

Space Radio Communication. Symp. Proc. (Paris, Sept. 1961). G. M. Brown, ed. 630 pp. American Elsevier, New York, 1962. \$25.00. *Reviewed by Hans J. Hagger, Albiswerk, Zürich, Switzerland.*

UNDER the auspices of the International Scientific Radio Union (U.R.S.I.), a symposium on space radio communication was held from September 18 to 22, 1961, in Paris. The 37 papers presented at the meeting now appear in book form. General problems of satellite communication are discussed in two survey papers. Five papers deal with launching, control in space, and tracking of satellites. The topics of frequency allocation, interference with other space-borne and earth-bound systems, and radio frequency propagation in the atmosphere and in space, were discussed with regard to earth-bound communication systems. Two sessions were devoted to electronic equipment used in the satellite and included reliability of the components, environmental tests, energy production on board the vehicle, and amplification of signals, particularly in connection with antenna problems for ground stations. Modulation systems were discussed with regard to the relationship between equipment costs caused by more complex modulation systems and the provision of a greater number of communication channels. Specific communication systems, i.e., reflection at orbiting dipoles, random-orbit satellites, 24-hour satellites, etc., as well as problems of transmission time and economic aspects were reviewed.

By the publication of these symposium papers, which are well edited and nicely presented by G. M. Brown, it is not intended to give a solution to every communication satellite problem, nor to show what can be done technically and scientifically, but rather to present the main problems of satellite communication. The book will be helpful to everyone interested in the work done in this field.

Cosmic Rays. By A. W. Wolfendale. 222 pp. Philosophical Library, New York, 1963. \$10.00. *Reviewed by M. W. Friedlander, Washington University.*

FAR too much space would be needed to itemize the more important omissions, shortcomings, and even errors of this disappointing book. Its probable readers, undergraduates and nonspecialists, will emerge from this pedestrian treatment of an exciting subject with no proper appreciation of the relative importance of its various parts, having covered 150-odd sections in the 222 pages. Further, the text suffers greatly from uncritical editing and too many pointless diagrams. The twelve half-tone plates contribute to the book only in raising the price. There is every sign of a hastily prepared manuscript, yet the book was written in 1960 but did not appear until 1963. Even numerical values for the neutron lifetime (p. 157 and Table 19, p. 211) and the parsec (Fig. 82) are incorrectly given. Time after time, a discussion fails to give physical insight or completely omits important points. Some definitions, as they are stated in the text, are wrong.

What purpose is there in publishing such a book? Perhaps it fills some need as a catalog of the many facets of cosmic-ray research, but at what a price! In that respect, it should be pointed out that the book is published in England by George Newnes Ltd. and retails for about \$7. The difference between this and the price in the United States is considerably more than the postage involved. For those who insist upon buying it, reference to *Nature* will reveal the addresses of some booksellers in England.

Engineering Applications of Random Function Theory and Probability. John L. Bogdanoff and Frank Kozin, eds. Symp. Proc. (Purdue Univ., Nov. 1960). 421 pp. Wiley, New York, 1963. \$8.75. *Reviewed by Thomas Kailath, Stanford University.*

PERHAPS the most exhilarating way to begin a symposium on noise theory is with a talk by Mark Kac. In this one, he discusses the problem of finding the mean square distance between the zeros of an RLC Gaussian noise process. In typical fashion he brings a variety of ideas and techniques to bear on the problem and enlivens the discussion with various asides and comments. Nine other papers are included in this interesting volume. Few people would be knowledgeable in all the areas represented here—reliability studies, aerodynamic noise, safety analysis, Wiener filtering, etc. But the papers have been written with this in mind. They provide interesting and useful insights into how probabilistic techniques can be applied to a wide range of engineering problems. One of the most fascinating papers is by E. W. Montroll and is called *Theory and Observations of the Dynamics and Statistics of Traffic on an Open Road*. Most of us would feel that traffic problems are more a part of the fields of psychology and social relations than of mathematics and physics. Montroll's paper is an excellent illustration of how such a "nonphysical" problem can be studied by translating various assumptions about the acceleration pattern of a single car and about laws of car-following into mathematical form. As Montroll points out, this paper shows "that the physicist or mathematician who occasionally wants to free himself from the grooves into which the standard subject matter of the science has squeezed him might, with some entertainment, examine nonphysical processes with the same spirit that the natural philosopher examined the physical world a hundred years ago." The papers by Murphy and Freudenthal are in somewhat the same vein.

Murphy relates the life-testing problem to that of finding the first passage time probability for the "stress path" of a system to lead into a failure state. Freudenthal sets up probabilistic models for structures that enable safety factors to be chosen with regard to specified probabilities of failure. The other papers in this volume are in a more conventional mathematical framework. Siegert discusses the problem of finding the probability densities of various nonlinear functionals of Gaussian Markov random processes. Kalman presents