
Automotive Electrical and Electronic Systems

Classroom Manual

Fifth Edition Update

Chek-Chart

John F. Kershaw, Ed.D.
Revision Author

James D. Halderman
Series Advisor



Upper Saddle River, New Jersey
Columbus, Ohio

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Introduction

Automotive Electrical and Electronic Systems is part of the Chek-Chart Series in Automotive Technology, which also includes:

- *Automatic Transmissions and Transaxles*
- *Automotive Brake Systems*
- *Automotive Heating, Ventilation, and Air Conditioning*
- *Automotive Manual Drive Train and Rear Axle*
- *Automotive Steering, Suspension, and Wheel Alignment*
- *Automotive Engine Repair and Rebuilding*
- *Engine Performance, Diagnosis, and Tune-Up*
- *Fuel Systems and Emission Controls.*

Since 1929, the Chek-Chart Series in Automotive Technology has provided vehicle specification, training, and repair information to the professional automotive service field.

Each book in the Chek-Chart series aims to help instructors teach students to become competent and knowledgeable professional automotive technicians. The texts are the core of a learning system that leads a student from basic theories to actual hands-on experience.

The entire series is job-oriented, designed for students who intend to work in the automotive service profession. Knowledge gained from these books and the instructors enables students to get and keep jobs in the automotive repair industry. Learning the material and techniques in these volumes is a giant leap toward a satisfying, rewarding career.

NEW TO THE FIFTH EDITION UPDATE

The fifth edition of *Automotive Electrical and Electronic Systems* has been updated to include new coverage of ignition systems. Ignition coverage had been a standard feature of the text through the fourth edition, but was removed from the fifth edition. Based on feedback from numerous users who wanted the ignition material back in the book, this updated fifth edition was produced. It includes new ignition chapters in both the *Classroom* and *Shop Manuals*.

How to Use This Book

WHY ARE THERE TWO MANUALS?

Unless you are familiar with the other books in this series, *Automotive Electrical and Electronic Systems* is unlike any other textbook you have used before. It is actually two books, the *Classroom Manual* and the *Shop Manual*. They have different purposes and should be used together.

The *Classroom Manual* teaches what a technician needs to know about electrical and electronic theory, systems, and components. The *Classroom Manual* is valuable in class and at home, both for study and for reference. The text and illustrations can be used for years hence to refresh your memory about the basics of automotive electrical and electronic systems and also about related topics in automotive history, physics, mathematics, and technology. This fifth edition update text is based upon detailed learning objectives, which are listed in the beginning of each chapter.

The *Shop Manual* teaches test procedures, troubleshooting techniques, and how to repair the systems and components introduced in the *Classroom Manual*. The *Shop Manual* provides the practical, hands-on information required for working on automotive electrical and electronic systems. Use the two manuals together to understand fully how the systems work and how to make repairs when something is not working. This fifth edition update text is based upon the 2002 NATEF (National Automotive Technicians Education Foundation) Tasks, which are listed in the beginning of each chapter. The fifth edition update *Shop Manual* contains Job Sheet assessments that cover the 56 tasks in the NATEF 2002 A6 Electrical/Electronics repair area.

WHAT IS IN THESE MANUALS?

The following key features of the *Classroom Manual* make it easier to learn and remember the material:

- Each chapter is based on detailed learning objectives, which are listed in the beginning of each chapter.

- Each chapter is divided into self-contained sections for easier understanding and review. This organization clearly shows which parts make up which systems and how various parts or systems that perform the same task differ or are the same.
- Most parts and processes are fully illustrated with drawings or photographs. Important topics appear in several different ways, to make sure other aspects of them are seen.
- A list of Key Terms begins each chapter. These terms are printed in **boldface** type in the text and defined in the Glossary at the end of the manual. Use these words to build the vocabulary needed to understand the text.
- Review Questions are included for each chapter. Use them to test your knowledge.
- Every chapter has a brief summary at the end to help you review for exams.
- Brief but informative sidebars augment the technical information and present “real world” aspects of the subject matter.

The *Shop Manual* has detailed instructions on test, service, and overhaul procedures for modern electrical and electronic systems and their components. These are easy to understand and often include step-by-step explanations of the procedure. The *Shop Manual* contains:

- ASE/NATEF tasks, which are listed in the beginning of each chapter and form the framework for the chapter’s content
- A list of Key Terms at the beginning of each chapter (These terms are printed in boldface type where first used in the text.)
- Helpful information on the use and maintenance of shop tools and test equipment
- Safety precautions
- Clear illustrations and diagrams to help you locate trouble spots while learning to read service literature
- Test procedures and troubleshooting hints that help you work better and faster
- Repair tips used by professionals, presented clearly and accurately
- A sample test at the back of the manual that is similar to those given for Automotive Service

Excellence (ASE) certification (Use this test to help you study and prepare when you are ready to be certified as an electrical and electronics expert.)

WHERE SHOULD I BEGIN?

If you already know something about automotive electrical and electronic systems and how to repair them, this book is a helpful review. If you are just starting in automotive repair, then this book provides a solid foundation on which to develop professional-level skills.

Your instructor has designed a course that builds on what you already know and effectively uses the available facilities and equipment. You may be asked to read certain chapters of these manuals out of order. That's fine. The important thing is to really understand each subject before moving on to the next.

Study the Key Terms in boldface type and use the review questions to help understand the material.

When reading the *Classroom Manual*, be sure to refer to the *Shop Manual* to relate the descriptive text to the service procedures. When working on actual vehicle systems and components, look to the *Classroom Manual* to keep the basic information fresh in your mind. Working on such a complicated piece of equipment as a modern automobile is not easy. Use the information in the *Classroom Manual*, the procedures in the *Shop Manual*, and the knowledge of your instructor to guide you.

The *Shop Manual* is a good book for work, not just a good workbook. Keep it on hand while actually working on a vehicle. It will lie flat on the workbench and under the chassis, and it is designed to withstand quite a bit of rough handling.

When you perform actual test and repair procedures, you need a complete and accurate source of manufacturer specifications and procedures for the specific vehicle. As the source for these specifications, most automotive repair shops have the annual service information (on paper, CD, or Internet formats) from the vehicle manufacturer or an independent guide.

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