


2004 ACCESSORIES & EQUIPMENT

Data Link Communications - Vue

SCHEMATIC AND ROUTING DIAGRAMS

DATA LINK COMMUNICATIONS SCHEMATIC ICONS

Data Link Communications Schematic Icons

Icon	Icon Definition
	<p>CAUTION: When performing service on or near the SIR components or the SIR wiring, the SIR system must be disabled. Refer to SIR Disabling and Enabling Zones. Failure to observe the correct procedure could cause deployment of the SIR components, personal injury, or unnecessary SIR system repairs.</p>
	<p>IMPORTANT: Twisted-pair wires provide an effective shield that helps protect sensitive electronic components from electrical interference. In order to prevent electrical interference from degrading the performance of the connected components, you must maintain the proper specification when making any repairs to the twisted-pair wires shown:</p> <ul style="list-style-type: none">• The wires must be twisted a minimum of 9 turns per 31 cm (12 in) as measured anywhere along the length of the wires.• The outside diameter of the twisted

wires must not exceed 6.0 mm (0.25 in).



DATA LINK CONNECTOR (DLC) SCHEMATICS (A/T)

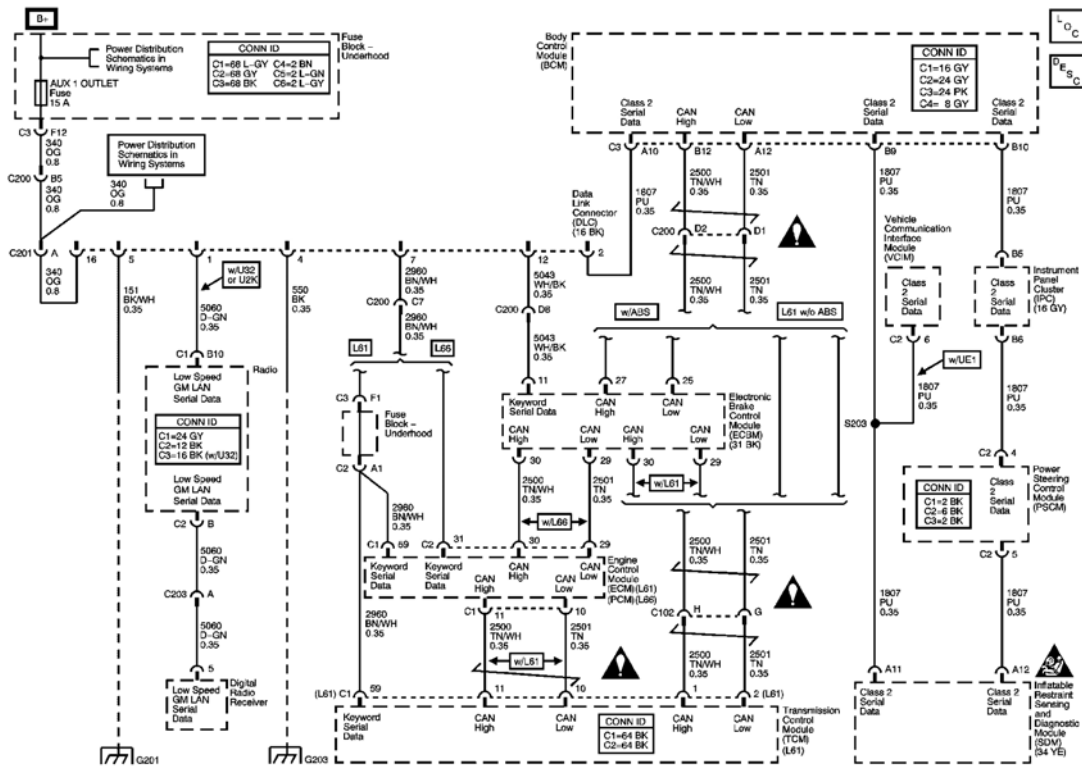


Fig. 1: Data Link Connector (DLC) Schematic (A/T)
 Courtesy of GENERAL MOTORS CORP.

DATA LINK CONNECTOR (DLC) SCHEMATICS (M/T)

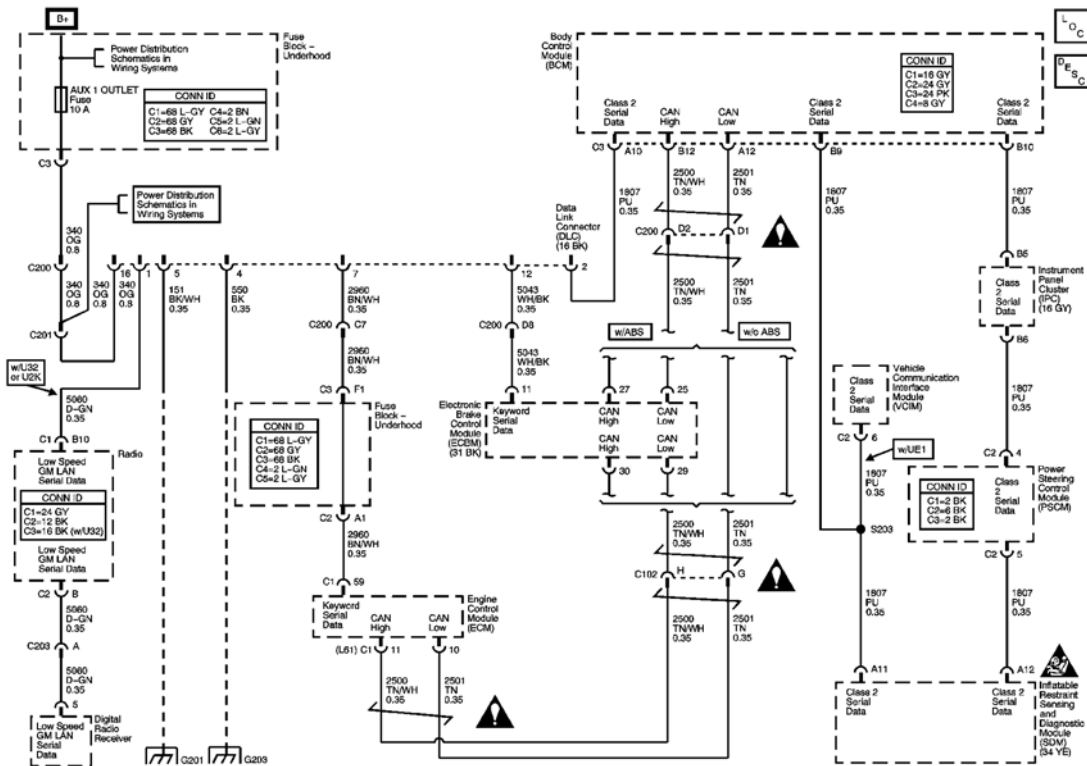


Fig. 2: Data Link Connector (DLC) Schematic (M/T)
 Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

DATA LINK COMMUNICATIONS COMPONENT VIEWS

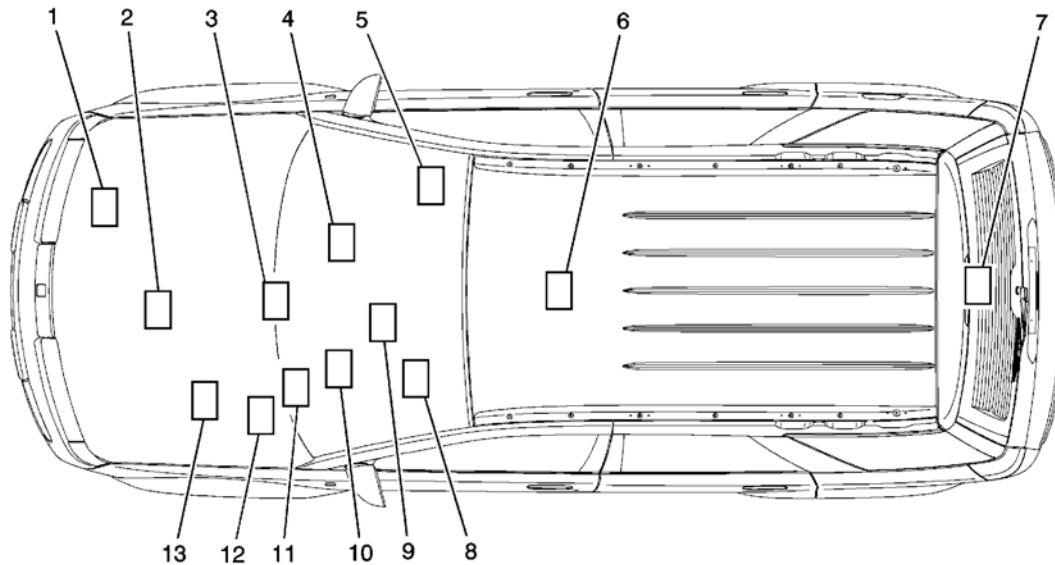


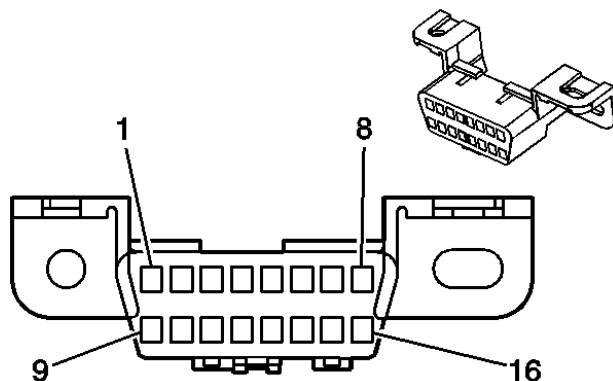
Fig. 3: Data Link Communications Components View
 Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 3

Callout	Component Name
1	Engine Control Module (ECM) - L61
2	Engine Control Module (ECM) - L81
3	Power Steering Control Module (PSCM)
4	Body Control Module (BCM), Radio
5	Door Lock Switch and Actuator - Front Passenger, Rest Similar
6	Inflatable Restraint Sensing and Diagnostic Module (SDM)
7	Liftgate Lock Actuator/Ajar Switch
8	Data Link Connector (DLC)
9	Vehicle Communication Interface Module (VCIM)
10	Instrument Panel Cluster (IPC)
11	Passlock Sensor
12	Transmission Control Module (TCM)
13	Electronic Brake Control Module (EBCM)

DATA LINK COMMUNICATIONS CONNECTOR END VIEWS

Data Link Connector (DLC) End View



Connector Part Information		<ul style="list-style-type: none"> • 15357575 • 16-Way F Metri-Pack 150 Series (BK) 	
Pin	Wire Color	Circuit Number	Function
1	D-GN	5060	Low Speed GM LAN Serial Data
2	PU	1807	Class 2 Serial Data
3	-	-	Not Used
4	BK	550	Ground
5	BK/WH	151	Ground
6	-	-	Not Used
7	BN/WH	2960	Keyword Serial Data
8-11	-	-	Not Used
12	WH/BK	5043	Keyword Serial Data
13-15	-	-	Not Used
16	OG	340	Battery Positive Voltage

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - DATA LINK COMMUNICATIONS

Begin the diagnosis of the data link communications by performing the Diagnostic System Check for the system in which the customer concern is apparent. The Diagnostic System Check will direct you to the correct procedure within the Data Link Communications section when a communication malfunction is present.

Establish serial data communications with each controller. Read and record the DTCs from each controller. It is important to systematically approach serial data communications diagnostics. This vehicle has 2 separate data links with 3 different circuits to communicate to the various data links.

The high speed CAN link which supports real-time information between the ECM, TCM, EBCM, and BCM is accessible through 2 different keyword circuits.

1. Circuit 2960 supports communication (Keyword 2000) from the DLC to the ECM and TCM.
2. Circuit 5043 supports communication (Keyword 2000) from the DLC to the EBCM.

CAN serial data information is interpreted by the BCM and transmitted to the serial data line by the BCM. The ECM, TCM, EBCM, and BCM all communicate on the CAN serial data line.

The other modules communicate on the class 2 link which is configured in a ring, except for the OnStar(R) module. The ring configuration provides redundant communication paths, so that a single open does not prevent a serial communications malfunction.

DIAGNOSTIC TROUBLE CODE (DTC) LIST

Diagnostic Trouble Code (DTC) List

DTC	Diagnostic Procedure	Module(s)
U0073	<u>DTC U0073</u>	BCM, EBCM, ECM, TCM
U0101	<u>DTC U0100-U0299</u>	ECM
U0121	<u>DTC U0100-U0299</u>	BCM, ECM, TCM
U0140	<u>DTC U0100-U0299</u>	EBCM, ECM, TCM
U1000	<u>DTC U1000</u>	BCM, SDM, PSCM, VCIM
U1016	<u>DTC U1001-U1254</u>	PSCM, SDM, VCIM
U1024	<u>DTC U1001-U1254</u>	PSCM
U1048	<u>DTC U1001-U1254</u>	BCM
U1064	<u>DTC U1001-U1254</u>	PSCM, SDM, VCIM
U1088	<u>DTC U1001-U1254</u>	BCM, VCIM
U1096	<u>DTC U1001-U1254</u>	BCM, PSCM, SDM
U1151	<u>DTC U1001-U1254</u>	BCM
U1300	<u>DTC U1300, U1301, or U1305</u>	BCM, PSCM, SDM, VCIM
U1301	<u>DTC U1300, U1301, or U1305</u>	BCM, PSCM, SDM, VCIM
U2100	<u>DTC U2100</u>	EBCM, ECM (6 Cyl.)
U2102	<u>DTC U2102 or U2103</u>	ECM (6 Cyl.)
U2103	<u>DTC U2102 or U2103</u>	ECM (4 Cyl.)
U2105	<u>DTC U2105-U2199</u>	BCM, EBCM, TCM
U2106	<u>DTC U2105-U2199</u>	BCM, EBCM, ECM
U2107	<u>DTC U2105-U2199</u>	EBCM, ECM, TCM
U2108	<u>DTC U2105-U2199</u>	BCM, ECM, TCM

DTC U0073

Circuit Description

The engine control module (ECM), electronic brake traction control module (EBTCM) and transmission control module (TCM) if applicable, communicate via a controller area network (CAN) serial data bus. The CAN serial data bus transmits over two wires at speeds high enough to ensure that the required real-time response is

maintained. Modules connected to the CAN serial data circuits monitor communications. During normal vehicle operation, information and commands are exchanged among modules. A no communication condition may result from a short to voltage, short to ground, or short between the CAN high and low circuits.

Conditions for Running the DTC

- Voltage supplied to the modules are in the normal voltage range.
- The vehicle power mode requires serial communication to occur.

Conditions for Setting the DTC

A no communication condition is detected on CAN serial data circuits.

Action Taken When the DTC Sets

A module may use a default value for a parameter that it expected to receive via serial data.

Conditions for Clearing the MIL/DTC

- A current DTC and MIL clear when the malfunction is no longer present.
- A history DTC clears when requested by the scan tool or when the module ignition cycle counter reaches the reset threshold, without a repeat of the malfunction.

Diagnostic Aids

The modules communicating on the CAN serial data circuits are wired parallel to each other. An open in the CAN circuits for one module will not affect other modules. A short to ground or short to voltage on either wire affects all modules no matter where the failure occurs.

Test Description

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

3: This test isolates a shorted TCM, ECM, or EBTCM. By reading the signal from the ECM after the wiring is tested, without a TCM connected, an ECM signal generating problem can be diagnosed. When the CAN circuits are open between two components, both components generate a 30,000 to 40,000 hertz signal. When the system is not open, the frequency is 3,000 to 3,500 hertz.

DTC U0073

Step	Action	Values	Yes	No
Schematic Reference: Data Link Connector (DLC) Schematics (A/T) or Data Link Connector (DLC) Schematics (M/T)				
Connector End View Reference: Data Link Communications Connector End Views				
	1. Observe the Freeze Frame/Failure Records for this DTC.			
	2. Turn OFF the ignition for 30 seconds.			

1	<p>3. Start the engine.</p> <p>4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records.</p> <p>Does the DTC fail this ignition?</p>	-	Go to Step 2	Go to Testing for Intermittent Conditions and Poor Connections in Wiring Systems
2	<p>IMPORTANT: Turn ON the ignition, with the engine OFF, when testing for a short to voltage. Use DMM MIN/MAX function to compare intermittent conditions.</p> <p>1. Turn OFF the ignition.</p> <p>2. Disconnect the ECM, TCM if applicable, and EBTCM harness connectors which contain CAN circuits.</p> <p>3. Test the CAN serial data circuits for a short to ground, short to voltage, or a short between the CAN High and CAN Low circuits. Refer to the following in Wiring Systems:</p> <ul style="list-style-type: none"> • Testing for Intermittent Conditions and Poor Connections • Circuit Testing • Connector Repairs • Wiring Repairs <p>Did you find and correct the condition?</p>	-	Go to Step 11	Go to Step 3
3	<p>IMPORTANT: If the vehicle is not equipped with a TCM, answer YES to this step.</p> <p>1. Turn OFF the ignition.</p> <p>2. Reconnect the TCM, if equipped.</p> <p>3. Clear any DTCs in memory.</p> <p>4. Start the engine.</p> <p>5. Measure the frequency across the CAN circuits in the harness with a DMM.</p> <p>Does the frequency measure more than the specified value?</p>	35,000 Hz	Go to Step 4	Go to Step 6

4	<ol style="list-style-type: none"> 1. Turn OFF the ignition. 2. Reconnect the EBTCM, if equipped. 3. Clear any DTCs in memory. 4. Start the engine. 5. Measure the frequency across the CAN circuits in the harness with a DMM. <p>Does the frequency measure more than the specified value?</p>	35,000 Hz	Go to Step 5	Go to Step 7
5	<p>Inspect for an intermittent or poor connection at the ECM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?</p>	-	Go to Step 11	Go to Step 8
6	<p>Inspect for an intermittent or poor connection at the TCM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you fine and correct the condition?</p>	-	Go to Step 11	Go to Step 9
7	<p>Inspect for an intermittent or poor connection at the EBTCM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you fine and correct the condition?</p>	-	Go to Step 11	Go to Step 10
8	<p>IMPORTANT: Perform the module setup procedure, if required.</p> <p>Replace the ECM (L61). Refer to <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 2.2L (L61).Did you complete the replacement?</p>	-	Go to Step 11	-
9	<p>IMPORTANT: Perform the module setup procedure, if required.</p> <p>Replace the TCM (5AT). Refer to <u>Powertrain Control Module (PCM) Replacement</u> in Automatic Transmission - (5AT).Did you complete the replacement?</p>	-	Go to Step 11	-
10	<p>IMPORTANT: Perform the module setup procedure, if required.</p>	-		

	Replace the EBCM. Refer to <u>Electronic Brake Control Module Replacement</u> in Antilock Brakes. Did you complete the replacement?		Go to Step 11	-
11	<ol style="list-style-type: none"> 1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. 	-		
	Did the DTC fail this ignition?		Go to Step 2	Go to Step 12
12	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	-	Go to <u>Diagnostic Trouble Code (DTC) List</u>	System OK

DTC U0100-U0299

Circuit Description

Modules connected to the CAN serial data circuits monitor for serial data communications during normal vehicle operation. Operating information and commands are exchanged among the modules. The modules have prerecorded information about messages exchanged on the serial data circuits. The supervised and periodic messages are used by the receiving module as an availability indicator from the transmitter module. Each message contains the identification number of the transmitting module. When a message indicates availability of the transmitting module is not received, the receiving module sets a DTC Uxxxx; where xxxx is equal to the 4-digit transmitter module identification number.

The control module ID number list below provides a method for determining which module is not communicating. Modules with CAN serial data circuit malfunctions, or which loses power during the current ignition cycle, will set a Loss of Communication DTC by other modules requiring information from the failed module. The modules able to communicate will set a DTC Uxxxx indicating the module not communicating.

If any of the CAN circuits are shorted to battery voltage, ground or between them, no communication is possible on CAN serial data bus, and a DTC U0073 sets.

CAN ID

Control Module	ID Number
Transmission Control Module (TCM)	0101
Electronic Brake/Traction Control Module (EBTCM)	0121
Body Control Module (BCM)	0140

Conditions for Running the DTCs

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

Conditions for Setting the DTC

A receiving module did not detect the CAN serial data supervised periodic message from a transmitting module.

Action Taken When the DTC Sets

The module uses a default value for the missing parameter.

Conditions for Clearing the MIL/DTC

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

Diagnostic Aids

- A poor connection at the inoperative module may cause this code to set.
- A module that loses its connections to battery, ground or switched ignition may set this DTC.

Test Description

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

1: A total loss of communication on CAN serial data link should be diagnosed first.

8: The modules which can communicate indicate the module which cannot communicate. You must clear the DTC from these modules to avoid future misdiagnosis.

DTC U0100-U0299

Step	Action	Yes	No
Schematic Reference: Data Link Connector (DLC) Schematics (A/T) or Data Link Connector (DLC) Schematics (M/T) Connector End View Reference: Data Link Communications Connector End Views			
1	1. Install a scan tool. 2. Start the engine. 3. Retrieve DTCs from engine control module (ECM). Is DTC U0073 set as current?	Go to DTC U0073	Go to Step 2
	IMPORTANT: Use the control module ID number list in order to determine which module is not communicating on CAN serial data bus.		

2	<ol style="list-style-type: none"> 1. Turn ON the ignition, with the engine OFF. 2. Test the following circuits of the module that is not communicating on CAN serial data bus for an open or a short to ground: <ul style="list-style-type: none"> • The battery positive voltage input circuits • The battery positive voltage output circuits • The ignition voltage input circuits • The ignition voltage output circuits • The switched battery positive voltage circuits <p>Refer to the following:</p> <ul style="list-style-type: none"> • <u>Control Module References</u> for the applicable schematic • <u>Circuit Testing</u> in Wiring Systems • <u>Wiring Repairs</u> in Wiring Systems <p>Did you find and correct the condition?</p>	Go to Step 7	Go to Step 3
3	<ol style="list-style-type: none"> 1. Turn OFF the ignition. 2. Test the ground circuits of the module that is not communicating on CAN serial data bus for an open. <p>Refer to the following:</p> <ul style="list-style-type: none"> • <u>Control Module References</u> for the applicable schematic • <u>Circuit Testing</u> in Wiring Systems • <u>Wiring Repairs</u> in Wiring Systems <p>Did you find and correct the condition?</p>	Go to Step 7	Go to Step 4
4	<p>Test the CAN serial data circuits of the module that is not communicating on CAN serial data bus for an open. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	Go to Step 7	Go to Step 5
	<p>Inspect the harness connectors of the module that is not communicating on CAN serial data bus for poor connections and terminal tension at the following circuits:</p> <ul style="list-style-type: none"> • The battery positive voltage input circuits • The battery positive voltage output circuits • The ignition voltage input circuits • The ignition voltage output circuits • The switched battery positive voltage supply circuits 		

5	<ul style="list-style-type: none"> • The ground circuits • The CAN serial data circuits <p>Refer to the following:</p> <ul style="list-style-type: none"> • <u>Control Module References</u> for the applicable schematic • <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems • <u>Connector Repairs</u> in Wiring Systems 	Go to Step 7	Go to Step 6
6	<p>IMPORTANT: Perform the programming or setup procedure for the module, if required.</p> <p>Replace the module that is not communicating on CAN serial data bus. Refer to <u>Control Module References</u> for the applicable replacement procedure. Did you complete the replacement?</p>	Go to Step 7	-
7	<p>Select the Display DTCs function for the modules which had the Loss of Communications DTC set. Does the scan tool display any DTCs which do not begin with a "U"?</p>	Go to <u>Control Module References</u> in Body Control System	Go to Step 8
8	<ol style="list-style-type: none"> 1. Use the scan tool in order to clear the DTCs. 2. Continue diagnosing or clearing the DTCs until all the modules have been diagnosed and all the DTCs have been cleared. <p>Did you complete the action?</p>	Go to <u>Control Module References</u> in Body Control System	-

DTC U1000

Circuit Description

Modules connected to the class 2 serial data circuit monitor for serial data communications during normal vehicle operation. Operating information and commands are exchanged among the modules. When a module receives a message for a critical operating parameter, the module records the ID number of the module which sent the message for State of Health monitoring, Node Alive messages. A critical operating parameter is one which, when not received, requires that the module use a default value for that parameter. When a module does not associate an ID number with at least one critical parameter within about 5 seconds of beginning serial data communication, DTC U1000 is set. When more than one critical parameter does not have an ID number associated with it, the DTC will only be reported once. DTC U1000 will set as long as U1300 or U1301 do not have a current status.

The table below list the modules on the class 2 serial data circuit that will set a U1000 and should be actively communicating the previously described messages on the class 2 serial data circuit.

DTC U1000 Control Modules & ID Numbers

Control Module	ID Number
Engine Control Module (ECM)	016
Traction Control Module (TCM)	024
Power Steering Control Module (PSCM)	048
Body Control Module (BCM)	064
Sensing and Diagnostic Module (SDM)	088
Instrument Panel Cluster (IPC)	096
Vehicle Communication Interface Module (VCIM)	151

Conditions for Running the DTC

The ignition switch run power mode is selected.

The modules voltage supply is within normal operating value, approximately 9-16 volts.

Conditions for Setting the DTC

At least one critical operating parameter has not been associated with a modules assigned ID number within about 5 seconds after beginning serial data communication.

Action Taken When the DTC Sets

The Service (Wrench) indicator illuminates.

The module will use default values for the missing parameters.

Conditions for Clearing the DTC

- A current DTC will clear when all critical operating parameters for the module have been associated with an ID number, or at the end of the current ignition cycle.
- A history DTC clears when the module ignition cycle counter reaches the reset threshold, without a repeat of the malfunction.

Diagnostic Aids

When a malfunction such as an open fuse to a module occurs while modules are communicating, a Loss of XXX Communication DTC is set as current. When the modules stop communicating, the ignition is turned OFF, the current Loss of XXX Communication DTC is cleared but the history DTC remains. When the modules begin to communicate again, the ignition is turned ON, the module with the open fuse will not be learned by the other modules so U1000 is set current by the other modules. If the malfunction occurs when the modules are not communicating, only U1000 is set. When this DTC sets, the module uses a default value for the missing parameter. A current DTC U1000 will clear when all of the critical operating parameters for the module have been associated with an identification number or when the current ignition cycle end. A history U1000 will clear upon executing 100 ignition RUN cycles with no recurrence of the malfunction.

Test Description

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

2: A DTC U1001-U1254 Lost Communications with XXX with a history status may indicate the cause of U1000.

3: The modules not communicating are the likely cause of U1000. The modules that are available on the class 2 serial data circuit are listed in the Circuit Description.

8: The module which was not communicating due to a poor connection to the class 2 serial data circuit may have set DTC U1001-U1254 Lost Communications with XXX for those modules that it was monitoring.

10: The modules which can communicate indicate the module which can not communicate. You must clear the serial data communication DTCs from these modules to avoid future misdiagnosis.

13: If all modules are communicating, the module which set U1000 may have done so due to some other condition.

15: The module which set U1000 is the likely cause of the malfunction.

DTC U1000 Diagnostic Test

Step	Action	Yes	No
Schematic Reference: <u>Data Link Connector (DLC) Schematics (A/T) or Data Link Connector (DLC) Schematics (M/T)</u> Connector End View Reference: <u>Master Electrical Component List</u> in Wiring Systems.			
1	Did you perform the Diagnostic System Check for the system exhibiting symptom?	Go to Step 2	Go to Control Module References in Body Control System for the applicable Diagnostic System Check
2	<ol style="list-style-type: none">1. Install a scan tool.2. Turn ON the ignition, with the engine OFF.3. Record the DTCs set in by each module. If using a Tech 2, use the Class 2 DTC Check feature to determine which modules have DTCs set. Did you record any DTCs in the range of U1001-U1254 with a history status?	Go to Diagnostic Trouble Code (DTC) List	Go to Step 3
3	<ol style="list-style-type: none">1. Attempt to communicate with each module on the class 2 serial data circuit. If using a Tech 2, obtain this information using the class 2 Message Monitor feature.2. Record all of the modules communicating on the class 2 serial data circuit.		

	<p>3. Compare the list of modules which are communicating to the list given in Circuit Description.</p> <p>Does any module on the class 2 serial data circuit not communicate?</p>		
4	<p>Test the following circuits of the module that is not communicating for an open or short to ground:</p> <ul style="list-style-type: none"> • The battery positive voltage supply circuits • The switched battery positive supply circuits • The battery positive voltage output circuits • The ignition voltage input circuits • The ignition voltage output circuits <p>Refer to the following:</p> <ul style="list-style-type: none"> • <u>Control Module References</u> in Body Control System for the applicable schematic • <u>Circuit Testing</u> in Wiring Systems • <u>Wiring Repairs</u> in Wiring Systems <p>Did you find and correct the condition?</p>	<p>Go to Step 4</p>	<p>Go to Step 13</p>
5	<ol style="list-style-type: none"> 1. Turn OFF the ignition. 2. Test the ground circuits of the module that is not communicating for an open. Refer to the following: <ul style="list-style-type: none"> • <u>Control Module References</u> in Body Control System for the applicable schematic • <u>Circuit Testing</u> in Wiring Systems • <u>Wiring Repairs</u> in Wiring Systems <p>Did you find and correct the condition?</p>	<p>Go to Step 9</p>	<p>Go to Step 5</p>
	<p>IMPORTANT: Inspect all connectors in the serial data</p>		

communications circuit.
Refer to the following:

- **Data Link Connector (DLC) Schematics (A/T) or Data Link Connector (DLC) Schematics (M/T)**
- **Testing for Intermittent Conditions and Poor Connections in Wiring Systems**
- **Connector Repairs in Wiring Systems**

- 6
1. Turn OFF the ignition.
 2. Test the class 2 serial data circuits of the module that is not communicating for an open. Refer to the following:
 - **Data Link Connector (DLC) Schematics (A/T) or Data Link Connector (DLC) Schematics (M/T)**
 - **Circuit Testing** in Wiring Systems.
 - **Wiring Repairs** in Wiring Systems.

Did you find and correct the condition?

Go to **Step 9**

Go to **Step 7**

7

Inspect the harness connector of the module that is not communicating for poor connections and terminal tension at the following circuits:

- The battery positive voltage input circuits
- The switched battery positive voltage supply
- The battery positive voltage output circuits
- The ignition voltage input circuits
- The ignition voltage output circuits
- The ground circuits
- The class 2 serial data circuits

Refer to the following:

- **Control Module References** in Body Control System for the applicable schematic
- **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems

	<ul style="list-style-type: none"> • Connector Repairs in Wiring Systems 		
	Did you find and correct the condition?	Go to Step 9	Go to Step 8
8	<p>IMPORTANT: Perform the programming or set up procedure for the replaced control module if required.</p> <p>Replace the module that is not communicating. Refer to Control Module References in Body Control System for the applicable replacement procedure. Did you complete the replacement?</p>	Go to Step 11	-
9	<ol style="list-style-type: none"> 1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. Select the Display DTCs function for the module which was not communicating. <p>Does the scan tool display any DTCs which do not begin with a "U"?</p>	Go to Control Module References in Body Control System for the applicable Diagnostic System Check	Go to Step 10
10	Use the scan tool in order to clear the DTCs. Did you complete the action?	Go to Step 11	-
11	Select the Display DTCs function for the modules which had U1000 set as a current DTC. Does the scan tool display DTCs which do not begin with a "U"?	Go to Control Module References in Body Control System for the applicable Diagnostic System Check	Go to Step 12
12	Use the scan tool in order to clear the DTCs. Did you complete the action?	System OK	-
13	Did you record any other DTCs for the modules which had U1000 set as a current DTC?	Go to Control Module References in Body Control System for the applicable Diagnostic System Check	Go to Step 14
14	<ol style="list-style-type: none"> 1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. Use the scan tool in order to clear the DTCs. 4. Turn OFF the ignition for at least 5 seconds. 5. Turn ON the ignition, with the engine OFF. 		

	6. Select the Display DTCs function. Does the scan tool display U1000 set as a current DTC?	Go to Step 15	Go to Diagnostic Aids
15	IMPORTANT: Perform the programming or set up procedure for the replaced control module if required. Replace the module which had U1000 set as a current DTC. Refer to Control Module References in Body Control System for the applicable replacement procedure. Did you complete the replacement?	System OK	-

DTC U1001-U1254

Circuit Description

Modules connected to the class 2 serial data circuit monitor for serial data communications during normal vehicle operation. Operating information and commands are exchanged among the modules. When a module receives a message for a critical operating parameter, the module records the identification number of the module which sent the message for State of Health monitoring, Node Alive messages. A critical operating parameter is one which, when not received, requires that the module use a default value for that parameter. Once an identification number is learned by a module, it will monitor for that module's Node Alive message. Each module on the class 2 serial data circuit, which is powered and performing functions that require detection of a communications malfunction, is required to send a Node Alive message every 2-5 seconds. When no message is detected from a learned identification number for 5 seconds, a DTC U1xxx, where xxx is equal to the 3 digit identification number, is set.

The control module ID number list below provides a method for determining which module is not communicating. A module with a class 2 serial data circuit malfunction or which loses power during the current ignition cycle will have a Loss of Communication DTC set by other modules that depend on information from that failed module. The modules that can communicate will set a DTC indicating the module that can not communicate. As long as U1300 and U1301 are not set as current, DTC U1001-U1254 will set.

DTC U1001-U1254 Control Modules & ID Numbers

Control Module	ID Number
Engine Control Module (ECM)	016
Transaxle Control Module (TCM)	024
Power Steering Control Module (PSCM)	048
Body Control Module (BCM)	064
Sensing and Diagnostic Module (SDM)	088
Instrument Panel Cluster (IPC)	096
Vehicle Communication Module (VCIM)	151

When more than one Loss of Communication DTC is set in either one module or in several modules, diagnose the DTCs in the following order:

1. Current DTCs before history DTCs unless told otherwise in the diagnostic table
2. The DTC which is reported the most times
3. From the lowest number DTC to the highest number DTC

Conditions for Running the DTC

- The vehicle power mode, ignition switch position, requires serial data communication to occur.
- The module supply voltage is in the normal operating range of 9-16 volts.

Conditions for Setting the DTC

A message from a learned identification number has not been detected for the past 5 seconds.

Conditions for Clearing the DTC

- A current DTC will clear when a Node Alive message from the failed identification number is detected on the class 2 serial data circuit or at the end of the current ignition cycle.
- A history DTC clears when the module ignition cycle counter reaches the reset threshold, without a repeat of the malfunction.

Diagnostic Aids

- An intermittent open of the class 2 serial data circuit to the inoperative module may cause this code to set.
- A poor connection at the inoperative module may cause this code to set.
- An intermittent open in the splice may cause this code to set.
- An improperly powered module may cause this code to set.
- A current DTC will clear when a Node Alive, State of Health, message from the failed identification number is detected on the class 2 serial data circuit or at the end of the current ignition cycle.
- A history DTC will clear after 100 engine running cycles with no recurrence of the malfunction.

Test Description

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

7: The module which was not communicating on the class 2 serial data circuit may have set the Loss of Communication DTCs for the modules it was monitoring.

DTC U1001-U1254 Diagnostic Test

Step	Action	Yes	No
Schematic Reference: <u>Data Link Connector (DLC) Schematics (A/T)</u> or <u>Data Link Connector (DLC) Schematics (M/T)</u>			

Connector End View Reference: Master Electrical Component List in Wiring Systems.

1	<p>Did you perform the Diagnostic System Check for the system exhibiting symptom?</p>	<p>Go to Step 2</p>	<p>Go to Control Module References in Body Control System for the applicable Diagnostic System Check</p>
2	<p>IMPORTANT: Use the control module ID number list in order to determine which module is not communicating.</p> <p>Test the following circuits of the module that is not communicating for an open or a short to ground:</p> <ul style="list-style-type: none"> • The battery positive voltage input circuits • The battery positive voltage output circuits • The ignition voltage input circuits • The ignition voltage output circuits • The switched battery positive voltage circuits <p>Refer to the following:</p> <ul style="list-style-type: none"> • Control Module References in Body Control System • Circuit Testing in Wiring Systems • Wiring Repairs in Wiring Systems <p>Did you find and correct the condition?</p>	<p>Go to Step 7</p>	<p>Go to Step 3</p>
3	<p>1. Turn OFF the ignition. 2. Test the ground circuits of the module that is not communicating for an open.</p> <p>Refer to the following:</p> <ul style="list-style-type: none"> • Control Module References in Body Control System • Circuit Testing in Wiring Systems • Wiring Repairs in Wiring Systems <p>Did you find and correct the condition?</p>	<p>Go to Step 7</p>	<p>Go to Step 4</p>
	<p>Test the class 2 serial data circuits of the module</p>		

4	<p>that is not communicating for an open. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	Go to Step 7	Go to Step 5
5	<p>Inspect the harness connectors of the module that is not communicating for poor connections and terminal tension at the following circuits:</p> <ul style="list-style-type: none"> • The battery positive voltage input circuits • The battery positive voltage output circuits • The ignition voltage input circuits • The ignition voltage output circuits • The switched battery positive voltage supply circuits • The ground circuits • The class 2 serial data circuits <p>Refer to the following:</p> <ul style="list-style-type: none"> • <u>Control Module References</u> in Body Control System • <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems • <u>Connector Repairs</u> in Wiring Systems <p>Did you find and correct the condition?</p>	Go to Step 7	Go to Step 6
6	<p>IMPORTANT: Perform the programming or set up procedure for the replaced control module if required.</p> <p>Replace the module that is not communicating. Refer to <u>Control Module References</u> in Body Control System for the applicable replacement procedure. Did you complete the replacement?</p>	Go to Step 7	-
7	<ol style="list-style-type: none"> 1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. Select the Display DTCs function for the module which was not communicating. <p>Does the scan tool display any DTCs which do not begin with a "U"?</p>	Go to <u>Control Module References</u> in Body Control System	Go to Step 8

8	<p>Select the Display DTCs function for the modules which had the Loss of Communications DTC set.</p> <p>Does the scan tool display any DTCs which do not begin with a "U"?</p>	<p>Go to <u>Control Module References</u> in Body Control System</p>	<p>Go to Step 9</p>
9	<ol style="list-style-type: none"> 1. Use the scan tool in order to clear the DTCs. 2. Continue diagnosing or clearing the DTCs until all the modules have been diagnosed and all the DTCs have been cleared. <p>Did you complete the action?</p>	<p>Go to <u>Control Module References</u> in Body Control System</p>	<p>-</p>

DTC U1300, U1301, OR U1305

Circuit Description

Modules connected to the class 2 serial data circuit monitor for serial data communications during normal vehicle operation. Operating information and commands are exchanged among the modules. In addition to this, Node Alive messages are transmitted by each module on the class 2 serial data circuit about once every 2-5 seconds. When the module detects one of the following conditions on the class 2 serial data circuit for approximately 3 seconds, the setting of all other class 2 serial communication DTCs is inhibited and a DTC will set.

DTC U1300, U1301, or U1305 Circuit Description

DTC	Condition
U1300	Low voltage on the class 2 serial data circuit.
U1301	High voltage on the class 2 serial data circuit.
U1305	Either high or low voltage on the class 2 serial data circuit. Some modules will set DTC U1305 if they are not capable of distinguishing between a short to battery voltage or ground.

Conditions for Running the DTCs

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

Conditions for Setting the DTCs

- No valid messages are detected on the class 2 serial data circuit.
- The voltage level detected on the class 2 serial data circuit is in one of the following conditions:
 - High
 - Low
- The above conditions are met for approximately 3 seconds.

Action Taken When the DTCs Sets

The module uses default values for all parameters received on the class 2 serial data circuit and all other DTCs are inhibited.

Conditions for Clearing the DTC

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

Diagnostic Aids

- These DTCs cannot be retrieved with a current status. Diagnosis of current DTCs is accomplished via the symptom, Scan Tool Does Not Communicate with a Class 2 Device. Refer to **Scan Tool Does Not Communicate with Class 2 Device** .
- An intermittent condition is likely to be caused by a short on the class 2 serial data circuit. Use the Scan Tool Does Not Communicate with a Class 2 Device procedure in order to isolate an intermittent condition. Refer to **Scan Tool Does Not Communicate with Class 2 Device** .

DTC U2100

Circuit Description

The controller area network (CAN) serial data line is a high speed serial data bus used to communicate information between the engine control module (ECM), body control module (BCM), and the transmission control module (TCM). Typical data-transmission speeds must be high enough to ensure the required real-time response is maintained. The CAN serial data line does not communicate with the scan tool via the data link connector (DLC). CAN serial data information is interpreted by the BCM and transmitted to the serial data line by the BCM.

Modules connected to the CAN serial data circuit monitors communication during normal vehicle operation, where operation information is exchanged among the modules. Each module on the CAN network maintains a transmit error counter (TEC) and a receive error counter (REC). The counter values increase with detected errors and will decrease with error-free messages. If the TEC value exceeds 255, the controller removes itself from the network and DTC U2100 will result.

Conditions for Running the DTC

- Supply voltage to the modules are in the normal operating range.
- The vehicle is in the RUN power mode.

Conditions for Setting the DTC

The module setting the DTC has attempted to establish communications on the CAN circuits for more than 7 times.

Action Taken When the DTC Sets

- The ECM turns ON the MIL during the second consecutive drive cycle with the error detected.
- The ECM records the operating conditions at the time of turning ON the MIL and stores the data as Freeze Frame information.
- The EBCM disables the traction control system.
- The LED in the traction control system switch is turned OFF.

Conditions for Clearing the MIL/DTC

- A current DTC Last Test Failed clears when the diagnostic runs and passes after 3 consecutive drive cycles.
- A current DTC clears and the MIL is turned OFF when the fault is no longer present.
- A history DTC clears when the module ignition cycle counter reaches the reset threshold, without a repeat of the fault, or after 40 consecutive drive cycles.

DTC U2100

Step	Action	Yes	No
Schematic Reference: <u>Data Link Connector (DLC) Schematics (A/T)</u> or <u>Data Link Connector (DLC) Schematics (M/T)</u> Connector End View Reference: <u>Master Electrical Component List</u> in Wiring Systems.			
1	Did you perform the Diagnostic System Check for the system exhibiting the symptom?	Go to Step 2	Go to Control Module References in Body Control System for the applicable Diagnostic System Check
2	1. Turn the ignition OFF. 2. Disconnect the body control module (BCM), engine control module (ECM), electronic brake control module (EBCM), and transmission control module (TCM) connectors. 3. Test both the controller area network (CAN) high and low circuits for the following conditions: <ul style="list-style-type: none"> • A short to ground • A short to voltage • A short to each other Turn the ignition ON, with the engine OFF when you test for a short to voltage. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 5	Go to Step 3
	1. Using the scan tool, clear the DTCs. 2. Turn the ignition OFF. 3. Reconnect each module one at a time, starting with		

3	<p>the TCM, then the BCM, the EBCM, and finally the ECM.</p> <p>4. After each module is connected, check for U2100 in the ECM and EBCM.</p> <p>Does DTC U2100 reset after reconnecting each module one at a time?</p>	Go to Step 5	Go to Step 4
4	<p>IMPORTANT: Perform the programming or setup procedure for the replaced control module if required.</p> <p>Replace the module that resets U2100. Refer to <u>Control Module References</u> in Body Control System for the applicable replacement procedure. Did you complete the replacement?</p>	Go to Step 5	-
5	<ol style="list-style-type: none"> 1. Reconnect all modules not already connected. 2. Use the scan tool in order to clear the DTCs. 3. Turn the ignition switch OFF. 4. Wait at least 10 seconds. 5. Turn the ignition ON, with the engine OFF. 6. Retrieve DTCs from the ECM and EBCM. <p>Does the DTC reset?</p>	Go to Step 2	System OK

DTC U2102 OR U2103

Circuit Description

The controller area network (CAN) serial data line is a high speed serial data bus used to communicate information between the engine control module (ECM), body control module (BCM), and the transmission control module (TCM). Typical data-transmission speeds must be high enough to ensure the required real-time response is maintained. The CAN serial data line does not communicate with the scan tool via the data link connector (DLC). CAN serial data information is interpreted by the BCM and transmitted to the serial data line by the BCM. The CAN bus is continuously monitored by the modules on the serial data bus.

Conditions for Running the DTC

- Supply voltage to the modules are in the normal operating range.
- The ignition is cycled from OFF to RUN.

Conditions for Setting the DTC

Each controller on the CAN serial data circuit monitors the activity or traffic on the bus. The module setting the DTC does not receive CAN formatted messages from all of the modules it expected to, or receives too many

CAN formatted messages. This indicates that there may be fewer controllers or more controllers actively communicating on the bus than programmed. After the seventh attempt, the module sets on one of the following DTCs:

- DTC U2102 - More Controllers
- DTC U2103 - Fewer Controllers

Action Taken When the DTC Sets

- The control module stores the DTC information into memory when the diagnostic runs and fails.
- The malfunction indicator lamp (MIL) turns ON during the second consecutive drive cycles with the error detected in the ECM.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Failure Records.
- The ECM records the operating conditions at the time of turning ON the MIL and stores the data as Freeze Frame information.

Conditions for Clearing the DTC

- A current DTC Last Test Failed clears when the diagnostic runs and passes after 3 consecutive drive cycles.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other non-emission related diagnostic.
- Clear the DTC with a scan tool.
- The MIL turns OFF.

DTC U2102 or U2103

Step	Action	Yes	No
Schematic Reference: <u>Data Link Connector (DLC) Schematics (A/T)</u> or <u>Data Link Connector (DLC) Schematics (M/T)</u> Connector End View Reference: <u>Master Electrical Component List</u> in Wiring Systems.			
1	Did you perform the Diagnostic System Check for the system exhibiting the symptom?	Go to Step 2	Go to Control Module References in Body Control System for the applicable Diagnostic System Check
2	<ol style="list-style-type: none"> 1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With the scan tool, communicate with the body control module (BCM), electronic brake control module (EBCM), engine control module (ECM), and transmission control module (TCM). 4. Monitor the DTC information for DTC U2100. 		

	Does the scan tool indicate that DTC U2100 sets as either a current or history DTC?	Go to <u>Diagnostic Trouble Code (DTC) List</u>	Go to Step 3
3	Inspect for poor connections at the harness connector of the module that is not communicating. Did you find and correct the condition?	Go to Step 4	Go to Step 5
4	<ol style="list-style-type: none"> 1. Use the scan tool in order to clear the DTCs. 2. Turn the ignition switch OFF. 3. Wait at least 10 seconds. 4. Turn the ignition ON, with the engine OFF. 5. Retrieve DTCs from the EBCM, ECM, TCM, and BCM. <p>Does the DTC reset?</p>	Go to Step 2	-
5	<p>IMPORTANT: Perform the programming or setup procedure for the replaced control module if required.</p> <p>Replace the control module that is not communicating. Refer to <u>Control Module References</u> in Body Control System for the applicable replacement procedure. Did you complete the replacement?</p>	Go to Step 4	System OK

DTC U2105-U2199

Circuit Description

The controller area network (CAN) serial data line is a high speed serial data bus used to communicate information between the engine control module (ECM), body control module (BCM), electronic brake control module (EBCM), and the transmission control module (TCM). Typical data-transmission speeds must be high enough to ensure that the required real-time response is maintained.

The CAN serial data line does not communicate with the scan tool via the data link connector (DLC). CAN serial data information is interpreted by the BCM and transmitted to the serial data line by the BCM.

Each module on the CAN serial data circuit learns the identity of the other modules on the circuit. If a module stops communicating after all modules have initiated for the ignition cycle, other modules set a DTC specific for the module not communicating:

- DTC U2105, can not communicate with the ECM
- DTC U2106, can not communicate with the TCM
- DTC U2107, can not communicate with the BCM

- DTC U2108, can not communicate with the EBCM

DTC U2105-U2199 Control Modules & ID Numbers

Control Module	ID Number
Engine Control Module (ECM)	05
Transaxle Control Module (TCM)	06
Body Control Module (BCM)	07
Electronic Brake Control Module (EBCM)	08

Conditions for Running the DTC

- Supply voltage to the modules are in the normal operating range.
- The vehicle is in the RUN power mode.

Conditions for Setting the DTC

The module setting the DTC has attempted to establish communications on the CAN circuits more than 7 times.

Action Taken When the DTC Sets

Besides storing the DTC as both current and history and using default values for missing parameters, the modules on the CAN network each take separate actions as listed:

- Engine control module (ECM)
 - Turn ON the MIL during the second consecutive drive cycle with the error detected.
 - Record the operating conditions at the time of turning ON the MIL and store the data as Freeze Frame information.
- Transaxle control module (TCM)

Send a request to the ECM to turn ON the MIL during the second consecutive drive cycle with the error detected.

- Electronic brake control module (EBCM)
 - The traction control system (TCS) is disabled.
 - Turn OFF the TCS LED in the TCS switch.
 - The EBCM may also set C0236, C0241, C0276, when a U code is current in the EBCM.
- Body control module (BCM)
 - Turn ON the MIL during the second consecutive drive cycle with the error detected.
 - Record the operating conditions at the time of turning ON the MIL and store the data as Freeze Frame information.

Conditions for Clearing the DTC

The MIL is cleared, turned OFF, and the DTC is cleared by a different strategy for each module.

- ECM
 - If the fault is not detected 3 consecutive drive cycles, the current DTC is cleared and the MIL is turned OFF.
 - The history DTC is cleared if the malfunction does not reoccur for 40 consecutive drive cycles.
 - The history DTC is cleared if there is a KAM reset (battery disconnected).
- TCM
 - If the fault is not detected one consecutive drive cycle, the current DTC is cleared.
 - The history DTC is cleared if the malfunction does not reoccur for 40 consecutive drive cycles.
- EBCM
 - If the fault is not detected on consecutive drive cycle, the current DTC is cleared and the TCS LED is illuminated.
 - The history DTC is cleared if the malfunction does not reoccur for 40 consecutive drive cycles.
- BCM
 - If the fault is not detected 3 consecutive drive cycles, the current DTC is cleared and the MIL is turned OFF.
 - The history DTC is cleared if the malfunction does not reoccur for 40 consecutive drive cycles.
 - The history DTC is cleared if there is a KAM reset (battery disconnected).

DTC U2105-U2199 Diagnostic Test

Step	Action	Yes	No
Schematic Reference: <u>Data Link Connector (DLC) Schematics (A/T) or Data Link Connector (DLC) Schematics (M/T)</u> Connector End View Reference: <u>Master Electrical Component List</u> in Wiring Systems.			
1	Did you perform the Diagnostic System Check for the system exhibiting the symptom?	Go to Step 2	Go to Control Module References in Body Control System for the applicable Diagnostic System Check
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With the scan tool, communicate with: <ul style="list-style-type: none"> • The body control module (BCM) • The electronic brake control module (EBCM) • The engine control module (ECM) • The transmission control module (TCM) 4. Monitor the DTC information for DTC U2100. 5. Monitor the DTC information for DTCs in the		

	range of U2102-U2104. Does the scan tool indicate that DTC U2100 or DTCs in the range of U2102-U2104 as either current or history DTCs?	Go to <u>Diagnostic Trouble Code (DTC) List</u>	Go to Step 3
3	<ol style="list-style-type: none"> 1. Test all battery positive and ignition positive circuits of the module that is not communicating for opens or shorts to ground. 2. Test all grounds of the module that is not communicating for opens. <p>Did you find and correct the concern?</p>	Go to Step 4	Go to Step 5
4	<ol style="list-style-type: none"> 1. Use the scan tool in order to clear the DTCs. 2. Turn the ignition switch OFF. 3. Wait at least 10 seconds. 4. Turn the ignition ON, with the engine OFF. 5. Retrieve DTCs from the ECM, EBCM, TCM, and BCM. <p>Does the DTC reset?</p>	Go to Step 7	System OK
5	<p>Test all CAN serial data circuits between the module setting the DTC and the module that is not communicating for opens, shorts to voltage, shorts to ground, and shorts between CAN circuits.</p> <p>Did you find and correct the concern?</p>	Go to Step 4	Go to Step 6
6	<p>Inspect for poor connections at the harness connector of the module that is not communicating.</p> <p>Did you find and correct the condition?</p>	Go to Step 7	Go to Step 10
7	<p>Inspect the connector of the module recording the DTC.</p> <p>Did you find and correct the condition?</p>	Go to Step 8	Go to Step 9
8	<ol style="list-style-type: none"> 1. Use the scan tool in order to clear the DTCs. 2. Turn the ignition switch OFF. 3. Wait at least 10 seconds. 4. Turn the ignition ON, with the engine OFF. 5. Retrieve the DTCs from the EBCM, ECM, TCM, and BCM. <p>Does the DTC reset?</p>	Go to Step 2	System OK
	IMPORTANT: Perform the programming or setup procedure for the replaced control module, if required.		

9	Replace the control module that has set the DTC. Refer to Control Module References in Body Control System for the applicable replacement procedure. Did you complete the replacement?	Go to Step 8	-
10	<p>IMPORTANT: Perform the programming or setup procedure for the replaced control module, if required.</p> <p>Replace the control module that is not communicating. Refer to Control Module References in Body Control System for the applicable replacement procedure. Did you complete the replacement?</p>	Go to Step 4	-

SYMPTOMS - DATA LINK COMMUNICATIONS

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

1. Perform the applicable diagnostic system check before using the Symptom Tables in order to verify that all of the following are true:
 - There are no DTCs set.
 - The control modules can communicate via the serial data line.
2. Review the system operation in order to familiarize yourself with the system functions. Refer to **Data Link Communications Description and Operation** .

Visual/Physical Inspection

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

Intermittent

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

Symptom List

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

- **Scan Tool Does Not Power Up**
- **Scan Tool Does Not Communicate with Class 2 Device**
- **Scan Tool Does Not Communicate with Keyword Data Line** .

SCAN TOOL DOES NOT POWER UP

Circuit 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 power battery positive voltage at terminal 16.
- Scan tool power ground at terminal 4.
- Common signal ground at terminal 5.

The scan tool will power up with the ignition OFF.

Test Description

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

4: If the battery positive voltage and ground circuits of the data link connector (DLC) are functioning properly, the malfunction must be due to the scan tool.

Scan Tool Does Not Power Up

Step	Action	Yes	No
Schematic Reference: <u>Data Link Connector (DLC) Schematics (A/T)</u> or <u>Data Link Connector (DLC) Schematics (M/T)</u> Connector End View Reference: <u>Data Link Communications Connector End Views</u>			
1	Test the battery positive voltage circuit of the DLC for an open or a short to ground. Refer to Circuit Testing or Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Control Module References in Body Control System for the applicable Diagnostic System Check	Go to Step 2
2	Test the ground circuit from pin 4 of the DLC for an open or high resistance. Refer to Circuit Testing or Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Control Module References in Body Control System for the applicable Diagnostic System Check	Go to Step 3
3	Inspect for poor connections and terminal tension at the DLC. Refer to Testing for Intermittent Conditions and Poor Connections or Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Control Module References in Body Control System for the applicable Diagnostic System Check	Go to Step 4
4	The scan tool may be malfunctioning. Refer to the scan tool user guide. Did you obtain a properly operating scan tool?	Go to Control Module References in Body Control System for the applicable Diagnostic System Check	-

SCAN TOOL DOES NOT COMMUNICATE WITH CLASS 2 DEVICE

Circuit Description

Modules connected to the class 2 serial data circuit monitor for serial data communications during normal vehicle operation. Operating information and commands are exchanged among the modules. Connecting a scan tool to the DLC allows communication with the modules for diagnostic purposes.

Diagnostic Aids

The following conditions will cause a class 2 serial data communication malfunction:

- The BCM detects that the ignition switch is ON and sends the appropriate power mode message to the other modules connected to the class 2 serial data circuit. The BCM must be connected to the class 2 serial data circuit for many other modules to communicate with the scan tool.
- A class 2 serial data circuit shorted to ground. A history U1300 will set in all modules. Refer to **DTC U1300, U1301, or U1305** .
- A class 2 serial data circuit shorted to voltage. A history U1301 will set in all modules. Refer to **DTC U1300, U1301, or U1305** .
- An internal condition within a module or connector on the class 2 serial data circuit, that causes a short to voltage or ground to the class 2 serial data circuit.
- If the malfunction is intermittent check for poor connections at the suspect module. Wiggling the harness wiring may help in locating the fault.

Test Description

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

3: A partial loss of communication in the class 2 serial data circuit uses a different procedure than a total loss of communication of the class 2 serial data circuit.

5: The following DTCs may be retrieved with a history status. These DTCs are not the cause of the present condition.

- U1300
- U1301

7: A State of Health DTC with a history status may be present along with a U1000 with a current status. This indicates that the malfunction occurred when the ignition was ON.

11: This step will isolate a wiring problem or a module malfunction.

13: This step analyzes the specific branch circuit for a malfunction.

14: An open circuit at this point will cause a loss of communication with the vehicle.

19: If there are no current DTCs that begin with the letter "U", the communication concern has been repaired.

21: The communication concern may have prevented diagnosis of the customer complaint.

Scan Tool Does Not Communicate with Class 2 Device

Step	Action	Yes	No
Schematic Reference: <u>Data Link Connector (DLC) Schematics (A/T)</u> or <u>Data Link Connector (DLC) Schematics (M/T)</u>			

Connector End View Reference: Master Electrical Component List in Wiring Systems

1	<p>Did you perform the Diagnostic System Check for the system exhibiting symptom?</p>	<p>Go to Step 2</p>	<p>Go to Control Module References in Body Control System for the applicable Diagnostic System Check</p>
2	<p>Install a scan tool. Does the scan tool power up?</p>	<p>Go to Step 3</p>	<p>Go to Scan Tool Does Not Power Up</p>
3	<p>1. Turn ON the ignition, with the engine OFF. 2. Attempt to communicate with each module on the class 2 serial data circuit. If using a Tech 2, obtain this information using the Class 2 Message Monitor feature.</p> <p>Does the scan tool communicate with any module on the class 2 serial data circuit?</p>	<p>Go to Step 4</p>	<p>Go to Step 9</p>
4	<p>1. Select the Display DTCs function for each module. If using a Tech 2, use the Class 2 DTC Check feature in order to determine which modules do have DTCs set. 2. Record all of the displayed DTCs, the DTC status, and the module which set the DTC.</p> <p>Did you record any DTCs in the range of U1000 to U1255?</p>	<p>Go to Step 5</p>	<p>Go to Step 8</p>
5	<p>Are history DTCs U1300 or U1301 retrieved from any module?</p>	<p>Go to Step 6</p>	<p>Go to Step 7</p>
6	<p>IMPORTANT: Turn ON the ignition, with the engine OFF, when testing for a short to voltage. Use the DMM MIN/MAX function to capture intermittent conditions.</p> <p>Test the class 2 serial data circuit for an intermittent short to ground or an intermittent short to voltage. Refer to the following in Wiring Systems:</p> <ul style="list-style-type: none"> • <u>Testing for Intermittent Conditions and Poor Connections</u> • <u>Circuit Testing</u> • <u>Connector Repairs</u> • <u>Wiring Repairs</u> 		

	Did you find and correct the condition?	Go to Step 18	Go to Step 7
7	Is U1000 the only DTC displayed in the previously specified range?	Go to <u>DTC U1000</u>	Go to <u>DTC U1001-U1254</u>
8	Diagnose the non communicating module by using the DTC U1001-U1254 Lost Communications with XXX procedure for the module which is not communicating. The DTC U1001-U1254 Lost Communications with XXX procedure will determine which module is not communicating. Refer to <u>DTC U1001-U1254</u> . Did you complete the action?	Go to <u>Control Module References</u> in Body Control Systems for the applicable Diagnostic System Check	-
9	<ol style="list-style-type: none"> 1. Turn OFF the ignition. 2. Disconnect the scan tool from the data link connector (DLC). 3. Inspect for poor connections and terminal tension at the DLC. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to <u>Control Module References</u> in Body Control Systems for the applicable Diagnostic System Check	Go to Step 10
10	Test the ground circuits of the DLC for an open or high resistance. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to <u>Control Module References</u> in Body Control Systems for the applicable Diagnostic System Check	Go to Step 11
11	<ol style="list-style-type: none"> 1. Disconnect all modules on the class 2 serial data circuit. IMPORTANT: Turn ON the ignition, leaving the engine OFF, when testing for a short to voltage. <ol style="list-style-type: none"> 2. Test the class 2 serial data circuit for a short to ground or short to voltage between DLC terminal 2 and each module on the class 2 serial data circuit. Did you find and correct the condition?	Go to Step 18	Go to Step 12
12	<ol style="list-style-type: none"> 1. Turn OFF the ignition. 2. Reconnect the BCM. 3. Install the scan tool. 		

	<p>4. Turn ON the ignition, with the engine OFF.</p> <p>5. Attempt to communicate with the BCM.</p> <p>Does the scan tool communicate with the BCM?</p>	Go to Step Step 13	Go to Step Step 14
13	<p>Continue connecting the disconnected modules and attempting to communicate after each connection until communication can not be established or all modules are reconnected.</p> <p>When a module is connected, is communication lost with the class 2 serial data devices?</p>	Go to Step 15	Go to Diagnostic Aids
14	<p>Inspect for poor connections and terminal tension at the class 2 serial data circuit of the BCM.</p> <p>Did you find and correct the condition?</p>	Go to Step 18	Go to Step 16
15	<p>Inspect for poor connections and terminal tension at the class 2 serial data circuit of the most recently reconnected module.</p> <p>Did you find and correct the condition?</p>	Go to Step 18	Go to Step 17
16	<p>IMPORTANT: Perform the programming or setup procedure for the replaced control module if required.</p> <p>Replace the BCM. Refer to Body Control Module Replacement in Body Control System for the applicable replacement procedure. Did you complete the replacement?</p>	Go to Step 18	-
17	<p>IMPORTANT: Perform the programming or setup procedure for the replaced control module if required.</p> <p>Replace the most recently reconnected module. Refer to Control Module References in Body Control System for the appropriate replacement procedure. Did you complete the replacement?</p>	Go to Step 18	-
18	<p>1. Connect all of the modules.</p> <p>2. Connect all the connectors.</p> <p>3. Install a scan tool.</p> <p>4. Turn ON the ignition, leaving the engine OFF.</p> <p>IMPORTANT: The scan tool may require a power up reset before communication will occur due to a short on the class 2 serial data circuit. Turn OFF or disconnect the scan tool before you display DTCs.</p>		

	<p>5. Wait for 10 seconds.</p> <p>6. Select the display DTCs function for each module. If using a Tech 2, use the Class 2 DTC Check feature in order to determine which modules do have DTCs set.</p> <p>7. Record all of the displayed DTCs and the DTC status.</p> <p>Did your record any DTCs which begin with a letter U and with a current status?</p>	Go to Step 20	Go to Step 19
19	Did you record any DTCs which do not begin with a letter "U"?	Go to Step 20	Go to Step 22
20	Diagnose the DTCs as directed by the diagnostic procedures for the particular module or concern. Did you complete the action?	Go to Step 21	-
21	Did you diagnose all of the DTCs?	Go to Step 22	Go to Step 20
22	Clear the DTCs using the scan tool. Did you complete the action?	Go to Control Module References in Body Control Systems for the applicable Diagnostic System Check	-

SCAN TOOL DOES NOT COMMUNICATE WITH LOW SPEED GMLAN DEVICE

Modules connected to the GMLAN serial data circuit monitor for serial data communications on the GMLAN network during normal vehicle operation. Operating information and commands are exchanged among the modules. When a module detects a bus-off condition a DTC U2100 will be set. This DTC can be retrieved as history only.

Diagnostic Aids

The engine will not start when there is a total malfunction of the GMLAN serial data circuits while the engine is not running. The following conditions may cause a total loss of GMLAN data communication:

- Any of the serial data circuits shorted to ground.
- Any of the serial data circuits shorted to voltage.
- A short between serial data circuits.
- An internal malfunction of a module on the GMLAN network that causes a short to voltage or ground.

Scan Tool Does Not Communicate with Low Speed GMLAN Device

Step	Action	Yes	No
Schematic Reference: Data Link Connector (DLC) Schematics (A/T) or Data Link Connector (DLC) Schematics (M/T)			

Connector End View Reference: Master Electrical Component List in Wiring Systems

1	Does the scan tool power up?	Go to Step 2	Go to Scan Tool Does Not Power Up
2	<ol style="list-style-type: none">1. Turn the ignition ON, with the engine OFF.2. Attempt to communicate with each module on the GMLAN serial data circuit using a scan tool with an in-line CANdi adaptor module properly installed. Does the scan tool communicate with all modules on the GMLAN serial data circuits?	Go to Testing for Intermittent Conditions and Poor Connections in Wiring Systems	Go to Step 3
3	<ol style="list-style-type: none">1. Disconnect the scan tool from the DLC.2. Turn the ignition OFF.3. Disconnect all non-communicating modules on the low speed GMLAN serial data circuit.4. Turn the ignition ON, with the engine OFF.5. Test the low speed GMLAN serial data circuit between the DLC and all the modules on the low speed GMLAN serial data circuit, for the following conditions:<ul style="list-style-type: none">• An open• A short to ground• A short to voltage Refer to the following: <ul style="list-style-type: none">• Control Module References in Body Control System for the applicable schematic• Circuit Testing in Wiring Systems• Wiring Repairs in Wiring Systems Did you find and correct the condition?	Go to Step 7	Go to Step 4
	Test the following circuits of the module that is not communicating for an open or high resistance: <ul style="list-style-type: none">• The battery positive voltage input circuits• The battery voltage output circuits• The ignition voltage input circuits• The ignition voltage output circuits• The switched battery positive voltage supply circuits• The ground circuits		

4	<p>Refer to the following:</p> <ul style="list-style-type: none"> • Control Module References in Body Control System for the applicable schematic • Circuit Testing in Wiring Systems • Wiring Repairs in Wiring Systems <p>Did you find and correct the condition?</p>	Go to Step 7	Go to Step 5
5	<p>Inspect for poor connections and terminal tension at the following harness connector circuits of the module that is not communicating:</p> <ul style="list-style-type: none"> • The battery positive voltage input circuits • The battery positive voltage output circuits • The ignition voltage input circuits • The ignition voltage output circuits • The switched battery positive voltage supply circuits • The ground circuits • The low speed GMLAN serial data circuits <p>Refer to the following:</p> <ul style="list-style-type: none"> • Control Module References in Body Control System for the applicable schematic • Testing for Intermittent Conditions and Poor Connections in Wiring Systems • Connector Repairs in Wiring Systems <p>Did you find and correct the condition?</p>	Go to Step 7	Go to Step 6
6	<p>IMPORTANT: Perform the programming or setup procedure for the replaced control module, if required.</p> <p>Replace the module that is not communicating on the low speed GMLAN serial data circuit. Refer to Control Module References in Body Control System for the applicable replacement procedure. Did you complete the replacement?</p>	Go to Step 7	-

7	<ol style="list-style-type: none"> 1. Connect all modules and connectors. 2. Connect the scan tool to the DLC. 3. Turn the ignition ON, with the engine OFF. 4. Perform the Diagnostic System Check for the system exhibiting symptoms. Refer to <u>Control Module References</u> in Body Control System. 		
	Did you complete the operation?	System OK	Go to Step 2

SCAN TOOL DOES NOT COMMUNICATE WITH KEYWORD DATA LINE

Circuit Description

The Keyword protocol utilizes a single wire bi-directional data line between the modules and the scan tool. The message structure is a request and response arrangement. Keyword serial data is used for scan tool diagnostics only. The modules do not exchange data on this circuit.

The following modules are connected to the Keyword serial data circuit:

- Electronic brake control module (EBCM)
- Engine control module (ECM)
- Transmission control module (TCM)

Diagnostic Aids

- If the malfunction is intermittent, check for poor connections at the suspect module. Wiggling the harness wiring may help in locating the fault.
- Diagnostic trouble codes (DTCs) may be set do to this symptom and during this diagnostic procedure. Complete the diagnostic procedure in order to ensure all the DTCs are diagnosed and cleared from memory.

Scan Tool Does Not Communicate with Keyword Data Line

Step	Action	Yes	No
Schematic Reference: <u>Data Link Connector (DLC) Schematics (A/T) or Data Link Connector (DLC) Schematics (M/T)</u> Connector End View Reference: <u>Master Electrical Component List</u> in Wiring Systems			
1	Did you perform the Diagnostic System Check for the system exhibiting symptom?	Go to Step 2	Go to Control Module References in Body Control System for the applicable Diagnostic System Check
	<ol style="list-style-type: none"> 1. Connect the scan tool to the DLC. 2. Turn ON the ignition, with the engine OFF. 		

2	<p>3. Attempt to communicate with each module on the keyword serial data circuit:</p> <ul style="list-style-type: none"> • The engine control module (ECM) • The transmission control module (TCM) • The electronic brake control module (EBCM) <p>Does the scan tool communicate with all the modules on the keyword serial data circuit?</p>	<p>Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in <u>Wiring Systems</u></p>	<p>Go to Step 3</p>
3	<ol style="list-style-type: none"> 1. Disconnect the scan tool from the DLC. 2. Turn OFF the ignition. 3. Disconnect all non-communicating modules on the keyword serial data circuit. 4. Turn ON the ignition, with the engine OFF. 5. Test the keyword serial data circuit between the DLC and all the modules on the keyword serial data circuit, for the following conditions: <ul style="list-style-type: none"> • An open • A short to ground • A short to voltage <p>Refer to the following:</p> <ul style="list-style-type: none"> • <u>Control Module References</u> in Body Control System for the applicable schematic • <u>Circuit Testing</u> in Wiring Systems • <u>Wiring Repairs</u> in Wiring Systems <p>Did you find and correct the condition?</p>	<p>Go to Step 7</p>	<p>Go to Step 4</p>
4	<p>Test the following circuits of the module that is not communicating for an open or high resistance:</p> <ul style="list-style-type: none"> • The battery positive voltage input circuits • The battery positive voltage output circuits • The ignition voltage input circuits • The ignition voltage output circuits • The switched battery positive voltage supply circuits • The ground circuits 		

	<p>Refer to the following:</p> <ul style="list-style-type: none"> • <u>Control Module References</u> in Body Control System for the applicable schematic • <u>Circuit Testing</u> in Wiring Systems • <u>Wiring Repairs</u> in Wiring Systems 		
	<p>Did you find and correct the condition?</p>	<p>Go to Step 7</p>	<p>Go to Step 5</p>
<p>5</p>	<p>Inspect for poor connections and terminal tension at the following harness connector circuits of the module that is not communicating:</p> <ul style="list-style-type: none"> • The battery positive voltage input circuits • The battery positive voltage output circuits • The ignition voltage input circuits • The ignition voltage output circuits • The switched battery positive voltage supply circuits • The ground circuits • The Keyword serial data circuits <p>Refer to the following:</p> <ul style="list-style-type: none"> • <u>Control Module References</u> in Body Control System for the applicable schematic • <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems • <u>Connector Repairs</u> in Wiring Systems 		
	<p>Did you find and correct the condition?</p>	<p>Go to Step 7</p>	<p>Go to Step 6</p>
<p>6</p>	<p>IMPORTANT: Perform the programming or setup procedure for the replaced control module if required.</p> <p>Replace the module that is not communicating on the Keyword serial data circuit. Refer to <u>Control Module References</u> in Body Control System for the applicable replacement procedure. Did you complete the replacement?</p>	<p>Go to Step 7</p>	<p>-</p>

7	<ol style="list-style-type: none"> 1. Connect all modules and connectors. 2. Connect the scan tool to the DLC. 3. Turn ON the ignition, with the engine OFF. 4. Perform the Diagnostic System Check for the system exhibiting symptoms. Refer to <u>Control Module References</u> in Body Control System. 		
	Did you complete the operation?	System OK	Go to Step 2

DATA LINK REFERENCES

Data Link References

This table identifies which serial data link that a particular module uses for in-vehicle data transmission. Some modules may use more than one data link to communicate. Some modules may have multiple communication circuits passing through them without actively communicating on that data link. Additionally, these modules may utilize communication circuits not accessible from the data link connector (DLC), use the schematic reference link in the table for additional information. This table is used to assist in correcting a communication malfunction. For the description and operation of these serial data communication circuits refer to **Data Link Communications Description and Operation**

Data Link References

Control Module	Data Link Type	Diagnostic Procedure
Schematic Reference: <u>Data Link Connector (DLC) Schematics (A/T)</u> or <u>Data Link Connector (DLC) Schematics (M/T)</u>		
Body Control Module (BCM)	Class 2	Refer to <u>Scan Tool Does Not Communicate with Class 2 Device</u>
Digital Radio Receiver	Low Speed GMLAN	Refer to <u>Scan Tool Does Not Communicate with Low Speed GMLAN Device</u>
Electronic Brake Control Module (EBCM)	Keyword Data Line	Refer to <u>Scan Tool Does Not Communicate with Keyword Data Line</u>
Engine Control Module (ECM) (L61)	Keyword Data Line	Refer to <u>Scan Tool Does Not Communicate with Keyword Data Line</u>
Inflatable Restraint Sensing and Diagnostic Module (SDM)	Class 2	Refer to <u>Scan Tool Does Not Communicate with Class 2 Device</u>
Instrument Panel Cluster (IPC)	Class 2	Refer to <u>Scan Tool Does Not Communicate with Class 2 Device</u>
Power Steering Control Module (PSCM)	Class 2	Refer to <u>Scan Tool Does Not Communicate with Class 2 Device</u>
Powertrain Control Module (PCM) (L66)	Keyword Data Line	Refer to <u>Scan Tool Does Not Communicate with Keyword Data Line</u>
	Low Speed	Refer to <u>Scan Tool Does Not Communicate</u>

Radio	GMLAN	<u>with Low Speed GMLAN Device</u>
Transmission Control Module (TCM) (L61)	Keyword Data Line	Refer to <u>Scan Tool Does Not Communicate with Keyword Data Line</u>
Vehicle Communication Interface Module (VCIM)	Class 2	Refer to <u>Scan Tool Does Not Communicate with Class 2 Device</u>

DESCRIPTION AND OPERATION

DATA LINK COMMUNICATIONS DESCRIPTION AND OPERATION

Circuit Description

Regulations and agreements among the automobile manufacturers have resulted in the data link connector (DLC). This connector must be used for the scan tool and programming access to all communications systems used for those purposes on the vehicle. The connector must have the following:

- A 16-pin connector configuration to which all scan tools connect
- Scan tool battery power always available at pin 16
- Scan tool ground always available at pin 4
- A clean signal ground always available at pin 5

The rest of the pins are available for serial data communications to the vehicle system.

The serial data circuits are the means by which the microprocessor controlled modules in the vehicle communicate with each other and the scan tool. There are 4 different types of protocols on this vehicle.

- Class 2
- Controller area network (CAN)
- Keyword 2000
- GMLAN

Class 2 Data Line Circuit Description

Saturn utilizes class 2 communications system for most vehicle system controllers that must exchange data and commands. Class 2 data is pulse width modulated. The pulse width modulation of class 2 data allows better utilization of the data line.

The messages carried on class 2 data streams are also prioritized. This means if 2 devices try to communicate on the data line at the same time, only the higher priority message will continue. The device with the lower priority message must wait. The modules on the class 2 data line are:

- Body control module (BCM)
- Power steering control module (PSCM)
- Instrument panel cluster (IPC)

- Inflatable restraint sensing and diagnostic module (SDM)
- Vehicle communication interface module (VCIM), if equipped

Controller Area Network (CAN)

The controller area network (CAN) serial data line is a high speed serial data bus used to communicate traction information between the electronic brake control module (EBCM), the engine control module (ECM), the body control module (BCM), and the transaxle control module (TCM). Typical data-transmission speeds must be high enough to ensure that the required real-time response is maintained.

The addressing scheme employed with CAN assigns a label to every message, with each message receiving a unique identifier. The identifier classifies the content of the message, such as engine speed.

Each module processes only those messages whose identifiers are stored in the module's acceptance list. This is CAN's form of message filtering.

The identifier labels both the data content and the priority of the message being sent. Each module can begin transmitting its most important data as soon as the bus is unoccupied. When more than one module starts to transmit simultaneously, the message with the highest priority is assigned first access. A module responds to failure to gain access by automatically switching to receive mode. The module then repeats the transmission attempt as soon as the bus is free again.

Keyword 2000 Data Line

The Keyword protocols utilizes a single wire bi-directional data line between the modules and the scan tool. The message structure is a request and response arrangement. Keyword 2000 is used for scan tool diagnostics only. The modules do not exchange data on these systems.

The modules on the Keyword 2000 data line are:

- Electronic brake control module (EBCM)
- Engine control module (ECM)
- Transaxle control module (TCM)

GMLAN Low Speed Circuit Description

The data link connector (DLC) allows a scan tool to communicate with the low speed GMLAN serial data circuit. The serial data is transmitted over a single wire to the appropriate control modules. The transmission speed for GMLAN low speed is up to 83.33 Kb/s. Under normal vehicle operating conditions the speed of the buss is 33.33 Kb/s. This protocol produces a simple pules train sent out over the GMLAN low speed serial data bus. When a module pulls the buss high, 5 volts, this creates a dominant logic state or 0 on the buss. When the buss is pulled low 0 volts, it is translated as a recessive logic state or 1. To wake the control modules connected to the GMLAN low speed serial data buss a high voltage wake up pulse is sent out over the buss, the voltage level of the pules is +10 volts. Modules connected to the GMLAN low speed buss can be part of a virtual network as described in the previous paragraph. The modules on the GMLAN low speed serial data buss are connected to the buss in a parallel configuration.