Besides its textbook character, which stems from its pedagogical point of view as an introduction to state-space methods, the book gives such a wide scope of problems of modern control theory that it can be used also as a handbook of modern control theory. The numerous examples point out the possibilities of practical applications.

Digital Design with Standard MSI and LSI—Thomas R. Blakeslee (New York: Wiley, 1975, 357 pp.). *Reviewed by John L. Pokoski, Department of Electrical Engineering, University of New Hampshire, Durham, NH 03824.*

Most textbooks on digital logic design emphasize optimization of performance indices, which ultimately minimize the number of NAND gates and flip-flops required for implementation. Thus map and chart reduction methods for combinatorial networks are studied in great detail, as are state and input logic reduction for sequential networks. Unfortunately, while these formal minimization techniques are fine for small-scale integrated circuits, they do not take advantage of the economics inherent in medium- and large-scale integration (MSI and LSI).

In contrast, as the title indicates, this book does concentrate on techniques for minimizing overall system costs through the use of MSI and LSI chips. The book is very practically oriented. In most cases, intuitive principles and detailed examples are emphasized rather than mathematical derivations. Included is an introduction to programmed logic (microprocessors) as an alternative to "random" logic. In addition, the practical problems of race conditions, signal reflection, noise, crosstalk, and inadequate grounding are discussed. Finally, descriptions of a variety of input–output devices are given, and statistical design methods are introduced. A brief description of each chapter follows.

Chapter 1 is a summary of historical trends regarding integrated circuits with emphasis on the increasing cost, reliability, and size advantages of MSI and LSI. This leads into Chapter 2, which includes an excellent description of how reduction of a system's integrated circuit (IC) package count leads to greatly reduced overall system cost. The "hidden" costs of printed circuit boards, racks, wire wraps, testing, etc., are all shown to be proportional to the number of IC packages. An introduction to system design is also given. Chapters 1 and 2 effectively set the theme of the book: minimize package count. Chapter 3 is a brief summary of traditional small-scale integrated (SSI) circuit combinational logic design techniques. Chapter 4 indicates methods of using standard MSI and LSI chips (multiplexers, decoders, ROM's, PLA's) in combinational design. Chapter 5 is an introduction to sequential logic design using SSI (flip–flops) and MSI (counters). Chapter 6 is concerned with the practical problems of race conditions and clock skew. Chapters 7 and 8 cover programmed logic (microprocessors). Chapter 9 introduces the concept of time-sharing data paths (multiplexing). Chapter 10 shows methods of combating signal reflections, noise, crosstalk, and grounding problems. In chapter 11 a variety of input–output devices are discussed, while chapter 12 introduces methods of using statistics in digital design. In the final, short but thought-provoking, chapter, the author urges engineers to use the new digital technology to produce systems beneficial to society (e.g., aids to the blind) rather than gimmickry (e.g., digital electric ranges).

Among the book's major strengths are the author's emphasis on overall system design rather than subsystem minimization, his willingness to address many of the most difficult problems of digital system design (e.g., noise), and his lengthy detailed examples. The author's use of italics to emphasize important points is helpful, and his informal writing style adds spice to whet the reader's appetite. (For example, two of the chapters are entitled "Nasty Realities, Parts I and II," and a subheading of Chapter 13 is called "The Engineer as a Dope Pusher".)

The book has two major weaknesses. The first is the large number of typographical errors. These are particularly troublesome when they occur in the midst of a complex example. Since the second printing contained fewer errors than the first, there is hope that this problem is under control. The second problem is the book's brevity, as can be seen from the variety of topics covered in 357 pages. For example, the whole world of computers is covered in 80 pages, and only 13 pages are used to study statistical design concepts.

In general, the book should not be used by the beginning student. On the other hand, it is an ideal text for an advanced logic design course if it is supplemented with outside readings. Its style, philosophy, and brevity produce challenges for the interested student and can generate many invigorating classroom discussions. In addition, the working professional will find the book of great value if he is prepared to use the author's bibliographies and does not become discouraged by the typographical errors.

Systemtheorie (System Theory)—G. Wunsch (Leipzig: Akademische Verlagsgesellschaft, 1975, 236 pp.). *Reviewed by R. Haber, Department of Automation, Technical University, Budapest, Hungary.*

In the last couple of decades the use of the state-space description has spread into all branches of control theory. Numerous books have been published that detail the application of the theory, both to continuous-data systems and to systems with finite discrete-data states (including so-called automata). Again, equations derived for deterministic systems have been formulated correspondingly for stochastic systems. The behavior of large bodies, for example in space, can be described also by state-space equations as a function of time and the space coordinates. The intention of the author of the book being reviewed is to present continuous and discrete, deterministic and stochastic, and time and time-and-space dependent systems in a uniform aspect.

Chapter 1 advances the mathematical and system-theoretical bases necessary to the mastery of the book. Finite and infinite sets and the operations and relationships defined between them are introduced. Various transformations and algebraic and topological structures are dealt with. The bases of system theory (e.g., the theory of dynamic systems), the state variables, are presented, and systems are classified according to their behavior in time, the type of the variables, or the transformation used.

Chapter 2 deals with two classes of deterministic systems, continuous and discrete systems. The most general equations, the system models, and the state and output operators are introduced for both classes. In the case of forced systems, the system solution is divided into two parts: an unexcited so-called free solution and the solution of an excited system in equilibrium state.

Chapter 3 is devoted to the theory of linear deterministic systems. In the first part of the chapter, the algebraic bases are summarized. The groups, the commutative groups, the rings, the bodies, the factor groups, and the operations defined on them are treated with a special consideration of polynomials. The system equation for discrete and continuous systems, the Laplace transform, the solution of the equations, the computation of the fundamental matrix and of the weighting function, and the input–output realization are presented. In addition to time, space coordinates are also introduced as characters of the studied state. Detailed discussion is limited to one- and two-dimensional systems, which are those most important in practice.

Chapter 4 is devoted to linear stochastic systems. After summarizing the bases of probability theory, the state and output operators are defined for stochastic systems in parallel to deterministic systems. Solution of the system equations is presented for both the discrete and the continuous cases.

In summary, the author stresses the theoretical fundamentals of system theory. The book is recommended to teachers and to researchers with strong mathematical knowledge who are already well versed in the engineering aspects of control and system theory.