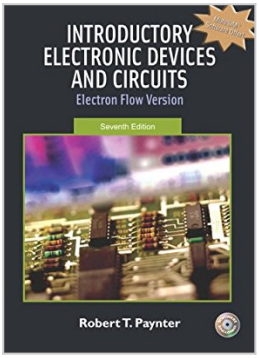


# Introductory Electronic Devices and Circuits: Electron Flow Version (7th Edition)

*By Robert T. Paynter*



**Introductory Electronic Devices and Circuits: Electron Flow Version (7th Edition)** By Robert T. Paynter

This book makes comprehension of material a top priority and encourages readers to be active participants in the learning process. The conventional-flow version of this book provides a readable and thorough approach to electronic devices and circuits, and support discussions with an abundance of learning aids to motivate and assist readers at every turn. The seventh edition of this well-established book features new internet link identifiers which bring the user to supplemental on-line resources.  Covered topics include fundamental solid-state principles, common diode applications, amplifiers, oscillators and transistors. For professionals in the field of Electronics Technology.

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## Editorial Review

From the Back Cover
This practical book provides a complete, hands-on approach to understanding electronic devices and circuits, and includes many “real-world” schematics to help readers identify components, circuits, and circuit configurations covered in the text. Offers a complete survey of the field, covering everything from the fundamentals of solid-state principles to common diode applications, dc biasing circuits, amplifier operation, field-effect transistors, oscillators, switching voltage regulators, and more. Places many supportive features in the margins, including critical thinking questions, objective identifiers, notes highlighting the differences between theory and practice, a running glossary, reminders of previously studied material, and lab references. Integrates schematic and Electronic Workbench( applications problems throughout for additional circuit simulation experience. For professionals in the electronic technology field.



# To the Instructor

If you compare the sixth edition of *Introductory Electronic Devices and Circuits* with its predecessor, you'll immediately see the changes in style and appearance that are part of this revision. The enhanced illustrations, combined with subtle changes in wording, are intended to make it easier for your students to study and comprehend the material being presented.

Users of previous editions will notice some changes in presentation and content. For example:

- The presentation on emitter bias in Chapter 7 (*DC Biasing Circuits*) has been reduced and moved into a new section (Section 7.4, Other Transistor Biasing Circuits) with the feedback bias circuits.
- The approach to transformer-coupled amplifier analysis in Chapter 11 (*Power Amplifiers*) has been modified to bring it in line with RC-coupled circuit analysis.
- The component specification sheets have been updated to reflect changes in component ratings and availability.

Several of the learning aids from previous editions have undergone revision (or relocation) as well. For example:

- The summary illustrations, in most cases, have been modified to include the primary component and/or circuit equations.
- Critical Thinking questions, which previously appeared in the margins, have been added to the Section Review questions.
- The glossary (Appendix E) has been updated and revised extensively.

## Learning Aids

From the start, my goal has been to produce a text that students can really *use* in their studies. As a result, many of the learning aids developed in the previous editions of *Introductory Electronic Devices and Circuits* have been retained:

1. **Performance-based objectives** enable students to measure their progress by telling them what they are

expected to be able to do as a result of their studies.
2. **Chapter outlines** provide a handy overview of the chapter organization.
3. **Objective identifiers** in the margins cross-reference the objectives with the chapter material. This helps students to locate the material that will enable them to fulfill any objective.
4. **Margin notes** (which are color coded in this edition) include:
   - A running glossary of new terms
   - Notes that highlight the differences between theory and practice
   - Reminders of principles covered in earlier sections or chapters
5. **In-chapter practice problems** are included in the examples to provide students with an immediate opportunity to apply the principles being demonstrated. The **answers** to these problems appear at the end of each chapter.
6. **Summary illustrations** provide a convenient review of circuit operating principles, analysis equations, and applications. Many also provide comparisons between two or more related components or circuits.
7. **Highlighted lab references** help to tie the material in the text to the exercises in the accompanying lab manual.

Examples of these learning aids are shown on the following pages. The following learning aids have also been retained from previous editions:

1. **Section review** questions at the end of each section. Most of these reviews now include Critical Thinking questions.
2. Each chapter ends with an **equation summary,** a **key terms list,** and an **extended chapter summary** (written in list form).
3. An extensive set of practice problems at the end of each chapter. In addition to standard practice problems, the problem sets include:
   - **Troubleshooting Practice Problems**
   - **Pushing the Envelope** (challenging questions)
   - **Suggested Computer Applications Problems**

## MULTISIM APPLICATIONS PROBLEMS

In response to reviewer input, applications problems incorporating **EWB**® software were integrated throughout the previous edition of this text. These files have been upgraded to **MultiSim**® and incorporated here so that instructors can decide (on an individual basis) whether or not to include them in their courses. The CD-ROM packaged with the text contains MultiSim applications problems developed by **George Shaiffer** (Pikes Peak Community College, Colorado Springs, CO). Various figures throughout the text are marked with an EWB icon. The file associated with each figure can be accessed from the CD-ROM using the figure number.

Many instructors see MultiSim as a valuable learning tool. Others believe that its classroom use should be limited to solving circuit problems encountered by more advanced students. I believe that the method used to integrate MultiSim into this text will make it valuable to those who wish to use it while keeping it unobtrusive to those who do not.

## COMPANION WEBSITE

*Introductory Electronic Devices and Circuits* has a companion website designed to provide additional review materials, questions, and practice problems. The website provides the following for each chapter in the text:

- A list of chapter objectives

- A chapter summary (written in a different form than the summary provided in the text)
- Multiple-choice review questions and problems
- Fill-in-the-blank review questions and problems

These items combine to provide a valuable tool for reviewing every chapter in the book.

### Lab Manual to Accompany *Introductory Electronic Devices and Circuits*

The lab manual that accompanies this text has also gone through extensive revision. The circuit schematics have been revised to better illustrate the test equipment connections called for in the exercises. Optional MultiSim procedures have also been added to each exercise.

## To the Student

### "Why Am I Learning This?"

Have you ever found yourself asking this question? If you have, then take a moment to read further.

I believe that any subject is easier to learn if you know *why* you are learning it. For this reason, we're going to take a moment to discuss:

- Why the study of electronic devices is important
- How this area of study relates to the other areas of electronics
- How you can get the most out of your study of electronic devices

Each electronics course serves, in part, as a foundation for the next. For example, you were taught about *resistors* in your fundamentals course. If you take a moment to flip through this book, you'll see that very few circuits do not contain at least one resistor. So, it should make sense that a thorough understanding of resistors is necessary to learn the principles and circuits discussed in this book.

*You are studying electronic devices at this point because it is serves as a foundation for the courses that will follow.* Just as the knowledge of basic components and circuit principles is essential for understanding electronic devices and circuits, you must successfully learn the material in this book to be prepared for later courses.

What *are* electronic devices? They are components with dynamic resistance characteristics. That is, they are components with resistance characteristics that are *current-controlled* or *voltage-controlled* (depending on the component). These fairly complex components are used in virtually every type of electronic system. They are used extensively in *communications systems* (such as televisions, stereos, and cellular phones), *digital systems* (such as PCs and calculators), *industrial systems* (such as process control systems), and *avionics* (aviation electronics).

As you can see, the study of electronic devices is essential if your knowledge is to advance beyond where it is now.

### "What Can I Do to Get the Most Out of This Course?"

There are several steps that you can take to help you successfully complete your study of electronics. The first is to realize that *learning electronics requires that you take an active role in your education.* It's like learning to ride a bicycle—you have to hop on and take a few spills. You can't learn how to ride a bike just

by "reading the book," and the same can be said about learning electronics. You must be *actively involved in the learning process.*

How do you get actively involved in the learning process? Here are some guidelines worth following:

1. *Attend class on a regular basis.* The book provides information. Insight (which is just as important) is gained through classroom and lab experience.
2. *Take part in classroom problem-solving sessions.* Get out your calculator, and solve the problems along with your classmates.
3. *Do all the assigned homework.* Circuit analysis is a skill. As with any skill, you gain competency only through practice.
4. *Take part in classroom discussions.* Classroom discussions can clarify points that otherwise may be confusing, and they can help you to better understand how the various principles tie together to form a complete picture.
5. Actively study the material in your textbook.

Actively studying the material in the textbook means that you must do more than simply read it. When you are reading material for the first time, there are several things you should do:

1. *Learn the terminology.* You are taught new terms so that you will know what they mean and how to use them. When you come across a new term in the text, commit the new term to memory. How do you know when a new term is being introduced? Throughout this text, new terms are identified in the margins. When you see a new term and its definition in the margin, stop and learn the term before going on to the next section.
2. *Use your calculator to work through the examples.* When you come across an example, get your calculator and work the calculations i...

## Users Review

**From reader reviews:**

**Marcos Anderson:**

The book Introductory Electronic Devices and Circuits: Electron Flow Version (7th Edition) can give more knowledge and information about everything you want. Why then must we leave a good thing like a book Introductory Electronic Devices and Circuits: Electron Flow Version (7th Edition)? Wide variety you have a different opinion about reserve. But one aim in which book can give many information for us. It is absolutely right. Right now, try to closer with the book. Knowledge or details that you take for that, you may give for each other; you could share all of these. Book Introductory Electronic Devices and Circuits: Electron Flow Version (7th Edition) has simple shape however, you know: it has great and massive function for you. You can appear the enormous world by open and read a e-book. So it is very wonderful.

**Alex Jose:**

Reading can called imagination hangout, why? Because when you find yourself reading a book especially book entitled Introductory Electronic Devices and Circuits: Electron Flow Version (7th Edition) the mind will drift away trough every dimension, wandering in each aspect that maybe mysterious for but surely will end up your mind friends. Imaging each word written in a book then become one contact form conclusion

and explanation this maybe you never get prior to. The Introductory Electronic Devices and Circuits: Electron Flow Version (7th Edition) giving you one more experience more than blown away the mind but also giving you useful data for your better life on this era. So now let us show you the relaxing pattern the following is your body and mind will probably be pleased when you are finished examining it, like winning an activity. Do you want to try this extraordinary spending spare time activity?

**Ray Ortiz:**

Do you like reading a book? Confuse to looking for your chosen book? Or your book seemed to be rare? Why so many concern for the book? But almost any people feel that they enjoy intended for reading. Some people likes reading through, not only science book but additionally novel and Introductory Electronic Devices and Circuits: Electron Flow Version (7th Edition) as well as others sources were given know-how for you. After you know how the great a book, you feel want to read more and more. Science book was created for teacher as well as students especially. Those textbooks are helping them to increase their knowledge. In other case, beside science publication, any other book likes Introductory Electronic Devices and Circuits: Electron Flow Version (7th Edition) to make your spare time considerably more colorful. Many types of book like this one.

**Robert Olsen:**

As a college student exactly feel bored in order to reading. If their teacher requested them to go to the library or make summary for some book, they are complained. Just tiny students that has reading's heart and soul or real their passion. They just do what the instructor want, like asked to go to the library. They go to at this time there but nothing reading really. Any students feel that reading is not important, boring and also can't see colorful pictures on there. Yeah, it is to become complicated. Book is very important to suit your needs. As we know that on this age, many ways to get whatever we want. Likewise word says, ways to reach Chinese's country. So , this Introductory Electronic Devices and Circuits: Electron Flow Version (7th Edition) can make you experience more interested to read.

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