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1.0 INTRODUCTION

The procedures contained in this manual include all the specifications, instructions, and graphics needed to diagnose Mark 20 Antilock Braking System (ABS) problems. The diagnostics in this manual are based on the failure condition or symptom being present at the time of diagnosis.

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

Follow the recommendations below when choosing your diagnostic path.

1. First make sure the DRBIII® is communicating with the CAB. 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 symptom.

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

An * placed before the symptom description indicated a customer complaint.

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

After using this book, if you have any comments or recommendations, please fill out the form at the back of the book and mail it back to us.

1.1 SYSTEM COVERAGE

This diagnostic manual covers the Teves Mark 20 Antilock Braking System (ABS) found on the 2001 Jeep Cherokee.

1.2 SIX-STEP TROUBLESHOOTING PROCEDURE

Diagnosis of the antilock brake system 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

Vehicles equipped with the Teves Mark 20 antilock brake system can be identified by the presence of the hydraulic control unit located with the controller antilock brake (CAB) under the hood near the air cleaner housing.

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

3.1 TEVES ABS SYSTEM DESCRIPTION

An electronic control module is used to monitor wheel speeds and to modulate (control) hydraulic pressure in each brake channel to prevent wheel lock-up during braking.

During a non-ABS stop, the system functions as a standard front/rear split configuration. The primary hydraulic system supplies brake fluid pressure to the front brakes, and the secondary hydraulic system supplies the rear brakes. A conventional combination/proportioning valve is used.

During an ABS stop, the system still uses the front/rear hydraulic split; however, the brakes system pressure is further split into three control channels. During ABS operation, the front wheels are controlled independently and are on two separate control channels. The rear wheels are controlled together through one control channel. By using separate control channels for the front wheels, more steering control is maintained during maximum braking.

During an antilock stop, "wheel lock-up" does not necessarily mean that the wheel has locked, it means only that the wheel is turning slower than the vehicle speed. This is called "wheel slip" and is indicated as a percentage. 0% slip means that the wheel is rolling free and 100% slip means that the wheel is locked. The antilock system maintains an average of approximately 20% wheel slip.

It is important to remember that the antilock brake system does not shorten the vehicle stopping distance under all driving conditions, but provides improved control of the vehicle while stopping. Vehicle stopping distance is still dependent on vehicle speed, weight, tires, road surface, and other factors.

3.1.1 PEDAL FEEL/VEHICLE CHARACTERISTICS

There are several pedal feel/vehicle characteristics that are considered normal for antilock braking that may require further explanation.

When stopping conditions activate the antilock brakes, the driver may feel some vibrations/ pulsations in the brake pedal and may hear the solenoid valves clicking and the pump motor running. The vibrations/pulsations are caused by the isolating, building and decaying of brake fluid pressure within the brake lines. The ABS prevents complete wheel lock-up, but some wheel slip is required for the best braking performance. This slip may result in some tire chirping, depending on the road surface. This chirping should not by interpreted as total wheel lock-up. Total wheel lock-up leaves black tire marks on dry pavement. Antilock braking may leave some light marks.

At the end of an ABS stop, the ABS system may not function below 5 Km/h (3 mph). There may be a slight brake pedal drop anytime the ABS is deactivated.

In case of braking on a bumpy surface, the ABS module may detect wheel locking tendencies due to wheel hop and cycle ABS. In that event the brake pedal my pulsate with a perceived loss of deceleration. ABS braking may also be activated at times while on dry pavement with sand, gravel, or other loose road debris.

It should be noted that the pulsating pedal feel characteristic will not illuminate the brake warning lamps or set a trouble code that is stored in the Controller Antilock Brake (CAB). When investigating a hard pedal feel, inspect the sensor and tone wheel teeth for chips/broken teeth, damaged sensor pole tips, excessive runout of the tone wheel, or excessive gap.

3.1.2 SYSTEM COMPONENTS

ANTILOCK BRAKE SYSTEM

- controller antilock brake (CAB)
- vacuum booster
- master cylinder (w/center valves)
- hydraulic control unit (HCU)
- valve block assembly: 6 valve solenoids (3 inlet valves, 3 outlet valves), 4 accumulators
- pump/motor assembly:
  1 motor
  2 pumps
- G (acceleration) switch
- 1 proportioning valve
- 4 wheel speed sensor/tone wheel assemblies
- ABS warning indicator
- fuses and wiring harness
- fluid reservoir (integral part of master cylinder assembly)

3.1.3 ABS AND BRAKE WARNING INDICATOR

The amber ABS warning indicator is located in the instrument cluster. It is used to inform the driver that the antilock function has been turned off due to a system malfunction. On some systems the warning indicator is controlled directly by the CAB. On an XJ, the CAB controls the indicator indirectly. The ABS light relay provides a ground path for the ABS warning indicator driver. The CAB grounds the ABS light relay control circuit to turn off the indicator.

The red brake warning indicator is located in the instrument cluster. It can be activated by application of the parking brake, a leak in the front or rear wheel brake hydraulic circuit, or by turning the ignition switch to the start position.

3.1.4 CONTROLLER ANTILOCK BRAKE (CAB)

The controller antilock brake (CAB) is a microprocessor−based device that monitors wheel speeds and controls the antilock functions.

The primary functions of the CAB are:

- monitor wheel speeds
- detect wheel locking tendencies
- control fluid pressure modulation to the brakes during antilock stop operation
- monitor the system for proper operation
- provide communication to the DRBIII® while in diagnostic mode
- control the ABS light relay
- store diagnostic information in non-volatile memory

The CAB continuously monitors the speed of each wheel. When a wheel locking tendency is detected, the CAB will command the appropriate valve in the HCU to modulate brake fluid pressure to that wheel. Brake pedal position is maintained during an antilock stop by being a closed system with the use of 3 accumulators. The CAB continues to control pressure in individual hydraulic circuits until a wheel locking tendency is no longer present. The CAB turns on the pump/motor during an antilock stop.

The antilock brake system is constantly monitored by the CAB for proper operation. If the CAB detects a system malfunction, it can disable the antilock system and turn on the ABS warning indicator. If the antilock function is disabled, the system will revert to standard base brake system operation.

The CAB inputs include the following:

- four wheel speed sensors
- brake switch
- ignition switch
- battery voltage
- diagnostic communication ISO/K
- G switch (acceleration switch)

The CAB outputs include the following:

- six valve/solenoid drivers
- pump/motor actuation
- ABS light relay control
- diagnostic communication

3.1.5 HYDRAULIC CONTROL UNIT

The hydraulic control unit (HCU) contains the valve block assembly, four accumulators, and the pump/motor assembly.

Valve Block Assembly: The valve block assembly contains 6 valves with three inlet valves and three outlet valves. The inlet valves are spring-loaded in the open position and the outlet valves are spring loaded in the closed position. During an antilock stop, these valves are cycled to maintain the proper slip ratio for each channel. If a wheel locks, the inlet valve is closed to prevent any further pressure increase. Then the outlet valve is opened to release the pressure to the accumulators until the wheel is no longer slipping. Once the wheel is no longer slipping, the outlet valve is closed and the inlet valve is opened to reapply pressure. If the wheel is decelerating within its predetermined limits (proper slip ratio), both valves will close to hold the pressure constant.

Pump/Motor Assembly: The pump/motor assembly provides the extra amount of fluid needed during antilock braking. The pump is supplied fluid that is released to the accumulators when the outlet valve is opened during an antilock stop. The pump is also used to drain the accumulator circuits after the antilock stop is complete. The pump is operated by an integral electric motor. This motor is controlled by the CAB. The CAB turns on the motor when an antilock stop is detected. The pump continues to run during the antilock stop and is turned off approximately 3-5 seconds after the stop is complete. The pump mechanism consists of two opposing pistons operated by an eccentric cam. One piston supplies the primary hydraulic circuit. The opposing piston supplies the secondary hydraulic circuit. In operation, one piston draws fluid from the accumulators. The opposing piston pumps fluid to the valve body solenoids. The CAB monitors the pump/motor operation.

Accumulators: The accumulators provide temporary fluid storage during an antilock stop and are drained by the pump/motor.

3.1.6 SENSORS

Wheel Speed Sensors and Tone Wheels: One wheel speed sensor (WSS) is located at each wheel and sends a low voltage AC signal to the controller antilock brake (CAB). This voltage is generated by magnetic induction when a toothed sensor ring (tone wheel) passes by a stationary magnetic sensor (wheel speed sensor). The CAB converts the AC signals into digital signals for each wheel.

The front wheel sensor is attached to a boss in the steering knuckle. The tone wheel is an integral part of the front axle shaft. The rear speed sensor is mounted in the caliper adapter plate (rear disc only) and the rear tone wheel is an integral part of the rear rotor hub. The front wheel speed sensor air gap is NOT adjustable. The correct front wheel speed sensor air gap is from 0.40mm to 1.3mm (0.016” to 0.051”). Preferred rear sensor air gap for drum brake systems is 1.1mm (0.043”). Acceptable air gap range is 0.92mm to 1.275mm (0.036” to 0.050”). For rear disc brake systems, the preferred rear sensor air gap is 1.2mm (0.047”). Acceptable air gap range is 0.95mm to 1.45mm (0.037” to 0.057”). All wheel speed sensors have a resistance between 900 and 1300 ohms.

Correct antilock system operation is dependent on correct wheel speed signals generated by the interaction of the tone wheels with the wheel speed sensors. The vehicle’s wheels and tires should all be the same size and type to generate accurate signals. In addition, the tires should be inflated to the recommended pressures for optimum system operation. Variations in wheel and tire size or significant variations in inflation pressure can produce inaccurate wheel speed signals; however, the system will continue to function when using the mini-spare. When driven over rough road surfaces, the rear wheel speed sensor signals may be erratic and cause a false trouble code (drum brakes only).

G (Acceleration) Switch: The CAB monitors the acceleration switch at all times. The switch assembly contains three mercury switches that monitor vehicle deceleration rates (G-force). Sudden, rapid changes in vehicle and wheel deceleration rate trigger the switch, sending a signal to the CAB. The switch assembly responds to three deceleration rates; two for forward braking and one for rearward braking.

3.2 DIAGNOSTIC TROUBLE CODES

The Teves Mark 20 Antilock Brake System (ABS) module may report any of the following diagnostic trouble codes:

- CAB Power Feed Circuit
- Controller Failure
- G Switch Not Processable
- Left Front Sensor Circuit Failure
- Left Front Sensor Signal Failure
- Left Rear Sensor Circuit Failure
- Left Rear Sensor Signal Failure
- Pump Motor Circuit Not Working Properly
- Right Front Sensor Circuit Failure
- Right Front Sensor Signal Failure
- Right Rear Sensor Circuit Failure
- Right Rear Sensor Signal Failure
- System Overvoltage
- System Undervoltage

Diagnostic trouble codes are retained in memory until erased using the DRBIII®, or automatically erased after 255 key cycles.

3.2.1 SYSTEM INITIALIZATION

System initialization starts when the key is turned to "run". At this point, the CAB performs a complete self-check of all electrical components in the antilock brake systems.

At around 12 miles per hour, the pump motor is briefly activated to test operation, and wheel speed sensor circuitry is checked. If for any reason the brake switch is activated when the vehicle reaches 12 mph, this check will be delayed until 25 mph. The driver may feel the test through brake pedal pulsations. This is a normal condition. Throughout the remainder of the drive cycle, ongoing tests are performed, and the CAB monitors ABS circuits for continuity.

If, during initialization or dynamic checks, the CAB detects a condition causing it to set a diagnostic code, it will remove the ground from the ABS light relay control circuit. The relay will deactivate and allow the ABS warning indicator driver to be grounded, which will illuminate the ABS warning indicator.

3.2.2 DIAGNOSTIC MODE

On a Mark 20 system to enter diagnostic mode, vehicle speed must be below 10 km/h (6 mph) and no ABS condition present. If vehicle speed is not below 10 km/h (6 mph), a "no response" message will be displayed by the DRBIII®. The following are characteristics of diagnostic mode:

- The amber ABS warning indicator will blink rapidly (about 1/2 second on and 1/2 second off). If a hard trouble code is present, such as a CAB Power Feed Circuit trouble code, the indictor will be illuminated without blinking until the diagnostic trouble code condition is corrected.
- Antilock operation is disabled.

3.2.3 INTERMITTENT DIAGNOSTIC TROUBLE CODES

If the malfunction is not present while performing a test procedure, the diagnostic procedures will not locate the problem. In this case, the code can only suggest an area to inspect. Check for the following:

- loose or corroded connections
- damaged components (sensors, tone wheels especially)
- damaged wiring
- excessive axle shaft runout
- brake system hydraulic leaks
- brake system problems, non-ABS related.

If no obvious problems are found, erase diagnostic trouble codes and, with the key on, wiggle the wire harness and connectors. Recheck for codes periodically as you work through the system. This procedure may uncover an intermittent or difficult to locate malfunction.

3.3 USING THE DRBIII®

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

3.4 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 MDS Hotline for information and assistance (1-800-825-8737). This is a sample of such an error message display:

```
over: 2.14
date: 26 Jul 93
file: key_itf.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.
```

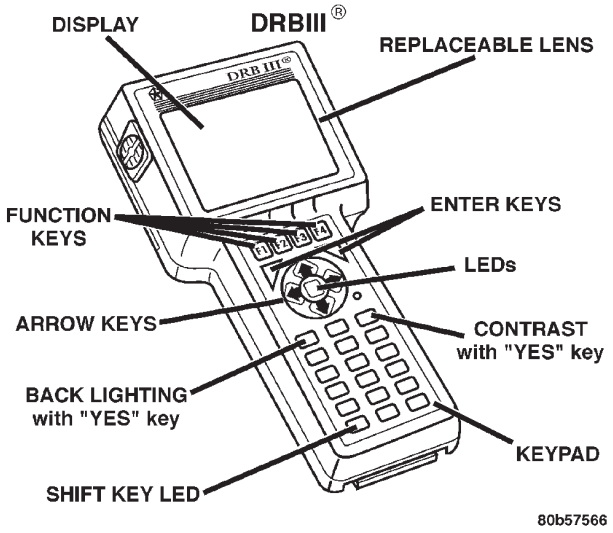
3.4.1 DRBIII® DOES NOT POWER UP (BLANK SCREEN)

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 the DLC.

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

3.4.2 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 TECHNICAN 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 four-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 speed proportional steering 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 the safety of individuals 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 or speed proportional steering system are intended to be serviced in assembly only. Attempting to remove or repair certain system 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 megohms
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 the load.
- Disconnect the live test lead before disconnecting the common test lead.
- 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.

WARNING: 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 ABS system for damaged components or disconnected connectors. The brake lamps must be operational, and if they are not, repair them prior to continuing.
2. Connect the DRBIII® to the data link connector located under the dash to the left of the steering column. If the DRBIII® does not power up, check the power and ground supplies to the connector.
3. Select "Antilock Brakes". Turn the ignition on. If the DRBIII® displays "No Response", perform the proper test.
4. Read and record all ABS diagnostic trouble codes. If the "CAB Power Feed Circuit" trouble code is present, it must be repaired prior the addressing and other DTC's. If any additional codes are present, proceed to the appropriate test.

5. If there are no diagnostic trouble codes present, select “Inputs/Outputs” and read the brake switch input as you press and release the brake pedal. If the display does not match the state of the pedal, perform appropriate test. Read the “G-Switch” status, with the vehicle on a level surface, both switches should read “CLOSED”. If the status is not correct, perform appropriate test. If a problem with the amber ABS warning indicator exists, refer to the system tests.
6. If no other problem are found, it will be necessary to road test the vehicle. **THE DRB 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 10 Km/h (6 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 problems were found, refer to any Technical Service Bulletins that may apply.

5.0 REQUIRED TOOLS AND EQUIPMENT

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

6.0 GLOSSARY OF TERMS

ABS	antilock brake system
AC	alternating current
BCM	Body Control Module
CAB	controller − antilock brake
CCD	Chrysler Collision Detection
DC	direct current
DLC	data link connector
DRB	diagnostic read-out box
EDW	electrical distribution wiring
EMI	electro magnetic interference
HCU	hydraulic control unit
HZ	Hertz
ISO	International Standards Organization
JBLK	junction block
JTEC	Jeep and Truck Engine Controller
LF	left front
LR	left rear
PCM	Powertrain Control Module
PDC	power distribution center
P/M	pump motor
RF	right front
RR	right rear
RFI	radio frequency interference
SCI	Serial Communication Interface
SOL	Solenoid
WSS	Wheel Speed Sensor

NOTES

7.0

DIAGNOSTIC INFORMATION AND PROCEDURES

Symptom:

CAB POWER FEED CIRCUIT

When Monitored and Set Condition:

CAB POWER FEED CIRCUIT

When Monitored: Ignition on. The CAB monitors the Fused B(+) circuit at all times for proper system voltage.

Set Condition: If the Fused B(+) voltage is missing when the CAB detects that an internal main driver is not ″on″, the Diagnostic Trouble Code (DTC) is set.

POSSIBLE CAUSES
INTERMITTENT DTC
BLOWN FUSE - FUSED B(+) CIRCUIT
FUSED B(+) CIRCUIT OPEN
FUSED B(+) CIRCUIT INTERMITTENTLY SHORTED TO GROUND
FUSED B(+) CIRCUIT SHORTED TO GROUND
NO B+ SUPPLY TO FUSE
CAB - FUSED B(+) CIRCUIT OPEN
CAB - FUSED B(+) CIRCUIT SHORTED TO GROUND

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. Drive the vehicle above 25 km/h (15 mph) for at least 10 seconds. Stop the vehicle. With the DRBIII®, read DTC's. Does the DRBIII® display CAB Power Feed Circuit DTC present right now? Yes → Go To 2 No → Test Complete.	All
2	Turn the ignition off. Remove and Inspect the ABS Solenoid Fuse #13 in the Power Distribution Center (PDC). Is the Fuse blown? Yes → Go To 3 No → Go To 7	All

CAB POWER FEED CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Visually inspect the Fused B(+) Circuit in the wiring harness from the Junction Block to the CAB. Look for any sign of an intermittent short to ground. Is the wiring harness OK? Yes → Go To 4 No → Repair the Fused B(+) Circuit Shorted to Ground. Perform ABS VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Remove the ABS Fuse 25 from the Junction Block. Disconnect the CAB harness connector. **Note: Check connector - Clean/repair as necessary.** Using a test light connected to 12 volts, probe the Fused B(+) Circuit. Is the test light on? Yes → Repair the Fused B(+) Circuit Shorted to Ground. Perform ABS VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Remove the ABS Solenoid Fuse from the PDC. The CAB must be connected for the results of this test to be valid. Using a test light connected to 12 volts, probe the Fused B(+) Circuit at the Junction Block fuse terminal. Is the test light on? Yes → Replace the CAB. Perform ABS VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off. If there are no potential causes remaining, view repair. If there are no potential causes remaining, view repair. Repair Replace the Fuse. Perform ABS VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Remove the ABS Solenoid Fuse from the Power Distribution Center (PDC). Disconnect the CAB harness connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the Fused B(+) circuit between the PDC Fuse terminal and the CAB connector. Is the resistance below 5 ohms? Yes → Go To 8 No → Repair Fused B(+) Circuit Open. Perform ABS VERIFICATION TEST - VER 1.	All

CAB POWER FEED CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	Remove the ABS Fuse 25 from the Junction Block. Turn the ignition on. Measure the voltage of the Fused B+ supply to Fuse 25 in the Junction Block. Is the voltage above 10 volts? Yes → Go To 9 No → Repair the B+ Supply circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
9	If there are no potential causes remaining, view repair. Repair Replace the CAB. Perform ABS VERIFICATION TEST - VER 1.	All

Symptom:
CONTROLLER FAILURE

When Monitored and Set Condition:

CONTROLLER FAILURE

When Monitored: Ignition on. The CAB monitors its internal microprocessors for correct operation.

Set Condition: If the CAB detects an internal fault, the DTC is set.

POSSIBLE CAUSES
GROUND AND POWER CONNECTIONS
GROUND CIRCUIT HIGH RESISTANCE
GROUND CIRCUIT INTERFERENCE
CAB - INTERNAL FAILURE

TEST	ACTION	APPLICABILITY
1	Inspect for non-factory wiring that may interfere with CAB power or ground circuits. Disconnect the CAB harness connector. Inspect the CAB wiring harness for incorrect routing and damage. Inspect the CAB harness and component connectors for corrosion and damage. Were any concerns found? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition off. Disconnect the CAB harness connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the CAB ground circuits to body ground. Is the resistance below 1.0 ohm? Yes → Go To 3 No → Repair the Ground circuit high resistance. Perform ABS VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Disconnect the CAB harness connector. **Note: Check connector - Clean/repair as necessary.** Turn the ignition on. Turn on all accessories. Measure the voltage of the Ground circuit. Is the voltage below 1.0 volts? Yes → Go To 4 No → Repair as necessary. Unsplice any accessories connected to the CAB ground circuit. Reroute and shield any high voltage cables away from the CAB ground circuit. Perform ABS VERIFICATION TEST - VER 1.	All

CONTROLLER FAILURE — Continued

TEST	ACTION	APPLICABILITY
4	If there are no potential causes remaining, view repair. Repair Replace the CAB. Perform ABS VERIFICATION TEST - VER 1.	All

Symptom:

G-SWITCH NOT PROCESSABLE

When Monitored and Set Condition:

G-SWITCH NOT PROCESSABLE

When Monitored: Ignition on. The CAB sends a test signal out to the G-switch and monitors the sense circuits #1 and #2.

Set Condition: If the sense circuits are open for 2 minutes while driving or an otherwise improper signal is detected at any time, the Diagnostic Trouble Code (DTC) is set.

POSSIBLE CAUSES
G-SWITCH TEST SIGNAL CIRCUIT OPEN
INTERMITTENT DTC
G-SWITCH TEST SIGNAL OR SENSE CIRCUIT SHORT TO VOLTAGE OR GROUND
G-SWITCH SIGNAL CIRCUIT INTERNAL OPEN
CAB - TEST SIGNAL CIRCUIT OPEN
G-SWITCH #1 SENSE CIRCUIT OPEN
G-SWITCH #1 SENSE SWITCH OPEN
CAB - #1 SENSE CIRCUIT OPEN
G-SWITCH #2 SENSE CIRCUIT OPEN
G-SWITCH #2 SENSE SWITCH OPEN
CAB - #2 SENSE CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the status of the G-Switch internal switches. What is the status of both of the G-Switches? Both G-Switches are closed. Go To 2 Both G-Switches are open. Go To 3 Only the #1 G-Switch is open. Go To 7 Only the #2 G-Switch is open. Go To 10	All

G-SWITCH NOT PROCESSABLE — Continued

TEST	ACTION	APPLICABILITY
2	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. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	All
3	Turn the ignition off. Disconnect the CAB connector. **Check connector - Clean/repair as necessary.** Disconnect the G-Switch Sensor Connector. **NOTE: Check connector - Clean/repair as necessary.** Measure the resistance of the G-Switch Test Signal circuit. Is the resistance below 5 ohms? Yes → Go To 4 No → Repair the G-Switch Test Signal Circuit Open. Perform ABS VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Disconnect the CAB Connector. **Check connector - Clean/repair as necessary.** Disconnect the G-Switch Sensor Connector. **Check connector - Clean/repair as necessary.** Turn the ignition on. Using a 12-volt test light connected to ground, check the Test Signal and both Sense circuits. Using a 12-volt test light connected to 12-volts, check the Test Signal and both Sense circuits. **CAUTION: The test light should not light at any test point.** Does the test light illuminate at any test point? Yes → Repair the G-Switch Test Signal or Sense circuit for a short to voltage or ground. Perform ABS VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the G-Switch Connector. **Check connector - Clean/repair as necessary.** Remove G-Switch from vehicle. While holding the G-Switch level, measure the resistance of the G-Switch Test Signal circuit and the G-Switch #1 Sense circuit in the G-Switch connector. Is the resistance below 5 ohms? Yes → Go To 6 No → Replace G-Switch. Perform ABS VERIFICATION TEST - VER 1.	All

G-SWITCH NOT PROCESSABLE — Continued

TEST	ACTION	APPLICABILITY
6	If there are no potential causes remaining, view repair. Repair Replace the CAB. Perform ABS VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the G-Switch Sensor Connector. Measure the resistance of the G-Switch #1 Sense Circuit. Is the resistance below 5 ohms? Yes → Go To 8 No → Repair the G-Switch #1 Sense circuit open. Perform ABS VERIFICATION TEST - VER 1.	All
8	Turn the ignition off. **Check connector - Clean/repair as necessary.** Remove G-Switch from vehicle. While holding the G-Switch level, measure the resistance of the G-Switch Test Signal circuit and the G-Switch #1 Sense circuit in the G-Switch connector. Is the resistance below 5 ohms? Yes → Go To 9 No → Replace G-Switch Assembly. Perform ABS VERIFICATION TEST - VER 1.	All
9	If there are no potential causes remaining, view repair. Repair Replace the CAB. Perform ABS VERIFICATION TEST - VER 1.	All
10	Turn the ignition off. Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the G-Switch Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the G-Switch #2 Sense Circuit. Is the resistance below 5 ohms? Yes → Go To 11 No → Repair the G-Switch #2 Sense Circuit Open. Perform ABS VERIFICATION TEST - VER 1.	All
11	Turn the ignition off. Disconnect the G-Switch connector. **Note: Check connector - Clean/repair as necessary.** Remove the G-Switch from vehicle. While holding the G-Switch level, measure the resistance of the G-Switch Test Signal circuit and the G-Switch #2 Sense circuit in the G-Switch connector. Is the resistance below 5 ohms? Yes → Go To 12 No → Replace the G-Switch Assembly. Perform ABS VERIFICATION TEST - VER 1.	All

G-SWITCH NOT PROCESSABLE — Continued

TEST	ACTION	APPLICABILITY
12	If there are no potential causes remaining, view repair. Repair Replace the CAB. Perform ABS VERIFICATION TEST - VER 1.	All

Symptom:
LEFT FRONT SENSOR CIRCUIT FAILURE

When Monitored and Set Condition:

LEFT FRONT SENSOR CIRCUIT FAILURE

When Monitored: Ignition on. The CAB monitors the wheel speed circuit every 7 milliseconds (ms).

Set Condition: If the CAB detects an open or shorted wheel speed sensor circuit, the Diagnostic Trouble Code (DTC) will set.

POSSIBLE CAUSES
LEFT FRONT WHEEL SPEED SENSOR OR CONNECTOR DAMAGE
INTERMITTENT DTC
LEFT FRONT WHEEL SPEED SENSOR (+) CIRCUIT SHORTED TO GROUND
LEFT FRONT WHEEL SPEED SENSOR (-) CIRCUIT SHORTED TO GROUND
LEFT FRONT WHEEL SPEED SENSOR SHORTED TO GROUND
CAB - INTERNAL SHORT OR OPEN
LEFT FRONT WHEEL SPEED SENSOR (+) CIRCUIT OPEN
LEFT FRONT WHEEL SPEED SENSOR (-) CIRCUIT OPEN
LEFT FRONT WHEEL SPEED SENSOR (+) CIRCUIT SHORTED TO VOLTAGE
LEFT FRONT WHEEL SPEED SENSOR (-) CIRCUIT SHORTED TO VOLTAGE
LEFT FRONT WHEEL SPEED SENSOR CIRCUITS SHORT TOGETHER
LEFT FRONT WHEEL SPEED SENSOR RESISTANCE OUT OF SPECIFICATION

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display ″Left Front Wheel Speed Sensor Circuit Failure″ DTC present right now? Yes → Go To 2 No → Go To 14	All
2	Turn the ignition off. Inspect the Left Front Wheel Speed Sensor and Connector. Is the Sensor or Connector Damaged? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 3	All

LEFT FRONT SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance across the Left Front Wheel Speed Sensor (+) circuit and the Left Front Wheel Speed Sensor (-) circuit at the CAB connector. Is the resistance between 900 and 1,300 ohms? Yes → Go To 4 No → Go To 8	All
4	Turn the ignition off. Disconnect the Left Front Wheel Speed Sensor Connector. Disconnect the CAB Connector. Measure the resistance between the Left Front Wheel Speed Sensor (+) Circuit and ground. Is the resistance below 15,000 ohms? Yes → Repair the Left Front Wheel Speed Sensor (+) Circuit Short to Ground. Perform ABS VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the Left Front Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance between the Left Front Wheel Speed Sensor (-) Circuit and ground. Is the resistance below 15,000 ohms? Yes → Repair the Left Front Wheel Speed Sensor (-) Circuit Short to Ground. Perform ABS VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off. Disconnect the Left Front Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** On the component, measure the resistance between both of the Left Front Wheel Speed Sensor Terminals and ground. Is the resistance below 15,000 ohms? Yes → Replace the Left Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST - VER 1. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace the CAB. Perform ABS VERIFICATION TEST - VER 1.	All

LEFT FRONT SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the Left Front Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the wheel speed sensor (+) circuit. Is the resistance below 5 ohms? Yes → Go To 9 No → Repair the Left Front Wheel Speed Sensor (+) Circuit Open. Perform ABS VERIFICATION TEST - VER 1.	All
9	Turn the ignition off. Disconnect the Left Front Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the Left Front Wheel Speed Sensor (-) circuit. Is the resistance below 5 ohms? Yes → Go To 10 No → Repair the Left Front Wheel Speed Sensor (-) Circuit Open. Perform ABS VERIFICATION TEST - VER 1.	All
10	Turn the ignition off. Disconnect the Left Front Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the Left Front Wheel Speed Sensor (+) Circuit. Is the voltage above 1 volt? Yes → Repair Left Front Wheel Speed Sensor (+) Circuit Shorted to Voltage. Perform ABS VERIFICATION TEST - VER 1. No → Go To 11	All
11	Turn the ignition off. Disconnect the Left Front Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the Left Front Wheel Speed Sensor (-) Circuit. Is the voltage above 1 volt? Yes → Repair Left Front Wheel Speed Sensor (-) Circuit Short to Voltage. Perform ABS VERIFICATION TEST - VER 1. No → Go To 12	All

LEFT FRONT SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. Disconnect the CAB Connector. Disconnect the left front wheel speed sensor harness connector. Measure the resistance through the Wheel Speed Sensor (+) and (-) circuits at the CAB harness connector. Is the resistance below 200 ohms? Yes → Repair the Left Front Wheel Speed Sensor Circuits Shorted together. Perform ABS VERIFICATION TEST - VER 1. No → Go To 13	All
13	If there are no possible causes remaining, view repair. Repair Replace the Left Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST - VER 1.	All
14	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. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
LEFT FRONT SENSOR SIGNAL FAILURE

When Monitored and Set Condition:

LEFT FRONT SENSOR SIGNAL FAILURE

When Monitored: Wheel speed comparison is checked at drive off or every 7 milliseconds (ms). Sensor circuit continuity is checked every 7 milliseconds. Wheel speed phase length supervision is checked every 7 milliseconds.

Set Condition: If, during an ABS stop, the CAB commands any valve solenoid on for an extended length of time, and does not see a corresponding wheel speed change, the Diagnostic Trouble Code (DTC) is set. The DTC can also set if the signal is missing or erratic.

POSSIBLE CAUSES
BOTH LEFT FRONT WHEEL SPEED SENSOR CIRCUIT AND SIGNAL DTC CONDITIONS PRESENT
LEFT FRONT WHEEL SPEED SENSOR OR CONNECTOR DAMAGED
TONE WHEEL DAMAGED
LEFT FRONT WHEEL SPEED SENSOR AIR GAP OUT OF SPECIFICATION
LEFT FRONT WHEEL BEARING OUT OF SPECIFICATION
LEFT FRONT WHEEL SPEED SENSOR INOPERATIVE
CAB - WON'T RESPOND TO LEFT FRONT WHEEL SPEED SENSOR SIGNAL
INTERMITTENT SIGNAL DTC

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Are both Left Front Sensor Signal Failure and Left Front Sensor Circuit Failure displayed? Yes → Refer to symptom Left Front Sensor Circuit Failure in the BRAKES Category. Perform ABS VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition on. Using the DRBIII®, monitor the Left Front Wheel Speed Sensor while an assistant drives the vehicle. Slowly accelerate as straight as possible from a stop to 24 Km/h (15 Mph). With the DRBIII®, monitor all wheel speed sensors. Is Left Front WSS Signal 0 Km/h (0 Mph) or differing from others by more than 5kmh (3mph)? Yes → Go To 3 No → Go To 8	All

LEFT FRONT SENSOR SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Inspect the Left Front Wheel Speed Sensor and Connector. Is the Sensor or Connector Damaged? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Inspect the Tone Wheel for damaged or missing teeth, cracks, or looseness. **Note: The Tone Wheel Teeth should be perfectly square, not bent or nicked.** Is the Tone Wheel OK? Yes → Go To 5 No → Replace the Tone Wheel. Perform ABS VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Using a Feeler Gauge, measure the Wheel Speed Sensor Air Gap. **NOTE: The Air Gap should be checked in at least four places on the Tone Wheel.** Is the Air Gap between 0.42 mm - 1.71 mm (0.017″ - 0.068″) ? Yes → Go To 6 No → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Inspect the wheel bearings for excessive runout or clearance. **Note: Refer to the appropriate service information, if necessary, for procedures or specifications.** Is the bearing clearance OK ? Yes → Go To 7 No → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Disconnect the CAB connector. Raise the left front wheel off the ground. Using a voltmeter in Alternating Current (AC) mode, measure the Left Front Wheel Speed Sensor (+) Signal Circuit and Left Front Wheel Speed Sensor (-) Circuit at the CAB connector. Quickly rotate the wheel by spinning the tire by hand. Measure the Alternating Current (AC) voltage of the Left Front Wheel Speed Sensor Circuit. Does the voltage go above 650 millivolts as the wheel is rotated? Yes → Replace the CAB. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Left Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST - VER 1.	All

LEFT FRONT SENSOR SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Visually inspect wheel speed sensor. Visually inspect tone wheel. Visually inspect wiring harness. Visually inspect brakes for locking up due to lining contamination or overheating. Inspect all Components for defects which may cause a Signal DTC to set. Is any Component Damaged? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:

LEFT REAR SENSOR CIRCUIT FAILURE

When Monitored and Set Condition:

LEFT REAR SENSOR CIRCUIT FAILURE

When Monitored: Ignition on. The CAB monitors the wheel speed circuit every 7 milliseconds (ms).

Set Condition: If the CAB detects an open or shorted wheel speed sensor circuit, the Diagnostic Trouble Code (DTC) will set.

POSSIBLE CAUSES
LEFT REAR WHEEL SPEED SENSOR OR CONNECTOR DAMAGE
LEFT REAR WHEEL SPEED SENSOR (+) CIRCUIT SHORTED TO GROUND
LEFT REAR WHEEL SPEED SENSOR (-) CIRCUIT SHORTED TO GROUND
LEFT REAR WHEEL SPEED SENSOR - SHORT TO GROUND
CAB - INTERNAL SHORT OR OPEN
LEFT REAR WHEEL SPEED SENSOR (+) CIRCUIT OPEN
LEFT REAR WHEEL SPEED SENSOR (-) CIRCUIT OPEN
LEFT REAR WHEEL SPEED SENSOR (+) CIRCUIT SHORTED TO VOLTAGE
LEFT REAR WHEEL SPEED SENSOR (-) CIRCUIT SHORTED TO VOLTAGE
LEFT REAR WHEEL SPEED SENSOR CIRCUITS SHORT TOGETHER
LEFT REAR WHEEL SPEED SENSOR RESISTANCE OUT OF SPECIFICATION
INTERMITTENT CIRCUIT DTC

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display LR Wheel Speed Sensor Circuit Failure DTC? Yes → Go To 2 No → Go To 14	All
2	Turn the ignition off. Inspect the Left Rear Wheel Speed Sensor and Connector. Is the Sensor or Connector Damaged? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 3	All

LEFT REAR SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance across the Left Rear Wheel Speed Sensor (+) and (-) circuits at the CAB connector. Is the resistance between 900 and 1,300 ohms? Yes → Go To 4 No → Go To 8	All
4	Turn the ignition off. Disconnect the Left Rear Wheel Speed Sensor Connector. Disconnect the CAB Connector. Measure the resistance between the Left Rear Wheel Speed Sensor (+) Circuit and ground. Is the resistance below 15,000 ohms? Yes → Repair the Left Rear Wheel Speed Sensor (+) circuit Short to Ground. Perform ABS VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the Left Rear Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance between the Left Rear Wheel Speed Sensor (-) circuit and ground. Is the resistance below 15,000 ohms? Yes → Repair the Left Rear Wheel Speed Sensor (-) Circuit Short to Ground. Perform ABS VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off. Disconnect the Left Rear Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance between ground and each of the Left Rear Wheel Speed Sensor circuits. Is the resistance below 15,000 ohms? Yes → Replace the Left Rear Wheel Speed Sensor. Perform ABS VERIFICATION TEST - VER 1. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace the CAB. Perform ABS VERIFICATION TEST - VER 1.	All

LEFT REAR SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the Left Rear Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the wheel speed sensor (+) circuit. Is the resistance below 5 ohms? Yes → Go To 9 No → Repair the Left Rear Wheel Speed Sensor (+) Circuit Open. Perform ABS VERIFICATION TEST - VER 1.	All
9	Turn the ignition off. Disconnect the Left Rear Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the Left Rear Wheel Speed Sensor (-) circuit. Is the resistance below 5 ohms? Yes → Go To 10 No → Repair the Left Rear Wheel Speed Sensor (-) Circuit Open. Perform ABS VERIFICATION TEST - VER 1.	All
10	Turn the ignition off. Disconnect the Left Rear Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the Left Rear Wheel Speed Sensor (+) Circuit. Is the voltage above 1 volt? Yes → Repair Left Rear Wheel Speed Sensor (+) Circuit Shorted to Voltage. Perform ABS VERIFICATION TEST - VER 1. No → Go To 11	All
11	Turn the ignition off. Disconnect the Left Rear Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the Left Rear Wheel Speed Sensor (-) Circuit. Is the voltage above 1 volt? Yes → Repair Left Rear Wheel Speed Sensor (-) Circuit Short to Voltage. Perform ABS VERIFICATION TEST - VER 1. No → Go To 12	All

LEFT REAR SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. Disconnect the CAB Connector. Disconnect the Left Rear Wheel Speed Sensor harness connector. Measure the resistance through the Wheel Speed Sensor (+) and (-) circuits at the CAB harness connector. Is the resistance below 200 ohms? Yes → Repair the Left Rear Wheel Speed Sensor Circuits Shorted together. Perform ABS VERIFICATION TEST - VER 1. No → Go To 13	All
13	If there are no possible causes remaining, view repair. Repair Replace the Left Rear Wheel Speed Sensor. Perform ABS VERIFICATION TEST - VER 1.	All
14	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. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:

LEFT REAR SENSOR SIGNAL FAILURE

When Monitored and Set Condition:

LEFT REAR SENSOR SIGNAL FAILURE

When Monitored: Wheel speed comparison is checked at drive off or every 7 milliseconds (ms). Wheel speed circuit continuity is checked every 7 milliseconds. Wheel speed phase length supervision is checked every 7 milliseconds.

Set Condition: If, during an ABS stop, the CAB commands any valve solenoid on for an extended length of time, and does not see a corresponding wheel speed change, the Diagnostic Trouble Code (DTC) is set. The DTC can also set if the signal is missing or erratic.

POSSIBLE CAUSES
BOTH LEFT REAR WHEEL SPEED SENSOR CIRCUIT AND SIGNAL DTC CONDITIONS PRESENT
LEFT REAR WHEEL SPEED SENSOR OR CONNECTOR DAMAGED
TONE WHEEL DAMAGED
LEFT REAR WHEEL SPEED SENSOR AIR GAP OUT OF SPECIFICATION
LEFT REAR WHEEL BEARING OUT OF SPECIFICATION
LEFT REAR WHEEL SPEED SENSOR INOPERATIVE
CAB - WON'T RESPOND TO LEFT REAR WHEEL SPEED SENSOR SIGNAL
INTERMITTENT SIGNAL DTC

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Are both Left Rear Sensor Signal Failure and Left Rear Sensor Circuit Failure displayed? Yes → Refer to symptom Left Rear Sensor Circuit Failure in the BRAKES Category. Perform ABS VERIFICATION TEST - VER 1. No → Go To 2	All
2	While an assistant drives the vehicle, monitor the Wheel Speed Sensors using the DRBIII®. Slowly accelerate as straight as possible from a stop to 24 Km/h (15 Mph). Is the Left Rear WSS Signal 0 Km/h (0 Mph) or differing from others by more than 5kmh (3mph)? Yes → Go To 3 No → Go To 7	All

LEFT REAR SENSOR SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Inspect the Left Rear Wheel Speed Sensor and Connector. Is the Sensor or Connector Damaged? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Inspect the Tone Wheel for damaged or missing teeth, cracks, or looseness. **Note: The Tone Wheel Teeth should be perfectly square, not bent or nicked.** Is the Tone Wheel OK? Yes → Go To 5 No → Replace the Tone Wheel. Perform ABS VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Using a Feeler Gauge, measure the Wheel Speed Sensor Air Gap. **NOTE: The Air Gap should be checked in at least four places on the Tone Wheel.** Is the Air Gap between 0.42 mm - 1.71 mm (0.017″ - 0.068″) ? Yes → Go To 6 No → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Inspect the wheel bearings for excessive runout or clearance. **Note: Refer to the appropriate service information, if necessary, for procedures or specifications.** Is the bearing clearance OK ? Yes → Go To 8 No → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Visually inspect wheel speed sensor. Visually inspect tone wheel. Visually inspect wiring harness. Visually inspect brakes for locking up due to lining contamination or overheating. Inspect all Components for defects which may cause a Signal DTC to set. Is any Component Damaged? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 8	All

LEFT REAR SENSOR SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the CAB connector. Set up a voltmeter to measure AC voltage on the Left Rear Wheel Speed Sensor Signal Circuits at the CAB connector. Raise the left rear wheel off the ground. Quickly rotate the wheel by spinning the tire by hand. Measure the AC voltage on the Left Rear Wheel Speed Sensor (+) and (-) Signal Circuits. Does the voltage go above 650 millivolts as the wheel is rotated? Yes → Replace the CAB. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Left Rear Wheel Speed Sensor. Perform ABS VERIFICATION TEST - VER 1.	All

Symptom:
PUMP MOTOR NOT WORKING PROPERLY

When Monitored and Set Condition:

PUMP MOTOR NOT WORKING PROPERLY

When Monitored: Ignition on. The CAB commands the pump on at 20 km/h (12 mph) to check its operation, if the brake switch is not applied. If the driver has their foot on the brake, the test will run at 40 km/h (25 mph). The CAB monitors pump voltage every 7 milliseconds.

Set Condition: The DTC is stored when the CAB detects: 1) Improper voltage decay after the pump was turned off. 2) Pump not energized by the CAB, but voltage is present for 3.5 seconds. 3) Pump is turned on by the CAB, but their is insufficient voltage to operate it.

POSSIBLE CAUSES
ABS PUMP MOTOR INTERMITENT DTC
FUSED B(+) CIRCUIT INTERMITTENTLY SHORTED TO GROUND
FUSED B(+) CIRCUIT SHORTED TO GROUND
CAB - FUSED B(+) CIRCUIT SHORTED TO GROUND
FUSE BLOWN - PUMP MOTOR CIRCUIT
NO B+ SUPPLY TO FUSE
ABS PUMP MOTOR INOPERATIVE
FUSED B(+) CIRCUIT OPEN
GROUND CIRCUIT OPEN
GROUND CIRCUIT HIGH RESISTANCE
CAB - INTERNAL FAULT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. With the DRBIII®, actuate the ABS pump motor. Did the Pump Motor operate when actuated? No → Go To 2 Yes → Go To 13	All
2	Turn the ignition off. Remove and inspect the ABS Pump fuse in the PDC. Is the Fuse blown? Yes → Go To 3 No → Go To 7	All

PUMP MOTOR NOT WORKING PROPERLY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Visually inspect the Fused B(+) Circuit in the wiring harness from the PDC to the CAB. Look for any sign of an Intermittent Short to Ground. Is the wiring harness OK? Yes → Go To 4 No → Repair the Fused B(+) Circuit shorted to ground. Perform ABS VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Disconnect the ABS PUMP Fuse # 12 from the Power Distribution Center (PDC). Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Using a test light connected to 12 volts, probe the Fused B (+) Circuit. Is the test light on? Yes → Repair the Fused B(+) circuit short to ground. Perform ABS VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the ABS PUMP Fuse 12 from the PDC. The CAB must be connected for the results of this test to be valid. Using a test light connected to 12 volts, probe the Fused B (+) circuit in the PDC. Is the test light on? Yes → Replace the CAB. Perform ABS VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off. If there are no potential causes remaining, replace the Fuse. View repair options Repair Replace the ABS Pump Motor Fuse. Perform ABS VERIFICATION TEST - VER 1.	All
7	Turn the ignition on. Using a 12-volt test light connected to ground, check the B+ supply to Fuse 12 in the PDC. Is the B+ supply OK? Yes → Go To 8 No → Repair the B+ supply for an open. Perform ABS VERIFICATION TEST - VER 1.	All

PUMP MOTOR NOT WORKING PROPERLY — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect Pump Motor Connector. Connect a 10 gauge jumper wire between pump motor Fused B (+) circuit and a 40 Amp Fused B (+) circuit. Connect a 10 gauge jumper wire between pump motor ground circuit and a known good body ground. Monitor Pump Motor operation. Is the pump motor running? Yes → Go To 9 No → Replace the ABS Pump Motor/Hydraulic Control Unit assembly. Perform ABS VERIFICATION TEST - VER 1.	All
9	Turn the ignition off. Remove the ABS PUMP Fuse #12 from the Power Distribution Center (PDC). Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the Fused B (+) circuit between the PDC Fuse Terminal and the CAB connector. Is the resistance below 10 ohms? 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 CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the CAB ground circuits. Is the resistance below 1.0 ohms? Yes → Go To 11 No → Repair the ground circuit circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
11	Turn the ignition on. With the DRBIII®, enable pump motor actuation. **NOTE: Pump motor will not operate, but voltage will be applied.** Measure the voltage drop across the ABS ground circuit connection, with pump motor actuation enabled. Is the voltage below 0.1 volt? Yes → Go To 12 No → Repair the Ground circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
12	If there are no potential causes remaining, view repair. Repair Replace the Controller Anti-Lock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All

PUMP MOTOR NOT WORKING PROPERLY — Continued

TEST	ACTION	APPLICABILITY
13	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. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
RIGHT FRONT SENSOR CIRCUIT FAILURE

When Monitored and Set Condition:

RIGHT FRONT SENSOR CIRCUIT FAILURE

When Monitored: Ignition on. The CAB monitors the wheel speed circuit every 7 milliseconds (ms).

Set Condition: If the CAB detects an open or shorted wheel speed sensor circuit, the Diagnostic Trouble Code (DTC) will set.

POSSIBLE CAUSES
RIGHT FRONT WHEEL SPEED SENSOR OR CONNECTOR DAMAGE
INTERMITTENT DTC
RIGHT FRONT WHEEL SPEED SENSOR (+) CIRCUIT SHORTED TO GROUND
RIGHT FRONT WHEEL SPEED SENSOR (-) CIRCUIT SHORTED TO GROUND
RIGHT FRONT WHEEL SPEED SENSOR - SHORT TO GROUND
CAB - INTERNAL SHORT OR OPEN
RIGHT FRONT WHEEL SPEED SENSOR (+) CIRCUIT OPEN
RIGHT FRONT WHEEL SPEED SENSOR (-) CIRCUIT OPEN
RIGHT FRONT WHEEL SPEED SENSOR (+) CIRCUIT SHORTED TO VOLTAGE
RIGHT FRONT WHEEL SPEED SENSOR (-) CIRCUIT SHORTED TO VOLTAGE
RIGHT FRONT WHEEL SPEED SENSOR CIRCUITS SHORT TOGETHER
RIGHT FRONT WHEEL SPEED SENSOR RESISTANCE OUT OF SPECIFICATION

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display RF Wheel Speed Sensor Circuit Failure DTC? Yes → Go To 2 No → Go To 14	All
2	Turn the ignition off. Inspect the Right Front Wheel Speed Sensor and Connector. Is the Sensor or Connector Damaged? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 3	All

RIGHT FRONT SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance across the Right Front Wheel Speed Sensor (+) and (-) circuits at the CAB connector. Is the resistance between 900 and 1,300 ohms? Yes → Go To 4 No → Go To 8	All
4	Turn the ignition off. Disconnect the Right Front Wheel Speed Sensor Connector. Disconnect the CAB Connector. Measure the resistance between the Right Front Wheel Speed Sensor (+) Circuit and ground. Is the resistance below 15,000 ohms? Yes → Repair the Right Front Wheel Speed Sensor (+) circuit Short to Ground. Perform ABS VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the Right Front Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance between the Right Front Wheel Speed Sensor (-) circuit and ground. Is the resistance below 15,000 ohms? Yes → Repair the Right Front Wheel Speed Sensor (-) Circuit Short to Ground. Perform ABS VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off. Disconnect the Right Front Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance between ground and both of the Right Front Wheel Speed Sensor circuits. Is the resistance below 15,000 ohms? Yes → Replace the Right Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST - VER 1. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace the CAB. Perform ABS VERIFICATION TEST - VER 1.	All

RIGHT FRONT SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the Right Front Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the wheel speed sensor (+) circuit. Is the resistance below 5 ohms? Yes → Go To 9 No → Repair the Right Front Wheel Speed Sensor (+) Circuit Open. Perform ABS VERIFICATION TEST - VER 1.	All
9	Turn the ignition off. Disconnect the Right Front Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the Right Front Wheel Speed Sensor (-) circuit. Is the resistance below 5 ohms? Yes → Go To 10 No → Repair the Right Front Wheel Speed Sensor (-) Circuit Open. Perform ABS VERIFICATION TEST - VER 1.	All
10	Turn the ignition off. Disconnect the Right Front Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the Right Front Wheel Speed Sensor (+) Circuit. Is the voltage above 1 volt? Yes → Repair Right Front Wheel Speed Sensor (+) Circuit Shorted to Voltage. Perform ABS VERIFICATION TEST - VER 1. No → Go To 11	All
11	Turn the ignition off. Disconnect the Right Front Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the Right Front Wheel Speed Sensor (-) Circuit. Is the voltage above 1 volt? Yes → Repair Right Front Wheel Speed Sensor (-) Circuit Short to Voltage. Perform ABS VERIFICATION TEST - VER 1. No → Go To 12	All

RIGHT FRONT SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. Disconnect the CAB Connector. Disconnect the Right Front Wheel Speed Sensor harness connector. Measure the resistance through the Wheel Speed Sensor (+) and (-) circuits at the CAB harness connector. Is the resistance below 200 ohms? Yes → Repair the Right Front Wheel Speed Sensor Circuits Shorted together. Perform ABS VERIFICATION TEST - VER 1. No → Go To 13	All
13	If there are no possible causes remaining, view repair. Repair Replace the Right Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST - VER 1.	All
14	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. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
RIGHT FRONT SENSOR SIGNAL FAILURE

When Monitored and Set Condition:

RIGHT FRONT SENSOR SIGNAL FAILURE

When Monitored: Wheel speed comparison is checked at drive off or every 7 milliseconds (ms). Wheel speed continuity is checked every 7 milliseconds. Wheel speed phase length supervision is checked every 7 milliseconds.

Set Condition: If, during an ABS stop, the CAB commands any valve solenoid on for an extended length of time, and does not see a corresponding wheel speed change, the Diagnostic Trouble Code (DTC) is set. The DTC can also set if the signal is missing or erratic.

POSSIBLE CAUSES
BOTH RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT AND SIGNAL DTC CONDITIONS PRESENT
RIGHT FRONT WHEEL SPEED SENSOR OR CONNECTOR DAMAGED
TONE WHEEL DAMAGED
RIGHT FRONT WHEEL SPEED SENSOR AIR GAP OUT OF SPECIFICATION
RIGHT FRONT WHEEL BEARING OUT OF SPECIFICATION
RIGHT FRONT WHEEL SPEED SENSOR INOPERATIVE
CAB - WON'T RESPOND TO RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
INTERMITTENT SIGNAL DTC

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Are both Right Front Sensor Signal Failure and Right Front Sensor Circuit Failure displayed? Yes → Refer to symptom Right Front Sensor Circuit Failure in the BRAKES Category. Perform ABS VERIFICATION TEST - VER 1. No → Go To 2	All
2	While an assistant drives the vehicle, monitor the Wheel Speed Sensors using the DRBIII®. Slowly accelerate as straight as possible from a stop to 24 Km/h (15 Mph). Is the Right Front WSS Signal 0 Km/h (0 Mph) or differing from others by more than 5kmh (3mph)? Yes → Go To 3 No → Go To 7	All

RIGHT FRONT SENSOR SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Inspect the Right Front Wheel Speed Sensor and Connector. Is the Sensor or Connector Damaged? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Inspect the Tone Wheel for damaged or missing teeth, cracks, or looseness. **Note: The Tone Wheel Teeth should be perfectly square, not bent or nicked.** Is the Tone Wheel OK? Yes → Go To 5 No → Replace the Tone Wheel. Perform ABS VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Using a Feeler Gauge, measure the Wheel Speed Sensor Air Gap. **NOTE: The Air Gap should be checked in at least four places on the Tone Wheel.** Is the Air Gap between 0.42 mm - 1.71 mm (0.017″ - 0.068″) ? Yes → Go To 6 No → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Inspect the wheel bearings for excessive runout or clearance. **Note: Refer to the appropriate service information, if necessary, for procedures or specifications.** Is the bearing clearance OK ? Yes → Go To 8 No → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Visually inspect wheel speed sensor. Visually inspect tone wheel. Visually inspect wiring harness. Visually inspect brakes for locking up due to lining contamination or overheating. Inspect all Components for defects which may cause a Signal DTC to set. Is any Component Damaged? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 8	All

RIGHT FRONT SENSOR SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the CAB connector. Set up a voltmeter to measure AC voltage on the Right Front Wheel Speed Sensor Signal Circuits at the CAB connector. Raise the right front wheel off the ground. Quickly rotate the wheel by spinning the tire by hand. Measure the AC voltage on the Right Front Wheel Speed Sensor (+) and (-) Signal Circuits. Does the voltage go above 650 millivolts as the wheel is rotated? Yes → Replace the CAB. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Right Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST - VER 1.	All

Symptom:
RIGHT REAR SENSOR CIRCUIT FAILURE

When Monitored and Set Condition:

RIGHT REAR SENSOR CIRCUIT FAILURE

When Monitored: Ignition on. The CAB monitors the wheel speed circuit every 7 milliseconds (ms).

Set Condition: If the CAB detects an open or shorted wheel speed sensor circuit, the Diagnostic Trouble Code (DTC) will set.

POSSIBLE CAUSES
RIGHT REAR WHEEL SPEED SENSOR OR CONNECTOR DAMAGE
INTERMITTENT DTC
RIGHT REAR WHEEL SPEED SENSOR (+) CIRCUIT SHORTED TO GROUND
RIGHT REAR WHEEL SPEED SENSOR (-) CIRCUIT SHORTED TO GROUND
RIGHT REAR WHEEL SPEED SENSOR - SHORT TO GROUND
CAB - INTERNAL SHORT OR OPEN
RIGHT REAR WHEEL SPEED SENSOR (+) CIRCUIT OPEN
RIGHT REAR WHEEL SPEED SENSOR (-) CIRCUIT OPEN
RIGHT REAR WHEEL SPEED SENSOR (+) CIRCUIT SHORTED TO VOLTAGE
RIGHT REAR WHEEL SPEED SENSOR (-) CIRCUIT SHORTED TO VOLTAGE
RIGHT REAR WHEEL SPEED SENSOR CIRCUITS SHORT TOGETHER
RIGHT REAR WHEEL SPEED SENSOR RESISTANCE OUT OF SPECIFICATION

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display RR Wheel Speed Sensor Circuit Failure DTC? Yes → Go To 2 No → Go To 14	All
2	Turn the ignition off. Inspect the Right Rear Wheel Speed Sensor and Connector. Is the Sensor or Connector Damaged? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 3	All

RIGHT REAR SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance across the Right Rear Wheel Speed Sensor (+) and (-) circuits at the CAB connector. Is the resistance between 900 and 1,300 ohms? Yes → Go To 4 No → Go To 8	All
4	Turn the ignition off. Disconnect the Right Rear Wheel Speed Sensor Connector. Disconnect the CAB Connector. Measure the resistance between the Right Rear Wheel Speed Sensor (+) Circuit and ground. Is the resistance below 15,000 ohms? Yes → Repair the Right Rear Wheel Speed Sensor (+) circuit Short to Ground. Perform ABS VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the Right Rear Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance between the Right Rear Wheel Speed Sensor (-) circuit and ground. Is the resistance below 15,000 ohms? Yes → Repair the Right Rear Wheel Speed Sensor (-) Circuit Short to Ground. Perform ABS VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off. Disconnect the Right Rear Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance between ground and both of the Right Rear Wheel Speed Sensor circuits. Is the resistance below 15,000 ohms? Yes → Replace the Right Rear Wheel Speed Sensor. Perform ABS VERIFICATION TEST - VER 1. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace the CAB. Perform ABS VERIFICATION TEST - VER 1.	All

RIGHT REAR SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the Right Rear Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the wheel speed sensor (+) circuit. Is the resistance below 5 ohms? Yes → Go To 9 No → Repair the Right Rear Wheel Speed Sensor (+) Circuit Open. Perform ABS VERIFICATION TEST - VER 1.	All
9	Turn the ignition off. Disconnect the Right Rear Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the Right Rear Wheel Speed Sensor (-) circuit. Is the resistance below 5 ohms? Yes → Go To 10 No → Repair the Right Rear Wheel Speed Sensor (-) Circuit Open. Perform ABS VERIFICATION TEST - VER 1.	All
10	Turn the ignition off. Disconnect the Right Rear Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the Right Rear Wheel Speed Sensor (+) Circuit. Is the voltage above 1 volt? Yes → Repair Right Rear Wheel Speed Sensor (+) Circuit Shorted to Voltage. Perform ABS VERIFICATION TEST - VER 1. No → Go To 11	All
11	Turn the ignition off. Disconnect the Right Rear Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the Right Rear Wheel Speed Sensor (-) Circuit. Is the voltage above 1 volt? Yes → Repair Right Rear Wheel Speed Sensor (-) Circuit Short to Voltage. Perform ABS VERIFICATION TEST - VER 1. No → Go To 12	All

RIGHT REAR SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. Disconnect the CAB Connector. Disconnect the Right Rear Wheel Speed Sensor harness connector. Measure the resistance through the Wheel Speed Sensor (+) and (-) circuits at the CAB harness connector. Is the resistance below 200 ohms? Yes → Repair the Right Rear Wheel Speed Sensor Circuits Shorted together. Perform ABS VERIFICATION TEST - VER 1. No → Go To 13	All
13	If there are no possible causes remaining, view repair. Repair Replace the Right Rear Wheel Speed Sensor. Perform ABS VERIFICATION TEST - VER 1.	All
14	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. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
RIGHT REAR SENSOR SIGNAL FAILURE

When Monitored and Set Condition:

RIGHT REAR SENSOR SIGNAL FAILURE

When Monitored: Wheel speed comparison is checked at drive off or every 7 milliseconds (ms). Wheel speed circuit continuity is checked every 7 milliseconds. Wheel speed phase length supervision is checked every 7 milliseconds.

Set Condition: If, during an ABS stop, the CAB commands any valve solenoid on for an extended length of time, and does not see a corresponding wheel speed change, the Diagnostic Trouble Code (DTC) is set. The DTC can also set if the signal is missing or erratic.

POSSIBLE CAUSES
BOTH RIGHT REAR WHEEL SPEED SENSOR CIRCUIT AND SIGNAL DTC CONDITIONS PRESENT
RIGHT REAR WHEEL SPEED SENSOR OR CONNECTOR DAMAGED
TONE WHEEL DAMAGED
RIGHT REAR WHEEL SPEED SENSOR AIR GAP OUT OF SPECIFICATION
RIGHT REAR WHEEL BEARING OUT OF SPECIFICATION
RIGHT REAR WHEEL SPEED SENSOR INOPERATIVE
CAB - WON'T RESPOND TO RIGHT REAR WHEEL SPEED SENSOR SIGNAL
INTERMITTENT SIGNAL DTC

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Ar both Right Rear Sensor Signal Failure and Right Rear Sensor Circuit Failure displayed? Yes → Refer to symptom Right Rear Sensor Circuit Failure in the BRAKES Category. Perform ABS VERIFICATION TEST - VER 1. No → Go To 2	All
2	While an assistant drives the vehicle, monitor the Wheel Speed Sensors using the DRBIII®. Slowly accelerate as straight as possible from a stop to 24 Km/h (15 Mph). Is the Right Rear WSS Signal 0 Km/h (0 Mph) or differing from others by more than 5kmh (3mph)? Yes → Go To 3 No → Go To 7	All

RIGHT REAR SENSOR SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Inspect the Right Rear Wheel Speed Sensor and Connector. Is the Sensor or Connector Damaged? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Inspect the Tone Wheel for damaged or missing teeth, cracks, or looseness. **Note: The Tone Wheel Teeth should be perfectly square, not bent or nicked.** Is the Tone Wheel OK? Yes → Go To 5 No → Replace the Tone Wheel. Perform ABS VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Using a Feeler Gauge, measure the Wheel Speed Sensor Air Gap. **NOTE: The Air Gap should be checked in at least four places on the Tone Wheel.** Is the Air Gap between 0.42 mm - 1.71 mm (0.017″ - 0.068″) ? Yes → Go To 6 No → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Inspect the wheel bearings for excessive runout or clearance. **Note: Refer to the appropriate service information, if necessary, for procedures or specifications.** Is the bearing clearance OK ? Yes → Go To 8 No → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Visually inspect wheel speed sensor. Visually inspect tone wheel. Visually inspect wiring harness. Visually inspect brakes for locking up due to lining contamination or overheating. Inspect all Components for defects which may cause a Signal DTC to set. Is any Component Damaged? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 8	All

RIGHT REAR SENSOR SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the CAB connector. Set up a voltmeter to measure AC voltage on the Right Rear Wheel Speed Sensor Signal Circuits at the CAB connector. Raise the right rear wheel off the ground. Quickly rotate the wheel by spinning the tire by hand. Measure the AC voltage on the Right Rear Wheel Speed Sensor (+) and (-) Signal Circuits. Does the voltage go above 650 millivolts as the wheel is rotated? Yes → Replace the CAB. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Right Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST - VER 1.	All

Symptom:
SYSTEM OVERVOLTAGE

When Monitored and Set Condition:

SYSTEM OVERVOLTAGE

When Monitored: Ignition on. The CAB monitors the Fused B(+) circuit at all times for proper system voltage.

Set Condition: If the voltage is above 16.5 volts for greater than 420 milliseconds (ms), the Diagnostic Trouble Code (DTC) is set.

POSSIBLE CAUSES
BATTERY OVERCHARGED
FUSED IGNITION SWITCH OUTPUT HIGH
GROUND CIRCUIT OPEN
CAB - INTERNAL FAULT
INTERMITTENT DTC

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. Start the engine. With the DRBIII®, read DTC's. Does the DRBIII® display System Overvoltage DTC present right now? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Inspect for battery charger connected to battery. Is a battery charger connected to the battery? Yes → Charge battery to proper level. Disconnect the battery charger. Clear DTC's. Perform ABS VERIFICATION TEST - VER 1. No → Go To 3	All

SYSTEM OVERVOLTAGE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Start the engine. Raise engine speed above 1,800 RPM. Measure the battery voltage. Is the voltage above 16.5 volts ? Yes → Refer to appropriate service information for charging system testing and repair. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the ground circuits. Is the resistance below 1.0 ohm? Yes → Go To 5 No → Repair the Ground circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
5	If there are no potential causes remaining, view repair. Repair Replace the Controller Antilock Brake. 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. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
SYSTEM UNDERVOLTAGE

When Monitored and Set Condition:

SYSTEM UNDERVOLTAGE

When Monitored: Ignition on. The CAB monitors the Fused Ignition Switch Output circuit voltage above 10 km/h (6 mph) every 7 milliseconds for proper system voltage.

Set Condition: If the voltage is below 9.5 volts, the Diagnostic Trouble Code (DTC) is set.

POSSIBLE CAUSES
BATTERY VOLTAGE LOW
INTERMITTENT DTC
FUSED IGNITION SWITCH OUTPUT CIRCUIT HIGH RESISTANCE
GROUND CIRCUIT OPEN
CAB - INTERNAL FAULT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. Start the engine. Drive the vehicle above 16 Km/h (10 mph) for at least 20 seconds. Stop the vehicle With the DRBIII®, read DTC's. Does the DRBIII® display System Undervoltage DTC present right now? Yes → Go To 2 No → Go To 6	All
2	Engine Running. Measure the battery voltage. Is the battery voltage below 10 volts? Yes → Refer to appropriate service information for charging system testing and repair. Perform ABS VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the ground circuits. Is the resistance below 1.0 ohm? Yes → Go To 4 No → Repair the Ground circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All

SYSTEM UNDERVOLTAGE — Continued

TEST	ACTION	APPLICABILITY
4	Disconnect the CAB harness connector. Turn the ignition on. Measure the voltage of the Fused Ignition Switch circuit. Is the voltage above 10 volts? Yes → Go To 5 No → Repair the Fused Ignition Switch Output Circuit for high resistance Perform ABS VERIFICATION TEST - VER 1.	All
5	If there are no potential causes remaining, view repair. Repair Replace the Controller Antilock Brake. 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. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:

*ABS WARNING INDICATOR ALWAYS ON

POSSIBLE CAUSES
ABS RELAY STUCK
ABS RELAY FUSED B+ CIRCUIT OPEN
ABS RELAY CONTROL CIRCUIT OPEN
CAB INTERNAL OPEN
ABS INDICATOR DRIVER SHORT TO GROUND
INSTRUMENT CLUSTER CONCERN

TEST	ACTION	APPLICABILITY
1	Remove the ABS relay from PDC. Perform the key-on bulb test. Does the ABS Indicator light and remain lit? Yes → Go To 2 No → Go To 3	All
2	Disconnect the Instrument Cluster C1 harness connector. Remove the ABS relay from the PDC. Using a 12-volt test light connected to 12-volts, check the ABS Warning Indicator Driver circuit. Does the test light illuminate? Yes → Repair the ABS Indicator circuit for a short to ground. Perform ABS VERIFICATION TEST - VER 1. No → Refer to symptom list for problems related to Instrument Cluster. Perform ABS VERIFICATION TEST - VER 1.	All
3	Install a substitute relay in place of the ABS relay. Perform the key-on bulb check. Does the ABS Warning Indicator operate OK? Yes → Replace the ABS relay. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All
4	Remove the ABS relay from the PDC. Turn the ignition on. Using a 12-volt test light connected to ground, check the Fused B+ circuit. Does the test light illuminate? Yes → Go To 5 No → Repair the ABS relay Fused B+ circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All

*ABS WARNING INDICATOR ALWAYS ON — Continued

TEST	ACTION	APPLICABILITY
5	Remove the ABS relay. Disconnect the CAB harness connector. Measure the resistance of the ABS Relay Control circuit. Is the resistance below 5.0 ohms? Yes → Replace the Controller Antilock Brake. Perform ABS VERIFICATION TEST - VER 1. No → Repair the ABS Relay Control circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All

Symptom:

*ABS WARNING INDICATOR INOPERATIVE

POSSIBLE CAUSES
INSTRUMENT CLUSTER CONCERN
ABS RELAY STUCK
ABS RELAY GROUND CIRCUIT OPEN
ABS RELAY CONTROL CIRCUIT SHORT TO GROUND
CAB INTERNAL SHORT TO GROUND
ABS INDICATOR BULB OPEN
ABS INDICATOR DRIVER OPEN
INSTRUMENT CLUSTER INTERNAL OPEN

TEST	ACTION	APPLICABILITY
1	Perform the key-on bulb check. Do all bulbs check OK except for the ABS Warning Indicator? Yes → Go To 2 No → Refer to symptom list for problems related to Instrument Cluster. Perform ABS VERIFICATION TEST - VER 1.	All
2	Install a substitute relay in place of the ABS relay. Perform the key-on bulb check. Does the ABS Warning Indicator operate OK? Yes → Replace the ABS relay. Perform ABS VERIFICATION TEST - VER 1. No → Go To 3	All
3	Remove the ABS relay from PDC. Connect a jumper wire between the ABS Warning Indicator driver cavity of the ABS relay socket and ground. Key to RUN Does the ABS Indicator light? Yes → Go To 4 No → Go To 6	All
4	Remove the ABS relay from the PDC. Using a 12-volt test light connected to 12-volts, check the ABS relay ground circuit. Does the test light illuminate? Yes → Go To 5 No → Repair the ABS relay Ground circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All

*ABS WARNING INDICATOR INOPERATIVE — Continued

TEST	ACTION	APPLICABILITY
5	Remove the ABS relay. Disconnect the CAB harness connector. Using a 12-volt test light connected to 12-volts, check the ABS Relay Control circuit. Does the test light illuminate? Yes → Repair the ABS Relay Control circuit for a short to ground. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Controller Antilock Brake. Perform ABS VERIFICATION TEST - VER 1.	All
6	Install a substitute bulb in place of the ABS Indicator bulb. Perform the key-on bulb check. Does the ABS bulb illuminate? Yes → Replace the ABS indicator bulb. Perform ABS VERIFICATION TEST - VER 1. No → Go To 7	All
7	Disconnect the Instrument Cluster C1 harness connector. Remove the ABS relay from the PDC. Measure the resistance of the ABS Indicator driver circuit. Is the resistance below 5.0 ohms? Yes → Replace the Instrument Cluster in accordance with the Service Information.. Perform ABS VERIFICATION TEST - VER 1. No → Repair the ABS Indicator Driver circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All

Symptom:

***BRAKE LAMP SWITCH**

POSSIBLE CAUSES
CHECK BRAKE LAMP SWITCH OUTPUT
BRAKE LAMP SWITCH B+ OPEN
BRAKE LAMP SWITCH OUTPUT CIRCUIT SHORT OR OPEN
BRAKE LAMP SWITCH OPEN
CAB -- INTERNAL OPEN

TEST	ACTION	APPLICABILITY
1	With the DRBIII® in Inputs/Outputs, read the Brake Lamp Switch state. Press and release the brake pedal. Does the DRBIII® display PRESSED and RELEASED? Yes → The Brake Lamp Switch is OK. Perform ABS VERIFICATION TEST - VER 1. No → Go To 2	All
2	Disconnect the Brake Lamp Switch harness connector. Using a 12-volt test light connected to ground, check the Brake Lamp Switch Fused B+ circuit. Does the test light illuminate brightly ? Yes → Go To 3 No → Repair the Brake Lamp Switch Fused B+ circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
3	Disconnect the Brake Lamp Switch harness connector. Connect a jumper wire between the Brake Lamp Switch B+ and Output circuits. With the DRBIII® in Inputs/Outputs, read the Brake Lamp Switch state. Does the DRBIII® display PRESSED? Yes → Replace the Brake Lamp Switch in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All
4	Disconnect the CAB harness connector. Disconnect the Brake Lamp Switch harness connector. Check the Brake Lamp Switch Output circuit for a short to voltage and an open. Is the Brake Lamp Switch Output circuit shorted or open? Yes → Repair the Brake Lamp Switch Output circuit for a short to voltage or an open. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Controller Anti-Lock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All

Symptom:

***NO RESPONSE FROM CONTROLLER ANTILOCK BRAKE**

POSSIBLE CAUSES
ATTEMPT TO COMMUNICATE WITH THE PCM
CHECK FUSE #25 IN JUNCTION BLOCK
OPEN GROUND CIRCUITS
OPEN FUSED IGNITION SWITCH OUTPUT CIRCUIT
SCI TRANSMIT CIRCUIT OPEN
CONTROLLER ANTILOCK BRAKE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB attempt to communicate with the PCM. Was the DRB able to communicate with the PCM? Yes → Go To 2 No → Refer to symptom list for problems related to No Response From PCM. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Remove and inspect fuse #25 in the Junction Block. Is the fuse open? Yes → Refer to the wiring diagrams located in the service information to help isolate a possible short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the CAB harness connector. Measure the resistance between ground and each ground circuit (cavs 8 and 24). Is the resistance below 5.0 ohms for each measurement? Yes → Go To 4 No → Repair the ground circuit that measured above 5.0 ohms for an open. Perform BODY VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. **NOTE: Ensure fuse #25 is installed in the Junction Block.** Disconnect the CAB harness connector. Turn the ignition on. Measure the voltage of the Fused Ignition Switch Output circuit. Is the voltage above 10.0 volts? Yes → Go To 5 No → Repair the Fused Ignition Switch Output circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

*NO RESPONSE FROM CONTROLLER ANTILOCK BRAKE — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the CAB harness connector. Measure the resistance of the SCI Transmit circuit between the CAB connector and the DLC. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the SCI Transmit circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
6	If there are no possible causes remaining, view repair. Repair Replace the Controller Antilock Brake. Perform BODY VERIFICATION TEST - VER 1.	All

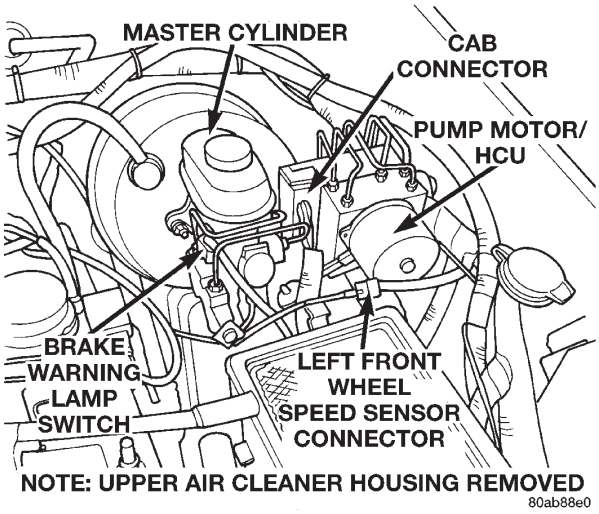
Verification Tests

ABS VERIFICATION TEST - VER 1	APPLICABILITY
1. Turn the ignition off. 2. Connect all previously disconnected components and connectors. 3. Ensure all accessories are turned off and the battery is fully charged. 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. 5. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII, read DTC's from ALL modules. 6. If any Diagnostic Trouble Codes are present, return to Symptom list and troubleshoot new or recurring symptom. 7. 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. **8. Caution: Ensure braking capability is available before road testing.** 9. Again, with the DRBIII® read DTC's. If any DTC's are present, return to Symptom list. 10. If there are no Diagnostic Trouble Codes (DTC's) present, and the customer's concern can no longer be duplicated, the repair is complete. Are any DTC's present or is the original concern still present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

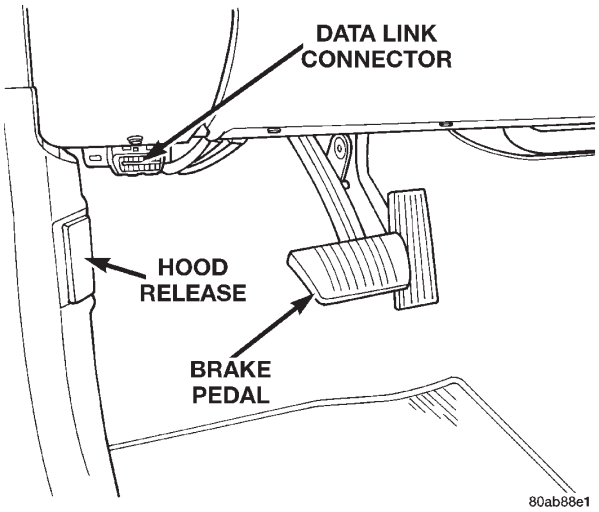
BODY VERIFICATION TEST - VER 1	APPLICABILITY
1. Disconnect all jumper wires and reconnect all previously disconnected components and connectors. 2. If the Sentry Key Immobilizer Module (SKIM) or the Powertrain Control Module (PCM) were replaced, proceed to number 4. If the SKIM or PCM were not replaced, continue to the next number. 3. If the Remote Keyless Entry module was replaced, using the DRBIII® select ″Theft Alarm″ ″VTSS″ ″Miscellaneous″ and ″Program RKE″. Program all transmitters used with this vehicle. Proceed to number 11. 4. Obtain the Vehicle's unique PIN number assigned to it's original SKIM module from either the vehicle's invoice or from Chrysler's Customer Center (1-800-992-1997). 5. With the DRBIII, select THEFT ALARM, SKIM, MISCELLANEOUS and select ″Skim Module Replaced″ function. Enter the 4 digit PIN number to put SKIM in ″Access Mode″. 6. The DRBIII will prompt you through the following steps. (1) Program the country code into the SKIM's memory. (2) Program the vehicle's VIN number into the SKIM's memory. (3) Transfer the vehicle's Secret Key data from the PCM. 7. Once secured access mode is active, the SKIM will remain in that mode for 60 seconds. 8. Using the DRBIII, program all customer keys into the SKIM's memory. This requires that the SKIM be in secured access mode, using the 4 digit code. 9. Note: If the PCM is replaced, the unique Secret Key data must be transferred from the SKIM to the PCM. This procedure requires the SKIM to be placed in secured access mode using the 4-digit code. 10. Note: If 3 attempts are made to enter secured access mode using an incorrect PIN, secured access mode will be locked out for 1 hour which causes the DRB III to display ″Bus +\- Signals Open″. To exit this mode, turn ignition to the ″Run″ pos. for 1 hour. 11. Ensure all accessories are turned off and the battery is fully charged. 12. 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. 13. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII®, read DTC's from ALL modules. Are any DTC's present or is the original complaint still present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

8.0 COMPONENT LOCATIONS

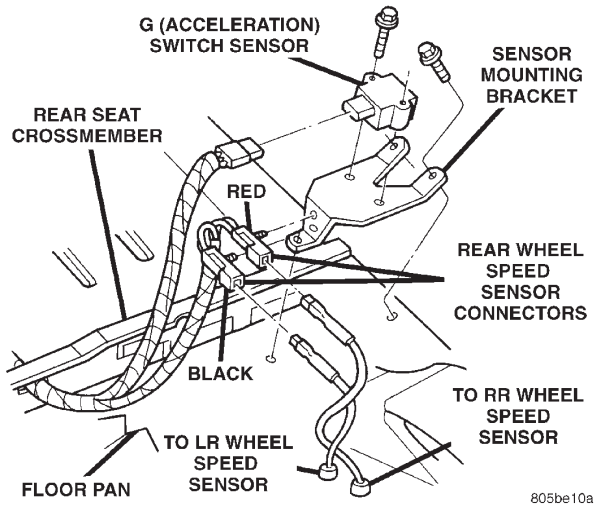
8.1 CONTROLLER ANTILOCK BRAKE



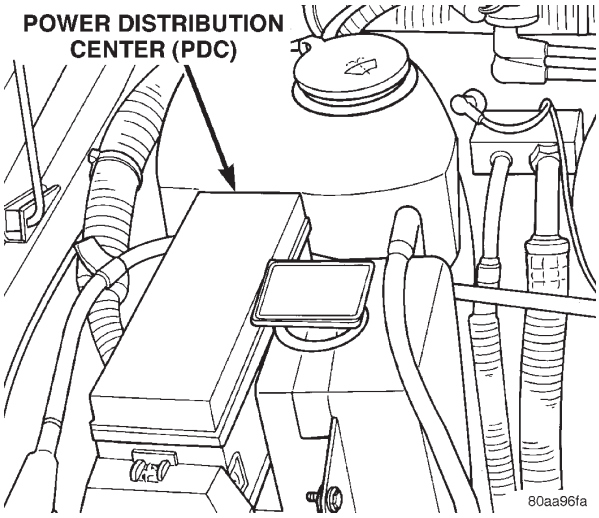
8.2 DATA LINK CONNECTOR



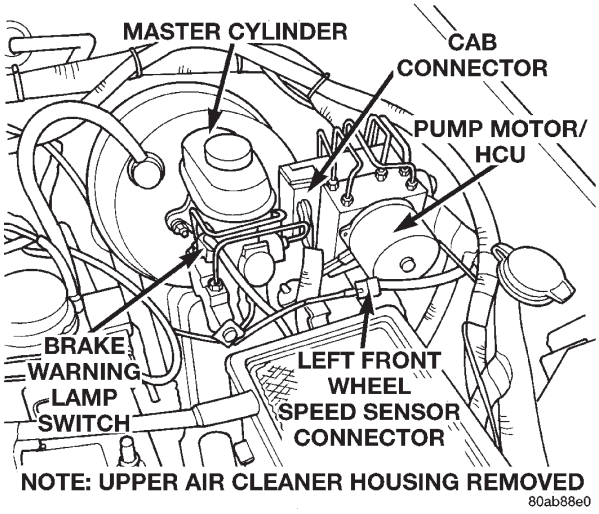
8.3 G-SWITCH



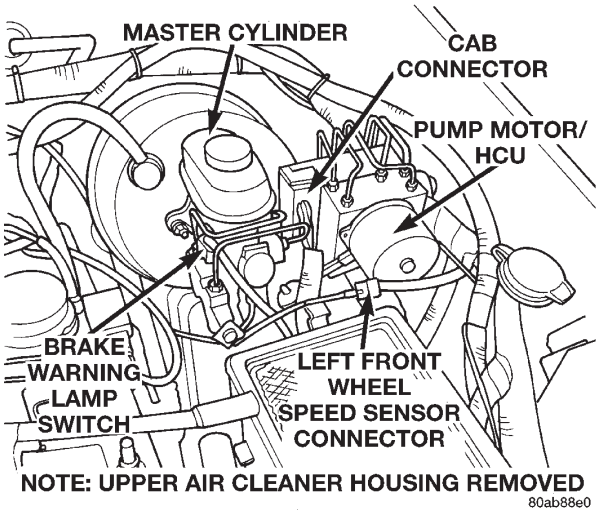
8.4 FUSES



8.5 HYDRAULIC CONTROL UNIT

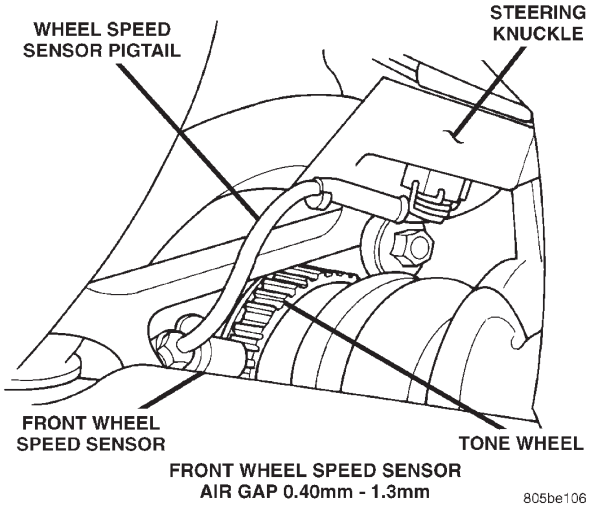


8.6 PUMP MOTOR

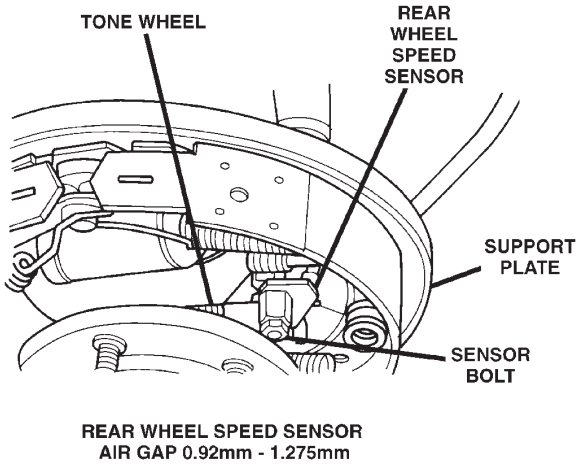


8.7 WHEEL SPEED SENSORS

8.7.1 FRONT



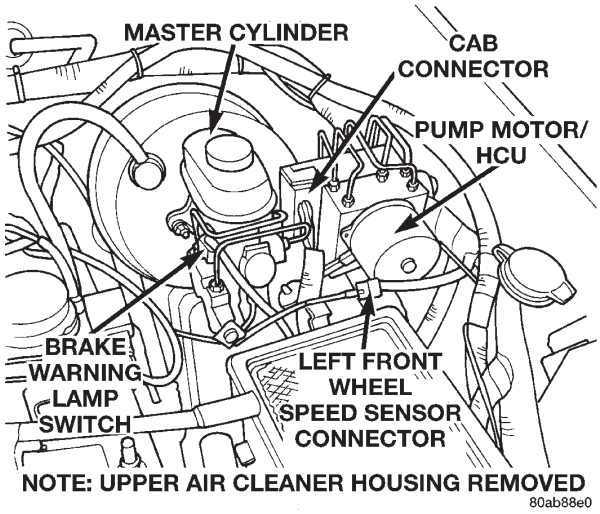
8.7.2 REAR DRUM BRAKES



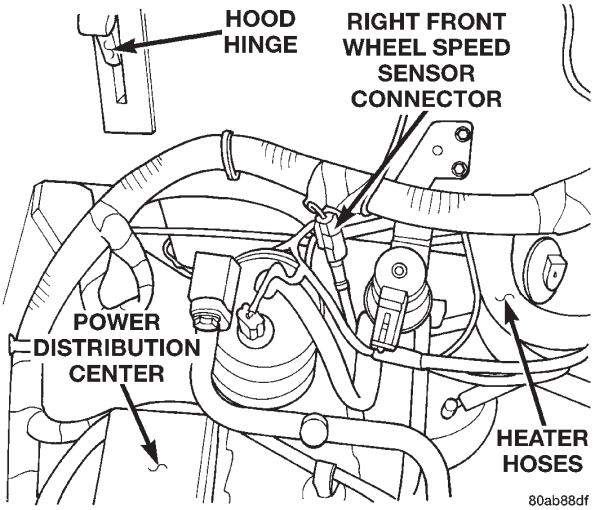
8.8 WHEEL SPEED SENSOR CONNECTORS

8.8.1 FRONT

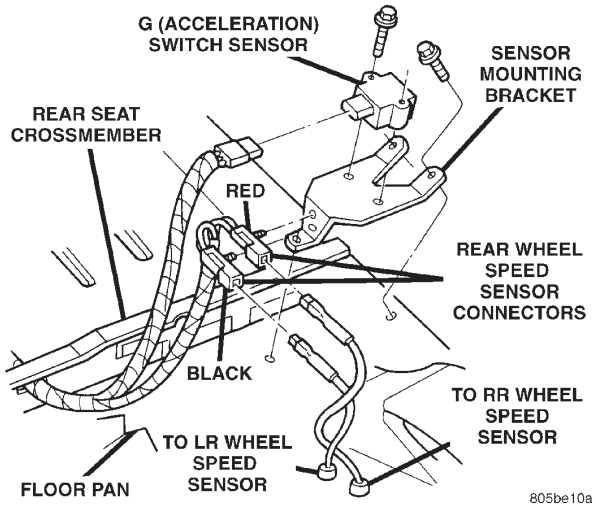
LEFT FRONT



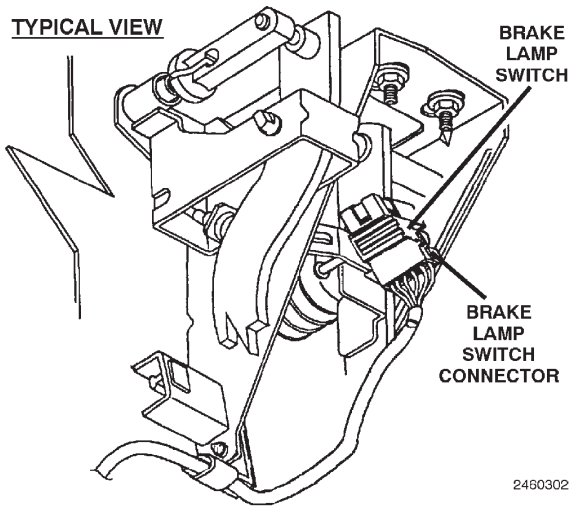
RIGHT FRONT



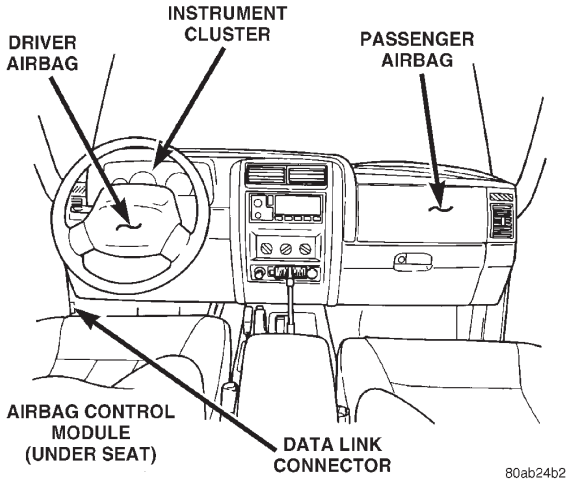
8.8.2 REAR



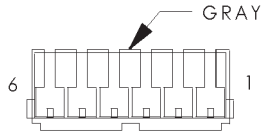
8.9 BRAKE SWITCH



8.10 INSTRUMENT CLUSTER



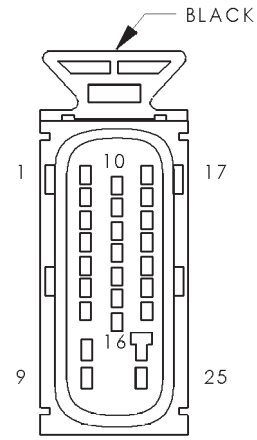
9.0 CONNECTOR PINOUTS



BRAKE LAMP SWITCH

BRAKE LAMP SWITCH - GRAY 6 WAY

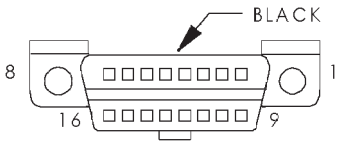
CAV	CIRCUIT	FUNCTION
1	K29 18WT/PK (GAS)	BRAKE LAMP SWITCH SENSE
1	K29 18WT/PK (DIESEL)	SECONDARY BRAKE SWITCH SIGNAL
2	Z1 18BK	GROUND
2	Z1 20BK (LHD BUILT UP EXPORT)	GROUND
3	V32 20YL/RD	SPEED CONTROL SUPPLY
4	V30 20DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
5	L50 20WT/TN (LHD GAS)	BRAKE LAMP SWITCH OUTPUT
5	L50 20WT/TN (GAS)	BRAKE LAMP SWITCH OUTPUT
5	L50 20WT/TN (DIESEL)	PRIMARY BRAKE SWITCH SIGNAL
6	F32 20PK/DB	FUSED B(+)



CONTROLLER ANTI-LOCK BRAKE

CONTROLLER ANTILOCK BRAKE - BLACK 25 WAY

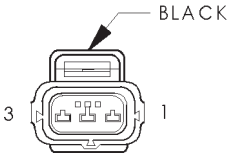
CAV	CIRCUIT	FUNCTION
1	B1 18YL/DB	RIGHT REAR WHEEL SPEED SENSOR (-)
2	B3 18LG/DB	LEFT REAR WHEEL SPEED SENSOR (-)
3	B7 18WT	RIGHT FRONT WHEEL SPEED SENSOR (+)
4	B9 18RD	LEFT FRONT WHEEL SPEED SENSOR (+)
5	-	-
6	B41 18YL/VT	G SWITCH NO. 1 SENSE
7	B42 18TN/WT	G SWITCH NO. 2 SENSE
8	Z1 12BK	GROUND
9	A20 12RD/DB	FUSED B(+)
10	B4 18LG	LEFT REAR WHEEL SPEED SENSOR (+)
11	B8 18RD/DB	LEFT FRONT WHEEL SPEED SENSOR (-)
12	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
13	B43 18PK/OR	G SWITCH TEST SIGNAL
14	-	-
15	-	-
16	G83 18GY/BK	ABS RELAY CONTROL
17	B2 18YL	RIGHT REAR WHEEL SPEED SENSOR (+)
18	B6 18WT/DB	RIGHT FRONT WHEEL SPEED SENSOR (+)
19	-	-
20	D21 18PK	SCI TRANSMIT
21	-	-
22	-	-
23	F15 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN)
24	Z1 12BK	GROUND
25	A10 12RD/DG	FUSED B(+)



DATA LINK CONNECTOR

DATA LINK CONNECTOR - BLACK 16 WAY

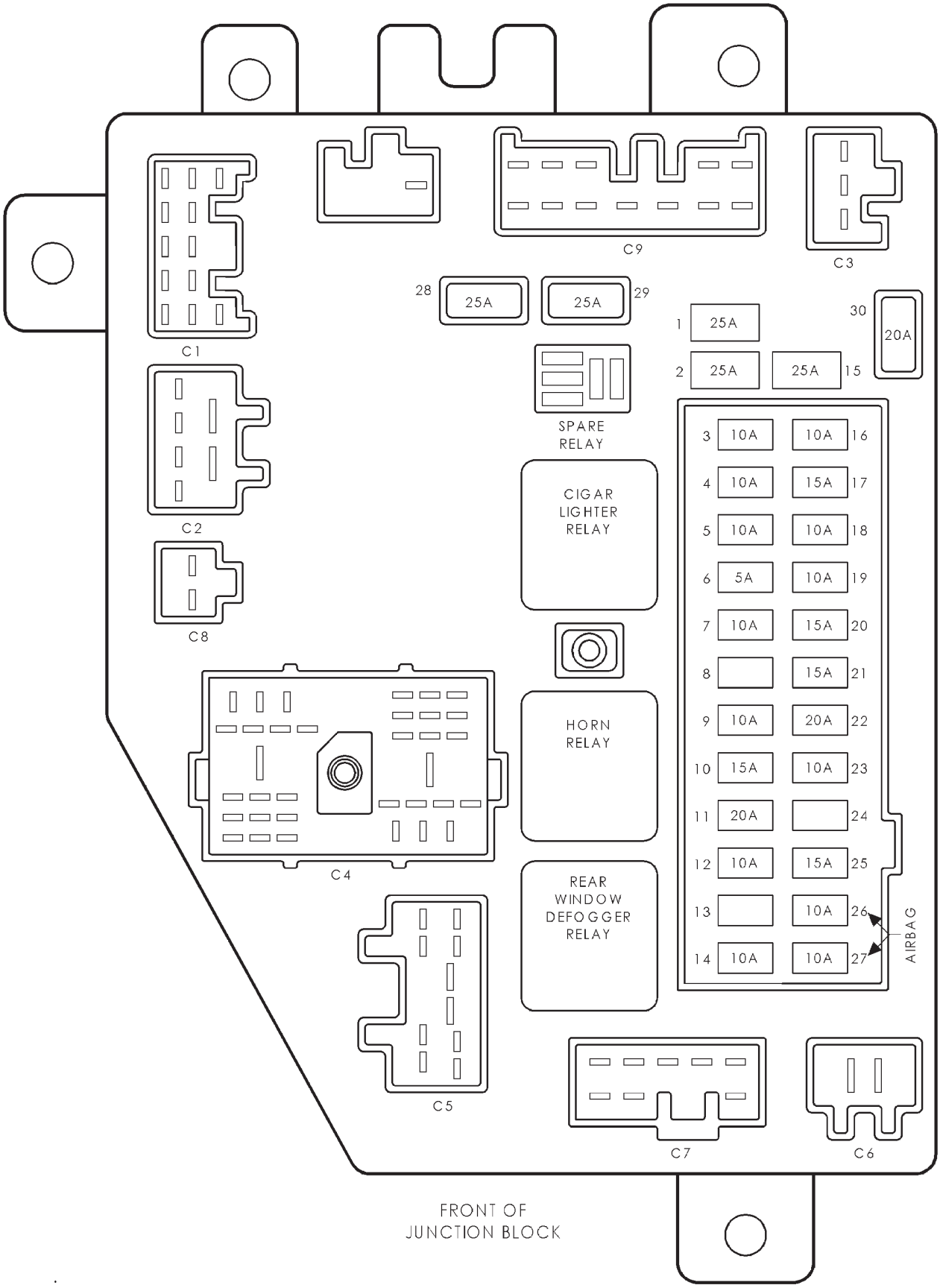
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	D1 18VT/BR	CCD BUS (+)
4	Z1 18BK	GROUND
5	Z12 18BK/TN	GROUND
6	D20 20LG/BK	SCI RECEIVE
7	D21 20PK	SCI TRANSMIT
8	-	-
9	-	-
10	-	-
11	D2 18WT/BK	CCD BUS (-)
12	-	-
13	-	-
14	-	-
15	-	-
16	F34 18TN/BK	FUSED B(+)



G-SWITCH

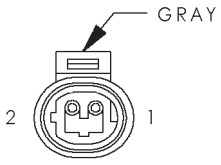
G-SWITCH - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	B42 20TN/WT	G SWITCH NO. 2 SENSE
2	B41 20YL/VT	G SWITCH NO. 1 SENSE
3	B43 20PK/OR	G SWITCH TEST SIGNAL


C9
C3
C1
28
25A
25A
29
1
25A
30
20A
2
25A
25A
15
SPARE
RELAY
C2
CIGAR
LIGHTER
RELAY
C8
3
10A
10A
16
4
10A
15A
17
5
10A
10A
18
6
5A
10A
19
7
10A
15A
20
8
15A
21
9
10A
20A
22
10
15A
10A
23
11
20A
24
12
10A
15A
25
13
10A
26
14
10A
10A
27
AIRBAG
HORN
RELAY
C4
REAR
WINDOW
DEFOGGER
RELAY
C5
C7
C6
FRONT OF
JUNCTION BLOCK

FUSES (JB)

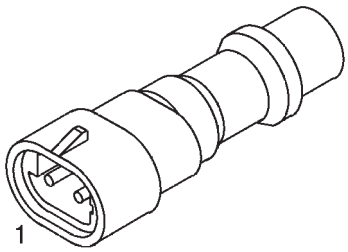
FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	25A	INTERNAL	FUSED B(+)
2	25A	INTERNAL	FUSED B(+)
3	10A	INTERNAL	DIMMER SWITCH HIGH BEAM OUTPUT
4	10A	INTERNAL	DIMMER SWITCH HIGH BEAM OUTPUT
5	10A	INTERNAL	DIMMER SWITCH HIGH BEAM OUTPUT
6	5A	E2 20OR	PANEL LAMPS DIMMER SWITCH SIGNAL
7	10A	INTERNAL	HEADLAMP SWITCH OUTPUT
8	-	-	-
9	10A	F87 20WT/BK	IGNITION SWITCH OUTPUT (RUN-START)
10	15A	F20 18WT	IGNITION SWITCH OUTPUT (RUN-START)
11	20A	F12 18DB/WT	IGNITION SWITCH OUTPUT (RUN-START)
12	10A	INTERNAL	IGNITION SWITCH OUTPUT (RUN)
13	-	-	-
14	10A	INTERNAL	REAR WINDOW DEFOGGER RELAY OUTPUT
15	25A	INTERNAL	FUSED B(+)
16	10A	INTERNAL	DIMMER SWITCH HIGH BEAM OUTPUT
17	15A	INTERNAL	IGNITION SWITCH OUTPUT (RUN-ACC)
18	10A	INTERNAL	IGNITION SWITCH OUTPUT (RUN-ACC)
19	10A	F45 20YL/RD	IGNITION SWITCH OUTPUT (START)
20	15A	A6 20RD/OR	FUSED B(+)
21	15A	INTERNAL	FUSED B(+)
22	20A	V23 18BR/PK	IGNITION SWITCH OUTPUT (RUN)
23	10A	INTERNAL	HEADLAMP SWITCH OUTPUT
24	-	-	-
25	15A	INTERNAL	IGNITION SWITCH OUTPUT (RUN)
26	10A	F14 18LG/YL	IGNITION SWITCH OUTPUT (RUN)
27	10A	F23 18DB/YL	IGNITION SWITCH OUTPUT (RUN-START)



LEFT FRONT WHEEL SPEED SENSOR

LEFT FRONT WHEEL SPEED SENSOR - GRAY 2 WAY

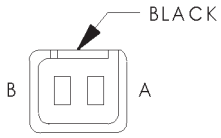
CAV	CIRCUIT	FUNCTION
1	B8 18RD/DB	LEFT FRONT WHEEL SPEED SENSOR (-)
2	B9 18RD	LEFT FRONT WHEEL SPEED SENSOR (+)



LEFT FRONT WHEEL SPEED SENSOR CONNECTOR (SENSOR SIDE)

LEFT FRONT WHEEL SPEED SENSOR CONNECTOR - 2 WAY (SENSOR SIDE)

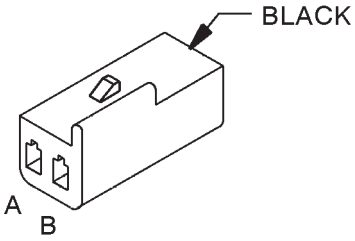
CAV	CIRCUIT	FUNCTION
1	RD/DB	LEFT FRONT WHEEL SPEED SENSOR (-)
2	RD	LEFT FRONT WHEEL SPEED SENSOR (+)



LEFT REAR WHEEL SPEED SENSOR

LEFT REAR WHEEL SPEED SENSOR - BLACK 2 WAY

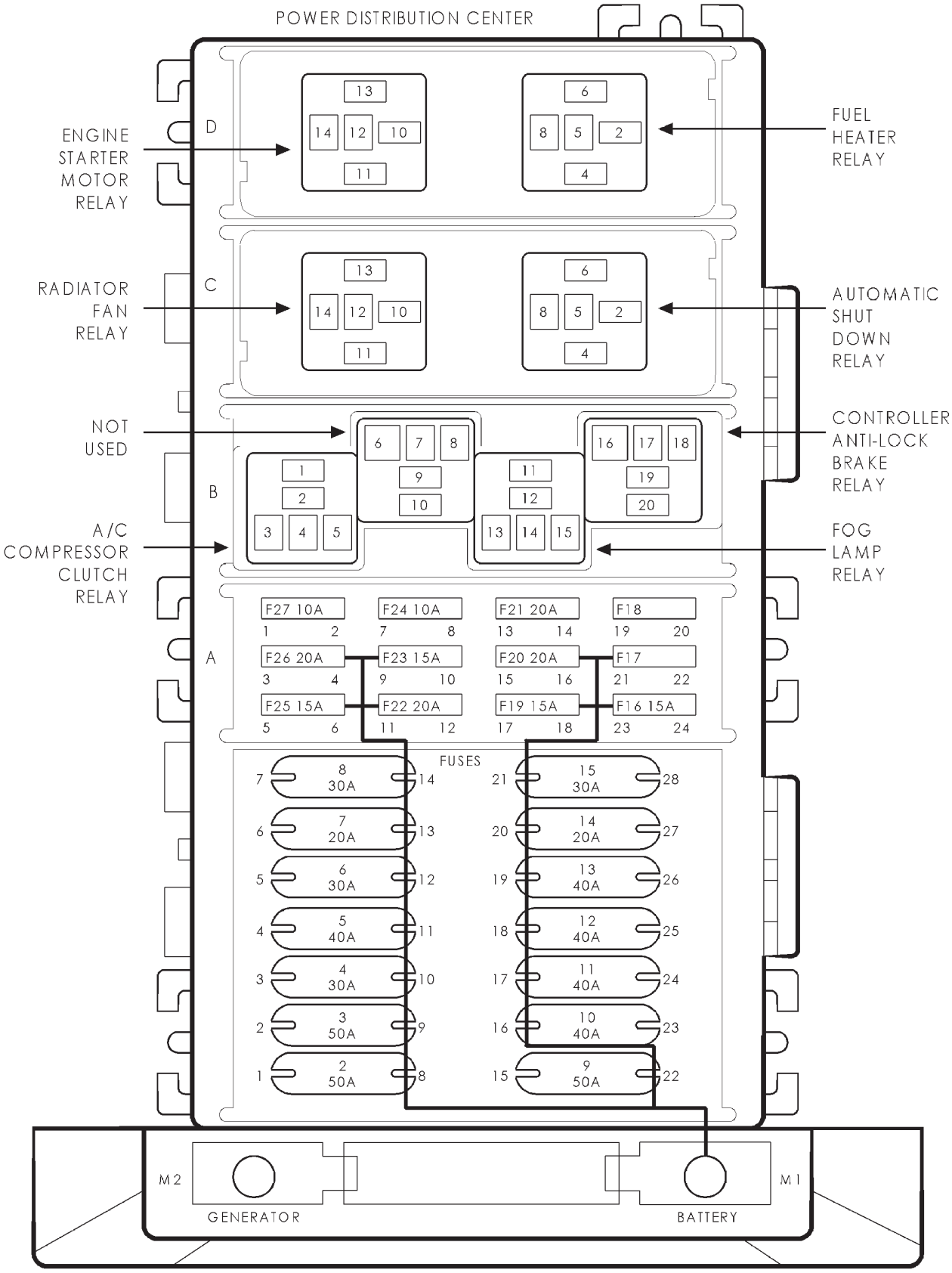
CAV	CIRCUIT	FUNCTION
A	B3 20LG/DB	LEFT REAR WHEEL SPEED SENSOR (-)
B	B4 20LG	LEFT REAR WHEEL SPEED SENSOR (+)



LEFT REAR WHEEL SPEED SENSOR CONNECTOR (SENSOR SIDE)

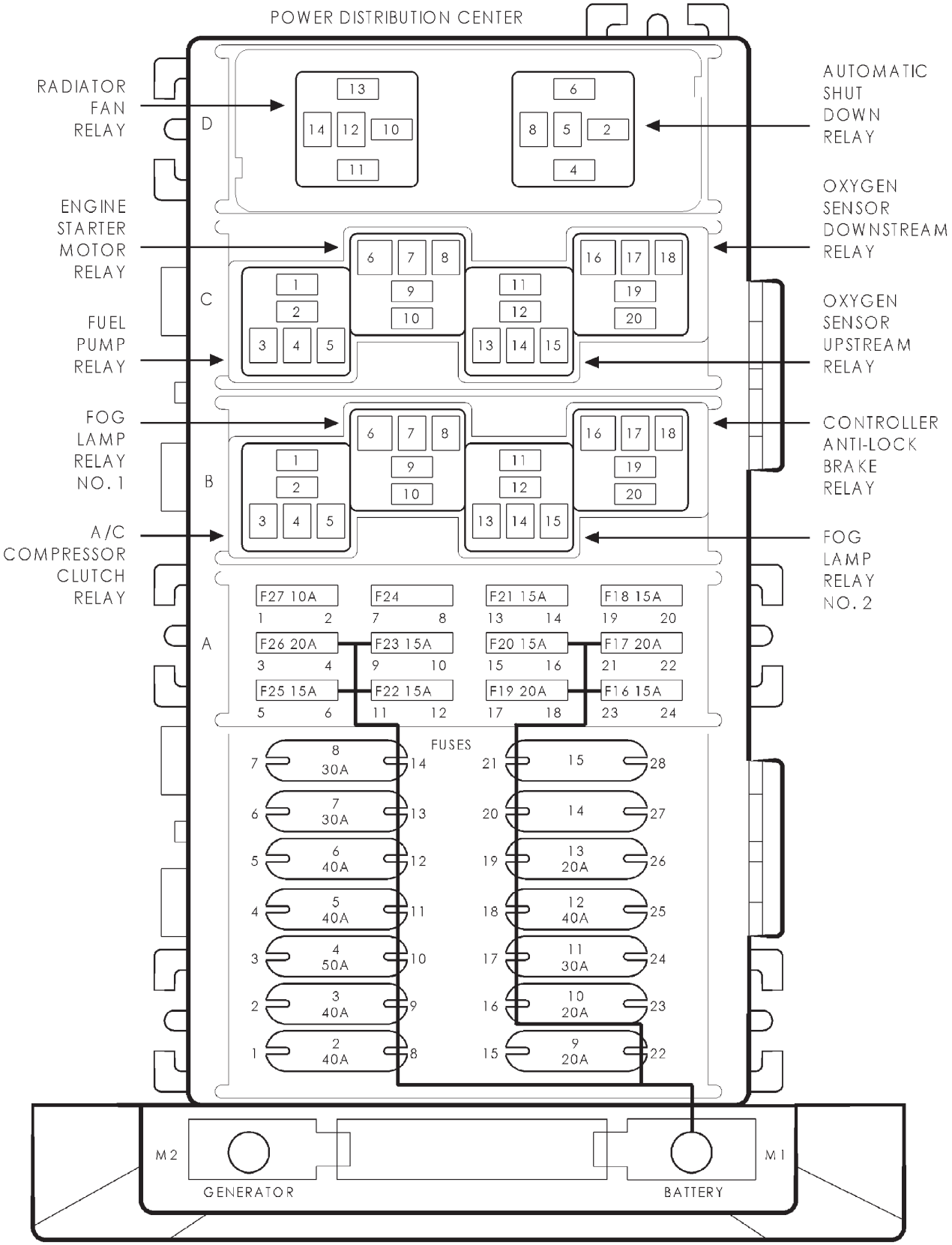
LEFT REAR WHEEL SPEED SENSOR CONNECTOR - 2 WAY (SENSOR SIDE)

CAV	CIRCUIT	FUNCTION
1	LG/DB	LEFT REAR WHEEL SPEED SENSOR (-)
2	LG	LEFT REAR WHEEL SPEED SENSOR (+)


POWER DISTRIBUTION CENTER
ENGINE STARTER MOTOR RELAY
RADIATOR FAN RELAY
NOT USED
A/C COMPRESSOR CLUTCH RELAY
FUEL HEATER RELAY
AUTOMATIC SHUT DOWN RELAY
CONTROLLER ANTI-LOCK BRAKE RELAY
FOG LAMP RELAY
D
C
B
A
F27 10A
F24 10A
F21 20A
F18
F26 20A
F23 15A
F20 20A
F17
F25 15A
F22 20A
F19 15A
F16 15A
FUSES
8 30A
7 20A
6 30A
5 40A
4 30A
3 50A
2 50A
15 30A
14 20A
13 40A
12 40A
11 40A
10 40A
9 50A
M2
M1
GENERATOR
BATTERY

FUSES (DIESEL)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	-	-	-
2	50A	A54 12RD/GY	FUSED B(+)
3	50A	A54 12RD/GY	FUSED B(+)
4	30A	A16 12RD/LG	FUSED B(+)
5	40A	A1 12RD	FUSED B(+)
6	30A	A61 14LG/RD	FUSED B(+)
7	20A	A41 16YL	FUSED B(+)
8	30A	A3 14RD/WT	FUSED B(+)
9	50A	A7 10RD/BK	FUSED B(+)
10	40A	A2 12PK/BK	FUSED B(+)
11	40A	A111 12RD/LG	FUSED B(+)
12	40A	F141 12LG/RD	FUSED B(+)
13	40A	F141 12LG/RD	FUSED B(+)
14	20A	A20 12RD/DB	FUSED B(+)
15	30A	A4 12BK/PK	FUSED B(+)
16	15A	M1 20PK	FUSED B(+)
16	15A	M1 20PK	FUSED B(+)
17	-	-	-
18	-	-	-
19	15A	F32 20PK/DB	FUSED B(+)
20	20A	A17 18RD/BK	FUSED B(+)
20	20A	A17 16RD/BK	FUSED B(+)
21	20A	F142 16DG/OR	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
22	20A	F75 16VT	FUSED B(+)
23	15A	L9 20BK/PK	FUSED B(+)
24	10A	F16 16RD/LG	FUSED B(+)
25	15A	F61 20WT/OR	FUSED B(+)
26	20A	F34 18TN/BK	FUSED B(+)
27	10A	F1 20DB/GY	FUSED B(+)

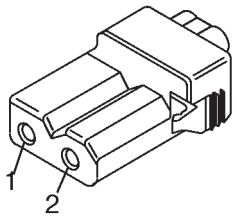

POWER DISTRIBUTION CENTER
RADIATOR FAN RELAY
ENGINE STARTER MOTOR RELAY
FUEL PUMP RELAY
FOG LAMP RELAY NO. 1
A/C COMPRESSOR CLUTCH RELAY
AUTOMATIC SHUT DOWN RELAY
OXYGEN SENSOR DOWNSTREAM RELAY
OXYGEN SENSOR UPSTREAM RELAY
CONTROLLER ANTI-LOCK BRAKE RELAY
FOG LAMP RELAY NO. 2
D
C
B
A
F27 10A
F24
F21 15A
F18 15A
F26 20A
F23 15A
F20 15A
F17 20A
F25 15A
F22 15A
F19 20A
F16 15A
FUSES
8 30A
7 30A
6 40A
5 40A
4 50A
3 40A
2 40A
15
14
13 20A
12 40A
11 30A
10 20A
9 20A
M2
GENERATOR
BATTERY
M1

FUSES (PDC)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	-	-	-
2	40A	A1 12RD	FUSED B(+)
3	40A	A2 12PK/BK	FUSED B(+)
4	50A	A7 10RD/BK	FUSED B(+)
5	40A	F141 12LG/RD	FUSED B(+)
6	40A	A111 12RD/LG	FUSED B(+)
7	30A	A3 14RD/WT	FUSED B(+)
7	30A	A3 14RD/WT (DRL)	FUSED B(+)
8	30A	A16 14RD/LG	FUSED B(+)
9	20A	A17 16RD/BK	FUSED B(+)
9	20A	A17 16RD/BK	FUSED B(+)
10	20A	A41 16YL	FUSED B(+)
11	30A	A4 12BK/PK	FUSED B(+)
12 (ABS)	40A	A10 12RD/DG	FUSED B(+)
13 (ABS)	20A	A20 12RD/DB	FUSED B(+)
14	-	-	-
15	-	-	-
16	15A	M1 20PK	FUSED B(+)
17	20A	F99 18RD	FUSED B(+)
18	15A	A142 18DG/OR	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
19	20A	F34 18TN/BK	FUSED B(+)
20	15A	L9 20BK/PK	FUSED B(+)
21	15A	F142 18DG/WT	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
22	15A	A61 14DG/BK	FUSED B(+)
23	15A	F32 20PK/DB	FUSED B(+)
24	-	-	-
25	15A	F61 20WT/OR	FUSED B(+)
26	20A	F75 16VT	FUSED B(+)
27 (ABS)	10A	F1 20DB/GY	A17 16RD/BK

CONTROLLER ANTILOCK BRAKE RELAY (GAS)

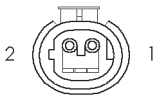
CAV	CIRCUIT	FUNCTION
B16	F15 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN)
B17	Z1 20BK	GROUND
B17	Z1 20BK (ABS EXCEPT DRL)	GROUND
B18	G83 18GY/BK	ABS RELAY CONTROL
B19	-	-
B20	G19 20LG/OR	ABS WARNING INDICATOR DRIVER



PUMP MOTOR CONNECTOR

PUMP MOTOR CONNECTOR - 2 WAY

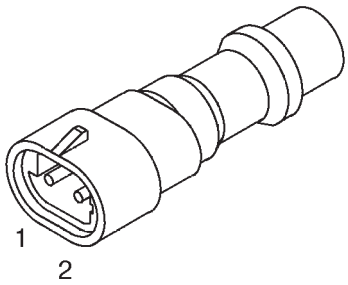
CAV	CIRCUIT	FUNCTION
1	TN	GROUND
2	RD	PUMP/MOTOR RELAY OUTPUT



RIGHT FRONT WHEEL SPEED SENSOR

RIGHT FRONT WHEEL SPEED SENSOR - 2 WAY

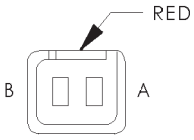
CAV	CIRCUIT	FUNCTION
1	B6 18WT/DB	RIGHT FRONT WHEEL SPEED SENSOR (-)
2	B7 18WT	RIGHT FRONT WHEEL SPEED SENSOR (+)



RIGHT FRONT WHEEL SPEED SENSOR CONNECTOR (SENSOR SIDE)

RIGHT FRONT WHEEL SPEED SENSOR CONNECTOR - 2 WAY (SENSOR SIDE)

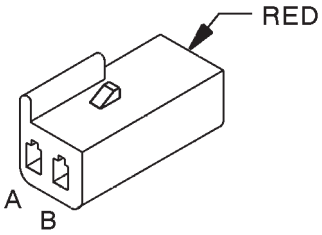
CAV	CIRCUIT	FUNCTION
1	WT/DB	RIGHT FRONT WHEEL SPEED SENSOR (-)
2	WT	RIGHT FRONT WHEEL SPEED SENSOR (+)



RIGHT REAR WHEEL SPEED SENSOR

RIGHT REAR WHEEL SPEED SENSOR - RED 2 WAY

CAV	CIRCUIT	FUNCTION
A	B1 20YL/DB	RIGHT REAR WHEEL SPEED SENSOR (-)
B	B2 20YL	RIGHT REAR WHEEL SPEED SENSOR (+)



RIGHT REAR WHEEL SPEED SENSOR CONNECTOR (SENSOR SIDE)

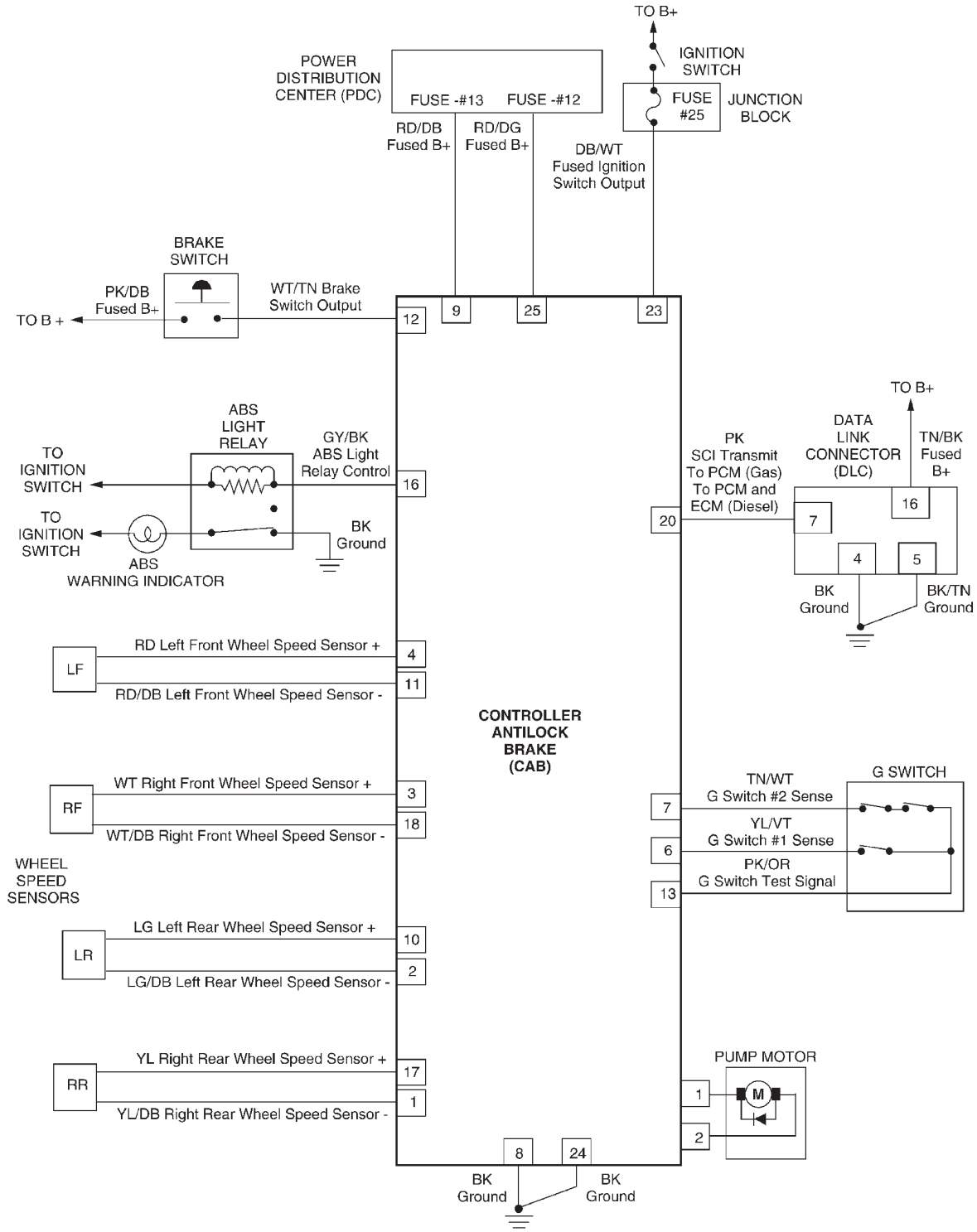
RIGHT REAR WHEEL SPEED SENSOR CONNECTOR - 2 WAY (SENSOR SIDE)

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

NOTES

10.0 SCHEMATIC

2000 XJ TEVES MARK 20 ANTILOCK BRAKE SYSTEM



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