

70[Z].—KARL NICKEL, *ALGOL Praktikum. Eine Einführung in das Programmieren*, Verlag G. Braun, Karlsruhe, W. Germany, 1964, vii + 220 pp. + separately bound "ALGOL-Wörterbuch" of 52 pp., 24 cm. Price DM 56.

If there was one thing that a numerical analyst acquired twenty years ago, it was a feeling for numerical calculation. For hours every day he observed such things as the propagation of rounding errors, the loss of accuracy due to cancellation, and from time to time the collapse of a badly formulated computational problem. Since the advent of electronic computers large numbers of people have become involved in numerical computation who have become increasingly out of touch with the elements of the subject; this has resulted in a growing inability to appreciate the value of competently produced programs, and is the cause of an extensive misuse of computers. Of textbooks on computing methods there have been more than enough, nor in recent times has there been any lack of literature on computers and languages for their instruction, but there has arisen no book specifically designed to impart to the student some of the awareness of what goes on in numerical processes that he would formerly have gained by experience. As the years have gone by and the dependence of the engineering and physical sciences on digital computation has increased, the need for such a book has become critical. In Professor Nickel's *Algol Practical: An Introduction to Programming* an attempt has been made to meet this need.

It is for the most part a collection of forty carefully contrived examples designed to illustrate the course of a numerical computation: these (particularly those that end in total failure; for, as the author remarks, more is often to be learned from things that go wrong than otherwise) are most instructive. Each problem is analyzed, the necessary numerical method is discussed, a block diagram is constructed, an ALGOL program is given, and finally some numerical results are displayed. There is an extensive introductory section dealing with the correct appreciation of what is being required from the calculation, and the need for formulating a computational problem correctly. This book is not an introduction to ALGOL: this language is used as a pedagogic weapon. It is presumed that the student will pick up what he wants to know as he goes along; in cases of uncertainty a detachable ALGOL dictionary is available. The writing is lively throughout and informed by an emphatic German wit.

If one may presume to offer adverse criticisms they are these: first, there is the usual run of typographical errors—an inverted letter on p. 26, three open brackets on p. 190, where by implication there should be seven, a wrong formula on p. 166, and so on. More seriously, since, whether the author likes it or not, his important book will be read with interest by numerical analysts throughout the world, he might have spared them a thought. It would not appear to be a matter of general concern that a particular problem took a certain length of time to run on the Z-22, though indications to this effect occur throughout the book: furthermore the Z-22 has been programmed in such a way as to print out numbers to nine decimal figures and work with slightly less. Thus, for example, the arguments 0.8, 0.5 and -0.7 occur in the text as  $8.00000001_{10} - 1$ ,  $5.00000002_{10} - 1$  and  $-6.99999999_{10} - 1$ . It would not seem too much trouble to have generalized the writing procedures so as to have permitted the rounding off of the above and similar numbers. Admittedly the programs would not then have conformed to the ALCOR conventions, but

these, at least for the purposes of this book, need not have been regarded as Holy Writ. Lastly, although the programs and numerical results are printed in colour, and quite clearly enormous trouble has been taken in preparation, in offering a book of 220 pages at DM 56 (i.e., at least \$14.00 in the United States) the publishers have come very near pricing the book clean out of the student's market.

It is clear that Professor Nickel has initiated a new *genre* in works on numerical analysis: his book should be read by anyone who is, or proposes to be in any way, associated with numerical computations, and studied thoroughly by any person intending to specialize in the subject.

PETER WYNN

71[Z].—GORDON RAISBECK, *Information Theory, an Introduction for Scientists and Engineers*, The M. I. T. Press, Cambridge, Mass., 1964, x + 105 pp., 21 cm. Price \$4.00.

*Information Theory, an Introduction for Scientists and Engineers* discusses the fundamental ideas of Information Theory and their applications to signal transmission and detection. It is addressed to the scientist or engineer with no specialized knowledge of Information Theory, but with some facility in mathematics. The liberal use of mathematics enables the author to include a great deal of substance. It is not, however, overloaded with mathematical detail and reads quite well.

The first chapter treats the problem of assigning a quantitative measure of "information." The second and third chapters are addressed to the noiseless and noisy coding problems, respectively, including Shannon's fundamental theorems on noiseless and noisy coding. The last two chapters discuss detection problems. The book concludes with a descriptive bibliography for the benefit of those who wish to do further reading on this subject.

AARON D. WYNER

Bell Telephone Laboratories  
Murray Hill, New Jersey