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background in the subject, who need and want an excellent exposition of more than the trivial aspects of modern electronics, and who need an understanding of the principles and functions of their apparatus, this is indeed *the* book.

Basic Astronautics. By Frederick I. Ordway, III, James Patrick Gardner, Mitchell R. Sharpe, Jr. 587 pp. Prentice-Hall, Inc., Englewood Cliffs, N. J., 1962. \$16.00. *Reviewed by Jacques E. Romain, General Dynamics/Fort Worth.*

INITIALY my reaction to this book was negative. It seemed to include a little of everything, an exhaustive treatment of nothing, and in places looked like a picture book. However, I soon understood the authors' point, namely, that "astronautics" is not just another name for applied celestial mechanics, but a blend of pure science, engineering, and medicine, the ultimate goal of which is "to put man into a new environment". The wide scope of astronautics is demonstrated by an elementary presentation of the problems that must be faced, the main lines of approach to these problems, and the principles of the solution—when a solution is available. And yet this simple-looking program furnishes ample material for 587 pages crammed with facts, figures, graphs, and pictures.

The book is divided into three parts: space science (ranging from the principal characteristics of the members of the solar system through "astrogeology" to space environment), space engineering (vehicles inside as well as outside an atmosphere), and space medicine (physiological and psychological factors, hazards, and training). Each chapter includes review questions and an impressive number of references, from the elementary to the advanced level. The relationships between the different topics are clearly displayed. The subject index has been prepared with particular care, and, although a few errors have crept into the book, they are for the most part minor.

The book provides a sound basis for putting into the proper perspective the various fields that contribute to astronautics and for reading specialized textbooks in these fields. It may be especially helpful to the reader who wishes to acquire a broad but elementary knowledge of the multiple facets of astronautics, and it will undoubtedly be useful as well to the specialist in one of the fields involved in astronautics who wishes to gather essential data about neighboring fields.

Physical Properties of Polymers. By F. Bueche. 354 pp. Interscience Division, John Wiley & Sons, Inc., New York, 1962. \$9.50. *Reviewed by Herbert Leaderman, National Bureau of Standards.*

THE physics of high polymers is concerned with the morphology of and molecular motion in condensed systems containing long semiflexible molecules. An ideal polymer chain, by virtue of free rotation under conditions where Brownian motion can exist, is characterized by a randomly kinked shape, and the structure



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of such a system can be described by statistical concepts only. The same remarks apply when the random structure is "frozen in". Under certain circumstances, ordered structures associated with crystallinity can be formed. Real polymer chains are characterized by the existence of potentials hindering free rotation, and finally, the migration of a segment of a polymer chain can be considered as governed by secondary forces acting upon it by neighboring atoms or alternatively by details of the local structure.

The morphology of and molecular mobility in a polymer under given circumstances are governed by the long flexible-chain property of the molecule and to a greater or less extent by either or both of the other properties. In the case of certain phenomena, the flexible long-chain property plays a relatively minor role, and the property is very similar to that observed in crystals, glasses, and liquids of low molecular weight. High-polymer physics thus arises naturally from the physics of materials of low molecular weight.

During the past few years, there has been a great commercial development of high-polymeric materials; their industrial value arises principally through their physical and primarily mechanical properties. There has thus appeared the need for an introductory book dealing with the physical properties of polymeric systems as related to molecular structure. Professor Bueche's book is written with this purpose in mind. The physical phenomena are discussed fully in terms of molecular theory as outlined above; this is presented in some detail and is based to a great extent upon the author's own extensive contributions. At the same time, the reader is made aware of the gaps which exist between the predictions of the theory and the results of experiment. Alternative theoretical treatments and interpretations of the data are discussed. This book, together with the reference material, could serve as a useful introduction for the research worker, while the book by itself should be of great value to a student who wishes simply to obtain an understanding of the field.

Theory of Probability (3rd ed.). By Harold Jeffreys. 447 pp. Oxford Univ. Press, New York, 1961. \$13.45. Reviewed by R. Bruce Lindsay, Brown University.

PRIMITIVE and intuitive notions, admittedly necessary for the construction of physical theories and the understanding of physical phenomena, have ever been a source of philosophical difficulty. The notion of probability is a good illustration. It is agreed on all sides that we cannot dispense with it in physics or indeed in science as a whole. Yet the endeavor to provide definitions of it which could serve as a reasonable basis for its use has led to endless argument on the part of many well-known mathematicians, physicists, and philosophers. Sir Harold Jeffreys first presented his point of view in detail in 1939, in the first edition of the book, the third edition of which is being reviewed here. He is a very distinguished geophysicist