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Robert Bosch GmbH (Ed.)

Bosch Automotive Electrics and Automotive Electronics

Systems and Components, Networking and Hybrid Drive

5th Edition

Springer Vieweg

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Foreword

In recent decades, the development of the motor vehicle has been marked by the introduction of electronics. At first, electronic systems were used to control the engine (electronic fuel-injection systems), then electronic components entered the domain of driving safety (e.g. antilock brake system, ABS). More recently, completely new fields of application have emerged in the areas of driving assistance, infotainment and communication as a result of continuous advancements in semiconductor technology. Consequently, the proportion of electrics and electronics in the motor vehicle has continuously increased.

A typical feature of many of these new systems is that they no longer perform their function as stand-alone systems but operate in interaction with other systems. If the flow of information between these systems is to be maintained, the electronic control units must be networked with each other. Various bus systems have been developed for this purpose. Networking in the motor vehicle is a topic that receives comprehensive coverage in this book.

Powerful electronic systems not only require information about operating states, but also data from the vehicle's surroundings. Sensors therefore play an important role in the area of automotive electronics. The number of sensors used in the motor vehicle will continue to rise.

The complexity of the vehicle system is set to increase still further in the near future. To guarantee operational reliability in view of this complexity, new methods of electronics development are called for. The objective is to create a standardized architecture for the electrical system/electronics that also offers short development times in addition to high reliability for the electronic systems.

Besides the innovations in the areas of comfort/convenience, safety and infotainment, there is a topic that stands out in view of high fuel prices and demands for cutting CO_2 emissions: fuel consumption. In the hybrid drive, there is great potential for lowering fuel consumption and reducing exhaust-gas emissions. The combination of internal-combustion engine and electric motor enables the use of smaller engines that can be operated in a more economically efficient range. Further consumption-cutting measures are start/stop operation and the recuperation of brake energy (recuperative braking). This book addresses the fundamental hybrid concepts.

The traditional subject areas of automotive electrical systems are the vehicle electrical system, including starter battery, alternator and starter. These topics have been revised for the new edition. New to this edition is the subject of electrical energy management (EEM), which coordinates the interaction of the alternator, battery and electrical consumers during vehicle operation and controls the entire electrical energy balance.

The new edition of the "Automotive Electric/Automotive Electronics" technical manual equips the reader with a powerful tool of reference for information about the level of today's technology in the field of vehicle electrical systems and electronics. Many topics are addressed in detail, while others – particularly the electronic systems – are only presented in overview form. These topics receive in-depth coverage in other books in our series.

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Electrical and electronic systems in the vehicle

The amount of electronics in the vehicle has risen dramatically in recent years and is set to increase yet further in the future. Technical developments in semiconductor technology support ever more complex functions with the increasing integration density. The functionality of electronic systems in motor vehicles has now surpassed even the capabilities of the Apollo 11 space module that orbited the Moon in 1969.

Overview

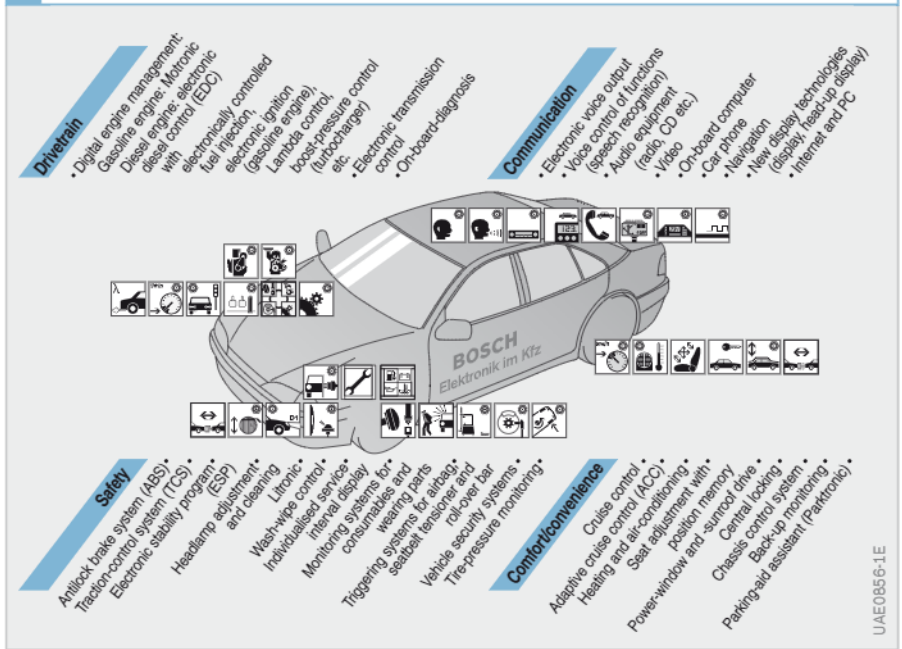
Development of electronic systems

Not least in contributing to the success of the vehicle has been the continuous string of innovations which have found their way into vehicles. Even as far back as the 1970s, the aim was to make use of new technologies to help in the development of safe, clean and economical cars. The pursuit of economic efficiency and cleanliness was closely linked to other customer benefits such as driving pleasure. This was characterized by the European diesel boom, upon which Bosch had such a considerable influence. At the same time, the development of the gasoline engine with gasoline direct injection, which would reduce fuel consumption by comparison with intake-manifold injection, experienced further advancements.

An improvement in driving safety was achieved with electronic brake-control systems. In 1978, the antilock brake system (ABS) was introduced and underwent continual development to such an extent that it is now fitted as standard on every vehicle in Europe. It was along this same line of development that the electronic stability program (ESP), in which ABS is integrated, would debut in 1995.

The latest developments also take comfort into account. These include the hill hold control (HHC) function, for example, which makes it easier to pull away on uphill gradients. This function is integrated in ESP.

1 Electronics in the motor vehicle



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