

2002 Chevrolet Corvette

2002 BRAKES Anti-Lock Brake System - Corvette

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Anti-Lock Brake System - Corvette

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS


Application	Specification	
	Metric	English
BPMV Brake Pipe Fittings	16 N·m	12 lb ft
Brake Fluid Pressure Sensor	22 N·m	16 lb ft
EBCM/BPMV Bracket Bolts	27 N·m	20 lb ft
EBCM/BPMV Insulator Nuts	12 N·m	106 lb in
EBCM/ BPMV Insulator Bolt	14 N·m	10 lb ft
EBCM to BPMV Bolts in Sequence	First Pass 3 N·m Second Pass 6 N·m	First Pass 27 lb in Second Pass 52 lb in
Lateral Accelerometer Nuts	3 N·m	24 lb in
Steering Gear Nut	100 N·m	74 lb ft
Yaw Rate Sensor Nuts	7 N·m	62 lb in

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Fig. 1: Fastener Tightening Specifications
Courtesy of GENERAL MOTORS CORP.

SCHEMATIC & ROUTING DIAGRAMS

ABS SCHEMATIC ICONS

Icon	Icon Definition
	<p>Important: Twisted-pair wires provide an effective "shield" that helps protect sensitive electronic components from electrical interference.</p> <p>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 (0.2 in).

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Fig. 2: ABS Schematic Icons
Courtesy of GENERAL MOTORS CORP.

ABS SCHEMATIC

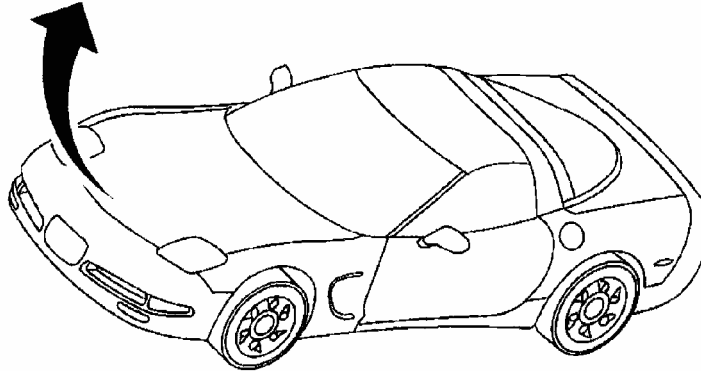
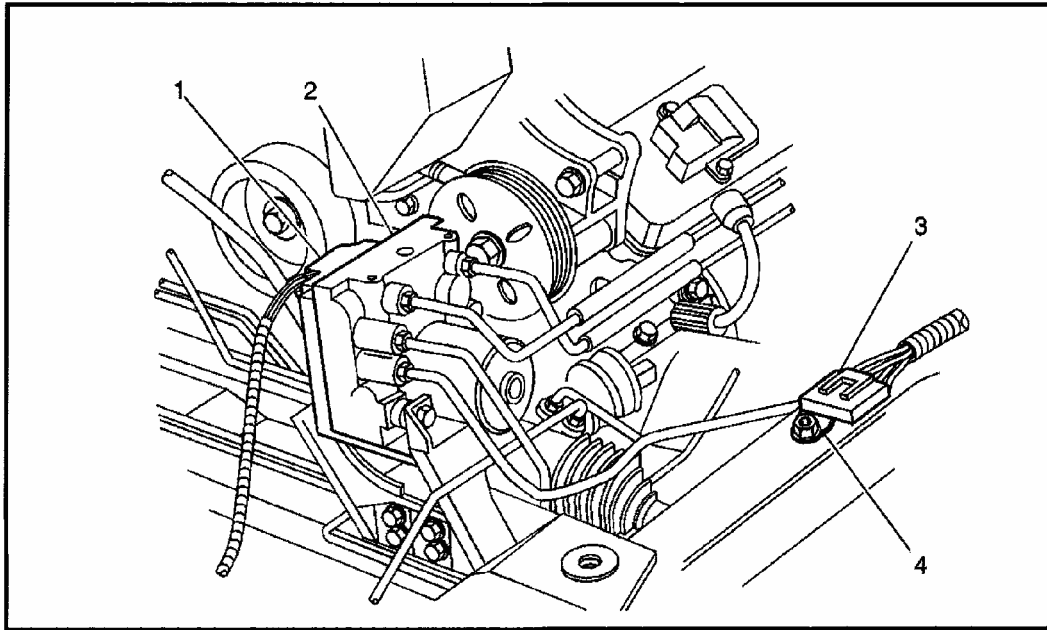
Refer to ANTI-LOCK BRAKES .

COMPONENT LOCATOR

ABS COMPONENT VIEWS

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(1) Electronic Brake Control Module (EBCM)
(2) Brake Pressure Modulator Valve (BPMV)

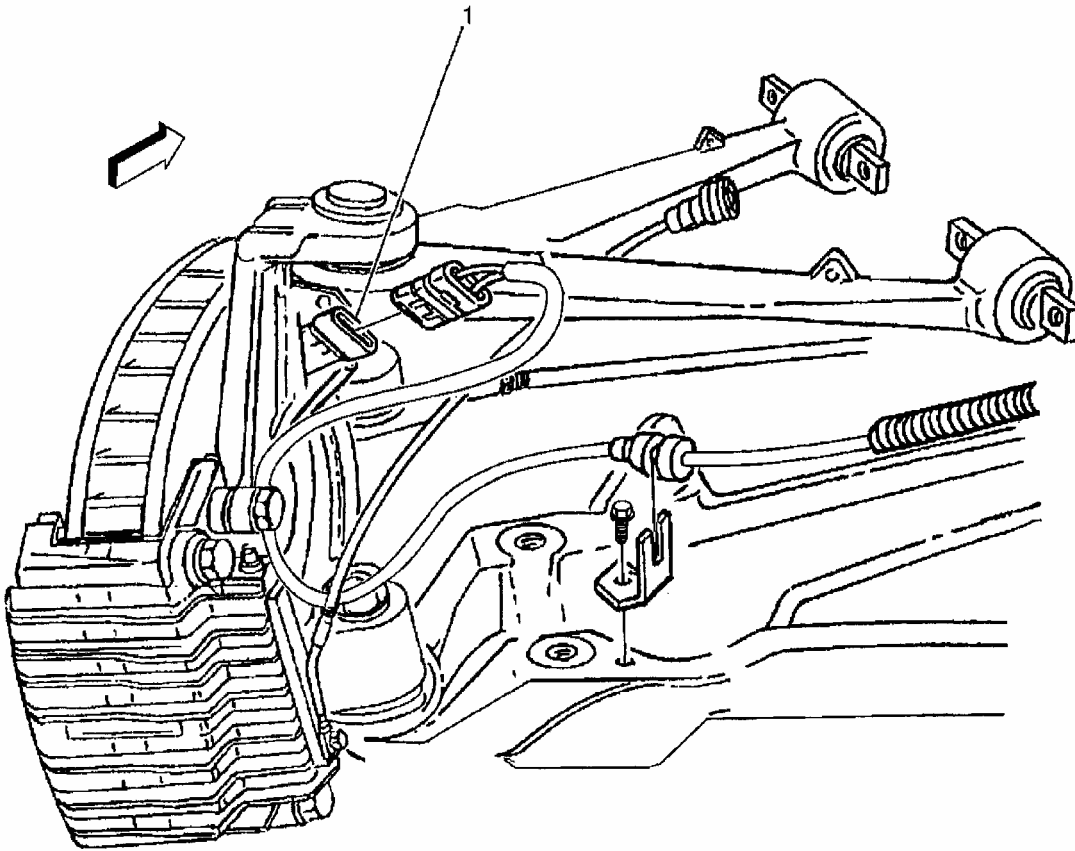
(3) SP101
(4) G101

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Fig. 3: Left Front Of Engine Compartment
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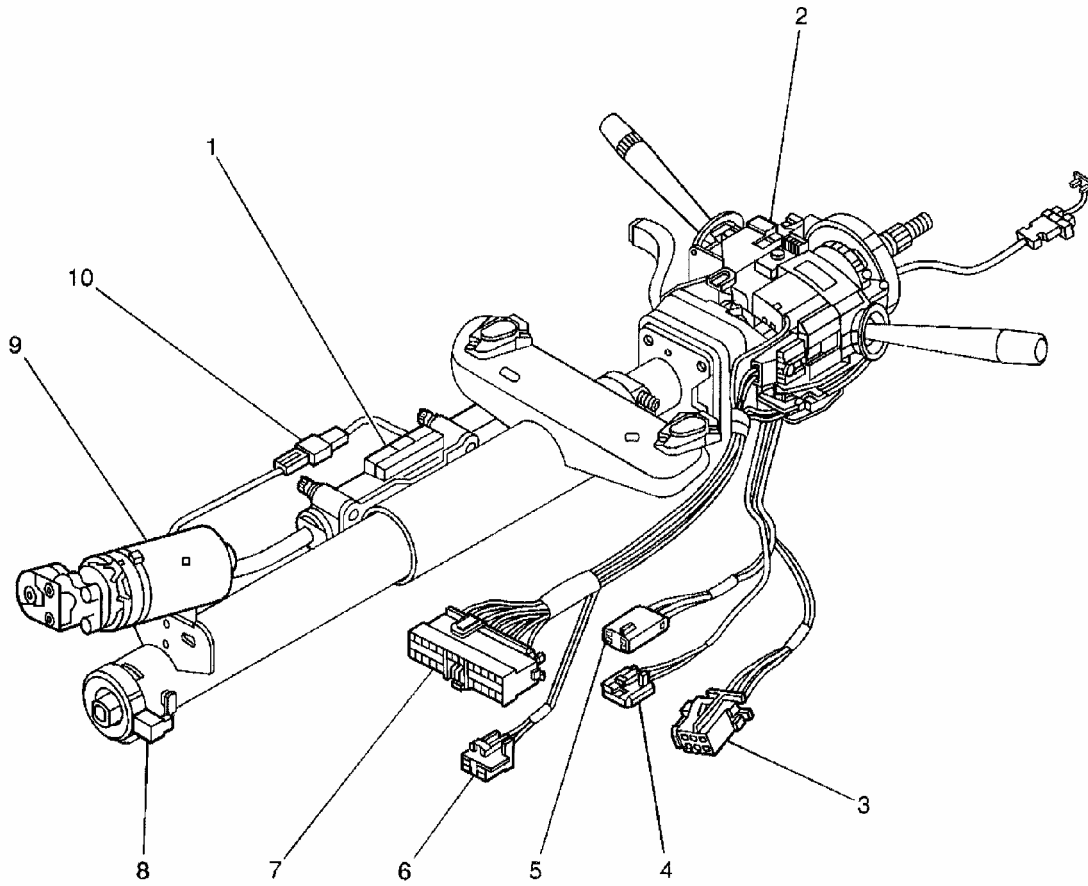
(1) Wheel Speed Sensor (WSS)-LF

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**Fig. 4: Behind Brake Rotor - LF (Rotor - RF Similar)
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- | | |
|--------------------------|------------------------------------|
| (1) Telescoping Sensor | (6) C217 |
| (2) Steering Column Lock | (7) C209 |
| (3) C219 | (8) Steering Wheel Position Sensor |
| (4) C207 | (9) Telescoping Drive Motor |
| (5) C211 | (10) C210 |

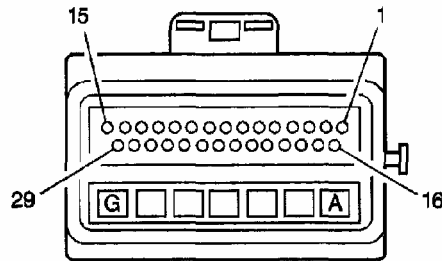
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Fig. 5: Steering Column
Courtesy of GENERAL MOTORS CORP.

ABS CONNECTOR END VIEWS

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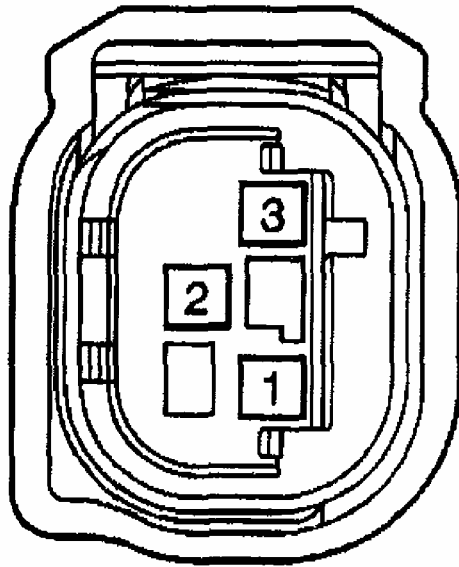
Connector Part Information

- C1 - 15318099
- 7-Way F Metri-Pack 480 Series (BLK)
- C2 - 15354984
- 29 Way F Micro-Pack 100 Series (NAT)

Pin	Wire Color	Circuit No.	Function
A	RED	1642	Battery Positive Voltage
B	BRN	641	Ignition 3 voltage
C	GRY	1787	Variable Effort Steering Actuator High Effort Control
D	WHT	345	Variable Effort Steering Actuator Low Effort Control
E	—	—	Not Used
F	BLK/WHT	1251	Ground
G	BLK	1250	Ground
1	—	—	Not Used
2	TAN/BLK	464	Delivered Torque Signal
3	LT GRN	1763	Steering Wheel Position Signal A
4	—	—	Not Used
5	LT GRN/ BLK	1338	Lateral Accelerometer Input (JL4)
6	LT BLU	20	Stop lamp Supply Voltage
7	—	—	Not Used
8	RED	885	Left Rear Wheel Speed Sensor Low Reference
9	BRN	882	Right Rear Wheel Speed Sensor Signal
10	DK GRN	872	Right Front Wheel Speed Sensor Signal
11	LT BLU	830	Left Front Wheel Speed Sensor Signa
12	ORN/BLK	463	Requested Torque Signal
13	ORN/BLK	556	Low Reference
14-16	—	—	Not Used
17	BLK	2626	Brake Pressure Sensor Signal (JL4)
18	LT BLU	1764	Steering Wheel Position Signal B
19	DK BLU	716	Yaw Rate Sensor Signal (JL4)
20	—	—	Not Used
21	LT BLU	1122	ABS/TCS Class 2 Serial Data
22	BLK	884	Left Rear Wheel Speed Sensor Signal
23	WHT	883	Right Rear Wheel Speed Sensor Low Reference
24	TAN	833	Right Front Wheel Speed Sensor Low Reference
25	YEL	873	Left Front Wheel Speed Sensor Low Reference
26	—	—	Not Used
27	GRY	1056	Steering Wheel Position Sensor 5V Reference Voltage
28	LT BLU	2627	Steering Position Sensor Signal
29	—	—	Not Used

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Fig. 6: Electronic Brake Control Module
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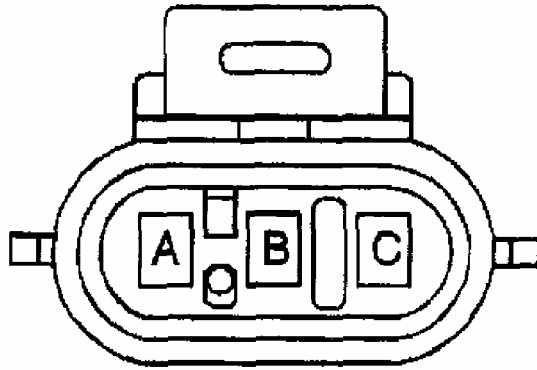
Connector Part Information		<ul style="list-style-type: none"> • 15324236 • 3-Way F Metri-Pack 150 Series (BLK) 	
Pin	Wire Color	Circuit No.	Function
1	GRY	556	Low Reference
2	BLK	2626	Brake Pressure Sensor Signal
3	ORN	1056	Steering Wheel Position Sensor 5V Reference Voltage

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Fig. 7: Brake Fluid Pressure Sensor
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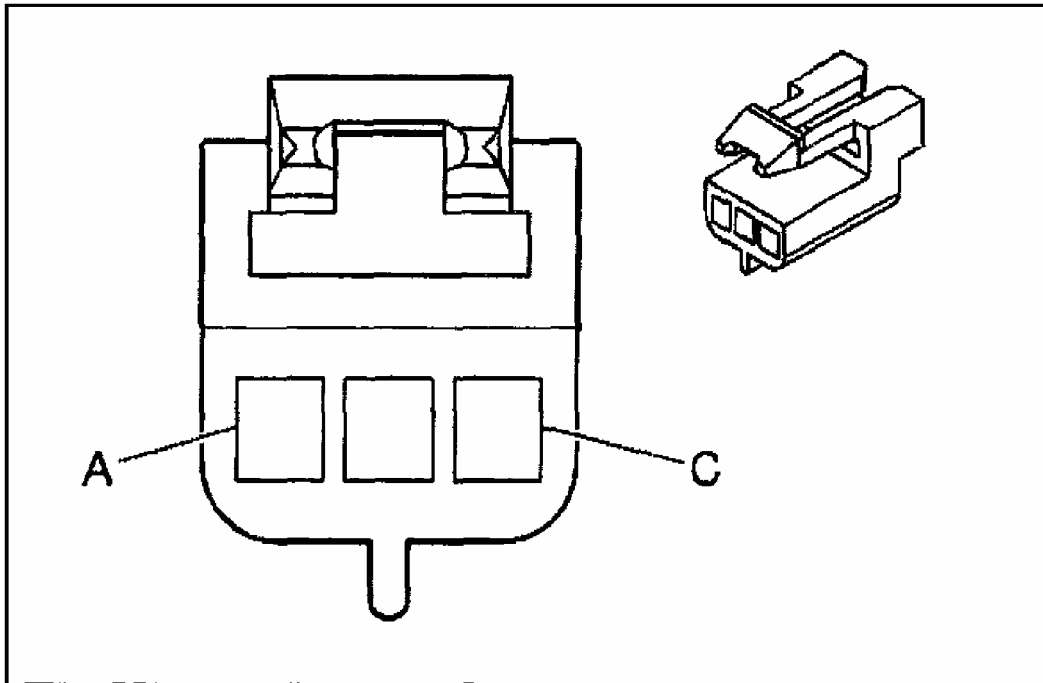
Connector Part Information		• 12146121 • 3-Way F Metri-Pack 150 Series (BRN)	
Pin	Wire Color	Circuit No.	Function
A	GRY	1056	Steering Wheel Position Sensor 5V Reference Voltage
B	LT GRN/ BLK	1338	Lateral Accelerometer Signal
C	ORN/BLK	556	Low Reference

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Fig. 8: Lateral Accelerometer Sensor
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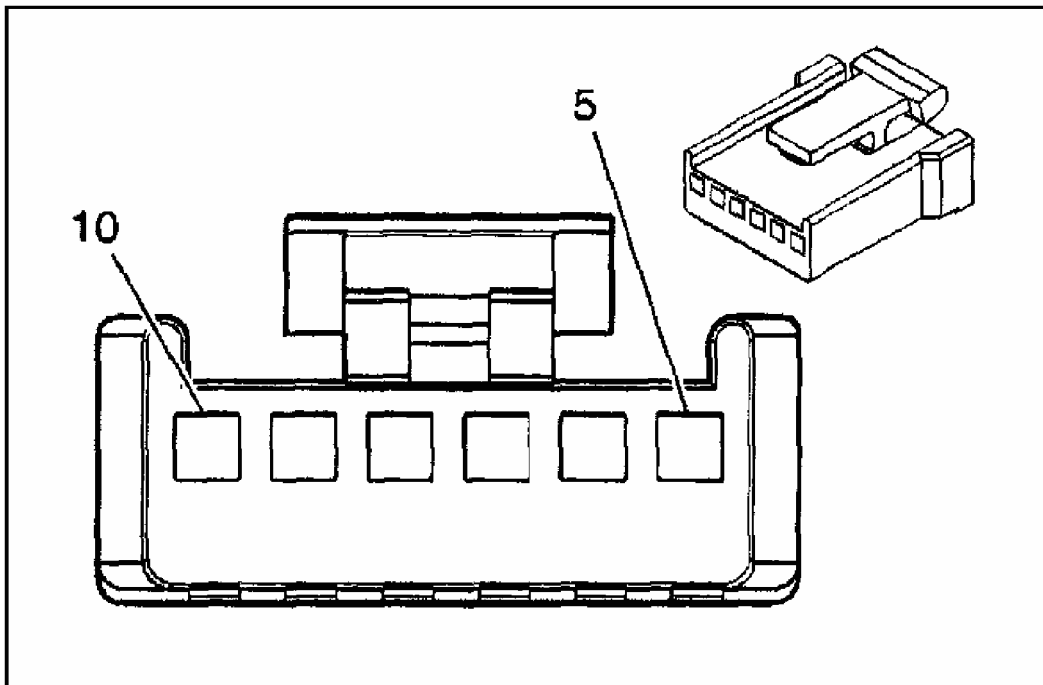
Connector Part Information		<ul style="list-style-type: none"> • 12064758 • 3-Way F 150 Metri-Pack Series (BLK) 	
Pin	Wire Color	Circuit No.	Function
A	GRY	1056	Steering Wheel Position Sensor 5V Reference Voltage
B	ORN/BLK	556	Low Reference
C	DK BLU	716	Yaw Rate Sensor Signal

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Fig. 9: Yaw Rate Sensor
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Connector Part Information		<ul style="list-style-type: none"> • 12040953 • 6-Way F Micro-Pack 100 Series (BLK) 	
Pin	Wire Color	Circuit No.	Function
5	BLK	150	Ground
6	BRN/WHT	1571	Traction Control Switch Signal
7	PNK/BLK	1385	Selective Ride Control Switch Low Reference
8	TAN/WHT	1384	Selective Ride Control Switch Signal
9	BRN/WHT	1244	Instrument Panel Lamp Supply Voltage – 2
10	ORN	2840	Battery Positive Voltage

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Fig. 10: Electronic Traction/Suspension Control Switch
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DIAGNOSTIC INFORMATION & PROCEDURES

DIAGNOSTIC STARTING POINT - ANTI-LOCK BRAKE SYSTEM

Begin the system diagnosis with **Diagnostic System Check - ABS** . The Diagnostic System Check will provide the following information:

- The identification of the control modules which command the system
- The ability of the control modules to communicate through the serial data circuit
- The identification of any stored diagnostic trouble codes (DTCs) and their status

The use of the Diagnostic System Check will identify the correct procedure for diagnosing the system and where the procedure is located.

DIAGNOSTIC SYSTEM CHECK - ABS

Circuit Description

The ABS Diagnostic System Check is an organized approach to identify problems associated with the EBCM. This check must be the starting point for any EBCM complaint, and will direct you to the next logical step in diagnosing the complaint. The EBCM is a very reliable component and is not likely the cause of the malfunction. Most system complaints are linked to faulty wiring, connectors, and occasionally to components. Understanding the ABS system and using the tables correctly will reduce diagnostic time and prevent unnecessary parts replacement.

Test Description

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

2. Lack of communication may be due to a partial malfunction of the serial data circuit or due to a total malfunction of the serial data circuit. The specified procedure will determine the particular condition.
4. The presence of DTCs which begin with "U" indicate some other module is not communicating. The specified procedure will compile all the available information before tests are performed.

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Step	Action	Yes	No
1	Install a scan tool. Does the scan tool power up?	Go to Step 2	Go to <i>Scan Tool Does Not Power Up in Data Link Communications</i>
2	1. Turn ON the ignition, with the engine OFF. 2. Attempt to establish communication with the following control modules: <ul style="list-style-type: none"> • Body control module (BCM) • Electronic brake control module (EBCM) • Instrument panel cluster (IPC) • Powertrain control module (PCM) Does the scan tool communicate with all control modules?	Go to Step 3	Go to <i>Scan Tool Does Not Communicate with Class 2 Device in Data Link Communications</i>
3	Select the display DTCs function on the scan tool for the following control modules: <ul style="list-style-type: none"> • Body control module (BCM) • Electronic brake control module (EBCM) • Instrument panel cluster (IPC) • Powertrain control module (PCM) Does the scan tool display any DTCs?	Go to Step 4	Go to <i>Symptoms - Antilock Brake System</i>
4	Does the scan tool display any DTCs which begin with a "U"?	Go to <i>Scan Tool Does Not Communicate with Class 2 Device in Data Link Communications</i>	Go to Step 5
5	Does the scan tool display DTC B0605 or B1000?	Go to <i>Diagnostic Trouble Code (DTC) List in Body Control Modules.</i>	Go to <i>Diagnostic Trouble Code (DTC) List</i>

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Fig. 11: Diagnostic System Check-ABS
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SCAN TOOL OUTPUT CONTROLS

Scan Tool Output Control	Additional Menu Selection(s)	Description
Automated Bleed	—	Used in order to bleed the ABS hydraulics. Refer to <i>ABS Automated Bleed Procedure</i> .
Automated Test	—	Cycles each solenoid valve and the pump motor in order to verify component operation. This test is identical to the Initialization Sequence. If a malfunction is detected, the EBCM will set the appropriate DTCs. The DTCs will be displayed upon completion of the test.
LF Inlet Valve Solenoid	Solenoid Test	Commands the solenoid ON and OFF.
LF Outlet Valve Solenoid	Solenoid Test	Commands the solenoid ON and OFF.
LR Inlet Valve Solenoid	Solenoid Test	Commands the solenoid ON and OFF.
LR Outlet Valve Solenoid	Solenoid Test	Commands the solenoid ON and OFF.
Pump Motor Test	—	Commands the pump motor ON and OFF.
RF Inlet Valve Solenoid	Solenoid Test	Commands the solenoid ON and OFF.
RF Outlet Valve Solenoid	Solenoid Test	Commands the solenoid ON and OFF.
RR Inlet Valve Solenoid	Solenoid Test	Commands the solenoid ON and OFF.
RR Outlet Valve Solenoid	Solenoid Test	Commands the solenoid ON and OFF.
Steering Position Sensor Test	—	Tests the steering wheel position sensor (SWPS) ability to provide a valid input.

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Fig. 12: Electronic Brake Control Module (EBCM)

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SCAN TOOL DATA LIST

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Ignition ON, engine OFF.			
Battery Volts	Data	Volts	12
TCS Switch	Input Data 2	On/Off	Off

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Fig. 13: Body Control Module
Courtesy of GENERAL MOTORS CORP.

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Ignition ON, engine OFF, and steering wheel straight.			
8 Digit GM Part Number	Controller Information 1	Numeric	Varies
ABS Active	ABS Data	Yes/No	No
ABS Failed	ABS Data	Yes/No	No
ABS Warning Indicator	ABS Data	On/Off	Off
Brake Pressure Sensor Input	VSES Data	Volts	0
Brake Temp Status	TCS Data	Normal/Over Temp	Normal
Calibration ID	Controller Information 1	Numeric	Varies
Configuration ID	System Configuration	Numeric	Varies
DE Base Part Number	Controller Information 2	Numeric	Varies
DE Build Sequence Number	Controller Information 1	Numeric	Varies
DE Calibration Part Number	Controller Information 2	Numeric	Varies
DE End Model Part Number	Controller Information 2	Numeric	Varies
DE ROM Part Number	Controller Information 2	Numeric	Varies
Delivered Torque PWM Duty Cycle	TCS Data	%	10
DRP Active	ABS Data	Yes/No	No

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Fig. 14: Electronic Brake Control Module (EBCM) 1 Of 3
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Fig. 15: Electronic Brake Control Module (EBCM) 2 Of 3
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Fig. 16: Electronic Brake Control Module (EBCM) 3 Of 3
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Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Ignition ON, engine OFF.			
Traction Control Signal	<ul style="list-style-type: none">• Cruise Control Data• TAC Data	Active/Inactive	Inactive
Traction Control Status	Engine Data 2	Active/Inactive	Inactive
Torque Delivered Signal	<ul style="list-style-type: none">• Engine Data 2• TAC Data	N-m or ft-lb	0
Torque Requested Signal	<ul style="list-style-type: none">• Engine Data 2• TAC Data	N-m or ft-lb	0

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Fig. 17: Powertrain Control Module (PCM)
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SCAN TOOL DATA DEFINITIONS

8 Digit GM Part Number: The scan tool displays the part number of the control module.

ABS Active: The scan tool displays Yes or No. The active status of the ABS. Indicates if ABS is currently active.

ABS Failed: The scan tool displays Yes or No. The failed status of the ABS. Indicates if the EBCM disabled ABS due to a malfunction.

ABS Warning Indicator: The scan tool displays Off or On. Indicates if the EBCM is commanding the ABS indicator.

Battery Volts: The scan tool displays 0-30 Volts.

The voltage measured between the module's battery positive voltage circuit and ground circuit.

Brake Pressure Sensor Input: The scan tool displays 0 to 5 volts. The brake fluid pressure signal from the brake fluid pressure sensor.

Brake Temp Status: The scan tool displays Normal or Over Temp. The status of the brake temperature.

Indicates if the brake temperature is above the traction control thermal cutoff point. If brake temperatures are above the thermal cutoff point, Over Temp is displayed and traction control is temporarily suspended until the brake temperature cools below the cutoff. This feature is used to maintain braking effectiveness if the base braking system is required.

Overly heated brakes could result in brake fade.

Calibration ID: The scan tool displays the 4 digit calibration ID of the control module.

Configuration ID: The scan tool displays the configuration ID of the EBCM.

DE Base Part Number: The scan tool displays the base part number of the EBCM.

DE Build Sequence Number: The scan tool displays the number in order that the EBCM was built.

DE Calibration Part Number: The scan tool displays the calibration part number of the EBCM.

DE End Model Part Number: The scan tool displays the end model part number of the EBCM.

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DE ROM Part Number: The scan tool displays the ROM part number of the EBCM.

Delivered Torque PWM Duty Cycle: The scan tool displays 0 to 100%. The duty cycle of the delivered torque signal. The duty cycle of the signal is used to transmit how much engine torque the PCM is delivering. Normal values are between 10 and 90 percent duty cycle. The signal is at low values (approximately 10 percent) at idle and at higher values under driving conditions.

DRP Active: The scan tool displays Yes or No. The active status of the DRP. Indicates if DRP is currently active.

DRP Disabled: The scan tool displays Yes or No.

The failed status of the DRP. Indicates if the EBCM disabled DRP due to a malfunction.

DRP Equipped: The scan tool displays Yes or No.

Indicates if the vehicle is equipped with dynamic rear proportioning.

Dual Analog Steering Sensor Expected: The scan tool displays Yes or No. Indicates if the EBCM is expecting an input from the steering wheel position sensor (SWPS).

Dual Analog SWPS Input A: The scan tool displays 0 to 5 volts. The steering wheel position signal A input.

Dual Analog SWPS Input B: The scan tool displays 0 to 5 volts. The steering wheel position signal B input.

ETS Equipped: The scan tool displays Yes or No.

Indicates if the vehicle is equipped with the enhanced traction system.

Extended Travel Brake Switch: The scan tool displays Applied or Released. The state of the extended travel brake switch.

Ignition Voltage: The scan tool displays 0 to 17 volts. The level of ignition voltage at the EBCM.

Julian Date Code: The scan tool displays year and day. The first digit indicates the last digit of the year that the EBCM was built. The remaining 3 digits indicate the day of the year that the EBCM was built.

Lateral Accelerometer Sensor Input: The scan tool displays 0 to 5 volts. The lateral accelerometer signal from the lateral accelerometer sensor, roughly 2.5 volts equals 0 g lateral acceleration.

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Lateral Accelerometer Input: The scan tool displays -1.2 to +1.2 g. The lateral acceleration of the lateral accelerometer signal.

Left Front Wheel Speed: The scan tool displays 0 to 255 km/h (0 to 159 mph). The actual speed of the left front wheel.

Left Rear Wheel Speed: The scan tool displays 0 to 255 km/h (0 to 159 mph). The actual speed of the left rear wheel.

LF Inlet Valve Solenoid: The scan tool displays Active or Inactive. The status of the left front inlet valve solenoid.

LF Outlet Valve Solenoid: The scan tool displays Active or Inactive. The status of the left front outlet valve solenoid.

LF Rotor Temperature: The scan tool displays -40 to +650°C (-40 to +1202°F). The estimated temperature of the left front brake rotor.

LR Inlet Valve Solenoid: The scan tool displays Active or Inactive. The status of the left rear inlet valve solenoid.

LR Outlet Valve Solenoid: The scan tool displays Active or Inactive. The status of the left rear outlet valve solenoid.

Manufacturing Shift Info: The scan tool displays the shift when the EBCM was built.

Manufacturing Site: The scan tool displays the location where the EBCM was built.

PROM ID: The scan tool displays the 4 digit PROM ID of the EBCM.

Pump Motor Feedback Voltage: The scan tool displays 0 to 17 volts. The voltage available to the pump motor when the pump motor control relay is energized.

Pump Motor PWM: The scan tool displays 0 to 100%. The duty cycle at which the EBCM is commanding the pump motor ON.

Pump Motor Relay Commanded State: The scan tool displays Off or On. Indicates the commanded state of the pump motor control.

Pump Motor Relay Feedback State: The scan tool displays Off or On. Indicate the actual state of the pump motor control.

Red Brake Warning Indicator: The scan tool displays Off or On. Indicates if the red Brake warning indicator is currently ON.

Requested Torque PWM Duty Cycle: The scan tool displays 0 to 100%. The duty cycle of

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the requested torque signal. The duty cycle of the signal is used to transmit how much torque the EBCM is requesting the PCM to deliver. Normal values are between 10 and 90 percent duty cycle. The signal should be at 90 percent duty cycle when traction control is not active and at lower values (approximately 10 percent) when traction control is active.

RF Inlet Valve Solenoid: The scan tool displays Active or Inactive. The status of the right front inlet valve solenoid.

RF Outlet Valve Solenoid: The scan tool displays Active or Inactive. The status of the right front outlet valve solenoid.

RF Rotor Temperature: The scan tool displays -40 to +650°C (-40 to +1202°F). The estimated temperature of the right front brake rotor.

Right Front Wheel Speed: The scan tool displays 0 to 255 km/h (0 to 159 mph). The actual speed of the right front wheel.

Right Rear Wheel Speed: The scan tool displays 0 to 255 km/h (0 to 159 mph). The actual speed of the right rear wheel.

Rough Road Parameter: The scan tool displays 0 to 1 g. The EBCM calculation of the road surface, this information is sent to the PCM via serial data messages. The PCM uses this information for misfire detection.

RR Inlet Valve Solenoid: The scan tool displays Active or Inactive. The status of the right rear inlet valve solenoid.

RR Outlet Valve Solenoid: The scan tool displays Active or Inactive. The status of the right rear outlet valve solenoid.

Solenoid Relay Commanded State: The scan tool displays Off or On. Indicates the commanded state of the system relay.

Solenoid Relay Feedback State: The scan tool displays Off or On. Indicates the actual state of the system relay.

Steering Wheel Angle: The scan tool displays -720 to +720 degrees. The angle that the steering wheel is turned in degrees.

Stop Lamp Switch: The scan tool displays Applied or Released. The state of the brake switch.

Switched System Battery Voltage: The scan tool displays 0 to 17 volts. The level of the internal EBCM switched battery voltage available to the solenoid valves and pump motor.

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System ID: The scan tool displays the configuration ID of the EBCM.

TCS Active: The scan tool displays Yes or No. The active status of the TCS. Indicates if TCS is currently active.

TCS Active Indicator/Message: The scan tool displays Off or On. Indicates if the EBCM is commanding the Traction System Active message to be displayed by the DIC.

TCS Failed: The scan tool displays Yes or No. The failed status of the TCS. Indicates if the EBCM disabled TCS due to a malfunction.

TCS Switch: Display Off or On. Indicates the status of the traction control switch signal.

TCS Warning Indicator/Message: The scan tool displays Off or On. Indicates if the EBCM is commanding the Traction Control and Active Handling indicator ON along with displaying the Service Traction System message on the DIC.

TIM Equipped: The scan tool displays Yes or No.

Indicates if the vehicle is equipped with tire inflation monitoring.

Torque Delivered Signal: The scan tool displays 0-10394 N.m (0-7666 lb-ft). The amount of torque that the PCM is delivering to the drive wheels.

Torque Requested Signal: The scan tool displays 0-10394 N.m (0-7666 lb-ft). The amount of torque that the EBCM is requesting the PCM to deliver to the drive wheels.

Traction Control Signal: The scan tool displays Active or Inactive. The active status of the TCS.

Indicates if TCS is currently active.

Traction Control Status: The scan tool displays Active or Inactive. The active status of the TCS.

Indicates if TCS is currently active.

Vehicle Speed: The scan tool displays 0 to 255 km/h (0 to 159 mph). The vehicle speed from the average of all four wheel speeds.

VES Equipped: The scan tool displays Yes or No.

Indicates if the vehicle is equipped with variable effort steering.

VSES Active: The scan tool displays Yes or No.

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The active status of the VSES. Indicates if VSES is currently active.

VSES Active Indicator/Message: The scan tool displays Off or On. Indicates if the EBCM is commanding the Active Handling message to be displayed by the DIC.

VSES Equipped: The scan tool displays Yes or No.

Indicates if the vehicle is equipped with vehicle stability enhancement system.

VSES Failed: The scan tool displays Yes or No.

The failed status of the VSES. Indicates if the EBCM disabled VSES due to a malfunction.

VSES Failed Indicator/Message: The scan tool displays Off or On. Indicates if the EBCM is commanding the Traction Control and Active Handling indicator ON along with displaying the Service Active Handling message on the DIC.

VSES Is Centered: The scan tool displays Yes or No. Indicates if the steering wheel is centered.

Yaw Rate Sensor Input: The scan tool displays 0 to 5 volts. The yaw rate signal from the yaw rate sensor, roughly 2.5 volts equals 0 second yaw rate.

Yaw Rate Sensor Input: The scan tool displays -75 to +75 second The yaw rate of the yaw rate signal.

DIAGNOSTIC TROUBLE CODE (DTC) LIST

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DTC	Diagnostic Procedure	Module(s)
B2597	<i>DTC B2597</i>	BCM
C1214	<i>DTC C1214</i>	EBCM
C1217	<i>DTC C1217</i>	EBCM
C1218	<i>DTC C1218</i>	EBCM
C1221–C1235	<i>DTC C1221-C1235</i>	EBCM
C1236	<i>DTC C1236</i>	EBCM
C1237	<i>DTC C1237</i>	EBCM
C1241	<i>DTC C1241 in Variable Effort Steering</i>	EBCM
C1242 or C1243	<i>DTC C1242 or C1243</i>	EBCM
C1247	<i>DTC C1247 in Hydraulic Brakes</i>	EBCM
C1248	<i>DTC C1248</i>	EBCM
C1254	<i>DTC C1254</i>	EBCM
C1255 or C1258	<i>DTC C1255 or C1258</i>	EBCM
C1261–C1274	<i>DTC C1261-C1274</i>	EBCM
C1276	<i>DTC C1276, P1644, or P1689</i>	EBCM
C1277	<i>DTC C1277 or P1571</i>	EBCM
C1278	<i>DTC C1278</i>	EBCM
C1281, C1283, or C1286	<i>DTC C1281, C1283, or C1286 (w/JL4)</i>	EBCM
C1282	<i>DTC C1282 (w/JL4)</i>	EBCM
C1284 or C1285	<i>DTC C1284 or C1285 (w/JL4)</i>	EBCM
C1287 or C1288	<i>DTC C1287 or C1288 (w/JL4)</i>	EBCM
C1291	<i>DTC C1291</i>	EBCM
C1292, C1293, or C1296	<i>DTC C1292, C1293, or C1296 (w/JL4)</i>	EBCM
C1294	<i>DTC C1294</i>	EBCM
C1295	<i>DTC C1295</i>	EBCM
P1571	<i>DTC C1277 or P1571</i>	PCM
P1689	<i>DTC C1276, P1644, or P1689</i>	PCM

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Fig. 18: Diagnostic Trouble Code (DTC) List
 Courtesy of GENERAL MOTORS CORP.

DIAGNOSTIC TROUBLE CODE (DTC) DEFINITION

DTC	Description
B2597	TCS Mode Switch Ckt. Short To Ground
C1214	System Relay Contact or Coil Circuit Open
C1217	Pump Motor Shorted to Ground
C1218	Pump Motor Circuit Shorted to Voltage or Motor Ground Open
C1221	LF Wheel Speed Sensor Input Signal is 0
C1222	RF Wheel Speed Sensor Input Signal is 0
C1223	LR Wheel Speed Sensor Input Signal is 0
C1224	RR Wheel Speed Sensor Input Signal is 0
C1225	LF Excessive Wheel Speed Variation
C1226	RF Excessive Wheel Speed Variation
C1227	LR Excessive Wheel Speed Variation
C1228	RR Excessive Wheel Speed Variation
C1232	LF Wheel Speed Circuit Open or Shorted

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C1233	RF Wheel Speed Circuit Open or Shorted
C1234	LR Wheel Speed Circuit Open or Shorted
C1235	RR Wheel Speed Circuit Open or Shorted
C1236	Low System Supply Voltage
C1237	High System Supply Voltage
C1242	Pump Motor Circuit Open
C1243	BPMV Pump Motor Stalled
C1248	EBCM Turned the Red Brake Warning Indicator On
C1254	Abnormal Shutdown Detected
C1255	EBCM Internal Malfunction
C1256	EBCM Internal Malfunction
C1261	LF Inlet Valve Solenoid Malfunction
C1262	LF Outlet Valve Solenoid Malfunction
C1263	RF Inlet Valve Solenoid Malfunction
C1264	RF Outlet Valve Solenoid Malfunction
C1265	LR Inlet Valve Solenoid Malfunction
C1266	LR Outlet Valve Solenoid Malfunction
C1267	RR Inlet Valve Solenoid Malfunction
C1268	RR Outlet Valve Solenoid Malfunction
C1271	LF TCS Master Cylinder Isolation Valve Malfunction
C1272	LF TCS Prime Valve Malfunction
C1273	RF TCS Master Cylinder Isolation Valve Malfunction
C1274	RF TCS Prime Valve Malfunction
C1276	Delivered Torque Signal Circuit Malfunction
C1277	Requested Torque Signal Circuit Malfunction
C1278	TCS Temporarily Inhibited By PCM
C1281	VSES Sensors Uncorrelated
C1283	Excessive Time to Center Steering
C1286	Steering Sensor Bias Malfunction (W/JL4)
C1282	Yaw Rate Sensor Bias Circuit Malfunction (W/JL4)
C1284	Lateral Accelerometer Sensor Bias Malfunction
C1285	Lateral Accelerometer Sensor Circuit Malfunction (W/JL4)
C1287	Steering Sensor Rate Malfunction
C1288	Steering Sensor Circuit Malfunction (W/JL4)
C1291	Open Brake Lamp Switch Contacts During Deceleration
C1292	Brake Fluid Pressure Sensor Circuit
C1293	Code C1291 Set in Previous Ignition Cycle
C1296	Brake Fluid Pressure Sensor Circuit (W/JL4)
C1294	

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	Brake Lamp Switch Circuit Always Active
C1295	Brake Lamp Switch Circuit Open
P1571	TCS PWM Circuit No Frequency
P1644	TP Output Circuit
P1689	Traction Control Delivered Torque Control Circuit

DIAGNOSTIC TEST DRIVE

When servicing vehicles with the vehicle stability enhancement system (VSES), test drives will be necessary to allow all tests to be run, and all system functions to be enabled and exercised. A test drive may also be required to duplicate specific DTCs covered in this section. The diagnostic system check (including test drive) should be run when vehicle repairs are complete in order to verify the repair. The diagnostic test drive will vary for ABS, TCS, or VSES concerns.

The following is a suggested VSES diagnostic test drive.

1. Read the Diagnostic Aids and the Conditions for Setting the DTC.
2. Turn OFF the ignition.
3. Reconnect any previously disconnected components.
4. Start the engine.
5. Install a scan tool.
6. With the scan tool, observe the VSES Is Centered parameter in the VSES data list. The scan tool will indicate Yes with the steering wheel centered.

Drive the vehicle in a straight line for 45 seconds at 24 km/h (15 mph) while monitoring the scan tool.

7. Remove the scan tool.

Important: Do not perform any unlawful or unsafe maneuvers.

8. Drive the vehicle under the following conditions for at least 10 minutes.
 - Highway driving
 - Rough roads
 - Perform turning maneuvers (curved freeway entrance ramp, parking lot maneuvers) and high steering angles and yaw rates at low speeds.
 - Verify the customers concern and duplicate driving conditions
9. With the engine still running, use the scan tool in order to check for DTCs. If any DTCs are set, refer to **Diagnostic Trouble Code (DTC) List**.

ENHANCED DIAGNOSTICS

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History Data

Enhanced diagnostic information is found in the History Data function of the scan tool. Enhanced diagnostic information provides the service technician with specific malfunction occurrence information.

The scan tool will display the last 3 DTCs to occur, one at a time. The DTC with the most recent occurrence will be displayed first. Each DTC will include the following:

- The number of drive cycles since the DTC last occurred.
- The number of occurrences for the DTC since the scan tool DTC information was last cleared.

The most recent DTC will also display various data parameters with values from the time of the DTC occurrence.

Diagnostic Strategy

In difficult diagnostic situations use the above information to identify malfunction occurrence trends.

Ask question such as the following:

- Did the malfunction only occur once over a large number of drive cycles, indicating an unusual condition present when it occurred?
- Does the malfunction occur infrequently over a large number of drive cycles, indicating that special diagnostic techniques may be required to identify the source of the malfunction?

A malfunction that occurs more frequently increases the odds of finding the cause of the malfunction.

Use the information in order to determine if a DTC is intermittent. Use the information in order to determine if the DTC has not set for long periods of time due to weather changes or a repair prior to this visit.

DTC B2597: TCS MODE SWITCH CKT. SHORT TO GROUND

Circuit Description

The Traction Control and Active Handling indicator is controlled by the instrument cluster via serial data messages from the EBCM. When the BCM sees the traction control switch input grounded through the momentary traction control switch, it sends a serial data message to the EBCM that tells the EBCM that the traction control switch has been pressed. The EBCM then disables TCS and VSES (w/JL4).

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The EBCM sends a serial data message to the instrument cluster to turn the Traction Control and Active Handling indicator ON and display the Traction System Off message or the Traction/Active Handling Off message (w/JL4) on the DIC.

With JL4, when the BCM sees the traction control switch input grounded for 5 seconds while the vehicle is stopped and the ignition is ON, it sends a serial data message to the EBCM that tells the EBCM that the traction control switch has been pressed for 5 seconds. The EBCM then disables TCS, while leaving VSES enabled. The EBCM sends a serial data message to the instrument cluster display the Competitive Driving message on the DIC. The Traction Control and Active Handling indicator remains OFF.

Each time the ignition is cycled from OFF to ON, the TCS and VSES (w/JL4) are enabled.

The following conditions will cause the Traction Control and Active Handling indicator to illuminate:

- The EBCM has disabled the TCS or VSES due to a DTC.
- The driver manually disabling the TCS or VSES via the traction control switch.
- The instrument cluster bulb check. When the ignition switch is turned to ON, the Traction Control and Active Handling indicator will turn on for approximately 3 seconds and then turn OFF.

Conditions For Running The DTC

The ignition is ON.

Conditions For Setting The DTC

The BCM detects a ground on the traction control switch signal circuit for longer than 60 seconds.

Action Taken When The DTC Sets

- The ABS remains functional.
- The ABS indicator remains OFF.

Conditions For Clearing The DTC

- The condition for the DTC is no longer present (the DTC is not current) and you used the scan tool Clear DTC function.
- The condition for the DTC is no longer present (the DTC is not current) and you used the On-Board Diagnostics Clear DTC function.
- The BCM automatically clears the history DTC when a current DTC is not detected in 50 consecutive ignition cycles.

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Test Description

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

1. **2.** Tests for the normal state of the TCS switch using a scan tool.
2. **3.** Tests if the BCM is able to detect a change in TCS switch state.
3. **4.** Tests for a stuck or shorted TCS switch. If the TCS switch is stuck or shorted, the state will change from On to Off when the TCS switch is disconnected.
4. **5.** Tests for a short to ground in the TCS switch signal circuit.
5. **8.** When the BCM is replaced, use a scan tool to perform the setup procedure for the BCM. Refer to **BODY CONTROL MODULE (BCM) PROGRAMMING/RPO CONFIGURATION** .

DTC C1214: SYSTEM RELAY CONTACT OR COIL CIRCUIT OPEN**Circuit Description**

The system relay is energized when the ignition is ON. The system relay supplies voltage to the solenoid valves and the pump motor. This voltage is referred to as the system voltage.

The EBCM controls each solenoid valve by grounding the solenoid.

The EBCM controls the pump motor by grounding the control circuit. The pump serves 2 purposes:

- Transfers brake fluid from the brake calipers to the master cylinder reservoir during pressure decrease events.
- Transfers brake fluid from the master cylinder reservoir to the brake calipers during pressure increase events.

Conditions For Running The DTC

- The ignition voltage is greater than 10.5 volts.
- The system relay is commanded ON.

Conditions For Setting The DTC

The system voltage is less than 8 volts for 0.23 seconds.

Action Taken When The DTC Sets

If equipped, the following actions occur:

- The EBCM disables the ABS/TCS/VSES for the duration of the ignition cycle.
- The DRP does not function optimally.
- The ABS indicator turns ON.
- The Traction Control and Active Handling indicator turns ON.
- The DIC displays the following messages:
 - Service ABS
 - Service Traction System
 - Service Active Handling

Conditions For Clearing The DTC

- The condition for the DTC is no longer present (the DTC is not current) and you used the scan tool Clear DTC function.
- The condition for the DTC is no longer present (the DTC is not current) and you used

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the On-Board Diagnostics Clear DTC function.

- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Diagnostic Aids

The system relay is integral to the EBCM. The relay is not serviceable.

Test Description

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

- Determines whether the DTC is current.

Step	Action	Values	Yes	No
Schematic Reference: <i>Anti-Lock Brakes</i>				
1	Did you perform the ABS Diagnostic System Check?	—	Go to Step 2	Go to <i>Diagnostic System Check - ABS</i>
2	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. With the scan tool, perform the Automated Test. Does the DTC reset as a current DTC?	—	Go to Step 3	Go to <i>Testing for Intermittent and Poor Connections in Wiring Systems</i>
3	1. Disconnect the pump motor harness pigtail connector of the BPMV. 2. Measure the resistance between each pump motor control circuit and the housing of the BPMV at the pump motor harness pigtail connector of the BPMV. Does the DMM display the specified value?	OL	Go to Step 5	Go to Step 4
4	Replace the EBCM and the BPMV. Refer to <i>Electronic Brake Control Module (EBCM) Replacement and Brake Pressure Modulator Valve (BPMV) Replacement</i> . Did you complete the repair?	—	Go to Step 6	—
5	Replace the EBCM. Refer to <i>Electronic Brake Control Module (EBCM) Replacement</i> . Did you complete the repair?	—	Go to Step 6	—
6	1. Use the scan tool in order to clear the DTCs. 2. With the scan tool, perform the Automated Test. Does the DTC reset?	—	Go to Step 2	System OK

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Fig. 20: DTC C1214
Courtesy of GENERAL MOTORS CORP.

DTC C1217: PUMP MOTOR SHORTED TO GROUND

Circuit Description

The system relay is energized when the ignition is ON. The system relay supplies voltage to the solenoid valves and the pump motor. This voltage is referred to as the system voltage.

The EBCM controls each solenoid valve by grounding the solenoid.

The EBCM controls the pump motor by grounding the control circuit. The pump serves 2

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purposes:

- Transfers brake fluid from the brake calipers to the master cylinder reservoir during pressure decrease events.
- Transfers brake fluid from the master cylinder reservoir to the brake calipers during pressure increase events.

Conditions For Running The DTC

- The pump motor has been commanded OFF for 1 second.
- The system voltage is greater than 9 volts.

Conditions For Setting The DTC

One of the following conditions exists for 0.2 seconds:

- The voltage across the pump motor is greater than 10.2 volts.
- The pump motor low side voltage is less than 2.7 volts.

Action Taken When The DTC Sets

If equipped, the following actions occur:

- The EBCM disables the ABS/TCS/VSES for the duration of the ignition cycle.
- The DRP does not function optimally.
- The ABS indicator turns ON.
- The Traction Control and Active Handling indicator turns ON.
- The DIC displays the following messages:
 - Service ABS
 - Service Traction System
 - Service Active Handling

Conditions For Clearing The DTC

- The condition for the DTC is no longer present (the DTC is not current) and you used the scan tool Clear DTC function.
- The condition for the DTC is no longer present (the DTC is not current) and you used the On-Board Diagnostics Clear DTC function.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Diagnostic Aids

- This DTC determines if there is a short in the pump motor control circuit.

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- The pump motor is integral to the BPMV. The pump motor is not serviceable.

Test Description

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

3. Tests the pump motor circuits of the BPMV for a short to the housing of the BPMV. The wiring from the BPMV to the EBCM should not be repaired.

Fig. 21: DTC C1217

Courtesy of GENERAL MOTORS CORP.

DTC C1218: PUMP MOTOR CIRCUIT SHORTED TO VOLTAGE OR MOTOR GROUND OPEN

Circuit Description

The system relay is energized when the ignition is ON.

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The system relay supplies voltage to the solenoid valves and the pump motor. This voltage is referred to as the system voltage.

The EBCM controls each solenoid valve by grounding the solenoid.

The EBCM controls the pump motor by grounding the control circuit. The pump serves 2 purposes:

- Transfers brake fluid from the brake calipers to the master cylinder reservoir during pressure decrease events.
- Transfers brake fluid from the master cylinder reservoir to the brake calipers during pressure increase events.

Conditions For Running The DTC

- The pump motor is commanded ON.
- The system voltage is greater than 8 volts.

Conditions For Setting The DTC

One of the following conditions exists for 0.16 seconds:

- With the commanded pump motor voltage less than the system voltage, the actual pump motor voltage is 3 volts less than the commanded voltage.
- With the commanded pump motor voltage greater than the system voltage, the actual pump motor voltage is less than 8 volts.

Action Taken When The DTC Sets

If equipped, the following actions occur:

- The EBCM disables the ABS/TCS/VSES for the duration of the ignition cycle.
- The DRP does not function optimally.
- The ABS indicator turns ON.
- The Traction Control and Active Handling indicator turns ON.
- The DIC displays the following messages:
 - Service ABS
 - Service Traction System
 - Service Active Handling

Conditions For Clearing The DTC

- The condition for the DTC is no longer present (the DTC is not current) and you used the scan tool Clear DTC function.

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- The condition for the DTC is no longer present (the DTC is not current) and you used the On-Board Diagnostics Clear DTC function.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Diagnostic Aids

The pump motor is integral to the BPMV. The pump motor is not serviceable.

Test Description

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

3. Tests the ability of the EBCM to control the pump motor. If the test lamp illuminates, the pump motor circuit within the EBCM is good.

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Fig. 22: DTC C1218

Courtesy of GENERAL MOTORS CORP.

DTC C1221: LF WHEEL SPEED SENSOR INPUT SIGNAL IS 0; C1222: RF WHEEL SPEED SENSOR INPUT SIGNAL IS 0; C1223: LR WHEEL SPEED SENSOR INPUT SIGNAL IS 0; C1224: RR WHEEL SPEED SENSOR INPUT SIGNAL IS 0; C1225: LF EXCESSIVE WHEEL SPEED VARIATION; C1226: RF EXCESSIVE WHEEL SPEED VARIATION; C1227: LR EXCESSIVE WHEEL SPEED VARIATION; C1228: RR EXCESSIVE WHEEL SPEED VARIATION; C1232: LF WHEEL SPEED CIRCUIT OPEN OR SHORTED; C1233: RF WHEEL SPEED CIRCUIT OPEN OR SHORTED; C1234: LR WHEEL SPEED CIRCUIT OPEN OR SHORTED; C1235: RR WHEEL SPEED CIRCUIT OPEN OR SHORTED

Circuit Description

As the wheel spins, the wheel speed sensor produces an AC signal. The EBCM uses the

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frequency of the AC signal to calculate the wheel speed.

Conditions For Running The DTC

C1221 Through C1228

- DTCs C1232 through C1235 are not set.
- The brake pedal is not pressed.
- The ABS is not active.

C1232 Through C1235

The ignition is ON.

Conditions For Setting The DTC

C1221 Through C1224

All of the following conditions exists for 2.5 seconds:

- The suspect wheel speed equals zero.
- The other wheel speeds are greater than 8 km/h (5 mph).
- The other wheel speeds are within 11 km/h (7 mph) of each other.

C1225 Through C1228

The EBCM detects a rapid variation in the wheel speed. The wheel speed changes by 16 km/h (10 mph) or more in 0.01 second. The change must occur 3 times with no more than 0.2 seconds between occurrences.

C1232 Through C1235

One of the following conditions exists for 0.02 seconds:

- A short to voltage - the wheel speed sensor signal circuit and wheel speed sensor return circuit voltages are both greater than 4.25 volts.
- A short to ground - the wheel speed sensor signal circuit and wheel speed sensor return circuit voltages are both less than 0.75 volts.
- An open - the wheel speed sensor signal circuit voltage is greater than 4.25 volts and wheel speed sensor return circuit voltage is less than 0.75 volts.

Action Taken When The DTC Sets

If equipped, the following actions occur:

- The EBCM disables the ABS/TCS/VSES for the duration of the ignition cycle.

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- The DRP does not function optimally.
- The ABS indicator turns ON.
- The Traction Control and Active Handling indicator turns ON.
- The DIC displays the following messages:
 - Service ABS
 - Service Traction System
 - Service Active Handling

Conditions For Clearing The DTC

- The condition for the DTC is no longer present (the DTC is not current) and you used the scan tool Clear DTC function.
- The condition for the DTC is no longer present (the DTC is not current) and you used the On-Board Diagnostics Clear DTC function.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Diagnostic Aids

C1221 Through C1224

Under the following conditions, 2 Wheel Speed Sensor Input is 0 DTCs are set:

- The 2 suspect wheel speeds equal zero for 60 seconds.
- The other wheel speeds are greater than 16 km/h (10 mph).
- The other wheel speeds are within 11 km/h (7 mph) of each other.

Diagnose each wheel speed sensor individually.

C1225 Through C1228

A possible cause of this DTC is electrical noise on the wheel speed sensor harness wiring. Electrical noise could result from the wheel speed sensor wires being routed to close to high energy ignition system components, such as spark plug wires.

C1232 Through C1235

If the customer comments that the ABS indicator is ON only during moist environmental conditions (rain, snow, vehicle wash, etc.), inspect the wheel speed sensor wiring for signs of water intrusion. If the DTC is not current, clear all DTCs and simulate the effects of water intrusion by using the following procedure:

1. Spray the suspected area with a 5 percent saltwater solution. To create a 5 percent saltwater solution, add 2 teaspoons (9.9 ml) of salt to 354 ml (12 oz) of water.

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2. Test drive the vehicle over various road surfaces (bumps, turns, etc.) above 40 km/h (25 mph) for at least 30 seconds.
3. If the DTC returns, replace the suspected wheel speed sensor or repair the wheel speed sensor wiring.
4. Rinse the area thoroughly when completed.

Test Description

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

3. Measure the resistance of the wheel speed sensor in order to determine if the sensor has a valid resistance value.
4. Ensures that the wheel speed sensor is generating a valid AC voltage output.