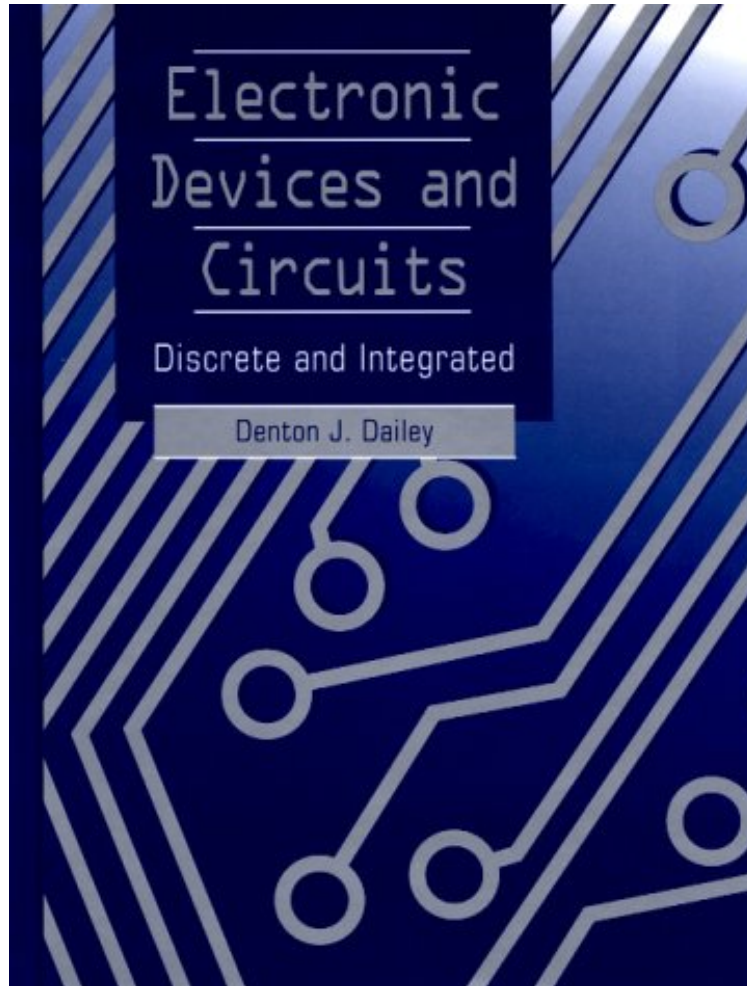


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Electronic Devices and Circuits: Discrete and Integrated

Denton J. Dailey

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book if you are refreshing your electronic memory or taking command of new projects and developing circuits of your own. 1 of 1 people found the following review helpful. excellent service, fast shipping, By Dongwook Moon The book was almost like new. I liked it. I am satisfied with the product. Thanks. 1 of 1 people found the following review helpful. This is an absolutely great book. By Christopher Katko I have never felt compelled enough to write a review for a book, so that should be your first clue to my seriousness about this book. I purchased it used, years ago, and it is clearly the most well-written, clearly described book on electronics I've read. I make no exaggeration when I tell you that I keep it next to my bed and enjoy reading before going to sleep. He tells you up front exactly what you should have known before starting this book, and goes over the abstract conceptuals, the hard math details, and lastly many points concerning practical matters. So you'll know how it works, how to compute it, and how often practicing engineers will leave out a specific calculation--and when they can't leave it out. I'm not an electrical engineer--I'm mechanical. But I'm starting my Ph.D. (with robots) and I've found this book to be a resource in expanding my skill set and usefulness as an engineer. I've been called on many times, specifically, for my cross-trained knowledge in electrical engineering. This book has helped me stand out from the competition. It's a great, informative, and dare I say fun, read. I would recommend it to anyone and everyone. Thanks for taking the time to read my comment, and have a great day.

For sophomore/junior-level courses in Electronic Devices, and Linear ICs. This introduction to electronic devices and circuits offers a balance between component orientation and system orientation and features an emphasis on device behavior and modeling. Multi-level in approach, it is mathematically accessible and provides comprehensive coverage--with many optional sections for greater depth and sophistication.

From the Inside Flap
PREFACE As stated in the title, this book is about the study of electronic devices and circuits. There is an excellent balance of coverage between discrete devices and integrated circuits (ICs), making this book suitable for use in courses that cover either or both of these areas. In general, there is more than enough material covered here for a two-course sequence covering discrete devices, amplifiers, oscillators, and linear ICs. This book is primarily intended for use by students in two- and four-year electronics and electrical engineering technology programs. Prerequisites for this text are basic knowledge of dc and ac circuit analysis techniques, including Ohm's law, Kirchhoff's laws, the superposition theorem, phasor algebra, and some trigonometry. The use of some calculus is unavoidable, especially when discussing differentiators and integrators; however, no formal calculus background is assumed. When necessary, the basic techniques and applications of differentiation and integration are presented in the text and they are explained in the most straightforward manner possible. It has been the author's experience that more often than not, even students who have never been exposed to calculus appreciate the insight that a brief encounter with derivatives and integrals provides. On the other hand, the book has been written so that the more mathematically advanced discussions can be omitted without loss of continuity. For example, the unit step function is a topic that has traditionally been ignored in devices and IC books. This is included here because it is such an important concept in later studies, and it is interesting and rather easy to understand. It is the author's opinion that students' classroom experience with these analytical tools is equivalent to use of equipment such as spectrum analyzers and logic analyzers in the lab. However, this topic can be omitted without loss of continuity. This flexibility allows the book to be used in a wide variety of programs. This also makes the book more useful as a reference for further study. The emphasis of this book is on device behavior and modeling. Because of the inherent nonlinearity of electronic devices, their study requires the student to think at a somewhat deeper level of abstraction, as compared to dc and ac circuit analysis. The presentation style used here should make this transition easier. Wherever possible, the emphasis is on the development of analysis equations using the basics: Ohm's law, Kirchhoff's laws, and the superposition theorem, of which Thevenin's theorem is a direct extension. Also, whenever possible, several alternative explanations of various topics are presented. This book is definitely not about the memorization of formulas, although some formulas are used so often that memorization is automatic. Because of the time constraints that instructors must deal with and because of practical book cost and space considerations, it is not possible to develop every topic in detail from first principles. However, this approach is taken as often as possible. The instructor may wish to deemphasize or even omit certain topics or sections that are less important, based on the emphasis of his or her program. For example, the coverage of zener regulators in Chapter 2 could be deemphasized, or perhaps deferred until later. Each chapter ends with a section on computer-aided circuit analysis. PSpice was chosen because it is the most widely used circuit analysis program in the world. A fully functional evaluation version is also available free from OrCAD. This is available on CD, or it can be downloaded from the OrCAD website at [orcad.com](http://www.orcad.com). The examples covered in these sections serve several purposes. First, they are primarily designed to reinforce, and are directly related to, the material covered in each associated chapter. Second, the computer analysis examples sometimes serve to demonstrate the limitations of the manual analysis approximations that are presented. Last, the computer-aided analysis sections allow easy access to more advanced topics such as frequency response in polar and rectangular forms, spectral analysis, transient response, and analog behavioral modeling. Computer-aided analysis was placed in separate sections within each chapter so that it is

very easy to find and can more easily be excluded, if so desired. The author welcomes suggestions for future revisions of this book. Recommendations regarding topic sequencing, errors and omissions, and material that should be deleted or inserted will be appreciated. Please feel free to send your comments to me at djdailey@altavista. What's in this Book? Chapters 1 and 2 cover diodes and diode applications. Chapter 1 concentrates on the use of diode modeling and the various levels of approximation that are applied in describing diode behavior. The concept of dynamic resistance is also introduced here. Significant coverage is given to zener diodes, photodiodes, and light-emitting diodes as well. Chapter 2 emphasizes rectifier and wave-shaping circuits. Chapter 3 introduces the bipolar junction transistor (BJT). The emphasis here is on the behavioral characteristics of BJTs rather than on device physics. The basic transistor parameters are covered, including β , I_{CBO} , leakage currents, breakdown voltages, and hybrid parameters. The Early voltage and base-spreading effects are also covered here. Chapter 4 covers all aspects of bipolar transistor biasing. This is presented strictly from a dc analysis standpoint. In the author's experience, coverage of signal-related topics at this stage tends to confuse many students. The objective here is to make the student comfortable using the basic circuit reduction techniques that allow complicated biasing arrangements to be redrawn in simpler, more familiar forms. Biasing arrangements that are more applicable to linear IC designs, including the current mirror, are also presented here. The dc load line is also covered in this chapter. Chapter 5 covers BJT small-signal amplifiers using r parameters. The basic common-emitter, common-collector, and common-base configurations are presented. Emphasis is placed on the development of the ac-equivalent circuit. Other topics in this chapter include ac load lines, output compliance, decibels, and the Darlington configuration. Field-effect transistors are covered in Chapters 6 and 7. The basic FET parameters and biasing arrangements are covered in Chapter 6, as well as a few applications such as analog switches, voltage-controlled resistance, and constant-current diodes. Chapter 7 covers the analysis of FET small-signal amplifiers. The relative advantages of FETs and BJTs are discussed. Differential amplifiers are the subject of Chapter 8. This chapter covers both the biasing and small-signal characteristics of differential amplifiers. The concepts of differential gain, commonmode gain, and common-mode rejection are presented here. This chapter provides a solid foundation for the later study of operational amplifiers. Multiple-stage amplifiers are covered in Chapter 9. This chapter serves to tie together much of the material covered in previous chapters, including class A BJT and FET amplifiers and differential amplifiers. Coverage of capacitively coupled and direct-coupled stages is also presented, along with the derivation of decibel gain. Chapter 10 covers power amplifiers and amplifier classifications (A, B, AB, and C). This is a direct extension of the previous chapter on multiple-stage amplifiers. Thermal analysis, overcurrent protection, and some tuned amplifier theory are presented in this chapter. Chapter 11 introduces the concept of negative feedback and its effects on amplifier characteristics. Some basic filter terminology, the concept of the Bode plot, the Miller effect, and transistor frequency limitations are covered as well. The emphasis here is on high-frequency operation, and coverage of the cascode amplifier follows directly from this perspective. Operational amplifiers are introduced in Chapter 12. The op-amp is first analyzed as an ideal gain block. Specifications of a sampling of commercial op-amps are presented and discussed as well. Nonideal characteristics of real op-amps, such as smallsignal bandwidth, slew rate and power bandwidth, CMRR, PSRR, and offset errors, are examined. Offset compensation techniques are discussed. Chapter 13 covers a variety of linear op-amp applications, which is a logical continuation of the previous chapter. Basic circuits and applications are analyzed for differential amplifiers, instrumentation amplifiers, V/I and I/V converters, bridged amplifiers, differentiators, and integrators. Brief introductions to differentiation and integration are presented, as well as the concept of the unit step function. These mathematical concepts are discussed primarily in the context of commonly occurring functions, including constant, linear, parabolic, sinusoidal, and exponential functions. Where possible, alternative analysis approaches are presented, such as the use of phasor algebra versus calculus when determining the Back CoverThis new text by Denton J. Dailey covers both discrete and integrated components. Among the many features that students will find helpful in understanding the material are the following: Concept icons in the margins signify that topical coverage relates to other fields and areas of electronics, such as communications, microprocessors, and digital electronics. These icons help the reader to answer the question, "Why is it important for me to learn this?" Key terms presented in each chapter are defined in the margins to reinforce students' understanding. Chapter objectives introduce each chapter and provide students with a roadmap of topics to be covered. Excerpt. Reprinted by permission. All rights reserved. PREFACE As stated in the title, this book is about the study of electronic devices and circuits. 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