Subject: Brakes of the Future

Since the initial introduction of ABS in 1978, Bosch has constantly improved brake control technology.

In cooperation with Daimler Chrysler, Bosch has recently developed SBC (Sensotronic Brake Control). This is the world's first Brake-by-Wire system in a passenger car, where mechanical and hydraulic connections are replaced by electronically controlled functions.

This system is standard equipment in the SL sports car and the new E-class.

A travel sensor and pressure sensor measure speed and power from the driver stepping on the brake pedal. The information received is processed by the control unit, which sends control signals to the pressure modulator. The hydraulic unit independently regulates the braking pressure to the individual wheels. This brake pressure is fed into each brake caliper from a high-pressure accumulator via the hydraulic unit. The brake fluid is permanently pressurized in hydraulic unit to approx. 140 bar, so the SBC can implement the brake command instantaneously.

The brake pressure for each wheel is calculated using information on the current driving conditions provided by the ESP (Electronic Stability Program). While cornering, higher brake pressure is applied to the outside wheels than the inside, which significantly increases stability while decelerating. If the brake pedal is depressed very quickly, yet not with sufficient force, the system concludes that it's an emergency and increases pressure up to the ABS control limit.

In case of emergency, there is a direct hydraulic connection from the brake master cylinder to the front brakes. During normal operation this is disengaged from the brake circuit and the system operates electronically, ("by wire")

Most cars with SBC are also fitted with a rain sensor which recognizes when it starts to rain. It automatically removes water or salt film on the brake discs by very light regular braking impulses, which means the brake discs will be clean and dry when braking is required. Switching on the windshield wiper activates this function.

SBC works with other developments

A crucial feature of the electrohydraulic brake SBC is that it raises driver comfort.

Brake pressure can be regulated variably without driver actuation, so SBC works with vehicle guidance functions such as Adaptive Cruise Control (ACC). ACC automatically detects vehicles ahead, determines their position and speed, and accelerates or brakes as necessary to keep the required distance. This relieves the burden on the driver, especially on freeways and dual highways. If the road ahead is clear, ACC accelerates to the speed set by the driver. Although ACC provides considerable assistance, drivers still remain responsible for their own driving, especially steering maneuvers and emergency stops.

It is not possible to replace brake pads on an SBC equipped vehicle without diagnostics equipment to disable the system. .