23 [P, X].—R. H. MACMILLAN, *Non-Linear Control Systems Analysis*, The Macmillan Company, New York, 1963, xvi + 174 p., 20 cm. Price $3.75.

This is an introductory volume for the engineer and applied mathematician who wishes to make the transition from prewar to postwar control theory. The authors cover in a very lucid fashion, with numerous examples and discussions, nonlinear control in practice, the phase-plane method, the describing function technique, the calculation of transients, and the rudiments of feedback control.

The book suffers, as do many of its kind, from a complete lack of awareness of the effect of the digital computer upon modern mathematics and control theory. There is no discussion of the use of large-scale computers, nor of dynamic programming, quasilinearization, or any other theories which depend upon modern devices for their successful utilization. There is nothing on the calculus of variations and no mention of the Pontryagin maximum principle. Furthermore, there are no references for advanced reading.

This book would have been extremely useful in 1940, or even in 1946.

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24 [X].—JOSEPH BECKER & ROBERT M. HAYES, *Information Storage and Retrieval: Tools, Elements, Theories*, John Wiley & Sons, Inc., New York, 1963, xi + 448 p., 23 cm. Price $11.95.

This is the first volume of the publisher's Information Science Series. It is written primarily from the point of view of the system designer, and is intended for use as either a textbook or a reference work. According to the preface, its purpose is to guide the newcomer through the maze of scattered development that has characterized the early growth of information storage and retrieval. The result is a well-balanced exposition of a field with tantalizing possibilities.

The first seven chapters survey the tools used by documentalists to organize recorded knowledge and make it available. Techniques developed by the library profession include classification schemes, indexes, and card catalogs. Over the years, however, both logical and physical inadequacies have appeared in the traditional approach. To cope with the logical difficulties a number of new techniques have been devised, viz., coordination of subject terms, superimposed coding of terms, generation of formalized abstracts, and analysis of subject relationships. To cope with the physical problems new recording and processing devices are being utilized, e.g., microfilm, fast reproducing equipment, and electronic computers.

In the next five chapters the authors examine how investigators with various technical backgrounds can contribute to the solution of outstanding problems. The areas of responsibility of user, operator, designer, and equipment supplier are defined, and their common areas of interest and conflict are analyzed in terms of requirements and capabilities. Questions of value arise in seeking to optimize system design. Thus, one must weigh the cost of complexity against its value to the user. In recognition of the importance of a logical structure for explaining the contents of a file, the authors observe that "the better the theory, the simpler the question which can be asked and the more complex the possible answer."

The final three chapters attempt to provide a theoretical foundation for design-