

TRACTION CONTROL SYSTEM

1993 Saab 9000

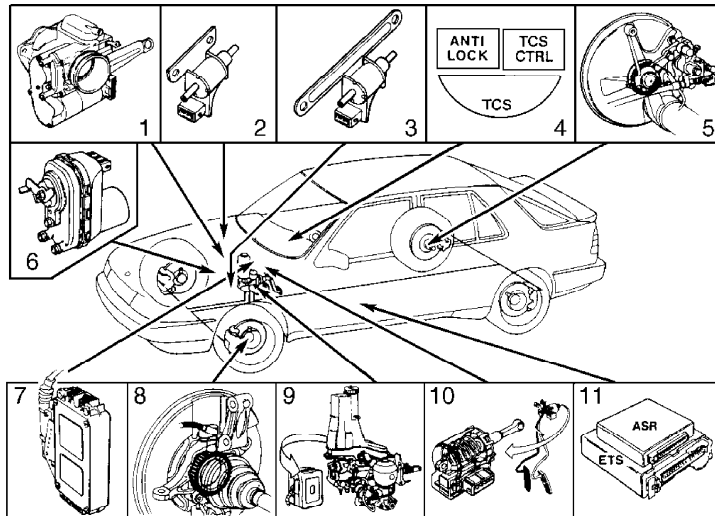
1993 BRAKES
Saab Traction Control
9000 Series

DESCRIPTION

Saab Traction Control System (TCS) operates in tandem with appropriate Anti-lock Braking (ABS) system. Saab 9000 series vehicles are equipped with Mark IV ABS. TCS is made up of 2 subsystems: ABS and Electronic Throttle System (ETS). System also incorporates a cruise control function. An additional Automatic Slip Reduction (ASR) system is used on automatic transmission models.

TCS uses many components already included in ABS system, including wheel sensors, hydraulic unit and valve block. TCS system consists of 2 different variations, one for manual transmission and one for automatic transmission. See Figs. 1 and 2.

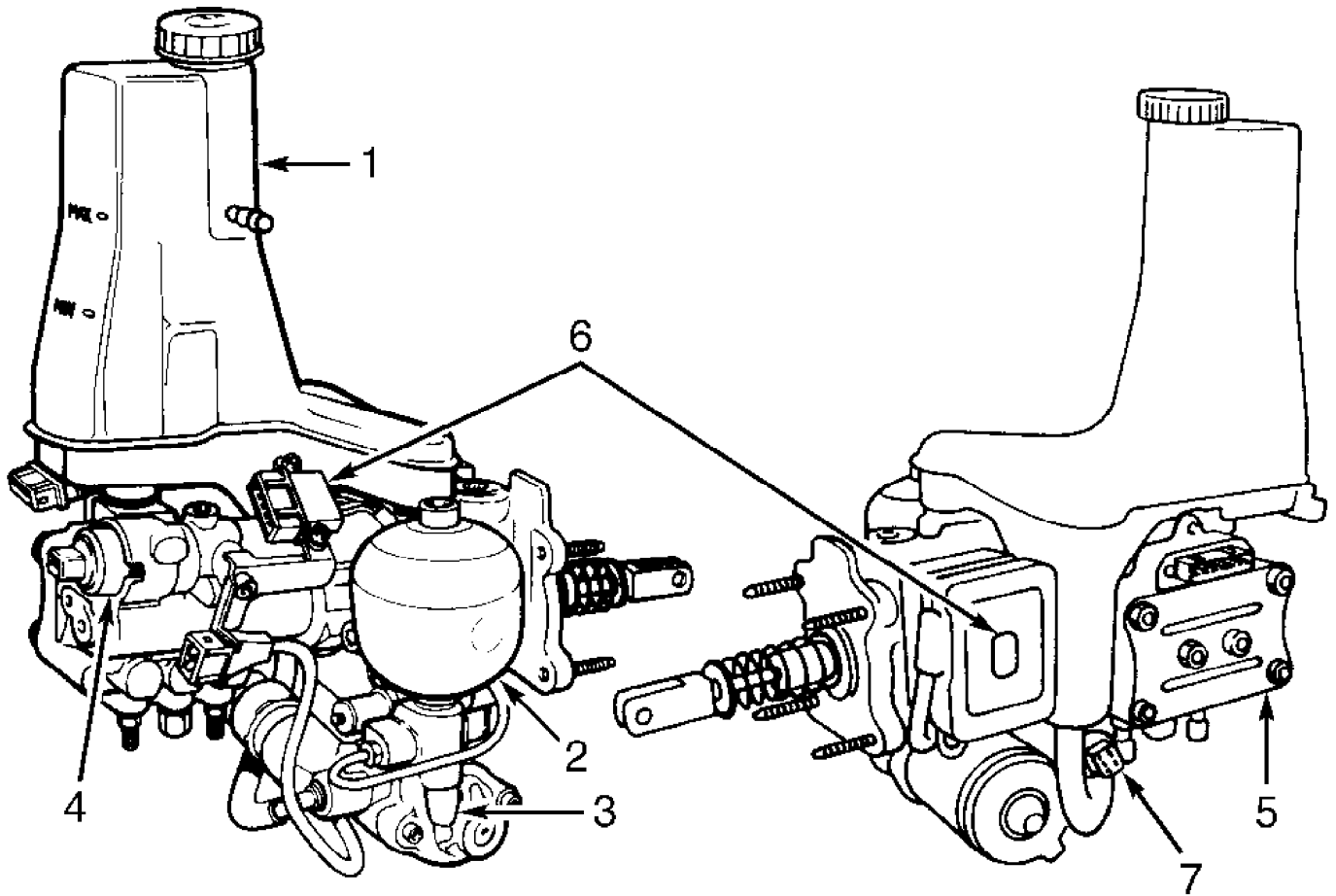
Manual transmission TCS has capability to apply front brakes independently during low speed wheel spin and also close throttle valve to reduce wheel spin at any speed. Automatic transmission TCS does not have capability to apply brakes during wheel spin conditions. Automatic transmission TCS does control operation of transmission kickdown cable in addition to controlling throttle valve. ABS components of system include a 55-terminal ECU (located on battery shelf), ABS hydraulic unit (with traction control valve block on manual transmission version), wheel speed sensors, and warning lights. See Fig. 3.



- | | |
|---------------------|--------------------------|
| 1. Throttle Housing | 7. TC/ABS ECU |
| 2. Safety Valve | 8. Wheel Sensor |
| 3. Control Valve | 9. TC/ABS Hydraulic Unit |
| 4. Warning Lights | 10. Pedal Sensor |
| 5. Wheel Sensor | 11. ASR & ETS ECU |
| 6. KDW Motor | |

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Fig. 1: Identifying TCS System Components
Courtesy of Saab-Scania of America, Inc.

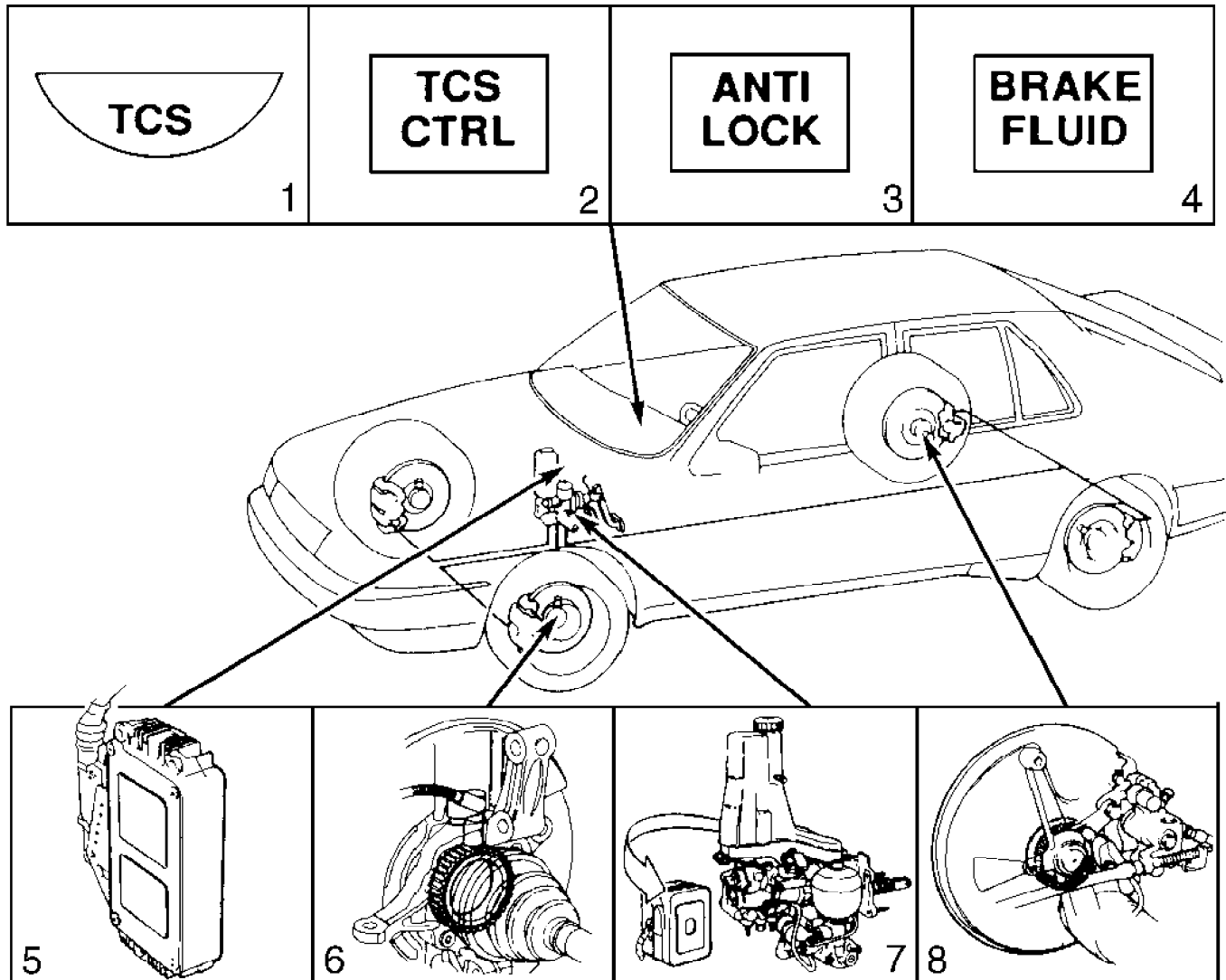


- 1. Brake Fluid Reservoir
- 2. Accumulator
- 3. High Pressure Pump
- 4. Main Valve

- 5. Valve Block
- 6. TC Block & Connector
- 7. Pressure Warning Switch

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Fig. 2: Identifying TC/ABS Hydraulic Unit Components
 Courtesy of Saab-Scania of America, Inc.



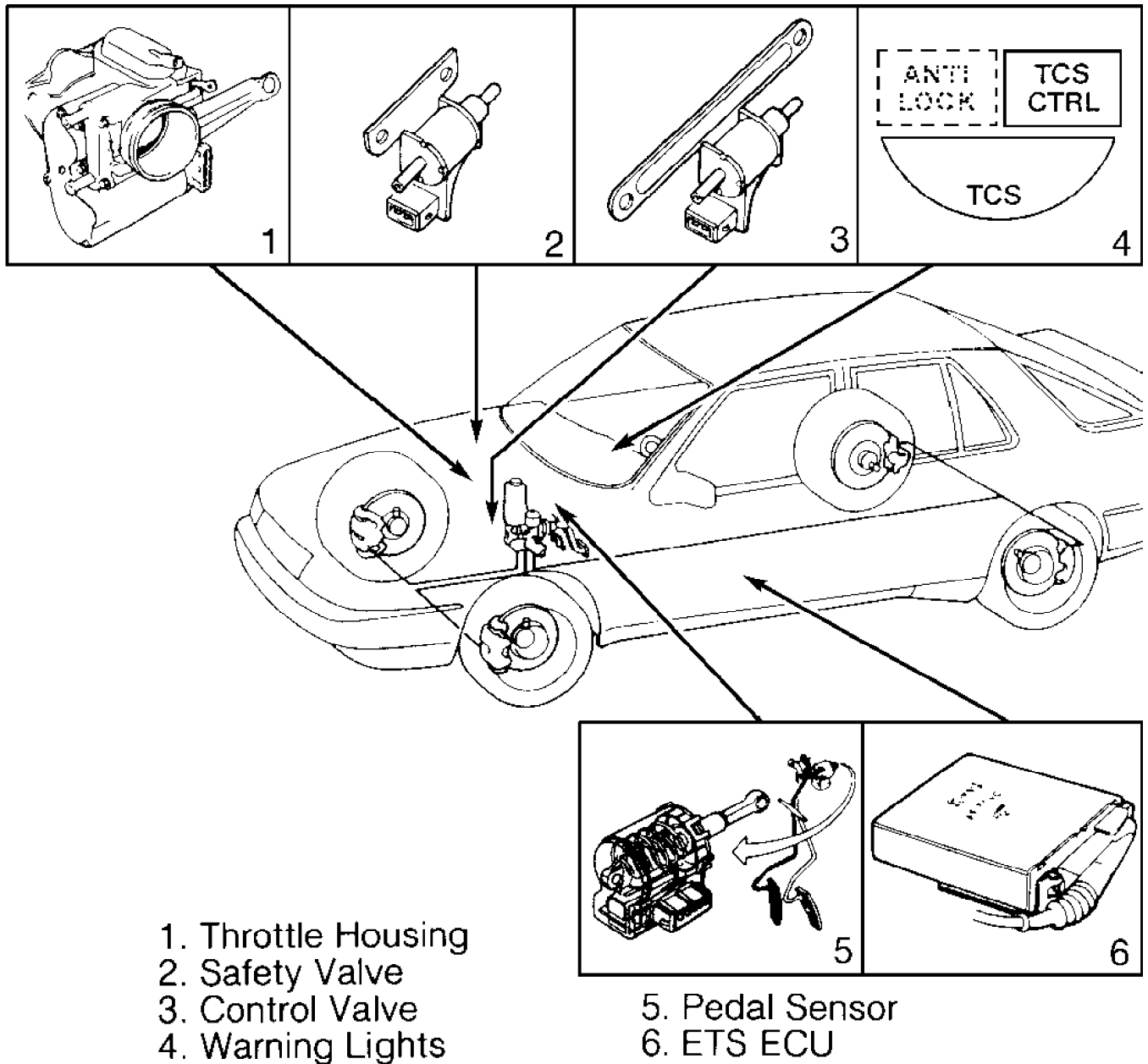
- 1. TCS Warning Light
- 2. TCS CTRL Warning Light
- 3. ANTI LOCK Warning Light
- 4. BRAKE FLUID Warning Light

- 5. TC/ABS ECU
- 6. Wheel Sensor
- 7. TC/ABS Hydraulic Unit
- 8. Wheel Sensor

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Fig. 3: Identifying TC/ABS System Components
 Courtesy of Saab-Scania of America, Inc.

Electronic Throttle System (ETS) utilizes a throttle cable only as an emergency limp-home measure, as it is an electronic (as opposed to mechanical) throttle operating system. Throttle is operated by a Pulse-Width Modulated (PWM) DC motor. ETS/ECU is located under driver's seat. See Fig. 4.

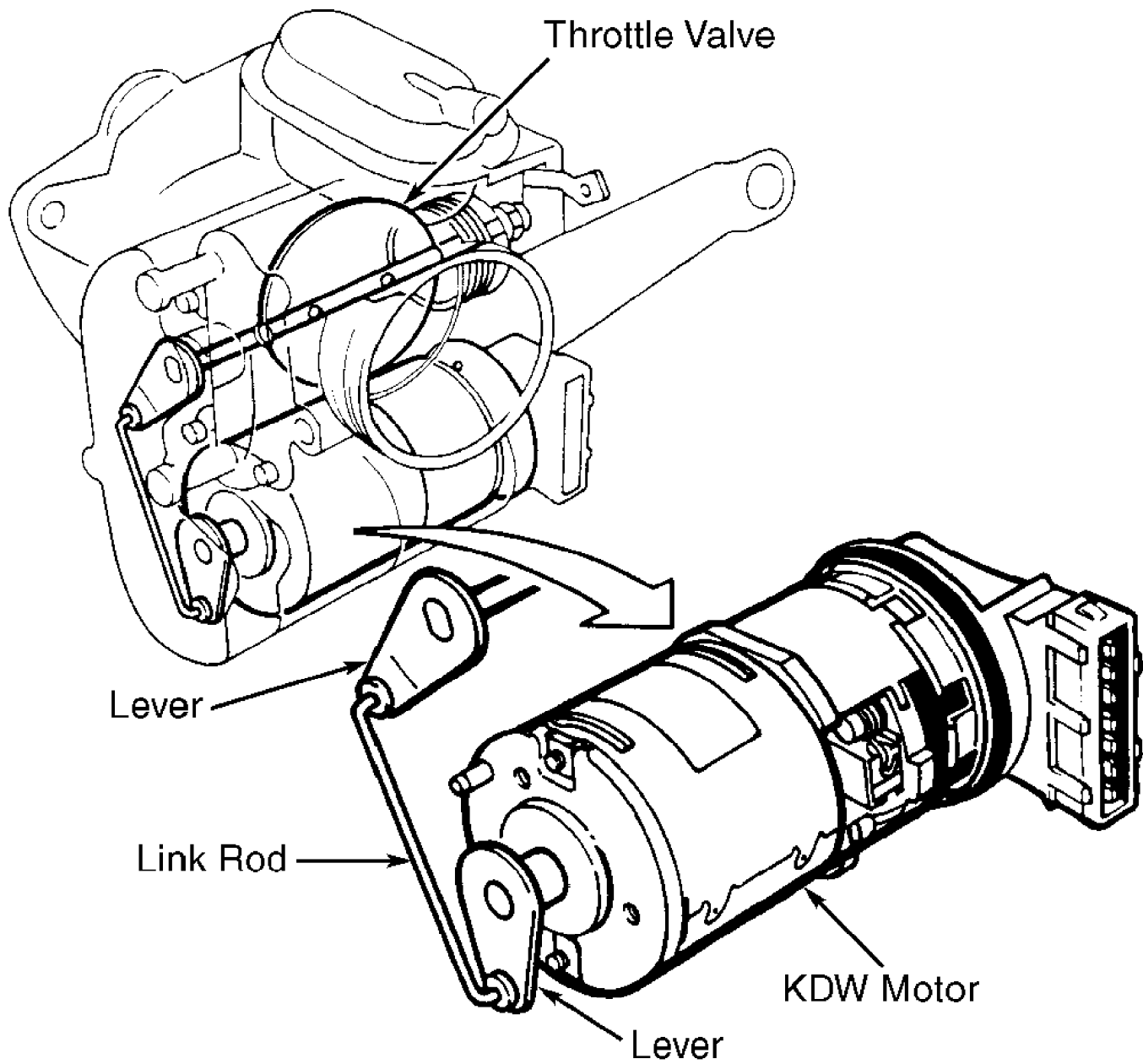


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Fig. 4: Identifying ETS System Components
 Courtesy of Saab-Scania of America, Inc.

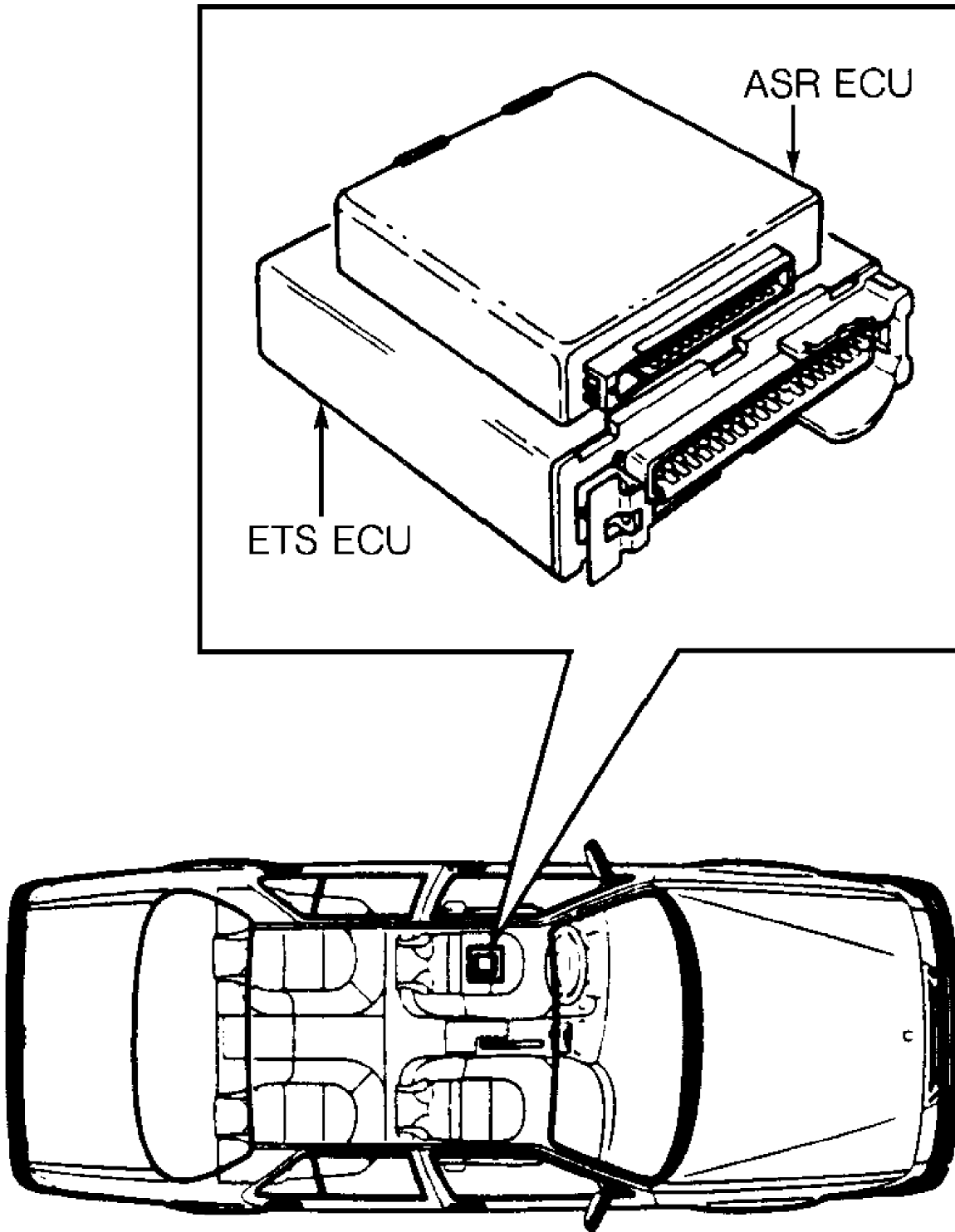
ETS components of system include a 38-pin ECU, throttle housing assembly, pedal potentiometer, and solenoid valves. ETS ECU is identical for both manual and automatic transmission versions. If a new ECU is installed, it must be calibrated in order to identify which version car it is being used on.

Automatic Slip Reduction (ASR) components of system include 25-pin ECU and Kickdown Wire (KDW) motor. See Fig. 5. ASR ECU is located on ETS ECU, under driver's seat. See Fig. 6. ASR system operates in much the same way as manual transmission version, except it is much more sensitive. Generally, the driver is not aware of its operation other than that the TCS light is on.



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Fig. 5: Locating KDW Motor
Courtesy of Saab-Scania of America, Inc.



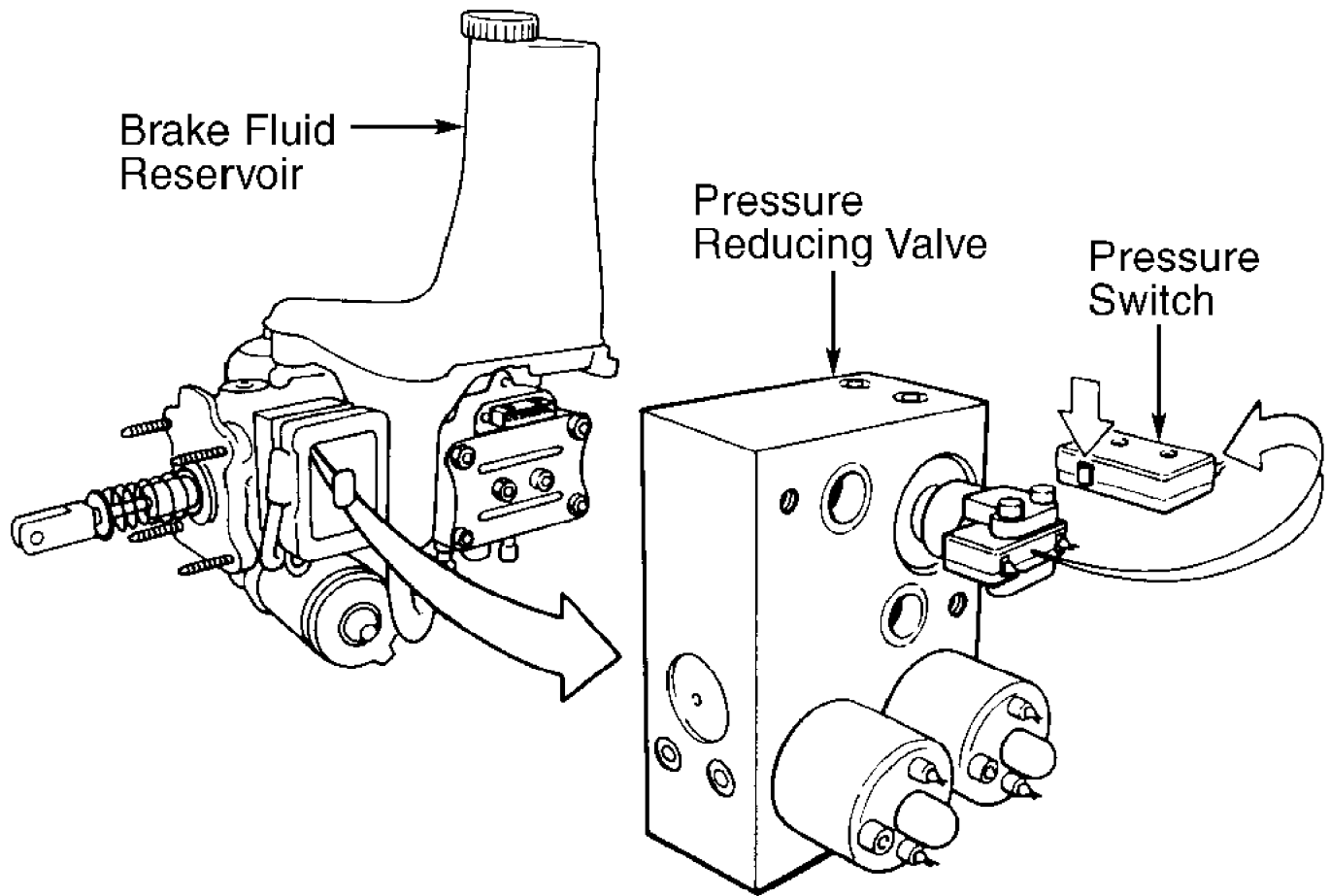
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Fig. 6: Locating ASR ECU
Courtesy of Saab-Scania of America, Inc.

OPERATION

TC/ABS ECU INPUT SIGNALS

TC/ABS ECU receives signals from 4 wheel sensors which provide input on wheel speed. TC/ABS ECU also receives signals from monitoring circuit for hydraulic pressure and brake fluid level. Pressure switch in TC block sends signals to TC/ABS ECU with information on whether the brake is activated and whether TC or ABS mode is operative (manual transmission version only). See Fig. 7. Signal from pressure switch is compared with input signal from brake light switch. TC/ABS ECU also communicates with ETS ECU. TC/ABS ECU is located on battery shelf. ETS ECU is located under driver's seat.



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Fig. 7: Locating Pressure Switch
Courtesy of Saab-Scania of America, Inc.

TC/ABS ECU OUTPUT SIGNALS

TC/ABS ECU sends signals to inlet and outlet valves, main valve, TC valves (manual transmission only), TC/ABS system relay, ports for communication with ETS ECU and Saab Intelligent Tester (ISAT), and warning lights.

TC/ABS SYSTEM SAFETY FEATURES

Overview

