makes use of extensive references; the bibliography in the present volume contains over 800 entries.

The early chapters classify photographic methods of high-speed analysis and provide a compendium of techniques for producing the requisite short-duration light flashes. The sections describing operation of nanosecond sparks along with typical photographic setups are particularly useful. The discussions of discharge lamp design and of the system aspects of selecting and designing flash tubes will be of use to any reader concerned with optical flash photography or the optical pumping of pulsed laser media.

Later chapters describe spark light sources that have special requirements and are used to visualize high-speed phenomena such as high-speed flows, propagating cracks and moving particles. One new development described involves superradiant light pulses from electron-beam-pumped disk semiconductors. The book concludes with a long chapter on laser pulse technology.

Although the book deals with many important topics, I was disappointed to find it quite difficult to use. The overall organization is extremely jumbled. Discussions of applications (extracted from referenced journal articles) are mixed with discussions of light-pulse technology. Furthermore, material is often repeated in various sections. Finally, the references to lasers are severely outdated, with very few articles carrying dates later than 1974.

R. T. Brown
United Technologies Research Center
East Hartford, Connecticut

Ultrasonic Imaging

P. Greguss
224 pp. Focal, New York, 1980. $15.00

The intensive research on ultrasonic imaging techniques during the last ten years has yielded important and extensive applications to medical imaging of the body and, to a more limited extent, to nondestructive testing of materials. Recently, acoustic microscopy has led to new ways of observing cell structure, defects in semiconductor devices and surface structure of metals.

Since the only books so far available on acoustic imaging have been proceedings of research conferences, such as the series of books on acoustical imaging and holography published by Plenum Press, there has been a great need for a good book on ultrasonic imaging. This new book by Pal Greguss is an attempt to fill this need. It is a nonmathematical treatment that reviews almost every possible method of acoustic imaging on which research has been carried out in the last 20 years. Greguss is an early contributor to the subject of acoustic holography and has been active and well known in the field.

The book is a useful one for those wishing to obtain some insight into the variety of acoustic imaging techniques that have been tried. Its fault is that it does not sort the material adequately. While readers are introduced to the many different techniques of acoustic microscopy that have been suggested, they are not given much insight into which are successful—and will be important in the future—and which have gone nowhere. This same comment applies to many of the other acoustic imaging techniques described in this book. Although it has a 1980 publication date and appears to use references as recent as 1977, the book already seems somewhat out-of-date because this field is rapidly changing. Most of the acoustic-microscope and medical images shown and, to some extent, the techniques described appear to be several years out-of-date and refer to very early work. One gets the impression that the author has been less in touch with the field recently than he had been earlier.

Simple explanations are given successfully in the book, but where Greguss attempts to use mathematical explanations, such as in his introductory material on the influence of noise, the theory, even to someone well versed in the field, might be rather difficult to follow.

I would recommend this book to provide a quick summary of the many acoustical imaging techniques that have been developed, an excellent source of references and an easily read introduction to the field. It will be useful to people in industry working on acoustic imaging as well as to students (although it would not be a suitable teaching text and is not intended for that purpose).

Gordon S. Kino
Stanford University

Principles of Superconductive Devices and Circuits

T. Van Duzer, C. W. Turner
369 pp. Elsevier, New York, 1981. $32.50

Research in applied superconductivity at the present time divides nicely into two mutually exclusive categories: electronics and high-field superconductors. This book gives an introduction to both. Its first five chapters discuss the basic physics of superconductivity and the engineering applications in superconducting electronics; the remaining three chapters concern the theory of superconductors in high magnetic fields. A look at the table of contents confirms that the coverage is much more thorough on the electronics side than it is for high-field superconductors. For example, while Van Duzer and Turner do not go into superconducting magnets, rotating machinery or power transmission lines—the end products of high-field superconductivity—they do include considerable discussion of the corresponding products of superconducting electronics, such as magnetometers and logic and memory circuits.

The first three chapters introduce the microscopic theory of superconductivity and the electrodynamics of superconductors in weak fields. The main chapter on the microscopic theory is one of the highlights of the book. The authors have devoted considerable effort to constructing a conceptual model as they develop the mathematics. It may well be the best introductory discussion of this topic in print.

The core of the book dicusses circuit applications and Josephson tunnel junctions, the latter largely at the phenomenological level, which befits an introductory text. More advanced topics—the details of junction fabrication, the microscopic theory of junctions and nonequilibrium phenomena, whose coverage would have significantly enlarged the book—are absent. One topic, however, that should have been included is the critical current density of junctions and its importance to the dynamical properties of junctions.

The authors provide good introductions to microwave detection and mixing and to parametric interactions, as well as a rather thorough description of SQUIDs, both as magnetometers and as devices in integrated circuits. The coverage of circuits for logic and memory is quite up-to-date and goes well beyond that of the only competing book in English, L. Solymar's *Superconductive Tunneling and Applications* (1972). (Because Solymar does give a more thorough discussion of several topics, that book is not made entirely obsolete by the new one.)

The remaining chapters follow a fairly traditional development of high-field superconductivity, with only a few exceptions. Stressing the importance of magnetization in superconductivity is a useful addition in Chapter 6. Only in a final section in Chapter 7 do the authors develop condensation amplitudes across junctions, the only real link to the first four chapters. Flux penetration in thin films plays a similar role in Chapter 8, on type-II superconductivity. The addition of these last three chapters broadens the scope of basic theory in the text. For readers with a practical orientation, however, it leaves a thirst for a discussion of applications.

Van Duzer and Turner have done a commendable job in providing an intro-