

# TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	SYSTEM COVERAGE	1
1.2	SIX-STEP TROUBLESHOOTING PROCEDURE	1
<b>2.0</b>	<b>IDENTIFICATION OF SYSTEM</b>	<b>1</b>
<b>3.0</b>	<b>SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION</b>	<b>1</b>
3.1	TEVES ABS SYSTEM DESCRIPTION	1
3.1.1	PEDAL FEEL/VEHICLES CHARACTERISTICS	2
3.1.2	SYSTEM COMPONENTS	2
3.1.3	ABS AND RED BRAKE WARNING INDICATOR	2
3.1.4	CONTROLLER ANTILOCK BRAKE (CAB)	2
3.1.5	HYDRAULIC CONTROL UNIT	3
3.1.6	SENSORS	3
3.2	ADJUSTABLE PEDALS SYSTEM DESCRIPTION	4
3.3	DIAGNOSTIC TROUBLE CODES	4
3.3.1	ABS INITIALIZATION	4
3.3.2	DIAGNOSTIC MODE	4
3.3.3	INTERMITTENT DIAGNOSTIC TROUBLE CODES	5
3.4	USING THE DRBIII®	5
3.5	DRBIII® ERROR MESSAGES	5
3.5.1	DRBIII® DOES NOT POWER UP (BLANK SCREEN)	5
3.5.2	DISPLAY IS NOT VISIBLE	5
<b>4.0</b>	<b>DISCLAIMERS, SAFETY, WARNINGS</b>	<b>5</b>
4.1	DISCLAIMERS	5
4.2	SAFETY	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
<b>5.0</b>	<b>REQUIRED TOOLS AND EQUIPMENT</b>	<b>7</b>
<b>6.0</b>	<b>GLOSSARY OF TERMS</b>	<b>7</b>
<b>7.0</b>	<b>DIAGNOSTIC INFORMATION AND PROCEDURES</b>	<b>9</b>
	<b>ADJUSTABLE PEDALS</b>	
	PEDAL SENSOR OPEN/SHORTED TO BATTERY	10
	PEDAL SENSOR SHORTED TO GROUND	12
	PEDAL SW STUCK FORWARD	13
	PEDAL SW STUCK REARWARD	15
	SYSTEM OVER VOLTAGE	17
	SYSTEM UNDER VOLTAGE	18
	*CAN'T ADJUST PEDALS	19
	*CAN'T SET/RECALL MEMORY POSITIONS	21

## TABLE OF CONTENTS - Continued

<b>BRAKES (CAB)</b>	
BRAKE FLUID LEVEL SWITCH.....	.22
CAB POWER FEED CIRCUIT .....	.25
CLUSTER FAULT .....	.28
CONTROLLER FAILURE .....	.29
G-SWITCH NOT PROCESSABLE .....	.31
LEFT FRONT SENSOR CIRCUIT FAILURE .....	.32
LEFT FRONT SENSOR SIGNAL FAILURE.....	.34
LEFT REAR SENSOR CIRCUIT FAILURE .....	.37
LEFT REAR SENSOR SIGNAL FAILURE .....	.39
PCI BUS COMMUNICATION .....	.42
PUMP MOTOR CIRCUIT NOT WORKING PROPERLY.....	.43
RIGHT FRONT SENSOR CIRCUIT FAILURE.....	.47
RIGHT FRONT SENSOR SIGNAL FAILURE.....	.49
RIGHT REAR SENSOR CIRCUIT FAILURE .....	.52
RIGHT REAR SENSOR SIGNAL FAILURE.....	.54
SYSTEM OVERVOLTAGE .....	.57
SYSTEM UNDERVOLTAGE .....	.59
<b>VERIFICATION TESTS</b>	
VERIFICATION TESTS.....	.61
<b>8.0 COMPONENT LOCATIONS.....</b>	<b>.63</b>
<b>8.1 CONTROLLER ANTILOCK BRAKE .....</b>	<b>.63</b>
<b>8.2 DATA LINK CONNECTOR .....</b>	<b>.63</b>
<b>8.2.1 DIAGNOSTIC JUNCTION PORT .....</b>	<b>.63</b>
<b>8.3 FUSES.....</b>	<b>.64</b>
<b>8.4 TONE WHEELS.....</b>	<b>.64</b>
<b>8.5 WHEEL SPEED SENSORS .....</b>	<b>.65</b>
<b>8.6 WHEEL SPEED SENSOR CONNECTORS.....</b>	<b>.65</b>
<b>8.7 ADJUSTABLE PEDALS SWITCH.....</b>	<b>.66</b>
<b>8.8 ADJUSTABLE PEDALS MODULE .....</b>	<b>.66</b>
<b>8.9 ADJUSTABLE PEDALS COMPONENTS.....</b>	<b>.66</b>
<b>9.0 CONNECTOR PINOUTS .....</b>	<b>.67</b>
ADJUSTABLE PEDALS MODULE (EXCEPT BUILT-UP-EXPORT) - GREEN 14 WAY .....	.67
ADJUSTABLE PEDALS MOTOR/SENSOR ASSEMBLY (EXCEPT BUILT-UP-EXPORT) - 6 WAY .....	.67
CONTROLLER ANTILOCK BRAKE - BLACK 24 WAY .....	.67
LEFT FRONT WHEEL SPEED SENSOR - GRAY 2 WAY .....	.68
LEFT REAR WHEEL SPEED SENSOR - GRAY 2 WAY .....	.68
RIGHT FRONT WHEEL SPEED SENSOR - GRAY 2 WAY .....	.68
RIGHT REAR WHEEL SPEED SENSOR - BLACK 2 WAY .....	.68
<b>10.0 SCHEMATIC DIAGRAMS.....</b>	<b>.69</b>
<b>10.1 WJ BODY TEVES MARK 20 .....</b>	<b>.69</b>
<b>10.2 ADJUSTABLE PEDALS SYSTEM .....</b>	<b>.70</b>

## 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.

Follow the recommendations below when choosing your diagnostic path.

1. First make sure the DRBIII® is communicating with the Controller Antilock Brake (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 asterisk (\*) 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) and the Adjustable Pedals system found on the Jeep Grand Cherokee.

### 1.2 SIX-STEP TROUBLESHOOTING PROCEDURE

Diagnosis of the antilock brake system is done in six basic steps:

- verification of complaint
- verification of any related symptoms
- symptom analysis
- problem isolation

- repair of isolated problem
- verification of proper operation

## 2.0 IDENTIFICATION OF SYSTEM

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

Vehicles equipped with the Adjustable Pedals system will have an Adjustable Pedals Switch mounted below the instrument cluster and to the right of the steering column.

## 3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

### 3.1 TEVES ABS SYSTEM DESCRIPTION

A Controller Antilock Brake (CAB) module is used to monitor wheel speeds and to modulate (control) hydraulic pressure in each brake channel to prevent wheel lock-up during braking. The CAB also provides a vehicle speed signal (VSS) to the powertrain control module.

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

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

During an antilock stop, “wheel lock-up” does not necessarily mean that the wheel has locked, it means only that the wheel is turning slower than the vehicle speed. This is called “wheel slip” and is

## GENERAL INFORMATION

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indicated as a percentage. 0% slip means that the wheel is rolling free and 100% slip means that the wheel is locked. The antilock system maintains an average of approximately 20% wheel slip.

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

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

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

### 3.1.2 SYSTEM COMPONENTS

#### ANTILOCK BRAKE SYSTEM

- controller antilock brake (CAB)
- vacuum booster

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

### 3.1.3 ABS AND 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. On the WJ, 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 at regular intervals, 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 brake fluid level switch circuit becomes open or shorted to ground.

### 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
- control fluid pressure modulations to the brakes during antilock stop operation
- control the ABS warning indicator

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

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

The CAB inputs include the following:

- four wheel speed sensors
- brake lamp switch
- ignition switch
- battery voltage
- diagnostic communication (PCI BUS)

The CAB outputs include the following:

- six valve/solenoid drivers
- pump/motor actuation
- ABS warning indicator actuation
- red brake warning indicator actuation
- diagnostic communication (PCI BUS)

### 3.1.5 HYDRAULIC CONTROL UNIT

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

**Valve Block Assembly:** The valve block assembly contains 6 valves with three inlet valves and three outlet valves. The inlet valves are spring-loaded in the open position and the outlet valves are spring loaded in the closed position. During an antilock stop, these valves are cycled to maintain the proper slip ratio for each channel. The CAB monitors wheel speeds. If the CAB detects a wheel deceleration that is disproportionate to the other wheels, it will close the inlet valve to that wheel. This prevents any increase in fluid pressure. If the wheel continues to decelerate disproportionately, the CAB opens the outlet valve for that wheel to release fluid pressure from that channel. The released fluid is routed to the accumulators. When the

wheel speed is no longer disproportionate to the other wheels, the inlet valve will return to its normally open position and the outlet valve will return to the normally closed position.

**Pump/Motor Assembly:** The pump/motor assembly provides the extra amount of fluid needed during antilock braking. The pump is supplied fluid that is released to the accumulators when the outlet valve is opened during an antilock stop. The pump is also used to drain the accumulator circuits after the antilock stop is complete. The pump is operated by an integral electric motor. This motor is controlled by the CAB. The CAB turns on the motor when an antilock stop is detected. The pump continues to run during the antilock stop and is turned off approximately 3-5 seconds after the stop is complete. The CAB monitors the pump/motor operation internally.

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

### 3.1.6 SENSORS

**Wheel Speed Sensors and Tone Wheels:** One wheel speed sensor (WSS) is located at each wheel and sends a 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 (rear disc only) and the rear tone wheel is an integral part of the rear rotor hub. **The wheel speed sensor air gap is NOT adjustable. Because of internal circuitry, a resistance check of WJ wheel speed sensors will not determine correct or incorrect function.**

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. When driven over rough road surfaces, the rear wheel speed sensor signals may be erratic and cause a false trouble code (drum brakes only).



## GENERAL INFORMATION

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**Brake Warning Indicator Switch:** The brake warning indicator switch is a fluid level sending switch. The CAB sends out a 12 volt signal to the switch. The switch has a 1,000 ohm resistor inside of it. This resistor is used for diagnostic purposes. Normal voltage is about 2.3 volts. If the switch is disconnected the resistor will be pulled out of the circuit and the CAB will sense voltage at about 5 volts. If the fluid level becomes too low or the circuit is shorted to ground, the voltage will be about 0 volts. Any fault condition will illuminate the red brake warning indicator and the specific fault can be read on the DRBIII®.

### 3.2 ADJUSTABLE PEDALS SYSTEM DESCRIPTION

#### GENERAL

The Adjustable Pedals System (APS) is designed to enable the fore and aft repositioning of the brake and accelerator pedals. This results in improved ergonomics in relation to the steering wheel for taller and shorter drivers. Being able to adjust the pedal positions also allows the driver to set steering wheel tilt and seat position to the most comfortable position. The position of the brake and accelerator pedals can be adjusted without compromising safety or comfort in actuating the pedals. Repositioning the pedals does not change the effort required for actuation.

Change of pedal position is accomplished by means of a motor driven screw. Operating the adjustable pedal switch activates the pedal drive motor. The pedal drive motor turns a screw that changes the position of the brake and accelerator pedals. The pedal can be moved rearward (closer to the driver) or forward (away from driver). The brake pedal is moved on its activating lever to a position where the driver feels most comfortable.

The accelerator pedal is moved at the same time and the same distance as the brake pedal. The accelerator pedal adjustment screw is turned by a flexible shaft slaved off the brake adjustment screw.

Neither the pedal drive motor nor drive mechanism are subject to the mechanical stress of brake or accelerator application.

#### SYSTEM FEATURES

- Range of Adjustment  
The pedals may be adjusted up to 3 in. (75 mm)
- Pedal Adjustment Speed  
0.5 in./sec (12.5 mm/sec)
- Pedal Adjustment Inhibitors  
Pedal adjustment is inhibited when the vehicle is in reverse or when cruise control is activated.
- Memory  
An optional memory feature is available. This

allows storing of one or two preferred pedal positions in the Adjustable Pedal Module (APM). A preferred position can be stored and recalled using the door-mounted switches.

The door-mounted switches activate the Driver Door Module (DDM). The DDM instructs the APM via the PCI bus to store the current pedal position.

A stored pedal position can be recalled (but not stored) using the Remote Keyless Entry (RKE).

- Adjustable Pedal Feedback Message  
The Electronic Vehicle Information Center (EVIC) will display a message when the APS is disabled. ie: "Adjustable Pedal Disabled — Cruise Control Engaged" or "Adjustable Pedal Disabled — Vehicle in Reverse".
- Damage Prevention  
Foot pressure or debris can stall pedal adjustment. In order to avoid damage to system components during pedal adjustment, the APM will monitor pedal position sensor voltage. If the APM does not detect expected voltage change within 1.5 seconds, it will cut power to the adjustable pedal motor.

### 3.3 DIAGNOSTIC TROUBLE CODES

The vehicle electronic system modules may report any of several diagnostic trouble codes (DTC)s. The possible DTCs for the ABS and Adjustable Pedals System are listed in the table of contents.

Diagnostic trouble codes are retained in memory until erased using the DRB, or automatically erased after 255 key cycles or 3,500 miles.

#### 3.3.1 ABS INITIALIZATION

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

At 20 km/h (12 mph) a dynamic test may be performed. If the brake lamp switch is activated the test will be run at 40 km/h (24 mph) regardless of the brake lamp switch state. 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 causes a diagnostic trouble code during system initialization or dynamic check, the CAB will illuminate the ABS warning lamp.

#### 3.3.2 DIAGNOSTIC MODE

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

### 3.3.3 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:

- mechanical interference with brake or accelerator pedal
- loose or corroded conditions
- damaged components (sensors, tone wheels, pedal drive cable)
- damaged wiring
- excessive axle shaft runout
- loose pedal mounting
- hydraulic system leaks
- regular brake system problems, non-ABS related

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

### 3.4 USING THE DRBIII®

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

### 3.5 DRBIII® ERROR MESSAGES

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

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

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

```

ver: 2.14
date: 26 Jul93
file: key_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.

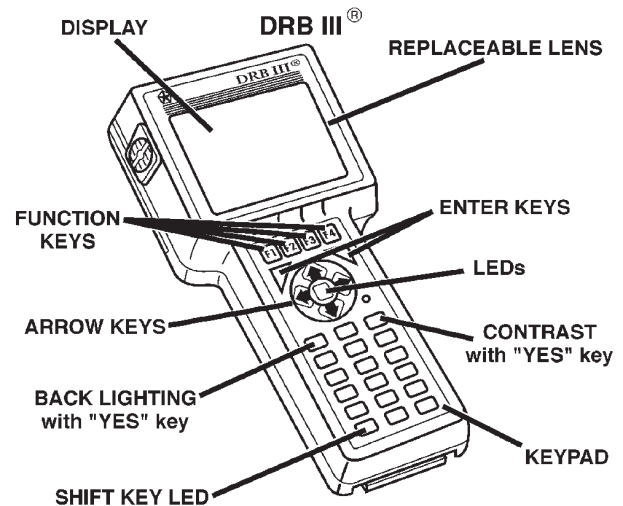
### 3.5.1 DRBIII® DOES NOT POWER UP (BLANK SCREEN)

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

### 3.5.2 DISPLAY IS NOT VISIBLE

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



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## 4.0 DISCLAIMERS, SAFETY, WARNINGS

### 4.1 DISCLAIMERS

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

## GENERAL INFORMATION

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

### 4.2 SAFETY

#### 4.2.1 TECHNICIAN SAFETY INFORMATION

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

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

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

When diagnosing an antilock brake or adjustable pedals system problem, it is important to follow approved procedures where applicable. These procedures can be found in the service manual. Following these procedures is very important to 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 adjustable pedals system are intended to be serviced in assembly only. Attempting to remove or repair certain sub-components may result in personal injury and/or improper system operation. Only those components with approved repair and installation procedures in the service manual should be serviced.

#### 4.2.4 DRBIII® SAFETY INFORMATION

**WARNING: EXCEEDING THE LIMITS OF THE DRBIII® MULTIMETER IS DANGEROUS. IT CAN EXPOSE YOU TO SERIOUS OR 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. Ohms can be measured only in a non-powered circuit.

- Voltage between any terminal and ground must not exceed 500v DC or 500v peak AC.
- Use caution when measuring voltage above 25v DC or 25v AC.
- Use the low current shunt to measure circuits up to 10A. Use the high current clamp to measure circuits exceeding 10A.
- When testing for the presence of voltage or current, make sure the meter is functioning correctly. Take a reading of a known voltage or current before accepting a zero reading.
- When measuring current, connect the meter in series with test 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 system in question for damaged components or disconnected connectors. For ABS, the brake lamps must be operational prior to continuing.
2. Connect the DRBIII® to the data link connector located under the dash. If the DRBIII® does not power up, check the power and ground supplies to the connector.
3. Select the system in question. Turn the ignition on. If the DRBIII® displays “No Response”, refer to Communication in the Body Diagnostic Procedures manual to diagnose the symptom.
4. Read and record all diagnostic trouble codes. For ABS, 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. For ABS, if there are no diagnostic trouble codes present, select “Inputs/Outputs” and read the

brake switch input as your press and release the brake pedal. If the display does not match the state of the pedal, perform the proper test. For a problem with the amber “ABS” warning indicator, refer to the proper test.

6. For ABS, 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. For ABS, the following conditions should be considered “NORMAL” operation, and no repairs should be attempted to correct them.
  - Brake pedal feedback during an ABS stop (clicking, vibrating)
  - Clicking, groaning or buzzing at 10 Km/h (6 mph) (drive off self test)
  - Groaning noise during an ABS stop
  - Slight brake pedal drop and pop noise when ignition is initially turned on
  - Brake pedal ratcheting down at the end of an ABS stop
8. If the complaint is ABS “cycling” at the end of a stop at low speeds, it may be caused by a marginal wheel speed sensor signal. The sensor air gap, tone wheel condition, and/or brakes hanging up are possible causes of this condition.
9. After a road test in which 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  
**APM** adjustable pedals module  
**BCM** Body Control Module

## GENERAL INFORMATION

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<b>CAB</b>	controller antilock brake	<b>LF</b>	left front
<b>DC</b>	direct current	<b>LR</b>	left rear
<b>DLC</b>	data link connector	<b>PCI</b>	Programmable Communication Interface
<b>DRB</b>	diagnostic read-out box	<b>PCM</b>	Powertrain Control Module
<b>DTC</b>	diagnostic test code	<b>PDC</b>	power distribution center
<b>EMI</b>	electro magnetic interference	<b>P/M</b>	pump motor
<b>EVBP</b>	Electronic Variable Brake Proportioning	<b>RF</b>	right front
<b>HCU</b>	hydraulic control unit	<b>RR</b>	right rear
<b>HZ</b>	Hertz	<b>SOL</b>	solenoid
<b>JBLK</b>	junction block	<b>WSS</b>	wheel speed sensor
<b>JTEC</b>	Jeep and Truck Engine Controller		

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7.0

DIAGNOSTIC INFORMATION AND  
PROCEDURES

**Symptom:**

**PEDAL SENSOR OPEN/SHORTED TO BATTERY**

**When Monitored and Set Condition:**

**PEDAL SENSOR OPEN/SHORTED TO BATTERY**

When Monitored: Constantly.

Set Condition: When the APM detects the voltage on the Sense circuit is too high.

**POSSIBLE CAUSES**

MOTOR/SENSOR SHORTED OR OPEN  
 SENSE CIRCUIT SHORT TO BATTERY OR TO SENSOR FEED CIRCUIT  
 APM-INTERNAL FAULT  
 INTERMITTENT DTC

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTC's. With the DRBIII®, read DTC's. Does the DRBIII® display PEDAL SENSOR OPEN/SHORTED TO BATTERY DTC active?  Yes → Go To 2 No → Go To 4	All
2	Disconnect the Adjustable Pedals Motor/Sensor harness connector. Turn the ignition on. With the DRBIII®, read the active DTCs. Does the DRBIII® display PEDAL SENSOR OPEN/SHORTED TO BATTERY?  Yes → Go To 3  No → Replace the Adjustable Pedals Motor/Sensor assembly in accordance with the Service Information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All



**PEDAL SENSOR OPEN/SHORTED TO BATTERY — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.                      Disconnect the Adjustable Pedals Motor/Sensor harness connector.                      Disconnect the Adjustable Pedals Module harness connector.  <b>Note: Check connector - Clean/repair as necessary.</b>                      Turn the ignition on.                      Check the Sense circuit for a short to battery and for a short to the Sensor Feed circuit.                      Is the Sense circuit shorted?</p> <p>Yes → Repair the Sense circuit for a short to battery or to the Sensor Feed circuit.                      Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p> <p>No → Replace and program the Adjustable Pedals Module in accordance with the Service Information..                      Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p>	All
4	<p>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?</p> <p>Yes → Repair as necessary.                      Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	All

**Symptom:**

**PEDAL SENSOR SHORTED TO GROUND**

**When Monitored and Set Condition:**

**PEDAL SENSOR SHORTED TO GROUND**

When Monitored: Constantly

Set Condition: When the APM detects a ground condition at the Sense circuit.

**POSSIBLE CAUSES**

MOTOR/SENSOR ASSEMBLY SHORTED TO GROUND

APM-SENSE CIRCUIT GROUNDED

INTERMITTENT DTC

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTC's. With the DRBIII®, read DTC's. Does the DRBIII® display PEDAL SENSOR SHORTED TO GROUND DTC active?  Yes → Go To 2  No → Go To 3	All
2	Disconnect the Adjustable Pedals Motor/Sensor harness connector. Turn the ignition on. With the DRBIII®, read the active DTCs. Does the DRBIII® display SENSOR WIRING SHORTED TO GROUND?  Yes → Inspect for and correct wiring damage. If no damage is found, replace and program the Adjustable Pedals Module in accordance with the Service Information.. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.  No → Repair any Motor/Sensor assembly wiring concerns. If no wiring concerns are found, replace the Adjustable Pedals Motor/Sensor assembly. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All
3	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 ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.  No → Test Complete.	All

**Symptom:**  
**PEDAL SW STUCK FORWARD**

**When Monitored and Set Condition:**

**PEDAL SW STUCK FORWARD**

When Monitored: Constantly

Set Condition: When the Adjustable Pedals module detects battery voltage on the Adjustable Pedals Switch FWD circuit for more than 20 seconds.

**POSSIBLE CAUSES**

ADJUSTABLE PEDALS MODULE INTERNAL FAULT  
 SWITCH FAILURE  
 INTERMITTENT DTC  
 FWD CIRCUIT SHORTED TO BATTERY OR TO BATTERY FEED CIRCUIT

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTC's. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display PEDAL SW STUCK FORWARD DTC active?  Yes → Go To 2 No → Go To 4	All
2	Disconnect the Adjustable Pedals switch connector. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display PEDAL SW STUCK FORWARD DTC active?  Yes → Go To 3 No → Replace the Adjustable Pedals Switch. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Disconnect the Adjustable Pedals Module harness connector. Disconnect the Adjustable Pedals switch connector. Turn the ignition ON. Check the FWD and BATTERY FEED circuits for a short to battery, to ground and to each other. Is there any circuit short?  Yes → Repair the circuit short. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.  No → Replace and program the Adjustable Pedals Module in accordance with the Service Information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All

# ADJUSTABLE PEDALS

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## PEDAL SW STUCK FORWARD — Continued

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Refer to any Hotline letters or Technical Service Bulletins that may apply.</p> <p>Were any problems found?</p> <p>    Yes → Repair as necessary.           Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p> <p>    No → Test Complete.</p>	All



**Symptom:**  
**PEDAL SW STUCK REARWARD**

**When Monitored and Set Condition:**

**PEDAL SW STUCK REARWARD**

When Monitored: Constantly

Set Condition: When the Adjustable Pedals module detects battery voltage on the Adjustable Pedals Switch AFT circuit for more than 20 seconds.

**POSSIBLE CAUSES**

ADJUSTABLE PEDALS MODULE INTERNAL FAULT  
 SWITCH FAILURE  
 INTERMITTENT DTC  
 AFT CIRCUIT SHORTED TO BATTERY OR TO BATTERY FEED CIRCUIT

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTC's. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display PEDAL SW STUCK REARWARD DTC active?  Yes → Go To 2 No → Go To 4	All
2	Disconnect the Adjustable Pedals switch connector. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display PEDAL SW STUCK REARWARD DTC active?  Yes → Go To 3 No → Replace the Adjustable Pedals Switch. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Disconnect the Adjustable Pedals Module harness connector. Disconnect the Adjustable Pedals switch connector. Turn the ignition ON. Check the AFT and BATTERY FEED circuits for a short to battery, to ground and to each other. Is there any circuit short?  Yes → Repair the circuit short. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.  No → Replace and program the Adjustable Pedals Module in accordance with the Service Information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All

# ADJUSTABLE PEDALS

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## PEDAL SW STUCK REARWARD — Continued

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Refer to any Hotline letters or Technical Service Bulletins that may apply.</p> <p>Were any problems found?</p> <p>    Yes → Repair as necessary.           Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p> <p>    No → Test Complete.</p>	All

**Symptom:**  
**SYSTEM OVER VOLTAGE**

**When Monitored and Set Condition:**

**SYSTEM OVER VOLTAGE**

When Monitored: Whenever the module is awake

Set Condition: When the APM detects 3 consecutive J1850 Bus messages indicating vehicle voltage over 15.94 VDC.

**POSSIBLE CAUSES**

VEHICLE VOLTAGE HIGH  
 APM -- INTERNAL FAILURE

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read the vehicle voltage status. Does the DRBIII® display a high voltage concern?  Yes → Refer to Charging information for the related symptom(s). Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.  No → Replace and program the Adjustable Pedals Module in accordance with the Service Information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All

# ADJUSTABLE PEDALS

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## **Symptom:** **SYSTEM UNDER VOLTAGE**

### **When Monitored and Set Condition:**

#### **SYSTEM UNDER VOLTAGE**

When Monitored: Any time that the module is awake.

Set Condition: When the APM detects 3 consecutive J1850 Vehicle Battery Voltage messages indicating a battery voltage less than 9 VDC.

#### **POSSIBLE CAUSES**

VEHICLE VOLTAGE LOW  
APM -- INTERNAL FAILURE

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
1	With the DRBIII®, read the vehicle voltage status. Does the DRBIII® display a low voltage concern?  Yes → Refer to Charging information for the related symptom(s). Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.  No → Replace and program the Adjustable Pedals Module in accordance with the Service Information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All



**Symptom:**

**\*CAN'T ADJUST PEDALS**

POSSIBLE CAUSES
VEHICLE IN CRUISE OR REVERSE DTC OR IN-PLANT MODE ACTIVE MOTOR/SENSOR ASSEMBLY MOTOR FWD OR AFT CIRCUIT SHORTED OR OPEN BATTERY FEED CIRCUIT OPEN ADJUSTABLE PEDALS MODULE INTERNAL FAULT ADJ PEDAL SW OPEN

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Adjustable Pedals are disabled when the vehicle is in Reverse or when the Speed Control is activated.</b></p> <p>Check whether vehicle is in Reverse and whether Speed Control is activated. Is the vehicle in Reverse or is Speed Control activated.</p> <p style="padding-left: 40px;">Yes → Correct as necessary. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p> <p style="padding-left: 40px;">No → Go To 2</p>	All
2	<p>With the DRBIII®, erase DTC's. With the DRBIII®, read DTC's. With the DRBIII® in Inputs/Outputs, read the In-Plant mode state. Are any DTCs active or is the APM in the In-Plant mode?</p> <p style="padding-left: 40px;">Yes → Refer to symptom list for problems related to the active DTC or disable In-Plant test mode. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p> <p style="padding-left: 40px;">No → Go To 3</p>	All
3	<p>Turn the ignition off. Disconnect the Adjustable Pedals Module harness connector. Connect a jumper wire between the Battery Feed circuit and ground. Operate the Adjustable Pedals Switch to the Aft and Fwd positions. Using a 12-volt test light connected to 12-volts, check the Aft and Fwd circuits. Does the test light illuminate brightly in each switch position?</p> <p style="padding-left: 40px;">Yes → Go To 4</p> <p style="padding-left: 40px;">No → Go To 6</p>	All

# ADJUSTABLE PEDALS

## \*CAN'T ADJUST PEDALS — Continued

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off.            Disconnect the Adjustable Pedals Motor/Sensor harness connector.            Operate the Adjustable Pedals Switch to the Fwd position.            On the APM side of the connector, using a 12-volt test light connected to ground, check the Fwd circuit.            On the APM side of the connector, using a 12-volt test light connected to 12-volts, check the Aft circuit.            Does the test light illuminate brightly at each pin?</p> <p>Yes → Repair any wiring concerns. If no concerns are found, replace the Adjustable Pedals Motor/Sensor assembly.            Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.            Disconnect the Adjustable Pedals Module harness connector.            Disconnect the Adjustable Pedals Motor/Sensor connector.            Check the FWD and AFT circuits for short to battery, to ground, to each other and for an open.            Is the FWD or AFT circuit shorted or open?</p> <p>Yes → Repair the Adjustable Pedals Motor FWD or AFT circuit short or open as necessary.            Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p> <p>No → Replace and program the Adjustable Pedals Module in accordance with the Service Information.            Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p>	All
6	<p>Turn the ignition off.            Disconnect the Adjustable Pedals Module harness connector.            Disconnect the Adjustable Pedals switch connector.            Measure the resistance of the Battery Feed circuit.            Is the resistance above 5.0 ohms?</p> <p>Yes → Repair the Battery Feed circuit for an open.            Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p> <p>No → Replace the Adjustable Pedals Switch.            Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p>	All

**Symptom:**

**\*CAN'T SET/RECALL MEMORY POSITIONS**

POSSIBLE CAUSES
DTC OR IN-PLANT MODE ACTIVE DRIVER DOOR MODULE -- INTERNAL FAULT ADJUSTABLE PEDALS MODULE FAULT

TEST	ACTION	APPLICABILITY
1	<p>With the DRBIII®, erase DTCs. With the DRBIII®, read the active DTCs. With the DRBIII® in Inputs/Outputs, read the In-Plant state. Any active DTCs or is In-Plant mode activated</p> <p style="padding-left: 40px;">Yes → Disable the In-Plant mode or refer to symptom list for problems related to the active DTC. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p> <p style="padding-left: 40px;">No → Go To 2</p>	All
2	<p>Attempt to set and recall other memory functions in the vehicle. Can other vehicle memory functions be set and recalled OK?</p> <p style="padding-left: 40px;">Yes → Replace the Adjustable Pedals Module in accordance with the Service Information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p> <p style="padding-left: 40px;">No → Replace and program the Driver Door Module in accordance with the Service Information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p>	All

**Symptom:**

**BRAKE FLUID LEVEL SWITCH**

**When Monitored and Set Condition:**

**BRAKE FLUID LEVEL SWITCH**

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

Set Condition: The DTC will be set when the Brake Fluid Level Switch Sense circuit is shorted to ground (below approximately 1 volt for 70 milliseconds) or is open or shorted to voltage (above 4 volts for 70 milliseconds).

**POSSIBLE CAUSES**

LOW FLUID LEVEL OR SWITCH DISCONNECTED  
 BRAKE FLUID LEVEL SWITCH RESISTANCE OUT OF SPECIFICATION  
 BRAKE FLUID LEVEL SWITCH SENSE CIRCUIT SHORTED TO BATTERY  
 BRAKE FLUID LEVEL SWITCH SENSE OR GROUND CIRCUIT OPEN  
 CAB - SENSE CIRCUIT OPEN  
 BRAKE FLUID LEVEL SWITCH SENSE CIRCUIT SHORTED TO GROUND  
 BRAKE FLUID LEVEL SWITCH SENSE AND GROUND CIRCUITS SHORTED TOGETHER  
 CAB-INTERNAL SHORT  
 INTERMITTENT DTC

TEST	ACTION	APPLICABILITY
1	Inspect the Brake Fluid Level in the Master Cylinder Reservoir. Check connection to Brake Fluid Level Switch. Is the Brake Fluid Level Low or the Switch disconnected?  Yes → Fill the brake fluid reservoir or reconnect as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 2	All
2	Turn the ignition off. Disconnect the Brake Fluid Level Switch connector. <b>Note: Check connector - Clean/repair as necessary.</b> Measure resistance of the Brake Fluid Level Switch. Is the resistance between 990 and 1010 ohms?  Yes → Go To 3  No → Replace Brake Fluid Level Switch. Perform ABS VERIFICATION TEST - VER 1.	All

**BRAKE FLUID LEVEL SWITCH — Continued**

TEST	ACTION	APPLICABILITY
3	Turn the ignition on. With the DRBIII®, read Brake Fluid Level Switch voltage. What is the Voltage reading of the Brake Fluid Level Switch?  Approximately 2 volts. Go To 4  Above 4 volts. Go To 5  Approximately 0 volts. Go To 8	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 wiring harness/connectors as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Test Complete.	All
5	Turn the ignition off. Disconnect the Brake Fluid Level Switch connector. <b>Note: Check connector - Clean/repair as necessary.</b> Disconnect the CAB harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the Fluid Level Sense circuit. Does the test light illuminate?  Yes → Repair the Brake Fluid Level Switch Sense circuit for a short to voltage. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 6	All
6	Turn the ignition off. Disconnect the Brake Fluid Level Switch connector. <b>Check connector - Clean/repair as necessary.</b> Disconnect the CAB connector. <b>Check connector - Clean/repair as necessary.</b> Measure the resistance of the Brake Fluid Level Switch Sense and Ground circuits. Is the resistance below 5 ohms for both circuits?  Yes → Go To 7  No → Repair the Brake Fluid Level Switch Sense or Ground circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
7	If there are no possible causes remaining, view repair.  Repair Replace the CAB. Perform ABS VERIFICATION TEST - VER 1.	All

# BRAKES (CAB)

## BRAKE FLUID LEVEL SWITCH — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the Brake Fluid Level Switch connector <b>Note: Check connector - Clean/repair as necessary.</b> Disconnect the CAB connector. <b>Check connector - Clean/repair as necessary.</b> Turn the ignition on. Using a 12-volt test light connected to ground, check the Brake Fluid Level Switch Sense circuit. Is the test light on?  Yes → Repair Brake Fluid Level Switch Sense Circuit for a Short to Ground. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 9	All
9	Turn the ignition off. Disconnect the Brake Fluid Level Switch connector <b>Note: Check connector - Clean/repair as necessary.</b> Disconnect the CAB connector. <b>Check connector - Clean/repair as necessary.</b> Measure the resistance between the Brake Fluid Level Switch Sense and Ground circuits. Is the resistance below 5.0 ohms?  Yes → Repair Brake Fluid Level Switch Sense and Ground circuits shorted together. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 10	All
10	If there are no possible causes remaining, view repair.  Repair Replace the CAB. Perform ABS VERIFICATION TEST - VER 1.	All

**Symptom:**  
**CAB POWER FEED CIRCUIT**

**When Monitored and Set Condition:**

**CAB POWER FEED CIRCUIT**

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

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

POSSIBLE CAUSES
INTERMITTENT DTC BLOWN FUSE - FUSED B(+) CIRCUIT NO B+ SUPPLY TO FUSE FUSED B(+) CIRCUIT OPEN B(+) CIRCUIT INTERMITTENTLY SHORTED TO GROUND B(+) CIRCUIT 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. Drive the vehicle above 25 km/h (15 mph) for at least 10 seconds. Stop the vehicle. With the DRBIII®, read DTC's. Does the DRBIII® display CAB Power Feed Circuit DTC present right now?  Yes → Go To 2 No → Go To 10	All
2	Turn the ignition off. Remove and Inspect the ABS Fuse 19 in the Junction Block. Is the Fuse blown?  Yes → Go To 3 No → Go To 7	All

# BRAKES (CAB)

## CAB POWER FEED CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off. Visually inspect the B(+) Circuit in the wiring harness from the Junction Block to the CAB. Look for any sign of an intermittent short to ground. Is the wiring harness OK?</p> <p>Yes → Go To 4</p> <p>No → Repair the Fused B(+) Circuit Shorted to Ground. Perform ABS VERIFICATION TEST - VER 1.</p>	All
4	<p>Turn the ignition off. Remove the ABS Fuse 19 from the Junction Block. Disconnect the CAB harness connector. <b>Note: Check connector - Clean/repair as necessary.</b> Using a test light connected to 12 volts, probe the Fused B(+) Circuit. Is the test light on?</p> <p>Yes → Repair the Fused B(+) Circuit Shorted to Ground. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off. Remove the ABS Fuse 19 from the Junction Block. The CAB must be connected for the results of this test to be valid. Using a test light connected to 12 volts, probe the Fused B(+) Circuit at the Junction Block fuse terminal. Is the test light on?</p> <p>Yes → Replace the CAB. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 6</p>	All
6	<p>Turn the ignition off. If there are no potential causes remaining, view repair.</p> <p>Continue Replace the Fuse. Perform ABS VERIFICATION TEST - VER 1.</p>	All
7	<p>Remove the ABS Fuse 19 from the Junction Block. Turn the ignition on. Measure the voltage of the Fused B+ supply to Fuse 19 in the Junction Block. Is the voltage above 10 volts?</p> <p>Yes → Go To 8</p> <p>No → Repair the B+ Supply circuit for an open. Perform ABS VERIFICATION TEST - VER 1.</p>	All
8	<p>Turn the ignition off. Remove the ABS Fuse 19 from the Junction Block. Disconnect the CAB harness connector. <b>Note: Check connector - Clean/repair as necessary.</b> Measure the resistance of the Fused B(+) circuit between the Junction Block Fuse terminal 19 and the CAB connector. Is the resistance below 5 ohms?</p> <p>Yes → Go To 9</p> <p>No → Repair Fused B(+) Circuit Open. Perform ABS VERIFICATION TEST - VER 1.</p>	All



**CAB POWER FEED CIRCUIT — Continued**

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
9	<p>If there are no potential causes remaining, view repair.</p> <p>Repair</p> <p>Replace the CAB.</p> <p>Perform ABS VERIFICATION TEST - VER 1.</p>	All
10	<p>Turn the ignition off.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Refer to any Hotline letters or Technical Service Bulletins that may apply.</p> <p>Were any problems found?</p> <p>Yes → Repair as necessary.</p> <p>Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	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: When the message from the instrument cluster, via the PCI Bus, informs the CAB that it cannot turn on the ABS Warning Indicator or the Red Brake Warning Indicator.

**POSSIBLE CAUSES**

CLUSTER FAULT DTC CONDITION PRESENT  
 CAB-- INTERNAL FAULT  
 INTERMITTENT DTC

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's in the Instrument Cluster, not the CAB module. Are any ABS or brake system-related DTCs present?  Yes → Refer to the Cluster category for the related symptom(s). Perform ABS VERIFICATION TEST - VER 1.  No → Go To 2	All
2	With the DRB, erase DTC's. Turn the ignition on and wait approximately 1 minute. With the DRB, read DTC's. Did this DTC reset?  Yes → Replace the Controller Anti-Lock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All
3	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Test Complete.	All

**Symptom:**  
**CONTROLLER FAILURE**

**When Monitored and Set Condition:**

**CONTROLLER FAILURE**

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

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

**POSSIBLE CAUSES**

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

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

## BRAKES (CAB)

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### CONTROLLER FAILURE — Continued

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

**Symptom:****G-SWITCH NOT PROCESSABLE****When Monitored and Set Condition:****G-SWITCH NOT PROCESSABLE**

**When Monitored:** Ignition on. The CAB sends a test signal to its internal G-Sensor and monitors the internal sense circuits.

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

**POSSIBLE CAUSES**

CAB - INTERNAL FAILURE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, record and erase DTC's. With the DRBIII®, read DTCs. Does the DRBIII® display G-SWITCH NOT PROCESSABLE?  Yes → Replace the CAB. Perform ABS VERIFICATION TEST - VER 1.  No → Test Complete.	All

## BRAKES (CAB)

### Symptom:

### LEFT FRONT SENSOR CIRCUIT FAILURE

#### When Monitored and Set Condition:

#### LEFT FRONT SENSOR CIRCUIT FAILURE

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

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

#### POSSIBLE CAUSES

LEFT FRONT WHEEL SPEED SENSOR OR CONNECTOR DAMAGE  
LEFT FRONT WHEEL SPEED SENSOR CIRCUITS SHORTED OR OPEN  
CAB--NO OUTPUT  
INTERMITTENT CIRCUIT DTC  
LEFT FRONT WHEEL SPEED SENSOR -- NO OUTPUT  
CAB - UNABLE TO READ LEFT FRONT WHEEL SPEED SENSOR SIGNAL

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, record and erase DTC's. Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display "Left Front Wheel Speed Sensor Circuit Failure" DTC present right now?  Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Inspect the Left Front Wheel Speed Sensor and Connector. Is the Sensor or Connector Damaged?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All

**LEFT FRONT SENSOR CIRCUIT FAILURE — Continued**

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Left Front Wheel Speed Sensor connector. <b>Note: Check connector - Clean/repair as necessary.</b> Disconnect the CAB connector. <b>Note: Check connector - Clean/repair as necessary.</b> Turn the ignition on. Check the Left Front Wheel Speed Sensor 12 volt Supply and Signal circuits for a short to battery, ground, to each other and for open. For the purposes of this test, a short to ground must be below 15k ohms. Was any circuit short or open found?  Yes → Repair Left Front Wheel Speed Sensor circuit short or open. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 4	All
4	Turn ignition off. Make sure the CAB is not disconnected. Disconnect the Left Front Wheel Speed Sensor connector. <b>Note: Check connector - Clean/repair as necessary.</b> Turn ignition on. Measure the voltage across the Left Front Wheel Speed Sensor 12 Volt Supply and Signal circuits at the Left Front Wheel Speed Sensor connector. Is the voltage above 10 volts?  Yes → Go To 5  No → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All
5	Turn ignition off. Disconnect the CAB harness connector. Remove the harness strain relief to access the wires in the CAB connector. Using a DC voltmeter and special tool 6801, backprobe the Wheel Speed Sensor 12 volt Supply and Signal circuits at the CAB. Reconnect the CAB. Turn ignition on. Slowly rotate the left front wheel while observing voltmeter reading. Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated?  Yes → Replace the CAB. Perform ABS VERIFICATION TEST - VER 1.  No → Replace the Left Front Wheel Speed Sensor. Perform ABS VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Test Complete.	All

**Symptom:**

**LEFT FRONT SENSOR SIGNAL FAILURE**

**When Monitored and Set Condition:**

**LEFT FRONT SENSOR SIGNAL FAILURE**

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

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

**POSSIBLE CAUSES**

LEFT FRONT WHEEL SPEED SENSOR OR CONNECTOR DAMAGED  
 TONE WHEEL DAMAGED  
 LEFT FRONT WHEEL SPEED SENSOR AIR GAP OUT OF SPECIFICATION  
 LEFT FRONT WHEEL BEARING OUT OF SPECIFICATION  
 LEFT FRONT WHEEL SPEED SENSOR INOPERATIVE  
 CAB - WON'T RESPOND TO LEFT FRONT WHEEL SPEED SENSOR SIGNAL  
 INTERMITTENT SIGNAL DTC

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Using the DRBIII®, monitor the Left Front Wheel Speed Sensor while an assistant drives the vehicle. With an assistant to drive, use the DRBIII® to monitor all wheel speed sensors. Slowly accelerate as straight as possible from a stop to 24 km/h (15 mph). Is Left Front WSS Signal 0 km/h (0 mph) or differing from others by more than 5 km/h (3 mph)?  Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Inspect the Left Front Wheel Speed Sensor and Connector. Is the Sensor or Connector Damaged?  Yes → Repair as necessary. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All



**LEFT FRONT SENSOR SIGNAL FAILURE — Continued**

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Inspect the Tone Wheel for damaged or missing teeth, cracks, or looseness. <b>Note: The Tone Wheel Teeth should be perfectly square, not bent or nicked.</b> Is the Tone Wheel OK?  Yes → Go To 4  No → Replace the Tone Wheel. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Using a Feeler Gauge, measure the Wheel Speed Sensor Air Gap. <b>NOTE: The Air Gap should be checked in at least four places on the Tone Wheel.</b> Is the Air Gap between 0.42 mm - 1.71 mm (0.017" - 0.068") ?  Yes → Go To 5  No → Repair as necessary. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Inspect the wheel bearings for excessive runout or clearance. <b>Note: Refer to the appropriate service information, if necessary, for procedures or specifications.</b> Is the bearing clearance OK ?  Yes → Go To 6  No → Repair as necessary. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All
6	Turn ignition off. Disconnect the CAB harness connector. Remove the harness strain relief to access the wires in the CAB connector. Using a DC voltmeter and special tool 6801, backprobe the Wheel Speed Sensor 12 volt Supply and Signal circuits at the CAB. Reconnect the CAB. Turn the ignition on. Slowly rotate the left front wheel while observing voltmeter reading. Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated?  Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Replace the Left Front Wheel Speed Sensor in accordance with the Service Information. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All

**LEFT FRONT SENSOR SIGNAL FAILURE — Continued**

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
7	Turn the ignition off. Visually inspect wheel speed sensor. Visually inspect tone wheel. Visually inspect wiring harness. Visually inspect brakes for locking up due to lining contamination or overheating. Inspect all Components for defects which may cause a Signal DTC to set. Is any Component Damaged?  Yes → Repair as necessary. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.  No → Test Complete.	All

**Symptom:**

**LEFT REAR SENSOR CIRCUIT FAILURE**

**When Monitored and Set Condition:**

**LEFT REAR SENSOR CIRCUIT FAILURE**

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

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

**POSSIBLE CAUSES**

LEFT REAR WHEEL SPEED SENSOR OR CONNECTOR DAMAGE  
 LEFT REAR WHEEL SPEED SENSOR CIRCUITS SHORTED OR OPEN  
 CAB-NO OUTPUT  
 LEFT REAR WHEEL SPEED SENSOR -- NO OUTPUT  
 CAB - UNABLE TO READ LEFT REAR WHEEL SPEED SENSOR SIGNAL  
 INTERMITTENT CIRCUIT DTC

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, record and erase DTC's. Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display Left Rear Wheel Speed Sensor Circuit Failure DTC present right now?  Yes → Go To 2  No → Go To 6	All
2	Turn the ignition off. Inspect the Left Rear Wheel Speed Sensor and Connector. Is the Sensor or Connector Damaged?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All

# BRAKES (CAB)

## LEFT REAR SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the Left Rear Wheel Speed Sensor connector.  <b>Note: Check connector - Clean/repair as necessary.</b>            Disconnect the CAB connector.  <b>Note: Check connector - Clean/repair as necessary.</b>            Turn the ignition on.            Check the Left Rear Wheel Speed Sensor 12 volt Supply and Signal circuits for a short to battery, ground, to each other and for open.            For the purposes of this test, a short to ground must be below 15k ohms.            Was any circuit short or open found?</p> <p>Yes → Repair Left Rear Wheel Speed Sensor circuit short or open.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 4</p>	All
4	<p>Turn ignition off.            Disconnect the Left Rear Wheel Speed Sensor connector.            Turn ignition on.            Measure the voltage across the Left Rear Wheel Speed Sensor 12 Volt Supply and Signal circuits at the Left Rear Wheel Speed Sensor connector.            Is the voltage above 10 volts?</p> <p>Yes → Go To 5</p> <p>No → Replace the Controller Antilock Brake in accordance with the Service Information.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
5	<p>Turn ignition off.            Disconnect the CAB harness connector.            Remove the harness strain relief to access the wires in the CAB connector.            Using a DC voltmeter and special tool 6801, backprobe the Wheel Speed Sensor 12 volt Supply and Signal circuits at the CAB.            Reconnect the CAB.            Turn ignition on.            Slowly rotate the left rear wheel while observing voltmeter reading.            Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated?</p> <p>Yes → Replace the Controller Anti-Lock Brake in accordance with the Service Information.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Replace the Left Rear Wheel Speed Sensor.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
6	<p>Turn the ignition off.            Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.            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?</p> <p>Yes → Repair as necessary.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	All

**Symptom:**

**LEFT REAR SENSOR SIGNAL FAILURE**

**When Monitored and Set Condition:**

**LEFT REAR SENSOR SIGNAL FAILURE**

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

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

<b>POSSIBLE CAUSES</b>	
LEFT REAR WHEEL SPEED SENSOR OR CONNECTOR DAMAGED	
TONE WHEEL DAMAGED	
LEFT REAR WHEEL SPEED SENSOR AIR GAP OUT OF SPECIFICATION	
WHEEL BEARINGS OUT OF SPECIFICATION	
LEFT REAR WHEEL SPEED SENSOR INOPERATIVE	
CAB - WON'T RESPOND TO WHEEL SPEED SENSOR SIGNAL	
INTERMITTENT SIGNAL DTC	

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
1	Turn the ignition on. While an assistant drives, use the DRBIII® to monitor all Wheel Speed Sensors. Slowly accelerate as straight as possible from a stop to 24 Km/h (15 Mph). With the DRBIII®, monitor all wheel speed sensors. Is Left Rear WSS Signal 0 km/h (0 mph) or differing from others by more than 5 km/h (3 mph)?  Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Inspect the Left Rear Wheel Speed Sensor and Connector. Is the Sensor or Connector damaged?  Yes → Repair as necessary. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All

# BRAKES (CAB)

## LEFT REAR SENSOR SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Inspect the Tone Wheel for damaged or missing teeth, cracks, or looseness. <b>Note: The Tone Wheel Teeth should be perfectly square, not bent or nicked.</b> Is the Tone Wheel OK?  Yes → Go To 4  No → Replace the Tone Wheel. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Using a Feeler Gauge, measure the Wheel Speed Sensor Air Gap. <b>NOTE: The Air Gap should be checked in at least four places on the Tone Wheel.</b> Is the Air Gap between 0.42 mm - 1.71 mm (0.017" - 0.068") ?  Yes → Go To 5  No → Repair as necessary. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Inspect the wheel bearings at the affected wheel for excessive runout or clearance. <b>Note: Refer to the appropriate service information, if necessary, for procedures or specifications.</b> Is the bearing clearance OK ?  Yes → Go To 6  No → Repair as necessary. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All
6	Turn ignition off. Disconnect the CAB harness connector. Remove the harness strain relief to access the wires in the CAB connector. With a voltmeter and special tool 6801, backprobe the Wheel Speed Sensor 12 volt Supply and Signal circuits for the affected wheel at the CAB. Reconnect the CAB. Turn the ignition on. Slowly rotate the left rear wheel while observing the voltmeter reading. Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated?  Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Replace the Left Rear Wheel Speed Sensor in accordance with the Service Information. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All

**LEFT REAR SENSOR SIGNAL FAILURE — Continued**

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
7	Turn the ignition off. Visually inspect wheel speed sensor. Visually inspect tone wheel. Visually inspect wiring harness. Visually inspect brakes for locking up due to lining contamination or overheating. Inspect all Components for defects which may cause a Signal DTC to set. Is any Component Damaged?  Yes → Repair as necessary. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.  No → Test Complete.	All

# BRAKES (CAB)

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## Symptom: PCI BUS COMMUNICATION

### When Monitored and Set Condition:

#### PCI BUS COMMUNICATION

When Monitored: Ignition ON, every 7 ms.

Set Condition: When the CAB does not receive a message from the instrument cluster for 10 seconds.

### POSSIBLE CAUSES

CHECK COMMUNICATION TO MIC  
CAB-- INTERNAL FAULT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, attempt to communicate with the MIC Was the DRB able to I/D or communicate with the MIC?  Yes → Go To 2  No → Refer to the Communication category and perform the symptom Bus +/- Signals Open from the Controller Anti-Lock Brake. Perform ABS VERIFICATION TEST - VER 1.	All
2	With the DRB, erase DTC's. Turn the ignition on and wait approximately 1 minute. With the DRB, read DTC's. Did this DTC reappear?  Yes → Replace the Controller Anti-Lock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Test Complete.	All



**Symptom:**

**PUMP MOTOR CIRCUIT NOT WORKING PROPERLY**

**When Monitored and Set Condition:**

**PUMP MOTOR CIRCUIT NOT WORKING PROPERLY**

When Monitored: Ignition on. The CAB commands the pump on at 20 km/h (12 mph) to check its operation, if the brake switch is not applied. If the brake is applied, 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 without sufficient voltage to operate it.

**POSSIBLE CAUSES**

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

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Reconnect all connectors. Turn the ignition on. Monitor the pump motor for continuous operation. Is the pump motor running continuously?  Yes → Replace the Controller Anti-Lock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 2	All

**PUMP MOTOR CIRCUIT NOT WORKING PROPERLY — Continued**

TEST	ACTION	APPLICABILITY
2	Turn the ignition on. With the DRBIII®, read DTC's. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. With the DRBIII®, actuate the ABS pump motor. Did the Pump Motor operate when actuated?  No → Go To 3  Yes → Go To 14	All
3	Turn the ignition off. Remove and inspect the ABS Pump fuse #4 in the PDC. Is the Fuse blown?  Yes → Go To 4  No → Go To 8	All
4	Turn the ignition off. Make sure the Pump Motor connector is secure. 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 5  No → Repair the Fused B(+) Circuit shorted to ground. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Remove the ABS PUMP Fuse # 4 from the Power Distribution Center (PDC). Disconnect the CAB connector. Make sure the Pump Motor connector is secure. <b>Note: Check connector - Clean/repair as necessary.</b> Using a test light connected to 12 volts, probe the Fused B (+) Circuit. Is the test light on?  Yes → Repair the Fused B(+) circuit short to ground. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 6	All
6	Turn the ignition off. Make sure the Pump Motor connector is secure. Remove the ABS PUMP Fuse 4 from the PDC. The CAB must be connected for the results of this test to be valid. Using a test light connected to 12 volts, probe the Fused B (+) circuit in the PDC. Is the test light on?  Yes → Replace the Controller Anti-Lock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 7	All

**PUMP MOTOR CIRCUIT NOT WORKING PROPERLY — Continued**

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Make sure the Pump Motor connector is secure If there are no potential causes remaining, replace the Fuse. If there are no possible causes remaining, view repair.  Repair Replace the ABS Pump Motor Fuse. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All
8	Turn the ignition off. Remove the ABS PUMP Fuse #4 from the Power Distribution Center (PDC). Disconnect the CAB connector. <b>Note: Check connector - Clean/repair as necessary.</b> Measure the resistance of the Fused B (+) circuit between the PDC Fuse Terminal and the CAB connector. Is the resistance below 10 ohms?  Yes → Go To 9  No → Repair the Fused B(+) circuit for an open. Make sure the Pump Motor connector is secure. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All
9	Turn the ignition on. Using a 12-volt test light connected to ground, check the B+ supply to Fuse 4 in the PDC. Is the B+ supply OK?  Yes → Go To 10  No → Repair the B+ supply for an open. Make sure the Pump Motor connector is secure. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All
10	Turn the ignition off. Disconnect Pump Motor Connector. Connect a 10 gauge jumper wire between pump motor Fused B (+) circuit and a 40 Amp Fused B (+) circuit. Connect a 10 gauge jumper wire between pump motor ground circuit and a known good body ground. Monitor Pump Motor operation. Is the pump motor running?  Yes → Go To 11  No → Replace the ABS Pump Motor/Hydraulic Control Unit assembly. Make sure the Pump Motor connector is secure. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All

**PUMP MOTOR CIRCUIT NOT WORKING PROPERLY — Continued**

TEST	ACTION	APPLICABILITY
11	Turn the ignition off. Disconnect CAB Connector. <b>Note: Check connector - Clean/repair as necessary.</b> Measure the resistance of the CAB ground circuits. Is the resistance below 1.0 ohm?  Yes → Go To 12  No → Repair the ground circuit for an open. Make sure the Pump Motor connector is secure. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All
12	Make sure the Pump Motor connector is secure. Turn the ignition on. With the DRBIII®, enable pump motor actuation. <b>NOTE: Pump motor will not operate, but voltage will be applied.</b> Measure the voltage drop across the ABS ground circuit connection, with pump motor actuation enabled. Is the voltage below 0.1 volt?  Yes → Go To 13  No → Repair the Ground circuit for an open. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All
13	If there are no possible causes remaining, view repair.  Repair Replace the Controller Anti-Lock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All
14	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Make sure the Pump Motor connector is secure. 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. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.  No → Test Complete.	All

**Symptom:**

**RIGHT FRONT SENSOR CIRCUIT FAILURE**

**When Monitored and Set Condition:**

**RIGHT FRONT SENSOR CIRCUIT FAILURE**

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

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

**POSSIBLE CAUSES**

RIGHT FRONT WHEEL SPEED SENSOR OR CONNECTOR DAMAGE  
 RIGHT FRONT WHEEL SPEED SENSOR CIRCUITS SHORTED OR OPEN  
 CAB-NO OUTPUT  
 RIGHT FRONT WHEEL SPEED SENSOR -- NO OUTPUT  
 CAB - UNABLE TO READ RIGHT FRONT WHEEL SPEED SENSOR SIGNAL  
 INTERMITTENT CIRCUIT DTC

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, record and erase DTC's. Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display Right Front Wheel Speed Sensor Circuit Failure DTC present right now?  Yes → Go To 2  No → Go To 6	All
2	Turn the ignition off. Inspect the Right Front Wheel Speed Sensor and Connector. Is the Sensor or Connector Damaged?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All

**RIGHT FRONT SENSOR CIRCUIT FAILURE — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.                      Disconnect the Right Front Wheel Speed Sensor connector.  <b>Note: Check connector - Clean/repair as necessary.</b>                      Disconnect the CAB connector.  <b>Note: Check connector - Clean/repair as necessary.</b>                      Turn the ignition on.                      Check the Right Front Wheel Speed Sensor 12 volt Supply and Signal circuits for a short to battery, ground, to each other and for open.                      For the purposes of this test, a short to ground must be below 15k ohms.                      Was any circuit short or open found?</p> <p style="padding-left: 40px;">Yes → Repair Right Front Wheel Speed Sensor circuit short or open.                      Perform ABS VERIFICATION TEST - VER 1.</p> <p style="padding-left: 40px;">No → Go To 4</p>	All
4	<p>Turn ignition off.                      Make sure the CAB is not disconnected.                      Disconnect the Left Front Wheel Speed Sensor connector.                      Turn ignition on.                      Measure the voltage across the Right Front Wheel Speed Sensor 12 Volt Supply and Signal circuits at the Right Front Wheel Speed Sensor connector.                      Is the voltage above 10 volts?</p> <p style="padding-left: 40px;">Yes → Go To 5</p> <p style="padding-left: 40px;">No → Replace the Controller Antilock Brake in accordance with the Service Information.                      Perform ABS VERIFICATION TEST - VER 1.</p>	All
5	<p>Turn ignition off.                      Disconnect the CAB harness connector.                      Remove the harness strain relief to access the wires in the CAB connector.                      Using a DC voltmeter and special tool 6801, backprobe the Wheel Speed Sensor 12 volt Supply and Signal circuits at the CAB.                      Reconnect the CAB.                      Turn ignition on.                      Slowly rotate the right front wheel while observing voltmeter reading.                      Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated?</p> <p style="padding-left: 40px;">Yes → Replace the CAB.                      Perform ABS VERIFICATION TEST - VER 1.</p> <p style="padding-left: 40px;">No → Replace the Right Front Wheel Speed Sensor.                      Perform ABS VERIFICATION TEST - VER 1.</p>	All
6	<p>Turn the ignition off.                      Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.                      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?</p> <p style="padding-left: 40px;">Yes → Repair as necessary.                      Perform ABS VERIFICATION TEST - VER 1.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	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**

RIGHT FRONT WHEEL SPEED SENSOR OR CONNECTOR DAMAGED  
 TONE WHEEL DAMAGED  
 RIGHT FRONT WHEEL SPEED SENSOR AIR GAP OUT OF SPECIFICATION  
 WHEEL BEARINGS OUT OF SPECIFICATION  
 RIGHT FRONT WHEEL SPEED SENSOR INOPERATIVE  
 CAB - WON'T RESPOND TO WHEEL SPEED SENSOR SIGNAL  
 INTERMITTENT SIGNAL DTC

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
1	Turn the ignition on. While an assistant drives, use the DRBIII® to monitor all Wheel Speed Sensors. Slowly accelerate as straight as possible from a stop to 24 Km/h (15 Mph). With the DRBIII®, monitor all wheel speed sensors. Is Right Front WSS Signal 0 km/h (0 mph) or differing from others by more than 5 km/h (3 mph)?  Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Inspect the Right Front Wheel Speed Sensor and Connector. Is the Sensor or Connector damaged?  Yes → Repair as necessary. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All

**RIGHT FRONT SENSOR SIGNAL FAILURE — Continued**

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Inspect the Tone Wheel for damaged or missing teeth, cracks, or looseness. <b>Note: The Tone Wheel Teeth should be perfectly square, not bent or nicked.</b> Is the Tone Wheel OK?  Yes → Go To 4  No → Replace the Tone Wheel. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Using a Feeler Gauge, measure the Wheel Speed Sensor Air Gap. <b>NOTE: The Air Gap should be checked in at least four places on the Tone Wheel.</b> Is the Air Gap between 0.42 mm - 1.71 mm (0.017" - 0.068") ?  Yes → Go To 5  No → Repair as necessary. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Inspect the wheel bearings at the affected wheel for excessive runout or clearance. <b>Note: Refer to the appropriate service information, if necessary, for procedures or specifications.</b> Is the bearing clearance OK ?  Yes → Go To 6  No → Repair as necessary. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All
6	Turn ignition off. Disconnect the CAB harness connector. Remove the harness strain relief to access the wires in the CAB connector. Using a DC voltmeter and special tool 6801, backprobe the Wheel Speed Sensor 12 volt Supply and Signal circuits at the CAB. Reconnect the CAB. Turn the ignition on. Slowly rotate the right front wheel while observing the voltmeter reading. Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated?  Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Replace the Right Front Wheel Speed Sensor in accordance with the Service Information. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All



**RIGHT FRONT SENSOR SIGNAL FAILURE — Continued**

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
7	Turn the ignition off. Visually inspect wheel speed sensor. Visually inspect tone wheel. Visually inspect wiring harness. Visually inspect brakes for locking up due to lining contamination or overheating. Inspect all Components for defects which may cause a Signal DTC to set. Is any Component Damaged?  Yes → Repair as necessary. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.  No → Test Complete.	All

**Symptom:**

**RIGHT REAR SENSOR CIRCUIT FAILURE**

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**When Monitored and Set Condition:**

**RIGHT REAR SENSOR CIRCUIT FAILURE**

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

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

**POSSIBLE CAUSES**

RIGHT REAR WHEEL SPEED SENSOR OR CONNECTOR DAMAGE  
 RIGHT REAR WHEEL SPEED SENSOR CIRCUITS SHORTED OR OPEN  
 CAB-NO OUTPUT  
 RIGHT REAR WHEEL SPEED SENSOR -- NO OUTPUT  
 CAB - UNABLE TO READ RIGHT REAR WHEEL SPEED SENSOR SIGNAL  
 INTERMITTENT CIRCUIT DTC

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display Right Rear Wheel Speed Sensor Circuit Failure DTC present right now?  Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Inspect the Right Rear Wheel Speed Sensor and Connector. Is the Sensor or Connector Damaged?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All

**RIGHT REAR SENSOR CIRCUIT FAILURE — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the Right Rear Wheel Speed Sensor connector.  <b>Note: Check connector - Clean/repair as necessary.</b>            Disconnect the CAB connector.  <b>Note: Check connector - Clean/repair as necessary.</b>            Turn the ignition on.            Check the Right Rear Wheel Speed Sensor 12 volt Supply and Signal circuits for a short to battery, ground, to each other and for open.            For the purposes of this test, a short to ground must be below 15k ohms.            Was any circuit short or open found?</p> <p>Yes → Repair Right Rear Wheel Speed Sensor circuit short or open.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 4</p>	All
4	<p>Turn ignition off.            Make sure the CAB is not disconnected.            Disconnect the Right Rear Wheel Speed Sensor connector.            Turn ignition on.            Measure the voltage across the Right Rear Wheel Speed Sensor 12 Volt Supply and Signal circuits at the Right Rear Wheel Speed Sensor connector.            Is the voltage above 10 volts?</p> <p>Yes → Go To 5</p> <p>No → Replace the Controller Antilock Brake in accordance with the Service Information.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
5	<p>Turn ignition off.            Disconnect the CAB harness connector.            Remove the harness strain relief to access the wires in the CAB connector.            Using a DC voltmeter and special tool 6801, backprobe the Wheel Speed Sensor 12 volt Supply and Signal circuits at the CAB.            Reconnect the CAB.            Turn ignition on.            Slowly rotate the right rear wheel while observing voltmeter reading.            Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated?</p> <p>Yes → Replace the Controller Anti-Lock Brake in accordance with the Service Information.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Replace the Right Rear Wheel Speed Sensor.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
6	<p>Turn the ignition off.            Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.            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?</p> <p>Yes → Repair as necessary.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	All

**Symptom:**

**RIGHT REAR SENSOR SIGNAL FAILURE**

**When Monitored and Set Condition:**

**RIGHT REAR SENSOR SIGNAL FAILURE**

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

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

<b>POSSIBLE CAUSES</b>
RIGHT REAR WHEEL SPEED SENSOR OR CONNECTOR DAMAGED
TONE WHEEL DAMAGED
RIGHT REAR WHEEL SPEED SENSOR AIR GAP OUT OF SPECIFICATION
WHEEL BEARINGS OUT OF SPECIFICATION
RIGHT REAR WHEEL SPEED SENSOR INOPERATIVE
CAB - WON'T RESPOND TO WHEEL SPEED SENSOR SIGNAL
INTERMITTENT SIGNAL DTC

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
1	Turn the ignition on. While an assistant drives, use the DRBIII® to monitor all Wheel Speed Sensors. Slowly accelerate as straight as possible from a stop to 24 Km/h (15 Mph). With the DRBIII®, monitor all wheel speed sensors. Is Right Rear WSS Signal 0 Km/h (0 Mph) or differing from others by more than 5kmh (3mph)?  Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Inspect the Right Rear Wheel Speed Sensor and Connector. Is the Sensor or Connector damaged?  Yes → Repair as necessary. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All

**RIGHT REAR SENSOR SIGNAL FAILURE — Continued**

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Inspect the Tone Wheel for damaged or missing teeth, cracks, or looseness. <b>Note: The Tone Wheel Teeth should be perfectly square, not bent or nicked.</b> Is the Tone Wheel OK?  Yes → Go To 4  No → Replace the Tone Wheel in accordance with the Service Information. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Using a Feeler Gauge, measure the Wheel Speed Sensor Air Gap. <b>NOTE: The Air Gap should be checked in at least four places on the Tone Wheel.</b> Is the Air Gap between 0.42 mm - 1.71 mm (0.017" - 0.068") ?  Yes → Go To 5  No → Repair as necessary. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Inspect the wheel bearings at the affected wheel for excessive runout or clearance. <b>Note: Refer to the appropriate service information, if necessary, for procedures or specifications.</b> Is the bearing clearance OK ?  Yes → Go To 6  No → Repair as necessary. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All
6	Turn ignition off. Disconnect the CAB harness connector. Remove the harness strain relief to access the wires in the CAB connector. With a voltmeter and special tool 6801, backprobe the Wheel Speed Sensor 12 volt Supply and Signal circuits for the affected wheel at the CAB. Reconnect the CAB. Turn the ignition on. Slowly rotate the right rear wheel while observing the voltmeter reading. Does the voltage change from approximately 1.6 volts to 0.8 volts as the wheel is rotated?  Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Replace the Right Rear Wheel Speed Sensor in accordance with the Service Information. The CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator. Perform ABS VERIFICATION TEST - VER 1.	All

**RIGHT REAR SENSOR SIGNAL FAILURE — Continued**

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

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

**When Monitored and Set Condition:**

**SYSTEM OVERVOLTAGE**

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

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

**POSSIBLE CAUSES**

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

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

# BRAKES (CAB)

## SYSTEM OVERVOLTAGE — Continued

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



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

**When Monitored and Set Condition:**

**SYSTEM UNDERVOLTAGE**

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

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

**POSSIBLE CAUSES**

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

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

# BRAKES (CAB)

## SYSTEM UNDERVOLTAGE — Continued

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

**Verification Tests**

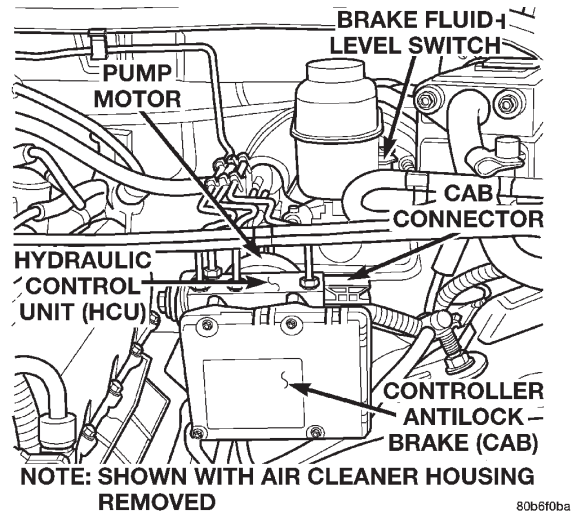
ABS VERIFICATION TEST - VER 1	APPLICABILITY
<p>1. Turn the ignition off.</p> <p>2. Connect all previously disconnected components and connectors.</p> <p>3. Ensure all accessories are turned off and the battery is fully charged.</p> <p>4. Ensure that the Ignition is on, and with the DRBIII, erase all Diagnostic Trouble Codes from ALL modules. Start the engine and allow it to run for 2 minutes and fully operate the system that was malfunctioning.</p> <p>5. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII, read DTC's from ALL modules.</p> <p>6. If any Diagnostic Trouble Codes are present, return to Symptom list and troubleshoot new or recurring symptom.</p> <p><b>7. NOTE: For Sensor Signal and Pump Motor faults, the CAB must sense all 4 wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator.</b></p> <p>8. If there are no DTC's present after turning ignition on, road test the vehicle for at least 5 minutes. Perform several antilock braking stops.</p> <p><b>9. Caution: Ensure braking capability is available before road testing.</b></p> <p>10. Again, with the DRBIII® read DTC's. If any DTC's are present, return to Symptom list.</p> <p>11. If there are no Diagnostic Trouble Codes (DTC's) present, and the customer's concern can no longer be duplicated, the repair is complete.</p> <p>Are any DTC's present or is the original concern still present?</p> <p>Yes → Repair is not complete, refer to appropriate symptom.</p> <p>No → Repair is complete.</p>	<p>All</p>

ADJUSTABLE PEDALS VERIFICATION TEST - VER 1	APPLICABILITY
<p>1. If the Adjustable Pedals Module was replaced, program two pedal positions if equipped with memory function.</p> <p>2. Activate the Adjustable Pedals through the full range of movement.</p> <p>3. Verify that the Adjustable Pedals system is disabled with the vehicle in Reverse.</p> <p>4. Verify that the Adjustable Pedals system is disabled with Speed Control activated.</p> <p>5. With the DRBIII®, erase DTCs.</p> <p>6. With the DRBIII®, read DTCs.</p> <p>Are any DTC's present or is the original complaint still present?</p> <p>Yes → Repair is not complete, refer to appropriate symptom.</p> <p>No → Repair is complete.</p>	<p>All</p>

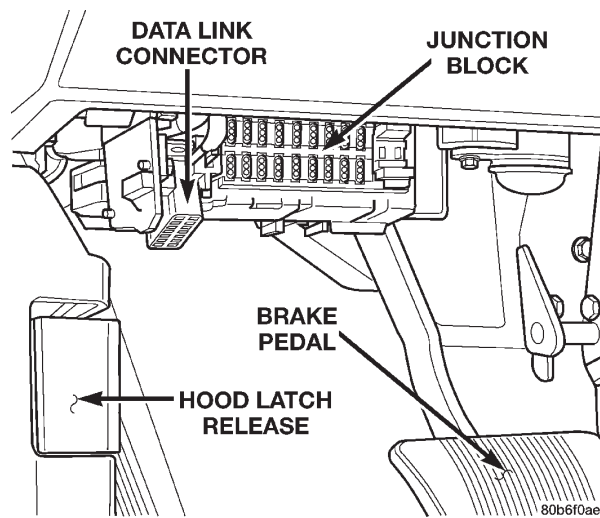


8.0 COMPONENT LOCATIONS

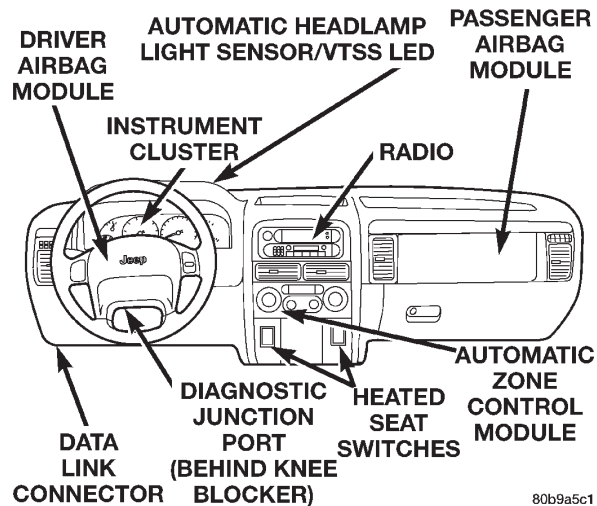
8.1 CONTROLLER ANTILOCK BRAKE



8.2 DATA LINK CONNECTOR

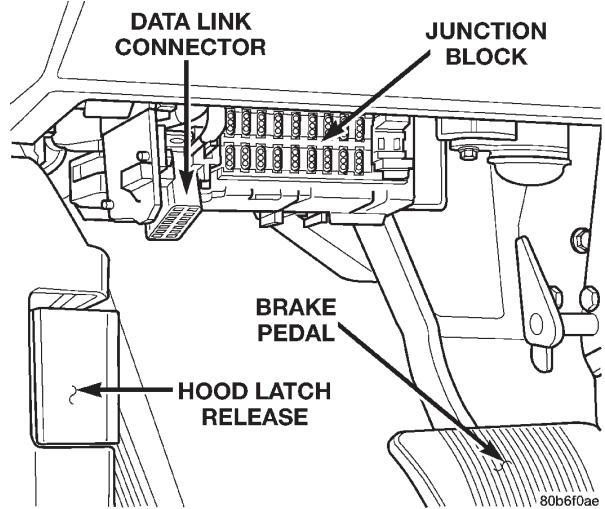
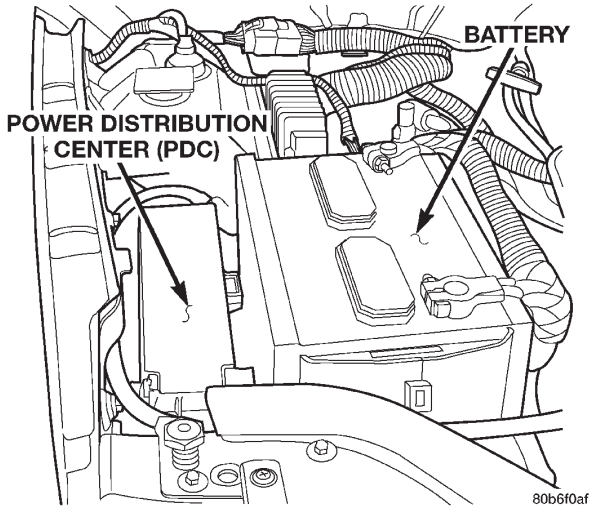


8.2.1 DIAGNOSTIC JUNCTION PORT



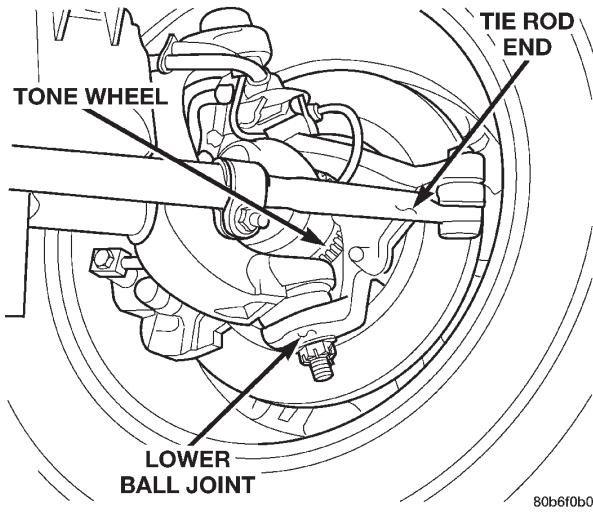
# COMPONENT LOCATIONS

## 8.3 FUSES

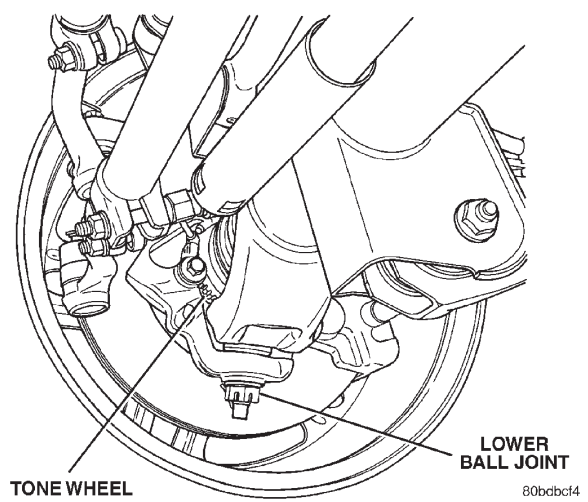


## 8.4 TONE WHEELS

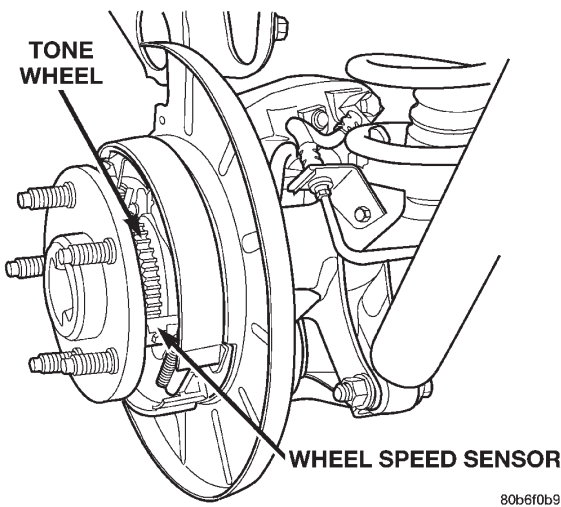
### LEFT FRONT



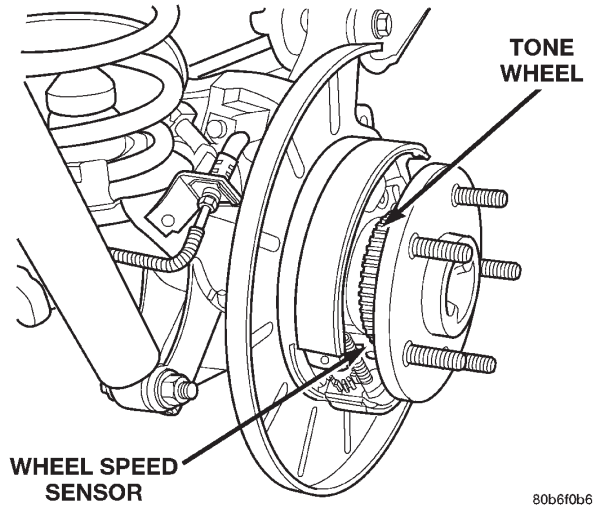
### RIGHT FRONT



### LEFT REAR

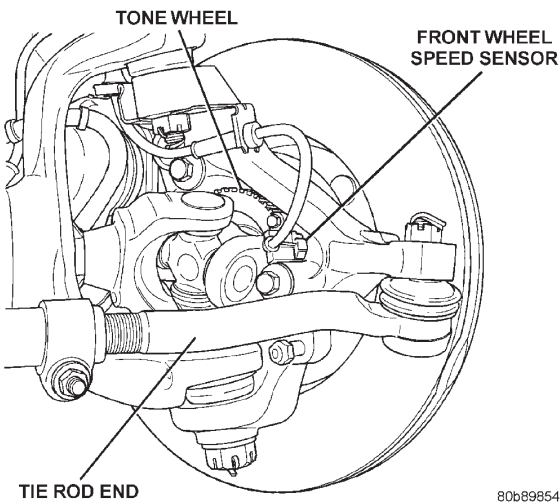


### RIGHT REAR

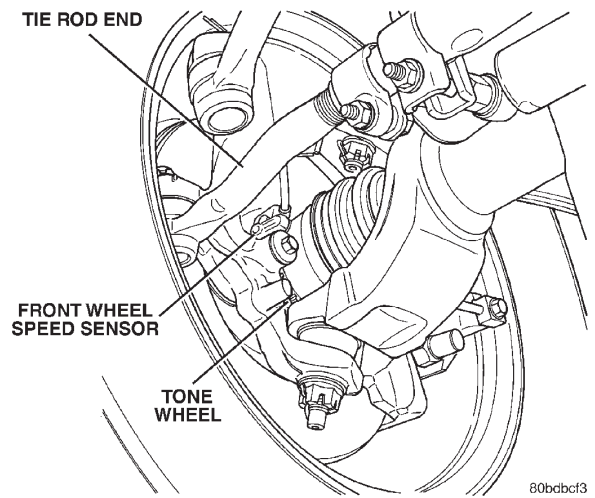


8.5 WHEEL SPEED SENSORS

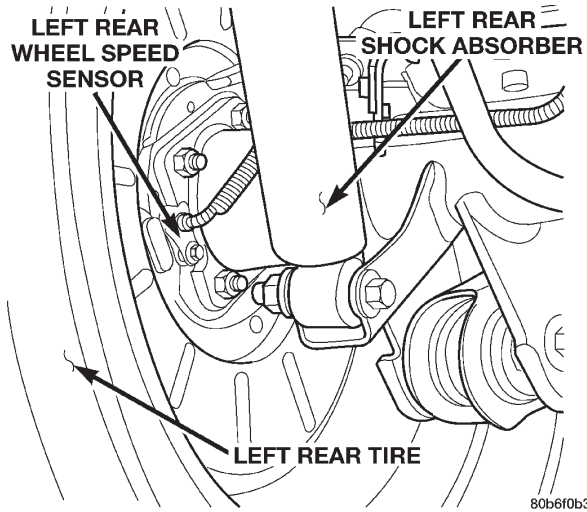
**LEFT FRONT**



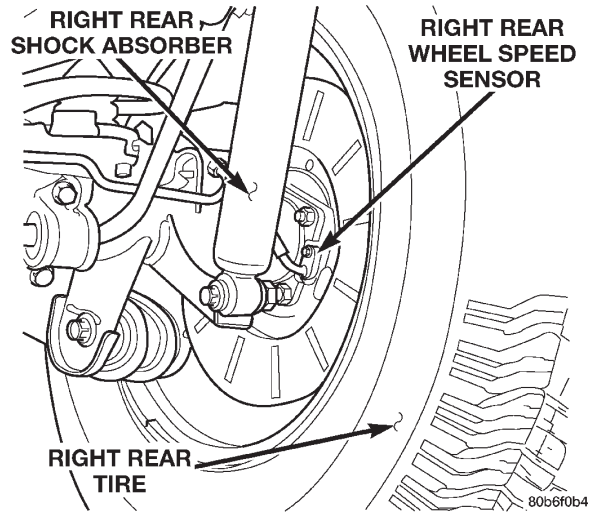
**RIGHT FRONT**



**LEFT REAR**

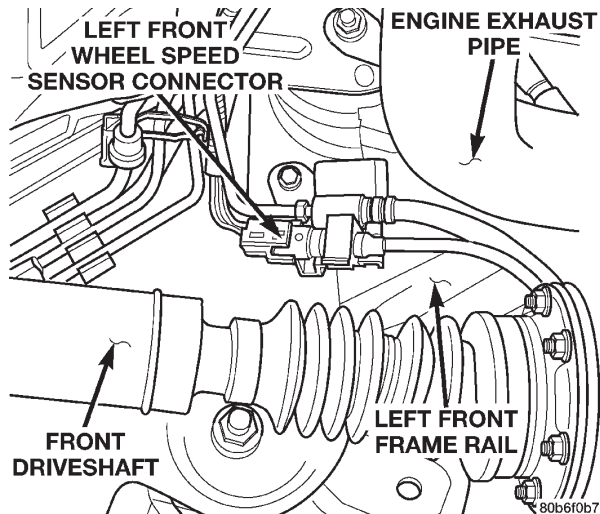


**RIGHT REAR**

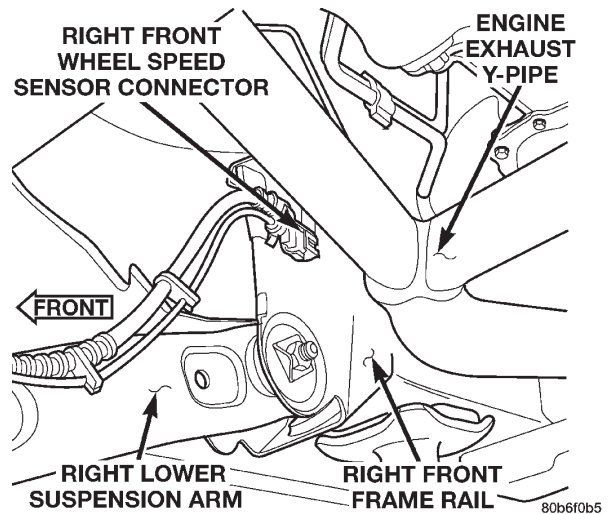


8.6 WHEEL SPEED SENSOR CONNECTORS

**LEFT FRONT**

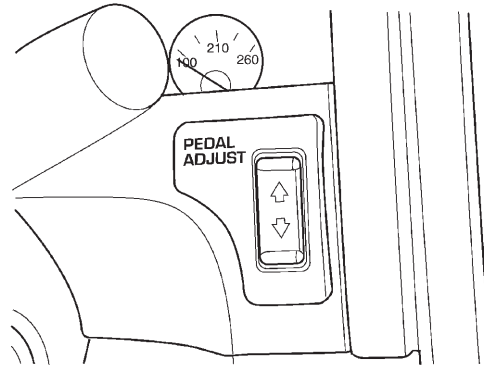


**RIGHT FRONT**



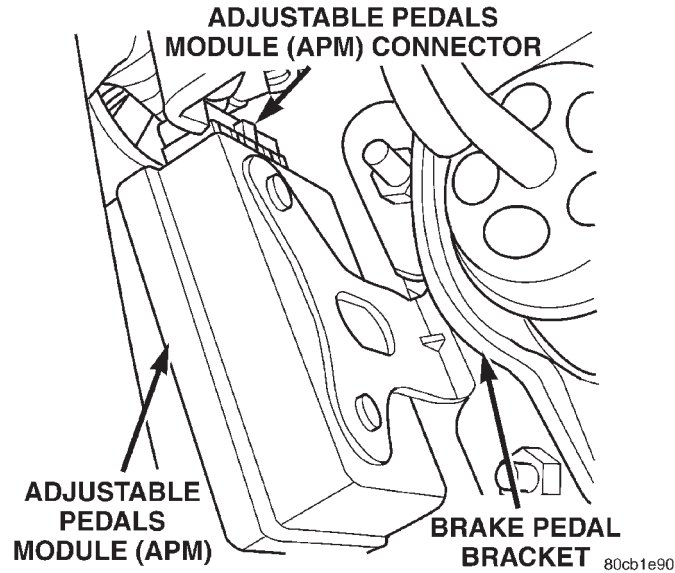
# COMPONENT LOCATIONS

## 8.7 ADJUSTABLE PEDALS SWITCH



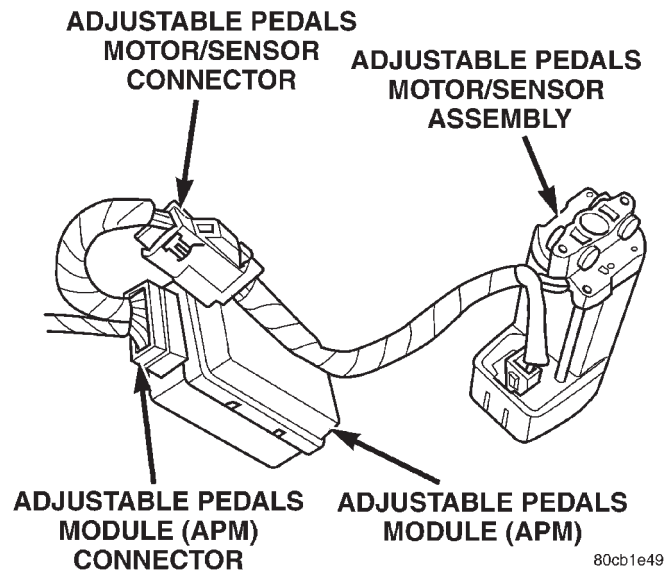
80cb1dc8

## 8.8 ADJUSTABLE PEDALS MODULE



80cb1e90

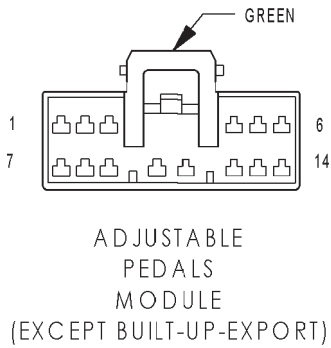
## 8.9 ADJUSTABLE PEDALS COMPONENTS



80cb1e49

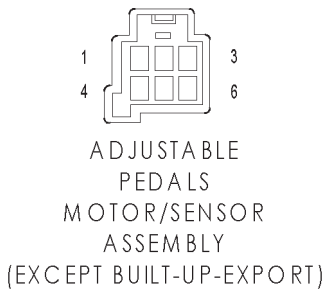


9.0 CONNECTOR PINOUTS



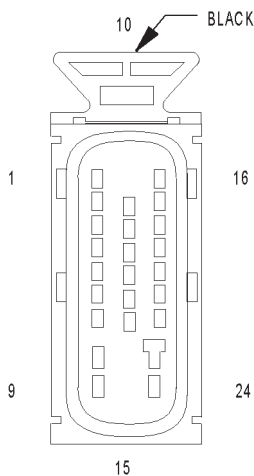
ADJUSTABLE PEDALS MODULE (EXCEPT BUILT-UP-EXPORT) - GREEN 14 WAY

CAV	CIRCUIT	FUNCTION
1	Y151 20LG/BR	ADJUSTABLE PEDALS SWITCH SENSE (FORWARD)
2	Y152 20LG/OR	ADJUSTABLE PEDALS SWITCH SENSE (REARWARD)
3	Q110 16OR/VT	ADJUSTABLE PEDALS MOTOR (FORWARD)
4	F72 16RD/YL	FUSED B(+)
5	-	-
6	Q111 16OR/GY	ADJUSTABLE PEDALS MOTOR (REARWARD)
7	Q113 20OR/DB (MEMORY)	PEDAL POSITION SENSOR FEED
8	Q112 20OR/YL (MEMORY)	PEDAL POSITION SENSOR SENSE
9	Q114 20OR/TN (MEMORY)	PEDAL POSITION SENSOR RETURN
10	Z151 16BK	GROUND
11	Z155 20BK/OR	GROUND
12	L1 18WT/BR	BACK-UP LAMP FEED
13	D25 20VT/YL	PCI BUS
14	Y153 16DB/RD	ADJUSTABLE PEDALS SWITCH FEED



ADJUSTABLE PEDALS MOTOR/SENSOR ASSEMBLY (EXCEPT BUILT-UP-EXPORT) - 6 WAY

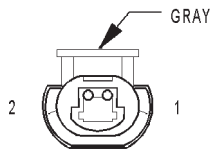
CAV	CIRCUIT	FUNCTION
1	Q113 20OR/DB	PEDAL POSITION SENSOR FEED
2	Q112 20OR/YL	PEDAL POSITION SENSOR SENSE
3	Q114 20OR/TN	PEDAL POSITION SENSOR RETURN
4	-	-
5	Q111 16OR/GY	ADJUSTABLE PEDALS MOTOR (REARWARD)
6	Q110 16OR/VT	ADJUSTABLE PEDALS MOTOR (FORWARD)



CONTROLLER ANTILOCK BRAKE - BLACK 24 WAY

CAV	CIRCUIT	FUNCTION
1	Z101 12BK/OR	GROUND
2	B1 18YL/DB	RIGHT REAR WHEEL SPEED SENSOR SIGNAL
3	B2 18YL	RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
4	-	-
5	D25 18VT/YL	PCI BUS
6	B6 18WT/DB	RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
7	B7 18WT	RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
8	-	-
9	A20 12RD/DB	FUSED B(+)
10	F20 18DB/PK	FUSED IGNITION SWITCH OUTPUT (RUN)
11	D52 18LG/WT (DIESEL)	CAN C BUS(+)
12	-	-
13	B22 18DG/YL	VEHICLE SPEED SIGNAL
14	D51 18DG/YL (DIESEL)	CAN C BUS(-)
15	-	-
16	Z102 12BK/OR	GROUND
17	G9 18GY/BK	BRAKE FLUID LEVEL SWITCH SENSE
18	L50 18WT/TN	PRIMARY BRAKE SWITCH SIGNAL
19	B3 18LG/DB	LEFT REAR WHEEL SPEED SENSOR SIGNAL
20	B4 18LG	LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
21	Z231 18BK	GROUND
22	B8 18RD/DB	LEFT FRONT WHEEL SPEED SENSOR SIGNAL
23	B9 18RD	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
24	A10 12RD/DG	FUSED B(+)

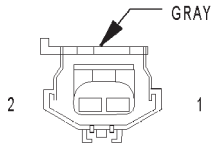
# CONNECTOR PINOUTS



LEFT FRONT  
WHEEL SPEED  
SENSOR

LEFT FRONT WHEEL SPEED SENSOR - GRAY 2 WAY

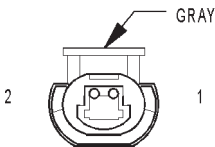
CAV	CIRCUIT	FUNCTION
1	B9 18RD	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B8 18RD/DB	LEFT FRONT WHEEL SPEED SENSOR SIGNAL



LEFT REAR  
WHEEL SPEED  
SENSOR

LEFT REAR WHEEL SPEED SENSOR - GRAY 2 WAY

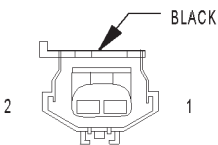
CAV	CIRCUIT	FUNCTION
1	B4 18LG	LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B3 18LG/DB	LEFT REAR WHEEL SPEED SENSOR SIGNAL



RIGHT FRONT  
WHEEL SPEED  
SENSOR

RIGHT FRONT WHEEL SPEED SENSOR - GRAY 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



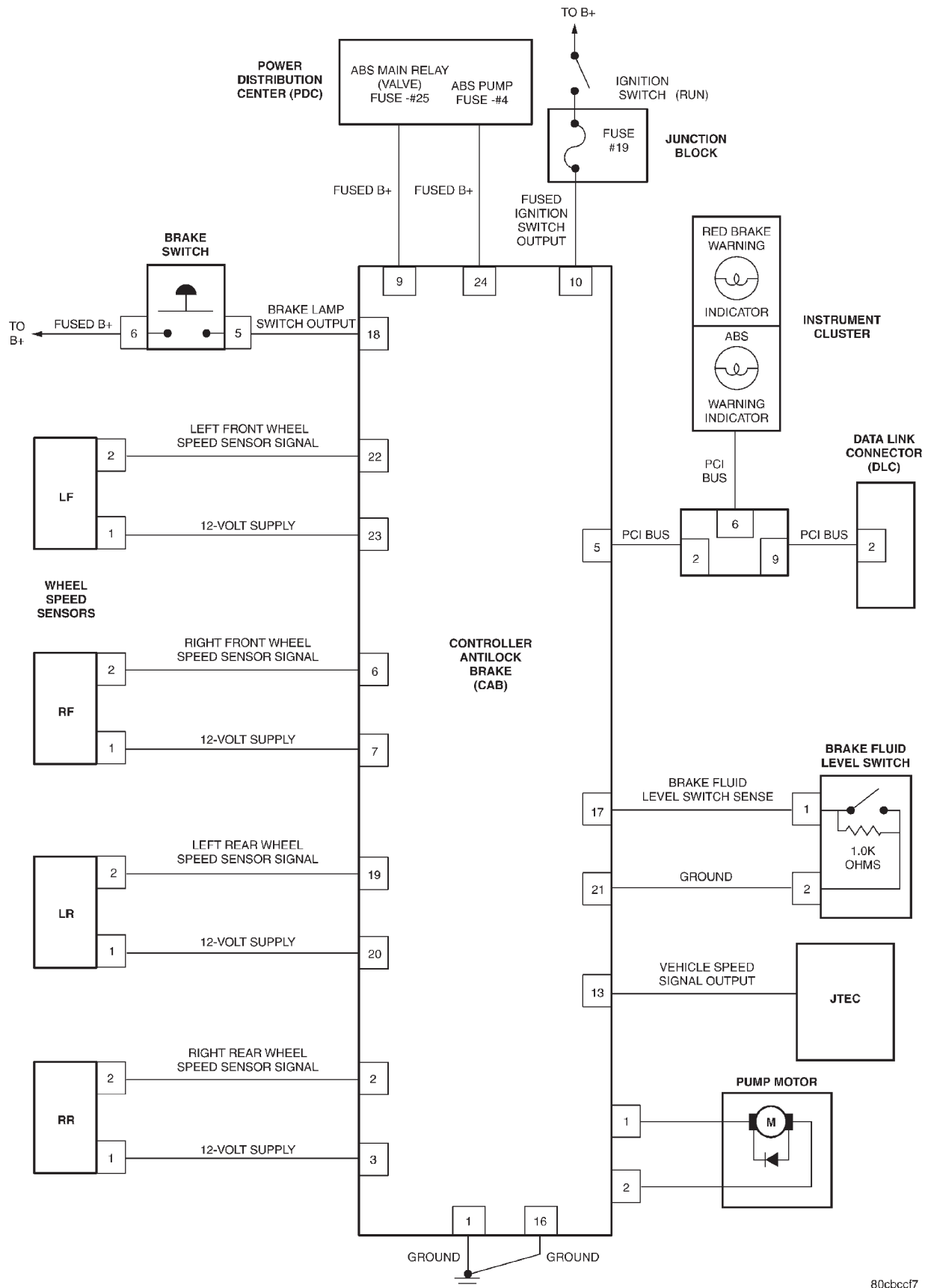
RIGHT REAR  
WHEEL SPEED  
SENSOR

RIGHT REAR WHEEL SPEED SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	B2 18YL	RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B1 18YL/DB	RIGHT REAR WHEEL SPEED SENSOR SIGNAL

10.0 SCHEMATIC DIAGRAMS

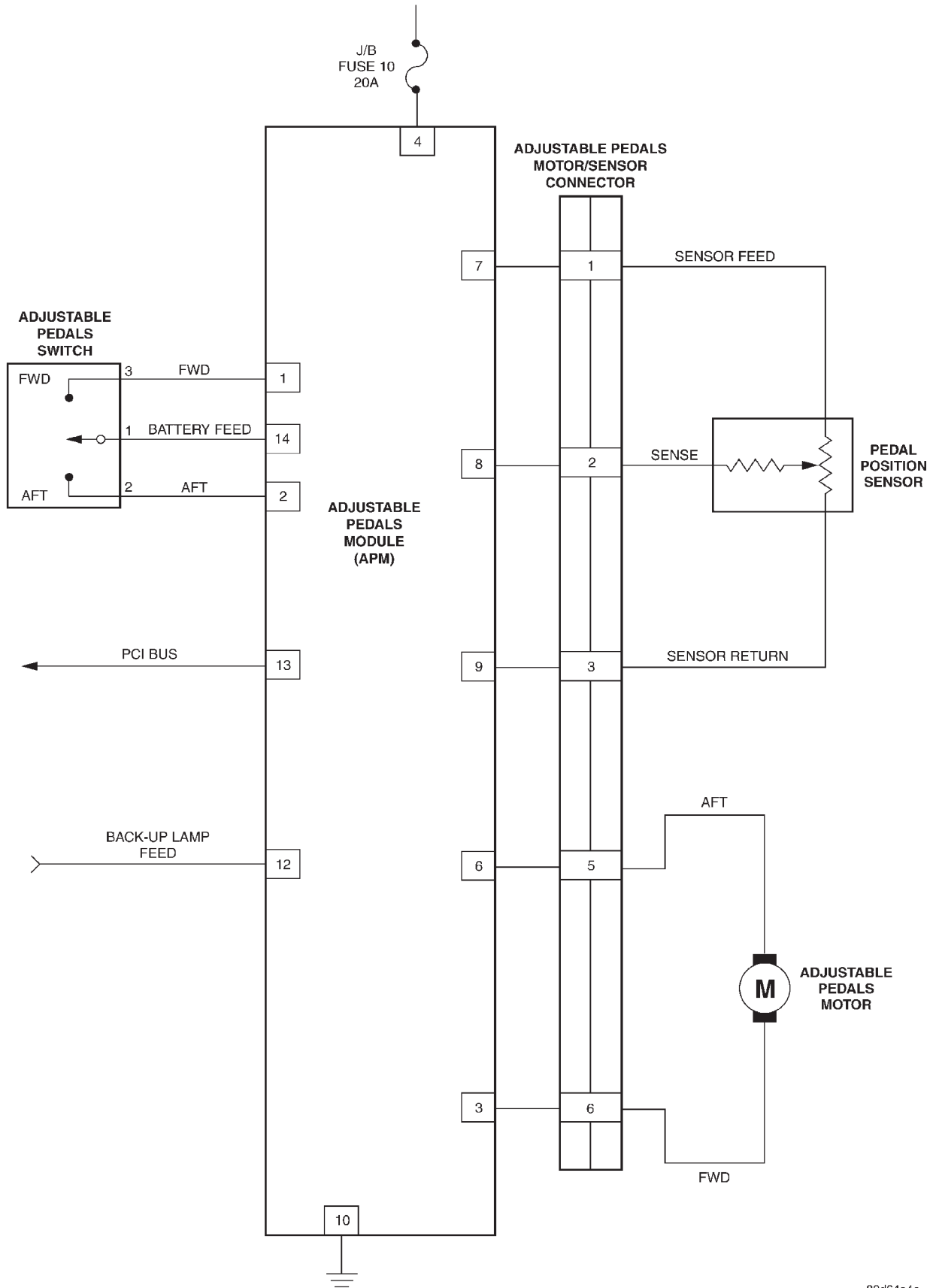
10.1 WJ BODY TEVES MARK 20



SCHEMATIC DIAGRAMS

# SCHEMATIC DIAGRAMS

## 10.2 ADJUSTABLE PEDALS SYSTEM



SCHEMATIC  
DIAGRAMS

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