Summing it up, we might say that this book essentially makes a case for more and stronger education in applied and numerical mathematics, education which must include the direct and intensive use of computers and modern computing methods. In fact, in his paper Sir Graham Sutton makes a statement which might almost be said to capsule the general tone of the entire conference:

"It is sometimes said that the applied mathematician has not the care for rigor that characterizes the work of the pure mathematician. To some extent this is true, but it is not an excuse for mediocrity or slapdash methods. In many ways the computer is a dangerous instrument, and there is every need for the best brains in its use. It is up to the teachers to see that this need is met." Indeed, and that is not just a British problem!

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63[Z].—ROBERT S. LEDLEY, *Programming and Utilizing Digital Computers*, McGraw-Hill Book Company, Inc., New York, 1962, xxi + 568 p., 23 cm. Price $12.50.

There is a long list of books on the current market which provide an introduction to computer programming and the application of computers. These books proceed along a variety of lines: in addition to those concerned with programming one specific computer, there are those which introduce the details of programming from a more general viewpoint by discussing a fictitious machine. Still others deal with a specific area of computer applications and discuss programming problems in connection with these applications. This particular book by R. S. Ledley contains elements of all of these types, and yet it is fundamentally different from all of them in a number of ways. Two very striking aspects are a well-written introduction to automatic programming, including a chapter each on ALGOL and COBOL, and the almost startlingly far-ranging list of topics discussed in the book.

In his introduction the author specifies his aims as follows: "This book was written as a college text in programming digital computers; it can be used on various levels, ranging from sophomore to first year graduate. This book is intended to fill the great need for an up-to-date, comprehensive text to provide an introduction to the many aspects of the digital computer-programming field . . . of course, an introductory exposition of a field as large and rapidly advancing as this can never hope to treat all subjects exhaustively . . . hence, each chapter is designed primarily to introduce the student to certain fundamental concepts and techniques of development."

The book comprises three roughly equal parts, entitled, respectively, Machine Languages, Automatic-Programming Techniques, and Data-Processing Techniques.

The first part begins with some descriptions of computer applications, including such topics as: process control, simulations, and aids to medical diagnosis. Then follows the usual block-diagram and functional description of computers. Chapter 2 contains an introduction to number systems, flow-charting, and the principles of machine languages. These principles are explained using a four-address instruction format. Chapter 3 then reduces the four-address format successively to three-,

two-, and single-address instruction systems; it also discusses such topics as indirect and relative addressing. Chapter 4 is entitled Programming for Special-Purpose Digital Computers. This is one of the topics usually not covered in textbooks of this type. The chapter contains some general discussion of digital differential analyzers, real-time control computers, information retrieval computers, and other similar topics.

With Chapter 5 we enter into Part 2 of the book. This chapter introduces various topics of automatic programming such as interpretive routines, including even a brief discussion of threaded-lists, and an introduction to algebraic compiling routines and the associated translation problems. Chapter 6 is an introduction to ALGOL; the Backus normal notation is used to define the language. This chapter appears to be quite condensed and, as a result, seems to lack the instructional value of, for example, H. Bottenbruch's "primer" on ALGOL 60. (See *Journal of the ACM*, v. 9, 1962, p. 161–221.) Chapter 7 presents an introduction to the essential concepts of COBOL 1961. Chapter 8, entitled Programming to Achieve Intelligence, is a quite ambitious chapter, as a list of subtitles will indicate: list processing, automatic programming-language translation and examples of translating ALGOL codes, mathematical optimization including dynamic programming, programming for medical diagnosis, proving geometric theorems and trigonometric identities, and abstraction and creativity.

Part 3 begins with Chapter 9, which gives a brief introduction to the fundamentals of numerical analysis, ranging, nevertheless, from simultaneous linear equations to the solution of Laplace's equation by difference techniques. Chapter 10 gives an equally condensed introduction to Boolean algebra. The last chapter, Chapter 11, discusses search and sorting techniques as well as some problems of codifying information.

As can be seen from this partial enumeration of topics, the author certainly introduces a wide variety of subjects. He definitely does this in a very lucid way and his selection of topics is up-to-date. However, one might perhaps wish that the author had gone into greater detail in certain sections of the book, compensating for this by leaving other sections out. As it stands, many sections are so short that they appear to be superficial, even though the author has tried to overcome this by giving extensive lists of relevant references. Nevertheless, the emphasis on automatic programming techniques and the discussion of modern problems in the computer sciences make this a very attractive book, which probably will find widespread use in introductory computer courses.

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64[Z].—DANIEL D. MCCRACKEN, *A Guide to ALGOL Programming*, John Wiley & Sons, Inc., New York, 1962, viii + 106 p., 27 cm. Price $3.95.

This is not a reference work on the syntax and semantics of ALGOL, but a highly practical text suitable for a beginner. It assumes no prior knowledge of computers or programming nor any mathematical sophistication.

Eight Chapters are contained within 93 pages. New concepts are introduced gradually. The if-statement appears in Chapter 3, the for-statement in Chapter 4, and procedures in chapter 7. Each chapter is followed by a set of exercises, the answers to some of which are given in the back of the book. Flow charts are used