

Book Reviews

An Introduction to On-Line Computers. By W. W. Black. Gordon and Breach Publishers (1971). 449 pp. \$18.00 pre-paid.

Dr. Black's book is a unique contribution to the literature of computers. Written in a plain down-to-earth style, this book is a highly successful attempt to tell how things really are with computers. I was particularly taken with the simplicity of the book's format: the pages are reproduced directly from typewritten copy and the drawings are generally freehand. This unsophisticated presentation seems quite as clear to me as the slickest product of the publisher's art. Unfortunately, the scanting of frills extended into the editing and proofreading phase. There are many crudities in writing which should have been corrected. The author's style, however, is generally straightforward and devoid of computer jargon; most readers should find it easy to overlook the occasional lapses.

The book is divided into four major sections. In the first, a general survey of the subject is presented. The author says that on-line computers are often defined as computers which control a device, a process, or an experiment. Other descriptions have been given, but he finds them too confining; he prefers to think of such computers as simply versatile tools whose utility is limited only by our ingenuity. On-line computers are characteristically used in particular situations—traffic light control, airline reservations, hospital patient monitoring, and so on—where immediate response is of prime importance. Besides this specialization of use, such computers are contrasted with general purpose central-facility computers by their smaller size and cost and their mobility. Test applications and trends are briefly discussed and conjectures and proposals on future lines of development are outlined. Three particular needs are noted: standardization of interfaces, that is, of the ways in which peripheral equipment is linked to the computer; simplification of programming by programming language improvement; and reduction of the need for programming by improvements in hardware. A chapter on number systems, conversion from one base to another, and arithmetic procedures follows. The second section, "On-Line Computer Fundamentals," starts out with a general description of an on-line computer system from the user standpoint. The next three chapters discuss programming, editing, assembling, and de-bugging, with practical illustrations taken from PDP-8 programming. The section concludes with a lengthy chapter on computer organization, describing how logic is carried out by circuitry. Boolean algebra, flip-flops, computer register, input-output operations and the like are discussed. The third section of the book, "On-Line Computer Utilization," discusses the various peripheral devices which may be used with the computer. Teletypes, paper tape, magnetic tape, disks, drums, oscilloscopes, printers, and plotters are briefly discussed with illustrations of use. More programming ex-

amples are given. The final section of the book covers the problems of choosing computer systems and, briefly, conversational languages.

There has been an endless making of many books about computers in recent years and all of the material above can be found in the mountain of literature which already exists. What is different about this book is its common-sense approach, the numerous suggestions, illustrations, and advice borne out of day-to-day experience. Despite its flaws in writing style, it is well worth reading.

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About the Reviewer: Melvin L. Tobias has been in the Reactor Division of Oak Ridge National Laboratory since 1950. He has been concerned with heat transfer research, the measurement of physical properties of reactor materials, reactor analysis, and the development of neutron diffusion and cross-section preparation codes. Currently, he is working on the neutronics aspects of fusion reactor technology.

Dissociation in Heavy Particle Collisions. By G. W. McClure and J. M. Peek. John Wiley and Sons, Inc. (1972). 198 pp. \$13.95.

Dissociation in Heavy Particle Collisions was written as one of a series to critically review data in specialized topics of heavy particle atomic and molecular collisions. In their preface the authors note that the book "is intended to aid scientists, engineers, and students who require information on the dissociation of molecules induced by collision with other 'heavy' particles, including atoms, molecules, and ions. It is an index to the scientific literature and a guide to the understanding and evaluation of the literature rather than a data compilation." These remarks quite accurately represent the book, and the authors have done a commendable job in meeting their goals.

One half of the relatively short monograph consists of tables which give a thorough index to the dissociation literature. Thus, Chap. 4 contains a large table indexing the experimental literature by projectile species, target species, energy range, observed dissociation products, measurement classification, and data classification; the table also contains page numbers and figure or table numbers where the data are located in the original papers. The theoretical literature is also indexed in tables with convenient classifications by collision partners, dissociative modes, and final states. These papers are also

classified by the theory used and the further subsidiary approximations employed. The tables are carefully captioned and explained, thus making them easy to use; they will indeed be of great service to those requiring information on dissociation in heavy particle collisions.

Of equal or greater value, the remainder of the book provides the "guide to the understanding and evaluation" of the large number of papers referred to. Chapter 2 develops a concise conceptual framework upon which thought and discussion of dissociation experiments can be built. The value of this chapter should extend past those interested only in dissociative collisions and should be of help to anyone planning or evaluating scattering experiments. Chapter 3 is directly concerned with dissociation and describes in rather brief terms the various experimental methods used.

Measurements without a means to evaluate measurement accuracy are in many ways meaningless. Communication of measurements without the attendant clear communication of the evaluation of accuracy is likewise meaningless. The authors' frustration in this matter shows clearly in Chap. 5 where major sources of systematic error in dissociation measurements are itemized and discussed. There the case is well made that principles leading to more careful assessment of uncertainty and (more importantly) better communication of the means and extent of uncertainty evaluation "need to be reemphasized in the interest of higher quality scientific work." The chapter constitutes a carefully considered and perceptive exposition of errors which arise in dissociation measurements and thus provides a comprehensive footing for those needing to evaluate specific data or to plan new measurements.

One might wish that the authors had applied their evaluation criteria of Chap. 5 to the data so thoroughly indexed in Chap. 4. Such is not the case. Ambiguities attendant in communicating such an evaluation, coupled with the large amount of extra space and labor needed for this task, apparently dissuaded them from this.

In a similar way, the authors did not include the data on dissociation in their work. The qualifying discussion needed to present the data clearly was apparently so great in most cases that captions for the figures became prohibitively long and complex.

Although it has taken some time to change point of view, this reviewer now believes the authors made the best choice in the above omissions. The book serves its stated function quite effectively as is.

Theoretical balance is added to the book in the lucid and brief discussion of theoretical methods employed in dissociative collisions and in the previously mentioned tables relating to theoretical papers. Thus, Chap. 7 is presented in a way that is readable and informative to the experimentalist; yet its structured and organized presentation, along with the index to the literature, should make it of real use to the theoretician as well. This chapter is written with good physical feeling, and it is communicated well.

One other feature deserves comment. The authors have communicated with the bulk of original authors of dissociation papers; updating and qualifying remarks obtained in this fashion are contained in Appendix I. Many such comments are found to be quite substantive, and this appendix should be useful.

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About the Reviewer: Gordon H. Dunn, a physicist for the National Bureau of Standards, is a Fellow of the Joint Institute for Laboratory Astrophysics and a lecturer in the Department of Physics and Astrophysics at the University of Colorado. His research has been in the field of atomic and molecular collisions, and a number of his papers have dealt with dissociative collisions of electrons and photons with molecules and molecular ions. He received his PhD in physics at the University of Washington in 1961, took an NRC Postdoctoral Research Associateship at NBS in Washington in 1961, and went to Boulder to help form the JILA in 1962.

Nuclear Power Plant Systems and Equipment. By Kenneth C. Lish. Industrial Press, Inc., New York (1972). \$17.50.

My overall assessment of this book is that it is an informative presentation and collection of system and equipment design definition for nuclear power plants. The information content is similar to General Description documents usually provided by nuclear system suppliers, but it is unique in combining the BWR, PWR, and HTGR descriptions on a level of basic understanding. For the most part, the material presented is technical facts and appears to be generally accurate.

The author has pointed out that the material is qualitative not quantitative, but there is a considerable amount of specific information and data, such as plant ratings, fuel bundle design parameters, and equipment and system numbers, that obviously will eventually become out of date. This may only be of concern for the user who needs these specifics. An example of this point is that the information presented on the BWR systems represents the product line offered prior to 1972. It is unfortunate that the author or contributors of information did not keep the content somewhat more general so that the presentation would not so readily become obsolete.

My impression is that the author has been careful not to emphasize any one reactor concept over another, although the manner in which the HTGR is presented might lead readers to the erroneous conclusion that this reactor concept has evolved to a similar state of development as have the BWR and the PWR. It was noted that presentation of more reactor design details in the subsequent chapters is obviously limiting with respect to the HTGR.

In general, I considered the balance of content good, considering the wide scope of presentation. I would have liked to see more attention given to the instrumentation presentation as covered in Chap. 15.

The text does contain certain notable errors. Within Chap. 5 on containment, the TVA Browns Ferry station is erroneously referred to as having an ice condenser-type containment, when obviously this should be TVA's Sequoia station. In Chap. 3 on boiling water reactors, the text states that the primary function of the recirculation loop is reactor control rather than cooling. This statement is incorrect in that the primary function is reactor cooling although the reactor load following function is controlled within the recirculation loop system. In covering the radioactive waste handling systems, the author has in different text locations referred to the effluent system as "near zero release," "as low as practicable," and "zero release concept." This area has been very carefully treated and reviewed as part of the AEC "As Low As Practicable" public hearing, with indications that "zero release" references are neither a practical nor necessary objective and should not be confused with a reasonable "as low as practicable" design objective.