the very short treatment of field-ion microscopy, the authors omit the important atom probe field-ion technique. In chapter 11, the effect of depolarization between adsorbates is mentioned in the section on work function and adsorption, but the authors do not give a formula or reference to how one actually includes depolarization in calculating the work-function change during adsorption. And in the short section in chapter 3 on the use of commercial getters for depositing alkali metals, the authors have an incorrect understanding of how those getters are constructed.

Despite some of its drawbacks, I like the book because of its clarity and compactness. Each chapter presents a few exercises that will serve well in the classroom. In conjunction with other recent books on the subject, *Surface Science* is a good resource for the student who is introduced to the field for the first time.

John T. Yates Jr
University of Pittsburgh
Pittsburgh, Pennsylvania

An Analog Electronics Companion: Basic Circuit Design for Engineers and Scientists

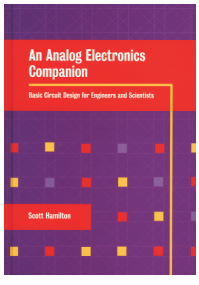
Scott Hamilton
Cambridge U. Press, New York, 2003. $120.00 (649 pp.).
ISBN 0-521-79838-8, CD-ROM

The term "electronics" covers a lot of territory, but we should know what to expect in *An Analog Electronics Companion: Basic Circuit Design for Engineers and Scientists* from its subtitle. Because electronic circuits and their associated active and passive circuit elements are so often designed for instrumentation and measurement applications, it seems reasonable to evaluate the book on the basis of its contributions to those fields. In my view, Scott Hamilton, a retired senior lecturer in electronic circuit design and physics at the University of Manchester in England, has successfully identified a niche where his efforts and expertise should be welcomed.

Many books covering electronic circuit design exist today, but my personal favorite is *The Art of Electronics* by Paul Horowitz and Winfield Hill. The first edition, published in 1980 at around 700 pages, was followed by a more than 1000-page second edition published in 1989 (Cambridge U. Press). The book's popularity was well deserved; it combined a how-to approach with a wealth of valuable information. Hamilton's volume turns out to be a worthy successor and a useful complement to Horowitz and Hill's book, which has less material on digital circuit design.

In *An Analog Electronics Companion*, Hamilton makes it relatively simple and convenient for the reader to appreciate how simulation programs can contribute to the design of electronic circuits. In part 5 of the book, he devotes more than 200 pages to computer-aided analog modeling using circuit applications from SPICE (simulation program with integrated circuit emphasis). The SPICE "flavor" software used by Hamilton is PSpice 8 from MicroSim, a company since acquired by Cadence Design Systems based in San Jose, California. Cadence made arrangements to provide with the book a CD-ROM containing a student demonstration version of PSpice. That version of the software will enable most, if not all, of the circuits to run.

For each of the 26 circuit applications, Hamilton provides the SPICE simulation circuit reference, along with other references and additional sources. For example, section 5.15, titled "Lumped or distributed?", addresses the problem of when to consider a short length of coaxial cable as a lumped element or as a transmission line. In one of the section's three figures, Hamilton provides the SPICE reference and suggests one book, one journal article, and two manuals as additional sources. Not surprisingly, the book features common circuit applications, such as operational amplifier circuits, integrators, power supplies, and frequency-independent phase shifters. However, some less expected examples are also covered, such as baluns and high-frequency transformers, photomultiplier gating circuits, transatlantic telegraph cables, and chaos. In all cases, the designer can easily make modifications to the trial circuits, all accomplished without breadboards and a soldering iron. He or she can then observe the predicted results in voltage and current, gain and frequency response, noise and distortion, and other parameters.



Because Hamilton believes that "some knowledge of the physical basis and origins of electronics" is useful, he includes chapters on mathematical techniques, physics, an introduction to circuit mathematics, and circuit elements (covering resistors, capacitors, transformers, transistors, and diodes). Hamilton has achieved his goal of making his book "a companion and a reminder of many things and techniques you may not know or have forgotten."

For those whose curiosity was piqued as mine was by the spelling of "analog" in a book published in England by a British author, Hamilton gives the rationale behind it: "In deference to market forces and to the entreaties of the publisher, I have used 'analog' rather than 'analogue' both in the title and the text. My apologies to any readers affronted by this craven act."

At the beginning of each of the book's more than 80 sections, Hamilton has supplied a quotation. Some of the quotations are directly relevant and some he "simply liked." My two favorites are from Niels Bohr, "Prediction is very hard . . . particularly of the future," and from Mark Twain, "First get your facts; and then you can distort them at your leisure." Aside from some circuit waveforms, readers should find few, if any, distortions in the book, and they can partake of a plethora of well-crafted instruction, seasoned with just the right amount of levity. I enthusiastically endorse the book, particularly to those who have never benefited from the simulation experience.

Lawrence Rubin
Massachusetts Institute of Technology
Cambridge

Galaxies and the Cosmic Frontier

William H. Waller and Paul W. Hodge
Harvard U. Press, Cambridge, MA, 2003. $29.95 (317 pp.).
ISBN 0-674-01079-5

The layperson interested in an up-to-date overview of galaxies, their relation to our own Milky Way, and their importance in the large-scale structure and evolution of the universe has little information available. Thus the publication of *Galaxies and the Cosmic Frontier* by two well-known galaxy experts is a welcome, timely event that fills a niche in the popular literature. William Waller is a research associate professor of physics and astronomy at Tufts University and co-founder of NASA's New England Space Science Initiative in Education. Paul Hodge, a seasoned author, is professor emeritus of astronomy at the University of Wash-