

Automotive Brake Systems


Traction Control and Stability Assist

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Automotive Brake Systems

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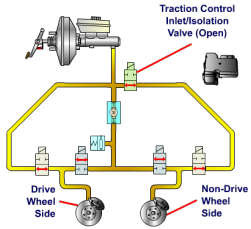
- Traction control and stability assist systems utilize existing ABS components in combination with additional sensors and actuators to assist the driver in maintaining vehicle control under various operating conditions



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Traction Control

- The ABS module applies the brakes for the slipping drive wheel
- The ABS module also interacts with the PCM to reduce engine torque if the driving wheels lose traction during acceleration by
 - regulating the fuel and spark
 - reducing throttle opening



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Stability Assist

- The system integrates ABS, traction control, and stability assist to further enhance the stability of the vehicle
- The system shares many of the electronic and mechanical elements already present in the traction control and ABS systems
- During operation, if the vehicle enters an over-steer or under-steer condition the stability assist system will attempt to correct the condition

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Stability Assist Module


- The ABS control module on vehicles equipped with the Advance Trac stability assist system controls the ABS, traction control and engine control systems to maintain vehicle control during deceleration, acceleration and vehicle maneuvers
- The module also controls electronic brake distribution (EBD) which controls rear brake pressure and acts as an electronic proportioning valve



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Stability Assist Control

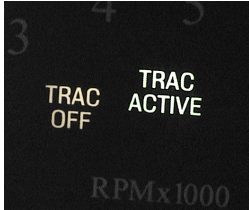
- The stability assist or Advance Trac system operates independently of the ABS system and may be turned off by the driver
- The antilock and traction control system continues to operate normally



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Advance Trac Indicator

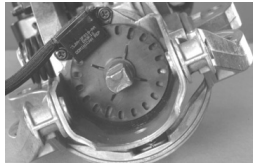
- During Advance Trac activation the light will illuminate
- Vehicles equipped with an instrument cluster message center will also display "Advance Trac Disabled" when the system is disabled



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Steering Wheel Rotation

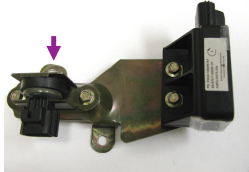
- The steering wheel rotation sensor provides information on how far right or left the steering wheel is being turned
- The sensor does not indicate steering position relative to straight ahead



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Lateral Accelerometer

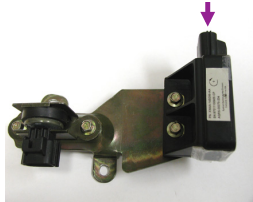
- The accelerometer measures lateral or side to side force through a turn
- The lateral accelerometer varies signal voltage based upon vehicle side to side forces
- Voltage output while the vehicle travels straight ahead is typically 2.5 volts
- When the vehicle turns right the voltage increases, when it turns left the voltage decreases



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Yaw Rate Sensor

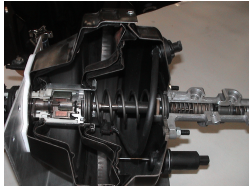
- The yaw rate sensor measures the relative vehicle motion about a vertical axis through its center of gravity



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Active Brake Booster

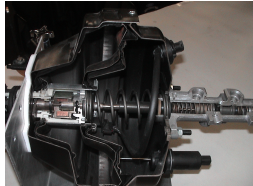
- The active brake booster is similar to a standard vacuum operated power assist unit with the following unique components:
 - Vacuum release solenoid with integrated brake pedal force (BPF) switches
 - Brake pedal travel BPT sensor
 - Master cylinder pressure (MCP) sensor or switches



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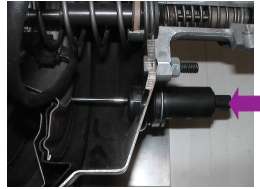
Brake Pedal Switches

- One switch is normally open and one is normally closed
- If the driver applies the brake pedal during an Advance Trac event, the switches signal the control module that the driver has applied the brakes
- This allows the control module to compensate for the additional brake pressure being applied by the driver and prevents the brake pedal feel from becoming excessively hard



Brake Pedal Travel Sensor

- The active brake booster contains a two-position brake pedal travel (BPT) sensor
- This allows the module to monitor brake pedal travel relative to the active brake booster diaphragm



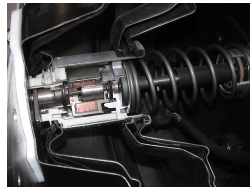
Master Cylinder

- The master cylinder pressure sensor is a transducer-type sensor that measures the amount of pressure in both chambers of the master cylinder
- The stability assist system uses this information to verify application of the master cylinder



Active Booster Solenoid

- The vacuum release solenoid is opened by increasing current flow
- The solenoid allows the ABS module to apply the booster and rapidly increase brake application in addition to the pump as used in traction control



Panic Assist Mode

- Electronic panic assist braking is part of the Advance Trac system
- This system uses the active brake booster to supplement braking pressure applied by the driver during a panic stop

