

mental details relevant to the growth of crystals, etc., as well as discussions of catalytic effects and more ordinary electronic properties.

As in the case of previous members of this series, this volume can be wholeheartedly recommended for inclusion in any collection of reference works on solid-state physics and chemistry.

Space Technology. Edited by Howard S. Seifert. 1172 pp. John Wiley and Sons, Inc., New York, 1959. \$22.50. *Reviewed by Stanley S. Ballard, University of Florida.*

SCIENTISTS have come to accept, during the past few years, an additional and entirely novel meaning for the word "space". Thus it now seems quite sensible for a book to be entitled *Space Technology*, whereas just four or five years ago such a title would have been puzzling indeed.

This weighty text resulted from a lecture series given in the Engineering Extension Division of the University of California at Los Angeles first in 1957, at the instigation of a group of scientists and engineers at Space Technology Laboratories (previously a division of Ramo-Wooldridge). The course was subsequently repeated, at several locations in California, so that it has been taken by well over four thousand students. Its subject matter has reached many thousand additional persons through television broadcasts and kinescope film. It was a highly analytical course, presented on the graduate level, and a brief examination of the book will indicate that mathematics was not spared in most of the treatments given by the 38 lecturers, who have now become contributing authors to the textbook.

The subject of space technology is discussed in five broad categories. The first is flight dynamics, which includes terrestrial, satellite, lunar, and planetary trajectories and the problem of re-entry into the atmosphere. The second category is propulsion and structures, and covers the fundamentals of nozzle flow; liquid-propellant, solid-propellant, and nuclear engines; thermonuclear devices; and a discussion of structural analysis and design. In the next section, the subjects of communication, guidance, and control are discussed from the point of view of their feasibility, the information theory involved, and the synthesis of radio and inertial techniques; the new subjects of midcourse and terminal guidance are included. Next, "man in space" is treated in relation to his physical environment, his medical problems, his performance under stress, and the design of his space cabin. Fifth and finally, the applications of space technology are discussed, particularly the use of satellites for research in space physics and the long-term future developments of space research that may be anticipated. An appendix gives, for the possible use of the earnest reader, the one hundred and two multiple-choice questions from the final examination for the UCLA course, and the correct answers.

In view of the identity of the authors, all of whom

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There will be a book exhibit at the Spring Meeting, located in the Florentine Foyer, Sheraton Park Hotel. The hours are 9 a.m. to 5:30 p.m., April 25, 26, 27; 9 a.m. to 2 p.m., April 28. All of the leading publishers will be on hand and everyone is cordially invited to visit.

have earned and received recognition in the technical fields of their specialties, one can properly expect this to be a highly authoritative treatment of this vital new part of engineering and physics. It is refreshing to see that so much information on missiles and their propulsion and guidance has now emerged from the classified literature and is readily available to the engineers and other applied scientists who need it. Persons interested in ballistics and flight dynamics, in the propulsion of space vehicles, in their guidance and in the problems of communicating between space vehicles and the earth, and finally in problems of putting man into space and of using space vehicles scientifically—each of these persons will profit by having a copy of this excellent volume close at hand.

Elements of Solid State Theory. By Gregory H. Wannier. 270 pp. Cambridge U. Press, New York, 1959. \$6.50. Reviewed by A. Maradudin, *Institute for Fluid Dynamics and Applied Mathematics, University of Maryland.*

At a time when almost every topic in solid-state physics is the subject of a separate book or comprehensive review article, the appearance of a new book which purports to survey solid-state physics perhaps requires some justification. How does it present standard material from a different point of view, and what does it say that has not already been said in earlier books? Fortunately this little book, written by a man who has made notable contributions to several branches of solid-state physics, provides a demonstration of how both of these aims may be realized. A comparison of the first chapter, on crystallography (in which, for example, the theory of two-dimensional Bravais lattices is developed from a purely formal mathematical point of view), with the equally fine but more pictorial treatment of the same subject in Kittel provides a good illustration of how the former aim is achieved. The chapters on lattice dynamics and cooperative phenomena are perhaps the most sophisticated to be found in any book not devoted exclusively to these subjects, both from the standpoint of the topics discussed and the level of the discussion. Indeed, the same remark can be made about the treatments of most of the remaining topics in this book: x-ray diffraction by crystals, the behavior of electrons in a periodic potential, the theory of semiconductors, electron transport processes, and the theory of cohesion. This general excellence, however, is not achieved without some sacrifices, which are represented either by the complete omission of certain topics, or by the brevity of the discussions of other topics, which, however, never become perfunctory. For example, there is no discussion of the more technological aspects of semiconductor theory, such as semiconductor devices, and the theory of ionic crystals receives only brief mention. However, since these and other topics are well covered in other books, the result of their neglect here is a gain in the excellence of the