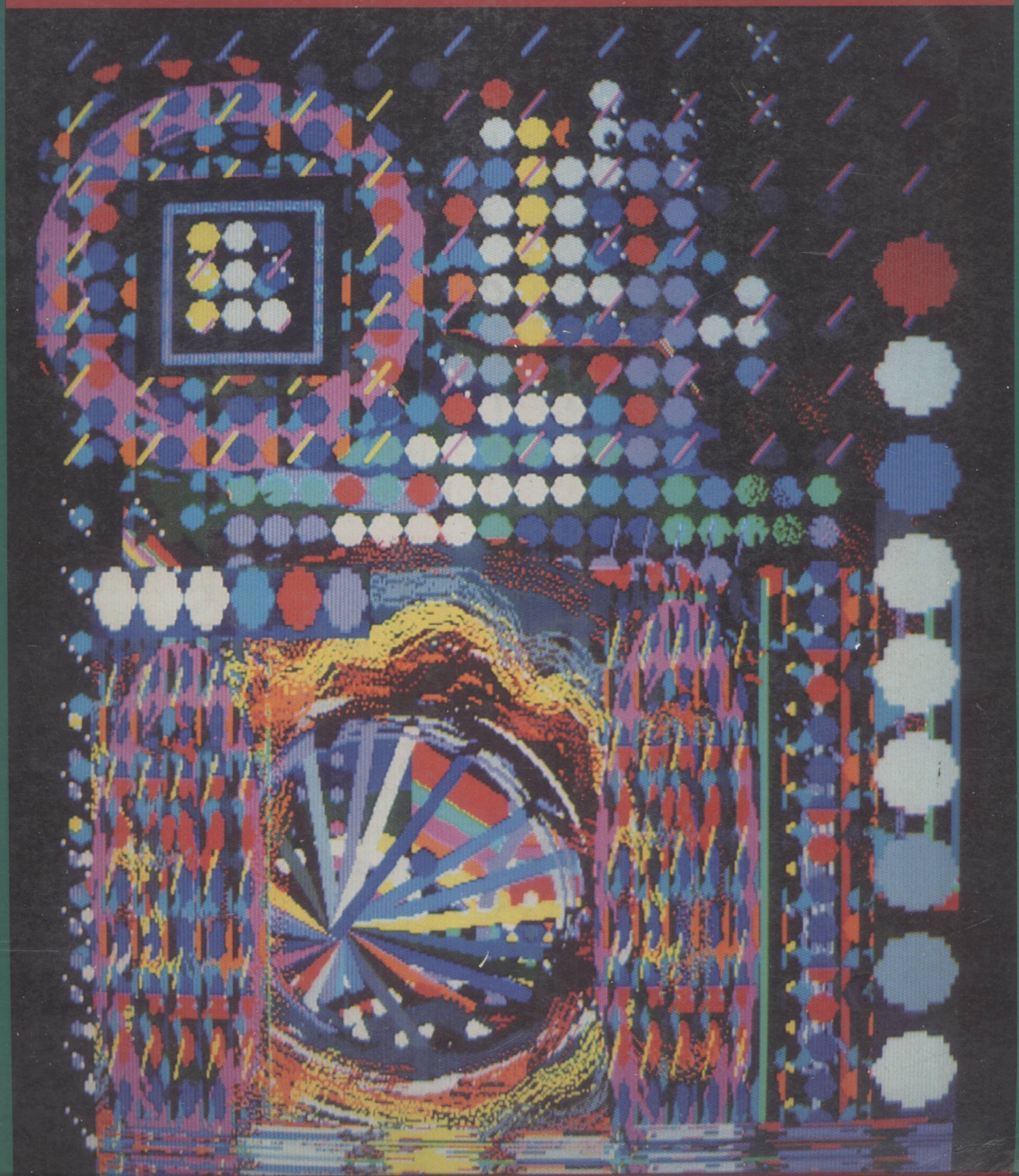
ROBERT H. BLISSMER

INTRODUCING COMPUTERS

1988-1989 COMPUTER ANNUAL



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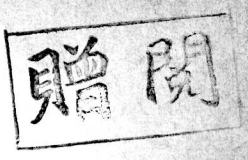

ROBERT H. BLISSMER

INTRODUCING COMPUTERS

CONCEPTS, SYSTEMS, AND APPLICATIONS

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1988-1989 COMPUTER ANNUAL

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This book is dedicated to
Dean, Staci, and Jennifer.

ABOUT THE AUTHOR

Robert H. Blissmer is the editor of *Business Solutions*, a computer-industry magazine, where he enjoys keeping his fingers on the pulse of the dynamic and changing computer field.

When he graduated from college, Mr. Blissmer had no idea that he would wind up in a career focused on computers, but his first job was as a COBOL computer programmer. He then became a systems analyst.

As a college professor in the 1970s at Orange Coast College and Cypress College in California, he taught computer, business, and general design courses. In addition, he designed, implemented, and directed a college-wide interdisciplinary studies program. While on sabbatical he worked with R. Buckminster Fuller, directing a World Game international design conference and designing an exhibit for the United Nations Habitat conference in Canada.

Following the completion of these projects, he began devoting more of his time to writing. His articles have appeared in numerous computer-industry publications. He is also the author of several other computer textbooks.

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PREFACE

Introducing Computers is an introductory textbook to be used in a first course in computer literacy, information systems, or data processing. It is a comprehensive, up-to-date survey of concepts, systems, and applications for learning about the fast-growing computer field and how computers relate to everyday life. The following key points have been integrated into the book to make learning easier.

- The book is updated annually. The changes from previous editions (*Computer Annual*) reflect the feedback from teachers and reviewers and the need to keep pace with rapidly changing technology.
- The book is comprehensive. It covers all key topics of computers and information systems. Nothing important has been omitted.
- The style and content of this book, along with its breadth of coverage and visuals, make this book a basic reference for nonspecialists who need information about computers.
- The focus of the book is personal computers—their uses, applications, and relationships to other types of computers.
- The book not only teaches concepts but places them in a context sothat you can better see how they can be applied to practical use.
- The book maintains a humanistic perspective. Computers do not operate by themselves. They are always a part of a larger system that includes people and an environment from which information is received and returned.
- The book explains the material without getting bogged down in technical details.

OVERVIEW OF THE BOOK

Section One—An Overview of Computer Systems—begins with a nontechnical overview of computer systems, and lays the ground rules for further learning.

- **Chapter 1, Getting Started,** introduces all of the important information systems concepts, and the hardware components of a computer system.
- **Chapter 2, Using Personal Computers,** covers the concepts of application software, such as word processing, spreadsheets, database management, graphics, communications, and integrated software as well as the role of an operating system.
- **Chapter 3, Computers and Society,** rounds out the overview by examining the role of computerization: the actual reshaping of society by the widespread adoption and use of computers. It also shows you several ways to cope with computerization.

Section Two—Computer-Systems Hardware—contains detailed coverage of how basic computer subsystems (input, output, processing, and storage) apply to information systems.

- **Chapter 4, Input,** explains the role and function of computer input, and contains comprehensive explanations of the types of computer input.

- **Chapter 5, Output,** discusses the role of output with a focus on types of output devices and their uses.
- **Chapter 6, Processors and Memories,** covers the important concepts and technical terms that are used to describe processors, memories, and computer systems. Also included are an evolution from mainframe computers to microcomputers and a useful comparative analysis of the types of computer systems.
- **Chapter 7, Mass Storage,** discusses files, how data are stored, the various devices on which data can be stored, and optical storage systems.

Section Three—Developing Computer Systems—is an overview of the major software and hardware concepts and the methods used to develop computer systems. The section explains these concepts in nontechnical terms so students can understand them.

- **Chapter 8, Systems Analysis,** is an overview of the role and process of systems analysis. It explains the process so that novices can begin to apply the principles in selecting and designing computer systems.
- **Chapter 9, Software Development,** explains the process of software development and programming.
- **Chapter 10, Hardware Development,** explains the role of hardware development and highlights the difference between hardware and software.

Section Four—Computers and Information Systems—discusses the changes in how organizations view computer-based technology, along with an explanation of that technology and the role it plays.

- **Chapter 11, Communications,** is a broad overview and explanation of how communication plays an important role in computer and informations systems.
- **Chapter 12, Database Management Systems,** explains the role that databases play in an organization's information systems. It discusses the principles, concepts, and technology of database applications.
- **Chapter 13, Office Automation,** discusses the need for and the technology of the office of the future.
- **Chapter 14, Artificial Intelligence and Robotics,** is an explanation of two emerging computer fields. It covers topics such as expert systems, natural language processing, robots, and factory automation.

Section Five—Appendixes—covers important and useful resource information.

- **Appendix A, The Evolution of Computer Systems,** is a comprehensive list of important events that played a major role in the modern computer's development. It presents the evolution of computer systems in timeline form.
- **Appendix B, Computers and Careers,** provides useful guidelines about careers and up-to-date salary information.
- **Appendix C, Shopping for a Personal Computer System,** is a minicatalog of personal computer software and hardware, along with helpful hints and guidelines for selecting a system.
- **Appendix D, Number Systems, Data Representation, and Codes,** explains the concepts of how computers represent and store information.
- **Appendix E, Glossary,** is a comprehensive dictionary of computer-related terms.

CHAPTER STRUCTURE

This book has been organized to aid the learner. Each chapter contains the following information to reinforce learning:

- **Preview.** This is a succinct overview of each chapter that states the major concepts clearly and concisely, so that the body of the chapter can hone in on the details. It includes a bullet-list summary of the key concepts presented in the chapter.
- **Highlights.** When a new or key term, idea, or important concept is introduced, it is highlighted in ***boldface italic*** type, then defined.
- **Applications.** Each new idea is accompanied by an explanation in the

form of an application (i.e., how the idea or device is used).

- **Photographs and Illustrations.** Each major concept and idea is accompanied by a visual illustration or photograph to enhance and reinforce the narrative material.
- **Review.** Chapter summaries provide a review of key points and ideas.
- **References and Resources.** An annotated bibliography is provided to direct you to additional in-depth reading on the subject.
- **Study Guide.** A built-in workbook at the end of each chapter includes matching key terms with definitions, true/false, multiple choice, and short answer/discussion questions. Answers to matching, true/false, and multiple choice are printed in the book to reinforce learning.
- **Software Exercises.** A set of generic exercises are designed for hands-on use with your word processing, spreadsheet, and database application software.

SUPPLEMENTS

- **Instructor's Manual.** The Instructor's Manual contains suggested syllabi, classroom teaching suggestions, chapter-by-chapter outlines, transparency masters, and additional background information.
- **Test Bank.** There are 2600 questions available on Autotest and Microtest formats, as well as in printed and bound form.
- **BASIC Programming Supplement.** The BASIC supplement teaches problem-solving skills and the fundamentals of computer programming in structured BASIC.

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This book would not have been possible without its editor, Susan Saltrick, whose foresight continues to allow the book to grow and evolve. My sincere thanks for the help and assistance that was provided during the design and production phases of the book by the following people at Wiley: Carolyn Henderson, Barbara Heaney, Maddy Lesure, Deborah Herbert, Caren Parnes, Sara Lampert, and Chris Cosentino.

I thank the following reviewers whose comments, ideas, and feedback greatly influenced the contents, scope and form of this edition of *Introducing Computers*: Ronald R. Bush, Austin Community College; Michael Feiler, Merritt College; Janina Lupkiewicz, Montana College of Mineral Sciences and Technology; David Hunter, Muskingum College; Paul Aho, Michigan Technological University; Eleonore Hammonds, Eastern New Mexico University.

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Robert H. Blissmer

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SECTION ONE

AN OVERVIEW OF COMPUTER SYSTEMS

PREVIEW

Everyone is telling you that you must become computer literate. That simply means using computers as problem-solving tools—a goal that is accomplished when using a computer becomes fluent, productive, and enjoyable. How do you become computer literate? First, you must become fluent in the language and vocabulary of computers. Chapter 1 will get you started, by explaining the major concepts, ideas, and terms, and by putting them in the context of the big picture of computers.

As with any problem-solving tool, you must understand what computers can and cannot be used for. What is the value of computers to you as an individual? Chapter 2 presents the computer as personal tool, discusses the applications for personal computers, and sets the stage for hands-on exploration with computers.

Computer literacy, however, could be shallow without an understanding of how the computer's influence goes far beyond personal uses. In Chapter 3, you will see that there is indeed a big picture, but it is not always a rosy one. Computers are changing our work, education, and everyday lives. Chapter 3 rounds out the big picture by discussing the causes, implications, and problems of the computerization of society.

The major topics introduced in this section include

- What is a computer?
- The three Rs of computer literacy.
- An overview of computer concepts.
- An overview of personal computer systems.
- Personal computer software.
- Packaged application software.
- Software for writing.
- Spreadsheet software.
- Database software.
- Graphic software.
- Communications software.
- Integrated software.
- The computerization of society.
- The information society.
- The economics of information.
- Crime, security, and privacy.
- Software piracy.
- How technology fuels change.
- Responses for a changing society.

STEVEN P. JOBS

Profession: Founder and chairman of Next Inc., Palo Alto, Calif.

Profile: Jobs is best known for co-founding Apple Computer Inc., with Stephen Wozniak. In recognition of his pioneering work, Jobs was awarded the National Technology Medal by President Reagan in 1985. He left Apple in 1985 to found Next Inc., where he plans to manufacture and sell a personal-computer workstation for education and business.

Quote: *"The college worker of today is the knowledge worker of tomorrow."*

CHAPTER 1

GETTING STARTED

PREVIEW

Learning about computers is like taking a journey to an interesting new country. It is an adventure—filled with creative, interesting, and challenging excursions. On any journey, you will find shortcuts, alternative routes, and interesting places to stop for a while. You may also get lost as you come across the use of unfamiliar language and customs; therefore, it is wise to consult a guide before starting out. This chapter serves as such a guide—a description of the territory you are going to encounter in the rest of the book.

To do this, it will provide you with a current map of the overall territory. First, it will define the term computer and show you some different types of computers and different uses for them. Second, it will give you some tips and guidelines that you can use for learning about computers and their uses. Third, it will translate the computer language that you will find along the way into an easy-to-learn and easy-to-use set of concepts for everyday use. Finally, it will give you an overview of personal computer systems so that you can apply the concepts and understand what computers are and how they can be used.

In this chapter, you'll learn

- What a computer is and what it can do for you.
- The types, sizes, and categories of computer systems.
- The three Rs of computer literacy.
- The basic concepts of systems, information, communication, hardware, software, and applications.
- The role of personal computing in larger systems.
- The function of a keyboard, display, system unit, disk drive, and printer.

WHAT IS A COMPUTER?

Have you ever been asked the question, "What is a computer?" If not, try to answer the question now. If you have some difficulty, do not be surprised. The term computer has been used in a wide variety of ways and tends to mean different things to different people.

A ***computer*** can be thought of as an electronic device that is capable of performing the following tasks:

- Responding in a predictable way to input.
- Processing that input according to a set of instructions.
- Storing the instructions and the results of processing.
- Providing output in the form of information.

This general definition may be applied to a wide variety of devices. It also emphasizes function: it tells what the computer does rather than what it is. The only mention of equipment appears in the words electronic device. To help put this definition in perspective, let us look at some examples of what a computer can do for you.

What computers do for you. *This musician is using his personal computer to compose, record, and playback music.*

WHAT COMPUTERS DO FOR YOU

People's perceptions of computers are often determined by the reasons they use them. Not long ago, computers were used only for rather routine tasks, such as keeping records for government agencies, tracking paychecks for accountants, and "crunching numbers" for scientists and engineers. Today, computers are used in more imaginative ways. Dancers, writers, and historians rarely given to number crunching have discovered that computers can help them, too. Computers are being used to choreograph dances, provide access to works of literature, and instruct history students in the intricacies of life in seventeenth-century France through game-like simulations.

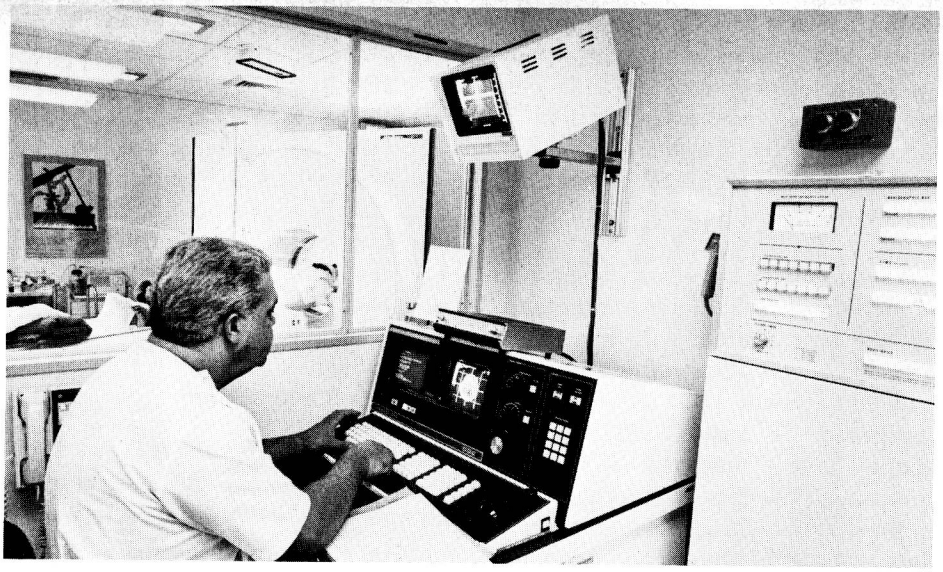
More people are using computers in one way or another, whether playing a game, learning a history lesson, or obtaining information. Why is this so? Dazzling technology aside, sociologists and psychologists point to a basic human need. In this age of big business, big government, television viewing, and spectator sports, people sometimes feel detached and uninvolved. In contrast, the computer offers involvement, participation, and immediate feedback.

- The computer is active, not passive.
- The computer can question you and respond to questions in a two-way conversation.
- The power to take control of a computer and make it respond to your bidding is literally at your fingertips.

TYPES OF COMPUTERS

Computers come in a wide variety of types and sizes, so it is useful to sort them out by their categories. The broadest categories are special purpose and general purpose.

Special-purpose computers are dedicated to only one function: controlling the machines in which they are embedded. They have been given a permanent set of instructions. In ef-



Types of computers. *Computer-aided tomography scanner (CAT scanner) uses a special-purpose computer to collect, analyze, and display medical information.*

fect, they have been preprogrammed to perform their specific purpose.

For example, tiny, hidden special-purpose computers tell you what time it is on your digital watch, control traffic signals, and inject fuel into your car's engine as you drive. Some even speak to you, telling you that your car door is open or that your car is low on gas. They help you scramble eggs in your microwave oven or unscramble programs on your cable TV decoder box. In your telephone, they remember numbers and even dial them for you at the press of a button.

Not all special-purpose computers are small. The navigational computers aboard the space shuttle, the computers found in sophisticated military aircraft, and those found in medical diagnostic equipment are typical examples of medium- to large-scale special-purpose computers.

Other computers that you might be aware of have such brand names as IBM, Apple, Atari, or Commodore. These computers differ from their special-purpose cousins by being programmable; that is, their operation can be changed by altering the instructions or programs they are given. Being programmable, they become ***general-purpose computers***. They can be adapted to many situations if given appropriate programs. For example, there are programs that can help store and organize data, sort data alphabetically (or any other way you choose), write letters and reports, and generate charts and graphics. Like special-purpose computers, general-purpose computers also come in a wide range of sizes and capabilities.

Some smaller general-purpose computers, often known as personal computers or microcomputers, are designed for use by individuals, such as executives, office workers, and engineers. Larger and far more expensive computers, called mainframes, are designed to process large amounts of data and to be shared by many different people in businesses, government agencies, and scientific and educational institutions. In between the

Types of computers. *Some of the many uses for special-purpose and general-purpose computers.*

Special purpose	General purpose
Watches	Data processing
Traffic signals	Writing
Automobiles	Calculating
Appliances	Record keeping
Telephones	Education
Airplanes	Accounting
Spaceships	Graphics
Instruments	Entertainment

Types of computers. *With the right program, a general-purpose personal computer can be used for almost any task.*

two in size and price are the minicomputers or midrange computers, which are suitable for use in departments, branch offices, factories, and scientific laboratories. In Chapter 6, you will learn more about these traditional categories of computers and their uses.

Of course, we have barely begun to scratch the surface. Later in this chapter, the term system will be used to describe a computer; after that, you will learn about what is inside the computer. Be aware that technical people have a tendency to describe computer concepts in complex specialized terms. This is the major reason the computer is understood so poorly by the general public. Therefore, you must acquire some fundamental knowledge and skills before you can fully appreciate what a computer is or what it can do for you. The following set of guidelines will help you become computer literate.

THE THREE Rs OF COMPUTER LITERACY

Computer literacy is the knowledge and skills required to make using a computer a fluent, productive, and enjoyable task. As an analogy, think of the little red schoolhouse of yesteryear. There, reading, writing, and arithmetic were considered to contain the fundamental knowledge and skills required for people to participate fully in the world in which they lived and worked. Those three Rs were always associated with the common-sense rules for preparing oneself for life; even though they seem quite simple, they took years to learn and master.

Today, common sense may dictate a slightly different approach. The computer is changing the nature of education, business, government, and everyday life. Soon everyone in our society will need a basic knowledge of and skill in using computers. What is a common-sense three Rs approach to computer literacy? Simply put, it is to

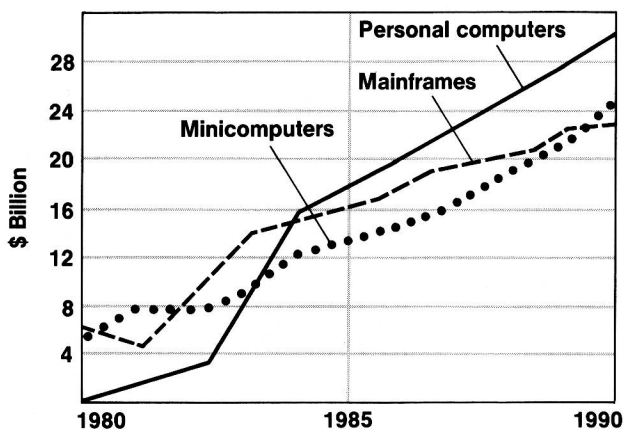
- Read about computers.
- Obtain real experience with computers.
- Write computer programs.

With a relatively modest effort on your part, you can reap some of the rewards that are waiting for those who can use computer literacy as a springboard for personal and professional growth.

READ ABOUT COMPUTERS

The day will come when computers will be just like other consumer products. You will buy them, take them out of their box, read a few simple directions on a single sheet of paper, and begin using them immediately. Because this is not the case today, reading is an excellent way to acquire basic knowledge about computers and their uses. There are two approaches for reading about computers.

The first approach for you, as a novice, to take is to gather general knowledge. This book will help you to translate a highly specialized and computer-related language into an easy-to-learn language for everyday use. Discovering a new language for communicating knowledge about something means discovering a new tool for solving problems. To aid you in this pursuit, appropriate references and resources have been listed at the end of each chapter. They will point you to more detailed knowledge about the subjects discussed. Reading these selections will help you gain the knowledge to make intelligent choices about computers and their uses. These selections will also help you discover uses for computers that you could not have imagined in advance. Whether



Mainframes, minicomputers, and microcomputers. *By 1985, worldwide personal computer shipments surpassed those of other categories. (From International Data Corp. © 1986. Reprinted by permission.)*

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