

Preface

Electronics: Principles and Applications, seventh edition, introduces analog devices, circuits, and systems. It also presents various digital techniques that are now commonly used in what once was considered the sole domain of analog electronics. It is intended for students who have a basic understanding of Ohm's law, Kirchhoff's laws, power, schematic diagrams, and basic components such as resistors, capacitors, and inductors. The digital material is self-contained and will not pose a problem for those students who have not completed a course in digital electronics. The only mathematics prerequisite is a command of basic algebra.

The major objective of this text is to provide entry-level knowledge and skills for a wide range of occupations in electricity and electronics. Its purpose is to assist in the education and preparation of technicians who can effectively diagnose, repair, verify, and install electronic circuits and systems. It also provides a solid and practical foundation in analog electronic concepts, device theory, and modern digital solutions for those who may need or want to go on to more advanced study.

The seventh edition, like the earlier ones, combines theory and applications in a logical, evenly paced sequence. It is important that a student's first exposure to electronic devices and circuits be based on a smooth integration of theory and practice. This approach helps the student to develop an understanding of how devices such as diodes and transistors function. Then the understanding of these functions can be applied to the solution of practical problems and system applications.

This is an extremely practical text. The devices, circuits, and applications are typical of those used in all phases of electronics. Reference is made to common aids such as parts catalogs and substitution guides, and real-world troubleshooting techniques are applied whenever they are appropriate. The information, theory, and calculations presented are the same as those used by practicing technicians.

The 16 chapters progress from an introduction to the broad field of electronics through solid-state theory, transistors, and the concepts of gain, amplifiers, oscillators, radio, integrated circuits, control circuitry, regulated power supplies, and digital signal processing. As an example of the practicality of the text, an entire chapter is devoted to troubleshooting circuits and systems; in other

chapters, entire sections are devoted to this vital topic. Since the last edition, the electronics industry has continued its march toward more digital and mixed-signal solutions to analog functions. The distinction between analog and digital continues to blur. This is the only text of its kind that addresses this issue.

New to This Edition

New, improved, and expanded features include:

- LEDs (light-emitting diodes)
- Capacitor testing
- Hard and soft saturation
- Beta dependency
- Transformer coupling
- Class D amplifiers
- Common-mode rejection
- ESD (electrostatic discharge)
- PUTs (programmable unijunction transistors)
- DDS (direct digital synthesis)
- Wireless networks
- IC coverage
- Thyristor circuits
- Regulated power supplies

Learning Features

Each chapter starts with *Chapter Objectives* to alert the reader to what should be accomplished. Numerous solved *Example* problems throughout the chapters demonstrate the use of formulas and the methods used to analyze electronic circuits. *Key Terms* are noted in the margins to call the reader's attention to key concepts. *History of Electronics* and *About Electronics* have been added to the margins for enrichment of knowledge, and highlighting of new and interesting technologies. Each chapter section ends with a *Self-Test*, to provide readers an easy way to check their understanding before proceeding on.

All critical facts and principles are reviewed in the *Summary and Review* listing at the end of each chapter. All of the important chapter formulas are summarized at the end of each chapter in the *Related Formulas* feature. *Chapter Review Questions* are found at the end of each chapter; and separate, more challenging *Chapter Review Problem* sections are available in appropriate chapters. Finally, each chapter ends with *Critical Thinking Questions* and *Answers to Self-Tests*.

Student Resources

- A correlated *Experiments Manual* is available. This manual provides a wide array of hands-on lab work, problems, and circuit simulations. MultiSim files are provided for both the simulation activities and the hands-on activities and these files are located on the bound-in *Student CD-ROM*.
- The *Student CD-ROM*, provided with the textbook and Experiments Manual, provides MultiSim simulation files for almost every circuit in the textbook. They are arranged by chapter for easy reference. This CD-ROM also contains .pdf files with semiconductor data sheets. Other resources included on the Student CD-ROM are:
 - Student PowerPoint presentations
 - Soldering PowerPoint presentation and .pdf file
 - Circuit interrupter PowerPoint (GFCI and AFCI)
 - Breadboarding PowerPoint presentation
 - Data sheets (.pdf format)
 - Digital signal processing simulations (4 programs)
 - “Audio Examples” PowerPoint presentation
 - HP instrumentation simulator
 - Instrumentation PowerPoint presentations
 - Circuit files (EWB 5 and MultiSim versions 6, 7, and 8)
 - MultiSim Primer (by Patrick Hoppe of Gateway Technical College), which provides a tutorial for new users of the software.
- The *Online Learning Center* (OLC) website (Student Site) contains a wealth of student features, including extra review questions, links to industry sites, chapter study overviews, assignments, and tests; and the MultiSim Primer in online form.

Instructor Resources

- The *Online Learning Center* (OLC) website (Instructor Site) contains a wealth of features, including the Instructor’s Manual in online form,

and a separate group of quizzing/self-test questions arranged by chapter.

- The *Instructor IPC CD-ROM* contains the *Instructor’s Manual* and the following resources:
 - PowerPoint presentations for classroom use
 - Electronic test bank questions for each chapter
 - Parts and equipment lists
 - Performance objectives
 - Answers to textbook questions:
 - Chapter review questions
 - Critical thinking questions
 - Answers and data for lab experiments and assignments
 - Projects
 - HP instrumentation simulator
 - Instrumentation PowerPoint presentations (lab 1 to lab 4)
 - Instrumentation lab experiments in .pdf format
 - Breadboarding PowerPoint presentation
 - Soldering (.pdf file)
 - Soldering PowerPoint presentation
 - Circuit interrupters (GFCI & AFCI) PowerPoint presentation
 - Circuit simulation files (EWB 5 and MultiSim versions 6, 7, and 8)
 - Digital Signal Processing simulations (four programs)
 - “Audio Examples” PowerPoint presentation for Chap. 16
 - Calculus PowerPoint presentation, with EWB and MultiSim circuit files
 - Data sheets in .pdf format
 - Statistics .pdf files
 - Miscellaneous .pdf files
 - Excel file for Chap. 2, Experiments Manual
 - Pro Electron Type Numbering .pdf file

About the Author

Charles A. Schuler received his Ed.D. from Texas A&M University in 1966, where he was an N.D.E.A. fellow. He has published many articles and seven textbooks in electricity and electronics, almost as many laboratory manuals, and another book that deals with ISO 9000. He taught electronics technology and electrical engineering technology at California University of Pennsylvania for 30 years. He is currently a full-time writer.