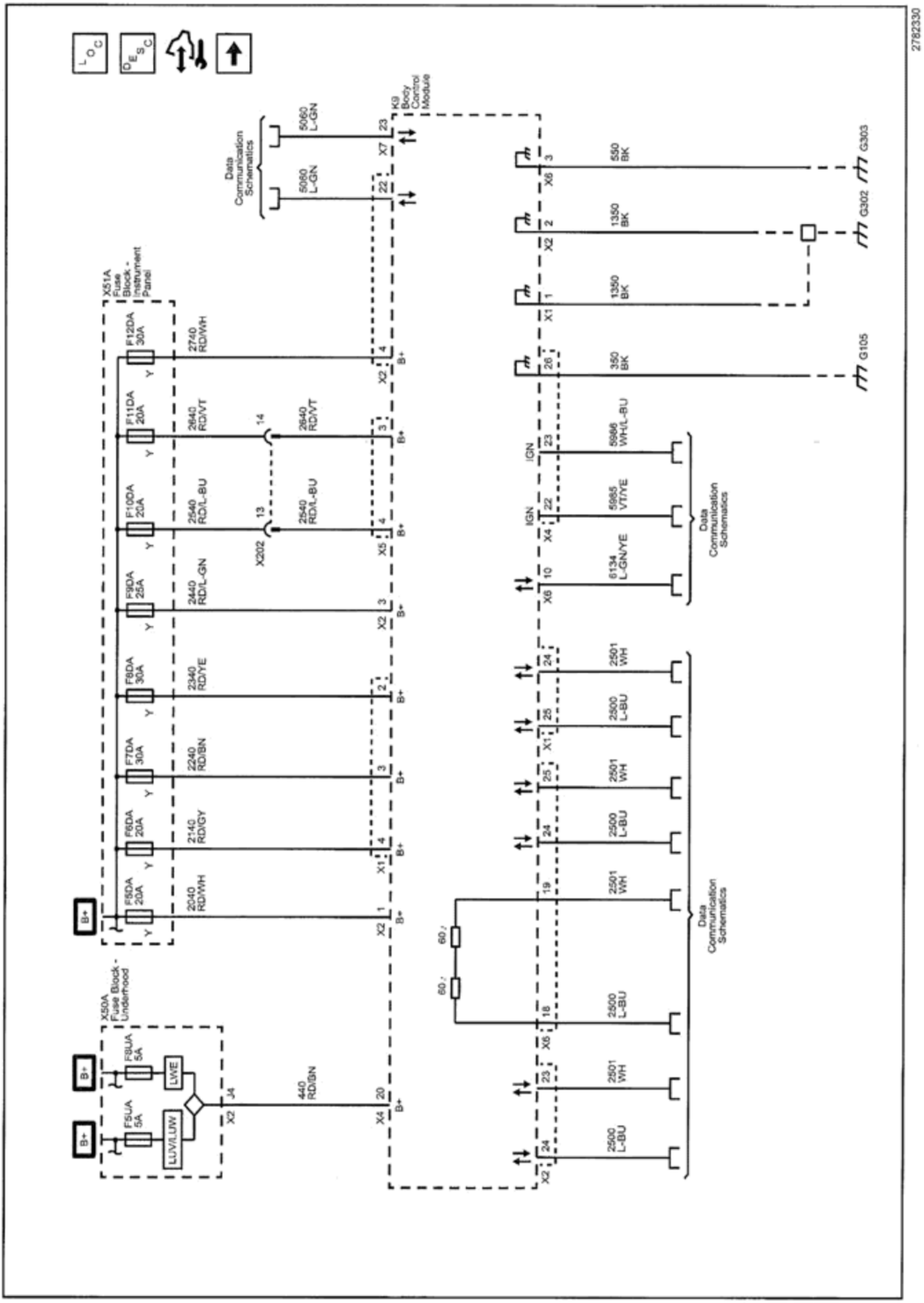
## Data Communication Schematics (High Speed GMLAN Bus 2)



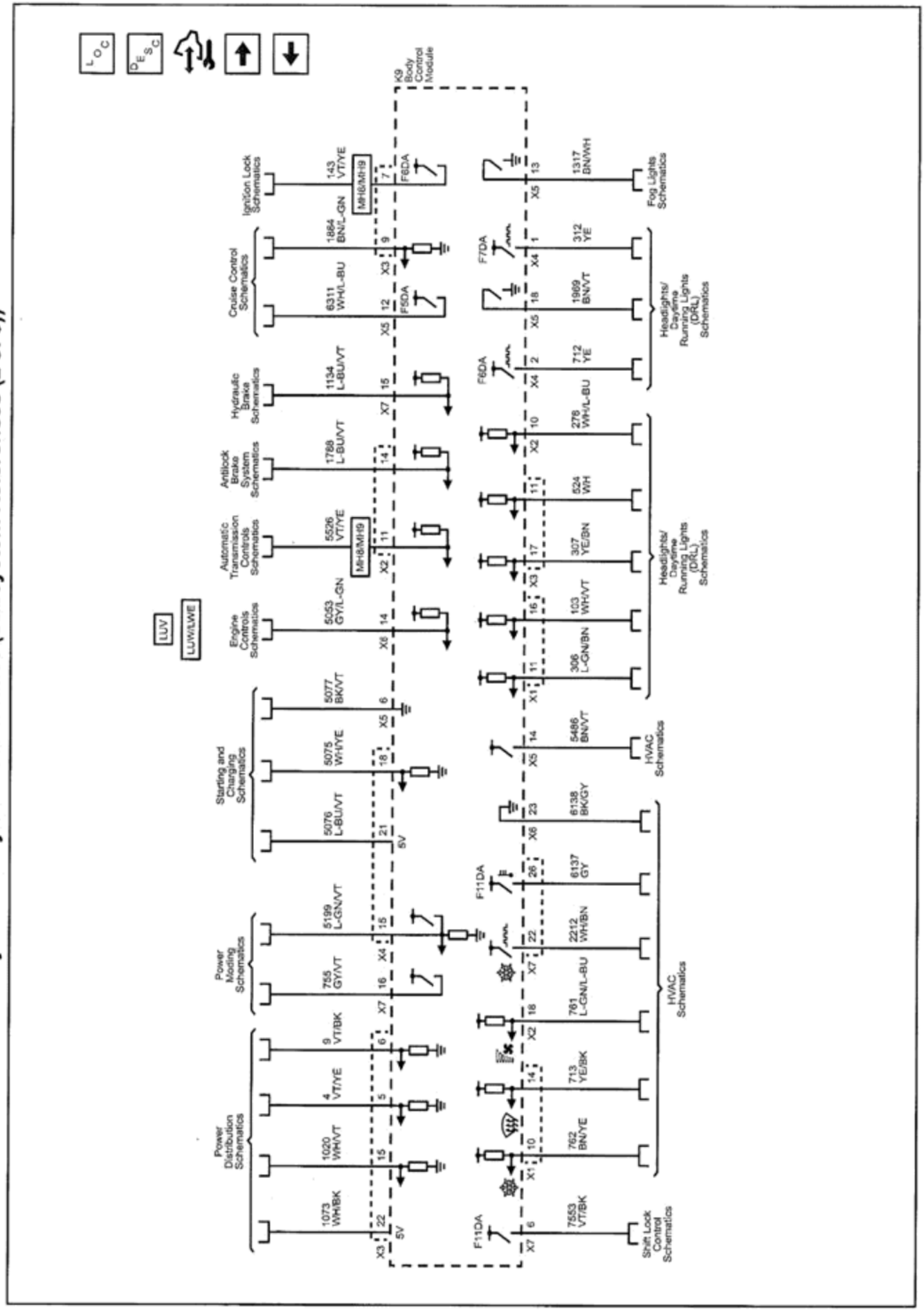
## Data Communication Schematics (Communication Enable and Linear Interconnect Network (LIN))



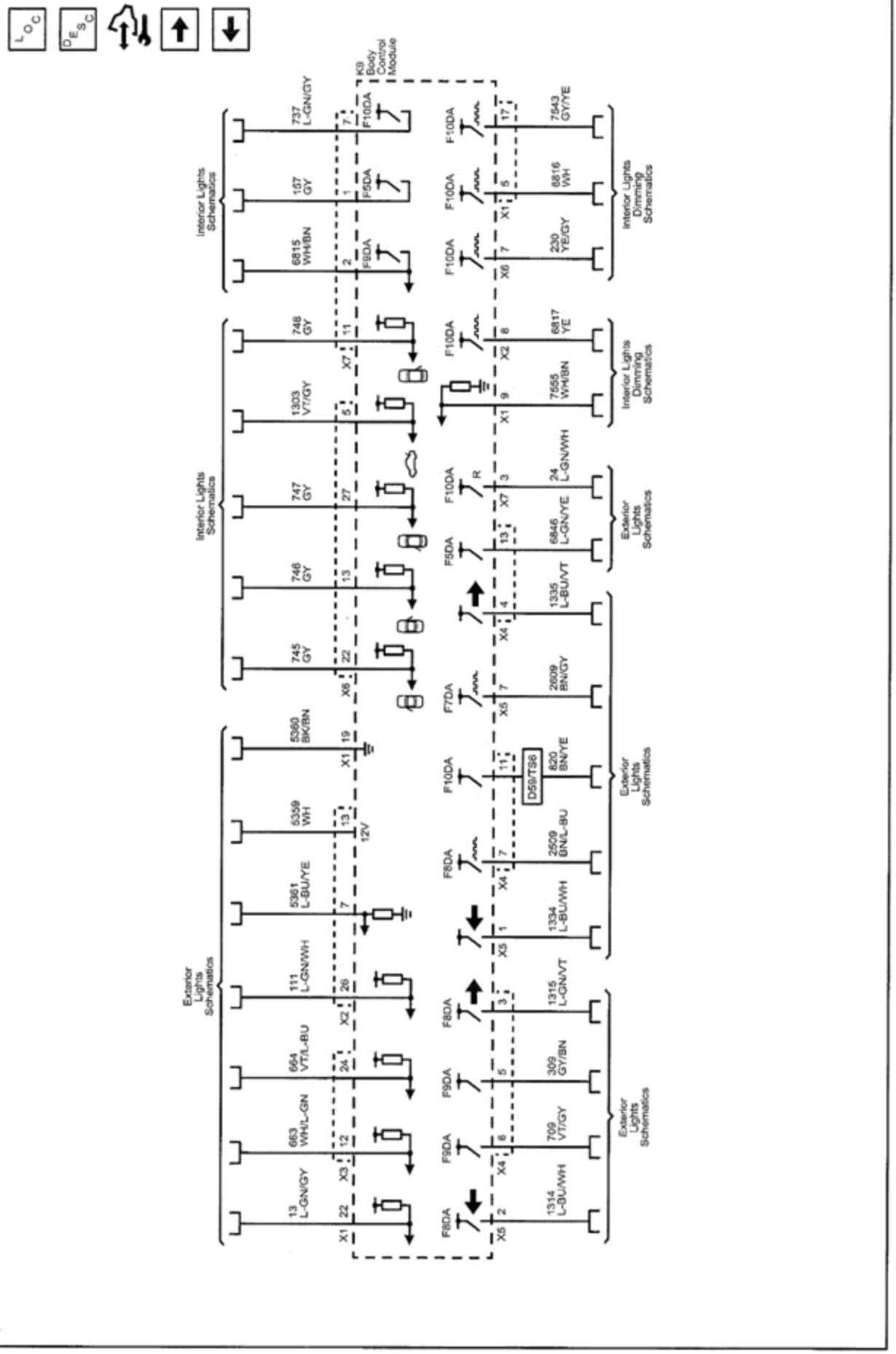
## Body Control System Schematics (Power, Ground, Data Communications, and Subsystem References (1 of 5))



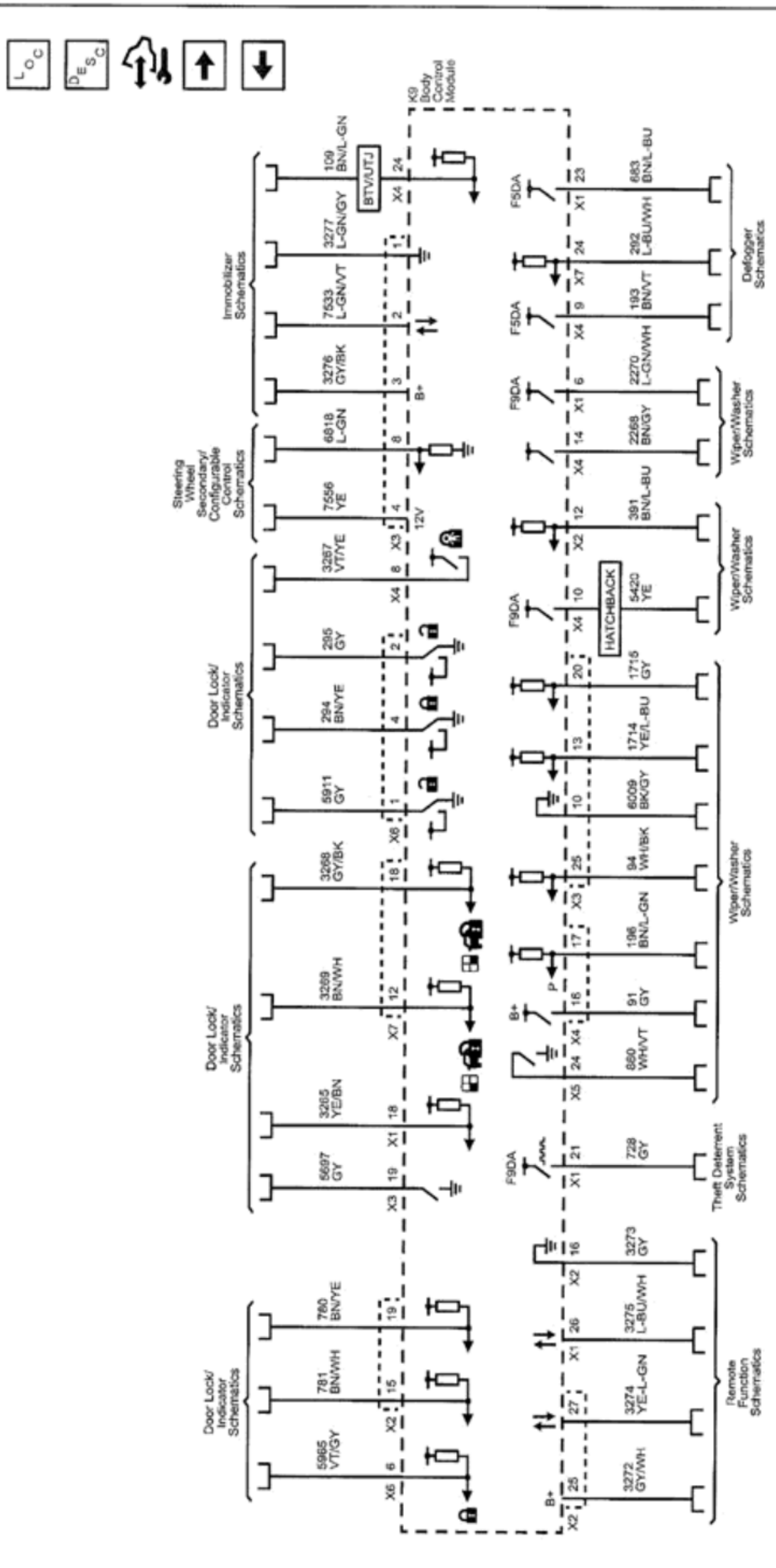
## Body Control System Schematics (Subsystem References (2 of 5))



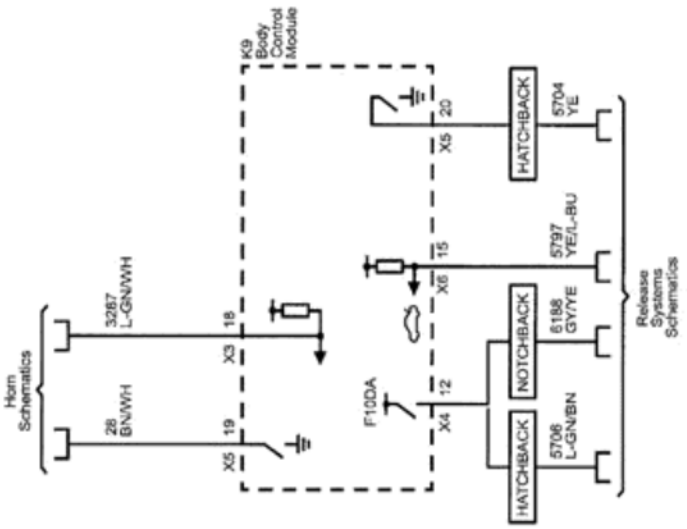
## Body Control System Schematics (Subsystem References (3 of 5))



## Body Control System Schematics (Subsystem References (4 of 5))



## Body Control System Schematics (Subsystem References (5 of 5))




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# 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 on page 6-85.*

### Control Module U Code List

| DTC | DTC Descriptor |
|---|---|
| U0001 | High Speed CAN Bus Malfunction |
| U0002 | High Speed CAN Bus |
| U0020 | Low Speed CAN Bus |
| U0028 | MOST Bus |
| U0029 | MOST Bus Performance |
| U0073 | Control Module Communication Bus A 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 |
| U0100 | Lost Communication With Engine Control Module |
| 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 |
| U0109 | Lost Communication with Fuel Pump Control Module |
| 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 |
| U0115 | Lost Communication with ECM 2 |
| 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 |
| 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 |
| U0136 | Lost Communication With Differential Control Module - Rear |

## Control Module U Code List (cont'd)

| DTC | DTC Descriptor |
|---|---|
| U0137 | Lost Communication with Trailer Brake Control Module |
| U0139 | Lost Communication With Suspension Control Module |
| U0140 | Lost Communication With Body Control Module |
| U0146 | Lost Communication with Gateway |
| 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 |
| 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 |
| 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 Memory Seat 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 |
| 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 *(with UGN)* |
| U0248 | Lost Communication with Remote Accessory Module |
| U0249 | Lost Communication With Rear Radio Audio Control Module |
| 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 |

## Control Module U Code List (cont'd)

| DTC | DTC Descriptor |
|---|---|
| U0257 | Lost Communication With Info Display Module/Infotainment Faceplate Control Module |
| U0264 | Lost Communication With Camera Module - Rear |
| U0265 | Lost Communication with Front Short Range Object Sensor 1 (left corner) |
| U0268 | Lost Communication with Front Short Range Object Sensor 2 (right corner) |
| 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 |
| U0293 | Lost Communication with Hybrid Powertrain Control Module |
| U029D | Lost Communication with NOx Sensor 1 Module |
| U029E | Lost Communication with NOx Sensor 2 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| U0452 | Invalid Data Received From Inflatable Restraint Sensing and Diagnostic Module |
| U0465 | Invalid Data Received From Power Take-Off Control Module |
| U0499 | Invalid Data Received From Telematic Control Module |
| U053B | Invalid Data Received From Active Safety Control Module |
| U056B | Invalid Data Received From Camera Module - Front |
| U0594 | Invalid Data Received From Hybrid/EV Powertrain Control Module |
| U1501 | LIN Bus 1 |
| U1502 | LIN Bus 2 |
| U1505 | LIN Bus 5 |
| U150E | LIN Bus 14 |
| U150F | LIN Bus 15 |

## Control Module U Code List (cont'd)

| DTC | DTC Descriptor |
|---|---|
| U1510 | (K9 Body Control Module) LIN Bus 1 Lost Communication With Device 0 (B67 Ultrasonic Intrusion Sensor) |
| | (K33 HVAC Control Module) LIN Bus 1 Lost Communication With Device 0 (A26 HVAC Controls) |
| | (A11 Radio) LIN Bus 1 Lost Communication with Device 0 (A20 Radio/HVAC Control) |
| | (P16 Instrument Cluster) LIN Bus 1 Lost Communication with Device 0 (S70R Steering Wheel Controls Switch - Right) |
| U1511 | (K26 Headlamp Control Module / K28 Headlamp Leveling Control Module) LIN Bus 1 Lost Communication With Device 1 (E13L Headlamp - Left) |
| | (K40 Seat Memory Control Module) LIN Bus 1 Lost Communication With Device 1 (K99 Steering Column Position Control Module) |
| U1512 | (K26 Headlamp Control Module / K28 Headlamp Leveling Control Module) LIN Bus 1 Lost Communication With Device 2 (E13R Headlamp - Right) |
| U1513 | (K26 Headlamp Control Module / K28 Headlamp Leveling Control Module) LIN Bus 1 Lost Communication With Device 3 (E13L Headlamp - Left) |
| U1514 | (K26 Headlamp Control Module / K28 Headlamp Leveling Control Module) LIN Bus 1 Lost Communication With Device 4 (E13R Headlamp - Right) |
| U1515 | (K9 Body Control Module) LIN Bus 1 Lost Communication With Device 5 (M75 Windshield Wiper Motor) |
| U1516 | (K9 Body Control Module) LIN Bus 1 Lost Communication With Device 6 (B110 Battery Sensor Module) |
| U1517 | (K9 Body Control Module) LIN Bus 1 Lost Communication With Device 7 (K62 Sunroof Sunshade Motor Module) |
| U1518 | (P16 Instrument Cluster) LIN Bus 1 Lost Communication with Device 8 (P29 Head-Up Display) |
| U1519 | (K40 Seat Memory Control Module) LIN Bus 1 Lost Communication With Device 9 (S52 Outside Rearview Mirror Switch) |
| | (K40 Seat Memory Control Module) LIN Bus 1 Lost Communication With Device 9 (K96 Mirror Control Module / K96L Mirror Control Module – Left) |
| U151A | (K9 Body Control Module) LIN Bus 1 Lost Communication With Device 10 (B117 Rain Sensor) |
| U151B | (K9 Body Control Module) LIN Bus 1 Lost Communication With Device 11 (K61 Sunroof Control Module) |
| | (K40 Seat Memory Control Module) LIN Bus 1 Lost Communication With Device 11 (S79P Window Switch - Passenger) |
| U151C | (K33 HVAC Control Module) LIN Bus 1 Lost Communication With Device 0 (K33A HVAC Control Module – Auxiliary) |
| U1520 | (K9 Body Control Module) LIN Bus 2 Lost Communication With Device 0 (P25 Power Sounder Content Theft Deterrent Alarm Module) |
| U1521 | (K26 Headlamp Control Module / K28 Headlamp Leveling Control Module) LIN Bus 2 Lost Communication With Device 1 (E13L Headlamp - Left) |
| U1522 | (K9 Body Control Module) LIN Bus 2 Lost Communication With Device 2 (K65 Tire Pressure Indicator Module) |
| | (K26 Headlamp Control Module / K28 Headlamp Leveling Control Module) LIN Bus 2 Lost Communication With Device 2 (E13R Headlamp - Right) |
| U1523 | (K26 Headlamp Control Module / K28 Headlamp Leveling Control Module) LIN Bus 2 Lost Communication With Device 3 (E13L Headlamp - Left) |
| U1524 | (K9 Body Control Module) LIN Bus 2 Lost Communication With Device 4 (K29F Seat Heating Control Module – Front) |
| | (K26 Headlamp Control Module / K28 Headlamp Leveling Control Module) LIN Bus 2 Lost Communication With Device 4 (E13R Headlamp - Right) |
| U1526 | (K9 Body Control Module) LIN Bus 2 Lost Communication With Device 6 (K29R Seat Heating Control Module – Rear) |
| U152C | (K9 Body Control Module) LIN Bus 2 Lost Communication With Device 12 (K18 Compass Module) |
| U152D | (K9 Body Control Module) LIN Bus 2 Lost Communication With Device 13 (P2 Transmission Shift Lever Position Indicator) |
| U1530 | (K9 Body Control Module) LIN Bus 3 Lost Communication With Device 0 (M74P Window Motor - Passenger) |

## Control Module U Code List (cont'd)

| DTC | DTC Descriptor |
|---|---|
| U1531 | (K26 Headlamp Control Module / K28 Headlamp Leveling Control Module) LIN Bus 3 Lost Communication with Device 1 (E13LA Headlamp Assembly - Left) |
| U1532 | (K26 Headlamp Control Module / K28 Headlamp Leveling Control Module) LIN Bus 3 Lost Communication with Device 2 (E13RA Headlamp Assembly - Right) |
| U1534 | (K9 Body Control Module) LIN Bus 3 Lost Communication With Device 4 (M74D Window Motor - Driver) |
| U1538 | (K9 Body Control Module) LIN Bus 3 Lost Communication With Device 8 (S79D Window Switch - Driver) |
| U153A | (K9 Body Control Module) LIN Bus 3 Lost Communication With Device 10 (S79P Window Switch - Passenger) |
| U1540 | (K9 Body Control Module) LIN Bus 4 Lost Communication With Device 0 (M74RR Window Motor - Right Rear) |
| U1544 | (K9 Body Control Module) LIN Bus 4 Lost Communication With Device 4 (M74LR Window Motor - Left Rear) |
| U1548 | (K9 Body Control Module) LIN Bus 4 Lost Communication With Device 8 (S79LR Window Switch - Left Rear) |
| U154A | (K9 Body Control Module) LIN Bus 4 Lost Communication With Device 10 (S79RR Window Switch - Right Rear) |
| U154B | (K9 Body Control Module) LIN Bus 4 Lost Communication With Device 11 (K49 Rear Seat Control Module) |
| U1556 | (K38 Chassis Control Module) LIN Bus 5 Lost Communication with Device 6 (K133 Trailer Brake Power Control Module) |
| U15E1 | (A11 Radio) LIN Bus 14 Lost Communication with Device 1 (A26 HVAC Controls) |
| U15E3 | (A11 Radio) LIN Bus 14 Lost Communication with Device 3 |
| U15F0 | (K74 Human Interface Control Module) LIN Bus 15 Lost Communication with Device 0 (P17 Info Display Module) |
| U1793 | 14V Power Module Lost Communication with Hybrid Powertrain Control Module on Powertrain Expansion Communication Bus |
| U1795 | 14V Power Module Powertrain Expansion Communication Bus Off |
| U179A | Lost Communication with Hybrid Powertrain Control Module 2 |
| U1803 | Lost Communication with Hybrid Powertrain Control Module 2 |
| U1806 | Battery Energy Control Module High Voltage Energy Management Communication Bus Off |
| U1807 | Battery Charger Control Module High Voltage Energy Management Communication Bus Off |
| U180A | Electric A/C Compressor Control Module High Speed Communication Bus Off |
| U180B | Battery Energy Control Module High Speed Communication Bus Off |
| U180C | Battery Charger Control Module High Speed Communication Bus Off |
| U180D | Electronic Brake Control Module Chassis Expansion Communication Bus Off |
| U1811 | Battery Energy Control Module Powertrain Expansion CAN Bus Off |
| U1814 | Powertrain Wake Up Communication Circuit Short to Battery |
| U1814 | Powertrain Wake Up Communication Circuit Short to Ground |
| U1815 | Lost Communication with Drive Motor Control Module A on Powertrain Expansion Communication Bus |
| U1816 | Lost Communication with Drive Motor Control Module B on Powertrain Expansion Communication Bus |
| U1817 | Lost Communication with Hybrid Powertrain Control Module on Powertrain Expansion Communication 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 Bus B (Chassis Expansion Bus) |
| U1827 | Lost Communication With Steering Angle Sensor Module on Bus B (Chassis Expansion Bus) |
| U182A | Hybrid Powertrain Control Module Lost Communication with Battery Energy Control Module on Powertrain Expansion CAN Bus |

## Control Module U Code List (cont'd)

| DTC | DTC Descriptor |
|---|---|
| U182D | Lost Communication with Hybrid Powertrain Control Module 2 on Powertrain Expansion Communication Bus |
| U182E | Drive Motor Control Module 1 Lost Communication with Hybrid Powertrain Control Module 2 on Powertrain Expansion Communication Bus |
| U182F | Drive Motor Control Module 2 Lost Communication with Hybrid Powertrain Control Module 2 on Powertrain Expansion Communication Bus |
| U1831 | Drive Motor Control Module 1 Lost Communication with Hybrid Powertrain Control Module on Powertrain Expansion CAN Bus |
| U1833 | Lost Communication with Electronic Brake Control Module on Chassis Expansion Communication Bus |
| U1838 | Lost Communication with Battery Charger Control Module on High Voltage Energy Management Communication Bus |
| U1839 | Auxiliary Transmission Fluid Pump Control Module Lost Communication with Engine Control Module |
| U183A | Lost Communication with OnStar Module |
| U183B | Auxiliary Transmission Fluid Pump Control Module Lost Communication with Transmission Control Module |
| U183C | Auxiliary Transmission Fluid Pump Control Module Lost Communication with Hybrid Powertrain Control Module 2 on Powertrain Expansion Communication Bus |
| U183E | Lost Communication with OnStar Module on Low Speed Communication Bus |
| U1844 | Battery Energy Control Module Lost Communication with Hybrid Powertrain Control Module on Powertrain Expansion Communication Bus |
| U1845 | Drive Motor Control Module 1 Lost Communication with Hybrid Powertrain Control Module |
| U1846 | Drive Motor Control Module 2 Lost Communication with Hybrid 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 Electronic Climate Control Module on Low Speed Communication Bus |
| U184C | Lost Communication with Instrument Cluster on Low Speed Communication Bus |
| U184D | Lost Communication with Radio on Low Speed Communication Bus |
| U184E | Lost Communication with Inflatable Restraint Sensing and Diagnostic Module on Low Speed Communication 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 Powertrain Control Module on Chassis Expansion Communication Bus |
| U185A | Lost Communication with Battery Energy Control Module on High Voltage Energy Management Communication Bus |
| U185B | Battery Energy Control Module Lost Communication with Hybrid Powertrain Control Module 2 on High Voltage Energy Management Communication Bus |
| U185C | Battery Charger Control Module Lost Communication with Hybrid Powertrain Control Module 2 on High Voltage Energy Management Communication 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 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 |

## Control Module U Code List (cont'd)

| DTC | DTC Descriptor |
|---|---|
| U1879 | Drive Motor Control Module 2 Lost Communication with Engine Control Module |
| U1885 | Battery Energy Control Module Lost Communication with Hybrid Powertrain Control Module |
| U1886 | Battery Energy Control Module Lost Communication with Engine Control Module |
| U1888 | Hybrid 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 |
| U18B9 | Primary High Speed CAN Bus Subnet Configuration List |
| U18BF | Secondary High Speed CAN Bus Subnet Configuration List |
| U1900 | Lost Communication With Speech to Text Interface Module |
| U1901 | Lost Communication With Front Controls Multifunction Interface 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 Configuration List |
| 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 Integrated Module |
| U2144 | Lost Communication with Distance Sensing Cruise 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 |
| U2501 | Invalid Data Received From Hybrid 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 |
| U2602 | Battery Energy Control Module Lost Communication with Hybrid Powertrain Control Module 2 |
| U2603 | Battery Energy Control Module Lost Communication with Hybrid Battery Interface Control Module 1 |
| U2604 | Battery Energy Control Module Lost Communication with Hybrid Battery Interface Control Module 2 |
| U2605 | Battery Energy Control Module Lost Communication with Hybrid Battery Interface Control Module 3 |

## Control Module U Code List (cont'd)

| DTC | DTC Descriptor |
|---|---|
| U2606 | Battery Energy Control Module Lost Communication with Hybrid Battery Interface Control Module 4 |
| U2608 | Electric A/C Compressor Control Module Lost Communication with Hybrid Powertrain Control Module |
| U2609 | Battery Charger Control Module Lost Communication with Hybrid Powertrain Control Module |
| U2611 | Auxiliary Transmission Fluid Pump Control Module Lost Communication with Hybrid Powertrain Control Module |
| U2612 | Battery Charger Control Module Lost Communication with Hybrid 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 |
| 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 |

# DTC B1000

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptor

**DTC B1000:** Electronic Control Unit

For symptom byte information, refer to *Symptom Byte List on page 6-85*.

## 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.

## 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 on page 11-4*
- *Control Module References on page 6-3*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool Reference

*Control Module References on page 6-3* 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 on page 6-92* after completing the repair.

*Control Module References on page 6-3* for device replacement, programming and setup

# DTC B1001

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptor

**DTC B1001:** Option Configuration

For symptom byte information, refer to *Symptom Byte List on page 6-85*.

## 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 on page 11-4*
- *Control Module References on page 6-3*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool Reference

*Control Module References on page 6-3* for scan tool information

## Circuit/System Verification

1. Ignition ON.
2. Verify DTC B1001 is not set.

⇒ **If DTC B1001 is set**

2.1. Program the device that set the DTC.

2.2. Verify the DTC does not set.

⇒ If the DTC sets, replace the device that set the DTC.

⇓ If the DTC does not set

2.3. All OK.

⇓ **If DTC B1001 is not set**

3. All OK

## Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

*Control Module References on page 6-3* for device replacement, programming and setup

# DTC B101D

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptor

**DTC B101D:** Electronic Control Unit Hardware

For symptom byte information, refer to *Symptom Byte List on page 6-85*.

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

## Reference Information

### Schematic Reference

- *Data Communication Schematics on page 11-4*
- *Control Module References on page 6-3*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool Reference

*Control Module References on page 6-3* for scan tool information

## Circuit/System Verification

1. Ignition ON.
2. Verify DTC B101D is not set.

⇒ **If DTC B101D is set with symptom byte 43**

2.1. Program the device that set the DTC.

2.2. Verify the DTC does not set.

⇒ If the DTC sets, replace the device that set the DTC.

⇓ If the DTC does not set

2.3. All OK.

⇒ **If DTC B101D is set with any symptom byte, except symptom byte 43**

Replace the device that set the DTC.

⇓ **If DTC B101D is not set**

3. All OK

## Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

*Control Module References on page 6-3* for device replacement, programming and setup

# DTC B101E

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptor

**DTC B101E:** Electronic Control Unit Software

For symptom byte information, refer to *Symptom Byte List on page 6-85*.

## 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.

## 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 on page 11-4*
- *Control Module References on page 6-3*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool Reference

*Control Module References on page 6-3* 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**

Refer to *Diagnostic Trouble Code (DTC) List - Vehicle on page 6-69*.

⇓ **If none of the DTCs are set**

3. Verify DTC B101E is not set.

⇒ **If DTC B101E is set**

3.1. Program the device that set the DTC.

3.2. Verify the DTC does not set.

⇒ If the DTC sets, replace the device that set the DTC.

⇓ If the DTC does not set

3.3. All OK.

⇓ **If DTC B101E is not set**

4. All OK

## Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

*Control Module References on page 6-3* for device replacement, programming and setup

# DTC C056D

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptor

**DTC C056D:** Electronic Control Unit Hardware

For symptom byte information, refer to *Symptom Byte List on page 6-85*.

## 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.

## 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 on page 11-4*
- *Control Module References on page 6-3*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool Reference

*Control Module References on page 6-3* for scan tool information

## Circuit/System Verification

1. Ignition ON.
2. Verify DTC C056D is not set.

⇒ **If DTC C056D is set in a device that can be programmed**

2.1. Program the device that set the DTC.

2.2. Verify the DTC does not set.

⇒ If the DTC sets, replace the device that set the DTC.

⇓ If the DTC does not set

2.3. All OK.

⇒ **If DTC C056D is set in a device that cannot be programmed**

Replace the device that set the DTC.

⇓ **If DTC C056D is not set**

3. All OK

## Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

*Control Module References on page 6-3* for device replacement, programming and setup

# DTC C056E

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptor

**DTC C056E:** Electronic Control Unit Software

For symptom byte information, refer to *Symptom Byte List on page 6-85*.

## 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 on page 11-4*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool References

*Control Module References on page 6-3* for scan tool information

## Circuit/System Verification

1. Ignition ON.
2. Verify DTC C056E is not set.

⇒ **If DTC C056E is set**

2.1. Program the device that set the DTC.

2.2. Verify the DTC does not set.

⇒ If the DTC sets, replace the device that set the DTC.

⇓ If the DTC does not set

2.3. All OK.

⇓ **If DTC C056E is not set**

3. All OK

## Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

*Control Module References on page 6-3* for device replacement, programming and setup

# DTC P0601-P0604, P0606, or P062F

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptor

**DTC P0601 00:** Control Module Read Only Memory Performance Malfunction
**DTC P0602 00:** Control Module Not Programmed Malfunction
**DTC P0603 00:** Control Module Long Term Memory Reset Malfunction
**DTC P0604 00:** Control Module Random Access Memory Performance Malfunction
**DTC P0606 00:** Control Module Processor Performance Malfunction
**DTC P062F 00:** Control Module Long Term Memory Performance Malfunction

## 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, P0602, P0603, P0604, P0606, and P062F are Type A DTCs.

## Conditions for Clearing the DTC

DTCs P0601, P0602, P0603, P0604, P0606, and P062F are Type A DTCs.

## Diagnostic Aids

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

## Reference Information

### Schematic Reference

*Data Communication Schematics on page 11-4*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### DTC Type Reference

*Powertrain Diagnostic Trouble Code (DTC) Type Definitions on page 6-68*

### Scan Tool References

*Control Module References on page 6-3* for scan tool information

## Circuit/System Verification

1. Ignition ON.
2. Verify DTC P0602 is not set.

⇒ **If DTC P0602 is set**

2.1. Program the device that set the DTC.
2.2. Verify the DTC does not set.

⇒ If the DTC sets, replace the device that set the DTC.

⇓ If the DTC does not set

2.3. All OK.

⇓ **If DTC P0602 is not set**

3. Verify DTC P0601, P0603, P0604, P0606, or P062F is not set.

⇒ **If DTC P0601, P0603, P0604, P0606, or P062F is set**

Replace the device that set the DTC.

⇓ **If DTC P0601, P0603, P0604, P0606, or P062F is not set**

4. All OK

## Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

*Control Module References on page 6-3* for device replacement, programming and setup

# DTC U0001

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptor

**DTC U0001 00:** High Speed CAN Communication Bus Malfunction

## Circuit Description

Devices connected to the GMLAN serial data circuits monitor for serial data communications on the GMLAN network during normal vehicle operation. Operating information and commands are exchanged among the devices. Each device on GMLAN network maintains a transmit error counter and a receive error counter. The counter values increase with detected errors and will decrease with error-free messages. If the transmit error counter value exceeds 255 the device removes itself from the network and a DTC U0001 will be set.

## Conditions for Running the DTC

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

## Conditions for Setting the DTC

A certain number of no valid transmitted messages on the GMLAN serial data circuits are detected by the device.

## Action Taken When the DTC Sets

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

## Circuit/System Verification

This DTC may not be retrieved with a current status. Diagnosis is accomplished via the symptom, Scan Tool Does Not Communicate with High Speed GMLAN Device. Refer to *Scan Tool Does Not Communicate with High Speed GMLAN Device on page 11-58* in order to isolate an intermittent condition caused by a short on the GMLAN serial data circuits.

# DTC U0020

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptors

**DTC U0020 00:** Low Speed CAN Communication Bus Performance Malfunction

## 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 indication of the transmitter device.

DTC U0020 will set when fewer devices are detected on the bus before the devices can learn the other device IDs. If the communication bus is opened, or if the device power supply is lost when the vehicle is in the OFF power mode, and then placed in the RUN power mode, U0020 will set in specific devices.

## 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 on page 11-62* or *Diagnostic Trouble Code (DTC) List - Vehicle on page 6-69*.

# DTC U0073 or U2100

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptors

**DTC U0073 00:** Control Module Communication Bus Off Malfunction

**DTC U2100 00:** CAN Bus Communication Malfunction

## 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 seconds.

## 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 seconds 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 on page 11-66* to determine which serial data communication system is used for a specific device.
2. This DTC may not be retrieved with a current status. Diagnosis is accomplished using the symptom. Refer to *Symptoms - Data Communications on page 11-51*.

# DTC U0074

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptor

**DTC U0074 00:** Control Module Communication Bus B Off Malfunction

## Diagnostic Fault Information

| Circuit | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|---|---|---|---|---|
| Chassis High Speed GMLAN Serial Data (+) | U0074 | U0074, U0100–U02FF* | U0074 | — |
| Chassis High Speed GMLAN Serial Data (-) | U0074 | U0074, U0100–U02FF* | U0074 | — |
| Ground (DLC, 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 chassis high speed GMLAN serial data circuit may allow degraded communication between the devices.

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.

## 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

- Use the *Data Link References on page 11-66* to identify the chassis 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 chassis 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 on page 11-4*
- *Control Module References on page 6-3*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool Reference

*Control Module References on page 6-3* 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 on page 11-66* to determine how many devices should be communicating on the 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 meters (9.8 feet) away from vehicle. Disconnect the scan tool from the X84 data link connector. The following tests will be done at the X84 data link connector. It may take up to 2 minutes for all vehicle systems to power down.
4. Test for less than 10 Ω between the ground circuit terminal 5 and ground.

⇒ **If 10 Ω or greater**

4.1. Ignition OFF.

4.2. 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:
   - Chassis high speed GMLAN serial data terminal 12
   - Chassis high speed GMLAN serial data 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 meters (9.8 feet) away from vehicle. It may take up to 2 minutes for all vehicle systems to power down.
8. Test for greater than 100 Ω between the serial data circuits listed below and ground:
   - Chassis high speed GMLAN serial data terminal 12
   - Chassis high speed GMLAN serial data 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**

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

Use the schematic to identify the following:

- Chassis high speed GMLAN devices the vehicle is equipped with
- Chassis high speed GMLAN serial data circuit terminating resistors
- 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

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 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**

2.1. Ignition OFF.

2.2. 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**

4.1. Ignition OFF.

4.2. 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 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 chassis 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 chassis 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 DLC 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 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 chassis 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.
5. Disconnect the harness connectors with the chassis 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**

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 chassis 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 chassis 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 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 at an easily accessible device that is not communicating.
3. Test for less than 10 Ω between each ground circuit terminal and ground.

⇒ **If 10 Ω or greater**

3.1. Ignition OFF.

3.2. 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**

4.1. Ignition OFF.

4.2. 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**

4.1. Ignition OFF.

4.2. 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**

6.1. Ignition OFF.

6.2. 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**

6.1. Ignition OFF.

6.2. 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**

7.1. Ignition OFF, disconnect the harness connectors at the control module that controls the ignition circuit.

7.2. 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

7.3. 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 meters (9.8 feet) away from vehicle. It may take up to 2 minutes for all vehicle systems to power down.
9. Test for less than 130 Ω between each pair of chassis high speed GMLAN serial data circuits at the device connector that was just disconnected.

⇒ **If any pair of serial data circuits is greater than 130 Ω**

Repair the open/high resistance in the serial data circuits between the disconnected device and the circuit splice in the serial data circuits.

⇓ **If each pair of serial data circuits is 130 Ω or less**

10. Replace the device that was disconnected.

## Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

- *GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs on page 11-606*
- *Control Module References on page 6-3* for device replacement, programming and setup

# DTC U0078

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptor

**DTC U0078 00:** Control Module Low Speed Communication Bus Off Malfunction

## 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 seconds.

## 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.
- 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 on page 11-62*.

⇓ **If DTC U0078 is not set**

3. All OK

# DTC U0100-U02FF

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptor

For device DTC descriptors, refer to *Control Module U Code List on page 11-13.*

## 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 (+) | U0074, U0077 | U0100–U02FF | U0074, U0077 | — |
| Chassis High Speed GMLAN Serial Data (−) | U0074, U0077 | U0100–U02FF | U0074, U0077 | — |
| Mid Speed GMLAN Serial Data (+) | U0074 | U0100–U02FF | U0074 | — |
| Mid Speed GMLAN Serial Data (−) | U0074 | U0100–U02FF | U0074 | — |
| High Speed GMLAN Serial Data (+) | U0073, 2 | U0100–U02FF | U0073, 2 | — |
| 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<br>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 DTCs. 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 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.
- 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 on page 11-66* 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.

## Reference Information

### Schematic Reference

- *Data Communication Schematics on page 11-4*
- *Control Module References on page 6-3*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool Reference

*Control Module References on page 6-3* for scan tool information

## Circuit/System Verification

1. Determine the device that is not communicating. Refer to *Control Module U Code List on page 11-13*.
2. Verify that DTC U0073, U2100, U0074, 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**

Refer to *Diagnostic Trouble Code (DTC) List - Vehicle on page 6-69*.

⇓ **If none of the DTCs are set**

3. Verify that DTCs U0125 and U0126 are not set.

⇒ **If both of the DTCs are set together**

Refer to *Scan Tool Does Not Communicate with Chassis High Speed GMLAN Device on page 11-53*.

⇓ **If both of the DTCs are not set together**

4. Engine running for 10 seconds.
5. Ignition ON, engine OFF, verify that DTC U0100-U02FF is not set.

⇒ **If the DTC U0100-U02FF is set in any device, except the K17 Electronic Brake Control Module**

Refer to Circuit/System Testing.

⇒ **If the DTC U0100-U02FF is set in the K17 Electronic Brake Control Module with any symptom byte, except symptom bytes 71, 72, and 74**

Refer to Circuit/System Testing.

⇒ **If the DTC U0100-U02FF is set in the K17 Electronic Brake Control Module with symptom byte 71, 72, or 74 along with other DTCs set**

Diagnose all other DTCs first. Refer to *Diagnostic Trouble Code (DTC) List - Vehicle on page 6-69*.

⇒ **If the DTC U0100-U02FF is set in the K17 Electronic Brake Control Module with symptom byte 71, 72, or 74 and without other DTCs set**

5.1. Program the K17 Electronic Brake Control Module.

5.2. Verify the DTC does not set.

⇒ If the DTC sets, replace the K17 Electronic Brake Control Module.

⇓ If the DTC does not set

5.3. All OK.

⇓ **If the DTC U0100-U02FF is not set**

6. All OK.

## 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 meters (9.8 feet) away from vehicle. Disconnect all the harness connectors at the device that is not communicating. 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**

2.1. Ignition OFF.

2.2. 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**

4.1. Ignition OFF.

4.2. 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**

4.1. Ignition OFF.

4.2. 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 and ground.

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

6.1. Ignition OFF.

6.2. 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**

6.1. Ignition OFF.

6.2. 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. Ignition ON.

8. 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**

8.1. Ignition OFF, disconnect the harness connectors at the control module that controls the ignition circuit.

8.2. 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

8.3. 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:** This test step is only applicable to low speed GMLAN devices.

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

⇒ **If 4.5 V or greater**

Refer to *Scan Tool Does Not Communicate with Low Speed GMLAN Device on page 11-62* to test for a short to voltage in the serial data circuit.

⇩ **If less than 4.5 V**

10. 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.
11. Test for less than 2 Ω in each of the serial data circuits end to end between the device harness connector and the 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
    - Mid speed GMLAN serial data circuit terminal 3 or 11
    - 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 high speed GMLAN devices.

12. 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 on page 11-58* 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 on page 11-58* to test for an open/high resistance in the serial data circuit.

⇩ **If between 110–130 Ω**

13. Replace the device that is not communicating.

## Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

- *GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs on page 11-606*
- *Control Module References on page 6-3* for device replacement, programming and setup

# DTC U0300-U0336

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptor

Refer to *Control Module U Code List on page 11-13*.

## 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.

## 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 on page 11-4*
- *Control Module References on page 6-3*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool Reference

*Control Module References on page 6-3* for scan tool information

## Circuit/System Verification

1. Ignition ON.
2. Verify DTC U0300-U0336 is not set.

⇒ **If DTC U0300-U0336 is set**

2.1. Program the device specified by the DTC descriptor.

2.2. Verify the DTC does not set.

⇒ If the DTC sets, replace the device specified by the DTC descriptor.

⇓ If the DTC does not set

2.3. All OK.

⇓ **If DTC U0300-U0336 is not set**

3. All OK

## Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

*Control Module References on page 6-3* for device replacement, programming and setup

# DTC U0400-U05FF

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptor

Refer to *Control Module U Code List on page 11-13*.

## 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.

## 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 on page 11-4*
- *Control Module References on page 6-3*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool Reference

*Control Module References on page 6-3* for scan tool information

## Circuit/System Verification

1. Engine running for 10 seconds.
2. Ignition ON, engine OFF, verify DTC U0400-U05FF is not set.

⇒ **If DTC U0400-U05FF is set along with other DTCs set**

Diagnose all other DTCs first. Refer to *Diagnostic Trouble Code (DTC) List - Vehicle on page 6-69*.

⇒ **If DTC U0400-U05FF is set without other DTCs set**

2.1. Program the device specified by the DTC descriptor.

2.2. Verify the DTC does not set.

⇒ If the DTC sets, replace the appropriate device.

⇓ If the DTC does not set

2.3. All OK.

⇓ **If DTC U0400-U05FF is not set**

3. All OK

## Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

*Control Module References on page 6-3* for device replacement, programming and setup

# DTC U1500-U15FF

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptor

For device DTC descriptors, refer to *Control Module U Code List on page 11-13*.

## 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 serial data is transmitted over a Local Interconnect Network (LIN) single wire network circuit bus 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, a no communication code against the non-communicating LIN device will be set. A master control module is the one that reports the non communication code. A loss of serial data communications DTC does not represent a failure of the master control module that set it.

## 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 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.

## Reference Information

### Schematic Reference

- *Data Communication Schematics on page 11-4*
- *Control Module References on page 6-3*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool Reference

*Control Module References on page 6-3* for scan tool information

## Circuit/System Verification

1. Determine the LIN device that is not communicating. Refer to *Control Module U Code List on page 11-13*.
2. Verify that 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 on page 6-69*.

⇓ **If none of the DTCs are set**

3. Refer to Circuit/System Testing.

## Circuit/System Testing

**Note:** 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 meters (9.8 feet) away from vehicle. Disconnect the harness connector at a LIN device that is not communicating. 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**

2.1. Ignition OFF.

2.2. 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. Verify a test lamp illuminates between each B+ circuit terminal and ground, if equipped.

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

4.1. Ignition OFF.

4.2. 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**

4.1. Ignition OFF.

4.2. 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. Ignition ON.
6. Verify a test lamp illuminates between each ignition circuit terminal and ground, if equipped.

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

6.1. Ignition OFF.

6.2. 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**

6.1. Ignition OFF.

6.2. 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**

7. Ignition ON.
8. Verify a test lamp illuminates between each ignition circuit terminal, which is controlled by a control module, and ground, if equipped.

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

8.1. Ignition OFF, disconnect the harness connectors at the control module that controls the ignition circuit.

8.2. 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

8.3. 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**

9. Ignition ON.

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

10. Test for 2–13 V between the LIN serial data circuit terminal and ground.

⇒ **If less than 2 V**

10.1. 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.

10.2. Test for infinite resistance between the serial data circuit and ground.

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

⇓ If infinite resistance

10.3. 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

10.4. Reconnect the control module that set the DTC, ignition ON.

10.5. Test for 2–13 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 13 V**

10.1. 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.

10.2. Ignition ON.

10.3. 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

10.4. Ignition OFF, reconnect the control module that set the DTC, ignition ON.

10.5. Test for 2–13 V between the LIN serial data circuit terminal and ground.

⇒ If greater than 13 V, replace the control module setting the DTC.

⇒ If less than 13 V, replace the LIN device that causes a current DTC to set when connected.

⇓ **If between 2–13 V**

11. Replace the disconnected LIN device.

## Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

- *GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs on page 11-606*
- *Control Module References on page 6-3* for device replacement, programming and setup

# DTC U1814

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptor

**DTC U1814 00:** Powertrain Wake-Up Communication Circuit Malfunction
**DTC U1814 02:** Powertrain Wake-Up Communication Circuit Short to Ground

## Diagnostic Fault Information

| Circuit | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|---|---|---|---|---|
| Ignition | U1814 02* | U0100-U02FF | — | — |
| * Vehicle will not start. | | | | |

## Circuit/System Description

The body control module (BCM) activates the igntion 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 on page 11-4*
- *Control Module References on page 6-3*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool Reference

*Control Module References on page 6-3* 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 22 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 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 on page 6-92* after completing the repair.

- *GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs on page 11-606*
- *Control Module References on page 6-3* for device replacement, programming and setup

# DTC U18B9-U18BF

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides 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 on page 6-85*.

## 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

- The device is not configured properly.
- Control unit recognises 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 on page 11-4*
- *Control Module References on page 6-3*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool Reference

*Control Module References on page 6-3* for scan tool information

## Circuit/System Verification

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 on page 6-69*.

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

2.1. Program the device that set the DTC.

2.2. Ignition OFF, remove the scan tool, open and close the driver door. Wait 60 seconds.

2.3. Verify the DTC does not set.

⇒ If the DTC sets, replace the appropriate device.

⇓ If the DTC does not set

2.4. All OK.

⇓ **If DTC U0400-U05FF is not set**

3. All OK

## Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

*Control Module References on page 6-3* for device replacement, programming and setup

# DTC U2099

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptor

**DTC U2099 00:** High Speed Communication Enable Circuit Malfunction

**DTC U2099 02:** High Speed Communication Enable Circuit Short to Ground

## Diagnostic Fault Information

| Circuit | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|---|---|---|---|---|
| Ignition | U2099 02* | U0100-U02FF | U0100-U02FF | — |
| * Vehicle will 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 on page 11-4*
- *Control Module References on page 6-3*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool Reference

*Control Module References on page 6-3* 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 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 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**

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 on page 6-92* after completing the repair.

- *GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs on page 11-606*
- *Control Module References on page 6-3* for device replacement, programming and setup

# DTC U2101

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## DTC Descriptor

**DTC U2101 00:** CAN Bus Maximum List of Control Modules Malfunction

## Circuit/System Description

Some devices must be programmed with software that specifically identifies the correct type and quantity of devices on the serial data 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

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

## Conditions for Setting the DTC

- 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 on page 11-4*
- *Control Module References on page 6-3*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool Reference

*Control Module References on page 6-3*

## Circuit/System Verification

1. Ignition ON.
2. Verify DTC U2101 is not set.

⇒ **If DTC U2101 is set along with other DTCs set**

Diagnose all other DTCs first. Refer to *Diagnostic Trouble Code (DTC) List - Vehicle on page 6-69*.

⇒ **If DTC U2101 is set without other DTCs set**

2.1. Program the device that set the DTC.

2.2. Clear the DTC.

2.3. Ignition OFF, remove the scan tool, open and close the driver door. Wait 60 seconds.

2.4. Verify the DTC does not set.

⇒ If the DTC sets, replace the appropriate device.

⇓ If the DTC does not set

2.5. All OK.

⇓ **If DTC U2101 is not set**

3. All OK

## Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

*Control Module References on page 6-3* for device replacement, programming and setup

# Symptoms - Data Communications

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

1. Perform the *Diagnostic System Check - Vehicle on page 6-66* 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 on page 11-68*.

## Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the systems. Refer to *Checking Aftermarket Accessories on page 11-525*.
- 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 on page 11-531*.

## Symptom List

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

- *Scan Tool Does Not Power Up on page 11-52*
- *Scan Tool Does Not Communicate with High Speed GMLAN Device on page 11-58*
- *Scan Tool Does Not Communicate with Low Speed GMLAN Device on page 11-62*
- *Scan Tool Does Not Communicate with Chassis High Speed GMLAN Device on page 11-53*

# Scan Tool Does Not Power Up

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## Diagnostic Fault Information

| 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 on page 11-4*
- *Control Module References on page 6-3*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool Reference

*Control Module References on page 6-3* for scan tool information

## Circuit/System Testing

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 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**

2.1. Ignition OFF.

2.2. 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**

4.1. Ignition OFF.

4.2. 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**

4.1. Ignition OFF.

4.2. 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 Chassis High Speed GMLAN Device

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## Diagnostic Fault Information

| Circuit | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|---|---|---|---|---|
| Chassis High Speed GMLAN Serial Data (+) | 1 | U0100–U02FF* | 1 | — |
| Chassis High Speed GMLAN Serial Data (−) | 1 | U0100–U02FF* | 1 | — |
| Ground (DLC, terminal 5) | — | 1 | — | — |

* No communications with one or more chassis high speed GMLAN devices. 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 chassis high speed GMLAN bus functions the same as the primary high speed GMLAN bus, and the two buses operate in parallel. The chassis high speed GMLAN bus is added to reduce message congestion on the primary high speed bus. Since the chassis high speed GMLAN bus and primary high speed GMLAN bus operate in the same manner, the diagnostics for each are the same.

The serial data is transmitted on two twisted wires that allow speeds up to 500 Kb/s. The twisted pair is terminated with two 120 Ω resistors, one is internal to the electronic brake control module 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 chassis high speed GMLAN bus during normal vehicle operation. The chassis high speed GMLAN is a differential bus. The chassis high speed GMLAN serial data bus (+) and chassis 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 chassis high speed GMLAN serial data bus (+) circuit and subtracts 1 V from the chassis 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

- 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 one or more GMLAN serial data systems 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).

## Reference Information

### Schematic Reference

- *Data Communication Schematics on page 11-4*
- *Control Module References on page 6-3*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool Reference

*Control Module References on page 6-3* 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 on page 11-66* to determine how many devices should be communicating on the 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 meters (9.8 feet) away from vehicle. Disconnect the scan tool from the X84 data link connector. The following tests will be done at the X84 data link connector. It may take up to 2 minutes for all vehicle systems to power down.
4. Test for less than 10 Ω between the ground circuit terminal 5 and ground.

⇒ **If 10 Ω or greater**

4.1. Ignition OFF.

4.2. 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 meters (9.8 feet) away from vehicle. It may take up to 2 minutes 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**

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

Use the schematic to identify the following:

- Chassis high speed GMLAN devices the vehicle is equipped with
- Chassis high speed GMLAN serial data circuit terminating resistors
- 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

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 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**

2.1. Ignition OFF.

2.2. 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**

4.1. Ignition OFF.

4.2. 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 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 chassis 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 chassis 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 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 chassis 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.
5. Disconnect the harness connectors with the chassis 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**

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 chassis 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 circuit 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 chassis 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 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 at an easily accessible device that is not communicating.
3. Test for less than 10 Ω between each ground circuit terminal and ground.

⇒ **If 10 Ω or greater**

3.1. Ignition OFF.

3.2. 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**

4.1. Ignition OFF.

4.2. 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**

4.1. Ignition OFF.

4.2. 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**

6.1. Ignition OFF.

6.2. 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**

6.1. Ignition OFF.

6.2. 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**

7.1. Ignition OFF, disconnect the harness connectors at the control module that controls the ignition circuit.

7.2. 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

7.3. 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 meters (9.8 feet) away from vehicle. It may take up to 2 minutes for all vehicle systems to power down.
9. Test for less than 130 Ω between each pair of chassis high speed GMLAN serial data circuits at the device connector that was just disconnected.

⇒ **If any pair of serial data circuits is greater than 130 Ω**

Repair the open/high resistance in the serial data circuits between the disconnected device and the circuit splice in the serial data circuits.

⇓ **If each pair of serial data circuits is 130 Ω or less**

10. Replace the device that was disconnected.

## Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

- *GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs on page 11-606*
- *Control Module References on page 6-3* for device replacement, programming and setup

# Scan Tool Does Not Communicate with High Speed GMLAN Device

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides 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 (DLC, 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 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 serial data is transmitted on two twisted wires that allow speeds up to 500 Kb/s. The twisted pair is terminated with two 120 Ω resistors, one is internal to the 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

- 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 DLC 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 low 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

## Reference Information

### Schematic Reference

- *Data Communication Schematics on page 11-4*
- *Control Module References on page 6-3*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool Reference

*Control Module References on page 6-3* for scan tool information

## Circuit/System Verification

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 on page 11-66* to determine how many devices should be communicating on the 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 meters (9.8 feet) away from vehicle. Disconnect the scan tool from the X84 data link connector. The following tests will be done at the X84 data link connector. It may take up to 2 minutes for all vehicle systems to power down.
4. Test for less than 10 Ω between the ground circuit terminal 5 and ground.

⇒ **If 10 Ω or greater**

4.1. Ignition OFF.
4.2. 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 meters (9.8 feet) away from vehicle. It may take up to 2 minutes for all vehicle systems to power down.
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.

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

2.1. Ignition OFF.

2.2. 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**

4.1. Ignition OFF.

4.2. 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 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 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 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 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.
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**

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 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 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 at an easily accessible device that is not communicating.
3. Test for less than 10 Ω between each ground circuit terminal and ground.

⇒ **If 10 Ω or greater**

3.1. Ignition OFF.

3.2. 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**

4.1. Ignition OFF.

4.2. 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**

4.1. Ignition OFF.

4.2. 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**

6.1. Ignition OFF.

6.2. 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**

6.1. Ignition OFF.

6.2. 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**

7.1. Ignition OFF, disconnect the harness connectors at the control module that controls the ignition circuit.

7.2. 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

7.3. 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 meters (9.8 feet) away from vehicle. It may take up to 2 minutes for all vehicle systems to power down.
9. Test for less than 130 Ω between each pair of high speed GMLAN serial data circuits at the device connector that was just disconnected.

⇒ **If any pair of serial data circuits is greater than 130 Ω**

Repair the open/high resistance in the serial data circuits between the disconnected device and the circuit splice in the serial data circuits.

⇓ **If each pair of serial data circuits is 130 Ω or less**

10. Replace the device that was disconnected.

## Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

- *GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs on page 11-606*
- *Control Module References on page 6-3* for device replacement, programming and setup

# Scan Tool Does Not Communicate with Low Speed GMLAN Device

## Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

## 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 (DLC, terminal 5) | — | 1* | — | — |

* An open between the 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 serial data is transmitted over a single wire to the appropriate devices. The transmission speed for GMLAN low speed is up to 83.33 Kb/s. Under normal vehicle operating conditions, the speed of the bus is 33.33 Kb/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 failure will set a loss of communication DTC for each device affected, and the other devices will still communicate.
- An open in the data link connector (DLC) 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

## Reference Information

### Schematic Reference

- *Data Communication Schematics on page 11-4*
- *Control Module References on page 6-3*

### Connector End View Reference

*Component Connector End Views on page 11-269*

### Description and Operation

*Data Link Communications Description and Operation on page 11-68*

### Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

### Scan Tool Reference

*Control Module References on page 6-3* for scan tool information

## Circuit/System Verification

**Note:** Use the schematic to identify the following:

- Devices the vehicle is equipped with
- 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

1. Attempt to communicate with all devices on the low speed GMLAN serial data circuit. Refer to *Data Link References on page 11-66*.
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 on page 11-37*.

⇒ **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 meters away from vehicle. Disconnect the scan tool from the X84 data link connector. The following tests will be done at the X84 data link connector. It may take up to 2 minutes for all vehicle systems to power down.
4. Test for less than 10 Ω between the ground circuit terminal 5 and ground.

⇒ **If 10 Ω or greater**

4.1. Ignition OFF.

4.2. 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 meters away from vehicle. It may take up to 2 minutes for all vehicle systems to power down.
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 connector's 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

### 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.

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

3.1. Ignition OFF, disconnect all devices on the failed serial data circuit, ignition ON.

3.2. 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

3.3. Connect the splice pack and connect the first device on the failed serial data circuit, ignition ON.

3.4. 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

3.5. 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 meters away from vehicle. Disconnect the appropiate 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**

3.1. Disconnect all devices on the failed serial data circuit.

3.2. Test for greater than 2 Ω between each section of the failed serial data circuit and ground.

⇒ If 2 Ω or less, repair the short to ground in the circuit.

⇓ If greater than 2 Ω

3.3. Connect the splice pack and connect the first device on the failed serial data circuit, ignition ON.

3.4. 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

3.5. 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 and all vehicle systems OFF, 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**

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

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

7. All OK.

## Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

- *GMLAN and Media Oriented Systems Transport (MOST) Wiring Repairs on page 11-606*
- *Control Module References on page 6-3* 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 on page 11-68*.

### Data Link References

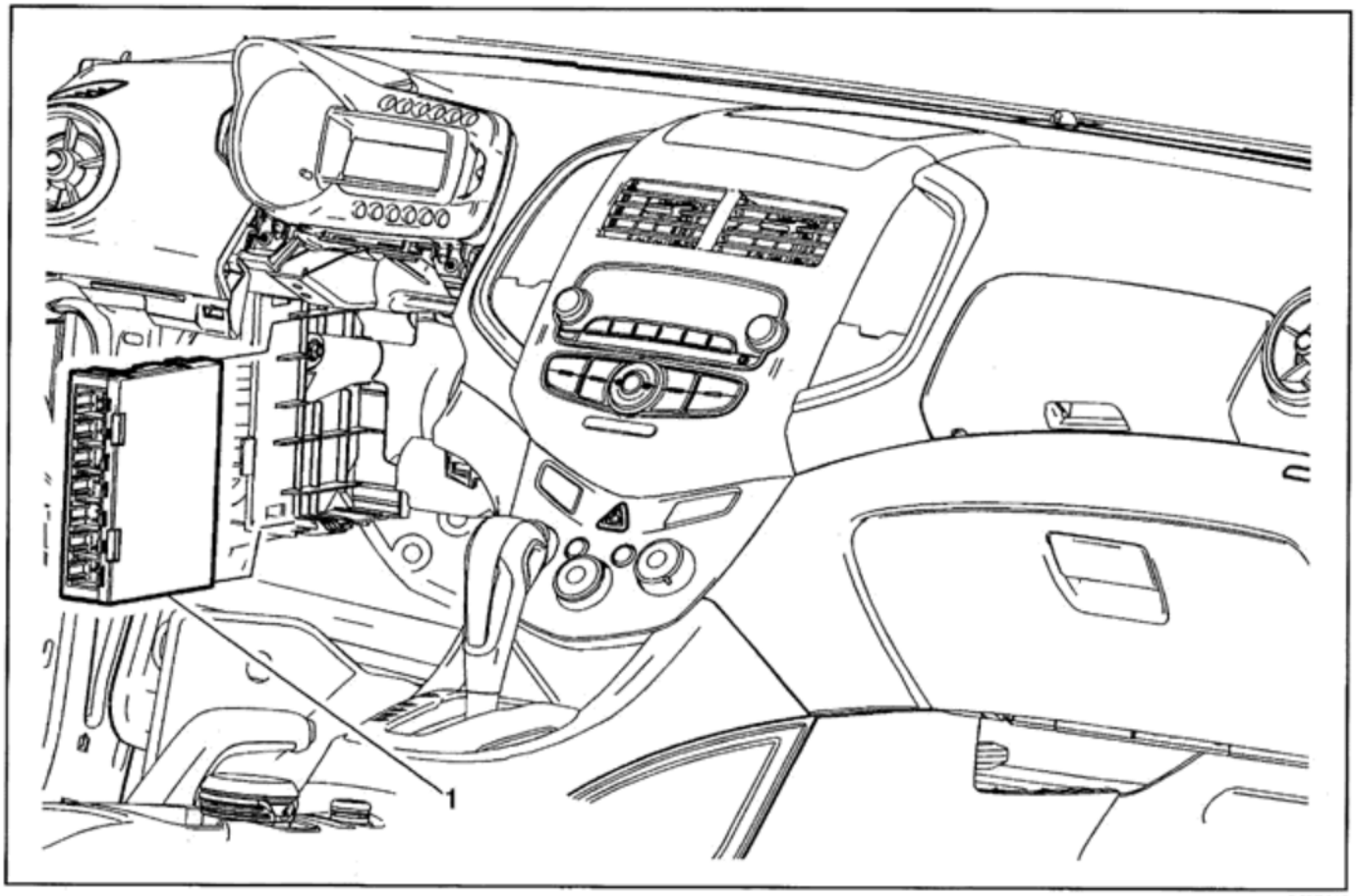
| Code | Device | Data Link Type | Diagnostic Procedure |
|---|---|---|---|
| **Schematic Reference: *Data Communication Schematics on page 11-4*** | | | |
| A11 | Radio | Low Speed GMLAN | *Scan Tool Does Not Communicate with Low Speed GMLAN Device on page 11-62* |
| B99 | Steering Wheel Angle Sensor | Chassis High Speed GMLAN | *Scan Tool Does Not Communicate with Chassis High Speed GMLAN Device on page 11-53* |
| B119 | Multi-axis Acceleration Sensor | Chassis High Speed GMLAN | *Scan Tool Does Not Communicate with Chassis High Speed GMLAN Device on page 11-53* |
| K9 | Body Control Module | • High Speed GMLAN<br>• Low Speed GMLAN<br>• Local Interconnect Network (LIN) | • *Scan Tool Does Not Communicate with High Speed GMLAN Device on page 11-58*<br>• *Scan Tool Does Not Communicate with Low Speed GMLAN Device on page 11-62*<br>• *DTC U1500-U15FF on page 11-43* |
| K17 | Electronic Brake Control Module | • High Speed GMLAN<br>• Chassis High Speed GMLAN | • *Scan Tool Does Not Communicate with High Speed GMLAN Device on page 11-58*<br>• *Scan Tool Does Not Communicate with Chassis High Speed GMLAN Device on page 11-53* |
| K20 | Engine Control Module | High Speed GMLAN | *Scan Tool Does Not Communicate with High Speed GMLAN Device on page 11-58* |
| K27 | Fuel Pump Control Module | High Speed GMALN | *Scan Tool Does Not Communicate with High Speed GMLAN Device on page 11-58* |
| K29 | Seat Heating Control Module | Low Speed GMLAN | *Scan Tool Does Not Communicate with Low Speed GMLAN Device on page 11-62* |
| K33 | HVAC Control Module | Low Speed GMLAN | *Scan Tool Does Not Communicate with Low Speed GMLAN Device on page 11-62* |
| K36 | Inflatable Restraint Sensing and Diagnostic Module | Low Speed GMLAN | *Scan Tool Does Not Communicate with Low Speed GMLAN Device on page 11-62* |
| K43 | Power Steering Control Module | High Speed GMALN | *Scan Tool Does Not Communicate with High Speed GMLAN Device on page 11-58* |
| K71 | Transmission Control Module | High Speed GMLAN | *Scan Tool Does Not Communicate with High Speed GMLAN Device on page 11-58* |

## Data Link References (cont'd)

| Code | Device | Data Link Type | Diagnostic Procedure |
|---|---|---|---|
| **Schematic Reference:** ***Data Communication Schematics on page 11-4*** | | | |
| K73 | Telematics Communication Interface Control Module | • High Speed GMLAN<br>• Low Speed GMLAN | • *Scan Tool Does Not Communicate with High Speed GMLAN Device on page 11-58*<br>• *Scan Tool Does Not Communicate with Low Speed GMLAN Device on page 11-62* |
| K85 | Passenger Presence Detection Module | Low Speed GMLAN | *Scan Tool Does Not Communicate with Low Speed GMLAN Device on page 11-62* |
| M74D | Window Motor – Driver | Local Interconnect Network (LIN) | *DTC U1500-U15FF on page 11-43* |
| P16 | Instrument Cluster | Low Speed GMLAN | *Scan Tool Does Not Communicate with Low Speed GMLAN Device on page 11-62* |

# Repair Instructions

## Body Control Module Replacement




2497612

## Body Control Module Replacement

| Callout | Component Name |
|---|---|
| **Preliminary Procedure**<br>Remove the instrument panel lower trim pad cover. Refer to *Instrument Panel Lower Trim Pad Cover Replacement (Without AAL) on page 2-40* or *Instrument Panel Lower Trim Pad Cover Replacement (With AAL) on page 2-41* | |
| 1 | Body Control Module<br>**Procedure**<br>1. Disconnect the electrical connectors.<br>2. Push tabs to release the body control module from the bracket.<br>3. Reprogram the module if replaced. Refer to *Control Module References on page 6-3*. |

# 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 on page 11-614* 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 on page 11-8* 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 *Data Communication Schematics on page 11-4* 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 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.

## 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 and B233R Radar Sensor Module – Short Range Rear on the bus, and optionally the Radar Sensor Module – Short Range Right Rear. 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

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.

## CAN Graphical Interface (CGI) Circuit Description

This bus is used by the Entertainment sub-system to transfer high-rate display graphics between the A11 Radio and the P17 Info Display Module and/or Radio/HVAC Control. The electrical characteristics of the CAN Graphical Interface (CGI) Bus are very similar to the High Speed GMLAN Bus. The message strategy and construction of messages are different however. Sometimes communication is required between the CAN Graphical Interface Bus and the Low Speed GMLAN Bus. This is accomplished by using the A11 Radio as the Gateway module. Since the CAN Graphical Interface Bus and primary High Speed GMLAN Bus have similar electrical characteristics, the diagnostics for each are similar.

In the case where the P17 Info Display Module and Radio/HVAC Control are separate devices the P17 Info Display Module is responsible for passing information between the A11 Radio and the Radio/HVAC Control. The A11 Radio interfaces only with the P17 Info Display Module and the P17 Info Display Module then communicates with the Radio/HVAC Control through a Local Interconnect Network (LIN) interface.

A bus wake up signal will be generated by the A11 Radio or by the P17 Info Display Module when the system functionality is required. The communication function of the CAN Graphical Interface shall be enabled or disabled based on the voltage level of the Center Stack Wake. The network will stay awake as long as the circuit voltage is driven low, to less than 1.5 V. Communications are disabled with a high circuit voltage around 5.0 V.

The A11 Radio can execute a warm reset of the P17 Info Display Module if the P17 Info Display Module fails to respond to the A11 Radio's request. The Center Stack Reset is a low-asserted pull down output (less than 1.5 V) from the A11 Radio to the P17 Info Display Module and has the same electrical characteristics as those for the Center Stack Wake signal defined above.

## Mid Speed GMLAN Circuit Description

The Mid Speed GMLAN Bus is very similar to the High Speed GMLAN Bus except that it uses a slower transmission rate of 125 Kbit/s. This bus is intended for use where the system response time demands that a large amount of data be transmitted in a relatively short amount of time, such as updating a graphics display. As such it has usually been used for infotainment applications. Sometimes communication is required between the Low Speed GMLAN Bus and the Mid Speed GMLAN Bus. This is accomplished by using the A11 Radio as the Gateway module. Since the Mid Speed GMLAN Bus and primary High Speed GMLAN Bus operate in a similar manner, the diagnostics for each are similar.

## 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 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:

- Pin 1 Low speed GMLAN communications terminal
- Pin 2 Class 2 communications terminal
- Pin 3 Mid speed GMLAN serial bus (+) terminal or Object high speed GMLAN serial bus (+) terminal
- Pin 4 Scan tool power ground terminal
- Pin 5 Common signal ground terminal
- Pin 6 High speed GMLAN serial data bus (+) terminal
- Pin 7 Keyword communications terminal
- Pin 11 Mid speed GMLAN serial bus (-) terminal or Object high speed GMLAN serial bus (-) terminal
- Pin 12 Chassis high speed GMLAN serial bus (+) terminal
- Pin 13 Chassis high speed GMLAN serial bus (-) terminal
- Pin 14 High speed GMLAN serial data bus (-) terminal
- Pin 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 on page 11-66* for a list of devices, the buses they communicate with, and the RPO codes for a specific device.