

# TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	SYSTEM COVERAGE	1
1.2	SIX-STEP TROUBLESHOOTING PROCEDURE	1
<b>2.0</b>	<b>IDENTIFICATION OF SYSTEM</b>	<b>1</b>
<b>3.0</b>	<b>SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION</b>	<b>1</b>
3.1	ESP	1
3.2	ABS	1
3.3	BRAKE ASSIST SYSTEM (HBA)	2
3.4	TCS (ASR)	2
3.5	ELECTRONIC BRAKE DISTRIBUTION (EBD)	2
3.6	VEHICLE CONTROLLING (FZR)	2
3.7	SYSTEM COMPONENTS	2
3.7.1	ABS AND TCS (ASR) INDICATORS	3
3.7.2	CONTROLLER ANTILOCK BRAKE (CAB)	3
3.7.3	HYDRAULIC CONTROL UNIT (HCU)	3
3.7.4	SWITCHES/SENSORS	3
3.7.5	SELF TESTS	4
3.8	USING THE DRBIII®	4
3.9	DRBIII® ERROR MESSAGES	4
3.9.1	DRBIII® DOES NOT POWER UP (BLANK SCREEN)	5
3.9.2	DISPLAY IS NOT VISIBLE	5
<b>4.0</b>	<b>DISCLAIMERS, SAFETY, WARNINGS</b>	<b>5</b>
4.1	DISCLAIMERS	5
4.2	SAFETY	5
4.2.1	TECHNICIAN SAFETY INFORMATION	5
4.2.2	VEHICLE PREPARATION FOR TESTING	5
4.2.3	SERVICING SUB-ASSEMBLIES	5
4.2.4	DRBIII® SAFETY INFORMATION	6
4.3	WARNING	6
4.3.1	VEHICLE DAMAGE WARNINGS	6
4.3.2	ROAD TESTING A COMPLAINT VEHICLE	6
4.4	DIAGNOSIS	6
<b>5.0</b>	<b>REQUIRED TOOLS AND EQUIPMENT</b>	<b>7</b>
<b>6.0</b>	<b>GLOSSARY OF TERMS</b>	<b>7</b>
<b>7.0</b>	<b>DIAGNOSTIC INFORMATION AND PROCEDURES</b>	<b>9</b>
	<b>BRAKES (CAB)</b>	
	ANTI-LOCK BRAKE MODULE INTERNAL	10
	CAB INTERNAL	10
	BRAKE FLUID LEVEL	13
	BRAKE PRESSURE SENSOR CIRCUIT	15
	BRAKE SWITCH CIRCUIT	17
	CAB CHECK SUM	21
	CAB OPTION	23
	CAN COMMUNICATION ERROR	25

## TABLE OF CONTENTS - Continued

DRIVE TEST COMPLETED SUCCESSFULLY .....	28
DRIVE TEST ERROR .....	29
INCORRECT TONE WHEEL .....	32
LATERAL ACCELERATION SENSOR CIRCUIT .....	36
LATERAL ACCELERATION SENSOR IMPLAUSIBLE .....	36
LATERAL ACCELERATION SENSOR INTERNAL FAULT .....	39
LEFT FRONT INLET SOLENOID .....	40
LEFT FRONT OUTLET SOLENOID .....	40
LEFT FRONT, RIGHT REAR INLET SOLENOID .....	40
LEFT FRONT, RIGHT REAR OUTLET SOLENOID .....	40
LEFT REAR INLET SOLENOID .....	40
LEFT REAR OUTLET SOLENOID .....	40
RIGHT FRONT INLET SOLENOID .....	40
RIGHT FRONT OUTLET SOLENOID .....	40
RIGHT FRONT, LEFT REAR INLET SOLENOID .....	40
RIGHT FRONT, LEFT REAR OUTLET SOLENOID .....	40
RIGHT REAR INLET SOLENOID .....	40
RIGHT REAR OUTLET SOLENOID .....	40
LEFT FRONT WHEEL SPEED SENSOR CIRCUIT .....	43
LEFT REAR WHEEL SPEED SENSOR CIRCUIT .....	43
RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT .....	43
RIGHT REAR WHEEL SPEED SENSOR CIRCUIT .....	43
LEFT FRONT WHEEL SPEED SENSOR SIGNAL .....	46
LEFT REAR WHEEL SPEED SENSOR SIGNAL .....	46
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL .....	46
RIGHT REAR WHEEL SPEED SENSOR SIGNAL .....	46
WHEEL SPEED SENSOR SIGNAL ERROR .....	46
NO COMMUNICATION WITH BUS .....	49
NO COMMUNICATION WITH ECM .....	52
NO COMMUNICATION WITH IC .....	54
PARAMETERIZATION ERROR .....	56
PUMP MOTOR .....	57
RELAY OUTPUT VOLTAGE .....	60
SOLENOID RELAY .....	63
STEERING ANGLE SENSOR CALIBRATION ERROR .....	65
STEERING ANGLE SENSOR GREATER THAN 720 DEGREES .....	66
STEERING ANGLE SENSOR IMPLAUSIBLE CAN SIGNAL .....	68
STEERING ANGLE SENSOR IMPLAUSIBLE VALUE .....	70
STEERING ANGLE SENSOR IMPLAUSIBLE WHEEL SPEED .....	72
STEERING ANGLE SENSOR INTERNAL FAULT .....	74
SYSTEM OVERVOLTAGE .....	75
SYSTEM UNDERVOLTAGE .....	77
<b>VERIFICATION TESTS</b>	
VERIFICATION TESTS .....	79
<b>8.0 COMPONENT LOCATIONS .....</b>	<b>81</b>
<b>8.1 DLC – INDICATORS .....</b>	<b>81</b>
<b>8.2 CAB – WSS .....</b>	<b>82</b>

## TABLE OF CONTENTS - Continued

<b>9.0</b>	<b>CONNECTOR PINOUTS</b> .....	<b>.83</b>
	BRAKE FLUID LEVEL SWITCH .....	.83
	BRAKE LAMP SWITCH C1 (EXCEPT ESP) .....	.83
	BRAKE LAMP SWITCH C2 (EXCEPT ESP) - BLACK .....	.83
	CONTROLLER ANTILOCK BRAKE .....	.84
	INSTRUMENT CLUSTER C2 - WHITE .....	.85
	STEERING ANGLE SENSOR .....	.85
	TCS SWITCH (ASR) - BLACK .....	.85
	WHEEL SPEED SENSOR-LEFT FRONT .....	.85
	WHEEL SPEED SENSOR-LEFT REAR .....	.86
	WHEEL SPEED SENSOR-RIGHT FRONT .....	.86
	WHEEL SPEED SENSOR-RIGHT REAR .....	.86
<b>10.0</b>	<b>SCHEMATIC DIAGRAMS</b> .....	<b>.87</b>
<b>10.1</b>	<b>BOSCH 5.7 ANTILOCK BRAKE SYSTEM – ABS</b> .....	<b>.87</b>



## 1.0 INTRODUCTION

The procedures contained in this manual include all the specifications, instructions, and graphics needed to diagnose the Sprinter Chassis system problems: Bosch 5.7 ABS/ESP/TCS (ASR) Braking System. The diagnostics in this manual are based on the failure condition or symptom being present at time of diagnosis.

Please follow the recommendations below when choosing your diagnostic path.

1. First make sure the DRBIII® is communicating with the vehicle system being diagnosed. If the DRBIII® displays a “No Response” condition, you must diagnose that first.

2. Read DTC's (diagnostic trouble codes) with the DRBIII®.

3. If no DTC's are present, identify the customer complaint.

4. Once the DTC or customer complaint is identified locate the matching test in the Table of Contents and begin to diagnose the system.

All component location views are in Section 8.0. All connector pinouts are in Section 9.0. All schematics are in Section 10.0.

When repairs are required, refer to the appropriate service manual for the proper removal and repair procedure.

Diagnostic procedures change every year. New diagnostic systems may be added; carryover systems maybe enhanced. READ THIS MANUAL BEFORE TRYING TO DIAGNOSE A VEHICLE DIAGNOSTIC TROUBLE CODE. It is recommended that you review the entire manual to become familiar with all new and changed diagnostic procedures.

This manual reflects many suggested changes from readers of past issues. After using this manual, if you have any comments or recommendations, please fill out the form at the back of the manual and mail it back.

### 1.1 SYSTEM COVERAGE

This diagnostic procedure manual covers the Antilock Braking System (ABS), the Electronic Stability Program (ESP) and the Traction Control System (TCS) found on the Sprinter.

### 1.2 SIX-STEP TROUBLESHOOTING PROCEDURE

Diagnosis of the Antilock Brake Systems is done in six basic steps:

- Verification of complaint
- Verification of any related symptoms
- Symptom analysis
- Problem isolation

- Repair of isolated problem
- Verification of proper operation

## 2.0 IDENTIFICATION OF SYSTEM

The Bosch 5.7 system can be identified by the 42 way Controller Antilock Brake (CAB), Hydraulic Control Unit (HCU) and Pump Motor being an integral electronic/hydraulic unit mounted below the Master Cylinder with four Wheel Speed Sensors, one at each wheel.

Vehicles with the Traction Control System (TCS/ASR) can be identified by the presence of the Traction Control System Switch (TCCS) located on the center instrument panel.

Vehicles with Electronic Stability Program (ESP) can be identified by the presence of the Steering Angle Sensor and the Lateral Acceleration/Yaw Sensor.

## 3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

### 3.1 ESP

The ESP system consists of the electronic control/hydraulic unit, steering angle sensor, lateral acceleration/yaw sensor and wheel speed sensors. When the vehicle is in a turn, the ESP looks at the steering wheel angle sensor value and monitors the wheel speed of the inner and outer wheels to ensure the values are plausible. The steering angle sensor also measures the speed at which the steering wheel is turned.

The ESP control module is very similar to the ABS/ASR module. The ESP is comprised of several other systems, namely the **HBA**, **ABS**, **TCS (ASR)**, **EBD** and **FZR** systems.

### 3.2 ABS

The Controller Antilock Brake (CAB) is used to monitor wheel speeds and modulates (controls) hydraulic pressure in each brake channel. The modulated hydraulic pressure is used to prevent wheel lock up during braking and maintain vehicle stability. The CAB also provides a vehicle speed signal (VSS) to the Electronic Control Module (ECM). During a non-ABS stop, the system functions as a standard braking system. The CAB uses special software that monitors the wheel speed(s) and when certain criteria are met, the software will

## GENERAL INFORMATION

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enable the HCU to perform the brake fluid management control as the combination/proportioning valves.

The Bosch 5.7 system uses the CAB/HCU/Pump Motor to make an integral electronic/hydraulic unit which shares data with other electronic modules on the vehicle via the CAN C Bus network. To access DTCs from the CAB, the DRBIII® uses the K-ABS line located in the Data Link Connector (DLC).

### 3.3 BRAKE ASSIST SYSTEM (HBA)

The Brake Assist System (HBA) analyzes how hard and fast the driver wants to brake. It monitors the brake pressure via a pressure sensor. The passenger car brake assist system uses a vacuum booster solenoid. The Sprinter uses the hydraulic control unit to develop the brake pressure.

### 3.4 TCS (ASR)

The primary function of the Traction Control System is to reduce wheel slip and maintain traction at the driven wheels when the road surfaces are slippery. The Traction Control System reduces wheel slip by applying the brake that has lost traction. The system is designed to operate at speeds below 50 km/h (30 mph). The engine's torque can be reduced by the ECM via the CAN C Bus, if necessary. The TCS can be deactivated with switch on the dash. The Traction Control System uses the ABS to indicate spinning tires to enable the traction control function. The TCS software is in the CAB.

The TCS (ASR) performs the following functions:

1. Engine power derate
2. Engine deceleration regulation. If the vehicle is on a patch of ice, the simple action of releasing the throttle is enough to cause the rear wheels to slip. To avoid this, the throttle input is regulated so power drops slowly instead of abruptly. The engine power is reduced (decelerated) as necessary.

### 3.5 ELECTRONIC BRAKE DISTRIBUTION (EBD)

The system was enhanced and eliminates the need for the ALB system (load sensing valve). All ESP equipped models will not have ALB. The EBV system self-adapts to operating conditions. It detects the vehicle's payload when the vehicle starts and pulls away. Based on the acceleration rate when the vehicle first pulls away from a standstill, the system is able to calculate the actual payload. This is a rough estimate which is used initially. Later on, the system gathers more precise information by monitoring the brake pressure and wheel speed and negative slip when the driver applies the

brakes. The system will then produce a more accurate calculation of payload depending on brake retardation. The adaptation is erased when the ignition is switched off. A new adaptation will occur on the next driving cycle. By default, the system acts upon the vehicle as if in an unloaded condition (safe mode).

Once a new driving cycle begins with the vehicle in a fully loaded condition (without having gathered more precise information) the system will detect ABS actuation in the front wheels and will allow enough pressure to be applied to the rear axle, to an extent where the wheels are just about to lock up (maximum braking possible).

The system calculates the braking force at the front and rear axles. If the driver applies the brakes gently and then realizes he needs to apply the brakes further, the EBV allows the proper pressure to be applied to the front and rear brakes.

The EBV also contains a feature called "corner brake system" (CBS) which operates when the vehicle is braked while cornering to avoid a possible oversteering condition. The EBV monitors the wheel speed of both rear wheels to detect when the vehicle is cornering and allows precise brake pressure application to the front and rear brakes. Also when the brakes are applied during cornering, the outer wheels get more of the vehicle's weight while the inner wheels get less weight and could lose traction (wheel lock up). The EBV system splits the pressure between left and right sides in addition to front and rear brakes.

### 3.6 VEHICLE CONTROLLING (FZR)

**Vehicle controlling (FZR)** requires additional sensors to operate. The term ESP refers to the software of the system. The term FZR refers to the system controller. The TCS (ASR) system requires wheel speed sensors to monitor wheel slip and CAN bus communications to regulate engine power. In addition to these inputs, the vehicle controlling (FZR) requires a steering angle sensor, and a lateral acceleration/yaw rate sensor.

The ESP system does not take the vehicle load into account. Instead, the coefficient of friction is calculated in a 20 millisecond period, where the controller measures the rate at which the wheel speed is decelerated, as brake pressure is applied to the wheel.

### 3.7 SYSTEM COMPONENTS

- Controller Antilock Brake (CAB)
- Hydraulic Control Unit (HCU)
- Pump Motor

- Four Wheel Speed Sensors/Tone Wheel assemblies
- ABS warning indicator
- TCS (ASR) event indicator
- TCS (ASR) warning indicator
- Steering Angle Sensor
- Lateral Acceleration/Yaw Rate Sensor
- Brake Pressure Sensor
- ESP event indicator
- Brake Fluid Level switch
- Brake Switch (BS)
- Brake Lamp Switch (BLS)
- TCS Switch (TCSS)
- K - ABS
- CAN C Bus
- Fuses, grounds, and wiring

### 3.7.1 ABS AND TCS (ASR) INDICATORS

This system is equipped with an ABS warning indicator, TCS (ASR) warning indicator, and TCS (ASR) event indicator to alert the driver of a malfunction/event it has detected. The CAB can request the illumination of the ABS warning indicator, TCS (ASR) warning indicator, and TCS (ASR) event indicator via CAN C BUS. The CAB controls the ABS warning indicator by:

- Light steady during an initial test at the beginning of an ignition cycle to function as a bulb check
- Light steady when a system malfunction exists (DTC)
- Light steady - If you have not met the speed required to reset/retest the ABS components

The Instrument Cluster (IC) controls the indicators. The Instrument Cluster transmits a message over the CAN C Bus relating to diagnostics and current lamp status for the ABS and TCS (ASR) indicators. The CAB can control the operation of TCS warning and TCS event indicators by:

- Both light steady with engine off and both go out with engine running
- TCS warning indicator lights steady when a TCS malfunction exists
- TCS event indicator will flash when TCS is in an active event

### 3.7.2 CONTROLLER ANTILOCK BRAKE (CAB)

The CAB is mounted directly to the Hydraulic Control Unit (HCU) that includes a microprocessor and twelve solenoids that control valves that con-

trol brake pressure during antilock braking or traction control events. The CAB also has circuits that monitor the following:

- Double brake switch outputs are monitored to determine whether or not to prepare for possible ABS braking
- Wheel Speed Sensors are monitored to determine when a wheel is tending to lock up. The CAB will operate the valves in the HCU to control braking pressure during ABS braking
- Detect ABS system related problems and take diagnostic action
- Able to execute self-tests and output control commands

When equipped with Electronic Stability (ESP), the CAB also monitors the following:

- The ESP looks at the Steering Angle Sensor value and monitors the speed of the inner and outer wheels to ensure that the values are plausible. The Steering Angle Sensor also monitors the speed that the steering wheel is turned.
- The Lateral Acceleration/Yaw Rate Sensor is contained in one unit. The sensor measures side to side (lateral) motion and rotational motion (how fast the vehicle is turning).
- The ESP uses data from the Brake Pressure Sensor to analyze how hard and fast that the driver wants to brake.

### 3.7.3 HYDRAULIC CONTROL UNIT (HCU)

The HCU on the Bosch 5.7 has an integral valve body for controlling the front and rear brakes. Within the HCU are inlet, outlet, and shuttle valves, to release brake pressure as required to avoid wheel lockup, keeping the wheels rolling, and maintain optimum deceleration with stability. The Pump Motor is attached to the HCU which works with the ABS and TCS and is controlled by the CAB. The primary function is to provide extra amount of fluid when needed.

### 3.7.4 SWITCHES/SENSORS

**BRAKE SWITCH (BS):** This switch prepares the CAB for a possible antilock event. The CAB uses an output state voltage from the BS when the brake pedal is either released/depressed. The Fused Ignition Switch Output circuit supplies 12 volts to the BS. A released brake pedal will close the BS circuit and the BS Output circuit supplies 12 volts to the CAB. When the driver depresses the brake pedal, the BS Output circuit voltage drops to 0 volts and the CAB senses the brake pedal state. This tells the CAB what position the brake pedal is currently in to make an ABS event possible. When using the DRBIII® in Inputs/Outputs, the BS and BLS will

## GENERAL INFORMATION

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read opposite switch states. **Note: The BS and BLS are in the same switch housing.**

**BRAKE LAMP SWITCH (BLS):** This switch prepares the CAB for a possible antilock event. The CAB uses an output state voltage from the BLS when the brake pedal is either depressed/released. The Fused Ignition Switch Output circuit supplies 12 volts to the BLS. A depressed brake pedal will close the BLS circuit and the BLS Output circuit supplies 12 volts at the CAB. When the driver releases the brake pedal, the BLS Output circuit voltage drops to 0 volts and the CAB senses the brake pedal state. This tells the CAB what position the brake pedal is currently in to make an ABS event possible. When using the DRBIII® in Inputs/Outputs, the BS and BLS will read opposite switch states. **Note: The BS and BLS are in the same switch housing.**

**TRACTION CONTROL SYSTEM SWITCH (TCSS):** This switch signals the CAB to either turn ON or OFF the TCS. The driver can toggle the TCSS, which receives 12 volts from the D (+) Relay Output circuit. Depending on the position of the TCSS, open or closed, the CAB receives the TCSS state voltage on the TCS Switch Sense circuit. When 12 volts are applied to the TCS Switch Sense circuit, the TCS is OFF. When no voltage is present, the TCS is ON.

**WHEEL SPEED SENSORS AND TONE WHEELS:** The Bosch 5.7 system uses one passive WSS on each wheel. The sensor measures the wheel speed by monitoring a rotating tone wheel. As the teeth of the tone wheel move through the magnetic field of the sensor an AC voltage and amperage is generated. This signal frequency increases or decreases proportionally to the speed of the wheel. The CAB monitors this signal to check for a sudden change in single or multiple wheel decelerations. If the deceleration of one or more wheels is not within a predetermined amount, the CAB takes control for antilock action through the HCU. Each WSS has a magnetic inductive pick up coil (WSS) that is mounted to a fixed component. There is an air gap between the tone wheel and the speed sensor assembly. Diagnostically, the coils of the Wheel Speed Sensors have the same amount of resistance. When measured across the CAB harness connector terminals, the resistance should be between 1100 - 1800 ohms. Refer to service manual for WSS replacement and air gap specifications.

Correct ABS operation is dependent on Tone Wheel speed signal from the WSS. The vehicle wheels and tires should all be the same size and type to get accurate signals. In addition, all tires should be at recommended tire pressures.

### 3.7.5 SELF TESTS

The system software includes several self tests that are performed every time the ignition is turned on and the vehicle is driven. Some of the self tests occur immediately, while others occur under normal driving conditions while not in antilock operation. The CAB checks continuously for a missing or erratic WSS signals/circuits, tone wheels, solenoids, pump motor or solenoid relay by performing several tests such as: dynamic, static, ohmic, voltage drop, and timed response. If any component exhibits a fault during testing, the CAB will request to illuminate the ABS and TCS warning indicators.

As an additional check of the ESP system, a road test procedure is available on the DRBIII®. This test should be carried out when any ESP component is replaced in order to ensure proper function. Since the wheel speed sensors are required inputs to the ESP, this test should also be performed if the wheel speed sensors are replaced.

First, the brakes are applied with the vehicle stationary. Then, the vehicle is driven at approximately 6 MPH. The driver has to make left and right turns, with a minimum 90 degree steering turning angle. If the indicator lamp goes out, everything is in order. If the lamp remains illuminated, the DRBIII® will display the fault codes that are causing the test to fail. The road test function is set in the ESP control module, and can only be deactivated once there are no more fault codes detected.

The Steering Angle Sensor must be initialized. A procedure is carried out using the DRBIII® to ensure that the module detects the exact position of the sensor. The sensor must be calibrated any time wheel alignment is changed, the steering column is removed and re-installed, or the sensor is replaced.

### 3.8 USING THE DRBIII®

Refer to the DRBIII® user's guide for instructions and assistance with reading diagnostic trouble codes, erasing diagnostic trouble codes and other DRBIII® functions.

### 3.9 DRBIII® ERROR MESSAGES

Under normal operation, the DRBIII® will display one of only two error messages:

— User-Requested WARM Boot or User-Requested COLD Boot.

If the DRBIII® should display any other error message, record the entire display and call the STAR Center for information and assistance. This is a sample of such an error message display:



ver: 2.14  
 date: 26 Jul93  
 file: key\_iff.cc  
 date: Jul 26 1993  
 line: 548  
 err: 0x1  
 User-Requested COLD Boot

Press MORE to switch between this display and the application screen.  
 Press F4 when done noting information.

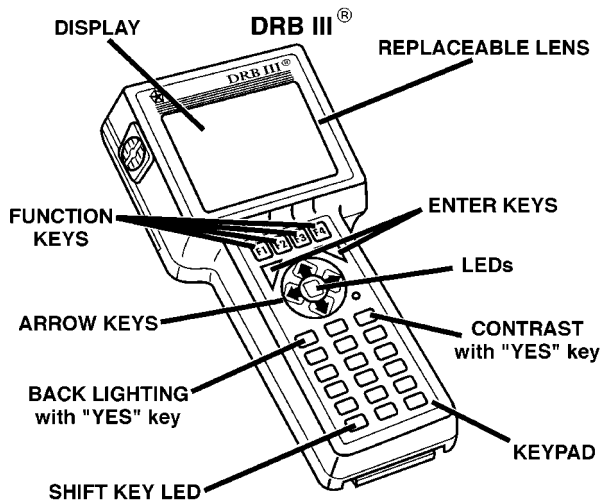
### 3.9.1 DRBIII® DOES NOT POWER UP (BLANK SCREEN)

If the LED's do not light or no sound is emitted at start up, check for loose cable connections or a bad cable. Check the vehicle battery voltage (data link 16-way connector cavity 16). A minimum of 11 volts is required to adequately power the DRBIII®. Also check for a good ground at DLC.

If all connections are proper between the DRBIII® and the vehicle or other devices, and the vehicle battery is fully charged, an inoperative DRBIII® may be the result of a faulty cable or vehicle wiring.

### 3.9.2 DISPLAY IS NOT VISIBLE

Low temperatures will affect the visibility of the display. Adjust the contrast to compensate for this condition.



## 4.0 DISCLAIMERS, SAFETY, WARNINGS

### 4.1 DISCLAIMERS

All information, illustrations, and specifications contained in this manual are based on the latest

information available at the time of publication. The right is reserved to make changes at any time without notice.

## 4.2 SAFETY

### 4.2.1 TECHNICIAN SAFETY INFORMATION

**WARNING: ENGINES PRODUCE CARBON MONOXIDE THAT IS ODORLESS, CAUSES SLOWER REACTION TIME, AND CAN LEAD TO SERIOUS INJURY. WHEN THE ENGINE IS OPERATING, KEEP SERVICE AREAS WELL VENTILATED OR ATTACH THE VEHICLE EXHAUST SYSTEM TO THE SHOP EXHAUST REMOVAL SYSTEM.**

Set the parking brake and block the wheels before testing or repairing the vehicle. It is especially important to block the wheels on front-wheel drive vehicles; the parking brake does not hold the front drive wheels.

When servicing a vehicle, always wear eye protection, and remove any metal jewelry such as watchbands or bracelets that might make an inadvertent electrical contact.

When diagnosing an antilock brake or adjustable pedals system problem, it is important to follow approved procedures where applicable. These procedures can be found in the service manual. Following these procedures is very important to safety of individuals performing diagnostic tests.

### 4.2.2 VEHICLE PREPARATION FOR TESTING

Make sure the vehicle being tested has a fully charged battery. If it does not, false diagnostic codes or error messages may occur.

### 4.2.3 SERVICING SUB-ASSEMBLIES

Some components of the antilock brake and traction control are intended to be serviced in assembly only. Attempting to remove or repair certain sub-components may result in personal injury and/or improper system operation. Only those components with approved repair and installation procedures in the service manual should be serviced.

## GENERAL INFORMATION

### 4.2.4 DRBIII® SAFETY INFORMATION

**WARNING: EXCEEDING THE LIMITS OF THE DRBIII® MULTIMETER IS DANGEROUS. IT CAN EXPOSE YOU TO SERIOUS OR POSSIBLE FATAL INJURY. CAREFULLY READ AND UNDERSTAND THE CAUTIONS AND THE SPECIFICATION LIMITS.**

- Follow the vehicle manufacturer's service specifications at all times.
- Do not use the DRBIII® if it has been damaged.
- Do not use the test leads if the insulation is damaged or if metal is exposed.
- To avoid electrical shock, do not touch the test leads, tips, or the circuit being tested.
- Choose the proper range and function for the measurement. Do not try voltage or current measurements that may exceed the rated capacity.
- Do not exceed the limits shown in the table below:

FUNCTION	INPUT LIMIT
Volts	0 - 500 peak volts AC 0 - 500 volts DC
Ohms (resistance)*	0 - 1.12 megaohms
Frequency Measured Frequency Generated	0 - 10 kHz
Temperature	-58 - +1100°F -50 - +600°C

\* Ohms cannot be measured if voltage is present. Ohms can be measured only in a non-powered circuit.

- Voltage between any terminal and ground must not exceed 500v DC or 500v peak AC.
- Use caution when measuring voltage above 25v DC or 25v AC.
- Use the low current shunt to measure circuits up to 10A. Use the high current clamp to measure circuits exceeding 10A.
- When testing for the presence of voltage or current, make sure the meter is functioning correctly. Take a reading of a known voltage or current before accepting a zero reading.
- When measuring current, connect the meter in series with test load.
- When using the meter function, keep the DRBIII® away from spark plug or coil wires to avoid measuring error from outside interference.

### 4.3 WARNING

#### 4.3.1 VEHICLE DAMAGE WARNINGS

Before disconnecting any control module, make sure the ignition is "off". Failure to do so could damage the module.

When testing voltage or continuity at any control module, use the terminal side (not the wire end) of the connector. Do not probe a wire through the insulation; this will damage it and eventually cause it to fail because of corrosion.

Be careful when performing electrical tests so as to prevent accidental shorting of terminals. Such mistakes can damage fuses or components. Also, a second code could be set, making diagnosis of the original problem more difficult.

#### 4.3.2 ROAD TESTING A COMPLAINT VEHICLE

Some complaints will require a test drive as part of the repair verification procedure. The purpose of the test drive is to try to duplicate the diagnostic code or symptom condition.

**CAUTION: Before road testing a vehicle, be sure that all components are reassembled. During the test drive, do not try to read the DRBIII® screen while in motion. Do not hang the DRBIII® from the rear view mirror or operate it yourself. Have an assistant available to operate the DRBIII®.**

### 4.4 DIAGNOSIS

1. Your diagnostic test procedure must begin with a thorough visual inspection of the system in question for damaged components or disconnected connectors. For ABS, the brake lamps must be operational prior to continuing.
2. Connect the DRBIII® to the data link connector located under the dash. If the DRBIII® does not power up, check the power and ground supplies to the connector.
3. Select the system in question. Turn the ignition on. If the DRBIII® displays "No Response", refer to Communication in the Body Diagnostic Procedures manual to diagnose the symptom.
4. Read and record all diagnostic trouble codes. If any additional codes are present, proceed to the appropriate test.
5. For ABS, if there are no diagnostic trouble codes present, select "Inputs/Outputs" and read the Brake Switch and Brake Lamp Switch inputs as you press and release the brake pedal. If the

display does not match the state of the pedal, perform the proper test. For a problem with the "ABS" warning indicator, refer to the proper test.

6. If no other problems are found, it will be necessary to road test the vehicle. **THE DRBIII® MUST NOT BE CONNECTED TO THE DATA LINK CONNECTOR WHEN ROAD TESTING FOR PROPER ANTILOCK OPERATION. THE SYSTEM IS DISABLED WHILE IN DIAGNOSTIC MODE.** Perform several antilock stops from above 50 Km/h (30 mph) and then repeat steps 2, 3, and 4. If any diagnostic trouble codes are present, proceed to the appropriate test.
7. The following conditions should be considered "NORMAL" operation, and no repairs should be attempted to correct them.
  - Brake pedal feedback during an ABS stop (clicking, vibrating)
  - Clicking, groaning or buzzing at 12 Km/h (8 mph) (drive off self test)
  - Groaning noise during an ABS stop
  - Slight brake pedal drop and pop noise when ignition is initially turned on
  - Brake pedal ratcheting down at the end of an ABS stop
8. If the complaint is ABS "cycling" at the end of a stop at low speeds, it may be caused by a marginal wheel speed sensor signal. The sensor air gap, tone wheel condition, and/or brakes hanging up are possible causes of this condition.
9. After a road test in which no problems were found, refer to any Technical Service Bulletins that may apply.

<b>DC</b>	direct current
<b>DLC</b>	data link connector
<b>DRBIII®</b>	diagnostic read-out box
<b>DTC</b>	diagnostic test code
<b>EBD</b>	electronic brake distribution
<b>ECM</b>	electronic control module
<b>HCU</b>	hydraulic control unit
<b>HZ</b>	Hertz
<b>IC</b>	instrument cluster
<b>LF</b>	left front
<b>LR</b>	left rear
<b>PM</b>	pump motor
<b>RF</b>	right front
<b>RR</b>	right rear
<b>SOL</b>	solenoid
<b>TCS</b>	traction control system
<b>TCSS</b>	traction control system switch
<b>VSS</b>	vehicle speed signal
<b>WSS</b>	wheel speed sensor

## 5.0 REQUIRED TOOLS AND EQUIPMENT

DRBIII® (diagnostic read-out box)  
 jumper wires  
 ohmmeter  
 voltmeter  
 test light  
 oscilloscope

## 6.0 GLOSSARY OF TERMS

<b>ABS</b>	antilock brake system
<b>AC</b>	alternating current
<b>BCM</b>	body control module
<b>BS</b>	brake switch
<b>BLS</b>	brake lamp switch
<b>CAB</b>	controller antilock brake



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7.0

DIAGNOSTIC INFORMATION AND  
PROCEDURES

## BRAKES (CAB)

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### Symptom List:

#### ANTI-LOCK BRAKE MODULE INTERNAL CAB INTERNAL

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**Test Note:** All symptoms listed above are diagnosed using the same tests.  
The title for the tests will be ANTI-LOCK BRAKE MODULE  
INTERNAL.

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#### When Monitored and Set Condition:

##### ANTI-LOCK BRAKE MODULE INTERNAL

When Monitored: Ignition On - Continuously.

Set Condition: When there is a deviation from the expected result of a CAB internal self check.

##### CAB INTERNAL

When Monitored: Ignition On - Continuously.

Set Condition: When there is a deviation from the expected result of a CAB internal self check.

#### POSSIBLE CAUSES

INTERMITTENT CAB INTERNAL DTC  
DAMAGED CAB/CAB HARNESS CONNECTOR  
FUSED OPTIONAL EQUIPMENT RELAY OUTPUT CIRCUIT OPEN  
FUSED B(+) CIRCUIT OPEN  
GROUND CIRCUIT OPEN  
ANTI-LOCK BRAKE CONTROLLER

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. With the DRBIII®, erase DTCs. Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTCs. Does this DTC reset?  Yes → Go To 2 No → Go To 6	All

## ANTI-LOCK BRAKE MODULE INTERNAL — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the CAB harness connector. Inspect the CAB/CAB harness connector for damage. Is there any broken, bent, pushed out, corroded or spread terminals?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All
3	Turn the ignition off. Disconnect the CAB harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the Fused Optional Equipment Relay Output circuit at the CAB harness connector. <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b> Does the test light illuminate brightly?  Yes → Go To 4  No → Repair the Fused Optional Equipment Relay Output circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Disconnect the CAB harness connector. Using a 12-volt test light connected to ground, check both Fused B(+) circuits at the CAB harness connector. <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b> Does the test light illuminate brightly?  Yes → Go To 5  No → Repair the Fused B(+) circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Disconnect the CAB harness connector. Using a 12-volt test light connected to 12-volts, check the CAB harness connector Ground circuits. <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b> Does the test light illuminate brightly?  Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Repair the Ground circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All

**ANTI-LOCK BRAKE MODULE INTERNAL — Continued**

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
6	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Look for broken, bent, pushed out, or corroded terminals. Were any problems found?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Test Complete.	All



**Symptom:**  
**BRAKE FLUID LEVEL**

**POSSIBLE CAUSES**

INTERMITTENT DTC  
 BRAKE FLUID LEVEL SWITCH SIGNAL CIRCUIT SHORT TO GROUND  
 BRAKE FLUID LEVEL SWITCH  
 ANTI-LOCK BRAKE MODULE

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Before proceeding, verify that the brake fluid is at the proper level in accordance with the Service Information.</b></p> <p>Turn the ignition on.            With the DRBIII®, read DTCs.            With the DRBIII®, erase DTCs.            Turn the ignition off.            Turn the ignition on.            With the DRBIII®, read DTCs.            Does the DRBIII® display BRAKE FLUID LEVEL?</p> <p>Yes → Go To 2            No → Go To 4</p>	All
2	<p><b>NOTE: The brake fluid must be at the proper level. Verify that the brake fluid is at the proper level in accordance with the Service Information.</b></p> <p>Turn the ignition off.            Disconnect the Brake Fluid Level Switch harness connector.            Measure the resistance between the terminals of the Brake Fluid Level Switch.            Is the resistance below 5.0 ohms?</p> <p>Yes → Replace the Brake Fluid Level Switch in accordance with the Service Information.            No → Go To 3</p>	All
3	<p>Turn the ignition off.            Disconnect the Brake Fluid Level Switch harness connector.            Disconnect the Instrument Cluster C2 harness connector.            Measure the resistance between ground and the Brake Fluid Level Switch signal circuit.            Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the Brake Fluid Level Switch signal circuit for a short to ground.            No → Replace the Antilock Brake Module in accordance with the Service Information.</p>	All

## BRAKES (CAB)

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### BRAKE FLUID LEVEL — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Look for broken, bent, pushed out, or corroded terminals. Were any problems found?  Yes → Repair as necessary.  No → Test Complete.	All

**Symptom:**  
**BRAKE PRESSURE SENSOR CIRCUIT**

POSSIBLE CAUSES
BRAKE PRESSURE SENSOR CIRCUIT INTERMITTENT DTC BRAKE PRESSURE SENSOR CIRCUIT SHORT TO VOLTAGE BRAKE PRESSURE SENSOR CIRCUIT SHORT TO GROUND BRAKE PRESSURE SENSOR CIRCUIT OPEN BRAKE PRESSURE SENSOR ANTI-LOCK BRAKE CONTROLLER

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTCs. Record DTC information. <b>NOTE: If a system undervoltage or overvoltage DTC is set along with this DTC, diagnose the system voltage DTC first.</b> <b>NOTE: Before continuing, make sure that the Brake Lamp switch is adjusted correctly and functioning properly. Adjust or replace the switch as necessary in accordance with the Service Information.</b> With the DRBIII®, erase DTCs. Road test the vehicle and perform several braking maneuvers. With the DRBIII®, read DTCs. Does this DTC reset?  Yes → Go To 2  No → Go To 6	All
2	Turn the ignition off. Disconnect the Brake Pressure Sensor harness connector. Disconnect the CAB harness connector. Turn the ignition on. Measure the voltage of the Brake Pressure Sensor signal circuit. Measure the voltage of the Brake Pressure Sensor ground circuit. Measure the voltage of the Brake Pressure Sensor 5 volt supply circuit. Is there voltage present on any of the circuits?  Yes → Repair the Brake Pressure Sensor circuit(s) for a short to voltage.  No → Go To 3	All
3	Turn the ignition off. Disconnect the Brake Pressure Sensor harness connector. Disconnect the CAB harness connector. Measure the resistance between ground and the Brake Pressure Sensor signal circuit. Measure the resistance between ground and the Brake Pressure Sensor 5 volt supply circuit. Is the resistance below 5.0 ohms for either circuit?  Yes → Repair the Brake Pressure Sensor circuit(s) for a short to ground.  No → Go To 4	All

# BRAKES (CAB)

## BRAKE PRESSURE SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off.            Disconnect the Brake Pressure Sensor harness connector.            Disconnect the CAB harness connector.            Measure the resistance of the Brake Pressure Sensor signal circuit.            Measure the resistance of the Brake Pressure Sensor ground circuit.            Measure the resistance of the Brake Pressure Sensor 5 volt supply circuit.            Is the resistance above 5.0 ohms for any of the circuits?</p> <p>Yes → Repair the Brake Pressure Sensor circuit(s) for an open            No → Go To 5</p>	All
5	<p>Turn the ignition off.            Disconnect the Brake Pressure Sensor harness connector.            Inspect the harness and connectors related to this circuit. If any problems are found, repair as necessary.            If no problems are found, replace the Brake Pressure Sensor in accordance with the Service Information.            With the DRBIII®, clear DTCs.            Road test the vehicle and perform several braking maneuvers.            With the DRBIII®, read DTCs.            Does this DTC reset?</p> <p>Yes → Replace the CAB in accordance with the Service Information.            No → Test Complete.</p>	All
6	<p>The condition that set this DTC is not present at this time.            Monitor the DRBIII® while wiggle testing the related harness and connectors. Look for any related parameters to change or for the DTC to reset.            Inspect the related harness and connectors.            Look for any chafed, pierced, pinched, or partially broken wires.            Look for broken, bent, pushed out, or corroded terminals.            Were any problems found?</p> <p>Yes → Repair as necessary.            No → Test Complete.</p>	All

**Symptom:**  
**BRAKE SWITCH CIRCUIT**

**When Monitored and Set Condition:**

**BRAKE SWITCH CIRCUIT**

When Monitored: Ignition On - Continuously

Set Condition: When the brake lamp switch and brake switch outputs are both open or shorted.

**POSSIBLE CAUSES**

INTERMITTENT BRAKE SWITCH CIRCUIT DTC  
 BRAKE LAMP SWITCH STATUS  
 BRAKE SWITCH STATUS  
 FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN  
 OUTPUT CIRCUIT SHORT TO VOLTAGE  
 OUTPUT CIRCUIT SHORT TO GROUND  
 OUTPUT CIRCUIT OPEN  
 BRAKE SWITCH OUTPUT CIRCUIT SHORT TO BRAKE LAMP SWITCH OUTPUT CIRCUIT  
 BRAKE LAMP SWITCH  
 BRAKE SWITCH  
 ANTI-LOCK BRAKE CONTROLLER

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: This DTC will set if the Brake Switch, the Brake Lamp Switch, or both switches are inoperative. It will be necessary to verify the functionality of each switch.</b></p> <p><b>NOTE: If the Brake Switch and the Brake Lamp Switch are inoperative, it will be necessary to diagnose BOTH circuits.</b></p> <p>Turn the ignition off.            Turn the ignition on.            With the DRBIII® in Inputs/Outputs, monitor the Brake Lamp Switch state while pressing and releasing the brake pedal.            Does the DRBIII® display change from OPEN to CLOSED as the brake pedal is pressed and released?</p> <p>Yes → Go To 2            No → Go To 5</p>	All

# BRAKES (CAB)

## BRAKE SWITCH CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	<p><b>NOTE: This DTC will set if the Brake Switch, the Brake Lamp Switch, or both switches are inoperative. It will be necessary to verify the functionality of each switch.</b></p> <p><b>NOTE: If the Brake Switch and the Brake Lamp Switch are inoperative, it will be necessary to diagnose BOTH circuits.</b></p> <p>Turn the ignition off. Turn the ignition on. With the DRBIII® in Inputs/Outputs, monitor the Brake Switch state while pressing and releasing the brake pedal. Does the DRBIII® display change from CLOSED to OPEN as the brake pedal is pressed and released?</p> <p>Yes → Go To 3 No → Go To 4</p>	All
3	<p>Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Look for broken, bent, pushed out, or corroded terminals. Were any problems found?</p> <p>Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	All
4	<p>Turn the ignition off. Disconnect the C1 Brake Switch harness connector. Turn the ignition on. With the DRBIII® in Inputs/Outputs, monitor the Brake Switch state. Connect a jumper wire between the Fused Ignition Switch Output circuit and Brake Switch Output circuit in the C1 Brake Switch harness connector. Does the DRBIII® display a change from OPEN to CLOSED?</p> <p>Yes → Replace the Brake Switch in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 6</p>	All
5	<p>Turn the ignition off. Disconnect the C2 Brake Lamp Switch harness connector. Turn the ignition on. With the DRBIII® in Inputs/Outputs, monitor the Brake Lamp Switch state. Connect a jumper wire between the Fused Ignition Switch Output circuit and Brake Lamp Switch Output circuit in the C2 Brake Lamp Switch harness connector. Does the DRBIII® display a change from OPEN to CLOSED?</p> <p>Yes → Replace the Brake Lamp Switch in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 6</p>	All

**BRAKE SWITCH CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the appropriate brake switch harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the Fused Ignition Switch Output circuit at the harness connector. <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b> Is the test light illuminated and bright?  Yes → Go To 7  No → Repair the Fused Ignition Switch Output circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Disconnect the CAB harness connector. Disconnect the appropriate brake switch harness connector. Turn the ignition on. Measure the voltage of the output circuit at the brake switch harness connector. <b>NOTE: Measurement is taken at the Brake Switch Output circuit or the Brake Lamp Output circuit as determined by the previously performed switch test.</b> Is there any voltage present?  Yes → Repair the affected circuit for a short to voltage. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 8	All
8	Turn the ignition off. Disconnect the CAB harness connector. Disconnect the appropriate brake switch harness connector. Measure the resistance between ground and switch output circuit at the switch connector. <b>NOTE: Measurement is taken at the Brake Switch Output circuit or the Brake Lamp Output circuit as determined by the previously performed switch test.</b> Is the resistance below 5.0 ohms?  Yes → Repair the affected circuit for a short to ground. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 9	All
9	Turn the ignition off. Disconnect the CAB harness connector. Disconnect the appropriate brake switch harness connector. Measure the resistance of the output circuit between the switch harness connector and the CAB harness connector. <b>NOTE: Measurement is taken at the Brake Switch Output circuit or the Brake Lamp Output circuit as determined by the previously performed switch test.</b> Is the resistance above 5.0 ohms?  Yes → Repair the affected circuit for an open. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 10	All

**BRAKE SWITCH CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
10	<p>Turn the ignition off.                      Disconnect the CAB harness connector.                      Disconnect the C1 Brake Switch and C2 Brake Lamp Switch harness connectors.                      Measure the resistance between the Brake Switch Output circuit and Brake Lamp Switch Output circuit in the C1 and C2 connectors.                      Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the Brake Switch Output circuit for a short to the Brake Lamp Switch Output circuit.                      Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Replace the Controller Antilock Brake in accordance with the Service Information.                      Perform ABS VERIFICATION TEST - VER 1.</p>	All



**Symptom:**  
**CAB CHECK SUM**

**When Monitored and Set Condition:**

**CAB CHECK SUM**

When Monitored: Ignition On - Once

Set Condition: When the sum of all storage bytes are not equal to the original sum stored.

**POSSIBLE CAUSES**

INTERMITTENT CAB CHECK SUM DTC  
DAMAGED CAB/CAB HARNESS CONNECTOR  
FUSED OPTIONAL EQUIPMENT RELAY OUTPUT CIRCUIT OPEN  
FUSED B(+) CIRCUIT OPEN  
GROUND CIRCUIT OPEN  
ANTI-LOCK BRAKE CONTROLLER

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. With the DRBIII®, erase DTCs. Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTCs. Does the DRBIII® display CAB CHECK SUM?  Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the CAB harness connector. Inspect the CAB/CAB harness connector for damage. Is there any broken, bent, pushed out, corroded or spread terminals?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All

# BRAKES (CAB)

## CAB CHECK SUM — Continued

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Turn the ignition on.            Using a 12-volt test light connected to ground, check the Fused Optional Equipment Relay Output circuit at the CAB harness connector.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>            Does the test light illuminate brightly?</p> <p>Yes → Go To 4</p> <p>No → Repair the Fused Optional Equipment Relay Output circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
4	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Using a 12-volt test light connected to ground, check both Fused B(+) circuits at the CAB harness connector.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>            Does the test light illuminate brightly?</p> <p>Yes → Go To 5</p> <p>No → Repair the Fused B(+) circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
5	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Using a 12-volt test light connected to 12-volts, check the CAB harness connector Ground circuits.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>            Does the test light illuminate brightly?</p> <p>Yes → Replace the Controller Antilock Brake in accordance with the Service Information.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Repair the Ground circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
6	<p>Turn the ignition off.            Visually inspect the related wiring harness.            Look for any chafed, pierced, pinched, or partially broken wires.            Look for broken, bent, pushed out, or corroded terminals.            Were any problems found?</p> <p>Yes → Repair as necessary.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	All

**Symptom:**  
**CAB OPTION**

**When Monitored and Set Condition:**

**CAB OPTION**

When Monitored: Ignition On - Once

Set Condition: When the vehicle line information transmitted does not match the expected values.

**POSSIBLE CAUSES**

INTERMITTENT CAB OPTION DTC  
DAMAGED CAB/CAB HARNESS CONNECTOR  
FUSED OPTIONAL EQUIPMENT RELAY OUTPUT CIRCUIT OPEN  
FUSED B(+) CIRCUIT OPEN  
GROUND CIRCUIT OPEN  
ANTI-LOCK BRAKE CONTROLLER

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. With the DRBIII®, erase DTCs. Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTCs. Does the DRBIII® display CAB OPTION?  Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the CAB harness connector. Inspect the CAB/CAB harness connector for damage. Is there any broken, bent, pushed out, corroded or spread terminals?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All

# BRAKES (CAB)

## CAB OPTION — Continued

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Turn the ignition on.            Using a 12-volt test light connected to ground, check the Fused Optional Equipment Relay Output circuit at the CAB harness connector.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>            Does the test light illuminate brightly?</p> <p>Yes → Go To 4</p> <p>No → Repair the Fused Optional Equipment Relay Output circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
4	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Using a 12-volt test light connected to ground, check both Fused B(+) circuits at the CAB harness connector.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>            Does the test light illuminate brightly?</p> <p>Yes → Go To 5</p> <p>No → Repair the Fused B(+) circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
5	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Using a 12-volt test light connected to 12-volts, check the CAB harness connector Ground circuits.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>            Does the test light illuminate brightly?</p> <p>Yes → Replace the Controller Antilock Brake in accordance with the Service Information.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Repair the Ground circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
6	<p>Turn the ignition off.            Visually inspect the related wiring harness.            Look for any chafed, pierced, pinched, or partially broken wires.            Look for broken, bent, pushed out, or corroded terminals.            Were any problems found?</p> <p>Yes → Repair as necessary.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	All

**Symptom:**  
**CAN COMMUNICATION ERROR**

**POSSIBLE CAUSES**

CAN DTCS PRESENT IN OTHER MODULES  
 INTERMITTENT CAN COMMUNICATION ERROR DTC  
 DAMAGED CAB/CAB HARNESS CONNECTOR  
 CAN CIRCUIT(S) SHORT TO VOLTAGE  
 CAN CIRCUIT(S) SHORTED TOGETHER  
 CAN CIRCUIT(S) SHORT TO GROUND  
 CAN CIRCUIT(S) OPEN  
 FUSED OPTIONAL EQUIPMENT RELAY OUTPUT CIRCUIT OPEN  
 FUSED B(+) CIRCUIT OPEN  
 GROUND CIRCUIT OPEN  
 ANTI-LOCK BRAKE CONTROLLER

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. <b>NOTE: Diagnose any Steering Angle Sensor DTCs that are present in this module before continuing.</b> With the DRBIII®, read DTCs in the Engine Control Module, Transmission Control Module, and Instrument Cluster. Are there any CAN communication DTCs present in any of these modules?  Yes → Refer to the diagnostic procedures for any CAN DTCs in ECM, TCM and Cluster before proceeding with this test. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 2	All
2	<b>NOTE: If a system undervoltage or overvoltage DTC is set along with this DTC, diagnose the system voltage DTC first.</b> Turn the ignition on. With the DRBIII®, erase DTCs. Turn the ignition off. Start the engine. With the DRBIII®, read DTCs. Does this DTC reset?  Yes → Go To 3  No → Go To 11	All
3	Turn the ignition off. Disconnect the CAB harness connector. Inspect the CAB/CAB harness connector for damage. Is there any broken, bent, pushed out, corroded or spread terminals?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 4	All

**CAN COMMUNICATION ERROR — Continued**

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off.                      Disconnect the CAB harness connector.                      Turn the ignition on.                      Measure the voltage of the CAN(+) circuit.                      Measure the voltage of the CAN(-) circuit.                      Is the voltage above 3.0 volts for either circuit?</p> <p>Yes → Repair the CAN circuit(s) for a short to voltage.                      Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.                      Disconnect the CAB harness connector.                      Measure the resistance between ground and the CAN(+) circuit.                      Measure the resistance between ground and the CAN(-) circuit.                      Is the resistance below 5.0 ohms for either circuit?</p> <p>Yes → Repair the CAN circuit(s) for a short to ground.                      Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 6</p>	All
6	<p>Turn the ignition off.                      Disconnect the CAB harness connector.                      Measure the resistance between the CAN(+) circuit and the CAN(-) circuit.                      Is the resistance below 5.0 ohms between the circuits?</p> <p>Yes → Repair the shorted CAN circuit(s).                      Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 7</p>	All
7	<p>Turn the ignition off.                      Disconnect the Engine Control Module harness connector.                      Disconnect the CAB harness connector.                      Measure the resistance of the CAN(+) circuit.                      Measure the resistance of the CAN(-) circuit.                      Is the resistance above 5.0 ohms for either circuit?</p> <p>Yes → Repair the CAN circuit(s) for an open                      Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 8</p>	All
8	<p>Turn the ignition off.                      Disconnect the CAB harness connector.                      Turn the ignition on.                      Using a 12-volt test light connected to ground, check the Fused Optional Equipment Relay Output circuit at the CAB harness connector.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>                      Does the test light illuminate brightly?</p> <p>Yes → Go To 9</p> <p>No → Repair the Fused Optional Equipment Relay Output circuit for an open.                      Perform ABS VERIFICATION TEST - VER 1.</p>	All

**CAN COMMUNICATION ERROR — Continued**

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the CAB harness connector. Using a 12-volt test light connected to ground, check both Fused B(+) circuits at the CAB harness connector. <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b> Does the test light illuminate brightly?  Yes → Go To 10  No → Repair the Fused B(+) circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
10	Turn the ignition off. Disconnect the CAB harness connector. Using a 12-volt test light connected to 12-volts, check the CAB harness connector Ground circuits. <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b> Does the test light illuminate brightly?  Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Repair the Ground circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
11	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Look for broken, bent, pushed out, or corroded terminals. Were any problems found?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Test Complete.	All

**Symptom:**

**DRIVE TEST COMPLETED SUCCESSFULLY**

**POSSIBLE CAUSES**

SYSTEM ROAD TEST COMPLETED SUCCESSFULLY

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: This is an informational DTC indicating that a fault free road test procedure has been completed.</b></p> <p>Turn the ignition on.                      With the DRBIII®, clear DTCs.                      Turn the ignition off.                      Turn the ignition on.                      With the DRBIII®, read DTCs.                      Are any other DTCs set along with this DTC?</p> <p>Yes → Refer to the Symptom List and perform the diagnostic procedure for any DTCs that are present.</p> <p>No → Test Complete.</p>	All



**Symptom:**  
**DRIVE TEST ERROR**

**POSSIBLE CAUSES**

INTERMITTENT DRIVE TEST ERROR DTC  
 STEERING COMPONENT INSPECTION  
 LATERAL ACCELERATION SENSOR CIRCUIT SHORT TO VOLTAGE  
 LATERAL ACCELERATION SENSOR CIRCUIT SHORT TO GROUND  
 LATERAL ACCELERATION SENSOR CIRCUIT OPEN  
 LATERAL ACCELERATION SENSOR  
 ANTI-LOCK BRAKE CONTROLLER

TEST	ACTION	APPLICABILITY
1	<p>Turn the ignition off.            Turn the ignition on.            With the DRBIII®, read DTCs. Record DTC information.  <b>NOTE: If any other DTC is set along with this DTC, diagnose the other DTC(s) first.</b>  <b>NOTE: Electromagnetic (radio) interference can cause an intermittent system malfunction by interrupting communication between the sensor and the CAB.</b>            With the DRBIII®, erase DTCs.            With the DRBIII®, perform the road test procedure in accordance with the Service Information.            With the DRBIII®, read DTCs.  <b>NOTE: Failure to perform the road test procedure properly can cause this DTC to set.</b>  <b>NOTE: This DTC can only be cleared by a fault free road test.</b>            Does this DTC reset?</p> <p>Yes → Go To 2            No → Go To 7</p>	All
2	<p><b>NOTE: When the vehicle is in a turn, the ESP compares the Steering Angle Sensor value and the speed of the inner and outer wheels to determine if the values are plausible.</b>            Inspect the front end and steering components for damage or misalignment.            Inspect the Lateral Acceleration Sensor for correct mounting and installation.            Inspect the tires and wheels to make sure that they are the correct size. All tires must be the same size.            Were any problems found?</p> <p>Yes → Repair or replace components as necessary in accordance with the Service Information.            No → Go To 3</p>	All

# BRAKES (CAB)

## DRIVE TEST ERROR — Continued

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the Lateral Acceleration Sensor harness connector.            Disconnect the CAB harness connector.            Turn the ignition on.            Measure the voltage on all 4 of the Lateral Acceleration Sensor signal circuits.            Measure the voltage of the Lateral Acceleration Sensor ground circuit.            There should be no voltage present on any of the circuits.            Measure the resistance between the Lateral Acceleration supply circuit and all 4 of the Lateral Acceleration Sensor signal circuits.            The resistance between the circuits should be above 5.0 ohms.            Were there any problems found?</p> <p>Yes → Repair the shorted Lateral Acceleration Sensor circuit(s).            No → Go To 4</p>	All
4	<p>Turn the ignition off.            Disconnect the Lateral Acceleration Sensor harness connector.            Disconnect the CAB harness connector.            Measure the resistance between the Lateral Acceleration Sensor ground and the 4 Lateral Acceleration Sensor signal circuits.            Measure the resistance between ground and the 4 Lateral Acceleration Sensor signal circuits.            Measure the resistance between ground and the Lateral Acceleration Sensor supply circuit.            Is the resistance below 5.0 ohms for any of the circuits?</p> <p>Yes → Repair the Lateral Acceleration Sensor circuit(s) for a short to ground.            No → Go To 5</p>	All
5	<p>Turn the ignition off.            Disconnect the Lateral Acceleration Sensor harness connector.            Disconnect the CAB harness connector.            Measure the resistance of the Lateral Acceleration Sensor supply circuit.            Measure the resistance of the Lateral Acceleration Sensor ground circuit.            Measure the resistance of the 4 Lateral Acceleration Sensor signal circuits.            Is the resistance above 5.0 ohms for any of the circuits?</p> <p>Yes → Repair the Lateral Acceleration Sensor circuit(s) for an open            No → Go To 6</p>	All
6	<p>Turn the ignition off.            Disconnect the Lateral Acceleration Sensor harness connector.            Inspect the harness and connectors related to this circuit. If any problems are found, repair as necessary.            If no problems are found, replace the Lateral Acceleration Sensor in accordance with the Service Information.            With the DRBIII®, clear DTCs.            With the DRBIII®, perform the road test procedure.            With the DRBIII®, read DTCs.            Does this DTC reset?</p> <p>Yes → Replace the CAB in accordance with the Service Information.            No → Test Complete.</p>	All

**DRIVE TEST ERROR — Continued**

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
7	<p>The condition that set this DTC is not present at this time. Monitor the DRBIII® while wiggle testing the related harness and connectors. Look for any related parameters to change or for the DTC to reset. Inspect the related harness and connectors. Look for any chafed, pierced, pinched, or partially broken wires. Look for broken, bent, pushed out, or corroded terminals. Were any problems found?</p> <p>Yes → Repair as necessary. No → Test Complete.</p>	All

**Symptom:**  
**INCORRECT TONE WHEEL**

**When Monitored and Set Condition:**

**INCORRECT TONE WHEEL**

When Monitored: Ignition On - Continuously

Set Condition: When continuous ABS control is active for one minute on one or more wheels OR interference on one or more wheels OR deviation of two wheel speeds at either side of vehicle by 6 km/h (4 mph) or at the front axle by 10 km/h (7 mph). If at least one wheel is 5 km/h (3 mph) or less, a wheel speed deviation of adjoining wheels of 12 km/h (8 mph) is allowed.

**POSSIBLE CAUSES**

- INTERMITTENT INCORRECT TONE WHEEL DTC
- INCORRECT TIRES ON VEHICLE
- TIRE CIRCUMFERENCES NOT MATCHING
- WHEEL SPEED SENSOR CIRCUIT SHORT TO VOLTAGE
- INCORRECT TONE WHEEL
- WHEEL SPEED SENSOR CIRCUIT SHORT TO GROUND
- DAMAGED WHEEL BEARING
- WHEEL SPEED SENSOR CIRCUIT OPEN
- DAMAGED BRAKE LININGS/COMPONENTS
- WHEEL SPEED SENSOR CIRCUITS SHORTED TOGETHER
- WHEEL SPEED SENSOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. With the DRBIII®, erase DTCs. Turn the ignition off. Turn the ignition on. Road test the vehicle. During the road test, drive the vehicle above 100 km/h (62 mph) for at least 3 minutes and perform several stops and Antilock stops. Stop the vehicle. With the DRBIII®, read DTCs. Does the DRBIII® display INCORRECT TONE WHEEL?  Yes → Go To 2  No → Go To 13	All

**INCORRECT TONE WHEEL — Continued**

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Inspect the tire sizes on the vehicle. Is a smaller than production tire or spare tire being used?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All
3	Turn the ignition off. Measure all the tire circumferences. Do all the tire circumferences match?  Yes → Go To 4  No → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Inspect the tone wheel(s) for damage, missing teeth, cracks, or looseness. <b>NOTE: Refer to the service manual information, if necessary, for procedures or specifications.</b> Are one or more tone wheel(s) loose or damaged?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 5	All
5	Turn the ignition off. Inspect the wheel bearings for excessive runout or clearance. <b>NOTE: Refer to the service information, if necessary, for procedures or specifications.</b> Is the wheel bearing clearance within specifications?  Yes → Go To 6  No → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Visually inspect the brakes for locking up due to lining contamination or overheating. Inspect all brake components for any condition that would cause a variation in wheel speed. Is any component damaged?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 7	All
7	Turn the ignition on. With the DRBIII® in Sensors, monitor ALL the Wheel Speed Sensor signals while an assistant drives the vehicle. Slowly accelerate from a stop to 65 km/h (40 mph). <b>NOTE: Wheel Speed should not vary by more than 10% from wheel to wheel when driving in a straight line.</b> Do any of the Wheel Speed Sensor signals vary by greater than 10% while driving in a straight line?  Yes → Go To 8  No → Go To 13	All

# BRAKES (CAB)

## INCORRECT TONE WHEEL — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the CAB harness connector. Turn the ignition on. Measure the voltage of both affected Wheel Speed Sensor circuits in the CAB harness connector. Is there any voltage present?  Yes → Repair the affected Wheel Speed Sensor circuit for a short to voltage. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 9	All
9	Turn the ignition off. Disconnect the CAB harness connector. Measure the resistance between ground and both affected Wheel Speed Sensor circuits in the CAB harness connector. Is the resistance below 5.0 ohms?  Yes → Repair the affected Wheel Speed Sensor circuit for a short to ground. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 10	All
10	Turn the ignition off. Disconnect the CAB harness connector. Measure the resistance between the affected Wheel Speed Sensor circuits in the CAB harness connector. Is the resistance over 1,800 ohms?  Yes → Repair the affected Wheel Speed Sensor circuit for an open. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 11	All
11	Turn the ignition off. Disconnect the CAB harness connector. Measure the resistance between the affected Wheel Speed Sensor circuits in the CAB harness connector. Is the resistance under 1,100 ohms?  Yes → Repair the affected Wheel Speed Sensor circuits for a short to each other. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 12	All
12	Turn the ignition off. Disconnect the CAB harness connector. Measure the resistance between the affected Wheel Speed Sensor circuits in the CAB harness connector. Is the resistance between 1,100 and 1,800 ohms?  Yes → Go To 13  No → Replace the Wheel Speed Sensor in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All

**INCORRECT TONE WHEEL — Continued**

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
13	<p>The condition necessary to set this DTC is not present at this time. Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any problems found?</p> <p>Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	All

**Symptom List:**

**LATERAL ACCELERATION SENSOR CIRCUIT  
LATERAL ACCELERATION SENSOR IMPLAUSIBLE**

**Test Note: All symptoms listed above are diagnosed using the same tests.  
The title for the tests will be LATERAL ACCELERATION  
SENSOR CIRCUIT.**

**POSSIBLE CAUSES**

LATERAL ACCELERATION SENSOR CIRCUIT INTERMITTENT DTC  
STEERING COMPONENT INSPECTION  
LATERAL ACCELERATION SENSOR CIRCUIT SHORT TO VOLTAGE  
LATERAL ACCELERATION SENSOR CIRCUIT SHORT TO GROUND  
LATERAL ACCELERATION SENSOR CIRCUIT OPEN  
LATERAL ACCELERATION SENSOR  
ANTI-LOCK BRAKE CONTROLLER

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTCs. Record DTC information. <b>NOTE: If a system undervoltage or overvoltage DTC is set along with this DTC, diagnose the system voltage DTC first.</b> <b>NOTE: Electromagnetic (radio) interference can cause an intermittent system malfunction by interrupting communication between the sensor and the CAB.</b> With the DRBIII®, erase DTCs. Road test the vehicle and perform several braking maneuvers. With the DRBIII®, perform the road test procedure. With the DRBIII®, read DTCs. Does this DTC reset?  Yes → Go To 2  No → Go To 7	All
2	<b>NOTE: When the vehicle is in a turn, the ESP compares the Steering Angle Sensor value and the speed of the inner and outer wheels to determine if the values are plausible.</b> Inspect the front end and steering components for damage or misalignment. Inspect the Lateral Acceleration Sensor for correct mounting and installation. Inspect the tires and wheels to make sure that they are the correct size. All tires must be the same size. Were any problems found?  Yes → Repair or replace components as necessary in accordance with the Service Information.  No → Go To 3	All



**LATERAL ACCELERATION SENSOR CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the Lateral Acceleration Sensor harness connector.            Disconnect the CAB harness connector.            Turn the ignition on.            Measure the voltage on all 4 of the Lateral Acceleration Sensor signal circuits.            Measure the voltage of the Lateral Acceleration Sensor ground circuit.            There should be no voltage present on any of the circuits.            Measure the resistance between the Lateral Acceleration supply circuit and all 4 of the Lateral Acceleration Sensor signal circuits.            The resistance between the circuits should be above 5.0 ohms.            Were there any problems found?</p> <p>Yes → Repair the Lateral Acceleration Sensor circuit(s) for a short to voltage.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.            Disconnect the Lateral Acceleration Sensor harness connector.            Disconnect the CAB harness connector.            Measure the resistance between the Lateral Acceleration Sensor ground and the 4 Lateral Acceleration Sensor signal circuits.            Measure the resistance between ground and the 4 Lateral Acceleration Sensor signal circuits.            Measure the resistance between ground and the Lateral Acceleration Sensor supply circuit.            Is the resistance below 5.0 ohms for any of the circuits?</p> <p>Yes → Repair the Lateral Acceleration Sensor circuit(s) for a short to ground.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.            Disconnect the Lateral Acceleration Sensor harness connector.            Disconnect the CAB harness connector.            Measure the resistance of the Lateral Acceleration Sensor supply circuit.            Measure the resistance of the Lateral Acceleration Sensor ground circuit.            Measure the resistance of the 4 Lateral Acceleration Sensor signal circuits.            Is the resistance above 5.0 ohms for any of the circuits?</p> <p>Yes → Repair the Lateral Acceleration Sensor circuit(s) for an open</p> <p>No → Go To 6</p>	All
6	<p>Turn the ignition off.            Disconnect the Lateral Acceleration Sensor harness connector.            Inspect the harness and connectors related to this circuit. If any problems are found, repair as necessary.            If no problems are found, replace the Lateral Acceleration Sensor in accordance with the Service Information.            With the DRBIII®, clear DTCs.            With the DRBIII®, perform the road test procedure.            With the DRBIII®, read DTCs.            Does this DTC reset?</p> <p>Yes → Replace the CAB in accordance with the Service Information.</p> <p>No → Test Complete.</p>	All

**LATERAL ACCELERATION SENSOR CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
7	<p>The condition that set this DTC is not present at this time.                      Monitor the DRBIII® while wiggle testing the related harness and connectors. Look for any related parameters to change or for the DTC to reset.                      Inspect the related harness and connectors.                      Look for any chafed, pierced, pinched, or partially broken wires.                      Look for broken, bent, pushed out, or corroded terminals.                      Were any problems found?</p> <p style="padding-left: 40px;">Yes → Repair as necessary.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

**Symptom:****LATERAL ACCELERATION SENSOR INTERNAL FAULT****POSSIBLE CAUSES**

LATERAL ACCELERATION SENSOR CIRCUIT INTERMITTENT DTC  
LATERAL ACCELERATION SENSOR

TEST	ACTION	APPLICABILITY
1	<p>Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTCs. Record DTC information. <b>NOTE: If a system undervoltage or overvoltage DTC is set along with this DTC, diagnose the system voltage DTC first.</b> <b>NOTE: Electromagnetic (radio) interference can cause an intermittent system malfunction by interrupting communication between the sensor and the CAB.</b> With the DRBIII®, erase DTCs. Road test the vehicle and perform several steering and braking maneuvers. With the DRBIII®, perform the road test procedure. With the DRBIII®, read DTCs. Does this DTC reset?</p> <p style="padding-left: 40px;">Yes → Replace the Lateral Acceleration Sensor in accordance with the Service Information.</p> <p style="padding-left: 40px;">No → Go To 2</p>	All
2	<p>The condition that set this DTC is not present at this time. Monitor the DRBIII® while wiggle testing the related harness and connectors. Look for any related parameters to change or for the DTC to reset. Inspect the related harness and connectors. Look for any chafed, pierced, pinched, or partially broken wires. Look for broken, bent, pushed out, or corroded terminals. Were any problems found?</p> <p style="padding-left: 40px;">Yes → Repair as necessary.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

**Symptom List:**

**LEFT FRONT INLET SOLENOID  
LEFT FRONT OUTLET SOLENOID  
LEFT FRONT, RIGHT REAR INLET SOLENOID  
LEFT FRONT, RIGHT REAR OUTLET SOLENOID  
LEFT REAR INLET SOLENOID  
LEFT REAR OUTLET SOLENOID  
RIGHT FRONT INLET SOLENOID  
RIGHT FRONT OUTLET SOLENOID  
RIGHT FRONT, LEFT REAR INLET SOLENOID  
RIGHT FRONT, LEFT REAR OUTLET SOLENOID  
RIGHT REAR INLET SOLENOID  
RIGHT REAR OUTLET SOLENOID**

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**Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be LEFT FRONT INLET SOLENOID.**

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**When Monitored and Set Condition:**

**LEFT FRONT INLET SOLENOID**

When Monitored: Ignition On - Continuous

Set Condition: When the electrical feedback signal does not match the actuation signal for the solenoid OR during the solenoid and pump motor test when all solenoids are tested in series and a solenoid response signal is detected.

**POSSIBLE CAUSES**

INTERMITTENT SOLENOID DTC  
DAMAGED CAB/CAB HARNESS CONNECTOR  
FUSED OPTIONAL EQUIPMENT RELAY OUTPUT CIRCUIT OPEN  
FUSED B(+) CIRCUIT OPEN  
GROUND CIRCUIT OPEN  
ANTI-LOCK BRAKE CONTROLLER

## LEFT FRONT INLET SOLENOID — Continued

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If a system undervoltage or overvoltage DTC is set along with this DTC, diagnose the system voltage DTC first.</b></p> <p>Turn the ignition on.            With the DRBIII®, read DTCs.            With the DRBIII®, erase DTCs.            Turn the ignition off.            Turn the ignition on.            Start the engine.            Drive the vehicle over 15 km/h (10 mph) to test solenoid and pump circuits.            Stop the vehicle.            With the DRBIII®, read DTCs.            Does the DRBIII® display any SOLENOID DTCs?</p> <p>Yes → Go To 2            No → Go To 6</p>	All
2	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Inspect the CAB/CAB harness connector for damage.            Is there any broken, bent, pushed out, corroded or spread terminals?</p> <p>Yes → Repair as necessary.            Perform ABS VERIFICATION TEST - VER 1.            No → Go To 3</p>	All
3	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Turn the ignition on.            Using a 12-volt test light connected to ground, check the Fused Optional Equipment Relay Output circuit at the CAB harness connector.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>            Does the test light illuminate brightly?</p> <p>Yes → Go To 4            No → Repair the Fused Optional Equipment Relay Output circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
4	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Using a 12-volt test light connected to ground, check both Fused B(+) circuits at the CAB harness connector.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>            Does the test light illuminate brightly?</p> <p>Yes → Go To 5            No → Repair the Fused B(+) circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All

**LEFT FRONT INLET SOLENOID — Continued**

TEST	ACTION	APPLICABILITY
5	<p>Turn the ignition off.                      Disconnect the CAB harness connector.                      Using a 12-volt test light connected to 12-volts, check the CAB harness connector Ground circuits.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>                      Does the test light illuminate brightly?</p> <p>Yes → Replace the Controller Antilock Brake in accordance with the Service Information.                      Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Repair the Ground circuit for an open.                      Perform ABS VERIFICATION TEST - VER 1.</p>	All
6	<p>Turn the ignition off.                      Visually inspect the related wiring harness.                      Look for any chafed, pierced, pinched, or partially broken wires.                      Look for broken, bent, pushed out, or corroded terminals.                      Were any problems found?</p> <p>Yes → Repair as necessary.                      Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	All

**Symptom List:**

- LEFT FRONT WHEEL SPEED SENSOR CIRCUIT**
- LEFT REAR WHEEL SPEED SENSOR CIRCUIT**
- RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT**
- RIGHT REAR WHEEL SPEED SENSOR CIRCUIT**

**Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be LEFT FRONT WHEEL SPEED SENSOR CIRCUIT.**

**When Monitored and Set Condition:**

**LEFT FRONT WHEEL SPEED SENSOR CIRCUIT**

When Monitored: Ignition On - Continuously

Set Condition: When the value of the wheel speed sensor circuit is open or shorted.

**POSSIBLE CAUSES**

- INTERMITTENT WHEEL SPEED SENSOR CIRCUIT DTC
- DAMAGED CAB/CAB HARNESS CONNECTOR
- WHEEL SPEED SENSOR CIRCUIT SHORT TO VOLTAGE
- WHEEL SPEED SENSOR CIRCUIT SHORT TO GROUND
- WHEEL SPEED SENSOR CIRCUIT OPEN
- WHEEL SPEED SENSOR CIRCUITS SHORTED TOGETHER
- ANTI-LOCK BRAKE CONTROLLER

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If a system undervoltage or overvoltage DTC is set along with this DTC, diagnose the system voltage DTC first.</b></p> <p>Turn the ignition on.                      With the DRBIII®, read DTCs.                      With the DRBIII®, erase DTCs.                      Turn the ignition off.                      Turn the ignition on.                      With the DRBIII®, read DTCs.                      Does the DRBIII® display any WHEEL SPEED SENSOR CIRCUIT DTCs?</p> <p>Yes → Go To 2                      No → Go To 7</p>	All

# BRAKES (CAB)

## LEFT FRONT WHEEL SPEED SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Inspect the CAB/CAB harness connector for damage.            Is there any broken, bent, pushed out, corroded or spread terminals?</p> <p>Yes → Repair as necessary.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 3</p>	All
3	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Turn the ignition on.            Measure the voltage of both affected Wheel Speed Sensor circuits in the CAB harness connector.  <b>NOTE: If the wheel is rotating, voltage will be present.</b>            Is there any voltage present?</p> <p>Yes → Repair the affected Wheel Speed Sensor circuit for a short to voltage.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Measure the resistance between ground and both affected Wheel Speed Sensor circuits in the CAB harness connector.            Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the affected Wheel Speed Sensor circuit for a short to ground.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Measure the resistance between the affected Wheel Speed Sensor circuits in the CAB harness connector.            Is the resistance over 1,800 ohms?</p> <p>Yes → Repair the affected Wheel Speed Sensor circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 6</p>	All
6	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Measure the resistance between the affected Wheel Speed Sensor circuits in the CAB harness connector.            Is the resistance under 1,100 ohms?</p> <p>Yes → Repair the affected Wheel Speed Sensor circuits for a short to each other.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Replace the Controller Antilock Brake in accordance with the Service Information.            Perform ABS VERIFICATION TEST - VER 1.</p>	All



**LEFT FRONT WHEEL SPEED SENSOR CIRCUIT — Continued**

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
7	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Look for broken, bent, pushed out, or corroded terminals. Were any problems found?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Test Complete.	All

**Symptom List:**

**LEFT FRONT WHEEL SPEED SENSOR SIGNAL  
 LEFT REAR WHEEL SPEED SENSOR SIGNAL  
 RIGHT FRONT WHEEL SPEED SENSOR SIGNAL  
 RIGHT REAR WHEEL SPEED SENSOR SIGNAL  
 WHEEL SPEED SENSOR SIGNAL ERROR**

**Test Note: All symptoms listed above are diagnosed using the same tests.  
 The title for the tests will be LEFT FRONT WHEEL SPEED  
 SENSOR SIGNAL.**

**When Monitored and Set Condition:**

**LEFT FRONT WHEEL SPEED SENSOR SIGNAL**

When Monitored: Ignition On - Continuously

Set Condition: When the value of the wheel speed sensor signal is missing at vehicle speeds over 40 km/h (25 mph) OR during a start-up test with vehicle speeds over 12km/h (8 mph) OR the vehicle is accelerated by 18 km/h (12 mph) after a wheel speed sensor signal has been lost.

**POSSIBLE CAUSES**

INTERMITTENT WHEEL SPEED SENSOR SIGNAL DTC  
 DAMAGED SENSOR/CAB HARNESS CONNECTOR  
 DAMAGED WHEEL SPEED SENSOR TONE WHEEL  
 EXCESSIVE WHEEL SPEED SENSOR AIR GAP  
 DAMAGED WHEEL BEARING  
 DAMAGED BRAKE LININGS/COMPONENTS  
 WHEEL SPEED SENSOR FAILURE  
 ANTI-LOCK BRAKE CONTROLLER

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Refer to the symptom list and repair any WHEEL SPEED SENSOR CIRCUIT DTCs before continuing.</b>                      Turn the ignition on.                      With the DRBIII® in Sensors, monitor ALL the Wheel Speed Sensor signals while an assistant drives the vehicle.                      Slowly accelerate from a stop to 65 km/h (40 mph).  <b>NOTE: Wheel Speed should not vary by more than 10% from wheel to wheel when driving in a straight line.</b>                      Do any of the Wheel Speed Sensor signals vary by greater than 10% while driving in a straight line?</p> <p>Yes → Go To 2                      No → Go To 8</p>	All

**LEFT FRONT WHEEL SPEED SENSOR SIGNAL — Continued**

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Inspect the CAB harness connector and affected Wheel Speed Sensor. Inspect for looseness. Inspect wiring harness. Inspect for metal chips on sensor. Is the Wheel Speed Sensor or CAB harness connector damaged?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All
3	Turn the ignition off. Inspect the affected Wheel Speed Sensor(s) tone wheel for damage, looseness, or missing. <b>NOTE: Refer to the appropriate Service information, if necessary, for procedures or specifications.</b> Is the affected tone wheel OK?  Yes → Go To 4  No → Replace the tone wheel in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Inspect the affected Wheel Speed Sensor air gap. <b>NOTE: Refer to the appropriate Service information, if necessary, for procedures or specifications.</b> Is the affected air gap OK?  Yes → Go To 5  No → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Inspect the affected Wheel Speed Sensor(s) wheel bearing. <b>NOTE: Refer to the appropriate Service information, if necessary, for procedures or specifications.</b> Is the affected wheel bearing clearance OK?  Yes → Go To 6  No → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Visually inspect the brakes for locking up due to lining contamination or overheating. Inspect all brake components for defects which would cause a speed difference. Were any problems found?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 7	All

**LEFT FRONT WHEEL SPEED SENSOR SIGNAL — Continued**

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
7	<p>Turn the ignition off.                      Disconnect the Anti-Lock Brake module harness connector.                      Connect a voltmeter to the Wheel Speed Sensor (+) and (-) circuits at the Antilock Brake module harness connector.                      Rotate the wheel at a speed of at least one revolution per second while monitoring the voltage.                      Is the AC voltage fluctuating above 120 mV?</p> <p>Yes → Replace the Controller Antilock Brake in accordance with the Service Information.                      Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Replace the affected Wheel Speed Sensor in accordance with the Service Information.                      Perform ABS VERIFICATION TEST - VER 1.</p>	All
8	<p>Turn the ignition off.                      Visually inspect the related wiring harness.                      Look for any chafed, pierced, pinched, or partially broken wires.                      Look for broken, bent, pushed out, or corroded terminals.                      Look for any wiring conditions that may cause electromagnetic interference with the Wheel Speed Sensor circuits.                      Inspect Wheel Speed sensors, Tone Wheels, Brake Rotors, Wheel Bearings, etc, for conditions that may cause speed variations from wheel to wheel.                      Were any problems found?</p> <p>Yes → Repair as necessary.                      Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	All

**Symptom:**  
**NO COMMUNICATION WITH BUS**

**When Monitored and Set Condition:**

**NO COMMUNICATION WITH BUS**

When Monitored: Ignition On - Continuously

Set Condition: When the CAB fails to receive all module messages.

**POSSIBLE CAUSES**

CAN CIRCUITS SHORTED TO VOLTAGE

MODULE SHORT TO VOLTAGE

CAN CIRCUITS SHORTED TO GROUND

MODULE SHORT TO GROUND

CAN CIRCUITS SHORTED TOGETHER

ENGINE CONTROL MODULE

SENTRY KEY REMOTE ENTRY MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the Instrument Cluster harness connectors. Turn the ignition on. Measure the voltage between CAN C Bus (+) circuit and ground. Measure the voltage between CAN C Bus (-) circuit and ground. Is the voltage above 3.0 volts on either circuit?  Yes → Go To 2  No → Go To 3	All

**NO COMMUNICATION WITH BUS — Continued**

TEST	ACTION	APPLICABILITY
2	<p>Turn the ignition off.                      Using a voltmeter, connect one end to the CAN circuit that previously measured above 3.0 volts, and the other end to ground.  <b>NOTE: Refer to the wiring diagrams in the service information to help determine which modules are connected to the CAN Bus.</b>  <b>NOTE: Wait one minute, after turning the ignition off, before disconnecting the module.</b>                      Disconnect a module that is connected to the CAN bus.                      Turn the ignition on.                      Monitor and note the voltmeter reading.                      Repeat this procedure until either the voltage reading drops below 3.0 volts or all modules that are connected to the CAN Bus are disconnected and the voltage reading remains above 3.0 volts. Then, proceed to the conclusion question.                      What is the outcome?</p> <ul style="list-style-type: none"> <li>&gt; 3.0 volts w/all modules disconnected                          Repair the CAN C Bus (+) circuit or the CAN C Bus (-) circuit for a short to voltage.                          Perform BODY VERIFICATION TEST - VER 1.</li> <li>&lt; 3.0 volts after disconnecting a module                          Replace the module that caused the voltage reading to drop after disconnecting it.                          Perform BODY VERIFICATION TEST - VER 1.</li> </ul>	All
3	<p>Turn the ignition off.                      Disconnect the Instrument Cluster harness connectors.                      Disconnect the negative battery cable.                      Measure the resistance between ground and the CAN C Bus (+) circuit.                      Measure the resistance between ground and the CAN C Bus (-) circuit.                      Is the resistance below 50.0 ohms on either circuit?</p> <ul style="list-style-type: none"> <li>Yes → Go To 4</li> <li>No → Go To 5</li> </ul>	All
4	<p>Turn the ignition off.                      Disconnect the negative battery cable.                      Using an ohmmeter, connect one end to the CAN Bus circuit that previously measured below 50.0 ohms and the other end to ground.  <b>NOTE: Refer to the wiring diagrams in the service information to help determine which modules are connected to the CAN Bus.</b>                      Disconnect a module that is connected to the CAN Bus.                      Monitor and note the ohmmeter reading.                      Repeat this procedure until either the resistance reading goes above 50.0 ohms or all modules that are connected to the CAN Bus are disconnected and the resistance reading remains below 50.0 ohms. Then, proceed to the conclusion question.                      What is the outcome?</p> <ul style="list-style-type: none"> <li>&lt; 50.0 ohms w/all modules disconnected                          Repair the CAN C Bus (+) circuit or the CAN C Bus (-) circuit for a short to ground.                          Perform BODY VERIFICATION TEST - VER 1.</li> <li>&gt;50.0 ohms after disconnecting a module                          Replace the module that caused the resistance reading to increase after disconnecting it.                          Perform BODY VERIFICATION TEST - VER 1.</li> </ul>	All

**NO COMMUNICATION WITH BUS — Continued**

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the negative battery cable. <b>NOTE: Refer to the wiring diagrams in the service information to help determine which modules are connected to the CAN Bus.</b> Disconnect all of the modules that are connected to the CAN Bus. Measure the resistance between the CAN C Bus (+) circuit and the CAN C Bus (-) circuit at any disconnected module's harness connector. Is the resistance below 10k ohms?  Yes → Repair the CAN C Bus (+) circuit for a short to the CAN C Bus (-) circuit. Perform BODY VERIFICATION TEST - VER 1.  No → Go To 6	All
6	Turn the ignition off. Reconnect the Engine Control Module harness connectors. While back probing, measure the resistance of the CAN C Bus (+) circuit and the CAN C Bus (-) circuit at the ECM harness connector. Is the resistance $120.0 \pm 2.0$ ohms?  Yes → Replace the Sentry Key Remote Entry Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.  No → Replace the Engine Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

**Symptom:**  
**NO COMMUNICATION WITH ECM**

**When Monitored and Set Condition:**

**NO COMMUNICATION WITH ECM**

When Monitored: Ignition On - Continuously

Set Condition: When the CAB fails to receive all messages from the ECM.

**POSSIBLE CAUSES**

NO COMMUNICATION WITH BUS  
 ENGINE CONTROL MODULE DTC(S) PRESENT  
 ENGINE CONTROL MODULE'S POWER/GROUND CIRCUIT(S) SHORTED OR OPEN  
 CAN C BUS (+)/CAN C BUS (-) CIRCUIT(S) OPEN TO ENGINE CONTROL MODULE  
 CAN C BUS (+)/CAN C BUS (-) CIRCUIT(S) OPEN TO CAB  
 ANTI-LOCK BRAKE CONTROLLER  
 ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read CAB DTCs. Does the DRBIII® display: NO COMMUNICATION WITH BUS?  Yes → Refer to the symptom list for the appropriate diagnostic procedure. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 2	All
2	Turn the ignition on. With the DRBIII®, read ECM DTCs. Does the DRBIII® display any DTCs?  Yes → Refer to Powertrain Diagnostic information for the related symptom(s). Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All
3	Turn the ignition on. With the DRBIII®, check the TCM, IC, and ATC module for the same or similar No Communication with Engine Control Module DTC. Does the DRBIII® display same or similar DTC in TCM, IC, & ATC module?  Yes → Go To 4  No → Go To 6	All



**NO COMMUNICATION WITH ECM — Continued**

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
4	Turn the ignition off. Disconnect the ECM harness connectors. Check all of the ECM's power circuits for a short or open condition. Check all of the ECM's ground circuits for an open condition. Were any problems found?  Yes → Repair the power/ground circuit(s) as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 5	All
5	Turn the ignition off. Disconnect the ECM harness connectors. Measure the resistance between the CAN C Bus (+) circuit and the CAN C Bus (-) circuit in the ECM harness connector. Is the resistance 57 to 63 ohms?  Yes → Replace the Engine Control Module in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Repair the CAN C Bus (+)/CAN C Bus (-) circuit(s) for an open. Perform ABS VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Disconnect the CAB harness connector. Measure the resistance between the CAN C Bus (+) circuit and the CAN C Bus (-) circuit in the CAB harness connector. Is the resistance 57 to 63 ohms?  Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Repair the CAN C Bus (+)/CAN C Bus (-) circuit(s) for an open. Perform ABS VERIFICATION TEST - VER 1.	All

## Symptom: NO COMMUNICATION WITH IC

### When Monitored and Set Condition:

#### NO COMMUNICATION WITH IC

When Monitored: Ignition On - Continuously

Set Condition: When the CAB fails to receive all messages from the IC.

### POSSIBLE CAUSES

NO COMMUNICATION WITH BUS DTC PRESENT  
 INSTRUMENT CLUSTER DTC(S) PRESENT  
 INSTRUMENT CLUSTER'S POWER/GROUND CIRCUIT(S) SHORTED OR OPEN  
 CAN C BUS (+)/CAN C BUS (-) CIRCUIT(S) OPEN TO INSTRUMENT CLUSTER  
 CAN C BUS (+)/CAN C BUS (-) CIRCUIT(S) OPEN TO CAB  
 INSTRUMENT CLUSTER  
 ANTI-LOCK BRAKE CONTROLLER

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read CAB DTCs. Does the DRBIII® display: NO COMMUNICATION WITH BUS?  Yes → Refer to the symptom list for the appropriate diagnostic procedure. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 2	All
2	Turn the ignition on. With the DRBIII®, read IC DTCs. Does the DRBIII® display any DTCs?  Yes → Refer to Instrument Cluster category for the related symptom(s). Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All
3	Turn the ignition on. With the DRBIII®, check the TCM and ATC module for the same or similar No Communication with IC DTC. Does the DRBIII® display same or similar DTC in TCM & ATC module?  Yes → Go To 4  No → Go To 6	All

**NO COMMUNICATION WITH IC — Continued**

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
4	Turn the ignition off. Disconnect the IC harness connectors. Check all of the IC's power circuits for a short or open condition. Check all of the IC's ground circuits for an open condition. Were any problems found?  Yes → Repair the power/ground circuit(s) as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 5	All
5	Turn the ignition off. Disconnect the IC harness connectors. Measure the resistance between the CAN C Bus (+) circuit and the CAN C Bus (-) circuit in the IC harness connector. Is the resistance 57 to 63 ohms?  Yes → Replace the Instrument Cluster in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Repair the CAN C Bus (+)/CAN C Bus (-) circuit(s) for an open. Perform ABS VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Disconnect the CAB harness connector. Measure the resistance between the CAN C Bus (+) circuit and the CAN C Bus (-) circuit in the CAB harness connector. Is the resistance 57 to 63 ohms?  Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Repair the CAN C Bus (+)/CAN C Bus (-) circuit(s) for an open. Perform ABS VERIFICATION TEST - VER 1.	All

**Symptom:**  
**PARAMETERIZATION ERROR**

POSSIBLE CAUSES
PARAMETERIZATION ERROR

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: DTC indicates the ABM has not been configured or that the info in the module does not agree with the info in the cluster. If the cluster has been recently replaced, refer to cluster reprogramming to ensure correct configuration before proceeding.</b></p> <p>Using the DRBIII<sup>®</sup>, view the vehicle parameters entered into this module and the Instrument Cluster. If possible, correct any false information by performing the configuration functions with the scan tool.</p> <p>If the information cannot be corrected using the DRBIII<sup>®</sup>, the module will need to be replaced.</p> <p>Were any problems found?</p> <p style="padding-left: 40px;">Yes → Repair as necessary.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

**Symptom:**  
**PUMP MOTOR**

**When Monitored and Set Condition:**

**PUMP MOTOR**

When Monitored: Ignition On - Continuously

Set Condition: When the pump motor voltage is not present after enabling the pump motor relay OR pump motor has voltage when the pump motor relay is disabled OR pump motor slow down test fails OR pump motor relay does not turn on completely.

**POSSIBLE CAUSES**

INTERMITTENT PUMP MOTOR DTC  
 DAMAGED CAB/CAB HARNESS CONNECTOR  
 FUSED OPTIONAL EQUIPMENT RELAY OUTPUT CIRCUIT OPEN  
 FUSED B(+) CIRCUIT OPEN  
 GROUND CIRCUIT OPEN  
 PUMP MOTOR

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If a system undervoltage or overvoltage DTC is set along with this DTC, diagnose the system voltage DTC first.</b></p> <p>Turn the ignition on.            With the DRBIII®, read DTCs.            With the DRBIII®, erase DTCs.            Turn the ignition off.            Turn the ignition on.            With the DRBIII®, read DTCs.            Does the DRBIII® display PUMP MOTOR?</p> <p>Yes → Go To 4            No → Go To 2</p>	All
2	<p>Turn the ignition off.            Turn the ignition on.            With the DRBIII®, actuate the Pump Motor.            Is the Pump Motor running?</p> <p>Yes → Go To 3            No → Go To 4</p>	All

## PUMP MOTOR — Continued

TEST	ACTION	APPLICABILITY
3	<p>The conditions necessary to set this DTC are not present at this time.            Monitor DRBIII® parameters while wiggle testing the related wiring harness and connectors.            Turn the ignition off.            Visually inspect the related wiring harness and connectors.            Look for any chafed, pierced, pinched, or partially broken wires.            Look for broken, bent, pushed out, or corroded terminals.            Were any problems found?</p> <p>Yes → Repair as necessary.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	All
4	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Inspect the CAB/CAB harness connector for damage.            Is there any broken, bent, pushed out, corroded or spread terminals?</p> <p>Yes → Repair as necessary.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Turn the ignition on.            Using a 12-volt test light connected to ground, check the Fused Optional Equipment Relay Output circuit at the CAB harness connector.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>            Does the test light illuminate brightly?</p> <p>Yes → Go To 6</p> <p>No → Repair the Fused Optional Equipment Relay Output circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
6	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Using a 12-volt test light connected to ground, check both Fused B(+) circuits at the CAB harness connector.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>            Does the test light illuminate brightly?</p> <p>Yes → Go To 7</p> <p>No → Repair the Fused B(+) circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All

**PUMP MOTOR — Continued**

TEST	ACTION	APPLICABILITY
7	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Using a 12-volt test light connected to 12-volts, check the CAB harness connector Ground circuits.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>            Does the test light illuminate brightly?</p> <p>Yes → Replace the Pump Motor in accordance with the Service Information.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Repair the Ground circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All

**Symptom:**  
**RELAY OUTPUT VOLTAGE**

**When Monitored and Set Condition:**

**RELAY OUTPUT VOLTAGE**

When Monitored: Ignition On - Continuously.

Set Condition: When the CAB supply voltage is under 9.4, under 8.8 during an ABS event or over 17.4 with vehicle speeds above 6 kph (4 mph).

**POSSIBLE CAUSES**

INTERMITTENT RELAY OUTPUT VOLTAGE DTC  
 BATTERY/CHARGING SYSTEM FAILURE  
 DAMAGED CAB/CAB HARNESS CONNECTOR  
 FUSED OPTIONAL EQUIPMENT RELAY OUTPUT CIRCUIT OPEN  
 FUSED B(+) CIRCUIT OPEN  
 GROUND CIRCUIT OPEN  
 ANTI-LOCK BRAKE CONTROLLER

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. With the DRBIII®, erase DTCs. Turn the ignition off. Turn the ignition on. Start the engine. Drive the vehicle above 6 km/h (4 mph) for at least 30 seconds. Stop the vehicle. With the DRBIII®, read DTCs. Does the DRBIII® display RELAY OUTPUT VOLTAGE?  Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Perform a battery and charging system test in accordance with the Service Information. <b>NOTE: Refer to symptom list for any problems related to the battery or charging system.</b> Were any problems found?  Yes → Repair any charging system or battery related symptom(s) in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All



**RELAY OUTPUT VOLTAGE — Continued**

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the CAB harness connector. Inspect the CAB/CAB harness connector for damage. Is there any broken, bent, pushed out, corroded or spread terminals?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 4	All
4	Turn the ignition off. Turn the ignition on. With the DRBIII® in Sensors, read the Relay Output voltage. Start the engine. With the DRBIII® in Sensors, read the Relay Output voltage. Select the Relay Output voltage that was displayed on the DRBIII®.  Voltage below 9.4 volts. Go To 5  Voltage above 17.4 volts. Go To 7  Voltage between 9.4 and 17.4 volts. Go To 8	All
5	Turn the ignition off. Disconnect the CAB harness connector. Start the engine. Allow the engine to idle. <b>WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.</b> Measure the voltage of the Fused Optional Equipment Relay Output circuit in the CAB harness connector. Raise the engine speed above 2,000 RPM's. Measure the voltage of the Fused Optional Equipment Relay Output circuit in the CAB harness connector. Is the voltage less than 9.4 volts?  Yes → Repair the Fused Optional Equipment Relay Output circuit for an open. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 6	All

# BRAKES (CAB)

## RELAY OUTPUT VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the CAB harness connector. Start the engine. Allow the engine to idle. <b>WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.</b> Measure the voltage of both Fused B(+) circuits in the CAB harness connector. Raise the engine speed above 2,000 RPM's. Measure the voltage of both Fused B(+) circuits in the CAB harness connector. Is the voltage below 9.4 volts?  Yes → Repair the Fused B(+) circuit for an open. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 7	All
7	Turn the ignition off. Disconnect the CAB harness connector. Measure the voltage between the Fused B(+) circuit and both Ground circuits in the CAB harness connector. Is the voltage above 9.4 volts?  Yes → Repair any charging system related DTCs before continuing. If no charging system or system voltage DTCs are present in any module, replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Repair the Ground circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
8	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Look for broken, bent, pushed out, or corroded terminals. Ensure the battery is fully charged. Inspect the vehicle for aftermarket accessories that may exceed the Generator System output. Were any problems found?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Test Complete.	All

**Symptom:**  
**SOLENOID RELAY**

**When Monitored and Set Condition:**

**SOLENOID RELAY**

When Monitored: Ignition On - Continuously.

Set Condition: When there is a voltage deviation from the expected result of a CAB internal self check.

**POSSIBLE CAUSES**

INTERMITTENT SOLENOID RELAY DTC  
 DAMAGED CAB/CAB HARNESS CONNECTOR  
 FUSED OPTIONAL EQUIPMENT RELAY OUTPUT CIRCUIT OPEN  
 FUSED B(+) CIRCUIT OPEN  
 GROUND CIRCUIT OPEN  
 ANTI-LOCK BRAKE CONTROLLER

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. With the DRBIII®, erase DTCs. Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTCs. Does the DRBIII® display SOLENOID RELAY?  Yes → Go To 2  No → Go To 6	All
2	Turn the ignition off. Disconnect the CAB harness connector. Inspect the CAB/CAB harness connector for damage. Is there any broken, bent, pushed out, corroded or spread terminals?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All

# BRAKES (CAB)

## SOLENOID RELAY — Continued

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Turn the ignition on.            Using a 12-volt test light connected to ground, check the Fused Optional Equipment Relay Output circuit at the CAB harness connector.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>            Does the test light illuminate brightly?</p> <p>Yes → Go To 4</p> <p>No → Repair the Fused Optional Equipment Relay Output circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
4	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Using a 12-volt test light connected to ground, check both Fused B(+) circuits at the CAB harness connector.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>            Does the test light illuminate brightly?</p> <p>Yes → Go To 5</p> <p>No → Repair the Fused B(+) circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
5	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Using a 12-volt test light connected to 12-volts, check the CAB harness connector Ground circuits.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>            Does the test light illuminate brightly?</p> <p>Yes → Replace the Controller Antilock Brake in accordance with the Service Information.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Repair the Ground circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
6	<p>Turn the ignition off.            Visually inspect the related wiring harness.            Look for any chafed, pierced, pinched, or partially broken wires.            Look for broken, bent, pushed out, or corroded terminals.            Were any problems found?</p> <p>Yes → Repair as necessary.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	All

**Symptom:****STEERING ANGLE SENSOR CALIBRATION ERROR****POSSIBLE CAUSES**

STEERING ANGLE SENSOR CALIBRATION ERROR

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: This is an informational DTC indicating that the Steering Angle Sensor has not been Calibrated.</b></p> <p>Turn the ignition on.            With the DRBIII®, clear DTCs.            With the DRBIII®, perform the Steering Angle Calibration under Miscellaneous functions.            Turn the ignition off.            Turn the ignition on.            Test drive the vehicle and perform the Road Test Function.            With the DRBIII read DTCs.            Does this DTC reset?</p> <p>Yes → Replace the Steering Angle Sensor in accordance with the Service Information.</p> <p>No → Test Complete.</p>	All

**Symptom:**

**STEERING ANGLE SENSOR GREATER THAN 720 DEGREES**

POSSIBLE CAUSES
STEERING ANGLE SENSOR INTERMITTENT DTC STEERING COMPONENT INSPECTION STEERING ANGLE SENSOR

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If a system undervoltage or overvoltage DTC is set along with this DTC, diagnose the system voltage DTC first.</b></p> <p><b>NOTE: Electromagnetic (radio) interference can cause an intermittent system malfunction by interrupting communication between the sensor and the CAB.</b></p> <p><b>NOTE: The Steering Angle Sensor is very sensitive to changes due to alignment problems. The sensor must be recalculated using the DRBIII® if alignment has been changed by more than 5 degrees.</b></p> <p>Turn the ignition on. With the DRBIII®, erase DTCs. Move the Steering Wheel from stop to stop several times. With the DRBIII®, read DTCs. Does this DTC reset?</p> <p style="padding-left: 40px;">Yes → Go To 2</p> <p style="padding-left: 40px;">No → Go To 3</p>	All
2	<p><b>NOTE: When the vehicle is in a turn, the ESP compares the Steering Angle Sensor value and the speed of the inner and outer wheels to determine if the values are plausible.</b></p> <p>Inspect the front end and steering components for damage or misalignment. Inspect the steering column and Steering Angle Sensor for correct mounting and installation. Inspect the tires and wheels to make sure that they are the correct size. All tires must be the same size. Were any problems found?</p> <p style="padding-left: 40px;">Yes → Repair or replace components as necessary in accordance with the Service Information.</p> <p style="padding-left: 40px;">No → Replace the Steering Angle Sensor in accordance with the Service Information.</p>	All

**STEERING ANGLE SENSOR GREATER THAN 720 DEGREES — Continued**

TEST	ACTION	APPLICABILITY
3	<p>The condition that set this DTC is not present at this time.</p> <p>Monitor the DRBIII® while wiggle testing the related harness and connectors. Look for any related parameters to change or for the DTC to reset.</p> <p>Inspect the related harness and connectors.</p> <p>Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Look for broken, bent, pushed out, or corroded terminals.</p> <p>Inspect the tires and wheels to make sure that they are the correct size. All tires must be the same size.</p> <p>Inspect the steering column and Steering Angle Sensor for correct mounting and installation.</p> <p>Inspect the front end and steering components for damage or misalignment.</p> <p>Were any problems found?</p> <p>Yes → Repair as necessary.</p> <p>No → Test Complete.</p>	All

**Symptom:**

**STEERING ANGLE SENSOR IMPLAUSIBLE CAN SIGNAL**

POSSIBLE CAUSES
STEERING ANGLE SENSOR INTERMITTENT DTC STEERING ANGLE SENSOR CAN CIRCUIT OPEN STEERING ANGLE SENSOR ANTI-LOCK BRAKE CONTROLLER

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If a system undervoltage or overvoltage DTC is set along with this DTC, diagnose the system voltage DTC first.</b></p> <p><b>NOTE: Electromagnetic (radio) interference can cause an intermittent system malfunction by interrupting communication between the sensor and the CAB.</b></p> <p><b>NOTE: The Steering Angle Sensor is very sensitive to changes due to alignment problems. The sensor must be recalculated using the DRBIII® if alignment has been changed by more than 5 degrees.</b></p> Turn the ignition on. With the DRBIII®, erase DTCs. Test drive the vehicle. Using the DRBIII®, perform the road test procedure. With the DRBIII®, read DTCs. <p><b>NOTE: If the ESP lamp remains illuminated after the test has completed, a fault code will be set indicating the cause of the failure.</b></p> Does this DTC reset? <p style="margin-left: 40px;">Yes → Go To 2</p> <p style="margin-left: 40px;">No → Go To 4</p>	All
2	Turn the ignition off. Disconnect the Steering Angle Sensor harness connector. Disconnect the CAB harness connector. Measure the resistance of the Steering Angle Sensor CAN(+) circuit. Measure the resistance of the Steering Angle Sensor CAN(-) circuit. Is the resistance above 5.0 ohms for either circuit? <p style="margin-left: 40px;">Yes → Repair the Steering Angle Sensor CAN circuit for an open.</p> <p style="margin-left: 40px;">No → Go To 3</p>	All



**STEERING ANGLE SENSOR IMPLAUSIBLE CAN SIGNAL — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the Steering Angle Sensor harness connector.            Inspect the harness and connectors related to this circuit. If any problems are found, repair as necessary.            If no problems are found, replace the Steering Angle Sensor in accordance with the Service Information.            Turn the ignition on.            With the DRBIII®, clear DTCs.            Using the DRBIII®, perform the road test procedure.            With the DRBIII®, read DTCs.            Does this DTC reset?</p> <p>Yes → Replace the CAB in accordance with the Service Information.            No → Test Complete.</p>	All
4	<p>The condition that set this DTC is not present at this time.            Monitor the DRBIII® while wiggle testing the related harness and connectors. Look for any related parameters to change or for the DTC to reset.            Inspect the related harness and connectors.            Look for any chafed, pierced, pinched, or partially broken wires.            Look for broken, bent, pushed out, or corroded terminals.            Were any problems found?</p> <p>Yes → Repair as necessary.            No → Test Complete.</p>	All

**Symptom:**

**STEERING ANGLE SENSOR IMPLAUSIBLE VALUE**

POSSIBLE CAUSES
STEERING ANGLE SENSOR INTERMITTENT DTC
STEERING COMPONENT INSPECTION
STEERING ANGLE SENSOR

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If a system undervoltage or overvoltage DTC is set along with this DTC, diagnose the system voltage DTC first.</b></p> <p><b>NOTE: Electromagnetic (radio) interference can cause an intermittent system malfunction by interrupting communication between the sensor and the CAB.</b></p> <p><b>NOTE: The Steering Angle Sensor is very sensitive to changes due to alignment problems. The sensor must be recalculated using the DRBIII® if alignment has been changed by more than 5 degrees.</b></p> <p>Turn the ignition on.            With the DRBIII®, erase DTCs.            With the DRBIII®, recalculate the Steering Angle Sensor.            Move the Steering Wheel from stop to stop several times.            With the DRBIII®, perform the road test procedure.            With the DRBIII®, read DTCs.            Does this DTC reset?</p> <p style="padding-left: 40px;">Yes → Go To 2</p> <p style="padding-left: 40px;">No → Go To 3</p>	All
2	<p><b>NOTE: When the vehicle is in a turn, the ESP compares the Steering Angle Sensor value and the speed of the inner and outer wheels to determine if the values are plausible.</b></p> <p>Inspect the front end and steering components for damage or misalignment.            Inspect the steering column and Steering Angle Sensor for correct mounting and installation.            Inspect the tires and wheels to make sure that they are the correct size. All tires must be the same size.            Were any problems found?</p> <p style="padding-left: 40px;">Yes → Repair or replace components as necessary in accordance with the Service Information.</p> <p style="padding-left: 40px;">No → Inspect the Steering Angle Sensor for proper installation. Inspect the wiring and connectors. Repair as necessary. If no other problems are found, replace the Steering Angle Sensor in accordance with the Service Information.</p>	All

**STEERING ANGLE SENSOR IMPLAUSIBLE VALUE — Continued**

TEST	ACTION	APPLICABILITY
3	<p>The condition that set this DTC is not present at this time.</p> <p>Monitor the DRBIII® while wiggle testing the related harness and connectors. Look for any related parameters to change or for the DTC to reset.</p> <p>Inspect the related harness and connectors.</p> <p>Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Look for broken, bent, pushed out, or corroded terminals.</p> <p>Inspect the tires and wheels to make sure that they are the correct size. All tires must be the same size.</p> <p>Inspect the steering column and Steering Angle Sensor for correct mounting and installation.</p> <p>Inspect the front end and steering components for damage or misalignment.</p> <p>Were any problems found?</p> <p>Yes → Repair as necessary.</p> <p>No → Test Complete.</p>	All

**Symptom:**

**STEERING ANGLE SENSOR IMPLAUSIBLE WHEEL SPEED**

POSSIBLE CAUSES
STEERING ANGLE SENSOR INTERMITTENT DTC STEERING COMPONENT INSPECTION STEERING ANGLE SENSOR

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If a system undervoltage or overvoltage DTC is set along with this DTC, diagnose the system voltage DTC first.</b></p> <p><b>NOTE: Electromagnetic (radio) interference can cause an intermittent system malfunction by interrupting communication between the sensor and the CAB.</b></p> <p><b>NOTE: The Steering Angle Sensor is very sensitive to changes due to alignment problems. The sensor must be recalculated using the DRBIII® if alignment has been changed by more than 5 degrees.</b></p> <p>Turn the ignition on. With the DRBIII®, erase DTCs. Test drive the vehicle. Using the DRBIII®, perform the road test procedure. With the DRBIII®, read DTCs. <b>NOTE: If the ESP lamp remains illuminated after the test has completed, a fault code will be set indicating the cause of the failure.</b> Does this DTC reset?</p> <p style="padding-left: 40px;">Yes → Go To 2</p> <p style="padding-left: 40px;">No → Go To 3</p>	All
2	<p><b>NOTE: When the vehicle is in a turn, the ESP compares the Steering Angle Sensor value and the speed of the inner and outer wheels to determine if the values are plausible.</b></p> <p>Inspect the front end and steering components for damage or misalignment. Inspect the steering column and Steering Angle Sensor for correct mounting and installation. Inspect the tires and wheels to make sure that they are the correct size. All tires must be the same size. Inspect the left and right Wheel Speed Sensors to make sure they are connected correctly, i.e. left harness connected to left sensor, etc. Were any problems found?</p> <p style="padding-left: 40px;">Yes → Repair or replace components as necessary in accordance with the Service Information.</p> <p style="padding-left: 40px;">No → Replace the Steering Angle Sensor in accordance with the Service Information.</p>	All

**STEERING ANGLE SENSOR IMPLAUSIBLE WHEEL SPEED — Continued**

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
3	<p>The condition that set this DTC is not present at this time. Monitor the DRBIII® while wiggle testing the related harness and connectors. Look for any related parameters to change or for the DTC to reset. Inspect the related harness and connectors. Look for any chafed, pierced, pinched, or partially broken wires. Look for broken, bent, pushed out, or corroded terminals. Were any problems found?</p> <p>Yes → Repair as necessary. No → Test Complete.</p>	All

**Symptom:**

**STEERING ANGLE SENSOR INTERNAL FAULT**

POSSIBLE CAUSES
STEERING ANGLE SENSOR INTERMITTENT DTC STEERING ANGLE SENSOR

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If a system undervoltage or overvoltage DTC is set along with this DTC, diagnose the system voltage DTC first.</b></p> <p><b>NOTE: Electromagnetic (radio) interference can cause an intermittent system malfunction by interrupting communication between the sensor and the CAB.</b></p> <p>Turn the ignition on. With the DRBIII®, erase DTCs. Move the Steering Wheel from stop to stop several times. With the DRBIII®, perform the road test procedure. With the DRBIII®, read DTCs.</p> <p><b>NOTE: The Steering Angle Sensor is very sensitive to changes due to alignment problems. The sensor must be recalculated using the DRBIII® if alignment has been changed by more than 5 degrees.</b></p> <p>Does this DTC reset?</p> <p style="padding-left: 40px;">Yes → Inspect the Steering Angle Sensor for proper installation. Inspect the wiring and connectors. Repair as necessary. If no other problems are found, replace the Steering Angle Sensor in accordance with the Service Information.</p> <p style="padding-left: 40px;">No → Go To 2</p>	All
2	<p>The condition that set this DTC is not present at this time.</p> <p>Monitor the DRBIII® while wiggle testing the related harness and connectors. Look for any related parameters to change or for the DTC to reset.</p> <p>Inspect the related harness and connectors.</p> <p>Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Look for broken, bent, pushed out, or corroded terminals.</p> <p>Inspect the tires and wheels to make sure that they are the correct size. All tires must be the same size.</p> <p>Inspect the steering column and Steering Angle Sensor for correct mounting and installation.</p> <p>Inspect the front end and steering components for damage or misalignment.</p> <p>Were any problems found?</p> <p style="padding-left: 40px;">Yes → Repair as necessary.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

**Symptom:**  
**SYSTEM OVERVOLTAGE**

POSSIBLE CAUSES
INTERMITTENT DTC DAMAGED CAB/CAB HARNESS CONNECTOR GROUND CIRCUIT OPEN ANTI-LOCK BRAKE CONTROLLER

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Repair any Powertrain charging system DTCs before continuing.</b></p> Turn the ignition on. With the DRBIII®, read DTCs. With the DRBIII®, erase DTCs. Turn the ignition off. Turn the ignition on. Start the engine. With the DRBIII®, read DTCs. Does this DTC reset?	All
	<p style="padding-left: 40px;">Yes → Go To 2</p> <p style="padding-left: 40px;">No → Go To 4</p>	
2	Turn the ignition off. Disconnect the CAB harness connector. Inspect the CAB/CAB harness connector for damage. Is there any broken, bent, pushed out, corroded or spread terminals?	All
	<p style="padding-left: 40px;">Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.</p> <p style="padding-left: 40px;">No → Go To 3</p>	
3	Turn the ignition off. Disconnect the CAB harness connector. Using a 12-volt test light connected to 12-volts, check the CAB harness connector Ground circuits. <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b> Does the test light illuminate brightly?	All
	<p style="padding-left: 40px;">Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.</p> <p style="padding-left: 40px;">No → Repair the Ground circuit for an open. Perform ABS VERIFICATION TEST - VER 1.</p>	

**SYSTEM OVERVOLTAGE — Continued**

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
4	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Look for broken, bent, pushed out, or corroded terminals. Were any problems found?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Test Complete.	All



**Symptom:**  
**SYSTEM UNDERVOLTAGE**

**POSSIBLE CAUSES**

INTERMITTENT DTC  
 DAMAGED CAB/CAB HARNESS CONNECTOR  
 FUSED OPTIONAL EQUIPMENT RELAY OUTPUT CIRCUIT HIGH RESISTANCE  
 FUSED B(+) CIRCUIT HIGH RESISTANCE  
 GROUND CIRCUIT HIGH RESISTANCE  
 ANTI-LOCK BRAKE CONTROLLER

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: An undercharged battery may cause this DTC to set. Repair any Powertrain charging system DTCs before continuing.</b></p> <p>Turn the ignition on.            With the DRBIII®, read DTCs.            With the DRBIII®, erase DTCs.            Turn the ignition off.            Turn the ignition on.            Start the engine.            With the DRBIII®, read DTCs.            Does this DTC reset?</p> <p>Yes → Go To 2            No → Go To 6</p>	All
2	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Inspect the CAB/CAB harness connector for damage.            Is there any broken, bent, pushed out, corroded or spread terminals?</p> <p>Yes → Repair as necessary.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 3</p>	All
3	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Turn the ignition on.            Using a 12-volt test light connected to ground, check the Fused Optional Equipment Relay Output circuit at the CAB harness connector.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>            Does the test light illuminate brightly?</p> <p>Yes → Go To 4            No → Repair the Fused Optional Equipment Relay Output circuit for high resistance.            Perform ABS VERIFICATION TEST - VER 1.</p>	All

**SYSTEM UNDERVOLTAGE — Continued**

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the CAB harness connector. Using a 12-volt test light connected to ground, check both Fused B(+) circuits at the CAB harness connector. <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b> Does the test light illuminate brightly?  Yes → Go To 5  No → Repair the Fused B(+) circuit for high resistance. Perform ABS VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Disconnect the CAB harness connector. Using a 12-volt test light connected to 12-volts, check the CAB harness connector Ground circuits. <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b> Does the test light illuminate brightly?  Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Repair the Ground circuit for high resistance. Perform ABS VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Look for broken, bent, pushed out, or corroded terminals. Were any problems found?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Test Complete.	All

**Verification Tests**

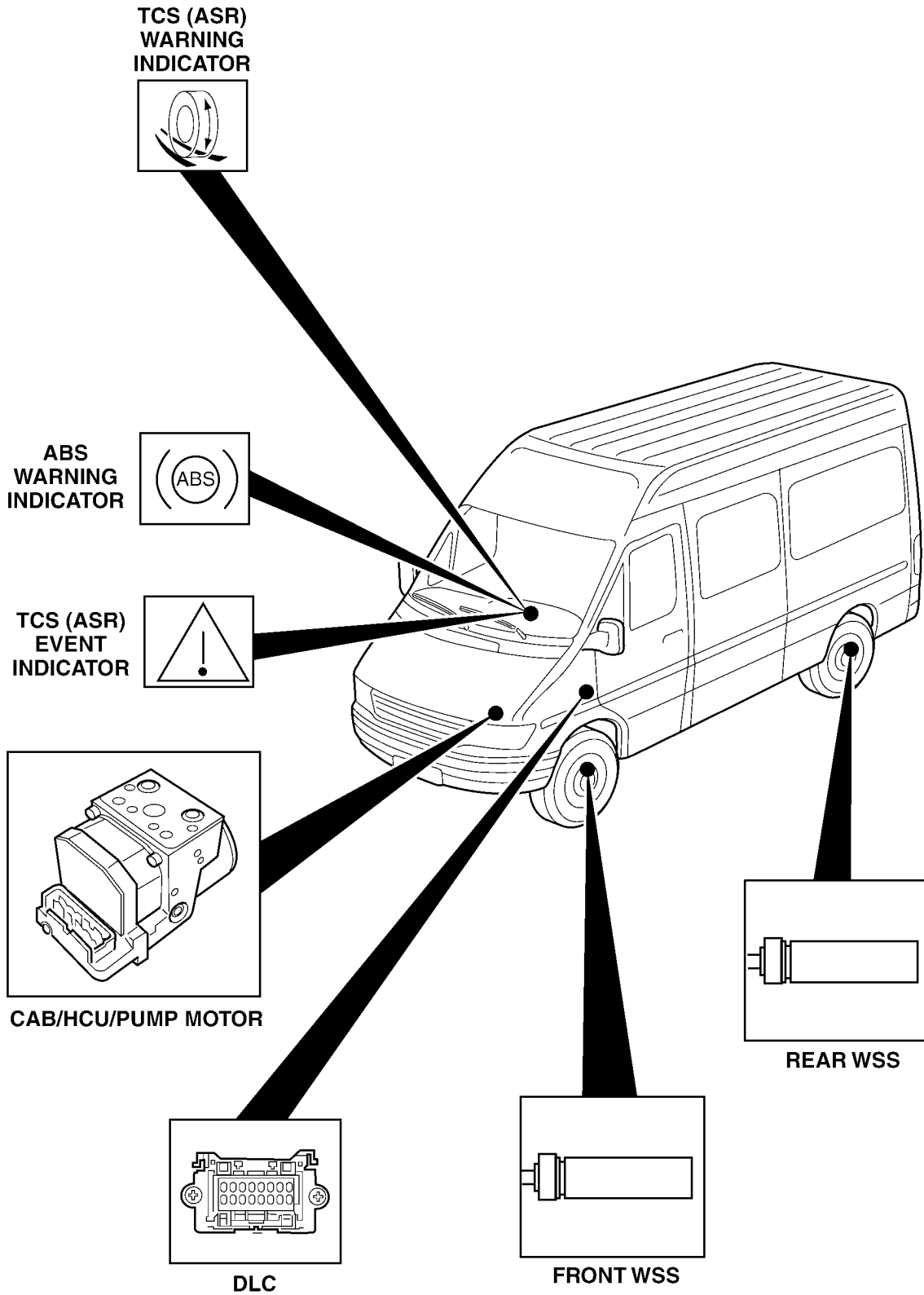
ABS VERIFICATION TEST - VER 1	APPLICABILITY
<p>1. Turn the ignition off.</p> <p>2. Connect all previously disconnected components and connectors.</p> <p>3. Ensure all accessories are turned off and the battery is fully charged.</p> <p>4. Ensure that the Ignition is on, and with the DRBIII, erase all Diagnostic Trouble Codes from ALL modules. Start the engine and allow it to run for 2 minutes and fully operate the system that was malfunctioning.</p> <p>5. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII, read DTC's from ALL modules.</p> <p>6. If any Diagnostic Trouble Codes are present, return to Symptom list and troubleshoot new or recurring symptom.</p> <p><b>7. NOTE: If the CAB/HCU was replaced, ensure the CAB has been initialized</b></p> <p><b>8. NOTE: If the SKREEM or ECM was replaced, refer to the service information for proper programming procedures.</b></p> <p><b>9. NOTE: For Sensor Circuit/Signal and Pump Motor faults, the CAB must sense all 4 wheels at 12 km/h (8 mph) before it will extinguish the ABS Indicator.</b></p> <p>10. If there are no DTC's present after turning ignition on, road test the vehicle for at least 5 minutes. Perform several antilock braking stops.</p> <p><b>11. CAUTION: Ensure braking capability is available before road testing.</b></p> <p>12. Again, with the DRBIII® read DTC's. If any DTC's are present, return to Symptom list.</p> <p>13. If there are no Diagnostic Trouble Codes (DTC's) present, and the customer's concern can no longer be duplicated, the repair is complete.</p> <p>Are any DTC's present or is the original concern still present?</p> <p>Yes → Repair is not complete, refer to appropriate symptom.</p> <p>No → Repair is complete.</p>	<p>All</p>

## Verification Tests — Continued

BODY VERIFICATION TEST - VER 1	APPLICABILITY
<p>1. Disconnect all jumper wires and reconnect all previously disconnected components and connectors.</p> <p>2. Ensure that all accessories are turned off and the battery is fully charged.</p> <p><b>3. NOTE: Refer to the service information for proper programming procedures if the ABM; ACM; ATC; CTM; ECM; IC; SKREEM; SLA; or SSM was replaced.</b></p> <p>4. If the SKREEM was replaced, program all RKE transmitters used with this vehicle.</p> <p><b>5. NOTE: Perform the next 8 steps of this procedure if either diagnosing the Automatic Temperature Control (ATC) system or if repairs were made to the ATC system. All of the following criteria must be met in order to successfully run the ATC Function Test.</b></p> <p>6. With DRBIII®, record and erase ATC DTCs.</p> <p>7. Place the shift lever in Park.</p> <p>8. Start the engine. Allow the engine to reach normal operating temperature.</p> <p>9. Set the blower to high speed.</p> <p>10. Press the Air Conditioning switch On.</p> <p>11. With the DRBIII®, verify that the ambient temperature is above 59°F (15°C), the refrigerant pressure is between 29 and 348 PSI (2 and 24 bar), the evaporator temperature is above 36.5°F (2.5°C), and the coolant temperature is above 158°F (70°C).</p> <p>12. With the DRBIII® in ATC, select System Tests and select ATC Function Test. When the ATC Function Test is complete, proceed to the next step of this procedure.</p> <p>13. With the DRBIII®, read active ATC DTCs. If any DTC is active or if the original condition is still present, proceed to the conclusion question and answer Yes.</p> <p>14. With the DRBIII®, record and erase all DTCs from ALL modules. Start and run the engine for 2 minutes. Operate all functions of the system that caused the original concern.</p> <p>15. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII®, read DTCs from ALL modules.</p> <p>Are any DTC's present or is the original condition still present?</p> <p>Yes → Repair is not complete, refer to the appropriate symptom.</p> <p>No → Repair is complete.</p>	<p>All</p>

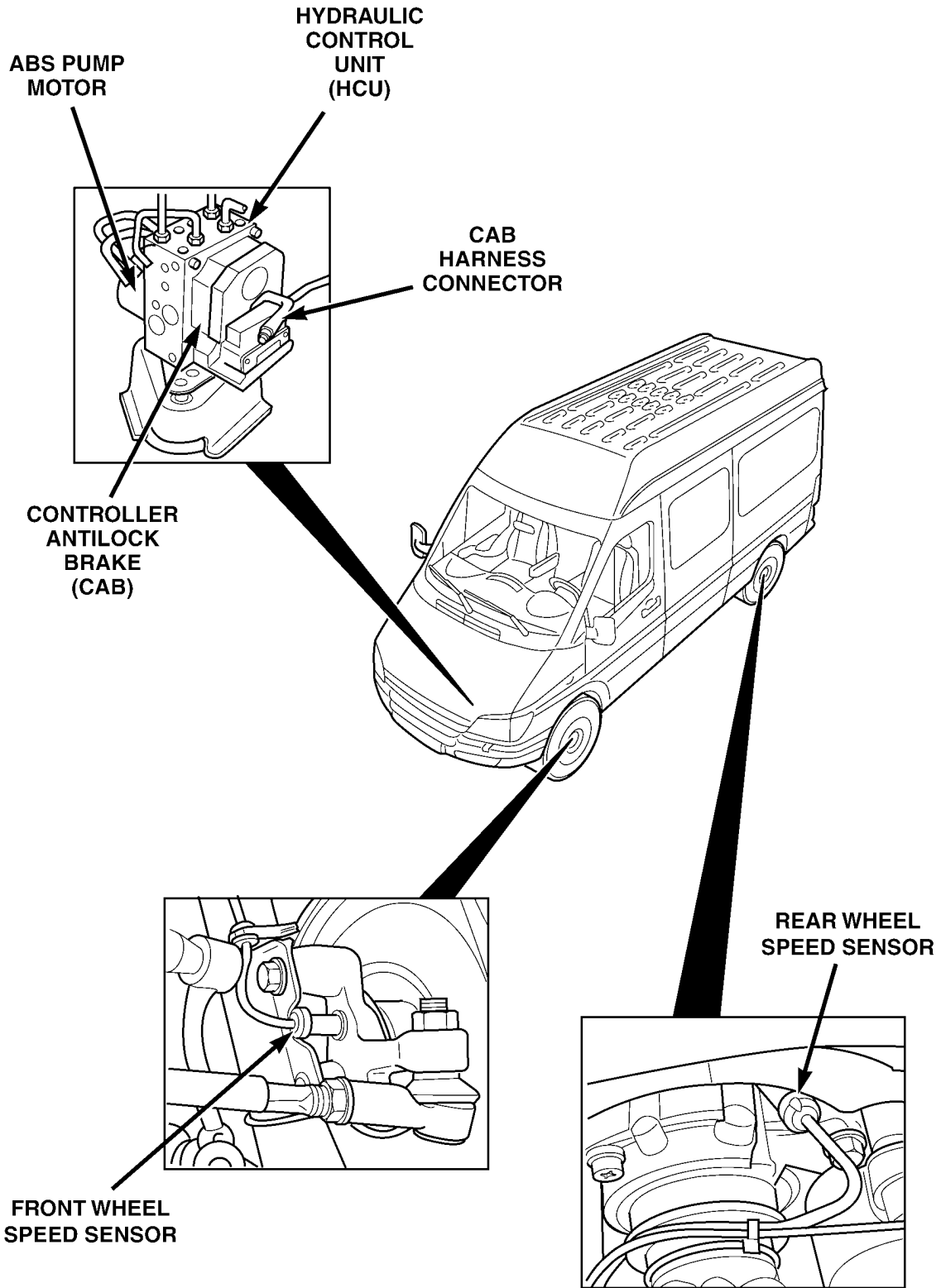
8.0 COMPONENT LOCATIONS

8.1 DLC - INDICATORS

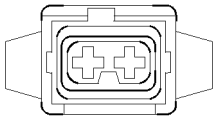


# COMPONENT LOCATIONS

## 8.2 CAB - WSS



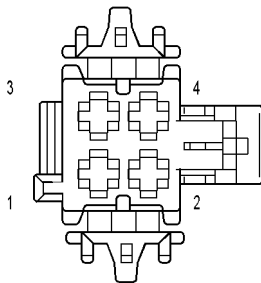
9.0 CONNECTOR PINOUTS



**BRAKE  
FLUID  
LEVEL  
SWITCH**

**BRAKE FLUID LEVEL SWITCH**

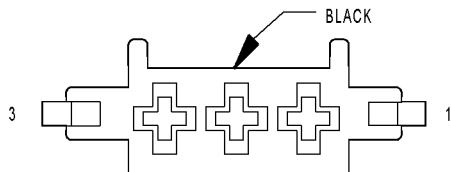
CAV	CIRCUIT	FUNCTION
1	20BR/YL	BRAKE FLUID LEVEL INDICATOR SIGNAL
2	16BR	GROUND



**BRAKE  
LAMP  
SWITCH C1  
(EXCEPT ESP)**

**BRAKE LAMP SWITCH C1 (EXCEPT ESP)**

CAV	CIRCUIT	FUNCTION
1	20WT	BRAKE SWITCH OUTPUT
2	16RD/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
3	20BK/BL/RD	BRAKE LAMP SWITCH
4	-	-



**BRAKE  
LAMP  
SWITCH  
C2  
(EXCEPT ESP)**

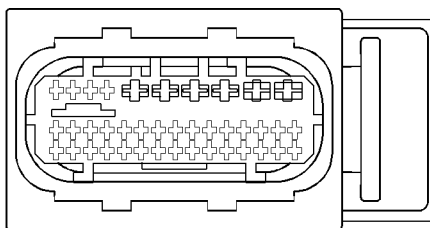
**BRAKE LAMP SWITCH C2 (EXCEPT ESP) - BLACK**

CAV	CIRCUIT	FUNCTION
1	16BK/BL/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
2	16BK/RD	BRAKE LAMP SWITCH OUTPUT
3	-	-

# CONNECTOR PINOUTS

CONNECTOR PINOUTS

10  
26  
42



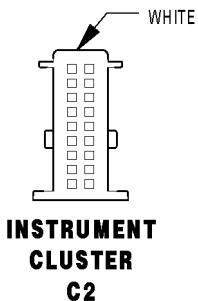
**CONTROLLER  
ANTILOCK  
BRAKE**

## CONTROLLER ANTILOCK BRAKE

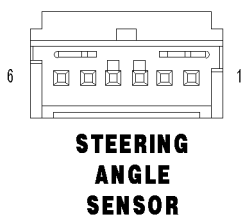
CAV	CIRCUIT	FUNCTION
1	12BR	GROUND
2	12RD	FUSED B(+)
3	-	-
4	-	-
5	14BR	GROUND
6	14RD	FUSED B(+)
7	-	-
8	20BK/DG	SENSOR SIGNAL
9	20YL/WT	SENSOR SIGNAL
10	20YL/RD	SENSOR SIGNAL
11	18BL/BK	K-ABS/SHIFTER ASSEMBLY
12	18BK	LEFT FRONT WHEEL SPEED SENSOR (+)
13	-	-
14	20WT	LEFT REAR WHEEL SPEED SENSOR (+)
15	18BR	RIGHT FRONT WHEEL SPEED SENSOR (-)
16	18BK	RIGHT FRONT WHEEL SPEED SENSOR (+)
17	-	-
18	-	-
19	-	-
20	20WT	BRAKE SWITCH OUTPUT
21	20BR	GROUND
22	-	-
23	18BK/RD	FUSED OPTIONAL EQUIPMENT RELAY OUTPUT
24	20DG/WT	CAN C BUS (+)
25	20BR	SENSOR GROUND
26	20WT/GY	BRAKE PRESSURE SENSOR SIGNAL
27	18BK/BL	TCS SWITCH (ASR) SENSE
28	18BR	LEFT FRONT WHEEL SPEED SENSOR (-)
29	20BR	LEFT REAR WHEEL SPEED SENSOR (-)
30	20BR	RIGHT REAR WHEEL SPEED SENSOR (-)
31	20YL	RIGHT REAR WHEEL SPEED SENSOR (+)
32	18BK/RD	BRAKE LAMP SWITCH OUTPUT
33	-	-
34	-	-
35	-	-
36	-	-
37	-	-
38	-	-
39	20RD/BL	POWER INPUT
40	20DG	CAN C BUS (-)
41	20DG/YL	SENSOR SIGNAL
42	20WT/RD	5 VOLT SUPPLY



## INSTRUMENT CLUSTER C2 - WHITE

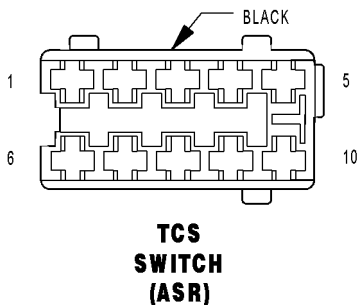


CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	20RD/YL	FUSED B(+)
4	20BR/WT	BRAKE WEAR SENSOR SIGNAL
5	-	-
6	18BR	GROUND
7	20GY/DG/RD	LAMP DRIVER
8	20BL/WT	FUSED HIGH BEAM SWITCH OUTPUT
9	20BL/RD/WT	VEHICLE SPEED SENSOR OUTPUT
10	20BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
11	20BL/BK	KEY-IN IGNITION SWITCH SIGNAL
12	-	-
13	20BK/WT	LEFT TURN SIGNAL
14	20BR/YL	BRAKE FLUID LEVEL INDICATOR SIGNAL
15	20BL	GENERATOR FIELD DRIVER
16	20YL	AIRBAG WARNING INDICATOR DRIVER
17	-	-
18	20BL/VT	D(+) RELAY NO. 1 CONTROL
18	20BL/VT	D(+) RELAY NO. 1 CONTROL



## STEERING ANGLE SENSOR

CAV	CIRCUIT	FUNCTION
1	20DG/WT	CAN C BUS (-)
2	-	-
3	20DG	CAN C BUS (+)
4	-	-
5	20BK/RD	FUSED OPTIONAL EQUIPMENT RELAY OUTPUT
6	20BR	GROUND



## TCS SWITCH (ASR) - BLACK

CAV	CIRCUIT	FUNCTION
1	16GY/DG/RD	LAMP DRIVER
2	-	-
3	18BK/BL	TCS SWITCH (ASR) SENSE
4	-	-
5	-	-
6	-	-
7	16BK/BL/DG	FUSED IGNITION SWITCH OUTPUT
8	-	-
9	-	-
10	16BR	GROUND

CONNECTOR NOT AVAILABLE

## WHEEL SPEED SENSOR-LEFT FRONT

CAV	CIRCUIT	FUNCTION
1	18BK	LEFT FRONT WHEEL SPEED SENSOR (+)
2	18BR	LEFT FRONT WHEEL SPEED SENSOR (-)

# CONNECTOR PINOUTS

CONNECTOR  
NOT  
AVAILABLE

## WHEEL SPEED SENSOR-LEFT REAR

CAV	CIRCUIT	FUNCTION
1	18WT	LEFT REAR WHEEL SPEED SENSOR (+)
2	18BR	LEFT REAR WHEEL SPEED SENSOR (-)

CONNECTOR  
NOT  
AVAILABLE

## WHEEL SPEED SENSOR-RIGHT FRONT

CAV	CIRCUIT	FUNCTION
1	18BK	RIGHT FRONT WHEEL SPEED SENSOR (+)
2	18BR	RIGHT FRONT WHEEL SPEED SENSOR (-)

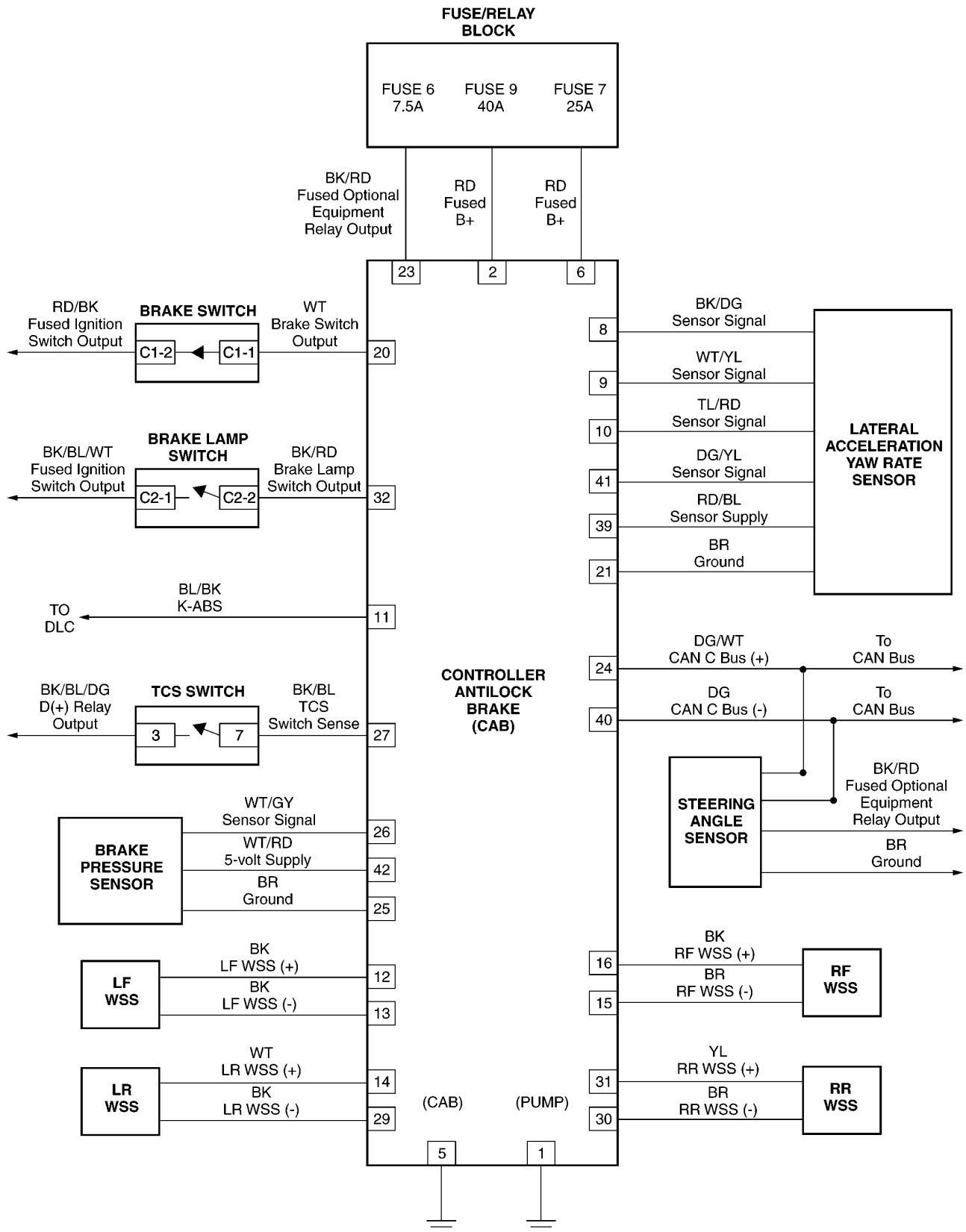
CONNECTOR  
NOT  
AVAILABLE

## WHEEL SPEED SENSOR-RIGHT REAR

CAV	CIRCUIT	FUNCTION
1	18BK	RIGHT REAR WHEEL SPEED SENSOR (+)
2	18BR	RIGHT REAR WHEEL SPEED SENSOR (-)

10.0 SCHEMATIC DIAGRAMS

10.1 BOSCH 5.7 ANTILOCK BRAKE SYSTEM – ABS



SCHEMATIC DIAGRAMS



## DIAGNOSTIC TEST PROCEDURES — TELL US!

DaimlerChrysler Corporation is constantly working to provide the technician the best diagnostic manuals possible. Your comments and recommendations regarding the diagnostic manuals and procedures are appreciated.

To best understand your suggestion, please complete the form giving us as much detail as possible.

---

**Model** \_\_\_\_\_ **Year** \_\_\_\_\_ **Body Type** \_\_\_\_\_ **Engine** \_\_\_\_\_

**Transmission** \_\_\_\_\_ **Vehicle Mileage** \_\_\_\_\_ **MDH** \_\_\_\_\_

**Diagnostic Procedure** \_\_\_\_\_ **Book No.** \_\_\_\_\_ **Page** \_\_\_\_\_

Comments/recommendations (if necessary, draw sketch)

Name \_\_\_\_\_

Submitted by: \_\_\_\_\_

Address \_\_\_\_\_

City/State/Zip \_\_\_\_\_

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All comments become property of DaimlerChrysler Corporation and may be used without compensation.

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