8. What Computers Should Be Doing—J. R. Pierce, Speaker; C. E. Shannon and W. A. Rosenblith, Discussants; V. Bush, Moderator.

The lectures and discussions were generally held at a non-technical level. Thus the book constitutes an informative and authoritative compilation of the prevailing views concerning the impact which the development of computers may have upon the future—written in a style which can easily be understood by the scientist, administrator or layman. The large variety of subjects covered, the many excellent presentations and the spirited discussions evoked by the speakers all contribute to the enjoyment and value which the reader may derive from the book. It is difficult for the reader not to become personally engulfed in the diverse points of view expounded concerning the future impact of computers. He may find himself becoming an ardent Luddite (named for Ned Lud, a poor nineteenth century English stocking weaver who, finding his meager livelihood threatened by automation, went out and destroyed the looms in his city), or a partisan defender of computer supremacy. Notwithstanding the preeminent position held by many of the contributors in the field of computer technology, the reader is not likely to find any earth-shaking pronouncements or discoveries—for, as pointed out by Martin Greenberger, the editor, in the matter of predicting the future of so revolutionary a device the layman or "amateur" can successfully hold his own with the so-called expert. This was shown to be the case during many of the discussions.

H. P.

15 [X, Z].—FRANZ, L. ALT, Editor, *Advances in Computers*, Volume 2, Academic Press, 1961, xiii + 434 p., 23.5 cm. Price $14.00. [For a review of Volume 1, see *Math. Comp.*, v. 15, 1961, p. 220–221.]

In view of the extent and variable quality of the literature in our field nowadays, periodical critical surveys of topics of current interest by experts are especially welcome. The present volume contains five such articles, all provided with extensive bibliographies:

"A survey of numerical methods for parabolic equations," by Jim Douglas, Jr., p. 1–54;

"Advances in orthonormalizing computation," by Philip J. Davis and Philip Rabinowitz, p. 55–133;

"Microelectronics using electron-beam-activated machining techniques," by Kenneth R. Shoulder, p. 135–293;

"Recent developments in linear programming," by Saul I. Gass, p. 295–377;

"The theory of automata, a survey," by Robert McNaughton, p. 379–421.

The article by Shoulder—the one most closely related to the title of this series—is concerned with a research program leading to the fabrication of machines several generations in the future. The other articles are in or near the field of numerical analysis, but there must be very few, apart from the editor, who could appreciate both these and that of Shoulder.

The title of this series suggests that we might expect to see evaluations of procedures in practice on the machine, as well as on paper. Those given by Douglas are largely qualitative, but Davis and Rabinowitz denote more than half their article to the results of numerical experiments—material of this kind is invaluable to the conscientious practical computer. It is surprising that the method of ortho-

normalization has not been exploited more widely; it has a wide range of application, and many of its strengths and weaknesses on the computer have been examined by Davis and his colleagues. About half of Gass's article is devoted to an account of machine codes for linear programming and related problems, mostly from this country but some from England and France. The sizes of problems acceptable are given, and time estimates are often given. There is a preliminary report on SCEMP: "*S*tandardized *C*omputational *E*xperiments in *M*athematical *P*rogramming."

McNaughton's point of view is that the theory of automata is a theory that is best understood in its own terms; its proper relationship to computer work is one of a pure science to an applied science. He restricts his survey to the study of general various behavioral descriptions of automata.

JOHN TODD

California Institute of Technology
Pasadena, California