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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 Mark 20 Antilock Braking System (ABS), Mark 20 Antilock Braking System with Traction Control and the Adjustable Pedals System. The diagnostics in this manual are based on the failure condition or symptom being present at time of diagnosis.

Please follow the recommendations below when choosing your diagnostic path.

1. First make sure the DRBIII® is communicating with the 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 indicates a concern with no associated DTC.

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; carry over 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 procedure manual covers the antilock braking system (ABS), the traction control system and the adjustable pedals system found on: 2002 Chrysler Town and Country, Dodge Caravan and Grand Caravan.

1.2 SIX-STEP TROUBLESHOOTING PROCEDURE

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

- verification of complaint
- verification of any related symptoms
- symptom analysis
- problem isolation
- repair of isolated problem
- verification of proper operation

2.0 IDENTIFICATION OF SYSTEM

Vehicles equipped with the Teves Mark 20 antilock brake system can be identified by the presence of the controller antilock brake module located beneath the master cylinder.

The presence of the Traction Control system is indicated by the TRAC OFF switch on top of the steering column shroud.

The presence of the Adjustable Pedals system is indicated by the Adjustable Pedals switch on the left side of the steering column.

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

3.1 TEVES MARK 20 SYSTEM DESCRIPTION

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

The Teves Mark 20 system uses a diagonal split hydraulic brake system. In the standard brake mode the master cylinder primary circuit supplies pressure to the right front and left rear wheel brakes, and the secondary master cylinder circuit supplies pressure to the left front and right rear wheel brakes.

3.2 TRACTION CONTROL SYSTEM (TCS) DESCRIPTION

The main purpose of traction control is to reduce wheel slip and maintain traction at the driven wheels when road surfaces are slippery. The traction control system reduces wheel slip by braking the wheel that is losing traction. The system is designed to operate at speeds below 56 km/h (35 mph).

3.3 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 effort required for pedal application will not change regardless of pedal position.

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 accelerator pedal. The motor also drives a cable connected to a gear box that changes the brake pedal position the same distance as the accelerator pedal. The pedals can be moved rearward (closer to the driver) or forward (away from driver). Each pedal is moved on its activating lever to a position where the driver feels most comfortable. The position and operation of the activating levers are not changed.

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 approximately 3 in. (75 mm)
- Pedal Adjustment Speed
  0.4 in./sec (9 mm/sec)
- Pedal Adjustment Inhibitors
  Pedal adjustment is inhibited when the vehicle is in reverse or when cruise control is engaged.
- 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. A stored pedal position can be recalled (but not stored) using the Remote Keyless Entry (RKE) if equipped with the memory feature.
- Adjustable Pedal Feedback Message
  The Electronic Vehicle Information Center (EVIC) will display a message when the APS is disabled. i.e.: ″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 3 seconds, it will cut power to the adjustable pedal motor.

3.4 SYSTEM COMPONENTS

ABS

- controller antilock brake (CAB)
- vacuum booster
- master cylinder
- ABS integrated electronic control module/ hydraulic control unit (HCU), valve block assembly: 8 valve solenoids (4 inlet valves, 4 outlet valves, 2 accumulators) 1 pump.
- 4 wheel speed sensor/tone wheel assemblies
- ABS warning indicator
- fuses and wiring harness
- fluid reservoir

ABS With Traction Control

- CAB with Traction Control programming
- HCU with two additional control valves.
- TRAC ON/OFF Switch
- TRAC/TRAC OFF indicators

Adjustable Pedals System

- Adjustable Pedals Switch
- Adjustable Pedals Position Sensor
- Adjustable Pedals Module/Pedal Assembly

3.4.1 ABS AND BRAKE WARNING INDICATORS

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. The ABS warning indicator is controlled by the CAB. The CAB controls the lamp with a command over the PCI bus.

The ABS Warning Indicator will remain lit during every key cycle until a circuit or component fault is repaired and the CAB no longer detects the fault. After repair of a sensor signal fault or a pump motor fault, the CAB must sense all four wheels at 25 km/h (15 mph) before it will extinguish the ABS and TRAC OFF Indicators.

The Instrument Cluster will illuminate the ABS Warning Indicator if it loses communication with the CAB.

The red BRAKE warning indicator is also located in the instrument cluster. It can be activated in several ways. Application of the parking brake or a

low fluid signal from the fluid level switch located in the master cylinder reservoir will cause the indicator to come on.

3.4.2 CONTROLLER ANTILOCK BRAKE (CAB)

The Controller Antilock Brake (CAB) is a microprocessor-based device that monitors wheel speeds and controls the antilock functions. The CAB contains two microprocessors that receive identical sensor signals and then independently process the information. The results are then compared to make sure that they agree. Otherwise, the CAB will turn off the antilock and turn on the ABS amber warning indicator.

The primary functions of the CAB are to:

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

The CAB continuously monitors the speed of each wheel. When a wheel locking tendency is detected, the CAB will command the appropriate valve to modulate brake fluid pressure in its hydraulic unit. Brake pedal position is maintained during an antilock stop by being a closed system with the use of 2 accumulators. The CAB continues to control pressure in individual hydraulic circuits until a wheel locking tendency is no longer present. The CAB turns on the pump motor during an antilock stop.

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

The CAB inputs include the following:

- diagnostic communication
- four wheel speed sensors
- three power feeds: valves, pump and microprocessor
- brake switch
- traction control switch

The CAB outputs include the following:

- ABS warning indicator actuation
- 12 volts power to wheel speed sensors
- eight valves
- ten valves with traction control
- diagnostic communication
- PCI bus communication
- traction control lamp illumination

3.4.3 HYDRAULIC CONTROL UNIT

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

Valve Block Assembly: The valve block assembly contains valves with four inlet valves and four 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 wheel. If a wheel detects slip, the inlet valve is closed to prevent and further pressure increase. Then the outlet valve is opened to release the pressure to the accumulators until the wheel is no longer slipping. Once the wheel is no longer slipping, the outlet valve is closed and the inlet valve is opened to reapply pressure. If the wheel is decelerating within its predetermined limits (proper slip ratio), the inlet valve will close to hold the pressure constant. On vehicles which are equipped with a traction control system, there are two additional valves that isolate the master cylinder and rear wheels. During a traction control event the brakes are applied to reduce wheel slippage.

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 may turn on the pump motor when an antilock stop is detected. The pump continues to run during the antilock stop and is turned off after the stop is complete. Under some conditions, the pump motor will run to drain the accumulators during the next drive off. The CAB monitors the pump motor operation internally.

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

3.4.4 ABS SWITCHES/SENSORS

Master Cylinder: The master cylinder is a standard tandem compensating port design for ABS and non ABS systems. Traction control vehicles use a dual center port master cylinder. For proper traction control operation the standard master cylinder must not be used.

A fluid level switch is located in the master cylinder fluid reservoir. The switch closes when a low fluid level is detected. The fluid level switch

turns on the brake warning indicator by grounding the indicator circuit. This switch does not disable the ABS system.

Wheel Speed Sensors and Tone Wheels: One active wheel speed sensor (WSS) is located at each wheel and sends a small signal to the control module (CAB). This signal is generated when a toothed sensor ring (tone wheel) passes by a stationary wheel speed sensor. The CAB converts the signals into digital signals for each wheel.

Because of internal circuitry, correct wheel speed sensor function cannot be determined by a continuity or resistance check through the sensor.

The front wheel speed 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 though the bearing cover and the rear tone wheel is an integral part of the rear bearing hub. The wheel speed sensor air gap is not adjustable. Refer to the service manual for wheel speed sensor air gap and resistance specifications.

The four wheel speed sensors are serviced individually. The front tone wheels are serviced as an assembly with the outer constant velocity (C.V.) joint housing. The rear tone wheels are serviced as an assembly.

Correct antilock system operation is dependent on tone wheel speed signals from the wheel speed sensors. The vehicle's wheels and tires should all be the same size and type to generate accurate signals. In addition, the tires should be inflated to the recommended pressure for optimum system operation. Variation in wheel and tire size or significant variations in inflation pressure can produce inaccurate wheel speed signals; however, the system will continue to function when using the mini-spare.

3.4.5 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 systems.

Between 8-17 km/h (5-10 mph), a dynamic test is performed. This will momentarily cycle the inlet and outlet valves, check wheel speed sensor circuitry, and run the pump motor at 25 km/h (15 mph). The CAB will try to test the pump motor. If the brake pedal is applied the test will be run at 40 km/h (24 mph) regardless of brake switch state. If, during the dynamic test, the brake pedal is applied, the driver may feel the test through brake pedal pulsations. This is a normal condition.

If any component exhibits a trouble condition during system initialization or dynamic check, the CAB will illuminate the ABS warning indicator and TRAC OFF lamp if equipped.

3.4.6 ABS DIAGNOSTIC MODE

To enter diagnostic mode, a vehicle speed must be below 10 km/h (6 mph) and no ABS condition present. If vehicle speed is not below 10 km/h (6 mph), a "No Response" message could be displayed by the DRBIII®. The following are characteristics of diagnostic mode:

- The amber ABS warning indicator will blink rapidly (about 1/2 second ON and 1/2 second OFF). If a hard trouble code, such as Valve Power Feed Failure code is present, the indicator will be illuminated without blinking until the trouble condition is cleared.
- Antilock operation is disabled.
- The HCU valves cannot be actuated when the vehicle speed is above 8 km/h (5 mph). If valve actuation is attempted above 8 km/h (5 mph), a "No Response" message will be displayed on the DRBIII®.

3.4.7 TRACTION CONTROL OPERATION

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

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

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

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

If at any time the brake pedal is applied during a traction control cycle, the brake lamp switch will trigger the CAB to switch off the traction control.

The traction control system will be enabled at each ignition cycle. It may be turned off by depressing the Traction Control Switch. The traction control system function lamp will illuminate "TRAC OFF" immediately upon depressing the traction control switch button. Only the "TRAC" portion of the "TRAC OFF" indicator will illuminate during a traction control event.

If the CAB calculates that the brake temperatures are high, the traction control system will

become inoperative until a time-out period has elapsed. When in this thermal protection mode, the traction control "TRAC OFF" lamp will illuminate; however, a fault will not be registered.

3.5 DIAGNOSTIC TROUBLE CODES

The Controller Antilock Brake may report any of several Diagnostic Trouble Codes (DTC)s. For a list of the DTCs diagnosed in this manual, refer to the Table of Contents.

3.6 DRBIII® ERROR MESSAGES AND BLANK SCREEN

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. 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.
```

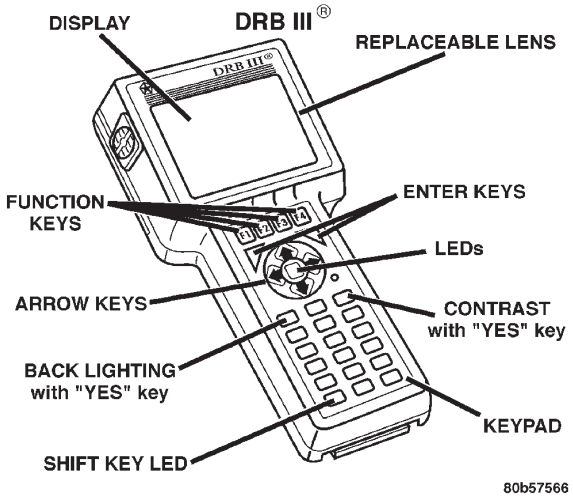
3.6.1 DRBIII® DOES NOT POWER UP

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 connector cavity 16). A minimum of 11 volts is required to adequately power the DRBIII®.

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

3.6.2 DISPLAY IS NOT VISIBLE

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



4.0 DISCLAIMERS, SAFETY, WARNINGS

4.1 DISCLAIMERS

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

4.2 SAFETY

4.2.1 TECHNICIAN SAFETY INFORMATION

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

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

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

When diagnosing a chassis 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 performing diagnostic tests.

4.2.2 VEHICLE PREPARATION FOR TESTING

Make sure the vehicle being tested has a fully charged battery. If is does not, false diagnostic codes or error messages may occur.

4.2.3 SERVICING SUB-ASSEMBLIES

Some components of the chassis system are intended to be serviced as an assembly only. Attempting to remove or repair certain system subcomponents 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 SPECIFICATION LIMITS.

- Follow the vehicle manufacturer's service specifications at all times.
- Do not use the DRBIII® if it has been damaged.
- Do not use the test leads if the insulation is damaged or if metal is exposed.
- To avoid electrical shock, do not touch the test leads, tips, or the circuit being tested.
- Choose the proper range and functions for the measurement. Do not try voltage or current measurements that may exceed the rated capacity.
- Do not exceed the limits shown in the table below:

FUNCTION	INPUT LIMIT
Volts	0 - 500 peak volts AC 0 - 500 volts DC
Ohms (resistance)*	0 -1.12 megohms
Frequency Measured Frequency Generated	0 - 10 kHz
Temperature	-58 - 1100°F -50 - 600°C

* Ohms cannot be measured if voltage is present. Ohms can be measured only in a non-powered circuit.

- Voltage between any terminal and ground must not exceed 500v DC or 500v peak AC.
- Use caution when measuring voltage above 25v DC or 25v AC.
- Use the low current shunt to measure circuits up to 10A. Use the high current clamp to measure circuits exceeding 10A.
- When testing for the presence of voltage or current, make sure the meter is functioning correctly. Take a reading of a known voltage or current before accepting a zero reading.
- When measuring current, connect the meter in series with the load.
- Disconnect the live test lead before disconnecting the common test lead.
- When using the meter function, keep the DRBIII® away from spark plug or coil wires to avoid measuring error from outside interference.

4.3 WARNINGS

4.3.1 VEHICLE DAMAGE WARNINGS

Before disconnecting any control module, make sure the ignition is "off". Failure to do so could damage the module.

When testing voltage or continuity at any control module, use the terminal side (not the wire end) of the connector. Do not probe a wire through the insulation, this will damage it and eventually cause it to fail because of corrosion.

Be careful when performing electrical tests so as to prevent accidental shorting of terminals. Such mistakes can damage fuses or components. Also, a second code could be set, making diagnosis of the original problem more difficult.

4.3.2 ROAD TESTING A COMPLAINT VEHICLE

Some complaints will require a test drive as part of the repair verification procedure. The purpose of the test drive is to try to duplicate the diagnostic code or symptom condition.

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

4.4 DIAGNOSIS

1. Your diagnostic test procedure must begin with a thorough visual inspection of the system in question for damaged components or disconnected

connectors. For ABS the brake lamps must be operational prior to continuing.

2. Connect the DRBIII® to the data link connector, which is located under the dash to the left of the steering column. If the DRBIII® does not power up, check the power and ground supplies to the connector.
3. Turn the ignition on. Select the system in question. If the DRBIII® displays "No Response" condition you must diagnose that first.
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 DTC's are present, proceed to the appropriate test by locating the matching test in the Table of Contents and begin to diagnose the symptom.
5. For ABS if there are no diagnostic trouble codes present, identify the customer complaint. 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 by locating the matching test in the Table of Contents and begin to diagnose the symptom. If a problem exists with the yellow "ABS" warning indicator or the red "Brake" indicator exists, refer to the proper tests by locating the matching test in the Table of Contents and begin to diagnose the symptom. Read the traction control switch input as you press and release the switch. If the display does not match the state of the indicator perform the proper test by locating the matching test in the Table of Contents and begin to diagnose the symptom.
6. If no other problems are found, it will be necessary to road test the vehicle. Perform several antilock stops from above 50 Km/h (30 mph) and then repeat step 4. If any diagnostic trouble codes are present, proceed to the appropriate test.
7. The following conditions should be considered "NORMAL" operation, and no repairs should be attempted to correct them.
   - Brake pedal feedback during an ABS stop (clicking, vibrating).
   - Clicking, groaning or buzzing at 25 Km/h (15 mph) or 40 Km/h (24 mph) (drive off self test).
   - Groaning noise during an ABS stop.
   - Slight brake pedal drop and pop noise when ignition is initially turned on.
   - Brake pedal ratcheting down at the end of an ABS stop.
8. If the complaint is ABS "cycling" at the end of a stop at low speeds, it may be caused by a marginal wheel speed sensor signal. The sensor air gap, tone wheel condition, and/or brakes hanging up are possible causes of this condition.
9. After a road test in which no problems were found, refer to any Technical Service Bulletins that may apply.

5.0 REQUIRED TOOLS AND EQUIPMENT

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

6.0 GLOSSARY OF TERMS

ABS	antilock brake system
APM	adjustable pedals module
CAB	controller antilock brake
DLC	data link connector
DRB	diagnostic read-out box
DTC	diagnostic test code
HCU	hydraulic control unit
ICU	integrated control unit
JBLK	junction block
PCI	programmable communication interface
PDC	power distribution center
P/M	pump motor
WSS	wheel speed sensor

NOTES

7.0

DIAGNOSTIC INFORMATION AND PROCEDURES

Symptom List:

BCM WAKE UP RESPONSE FAILURE
BROKEN CABLE
ECU FAILURE
EE PROM WRITE/READ FAILURE
HALL FEED BACK OPEN
HALL FEED BACK SHORT TO BATTERY
HALL FEEDBACK SHORT TO GROUND
HALL HIGH FREQUENCY FAILURE
HALL MECHANICAL FAILURE
INTERNAL START UP FAILURE
INTERNAL WAKE UP FAILURE
LOOP BACK FAILURE
MOTOR ARMATURE OPEN
MOTOR ARMATURE SHORT TO BATTERY
MOTOR CONTROL INPUT FAULT
MOTOR OUTPUT SHORT TO BATTERY
MOTOR OUTPUT SHORT TO GROUND
MOTOR THERMAL FAULT
PEDAL SENSOR REVERSE FAILURE
RAM CHECK FAILURE
ROM CHECK FAILURE
THERMAL PROTECTION OPEN

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be BCM WAKE UP RESPONSE FAILURE.

When Monitored and Set Condition:

BCM WAKE UP RESPONSE FAILURE

When Monitored: When Adjustable Pedals Module is awakened.

Set Condition: When the module fails to receive a response from the BCM.

BROKEN CABLE

When Monitored: Key ON.

Set Condition: When the module detects lower than expected motor current draw.

ECU FAILURE

When Monitored: When the Adjustable Pedals module enters the Sleep State.

Set Condition: When the module fails a self-test.

BCM WAKE UP RESPONSE FAILURE — Continued

EE PROM WRITE/READ FAILURE

When Monitored: During a module Write function.

Set Condition: When the module self-test detects an incorrect Read after a Write.

HALL FEED BACK OPEN

When Monitored: When the Adjustable pedals module is awake.

Set Condition: When the module detects a Hall Sensor circuit fault. (Voltage between 2.4 - 3.2 V)

HALL FEED BACK SHORT TO BATTERY

When Monitored: When the Adjustable Pedals module is awake.

Set Condition: When the Adjustable Pedals module detects a Hall Sensor feedback circuit voltage greater than 4.55 V.

HALL FEEDBACK SHORT TO GROUND

When Monitored: When the Adjustable Pedals module is awake.

Set Condition: When the module detects a Hall Sensor feedback circuit voltage is less than 0.1 V.

HALL HIGH FREQUENCY FAILURE

When Monitored: Anytime motion takes place.

Set Condition: When the module detects a Hall Sensor circuit fault. (More than 3 counts/49 ms.)

HALL MECHANICAL FAILURE

When Monitored: Anytime motion takes place.

Set Condition: When the module detects a Hall Sensor circuit fault. (Less than 2 counts in 497 ms.)

INTERNAL START UP FAILURE

When Monitored: Key ON.

Set Condition: When the module self test detects an internal fault.

INTERNAL WAKE UP FAILURE

When Monitored: At module wake up.

Set Condition: When the module self test detects an internal fault.

LOOP BACK FAILURE

When Monitored: When the Adjustable Pedals module is unable to transmit messages or prior to log in missing messages.

Set Condition: When the Adjustable Pedals module detects an internal fault.

BCM WAKE UP RESPONSE FAILURE — Continued

MOTOR ARMATURE OPEN

When Monitored: Anytime the Adjustable Pedals module is awake.

Set Condition: When the module detects a fault in the motor armature circuit.

MOTOR ARMATURE SHORT TO BATTERY

When Monitored: Anytime the Adjustable Pedals module is awake.

Set Condition: When the module detects a fault in the motor circuitry

MOTOR CONTROL INPUT FAULT

When Monitored: Anytime pedal motion takes place..

Set Condition: When the module detects a fault in the motor driver circuitry

MOTOR OUTPUT SHORT TO BATTERY

When Monitored: Anytime the Adjustable Pedals module is awake.

Set Condition: When the module detects a fault in the motor circuitry

MOTOR OUTPUT SHORT TO GROUND

When Monitored: Anytime the Adjustable Pedals module is awake.

Set Condition: When the module detects a fault in the motor circuitry

MOTOR THERMAL FAULT

When Monitored: Key ON.

Set Condition: When the module detects a fault in the motor circuitry

PEDAL SENSOR REVERSE FAILURE

When Monitored: Anytime pedal motion takes place.

Set Condition: When the module detects a Pedal Sensor Reverse circuit failure.

RAM CHECK FAILURE

When Monitored: Anytime the Adjustable Pedals module is awake.

Set Condition: When the module self test detects a RAM failure.

ROM CHECK FAILURE

When Monitored: Anytime the Adjustable Pedals module is awake.

Set Condition: When the module self test detects a ROM failure.

THERMAL PROTECTION OPEN

When Monitored: Key ON. Within 1 second of time motor stops functioning.

Set Condition: When the module self test detects an internal thermal protection sensor open (triggered).

BCM WAKE UP RESPONSE FAILURE — Continued

POSSIBLE CAUSES
ACTIVE DTC PRESENT
ADJUSTABLE PEDALS MODULE INTERNAL FAULT
INTERMITTENT DTC

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, record and erase DTC's. With the DRBIII®, read DTCs. Does the DRBIII® display any additional DTCs? Does the DRBIII® display the original DTC? Yes → Replace and program the Adjustable Pedals Module in accordance with the Service Information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
BUS HIGH

When Monitored and Set Condition:

BUS HIGH

When Monitored: When the Adjustable Pedals module is awake.

Set Condition: When the module detects the bus shorted to voltage.

POSSIBLE CAUSES
ADJUSTABLE PEDALS MODULE INTERNAL FAULT
INTERMITTENT DTC

TEST	ACTION	APPLICABILITY
1	**NOTE: That the module can be queried indicates the bus is OK and an active DTC is false.** With the DRBIII®, erase DTCs. With the DRBIII®, read DTCs. Does the DRBIII® display the DTC as active? Yes → Replace and program the Adjustable Pedals Module in accordance with the Service Information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom List:

BUS INTEGRITY FAILURE
NO COMMUNICATION WITH BCM
NO COMMUNICATION WITH EATX
NO COMMUNICATION WITH FCM
NO COMMUNICATION WITH SBEC

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be BUS INTEGRITY FAILURE.

When Monitored and Set Condition:

BUS INTEGRITY FAILURE

When Monitored: When the Adjustable Pedals module is awake.

Set Condition: When the module detects no bus communication.

NO COMMUNICATION WITH BCM

When Monitored: When the Adjustable Pedals module is awake and not doing diagnostics.

Set Condition: When the module detects no communication with the BCM.

NO COMMUNICATION WITH EATX

When Monitored: When the Adjustable Pedals module is awake and key position is correct to receive messages.

Set Condition: When the module detects no communication with the EATX.

NO COMMUNICATION WITH FCM

When Monitored: When the Adjustable Pedals module is awake and the key position is correct to receive messages.

Set Condition: When the module detects no communication with the FCM.

NO COMMUNICATION WITH SBEC

When Monitored: When the Adjustable Pedals module is awake and the key position is correct to receive messages.

Set Condition: When the module detects no communication with the SBEC.

POSSIBLE CAUSES
ACTIVE DTC PRESENT
INTERMITTENT DTC

BUS INTEGRITY FAILURE — Continued

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, record and erase DTC's. With the DRBIII®, read DTCs. Does the DRBIII® display the NO COMMUNICATION DTC as active? Yes → Refer to symptom list for problems related to Communication. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:

BUS LOW

When Monitored and Set Condition:

BUS LOW

When Monitored: Key ON.

Set Condition: When the module detects the bus shorted to ground.

POSSIBLE CAUSES
ADJUSTABLE PEDALS MODULE INTERNAL FAULT
INTERMITTENT DTC

TEST	ACTION	APPLICABILITY
1	**NOTE: That the module can be queried indicates the bus is OK and an active DTC is false.** With the DRBIII®, record and erase DTC's. With the DRBIII®, read DTCs. Does the DRBIII® display the DTC as active? Yes → Replace and program the Adjustable Pedals Module in accordance with the Service Information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom List:

IOD OVER VOLTAGE
IOD UNDER VOLTAGE
IOD UNDER VOLTAGE PLAUSIBILITY

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be IOD OVER VOLTAGE.

When Monitored and Set Condition:

IOD OVER VOLTAGE

When Monitored: Anytime the Adjustable Pedals Module is awake.

Set Condition: When the Adjustable Pedals Module detects vehicle voltage above 17.5 V DC.

IOD UNDER VOLTAGE

When Monitored: Any time that the module is awake.

Set Condition: When the APM detects a Vehicle Battery Voltage less than 6.5 V DC for 200 ms.

IOD UNDER VOLTAGE PLAUSIBILITY

When Monitored: Whenever the module is awake

Set Condition: When the APM detects a vehicle voltage below 6.5 V DC for more than 200 milliseconds.

POSSIBLE CAUSES
VEHICLE VOLTAGE LOW
IOD CIRCUIT HIGH RESISTANCE
APM -- IOD VOLTAGE LOW
VEHICLE VOLTAGE HIGH
APM -- IOD VOLTAGE HIGH
INTERMITTENT DTC

IOD OVER VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, record and erase DTC's. With the DRBIII®, read DTCs. Does the DRBIII® display an IOD Voltage DTC? Yes-IOD Undervoltage or IOD Plausability Go To 2 Yes - IOD Overvoltage Go To 4 No → Go To 5	All
2	With the DRBIII®, read the vehicle voltage status. Does the DRBIII® display a vehicle voltage concern? Yes → Refer to Charging information for the related symptom(s). Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Go To 3	All
3	Disconnect the Adjustable Pedals Module harness connector. Using a 12-volt test light connected to ground, check the IOD circuit. Does the test light illuminate brightly? Yes → Replace and program the Adjustable Pedals Module in accordance with the Service Information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Repair the IOD circuit for an open or a short to ground. Refer to the Wiring Diagrams for circuits common to the IOD fuse. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All
4	With the DRBIII®, read the vehicle voltage status. Does the DRBIII® display a vehicle voltage above 17.5 volts? 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
5	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom List:

LINEAR SENSOR FEEDBACK OPEN
LINEAR SENSOR FEEDBACK SHORT TO BATTERY
LINEAR SENSOR SUPPLY SHORT TO BATTERY
LINEAR SENSOR SUPPLY SHORT TO GROUND

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be LINEAR SENSOR FEEDBACK OPEN.

When Monitored and Set Condition:

LINEAR SENSOR FEEDBACK OPEN

When Monitored: Anytime the Adjustable Pedals Module is awake.

Set Condition: When the APM detects less than 0.3 V on the feedback circuit through the pedal position sensor.

LINEAR SENSOR FEEDBACK SHORT TO BATTERY

When Monitored: Anytime the Adjustable Pedals Module is awake.

Set Condition: When the APM detects a short to battery greater than 4.7 V on the Pedal Position Sensor Feedback circuit.

LINEAR SENSOR SUPPLY SHORT TO BATTERY

When Monitored: Anytime the Adjustable Pedals Module is awake.

Set Condition: When the APM detects a short to battery greater than 5.3 V on the Pedal Position Sensor Supply circuit.

LINEAR SENSOR SUPPLY SHORT TO GROUND

When Monitored: Anytime the Adjustable Pedals Module is awake.

Set Condition: When the APM detects the Adjustable Pedals Sensor Supply circuit voltage as less than 4.7 V.

POSSIBLE CAUSES
PEDAL POSITION SENSOR - INTERNAL
ADJUSTABLE PEDALS MODULE- INTERNAL FAULT
INTERMITTENT DTC

LINEAR SENSOR FEEDBACK OPEN — Continued

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTCs. With the DRBIII®, read DTCs. Does the DRBIII® display a Linear Sensor DTC? Yes → Go To 2 No → Go To 3	All
2	Disconnect the Adjustable Pedals Module harness connector. **NOTE: The sum of the measurements must be between 4k and 6k ohms.** On the Pedal Position Sensor, measure the resistance from pin 1 to 2 and from 2 to 3. Is the sum of the measurements within specification? Yes → Replace the Adjustable Pedals Module. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Replace the Pedal Position Sensor. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom List:

MEMORY 1 FAILURE
MEMORY 2 FAILURE
MEMORY 3 FAILURE
MEMORY 4 FAILURE
***CAN'T SET/RECALL MEMORY POSITION**

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be MEMORY 1 FAILURE.

When Monitored and Set Condition:

MEMORY 1 FAILURE

When Monitored: When there is an attempt to set or recall a memory position.

Set Condition: When the Adjustable Pedals module fails an internal memory data check.

MEMORY 2 FAILURE

When Monitored:

Set Condition: .

POSSIBLE CAUSES
ACTIVE DTC
APM - MEMORY FUNCTION
MEMORY SEAT MIRROR MODULE

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, record and erase DTC's. Wait 5 seconds and with the DRBIII®, read DTC's. Does the DRBIII® display any active Adjustable Pedals or Communication DTC? Yes → Refer to symptom list for problems related to the displayed symptom(s). Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Go To 2	All

MEMORY 1 FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Attempt to set and recall seat and mirror positions using the memory function. Does the memory function work OK for the seats and mirrors? Yes → Replace and program the Adjustable Pedals Module in accordance with the Service Information.. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Replace and program the Memory Seat Mirror Module in accordance with the Service Information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All

Symptom:
PEDAL SWITCH OPEN

When Monitored and Set Condition:

PEDAL SWITCH OPEN

When Monitored: Anytime the Adjustable Pedals Module is awake.

Set Condition: When the Adjustable Pedals Module detects higher than expected resistance on the Switch Sense circuit and the Switch Ground circuit.

POSSIBLE CAUSES
ADJUSTABLE PEDALS MODULE INTERNAL FAULT
ADJUSTABLE PEDALS SWITCH CIRCUITS OPEN
INTERMITTENT DTC
ADJUSTABLE PEDALS SWITCH OPEN

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTC's. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display PEDAL SWITCH OPEN DTC active? Yes → Go To 2 No → Go To 4	All
2	Disconnect the Adjustable Pedals Module harness connector. At each switch position, measure the resistance between the Switch Sense and Sense Ground circuits. Is the resistance above 24.6k ohms at any switch position? Yes → Go To 3 No → Replace and program the Adjustable Pedals Module in accordance with the Service Information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All
3	Disconnect the Adjustable Pedals Switch harness connector. Disconnect the Adjustable Pedals Module harness connector. Measure the resistance of the Switch Sense and Switch Ground circuits. Is the resistance below 5.0 ohms? Yes → Replace the Adjustable Pedals Switch. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Repair the Adjustable Pedal Switch circuit open. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All

PEDAL SWITCH OPEN — Continued

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

Symptom:
PEDAL SWITCH SHORTED

When Monitored and Set Condition:

PEDAL SWITCH SHORTED

When Monitored: Anytime the Adjustable Pedals Module is awake.

Set Condition: When the Adjustable Module detects a short to battery, short to ground or less than expected resistance on the Switch Sense and the Switch Ground circuits.

POSSIBLE CAUSES
ADJUSTABLE PEDALS MODULE INTERNAL FAULT
ADJUSTABLE PEDALS SWITCH CIRCUITS SHORTED
INTERMITTENT DTC
ADJUSTABLE PEDALS SWITCH SHORTED

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTC's. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display PEDAL SWITCH SHORTED DTC active? Yes → Go To 2 No → Go To 4	All
2	Disconnect the Adjustable Pedals Module harness connector. Check the Switch Sense and Ground circuits for short to battery and short to ground. At each switch position, measure the resistance between the Switch Sense and Switch Ground circuits. **NOTE: A short to ground is any resistance less than 1M ohm.** Is any circuit shorted or is resistance below 1.0k ohm at any switch position? Yes → Go To 3 No → Replace and program the Adjustable Pedals Module in accordance with the Service Information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All
3	Disconnect the Adjustable Pedals Switch harness connector. Disconnect the Adjustable Pedals Module harness connector. Check the Switch Sense and Switch Ground circuits for a short to battery, ground and to each other. Is either circuit shorted? Yes → Repair the Adjustable Pedals Switch circuit short. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Replace the Adjustable Pedals Switch. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All

PEDAL SWITCH SHORTED — Continued

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

Symptom:
PEDAL SWITCH STUCK FORWARD

POSSIBLE CAUSES
ADJUSTABLE PEDALS MODULE INTERNAL FAULT
SWITCH FAILURE
INTERMITTENT DTC

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTC's. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display PEDAL SWITCH STUCK FWD DTC active? Yes → Go To 2 No → Go To 3	All
2	Disconnect the Adjustable Pedals switch connector. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display PEDAL SW STUCK FORWARD DTC active? Yes → Replace and program the Adjustable Pedals Module in accordance with the Service Information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Replace the Adjustable Pedals Switch. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:

PEDAL SWITCH STUCK REARWARD

POSSIBLE CAUSES
ADJUSTABLE PEDALS MODULE INTERNAL FAULT
SWITCH FAILURE
INTERMITTENT DTC

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTC's. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display PEDAL SWITCH STUCK RWD DTC active? Yes → Go To 2 No → Go To 3	All
2	Disconnect the Adjustable Pedals switch connector. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display PEDAL SWITCH STUCK RWD DTC active? Yes → Replace and program the Adjustable Pedals Module in accordance with the Service Information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Replace the Adjustable Pedals Switch. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
*CAN'T ADJUST PEDALS

POSSIBLE CAUSES
ACTIVE DTC
GROUND OR BATTERY FAULT
VEHICLE IN CRUISE OR REVERSE
SWITCH FAULT
ADJUSTABLE PEDALS MODULE FAULT

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTCs. With the DRBIII®, read DTCs. Are there any active DTCs? Yes → Refer to symptom list for problems related to the DTC(s) displayed. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Go To 2	All
2	**NOTE: The Adjustable Pedals will not operate when the vehicle is in Reverse or when Cruise Control is enabled.** With the DRBIII® in Inputs/Outputs, read the EATX in Rev and the Cruise Control Enabled state. Does the DRBIII® display the EATX in Rev or Cruise Control Enabled? Yes → Correct the Cruise or Reverse condition. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Go To 3	All
3	Disconnect the Adjustable Pedals Switch harness connector. Measure the resistance of the Switch at each switch position. Expected Resistance: Neutral: 16.4k - 24.6k ohms Forward: 960 - 1440 ohms Aft: 2340 - 2860 ohms Are the resistances within specification? Yes → Go To 4 No → Replace the Adjustable pedals Switch. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All

*CAN'T ADJUST PEDALS — Continued

TEST	ACTION	APPLICABILITY
4	Disconnect the Adjustable Pedals Module harness connector. Using a 12-volt test light connected to ground, check the Fused B+ circuit. Using a 12-volt test light connected to 12-volts, check the Ground circuit. Are the Fused B+ and Ground circuits OK? Yes → Replace and program the Adjustable Pedals Module in accordance with the Service Information. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1. No → Repair the system ground or battery concern. Perform ADJUSTABLE PEDALS VERIFICATION TEST - VER 1.	All

Symptom:

BUS SYSTEM COMMUNICATION FAILURE

When Monitored and Set Condition:

BUS SYSTEM COMMUNICATION FAILURE

When Monitored: Ignition ON, every 7 ms.

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

POSSIBLE CAUSES
SHORT TO BATTERY OR SHORT TO GROUND
CAB-- INTERNAL FAULT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, attempt to communicate with the MIC Was the DRB able to I/D or communicate with the MIC? Yes → Test Complete. No → Repair the PCI Bus circuit for a short to voltage or a short to ground. Perform ABS VERIFICATION TEST - VER 1.	All

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
CAB - INTERNAL CONCERN

TEST	ACTION	APPLICABILITY
1	The only possible cause is a CAB internal concern. If there are no possible causes remaining, view repair. View repair. Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All

Symptom:
CLUSTER LAMP FAILURE

When Monitored and Set Condition:

CLUSTER LAMP FAILURE

When Monitored: Key ON. After Key-ON bulb check.

Set Condition: When the instrument cluster informs the CAB that the cluster cannot turn on the ABS Lamp.

POSSIBLE CAUSES
CLUSTER DTC PRESENT
CLUSTER INTERNAL FAULT
CAB -- NO ABS INDICATOR MESSAGE
CAB -- ABS INDICATOR FAULT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Are there any Instrument Cluster DTCs present? Yes → Refer to the INSTRUMENT CLUSTER category for the related symptom(s). Perform ABS VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition off. Observe the instrument cluster indicators. Turn the ignition on. Did the ABS Indicator illuminate for several seconds and then go out? Yes → Go To 3 No → Go To 4	All
3	**NOTE: The DRBIII® communication with the CAB must be operational for the result of this test to be valid.** Turn the ignition off. Remove Fuse 21 (ABS valve power) from the IPM. Perform the Key-on Bulb Check. Does the ABS Indicator remain on after the bulb check? Yes → Test Complete. No → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All

CLUSTER LAMP FAILURE — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: The purpose of this test is to perform the Instrument Cluster self test.** Turn the ignition off. Depress and hold the Odometer Reset Button. Turn the Key from OFF to ON and then back to OFF. Release the Odometer Reset Button. Do the Instrument Cluster Indicators and Gauges activate and deactivate? Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Instrument Cluster in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	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 every 7 milliseconds (ms).

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

LEFT REAR SENSOR CIRCUIT FAILURE

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

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

RIGHT FRONT SENSOR CIRCUIT FAILURE

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

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

RIGHT REAR SENSOR CIRCUIT FAILURE

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

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

POSSIBLE CAUSES
SENSOR OR CONNECTOR DAMAGE
WHEEL SPEED SENSOR FAULT
SENSOR CIRCUITS SHORTED OR OPEN

LEFT FRONT SENSOR CIRCUIT FAILURE — Continued

POSSIBLE CAUSES
CAB - INTERNAL FAULT
INTERMITTENT CIRCUIT DTC

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, record and erase DTC's. Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display a Wheel Speed Sensor Circuit Failure DTC? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Inspect the affected Wheel Speed Sensor and Connector. Is the Sensor or Connector Damaged? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the affected Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn the ignition on. Using a 12-volt test light connected to ground, check the Sensor 12 volt Supply circuit. Measure the resistance between ground and the Sensor Signal circuit. Was the test light bright and the resistance between 100 and 300 ohms? Yes → Replace the Wheel Speed Sensor in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Disconnect the affected Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Turn the ignition on. Check the Wheel Speed Sensor 12 volt Supply and Signal circuits for a short to battery, ground, to each other and for an open. For the purposes of this test, a short to ground must be below 15k ohms. Was any circuit short or open found? Yes → Repair the Wheel Speed Sensor circuit short or open. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All

LEFT FRONT SENSOR CIRCUIT FAILURE — Continued

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

Symptom:
LEFT FRONT WHEEL SPEED SIGNAL FAILURE

When Monitored and Set Condition:

LEFT FRONT WHEEL SPEED SIGNAL FAILURE

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

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

POSSIBLE CAUSES
SENSOR OR TONE WHEEL CONCERN
CAB SETTING FALSE DTC
LEFT FRONT WHEEL SPEED SENSOR INOPERATIVE
INTERMITTENT SIGNAL DTC

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTCs. Turn the ignition off. Start the engine. With an assistant to drive, use the DRBIII® to monitor all wheel speed sensors. Using the DRBIII®, monitor the Left Front Wheel Speed Sensor while an assistant drives the vehicle. Slowly accelerate as straight as possible from a stop to 24 km/h (15 mph). Is Left Front WSS Signal 0 km/h (0 mph) or differing from others by more than 5 km/h (3 mph)? Yes → Go To 2 No → Go To 3	All
2	Inspect the Left Front Wheel Speed Sensor, Connector and Tone Wheel. **NOTE: Inspect components for damage, correct installation and sensor/tone wheel air gap.** Are there any visible Sensor, Connector or Tone Wheel concerns? Yes → Correct the sensor, connector or tone wheel concern as necessary. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Left Front Wheel Speed Sensor in accordance with the Service Information. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1.	All

LEFT FRONT WHEEL SPEED SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, read DTCs. Did the DTC reoccur? Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Visually inspect wheel speed sensor. Visually inspect tone wheel. Visually inspect wiring harness. Visually inspect brakes for locking up due to lining contamination or overheating. Inspect all Components for defects which may cause a Signal DTC to set. Is any Component Damaged? Yes → Repair as necessary. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
LEFT REAR WHEEL SPEED SIGNAL FAILURE

When Monitored and Set Condition:

LEFT REAR WHEEL SPEED SIGNAL FAILURE

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

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

POSSIBLE CAUSES
SENSOR OR TONE WHEEL CONCERN
CAB SETTING FALSE DTC
LEFT REAR WHEEL SPEED SENSOR INOPERATIVE
INTERMITTENT SIGNAL DTC

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTCs. Turn the ignition off. Start the engine. Slowly accelerate as straight as possible from a stop to 24 km/h (15 mph). Using the DRBIII®, monitor the Left Rear Wheel Speed Sensor while an assistant drives the vehicle. With the DRBIII®, monitor all wheel speed sensors. Is Left Rear WSS Signal 0 km/h (0 mph) or differing from others by more than 5 km/h (3 mph)? Yes → Go To 2 No → Go To 3	All
2	Inspect the Left Rear Wheel Speed Sensor, Connector and Tone Wheel. **NOTE: Inspect components for damage, correct installation and sensor/tone wheel air gap.** Are there any visible Sensor, Connector or Tone Wheel concerns? Yes → Correct the sensor, connector or tone wheel concern as necessary. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Left Rear Wheel Speed Sensor in accordance with the Service Information. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1.	All

LEFT REAR WHEEL SPEED SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, read DTCs. Did the DTC reoccur? Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Visually inspect wheel speed sensor. Visually inspect tone wheel. Visually inspect wiring harness. Visually inspect brakes for locking up due to lining contamination or overheating. Inspect all Components for defects which may cause a Signal DTC to set. Is any Component Damaged? Yes → Repair as necessary. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	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 every 7 milliseconds.

Set Condition: The DTC is stored when the CAB detects: 1) Improper voltage decay after the pump was turned off. 2) Pump not energized by the CAB, but voltage is present for 3.5 seconds. 3) Pump is turned on by the CAB, but without sufficient voltage to operate it.

POSSIBLE CAUSES
PUMP HARNESS DISCONNECTED
CAB - PUMP MOTOR RUNNING CONTINUOUSLY
ABS PUMP MOTOR INTERMITTENT DTC
GROUND CIRCUIT HIGH RESISTANCE
FUSED B(+) CIRCUIT OPEN
GROUND CIRCUIT OPEN
CAB - INTERNAL FAULT
CAB - SETTING FALSE CODE

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Turn the ignition on. Monitor the pump motor for continuous operation. Is the pump motor running continuously? Yes → Replace the Controller Anti-Lock Brake in accordance with the Service Information. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition on. With the DRBIII®, read DTC's. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. With the DRBIII®, actuate the ABS pump motor. Did the Pump Motor operate when actuated? Yes → Go To 3 No → Go To 4	All

PUMP CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	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 connecter is secure. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Controller Anti-Lock Brake in accordance with the Service Information. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1.	All
4	Check the short Wiring Harness between the ABS Pump and the CAB. Check for disconnect and damage. Is the harness disconnected or damaged? Yes → Reconnect or repair the Pump Harness as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Turn the ignition on. Using a 12-volt test light connected to ground, check the Pump Motor Fused B+ circuit. Does the test light illuminate brightly? Yes → Go To 6 No → Repair the Fused B(+) circuit for an open. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Disconnect CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the CAB ground circuits. Is the resistance below 1.0 ohm? Yes → Go To 7 No → Repair the ground circuit for an open. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1.	All

PUMP CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
7	Make sure the Pump Motor connector is secure. Turn the ignition on. With the DRBIII®, enable pump motor actuation. **NOTE: Pump motor will not operate, but voltage will be applied.** Measure the voltage drop across the ABS ground circuit connection, with pump motor actuation enabled. Is the voltage below 0.1 volt? Yes → Go To 8 No → Repair the Ground circuit for high resistance. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1.	All
8	If there are no possible causes remaining, view repair. Repair Replace the Controller Anti-Lock Brake in accordance with the Service Information. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1.	All

Symptom:
RIGHT FRONT WHEEL SPEED SIGNAL FAILURE

When Monitored and Set Condition:

RIGHT FRONT WHEEL SPEED SIGNAL FAILURE

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

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

POSSIBLE CAUSES
SENSOR OR TONE WHEEL CONCERN
CAB SETTING FALSE DTC
RIGHT FRONT WHEEL SPEED SENSOR INOPERATIVE
INTERMITTENT SIGNAL DTC

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTCs. Turn the ignition off. Start the engine. Slowly accelerate as straight as possible from a stop to 24 km/h (15 mph). Using the DRBIII®, monitor the Right Front Wheel Speed Sensor while an assistant drives the vehicle. With the DRBIII®, monitor all wheel speed sensors. Is Right Front WSS Signal 0 km/h (0 mph) or differing from others by more than 5 km/h (3 mph)? Yes → Go To 2 No → Go To 3	All
2	Inspect the Right Front Wheel Speed Sensor, Connector and Tone Wheel. **NOTE: Inspect components for damage, correct installation and sensor/tone wheel air gap.** Are there any visible Sensor, Connector or Tone Wheel concerns? Yes → Correct the sensor, connector or tone wheel concern as necessary. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Right Front Wheel Speed Sensor in accordance with the Service Information. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1.	All

RIGHT FRONT WHEEL SPEED SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, read DTCs. Did the DTC reoccur? Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Visually inspect wheel speed sensor. Visually inspect tone wheel. Visually inspect wiring harness. Visually inspect brakes for locking up due to lining contamination or overheating. Inspect all Components for defects which may cause a Signal DTC to set. Is any Component Damaged? Yes → Repair as necessary. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
RIGHT REAR WHEEL SPEED SIGNAL FAILURE

When Monitored and Set Condition:

RIGHT REAR WHEEL SPEED SIGNAL FAILURE

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

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

POSSIBLE CAUSES
SENSOR OR TONE WHEEL CONCERN
CAB SETTING FALSE CODE
RIGHT REAR WHEEL SPEED SENSOR INOPERATIVE
INTERMITTENT SIGNAL DTC

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTCs. Turn the ignition off. Start the engine. Slowly accelerate as straight as possible from a stop to 24 km/h (15 mph). Using the DRBIII®, monitor the Right Rear Wheel Speed Sensor while an assistant drives the vehicle. With the DRBIII®, monitor all wheel speed sensors. Is Right Rear WSS Signal 0 km/h (0 mph) or differing from others by more than 5 km/h (3 mph)? Yes → Go To 2 No → Go To 3	All
2	Inspect the Right Rear Wheel Speed Sensor, Connector and Tone Wheel. **NOTE: Inspect for damage, correct installation and sensor/tone wheel air gap.** Are there any visible Sensor, Connector or Tone Wheel concerns? Yes → Correct the sensor, connector or tone wheel concern as necessary. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Left Rear Wheel Speed Sensor in accordance with the Service Information. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1.	All

RIGHT REAR WHEEL SPEED SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, read DTCs. Did the DTC reoccur? Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Visually inspect wheel speed sensor. Visually inspect tone wheel. Visually inspect wiring harness. Visually inspect brakes for locking up due to lining contamination or overheating. Inspect all Components for defects which may cause a Signal DTC to set. Is any Component Damaged? Yes → Repair as necessary. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
SYSTEM OVERVOLTAGE

When Monitored and Set Condition:

SYSTEM OVERVOLTAGE

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

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

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

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

SYSTEM OVERVOLTAGE — Continued

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

Symptom:
SYSTEM UNDERVOLTAGE

When Monitored and Set Condition:

SYSTEM UNDERVOLTAGE

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

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

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

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. Start the engine. Drive the vehicle above 16 km/h (10 mph) for at least 20 seconds. Stop the vehicle With the DRBIII®, read DTC's. Does the DRBIII® display System Undervoltage DTC? Yes → Go To 2 No → Go To 5	All
2	Engine Running. Measure the battery voltage. Is the battery voltage below 10 volts? Yes → Refer to appropriate service information for charging system testing and repair. Perform ABS VERIFICATION TEST - VER 1. No → Go To 3	All
3	Disconnect the CAB harness connector. Turn the ignition on. Measure the voltage of the Fused Ignition Switch circuit. Is the voltage above 10 volts? Yes → Go To 4 No → Repair the Fused Ignition Switch Output Circuit for high resistance Perform ABS VERIFICATION TEST - VER 1.	All

SYSTEM UNDERVOLTAGE — Continued

TEST	ACTION	APPLICABILITY
4	If there are no potential causes remaining, view repair. Repair Replace the Controller Antilock Brake. Perform ABS VERIFICATION TEST - VER 1.	All
5	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:

VALVE POWER FEED FAILURE

When Monitored and Set Condition:

VALVE POWER FEED FAILURE

When Monitored: Ignition ON for at least 3.5 seconds. ABS Power Relay closed. Valve command for a particular solenoid not present.

Set Condition: Low feedback voltage from the low side of all the solenoids for over 20 consecutive controller checks spaced 5 ms apart.

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

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. Drive the vehicle above 25 km/h (15 mph) for at least 10 seconds. Stop the vehicle. With the DRBIII®, read DTC's. Does the DRBIII® display Valve Power Feed Circuit DTC present right now? Yes → Go To 2 No → Go To 9	All
2	Turn the ignition off. Remove and Inspect the ABS Fuse 21 in the IPM. Is the Fuse blown? Yes → Go To 3 No → Go To 6	All

VALVE POWER FEED FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the ABS Fuse 21 from the IPM. Disconnect the CAB harness connector. **Note: Check connector - Clean/repair as necessary.** Using a test light connected to 12 volts, probe the Fused B(+) Circuit. Does the test light illuminate brightly? Yes → Repair the Fused B(+) Circuit short to ground. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Remove the ABS Fuse 21 from the IPM. The CAB must be connected for the results of this test to be valid. Using a test light connected to 12 volts, probe the Fused B(+) Circuit at the IPM fuse terminal. Does the test light illuminate brightly? Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. If there are no potential causes remaining, view repair. Continue Replace the Fuse. Perform ABS VERIFICATION TEST - VER 1.	All
6	Remove the ABS Fuse 21 from the IPM. Turn the ignition on. Measure the voltage of the Fused B+ supply to Fuse 21 in the IPM. Is the voltage above 10 volts? Yes → Go To 7 No → Repair the B+ Supply circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Remove the ABS Fuse 21 from the IPM. Disconnect the CAB harness connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the Fused B(+) circuit between IPM Fuse terminal 21 and the CAB connector. Is the resistance below 5 ohms? Yes → Go To 8 No → Repair the Fuse B+ circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
8	If there are no possible causes remaining, view repair. Repair Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All

VALVE POWER FEED FAILURE — Continued

TEST	ACTION	APPLICABILITY
9	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:

***BRAKE LAMP SWITCH**

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

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

Symptom:

***TRAC OFF INDICATOR NEVER/ALWAYS ON**

POSSIBLE CAUSES
TRAC OFF SW GROUND OPEN
TRAC OFF SWITCH OPEN
TRAC OFF SWITCH SENSE CIRCUIT SHORT TO B+ OR OPEN
BCM -- NO TRAC OFF MESSAGE
CLUSTER INTERNAL FAULT-- TRAC OFF INDICATOR INOPERATIVE
CLUSTER-PERMANENT TRAC OFF INDICATOR
TRAC OFF SWITCH INTERNAL SHORT
TRAC OFF SWITCH SENSE CIRCUIT SHORT TO GROUND
BCM -- PERMANENT TRAC OFF MESSAGE

TEST	ACTION	APPLICABILITY
1	**Note: If any DTC's are present, they must be repaired prior to performing this test.** Turn the ignition off. Turn the ignition on. Observe the TRAC OFF indicator. Did the TRAC OFF indicator come on for several seconds then go out? Yes → Go To 2 No. TRAC OFF Indicator does not come on. Go To 5 No. TRAC OFF Indicator does not go out. Go To 6	All
2	Disconnect the TRAC OFF Switch harness connector. Using a 12-volt test light connected to 12-volts, check the TRAC OFF Switch Ground circuit. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the TRAC OFF Switch Ground circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Disconnect the TRAC OFF Switch harness connector. Turn the ignition on. Connect and disconnect a jumper wire between TRAC OFF Switch Ground and TRAC OFF Switch Sense circuits. Does the TRAC OFF Indicator light and then go out? Yes → Replace the TRAC OFF switch. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All

*TRAC OFF INDICATOR NEVER/ALWAYS ON — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the TRAC OFF Switch harness connector. Disconnect the CAB harness connector. Turn the ignition on. Check the TRAC OFF Switch Sense circuit for short to B+ and for an open. Is the Sense circuit shorted or open? Yes → Repair the TRAC OFF Switch Sense circuit for a short to battery or for an open. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Body Control Module in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. **NOTE: The purpose of this test is to perform the Instrument Cluster self test.** Depress and hold the Odometer Reset Button. Turn the Key from OFF to ON and then back to OFF. Release the Odometer Reset Button. Do the Instrument Cluster Indicators and Gauges activate and deactivate? Yes → Replace the Body Control Module in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Instrument Cluster in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All
6	**NOTE: The purpose of this test is to perform the Instrument Cluster self test.** Depress and hold the Odometer Reset Button. Turn the Key from OFF to ON and then back to OFF. Release the Odometer Reset Button. Do the Instrument Cluster Indicators and Gauges activate and deactivate? Yes → Go To 7 No → Replace the Instrument Cluster in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Disconnect the TRAC OFF Switch harness connector. Turn the ignition on. Does the TRAC OFF Indicator light and then go out? Yes → Replace the TRAC OFF switch. Perform ABS VERIFICATION TEST - VER 1. No → Go To 8	All

*TRAC OFF INDICATOR NEVER/ALWAYS ON — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the TRAC OFF Switch harness connector. Disconnect the BCM C4 harness connector. Check the TRAC OFF Switch Sense circuit for short to ground. Is the Sense circuit shorted to ground? Yes → Repair the TRAC OFF Switch Sense circuit for a short to ground. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Body Control Module in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All

Symptom:
*TRAC ON INDICATOR NEVER/ALWAYS ON

POSSIBLE CAUSES
CAB -- INTERNAL FAULT
CHECK TRACTION CONTROL SYSTEM
CLUSTER FAILS SELF TEST
CAB - NO TRAC MESSAGE

TEST	ACTION	APPLICABILITY
1	**NOTE: The DRBIII® must be able to communicate with the CAB prior to performing this test.** **NOTE: Note: If any CAB DTC's are present, they must be repaired prior to performing this test.** Perform the KEY-ON bulb test. Did the TRAC Indicator illuminate and then go out? Yes → Go To 2 No → Go To 3	All
2	Make sure the Traction Control system has not been deactivated with the TRAC OFF switch. **NOTE: The purpose of this test is to determine if the Traction Control system is operating.** With the DRBIII® in Inputs/Outputs, read the ABS Pump Motor voltage state. Accelerate sufficient to cause drive wheel slip. Does the TRAC Indicator illuminate and the DRBIII® display approximately 9 volts? Yes → The traction control system is functioning normally. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All
3	**NOTE: The purpose of this test is to perform the Instrument Cluster self test.** Depress and hold the Odometer Reset Button. Turn the Key from OFF to ON and then back to OFF. Release the Odometer Reset Button. Do the Instrument Cluster Indicators and Gauges activate and deactivate? Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Instrument Cluster in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All

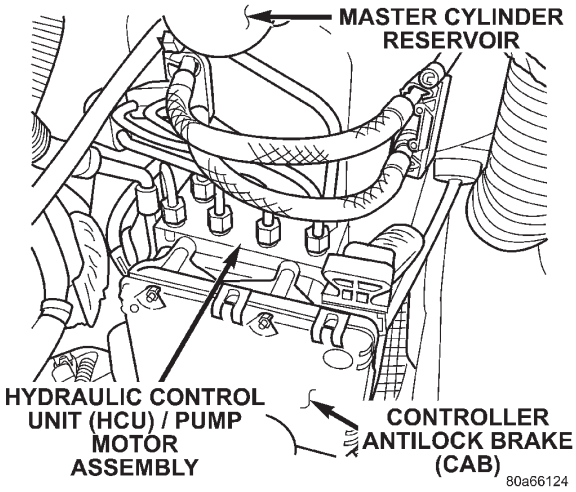
Verification Tests

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

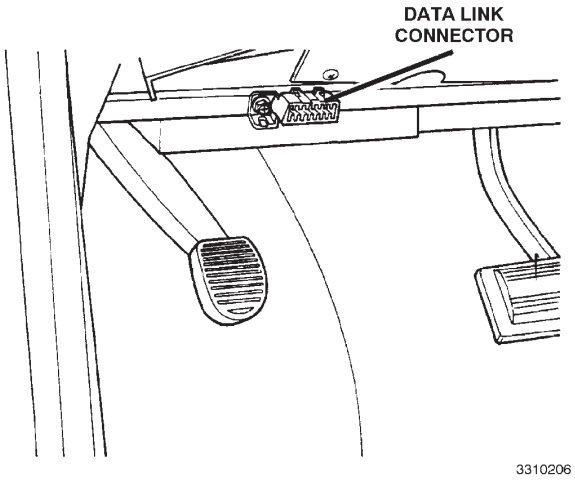
ADJUSTABLE PEDALS VERIFICATION TEST - VER 1	APPLICABILITY
1. If the Adjustable Pedals Module was replaced, program two pedal positions if equipped with memory function. 2. Activate the Adjustable Pedals through the full range of movement. 3. Verify that the Adjustable Pedals system is disabled with the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

8.0 COMPONENT LOCATIONS

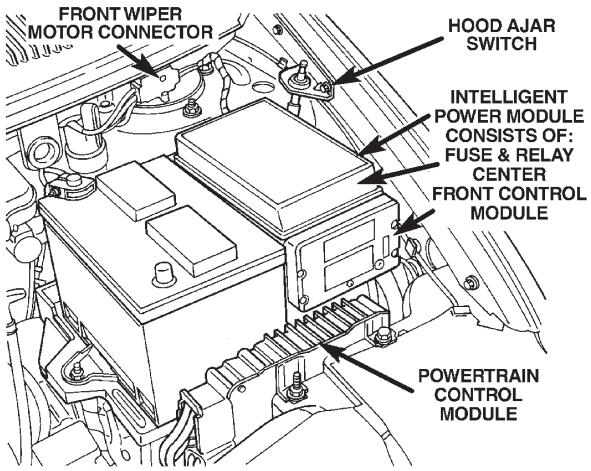
8.1 CONTROLLER ANTILOCK BRAKE (CAB)



8.2 DATA LINK CONNECTOR

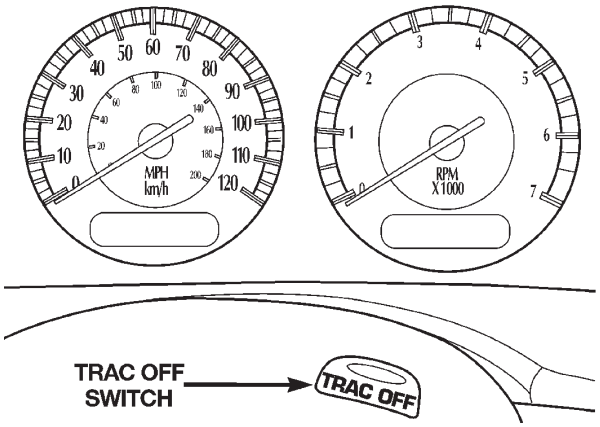


8.3 FUSES



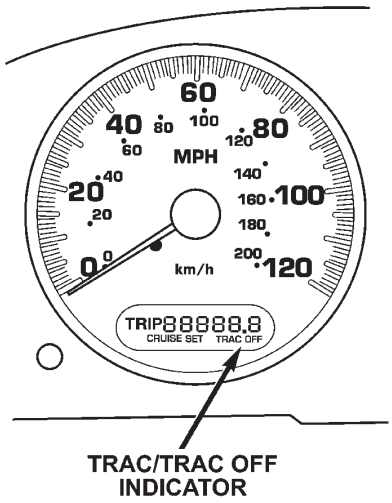
80964236

8.4 TRACTION CONTROL SWITCH



80a66201

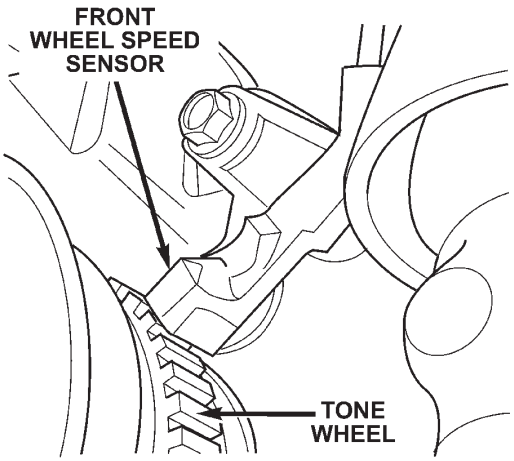
8.4.1 TRACTION CONTROL INDICATORS



80a655a5

8.5 WHEEL SPEED SENSORS

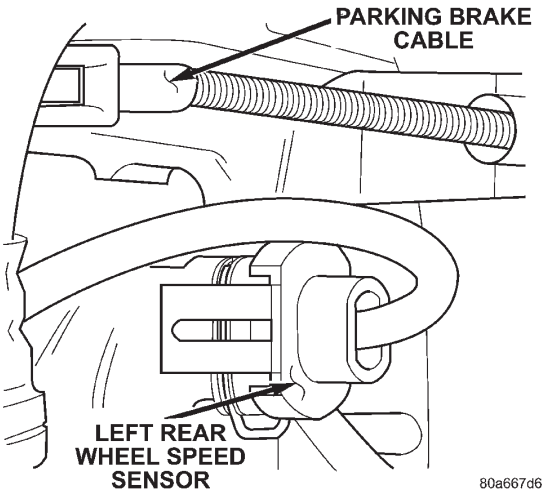
8.5.1 FRONT



80a6719b

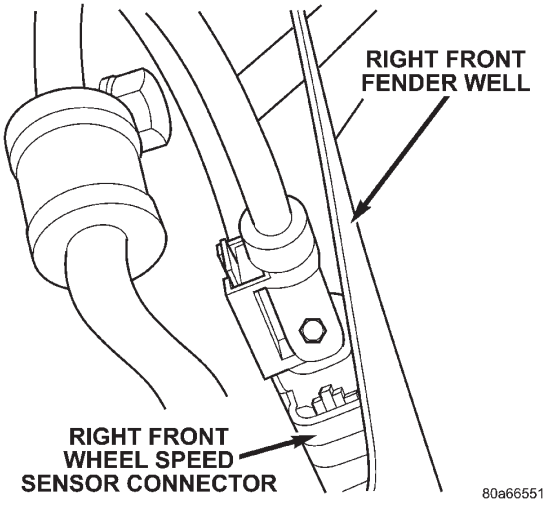
8.5 WHEEL SPEED SENSORS (Continued)

8.5.2 REAR

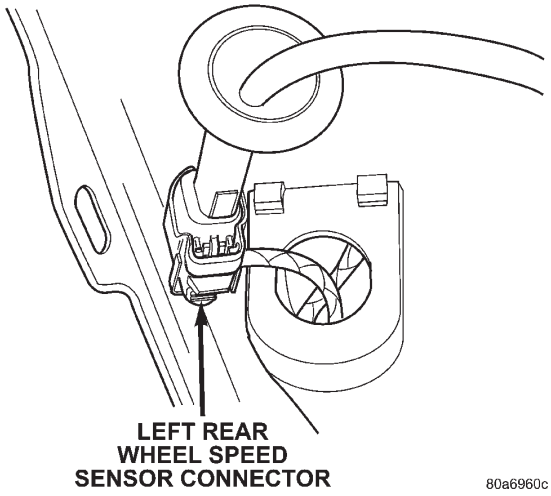


8.5A WHEEL SPEED SENSOR CONNECTORS

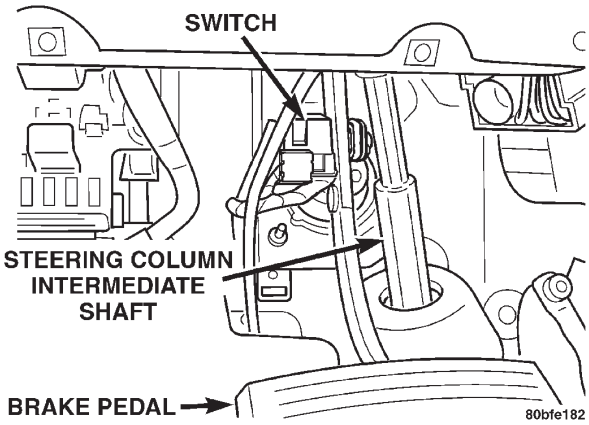
8.5A.1 FRONT



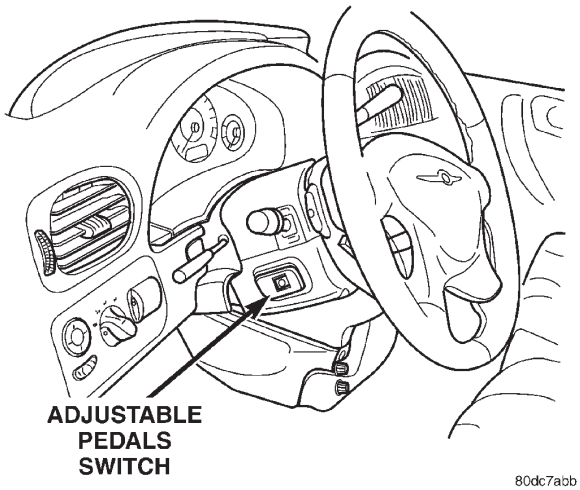
8.5A.2 REAR



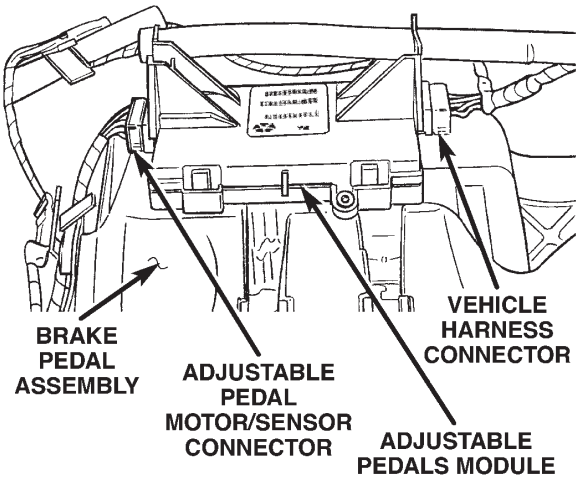
8.6 BRAKE LAMP SWITCH



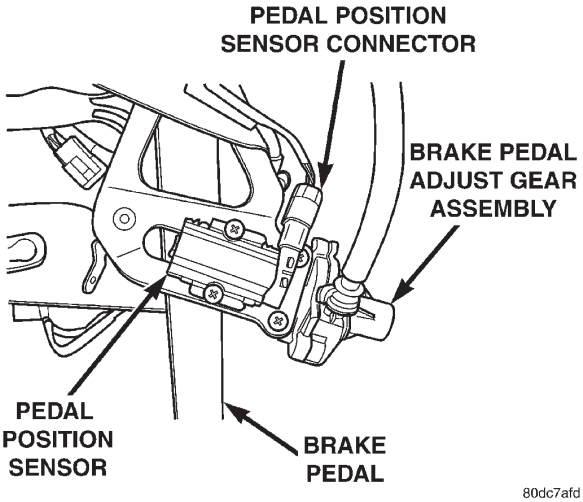
8.7 ADJUSTABLE PEDALS SWITCH



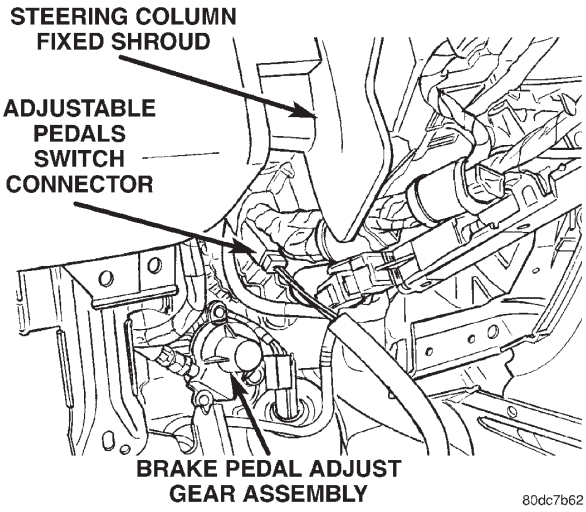
8.8 ADJUSTABLE PEDALS MODULE



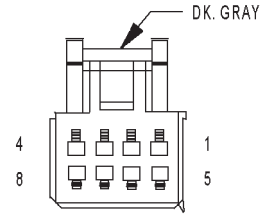
8.9 ADJUSTABLE PEDALS SENSOR



8.10 ADJUSTABLE PEDALS SWITCH CONNECTOR



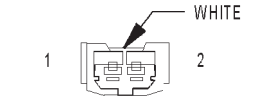
9.0 CONNECTOR PINOUTS



ADJUSTABLE PEDALS MODULE (EXCEPT BUILT-UP-EXPORT)

ADJUSTABLE PEDALS MODULE (EXCEPT BUILT-UP-EXPORT) - DK. GRAY 8 WAY

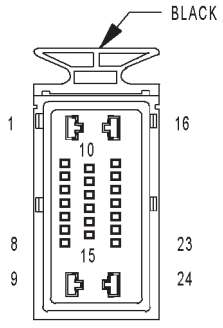
CAV	CIRCUIT	FUNCTION
1	A108 18LG/RD	FUSED B(+)
2	D25 20WT/VT	PCI BUS
3	-	-
4	Z140 18BK/YL	GROUND
5	A114 18GY/RD	FUSED B(+) (I.O.D.)
6	-	-
7	Q100 20OR/WT	ADJUSTABLE PEDALS SWITCH SENSE
8	Q900 20OR/BK	ADJUSTABLE PEDALS SWITCH GROUND



ADJUSTABLE PEDALS SWITCH (EXCEPT BUILT-UP-EXPORT)

ADJUSTABLE PEDALS SWITCH (EXCEPT BUILT-UP-EXPORT) - WHITE 2 WAY

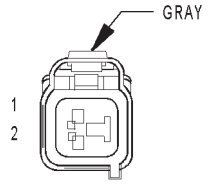
CAV	CIRCUIT	FUNCTION
1	Q100 20OR/WT	ADJUSTABLE PEDALS SWITCH SENSE
2	Q900 20OR/BK	ADJUSTABLE PEDALS SWITCH GROUND



CONTROLLER ANTILOCK BRAKE

CONTROLLER ANTILOCK BRAKE - BLACK 24 WAY

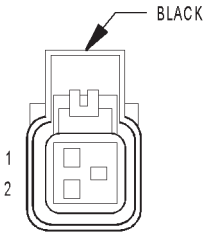
CAV	CIRCUIT	FUNCTION
1	Z107 12BK/DG	GROUND
2	B1 18DG/OR	RIGHT REAR WHEEL SPEED SENSOR SIGNAL
3	B2 18DG/LB	RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
4	-	-
5	D25 18WT/VT	PCI BUS
6	B6 18DG/WT	RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
7	B7 18DG/VT	RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
8	-	-
9	A111 12DG/RD	FUSED B(+)
10	F500 18DG/PK	FUSED IGNITION SWITCH OUTPUT (RUN)
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	Z127 12BK/DG	GROUND
17	-	-
18	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
19	B3 18DG/YL	LEFT REAR WHEEL SPEED SENSOR SIGNAL
20	B4 18DG/GY	LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
21	-	-
22	B8 18DG/TN	LEFT FRONT WHEEL SPEED SENSOR SIGNAL
23	B9 18DG/WT (3.3L/3.8L)	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
23	B9 18DG/LG (EXCEPT 3.3L/3.8L)	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
24	A107 12TN/RD	FUSED B(+)



LEFT FRONT WHEEL SPEED SENSOR

LEFT FRONT WHEEL SPEED SENSOR - GRAY 2 WAY

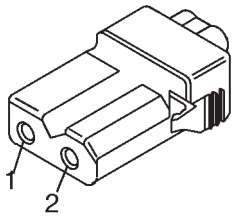
CAV	CIRCUIT	FUNCTION
1	B9 18DG/WT (3.3L/3.8L)	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
1	B9 18DG/LG (EXCEPT 3.3L/3.8L)	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B8 18DG/TN	LEFT FRONT WHEEL SPEED SENSOR SIGNAL



LEFT REAR WHEEL SPEED SENSOR

LEFT REAR WHEEL SPEED SENSOR - BLACK 2 WAY

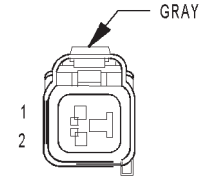
CAV	CIRCUIT	FUNCTION
1	B4 18DG/GY	LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B3 18DG/YL	LEFT REAR WHEEL SPEED SENSOR SIGNAL



PUMP MOTOR CONNECTOR

PUMP MOTOR CONNECTOR

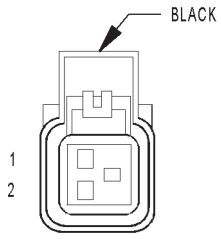
CAV	CIRCUIT	FUNCTION
1	TN	GROUND
2	RD	PUMP/MOTOR RELAY OUTPUT



RIGHT FRONT WHEEL SPEED SENSOR

RIGHT FRONT WHEEL SPEED SENSOR - GRAY 2 WAY

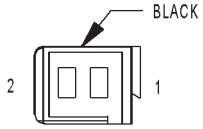
CAV	CIRCUIT	FUNCTION
1	B7 18DG/VT	RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B6 18DG/WT	RIGHT FRONT WHEEL SPEED SENSOR SIGNAL



RIGHT REAR WHEEL SPEED SENSOR

RIGHT REAR WHEEL SPEED SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	B2 18DG/LB	RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B1 18DG/OR	RIGHT REAR WHEEL SPEED SENSOR SIGNAL



TRACTION CONTROL SWITCH

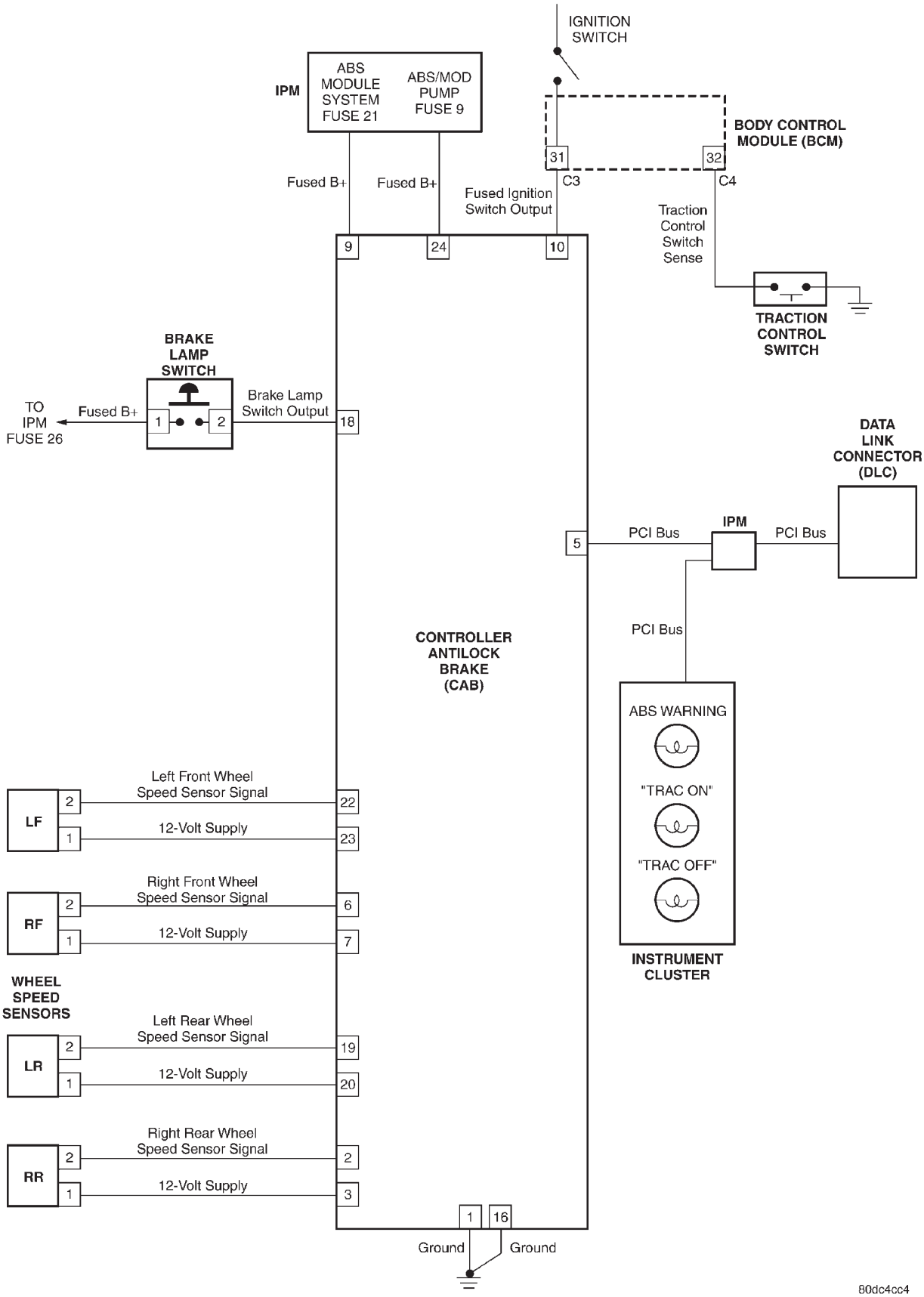
TRACTION CONTROL SWITCH - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	B27 20DG/WT	TRACTION CONTROL SWITCH SENSE
2	Z427 20BK/WT	GROUND

NOTES

10.0 SCHEMATIC DIAGRAMS

10.1 TEVES MARK 20 ANTILOCK BRAKE SYSTEM



10.2 ADJUSTABLE PEDALS SYSTEM

