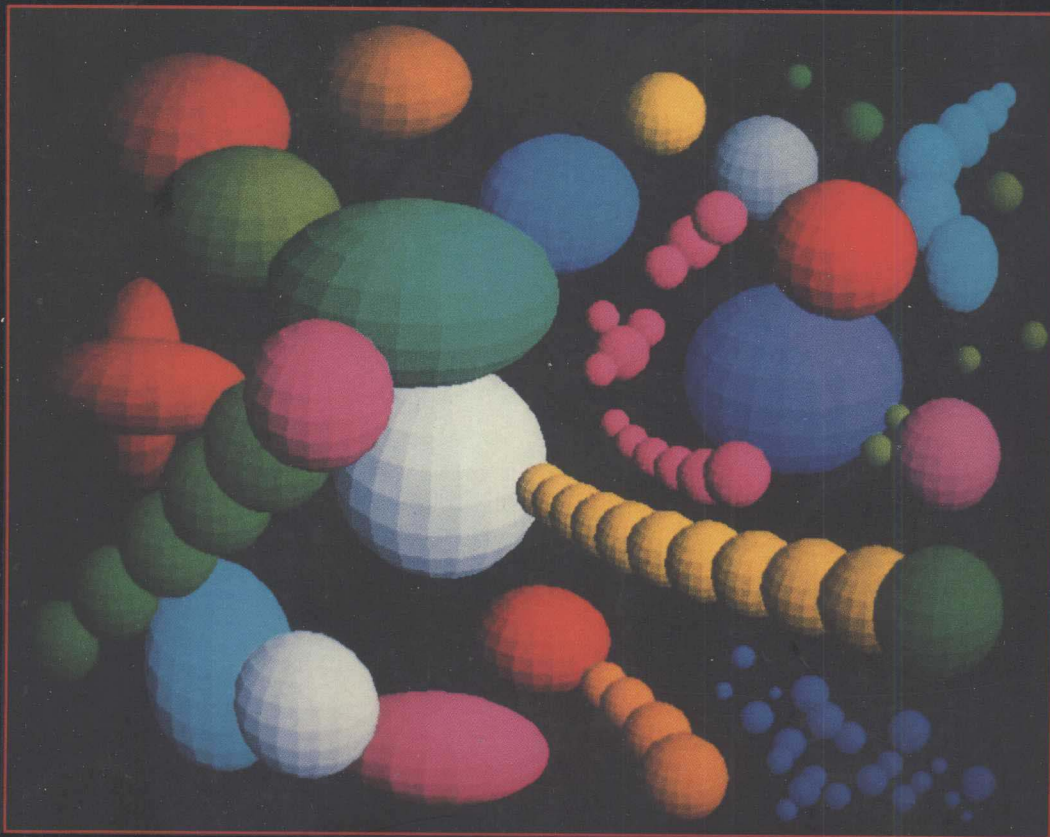
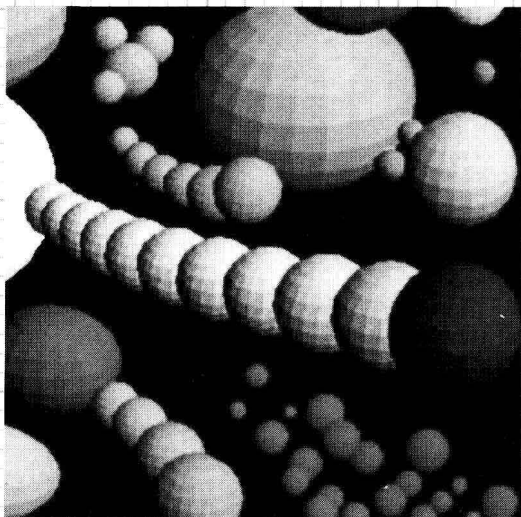


DATA PROCESSING AN INTRODUCTION

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preface

The purpose of this book is to introduce you to today's world of computers and data processing. It is composed of five major sections:

- ***Introduction.*** This section looks at computers and computing as they fit into the overall picture of human activity, with emphasis on the ways data processing is used in business. The universal cycle of data processing is explained, briefly and nontechnically. Basic words that are specific to the computer field are defined on the same page where they are first used, to provide an easier, more solid basis for understanding the text.
- ***Description.*** This portion provides a brief explanation for the person who is not a technician of how computers use a few simple principles to carry out their work. The organization of primary storage (the computer's internal memory) is explained, and the more common types of memory are discussed. The number systems computers use to perform their calculations are illustrated, and the most popular data codes are explored. Input and output devices, such as terminals, printers, and disks, are described, and their operating capabilities are discussed. Then, there is an explanation of software—the collection of programs and operating instructions that direct the computer. The section ends with a “how to” discussion of the hottest development in computers today, the microcomputer.

- **Computer logic.** This part discusses artificial intelligence and compares the way computers and humans solve problems. This is followed by an explanation of the tools we use to put problems into a logical form that can be accepted by the computer. These tools include decision tables and other problem definition techniques that are used as a basis for developing computer programs. The concepts and methods of system analysis and design are outlined, and examples of their use in business system development are given. The section ends with an explanation of flowcharting, a widely used method of “blueprinting” a computer system.
- **Programming.** It describes the use of the major business programming languages and provides enough detailed information about the features and rules of the BASIC language to permit you to write programs that are unsophisticated but that will accomplish useful business functions, such as keeping track of employee hours and wages, calculating customer billings, or developing a table of markups. An extension of this section is contained in Modules A, B, C, and D, which explain the additional programming languages COBOL, FORTRAN, Pascal, and Ada.
- **Management, Society, and the Future.** This section explores the broader uses and implications of the computer. Through the story of Western Farms, Inc., it examines the uses of a computer-based management information system. It investigates the renewed interest in MIS and explains recent developments in decision support systems. The threat computers pose to our personal privacy and the problems of security in computer data systems are discussed, with examples of system break-ins. The final chapter is a look at computers and their effects on our lives as we enter the 21st century.

This book has two kinds of objectives: those that are specific to each chapter and those that are general in nature. The specific objectives are listed at the beginning of each chapter, and they are carefully stated in measurable terms. The general objectives—not so easily measured—are:

- **To provide you with a new kind of literacy—computer literacy.** Because this is a relatively new concept, the term **computer literacy** does not have a widely accepted definition, but, generally, it means possessing enough knowledge about computers and how they work to enable you to live comfortably in a computerized society. Many educators regard computer literacy as the fourth basic skill. Donald N. Michael, in his book **The Unprepared Society**, wrote, “Ignorance of computers will render people as functionally illiterate as does ignorance of reading, writing, and

arithmetic.”¹ When you complete this book you will have taken a major step toward attaining computer literacy.

- ***To give you a firm foundation for mastering more advanced data processing subjects.*** If you are considering data processing as a career, the subject matter of this book represents your starting point.
- ***To present a new way of perceiving problem solutions.*** Computers, as you will soon see, are simple-minded machines that are stubbornly logical. This logic is basically the same as that required in the study of law, biology, engineering, or English composition for that matter. Learning how computers solve problems will give you new insights into the logical structure of other, non-data processing subjects.
- ***To prepare you to use computers effectively in business.*** If your career objective is to specialize within the field of business (to become an accountant, a manager, or a marketer, for example), you will be using computers and their output. To perform effectively, you have to know the capabilities and limitations of these systems. When you finish this book, you will have that knowledge.

As for the specific objectives that are listed at the beginning of each chapter, their purpose is to help guide your study by focusing on the essential elements. They are stated in measurable terms so you can test yourself. A recommended, sure-fire formula for success in your study of data processing is this self-directed three-step method:

1. Read the objectives lightly, to provide a mental environment; then read the chapter.
2. Turn back to the objectives and test yourself by studying them one-by-one; when you find an objective that is not immediately clear to you, reread the paragraph or section in the chapter which deals with the objective in question.
3. When you are satisfied that you have mastered the objectives, turn to the Self-Directed Study Questions at the end of the chapter. When you can answer each question without hesitation, you can be confident that you have learned the essential points in the chapter.

George B. Potter

¹D. N. Michael, *The Unprepared Society*.

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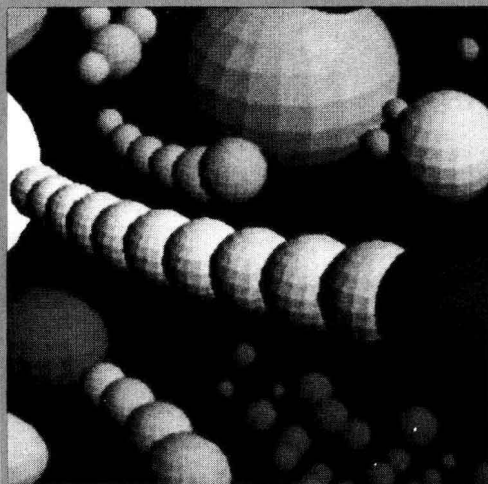
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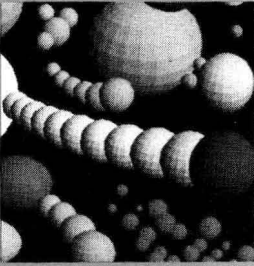
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part one

introduction





chapter 1

the logic machine

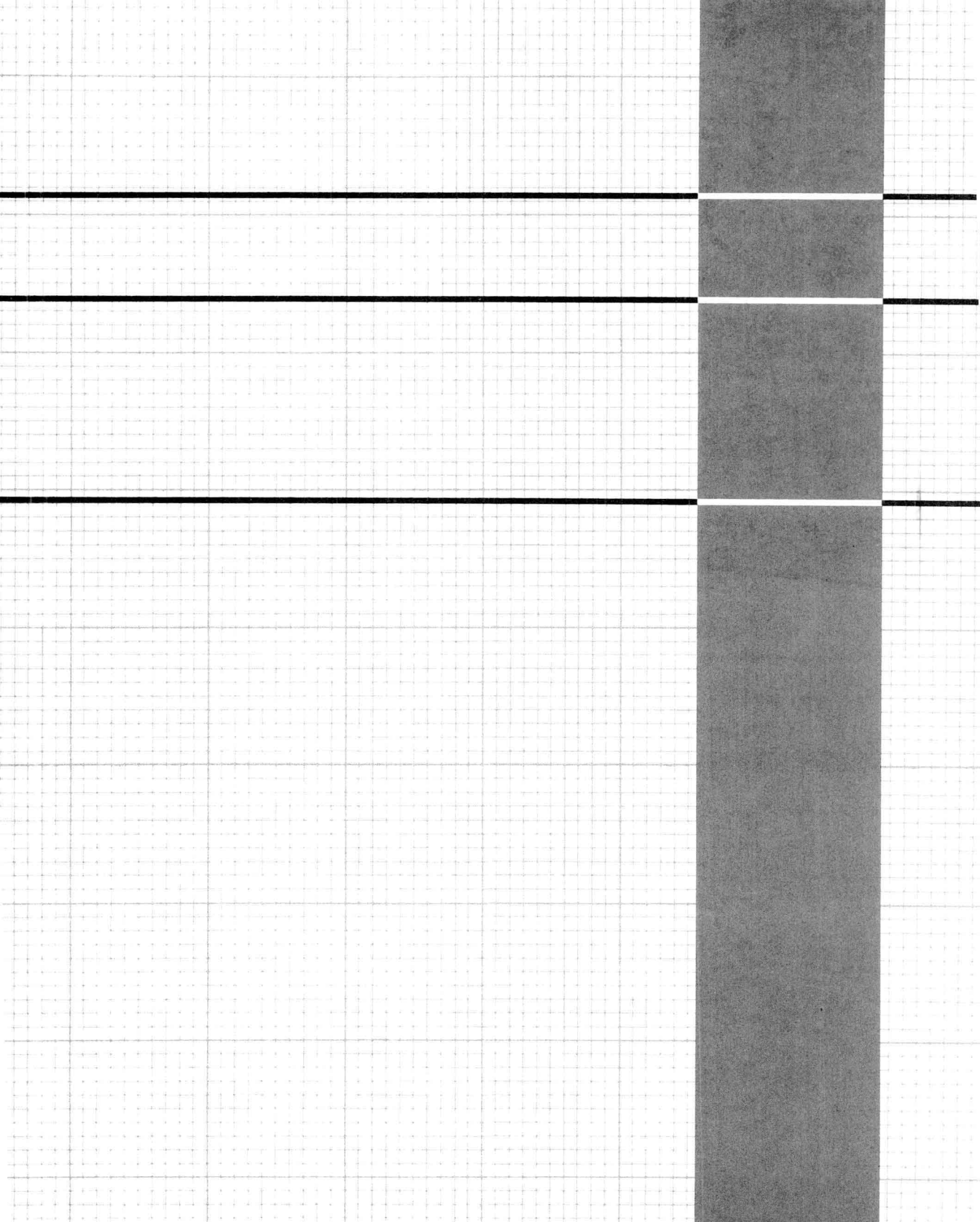
OBJECTIVES

When you finish this chapter, you should be able to:

- Explain what computer literacy is and discuss its importance in tomorrow's society.
- Give at least three examples of the way your life would be changed if there were no computers.
- Explain what is meant by data processing and give specific examples of its uses in business.
- Describe the steps in the universal data processing cycle.
- List at least four characteristics of today's business computers.
- Briefly describe the functions of peripheral devices in a computer system.
- Define the data processing terms used in this chapter.

data processing

an introduction



PREVIEW

Our study of data processing begins with a look at the computer's impact on society. To what extent have we become dependent upon electronic computers? Chapter 1 speculates on how our daily activities would be affected if our computers should all go on strike. Computer literacy is defined, and its importance is explained. We define data processing, describe steps in the universal data processing cycle, and conclude the chapter with a glimpse at a modern business computer and its supporting devices.

*"The meek shall inherit the Earth. The rest of us are going to the stars."**

What's in it for me?

This is the basic question everyone must ask in today's fast changing society with its constant demands for our time and attention. We have to set priorities. We can afford only to invest our resources in those things that are worthwhile and that have a reasonable promise of personal payoff. Certainly, before you make the commitment to complete the study of a new subject, such as the electronic computer and its uses, you are entitled to an answer to "What's in it for me?"

The reply is simple: "Everything." As you will see in the next few pages, a quiet revolution has taken place. The computer has become an inseparable part of our lives. Things will not be the same again. Like it or not, understand it or not, the computer will not go away. It will only become more important, more indispensable, and more pervasive. Futurist Alvin Toffler writes in *The Third Wave*:

Humanity faces a quantum leap forward. It faces the deepest social upheaval and creative restructuring of all time. Without clearly recognizing it, we are engaged in building a remarkable new civilization from the ground up. This is the meaning of the Third Wave.

*OMNI Magazine.

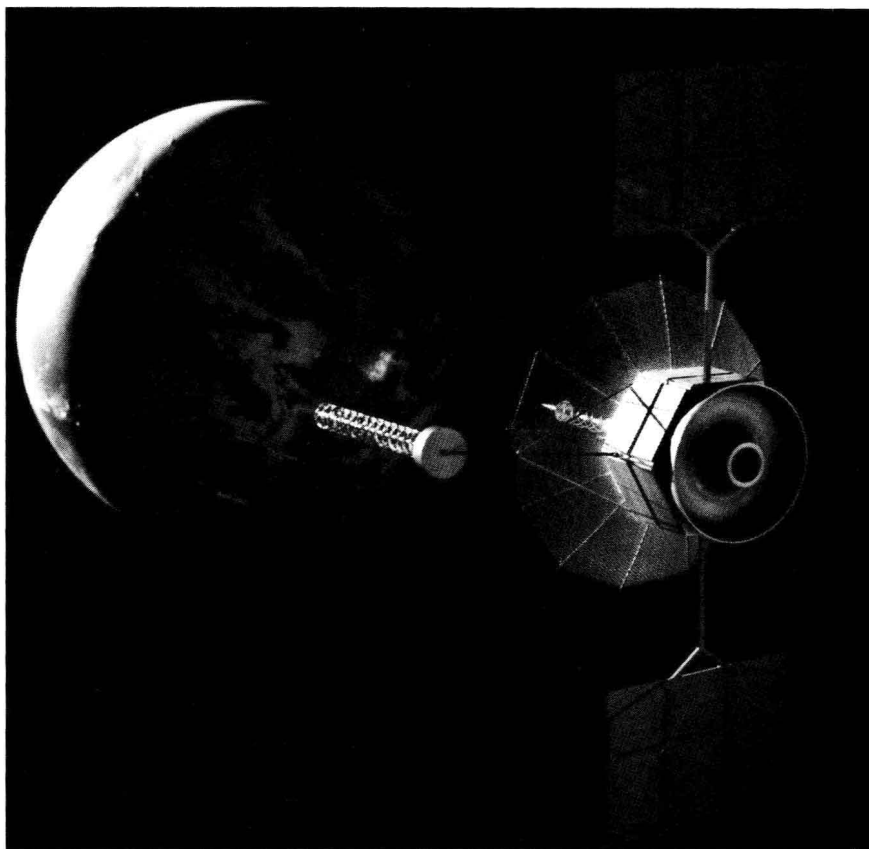
Until now the human race has undergone two great waves of change, each one largely obliterating earlier cultures or civilizations and replacing them with ways of life inconceivable to those who came before. The First Wave of change—the agricultural revolution—took thousands of years to play itself out. The Second Wave—the rise of industrial civilization—took a mere three hundred years. Today history is even more accelerative, and it is likely that the Third Wave will sweep across history and complete itself within a few decades. We, who happen to share the planet at this explosive moment, will therefore feel the full impact of the Third Wave in our own lifetimes.

Many feel that in the new society the “haves” and “have nots” will be replaced by the “knows” and “know nots”. Those who know and understand the computer will control it. Those who do not will be controlled by it. The choice is yours.

• The computer has become the foundation of our dynamic culture.

When we earthlings leave our mother planet to colonize other worlds, the computer will be our navigator and our copilot. The “logic machine” has been with us for only a little more than 30 years, but in that short time it has become the foundation of our complex, dynamic culture. If all electronic computers should go on strike tomorrow morning, we would lose most of the productive capacity that is the basis for our standard of living. Our daily lives would be altered dramatically.

1. Food shortages would develop, and prices would skyrocket, for computers not only bake our bread, they measure out the ingredients; mix the dough; and slice, wrap, and send the precisely golden brown loaves to the shipping dock. They also mix the feed for chickens (and time the lights that keep them up all night, laying eggs), select the best bloodlines for breeding our cattle herds, prescribe the most nutritious rations for the pigs, and tell the farmer the best time to send them to market. Computerized agricultural models recommend the kinds and quantities of crops to plant. After the seeds are in, probes sense the soil moisture, so computers can turn on the irrigation systems when more water is needed. Computer controlled machines harvest, sort, cut, peel, process, can, freeze, wrap, date, and ship foods to the supermarket, where computer controlled checkout stands keep track of purchases.
2. Our major transportation systems would slow to a crawl. Computer controlled traffic lights would go out. The computer directed refineries that produce gasoline, oil, diesel, and jet fuel

Figure 1-1

COMSAT Communications Satellite in geosynchronous orbit accepts computer transmitted data and relays it to receiving stations on earth.

- Our modern society could not exist in its present form without the computer.

would have to be shut down. Ships loaded with crude oil would remain anchored in the harbor; pipelines would clog; and oil wells would stop pumping. The computerized ignition and fuel systems in our automobile engines would shut off. Computer monitored rail and subway lines would be taken out of service (see Figure 1-2); the communications and radar sets in our air traffic control system would blink off. They wouldn't be missed, of course, because our jetliners couldn't take off if their on-board computers were not operating. And even if they could, there wouldn't be enough passengers to make it worthwhile to fly—the computer based seat reservation systems would be down.