

Choosing The Right Printer

COMPUTE!

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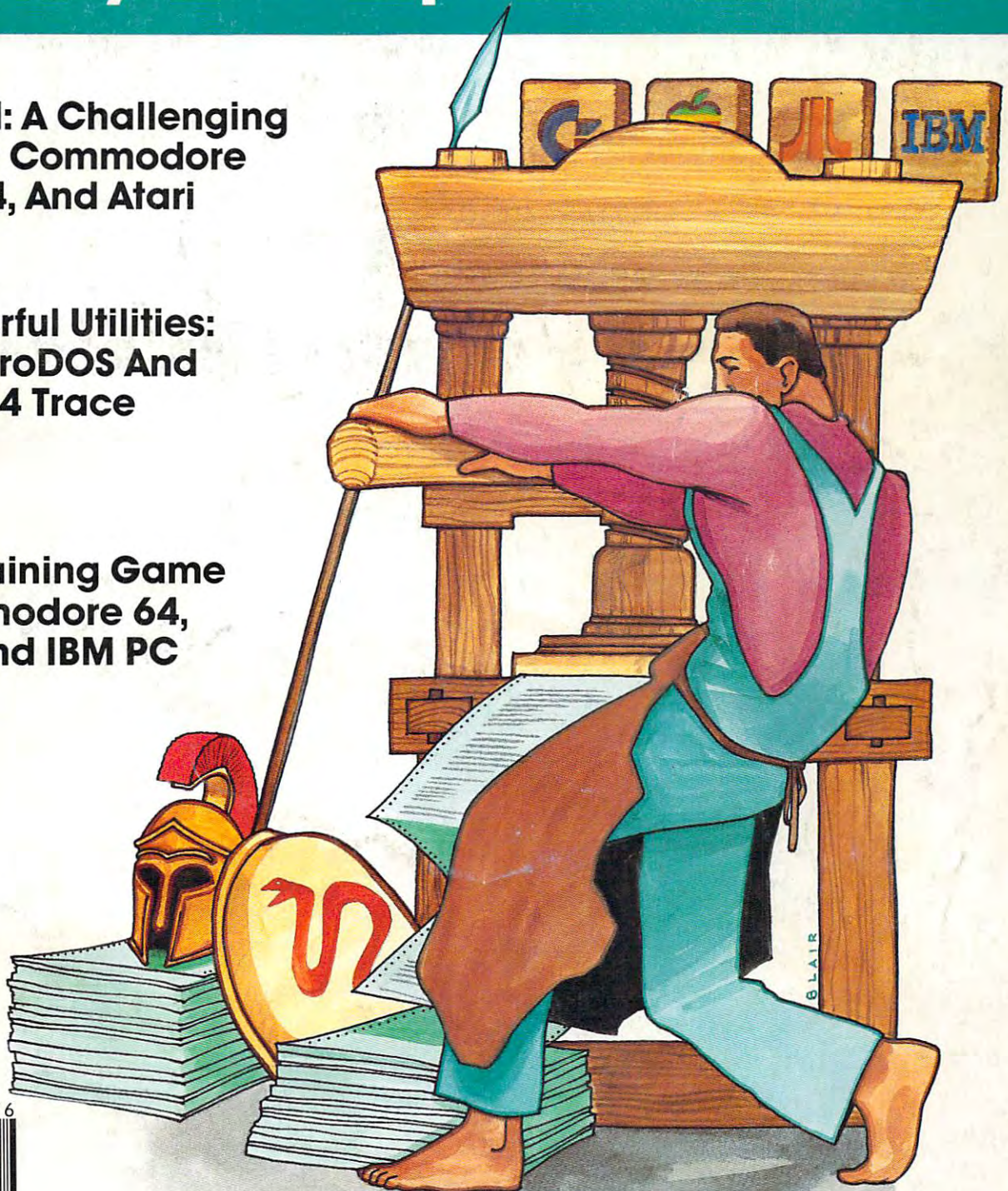
The Leading Magazine Of Home, Educational, And Recreational Computing

A Survey Of Inexpensive Printers

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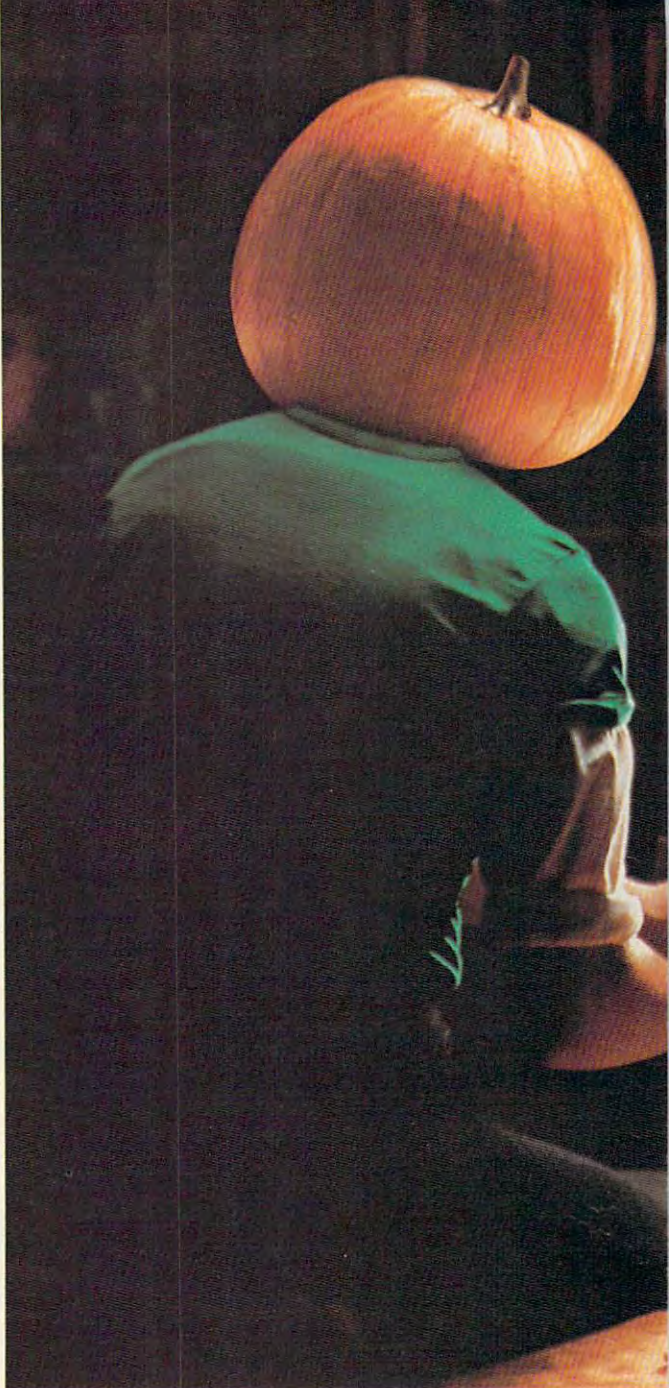
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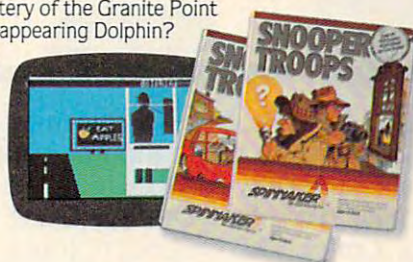
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FEATURES

- 14 Choosing The Right Printer: The Easy Way To Hard Copy Selby Bateman
 18 From Dot Matrix To Laser Print: The Changing Face Of Printers Selby Bateman
 24 Bundling Printers With Computers: Did Coleco Answer A Need? Selby Bateman
 26 The Inexpensive Printers Of 1984 Kathy Yakal
 34 Avoiding Printer Problems J. Blake Lambert

EDUCATION AND RECREATION

- 36 Pests Kevin Woram
 50 Olympiad Kevin Woram and Mike Buhidar, Jr.

REVIEWS

- 66 MailPro Elizabeth Deal
 70 Promenade EPROM Programmer For VIC And 64 Sheldon Leemon
 71 Stickybear Larry Ross
 72 Two Games Of Strategy Dale F. Brown
 74 Operation Whirlwind James V. Trunzo

COLUMNS AND DEPARTMENTS

- 6 The Editor's Notes Robert Lock
 10 Readers' Feedback The Editors and Readers of COMPUTE!
 78 On The Road With Fred D'Ignazio: The Morning After, Part 2 Fred D'Ignazio
 82 Questions Beginners Ask Tom R. Halfhill
 86 The Beginner's Page: A Wall Of Loops Richard Mansfield
 90 Computers And Society David D. Thornburg
 96 INSIGHT: Atari Bill Wilkinson
 102 64 Explorer Larry Isaacs
 106 Machine Language: A Program Critique, Part 3 Jim Butterfield
 110 Programming The TI: TI Graphics C. Regena

THE JOURNAL

- 112 Commodore Information Handyman F. Joseph Walker
 116 MacroDOS For Atari, Part 1 Jerry Allen
 118 VIC And 64 TRACE Roger Harris
 123 Apple Variable Save Jeff Brewster
 126 Graphics 0 Text In Four Colors Ted Baldwin
 129 Atari TAB Stephen Levy
 131 Garbage Collection On Commodore Computers, Part 1 Jim Butterfield
 134 Programming 64 Sound, Part 1 John Michael Lane
 139 Apple Input And Menu Screens Dan Jordan

- 141 A Beginner's Guide To Typing In Programs
 142 How To Type COMPUTE!'s Programs
 144 CAPUTE! Modifications Or Corrections To Previous Articles
 146 The Automatic Proofreader For VIC, 64, And Atari
 149 News & Products
 154 Product Mart
 160 Advertisers Index

NOTE: See page 142
before typing in
programs.

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V/64
AP
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EDITOR'S NOTES

Apple, in an extravaganza at San Francisco's Moscone Center yesterday, formally introduced their new personal computer, the Apple IIc. Discussion with over one dozen dealers revealed a reaction which was uniformly positive, with the only concern being, "What about the Apple IIe?"

Significantly, Apple's massive entry into the home and educational computing market, backed by an initial advertising push in excess of \$15 million is being handled by their existing dealer network. While some units will be sold through department store or chain outlets, the majority will flow, unbundled, through Apple's dealer group. The rationale given for not bundling the system was that dealers would be better able to customize the system for prospective purchasers.

During the course of all of this, Apple revealed that they have now sold almost 2 million Apple II's since its introduction, and over 50,000 Macintoshes. By the time you read this, the external drive should be available for the Macintosh, and many dealers will have Apple IIc's in stock... or at least flowing through their stores. Impressively, both of Apple's recent

major announcements have been coupled with the actual shipment of the computers being introduced.

Apple expects the IIc to be a forceful competitor in the home market, and stresses that the product is specifically targeted for the serious personal computer user. Will the IIc succeed? Pricewise, it's competitive with the high-end PCjr system from IBM. It contains the same amount of RAM (128K), and built-in BASIC in ROM (albeit a smaller version with less power than that in the Cartridge BASIC of the PCjr). The IIc has one built-in disk drive, a keyboard that's a bit more standard than the frequently criticized keyboard of the PCjr, and an available software library of over 10,000 Apple II programs that will be compatible with the IIc.

By the fall, Apple will be shipping a \$600 flat panel display for the IIc which will display 24 lines by 80 characters, and fully complement the already integrated design of the rest of the unit. The disk drive, for example, is built into the side of the combination computer/keyboard housing.

ProDOS, the operating system, is fully compatible with

Apple DOS 3.3, and with a very minor change, DOS 3.2. Almost two dozen leading software vendors were exhibiting products for the IIc at the introduction, and Apple indicates that it's working with more than 100 vendors at present.

Has Apple come home? For now, it certainly appears that way. You can anticipate a rapid expansion of COMPUTE!'s editorial coverage to include the industry's latest entry into the field of home and educational computing. Next month we'll have a full feature on the IIc, and further analysis of its future.

Until then, enjoy your issue.



Editor In Chief

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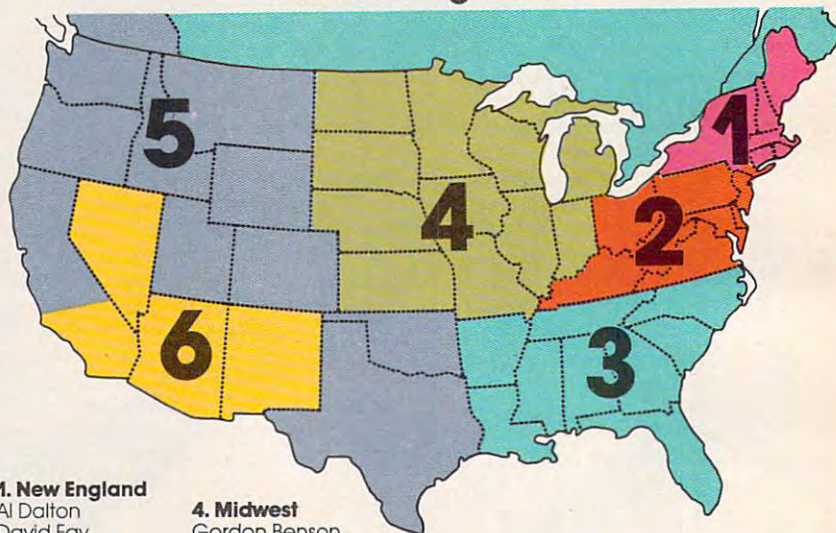
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Atari	2000	1100	1000	500	200	100	4900
Commodore	4000	2000	2000	1000	500	200	11500
IBM PC	1000	2000	3000	4000	3000	2000	15000
VC 20	500	400	300	300	250	200	1950
TOTALS	9500	7600	10100	8800	9510	6300	52810
IBM TOTAL	8500	5600	7100	6800	5510	4300	37810

Koala's Speed Key with Lotus 1-2-3

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READERS' FEEDBACK

The Editors and Readers of COMPUTE!

How To Turn A Computer On

I have a question concerning peripheral equipment. When first turning on the computer equipment, I've heard that it is advisable to turn on the accessories first and the computer last. Is it okay to have all three units (computer, disk drive, and printer) plugged into a single power strip, and turn everything on at once merely by turning the power strip on?

Robert C. Leuten

No. Computers, and electronic equipment in general, often have circuits that protect against damaging surges of power when equipment is first turned on. By leaving all your equipment on and turning on the power strip, you defeat this circuitry. This could damage your equipment.

Also consider that the more devices on the power strip, the bigger the initial surge will be. So generally, it's a good idea to turn on each piece of equipment in the proper order, one at a time.

Another commonly asked question is, "In what order should I turn on the computer equipment?"

The Commodore 1541 disk drive owner's manual states that the computer should always be turned on last. Since the printing of that manual, Commodore has issued an update bulletin concerning the proper order for turning on the computer and its peripheral devices. Here are their recommendations:

1. Computer, disk drive, printer
2. Computer, disk drive, disk drive
3. Computer, disk drive, disk drive, printer

Variables In Atari Filenames

Is there any way you can assign a filename to A\$, and then open an Atari disk file named A\$?

James Beach

Sure. Let's say someone INPUTs the name into a string:

```
10 DIM T$(40),A$(20)
100 PRINT "Filename":INPUT T$
```

You can then create a disk filename:

```
110 A$="D:"A$(3)=T$
```

now we OPEN the file, for read access:

```
120 OPEN #1,4,0,A$
```

Disk Drive Door Dust Defense

I own a 1541 disk drive, and I would like to know if I should keep the disk drive door closed when it is not in use. I have read that if you keep the door closed, it will prevent dust from getting into the drive. On the other hand, I've also read that keeping the door closed also keeps the read/write head down, and the constant pressure will damage the head. Which would be better?

Jerrell F. Schivers

There is no compelling argument on either side of this debate. The pad that the read/write head rests on is soft, and shouldn't damage it with the door closed. On the other hand, dust can still find ways in with the door closed.

Tokenized Commands In TI Extended BASIC

Recently, I was working in Extended BASIC on my TI-99/4A and found that I could enter commands while in programming mode using the CTRL key. For instance, holding the CTRL key and pressing ; produces the PRINT command after the line is LISTed. (Note: This won't work in immediate mode or in console BASIC.)

As it turns out, most keys in conjunction with the CTRL key produce a command. I've also discovered that only one such command can be entered per line in this fashion. Can you tell me the significance of all this?

Steve Hayner

Like most computers, TI represents its BASIC commands internally in a tokenized, or numerically-coded, abbreviated form. Apparently, certain keystrokes generate the same codes as some tokenized commands.

This technique is indeed limited to the Extended BASIC programming mode. Also, as you say, only one command can be entered per line with this method. These severe limitations, along with the absence of documentation in the TI-99/4A reference manuals, lead us to believe that the use of tokenized commands in this manner is allowed through a quirk in the system. They are probably not a design feature. Regardless, the method that you've described does offer a shortcut for entering commands in certain instances.



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We've found that a few tokenized commands can also be keyed in with the FCTN key. Here's a list of the CTRL- and FCTN- keystrokes, and the commands they access:

Key	Command	Key	Command
CTRL 1	TO	CTRL D	IF
CTRL 2	STEP	CTRL F	GOTO
CTRL 8	OPTION	CTRL G	GOSUB
CTRL 9	OPEN	CTRL H	RETURN
CTRL 0	THEN	CTRL J	DIM
CTRL +	CALL	CTRL K	END
CTRL Q	UNTRACE	CTRL L	FOR
CTRL W	READ	CTRL ;	PRINT
CTRL E	GO	CTRL Z	REM
CTRL R	INPUT	CTRL X	STOP
CTRL T	RESTORE	CTRL V	NEXT
CTRL Y	DELETE	CTRL N	BREAK
CTRL U	RANDOMIZE	CTRL M	LET
CTRL I	DEF	CTRL >	ON
CTRL O	UNBREAK		
CTRL P	TRACE	FCTN 0	XOR
CTRL /	AND	FCTN ;	NOT
CTRL A	ELSE	FCTN /	OR
CTRL S	DATA		

Modifying The Atari 400 Monitor Cable

I have owned an Atari 400 for a little more than a year now, and I'm considering the purchase of a monitor. The monitor I want to buy has an RCA-type jack, but my computer doesn't. Is there a way I can hook up a monitor to my computer without any extra cables?

Davy Wong

It's not that simple. The 400's video output is designed to work with a television set. The signals generated by the RF modulator won't drive a monitor. Hooking up a monitor would require rerouting the 400 circuitry to bypass the RF modulator, or installing a device to convert the modulator's signals.

Protected Disks

What exactly is the difference between write-protected and copy-protected disks? Can these protection devices be evaded on disk? Also, if my friend buys a program on disk, is there any way to transfer it to tape for me?

Jon Regen

Write-protected disks are disks that can be read from, but not written to. As you hold a disk in the normal fashion, and slip it into your disk drive, you'll notice a little square notch cut out of the left side of the protective sheath. Inside your disk drive are a light-emitting diode and a phototransistor.

These two components are in-line with each other, and when you insert a disk, the light from the LED shines through the notch and into the phototransistor. If the transistor detects the light, then the drive is allowed

to write to the disk.

To write-protect a disk, place one of the sticky tabs included with the disk over the square hole. This will stop the light from reaching the phototransistor, and signal the drive not to write to this disk. An attempt to write will cause the red error light on the front of the drive to blink.

Copy protection is a different matter. More often than not, commercial software is copyrighted. This means that you may not (under penalty of law) make a copy for any purposes other than specified by the software distributor. Software manufacturers use several different methods to prevent copying, from different programming techniques to special coding on the diskette.

As for making a tape copy of the programs, the same answer applies. The copyright laws cover all copies, whether on tape or disk. Copies should not be made unless permitted by the software company.

Gotcha! Champions

My family has a VIC. This week we have been playing "Gotcha!" (COMPUTE!, February 1984) and I managed to get to the eighteenth screen. Since you mentioned that no one had reached this level yet, I thought I would let you know. When I got to the end it flashed yellow and said, "You made it!!!!"

Mark Crow

P.S. I am 11 years old, and I live in Cambridge, Ontario.

You said that no one has ever survived 18 rounds of "Gotcha!" Well, I did, and I have two reliable witnesses—my mom and dad. They saw me make 240 points and survive 19 levels.

I am 12 years old and I go to Grant Middle School in Springfield, Illinois.

Eric Jurgen

P.S. My dad thinks I fixed the machine.

Congratulations to both of you.

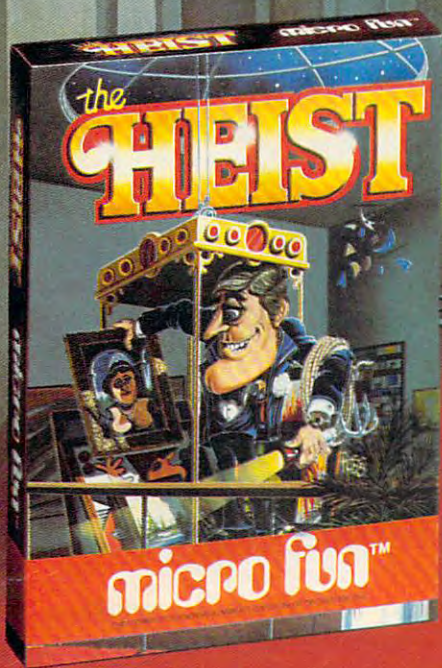
Disappearing VIC?

I own a VIC-20. I would like to know if Commodore has decided to stop making VIC-20s. If so, why? If they have, will you be able to buy Commodore software and hardware for it?

Jon Fedyk

We've received many inquiries about this. Commodore asserts that they do not now plan to stop production on either the VIC-20 or the 64. Commodore and third-party software and hardware for both computers should also continue to be available for some time.

As a point of interest, there are now two million VICs out there.



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Choosing The Right Printer The Easy Way To Hard Copy

Selby Bateman, Features Editor

If you're thinking about buying a printer, remember that what you don't need in a printer can be as important as what you do. Save yourself time, money, and major headaches by following a few well-planned steps.

How can you choose the printer that's right for you? Listen to some experts:

"The most important thing you need to know when buying a printer is what in the world you're going to do with the thing," says Craig Ringuette, merchandising manager for Okidata. "That's the key. Once you know that, then there are clearly a lot of ways to be directed."

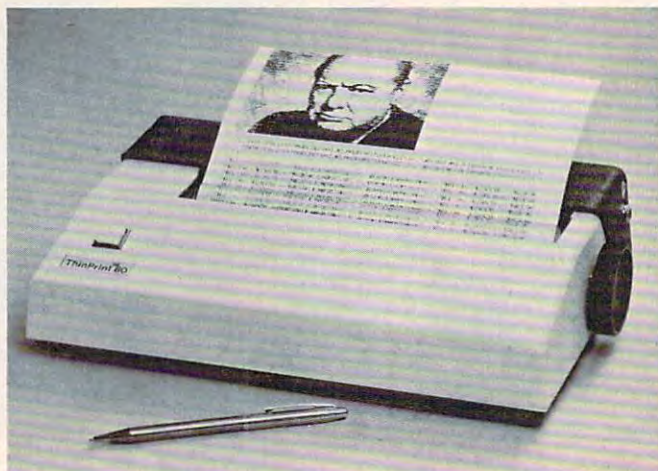
"You have to decide the quality of the print you want," states Rick Osgood, national technical support manager for Star Micronics. "Do you want dot matrix—which is going to print just draft quality—or do you require something a little better, like near-letter quality?"

"A buyer's first question will be, 'Will this work with my system?'" says Charles Srogus III, product line manager for Micro Peripherals, Inc. "And the second question will probably be, 'Will it print graphics? Will it do the fun things I see them demonstrating on television or at the local computer fair?'"

"You need to consider whether you want fully formed letter characters or whether dot matrix is adequate," adds Ken Bosomworth, president of International Resource Development, Inc., a market research firm. "And you should certainly think about whether or not you want color; and whether, if you get color, you can do anything with it."

Lower Prices, Better Quality

These printer manufacturers agree that buying a printer which works with your computer doesn't have to be a confusing or frustrating process. Lower prices and better quality are trends which have been accelerating during the past year. Computer owners now have a greater choice of reasonably priced printers than ever before. (See



Axonix Corporation's ThinPrint 80, a \$279, four-pound, battery-powered, portable, thermal printer that fits into one side of a briefcase and prints full-page text and graphics.

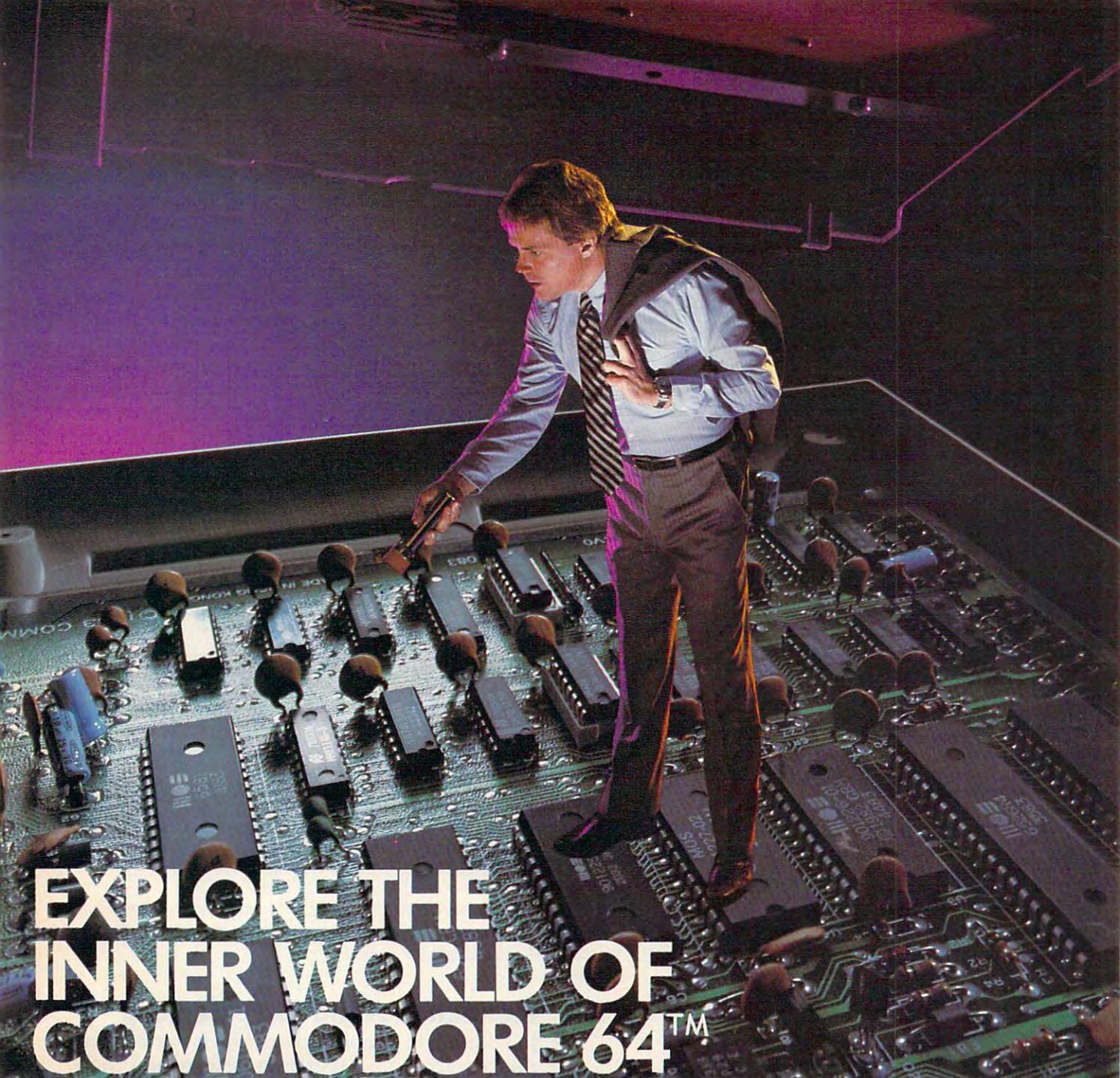
"The Inexpensive Printers Of 1984" in this issue.)

Computer printers are now a \$2.4 billion industry. Leading printer companies such as Okidata, Epson, Ricoh, Canon, Micro D (Abati), Micro Peripherals, Star Micronics (Gemini), Diablo, Axiom, Alphacom, and others are competing fiercely to make their printers the most versatile, dependable, and cost-effective.

But with so many choices, you need to have a basic understanding of what kinds of printers there are. Then define your specific needs.

The two most popular types of printers for microcomputers are the dot matrix impact systems and daisy wheel printers. Thermal printers are another category. There are also several newer types of printers—ink jet, thermal transfer, and laser—which are already beginning to affect the personal computer printer market.

Dot matrix printers are less expensive, and produce images on paper much like those displayed on your computer monitor or television set—patterns of dots arranged to form characters or graphic figures.



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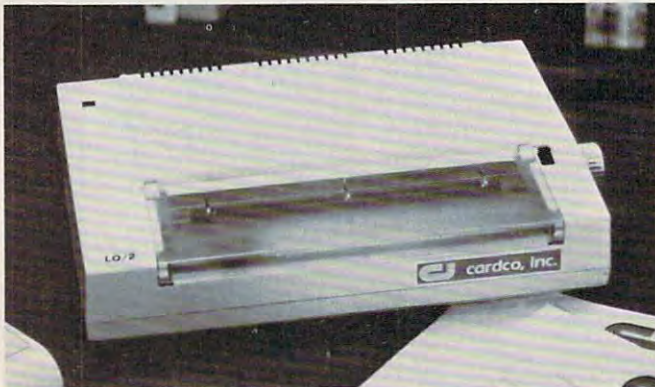


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Stacked Wires That Strike

There are several types of dot matrix systems, the most common of which uses stacked wires that strike in various configurations against an inked ribbon to form characters on paper.

The early dot matrix printheads usually were limited to five wires horizontally by seven vertically. This resulted in crude, often difficult-to-read rectangular characters, with ill-formed descending arms on the letters q, y, p, g, and j, for example. More recently, more wires have been added, producing more fully formed characters.



Cardco's LQ/2 is a \$349.95 letter-quality portable printer which prints 12 characters per second, and has built-in interfacing for all Commodore personal computers. It is also compatible with the PC, PCjr, TRS-80, and other computers with parallel Centronics printer output.

A daisy wheel printer, on the other hand, has a printhead composed of formed characters which are located on the ends of spokes—or petals—emanating from a central, spinnable hub. The printhead looks like a high-tech daisy, hence the name. Daisy wheels leave an image very similar to a good typewriter, but print much more rapidly.

Closing The Gap

Daisy wheel printers generally are more expensive than dot matrix impact printers. And some newer dot matrix printers even rival the high-quality printouts from the daisy wheel printers.

Thermal printers actually burn off a coating on special thermal paper. Their costs are relatively low and their quality good. But thermal printers require special heat-sensitive paper, which is more expensive in the long run and subject to eventual decay.

How Fast Is Fast?

Different printers operate at different speeds. Generally, the faster the printer, the higher the cost.

"At the entry level, you're looking at a low-end 100 to 140 characters-per-second (cps) printer,

for anywhere from \$400 to \$600," says Star Micronics' Osgood. "That can go all the way up to a printer with 200 to 250 cps at upwards of a thousand dollars."

Do you need a printer that prints twice as fast as the low-end model, if that means you'll have to pay twice as much or more in order to get it? This is where the tradeoffs start, and a smart shopper will know what his or her needs will be.

"A printer is a very slow device—it's one of the slowest devices you'll hang on your system," says Osgood. "You'll want to take into consideration the amount of buffering a printer has (a temporary storage area in the printer into which the computer can dump your data). If you can only have a one-line buffer on the printer, then you're going to tie up your computer for a long time. If you have a 16K or an 8K or larger buffer, then you can off-load your data from the system in a much quicker time, freeing your computer to do other work."



Okidata's \$599 Microline 92 dot matrix printer can print 160 characters per second and, for correspondence quality, 40 characters per second.

Bidirectional And Logic-Seeking

In addition to sizable buffers, the faster printers put characters on paper both forward and backward rather than wasting the carriage-return time that occurs when a printhead must return to the left margin after each left-to-right pass. This is called bidirectional printing. Another advanced speed capability is logic-seeking, in which the carriage covers only the area of the line on which print is to appear rather than running from margin to margin on every return.

Okidata's Ringuette suggests that you ask, "Do I really need 200 or 300 cps? Is that important to what I'm doing? Can I live with 100 cps?"

The answer to those questions will be an important part of your decision on which printer you buy, he adds.

No Irreconcilable Differences

"Compatibility is another key issue," says



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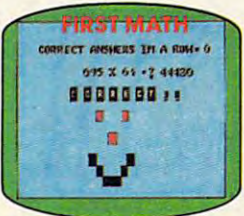
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From Dot Matrix To Laser Print

The Changing Face Of Printers

Selby Bateman, Features Editor

"Not too many people use horses and buggies anymore," says Jim Hafer, supervisor of product evaluations for Micro D, which markets the Abati LQ20 letter-quality printer.

Hafer thinks that changes in printer technology could challenge, and possibly even supplant, the present generation of dot matrix and daisy wheel printers.

The staccato chatter of these impact printers appears to be giving way to the quiet hum of thermal transfer, ink jet, and laser printers. Recent advances in all of these technologies make their entry into the mass market a virtual certainty.

"It's probably going to happen a lot quicker than we expect," he says. "There are additional advantages to some of the new printer technologies that are coming out."

Boiling Ink

"Take thermal transfer, which is wax-embedded ink on a ribbon. The printhead actually heats the ink up, boils it, and forces it onto the paper. The image you get on the paper is letter quality from a dot matrix printer," he adds. "And it's actually raised lettering. You can run your fingers across it, and feel the letters. So it provides a really, really high quality output."

Hafer's views are shared by International Resource Development, Inc. (IRD), a market research firm in Norwalk, Conn. Based on a study the company conducted, IRD predicts that dot matrix impact printers will soon lose the dominance they've enjoyed in the printer marketplace.

"In 1983, impact matrix shipments accounted for 72 percent of all unit shipments; by 1993, the figure will be down to 20 percent," the study indicates. "It is not only under-\$500, fully formed character printers that will be responsible for the transformation of the microcomputer printer industry."

Low-Cost Contenders

The report predicts that by 1985 thermal transfer printers which use ordinary paper, operate quietly at high speeds, and produce color graphics and near-letter quality text will have 12 percent of the market. By 1993, the market share will be 28 percent.

"The major advantage of impact printers, besides multiple copies, has been the ability to work with ordinary paper rather than some specially coated paper that might be difficult to get, as is the case with thermal printing," says Ken Bosomworth, IRD president. "However, the two major low-cost contenders—thermal transfer and ink jet—also use plain paper. So they have no disadvantages vis-à-vis the impact printer in terms of paper cost."

Thermal transfer printers do have a higher ribbon cost, he notes, since the ribbon can be used only once.

From Clogged Tubes To Cartridges

Although ink jet printers have been manufactured for quite a while, recent technological advances have improved them too. Traditionally, ink jet printers have drawn ink into tubes then shot the ink at high speed onto the paper. When idle for a while, the tubes tended to clog. Ink jet systems also suffered from a reputation for being messy.

But Hewlett-Packard recently introduced a \$495 ink jet printer, named the ThinkJet, which uses low-cost disposable ink cartridges. And other companies are working on improved ink jet systems as well.

"We see ink jet printers as being a definite technological competitor," says Ron Ockander, director of sales for Epson. "You create a membrane of ink over a hole, then blast it onto the paper. The problem with filling a reservoir (in older ink jet models), is that it would clog eventually. This way, you don't fill a tube."

Laser Printing

On the horizon, but not yet inexpensive enough for the home, is the laser printer. It works something like a photocopying machine. Instead of using a light-reflecting mechanism to form patterns on a rotating cylindrical drum, however, the laser actually writes on the drum. Electrically charged particles form patterns on the drum where the computer has told the laser to draw.

But the least expensive laser printers cost about five or six thousand dollars. And the most expensive climb to the half-million dollar mark.

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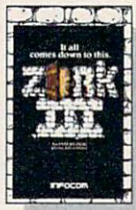
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"Even the most optimistic developers of laser printers don't see them coming down below a \$2000 selling price," says Bosomworth. "And in the home market, what people are really looking for is more like \$200.

"For that sort of price it's a contest between the ultra low-cost daisy wheel type—like the one the Coleco Adam has—or various types of cheap dot matrix printers," he says.

But Micro D's Hafer has a more optimistic attitude about the future of laser printers. "I think the most promising area is laser technology. Canon, for instance, has a raster scan laser printer that will imprint the image onto the drum, and photoelectrically develop it using a chemical developer."

A Laser For The Macintosh?

"It probably won't be on the market until late '84 or '85, and it will retail for from three to five thousand dollars," Hafer says. "It's rumored that Apple will be using that technology for the Macintosh. I don't see how they can effectively use any other type of technology, the reason being that the laser

printer actually uses a video signal—a raster scan type of signal—to create the image on the drum. And the Macintosh is a completely video-based screen."

In addition to the Canon laser printer, it's reported that Ricoh of America, Inc., and Xerox are creating similar printers.

Despite the expectations for thermal transfer, ink jet, and laser printers, many industry observers are not ready to assign the dot matrix impact printer to oblivion.

"I'll tell you who will grab the market share," says Charles Srogus of Micro Peripherals, Inc. "It's going to be the (dot matrix) printers that are encroaching on the letter-quality printers. You're going to see an increase in the number of wires and the shape of the wires in the printhead.

"And the people who are going to be the leaders in this are those who have to use that kind of technology to print their language. The Japanese have had to work on this for some time," he says. "They have some very interesting products coming out that will also work in color."



Axiom's \$299 dot matrix printer with dot-addressable graphics is plug-compatible with the TI-99/4A.

Ringuette. "In other words, what software packages am I going to run, and what computer am I going to run this on?

"Does the printer really work with that system? People get amazed by the compatibility problem. You get a printer, you hook it up, and it doesn't do anything because it's not compatible," he adds.

When buying a printer, make certain that the printer will work with your particular computer, or that there is an interface you can buy which will make the two compatible. Printer interfaces are usually Centronics parallel or RS-232-C serial types. If you're buying a printer from a store, have the dealer explain what interface you need to get the full capabilities of the printer for your computer.

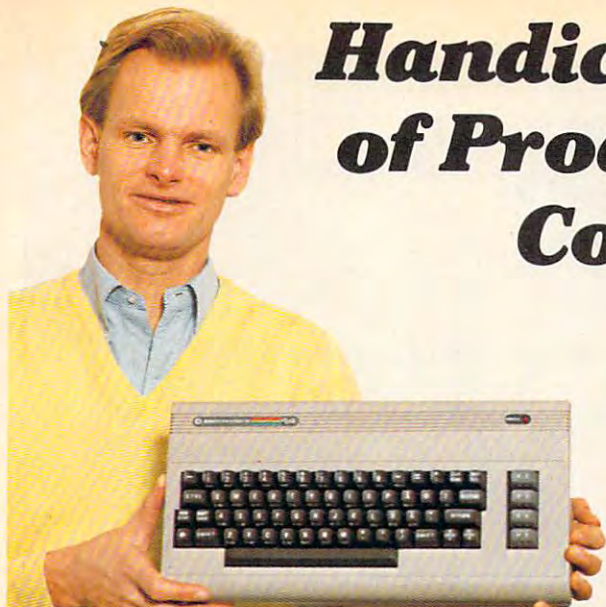
Questions To Ask

Before you buy your printer, you should also know the answers to the following questions:

The TTP16 is capable of printing **bold face**, **double-strike**, **expanded**, **compressed**, **super_{script}**, **sub_{script}**, **proportional spacing**, **underlining**, **Pica**, **Elite**, and **Italicized print** as well as **hex dumps** and **graphics**.

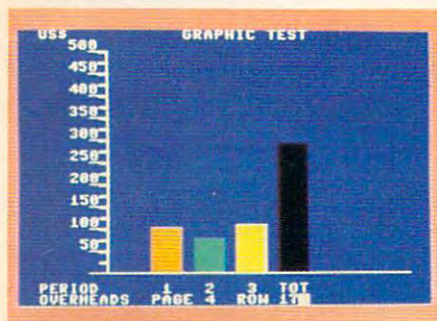
Many dot matrix printers offer a variety of type styles, as does this thermal transfer printer from Fujitsu.

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SALES C	10	10	10	30	
TOTAL S	460	460	500	1400	
SALARY	95	95	100	290	
RENT, I	20	20	20	60	
ADMIN	20	20	20	60	
MARKETS	25	25	20	70	
ALL DIR	215	200	205	620	
CONTRIB	245	240	295	780	
OVERHEAD					
NET PRO	NA	NA	NA	8	
PROFIT	NA	NA	NA	0	

Calc Result Advanced \$99.95

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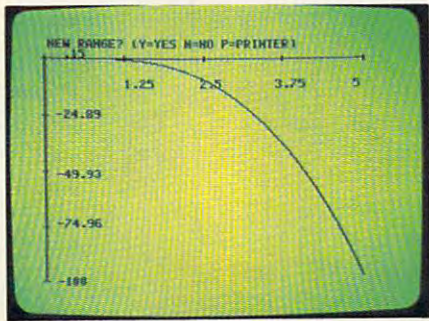
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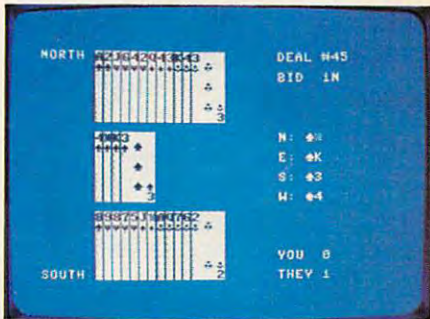
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Bundling Printers With Computers: Did Coleco Answer A Need?

Selby Bateman, Features Editor

Coleco made headlines late last year when it introduced the new Adam computer system, complete with a letter-quality daisy wheel printer, all for under \$700.

Since that time, industry leaders and observers have waited and watched to see if Coleco's bundling was a brilliant idea whose time had come or merely a gimmick that would fail to catch on. The results, according to a number of industry leaders, have been a little bit of both.

"There's a definite trend toward bundling," says Craig Ringuette, merchandising manager for Okidata, a leading printer manufacturer. He admits, however, that he is dissatisfied with Coleco's effort.

"The Coleco printer is a 12 cps (characters per second) daisy wheel. You can almost type as fast as that. You can't print graphics. That thing has so many limitations, I don't know how anybody could be satisfied with it for any type of real computer application. You'd be spending your whole life waiting for the printer to get caught up."

Consumers Like Bundles

Despite Ringuette's assessment of the Coleco printer, he's convinced that bundling is attractive to most buyers of personal computers. "Say I'm Joe Consumer. I buy an Apple computer, and if there's an Apple printer sitting there, it's going to be a lot easier to sell me that than it is an Okidata or an Epson or anybody else.

"It may not be the wisest move you can make, but you're seeing a trend toward it," he says.

Opinions differ on the success of bundling, however. "I have not seen that to be a trend," says Rick Osgood, national technical support manager for Star Micronics. "It's something a marketing group will try, to see what the reaction is; and based on the reaction, decide to go whole hog or not. But across the industry, I have not seen that to be a large idea that has taken hold."

A Question Of Profits

"From a marketing standpoint, your periph-

erals are your bread and butter. You can undercut (the retail pricing) on your main system—your CPU (central processing unit). You're not as likely to bundle your add-ons: printers, modems, disk drives," Osgood says.

While some manufacturers have tried bundling in one form or another, it can create problems for dealers who sell to the public, says Ron Ockander, director of sales for Epson America, Inc. "We did a bundle last July. You could walk away with a printer and a computer, for the price of the computer. And Apple is doing it now with its Image-Writer [the printer that is a part of the Macintosh system]," he says.

"But we have to be very careful that we don't alienate the dealer. If he wants to sell a different type of bundle, he likes to have that prerogative. And if you take that away from him by forcing him to buy in bundles, it takes away some of his merchandising capability," Ockander says.

Experience Is A Factor

For many first-time computer users, a bundled system is as attractive for a computer as it is for a stereo system, notes Jim Hafer, supervisor of product evaluations for Micro D. "It's going to have its place. There are certainly people who are going to want to buy a bundled package. But the people who are really dedicated to using computers, and getting the most out of them, will buy their original accessories separately."

Market researcher Ken Bosomworth believes that bundling will be attractive to consumers in the future. "Particularly as the home user gets more into using his computer to do teleshopping and electronic banking and so forth, he's really going to want a running paper record of transactions that he's initiated.

"And I think you'll find that computer manufacturers are going to respond to this by both bundling and building in printers in many future home computers," he says. "But they will not necessarily be full 80-column printers. They may be little calculator-type strip printers."

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The Inexpensive Printers Of 1984

Kathy Yakal, Editorial Assistant

Perhaps more than any other peripheral—even computers themselves—printers have made tremendous advances over the last year. Higher-quality print technology that could only be found on over-\$1000 models can now be had for less than \$700.

The following chart lists features of these inexpensive peripherals. We have tried to be as comprehensive as possible. If any manufacturer has been left out, we regret the omission.

Here's a brief explanation of printer specifications:

Compatibility: Perhaps the biggest stumbling block in matching a printer to your needs. Many printers will accept both parallel (Centronics) and serial (RS-232 or IEEE-488) interfaces; some even have cables for specific computers. Be sure the printer you want has the correct interface, and that you have any necessary cables or connectors.

Print Technology: The method employed to print characters on paper. In the under-\$700 category, there are several: impact (dot-matrix or daisy wheel); thermal, which requires special paper; thermal transfer, which works with any kind of paper; and ink-jet, which sprays the ink on the paper through tiny holes. (For more detailed description, see Selby Bateman's article "Choosing The Right Printer" elsewhere in this issue.)

Speed: How fast the printer prints, usually noted in characters per second (cps).

Pitch: Characters per inch (cpi) or characters per line (cpl). This can vary, if the printer supports software that calls for different fonts, like italics, double-width, or compressed characters.

Logic-Seeking?: To print as quickly as possible, many printheads will move in the most economical direction, bidirectionally, and "look for" the closest character at the end of each line.

Buffer: This is another way many printers save you time. A buffer is that area of a printer that "holds" the characters next in line to be printed, freeing up the computer for further input. Most printers have very small buffers, but buffer expansion cards are available for longer printing jobs.

True Descenders?: On some printers, lower-case letters that have "tails," like j, g, and y, do not extend below the line. If you're using your printer for anything beyond casual home use, you will probably want a printer that can print true descenders.

Paper: Maximum width paper you can use with this printer. Standard printer paper for use with tractor feed printers is 9.5 inches wide. With a friction feed printer, any size paper, up to the maximum regulated by the carriage width, can be used.

Feed Type: Pin (tractor) and friction feed are the two most common found on printers for personal computers. Sprockets on the edge of the printer's platen catch the holes at the edge of the paper on tractor feed printers. Friction feed is similar to the way a typewriter holds the paper. Some printers have the option for both; if not, manufacturers often offer optional snap-on tractors.

Suggested Retail Price: List price at the time this chart was prepared. Individual retailers' prices may vary.

Most printers are capable of printing graphics, as well as additional character sets beyond the standard 96-character ASCII set.

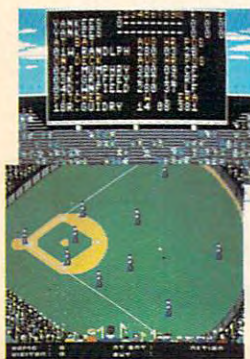
● What print width do you want? The number of characters that a printer can put on a line varies from 32 to 40 to 80, and even up to 132. The 80-column format is a standard with 8½ x 11-inch paper for word processing, and is thus one of the most popular widths.

● Do you want to print graphics, or only text? Many dot matrix printers allow you to print an almost unlimited variety of graphic images. Daisy wheel printers, however, use preset, fully formed

characters. In addition, there are printers which support high-resolution images from your screen.

There is evidence that personal computer users are becoming more interested in these graphics capabilities as the price of printers comes down. "That's because of the business market," says Micro Peripherals' Charles Srogus. "But people in the home have seen that. The consumer is looking at it and saying, 'Gee, this is fun. I'd like to do that myself.'"

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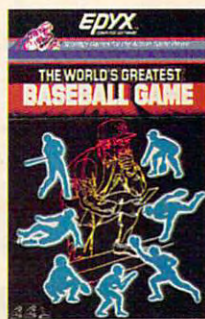
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Model Name	Manufacturer/ Distributor	Compatibility	Print Technology	Speed	Pitch	Logic-Seeking	Buffer	True Descenders	Max. Paper Width, in.	Feed Type	Suggested Retail Price	Comments
Abati LQ-20	Micro D	Parallel standard; serial optional	Impact (daisy wheel)	18 cps	120-180 cpl	Yes	1.5K	Yes	13	Friction standard; pin optional	\$479	Special character sets with purchase of additional wheels
Alphacom 42	Alphacom, Inc.	Parallel and serial cables available; also Commodore, Atari, TI	Thermal	80 cps	10 cpi		One line	Yes	4.5	Friction	\$119.95	Price does not include interface
Alphacom 81	Alphacom, Inc.	Parallel and serial cables available; also Commodore, Atari, TI, Apple	Thermal	80 cps	10 cpi		One line	Yes	8¾	Friction	\$169.95	Price does not include interface
Cardco LQ-2	Cardco, Inc.	Parallel standard; built-in interface for Commodore computers	Impact (daisy wheel)	12-20 cps	Max. 80 cpl	Yes	80 characters	Yes	8.7	Friction	\$349.95	Can run on optional battery pack
CGP-220	Tandy Corporation/Radio Shack	Parallel standard; TRS-80 Color Computer serial interface included	Ink-jet	2600 dots per second, 37 cps	12 cpi		One line	Yes	8.5	Friction only	\$699	• Seven colors • Hi-res color
Compumate 2100	Swintec Corporation	Parallel and Serial	Impact (daisy wheel)	20 cps	10-15 cpi	Yes	256 characters	Yes	14	Friction and power	\$649	International character sets
Commodore 1526	Commodore Business Machines	Serial	Impact (dot-matrix)	45 inches per minute	80 cpl	Yes	One line	Yes	8.5	Friction and pin	under \$300	
Comriter CR-II	Comrex	Parallel and serial available	Impact (daisy wheel)	12 cps	10-15 cpl	Yes	5K	Yes	13.5	Friction standard; pin optional	\$649 Serial \$599 Parallel	
Delta 10	Star Micronics	Parallel and serial standard	Impact (dot-matrix)	160 cps	80-136 cpl	Yes	8K standard; expandable to 16K	Yes	9.5	Both friction and pin	\$549	• International character sets • 64 special characters, 32 block shapes
DMP-120	Tandy Corporation/Radio Shack	Parallel standard; TRS-80 Color Computer serial interface included	Impact (dot-matrix)	120 cps	10-16.7 cpi	Yes	One line	Yes	9.5	Both pin and friction	\$499.95	Bit-image graphics
DMP-200	Tandy Corporation/Radio Shack	Parallel standard; TRS-80 Color Computer serial interface included	Impact (dot-matrix)	120 cps	10-16.7 cpi	Yes	One line	Yes	9.5	Both pin and friction	\$699	Correspondence fonts
Epson FX-80	Epson America, Inc.	Parallel standard; serial optional	Impact (dot-matrix)	160 cps	10-12 cpi	Yes	2K (with serial)	Yes	10	Friction and pin	\$699	International character set
Epson MX-80	Epson America, Inc.	Parallel standard	Impact (dot-matrix)	80 cps	80 cpl	Yes	One line	Yes	10	Friction and pin	\$494	
Epson RX-100	Epson America, Inc.	Parallel standard; serial optional	Impact (dot-matrix)	100 cps	up to 136 cpl	Yes	2K (with serial)	Yes	15.5	Friction and pin	\$699	• Dot-addressable graphics • International character set
Facit 4510	Facit Data Products	Both parallel and serial	Impact (dot-matrix)	120 cps	10-17 cpi	Yes	2K	Yes	11	Friction and pin standard	\$495	• International character sets • Block and pin graphics
Gemini 10X	Star Micronics	Parallel standard; serial optional	Impact (dot-matrix)	120 cps	6-17 cpi	Yes	4K or 8K	Yes	9.5	Both friction and pin	\$399	32 block shapes
Gemini 15X	Star Micronics	Parallel standard; serial optional	Impact (dot-matrix)	120 cps	136-232 cpl	Yes	8K standard; expandable to 16K	Yes	9.5	Both friction and pin	\$549	88 international characters
GP 100-TI	Axiom Corporation	Includes cable that plugs directly into TI-99/4A	Impact (dot-matrix)	30 cps	5-10 cpi	Yes	One line		9.5	Pin	\$299	
GP 700 AT	Axiom Corporation	Plugs into serial user port on Atari	Impact (dot-matrix)	30 cps	5-10 cpi	Yes	One line		9.5	Pin	\$599	
IT-4010	Blue Chip Electronics	Serial and parallel standard; no special interface required for Commodore 64	Thermal transfer	120 cps	10-15 cpi	Yes	256 bytes	Yes	9.5	Both pin and friction	\$399	• International character sets • Seven colors • Will print on any paper
Image-Writer	Apple Computer	Apple II, III, LISA	Impact (dot-matrix)	120 cps	36-136 cpl	Yes	1K	Yes	10	Friction and adjustable-width pin	\$675	

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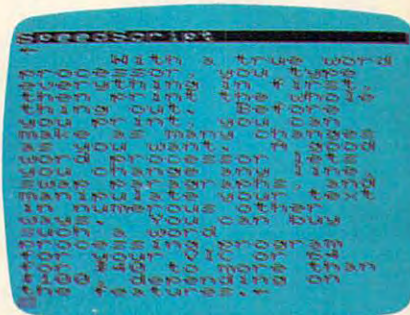
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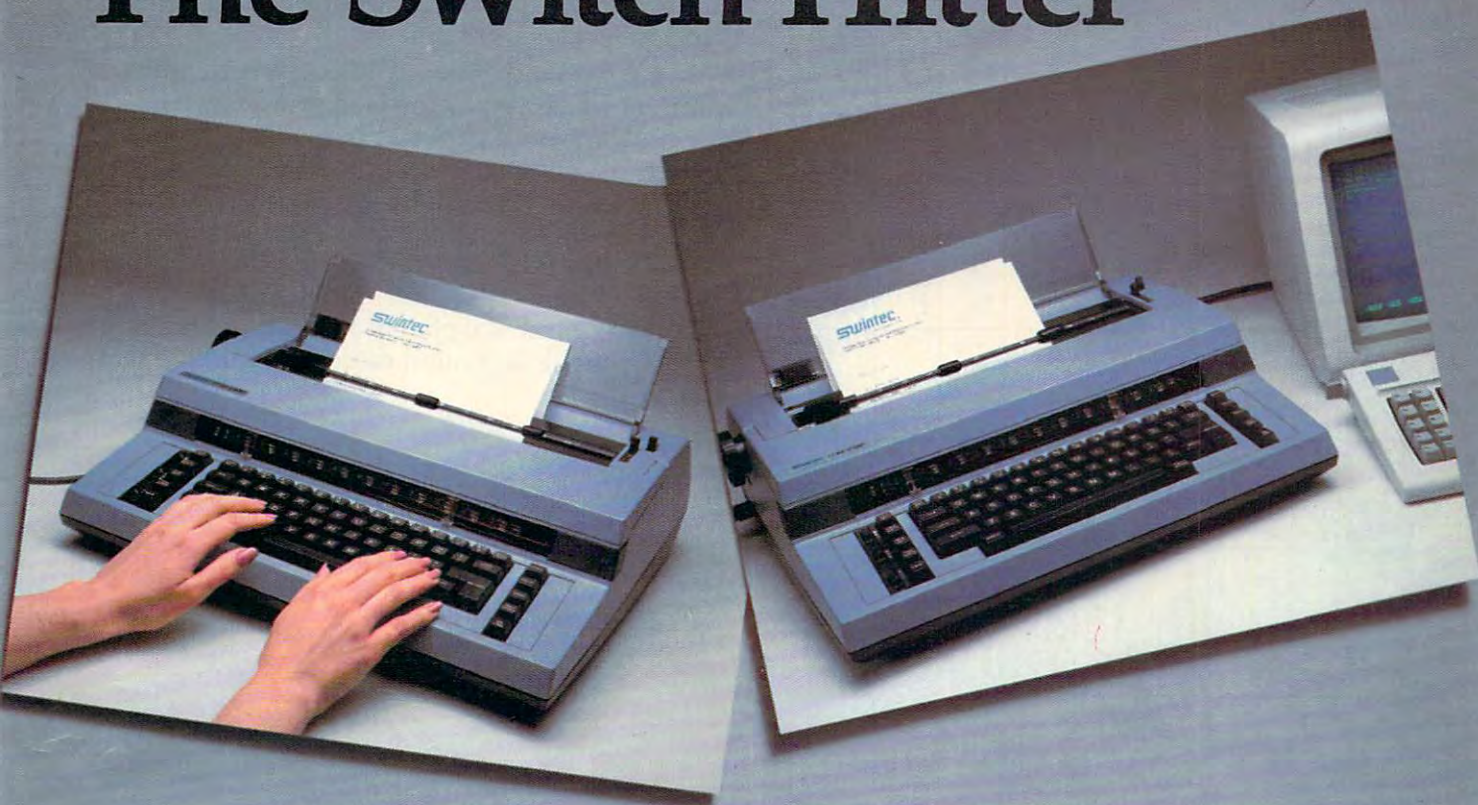
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Model Name	Manufacturer/Distributor	Compatibility	Print Technology	Speed	Pitch	Logic-Seeking	Buffer	True Descenders	Max. Paper Width, in.	Feed Type	Suggested Retail Price	Comments
KX-P1090	Panasonic	Parallel; serial optional	Impact (dot-matrix)	80 cps		Yes	1K standard; 4K optional	Yes	10	Pin and friction	\$399	
KX-P1091	Panasonic	Parallel standard; serial optional	Impact (dot-matrix)	120 cps		Yes	1K standard; 4K optional	Yes	10	Pin and friction	\$499	
KX-P1092	Panasonic	Parallel standard; serial optional	Impact (dot-matrix)	180 cps		Yes	1K standard; 4K optional	Yes	10	Pin and friction	\$599	
KX-P3151	Panasonic	Serial standard	Impact (daisy wheel)	22 cps	10-12 cpi	Yes	1K standard; 4K optional	Yes	15.5	Friction only; pin optional	Around \$700	
Legend 800/1000	Legend Peripheral Products	Parallel standard; serial optional	Impact (dot-matrix)	Legend 800: 80 cps Legend 1000: 100 cps	40-142 cpl	Yes	1K	Yes	10	Friction and pin standard	800:\$349 1000:\$359	Eight international character sets
M120/10	Blue Chip Electronics	Serial and parallel standard; no special interface required for Commodore 64	Impact (dot-matrix)	120 cps	10-15 cpi	Yes	256 bytes	Yes	9.5	Both pin and friction	\$349	
Microline 80	Okidata	Parallel standard	Impact (dot-matrix)	80 cps	80-132 cpl	No	None	Yes	9.5	Pin and friction; tractor optional	\$449	
Microline 82A	Okidata	Parallel and RS-232 serial standard; IEEE488 optional	Impact (dot-matrix)	120 cps	80-132 cpl	Yes	2K (optional with serial)	Yes	9.5	Friction and pin	\$549	• 64 block shapes • Okigraph I and II dot-addressable graphics • Optional paper stand, acoustical cover
Microline 92	Okidata	Parallel and serial standard	Impact (dot-matrix)	40-160 cps	80-136 cpl	Yes	Serial comes with 2K IEEE488 2 or 4K	Yes	9.5	Friction and pin standard; tractor optional	\$699	• International character sets • Optional paper stand, acoustical cover
Microprism	Integral Data Systems	Parallel and serial	Impact (dot-matrix)	75-110 cps	10-16.8 cpi	Yes	1.2K	Yes	8.5	Pin and friction	\$649	
MPS-801	Commodore Business Machines	Serial	Impact (dot-matrix)	50 cps	80 cpl	No	One line	No	8.5	Pin	under \$300	Second serial port on back
NEC PC-6021	NEC Home Electronics (USA), Inc.	Parallel standard	Thermal	40 cps	40 cpl	No	None	No	4.5	Friction	\$249.95	
NEC PC-8023A	NEC Home Electronics (USA), Inc.	Parallel standard; serial optional	Impact (dot-matrix)	100 cps	80-136 cpl	Yes	2K	Yes	10	Both pin and friction	\$499	Greek character set
Printelx	Computer Peripherals	Parallel and serial standard; interface cables available for Commodore, IBM PC, Radio Shack	Impact (dot-matrix)	160 cps	40 cpl	No	One line	No	4¼	Friction only	\$145	40-column
PrintMate 99	Micro-Peripherals, Inc.	Both parallel and serial	Impact (dot-matrix)	100 cps	5-17 cpi	Yes	1K standard; expandable to 2K	Yes	9.5	Friction and pin standard	\$599	
Prowriter 8510-AP	C. Itoh	Parallel and serial available	Impact (dot-matrix)	120 cps	10-17 cpi, 80-136 cpl	Yes	1K	Yes	13	Both friction and pin	Parallel: \$495, serial: \$755	Five additional character sets
Sprinter	Micro-Peripherals, Inc.	Parallel standard; serial optional	Impact (dot-matrix)	160 cps	10-17 cpi	Yes	4K	Yes	9.5	Friction and tractor standard	\$695	• Three selectable foreign fonts • Portable • Buffer expandable to 68K through Memory Mate • Built-in single sheet feed
Seikosha GP-100A	Axiom Corporation	Axiom Corporation	Impact (dot-matrix)	64 cps	32 cpl	No	None		10		\$389	
Seikosha GP-250X	Axiom Corporation	Parallel and serial available	Impact (dot-matrix)	50 cps	80 cpl	No	80 bytes		10		\$499	

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Model Name	Manufacturer/Distributor	Compatibility	Print Technology	Speed	Pitch	Logic-Seeking	Buffer	True Descenders	Max. Paper Width, in.	Feed Type	Suggested Retail Price	Comments
Thin-Print 80	Axonix Corporation	Parallel and serial available	Thermal	40 cps	80-136 cpi	Yes	2K	No	8.5	Friction feed	\$279	• Portable • Battery-operated • AC adapter included
Transtar 120	Silver Reed	Parallel and serial versions available	Impact (daisy wheel)	14 cps	10, 12, 15 cpi	Yes	2K serial, none on parallel	Yes	13	Friction standard; pin optional	\$550	Portable
Transtar 130	Silver Reed	Parallel and serial versions available	Impact (daisy wheel)	18-20 cps	10-12 cpi; also supports proportional spacing	Yes	None on parallel; 2K on serial	Yes	17	Friction standard; pin optional	\$599	
Transtar 315	Seikosha	Parallel standard; serial optional	Impact (dot-matrix)	38-50 cps	10-13.3 cpi	No	Serial: 2K standard; additional 2K optional. None on parallel	No	11	Both friction and pin	\$599	Prints seven colors, more than 30 shades
TRS-80 DMP-110	Tandy Corporation/Radio Shack	Parallel standard; TRS-80 Color Computer serial interface included	Impact (dot-matrix)	120 cps	10-16.7 cpi	Yes	One line	Yes	9.5	Pin and friction	\$499.95	• 32 international characters • Bit-image graphics
TTP16	Fujitsu America, Inc.	Parallel and serial available	Thermal transfer	45 cps	80-96 cpi	No	None	Yes	10	Friction	\$625	• Single-sheet feeding • Four separate color ribbons • No special paper required
Thinkjet (HP2225)	Hewlett-Packard	Parallel, HP-1B, and HP-IL available	Ink-jet	150 cps	40-142 cpi	Yes	1000 bytes	Yes	9.5	Pin and friction	\$495	• Portable • No special paper required • International character sets

Many More Options

• What special print capabilities do you need for text? Many printers today give you the option of printing elongated type, condensed characters, underlined text, subscripts and superscripts, boldface and italic type, and other special forms. Some printers will also let you print different typefaces in a variety of sizes.

• What kind of paper do you want with your printer? There are tractor-feed printers which precisely advance paper by using teeth that fit into holes on both sides of the paper. The teeth pull the paper through the printer in one continuous feed. But the paper can later be separated into standard sheets. Friction-feed printers operate much like a typewriter, pulling the paper around a cylindrical platen. Friction-fed paper can slip out of alignment more easily than tractor-fed, however.



The ThinkJet Printer by Hewlett-Packard (HP 2225) is a \$495 ink jet printer which uses an ink cartridge system and is fully portable.

• How much noise can you tolerate? Daisy wheel and dot matrix impact printers can produce quite a bit of noise, something you might also need to consider.

Once you've answered all of these questions, then you're ready to shop around and find the printer that does the best job for your computer.

A printer is so important for most computer users that Okidata's Ringuette sometimes gets the feeling that the purchase of a computer and then a printer is putting the cart before the horse. "You really ought to buy the printer first. Most people buy the thing backwards," he says, not quite tongue in cheek. "Basically, a computer is only worth the paper it's printed on."

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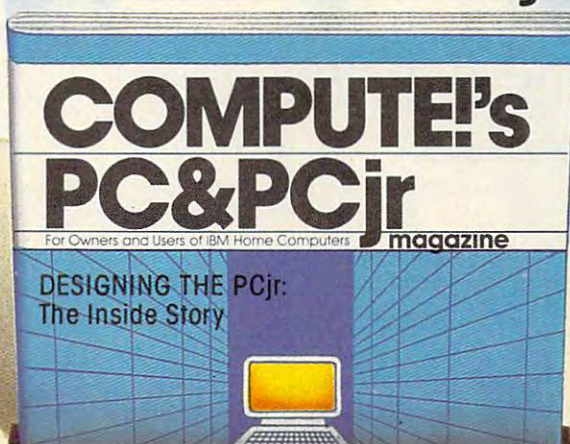
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Major Printer Manufacturers And Distributors

If you are interested in finding out more about a particular printer, it's best to check with a local computer dealer first. If they don't have the information you need, contact the manufacturer or distributor listed here.

Alphacom, Inc.
2323 S. Bascom Ave.
Campbell, CA 95008

Apple Computer
20525 Mariani Ave.
Cupertino, CA 95014

Axiom Corporation
1014 Griswold Ave.
San Fernando, CA 91340

Axonix Corporation
417 Wakara Way
Salt Lake City, UT 84108

Blue Chip Electronics
7406 E. Butherus Dr.
Scottsdale, AZ 85260

CAL-ABCO
Legend Peripheral Products
14722 Oxnard St.
Van Nuys, CA 91401

Cardco, Inc.
300 S. Topeka
Wichita, KS 67202

Commodore Business
Machines
1200 Wilson Dr.
West Chester, PA 19380

Computer Peripherals
6400 Canoga Ave.
Suite 305
Woodland Hills, CA 91367

Comrex
3701 Skypark Dr.
Torrance, CA 90505

Epson America, Inc.
3415 Kashiwa St.
Torrance, CA 90505

Facit Data Products
235 Main Dunstable Rd.
Nashua, NH 03060

Fujitsu America, Inc.
3055 Orchard Rd.
San Jose, CA 95134

Hewlett-Packard
3000 Hanover St.
Palo Alto, CA 94304

Integral Data Systems
Milford, NH 03055

Leading Edge
225 Turnpike St.
Canton, MA 02021

Micro Peripherals, Inc.
4426 S. Century Dr.
Salt Lake City, UT 84123

NEC Home Electronics
(U.S.A.), Inc.
Personal Computer Division
Elk Grove Village, IL 60007

Okidata
Mt. Laurel, NJ 08054

Panasonic Company
One Panasonic Way
Secaucus, NJ 07094

Star Micronics
200 Park Ave.
Pan Am Building
New York, NY 10166

Swintec Corporation
23 Poplar St.
P.O. Box 421
East Rutherford, NJ 07073

Tandy Corporation/Radio Shack
1800 One Tandy Center
Fort Worth, TX 76102

Transtar
P.O. Box C-96975
Bellevue, WA 98009

Avoiding Printer Problems

J. Blake Lambert, Assistant Editor

When you first bring your new printer home—before you connect it to anything—you should read through the manual. And if you have an add-on interface, read its manual, too. If you just pull everything out, try holes till the plugs fit (or bend), plug everything in and say, "I command thee: PRINT," it probably won't work. You may get a few things to work this way, but you're likely to run into problems.

Don't Force Connections

After looking through the manual, follow the recommendations for connecting the printer to the interface (if necessary) and computer. Don't force connections together. The connections should be snug, but if the parts don't fit, check the diagrams and text to make sure you are doing everything right.

You may need to install the print ribbon, and check the print head (or insert a daisy wheel, on letter-quality printers). Check the manual for instructions, and check on the printer for stickers with diagrams and instructions that may have been left out of the manual.

Before you turn the system on, check the printer manual to see the correct setting for the DIP (Dual In-line Package) switches.

These allow you to select the functions that the printer will default to—the normal settings. Some interfaces also have internal DIP switches which you need to set to get the best results. See the interface manual to find the correct switch positions for your system.

Sometimes just feeding the paper through the printer causes problems. Most of these are easily cured. When using continuous pin-feed paper, make sure the paper is not in a bind anywhere on its way to the printer. If your printer allows for both regular and pin-feed paper, be sure the platen is set for the correct mode. If the platen is holding the paper while the tractor mechanism is trying to pull the paper through, this can cause the paper to jam.

The first time you print something, don't be shocked if the printer puts everything on one line, or if you get double-spacing when you expected single. This is usually not a problem with the printer. Instead, it can mean that the DIP switches are still not set correctly, or that you are using the incorrect interface mode. Experiment with the interface modes; you can't hurt anything, and you may discover some features you didn't know about.

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The slide out software tray has room for 14 cartridges or cassettes and up to 30 diskettes. Most brands of software will fit between the adjustable partitions with a convenient hook for the spare key at rear.

Stand fits Atari 400 & 800, Commodore 64 & VIC 20, TI 99/4A and TRS-80.

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The two slide-out shelves put the keyboard at the proper operating height while allowing easy access to the disk drives.

The bronze tempered glass door protecting the keyboard and disk drives simply lifts up and slides back out of the way during use.

Twist tabs on the back of the center panel allow for neat concealed grouping of wires while a convenient storage shelf for books or other items lies below. The printer sits behind a fold down door that provides a work surface for papers or books while using the keyboard. The lift up top allows easy access to the top and rear of the printer. A slot in the printer shelf allows for center as well as rear feed printers.

Behind the lower door are a top shelf for paper, feeding the printer, and a bottom shelf to receive printer copy as well as additional storage.

Stand fits same computers as the CS-1632 as well as the Apple I and II, IBM-PC, Franklin and many others.

The cabinet dimensions overall: 39-1/2" high x 49" wide x 27" deep.

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Pests

Kevin Woram



Poor Joe. Weeds and blight are choking and wilting his flowers. Use a joystick to help him save his blossoms from oblivion. Originally written for the Commodore 64, versions are included for VIC-20, IBM PC, and PCjr.

Ever since man cleared his first plot of ground and planted a few seeds, he has fought an endless battle with the enemies of his garden, the dreaded weeds. Now, you can join the agrarian struggle, and you won't even have to get your hands dirty.

Using a joystick plugged into port 2, you can guide Joe the gardener as he races around, spraying weeds where they appear and fumigating his flowers against another deadly enemy, disease. Joe not only has weeds and disease to contend with, but he also must keep track of time. If he spends too much time killing weeds and spraying flowers, the timer will run down and disease will overrun his garden.

If Joe manages to overcome all these obstacles, he will advance to the next level of difficulty where more flowers and nastier weeds await him. When Joe completes a level, the amount of time remaining on the clock is awarded to him in the form of bonus points.

A Two-Minute Flower Show

At the beginning of each game, Joe has two minutes to complete the level, but with each successive

level he gets 15 extra seconds to finish his work. There are three kinds of flowers in Joe's garden—yellow daisies, blue daisies, and red roses. They all must be fumigated to complete a level, but Joe doesn't have to kill all the weeds on a level.

All it takes to fumigate a flower is to position Joe's spray gun so that it points to a flower, then press the joystick button. Flowers which have been fumigated turn white. The process is the same for weeds, but Joe's spray is a deadly poison to weeds, bringing instant disintegration.

Joe gets 10 points for fumigating yellow daisies, 20 points for blue daisies, and 40 points for roses. Killed weeds are worth five points.

The Life Cycle Of Weeds

Weeds grow in three stages. They start off as seeds, grow to sprouts, and then become adults. In the adult stage, they multiply rapidly by spreading seeds which grow to adulthood and then repeat the process. If too many weeds are allowed to grow in the garden, the game ends and a TOO MANY WEEDS message appears on the screen.

Likewise, if time runs out, the game will end and a TIME'S UP message will appear.

The highest score will be kept and displayed by the computer between games. Playing "Pests" takes a quick mind and a fast trigger finger, so if you've ever wondered if you have a green thumb, here is your chance to find out.

The Official

ZAXXON™ FOR THE C-64!



Sentinel

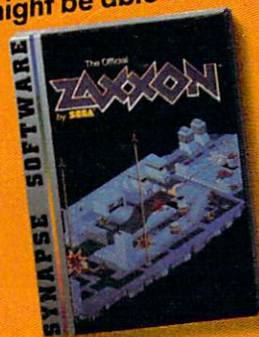
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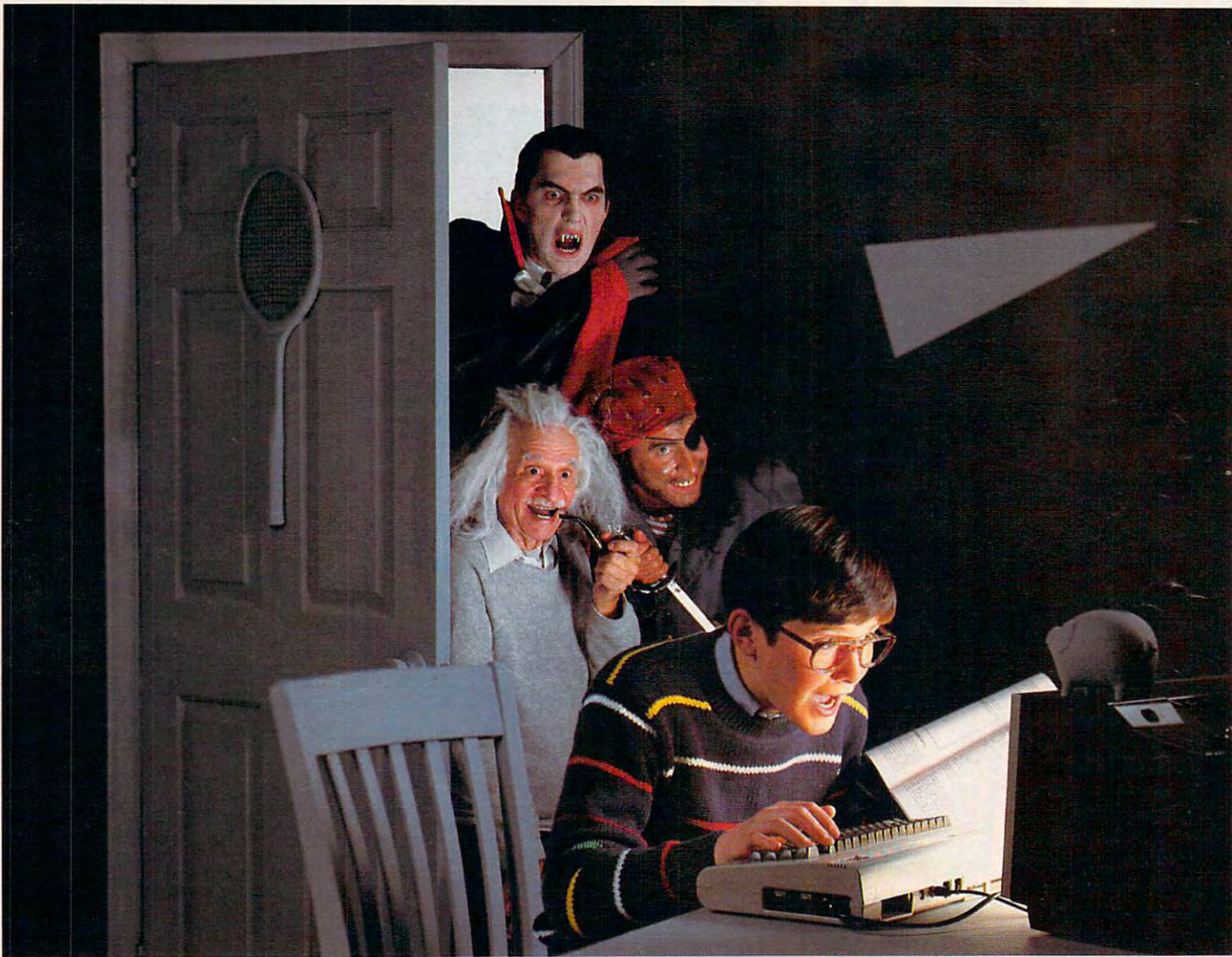
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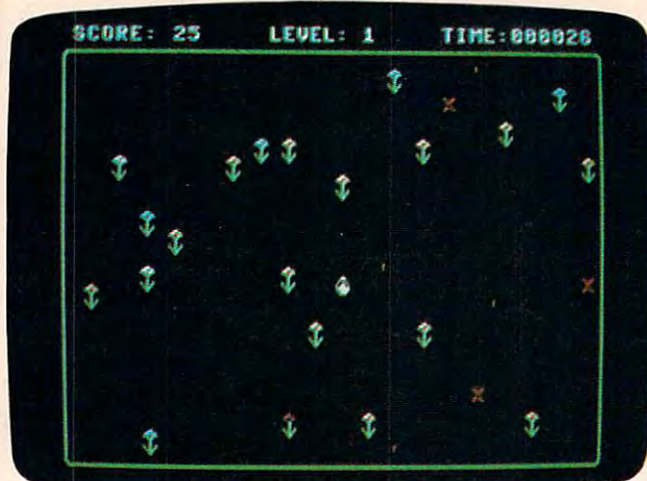
For the beginner, here is the book to buy with your Commodore 64. It is simply organized by BASIC programming statements so while programming, the user can go directly to the information he needs without confusion or delay. This one-of-a-kind guide contains the same information as the BASIC reference manual supplied with your Commodore, rewritten especially for the new user. It presumes no knowledge of BASIC and explains the materials supplied in the manual.

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BRADY



In this 64 version of "Pests," the player tries to fertilize the flowers.



The player scrambles to kill weeds before they overrun the screen (VIC version of "Pests").

If you want to save yourself the trouble of typing the Commodore 64 version of this program, send a stamped, self-addressed envelope, a blank cassette or diskette (1541 format), and \$3 to the address listed below, and I will make a copy (64 version only) for you.

Kevin Woram
4314 Killarmet
Corpus Christi, TX 78413

Program 1: Pests For Commodore 64

Refer to the "Automatic Proofreader" article before typing this program in.

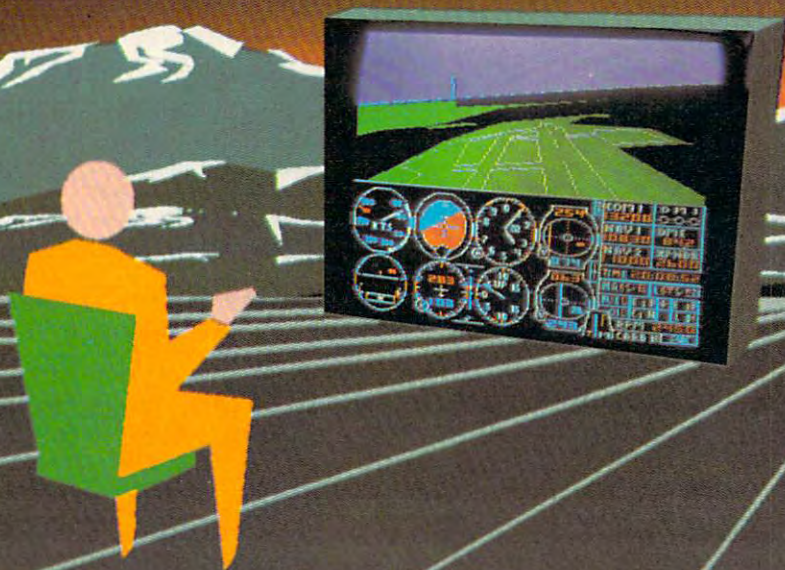
```
10 POKE53280,0:POKE53281,0:GOTO1000      :rem 234
15 CO=54272:JL=56320:TR=16:N=15           :rem 245
20 GOSUB10000:GOSUB6000:DIMPP(200),JP(15) :rem 121
   ,CS(15),DN$(15)
23 SC=0:D=15:E=3:QW=E:ET=200:WL=20:LV=1:D :rem 148
   N$="{HOME}{12 DOWN}"
25 RS=439:AV=1104:U=40:B=32:FC=7:FI=0:GOS :rem 145
   UB3000:TI$="000000"
31 PRINT"{CLR}{WHT} SCORE: ";SC:PRINT"    :rem 44
   {HOME}"TAB(15)"LEVEL: ";LV:PRINT"{HOME}
   "TAB(28)"TIME: ";TI$
32 POKE1064+CO,5:POKE1064,85:FORK=1065TO1 :rem 190
   102:POKEK+CO,5:POKEK,67:NEXT
33 POKE1103+CO,5:POKE1103,73              :rem 60
34 FORK=1104TO1944STEP40:POKEK+CO,5:POKEK :rem 148
   ,66:POKEK+CO+39,5:POKEK+39,66:NEXT
35 POKE1984+CO,5:POKE1984,74:FORK=1985TO2 :rem 226
   022:POKEK+CO,5:POKEK,67:NEXT
36 POKE2023+CO,5:POKE2023,75:PL=191:QF=0  :rem 49
39 FORK=1TO3:FORJ=1TOD                    :rem 162
40 FP=(INT(RND(1)*RS)*2)+AV:SP=FP+U
   :rem 71
50 IFPEEK(FP)<>BTHEN40                     :rem 79
55 IFPEEK(SP)<>BTHEN40                     :rem 97
60 POKEFP+CO,FC:POKEFP,PL:POKESP+CO,5:POK :rem 102
   ESP,207:QF=QF+1:NEXT:D=D-10
70 IFFC=7THENFC=3:PL=192:GOTO90          :rem 166
80 FC=2:PL=193                           :rem 16
90 NEXT:D=D+30:OP=1105:POKEOP,196:WC=203 :
```

```
X=0:GOSUB300:TI$="000000":GOTO110
```

```
      :rem 121
100 IFH<0THENH=0                          :rem 184
101 IFE<0THENE=0                          :rem 179
103 IFWC=206THENWC=203:X=X+E:GOSUB300:GOT :rem 22
   O110
105 GOSUB320                              :rem 171
110 L=TI+500:GOTO4000                    :rem 175
300 FORH=XTOX+E                          :rem 194
305 WP=INT(RND(1)*(RS*2))+AV:IFPEEK(WP)<> :rem 197
   BTHEN305
310 PP(H)=WP:POKEPP(H)+CO,9:POKEPP(H),WC :rem 156
   NEXT:E=E+1:IFH>WLTHEN8000
315 RETURN                                :rem 121
320 FORH=XTOX+E:POKEPP(H)+CO,9:POKEPP(H), :rem 131
   WC:NEXT:RETURN
1000 REM CHR. SET LOADER                  :rem 83
1010 PRINT"{CLR}{WHT}LOADING CHARACTER SE :rem 239
   T INTO MEMORY...":PRINTCHR$(142)
1020 POKE52,48:POKE56,48:CLR:Z=56334     :rem 78
1030 POKEZ,PEEK(Z)AND254                  :rem 183
1040 POKE1,PEEK(1)AND251                  :rem 99
1045 IFPEEK(13950)=24THEN1060             :rem 106
1050 FORI=0TO2047:POKEI+12288,PEEK(I+5324 :rem 74
   8):NEXT
1060 POKE1,PEEK(1)OR4                     :rem 207
1070 POKEZ,PEEK(Z)OR1                     :rem 31
1080 POKE53272,(PEEK(53272)AND240)+12:BC= :rem 231
   13816
1090 FORK=1TO4:FORNM=BCTOBC+7:READCD:POKE :rem 17
   NM,CD:NEXT:RESTORE:BC=BC+8:NEXT
1095 BC=BC-8:FORNM=BCTOBC+111:READCD:POKE :rem 197
   NM,CD:NEXT:GOTO15
2000 DATA0,0,0,0,24,126,231,60          :rem 203
2010 DATA24,60,66,153,189,255,126,60    :rem 31
2020 DATA60,126,255,189,153,66,60,24    :rem 32
2030 DATA28,38,79,223,223,79,38,28      :rem 203
2040 DATA192,252,70,95,95,127,62,28     :rem 248
2050 DATA28,62,127,95,95,70,252,192     :rem 249
```


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```

2070 DATA56,100,242,251,251,242,100,56
:rem 111
2080 DATA3,63,98,250,250,254,124,56
:rem 240
2090 DATA56,124,254,250,250,98,63,3
:rem 241
2100 DATA0,0,24,24,24,0,0,0
:rem 51
2110 DATA0,34,28,8,28,34,0,0
:rem 124
2120 DATA66,231,126,60,36,126,231,66
:rem 24
2130 DATA153,60,90,255,255,90,60,153
:rem 28
2140 DATA24,24,153,219,126,60,24,0
:rem 171
3000 REM JOYSTICK INITIALIZER
:rem 91
3010 JP(0)=0:JP(1)=-40:JP(2)=40:JP(4)=-1:
JP(5)=-41
:rem 133
3020 JP(6)=39:JP(8)=1:JP(9)=-39:JP(10)=41
:DO=191
:rem 91
3040 CS(0)=195:CS(1)=195:CS(2)=196:CS(4)=
197:CS(5)=198
:rem 128
3050 CS(6)=199:CS(8)=200:CS(9)=201:CS(10)
=202:RETURN
:rem 132
4000 JV=N-(PEEK(JL)ANDN):FR=PEEK(JL)ANDTR
:CS(0)=CS(JV)
:rem 67
4005 IFFR<>TRTHENGOSUB5500
:rem 137
4010 NP=OP+JP(JV):IFPEEK(NP)<>BTHENNP=OP
:rem 55
4015 POKENP+CO,15:POKEOP,B:POKENP,CS(JV):
OP=NP
:rem 202
4020 IFTI>LTHENWC=WC+1:GOTO100
:rem 124
4025 PRINT "{HOME}"TAB(33)TI$:IFVAL(TI$)>E
TTHEN8100
:rem 139
4030 GOTO4000
:rem 196
5500 MP=CS(JV):GOSUB5800
:rem 178
5505 G=NP+CP:CM=G+CO:TP=PEEK(G):IFTP<128A
NDTP>32THENRETURN
:rem 255
5510 POKECM,11:POKEG,206
:rem 140
5515 FORSN=1TO2:POKES,200:POKES+1,100:FOR
J=1TO50:NEXT
:rem 68
5516 POKES,0:POKES+1,0:FORH=1TO50:NEXT:NE
XT
:rem 244
5517 IFTP=207THENPOKECM,5:POKEG,207:RETUR
N
:rem 185
5519 IFTP=194THENPOKECM,1:POKEG,194:RETUR
N
:rem 193
5520 IFTP=BTHENPOKEG,B:RETURN
:rem 171
5530 IFTP=191THENS=SC+10:GOTO5900:rem 61
5540 IFTP=192THENS=SC+20:GOTO5900:rem 64
5550 IFTP=193THENS=SC+40:GOTO5900:rem 68
5560 SC=SC+5:E=E-1:POKEG,B:PRINT "{HOME}
{7 RIGHT}";SC:RETURN
:rem 234
5800 IFMP=195THENC=-40:RETURN
:rem 127
5810 IFMP=196THENC=40:RETURN
:rem 84
5820 IFMP=197THENC=-1:RETURN
:rem 80
5830 IFMP=198THENC=-41:RETURN
:rem 134
5840 IFMP=199THENC=39:RETURN
:rem 98
5850 IFMP=200THENC=1:RETURN
:rem 23
5860 IFMP=201THENC=-39:RETURN
:rem 129
5870 CP=41:RETURN
:rem 35
5900 POKECM,1:POKEG,194:PRINT "{HOME}
{7 RIGHT}";SC
:rem 30
5905 FI=FI+1:IFFI=QFTHEN7000
:rem 172
5907 RETURN
:rem 181
6000 REM SOUND INITIALIZATION
:rem 91
6010 S=54272:FORQ=STOS+24:POKEQ,0:NEXT
:rem 115
6020 POKES+24,15:POKES+5,66:POKES+6,20:PO
KES+4,129:RETURN
:rem 201
7000 PRINTDN$TAB(11)"LEVEL";LV;"COMPLETED
":TL=ET-VAL(TI$)
:rem 27
7005 PRINTTAB(12)"TIME BONUS:";TL:rem 243
7010 SC=SC+TL:LV=LV+1:D=D+4:QW=QW+1:E=QW:
ET=ET+14:WL=WL+1
:rem 74
7020 IFD>70THEND=70
:rem 88
7030 IFET>500THENET=500
:rem 95
7035 IFQW>20THENQW=20
:rem 28
7037 IFWL>40THENWL=40
:rem 24
7040 FORK=1TO999:NEXT:GOTO25
:rem 12
8000 PRINTDN$TAB(13)"TOO MANY WEEDS!":GOT
O9000
:rem 215
8100 PRINTDN$TAB(15)"TIME'S UP!":GOTO9000
{34 SPACES}"
:rem 171
9000 IFSC>HSTHENHS=SC
:rem 100
9004 FORJ=1TO999:NEXT
:rem 51
9005 PRINT "{CLR}"TAB(12)"HIGH SCORE:";HS
:rem 173
9008 PRINTTAB(10){DOWN}YOUR SCORE WAS";S
C:PRINTTAB(10){DOWN}YOU ACHIEVED LE
VEL";LV
:rem 243
9010 PRINTDN$ {9 DOWN}TAB(6)"PRESS TRIGG
ER TO PLAY AGAIN"
:rem 102
9020 M=PEEK(JL)ANDTR:IFM=0THEN23
:rem 241
9030 GOTO9020
:rem 208
10000 REM TITLE SCREEN
:rem 23
10010 PRINT "{CLR}"TAB(16)"PESTS{3 DOWN}"
:rem 235
10015 PRINT "{4 SPACES}USE A JOYSTICK TO M
OVE JOE ( ), THE{DOWN}"
:rem 141
10020 POKE1216+CO,15:POKE1216,195
:rem 57
10030 PRINT"GARDENER, AROUND THE GARDEN.
{2 SPACES}SPRAY THE{DOWN}"
:rem 67
10040 PRINT"WEEDS ( ) USING THE TRIGGER.
{2 SPACES}ALSO USE{DOWN}"
:rem 101
10045 POKE1351+CO,9:POKE1351,206
:rem 12
10050 PRINT"THE TRIGGER TO FUMIGATE THE F
LOWERS.{2 DOWN}"
:rem 4
10060 PRINTTAB(11)"** SCORING TABLE **
{DOWN}"
:rem 136
10070 PRINTTAB(10)"WEED"SPC(11)"5 POINTS
{DOWN}":POKE1643+CO,9:POKE1643,206
:rem 203
10080 PRINT "{2 SPACES}YELLOW DAISY"SPC(11
)"10 POINTS{DOWN}"
:rem 76
10090 POKE1683+CO,7:POKE1683,191:POKE1723
+CO,5:POKE1723,207
:rem 108
10100 PRINT "{4 SPACES}BLUE DAISY"SPC(11)"
20 POINTS{DOWN}"
:rem 146
10105 POKE1763+CO,3:POKE1763,191:POKE1803
+CO,5:POKE1803,207
:rem 97
10110 PRINTTAB(10)"ROSE"SPC(11)"40 POINTS
{DOWN}"
:rem 181
10115 POKE1843+CO,2:POKE1843,191:POKE1883
+CO,5:POKE1883,207
:rem 111
10120 PRINTTAB(9)"PRESS TRIGGER TO BEGIN"
:rem 207
10130 M=PEEK(JL)ANDTR:IFM=0THENRETURN
:rem 150
10140 GOTO10130
:rem 36

```

Program 2: Pests For VIC

Refer to the "Automatic Proofreader" article before typing this program in.

```

10 POKE36879,8:GOTO1000
:rem 57
15 POKE36878,15:POKE36869,253:CO=30720
:rem 123
20 DIMPP(200),JP(15),CS(15),DN$(15)
:rem 78
23 SC=0:D=10:E=3:QW=E:ET=200:WL=20:LV=1:D
N$="{HOME}{11 DOWN}"
:rem 126

```


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We talked to them, photographed them in action, studied their moves and their stats and their styles. Then we set out to create on computer disc an event which may never happen in real life. We put the two of them together on a dream court of light, for an electronic afternoon of one-on-one.

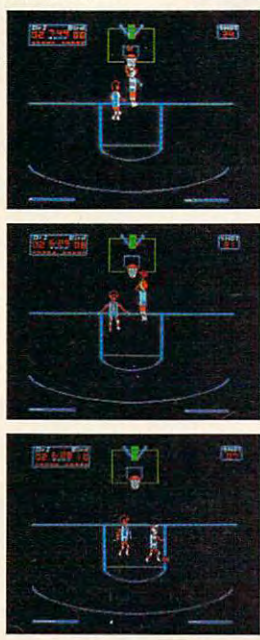
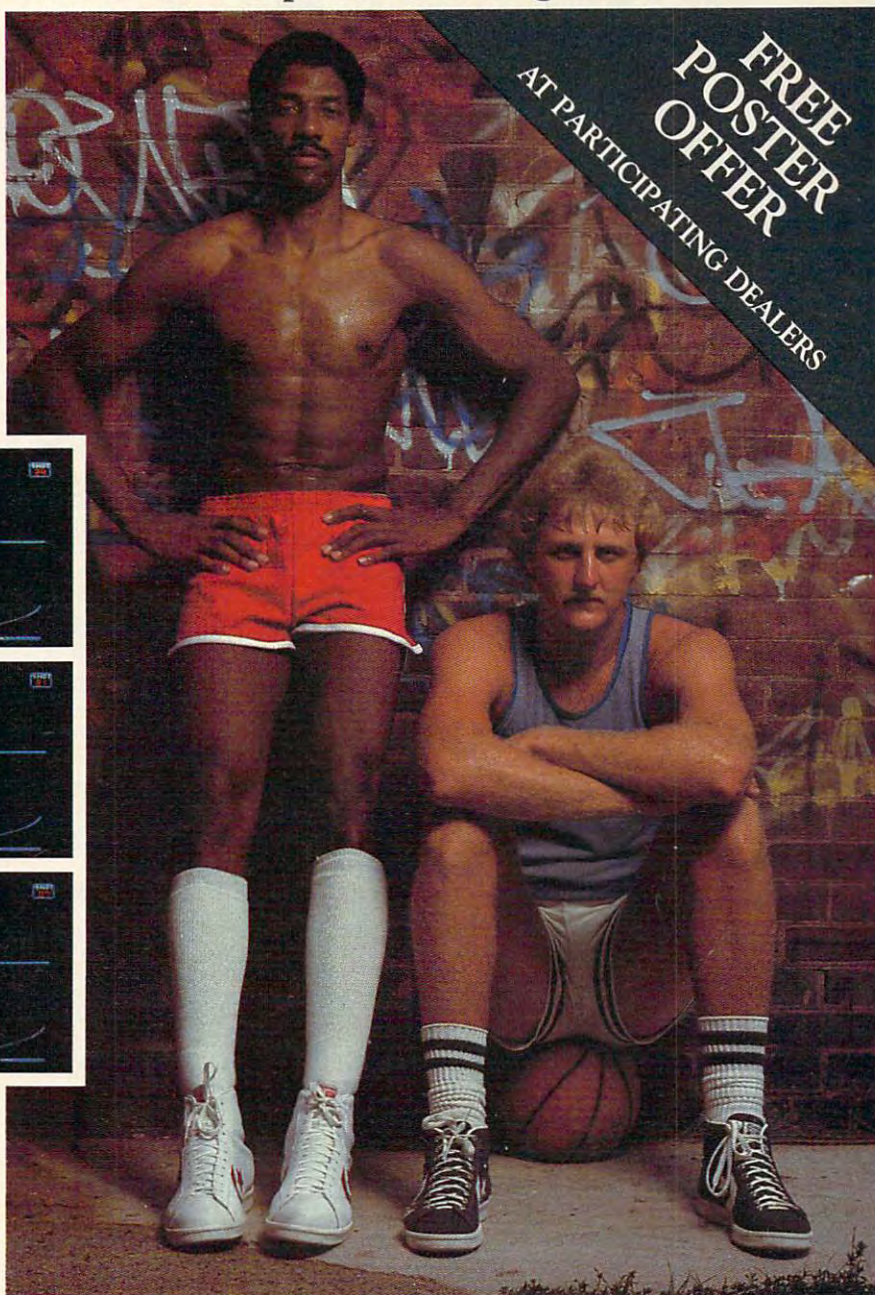
It wasn't easy. When they talked, we listened. When they criticized, we made big changes. When they gave suggestions, we took them.

And it shows. This thing is absolutely uncanny. You actually take on all the skills and characteristics of Bird or The Doctor — their own particular moves, shooting abilities, even strength and speed.

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Notes For VIC, PC, And PCjr

Kevin Martin, Editorial Programmer

In "Pests," you are the gardener and you must protect the flowers from deadly weeds and disease. Protect the flowers from disease by fumigating them with a special spray. When you spray the flowers, you receive points—10 for yellow flowers, 20 for blue, 40 for red—and the flowers turn white. Destroy the weeds which grow in the garden by spraying them with the same sprayer. If you allow too many weeds to grow in the garden or your time runs out, the game ends. If you finish before the time runs out, you receive bonus points for the extra time.

The VIC version of Pests requires an 8K expander and a joystick. To RUN, first type in the program and save it to tape or disk. Then, turn the computer off and back on to reset the BASIC pointers. Next, enter the following POKES to move screen memory and the top of BASIC:

```
POKE 43,1:POKE 44,32:POKE 8192,0:NEW
POKE 36869,240:POKE 36866,150:POKE 648,30:
PRINT "{CLR}"
```

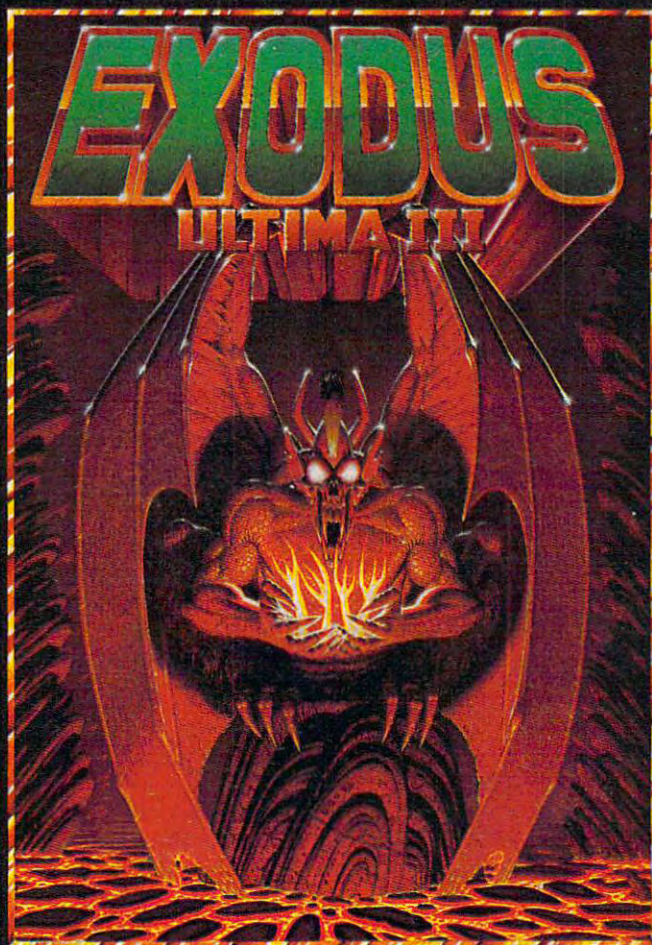
The screen should momentarily display a flash of garbage before clearing. You now can load the program and run it as you normally would.

The PC version requires disk BASIC and the Color/Graphics Adapter board. This version will also run on a PCjr with Cartridge BASIC and disk. On the PC, you control your gardener (represented by a smiling face character) with the numeric keypad. On the PCjr, use the arrow keys at the right of the keyboard to control the gardener.

```
25 RS=219:AV=7724:U=22:B=32:FC=7:FI=0:GOS
UB3000:TI$="000000" :rem 155
31 PRINT "{CLR}{WHT} SCORE";SC:PRINT"
{HOME}"TAB(13)"TIME ";RIGHT$(TI$,3)
:rem 133
32 PRINT "{HOME}{DOWN}{BLU}U*****
*****I"; :rem 82
33 FORK=1TO20:PRINT"_{20 SPACES}_";NEXT
:rem 132
34 PRINT"J*****{WHT}";:POK
E8185,75:POKE8185+CO,6 :rem 119
36 PL=191:QF=0 :rem 27
39 FORK=1TO3:FORJ=1TOD :rem 162
40 FP=(INT(RND(1)*RS)*2)+AV:SP=FP+U
:rem 71
50 IFPEEK(FP)<>BTHEN40 :rem 79
55 IFPEEK(SP)<>BTHEN40 :rem 97
```

```
60 POKEFP+CO,FC:POKEFP,PL:POKESP+CO,5:POK
ESP,207:QF=QF+1:NEXT:D=D-10 :rem 102
70 IFFC=7THENFC=3:PL=192:GOTO90 :rem 166
80 FC=2:PL=193 :rem 16
90 NEXT:D=D+30:OP=7725:NP=OP:POKEOP,196:W
C=203:X=0:GOSUB300:TI$="000000":GOTO11
0 :rem 59
100 IFH<0THENH=0 :rem 184
101 IFE<0THENE=0 :rem 179
103 IFWC=206THENWC=203:X=X+E:GOSUB300:GOT
O110 :rem 22
105 GOSUB320 :rem 171
110 L=TI+500:GOTO4000 :rem 175
300 FORH=XTOX+E :rem 194
305 WP=INT(RND(1)*(RS*2))+AV:IFPEEK(WP)<>
BTHEN305 :rem 197
310 PP(H)=WP:POKEPP(H)+CO,4:POKEPP(H),WC:
NEXT:E=E+1:IFH>WLTHEN8000 :rem 151
315 RETURN :rem 121
320 FORH=XTOX+E:POKEPP(H)+CO,4:POKEPP(H),
WC:NEXT:RETURN :rem 126
1000 REM CHR. SET LOADER :rem 83
1005 IFPEEK(6782)=24THEN15 :rem 218
1010 PRINT "{CLR}{WHT}{6 SPACES}REDEFINING
{12 SPACES}CHARACTERS :rem 196
1020 FORI=5120TO7168:POKEI,PEEK(I+27648):
NEXT :rem 189
1030 POKE36869,253:BC=6648 :rem 157
1090 FORK=1TO4:FORNM=BCTOBC+7:READCD:POKE
NM,CD:NEXT:RESTORE:BC=BC+8:NEXT
:rem 17
1095 BC=BC-8:FORNM=BCTOBC+111:READCD:POKE
NM,CD:NEXT:GOTO15 :rem 197
2000 DATA0,0,0,0,24,126,231,60 :rem 203
2010 DATA24,60,66,153,189,255,126,60
:rem 31
2020 DATA60,126,255,189,153,66,60,24
:rem 32
2030 DATA28,38,79,223,223,79,38,28
:rem 203
2040 DATA192,252,70,95,95,127,62,28
:rem 248
2050 DATA28,62,127,95,95,70,252,192
:rem 249
2070 DATA56,100,242,251,251,242,100,56
:rem 111
2080 DATA3,63,98,250,250,254,124,56
:rem 240
2090 DATA56,124,254,250,250,98,63,3
:rem 241
2100 DATA0,0,24,24,24,0,0,0 :rem 51
2110 DATA0,34,28,8,28,34,0,0 :rem 124
2120 DATA66,231,126,60,36,126,231,66
:rem 24
2130 DATA153,60,90,255,255,90,60,153
:rem 28
2140 DATA24,24,153,219,126,60,24,0
:rem 171
3000 REM JOYSTICK INITIALIZER :rem 91
3010 JP(7)=0:JP(6)=-22:JP(5)=22:JP(3)=-1:
JP(2)=-23 :rem 144
3020 JP(1)=21:JP(11)=1:JP(12)=-21:JP(13)=
23:DO=191 :rem 155
3040 CS(7)=195:CS(6)=195:CS(5)=196:CS(3)=
197:CS(2)=198:CS(0)=195 :rem 184
3050 CS(1)=199:CS(11)=200:CS(12)=201:CS(1
3)=202:RETURN :rem 214
4000 POKE37154,127:JV=(PEEK(37137)AND28)O
R(PEEK(37152)AND128):JV=ABS((JV-100)
/4)-7 :rem 105
4001 IFJV=7THENJV=0 :rem 164
```


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```

4002 FR=-(PEEK(37137)AND32)/32:CS(0)=CS(J
V) :rem 117
4003 POKE37154,255 :rem 194
4005 IFNOTFRTHENGOSUB5500 :rem 90
4010 NP=OP+JP(JV):IFPEEK(NP)<>BTHENNP=OP
:rem 55
4015 POKENP+CO,1:POKEOP,B:POKENP,CS(JV):O
P=NP :rem 149
4020 IFTI>LTHENWC=WC+1:GOTO100 :rem 124
4025 PRINT"{HOME}"TAB(18)RIGHT$(TI$,3):IF
VAL(TI$)>ETTHEN8100 :rem 224
4030 GOTO4000 :rem 196
5500 MP=CS(JV):GOSUB5800 :rem 178
5505 G=NP+CP:CM=G+CO:TP=PEEK(G):IFTP<128A
NDTP>32THENRETURN :rem 255
5510 POKECM,1:POKEG,206 :rem 91
5515 FORQ1=1TO2:POKE36877,230 :rem 181
5516 FORQ2=1TO50:NEXT:POKE36877,0:FORQ2=1
TO50:NEXT:NEXT :rem 10
5517 IFTP=207THENPOKECM,5:POKEG,207:RETUR
N :rem 185
5519 IFTP=194THENPOKECM,1:POKEG,194:RETUR
N :rem 193
5520 IFTP=BTHENPOKEG,B:RETURN :rem 171
5530 IFTP=191THENSC=SC+10:GOTO5900:rem 61
5540 IFTP=192THENSC=SC+20:GOTO5900:rem 64
5550 IFTP=193THENSC=SC+40:GOTO5900:rem 68
5560 SC=SC+5:E=E-1:POKEG,B:PRINT"{HOME}
{6 RIGHT}";SC:RETURN :rem 205
5800 IFMP=195THENCP=-22:RETURN :rem 127
5810 IFMP=196THENCP=22:RETURN :rem 84
5820 IFMP=197THENCP=-1:RETURN :rem 80
5830 IFMP=198THENCP=-23:RETURN :rem 134
5840 IFMP=199THENCP=21:RETURN :rem 89
5850 IFMP=200THENCP=1:RETURN :rem 23
5860 IFMP=201THENCP=-21:RETURN :rem 120
5870 CP=23:RETURN :rem 35
5900 POKECM,1:POKEG,194:PRINT"{HOME}
{6 RIGHT}";SC :rem 1
5905 FI=FI+1:IFFI=QFTHEN7000 :rem 172
5907 RETURN :rem 181
7000 PRINTDN$"{3 RIGHT}LEVEL";LV;"COMPLET
ED":TL=ET-VAL(TI$) :rem 232
7005 PRINTTAB(4)"TIME BONUS:";TL :rem 196
7010 SC=SC+TL:LV=LV+1:D=D+4:QW=QW+1:E=QW:
ET=ET+14:WL=WL+1 :rem 74
7015 IFD>37THEND=37 :rem 98
7020 IFD>70THEND=70 :rem 88
7030 IFET>500THENET=500 :rem 95
7035 IFQW>20THENQW=20 :rem 28
7037 IFWL>40THENWL=40 :rem 24
7040 FORK=1TO999:NEXT:GOTO25 :rem 12
8000 PRINTDN$"{3 RIGHT}TOO MANY WEEDS!":G
OTO9000 :rem 162
8100 PRINTDN$"{6 RIGHT}TIME'S UP!":GOTO90
00 :rem 169
9000 IFSC>HSTHENHS=SC :rem 100
9004 FORJ=1TO999:NEXT :rem 51
9005 PRINT"{CLR}"TAB(2)"HIGH SCORE:";HS
:rem 124
9008 PRINT"{DOWN} YOUR SCORE WAS";SC:PRIN
T"{DOWN} YOU ACHIEVED LEVEL";LV
:rem 225
9010 PRINTDN$"{7 DOWN}PRESS TRIGGER TO PL
AY" :rem 66
9020 REM CHECK BUTTON :rem 233
9030 GOTO9020 :rem 208
5 DEF SEG=&HB800
20 DIM PP(200),JP(9)
23 SC=0:D=15:E=3:QW=E:ET=200:WL=20:LV=1
25 RS=399:AV=160:U=80:B=32:FC=14:FI=0:GO
SUB 3000:TIME$="00:00:00"
31 CLS:COLOR 7,0:LOCATE 1,1,0:PRINT" SCO
RE:";SC:LOCATE 1,15:PRINT"LEVEL:";LV:LOC
ATE 1,28:PRINT"TIME ";RIGHT$(TIME$,4)
32 COLOR 9,0:LOCATE 2,1:PRINT CHR$(218)S
TRING$(38,196)CHR$(191);
33 FOR I=1 TO 20:PRINT CHR$(179)STRING$(
38,32)CHR$(179);:NEXT I
34 PRINT CHR$(192)STRING$(38,196)CHR$(21
7);
36 QF=0
39 FOR K=1 TO 3:FOR J=1 TO D
40 FP=(INT(RND*RS)*4)+AV:SP=FP+U
50 IF PEEK(FP)<>B THEN 40
55 IF PEEK(SP)<>B THEN 40
60 POKE FP+1,FC:POKE FP,15:POKE SP+1,2:P
OKE SP,25:QF=QF+1:NEXT:D=D-10
70 IF FC=14 THEN FC=3:GOTO 90
80 FC=4
90 NEXT:D=D+30:DP=162:NP=162:POKE OP,1:P
OKE OP+1,7:WC=203:X=0:GOSUB 300:TIME$="0
0:00:00":GOTO 110
100 IF H<0 THEN H=0
101 IF E<0 THEN E=0
103 IF WC=206 THEN WC=203:X=X+E:GOSUB 30
0:GOTO 110
105 GOSUB 320
110 GOSUB 11000:L=TI+8:GOTO 4000
300 E=E+1:FOR H=X TO X+E
305 WP=INT(RND*(RS*4))+AV:IF PEEK(WP)<>B
THEN 305
310 PP(H)=WP:POKE PP(H)+1,6:POKE PP(H),W
C:NEXT:IF H>WL THEN 8000
315 RETURN
320 FOR H=X TO X+E:POKE PP(H)+1,6:POKE P
P(H),WC:NEXT:RETURN
3000 REM JOYSTICK INITIALIZER
3010 JP(0)=0:JP(1)=78:JP(2)=80:JP(3)=82:
JP(4)=-2:JP(6)=2:JP(7)=-82:JP(8)=-80:JP(
9)=-78:D0=191:CS=1
3020 RETURN
4000 I$=INKEY$:JV=VAL(I$):FR=(I$=" ")
4002 IF JV THEN CP=JP(JV)
4005 IF FR THEN GOSUB 5500
4010 NP=OP+JP(JV):IF PEEK(NP)<>B THEN NP
=OP
4012 IF NP=OP THEN 4020
4015 POKE NP+1,7:POKE OP,B:POKE NP,CS:OP
=NP
4020 GOSUB 11000:IF TI>L THEN WC=WC+1:GO
TO 100
4025 COLOR 7,0:LOCATE 1,33:PRINT RIGHT$(
TIME$,4);:GOSUB 11000:IF TI>ET THEN 8100
4030 GOTO 4000
5500 REM SPRAY WEEDS & FLOWERS
5505 G=NP+CP+1:TP=PEEK(G):TQ=PEEK(G-1):I
F TP<>3 AND TP<>4 AND TP<>14 AND TP<>6 T
HEN RETURN
5510 POKE G,7:POKE G-1,254
5515 FOR I=1 TO 2:SOUND 110,2:FOR J=1 TO
100:NEXT J,I
5530 IF TP=3 THEN SC=SC+10:GOTO 5900
5540 IF TP=4 THEN SC=SC+20:GOTO 5900
5550 IF TP=14 THEN SC=SC+40:GOTO 5900

```

Program 3: Pests For PC/PCjr

```

2 DEF SEG=0:POKE 1047,240:SCREEN 0,1
4 WIDTH 40:KEY OFF

```


BRUTAL! RUTHLESS! UNPREDICTABLE!



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C R E A T I V E S O F T W A R E


```

5560 SC=SC+5:E=E-1:POKE G-1,B:LOCATE 1,8
:PRINT SC::RETURN
5900 POKE G,15:POKE G-1,15:LOCATE 1,8:PR
INT SC;
5910 FI=FI+1:IF FI<>QF THEN RETURN
7000 LOCATE 12,11:PRINT"Level";LV;"Compl
eted":GOSUB 11000:TL=ET-TI
7002 LOCATE 14,12:PRINT"Time Bonus:";TL
7005 SC=SC+TL:LV=LV+1:D=D+4:QW=QW+1:E=QW
:ET=ET+14:WL=WL+1
7020 IF D>70 THEN D=70
7030 IF ET>500 THEN ET=500
7035 IF QW>20 THEN QW=20
7037 IF WL>40 THEN WL=40
7040 FOR K=1 TO 999:NEXT:GOTO 25
8000 LOCATE 12,13:PRINT"Too Many Weeds!!
":GOTO 9000
8100 LOCATE 12,15:PRINT"Time's up!!"
9000 IF SC>HS THEN HS=SC
9004 FOR J=1 TO 999:NEXT
9005 CLS:LOCATE 3,12:PRINT"High Score:";
HS
9008 LOCATE 5,10:PRINT"Your Score Was";S
C:LOCATE 7,10:PRINT"You Achieved Level:"
;LV
9010 LOCATE 19,6:PRINT"Press SPACE BAR t
o play again"
9020 IF INKEY$="" THEN 23 ELSE 9020
11000 TI=VAL(MID$(TIME$,4,2))*100+VAL(RI
GHT$(TIME$,2)):RETURN

```

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Kevin Woram and Mike Buhidar, Jr.

In this mythical struggle between a magician and a king, you decide the fate of the realm with your joystick. Written for the 64, we've included versions for the VIC and Atari.

Long ago Admar, a magician of great power, served the king of Denbar as an advisor in matters of war. Through the years Admar's power grew so much that the king began to fear him. Foolishly, the king decided that because of his power, Admar could no longer be trusted, and he plotted to kill the magician.

Admar, however, was still loyal to the king, and when he learned of the king's plot he decided to flee the kingdom with a legion of his own loyal warriors.

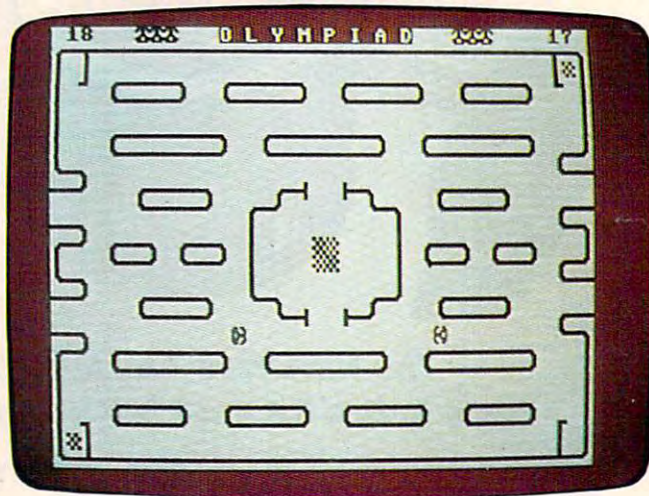
The king followed with his army and attacked Admar's stronghold, resulting in heavy casualties on both sides. Both the king and Admar now realized that warfare would be very costly in lives.

An Enchanted Arena

So it was agreed that an enchanted arena should be built where the king's Black Knights would do mock battle with Admar's Red Knights.

You and a friend control the actions of the knights as they fight for their masters. Movement in all eight directions is controlled by the joystick. The red knight is controlled by the joystick in control port 1, the black knight by the joystick in port 2.

The knights have also been given 20 magical arrows which stun on contact. The arrows are launched by pressing the fire button. When a



Players get ready to challenge each other ("Olympiad," 64 version).

fighter has used all of his arrows, his only defense is to run.

Teleportation Grids

To add an element of randomness to the battle, three enchanted teleportation grids have been added to the arena. When any warrior steps onto one of these grids, he is instantly teleported to a random position in the arena.

If you want to save yourself the trouble of typing in this program (64 version *only*), just send a blank cassette or diskette (1541 format), a self-addressed, stamped mailer, and \$3 to either address listed below. Please specify that you wish a copy of the "Olympiad" program.

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Program 1: Olympiad For The 64

Refer to the "Automatic Proofreader" article before typing this program in.

```
1 POKE53280,2:POKE53281,1:GOTO1000      :rem 189
2 DIM X(15),CS(15),D2(15),C2(15)          :rem 69
4 CLR:N=15:B=32:FJ=56320:FT=56321:CO=5427
  2:JB=16:HP=102:GOSUB500                  :rem 223
10 RN=1:RO=1104:FB=1030:FO=1054:LB=1032:L
  R=1056:GOSUB3000                          :rem 15
20 DX(0)=0:DX(1)=-40:DX(2)=40:DX(4)=-1:DX
  (5)=-41:DX(6)=39:DX(8)=1:DX(9)=-39      :rem 54
22 D2(0)=0:D2(1)=-40:D2(2)=40:D2(4)=-1:D2
  (5)=-41:D2(6)=39:D2(8)=1:D2(9)=-39      :rem 8
25 DX(10)=41:CS(0)=192:CS(1)=194:CS(2)=19
  5:CS(4)=193:CS(5)=198:CS(6)=197         :rem 118
27 D2(10)=41:C2(0)=193:C2(1)=194:C2(2)=19
  5:C2(4)=193:C2(5)=198:C2(6)=197         :rem 141
30 CS(8)=192:CS(9)=196:CS(10)=199:rem 244
32 C2(8)=192:C2(9)=196:C2(10)=199:rem 147
34 RESTORE:GOSUB400:FORNP=13824TO13983:RE
  ADMD:POKENP,MD:NEXT                      :rem 166
36 PRINT"[2 UP]";SPC(JB);"[7 SPACES]"      :rem 217
50 OP=1105:O2=1982:POKEOP,195:POKEO2,194:
  POKEOP+CO,0:POKEO2+CO,5                 :rem 101
60 IF AT+NA=0 THEN POKEOP,B:POKEO2,B:RN=R
  N-1:GOTO34                               :rem 99
61 JV=N-(PEEK(FJ)ANDN):FR=PEEK(FJ)ANDJB:C
  S(0)=CS(JV):UP=OP+DX(JV)                :rem 51
65 IFPEEK(UP)<>BTHENGOSUB4000              :rem 68
70 POKEOP,B:POKEUP+CO,0:POKEUP,CS(JV):OP=
  UP                                         :rem 70
75 IFFR<>JBTHENGOSUB100                    :rem 217
80 J2=N-(PEEK(FT)ANDN):F2=PEEK(FT)ANDJB:C
  2(0)=C2(J2):U2=O2+D2(J2)                :rem 24
85 IFPEEK(U2)<>BTHENGOSUB4100              :rem 41
90 POKEO2,B:POKEU2+CO,2:POKEU2,C2(J2):O2=
  U2                                         :rem 111
95 IFF2<>JBTHENGOSUB110                    :rem 188
97 GOTO60                                   :rem 15
99 REM SHOOT ARROW                         :rem 110
100 IFNA=0THENRETURN                       :rem 43
101 NA=NA-1:BP=INT(NA/10):IFBP>1THENBP=1
                                           :rem 168
102 PRINT"[HOME]{BLK}";NA:POKE1026+BP,B:D
  =DX(JV):JC=CS(JV):GOSUB200              :rem 77
105 AP=UP+D:C1=0:GOTO115                   :rem 157
110 IFAT=0THENRETURN                       :rem 50
111 AT=AT-1:BT=INT(AT/10):IFBT>1THENBT=1
                                           :rem 199
112 PRINT"[HOME]{RED}";SPC(36);AT:POKE106
  2+BT,B:D=D2(J2):JC=C2(J2):GOSUB200      :rem 48
114 AP=U2+D:C1=2                           :rem 119
115 AD=JC+8:IFPEEK(AP)<>BTHENRETURN         :rem 228
```

Notes For VIC And Atari Versions

Chris Poer, Editorial Programmer

The object of "Olympiad" is to defeat your opponent's three knights with three of your own in one-on-one combat. In the VIC version, player 1 controls his knight with the joystick while player 2 uses the keyboard (I, J, K, and M keys for up, left, right, and down movements, respectively). In the Atari version, the knights are controlled with joysticks 0 and 1.

When the game begins, position yourself directly in front of the enemy. Press the joystick button (or space bar in the VIC version) to fire an arrow. Arrows travel only a certain distance. In addition, each knight has only 20 arrows in his quiver, so be careful not to waste any. If both warriors exhaust their supply of arrows, the round will start anew, with each player receiving a fresh supply of 20 arrows.

The VIC version requires 8K or more of expansion RAM. Before loading the game into the VIC (right after the computer is turned on), carefully enter the following lines:

```
POKE43,1:POKE44,32:POKE8192,0:NEW
POKE36869,240:POKE36866,150:POKE648,30
PRINT"[CLR]"
```

```
120 FORA=1TO15:NP=AP+D                    :rem 71
125 AC=NP+CO                               :rem 180
130 IFPEEK(NP)<>BTHEN300                    :rem 181
140 POKEAP,B:POKEAC,C1:POKENP,AD:AP=NP:NE
  XT:POKEAP,B:RETURN                       :rem 169
199 REM STILL CHECKER                     :rem 4
200 LFD<>0THENRETURN                       :rem 30
210 IFJC=194THEND=-40:RETURN               :rem 229
220 IFJC=195THEND=40:RETURN                :rem 186
230 IFJC=193THEND=-1:RETURN                :rem 179
240 IFJC=198THEND=-41:RETURN               :rem 237
250 IFJC=197THEND=39:RETURN                :rem 199
260 IFJC=192THEND=1:RETURN                 :rem 136
270 IFJC=196THEND=-39:RETURN               :rem 245
280 D=41:RETURN                           :rem 154
299 REM DEATH                             :rem 238
300 IFPEEK(NP)<192THENPOKEAP,B:RETURN      :rem 133
310 IFC1=0THEN330                          :rem 201
312 POKELB,B:LB=LB-1:GOSUB600              :rem 2
315 IFLB=FB-1THEN6000                      :rem 206
317 GOTO34                                 :rem 59
330 POKELR,B:LR=LR-1:GOSUB610              :rem 51
335 IFLR=FO-1THEN6010                      :rem 238
340 GOTO34                                 :rem 55
```




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```

400 NA=20:AT=20:PRINT "{HOME}{BLK}";NA;SPC
(32);"{RED}";AT :rem 234
410 PRINT "{BLU}{HOME}{2 DOWN}{RVS}";SPC(1
6);"ROUND";RN;"{OFF}":RN=RN+1:RETURN
:rem 197
500 REM SOUND INITIALIZATION :rem 42
510 S=54272:FORQ=STOS+24:POKEQ,0:NEXT
:rem 66
520 POKES+24,15:POKES+5,17:POKES+6,248
:rem 211
525 POKES,150:POKES+1,150 :rem 186
530 RETURN :rem 120
600 DP=UP:OM=U2:GOTO620 :rem 177
610 DP=U2:OM=UP :rem 167
620 POKEAP,B:POKEOM,B:GOSUB7000:FORK=210T
O208STEP-1:POKEDP,K :rem 65
630 FORH=1TO100:NEXT:NEXT:POKEDP,211:POKE
DP,B:POKEUP,B:POKEU2,B:RETURN:rem 120
1000 REM CHR. SET LOADER :rem 83
1010 PRINT "{CLR}{BLK}LOADING CHARACTER SE
T INTO MEMORY. . .":PRINTCHR$(142)
:rem 122
1020 POKE52,48:POKE56,48:CLR:G=56334
:rem 59
1030 POKEG,PEEK(G)AND254 :rem 145
1040 POKE1,PEEK(1)AND251 :rem 99
1045 IFPEEK(13983)=102THEN1060 :rem 157
1050 FORI=0TO2047:POKEI+12288,PEEK(I+5324
8):NEXT :rem 74
1060 POKE1,PEEK(1)OR4 :rem 207
1070 POKEG,PEEK(G)OR1 :rem 249
1080 POKE53272,(PEEK(53272)AND240)+12
:rem 232
1090 FORNP=13824TO13983:READMD:POKENP,MD:
DC=DC+MD:NEXT :rem 158
1095 IFDC<>13392THENPRINT"ERROR IN DATA.
{SPACE}. . .":STOP :rem 166
1100 GOTO2 :rem 45
1999 REDEFINED CHARACTERS :rem 66
2000 DATA102,227,241,159,159,241,227,102
:rem 216
2010 DATA102,199,143,249,249,143,199,102
:rem 235
2020 DATA126,219,153,24,60,231,231,126
:rem 113
2030 DATA126,231,231,60,24,153,219,126
:rem 114
2040 DATA60,6,207,253,201,201,124,60
:rem 6
2050 DATA60,62,147,147,191,243,96,60
:rem 36
2060 DATA60,96,243,191,147,147,62,60
:rem 37
2070 DATA60,124,201,201,253,207,6,60
:rem 9
2082 DATA0,132,66,63,66,132,0,0,0,33,66,2
52,66,33,0,0,16,56,84,16,16,16,40,68
:rem 233
2084 DATA68,40,16,16,16,84,56,16,7,3,5,8,
16,224,32,32,4,4,7,8,16,160,192,224
:rem 202
2086 DATA224,192,160,16,8,7,4,4,32,32,224
,16,8,5,3,7 :rem 39
2088 DATA0,0,8,16,4,16,0,0 :rem 26
2090 DATA0,0,20,10,32,20,0,0 :rem 99
2092 DATA68,9,32,132,1,40,130,17 :rem 78
2094 DATA0,0,0,0,0,0,0,0 :rem 157
2999 REM PLAYFIELD :rem 91
3000 PRINT "{CLR}{RED}{12 SPACES}{RVS}O L
{SPACE}Y M P I A D{OFF}{14 SPACES}"
:rem 70
3001 NA=20:AT=20:PRINT "{HOME}";NA;SPC(B);
AT :rem 204
3002 FORL=1024TO1035:POKEL+CO,0:NEXT:FORL
=1057TO1062:POKEL+CO,2:NEXT :rem 219
3004 FORL=FBTOLB:POKEL,194:NEXT:FORL=FOTO
LR:POKEL,194:NEXT :rem 96
3010 PRINT "{UP}{BLK}UC[R]CCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCC[R]CI" :rem 36
3020 GOSUB3990:POKE1106+CO,0:POKE1106,66:
POKE1141+CO,0:POKE1141,66:POKE1142,H
P :rem 51
3030 POKE1142+CO,2:PRINT "{UP}B {X} UCCC
CI{2 SPACES}UCCCCCI{2 SPACES}UCCCCCI
{2 SPACES}UCCCCI {Z} B" :rem 144
3040 PRINT "{UP}B{3 SPACES}JCCCCCK
{2 SPACES}JCCCCCK{2 SPACES}JCCCCCK
{2 SPACES}JCCCCCK{3 SPACES}B" :rem 183
3050 GOSUB3990 :rem 29
3060 PRINT "{UP}B{3 SPACES}UCCCCCCCCI
{2 SPACES}UCCCCCCCCI{2 SPACES}UCCCCC
CCI{3 SPACES}B" :rem 75
3070 PRINT "{UP}B{3 SPACES}JCCCCCCCCCK
{2 SPACES}JCCCCCCCCCK{2 SPACES}JCCCCC
CK UCK" :rem 210
3080 PRINT "{UP}JCI";SPC(34);"JCC" :rem 43
3090 PRINT "{UP}CCK{3 SPACES}UCCCCI
{4 SPACES}UC[W]{2 SPACES}{Q}CI
{4 SPACES}UCCCCI" :rem 85
3100 PRINT "{6 SPACES}JCCCCCK{2 SPACES}UCK
{6 SPACES}JCI{2 SPACES}JCCCCCK
{3 SPACES}UCC" :rem 235
3110 PRINT "{UP}CCI{11 SPACES}B{10 SPACES}
B{11 SPACES}JCI" :rem 80
3120 PRINT "{UP}UCK UCCI UCCI B{4 SPACES}
{BLK}{+}{RED}{+}{BLK}{4 SPACES}B
UCCI UCCI{3 SPACES}B" :rem 233
3130 PRINT "{UP}B{3 SPACES}JCCCK JCCCK B
{4 SPACES}{RED}{+}{BLK}{+}
{4 SPACES}B JCCCK JCCCK UCK" :rem 54
3140 PRINT "{UP}JCI{11 SPACES}B{10 SPACES}
B{11 SPACES}JCC" :rem 84
3150 PRINT "{UP}CCK{3 SPACES}UCCCCCI
{2 SPACES}JCI{6 SPACES}UCK{2 SPACES}
UCCCCI{6 SPACES}" :rem 137
3160 PRINT "{UP}{6 SPACES}JCCCCCK{4 SPACES}
JC[W]{2 SPACES}{Q}CK{4 SPACES}JC
CCK{3 SPACES}UCC" :rem 66
3170 PRINT "{UP}CCI{34 SPACES}JCI" :rem 210
3180 PRINT "{UP}UCK UCCCCCCCCI{2 SPACES}UCC
CCCCCI{2 SPACES}UCCCCCCCCI{3 SPACES}
B" :rem 239
3190 PRINT "{UP}B{3 SPACES}JCCCCCCCCCK
{2 SPACES}JCCCCCCCCCK{2 SPACES}JCCCCC
CK{3 SPACES}B" :rem 52
3200 GOSUB3990 :rem 26
3210 PRINT "{UP}B{3 SPACES}UCCCCCI
{2 SPACES}UCCCCCI{2 SPACES}UCCCCCI
{2 SPACES}UCCCCI{3 SPACES}B" :rem 218
3220 PRINT "{UP}B {S} JCCCCCK{2 SPACES}JC
CCCCCK{2 SPACES}JCCCCCK{2 SPACES}JCCC
CK {A} B" :rem 21
3230 PRINT "{UP}B":POKE1945,HP :rem 236
3245 FORL=56215TO56295:POKEL,0:NEXT
:rem 121
3250 POKE1983,93:POKE1984,74:FORL=1985TO2
022:POKEL,67:NEXT :rem 237
3260 POKE1986,113:POKE1946,66:POKE2021,11
3:POKE1981,66:POKE2023,75:RETURN
:rem 13
3990 PRINT "{UP}B";SPC(38);"B":RETURN
:rem 49

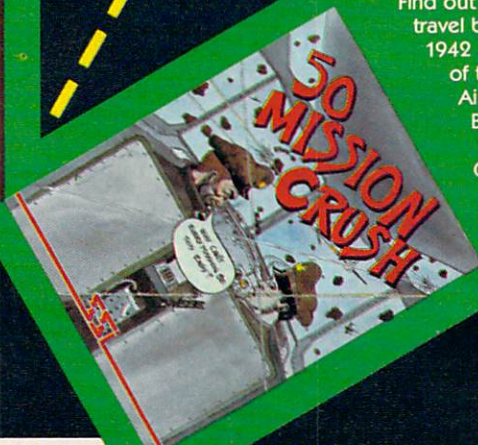
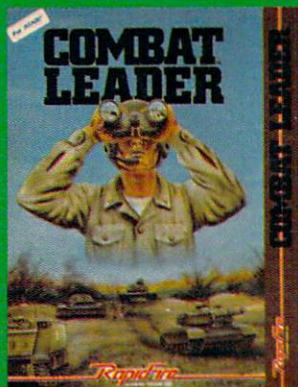
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As the hero in this fantasy adventure role-playing game, you must battle hordes of deadly monsters as you seek out to destroy the evil wizard, Mantor. Use your strength, dexterity, intelligence and charisma to the fullest in your treacherous journey to save the Questron Empire. On 40K disk. \$49.95.

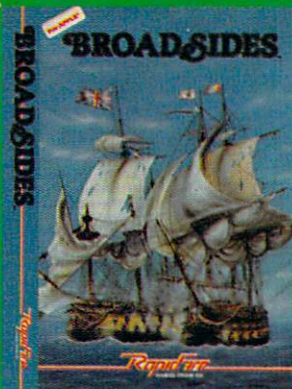
Arcade-like graphics and action plus strategy-gaming sophistication and realism make **COMBAT LEADER™** one of the greatest tank-battle games ever! You can choose from over 70 historical and modern tanks. On 48K disk and cassette. \$39.95.

As the pilot of a World War II B-17 bomber in this role-playing game, can you survive 50 dangerous but exciting raids over France and Germany to earn the crushed cap of a true veteran? Find out as you travel back to 1942 as part of the 8th Air Force Bomber Group. On 40K disk. \$39.95.



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SIMULATIONS
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15 months of development time have gone into this game to make it the definitive division-level simulation of the Russian War. You can re-enact the entire campaign from June 1941 through December 1944 or select one of 3 shorter scenarios. If you call yourself a real war-gamer, you must play it! On 48K disk. \$79.95.



This strategy/arcade game brings back all the romance and excitement of the adventurous age of fighting sail by letting you command your very own 18-century warship. You'll make all the military decisions a real captain must make, and you can even construct a ship of your own design. On 48K disk. \$39.95.

RAILS WEST!™ is a sophisticated business/educational game that takes you back to 1870. You'll wheel and deal as you try to build the richest Trans-continental railroad. For up to 8 players, it is fun, challenging, and exhaustive in detail and realism. On 40K disk. \$39.95.



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If there are no convenient stores near you, VISA & M/C holders can order direct by calling 800-227-1617, ext. 335 (toll free). In California, call 800-772-3545, ext. 335. To order by mail, send your check to: SSI, 883 Stier-

lin Road, Bldg. A-200, Mountain View, CA 94043. Please include \$2.00 for shipping & handling. (California residents, add 6.5% sales tax.) All SSI games carry a 14-day "satisfaction or your money back" guarantee.

ATARI® is a registered trademark of Atari, Inc.

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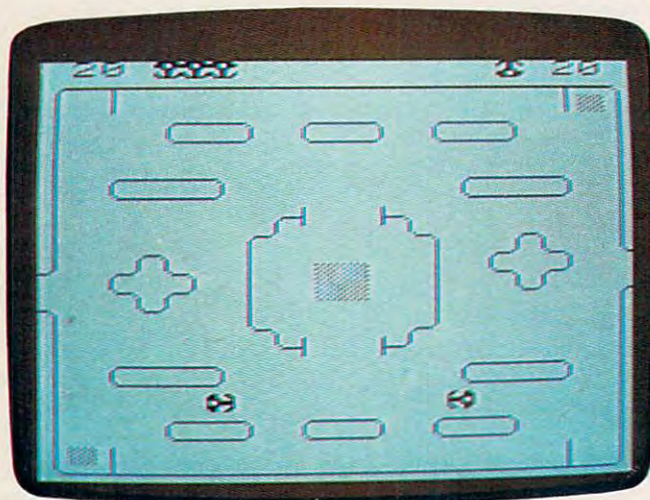
3999 REM HIT DATA :rem 193
4000 IFPEEK(UP) <> HPTHENUP=OP:RETURN :rem 74
4010 RF=INT(RND(1)*879)+RO:IFPEEK(RF) <> BT :rem 97
HEN4010 :rem 97
4020 UP=RF:POKEUP+CO,0:POKEOP,B:MP=UP:JP= :rem 198
JV:GOSUB5000 :rem 198
4100 IFPEEK(U2) <> HPTHENU2=O2:RETURN :rem 241
:rem 241
4110 R2=INT(RND(1)*879)+RO:IFPEEK(R2) <> BT :rem 59
HEN4110 :rem 59
4120 U2=R2:POKEU2+CO,2:POKEO2,B:MP=U2:JP= :rem 51
J2:GOSUB5000:RETURN :rem 51
5000 FORMN=208TO210:POKEMP,MN:FORW=1TO150 :rem 255
:NEXT:NEXT:POKEMP,CS(JP):RETURN :rem 255
5999 REM END ROUTINE :rem 193
6000 WN$=" RED ":LS$=" BLACK ":T1=4:T2=4: :rem 98
GOTO6020 :rem 98
6010 WN$=" BLACK ":LS$=" RED ":T1=3:T2=5 :rem 40
:rem 40
6020 PRINT"{CLR}";TAB(T1);"{DOWN}{BLK}THE :rem 44
";WN$;"KNIGHTS WERE VICTORIOUS! :rem 44
{DOWN}":rem 44
6030 PRINTTAB(T2);"THEY DEFEATED THE";LS$ :rem 118
;"KNIGHTS{DOWN}":rem 118
6040 PRINTTAB(14);"IN";RN-1;"ROUNDS" :rem 141
:rem 141
6060 PRINT"{15 DOWN}{4 SPACES}PRESS <<SPA :rem 151
CEBAR>> TO PLAY AGAIN{3 SPACES}":rem 151
6065 GETI$:IFI$<>" THEN6065 :rem 18
6070 GOTO4 :rem 58
7000 REM DEATH SOUND :rem 154
7010 POKES+4,129:FORQ=1TO30:NEXT:POKES+4, :rem 178
128 :rem 178
7040 RETURN :rem 171

```

```

5 PB=37152:JB=16:HP=102 :rem 18
10 RN=1:COL=A:LB=SC+4:FB=SC+10 :rem 32
15 RO=SC+22:FB=SC+3:FO=SC+15:LB=SC+4:LR=S :rem 66
C+15:GOSUB 3000 :rem 66
22 D2(0)=0:D2(1)=-22:D2(2)=22:D2(4)=-1:D2 :rem 246
(5)=-23:D2(6)=21:D2(8)=1:D2(9)=-21 :rem 246
25 DX(10)=23:CS(25)=192:CS(23)=193:CS(46) :rem 21
=195:CS(2)=194:CS(45)=197 :rem 21
27 D2(10)=23:C2(12)=194:C2(20)=193:C2(44) :rem 51
=192:C2(36)=195 :rem 51
30 CS(47)=199:CS(3)=196:CS(1)=198:rem 247
34 RESTORE:GOSUB4000:XX=0:CS(0)=195:C2(0)= :rem 226
194:FORI=1TO160:READPI:NEXT :rem 226
36 PRINT"{3 UP}";SPC(JB/2);"{7 SPACES}" :rem 203
:rem 203
49 OP=SCR+45:O2=SCR+482:UP=OP:U2=O2 :rem 168
:rem 168
50 POKEOP,195:POKEO2,194:POKEOP+CO,0:POKE :rem 216
O2+CO,2 :rem 216
60 IF NA+AT=0 THEN POKE OP,B:POKEO2,B:RN= :rem 99
RN-1:GOTO34 :rem 99
61 POKE 37154,127:P=PEEK(37152)AND128:J0= :rem 110
-(P=0):POKE37154,255 :rem 110
63 P=PEEK(37151):J1=-((PAND8)=0):J2=-((PA :rem 54
ND16)=0):J3=-((PAND4)=0) :rem 54
64 IF-((PAND32)=0)=1THENGOSUB 100:rem 107
65 IF XX=1 THEN 34 :rem 174
66 VV=(J0-J2)+(J1-J3)*22:IFVV=0THEN75 :rem 117
:rem 117
67 UP=OP+VV:JV=VV+24:CS(0)=CS(JV) :rem 46
68 IF (PEEK(UP) <> B)AND (PEEK(UP) <> 96)THENGO :rem 159
SUB4000:GOTO 75 :rem 159
70 POKEOP,B:POKEUP+CO,0:POKEUP,CS(JV):OP= :rem 70
UP :rem 70
75 AA=PEEK(197):IF(AA <> 12)AND(AA <> 20)AND( :rem 235
AA <> 36)AND(AA <> 44)THEN95 :rem 235
76 BB=INT(AA/10):ONBBGOTO80,78,77,79 :rem 73
:rem 73
77 U2=O2+22:GOTO81 :rem 30
78 U2=O2-1:GOTO81 :rem 238
79 U2=O2+1:GOTO81 :rem 237
80 U2=O2-22 :rem 62
81 IF (PEEK(U2)) <> BAND (PEEK(U2) <> 96)THENGO :rem 97
SUB4100:GOTO 95 :rem 97
82 IF XX=1 THEN 34 :rem 173
90 POKEO2,B:POKEU2+CO,2:POKEU2,C2(AA):O2= :rem 244
U2:CC=AA :rem 244
95 IF PEEK(197)=32THENGOSUB110 :rem 247
97 GOTO60 :rem 15
99 REM SHOOT ARROW :rem 110
100 IFNA=0THENRETURN :rem 43
101 NA=NA-1:BP=INT(NA/10):IFBP>1THENBP=1 :rem 168
:rem 168
102 PRINT"{HOME}{BLK}";NA:POKESC+2+BP,B:D :rem 119
=DX(JV):JC=CS(JV):GOSUB 200 :rem 119
105 AP=UP+D:C1=0:GOTO115 :rem 157
110 IFAT=0THENRETURN :rem 50
111 AT=AT-1:BT=INT(AT/10):IFBT>1THENBT=1 :rem 199
:rem 199
112 PRINT"{HOME}{RED}";SPC(18);AT:POKESC+ :rem 158
20+BT,B:D=D2(CC):JC=C2(CC):GOSUB200 :rem 158
:rem 158
114 AP=U2+D:C1=2 :rem 119
115 AD=JC+8:IF (PEEK(AP) <> B)AND (PEEK(AP) <> :rem 73
96)THENRETURN :rem 73
120 POKEV,2:POKES4,200:FORA=1TO13:NP=AP+D :rem 16
:rem 16
125 AC=NP+CO :rem 180

```



The contest is about to start (VIC version, "Olympiad").

Program 2: Olympiad For VIC

Refer to the "Automatic Proofreader" article before typing this program in.

```

0 POKE36879,26:GOTO 1000 :rem 56
1 SCR=256*PEEK(648):A=30720:IFPEEK(648)=1 :rem 35
6THEN A=33792 :rem 35
2 DIM X(50),CS(50),D2(50),C2(80),DX(50) :rem 194
:rem 194
4 N=15:B=32:V=36878:S1=36874:S4=36877

```


IS YOUR CHILD TOP BANANA, OR JUST ONE OF THE BUNCH?

Kids everywhere are going ape over Artworx[®] Monkey Series educational software! Like all good arcade games, kids just can't stop playing them. Which is great, because while they're enjoying the antics of Marc the Monkey, they're learning. And growing.

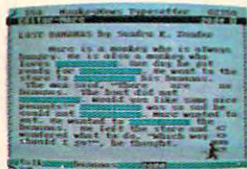
Three Artworx monkey programs, designed by teachers and learning specialists, are available to help your child.

Monkeymath[™] uses colorful graphics and three levels of challenges to give a better understanding of number sequences, addition, subtraction, multiplication, and division.



Monkeymath

Monkeynews[™] uses a newspaper setting to increase your child's ability to read and understand by enabling him to actively participate in the story, answer questions, check facts and type his own headlines.



Monkeynews

For help with spelling and vocabulary, choose *Monkeybuilder*[™]. It encourages the child to combine word pieces correctly to form building blocks, and make a tree house for Marc.

All three programs are more fun than a barrel of you-know-whats!

All are available for the Commodore 64, Atari, and Apple computers. All include a FREE Marc the Monkey story and coloring book. And they're all the stuff top bananas are made of!

See them in action wherever software is sold. To find out more facts, send \$1.00 for a colorful catalog to: Artworx Software Co., Inc. 150 North Main Street, Fairport, NY 14450.

Or call: 800-828-6573.
(In New York call: 716-425-2833).



Monkeybuilder



Monkeymath
by Dennis Zander
\$24.95

Monkeynews
by Dennis Zander
\$29.95

Monkeybuilder
by Dean Kindig and Rob Fitter
\$29.95



Artworx[®]

Educational Software with a smile
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```

130 IF (PEEK(NP) <> B) AND (PEEK(NP) <> 96) THENP
OKEV, 0: POKES4, 0: GOTO 300 :rem 199
140 POKEAP, B: POKEAC, C1: POKENP, AD: AP: NP: NE
XT: POKEAP, B: POKEV, 0: POKES4, 0: RETURN :rem 16
199 REM STILL CHECKER :rem 4
200 IFD <> 0 THEN RETURN :rem 30
210 IFJC=192 THEN D=1: RETURN :rem 131
220 IFJC=193 THEN D=-1: RETURN :rem 178
230 IFJC=195 THEN D=22: RETURN :rem 187
240 IFJC=194 THEN D=-22: RETURN :rem 232
250 IFJC=197 THEN D=21: RETURN :rem 190
260 IFJC=198 THEN D=-23: RETURN :rem 239
270 IFJC=194 THEN D=-21: RETURN :rem 234
280 D=23: RETURN :rem 154
299 REM DEATH :rem 238
300 IF PEEK(NP) < 192 THEN POKEAP, B: RETURN :rem 133
310 IF C1=0 THEN 330 :rem 201
312 POKELB, B: LB=LB+1: GOSUB 600 :rem 0
315 IFLB=SC+7 THEN 60000 :rem 224
317 XX=1: RETURN :rem 211
330 POKELR, B: LR=LR+1: GOSUB 610 :rem 49
335 IFLR=SC+18 THEN 6010 :rem 37
340 XX=1: RETURN :rem 207
400 NA=20: AT=20: PRINT "{HOME}{BLK}"; NA: SPC
(14); "{RED}"; AT :rem 234
410 PRINT "{BLU}{HOME}{2 DOWN}{RVS}"; SPC(8
); "ROUND"; RN; "{OFF}": RN=RN+1: RETURN :rem 150
600 DP=UP: OM=U2: GOTO 620 :rem 177
610 DP=U2: OM=UP :rem 167
620 POKEAP, B: POKEOM, B: FORK=210 TO 208 STEP -1
: POKEDP, K: FORH=1 TO 100: NEXT: NEXT :rem 189
630 POKEDP, 211: GOSUB 7000: POKEDP, B: POKEUP,
B: POKEU2, B: RETURN :rem 252
650 IFJC=196 THEN D=21: RETURN :rem 193
1000 PRINT "{CLR}{BLK} LOADING CHARACTER SE
T INTO MEMORY. . .": PRINT CHR$(142) :rem 121
1010 FOR I=5120 TO 7168: POKEI, PEEK(I+27648):
NEXT :rem 188
1020 POKE 36869, 253 :rem 200
1045 IF PEEK(13983)=102 THEN 1060 :rem 157
1090 FOR NP=6656 TO 6815: READ MD: POKENP, MD: NE
XT :rem 254
1100 GOTO 1 :rem 44
1999 REDEFINED CHARACTERS :rem 66
2000 DATA 102, 227, 241, 159, 159, 241, 227, 102 :rem 216
2010 DATA 102, 199, 143, 249, 249, 143, 199, 102 :rem 235
2020 DATA 126, 219, 153, 24, 60, 231, 231, 126 :rem 113
2030 DATA 126, 231, 231, 60, 24, 153, 219, 126 :rem 114
2040 DATA 60, 6, 207, 253, 201, 201, 124, 60 :rem 6
2050 DATA 60, 62, 147, 147, 191, 243, 96, 60 :rem 36
2060 DATA 60, 96, 243, 191, 147, 147, 62, 60 :rem 37
2070 DATA 60, 124, 201, 201, 253, 207, 6, 60 :rem 9
2082 DATA 0, 132, 66, 63, 66, 132, 0, 0, 0, 33, 66, 2
52, 66, 33, 0, 0, 16, 56, 84, 16, 16, 16, 40, 68 :rem 233
2084 DATA 68, 40, 16, 16, 16, 84, 56, 16, 7, 3, 5, 8,
16, 224, 32, 32, 4, 4, 7, 8, 16, 160, 192, 224 :rem 202
2086 DATA 224, 192, 160, 16, 8, 7, 4, 4, 32, 32, 224
, 16, 8, 5, 3, 7 :rem 39
2088 DATA 0, 0, 8, 16, 4, 16, 0, 0 :rem 26
2090 DATA 0, 0, 20, 10, 32, 20, 0, 0 :rem 99
2092 DATA 68, 9, 32, 132, 1, 40, 130, 17 :rem 78
2093 DATA 0, 0, 0, 0, 0, 0, 0, 0 :rem 156
2094 REM DATA 126, 90, 126, 60, 0, 102, 24, 102 :rem 190
2605 IFJC=198 THEN D=-23: RETURN :rem 36
2999 REM PLAYFIELD :rem 91
3000 PRINT "{7 SPACES} OLYMPIAD" :rem 243
3010 PRINT "U*[R]*****[R]*I"; :rem 82
3020 PRINT "- {16 SPACES} - [RED] [+]{BLU}
-"; :rem 38
3030 PRINT "- {3 SPACES} U**I U**I U**
I {3 SPACES} -"; :rem 230
3040 PRINT "- {3 SPACES} J**K {SHIFT-SPACE}
J**K {SHIFT-SPACE} J**K {3 SPACES} -
"; :rem 12
3050 PRINT "- {20 SHIFT-SPACE} -"; :rem 14
3060 PRINT "- U***I {8 SPACES} U***I
{SHIFT-SPACE} -"; :rem 235
3070 PRINT "- {SHIFT-SPACE} J***K
{8 SPACES} J***K {SHIFT-SPACE} -"; :rem 122
3080 PRINT "- {2 SHIFT-SPACE} {5 SPACES} U
[W] {2 SPACES} [O] I
{5 SHIFT-SPACE} -"; 2 spaces :rem 237
3090 PRINT "- {6 SPACES} UK {4 SPACES} JI
{2 SPACES} UI {2 SPACES} -"; :rem 99
3100 PRINT "- {2 SPACES} UI {2 SPACES} -
{6 SPACES} - UKJI J"; :rem 2
3110 PRINT "K UKJI - {2 SPACES} {RED} [+]{
BLK} [+]{BLU} {2 SPACES} - JIUK
{2 SPACES}"; :rem 211
3120 PRINT "{2 SPACES} JIUK - {2 SPACES}
{BLK} [+]{RED} [+]{BLU}
{2 SHIFT-SPACE} - {2 SPACES} JK
{2 SPACES} U"; :rem 128
3130 PRINT "I {2 SPACES} JK {2 SPACES} -
{6 SHIFT-SPACE} - {6 SPACES} -"; :rem 136
3140 PRINT "- {SHIFT-SPACE} {4 SPACES} JI
{4 SHIFT-SPACE} UK {6 SPACES} -"; :rem 225
3150 PRINT "- {7 SPACES} J[W] {2 SPACES}
[Q] K {7 SPACES} -"; :rem 130
3155 PRINT "- U***I {8 SPACES} U***I -
"; :rem 80
3160 PRINT "- J***K {8 SPACES} J***K -
"; {6 SPACES} :rem 58
3170 PRINT "- {20 SPACES} -"; :rem 145
3180 PRINT "- {3 SHIFT-SPACE} U**I U**I
{SHIFT-SPACE} U**I {3 SHIFT-SPACE} -
"; :rem 76
3190 PRINT "- {3 SPACES} J**K {SHIFT-SPACE}
J**K {SHIFT-SPACE} J**K {3 SPACES} -
"; :rem 18
3200 PRINT "- {BLK} [+]{BLU} - {16 SPACES} -
{SPACE} -"; :rem 154
3210 PRINT "J*[E]*****[E]*"; :rem 126
3220 POKE 505+SCR+A, 6: POKE 505+SCR, 75 :rem 31
3225 FOR I=0 TO 2: POKECO+LB+I, 0: POKELB+I, 195
: POKECO+LR+I, 2: POKELR+I, 194 :rem 211
3226 NEXT :rem 12
3230 RETURN :rem 168
3999 REM HIT DATA :rem 193

```


Games from MMG keep you on the run!

PYRAMID RUN by Mike Marsico & Ed Annunziata

You'll be running for your life when you enter the forbidden pyramid. You're the first person in over 3000 years to have successfully reached the bottom level of the Great Pyramid of the Egyptian Pharaoh Cheotemkahmen, supreme ruler of the Fifth Dynasty, and the jewels and riches are yours to collect! All that remains is to take whatever you can carry, and climb to the top of the pyramid. However, there are still one or two problems to overcome before spending your newly found wealth. The Great Royal Court Sorcerers of the Fifth Dynasty were charged by Cheotemkahmen with the responsibility of ensuring that his eternal sleep should be undisturbed. They ensured that Demons of the Dark Places would be loosed on any trespasser, and now you've got to conquer them to reach your freedom. Monsters, lightning bolts, radioactive fire, and much more, lie between you and your escape. PYRAMID RUN is a race against time and the Demons of the Dark Places, set upon a scrolling view of the tunnels of the Great Pyramid. You may choose to begin at any of five levels of difficulty. Fantastic full color graphics and spectacular sound effects highlight this game, with dozens of the most hideous and original monsters in computer gaming. In addition, PYRAMID RUN is another of the MMG games which are two in one: as you complete each pyramid, you play a totally different interlude board, for the chance to win additional lives for your next, and more difficult run through the pyramid. PYRAMID RUN requires a disk drive, one joystick and 48K. Suggested retail price: \$29.95



PHOENIX LAIR

It's a dangerous flight when you are the Phoenix on a search and destroy mission to find enemy eggs. At the beginning of each board, you must leave your nest in search of enemy eggs. After successfully destroying at least six of these eggs, you must return to the far right side of your lair. Points are awarded based on the number of eggs destroyed and the time it takes to complete the mission. A fast mission will result in additional bonus points. You begin with 5 lives and gain additional lives at boards 7, 9, and 10 (if you make it that far). The ten increasingly difficult boards can be played at any of ten speeds and the obstacles you will encounter will make your mission a nightmare. Multiple strategies and bright and lively colors and music add to the already superb play of this completely unique and different game. PHOENIX LAIR also features MMG's interlude board, a head-to-head joust with the Pharis Hailex, principal knight of the Kingdom of Pharis. Successful unseating of the Knight without being hit by his mount gains bonus points. It's like getting two games for the price of one. PHOENIX LAIR requires a disk drive, one joystick and 40K. Suggested retail price: \$29.95

Available at your favorite computer store or send check or money order to: MMG Micro Software
PO Box 131 Marlboro, NJ 07746
or call: (201) 431-3472
Please add \$3.00 for postage and handling. Use your Visa, MasterCard or order C.O.D. N.J. residents please add 6% sales tax.



For Atari and Commodore Computers.
Atari is a registered trademark of Atari, Inc.
Commodore is a registered trademark of Commodore Business Machines, Inc.


```

4000 IFPEEK(UP) <> HP THEN UP=OP: RETURN
                                : rem 74
4010 RF=INT(RND(1)*482)+RO: IFPEEK(RF) <> BT
    HEN4010                      : rem 87
4020 UP=RF: POKEUP+CO,0: POKEOP,B: MP=UP: JP=
    JV: OP=UP: GOSUB5000: RETURN : rem 155
4100 IFPEEK(U2) <> HP THEN U2=O2: RETURN
                                : rem 241
4110 R2=INT(RND(1)*482)+RO: IFPEEK(R2) <> BT
    HEN4110                      : rem 49
4120 U2=R2: POKEU2+CO,2: POKEO2,B: MP=U2: JP=
    J2: GOSUB5000: O2=U2: RETURN : rem 178
5000 FORMN=208TO210: POKEMP,MN: FORW=1TO150
    : NEXT: NEXT: POKEMP,CS(JP): RETURN
                                : rem 255
5999 REM END ROUTINE          : rem 193
6000 WN$=" RED ":LS$=" BLACK ":GOTO6020
                                : rem 1
6010 WN$=" BLACK ":LS$=" RED " : rem 199
6020 PRINT "{CLR}{DOWN}{BLK} THE";WN$;"KNI
    GHTS"                        : rem 73
6030 PRINT " DEFEATED THE";:PRINTLS$
                                : rem 114
6040 PRINT " KNIGHTS IN ";RN-1;" ROUNDS"
                                : rem 221
6060 PRINT "{3 DOWN}PRESS SPACEBAR TO PLAY
    ":PRINT "{DOWN} ANY OTHER KEY TO END"
                                : rem 96
6063 POKE 198,0                : rem 252
6065 GETIS:IFI$=" "THEN6065    : rem 213
6067 IF I$<>" "THEN END       : rem 147
6070 CLR:GOTO1                : rem 82
6999 REM DEATH SOUND          : rem 180
7000 POKEV,12:POKES4,150:FORI=12TOLSTEP-1
    :FORJ=1TO30                : rem 228
7010 NEXT J:POKEV,I:NEXTI:POKES4,0:RETURN
                                : rem 173

```

Program 3: Olympiad For Atari

Refer to the "Automatic Proofreader" article before typing this program in.

```

KP 1 CLOSE #1: OPEN #1,4,0,"K": GRAPHIC
    S 0: POKE 752,1: POKE 82,0: GOSUB 10
    00: POKE 756,CHSET/256
LB 2 DIM X(15),CS(15),D2(15),C2(15),DX
    (10),LS$(6),WN$(6)
NH 4 N=15:B=0:JB=16:FB=0:FC=0
GP 10 RN=1
CL 11 LB=PEEK(88)+PEEK(89)*256+10:LR=L
    B+17:GOSUB 3000
DG 20 DX(0)=0:DX(1)=-40:DX(2)=40:DX(4)
    =-1:DX(5)=-41:DX(6)=39:DX(8)=1:D
    X(9)=-39
AI 22 D2(0)=0:D2(1)=-40:D2(2)=40:D2(4)
    =-1:D2(5)=-41:D2(6)=39:D2(8)=1:D
    2(9)=-39
OJ 25 DX(10)=41:CS(0)=100:CS(1)=99:CS(
    2)=100:CS(4)=98:CS(5)=103:CS(6)=
    102
OA 27 D2(10)=41:C2(0)=99:C2(1)=99:C2(2)
    =100:C2(4)=98:C2(5)=103:C2(6)=1
    02
KM 30 CS(8)=97:CS(9)=101:CS(10)=104
EL 32 C2(8)=97:C2(9)=101:C2(10)=104
IB 34 GOSUB 400: POSITION 17,4:FOR I=1
    TO 500:NEXT I: ? "{8 SPACES}"
KB 55 OP=PEEK(88)+PEEK(89)*256+41:O2=O
    P+877:CK=OP
DP 60 IF NA+AT=0 THEN RN=RN-1:POKE OP,
    0:POKE O2,0:GOTO 34
FP 61 JV=N-STICK(0):FR=STRIG(0):CS(0)=
    CS(JV):UP=OP+DX(JV)

```

Typing Olympiad

All three versions of "Olympiad" make extensive use of keyboard graphics in drawing the arena display. To avoid confusion and possible typing errors, please refer to the article "How To Type COMPUTE!'s Programs" before you attempt to enter these programs.

For the 64 version (lines 3010-3220) and VIC version (lines 3010-3210), pay close attention to the places where program lines are divided on the page. If any spaces are to be left after the characters on one line of the page, the correct number of spaces will be indicated in braces at the beginning of the next line. Unless you are specifically instructed to type spaces, do not do so. For example, in the statement below there should be no spaces between the SHIFTed characters on the first line and the cursor lefts at the start of the second, and only four spaces (as specified in the braces) should be typed between the SHIFTed characters at the end of the second line and those at the beginning of the third.

```

400 PRINT"-[R]JCCCCCK{2 SPACES}JCCCCCK
    {6 LEFT}{2 DOWN}JCCCCCCCCCCCCCK
    {4 SPACES}JCCCCCK"; : rem 128

```

In the Atari version, many special graphics characters are used in lines 3010-3240. Be sure you understand how to type these before you start. In particular, the vertical bar character (|) used frequently in these lines is obtained by pressing the SHIFT and = keys simultaneously.

```

EE 65 IF PEEK(UP) <> B THEN GOSUB 4000
BP 70 POKE OP,B:POKE UP,CS(JV):OP=UP
EA 75 IF FR=0 THEN GOSUB 100
DC 80 J2=N-STICK(1):F2=STRIG(1):C2(0)=
    C2(J2):U2=O2+D2(J2)
CJ 85 IF PEEK(U2) <> B THEN GOSUB 4100
CK 90 POKE O2,B:POKE U2,C2(J2)+128:O2=
    U2
CD 95 IF F2=0 THEN GOSUB 110
AP 97 GOTO 60
CL 100 IF NA=0 THEN RETURN
EL 101 NA=NA-1
EP 102 POSITION 4,0: ? "{2 LEFT}";NA;
    :IF NA<10 THEN ? "{R}"
HJ 103 D=DX(JV):JC=CS(JV):GOSUB 200
JN 105 AP=UP+D:C1=0:GOTO 115
DC 110 IF AT=0 THEN RETURN
FI 111 AT=AT-1
IP 112 POSITION 34,0: ? "{2 LEFT}";AT;
    :IF AT<10 THEN ? "{R}"
OL 113 D=D2(J2):JC=C2(J2):GOSUB 200
HH 114 C1=2:AP=U2+D

```


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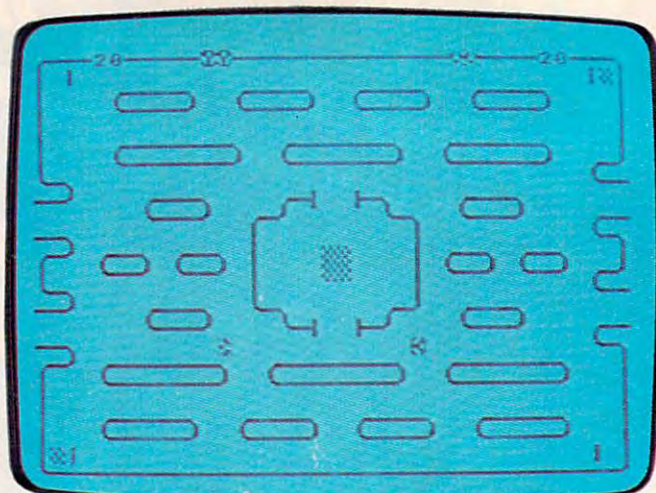
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```

DE 115 AD=JC+8: IF PEEK(AP)<>B THEN RET
URN
IG 120 FOR A=1 TO 15:FOR AA=1 TO 5:NEX
T AA:NP=AP+D: IF PEEK(NP)<>B THE
N 300
LB 140 SOUND 3,10,8,7:POKE AP,B:POKE N
P,AD:AP=NP:NEXT A:SOUND 3,0,0,0
:POKE AP,B:RETURN
BO 200 IF D<>0 THEN RETURN
LJ 210 IF JC=99 THEN D=-40:RETURN
KM 220 IF JC=100 THEN D=40:RETURN
IH 230 IF JC=98 THEN D=-1:RETURN
NP 240 IF JC=103 THEN D=-41:RETURN
LJ 250 IF JC=102 THEN D=39:RETURN
FM 260 IF JC=97 THEN D=1:RETURN
OH 270 IF JC=101 THEN D=-39:RETURN
JK 280 D=41:RETURN
PJ 300 SOUND 3,0,0,0:POKE AP,B: IF (PEE
K(NP)<97 OR PEEK(NP)>116) AND P
EEK(NP)<205 THEN RETURN
JO 305 IF NP<CK THEN RETURN
MJ 310 IF C1=0 THEN 330
AL 312 POKE LB,82:LB=LB+1:FB=FB+1:GOSU
B 600
BE 314 IF FB=3 THEN 6000
DL 317 GOTO 34
DO 330 POKE LR,82:LR=LR+1:FC=FC+1:GOSU
B 610
BJ 335 IF FC=3 THEN 6010
DH 340 GOTO 34
LO 400 NA=20:AT=20:POSITION 17,4: ? "
GUNE ":RN:RN=RN+1:POKE 752,1
CG 405 POSITION 4,0: ? NA:POSITION 34,0
: ? AT
MM 410 POKE PEEK(88)+PEEK(89)*256+959,
1:RETURN
LB 600 DP=UP:OM=U2:GOTO 620
KH 610 DP=U2:OM=UP
CD 620 POKE AP,B:POKE OM,B:FOR K=115 T
O 113 STEP -1:POKE DP,K:FOR H=1
TO 50:NEXT H:NEXT K
AA 630 POKE DP,116:GOSUB 7000:POKE DP,
B:POKE UP,B:POKE U2,B:RETURN
FD 1000 REM CHR. SET LOADER
KB 1010 POKE 752,1:POSITION 3,2: ? "LOA
DING CHARACTER SET INTO MEMORY
"
HE 1020 CHSET=(PEEK(106)-8)*256:FOR I=
0 TO 1023:POKE CHSET+I,PEEK(57
344+I):NEXT I
EG 1025 ? "{CLEAR}":POSITION 8,2: ? "RE
DEFINING CHARACTER SET":RESTOR
E 1045
NF 1030 READ A: IF A=-1 THEN RETURN
CN 1035 FOR J=0 TO 7:READ B:POKE CHSET
+A*B+J,B:NEXT J
MC 1040 GOTO 1030
GO 1045 DATA 1,24,24,56,240,192,0,0,0
MN 1050 DATA 5,24,24,12,15,3,0,0,0
HE 1055 DATA 3,0,0,0,192,224,48,24,24
JO 1060 DATA 4,0,0,0,3,7,12,24,24
HM 1063 DATA 97,102,227,241,159,159,24
1,227,102
JB 1065 DATA 98,102,199,143,249,249,14
3,199,102
BJ 1067 DATA 99,126,219,153,24,60,231,
231,126
DK 1069 DATA 100,126,231,231,60,24,153
,219,126
MG 1070 DATA 101,60,6,207,253,201,201,
124,60
OG 1072 DATA 102,60,62,147,147,191,243
,96,60
OJ 1074 DATA 103,60,96,243,191,147,147

```



"Olympiad," Atari version.

```

,62,60
MP 1076 DATA 104,60,124,201,201,253,20
7,6,60
NM 1078 DATA 105,0,132,66,63,66,132,0,
0
KH 1080 DATA 106,0,33,66,252,66,33,0,0
CF 1085 DATA 107,16,56,84,16,16,16,40,
68
CC 1090 DATA 108,68,40,16,16,16,16,84,
56
ID 1095 DATA 109,7,3,5,8,16,224,32,32
NH 2000 DATA 110,4,4,7,8,16,160,192,22
4
NJ 2010 DATA 111,224,192,160,16,8,7,4,
4
HC 2020 DATA 112,32,32,224,16,8,5,3,7
MD 2030 DATA 113,0,0,8,16,4,16,0,0
CA 2040 DATA 114,0,0,20,10,32,20,0,0
AL 2050 DATA 115,68,9,32,132,1,40,130,
17
FK 2060 DATA 116,0,0,0,0,0,0,0,0
GN 2065 DATA 6,204,204,51,51,204,204,5
1,51
EB 2070 DATA -1
EL 3000 POKE 712,152:POKE 710,152:POKE
709,144:POKE 559,0
JB 3010 ? "{R} {R}ddd{14 R}ccc
{4 R} {3 R}#";
JJ 3020 ? "I {34 SPACES}I&I";
LI 3030 ? "I{4 SPACES}{4 R}# {4 R}#
{4 R}# {4 R}#{4 SPACES}I"
;
LF 3040 ? "I{4 SPACES}%{4 R}! %{4 R}!
%{4 R}! %{4 R}!{4 SPACES}I"
;
HO 3050 ? "I{38 SPACES}I";
LM 3060 ? "I{4 SPACES}{7 R}# {7 R}#
{6 R}#{4 SPACES}I";
JF 3070 ? "I{4 SPACES}%{7 R}! %{7 R}!
%{6 R}! {R}!";
CM 3080 ? "%{R}#{34 SPACES}%{2 R}";
DJ 3090 ? "%{2 R}!{4 SPACES}{3 R}#
{4 SPACES}{R}{D} {A}{R}#
{4 SPACES}{3 R}#{7 SPACES}";
HD 3100 ? "%{7 SPACES}%{3 R}! {R}!
{6 SPACES}%{R}# %{3 R}!
{4 SPACES}{2 R}";
BM 3110 ? "%{2 R}#{11 SPACES}I
{10 SPACES}I{11 SPACES}%{R}#";

```



```

EH 3120 ? "$ {R}! $ {2 R}# $ {2 R}# 1
      {4 SPACES}&& {4 SPACES} 1 $ {2 R}
      # $ {2 R}# {3 SPACES} 1";
EE 3130 ? "1 {3 SPACES} % {2 R}! % {2 R}!
      {4 SPACES}&& {4 SPACES} 1 % {2 R}
      ! % {2 R}! $ {R}!";
CB 3140 ? "% {R}# {11 SPACES} 1 {10 SPACES}
      {11 SPACES} % {2 R}";
HH 3150 ? "% {2 R}! {4 SPACES} $ {3 R}# %
      {R}# {6 SPACES} $ {R}! $ {3 R}#
      {7 SPACES}";
DH 3160 ? "% {7 SPACES} % {3 R}!
      {4 SPACES} % {R} {D} {A} {R}!
      {4 SPACES} % {3 R}! {4 SPACES} $
      {2 R}";
CK 3170 ? "% {2 R}# {34 SPACES} % {R}#";
LD 3180 ? "$ {R}! $ {7 R}# $ {8 R}# $
      {7 R}# {3 SPACES} 1";
OB 3190 ? "1 {3 SPACES} % {7 R}! % {8 R}!
      % {7 R}! {3 SPACES} 1";
HL 3200 ? "1 {38 SPACES} 1";
NM 3210 ? "1 {3 SPACES} $ {5 R}# $ {4 R}#
      $ {4 R}# $ {5 R}# {3 SPACES} 1";
;
NJ 3220 ? "1 {3 SPACES} % {5 R}! % {4 R}!
      % {4 R}! % {5 R}! {3 SPACES} 1";
;
JM 3230 ? "1 & 1 {34 SPACES} 1 1";
FI 3240 ? "% {38 R}";
GO 3245 POSITION 0,0:POKE 559,34
OH 3250 POKE PEEK(88)+PEEK(89)*256+959
      ,1
KL 3260 RETURN
OI 4000 IF PEEK(UP)<>6 THEN UP=OP:RETU
      RN
HO 4010 RF=INT(RND(1)*959)+PEEK(88)+PE
      EK(89)*256:IF PEEK(RF)<>B THEN
      4010

```

```

LJ 4020 UP=RF:POKE OP,B:MP=UP:JP=JV:GO
      SUB 5000:RETURN
IP 4100 IF PEEK(U2)<>6 THEN U2=02:RETU
      RN
FI 4110 R2=INT(RND(1)*959)+PEEK(88)+PE
      EK(89)*256:IF PEEK(R2)<>B THEN
      4110
CI 4120 U2=R2:POKE 02,B:MP=U2:JP=J2:GO
      SUB 5000:RETURN
MG 5000 FOR MN=113 TO 115:POKE MP,MN:F
      OR W=1 TO 25:SOUND 3,W+50,10,9
      :NEXT W:NEXT MN:POKE MP,CS(JP)
      :SOUND 3,0,0,0:RETURN
GC 6000 WN$=" RED":LS$=" BLACK":T1=4:T
      2=4:GOTO 6020
CI 6010 LS$=" RED":WN$=" BLACK":T1=3:T
      2=5
NM 6020 ? "% {CLEAR}":POSITION T1,1:?"T
      HE":WN$;" KNIGHTS WERE VICTORI
      OUS"
MD 6030 POSITION T2,4:?"THEY DEFEATED
      THE":LS$;" KNIGHTS"
OD 6040 POSITION 14,7:?"IN ";RN-1;" R
      OUNDS"
MC 6050 POSITION 4,19:?"PRESS <<SPACE
      BAR>> TO PLAY AGAIN"
CD 6055 POSITION 7,22:?"PRESS ANY OTH
      ER KEY TO END"
OP 6060 GET #1,I:IF I=0 THEN 6060
JI 6070 IF I=32 THEN POSITION 0,0:POKE
      756,CHSET/256:GOTO 4
GE 6080 CLOSE #1:GRAPHICS 0:END
LC 7000 SOUND 3,80,8,15:SOUND 2,100,7,
      12:FOR I=1 TO 250:NEXT I:SOUND
      2,0,0,0:SOUND 3,0,0,0:RETURN
KF 8010 DATA 68,12,68,25,81,12,81,25,8
      1,12,81,25

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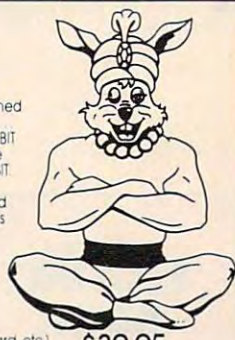
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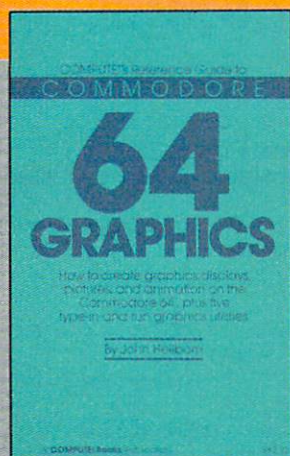
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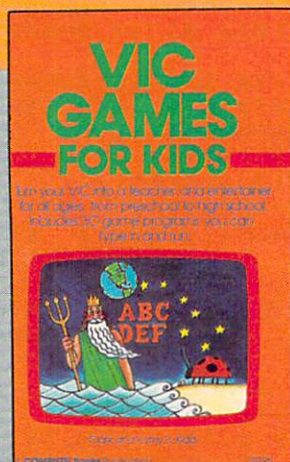
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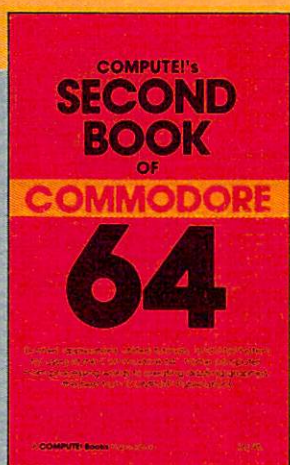
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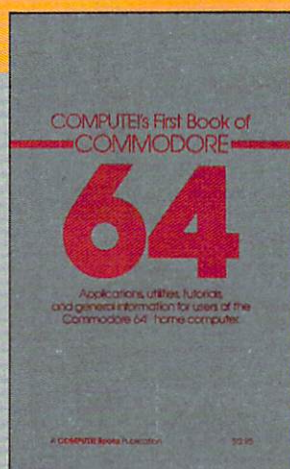
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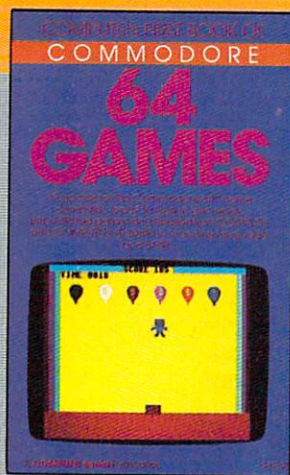
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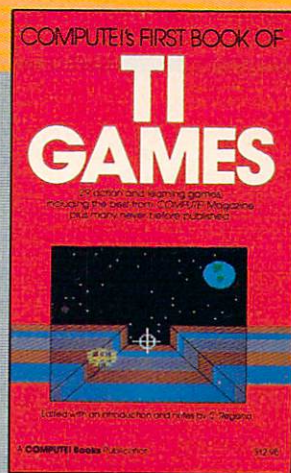


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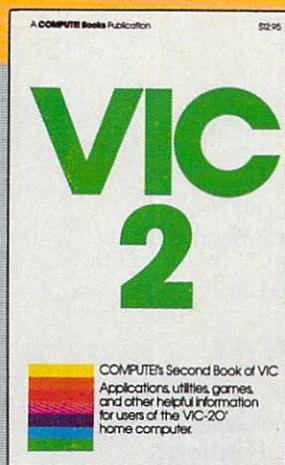
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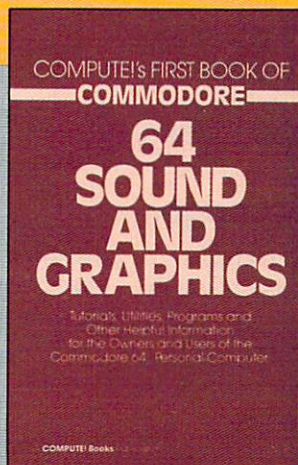


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REVIEWS

MailPro

Elizabeth Deal

MailPro, by Pro-Line Software Ltd., is a general filing system for Commodore computers. Versions are available for PETs with 4.0 BASIC as well as the Commodore 64. The Commodore 64 version is reviewed here. I believe that other versions have comparable features.

MailPro works well with *WordPro*, Pro-Line's word processor, and may well be compatible with others, since it outputs normal sequential files.

MailPro on the Commodore 64 uses one 1541 drive and just about any kind of printer. It is up to you to describe the configuration.

A General Data Manager

MailPro is designed to handle mailing lists, but can just as easily handle any kind of information you need to store: catalogs of records or books, bibliographies, student records, or any kind of business files.

The manual is complete. It takes the user from the beginning of setting it all up, through all its variations, to the results. It is both tutorial and descriptive. The only thing I miss in the book is an index of all available keys and functions: A summary would be nice to have. But a list of contents is clearly shown up front, so finding information is not difficult.

The best illustrations are at the end of the book, where a complete example is thoroughly worked out. If anything is un-

clear in the manual, it becomes easily understood when you go through that example.

MailPro is a pleasure to use. The screen prompts are well done, and it is difficult to botch a job—the computer helps you while you're creating and retrieving files. Setting up the original file is easy; just specify what sort of information will be stored: alphabetic, numeric, yes-no type, sorted, not sorted, etc. The maximum length of each variable is specified next, and so on; you design the screen as you go along. The screen can scroll sideways if any field is larger than 40 columns.

Simple Data Entry

Entering the information is simple, too. Cursor keys act as they normally do on the Commodore computers, with some elaborations. For example, you can jump from field to field easily by using the cursor keys. You can edit the information, and easily abort any function.

Mailpro permits manual entry. It also works with existing files, and allows the user to combine the two processes to manually fill in missing information during file entry. It's a well-thought-out, flexible system.

In addition, *MailPro* can process an existing *WordPro* sequential file. This worked very well in my PET-64 system. *MailPro* just gobbled up the whole *WordPro* file in no time, filling in the variables I defined. The computer did all the tedious work a million times faster than I could have.

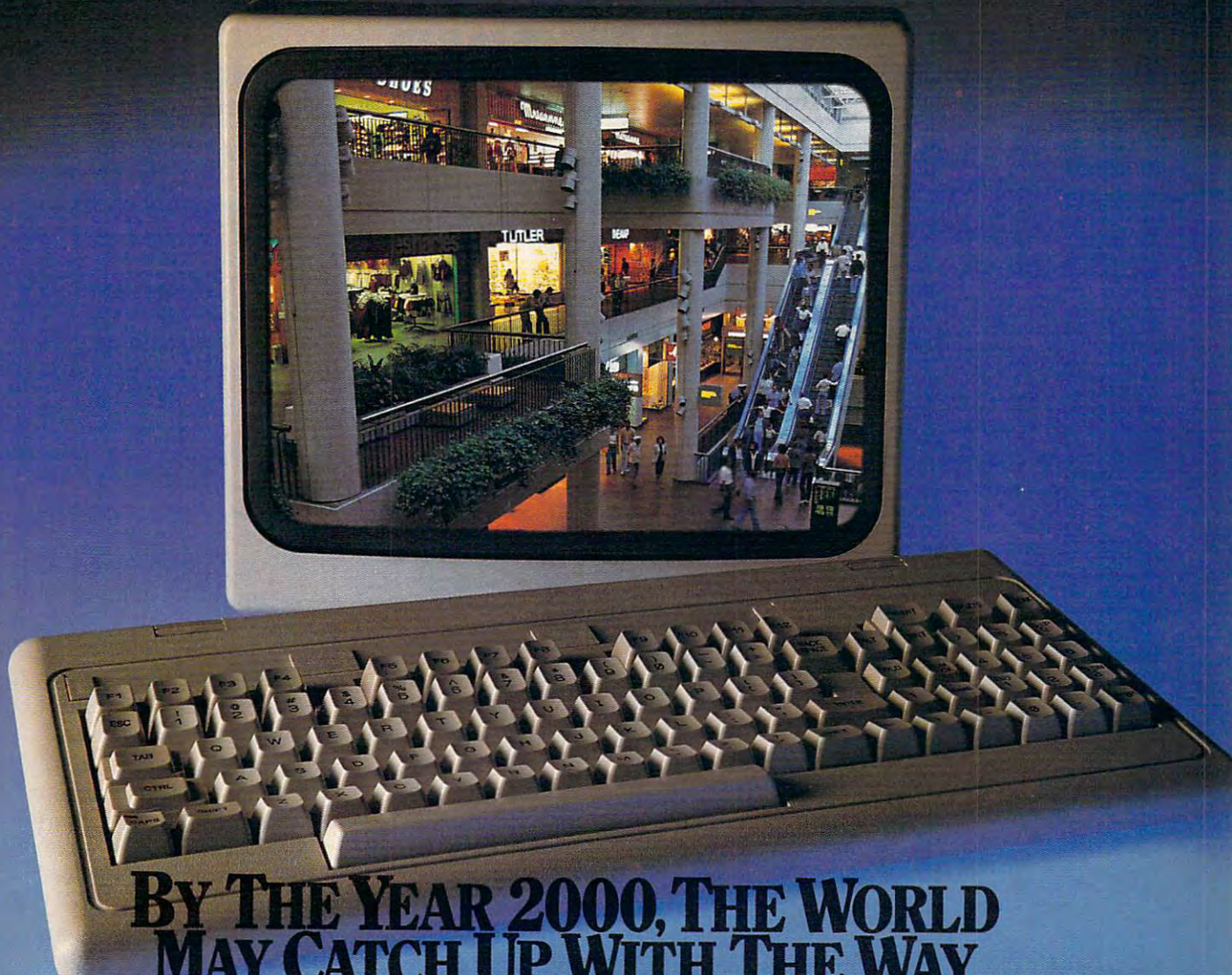
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Changing information also is easy. You can add records at any time, of course, and change the information in existing records.

For straightforward data retrieval, use the screen. If you ask for JONES, all the records (one at a time) containing JONES are displayed. You can ask to go forward or backward in the file, of course.

Fancier retrieval involving complex search criteria can be performed on the printer (or disk). Here you define the output format. It can be a simple list, or it can be a fairly complex report with headings, paging, and extra text.

A Report Generator

The versatility of the system really shows up in the report generator. Instructions for producing reports take up about half of the entire manual.

MailPro writes relative files.

The total record length can be 254 bytes; the total number of records on one 1541/4040 floppy is over four thousand. A batch of 127 records can be entered at one time, and the information is sorted during entry. It's a complex system of sorting, and an elegant one, with unlimited key fields. The manual warns that the original sort can take quite awhile, but I haven't run into any serious time delays yet.

Several files are set up, including descriptive files of each field, field sort information, and, of course, the data you enter. In addition, there are output de-

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scriptor files, which allow the user to define and redefine up to ten different output formats (printer or sequential disk files). The output format files are of the USR type, but they are created as normal files, so that the disk **VALIDATE** (**COLLECT** in BASIC 4.0) does not erase them.

File Conversion

The relative files can be read by *MailPro*, but the program can output sequential versions of those files. They can contain all of the original information (in sorted order on the variable of your choice) or any selected portions of it—perhaps only addresses of people who live in a certain zip code area. Those files can then be easily read from another program such as *WordPro* or a BASIC program of your own making.

MailPro's main options include looking at the disk directory of existing files, creating new files, editing field names, adding records, recalling them, entering new records (manual or merging), and printer or disk output.

The editor options include use of the cursor keys and function keys.

To create a new file, these options are available: specifying number of fields, their sizes (maximum 99 characters per field), and type (alphabetic, numeric, yes/no, sorted/unordered, etc.).

File Management

To manage an existing file, you can display and print a record, change the information, delete a record, and add records, in a variety of ways.

To specify how a final report is to look, you can ask for a simple listing of everything on a file (such as mailing labels) or you can ask for output of records that match specific criteria. The formatting features include right and left justification, aligned decimal output, compressed output (no spaces), page headings,

page numbering, overall margins, sequencing, and tabbing. Print formats can be stored for later use, and up to ten can be defined. They can be redefined at any time. The existing screen image can be dumped to a printer at any time.

Overall, *MailPro* is fairly easy to set up, use, and maintain. It permits easy report generation. It is flexible for use with any kind of data. The sequential files written by *MailPro* can be read into *WordPro* or used as stand-alone files for other systems. The disk management is excellent, errors are trapped, and the files can be copied or duplicated by normal procedures. The whole system is solidly built. If you need a versatile data manager, this one is worth looking into.

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Promenade EPROM Programmer For VIC And 64

Sheldon Leemon

Most computer users would agree that cartridge-based software, which plugs right into the computer and is ready to run instantly, is the most convenient to use. In order to create software cartridges at home, however, you need a machine to store programs on EPROM (Erasable, Programmable Read Only Memory) chips.

Some EPROM programmers are difficult to use or prohibitively expensive. One notable exception is the Promenade from Jason-Ranheim. Most programmers in its under-\$100 range are little more than bare circuit boards which may be difficult to install. The Promenade, however, is a professional-looking unit which comes in a compact aluminum case approximately 4½ inches square.

It plugs directly into the user port on the back of the VIC or 64, and since it takes all of its power directly from the computer, no other connections are necessary. On the top of the case is a high-quality Zero Insertion Force socket. There are also three colored LEDs, which indicate when the unit is receiving power, when the socket is activated, and when actual programming is taking place.

Versatile Programmer

Its performance is even more impressive than its looks. Most programmers in its price range will only program a few lower-capacity EPROMs such as the 2716 or 2732 types. Others require that "personality modules" be added for each additional EPROM type. The Promenade, however, has several different programming voltages available under software control, so that it can program almost any type of EPROM OR EEPROM

now available.

The PROMOS 1.0 programming software, which accompanies the programmer, adds several new commands to BASIC. These commands are used to transfer data between the computer and the EPROM in the Promenade's socket. Besides being convenient to use, these BASIC commands offer several "smart" programming methods. This means that instead of taking seven minutes or more to program an 8K 2764 EPROM, the Promenade may be able to finish the job in eight or nine seconds.

The only part of this package that is less than first-rate is the instruction manual. Though adequate for the more experienced programmer, it is probably too brief for the total novice. Update sheets have recently been sent to registered owners, however, giving step-by-step instructions for saving BASIC and machine language programs on autostart cartridges. Further revisions of the manual are on the way.

Besides offering Promenade programmer, Jason-Ranheim also sells an assortment of blank EPROMs and cartridges.

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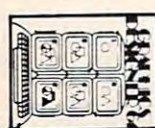
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Stickybear

Larry Ross

There has been a sudden increase in educational software for pre-schoolers and young children. Much of this software has been created to fill a gap, but cannot really be considered quality products. The Stickybear series, however, is an exception.

Stickybear ABC and *Stickybear Numbers* are educational programs designed for children ages three to six. *Stickybear Bop* is a game that the entire family can enjoy. All three programs emphasize graphics, sound, and simplicity. There are no menus or screen directions to deal with. The operation is straightforward. They are available for the Apple II or II+ with 48K and one disk drive (DOS 3.3).

Stickybear ABC

Stickybear ABC is designed so that even a three-year-old can operate it. The child simply presses a letter, and a beautifully animated high-resolution picture, complete with sound effects, appears on the screen. When the same letter is pressed again, a completely different picture appears.

The screen display features a large version of the letter which is selected. A word beginning with this letter is shown in uppercase.

The main objective of the program is to introduce the letters of the alphabet to the user and illustrate words beginning with these letters. In addition to this, *Stickybear ABC* is a thoroughly enjoyable way to accustom children to a computer. A basic introduction to the keyboard is also provided.

Stickybear ABC is part of a complete package. It is accompanied by *The Strawberry Look Book* by Richard Hefter, the creator of Stickybear and the illustrator of each of the Sticky-



A bear blowing a whistle is one of the displays that appears when a child using Stickybear ABC presses the W key.

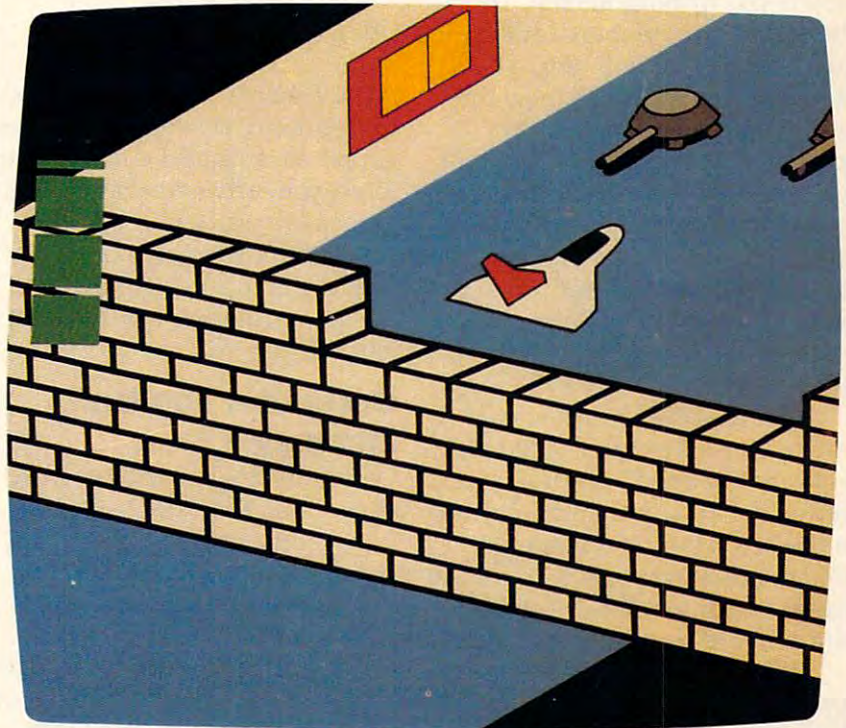
bear programs. This book is an account of what the bears see when they go shopping. The name of each item is printed next to it. The package also includes a direction card, a poster depicting each letter as it is shown in the program, and a sheet of Stickybear stickers.

Stickybear Numbers

Stickybear Numbers graphically illustrates the numbers from 0 to 9. Here, too, operation is simple

and the graphics and sound are excellent. The child can operate the program either by pressing a number or the space bar. Each time a number is selected, it is animated. The animations range from Stickybear scooping up sundaes to penguins jumping out of the water onto ice. As each number is pressed, a different picture appears. The pictures are randomly selected by the computer.

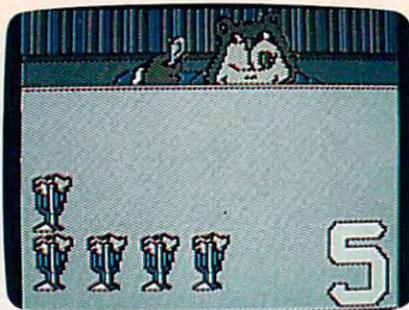
If the space bar is chosen instead of a number, the animation process is different. The first time the space bar is pressed, the number one is illustrated. The second time, one more object appears on the screen in the same setting until nine objects are finally depicted. Pressing the space bar after this point results in one object at a time being erased from the screen until no objects appear. This completes a cycle and another press of the space bar randomly accesses a



ZAXXON



Stickybear puckers up to kiss his mate when the K key is pressed in Stickybear ABC.



Stickybear Numbers graphically illustrates the numbers from 0 to 9. Here, Stickybear is about to eat 5 ice cream sundaes.



In Stickybear Bop, the player uses a paddle or joystick to launch a ball that knocks out the objects Stickybear juggles.

new animation and starts the procedure over again.

Stickybear Numbers is also part of a complete package which features a direction card, the *One Bear, Two Bears* number book by Richard Heffer, a Stickybear number poster, and a sheet of Stickybear stickers.

Stickybear Bop

Stickybear Bop is the game program in the Stickybear series. With a shooting gallery theme, the game opens as a large, smiling Stickybear moving slowly by, tipping his hat. At the same time, planets, ducks, and hats pass above him. The object of this round of the game is to "bop" ten objects off the screen using the flipper and ball which are positioned at the bottom of the screen. The player is supplied with ten balls. Each time an object is missed, the player loses a ball. The game ends when all ten balls have been used.

There are six rounds, each with different graphics. As objects are "bopped" off the screen, points are awarded and recorded in the score box. If a player is able to finish round six, there are still additional items to be bopped and the game continues.

While the game is designed for the whole family, young children will find round two to be difficult, though rewarding. Time and practice will help them improve. This is a good game to play as a family.

The graphics and animation are as appealing in *Stickybear Bop* as they are in the other two Stickybear programs. The program package includes a direction card, a poster of Stickybear, a Stickybear sticker sheet, and a Stickybear Bop game.

All three programs demonstrate their creators' awareness of what appeals to children.

Also, there appears to be a commitment to introducing the computer to children cleverly, enjoyably.

Stickybear Series
Distributed by:
Xerox Education Publications/
Weekly Reader
Computer Software Division
Dept. 1D, 245 Long Hill Road
Middletown, CT 06457
\$39.95 each



Two Games Of Strategy

Dale F. Brown

Avalon Hill has produced several high-quality strategy computer games that should challenge and interest nearly everybody. These games are written in BASIC—proof that fast-action, nerve-tangling computer games can still be written without machine language.

Computer Football Strategy

When my TV isn't doing word processing with the computer, it's usually tuned to a football game, so naturally the first Avalon Hill game I picked was *Computer Football Strategy* for the Commodore 64. The game display shows the football field as a small, thin strip divided with ten-yard lines. While you are playing, four graphics characters (two for the offense and two for the defense) run back and forth

on the field with the ball. It has no resemblance whatsoever to a real field, and it's not designed to simulate a real game. A field with X's and O's would have been more useful.

Above the field are the game statistics and scoreboard information. Below it are the displays showing the offensive and defensive play options. (You can play the computer, play another person, or have the computer play itself.) Each side picks either an offensive or a defensive play, and the ball advances depending on the plays called.

Each player has a playbook with all of the possible offensive plays paired with all the possible defensive plays, showing their outcomes. The offensive play has a certain amount of time built into it (it is not a realtime game), so you can either take

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the play or call a time-out and call another play.

The most impressive feature of this game is the numerous offensive and defensive options available. As quarterback, you can call 20 different plays from scrimmage, and depending on the defensive alignment, there can be ten different outcomes to each play. If you truly get into realistic role-playing in this type of game, you can re-create an actual football game with surprisingly accurate results.

However, I was expecting to watch my quarterback drop back to pass, watch my receivers run their button-hooks or down-and-ins, or watch my linebackers do their inside blitz, but the display doesn't show any of that. Also, some of the plays take some time. A sideline pass for a short 5- or 10-yard gain sometimes takes 10 to 15 seconds, and there are no hurry-up offenses. The game might be more realistic if more clock control were allowed.

This game is best when you play another person, rather than the computer. Maybe it's just sour grapes, but I seemed to get more penalties and fewer touchdowns while playing the computer. I always do better against a human opponent.

Take To The Skies

If I rated *Computer Football Strategy* as good, Avalon Hill's *B-1 Nuclear Bomber* rates a solid better. In *B-1 Bomber*, you are the captain of a supersonic bomber on airborne alert. As the game begins, you receive a message containing a fail-safe arming code, your primary target, a list of alternate targets, and a longer list of enemy defense complexes that can be targets for one of your six multipurpose Phoenix missiles. Your job is to fly your plane to the target of your choice, evading or countering the defenses along the way, and launch your single Short-Range Attack Missile (SRAM) at the target.

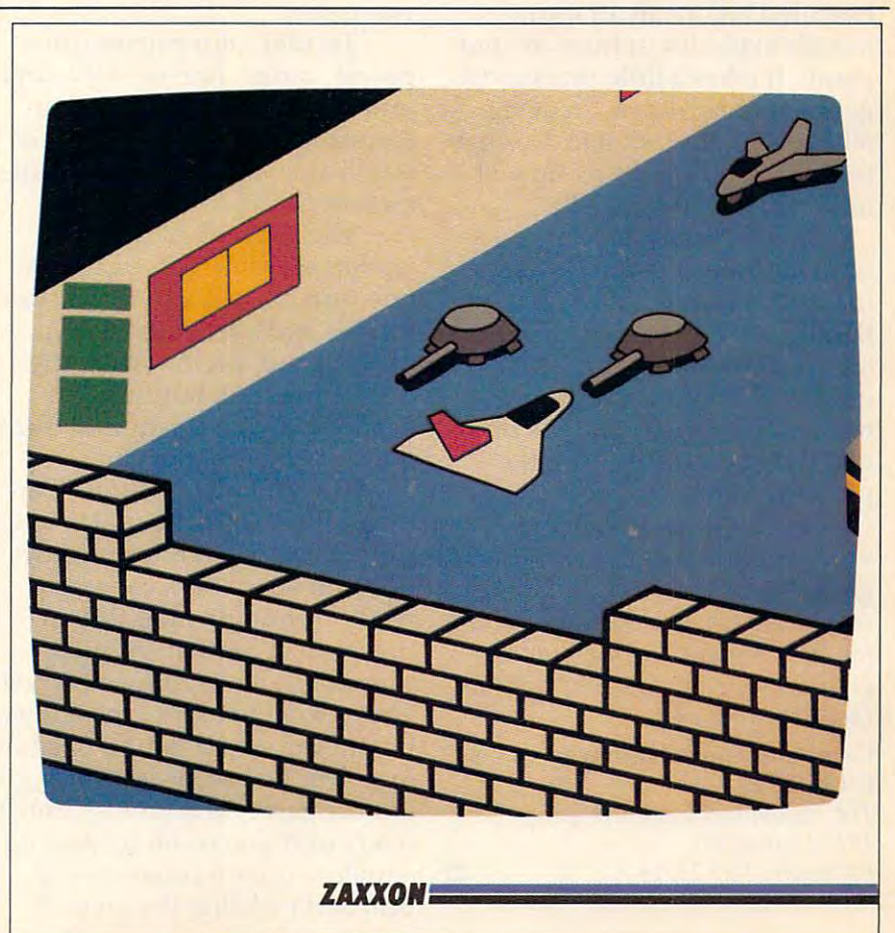
At the beginning, the game is agonizingly slow. Even flying at 4500 kilometers per hour, it will take you several minutes of simple droning to even get within range of a defense complex that may take any action against you.

Here's where the strategy comes in. You can attack any target on the list with your SRAM, and you can launch your Phoenix missiles at any defense complex in range. This means you can attack a base, then turn around and head for home before too many attackers find you. You can choose to fly around the enemy defense bases, or attack them head-on. You can launch your missiles at attacking fighters, or save them for the bases. Will you run out of missiles before you get to the enemy bases, or will you try to save the missiles and rely on electronic countermeasures (ECM, or jamming) and violent evasive maneuvers

to defeat the enemy fighters and surface-to-air missiles?

The action in the target area more than makes up for the long minutes of boredom flying towards the target. Once you reach the target area, you enter the fail-safe code to arm the attack missile. Here's where the action really begins. Arming the SRAM acts like a beacon to the enemy, saying "Hey! Here I am!" Soon, your screen fills with attackers. Each radar search tells you what kind of threat is attacking and how long it will be before it attacks. If you've used too much ECM before now, it becomes less and less effective. Evasive maneuvers start to use up more and more fuel and place you closer and closer to the ground.

The back of the game manual has a map of the targets and defense complexes. The computer will give you a heading toward any base you select, but you must put in your own head-



ings if you've run out of missiles and don't want to overfly a defense complex. A heading of 90 is east (right), 180 is south (down), etc.

The cockpit display is rather disappointing. There is a graphic depiction of a bomber cockpit, with a control column and throttles, but they don't really do anything and are a little distracting; some cockpit gauges or a simple route map might have been more interesting. The very bottom of the display shows present course, fuel, missiles remaining, speed, and primary target, but they're hard to read and hard to understand. The commands for navigation, defensive measures, and launching missiles are easy to understand, though.

Again, the game is not in realtime. Each command takes a certain amount of preprogrammed time, so an evasive maneuver command may not have enough time to be fully executed before an attacking missile explodes in front of your plane. It takes a little practice to get the timing down, so eventually you'll know what to do when the computer says, "a Mig will intercept in 32 seconds!"

In *B-1 Nuclear Bomber*, you can take advantage of the fact that these games are written in BASIC. Do you think six Phoenix missiles are too few for a beginner? Is 4500 kilometers an hour too slow? Is 24,000 pounds of fuel to start too little? A little poking around the program can change those parameters until you get more familiar with the game.

These two games are available for most popular microcomputers at prices ranging from \$16 for tape to \$21 for disk.

Computer Football Strategy
B-1 Bomber
The Avalon Hill Game Company
4517 Harford Rd.
Baltimore, MD 21214

Operation Whirlwind

James V. Trunzo

Operation Whirlwind, by Bröderbund, is a new and unique computer war game for the Atari 400/800/1200 computers. Bröderbund, heretofore better known for their superior arcade games and more recently their word processor, *Bank Street Writer*, has released a World War II strategy game that is in many ways, an original.

Computer war games usually bring to mind endless hours of tedious movement and even more tedious perusing of a book-length set of instructions. *Operation Whirlwind*, however, is simple to play, yet authentic and challenging.

All The Classic Moves

Operation Whirlwind, while not based on any specific battle or operation, adheres to all the subtleties that go into a first-class war game.

Terrain, movement, fire-power, range, line-of-sight, and unit disorganization are all incorporated into the game without the usual burden of a multitude of charts and tables.

The sequence of play for *Operation Whirlwind* consists of one turn broken into five distinct phases, each activated with a joystick and, on the Atari, the yellow function buttons. No keyboard input is required during any phase of the game.

The first phase is the Command Phase, during which you can either order your units to dig in or keep them combat-ready. A unit that has dug in regains lost combat strength through reorganization and rest. They can defend their positions, but they cannot assault a position or move. Like all orders throughout the game, you give a combat-ready or dig-in order by placing a hollow square cursor over a unit and pressing the joystick button.

Armies On The Move

The second phase is the Movement Phase. Use the joystick to place the cursor over a unit, then press the joystick button to begin the unit's movement. Movement must be either horizontal or vertical. Movement rates vary, depending upon unit type, terrain being traversed, and remaining unit strength. Movement can also be halted by severe enemy fire or by damage from hitting mines.

It should be noted that an enemy unit is invisible until it is spotted by your recon units or it fires on your units. Mines are never visible.


Movement is completed by pressing the fire button again and releasing the piece. You can move all, some, or none of your units each Movement Phase, and each unit can move its entire allotment or only part of it.

Using all of a unit's movement allotment, however, prohibits it from firing during the turn. To indicate that you are approaching total depletion of activity points, the cursor turns red.

Combat Is The Action Phase

The third phase is the Combat Phase. Unseen enemy artillery starts to shell your troops, and sighted enemy units also open fire. To return fire, place the cursor over the unit which is to fire and press the fire button.

The cursor turns into a blinking cross hairs which you then move from the firing unit to its target. Press the fire button again to activate the shot. Several things can occur at this time: 1) You can score a hit (don't count on any single hit taking out an enemy unit); 2) you may get a message indicating that the target is out of your range; or 3)

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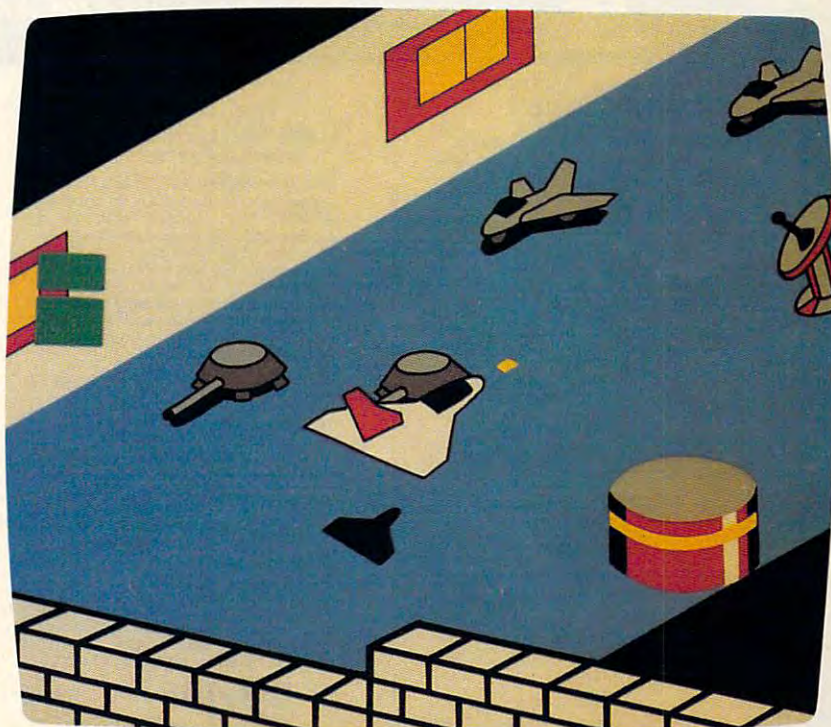
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you may get a message indicating that your line-of-sight is blocked. The number of shots each unit receives is determined by how much movement it did prior to the combat phase.

Assault Order Phase

The fourth phase is the Assault Order Phase, during which units with activity left (those not using it all during the movement and combat phases) can assault enemy units adjacent to their positions. Assaults, or overruns in the case of tanks, are devastating attacks, but they also inflict many casualties on the attacking units.

Assault orders are used for a second important purpose. There are two rivers that must be crossed before getting to the occupied city. To cross them, your engineer units must build new bridges. This is handled by placing an engineer unit next to the river and giving it an assault order. All orders are given via

joystick, with the cursor turning into an arrow to show the direction of the assault.

The fifth and final phase is the Assault Phase. All assault orders given in phase four are carried out during this phase, though not always successfully. It might, for example, take several turns to build a bridge or dislodge a strong defending enemy unit.

At the end of this phase, enemy units may move, either in retreat or simply in an attempt to fortify their defensive positions. They will fire a parting shot at any unit in their range as they go.

To get from one phase to the next, use the yellow function keys. Press the START key whenever you wish to move from one phase to another, and you are on your way.

This description of the phases is simplified. Much strategy and planning are involved in all areas, and there are

many programming niceties such as cursors changing color to indicate that various events have occurred during the game sequence.

Assessing The Action

When you have completed all five phases, you have completed one turn. You will be informed of your chances for victory (doubtful, marginal, tactical, etc.), and you will be asked whether or not you wish the game to be saved before starting the next turn. Saving (and re-loading) a game is accomplished with the yellow function keys. Games may be saved to either the master disk or to a formatted, unused data disk.

The game has four difficulty levels. In addition, each level of difficulty can result in one of five levels of victory or defeat. Furthermore, the computer-controlled German forces will randomly employ one of four different strategies to add to the



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Operation Whirlwind has excellent sound effects and a good graphics rendition of typical war-game unit and terrain symbols. Even when viewed on a television instead of a monitor, the symbols are sharp, making unit identification easy.

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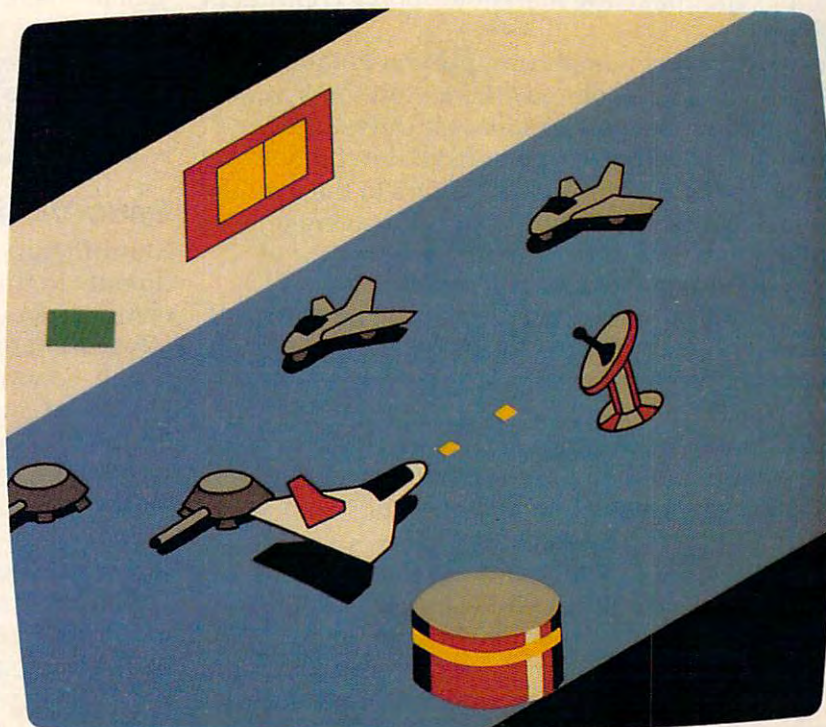
Operation Whirlwind differs from some other war strategy games in that it concentrates on a single, ongoing battle with a single, well-defined objective rather than trying to simulate a far-flung campaign. Just as you are celebrating your conquest of the German-held city, you are greeted by the sounds of the marching units that make

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The Morning After: Anti-Computer Backlash And The Arrival Of The Mass-Market Home Computer Part 2

In this month's column, we conclude the text of Fred's speech at the West Coast Computer Faire. Part 1 appeared last month.

A Failure To Explain Computers

What could make computers go out of style?
What could make the market for home computers dry up?

First, the personal computing revolution is already nine years old, yet the revolution's leaders (computing educators, manufacturers, authors, journalists, and spokespersons) have still not succeeded in explaining computers to the average person. Underneath the surface, the average person remains just as fearful, just as ignorant of computers as he was nine years ago.

Second, the computer industry has persisted in focusing on hardware and high technology instead of on human beings and human needs. Computers and computer programs have evolved based on their own logic and strengths rather than on human nature and human psychology. Most of the industry's imagination has gone into making the computer a gaudy "show-off" machine rather than on tailoring the computer to average human beings who want only to think like human beings, work like human beings, and have fun like human beings, *and not like computers*.

We need a new generation of computer programs which reflect the workings of the human mind. We have had enough computer programs that put human minds on the rack and try to squeeze them and stretch them to become more computerlike.

A Wellspring Of Resentment

Last, the computer industry, in its well-founded enthusiasm and zeal, has not been completely honest. Advanced computer applications are shown regularly on TV commercials. The average consumer sees these commercials, so he thinks that his \$50 computer will be able to do something similar. His expectation, of course, is absurd. But it is creating a huge wellspring of resentment and disappointment among disgruntled consumers who discover that their low-cost home computer cannot perform the miracles that computers in TV ads commonly perform.

Educational Advertisements

Manufacturers should respond quickly and directly to this growing consumer backlash to computers by beginning a series of educational advertisements on TV and in the other media. For purely commercial reasons, these computer ads should be carefully designed, ongoing tutorials on the fundamentals of computing.

Manufacturers can begin their campaign by showing bare-bones computers. They can explain that low-cost computers are "kits" that require lots of time, effort, and money before they can do anything useful.

In later ads manufacturers can take consumers by the hand and show them how they can put their kits together, how they can "grow" their kits into full-fledged computers, and how they can buy full-fledged computer *systems* outright.

Preventing A Consumer Backlash

To prevent a consumer backlash against com-

puters, manufacturers need to advertise computers honestly; they need to start educating the average consumer. In addition, they need to admit that computer software is far more important than hardware. The simplest, most ugly computer can be a better buy than an advanced computer *if* it comes with good, easy-to-use software.

In addition, manufacturers need to design new computers that are more suitable for the average consumer. Low-cost, bare-bones computers should still be offered. They meet the needs of people and groups who operate on a tight budget. And they are perfect programming laboratories for young people who will become our next generation of software inventors, engineers, designers, artists, and entertainers.

However, manufacturers should also offer higher-priced computer *systems* that come completely bundled with hardware and software. The entry-level computer system should come with at least 256K of memory (for powerful yet simple software), a built-in modem, a disk drive, and a printer. And it should come, at minimum, with a library of software, including a word processor, an electronic notebook, a file cabinet, communications software (a post-office, mailbox, library, telephone program), a spreadsheet program, and a calendar-scheduler program.

Computer systems should also come with a program (like "Apple Presents Apple") that lets the computer introduce itself. And every program on the computer should have the responsibility to teach the new user how it (the program) works.

The First Mass-Market Computer

Into this rapidly evolving market comes the IBM PCjr. This computer arrives at a fateful time. It may well become the catalyst for a new generation of mass-market home computers.

According to many industry experts, the PCjr is something of a disappointment as a computer. *But this is absolutely inconsequential!* From the looks of things, the PCjr will probably still emerge as the standard in the home computer market the way its big sister, the PC, has emerged as the standard in the business market.

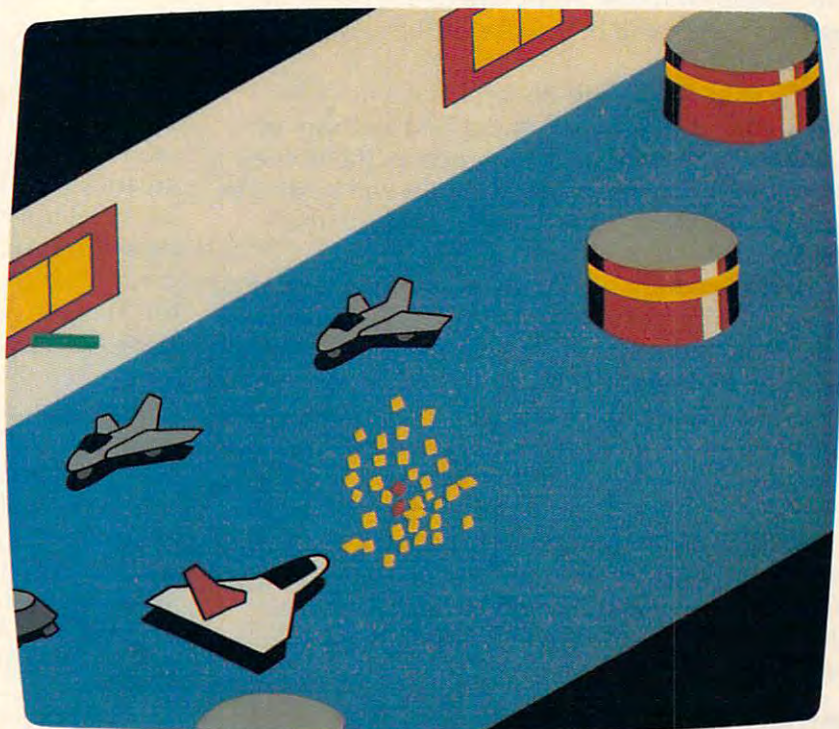
The PCjr is attracting third-party software and equipment

the way the Apple computer did before it. But there is an important difference: The industry has grown and matured enormously since the introduction of the original Apple computer.

What does this mean? It means that third-party support for the PCjr is materializing much faster than it did for the Apple. It means that, within a year to 18 months, there will be a vast supply of equipment and software for the PCjr. It means that the quality of this equipment and software will be as advanced as anything that is on the market. The guidelines for the best new computer products are *low cost, productivity, friendliness, and simplicity*. The products for the PCjr that incorporate these features will be a better buy than older products for home and business computers, products that probably cost hundreds of dollars more.

All these developments will totally transform the PCjr. Within a year after its introduction, the basic PCjr computer will cease to be of any consequence. Instead, all that will matter will be:

- The quality and variety of its third-party software.
- The quality and variety of its third-party equipment.
- The IBM name and reputation for stability and excellence.



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Splitting Into Two Markets

The PCjr, as a galaxy of hardware, software, and equipment, will reflect the emerging sophistication of the American consumer. If it is marketed honestly, it may play a major role in educating the American consumer and in combating anticomputer backlash.

The PCjr should be sold at two levels. The less expensive model will appeal to people on a tight budget, to schools and budding computer inventors, and to the computer literates. It is a computer "kit" for people who want to learn more about how computers work or who have to do their computing on a shoestring.

The more expensive model will become the preferred computer of the computer intimates. Computer intimates will choose their computer the way they buy their home stereo. They will purchase the complete computer with all its components and with a library of record albums (software). They will want to take the computer home, plug it in, and let it become the heart of a family work station, communications network, and entertainment center.

A New, Expensive Standard

By mid-1985 the Japanese will be ready to follow IBM into the U.S. home computer market. By then the market will have consolidated, matured, and stabilized to the point where the risk of entering the market will be small and the rewards will be immense.

By mid-1985 a full-blown PCjr, with supporting third-party equipment and a library of software, may well have emerged as the home computer industry standard. But it will be an expensive standard, thus severely limiting the market size.

This is where the Japanese come in with their proven ability to market high-quality, high-technology products at a mass-market price. The Japanese will offer the lower-priced computer "kits," but they will concentrate on mass-marketing complete systems at only a fraction of the price of the PCjr and its clones and look-alikes.

As a result of the entry of IBM, and later the Japanese, by 1986 computers for the first time may become a truly low-cost, mass-market home appliance. Christmas 1986 will be like Christmas 1983, but with Americans buying millions of bundled home computer systems.

Software At The 7-11

The biggest revolution over the next three years will not be in home-computing computer hardware or software. It will be in software distribution.

Today the computer software industry is a

dwarf about to become a giant.

Until now, the software industry's offerings have been narrow, primitive, and far too expensive for mass-market merchandising. The problem has been the medium on which the software is distributed—cassettes, diskettes, or ROM cartridges. The medium was either cheap but slow and inappropriate for large programs (tapes), or fast but too expensive and too limited in memory (cartridges), or fast and spacious but expensive (diskettes).

There are more than 35,000 computer programs on the market, stored on a tape, cartridge, or diskette. But buyers can afford to buy only a few programs apiece because of their high cost, and because there has been no way to evaluate or preview the programs. At the same time, retailers are reluctant to stock a large number of programs because program packages are bulky, and programs have a limited shelf life. (Like records and books, they stay "hot" for only a short time.) The retailers are afraid of acquiring a big inventory of programs that aren't moving.

But the software industry is on the verge of changing—suddenly and explosively. Software manufacturers have now found an amazing shortcut—a new way to distribute their products. Over the next year they will begin distributing software *electronically*. This one change will enable the industry to quadruple itself in under a year's time.

How will software manufacturers manage this miracle?

New software kiosks will soon be popping up in all sorts of places, including department stores, stereo stores, toy stores, computer stores, discount stores, and even 7-11s, drugstores, and videogame arcades. The kiosks will feature computer terminals that are capable of running thousands of piped-in programs on all subjects and for all major computers. A powerful "expert system" will guide the average consumer through the myriad choices and help him decide on his next software purchase.

When the consumer is ready to purchase a program, he will place a disk into a slot on the terminal. He will have purchased the disk for about \$10. A moment later, software for his home computer will be beamed over a telephone link from a mainframe computer to the store's terminal and stored on his disk. He will pay the machine, vending machine style, with a credit card, or make his purchase as he leaves the store. The software itself will cost him only a nominal price—from \$5 to \$10.

The real savings comes to the consumer (and the real meaning of the revolution emerges) the next time he wants to buy a new program. He returns to the kiosk, picks out a new program, and has to pay a total of only \$5 or \$10. The computer

automatically erases his old program from the disk and replaces it with the new program.

Piping in new programs electronically and reducing the cost of individual programs will turn software into an overnight mass-market industry. And software, of course, must be run on computers.

However, when the electronic distribution of software cranks into high gear, computers themselves will quickly sink into obscurity. The computer industry will become like the record industry, with the real focus not on the hardware but on the software.

In the record industry, the focus is on the hot new *songs*. In the computer industry, the focus will be on the hot new *programs*. Because of their instantaneous, low-cost availability, new programs will be in great demand. The average person will be able to acquire programs almost on a whim, and he or she will be anxiously awaiting all the new programs the moment they come on the market.

A New Synthesis

During 1986 the huge group of computer intimates (people who love to use computers, but don't have the faintest idea how they work) will merge with the much smaller group of computer literates (people who insist on being knowledgeable about the goings-on under a computer's "hood"). As a result of this merger, the home computer market will again be relatively homogeneous and unified.

At that time both groups will realize that the average person doesn't want to buy a computer "kit." But they will also realize that computers can never become black boxes—like toaster ovens or TVs. No matter how friendly the software, no matter how simple computers are to use, computers will still need to be programmed. Programming is an unavoidable part of computing.

But programming, in 1986, will not be equated with learning BASIC or Logo or Pascal. Instead, it will be a more general-purpose discipline of (goal-oriented, problem-solving, and algorithmic) thinking. And it will be practical and *application-oriented*.

Even when people use a friendly, commercial program, they must do some programming themselves. No matter

how advanced the program, the computer cannot do everything itself. When people use a word processor, they are programming a document. When they use a data base manager, they are programming their electronic file cabinet. When they dial up CompuServe or the Source, they are programming their electronic telephone, post office, newspaper, catalog, or library. Programming can be easy, menu-driven, and done with icons and mice, but it is still programming. Human beings still have to do some of the work.

Computer Builder Kits

We are on the verge of a new generation of computer programming languages—high-level, application-oriented *builder kits*. In the future, computer literates and intimates alike will use these new languages to "build" their own music, colorful pictures, animated cartoons, robot pets, interactive simulations, computer advisors, and electronic tutors.

With the right software, the computer can be a multipurpose appliance. It is the ultimate "Mr. T": a Toy, a Tool, or a Tutor. But whatever it is, the computer will still need further programming *after* we bring it into our home. We will have to program it so that we can mold it exactly to our evolving needs and our desires.

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Questions Beginners Ask

Tom R. Halfhill, Staff Editor

Are you thinking about buying a computer for the first time, but don't know much about computers? Or maybe you just purchased a computer and are still a bit baffled. Each month in this column, COMPUTE! will answer some questions often asked by beginners.

Q For keeping programs on tape, what's the best kind of cassette recorder I should buy for my computer?

A First of all, be sure you have an option in this area. Some computers require a special recorder and are not designed to work with ordinary cassette recorders. Examples are Commodore and Atari computers. The Commodore 64, VIC-20, and PETs require a Datassette recorder; the Atari 400/800 and new XL models require the 410 or 1010 Program Recorder. These special recorders are optimized for data storage and generally cannot be used for any other purpose. For instance, neither the Commodore Datassette nor the Atari Program Recorders have microphones or standard input/output phono jacks. Instead, they have interface cables which plug into a special port on the computer.

Other personal computers are designed to work with any standard cassette recorder. Examples are the Texas Instruments TI-99/4A, Radio Shack TRS-80 computers, the Apple II, IBM PC/PCjr, and Timex/Sinclair computers.

If you have a computer which can work with a standard recorder, check the manuals to see if the manufacturer recommends a certain brand. Sometimes a recommendation means the manufacturer has experimented with different recorders and has found a particular model to be superior. On the other hand, some manufacturers merely recommend a recorder made by an affiliated company. Radio Shack, for instance, advises TRS-80 owners to buy a certain Radio Shack recorder for their computers.

The best way to get a reliable recorder is to try several different models with your computer and decide for yourself. Unfortunately, you probably won't have access to very many recorders, unless you can find a store which will let you return any which don't work well. Perhaps you can borrow cassette recorders from friends for your

tests. Or contact your local users group for advice.

Other than the computer manufacturers' own units, we know of only one recorder specifically made for home computers: the General Electric Computer Program Data Recorder (Model 3-5158A). It looks about the same as any other recorder in its price range (under \$40), and even has a built-in microphone for taping voice or music. However, GE says the unit has a flatter bass response for more reliable data recording. It also has two features you should look for in any recorder to be used with a computer—a tape counter and a tone control. Tape counters are invaluable for locating programs in the middle of tapes, and tone controls can optimize the recorder's output for your computer. With any recorder, you should experiment to find the exact volume and tone settings that work best and then mark them for future reference.

Q I've tried to take pictures of my computer screen like the ones I've seen in COMPUTE!, but they never come out quite right. What's the best way to do this?

A In the first place, you must have a camera which can focus closely enough to fill the viewfinder with the screen. Most inexpensive cameras cannot focus sharply on objects less than three to five feet away. Inexpensive cameras also have semi-wide-angle lenses which make the image appear even smaller, plus separate viewfinders which do not show the actual image as seen by the lens (and therefore the film). At COMPUTE!, all screen photos are taken with a tripod-mounted 35mm single-lens reflex camera with a 50mm (normal) lens. The camera is positioned so the edges of the screen are just visible at the edges of the viewfinder.

With this setup, only three major problems remain: avoiding reflections, determining proper exposure, and eliminating partial scan lines.

Reflections on the glass video screen are distracting and often show up as "hot spots" in the photograph. Flash pictures, of course, are out of the question. All light for the picture must come from the screen. We avoid reflections by shooting the photos in completely darkened, windowless

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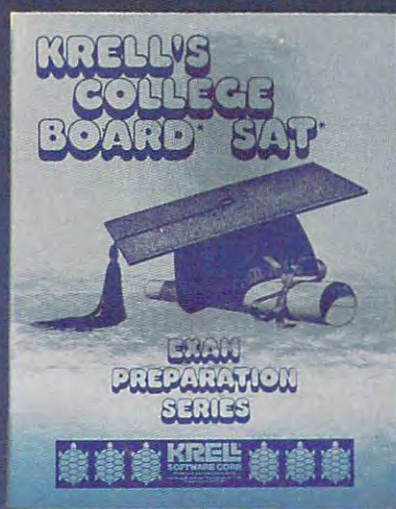
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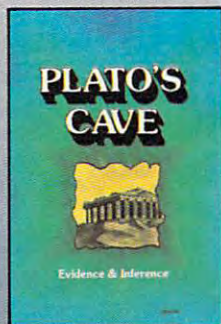
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rooms. At home you'll have to shut off all the lights, pull the window shades and curtains, and close the doors. If this isn't practical, try erecting a blanket "tent" over the camera and screen to block off all outside light.

Unfortunately, darkening the room can complicate the second problem—determining proper exposure. If the camera has a built-in meter, it is fooled by the dark background. We often get around this problem with a handheld light meter, holding it close enough to the screen to make sure it isn't reading anything else. You can do the same thing with your camera's meter, although it means removing the camera from the tripod for each reading. And be sure not to read a completely dark or light screen. Take your readings from medium tones or colors.

The camera must be mounted on a tripod for the exposure because of the very slow shutter speeds required. TV sets and monitors display an image by constantly redrawing it on the screen—about every 1/30 second. Theoretically, then, shutter speeds faster than 1/30 second result in a picture with only a partial screen image (the partial image shows up as a dark band across the screen). In practice, we've found that shutter speeds no faster than 1/4 second are necessary to completely eliminate partial scan lines. And that, in turn, means the image must remain motionless for the

duration of the exposure to avoid blurs. We often have to modify programs to freeze them on the screen.

Finally, slow- or medium-speed films are better than fast films. We use Kodak Ektachrome 64 (a color slide film) mainly because it can be custom-processed locally in a few hours. Actually we would prefer Kodachrome or another film with a warmer response to compensate for the strong blues emitted by most video tubes. Our exposures with Ektachrome 64 are usually about 1/2 second at f/16. We bracket one stop each way to insure good results. We also hook up the computer to a regular computer monitor instead of an ordinary TV to get a sharper picture. ©

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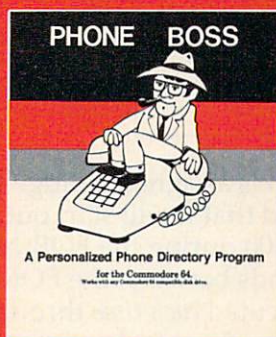
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THE BEGINNER'S PAGE

Richard Mansfield, Senior Editor

A Wall Of Loops

It takes most people a few weeks of part-time study to learn BASIC. Of course defined functions, multidimensional arrays, and other advanced techniques would not yet be understood, but after a short time, a novice programmer can accomplish a good deal with BASIC.

Nevertheless, during those first few weeks, most of us run into a wall—one of the fundamental BASIC commands is simply beyond understanding. Try as we might, some concept thoroughly resists our efforts to learn it. For me, the wall was the ON X GOTO 100,200,300 command. With furrowed brow, I came back to it again and again, trying to see how X controlled those line numbers following the GOTO.


Simple Loops

Others have said that their wall was *nested loops*. Let's take a look at these loops within loops. Nested loops are one of the elements of computer power and a beginning programmer must be able to use them.

Here's a simple loop:

Program 1: Simple Looping

```
10 FOR I = 1 TO 100
20 PRINT I
30 NEXT I
```



The variable I is assigned a range of 1 to 100 in line 10. It is told that it will start out being a 1 and count up to 100 during the FOR-NEXT loop. And any commands between the FOR and the NEXT will be executed *each time* through this loop. In other words, line 20, which prints the current value of I, will be executed 100 times.

Anything else you want done 100 times can be squeezed in between lines 10 and 30 in this program. If you want your name printed 100 times, just put in a line 11 like this:

```
11 PRINT "MY NAME"
```

and it, too, will be printed. It's easy to see how this might come in handy when printing labels or addresses on a printer.

Now, to make the actions in Program 1 a bit

clearer, take a look at Program 2:

Program 2: Looping Without FOR-NEXT

```
10 I = 1
20 PRINT I
30 I = I + 1
40 IF I = 101 THEN END
50 GOTO 20
```

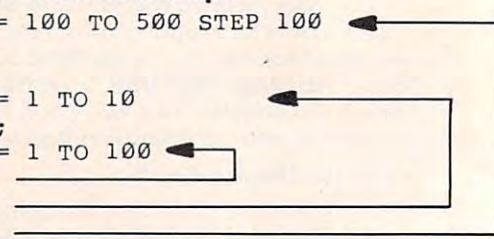
This does exactly the same thing as Program 1, but it's a bit clumsy. As you see, we *can* create a loop structure without using FOR-NEXT commands, but it takes up more room, takes longer to program, and runs more slowly. It's not generally the best way to set up loops, but it does help to visualize how a loop actually works.

Stuffed And Nested

Now we can try stuffing loops inside other loops. This is a technique which amplifies the power of loops. It's called *nesting* and the first FOR (coupled with the last NEXT) is called the *outer loop*:

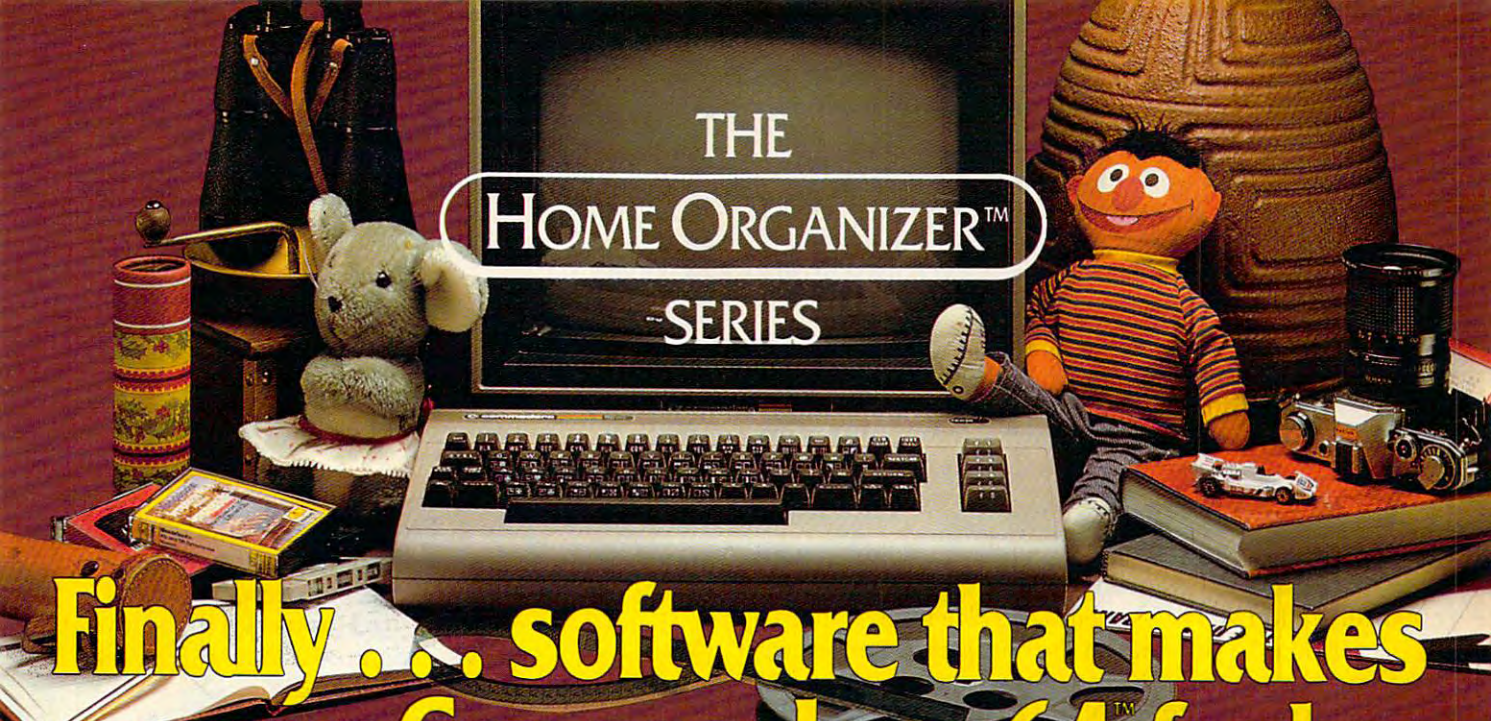
Program 3: Nested Loops

```
10 FOR I = 100 TO 500 STEP 100
20 PRINT
30 PRINT I
40 FOR J = 1 TO 10
50 PRINT J;
60 FOR T = 1 TO 100
70 NEXT T
80 NEXT J
90 NEXT I
```



The outer loop in this program (the FOR in line 10 and the NEXT in line 90) causes the entire program to cycle five times, executing every command in lines 20–80 five times before stopping. As an aside, the STEP command in line 10 is an interesting variation on the simple I = 100 TO 500 command. Without the STEP, this program would execute 500 times. But STEP forces the I variable to add 100 to itself each time we hit the NEXT in line 90. So, instead of a series like 1,2,3,4,5,6,7 ... we get the series 100,200,300,400,500, a total of five cycles through the loop.

In any case, line 20 PRINTs a blank line, line 30 PRINTs the current value of the I variable, and then we come upon the first nested loop. The J

A Commodore 64 computer system is the central focus, sitting on a dark wooden desk. The monitor displays the text 'THE HOME ORGANIZER™ SERIES'. To the left of the monitor is a small, light-colored stuffed mouse. To the right is a large, orange, striped puppet head (resembling Ernie from Sesame Street) and a baseball. In the background, there's a large, textured, brown object resembling a beehive. On the desk, there are also several books, a small toy car, a camera, and a can of soda. The overall scene is a cozy, lived-in home environment.

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variable is given a range of 1 to 10, so everything between lines 40–80 will be performed ten times. But since this loop is nested inside the I loop (which creates five cycles of its own), the PRINTJ in line 50 will be executed 5 times 10. In other words, the value of J will be printed a total of 50 times in this program.

An even deeper loop, called the *inner loop*, appears between the FOR in line 60 and the NEXT in line 70. This loop is given a range of 1 to 100, but it isn't given anything to do. It just counts up to 100 and then we perform the NEXT J in line 80.

Do-Nothing Timers

That inner T loop does actually accomplish something, however. It uses up time. Such loops are often called *do-nothing loops* or *delay loops*. Their function is to slow down the computer. Sometimes this is very handy. Computers are fast. If you are having something PRINTed to the screen and it's sliding by too fast to read, insert a delay loop and give that loop whatever range suits your reading speed. Then, before allowing the program to proceed, the delay loop will count from the low up to the high number in its range.

Here is a second version of this same program, but, again, the FOR-NEXT commands are not used. If you are still unclear about how Program 3 functions, take a look at Program 4:

Program 4: Nested Loops Without FOR-NEXTs

```
10 I = 100
20 PRINT
30 PRINT I
40 J = 1
50 PRINT J;
60 T = 1
70 T = T + 1
80 IF T < > 100 THEN 70
90 J = J + 1
100 IF J < 11 THEN 50
110 I = I + 100
120 IF I = 600 THEN END
130 GOTO 20
```

Like Program 2, Program 4 is large, clumsy, and slow. For example, it takes five times as long to execute as Program 3, its counterpart. You'll probably never write nested loops like those found in Program 4, but you can take a look at it to see how nested loops are structured.

Program 4 also illustrates various true/false types of loop exits. Line 80 means that we keep on cycling through the loop if the variable T does not yet equal 100. We exit when T = 100. Line 100 continues to cycle as long as J is less than 11. In line 120, we exit the loop (and stop the entire program, via the END command) if I equals 600.

Rules And Customs

There are several programming rules and customs you should try to observe when working with loops. In general, a programmer cannot use the same variable name for different functions or the program might make serious errors. For example, if you are writing a program to figure out your budget and you say TAXES = 15000 (for federal tax) and then use the variable name TAXES again later in the program: TAXES = 400 (meaning state tax), you will have hopelessly confused the computer. You have to use different variable names, such as FED and STATE.

The same thing applies to loops. Each different loop must have its own name FOR I/NEXT I, FOR J/NEXT J, etc. To help keep this straight, most programmers use the variable I for their outer loop, then J, then K, and so on up the alphabet. The letters I, J, K, and L are *not used for normal variables*, just for loops. Similarly, the variable name T is reserved for *timing loops*, those delay loops we mentioned above.

Also, every FOR must have a matching NEXT to close its loop, and nested loops must not interweave. You cannot have a structure like this:

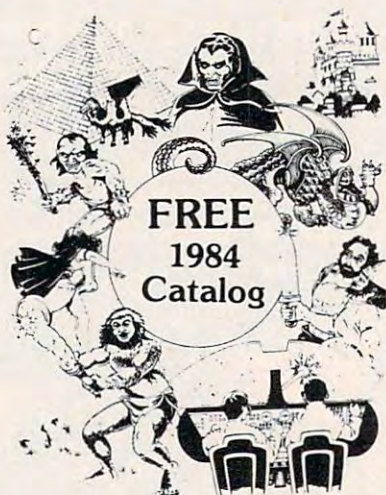
```
10 FOR I=1 TO 10
20 FOR J=1 TO 20
30 NEXT I
40 NEXT J
```

lines 30 and 40 are out of order. The inner loop, the J loop here, must be closed by its NEXT before the I loop can be closed.

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Computers And Society

David D. Thornburg, Associate Editor

Until this year, the personal computer industry had been moving steadily forward in the quality and utility of the technology made available to the user.

I remember in 1978 when choices were largely limited to Commodore's black-and-white display of characters (no high-resolution graphics), Radio Shack's black-and-white display of capital letters and limited low-resolution graphics, and Apple's color display with low- and high-resolution graphics, but no lowercase letters.

Over the intervening years, new players like Atari created improved computers with superb sound and graphic capabilities, simply because improving the technology was the way to win new customers. This type of advancement rippled through the early computer manufacturers, leading, for example, to computers like the Commodore 64.

Innovation Meant Profits

It was the American Dream in action. If you wanted to compete in the personal computer marketplace, you had to create better technology so the customer got more perceived value for each dollar spent. The customer *and* the computer manufacturers were clear winners. Each technological advancement sparked new enthusiasm in the marketplace and in the hearts of the designers.

Companies who lacked the vision or the ability to keep in step fell by the wayside, and new companies entered the field knowing they would be judged on technological performance and price. It didn't matter if you were a new company or an old-timer to the industry; the issue was one of performance.

Benjamin Franklin would have been proud.

Enter Big Blue

But then something strange happened. A sleeping giant awoke and entered the personal computer marketplace with a system that would have gathered dust on the shelves had it been created by a small company. Given IBM's newness to the personal computer field, the awkwardness of the PC could perhaps be forgiven.

But, rather than letting IBM take its lumps with the other companies who delivered less than expected, analysts and just about everyone else

started jumping on the PC bandwagon. "IBM legitimizes the small computer market" was a common statement, as though this thriving industry somehow needed IBM's belated blessing to even exist. Many people quickly forgot that this industry was doing just fine, thank you, *years* before IBM was willing to concede that computers might be owned by individuals rather than by corporations.

Overwhelming Influence

And so, as an industry, we had to live with *fewer* colors, cumbersome peripheral cards, and expense after expense. But, we were told, don't compare the PC to the Commodore 64. The PC is *not* a home computer, it's a computer for *business*. Big, bold, expensive, time-consuming to use—after all, who ever said computing should be fun?

Nonetheless, many software artisans and hardware copyists said, "If IBM does it, it must be right."

Within a short period, IBM work-alike computers were appearing in droves, and almost every software house in the country rushed to produce software for this machine. It made great business sense, and everybody thrived.

Some of us thought that IBM's *home* entry would make up for some of the PC's shortcomings.

After all, the consumer marketplace had been bombarded with technological marvels for years: Atari had shown us that good colors can be created when you have independent control of hue *and* luminance.

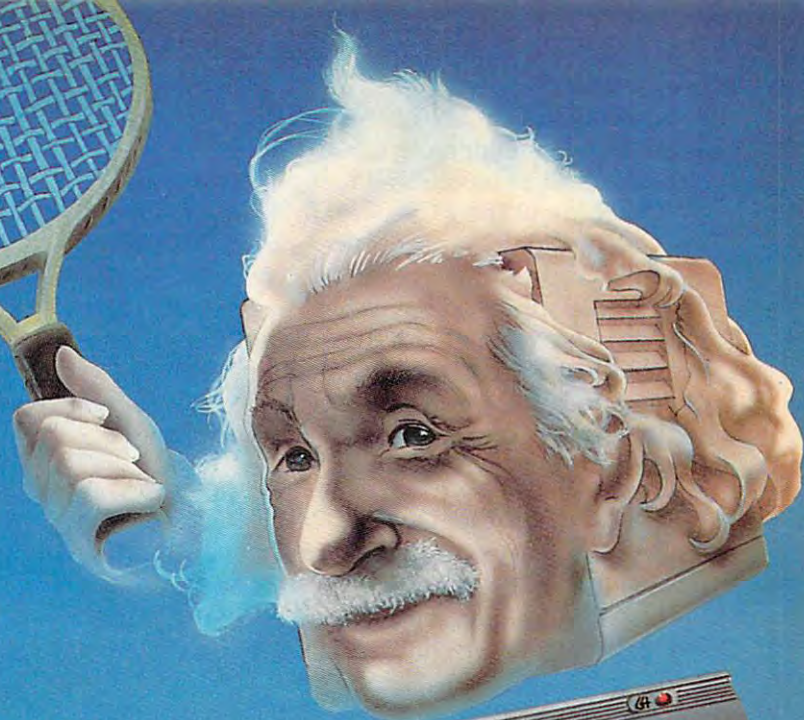
The sound chip capabilities of Atari and Commodore computers took computers out of the beep and click stages and gave us harpsichords and pipe organs instead.

Waiting For Junior

One processor was no longer enough—multi-processor computers for home use became commonplace. Apple redid the II and produced the crisp and competitively priced IIfx. All was right with the home computer world as we eagerly awaited IBM's announcement.

When the long-awaited PCjr was announced, some of us thought that IBM hadn't even looked at the competitive products. Borrowing a page from the past, the PCjr used a bulky external

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power transformer. Yes, so does Commodore and Atari, but we never liked this external transformer, and IBM had a chance to improve in this area.

Looking at the PCjr overall, it reminds me of the Coleco Adam—a computer system that for under \$700 provides everything you need—software, letter quality daisy wheel printer, etc. The PCjr may have borrowed from Adam's good looks, but the IBM starter system has no mass storage device, no software, no printer, and doesn't even come with a cable to connect the computer to a TV or monitor.

The Controversial Keyboard

Aside from its striking price difference from the Adam, the PCjr does have one other difference: The Adam has a decent typewriter-like keyboard while the PCjr has what we call a "Chiclet keyboard."

Old-time readers might recall that in 1980 I wrote of the TRS-80 Color Computer's keyboard: "I do find the noise from the keyboard to be a bit annoying—somewhat like typing on a plate full of pennies...." The fact is that Chiclet keyboards were poor choices when Radio Shack and TI used them. In the intervening years, Radio Shack and TI switched to full-stroke, typewriter-style keyboards.

To my knowledge, IBM entered the market as the *only* personal computer manufacturer to promote a keyboard design that had been tried and rejected by the customers of several other computer manufacturers.

Once again, almost every trade magazine includes an editorial claiming that "IBM has now made the home computer market legitimate."

Buying The Brand

What is happening to us? Why are we apparently so willing to have our technological expectations sacrificed on the altar of brand-name recognition?

Yes, it is true that companies like Apple haven't been in the computer business as long as IBM, but that doesn't mean that their service is any poorer. Somehow, even though they had no prior experience in this marketplace, IBM had cultivated an image that so excited the computer-buying public that they could have sold *anything* and people would have bought it.

To me it is tragic that, given the history of IBM, they didn't use their entry to establish new standards of excellence, user-friendliness, and sensitivity to the price expectations of the public. Had they done that, the PCjr would have been worth the wait.

Standard Disappointments

If the PCjr is one step backward, it is not alone. When I first heard about the MSX computers, I

was quite pleased. For the first time since the start of this industry, several manufacturers got together to create a standard for everything from disk drives to joysticks.

From the customer's perspective, this was a dream come true. Every time I address the general public, someone asks why they can't run an Apple disk on their Atari computer.

Good question. After all, everybody knows you can play the same phonograph record or video tape on equipment from any number of manufacturers.

So, a standard was a good idea in my mind. The problem with the MSX computers is that the standard was designed around the Z-80A microprocessor. As a result, we are going to see 1970's technology locked into a standard with total disregard to the advancements in 16-bit and 32-bit architectures that are much more powerful. One always expects some tradeoff when several companies share in a joint decision (after all, it is said that a camel is a horse designed by a committee), but this technological back-step seems to be too high a price to pay.

Saved By Competition?

Will the marketplace take care of this problem by itself? After all, consumers have made their desires known in the past. Well, if SONY, Yamaha Hitachi, Mitsubishi, Pioneer, Fujitsu and the others (yes, Virginia, there is an American MSX machine—from Spectravideo) enter our market with a media blitz equal to that used to sell televisions, it will take a lot of resistance to keep from falling in line. In fact, I wouldn't be surprised to see companies like Commodore introduce an MSX computer just to preserve their market share.

But the darkest hour is always just before dawn, and there is a refreshing glimmer that shows an alternative to these two technologically backward steps.

A Bright New Apple

This refreshing one-step-forward is the Apple Macintosh—a computer designed for anyone to use. Macintosh is reasonably priced (\$2500 *including* display and disk drive and operating system software—IBM, please note). But more important than Macintosh's system price is the almost intuitively simple manner in which it is used.

I maintain that any COMPUTE! reader can *master* Macintosh in 30 minutes. It is, by far, the easiest computer I have used since I worked at the Xerox Palo Alto Research Center. PARC was the spiritual home of some of the software ideas so masterfully implemented in Macintosh. This computer is designed from the ground up to be responsive to the user's way of doing things, rather than forcing the user to bend to the arbitrary constraints of the

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computer.

To take just one example, suppose you want to edit a letter you have written with the MacWrite word processor. Once you have inserted your disk, your screen shows you a set of icons representing the various items stored on the disk, with their names beneath them. These items might be documents, pictures, programs, schedules, etc.

You use the mouse to move the cursor to the

icon representing the document you want to edit, and with a couple of clicks you have automatically loaded the word processor which has automatically loaded the document for you to edit.

Truly Innovative

Macintosh is, quite simply, a civilized machine. After working with it for a while, I found myself quite intolerant of my other computers. The

Counterpoint:

Computers And Society, June 1984

David wrote his first article for me in the first issue of COMPUTE!, Fall 1979. Since then he has been a regular columnist. One of the constants of our working relationship in all these years is that David has been free to share his thoughts—after all, who could ever justify curbing a column called "Computers and Society," especially in 1984?

I have some problems with this particular column of David's. Among our editorial staff here I do not have unanimous support. On the other hand, I'm not alone in my concerns. Thus, David's column is presented here in full; my comments appear below.

Robert C. Lock, Editor In Chief

It would seem that the primary criticism of IBM is their "failure" to introduce personal computing products that are hallmarks of technological innovation. In any maturing industry, there are always leaders, entrepreneurs, bastion stormers who take the risks, blaze the trails, and yes, make several mistakes and fail—or make fewer and survive. I would suggest that IBM passed through that phase in its maturation as a company some decades ago. Right or wrong, such a process is also a part of the American Dream in action.

The Case Is Overstated

To characterize IBM as a sleeping giant, stumbling awake to inflict awkward products on a naive public, is unrealistic. In part, it simply reflects the changing values one frequently encounters in a maturing market. While it may be frustrating that the IBM products don't reflect a state-of-the-art technology, it can also be argued that they reflect a tested, tried, and reliable technology.

Is this a sidestep argument? I don't think so. No more than to argue that IBM computers sell simply because they're IBM computers. Built into that statement is a tradition that's also a reflection of the various levels of maturation of the marketing process. Given appropriate emphasis, the statement can be negative;

given another emphasis, it can be exceptionally positive.

Consumers Trust IBM

I don't think that IBM could have sold "anything," and that people would have bought it. At least not for long. That's not what IBM's all about. Their business is to deliver reliable working products that meet a need in the market.

Have they done that? The demand for their personal computer products would seem to indicate their success. Have they failed to "establish" new standards of excellence? I would disagree. Have they had the design problems, delivery problems, service problems, continually revamped operating systems, bugs and fixes, that have bedeviled less mature companies over the years? Have we seen them "experiment" with the public by quickly, hastily bringing to market a product that's gone in six months—or worse, never delivered? Have we seen them vacillate in and out of the market with promises and visions never to be fulfilled?

I think not. And I'm not quite sure why all of these "failures" indicate a deviation from their history, or a step backwards for the industry.

Rather than saying "If IBM does it, it must be right," I would argue that "If IBM does it, it will probably be valid." After all of the arguments and questions over the last few years about the true utility of home computers, and the myriad of attempts to expand their usefulness to a broader base of the population, IBM is showing a willingness to take a certain kind of risk. It may not be in the area of sophisticated graphics, or breakthroughs in software, but I would venture to guess that the recently announced joint venture between IBM, Sears, and CBS to develop mutual utilization of home computers will have a chance at making a massive step forward in the ability of our industry to mature as a functional home "utility."

Innovation comes in many guises, not all of them hardware- or software-based.

And David, a p.s.: I agree with you on that strange little keyboard.

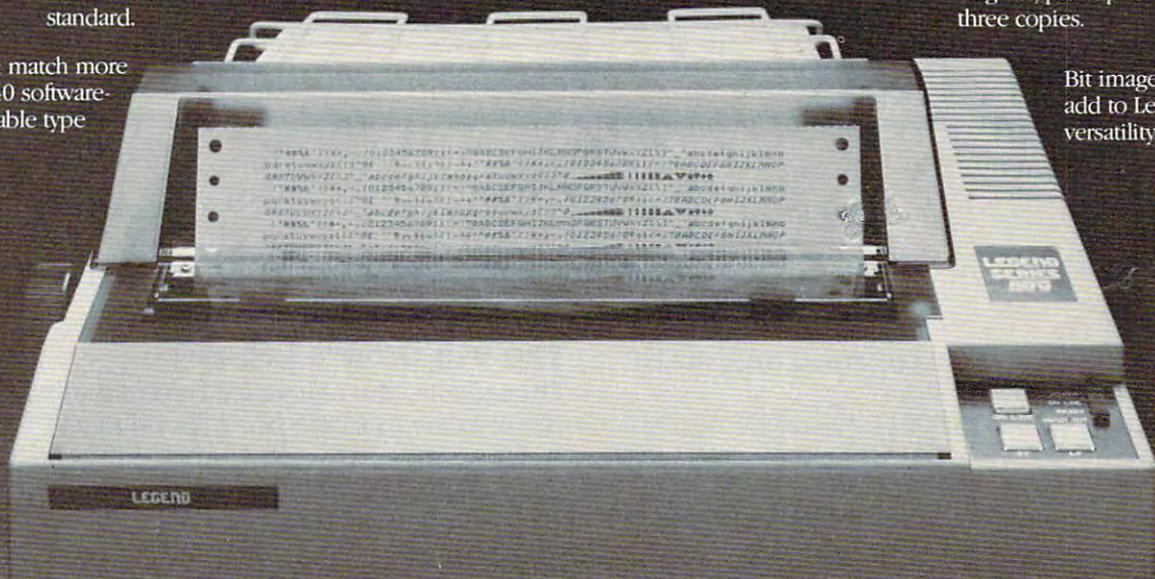
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Macintosh is qualitatively distinct from any other personal computer. It has defined a new tier of the market.

This definition had happened *not* because of its 32-bit architecture, its 1 to 2 million instructions-per-second speed, or its price, but simply because of its functionality. For years the industry has been telling us that computers are easy to use. Macintosh finally came out to fulfill that promise.

But will Macintosh be successful? I hope so. Apple appears dedicated to supporting third-party software developers, and several powerful languages are available for users who like to create their own programs.

Back On The Right Track

There is another reason I hope Macintosh is successful. This country was built on the concept that people with good ideas could compete in the open marketplace. This spirit of open competition guaranteed not only that the customer got a good deal, but that technology would improve as newer and better products were developed. If, by pure force of corporate identity, we can be convinced to drop our high standards of cost-effective performance, we can kiss the free enterprise system goodbye.

Macintosh is more than a computer—it is a statement in response to the clearly stated needs of the consumer. How will *we* respond? ©

INSIGHT: Atari

Bill Wilkinson

As I write this, I have just returned from the Las Vegas Comdex show.

Comdex stands for "COMputer Dealers' EXposition," but it is really a show for those who would sell to the computer dealers. And sell they did. Everything from magic acts to talking robots to sit-down demonstrations (very welcome after walking through literally acres and acres of booths). And, of course, IBM was there in force, occupying an entire building and demonstrating the usual stuff on the PC and, not surprisingly, some me-too-ish software on the PCjr.

Compatible Disk Drives

The only Atari-compatible hardware products that I saw at Comdex were some disk drives (though I understand that one or two graphics tablets were shown there, also). And that, of course, brings up my next topic.

When you consider the fact that Atari doesn't even make a double-density disk drive, it's more than a little surprising and pleasing to discover the amazing degree of compatibility exhibited by the various non-Atari disk drives.

Since OSS provides the disk operating system (DOS XL) which many of the drive manufacturers supply with (or as an option to) their disks, I can't make judgments as to quality, reliability, etc., without an obvious conflict of interest. I can, however, comment on the features common to all Atari-compatible drives (except those made by Atari itself).

The 815 Drive's Legacy

Historically, the reason for the compatibility is the ill-fated Atari 815 drive. For those of you relatively new to the world of Atari, that was the dual, double-density disk drive announced by Atari for delivery in early 1982. Notice the word "was."

Although never produced in quantity, the 815 survived long enough to cause Atari, Inc., to produce DOS 2.0d ("d" for double), and a few lucky people even have a copy of it. (I'm not lucky.) In fact, even Atari DOS 2.0s can access an 815 style double-density drive for most functions (just don't try to copy files or duplicate disks).

The folks at Percom Data Corporation, though, didn't know the 815 was going to die when they started designing their double-density drives. They did, however, want a way to switch from single to double density without having to physically flick a switch. Hence the configuration block was born. Give Percom credit.

Give the other manufacturers credit, also, for recognizing the Percom system as a viable and usable standard. Would you be surprised to find that the same double-density DOS XL diskette works unchanged in drives or controllers from (in alphabetical order) Amdek, Astra, Concorde, Indus, Micro Mainframe, NCT, Percom, Rana, SPI, and Trak? If you are *not* surprised, you are not aware of the hodgepodge of the CP/M world.

Each of the companies mentioned can tell you of the advantages of their drives or controllers.

A final comment on the configuration block

scheme mentioned above. A controller capable of implementing all the options of the configuration block can, in theory, support virtually any size disk drive. At Comdex I saw floppy disk drives with densities over a megabyte. Yum.

XL Compatibility

I have received more than a little correspondence from readers asking what they can do about the lack of software compatible with their 1200XL (and, now, the 600XL and 800XL). Up until now, my stock answer has been that they should go beat on the heads of the software manufacturers (the ones who didn't follow Atari's rules).

Now, though, there is a little relief in sight. Atari has, at long last, made available something known as the Atari Translator Disk. This disk, when booted from any 810-compatible drive into any XL machine with 64K of RAM, will (for all practical purposes) turn your XL computer into a non-XL Atari 800. Virtually all software, including protected games and the like, will then boot and run properly. (Of course, you don't turn the power off to boot anymore.)

For those who are stuck with incompatible software, this seems like a neat solution. For those who are stuck with incompatible software and no disk drive, this looks like a frustrating solution. Point of interest: I do believe that this software could be loaded via cartridge instead, since one need not turn off the power to change or remove cartridges on an XL machine. Atari, are you listening?

Anyway, if you need the disk, check with your local authorized Atari dealer. If he doesn't have it, hasn't heard of it, or is nonexistent, try Atari's customer service department.

Reading Binary Files

In March, I presented a short program in Atari BASIC which would read a binary object file directly into the memory locations it was originally assembled for (or saved from).

This month, I will start to parallel that listing in machine language. Please understand that this may not be the fastest or easiest way to perform the task. I use the BASIC parallel method as a way of making the program understandable to those who are just beginning to learn machine language.

As a first step, you might look through the listing, noting where the BASIC line equivalents are. They are easy to find. Starting at line 1000, any line number ending in 00 is a comment line which reflects the line in the BASIC program which I presented last month. Note, also, that the line numbers in this listing are 10 times the BASIC line numbers (simply for convenience and readability).

While examining the listing, you probably noted that there seems to be more nonparallel

code than otherwise. In truth, this simple pseudo-BASIC program does indeed require a fairly substantial amount of support. The support is in two forms: definitions of variables (including buffers) and I/O subroutines.

A Page 6 Assembly

You may also have noticed that I assembled the listing in the infamous page 6 memory block. I plead guilty. Actually, in testing this program, I assembled it twice: once at \$600, as shown, and once at \$6000 (just by changing line 110). I then used the \$600 version to read in the \$6000 version, and it worked!

Anyway, since I will be giving you complete source code here, I don't feel too guilty. Obviously, you can change line 110 to anything you wish if you need to stay out of page 6.

There are two other "cheats" in this listing. In line 220, I place NAME at location \$580; and, in lines 250 and 270, I place START and ADDR at location \$CE. Are these locations truly safe to use? In general, no. If you have been reading my series on self-relocatable code, you know that there are no truly safe locations. But for the purposes of this demonstration, I think we can use them as is, since they are compatible with usage by the Atari Assembler Editor (and MAC/65 and—I believe—AMAC) and Atari BASIC (and BASIC XL but not Microsoft BASIC).

One other comment before we begin analyzing the operation of the listed code. If you wish to use this program as a callable USR routine from Atari BASIC, you need to add this line:

125 PLA; clean up stack for BASIC

BASIC And ML Compared

Now, onward and downward, into the depths of machine language. I will discuss the lines which I feel are relevant and important by line number.

Line 130. We could have accomplished the same thing by giving a RUN address at the end of the listing, but this gets us started in a visible way.

Line 210. Note the use of the \$9B (an ATASCII RETURN code) to terminate the message. The 0 is for safety and because I am paranoid.

Double Usage

Lines 230, 240, 260. If you consider LOW and HIGH together, they form a 16-bit word. Since QUIT needs to be a word, why not join usage? This is not recommended procedure, but it works if you are careful.

Lines 250, 270. This isn't surprising if you think about the fact that line 310 in the BASIC code could have been written as FOR START = START TO QUIT, thus eliminating the need for the extra variable, ADDR.

Lines 300–321. These are the same equates you have seen many places, including in the Atari

OS listings and *Inside Atari DOS* though the actual mnemonics may differ slightly.

Lines 550-566. When you get to this routine, it expects the OS channel designator (which is 16 times the Atari BASIC file number) in the X register, the command value in the A register, and the address of the buffer to use in the Y register (low byte) and on the stack (high byte). The routine assumes that you will not be doing I/O which requires over 255 bytes of buffer (a valid assumption for this program, but not for all circumstances).

Checking For Errors

CMDJOIN sets up the appropriate IOCB and calls

CIO to do the real work. It returns the error status to the user in A, Y, and the flags. In this program, only OPEN looks for the error status. (Because PRINT and INPUT to/from channel zero had *better* work, and if CLOSE fails it's too late anyhow.)

Lines 500-545. These are the various I/O entry points. Note that they expect the X and Y registers set up as in CMDJOIN. They assume that the high byte of the buffer address is in A and push it on the stack to make room for the command byte. They are simple and effective.

Next month we'll look at the rest of this listing.

Load A Binary Object File

```

0100      .TITLE "Binary Object File Loader for COMPUTE!"
0101 ;
0102 ;
0103 ; a binary object file loader in assembly language
0104 ;
0000      0110      *= $0600 ; an arbitrary location
0600      0120 BEGIN
0600 4C6006 0130      JMP BEGINWORK ; skip data and subroutines
0140 ;
0150 ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
0160 ;
0170 ; variables and buffers
0180 ;
0190 ; defined in order encountered in BASIC program
0200 ;
0603 57484154 0210 MESSAGE .BYTE "WHAT FILE TO LOAD ?", $9B, 0
0607 2046494C
060B 4520544F
060F 204C4F41
0613 44203F9B
0617 00
      =0580      0220 NAME = $0580 ; buffer for file name (see text)
0618 00      0230 LOW .BYTE 0 ; low byte of address
0619 00      0240 HIGH .BYTE 0 ; high byte of address
      =00CE      0250 START = $CE ; although START could be anywhere,
      ; ADDR (see below) needs zero page
      =0618      0260 QUIT = LOW ; accomplishes line 270 of BASIC program
      =00CE      0270 ADDR = START ; accomplishes part of FOR statement
      ; in line 310 (see text)
      0300 ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
      0301 ;
      0302 ; system equates, etc.
      0303 ;
      =0340      0304 IOCB = $0340 ; where IOCB #0 is
      =0342      0305 ICCOM = $0342 ; the command byte
      =0344      0306 ICBADR = $0344 ; buffer addr
      =0348      0307 ICBLEN = $0348 ; buffer length
      =034A      0308 ICAUX1 = $034A ; aux 1 byte (open mode)
      0310 ;
      =0003      0311 CMDOPEN = 3 ; the open command
      =000C      0312 CMDCLOSE = 12 ; the close command
      =0009      0313 CMDPRINT = 9 ; put a text line
      =0005      0314 CMDINPUT = 5 ; get a text line
      =0007      0315 CMDGET = 7 ; get a binary byte or block
      0320 ;
      =E456      0321 CIO = $E456 ; the master I/O routine for Atari OS
      0498      .PAGE " ; Major I/O Subroutines"
      0499 ;
      0500 ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

```