

# THINGS TO DO WITH YOUR ATARI® COMPUTER



JERRY WILLIS, MERL MILLER,  
& NANCY MORRICE





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# THINGS TO DO WITH YOUR ATARI® COMPUTER

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by

Jerry Willis

Merl Miller

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SIGNET, SIGNET CLASSIC, MENTOR, PLUME, MERIDIAN,  
and NAL BOOKS are published by The New American Library, Inc., 1633 Broadway,  
New York, New York 10019.

First Printing, November, 1983

1 2 3 4 5 6 7 8 9

PRINTED IN THE UNITED STATES OF AMERICA



This book is the result of the creative efforts and research talent of the editorial staff at dilithium Press. The authors gratefully acknowledge the work of the staff and would like to publicly recognize each of the people who contributed to the creation of this book:

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## CHAPTER ONE

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# Introducing the ATARI Computer

This book was written for people who own or are considering the purchase of an ATARI computer. The material in this book is applicable to the two older ATARI models, the 400 and 800, as well as the four new ATARI computers, the 600XL, 800XL, 1400XL, and 1450XLD. In this book we will show you what can be done with a personal computer like the ATARI. We will give you detailed information on many of the programs that run on ATARI computers.

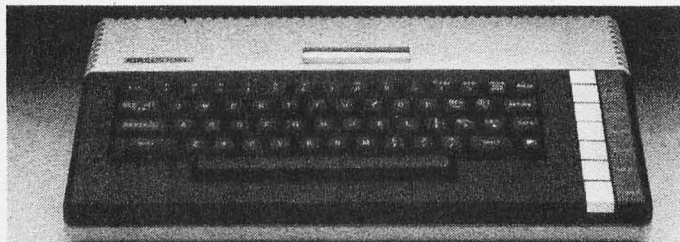
Atari is a division of Warner Communications, a large conglomerate with interests in cable television, paperback book publishing, movies, and records. The Atari division makes computers as well as home and arcade video games. Atari has been in the news recently for several reasons. First, the company lost millions of dollars in 1983. Sales of their video games were less than predicted, and sales of the cartridges were well below expectations. Atari once dominated the video game market but now faces stiff competition from companies like Coleco and Mattel, who manufacture competing games, and from at least fifty companies who develop and distribute video game cartridges for the ATARI video game machines.

All was not rosy in the home computer market for Atari, either. The company spent millions on advertising, developed a large range of software for its computers, and had two very competitive personal computers—the 400 and 800. In spite of that, ATARI computers have never been more than fourth or

**Figure 1.1 The new ATARI Home Computer line.**



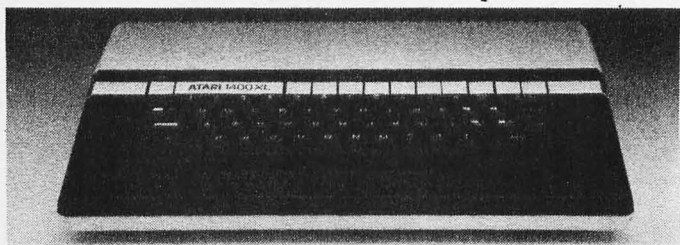
**ATARI 600 XL Home Computer**



**ATARI 800 XL Home Computer**



**ATARI 1450 XLD Home Computer**



**ATARI 1400 XL Home Computer**

fifth most popular in the personal computer market. Atari threw everything they had into the competitive fray, however. Executives at the California headquarters came and went with distressing speed and regularity. The advertising budget was increased several times, and Atari even offered hundreds of thousands of dollars in awards, royalties, and prizes to ATARI owners who sent the Atari Program Exchange (APX) programs that were good enough to be sold to other Atari owners. The APX catalog now lists hundreds of very good programs that were written by people who bought an ATARI and wrote programs for it. Atari even joined the competitive price wars of 1981 through 1983. The ATARI 400 was selling for less than \$99 when this book was written, partially because the models that will replace the 400 had already been announced.

With all the effort Atari put into their computers, why were they failures? The answer is quite simple. They weren't. If you own an ATARI, you have an excellent machine. There are many models that do less and cost more. Many people in the computer business classify a computer a success only if it holds the top position in its market. Atari has never achieved that goal, but hundreds of thousands of ATARI 400 and 800 computers have been sold, primarily for use in homes and schools. These computers are reasonably priced and well-supported by the company. They are easy to use, have some unique and desirable features, and run a wide range of programs.

Atari isn't the top seller in its market because its computers generally cost a little more than some of the competing models. For the extra price, however, you generally get more features and a computer that can run lots of good programs. Even with a better computer at a reasonable price, Atari hasn't come close to toppling the Apple II from the top of the heap in general-purpose personal computers. Atari got into the computer field later than Apple, after Apple had become almost synonymous with personal computers. That head start is hard to overcome. In addition, the ATARI computers are sold in fewer retail outlets than some of their competitors, such as the Texas Instruments 99/4A and the Commodore VIC 20, and there's less advertising for ATARI computers than for several competing models.

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All those reasons don't have a thing to do with the quality and usefulness of an ATARI computer. They are *marketing* issues that worry the people who own Warner Communications stock, but they don't detract from the fact that ATARI computers are some of the most versatile and most sophisticated of the moderately priced personal computers.

If you are not yet a computer owner, this book may help you decide if you really want to buy one. This book is one in a series on popular computer models. If you are shopping for a computer, you may want to read more than one book, so you can compare the features and characteristics of several different models. This information will help you select the best computer for your needs.

## WHAT'S IN THE REST OF THIS BOOK

Before a computer balances your checkbook or serves as your very own PAC-MAN arcade game, you should learn a bit about how it works and what it can do. In addition, you will quickly discover that there are many different ways of getting the computer to do a particular job. There are, for example, at least ten good word processing programs for the ATARI. There are hundreds of video games for it, some good, a few great ones, and many that can only be described as terrible. You won't want to buy everything that is available, but how do you decide? This book should help you make good decisions. It describes many of the programs currently available for the ATARI computer. We assume that you aren't a computer expert but would like to know a lot more about how you can use an ATARI computer in your office, home, or school. If you already own a computer and have considerable experience, you may still learn some new ways of using it while reading the chapters that follow this one. Each chapter in *Things To Do With Your ATARI Computer* introduces you to one area



of computer application. The chapters begin with some general background information. Then detailed information on programs or accessories for the computer is presented. This book won't make you a computer *expert*. Instead, it will help you become an informed consumer.

You can skip around in this book as much as you like. If you are interested in video games, for example, you don't need to read the chapter on business applications. Here is a list of the chapters and a short description of their content:

Chapter One. *Introducing the ATARI Computer*. In this chapter you find out what a personal computer is and some ways you can use it. We also give you a brief guided tour of the ATARI computer, and we introduce *software*.

Chapter Two. *Fun and Games*. This chapter describes the various recreational uses of the computer, with an emphasis on video games. It includes reviews of many of the most popular games.

Chapter Three. *Arts and Crafts*. You may not become a modern day Van Gogh or Bach, but there is more artistic potential in the computer than you might expect. It is more than a number cruncher! The ATARI computer has excellent color graphics and sound capabilities. There are some exciting music and visual arts programs written specifically for the ATARI systems.

Chapter Four. *The ATARI as Teacher*. There are two aspects of educational computing: the use of the computer to teach other academic subjects and the computer as a topic of study itself. Several hundred programs for the computer teach everything from number recognition to chemistry. In addition, there are many books and programs that help you become *computer literate*, all described in this chapter.

Chapter Five. *Home Finance, Record Keeping, and Health Care*. Each year family finances become more complex and require more records. The time it takes to keep track of family finances can be cut drastically by computerizing some of these tasks. Several programs for the computer can help you with home finance and record keeping.

Chapter Six. *Tapping into the World: Telecommunications*. Did you know the computer sitting on your kitchen table can

## 6 THINGS TO DO WITH YOUR ATARI COMPUTER

be used to communicate with other computers all over the world? You can get all sorts of information, from Italian train schedules to reviews of the latest movies.

Chapter Seven. *Word Processing*. Explains how the computer can be turned into a very smart electronic typewriter and word processor. The ATARI computers are excellent for home word processing use, and they are even used by some professionals and in a few small businesses. With the right programs, a good printer, and some practice, you can compose letters, write reports, edit term papers, and type up business forms.

Chapter Eight. *Business and Professional Uses*. Regardless of your profession or the type of work you do, there is probably some aspect of your daily activities that could be improved or made more efficient by using a computer. This chapter is a brief overview of the ways a computer can be used on the job, concluding with a description of some of the business software available.

Chapter Nine. *Programming*. Writing instructions that tell a computer what to do is called programming. Programming in the various languages available on the computer (for example, BASIC, PILOT, Logo) is described in Chapter Nine.

Chapter Ten. *Peripherals*. The final chapter in the book deals with the accessories you can buy for the computer. Disk drives, printers, monitors, and more are discussed in this chapter.

The remaining sections of this chapter introduce you to the personal computing phenomenon, explain some of the frequently used jargon, and introduce you to the ATARI computer.

## DO YOU HAVE TO LEARN TO PROGRAM YOUR COMPUTER?

You may have heard that you will have to learn to *program* the computer before it will do anything useful. While it's true your computer can't do anything until it gets a program written

in a computer language it understands, *you* don't have to write it.

Computer languages can take weeks or months to learn. Programs (software) that do complicated and useful things take time to write. Writing computer programs is an interesting hobby (or profession) thousands of people enjoy. You may decide that you want to learn to write programs in a language like BASIC (Beginners All-purpose Symbolic Instruction Code). (We'll talk more about BASIC and other computer languages in Chapter Nine.) Programming doesn't appeal to everyone who uses a computer, however. Fewer than ten percent of the people who own personal computers spend much of their time writing programs. This means the great majority of people do not write their own software. Instead, they buy software someone else has written. That's what we discuss in this book: ready-made software for the computer. We'll tell you about software that lets the computer do hundreds of things, where to get the software, and the strengths and weaknesses we see in it.

You can use your computer on many different levels. You may choose to regard your computer as you do any other appliance and simply use it as a labor-saving device. Or you may become fascinated with its internal workings and continue studying and learning about computers for the rest of your life.

This book is aimed primarily at those who want to use their computer as an appliance. If that is how you want to use yours, you won't have to learn too much of the computer jargon that is currently in vogue. The bad news is that you will have to learn a little jargon. You had to know a little jargon to learn to drive your car. Most of us learned the terms, concepts, and principles needed to drive a car as we were growing up. Common terms such as ignition, premium gas, gas pedal, and brake were *jargon* when the automobile was first introduced. Today these terms are taken for granted. The same thing will be true with computers. The next generation may well take for granted a computer on the dining table or in the recreation room. Kids will take terms like RAM and ROM in stride because they grew up with them and understand how to use computers. Unfortunately we are part of a transitional generation. We didn't grow up with this inexpensive and useful technology.

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We are *automobile literate* and *telephone literate*, but we aren't *computer literate*. We'll try to help you solve this problem in three ways. First, as we introduce each computer term, we define it. Second, we have a little introduction to computer terms and concepts later on in this chapter. Third, there is a glossary in the back of the book.

# HARDWARE AND SOFTWARE

Before we get into specifics, it is important that you understand two general computer terms. *Hardware* may conjure up visions of eggbeaters or pipe fittings, but it really refers to any piece of computer equipment. The computer itself is a piece of hardware, and so are other accessories, like printers or disk drives (See Chapter Ten).

*Software* refers to the programs that make your computer do a specific task. The mass media often make it seem very easy to make a computer do what you want it to. Television programs and movies often show people making a computer perform simply by talking to it. As you may have already discovered, your computer isn't that friendly yet. (Actually, we talk to our computers all the time, usually when they don't do what we want, and what we say is often x-rated!). Communicating with a computer today usually involves typing instructions on its keyboard or transferring information stored electronically on a *cassette* or *disk* into the electronic memory of the computer. The instructions a computer follows when it performs a particular task are called *software*. It takes software to make hardware useful.

## OH, NO! JARGON!

It's not as bad as all that. We're just going to give you a little guided tour of jargon as well as an introduction to the

ATARI computer. The least expensive model of the computer includes the power supply, keyboard, cassette I/O, and the main CPU circuit board (called the System Board). You need several more items just to get the computer to work (for example, a video display), and many people end up spending two to five times as much on options as they do on the basic ATARI computer. That is because the computer is an *unbundled* system. Many items, such as printer interfaces and the video display, are extra cost options on the ATARI. Instead of buying a system with everything you need to start computing, Atari sells a basic system and lets you select the options you want. For example, the ATARI will work with an ordinary television or a more expensive video monitor. You can select which type of display you want to use.

There are actually seven different models of the ATARI computer. The 400 and 800 are old models that will be discontinued when current inventories are exhausted. The 1200XL was an upgrade of the 800, which corrected some problems and added a few features. It is likely to disappear along with the 400 and 800. In their place are four new models—the 600XL, the 800XL, the 1400XL, and the 1450XLD. There are real differences between these four models, but all are based on the same essential computer design. The 600XL and 800XL, for example, are essentially the same computer with different amounts of memory. The 1450XLD is the same computer as the 1400XL with a high-capacity disk drive added.

We'll look at each of the major elements in an ATARI computer system.

## The Power Supply

The ATARI power supply is a small black box that plugs into a wall outlet. That power supply runs the keyboard console unit only. You may need other power supplies for accessories such as an expansion interface and disk drives.

## I/O Ports

I/O is an abbreviation for input/output. If a computer is to be of any use, it must be able to communicate with you. This basic function is called input/output. The places on the computer circuit board where I/O occurs are often called *ports*. The ATARI computer has several standard ports that allow you to communicate with it and it with you. Since the keyboard is the primary means of entering data and instructions to the computer, the keyboard port is built into the main computer console. All the ATARI models also have standard ports for connecting a cassette recorder and a video display.

All models have a slot for inserting video game cartridges and optional language cartridges. For example, you can buy languages such as PILOT and Logo in cartridges. On the 600XL and 800XL, the cartridge slot is on top just behind the keyboard. The other models have a slot on the side.

All models have connectors where you can plug in two joysticks or game controllers. There is also a *processor bus* connector where other accessories can be attached. Atari's least expensive models cannot be expanded internally, but you can connect an *expansion chassis* to the computer. This lets you connect modems, printers, and other accessories to the computer. The expansion interface has two *serial* interface ports and one *parallel* interface port. We won't go into the technical explanation of what serial and parallel ports are, but they are the two common types of general-purpose interfaces. Virtually all the printers available for personal computers must be connected to either a serial or a parallel port.

## Keyboard

Atari has wisely dropped its plastic membrane keyboard model, the 400. There is no equivalent to the 400 in the new model lineup. All four systems have a standard format key-

board with sixty-two separate keys; it's one of the better keyboards in that price range. It has a good feel to it; there should be no problem touch-typing on even the least expensive model, the 600XL. One desirable feature of this keyboard is the set of five programmed function keys on the right side. There are HELP, RESET, START, SELECT, and OPTION keys. (On the 1400XL and 1450XLD these keys are at the top of the keyboard along with four additional programmable function keys.) A programmed function key is a key that gives the computer a particular instruction. The START key, for example, is used in many games to tell the computer you are ready to begin playing. A programmable function key is one that can be used for a variety of different purposes. The same key might be used for a different purpose in different programs. Having both programmable function keys makes it easier to use the computer.

## Video Display

Atari decided to stay with a 24-line by 40-character display format for all four of its models. That is, the computer will display a maximum of 24 lines of 40 characters on the screen of your video monitor or television. This has become the de-facto standard for computers designed for home use with a color television. The Commodore 64, Apple IIe, and several others have similar display formats.

The ATARI computers have a built-in modulator that lets you use an ordinary television as a video display. A modulator costs extra on computers from several competitors. The ATARI can display standard upper and lowercase characters and a set of graphics symbols that are used for low-resolution graphics. *Low-resolution* graphics are relatively crude graphics that replace letters and numbers with graphics symbols of the same size.

The display of ordinary text is sometimes called an *alphanumeric display* because it is made up of letters and numbers. The ATARI computer can also display graphs, figures,



and illustrations. If the video monitor has a picture of an ocean with a ship riding at anchor on a blue sky summer day, you have a *graphics display*. What you see on the screen is composed of special graphics characters. High-quality graphics displays that show fine detail are made up of tiny dots of color called *picture elements* or *pixels*. The ATARI computer can create high-quality pictures and figures made up of thousands of tiny colored pixels. Graphics of this type are called *high-resolution* or *HI-RES* graphics. The computer's high-resolution graphics uses a screen format of 320 lines of 190 pixels.

Color graphics are a strong point of ATARI computers. Atari pioneered the use of special integrated circuits to improve the quality and range of color graphics in a home computer. ATARI computers let you select from many different types of *display modes*. There are modes, for example, that let you use banner-style letters that are much bigger than normal characters. The computers also have low, medium, and high-resolution graphics modes that turn the computer screen into a medium for displaying excellent color graphics. There are even modes that let you use most of the screen for graphics while printing standard text messages or instructions at the bottom.

The 24-by-40 format for displaying text is fine for home use, but ATARI's use in professional and business applications has been limited by this format. You need 24 or 25 lines of 80 characters on your display to get maximum benefit from a business computer. Several companies offered video upgrade kits for the 400 and 800 computers. For the new models, Atari itself plans to offer a video upgrade that will give you 24 lines of 80 characters. The video upgrade will be part of the CP/M module, which is discussed later in this section.

Atari kept the 24-by-40 format as its standard because ordinary color televisions cannot handle 24-by-80. The characters are too fuzzy to read. All the ATARI models can also be connected to video monitors. They cost from \$300 to \$600, but you will get higher quality in the display, particularly when you use color graphics. Commodore, a major competitor of Atari, has an inexpensive color monitor that works well with ATARI computers.

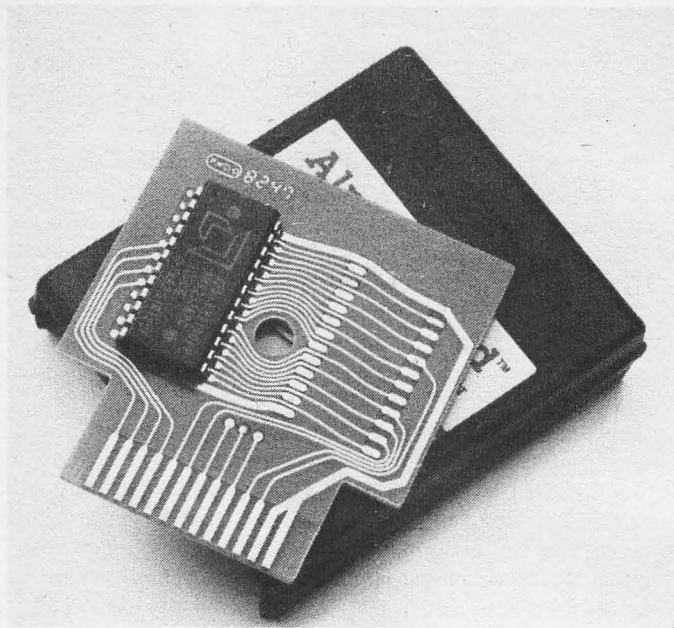
## Sound

The ATARI computers have a four-voice synthesizer. Four *voices* means the computer can generate and independently control up to four different sounds at once. Atari uses the speaker in the television or video monitor for sound output. ATARI's BASIC programming language includes keywords that let you control the voice synthesizer. You can also get several pieces of software that turn the computer into an electronic piano or music composer. Many different types of sound effects are also possible on these computers.

Both the 1400XL and the 1450XLD also have a built-in speech synthesizer, which means the computer can talk to you through the television speaker. The speech synthesizer will take text like HELLO HOW ARE YOU? and translate it into speech. You can get a higher quality of speech by converting English words or phrases into phonemes and typing in the symbols for the phonemes. Either way, the quality of the speech generated by the ATARI computers is good.

## Memory

When you press a key on the keyboard or load a program into the computer from a cassette or disk, there must be somewhere to put that information. Each letter you type in is converted to a code and stored in the memory of the computer. All computers convert characters into ones and zeros (on and off electrical signals). The letter A, for example, has the code 01000001. Such a set of eight digits is called a *byte*, and each of the ones and zeros is called a *bit*. Seven of those bits are used to define the code for each character the ATARI understands. The eighth is usually added to the character code so the computer can check for errors. This process, called *parity checking*, will not be discussed here. Bytes, the eight-bit pat-



**Figure 1.2 ROM cartridge**

terns, are the fundamental code units for the ATARI and for most small computers.

Memory inside the computer is also divided into bytes. One byte of memory can hold the electrical impulses that represent eight ones and zeros. Every letter, digit, graphic symbol, and punctuation mark the computer understands has a unique code that is one byte (eight bits) long. There is not a place in the computer where an A or B or 7 or + is stored. Instead, each of those symbols has its own one-byte code. This code is what is stored in the memory of the computer.

Even the \$199 ATARI 600 comes with over 40,000 bytes of memory, but not all of it is available for general use. There are actually two different types of memory in the ATARI computer: RAM and ROM. ROM stands for read only memory. This type of memory is generally programmed at the factory.

The contents of ROM cannot be changed by the user. There are a little over 24,000 bytes of ROM in the ATARI computer. The instructions that allow the computer to understand a version of BASIC, a popular computer language, are in ROM. When the ATARI computer is turned on, it automatically goes to the section of ROM where the instructions for BASIC are stored and prepares itself to work with commands given it in BASIC. If you have a computer with disk drives, the computer follows instructions in its ROM that let it load in programs stored on disks.

All computer memory cannot be ROM, however. Much of the memory in the ATARI computer is RAM, or random access memory. RAM is general-purpose memory that is available for use by the computer operator. The ATARI 600 comes with just over 16,000 bytes of RAM. All the other models have 65,536 bytes of RAM.

Thus far, we've talked about the number of bytes of memory in the ATARI computer. Computer buffs generally do not talk about memory in terms of bytes but in terms of K (short for kilobytes, which means a thousand bytes. Each K of memory is actually 1024 bytes. Thus 16K would be 1024 times 16 or 16,384 bytes. Just multiply the number of K by 1024 to determine the number of bytes of memory.

## The CPU

The CPU, or central processing unit, is the heart of a computer system. The CPU is the chip that performs the actual processing of data; most of the other components in the computer provide support or assistance to the CPU as it does its work.

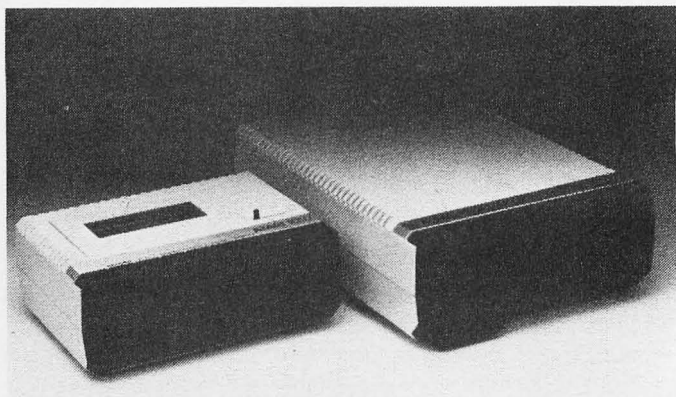
Although most CPUs are smaller than a half dollar, the electronic components they contain would have filled a room a few decades ago. Large scale integration technology permits manufacturers to cram thousands of circuits into tiny silicon chips. These chips work dependably and use less power than an electric razor.

The ATARI computer uses a 6502 microprocessor chip, the same one used in the Apple II and Commodore VIC 20 computers. This is an *eight-bit* CPU which means the computer processes eight bits of data (one byte) at a time. Some expensive business computers, such as the IBM PC, use CPUs that process sixteen bits of data at a time.

The number of bits a CPU processes at once, the speed of operation, and the amount of memory the CPU can use are the primary features that are important to computer buyers. The 6502 is a moderately fast, eight-bit CPU that can *address*, or use, up to 64K of memory.

## Mass Storage

Random access memory (RAM) serves as a temporary storage medium for data or program information while a program is running. Programs and data in RAM are lost when the computer is switched off, however. A functional computer system must, therefore, have some method of permanently storing programs and data for later use. The ATARI computer comes with the circuits needed to use a special cassette recorder to



**Figure 1.3 ATARI 1010 Cassette Recorder  
and 1050 Single Disk Drive**



**Figure 1.4 Floppy disk**

store programs and data. However, cassette storage is slow, and many ATARI owners buy the more expensive disk drive for their computer. A disk system provides you with reliable, high speed storage. A disk system uses floppy disks—round, flexible plastic platters enclosed in a protective case—to store information. You insert one of the floppy disks in a disk drive, and the computer can magnetically store data on the disk or read data previously stored on it. When you buy a program on a floppy disk, the instructions the computer needs to run that program are stored as magnetic codes on the disk. To run the program, you tell the computer to load those instructions into RAM.

Floppy disk drives come in several different flavors. Some store data on only one side of the disk, some store it on both. The least expensive disk drives for the ATARI computer store

data on one side. These can put up to 127K of data on each disk. Higher capacity drives are used in the 1450XLD; they can store over 250K on a disk.

Two disk drives can be installed in the main case of the 1400 series computers. Drives for other models are in a separate case and must be connected to the computer by a cable.

## Software

The ATARI computer speaks BASIC because a version of BASIC is in its read only memory. Several other versions of BASIC are also available.

Computers are made up of many components, like memory, keyboard, display, and disk drives. A special type of software called an *operating system* is required to make all these components work together. In a computer that has disk drives, this software is called a *disk operating system* or *DOS*. ATARI has a regular operating system in its permanent memory (ROM), but if you add disk drives to the computer, you will also get a DOS that must be loaded into RAM before you can use them. Loading an ATARI DOS involves putting the disk with DOS on it into the disk drive and turning on the machine. DOS is automatically loaded into memory.

Earlier versions of the ATARI DOS were unimpressive. They had some flaws and were not flexible. We understand the new DOS III, which was not available when this book was written, will correct problems in earlier versions and provide many features not available in DOS I and DOS II.

While disk operating systems such as DOS III are necessary, they are not that interesting themselves. The interesting aspect of ATARI computer software is the *applications software*—programs that let you do something useful, such as play PAC-MAN, balance your checkbook, or save the human race from invading space no-good-niks.

Atari has done a good job of developing a strong software base for its computers. The company has a comprehensive line of recreational programs and many programs for home appli-



cations. Through its Atari Program Exchange (APX), owners of ATARI computers can submit programs they have written. If they are good, APX will package and distribute them and pay the person who wrote the program a royalty. APX has many good programs in virtually every area of computer application.

If you are new to computing, you may not realize how important lots of software is to a computer owner. Hardware is useless unless there is software. Some computers, for example, have fewer than fifty programs that will run on them. Others have lots of software, but it is concentrated in one area, such as video games or sophisticated business software. The ATARI computer has at least some programs in every area but is strongest in video games and home applications. It can also run a large amount of educational software but is weak in business software.

## OWNER RESOURCES

Many types of resources are available to someone who buys an ATARI computer. Here again, you are fortunate. You can get many good books on the ATARI computer: introductory books, books like this one that review software, books on programming in BASIC, books on ATARI graphics and sound, and much more.

One book we particularly recommend is *Free Software for Your ATARI* by David and Dorothy Heller. The title is a little misleading because the book is about more than just free software. It tells you about many user's groups for ATARI owners, about electronic bulletin boards you can access with your ATARI computer, and about hundreds of programs that are free or almost free. This \$8.95 book is published by Enrich/Ohaus in San Jose, California.

In addition to books, there are several magazines published for owners of ATARI computers.

*ANTIC* is a slick monthly magazine that publishes articles

only on the ATARI computers. Subscriptions are \$24 for 12 issues. The magazine publishes a mix of tutorial and beginner introductory articles, listings of programs you can type in and use, reviews of programs and hardware for the ATARI, and advanced articles on hardware and software. The magazine carries ads from many suppliers of ATARI-compatible products.

*A.N.A.L.O.G Computing* is an excellent bimonthly magazine on the ATARI only. Subscriptions are \$12 for one year. The range of articles in this magazine are similar to those in *ANTIC*.

*COMPUTE!* publishes articles on Apple, PET, VIC 20, Commodore 64, TRS-80 Color Computer, Timex Sinclair, Texas Instruments, and ATARI computers. This is a fat, well-designed, informative magazine that sets the standard of quality in the field. You can read all sorts of articles in this magazine, and each issue has three or four programs (often games) you can type in and run on your ATARI. It is an excellent magazine.

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## CHAPTER TWO

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# Fun and Games

OK, so you finally made the big decision. You signed your life away to the finance company and brought home your ATARI computer with all the accessories. You've astounded your friends (and appeased your spouse, or tried to) by demonstrating how it analyzes real estate investments, improves your child's spelling, and stores your favorite recipe for chocolate-covered cabbage. That's great. Now that the friends have gone home and everyone is in bed, it's time to get down to business. Time to put your computer through its paces. Time for what you *really* bought your ATARI for: playing computer games!

## THE ATARI IS AN EXCELLENT GAME COMPUTER

While it's true that computers can do a variety of tasks in the home, it's also true that they are *most often* used for game-playing. There are literally thousands of games written for the ATARI! That's not hard to understand when you consider the

popularity of arcade games. They're everywhere you go these days: grocery stores, convenience markets, restaurants, malls!

The ATARI computers run games that are strikingly similar to arcade games. In fact, Atari is a leading manufacturer of arcade games, and their computers benefit from the company's arcade experience.

If you have ever played an arcade game, you know that much of their appeal lies in their colorful, animated color graphics and their excellent sound effects. Graphics and sound are excellent on the ATARI computers. The company has some brilliant game programmers on the payroll too. In addition, Atari is popular enough to attract many other excellent companies that write high quality game programs for ATARI computers.

## TYPES OF GAMES FOR THE ATARI

We will review several different types of computer games in this chapter, beginning with action games. While action games are familiar to most people, you may be surprised at how many other types of games there are for the ATARI. There are also fantasy games, simulations, card games, games of chance, board games, and sports games. You may have a favorite type, but we suggest you read a few of the reviews in every category.

*A Word of Caution:* We have not attempted to review every one of the games available for the ATARI computer: there are too many of them, and quite a few are so poor they do not deserve mention. It would take many chapters just to review all the bad software for ATARI. Therefore, we decided to use the space in this book to describe software we found acceptable, if not excellent. Even with that limitation, we were not able to describe all the good software that was available when this book was written. We hope this chapter will at least give you an idea of the type of recreational software you can buy for the ATARI.

## Action Games

The most popular of all computer games are the action games. Most arcade games are action games. There are hundreds (maybe even thousands) of action games you can play on your ATARI computer. (The violence in some of these games has been criticized by some people who fear that playing them could lead to increased violence in real life. That may or may not be true. We simply do not have the evidence to determine what effect playing action games might have on children.)

Actually, there are several subtypes of action games. The most popular type pits your spaceship/missile base/tank against hordes of attacking enemy ships/creatures/tanks. We call these *bang, bang, shoot 'em up* games. That certainly sums it up well. You spend your time zapping alien spaceships or blasting asteroids. In other types of action games you guide race cars around a track or guide your player around a maze while it's pursued by monsters. The intricate graphics possible on the ATARI computer, the built-in joystick connectors, and the computer's ability to generate sound effects make it especially well-suited for action games. We'll review some of the better games

### Choplifter

*Choplifter* is a one-player action game available on diskette for \$34.95. The game uses advanced high-resolution graphics and realistic sound effects. This unusual action game has become a classic in the short time it has been available. Versions for both the Apple and ATARI computers are best sellers.

The setting for this unique game is the mythical Empire of Bungeling. Militant army factions there have kidnapped sixty-four people attending the United Nations Conference on Peace and Child Rearing. The hostages are spirited away and imprisoned in four barracks near the eastern border of Bungeling.

You oppose the kidnapping and have set up a rescue com-

mand post in a U.S. Postal Service mail distribution center just across the eastern border. You have smuggled in an entire helicopter with armaments by disguising it as a mail-sorting machine. You have assembled the helicopter inside the post office and are awaiting an opportunity to carry out a rescue attempt.

As the game opens, you have been notified that sixteen of the hostages have broken out of one of the barracks and need help desperately. You can depend only on your heavily-armed helicopter and your own flying skill to carry off the rescue.

You use a joystick to fly your helicopter. Your mission is to rescue the hostages by loading them on your helicopter. At the beginning of the game you are in the easiest level of play. The helicopter is fairly easy to fly. Later, you'll have to be careful, or you'll crash before you get to the hostages!

If you do manage to stay in the air, there are enemy tanks to contend with. Fortunately, if you are high in the air, they can't raise their guns high enough to threaten your safety. You can machine-gun them with your unending supply of ammunition. However, unlike most arcade games, that won't earn you any points. The only thing that counts is rescuing the hostages. The only reason to go after a tank is to protect the hostages.

If you fly carefully and land just as carefully, the hostages will run out and jump on board your ship. But be careful; there are all kinds of things that can go wrong. You can land on top of the hostages you are trying to free, or the helicopter rotor may do them in. Of course, the tanks shoot the hostages if you don't get there first and protect them.

Sound difficult? It is. It's a good thing that it's easy to fly the chopper in the beginning, because the joystick action takes some getting used to. You make the helicopter go up, down, and sideways by moving the joystick forward, back, and sideways. To fire your cannon, press the joystick button briefly. Logical, right? There's a catch. To get your craft into position to attack the tanks, you give the button a medium long press. A longer press turns the chopper completely around. This can cause problems in the middle of a battle. Don't hold the button

down too long, or your chopper will interpret that as an order to turn around. You could turn right into a shell or a missile!

In addition to all these problems, you also have to contend with jets and drone air mines (these militants are really well armed). Enemy jets attack and fire air-to-air missiles at you and the hostages. If your helicopter is in the air, it can be shot down. If it's on the ground, it can be blown up, but you're a more difficult target on the ground. The drone air mines chase you wherever you go. They are the only weapons that can get you, once you cross the border.

We mentioned that you get no points for destroying enemy craft. The only way to earn points is to rescue hostages. There's a running count of how many you have returned safely to your base, how many are aboard the helicopter, and how many are still in the hands of the enemy. Since there are sixty-four hostages, sixty-four is the maximum score.

Like most action games, there's a lot of violence in *Choplifter*. We may be splitting hairs, but we think the violence in this one is a shade different than what is found in many action

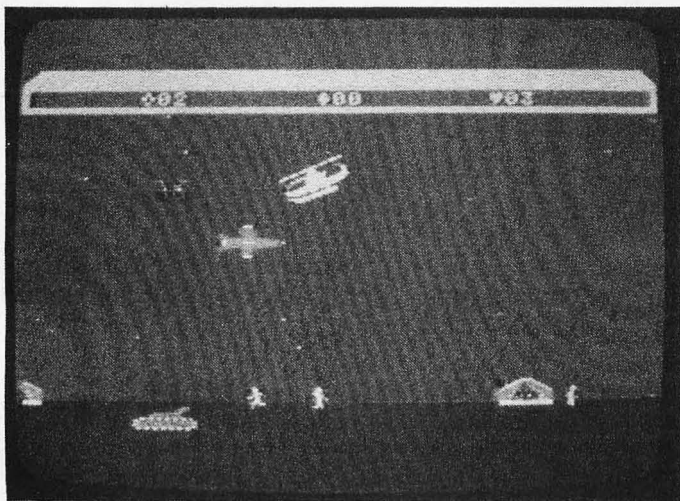


Figure 2.1 Choplifter

games. The points don't come from blasting the enemy, but from *saving* your friends. In fact, blasting the enemy won't really get you anywhere. The only motivation for doing so at all is to protect yourself or the hostages. It's still a *shoot 'em up*, mind you, but the moral tone of this game seems a cut above many arcade-type games.

Some players may not feel comfortable with *Choplifter*. Unlike most other computer games, this game is an unfunny simulation of some serious recent history.

Be that as it may, the technical quality of this game is definitely superior: the sound effects are excellent, and the graphics are some of the best you'll see in games for the ATARI or for any other small computer. They really don't come any better. It might be best not to make this the first action game you play on an ATARI. You might never be satisfied with anything less!

## Fort Apocalypse

This program is available on disk or cassette for \$34.95 from Synapse Software. Like the one just described, it lets you pilot a helicopter using the joystick. Your task is to fly a well-armed helicopter to the fortified entrance of the Draconis caves, bomb the entrance until you get in, and then maneuver through the caves until you reach an inner chamber where eight prisoners are kept.

This is a good program. The color graphics are well done, the sound effects above average, and the no-good-niks just as mean and nasty as those in other video games. Many different types of obstacles, from impact shields to Kralthan tanks and missile drones, stand in your way. They shoot at you, and you must shoot back to survive and accomplish the mission.

One particularly nice aspect of this game is the dual screen display. At the top of the screen you get a *big picture* that shows you where you are in relation to other things such as enemy tanks. The bottom two-thirds of the screen is a detailed depiction of the immediate area around your helicopter. The main criticism we would make of this game is the speed of the helicopter. It doesn't move as quickly as we would like.



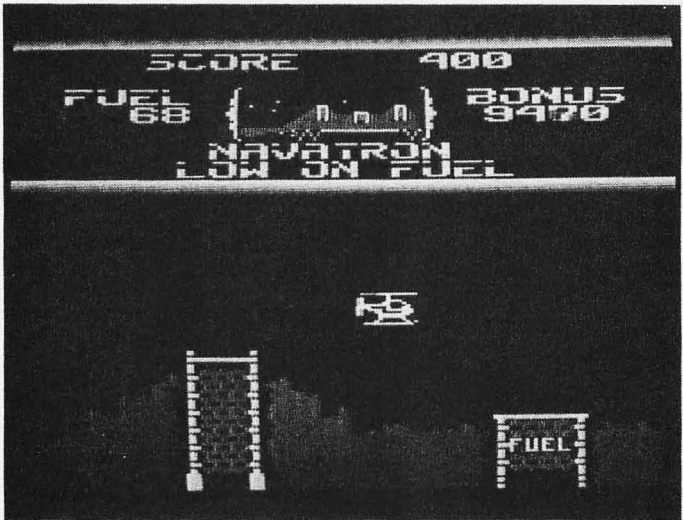


Figure 2.2 Fort Apocalypse

## Raster Blaster

*Raster Blaster* is an excellent pinball simulation available for \$29.95. You will need 32K of memory and a joystick to play this game. The graphics and sound effects are excellent. The left side of the screen pictures the playing board of a pinball machine. The right side shows the score, the player, and the balls remaining.

The game uses all the standard pinball equipment. There are four lanes at the top of the screen that the ball rolls through, and four sensitive bumpers in the center of play. When the ball hits these bumpers, it rebounds with realistic action.

*Raster Blaster* includes bumpers, flippers, and targets and has two levels of difficulty. Up to four players may participate, each with five balls.

The outstanding part of this game is the realistic ball movement. It's easy to forget that it's all electronic and that gravity

really has nothing to do with the action. If you're a pinball wizard (or want to be), you'll like this game.

## Pinball Construction Set

*Pinball Construction Set* by BudgeCo is for the dedicated pinball player who tires of the standard *Raster Blaster* board layout. This \$39.95 *kit* is typical of a new trend in software. You can use it to custom-design your own game. The author calls the program *the first software toy*.

When you load the program, the first thing you see is an empty pinball playing board on the left side of the screen. There are a lot of pinball parts such as flippers, bumpers, and targets on the right side. There is also a hand. You move the hand with your joystick. When you want the hand to stop, you return the joystick to the center position. To pick up a pinball part, you place the hand so that the index finger is touching the part you want. When you press the joystick button and hold it down, the hand grasps the part. You then use the joystick to place the part wherever you want it on the playing board. You release the button to leave the part in place.

You can use the electronic paintbrush to color the parts, a hammer to change their shape, and scissors to cut knobs off. A magnifying glass makes it possible to paint tiny parts.

After you have created a pleasing layout, you decrease or increase gravity, speed, bumper strength, resilience of collisions, and values for score and noise. After you design the game, you test it, play it, and save it on a disk so you can play it anytime you wish.

This disk is the next logical step beyond *Raster Blaster*. It's creative and ensures that you'll never tire of computer pinball.

## Ricochet

This might be called the thinking person's video game. As in the electronic pinball programs, in *Ricochet* you launch a ball that bounces around on the screen. This is not a game of quick reflexes and good eye-hand coordination, however. It

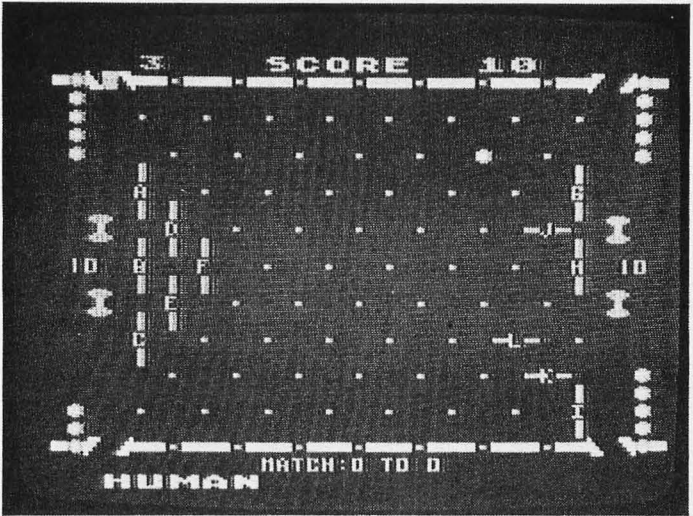


Figure 2.3 Ricochet

requires strategy. You can play against the computer or a person. Each opponent takes a turn. You can move any of six rectangular pieces you control on the screen, or you can launch a ball. When a ball is launched, it bounces around the screen in much the same way a billiard ball bounces around a pool table. If your ball hits one or more of your opponents pieces or launcher, you get points. To win the game, you must be able to arrange your pieces so they won't be easy to hit with the ricocheting ball. You also set up your pieces so they help aim your ball and keep it within the playing field for as long as possible. A well-aimed ball on a well-arranged field may bounce around for quite a while before it leaves the playing field by bouncing through one of the open areas at the side of the screen.

*Ricochet* is like chess: you take more time thinking through a turn and planning strategy than the action takes. When playing against the computer, you can even choose to play a more or less skilled opponent. In fact, the computer automatically takes your skill level into consideration as it sets up and plays the

game. If you like puzzles and strategy games, this one may be interesting. It is produced by Epyx, comes on cassette, and costs \$19.95. The manual for this game is rather poorly written. It plunges into details before you have much of an idea of what the game is about. If you can read and decipher the manual, you will probably do well playing the game.

## O'Riley's Mine

This is another video game that emphasizes strategy. You control O'Riley, a miner who is looking for buried treasure—oil, gold bars, rubies, diamonds, coal, and uranium—in his mine. The game begins with O'Riley at the top of the mine shaft. You guide O'Riley around the mine and create new mine shafts as you go. You can see the treasures on the screen and thus know where it is buried. All you have to do is get to each place where it is buried and then get out of the mine alive. Getting out alive is more difficult than finding the treasure because the mine begins to flood as soon as you start the game.

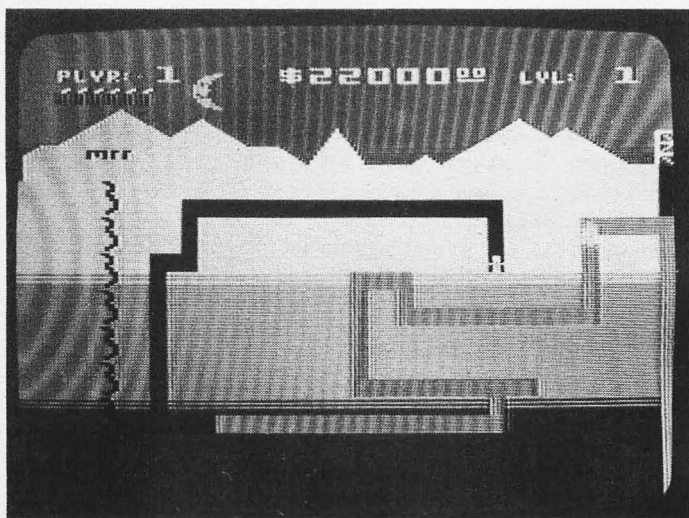


Figure 2.4 O'Riley's Mine

In addition, there are river monsters that try to get you. The only defense you have against the water and the monsters is to move quickly and to set dynamite charges behind you to block the flow of water and the monsters. The way you dig mine shafts also determines the level to which the water will rise in the mine, so you must dig shafts in a way that won't trap you deep in the mine.

This is an excellent game. It has great color graphics, excellent sound effects and music, and is playable at many different levels. Many people plan their strategy before they actually begin to dig mine shafts; others head for the treasure and try to dig themselves out of trouble when it occurs. Either way, it's fun. It is available on disk from DataSoft, a company with an increasing number of very good video games.

## Missile Command

This is the small computer version of the popular *Missile Command* arcade game. You are the commander of six cities being attacked by missiles, planes, satellites, and smart bombs. You use an arsenal of anti-ballistic missiles to intercept the attackers before your cities are destroyed. It's a losing battle because the game progresses into more difficult levels. You will eventually be destroyed. The trick is to pile up as many points as possible before that happens.

This is a game for one or two players, and the action differs from many arcade-type games. You must anticipate the position of attackers and explode your missiles in the spot where they *will* be, rather than aim directly at them.

The game requires a joystick. The original arcade game uses a *trackball*, a ball approximately the size of a billiard ball installed almost flush with the surface of the game console. By using your palm to roll the ball in its socket, you control the direction of your weapons. The joystick slows this game down considerably. A trackball is now available for your ATARI as an option, but this game plays well with a regular joystick. The trackball or joystick moves a marker on the screen to the point where you want to explode your missile. When you press the button, the missile explodes.

*Missile Command* has several levels of difficulty. At the lower levels, the missiles and planes start from the top of the screen and proceed at moderate speed down the screen toward your cities. You move your marker to the spot where you want to fire and press a button. If you are a little slow on the draw, the missiles break up into several strands and you must fire several times to destroy them. At higher levels of difficulty, the game is faster, and the missiles split up more often and higher up on the screen.

This is an enjoyable game that will tax your eye-hand coordination and reaction time to the limit. Many preteens and teenagers play it by the hour. *Missile Command* lists for \$34.95. It is made by Atari and comes on a cartridge.

## Wavy Navy

This game uses the same basic concept as *Missile Command*. Hordes of invaders come down from the sky and try to wipe

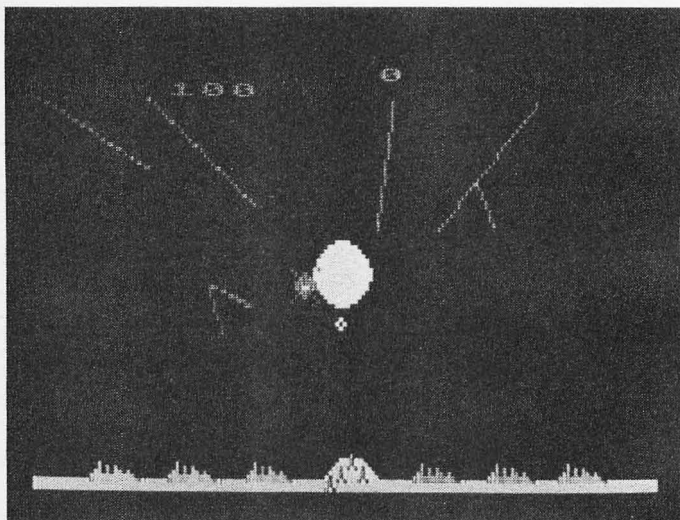


Figure 2.5 Missile Command

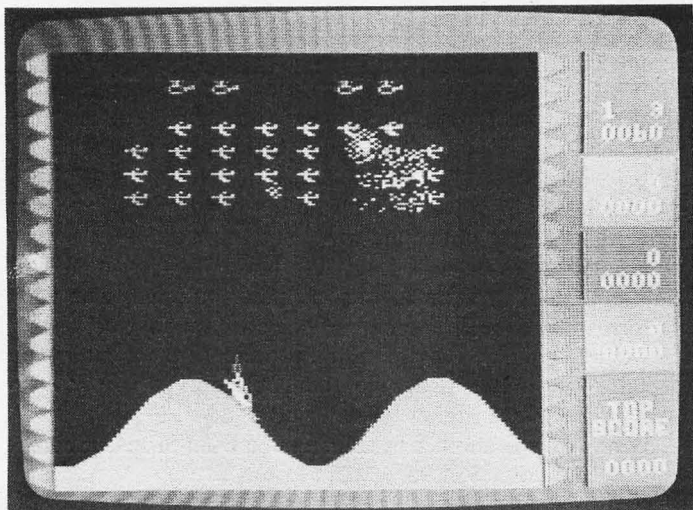


Figure 2.6 Wavy Navy

you out. This time you are commander of a PT boat on a blue sea with rather high waves. The joystick lets you maneuver the PT boat around for the best firing angle (and to avoid the unending barrage of torpedos, cannon fire, and mines). The sound effects for this game are excellent, but parents who've had a hard day can push the 8 key and turn it off completely—a nice feature. The graphics on this game are well done, and the color is good.

The game can be played at several levels of difficulty, but in all of them you control your ship by moving the joystick and fire at the enemy by pressing the fire button. Thirty or forty planes and helicopters move down the screen in the *Space Invader* tradition, and you must shoot them down before they get close enough to get you. When you are hit, the little PT boat does a double flip in the air and sinks slowly to the bottom of the sea.

We liked this game because we could start at one of the lower difficulty levels and actually survive for a while right from the beginning. Up to four people can play; each one gets a turn.



As you survive to higher difficulty levels, or if you elect to start there, the planes and helicopters get smarter and faster. They fire more accurately. In addition, the sea becomes increasingly more hostile, with more mines to avoid, and the planes develop a sort of saturation-bombing approach. They drop a whole screen full of bombs that drop toward you. Since the whole sky is filled up with falling bombs you can't just move the PT boat out of the way. You must shoot the bombs down quickly or be wiped out. We never mastered that skill enough to do well. You begin as a galley slave and, with good performance, earn promotions to boatswain, cook, deckhand, crewchief, gunner, captain, admiral, defense chief, and even captain. The higher ranks are obtainable only if you elect to start at one of the higher levels of difficulty.

*Wavy Navy* is another excellent game from Sirius. It comes on disk and costs \$34.95.

## Cosmic Balance

*Cosmic Balance* is a design-it-yourself *shoot-'em-up*. This game combines some of the strategic elements of adventure games (described later) with the fast pace of an action game. It's a good illustration of how game categories are beginning to merge. *Cosmic Balance* is available for \$39.95 from Strategic Simulations. You will need 48K of memory and a disk drive.

There are six different game plots. You learn to play the game in the first plot, and in the other plots you design your own space ship or fleet of space ships. You choose your weapons, the size of your ships, and the field of fire of each weapon. You can save any designs whenever you want to.

Play in this game reminds us a little of football. The action takes place in sixteen-second bursts after you have designed your ship and made other choices related to the upcoming battle. You may play against ships designed by one opponent or by the computer.



## PAC-MAN

No review of action games for the ATARI computer would be complete without mentioning this popular game. We suspect *PAC-MAN* may be familiar to more Americans than the name of the president! The arcade game took the country by storm and spawned everything from *PAC-MAN* T-shirts to a weekly television cartoon series.

The *PAC-MAN* cartridge (\$44.95) for the ATARI video game was disappointing to many people who played the arcade version. The action and the video display is inferior. The version for the ATARI computers, on the other hand, is outstanding. In fact, it's nearly identical to the arcade version. There are many *PAC-MAN* imitators, but this is the best version available for the ATARI.

If you are not familiar with the idea behind this game, here's a brief summary of the action: You control *PAC-MAN*, a round-ish figure with a voracious appetite. As you move *PAC-MAN* around a maze (joystick required), he gobbles up the dots in his path. You must avoid four pursuing ghosts who gobble up *PAC-MAN*. There are four *power pills* in the maze, and if you gobble one of those, you briefly turn the tables on the ghosts and eat them up.

## Jumpman

This is another game from Epyx and costs \$39.95 on disk or cassette. It is somewhat similar to *PAC-MAN*. You move a little man, Jumpman, around the screen with a joystick, to find and gobble up bombs that have been planted in the headquarters building. The building shows up on the screen as a pattern of ladders, ledges, climbing ropes, and stairs. Jumpman can even jump from a ledge to a rope or jump across to another part of the building if you press the joystick button at the right time. This is a dangerous building, and Jumpman tends to fall quite often. You start with five Jumpmen and lose them as you misjudge jumps or they fall off ladders. The task is to move

Jumpmen around the building until they have defused all the bombs. At higher levels of difficulty, you must also contend with smart bullets. They're smart because they don't go in a straight line; they may change directions and come directly at Jumpman. You must also avoid fast moving rockets.

*Jumpman* has good graphics, an interesting premise, and many difficulty levels. We enjoyed playing it. If you want more aggression in your games, Epyx has a video game called *Star Warrior*. You are a well-armed space warrior who is battling on the planet Fornax. You play this complex game by issuing instructions through the keyboard. The game understands nineteen different commands that let you move, jump, fire a wide assortment of armament, hide, and repair damage. *Star Warrior* comes on cassette or disk and costs \$39.95.

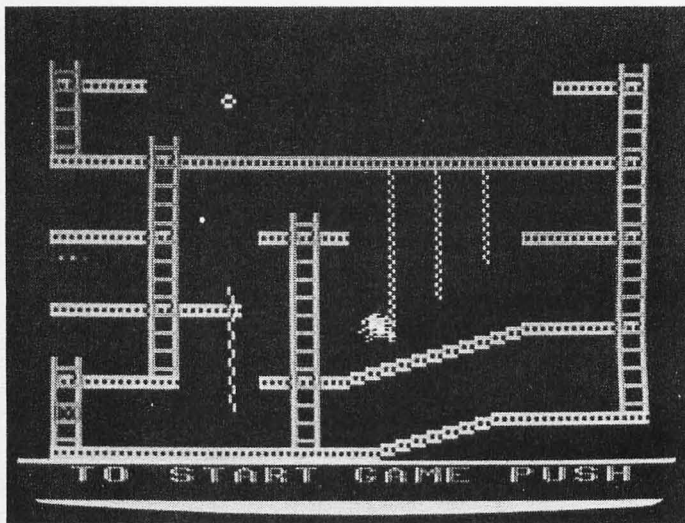


Figure 2.7 Jumpman

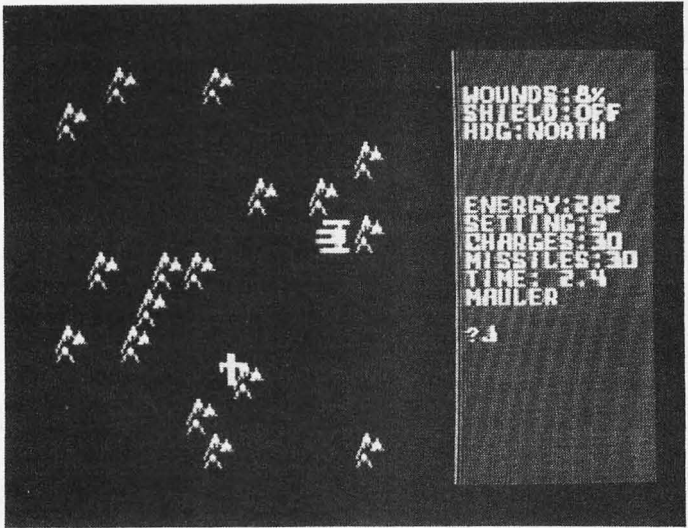


Figure 2.8 Star Warrior

## Frogger

This is an exact replica of the popular arcade game of the same name. In this game you guide a frog through various dangerous situations and into one of five safe cubbyholes at the top of the screen. When the game begins, you have three frogs. You must maneuver the first one across four highway lanes beset with speeding automobiles. If you make it, your frog must then cross a pond by jumping from the backs of swimming turtles and then onto logs. The only problem is that the turtles may sink. To make things a little more difficult, you have a limited time to guide each frog to safety.

Once you get five frogs into the safe havens at the top of the screen, you earn a bonus frog and move up to the next level of difficulty. As you get to each new level, the game gets faster, and more and more of the turtles dive just when

they're needed most. There are bonuses for helping a lady frog get to safety and for catching insects.

This is an excellent action game. Some people prefer games like *Frogger* to the games that emphasize violence and conflict. *Frogger* sells for \$34.95 and is produced by Sierra On-Line.

## Spider City

This section on games wouldn't really be complete without a review of a traditional *bang, bang, shoot 'em up* of the arcade variety. *Spider City* is one of those games. The program comes on disk for \$39.95 (Sirius Software).

You are in command of a heavily armed ship sent to wipe out *Spider City*. The city lies completely underground. When the game begins, you are in one of the tunnels. The upper part of the screen is a view of the tunnel, complete with your ship. The lower part is a radar map of the entire city. On this map,

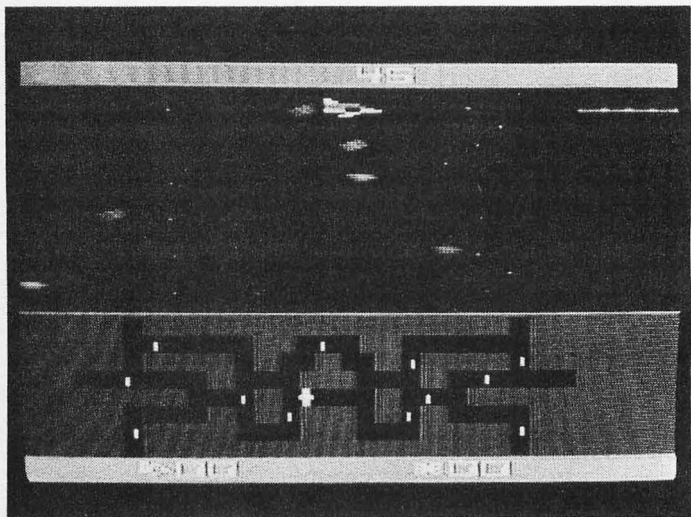


Figure 2.9 Spider City

your ship is shown as a small horizontal line. Also depicted on the map, this time with vertical lines, are the spider hatching pods. Your job is to find all the hatching pods and destroy as many of them as possible. At the same time, you must avoid the spider warriors, patrol ships, and debris that floats rapidly about the tunnels and attempts to ram you.

To destroy the hatching pods, you keep one eye on the radar map and one on the screen, with your firing button at the ready. When the horizontal line (your ship) on the map touches a vertical line (a hatching pod), the pod hatches. The resulting spiders appear on the upper part of the screen and attempt to ram you. You must dodge them or blast them. If you succeed in shooting five spiders, you absorb enough power to establish a temporary shield. You have two ships in reserve. There is a point system for blasting the various nasties who roam the corridors. Each time you destroy all the hatching pods in a city, you get an extra bonus. There is another bonus for rescuing spacemen who have been held captive in the *Spider City*. You rescue the spacemen by touching them with any part of your ship.

The graphics and sound effects are excellent, and the action is fast and furious in this fine *shoot 'em up*. The game gets more difficult as you play and will keep the most dedicated player interested for many hours.

## Star Raiders

*Star Raiders* is an ATARI cartridge that sells for \$39.00. It is one of the most challenging and entertaining action games available for any computer. You can play the game at several different levels from Novice to Commander. At the Novice level you are protected from enemy shots. They just bounce off, and you can go about your business. At all other levels, enemy hits can do you harm. The first hit may do no more than damage your shields. Other hits destroy your shields or wipe you out. You have to keep an eye on the fuel supply, the range finder, and a lot of other things. If you run out of fuel, the game is over, and you are told to report to base for

training. Refueling is a tricky business that involves careful maneuvers to get your ship in the right place. Meanwhile, the bad guys can get you, because you're not moving. We do all right at the Novice level, but we have never been able to go for more than a few minutes at the Commander level. On occasion, Starfleet command has reduced our rank to *Galactic Cook* or *Garbage Scow Captain* after a poor performance. It is an exciting, frustrating, and fun game. The graphics in this game weren't achievable on large computers a few years ago. It has to be seen to be believed.

## Final Orbit

This game (\$39.95—cartridge, Sirius Software) is very similar to *Star Raiders*, although many people find it a little easier to master. Your perspective is out the front window of your spaceship. As alien attackers approach, you can use the joystick to orient the ship so the alien attackers are in your sights. Press the fire button on the joystick at the right time, and they are destroyed.

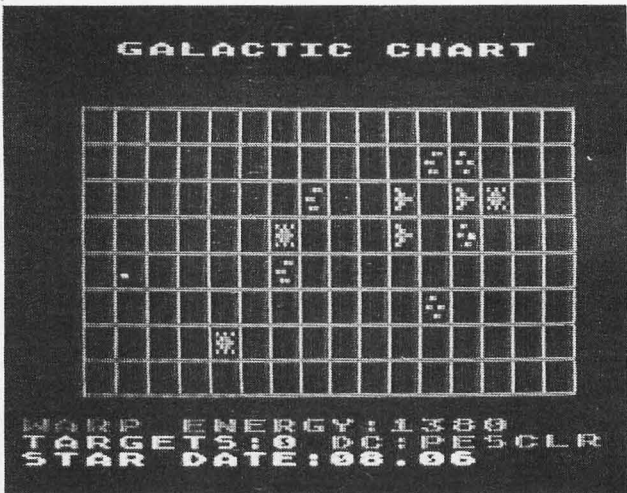


Figure 2.10 Star Raiders

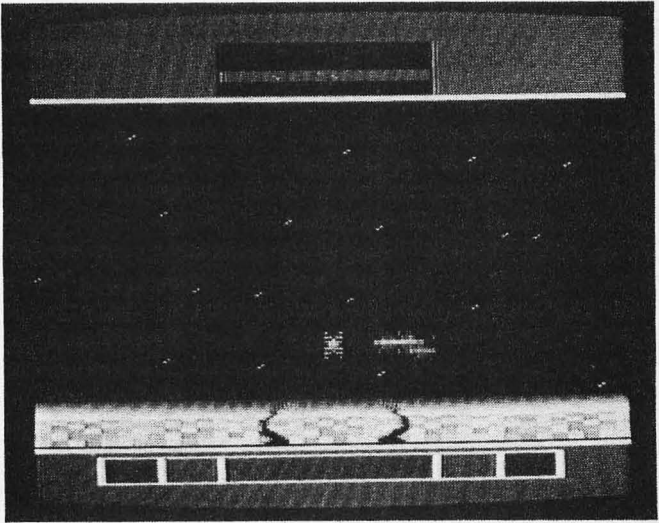


Figure 2.11 Final Orbit

Sound effects, color graphics, and animation are all very good.

## PAC Invaders

*PAC Invaders* is a free game by Vince Scott listed in the August 1982 issue of *Antic Magazine*. *PAC Invaders* is a cross between *PAC-MAN* and *Space Invaders*. This game is typical of the free games listed in magazines. These games aren't really free of course, but if you're willing to type in the program, you get the game for the price of the magazine. Some people don't like to type in their own programs, because it is tedious and time-consuming. If you make any errors in your typing, the game won't run, or won't behave correctly if it does run. This game is about seventy-five lines long, which is about average for a simple type-it-yourself game.

If you don't want to do all that typing, there is often an

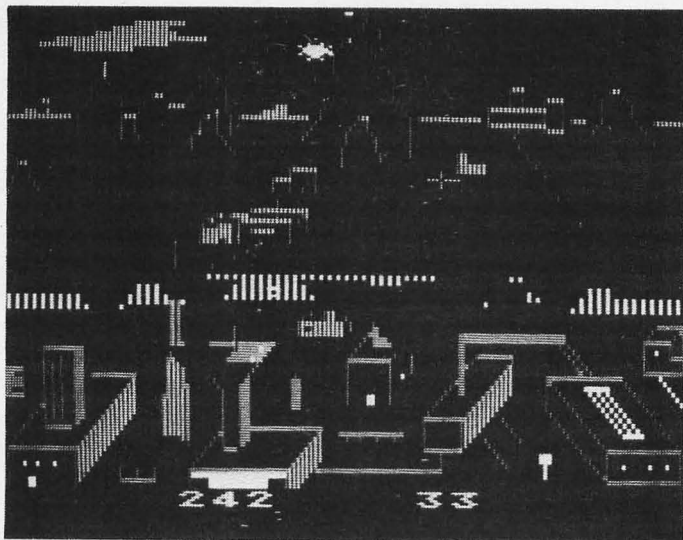


Figure 2.12 Rocket Raiders

alternative. Many magazines sell diskettes of the main programs listed in the magazine. *Antic* is one of those magazines and sells disks with six to nine programs for \$10.00 each. A subscription to *Antic Magazine* is \$39.00 for 12 issues or \$72.00 for 24 issues.

## Artworx Programs

Artworx Software Company has been in the software development business for several years and has a number of well-done games for the ATARI. We have only been able to get cursory looks at these programs at some of the computer shows and have not thoroughly tested them. Therefore, only brief descriptions are provided. Some of the Artworx programs are a little different, as you see in the reviews below:

*Rocket Raiders* (cassette—\$20.00, disk—\$24.00) is another *protect your cities from invasion from the sky* video game with good action and nice color graphics.



*Hazard Run* (cassette—\$28.00, disk—\$32.00) has an interesting premise. You are on the run from the sheriff and must drive your car over treacherous roads (using the joystick as a steering wheel). The game has five different roads to drive on, good graphics, and several control strategies for driving the car. We liked it.

*Beta Fighter* (cassette—\$18.00, disk—\$22.00) is a takeoff on the invaders theme. It is set on Mars, where you control a missile launching platform that fires rockets against the Kre-loids who fly by.

*Pilot* (cassette—\$17.00, disk—\$21.00). Would you like to take control of an airplane and try to land it? This program lets you take control of the plane and try to land it on the runway. The animated graphics are good, and it plays at several levels of difficulty.

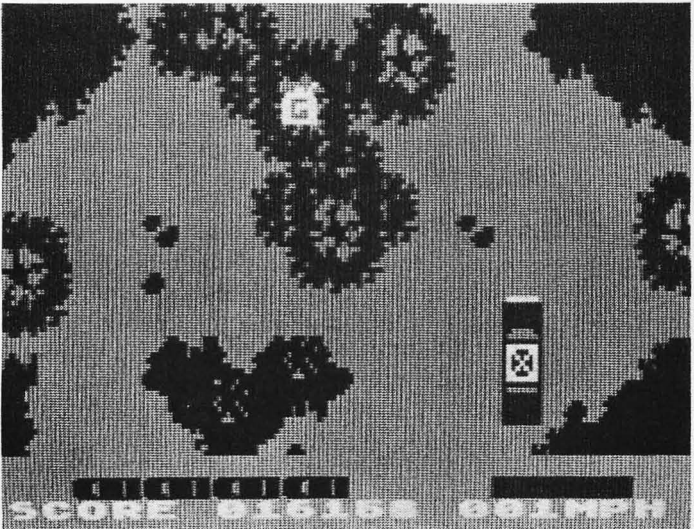


Figure 2.13 Hazard Run

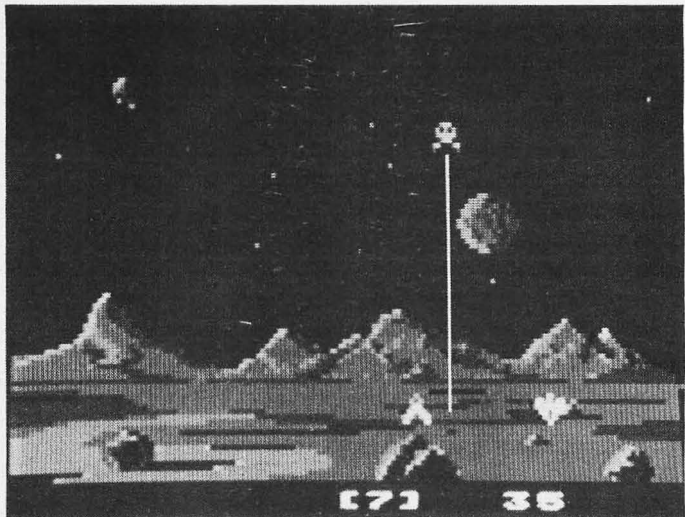


Figure 2.14 Beta Fighter

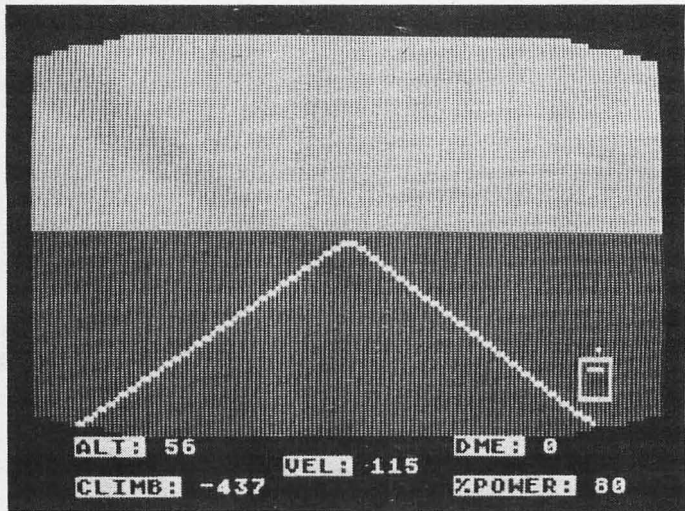


Figure 2.15 Pilot

*Strip Poker* (disk—\$34.00). We review some other poker games in this chapter but none like this. The program uses graphics to create attractive male and female players on the screen. The standard game lets you play against Suzi and Melissa. When they lose a hand they take off one item of clothing. The game gets very revealing (very revealing) as it proceeds. Additional data disks for this program (\$25.00 each) let you play against other computer-generated players: Candi, Marlana, Tony, or David. We can't show you how the screen looks after a player loses several hands, but you would be surprised what people are doing with ATARI color graphics these days! Artworx also has programs that play ordinary card games (for example, *Bridge 3.0* and *Poker Tourney*). They cost between \$19.00 and \$24.00.

Artworx also has a line of adventure games (see the discussion in this chapter on adventure games). Several of the programs use lots of color graphics. *Gwendolyn* (disk—\$28.00) lets you rescue a princess from a dungeon; *The Vaults of Zurich* (cassette—\$22.00, disk—\$26.00) puts you in the role of a master thief who plans to break into banks in Switzerland; *Forest Fire Two* (cassette—\$17.00, disk—\$21.00) lets you take charge of a team who must find and put out forest fires; and *Crazitak* (cassette—\$18.00, disk—\$22.00) requires you to fight off radicals who attack Washington (this one, unfortunately, won't let you take the side of the crazies and coordinate the attack!). Adventures that primarily use text include *Cranston Manor* (disk—\$25.00). You must explore a large house with lots of weird inhabitants, many dangers, and some treasure. Finally, *Domination* (cassette—\$19.00, disk—\$23.00) lets up to six players compete against each other in a political and economic simulation.

## Adventure Games

Fantasy or adventure games represent an exciting departure from the typical arcade-style computer game. You must think your way through the strategy games rather than act your way

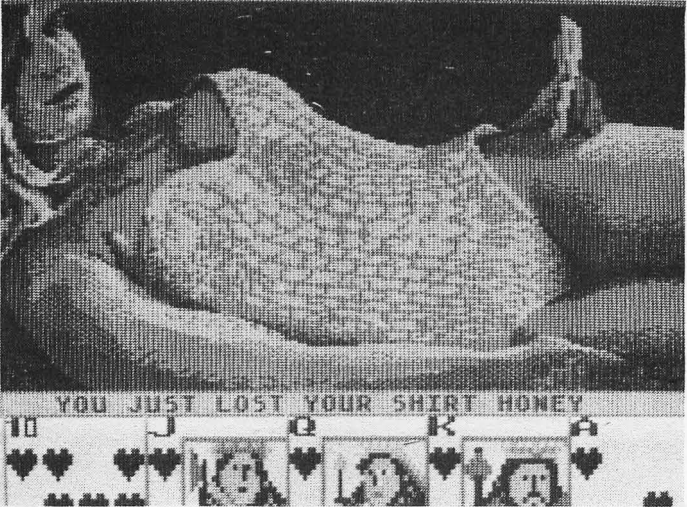


Figure 2.16 Strip Poker

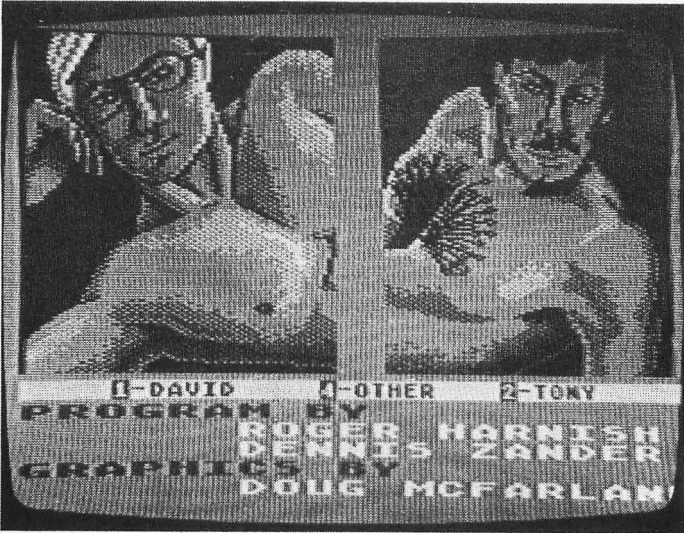


Figure 2.17 Strip Poker

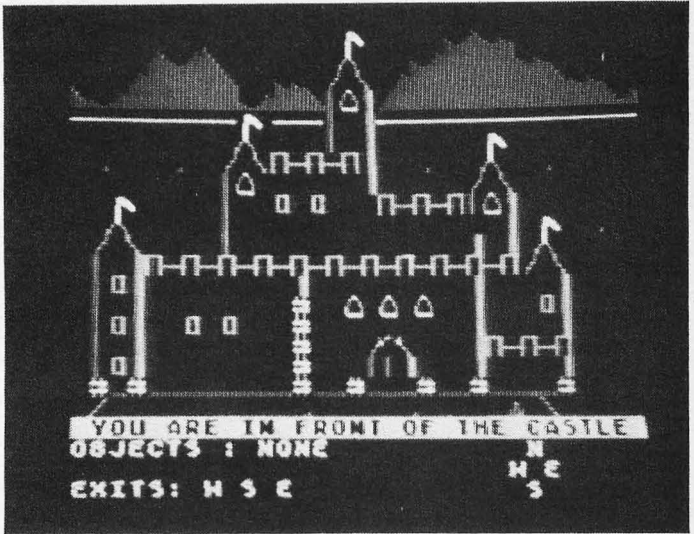


Figure 2.18 Gwendolyn

through. While you need excellent eye/hand coordination, fast reflexes, and good peripheral vision to be a success at most of the arcade video games that use joysticks or game paddles, you don't need these attributes for most fantasy games. They depend on the story line, thoughtful strategy, and imaginative problem solving. The wizards, trolls, and other magical beings in many of these games tend to appeal more to older children and adults.

Most of the early adventure games were text-only, with no graphics. You actually read the entire game, selecting certain options as the game progressed. Typical of this type of game is the popular *Adventure* series by Adventure International. This company, founded by Scott Adams, is one of the leaders in adventure game software, which creates programs for most of the popular personal computers.

An adventure game usually begins with a paragraph that

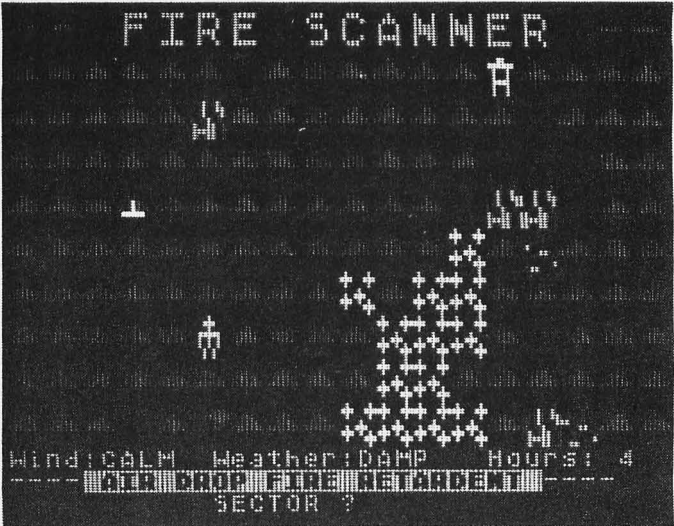


Figure 2.19 Forest Fire Two



Figure 2.20 Crazitack

?GO EAST

I am at the intersection of 1st street and Main. 1st street runs north/south. There are old houses on each side.

?GO NORTH

1st street curves around a corner going south and east from here. There are houses on each side and a woods to the N.

?GO EAST

I am at the intersection of 2nd and Cranston Blvd. which runs to the SE from here. There is a small store to the SW, and a huge house can be seen to the NE over some trees.

?SW

I'm standing inside an old dusty store, which is empty except for long bare counters. There is a dirty sign on one which reads: "FREE LANTERNS FOR ADVENTURERS (or droids)." There is a small lantern here.

?TAKE LANTERN

Figure 2.21 Cranston Manor

INDUSTRY		RICHIE		FACTORIES	
ENERGY	10	10	10	4000	
GOLD	10	10	10	HT BARRELS	2700
DOLLARS	50	50	50	TH OUNCES	642 OZ
ARMY	\$ 10000	\$ 10000	\$ 10000	THOUSANDS	
	10	10	10	DIVISIONS	

OPTIONS		HOW MUCH?	
1	SELL FACTORIES	60	
2	SELL ENERGY		
3	SELL GOLD		
4	BUY FACTORIES		
5	BUY ENERGY		
6	BUY GOLD		
7	DIVERT FACTORIES TO ARMY		
8	DIVERT ENERGY TO ARMY		
9	CONTINUE		

TIME LEFT	
\$ 38520	

Figure 2.22 Domination



sets the scene: *You are standing on the edge of a forest. There is a narrow winding road that leads out of the forest and winds through the hills to a large stone house. The house stands on the edge of a cliff and is shrouded in fog. You see a footprint!*

All fantasy games put you in an imaginary environment (forest, cave with many chambers, castle with many rooms, maze, planet deep in space), give you a task to perform (stay alive, get out, find the treasure, rescue the prisoners), and put all sorts of dangers in your way (monsters, cliffs, sorcerers, bottomless pits, enemy soldiers, bombs).

Two final ingredients of an adventure game are incomplete information and ways of getting that information. This means you begin the adventure without all the information you need. However, there are ways to learn more about the adventure's environment and how to deal successfully with it. Most adventures require you to move through a series of rooms. The term room really refers to different segments of the simulation such as rooms, cities, chambers in a cave, and so on.

You move about the rooms by giving the computer instructions like GO AHEAD, TURN LEFT, CLIMB STAIRS, DIG OUT. Depending on the adventure, it may understand only a few instructions or several hundred. Some games even let you create your own characters and move them about the simulation independently. You can endow different characters with different powers and send them against foes they are likely to overcome. For example, a sorcerer might fight a wicked magician, and a powerful Samson type might fight a giant. However, things do not always work out as you hope, and it is not unusual to lose some of your characters in the adventure.

Adventure games take time and patience. Some games take several hours, even days, to learn, and playing a complete game through to its conclusion can take ten hours, if not longer. Because they take so much time, some of them let you save your position in the game. You can play for several hours today, save the game at that point, and continue playing later at the point where you stopped. If you like strategy, enjoy solving intricate puzzles, and have time to devote to it, playing adventure games can be a pleasant addiction.



## Pirate Adventure

In *Pirate Adventure*, (cassette—\$24.95; diskette—\$39.95), you are searching for Long John Silver's treasure. The treasure is hidden somewhere on a strange island. From a flat in London, you must find your way to the island, then search it for clues to the whereabouts of the treasure, using some of the items you have found. There are many dangers on the island, and you must keep your wits about you, or you will be killed, and the game will be over!

This is a text-only game—there are no graphics. As you move through the adventure, the screen tells you what is happening. You move about the island by issuing a series of two-word commands such as GET RUM (for *get the rum*), GO WEST, and LOOK UP. The computer will respond with answers such as "I see nothing of interest."

This is one of twelve Scott Adams adventures in a series intended for beginners, those with moderate skill, and for advanced players. *Pirate Adventure* is for beginners. However, text-only adventure games require logic and patience beyond most children (and many adults) and are really not well-suited for most children younger than thirteen or so. Recently, another type of adventure game has emerged that blends adventure and arcade-style games. You see the adventure environment on your screen and can move about the environment by moving your joystick. Games of this type are likely to be more interesting to younger children.

## Zork I, II, and III

The *Zork* adventure games from Infocom have enjoyed fantastic popularity. They sell for \$39.95 each on disk. The games are made for most small computers, and their claim to fame is the large vocabulary and complicated syntax they understand. It is not necessary to type in only two-word commands as it is in most traditional adventure games. The *Zork* trilogy understands complex, lengthy sentences.

The plot resembles most adventure games. There are trolls, magic wands, and treasures galore. But this series of games is a real pleasure to talk to. The programs seem almost human!

If you have problems solving some of the puzzles presented in the *Zork* games, you may be interested in purchasing *Invisiclues*. This is a clever book of clues written in invisible ink. The clues become visible when rubbed with a special pen supplied with the package.

In *Zork I*, you seek the Twenty Treasures of Zork and attempt to escape with your life. In *Zork II*, the Wizard of Frobozz takes you deeper into the underground kingdom, where you meet the Wizard himself. You may not survive the meeting! In *Zork III*, you will meet the Dungeon Master, the most dangerous opponent of all.

The *Zork* games are classics and should not be missed by anyone who likes fantasy-adventure games.

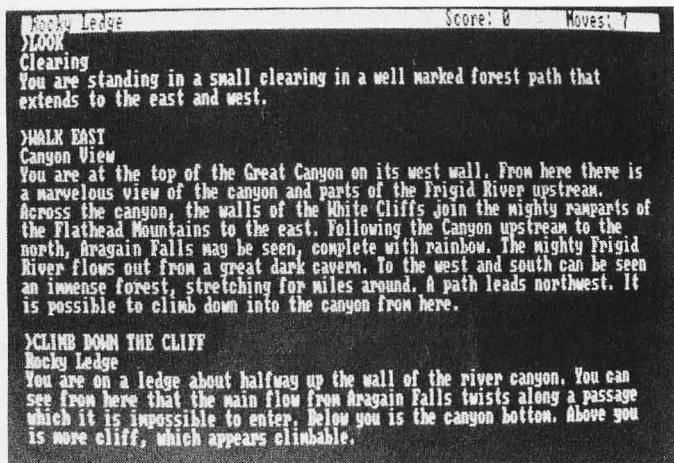


Figure 2.23 Zork I

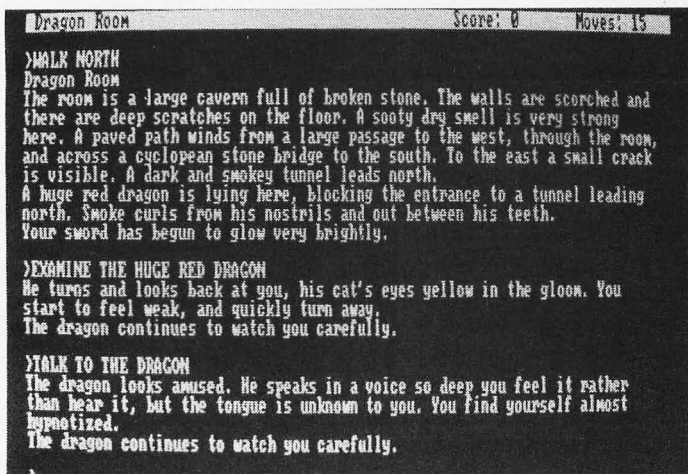


Figure 2.24 Zork II

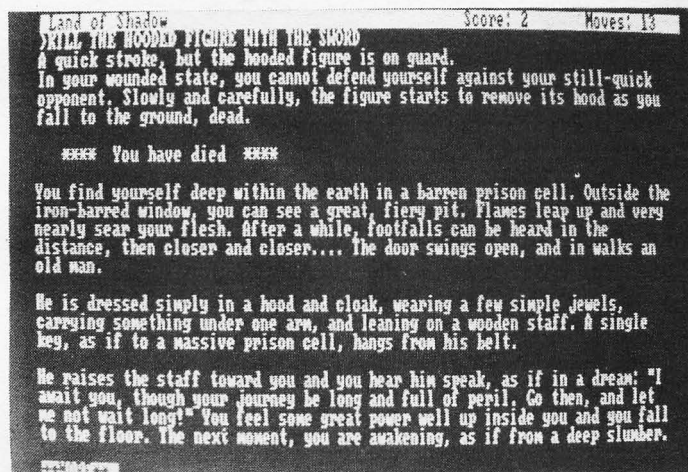


Figure 2.25 Zork III

## Temple of Apshai

*Temple of Apshai* is a popular adventure game that may represent the wave of the future in fantasy-adventure games. The game has some of the characteristics of classic action games and some of the characteristics of more typical fantasy games. *Temple of Apshai* sells for \$39.95 (Epyx).

Like many adventure games, you begin by equipping your character with weapons and provisions. Unlike the early adventure games, you eventually see your character depicted on the screen in animated graphics. In this game, the Innkeeper sells you what you need. You begin with a specific number of silver coins. You are told how many coins you have, as well as numbers signifying intelligence, intuition, ego, strength, constitution, and dexterity. This is important information if you are to spend your silver coins wisely.

After you name your character, the innkeeper asks *Wilt thou buy one of our fine swords?* If you answer yes, you are presented with a menu of available swords, complete with prices. There is quite a range. You can get anything from a dagger to a great sword. After you make a selection, the bargaining starts. When you reach a price agreeable to both, the innkeeper asks if you would like to purchase a shield. The game proceeds in like manner as you bargain for armor, a bow, arrows, and salve for wounds.

You then select the level of difficulty, and play begins. The screen pictures you moving through various rooms in a labyrinth filled with treasures, traps, and monsters. The unique thing about this game is that the battles you wage with the various monsters resemble action games. You move your character from room to room, attack, thrust, or parry with your sword, fire a normal arrow or a magic arrow, or change weapons. You must be careful not to move too quickly, however, for an attack by a monster while you are fatigued is deadly. You must contend with skeletons, zombies, spiders, wraiths, and more, as you attempt to accumulate treasure and escape unharmed.

This game is entertaining, especially for children. The graphics are sometimes more interesting for younger users than are text-only adventure games. *Temple of Apshai* is therefore a good introduction to adventure games for children ten years and older.

As we mentioned before, fantasy games have traditionally relied more on strategy and logic and less on fine muscle coordination and quick reactions. We suspect that many future games will, like *Temple of Apshai*, merge some of the aspects of action games with fantasy games. Fantasy games will probably continue to appeal mostly to older children and adults, because of the logic required.

Some of the companies that sell good adventure-fantasy software for the ATARI are Epyx, Quality Software, Synapse Software, Broderbund Software, and Synergistic Software.

## Simulations

Simulation games are designed to mirror real-life experiences, like flying an airplane or running a large corporation. Some computerized simulations actually do prepare people for the real experience, such as flight simulators used by the Air Force or NASA, while others are purely for fun.

### Deadline

*Deadline* is a unique game from Infocom. Actually, we could have discussed this game in the fantasy-adventure category, but we really couldn't decide where to put it. It is an adventure, but in a sense it's also a simulation. It's a simulation of a detective's work, and it's really fun! It is a text-only game that's head and shoulders above the early text-only games. What makes *Deadline* so much fun is the way it can understand so many different things you type in. This has become something of a trademark for Infocom.

Traditionally, text-only computer games for microcomputers have only been able to understand sentences of one or two

words, often only a verb and a noun. It can be terribly frustrating to continue to ask the same question in as many different two-word combinations as you can think of, only to have the program continue to tell you it doesn't understand your question. This situation has been greatly improved in *Deadline*. In this game, you are not restricted to two-word commands. You can type in things like PUT THE KNIFE IN THE TROPHY CASE, ASK THE COOK ABOUT MRS. ROBNER AND HER OTHER MEN, or UNLOCK THE DOOR WITH THE KEY and the program understands perfectly. Of course you can't talk to this program as you would to a friend, but its ability to understand a variety of commands and sentence structures is truly amazing!

*Deadline* puts you in the role of a tough private eye out to solve the mystery of the death of Mr. Marshall Robner, millionaire industrialist and philanthropist. Robner was found dead on the floor of his library, the victim of an apparent overdose of the tranquilizer he had been taking. The door was locked from the inside. Robner had experienced recent business setbacks and had been suffering from severe bouts of depression. It seems to be an open-and-shut case of suicide. But is it? It's up to you to find out.

You have been hired by Robner's attorney to investigate this presumed suicide. The attorney is convinced there was no foul play, but he feels an investigation is in order since Robner was in the process of changing his will when he died. Mrs. Robner is reluctant to cooperate, but grudgingly agrees to let you spend one day in the Robner mansion to investigate the death. Therefore, you have a deadline of twelve hours to complete your investigation and solve the case.

Each turn you take consumes one minute. A line at the top of the screen tells you how much time you have left. You are free to move around the Robner mansion and examine anything or anybody you please.

At first, the people you meet seem ordinary enough, but are they? There's Mrs. Robner, who was frequently visited by gentlemen callers and who is obviously NOT grief stricken over her husband's death. Then there is Ms. Dunbar, Robner's

personal secretary, who seems to have been unusually close to him. And then there is George, the spoiled son who often quarreled with his father. You wonder too about Mr. Baxter, Robner's business partner who may have more to gain from Robner's death than anyone suspects. There is also Mrs. Rourke, the housekeeper, who seems innocent enough, but who takes an unnatural interest in the personal affairs of everyone in the Robner household. There are other characters as well, and you are free to wander the estate, examine, question, fingerprint and analyze to your heart's content. Meanwhile, the clock ticks on.

This is an elegant game, beautifully and artfully packaged. It comes complete with a letter of employment from Robner's attorney, a coroner's report, a photo of the death scene, a crime lab analysis of the teacup, a police report, a transcript of interviews with all the people concerned with the case, and even three of the "deadly pills" found near the body. In addition, there is a fine manual explaining how to play the game and how to talk to the program in language it will understand.

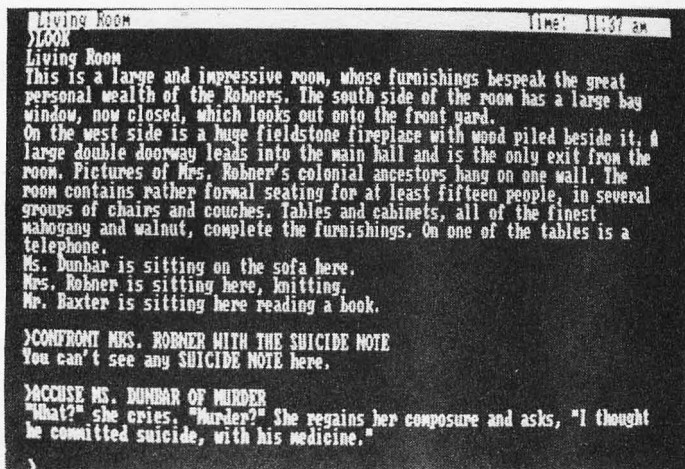


Figure 2.26 Deadline



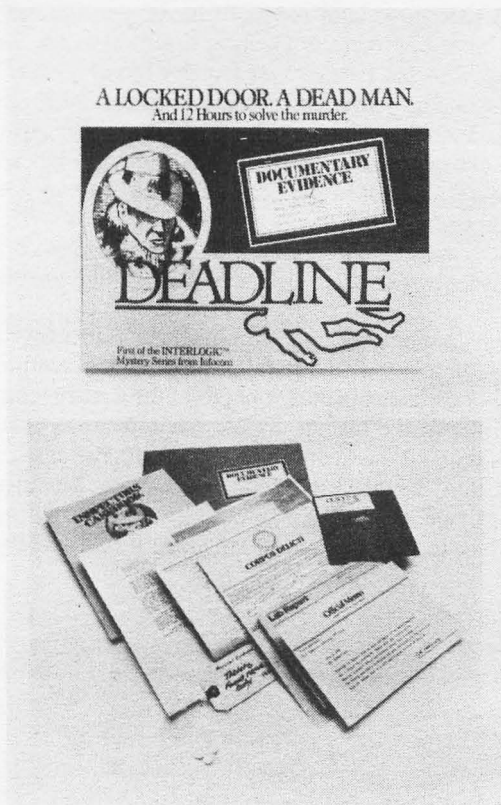


Figure 2.27 Deadline Packaging

It takes about twenty hours to complete this game, and it can be saved at any point so that it can be resumed at a later time. Anyone who enjoys mysteries will love this Infocom game. It sets a new standard for text-only games. This one's a winner.

## Suspended

This is another excellent simulation from Infocom (diskette—\$49.95). Like *Deadline*, the packaging is excellent. The



game comes with a heavy playing board to help you keep track of what's going on.

The plot is a science fiction simulation. You were chosen by lottery to be placed in suspended animation. Your mind is used to control the life systems of an entire planet. This should have continued for 500 years. As the game begins, you have been unexpectedly awakened to cope with an emergency. You must first determine what the emergency was, then deal with it.

You control six robots—Iris, Auda, Whiz, Waldo, Sensa, and Poet. Each of these robots has distinct strengths and weaknesses. Iris, for example, is highly visual but has limited mo-



Figure 2.28 Suspended Packaging

bility. Auda has unbelievably good hearing but is not equipped to carry out fine manipulations. You may address all of the robots at once or any one of them. Each will reply, and each seems to take on a personality as the game develops.

This is another first-rate game. Like *Deadline*, the program understands a sizable vocabulary of complex sentences. Both games have been called *participatory novels*. That seemed a little outlandish before we really played these games. It doesn't anymore.

## Millionaire

This is a sophisticated stock market simulation game that sells for \$99.95 (Blue Chip Software). This game is definitely not for young children. You are given complex market charts of various kinds, tables showing highs and lows, world and national news items, and stock prices. With this information, you must decide when to buy and sell. The game is simple to learn and easy to play if you understand just a little about stocks.

```

IRIS                                     Score: 3   Moves: 17
Projected damage: Cooling systems for FCs in Maintenance Area.

>POET, REPORT
FC: Cryolink established to Poet.
FC: Full report from POET
POET: Moving through Beta Repair
We're getting nowhere fast, glider, but at least we're not getting there
slowly.
The glider is not in motion.
POET: As far as I know, I'm Zen on inventory.
POET: Sensory pads detect no abnormal flow.

AUDA INTERRUPT: From what I can hear, I've arrived at the Small Supply Room.

>IRIS, REPORT
FC: Cryolink established to Iris.
FC: Full report from IRIS
IRIS: Moving through Weather Monitors
Everything is dark.
IRIS: I am holding nothing in my dainty extensions.

POET INTERRUPT: As much as I can be anywhere, I'm here at the Gamma Repair.
>

```

Figure 2.29 Suspended

## Blue Max

*Blue Max* (\$34.95) is a unique three-dimensional flight simulation. The game is set during World War I in the skies of Europe. You control a biplane which you must fly over a variety of difficult terrain. You bomb gun emplacements and ships, strafe enemy troops and take part in dogfights with enemy planes. The graphics are stunning in this well-written flight simulation. Synapse Software sells this program.

## Computer Ambush

This program is distributed by Strategic Simulations, a company well known for both computer and ordinary simulation games. Strategic Simulation programs generally come with a complete set of material. *Computer Ambush* pits two squads of soldiers against each other, one American and one German, during World War II. The program is on disk and costs \$59.95. You get a twenty-page instruction manual that explains the game, two squad cards that tell you the name of each person in your squad and their characteristics. You learn, for example, that Max Wagner carries only a rifle and two grenades, that he is just slightly above average in intelligence, but he is an outstanding marksman. Max is below average in hand-to-hand combat, however. You also get two laminated mapboard cards and two grease pencils.

You can play against a human opponent or the computer. The game requires you to lead your squad against the other squad. You decide where the men are positioned, what they do, and which member of the squad performs each assignment. The likelihood of success depends on many things, including the abilities of the men assigned the task. Maroot Marootian, a U.S. private, is a poor shot, but Aloysius Garrity, another U.S. private, is excellent. If Maroot has to shoot, he is much less likely than Aloysius to hit his target.

*Computer Ambush* understands a relatively large vocabulary of words, but they are generally two letter combinations. GR,

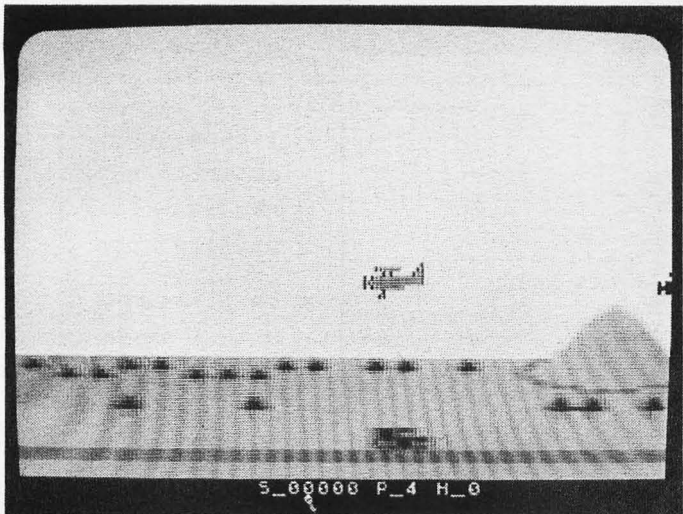
for example, means GET RIFLE, PP means PREPARE PLASTIC EXPLOSIVES, and EF## means THROW A HAND GRENADE TO SQUARE ##. Coordinates on the cardmaps let you keep track of your men. The game can be played blindly, (you don't know where the enemy soldiers are until an encounter) or sighted (you know where all the enemy soldiers are). *Computer Ambush* is an excellent game in the tradition of military simulations. Unlike many, it puts you in the front lines of the battle. Many military simulations make you a general who runs the whole war from a command post. This program takes one to three hours to play and can be saved on disk and continued later. You even get a password, which you keep secret so your opponent can't come in and read the data on your troops without your knowing it.

## Flying Ace

This simulation is very different from *Computer Ambush*. In *Flying Ace* you are the pilot of a biplane during World War I. Your mission is to attack trucks hauling ammunition to the front, as well as any staff cars you see on the road. While you are looking for trucks and cars, an enemy biplane will attack you. To survive, you must shoot down the plane.

This simulation works like a video game. The game begins with a display of your landing strip on the screen. You take off and control the plane with your joystick. Pressing the button on the joystick fires your machine gun.

The color graphics in this game are good but not outstanding, as are the sound effects. It is fun to play, however. Preteens are likely to find it most interesting. The program from Avalon Hill is \$31.00 on disk and \$26.00 on cassette. Another simulation for the ATARI from Avalon Hill is *Paris in Danger* (disk—\$35.00). It simulates Napoleon's 1814 battles against allied armies who were fresh from victories against Napoleon in 1812 and 1813. The video screen displays the battle region; play is on two levels. You can make strategic decisions about deployment of your armies. During a battle, however, you can take control of the troops and move them about with the joy-



**Figure 2.30 Flying Ace**

stick. If you don't take control, the computer does it for you and resolves the battle, based on the position and strength of the troops on each side.

*Paris in Danger* comes with a thick instruction booklet that tells you how to play the game and gives a concise and well-written history of the context in which this campaign was fought. Another excellent simulation in the same tradition is *Eastern Front*. This simulation is distributed by Atari and comes on a disk or cassette for \$35.00. *Eastern Front* lets you take control of the German army as it began its attack on Russian troops. The screen is used to show you part of regions where the armies were in conflict. You have sophisticated control over the German divisions and must make important strategic decisions on troop deployment and battle plans. The game has excellent graphics and gives players more control and more decisions to make than most simulations. This excellent game costs \$44.95 on cartridge.

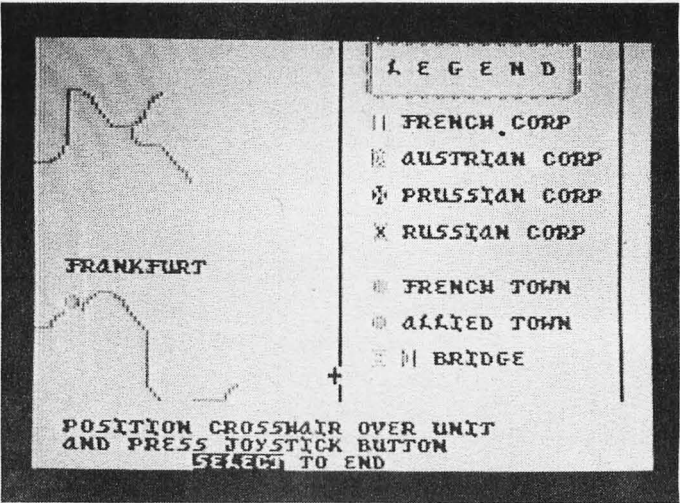


Figure 2.31 Paris in Danger

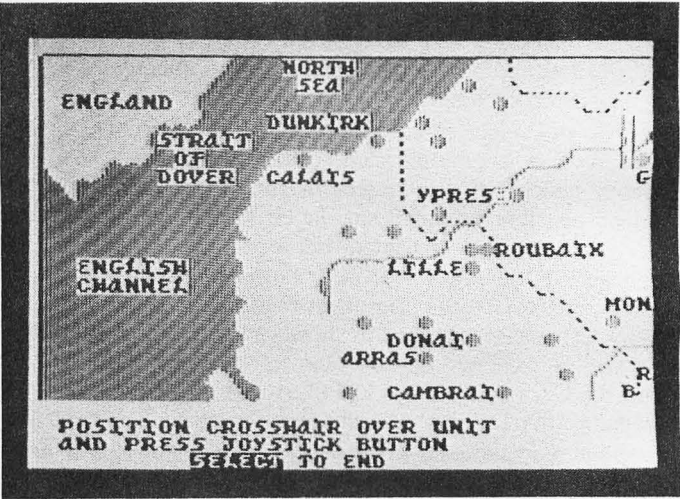


Figure 2.32 Paris in Danger

## Card Games, Las Vegas-Style Games, and Board Games

### **Black Jack Strategy**

*Black Jack Strategy* is designed for people who want to use their computer to learn something about playing this difficult card game. It's available from Soft Images for \$69.95. You can either play against the program or have the program set up certain card situations, monitor your play, and make suggestions for improvement. All the basics are included, except card counting, and a good manual is provided.

### **Seven Card Stud**

This is an excellent card game. The program plays five hands against you. Each of the five players have a different name and different playing characteristics, which you must learn and turn the knowledge to your advantage. The game is available for \$15.95 from Atari.

### **PokerSam**

This \$25.00 program, available on disk from Don't Ask Computer Software, lets you play standard poker games against the dealer, better known as the computer. The graphics on this game aren't that great, but the game has something else—speech. Don't Ask is the developer of a software program that generates intelligible, if computerlike, speech on computers like the ATARI and Apple. They used that program to endow *PokerSam* with speech. As he deals cards, he tells you what cards are dealt and makes comments about your play. The program's speech abilities make it a unique poker player.

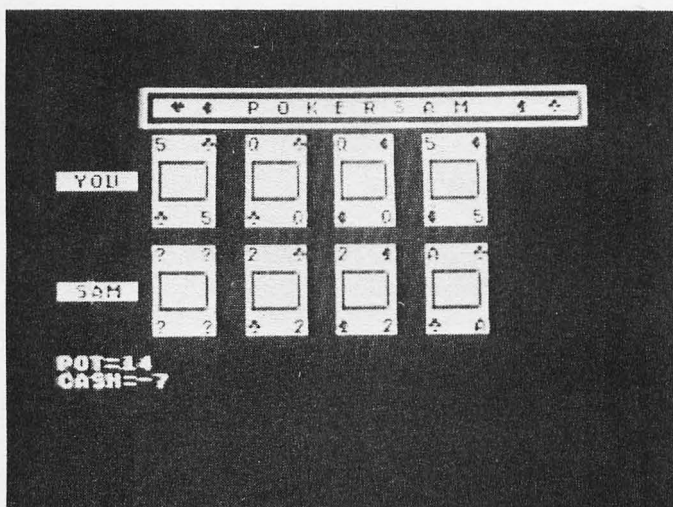


Figure 2.33 Poker Sam

## Chess 7.0

Larry Atkin's *Chess 7.0* is one of the better chess programs. It is available from Odesta for \$69.95. The graphics are excellent, and making your moves is simple. You place the cursor on the piece you want to move, and press your game button or the return key. Then you use the arrow keys to put the cursor where you want to move the piece and press the game button or the return key again.

There are seventeen levels of play. This program is more than just an opponent: the computer gives you advice and predicts the best moves. It can also replay thirty classic human and computer chess games. And when you start the program, you can choose to watch an excellent ten-minute tutorial on how to get the most out of the program.

*Checkers* (\$49.95) and *Odin* (\$49.95) are two other excellent board game programs from the same company.



## Stocks and Bonds

The popular *Stocks and Bonds* is now available on cassette (\$20.00) or on diskette (\$25.00) for your ATARI from Avalon Hill. Here's your chance to be a Wall Street genius. Buy low, sell high, and get rich. The winner is the player with the most money at the end of the game. This is a good simulation game for children of about ten years and up.

## Sports Games

Many sports games are available for the ATARI computer. Most of these games are suitable for both children and adults, but you have to know the rules of each game.

### Starbowl Football

*Starbowl Football* (\$31.95) is an animated graphics football game that is fun for children and adults. The game displays six players who actually run, pass, kick, tackle, punt, and do all the other standard football moves. One or two people can play. You use a joystick to select one of 196 different play possibilities. After the plays are selected, the computer runs the play on the screen.

One of the virtues of this game is that you can play it at several levels of sophistication. Younger children enjoy watching the animation, while confirmed football fans become absorbed in the strategy. Gamestar, the company that produced this game, also has *Star League Baseball*, a similar game.

### Basketball

*Basketball* is an ATARI sports cartridge for one to four players (\$34.95). This is another animated graphics game that children find appealing. When you press the button on your joystick the player shoots a basket.

## Pool 1.5 and Pool 400

*Pool 1.5* is a disk game (\$34.95), and *Pool 400* is the cartridge version (\$39.95) of this popular billiard simulation from Innovative Software Design. Straight pool, nine ball, eight ball, and rotation can all be played by up to four people. There are options for variable friction, strength of shot, and type of English on the ball. The graphics are excellent, but the really amazing part of this game is the ball movement. It's easy to forget that you're looking at electronic action.

## WHERE TO LOOK FOR SOFTWARE

The best way to keep up on new game software is to read reviews in some of the computer magazines that cover ATARI computers. Several were mentioned at the end of Chapter One.

Another good source is *The Book of ATARI Software, 1983*, edited by Stanton, Wells, and Rochowansky, and published by The Book Company. This book is also sold as the *Addison-Wesley Book of ATARI Software 1983*.

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## CHAPTER THREE

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# Arts and Crafts

You may not think of your computer as a musical instrument or an artist's canvas. After all, computers are machines, and machines aren't artistic, or are they? If you think your ATARI is only a number-crunching machine incapable of anything artistic, you may be in for a surprise. Sculptors have hammers and chisels, painters have pallets and brushes, and musicians have pianos, electric guitars, or whatever. These are all tools artists use to create or play. The ATARI computer can also serve as a useful tool for budding (or not so budding) artists and musicians.

The title of the chapter is not meant to imply that the applications discussed here will not be of interest to the professional person or to businesses. The ATARI is regularly used by businesses, for example, to design and generate all sorts of charts, figures, and tables. These *graphics* are used as overheads for meetings, in financial reports, and in accounting records.

We won't tell you that, after a weekend of study, you will be able to replace your baby grand piano or electric organ with the ATARI computer. You will not be able to press a button and get a Picasso to hang on your wall either, but there are some interesting musical and artistic things you can do with it. You can even create business graphics for reports and meet-



**Figure 3.1 The expandable ATARI 600 XL Home Computer can open up the world of music and make learning fun.**

ings more quickly, less expensively, and more professionally on a computer than in the traditional way.

If you are just getting acquainted with computers, you probably won't be able to create a video game next week that will sell millions of copies. That requires a considerable amount of knowledge about how computers operate, as well as creative

and artistic genius, which most of us just don't have. But many of the creators of video games began by buying a computer and learning how it operates. They did not necessarily have formal training or college degrees in computer science or engineering. However, some people use the ATARI computer to make money. If you are skilled in creating color pictures and animated drawings on the computer screen, you can put these skills to work in adding interest and excitement to game and educational software programs. You can also use the skill of creating music on the ATARI to good advantage by adding sound to software.

Fernando Herrera is a case in point. Mr. Herrera bought an ATARI computer and decided to write a program to help his handicapped son learn the alphabet. His program, *My First Alphabet*, won an award and generated tens of thousands of dollars in royalties for Mr. Herrera. After the success of *My First Alphabet*, he went on to create a number of outstanding video games for the ATARI.

## GRAPHICS ON THE ATARI

When you buy your ATARI and take it home, you have a potentially powerful graphics and sound machine. We say potential, because the computer normally displays no more than ordinary characters on its screen, and you usually hear no more than a high-pitched beep. But the ATARI is one of the best graphics computers on the market today.

As you are undoubtedly aware, ATARI has been in the video game business for a long time. The great color graphics that you see in these video games are now available in the ATARI computers. While most computers have only two graphics modes, the ATARI has twelve. Once you become familiar with the different modes and with the use of graphics, you will be in command of a first-rate graphics machine. Your hard work in learning will pay off, because you can do more with ATARI graphics than with most other computer graphics systems.

ATARI graphics can be complex, but the principle is simple. A letter, a number, or any other image is formed on the screen by lighting up or turning on certain combinations of small squares. Have you ever sat at a football or basketball game and watched the scoreboard change numbers? You probably noticed that the scoreboard has a square space filled with small lights. Each number is made by turning on certain patterns of these lights. One pattern forms a 2, another pattern forms a 9, and so on. Computer graphics work the same way. Think of the computer screen as a square divided into many smaller squares. Each different graphics mode has a different number of squares or a different number of colors that can be controlled.

The ATARI divides its screen into 960 little squares. There are 40 squares on each of 24 different lines. Through the ordinary video display features of this computer, you can display upper and lowercase letters, numbers, punctuation marks, and several special symbols in any of those 960 squares. The ATARI normally displays white characters on a blue background, but it can also display in *reverse video* (dark characters on a light background).

The character set (the symbols the computer can display) of the ATARI computer also includes a set of special graphics symbols, such as a small heart, tiny circles, and lines of several sizes. Symbols for card suits, like clubs and spades, are also included. These graphics symbols are the same size as regular letters and numbers, and they can be typed just like an A or 3, by pressing the correct keys on the keyboard. You can use these symbols to create relatively crude pictures on the screen in much the same way you may have created a Christmas tree image on a typewriter by typing lines of Xs and Is in the pattern of a tree. This type of graphics is called *low-resolution* graphics.

The ATARI computer is not limited to displaying material in the 24-by-40 format. When you turn the ATARI computer on, you are automatically in the first graphics mode. This is actually mode 0, because the modes are numbered from 0 to 11. Modes 0, 1, and 2 are called text modes. This means that they are intended to be used primarily for writing words and numbers on the screen. You'll be in one of these modes if you

do word processing or programming. The difference in the three text modes is size. Mode 1 letters and numbers are much larger than the standard ones in mode 0. Mode 2 makes even larger characters that can be read from across the room. With modes 1 and 2 the screen has even lower resolution than in mode 0. That is, the number of graphics squares on the computer screen is reduced. The smaller the number of squares the screen is divided into, the larger the characters will be. When the ATARI is in graphics mode 0, the screen is divided into 960 squares. When it is in mode 1, the screen is divided into 480 squares, and when it is in mode 2, the screen is divided into only 240 squares.

When you want to put only letters, words, and numbers on the screen, 960 squares are fine. When you want to start drawing pictures, however, you will need more. With only 960 squares, your picture will look as if it was made with square blocks. To get good pictures, you have to increase the number of squares. The reason a picture is so sharp and clear on your TV screen is that the screen is divided into hundreds of thousands of small squares. Actually the squares are really small dots of color. These dots are called picture elements or *pixels*. When the ATARI is in graphics mode 4, you have control over 3,840 squares, and when it is in mode 8, you have control over 62,720 squares. From mode 3 to mode 8 you have more and more picture elements to work with. That means you can create finer and finer-grained graphics displays. Mode 9, 10, and 11 have the same number of squares as mode 8 (3,840), but you gain control over more colors. Some ATARI display modes also let you put graphics pictures on the top of the screen and a text message at the bottom.

When you have several thousand picture elements or pixels to work with, you are working with high-resolution or HI-RES graphics. Good HI-RES color graphics are a strong point in the ATARI computer, but there is more. Atari designed a special graphics and sound chip that gives the computer superior color graphics and a type of graphics Atari calls *player missile* graphics. On other computers, such as the Texas Instruments 99/4A and the Commodore 64, player/missile graphics are called *sprite* graphics. On ATARI computers you can

design special graphics figures like tanks, spaceships, or missiles, which can be very small or rather large. These sprites or player/missiles can be controlled by instructions written into video game software, or any other type of software, for that matter. Atari used the term player/missile because they expected this type of graphics to be used most often in video games. You control the color, speed, and direction of movement of each sprite or player/missile on the screen, and you can even detect collisions between them. ATARI was one of the first computers with built-in player/missile graphics, and this system is still one of the best.

## THE SOUNDS OF ATARI

ATARI computers also have special circuits that let you generate sounds through the speaker in your television or video monitor. While some computers produce only one sound at a time, the ATARI can generate four. The computer thus has four *voices*. You can generate and control four independent sounds simultaneously on the ATARI.

### Some Music Principles

Before we proceed further in your discussion of ATARI sound synthesis we would like to introduce a few musical concepts. There are several elements in even a simple sound:

- *Pitch* is determined by the frequency (cycles per second) of the sound. We hear cycles or waves created by vibrations in the air. These are measured in cycles per second, or Hertz. You can hear sounds between 20 and 15,000 Hertz. Notes on a piano or any other musical instrument are organized by pitch. Sound created by a piano is organized into several *octaves*. A piano has slightly more than an eight-octave range, from deep or bass sounds to high pitched notes. An octave is a group of sounds, not a single sound. An octave, for example, might



begin with the C note and progress up through notes D, E, F, G, A, and B. The next C note ends that octave and begins the next highest octave. Composers and musicians have created a complicated system of naming sounds of different pitch and duration, but the primary difference between one note on a piano and another is the pitch (the Hertz of the sound).

- *Amplitude* or *loudness* of the sound. We experience this as variations in the volume of the sound.

- *Duration* is the amount of time the sound is made. Symbols and notation conventions tell the musician exactly how much time to play each note in a composition.

- The *envelope* of the sound is the variation of loudness over the period it is heard. Different sounds have different *attack* and *decay* patterns. Some reach their maximum loudness gradually and then trail off. Others begin at maximum amplitude and stop abruptly. The pattern of changes in amplitude of a tone helps determine the timbre.

- *Timbre* is musician's term for the complexity of the sound. Some sounds are pure tones with only one pitch. Others have a major tone at a particular frequency and many harmonic or secondary frequencies that add richness to the sound. These secondary sounds are part of what gives each musical instrument its own personality.

## Programming Your Own Music

One way to get your ATARI computer to make music or sound is to learn a computer language. Each of the programming languages available for the ATARI has a way of telling the computer to make sounds. The most commonly used programming language, BASIC, has a SOUND command that lets you control the pitch, volume, and distortion (timbre) of the sound. As mentioned earlier, the computer can control four separate sounds simultaneously. Some surprisingly sophisticated music can be generated by the ATARI. The *Atari BASIC Reference Manual* shows you how to tell the computer to make sounds.

Programming music in a language like BASIC takes a con-

siderable amount of study before you can get results. Even if you already know BASIC or some other language, programming music into the computer is a slow, tedious job.

But if you are interested in programming music yourself, there are some helpful books on the subject. *ATARI Sound and Graphics: A Self-Teaching Guide* is a good starting point. It is published by John Wiley and Sons and written by Herb Moore, Judy Lower and Bob Albrecht. It walks you through a step-by-step sequence for mastering BASIC for both music and graphics. Programming sound and music is also the topic of many articles in the magazines mentioned at the end of Chapter One.

In addition, we recommend a set of programs called *Tricky Tutorials* from Santa Cruz Educational Software. This \$99.95 set of tutorials covers many topics on programming the ATARI computer in BASIC. Most of them are related to writing programs to display color graphics, but a few are on sound and music. The ones on generating music on the computer are some

### The SOUND command

Leaving the VOLUME set at 8,  
and using only DISTORTION 10,  
watch what happens when we change  
the PITCH variable.

SOUND 0,202,10,8

Figure 3.2 Tricky Tutorials: The Sound Command

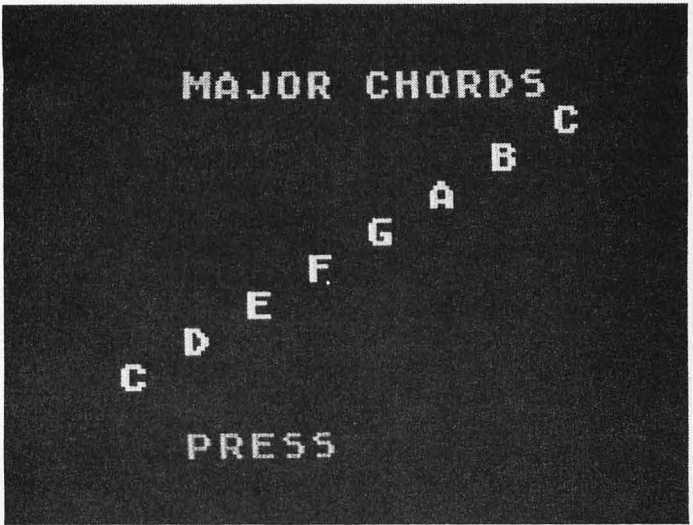


Figure 3.3 Tricky Tutorial

of the best educational software we've seen. You load tutorial number 6 into the computer, and it gives you a ten-minute tutorial on how music is generated and how to write music programs in BASIC. The tutorial ends with an excellent rendition of a tune from *Sound of Music*.

Writing music programs in BASIC or some other language may not be your cup of tea, however. Take heart—there are other ways to use the ATARI for sound and music synthesis.

## SOFTWARE AND PERIPHERALS FOR MUSIC

As with all types of software for the ATARI, a wide variety is available for music. The quality of music you get from the computer with different pieces of software varies as greatly as the price you pay. However, some of the best software and

peripheral combinations approach the sounds of an expensive music synthesizer.

## Music Composer

This program makes it easy to write songs that are played through the television's speaker. *Music Composer* gives you a way to compose and play music on the computer without programming the computer yourself. For the price, it is a good investment, if you are interested in composing your own music and don't want to spend a lot of money. This is typical of music software available for most personal computers. The program displays a musical staff on the screen. By giving the computer coded information describing the pitch, volume, and duration of the notes, you write your own song. You can also edit or change the music you compose. Editing works a lot like a word processor: you insert notes into the song or erase notes from the song with simple keyboard commands. As you type in the coded descriptions of each note you want, you can hear it and see it placed on the musical staff. When your song is just as you want it, you type L for listen, and the computer plays the entire song for you. You can also save the song on disk or tape and play it for your friends later. *Music Composer* is sold by Atari for \$39.95.

## Advanced Musicsystem

This is another inexpensive music software package for the ATARI. You don't have to buy anything but the software. With this software alone, you create, edit, and store on tape or on disk any song you write. *Advanced Musicsystem* puts out multi-voice music with a variety of timbres. While the sound quality you get from the ATARI with this program is not as good as that produced by specially-designed hardware, it is acceptable for many purposes, especially when you consider the low cost.

*Advanced Musicsystem* is similar to *Music Composer*. You give the computer codes to describe the individual notes of a song, then tell the computer to play the song back to you. You

also edit the song and store it on either tape or disk. When you buy the package, you also get a disk with five sample classical musical pieces. This program is available from the Atari Program Exchange and sells for \$29.95.

## **Player Piano**

This is another program from the Atari Program Exchange. It turns your ATARI into a simulated piano with twenty keys. The screen displays the standard piano configuration of black and white keys. As you touch keys on the keyboard, you hear the note and see it jump from one key to another. Unlike an ordinary piano, this program also lets you save, edit, and replay your performance. It costs \$23 and is available on either a disk or cassette. A similar program called *Keyboard Organ* turns the computer into a simple but playable electronic organ. This program also costs \$23 and is available from the Atari Program Exchange.

## **ATARI Keyboard Music**

One obvious difference between using a computer to make music and playing a piano or organ is the lack of a keyboard. When you play a standard musical keyboard instrument, you don't have to worry about how to make a single note sound long or short; you just hold down a key. The computer, on the other hand, has to be told everything about each note it generates: how high, how loud, and how long. Since computers are only told what to do in a complicated coding system, the keyboard of your computer will not function in exactly the same way as the keyboard of your electric organ. There are keyboard devices that connect to your computer and let you play the computer in much the same way you play a piano or organ.

## **Soundchaser Computer Music System**

This is one of the least expensive keyboard systems available for the ATARI. You will want to do some investigating to

make sure you are getting just the right options to fit your needs before you buy a system like this.

Passport Designs, Inc., manufactures *SOUNDCHASER*. It has a piano-style keyboard and software that converts the electronic signals sent by the keyboard into signals the computer recognizes. Depending on what features you want, the system costs from \$1000 to \$1350.

## The AlphaSyntauri System

If you are really serious about ATARI music, join such famous musicians as Herbie Hancock. He uses an *Alpha-Syntauri* keyboard system to perform much of his famous jazz music. This system is available from Syntauri. Depending on what options you want, it will cost you between \$1295 and \$1995. Like the *SOUNDCHASER* system, this one lets you play music on a piano-style keyboard, store it in the memory of the computer, save it on a cassette or disk, and edit or change it as you wish.

## Music Training

Some software packages use the music capabilities of the computer to teach musical concepts, and most are of the drill and practice variety. That is, they do things like sound a note and have the student name the note. Or, they play a short melody and then have the student program the same melody back into the computer.

## Music 1 Terms and Notations

One of the most comprehensive software packages for music training available for the ATARI, this series of programs make it fun to learn music fundamentals. You can both hear and see the music as you play it. The series is primarily designed as a supplement to basic music theory training. This solid basic music theory training for young children is available from Atari

Program Exchange for \$29.95. The Exchange also has several other programs for music training.

## **Name That Song**

While *Name That Song* is primarily designed as a party game, it may help you gain some music appreciation. Up to ten players can play at one time. The computer begins playing the notes of a tune, and the players try to guess the title. There's an elaborate scoring system and a good selection of tunes in this product of Quality Software.

## **Logo Music**

Perhaps the most exciting way for you to use the ATARI to teach young children basic music concepts is with *Logo Music*. *Logo Music* uses an ALF synthesizer to generate musical sounds. Logo is actually a computer programming language developed to help children learn. In the true tradition of Logo, *Logo Music* is designed to help children experiment with music and, in the process of having fun, learn some basic musical concepts.

## **Minnesota Educational Computing Consortium Music Software**

The Minnesota Educational Computing Consortium (MECC) is a publicly-supported organization that has led the way in educational computing. MECC has converted several of the programs in its educational software library to run on ATARI computers. Several of these programs that teach music notation, pitch and rhythm, and scales and chords are available through the Atari Program Exchange. MECC programs are excellent and come with good instruction manuals. They cost \$30.00 each.

## THE SPEAKING ATARI

The ATARI 1400XL and the 1450XLD models have a built-in speech synthesizer that gives the computer the gift of speech. Other ATARI computers can also be made to talk by adding peripherals such as Votrax's *Type N Talk* system. An inexpensive way to get a talking ATARI is also available. *Sam, the Software Automatic Mouth*, is a \$60.00 program that lets you type in letters, words, and phrases and listen to the computer speak what you typed in. *SAM* is not an eloquent speaker, and he is difficult to understand on occasion, but the fact that this software gets the ATARI to talk at all is amazing. *SAM* is available from Don't Ask Computer Software.

## THE ATARI AS A GRAPHICS MACHINE

The most straightforward and cheapest way to get started in graphics is to program the computer yourself. With the ATARI or any other computer, you create a variety of patterns on the screen by using simple commands. We have already noted, however, that writing programs in BASIC to create music takes quite a bit of effort. The same is true of programming color graphics. There is an alternative.

### Graphics Software

The alternative is graphics software that translates your instructions into codes the computer understands. For example, in many graphics software packages, you simply move the cursor around on the screen by pressing the *arrow* keys on the



keyboard or by using a joystick. When you press the left arrow, the cursor moves left, when you press the right arrow, the cursor moves right, and so on. With some practice, you can draw intricate designs. We will review some of the graphics programs for the ATARI.

## Paint

This graphics package is an excellent general-purpose system. It is easy to use and has a great deal of versatility. The total package is divided into two levels, one for children and one for adults. When you are in the children's level, you see four paint pots and five brush sizes arranged at the bottom of the screen. You move the cursor with either the joystick or the keys to the paint pot and brush size you want to use, then move the cursor easily and freely around the screen. While the cursor is moving, nothing happens on the screen until the button on the joystick or a key is pressed. Then the cursor begins leaving a brush stroke. You paint your own masterpiece and erase whatever you don't like, until you get just what you want. Paint and brushes can be changed as often as you like.

The advanced portion of the package will do everything the lower version does and much more. Now you can create colorful circles, lines, and rectangles with simple instructions. You can paint with textured splashes of color. This creates the effect a painter gets by using different types of brushes and different brush strokes. *Paint* is sold by Reston Publishing Co. for \$39.95. It is an excellent package.

Reston also sells two other programs for the ATARI. *Movie Maker* is a sophisticated program that helps you create detailed scenes and animate them in living color. *Genesis II* is another powerful utility program that helps you create sophisticated color graphics with sound. Both these programs go beyond the ordinary utility software; they are very powerful.

## SketchPad

This \$23.00 program from the Atari Program Exchange lets you create computerized doodles in color on the screen. You

use the joystick to control the movement and direction of the cursor as it draws. The program also has some keywords that let you create shapes with very little effort. If you want a box at the top center of the screen, you can move the cursor there and then press B, which is short for BOX. You use the cursor to define the corners of the box (move it with the joystick and press the fire button to indicate corners). You can create lines, boxes, circles, and many more graphics shapes in much the same way. The program gives you many options for color and shapes and is a good program for people who want an easy-to-use program. The quality of the graphics are not quite as good as they are in some other programs, but they are good.

The Atari Program Exchange has several other programs for graphics. *Drawit* (\$40.00) is another easy-to-use but powerful utility program that helps you draw a wide variety of graphics in color. *Banner Generator* (\$16.00) helps you create large banner-style messages. *Isopleth Map-Making Package*



Figure 3.4 PM Animator

(\$23.00) lets you create and display on the screen some very detailed color maps of contours. *Enhancements to Graph It* is a \$16.00 program that works with *Graph It*, a program for creating standard bar graphs, pie charts, and three dimensional plots. Using the two programs together, you can generate some high-quality graphs. *Mapmaker* (\$23.00) helps you create detailed maps like the ones used in *Eastern Front*, a program that was described in Chapter Two.

## PM Animator

This is another program from Don't Ask Computer Software. With it, you can use the more powerful aspects of ATARI's player/missile graphics without learning to program the computer in a complex language called 6502 assembly language. *PM Animator* lets you design and animate graphics characters and figures, which can be used in other programs such as video games.

One of the demonstration graphics for this program is a blue and green world rotating in a dark star-filled sky. The program costs \$45, and comes with a manual that explains how Atari graphics work and how to use the program to create player/missile graphics.

## Screen Maker

This program lets you create graphics and graphics/text displays on the screen. Then it creates a set of instructions in BASIC that recreate your graphics. Those instructions can then be saved on a disk and used in other programs that you write. *Screen Maker* is available from Icon Software on disk.

## Turtle Tracks

This package of software could have been discussed in the chapter on educational software or in the chapter on programming languages. *Turtle Tracks* is really a programming language designed specifically for children who are learning about computers. The program lets you use instructions similar to

those used in a computer language called Logo, to create color graphics and sound. The graphics this program lets you create are relatively low-resolution, which is surprising considering the potential of the ATARI computer. *Turtle Tracks* is also a bit slow, but the instruction manual is a good introduction to the program, and children are likely to find it very interesting because they can write simple programs that tell the *turtle* (a little turtle-like cursor on the screen) to draw all sorts of shapes. The program is available on cassette or disk and is one of a whole line of educational software from Scholastic, a well-known educational publisher.

### Antic Public Domain Software

*Antic* is one of the leading magazines for ATARI owners, and it also supports a public domain software program. You can buy these programs for little more than the cost of the disk and a fee for copying them. The *Antic* Public Domain Software

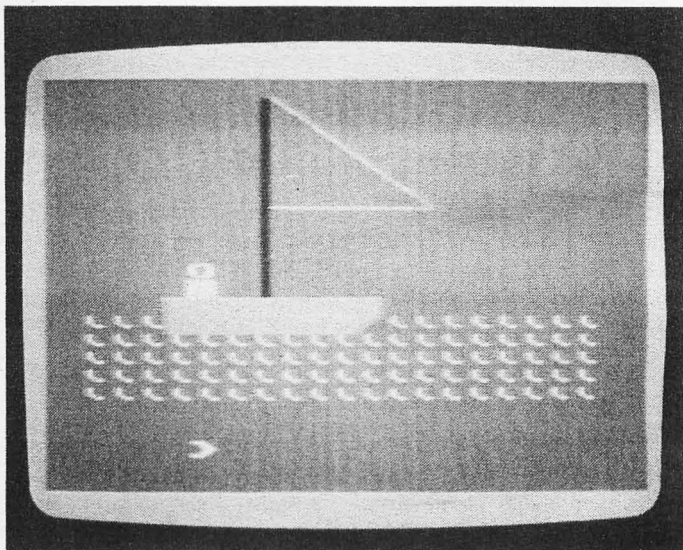


Figure 3.5 Turtle Tracks

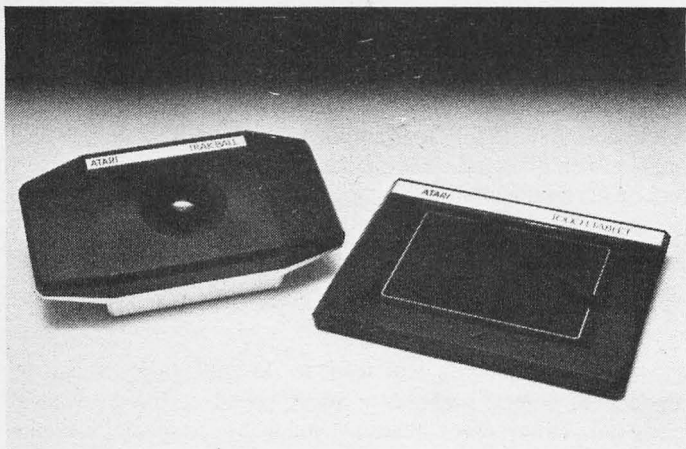
Library has a number of programs that take advantage of the computer's sound and graphics. There is a graphics demonstration disk that contains many excellent color pictures and a music demonstration disk that has many computerized songs, including some Scott Joplin compositions and some Beatle's music. The disks cost \$11.50 each and generally have at least six or seven different programs. The disks are a bargain even if you use only one or two of the programs on each one.

## Special Input and Output Devices for Graphics

Much of what you will want to do with graphics can be done with a good graphics software package. If you want to print out your graphics creations, you will need special software and a printer, such as the Epson MX-80. This printer and many others can print graphics (in black and white) as well as ordinary letters and numbers. A company called Macrotronics sells a product called the *Screen Printer Interface, Version 2.0*. This product lets you get printed copies of the graphics images on the ATARI video display. It works with many popular printers and comes with a program that is easy to use. The package costs \$79.95.

There are also some special peripheral devices designed just for graphics output. *Plotters* and *printer/plotters* are relatively expensive, but they can create multicolored graphs and figures. Sometimes these peripherals are called *printer/plotters* and sometimes they are just called *plotters*. Plotters actually draw out your graphics in color. Atari recently announced a special printer/plotter for their computers that comes with the software you need to draw four-color graphs and figures on paper about four inches wide. The quality of the art created by this printer/plotter is quite good, but it is somewhat limited by the size of the paper it uses.

Just because you get some color pictures on your ATARI screen doesn't necessarily mean the picture will print on your printer. There are software packages designed just for this purpose. One of the least expensive of these programs is called *Color Print*. This package is available for \$34.95 from Data-



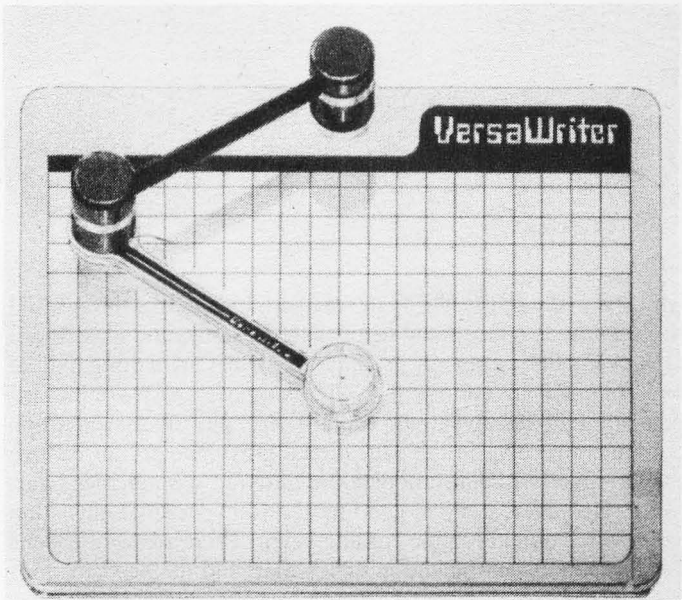
**Figure 3.6 The ATARI TouchTablet and Trak-Ball**

soft. Many good graphics software packages have their own printout capability. All you have to have is the right kind of equipment. If you use a program that does not have a printout capability, however, you should make sure that the printout software you buy will work with your graphics package and your printer.

All of the art work we have discussed thus far has used the keyboard or joystick as the input device. There are special devices that let you enter graphics data directly into the computer. Graphics tablets have a flat area covered with a soft plastic cover and look like an electronic graph pad. By moving a pen-like pointer called a stylus over the surface of the graphics tablet, you send a signal to the computer and an image appears on the computer screen. If you lay a map of the United States over the tablet and trace the outline with the stylus, the outline will be duplicated on the screen. Atari recently announced a special graphics tablet, the ATARI Touch Tablet, which works with all ATARI computers.

Another graphics input device is *VersaWriter*, which sells for \$299.00, with software that lets you interface it with the ATARI computer. This product works a lot like a pantograph.

It has a levered stylus arm that can be moved anywhere on the surface of the *VersaWriter* pad. It works much like the *Touch Tablet* but has a larger drawing surface. This system is sold by Versa Computing.



**Figure 3.7 VersaWriter**

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## CHAPTER FOUR

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# The ATARI as Teacher

Much is made of the ability of small computers like the ATARI to function as educational devices in the home and classroom. However, the computer is only the latest in a long list of technological inventions that were supposed to revolutionize education in the twentieth century. In spite of the attention computers receive in the educational press, we do not believe they are likely to revolutionize the little red schoolhouse overnight. However, there is good reason to expect that education will evolve quickly in the coming years. There are two reasons for this: the decentralization of learning and the need for life-long learning.

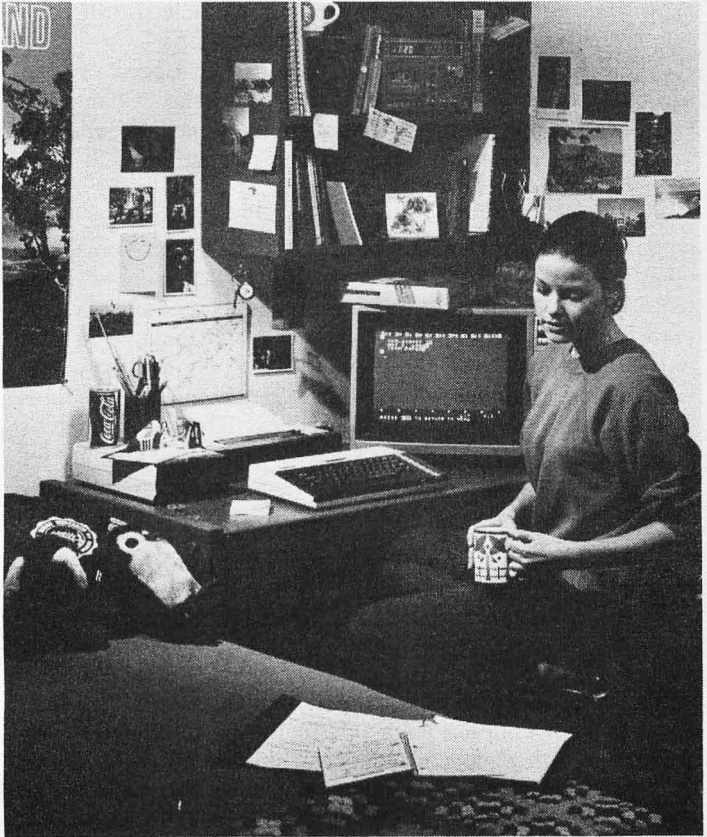
## THE DESCHOOLING OF LEARNING

Education has been institutionalized for most of the twentieth century. Learning has been something children do in a classroom supervised by one or more adults. This model will continue to be important through the end of this century, but by the year 2000 it will play a smaller role than it does today. More people will spend time learning at home, in the office, at the factory, and at adult learning centers. Learning will be



a lifelong task rather than something children do to prepare for adulthood.

In earlier times you could learn a trade or profession and then earn your livelihood for the rest of your life with the skills you acquired. Today virtually every job is being changed or eliminated by new information, new social trends, or new



**Figure 4.1 An ATARI 800 XL Home Computer helps learning outside the classroom.**

technology. Physicians, for example, cannot continue to practice medicine for years without keeping up with new discoveries that affect the way they practice. Other jobs disappear and are replaced by new ones. Like the wagon-wheel factory that converts to hubcaps, many of us will have to learn a different profession or trade at least once in our lifetime. Most of us will find ourselves learning throughout our lives to keep up with change. Many of us will return to some sort of adult training program to retool for a new profession.

Even if your job stays stable, many other aspects of your life will change. It's like our federal income tax. Changes in the federal income tax laws can mean thousands of dollars to families with modest incomes. Failure to keep up with these changes can be an expensive oversight.

So we must continue to learn, regardless of our age, if we are to cope with the demands of life. And we'll learn someplace other than in public school classrooms. In the future all of us will spend more time in learning activities at home and at work. Fortunately, small computers like the ATARI can be helpful in both traditional and non-traditional learning environments. For example, families will be able to buy computer programs that teach them about new income tax laws. There are numerous programs for the ATARI that computerize record keeping for income tax records.

## THE SMALL COMPUTER AS A LEARNING MACHINE

There are many ways computers like the ATARI can help you and your children learn. Currently most students, from elementary school to college, have little or no contact with computers during their educational careers. This will change drastically in the coming years, because computers are becoming integral parts of thousands of jobs. Few people will be able to find jobs that are not influenced, in one way or another, by computers.

## Computer Literacy

This brings us to the first use of a computer: as a means of becoming computer literate. Although children tend to take to computers naturally, many adults are not at ease with them. They feel uncomfortable around them and do not look forward to the time when computers are a common appliance in the home and office.

Buying and using a computer is one effective way of overcoming that initial feeling of discomfort. It is a good way to learn how the computer operates, what it can and can't do. Becoming computer literate is perhaps the most important educational benefit of owning a computer.

You may think computer literacy is silly because it implies that understanding computers and being able to use them is like learning to read. Reading is an essential skill in this society, while computer literacy is not. The universal need to be able to read is relatively modern however. Two hundred years ago well over ninety-nine percent of the world's population could not read. Yet these people were able to deal with their day-to-day demands. Arguing that everyone should be taught to read probably sounded silly in the 1700s. Today we believe the next generation should be taught to read because our society requires it. You cannot cope with life today as a responsible adult without that skill.

The shift from an *industrial* society to an *information* society is under way. This development will bring us rapidly to the point where computer literacy is just as essential to modern living as reading.

## Computer-Assisted Instruction

Computer-Assisted Instruction (CAI), Computer-Aided Learning (CAL), and Computer-Aided Instruction (CAI) are all terms that refer to the use of a computer in education. We will use the abbreviation CAI to refer to several types of com-

puter-based teaching approaches that give some of the responsibility for teaching to the computer. There are three general types of CAI: drill and practice, tutorial, and simulations.

## **Drill and Practice**

The simplest type of computer-assisted instruction is drill and practice. Drill and practice programs don't really teach you anything, they just help you practice something you've already learned. A common type of drill and practice helps you practice basic math skills. The computer generates a problem and asks you to type in the answer. When you answer, the computer checks the answer for accuracy.

A more sophisticated type of drill and practice program keeps track of your errors, explains errors, and provides help. New problems are adjusted to your current skill level. Some drill and practice programs set the difficulty level of problems on the basis of your performance during earlier sessions.

Several ATARI drill and practice programs are described later in this chapter.

## **Tutorial Programs**

A tutorial program does more than just give you practice on something you already know. It actually teaches. Educational programs that use the tutorial format are more difficult to write than those that use the drill and practice format. You must teach the skill, evaluate learning, and provide practice. There are a few good tutorial programs for the ATARI.

## **Simulations**

When you drop a quarter into an arcade game and control an interstellar fighter with laser guns and force field shields, you are participating in a computer simulation. Most of the arcade games are simulations.

Simulations are models of complex events or conditions. You take a role in the simulation and help determine what

happens next by the decisions you make. A computer simulation is an imaginary environment with its own rules. In an educational simulation, you take a role in the imaginary environment (you might be the king of an ancient kingdom, the president of a large manufacturing company, or the operator of a small retail business). The decisions you make determine what happens next. For example, in a popular simulation called *Hammurabi*, you are the ruler of an ancient city that has 100 citizens, 1000 acres of land for cultivation, and 3000 bushels of grain in storage. As ruler you must decide how much grain to give the people to eat, how much to save for seed, and how many acres to plant. Your decisions determine whether the kingdom starves or grows and develops (and requires more grain next year).

Simulations are widely used in business and industry. Nuclear and chemical plant workers are trained by computer simulations. It is much less expensive to have a trainee blow up a make-believe plant on the computer screen than to make a real mistake.

Simulations are useful in teaching basic skills, concepts, and attitudes. Some are more than just effective training tools—they are also fun. Many of the popular computer and arcade games are simulations designed for fun rather than learning. But there are some educational aspects to many of the popular video games.

## Other Educational Applications

Computer literacy, drill and practice, tutorial programs, and simulations account for the majority of computer applications in education today. Another approach, Computer-Managed Instruction (CMI), uses the computer as a manager or overseer of learning. Students may be given a series of assignments that require them to read a text and work in the library. As each assignment is finished, the student sits at the computer and takes a test on the assignment. A “pass” means the student can go on to the next assignment. Otherwise, the computer provides suggestions for further study.

CMI requires a lot of work from the teacher to set up, but it does not require the teacher to actually write programs that teach the student. The teacher can use an *authoring language* to develop both CAI and CMI programs without learning to program the computer in a language like BASIC. Several authoring languages are available for the ATARI. PILOT is one that's often used by teachers who want to develop their own CAI or CMI.

The popular language, Logo, developed at the Massachusetts Institute of Technology, is considered by many to be an ideal first language for children. Advocates say this language not only provides children with an enjoyable, even exciting, way to learn to program a computer but also helps them develop better, more sophisticated ways of thinking and solving problems. Parents and teachers who would like to read a strong statement of support for Logo by its developer should read Seymour Papert's book, *Mindstorms*. A less enthusiastic, but still positive, view of the language is given in *Computers, Teaching, and Learning*, a book published by dilithium Press and written by Jerry Willis, LaMont Johnson, and Paul Dixon.

The computer is often a versatile *tool* in the classroom or at home. We use many tools in our efforts to learn, including pens, pencils, tablets, rulers, and protractors. Specialized classes like chemistry, biology, and typing also have their own sets of tools—Bunsen burners, test tubes, and typewriters. The computer is likely to be an important educational tool in the future. English students will use its word processing power to write term papers, students in physics and chemistry will use it to calculate complicated formulas, and math students are likely to find it integrated into many math courses. The computer's role as an *educational tool* is likely to grow in the future.

Atari launched a program in 1983 to develop accessories for the computer that make it easier to use as an educational tool. The company plans to offer modules that help students perform experiments in physics, chemistry, biology, psychology, and geology. The first module in the ATARI lab series is a temperature probe. It costs \$90.00 and comes with software and an instruction booklet.

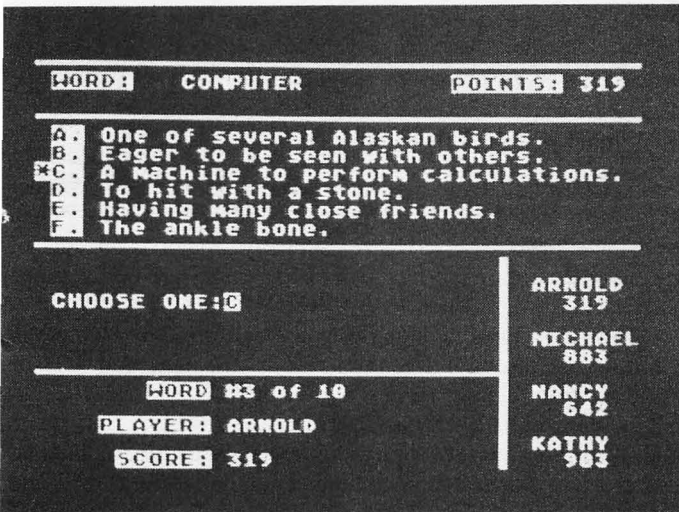


Figure 4.2 Wordrace

## EDUCATIONAL SOFTWARE

### Wordrace

*Wordrace* (diskette—\$24.95) from Don't Ask Computer Software is an educational game for up to four players. The game is intended to help increase your vocabulary. There are three levels of difficulty: grade school, high school, and adult.

In this game, a word is displayed on the screen along with several possible definitions. As soon as the word appears, a clock starts counting backward from 600 points. The clock freezes when you choose the definition you think goes with the word. If you choose correctly, you are credited with the *number of points* on the screen. If you choose incorrectly, that number of points is deducted from your score.

*Wordrace* has a 2000-word dictionary from which to choose

words. This is an interesting word game that really should improve vocabulary skills and provide some fun at the same time.

## Arcademic Skill Builders

This series of twelve disks combines some of the characteristics of arcade action games with drill and practice. They were developed by the DLM Company, major producers of special education materials. Six of the games are on language arts and six are on math.

The math games include *Dragon Mix*, *Alligator Mix*, *Alien Addition*, *Demolition Division*, *Minus Mission*, and *Meteor Multiplication*. These games sell for \$34.00 each or \$122.40 for the entire set. Each package includes a manual, a diskette with instruction sheet, duplication masters for use in schools, and a set of flashcards. Although DLM aims these drill and



Figure 4.3 Alligator Mix



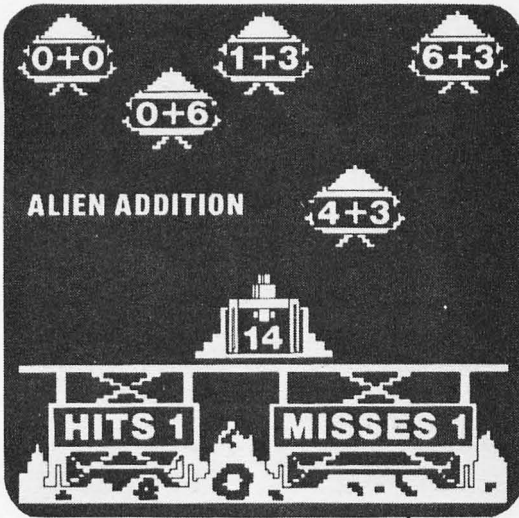


Figure 4.4 Alien Addition

practice packages at schools, parents buy them, too, because they provide lots of motivation to practice basic skills.

These programs are a creative blend of education and gaming. For example, in *Meteor Multiplication*, you are given a multiplication problem, and your task is to blast the asteroid containing the correct answer. When you load this program, you are shown a colorful high-resolution graphic featuring the DLM logo with a message to press any key.

When the game begins, you see a high-quality color graphic of your star station in the center of the display. The star station is surrounded by eight colorful asteroids rapidly converging on the station. In the center of each asteroid is a multiplication problem such as  $6 \times 6$  or  $4 \times 2$ . A clock is ticking in the background.

With each tick of the clock, one of the asteroids blinks and moves one step closer to the space station. You must type in the answer to the problem centered in one of the asteroids.

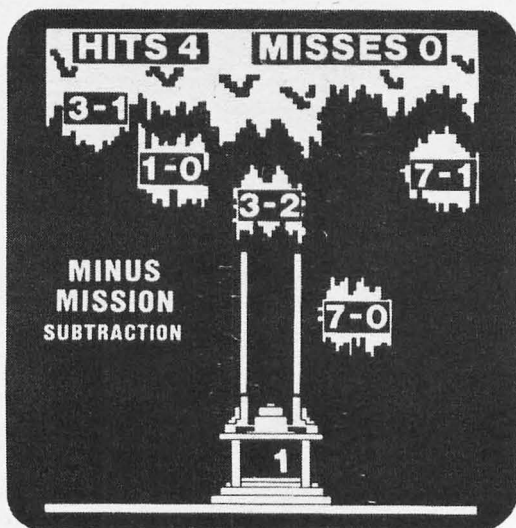


Figure 4.5 Minus Mission

The answer then appears in the center of the space station. You use the arrow keys to rotate the space station until its laser gun is pointed at the approaching asteroid. You fire the laser by pressing the space bar. If you type in the correct answer, the asteroid disintegrates when you hit it, complete with a satisfying sound effect. If the answer is wrong, the laser fires, but the asteroid continues to advance on the station. You must destroy all the asteroids before they reach the station. If any asteroid reaches the space station, you lose. Hits and misses are recorded at the bottom of the screen. High and low scores are displayed periodically. This is an excellent drill and practice math game. The task is exciting and challenging.

In *Demolition Division*, five tanks displaying division facts between 0 and 9 move toward five artillery bases on the right side of the screen. As the tanks advance, they fire their guns at a wall protecting each gun emplacement. You enter a number beside one of your guns and hit the space bar. If the number is too large, your shot lands behind the tank. If the number is

too small, the shot falls in front of it. If the number is the correct answer to the problems displayed by the tank, the tank is destroyed. You must work quickly, because as soon as any wall is totally destroyed by a tank, the next shot will wipe out the gun emplacement, and you lose the game.

*Dragon Mix* provides practice in both multiplication and division facts. A large dragon on the right of the screen defends a city with skyscrapers in the background. Three alien ships approach the dragon. On each ship is a different multiplication or division problem. An answer to one of the three problems appears in the center of the dragon. You must match the answer to the approaching ship, aim the dragon's tongue at it, and hit the space bar. If you choose the correct ship, it will be destroyed. If you make the wrong choice, the ship just keeps coming. If a ship gets close enough, it begins to wipe out the city. Three hits on the city, and you lose.

The other programs are similar in content. Arcade-style action graphics and sound effects are used to keep the child

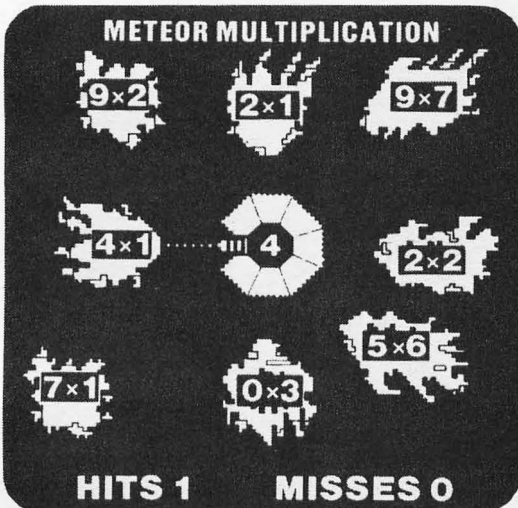


Figure 4.6 Meteor Multiplication

motivated. Each diskette is programmed so that you can change the game in certain ways. Speed of the action, difficulty of the problems, the time allowed, and whether the keyboard or game paddles can be used can all be changed to suit your needs.

The language arts games are called *Verb Viper*, *Word Man*, *Word Invasion*, *Spelling Wiz*, *Word Radar*, and *Word Master*. These games focus on drill in verb tenses and subject-verb agreement; word formation; identification of major parts of speech; spelling; sight word recognition; and synonyms, antonyms, and homonyms. These six games sell for \$44.00 each or all six for \$158.40. If you purchase two to eleven games, you receive a discount of forty percent off the unit price.

These games are unusually good in several ways. First, the graphics, the sound effects, and the action are truly first-rate and enjoyable. Children and adults alike would play these games just for the fun of it, even if the math drills were not included. There have been other educational games that included some action sequences, but too often the action se-

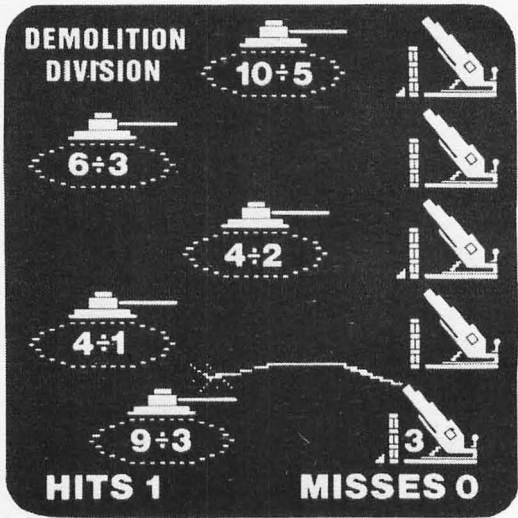


Figure 4.7 Demolition Division



Figure 4.8 Dragon Mix

quences were poorly done. Graphics and sound effects (if any) were crude, and the games were just plain boring. Not so with *Arcademics*. Second, in this series of games, the arithmetic drills are actually part of the game itself. The child must choose the correct answer to destroy the attacking meteors, for example. In many other games, action sequences are included only as a reward for completing the drill, and the educational content is not really part of that action. The games in the *Arcademics* series are not like that. The educational content plays an important role in the action sequences.

Some sound educational thinking went into this unique series. Finding educational software incorporating both excellent programming and educational content is rare. DLM has it. These are excellent drill programs.

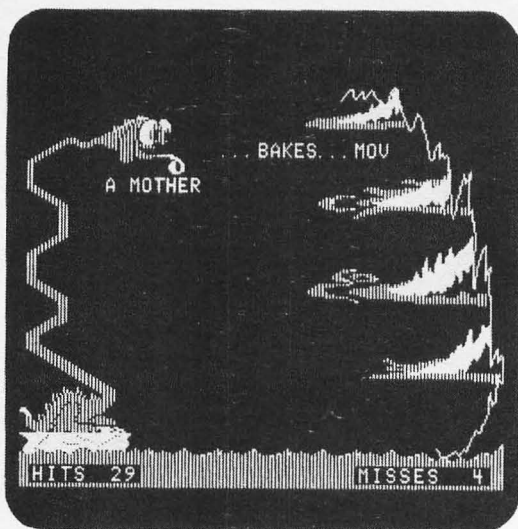


Figure 4.9 Verb Viper

## College Board SAT Exam Preparation Series

This six-disk series (\$299.95) contains over forty programs designed to help you improve your score on the Scholastic Aptitude Test (SAT), which is the test used by many American colleges and universities to help determine who will be admitted. These programs generate questions that are similar to the questions used on the SAT and provide you with practice answering them. The computer is also programmed to give you quick feedback on how you're doing.

Krell Software Corporation has produced one of the most user-friendly drill and practice educational programs we have ever seen. Menus are presented at the beginning and end of each lesson. These programs are *so* user-friendly that we're sure someone with *no* previous experience with computers would find them easy to use.

Krell is so certain their program will result in improved performance on the SAT that they issue a warranty, which

promises to refund the full purchase price of the software if you use the programs but fail to increase your score by at least seventy points.

The six disks contain drill and practice on skill areas tested by the SAT: math, vocabulary, written English, word relationships, reading comprehension, and sentence completion. Two of the disks contain the math programs, two contain the English programs, one contains the vocabulary programs, and one contains word relationships, reading comprehension, and sentence completion.

You may choose to use the *automatic learning strategy* for any of the programs. If you choose this option, the program analyzes your performance on an ongoing basis and uses that information to change the way problems are selected for you. This helps give you work at the level you need it—not too hard and not too easy.

You can use another option, the *worksheet generator*, if you have a printer to produce a written copy of the problems

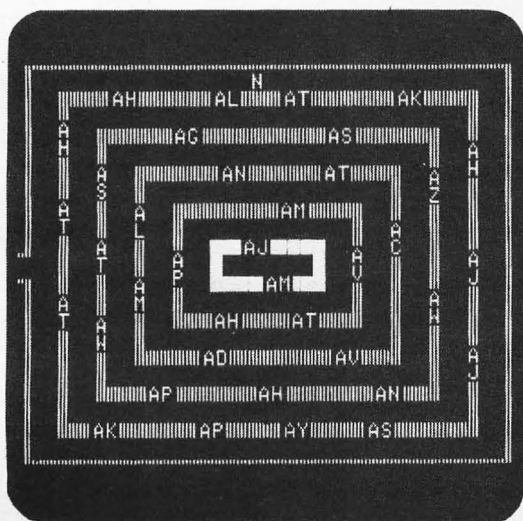


Figure 4.10 Word Man

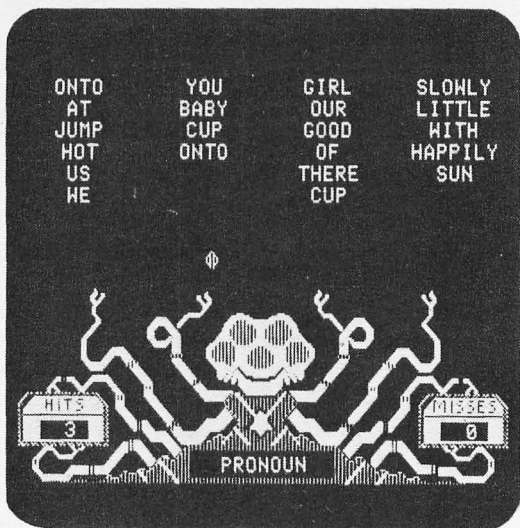


Figure 4.11 Word Invasion

rather than a screen display of them. The *worksheet generator* also prints an answer sheet.

At the end of each session, you can choose to be shown a screen display or a printout telling you how you did on each type of skill covered by that lesson. This will help you know how you are doing and in what areas of study you need more practice.

This is an excellent way to practice for the SAT, and if you are hoping to improve your score, we wouldn't be surprised if this program helps you do it. In addition, Krell is planning another interesting package for release in 1984. Called *Complete Classroom Tutorial Package*, this series of programs will go beyond drill and practice to provide detailed instruction in the specific skill areas needed to do well on the SAT. If Krell does as good a job on this tutorial package as it has done on its drill and practice package, this one will be another winner!



## MasterType

*The Universe is not always kind to those who type slowly. There is hope, however, for those who carefully read this manual. It is your guide to survival in interstellar combat.*

So begins the *MasterType* manual. This is another program, this time tutorial, that uses arcade action to help teach a skill. There are eighteen lessons aimed at teaching typing. Each lesson teaches a different touch typing skill. At the beginning of each lesson, the screen tells you what is being studied and gives you instructions on how good typists use that skill.

Most lessons feature you in the middle of a screen as a large blue command ship. You are being attacked by smaller enemy ships, usually from all four corners of the screen. A word or letter appears in each corner of the display. When you type that word or letter, it appears briefly in the center of your ship. If you have typed it correctly, a bolt of energy flashes out from your ship to destroy one of the attackers. You can't relax

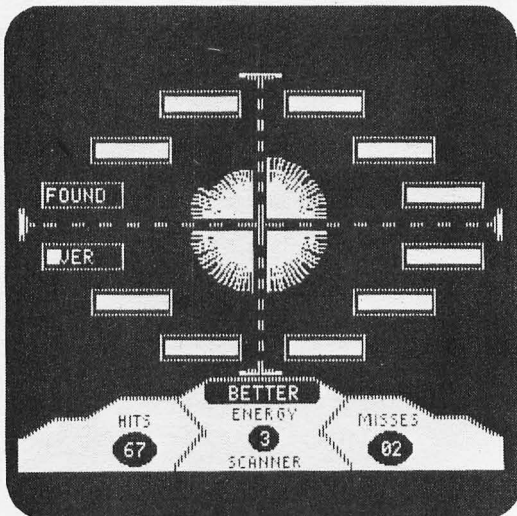


Figure 4.12 Spelling Wiz

because the ships keep coming, and new things to type keep appearing. If an attacker gets close enough to touch your ship, you are destroyed. The program keeps score, the graphics are excellent, and the sound effects are first-rate. Lightning Software produces this on disk for \$39.95.

### ***M-SS-NG L-NKS and Other Programs***

Sunburst Communications sells this and many other language arts programs (disk—\$45.00 or \$55.00) aimed at teaching language skills to children and adults. This program is really a language puzzle that lets students discover and put to work implicit language skills they may not even know they have. This program comes in seven versions: Young People's Literature, Literary MicroAnthology, MicroEncyclopedia, English Editor, German Editor, Spanish Editor, and French Editor.



**Figure 4.13 Word Radar**

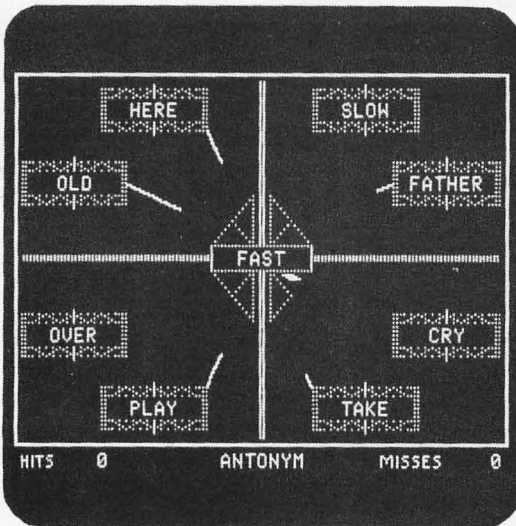


Figure 4.14 Word Master

In all versions, you fill in the blanks in words and sentences using knowledge about how words are spelled, the way words go together to make sentences, and the meaning of sentences.

This series of language programs was designed by a group of people who are experts in how we acquire language. The theory behind these programs is sound, the lessons are interesting and well-done, and we recommend them highly.

Other ATARI programs available from Sunburst are *Survival Math* (disk—\$50.00) and *Teasers by Tobbs* (disk—\$35.00). *Survival Math* presents some interesting simulations, such as putting your child in charge of managing a hot dog stand. (We'll talk about that program later.) *Teasers by Tobbs* presents logic and math puzzles and problem-solving exercises. Sunburst has many other educational programs available in the \$25—\$60 price range. Write for a catalog if you're interested.



Figure 4.15 MasterType

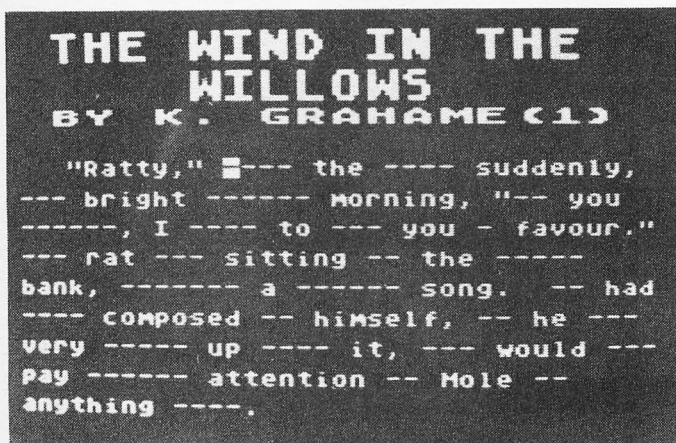


Figure 4.16 M-SS-NG L-NKS

```

10 FOR I=1 TO 4
20 FOR J=4 TO 1 STEP -1
30 PRINT J,
40 NEXT J
50 NEXT I
60 END

```

LOOPS CAN BE 'NESTED' - ONE PHYSICALLY INSIDE THE OTHER. TAKE A MOMENT AND TRY TO PREDICT THE OUTPUT. TYPE RUN AND THE PROGRAM WILL EXECUTE.

>RUN

4	3	2	1
4	3	2	1
4	3	2	1
4	3	2	1

NOTICE THAT THE INNER LOOP IS EXECUTED ONCE FOR EACH VALUE OF THE OUTER LOOP COUNTER. PRESS ENTER TO CONTINUE

Figure 4.17 How to Program in BASIC Language

## How to Program in BASIC Language

This set of tutorial programs is available on cassette or diskette (\$74.95) from Sterling Swift. The set comes with student workbooks and is designed to teach you how to program using the BASIC language (Beginners All-purpose Symbolic Instruction Code). This program received the *Learning Magazine* award for Best Microcomputer Software of 1982.

## Hodge Podge

*Hodge Podge* is just that—a real hodge podge for young children! The company bills this as an *educational happening* or a *surreptitious learning* program for preschoolers. It's available for \$14.95 on cassette or \$18.95 on disk from Dynacomp, Inc.

As any key is pressed, a song, animation, or picture that is

related to the key in some way is heard or appears on the screen. If you press the B key, for example, a colorful bear is pictured on the screen with the word BEAR displayed below it. If you press W, a worm appears and crawls across the screen. And if you press Y, Yankee Doodle is played and a flag appears.

For young children, the program would be most effective with the child seated on your lap. You could then explain, make comments, sing along, or do whatever else tickles your fancy.

This is an excellent program that would lend itself to some creative uses. The graphics and sound effects are great, and children enjoy them immensely.

## **Creature Creator**

*Creature Creator* is another computer game for preschool children. The skill this game teaches is pattern-matching, a fundamental skill for reading. Children are presented with a variety of heads, bodies, arms, and legs. They choose how they want to combine these parts to create their own personal monster. The monster can then be programmed to dance, jump, or hop around with another ghoulish friend. Colorful graphics and sound effects make this game popular with young children. *Creature Creator* lists for \$39.95 from DesignWare. The same company sells *Spellicopter* for the ATARI. This game drills children six years and older on visual memory and spelling skills. It also lists for \$39.95.

An added benefit of buying software from this company is that you receive a free quarterly newsletter on computers for children. *Kids' Computer News* will be sent to anyone who returns the warranty card from any DesignWare software.

## **Magic Storybook: Three Little Pigs**

This program is an interesting one that is unlike any of the other programs reviewed in this chapter. The program contains a set of graphics displays that provide visual support for *The Three Little Pigs*. You read the story to your child and use the

joystick to move the wolf around on the screen. It is an interesting concept that may appeal to many parents. This program from Amulet Enterprises costs \$24.95 on disk and \$19.95 on cassette.

## Square Pairs

Scholastic, a major educational publisher, is moving into educational computing on several fronts. They publish *Electronic Learning*, a magazine for teachers, and *Microzine*, a magazine for children aged ten and up. *Microzine* publishes programs like *Haunted House*, a mystery adventure, and *Poster*, a program that helps you create your own color graphics. *Square Pairs* is a program for seven- to twelve-year-olds. The program is a matching game. You are shown shapes, parts of speech, or quantities on the screen and must match up things like nouns, adjectives, or shapes. The program even lets you create your own games. Scholastic plans to have many programs like this available for the ATARI and Apple Computers. *Square Pairs* costs \$29.95 on cassette.

## Edupro Multi-User Educational Software

Edupro is an established educational software developer with a large catalog of programs. This series was written for group work. There are disks on topics such as number relationships and addition and subtraction. The games let up to four players compete against each other or cooperate to accomplish a group goal. The programs all teach basic concepts in a game context. For example, in one of the games in the program on number relationships, the screen fills with digits (for example, 5, 6, 9, 0) and number words (for example, five, six, nine, zero). An instruction appears at the top of the screen, such as "Find numbers and numerals  $> 0$  and  $< 3$ ." Up to four players can move their cursors over numbers and words they think satisfy the requirement stated at the top of the screen. When their cursor is over the top of a correct answer, they press the fire button. If they are correct, their score increases.

This is just one of many games in this series. Edupro has

produced some very good drill and practice software. A set of programs is \$24.95 on disk and \$19.95 on cassette.

## Atari Program Exchange Software

The APX software catalog from Atari describes several inexpensive but good educational programs written by other owners of ATARI computers. Several excellent educational programs from the Minnesota Educational Computing Consortium are also in the APX catalog.

## Children as Programmers

### Logo

In his book, *Mindstorms*, Seymour Papert suggests that if educational computing is to be of value, the child should program the computer, rather than the computer programming the child (as in drill and practice applications). Papert is an MIT computer scientist who studied child development for five years in Geneva, under the renowned child psychologist Jean Piaget. Papert and his colleagues then developed Logo, which combines computer capabilities with Piaget's ideas about how children think and learn.

Logo makes it possible for children to actually *program* the computer to create complex graphics. Many children are able to begin doing this after only a five- to ten-minute introduction to Logo commands! Papert believes Logo can actually change the quality of children's thinking. For example, he believes Logo can make some mature thought patterns available to children at younger ages than we have ever suspected possible. That remains to be proven through research, but it is certainly true that children enjoy Logo and learn mathematical and geometric concepts and skills easily. We believe that Logo holds great promise for educating children, and we recommend its use both at home and at school.

Although Logo will do other things besides create graphics, it may be the graphics capabilities that are most important for



use with children. Logo can be learned and used at many different levels of complexity.

Logo graphics revolve around a *turtle*, a triangular object on the screen that can be guided around the display with a series of simple commands. As the turtle moves, it leaves a line in its path. You can create complex designs by moving the turtle this way. You can move the turtle in the *immediate mode* by entering simple commands one at a time, or you can write a program. Additional commands change the background color or the color of the lines drawn by the turtle.

Even if it turns out that Papert is overly optimistic about changing the quality of children's thought, there are some other things to recommend Logo. Many children dislike school because they associate it with failure. Logo can give the child successful control of a complex instrument at school. In addition, Logo can motivate children to learn mathematical and geometric concepts since they help in moving the turtle efficiently. If errors are made, they are immediately obvious, and the computer is nonjudgmental. This is particularly good if the child is sensitive to adult criticism. Logo can also be used to encourage children to work together as they attempt to solve Logo problems in groups. This can promote cooperation and group problem-solving skills.

Until 1983, there was no complete version of Logo for the ATARI computers, though it has been possible to use the PILOT language to perform some limited Logo-like activities with the *turtle graphics* in ATARI PILOT.

The new version of Logo for the ATARI computers was not available for review when this book was published. Press releases on ATARI Logo do sound promising, however. The language, developed by Logo Computer Systems, Inc., of Montreal, will be a plug-in cartridge. It will sell for \$99.95 and will feature four turtles that will have some of the characteristics of conventional Logo turtles and some of the characteristics of sprites (detailed moving graphics). The purchase price will include the language cartridge, an *Introduction to Programming through Turtle Graphics*, a reference manual, and a reference guide.

## Facemaker

*Facemaker* is a unique program designed to introduce children to computer programming. The display presents a blank oval for a face and a list of facial features. Children can choose which features and then what type of feature they want to add to the face. For example, there are several types of hair, eyes, or mouths they can use.

Once they have constructed the face, they can use a simple programming language consisting of one-letter commands. With these commands, the child can program the face to do things like wink, cry, smile, frown, and stick out its tongue. The instructions CFTTT would cause the face to cry, frown, and stick out its tongue three times.

We like *Facemaker*. It seems to teach children to think logically, and they enjoy it very much. *Facemaker* lists for \$40.00 from Spinnaker Software.

## Simulations

Simulations help learners gain experience with many types of simulated environments. We have already discussed several simulation programs in the chapter on computer games. Here are some more.

### Snooper Troops Case #1 and #2

Each of these two detective simulations lists for \$44.95 from Spinnaker and is intended to give children practice in taking notes and drawing maps, and in classifying and organizing information. Case #1 is called *The Granite Point Ghost*, and case #2 is called *The Disappearing Dolphin*.

As you've probably guessed, the object of these games is to solve the crimes. Unless you practice the skills listed above, you won't be able to do that. Solving these crimes will probably take at least twelve hours each. These games are for children

ten years and up. You can save the game any time you want, then proceed later from where you left off.

We like these games. They have excellent color graphics and sound effects. They're a painless way to practice some important problem-solving and evaluation skills.

## **Survival Math**

*Survival Math* presents several interesting text-only simulations. Available for \$50.00 from Sunburst Communications, this program is based on the idea that people in many walks of life need some math ability to do their jobs well. The four simulations in this package are Travel Agent Contest, Smart Shopper Marathon, Hot Dog Stand, and Foreman's Assistant. Also included on the disk is a short description of each simulation.

If you choose the Hot Dog Stand program, you are told that your club is planning a hot dog stand at eight home football games. You have \$200 to begin with, and your goal is to accumulate \$2500. You must purchase hot dogs and buns, chips, soda, napkins, mustard, and relish and set the price for all items.

The computer determines the weather for the game and decides how many items were sold, calculates your costs and profits, and gives you the new bank balance. You continue until you reach your goal or until you go broke.

This is an interesting simulation that could be used to plan for purchasing and price setting for a real enterprise. It's fun, and you may learn some interesting facts about why you have to pay so much for that hot dog at the next football game you attend.

This software company has some other interesting simulations, and you might want to write and ask for a copy of their catalog.

## **Walt Disney Personal Computer Software**

Perhaps it was inevitable that Mickey Mouse and his friends would eventually be computerized. At the Consumer Elec-

tronics Show in the summer of 1983, the Walt Disney booth was just across from the section set aside for producers and distributors of X-rated movies and video tapes. Many of those booths had scantily clad males and females (who wore even less in their movies) available to autograph photographs you wouldn't want to take home to mother. It was quite a contrast to walk over to the Walt Disney booth and be greeted by Old Yeller, Winnie the Pooh, and Mickey Mouse. Disney's booth also had some surprises, though. In one corner they were running educational software on several brands of computers, including the ATARI.

We were not able to get copies of the Walt Disney software to review, but we did have a chance to see it run at the Consumer Electronics Show. The programs appear to be strong on color graphics and sound effects, and use lots of animation (what else would you expect from Walt Disney?). One program, *Mickey In The Great Outdoors*, takes Mickey on a series of *learning adventures* that teach children some basic academic

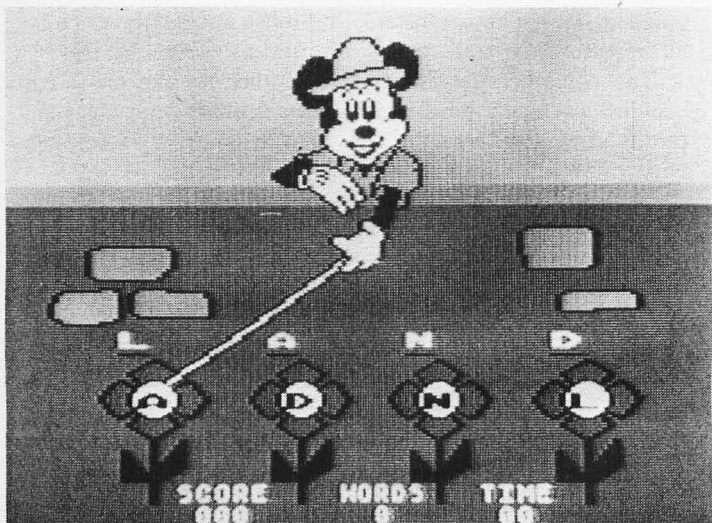


Figure 4.18 Mickey in the Great Outdoors

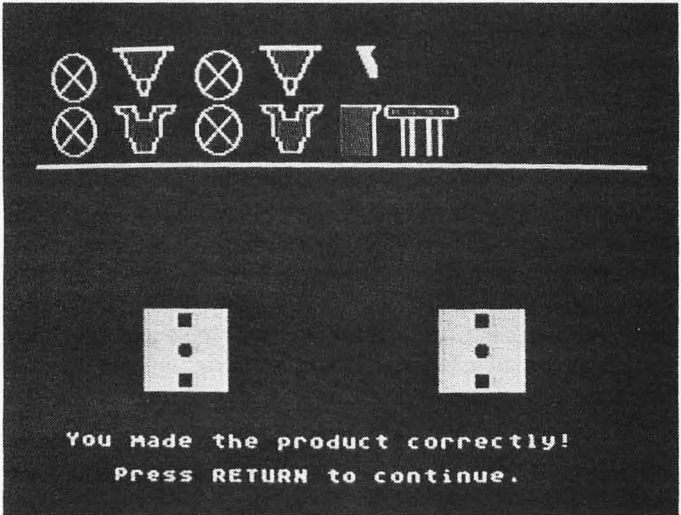


Figure 4.19 The Factory

skills. Kids use the joystick to help Mickey as he proceeds through the adventure. Part of the program (*Mickey goes Hiking*) teaches basic grammar and spelling skills. Children must fill in words in sentences or create a word from a scrambled group of letters before Mickey can proceed. The other program, *Mickey Goes Exploring*, teaches basic math skills. The programs are designed for the seven-to-ten age group. These are good programs worth exploring if your kids like Walt Disney characters. The company plans a whole series of educational programs that will run on the ATARI and other popular computers. The next program will be *Captain Hook's Revenge*, aimed at children eleven and older. Each disk or cassette costs \$44.95 and includes two programs.

## The Factory

This \$35.00 program from Sunburst is an interesting simulation designed to help develop many problem-solving strat-

egies. Working backwards, analyzing a process, determining a sequence, and applying creativity are the focus.

There are three parts to this package: Test a Machine, Build a Factory, and Make a Product. The program is easy to use. Selections are made by moving a large rectangular box on the screen over your choice, using the arrow key and then pressing RETURN.

You can construct machines and examine the product made by that machine, and even design a complete factory assembly line. All the machines are displayed on the screen as they operate, and the finished product is displayed. Children enjoy predicting what the finished product will look like after they have designed their factory. This is an intriguing and creative program.

## Energy Czar

This program is an educational simulation of the energy situation in the United States. In this intriguing simulation, you have just been appointed Energy Czar of the U.S. and given the near-impossible chore of solving the country's energy crisis. There are eight energy sources over which you have almost unlimited control: coal, oil, natural gas, uranium, hydroelectric power, solar power, wind power, and biomass (syn-fuels).

Every five years you must face a public opinion poll that can remove you from office. If you haven't maintained the country's energy supplies, the people will be unhappy and will vote you out.

This game is complex and is not suitable for children under ten years of age. It is available on cassette (\$14.95) or on diskette (\$19.95) from Atari, Inc. It teaches a lot about energy use and conservation.

Another Atari simulation, *SCRAM*, is one of the best simulations we have ever seen of how a nuclear power plant operates. *SCRAM* has great graphics, sound effects, and an excellent training manual that teaches you the principles of nuclear power and plant operation.

## Chem Lab Simulations

There are three chemistry lab simulations from High Technology Software that run on the ATARI computer. Number 1 simulates acid-base titration and the determination of Avogadro's Number. Number 3 demonstrates calorimetry. Number 4 covers thermodynamics. Number 2, on the gas laws, has not been made available for the ATARI.

These simulations are extremely complex, college-level simulations with sophisticated graphics. They sell for \$100.00 each.

## BOOKS AND MAGAZINES

You may be interested in reading more about computers and education. Magazines on the topic include *Computers in the Schools*, *The Computing Teacher*, and *Educational Computer Magazine*.

Books of interest include *Computers, Teaching and Learning*, by Willis, Johnson, and Dixon (dilithium Press) and *The Computer in the School: Tutor, Tool, Tutee* (Columbia University Press, 1981), edited by Robert P. Taylor.

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## CHAPTER FIVE

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# Home Finance, Record Keeping, and Health Care

## PUT YOUR ATARI TO WORK AT HOME

You don't generally buy a computer specifically for the uses described in this chapter, but for some other reason, like word processing, telecommunications, and playing games. You will probably get a computer for other purposes, and then begin looking for more ways to use it. There is a good variety of software in this area. We will discuss some of it in this chapter. By watching the ads and reviews in ATARI-oriented computer magazines, you can become aware of new software as it becomes available.

*Interface Age* magazine led the way in describing home applications of the microcomputer. Their December 1977 issue had two articles by Francis Ascolillo on a *Household Finance System*. Written in BASIC, the program can give your family an overview of spending and earning patterns. When you write your family checks each month, you simultaneously give the computer the data needed to do an analysis. Monthly and yearly printouts show your spending patterns and predicted trends. The same issue has a personal accounts payable program writ-



ten in BASIC by Kevin Redden. With it you can keep track of bills received, payments made, and information like time between receipt and payment, minimum payment due, total amount owed on each account, and interest paid on each account. These BASIC programs can be adapted for your ATARI (Chapter Nine on Programming), or you may purchase similar programs written especially for the ATARI.

Many of the popular computer magazines regularly publish this type of program for the ATARI. A well-stocked bookstore will carry at least two or three magazines with listings of software for the ATARI.



**Figure 5.1 An ATARI 1400 XL Home Computer with printer and disk drive makes a great checkbook management system.**

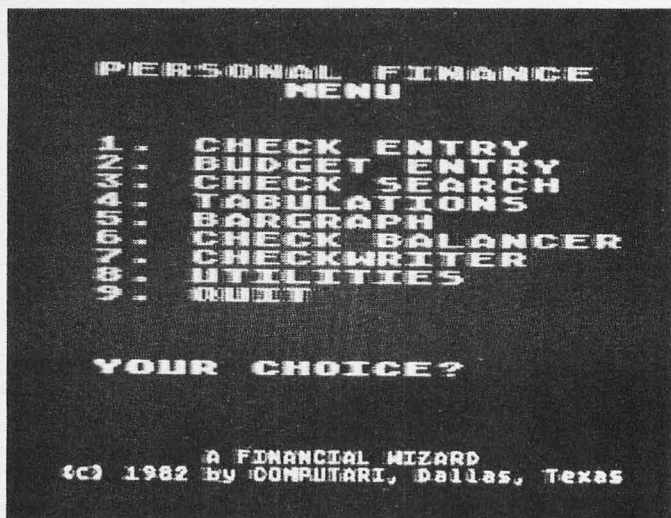


Figure 5.2 Financial Wizard

## The ATARI as a Home Financial Manager

A growing number of ATARI programs help families make financial decisions. These programs help you control your budget, plan your finances, balance your checkbook, analyze your loan options, and file your income tax.

### A Financial Wizard

This program is a comprehensive home accounting program developed specifically for the ATARI computer. A review of the program in *Antic* magazine made these comments: "Like most Atarians, I am captivated by the graphic, color, and sound capabilities of my machine. Nothing quite discourages me more than to boot up an applications program and to be presented with the standard graphic 'o' white characters on a blue screen.... *A Financial Wizard*... is an excellent example of

an application program that integrates many of the ATARI's features into a well-conceived and executed program.

"The use of color and sound in the data input prompts and error checking routines are so well done that it's quite simple to boot up the disk, follow along with the very clear documentation, and be 'up and running' in short order.

"I gave *A Financial Wizard* high marks in ease of use, documentation and performance."

This is lavish praise for a program, but we agree with *Antic's* review. This is a well-designed, well-executed family finance package. It is both easy to use and powerfully flexible. The program is *menu-driven*, which means you are shown your options on the screen, and you simply type the number of the option you want. The initial screen presents nine options: check entry, budget entry, check search, tabulations, bar graph, check balancer, checkwriter, utilities, and quit.

The program helps you keep a detailed, organized record of your income and outgo, with special categories of expenses

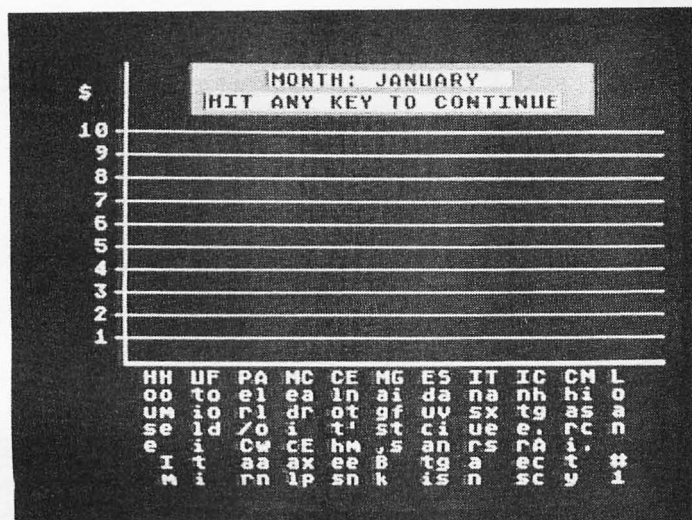


Figure 5.3 Financial Wizard: Bar graph

that are tax deductible. The program also helps you plan a budget, which will be your financial battle plan for the next year, and you can keep track of how close to the budget you actually come. The program will, for example, compare by month, category, or year, your budgeted expense or income with your actual expenses or income. *A Financial Wizard* will even print out bar graphs of your expense and income patterns.

In a typical family, the program would be used once or twice a month when bills are paid. The program keeps track of expenses in each of the categories you select. It also helps you balance your checkbook and automatically flags tax deductible expenses. If you purchase checks specially designed for this program, you can even get the computer to write the checks for you. Then all you do is sign them.

The program also lets you search for the details on a particular check. If you know the month, amount, or whom the check was written to, the computer can search for it and provide the missing details. You can even look it up if you know only what category the check was written in (for instance, a check that paid the utility bill).

*A Financial Wizard* is an excellent family finance program that takes advantage of the color graphics and sound features of the ATARI. It is easy to learn to use and is one of the most flexible, most powerful programs of its type. We recommend it highly. Available from Computari, it sells for \$63.00 on disk. An optional set of utilities is also available for people who purchased earlier versions of the program. A check register program is \$15.00. A utility that gives you printouts in the format of a general ledger is also available for \$15.00. If you buy both, the price is \$25.00. Current versions include both these utilities, but the cost is still \$63. The company that sells *A Financial Wizard* even has a newsletter for program owners called *Financial Wizard Newsbits*.

This program is often compared to *The Home Accountant*, which is reviewed next. *The Home Accountant* provides more detailed reports in some areas, but it is as *user-unfriendly* as this one is *user-friendly*. Unless you need the extra details, we recommend *A Financial Wizard*.

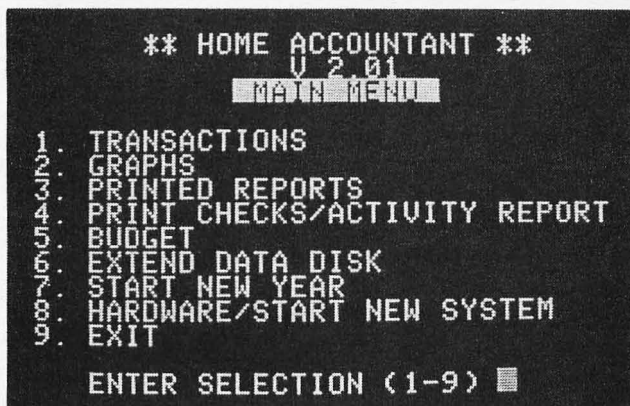


Figure 5.4 Home Accountant

## The Home Accountant

*The Home Accountant*, available for \$74.95 from Continental Software, will help you get a clear and accurate picture of your financial condition at any time. You will see how much money is coming in and exactly where it is being spent. You can keep track of up to five checkbooks at a time and define up to 100 budget categories. You can mark any financial transactions so they can be used for tax purposes, and you can even print checks.

The *budget module* is the heart of this package and is extremely flexible. You can set up a complex budget if you choose, or you may wish to use the program only to keep track of your checking account. If you opt for a more complex budget, you can have as many as 100 budget categories within five broad budgeting areas: assets, credit cards, liabilities, income, and expenses. *The Home Accountant* gives you totals on all areas and categories. At the end of the year, you generate a report that summarizes your income, your expenditures, and your net worth.

The program is organized around five major financial areas. *Assets* are things of value such as money in bank accounts, real estate, furniture, stocks, bonds, autos, cash, jewelry, or pensions. *Credit cards* include all cards you use. *Liabilities* are anything you owe to anyone, including such things as car loans, mortgages, alimony, or child support. *Income* refers to any source of revenue, such as salary, gifts, interest, tips, or consulting fees. *Expenses* are any expenditures, including rent, food, utilities, entertainment, clothing, or anything you spend money on.

You can break these five areas down into more specific categories if you choose. For example, you may want to make *utilities* a separate category of expenses, with gas, electricity, and water expenses a subcategory. The more detailed you make your records, the better you will be able to trace your financial affairs.

Once you have decided what information will be entered,

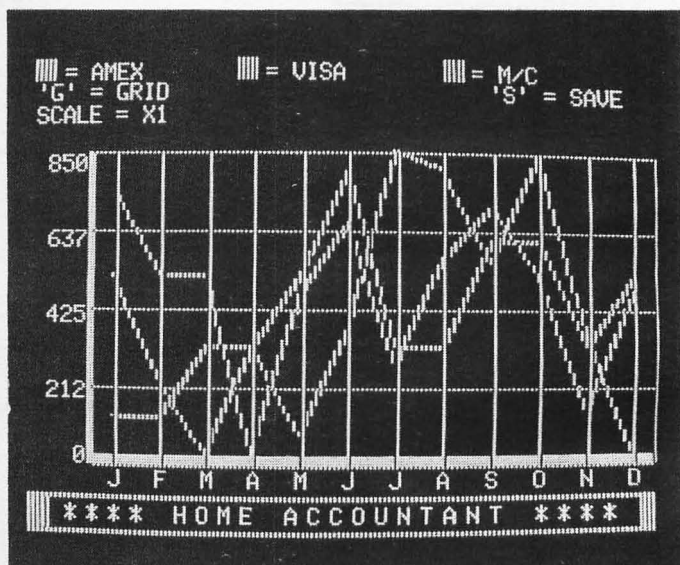


Figure 5.5 Home Accountant: bar graph

you use the *transactions module* to enter the data and to assign the budget categories. You also use this module to search or edit your data. The transaction module also helps you set up *automatic* transactions, which are things like rent payments that you want automatically deducted from your account each month. This way, you don't have to enter them yourself.

You can use the *graphing module* to prepare graphs of your financial data. You can order bar graphs, line graphs, and trend analysis. The bar graph will display a comparison between budgeted amounts and actual amounts for any of the categories you have entered. Graphs must include a minimum of two months of financial activities.

You use the *printed reports module* to get various kinds of printed statements of your financial affairs. You can get reports such as budgeted amounts versus actual amounts spent, a personal balance sheet, and a net worth statement.

The *print checks/activity report module* can be used to print out a report of all transactions, or it can be used to print checks. If you use *The Home Accountant* to print checks, you must use special checks. An order blank is included in the program package.

The *start new year module* is used at the end of the year. This module prepares a new data disk and transfers all relevant information from the previous year.

The *extend-module* is used if you have more than 1000 transactions in a year. This module prepares a new disk for additional transactions.

The *hardware/start new system module* holds information about your particular printer and also has a program for initial start-up of this system.

## The Family Budget

*The Family Budget* is available on disk for \$34.95 and is designed to help you keep track of the money you spend each year. Published by Dynacomp, it should help you figure out if you are spending wisely. There are two parts to this program. Part One is used to record all money paid out each day over a one-year period. There are twenty-eight categories for coding



transactions, plus three categories for tax deductible expenditures. Part Two is used to record all credit transactions. You can get printouts from either part at any time.

*The Family Budget* is an excellent program for you if you need some help tracing your financial transactions but aren't interested in setting up as detailed a system as *The Home Accountant*.

## **Newspaper Route Management Program**

This program from the Atari Program Exchange (APX) is designed to help you keep track of all the records for a newspaper route of up to 100 subscribers on twelve different streets. You can enter all the important information, such as customer name, address, and payments.

There are many newspaper management programs available for small computers, but this one for the ATARI does some things most of the others do not. You can use the program to create and display a route map showing the location of each customer. This will help you plan your delivery route. You can even print out a list of customers you need to collect money from, and you can print customer receipts.

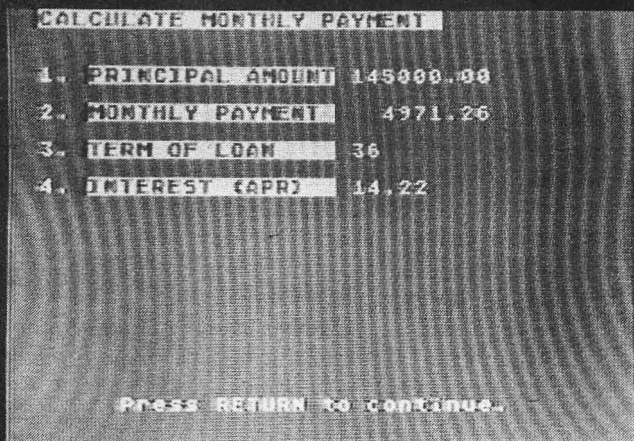
To take full advantage of the extra capabilities of this program, you must have some knowledge of the BASIC language. You have to customize the program to display the correct street names and map coordinates.

## **Budget Worksheet**

This is a free home finance program by Aly Kahn, listed in Issue 7, 1982, of *A.N.A.L.O.G. Computing Magazine* (p. 39). This simple program helps you set up a budget using up to eight different categories.

If a simple budget is all you require, this program can fill the bill. It has the added allure of being free, if you are willing to take the time and effort to type in the program (this one is about ninety lines). You get the program for the cost of the magazine.





CALCULATE MONTHLY PAYMENT

1.	PRINCIPAL AMOUNT	145000.00
2.	MONTHLY PAYMENT	4971.26
3.	TERM OF LOAN	36
4.	INTEREST (APR)	14.22

Press RETURN to continue.

Figure 5.6 Loan Analyzer

## Loan Analyzer

*Loan Analyzer* is one of a set of ten home application programs available from Creative Software. It is available on cassette for \$14.95 or on diskette for \$19.95.

Not too long ago, making a major purchase consisted of shopping for the best buy on a car, a stereo, or whatever, and then filling out the application of credit. Today, you may spend as much time shopping for the best loan value as you do for the product. *Loan Analyzer* helps you make comparisons among different financing options. It will also give you information on alternative purchases. If, for example, you are considering the purchase of an \$80,000 house with an assumable eleven percent mortgage or a \$90,000 house with a ten percent mortgage, the program gives you comparative data on the two mortgages.

*Loan Analyzer* has two parts: one can be used to print out amortization tables for loans, and the other lets you analyze

loans. The program can deal with all loans that involve monthly payments with interest rates between .01 percent (don't we wish) and 99.9 percent (it could get to that). The term of the loan can be anywhere between 1 and 999 months. The maximum loan the program can work with is one million dollars. The only other limitation is that the program can handle only *fully amortized loans*. That is, the computer calculates the figures to pay off the loan completely within the term specified. If you have a balloon payment loan, the manual gives instructions on how to use the program anyway. Although there is nothing flashy about this program, it is a handy one that you will be likely to use more often than you think.

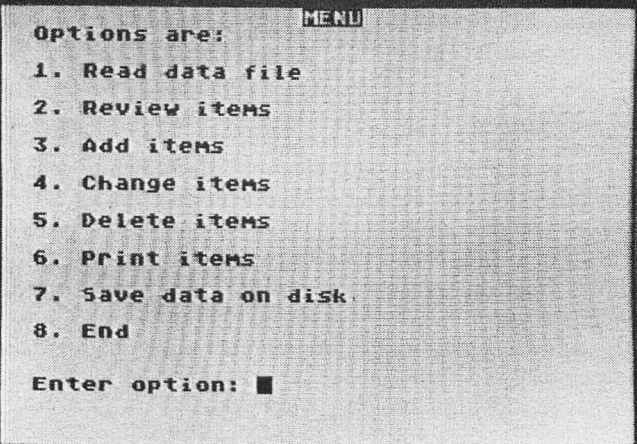
The Atari Program Exchange has many programs for home finance. Some of the titles available include *Home Inventory*, *Home Loan Analysis*, *Strategic Financial Ratio Analysis*, *Family Vehicle Expense*, *Financial Asset Management System*, *Real Estate Cash Flow Analysis*, *Recipe Search 'n Save*, *Stock Management*, *Family Cash Flow*, *Family Budget*, *Bowler's Database*, and *Personal Fitness Program*. Most of the programs from Atari Program Exchange cost between \$20.00 and \$35.00.

## Retirement Planning

This unique program comes on disk (\$29.95) and is available from Advanced Financial Planning. The program helps you compute a net-worth analysis and develop a plan for retirement. The program analyzes your assets and liabilities; computes likely retirement income from sources such as Social Security, pension funds, and investments; and helps you decide how much income you will need during retirement. It is a useful program that deals with an issue many of us put off thinking about until it is too late to do much about it.

## The ATARI as a Home Record Keeper

There are many record-keeping functions that can be done at home with the ATARI. You can buy software for everything from keeping track of recipes to storing bartending instructions.

A screenshot of a computer terminal window showing the 'Home Inventory' program's main menu. The title 'MENU' is in a box at the top right. The text 'Options are:' is followed by a numbered list of eight options. At the bottom, it says 'Enter option:' followed by a cursor.

```

MENU
Options are:
1. Read data file
2. Review items
3. Add items
4. Change items
5. Delete items
6. Print items
7. Save data on disk
8. End

Enter option: █

```

Figure 5.7 Home Inventory

## Home Inventory

Ever wonder what would happen if your home or apartment were broken into? Would you be able to remember what items you had? Could you correctly identify missing items for your insurance company? What about that beautiful stuffed aardvark your great aunt gave you? Surely you would want to be able to replace that!

*Home Inventory* is another in the set of ten home application programs available from Creative Software. *Home Inventory* is intended to be used for insurance and estate management. It is available on cassette for \$14.95 or on disk for \$19.95 from Creative Software.

This program will help you record, change, and delete inventory items in up to forty different categories. It will search for specified items and display all information available on those items. The program will also sum the value of all your possessions, even if items are entered in more than one file.

Creative Software also has a program called *Car Costs* (\$20.00) that helps you keep track of automobile expenses, and one called *Household Finance* (\$35.00), a program similar to *The Home Accountant*.

## ListMaker

This is a general-purpose electronic information management program from Reader's Digest on diskette for \$97.50. You can use this program to convert any paper file system to an electronic file. Real estate listings, customer records, and membership rosters are examples of file systems that *ListMaker* handles.

It includes a mailing list program that prints mailing labels and personalized form letters. If you're tired of bulky, hard-to-manage files, this program is for you.

## The ATARI as a Home Health Care Assistant

Home health care is a promising new area for home computer use. Although there isn't a great deal of software available, we expect the future to bring increased interest and, consequently, much more software related to home health care.

## Electronic House Calls

This is a service available from CompuServe, a national telecommunications information utility, which charges subscribers a monthly fee. If you have the proper accessories for your computer, you can dial the service on your telephone, hook up the phone to your computer, and view a variety of data. (If you are interested in telecommunications, see Chapter Six.)

*Electronic House Calls* helps you get information on drugs, symptoms, first aid, and preventive health advice. *Electronic House Calls* will never replace your family physician, but it may be the closest thing most of us will ever get to a medical house call!

## Personal Fitness Program

This is another program available from the Atari Program Exchange (APX). It sells for \$22.95 on diskette.

Eight programs are included in this exercise program featuring the animated character Pinky Stamina. The program will take your age, sex, heart rate, and past exercise performance into consideration and design a custom exercise program. The exercises are designed to be carried out in fifteen to thirty minutes per day and are aimed at improving flexibility, strength, stamina, coordination, circulation, and general body tone. The program will also keep daily and weekly progress charts.

The eight basic exercises are overhead stretch, jumping jacks, sit-ups, hip lifts, push-ups, trunk twistors, running in place, and toe touches. Pinky Stamina demonstrates the exercises and performs them along with you. The graphics are excellent in this program, and if you follow the exercise regime, it should help you achieve a minimum level of fitness.

## More Than 32 BASIC Programs for the ATARI Personal Computer

This especially good software bargain is available for \$34.95. *32 BASIC Programs* comes with a full-length book by Tom Rugg and Phil Feldman, as well as a diskette containing the thirty-two programs. The package includes educational, graphics, math, and home use programs, and games.

Some of the home programs include *Biorhythm*, *Checkbook*, *Loan*, and *Mileage*. Many of the programs are as good or better than programs that sell separately for \$20.00 to \$40.00 or more. For instance, *Loan* is just as good as many of the loan analyzer programs available for the ATARI. The package also includes *Decide*, a unique program designed to help you make decisions involving the selection of one alternative from several choices. It works by prying relevant information from you and then organizing it in a meaningful, quantitative manner. Your best choice will be indicated and all of the possibilities given a relative rating.

You can use *Decide* for a wide variety of decisions. It can help with things like choosing the best stereo system, saying yes or no to a job or business offer, or selecting the best course of action for the future. The program personalizes the decision-making process for you.

The unique thing about this package is the documentation. Since all thirty-two programs are listed in the book, it is extremely easy to revise them if you understand BASIC and are so inclined. If not, the book does a great job of teaching you to use them as-is. The package is available from dilithium Software for \$34.95, or you can get the book separately for \$19.95 from dilithium Press.

Database programs and electronic spreadsheets are discussed in the business chapter (Chapter Eight). Both types of programs have several home applications, so we suggest you read the business chapter, even if you do not plan to use the computer for a business or profession.

# Tapping into the World: Telecommunications

Imagine touching a few keys on your ATARI computer and making all your travel arrangements yourself at any hour of the day or night. How about being able to read the latest newswire or stock report at the same time the editor of your newspaper does? Would you like to read movie reviews or pro-football statistics on your computer screen? These are a few of the things you can do with telecommunications.

You are probably aware of the video game potential of personal computers. You also know that those desktop marvels playing *PAC-MAN*, *Frogger*, and *Fast Eddie* can do an honest day's work as word processors, accounting machines, and educational tools. The subject of this chapter is not so well known. Telecomputing involves connecting your home computer to other computers over standard phone lines. Your computer becomes a link to hundreds, perhaps thousands, of other computers that have been programmed for various services. You can sit back in your easy chair, get a comfortable grip on your keyboard, and do everything from pay bills to read weather reports for Colorado ski resorts.

Telecomputing is, in fact, one of the fastest-growing areas of personal computer use. Many ATARI owners regularly use their computer to talk to other computers. To begin telecomputing you must connect your computer to a special device

called a *modem*. (Some ATARI models have the modem built in.) The modem is connected to your phone line. You dial another computer's number and, when it answers, you talk to the computer by typing on the ATARI keyboard. The computer on the other end of the phone line responds to your requests by sending information, which is displayed on the television or monitor screen.

Because you may not be familiar with telecommunications, we will begin with an extended introduction to the topic. In the final section of the chapter we'll discuss the equipment and software you need to get started.

Telecommunications is complicated. There are many aspects of this phenomenon and many ways you can take advantage of the services available. Explaining it is a little like trying to explain reading and talking. The skills of reading and talking are really *tools* that let you do many different things—from reading the morning paper to decoding the assembly instructions that come with Christmas toys. The ability to telecommunicate also gives you many options for acquiring and using information. Over the last century the development of wireless communication technology, such as radio, television, and satellite transmission systems, changed the way we get much of our information. It also changed the type of information we get. Today, if you have cable television, you can tune to an all-news channel and get instant information on current news stories. Cable channels now, or soon available, will give you specific types of information in areas such as health and nutrition and business news.

Cable-based information systems all share one problem, however. You are a passive viewer with no direct control over the material you view. Yes, you can tune to the health and nutrition news channel, but it may or may not do a piece on the particular topic you want to hear about. Telecommunications will help you take a much more active role in the selection of information.



## Major Telecommunications Applications for Home Computers

### What Are Information Utilities?

When you go to your kitchen sink to get a glass of water, you simply turn on the tap and out flows the water. A similar thing happens when you turn on the electric lights in your home or when you tune into your favorite cable television station. Water, electricity, and cable television services are called utilities. A utility service becomes available to you when you have the proper receiving equipment: the kitchen sink, the electric light, or the television set.

Telecommunications can be thought of as a large family of information utilities that can be brought into your home or office through your personal computer. We will use the term *information utilities* in a very broad sense to include any source of information that can be accessed by a computer through telecommunications. Sometimes the term describes only the very large systems that offer a wide variety of services. We like to think of an information utility as any kind of information service, large or small, local or national.

Starting with this definition, we can say that many information utilities are now offered, and many more will become available soon. To receive such a service, you will need the right equipment, and you will need to make the appropriate connections. In most cases, you will need to pay a utility fee, although some of these services are free. More detail will be given on how all this works later. For now let's look at some of the many utility services available for your computer.

## Local Area Networks and Computer Bulletin Boards

There are hundreds of local computer *networks* now operating in this country. Most use regular phone lines for communications. They're run by universities and colleges, computer clubs, amateur radio clubs, and special interest groups. Members of the sponsoring organization (or, in some cases, anyone who knows the phone number) interact with the network's computer. Some systems limit use to reading the local electronic bulletin board; others let you use a large computer system's power from your own home.

A typical local area network will be sponsored by a computer club. The club pays for a phone line connected to the club's computer. When you call, the computer answers the phone electronically and asks what information you would like to have transmitted to your computer. There may be options such as reading the latest issue of the club's newsletter, browsing through want ads for used equipment, or looking at material written by other ATARI owners about new products or problems. The type of network and the services offered vary greatly from one locale to the other. Local computer stores and computer clubs are usually aware of the networks operating in the area and what they offer. Many local networks are the electronic equivalent of the bulletin board down at the laundromat or at the factory, with notices of events, want ads, offers of free puppies or kittens, and descriptions of new computer equipment.

## National Networks and Bulletin Boards

Besides local computer bulletin boards, several national systems (some with toll-free numbers) are available for the cost of the phone call. National bulletin boards are generally in-

tended for a special audience, and some charge for their use. HEX (Handicapped Education Exchange), reached by dialing (301) 593-7033, is used by individuals and organizations to exchange information on how technology can be used to help the handicapped. There are also national networks for owners of a particular brand of computer. Some of the ATARI networks are described in a later section of this chapter.

## Recreational Games

Both CompuServe and The Source, telecomputing department stores discussed later in this chapter, have provisions for playing games. Dial their numbers, type in your personal identification code, then play any of over 100 different games. Most games are the adventure or strategy type with little or no graphics, because it's difficult to transmit graphics quickly over phone lines and virtually impossible, without specialized software, to transmit usable graphics to all the different models of personal computers on the market today.

## Downloading Programs

Several networks sell programs by *downloading* them to your computer and billing the cost to a credit card. Some services even let you try the program first; if you like it, the program is yours for a small fee. Before you can download programs, you must have a special program that lets you store the programs you buy on a cassette or disk.

## Databases

A database is simply a batch of information stored in the memory of a computer. If you need to know the current price of Warner stock or the time of the next plane to Lubbock, this information—and much more—is available from databases

that make up an information utility. Both The Source and CompuServe have such information stored in extensive data bases. A doctor can check on a recommended treatment for a new disease, a farmer can get predictions on the wheat crop in South America, and a consumer can check discount prices on a dishwasher or color television.

Some writers predict that these large computerized information utilities, with their huge databases, will replace traditional sources of news and information, such as newspapers and television newscasts. We doubt that. Newspapers are sources of professionally packaged and conveniently presented general information. We think information utilities are likely to be added to our existing sources of information rather than replacing them.

The reason for our view is that information utilities are not easy to access; it takes some effort to get information from them. In addition, they are not very convenient sources of general information. The morning paper or the nightly news gives us that. What information utilities do best is give us access to specific information. Suppose you are a member of a local group formed to fight for modifications in local laws governing waste disposal near the subdivision where you live. One task the group must accomplish is to write a booklet on the problem, to be distributed to citizens and local officials. You want the booklet to be technically accurate, and you want to be able to include information on what has happened in other areas that faced a similar problem.

It would be possible to gather the background and support information you need by going to the library and searching through the relevant indexes for articles and books on the topic. A hand search would probably take a day or two of hard work at the library. Because it takes so long, the search is unlikely to be as comprehensive as it should. An alternative is a computerized search through a database available from an information utility called DIALOG. A DIALOG search will give you a list of articles (with abstracts or summaries of the articles) and books on the topics you're interested in. A DIALOG search would take less than an hour and would be more comprehensive. Even a DIALOG search is unlikely to point you to recent

news stories on the topic. Those stories can be accessed through general information utilities like The Source or CompuServe.

Hundreds of these databases available through information utilities today are of interest to professionals in virtually every field. You can use your ATARI to find information on new metallurgical patents, federal court cases, space games, college scholarships, and much more.

## Banking and Shopping

Several banks, led by the United American Bank of Knoxville, have systems that help customers transfer funds and pay bills by computer. Dial the bank's number, type in your account number, then type in the instructions on how much to pay whom. Chemical Bank of New York even has provisions for making purchases like airline tickets. The tickets are mailed to you and debited to your account. Some experts foresee *banking by computer* as a commonplace activity in the future. At present it is limited to a few areas where it is being test marketed and to people who use information utilities such as CompuServe.

Shopping by computer has caught the public's eye. There are several shopping services that help you order items, which are charged to your credit card and mailed to your home or office. Both The Source and CompuServe have shopping services that will be discussed later. In addition, many services have various types of consumer information, like movie and book reviews, theatre tickets, and restaurant reviews.

## Electronic Mail and Teleconferencing

Electronic mail means different things to different people. A large corporation may have computers that store messages written in the Dallas office to staff in the Chicago office. Late at night the Dallas computer automatically calls up the Chicago computer and transmits the messages. When the recipient of a message arrives at work the next day, a flashing light on the

computer console indicates there is a message waiting in the computer's memory. This is electronic mail.

Public access electronic mail involves typing a message to a friend on your keyboard. This message is sent to a company that handles electronic mail. The company transmits the message to the city where your friend lives. The message may then be printed out and delivered by the Post Office the next day. In the future, your friend may have a home computer that is always connected to the phone line. Messages may be transmitted directly to your home and printed out on a printer attached to the computer.

Today a form of electronic mail is possible through the information utilities. Each person with an account has a user number that serves as an electronic address. If you need to send a report to a friend or colleague who lives across the country, you can transmit the report from your computer to The Source. When your friend next uses The Source, it tells him or her a message is waiting. The report is then transmitted from The Source to your friend who can transfer it from the computer's memory to a disk or cassette.

## MAJOR INFORMATION UTILITIES

Currently there are two established national general-purpose information utilities: The Source and CompuServe. Both can be used by anyone with a small computer, a credit card (so they can bill you), and a telephone. Calls to the two major networks are local in many major cities. You are connected to them through special electronic communication networks—usually Telenet or Tymnet.

### The Source

The Source is a service of Source Telecomputing Corporation. If you want to sign up with The Source, you can do so

through the mail or at many computer stores. As with cable television, there is an initial hookup charge, of \$100. After that, The Source charges \$7.75 per hour of use during non-business hours, less for late night use, \$5.75, and during office hours, \$20.75. There is a minimum monthly charge of \$10, whether you use the system or not.

Few people will want every service offered by The Source, now a subsidiary of Reader's Digest, but it's nice to know they're there. Some of the most interesting services are described here:

- *Electronic Mail.* Besides the method of electronic mail described earlier, it is possible to dial a toll-free number and dictate a letter over the phone. Your letter is put in the electronic mail file and will be available to the recipient the next time that person signs on. Special interest groups can also use the electronic mail feature by placing information in a sort of electronic bulletin board for subscribers with similar interests. There is also an electronic equivalent of junk mail. You type in a letter or report and tell the system to send it to as many Source subscribers as you wish.

- *Electronic Travel Service.* You can make your own airline and hotel reservations, get restaurant rating guides, and see international airline schedules. You have access to worldwide airline flight information, which is updated every two weeks. If you are going to visit New York or Washington D.C., you can get listings of services ranging all the way from fur rental to babysitting before you leave home. One part of this service, called the Travel Club, can be used just like a travel agency. You can wrap all of your travel plans up by asking the Travel Club to order tickets and make reservations.

- *Educational Applications.* The Source has a few drill and practice programs on a variety of topics suitable for both children and adults. These programs can help your children learn how to count, learn the alphabet, the decimal system, and much more. You can learn spelling, math, foreign languages, and science. In addition, there is a directory of financial support

possibilities for college students and a job service that lets you type in your resume so prospective employers can review it. There is also a jobs-available listing.

- *Consumer Aids*. You can get informative articles on how to reduce energy costs and save gasoline, as well as assistance in choosing the right wines or the right vitamins. One part of this service called *Comp-U-Store* amounts to an electronic supermarket. You can review items and prices on the computer screen and place your order by typing on the computer keyboard. With *TradeNet*, a barter service, you can barter trips, professional advice on a range of subjects, and items of almost any description. The service also has restaurant guides and reviews for most large cities, and a movie review section.

- *Sports News*. Up-to-the-minute news on sports, team standings, sports trivia, and sports records is available, as well as round-ups of scores on a national, international, and state-wide level.

- *Financial Service*. Business and financial forecasts from professional economists and security analysts are up-dated weekly.

- *Portfolio Management*. You have access to a system that you can use to create and maintain your personal investment portfolio. By simply entering a file name, you will see an up-to-date report on each stock in your portfolio.

- *Legi-Slate*. You can track bills referred out of Congressional committees and list members of Congress by state, party, committee, and subcommittee. This service is up-dated weekly.

- *Commodity News Service, Inc.* This service helps you track price movements in commodities futures markets and gives you market commentary and commodity news.

- *Computing Services*. You can write and run programs in a variety of languages, including BASIC, COBOL, Pascal, and FORTRAN, among others. The Source also makes available a few canned programs of their own. Many are free; some involve a small extra charge. These programs include games, business software, and software for special applications, such as statistical analysis of large amounts of data. You cannot buy these programs and run them without being connected to the service. In essence, you *rent* them by connecting to The Source



by phone and typing in the name of the program you want to use.

- *Databases.* There are many other databases available on The Source. One of the more popular databases is the United Press International (UPI) wire service. It is possible to tell The Source to put the UPI output on the screen and watch the news scroll by a line at a time. However, that is an inefficient way of finding the news you're interested in. From your computer, you can tell the UPI database exactly what stories you want to read. If you want information on what is happening in the latest crisis in any country, you can do so by typing in the name of the country. All of the recent stories filed with UPI about that country will be displayed. It is easy to get in-depth reports on any subject. Best of all, you can have up-to-date information any time you want it. The UPI database is only one of many available on The Source. It takes some effort to learn how to use them effectively, but the effort is well worth it.

Many of the databases available on the system are oriented toward a particular topic. A person interested in the stock market, for example, can get detailed news and background information relevant to the specific companies. There are databases on commodities, stocks, bonds, precious metals, and more. And there is an electronic version of the magazine *U.S. News and World Report*, as well as abstracts of articles from magazines like *Forbes* and *Harvard Business Review*.

## CompuServe

The major competitor to The Source is CompuServe Information Service, now a subsidiary of H & R Block. There are many similarities between the two major information utilities, and some differences. CompuServe has an initiation fee of around \$30 and charges \$5 per hour during non-business hours. CompuServe is not available during normal working hours, since the company that runs this service uses its computers to serve commercial customers during that time. The connect call is a local one in over 300 cities.

CompuServe offers services similar to those of The Source. Instead of UPI, CompuServe uses the Associated Press news-wire, and it has electronic editions of papers such as the *St. Louis Post-Dispatch*. There are also electronic editions of popular magazines such as *Computers and Electronics*, *Better Homes and Gardens*, and *Popular Science*. CompuServe also has a newsletter for ATARI computer owners. This is one way to get up-to-date information on the ATARI computers.

CompuServe also offers information on topics as diverse as home repair, personal health, and recipes. Like The Source, it has book and movie reviews, as well as a sports information service. There is even a file of computer art that can be copied on your printer.

Like The Source, CompuServe has many financial databases you can use to investigate and track the performance of stock and commodities. There is also a way of doing electronic banking on CompuServe through a bank in Boston or Knoxville. The service also has an electronic version of the *World Book Encyclopedia* on line, a program that helps you select a college, and a service called *Refundle Bundle* for coupon clip-pers.

CompuServe sign-up kits are available from some computer stores. All you have to do is fill out the paperwork, and you will get your identification numbers. If you own the right equipment, you can then go home and begin using Compu-Serve. You can also contact the CompuServe main office directly. The base fee is \$20, but most people buy at least \$10 worth of manuals to help learn how to use CompuServe. A CompuServe Starter Kit that includes manuals and several hours of time is \$40.

Both CompuServe and The Source add new services regularly, and both offer value for the money you pay.

## OTHER INFORMATION UTILITIES

Besides the general-purpose information supermarkets, there are many specialized services with a more limited range. What they lack in breadth is more than offset by their depth.

## Bulletin Boards For ATARI

There is a wide selection of bulletin boards for the ATARI. Most of them are of the branching type, meaning they are located in not one, but several, different cities in the United States. For example, *AMIS* was started by the Michigan ATARI Computer Enthusiasts group and now has a branch in nearly every major city in the country. Rather than try to list all the bulletin boards and their telephone numbers, we'll tell you three easy ways to find them. First, the May 1983 issue of *Antic* has a good article on ATARI bulletin boards, with a full-page listing of the popular boards and their telephone numbers. If you would rather do your bulletin board shopping electronically, you can call a bulletin board of ATARI bulletin boards. When you are equipped for telecommunications, you can dial (619) 561-7277 and get a listing of ATARI bulletin boards and phone numbers. By choosing the boards closest to you, you can avoid or cut down on long-distance telephone charges.

A third way to get listings of bulletin boards is to make contact with the computer bulletin board system (CBBS) sponsored by Novation. This large manufacturer of modems gives information to callers on the hundreds of free CBSSs across the country. When you have your ATARI set up for telecomputing, you can dial (213) 881-6880. When Novation's computer answers the phone you should see:

### LOGON PLEASE

Most systems require you to sign on. In this case, all you need to do is type CAT (Novation makes CAT modems) and press RETURN. You are then given access to a list of hundreds of other CBBSs organized by area code. The system also has many other services, such as games you can play.

Many of the ATARI bulletin boards let you download programs. Don't expect to find a \$200 piece of software that you can download free. Most of the programs you get from these

services are written by hobbyists. But there will be some good ones, and the only cost to you is the long-distance telephone service while the program is downloading.

One problem with small, specialized bulletin boards is that they are often short-lived. Someone may start a good bulletin board, run it for several months, and then, for one reason or another, drop it. The best way to keep up on bulletin boards is to watch for listings in computer magazines. In the case of the ATARI, of course, you should especially watch *Antic*, *Analog*, and *ATARI Connections*.

## Knowledge Index

This is a special microcomputer version of DIALOG Information Service, which has a huge computer complex with billions of references on every imaginable subject. Because of the high cost of the DIALOG service, it is used primarily by professionals at libraries and universities. You can use it if you want to find out all about a certain subject; the computer does all of the searching and gathers the information for you. *Knowledge Index* costs \$35.00 for the initial sign-up. With this initial fee, you get two hours of search time. After that, it costs \$24.00 an hour to use the system.

## Dow Jones News/Retrieval Service

You can join this service for an initial fee of \$50.00. There is no monthly fee, but you are charged for the time you use the system. This charge varies depending on the service you are using.

## Money DOS

You do not need an address for this service because it is free, and you can access it just by having the telephone number,

once you are set up for telecommunications with your ATARI. Money DOS is a bulletin board on financial investments. The person who gives the advice and runs the bulletin board is J. M. Keynes, a senior vice president of investments for a member firm of the New York Stock Exchange. You can contact the bulletin board by dialing (305)-655-2340 during the week and on weekends by dialing (305)-655-3389. With your ATARI computer set up for telecommunications you can receive Mr. Keynes' latest advice, and if you have a printer, you can have it printed out for later reference.

## The Encyclopedia Britannica

This service gives you the full text of the *Britannica 3* encyclopedia and covers the ten-volume *Micropedia*, which has important facts in capsule form. Other special editions such as *Book of the Year* are also included.

## GETTING ON LINE

Does one or more of the possibilities in telecommunications arouse your interest? Would you like to connect your ATARI to a bulletin board or information utility?

### Connecting the ATARI to the Telephone

The new 1400 XL and 1450 XLD have modems (short for modulator demodulator) built in. This is called a direct-connect modem. You simply connect the computer to a telephone line. On other ATARI computers a modem is not built in, nor are they ready to be connected to a modem. A modem takes the signals from your computer and converts them into tones that can be reliably transmitted over phone lines. It also converts tones transmitted to your computer into signals the ATARI can process.

## Modems

Modems with several different features are available for the ATARI computers. These features have to do with how the modem hooks to your computer, as well as how it hooks to the telephone line. There are also some special features that make it possible for you to gain automatic access to an information source. As with nearly all other computer accessories, a wide range of options and prices is available.

The *ATARI 1030 Direct Connect Modem* is a popular modem for ATARI computers. This modem, like the one built into the 1400 XL and 1450 XLD computers, connects directly into a telephone line. Some modems are the acoustic coupler type. The telephone handset is placed into a holding device, and information is transferred from the computer to the telephone line through the handset. This type of modem is not nearly as efficient as the direct connect type, but is cheaper. In Chapter Ten of this book, we have a section on modems. In that section you will find a more detailed discussion of modems, along with some additional recommended brands.

## Software for Telecommunications

A critical portion of your telecommunications system is a software package that tells your ATARI computer how to send and receive information.

*Teletari* from Don't Ask Software is an inexpensive telecommunications software package that sells for \$39.95 and requires at least 32K of memory and a disk drive system. This is a good quality software package with all of the necessary functions to help you use your computer in telecommunications. It has three very good features often only found in more expensive programs. First, it will support 80 columns and 24 rows of characters on the video screen. The software itself doesn't do this, but if you have a special 80-column card, this software takes advantage of the card. Second, this program sets aside part of the computer's memory for its work. This

section of memory is called a buffer. Information received from an information utility is stored in the buffer area. At any point in the process, you can review the information in the buffer. When all of the information has been received, you can review it, edit it, and have it printed out. Third, the program is entirely menu-driven, so the computer shows you what your choices are, and you select what you want. This feature, of course, saves you from looking up codes or memorizing them.

*Tele-Talk*, another software package for telecommunications, is sold by Datasoft for \$49.95. This program is similar to *Teletari* but has a couple of additional features. One feature that gives it an edge over *Teletari* is that it's written in machine language, which means it will operate much faster than *Teletari*. Another feature of *Tele-Talk* is that you can change the color of the screen whenever you like. This is an advantage, since it makes staring at the screen for long periods of time easier on your eyes. It has a very good instruction manual and

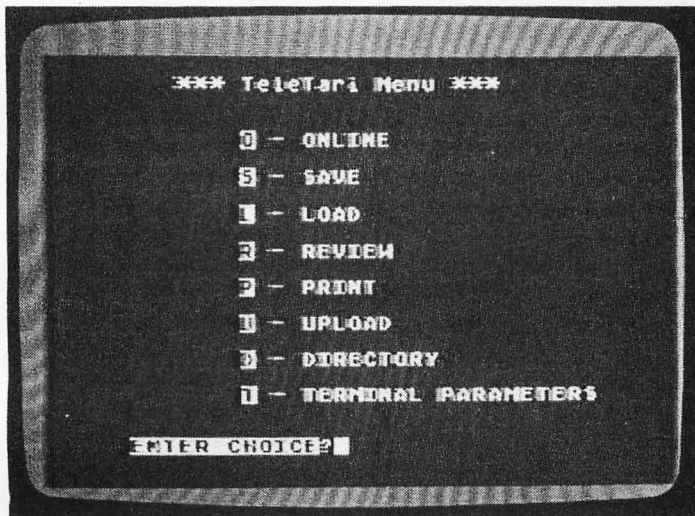


Figure 6.1 Teletari

is also menu-driven. However, it does not support the 80-column card, as does Teletari.

*T.H.E. Smart Terminal* offers you a third choice in telecommunications software. This package is really very similar to *Tele-Talk* in the way it works and how it's used. It is sold by Binary Computer Software for \$49.95 either on cassette or disk.

With a modem and telecommunications software, you are ready to telecommunicate!



# Word Processing

## What Is Word Processing?

This chapter is about using your ATARI as a word processor. Just what *is* a *word processor*, and why would anyone want one? When you think about what computers do, you may think about handling numbers. You know computers will accept, manipulate, store, and print numbers. Computers are capable of doing similar work with words. When computers are used to accept, manipulate, store, and print words, this work is called *word processing*.

## Word Processing Is Better Than Typewriting

Word processing is the next step beyond typewriting. The invention of the typewriter permanently changed (and simplified) the task of writing. Word processing is now changing (and simplifying) writing again, perhaps more dramatically than typewriting did! Word processing is far superior to typewriting in many ways.

In typewriting, the first step in producing a document is usually composing a rough draft. The next step involves typing the rough draft on paper. You may compose the rough draft directly on a typewriter. In business, this process usually involves a secretary as the typist. The typist then gives the writer

the rough draft. The writer marks any changes to be made and gives it back to the typist. The typist produces another copy on paper, complete with the writer's corrections, and again gives it to the writer. This cycle can be repeated over and over again until the writer is satisfied with the document, or until the typist goes into cardiac arrest, whichever comes first.

The really time-consuming part of this whole process is the retyping. Even small revisions like spelling errors can mean the entire document must be retyped. This sometimes starts a vicious cycle, because typists often correct one error only to make another somewhere else in the document.

## Word Processing Makes Revisions Easy

Word processing makes it easy to revise a document, by eliminating some of the steps of traditional typewriting. And it saves time by helping a typist make revisions quickly. When the typist gets the rough draft from the writer, it is typed on the computer keyboard, and it appears on the monitor screen. The typist then stores the document on a floppy disk or a cassette tape and types in a simple command to cause the document to be printed out on paper. The writer marks revisions and gives the marked rough draft back to the typist. The typist then loads the document back into the computer's memory. The document is again displayed on the monitor and the typist makes the changes. If a word is spelled wrong, the change is easy to make, usually by simply positioning the cursor on top of the incorrect word and typing over the top of it. In addition, whole words, phrases, or paragraphs can be deleted by pressing a key or two. Inserting words or longer passages is equally easy. Whole sentences, paragraphs, or even pages can be moved around in the text by typing in a few simple commands. The typist then stores the changed document and prints another copy on paper. Most of the time, even complex changes can be made in a matter of just a few seconds or minutes.

## Word Processing Makes It Easy to Produce Copies

Since the document is stored on a disk or cassette tape, it can be printed as many times as desired even weeks after it was written. This can be helpful when you wish to send the same letter to several people. We've all received form letters like that at Christmas time, and they usually begin *Dear Friend/s*. They tell us fascinating stories about Susie's braces and Fred's Little League team. Letters like that can be mass produced and sent to many different people.

With a word processor you can produce these little Christmas missives without Aunt Mary or Cousin Gertrude ever suspecting they're numbers 597 and 598 on your list. After each letter is printed, you simply change the name in the salutation as it appears on the monitor screen. Then you print the letter again. You repeat this process until everyone on your list has a personalized letter. You can even add a different paragraph at the end of each letter, customized for each of the people on your list. ("Thanks so much for the stuffed aardvark you sent last year; it's just what I always wanted and looks lovely in the den.") Many word processing programs can be instructed to stop at a specific point (after the word "Dear" for instance), and you can type in unique material like names or addresses. Some word processing programs can even be instructed to insert names from a list and continue printing copies until all names have been used.

## Word Processing Eliminates Many Tedious Typing Chores

Any traditional typist can tell you how tedious it is to listen for the bell that signals the end of the line. Most word processing programs have a feature called *wraparound* that makes an end bell and a carriage return at the end of each line un-

necessary. When the typist gets to the end of a line, the program takes the last word and wraps it around to the beginning of the next line if it will not fit on the previous line.

Other tedious typewriting tasks are centering headings and varying margins. With word processing, these can be done by typing simple codes into the document or making selections from a *menu*. Many word processing programs can also *justify* text (make each line end exactly at the right margin), center a block of text on a page, or otherwise change the format of a document.

## Word Processing Improves the Quality of Writing

When you know that even major changes can be made quickly and easily, you won't hesitate to try out a different, and sometimes better, way of expressing yourself. ("Thanks so much for the stuffed aardvark. It looks lovely in the den and had absolutely nothing to do with the divorce.") If the change isn't as good as the original, you can go back to the first version just as easily. Word processing encourages you to experiment and to refine until you're completely satisfied with a document.

## THE ATARI AS A WORD PROCESSOR

From time to time in this book we have mentioned some weaknesses of the ATARI computer. Talking about word processing and the ATARI is a little like one of those old *good news, bad news* jokes. The good news is that word processing is wonderful, the bad news is that the *as-is* ATARI isn't the greatest machine in the world for word processing.

## Screen Display Width

An important question to ask about any computer you are planning to use as a word processor is "How many characters can this computer display across each line?" A general rule of thumb is "the more, the better." You need a computer that can display a wide line so you can make the screen display width the same length as a line on your printout. In other words, you want to be able to make the screen display look just like the printout.

Unless you have purchased an 80-column board for your ATARI, you can display only a very short line of word processing text (40 characters). This means when you do word processing, you can't see an entire standard letter-width line at one time. You are forced to look at only one part of the line, because the whole line won't fit on the display. Some programs can't handle lines longer than 40 characters. Others will, but you have to look first at the left side of the line and then *scroll* (move) over so you can see the right side of the line. This is like viewing the line through a movable, 40-column *window*.

If you're serious about word processing, we recommend that you avoid 40-column word processing, if at all possible. You'll find this limitation to be very distracting. This is unfortunate, because anything that distracts you while you're writing becomes a barrier to good composition. After several hours of word processing with a 40-column window, you may feel like you've been watching a tennis match from the net position! If your word processing needs are modest, the ATARI may fill the bill. If you need word processing only to write a few letters or prepare other short documents at home, the 40-column limitation might not be too important. But if you will be spending several hours a day doing word processing and preparing lengthy documents, you probably won't be satisfied with 40-column word processing. In fact, you may decide that this limitation alone makes word processing undesirable. We disagree, because we have found that even poor word pro-

cessing beats traditional typewriting in almost every way! But screen width is a serious consideration in word processing, and if word processing is your primary reason for buying a computer, the ATARI is not your best buy, unless you also buy the 80-column video expansion circuits.

If your word processing needs are extensive, we recommend you buy a different computer, such as an IBM PC or a TRS-80 Model 4. If you do decide to do word processing on an ATARI computer, we recommend you consider purchasing an 80-column board and a program that will display a line of that width. At the moment, we know of only one company, Bit 3, that sells 80-column boards for ATARI 400 and 800 computers. The only word processing program we know of that makes use of the board is *Letter Perfect*, by LJK. We will review that word processing program in this chapter. The new ATARI computers can use the 80-column card that comes with the ATARI CP/M system.

In addition, a green or amber high-resolution monitor should be used rather than a television set. TV sets and color monitors are great for games, but they are terrible for word processing. They tend to distort the letters slightly and add significantly to the eye-strain problem.

## A Standard Keyboard

The keyboard is another important thing to look at when you are evaluating the word processing potential of a computer. In our opinion, a standard typewriter keyboard is absolutely essential if a computer is to be excellent as a word processor. Some keyboards have small, or compacted, keyboards. We think that is almost unacceptable for word processing. It's true that you can get accustomed to just about anything, but like a rock in your shoe, a non-standard keyboard is something you may never feel good about. Fortunately, the ATARI has an excellent, standard-size keyboard. Its only major limitation is the lack of lots of special *programmable function keys*. On other computers, you can press one key to give an instruction like PRINT the document.

## What Word Processing Programs are Available?

Programmers realize the ATARI computers are limited in their word processing potential. Therefore, only a few word processing packages have been developed for use with these computers. They range in price—from around \$20 to more than \$150. We will talk about several of these to acquaint you with them, and to give some pointers on important things to look for when you select your own word processing program.

You might also be interested in two articles about word processing. *InfoWorld Magazine* published an article entitled "InfoWorld's Guide to Word Processing Programs" (Vol. 5, No. 3, p.27). This article presents information on scores of different word processing programs. Another good article appeared in *Personal Computing* in April of 1983 (p. 110). It's entitled "Word Processing: Finding the Right Software."

### Letter Perfect

*Letter Perfect* is the only ATARI word processing program we know of that uses the Bit 3 80-column board and displays an 80-column line. This word processing program sells for \$149.95 on diskette and \$199.95 as a cartridge from LJK Enterprises.

Of all the word processors for ATARI computers, this one comes closest to being a professional-quality package (if used with the 80-column board). *Letter Perfect* provides for additions, deletions, search-and-replace, block moves, and merging and chaining of text. You can underline and print boldfaced type, and you can vary the line spacing and the margins on the printout. You can prepare headers and footers, center text, and get automatic page numbering and justified text. You may also *lock* any files you don't want accidentally changed. The program is menu-driven and fairly easy to use, even though the documentation is far from excellent.

In addition, *Letter Perfect* is compatible with *Data Perfect*,

the electronic file program also produced by LJK. This makes it easy to use data stored in *Data Perfect* to prepare mailing lists, form letters, and other documents in *Letter Perfect*. Unfortunately, *Letter Perfect* uses its own DOS (Disk Operating System), rather than ATARI DOS. This means *Letter Perfect* will not be compatible with other software prepared for ATARI computers.

One problem with this program is that the insertion capability is somewhat awkward, since you can insert only one blank line at a time. There is no way to tell the program to move everything down automatically until you are through inserting lengthy text.

We have already said that word processing on the ATARI is less than ideal. However, we think *Letter Perfect* is probably the best word processing package available for ATARI computers. When used with the 80-column board, it is an acceptable program for most light to medium word processing needs.

The main competition for *Letter Perfect* is *Text Wizard*, a \$100.00 program from Datasoft. It has similar features and comes with a good manual.

## Bank Street Writer

*Bank Street Writer* has had many ATARI owners waxing eloquent with praise since it was introduced in 1983. It was even given high praise by the *New York Times* and *Time Magazine*.

This new word processing system was developed by Broderbund Software in conjunction with the Bank Street College of Education in New York. It is currently offered in both home and school versions. The home version is available from Broderbund and comes with a twenty-eight-page manual and two copies of the program disk for \$69.95. The school version is available from Scholastic, Inc., and comes with separate teacher and student manuals and three copies of the program disk for \$95.00.

This word processor was designed to be, above all else, *simple to learn* and *simple to use*. And simple it is. The goal was to produce a word processor children could learn easily.



It takes at least ten hours to become comfortable with a word processing system. Educators have found that few children are motivated to spend so much time learning a word processing system. Many give up before they are ready to *produce* anything. *Bank Street Writer* was developed to make it possible to begin using the word processor quickly.

Now don't get the wrong idea. *Bank Street Writer* is far from being the ultimate word processing program. But it very well may be the ultimate *introduction* to computing in general and to word processing in particular.

What makes this word processing program so friendly? First, an excellent tutorial on the flip side of the disk leads you by the hand as it explains how to use the program. Best of all, it keeps you involved by frequently having you type in text or press different keys.

The tutorial is very well done, and ten-year-olds with average reading ability have no difficulty at all with it. For younger children, it's best to have an adult go through the lessons with

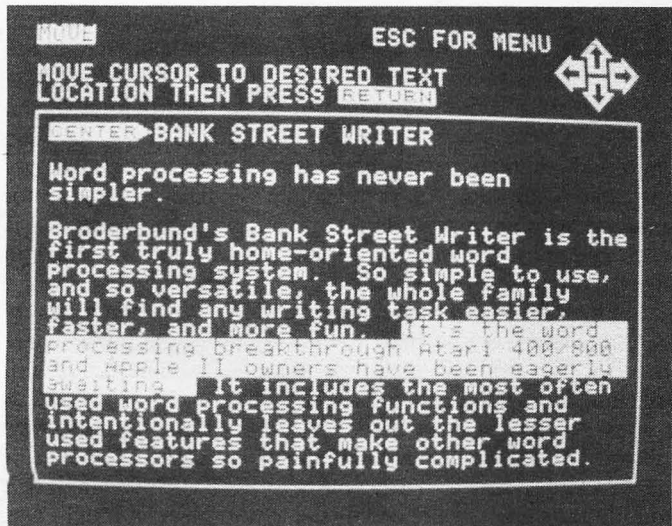


Figure 7.1 Bank Street Writer

the child, reading aloud as the tutorial progresses. The lessons are short, with frequent opportunities to take a break to go over the lesson again, or to proceed to the next lesson.

Lesson One teaches you how to enter text, Lesson Two teaches you how to move the cursor, Lesson Three teaches how to use the ERASE and UNERASE commands, Lesson Four teaches the MOVE and MOVEBACK commands, and Lesson Five teaches you to use the FIND and REPLACE commands.

The tutorial is so good that you can actually throw the manual away if you want to and learn to use the program solely from the disk. This wouldn't be wise, because the manual is also excellent.

If you select TRANSFER MENU, you are presented with a menu to help you communicate with your printer or with a memory device like a disk drive. You use this mode to load or save a file, format a disk, or to actually begin printing. You can choose to single, double, or triple-space and to print using a line-length from 40 to 126 characters. You can select page numbering at the top or the bottom of each page, and you may begin with any number you choose. You may put a standard header line at the top of every page, and you can elect to see where every page will end.

Those are all nice features. But as we said before, this is not the supreme word processor. In the first place, you are limited to 38 characters as the widest line you can view at any one time. Then, too, the very simplicity causes frustration for someone who wants speed and efficiency. A good example is what you must go through to change a word you typed in several lines back in your text.

Unlike most word processing programs, you cannot simply use the arrow keys to back the cursor up to the point where the error occurred and type over the mistake. The cursor will back up, all right (use the BACK S key), but it will erase as it goes. What you must do is first hit the ESCAPE key, then use the arrow keys to back the cursor up to the beginning of the text to be erased. Then you press RETURN again. Then you put the cursor at the end of the text to be erased and press

RETURN again. You will then be shown, in reverse video, the text you have marked for erasure and you will be asked if you are sure you want it erased. If you type Y, the text will be erased. Now you must press ESCAPE again and enter the correction. After the correction is entered, you press ESCAPE again so that you can move the cursor back to where you left off. Then you press ESCAPE again so that you can continue entering text. This is time-consuming, but it protects you against errors.

Memory is another problem. With 64K of RAM you can store only about 3500 words in each file. That's pretty short. You may often want to compose a document longer than that. If so, you'll have to break it into several files.

However, the biggest problem is the short line width. Thirty-eight spaces is simply too short for convenient word processing. But as a learning tool for beginners, or as a word processor for short projects around the house, *Bank Street Writer's* great, and we recommend it highly.

## Atari Word Processor

The *Atari Word Processor* was an early word processing program for the ATARI computers, and it has a few problems. The manual is not very good, and you are limited to a 40-column screen width. Unfortunately, the program insists on displaying an 88-column width. This means you are doomed to using the 40-column window at all times. Most other programs make it possible to display 40 characters so that the window is not necessary.

On the other hand, the program is menu-driven and easy to learn. It has all the standard editing capabilities, and they are easy to use. We know people who have used this program for a long time and say they love it. Although unsuitable for business applications, it is acceptable for light word processing needs. The program is available from Atari, Inc., on cassette or diskette for \$150.00.

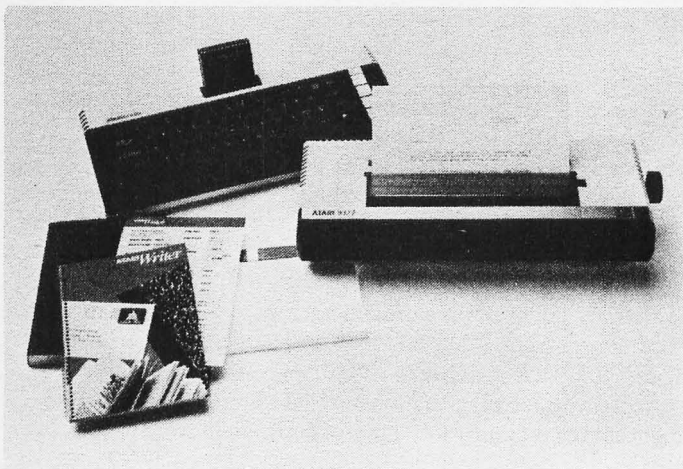


Figure 7.2 AtariWriter

## AtariWriter

The latest contribution to word processing from Atari, Inc., *AtariWriter* is available as a cartridge for \$99.95. This program may not be as powerful as the *Atari Word Processor*, but it is an improvement in many respects. First of all, the price is significantly lower. Second, you are not forced to display an 80-column line, as you are with the *Atari Word Processor*. You can choose to display the 80-column line and use the window approach to viewing it, but you are not limited to this approach.

You can do double-column printing, and the manual is good. This is a better 40-column word processor for the ATARI. Only *Bank Street Writer* is easier to learn.

## Tiny Text

This is a free, type-it-yourself program by Jim Carr, listed in the February/March issue of *Antic Magazine* (p. 61). It is a small, easy-to-use program, and is free if you're willing to type it into your computer. It's approximately 107 lines long,

you can use it with cassette or disk operation, and it will run an ATARI 820 printer. This program would be excellent for getting a taste of word processing. If you find word processing to be something you think you can profit from, you can then invest in a more sophisticated package.

## Spelling Checkers Can Aid Word Processing

Spelling checkers are helpful add-ons for your word processor. They look through your document and compare your spelling to thousands of words in their spelling dictionary. If you have used a word not listed in the dictionary, the program shows you the word and offers you the opportunity to change it, leave it alone, or enter the word into the dictionary.

Grammar checkers examine your sentence structure and make suggestions for improvements. Some grammar checkers will also look for misplaced parentheses, quotation marks, or other incorrect punctuation and even alert you to sexist language. To date, we know of no grammar checkers for ATARI word processing programs. This's too bad, because they are a real asset to some people.

The Atari Program Exchange (APX) sells a spelling checker called *At-Speller*. This program will run with any word processor and has a dictionary with more than 30,000 words. It will find spelling errors, help you correct them, and store the corrected version on diskette. *At-Speller* sells for \$39.95.

# Business and Professional Uses

If you are thinking about buying a personal computer to help you run your business, you need to know that the ATARI is not noted as a first-class business computer. The selection of software for business is not nearly as large or as varied as it is for most other small computers. Nevertheless, some business software is available for the ATARI, and we will review a representative sample.

The two areas of business use for small computers are in small business and for managerial tasks. Since the ATARI is not a business computer, you probably won't use it to run your small business. However, there are some good managerial uses for your ATARI, so this is what we will discuss.

Most of what you do as a business manager is concerned with either planning or report writing. We discussed word processing in Chapter Seven, so we will concentrate on planning in this chapter. If you want to use your computer for planning, your main concern is projections. You want the answers to questions such as "what will happen if sales increase by ten percent?" The answers to many questions beginning with "What if" can help you make decisions about the future.



**Figure 8.1 The ATARI 1450 XLD Home Computer works well both at home and in the office.**

## Spreadsheets

The most useful managerial tool for people in business is probably the spreadsheet. Accountants and others who perform financial analyses have been using spreadsheets for a long time. A spreadsheet is simply a rectangular worksheet containing rows and columns of numbers. This form is used because it makes it easier to keep the numbers organized.

The simplest example of a spreadsheet is a column of numbers with a total. Now what happens when a number in the column is changed? The total for that column is wrong! If you

are doing your work by hand, and you change several numbers in several columns, you have to recalculate all the totals. The larger the number of rows and columns on the work sheet, the more complicated it becomes to change any one number. Imagine how many hours of work would be involved in changing and updating a complicated financial forecast.

A spreadsheet analysis done without a computer is tedious. You can avoid much of this tedium by using your ATARI and an electronic spreadsheet. There are now a variety of electronic spreadsheets available for small computers.

## VisiCalc

*VisiCalc* was the first electronic spreadsheet program for personal computers and is the single most popular software product in history! *VisiCalc* has been so successful that many other companies developed electronic spreadsheet programs. Today there are more than sixty different electronic spreadsheets available for small computers!

*VisiCalc* has been such a success because it cuts down on the amount of work you must do when you use a spreadsheet. In fact, if you have *VisiCalc*, most of what you have to do is to get the numbers and information into the computer. After that, simple commands tell the computer to rearrange the information in almost any way you want. With *VisiCalc* you can:

- Get the total of the values of any series of locations. For example, all of the top row or all of the first column.
- Get the average for any series of numbers.
- Try different values on your data to get projections.
- See certain data organized in a graph, which can be printed.

Assume that you are a district sales manager for a large company. You have been asked to prepare a sales estimate for next fiscal year that gives three different levels of performance. You supervise twenty-five sales representatives, your company has 350 products that range in price from \$3.95 to \$225, and you have nineteen different discount plans. Your regional man-



ager wants your sales estimate by next week, and you just found out about it today. You have two choices: get an ATARI and *VisiCalc* or get a different job! Believe it or not you could probably do this complicated sales analysis in just a single afternoon with *VisiCalc*.

How does *VisiCalc* do all this? Your computer screen becomes a window showing you a certain section of a giant spreadsheet made up of 254 rows and 63 columns. This window can be moved around simply by using the arrow keys on the computer to view any portion of the spreadsheet. The screen can even be split so that you can see two different parts of the spreadsheet at one time, when you want to make comparisons. Besides being able to see the different parts of the spreadsheet, you can ask the computer to search for certain kinds of information, do some calculations, and show you the result. You can also find out what is in any given portion of the worksheet at any given time.

Once you have entered a formula, you never have to enter it again. You can copy formulas, headings (or titles), and numbers into as many columns as you want. Using our sales estimate as an example, suppose you want to show what would happen if two of the sales reps had a twenty-five percent increase and all the others had a five percent decrease. All you have to do is tell the computer to multiply your first results by either twenty-five percent or minus five percent, wherever appropriate. The computer performs all of the calculations.

Don't get us wrong, though. A program that does as much for you as *VisiCalc* will take time to learn. But if you have to do any kind of financial projections, your time and effort will be well spent. *VisiCalc* is published by VisiCorp and lists for \$250.

## **Data Base/Report System**

This is an electronic filing system designed to help managers keep track of the mountains of information needed to conduct business. These programs are called *database management systems*.

Why do you need a database management system? One

reason is that you may have wasteful duplication in the way you maintain your files. Personnel departments, for example, typically have a bit of information on each employee. They have to keep track of data such as names, addresses, next of kin, and so on. The sales department probably also maintains a file on each sales rep. These files have some unique information but probably also have some of the same information in the personnel file. Within departments, it's the same story.

If you are currently doing some of your business information housekeeping with computers, you probably still have the same problem. You may be using a payroll program, and you may also be using a program to keep track of the amount and type of each sale made by each sales rep in your department. The ideal way to handle information for these purposes is to have one central electronic file, which is accessed by all other programs. This eliminates duplication and saves money. It also means you can centralize your *data gathering* efforts. Since there is only one file, you can be very thorough and do a really good job. And when information needs to be updated, it only has to be entered once. *Data Base/Report System* is designed to help you set up such a system.

You'll need at least 40K, a disk drive, a printer, and ATARI BASIC to use this program. It is available on diskette for \$22.95 from the Atari Program Exchange and is recommended only for experienced database users.

This database system will handle approximately 1300 records and includes most of the standard database capabilities. You can create and revise your files, as well as conduct searches using keywords or codes. In addition, you can use the program to print reports. The program is menu-driven.

## **Filemanager 800 +**

This is another database management program, but with some unique features. First, it is possible to make extensive changes in a file after you have created your original filing system, and even after you have entered data into the system. Second, *Filemanager 800 +* has a security system that requires

that you plug a special electronic circuit into a joystick port before you can use it.

This program can handle several hundred records, conduct searches of your files, and print mailing labels. The program lists for \$99.95 and is available from Synapse Software.

## Graph It

*Graph It*, from Atari, Inc., comes on cassette and sells for \$19.95. This BASIC program requires at least 16K of RAM. The program prompts you for statistical information and converts this information to pie charts, bar graphs, or two- or three-dimensional plots.

You can produce bar graphs with up to ten columns. Pie charts may have up to twelve slices. Both bar graphs and pie charts can be displayed in three colors. You can use the joystick to signal the program to calculate values of any points on the curve of a two-dimensional plot.

This is a useful program with a good manual. However, it is not possible to use *Graph It* to print our charts. Another problem is that if you want to re-create any of the graphs or charts at a later time, you will have to re-enter the raw data and wait for the program to re-produce your graphics. This latter problem can be solved by purchasing an enhancement program called *Enhancements to Graph It* from the Atari Program Exchange for \$15.95 (cassette).

## Stock Charting

This is a tool for *technical analysis*. This is investment jargon for looking at how a stock has done in the past to try to figure out how it will do in the future.

*Stock Charting* from Atari prompts for data on past performance and produces a chart to help you identify future trends. The program is written in ATARI BASIC and requires at least 24K of memory. It sells on diskette for \$29.95.

## Strategic Financial Ratio Analysis

This program won second prize in the Atari Program Exchange summer 1983 competition. It is available on diskette for \$24.95. This program prompts you for information on a company and then computes ratios to help you assess the company's profitability, liquidity, and use of debt. The program can also be used by managers to assess the desirability of hypothetical business decisions.

## P.M.P. 2000

*P.M.P.* stands for *Property Management Program*. It is available on diskette for \$219.95 ( T & F Software Co.) and is intended to take over some of the business accounting tasks involved in managing an apartment complex. To use *P.M.P.*, you must have the *VisiCalc* program, at least 48K of memory, a disk drive, and a printer.

The programs included in this package prompt you for information about your tenants and your expenses and give you printed reports. You can determine the return on your investment and how many apartments are vacant, and you can print invoices. The program also does a good job of keeping track of how much money you spend on each unit.

## Some Common BASIC Programs, ATARI Edition

This book of programs is published by Osborne/McGraw Hill. The book contains listings of over eighty different programs that you can type in and run on your ATARI computer. The book, which costs \$14.99, is a bit sparse on explanations of how the programs work, but each program listing is accompanied by a *sample run* that shows how the program should work when typed in correctly. Here are some examples of programs included in this book:

- Future Value of An Investment
- Depreciation Rate

Term of Loan  
Area of a Polygon  
Coordinate Plot  
Plot of Functions  
Linear Programming  
Mann-Whitney U Test  
Mean, Variance, Standard Deviation  
Poisson Distribution  
F-distribution  
Average Growth Rate, Future Projections  
Tax Depreciation Schedule  
Check Writer  
Alphabetize

## **University Software Publications**

University Software publishes a set of books of programs written in a relatively standard BASIC. The books cost \$15.00 each and contain programs in areas such as Small Business Programs, Education and Scientific, Fun and Games, and Home & Economics Programs. You can also buy tapes of the most popular programs in each of the books. The ATARI tape for Small Business Programs includes programs on calculating tax deductions, developing a PERT chart, learning to touch-type, and mortgage analysis. The tape costs \$30.00. ATARI cassettes are available for small business, education, fun and games, and home & economics programs.

## **High Country Super Ledger**

High Country Microsystems distributes one of the few accounting packages for the ATARI computer. The version we reviewed was a prerelease copy that still needed some work, particularly in the manual. The program looks good and provides users with a full general ledger program. You begin by entering a chart of accounts and beginning balances. After that you use it as a computerized version of a general ledger program. This is a comprehensive program with a thick manual. You will need to spend several hours poring over the manual

before beginning to use the program. *Super Ledger* may well be all the accounting software some very small businesses will need.

## **Miles Payroll System**

This program is designed as a complete payroll accounting system and sells for \$279.95 (Miles Computing). It helps you handle all aspects of your payroll records. The program will handle up to fifty employees and will produce up to fifteen different reports, including a W-2 Forms Report. It calculates, and you may use it to print checks. Deductions that can be included are federal, state, and city withholding; FICA; SDI; group insurance; and up to three deductions you define yourself.

## **Other Business Software for the ATARI**

To find other business software for the ATARI computers, watch the computer magazines for ads and reviews. In addition, you might want to write the following software companies for catalogs: Dynacomp, Inc., and VERVAN Software.

# Programming

## THE ATARI'S PROGRAMMING LANGUAGES

The ATARI in your home or school understands several computer languages. No, it doesn't converse fluently in French or Spanish, but it does understand a language called BASIC, as well as PILOT, Logo, and FORTH. The concept of a *computer language* is difficult for new computer owners. What is a computer language, and what role does it play in the computer?

These questions will be answered in this chapter. You will learn what a computer program is, what computer languages are, and a little about how programs are written. You will not learn how to write programs, however. We will discuss what kind of programming can be done on the ATARI computer and how programming fits into the total picture of what you can do with your computer. And we will show you some examples of the different languages. The sample programs you see in this chapter are intended to give you a picture of how the languages differ. If you want to learn programming, the place to start is with the instruction manual that came with your computer or with a good book on how to program in a particular language.

Computer languages serve much the same purpose as human languages. They are a means of communication. Consider the way two people communicate. For the moment, assume you are a cooking instructor. Today you are going to teach a student how to cook a soufflé. Because you and the student both speak English, you can give your instructions in English. English is your language or medium of communication. The information you communicate to the student in English is a specific, step-by-step set of instructions. *Recipe* is the special term used to describe such a set of directions when you are cooking.

If your student speaks French and you speak only English, you may have a very strange looking soufflé! To get what you want, there must be a common language between the two of you. The same thing is true of computers. Computers like the ATARI speak their own set of languages. They cannot learn English. So if you want to give the computer instructions, you will have to learn one of the languages the computer understands. When you learn a computer language like BASIC, you can communicate with the computer much as a master cook communicates with a student. Instead of communicating recipes, however, you will give the computer programs. A *computer program* is an organized set of instructions that tell the computer how to accomplish a particular goal. All the software reviewed in this book are really programs someone has written to tell the computer how to do a job. Programs, like recipes, are created by humans.

Learning to program a computer is not something everyone should do. Learning how to use the computer to do a job or play a game is just as honorable as becoming an experienced computer programmer. Learn to program the computer only if you find it interesting.

## LEVELS OF COMPUTER LANGUAGE

Suppose you are thinking of learning a second human language. If your first language is English, there are some lan-



guages, like French and Spanish, that are similar to yours. Others, like Greek and Latin, are not as similar, but still contain some elements familiar to a person who speaks English. Still other languages, like Japanese and Chinese, are so different that few elements will be familiar. To learn Chinese, you need to learn a completely new alphabet that bears no resemblance to the one you learned as a child. In addition, the way information is organized is quite different.

If you decide to learn a computer language, you will find the analogy relates. Some, like BASIC, are not exactly English but have enough similarities so you don't feel completely abandoned by your native tongue. Others, like FORTRAN or Pascal, are not so much like English, but they contain some familiar phrases or terms. Still others, like 6502 machine or assembly language bear little resemblance, if any, to English. We would advise you to learn one of the more English-like languages before tackling an assembly or machine language.

Computer languages have two basic parts: the vocabulary and the rules for using the vocabulary. These rules are usually referred to as the grammar. The word PRINT, for example, is a part of the vocabulary used in the ATARI's BASIC. When the computer finds this word in a program, it looks for material to display on the screen. A rather extensive set of rules tells you how to organize and punctuate the material after PRINT. These instructions tell the computer exactly how you want your material displayed on the screen. However, it is relatively easy to remember that PRINT is one of the words in the vocabulary of BASIC and to remember what PRINT tells the computer to do. Things are not so easy with some languages.

## HIGH-LEVEL LANGUAGES

BASIC is only one of several languages that make up the category of *high-level languages*. High-level computer languages like BASIC use English-like words. Generally, high-level languages work with decimal numbers (the type we learned

to add, subtract, multiply, and divide in grade school). Machine and assembly languages are written specifically for a particular *computer*, while high-level languages are often developed for a particular *purpose*. One of the older computer languages, FORTRAN (FORmula TRANslator), for example, is the language most used by universities and scientists. COBOL (COMmon Business Oriented Language) is a popular business language, and BASIC (Beginners All-purpose Symbolic Instruction Code) is the best known of the easy-to-learn general-purpose computer languages. Every popular personal computer sold today understands at least one, if not several, dialects of BASIC.

## Programming Languages for the ATARI

Several different programming languages are available for the ATARI computers. We will explain what the different languages are and how you get them.

### BASIC for the ATARI Computer

The obvious place to begin is with the language that comes with ATARI computers: BASIC, the most popular programming language in use today. Virtually every personal computer on the market speaks some version of BASIC. BASIC is a high-level general-purpose language. It can be used for almost any type of programming and is many times easier to learn and to use than low-level languages like machine or assembly language. BASIC uses English and English-like words instead of numbers or letters. For example, if you want the computer to print a greeting on the screen at the beginning of a program, you just tell it to PRINT the message:

Print "Hello, I'm Glad To See You Again."

Or if you want the computer to add 3 and 2 and assign the sum to X, you just tell it to "LET X = 3 + 2".

If dealing with so many different computer languages is not confusing enough, there is one more complication. Not only are there over 150 different languages, there are also many different versions of each language. Just as there are many dialects of French or English, there are also many dialects of BASIC. The reason there are different dialects is complicated, but in part it comes back to the idea that we need different tools to do different jobs. You probably always use a hammer to pound a nail, but you may use a different type of hammer to pound different types of nails. Another reason there are different dialects of BASIC is that computer manufacturers keep modifying their versions of BASIC to keep up with new features they add to their computers. When a new model comes out with excellent sound synthesis or great color graphics, the people who design the BASIC that goes into that computer must modify the language so owners can make use of those neat new features.

More than one dialect of BASIC will work on ATARI computers. The most commonly used version is *ATARI BASIC*, the dialect that comes with the 800 models. (Depending on when you bought an ATARI 400, ATARI BASIC might also have come with it.) ATARI BASIC comes in cartridge form and is sold by Atari for \$59.95. This is convenient because all you have to do is plug the cartridge in, and you are ready to begin. This version of BASIC is a versatile, easy-to-learn high-level programming language. This is the standard language for the ATARI computers, so most of the BASIC programs in magazines and most of the books on programming the ATARI in BASIC were written for this version.

There are disadvantages to ATARI BASIC, too. The language differs considerably from the versions used on many of the other popular personal computers. Computers from Apple, Commodore, and Radio Shack, as well as many others, use a version of Microsoft BASIC. Microsoft is a software development company in Bellevue, Washington. Microsoft versions of BASIC are used in millions of computers today. Atari decided not to use a Microsoft version of BASIC and has been criticized for it ever since, because every other major personal

computer manufacturer, except Timex Sinclair, uses Microsoft. Another disadvantage of ATARI BASIC is its limited features. Some things are very difficult, if not virtually impossible, to do in ATARI BASIC, but are easy to do in most versions of Microsoft BASIC. The limitations of ATARI BASIC opened the door for several companies to produce improved BASICs for ATARI computers.

The second most popular version of BASIC for the ATARI is *BASICA+*. This is a disk-based version so you will need a disk drive to use it. *BASICA+* is sold by Optimized Systems Software for \$88.00. Not only do you need a disk drive system to use this BASIC, you also need at least 32K of memory. That's a problem for the ATARI owner who wants to stick with the bare-bones machine and a cassette tape recorder. *BASICA+* is more powerful than ATARI BASIC. You can do some things in this version that you cannot do in ATARI BASIC, and you can do some things more quickly and easily. *BASICA+* is completely compatible with ATARI BASIC: any program written in ATARI BASIC can be run on *BASICA+*.

There is one other popular version of BASIC for the ATARI called *ATARI Microsoft BASIC*. A year or so after the ATARI computers were announced, Atari finally gave in to pressure and brought out a Microsoft BASIC. This \$89.95 version of BASIC is similar to that used on other popular personal computers. So if you learn to write programs in ATARI Microsoft BASIC and then shift to another computer, like the Apple IIe or the Radio Shack Model 4, most of what you learned about BASIC will transfer to the new computer.

There are a few other dialects of BASIC for the ATARI. Most are available from third-party software companies. One advantage to some versions of BASIC over those versions that we have already mentioned is speed. Some BASIC languages are *compiler* programs. A compiler program translates the instructions of a program written in BASIC back into machine language (the language the computer's CPU speaks) all at one time. The program, now in machine language, is then stored. When you run the program, it runs very fast. ATARI BASIC, *BASICA+*, and ATARI Microsoft BASIC are all *interpreter* languages. An interpreter language translates the BASIC in-

structions to machine language as the program is running, and the program is always stored in BASIC. Language programs that use interpreters are easier to work with than those that use compilers, but they are slower.

One compiler program called *ABC* is sold by Monarch Data Systems for \$69.95. It takes a program already written in ATARI BASIC and translates it into machine language. This machine language program can then be stored on disk for later use. Once your program has been translated and stored, it should work fine, but it takes several steps to get from your ATARI BASIC program to the compiled version. If you are writing or using programs in which speed is important, this program will do the job inexpensively, but you must be willing to learn the somewhat complicated process involved in using it.

## Pascal

Pascal is another high-level general-purpose language for the ATARI. If you are interested in programming in Pascal, *ATARI Pascal* is available from Atari for \$49.95. This is a limited version of Pascal; some things you could do with full blown versions of Pascal, you can't do on the ATARI.

## PILOT

PILOT is short for Programmed Inquiry Learning Or Teaching. This is another specialized high-level language, and as the name suggests, it was designed for educational applications. A version called *ATARI PILOT* is available from Atari for \$129.95 in a version for teachers and \$79.95 in a home version. The difference between these two versions is the booklet and a rather sparse set of demonstration programs. The extra material isn't worth \$50.00. We would suggest you use that to buy back issues of magazines like *Compute!* that regularly publish articles on programming in PILOT.

ATARI PILOT is unique among PILOT dialects, because it includes turtle graphics, an easy-to-use mini-language that lets children use the color graphics and sound effects of the

ATARI simply and easily. The ATARI version of PILOT is an excellent language for young children who are working with a computer for the first time.

## Logo

Logo is a specialized high-level language. This interesting and easy-to-use language was especially designed to help children learn and to help them learn about computers. A more detailed discussion of Logo is presented in Chapter 4 of this book.

## Assembly Language

About the closest most computer programmers come to programming the actual internal workings of the computer is assembly language. Because programming in machine language was so hard, early computer workers developed this language, which uses letters of the alphabet as codes for different instructions. The advantage is that the program is much easier to understand, and the codes are much easier to remember and use. For example, the code for telling the computer to add the number 2 to the number 3 would look like this in one machine language:

```
110011100000011 11001110 000000010
```

While in an assembly language, part of the program could look like this:

```
ACI 3
```

```
ACI 2
```

Although ACI 3 may not mean anything to you, to the person who knows assembly language it means "Add the number 3 to the number in the accumulator." The accumulator is a special memory location in the CPU of the computer. Likewise, ACI 2 means "now add the number 2 to the accumulator." ACI 3 would be much more likely to remind you that 3 was being sent to the accumulator than would 11001110 000000011, wouldn't it? The point is that few people have to program in machine language today. Usually the lowest-level language used is assembly language.

Your ATARI computer is not ready to be programmed in assembly language when you turn it on. First, you will need to buy some optional software. Software that allows you to program the ATARI in assembly language are usually called *editor/assembler* packages. Editor/assemblers change the instructions you write in assembly language to machine language instructions the CPU can understand. Since the ATARI computer uses the 6502 CPU, it speaks 6502 machine language, and you can write programs for it in 6502 assembly language. Often these editor/assembler packages have other special programs, most commonly short programs already written in assembly language that can be added to any program you write. These short programs are called *subroutines* and are written to do ordinary things that many programmers want the computer to do. For instance, there is usually a subroutine that will alphabetize a set of words. This could simply be added whenever you wanted to use it, and you wouldn't have to program it in yourself.

There are several editor/assembler packages for the ATARI computer. The most popular is called *Assembler Editor* and is available from Atari for \$59.95. This is a good product. The real strength of this assembler is that it comes in cartridge form and is designed for easy use. There's a well-organized and readable manual. Because its focus is on ease of use, it has some disadvantages. There are some things you cannot do with this assembler that you can do with more powerful ones. It is also slow. But it's ideal if you write only short assembly language programs and want a friendly assembler that will make such things as editing easy. A book by Don and Kurt Innman called *The ATARI Assembler* is published by Reston. We recommend this book if you are new to assembly programming and want to use the ATARI Assembler.

## A High-Level Language Sampler

To give you an idea of what the different languages look like, we will show you how a simple computer program would look in several high-level languages. Keep in mind that there

are many different dialects of each language, and the program you see in this chapter is only intended to show you what each language looks like.

Each will instruct the computer to show a simple conversation.

The computer displays on the screen:

HI, I AM THE ATARI COMPUTER

WHAT'S YOUR NAME?

You type your name, let's say Bob.

The computer then says:

NICE TO MEET YOU, BOB

## High-Level General-Purpose Programming

ATARI BASIC belongs to the family of the most popular programming language today. Two aspects of BASIC have made it so popular. First, it is a general-purpose language and can be used efficiently for almost any programming job. Second, it is easy to learn. If you have never learned a programming language and want to start programming your ATARI computer yourself, BASIC is a good place to start.

Here's what our computer program looks like in ATARI BASIC:

```
10 DIM N$(10)
```

```
20 PRINT "HI, I'M YOUR ATARI COMPUTER"
```

```
30 PRINT "WHAT'S YOUR NAME?"
```

```
40 INPUT N$
```

```
40 PRINT "NICE TO MEET YOU,"; N$
```

```
50 END
```

Pascal, while it is much easier to use than assembly language, is more complicated than other high-level languages like BASIC. Pascal has three main advantages:

- It is faster than other high-level languages.
- Because of the way Pascal is structured, a program written



in this language is easy for another Pascal programmer to understand and to modify.

- Because of its speed and power, Pascal is a more efficient language for some complex business and scientific uses.

Our simple program written in Pascal could look like this:

```
BEGIN
WRITE(OUTPUT,"HI, I AM THE ATARI COM-
PUTER").;
WRITE(OUTPUT,"WHAT IS YOUR NAME?").;
READLN(INPUT,NAME).;
WRITE(OUTPUT,"NICE TO MEET YOU,");
WRITE(OUTPUT,"NAME").;
END
```

## Specialized Programming for Teaching and Learning

Enthusiasts of this group of languages claim that they are really suited for many general-purpose programming tasks. However, they are becoming popular primarily because they are good languages for teaching and learning applications. Logo is extremely popular. Chapter Four talks about Logo as an educational tool, and we need not say much more about it here. Remember that this language is so easy to begin using that very young children can start programming after only a few minutes of instruction. If you have children who use your ATARI computer, Logo is a good investment. Our same simple little program might look like this in some dialects of Logo:

```
TO GREET
CLEARSCREEN
PRINT [HI, I AM THE ATARI COMPUTER]
PRINT [WHAT IS YOUR NAME?]
CALL READLINE "N
PRINT "HELLO :N
END
```

PILOT is a language created for a specific purpose: to let teachers write teaching programs called *computer-assisted instruction* programs. Many teachers do not have the technical background to learn and use complex programming languages quickly. Yet teachers are in a better position than anyone to know what kinds of programs are most needed in their classrooms. PILOT is a language that teachers can learn quickly. Because PILOT is a conversational language, a teacher with only a few programming skills can write a program that makes the computer seem almost human in the way it responds to students. It seems to understand what they say and can talk back to them.

PILOT is *not* the best general-purpose language around if you are writing programs that deal primarily with numbers. But it is very good for programs that deal mainly with words. ATARI PILOT also has a good vocabulary for using the color graphics and sound of the computer. Many teachers also use ATARI PILOT as the first computing language in computer literacy classes for elementary and junior high school students. In ATARI PILOT, our little illustrative program might look like this:

T: HI, I AM THE ATARI COMPUTER

T: WHAT IS YOUR NAME?

A: \$NAME

T: HI THERE,\$NAME

E:

As you have learned from reading this chapter, there are many different languages available for the ATARI computer. Many people are content with ATARI BASIC, but several other dialects of BASIC and a number of other languages can be used with ATARI computers.

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## CHAPTER TEN

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# Peripherals

This chapter might have been subtitled *Ways to Spend Your Money*. Peripherals, or accessories, are the extra pieces of hardware you buy to get your computer to do different jobs. Buying peripherals for your computer is a little like shopping for options for a new car. Each option for the car makes it a little nicer, and each one has a price tag. The same thing is true of computer peripherals. There is a difference, however. Peripherals for your ATARI can easily cost four or five times the cost of the basic computer!

This chapter will review some of the more popular peripherals for the ATARI computers and offer some tips on shopping for them.

## WHERE TO BUY ACCESSORIES

Where should a new ATARI owner buy accessories? If you subscribe to magazines like *Antic*, *ANALOG*, and *Compute!*, you will see ads from hundreds of mail-order companies with toll-free numbers. Call them up, give your VISA or MASTERCARD number, and they ship products to you by return mail. Prices for products through the mail are often ten to

thirty-five percent lower than the price of comparable products in local stores. Should you buy locally or through the mail?

We buy about half our computer accessories and software through the mail and half from local stores. In our opinion, beginners should seriously consider buying mostly from local stores. For one thing, a good store will have someone who can give advice, suggestions, and hints, as well as take your money. But a good store can be hard to find. In some, the only thing the salesperson can do is point you in the direction of the counter with ATARI accessories and ask if that will be cash or credit card. Even with that type of store, it is usually easier to get an adjustment when a problem occurs. If the product doesn't work or the software doesn't load, the store will usually exchange it or refund the purchase price. A mail-order company will usually do the same thing, but you must return the product first. It can take several weeks to straighten out a problem, even if the mail-order supplier is cooperative.

There is one area where mail-order suppliers generally have an advantage. Few local stores carry the variety of products available by mail. Several mail-order companies carry several hundred products for the ATARI; few retail stores can match that. Sometimes the only source for a product you want will be a mail-order supplier.

Whether you buy locally or by mail-order, there are some hazards you should be aware of. Local stores often have salespeople who don't understand your computer. Instead of telling you they don't know the answer to a question, they'll give you the answer they think is more likely to make a sale. If we go into a store where we're not sure of the salespeople, we ask a few questions we know the answers to. If the salesperson answers them accurately and honestly, even if the answers reduce the likelihood of a sale, we can put more confidence in the answers that person gives to other questions. This technique has produced some astounding answers.

The people who answer the phone at a mail-order supplier can also provide inaccurate information. Perhaps the best advice is to be very careful about making buying decisions on the basis of what a salesperson, especially one working on a

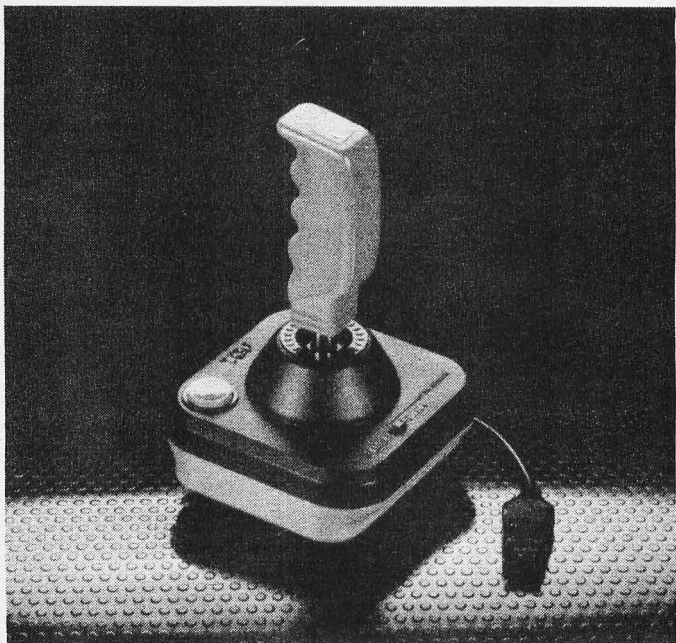
commission, tells you. This may be doing a disservice to many fine salespeople, but they are a minority in this field. We feel a store that has a good sales staff is worth an extra ten to fifteen percent because their knowledge and advice can save you much more than that.

A common problem with mail-order companies is delays in shipping products. Think twice about ordering something that is not in stock. Many companies will tell you they are expecting a big shipment *on Friday* and will be glad to ship yours that afternoon. Big shipments are often late in this industry because companies cannot keep up with demand. That Friday shipment may not get there for five or six Fridays. And even if the shipment does arrive, there may be so many back orders that your order cannot be filled. It is not uncommon for mail-order suppliers to charge the cost of a product to your credit card the day you place the order and then take weeks, even months, to send that product to you. Of course, there are honest, responsible mail-order suppliers who do everything they can to provide quick service. As with local suppliers, we feel that type of company is worth a little extra cost, because it saves you lots of frustration.

## Extra Memory

The older ATARI 400 and 800 computers came with 16K of RAM and could be expanded to 48K. Several companies, including Axlon and Mosaic, sell inexpensive memory cartridges for the 400 and 800. Memory cartridges from companies other than Atari are often twenty to forty percent cheaper than memory from Atari, and we have never had a problem with non-Atari memory.

Three of the four new models from Atari already have all the RAM they can normally use. The fourth model, the 600, has 16K and can be expanded to 64K. Because this is a new model, you may have to buy memory from Atari until other companies begin offering expansion memory for it.



**Figure 10.1** Power Grip joystick

## Video Game Controllers

Education and recreational uses of the ATARI computers often call for a means of input other than the keyboard. Many arcade games do not work well if you must press keys to control movement. All ATARI computers have provisions for connecting joysticks or game paddles.

Some of the kids who evaluated video games for this book were not impressed with the standard ATARI joystick. It has an easy-to-hold round post, but some complained about its durability and the imprecise action. We used a *Pointmaster* joystick from Discwasher, which is more expensive than the ATARI joystick but rated better among the confirmed game players.

If you are shopping for joysticks, you may want to test-drive several before buying. Joysticks vary considerably in their feel and fit, and if they don't fit your playing style, they can cause fatigue and low scores. Some people feel the joystick made by Atari is difficult to use because you can't feel when you've moved the stick far enough to register. Others find its post too small and too short.

Companies such as Discwasher, Spectravision, Suncom, and Wico manufacture higher-priced but more adaptable models in a variety of formats and styles. Wico's *Famous Red Ball* joystick, for example, costs \$35.00, is sturdily built, and has two strategically placed fire buttons. Wico, which also manufactures joysticks and trackballs for arcade games, has a large line of products, including the *Power Grip* joystick (\$37.00), which has a large handle that fits your hand, and a deluxe model (\$45.00) that comes with three different interchangeable handles.

There are more versions of the traditional joystick than any other type, but at least a few models of other game controllers are also available for the ATARI. Both Wico and TG Products sell a *trackball* game controller that can be substituted for a joystick. Trackballs let you roll a large round ball set in the top of a controller to direct the action of a game. They are quicker and more precise than many joysticks (for some games), but are generally much more expensive. Atari has a good trackball made especially for ATARI computers.

You can also buy radically different joysticks, like Zircon's *Video Command*, a cigar-shaped device with a triangular controller on top that can be moved by your thumb, and *Le Stick*, another fat cigar-style joystick that you control by tilting your hand in the direction you want it to go. One of our favorite controllers for the ATARI is the *Wico Command*, another cigar-shaped joystick with a triangular post at the top.

## Voice Input

This type of input device is developing rapidly and is now available for the ATARI computer. It has an air of science

fiction about it. You can speak to the computer in your native tongue, and the computer will follow your instructions. There is still a way to go before this type of device is perfected, but it will undoubtedly become an important peripheral device. One voice control system is available now. This system can be used to give instructions to an ATARI computer when it is being used as a home control system. You can only give the computer commands that have already been programmed into it. In other words, if the computer has a program that will tell it to ring the dinner bell, you can tell it to ring the dinner bell by just saying "Ring the dinner bell," instead of typing in the message. This system is called *WALDO* and is marketed by Artra, Inc. The complete *WALDO* system costs about \$800.

## Video Enhancement Hardware

ATARI computers were designed to hook up to color televisions. That decreases the cost of getting started, but televisions must display material in the 24-by-40 format because larger formats produce fuzzy, hard-to-read text. The ATARI computers can also be connected to ordinary monochrome (one color) video monitors or to color monitors. Monitors give a sharper, easier-to-read display, even when the 24-by-40 format is used. You will also be surprised by the improvement you see in color graphics when you shift from a color television to a color video monitor. Both monochrome and color video monitors are, as you might expect, expensive. A good green screen video monitor will cost \$150, and a good color monitor can cost as much as \$600.

Many ATARI owners who buy video monitors are also interested in expanding the display format for the computer to 24 lines of 80 characters. Word processing is considerably easier if you use this format. On the older ATARI models, there is a popular video enhancement system. Bit 3 Computer Corporation sells the *Full-View 80 Display Card*. With this card installed, you display 80 characters on each line. If you buy this \$299.00 product you will also need a video monitor because it cannot be used with a television.



The newer ATARI models can use an 80-column card made by Atari. It will be discussed with the CP/M expansion module.

## Printers

Most printers aren't specially designed for a particular brand of computer. Therefore, many companies make printers for personal computers. At least a hundred different models will work with your ATARI. To review them all would take far more space than we have in this chapter. Instead we will offer some general advice about printer shopping. Several of the magazines described at the end of Chapter One regularly publish articles on selecting printers for your computer. The book *Computers for Everybody* by Jerry Willis and Merl Miller also has a section on printer selection. You may want to consult these sources if you are shopping for a printer.

There are many things you need to think about before you buy a printer: how fast can it print, what does the print look like, and does it have special functions? With printers, you are always dealing with trade-offs. If you choose a cheap one, you might find that the quality of the print is not what you want. Or you may find that it prints slowly and has no special features, such as the ability to print graphics. Although there are printers that cost less than \$100 today, a good one can cost much more than the computer.

The printer situation today is far from gloomy, however. Things are getting better all the time. Some of the low-cost printers (\$300 to \$600) have good quality and reasonable speed along with some good special features.

There are two main types of printers for personal computers today: *dot matrix* and *daisy wheel*.

### Dot Matrix Printers

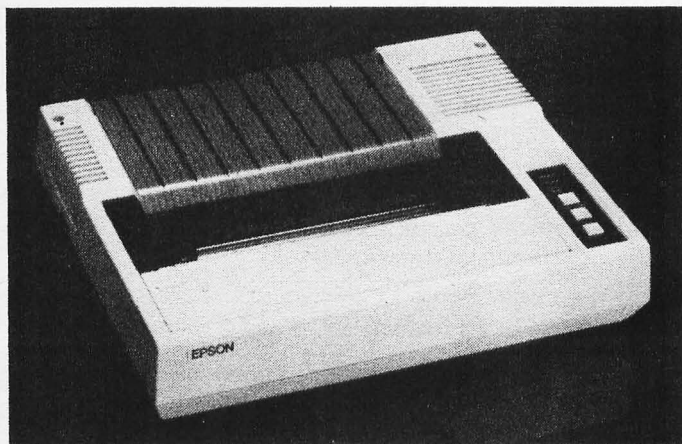
These printers produce the type of print you can recognize as being printed by a computer. Each letter is formed by a series of dots. The quality of the print varies but is getting better all the time. Some of the newest models have such a

tight pattern of dots that the letters look almost as if they were printed on a typewriter. Dot matrix printers are relatively cheap and fast. The major disadvantage is the quality of print. Since the print does not look exactly like typewriter print, they have not been considered *letter quality*. However, the print quality is getting so good that some people are beginning to use them for letter quality work.

If you will use a printer primarily for printing out computer programs and graphics, this type of printer will work well for you. However, if your primary need is for word processing, you may want to look at another type.

Dot matrix printers can be selected from a staggering array of prices, qualities, and brands. Almost any computer store you enter will have several models, ranging in price from a low of \$300 to a high of \$2000. These printers vary as much in speed and quality of print as they do in price. Our suggestion is that you go into your local computer store and ask for a demonstration.

Popular models include the Epson FX-80 which has a suggested retail price of \$699.00. It is regularly sold for much less, however. It prints about three pages per minute and has



**Figure 10.2 Epson FX-80 dot matrix printer**

some good special features, including the ability to print graphics. Other manufacturers, like Okidata, Toshiba, IDS, C-Itoh, and Centronics, also make good-quality dot matrix printers. Mannesman-Talley recently attracted attention with a fast dot matrix printer with high-quality output that sells for less than \$800.

## Daisy Wheel Printers

This type of printer will print fully formed letters and characters as clear and crisp as those made by a typewriter. This means the printed letters are made up of solid images rather than dots. The daisy wheel printer gets its name from the print element, which looks like a daisy with long prongs coming out from a central wheel. There is a letter, number, or character at the end of each prong. The daisy wheel spins around at high speed. When the correct letter is in the correct location, a small hammer knocks it into the ribbon and leaves an imprint on the paper.

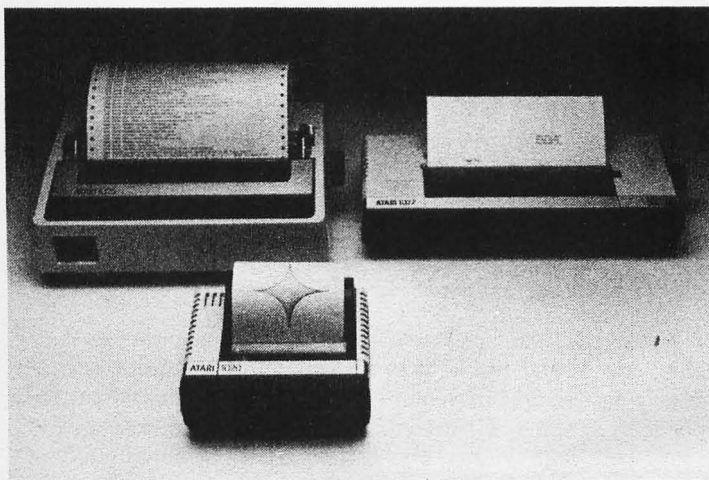
Until recently, these printers were expensive. Now they have begun to drop in price and are becoming competitive with dot matrix printers. The low-cost daisy wheel printers, including the one from Atari, are very slow, however. The Smith Corona TP-1 prints 12.5 characters a second and costs around \$550. At that speed it would take the TP-1 twenty minutes to print a ten-page report. A dot matrix printer in that price range might print 80 to 100 characters a second.

Atari has recently announced three new printers that interface easily with ATARI computers:

- **ATARI 1020.** This is a color printer that prints in red, blue, green, and black. It is really a special-purpose device that is best at drawing color charts and graphs on its narrow paper. It is slow, around ten characters a second, and uses a set of pens with colored ink. It costs \$299.00, but is really a *plotter* rather than a regular printer.

- **ATARI 1025.** This is an 80-column dot matrix printer that prints 40 characters per second and sells for \$549.00. It is a good-quality dot matrix printer at a reasonable price. Although

the case on this printer says it is an ATARI 1025, it is really an Okidata Microline 80 printer. Atari's original dot matrix printer was the Centronics 727, also known as the ATARI 835. That printer had heat and design problems, however, and Atari switched to the Okidata printer recently. You can buy the Okidata Microline 80 for about \$100 less than the retail price of the ATARI 1025, but the Microline 80 does not have the special interface that lets you connect the printer directly to the computer. Most printers use either a *serial* or a *parallel* interface. Serial printers accept data a bit at a time, and each character code is made up of seven or eight bits. Parallel printers accept data eight bits at a time over eight separate lines. You don't get a standard serial or parallel interface in the lower-priced ATARI models. The expansion box, which costs extra, contains both serial and parallel interfaces. Thus the ATARI 1025 is probably a better buy for people who won't need the expansion box for other purposes.



**Figure 10.3 ATARI 1020 color printer (front)  
ATARI 1025 dot matrix printer (left rear)  
ATARI 1027 letter quality printer (right rear)**

- **ATARI 1027.** This is a letter quality printer that uses an oddly designed cylindrical printing mechanism. You can use both continuous form paper or single sheets in this printer. Again, it is slow, printing at only 20 characters per second, but at \$399.00 is priced lower than any other letter quality printer currently available.

## Speech Synthesizers

When a computer is equipped with a speech synthesizer, it can convert printed words into spoken words. Keep in mind that this means words spoken by the computer, and the computer has a strange accent. The quality of speech is getting better but still sounds like something from a science fiction robot.

To get your ATARI computer to talk to you, the first thing you need is a speech synthesizer. If you own or are thinking about buying a new 1400 XL or 1450 XLD computer, you don't need to worry about this, because they have a speech synthesizer built in. If you have another model, there are three good choices. With these three choices, you have a good range of options and price. As you may have guessed, the one with the best options costs the most money:

- **The Echo GP.** Sold by Street Electronics Corporation for \$300.00, this one is the best. It has both the hardware and software features needed for sophisticated operation. The advantage of this type of synthesizer is that it doesn't take up any of the memory in the computer and doesn't interfere with other things you are doing on the computer.

- **The Voice Box.** This speech synthesizer is sold by The Alien Group for \$170.00. While there is little difference in the quality of speech between this synthesizer and The Echo GP, it presents one problem. It is not completely self-contained and therefore has to use some of the internal memory of the computer. This is not much of a problem if you have lots of memory, but if you have as little as 16K, you will be at a

disadvantage when you try to run your regular programs while using the speech synthesizer.

- **SAM.** SAM is short for Software Automatic Mouth and is sold by Don't Ask Software for only \$60.00. The speech from SAM is almost as good as it is from other synthesizers. The trade-off comes in the degree the computer is tied up while the synthesizer is in use. SAM is really just a software package and involves no hardware. Actually it is a program that instructs the computer to use its own sound-generating capabilities to turn printed words into spoken words. Since everything is done with the ATARI hardware, while SAM is working everything else stops. This is fine if you just want to type words and listen to the computer say them, or if you want the computer to read a whole text. But if you want to use the SAM with other software, you will have to be willing to have the other program disrupted every time SAM speaks. However, if you are a good programmer, you can incorporate SAM into your programs with a minimum of disruption. SAM may be worth the price as an introduction to speech synthesis. SAM can also be good entertainment. It does one of the funniest renditions of the *Star Spangled Banner* we've ever heard.

## Mass Storage

One of the most urgent needs of any personal computer user is a method of storing large amounts of information outside the computer. This is important because, without such a device, when the computer is turned off, all your work is lost. It is not practical to spend hours writing a program or doing word processing and then have to start all over the next morning because you turned off your computer. The family of peripherals that handle this problem are called mass storage systems.

### Cassette Recorders

The first personal computers all used cassette recorders for mass storage. The cassette recorder is still popular, although

many computer owners are now going to other systems. It has three serious limitations as a mass storage device:

- It is slow. Compared to the speed you can type in information, the cassette recorder is fast. Compared to disk storage systems, it is slow. It works fine for some uses, but after waiting five to ten minutes for a program to load or save onto cassette tape, you may be wishing you had a faster system.
- It does not have random access. When you have more than one program on a tape, and you want the computer to find and load a certain program, you either have to find the right place on the tape yourself or start the tape at the beginning and let it run until the right program comes along.
- It isn't very reliable. Some dedicated tape users will argue differently, but cassette tape is notoriously unreliable as a storage system. If the slowness of the cassette system doesn't make you covet a disk system, the first time you lose three hours worth of work when you thought you had it all stored on tape will. Admittedly, ATARI's cassette system is one of the most reliable systems available.

Atari has just announced a new cassette recorder specially designed for their computers. It is the *1010 Cassette Recorder* and will cost \$99.95. This is high compared to the one you can buy at the local five-and-dime, but the better reliability you get should be worth the extra money.

## Disk Drive Systems

A floppy disk is a small, 5½-inch disk that looks like a 45 RPM phonograph record. It is thin and can bend easily—thus the name floppy disk. These disks are inserted into a disk drive, which records (saves) or plays (reads) information from the disk in much the same manner a cassette drive reads a tape. However, the disk drive can read any part of the disk at any time. The biggest advantage of the disk system is that it saves information from the computer and loads it back many times faster than a cassette. Programs can be found quickly on

a disk. The disk system is also many times more reliable than the cassette system.

Although one drive is far better than no drives at all, you will probably want two. The second drive makes it easier to do things like make a backup copy of an important disk. The only ATARI computer that comes with a disk drive built in is the new 1450 XLD. For all other ATARI computers, you need to buy disk drives that sit beside your computer. Atari has a new disk drive that is faster and more reliable than the temperamental, slow drives it entered the market with. The new *1050 Disk Drive* sells for \$449.95.

## Modems

The new 1400 XL and 1450 XLD computers have built-in modems. For other ATARI computers, you will have to buy a modem that sits beside your computer. A wide variety of modems are available for the ATARI. Depending on the type and quality, they will cost anywhere from \$80 to \$700. Like printers, modems vary widely in what they can do. Some do nothing more than make a connection between the computer and the telephone, while others actually dial the telephone for you. Atari has a high-quality modem called the *Atari 1030 Direct Connect Modem*. This modem has all of the features you will want in a high-quality modem. Two other companies that have become popular suppliers of modems for all computers are Novation, Inc., and Hayes Microcomputer Products, Inc. These companies make lines of modems with different features and prices. Most people will be quite satisfied with one of the ordinary, no-frills modems that sell for \$100 to \$160. The Signalman Modem from Anchor Automation is a *best buy* for ATARI owners. It costs \$99.00 and comes with a cable that connects to the ATARI computer's serial expansion port.



## ATARI CP/M Module

CP/M is a program that is popular on business computers because computers that run CP/M can use hundreds of excellent business programs. Atari recently announced a CP/M module for its new computers. It also gives ATARI owners an 80-column video display if you have a video monitor.

Those thousands of CP/M programs for business computers won't run on the ATARI just because you buy this module, however. The programs must also be converted to run on the ATARI disk drives. Few programs had been converted when this was written, but some are likely to be available by the time you read this. Before spending several hundred dollars to make your ATARI CP/M-compatible, we suggest you check with dealers and determine how many CP/M programs will run with ATARI CP/M. Don't believe anyone who tells you *all* CP/M software will work. It won't.

## A CLOSING NOTE ON PERIPHERALS

One last note on peripherals: whenever you connect a piece of equipment to your computer, you will need some type of connecting cable. These can often be expensive, so make sure they are either included in the cost of the peripheral or that you find out what the price is before you buy the peripheral. Otherwise you may find yourself with a new device you can't use because you can't connect it to your computer. Many standard peripherals will connect to the ATARI only if you have the expansion box that contains standard serial and parallel I/O ports.

We have tried to give you an idea of the vast array of items that can be added to the ATARI computer to get it to do some helpful and specialized things. In some cases, we have suggested specific brands and models. These are really only in-

tended to be representative of what is available. When you set out to add things to your ATARI computer, we suggest you do some careful shopping at your local computer store and read some of the magazines written for ATARI computer owners.

This concludes *Things To Do With Your ATARI Computer*. We hope that you have enjoyed it and that you have learned some useful things. If you haven't bought a computer yet, you might want to read some of the other books in this series. You will find that some of the information in the first part of each chapter is similar to this book. However, the last part of each chapter covers things specific to the computer. Also, two of the authors of this book (Jerry and Merl) have written a buyers' guide for computers called *Computers For Everybody 1984 Buyers Guide*. One last thing, buying a computer can be either an enjoyable or a frustrating experience. How much you enjoy your computer may depend on how much you find out about it before you buy it.

Happy Computing!

# Glossary

*Address:* Main memory in a computer is like a grid of thousands of individual boxes. Each memory location (or box) is called an address.

*Alphanumeric:* Information presented in both alphabetic and numeric form, for instance a mailing list. The numbers 0–9 and the letters A–Z or any combination.

*Applications software:* Programs designed to perform specific tasks. Applications software can be games, educational programs, or business programs.

*Arithmetic expression:* A group of letters, numbers and/or symbols that tell the computer to perform an arithmetic function. For example:

$2 + 2$

$2 * 2$

A22

$2/4$

$2/A$

$A*(2/B8)$

*Arithmetic operator:* A symbol that tells the computer to perform an arithmetic operation. The operators include + addition; – subtraction; \* multiplication; / division; and ^ raise to a power.

*ATARI BASIC:* A version of BASIC designed for ATARI computers. It has special commands for graphics and other features.

**ASCII:** A simple code system that converts symbols and numbers into numbers the computer can understand. For instance, when you type *a* on the keyboard of your computer, the binary number 01100001 is sent to computer's central processing unit (CPU). The CPU then displays the letter *a* on the screen.

**Assembly language:** A low-level programming language that is much faster than a high-level language such as BASIC. Assembly language programs are extremely difficult to write. Here are two lines from an assembly language program:

```
LDA
MOV C,A
```

**ATASCII:** Atari version of standard ASCII code. ATARI computers need an enhanced version because of their greater graphics capability.

**Audio Track Of Cassette:** A separate track of the cassette that lets the computer play music, voices, and so on.

**BASIC:** Beginner's All-purpose Symbolic Instruction Code. A high-level computer language designed for beginners. ATARI BASIC is a dialect of BASIC designed especially for the ATARI microcomputers. Here are four lines of a program written in BASIC:

```
10 PRINT "HELLO HOW ARE YOU?"
20 DIM A$ (10)
30 INPUT A$
40 GOSUB 500
```

**Baud:** A unit of information transfer. In microcomputers, a baud is one bit per second.

**Baud rate:** The rate at which information is transferred. For instance, 300 baud is a transfer rate of 300 bits per second. The ATARI computers are eight-bit computers. This means that each character, space or symbol requires eight bits. Therefore, a baud rate of 300 transfers only 37.5 characters per second. If you are sending a letter with each word approximately six characters long, and you have one space between words, you can send about five words a second or 300 words a minute.

**Binary number:** A number system that uses only two digits, 0 and 1, to express all numeric values. See digital computer.

**Bit:** The basic unit of computer memory. It is short for binary digit and can have a value of either 1 or 0.

**Black box:** A piece of equipment that is viewed only in terms of its input and output.

- Boot:** The process of loading part or all of the disk operating system into the computer. This lets you load information from the disk or save information to the disk.
- Break:** To interrupt execution of a program. The ATARI computers have a key labelled BREAK.
- Buffer:** A temporary storage place used to hold data for further processing.
- Bug:** A problem that causes the computer to perform incorrectly or not at all.
- Bus:** A set of connection lines between various components of the computer.
- Byte:** A group of eight bits usually treated as a unit. It takes one byte to store a unit of information. For instance the word *love* requires four bytes.
- CAI:** Computer-Aided Instruction.
- Canned software:** One or more programs that are ready to run as is. The game *Deadline* is canned software.
- Cartridge:** A 2x3x3/4-inch plastic box that contains ROM software such as BASIC. Various ATARI games such as *Ms. Pac-Man* and *Star Raiders* are available on cartridges.
- Cassette:** A small plastic cartridge that has magnetic tape inside. The tape is wound from one reel onto the other. Computer programs can be stored on a standard audio cassette.
- Cassette drive:** A standard tape recorder used to save (record) or load (retrieve) computer information.
- Cathode ray tube (CRT):** The picture tube of a television set or monitor. It is used to display computer output.
- Central processing unit (CPU):** This is the heart of the computer. It contains the circuits that control the execution of instructions.
- Chip:** A formed flake of silicon or other semiconductor material containing an integrated circuit.
- Circuit:** The complete path of an electric current. A computer circuit may have thousands of different elements, such as transistors, diodes, resistors.
- Circuit board:** A plastic board that has hundreds or even thousands of different circuits.
- Clock:** An electronic circuit in a computer that is the source of timing and synchronizing signals.
- Code:** A system of symbols and rules for representing, transmitting, and storing information.
- Coding:** Designing a computer program.
- Command:** An instruction that tells the computer to perform an

operation immediately. The command *RUN*, for instance, tells the computer to begin immediately executing a program.

*Compiler*: A computer program that translates high-level language statements into machine language.

*Computer-Aided Instruction*: The process of teaching by computer. This is a system of individualized instruction that uses a computer program as the learning medium.

*Console*: The keyboard and other devices that make up the control unit of a computer.

*Control key*: Pushing the computer's Control key in conjunction with another key causes the computer to perform special functions.

*Controller*: A device that can be attached directly to the computer or to an external mechanical device so that images on the screen can be moved around. A joystick is a controller.

*CP/M*: A special operating system that runs on many different computers.

*CPU*: Central processing unit.

*CRT*: Cathode ray tube.

*Cursor*: The little flashing square on the CRT that indicates where the next character will be displayed.

*Daisy wheel printer*: A printing machine whose print head has a number (usually 96) of radial arms or petals. Each petal has a type character on the end. Daisy wheel type is equal to or better than most typewriter type.

*Data*: All items of information a computer can process or generate: numbers, symbols, facts, statements, and so on.

*Database*: The entire collection of data in a computer system that can be accessed at one time.

*Database management system*: A program that organizes data in a computer's data storage so that several, or all, programs can have access to virtually any item, and yet a particular item need be keyed into the computer system only once.

*Data processing*: The process of converting data into machine-readable form so the computer can work on it.

*Data transmission rate*: Baud rate.

*Debug*: To eliminate errors in a computer program or a computer.

*Decimal number system*: This is the number system you are familiar with, that is, 0–9.

*Default*: See default value.

*Default value*: An assigned quantity for a device or program that

is set by the manufacturer. For instance, a printer may have a default value that tells it to print everything in elite type. A default value in a program is usually the most common or safest answer. As another example, a word processing program may ask if you want to clear everything in memory. The safest answer is no, since it doesn't cause any harm if you hit the wrong key. In this example the program would have a default value of no.

*Desktop computer:* A complete computer system designed to fit on a desktop. The ATARI computers are desktop computers.

*Device:* Any piece of computer equipment.

*Digital:* A system that uses the numbers 0 and 1 to represent variables involved in calculation. This means that information can be represented by a series of offs (0) or ons (1). See bit.

*Digital computer:* A computer that uses a series of electronic offs and ons to represent information. These offs and ons are converted to (or from) binary numbers. ATARI computers are digital computers.

*Directory:* A list of all the files on a diskette.

*Disc:* Disk.

*Disk:* A rotating piece of flat circular mylar that is coated with magnetic material. It is used to store computer information. See also hard disk and diskette.

*Diskette:* A flexible disk that is 5¼-inches in diameter (about the size of a 45 RPM record). It is the most common mass storage device. ATARI computers use diskettes as the primary means for mass storage. However, they can also use cassette storage.

*Disk drive:* An electromechanical device that stores information on or recalls information from a disk. Up to four disk drives can be connected to an ATARI computer.

*Disk file:* An organized collection of data stored on a disk.

*Disk operating system (DOS):* An operating system that lets the computer use one or more disk drives. See operating system. The ATARI computers run ATARI DOS, but you can buy a special interface that runs CP/M.

*Documentation:* All of the available information about a particular computer, computer program, or set of programs, for instance, how to turn on the computer and how to load programs. For computer programs, the documentation should include such information as: what type of computer the

program runs on, how much memory is needed, and how to operate the program. The ATARI computers come with an owner's manual. Other manuals available tell how to use BASIC, disk drives, ATARI DOS, and so on.

*DOS*: Disk operating system.

*Dot matrix printer*: A printer that forms characters as patterns of dots. The dots lie within a grid of definite dimensions, such as 5x7 dots.

*Dual density*: A technique of writing twice as much information on a diskette.

*Edit*: To make changes on the screen in data or a program.

*Electronic mail*: Personal or other messages generated on computer and transmitted to another computer at a different location. The computers are connected by phone lines.

*Execute*: To operate a computer program or part of a computer program. The process a computer goes through when it analyzes instructions and acts on them.

*Expression*: A combination of numbers, variables, and operators that can be evaluated. The answer must be a single number or variable. For instance, 235. It can't equal 7. Other expressions such as  $A + B$ ,  $A - 3$ , or  $A/B * 38$  must also have only one answer.

*External memory*: Mass storage.

*Field*: A unit of information that is part of a file. For instance, in the following mailing list file, NAME, ADDRESS, CITY, STATE and ZIP are all fields:

#### SAMPLE MAILING LIST

NAME\_\_\_\_\_

ADDRESS\_\_\_\_\_

CITY\_\_\_\_\_

STATE\_\_\_\_\_

ZIP\_\_\_\_\_

In the example above, both the information and title are part of a field. For instance, the field for Joe Jones is this: NAME Joe Jones.

*File*: An organized collection of related records. A payroll file has a complete payroll record for each employee.

*Floppy disk*: Diskette.

*Formatting*: The process of electronically organizing a diskette so that information can be stored on it and retrieved from it.

*FORTTRAN*: FORMula TRANslation. A high-level computer lan-



guage used for mathematical or engineering applications. Here are three lines from a FORTRAN program:

```
40 FORMAT (E14.7)
```

```
X = A + B*C/D - E
```

```
WRITE (6, 50)X
```

*Graphics:* Pictures, line drawings, special characters, and so on that can be displayed on the screen or produced by a printer. One of the strong points of ATARI computers is their ability to produce sophisticated graphics.

*Hard copy:* A copy of the computer's output printed on paper.

*Hard disk:* A rotating mass storage device that uses a rigid disk made of a hard plastic-like material. It has many times the storage capacity of a diskette.

*Hardware:* The various physical components of a computer system, for instance the computer itself, the printer, keyboard and monitor.

*High-level language:* A computer language that uses simple English words to represent computer commands. For instance, the command PRINT "Hello" in BASIC tells the computer to print the word *Hello* on the screen.

*Initialize:* To set a program element or hardware device to an initial quantity (usually zero).

*Input:* To transfer data from the keyboard or a mass storage device into the computer's internal memory.

*Input device:* A device used to enter information into a computer. These are all input devices: keyboard, joystick, disk drive, cassette player.

*Input/Output:* The processing of entering data into a computer or taking it out.

*Integrated circuit:* A group of components that form a complete miniaturized electronic circuit. The circuit has a number of transistors plus associated circuits. These components are fabricated together on a single piece of semiconductor material.

*Interactive:* A computer system that responds immediately to user input.

*Interface:* A device that allows other devices to communicate with each other. A modem, for instance.

*Inverse video:* A process that shows dark text on a light background on your screen. Normally light text is shown on a dark background.

*I/O:* Input/Output.

*Jack:* A plug socket on a computer.

*Joystick controller:* A two-inch by two-inch black box with a movable plastic stick on the top of it. It is used as an input device most often with computer games.

*K:* When used as a measure of computer memory, K is an abbreviation for kilobyte or kilobytes. It is also an abbreviation for kilo.

*Kilo:* A prefix meaning 1000. In computer jargon it is used as an abbreviation for 1024.

*Kilobyte:* 1024 bytes. Thus 4 kilobytes (abbreviated 4K) of memory is about 4000 bytes of memory. It is exactly 4096 bytes, but 4K is a convenient way to keep track of it. This means that if you have 4K of memory, you have space for 4096 characters, spaces, numbers, and symbols in your computer.

*Language:* A means of communicating. The difference between computer language and human language is that a computer language allows humans to communicate with computers. The lowest level of language is machine language, the *pure* language of the computer. Machine language programs use 1s and 0s to represent the offs and ons in the computer. Machine language programs are the most difficult programs to write, but they do not have the speed and action limitations of higher level languages. Assembly language programs are also low-level languages but they use simple mnemonic statements as commands. High-level languages, such as BASIC, FORTRAN and Logo, use English-like statements to tell the computer what to do. BASIC is the most common language because it is the simplest to use.

*Load:* The process of entering data or programs from an external device, such as a disk drive, into the computer. If you load a program into the computer, it is available for use.

*Line number:* A number that defines each line of programming in a high-level language. Each line of the program begins with a line number. The computer executes the program in line-number order, starting with the lowest number.

*Logic:* A systematized interconnection of devices in a computer circuit that cause it to perform certain functions.

*Logical operator:* A symbol that tells the computer to make a comparison. These operators include > (greater than), < (less than), and = (equals).

*Logo:* A high-level computer language often used by children. An easy-to-learn language, Logo allows colorful, detailed

graphics to be drawn on the screen. Sprite graphics and turtle graphics are terms associated with Logo.

*Loop:* A series of programming instructions that repeat. The last instruction in the loop tells the computer to return to the first instruction. Intentional loops have some means of escape built into them. Unintentional loops, caused by programmer error, can only be stopped by pressing the escape key or turning the computer off.

*Low-level language:* A computer language at the machine level (a pattern of pure binary coding.) It is neither simple nor obvious for a human being to read, understand, or use.

*Machine language:* The lowest level language, a pattern of ones and zeros the computer understands.

*Mail merging:* A program usually used with word processing that allows you to insert names and addresses into a group of documents. All you have to do is load the names and a sample of the document; everything else is automatic. For instance, suppose you want to send the same letter to 2000 people. Once you have created the mailing list and the letter, the computer adds the name and address of the first person to an original copy of the letter. It can also address the person by name at several different places in the letter. It does the same thing for the second person on the list, the third, and so on.

*Mainframe computer:* A large, expensive computer generally used for data processing in large corporations and government installations. Originally, the term referred to the extensive array of large rack and panel cabinets that held thousands of vacuum tubes in the early computers.

*Mass storage:* The files of computer data that are stored on media other than the computer's memory. For example, diskettes and cassettes are mass storage devices.

*Matrix printer:* Dot matrix printer.

*Mega:* A prefix meaning one million.

*Memory:* The internal hardware in the computer that stores information for further use. The ATARI 600XL has 16K of memory. The 800XL, the 1400XL and the 1450XLD all have 64K of memory.

*Menu:* A display shown on the screen that gives you a list of options. You select an option by typing a letter or number and pressing the return key.

*Microcomputer:* A fully operational computer that uses a micro-

processor as its CPU. Microcomputers are a new kind of computer. Whereas minicomputers are small scale versions of large computers, microcomputers are an outgrowth of semiconductor technology. Consequently, some microcomputers have features not found on either minicomputers or mainframe computers.

*Microprocessor:* A central processing unit contained on a single silicon chip.

*Minidisk:* Diskette.

*Minicomputer:* A small computer based on large computer technology.

*Mnemonic:* A technique or symbol designed to aid the human memory. Its most common computer use is in assembly language programming. For instance, it is much easier to remember LDA (an assembly language term) than 004000 072.

*Mnemonic code:* A system of abbreviations designed to replace obscure, complex terms used in preparing assembly language programs.

*Modeling:* A partial simulation of real or possible situations.

*Modem:* A modulating and demodulating device that enables computers to communicate over telephone lines.

*Monitor:* A television or cathode ray tube used to display computer information. In common usage, a monitor usually refers to a special device used exclusively for computer output.

*Mylar:* A type of plastic used in the manufacture of floppy disks.

*Nano:* One billionth.

*Nanosecond:* One billionth of a second. Modern computers operate in nanoseconds.

*Numeric data:* Data that consists entirely of numbers.

*Operating system:* A set of computer programs devoted to the operation of the computer itself. The operating system must be present in the computer before applications programs can be loaded or run.

*OS:* Operating system.

*Output:* Information or data transferred from the internal memory of the computer to some external device.

*Output device:* A device used to take information out of a computer. CRTs, mass storage devices (such as disk drives), and printers are all output devices.

*Packaged software:* Canned software.

*Parallel:* The performance of two or more operations or functions simultaneously. For instance, a parallel port accepts all eight

bits of a byte at one time. Some computers are connected to the computer by the parallel port.

*Pascal*: A powerful high-level computer language for business and general use. Named for French mathematician and philosopher Blaise Pascal (1623–1662). Here are three lines from a Pascal program:

```
BEGIN
READLN(I,HOURS)
IF I=1 THEN WORK:=SUN
```

*PC*: Personal computer.

*Peripheral*: Any device that connects to a computer. Printers, joysticks, and modems are peripherals.

*Personal computer*: Microcomputer.

*PILOT*: This is an easy-to-learn, high-level language designed for use by novice computer users. Primarily used for educational programs.

*Pixel*: A picture element that is one point on a screen. The size of the pixel depends on the computer graphics mode being used and the resolution capabilities of the screen.

*Port*: The location where input/output devices are connected to the computer. For example, a printer may be connected to computer with a cable at the parallel port. A modem may be connected at the serial port.

*Power supply*: A device, consisting of a transformer and other components, that converts household current (115 or 220 volt) to the voltage used by a computer.

*Powerful*: As used with computers, powerful means that a computer, a device or a program has a lot of features. Powerful is so *over used* in the computer industry that it really has no meaning.

*PRINT*: A command to the computer that tells it to display something on the screen or print it out on a printer.

*Printer*: A device for producing paper copies (hard copy) of the data produced by a computer.

*Program*: An organized group of instructions that tells the computer what to do. The program must be in a language the computer understands.

*Prompt*: A symbol, usually a question mark, appearing on the screen that asks you to enter information.

*QWERTY*: An abbreviation used to indicate a standard typewriter-style keyboard. The first six letters in the third row of a standard keyboard are QWERTY.

*RAM*: Random access memory.

*Random access memory (RAM):* This is the read-write memory available for use in the computer. Through random access the computer can retrieve or send information instantly at any memory address. See memory.

*Read:* The act of taking data from a storage device, such as a diskette, and putting it in the computer's memory.

*Read only memory:* A random access memory device that contains permanently stored information. The contents of this memory are set during manufacture. A game cartridge is read only memory.

*Read/write memory:* Computer memory that you can put data into or take data out of at any time.

*Record:* An organized block of data. For instance, the payroll information on one person.

*Resolution:* The number of points (or pixels) you can put on a television screen (or monitor) both vertically and horizontally. High resolution indicates a large number of pixels and, therefore, a sharper display.

*Reverse video:* Inverse video.

*ROM:* Read only memory.

*SAVE:* A command that tells the computer to store the contents of memory on some media, such as a diskette or cassette.

*Screen:* A CRT or television screen.

*Semiconductor:* A metal or other material (silicon, for example) with properties between those of conductors and insulators. Its electrical resistance can be changed by electricity, light, or heat.

*Serial:* A group of events that happen one at a time in sequence. For instance, a serial interface reads in a byte one bit at a time. Modems transmit data serially.

*Silicon:* A nonmetallic chemical element resembling carbon. It is used in the manufacture of transistors and solar cells.

*Software:* The programs and data used to control a computer. Software is available in many forms. You can type the program in yourself, for instance, or you can have it transmitted to you over the telephone. You can also get it on cassette, diskette, or cartridge.

*System:* All of the hardware components that make the computer usable, including the computer, printer, modem, keyboard, CRT and disk drive or cassette player.

*Text editor:* A computer program that allows you to change or modify the contents of memory. It can modify either data or programs.

**Turtle graphics:** A small triangular shape that is displayed on the screen when the language Logo is used. The *turtle* shows the direction of lines for graphics. For example, if the instruction is to move north, the turtle moves towards the top of the screen.

**User-friendly:** A computer system or software package that is easy for novice users to use and understand.

**User's manual:** A book or notebook that describes how to use a particular piece of equipment or software.

**Variable:** A quantity that can assume any of a given set of values. For instance, assume A is a variable whose value is 1. If you add 3 to it, its value becomes 4.

**Video display:** The screen of your monitor or TV.

**Volatile memory:** As used with computers, volatile means that the memory loses its contents when the computer is turned off. That is, any information in volatile memory is lost when the computer is turned off.

**Window:** A portion of the CRT display devoted to a specific purpose.

**Word:** A minimum storage element in computer memory and the smallest data element worked on by the CPU. Word sizes vary with the design of the computer, varying from eight bits to 12, 16, 32, or 64 bits.

**Word processing:** A special feature of a computer that allows you to manipulate text. See also word processor or text editor.

**Word processor:** A computer program that helps you manipulate text. You can write a document, insert or change words, paragraphs or pages, and then print the document letter-perfect.

**Write:** To store data on external media such as a disk or cassette. The expression *write to diskette* means that the information stored in the computer's memory is sent to the diskette where it is stored.

**Write protect:** When new material is written to a diskette, any old material there is erased. Write protect is a method of fixing the disk so that it can't be written on.

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