# Preface

*Modern Residential Wiring* provides you with a solid background of electrical principles and practices, as well as a thorough understanding of the *National Electrical Code*®*. When the information provided here is mastered, you will be well equipped to design and install modern and safe residential wiring systems that meet the electrical power demands of today's world.

*Modern Residential Wiring* covers not only the "how" but also the "why" of safe electrical wiring practices. Although the content is concerned primarily with residential installations, many of the same concepts and principles may be applied to commercial and industrial electrical construction. The chapters are arranged in a logical sequence. The order of instruction follows the normal order in which an installation is made. However, each chapter is designed to stand alone and may be studied independently to suit specific needs.

*Modern Residential Wiring* makes the study of electrical wiring easy. Even the most complicated procedures are explained in a clear, simple, easy-to-understand manner. Procedures are presented "step-by-step," while many illustrations are fully integrated into the easy-to-read text. The illustrations should be carefully examined as they will often clarify and explain the more difficult principles of electricity and the requirements of the *National Electrical Code*.

The principles of electricity remain fixed. However, the methods, materials, and tools of the trade are continuously evolving. *Modern Residential Wiring* presents both the fundamentals of electrical wiring and the latest practices used in the trade. This new edition of *Modern Residential Wiring* is revised to be consistent with changes in trade practices, materials, and the requirements of the 2023 *National Electrical Code*.

The author wishes to express his sincere appreciation to each of the individuals, organizations, and associations that provided input, assistance, and illustrative materials for this new edition. A special thanks to my wife, Linda, for her active assistance in the creation of this edition.

Harvey N. Holzman

# About the Author

Harvey N. Holzman is a licensed master electrician with over 45 years of hands-on experience in several states, including New York, Florida, Kansas, North Carolina, Pennsylvania, and Texas. Besides owning his own electrical contracting services company, Mr. Holzman has worked for several major constructors at both refineries and power-generating stations, providing consulting, supervision, and field engineering. He has been a member of many electrical trade organizations and has trained dozens of individuals, many of whom have gone on to become master electricians.

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# Reviewers

The author and publisher wish to thank the following industry and teaching professionals for their valuable input into the development of *Modern Residential Wiring*, with special thanks to Robert W. Baird of R. W. Baird & Associates and Philip Schmidt for their in-depth reviews.

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# New to This Edition

This 13th edition of *Modern Residential Wiring* continues to provide clear and simple instruction of residential wiring concepts, techniques, and requirements for introductory students. The following changes have been incorporated for this edition:

- Updates to *National Electrical Code* references and content to reflect the 2023 *NEC*.
- A new video library has been added to the digital products. These engaging videos illustrate electrical concepts and wiring techniques.
- Additional content on fall protection, fire safety, and renewable energy sources.

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# Credentialing Partners and Support

Goodheart-Willcox appreciates the value of industry credentials, certifications, and accreditation. We are pleased to partner with leading organizations to support students and programs in achieving credentials. Integrating industry-recognized credentialing into a career and technical education (CTE) program provides many benefits for the student and for the institution. By achieving third-party certificates, students gain confidence, have proof of a measurable level of knowledge and skills, and earn a valuable achievement to include in their résumés. For educators and administrators, industry-recognized credentials and accreditation validate learning, enhance the credibility of programs, and provide valuable data to measure student performance and help guide continuous program improvement.

*Modern Residential Wiring* is correlated to the Electrical Construction Technology credential and Electrical Occupations credential offered by NOCTI.

## NOCTI Certifications

Goodheart-Willcox is pleased to partner with NOCTI, a leading provider of industry certification solutions for CTE programs across the nation. With over 50 years of experience, NOCTI is a valuable partner in the CTE community's efforts to improve America's workforce. Goodheart-Willcox has created correlations between select products and the standards and competencies that make up the NOCTI credentials, to the benefit of states, instructors, and students working to achieve NOCTI credentials.

NOCTI certifications (knowledge-based and skill-based) are developed by national teams of subject matter experts as part of the process that meets personnel accrediting standards and requirements under ISO 17.024, resulting in credentials measuring skills and competencies critical for learner success outside the classroom. From online test delivery and psychometric services to digital badging and professional development, NOCTI uses the latest tools and methods to provide relevant solutions for those in CTE. For more information about NOCTI, visit www.nocti.org.

To see how *Modern Residential Wiring* correlates to credentialing and certification standards, visit the Correlations tab at www.g-w.com/modern-residential-wiring-2024.

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# Features of the Textbook

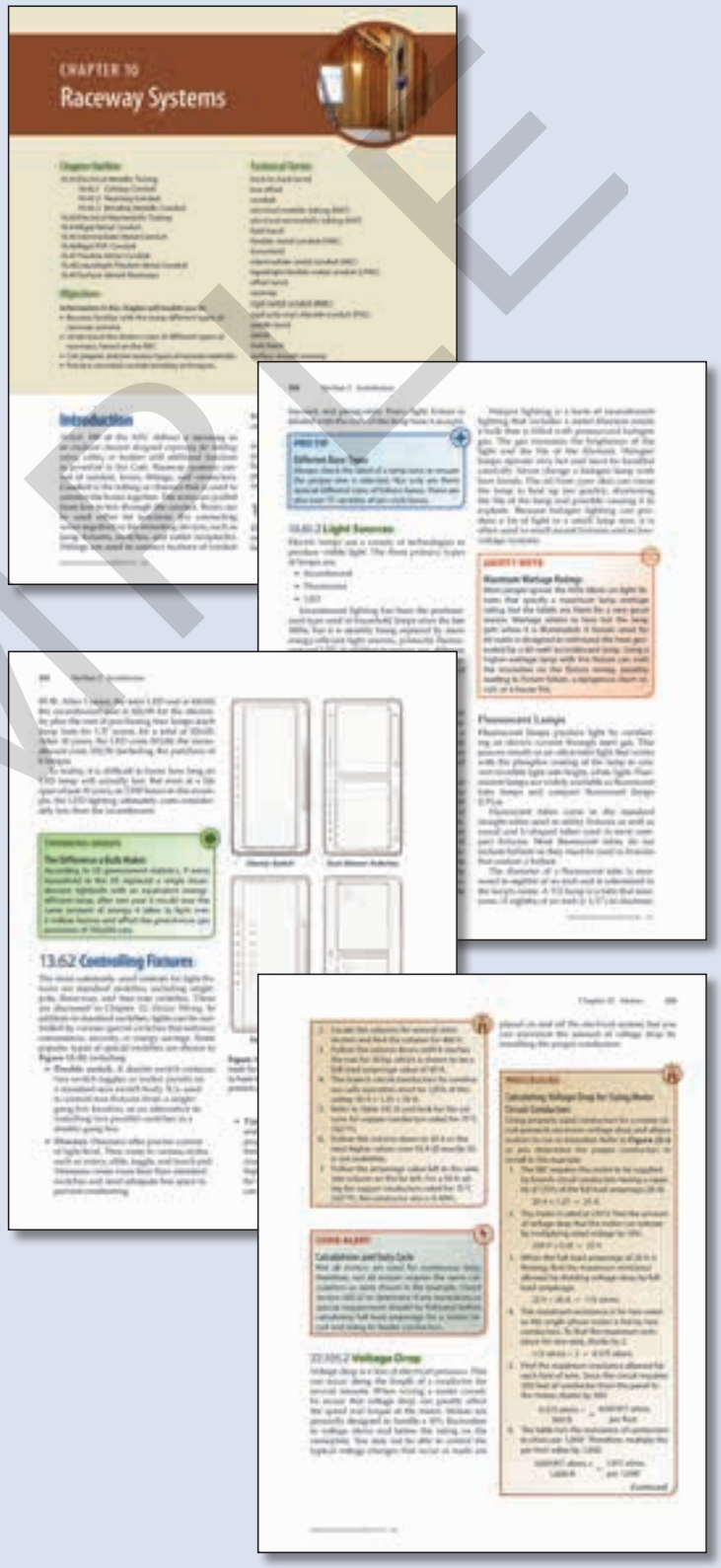
The instructional design of this textbook includes student-focused learning tools to help you succeed. This visual guide highlights these features.

## Chapter Opening Materials

Each chapter opener contains a chapter outline, a list of learning objectives, and a list of technical terms. The **Chapter Outline** summarizes the topics that will be covered in the chapter. **Objectives** clearly identify the knowledge and skills to be gained when the chapter is completed. **Technical Terms** list the key words to be learned in the chapter. **Introduction** provides an overview and preview of the chapter content.

## Additional Features

Additional features are used throughout the body of each chapter to further learning and knowledge. **Safety Notes** alert you to potentially dangerous materials and practices. **Code Alerts** point out specific items from typical building codes. **Procedures** are highlighted throughout the textbook to provide clear instructions for hands-on service activities. **Pro Tips** provide additional useful information. **Thinking Green** features highlight key items related to sustainability, energy efficiency, and environmental issues.




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# End-of-Chapter Content

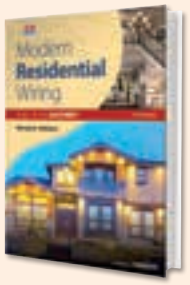
End-of-chapter material provides an opportunity for review and application of concepts. A concise **Summary** provides an additional review and reinforces key learning objectives. This helps you focus on important concepts presented in the text. **Know and Understand** questions enable you to demonstrate knowledge, identification, and comprehension of chapter material. **Internet Resources** list websites that provide content related to the electrical wiring profession. **Apply and Analyze** questions extend learning and develop your abilities to use learned material in new situations and to break down material into its component parts. **Critical Thinking** questions develop higher-order thinking and problem solving, personal, and workplace skills. **Know the Code** questions get you familiar with using the *National Electrical Code*.

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# TOOLS FOR STUDENT AND INSTRUCTOR SUCCESS

## Student Tools

### Student Text




*Modern Residential Wiring* includes information on safety, electrical theory, tools, and electrical systems, as well as specialized installations, such as swimming pools and emergency standby systems.

### Student Workbook

The student workbook provides learning practice with questions and activities. Each chapter corresponds to the text and reinforces key concepts and applied knowledge.

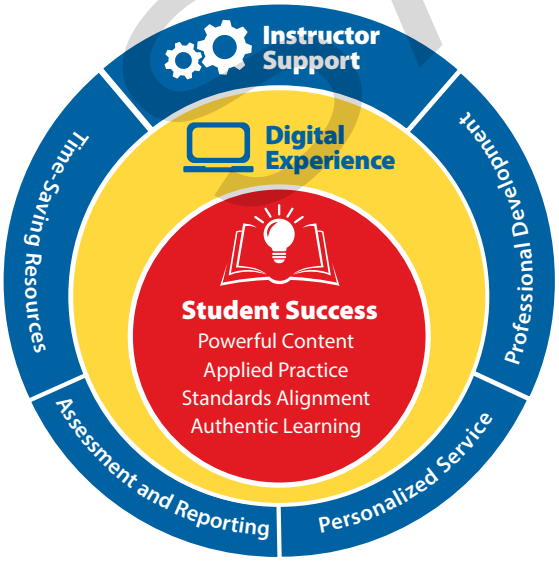
### G-W Digital Companion

- For digital users, e-flash cards and vocabulary exercises allow interaction with content to create opportunities to increase achievement.

### Online Learning Suite

- Online student text and student workbook, along with rich supplemental content, brings digital learning to the classroom.
- A video library contains videos that illustrate electrical concepts and wiring techniques.
- All instructional materials are accessible at home, at school, or on the go.

G-W EduHub®




## Instructor Tools

### LMS Integration

Integrate Goodheart-Willcox content within your Learning Management System for a seamless user experience for both you and your students. EduHub LMS–ready content in Common Cartridge® format facilitates single sign-on integration and gives you control of student enrollment and data. With a Common Cartridge integration, you can access the LMS features and tools you are accustomed to using and G-W course resources in one convenient location—your LMS.

G-W Common Cartridge provides a complete learning package for you and your students. The included digital resources help your students remain engaged and learn effectively:

- **Digital Textbook**
- Online **Student Workbook content**
- **Videos**
- **Drill and Practice** vocabulary activities

When you incorporate G-W content into your courses via Common Cartridge, you have the flexibility to customize and structure the content to meet the educational needs of your students. You may also choose to add your own content to the course.

For instructors, the Common Cartridge includes the Online Instructor Resources. QTI® question banks are available within the Online Instructor Resources for import into your LMS. These prebuilt assessments help you measure student knowledge and track results in your LMS gradebook. Questions and tests can be customized to meet your assessment needs.

### Online Instructor Resources

- The **Instructor Resources** provide instructors with time-saving preparation tools such as answer keys, editable lesson plans, and other teaching aids.
- **Instructor's Presentations for PowerPoint®** are fully customizable, richly illustrated slides that help you teach and visually reinforce the key concepts from each chapter.
- Administer and manage assessments to meet your classroom needs using **Assessment Software with Question Banks**, which include hundreds of matching, completion, multiple choice, and short answer questions to assess student knowledge of the content in each chapter.

See www.g-w.com/modern-residential-wiring-2024 for a list of all available resources.

### Professional Development

- Expert content specialists
- Research-based pedagogy and instructional practices
- Options for virtual and in-person Professional Development

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# The *National Electrical Code*®

The most informative and authoritative body of information concerning electrical wiring installation in the United States, and perhaps the world, is the *National Electrical Code*® (*NEC*). This code establishes a set of rules, regulations, and criteria for the installation of electrical equipment. Compliance with these methods will result in a safe installation.

The *NEC* is drafted by a team of experts assembled for this purpose by the National Fire Protection Association (NFPA). This team is formally called the *National Electrical Code* committee. They revise and update the *NEC* every three years. It is imperative that anyone installing electrical wiring obtains and studies the *NEC*. Articles and sections of the *NEC* are referred to throughout this text. Although certain portions, tables, and examples are directly quoted from its text, there is enough useful information in the *NEC*, that not having it available would be a tremendous hindrance.

The latest edition of the *National Electrical Code* can be purchased from the National Fire Protection Association by visiting their website. Online access to the *National Electrical Code* and over 1,400 NFPA codes and standards is available with an NFPA LiNK® subscription. NFPA LiNK includes all current editions as well as a library of legacy codes and standards going back five editions. Subscribers also have early access to newly released editions before the printed book is available for purchase. To learn more about NFPA LiNK, visit the NFPA website at www.nfpa.org.

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