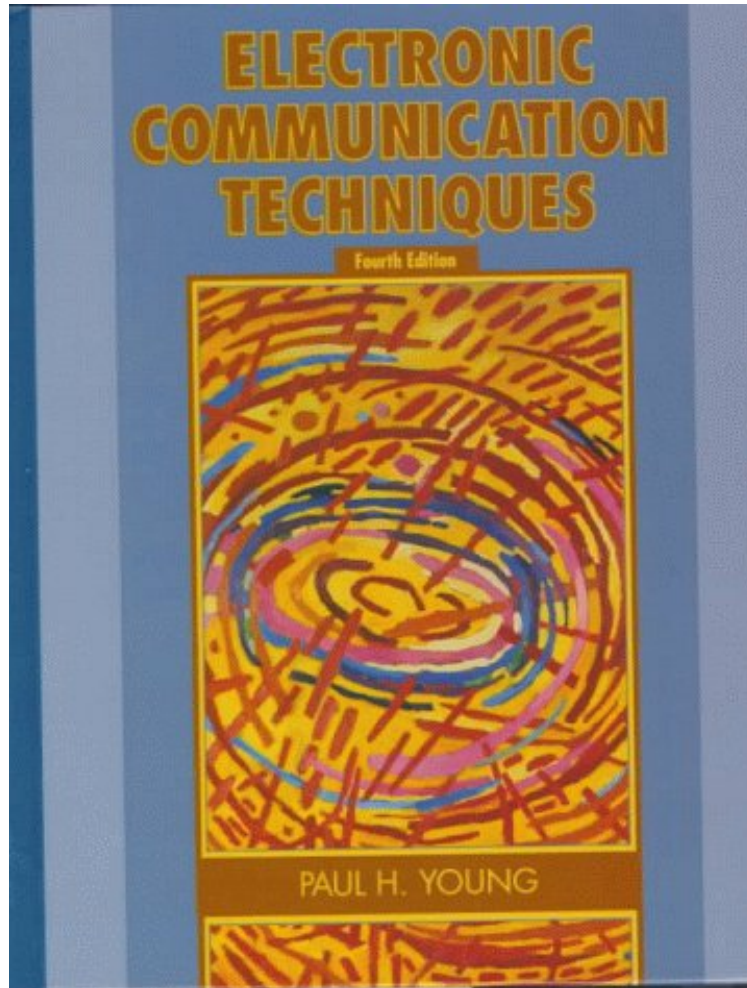


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For RF Communication Circuits and Communication Systems courses at the junior/senior undergraduate level. Helping students become successful designers of useful communications products, this easy-to-read, hands-on text provides a solid circuit design and analysis resource for communications electronic applications, introducing systems and circuits in a way that keeps students involved and active in the learning process. Grounded in sound theory and engineering principles, it uses algebra-based mathematics through calculus and a logical design-and-analysis approach, and now includes the very latest information on cellular and PCS systems, digital communications, integrated circuit transceivers, and more.

From the Publisher This edition introduces students to systems and circuits in a way that keeps them involved and learning. In *Electronic Communication Techniques, Third Edition*, solid theory and sound engineering principles are articulated through a conversational writing style, algebra-based mathematics through calculus, and a logical design-and-analysis approach...creating a practical "hands on" introduction that will help students become successful designers of useful communications products. From the Back Cover This conversational, hands-on guide provides a solid circuit design and analysis resource for communications electronic applications, helping users become successful designers of useful communications products. Providing solid coverage of theory and engineering principles, it uses algebra-based mathematics through calculus and a logical design-and-analysis approach, and now includes the very latest information on cellular and personal communication systems (PCS), digital communications, integrated circuit transceivers, and more. Provides a broad-based, real-world industry orientation by incorporating examples, standards and techniques from a number of different technology disciplines - including RF, microwave, optics, and digital transmission. Contains numerous derivations, examples, and problems, and provides computer analysis sections in every chapter to expose readers to the use of Spice, MicroCAP, and Touchstone software. Now offers a complete update on modern digital modulation and circuits for cellular and PCS - covering cell system structure and size requirements for propagation and interference, digital modulation efficiency and impairments, Nyquist filtering, I/Q modulators, MSK, multiple access techniques, and transceiver design. Also includes a handy new appendix on Abbreviations and Acronyms. Excerpt. Reprinted by permission. All rights reserved. *Electronic Communication Techniques, Fifth Edition*, is intended to bridge the gap between circuit design and the system concepts that predetermine circuit requirements in particular applications. The results of theoretical research are combined with engineering principles, design equations, charts, and tables for those of us who will design and produce hardware and software. The mathematics level is typical of that used by engineering practitioners, with calculus and transform techniques occasionally employed. Enough circuit detail and topical coverage have been included to provide material for two or even three courses in analog and digital communications technology, depending on the depth and pace desired. Use in a one-term course is also feasible, as is shown shortly. Any sequence of topics needed for a particular program may be selected. **NEW TO THIS EDITION** The main additions to the fifth edition, optical and cellular networks, are in Chapters 17 and 18 and include Internet basics. Dense wavelength-division multiplexing (DWDM) exploded when the International Telecommunications Union issued a grid of wavelengths for DWDM and coarse wavelength-division multiplexing (CWDM). Devices to implement DWDM, such as arrayed waveguide gratings, fiber Bragg gratings, and thin-film filters, are discussed. Digital and analog system applications of WDM, including digital transmission infrastructure for telephony with local exchange and intercarrier loops, local area networks, and digital loop carrier technology, are included. A new Internet section includes protocol basics, routers, switches, and add/drop multiplexers (electronic and optical). This transition into wide-area networks with optical switching, including multiprotocol label switching (MPLS) and generalized MPLS with all optical switching and crossconnects, is made possible by adding a label ahead of IP packet headers. Also, a new section on broadband analog DWDM updates the section on broadband RF signals on first-generation fiber optic CATV networking. Chapter 17 now includes Bluetooth technology with hardware and link connection, and packet management software aspects for personal area wireless interconnectivity among devices within a home/office environment. Also added is "Wi-Fi," an unlicensed 2.4-GHz, IEEE 802.11b wireless local-area network (WLAN) standard with very low transmission power for short-range wireless LANs in public places such as waiting rooms, coffee shops, convention sites, and airports. Pedagogical components are improved with the addition of Chapter Previews. Also, the Abbreviations and Acronyms table has been updated. **ORGANIZATION OF THIS TEXT** Chapter 1 provides a review of tuned circuits and amplifiers for continuity with previous courses. There is more material on lownoise amplifiers and saturation characteristics in

Chapter 7. RF oscillators (Chapter 2) are considered as stable tuned amplifiers with well-defined feedback arrangements. Oscillators also provide the carrier signal for subsequent modulation in transmitters. A section on phase noise has been included in Chapter 17. Development of the frequency domain and the signal spectra of common periodic waveforms in Chapter 3 include Fourier transforms and Fourier series analysis. Noise fundamentals in Chapter 4 include a typical treatment enhanced with circuit noise power analysis using shot and thermal noise spectral density techniques. System noise figure and temperature are included. A detailed derivation of the equation for the system noise figure is presented in Chapter 5, which also introduces communication systems and amplitude modulation. Other aspects of noise and signal-to-noise ratio are introduced in the context of their effects on analog receivers in Chapter 5 and in their statistical nature as it affects transmission error in pulsed and digital data systems in Chapter 13. The continuous information signals discussion in Chapter 5 along with the digital information signal discussion in Chapter 12 constitute a broad overview of information theory from a nonstatistical perspective. Chapters 1, 2, 6, 7, and 9 provide most of the analog circuit analysis and design component of the textbook. The circuit details may be skipped by those who have time only for system-level concepts. Chapters 5, 8, 17, and the first five sections of Chapter 7 provide coverage for receiver systems and AM/AM-sideband communication. Mixer circuit design is presented in Chapter 7, along with a section on Butterworth and Chebyshev bandpass filter circuit design. As is the case with all the chapters that include circuit analysis and design, computer circuit simulations and design program examples are included. Chapter 8 completes the system-level discussion of amplitude modulation begun in Chapter 5. In addition to various sideband systems, Chapter 8 presents frequency-division multiplex and quadrature-multiplex concepts, including Costas loop analysis for suppressed carrier demodulation. The voltage-controlled oscillator, including integrated circuit VCOs, and the phase detector of Chapter 9 are combined to produce the phase-locked loop of Chapter 10. Phase-locked loop applications in communication and instrumentation are so widespread that a full chapter is devoted to them. The most successful approach is to present PLL basics (through Section 10-2) in an introductory communication course and then discuss loop dynamics with FSK and synthesizers in a later course. AM, FM, and PM basics are the same today as they have always been, but they will be implemented in digital form as ASK, OOK, FSK, PSK, and compound modulations such as QAM. Chapters 11, 12, 13, 17, and 18 address these topics, with Chapters 11 and 12 forming the conceptual bridge for the applications in Chapters 13, 17, and 18. Sampling theory and intersymbol interference concepts are presented in Chapters 11 and 17, as are the information theory concepts and digital signal power and quantization noise equations in Chapter 12. Chapter 13 presents data communication in a noise environment with techniques for detecting and correcting data errors, material on codes, a table of some standard data modems, a short introduction to queuing and basic digital network engineering relationships, OSI, ISDN, and a section on ATM. Chapters 14 and 15 cover transmission lines and waveguides, antennas, and propagation. Stub-tuner design and complex-impedance S-parameter 2-port problems with simulations provide a good lead-in to a section on microstrip amplifier design. Another Touchstone simulation confirms the microstrip design results. Chapter 16, which covers television, has been broadened beyond North American/Japanese NTSC with the inclusion of PAL and SECAM format standards. The section on digital video compression and motion-compensation techniques also discusses HDTV including transmission formats and techniques both for broadcast (4- and 16-VSB) and 64-QAM for CATV. Chapter 17 presents circuit and systems technology for digital radio, space transmission systems with applications for QPSK, and multilevel QAM. The increasingly important areas of the satellite and personal communication system (PCS) multiple-access techniques of FDMA, TDMA, and CDMA, as well as spread-spectrum system concepts, are also included in Chapter 17. There is new material on cellular/PCS systems and circuits. Fiber-optic communication-link applications are included in Chapter 18. This chapter includes ultralinear DFB lasers and thermal electric coolers, Mach-Zehnder external modulators, fiber amplifiers, and dispersion-shifted fiber technology. A new section enhances analog fiberoptic link analysis, including OMI, laser, and carrier-to-noise performance. An expansion of fiber-optic LANs, with dual counter-rotating rings for digital optical networking, SONET networks, and hybrid fiber/coax networking have been added. A one-semester survey of communication transmission techniques might use the following outline (by chapter numbers): 4, Elements of Noise; 5, Modulation and Amplitude-Modulation Systems; 6, Transmitter Circuits (Section 6-5); 7, Receiver Circuits (through Section 7-3); 8, Sideband Systems; 9, Frequency and Phase Modulation; 10, Phase-Locked Loops (through Section 10-2); 11, Pulse and Digital Modulation; 12, Digital Communication Concepts (through Section 12-7); 13, Data Communication Techniques; 14, Transmission Lines and Waveguides; 15, Antennas and Radiowave Propagation; 17, Digital Radio and Space Communication (Section 17-1, Modems and Digital Modulation Techniques); and 18, Fiber-Optic Communication. A one-year, two-course sequence could be structured as follows: Course 1, Electronic Communications (4 hours, with one hour for lab work): Chapters 1 through 10 Course 2, Digital, Satellite, and Optical Communications (4 hours): Chapters 11 through 18 If there is one course devoted to systems and a second course devoted to circuits, you might need to skip around a little more (moving Chapters 6, 7, and 9 to the second course, for example). This book was written to allow just such separation, if desired, by keeping system and circuit coverage in balance.