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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/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), 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.

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

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

The Bosch 5.7 system uses Electronic Brake Distribution (EBD). The HCU replaces the conventional proportioning valve as a means of balancing the front-to-rear braking effort under normal braking conditions. EBD makes the rear brakes more effective when the truck is lightly loaded, balancing front-to-rear lining wear and minimizing instances of rear wheel antilock action. As with a proportioning valve, EBD uses the rear axle speed sensor to determine how much, if any, to reduce the rear brake hydraulic pressure based on the deceleration of the rear wheels. EBD automatically adapts to variations in the vehicle loading and road surface, where as a proportioning valve is fixed.

The Bosch 5.7 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

GENERAL INFORMATION

from the CAB, the DRBIII® uses the K - ABS line located in the Data Link Connector (DLC).

3.2 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 CAN C Bus, if necessary. The TCS can be switched off with a 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.

3.3 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
- Brake Switch (BS)
- Brake Lamp Switch (BLS)
- TCS Switch (TCSS)
- K - ABS
- CAN C Bus
- Fuses, grounds, and wiring

3.3.1 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 meet 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

3.3.2 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 control 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

3.3.3 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.

3.3.4 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 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.

3.3.5 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.

3.4 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.

3.5 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.

3.5.1 DRBIII® DOES NOT POWER UP (BLANK SCREEN)

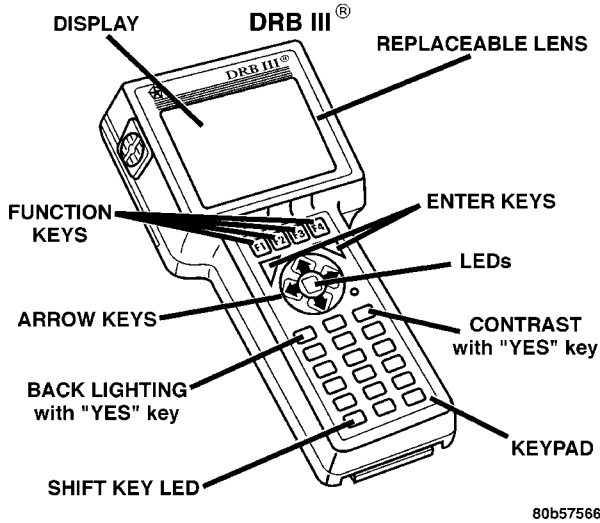
If the LED's do not light or no sound is emitted at start up, check for loose cable connections or a bad cable. Check the vehicle battery voltage (data link 16-way connector cavity 16). A minimum of 11 volts is required to adequately power the DRBIII®. Also check for a good ground at DLC.

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.

GENERAL INFORMATION

3.5.2 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.

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 ques-

tion 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.

GENERAL INFORMATION

5.0 REQUIRED TOOLS AND EQUIPMENT

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

6.0 GLOSSARY OF TERMS

ABS antilock brake system
AC alternating current
BCM body control module
BS brake switch
BLS brake lamp switch
CAB controller antilock brake
DC direct current
DLC data link connector

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

7.0

DIAGNOSTIC INFORMATION AND
PROCEDURES

BRAKES (CAB)

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 SWITCH CIRCUIT DTC PRESENT
BRAKE LAMP SWITCH STATUS
BRAKE SWITCH STATUS
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
BRAKE SWITCH OUTPUT CIRCUIT/BRAKE LAMP SWITCH OUTPUT CIRCUIT SHORT TO VOLTAGE
BRAKE SWITCH OUTPUT CIRCUIT/BRAKE LAMP SWITCH OUTPUT CIRCUIT SHORT TO GROUND
BRAKE SWITCH OUTPUT CIRCUIT/BRAKE LAMP SWITCH OUTPUT CIRCUIT OPEN
BRAKE SWITCH OUTPUT CIRCUIT/BRAKE LAMP SWITCH OUTPUT CIRCUIT SHORTED TOGETHER
BRAKE LAMP SWITCH FAILURE
BRAKE SWITCH FAILURE
CAB FAILURE

| TEST | ACTION | APPLICABILITY |
|------|---|---------------|
| 1 | Turn the ignition off. Turn the ignition on. With the DRBIII®, record and erase DTC's. Start the engine. Road test the vehicle and perform several braking maneuvers. With the DRBIII® in Inputs/Outputs, monitor the Brake Switch and Brake Lamp Switch state while driving. Stop the vehicle. With the DRBIII®, read DTCs. Does the DRBIII® display BRAKE SWITCH CIRCUIT? Yes → Go To 2 No → Go To 11 | All |

BRAKE SWITCH CIRCUIT — Continued

| TEST | ACTION | APPLICABILITY |
|------|---|---------------|
| 2 | Turn the ignition off. Turn the ignition on. With the DRBIII® in Inputs/Outputs, monitor the Brake Lamp Switch state. Depress the brake pedal. Does the DRBIII® display a change from OPEN to CLOSED? Yes → Go To 3 No → Go To 4 | All |
| 3 | Turn the ignition off. Turn the ignition on. With the DRBIII® in Inputs/Outputs, monitor the Brake Switch state. Depress the brake pedal. Does the DRBIII® display a change from CLOSED to OPEN? Yes → The condition is not present at this time. Monitor DRBIII® parameters while wiggling the related wiring harness. Visually inspect the related wiring harness and CAB harness connector terminals. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4 | All |
| 4 | Turn the ignition off. Disconnect the C1 Brake Switch and C2 Brake Lamp Switch harness connectors. Turn the ignition on. Measure the voltage of the Fused Ignition Switch Output circuit in the C1 and C2 connectors. Is battery voltage present? Yes → Go To 5 No → Repair the Fused Ignition Switch Output circuit for an open. Perform ABS VERIFICATION TEST - VER 1. | All |
| 5 | Turn the ignition off. Disconnect the CAB harness connector. Disconnect the C1 Brake Switch and C2 Brake Lamp Switch harness connectors. Turn the ignition on. Measure the voltage of the Brake Switch Output circuit and Brake Lamp Switch Output circuit in the C1 and C2 connectors. Is there any voltage present? Yes → Repair the affected circuit for a short to voltage. Perform ABS VERIFICATION TEST - VER 1. No → Go To 6 | All |
| 6 | Turn the ignition off. Disconnect the CAB harness connector. Disconnect the C1 Brake Switch and C2 Brake Lamp Switch harness connectors. Measure the resistance of the Brake Switch Output circuit and Brake Lamp Switch Output circuit in the C1 and C2 connectors to ground. 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 7 | All |

BRAKES (CAB)

BRAKE SWITCH CIRCUIT — Continued

| TEST | ACTION | APPLICABILITY |
|------|--|---------------|
| 7 | <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 of the Brake Switch Output circuit between the C1 connector and the CAB connector. Measure the resistance of the Brake Lamp Switch Output circuit between the C2 connector and the CAB connector. Is the resistance over 5.0 ohms?</p> <p>Yes → Repair the affected circuit 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. 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 and Brake Lamp Switch Output circuit for a short together. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 9</p> | All |
| 9 | <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 10</p> | All |
| 10 | <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 → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.</p> | All |

BRAKE SWITCH CIRCUIT — Continued

| TEST | ACTION | APPLICABILITY |
|-------------|---|----------------------|
| 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 |

BRAKES (CAB)

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
CAB FAILURE

| 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 |

CAB CHECK SUM — Continued

| TEST | ACTION | APPLICABILITY |
|------|--|---------------|
| 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. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. 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. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. 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. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. 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 |
| 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 |

BRAKES (CAB)

Symptom: CAB INTERNAL

When Monitored and Set Condition:

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
CAB FAILURE

| 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 INTERNAL? 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 |

CAB INTERNAL — Continued

| TEST | ACTION | APPLICABILITY |
|------|--|---------------|
| 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. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. 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. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. 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. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. 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 |
| 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 |

BRAKES (CAB)

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
CAB FAILURE

| 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 |

CAB OPTION — Continued

| TEST | ACTION | APPLICABILITY |
|------|--|---------------|
| 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. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. 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. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. 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. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. 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 |
| 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 |

BRAKES (CAB)

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
 INCORRECT TONE WHEEL
 DAMAGED WHEEL BEARING
 DAMAGED BRAKE LININGS/COMPONENTS

| 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 100 km/h (62 mph) for at least 3 minutes. Perform several stops and Antilock stops while on road test. Stop the vehicle. With the DRBIII®, read DTCs. Does the DRBIII® display INCORRECT TONE WHEEL? Yes → Go To 2 No → Go To 7 | All |
| 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 |

INCORRECT TONE WHEEL — Continued

| TEST | ACTION | APPLICABILITY |
|------|--|---------------|
| 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. NOTE: Refer to the service manual information, if necessary, for procedures or specifications. 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. NOTE: Refer to the service information, if necessary, for procedures or specifications. 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 defects which would cause a speed difference. Is any component damaged? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 7 | All |
| 7 | 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? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete. | 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

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

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.

LEFT FRONT OUTLET 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.

LEFT FRONT, RIGHT REAR 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.

LEFT FRONT, RIGHT REAR OUTLET 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.

LEFT FRONT INLET SOLENOID — Continued

LEFT REAR 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.

LEFT REAR OUTLET 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.

RIGHT 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.

RIGHT FRONT OUTLET 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.

RIGHT FRONT, LEFT REAR 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.

RIGHT FRONT, LEFT REAR OUTLET 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.

RIGHT REAR 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.

LEFT FRONT INLET SOLENOID — Continued

RIGHT REAR OUTLET 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
 CAB FAILURE

| 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 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 DTC? 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 |

LEFT FRONT INLET SOLENOID — Continued

| TEST | ACTION | APPLICABILITY |
|------|--|---------------|
| 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. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. 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. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. 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. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. 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 |
| 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 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.

LEFT REAR WHEEL SPEED SENSOR CIRCUIT

When Monitored: Ignition On - Continuously

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

RIGHT 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.

RIGHT REAR 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
WHEEL SPEED SENSOR FAILURE
CAB FAILURE

LEFT FRONT WHEEL SPEED SENSOR CIRCUIT — Continued

| 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 WHEEL SPEED SENSOR CIRCUIT? Yes → Go To 2 No → Go To 8 | 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 |
| 3 | 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 4 | All |
| 4 | 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 5 | All |
| 5 | 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 6 | All |

LEFT FRONT WHEEL SPEED SENSOR CIRCUIT — Continued

| TEST | ACTION | APPLICABILITY |
|------|--|---------------|
| 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 → Go To 7</p> | All |
| 7 | <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 between 1,100 and 1,800 ohms?</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 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. 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 SIGNAL
LEFT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SIGNAL

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.

LEFT REAR 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.

RIGHT 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.

RIGHT REAR 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.

LEFT FRONT WHEEL SPEED SENSOR SIGNAL — Continued

| POSSIBLE CAUSES | |
|---|--|
| WHEEL SPEED SENSOR CIRCUIT/SIGNAL DTC PRESENT | |
| WHEEL SPEED SENSOR SIGNAL FAILURE | |
| 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 | |
| CAB FAILURE | |

| 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 WHEEL SPEED SENSOR CIRCUIT and WHEEL SPEED SENSOR SIGNAL? Yes → Refer to the affected Wheel Speed Sensor CIRCUIT for the related symptom. Perform ABS VERIFICATION TEST - VER 1. No → Go To 2 | All |
| 2 | Turn the ignition on. With the DRBIII® in Sensors, monitor ALL the Wheel Speed Sensor signals while an assistant drives the vehicle. Slowly accelerate as straight as possible from a stop to 65 km/h (40 mph). Is the affected Wheel Speed Sensor signal showing 0 km/h (0 mph)? Yes → Go To 3 No → The condition is not present at this time. Monitor DRBIII® parameters while wiggling the related wiring harness. Visually inspect the related wiring harness and CAB harness connector terminals. Perform ABS VERIFICATION TEST - VER 1. | All |
| 3 | 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 4 | All |

LEFT FRONT WHEEL SPEED SENSOR SIGNAL — Continued

| TEST | ACTION | APPLICABILITY |
|------|--|---------------|
| 4 | Turn the ignition off. Inspect the affected Wheel Speed Sensor(s) tone wheel for damage, looseness, or missing. NOTE: Refer to the appropriate Service information, if necessary, for procedures or specifications. Is the affected tone wheel OK? Yes → Go To 5 No → Replace the tone wheel in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. | All |
| 5 | Turn the ignition off. Inspect the affected Wheel Speed Sensor air gap. NOTE: Refer to the appropriate Service information, if necessary, for procedures or specifications. Is the affected air gap OK? Yes → Go To 6 No → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. | All |
| 6 | Turn the ignition off. Inspect the affected Wheel Speed Sensor(s) wheel bearing. NOTE: Refer to the appropriate Service information, if necessary, for procedures or specifications. Is the affected wheel bearing clearance OK? Yes → Go To 7 No → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. | All |
| 7 | 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. Is any component damaged? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 8 | All |
| 8 | Turn the ignition off. Monitor the AC voltage/amperage between the two affected Wheel Speed Sensor circuits at the CAB harness connector. Rotate the affected wheel at the rate of at least one revolution per second. Is the AC voltage fluctuating above 120 mV? Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Replace the affected Wheel Speed Sensor in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. | All |

BRAKES (CAB)

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. NOTE: Refer to the wiring diagrams in the service information to help determine which modules are connected to the CAN Bus. NOTE: Wait one minute, after turning the ignition off, before disconnecting the module. 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"> > 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. < 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. | 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> <p>Yes → Go To 4 No → Go To 5</p> | 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. NOTE: Refer to the wiring diagrams in the service information to help determine which modules are connected to the CAN Bus. 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"> < 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. >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. | All |

NO COMMUNICATION WITH BUS — Continued

| TEST | ACTION | APPLICABILITY |
|------|---|---------------|
| 5 | <p>Turn the ignition off. Disconnect the negative battery cable. NOTE: Refer to the wiring diagrams in the service information to help determine which modules are connected to the CAN Bus. 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?</p> <p>Yes → Repair the CAN C Bus (+) circuit for a short to the CAN C Bus (-) circuit. Perform BODY VERIFICATION TEST - VER 1.</p> <p>No → Go To 6</p> | All |
| 6 | <p>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 ± 2.0 ohms?</p> <p>Yes → Replace the Sentry Key Remote Entry Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.</p> <p>No → Replace the Engine Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.</p> | 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

CAN C BUS CIRCUIT(S) SHORTED OR OPEN
 ENGINE CONTROL MODULE DTC(S) PRESENT
 ENGINE CONTROL MODULE'S POWER/GROUND CIRCUIT(S) SHORTED OR OPEN
 ENGINE CONTROL MODULE
 CAN C BUS (+)/CAN C BUS (-) CIRCUIT(S) OPEN TO ENGINE CONTROL MODULE
 CAB
 CAN C BUS (+)/CAN C BUS (-) CIRCUIT(S) OPEN TO CAB

| 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 Communication category for the related symptom. 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 |

BRAKES (CAB)

NO COMMUNICATION WITH ECM — Continued

| TEST | ACTION | APPLICABILITY |
|------|---|---------------|
| 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

CAN C BUS CIRCUIT(S) SHORTED OR OPEN
 INSTRUMENT CLUSTER DTC(S) PRESENT
 INSTRUMENT CLUSTER'S POWER/GROUND CIRCUIT(S) SHORTED OR OPEN
 INSTRUMENT CLUSTER
 CAN C BUS (+)/CAN C BUS (-) CIRCUIT(S) OPEN TO INSTRUMENT CLUSTER
 CAB
 CAN C BUS (+)/CAN C BUS (-) CIRCUIT(S) OPEN TO CAB

| 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 Communication category for the related symptom. 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 |

BRAKES (CAB)

NO COMMUNICATION WITH IC — Continued

| TEST | ACTION | APPLICABILITY |
|------|---|---------------|
| 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:
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
PUMP MOTOR FAILURE
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 | 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? Yes → Go To 2 No → Go To 7 | All |
| 2 | Turn the ignition off. Turn the ignition on. With the DRBIII®, actuate the Pump Motor. Is the Pump Motor running? Yes → The condition is not present at this time. Monitor DRBIII® parameters while wiggling the related wiring harness. Visually inspect the related wiring harness and CAB harness connector terminals. Perform ABS VERIFICATION TEST - VER 1. No → Go To 3 | All |

BRAKES (CAB)

PUMP MOTOR — 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. 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. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. Does the test light illuminate brightly? Yes → Go To 5 No → Repair the Fused Optional Equipment Relay Output 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 ground, check both Fused B(+) circuits at the CAB harness connector. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. Does the test light illuminate brightly? Yes → Go To 6 No → Repair the Fused B(+) circuit for an open. Perform ABS VERIFICATION TEST - VER 1. | All |
| 6 | 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. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. Does the test light illuminate brightly? Yes → Replace the Pump Motor 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 |

PUMP MOTOR — Continued

| TEST | ACTION | APPLICABILITY |
|-------------|---|----------------------|
| 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 |

BRAKES (CAB)

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 km/h (4 mph).

POSSIBLE CAUSES

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

| 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 |

RELAY OUTPUT VOLTAGE — Continued

| TEST | ACTION | APPLICABILITY |
|------|--|---------------|
| 2 | 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. Is the voltage under 9.4 or above 17.4? Yes → Go To 3 No → The condition is not present at this time. Monitor DRBIII® parameters while wiggling the related wiring harness. Visually inspect the related wiring harness and CAB harness connector terminals. Perform ABS VERIFICATION TEST - VER 1. | All |
| 3 | Turn the ignition off. Perform a battery and charging system test. Refer to SERVICE manual. NOTE: Refer to symptom list for problems related to battery and charging system. Is the battery/charging system OK? Yes → Go To 4 No → Refer to SERVICE information for the related symptom(s). Perform ABS VERIFICATION TEST - VER 1. | All |
| 4 | 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 5 | All |
| 5 | Turn the ignition off. Disconnect the CAB harness connector. Start the engine. Allow the engine to idle. 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. 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 between 9.4 and 17.4 for both readings? Yes → Go To 6 No → Repair the Fused Optional Equipment Relay Output circuit for an open. Refer to SERVICE information for the related Charging symptom(s). Perform ABS VERIFICATION TEST - VER 1. | All |

BRAKES (CAB)

RELAY OUTPUT VOLTAGE — Continued

| TEST | ACTION | APPLICABILITY |
|------|---|---------------|
| 6 | <p>Turn the ignition off. Disconnect the CAB harness connector. Start the engine. Allow the engine to idle. 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. Measure the voltage of both Fused B(+) circuits in the CAB harness connector. Raise the engine speed above 2,000 RPM's. Is the voltage between 9.4 and 17.4 for both readings?</p> <p>Yes → Go To 7</p> <p>No → Repair the Fused B(+) circuit for an open. Refer to SERVICE information for the related Charging symptom(s). Perform ABS VERIFICATION TEST - VER 1.</p> | All |
| 7 | <p>Turn the ignition off. Disconnect the CAB harness connector. Measure the voltage on both Ground circuits to the Fused B(+) circuit in the CAB harness connector. Is the voltage above 9.4 volts?</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 |
| 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. Ensure the battery is fully charged. Inspect the vehicle for aftermarket accessories that may exceed the Generator System output. Were any problems found?</p> <p>Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p> | 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
 CAB FAILURE

| 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. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. 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. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. 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. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. 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:

***NO RESPONSE FROM CONTROLLER ANTILOCK BRAKE**

| POSSIBLE CAUSES |
|--|
| CHECK POWERS AND GROUNDS TO THE CONTROLLER ANTILOCK BRAKE SHIFTER ASSEMBLY K-ABS, SHIFTER ASSEMBLY CIRCUIT SHORTED TO GROUND SHIFTER ASSEMBLY K-ABS, SHIFTER ASSEMBLY CIRCUIT SHORTED TO VOLTAGE K-ABS, SHIFTER ASSEMBLY CIRCUIT OPEN CONTROLLER ANTILOCK BRAKE |

| TEST | ACTION | APPLICABILITY |
|------|---|---------------|
| 1 | Turn the ignition off. Disconnect the Controller Antilock Brake harness connector. Check each power and ground circuit to the module. Were any problems found? Yes → Refer to the wiring diagrams located in the service information to help isolate an open or shorted condition. Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 2 | All |
| 2 | Turn the ignition off. Disconnect the CAB harness connector. Disconnect the DRBIII® from the DLC. Measure the resistance between ground and the K-ABS, Shifter Assembly circuit. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Go To 4 | All |
| 3 | Turn the ignition off. Disconnect the Shifter Assembly harness connector. Measure the resistance between ground and the K-ABS, Shifter Assembly circuit. Is the resistance below 5.0 ohms? Yes → Repair the K-ABS, Shifter Assembly circuit for a short to ground. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Shifter Assembly in accordance with the service information. Perform ABS VERIFICATION TEST - VER 1. | All |

***NO RESPONSE FROM CONTROLLER ANTILOCK BRAKE — Continued**

| TEST | ACTION | APPLICABILITY |
|------|---|---------------|
| 4 | Turn the ignition off. Disconnect the DRBIII® from the DLC. Disconnect the CAB harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the K-ABS, Shifter Assembly circuit. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. Does the test light illuminate brightly? Yes → Go To 5 No → Go To 6 | All |
| 5 | Turn the ignition off. Disconnect the Shifter Assembly harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the K-ABS, Shifter Assembly circuit. NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery. Does the test light illuminate brightly? Yes → Repair the K-ABS, Shifter Assembly circuit for a short to voltage. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Shifter Assembly in accordance with the service information. Perform ABS VERIFICATION TEST - VER 1. | All |
| 6 | Turn the ignition off. Disconnect the CAB harness connector. Disconnect the DRBIII® from the DLC. Measure the resistance of the K-ABS, Shifter Assembly circuit between the CAB connector and the DLC. Is the resistance below 5.0 ohms? Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Repair the K-ABS, Shifter Assembly circuit for an open. Perform ABS VERIFICATION TEST - VER 1. | All |

Verification Tests

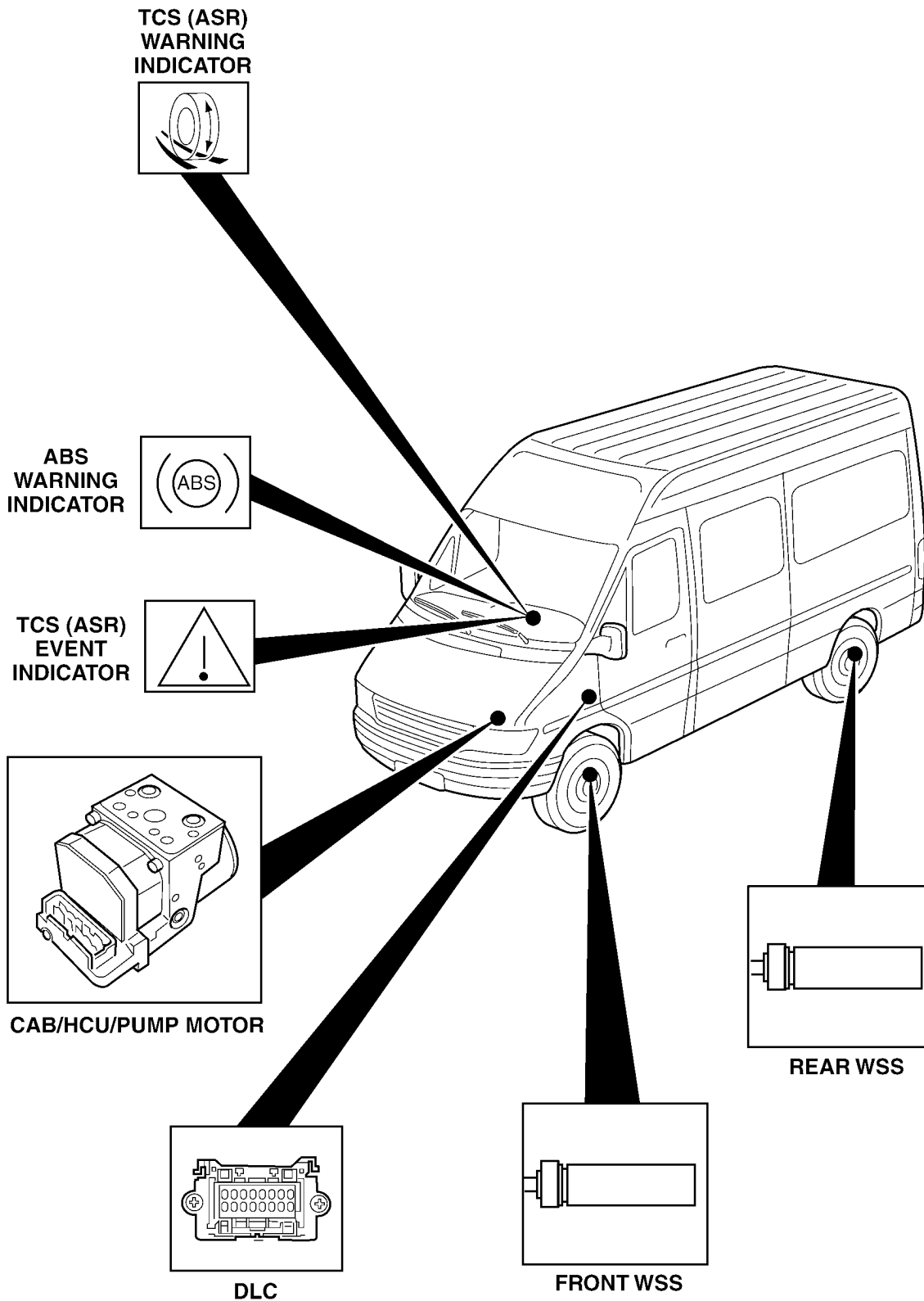
| ABS VERIFICATION TEST - VER 1 | APPLICABILITY |
|--|---------------|
| <p>1. Turn the ignition off.</p> <p>2. Connect all previously disconnected components and connectors.</p> <p>3. Ensure all accessories are turned off and the battery is fully charged.</p> <p>4. Ensure that the Ignition is on, and 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>7. NOTE: If the CAB/HCU was replaced, ensure the CAB has been initialized</p> <p>8. NOTE: If the SKREEM or ECM was replaced, refer to the service information for proper programming procedures.</p> <p>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.</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>11. CAUTION: Ensure braking capability is available before road testing.</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 style="padding-left: 40px;">Yes → Repair is not complete, refer to appropriate symptom.</p> <p style="padding-left: 40px;">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>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.</p> <p>4. If the SKREEM was replaced, program all RKE transmitters used with this vehicle.</p> <p>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.</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> |

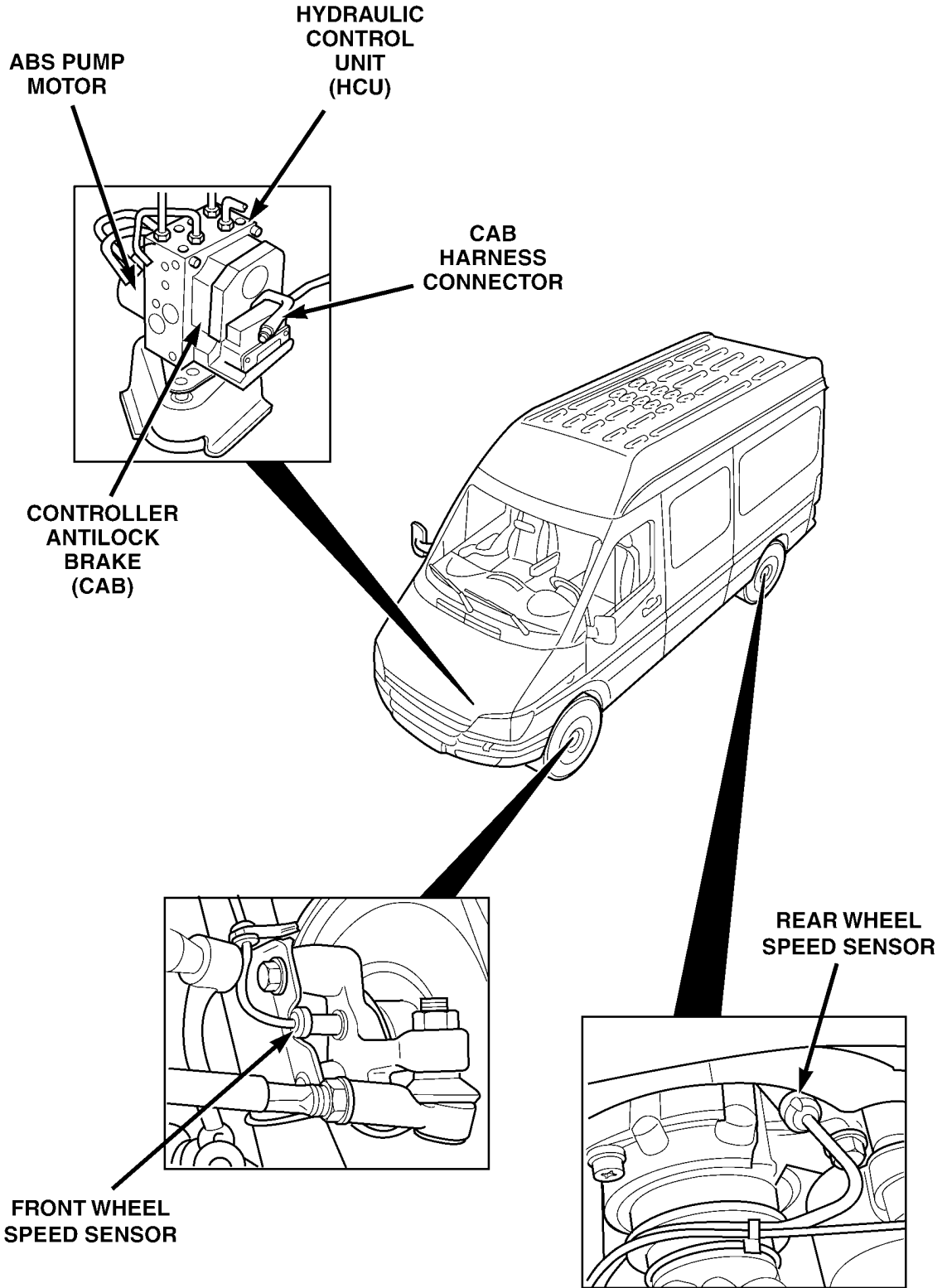
8.0 COMPONENT LOCATIONS

8.1 DLC - INDICATORS



COMPONENT LOCATIONS

8.2 CAB - WSS

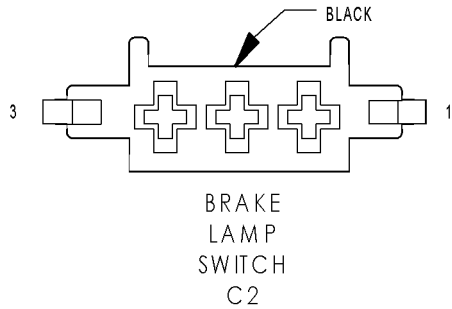


9.0 CONNECTOR PINOUTS

CONNECTOR
NOT
AVAILABLE

BRAKE LAMP SWITCH C1

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



BRAKE LAMP SWITCH C2 - BLACK

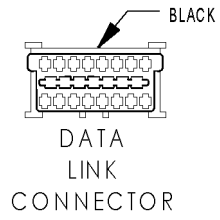
| CAV | CIRCUIT | FUNCTION |
|-----|------------|--|
| 1 | 20BK/BL/WT | FUSED IGNITION SWITCH OUTPUT (RUN-START) |
| 2 | 20BK/RD | BRAKE LAMP SWITCH OUTPUT |

CONNECTOR
NOT
AVAILABLE

CONTROLLER ANTILOCK BRAKE

| CAV | CIRCUIT | FUNCTION |
|-----|---------|---------------------------------------|
| 1 | 12BR | GROUND |
| 2 | 12RD | FUSED B(+) |
| 5 | 14BR | GROUND |
| 6 | 14RD | FUSED B(+) |
| 11 | 18BL/BK | K-ABS/SHIFTER ASSEMBLY |
| 12 | 18BK | LEFT FRONT WHEEL SPEED SENSOR (+) |
| 14 | 20WT | LEFT REAR WHEEL SPEED SENSOR (+) |
| 15 | 18BR | RIGHT FRONT WHEEL SPEED SENSOR(-) |
| 16 | 18BK | RIGHT FRONT WHEEL SPEED SENSOR (+) |
| 20 | 20WT | BRAKE SWITCH OUTPUT |
| 23 | 18BK/RD | FUSED OPTIONAL EQUIPMENT RELAY OUTPUT |
| 24 | 20DG/WT | CAN C BUS (+) |
| 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 |
| 40 | 20DG | CAN C BUS (-) |

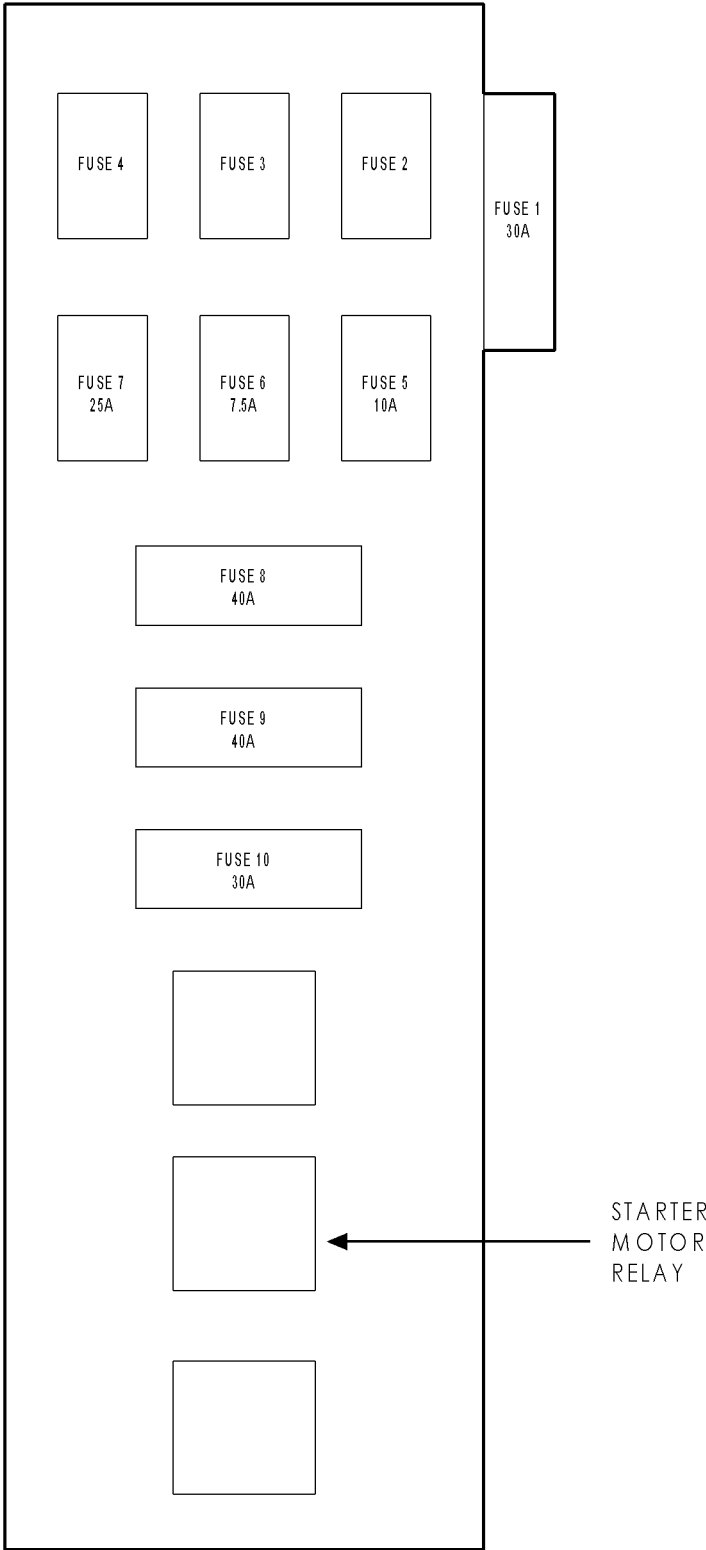
CONNECTOR PINOUTS



DATA LINK CONNECTOR - BLACK

| CAV | CIRCUIT | FUNCTION |
|-----|------------|--|
| 1 | 20WT/DG | K-SKREEM |
| 3 | 20DG/GY | ENGINE RPM |
| 4 | 20BR | GROUND |
| 5 | 20BR | GROUND |
| 7 | 18BL/YL | K-ECM |
| 8 | 20BK/BL/DG | FUSED IGNITION SWITCH OUTPUT (RUN-START) |
| 9 | 20BL/BK | K-ABS/SHIFTER ASSEMBLY |
| 11 | 20BL | K-TCM |
| 12 | 20GY/DG/RD | K-CTM/SSM |
| 13 | 20BK/RD | K-ACM |
| 15 | 20WT/GY | K-IC/ATC/HBM/CHM |
| 16 | 20RD/YL | FUSED B(+) |

FUSE/ RELAY BLOCK



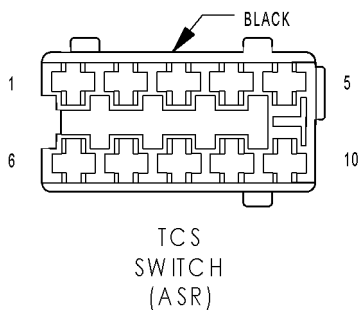
CONNECTOR
PINOUTS

NOTE: THE FUSE AND RELAY LOCATIONS SHOWN HERE
MAY VARY FROM VEHICLE TO VEHICLE.

CONNECTOR PINOUTS

FUSES (FUSE/RELAY BLOCK)

| FUSE NO. | AMPS | FUSED CIRCUIT | FUNCTION |
|----------|------|---------------|---------------------------------|
| 1 | 30A | 14BL/YL | FUSED B(+) |
| 5 | 10A | 16RD/YL | FUSED B(+) |
| 6 | 7.5A | 18BK/RD | OPTIONAL EQUIPMENT RELAY OUTPUT |
| 7 | 25A | 14RD | FUSED B(+) |
| 8 | 40A | 12RD | FUSED B(+) |
| 9 | 40A | 12RD | FUSED B(+) |
| 10 | 30A | 12RD/GY | FUSED B(+) |



TCS SWITCH (ASR) - BLACK

| CAV | CIRCUIT | FUNCTION |
|-----|------------|------------------------|
| 1 | 16GY/DG/RD | LAMP DRIVER |
| 3 | 18BK/BL | TCS SWITCH (ASR) SENSE |
| 7 | 16BK/BL/DG | S201 COMMON CIRCUIT |
| 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
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

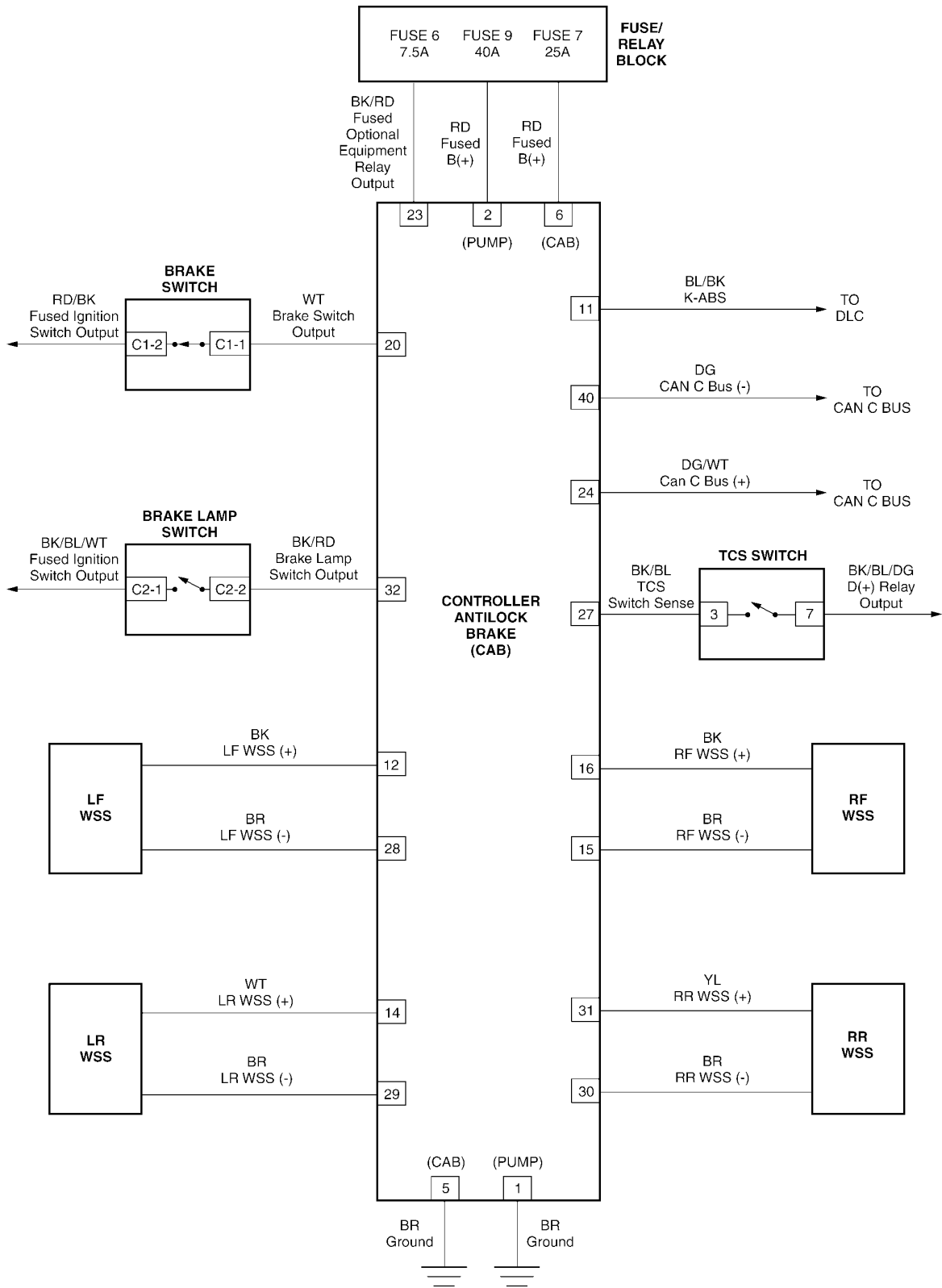
WHEEL SPEED SENSOR-RIGHT REAR

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

CONNECTOR
PINOUTS

10.0 SCHEMATIC DIAGRAMS

10.1 BOSCH 5.7 ANTILOCK BRAKE SYSTEM – ABS



8111864

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 _____

Business Phone # _____

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

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