ABC with RapidPro

- DaimlerChrysler tested the RapidPro in a Mercedes S-Class Coupé
- RapidPro prototype and MicroAutoBox for Active Body Control (ABC)
- Thousands of test kilometers in Germany, Sweden and Spain

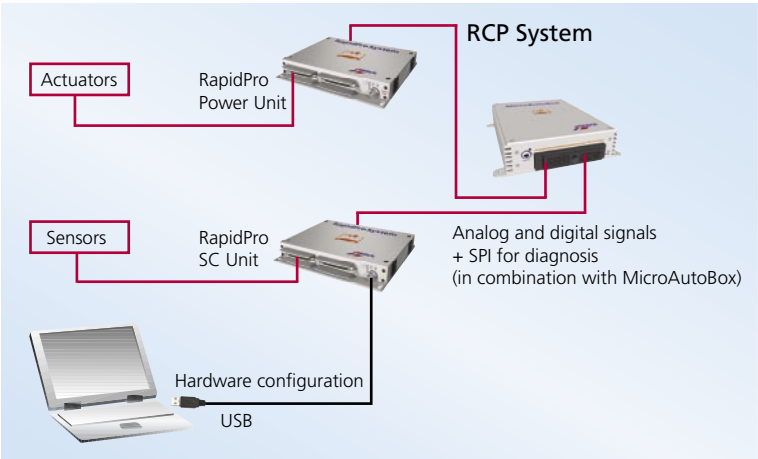
DaimlerChrysler needed a signal conditioning and power stage system for function prototyping that was both compact in size and easy to install in the vehicle, and chose the new RapidPro System from dSPACE as the candidate for evaluation. A prototype system went into action in Mercedes-Benz vehicles, where it successfully performed active body control in conjunction with MicroAutoBox. The RapidPro prototype has since clocked up several thousand test drive kilometers throughout Europe, for example, on the Nürburgring, in Spain, and in winter tests in Sweden.

Active Body Control (ABC)

Vehicle suspensions that provide both optimum vehicle dynamics and a smooth ride were long thought to be hard to achieve, as maximizing the one always meant compromising the other. Then along came electronically controlled, active suspension systems such as Active Body Control (ABC) from DaimlerChrysler, which counteract undesirable vehicle body movement around the vertical, longitudinal and transverse axes to keep the body under optimum control in all driving situations.

Building on Experience

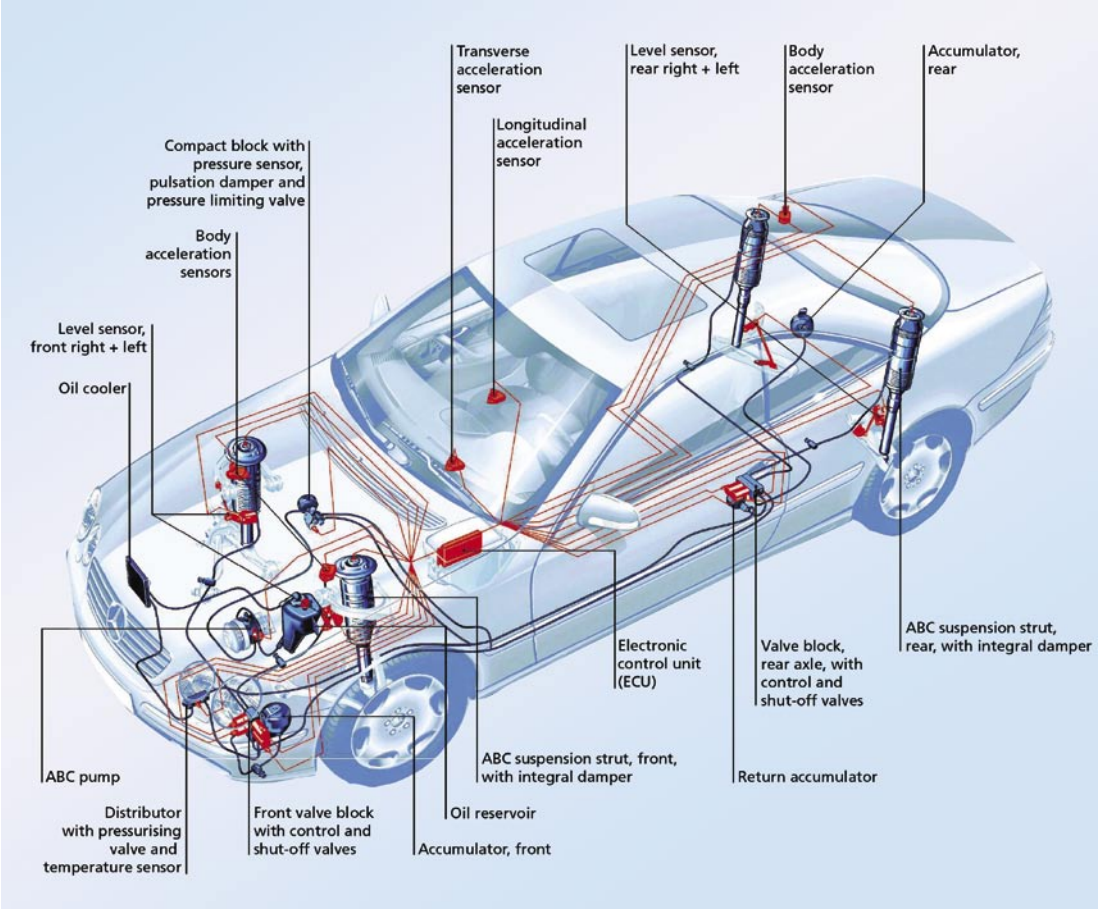
At DaimlerChrysler, we had already used dSPACE Prototyper in 1999 to bring the ABC electronic control unit up to production level for the Mercedes CL Coupé, so we knew from experience that we could rely on dSPACE technology (see dSPACE NEWS, Fall 2000). Since then, we have systematically developed the ABC functions further, again using dSPACE Prototyper and the TargetLink production code generator. One of our main development requirements was that the signal conditioning and the power stages should be quick and flexible to install and also particularly compact, to allow mobile use in different vehicles. In view of our previous experience with the dSPACE tool chain, evaluating the new RapidPro System together with dSPACE Prototyper was an obvious next step.



▲ *The sensors and actuators required for active suspension in the Mercedes S-Class Coupé were connected to the MicroAutoBox by means of prototypes of the RapidPro SC Unit (signal conditioning) and the RapidPro Power Unit (power stage).*

Lab Tests

First dSPACE engineers prepared the prototype RapidPro System, including the cabling that would be needed, according to our specifications. Several module types were installed in the RapidPro SC Unit (for signal conditioning): 10-channel analog input, 4-channel analog input, 8-channel digital input, and a 4-channel sensor supply module. Five 2-channel full-bridge power stage modules were installed in the RapidPro Power Unit. The entire system was successfully put into operation at dSPACE in Paderborn. In preparation for vehicle tests, we thoroughly tested the prototype in our laboratory in Sindelfingen, using a stimulator with all the real loads of the ABC suspension system. An existing ABC model for MicroAutoBox was used as the controller model, needing only minor modifications. The modules were easily to configure via software.



▲ *Active Body Control (ABC) from DaimlerChrysler is an electrohydraulic suspension system that counteracts undesirable vehicle movement around the vertical, longitudinal, and transverse axes.*

Mobility

Following the laboratory runs, we performed initial test drives in a Mercedes S-Class Coupé on the test track at Sindelfingen. Frequent changes of test vehicle made tough demands on the mobility of the RapidPro prototype. It fulfilled our expectations. One of the RapidPro System's main uses is in the further development and testing of the ABC chassis controller and the safety concept. The RapidPro System has been used in normal driving conditions, and also on the test tracks at Sindelfingen, Untertürkheim, the North Loop of the Nürburgring, Spain (IDIADA), and Sweden (Arjeplog). We found the RapidPro System's compactness, quick installation, and flexibility with regard to the modules it can take to be particularly useful. We are very satisfied with the prototype and looking forward to the even more optimized end product. In the meantime, the RapidPro prototype is also being used in other DaimlerChrysler development projects.

Team ABC E/E
Component and Function Design
DaimlerChrysler AG
Germany

You can find details on RapidPro on the pages 6 and 7.

◀ *The DaimlerChrysler team testing the RapidPro prototype in Spain.*