64[Z].—PHILIP MORRISON & EMILY MORRISON, Editors, *Charles Babbage and His Calculating Engines*, Dover Publications, Inc., New York, 1961, xxxviii + 400 p., 21 cm. Price $2.00 (Paperbound).

The editors have prefaced this convenient compilation of selected writings of Charles Babbage and of several relevant papers by his contemporaries with an excellent biographical sketch, followed by a brief history of punch cards and a selected bibliography of pertinent literature.

The body of this entertaining book is made up of three parts, consisting, respectively, of unabridged chapters from Babbage's autobiographical *Passages from the Life of a Philosopher*, originally published in London in 1864; essays extracted verbatim from *Babbage's Calculating Engines*, published in London in 1889 under the editorship of his son Henry P. Babbage; and miscellaneous papers. These last include a complete listing of Babbage's published papers, a general plan of his Analytical Engine, several plates relating to an eight-day clock and a hydraulic ram as exemplifying his notation for expressing the action of machinery, and a reproduction of the table of contents of *Passages from the Life of a Philosopher*, which is revelatory of certain interesting aspects of his personal life and of his multifarious scientific interests. His versatility is revealed by these fields of interest, which include mathematics, railway engineering, cryptanalysis, and submarine navigation, in addition to his lifelong preoccupation with calculating machines. Furthermore, his only significant *completed* work, namely, the book, *Economy of Manufactures and Machinery*, published in 1832, foreshadowed the field now known as operations research.

The essays from *Babbage's Calculating Engines* include Dr. Lardner's detailed description of Babbage's Difference Engine, originally published in 1834; a memoir on the Analytical Engine published by an Italian engineering officer, L. F. Menabrea, following a visit of Babbage to Turin in 1840, and subsequently translated into English, with extensive annotations, by the Countess of Lovelace, only child of Lord Byron. The Countess, we are told, thoroughly understood and appreciated Babbage's elaborate plans for a universal automatic digital computer, and is reputed to have written the most lucid contemporary accounts of that machine as designed by its inventor. One of her contributions, which was appended to the translation of Menabrea's paper, is a detailed program for evaluating the Bernoulli numbers on the proposed Analytical Engine.

In this book one reads of Babbage's ambitious plans for an increasingly complex series of calculating machines, of his subsequent difficulty in securing continued financial support of the British Government in this research, and of his ultimate failure to bring his farsighted plans to fruition because of their magnitude and the resulting extraordinary demands on the technology of his time.

As the editors aptly remark of Babbage in concluding their Introduction, "The wide range of his practical and scientific interests and his clear commitment to the notion that careful analysis, mathematical procedures, and statistical calculations could be reliable guides in almost all facets of practical and productive life give him still a wonderful modernity. . . . His monument, not wholly beautiful, but very grand, is the kind of coupled research and development that is epitomized today, as it was foreshadowed in his time, by the big digital computers."

J. W. W.