TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 SYSTEM COVERAGE 1
1.2 SIX-STEP TROUBLESHOOTING PROCEDURE 1

2.0 IDENTIFICATION OF SYSTEM 1

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION 1

3.1 TEVES ABS SYSTEM DESCRIPTION 1
3.1.2 TRACTION CONTROL SYSTEM (TCS) DESCRIPTION 2
3.1.3 PEDAL FEEL/VEHICLES CHARACTERISTICS 2
3.1.4 SYSTEM COMPONENTS 3
3.1.5 ABS AND RED BRAKE WARNING INDICATOR 3
3.1.4 CONTROLLER ANTILOCK BRAKE (CAB) 3
3.1.6 HYDRAULIC CONTROL UNIT 4
3.1.7 SENSORS 4
3.2 ABS DIAGNOSTIC TROUBLE CODES 4
3.2.1 SYSTEM INITIALIZATION 4
3.2.2 DIAGNOSTIC MODE 5
3.2.3 INTERMITTENT DIAGNOSTIC TROUBLE CODES 5
3.3 USING THE DRBIII® 5
3.4 DRBIII® ERROR MESSAGES 5
3.4.1 DRBIII® DOES NOT POWER UP (BLANK SCREEN) 5
3.4.2 DISPLAY IS NOT VISIBLE 5

4.0 DISCLAIMERS, SAFETY, WARNINGS 6

4.1 DISCLAIMERS 6
4.2 SAFETY 6
4.2.1 TECHNICIAN SAFETY INFORMATION 6
4.2.2 VEHICLE PREPARATION FOR TESTING 6
4.2.3 SERVICING SUB-ASSEMBLIES 6
4.2.4 DRBIII® SAFETY INFORMATION 6
4.3 WARNING 7
4.3.1 VEHICLE DAMAGE WARNINGS 7
4.3.2 ROAD TESTING A COMPLAINT VEHICLE 7
4.4 DIAGNOSIS 7

5.0 REQUIRED TOOLS AND EQUIPMENT 7

6.0 GLOSSARY OF TERMS 8

7.0 DIAGNOSTIC INFORMATION AND PROCEDURES 9

BRAKES (CAB)
CAB POWER FEED CIRCUIT 10
CLUSTER FAULT 13
CONTROLLER FAILURE 14
INCORRECT TONE WHEEL 16
LEFT FRONT SENSOR CIRCUIT FAILURE 17
LEFT FRONT SENSOR SIGNAL FAILURE 22
LEFT REAR SENSOR CIRCUIT FAILURE 25
LEFT REAR SENSOR SIGNAL FAILURE 30

TABLE OF CONTENTS - Continued

PCI BUS COMMUNICATION 33
PUMP MOTOR NOT WORKING PROPERLY 35
RIGHT FRONT SENSOR CIRCUIT FAILURE 38
RIGHT FRONT SENSOR SIGNAL FAILURE 43
RIGHT REAR SENSOR CIRCUIT FAILURE 46
RIGHT REAR SENSOR SIGNAL FAILURE 51
SYSTEM OVERVOLTAGE 54
SYSTEM UNDERVOLTAGE 56
*TRACTION CONTROL SWITCH 58

COMMUNICATION
*NO RESPONSE FROM CAB 61

VERIFICATION TESTS
VERIFICATION TESTS 63

8.0 COMPONENT LOCATIONS 65

8.1 CONTROLLER ANTILOCK BRAKE 65
8.2 DATA LINK CONNECTOR 65
8.3 FUSES 65
8.4 HYDRAULIC CONTROL UNIT 66
8.5 PUMP MOTOR 66
8.6 TONE WHEELS 66
8.7 Wheel Speed Sensors 67
8.8 Wheel Speed Sensor Connectors 68
8.9 TRACTION CONTROL SWITCH 68
8.10 BRAKE LAMP SWITCH 69

9.0 CONNECTOR PINOUTS 71

BRAKE LAMP SWITCH - GRAY 6 WAY 71
CONTROLLER ANTI-LOCK BRAKE - 25 WAY 71
DATA LINK CONNECTOR - BLACK 16 WAY 72
FUSES 74
CIRCUIT BREAKERS 74
HEADLAMP RELAY (LHD) 74
HEADLAMP RELAY (RHD) 75
LEFT FRONT WHEEL SPEED SENSOR - BLACK 2 WAY 75
LEFT FRONT WHEEL SPEED SENSOR (SENSOR SIDE) 75
LEFT REAR WHEEL SPEED SENSOR - BLACK 2 WAY 75
LEFT REAR WHEEL SPEED SENSOR (SENSOR SIDE) 76
FUSES 78
A/C COMPRESSOR CLUTCH RELAY 78
AUTOMATIC SHUT DOWN RELAY 78
ENGINE STARTER MOTOR RELAY 78
FUEL PUMP RELAY 79
HIGH SPEED RADIATOR FAN RELAY 79
HORN RELAY 79
LOW SPEED RADIATOR FAN RELAY 79
TRANSMISSION CONTROL RELAY 79
PUMP MOTOR CONNECTOR (CONNECTOR SIDE) 80
RIGHT FRONT WHEEL SPEED SENSOR - BLACK 2 WAY 80
RIGHT FRONT WHEEL SPEED SENSOR (SENSOR SIDE) 80

RIGHT REAR WHEEL SPEED SENSOR - BLACK 2 WAY 81
RIGHT REAR WHEEL SPEED SENSOR (SENSOR SIDE) 81
TRACTION CONTROL SWITCH - WHITE 4 WAY 81
TRACTION CONTROL SWITCH (SWITCH SIDE) 82

10.0 SCHEMATIC DIAGRAMS. 83

NOTES

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 time of diagnosis.

Please 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.

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

Diagnostic procedures change every year. New diagnostic systems may be added; carryover systems 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) with traction control found on the 2001 PT Cruiser.

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 with traction control 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, or by observing the ABS lamp illumination during the bulb check.

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

3.1 TEVES ABS SYSTEM DESCRIPTION

This section covers the physical and operational descriptions, and the diagnostic service procedures for the Teves Mark 20 Antilock Brake System with traction control. It is the only antilock brake system (ABS) available on this vehicle.

The purpose of the antilock brake system is to prevent wheel lockup under braking conditions on virtually any type of road surface. Antilock braking is desirable because a vehicle that is stopped without locking the wheels retains directional stability and some steering capability. This allows the driver to retain greater control of the vehicle during braking.

All vehicles are equipped with ABS and use Electronic Brake Distribution (EBD) to balance front-to-rear braking when the brakes are applied in the partial braking range.

A Controller Antilock Brake (CAB) module is used to monitor wheel speeds and to modulate (control) hydraulic pressure in each brake channel when ABS or traction control are actuated.

During a non-ABS stop, the system functions as a standard diagonally split configuration. The primary supplies brake fluid pressure to the right front and left rear brakes, and the secondary supplies the right rear and left front brakes. A conventional proportioning valve is not used. This system uses the existing ABS solenoids to replace and perform the same functions that the proportioning valves do. The CAB has a special software program that monitors the wheel speeds and when certain critera are met the software will enable the solenoids to perform the same brake fluid management control as the proportioning valves.

During an ABS stop, the system still uses the diagonally hydraulic split; however, the brake sys-

tem pressure is further split into four control channels. During and ABS operation, all wheels are controlled independently and are on four separate control channels.

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.

3.1.2 TRACTION CONTROL SYSTEM (TCS) DESCRIPTION

The Traction Control System is available on this vehicle only with ABS. The main purpose of traction control is to reduce wheel slip and maintain traction at the driven wheels when road surfaces are wet or snow covered. The traction control system reduces wheel slip by braking the wheel that is losing traction. The system is designed to operate at speeds below 56 km/h (35 mph).

The control module monitors wheel speed. If during acceleration the module detects front (drive) wheel slip and the brakes are not applied, the control module will enter traction control mode. Traction control works in the following order when drive wheel slip is detected.

1. Close the (normally open) isolation valves.
2. Start pump/motor and supply volume/pressure to front hydraulic circuits (pump runs continuously during traction control).
3. Open and close build and decay valves to maintain minimum wheel slip and maximum traction.

The cycling of the build and decay valves works similar to ABS except that they work to control wheel spin by applying brakes. ABS function is to control wheel skid by releasing brakes.

Two pressure relief valves allow pressure/volume to return to the reservoir when not consumed by the build/decay cycles. These are required because the pump supplies more volume than the system requires.

If at any time the brakes are applied during a traction control cycle, the brake switch will trigger the control module to switch off the traction control.

The traction control system will be enabled at each ignition cycle. It may be turned off by depressing the traction control switch. The traction control system function lamp will illuminate "TRAC OFF" immediately upon depressing the traction control switch button. The lamp above the odometer will display "TRAC" during a traction control cycle. If the controller calculates that the brake temperatures are high, the traction control system will become inoperative until a time-out period has elapsed. When in this thermal protection mode, the traction control "TRAC OFF" lamp will illuminate; however, a fault will not be registered.

3.1.3 PEDAL FEEL/VEHICLES 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 electric 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 system 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. The chirping sound should not be interpreted as total wheel lock-up, which leaves black tire marks on dry pavement; antilock braking may leave some light marks.

At the end of an ABS stop, the ABS may function all the way down to near 0 km/h (0 mph). There may be a slight brake pedal drop anytime the ABS is deactivated.

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

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.

3.1.4 SYSTEM COMPONENTS

ANTILOCK BRAKE SYSTEM

- Integrated Controller Unit (ICU)

  mounting bracket

  controller antilock brake (CAB)

  hydraulic control unit (HCU)pump/motor assembly:

  1 motor

  2 pumps

  valve block assembly: 10 valves/solenoids (4 inlet valves, 4 outlet valves, 2 traction control valves.).
  2 hydraulic shuttle valves
  2 accumulators
- vacuum booster
- master cylinder (w/center valves and fluid reservoir)
- 4 wheel speed sensor/tone wheel assemblies
- ABS warning indicator (cluster)
- Trac off indicator (cluster)
- fuses and wiring harness (w/trac on/off switch)

3.1.5 ABS AND RED 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. The CAB controls the lamp indirectly. The CAB monitors its own functions. If the CAB determines that the ABS indicator should be on, the CAB sends a message via the PCI BUS to the instrument cluster and the cluster turns on the indicator. The instrument cluster sends a message over the PCI BUS, if the CAB does not respond the instrument cluster will illuminate the ABS 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 which causes the master cylinder reservoir to be low on fluid, or by turning the ignition switch to the start position. The red brake warning indicator can also be turned on if the CAB indicates an EBD failure.

3.1.4 CONTROLLER ANTILOCK BRAKE (CAB)

The antilock brake controller (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
- detect wheel slip
- control fluid pressure modulation to the brakes during antilock stop and traction control operation
- monitor the system for proper operation
- provide communication to the DRBIII® while in diagnostic mode
- 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 to modulate brake fluid pressure in its hydraulic unit. 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 the proper operation. If the CAB detects a system malfunction, it can disable the antilock system and turn on the antilock warning lamp. 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 lamp switch
- ignition switch
- battery voltage
- diagnostic communication (PCI BUS)
- traction control switch

The CAB outputs include the following:

- ten valve/solenoid drivers
- pump/motor actuation
- ABS warning indicator actuation (PCI BUS)
- red brake warning indicator actuation (PCI BUS)
- Trac off lamp (PCI BUS)
- Trac lamp (PCI BUS)
- diagnostic communication (PCI BUS)

3.1.6 HYDRAULIC CONTROL UNIT

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

Valve Block Assembly: The valve block assembly contains a total of 12 valves; 10 solenoid valves with four inlet valves and four outlet valves, and two traction control valves and two hydraulic shuttle 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. The valves are also cycled during a traction control event.

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 DC-type 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 internally.

Accumulators: The 3.0mm accumulators provide temporary fluid storage during an antilock stop and are drained by the pump/motor.

3.1.7 SENSORS

Wheel Speed Sensors and Tone Wheels: One Wheel Speed Sensor (WSS) is located at each wheel and sends a small digital signal to the control module (CAB). The CAB sends 12 volts down to the sensor. The sensor has an internal magneto resistance bridge that alters the voltage and amperage of the signal circuit. This voltage and amperage is changed by magnetic induction when a toothed sensor ring (tone wheel) passes by a stationary magnetic sensor (wheel speed sensor). The CAB measures the voltage and amperage of the 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 and the rear tone wheel is an integral part of the rear rotor hub.

- The wheel speed sensor air gap is NOT adjustable.
- Wheel speed sensors cannot be checked for resistance to determine if they are ok.

Correct antilock system operation is dependent on wheel speed signals from 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.

3.2 ABS 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
- Cluster Fault
- Controller Failure
- Incorrect Tone Wheel
- Left Front Sensor Circuit Failure
- Left Front Sensor Signal Failure
- Left Rear Sensor Circuit Failure
- Left Rear Sensor Signal Failure
- PCI Bus Communication
- 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 or 3500 miles.

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. The ABS, TRAC OFF,

TRAC and brake warning lamps will illuminate for 4 seconds with ignition on.

AT 20 km/h (12 mph) a dynamic test is performed. This will momentarily run the pump/motor. If during the dynamic test, the driver has his/her foot on the brake pedal, he/she may feel the test through brake pedal pulsations. This is a normal condition.

If any component exhibits a diagnostic trouble code during system initialization or dynamic check, the CAB will illuminate the ABS and TRAC off warning lamps.

3.2.2 DIAGNOSTIC MODE

On a Mark 20 system to enter a 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 could be displayed by the DRBIII®. The following are characteristics of diagnostic mode:

- The amber ABS and red brake warning indicator will blink rapidly (about 1/2 second on and 1/2 second off). If a hard trouble code is present, such as CAB Power Feed Circuit diagnostic trouble code, the indicator will be illuminated without blinking until the diagnostic trouble 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 conditions
- damaged components (sensors, tone wheels)
- damaged wiring
- excessive axle shaft runout
- hydraulic system leaks
- regular brake system problems, non-ABS related

If not 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 a difficult to locate malfunction.

3.3 USING THE DRBIII®

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

3.4 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 STAR Center for information and assistance. This is a sample of such an error message display:

```
ver: 2.14
date: 26 Jul93
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.
```

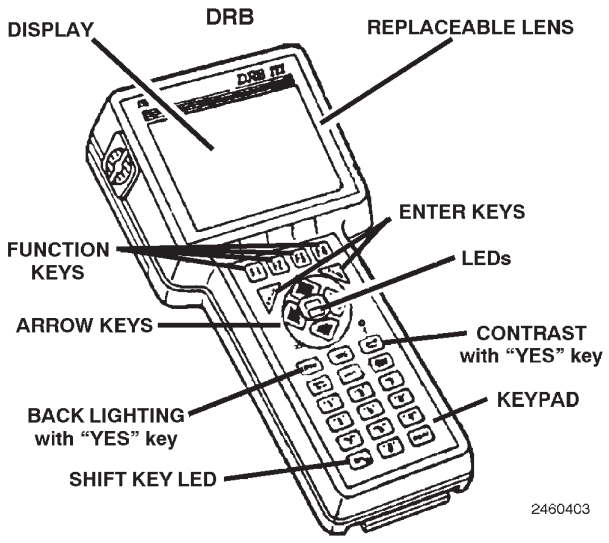
3.4.1 DRBIII® DOES NOT POWER UP (BLANK SCREEN)

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, an 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 TECHNICIAN SAFETY INFORMATION

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

Set the parking brake and block the wheels before testing or repairing the vehicle. It is especially important to block the wheels on the vehicle; 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 POSSIBLY FATAL INJURY. CAREFULLY READ AND UNDERSTAND THE CAUTIONS AND THE SPECIFICATIONS 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 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. Ohm can be measured only in a non-powered circuit.

- Voltage between any terminal and ground must not exceed 500v DC or 500v peak AC.
- Use caution when measuring voltage above 25v DC or 25v AC.
- Use the low current shunt to measure circuits up to 10A. Use the high current clamp to measure circuits exceeding 10A.
- When testing for the presence of voltage or current, make sure the meter is functioning correctly. Take a reading of a known voltage or current before accepting a zero reading.
- When measuring current, connect the meter in series with test 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.

CAUTION: BEFORE ROAD TESTING A VEHICLE, BE SURE THAT ALL COMPONENTS ARE REASSEMBLED. DURING THE TEST DRIVE, DO NOT TRY TO READ THE DRBIII® SCREEN WHILE IN MOTION. DO NOT HANG THE DRBIII® FROM THE REAR VIEW MIRROR OR OPERATE IT YOURSELF. HAVE AN ASSISTANT AVAILABLE TO OPERATE THE DRBIII®.

4.4 DIAGNOSIS

1. Your diagnostic test procedure must begin with a thorough visual inspection of the 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" diagnostic trouble code is present, it must be repaired prior to addressing any 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 the proper test. Read the "Traction Control Switch" status, the switch should read "CLOSED". If the status is not correct, perform the proper test. If a problem with the amber "ABS" warning indicator exists, refer to the proper test.
6. If no other problems are found, it will be necessary to road test the vehicle. **THE DRBIII® MUST NOT BE CONNECTED TO THE DATA LINK CONNECTOR WHEN ROAD TESTING FOR PROPER ANTILOCK OPERATION. THE SYSTEM IS DISABLED WHILE IN DIAGNOSTIC MODE.** Perform several antilock stops from above 50 Km/h (30 mph) and then repeat steps 2, 3, and 4. If any diagnostic trouble codes are present, proceed to the appropriate test.
7. The following conditions should be considered "NORMAL" operation, and no repairs should be attempted to correct them.
   - Brake pedal feedback during an ABS stop (clicking, vibrating)
   - Clicking, groaning or buzzing at 20 Km/h (12 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 and no 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 light

6.0 GLOSSARY OF TERMS

ABS	antilock brake system
AC	alternating current
CAB	controller antilock brake
DC	direct current
DLC	data link connector
DRB	diagnostic read-out box
EBD	electronic brake distribution
EMI	electro magnetic interference
HCU	hydraulic control unit
HZ	Hertz
LF	left front
LR	left rear
PCI	Programmable Communication Interference
PCM	Powertrain Control Module
PDC	power distribution center
P/M	pump motor
RF	right front
RR	right rear
RFI	radio frequency interference
SOL	solenoid
WSS	wheel speed sensor

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
FUSE BLOWN - FUSED B(+) CIRCUIT
FUSED B(+) CIRCUIT OPEN
FUSED B(+) CIRCUIT SHORTED TO GROUND
FUSED B(+) CIRCUIT INTERMITTENTLY SHORTED TO GROUND
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. With the DRBIII®, read DTC's. Is the CAB Power Feed Circuit DTC present right now? Yes → Go To 2 No → Go To 10	All
2	Turn the ignition off. Remove and Inspect ABS SOL Fuse in the PDC. Is the Fuse blown? Yes → Go To 3 No → Go To 8	All
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.	All

CAB POWER FEED CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the ABS SOL Fuse from the 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 Shorted to Ground. Perform ABS VERIFICATION TEST. No → Go To 5	All
5	Turn the ignition off. Disconnect the ABS SOL Fuse from the PDC. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the Fused Ignition Switch Output circuit between the Fuse and the CAB connector. Is the resistance below 5 ohms? Yes → Go To 6 No → Repair Fused B(+) Circuit Open. Perform ABS VERIFICATION TEST.	All
6	Turn the ignition off. Disconnect the ABS SOL Fuse from the PDC. Using a test light connected to 12 volts, probe the Fused B(+) Circuit. Is the test light on? Yes → Replace the CAB. Perform ABS VERIFICATION TEST. No → Go To 7	All
7	Turn the ignition off. If there are no potential causes remaining, replace the Fuse. View repair options. Repair Replace the Fuse. Perform ABS VERIFICATION TEST.	All
8	Turn the ignition off. Disconnect the ABS SOL Fuse from the PDC. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the Fused Ignition Switch Output circuit between the Fuse and the CAB connector. Is the resistance below 5 ohms? Yes → Go To 9 No → Repair Fused B(+) Circuit Open. Perform ABS VERIFICATION TEST.	All
9	If there are no potential causes remaining, replace the CAB. View repair options. Repair Replace the CAB. Perform ABS VERIFICATION TEST.	All

CAB POWER FEED CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
10	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. No → Test Complete.	All

Symptom:
CLUSTER FAULT

When Monitored and Set Condition:

CLUSTER FAULT

When Monitored: Ignition on, every time a message is sent from the instrument cluster.

Set Condition: This DTC will be set when the message from the instrument cluster, via PCI Bus, informs the CAB that it can not turn on the ABS Warning Indicator or the Red Brake Warning Indicator.

POSSIBLE CAUSES
INTERMITTENT DTC
CLUSTER FAULT DTC CONDITION PRESENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, try to communicate with the Mechanical Instrument Cluster (MIC), not the CAB module. Does the DRBIII® display ″Bus +/- Signal Open? Yes → Refer to symptom *BUS +/- SIGNALS OPEN FROM INSTRUMENT CLUSTER in the COMMUNICATION category. Perform ABS VERIFICATION TEST. No → Go To 2	All
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. No → Test Complete.	All

Symptom:
CONTROLLER FAILURE

When Monitored and Set Condition:

CONTROLLER FAILURE

When Monitored: Ignition on. Two microprocessors, internal to the CAB, calculate the wheel speed independently of each other then compare the results.

Set Condition: If the values that each microprocessor calculate for wheel speed differ by more than 1.5% for more than 70 milliseconds (MS), the Diagnostic Trouble Code (DTC) is set.

POSSIBLE CAUSES
GROUND CIRCUIT CONNECTION POOR
GROUND CIRCUIT OPEN
CAB - GROUND CIRCUIT OPEN
GROUND CIRCUIT RADIO FREQUENCY INTERFERENCE

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the CAB harness connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance between ground and both of the ground circuits. Is the resistance below 1.0 ohm for both measurements? Yes → Go To 2 No → Repair the Ground circuit(s) for an open. Perform ABS VERIFICATION TEST.	All
2	Turn the ignition on. With the DRBIII®, actuate the pump motor. Measure the voltage drop across the CAB ground circuit connection with the pump motor running. Is the voltage above 0.10 volts? Yes → Repair Ground Circuit Poor Connection. Perform ABS VERIFICATION TEST. No → Go To 3	All

CONTROLLER FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Turn the ignition on. Turn on all accessories. Measure the voltage of the ground circuit at the CAB. 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.	All
4	If there are no potential causes remaining, replace the CAB. View repair options. Repair Replace the CAB. Perform ABS VERIFICATION TEST.	All

Symptom:
INCORRECT TONE WHEEL

When Monitored and Set Condition:

INCORRECT TONE WHEEL

When Monitored: Every 7 milliseconds (ms).

Set Condition: Requires 2 minutes to detect that all wheels are above 40 km/h (24 mph).

POSSIBLE CAUSES
INCORRECT TONE WHEEL
INCORRECT TIRES

TEST	ACTION	APPLICABILITY
1	Inspect the tire sizes on the vehicle. Is a smaller than production tire, or two mini spares installed on both front wheels? Yes → Replace the incorrect tire(s) size with production size tire(s). Perform ABS VERIFICATION TEST. No → Go To 2	All
2	Count the number of tone wheel teeth on both of the front driveshafts. Does one or both of the front driveshaft teeth have 40 teeth? Yes → Replace the front dirveshaft(s) with the incorrect number of tone wheel teeth. Note: Driveshafts for 1997 and earlier vehicles can not be used on this vehicle, because the number of tone wheel teeth are different between the Bendix and Teves systems. Perform ABS VERIFICATION TEST. No → Test Complete.	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 12 VOLT SUPPLY CIRCUIT OPEN
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
LEFT FRONT WHEEL SPEED SENSOR SIGNAL CIRCUIT OPEN
LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
INTERMITTENT CIRCUIT DTC
LEFT FRONT WHEEL SPEED SENSOR DEFECTIVE - SHORTED TO GROUND
LEFT FRONT WHEEL SPEED SENSOR OR CONNECTOR DAMAGED
CAB - LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY OPEN
CAB - LEFT FRONT WHEEL SPEED SENSOR SIGNAL CIRCUIT OPEN
CAB - LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY SHORTED TO GROUND
CAB - LEFT FRONT WHEEL SPEED SIGNAL CIRCUIT SHORTED TO GROUND
CAB - UNABLE TO READ LEFT FRONT WHEEL SPEED SENSOR SIGNAL
LEFT FRONT WHEEL SPEED SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
LEFT FRONT WHEEL SPEED SENSOR CIRCUITS SHORTED TOGETHER
LEFT FRONT WHEEL SPEED SENSOR SIGNAL SHORTED TO B(+)

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRBIII®, read DTC's. With the DRBIII® erase DTC's. Turn ignition off. Turn ignition on. With the DRBIII®, read DTC's. Is the Left Front Wheel Speed Sensor Circuit Failure DTC present right now? Yes → Go To 2 No → Go To 17	All

LEFT FRONT SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Turn ignition off. Disconnect the Left Front Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Measure the voltage across the Left Front Wheel Speed Sensor 12 Volt Supply circuit and the Left Front Wheel Speed Sensor Signal circuit in the Left Front Wheel Speed Sensor connector. Is the voltage above 10 volts? Yes → Go To 3 No → Go To 7	All
3	Turn 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. No → Go To 4	All
4	Turn ignition off. Disconnect the Left Front Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** 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. No → Go To 5	All
5	Turn ignition off. Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Remove harness strain relief to access wires in CAB connector for backprobing. Using a voltmeter in Direct Current (DC) mode, and special tool 6801, backprobe the Left Front Wheel Speed Sensor Signal circuit at CAB. Reconnect the CAB connector. Turn ignition on. Slowly rotate the wheel while observing voltmeter reading. Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated? Yes → Go To 6 No → Replace the Left Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST.	All
6	If there are no potential causes remaining, replace the CAB. View repair options. Repair Replace the CAB. Perform ABS VERIFICATION TEST.	All

LEFT FRONT SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
7	Turn ignition off. Disconnect the Left Front Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Connect a jumper wire between the Left Front Wheel Speed Sensor 12 Volt Supply Circuit and ground. Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance between the Left Front Wheel Speed Sensor 12 Volt Supply Circuit and ground. Is the resistance below 5 ohms? Yes → Go To 8 No → Repair the Left Front Wheel Speed Sensor 12 Volt Supply Circuit Open. Perform ABS VERIFICATION TEST.	All
8	Turn ignition off. Disconnect the Left Front Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Connect a jumper wire between the Left Front Wheel Speed Sensor Signal Circuit and ground. Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance between the Left Front Wheel Speed Sensor Signal Circuit and ground. Is the resistance below 5 ohms? Yes → Go To 9 No → Repair the Left Front Wheel Speed Sensor Signal Circuit Open. Perform ABS VERIFICATION TEST.	All
9	Turn 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 12 Volt Supply Circuit and ground. Is the resistance below 15,000 ohms? Yes → Repair the Left Front Wheel Speed Sensor 12 Volt Supply Circuit Shorted to Ground. Perform ABS VERIFICATION TEST. No → Go To 10	All

LEFT FRONT SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
10	Turn 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 Signal Circuit and ground. Is the resistance below 15,000 ohms? Yes → Repair the Left Front Wheel Speed Sensor Signal Circuit Shorted to Ground. Perform ABS VERIFICATION TEST. No → Go To 11	All
11	Turn ignition off. Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the Left Front Wheel Speed Sensor Circuits. Is the resistance below 200 ohms? Yes → Repair the Left Front Wheel Speed Sensor Circuits Shorted Together and Replace the Left Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST. No → Go To 12	All
12	Turn 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 ignition on. Measure the voltage of the Left Front Wheel Speed Sensor Signal Circuit. Is the voltage above 1 volt? Yes → Repair Left Front Wheel Speed Sensor Signal Cricuit Shorted to Voltage and Replace Left Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST. No → Go To 13	All
13	Turn ignition off. Disconnect the Left Front Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Measure the voltage of the Left Front Wheel Speed Sensor 12 Volt Supply Circuit. Is the voltage above 10 volts? Yes → Go To 14 No → Replace the CAB. Perform ABS VERIFICATION TEST.	All

LEFT FRONT SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
14	Turn ignition off. Disconnect the Left Front Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Using a test light connected to 12 volts, probe the Left Front Wheel Speed Sensor Signal Circuit. Is the test light on? Yes → Go To 15 No → Replace the CAB. Perform ABS VERIFICATION TEST.	All
15	Turn ignition off. Disconnect the Left Front Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Using a test light connected to 12 volts, probe the Left Front Wheel Speed Sensor 12 Volt Supply Circuit. Is the test light on? Yes → Replace the CAB. Perform ABS VERIFICATION TEST. No → Go To 16	All
16	Turn ignition off. Disconnect the Left Front Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Using a test light connected to 12 volts, probe the Left Front Wheel Speed Sensor Signal Circuit. Is the test light on? Yes → Replace the CAB. Perform ABS VERIFICATION TEST. No → Test Complete.	All
17	Turn 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. 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). 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
TONE WHEEL DEFECTIVE
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
INTERMITTENT SIGNAL DTC
LEFT FRONT WHEEL SPEED SENSOR OR CONNECTOR DAMAGED
LEFT FRONT WHEEL BEARING OUT OF SPECIFICATION
LEFT FRONT WHEEL SPEED SENSOR FUNCTIONAL TEST
LEFT FRONT WHEEL SPEED SENSOR AIR GAP OUT OF SPECIFICATION
CAB - UNABLE TO READ LEFT FRONT WHEEL SPEED SENSOR SIGNAL

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRBIII®, read DTC's. Are the Left Front Sensor Signal Failure and Left Front Sensor Circuit Failure DTC's present now? Yes → Refer to symptom LEFT FRONT SENSOR CIRCUIT FAILURE in the BRAKES (CAB) category. No → Go To 2	All
2	Turn ignition on. Have an assistant drive the vehicle while you monitor the Left Front Wheel Speed Sensor Signal, using the DRBIII®. Slowly accelerate as straight as possible from a stop to 24 Km/h (15 Mph). With the DRBIII®, monitor all wheel speed sensor signals. Did the Left Front Wheel Speed Sensor Signal show 0 Km/h (0 Mph)? Yes → Go To 3 No → Go To 10	All

LEFT FRONT SENSOR SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Inspect the Tone Wheel for damaged or missing teeth. **Note: The Tone Wheel Teeth should be perfectly square, not bent or nicked.** Is the Tone Wheel OK? Yes → Go To 4 No → Replace the Tone Wheel. Perform ABS VERIFICATION TEST.	All
4	Turn 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. No → Go To 5	All
5	Turn 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 6 No → Repair as necessary. Perform ABS VERIFICATION TEST.	All
6	Turn ignition off. Using a Feeler Gauge, measure the Sensor Air Gap. **Note: The Air Gap should be checked in at least four places on the Tone Wheel.** Is the Air Gap between 0.30 mm - 1.50 mm (0.012″ - 0.059″)? Yes → Go To 7 No → Repair as necessary. Perform ABS VERIFICATION TEST.	All
7	Turn ignition off. Disconnect the Left Front Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Connect a single jumper wire from the harness side of Left Front Wheel Speed Sensor 12 Volt Supply circuit into the Left Front Wheel Speed Sensor connector mating terminal. Using a voltmeter in Direct Current (DC) mode, probe the Left Front Wheel Speed Sensor Signal Circuit at Left Front Wheel Speed Sensor connector. Turn ignition on. Slowly rotate the wheel while observing voltmeter reading. Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated? Yes → Go To 8 No → Replace the Left Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST.	All

LEFT FRONT SENSOR SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
8	Turn ignition off. Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Remove harness strain relief to access wires in CAB connector for backprobing. Using a voltmeter in Direct Current (DC) mode, and special tool 6801, backprobe the Left Front Wheel Speed Sensor Signal circuit at CAB. Reconnect the CAB connector. Turn ignition on. Slowly rotate the wheel while observing voltmeter reading. Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated? Yes → Go To 9 No → Replace the Left Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST.	All
9	If there are no potential causes remaining, replace the CAB. View repair options. Repair Replace the CAB. Perform ABS VERIFICATION TEST.	All
10	Turn 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. 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 12 VOLT SUPPLY CIRCUIT OPEN
LEFT REAR WHEEL SPEED SENSOR SIGNAL
LEFT REAR WHEEL SPEED SENSOR SIGNAL CIRCUIT OPEN
LEFT REAR WHEEL SPEED SENSOR 12 SUPPLY CIRCUIT SHORTED TO GROUND
LEFT REAR WHEEL SPEED SENSOR DEFECTIVE - SHORTED TO GROUND
LEFT REAR WHEEL SPEED SENSOR OR CONNECTOR DAMAGED
CAB - LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY OPEN
CAB - LEFT REAR WHEEL SPEED SENSOR SIGNAL CIRCUIT OPEN
CAB - LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY SHORTED TO GROUND
CAB - LEFT REAR WHEEL SPEED SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
CAB - UNABLE TO READ LEFT REAR WHEEL SPEED SENSOR SIGNAL
LEFT REAR WHEEL SPEED SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
LEFT REAR WHEEL SPEED SENSOR CIRCUITS SHORTED TOGETHER
LEFT REAR WHEEL SPEED SENSOR SIGNAL SHORTED TO B(+)

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRBIII®, read DTC's. With the DRBIII®, erase DTC's. Turn ignition off. Turn ignition on. With the DRBIII®, read DTC's. Is the Left Rear Wheel Speed Sensor Circuit Failure DTC present right now? Yes → Go To 2 No → Go To 17	All

LEFT REAR SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Turn ignition off. Disconnect the Left Rear Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Measure the voltage across the Left Rear Wheel Speed Sensor 12 Volt Supply circuit and the Left Rear Wheel Speed Sensor Signal Circuit in the Left Rear Wheel Speed Sensor connector. Is the voltage above 10 volts? Yes → Go To 3 No → Go To 7	All
3	Turn 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. No → Go To 4	All
4	Turn ignition off. Disconnect the Left Rear Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance between either one of the Left Rear Wheel Speed Sensor terminals and ground. Is the resistance below 15,000 ohms? Yes → Replace the Left Rear Wheel Speed Sensor. Perform ABS VERIFICATION TEST. No → Go To 5	All
5	Turn ignition off. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Remove harness strain relief to access wires in CAB connector for backprobing. Using a voltmeter in Direct Current (DC) mode, and special tool 6801, backprobe the Left Rear Wheel Speed Sensor Signal Circuit at CAB. Reconnect the CAB connector. Turn ignition on. Slowly rotate the wheel while observing voltmeter reading. Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated? Yes → Go To 6 No → Replace the Left Rear Wheel Speed Sensor. Perform ABS VERIFICATION TEST.	All
6	If there are no potential causes remaining, replace the CAB. View repair options. Repair Replace the CAB. Perform ABS VERIFICATION TEST.	All

LEFT REAR SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
7	Turn 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.** Connect a jumper wire between the Left Rear Wheel Speed Sensor 12 Volt Supply Circuit and ground. Measure the resistance between the Left Rear Wheel Speed Sensor 12 Volt Supply Circuit and ground. Is the resistance below 5 ohms? Yes → Go To 8 No → Repair the Left Rear Wheel Speed Sensor 12 Volt Supply Circuit Open. Perform ABS VERIFICATION TEST.	All
8	Turn 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.** Connect a jumper wire between the Left Rear Wheel Speed Sensor Signal Circuit and ground. Measure the resistance between the Left Rear Wheel Speed Sensor Signal Circuit and ground. Is the resistance below 5 ohms? Yes → Go To 9 No → Repair the Left Rear Wheel Speed Sensor Signal Circuit Open. Perform ABS VERIFICATION TEST.	All
9	Turn 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 12 Volt Supply Circuit and ground. Is the resistance below 15,000 ohms? Yes → Repair the Left Rear Wheel Speed Sensor 12 Volt Supply Circuit Shorted to Ground. Perform ABS VERIFICATION TEST. No → Go To 10	All
10	Turn ignition off. Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the Left Rear Wheel Speed Sensor Circuits. Is the resistance below 200 ohms? Yes → Repair the Left Rear Wheel Speed Sensor Circuits shorted together and Replace the Left Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST. No → Go To 11	All

LEFT REAR SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
11	Turn 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 Signal Circuit and ground. Is the resistance below 15,000 ohms? Yes → Repair the Left Rear Wheel Speed Sensor Signal Circuit Shorted to Ground. Perform ABS VERIFICATION TEST. No → Go To 12	All
12	Turn 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 ignition on. Measure the voltage of the Left Rear Wheel Speed Sensor Signal Circuit. Is the voltage above 1 volt? Yes → Repair Left Rear Wheel Speed Sensor Signal Circuit Shorted to Voltage and Replace Left Rear Wheel Speed Sensor. Perform ABS VERIFICATION TEST. No → Go To 13	All
13	Turn ignition off. Disconnect the Left Rear Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Measure the voltage of the Left Rear Wheel Speed Sensor 12 Volt Supply Circuit. Is the test light on? Yes → Go To 14 No → Replace the CAB. Perform ABS VERIFICATION TEST.	All
14	Turn ignition off. Disconnect the Left Rear Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Using a test light connected to 12 volts, probe the Left Rear Wheel Speed Sensor Signal Circuit. Is the test light on? Yes → Go To 15 No → Replace the CAB. Perform ABS VERIFICATION TEST.	All

LEFT REAR SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
15	Turn ignition off. Disconnect the Left Rear Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Using a test light connected to 12 volts, probe the Left Rear Wheel Speed Sensor 12 Volt Supply Circuit. Is the test light on? Yes → Replace the CAB. Perform ABS VERIFICATION TEST. No → Go To 16	All
16	Turn ignition off. Disconnect the Left Rear Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Using a test light connected to 12 volts, probe the Left Rear Wheel Speed Sensor Signal Circuit. Is the test light on? Yes → Replace the CAB. Perform ABS VERIFICATION TEST. No → Test Complete.	All
17	Turn 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 → Test Complete. 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 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
TONE WHEEL DEFECTIVE
LEFT REAR WHEEL SPEED SENSOR SIGNAL
INTERMITTENT SIGNAL DTC
LEFT REAR WHEEL SPEED SENSOR OR CONNECTOR DAMAGED
LEFT REAR WHEEL BEARING OUT OF SPECIFICATION
LEFT REAR WHEEL SPEED SENSOR FUNCTIONAL TEST
LEFT REAR WHEEL SPEED SENSOR AIR GAP OUT OF SPECIFICATION
CAB - UNABLE TO READ LEFT REAR WHEEL SPEED SENSOR SIGNAL

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRBIII®, read DTC's. Are Left Rear Sensor Signal Failure and Left Rear Sensor Circuit Failure DTC's present right now? Yes → Refer to symptom LEFT REAR SENSOR CIRCUIT FAILURE in the BRAKES (CAB) category. No → Go To 2	All
2	Turn ignition on. Have an assistant drive the vehicle while you monitor the Left Rear Wheel Speed Sensor Signal, using the DRBIII®. Slowly accelerate as straight as possible from a stop to 24 Km/h (15 Mph). With the DRBIII®, monitor all wheel speed sensor signals. Did the Left Rear Wheel Speed Sensor Signal show 0 Km/h (0 Mph)? Yes → Go To 3 No → Go To 10	All

LEFT REAR SENSOR SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Inspect the Tone Wheel for damaged or missing teeth. **Note: The Tone Wheel Teeth should be perfectly square, not bent or nicked.** Is the Tone Wheel OK? Yes → Go To 4 No → Replace the Tone Wheel. Perform ABS VERIFICATION TEST.	All
4	Turn 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. No → Go To 5	All
5	Turn 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 6 No → Repair as necessary. Perform ABS VERIFICATION TEST.	All
6	Turn 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 0.50 mm - 1.25 mm (0.019″ - 0.049″)? Yes → Go To 7 No → Repair as necessary. Perform ABS VERIFICATION TEST.	All
7	Turn ignition off. Disconnect the Left Rear Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Connect a single jumper wire from the harness side of Left Rear Wheel Speed Sensor 12 Volt Supply Circuit into the Left Rear Wheel Speed Sensor connector mating terminal. Using a voltmeter in Direct Current (DC) mode, measure the Left Rear Wheel Speed Sensor Signal Circuit at Left Rear Wheel Speed Sensor conector. Turn ignition on. Slowly rotate the wheel while observing voltmeter reading. Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated? Yes → Go To 8 No → Replace the Left Rear Wheel Speed Sensor. Perform ABS VERIFICATION TEST.	All

LEFT REAR SENSOR SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
8	Turn ignition off. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Remove harness strain relief to access wires in CAB connector for backprobing. Using a voltmeter in Direct Current (DC) mode, and special tool 6801, backprobe the Left Rear Wheel Speed Sensor Signal Circuit at CAB. Reconnect the CAB connector. Turn ignition on. Slowly rotate the wheel while observing voltmeter reading. Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated? Yes → Go To 9 No → Replace the Left Rear Wheel Speed Sensor. Perform ABS VERIFICATION TEST.	All
9	If there are no potential causes remaining, replace the CAB. View repair options. Repair Replace the CAB. Perform ABS VERIFICATION TEST.	All
10	Turn 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. No → Test Complete.	All

Symptom:
PCI BUS COMMUNICATION

When Monitored and Set Condition:

PCI BUS COMMUNICATION

When Monitored: Ignition on, every 7 milliseconds (ms).

Set Condition: This DTC will be set when the CAB does not recieve a message from the instrument cluster for 10 seconds.

POSSIBLE CAUSES
INTERMITTENT DTC
PCI BUS OPEN TO CAB
CAB - PCI CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase DTC's. Turn ignition off. Turn the ignition on. Wait 20 seconds. Is the PCI Bus Communication DTC present? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition on. With the DRBIII®, read Mechanical Instrument Cluster (MIC) Diagnostic Trouble Codes (DTC's). Does the MIC have the ″ABS Message Not Received by MIC″ DTC set? Yes → Refer to symptom ABS MESSAGES NOT RECEIVED BY MIC in the INSTRUMENT CLUSTER category. 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 PCI Bus Circuit between the CAB connector and the Data Link Connector (DLC) . Is the resistance below 5 ohms? Yes → Go To 4 No → Repair the PCI Bus Circuit Open. Perform ABS VERIFICATION TEST.	All

PCI BUS COMMUNICATION — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary** Turn the ignition on. Using the DRBIII® Lab Scope, measure the voltage of the PCI BUS circuit. Is the voltage above 0.4 volts? Yes → Go To 5 No → Go To 5	All
5	If there are no potential causes remaining, replace the CAB. Replace the CAB. Repair Replace the CAB. Perform ABS VERIFICATION TEST.	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. No → Test Complete.	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 25 km/h (15 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
FUSE BLOWN - PUMP MOTOR CIRCUIT
GROUND CIRCUIT POOR CONNECTION
FUSED B(+) CIRCUIT OPEN
CAB - FUSED B(+) CIRCUIT OPEN
ABS PUMP MOTOR DOES NOT ROTATE
CAB - FUSED B(+) CIRCUIT SHORTED TO GROUND
FUSED B(+) CIRCUIT INTERMITTENTLY SHORTED TO GROUND
FUSED B(+) CIRCUIT SHORTED TO GROUND
CAB - PUMP MOTOR RUNNING CONTINUOUSLY

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRBIII®, read DTC's. Is the CAB Power Feed Circuit DTC present now? Yes → Refer to symptom CAB POWER FEED CIRCUIT in the BRAKES (CAB) category. No → Go To 2	All
2	Turn ignition on. With the DRBIII® read DTC's. With the DRBIII® erase DTC's. Turn ignition off. Turn ignition on. With the DRBIII® actuate the pump motor. Did the Pump Motor operate as commanded by the DRBIII®? No → Go To 3 Yes → Go To 13	All

PUMP MOTOR NOT WORKING PROPERLY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove and Inspect the ABS Pump Fuse in the Power Distribution Center. Is the Fuse blown? Yes → Go To 4 No → Go To 8	All
4	Turn the ignition off. Visually inspect the Fused B(+) Circuit in the wiring harness from the Power Distribution Center (PDC) to the CAB. Look for any sign of an Intermittent Short to Ground. Is the wiring harness OK? Yes → Go To 5 No → Repair the Fused B(+) Circuit shorted to ground. Perform ABS VERIFICATION TEST.	All
5	Turn the ignition off. Disconnect the ABS Pump Fuse from the PDC. Disconnect the CAB connector. **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. No → Go To 6	All
6	Turn the ignition off. Disconnect the Fuse #8 from the PDC. Using a test light connected to 12 volts, probe the Fused B(+) circuit. Monitor the test light. Is the test light on? Yes → Replace the CAB. Perform ABS VERIFICATION TEST. No → Go To 7	All
7	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.	All
8	Turn the ignition on. With the DRBIII®, actuate the pump motor. Measure the voltage drop across the ABS ground circuit connection, with the pump motor running. Is the voltage below 0.1 volt? Yes → Go To 9 No → Repair the poor ground circuit. Perform ABS VERIFICATION TEST.	All

PUMP MOTOR NOT WORKING PROPERLY — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the ABS Pump Fuse from the PDC. Disconnect the CAB connector. **Check connector - Clean/repair as necessary.** Measure the resistance of the Fused B(+) circuit. Is the resistance below 5 ohms? Yes → Go To 10 No → Repair Fused B(+) Circuit Open. Perform ABS VERIFICATION TEST.	All
10	Turn the ignition off. Disconnect Pump Motor Connector. Connect a 10 gauge jumper wire between the pump motor Fused B(+) circuit and a known good Fused B(+) circuit capable of providing 40 amps. Connect a 10 gauge jumper wire between the pump motor ground circuit and a known good body ground. Monitor pump motor operation. Is the pump motor running? Yes → Go To 11 No → Replace the ABS Pump Motor. Perform ABS VERIFICATION TEST.	All
11	Turn the ignition off. Reconnect all connectors. Turn the ignition on. Monitor the pump motor for continuous operation. Is the pump motor running continuously? Yes → Replace the CAB. Perform ABS VERIFICATION TEST. No → Go To 12	All
12	If there are no potential causes remaining, replace the CAB. View repair options. Repair Replace the CAB. Perform ABS VERIFICATION TEST.	All
13	Turn 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 → Test Complete. 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 12 VOLT SUPPLY CIRCUIT OPEN
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL CIRCUIT OPEN
RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RIGHT FRONT WHEEL SPEED SENSOR DEFECTIVE - SHORTED TO GROUND
RIGHT FRONT WHEEL SPEED SENSOR OR CONNECTOR DAMAGED
CAB - RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY OPEN
CAB - RIGHT FRONT WHEEL SPEED SENSOR SIGNAL CIRCUIT OPEN
CAB - RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY SHORTED TO GROUND
CAB - RIGHT FRONT WHEEL SPEED SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
CAB - UNABLE TO READ RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
RIGHT FRONT WHEEL SPEED SENSOR CIRCUITS SHORTED TOGETHER
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL SHORTED TO B(+)

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRBIII® read DTC's. With the DRBIII®, erase DTC's. Turn ignition off. Turn ignition on. With the DRBIII®, read DTC's. Did the Right Front Wheel Speed Sensor Circuit Failure DTC set again right now? Yes → Go To 2 No → Go To 17	All

RIGHT FRONT SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Turn ignition off. Disconnect the Right Front Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Measure the voltage across the Right Front Wheel Speed Sensor 12 Volt Supply circuit and the Right Front Wheel Speed Sensor Signal Circuit in the Right Front Wheel Speed Sensor connector. Is the voltage above 10 volts? Yes → Go To 3 No → Go To 7	All
3	Turn 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. No → Go To 4	All
4	Turn ignition off. Disconnect the Right Front Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance between either one of the Right Front Wheel Speed Sensor terminals and ground. Is the resistance below 15,000 ohms? Yes → Replace the Right Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST. No → Go To 5	All
5	Turn ignition off. Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Remove harness strain relief to access wires in CAB connector for backprobing. Using a voltmeter in Direct Current (DC) mode, and special tool 6801, backprobe the Right Front Wheel Speed Sensor Signal Circuit at CAB. Reconnect the CAB connector. Turn ignition on. Slowly rotate the wheel while observing voltmeter reading. Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated? Yes → Go To 6 No → Replace the Right Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST.	All
6	If there are no potential causes remaining, replace the CAB. View repair options. Repair Replace the CAB. Perform ABS VERIFICATION TEST.	All

RIGHT FRONT SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
7	Turn 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.** Connect a jumper wire between the Right Front Wheel Speed Sensor 12 Volt Supply Circuit and ground. Measure the resistance between the Right Front Wheel Speed Sensor 12 Volt Supply Circuit and ground. Is the resistance below 5 ohms? Yes → Go To 8 No → Repair the Right Front Wheel Speed Sensor 12 Volt Supply Circuit Open. Perform ABS VERIFICATION TEST.	All
8	Turn 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.** Connect a jumper wire between the Right Front Wheel Speed Sensor Signal Circuit and ground. Measure the resistance between the Right Front Wheel Speed Sensor Signal Circuit and ground. Is the resistance below 5 ohms? Yes → Go To 9 No → Repair the Right Front Wheel Speed Sensor Signal Circuit Open. Perform ABS VERIFICATION TEST.	All
9	Turn 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 12 Volt Circuit and ground. Is the resistance below 15,000 ohms? Yes → Repair the Right Front Wheel Speed Sensor 12 Volt Supply Circuit Shorted to Ground. Perform ABS VERIFICATION TEST. No → Go To 10	All

RIGHT FRONT SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
10	Turn 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 Signal Circuit and ground. Is the resistance below 15,000 ohms? Yes → Repair the Right Front Wheel Speed Sensor Signal Circuit Shorted to Ground. Perform ABS VERIFICATION TEST. No → Go To 11	All
11	Turn ignition off. Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the Right Front Wheel Speed Sensor Circuits. Is the resistance below 200 ohms? Yes → Repair the Right Front Wheel Speed Sensor Circuits Shorted Together and Replace the Right Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST. No → Go To 12	All
12	Turn 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 ignition on. Measure the voltage of the Right Front Wheel Speed Sensor Signal circuit. Is the voltage above 1 volt? Yes → Repair Right Front Wheel Speed Sensor Signal Cricuit Shorted to Voltage and Replace Right Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST. No → Go To 13	All
13	Turn ignition off. Disconnect the Right Front Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Measure the voltage of the Right Front Wheel Speed Sensor 12 Volt Supply Circuit. Is the voltage above 10 volts? Yes → Go To 14 No → Replace the CAB. Perform ABS VERIFICATION TEST.	All

RIGHT FRONT SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
14	Turn ignition off. Disconnect the Right Front Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Using a test light connected to 12 volts, probe the Right Front Wheel Speed Sensor Signal Circuit. Is the test light on? Yes → Go To 15 No → Replace the CAB. Perform ABS VERIFICATION TEST.	All
15	Turn ignition off. Disconnect the Right Front Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Using a test light connected to 12 volts, probe the Right Front Wheel Speed Sensor 12 Volt Supply Circuit. Is the test light on? Yes → Replace the CAB. Perform ABS VERIFICATION TEST. No → Go To 16	All
16	Turn ignition off. Disconnect the Right Front Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Using a test light connected to 12 volts, probe the Right Front Wheel Speed Sensor Signal Circuit. Is the test light on? Yes → Replace the CAB. Perform ABS VERIFICATION TEST. No → Test Complete.	All
17	Turn 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 → Test Complete. 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
TONE WHEEL DEFECTIVE
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
INTERMITTENT SIGNAL DTC
RIGHT FRONT WHEEL SPEED SENSOR OR CONNECTOR DAMAGED
RIGHT FRONT WHEEL BEARING OUT OF SPECIFICATION
RIGHT FRONT WHEEL SPEED SENSOR FUNCTIONAL TEST
RIGHT FRONT WHEEL SPEED SENSOR AIR GAP OUT OF SPECIFICATION
CAB - UNABLE TO READ RIGHT FRONT WHEEL SPEED SENSOR SIGNAL

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRBIII®, read DTC's. Are the Right Front Sensor Signal Failure and Right Front Sensor Circuit Failure DTC's present? Yes → Refer to symptom RIGHT FRONT SENSOR CIRCUIT FAILURE in the BRAKES (CAB) category. No → Go To 2	All
2	Turn ignition on. Have an assistant drive the vehicle while you monitor the Right Front Wheel Speed Sensor Signal, using the DRBIII®. Slowly accelerate as straight as possible from a stop to 24 Km/h (15 Mph). With the DRBIII®, monitor all wheel speed sensor signals. Did Right Front Wheel Speed Sensor Signal show 0 Km/h (0 Mph)? Yes → Go To 3 No → Go To 10	All

RIGHT FRONT SENSOR SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Inspect the Tone Wheel for damaged or missing teeth. **Note: The Tone Wheel Teeth should be perfectly square, not bent or nicked.** Is the Tone Wheel OK? Yes → Go To 4 No → Replace the Tone Wheel. Perform ABS VERIFICATION TEST.	All
4	Turn 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. No → Go To 5	All
5	Turn 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 6 No → Repair as necessary. Perform ABS VERIFICATION TEST.	All
6	Turn 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 0.30 mm - 1.50 mm (0.012″ - 0.059″)? Yes → Go To 7 No → Repair as necessary. Perform ABS VERIFICATION TEST.	All
7	Turn ignition off. Disconnect the Right Front Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Connect a single jumper wire from the harness side of Right Front Wheel Speed Sensor 12 Volt Supply Circuit into the Right Front Wheel Speed Sensor connector mating terminal. Using a voltmeter in Direct Current (DC) mode, probe the Right Front Wheel Speed Sensor signal circuit at Right Front Wheel Speed Sensor connector. Turn ignition on. Slowly rotate the wheel while observing voltmeter reading. Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated? Yes → Go To 8 No → Replace the Right Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST.	All

RIGHT FRONT SENSOR SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
8	Turn ignition off. Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Remove harness strain relief to access wires in CAB connector for backprobing. Using a voltmeter in Direct Current (DC) mode, and special tool 6801, backprobe the Right Front Wheel Speed Sensor Signal Circuit at CAB. Reconnect the CAB connector. Turn ignition on. Slowly rotate the wheel while observing voltmeter reading. Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated? Yes → Go To 9 No → Replace the Right Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST.	All
9	If there are no potential causes remaining, replace the CAB. View repair options. Repair Replace the CAB. Perform ABS VERIFICATION TEST.	All
10	Turn 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. No → Test Complete.	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 12 VOLT SUPPLY CIRCUIT OPEN
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SIGNAL CIRCUIT OPEN
RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RIGHT REAR WHEEL SPEED SENSOR DEFECTIVE - SHORTED TO GROUND
RIGHT REAR WHEEL SPEED SENSOR OR CONNECTOR DAMAGED
CAB - RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY CIRCUIT OPEN
CAB - RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY SHORTED TO GROUND
CAB - RIGHT REAR WHEEL SPEED SENSOR SIGNAL CIRCUIT OPEN
CAB - RIGHT REAR WHEEL SPEED SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
CAB - UNABLE TO READ RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
RIGHT REAR WHEEL SPEED SENSOR CIRCUITS SHORTED TOGETHER
RIGHT REAR WHEEL SPEED SENSOR SIGNAL SHORTED TO B(+)

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRBIII®, read DTC's. With the DRBIII®, erase DTC's. Turn ignition off. Turn ignition on. With the DRBIII®, read DTC's. Did the Right Rear Wheel Speed Sensor Circuit Failure DTC set again? Yes → Go To 2 No → Go To 17	All

RIGHT REAR SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Turn ignition off. Disconnect the Right Rear Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Measure the voltage across the Right Rear Wheel Speed Sensor 12 Volt Supply circuit and the Right Rear Wheel Speed Sensor Signal Circuit in the Right Rear Wheel Speed Sensor connector. Is the voltage above 10 volts? Yes → Go To 3 No → Go To 5	All
3	Turn 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. No → Go To 4	All
4	Turn ignition off. Disconnect the Right Rear Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance between either one of the Right Rear Wheel Speed Sensor terminals and ground. Is the resistance below 15,000 ohms? Yes → Replace the Right Rear Wheel Speed Sensor. Perform ABS VERIFICATION TEST. No → Go To 15	All
5	Turn 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.** Connect a jumper wire between the Right Rear Wheel Speed Sensor 12 Volt Supply Circuit and ground. Measure the resistance between the Right Rear Wheel Speed Sensor 12 Volt Supply Circuit and ground. Is the resistance below 5 ohms? Yes → Go To 6 No → Repair the Right Rear Wheel Speed Sensor 12 Volt Supply Circuit Open. Perform ABS VERIFICATION TEST.	All

RIGHT REAR SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
6	Turn 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.** Connect a jumper wire between the Right Rear Wheel Speed Sensor Signal Circuit and ground. Measure the resistance between the Right Rear Wheel Speed Sensor Signal Circuit and ground. Is the resistance below 5 ohms? Yes → Go To 7 No → Repair the Right Rear Wheel Speed Sensor Signal Circuit Open. Perform ABS VERIFICATION TEST.	All
7	Turn 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 12 Volt Supply Circuit and ground. Is the resistance below 15,000 ohms? Yes → Repair the Right Rear Wheel Speed Sensor 12 Volt Supply Circuit Shorted to Ground. Perform ABS VERIFICATION TEST. No → Go To 8	All
8	Turn 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 Signal Circuit and ground. Is the resistance below 15,000 ohms? Yes → Repair the Right Rear Wheel Speed Signal Circuit Shorted to Ground. Perform ABS VERIFICATION TEST. No → Go To 9	All
9	Turn ignition off. Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the Right Rear Wheel Speed Sensor Circuits. Is the resistance below 200 ohms? Yes → Repair the Right Rear Wheel Speed Sensor Circuits Shorted Together and Replace the Right Rear Wheel Speed Sensor. Perform ABS VERIFICATION TEST. No → Go To 10	All

RIGHT REAR SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
10	Turn 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 ignition on. Measure the voltage of the Right Rear Wheel Speed Sensor Signal Circuit. Is the voltage above 1 volt? Yes → Repair Right Rear Wheel Speed Sensor Signal Circuit Shorted to Voltage and Replace Right Rear Wheel Speed Sensor. Perform ABS VERIFICATION TEST. No → Go To 11	All
11	Turn ignition off. Disconnect the Right Rear Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Measure the voltage of the Right Rear Wheel Speed Sensor 12 Volt Supply Circuit. Is the voltage above 10 volts? Yes → Go To 12 No → Replace the CAB. Perform ABS VERIFICATION TEST.	All
12	Turn ignition off. Disconnect the Right Rear Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Using a test light connected to 12 volts, probe the Right Rear Wheel Speed Sensor 12 Volt Supply Circuit. Is the test light on? Yes → Replace the CAB. Perform ABS VERIFICATION TEST. No → Go To 13	All
13	Turn ignition off. Disconnect the Right Rear Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Using a test light connected to 12 volts, probe the Right Rear Wheel Speed Sensor Signal Circuit. Is the test light on? Yes → Replace the CAB. Perform ABS VERIFICATION TEST. No → Go To 14	All

RIGHT REAR SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
14	Turn ignition off. Disconnect the Right Rear Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Using a test light connected to 12 volts, probe the Right Rear Wheel Speed Sensor Signal Circuit. Is the test light on? Yes → Replace the CAB. Perform ABS VERIFICATION TEST. No → Go To 15	All
15	Turn ignition off. Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Remove harness strain relief to access wires in CAB connector for backprobing. Using a voltmeter in Direct Current (DC) mode, and special tool 6801, backprobe the Right Rear Wheel Speed Sensor Signal Circuit at CAB. Reconnect the CAB connector. Turn ignition on. Slowly rotate the wheel while observing voltmeter reading. Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated? Yes → Go To 16 No → Replace the Right Rear Wheel Speed Sensor. Perform ABS VERIFICATION TEST.	All
16	If there are no potential causes remaining, replace the CAB. View repair options. Repair Replace the CAB. Perform ABS VERIFICATION TEST.	All
17	Turn 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 → Test Complete. 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 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
TONE WHEEL DEFECTIVE
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
INTERMITTENT SIGNAL DTC
RIGHT REAR WHEEL SPEED SENSOR OR CONNECTOR DAMAGED
RIGHT REAR WHEEL BEARING OUT OF SPECIFICATION
RIGHT REAR WHEEL SPEED SENSOR FUNCTIONAL TEST
RIGHT REAR WHEEL SPEED SENSOR AIR GAP OUT OF SPECIFICATION
CAB - UNABLE TO READ RIGHT REAR WHEEL SPEED SENSOR SIGNAL

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRBIII®, read DTC's. Are Right Rear Sensor Signal Failure and Right Rear Sensor Circuit Failure DTC's present right now? Yes → Refer to symptom RIGHT REAR SENSOR CIRCUIT FAILURE in the BRAKES (CAB) category. No → Go To 2	All
2	Turn ignition on. Have an assistant drive the vehicle while you monitor the Right Rear Wheel Speed Sensor Signal, using the DRBIII®. Slowly accelerate as straight as possible from a stop to 24 Km/h (15 Mph). With the DRBIII®, monitor all wheel speed sensor signals. Did the Right Rear Wheel Speed Sensor Signal show 0 Km/h (0 Mph)? Yes → Go To 3 No → Go To 10	All

RIGHT REAR SENSOR SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Inspect the Tone Wheel for damaged or missing teeth. **Note: The Tone Wheel Teeth should be perfectly square, not bent or nicked.** Is the Tone Wheel OK? Yes → Go To 4 No → Replace the Tone Wheel. Perform ABS VERIFICATION TEST.	All
4	Turn 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. No → Go To 5	All
5	Turn 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 6 No → Repair as necessary. Perform ABS VERIFICATION TEST.	All
6	Turn ignition off. Using a Feeler Gauge, measure the Sensor Air Gap. **Note: The Air Gap should be checked in at least Four places on the Tone Wheel.** Is the Air Gap between 0.50 mm - 1.25 mm (0.019″ - 0.049″)? Yes → Go To 7 No → Repair as necessary. Perform ABS VERIFICATION TEST.	All
7	Turn ignition off. Disconnect the Right Rear Wheel Speed Sensor Connector. **Note: Check connector - Clean/repair as necessary.** Connect a single jumper wire from the harness side of Right Rear Wheel Speed Sensor 12 Volt Supply circuit into the Right Rear Wheel Speed Sensor connector mating terminal. Using a voltmeter in Direct Current (DC) mode, probe the Right Rear Wheel Speed Sensor Signal circuit at Right Rear Wheel Speed Sensor connector. Turn ignition on. Slowly rotate the wheel while observing voltmeter reading. Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated? Yes → Go To 8 No → Replace the Right Rear Wheel Speed Sensor. Perform ABS VERIFICATION TEST.	All

RIGHT REAR SENSOR SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
8	Turn ignition off. Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Remove harness strain relief to access wires in CAB connector for backprobing. Using a voltmeter in Direct Current (DC) mode, and special tool 6801, backprobe the Right Rear Wheel Speed Sensor Signal Circuit at CAB. Reconnect the CAB connector. Turn ignition on. Slowly rotate the wheel while observing voltmeter reading. Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated? Yes → Go To 9 No → Replace the Right Rear Wheel Speed Sensor. Perform ABS VERIFICATION TEST.	All
9	If there are no potential causes remaining, replace the CAB. View repair options. Repair Replace the CAB. Perform ABS VERIFICATION TEST.	All
10	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. No → Test Complete.	All

Symptom:
SYSTEM OVERVOLTAGE

When Monitored and Set Condition:

SYSTEM OVERVOLTAGE

When Monitored: Ignition on. The CAB monitors the Fused Ignition Switched Output circuit at all times for proper system voltage.

Set Condition: If the voltage is between 17 and 19 volts for greater than 420 milliseconds (ms), the Diagnostic Trouble Code (DTC) is set.

POSSIBLE CAUSES
INTERMITTENT DTC
BATTERY OVERCHARGED
FUSED IGNITION SWITCH OUTPUT CIRCUIT OVERVOLTAGE

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. Is the System Overvoltage DTC present? Yes → Go To 2 No → Go To 4	All
2	Turn 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. No → Go To 3	All
3	Turn ignition off. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Start the engine. Raise engine RPM's above 1800. Measure the voltage of the Fused Ignition Switch Output Circuit. Is the voltage above 16.5 volts ? Yes → Refer to appropriate service information for charging system testing and repair. Perform ABS VERIFICATION TEST. No → Test Complete.	All

SYSTEM OVERVOLTAGE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. 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. 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 every 7 milliseconds for proper system voltage.

Set Condition: If the voltage is below 8 volts, the Diagnostic Trouble Code (DTC) is set.

POSSIBLE CAUSES
INTERMITTENT DTC
FUSED IGNITION SWITCH OUTPUT CIRCUIT HIGH RESISTANCE
FUSED IGNITION SWITCH OUTPUT CIRCUIT UNDERVOLTAGE

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. Is the System Undervoltage DTC present? Yes → Go To 2 No → Go To 4	All
2	Turn ignition on. With the DRBIII®, select Sensors. With the DRBIII®, read the ″Ignition Voltage″ status and record. Measure the voltage at the battery and record. Compare voltage measurements. Does the DRBIII® display ignition voltage within one volt of the battery voltage? Yes → Go To 3 No → Repair the Fused Ignition Switch Output Circuit for high resistance Perform ABS VERIFICATION TEST.	All

SYSTEM UNDERVOLTAGE — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Start the engine. Raise engine RPM's above 1800. Measure the voltage of the Fused Ignition Switch Output circuit. Is the voltage below 13 volts ? Yes → Refer to appropriate service information for charging system testing and repair. Perform ABS VERIFICATION TEST. No → Test Complete.	All
4	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. No → Test Complete.	All

Symptom:
*TRACTION CONTROL SWITCH

POSSIBLE CAUSES
TRACTION CONTROL SWITCH GROUND CIRCUIT OPEN
TRACTION CONTROL SWITCH SENSE CIRCUIT OPEN
TRACTION CONTROL SWITCH SENSE CIRCUIT SHORTED TO GROUND
TRACTION CONTROL SWITCH STUCK CLOSED
TRACTION CONTROL SWITCH STUCK OPEN
CAB - TRACTION CONTROL SWITCH CIRCUIT SHORTED TO GROUND
CAB - TRACTION CONTROL SWITCH SENSE CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	Turn ignition on. Depress the Traction Control Switch on dash several times while watching the ″Trac Off″ Lamp in the Instrument Cluster. Does Lamp change from ″Trac Off″ to nothing? Yes → Test Complete. No → Go To 2	All
2	Turn ignition on. Depress the Traction Control Switch on dash several times while watching the ″Trac Off″ Lamp in the Instrument Cluster. Does the Instrument Cluster display ″Trac Off″ all the time? Yes → Go To 3 No → Go To 6	All
3	Turn the ignition off. Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the Traction Control Switch Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the Traction Control Switch Sense circuit and ground. Is the resistance below 5.0 ohms? Yes → Repair the Traction Control Switch Sense Circuit Shorted to Ground. No → Go To 4	All
4	Turn ignition off. Disconnect the Traction Connector Switch Connector. **Note: Check connector - Clean/repair as necessary.** Measure across the Traction Control Switch Sense circuit and Ground circuit, on Switch. Measure resistance of the Traction Control Switch. Is the resistance below 2.0 ohms across switch? Yes → Replace the Traction Control Switch. No → Go To 5	All

*TRACTION CONTROL SWITCH — Continued

TEST	ACTION	APPLICABILITY
5	If there are no potential causes remaining, replace the CAB. View repair options. Repair Replace the CAB.	All
6	Turn ignition off. Disconnect the Traction Control Switch Connector. **Note: Check connector - Clean/repair as necessary.** Turn ignition on. Measure the voltage of the Traction Control Switch Sensor Circuit in the vehicle harness. Is the voltage above 9 volts. Yes → Go To 7 No → Go To 9	All
7	Turn the ignition off. Disconnect the Traction Control Switch harness connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the Ground Circuit in the vehicle harness. Is the resistance below 5 ohms? Yes → Go To 8 No → Repair the Ground Circuit Open. Perform ABS VERIFICATION TEST.	All
8	Turn ignition off. Disconnect the Traction Connector Switch Connector. **Note: Check connector - Clean/repair as necessary.** Measure across the Traction Control Switch Sense circuit and Ground circuit, on Switch. Depress the Traction Control Switch. Using an ohmmeter, take measure while depressing the Traction Control Switch. Is the resistance below 2.0 ohms across switch when the switch is depressed? Yes → Test Complete. No → Replace the Traction Control Switch.	All
9	Turn the ignition off. Disconnect the CAB Connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the Traction Control Switch Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the Traction Control Switch Sense Circuit. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the Traction Control Switch Sense Circuit Open.	All

*TRACTION CONTROL SWITCH — Continued

TEST	ACTION	APPLICABILITY
10	Turn ignition off. Disconnect the Traction Connector Switch Connector. **Note: Check connector - Clean/repair as necessary.** Measure across the Traction Control Switch Sense circuit and Ground circuit, on Switch. Depress the Traction Control Switch. Using an ohmmeter, take measure while depressing the Traction Control Switch. Is the resistance below 2.0 ohms across switch when the switch is depressed? Yes → Go To 11 No → Replace the Traction Control Switch.	All
11	If there are no potential causes remaining, replace the CAB. View repair options. Repair Replace the CAB.	All

Symptom:
*NO RESPONSE FROM CAB

POSSIBLE CAUSES
NO RESPONSE FROM CAB
CHECK FUSE #11
GROUND CIRCUIT OPEN
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
PCI BUS CIRCUIT OPEN
CAB - NO RESPONSE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **As soon as one or more module communicates with the DRBIII®, answer the question.** With the DRBIII®, select PASSIVE RESTRAINTS, then select AIRBAG. With the DRBIII®, select MECHANICAL INSTRUMENT CLUSTER. Were you able to establish communication with any of the modules? Yes → Go To 2 No → Refer to symptom PCI BUS COMMUNICATION FAILURE in the COMMUNICATION category. Perform ABS VERIFICATION TEST.	All
2	Turn the ignition off. Remove and inspect fuse #11 from the Fuse Block. Is the Fuse blown? Yes → Refer to the wiring diagrams located in the service information to help isolate a possible short to ground condition. Perform ABS VERIFICATION TEST. No → Go To 3	All
3	Turn the ignition off. Disconnect the CAB harness connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance between ground and both of the ground circuits. Is the resistance below 1.0 ohm for both measurements? Yes → Go To 4 No → Repair the Ground circuit(s) for an open. Perform ABS VERIFICATION TEST.	All

*NO RESPONSE FROM CAB — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Ensure Fuse #11 is installed. Disconnect the CAB harness connector. **Note: Check connector - Clean/repair as necessary.** 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 ABS VERIFICATION TEST.	All
5	**NOTE: Ensure there is PCI bus communication with other modules. If not, refer to the PCI Bus Communication Failure symptom and repair as necessary.** Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. Select DRB Standalone. Select lab scope. Select Live. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete. Disconnect the CAB harness connector. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the CAB harness connector. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. What is the voltage display on the scope? Pulse from 0 to approximately 7.5 volts Go To 6 Steady 0 volts Repair the PCI Bus circuit for an open. Perform ABS VERIFICATION TEST.	All
6	If there are no potential causes remaining, view repair. Repair Replace the CAB. Perform ABS VERIFICATION TEST.	All

Verification Tests

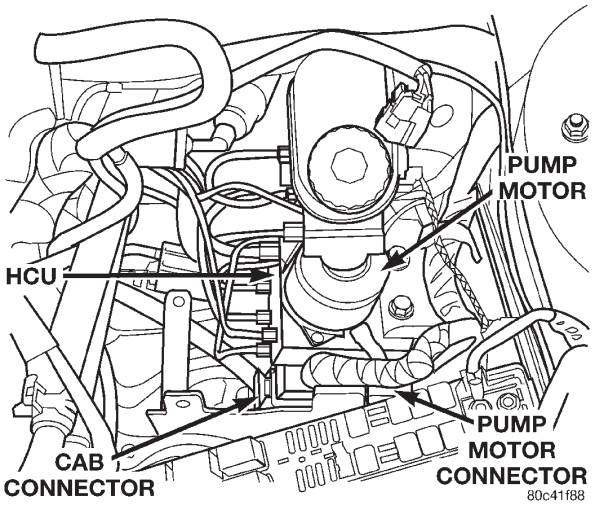
ABS VERIFICATION TEST	APPLICABILITY
1. Turn ignition off. 2. Connect all previously disconnected components and connectors. 3. Turn the ignition on. 4. With the DRBIII®, erase DTC's. 5. With the DRBIII®, read DTC's. 6. If any Diagnostic Trouble Codes are present, return to Symptom list and troubleshoot 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 complaint can no longer be duplicated, the repair is complete.	All

NOTES

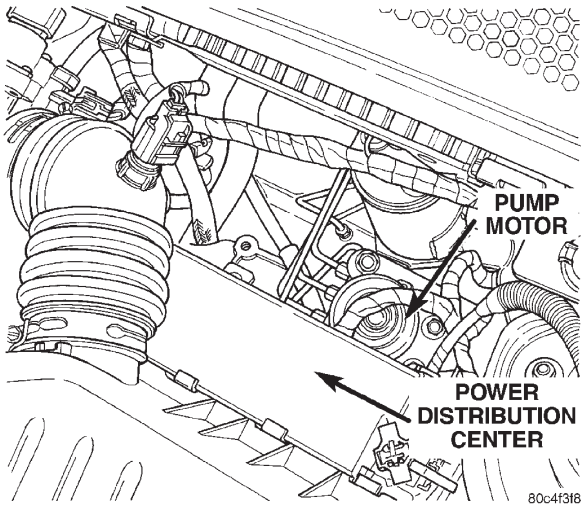
8.0 COMPONENT LOCATIONS

8.1 CONTROLLER ANTILOCK BRAKE

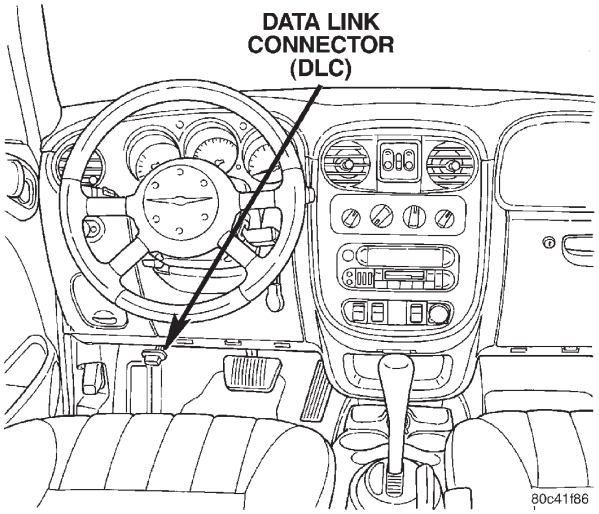
LHD



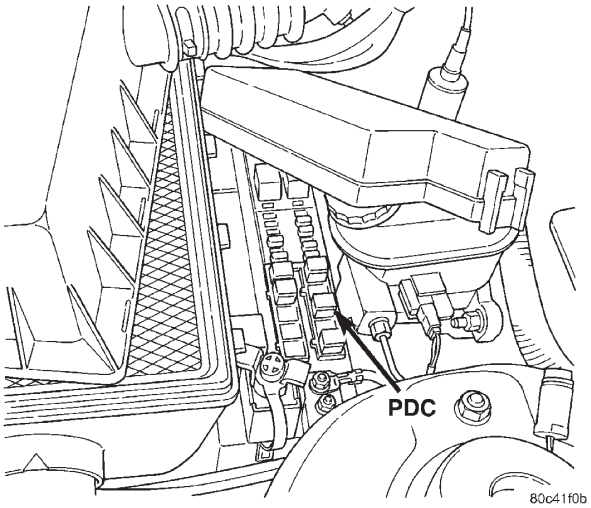
RHD

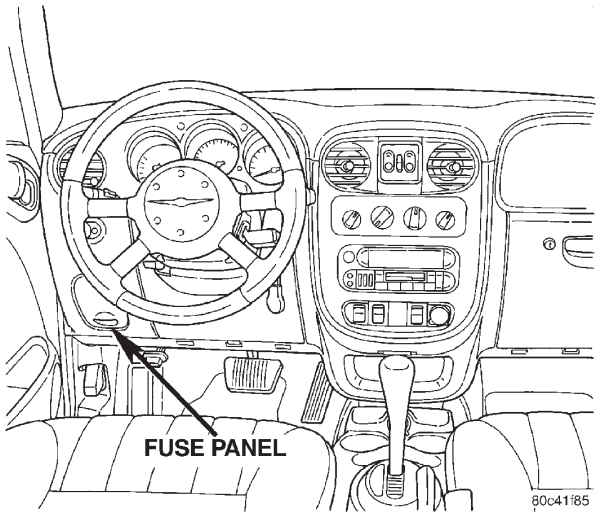


8.2 DATA LINK CONNECTOR

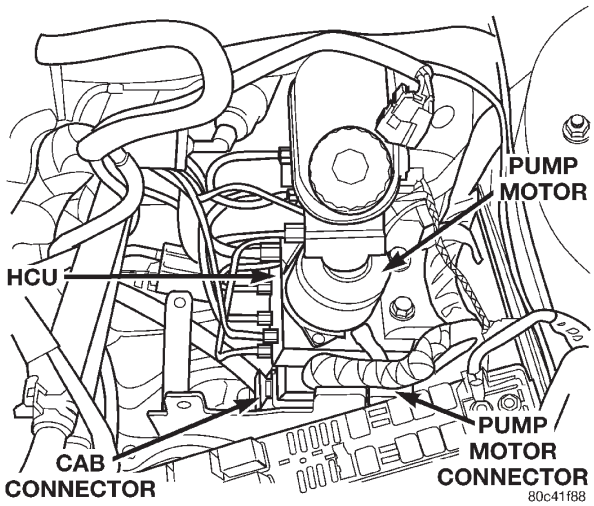


8.3 FUSES

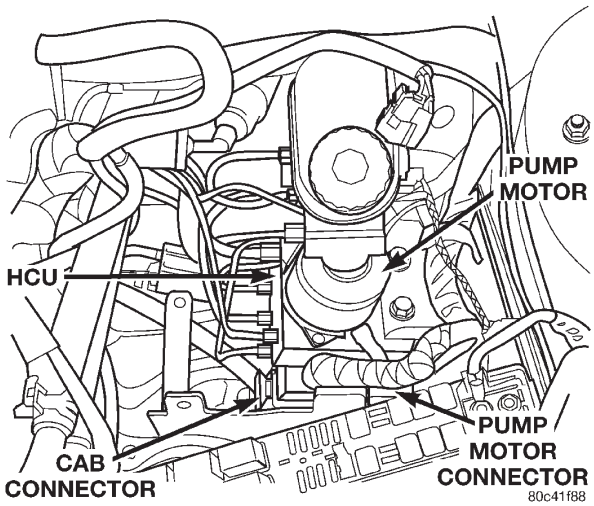




8.4 HYDRAULIC CONTROL UNIT

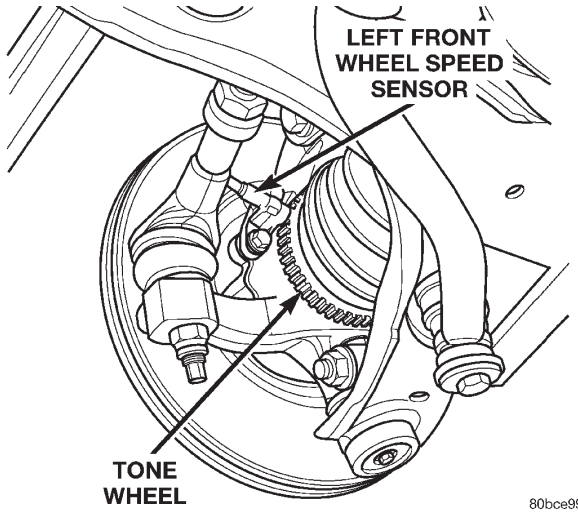


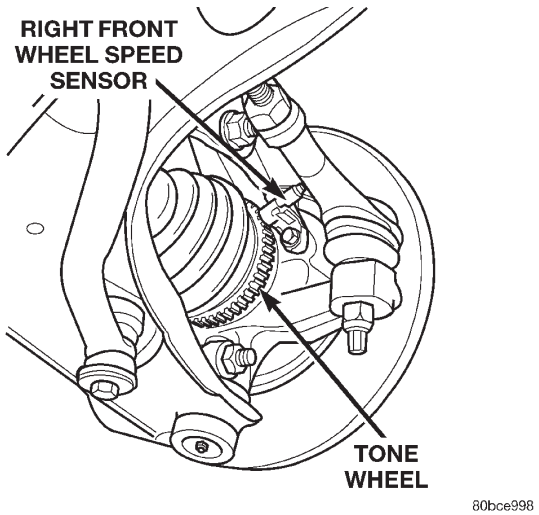
8.5 PUMP MOTOR



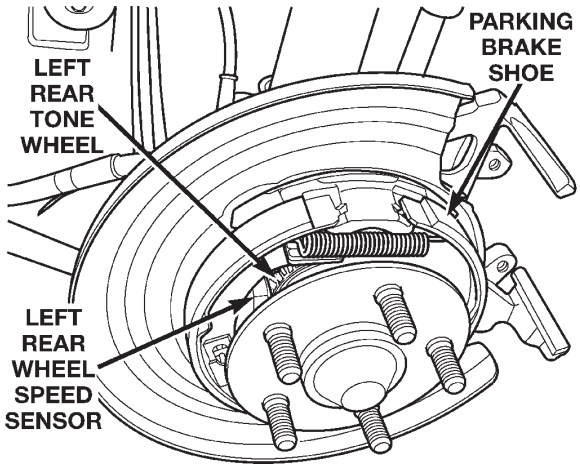
8.6 TONE WHEELS

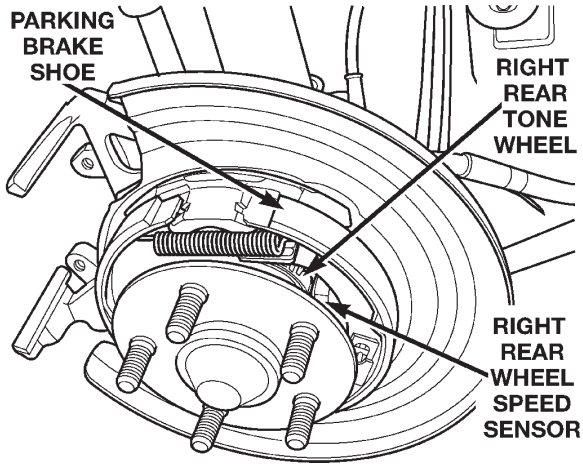
FRONT





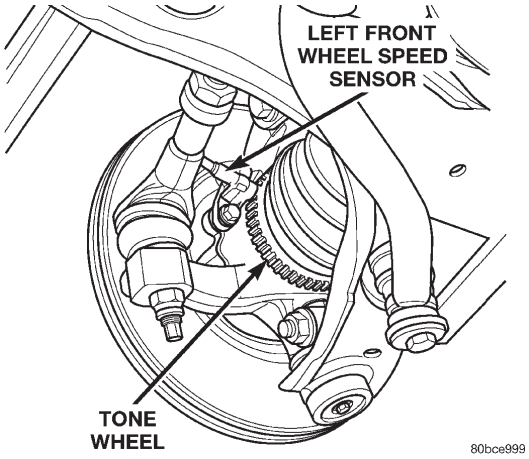
REAR

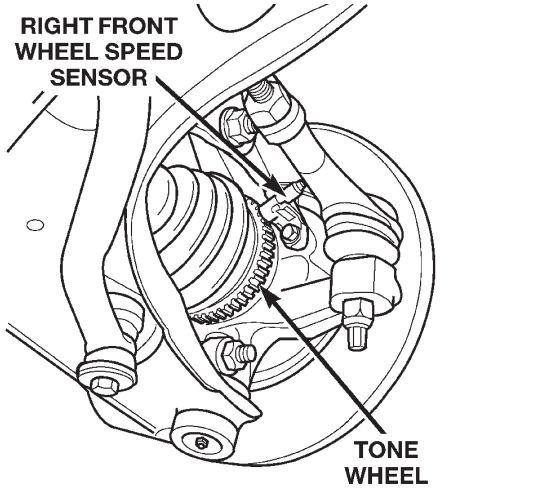




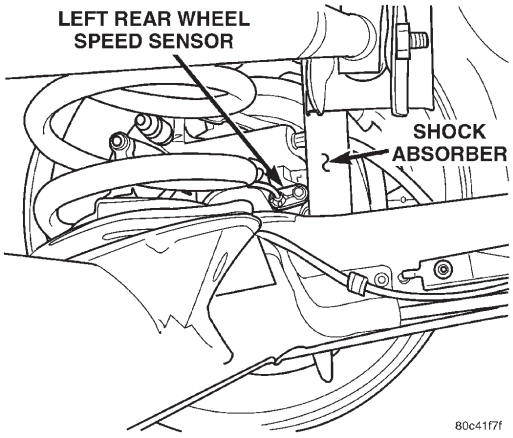
8.7 WHEEL SPEED SENSORS

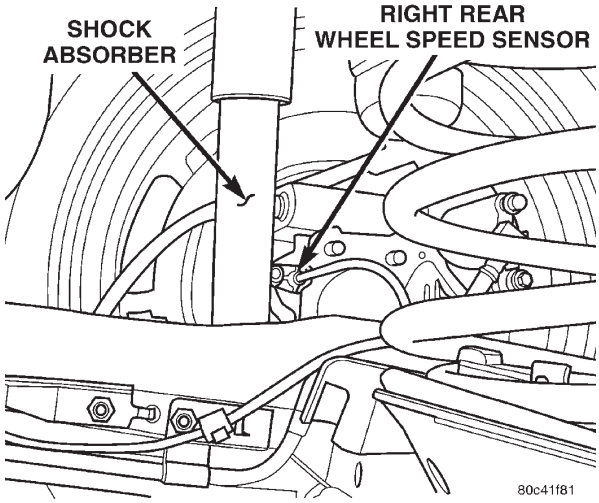
FRONT





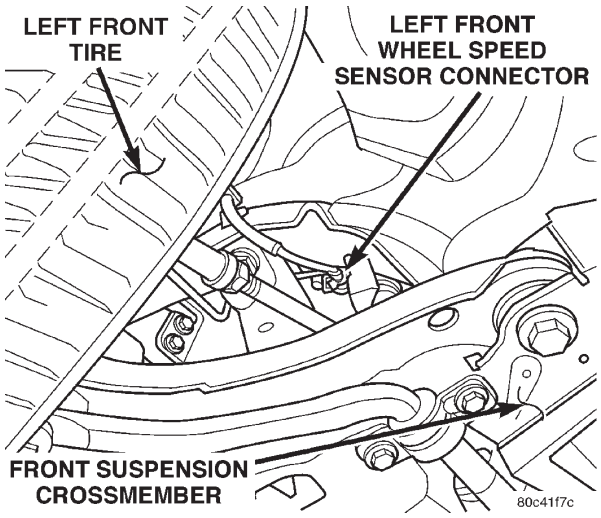
REAR

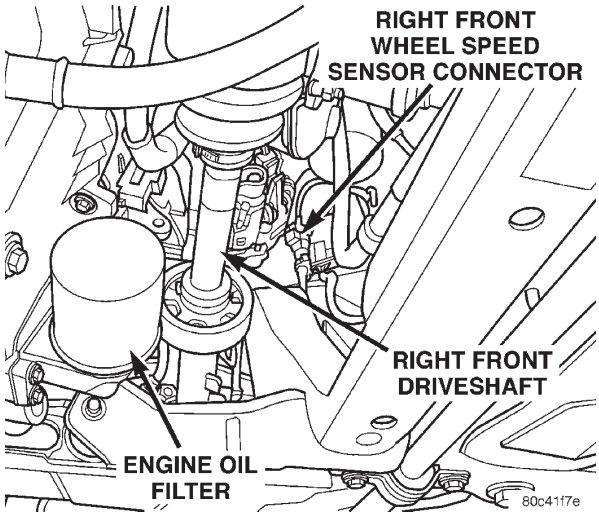




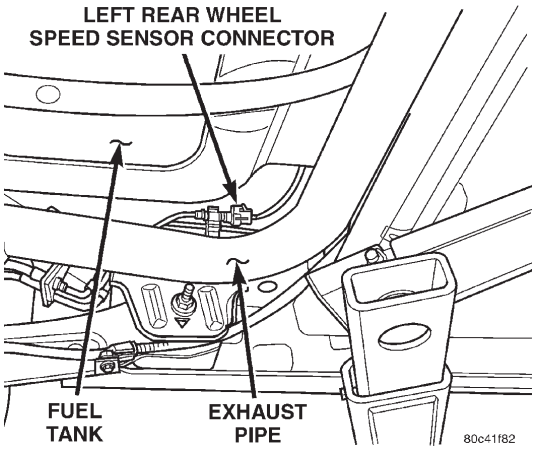
8.8 WHEEL SPEED SENSOR CONNECTORS

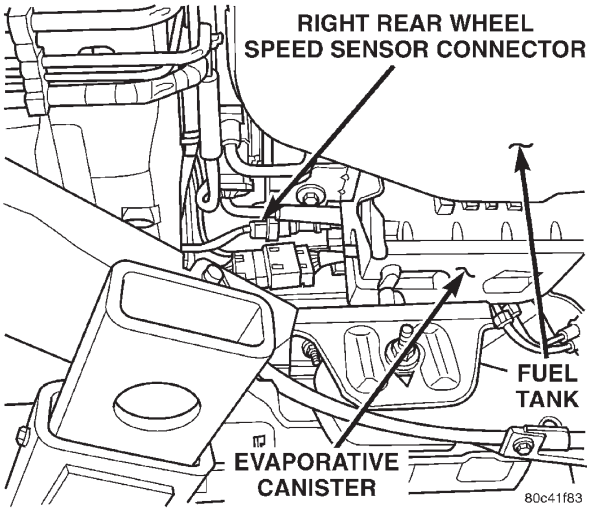
FRONT



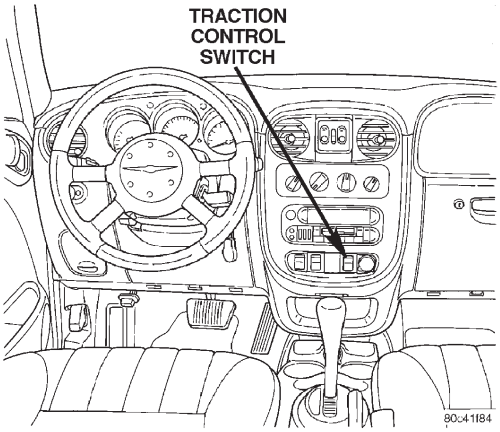


REAR

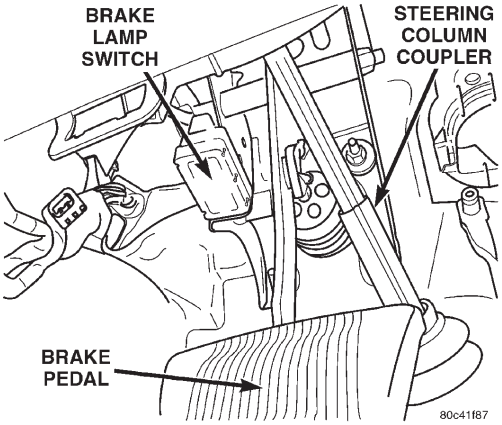




8.9 TRACTION CONTROL SWITCH

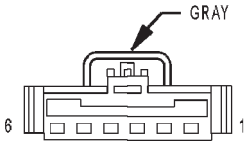


8.10 BRAKE LAMP SWITCH



NOTES

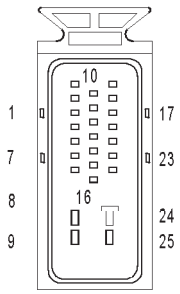
9.0 CONNECTOR PINOUTS



BRAKE
LAMP
SWITCH

BRAKE LAMP SWITCH - GRAY 6 WAY

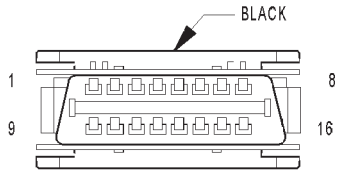
CAV	CIRCUIT	FUNCTION
1	F32 18PK/DB	FUSED B(+)
2	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
3	V40 20DB/RD	SPEED CONTROL BRAKE LAMP SWITCH OUTPUT
4	V32 20YL/RD	SPEED CONTROL POWER SUPPLY
5	Z1 20BK	GROUND
6	K29 20WT/PK	BRAKE LAMP SWITCH SENSE



CONTROLLER
ANTI-LOCK
BRAKE

CONTROLLER ANTI-LOCK BRAKE - 25 WAY

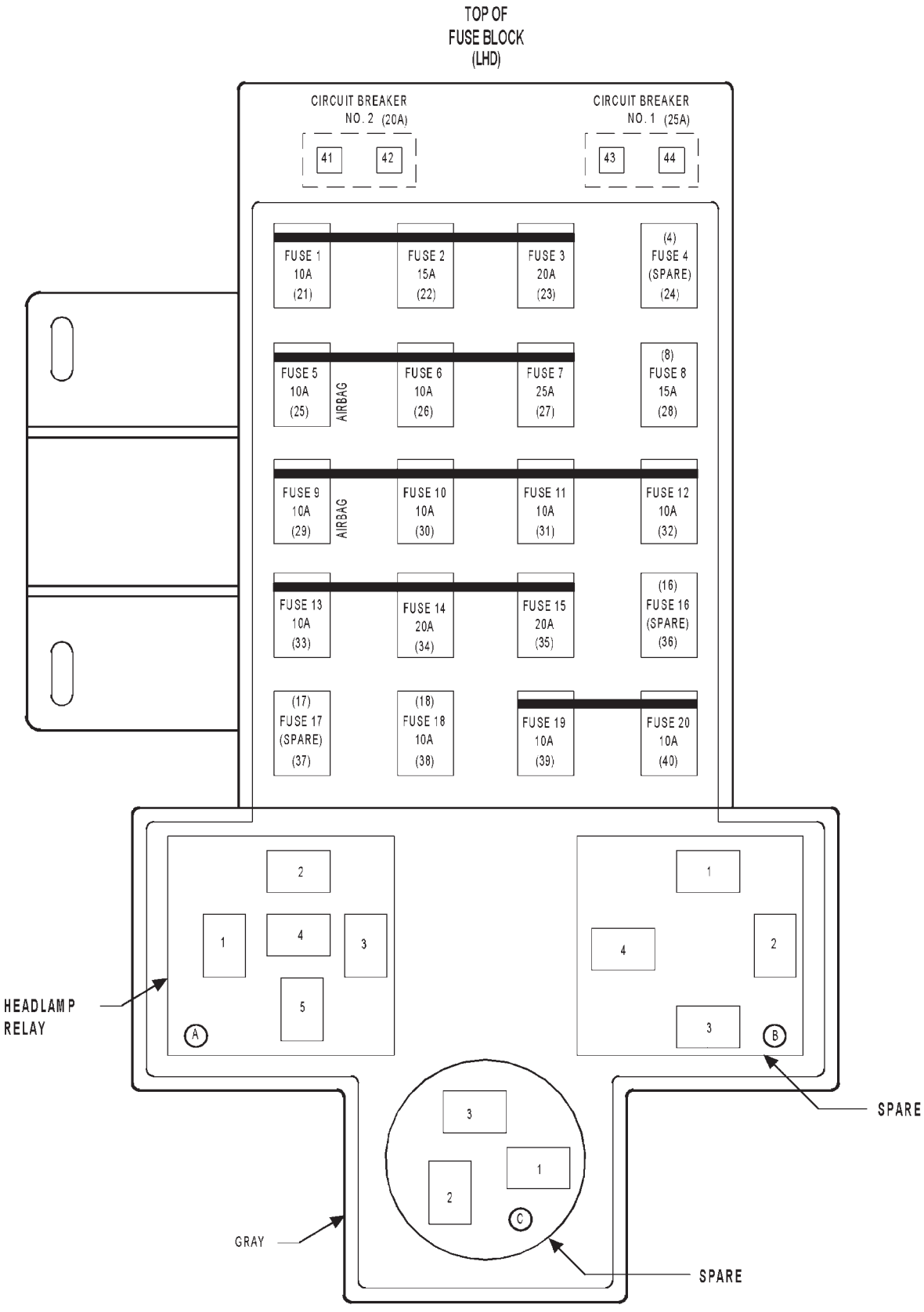
CAV	CIRCUIT	FUNCTION
1	B8 18RD/DB	LEFT FRONT WHEEL SPEED SENSOR SIGNAL
2	B9 18RD	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
3	-	-
4	F12 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
5	B3 18LG/DB	LEFT REAR WHEEL SPEED SENSOR SIGNAL
6	B4 18LG	LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
7	-	-
8	Z1 12BK	GROUND
9	A20 12RD/DB	FUSED B(+)
10	D25 18VT/YL	PCI BUS
11	-	-
12	-	-
13	-	-
14	-	-
15	B27 18RD/YL	TRACTION CONTROL SWITCH SENSE
16	-	-
17	-	-
18	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
19	B6 18WT/DB	RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
20	B7 18WT	RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
21	-	-
22	B2 18YL	RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
23	B1 18YL/DB	RIGHT REAR WHEEL SPEED SENSOR SIGNAL
24	Z1 12BK	GROUND
25	A10 12RD/DG	FUSED B(+)



DATA LINK
CONNECTOR

DATA LINK CONNECTOR - BLACK 16 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/YL	PCI BUS
3	-	-
4	Z12 20BK/TN	GROUND
5	Z11 20BK/WT	GROUND
6	D20 20LG	SCI RECEIVE
7	D21 20PK	SCI TRANSMIT
8	-	-
9	-	-
10	-	-
11	-	-
12	-	-
13	-	-
14	D6 20PK/LB	SCI RECEIVE (EATX)
15	-	-
16	A14 18RD/WT	FUSED B(+)


TOP OF
FUSE BLOCK
(LHD)
CIRCUIT BREAKER
NO. 2 (20A)
41
42
CIRCUIT BREAKER
NO. 1 (25A)
43
44
FUSE 1
10A
(21)
FUSE 2
15A
(22)
FUSE 3
20A
(23)
(4)
FUSE 4
(SPARE)
(24)
FUSE 5
10A
(25)
AIRBAG
FUSE 6
10A
(26)
FUSE 7
25A
(27)
(8)
FUSE 8
15A
(28)
FUSE 9
10A
(29)
AIRBAG
FUSE 10
10A
(30)
FUSE 11
10A
(31)
FUSE 12
10A
(32)
FUSE 13
10A
(33)
FUSE 14
20A
(34)
FUSE 15
20A
(35)
(16)
FUSE 16
(SPARE)
(36)
(17)
FUSE 17
(SPARE)
(37)
(18)
FUSE 18
10A
(38)
FUSE 19
10A
(39)
FUSE 20
10A
(40)
HEADLAMP
RELAY
A
B
C
SPARE
GRAY
SPARE

FUSES

CAV	CIRCUIT	FUNCTION
1	F9 20RD/BK	FUSED B(+)
2	F33 18PK/RD	FUSED B(+)
3	F35 18RD	FUSED B(+)
4	-	-
5	F25 18TN/LG	FUSED IGNITION SWITCH OUTPUT (RUN)
6	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN)
7	C1 14DG	FUSED IGNITION SWITCH OUTPUT (RUN)
8	F39 18PK/LG	HEADLAMP RELAY OUTPUT
9	F15 18DG/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
10	G5 20DB/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
11	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
12	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
12	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
13	X12 18RD/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
14	F10 18YL/RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
15	F13 16DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
16	-	-
17	-	-
18	C16 20LB/YL	FUSED REAR WINDOW DEFOGGER SWITCH OUTPUT
19	L44 16VT/RD	FUSED RIGHT LOW BEAM OUTPUT
20	L43 18VT	FUSED LEFT LOW BEAM OUTPUT
20	L43 16VT	FUSED LEFT LOW BEAM OUTPUT

CIRCUIT BREAKERS

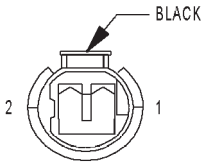
CAV	CIRCUIT	FUNCTION
C.B. NO. 1	F3 16LB/OR	FUSED B(+)
C.B. NO. 2	F21 14TN	FUSED IGNITION SWITCH OUTPUT (RUN)

HEADLAMP RELAY (LHD)

CAV	CIRCUIT	FUNCTION
A1	Z1 20BK	GROUND
A2	L4 16VT/WT	HEADLAMP RELAY OUTPUT
A3	L3 16RD/OR	HEADLAMP RELAY CONTROL
A4	F34 18TN/BK	HEADLAMP RELAY OUTPUT
A5	F3 16LB/OR	FUSED B(+)

HEADLAMP RELAY (RHD)

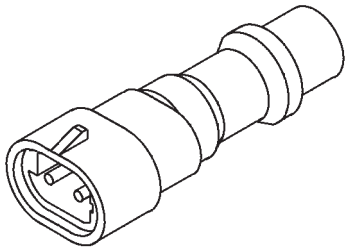
CAV	CIRCUIT	FUNCTION
B1	Z1 20BK	GROUND
B2	L4 16VT/WT	HEADLAMP RELAY OUTPUT
B3	L3 16RD/OR	HEADLAMP RELAY CONTROL
B4	-	-
B5	F3 16LB/OR	FUSED B(+)



LEFT FRONT WHEEL SPEED SENSOR

LEFT FRONT WHEEL SPEED SENSOR - BLACK 2 WAY

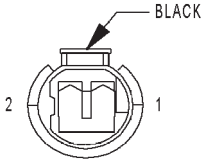
CAV	CIRCUIT	FUNCTION
1	B8 18RD	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B8 18RD/DB	LEFT FRONT WHEEL SPEED SENSOR SIGNAL



LEFT FRONT WHEEL SPEED SENSOR CONNECTOR (SENSOR SIDE)

LEFT FRONT WHEEL SPEED SENSOR (SENSOR SIDE)

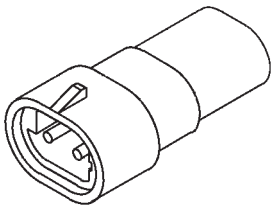
CAV	CIRCUIT	FUNCTION
1	RD	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	RD/DB	LEFT FRONT WHEEL SPEED SENSOR SIGNAL



LEFT REAR WHEEL SPEED SENSOR

LEFT REAR WHEEL SPEED SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	B4 20LG	LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B3 20LG/DB	LEFT REAR WHEEL SPEED SENSOR SIGNAL

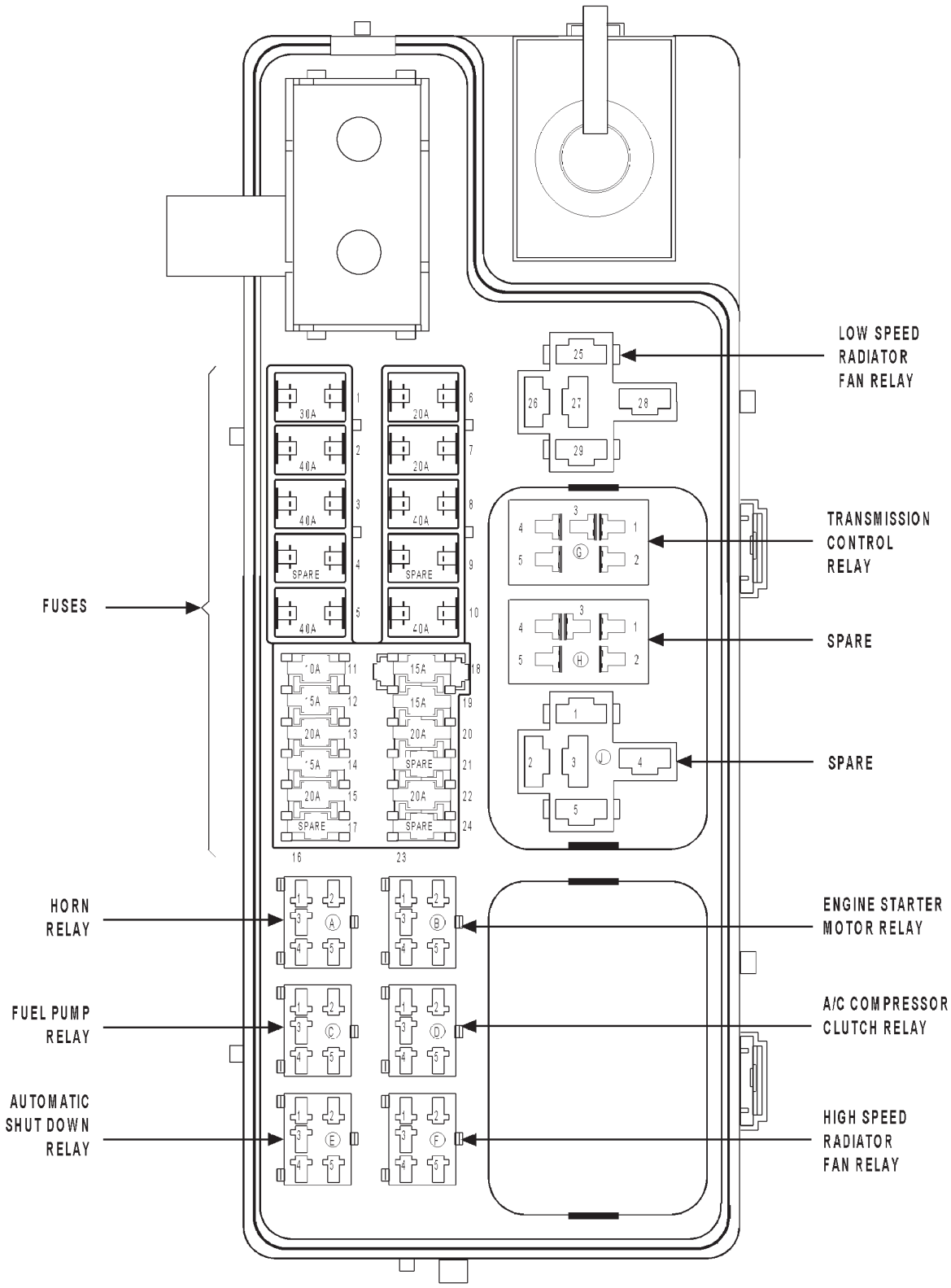


LEFT REAR
WHEEL SPEED
SENSOR
CONNECTOR
(SENSOR SIDE)

LEFT REAR WHEEL SPEED SENSOR (SENSOR SIDE)

CAV	CIRCUIT	FUNCTION
1	LG	LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	LG/DB	LEFT REAR WHEEL SPEED SENSOR SIGNAL

POWER DISTRIBUTION CENTER



FUSES

CAV	CIRCUIT	FUNCTION
1	A1 14RD	FUSED B(+)
2	A10 12RD/DG	FUSED B(+)
3	A2 12PK/BK	FUSED B(+)
4	-	-
5	A16 12GY	FUSED B(+)
6	A120 16RD/LB	FUSED B(+)
7	A20 12RD/DB	FUSED B(+)
8	A4 12BK/PK	FUSED B(+)
9	-	-
10	A3 12RD/WT	FUSED B(+)
11	A17 20RD/BK	FUSED B(+)
12	F32 18PK/DB	FUSED B(+)
13	A14 18RD/WT	FUSED B(+)
14	F62 20RD	FUSED B(+)
15	A30 16RD/WT	FUSED B(+)
16	-	-
17	-	-
18	M1 20PK	FUSED B(+)
19	A15 18PK/DG	FUSED B(+)
20	F1 16DB/BK	FUSED B(+)
21	-	-
22	F39 18PK/LG	FUSED B(+)
23	-	-
24	-	-

A/C COMPRESSOR CLUTCH RELAY

CAV	CIRCUIT	FUNCTION
D1	C3 20DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
D2	C28 20DB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
D3	-	-
D4	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
D5	A17 20RD/BK	FUSED B(+)

AUTOMATIC SHUT DOWN RELAY

CAV	CIRCUIT	FUNCTION
E1	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT
E2	K51 20DB/YL	AUTOMATIC SHUT DOWN RELAY CONTROL
E3	-	-
E4	A14 18RD/WT	FUSED B(+)
E5	A14 18RD/WT	FUSED B(+)

ENGINE STARTER MOTOR RELAY

CAV	CIRCUIT	FUNCTION
B1	T40 14BR	ENGINE STARTER MOTOR RELAY OUTPUT
B2	K90 20TN	ENGINE STARTER MOTOR RELAY CONTROL
B3	-	-
B4	A41 14YL	FUSED IGNITION SWITCH OUTPUT (START)
B5	A1 14RD	FUSED B(+)

FUEL PUMP RELAY

CAV	CIRCUIT	FUNCTION
C1	A141 16DG/WT	FUEL PUMP RELAY OUTPUT
C2	K31 20BR	FUEL PUMP RELAY CONTROL
C3	-	-
C4	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
C5	A14 18RD/WT	FUSED B(+)

HIGH SPEED RADIATOR FAN RELAY

CAV	CIRCUIT	FUNCTION
F1	C25 12YL	HIGH SPEED RADIATOR FAN RELAY OUTPUT
F2	C27 20DB/PK	HIGH SPEED RADIATOR FAN RELAY CONTROL
F3	-	-
F4	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
F5	A16 12GY	FUSED B(+)

HORN RELAY

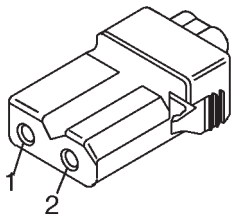
CAV	CIRCUIT	FUNCTION
A1	X2 20DG/RD	HORN RELAY OUTPUT
A2	X3 20BK/RD	HORN RELAY CONTROL
A3	-	-
A4	F62 20RD	FUSED B(+)
A5	F62 20RD	FUSED B(+)

LOW SPEED RADIATOR FAN RELAY

CAV	CIRCUIT	FUNCTION
25	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
26	C23 12DG	LOW SPEED RADIATOR FAN RELAY OUTPUT
27	-	-
28	A16 12GY	FUSED B(+)
29	C24 20YL/RD	LOW SPEED RADIATOR FAN RELAY CONTROL

TRANSMISSION CONTROL RELAY

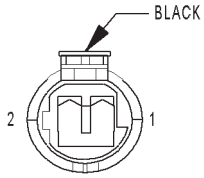
CAV	CIRCUIT	FUNCTION
G1	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
G2	Z1 20BK	GROUND
G3	-	-
G4	T15 20LG	TRANSMISSION CONTROL RELAY CONTROL
G5	A30 16RD/WT	FUSED B(+)



PUMP MOTOR CONNECTOR

PUMP MOTOR CONNECTOR (CONNECTOR SIDE)

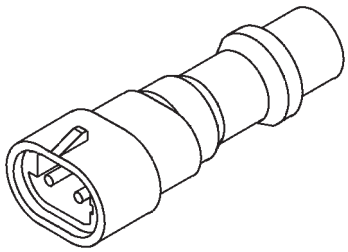
CAV	CIRCUIT	FUNCTION
1	TN	GROUND
2	RD	PUMP/MOTOR RELAY OUTPUT



RIGHT FRONT WHEEL SPEED SENSOR

RIGHT FRONT WHEEL SPEED SENSOR - BLACK 2 WAY

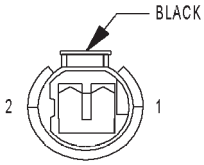
CAV	CIRCUIT	FUNCTION
1	B7 18WT	RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B6 18WT/DB	RIGHT FRONT WHEEL SPEED SENSOR SIGNAL



RIGHT FRONT WHEEL SPEED SENSOR CONNECTOR (SENSOR SIDE)

RIGHT FRONT WHEEL SPEED SENSOR (SENSOR SIDE)

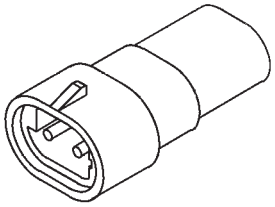
CAV	CIRCUIT	FUNCTION
1	WT	RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	WT/DB	RIGHT FRONT WHEEL SPEED SENSOR SIGNAL



RIGHT REAR WHEEL SPEED SENSOR

RIGHT REAR WHEEL SPEED SENSOR - BLACK 2 WAY

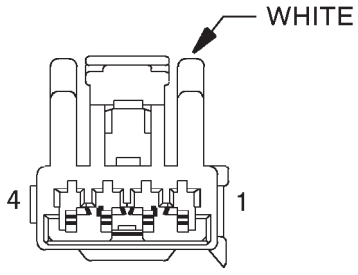
CAV	CIRCUIT	FUNCTION
1	B2 20YL	RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B1 20YL/DB	RIGHT REAR WHEEL SPEED SENSOR SIGNAL



RIGHT REAR WHEEL SPEED SENSOR CONNECTOR (SENSOR SIDE)

RIGHT REAR WHEEL SPEED SENSOR (SENSOR SIDE)

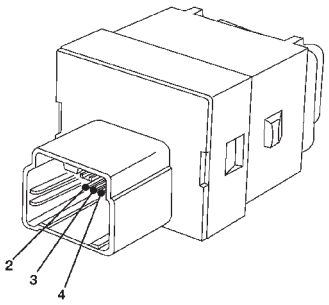
CAV	CIRCUIT	FUNCTION
1	YL	RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	YL/DB	RIGHT REAR WHEEL SPEED SENSOR SIGNAL



TRACTION CONTROL SWITCH

TRACTION CONTROL SWITCH - WHITE 4 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	B27 20RD/YL	TRACTION CONTROL SWITCH SENSE
3	Z1 20BK	GROUND
4	E2 22OR	PANEL LAMPS DRIVER

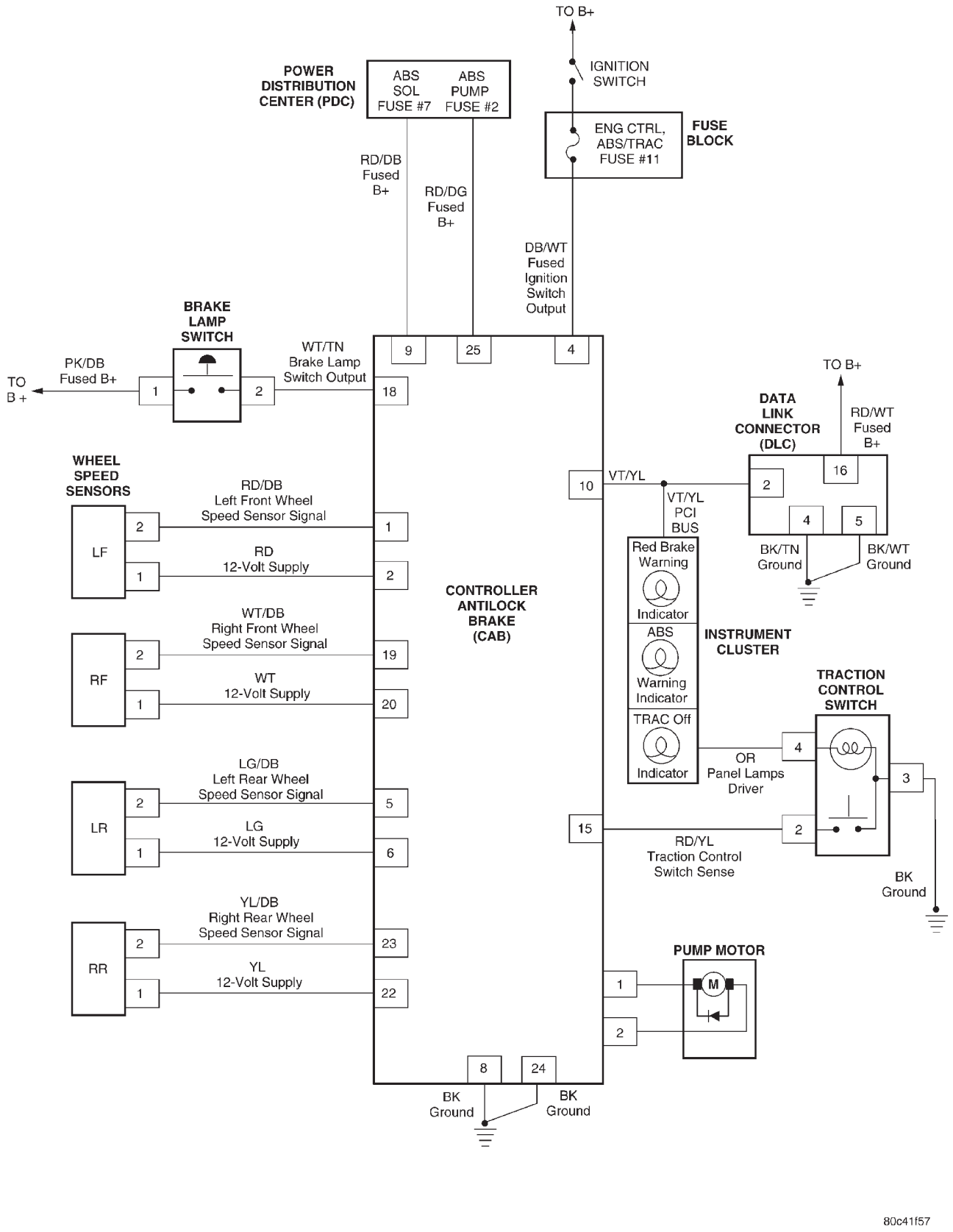


TRACTION CONTROL SWITCH
(SWITCH SIDE)

TRACTION CONTROL SWITCH (SWITCH SIDE)

CAV	CIRCUIT	FUNCTION
1	-	-
2	RD/YL	TRACTION CONTROL SWITCH SENSE
3	BK	GROUND
4	OR	PANEL LAMPS DRIVER

10.0 SCHEMATIC DIAGRAMS



NOTES