

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	SYSTEM COVERAGE	1
1.2	SIX-STEP TROUBLESHOOTING PROCEDURE	1
2.0	IDENTIFICATION OF SYSTEM	1
3.0	SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION	1
3.1	TEVES MARK20e SYSTEM DESCRIPTION	1
3.2	TRACTION CONTROL SYSTEM (TCS) DESCRIPTION	2
3.3	SYSTEM COMPONENTS	2
3.3.1	ABS AND BRAKE WARNING INDICATORS	2
3.3.2	CONTROLLER ANTILOCK BRAKE (CAB)	2
3.3.3	HYDRAULIC CONTROL UNIT	3
3.3.4	SWITCHES / SENSORS	3
3.3.5	SYSTEM INITIALIZATION	4
3.3.6	DIAGNOSTIC MODE	4
3.4	DIAGNOSTIC TROUBLE CODES	4
3.5	DRBIII® ERROR MESSAGES AND BLANK SCREEN	4
3.5.1	DRBIII® DOES NOT POWER UP	4
3.5.2	DISPLAY IS NOT VISABLE	5
4.0	DISCLAIMERS, SAFETY, WARNINGS	5
4.1	DISCLAIMERS	5
4.2	SAFETY	5
4.2.1	TECHNICIAN SAFETY INFORMATION	5
4.2.2	VEHICLE PREPARATION FOR TESTING	5
4.2.3	SERVICING SUB-ASSEMBLIES	5
4.2.4	DRBIII® SAFETY INFORMATION	5
4.3	WARNINGS	6
4.3.1	VEHICLE DAMAGE WARNINGS	6
4.3.2	ROAD TESTING A COMPLAINT VEHICLE	6
4.4	DIAGNOSIS	6
5.0	REQUIRED TOOLS AND EQUIPMENT	7
6.0	GLOSSARY OF TERMS	7
7.0	DIAGNOSTIC INFORMATION AND PROCEDURES	9
	BRAKES (CAB)	
	ABS WARNING INDICATOR	10
	CAB POWER FEED CIRCUIT	11
	CONTROLLER FAILURE	14
	LEFT FRONT SENSOR CIRCUIT FAILURE	16
	LEFT REAR SENSOR CIRCUIT FAILURE	16
	RIGHT FRONT SENSOR CIRCUIT FAILURE	16
	RIGHT REAR SENSOR CIRCUIT FAILURE	16
	LEFT FRONT SENSOR SIGNAL FAILURE	19
	LEFT REAR SENSOR SIGNAL FAILURE	19
	RIGHT FRONT SENSOR SIGNAL FAILURE	19
	RIGHT REAR SENSOR SIGNAL FAILURE	19

TABLE OF CONTENTS - Continued

PCI BUS COMMUNICATION .....	.22
PUMP MOTOR NOT WORKING PROPERLY .....	.23
SYSTEM OVERVOLTAGE .....	.27
SYSTEM UNDERVOLTAGE .....	.29
*BRAKE LAMP SWITCH .....	.31
*TRAC OFF INDICATOR NEVER/ALWAYS ON .....	.32
*TRAC ON INDICATOR NEVER/ALWAYS ON .....	.34
VERIFICATION TESTS	
VERIFICATION TESTS .....	.35
8.0 COMPONENT LOCATIONS .....	.37
8.1 CONTROLLER ANTILOCK BRAKE (CAB) .....	.37
8.2 HARNESS ROUTING .....	.37
8.3 DATA LINK CONNECTOR .....	.37
8.4 FUSES .....	.38
8.5 TRACTION CONTROL INDICATORS .....	.38
8.6 WHEEL SPEED SENSORS .....	.38
8.6.1 FRONT .....	.38
8.6.2 REAR .....	.39
8.7 BRAKE LAMP SWITCH .....	.39
9.0 CONNECTOR PINOUTS .....	.41
BRAKE LAMP SWITCH - GRAY 6 WAY .....	.41
CONTROLLER ANTILOCK BRAKE - BLACK 24 WAY .....	.41
DATA LINK CONNECTOR - BLACK 16 WAY .....	.42
LEFT FRONT WHEEL SPEED SENSOR - BLACK 2 WAY .....	.42
LEFT REAR WHEEL SPEED SENSOR - BLACK 2 WAY .....	.42
RIGHT FRONT WHEEL SPEED SENSOR - BLACK 2 WAY .....	.42
RIGHT REAR WHEEL SPEED SENSOR - BLACK 2 WAY .....	.43
TRACTION CONTROL SWITCH - NATURAL 6 WAY .....	.43
TRACTION CONTROL SWITCH (SWITCH SIDE) .....	.43
10.0 SCHEMATIC DIAGRAMS .....	.45
LH-TEVES MARK20E ANTILOCK BRAKE SYSTEM .....	.45

1.0 INTRODUCTION

The procedures contained in this manual include all the specifications, and graphics needed to diagnose the Teves Mark20e Antilock Braking System (ABS) and the Mark20e with Traction Control. 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 customer complaint.

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

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

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

1.1 SYSTEM COVERAGE

This diagnostic procedure manual covers the antilock braking system (ABS) and traction control system found on: Chrysler Concord, LHS, 300M and Dodge Intrepid.

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 Mark20e antilock brake system can be identified by the presence of the controller antilock brake module located along with HCU. On an LH Body the CAB and HCU are behind the left front bumper on the left side of the engine cradle.

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

3.1 TEVES MARK20e 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 Mark20e 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.

During an antilock stop the Mark20e system uses four-channel operation. This means that during antilock operation each wheel brake is independently controlled. By using a separate hydraulic channel for each wheel, the system is able to retain directional stability and steering control while applying maximum braking. The system provides maximum braking even when road conditions vary.

GENERAL INFORMATION

3.2 TRACTION CONTROL SYSTEM (TCS) DESCRIPTION

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

The controller antilock brake (CAB) monitors wheel speed. If during acceleration the CAB detects front (drive) wheel slip and the brakes are not applied, it will enter traction control mode. The CAB performs the traction control function in the following sequence:

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

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

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

If at any time the brakes are applied during a traction control cycle, the brake switch will trigger the 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. The lamp will display "TRAC ON" during a traction control cycle. If the controller calculates that the brake temperatures are high, the traction control system will become inoperative until a time-out period has elapsed. When in this thermo protection mode, the traction control "TRAC OFF" lamp will illuminate; however, a fault will not be registered.

3.3 SYSTEM COMPONENTS

- controller antilock brake (CAB)
- vacuum booster
- master cylinder

- ABS integrated control unit hydraulic control unit (HCU), valve block assembly: 8 valve solenoids (4 inlet valves, 4 outlet valves, 2 accumulators) 1 motor, 2 pumps.
- ABS integrated control unit with traction control same as above but has 10 valve solenoids. 2 valves are isolation valves.
- 2 proportioning valves (LR, RR)
- 4 wheel speed sensor/tone wheel assemblies
- ABS warning indicator
- fuses and wiring harness
- fluid reservoir

3.3.1 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 indirectly controlled by the CAB. The CAB will send a message across the PCI Bus that informs the instrument cluster to turn the ABS warning indicator ON or OFF. If the 24-way CAB connector is not connected, the instrument cluster will not receive a message from the CAB via the PCI BUS circuit. The instrument cluster will then turn on the ABS warning indicator.

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.

3.3.2 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 an antilock stop
- monitor the system for proper operation
- provide communication to the DRBIII® while in diagnostic mode

- store diagnostic information in non-volatile memory

The CAB continuously monitors the speed of each wheel. When a wheel locking tendency is detected, the CAB will command the appropriate valve to modulate brake fluid pressure in its hydraulic unit. Brake pedal position is maintained during an antilock stop by being a closed system with the use of 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
- ignition switch
- fused B+
- brake lamp switch
- traction control switch

The CAB outputs include the following:

- ABS warning indicator actuation
- valve actuation
- diagnostic communication
- traction control lamp illumination

3.3.3 HYDRAULIC CONTROL UNIT

The hydraulic control unit (HCU) contains the valve block assembly, two accumulators, and pump/motor assembly. On an LH Body the HCU is located behind the left front bumper on the left side of the engine cradle.

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. The CAB monitors wheel speeds. If the CAB detects a wheel deceleration that is disproportionate to the other wheels, it will close the inlet valve to that wheel. This prevents any increase in fluid pressure. If the wheel continues to decelerate disproportionately, the CAB opens the outlet valve for that wheel to release fluid pressure from that channel. The released fluid is routed to the accumulators. When the wheel speed is no longer disproportionate to the other wheels, the

inlet valve will return to its normally open position and the outlet valve will return to the normally closed position. On LH Bodies 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 situation the brakes are applied at a slipping drive wheel 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 required. 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. Each of the diagonal circuits uses a 3cc. accumulator.

3.3.4 SWITCHES / SENSORS

Master Cylinder: All vehicles including Traction control vehicles use a dual center port master cylinder.

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 Wheel Speed Sensor (WSS) is located at each wheel and sends a small AC signal to the control module (CAB). This voltage is generated by induction when a toothed sensor ring (tone wheel) passes by a stationary sensor (wheel speed sensor). The CAB converts the AC signals into digital signals for each wheel.

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. On LH Bodies the rear sensors are mounted to the rear brake backing plates or rear disc adapters. The rear tone wheels are pressed on the rear hub. The wheel speed sensor air gap is not adjustable. Refer to 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

GENERAL INFORMATION

assembly with the outer C.V. joint housing. The rear tone wheels are serviced as an assembly.

Correct antilock system operation is dependent on accurate wheel speed signals from the wheel speed sensors. The vehicle's wheels and tires should all be the same size and type to generate accurate signals. In addition, the tires should be inflated to the recommended pressures for optimum system operation. Variation in wheel and tires 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.

3.3.5 SYSTEM INITIALIZATION

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

3.3.6 DIAGNOSTIC MODE

To enter diagnostic mode, a vehicle speed must be below 10 km/h (6 mph) and no ABS/TCS 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 CAB Power Feed Circuit Failure code is present, the indicator will be illuminated without blinking until the trouble condition is cleared.
- Antilock operation is disabled.
- Valve actuation with the DRBIII® is disabled 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 DIAGNOSTIC TROUBLE CODES

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

3.5 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

This is a sample of such an error message display:

```
ver: 2.14
date: 26 Jul93
file: key_itf.cc
date: Jul 26 1993
line: 548
err:0x1
User-Requested COLD Boot

Press MORE to switch between this display
and the application screen.
Press F4 when done noting information.
```

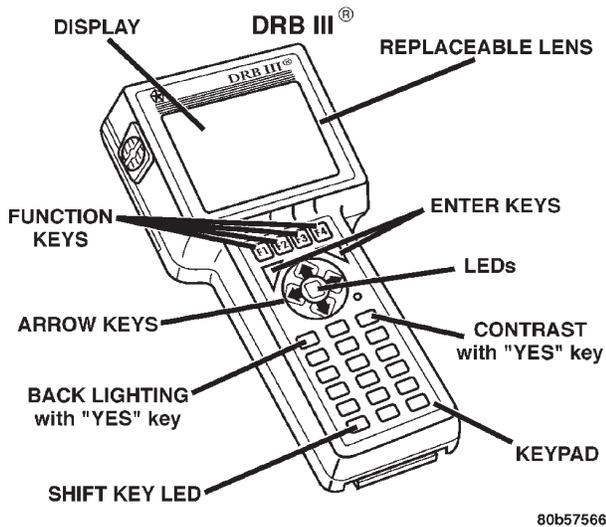
3.5.1 DRBIII® DOES NOT POWER UP

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.

3.5.2 DISPLAY IS NOT VISABLE

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



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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 wheel 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 system problem, it is important to follow approved procedures where applicable. These procedures can be found in the service manual. Following these procedures is very important to 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 it 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 sub-components may result in personal injury and/or improper system operation. Only those components with approved repair and installation procedures in the service manual should be serviced.

4.2.4 DRBIII® SAFETY INFORMATION

WARNING: EXCEEDING THE LIMITS OF THE DRB 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 measurement 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

GENERAL INFORMATION

* 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 DRBIII® SCREEN WHILE IN MOTION. DO NOT HANG THE DRBIII® FROM THE REAR VIEW MIRROR OR OPERATE IT YOURSELF. HAVE AN ASSISTANT AVAILABLE TO OPERATE THE DRB.

4.4 DIAGNOSIS

1. Your diagnostic test procedure must begin with a thorough visual inspection of the ABS system for damaged components or disconnected connectors. The brake lamps must be operational, and if they are not, repair them prior to continuing.
2. Connect the DRBIII® to the data link connector, 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 “Antilock Brakes”. If the DRBIII® displays “No Response” condition you must diagnose that first.
4. Read and record all ABS Diagnostic Trouble Codes (DTC’s). If the “CAB Power Feed Circuit” diagnostic trouble code is present, it must be repaired prior to addressing 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. 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, perform the proper test by locating the matching test in the Table of Contents and begin to diagnose the symptom. On LH read the traction control switch input as you press and release the switch. If the display does not match the state of the indicator, locate 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 and no problems were found, refer to any Technical Service Bulletins that may apply.

5.0 Required tools and equipment

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

6.0 Glossary of Terms

ABS	antilock brake system
CAB	controller antilock brake
DLC	data link connector
DRB	diagnostic read-out box
HCU	hydraulic control unit
JBLK	junction block
PCI	programmable communications interface (communications bus)
PDC	power distribution center
P/M	pump motor
WSS	wheel speed sensor

7.0

DIAGNOSTIC INFORMATION AND
PROCEDURES

BRAKES (CAB)

Symptom: ABS WARNING INDICATOR

POSSIBLE CAUSES
CLUSTER DTC PRESENT INSTRUMENT CLUSTER BULB CONCERN CAB DTC PRESENT INSTRUMENT CLUSTER INTERNAL CONCERN

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? Yes → Go To 3 No → Replace the Instrument Cluster in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All
3	Turn the ignition on. NOTE: The DRBIII® communication with the CAB must be operational for the result of this test to be valid. Remove Fuse 21 (ABS valve power) from the IPM. Perform the Key-on Bulb Check. Are there any CAB DTCs present? Yes → Refer to BRAKES category for the related symptom(s). After repair of the CAB DTC, perform the ABS Verification Test. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All
4	If there are no possible causes remaining, view repair. Repair Replace the Instrument Cluster in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All

Symptom:
CAB POWER FEED CIRCUIT

When Monitored and Set Condition:

CAB POWER FEED CIRCUIT

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

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

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

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. Drive the vehicle above 25 km/h (15 mph) for at least 10 seconds. Stop the vehicle. With the DRBIII®, read DTC's. Does the DRBIII® display CAB Power Feed Circuit DTC present right now? Yes → Go To 2 No → Go To 10	All
2	Turn the ignition off. Remove and Inspect the ABS Fuse 17 in the Junction Block. Is the Fuse blown? Yes → Go To 3 No → Go To 7	All

BRAKES (CAB)

CAB POWER FEED CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off. Visually inspect the B(+) Circuit in the wiring harness from the Junction Block to the CAB. Look for any sign of an intermittent short to ground. Is the wiring harness OK?</p> <p>Yes → Go To 4</p> <p>No → Repair the Fused B(+) Circuit Shorted to Ground. Perform ABS VERIFICATION TEST - VER 1.</p>	All
4	<p>Turn the ignition off. Remove the ABS Fuse 17 from the Junction Block. Disconnect the CAB harness connector. Note: Check connector - Clean/repair as necessary. Using a test light connected to 12 volts, probe the Fused B(+) Circuit. Is the test light on?</p> <p>Yes → Repair the Fused B(+) Circuit Shorted to Ground. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off. Remove the ABS Fuse 17 from the Junction Block. The CAB must be connected for the results of this test to be valid. Using a test light connected to 12 volts, probe the Fused B(+) Circuit at the Junction Block fuse terminal. Is the test light on?</p> <p>Yes → Replace the CAB. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 6</p>	All
6	<p>Turn the ignition off. If there are no potential causes remaining, view repair.</p> <p>Continue Replace the Fuse. Perform ABS VERIFICATION TEST - VER 1.</p>	All
7	<p>Remove the ABS Fuse 17 from the Junction Block. Turn the ignition on. Measure the voltage of the Fused B+ supply to Fuse 17 in the Junction Block. Is the voltage above 10 volts?</p> <p>Yes → Go To 8</p> <p>No → Repair the B+ Supply circuit for an open. Perform ABS VERIFICATION TEST - VER 1.</p>	All
8	<p>Turn the ignition off. Remove the ABS Fuse 17 from the Junction Block. Disconnect the CAB harness connector. Note: Check connector - Clean/repair as necessary. Measure the resistance of the Fused B(+) circuit between the Junction Block Fuse terminal 17 and the CAB connector. Is the resistance below 5 ohms?</p> <p>Yes → Go To 9</p> <p>No → Repair Fused B(+) Circuit Open. Perform ABS VERIFICATION TEST - VER 1.</p>	All

CAB POWER FEED CIRCUIT — Continued

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

BRAKES (CAB)

Symptom: CONTROLLER FAILURE

When Monitored and Set Condition:

CONTROLLER FAILURE

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

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

POSSIBLE CAUSES

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

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

CONTROLLER FAILURE — Continued

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

Symptom 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	<p>Turn the ignition off.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Refer to any Hotline letters or Technical Service Bulletins that may apply.</p> <p>Were any problems found?</p> <p style="padding-left: 40px;">Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

Symptom List:

LEFT FRONT SENSOR SIGNAL FAILURE
LEFT REAR SENSOR SIGNAL FAILURE
RIGHT FRONT SENSOR SIGNAL FAILURE
RIGHT REAR SENSOR SIGNAL FAILURE

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

When Monitored and Set Condition:**LEFT FRONT SENSOR SIGNAL FAILURE**

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

LEFT REAR SENSOR SIGNAL FAILURE

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

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

RIGHT FRONT SENSOR SIGNAL FAILURE

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

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

LEFT FRONT SENSOR SIGNAL FAILURE — Continued

RIGHT REAR SENSOR SIGNAL FAILURE

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

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

POSSIBLE CAUSES

- SENSOR OR TONE WHEEL CONCERN
- SENSOR OUTPUT INTERMITTENT OR OPEN
- CAB SETTING FALSE DTC
- 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, drive the vehicle as straight as possible and maintain a steady speed above 24 km/h (15 mph). With the DRBIII®, monitor all wheel speed sensors. Note whether the speed of the affected wheel is zero. Note whether the speed of the affected wheel differs from others by 5 km/h (3 mph) or more. Is the affected wheel speed zero or differing from others? Yes → Go To 2 No → Go To 3	All
2	Inspect the Wheel Speed Sensor, Connector and Tone Wheel at the affected 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 24 km/h (15 mph) to extinguish ABS and TRAC OFF indicators. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Wheel Speed Sensor in accordance with the Service Information. The vehicle must be driven at 24 km/h (15 mph) to extinguish ABS and TRAC OFF indicators. Perform ABS VERIFICATION TEST - VER 1.	All

LEFT FRONT SENSOR SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	<p>With the DRBIII®, read DTCs. Did the DTC reoccur?</p> <p>Yes → Replace the Controller Antilock Brake in accordance with the Service Information. The vehicle must be driven at 24 km/h (15 mph) to extinguish ABS and TRAC OFF indicators. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Go To 4</p>	All
4	<p>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?</p> <p>Yes → Repair as necessary. The vehicle must be driven at 24 km/h (15 mph) to extinguish ABS and TRAC OFF indicators. Perform ABS VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	All

BRAKES (CAB)

Symptom: PCI BUS COMMUNICATION

When Monitored and Set Condition:

PCI BUS COMMUNICATION

When Monitored: Ignition ON, every 7 ms.

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

POSSIBLE CAUSES

CHECK COMMUNICATION TO MIC
CAB-- INTERNAL FAULT

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

Symptom:

PUMP MOTOR NOT WORKING PROPERLY

When Monitored and Set Condition:

PUMP MOTOR NOT WORKING PROPERLY

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

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

POSSIBLE CAUSES

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

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. 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 24 km/h (15 mph) to extinguish ABS and TRAC OFF indicators. Perform ABS VERIFICATION TEST - VER 1. No → Go To 2	All

BRAKES (CAB)

PUMP MOTOR NOT WORKING PROPERLY — Continued

TEST	ACTION	APPLICABILITY
2	<p>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?</p> <p>No → Go To 3 Yes → Go To 14</p>	All
3	<p>Turn the ignition off. Remove and inspect the ABS Pump fuse K in the PDC. Is the Fuse blown?</p> <p>Yes → Go To 4 No → Go To 8</p>	All
4	<p>Turn the ignition off. Make sure the Pump Motor connector is secure. Visually inspect the Fused B(+) Circuit in the wiring harness from the PDC to the CAB. Look for any sign of an Intermittent Short to Ground. Is the wiring harness OK?</p> <p>Yes → Go To 5 No → Repair the Fused B(+) Circuit shorted to ground. The vehicle must be driven at 24 km/h (15 mph) to extinguish ABS and TRAC OFF indicators. Perform ABS VERIFICATION TEST - VER 1.</p>	All
5	<p>Turn the ignition off. Remove the ABS PUMP Fuse K from the Power Distribution Center (PDC). Disconnect the CAB connector. Make sure the Pump Motor connector is secure. Note: Check connector - Clean/repair as necessary. Using a test light connected to 12 volts, probe the Fused B (+) Circuit. Is the test light on?</p> <p>Yes → Repair the Fused B(+) circuit short to ground. The vehicle must be driven at 24 km/h (15 mph) to extinguish ABS and TRAC OFF indicators. Perform ABS VERIFICATION TEST - VER 1. No → Go To 6</p>	All
6	<p>Turn the ignition off. Make sure the Pump Motor connector is secure. Remove the ABS PUMP Fuse K from the PDC. The CAB must be connected for the results of this test to be valid. Using a test light connected to 12 volts, probe the Fused B (+) circuit in the PDC. Is the test light on?</p> <p>Yes → Replace the Controller Anti-lock Brake in accordance with the Service Information. The vehicle must be driven at 24 km/h (15 mph) to extinguish ABS and TRAC OFF indicators. Perform ABS VERIFICATION TEST - VER 1. No → Go To 7</p>	All

PUMP MOTOR NOT WORKING PROPERLY — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Make sure the Pump Motor connector is secure If there are no potential causes remaining, replace the Fuse. If there are no possible causes remaining, view repair. Repair Replace the ABS Pump Motor Fuse. The vehicle must be driven at 24 km/h (15 mph) to extinguish ABS and TRAC OFF indicators. Perform ABS VERIFICATION TEST - VER 1.	All
8	Turn the ignition off. Remove the ABS PUMP Fuse K from the Power Distribution Center (PDC). Disconnect the CAB connector. Note: Check connector - Clean/repair as necessary. Measure the resistance of the Fused B (+) circuit between the PDC Fuse Terminal and the CAB connector. Is the resistance below 10 ohms? Yes → Go To 9 No → Repair the Fused B(+) circuit for an open. The vehicle must be driven at 24 km/h (15 mph) to extinguish ABS and TRAC OFF indicators. Perform ABS VERIFICATION TEST - VER 1.	All
9	Turn the ignition on. Using a 12-volt test light connected to ground, check the B+ supply to Fuse K in the PDC. Is the B+ supply OK? Yes → Go To 10 No → Repair the B+ supply for an open. The vehicle must be driven at 24 km/h (15 mph) to extinguish ABS and TRAC OFF indicators. Perform ABS VERIFICATION TEST - VER 1.	All
10	Turn the ignition off. Disconnect Pump Motor Connector. Connect a 10 gauge jumper wire between pump motor Fused B (+) circuit and a 40 Amp Fused B (+) circuit. Connect a 10 gauge jumper wire between pump motor ground circuit and a known good body ground. Monitor Pump Motor operation. Is the pump motor running? Yes → Go To 11 No → Replace the ABS Pump Motor/Hydraulic Control Unit assembly. The vehicle must be driven at 24 km/h (15 mph) to extinguish ABS and TRAC OFF indicators. Perform ABS VERIFICATION TEST - VER 1.	All

PUMP MOTOR NOT WORKING PROPERLY — Continued

TEST	ACTION	APPLICABILITY
11	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 12 No → Repair the ground circuit for an open. The vehicle must be driven at 24 km/h (15 mph) to extinguish ABS and TRAC OFF indicators. Perform ABS VERIFICATION TEST - VER 1.	All
12	Make sure the Pump Motor connector is secure. Turn the ignition on. With the DRBIII®, enable pump motor actuation. 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 13 No → Repair the Ground circuit for an open. The vehicle must be driven at 24 km/h (15 mph) to extinguish ABS and TRAC OFF indicators. Perform ABS VERIFICATION TEST - VER 1.	All
13	If there are no possible causes remaining, view repair. Repair Replace the Controller Anti-lock Brake in accordance with the Service Information. The vehicle must be driven at 24 km/h (15 mph) to extinguish ABS and TRAC OFF indicators. Perform ABS VERIFICATION TEST - VER 1.	All
14	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Make sure the Pump Motor connector is secure. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. The vehicle must be driven at 24 km/h (15 mph) to extinguish ABS and TRAC OFF indicators. 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

BRAKES (CAB)

SYSTEM OVERVOLTAGE — Continued

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

Symptom:
SYSTEM UNDERVOLTAGE

When Monitored and Set Condition:

SYSTEM UNDERVOLTAGE

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

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

POSSIBLE CAUSES

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

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

BRAKES (CAB)

SYSTEM UNDERVOLTAGE — Continued

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

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

BRAKES (CAB)

Symptom:

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

POSSIBLE CAUSES
INSTRUMENT CLUSTER FAILS BULB CHECK TRAC OFF SWITCH GROUND OPEN TRAC OFF SWITCH INOPERATIVE CHECK TRAC OFF SWITCH TRAC OFF SWITCH SENSE CIRCUIT SHORT TO B+, GROUND OR OPEN INSTRUMENT CLUSTER INTERNAL FAULT

TEST	ACTION	APPLICABILITY
1	<p>Note: If any DTC's are present, they must be repaired prior to performing this test.</p> 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 → Replace the Instrument Cluster in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All
2	Turn the headlamps ON. Depress the TRAC OFF switch. Does the TRAC OFF switch button illuminate? Yes → Go To 3 No → Go To 5	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. Check the TRAC OFF Switch Sense circuit for short to B+ or ground and for an open. Is the Sense circuit shorted or open? Yes → Repair the TRAC OFF Switch Sense circuit for a short to battery, ground or for an open. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Instrument Cluster in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All
5	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? Yes → Replace the TRAC OFF Switch. Perform ABS VERIFICATION TEST - VER 1. No → Repair the TRAC OFF Switch Ground circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All

BRAKES (CAB)

Symptom:

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

POSSIBLE CAUSES
FAILS KEY-ON BULB TEST CHECK TRACTION CONTROL OPERATION RECHECK TRAC ON INDICATOR CAB - NO TRAC ON INDICATOR

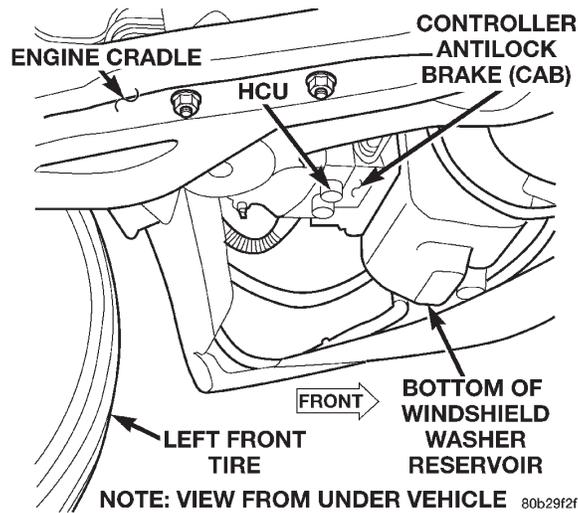
TEST	ACTION	APPLICABILITY
1	<p>NOTE: The DRBIII® must be able to communicate with the CAB prior to performing this test. Note: If any CAB DTC's are present, they must be repaired prior to performing this test. Perform the KEY-ON bulb test. Did the Trac On indicator illuminate and then go out?</p> <p style="padding-left: 40px;">Yes → Go To 2</p> <p style="padding-left: 40px;">No → Refer to INSTRUMENT CLUSTER for the related symptom(s). Perform ABS VERIFICATION TEST - VER 1.</p>	All
2	<p>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 DRBIII® display approximately 9 volts?</p> <p style="padding-left: 40px;">Yes → Go To 3</p> <p style="padding-left: 40px;">No → Replace the Controller Anti-Lock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.</p>	All
3	<p>Replace the Instrument Cluster in accordance with the Service Information. 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 replacing the Instrument Cluster has corrected the problem. Accelerate sufficient to cause drive wheel slip. Does the TRAC ON indicator illuminate during Traction Control activation?</p> <p style="padding-left: 40px;">Yes → Repair is complete. Perform ABS VERIFICATION TEST - VER 1.</p> <p style="padding-left: 40px;">No → Replace the Controller Anti-Lock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.</p>	All

Verification Tests

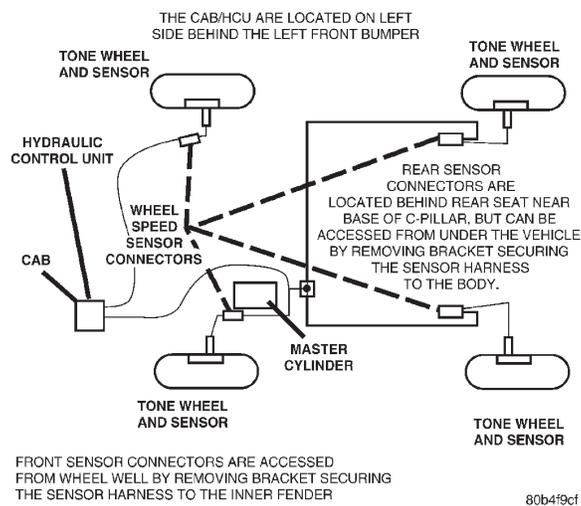
ABS VERIFICATION TEST - VER 1	APPLICABILITY
<p>1. Turn the ignition off.</p> <p>2. Connect all previously disconnected components and connectors.</p> <p>3. Ensure all accessories are turned off and the battery is fully charged.</p> <p>4. Ensure that the Ignition is on, and with the DRBIII®, erase all Diagnostic Trouble Codes from ALL modules. Start the engine and allow it to run for 2 minutes and fully operate the system that was malfunctioning.</p> <p>5. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII, read DTC's from ALL modules.</p> <p>6. If any Diagnostic Trouble Codes are present, return to Symptom list and troubleshoot new or recurring symptom.</p> <p>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.</p> <p>8. Caution: Ensure braking capability is available before road testing.</p> <p>9. Again, with the DRBIII® read DTC's. If any DTC's are present, return to Symptom list.</p> <p>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.</p> <p>Are any DTC's present or is the original concern still present?</p> <p style="padding-left: 40px;">Yes → Repair is not complete, refer to appropriate symptom.</p> <p style="padding-left: 40px;">No → Repair is complete.</p>	<p>All</p>

8.0 COMPONENT LOCATIONS

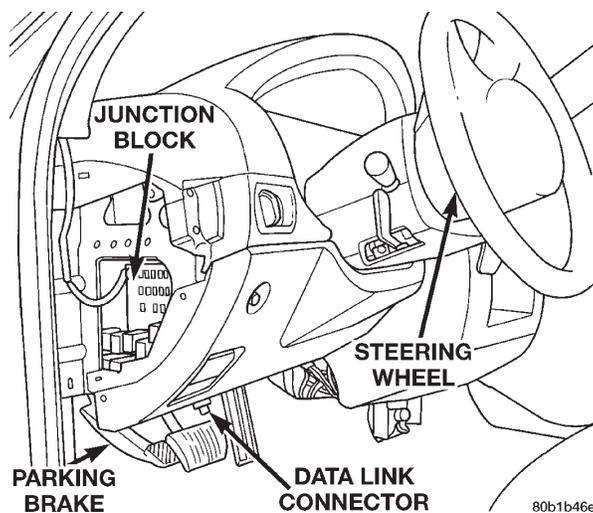
8.1 CONTROLLER ANTILOCK BRAKE (CAB)



8.2 HARNESS ROUTING

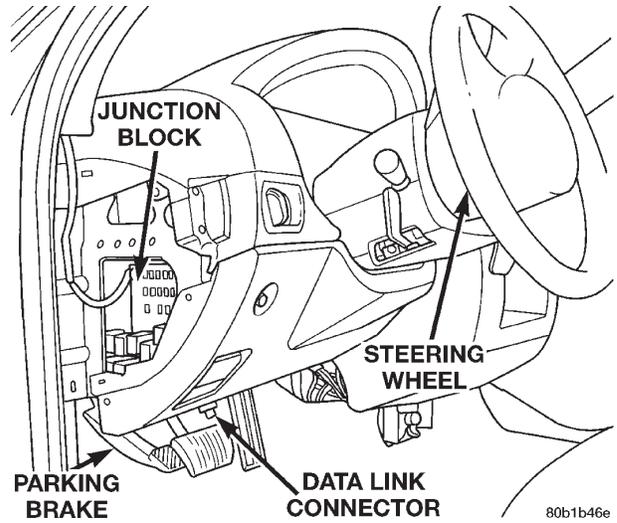
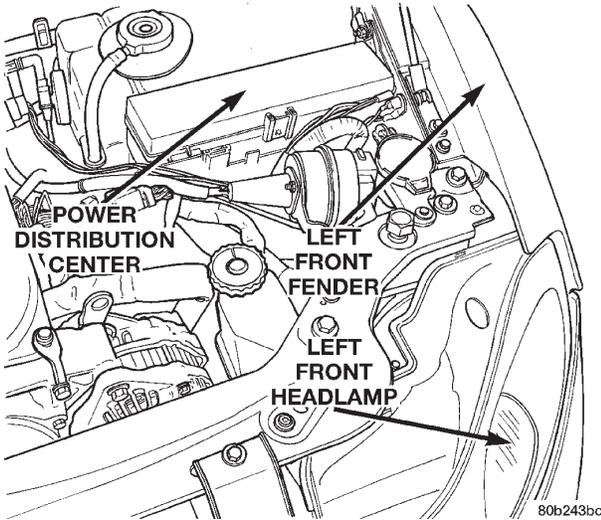


8.3 DATA LINK CONNECTOR

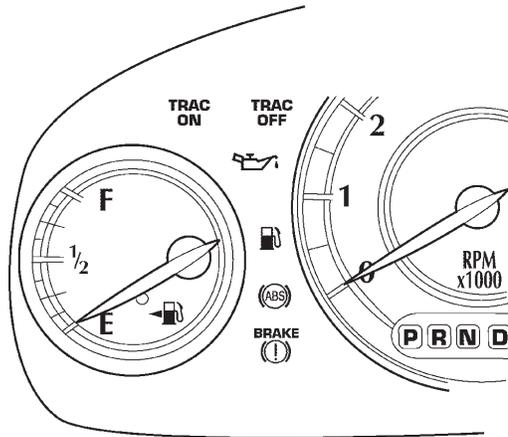


COMPONENT LOCATIONS

8.4 FUSES

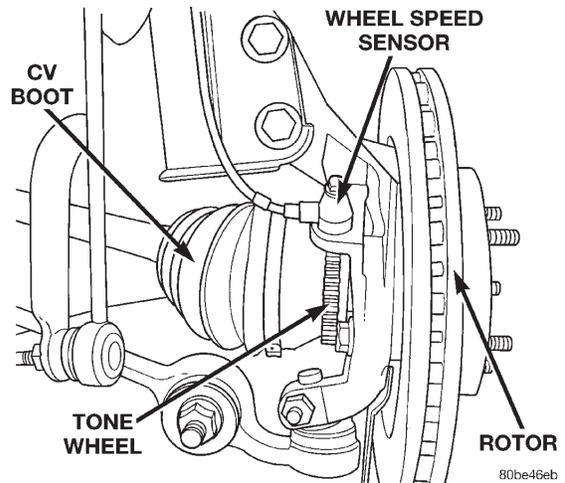
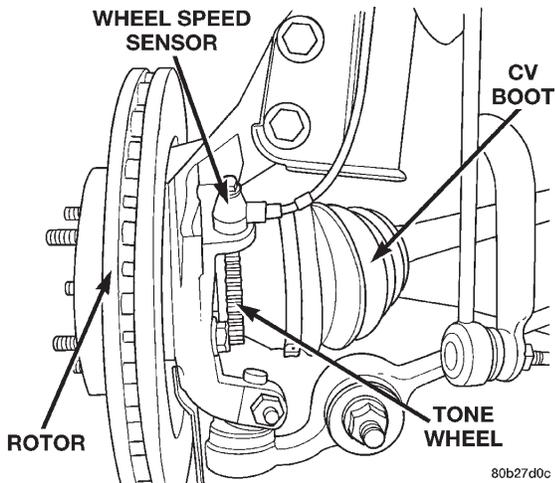


8.5 TRACTION CONTROL INDICATORS

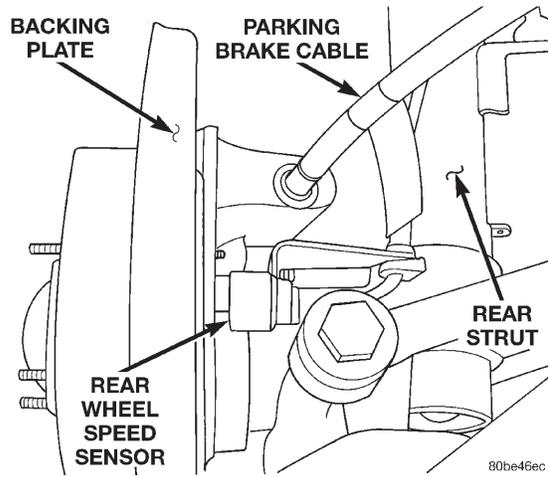
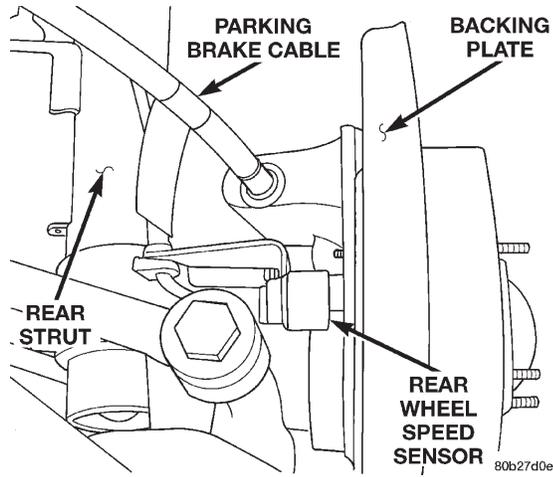


8.6 WHEEL SPEED SENSORS

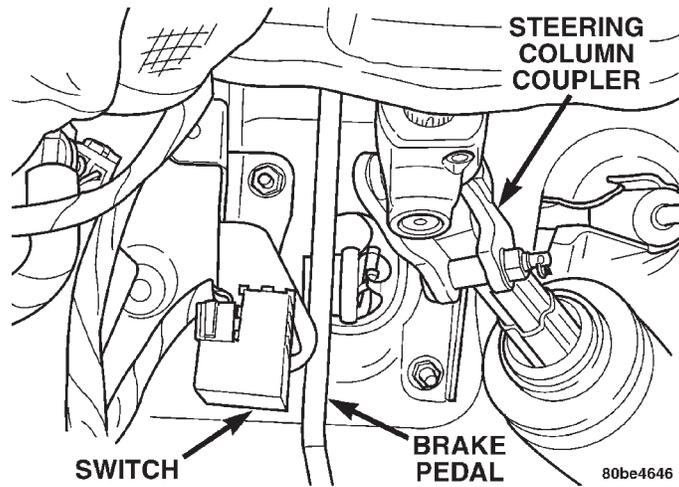
8.6.1 FRONT



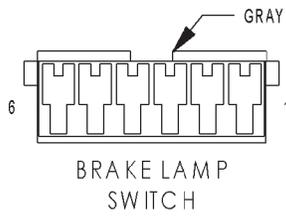
8.6.2 REAR



8.7 BRAKE LAMP SWITCH

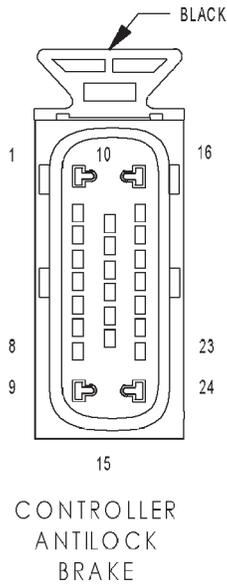


9.0 CONNECTOR PINOUTS



BRAKE LAMP SWITCH - GRAY 6 WAY

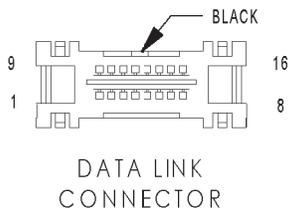
CAV	CIRCUIT	FUNCTION
1	K29 20WT/PK	BRAKE SWITCH SENSE
2	Z2 18BK/LG	GROUND
3	V32 20YL/RD	SPEED CONTROL POWER SUPPLY
4	V30 20DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
5	L50 16WT/TN	BRAKE LAMP SWITCH OUTPUT
6	F32 16PK/DB	FUSED B(+)



CONTROLLER ANTILOCK BRAKE - BLACK 24 WAY

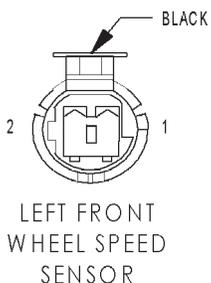
CAV	CIRCUIT	FUNCTION
1	Z1 12BK	GROUND
2	B1 18YL/DB	RIGHT REAR WHEEL SPEED SENSOR (-)
3	B2 18YL	RIGHT REAR WHEEL SPEED SENSOR (+)
4	-	-
5	D25 18VT/YL	PCI BUS
6	B6 18WT/DB	RIGHT FRONT WHEEL SPEED SENSOR (-)
7	B7 18WT	RIGHT FRONT WHEEL SPEED SENSOR (+)
8	-	-
9	A20 12RD/DB	FUSED B(+)
10	F20 18WT/VT	FUSED IGNITION SWITCH OUTPUT (RUN)
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	Z1 12BK	GROUND
17	-	-
18	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
19	B3 18LG/DB	LEFT REAR WHEEL SPEED SENSOR (-)
20	B4 18LG	LEFT REAR WHEEL SPEED SENSOR (+)
21	-	-
22	B8 18RD/DB	LEFT FRONT WHEEL SPEED SENSOR (-)
23	B9 18RD	LEFT FRONT WHEEL SPEED SENSOR (+)
24	A10 12RD/DG	FUSED B(+)

CONNECTOR PINOUTS



DATA LINK CONNECTOR - BLACK 16 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/YL	PCI BUS
3	-	-
4	Z1 20BK	GROUND
5	Z2 20BK/LG	GROUND
6	-	-
7	D21 20PK/TN	SCI TRANSMIT (PCM)
8	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
9	D19 20VT/OR (EXCEPT PREMIUM LHS/300M)	SCI RECEIVE (TCM/BCM)
10	Y98 18 OR/WT	FLASH ENABLE
11	-	-
12	D20 20LG	SCI RECIEVE (PCM)
13	-	-
14	-	-
15	D15 20WT/DG	SCI TRANSMIT (TCM)
16	F62 16RD	FUSED B (+)



LEFT FRONT WHEEL SPEED SENSOR - BLACK 2 WAY

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



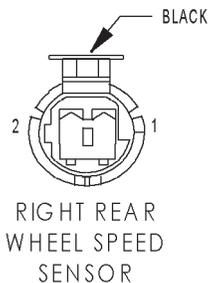
LEFT REAR WHEEL SPEED SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	B4 18LG	LEFT REAR WHEEL SPEED SENSOR (+)
2	B3 18LG/DB	LEFT REAR WHEEL SPEED SENSOR (-)



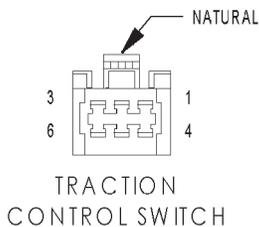
RIGHT FRONT WHEEL SPEED SENSOR - BLACK 2 WAY

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



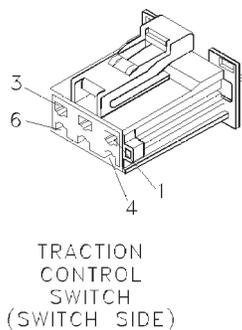
RIGHT REAR WHEEL SPEED SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	B2 18YL	RIGHT REAR WHEEL SPEED SENSOR(+)
2	B1 18YL/DB	RIGHT REAR WHEEL SPEED SENSOR(-)



TRACTION CONTROL SWITCH - NATURAL 6 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	Z2 22BK/LG	GROUND
3	B27 20RD/YL	TRACTION CONTROL SWITCH SENSE
4	-	-
5	E2 200R	PANEL LAMP DRIVER
6	-	-

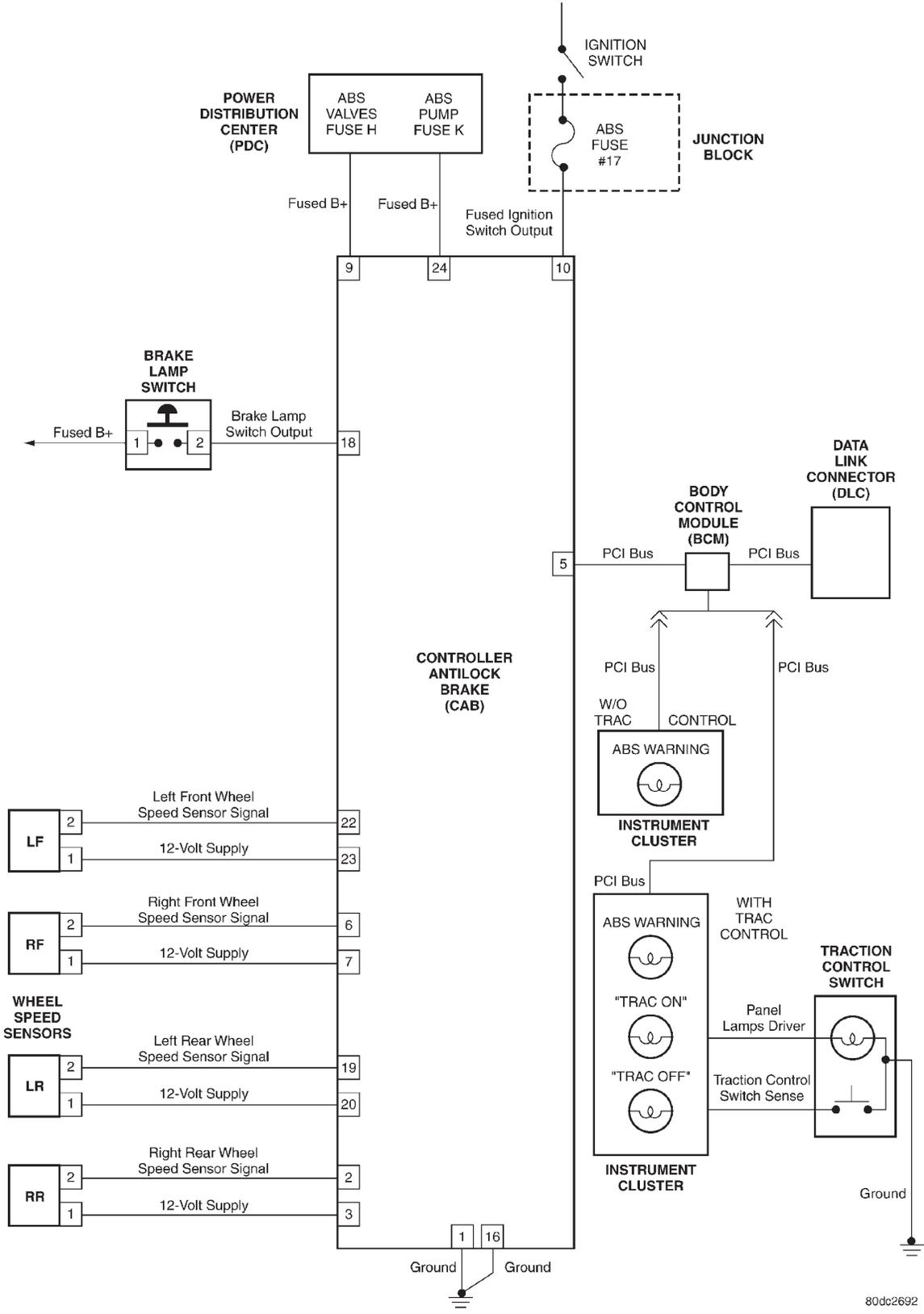


TRACTION CONTROL SWITCH (SWITCH SIDE)

CAV	CIRCUIT	FUNCTION
1	-	-
2	BK/LG	GROUND
3	RD/YL	TRACTION CONTROL SWITCH SENSE
4	-	-
5	OR	PANEL LAMP DRIVER
6	-	-

10.0 SCHEMATIC DIAGRAMS

LH-TEVES MARK20E ANTILOCK BRAKE SYSTEM



80dc2692

SCHEMATIC DIAGRAMS

