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The Practical Application of World Energy. Such books, though perhaps not as numerically complete as the books under review, were not only suitable for laymen but offered comprehensive insights that enabled them to help engineers overcome their occasional professional narrowness and short-term views. We still await such definitive books of this generation. With their aid, we—layman and technologist together—may plan both the tactics and strategy for our future life in a world of diminishing fossil energy sources but (one hopes) increasing renewable possibilities.

ALVIN M. SAPERSTEIN
Wayne State University
Detroit, Mich.

(currently visiting Science Faculty
The Open University
Milton Keynes, England)

Microwave Circuits and Amplifiers: The Physics of Transmission Lines at High and Very High Frequencies, Vol. 2

P. Grivet
749 pp. Academic, London, 1976. \$79.50

The increasing spectrum congestion at conventional frequencies impels the modern communications engineer to shift his projects into the microwave range. Also, the current trend to replace analog equipment by digital devices calls for the development of circuitry at frequencies that lie several orders of magnitude above the original working range of the analog system. As the author points out in his preface, beyond about 500 MHz even the long-familiar idea of "connection" loses all its simplicity, giving way to the "connection quadrupole" formed by a transmission line or a waveguide.

As a consequence, a marked revival of interest in specialized applications of microwave techniques has recently become evident. To find effective solutions to the multifaceted problems encountered, a thorough knowledge of the theory and practice of transmission lines is obviously required. Although extensive literature has accumulated on this subject over the course of years, one can observe that relatively few authors add new points to the basic approach outlined in a few classic works. Especially in modern applications the designer is often forced to synthesize his approach from a tedious study of a large number of different sources. The book by Pierre Grivet constitutes a rare exception in this respect. Based on the most advanced theory, it reviews in a clear and concise manner the subject of transmission lines as applied to the microwave circuits and amplifiers of today's practice.

After an introductory discussion of line parameters, the circle diagram and the physics of pure and partial standing-wave operation, the author examines available methods for calculating the properties of various quadrupoles. Grivet then analyzes problems associated with power transfer, amplification and matching. He concludes by treating multipoles, line coupling and directional couplers, with the help of extended matrix techniques.

The text offers the reader a clear insight into problems associated with the design of transmission lines and with their application in power transfer, amplification and measuring techniques. By outlining a problem and showing its analytical solution, the author finds in many instances an optimal coupling between theory and practice. Here is a book distinguished not only by a new approach to conventional subject matter in the application of the latest tools of mathematical physics, but which in many cases thoroughly discusses problems hardly touched by other authors. The scientist and the experienced engineer, as well as the interested student, will certainly find it a very useful reference.

F. E. BORGNIS
Institut für Hochfrequenztechnik
Eidgenössische Technische Hochschule
Zürich, Switzerland

book notes

Principles of Laser Plasmas. B. Bekefi, ed. 695 pp. Wiley, New York, 1976. \$35.00

Electrical discharges of the lasing medium are the central concern of this volume. After an introductory survey section the book's eleven contributors get down to business with four chapters on particle collisions, two on distribution functions and instabilities, three on laser systems (including excimer lasers and the electrically- and e-beam-pumped molecular lasers), two on laser interactions with gases and one on plasma diagnostics. The presentation is largely nonmathematical, and the book is intended as a reference tool for research physicists, chemists and electrical engineers.

Cosmology Now. L. John, ed. 168 pp. Taplinger, New York, 1976. \$10.95

Ten prominent astronomers, all but one of them theoreticians, contributed to this book, which seeks to explain at a non-technical and nonmathematical level what is known and conjectured in the field of cosmology; the ten are Hermann Bondi, Donald Lynden-Bell, William H. McCrea, Jayant V. Narlikar, John Peacock, Roger Penrose, Martin Rees, Martin Ryle, Dennis Sciama and John Taylor. One

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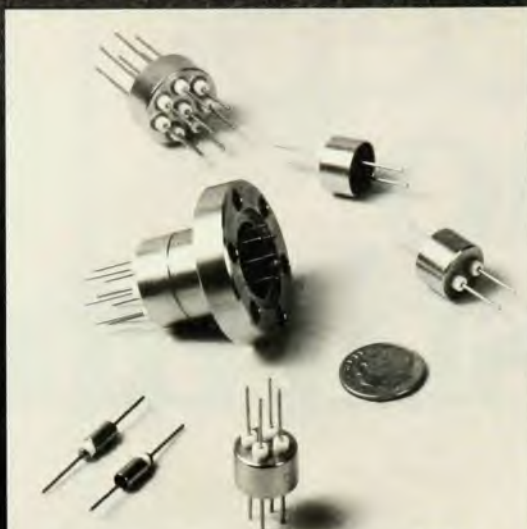
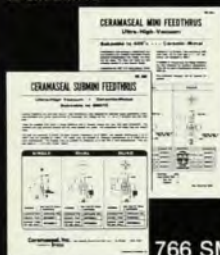
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Queisser, H. J., Ed.

Presents a selection of invited papers which demonstrate the close interactions between the various branches of the solid state sciences. Solid laser sources as well as novel optical characterization techniques are covered here. German Physical Society, Munster, 1975.

0-08-019894-5

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British Association for Crystal Growth Newsletter

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TUNNELLING AND NEGATIVE RESISTANCE PHENOMENA IN SEMICONDUCTORS

Roy, D. K.

Provides a thorough discussion of the phenomenon of tunnelling and its application to devices like tunnel diodes, backward diodes, zener diodes and MIS and MOS structures. Includes chapters on circuitry, switching devices and quantum mechanical tunnelling.

0-08-021044-9

225 pp.

1977

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expects to find, and does, such topics as cosmological models, sources of cosmic power, black holes and galaxy formation. Narlikar offers a defense of the steady-state model, a theory neither widely accepted nor decently laid to rest; he contends that attempts to account for such fundamental concepts as "the arrow of time" favor steady-state theory over big-bang cosmologies. The big bang appears implicitly accepted by most of the contributors, however. For them, infinite expansion or eventual collapse of the universe are the choices available. Taylor comments on the validity of questions about the ultimate sources of the primeval particles of Creation, or if alien minds (perhaps even nonphysical) would perceive a radically different physical universe. Readers of popular-astronomy texts would probably have no trouble with this material.

Bicycling Science: Ergonomics and Mechanics. F. R. Whitt, D. G. Wilson. 247 pp. MIT, Cambridge, 1976. \$4.95

Frank R. Whitt and David G. Wilson laud the modern bicycle, in their dedication, as "the simplest, quietest, most efficient and least lethal of modern vehicles." Friends of the bicycle will read with interest their observations on such topics as whether one should walk or pedal up hills, while physical scientists and engineers should find this volume a handy compendium of data in this technical area. The first of the book's three parts, "Human Power," deals with power requirements for locomotion, the ergonomics of human power generation and various considerations associated with man-powered machinery in general. In the second part, "Some Bicycle Physics," the authors discuss at some length wind resistance and rolling resistance; the operations of braking, steering and balancing; mechanical friction, and construction materials. The future of man-powered vehicles and some of the more exotic forms of cycling—through the air, along railroad tracks and on top of water, ice and snow—are the subjects of a brief third part of the volume. This paperbound edition represents a substantial saving over the clothbound 1974 edition at \$12.95.

—FCB

new books

Particles, Nuclei and High-Energy Physics

Introduction à L'Étude des Accélérateurs de Particules: Physique Atomique, Physique Nucléaire, Physique des Hautes Énergies, a L'Usage des Ingénieurs, Vol. 2. R. R. Warnecke. 1137 pp. Masson, Paris, 1976. 260.00 F