

2000-01 BRAKES**Anti-Lock - Teves Mark 20 - Concorde, Intrepid, LHS & 300M****DESCRIPTION**

CAUTION: See **ANTI-LOCK BRAKE SAFETY PRECAUTIONS** article in **GENERAL INFORMATION**.

NOTE: For more information on brake system, see appropriate **DISC & DRUM** article.

The Teves Mark 20 Anti-Lock Brake System (ABS) is designed to prevent wheel lock-up during heavy braking, allowing the driver to maintain steering control while stopping vehicle in shortest distance possible.

ABS uses a diagonal-split, hydraulic brake system. In standard brake mode, master cylinder primary circuit supplies pressure to right front and left rear brakes. Master cylinder secondary circuit supplies pressure to left front and right rear brakes. During an ABS stop, each brake is independently controlled by using separate hydraulic circuits for each brake. The ABS becomes enabled at speeds greater than 3-5 MPH and will automatically turn off when vehicle speed is less than 3-4 MPH.

ABS is equipped with a Red BRAKE warning light and an Amber ABS warning light located on instrument cluster, a brake booster and master cylinder. The Controller Anti-Lock Brake (CAB) and Hydraulic Control Unit (HCU) are integrated into one unit, the Integrated Control Unit (ICU). See **Fig. 1** and **Fig. 2**. An ABS fuse is located in junction block. ABS pump fuse and ABS valve fuse are located in Power Distribution Center (PDC). See **Fig. 3**. ABS also uses a brakelight switch, 2 proportioning valves and 4 wheel speed sensors. CAB communicates with scan tool via the Data Link Connector (DLC). See **Fig. 4**.

The Teves Mark 20 ABS may be equipped with a Traction Control System (TCS) which prevents front wheel slippage during fast acceleration at speeds less than 35 MPH. Models with TCS use a traction control switch mounted on upper right trim bezel. See **Fig. 5**. An Amber traction control warning (TRAC OFF) light and a Green traction control function (TRAC ON) light are located on instrument cluster.

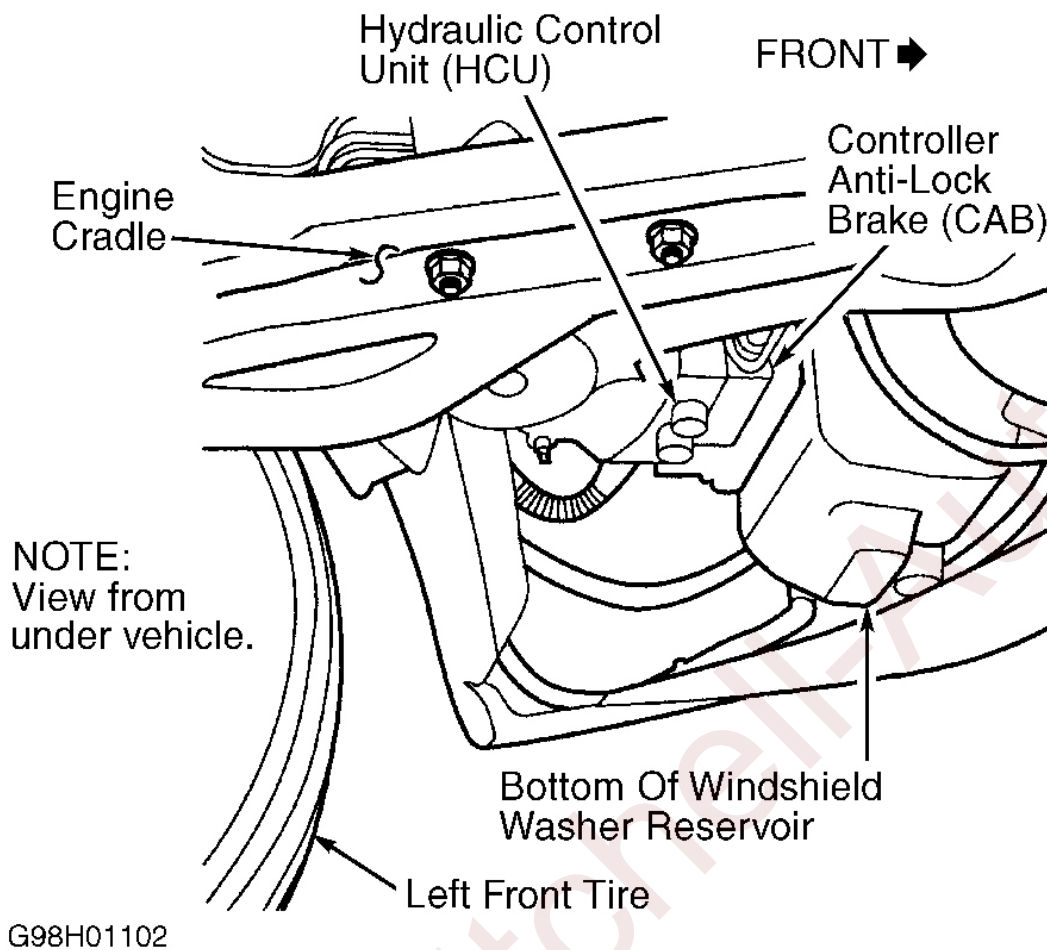


Fig. 1: Locating Controller Anti-Lock Brake & Hydraulic Control Unit
Courtesy of CHRYSLER CORP.

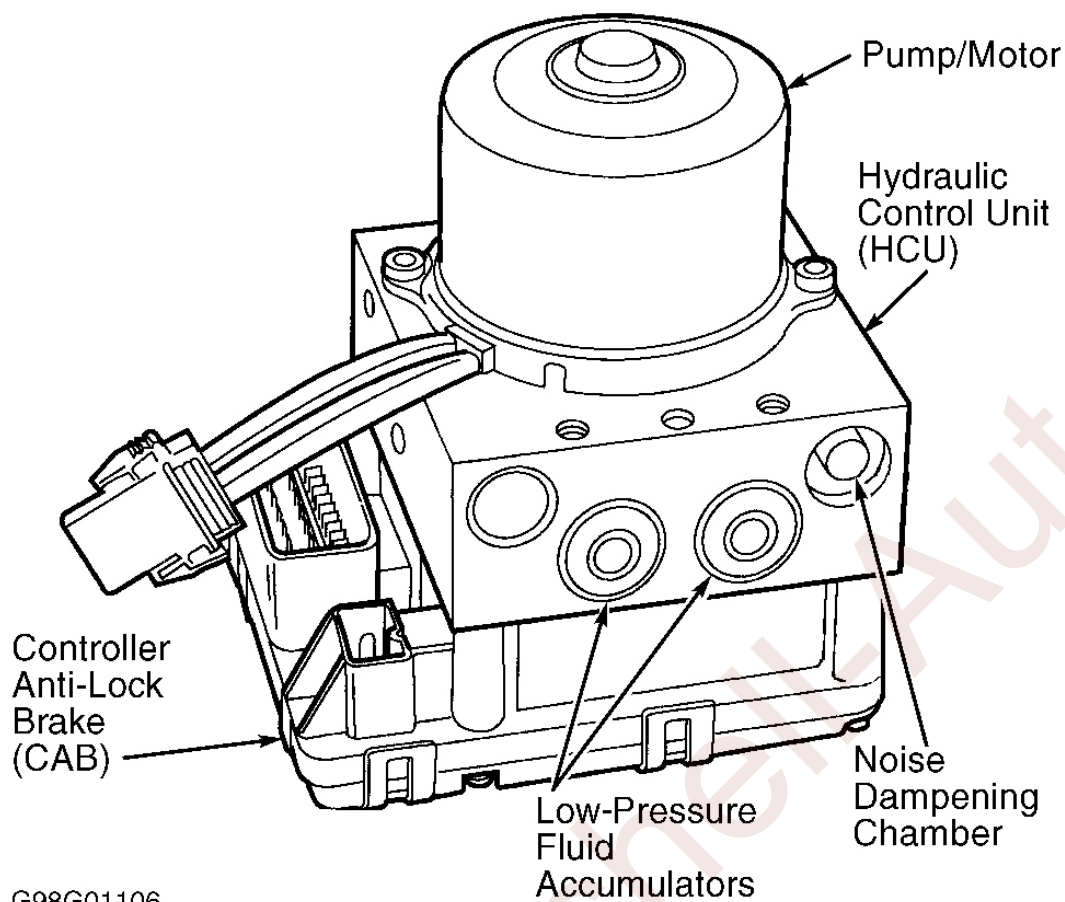
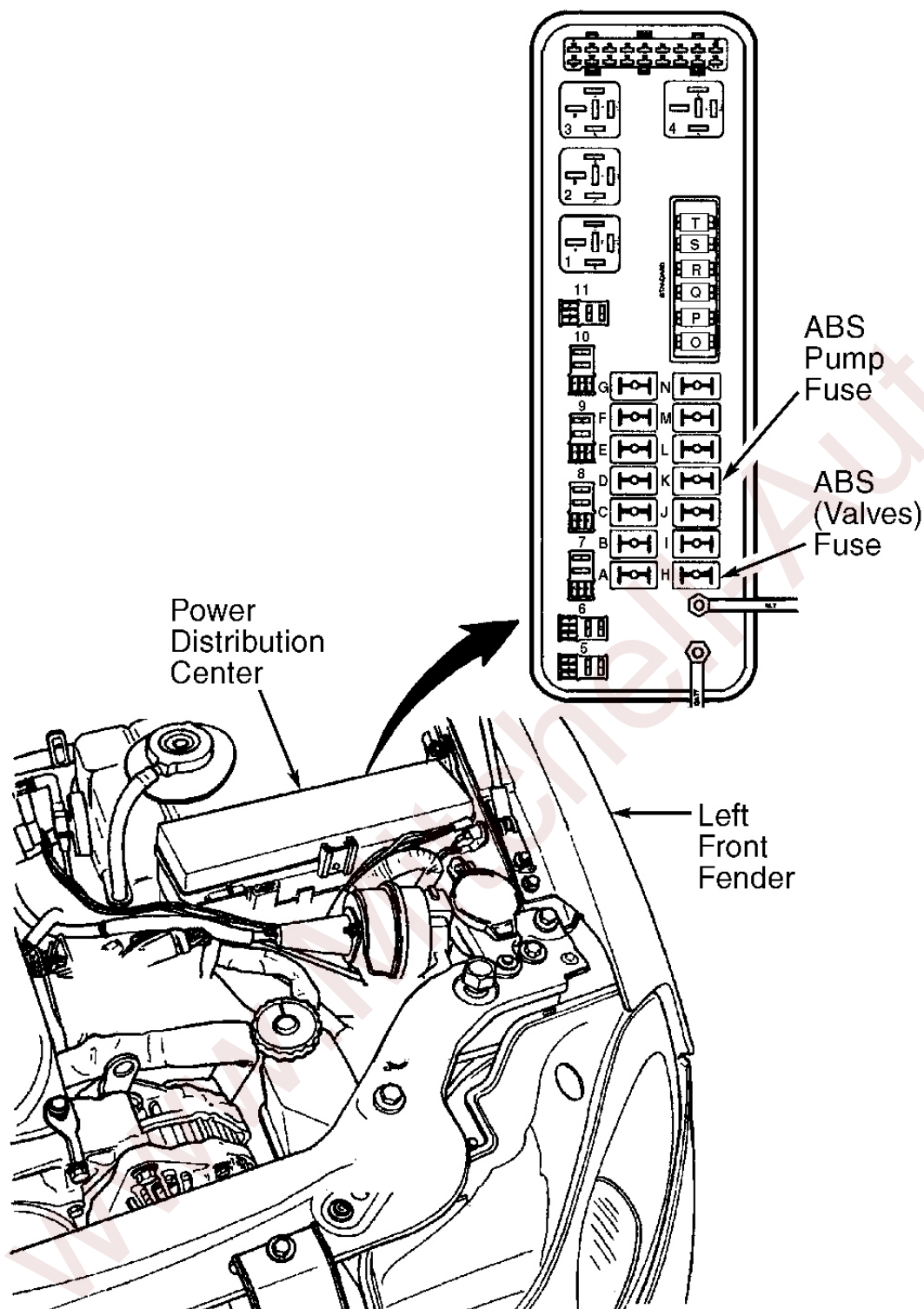
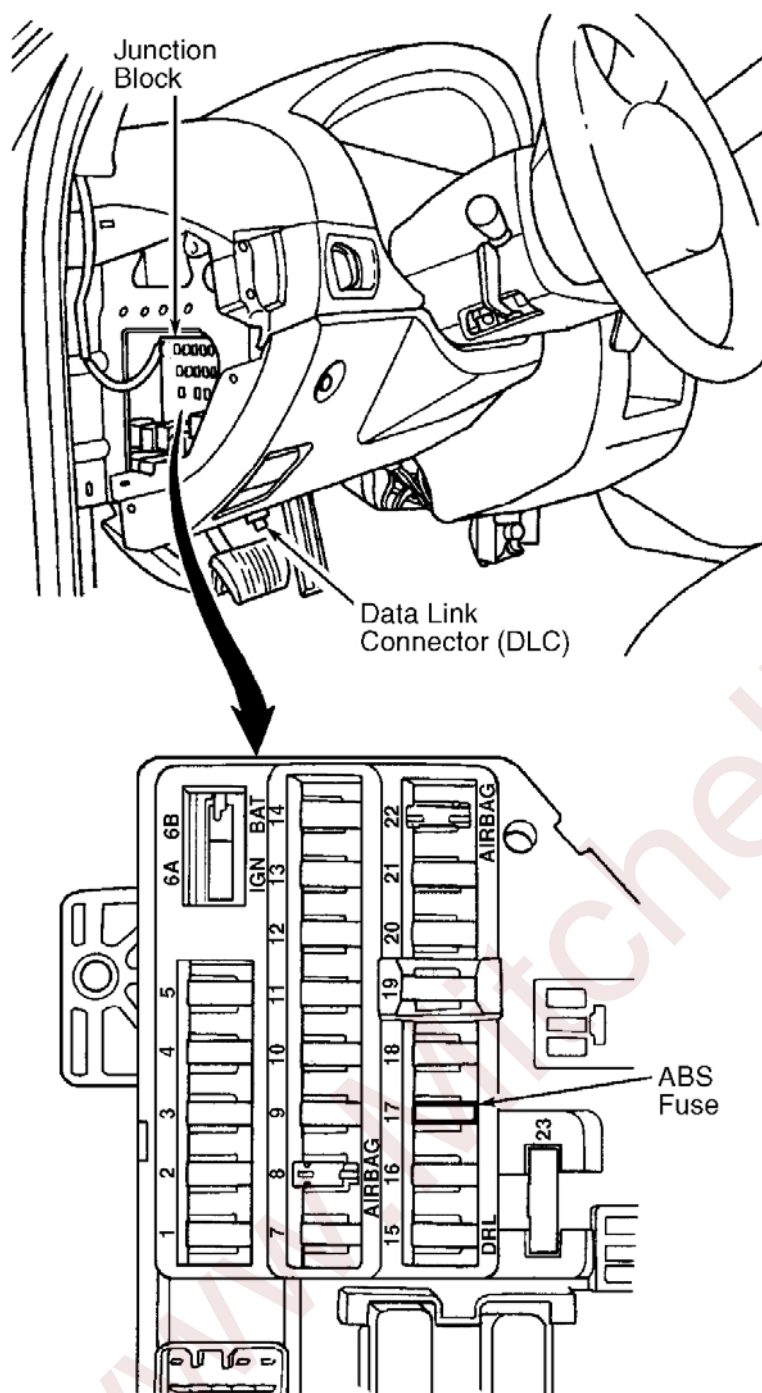


Fig. 2: Identifying Integrated Control Unit Components
Courtesy of CHRYSLER CORP.



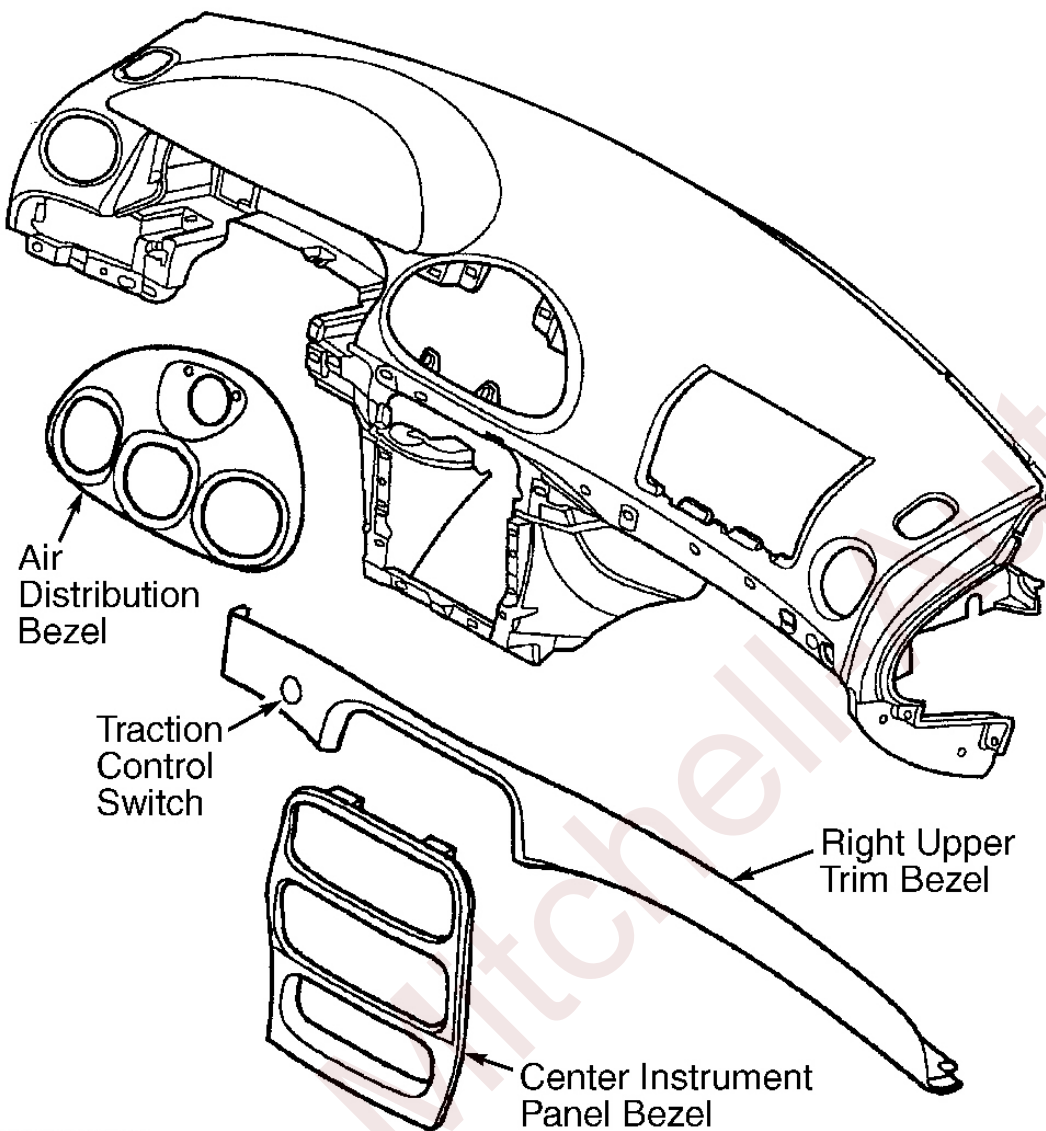
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Fig. 3: Locating Power Distribution Center & ABS Fuses
Courtesy of CHRYSLER CORP.



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Fig. 4: Locating Data Link Connector & Junction Block
Courtesy of CHRYSLER CORP.



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Fig. 5: Locating Traction Control Switch

OPERATION

SYSTEM OPERATION

Listed are some of the normal conditions which may exist during Anti-Lock Brake System (ABS) and Traction Control System (TCS) operation:

- When ignition is turned on, brake pedal may drop and a popping sound may be heard. Brake pedal movement and popping sound are caused by pulsating of the valves in the Hydraulic Control Unit (HCU).
- Brake pedal may pulsate during braking due to modulation of brake fluid pressure in each brake hydraulic circuit.

- Clicking or buzzing sound may be heard with vehicle at approximately 15-24 MPH. Clicking or buzzing sound is caused by a system test which operates pump/motor to verify proper pump/motor operation.
- Groaning sound may be heard during hard braking resulting in ABS operation. Groaning sound is caused by operation of valves in pump/motor to perform an ABS stop.
- Brake pedal may ratchet downward at the end of an ABS stop. Brake pedal movement is caused by opening of inlet valves in the HCU to increase pressure in the brake hydraulic circuits.
- On models with TCS, a groaning sound may be heard when vehicle is accelerating until vehicle speed is approximately 35 MPH. Groaning sound may be caused by front wheel(s) slipping on the road surface and TCS operating.
- The Green traction control function (TRAC ON) light, located on instrument cluster, will remain on until traction control cycle is completed.

COMPONENT OPERATION

Amber ABS Warning Light

The ABS warning light is located on the instrument cluster. When ignition is first turned on, ABS warning light will come on for 4-5 seconds as a bulb check, and then turn off. ABS warning light is used to inform driver that a failure exists in ABS, and that ABS has been turned off. The ABS warning light is controlled by the Controller Anti-Lock Brake (CAB). ABS warning light will flash when ABS is in diagnostic mode.

Red BRAKE Warning Light

The BRAKE warning light is located on instrument cluster. When ignition is first turned on, BRAKE warning light will come on as a bulb check, and then turn off. Application of parking brake or a low fluid signal from low brake fluid switch may cause BRAKE warning light to remain on steady. The BRAKE warning light may also indicate a potential hydraulic brake system problem.

Brakelight Switch

Brakelight switch delivers input signal to Controller Anti-Lock Brake (CAB) to indicate when brakes are being applied.

Controller Anti-Lock Brake

The Controller Anti-Lock Brake (CAB) is located in engine compartment, along with Hydraulic Control Unit (HCU). See **Fig. 1** and **Fig. 2**. When CAB determines wheel(s) are about to spin or lock up by input signal from each wheel speed sensor, it activates appropriate valve in HCU to increase or decrease hydraulic pressure to each wheel, resulting in a slight pulsation of brake pedal. ABS operation will be automatically turned off when vehicle speed is less than 3-4 MPH.

CAB detects wheel spin and lock-up tendencies, controls fluid pressure modulation during ABS operation, and monitors ABS operation. CAB contains a self-diagnostic system which stores a Diagnostic Trouble Code (DTC) if a system failure exists. For additional information on self-diagnostic system, see **SELF-DIAGNOSTIC SYSTEM**. CAB receives input signals from Wheel Speed Sensors (WSS), brakelight switch, and ABS warning light voltage. CAB controls valves in HCU for fluid pressure operation, traction control warning (TRAC OFF) light, and traction control function (TRAC ON) light.

On models with Traction Control System (TCS), CAB has the ability to calculate brake system overheating.

If brakes are used frequently and brake pad temperature becomes excessive according to CAB programmed limits, CAB will turn off TCS and turn on Amber traction control warning (TRAC OFF) light for a preprogrammed time limit. Once brake system has cooled, CAB will turn off TRAC OFF warning light and TCS operation will be restored.

Hydraulic Control Unit

The Hydraulic Control Unit (HCU) is located in engine compartment, along with Controller Anti-Lock Brake (CAB). See **Fig. 1** and **Fig. 2**. HCU contains 2 fluid accumulators and a valve block which consists of inlet and outlet valves. Fluid accumulators, used for primary and secondary brake hydraulic circuits, store brake fluid released when outlet valves are opened during an ABS cycle. Valve block is located on bottom of HCU, just below pump/motor.

If any of the wheels lock or skid, the inlet valve is closed to prevent any further brake pressure increase. The outlet valve is then opened to release brake fluid back into fluid accumulators until wheel is released. Once wheel is no longer locked, outlet valve is closed and inlet valve is opened to reapply brake pressure. If a wheel is decelerating within predetermined limits, both outlet valve and inlet valve are closed to maintain constant brake pressure.

The pump/motor is mounted on the HCU and consists of an electrical motor and a dual-piston pump. Pump/motor obtains brake fluid from fluid accumulators to supply pressure during an ABS stop. Pump/motor only operates during an ABS stop and is controlled by the CAB.

Low Brake Fluid Switch

The low brake fluid switch is located in brake fluid reservoir on master cylinder. If brake fluid level becomes low, switch contacts close and Red BRAKE warning light is turned on. Low brake fluid switch does not disable ABS operation. Low brake fluid switch may also be referred to as brake fluid level switch.

Proportioning Valves

Two in-line proportioning valves are used, one in each rear wheel brake hydraulic circuit between the brakeline and flex hose. Proportioning valves limit pressure to rear brakes to improve front-to-rear brake balance during normal braking.

Traction Control Switch

The traction control switch is mounted on upper right trim bezel. See **Fig. 5**. Traction control switch may be used to turn Traction Control System (TCS) on or off. TCS will come on each time ignition is turned on, even if system was turned off with traction control switch before turning ignition off.

Traction Control Function (TRAC ON) Light

The Green TRAC ON light is located on instrument cluster. When the ignition is first turned on, TRAC ON light will come on for 4-5 seconds as a bulb check, and then turn off. TRAC ON light is used to inform driver that Traction Control System (TCS) has entered traction control mode. TRAC ON light is controlled by Controller Anti-Lock Brake (CAB).

Traction Control Warning (TRAC OFF) Light

The Amber TRAC OFF light is located on instrument cluster. When ignition is first turned on, TRAC OFF

light will come on for 4-5 seconds as a bulb check, and then turn off. The TRAC OFF light will come on to inform the driver that Traction Control System (TCS) has been turned off by Controller Anti-Lock Brake (CAB) or traction control switch. TRAC OFF light may also come on when TCS has been deactivated by system to prevent damage to brake system due to brake pad overheating. If a failure exists in ABS or TCS, TRAC OFF light will come on to inform driver of system malfunction.

Wheel Speed Sensor/Tone Wheel Assemblies

Four Wheel Speed Sensor (WSS)/tone wheel assemblies are used, one on each wheel. WSS constantly delivers an AC analog voltage signal to Controller Anti-Lock Brake (CAB). CAB then translates this voltage signal into digital signals via the Analog-to-Digital (A/D) converter inside the CAB for each wheel.

On front wheels, WSS is located on steering knuckle, and tone wheel is located on outer CV joint on axle shaft. On rear wheels, WSS is mounted on brake caliper adapter plate, and tone wheel is located on hub assembly. WSS air gap is non-adjustable.

SELF-DIAGNOSTIC SYSTEM

Controller Anti-Lock Brake Operation

Controller Anti-Lock Brake (CAB) contains a self-diagnostic system which may be used for system diagnosis. When ignition is first turned on, a system initialization starts and CAB performs a self-check on Anti-Lock Brake System (ABS) and Traction Control System (TCS) electrical components. At the same time, valves in Hydraulic Control Unit (HCU) are cycled, resulting in pulsations of brake pedal.

When vehicle is operated and vehicle speed is more than 5 MPH, a dynamic test is performed. During this test, the pump motor will momentarily turn on at 15 MPH. If driver places foot on brake pedal during this test, test will then be run at 24 MPH regardless of brake pedal position. If any component is determined to be defective during system initialization or dynamic test, a Diagnostic Trouble Code (DTC) will set and CAB will turn on Amber ABS warning light located on instrument cluster. On TCS equipped models, Amber traction control warning (TRAC OFF) light located on instrument cluster, will also be turned on. Both ABS and TCS will become inoperative.

CAB also contains a diagnostic mode which may be used with scan tool connected to Data Link Connector (DLC). See **Fig. 4**. Vehicle speed must be less than 6 MPH for diagnostic mode operation. If vehicle speed is more than 6 MPH, a NO RESPONSE message will be displayed on scan tool. When in diagnostic mode, Amber ABS warning light on instrument cluster will flash on and off. The Red BRAKE warning light on instrument cluster will also flash on and off. Both ABS and TCS will become inoperative during diagnostic mode.

If problem area exists in ABS circuits, or inlet and outlet valve, a DTC will be set for problem area. The Amber ABS warning light will come on steady. No diagnostic mode operation will be available until defective condition is repaired and DTC is cleared from CAB. Valves in HCU may be operated when in diagnostic mode as long as vehicle speed is 6 MPH or less.

Diagnostic Trouble Codes

Once a Diagnostic Trouble Code (DTC) exists, the DTC is stored in Controller Anti-Lock Brake (CAB) memory. More than one DTC may be stored at one time. DTCs may be retrieved using a scan tool. See **RETRIEVING DIAGNOSTIC TROUBLE CODES** procedure under DIAGNOSIS & TESTING. The number of ignition cycles since most recent DTC will be displayed on scan tool. DTC may be cleared from

CAB using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES** under DIAGNOSIS & TESTING.

BLEEDING BRAKE SYSTEM

NOTE: During bleeding procedure, ensure master cylinder fluid level remains close to FULL mark. Check master cylinder fluid level periodically while bleeding system. Add DOT 3 brake fluid as required.

Teves Mark 20 Anti-Lock Brake System (ABS) must be bled as 2 independent braking systems (ABS and base brake system). Always bleed base brake system first using manual bleeding or pressure bleeding procedure. See **MANUAL BLEEDING** or **PRESSURE BLEEDING**. ABS Hydraulic Control Unit (HCU) must be bled after base brake system. See **BLEEDING HYDRAULIC CONTROL UNIT**. Bleeding of HCU requires use of DRB-III scan tool. Always repeat base system bleeding procedure after bleeding HCU.

MANUAL BLEEDING

1. Fill master cylinder (if necessary). Reinstall master cylinder cap. Remove rubber caps from all 4 bleeder valves. Install clear hose on bleed valve at one wheel. Place other end of hose in clean transparent container of clean brake fluid. Ensure end of clear hose is submerged in brake fluid.
2. Have an assistant pump brake pedal 3-4 times. Hold brake pedal down. Open bleed valve at least one full turn. Brake pedal should drop to floor. Close bleed valve. Release brake pedal. Repeat bleeding procedure until brake fluid flow is clear and free of bubbles. Proceed to next bleed screw of brake bleeding sequence. See **BLEEDING SEQUENCE** table. Install rubber caps on all 4 bleeder valves and refill master cylinder.

BLEEDING SEQUENCE

Application	Sequence
All Models	LR, RF, RR, LF

PRESSURE BLEEDING

1. Connect pressure bleeder to master cylinder using appropriate adapters. Remove rubber caps from all 4 bleeder valves. Install clear hose on bleed valve at one wheel. Place other end of hose in clean transparent container of clean brake fluid. Ensure end of clear hose is submerged in brake fluid.
2. Open valve on pressure bleeder. Open bleed valve at least one full turn. Close bleed valve when brake fluid flow is clear and free of bubbles.
3. Proceed to next bleed screw of brake bleeding sequence. See **BLEEDING SEQUENCE** table. Install rubber caps on all 4 bleeder valves. Close valve on pressure bleeder. Remove pressure bleeder from master cylinder. Fill master cylinder with brake fluid (if necessary). Install cap on master cylinder.

BLEEDING HYDRAULIC CONTROL UNIT

CAUTION: Ensure manual bleeding or pressure bleeding procedure is performed both before and after bleeding Hydraulic Control Unit (HCU).

1. Bleed base brake system using manual or pressure bleeding procedure. See **MANUAL BLEEDING**

or **PRESSURE BLEEDING** .

2. Connect scan tool to Data Link Connector (DLC) located under left side of instrument panel. See **Fig. 4** . Using scan tool, check for stored Diagnostic Trouble Codes (DTC). See **RETRIEVING DIAGNOSTIC TROUBLE CODES** under DIAGNOSIS & TESTING. If no DTCs exist, go to next step. If DTCs exist, clear DTCs from Controller Anti-Lock Brake (CAB) using scan tool, and go to next step.
3. Using scan tool, perform ABS bleeding procedure. Follow screen prompts to bleed brake system. Disconnect scan tool. Fill master cylinder with brake fluid (if necessary). Repeat bleeding procedure until brake fluid flow is clear and free of bubbles. Repeat base system bleeding procedure. See **MANUAL BLEEDING** or **PRESSURE BLEEDING** . Refill master cylinder and test drive vehicle to ensure brakes operate properly and brake pedal is not spongy.

DIAGNOSIS & TESTING

PRELIMINARY CHECKS

NOTE: For system diagnosis, perform visual inspection, and then road test vehicle. Perform road test to duplicate conditions under which problem exists.

Service Precautions

CAUTION: For additional information on Anti-Lock Brake System (ABS) service precautions, see **ANTI-LOCK BRAKE SAFETY PRECAUTIONS** article in **GENERAL INFORMATION**.

Before proceeding with system diagnosis, observe service precautions as follows:

- Ensure battery is fully charged and charging system is functional.
- Ensure ignition is off before disconnecting connector from any component.
- When testing voltage or continuity at any electrical component, disconnect connector and check at terminal side of connector. DO NOT backprobe circuit with connector installed unless otherwise instructed. DO NOT probe a wire through wire insulation.
- If using a jumper wire, ensure jumper wire is fuse-protected.
- Use care when performing electrical tests, as not to accidentally cause short circuits. Causing a short circuit may cause component damage or set an additional diagnostic trouble code(s), making diagnosis of original problem more difficult.
- Use scan tool voltmeter or ohmmeter unless instructed to use an external voltmeter or ohmmeter.

Visual Inspection

Ensure connectors are securely installed on Controller Anti-Lock Brake (CAB), Hydraulic Control Unit (HCU), and low brake fluid switch. Ensure connector is securely installed for each wheel speed sensor. Ensure no brake fluid leaks exist on brake system components and brake fluid level is correct. Ensure all tires are properly inflated and of correct size. Repair or replace components as necessary.

Road Test

1. Turn ignition on. Note if Red BRAKE warning light and Amber ABS warning light come on.

Warning lights are located on instrument cluster. Both warning lights should momentarily come on as a bulb check, and then go off. If Red BRAKE warning light does not operate properly, go to next step. If Amber ABS warning light does not operate properly, go to step 3 . If warning lights operate properly, go to step 4 .

2. If Red BRAKE warning light does not come on momentarily, diagnose Red BRAKE warning light circuit. See **WIRING DIAGRAMS** . If Red BRAKE warning light remains on steady with ignition on, diagnose base brake system. See appropriate DISC & DRUM article.
3. If Amber ABS warning light does not come on momentarily, perform **TEST 1A: ABS WARNING LIGHT** under DIAGNOSTIC TESTS. If Amber ABS warning light remains on steady, retrieve and record Diagnostic Trouble Codes (DTC), and then clear DTCs from Controller Anti-Lock Brake (CAB). See **RETRIEVING DIAGNOSTIC TROUBLE CODES** and **CLEARING DIAGNOSTIC TROUBLE CODES** .
4. Drive vehicle at a speed of at least 12 MPH and note if Amber ABS warning light comes on steady. If Amber ABS warning light does not come on, go to next step. If Amber ABS warning light comes on steady, retrieve DTCs. See **RETRIEVING DIAGNOSTIC TROUBLE CODES** .
5. Continue driving vehicle. Ensure vehicle attains a speed of 40 MPH. Bring vehicle to at least one complete stop, and then again accelerate to at least 25 MPH. If Amber ABS warning light comes on steady, retrieve DTCs. See **RETRIEVING DIAGNOSTIC TROUBLE CODES** .

RETRIEVING DIAGNOSTIC TROUBLE CODES

NOTE: For connector terminal and circuit identification referenced in testing, refer to illustrations. See **CONNECTOR IDENTIFICATION** and **WIRING DIAGRAMS** . After each repair is complete, perform **TEST VER-1A: VERIFICATION TEST** under **DIAGNOSTIC TESTS** to confirm problem has been corrected.

1. Perform visual inspection. See **VISUAL INSPECTION** under DIAGNOSTIC PROCEDURE. Ensure brakelights work properly. If brakelights operate properly, go to next step. Adjust brakelight switch as necessary. Brakelight switch adjustment requires brakelight switch removal. See **BRAKELIGHT SWITCH** under REMOVAL & INSTALLATION. If brakelights do not operate properly, repair brakelights as necessary.
2. Connect scan tool to Data Link Connector (DLC) located under left side of instrument panel. See **Fig. 4** . If scan tool will not power up, check for loose cable connections or bad cable. If cable connections and cable are okay, measure voltage at DLC terminal No. 16, fused B+ circuit (Pink wire). See **Fig. 7** . Voltage should be at least 11 volts. If voltage is not within specification, check fused B+ circuit. Repair circuit as necessary. If circuit is okay, check DLC ground circuits (Black and Black/Light Green wires). See **WIRING DIAGRAMS** .
3. Using scan tool, select ANTI-LOCK BRAKES. Turn ignition on. If scan tool displays NO RESPONSE FROM CONTROLLER ANTILOCK BRAKE, or any other communication problem exists, diagnose communication problem before proceeding. See appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT.
4. Read and record any ABS Diagnostic Trouble Code (DTC) messages. If no DTCs are displayed, go to next step. If scan tool displays CAB POWER FEED CIRCUIT, diagnose this DTC before diagnosing any other DTC. See **TEST 2A: CAB POWER FEED CIRCUIT** under DIAGNOSTIC TESTS. If any other DTCs are present, perform appropriate test under DIAGNOSTIC TESTS. See **DIAGNOSTIC TROUBLE CODE DEFINITION** table.
5. Using scan tool, select INPUTS/OUTPUTS and read brakelight switch input state while pressing and releasing brake pedal. If scan tool display does not match brake pedal position, perform **TEST 16A: BRAKELIGHT SWITCH** . If a problem exists with Amber ABS warning light, perform **TEST 1A:**

ABS WARNING LIGHT . If problem exists with Red BRAKE warning light, diagnose park brake warning light. See appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT. On vehicles equipped with traction control system, use scan tool to read traction control switch input state while pressing and releasing traction control switch. Traction control switch is located in right upper trim bezel. See **Fig. 5** . If scan tool display does not match the state of TRAC OFF light located on instrument cluster, perform **TEST 17A: TRAC OFF INDICATOR ALWAYS/NEVER ON** .

NOTE: **Ensure scan tool is disconnected from DLC when performing road test.**

6. If no other problems exist, disconnect scan tool from DLC. Perform vehicle road test with vehicle speed at more than 30 MPH, and perform several hard ABS stops. Using scan tool, read DTCs. If any DTCs are present, perform appropriate test under DIAGNOSTIC TESTS. See **DIAGNOSTIC TROUBLE CODE DEFINITION** table.
7. When performing road test, the following conditions are considered normal and no attempt should be made to correct them:
 - When ignition is turned on, brake pedal drops and popping sound is heard.
 - Brake pedal pulsates during braking.
 - Clicking or buzzing heard with vehicle at about 15 MPH or 24 MPH.
 - Groaning sound heard during hard braking during ABS operation.
 - Brake pedal ratchets downward at end of an ABS stop.
8. If complaint is ABS cycles at end of a stop at low speeds, this condition may be caused by a marginal Wheel Speed Sensor (WSS) signal. Marginal WSS signal may be caused by improper WSS air gap, defective tone wheel or brakes hanging up.
9. If after road test no problems are found, check if any Technical Service Bulletins (TSB) apply to vehicle.

DIAGNOSTIC TROUBLE CODE DEFINITION

Fault	(1) Perform Test
Scan Tool Message	
ABS WARNING LIGHT	<u>1A</u>
CAB POWER FEED CIRCUIT	<u>2A</u>
CONTROLLER FAILURE	<u>3A</u>
LEFT FRONT SENSOR CIRCUIT FAILURE	<u>4A</u>
LEFT FRONT SENSOR SIGNAL FAILURE	<u>5A</u>
LEFT REAR SENSOR CIRCUIT FAILURE	<u>6A</u>
LEFT REAR SENSOR SIGNAL FAILURE	<u>7A</u>
PCI BUS COMMUNICATION	<u>8A</u>
PUMP MOTOR NOT WORKING PROPERLY	<u>9A</u>
RIGHT FRONT SENSOR CIRCUIT FAILURE	<u>10A</u>
RIGHT FRONT SENSOR SIGNAL FAILURE	<u>11A</u>
RIGHT REAR SENSOR CIRCUIT FAILURE	<u>12A</u>
RIGHT REAR SENSOR SIGNAL FAILURE	<u>13A</u>
SYSTEM OVERVOLTAGE	<u>14A</u>
SYSTEM UNDERVOLTAGE	<u>15A</u>

System Tests

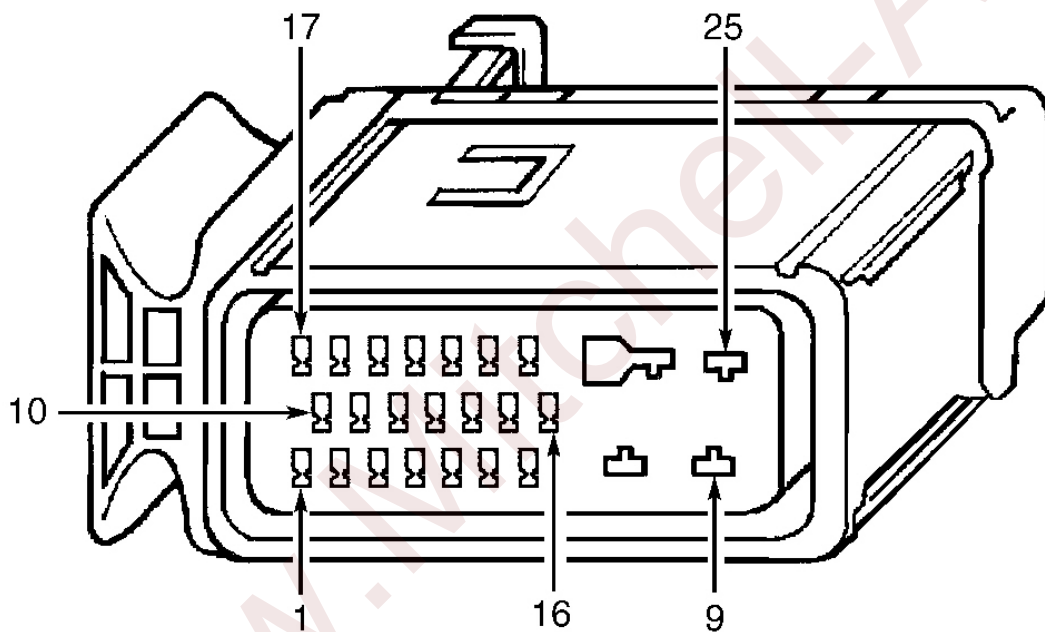
Brakelight Switch	16A
TRAC OFF Indicator Always/Never On	17A
TRAC ON Indicator Always/Never On	18A

(1) Perform appropriate test under DIAGNOSTIC TESTS. After each repair is complete, perform **TEST VER-1A: VERIFICATION TEST** under DIAGNOSTIC TESTS to confirm repair.

CLEARING DIAGNOSTIC TROUBLE CODES

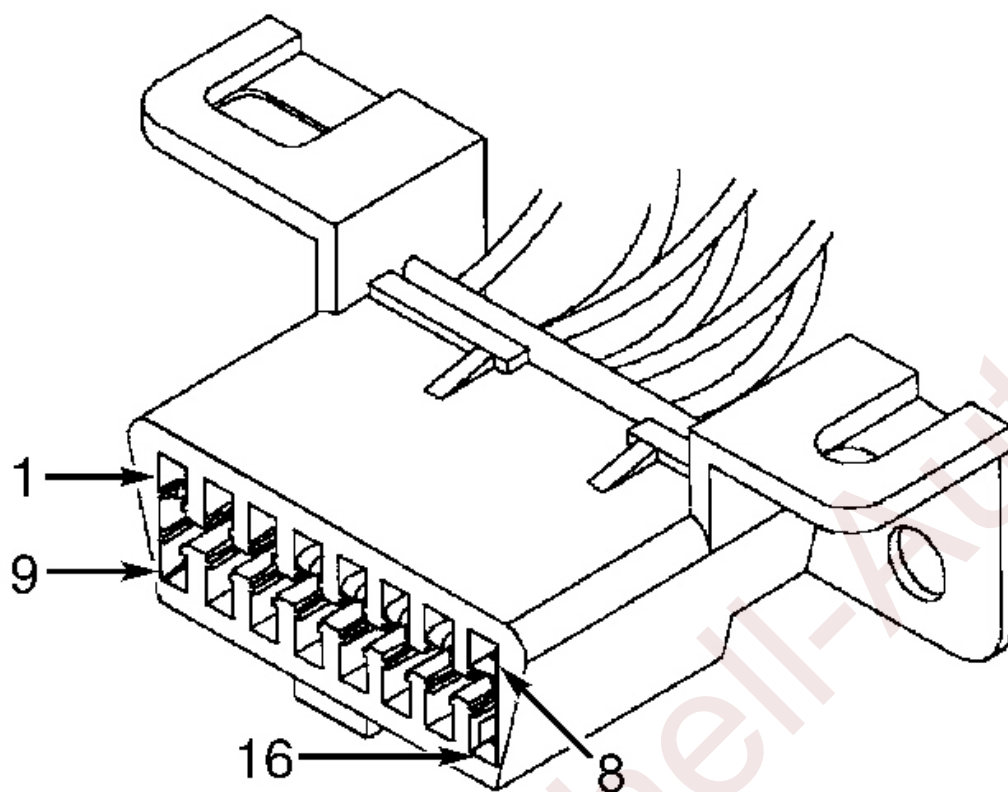
Connect scan tool to Data Link Connector (DLC) located under left side of instrument panel. See **Fig. 4**. Turn ignition on. Using screen prompts on scan tool, clear diagnostic trouble codes from Controller Anti-Lock Brake (CAB).

CONNECTOR IDENTIFICATION



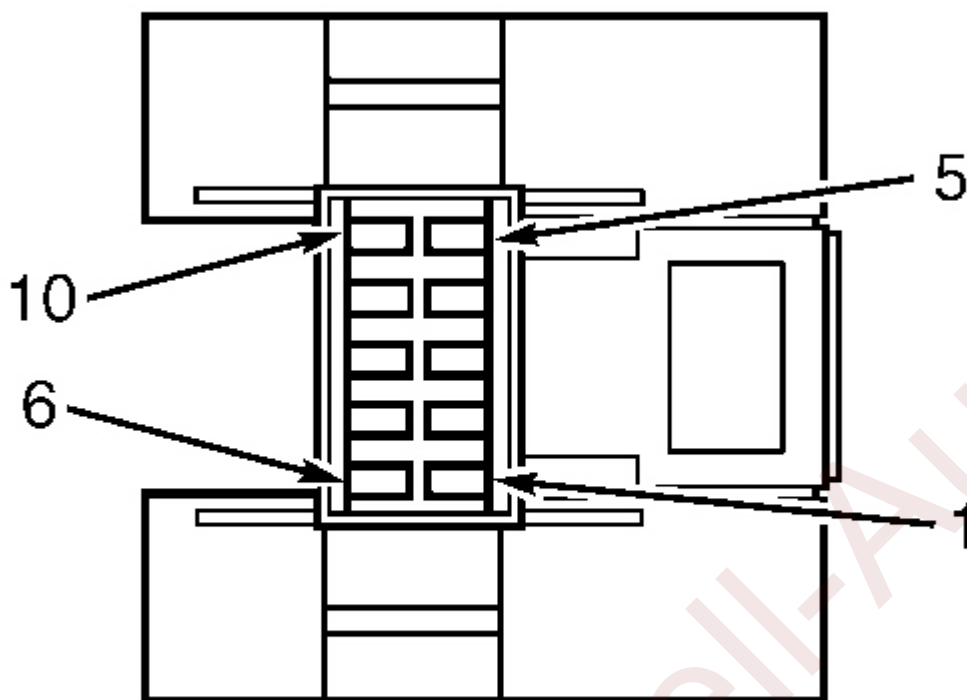
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Fig. 6: Identifying Controller Anti-Lock Brake Connector Terminals
Courtesy of CHRYSLER CORP.



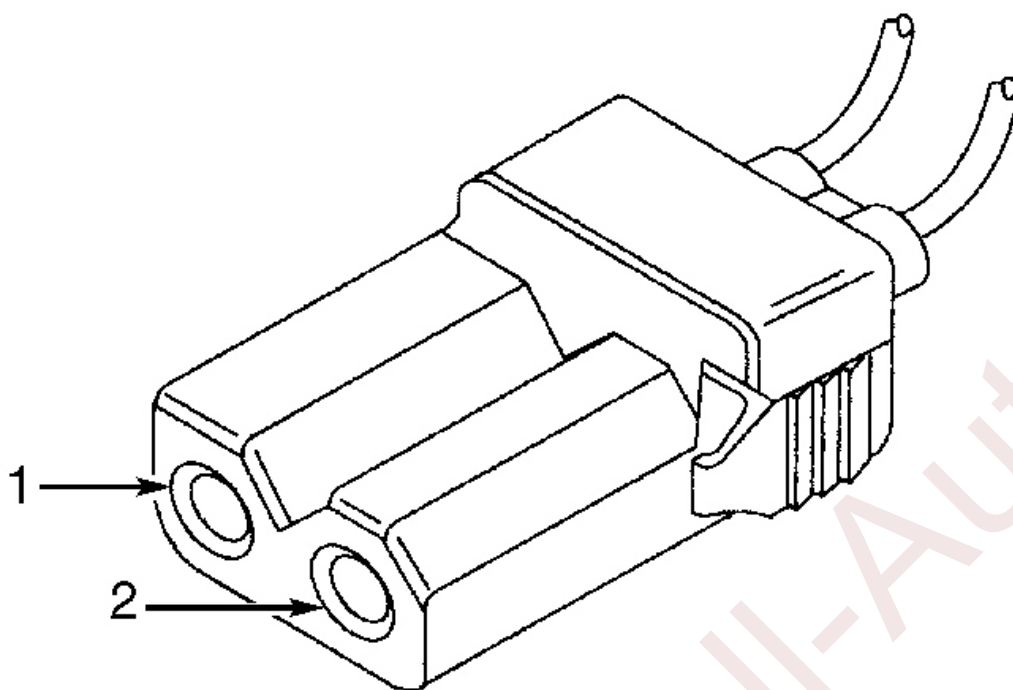
G96H25129

Fig. 7: Identifying Data Link Connector Terminals
Courtesy of CHRYSLER CORP.



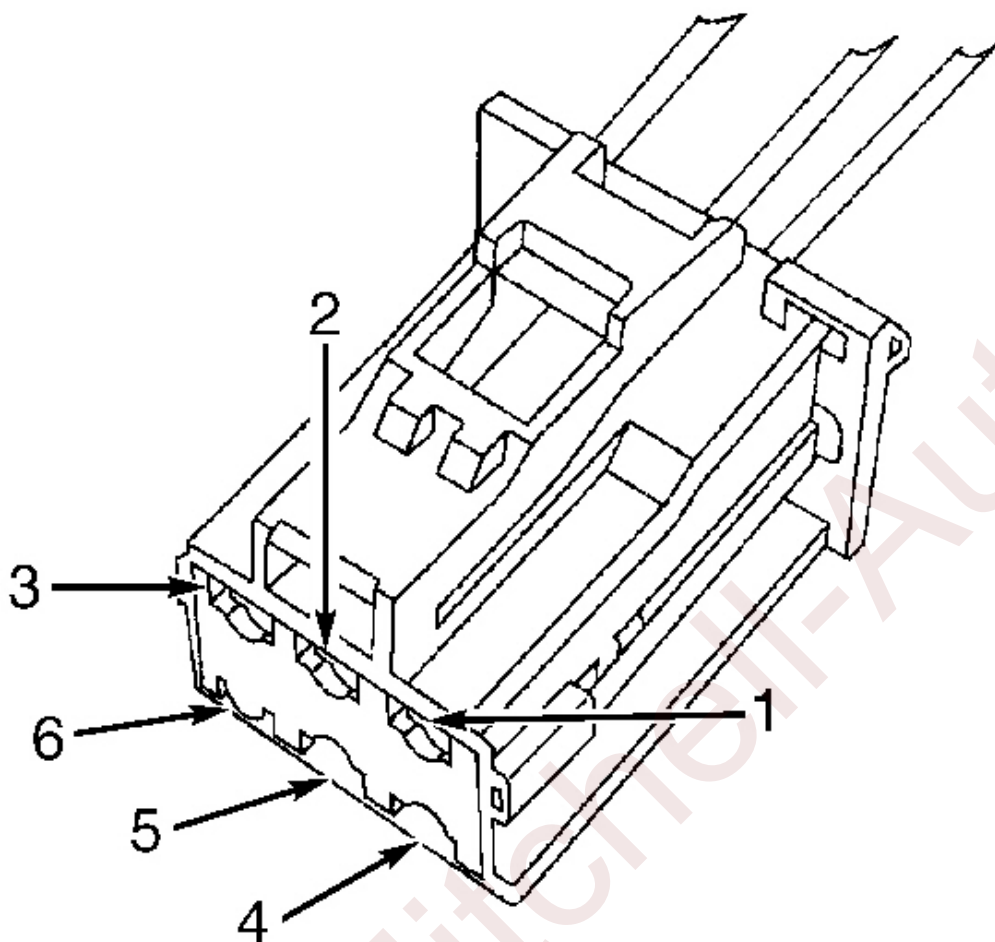
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Fig. 8: Identifying Instrument Cluster C1 (Green) & C2 (Blue) Connector Terminals
Courtesy of CHRYSLER CORP.



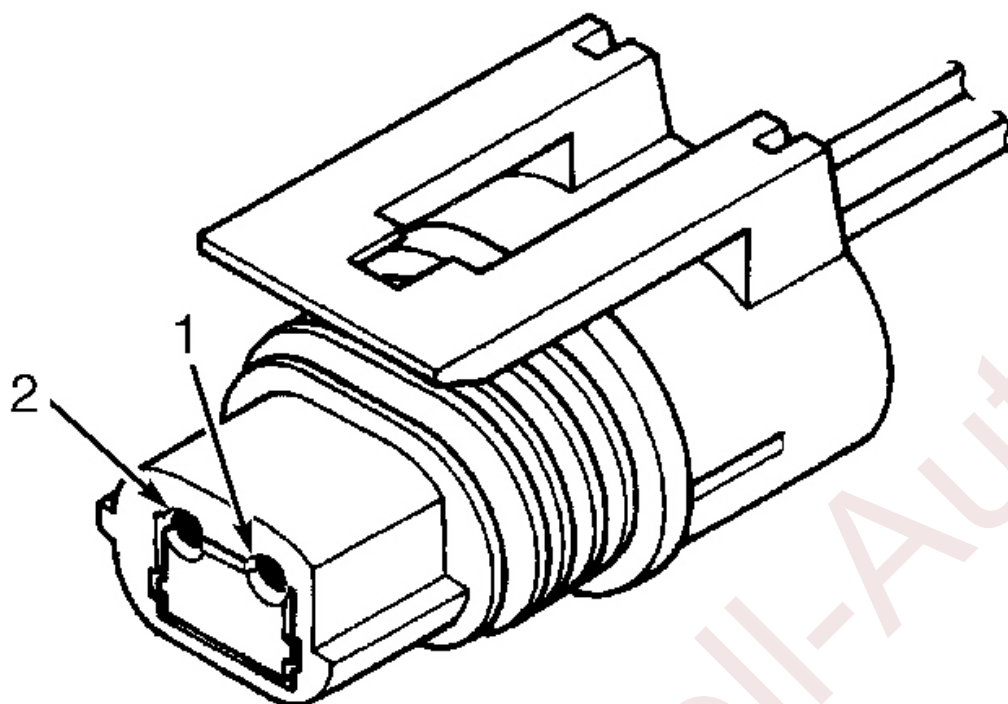
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Fig. 9: Identifying Pump/Motor Connector Terminals
Courtesy of CHRYSLER CORP.



G98C01109

Fig. 10: Identifying Traction Control Switch Connector Terminals
Courtesy of CHRYSLER CORP.



G98E01110

Fig. 11: Identifying Wheel Speed Sensor Connector Terminals (Typical)
Courtesy of CHRYSLER CORP.

DIAGNOSTIC TESTS

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery.

NOTE: When using diagnostic tests, **DO NOT** skip any test steps unless instructed to do so, or incorrect diagnosis may result.

NOTE: Diagnostic tests are written specifically for Diagnostic Readout Box (DRB-III). A generic scan tool may not be capable of performing all necessary test functions.

TEST 1A: ABS WARNING LIGHT

NOTE: After each repair, perform **TEST VER-1A: VERIFICATION TEST** to confirm

problem has been corrected.

1. Turn ignition on. Using scan tool, read DTCs. If any instrument cluster-related DTCs are present, proceed to appropriate test(s) in appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT. If no instrument panel-related DTCs are present, go to next step.
2. Turn ignition off. Observe instrument cluster indicators. Turn ignition on. If ABS indicator illuminates for several seconds and then goes out, go to next step. If ABS indicator does not illuminate for several seconds and then go out, diagnose instrument cluster lights problem. See appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT.
3. Using scan tool, attempt to communicate with CAB. If scan tool communicates with CAB, go to next step. If scan tool does not communicate with CAB, or any other communication problem exists, diagnose communication problem before proceeding. See appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT.
4. Using scan tool, read DTCs. If any CAB-related DTCs exist, perform appropriate test. See **DIAGNOSTIC TROUBLE CODE DEFINITION** table under DIAGNOSIS & TESTING. If no CAB-related DTCs exist, replace instrument cluster. See appropriate INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT.

TEST 2A: CAB POWER FEED CIRCUIT

NOTE: After each repair, perform **TEST VER-1A: VERIFICATION TEST** to confirm problem has been corrected.

1. Turn ignition on. Using scan tool, erase DTCs. Turn ignition off, then on. Drive vehicle at more than 15 MPH for at least 10 seconds. Using scan tool, read DTCs. If DTC returns, go to next step. If DTC does not return, go to step 9 .
2. Turn ignition off. Remove and inspect fuse No. 17 (ABS) located in junction block behind left instrument panel end cap. Fuses are identified inside uncap **Fig. 4** . If fuse is blown, go to next step. If fuse is okay, leave fuse removed, and go to step 7 .
3. Check fused B+ circuits (Red/Dark Blue wire and Red/Dark Green wire) between junction Block and Controller Anti-Lock Brake (CAB) for an intermittent short to ground. Repair circuit(s) as necessary and replace fuse. If circuits are okay, leave fuse removed, and go to next step.
4. Ensure ignition is off. Disconnect CAB connector. Inspect CAB connector and terminals for damage. Repair connector and terminals as necessary. If CAB connector and terminals are okay, go to next step.
5. Using a test light connected to battery voltage, probe CAB connector terminal No. 9, fused B+ circuit (Red/Dark Blue wire) and then terminal No. 25, fused B+ circuit (Red/Dark Green wire). If test light illuminates on either circuit, repair short to ground in circuit(s), and replace fuse. If test light does not illuminate at both circuits, leave fuse removed, and go to next step.
6. Reconnect CAB connector. Using test light connected to battery voltage, probe junction block terminal No. 1, fused B+ circuit (Pink/Dark blue wire). If test light illuminates, replace CAB and fuse. See **CONTROLLER ANTI-LOCK BRAKE** under REMOVAL & INSTALLATION. If test light does not illuminate, replace defective fuse.
7. Turn ignition on. Check voltage on junction block terminal No. 2, voltage supply circuit (Black/Orange wire). If voltage is more than 10 volts, leave fuse removed, and go to next step. If voltage is 10 volts or less, repair open Black/Orange wire, and replace fuse.
8. Turn ignition off. Disconnect Controller Anti-Lock Brake (CAB) connector. Check resistance of fused ignition switch output circuit (White/Violet wire) between iunction block terminal No. 1 and CAB

connector terminal No. 23. If resistance is less than 5 ohms, replace CAB and fuse. See **CONTROLLER ANTI-LOCK BRAKE** under REMOVAL & INSTALLATION. If resistance is 5 ohms or more, repair open White/Violet wire, and replace fuse.

9. Turn ignition off. Inspect related wiring harness, connectors and terminals for defective connectors, bare or broken wires. See **WIRING DIAGRAMS**. Repair any problems found as necessary. If no problems are found, check if any Technical Service Bulletins (TSB) apply to vehicle.

TEST 3A: CONTROLLER FAILURE

NOTE: After each repair, perform **TEST VER-1A: VERIFICATION TEST** to confirm problem has been corrected.

1. Turn ignition off. Inspect all aftermarket accessories that have been installed on vehicle (i.e. cellular telephone, radio transmitter) for proper power and ground connections. Ensure antenna cable is properly routed. Repair defective power and ground connections, or antenna cable routing as necessary. If no defective power and ground connections exist and antenna cable is properly routed, go to next step.
2. Ensure ignition is off. Disconnect Controller Anti-Lock Brake (CAB) connector. Inspect CAB connector and terminals for damage. Inspect CAB power and ground circuits for pushed-out terminals, damaged terminals or miswired terminals. See **WIRING DIAGRAMS**. Repair connector and terminals as necessary. If connector and terminals are okay, go to next step.
3. Check resistance between ground and CAB connector terminals No. 8 and 24, ground circuits (Black wires). If resistance is less than one ohm, go to next step. If resistance is one ohm or more, repair open in ground circuit(s).
4. Turn ignition on. Turn on all accessories. Check voltage on CAB connector terminals No. 8 and 24, ground circuits (Black wires). If voltage is less than one volt, replace CAB. See **CONTROLLER ANTI-LOCK BRAKE** under REMOVAL & INSTALLATION. If voltage is one volt or more, repair, reroute and/or shield ground circuit(s) from high voltage sources as necessary.

TEST 4A: LEFT FRONT SENSOR CIRCUIT FAILURE

NOTE: After each repair, perform **TEST VER-1A: VERIFICATION TEST** to confirm problem has been corrected.

1. Turn ignition on. Using scan tool, read and then erase DTCs. Turn ignition off, then on. Using scan tool, read DTCs. If DTC returns, go to next step. If DTC does not return, go to step 12.
2. Turn ignition off. Inspect Left Front (LF) Wheel Speed Sensor (WSS) and connector for obvious damage. Repair as necessary. If WSS and connector are okay, go to next step.
3. Ensure ignition is off. Disconnect CAB connector. Inspect CAB connector for damaged or pushed out terminals. Repair connector as necessary. Check resistance across CAB connector terminals No. 4, LF WSS voltage circuit (Red wire) and No. 11, LF WSS negative circuit (Red/Dark Blue wire). If resistance is 900-1300 ohms, go to next step. If resistance is not 900-1300 ohms, go to step 7.
4. Disconnect LF WSS connector. Inspect connector for damaged or pushed out terminals. Repair connector as necessary. Check resistance between ground and CAB connector terminal No. 4, LF WSS voltage circuit (Red wire). If resistance is less than 15 k/ohms, repair Red wire for short to ground. If resistance is 15 k/ohms or more, go to next step.
5. Check resistance between ground and CAB connector terminal No. 11, LF WSS negative circuit (Red/Dark Blue wire). If resistance is less than 15 k/ohms, repair Red/Dark Blue wire for short to

ground. If resistance is 15 k/ohms or more, go to next step.

6. Check resistance between ground and each WSS terminal. If resistance is less than 15,000 at either terminal, replace WSS. See **FRONT WHEEL SPEED SENSOR** under REMOVAL & INSTALLATION. If resistance is 15 k/ohms or more at both terminals, replace CAB. See **CONTROLLER ANTI-LOCK BRAKE** under REMOVAL & INSTALLATION.
7. Disconnect LF WSS connector. Inspect connector for damaged or pushed out terminals. Repair connector as necessary. Check resistance of LF WSS voltage circuit (Red wire) between CAB connector terminal No. 4 and LF WSS connector terminal No. 1. If resistance is less than 5 ohms, go to next step. If resistance is 5 ohms or more, repair open Red wire.
8. Check resistance of LF WSS negative circuit (Red/Dark Blue wire) between CAB connector terminal No. 11 and LF WSS connector terminal No. 2. If resistance is less than 5 ohms, go to next step. If resistance is 5 ohms or more, repair open Red/Dark Blue wire.
9. Turn ignition on. Check voltage on CAB connector terminal No. 4, LF WSS voltage circuit (Red wire). If voltage is more than one volt, repair Red wire for short to voltage. If voltage is one volt or less, go to next step.
10. Check voltage on CAB connector terminal No. 11, LF WSS negative circuit (Red/Dark Blue wire). If voltage is more than one volt, repair Red/Dark Blue wire for short to voltage. If voltage is one volt or less, go to next step.
11. Turn ignition off. Check resistance between CAB connector terminal No. 4, LF WSS voltage circuit (Red wire) and terminal No. 11, LF WSS negative circuit (Red/Dark Blue wire). If resistance is less than 200 ohms, repair Red wire for short to Red/Dark Blue wire. If resistance is 200 ohms or more, replace LF WSS. See **FRONT WHEEL SPEED SENSOR** under REMOVAL & INSTALLATION.
12. Turn ignition off. Inspect related wiring harness, connectors and terminals for defective connectors, bare or broken wires. See **WIRING DIAGRAMS**. Repair any problems found as necessary. If no problems are found, check if any Technical Service Bulletins (TSB) apply to vehicle.

TEST 5A: LEFT FRONT SENSOR SIGNAL FAILURE

NOTE: After each repair, perform **TEST VER-1A: VERIFICATION TEST** to confirm problem has been corrected.

1. With assistant driving vehicle, use scan tool to observe all Wheel Speed Sensors (WSS). Slowly accelerate as straight as possible from a stop to 15 MPH. If Left Front (LF) WSS shows zero MPH or lags behind any other WSS more than 3 MPH, go to next step. If LF WSS does not show zero MPH or lag behind any other WSS more than 3 MPH, go to step 6.
2. Turn ignition off. Inspect LF WSS and connector for obvious damage. Repair as necessary. If WSS and connector are okay, go to next step.

NOTE: Tone wheel teeth should be perfectly square, not bent or nicked. Tone wheel is pressed into axle shaft. Replacement of tone wheel requires replacement of axle shaft.

3. Inspect tone wheel for damaged or missing teeth, or looseness. Tighten or replace as necessary. If tone wheel is okay, go to next step.
4. Using feeler gauge, measure air gap between end of LF WSS and teeth on tone wheel at 4 different places on tone wheel. Air gap should be .017-.067" (.42-1.71 mm). If air gap is within specification, go to next step. If air gap is not within specification, repair or replace components as necessary.
5. Inspect LF wheel bearings for excessive runout or clearance. If no excessive wheel bearing runout or

clearance exists, test is complete. If excessive wheel bearing runout or clearance exists, repair as necessary.

6. Conditions required to set Diagnostic Trouble Code (DTC) are not present at this time. DTC may have set by attempting to stop on very slippery road surface, or by brakes locking up due to lining contamination or overheating. Check if any of these conditions are present. Repair as necessary. If these conditions are not present, go to next step.

NOTE: **Front tone wheel is pressed into front axle shaft. Replacement of front tone wheel requires replacement of front axle shaft.**

7. Visually inspect WSS and tone wheel for obvious damage. Replace tone wheel and/or WSS as necessary. See **FRONT WHEEL SPEED SENSOR** under REMOVAL & INSTALLATION. If tone wheel and WSS are okay, go to next step.
8. Using wiring diagram as a guide, inspect ABS wiring and connectors. See **WIRING DIAGRAMS** . Repair problems as necessary. If no problems are found, test is complete.

TEST 6A: LEFT REAR SENSOR CIRCUIT FAILURE

NOTE: **After each repair, perform TEST VER-1A: VERIFICATION TEST to confirm problem has been corrected.**

1. Turn ignition on. Using scan tool, read and then erase DTCs. Turn ignition off, then on. Using scan tool, read DTCs. If DTC returns, go to next step. If DTC does not return, go to step 12 .
2. Turn ignition off. Inspect Left Rear (LR) Wheel Speed Sensor (WSS) and connector for obvious damage. Repair as necessary. If WSS and connector are okay, go to next step.
3. Ensure ignition is off. Disconnect CAB connector. Inspect CAB connector for damaged or pushed out terminals. Repair connector as necessary. Check resistance across CAB connector terminals No. 2, LR WSS negative circuit (Light Green/Dark Blue wire) and No. 10, LR WSS voltage circuit (Light Green wire). If resistance is 900-1300 ohms, go to next step. If resistance is not 900-1300 ohms, go to step 7 .
4. Disconnect LR WSS connector. Inspect connector for damaged or pushed out terminals. Repair connector as necessary. Check resistance between ground and CAB connector terminal No. 10, LR WSS voltage circuit (Light Green wire). If resistance is less than 15 k/ohms, repair Light Green wire for short to ground. If resistance is 15 k/ohms or more, go to next step.
5. Check resistance between ground and CAB connector terminal No. 2, LR WSS negative circuit (Light Green/Dark Blue wire). If resistance is less than 15 k/ohms, repair Light Green/Dark Blue wire for short to ground. If resistance is 15 k/ohms or more, go to next step.
6. Check resistance between ground and each WSS terminal. If resistance is less than 15,000 at either terminal, replace WSS. **REAR WHEEL SPEED SENSOR** under REMOVAL & INSTALLATION. If resistance is 15 k/ohms or more at both terminals, replace CAB. See **CONTROLLER ANTI-LOCK BRAKE** under REMOVAL & INSTALLATION.
7. Disconnect LR WSS connector. Inspect connector for damaged or pushed out terminals. Repair connector as necessary. Check resistance of LR WSS voltage circuit (Light Green wire) between CAB connector terminal No. 10 and LR WSS connector terminal No. 2. If resistance is less than 5 ohms, go to next step. If resistance is 5 ohms or more, repair open Light Green wire.
8. Check resistance of LR WSS negative circuit (Light Green/Dark Blue wire) between CAB connector terminal No. 2 and LR WSS connector terminal No. 1. If resistance is less than 5 ohms, go to next step. If resistance is 5 ohms or more, repair open Light Green/Dark Blue wire.

9. Turn ignition on. Check voltage on CAB connector terminal No. 10, LR WSS voltage circuit (Light Green wire). If voltage is more than one volt, repair Light Green wire for short to voltage. If voltage is one volt or less, go to next step.
10. Check voltage on CAB connector terminal No. 2, LR WSS negative circuit (Light Green/Dark Blue wire). If voltage is more than one volt, repair Light Green/Dark Blue wire for short to voltage. If voltage is one volt or less, go to next step.
11. Turn ignition off. Check resistance between CAB connector terminal No. 2, LR WSS negative circuit (Light Green/Dark Blue wire) and No. 10, LR WSS voltage circuit (Light Green wire). If resistance is less than 200 ohms, repair Light Green wire for short to Light Green/Dark Blue wire. If resistance is 200 ohms or more, replace LR WSS. See **REAR WHEEL SPEED SENSOR** under REMOVAL & INSTALLATION.
12. Turn ignition off. Inspect related wiring harness, connectors and terminals for defective connectors, bare or broken wires. See **WIRING DIAGRAMS**. Repair any problems found as necessary. If no problems are found, check if any Technical Service Bulletins (TSB) apply to vehicle.

TEST 7A: LEFT REAR SENSOR SIGNAL FAILURE

NOTE: After each repair, perform **TEST VER-1A: VERIFICATION TEST** to confirm problem has been corrected.

1. With assistant driving vehicle, use scan tool to observe all Wheel Speed Sensors (WSS). Slowly accelerate as straight as possible from a stop to 15 MPH. If Left Rear (LR) WSS shows zero MPH or lags behind any other WSS more than 3 MPH, go to next step. If LR WSS does not show zero MPH or lag behind any other WSS more than 3 MPH, go to step 6.
2. Turn ignition off. Inspect LR WSS and connector for obvious damage. Repair as necessary. If WSS and connector are okay, go to next step.

NOTE: Tone wheel teeth should be perfectly square, not bent or nicked. Tone wheel is pressed into rear hub and bearing assembly. Replacement of tone wheel requires replacement of rear hub and bearing assembly.

3. Inspect tone wheel for damaged or missing teeth, or looseness. Tighten or replace as necessary. If tone wheel is okay, go to next step.
4. Using feeler gauge, measure air gap between end of LR WSS and teeth on tone wheel at 4 different places on tone wheel. Air gap should be .015-.052" (.38-1.31 mm). If air gap is within specification, go to next step. If air gap is not within specification, repair components as necessary.
5. Inspect LR wheel bearings for excessive runout or clearance. If no excessive wheel bearing runout or clearance exists, test is complete. If excessive wheel bearing runout or clearance exists, repair as necessary.
6. Conditions required to set Diagnostic Trouble Code (DTC) are not present at this time. DTC may have set by attempting to stop on very slippery road surface, or by brakes locking up due to lining contamination or overheating. Check if any of these conditions are present. Repair as necessary. If these conditions are not present, go to next step.

NOTE: Tone wheel is pressed into rear hub and bearing assembly. Replacement of tone wheel requires replacement of rear hub and bearing assembly.

7. Visually inspect WSS and tone wheel for obvious damage. Replace tone wheel and/or WSS as necessary. See **REAR WHEEL SPEED SENSOR** under REMOVAL & INSTALLATION. If tone wheel and WSS are okay, go to next step.
8. Using wiring diagram as a guide, inspect ABS wiring and connectors. See **WIRING DIAGRAMS**. Repair problems as necessary. If no problems are found, test is complete.

TEST 8A: PCI BUS COMMUNICATION

NOTE: After each repair, perform **TEST VER-1A: VERIFICATION TEST** to confirm problem has been corrected.

1. Turn ignition on. Using scan tool, attempt to communicate with Mechanical Instrument Cluster (MIC). If scan tool communicates with MIC, go to next step. If scan tool does not communicate with MIC, diagnose instrument cluster communication problem. See appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT.
2. Using scan tool, erase DTCs. Turn ignition off, then on. Wait one minute. Using scan tool, read DTCs. If DTC returns, replace Controller Anti-Lock Brake (CAB). See **CONTROLLER ANTI-LOCK BRAKE** under REMOVAL & INSTALLATION. If DTC does not return, test is complete.

TEST 9A: PUMP MOTOR NOT WORKING PROPERLY

NOTE: After each repair, perform **TEST VER-1A: VERIFICATION TEST** to confirm problem has been corrected.

NOTE: Pump/motor is integral part of Hydraulic Control Unit (HCU).

1. With ignition on, listen for pump/motor operation. If pump/motor runs continuously, replace Controller Anti-Lock Brakes (CAB). See **CONTROLLER ANTI-LOCK BRAKE** under REMOVAL & INSTALLATION. If pump/motor does not run continuously, go to next step.
2. Turn ignition on. Using scan tool, read and then erase DTCs. Turn ignition off, then on. Using scan tool, actuate ABS PUMP MOTOR. If pump/motor does not run when actuated, go to next step. If pump/motor runs when actuated, go to step 12.
3. Turn ignition off. Remove and inspect ABS pump fuse "K" from Power Distribution Center (PDC). Fuses are identified inside PDC cover. If fuse is okay, leave fuse removed, and go to next step. If fuse is blown, leave fuse removed, and go to step 7.
4. Inspect fused B+ circuit (Red/Dark Green wire) between CAB connector and PDC for signs of intermittent short to ground. Repair Red/Dark Green wire as necessary, and replace fuse. If Red/Dark Green wire is okay, leave fuse removed and go to next step.
5. Ensure ignition is off. Disconnect CAB connector. Using a test light connected to battery voltage, probe CAB connector terminal No. 25, fused B+ circuit (Red/Dark Green wire). If test light illuminates, repair Red/Dark Green wire for short to ground, and replace fuse. If test light does not illuminate, leave fuse removed, and go to next step.
6. Reconnect CAB connector. Using a test light connected to battery voltage, probe PDC fused B+ terminal (Red/Dark Green wire). If test light illuminate, replace CAB and fuse. See **CONTROLLER ANTI-LOCK BRAKE** under REMOVAL & INSTALLATION. If test light does not illuminate, replace defective fuse.
7. Turn ignition on. Using a test light connected to ground, probe PDC voltage supply terminal

(Red/Black wire). If test light illuminates, leave fuse removed, and go to next step. If test light does not illuminate, repair open Red/Black wire, and replace fuse.

8. Disconnect pump/motor connector. Connect a jumper wire between PDC voltage supply terminal (Red/Black wire) and pump/motor connector (component side) terminal No. 2, voltage circuit (Red wire). Connect a second jumper wire between ground and pump/motor connector (component side) terminal No. 1, ground circuit (Tan wire). If pump/motor operates, leave fuse removed, and go to next step. If pump/motor does not operate, replace pump/motor and HCU assembly, and fuse. See **HYDRAULIC CONTROL UNIT** under REMOVAL & INSTALLATION.
9. Ensure ignition is off. Disconnect CAB connector. Inspect connector for pushed-out terminals, damaged terminals, or miswired terminals. Repair connector as necessary. Check resistance of fused B+ circuit (Red/Dark Green wire) between CAB connector terminal No. 25 and PDC. If resistance is less than 10 ohms, leave fuse removed, and go to next step. If resistance is 10 ohms or more, repair open in Red/Dark Green wire, and replace fuse.
10. Check resistance between ground and CAB connector terminals No. 8 and 24, ground circuits (Black wires). If resistance is less than one ohm on both circuits, reconnect CAB connector, replace fuse, and go to next step. If resistance is one ohm or more on either circuit, repair open in Black wire(s), and replace fuse.
11. Turn ignition on. Using scan tool, actuate ABS PUMP MOTOR. Check voltage drop across pump/motor ground circuit (Tan wire). If voltage is less than .1 volt, replace CAB and fuse. See **CONTROLLER ANTI-LOCK BRAKE** under REMOVAL & INSTALLATION. If voltage is .1 volt or more, repair open Tan wire, and replace fuse.
12. Turn ignition off. Inspect related wiring harness, connectors and terminals for defective connectors, bare or broken wires. See **WIRING DIAGRAMS**. Repair any problems found as necessary. If no problems are found, check if any Technical Service Bulletins (TSB) apply to vehicle.

TEST 10A: RIGHT FRONT SENSOR CIRCUIT FAILURE

NOTE: After each repair, perform **TEST VER-1A: VERIFICATION TEST** to confirm problem has been corrected.

1. Turn ignition on. Using scan tool, read and then erase DTCs. Turn ignition off, then on. Using scan tool, read DTCs. If DTC returns, go to next step. If DTC does not return, go to step 12.
2. Turn ignition off. Inspect Right Front (RF) Wheel Speed Sensor (WSS) and connector for obvious damage. Repair as necessary. If WSS and connector are okay, go to next step.
3. Ensure ignition is off. Disconnect CAB connector. Inspect CAB connector for damaged or pushed out terminals. Repair connector as necessary. Check resistance across CAB connector terminals No. 3, RF WSS voltage circuit (White wire) and No. 18, RF WSS negative circuit (White/Dark Blue wire). If resistance is 900-1300 ohms, go to next step. If resistance is not 900-1300 ohms, go to step 7.
4. Disconnect RF WSS connector. Inspect connector for damaged or pushed out terminals. Repair connector as necessary. Check resistance between ground and CAB connector terminal No. 3, RF WSS voltage circuit (White wire). If resistance is less than 15 k/ohms, repair White wire for short to ground. If resistance is 15 k/ohms or more, go to next step.
5. Check resistance between ground and CAB connector terminal No. 18, RF WSS negative circuit (White/Dark Blue wire). If resistance is less than 15 k/ohms, repair White/Dark Blue wire for short to ground. If resistance is 15 k/ohms or more, go to next step.
6. Check resistance between ground and each WSS terminal. If resistance is less than 15,000 at either terminal, replace WSS. See **FRONT WHEEL SPEED SENSOR** under REMOVAL & INSTALLATION. If resistance is 15 k/ohms or more at both terminals, replace CAB.

See **CONTROLLER ANTI-LOCK BRAKE** under REMOVAL & INSTALLATION.

7. Disconnect RF WSS connector. Inspect connector for damaged or pushed out terminals. Repair connector as necessary. Check resistance of RF WSS voltage circuit (White wire) between CAB connector terminal No. 3 and RF WSS connector terminal No. 1. If resistance is less than 5 ohms, go to next step. If resistance is 5 ohms or more, repair open White wire.
8. Check resistance of RF WSS negative circuit (White/Dark Blue wire) between CAB connector terminal No. 18 and RF WSS connector terminal No. 2. If resistance is less than 5 ohms, go to next step. If resistance is 5 ohms or more, repair open White/Dark Blue wire.
9. Turn ignition on. Check voltage on CAB connector terminal No. 3, RF WSS voltage circuit (White wire). If voltage is more than one volt, repair White wire for short to voltage. If voltage is one volt or less, go to next step.
10. Check voltage on CAB connector terminal No. 18, RF WSS negative circuit (White/Dark Blue wire). If voltage is more than one volt, repair White/Dark Blue wire for short to voltage. If voltage is one volt or less, go to next step.
11. Turn ignition off. Check resistance between CAB connector terminal No. 3, RF WSS voltage circuit (White wire) and No. 18, RF WSS negative circuit (White/Dark Blue wire). If resistance is less than 200 ohms, repair White wire for short to White/Dark Blue wire. If resistance is 200 ohms or more, replace RF WSS. See **FRONT WHEEL SPEED SENSOR** under REMOVAL & INSTALLATION.
12. Turn ignition off. Inspect related wiring harness, connectors and terminals for defective connectors, bare or broken wires. See **WIRING DIAGRAMS**. Repair any problems found as necessary. If no problems are found, check if any Technical Service Bulletins (TSB) apply to vehicle.

TEST 11A: RIGHT FRONT SENSOR SIGNAL FAILURE

NOTE: After each repair, perform **TEST VER-1A: VERIFICATION TEST** to confirm problem has been corrected.

1. With assistant driving vehicle, use scan tool to observe all Wheel Speed Sensors (WSS). Slowly accelerate as straight as possible from a stop to 15 MPH. If Right Front (RF) WSS shows zero MPH or lags behind any other WSS more than 3 MPH, go to next step. If RF WSS does not show zero MPH or lag behind any other WSS more than 3 MPH, go to step 6.
2. Turn ignition off. Inspect RF WSS and connector for obvious damage. Repair as necessary. If WSS and connector are okay, go to next step.

NOTE: Tone wheel teeth should be perfectly square, not bent or nicked. Tone wheel is pressed into axle shaft. Replacement of tone wheel requires replacement of axle shaft.

3. Inspect tone wheel for damaged or missing teeth, or looseness. Tighten or replace as necessary. If tone wheel is okay, go to next step.
4. Using feeler gauge, measure air gap between end of RF WSS and teeth on tone wheel at 4 different places on tone wheel. Air gap should be .017-.067" (.42-1.71 mm). If air gap is within specification, go to next step. If air gap is not within specification, repair components as necessary.
5. Inspect RF wheel bearings for excessive runout or clearance. If no excessive wheel bearing runout or clearance exists, test is complete. If excessive wheel bearing runout or clearance exists, repair as necessary.
6. Conditions required to set Diagnostic Trouble Code (DTC) are not present at this time. DTC may have set by attempting to stop on very slippery road surface, or by brakes locking up due to lining

contamination or overheating. Check if any of these conditions are present. Repair as necessary. If these conditions are not present, go to next step.

NOTE: **Front tone wheel is pressed into front axle shaft. Replacement of front tone wheel requires replacement of front axle shaft.**

7. Visually inspect WSS and tone wheel for obvious damage. Replace tone wheel and/or WSS as necessary. See **FRONT WHEEL SPEED SENSOR** under REMOVAL & INSTALLATION. If tone wheel and WSS are okay, go to next step.
8. Using wiring diagram as a guide, inspect ABS wiring and connectors. See **WIRING DIAGRAMS** . Repair problems as necessary. If no problems are found, test is complete.

TEST 12A: RIGHT REAR SENSOR CIRCUIT FAILURE

NOTE: **After each repair, perform TEST VER-1A: VERIFICATION TEST to confirm problem has been corrected.**

1. Turn ignition on. Using scan tool, read and then erase DTCs. Turn ignition off, then on. Using scan tool, read DTCs. If DTC returns, go to next step. If DTC does not return, go to step 12 .
2. Turn ignition off. Inspect Right Rear (RR) Wheel Speed Sensor (WSS) and connector for obvious damage. Repair as necessary. If WSS and connector are okay, go to next step.
3. Ensure ignition is off. Disconnect CAB connector. Inspect CAB connector for damaged or pushed out terminals. Repair connector as necessary. Check resistance across CAB connector terminals No. 1, RR WSS negative circuit (Yellow/Dark Blue wire) and No. 17, RR WSS voltage circuit (Yellow wire). If resistance is 900-1300 ohms, go to next step. If resistance is not 900-1300 ohms, go to step 7 .
4. Disconnect RR WSS connector. Inspect connector for damaged or pushed out terminals. Repair connector as necessary. Check resistance between ground and CAB connector terminal No. 17, RR WSS voltage circuit (Yellow wire). If resistance is less than 15 k/ohms, repair Yellow wire for short to ground. If resistance is 15 k/ohms or more, go to next step.
5. Check resistance between ground and CAB connector terminal No. 1, RR WSS negative circuit (Yellow/Dark Blue wire). If resistance is less than 15 k/ohms, repair Yellow/Dark Blue wire for short to ground. If resistance is 15 k/ohms or more, go to next step.
6. Check resistance between ground and each WSS terminal. If resistance is less than 15,000 at either terminal, replace WSS. See **REAR WHEEL SPEED SENSOR** under REMOVAL & INSTALLATION. If resistance is 15 k/ohms or more at both terminals, replace CAB. See **CONTROLLER ANTI-LOCK BRAKE** under REMOVAL & INSTALLATION.
7. Disconnect RR WSS connector. Inspect connector for damaged or pushed out terminals. Repair connector as necessary. Check resistance of RR WSS voltage circuit (Yellow wire) between CAB connector terminal No. 17 and RR WSS connector terminal No. 1. If resistance is less than 5 ohms, go to next step. If resistance is 5 ohms or more, repair open Yellow wire.
8. Check resistance of RR WSS negative circuit (Yellow/Dark Blue wire) between CAB connector terminal No. 1 and RR WSS connector terminal No. 1. If resistance is less than 5 ohms, go to next step. If resistance is 5 ohms or more, repair open Yellow/Dark Blue wire.
9. Turn ignition on. Check voltage on CAB connector terminal No. 17, RR WSS voltage circuit (Yellow wire). If voltage is more than one volt, repair Yellow wire for short to voltage. If voltage is one volt or less, go to next step.
10. Check voltage on CAB connector terminal No. 1, RR WSS negative circuit (Yellow/Dark Blue wire).

If voltage is more than one volt, repair Yellow/Dark Blue wire for short to voltage. If voltage is one volt or less, go to next step.

11. Turn ignition off. Check resistance between CAB connector terminal No. 1, RR WSS negative circuit (Yellow/Dark Blue wire) and No. 17, RR WSS voltage circuit (Yellow Green wire). If resistance is less than 200 ohms, repair Yellow wire for short to Yellow/Dark Blue wire. If resistance is 200 ohms or more, replace RR WSS. See **REAR WHEEL SPEED SENSOR** under REMOVAL & INSTALLATION.
12. Turn ignition off. Inspect related wiring harness, connectors and terminals for defective connectors, bare or broken wires. See **WIRING DIAGRAMS**. Repair any problems found as necessary. If no problems are found, check if any Technical Service Bulletins (TSB) apply to vehicle.

TEST 13A: RIGHT REAR SENSOR SIGNAL FAILURE

NOTE: After each repair, perform **TEST VER-1A: VERIFICATION TEST** to confirm problem has been corrected.

1. With assistant driving vehicle, use scan tool to observe all Wheel Speed Sensors (WSS). Slowly accelerate as straight as possible from a stop to 15 MPH. If Right Rear (RR) WSS shows zero MPH or lags behind any other WSS more than 3 MPH, go to next step. If RR WSS does not show zero MPH or lag behind any other WSS more than 3 MPH, go to step 6.
2. Turn ignition off. Inspect RR WSS and connector for obvious damage. Repair as necessary. If WSS and connector are okay, go to next step.

NOTE: Tone wheel teeth should be perfectly square, not bent or nicked. Tone wheel is pressed into rear hub and bearing assembly. Replacement of tone wheel requires replacement of rear hub and bearing assembly.

3. Inspect tone wheel for damaged or missing teeth, or looseness. Tighten or replace as necessary. If tone wheel is okay, go to next step.
4. Using feeler gauge, measure air gap between end of RR WSS and teeth on tone wheel at 4 different places on tone wheel. Air gap should be .015-.052" (.38-1.31 mm). If air gap is within specification, go to next step. If air gap is not within specification, repair components as necessary.
5. Inspect RR wheel bearings for excessive runout or clearance. If no excessive wheel bearing runout or clearance exists, test is complete. If excessive wheel bearing runout or clearance exists, repair as necessary.
6. Conditions required to set Diagnostic Trouble Code (DTC) are not present at this time. DTC may have set by attempting to stop on very slippery road surface, or by brakes locking up due to lining contamination or overheating. Check if any of these conditions are present. Repair as necessary. If these conditions are not present, go to next step.

NOTE: Tone wheel is pressed into rear hub and bearing assembly. Replacement of tone wheel requires replacement of rear hub and bearing assembly.

7. Visually inspect WSS and tone wheel for obvious damage. Replace tone wheel and/or WSS as necessary. See **REAR WHEEL SPEED SENSOR** under REMOVAL & INSTALLATION. If tone wheel and WSS are okay, go to next step.
8. Using wiring diagram as a guide, inspect ABS wiring and connectors. See **WIRING DIAGRAMS**.

Repair problems as necessary. If no problems are found, test is complete.

TEST 14A: SYSTEM OVERVOLTAGE

NOTE: After each repair, perform **TEST VER-1A: VERIFICATION TEST** to confirm problem has been corrected.

1. Turn ignition on. Using scan tool, erase DTCs. Turn ignition off, then on. Start engine. Using scan tool, read DTCs. If DTC returns, go to next step. If DTC does not return, go to step 5 .
2. Turn ignition off. If a battery charger is not connected to vehicle, go to next step. If a battery charger is connected to vehicle, charge battery to proper level. Disconnect charger. Turn ignition on. Using scan tool, clear DTCs. Start engine and allow it to run for one minute. Turn ignition off, then on. Using scan tool, read DTCs. If DTC returns, go to next step. If DTC does not return, test is complete.
3. Turn ignition off. Disconnect Controller Anti-Lock Brake (CAB) connector. Start engine. Increase engine speed to more than 1800 RPM and hold. Using a voltmeter, check battery voltage. If battery voltage is 16.5 volts or less, go to next step. If battery voltage is more than 16.5 volts, repair charging system as necessary. See appropriate GENERATORS & REGULATORS article in STARTING & CHARGING SYSTEMS in ACCESSORIES & EQUIPMENT.
4. Turn engine off. Check resistance of CAB connector terminals No. 8 and 24, ground circuits (Black wires). If resistance is less than one ohm on both circuits, replace CAB. See **CONTROLLER ANTI-LOCK BRAKE** under REMOVAL & INSTALLATION. If resistance is one ohm or more on either circuit, repair open Black wire(s).
5. Turn ignition off. Using wiring diagram as a guide, inspect ABS wiring and connectors. See **WIRING DIAGRAMS** . Check if any Technical Service Bulletins (TSB) apply to vehicle. Repair problems as necessary. If no problems are found, test is complete.

TEST 15A: SYSTEM UNDERVOLTAGE

NOTE: After each repair, perform **TEST VER-1A: VERIFICATION TEST** to confirm problem has been corrected.

1. Turn ignition on. Using scan tool, erase DTCs. Turn ignition off, then on. Start engine. Using scan tool, read DTCs. If DTC returns, leave engine running, and go to next step. If DTC does not return, go to step 5 .
2. Using a voltmeter, check battery voltage. If battery voltage is less than 10 volts, repair charging system as necessary. See appropriate GENERATORS & REGULATORS article in STARTING & CHARGING SYSTEMS in ACCESSORIES & EQUIPMENT. If voltage is 10 volts or more, go to next step.
3. Turn engine off. Check resistance of Controller Anti-Lock Brake (CAB) connector terminals No. 8 and 24, ground circuits (Black wires). If resistance is less than one ohm on both circuits, go to next step. If resistance is one ohm or more on either circuit, repair open Black wire(s).
4. Turn ignition on. Check voltage on CAB connector terminal No. 23, fused ignition switch output circuit (White/Violet wire). If voltage is more than 10 volts, replace CAB. See **CONTROLLER ANTI-LOCK BRAKE** under REMOVAL & INSTALLATION. If voltage is 10 volts or less, repair high resistance in White/Violet wire.
5. Turn ignition off. Using wiring diagram as a guide, inspect ABS wiring and connectors. See **WIRING DIAGRAMS** . Check if any Technical Service Bulletins (TSB) apply to vehicle. Repair problems as necessary. If no problems are found, test is complete.

TEST 16A: BRAKELIGHT SWITCH

NOTE: After each repair, perform **TEST VER-1A: VERIFICATION TEST** to confirm problem has been corrected.

1. Turn ignition on. Using scan tool, select INPUTS/OUTPUTS. Read brakelight switch state as brake pedal is pressed and released. If scan tool display does not match brake pedal position, go to next step. If scan tool display matches brake pedal position, brakelight switch is okay. Test is complete.
2. Turn ignition off. Disconnect brakelight switch connector. Connect a test light between ground and brakelight switch connector terminal No. 6, fused B+ circuit (Pink/Dark Blue wire). Turn ignition on. If test light illuminates brightly, go to next step. If test light does not illuminate brightly, repair open Pink/Dark Blue wire.
3. Turn ignition off. Connect a jumper wire between brakelight switch connector terminals No. 5, output circuit (White/Tan wire) and No. 6, fused B+ circuit (Pink/Dark Blue wire). Turn ignition on. Using scan tool in INPUTS/OUTPUTS, read brakelight switch state. If scan tool displays **PRESSED**, replace brakelight switch. See **BRAKELIGHT SWITCH** under REMOVAL & INSTALLATION. If scan tool does not display **PRESSED**, go to next step.
4. Turn ignition off. Disconnect Controller Anti-Lock Brake (CAB) connector. Check brakelight switch output circuit (White/Tan wire) between CAB connector terminal No. 12 and brakelight switch connector terminal No. 5 for short to voltage or open circuit. Repair problems as necessary. If no problems are found, replace CAB. See **CONTROLLER ANTI-LOCK BRAKE** under REMOVAL & INSTALLATION.

TEST 17A: TRAC OFF INDICATOR ALWAYS/NEVER ON

NOTE: After each repair, perform **TEST VER-1A: VERIFICATION TEST** to confirm problem has been corrected.

NOTE: If any other Diagnostic Trouble Code (DTC) is set, proceed to appropriate test, and diagnose and repair DTC before continuing with this test. See **DIAGNOSTIC TROUBLE CODE DEFINITION** table under **DIAGNOSIS & TESTING**.

1. Turn ignition off. Observe TRAC OFF light. TRAC OFF light is located in instrument cluster, to left of speedometer. Turn ignition on. IF TRAC OFF light comes on for 2-3 seconds then goes off, go to next step. If TRAC OFF light does not come on, replace instrument cluster. See appropriate INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT.
2. Turn headlights on. Depress traction control switch button. Traction control switch is located in right upper trim bezel. See **Fig. 5**. If traction control switch button illuminates, go to next step. If traction control switch button does not illuminate, go to step 5.
3. Turn ignition off. Disconnect traction control switch connector. Removal of traction control switch is required to disconnect traction control switch connector. See **TRACTION CONTROL SWITCH** under REMOVAL & INSTALLATION. Turn ignition on. Observe TRAC OFF light while connecting and disconnecting a jumper wire between traction control switch connector terminals No. 2, ground circuit (Black/White wire) and No. 3, switch sense circuit (Red/Yellow wire). If TRAC OFF light switches on and off, replace traction control switch. If TRAC OFF light does not switch on and off, go to next step.
4. Ensure ignition is off. Disconnect Controller Anti-Lock Brake (CAB) connector. Check switch sense

circuit (Red/Yellow wire) between traction control switch connector terminal No. 3 and Blue instrument cluster connector C2 terminal No. 2 for short to voltage or open circuit. Repair problems as necessary. If no problems are found, replace instrument cluster. See appropriate INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT.

5. Turn ignition off. Disconnect traction control switch connector. Removal of traction control switch is required to disconnect traction control switch connector. See **TRACTION CONTROL SWITCH** under REMOVAL & INSTALLATION. Using a test light connected to battery voltage, probe traction control switch connector terminal No. 2, ground circuit (Black/White wire). If test light illuminates brightly, replace traction control switch. If test light does not illuminate brightly, repair open Black/White wire.

TEST 18A: TRAC ON INDICATOR ALWAYS/NEVER ON

NOTE: After each repair, perform **TEST VER-1A: VERIFICATION TEST** to confirm problem has been corrected.

NOTE: If any other Diagnostic Trouble Code (DTC) is set, proceed to appropriate test, and diagnose and repair DTC before continuing with this test. See **DIAGNOSTIC TROUBLE CODE DEFINITION** table under DIAGNOSIS & TESTING.

1. Turn ignition off. Observe TRAC ON light located on instrument cluster. Turn ignition on. If TRAC ON light turns on for several seconds, and then turns off, go to next step. If TRAC ON light does not operate as specified, diagnose instrument cluster lights problem. See appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT.
2. Using traction control switch, deactivate Traction Control System (TCS). Traction control switch is located in right upper trim bezel. See **Fig. 5**. Start engine. With assistant driving vehicle, use scan tool in INPUTS/OUTPUTS to observe ABS PUMP MOTOR VOLTAGE state. Rapidly accelerate sufficiently to cause wheel slip. If scan tool displays about 9 volts, go to next step. If scan tool does not display about 9 volts, replace Controller Anti-Lock Brake (CAB). See **CONTROLLER ANTI-LOCK BRAKE** under REMOVAL & INSTALLATION.

TEST VER-1A: VERIFICATION TEST

1. Turn ignition off. Connect or install all previously disconnected connectors and removed components. Go to next step.
2. Using scan tool, clear all Diagnostic Trouble Codes (DTC). Turn ignition on. Using scan tool, read DTCs. If any DTCs are set, repeat **RETRIEVING DIAGNOSTIC TROUBLE CODES** procedure under DIAGNOSIS & TESTING. If no DTCs are set, go to next step.

CAUTION: Ensure brake system has braking capability before road testing vehicle. Ensure scan tool is not in ABS diagnostics mode during road test, or ABS will be disabled.

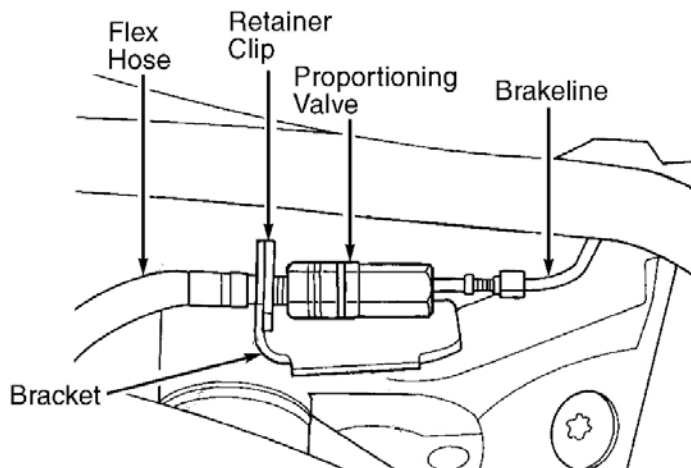
3. Road test vehicle for at least 5 minutes. Perform several ABS stops and traction control starts (if equipped). Go to next step.
4. Using scan tool, read DTCs. If any DTCs are set, repeat **RETRIEVING DIAGNOSTIC TROUBLE CODES** procedure under DIAGNOSIS & TESTING. If no DTCs are set and customer's complaint cannot be duplicated, repair is complete.

COMPONENT TESTS

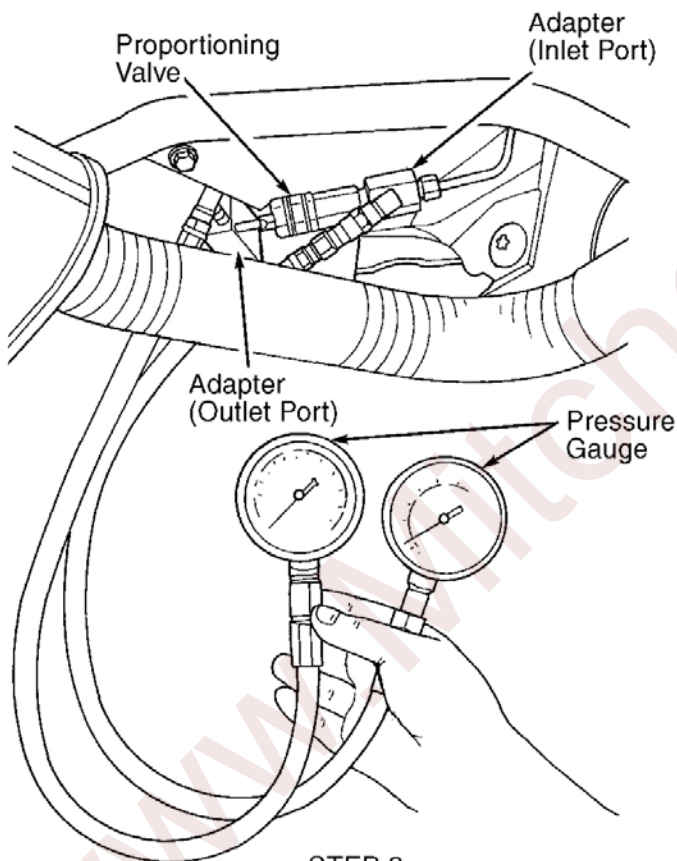
PROPORTIONING VALVE

NOTE: Premature rear wheel ABS cycling on a hard brake application may be caused by a defective proportioning valve. Two in-line proportioning valves are used, one in each rear wheel brake hydraulic circuit between brakeline and flex hose. Both proportioning valves must be checked to isolate defective proportioning valve.

1. Road test vehicle to determine which rear wheel indicates a premature wheel skid. Raise and support vehicle. Remove suspect proportioning valve from brakeline. Remove retaining clip securing flex hose from bracket so brakelines will not be bent when installing proportioning valve with adapters back into vehicle. See STEP 1 in illustration. See **Fig. 12**.
2. Install pressure Test Fitting Adapter (6892-2) into inlet port and Adapter (8187-2) into outlet port of proportioning valve. Install proportioning valve with adapters back into vehicle. Install Pressure Gauge (C-4007-A) into each adapter. See STEP 2 in illustration. See **Fig. 12**.
3. Bleed air from pressure gauges. Have an assistant hold brake pedal down until pressure on inlet side of proportioning valve is 1000 psi (70 kg/cm²) and note pressure on outlet side of proportioning valve. Pressure on outlet side should be 600-700 psi (42-49 kg/cm²). Replace proportioning valve if pressure is not within specification. See **PROPORTIONING VALVES** under REMOVAL & INSTALLATION.
4. Remove test equipment. Reinstall brakelines on proportioning valve. Tighten brakeline nuts to 12.5 ft. lbs. (17 N.m). Bleed brake system. See **BLEEDING BRAKE SYSTEM**. Once brake system is bled, perform pressure test on remaining proportioning valve.



STEP 1



STEP 2

G98B01104

Fig. 12: Identifying & Testing Proportioning Valve (Typical)
Courtesy of CHRYSLER CORP.

WHEEL SPEED SENSOR

1. Disconnect harness connector from the appropriate Wheel Speed Sensor (WSS). Using a digital volt/ohmmeter, measure resistance across WSS terminals. Resistance specification should be 900-1300 ohms. Replace WSS if resistance is not within specification. See appropriate procedure under

REMOVAL & INSTALLATION If resistance is within specification, go to next step.

NOTE: Front tone wheel is pressed into front axle shaft, and rear tone wheel is pressed into rear hub and bearing assembly. Replacement of tone wheel requires replacement of axle shaft or rear hub bearing assembly.

2. Using a feeler gauge, check WSS air gap in at least 4 places. Clearance should be .017-.067" (.42-1.71 mm) for front WSS, and 0.15-0.52" (.38-1.31 mm) for rear WSS. Repair air gap as necessary. If air gap is okay, use a dial indicator to check tone wheel runout. Replace tone wheel if runout exceeds .006" (.15 mm).

REMOVAL & INSTALLATION

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery.

NOTE: For additional removal and installation procedures on base brake system components, see appropriate **DISC & DRUM** article.

BRAKELIGHT SWITCH

Removal & Installation

1. Brakelight switch is located in mounting bracket near top of brake pedal. Depress and hold brake pedal. Rotate brakelight switch 30 degrees counterclockwise and remove switch from mounting bracket. Disconnect electrical connector from brakelight switch.
2. Pull plunger on brakelight switch outward until plunger ratchets outward to fully extended position. Fully depress brake pedal. Install brakelight switch in mounting bracket so index tab on brakelight switch aligns with slot in mounting bracket.
3. With brakelight switch fully seated in mounting bracket, rotate brakelight switch 30 degrees clockwise to lock brakelight switch in mounting bracket. Reconnect electrical connector on brakelight switch.

CAUTION: DO NOT use excessive force when pulling brake pedal upward, or brakelight switch may be damaged.

4. Gently pull brake pedal upward toward brakelight switch until brake pedal stops moving. This will ratchet plunger on brakelight switch backward to correct operating position.

CONTROLLER ANTI-LOCK BRAKE

CAUTION: External features of Controller Anti-Lock Brake (CAB) on ABS with Traction Control System (TCS) and ABS without TCS are similar, but there are functional differences in CAB operation. Ensure proper CAB is installed, or ABS will be disabled and diagnostic trouble code will be

set.

NOTE: CAB and Hydraulic Control Unit (HCU) are integrated into one unit, the Integrated Control Unit (ICU). See Fig. 2 . DO NOT attempt to remove CAB from ICU while still in vehicle. ICU must be removed from vehicle before CAB can be separated from ICU.

Removal

1. CAB is located in engine compartment, along with HCU. See Fig. 1 . Remove ICU from vehicle. See **INTEGRATED CONTROL UNIT** . Disconnect pump/motor electrical connector from CAB.
2. Remove 4 CAB-to-HCU bolts. Remove CAB from HCU by pulling straight up from connector on HCU. DO NOT twist CAB during removal from HCU.

Installation

1. To install, push CAB straight down onto connector on HCU until CAB is fully seated. Install and tighten CAB-to-HCU screws to specification. See **TORQUE SPECIFICATIONS** . Reconnect pump/motor electrical connector to CAB.
2. Install ICU into vehicle. See **INTEGRATED CONTROL UNIT** . Using scan tool, initialize ICU. Bleed base brake system and HCU. See **BLEEDING BRAKE SYSTEM** . Test drive vehicle to ensure base brake system and ABS operate properly.

FRONT WHEEL SPEED SENSOR

Removal

1. Raise and support vehicle. Remove front wheel. Remove bolt securing speed sensor cable routing bracket to strut assembly. Remove bolt and grommet retaining clip from inner fender shield.
2. Note front Wheel Speed Sensor (WSS) wiring harness installation for reinstallation reference. Carefully pull front WSS wiring harness grommet from inner fender shield. Disconnect front WSS electrical connector. Remove front WSS wiring harness bracket from front strut assembly.

CAUTION: If front WSS is stuck in steering knuckle, use a hammer and soft drift to lightly tap on each side of WSS near bolt area to rotate WSS back and forth until WSS can be removed. DO NOT use pliers to pull WSS from steering knuckle.

3. Remove front WSS-to-steering knuckle bolt. Carefully remove front WSS from steering knuckle.

Inspection

1. Inspect tone wheel on front axle shaft for missing teeth, broken teeth or looseness on mounting surface. Ensure tone wheel has not contacted front WSS. Replace components if damaged.
2. Using dial indicator, check tone wheel runout. It may be necessary to replace front axle shaft if tone wheel runout exceeds .006" (.15 mm).

Installation

CAUTION: Proper installation of front WSS wiring harness is critical to provide proper ABS operation. Ensure wiring harness is properly installed in all retainers to prevent contact with moving parts and/or over-extension, resulting in open circuit.

1. Ensure front WSS hole in steering knuckle is clean. Apply light coat of high-temperature multipurpose grease on WSS-to-steering knuckle contact areas.
2. Install front WSS in steering knuckle. Ensure WSS is fully seated. Install and tighten front WSS-to-steering knuckle bolt to specification. See **TORQUE SPECIFICATIONS**.
3. Front WSS air gap should be .017-.067" (.42-1.71 mm). Front WSS air gap is non-adjustable. To install remaining components, reverse removal procedure. Ensure locking tab on electrical connector is securely locked in place and wiring harness is properly routed. Tighten wheel lug nuts to specification. See **TORQUE SPECIFICATIONS**.

INTEGRATED CONTROL UNIT

Removal

1. Ensure ignition is off. Remove and shield remote ground cable from ground stud on right strut tower. Using a brake pedal positioning tool, apply brake pedal past one inch of travel position, and hold in place.
2. Remove speed control servo retaining bolt and 2 nuts. Disconnect electrical connector from speed control servo. With cable attached, position speed control servo aside. Remove windshield washer bottle filler neck retaining screw. Without loosening filler tube, position washer bottle filler neck aside.
3. Remove transmission controller and bracket retaining nut and bolt. Transmission controller is located between Power Distribution Center (PDC) and washer bottle filler neck. Lift transmission controller up and move away from mounting position. Thoroughly clean all brakeline-to-Hydraulic Control Unit (HCU) connections and surfaces of HCU with brake cleaner.
4. Note location of brake lines for reinstallation reference. Remove primary and secondary master cylinder brake lines at HCU. Remove chassis brake lines at HCU. Grasp lock on 25-pin wiring harness connector at CAB and pull up from connector as far as possible. This will unlock and raise 25-pin connector out of socket on CAB.
5. Raise and support vehicle. Remove left front wheel assembly. Remove inner fender splash shield. Remove 3 ICU-to-mounting bracket bolts and remove ICU from mounting bracket. Remove ICU from vehicle by pulling ICU out and around left side of mounting bracket, and then out through wheelwell.

Installation

1. To install, reverse removal procedure. Tighten 3 ICU-to-mounting bracket bolts to specification. See **TORQUE SPECIFICATIONS**. Ensure 25-pin connector seal is properly installed in connector. Position 25-pin connector in socket on CAB and fully seat into socket. Push in connector lock to lock connector into place on CAB.
2. Install brakelines on HCU and tighten to specification. To complete installation, reverse removal procedure. Using scan tool, initialize ICU. Bleed base brake system and HCU. See **BLEEDING BRAKE SYSTEM**. Test drive vehicle to ensure base brake system and ABS operate properly.

HYDRAULIC CONTROL UNIT

Removal & Installation

The Controller Anti-Lock Brake (CAB) and Hydraulic Control Unit (HCU) are integrated into one unit, the Integrated Control Unit (ICU). HCU replacement requires replacement of HCU and pump/motor as an assembly. See **Fig. 2** . Remove ICU from vehicle and separate CAB from HCU and pump/motor assembly. See **CONTROLLER ANTI-LOCK BRAKE (CAB)** .

LOW BRAKE FLUID SWITCH

Removal & Installation

Low brake fluid switch is located in brake fluid reservoir, on master cylinder. Low brake fluid switch is not repairable. If low brake fluid switch is faulty, brake fluid reservoir must be replaced. See appropriate DISC & DRUM article.

MASTER CYLINDER & BRAKE BOOSTER

NOTE: For removal and installation of master cylinder and brake booster, see appropriate DISC & DRUM article.

PROPORTIONING VALVES

Removal & Installation

1. Raise and support vehicle. Two in-line proportioning valves are used, one in each rear wheel brake hydraulic circuit between the brakeline and flex hose. Disconnect brakelines and remove proportioning valve.
2. To install, reverse removal procedure. Tighten brakeline nuts to specification. See **TORQUE SPECIFICATIONS** . Bleed brake system. See **BLEEDING BRAKE SYSTEM** .

PUMP/MOTOR

Removal & Installation

Pump/motor assembly is located on Hydraulic Control Unit (HCU) in engine compartment. See **Fig. 1** and **Fig. 2** . Pump/motor may only be serviced as part of HCU. DO NOT attempt to remove pump/motor from HCU. See **HYDRAULIC CONTROL UNIT** .

REAR WHEEL SPEED SENSOR

Removal

1. Remove rear seat cushion and seat back. Disconnect rear Wheel Speed Sensor (WSS) electrical connector from vehicle wiring harness.
2. Note rear WSS wiring harness installation for reinstallation reference. Raise and support vehicle. Remove rear wheel. Carefully remove grommet from floor pan with end of cable which attaches to wiring harness. Remove WSS cable from routing bracket on strut tower flange.

CAUTION: If rear WSS is stuck in brake caliper adapter plate, use a hammer and soft drift to lightly tap on each side of WSS near bolt area to

rotate WSS back and forth until WSS can be removed. DO NOT use pliers to pull WSS from brake caliper adapter plate.

3. Remove rear WSS-to-brake caliper adapter plate bolt. Carefully remove rear WSS from brake caliper adapter. Remove remaining brackets for rear WSS wiring harness.

Inspection

1. Inspect tone wheel on hub assembly for missing teeth, broken teeth or looseness on mounting surface. Ensure tone wheel has not contacted rear WSS. Replace components if damaged.
2. Using dial indicator, check tone wheel runout. It may be necessary to replace hub assembly if tone wheel runout exceeds .006" (.15 mm).

Installation

1. Ensure rear WSS hole in brake caliper adapter plate is clean. Apply light coat of high-temperature multipurpose grease on WSS-to-brake caliper adapter plate contact areas.
2. Install rear WSS in brake caliper adapter plate. Ensure WSS is fully seated. Install and tighten rear WSS-to-brake caliper bolt to specification. See **TORQUE SPECIFICATIONS**.

CAUTION: Proper installation of rear WSS wiring harness is critical to provide proper ABS operation. Ensure wiring harness is properly installed in all retainers to prevent contact with moving parts and/or over-extension, resulting in an open circuit.

3. Rear WSS air gap should be .015-.052" (.38-1.31 mm). The rear WSS air gap is non-adjustable. To install remaining components, reverse removal procedure. Ensure locking tab on rear WSS-to-vehicle wiring harness electrical connector is securely locked in place and wiring harness is properly routed. Tighten wheel lug nuts to specification. See **TORQUE SPECIFICATIONS**.

TRACTION CONTROL SWITCH

Removal & Installation

1. Ensure ignition is off. Remove and shield remote ground cable from ground stud on right strut tower. Using a trim stick, gently pry out center instrument panel bezel. See **Fig. 5**. Open glove box, and remove 4 screws along bottom edge of right upper trim bezel. Remove one screw in center bezel. Loosen right edge of lower steering column cover. Loosen right corner of upper steering column cover.
2. Using a trim stick, gently pry upper right trim bezel away from instrument panel. Disconnect traction control switch connector. Press tabs in on both sides of traction control switch, and remove switch. To install, reverse removal procedure.

ADJUSTMENTS

BRAKELIGHT SWITCH

Brakelight switch adjustment requires brakelight switch removal. See **BRAKELIGHT SWITCH** under REMOVAL & INSTALLATION.

DRUM BRAKE SHOE

NOTE: Normally self-adjusting drum brakes will not require adjustment. However, when brake shoes are replaced, it is recommended to manually make initial adjustment.

1. Raise vehicle so rear wheels are free to turn. Remove rubber plug from brake backing plate. Insert brake adjusting tool through adjusting hole in backing plate.
2. Push against star wheel of adjusting screw. Move handle of tool upward until a slight drag is felt when wheel is rotated.
3. Insert a thin screwdriver through adjusting hole, pushing lever out of engagement with star wheel. DO NOT bend lever. While holding lever out of engagement, back off star wheel until wheel rotates with no drag. Repeat procedure for other rear wheel. Install rubber plug in brake backing plate.

PARKING BRAKE

Disc Brakes

Parking brake shoes are automatically adjusted and require no manual adjustment. After servicing parking brake shoes, initial adjustment is accomplished by applying parking brake firmly one time, and then releasing brake.

Drum Brakes

Parking brake application mechanism is self-adjusting. No manual adjustment is necessary. Proper parking brake operation relies on proper rear brake adjustment. See **DRUM BRAKE SHOE**.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Brakeline-To-HCU Nut	12.5 (17)
Brakeline-To-Proportioning Valve Nut	12.5 (17)
Wheel Lug Nut	(1) 95 (129)
INCH Lbs. (N.m)	
CAB-To-HCU Screws	17 (2)
Front Wheel Speed Sensor-To-Steering Knuckle Bolt	62 (7)
ICU-To-Mounting Bracket Bolts	97 (11)
Rear Wheel Speed Sensor-To-Brake Caliper Adapter Plate Bolt	62 (7)
(1) Tighten nuts in crisscross sequence to half torque, and then tighten to full torque.	

WIRING DIAGRAMS

2001 Dodge Intrepid

2000-01 BRAKES Anti-Lock - Teves Mark 20 - Concorde, Intrepid, LHS & 300M

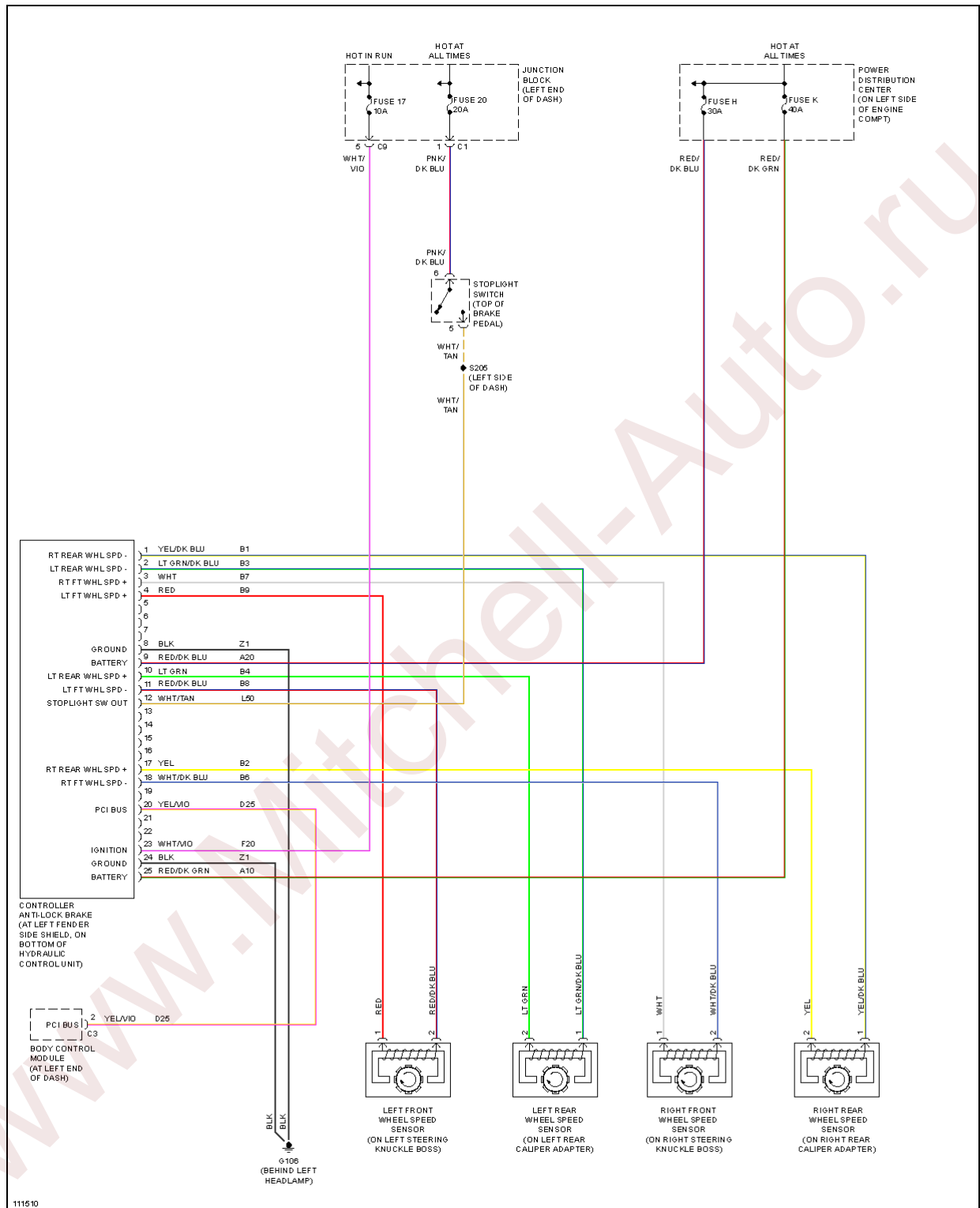


Fig. 13: Teves Mark 20 Anti-Lock Brake System Wiring Diagram (2000-01 Concorde, Intrepid, LHS & 300M)