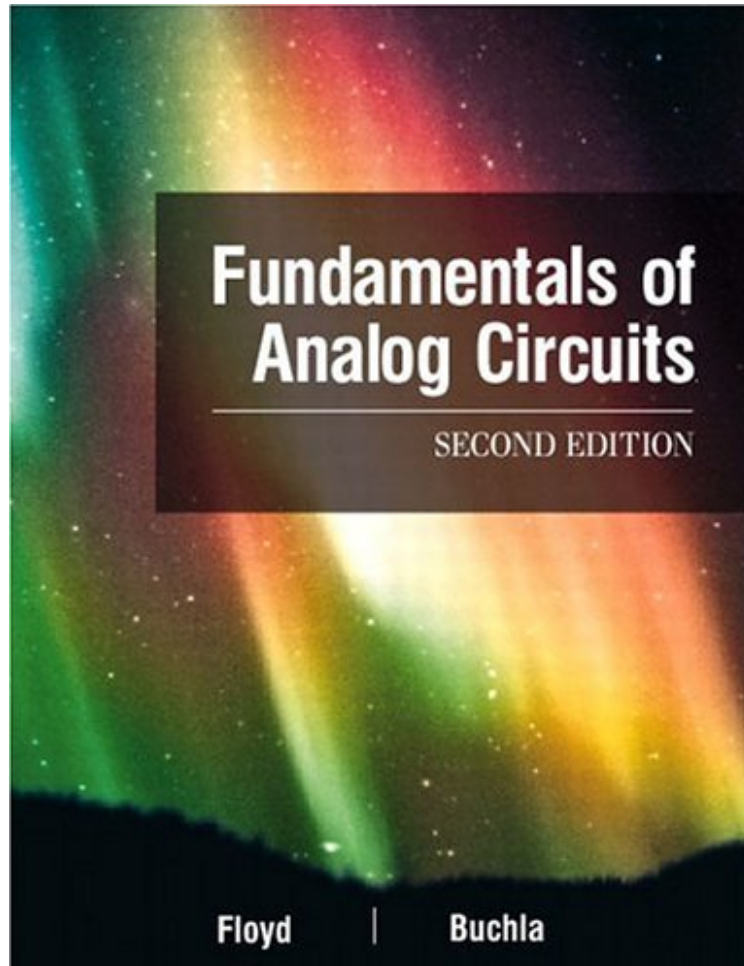


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Fundamentals of Analog Circuits (2nd Edition)

Thomas L. Floyd, David M. Buchla
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Thomas L. Floyd, David M. Buchla : Fundamentals of Analog Circuits (2nd Edition) before purchasing it in order to gage whether or not it would be worth my time, and all praised Fundamentals of Analog Circuits (2nd Edition):

0 of 0 people found the following review helpful. Great analog treatiseBy ti jediA very understandable, well written tome on analog design. highly recommend1 of 1 people found the following review helpful. In case you dont know it, this is a college textbook...By JKCso while thorough on what it covers, it assumes you know everything covered previously (and apparently that you kept the textbook from the previous course to refer to...). It also explains everything in terms of math, which is good for some yet bad for others. Page count listed above is accurate... *THUD*0 of 0 people found the following review helpful. Great bookBy WizbangFrom the few chapters I've read, this book does a good job explaining the fundamentals and some more in-depth discussion without over complicating the content. Would highly recommend it for someone looking to cover the basics! Especially if you can get a decent

used one like I did for ~\$5.00 shipped!!!

This comprehensive book meets the content requirements of most technical schools without hampering the reader with excessive detail. A strong emphasis on troubleshooting will help prepare the reader for work in the industry. This book introduces discrete device circuits and then delves more deeply into analog integrated circuits a topic that has more importance for today's technicians. For technician-level courses in analog circuits and those who are pursuing a career in electrical technology.

From the Back Cover Fundamentals of Analog Circuits, Second Edition, presents an introduction to discrete linear devices and circuits, followed by comprehensive coverage of operational amplifiers and other linear integrated circuits. This new edition has been expanded and improved to include up-to-date coverage of these topics in a format containing a wealth of features to enhance the learning process. The text opens with five chapters providing a fundamental discussion of basic concepts, diodes, transistors, and amplifiers. The following ten chapters focus on integrated circuit op-amps, active filters, oscillators, power supplies, special amplifiers, communications circuits, data conversion circuits, and measurement and control circuits. Extensive troubleshooting material and exercises appear throughout these chapters, and further practice and understanding can be achieved with the use of the CD-ROM described below. In addition, the following innovative features assist in making Fundamentals of Analog Circuits, Second Edition, the leading text in its area: Current in a circuit is indicated by a polarized meter symbol that allows the user to apply the direction of preference. Current meters show relative current magnitude in a circuit. Emphasis is on analog integrated circuits, but good coverage of discrete circuits is also included. Topics that are generally not found in other textbooks, such as RF amplifiers and transducers, are included. System applications with Troubleshooting exercises incorporate realistic printed circuit boards, and a related full-color insert section is included. A full set of ancillaries accompanies this book, including a Laboratory Manual (ISBN 0-13-060673-1). A CD-ROM (ISBN 0-13-060944-7) containing numerous circuits from the text in a locked version of Electronics Workbench Version 5 and MultiSim Version 6 is also available. The Companion Website, <http://www.prenhall.com/floyd>, contains practice test questions and other supportive material. Supplements available to instructors who are using this book for a course include an Instructor's Supplement CDROM (ISBN 0-13-060677-4), the Instructor's Manual (ISBN 0-13-060678-2), PowerPoint Transparencies (ISBN 0-13-060675-8), and the Prentice Hall Test Manager, a computerized test bank (ISBN 0-13-060676-6). WebCT (ISBN 0-13-062317-2), BlackBoard (ISBN 0-13-062316-4), and Course Compass (ISBN 0-13-065355-1) complete the package. Excerpt. Reprinted by permission. All rights reserved. Fundamentals of Analog Circuits, Second Edition, presents an introduction to discrete linear devices and circuits followed by a thorough coverage of operational amplifiers and other linear integrated circuits. Also, this textbook provides extensive troubleshooting and applications coverage. Applications are shown with a realistic printed circuit board format in the last section of each chapter. They include a Troubleshooter's Bench exercise that presents a troubleshooting problem with the system. In addition to the Troubleshooter's Bench, troubleshooting sections are found in many parts of the text. This second edition updates and improves coverage of the various operational amplifiers and other analog circuits introduced in the first edition. Each device was reviewed; older devices were replaced with newer ones, and a reference to the manufacturer's Internet site has been added to expedite finding additional information. In some cases, the explanation was streamlined or improved. For example, a brief discussion of triggering SCRs and triacs by microcontrollers was added in Chapter 15. Two new features of this text include identifying key terms and adding a Troubleshooter's Quiz. Key terms are presented in the chapter opener and highlighted in color in the text with a margin icon. The Troubleshooter's Quiz reinforces critical thinking and troubleshooting skills for circuits introduced in the chapter. The Troubleshooter's Quiz consists of 8 to 12 multiple-choice questions that require students to consider how a given fault will affect voltage, current, gain, and so forth (increase, decrease, no change). Answers to the Troubleshooter's Quiz are found at the end of each chapter. In addition, circuits have been prepared for many of the examples using Electronics Workbench/Multisim to enable changes or troubles to be investigated. Electronics Workbench/Multisim is a computer-simulation program that is useful for testing circuits and observing the effect of parameter changes or troubles with the circuit. It uses a graphical interface to place components on a "workbench" and simulated instruments to view the results. These circuits are available on CD-ROM (ISBN: 0-13-060944-7). Current in Fundamentals of Analog Circuits, Second Edition, is indicated by a meter notation rather than by directional arrows. This unique approach accomplishes two things. First, it eliminates the need to distinguish between conventional flow and electron flow because it indicates current direction by polarity signs, just as an actual ammeter does. Users can interpret current direction based on the meter polarity in accordance with their particular preference. Second, in addition to current direction, the meter notation provides relative magnitudes of the currents in a given circuit by observing the number of bars. Overview The first five chapters provide a fundamental coverage of basic concepts, diodes, transistors, and amplifiers. The last ten chapters focus on integrated circuit op-amps, active filters, oscillators, power supplies, special amplifiers, communications circuits, data conversion circuits, and measurement and control circuits. Discrete Devices and Circuits. The first part of the text consists of five chapters as follows: Chapter 1 presents

an introduction to analog electronics, analog signals, amplifiers, and troubleshooting. Chapter 2 covers diodes, rectifiers, and regulators. Chapter 3 introduces bipolar junction transistors and BJT amplifiers. Chapter 4 gives a basic treatment of field-effect transistors and FET amplifiers. Chapter 5 deals with multistage amplifiers, radio-frequency (RF) amplifiers, and power amplifiers. Analog Integrated Circuits. The second part of the text consists of ten chapters that cover analog integrated circuits as follows: Chapter 6 provides an introduction to operational amplifiers. Op-amp frequency response is covered in Chapter 7, and basic op-amp circuits (comparators, summing amplifiers, integrators, and differentiators) is the topic of Chapter 8. Active op-amp filters are covered in Chapter 9, and oscillators and timers are introduced in Chapter 10. Power supplies are covered in Chapter 11. Special amplifiers (instrumentation amplifiers, isolation amplifiers, operational transconductance amplifiers (OTAs), and log/antilog amplifiers) are introduced in Chapter 12. Communication circuits (AM and FM receivers, linear multipliers, mixers, and phase-locked loops) are studied in Chapter 13. Data conversion circuits such as analog switches, sample-and-hold circuits, digital-to-analog and analog-to-digital converters, and voltage-to-frequency and frequency-to-voltage converters are among the topics in Chapter 14. Finally, Chapter 15 covers various types of transducers and associated measurement circuits. Features Fundamentals of Analog Circuits, Second Edition, is innovative in four areas: Current in a circuit is indicated by a polarized meter symbol that allows the user to apply the direction of preference. Also, current meters show relative current magnitude in a circuit. Emphasis is on analog integrated circuits, but also there is a good coverage of discrete circuits. Topics that are generally not found in competing textbooks, such as RF amplifiers and transducers, are covered. System applications with Troubleshooter's Bench exercises incorporate realistic printed circuit boards, and a related full-color insert section is included. Other features are as follows: Extensive troubleshooting material, including new Troubleshooter's Quiz Extensive use of examples Practice exercise in each numbered example Standard component values Two-page chapter openers with introduction, section list, objectives, key terms, and system application preview Section openers with overview and objectives End-of-section review questions Glossary terms boldfaced in text Answers to practice exercises for examples, section review questions, self-test, and Troubleshooter's Quiz at end of chapter Minimal mathematics, with important equations numbered A summary, key formula list, glossary, multiple-choice self-test, Troubleshooter's Quiz, and section problems for each chapter Key terms in color and with a margin icon in each chapter End-of-book derivations, manufacturers' specifications sheets, and answers to odd-numbered problems References to manufacturers' home pages for integrated circuits Comprehensive end-of-book glossary that includes all the terms from the end-of-chapter glossaries Lab Exercises manual written by David Buchla Instructor's Resource Manual that includes transparency masters, System Application worksheets, and test item file Visit the companion website to this text at www.prenhall.com/floyd. Chapter Pedagogy Chapter Opener. Each chapter begins with a two-page spread. Section Opener and Section Questions. Each section within a chapter begins with an opening introduction and list of section objectives. Each section ends with a set of review questions that focus on key concepts. Answers to review questions are given at the end of the chapter. Key Terms. Certain terms are in color and are identified by a margin icon. These key terms, as well other bold terms, are defined in the end-of-chapter glossary and in the end-of-book glossary. Examples and Practice Exercises. Worked-out examples are used to illustrate and clarify topics covered in the text. At the end of every example and within the example box is a practice exercise that either reinforces the example or focuses on a related topic. Answers to the practice exercises are given at the end of the chapter. System Application. The last section of each chapter (except Chapter 1) is a system application of devices and circuits related to the chapter coverage. The Troubleshooter's Bench sections provide a series of activities with a practical slant to simulate "on-the-job" situations. These activities include relating a schematic to a realistic printed circuit board, making measurements, troubleshooting, and writing reports. Three selected system applications are related to the full-color insert as indicated by a special logo. Results are provided in the Instructor's Resource Manual. The system application is an optional feature which if omitted will not affect the coverage of any other topics. The variety of "systems" is intended to give students an appreciation for the wide range of applications for electronic devices and to provide motivation to learn the basic concepts of each chapter. The system application sections can be used as: A part of each chapter for the purpose of relating devices to a realistic application and for establishing a useful purpose for devices covered. All or selected activities can be assigned and discussed in class or turned in for a grade. A separate out-of-class assignment to be turned in for extra credit. An in-class activity to promote and stimulate discussion and interaction among students and between students and instructor. An illustration to help answer the question that many students have: "Why do I need to know this?" Chapter End Matter. A summary, key formula list, glossary, self-test, Troubleshooter's Quiz, and sectionalized problem sets are found at the end of each chapter. The answers to practice exercises for examples, section review questions, self-test, and Troubleshooter's Quiz are also provided. To the Student Any career training requires hard work, and electronics is no exception. The best way to learn new material is by reading, thinking, and doing. This text is designed to help you along the way by providing an overview and objectives for each section, numerous worked-out examples, practice exercises, and review questions with answers. Don't expect every concept to be crystal clear after a single reading. Read each section of the text carefully and think about what you have read. Work through the example problems step-by-step before trying the practice exercise that goes with the example.

Sometimes more than one reading of a section will be necessary. After each section, check your understanding by answering the section review questions, the chapter summary, glossary, and formula list. Take the multiple-choice self-test. Finally, work the problems at the end of the chapter. Check your answers to the self-test and the odd-numbered problems against those provided. Working problems is the most important way to check your comprehension and solidify concepts. One of the best ways to reinforce text material is through the actual construction of circuits in the laboratory. You will become a better troubleshooter as well if you "learn by doing." Circuit construction reinforces troubleshooting skills because you will find that many times a simple wiring error or other fault is accidentally introduced in your experiment. Making a circuit work correctly involves analysis of the circuit as well as logical thinking. The sort of thinking that goes into lab work is also simulated on Electronics Workbench/Multisim. Another way to develop skill in troubleshooting is to take the Troubleshooter's Quiz, located at the back of each chapter; answers are provided to check your understanding.

Milestones in Electronics Before you begin your study of analog circuits, let's briefly look at some of the important developments that led to electronics technology as we have today. The names of many of the early pioneers in electricity and electromagnetics still live on in terms of familiar units and quantities. Names such as Ohm, Ampere, Volta, Farad, Henry, Coulomb, Oersted, and Hertz are some of the better known examples. More widely known names such as Franklin and Edison are also significant in the history of electricity and electronics because of their tremendous contributions.

The Beginning of Electronics. Early experiments with electronics involved electric currents in vacuum tubes. Heinrich Geissler (1814-1879) removed most of the air from a glass tube and found that the tube glowed when there was current through it. Later, Sir William Crookes (1832-1919) found the current in vacuum tubes seemed to consist of particles. Thomas Edison (1847-1931) experimented with carbon filament bulbs with plates and discovered that there was a current from the hot filament to a positively charged plate. He patented the idea but never used it. Other early experimenters measured the properties of the particles that flowed in vacuum tubes. Sir Joseph Thompson (1856-1940) measured properties of these particles, later called electrons. Although wireless telegraphic communication dates back to 1844, electronics is basically a 20th century concept that began with the invention of the vacuum tube amplifier. An early vacuum tube that allowed current in only one direction was constructed by John A. Fleming in 1904. Called the Fleming valve, it was the forerunner of vacuum tube diodes. In 1907, Lee deForest added a grid to the vacuum tube. The new device, called the audiotron, could amplify a weak signal. By adding the control element, deForest ushered in the electronics revolution. It was with an improved version of his device that made transcontinental telephone service and radios possible. In 1912, a radio amateur in San Jose, California, was regularly broadcasting music! In 1921, the secretary of commerce, Herbert Hoover, issued the first license to a broadcast radio station; within two years over 600 licenses were issued. By the end of the 1920s radios were in many homes. A new type of radio, the superheterodyne radio, invented by Edwin Armstrong, solved problems with high-frequency communication. In 1923, Vladimir Zworykin, an American researcher, invented the first television picture tube, and in 1927 Philo T. Farnsworth applied for a patent for a complete television system. The 1930s saw many developments in radio, including metal tubes, automatic gain control, "midgit sets," directional antennas, and more. Also started in this decade was the development of the first electronic computers. Modern computers trace their origins to the work of John Atanasoff at Iowa State University. Beginning in 1937, he envisioned a binary machine that could do complex mathematical work. By 1939, he and graduate student Clifford Berry had constructed a binary machine called ABC, (for Atanasoff-Berry Computer) that used vacuum tubes for logic and condensers (capacitors) for memory. In 1939, the magnetron, a microwave oscillator, was invented in Britain by Henry Boot and John Randall. In the same year, the klystron microwave tube was invented in America by Russell and Sigurd Varian. During World War II, electronics developed rapidly. Radar and very high-frequency communication were made possible by the magnetron and klystron. Cathode ray tubes were improved for use in radar. Computer work continued during the war. By 1946, John von Neumann had developed the first stored program computer, the Eniac, at the University of Pennsylvania. The decade ended with one of the most important inventions ever, the transistor. **Solid-State Electronics.** The crystal detectors used in early radios were the forerunners of modern solid-state devices. However, the era of solid-state electronics began with the invention of the transistor in 1947 at Bell Labs. The inventors were Walter Brattain, John Bardeen, and William Shockley, shown in Figure P-6. PC (printed circuit) boards were introduced in 1947, the year the transistor was invented. Commercial manufacturing of transistors began in Allentown, Pennsylvania, in 1951. The most important invention of the 1950s was the integrated circuit. On September 12, 1958, Jack Kilby, at Texas Instruments, made the first integrated circuit, for which he was awarded a Nobel prize in the fall of 2000. This invention literally created the modern computer age and brought about sweeping changes in medicine, communication, manufacturing, and the entertainment industry. Many billions of "chips" as integrated circuits came to be called have since been manufactured. The 1960s saw the space race begin and spurred work on miniaturization and computers. The space race was the driving force behind the rapid changes in electronics that followed. The first successful "op-amp" was designed by Bob Widlar at Fairchild Semiconductor in 1965. Called the U A709, it was very successful but suffered from "latch-up" and other problems. Later, the most popular op-amp ever, the 741, was taking shape at Fairchild. This op-amp became the industry standard and influenced design of op-amps for years to come. Precursors to the Internet began in the 1960s with remote networked computers.

Systems were in place within Lawrence Livermore National Laboratory that connected over 100 terminals to a computer system (colorfully called the "Octopus system" and used by one of this text's authors). In an experiment in 1969 with very remote computers, an exchange took place between researchers at UCLA and Stanford. The UCLA group hoped to connect to a Stanford computer and began by typing the word "login" on its terminal. A separate telephone connection was set up and the following conversation occurred. The UCLA group asked over the phone, "Do you see the letter L?" "Yes, we see the L." The UCLA group typed an O. "Do you see the letter O?" "Yes, we see the O." The UCLA group typed a G. At this point the system crashed. Such was technology, but a revolution was in the making. By 1971, a new company that had been formed by a group from Fairchild introduced the first microprocessor. The company was Intel and the product was the 4004 chip, which had the same processing power as the Eniac computer. Later in that same year, Intel announced the first 8bit processor, the 8008. In 1975, the first personal computer was introduced by Altair, and Popular Science magazine featured it on the cover of the January, 1975, issue. The 1970s also saw the introduction of the pocket calculator and new developments in optical integrated circuits. By the 1980s, half of all U.S. homes were using cable hookups instead of television antennas. The reliability, speed, and miniaturization of electronics continued throughout the 1980s, including automated testing and calibrating of PC boards. The computer became a part of instrumentation and the virtual instrument was created. Computers became a standard tool on the workbench. The 1990s saw a widespread application of the Internet. In 1993, there were only 130 websites; by the start of the new century (in 2001) there were over 24 million. In the 1990s, companies scrambled to establish a home page and many of the early developments of radio broadcasting had parallels with the Internet. (The bean counters still want to know how it's going to make money!) The exchange of information and e-commerce fueled the tremendous economic growth of the 1990s. The Internet became especially important to scientists and engineers, becoming one of the most important scientific communication tools ever. In 1995, the FCC allocated spectrum space for a new service called Digital Audio Radio Service. Digital television standards were adopted in 1996 by the FCC for the nation's next generation of broadcast television. As the 20th century drew toward a close, historians could only breathe a sigh of relief. As one wag put it, "I'm all for new technology; but I wish they'd let the old ones wear out first." The 21st century dawned in January 2001 (although most people celebrated the new century the previous year, known as "Y2K"). The major technology story was the continued explosive growth of the Internet. Traffic on the Internet doubles every 100 days with no end in sight. The future of technology looks brighter than ever. Acknowledgments This textbook is the result of not only the authors' collaboration, but also the skills and efforts of all those at Prentice Hall who were involved in this project. We would particularly like to express our appreciation to Rex Davidson, Scott Sambucci, Kate Linsner, and Steve Helba. Lois Porter did another outstanding job of manuscript editing from beginning to end, and Jane Lopez and Steve Botts deserve our admiration for their work on the manuscript. Thanks also to Gary Snyder and Chuck Garbinski for their superb work in checking accuracy. We also appreciate feedback from various users; we have made several improvements as a result of these suggestions. Tom Floyd Dave Buchlu