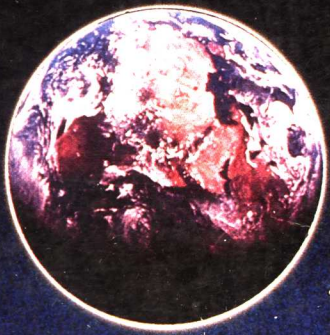



COMPUTERS

IN TODAY'S WORLD



GARY G. BITTER



COMPUTERS IN TODAY'S WORLD

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Preface

This book is for the student, teacher, or layperson who wishes to become familiar with computers. It can be used for general reading, as an introduction to computers, or as a textbook in computer literacy classes.

The book explores the functions of computers and their role in society and education. No previous expertise is required to follow the discussion of the how's and why's of computer technology as it is traced from fingers to the introduction and acceptance of home computers. Each step in the development of the four computer generations is examined and illustrated. The fundamental questions "What is a computer?" and "How does a computer work?" are explored with a minimal use of computer terms (jargon). Software and hardware are described, and the computer language software used for different professions and applications is illustrated with sample programs. Large, medium, and small computer systems are compared and analyzed. An entire chapter is devoted to the home computer, alias microcomputer or personal computer. Each system is considered from the standpoint of its capabilities and applications.

Computer errors are discussed, and examples are given of errors often blamed on computers that are usually related to human failures. The book also shows how computers can make errors and describes how these errors arise.

The general uses of computers are outlined in Chapter Nine, with discussions on data bases, simulation and modeling, word processing, artificial intelligence, and problem solving.

Computer applications in many professions and occupations are highlighted in the specific chapter on computer uses. Education, medicine, industry, scientific, and business applications are explored, with an emphasis on the role that computers play in our daily lives. Since computer misuses are becoming commonplace in our society, one chapter is devoted to this important topic—so that readers will understand the societal implications of computer usage.

The chapter on computer careers summarizes the professions related to the computer, acquainting users of the book with the responsibilities of a particular computer occupation. The discussion explores all of the levels of skills and abilities needed to meet the job requirements of the computer revolution, enabling readers to determine their interests in pursuing a computer career. The last chapter deals with prospective computer applications and their implications for the future. Ideas are provided to stimulate a better understanding of the impending impacts of the computer on our lives.

Additional discussions of software, hardware, logic, and binary arithmetic and also a glossary of computer terms are provided in the end-of-book appendices.

To stimulate readers further exploration of the topics discussed, each chapter of the text opens with objectives and vocabulary and contains end-of-chapter questions and activities. Those marked with an asterisk (*) refer to supplemental information presented in the margins and boxed material throughout the book.

Also available are the following teaching aids:

Student Study Guide. Extra student exercises in various formats reinforce the basic contents of each chapter. Specifically, the Study Guide includes chapter objectives, chapter summary, chapter outline, key terms and definitions, key vocabulary practice, related reading and activities, and self-evaluation practice questions.

Instructor's Manual and Test Bank. Included in the manual are hints to help the instructor discuss the contents of each chapter utilizing the transparency masters as well as outlines of assignments. Numerous test items help evaluate the student's comprehension of the objectives outlined in each chapter. Specifically the manual includes for each chapter, lesson plans with chapter objectives, key concepts, key vocabulary, a class outline, assignments, related activities, related readings, and transparency masters. The Test Bank has multiple-choice, true/false, matching, and fill-in items. Quarterly exams are included.

Transparency Masters. Key tables, figures, and charts in addition to other chapter contents are available for vivid presentation of the objectives of each chapter.

BASIC Programming Workbook. Students can use this easy-to-follow workbook on the BASIC language in conjunction with classes that require BASIC programming as part of the curriculum.

Pascal Programming Workbook. This easy-to-follow student workbook can be used in conjunction with classes that require Pascal programming as part of the curriculum.

Television Course. Contact the author for a syllabus utilizing films and *Computers in Today's World* for educational television computer literacy classes.

This book is designed to be used in the following courses:

- Computer literacy or awareness courses
- Introduction to computers or computer science
- Computers in society
- Computers in education
- Computer-related courses

In addition, the book can be used as supplementary reading for any class that emphasizes the computer revolution in society and education.

Finally, the book can be used for personal reading enjoyment. By using a low-key approach with a minimum computer vocabulary, the book makes computers more readily understandable in the world in which we live. If the reader,

after completing the book, feels more comfortable and less anxious about the computer and knows that it only does what it is told to do, then the book has served its purpose.

Remember:

A computer has no conscience.

It feels no passion.

It has no life of its own or any sense of value.

It is neither a poet nor a philosopher.

A computer in short is a machine, not a man, a fool or a tyrant.

Source: Unknown

Gary G. Bitter

Tempe, Arizona

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I personally thank all of my students who have enrolled in my computer classes at Arizona State University since 1970. Their interest and motivation were the impetus for this book.

I thank my wife for her constant support.

Finally, I thank my children and all other computer geniuses of the future—for their's is the future!

G.G.B.

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The Computer Scene: Computers in Our World

Objectives

Upon completion of this chapter, you will be able to:

1. Define the term computer.
2. Identify the general capabilities of computers.
3. Describe the differences between digital and analog computers.

Vocabulary

Analog computer
Application
Computer
Digital computer
Distributed processing
Nanosecond
Processing
Program

In metropolitan Phoenix, Arizona, a pizza parlor thrives, not only because of the tasty foods it offers, but also because of the unusual entertainment it provides its patrons: music played on a room-sized theater organ. The building was specially constructed to house the organ in rooms filled with special pipes, bellows, and contraptions to make different musical effects. The ghosts of the organ's inventors who fashioned the many parts into an instrument capable of producing the sounds of an entire orchestra seem to hover about as happy diners sing and tap toes along with the resounding tones.

The theater organ represents one of man's attempts at harnessing mechanical means to produce certain results. Even the ceiling fans at the pizza parlor are turned mechanically by a belt system crisscrossing the ceiling. Although contemporary technology has made the organ obsolete and unnecessarily cumbersome, we are fortunate that someone has preserved this musical giant for us to enjoy today.

If you want an organ that produces the sound effects of the one at the pizza parlor, you do not need a specially designed and equipped air-conditioned building in which to house it. In fact, technology now enables us to produce an organ not much larger than the keyboard on which it is played. This technology has resulted from the efforts of many people that you will read about in this book as well as the labors of many unsung heroes whose names are not recorded. These people contributed to the progressive development of automation until today a pint-sized computer can do the same amount of work that would have required a roomful of equipment years ago. Many geniuses participated in this advancement; some were microgeniuses, others minigeniuses, and still others supergeniuses. Using known technology as a springboard into the untried, these creative and innovative people helped to create the computer of our time, which has been adapted to many different areas.

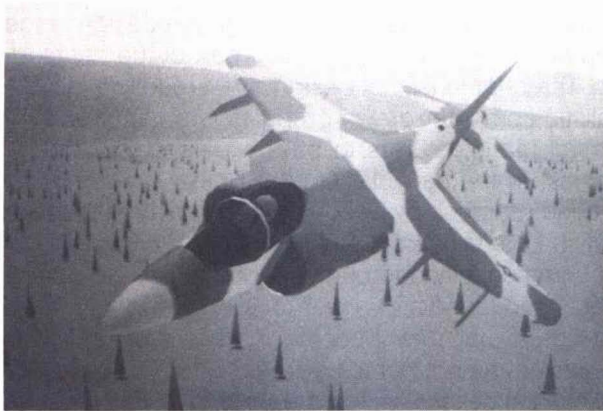
Not far from the musical pizza parlor is Williams Air Force Base where graduates of the Air Force Academy come each summer to receive training as pilots. They do not immediately begin their flight training in training planes because this would result in airplane crashes, lost lives, exorbitant fuel costs, and risks to civilians on the ground over which these fledgling pilots would be training.

A COMPUTER PLAYS MUSIC

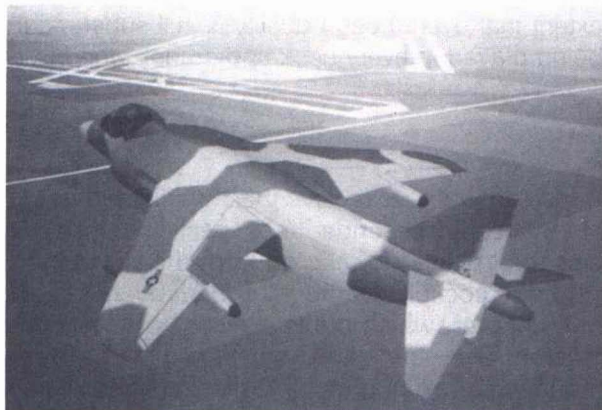
Computers may become music to your ears! Sony and Phillips Corporation are recording music changed to binary code on disks. When a disk (which looks like a regular 45 rpm record) is played, a tiny laser shines on the disk and the sound is heard. Right now, when music is recorded on the disk, 44,000 separate waveheight measurements are taken per second—much faster than the "old way." But—important to followers of the latest music craze—a 4.7-inch-diameter disk contains 3 miles of music and plays for one hour. Just imagine: 3 miles of punk rock!

COMPUTER GRAPHICS

In a recent space shuttle flight, computer graphics were used to simulate the terrain being passed below the shuttle. When the graphics displayed the desired terrain, special cameras were turned on to survey the land. The results: the hunt for deposits of natural resources was shortened dramatically as time was not wasted photographing land that did not possess the characteristics required.



Computer graphics of the terrain being passed over in flight simulation. The U.S. Marine Corps AV-8B Harrier II multirole combat aircraft uses the CT5-A System to create strikingly realistic graphic displays for pilot training.



COMPUTER GRAPHICS LIBRARY

Although computer languages are becoming easier to use, top executives still hesitate to operate a computer keyboard in front of other executives. Executives may wish to use computer graphics to explain major points, but they were not raised in the electronic age. One development that aids the flow of information from the data in the computer to the corporation board meeting without use of keyboard and terminal is a screen that enables charts and graphs to appear when the screen is touched. Mathematical formulas and color charts are stored in the computer along with the data base. The computer uses these to forecast future trends that can be presented visually at a board meeting simply by a touch.

COMPUTER AIDED DESIGN (CAD)

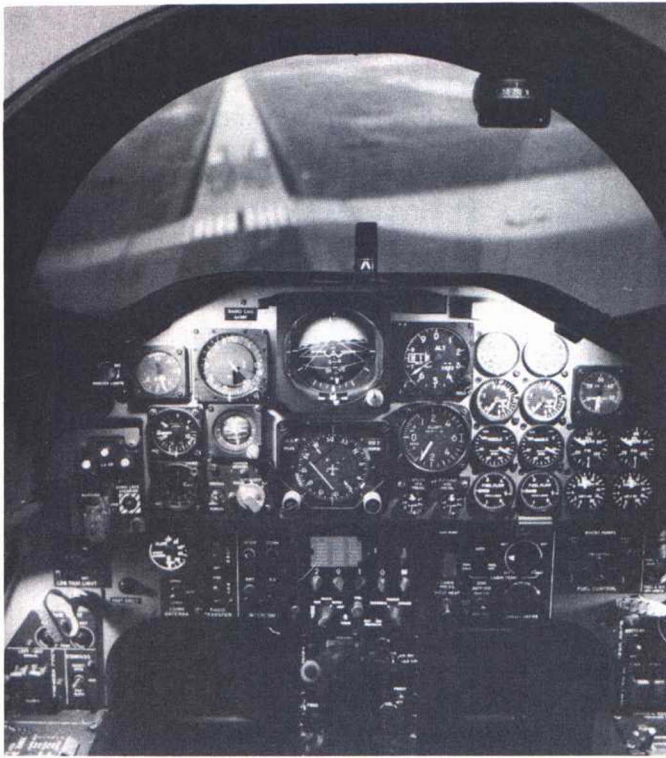
There is an interesting history of computer graphics. In 1950 the Whirlwind I computer generated a graphics display on a television-type screen; the display was then photographed to depict the solutions to scientific formulas.

By 1963 SKETCHPAD system by Sutherland made it possible to communicate with the computer and display the graphic results. Three-dimensional designing grew from the SKETCHPAD attempts. By the mid-1960s, automobile and airplane manufacturers were using graphics in the design stage of development. CAD (computer-aided design) is now a part of the development of many new products. Three-dimensional design is not readily available today, but in the future, realistic computer-drawn graphics is a certainty.

Xerox was one of the first manufacturers to offer a personal computer capable of displaying graphics. In the early 1970s, the British Broadcasting Corporation transmitted text and graphics by decoding the display at the television receiver. Next the British Post Office started viewdata (or videotex), an information system relaying communication through telephone lines to receivers and back to the sender. The Canadian version of videotex offers high-quality communication and setup that may become more popular. Further development will bring videotex into more homes at lower prices.

The entertainment field has successfully used graphics in motion pictures that depict life in outer space. Graphics in video games has caught on to the extent that even though quality is still substandard, the games are selling or being played in every nook and cranny where a unit can be plugged in.

Instead, trainees receive their first flight training in simulators. Here a student sits in a cockpit suspended in a specially constructed building. The trainee then directs the "plane" to take off from the runway on the television-type screen in front of the cockpit. As the pilot maneuvers the plane, the "flight" is monitored by a computer, which prints a record of the flight to be examined by the flight instructor. The simulation experience is made possible by a combination of computers performing many tasks. Especially interesting is the use of computer graphics to provide a constantly moving terrain and skyline that recreate the sensations of actual flight for the trainees.



At Williams Air Force Base, near Phoenix, Arizona, pilots train in this cockpit which uses simulation technology to recreate flight conditions. The scene displayed on the screen in front of the pilot gives the illusion of flight.

MACHINE OF THE YEAR

Readers of *Time* magazine were surprised to learn that, after 55 years of usually featuring people of great importance on their "Man of the Year" covers, *Time* departed from tradition in 1982 by selecting the computer as "Machine of the Year." In support of their unorthodox decision, *Time* observes:

It is easy enough to look at the world around us and conclude that the computer has not changed things all that drastically. But one can conclude from similar observations that the earth is flat, and that the sun circles it every 24 hours. Although everything seems much the same from one day to the next, changes under the surface of life's routine are actually occurring at almost unimaginable speed. Just 100 years ago, parts of New York City were lighted for the first time by a strange new force called electricity; just 100 years ago, the German engineer Gottlieb Daimler began building a gasoline-fueled internal combustion engine. . . . So it is with the computer.

Source: Michael Moritz, Madeleine Nash, and Peter Stoler, "The Computer Moves In," *Time*, January 3, 1983, Vol. 121, No. 1, pp. 14-24.

Chances are that you have not had the opportunity to play a computerized organ or to "fly" in a simulator, but consider the impact on your life of computers performing numerous tasks they could not perform until a few years ago.

The telephone is another device that demonstrates the rapid advancement of technology in recent years. You simply dial and then wait several seconds to be connected to practically anywhere in the world.