ANTI-LOCK BRAKE SYSTEM

General Information

The 4-Wheel Anti-lock Brake System (ABS) is an electronically operated, all wheel brake control system. Major components include the power brake booster, master cylinder, the wheel speed sensors, and the Hydraulic Control Unit (HCU) which contains the control module, a relay, and the pressure control valves.

The system is designed to retard wheel lockup during periods of high wheel slip when braking. Retarding wheel lockup is accomplished by modulating fluid pressure to the wheel brake units. When the control module detects a variation in voltage across the wheel speed sensors, the ABS is activated. The control module opens and closes various valves located inside the HCU. These valves, called dump and isolation valves, modulate the hydraulic pressure to the wheels by applying and venting the pressure to the brake fluid circuits.

Some models are equipped with a Traction Assist (TA) system. The TA system senses wheel spin upon acceleration, turns on the Hydraulic Control Unit (HCU) pump and applies fluid pressure to the appropriate rear wheel. Two additional isolation valves in the HCU will also close to permit fluid to flow only to the rear wheels.

The TA system monitors TA usage to avoid overheating the rear brakes. If the system does sense brake overheating, the ABS module will inhibit TA operation until the rear brakes are permitted to cool down.

SYSTEM COMPONENTS

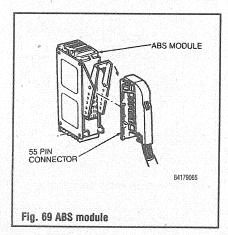
The anti-lock brake system consists of the following components:

- Vacuum booster and master cylinder assembly
 - Hydraulic Control Unit (HCU)
 - ABS module
 - Wheel sensors
 - · Pedal travel switch

ABS Module

See Figures 69, 70 and 71

The ABS module is an on-board, self-test, non-repairable unit consisting of 2 microprocessors and



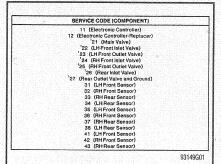
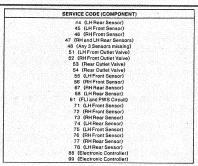


Fig. 70 The on-board self test service codes (1 of 2)



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Fig. 71 The on-board self test service codes (2 of 2)

the necessary circuitry for their operation. These microprocessors are programmed identically. The ABS module monitors system operation during normal driving as well as during anti-lock braking and traction assist cycling.

Under normal driving conditions, the microprocessors produce short test pulses to the solenoid valves that check the electrical system without any mechanical reaction. Impending wheel lock conditions trigger signals from the ABS module that open and close the appropriate solenoid valves. This results in moderate pulsation in the brake pedal. If brake pedal travel exceeds a preset dimension determined by the pedal travel switch setting, the ABS module will send a signal to the pump to turn on and provide high pressure to the brake system. When the pump starts to run, a gradual rise in pedal height will be noticed. This rise will continue until the pedal travel switch closes and the pump will shut off until the pedal travel exceeds the travel switch setting again. During normal braking, the brake pedal feel will be identical to a standard brake system.

During traction assist operation, the ABS module will close the appropriate isolation valves and operate the pump. If the brakes are applied during cycling, the system will automatically shut off. The ABS module monitors traction assist usage and will shut off the traction assist features to prevent overheating of the rear brakes. If the system shuts off, there is a cool down period required before it becomes functional again. This cool down period

varies depending on brake usage during the cool down period. Anti-lock braking is still fully functional during the cool down period.

Most malfunctions, which occur to the anti-lock brake system and the traction assist, will be stored as a coded number in the keep-alive memory of the ABS module. The codes can be retrieved from memory by following the on-board self-test procedures

⇒Any brake code between 20–29 must be serviced before the processor will output any other codes

REMOVAL & INSTALLATION

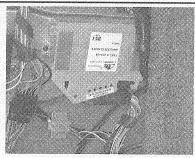
1988–94 Continental and Mark VII

b See Figures 72, 73 and 74

1990-94 Town Car and 1993-94 Mark VIII

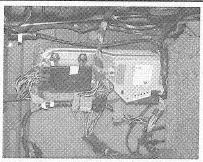
♦ See Figure 75

- 1. Disconnect the negative battery cable.
- 2. Locate the ABS module at the left front side of the radiator support.
- 3. Detach the 55-pin connector from the ABS module. Unlock the connector by pulling up the lever completely. Move the end of the connector away from the ABS module until all terminals are clear, then pull the connector up and out of the slots in the ABS module.
 - 4. Remove the 3 screws attaching the ABS



93149P0

Fig. 72 This is the ABS module. It is located in the luggage compartment, mounted against the rear seat supports



93149P04

Fig. 73 You will find the ABS module mounted next to the door lock module