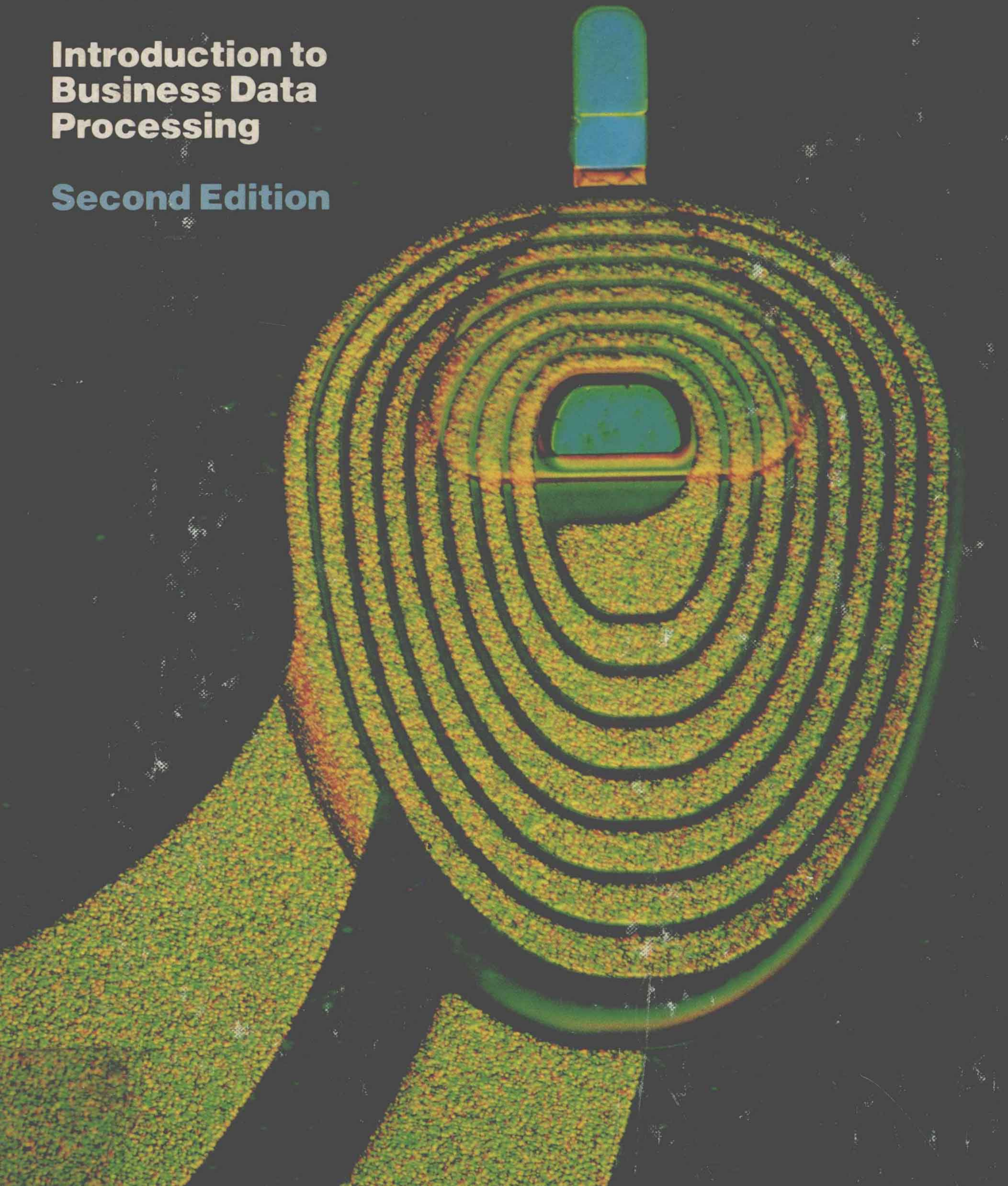
Orilia

Introduction to Business Data Processing

Second Edition



Introduction to Business Data Processing
Second Edition

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Introduction to Business Data Processing

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About the cover

Copper coil of "film" recording head in new IBM 3380 large-system disk file. Head can read and write data at 3 million characters a second—first device in a commercial product to achieve such a rate. (Coil is magnified several hundred times; light refraction from minutely separated film layers produces iridescent color pattern.)

The IBM 3380 was announced in 1980, offering higher disk surface density than any other commercially available disk file, as well as the largest information capacity per disk file—2.5 billion characters. From IBM's 1980 Annual Report.

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PASCAL in detailed illustrative examples. Chapter 13's discussion of MIS reviews the organization of these complex systems, their relationship to databases, and the use of IMS systems. Specialized systems such as the CICS and DC/DB configurations are presented, with detailed case studies offering a practical orientation to both MIS and database systems.

The latter part of the text offers special discussions of minicomputers, microcomputers, and other types of computer systems; data communication systems, systems analysis, and design concepts; and a detailed example of a systems documentation package. The review of many of these topics can add much to the content of an introductory computer course and provide the student with a broader overview of the business data processing field.

The organization of the chapters affords the instructor flexibility. The instructor can use the first seven chapters to develop the concepts of data processing for half of the semester. The remainder of the semester can be devoted to programming applications. Another approach might provide a brief discussion of programming and the development of systems-related concepts in the last half of the semester. The instructor is free to choose the topics of coverage and can diversify the material presented.

Learning Objectives

Every chapter begins with a section entitled "Purpose of This Chapter," which presents the student with an overview of the material and topics to be covered. This section provides a general feel for the chapter's content. The student can grasp the organization of the chapter and place topics of discussion in their proper perspective.

The purpose section also presents the learning objectives for the chapter. These briefly stated objectives offer the student a guide to the key areas of the chapter and the skills and concepts to be gained from reading it. The learning objectives are also of value when a review of the chapter is anticipated, prior to a test.

Key terms used throughout the chapter are also listed in the learning objectives. The terms are commonly used in data processing and represent an operational vocabulary vital to the current or future user of computer services. All the terms are defined in the text of the chapter and appear in a glossary at the chapter's end.

Readability

A concerted effort has been made to keep the reading level of this text from becoming overly technical, monotonous, or unduly complicated. Standardized reading tests applied to the text indicate that the average high school graduate should not have difficulty in comprehending the material presented. I have blended this reading level into a conversational mode of presentation. It is my belief that the conversational approach greatly assists the learning process and is uniquely suited to today's student. It does not belittle the student, but rather guides the reader through the required material on a step-by-step basis in an easily comprehensible manner.

Summary

A point-by-point summary of all material covered appears at the end of the chapter. The summary details the major topics discussed in the chapter, capsulizing each point in a few sentences. The summary is organized to follow the presentation of material in the chapter, reinforcing the order of topic coverage. Students will find this type of summary particularly advantageous when reviewing for a test.

Glossary

An introductory text requires clear definitions of all terms used in its discussion. The chapter glossaries list, in alphabetical order, all key terms introduced in the chapter. The page on which each term is defined appears in boldface type in the index of the book for easy referencing to its appropriate chapter.

End-of-Chapter Tests

The discussion questions and summary tests at the end of each chapter enable the reader to test his or her mastery of the material covered in the chapter. The student is advised to complete the summary test before proceeding on to the next topic of discussion. The summary test can also be used in preparation for an exam. The topics related to questions that have been answered incorrectly can be reviewed before the test. Summary test answers appear at the end of each chapter.

Special-Interest Items

Students like to study material that is current and related to real-life situations. In an effort to meet this requirement, items of special interest have been included in each chapter. These items are drawn from a variety of sources and relate directly to the materials covered in the chapter. In some cases, these special items note the widespread applicability of the computer and some of its more appealing uses. In the chapters related to programming, the special items highlight programming considerations affecting the student. These items point out commonly made student errors, ways to avoid specific mistakes, and tips to help simplify programming assignments. Each special item is intended to enhance the presentation of the material and complement the chapter's coverage of a topic.

Case studies at the end of each chapter also reinforce the practical and diversified uses of computers in our daily environment. Each case study has been rewritten to focus on its high points and avoid highly technical discussions. Case study applications range from the use of computers to prepare mailing labels for small advertising companies to the use of computers by vast administrative organizations supporting millions of people. Each case attempts to bring into focus how the computer is used and why it serves the purpose that it does.

Of particular interest are the new topics included in the second edition. New material includes characteristics and examples of computerized crime, service bureaus, and operating systems; new types of hardware and word processing; newly introduced programming languages; managerial considerations in systems evaluations; canned programs; business simulations and models; and details on the newer versions of both minicomputers and microcomputers.

Many instructors will be especially interested in Chapter 15, ''Documentation of a System.'' Because systems-related subjects represent one of the more difficult topics for many students, Chapter 15 serves as an example of the work a systems analyst may perform. Many instructors assign this chapter for reading before their DP students enter the systems course. Many students do not know what a system is; this exposure offers them an initial glimpse of this topic. Many students retain this text and use Chapter 15 as a guideline in the preparation of their systems project.

In general, I have tried to write a text that is easy to read, is informative, and assists in the development of selected data processing skills. I have attempted to include material which is relevant to the study of computers, without becoming overly technical. I believe that this text provides students with a working knowledge of computer-related data processing skills that can be used in subsequent computer courses or in the performance of their jobs. I would like students to think of this text as a reference that they can turn to when faced with a data-processing-oriented question or task. I have tried to make this text, as well as the learning of data processing skills, an enjoyable experience.

Additional Materials

Study Guide

For some students, lectures and repeated readings of the text are not sufficient. The material under discussion must be reinforced through additional review and self-testing. For these students, the Study Guide has been written. In this separate guide, the contents of each chapter receives special treatment. The student is provided with a restatement of the chapter's learning objectives, a brief summary of the material covered, 10 multiple-choice questions, 15 true-false questions, and approximately 30 self-study questions. This array of questions offers students sufficient opportunity to test themselves on their mastery of the chapter.

Instructor's Manual (IM)

An instructor assumes the responsibility of preparing the supporting materials, tests, and lecture notes that parallel the presentation of material in a newly adopted text. A properly prepared instructor's manual can greatly ease this task and assist the instructor in the time-consuming conversion of his or her classroom materials. For each chapter, the IM will provide:

1 An overview of the chapter, highlighting its major points.
2 A lecture outline noting sample discussion questions, topics, or examples which can be used in class.
3 Answers to all discussion questions listed in the main text.
4 Answers to all test bank questions.
5 Overhead transparency masters of selected illustrations drawn from the text.

In addition, instructors are given sample discussion questions which can be employed to initiate classroom discussions. In selected chapters, specialized materials relating to points covered in the text are provided. These include sample newspaper readings, extra flowcharting problems, extra BASIC programming problems, and helpful teaching hints.

Test Bank

One of the more important supporting materials available to the instructor is the Test Bank, containing a variety of test questions. Included in the Test Bank are two quizzes per chapter, composed of 15 true-false questions and 10 multiple-choice questions, in a format that will enable them to be easily duplicated and administered. These prepared quizzes and test questions offer the instructor freedom from the preparation of exams, allowing more time for personalized instruction.

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Lawrence S. Orilia

Portfolio: The History of Data Processing

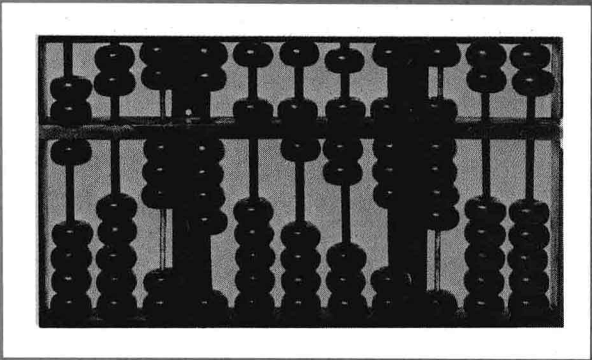


Plate 1 The suan-pan is the Chinese version of the abacus. (*IBM.*)

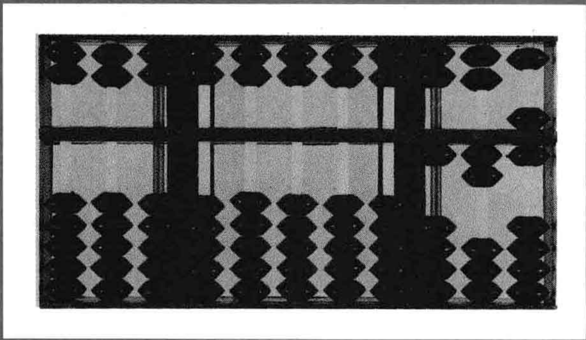


Plate 2 A Japanese abacus, or soroban. (*The Granger Collection.*)

The abacus is one of the earliest known computational devices and can be traced to ancient Babylonia. The abacus remains useful today in certain small businesses and in elementary schools where students are learning arithmetic.

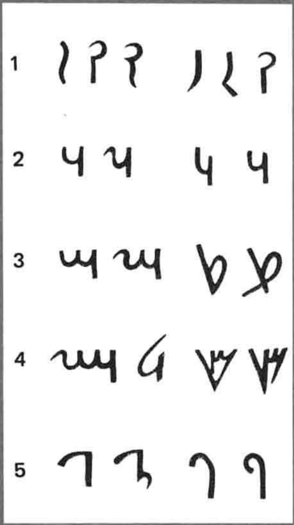


Plate 3 Numerical symbols used in early Egypt.

A system of numerical notation was essential to the processing of data. People needed a shorthand to represent quantities in computations. Many societies have developed methods of representing quantities, some based on the numbers 5, 8, 20, and 64. Most societies today use the Arabic numbering system, a decimal system based on the number 10. Computers use a binary system, based on the number 2, to represent their data.

Fra Luca Pacciola, a fourteenth-century monk, developed and applied the concepts of double-entry bookkeeping, which laid the foundation of modern accounting principles. In recent years, these principles have been adapted to facilitate the computerized accounting of financial data. The computer can analyze large amounts of financial and accounting data and present the information in an immediately usable format. The computer format is a long way from the quills and ink once used to record transactions.

Plate 4 Bookkeeping in a medieval monastery. (*The Granger Collection.*)

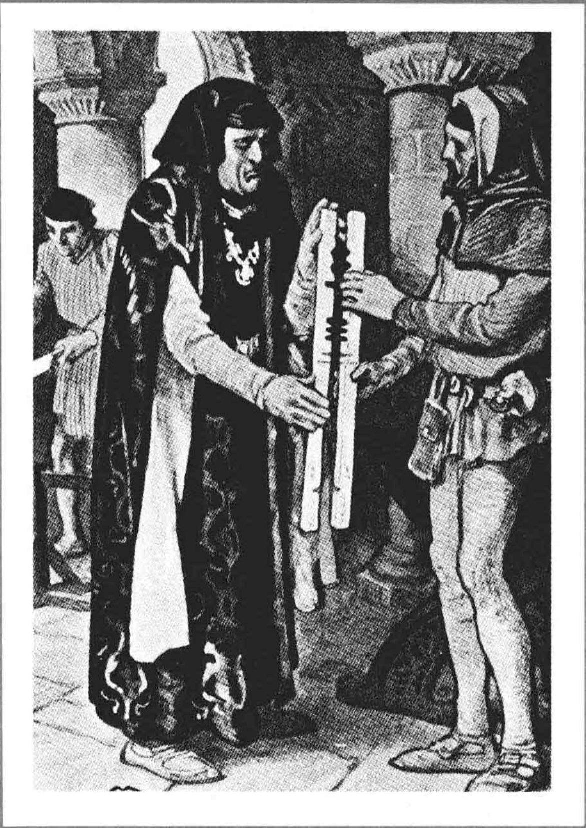
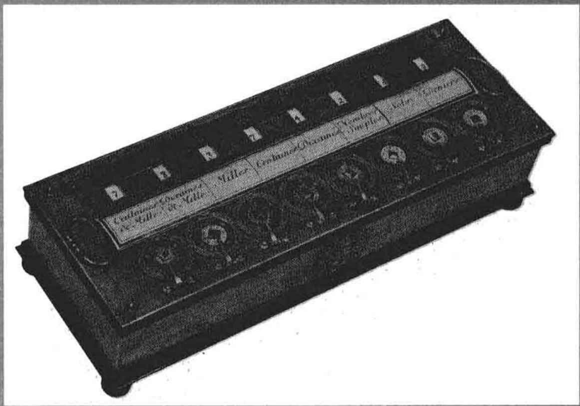


Plate 5 Fifteenth-century English tally stick. (*The Bettmann Archive.*)

Plate 6 Pascal's Machine Arithmetique. (*IBM.*)



Each notch on the English tally stick represents 1 pound sterling. The tally stick served as a tax receipt and was a permanent record of tax payments. The accurate recording of data was a vital aspect of society, even in the Middle Ages.

In the 1640s, the Frenchman Blaise Pascal invented a mechanical device that functioned as an adding machine. Known as the Machine Arithmetique, the device was constructed of interlocking gears that represented the numbers 0 through 9. It operated like an odometer, which records an automobile's mileage. Pascal's was another historical attempt to develop a mechanical device that would perform arithmetic operations.

Plate 7 Gottfried von Leibniz. (*Culver Pictures.*)

Gottfried von Leibniz, a German mathematician, further refined Pascal's concepts and produced a calculating device capable of multiplication, division, addition, and subtraction.

In 1804, Joseph Marie Jacquard perfected the idea of the automated loom. Using holes punched into a series of connected cards, Jacquard was able to control the weaving of fabrics. The loom used in this process sensed the pattern coded into the cards and wove the fabric accordingly. These cards were the forerunners of Hollerith's punched cards.

In the early 1800s, the English inventor Charles Babbage theorized that it was possible to construct an automatic, mechanical calculator. With the support of the British government, Babbage began the construction of the Difference Engine and, years later, the Analytic Engine. The concepts Babbage put forward were eventually used by engineers in the development of the first computer prototypes.

Despite ten years' work, Babbage failed to build a fully operational model of either the Difference or Analytic Engine and lost his government subsidy. Not until 1854 did George Pehr Schuetz build a working model of the Difference Engine.

In 1842, a paper by L. F. Menabrea on the Analytic Engine was translated from Italian into English by Augusta Ada Byron, Countess of Lovelace, and presented to her colleagues. Babbage encouraged Lady Lovelace to conduct her own research and refine many of the concepts in the paper. Lady Lovelace's contributions to binary arithmetic would later be used by John Von Neumann in developing the modern computer.

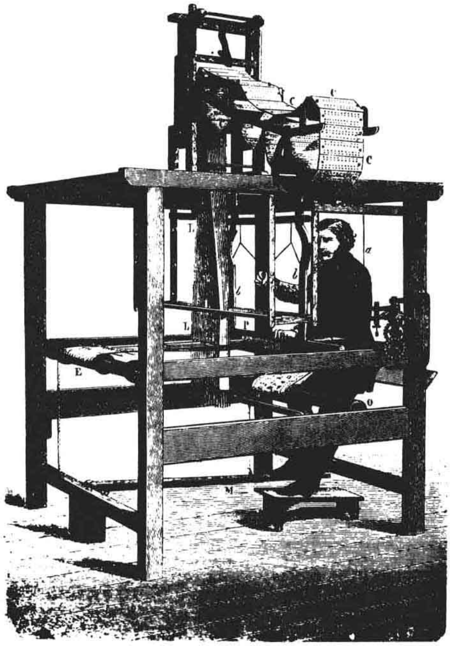


Plate 8 Jacquard's automated loom. (*IBM.*)

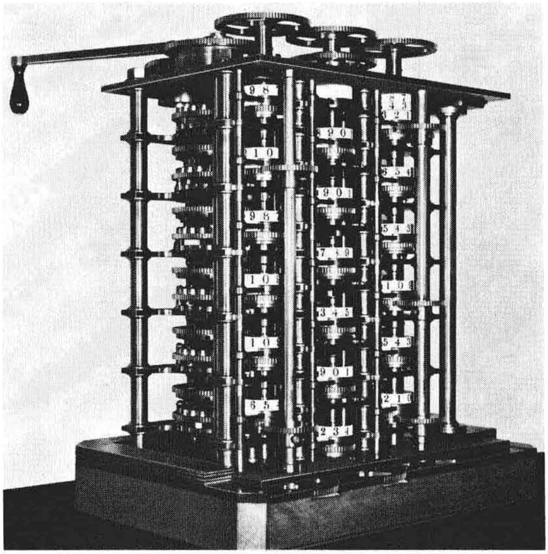


Plate 9 The Difference Engine was constructed using the theories of Charles Babbage. (*IBM.*)

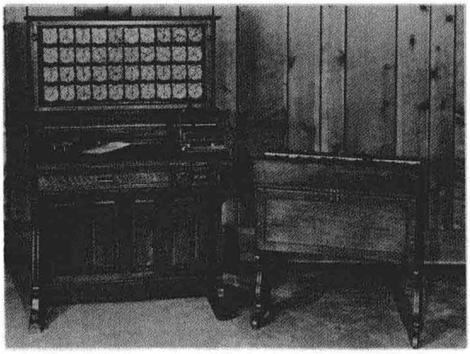


Plate 10 The electrical tabulator and sorter developed by Hollerith. (*IBM.*)

In the 1880s, the U.S. Census Bureau asked Herman Hollerith to find a way to speed up the processing of census data. Hollerith created punch cards that resemble today's computer cards, their code, and tabulating equipment. The 1890 Census was completed in approximately 3 years rather than the 11 years the Census Bureau had originally estimated.

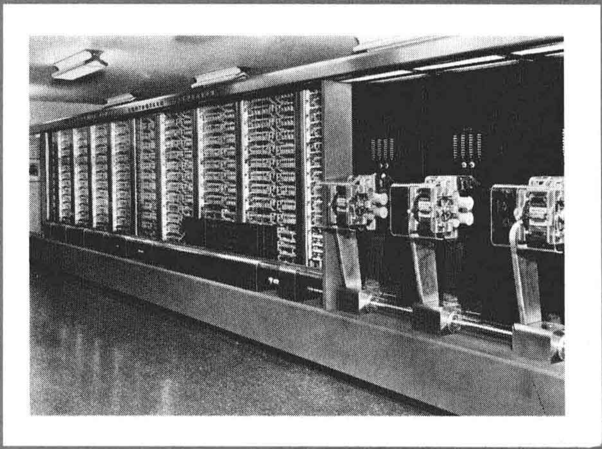


Plate 11 The Mark I was developed by H. H. Aiken in 1937 at Harvard University. (*IBM.*)

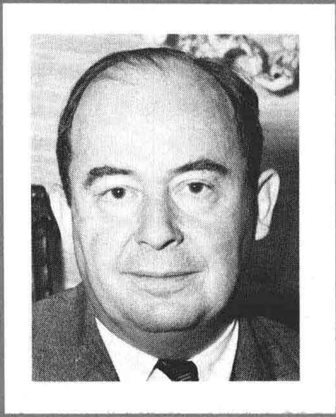


Plate 12 John Von Neumann. (*UPI.*)

Plate 13 ENIAC, the first all-electric computer. (*UPI.*)

In 1937, a computer was developed at Harvard University by H. H. Aiken. This device, the Mark I, was a prototype of the computers used today. It is less well-known that a closely related predecessor to the Mark I was built at Iowa State College in the 1930s. This electronic machine was developed under John V. Atanasoff's supervision and laid the groundwork for the ENIAC (electronic numerical integrator and calculator) computer, which appeared in 1946. World War II sparked intense research and computer development, and the ENIAC was the first all-electronic computer.

Plate 14 UNIVAC I.
(*Sperry Univac.*)

During the same period, a brilliant mathematician, John Von Neumann, presented technical papers on the stored program concept. According to this concept, the operating instructions and data used in processing should be stored inside the computer. Whenever necessary, the computer would have the capability to modify these program instructions during their execution. The stored program concept was the basis for all future computer advances. In 1949, this concept was incorporated into the computer EDSAC (electronic delay storage automatic computer), which was developed at Cambridge University. This computer was capable of storing a sequence of instructions, the equivalent of the first computer program.

Developments in the field of computer technology mushroomed in the early 1950s. Computers featured internal data storage areas and used data provided by paper tapes. In 1951, the UNIVAC I (Universal Automatic Computer) was introduced and became the first commercially available computer. The UNIVAC I was characteristic of the first generation of computers. These computers were constructed of vacuum tubes, were big and bulky, and generated so much heat that they required controlled air-conditioned rooms. First-generation computers were relatively difficult to program and were restricted in their uses.

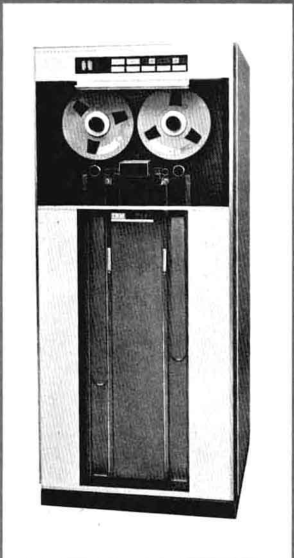


Plate 15 Magnetic tape unit. (*IBM.*)

The early 1950s also brought the development and acceptance of magnetic tape, a great technological advance. This compact, portable medium permitted the sequential storage of millions of characters of data and its rapid transfer to the computer. Data could move up to 75 times faster than with other available methods. Magnetic tape storage operates in principle like the home tape recorder.

The post-Sputnik era, 1959–1965, brought the second generation of computers. They used transistors and therefore were less bulky, could store more data, were easier to program, had higher processing speeds, and could be applied to more processing jobs than first-generation computers.

Between 1959 and 1965, the high-speed magnetic disk was developed and marketed. It allowed the random access of data and overcame many of tape's problems—slowness and sequential access of data. Magnetic disks let computers go directly to an item of data and use it without first having to read through other records.

Plate 16 IBM 1401, a second-generation computer. (*IBM.*)

Plate 17 Magnetic disk pack. (*IBM.*)

In the mid-1960s, the third generation of computers arrived and made the computer a major business tool. Third-generation computers were constructed of microminiaturized integrated circuits, had greater input-output capabilities and vast internal storage, and operated in billionths of a second. The program languages developed for third-generation machines were easy to learn, and so more people were able to develop programming skills and apply them to more jobs. A major development in third-generation machines was the IBM 360 Series of computer systems.

Plate 18 The IBM 360, a third-generation computer, and its microminiaturized circuits. (*IBM.*)