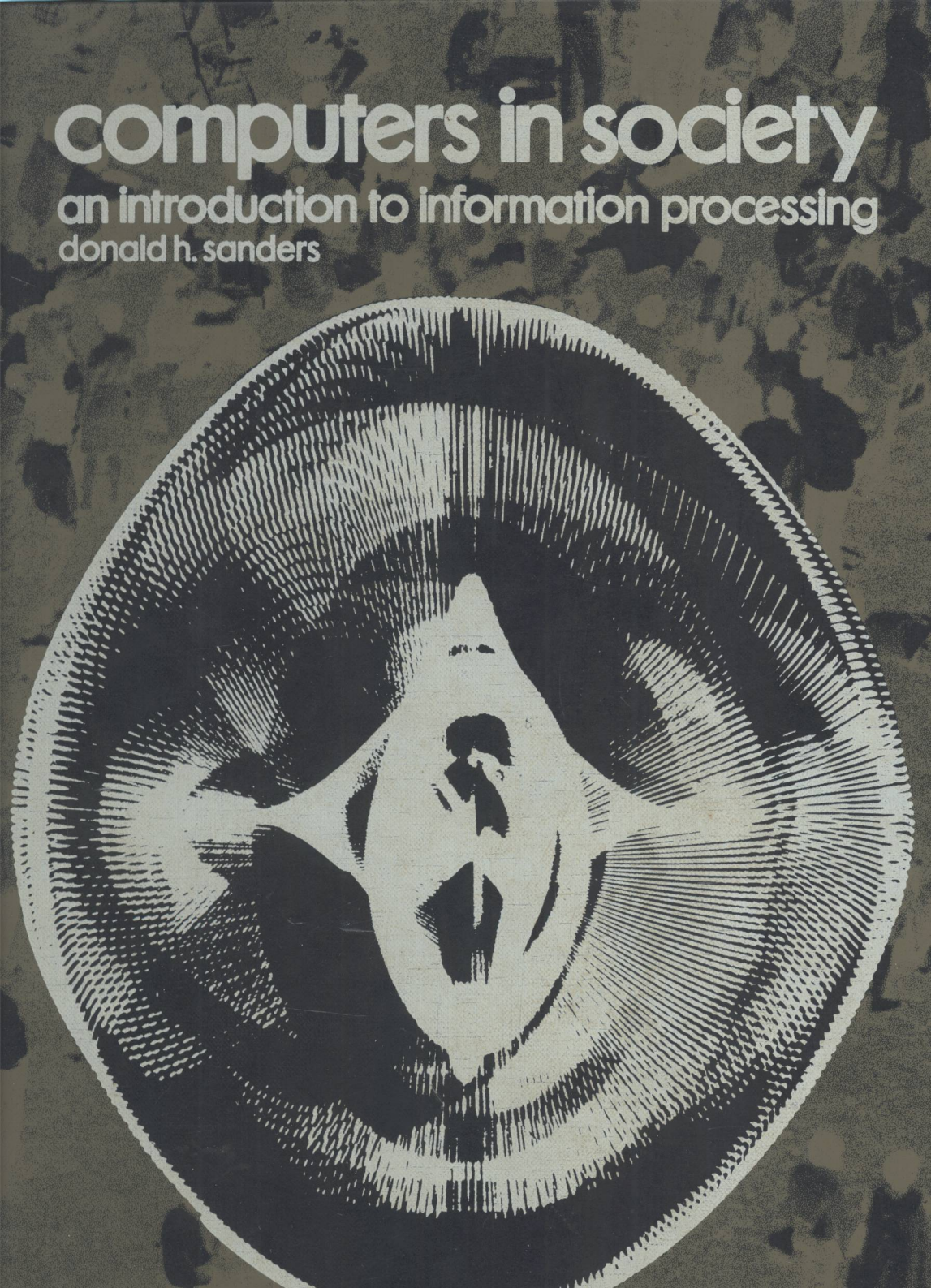
computers in society

an introduction to information processing

donald h. sanders



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preface

At the present time, computers are generally acquired and/or used by organizations to process information. Only rarely do individuals have both the need and the resources to acquire their own private computers. But this fact, of course, does not mean that changes brought about by computer usage do not affect citizens. There are possibly only a few hermits today who do not participate in one or more computer-using organizations in some capacity or who are not served or affected in their private lives by one of these organizations.

Understanding is a key to how the individual feels about the world around him. What he does not understand is likely to stimulate such emotions as uneasiness or even fear. The future shapers and movers of our society—the students of today—must acquire an understanding of the capabilities and limitations of computer information processing systems. Students in virtually all disciplines will find their careers and private lives greatly affected by these systems and by the changing conditions brought about by their implementation and use.

In a 1970 publication of the American Association of Junior Colleges, one recommendation was that "computer literacy should be required of all college students and of all high school students too, whatever their field of work might be."* All educated persons, the report continued, should have a knowledge of (1) the development of information processing, (2) the basic concepts of computer hardware and software, (3) the social impact of computer usage, and (4) the ways in which computers are applied. How well do current introductory computer information processing texts satisfy the needs of such a course? Most have either a strong computer science or a strong business orientation. Although such texts admirably serve rather specialized needs, they unfortunately tend to ignore the needs of instructors and students who desire a *broader perspective* on the impact computer usage is having (and may be expected to have) on society. The purpose of *Computers in Society,* therefore, is to fill the existing void by better serving the needs of those with a liberal

* *The Computer and the Junior College: Curriculum,* American Association of Junior Colleges, Washington, 1970, p. 6.

arts, social science, education, health science, or humanities bent (although, of course, it is not restricted to the needs of those students).

More specifically, the objectives of this book are to (1) provide an introduction to the history and evolution of information processing, (2) lay the foundation for the continuing study which will provide broadly educated persons with an orientation to the computer (what it is, what it can and cannot do, and how it operates), (3) consider some of the ways in which the computer influences social organizations and individuals, and (4) examine some of the uses and implications of computers in a number of social environments—i.e., government and law, health, education, the humanities, science and engineering, and business.

To achieve these objectives, the book is divided into four parts. Part 1 is entitled "Information Processing in Society: Background and Some Implications," and consists of the first four chapters. Part 2 ("Orientation to Computers") has six chapters devoted to computer concepts, computing equipment, and program preparation. Part 3 ("Computer Influence on a Changing Society") discusses the implications of computers for organizations and individuals. The six chapters in Part 4 ("Selected Computer Uses in Society") describe computer applications in the social environments listed above.

The organization of *Computers in Society* into four broad areas of study permits a great deal of *modular flexibility* in the use of the book. It is possible, for example, to design a course to emphasize social, political, and educational implications of computers to students who do not need a presentation of computer concepts by using materials in Parts 1, 3, and 4. If computer hardware/software concepts are to be covered, Parts 1, 2, and 3 are recommended. The applications chapters in Part 4 are self-standing and may be selected as desired for any course of study. Chapters 13 and 14 are of particular interest to most students.

The chapters dealing with (1) the history and current developments in information processing and (2) computing hardware and software concepts are similar to chapters dealing with these same topics in the author's *Computers in Business,* 2d ed., McGraw-Hill Book Company, 1972. However, new sections have been added, and the amount of hardware and software detail has been *substantially reduced* (sections on computer numbering systems and binary arithmetic, for example, have been either eliminated or significantly decreased). Much of the material in Part 3 and all six of the chapters in Part 4 are new.

This book is designed for use in an introductory one-semester or one-quarter course. No mathematical or information processing background is required or assumed, and no specific computer make

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or model is featured. The book can be used without access to a machine.

Many individuals have contributed to and improved the quality of this publishing effort. (Of course, only the author is responsible for any remaining errors.) A special tribute must go to those equipment manufacturers who furnished technical materials and photographs. Their individual contributions are acknowledged in the body of the book. Mr. Eric A. Weiss offered helpful suggestions. Finally, my thanks go to Dean Joe Lee Steele and to the faculty of the M. J. Neeley School of Business, Texas Christian University, for their encouragement and support.

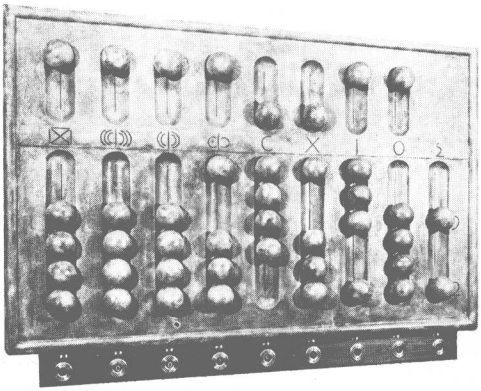
DONALD H. SANDERS

computers in society:

a pictorial history

Greek counting stone

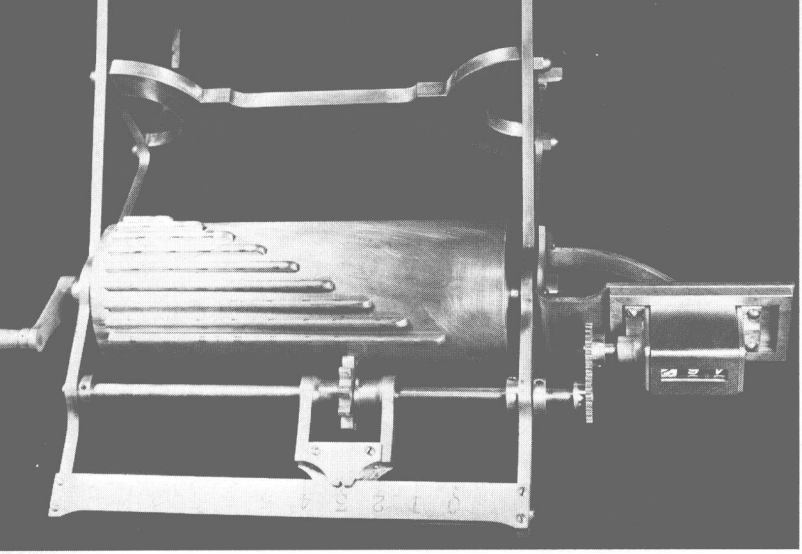
Giant Roman abacus



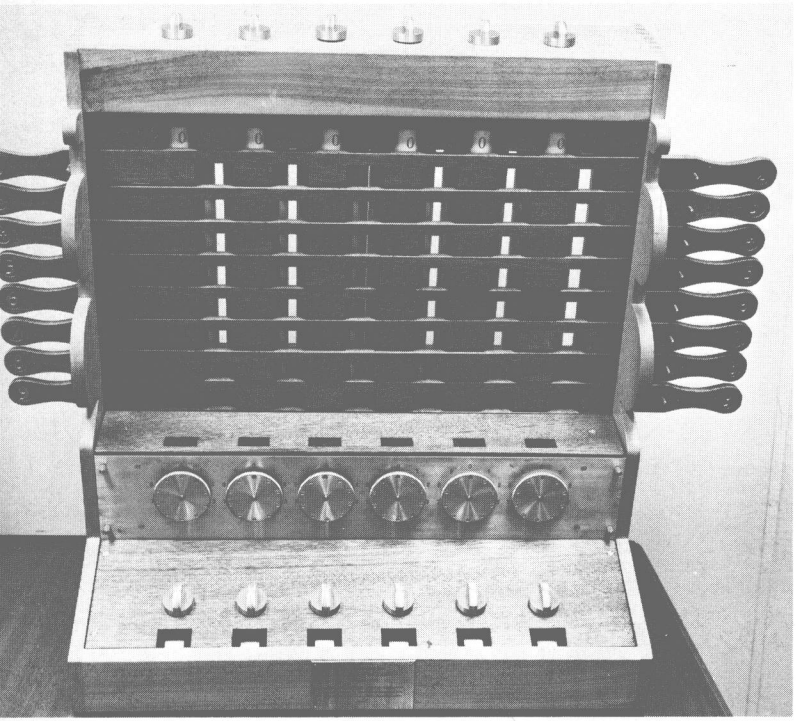
Aztec calendar stone

In the past few decades the computer and its impact on man have been major concerns of both the opponents and proponents of computer technology. Yet, the computer, in its myriad forms, has been a major factor of civilization since man learned to count on his fingers.

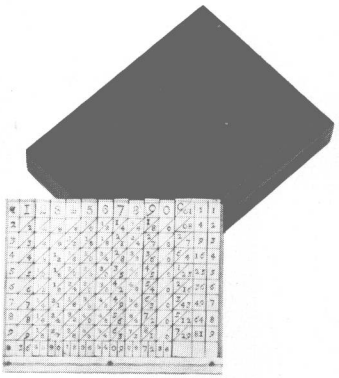
Abu Baker Astrolabe Used throughout the Middle Ages by astronomers, navigators, and astrologers for various surveying and geographical problems.



Stepped pinion Created by Leibniz in 1671. This machine was never mechanically reliable but was later incorporated in the Leibniz calculator.



Shickard's calculating clock The first true digital computer. It could multiply numbers by truly mechanical means.



Napier's bones These are logarithm tables inscribed on sets of ivory rods.

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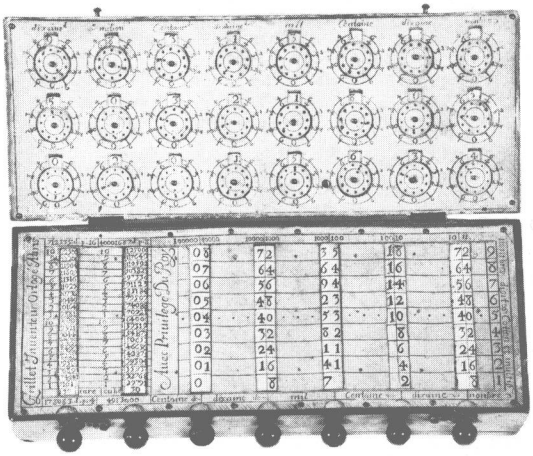
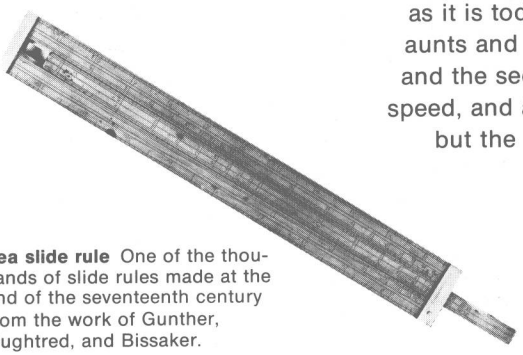


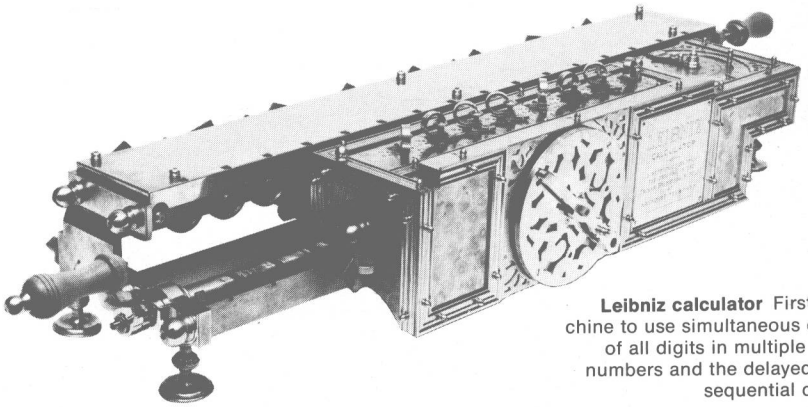
Grillet de Rouven calculator
Early calculator invented by the clockmaker to Louis XIV of France.

These six pages of photographs represent a few of the computing devices man has created. From the Greek counting stone to the Facit computer, each has its place in computer history.

None of the devices shown resembles the computer as it is today. They are the great-grandparents, the aunts and uncles, the stepbrothers and stepsisters, and the second cousins twice-removed. The shape, speed, and ability of the computer have all changed, but the purpose remains the same—to store and dispense information.

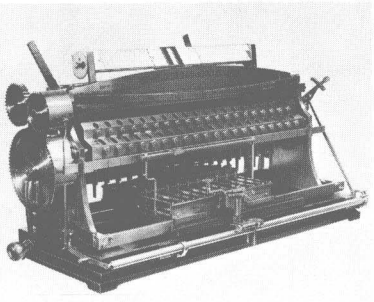


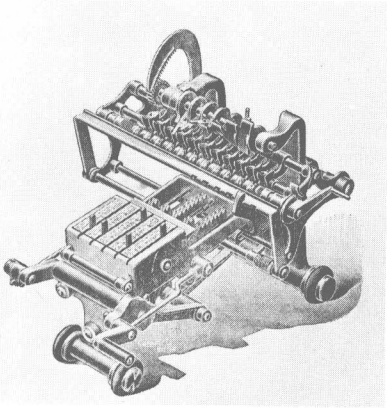
Lea slide rule One of the thousands of slide rules made at the end of the seventeenth century from the work of Gunther, Oughtred, and Bissaker.



Leibniz calculator First machine to use simultaneous entry of all digits in multiple digit numbers and the delayed and sequential carry.

Bollée calculator First machine to perform multiplication by a direct method. Bollée was eighteen when he invented this machine.

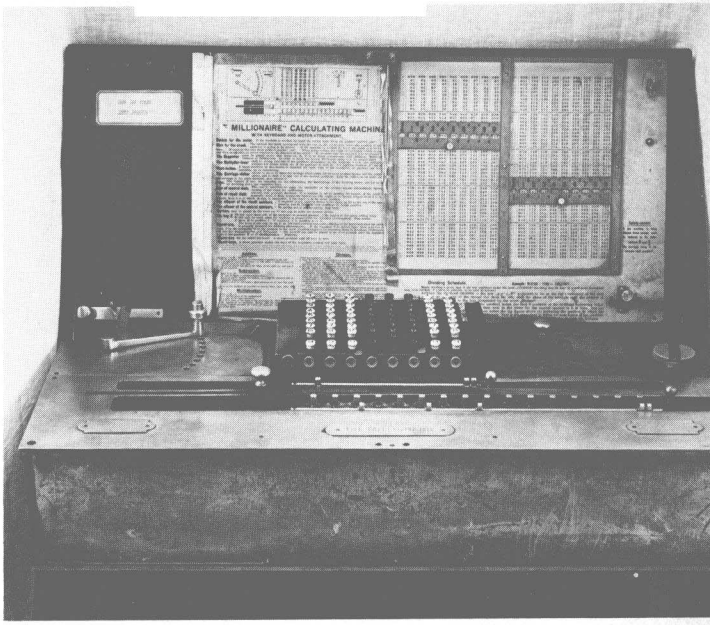




Grant calculating machine One of the first calculators to use devices especially designed to increase the speed of multiplication and division.

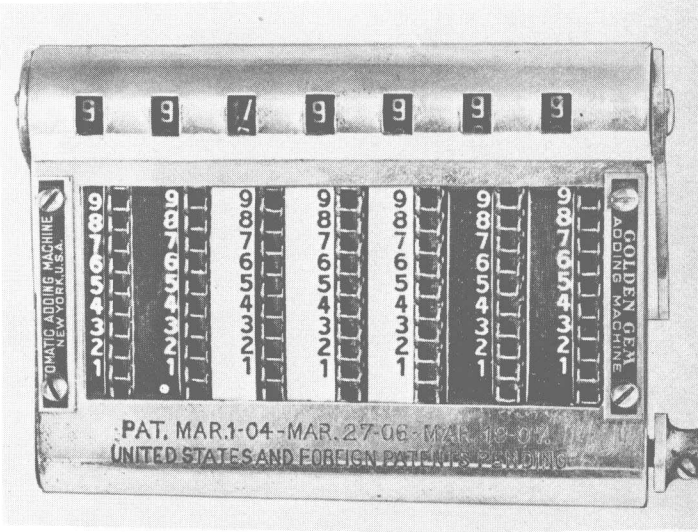
Jacquard loom cards Used to determine the pattern of the weave, this development marked the beginning of punch card accounting and programming.

Millionaire calculator Fastest multiplying machine of the nineteenth century. It was based on the Bollée calculator.

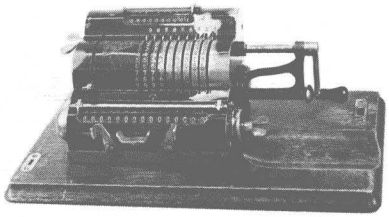


Man's physical and mental horizons are expanding, and the computer is of increasing importance. It is time to have an understanding of the role of the computer—its benefits and its dangers and the way it affects society.

(all photographs courtesy of IBM Corporation.)



Golden Gem adding machine This is a hand calculator from the early 1900s. It was small enough to be carried in a pocket.



Facit standard calculator A durable, easy-to-handle, Swedish universal calculating machine.

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