effectively to help illustrate the algorithms. Several chapters are concluded with case studies: examples of programs which can occur in practice. The final chapter deals with an input-output scheme which the author admits is not ALGOL, and the reviewer hopes will never be.

This text is on the other end of the scale from that of Naur, which was evidently written for the experienced programmer. It is probably more suitable for the beginner than those of Bottenbruch or Dijkstra. However, the reader is not warned that ALGOL has imperfections, nor is he given an indication of the precise manner in which the syntax is defined. The author gets into trouble by not making clear the distinction between procedure-identifier and function-designator. Thus the statement (on page 76) that a function name "must never appear anywhere but on the left-hand side of an assignment statement", will probably convince many readers falsely that the recursive factorial procedure on page 79 is incorrect.

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65[Z].—JAMES A. SAXON & WILLIAM S. PLETTE, *Programming the IBM 1401: A Self-Instructional Programmed Manual*, Prentice-Hall, Inc., New Jersey, 1962, xv + 208 p., 23 cm. Price $9.00.

The sub-title of this book; namely, *A Self-Instructional Programmed Manual*, describes the special feature of its design. It is a text on the 1401 designed for study without the aid of a teacher. In order to accomplish this purpose, frequent problems are provided, with the answers given on the immediately succeeding pages. The answers are accompanied by comments which help to clarify any errors that may have been made by the student.

This general technique seems very useful, and can certainly assist in the initial training of 1401 programmers, with a reduction in the time required by an instructor.

Considering the space demands of this special method of presentation, the text provides a good coverage of the fundamentals of programming. Machine language, flow charting, symbolic coding, assembly programs, input and output, editing features, and subroutines are only briefly mentioned.

With the completion of this text, the student has acquired a good start in 1401 programming.

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66[Z].—RAJKO TOMOVIC & WALTER J. KARPLUS, *High-Speed Analog Computers*, John Wiley and Sons, Inc., New York, 1962, xi + 255 p., 22 cm. Price $9.95.

This book presents the material on electronic devices and circuits which combine to constitute the repetitive type of analog computers (where a solution can be displayed on a cathode ray tube) and on applications of such computers to engineering problems. Professor Tomovic is associated with the University of Belgrade, Yugoslavia. He has written a book (entitled *Calculateurs Analogiques Répétitifs*, published in Paris in 1958) from which the present volume was derived. The co-author, Professor Karplus of the University of California, author of other books on analog com-

puters, is well known in this field. This book is apparently the contributions of the two professors while Professor Tomovic was a Visiting Professor at the University of California in 1961.

This book is divided into three parts of about equal length: Part I on Theory, part II on Equipment, and part III on Application; in addition, the first chapter is an introduction.

Part I consists of Chapters 2, 3 and 4, respectively entitled Analytical Foundations, Error Analysis of Analog Computers, and Scale Factors. In Chapter 1, the authors describe a system of differential equations (expressed in a matrix form in the case of linear equations), which is shown to be realizable by a set of multiple-input operational amplifiers. The multiloop feedbacks from the set of operational amplifiers obviate the necessity of iterations in a repetitive analog computer. This is the fundamental principle employed in the book. In Chapter 3, the relation between the sensitivity of computer solutions to errors and the stability of solution is presented as well as the error coefficients developed on a theoretical level. Chapter 4 discusses the scale factor, the interrelation of scale factors, and the effect of drift on scale factoring.

Part II consists of Chapters 5, 6, 7, and 8, respectively entitled Linear Elements, Nonlinear Operations, Output Equipment, and Auxiliary Devices. Chapter 5 discusses essentially the operational amplifier and dynamic memory (an integrating operational amplifier used for memory purpose). In Chapter 6, the nonlinear elements include hyperbolic electrostatic-field multipliers, Hall-effect multipliers, photoformers, diode function generators, so-called universal nonlinear operators, and function generators of two variables. Chapter 7 describes an "electronic graph paper" for display on a cathode-ray tube and servo-driven plotter. Auxiliary devices of Chapter 8 cover pulse generators and power supply.

Part III consists of Chapters 9, 10, 11, and 12, concerned, respectively, with ordinary differential equations, partial differential equations, integral equations, and miscellaneous applications. The topics in these chapters include Fourier analysis, two-point boundary-value problems, Monte-Carlo method, analog iterative solution of integral equations, roots of a polynomial, conformal mapping, and system analysis by statistical techniques.

This volume fills the need for a book on repetitive analog computers. It includes material published in Europe (including Russia) and in America, and gives many interesting ideas on analog computers. It is a contribution and a welcome addition to the literature on analog computers.

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