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## NOTES

## 1.0 INTRODUCTION

The procedures contained in this manual include all the specifications, instructions, and graphics needed to diagnose the 2004 Jeep Grand Cherokee Mark 20e 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 20e 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 20e antilock brake system can be identified by the presence of the hydraulic control unit located with the controller antilock brake (CAB) under the hood.

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 MARK 20e 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 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 air 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, 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.

### 3.1.6 SENSORS

**Wheel Speed Sensors and Tone Wheels:** The Mark 20e system uses a new style of wheel speed sensor. The sensors use an electronic principle known as magneto-resistive to help increase performance, durability and low speed accuracy. The sensors convert wheel speed into a small digital signal. A toothed gear tone wheel serves as the trigger mechanism for each sensor.

The CAB sends 12 volts to power an Integrated Circuit (IC) in the sensor. The IC supplies a constant 7 mA signal to the CAB. The relationship of the tooth on the tone wheel to the permanent magnet in the sensor, signals the IC of the sensor to toggle a second 7 mA power supply on or off. The output of the sensor, sent to the CAB, is a DC voltage signal with changing voltage and current levels. The CAB monitors the changing amperage (digital signal) from each wheel speed sensor. The resulting signal is interpreted by the CAB as the wheel speed.

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 sen

sors. 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).

**Brake Warning Indicator Switch:** The brake warning indicator switch is a fluid level sending switch. The CAB sends out a voltage divider 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 over 4 volts. If the fluid level becomes too low or the circuit is shorted to ground, the voltage will be below 1 volt. 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 20e 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. 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 FREEZE FRAME

Freeze Frame takes a "snapshot" of specific vehicle information the instant an ABS failure is recognized and stores this information into the CAB memory. This information can be accessed using the DRBIII® to help diagnose the fault. Freeze Frame will capture the first time failure or only a new failure that occurs during the current ignition cycle.

## 3.5 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.

## 3.6 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.

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

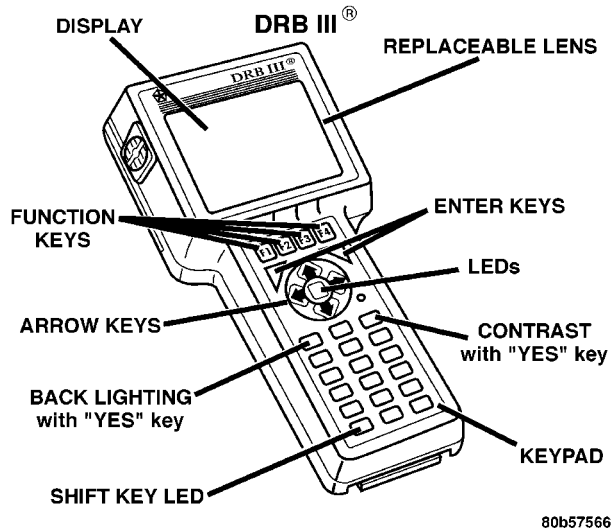
If the LED's do not light or no sound is emitted at start up, check for loose cable connections or a bad cable. Check the vehicle battery voltage (data link 16-way connector cavity 16). A minimum of 11 volts is required to adequately power the DRBIII®. Also check for a good ground at the DLC.

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.

## GENERAL INFORMATION

### 3.6.2 DISPLAY IS NOT VISIBLE

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



### 3.7 TIRE PRESSURE MONITORING SYSTEM

If equipped with the Tire Pressure Monitoring System, each of the vehicle's five wheels will have a valve stem with a pressure sensor and radio transmitter built in. Signals from the tire pressure sensors are received and interpreted by the Electronic Vehicle Information Center (EVIC).

A sensor in a mounted wheel will broadcast its detected pressure once per minute when the vehicle is moving faster than 40 km/h (25 mph). The spare tire sensor will broadcast once every hour. Each sensor's broadcast is uniquely coded so that the EVIC can determine location. The individual tire pressures can be displayed graphically on the EVIC.

**NOTE: The spare tire is only monitored when equipped with the 5-Tire TPM System.**

#### 3.7.1 TRAINING THE EVIC

The EVIC can be trained to recognize the source locations of pressure sensor signals. The training procedure is given below:

1. Locate "RETRAIN TIRE SENSORS" on the EVIC menu.  
When this mode is enabled by selecting "YES", the EVIC will initiate the following procedure.
2. A display will prompt the user to: "TRAIN LEFT FRONT TIRE". At this point the user must set the left front tire sensor to learn mode by positioning a magnet (Relearn Magnet special tool 8821) over the valve stem for at least 5 seconds. The Remote Tire Pressure Monitor (RTPM) in the front left tire will transmit a message indicating to the

EVIC that it is in learn mode. When the EVIC has received this message and is assured that it has learned an ID, the EVIC will request a horn chirp via a bus message and then display the next train request. **Note: There is a 60 second timer for learning the first tire location and a 30 second timer between the remaining tires. If any of these timers expire the EVIC will abort the training procedure.**

3. The EVIC will request the initiation of a training sequence for each tire, one-by-one in a clockwise direction around the vehicle (Left Front, Right Front, Right Rear, Left Rear and Spare). The EVIC will allow 30 seconds (60 seconds for the first tire) from the beginning of the train request display to the receipt of a unique learn ID message from the RTPM. If, during a training session, a 60 or 30 second timer expires before a unique learn sensor ID is received or the vehicle is not in park, the EVIC will keep the previous set of trained IDs and will display "TRAINING ABORTED" until a button is pressed. Any IDs learned during the current session will be discarded. The EVIC will not store one ID for multiple locations.

**NOTE: The spare tire is only monitored when equipped with the 5-Tire TPM System.**

4. Once all four (or five) tires are successfully trained, the previous set of stored IDs will be replaced by the new IDs, and the EVIC will display, "TRAINING COMPLETE" until a button is pressed.

If the vehicle is equipped with the Homelink feature and a Homelink button is pressed at any time during the training procedure, the EVIC module will immediately exit the training procedure, discard any IDs learned in the current session and perform the Homelink function. After the button is released, the module will display "RETRAIN TIRE SENSORS? NO".

The training procedure can be stopped at any time by pressing the C/T, STEP, RESET or MENU button. When any of these buttons are pressed the EVIC will display "TRAINING ABORTED."

Once training is complete, the EVIC can determine when the spare wheel has been mounted on the vehicle. The spare wheel sensor/transmitter is expected to transmit once per hour. If the sensor/transmitter ID for the spare wheel is received at a shorter interval, the EVIC will request a chime and display "SPARE SWAP DETECTED" for five seconds.

**NOTE: The spare tire message is only available when equipped with the 5-Tire TPM System.**

### 3.7.2 PRESSURE THRESHOLDS

The EVIC will monitor the tire pressure signals from the four (or five) tire sensors and determine if any tire has gone below the low pressure threshold or raised above the high pressure threshold. Refer to the table below.

LOW TIRE PRESSURE THRESHOLDS	
SYSTEM STATUS INDICATOR	TIRE PRESSURE
On	172 kPa (25 PSI)
Off	193 kPa (28 PSI)

HIGH TIRE PRESSURE THRESHOLDS	
SYSTEM STATUS INDICATOR	TIRE PRESSURE
On	310 kPa (45 PSI)
Off	276 kPa (40 PSI)

#### 3.7.2.1 CRITICAL AND NON-CRITICAL PRESSURE ALERTS

A critical alert will be triggered when a tire pressure has gone below or above a set threshold pressure. Depending on what the condition is, the EVIC will request a chime and then display a LOW PRESSURE or HIGH PRESSURE message indicating the appropriate location.

The alert message will display for three seconds and then switch to the tire pressure trip screen. The tire pressure for the tire that has exceeded its threshold will blink at one second intervals on the graphic display. The blinking pressure will continue for the rest of the ignition cycle or until an EVIC button is pressed. If the display is removed without correcting the condition, it will reappear without a chime after 60 seconds to warn the driver of the low/high pressure condition.

A non-critical alert will be triggered when low or high pressure threshold has been exceeded in the spare tire. The "SPARE LOW PRESSURE" or "SPARE HIGH PRESSURE" alert will be displayed for 60 seconds during each ignition ON cycle. If the pressure threshold is exceeded while the ignition is OFF, the alert will be delayed 8-10 seconds after ignition ON.

**NOTE: The spare tire is only monitored when equipped with the 5-Tire TPM System.**

### 3.7.3 SYSTEM FAULTS

**NOTE: The Remote Tire Pressure Monitors (RTPM) are not internally serviceable. For a Sensor Failure or Low Battery fault, the RTPM must be replaced.**

There are four conditions which will cause a Tire Pressure Monitoring System fault to be set. All fault codes are associated with a specific wheel location.

1. If the EVIC detects a non-transmitting Sensor/Transmitter in a road wheel for ten consecutive minutes with vehicle speed above 25 MPH (40 kph), it will:
  - a. Store an active fault code.
  - b. Request a chime.
  - c. Display "TIRE SENSOR BAD / MISSING".
  - d. Display a dashed line at the wheel location on the graphic display if the display is activated.
 When the EVIC detects:

2. A low pressure sensor battery status,
3. All five sensors transmitting at a shorter than expected interval or,
4. No valid pressure sensor ID from the spare tire for 20 consecutive ignition cycles spaced at least one hour apart, it will:
  - a. Store an active fault code.
  - b. Request a chime.
  - c. Display "TIRE SENSOR BAD / MISSING".
 Use the DRBIII® Input/Output function to further isolate the specific concern.

The DRBIII® can be queried to determine the Sensor/Transmitter status:

- "Invalid Pressure" - The Sensor/Transmitter is reporting a negative pressure or a pressure above 434 kPa (63 psi).
- "Low Batt" - The Sensor/Transmitter has reported a low battery status for seven consecutive ignition cycles.
- "Trained" - The Sensor/Transmitter ID code is recognized by the EVIC.
- "Active" - The vehicle is moving at 40 km/h (25 mph) and/or the Sensor/Transmitter is "awake" and transmitting as expected by the EVIC.

#### 3.7.4 SPARE WHEEL AUTO-LOCATE (5-TIRE TPM SYSTEM ONLY)

If the spare tire is mounted on the vehicle, the EVIC will detect the move and determine from the sensor transmit intervals, which wheels are mounted and which one is now the spare. The spare tire sensor/transmitter transmits once per hour. The sensor/transmitters in the mounted wheels transmit once per minute when the vehicle is moving at 40 km/h (25 mph).

### 3.7.5 REMOVE MAGNET FROM SPARE (5-TIRE TPM SYSTEM ONLY)

A magnet is used to initiate a sensor ID transmission. In the EVIC training procedure, the spare wheel is the last in the sequence. If the magnet is left on the wheel, the sensor/transmitter will continue its ID transmission. If the EVIC detects 20 transmissions from the spare wheel in 60 seconds and the vehicle speed is above 40 km/h (25 mph), it will:

- request a chime.
- display “REMOVE MAGNET FROM SPARE” for 60 seconds per ignition-ON cycle.

### 3.7.6 TIRE PRESSURE UNAVAILABLE

The EVIC can detect high radio noise interference. When the noise level is too high to distinguish a transmission from a sensor/transmitter, it will:

- display “TIRE PRESSURE UNAVAILABLE” for 5 seconds.
- request a chime
- switch back to previous screen.

### 3.7.7 TIRE PRESSURE NOW AVAILABLE

If the “TIRE PRESSURE UNAVAILABLE” message was displayed because of radio noise interference, the EVIC will:

- display “TIRE PRESSURE NOW AVAILABLE” for 5 seconds.
- request a chime when the noise level no longer interferes with sensor/transmitter transmissions.

### 3.7.8 DIAGNOSING AND CLEARING SYSTEM FAULTS

All Tire Pressure Monitoring System Faults are specific to one location. If a “LOW BATTERY” fault is detected, the “TIRE SENSOR BAD / MISSING” message will be displayed. The appropriate sensor/transmitter can then be replaced.

If a single sensor/transmitter cannot be detected by the EVIC, replace that sensor transmitter. If none of the sensors/transmitters can be detected, refer to symptoms in the EVIC section.

### 3.7.9 SYSTEM TEST

A test of the Tire Pressure Monitoring System can be initiated in the EVIC. The test sequence is as follows:

1. Scroll to the blank display by pressing the STEP button.
2. Press and hold the RESET button for five seconds.

3. The EVIC will emit a beep to indicate the start of the test.
4. The EVIC will clear the sensor signal counters
5. The vehicle icon will be displayed with transmission counters at each corner. (Same display as for pressures but with counters in place of pressures.)
6. Drive the vehicle at speeds above 40 km/h (25 mph) for 10 minutes.
7. The counters will increase by one each time a sensor signal is received by the EVIC (approximately 1/min from each wheel except the spare).
8. The test will continue until any EVIC button is pressed or until the ignition is cycled to OFF.

## 4.0 DISCLAIMERS, SAFETY, WARNINGS

### 4.1 DISCLAIMERS

All information, illustrations, and specifications contained in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

### 4.2 SAFETY

#### 4.2.1 TECHNICIAN SAFETY INFORMATION

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

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

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

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

## GENERAL INFORMATION

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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 you press and release the brake pedal. If the display does not match the state of the pedal, perform the proper test. For a problem with the 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

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



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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	<p>With the DRBIII®, erase DTC's.            With the DRBIII®, read DTC's.            Does the DRBIII® display PEDAL SENSOR OPEN/SHORTED TO BATTERY DTC active?</p> <p>Yes → Go To 2            No → Go To 4</p>	All
2	<p>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?</p> <p>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.</p>	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	<p>With the DRBIII®, erase DTC's. With the DRBIII®, read DTC's. Does the DRBIII® display PEDAL SENSOR SHORTED TO GROUND DTC active?</p> <p>Yes → Go To 2 No → Go To 3</p>	All
2	<p>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?</p> <p>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.</p> <p>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.</p>	All
3	<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 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	<p>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?</p> <p>Yes → Go To 2</p> <p>No → Go To 4</p>	All
2	<p>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?</p> <p>Yes → Go To 3</p> <p>No → Replace the Adjustable Pedals Switch. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p>	All
3	<p>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?</p> <p>Yes → Repair the circuit short. 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

## 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	<p>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?</p> <p>Yes → Go To 2</p> <p>No → Go To 4</p>	All
2	<p>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?</p> <p>Yes → Go To 3</p> <p>No → Replace the Adjustable Pedals Switch. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p>	All
3	<p>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?</p> <p>Yes → Repair the circuit short. 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

## 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	<p>With the DRBIII®, read the vehicle voltage status.            Does the DRBIII® display a high voltage concern?</p> <p>Yes → Refer to Charging information for the related symptom(s).            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

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

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**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.

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**POSSIBLE CAUSES**

VEHICLE VOLTAGE LOW

APM -- INTERNAL FAILURE

TEST	ACTION	APPLICABILITY
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>            Check whether vehicle is in Reverse and whether Speed Control is activated.            Is the vehicle in Reverse or is Speed Control activated.</p> <p>Yes → Correct as necessary.            Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p> <p>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>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>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>Yes → Go To 4</p> <p>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>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>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>Yes → Replace the Adjustable Pedals Module in accordance with the Service Information.  Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p> <p>No → Replace and program the Driver Door Module in accordance with the Service Information.  Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p>	All

## Symptom: BUS SYSTEM COMMUNICATION FAILURE

### When Monitored and Set Condition:

#### BUS SYSTEM COMMUNICATION FAILURE

When Monitored: Ignition on. Continuously monitors.

Set Condition: When the CAB detects a short on the PCI Bus circuit.

#### POSSIBLE CAUSES

INTERMITTENT CONDITION

ELECTRO-MECHANICAL INSTRUMENT CLUSTER DTC PRESENT

BUS CIRCUIT OPEN

CAB - INTERNAL FAILURE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. With the DRBIII®, read Freeze Frame information. With the DRBIII®, erase DTCs. Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTCs. Does the DRBIII® display BUS SYSTEM COMMUNICATION FAILURE?  Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, read EMIC DTCs. Does the DRBIII® display ABS MESSAGE NOT RECEIVED BY MIC?  Yes → Refer to symptom ABS MESSAGE NOT RECEIVED BY MIC in the BODY/INSTRUMENT CLUSTER category. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All
3	Turn the ignition off. Disconnect the negative (-) battery cable. Disconnect the CAB harness connector. <b>NOTE: check connector - Clean/repair as necessary.</b> Measure the resistance of the Bus circuit between the CAB connector and the Data Link Connector (DLC). Is the resistance below 5.0 ohms?  Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Repair the Bus circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All

**BUS SYSTEM COMMUNICATION FAILURE — 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>Were any problems found?</p> <p>Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	All

## BRAKES (CAB)

### Symptom: CAB INTERNAL FAILURE

#### When Monitored and Set Condition:

##### CAB INTERNAL 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

INTERMITTENT DTC  
DAMAGED CAB/CAB HARNESS CONNECTOR  
CAB - GROUND CIRCUIT OPEN  
ABS VALVE FUSED B(+) CIRCUIT OPEN  
ABS PUMP FUSED B(+) CIRCUIT OPEN  
CAB - INTERNAL FAULT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. With the DRBIII®, erase DTCs. Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTCs. Does the DRBIII® display CAB INTERNAL FAILURE?  Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the CAB harness connector. Inspect the CAB/CAB harness connector for damage. Is there any broken, bent, pushed out, corroded or spread terminals?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All
3	Turn the ignition off. Disconnect the CAB harness connector. Using a 12-volt test light connected to 12-volts, probe the CAB harness connector ground circuits. Did the test light illuminate?  Yes → Go To 4 No → Repair the CAB Ground circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All

**CAB INTERNAL FAILURE — Continued**

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Using a 12-volt test light connected to ground, probe the ABS Valve Fused B(+) circuit at the CAB harness connector. Did the test light illuminate?  Yes → Go To 5  No → Repair the ABS Valve Fused B(+) circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Using a 12-volt test light connected to ground, probe the ABS Pump Fused B(+) circuit at the CAB harness connector. Did the test light illuminate?  Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Repair the ABS Pump Fused B(+) circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. 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: **CLUSTER LAMP FAILURE**

#### When Monitored and Set Condition:

##### **CLUSTER LAMP FAILURE**

When Monitored: Ignition on. Continuous.

Set Condition: When the CAB receives a bus message from the Instrument Cluster that the Cluster cannot illuminate the ABS Warning Indicator.

#### **POSSIBLE CAUSES**

INSTRUMENT CLUSTER OR ABS DTC PRESENT

INSTRUMENT CLUSTER

CAB--NO DTC SIGNAL TO THE INSTRUMENT CLUSTER

CAB -- PERMANENT FAULT SIGNAL

CAB--NO KEY-ON BULB CHECK SIGNAL

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Are there any Instrument Cluster or ABS DTCs present?  Yes → Refer to the appropriate category for the related symptom(s). Perform ABS VERIFICATION TEST - VER 1.  No → Go To 2	All
2	Turn the ignition off. Perform the Key-on Bulb Check. Does the ABS Warning Indicator light and then go out after a few seconds?  Yes → Go To 3  No. Light remains after bulb check. Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No. Indicator never comes on. Go To 4	All



**CLUSTER LAMP FAILURE — Continued**

TEST	ACTION	APPLICABILITY
3	<p><b>NOTE: The DRBIII® communication with the CAB must be operational for the result of this test to be valid.</b></p> <p>Turn the ignition off.  Remove ABS Valve fuse.  Perform the Key-on Bulb Check.  Does the ABS Indicator remain on after the bulb check?</p> <p>Yes → Test Complete.</p> <p>No → Replace the Controller Antilock Brake in accordance with the Service Information.  Perform ABS VERIFICATION TEST - VER 1.</p>	All
4	<p><b>NOTE: The following steps will initiate the Instrument Cluster self test.</b></p> <p>Turn the ignition off.  Press and hold the odometer reset button.  Turn the ignition to RUN.  Observe the Instrument Cluster indicators.  Release the odometer reset button.  Did the ABS Indicator illuminate during the Instrument Cluster self test?</p> <p>Yes → Replace the Controller Antilock Brake in accordance with the Service Information.  Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Replace the Instrument Cluster in accordance with the Service Information.  Perform ABS VERIFICATION TEST - VER 1.</p>	All

### **Symptom:** **G-SENSOR FAILURE**

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

##### **G-SENSOR FAILURE**

When Monitored: Ignition ON. Continuously monitored when speed is greater than 2 km/h (1 mph) and there is no Brake Lamp Switch input.

Set Condition: When the CAB detects a condition outside programmed parameters from the internal G-Sensor.

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#### **POSSIBLE CAUSES**

CAB - INTERNAL FAULT

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-SENSOR FAILURE?  Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Test Complete.	All

**Symptom List:**

**LEFT FRONT SENSOR CIRCUIT FAILURE**  
**LEFT REAR SENSOR CIRCUIT FAILURE**  
**RIGHT FRONT SENSOR CIRCUIT FAILURE**  
**RIGHT REAR SENSOR CIRCUIT FAILURE**

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

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

**LEFT REAR SENSOR CIRCUIT FAILURE**

When Monitored: Ignition on. The CAB monitors the wheel speed circuit continuously.

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

**RIGHT FRONT SENSOR CIRCUIT FAILURE**

When Monitored: Ignition on. The CAB monitors the wheel speed circuit continuously.

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

**RIGHT REAR SENSOR CIRCUIT FAILURE**

When Monitored: Ignition on. The CAB monitors the wheel speed circuit continuously.

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

**POSSIBLE CAUSES**

INTERMITTENT CONDITION

WHEEL SPEED SENSOR OR CONNECTOR DAMAGE

WHEEL SPEED SENSOR SIGNAL CIRCUIT FAULT

WHEEL SPEED SENSOR 12 VOLT SUPPLY CIRCUIT SHORT TO GROUND

WHEEL SPEED SENSOR 12 VOLT SUPPLY CIRCUIT OPEN

WHEEL SPEED SENSOR SIGNAL CIRCUIT SHORT TO GROUND

WHEEL SPEED SENSOR SIGNAL CIRCUIT OPEN

## LEFT FRONT SENSOR CIRCUIT FAILURE — Continued

POSSIBLE CAUSES
CAB - 12 VOLT SUPPLY CIRCUIT FAULT
CAB - SIGNAL CIRCUIT FAULT
WHEEL SPEED SENSOR 12 VOLT SUPPLY SHORT TO GROUND
WHEEL SPEED SENSOR SIGNAL CIRCUIT INOPERATIVE

TEST	ACTION	APPLICABILITY
1	<p>Turn the ignition on.</p> <p>With the DRBIII®, read DTCs.</p> <p>With the DRBIII®, read the Freeze Frame information.</p> <p>With the DRBIII®, erase DTCs.</p> <p>Turn the ignition off.</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, read DTCs.</p> <p><b>NOTE: The CAB must sense all four wheels at 25km/h (15 mph) before it will extinguish the ABS indicators.</b></p> <p>Does the DRBIII® display SENSOR CIRCUIT FAILURE?</p> <p>Yes → Go To 2</p> <p>No → Go To 13</p>	All
2	<p>Turn the ignition off.</p> <p>Inspect the CAB connector, affected Wheel Speed Sensor, and affected Wheel Speed Sensor connector.</p> <p>Is the affected Wheel Speed Sensor or any of the connectors damaged?</p> <p>Yes → Repair as necessary.</p> <p>Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 3</p>	All
3	<p>Turn the ignition off.</p> <p>Disconnect the affected Wheel Speed Sensor connector.</p> <p><b>Note: Check connector - Clean/repair as necessary.</b></p> <p>Turn the ignition on.</p> <p>Measure the voltage between affected Wheel Speed Sensor 12 Volt Supply circuit and ground.</p> <p>Is the voltage above 10 volts?</p> <p>Yes → Go To 6</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.</p> <p>Disconnect the CAB harness connector.</p> <p>Disconnect the affected Wheel Speed Sensor connector.</p> <p>Using a 12-volt test light connected to 12-volts, probe the affected Wheel Speed Sensor 12 Volt Supply circuit.</p> <p>Does the test light illuminate?</p> <p>Yes → Repair the affected Wheel Speed Sensor 12 Volt Supply circuit for a short to ground.</p> <p>Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 5</p>	All

**LEFT FRONT SENSOR CIRCUIT FAILURE — Continued**

TEST	ACTION	APPLICABILITY
5	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Disconnect the affected Wheel Speed Sensor connector.            Connect a jumper wire between affected Wheel Speed Sensor 12 Volt Supply circuit and ground.            Using a 12-volt test light connected to 12-volts, probe the affected Wheel Speed Sensor 12 Volt Supply circuit.            Does the test light illuminate?</p> <p>Yes → Go To 6</p> <p>No → Repair the affected Wheel Speed Sensor 12 Volt Supply circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
6	<p>Turn the ignition off.            Disconnect the affected Wheel Speed Sensor connector.  <b>NOTE: Check connector - Clean/repair as necessary.</b>            Turn the ignition on.            Measure the voltage between affected Wheel Speed Sensor Signal circuit and ground.            Is the voltage above 1 volt?</p> <p>Yes → Repair the affected Wheel Speed Sensor Signal circuit for a short to voltage.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 7</p>	All
7	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Disconnect the affected Wheel Speed Sensor connector.            Using a 12-volt test light connected to 12-volts, probe the affected Wheel Speed Sensor Signal circuit.            Does the test light illuminate?</p> <p>Yes → Repair the affected Wheel Speed Sensor Signal circuit for a short to ground.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 8</p>	All
8	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Disconnect the affected Wheel Speed Sensor connector.            Connect a jumper wire between affected Wheel Speed Sensor Signal circuit and ground.            Using a 12-volt test light connected to 12-volts, probe the affected Wheel Speed Sensor Signal circuit.            Does the test light illuminate?</p> <p>Yes → Go To 9</p> <p>No → Repair the affected Wheel Speed Sensor Signal circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All

## LEFT FRONT SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
9	<p>Turn the ignition off.  Remove the CAB harness strain relief to access wires.  Reconnect the CAB harness connector.  Turn the ignition on.  Measure the voltage between affected Wheel Speed Sensor 12 Volt Supply circuit and ground.  Is the voltage above 10 volts?</p> <p>Yes → Go To 10</p> <p>No → Replace the Controller Antilock Brake in accordance with the Service Information.  Perform ABS VERIFICATION TEST - VER 1.</p>	All
10	<p>Turn the ignition off.  Remove the CAB harness strain relief to access wires.  Reconnect the CAB harness connector.  Turn the ignition on.  Measure the voltage between affected Wheel Speed Sensor 12 Volt Supply circuit and affected Wheel Speed Sensor Signal circuit.  Is the voltage above 10 volts?</p> <p>Yes → Go To 11</p> <p>No → Replace the Controller Antilock Brake in accordance with the Service Information.  Perform ABS VERIFICATION TEST - VER 1.</p>	All
11	<p>Turn the ignition off.  Reconnect ALL affected Wheel Speed Sensor circuit connectors.  Disconnect the affected Wheel Speed Sensor connector.  Turn the ignition on.  Measure the voltage of the affected Wheel Speed Sensor 12 Volt Supply circuit in the affected Wheel Speed Sensor connector while reconnecting the sensor connector.  Did the affected Wheel Speed Sensor 12 Volt Supply circuit drop voltage to 0 DC volts?</p> <p>Yes → Replace the affected Wheel Speed Sensor in accordance with the Service Information.  Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 12</p>	All
12	<p>Turn the ignition off.  Reconnect ALL affected Wheel Speed Sensor circuit connectors.  Turn the ignition on.  Measure the DC voltage of the Wheel Speed Sensor Signal circuit in the affected Wheel Speed Sensor connector.  Slowly rotate the wheel.  Does the DC voltage toggle between 1.6 volts to .8 volts?</p> <p>Yes → Go To 13</p> <p>No → Replace the affected Wheel Speed Sensor in accordance with the Service Information.  Perform ABS VERIFICATION TEST - VER 1.</p>	All

**LEFT FRONT SENSOR CIRCUIT FAILURE — Continued**

TEST	ACTION	APPLICABILITY
13	<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 ABS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	All



### **Symptom List:**

**LEFT FRONT WHEEL SPEED SIGNAL FAILURE**  
**LEFT REAR WHEEL SPEED SIGNAL FAILURE**  
**RIGHT FRONT WHEEL SPEED SIGNAL FAILURE**  
**RIGHT REAR WHEEL SPEED SIGNAL FAILURE**

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

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

#### **LEFT FRONT WHEEL SPEED SIGNAL FAILURE**

**When Monitored:** Ignition on. Wheel speeds are checked and verified at drive off and continuously thereafter.

**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.

#### **LEFT REAR WHEEL SPEED SIGNAL FAILURE**

**When Monitored:** Ignition on. Wheel speeds are checked and verified at drive off and continuously thereafter.

**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.

#### **RIGHT FRONT WHEEL SPEED SIGNAL FAILURE**

**When Monitored:** Ignition on. Wheel speeds are checked and verified at drive off and continuously thereafter.

**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.

#### **RIGHT REAR WHEEL SPEED SIGNAL FAILURE**

**When Monitored:** Ignition on. Wheel speeds are checked and verified at drive off and continuously thereafter.

**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.

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

<b>POSSIBLE CAUSES</b>	
WHEEL SPEED SIGNAL FAILURE DTC PRESENT	
AFFECTED WHEEL SPEED SENSOR SIGNAL INOPERATIVE	
AFFECTED WHEEL SPEED SENSOR CONNECTOR DAMAGED	
AFFECTED WHEEL SPEED SENSOR TONE WHEEL DAMAGED	
AFFECTED WHEEL SPEED SENSOR AIR GAP FAULT	
WHEEL BEARING FAULT	
BRAKE LINING FAULT	
AFFECTED WHEEL SPEED SENSOR CIRCUIT ELECTRICAL FAULT	

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
1	<p>Turn the ignition on.            With the DRBIII®, read DTCs.            With the DRBIII®, read Freeze Frame information.  <b>NOTE: The CAB must sense ALL 4 wheels at 25 km/h (15 mph) before it will extinguish the ABS indicators.</b>            Does the DRBIII® display WHEEL SPEED/SIGNAL FAILURE and SENSOR CIRCUIT FAILURE?</p> <p>Yes → Refer to the affected Wheel Speed SENSOR CIRCUIT FAILURE for the related symptom(s).            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 2</p>	All
2	<p>Turn the ignition on.            With the DRBIII® in Sensors, monitor ALL the Wheel Speed Sensor Signals while an assistant drives the vehicle.            Slowly accelerate as straight as possible from a stop to 24 km/h (15 mph).            Is the affected Wheel Speed Signal showing 0 km/h (0 mph)?</p> <p>Yes → Go To 3</p> <p>No → The condition is not present at this time. Monitor DRBIII® parameters while wiggling the related wiring harness. Refer to any Technical Service Bulletins(TSB) that may apply. Visually inspect the related wiring harness and connector terminals.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
3	<p>Turn the ignition off.            Inspect the CAB connector, affected Wheel Speed Sensor, and affected Wheel Speed Sensor connector.            Is the Wheel Speed Sensor or any connector damaged?</p> <p>Yes → Repair as necessary.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 4</p>	All

## LEFT FRONT WHEEL SPEED SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
4	<p>Turn ignition off. Inspect the affected Tone Wheel for damaged, missing teeth, cracks, or looseness. <b>NOTE: The Tone Wheel teeth should be perfectly square, not bent, or nicked.</b> Is the affected Tone Wheel OK?</p> <p>Yes → Go To 5</p> <p>No → Replace the Tone Wheel in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.</p>	All
5	<p>Turn the ignition off. Using a Feeler Gauge, measure the affected Wheel Speed Sensor Air Gap. <b>NOTE: Refer to the appropriate service information, if necessary, for procedures or specifications.</b> Is the Air Gap OK?</p> <p>Yes → Go To 6</p> <p>No → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.</p>	All
6	<p>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 ?</p> <p>Yes → Go To 7</p> <p>No → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.</p>	All
7	<p>Turn the ignition off. 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?</p> <p>Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Refer to symptom SENSOR CIRCUIT FAILURE for further diagnostics. Perform ABS VERIFICATION TEST - VER 1.</p>	All

## Symptom:

### PUMP CIRCUIT FAILURE

#### When Monitored and Set Condition:

#### PUMP CIRCUIT FAILURE

**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 continuously.

**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 FUSE  
 ABS PUMP MOTOR INTERMITTENT DTC  
 DAMAGED CAB/CAB HARNESS CONNECTOR  
 ABS PUMP FUSED B(+) CIRCUIT INTERMITTENT SHORT TO GROUND  
 ABS PUMP FUSED B(+) CIRCUIT SHORT TO GROUND  
 CAB - INTERNAL FAULT  
 ABS PUMP MOTOR INOPERATIVE  
 ABS PUMP MOTOR OPEN  
 ABS PUMP MOTOR B(+) CIRCUIT OPEN  
 ABS PUMP MOTOR GROUND CIRCUIT OPEN  
 CAB - INTERNAL FAULT

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Turn the ignition on. Monitor the ABS Pump Motor for continuous operation. <b>NOTE: The CAB must sense ALL wheels at 25 km/h (15 mph) before it will extinguish the ABS indicators.</b> Is the ABS Pump Motor running continuously?  Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 2	All

## PUMP CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	<p>Turn the ignition off.  Turn the ignition on.  With the DRBIII®, read DTCs.  With the DRBIII®, erase DTCs.  Turn the ignition off.  Turn the ignition on.  With the DRBIII®, actuate the ABS Pump Motor.  Did the ABS Pump Motor operate?</p> <p>Yes → Go To 3  No → Go To 4</p>	All
3	<p>Turn the ignition off.  Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.  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?</p> <p>Yes → Repair as necessary.  Perform ABS VERIFICATION TEST - VER 1.  No → Test Complete.</p>	All
4	<p>Turn the ignition off.  Remove and inspect the ABS Pump fuse.  Is the ABS Pump fuse open?</p> <p>Yes → Go To 5  No → Go To 8</p>	All
5	<p>Turn the ignition off.  Visually inspect the ABS Pump Fused B(+) circuit in the wiring harness.  Look for any sign of an intermittent short to ground.  Is the wiring harness OK?</p> <p>Yes → Go To 6  No → Repair the ABS Pump Fused B(+) circuit for a short to ground.  Perform ABS VERIFICATION TEST - VER 1.</p>	All
6	<p>Turn the ignition off.  Disconnect the CAB harness connector.  Check connectors - Clean/repair as necessary.  Using a 12-volt test light connected to 12-volts, probe the ABS Pump Fused B(+) circuit fuse terminal.  Does the test light illuminate?</p> <p>Yes → Repair the ABS Pump Fused B(+) circuit for a short to ground.  Perform ABS VERIFICATION TEST - VER 1.  No → Go To 7</p>	All

**PUMP CIRCUIT FAILURE — Continued**

TEST	ACTION	APPLICABILITY
7	<p>Turn the ignition off. Reconnect the CAB harness connector. Using a 12-volt test light connected to 12-volts, probe the ABS Pump Fused B(+) circuit fuse terminal. Does the test light illuminate?</p> <p>Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Replace the ABS Pump fuse. If the fuse is open make sure to check for a short to ground. Perform ABS VERIFICATION TEST - VER 1.</p>	All
8	<p>Turn the ignition off. Disconnect the CAB harness connector. Inspect the CAB and CAB harness connector for damage. Is there any broken, bent, pushed out, corroded, or spread terminals?</p> <p>Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 9</p>	All
9	<p>Turn the ignition off. Reinstall the ABS Pump fuse. Disconnect the ABS Pump Motor connector. Check connectors - Clean/repair as necessary. Connect a 10 gauge 40 amp fused jumper wire between the ABS Pump Fused B(+) terminal in the CAB harness connector to the ABS Pump Motor connector RED wired terminal. Connect a 10 gauge jumper wire between the Ground circuit terminal in the CAB harness connector to the ABS Pump Motor connector BLACK wired terminal. Did the ABS Pump Motor operate?</p> <p>Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 10</p>	All
10	<p>Turn the ignition off. Disconnect the ABS Pump Motor connector. Check connectors - Clean/repair as necessary. Connect a 10 gauge 40 amp fused jumper wire between the ABS Pump Motor connector RED wired terminal and an alternate 40 amp capable B(+) source. Connect a 10 gauge jumper wire between the ABS Pump Motor connector BLACK wired terminal and ground Did the ABS Pump Motor operate?</p> <p>Yes → Go To 11</p> <p>No → Replace the Hydraulic Control Unit in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.</p>	All

**PUMP CIRCUIT FAILURE — Continued**

TEST	ACTION	APPLICABILITY
11	<p>Turn the ignition off. Disconnect the ABS Pump Motor connector. Check connectors - Clean/repair as necessary. Connect a 10 gauge 40 amp fused jumper wire between the ABS Pump Fused B(+) terminal in the CAB harness connector to the ABS Pump Motor connector RED wired terminal. Connect a 10 gauge jumper wire between the ABS Pump Motor connector BLACK wired terminal and ground. Did the ABS Pump Motor operate?</p> <p>Yes → Repair the ABS Pump Motor Fused B(+) circuit for an open. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Repair the ABS Pump Motor Ground circuit for an open. Perform ABS VERIFICATION TEST - VER 1.</p>	All



**Symptom:****RED BRAKE WARNING INDICATOR SWITCH SENSE****When Monitored and Set Condition:****RED BRAKE WARNING INDICATOR SWITCH SENSE**

When Monitored: Ignition ON, continuously.

Set Condition: The DTC will be set when the Red Brake Warning Indicator Switch Sense circuit is open, shorted to voltage or ground.

**POSSIBLE CAUSES**

LOW FLUID LEVEL OR SWITCH DISCONNECTED

BRAKE FLUID LEVEL SWITCH RESISTANCE OUT OF SPECIFICATION

RED BRAKE WARNING INDICATOR SWITCH SENSE CIRCUIT SHORT TO BATTERY

RED BRAKE WARNING INDICATOR SWITCH SENSE OR GROUND CIRCUIT OPEN

RED BRAKE WARNING INDICATOR SWITCH SENSE CIRCUIT SHORT TO GROUND

RED BRAKE WARNING INDICATOR SWITCH SENSE AND GROUND CIRCUITS SHORTED TOGETHER

CAB - INTERNAL FAILURE

INTERMITTENT DTC

TEST	ACTION	APPLICABILITY
1	<p>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?</p> <p>Yes → Fill the Master Cylinder Reservoir to correct level or reconnect as necessary. If low fluid check for worn brake components. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 2</p>	All
2	<p>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?</p> <p>Yes → Go To 3</p> <p>No → Replace the Brake Fluid Level Switch in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.</p>	All

## RED BRAKE WARNING INDICATOR SWITCH SENSE — Continued

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition on.</p> <p>While back probing, measure the DC voltage of the Red Brake Warning Indicator Switch Sense circuit at the CAB connector..</p> <p>What is the voltage reading of the Red Brake Warning Indicator Switch Sense?</p> <p>Approximately 2 volts. Go To 4</p> <p>Above 4 volts. Go To 5</p> <p>Below 1 volt. Go To 7</p>	All
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 wiring harness/connectors as necessary. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	All
5	<p>Turn the ignition off.</p> <p>Disconnect the Brake Fluid Level Switch connector.</p> <p><b>Note: Check connector - Clean/repair as necessary.</b></p> <p>Disconnect the CAB harness connector.</p> <p><b>NOTE: Check connectors - Clean/repair as necessary.</b></p> <p>Turn the ignition on.</p> <p>Using a 12-volt test light connected to ground, probe the Red Brake Warning Indicator Switch Sense circuit.</p> <p>Does the test light illuminate?</p> <p>Yes → Repair the Red Brake Warning Indicator Switch Sense circuit for a short to voltage. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 6</p>	All
6	<p>Turn the ignition off.</p> <p>Disconnect the Brake Fluid Level Switch connector.</p> <p><b>Check connector - Clean/repair as necessary.</b></p> <p>Disconnect the CAB connector.</p> <p><b>Check connector - Clean/repair as necessary.</b></p> <p>Measure the resistance of the Red Brake Warning Indicator Switch Sense and Ground circuits.</p> <p>Is the resistance below 5 ohms for both circuits?</p> <p>Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Repair the Red Brake Warning Indicator Switch Sense or Ground circuit for an open. Perform ABS VERIFICATION TEST - VER 1.</p>	All

**RED BRAKE WARNING INDICATOR SWITCH SENSE — Continued**

TEST	ACTION	APPLICABILITY
7	<p>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 12-volts, probe the Red Brake Warning Indicator Switch Sense circuit.            Does the test light illuminate?</p> <p>Yes → Repair Red Brake Warning Indicator Switch Sense circuit for a short to ground.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 8</p>	All
8	<p>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 Red Brake Warning Indicator Switch Sense and Ground circuits.            Is the resistance below 5.0 ohms?</p> <p>Yes → Repair Red Brake Warning Indicator Switch Sense and Ground circuits for a short together.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Replace the Controller Antilock Brake in accordance with the Service Information.            Perform ABS VERIFICATION TEST - VER 1.</p>	All

## BRAKES (CAB)

### Symptom: SYSTEM OVER VOLTAGE

#### When Monitored and Set Condition:

##### SYSTEM OVER VOLTAGE

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, the Diagnostic Trouble Code (DTC) is set.

#### POSSIBLE CAUSES

INTERMITTENT DTC  
BATTERY CHARGER CONNECTED  
FUSED IGNITION SWITCH OUTPUT (RUN) CIRCUIT HIGH  
DAMAGED CAB/CAB HARNESS CONNECTOR  
CAB - GROUND CIRCUIT OPEN  
CAB - INTERNAL FAULT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. Start the engine. With the DRBIII®, read DTC's. Does the DRBIII® display SYSTEM OVER VOLTAGE?  Yes → Go To 2 No → Go To 7	All
2	Is a battery charger connected to the vehicle?  Yes → Ensure the battery is fully charged. Perform ABS VERIFICATION TEST - VER 1.  No → Go To 3	All

**SYSTEM OVER VOLTAGE — Continued**

TEST	ACTION	APPLICABILITY
3	<p>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's            Measure the voltage between Fused Ignition Switch Output (RUN) circuit and ground.            Is the voltage above 16.5 volts ?</p> <p>Yes → Refer to appropriate service information for Charging System testing and repair.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.            Disconnect the CAB connector.  <b>Note: Check connector - Clean/repair as necessary.</b>            Inspect the CAB and CAB harness connector for damage.            Is there any broken, bent, pushed out, corroded, or spread terminals?</p> <p>Yes → Repair as necessary.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.            Disconnect the CAB connector.  <b>Note: Check connector - Clean/repair as necessary.</b>            Using a 12-volt test light connected to 12-volts, probe the Ground circuits.            Does the test light illuminate?</p> <p>Yes → Go To 6</p> <p>No → Repair the Ground circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
6	<p>Turn the ignition off.            Reconnect the CAB harness connector.            Turn the ignition on.            With the DRBIII® in Sensors, read the ignition voltage.            Does the DRBIII® display ignition voltage above 16 volts?</p> <p>Yes → Replace the Controller Antilock Brake in accordance with the Service Information.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 7</p>	All

## SYSTEM OVER VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
7	<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>Ensure the battery is fully charged.</p> <p>Inspect the vehicle for aftermarket accessories that may exceed the Generator System output.</p> <p>Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.</p> <p>Were any problems found?</p> <p>Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	All

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

**When Monitored and Set Condition:**

**SYSTEM UNDER VOLTAGE**

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

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

**POSSIBLE CAUSES**

INTERMITTENT DTC  
 DAMAGED CAB/CAB HARNESS CONNECTOR  
 RUNNING BATTERY VOLTAGE LOW  
 CAB - GROUND CIRCUIT OPEN  
 FUSED IGNITION SWITCH OUTPUT (RUN) CIRCUIT OPEN  
 CAB - INTERNAL FAULT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. 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 UNDER VOLTAGE ?  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



## SYSTEM UNDER VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.  Disconnect the CAB harness connector.  Inspect the CAB and CAB harness connector for damage.  Is there any broken, bent, pushed out, corroded, or spread terminals?</p> <p>Yes → Repair as necessary.  Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.  Disconnect the CAB harness connector.  Using a 12-volt test light connected to 12-volts, probe the Ground circuits.  Does the test light illuminate?</p> <p>Yes → Go To 5</p> <p>No → Repair the Ground circuit for an open.  Perform ABS VERIFICATION TEST - VER 1.</p>	All
5	<p>Turn the ignition on.  Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output (RUN) circuit.  Does the test light illuminate?</p> <p>Yes → Replace the Controller Antilock Brake in accordance with the Service Information.  Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Repair the Fused Ignition Switch Output (RUN) circuit for an open.  Perform ABS VERIFICATION TEST - VER 1.</p>	All
6	<p>Turn the ignition off.  Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.  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.  Ensure the battery is fully charged.  Inspect the vehicle for aftermarket accessories that may exceed the Generator System output.  Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.  Were any problems found?</p> <p>Yes → Repair as necessary.  Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	All

**Symptom:**  
**VALVE POWER FEED FAILURE**

**When Monitored and Set Condition:**

**VALVE POWER FEED FAILURE**

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

**Set Condition:** If the Valve Fused B(+) is missing, the DTC will be set.

**POSSIBLE CAUSES**

INTERMITTENT DTC  
 ABS VALVE FUSE  
 ABS VALVE FUSED B(+) SUPPLY CIRCUIT OPEN  
 ABS VALVE FUSED B(+) CIRCUIT OPEN  
 ABS VALVE FUSED B(+) CIRCUIT INTERMITTENT SHORT TO GROUND  
 ABS VALVE FUSED B(+) CIRCUIT SHORT TO GROUND  
 DAMAGED CAB/CAB HARNESS CONNECTOR  
 CAB - GROUND CIRCUIT OPEN  
 CAB - INTERNAL FAULT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display VALVE POWER FEED FAILURE?  Yes → Go To 2 No → Go To 10	All
2	Turn the ignition off. Remove and Inspect the ABS Valve fuse. Is the ABS Valve fuse open?  Yes → Go To 3 No → Go To 6	All

## VALVE POWER FEED FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.</p> <p>Visually inspect the ABS Valve Fused B(+) circuit in the wiring harness. Look for any sign of an intermittent short to ground.</p> <p>Is the wiring harness OK?</p> <p>Yes → Go To 4</p> <p>No → Repair the ABS Valve Fused B(+) circuit for a short to ground.</p> <p>Perform ABS VERIFICATION TEST - VER 1.</p>	All
4	<p>Turn the ignition off.</p> <p>Disconnect the CAB harness connector.</p> <p><b>Note: Check connector - Clean/repair as necessary.</b></p> <p>Using a test light connected to 12 volts, probe the ABS Valve Fused B(+) circuit fuse terminal.</p> <p>Did the test light illuminate?</p> <p>Yes → Repair the ABS Valve Fused B(+) circuit for a short to ground.</p> <p>Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.</p> <p>Reconnect the CAB harness connector.</p> <p><b>NOTE: The CAB harness connector must be reconnected for the results of this test to be valid.</b></p> <p>Using a test light connected to 12 volts, probe the ABS Valve Fused B(+) circuit fuse terminal.</p> <p>Did the test light illuminate?</p> <p>Yes → Replace the Controller Antilock Brake in accordance with the Service Information.</p> <p>Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Replace the ABS Valve Fused B(+) fuse. If the fuse is open make sure to check for a short to ground.</p> <p>Perform ABS VERIFICATION TEST - VER 1.</p>	All
6	<p>Turn the ignition off.</p> <p>Disconnect the CAB harness connector.</p> <p>Inspect the CAB and CAB harness connector for damage.</p> <p>Is there any broken, bent, pushed out, corroded or spread terminals?</p> <p>Yes → Repair as necessary.</p> <p>Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 7</p>	All
7	<p>Turn the ignition off.</p> <p>Using a 12-volt test light connected to ground, probe the B(+) supply at the ABS Valve fuse terminal.</p> <p>Did the test light illuminate?</p> <p>Yes → Go To 8</p> <p>No → Repair the ABS Valve Fused B(+) supply circuit for an open.</p> <p>Perform ABS VERIFICATION TEST - VER 1.</p>	All

**VALVE POWER FEED FAILURE — Continued**

TEST	ACTION	APPLICABILITY
8	Reinstall the ABS Valve fuse. Disconnect the CAB harness connector. Using a 12-volt test light connected to ground, probe the ABS Valve Fused B(+) circuit at the CAB harness connector. Did the test light illuminate?  Yes → Go To 9  No → Repair the ABS Valve Fused B(+) circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
9	Turn the ignition off. Using a 12-volt test light connected to 12-volts, probe the ground circuits at the CAB harness connector. Did the test light illuminate?  Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.  No → Repair the CAB Ground circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
10	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found?  Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.  No → Test Complete.	All

## BRAKES (CAB)

### Symptom:

#### \*ABS LIGHT FLASHING AFTER CAB REPLACEMENT

#### POSSIBLE CAUSES

IMPROPERLY CONFIGURED CAB

TEST	ACTION	APPLICABILITY
1	<p>Turn the ignition on. Connect the DRBIII® to the Data Link Connector. Select Anti - lock Brakes from the DRBIII® main menu. <b>NOTE: If DRBIII® is unable to I/D or communicate with CAB, refer to NO RESPONSE test.</b> Select Miscellaneous from menu. Select Set Pinion Factor from menu. Does the vehicle have unknown tires and unknown rear axle? Press Enter, to change will be displayed. Press Enter. Select the tire size that is installed on the vehicle. Press Enter. Select correct axle. Press Enter. The tire size and axle selected will be displayed. Press Enter to accept these values. Programming Successful! will be displayed. Does the DRBIII® display PROGRAMMING SUCCESSFUL?</p> <p>Yes → Test Complete.</p> <p>No → Ensure DRBIII® software is current and retry on a known good vehicle. Communicate with other modules, refer to symptom(s). Perform ABS VERIFICATION TEST - VER 1.</p>	All

**Symptom:****\*BRAKE LAMP SWITCH INOPERATIVE****POSSIBLE CAUSES**

CHECK BRAKE LAMP SWITCH OUTPUT

BRAKE LAMP SWITCH B+ OPEN

BRAKE LAMP SWITCH OPEN

BRAKE LAMP SWITCH OUTPUT CIRCUIT SHORT OR OPEN

CAB -- INTERNAL OPEN

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

## Symptom:

### \*NO RESPONSE FROM ADJUSTABLE PEDALS MODULE

POSSIBLE CAUSES
ATTEMPT TO COMMUNICATE WITH THE BCM FUSED B(+) CKT OPEN GROUND CKT OPEN OPEN PCI BUS CIRCUIT ADJUSTABLE PEDALS MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, enter Body then Body Computer. Was the DRB able to I/D or communicate with the BCM?  Yes → Go To 2  No → Refer to the symptom list for problems related to no communication with the BCM. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Disconnect the Adjustable Pedals Module harness connector. Using a 12-volt test light connected to ground, probe the Fused B+ circuit. Is the test light illuminated?  Yes → Go To 3  No → Repair the Fused B+ circuit for an open or short. Refer to the wiring diagrams in the service information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Disconnect the Adjustable Pedals Module harness connector. Using a 12-volt test light connected to 12-volts, probe each ground circuit. Is the test light illuminated for each circuit?  Yes → Go To 4  No → Repair the Ground circuit for an open. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All

**\*NO RESPONSE FROM ADJUSTABLE PEDALS MODULE — Continued**

TEST	ACTION	APPLICABILITY
4	<p><b>Note: Ensure there is PCI Bus communication with other modules on the vehicle before proceeding. If not, refer to the symptom list from the menu and repair as necessary.</b></p> <p>Disconnect the Adjustable Pedals Module harness connector.</p> <p>Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes.</p> <p>Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable.</p> <p>With the DRBIII® select Pep Module Tools.</p> <p>Select lab scope.</p> <p>Select Live Data.</p> <p>Select 12 volt square wave.</p> <p>Press F2 for Scope.</p> <p>Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete.</p> <p>Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the Adjustable Pedals Module connector.</p> <p>Turn the ignition on.</p> <p>Observe the voltage display on the DRB Lab Scope.</p> <p>Does the voltage pulse from 0 to approximately 7.5 volts?</p> <p>Yes → Replace the Adjustable Pedals Module in accordance with the service information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p> <p>No → Repair the PCI Bus circuit for an open. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.</p>	All



## Symptom:

### \*NO RESPONSE FROM CONTROLLER ANTILOCK BRAKE

POSSIBLE CAUSES
NO RESPONSE FROM CAB REPLACE FUSE #19 CONTROLLER ANTILOCK BRAKE SHORTED TO GROUND FUSED IGNITION SWITCH OUTPUT CIRCUIT SHORTED TO GROUND JUNCTION BLOCK SHORTED TO GROUND GROUND CIRCUIT OPEN OPEN FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN PCI BUS CIRCUIT CONTROLLER ANTILOCK BRAKE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. <b>Note: As soon as one or more module communicates with the DRB, answer the question.</b> With the DRB, attempt to communicate with the Airbag Control Module (ACM). With the DRB, attempt to communicate with the Body Control Module (BCM). Was the DRB able to I/D or establish communications with either of the modules?  Yes → Go To 2  No → Refer to the Communications category and perform the symptom PCI Bus Communication Failure. Perform ABS VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Remove and inspect fuse #19 in the junction block. Is the fuse open?  Yes → Go To 3  No → Go To 6	All
3	Turn the ignition off. Replace Fuse #19 in the junction block. Turn the ignition on. Remove and inspect fuse #19 in the junction block. Is the fuse open?  Yes → Go To 4  No → Check the Fused Ignition Switch Output circuit for an intermittent short to ground, refer to the wiring diagrams in the service information. Perform ABS VERIFICATION TEST - VER 1.	All

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

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off.            Replace fuse #19 in the junction block.            Disconnect the CAB harness connector.            Turn the ignition on.            Remove and inspect fuse #19 in the junction block.            Is the fuse open?</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 the ignition off.            Disconnect the CAB harness connector.            Disconnect the Junction Block C2 harness connector.            Measure the resistance between ground and the Fused Ignition Switch Output circuit.            Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the Fused Ignition Switch Output circuit for a short to ground.            Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Replace the Junction Block in accordance with the service information.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
6	<p>Turn the ignition off.            Disconnect the CAB harness connector.            Using a 12-volt test light connected to 12-volts, probe each ground circuit.            Is the test light illuminated for each circuit?</p> <p>Yes → Go To 7</p> <p>No → Repair the ground circuit(s) for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All
7	<p>Turn the ignition off.  <b>Note: Ensure fuse #19 is installed in the junction block.</b>            Disconnect the CAB harness connector.            Turn the ignition on.            Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output circuit.            Is the test light illuminated?</p> <p>Yes → Go To 8</p> <p>No → Repair the Fused Ignition Switch Output circuit for an open.            Perform ABS VERIFICATION TEST - VER 1.</p>	All

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

TEST	ACTION	APPLICABILITY
8	<p><b>Note: Ensure there is PCI Bus communication with other modules on the vehicle before proceeding. If not, refer to the symptom list from the menu and repair as necessary.</b></p> <p>Disconnect the CAB harness connector.</p> <p>Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes.</p> <p>Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable.</p> <p>With the DRBIII® select Pep Module Tools.</p> <p>Select lab scope.</p> <p>Select Live Data.</p> <p>Select 12 volt square wave.</p> <p>Press F2 for Scope.</p> <p>Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete.</p> <p>Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the CAB connector.</p> <p>Turn the ignition on.</p> <p>Observe the voltage display on the DRB Lab Scope.</p> <p>Does the voltage pulse from 0 to approximately 7.5 volts?</p> <p>Yes → Go To 9</p> <p>No → Repair the PCI Bus circuit for an open.</p> <p>Perform ABS VERIFICATION TEST - VER 1.</p>	All
9	<p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace the Controller Antilock Brake in accordance with the Service Information.</p> <p>Perform ABS VERIFICATION TEST - VER 1.</p>	All

## Verification Tests

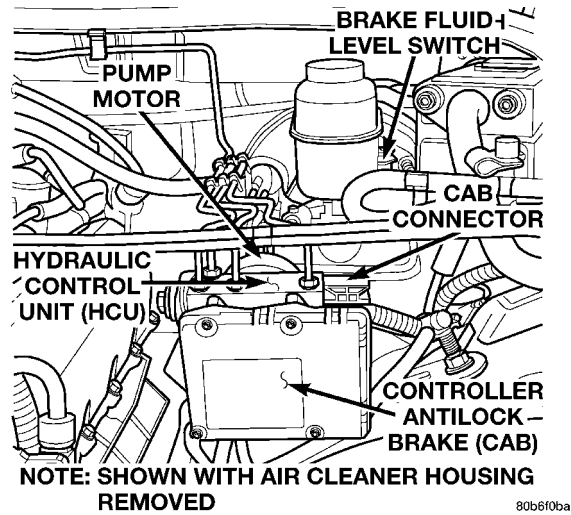
ABS VERIFICATION TEST - VER 1	APPLICABILITY
<ol style="list-style-type: none"> <li>1. Turn the ignition off.</li> <li>2. Connect all previously disconnected components and connectors.</li> <li>3. Ensure all accessories are turned off and the battery is fully charged.</li> <li>4. Ensure that the Ignition 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.</li> <li>5. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII, read DTC's from ALL modules.</li> <li>6. If any Diagnostic Trouble Codes are present, return to Symptom list and troubleshoot new or recurring symptom.</li> <li>7. <b>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></li> <li>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.</li> <li>9. <b>Caution: Ensure braking capability is available before road testing.</b></li> <li>10. Again, with the DRBIII® read DTC's. If any DTC's are present, return to Symptom list.</li> <li>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.</li> </ol> <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>	All

ADJUSTABLE PEDALS VERIFICATION TEST - VER 1	APPLICABILITY
<ol style="list-style-type: none"> <li>1. If the Adjustable Pedals Module was replaced, program two pedal positions if equipped with memory function.</li> <li>2. Activate the Adjustable Pedals through the full range of movement.</li> <li>3. Verify that the Adjustable Pedals system is disabled with the vehicle in Reverse.</li> <li>4. Verify that the Adjustable Pedals system is disabled with Speed Control activated.</li> <li>5. With the DRBIII®, erase DTCs.</li> <li>6. With the DRBIII®, read DTCs.</li> </ol> <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>	All

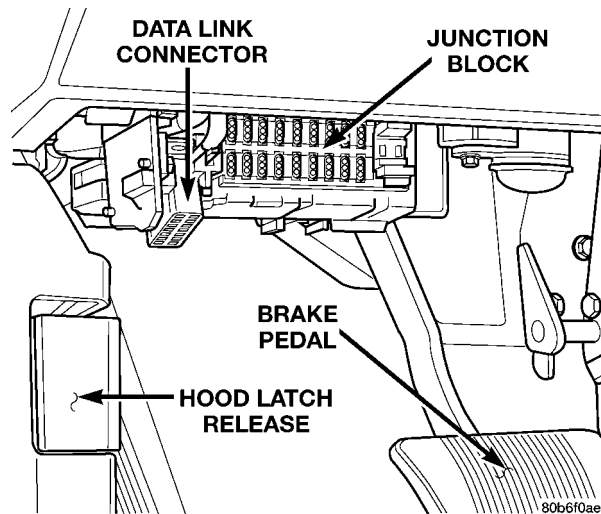
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### 8.0 COMPONENT LOCATIONS

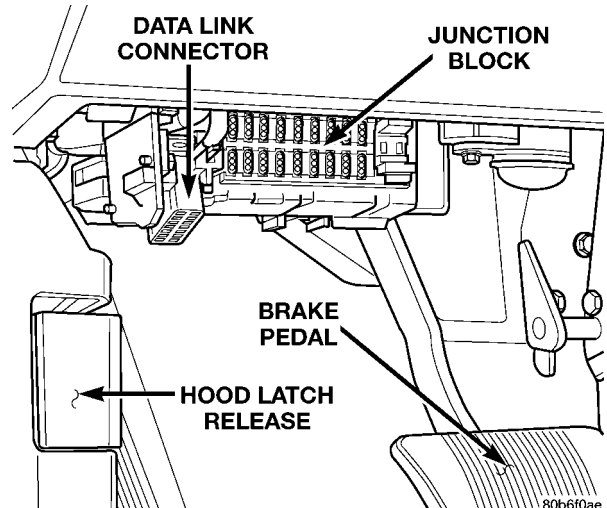
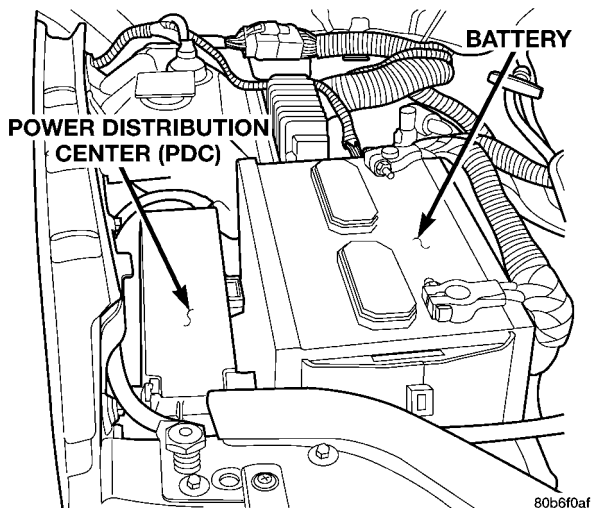
#### 8.1 CONTROLLER ANTILOCK BRAKE



#### 8.2 DATA LINK CONNECTOR



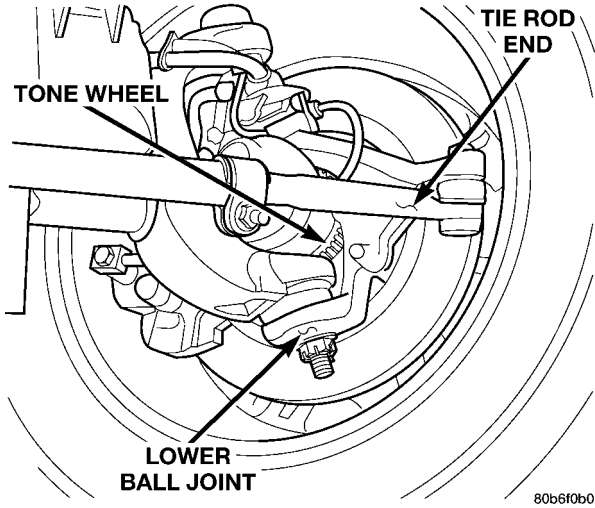
#### 8.3 FUSES



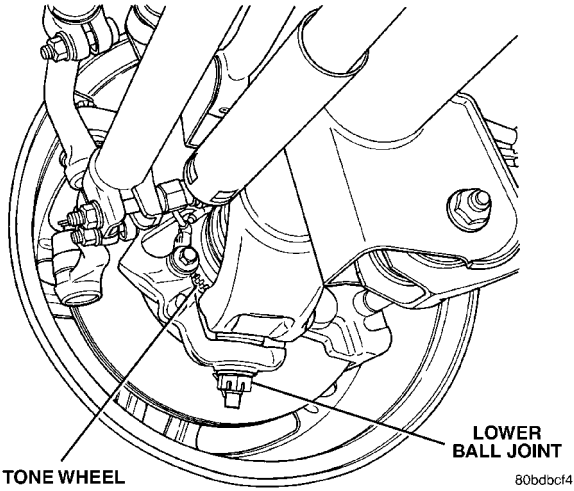
# COMPONENT LOCATIONS

## 8.4 TONE WHEELS

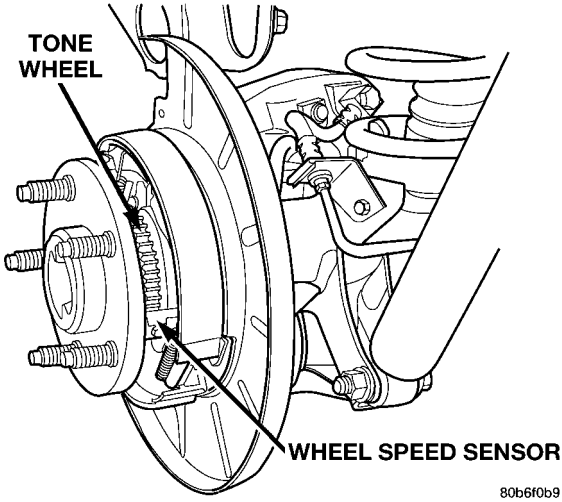
### LEFT FRONT



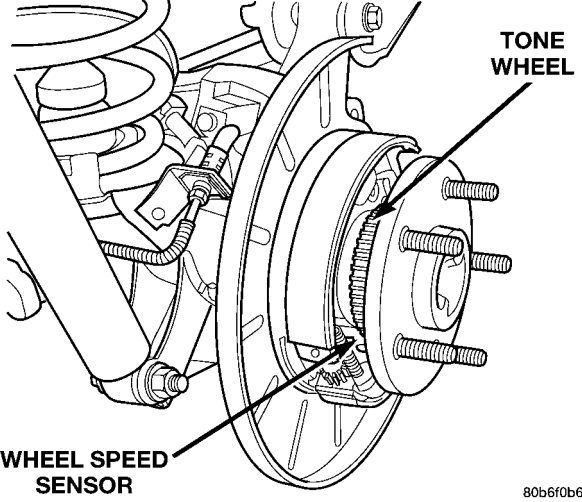
### RIGHT FRONT



### LEFT REAR

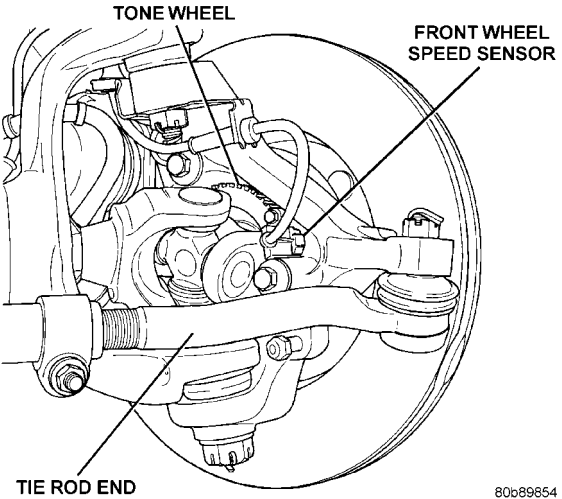


### RIGHT REAR

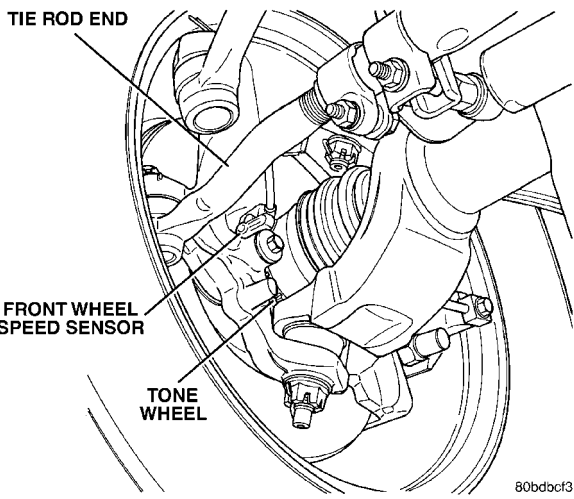


## 8.5 WHEEL SPEED SENSORS

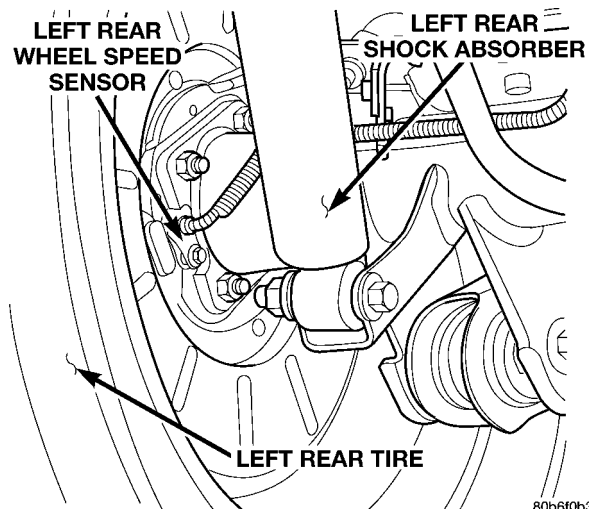
### LEFT FRONT



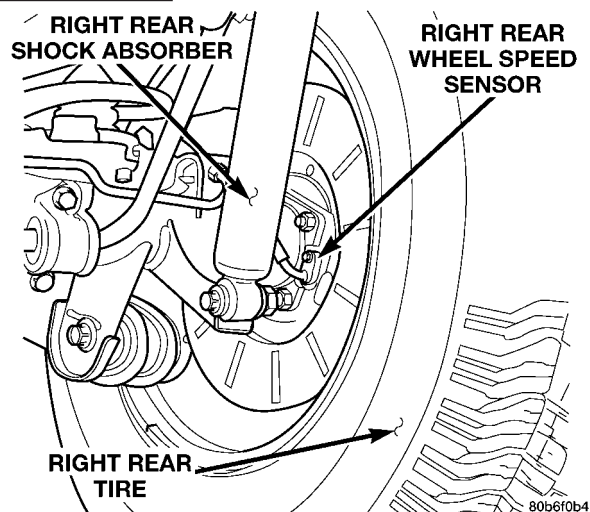
### RIGHT FRONT



## LEFT REAR

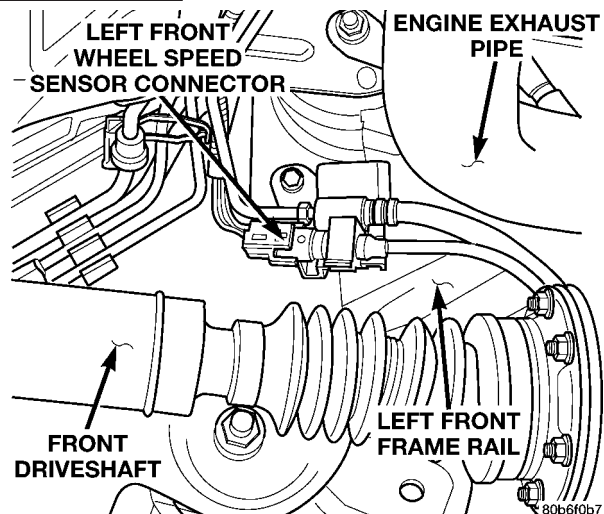


## RIGHT REAR

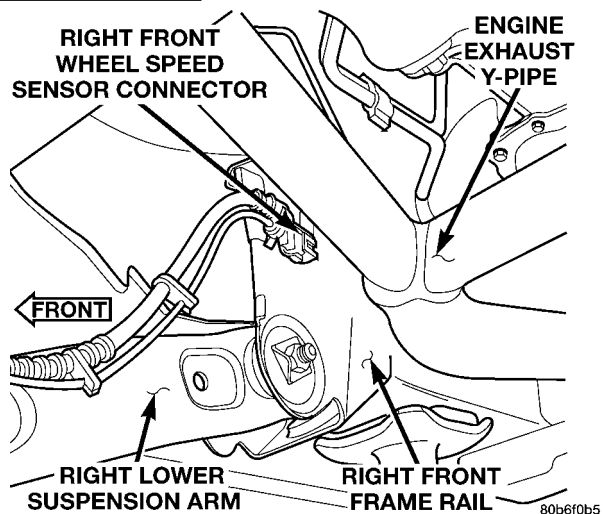


## 8.6 WHEEL SPEED SENSOR CONNECTORS

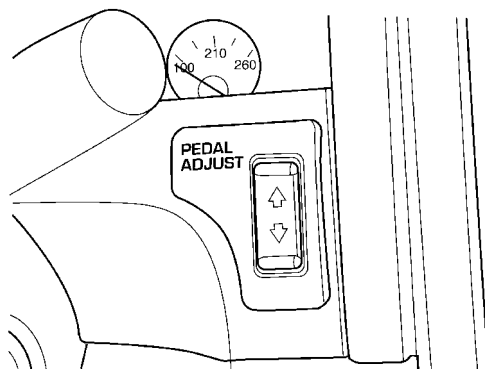
### LEFT FRONT



### RIGHT FRONT



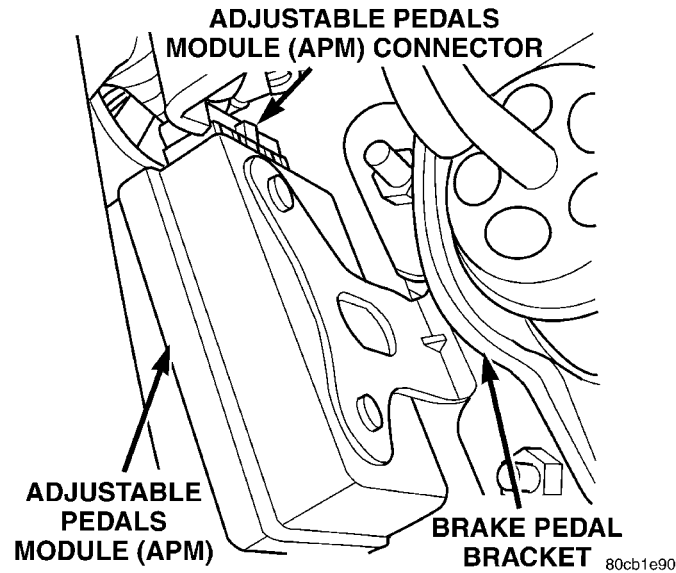
## 8.7 ADJUSTABLE PEDALS SWITCH



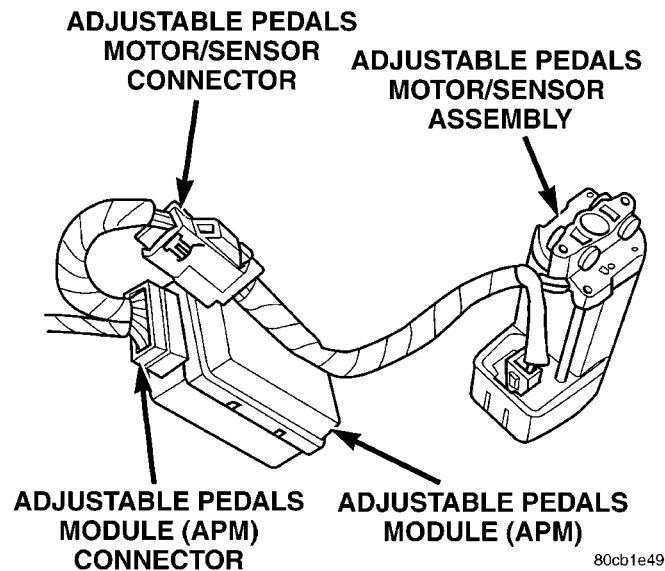


## COMPONENT LOCATIONS

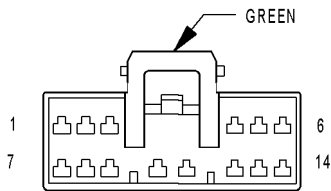
### 8.8 ADJUSTABLE PEDALS MODULE



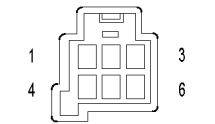
### 8.9 ADJUSTABLE PEDALS COMPONENTS



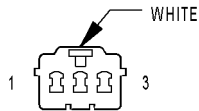
## 9.0 CONNECTOR PINOUTS



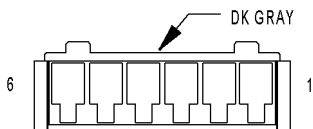
ADJUSTABLE  
PEDALS  
MODULE  
(EXCEPT EXPORT)



ADJUSTABLE  
PEDALS  
MOTOR/SENSOR  
ASSEMBLY  
(EXCEPT EXPORT)



ADJUSTABLE  
PEDALS  
SWITCH  
(EXCEPT EXPORT)



BRAKE  
LAMP  
SWITCH

## ADJUSTABLE PEDALS MODULE (EXCEPT 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 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)

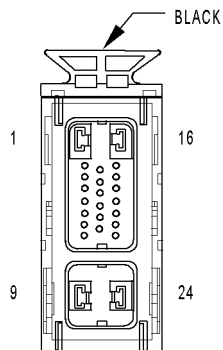
## ADJUSTABLE PEDALS SWITCH (EXCEPT EXPORT) - WHITE 3 WAY

CAV	CIRCUIT	FUNCTION
1	Y153 20DB/RD	ADJUSTABLE PEDALS SWITCH FEED
2	Y152 20LG/OR	ADJUSTABLE PEDALS SWITCH SENSE (REARWARD)
3	Y151 20LG/BR	ADJUSTABLE PEDALS SWITCH SENSE (FORWARD)

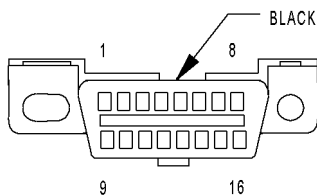
## BRAKE LAMP SWITCH - DK GRAY 6 WAY

CAV	CIRCUIT	FUNCTION
1	K29 20WT/PK (DIESEL)	SECONDARY BRAKE SWITCH SIGNAL
1	K29 20WT/PK (GAS LHD)	BRAKE SWITCH SENSE
1	K29 18WT/PK (GAS RHD)	BRAKE SWITCH SENSE
2	Z238 18BK (LHD)	GROUND
2	Z243 18BK (RHD)	GROUND
3	B30 18DG/OR (DIESEL)	SPEED CONTROL POWER SUPPLY
3	V32 22OR/DG (GAS)	SPEED CONTROL POWER SUPPLY
4	Z238 18BK (DIESEL)	GROUND
4	V30 22DB/RD (GAS)	SPEED CONTROL BRAKE SWITCH OUTPUT
5	L50 20WT/TN (DIESEL)	PRIMARY BRAKE SWITCH SIGNAL
5	L50 20WT/TN (GAS)	BRAKE LAMP SWITCH OUTPUT
6	F32 20PK/DB	FUSED B(+)

# CONNECTOR PINOUTS



CONTROLLER  
ANTILOCK  
BRAKE



DATA LINK  
CONNECTOR

CONTROLLER ANTILOCK BRAKE - BLACK 25 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 SENSOR SIGNAL
14	D51 18DG/WT (DIESEL)	CAN C BUS(-)
15	-	-
16	Z102 12BK/OR	GROUND
17	G9 18GY/BK	RED BRAKE WARNING INDICATOR SWITCH SENSE
18	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
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(+)

DATA LINK CONNECTOR - BLACK 16 WAY

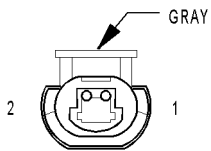
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20YL/VT	PCI BUS
3	-	-
4	Z305 20BK/OR	GROUND
5	Z306 20BK/LG	GROUND
6	D32 20LG/DG	SCI RECEIVE
7	D21 20PK	SCI TRANSMIT
8	-	-
9	D19 20VT/OR	BODY CONTROL MODULE FLASH ENABLE
10	-	-
11	-	-
12	-	-
13	-	-
14	D20 20LG	SCI RECEIVE
15	-	-
16	F33 20PK/RD	FUSED B(+)



# CONNECTOR PINOUTS

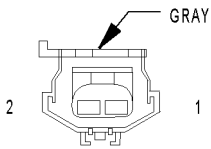
## FUSES (JB)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	-	-	-
2	-	-	-
3	10A	L33 18RD	FUSED HIGH BEAM RELAY OUTPUT
4	15A	INTERNAL	FUSED B(+)
5	25A	INTERNAL	FUSED B(+)
6	15A	INTERNAL	FUSED B(+)
7	10A	INTERNAL	FUSED B(+)
8	15A	INTERNAL	FUSED B(+)
9	20A	INTERNAL	FUSED B(+)
10	20A	F72 16RD/YL (EXCEPT EXPORT)	FUSED B(+)
11	10A	C79 20BK/WT	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
12	10A	F991 20OR/DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
13	-	-	-
14	10A	L43 18VT	FUSED LEFT LOW BEAM OUTPUT
15	10A	L44 18VT/RD	FUSED RIGHT LOW BEAM OUTPUT
16	10A	L34 18RD/OR	FUSED HIGH BEAM RELAY OUTPUT
17	10A	INTERNAL	FUSED B(+)
18	30A	F9 14RD/BK	FUSED B(+)
19	10A	F20 18DB/PK	FUSED IGNITION SWITCH OUTPUT (RUN)
20	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN)
21	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
22	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
23	15A	F32 20PK/DB	FUSED B(+)
24	15A	INTERNAL	FUSED B(+)
25	15A	INTERNAL	FUSED B(+)
26	15A	F30 16RD	FUSED CIGAR LIGHTER RELAY OUTPUT
27	15A	INTERNAL (EXPORT)	FUSED B(+)
28	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
29	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
30	10A	X12 20WT/RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
31	10A	F45 20YL/RD	FUSED IGNITION SWITCH OUTPUT (START)
32	10A	F14 20LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
33	10A	F23 18DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN)



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

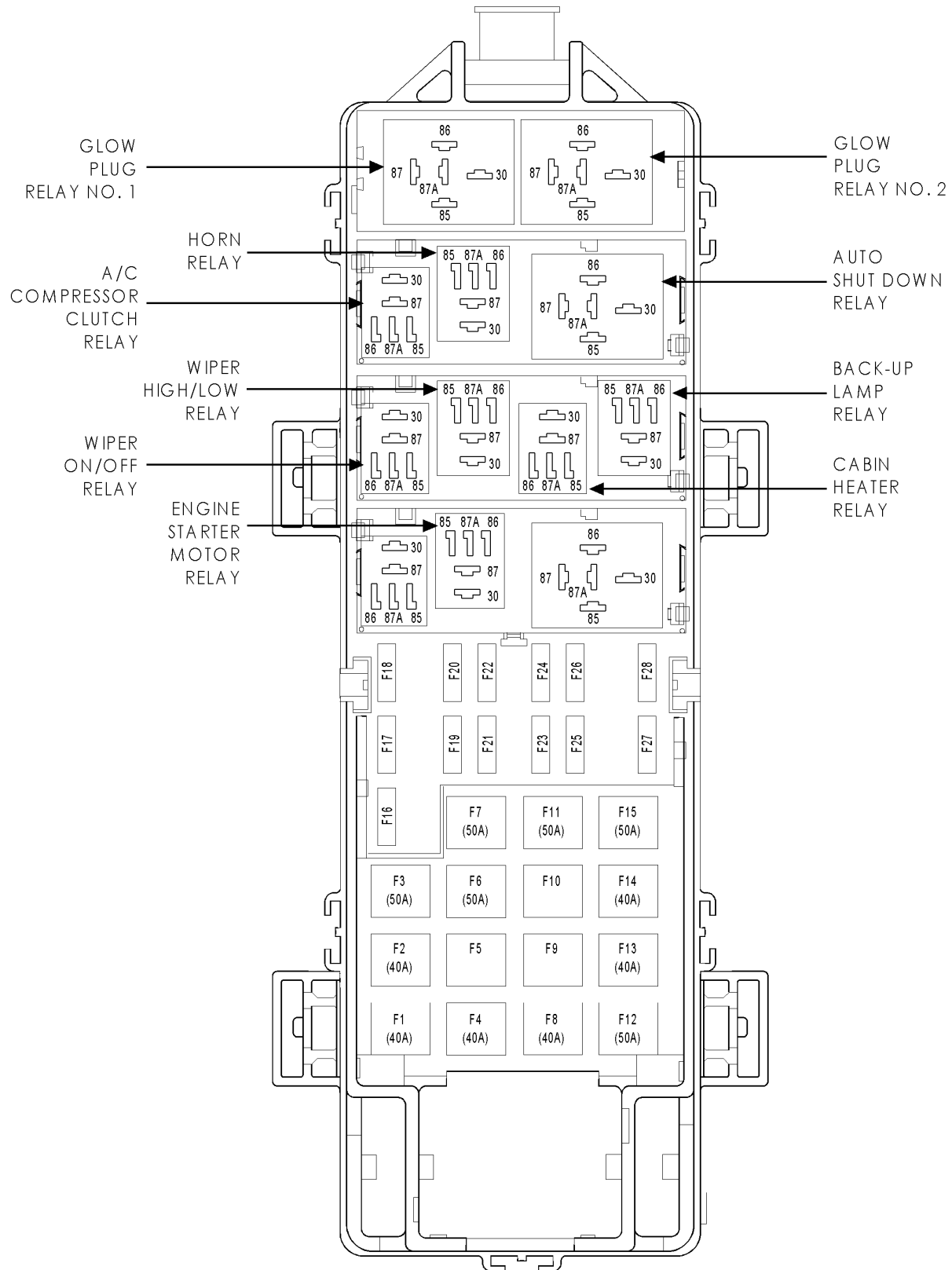


LEFT REAR  
WHEEL SPEED  
SENSOR

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

# CONNECTOR PINOUTS

## POWER DISTRIBUTION CENTER (DIESEL)



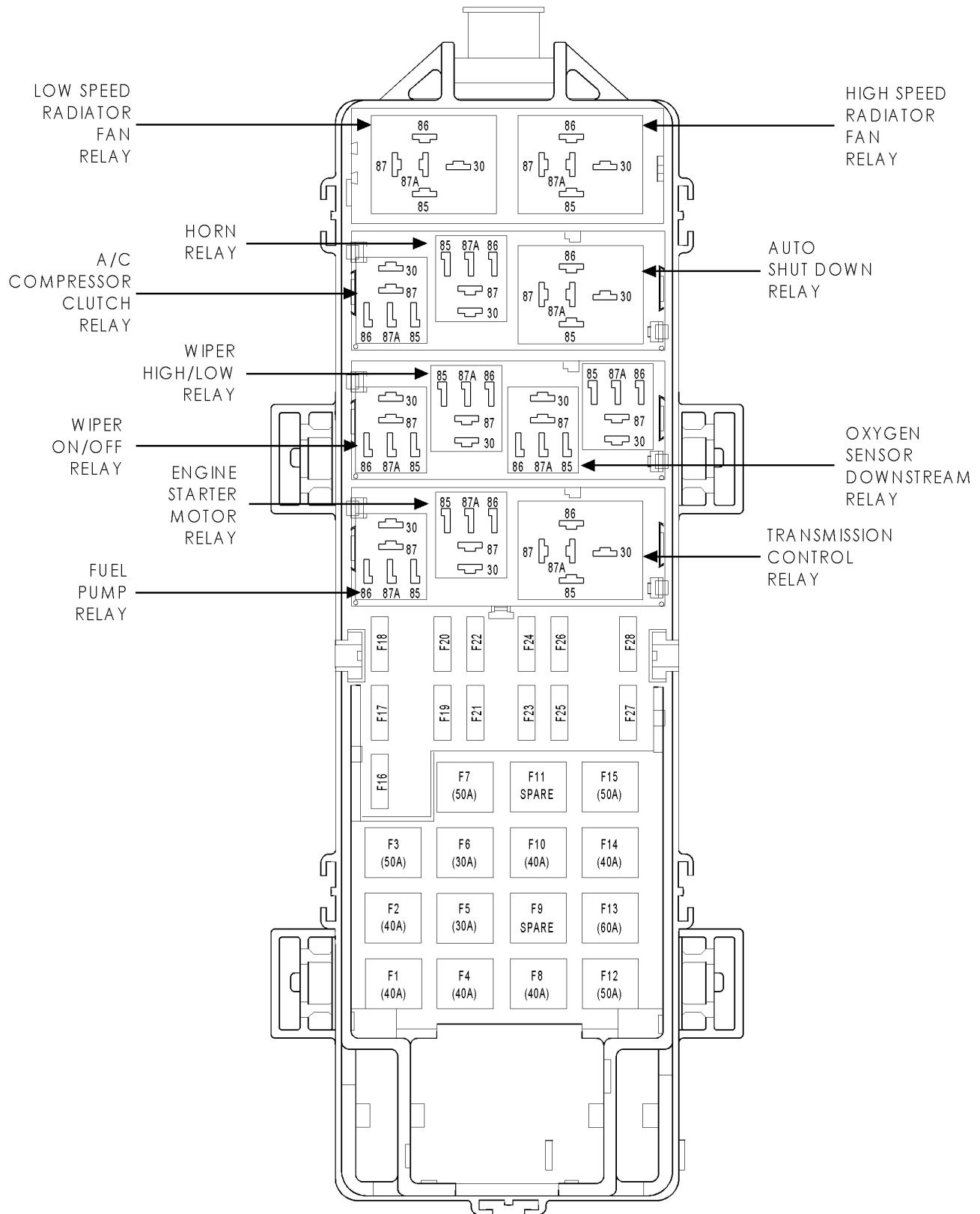
## FUSES (DIESEL)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	40A	C1 12DG	FUSED B(+)
2	40A	A149 12RD/TN	FUSED B(+)
3	50A	A145 10WT/RD	FUSED B(+)
4	40A	A10 12RD/DG	FUSED B(+)
5	-	-	-
6	50A	A105 10DB/RD	FUSED B(+)
7	50A	A147 10RD/GY	FUSED B(+)
8	40A	A1 12RD	FUSED B(+)
9	-	-	-
10	-	-	-
11	50A	A110 10VT/RD	FUSED B(+)
12	50A	A146 10OR/WT	FUSED B(+)
13	40A	A14 14RD/WT	FUSED B(+)
13	40A	A14 14RD/WT	FUSED B(+)
14	40A	A2 12PK/BK	FUSED B(+)
15	50A	A148 10PK/WT	FUSED B(+)
16	20A	F15 18DB/WT	FUSED AUTO SHUT DOWN RELAY OUTPUT
16	20A	F15 18DB/WT	FUSED AUTO SHUT DOWN RELAY OUTPUT
17	-	-	-
18	15A	F62 18RD	FUSED B(+)
18	15A	F62 18RD	FUSED B(+)
19	-	-	-
20	-	-	-
21	15A	A17 14RD/BK	FUSED B(+)
22	10A	F300 18RD/BK	FUSED B(+)
23	15A	A80 18RD/LG	FUSED B(+)
24	-	-	-
25	20A	A20 12RD/DB	FUSED B(+)
26	20A	F142 14OR/DG	FUSED AUTO SHUT DOWN RELAY OUTPUT
27	20A	A148 16LG/RD	FUSED B(+)
28	-	-	-



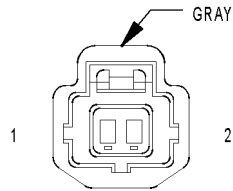
# CONNECTOR PINOUTS

## POWER DISTRIBUTION CENTER (GAS)



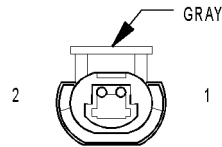
FUSES (GAS)			
FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	40A	C1 12DG	FUSED B(+)
2	40A	A149 12RD/TN	FUSED B(+)
3	50A	A145 10WT/RD	FUSED B(+)
4	40A	A10 12RD/DG	FUSED B(+)
5	30A	A30 14RD/WT	FUSED B(+)
5	30A	A30 14RD/WT (4.7L)	FUSED B(+)
6	30A	A14 14RD/DG	FUSED B(+)
7	50A	A147 10RD/GY	FUSED B(+)
8	40A	A1 12RD	FUSED B(+)
9	-	-	-
10	40	A16 12GY (4.0L)	FUSED B(+)
11	-	-	-
12	50A	A146 100R/WT	FUSED B(+)
13	-	-	-
14	40A	A2 12PK/BK	FUSED B(+)
15	50A	A148 10PK/WT	FUSED B(+)
16	15A	F142 180R/DG	FUSED AUTO SHUT DOWN RELAY OUTPUT
16	15A	F142 180R/DG (4.7L)	FUSED AUTO SHUT DOWN RELAY OUTPUT
17	-	-	-
18	15A	F62 18RD	FUSED B(+)
18	15A	F62 18RD	FUSED B(+)
19	10A	A7 14RD/BK	FUSED B(+)
20	-	-	-
21	15A	A17 18RD/BK	FUSED B(+)
22	-	-	-
23	-	-	-
24	20A	A62 16VT/LB (LHD)	FUSED B(+)
24	20A	A62 16VT/WT (RHD)	FUSED B(+)
25	20A	A20 12RD/DB	FUSED B(+)
26	15A	F42 18DG/LG	FUSED AUTO SHUT DOWN RELAY OUTPUT
26	15A	F42 18DG/LG	FUSED AUTO SHUT DOWN RELAY OUTPUT
27	20A	A148 16LG/RD	FUSED B(+)
28	15A	T15 18YL/BR (4.0L)	FUSED TRANSMISSION CONTROL RELAY OUTPUT

# CONNECTOR PINOUTS



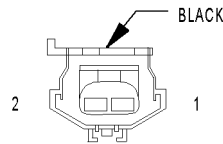
RED BRAKE  
WARNING  
INDICATOR SWITCH

RED BRAKE WARNING INDICATOR SWITCH - GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	Z231 18BK	GROUND
2	G9 18GY/BK	RED BRAKE WARNING INDICATOR SWITCH SENSE



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

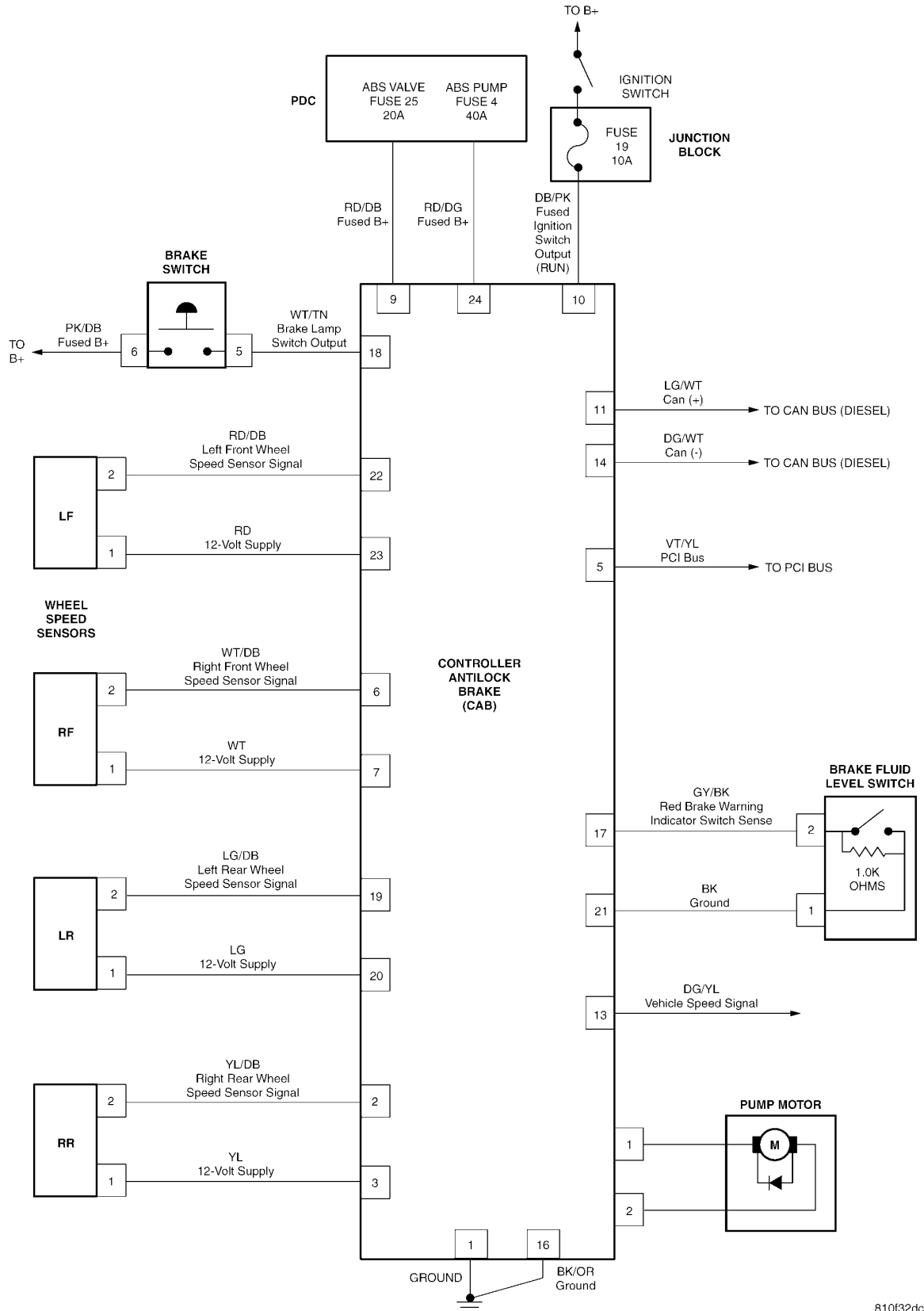


RIGHT REAR  
WHEEL SPEED  
SENSOR

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

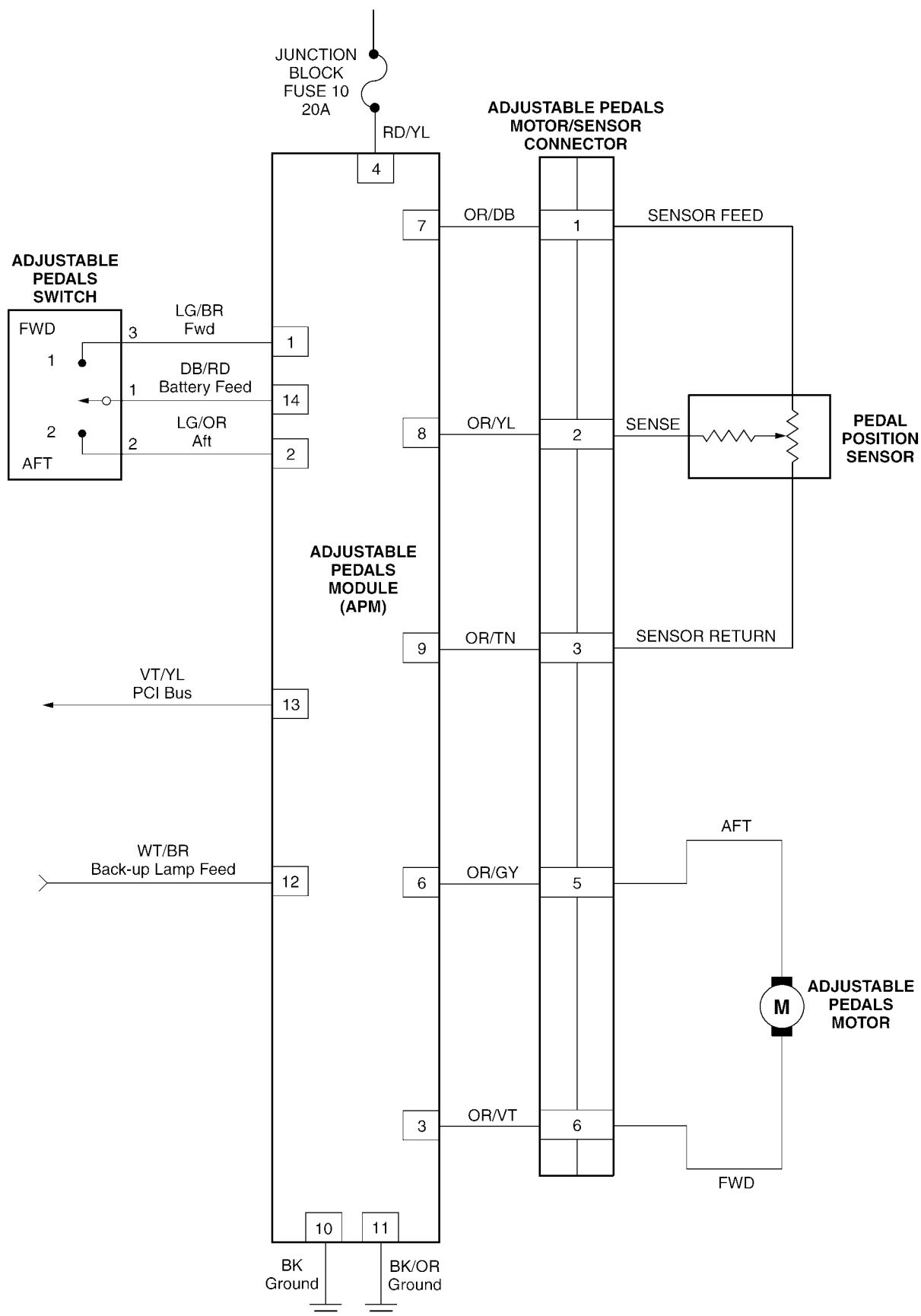
## 10.0 SCHEMATIC DIAGRAMS

## 10.1 TEVES MARK 20e CONTROLLER ANTILOCK BRAKE — ABS



# SCHEMATIC DIAGRAMS

## 10.2 ADJUSTABLE PEDALS SYSTEM



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