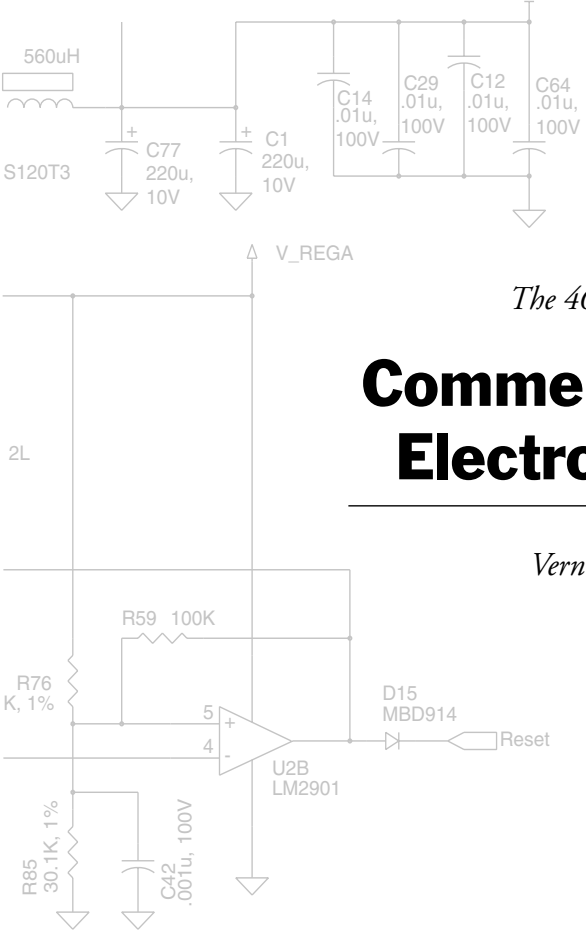

The 46th L. Ray Buckendale Lecture

Commercial Vehicle Electronics Design

Vern A. Caron, Caron Engineering

SAE INTERNATIONAL® SP-1650

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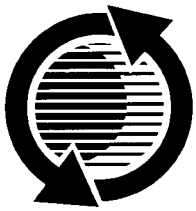

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Vern A. Caron

Vern Caron is president of Caron Engineering, a consulting firm engaged in hardware, software and systems design for passenger car and commercial vehicle applications.

Vern graduated from college in 1971 and spent the first ten years of his career at Chrysler Corporation engaged in the design of electronic ignition, fuel injection and emission controls. Among other projects, he was responsible for the design of the engine electronics for the Omni and Horizon car lines when they entered production.

Vern joined the International Harvester Research Center in 1981 and later became Chief Engineer in charge of Engine Electronics for Navistar's Engine Division. At Engine Division, he managed design and development efforts for a variety of engine electronics projects, including cold starting systems, fuel injection electronics, and turbo charger controls. One of these projects was the design of the prototype controls for the Navistar/Caterpillar HEUI injection system.

In 1988, Vern joined Eaton Truck Components Division as Chief Engineer of Antilock Brake Systems. Related activity included engineering support for the VORAD program, Tire Pressure Management Systems, and for several of the Automated Transmission Control projects. Vern also handled the concept work for Eaton's 3rd Generation AutoShift Transmission.

Vern received his bachelors degree in Electrical Engineering from the University of Minnesota in 1971. In 1981, while at Chrysler, he earned a Masters degree in Mechanical Engineering from Wayne State University. In 1987, he received an MBA from Keller Graduate School of Management in Chicago. Vern holds 25 U.S. patents and is registered as a Professional Engineer in Michigan and in Illinois.

Vern has been a member of SAE since 1973 and has been active in various SAE committees and subcommittees including the Convergence Committee and Buckendale Committee. He is currently a member of the Truck and Bus Council.

L. RAY BUCKENDALE LECTURES

The L. Ray Buckendale lectures, inaugurated in 1954, commemorate the contributions of the 1946 SAE President.

L. Ray Buckendale, by his character and work, endeared himself to all who were associated with him. Foremost among his many interests was the desire to develop the potential abilities of young people. As he was an authority in the theory and practice of gearing, particularly as applied to automotive vehicles, it was in this field that he was best able to accomplish his purpose. To perpetuate his memory, the Society of Automotive Engineers administers a series of lectures called "The L. Ray Buckendale Lectures." This series of lectures is intended to provide practical and useful technical information to young people involved in vehicle engineering. Sponsorship of the lecture series is rotated among companies within the commercial vehicle industry. Current sponsors include: ArvinMeritor Automotive Inc., Dana Corporation, Eaton Corporation, Cummins Inc., and TRW Inc.

Arvin-Meritor Automotive sponsors this year's lecture.

Page Group, Inc., Technical Documentation and Training Development, provided art and documentation support.

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The L. Ray Buckendale Committee of SAE welcomes nomination for future lectures and suggestions for subject matter related to the basic objective of the program. Nominations and suggestions may be addressed to: Secretary, L. Ray Buckendale Committee at SAE Headquarters.

Abstract

Transportation touches the lives of everyone on a daily basis. The Society of Automotive Engineers is involved in the continuous improvement of all areas of transportation. Like most products and services, the automotive business has benefited from the advances in electronics and computers. The sometimes unsteady alliance between engineers that work with metal chips and those that work with silicon chips has ultimately led to real value for the end user and for society as a whole.

The paper focuses on the design of automotive electronics and controls including hardware design and packaging, systems architecture, software architecture and systems interaction. As one of the papers in the Buckendale series, it concentrates particularly on the commercial vehicle aspects of this technology. This paper is intended for use as a general reference to the subject matter and is especially hoped to be of use to new practitioners in this field.

Automotive electronics contains elements of commercial, industrial, defense, computer and communications electronics. Specifically, it has the economics of commercial electronics, the durability requirements of military electronics, the life cycle of industrial electronics and the complexity of computer and communications electronics. Much of the innovation is driven by government regulation aimed at improving emissions, fuel economy and vehicle safety. But marketing pressure to gain a competitive advantage is also a strong driving force.

Commercial vehicle electronics is a unique segment of the automotive electronics business; essentially the same, except the durability requirements are tougher, the design life is longer, the production volumes are lower, and the systems are more varied and complex.

This paper is the first in a series of three papers on the subject of electronics for commercial vehicles. The second paper will discuss systems integration and the third paper will discuss validation and testing.

SP-1650

Commercial Vehicle Electronics Design

Vern A. Caron

Caron Engineering

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