flux, many of these omissions are understandable. However, the complete absence of at least two important PL/I statements (LOCATE and REVERT) and of numerous minor but important techniques, (e.g., indexing a structure BY NAME), prevent the reader from fully appreciating the power of the PL/I language.

The organization of the material, based upon the elaboration of a few basic programs to incorporate more advanced features, is highly commendable. It is far superior to the obviously contrived and trivial examples often used in textbooks to illustrate programming techniques. The exercises are adequate to illustrate and reinforce the major points of the book, and the answers provided seem to be correct and complete.

There is a conspicuous lack of the usual technical appendices (the only one provided is the PL/I character set). This is unfortunate since one would appreciate at least a list of legal statements and their formats. This is especially vital since several statements are never mentioned, or, if they are, they are not included in the index. Presumably, the reader is at the mercy of the IBM-provided language specification or Mr. Weinberg's promised "second volume" which "is contemplated for the time when the most advanced features of the language are more firmly specified." Perhaps this volume will continue in the excellent style of the first, and will provide a reasonably complete introduction to PL/I. In the meantime, there are several other texts on the market, notably Frank Bates and Mary Douglas, *Programming Language/One*, Prentice-Hall, Inc., Englewood Cliffs, N. J., 1967, which seems better fare for both the novice and the experienced programmer.

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31 [12].—GUENTHER HINTZE, *Fundamentals of Digital Machine Computing*, Springer-Verlag, New York, 1966, ix + 225 pp., 24 cm. Price $6.40.

As pointed out in the preface, this book is "the outgrowth of class notes developed over several years for a basic course on digital computers. . . ". The approach is nearer that of the computer designer than that of the programmer, starting with the representation of numbers, and progressing through logical design, instruction codes, and assembly language to an introduction to automatic programming. The book is somewhat dated, showing the computer family tree ending at the IBM 7094 and the CDC 3600, and the most recent reference being the revised Algol report of January 1963. It contains a number of generalizations which may have been reasonably accurate several years ago, but which appear very curious in the light of recent developments. For example, the sentence "Typical timing figures for presently used circuits, coordinating pulses and voltage levels, are pulse width .25 microseconds, response time for flip-flop approximately 1.5 microseconds, and pulse intervals 2 microseconds" is in no way consistent with commercially available packages which are more than 10 times as fast, and machines like the CDC 6600 using flip-flops which switch in 20 nanoseconds.

The personal preference of this reviewer is for course material which contains factual information about machines or programs to which the student has access, supplemented by a more general text if one is available. This book is in the category of general texts and is quite readable, but the material will need careful updating by the instructor.

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32 [12, 13.05].—ALFRED M. BORK, *Fortran for Physics*, Addison-Wesley Publishing Co., Reading, Mass., 1967, viii + 85 pp. 23 cm. Price $1.95 paperbound.

This rather thin (85 pages) booklet is devoted to the physicist who has had no exposure to the mysteries of computer programming. In particular, the author addresses himself to classical mechanics. Indeed, the first three chapters are devoted to the subject of classical mechanics to the complete exclusion of Fortran. By this time the reader is left wondering whether Fortran *is* Physics. However, in Chapter 4 the reader is presented with an IBM 1620 Fortran II program which, regrettably, requires a substantial textbook on Fortran II to understand it.

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33 [13.05].—JOHANN JAKOB BURCKHARDT, *Die Bewegungsgruppen der Kristallographie*, Birkhäuser Verlag, Basel, Switzerland, 1966, 209 pp., 25 cm. Price F 37.50.

There are very few readable, carefully developed derivations of crystallographic space groups available. This book is one of them. From the few known derivations of space groups, the author selects one which he has helped to develop. This derivation relies heavily on the concept of an arithmetic crystal class (which is to be distinguished from the more common geometric crystal class, or point group), and on the Frobenius congruences. The development is such as to require a minimum of mathematical background (even the required linear algebra is developed in the text). The theoretical development is accompanied by many examples, pictures, and tables.

This second edition does not differ markedly from the first, although several sections have been rewritten.

The author defines a point lattice L to be a subset of a Euclidean space R^ν which spans R^ν, which is closed under subtraction, and which has the property that there exists a positive, real number ϵ such that $x, y \in L \Rightarrow ||x - y|| > \epsilon$. A symmetry of a point lattice $L \subset R^\nu$ is then a function $f: R^\nu \to R^\nu$ such that $f(L) \subset L$, and $f(x) = Ax + a$, where A is a real $\nu \times \nu$ orthogonal matrix, and a is a real $\nu \times 1$ column matrix. The author develops some properties of lattices, and proceeds to define and develop properties of crystal classes, geometric and arithmetic crystal classes, and space groups. A few of the results obtained can be summarized in the following table.