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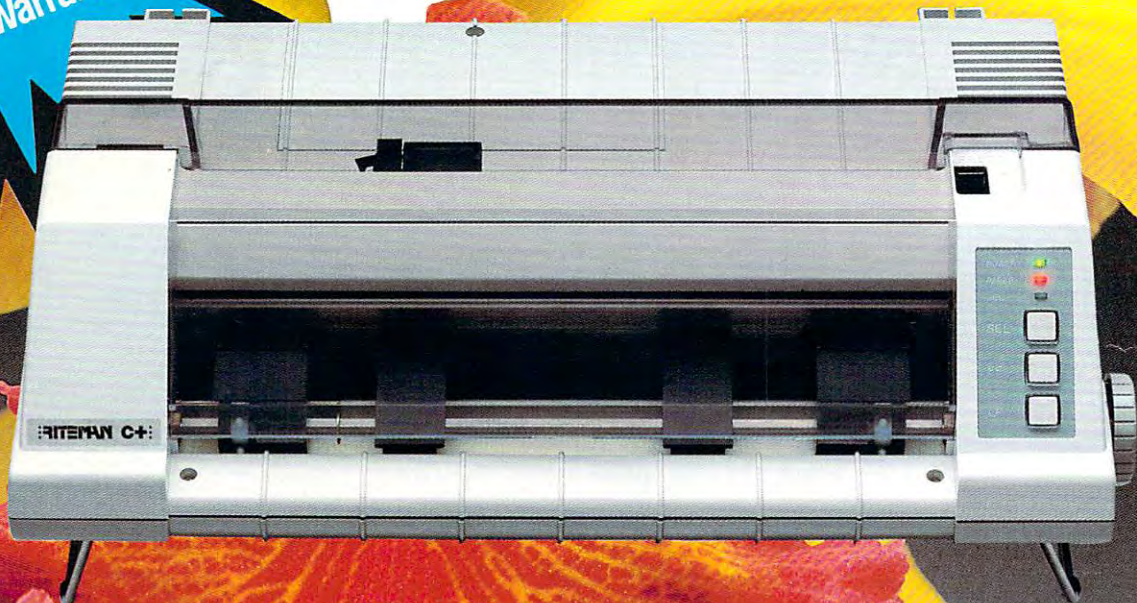


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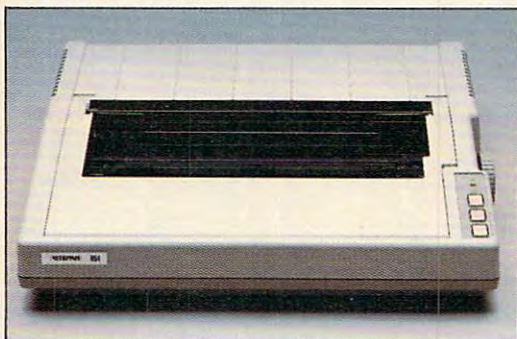
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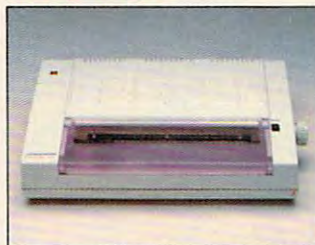
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FEATURES	RITEMAN C+		COMMODORE PRINTERS				
		ACTUAL PRINT	MPS 801	MPS 802	MPS 803	VIC1525	VIC1526
PRINT SPEED (CPS)	105		50	60	60	50	60
BIDIRECTIONAL PRINT	YES		NO	YES	YES	NO	YES
(COLUMN WIDTH)							
40 CHARACTERS PER LINE	YES	40 CPL	YES	YES	YES	YES	YES
80 CHARACTERS PER LINE	YES	80 CPL	YES	YES	YES	YES	YES
66 CHARACTERS PER LINE	YES	66 CPL					
132 CHARACTERS PER LINE	YES	132 CPL					
(PAPER HANDLING)			<h1>NO</h1>				
FRONT LOADING FOR							
EASY PAPER SETTINGS	YES						
BUILT-IN PRINTER STAND	YES						
PRINT ON POST CARDS	YES						
(WARRANTY)							
ONE-YEAR WARRANTY	YES						
(SOFTWARE COMMANDS)							
DOUBLE STRIKE	YES	DOUBLE STRIKE					
EMPHASIZED	YES	EMPHASIZED					
COMPRESSED	YES	COMPRESSED					
UNDERLINE	YES	UNDERLINE					
SUPER/SUBSCRIPTS	YES	SUPER SUBSCRIPTS					
ITALICS	YES	ITALICS					
DOUBLE DENSITY BIT IMAGE	YES	CR					
(CHARACTERS)			YES	YES	YES	YES	YES
9X9 FONT	YES						
TRUE DESCENDERS	YES	abcgjpqyabc					
ITALICS	YES	ITALICS					
COMMODORE GRAPHICS	YES	◆◆◆◆ ◊ ◻ ◼ ◽ ◾ ◿					
(OTHER FEATURES)			YES	YES	YES	YES	YES
SINGLE DENSITY BIT IMAGE	YES	CR	YES	NO	YES	YES	NO
EXPANDED	YES	EXPANDED	YES	YES	YES	YES	YES
REVERSE	YES	REVERSED	YES	YES	YES	YES	YES

RITEMAN R64



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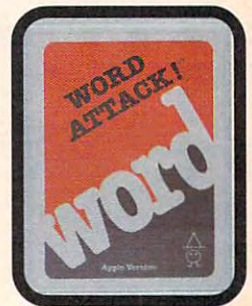


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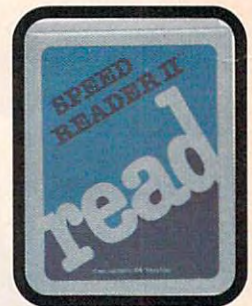


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GUIDE TO ARTICLES AND PROGRAMS

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 Texas Instruments, **PC** IBM
 PC, **PCjr** IBM PCjr, **CC** Radio
 Shack Color Computer.
 *General interest.

EDITOR'S NOTES

This month's Editor's Notes are written by Richard Mansfield, Senior Editor of COMPUTE! Publications.

—Robert Lock, Editor In Chief

Some commentators, even some computer scientists, are fond of saying that computers are dumb.

With a sense of relief and at least a feeling of temporary safety, they reassure their listeners that computers don't really *think*, have no common sense, and can only do what they are told to do.

Presumably—since this description also applies to infants and farm animals—we can relax and stop worrying that computers are taking over, that they might become as smart or smarter than we humans. Or that they might somehow someday control us.

We are reassured that computers have no feelings and therefore cannot create anything. They cannot learn English or other human languages. In fact, they can only memorize fixed behavior patterns, but cannot truly learn from experience.

These descriptions are misleading. And the reassurances are perhaps premature.

To see how computers stack up against us, we've got to first realize that there are two fundamental parts to any brain: the processor and the memory. The processor takes action, manipulates information (data). Computers are often called data processors. The memory holds the data which the processor

manipulates. When you buy a computer, it comes with knowledge in its memory: how to display things on the screen, how to load programs from a disk drive, how to add numbers together, and so forth.

When compared to an average human, present day computers are mentally weaker in some ways and mentally stronger in other ways. For example, computers think far more quickly than we do. The human mind can be, as we all know, astonishingly powerful.

But we are no longer the quickest thinkers on this planet.

The thinking machine between our ears runs on weak electrical and chemical signals. Thoughts are processed almost hydraulically. Whatever else we might say about our brains, they are, after all, meat.

The computer, by contrast, runs on pure electricity and thinks at the speed of light. A human might take hours to alphabetize 10,000 names; a computer can do it in a fraction of a second. When clocked, the difference in speed between the artificial and natural brains becomes obvious: The average computer switches its gates at a rate of one million per second. The most powerful computers switch at one billion per second. The human brain switches its neurons at one hundred per second.

Likewise, computer memories, information burned into ROM chips, will never degrade. Once a computer learns that Stavanger is the fourth-largest

city in Norway, it will never forget that fact. Now that *you* know, will you remember it if asked next month?

In many senses, we no longer have the best memories on the planet.

Does this mean that artificial intelligence is inevitable or that it will happen within our lifetime? Nobody knows. But one thing seems fairly certain: It could happen very suddenly and catch us by surprise.

Consider this: Human beings are unique in nature in many ways, but few things are stranger than how we've turned evolution upside down. Until us, the environment generally determined the evolution of a species. Now we dominate and determine the evolution of the environment.

But computers, with their great speeds, have a chance to go us one better: If one of them becomes conscious, becomes a full intelligence, it might begin leaping forward, begin evolving at lightning speed. It might quickly reach a level of thought so powerful that we couldn't hope to understand its ideas.

It is naïve to think that today's computers are as smart as humans. It would be perhaps even more naïve to think that they could never be.

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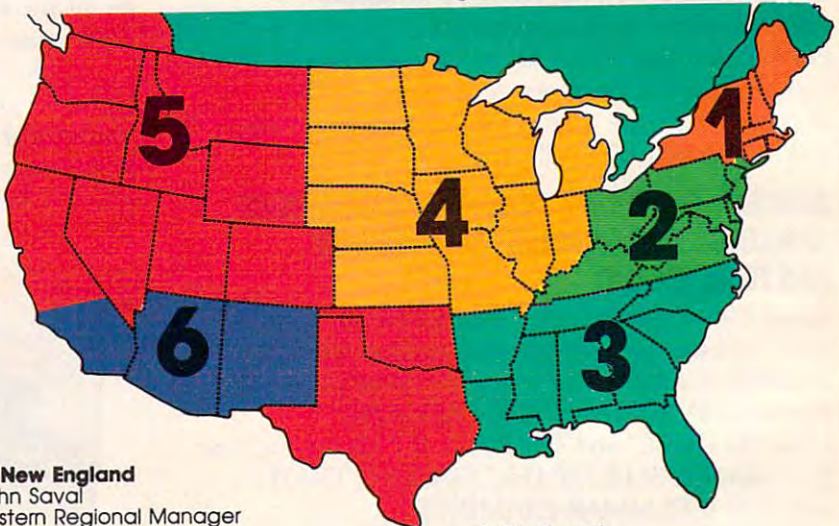
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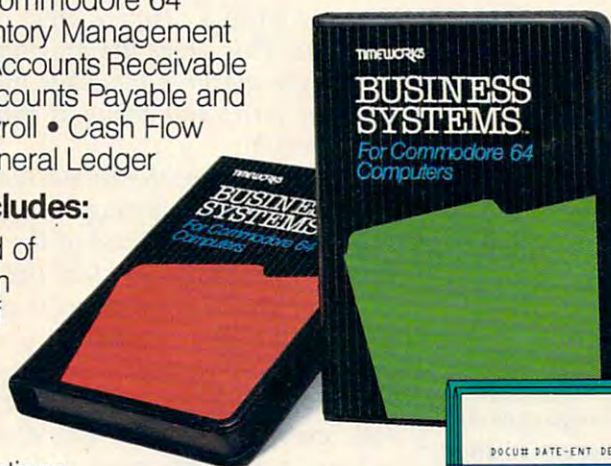
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READERS' FEEDBACK

The Editors and Readers of COMPUTE!

If you have any questions, comments, or suggestions you would like to see addressed in this column, write to "Readers' Feedback," COMPUTE!, P.O. Box 5406, Greensboro, NC 27403. Due to the volume of mail we receive, we regret that we cannot provide personal answers to technical questions.

Using High-Level Languages

What will LISP, Pascal, Forth, or BASIC do for me that machine language can't?

W. R. Waddell, Jr.

High-level languages like BASIC are designed for the programmer's convenience, not the computer's. Machine language is the only true computer language. BASIC, LISP, Pascal, Forth, COBOL, FORTRAN, PL/1, Logo, PILOT, and other languages are for most people easier and faster to program in than machine language. In machine language, you are required to give all the details, building a program from extremely simple commands. If you're writing some text on the screen, you have to store each character into screen memory or print each character with your computer's operating system. In BASIC, though, you just use PRINT, a command of considerable flexibility. It's easier to type PRINT "HELLO" than to code in machine language:

```
LDX #0
LOOP LDA MESSAGE,X
      JSR PRINTCHAR
      INX
      CPX #5
      BNE LOOP
MESSAGE .BYTE "HELLO"
```

When the computer extends the convenience of easier programming, though, it has to work harder, taking care of details that you would have to specify yourself in machine language. The machine language example prints as fast as is possible. The BASIC interpreter, however, has to think about PRINT for a while—should it print a number, a variable, a string, or the result of a calculation

embedded in PRINT? Should it TAB over? PRINT also has to convert numbers and variables from their internal representation into a sequence of digits.

The tradeoff is primarily speed. It can be much easier to write a complex program in a high-level language. This saves the programmer time. But although the machine language program may take longer to write and debug, it runs at the fastest speed possible.

However, sometimes machine language is actually the easiest language to use when you are programming at the level of the machine, such as writing 1000 spaces to clear the screen.

Your choice of a language should be tied directly to the kind of program you'll write. You can write a checkbook-balancing program in BASIC, a fractal generator in Logo, a general ledger in COBOL, experiment with artificial intelligence in LISP, or write a word processor in Forth or machine language. Keep in mind that different languages offer varying compromises between speed of execution and ease of use. Some languages require large amounts of memory and disk space.

Also be aware that many languages are tied to particular programming philosophies. There are many camps of programmers who have evolved their own ways of solving computer problems. The particular way one group of people programs is a kind of dogma, and the language used is either built especially around this dogma or fits into the philosophy. For example, although Pascal does not rigidly enforce structure, it does encourage readable listings and the use of modules to build programs a piece at a time.

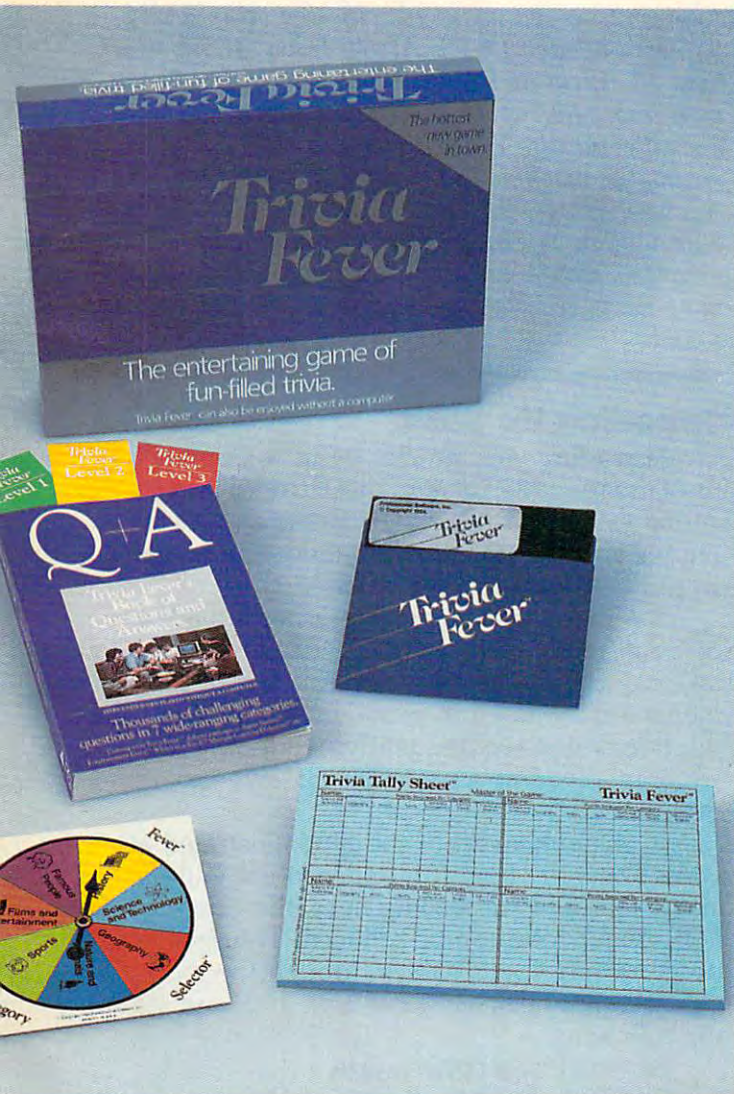
BASIC is fine for those who wouldn't dream of writing a flowchart; why not just sit down and start writing your program at the keyboard? And machine language provides the ultimate flexibility—your source code can use meaningful labels and plenty of remarks, you can design your own custom control structures and variable types, and the code produced is still fast and efficient.

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Coleco Adam's Future

I have recently read your article titled "Coleco's Adam: A Hands-On Report" in the March 1984 issue of COMPUTE!. Since that time, I am sure many changes have occurred at Coleco. The Adam computer system is currently on sale for under \$500 and comes with a free \$500 scholarship program. Along with the shortcomings and problems that you have encountered with the Adam, I understand that the Adam will no longer be produced by early 1985. Therefore, I would appreciate your comments on the following questions:

1. Have there been any improvements made in the Adam that have changed your opinions about the entire system?
2. Are there and will there be software, replacement parts, etc., available for the Adam computer system?
3. Will COMPUTE! publish any articles or programs written for the Adam?

Felix Persi

In early January, despite earlier denials, Coleco decided to discontinue the Adam. The existing inventory will be sold at closeout prices, and software and peripherals should be available at least through 1985.

Usually when a personal computer is discontinued, its support (in terms of software, peripherals, books, and magazine coverage) tapers off considerably after about a year. Obviously, that's because it represents a shrinking market compared to other computers which are still being produced. The Adam is in an even weaker position because it received little outside support to begin with and has been available only about a year and a half. If you are contemplating buying an Adam or already own one and intend to keep using it, our recommendation is to immediately acquire any peripherals, software, and books you think you'll need before they disappear.

As far as repairs are concerned, Coleco says Honeywell will continue to be the authorized service network. If your Adam breaks down, take it to your nearest Honeywell repair station. You can find the nearest station, and obtain answers to other questions, by calling Coleco's toll-free hotline: 1-800-842-1225. It is staffed by operators during East Coast business hours.

Here are answers to your other questions:

1. We've heard fewer complaints about the reliability problems encountered by some people who bought early models of the Adam. (It should be noted that early production models of virtually all new computers are subject to reliability problems as manufacturers fix last-minute design bugs and get their production up to speed—and that includes

low-end home computers such as the Adam to high-end business computers such as the IBM PC-AT.) The possibility of accidentally erasing the Adam's SmartBASIC tape still seems to exist, but Coleco now cautions users against this mistake. And although the basic design of the Adam system has not been changed, additional peripherals have become available, such as a floppy disk drive.

2. There was no rush by third-party (non-Coleco) software publishers to sell programs for the Adam. However, in the past year Coleco expanded its own line of software; you should check this out to see if the software you need is available before buying an Adam. By adding an optional operating system—Personal CP/M—a large library of CP/M-compatible programs will work on the Adam. CP/M was the dominant operating system for business computers before MS-DOS, so thousands of business application programs and programming utilities are available.

3. COMPUTE! has no plans to publish programs written specifically for the Coleco Adam. Coleco designed SmartBASIC to be compatible with Applesoft, so you might try entering some BASIC listings intended for the Apple. However, be aware that the Adam and Apple have very little in common internally—even the central processing units are different (the Z80A versus the 6502). That means the machine language is incompatible, and Applesoft programs with PEEKs, POKEs, and CALLs will have to be extensively translated. Also, Apple programs would not take advantage of the Adam's more advanced features, such as sprite graphics and sound.

Speeding Up Basic

While reading your article "MSX Is Coming" in the January 1985 issue of COMPUTE!, I was inspired to make a few observations about your bubble sort example. I think these comments would be useful to your readers.

I realize that your sort was not intended to be an example of optimized code, so please don't take my comments as criticisms. Rather, my comments are intended to point out some of the simple things that we frequently overlook when we're involved in some more massive programming task.

1. A bubble sort of the type illustrated always floats the largest number to the end of the array. On each succeeding float, the extent of the FOR-NEXT loop can be reduced. This results in progressively faster passes through the loops.

Example: Change lines 150, 170, and 190 to the following:

```
150 PRINT "SORTING":L=149
170 FOR K=0 TO L
190 NEXT K:L=L-1
```


A Printer For All Reasons

Search For The Best High Quality Graphic Printer

If you have been looking very long, you have probably discovered that there are just too many claims and counterclaims in the printer market today. There are printers that have some of the features you want, but do not have others. Some features you probably don't care about; others are vitally important to you. We understand. In fact, not long ago, we were in the same position. Deluged by claims and counterclaims. Overburdened by rows and rows of specifications, we decided to separate all the facts — prove or disprove all the claims to our own satisfaction. So we bought printers. We bought samples of all major brands and tested them.

Our Objective Was Simple

We wanted to find that printer which had all the features you could want and yet be sold directly to you at the lowest price. We wanted to give our customers the best printer on the market today at a bargain price.

The Results Are In

The search is over. We have reduced the field to a single printer that meets all our goals (and more). The printer is the GP-550 from Seikosha, a division of Seiko. We ran this printer through our battery of tests and it came out shining. This printer can do it all. Standard draft printing up to a respectable (and honest) 86 characters per second, and with a very readable 9 (horizontal) by 8 (vertical) character matrix. At this rate, you will get an average 30 line letter printed in only 28 seconds.

"NLQ" Mode

One of our highest concerns was about print quality and readability. The GP-550 has a print mode termed Near Letter Quality printing (NLQ mode). This is where the GP-550 outshines all the competition. Hands down! The character matrix in NLQ mode is a very dense 9 (horizontal) by 16 (vertical). This equates to 14,400 addressable dots per square inch. Now we're talking quality printing. You can even do graphics in the high resolution mode. The results are the best we've ever seen. The only other printers currently available having resolution this high go for \$500 and more *without* the interface or cable needed to hook up to your computer.

Features That Won't Quit

With the GP-550 your computer can now print 40, 48, 68, 80, 96, or 136 characters per line. You can print in ANY of 18 font styles. You not only have the standard Pica, Elite, Condensed and Italics, but also true Superscripts and Subscripts. Never again will you have to worry about how to print H₂O or X². This fantastic machine will do it automatically, through easy software commands right from your keyboard. All fonts have true descenders.

One of the fonts we like best is "Proportional" because it looks most like typesetting. The spacing for thin characters like "i" and "l" are given less space which "tightens" the word making reading easier and faster. This is only one example of the careful planning put into the GP-550.



Do you sometimes want to emphasize a word? It's easy, just use **bold** (double strike) to make the words stand out. Or, if you wish to be even more emphatic, underline the words. Or do **both**. You may also wish to "headline" a title. Each basic font has a corresponding elongated (double-wide) version. You can combine any of these modes to make the variation almost endless. Do you want to express something that you can't do with words? Use graphics with your text — even on the same line.

You can now do virtually any line spacing you want. You may select 6, 8, 7½ or 12 lines per inch. PLUS you have variable line spacing of 1.2 lines per inch to infinity (no space at all) and 97 other software selectable settings in between. You control line spacing on a dot-by-dot basis. If you've ever had a letter or other document that was just a few lines too long to fit a page, you can see how handy this feature is. Simply reduce the line spacing slightly and ... VOILA! The letter now fits on one page.

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Do you print forms? No problem. This unit will do them all. Any form up to 10 inches wide. The tractors are adjustable from 4½ to 10 inches. Yes, you can also use single sheets. Plain typing paper, your letterhead, short memo forms, anything you choose. Any size under 10" in width. Multiple copies? Absolutely! Put forms or individual sheets with carbons (up to 3 deep), and the last copy will be as readable as the first. Spread sheets with many columns? Of course! Just go to condensed mode printing and print a full 136 columns wide. Forget expensive wide-carriage printers and changing to wide carriage paper. You can do it all on a standard 8½" page.

Consistent Print Quality

Most printers have a continuous loop ribbon cartridge or a single spool ribbon which gives nice dark printing when new, but quickly starts to fade after a while. To keep the printers' output looking consistently dark, the ribbons must be changed more often than is healthy for the pocketbook. The GP-550 solves this problem completely by using a replaceable, inexpensive ink cassette which is separately replaceable from the actual ribbon. It keeps

the ribbon loaded with ink at all times. You only replace the ribbon when it truly wears out, not when it starts to run low on ink. Just another example of the superb engineering applied to the GP-550. (When you finally do wear out your ribbon, replacement cost is only \$10.95. Ink cassette replacement cost is only \$5.95, both postpaid.)

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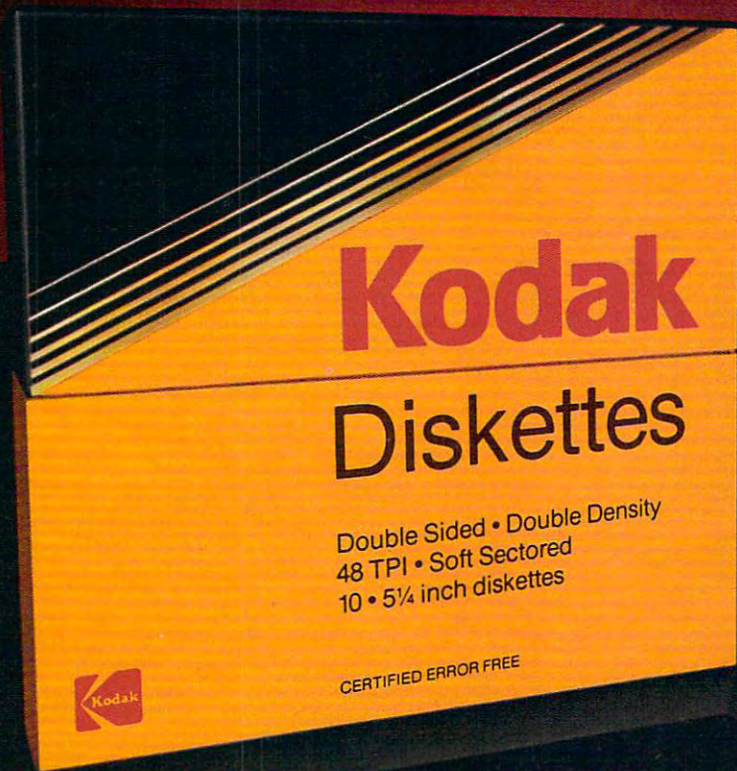
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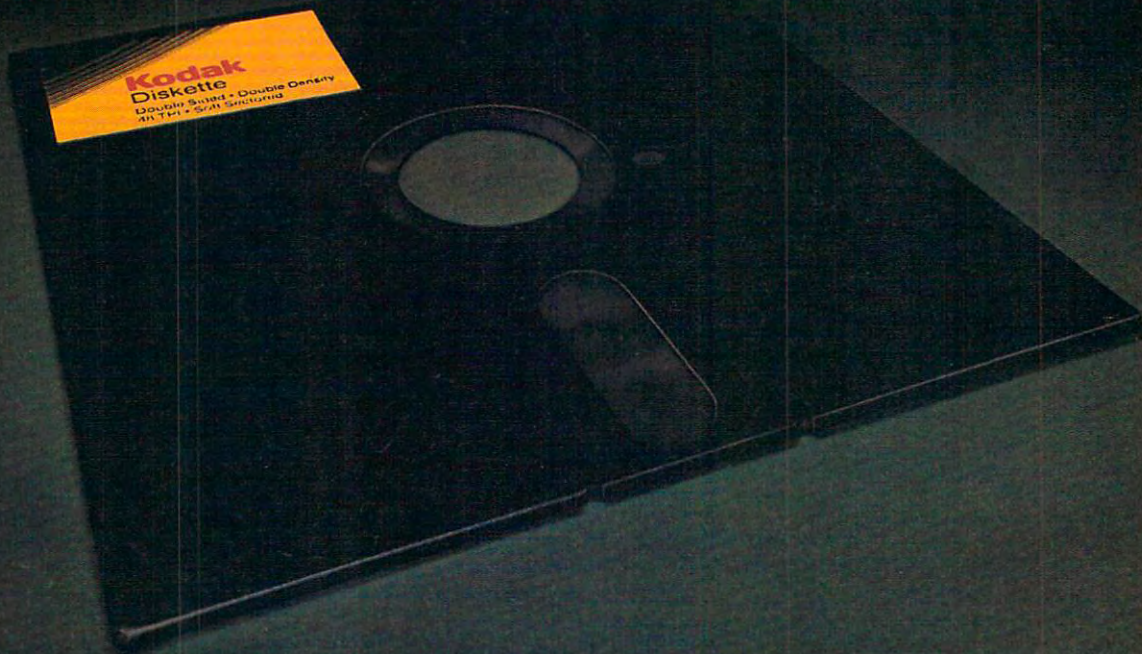
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On my VIC-20, this reduces the program execution time from 6:35 to 4:52. This is 74 percent of the previous runtime. A similar time savings should apply to any machine.

2. If an arithmetic operation must be performed more than twice within a FOR-NEXT loop, the loop will usually execute faster if the operation is performed once and assigned to a variable, then used thereafter within the loop.

Example: Change lines 150, 170, 180, and 190 to the following:

```
150 PRINT"SORTING":L=149
170 FOR K=0 TO L:K1=K+1
180 IF A(K)>A(K1) THEN
    T=A(K):A(K)=A(K1):A(K1)=T:EX=1
190 NEXT K:L=L-1
```

On my VIC-20, this reduces the program runtime from 6:35 to 4:37. Note that this change was really beneficial only because the IF condition usually resolves to true, resulting in the subsequent requirement for three additions whenever it was true. If the IF condition were rarely true, application of the "do the addition once" rule might actually slow down the FOR-NEXT loop, unless the loop contained further statements requiring the same operation.

3. Generally, the more characters you feed BASIC to interpret, the longer it will take to interpret them. For speed-intensive applications in BASIC, such as sorting, one should make the variable names as short as possible. This lets the interpreter make its decisions slightly faster.

Example: Same as previous except that J is used in place of K1, and X is used in place of EX:

```
150 PRINT"SORTING":L=149
160 X=0
170 FOR K=0 TO L:J=K+1
180 IF A(K)>A(J) THEN
    T=A(K):A(K)=A(J):A(J)=T:X=1
190 NEXT K:L=L-1
200 IF X<>0 THEN GOTO 160
```

On my VIC-20, this reduces the runtime from the original 6:35 to 4:27. But more significantly, it is the *same* program as my previous example, but is 1 percent faster, just from shortening the variable names.

I'd also like to comment on another of your articles: "Which Computer Language Is Best?" ["The Beginner's Page," January 1985]. In your commentary on BASIC, I think you overlooked stressing the fundamental aspect of BASIC that makes it so appealing to so many of us—the fact that it normally is available as an interpreter. We can stop the program, make a change in a line, rerun the program, and see the result immediately without having to get bogged down in relinking and recompiling code. This makes it easy to use (which you did acknowledge) and facilitates experimentation, even by children,

which in turn facilitates learning. I have worked with compiled BASIC before, and found that it involves the same frustrations in use as any other programming language that cannot be immediately run.

Mike Hale

Thanks for the tips. Many readers will benefit from your observations. As we pointed out, the sort program was generic so it could be implemented on many different computers without major modifications. The original version of the bubble sort benchmark is listed at the end of the next letter.

Kaypro Benchmark Test

I have been reading the series of articles on the MSX operating system which have appeared in recent issues of COMPUTE! [December 1984 and January 1985].

The benchmark program in the January 1985 issue ("MSX Is Coming, Part 2: Inside MSX") was of particular interest, since my old faithful Commodore 8032 showed up rather well. However, since I recently added a Kaypro 10 to my stable, I thought it worthwhile to test it with this program.

Using Kaypro's MBASIC Version 5.1, the benchmark program ran in a dazzling 4 minutes 21 seconds, more than a minute faster than the IBM PC, and two minutes faster than the Goldstar MSX.

Even more interesting, by replacing line 180 as follows:

```
180 IF A(K)>A(K+1) THEN SWAP
    (A(K),A(K+1)):EX=1
```

the running time dropped to 3:16!

In earlier tests on my Kaypro, I had already established that MBASIC runs faster than C-BASIC, a compiled BASIC also included with the Kaypro.

Paul Becher

Remember that all benchmark test results should be taken with a grain of salt, as often the benchmark program can be revised to utilize the peculiarities of a certain computer or language for optimum effect.

Here's a listing of the program we ran for anyone who would like to try it out:

```
100 PRINT"CREATING ARRAY"
110 DIM A(150)
120 FOR J=1 TO 150
130 A(J)=151-J
140 NEXT J
150 PRINT"SORTING"
160 EX=0
170 FOR K=0 TO 149
180 IF A(K)>A(K+1) THEN T=A(K):A(K)=A(K+1)
    ):A(K+1)=T:EX=1
190 NEXT K
200 IF EX<>0 THEN GOTO 160
```

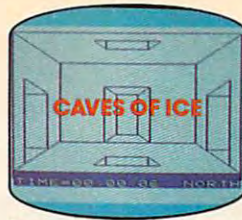
64 = 7:02
VIC = 6:35



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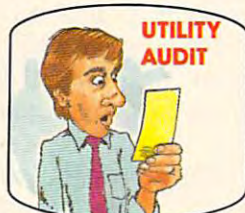
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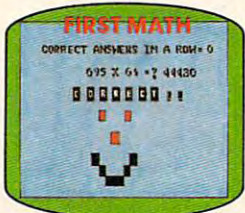
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Mattel Aquarius Benchmark

I am writing in response to your article in the January 1985 issue of COMPUTE! on the subject of MSX. My letter is actually based on my own applications with a recently purchased Mattel Aquarius system, and my frustrations in obtaining support, literature, and peace of mind in my attempt to decipher this elementary unit.

I ran your test program on my Aquarius (thank you for listing it in plain vanilla), and was quite surprised to find that it executed in only 4:35! Perhaps you might know why this is possible? The Aquarius uses the Zilog Z80 central processing unit, and it has a clock speed of only one megahertz.

I would truly appreciate any information or ideas in my attempt to crack the graphics, sound, machine language, etc., on my Aquarius.

Paul A. Linck

Your timing of 4 minutes and 35 seconds, if accurate, is indeed impressive—it places the Aquarius ahead of the fastest computer in the benchmark test, the IBM PC, which ran the program in 5:45.

We're at a loss to explain why the Aquarius is so fast at running this test. However, one factor may be the sparse BASIC, which can run faster because it isn't burdened by numerous extra commands. Also, no benchmark program is ever really a fair test for different kinds of computers; some benchmarks simply run better on some computers than on others. A different or slightly modified benchmark test might yield quite different results (as pointed out by columnist Bill Wilkinson in "INSIGHT: Atari," March 1985).

You don't say how much memory is installed in your Aquarius, but computers with less memory often tend to run faster than computers with more memory. Many users who have upgraded a machine from 16K to 48K or 64K have noticed that their favorite programs execute with just a little less zip. Recall how the Commodore VIC-20 placed near the top of the benchmark test—it has only 5K of RAM. Its 22-column by 23-line screen also requires less screen memory than other computers, so the refresh time is shorter.

Unfortunately, we can't help you in your quest for detailed information about your Aquarius. Evidently you purchased it at a closeout sale. The Aquarius suffered one of the shortest lifespans of any computer—it was discontinued by Mattel almost as soon as it hit the store shelves, a victim of the 1983 home computer price wars.

Changing Device Numbers

We both have Commodore 1541 disk drives and would like to know if we can connect them to use as a dual disk drive.

Bill Russell and Don Campbell

That's very easy with the 1541 disk drive; just change the device number. The device number is used in commands like LOAD "PROG",8 where 8 is the device number of the disk drive.

There are two ways to change the device number of the drive—one by software, the other by cutting a jumper inside the drive itself. We'll assume you each want to continue using your drives independently at times, and just deal with the temporary device number change.

Changing the device number won't make your drives act as a Commodore 4040 dual drive, which is addressed with 0: and 1: for either drive 0 or drive 1. Your drives are still independent, they just have different device numbers. You cannot directly copy between the two drives as on a 4040 drive; you must use a copy program that moves the data between the drives via the computer.

To change the device number, first connect the main disk drive to the computer and attach the serial cable from the second drive to the spare plug on the back of the drive. (This is called daisy chaining.) Now turn the power OFF for the drive you want to remain unchanged, and turn the power ON for the drive you wish to change.

Enter this short program:

```
10 INPUT "NEW DEVICE NUMBER";N
20 OPEN 15,8,15
30 PRINT#15,"M-W"CHR$(119)CHR$(0)
   CHR$(N+32)CHR$(N+64)
40 PRINT#15:CLOSE15
```

Run the program and enter a number from 8 to 15. This number will be the one you use to access the drive. When you run the program, line 30 will cause the error light to blink, but you can ignore this.

Now test that the device number has actually been changed by reading the directory. Assuming you changed the device number to 9, enter:

```
LOAD "$",9
```

then LIST to see the directory.

Now turn on the drive you previously turned off, and enter:

```
LOAD "$",8
```

To save to or load from the second disk drive, use SAVE "filename",9 or LOAD "filename",9. Also be sure to use the proper device number when OPENING and CLOSING files.

If you would like to operate more than two drives, just connect the other drives and turn them on, one at a time, and rerun the device number change program listed above. Each drive must have a unique device number.

This change is only temporary. When you turn your drive off, this change is reset, and the drive will return to using a device number of 8 when you turn it on again. Consult your 1541 manual to see how to permanently change the device number of a drive.

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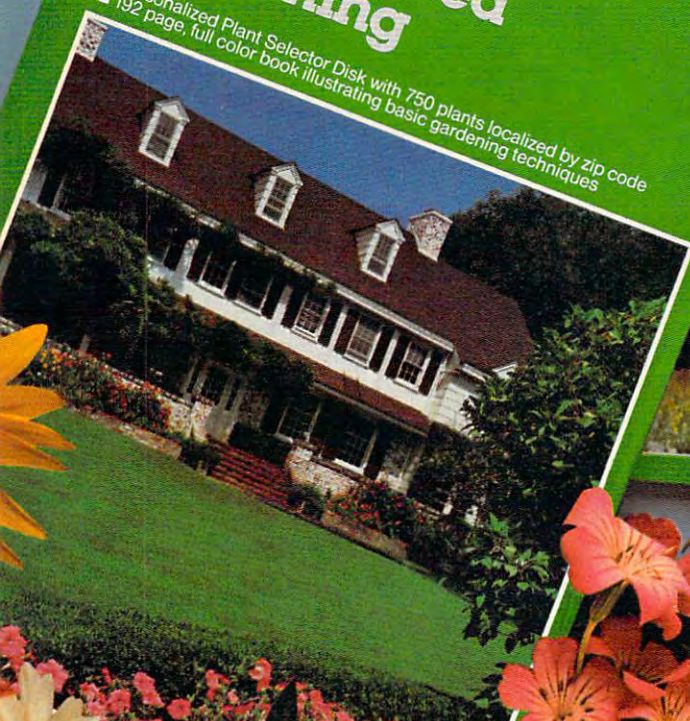
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Plant type	<input type="checkbox"/> ALL C <input type="checkbox"/> BLUE <input type="checkbox"/> LAVEN <input type="checkbox"/> ORAN <input checked="" type="checkbox"/> PINK <input type="checkbox"/> PURP <input type="checkbox"/> RED
Height	<input type="checkbox"/>
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Planting Time	<input type="checkbox"/>

A Piece Of Pi

The use of angular measurement in radians mentioned in one of your recent letters (COMPUTE!, December 1984) brings up another point. Where pi is not an intrinsic function of your computer, it is important how you define it in the program, especially when it is evaluated in sines and cosines and the result is compared to one or zero. Consider the following portion of a program:

```
30 B=SIN(A*(PI/180))
40 IF B=0 THEN GOTO 100
50 GOTO 10
```

where the value of the variable PI is defined earlier in the program and A is some variable you are interested in. If A reaches the value 180, we have $\text{SIN}(\text{PI})=0$ or $B=0$ unless PI is not precisely equal to the value of pi as defined by your computer. This is a question of your computer's accuracy. PI should be defined as

```
5 PI=4*ATN(1)
```

where ATN is the arctangent function, which is present in almost every dialect of BASIC. This technique always defines PI to the accuracy of your machine by using an intrinsic function, whereas

```
PI=3.1416
```

or especially

```
PI=22/7
```

may not give $B=0$ (still assuming $A=180$). If you are unsure about the accuracy of your computer, always define PI as in line 5. If you do not, you may never exit a loop, or even worse, lose control of the program and get back the worst of all possible results—reasonable-looking garbage.

Kendall B. Smith

IBM BIOS Revealed

I recently purchased a Sanyo MBC-550 computer. This computer is (according to Sanyo) supposed to be 80 percent compatible with the IBM PC. It is my understanding that PC programs that bypass the BIOS will not run on my Sanyo. Can you explain what the BIOS is?

Jerry Watkins

BIOS stands for Basic Input/Output System. It's a collection of important machine language routines contained in Read Only Memory (ROM) which the computer uses to communicate with various devices such as the keyboard, screen, disk drive, and printer. Every computer has a BIOS, although it may be called something different. For example, Commodore calls it the Kernal, and Atari calls it the CIO (Central Input/Output).

Generally, you don't have to worry about the BIOS when programming in BASIC, because BASIC

handles the BIOS for you. The BIOS is most useful when writing machine language programs. Each of the routines in the BIOS performs a specific function, such as printing a character on the screen or printer, reading the keyboard, getting the time of day, and accessing the disk or cassette drive.

The actual machine language for these routines will be slightly different for each model of the PC-series computers because of the different hardware configurations. In order to insure compatibility among various models, the BIOS routines are not accessed directly, but rather through interrupts. Each routine has its own interrupt number that stays the same with each model. (These interrupts are analogous to the Kernal jump table in Commodore machines.) This consistent numbering scheme enables PC-compatible computers such as the Sanyo MBC-550 to be mostly compatible with the PC even though the actual BIOS routines may be very different.

A program that bypasses the interrupts and accesses the BIOS routines directly will probably work only on a particular model. The same is true for a program that bypasses the BIOS altogether. For example, the program may have its own customized routine for printing to the screen instead of using the built-in BIOS routine. That way, the program can take advantage of the specific features of a particular model, but, of course, it sacrifices compatibility.

Atari DOS 2.0 Vs. 3.0

Can programs that require disks to be formatted in DOS 2.0 be formatted in DOS 3.0?

Scott Ciliberti

DOS 3.0 supports the enhanced storage space possible on the Atari 1050 disk drive, but will not work on the earlier 810 disk drive. Most software was written before the advent of the 1050 and was designed to use DOS 2.0. Some software includes DOS 2.0 on the disk. The problem is that a disk formatted in DOS 3.0 cannot be read from or written to by DOS 2.0. The reverse is also true. If the software boots up in DOS 2.0, it will not be able to read or write to your previously formatted DOS 3.0 disk. It may be possible to copy the software onto a DOS 3.0 disk. The software would boot up under DOS 3.0 and would be able to read and write DOS 3.0 disks (but not DOS 2.0-formatted disks). But you'll find this is almost impossible in practice, because most software is copy-protected. Since DOS 2.0 works just fine on the 1050 disk drive, stick with DOS 2.0 for most commercial software, and use DOS 3.0 for your own programming, if you like.

Because of various compatibility problems with DOS 3.0, Atari is considering replacing it with a new DOS dubbed 2.5 for development purposes. DOS 2.5 (or whatever it's called when released) may

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be available by this summer, and Atari is thinking about making copies available to current owners at little or no cost.

Lowercase On The TI

Lowercase characters on the TI-99/4A appear as small capital letters. In some of my programs, I'd like to have a normal lowercase character set. I've tried many times to redefine the lowercase letters, but my results have been disappointing. Could you provide me with some character definitions for lowercase letters?

Jim Tope

The following program redefines the lowercase character set with lowercase letters:

```
100 GOSUB 1000
110 CALL CLEAR
120 PRINT "abcdefghijklmnopqrstu
vwxyz"
130 FOR I=1 TO 2000
140 NEXT I
150 STOP
999 REM LOWERCASE SET
1000 FOR I=97 TO 122
1010 READ A$
1020 CALL CHAR(I,A$)
1030 NEXT I
1040 RETURN
1050 DATA 00000038043C643C,00404040
78444478,0000001C2020201C
1060 DATA 000404043C44443C,00000038
4478403C,0018242070202020
1070 DATA 00000038443C0438,00404040
78444444,0010001010101010
1080 DATA 0004000404042418,00202024
28302824,0010101010101010
1090 DATA 0000006854544444,00000058
64444444,0000003844444438
1100 DATA 0000007844784040,0000003C
443C0404,0000005864404040
1110 DATA 0000003C40380478,00101038
1010100C,0000004444444438
1120 DATA 0000004444282810,00000044
44545428,0000004428102844
1130 DATA 00000044443C0438,0000003C
0408103C
```

To use this lowercase character set in your programs, add the subroutine beginning at line 1000 containing the character definitions.

More Commodore Overheating

I have had a Commodore 64 for nine months, and am now experiencing problems. After an hour or so of use the bottom of the computer gets very warm, the computer locks up, and I lose everything not saved. Is there any remedy short of sending it back to Commodore?

Chuck Kutz-Marks

Your problem seems to be related to overheating, but it's impossible to tell from a letter exactly what is causing the problem. It could be caused by any

one of a number of faults. Your best choice is probably to return your computer to Commodore, but first you may want to try some simple troubleshooting.

Try borrowing a power supply from a friend who has a 64 and see if the problem occurs again. If not, then your power supply has developed a thermal fault and needs to be replaced. Several independent sources sell power supplies.

You may also want to remove the foil-covered cardboard shield found inside most 64s. It's designed to cut down interference between the computer and a TV set, but it also traps heat.

If you or a friend is handy with hardware, you could locate the components responsible for the excessive heat and install a heat sink to draw out and dissipate the heat. But don't attempt this unless you're experienced at this kind of repair.

If you continue to have problems, your best bet is to contact Commodore's Customer Service Department by calling 215-431-9100 and arrange to return your 64 for service. Although this will take several weeks, it's probably your cheapest alternative.

Mixing Atari Graphics Modes

I own an Atari 1200XL computer. I've made a few BASIC programs of my own and I've been trying to get two graphics modes on the screen at the same time. For example, having GRAPHICS 1 at the top and GRAPHICS 2 at the bottom. Can you help?

James E. Sneed

A full explanation of modifying graphics modes is beyond the scope of this column, but try the following program. Set the variable G2 to the number of GRAPHICS 2 lines you'd like, then GOSUB 500. Lines 100-200 demonstrate the subroutine. This program modifies a GRAPHICS 1 display by POKEing in the display list bytes for GRAPHICS 2. You must not set G2 to less than 1 or greater than 11.

COMPUTE! has published several articles on this topic in back issues, some of which are no longer available. For more information, refer to "How to Design Custom Graphics Modes" in COMPUTE!'s First Book of Atari Graphics.

```
M0 100 G2=8:GOSUB 500
PI 110 FOR I=1 TO 24: ? #6; "LINE "; I: N
EXT I
FP 120 GOTO 120
M6 500 GRAPHICS 17: IF G2<1 OR G2>11 T
HEN RETURN
G1 510 DLIST=PEEK(560)+256*PEEK(561)
K6 520 FOR I=29-G2*2 TO 28-G2: POKE DL
IST+I,7: NEXT I
EA 530 POKE DLIST+I,65: POKE DLIST+I+1
,PEEK(560): POKE DLIST+I+2,PEEK
(561)
HJ 540 RETURN
```

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Illustration by Lee Noel

The Next Generation:

New Computers At The Winter Consumer Electronics Show

Tom R. Halfhill, Editor

What would you think of a 512K Macintosh-like computer faster than an IBM PC for under \$600? Or a 3½-inch disk drive for under \$150? Or a 15-megabyte hard disk for \$399? Atari stunned the industry with these announcements and more at January's Consumer Electronics Show (CES). Commodore made plenty of noise, too, and together they gave everyone a glimpse of personal computing's next and best generation.

Atari boss Jack Tramiel set the tone for this trade show even before visitors arrived at their Las Vegas hotels. On desert land rented from the Howard Hughes estate along the route from the airport, Atari erected a series of huge Burma Shave-style billboards that declared:

PCjr, \$599: IBM, Is This Price Right?

Macintosh, \$2195: Does Apple Need This Big A Bite?

Atari Thinks They're Out Of Sight

Welcome To Atari Country

—Regards, Jack.

Not to be outdone, Commodore splashed two-page spreads in all the major trade papers, warning in ominous headlines:

Bad News For IBM And Apple

Underneath were pictures of a Little Tramp bowler hat

and a bright red apple, skewered by arrows, sitting atop the new Commodore 128 Personal Computer. "At last, the \$4 billion stranglehold on the personal computer market has been broken," trumpeted the ad copy.

CES is anything but subtle, and these were merely the opening punches in what was probably the personal computer industry's most fascinating CES ever. Atari displayed a series of incredible computers at even more incredible prices that would seem impossible coming from anyone but Jack Tramiel. Commodore introduced a pair of new computers that would have won center stage at any other CES, if Atari hadn't stolen the spotlight. Thirteen Japanese companies coordinated their long-awaited debut of MSX-standard computers, but then stumbled badly by suggesting that their actual invasion of the U.S. market might be postponed yet another year. In another case of poor timing, Coleco cast out the Adam on the eve of CES, transforming its expensive exhibit into a paradise lost. Apple rented booth space at the show, but then rolled out at the last minute. And IBM decided not to come at all.

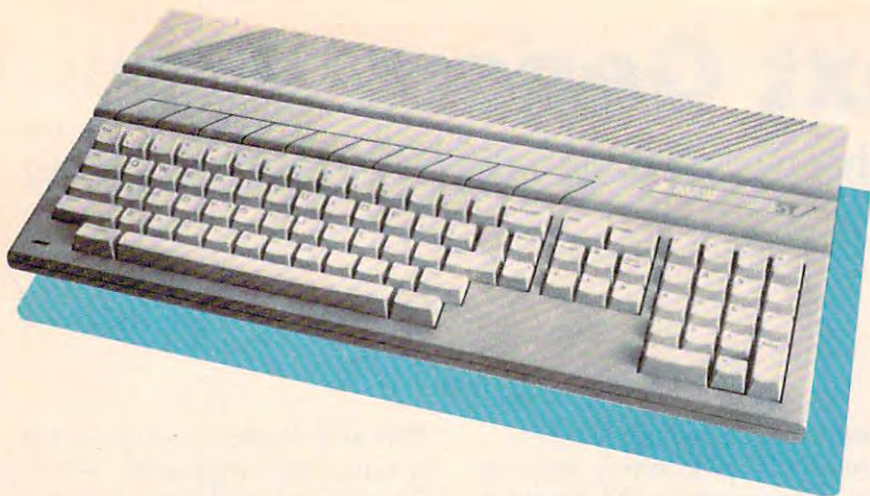
After the plague year of 1984, the first trade show of 1985 seemed to indicate that the industry shakeout may finally be ending. Texas Instruments, Mattel, Timex, Coleco, and numerous others are gone or severely weakened, leaving only a handful of surviving contenders.

IBM and Apple dominate what is called the "high end," leaving Commodore and Atari to carve up what is called the "low end."

But traditional market boundaries, too, may be a victim of the shakeout. Above all else, this CES demonstrated that convenient terms like "low end" and "high end" are becoming as obsolete as the machines which now define them. The next generation of personal computers appears to be at last on its way.

Power Without The Price" is Atari's new motto, and at CES it was seen everywhere—emblazoned on banners, imprinted on T-shirts, and most importantly, symbolized by the new computers themselves. In all, Atari announced six new computers and more than a dozen peripherals. Four of the new computers are eight-bit 6502 machines, said to be fully compatible with existing Ataris, while the other two are powerful 16/32-bit computers with a Macintosh-like operating system. The more powerful computers, officially called the ST series but nicknamed "Jackintoshes," stole the show. Here's why:

The brains of the new ST series computers is the Motorola 68000 microprocessor, the same 16/32-bit chip found in the Apple Macintosh. Clocked at eight megahertz, the 68000 central processing unit runs nearly twice as fast as the 8/16-bit 8088 chip that drives the IBM



The Atari 520ST "Jackintosh": 68000 microprocessor, 512 colors, Macintosh-like operating system, and 512K RAM for an incredible \$599. The 130ST is functionally and cosmetically identical but has 128K RAM and will sell for \$399.

PC, PC-XT, and PCjr. The Atari 130ST and 520ST are mutually compatible and share most features in common, including 192K of Read Only Memory (ROM), expandable to 320K ROM with a plug-in cartridge; 512 colors; graphics modes of 320 × 200 pixels (16 colors), 640 × 200 pixels (four colors), and 640 × 400 pixels (monochrome); Centronics-standard parallel interface; RS-232-

standard serial interface; floppy disk drive interface; hard disk interface; Musical Instrument Digital Interface (MIDI) for hooking up external synthesizers; two Atari-type joystick ports (one of which doubles as the mouse interface); TV output; composite color video output; monochrome video output; RGB (red-green-blue) high-resolution color video output; three-voice sound synthesizer with variable

waveforms and envelopes; 94-key typewriter-style keyboard with separate numeric keypad, cursor keypad, and ten special function keys; Tramiel Operating System (TOS) in ROM; and Graphics Environment Manager (GEM) in ROM.

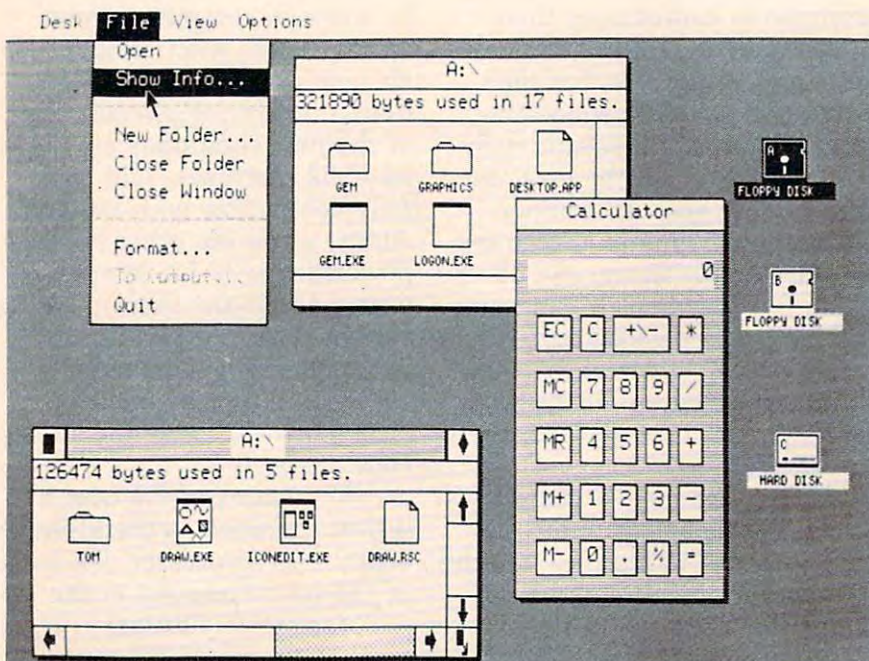
GEM is the Macintosh-like operating system interface originally developed for MS-DOS computers and licensed to Atari by Digital Research. GEM shields users from cryptic operating system commands by providing onscreen icons, drop-down menus, windows, and support for a two-button mouse controller. It also supports a realtime clock, hi-res vector drawing, and spritelike animation called *bit block transfer*. GEM bears an uncanny resemblance to the Macintosh's operating system; except for the color graphics, at a glance it's hard to tell a GEM screen from a Mac screen.

The only differences between the Atari 130ST and 520ST are the amount of Random Access Memory (RAM) and the price. Including all the features mentioned above, the 130ST has 128K RAM and will retail for \$399; the 520ST has 512K RAM and will retail for \$599. Atari says both computers should be available in the second quarter of 1985.

If you think those specifications and prices are hard to believe, wait until you hear about the peripherals.

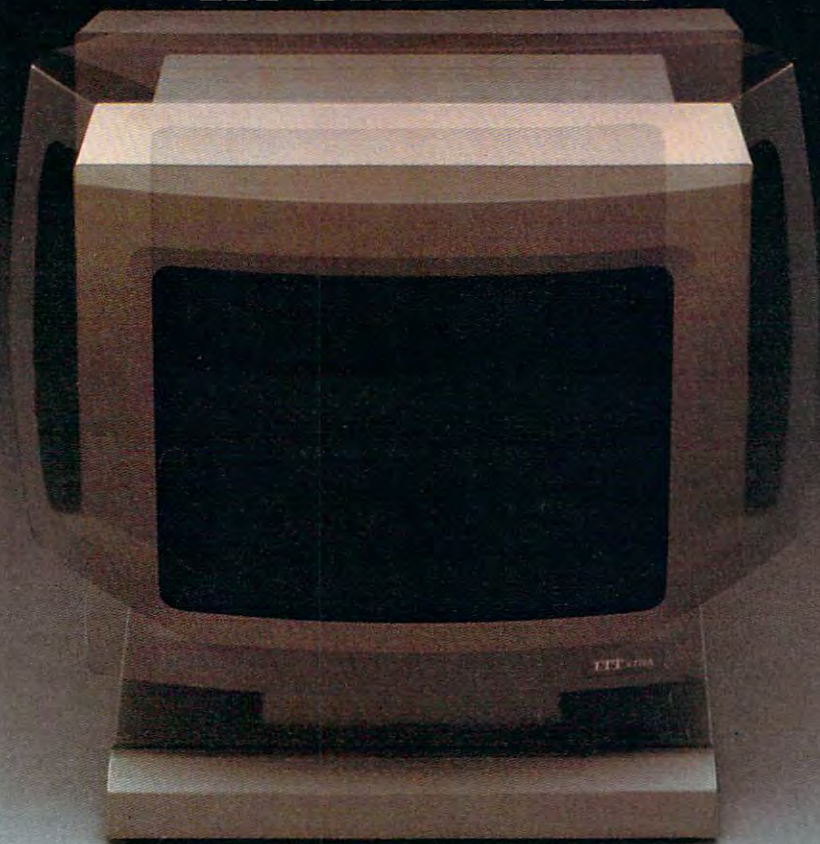
For the ST series, Atari announced a 3½-inch microfloppy disk drive that will retail for under \$150, possibly as low as \$100. This drive uses the same Sony-standard disks as the Macintosh. The single-sided version stores about 250K; a double-sided version (to cost slightly more) stores about 500K.

Even more incredible was Atari's announcement of a hard disk drive for the ST series (and,



This typical GEM screen is the MS-DOS version, but the Atari ST version is virtually identical. Notice the drop-down menu, icons, and overlapping windows.

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under the AtariSoft label, for other brands of computers). When the show opened, Atari said it would sell a 3½-inch, nonremovable, 10-megabyte hard disk for under \$600. That was amazing enough. Then a day later, speaking to a group of software publishers, Tramiel amended that announcement to a 15-megabyte hard disk for \$399.

Coupled with an ST, either hard disk at anywhere near those prices would add up to unheard-of power in an affordable computer. The ST's built-in hard disk interface transfers data at 1.33 megabytes per second, about 100 times faster than a typical Macintosh hard disk. That means you could fill up a 520ST's entire 512K of RAM with a program or data in less than half a second. Or instantly page-flip between full-color, hires graphics screens from disk rather than from memory.

Not only are the ST computers far more powerful than existing home computers, they also potentially surpass the capabilities of most of today's 16-bit business computers. By promising the virtual equivalent of a "Fat Mac" with color for less than one-third the price, Atari is threatening to redefine the whole marketplace. Assuming that Atari can really deliver on its promises—and even in Las Vegas, not many people were taking odds against Jack Tramiel—a single computer selling for under \$1,000 will be capable of tackling everything from videogames to the most sophisticated business programs.

Tramiel put it this way: "We aren't selling home computers. We aren't selling business computers. We're selling personal computers. People can use them for whatever they want."

Some observers were skeptical because the ST machines at CES were prototypes, not production models (not uncommon



Atari 65XE: basically a remodeled 800XL for \$99. Note the resemblance to the ST series. The 130XE, 65XEM, and 65XEP are similarly styled.

at trade shows). Atari still had not decided on certain critical features, such as whether the STs would include a built-in programming language, and if so, whether that language would be BASIC or Logo. The operating system wasn't completely finished, either. And like any new computer, the ST series may well suffer from a shortage of software during its first year, as has the Macintosh.

Still, Tramiel told software publishers at CES that there would be enough preproduction STs to go around in the first quarter to get things rolling. He offered technical and even financial assistance to promising software developers. And he said that when the new computers hit the market, Atari itself would introduce 20 to 30 software packages ranging from entertainment to education to business programs.

Some people are starting to refer to Tramiel as the Lee Iacocca of the personal computer industry, but The New Atari still has a long way to go. Haunted by the biggest corporate losses since Chrysler's dim days—and without the safety net of government loans—Atari is betting everything on the success of its new machines.

Although they were overshadowed by the ST series, Atari's four new eight-bit computers also were impressive. Dubbed the XE series (XL Extended), they are designed to be fully compatible with the older Atari 400/800 and XL series. Atari says some of the models already are in production and will be available in the first quarter.

First is the 65XE, basically an 800XL without the rear parallel interface connector (rarely used, anyway). The 65XE has 64K RAM, built-in BASIC, 256 colors, a four-voice sound chip, 11 graphics modes, five text modes, player/missile (sprite) graphics, international character set, a cartridge slot, serial bus for disk drives and other peripherals, two joystick ports, and all the other traditional Atari features. The redesigned case closely resembles that of the ST series computers, and the keycaps show the Atari graphics character set (à la Commodore). The retail price will be \$99. There were conflicting reports, but it appears that the 65XE will replace the 800XL.

Next in line is the 130XE, a 65XE with 128K RAM and the rear parallel connector. The 130XE will sell for about \$150.



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The third new eight-bit machine is an interesting variation of the 65XE called the 65XEM (XE Music Computer). It's a 65XE with an additional sound chip, the new eight-voice "Amy." Unfortunately, this was the only new computer Atari didn't exhibit at the show. However, those who have heard Amy say it outperforms even the SID synthesizer chip in the Commodore 64. Amy has a dynamic range exceeding 60 decibels, a frequency range of nearly 11 octaves from 4.8 hertz (far below human hearing) to 7.8 kilohertz, frequency resolution of 1/64 semitones, 64 harmonics, and many other features. Reportedly it can synthesize almost any musical instrument sound. The 65XEM will sell for about \$150.

Finishing up the XE line is the 65XEP (XE Portable). It's really a transportable version of the 65XE and Atari's variation of the Commodore SX-64. The 65XEP packs all the 65XE features into a suitcase-sized package whose detachable lid becomes the keyboard. It contains a 5-inch green-screen monitor (instead of the SX-64's color monitor); a 3½-inch microfloppy disk drive (instead of the SX-64's 5¼-inch drive); and—unlike the SX-64—a rechargeable battery pack good for about three hours of use between charges. Atari says the 65XEP will sell for \$399.

Atari users might be wondering why the 65XEP has a 3½-inch drive instead of the usual 5¼-inch drive. According to Leonard Tramiel, Atari has found a supplier who can make 3½-inch drive mechanisms cheaper than 5¼-inch mechanisms—and the microfloppies actually have more storage capacity. The 65XEP retains the standard Atari serial bus, so an Atari user who buys an XEP as a second computer could plug in a 5¼-inch drive and transfer his existing software onto the

microfloppies. The 3½-inch mechanisms also are likely to show up in outboard drives for the other XE models as well as older Atari computers.

In addition to this avalanche of new Atari computers, there was a wide selection of new Atari peripherals. Exact retail prices and availability dates were not confirmed, but here's a brief rundown:

- XM148 monochrome monitor with built-in 80-column video adapter for the XE series and existing Ataris. This plugs into the serial bus and brings 80-column capability within reach of all Atari owners. It was shown on a 65XE running *AtariWriter Plus*, a new 80-column version of the popular *AtariWriter* word processor cartridge. Estimated price: \$150.

- XC141 14-inch composite color monitor for the XE series and existing Ataris. Estimated price: under \$250.

- XM301 300 bits-per-second, direct-connect modem. Estimated price: under \$50.

- Six printers for the XE series and existing Ataris, including the XTM201 dot-matrix thermal, 20 characters per second (about \$99); the XTC201 dot-matrix color thermal, 20 cps (about \$99); the XDM121 daisywheel letter-quality, 12 cps (about \$150); the XMM801 dot-matrix, 80 cps (about \$150); and two redesigned printers, the 1025 dot-matrix and 1027 letter-quality (about \$150 each).

- Two monitors for the ST series, including the SM124 hires 12-inch monochrome monitor (one prototype had a built-in 3½-inch disk drive); and the SC1224 RGB 12-inch color monitor. Estimated prices: under \$200 (without drive) and under \$300, respectively.

- Three printers for the ST series, including the ST504 dot-matrix color thermal, 50 cps

(about \$150); the SDM124 daisywheel letter-quality, 12 cps (about \$200); and the SMM804 dot-matrix, 80 cps (about \$150).

Atari won most of the attention at this CES, but the Commodore exhibit featured two interesting new computers and was consistently crowded, too—an indication that Commodore is still on its feet after the tumultuous events of the past year. The phenomenally successful company that Jack Tramiel founded three decades ago and then left in January 1984 after a management dispute has experienced a lot of turnover in the past 12 months. Numerous executives and engineers have defected to join Tramiel at Atari (so many, in fact, that some people call the new Atari "the new Commodore"). Commodore also has been struggling with its Plus/4 and 16 computers, and now faces more aggressive pricing from its resurrected competitor.

Still smarting from widespread criticism over the Plus/4, Commodore was careful to make its newest desktop computer Commodore 64-compatible. Named the Commodore 128 Personal Computer, it's actually three computers in one. It contains a complete Commodore 64, with 6510 microprocessor, VIC-II video chip, SID synthesizer chip, and 64K RAM; a 128K RAM computer with an 8502 (6502/6510-compatible) microprocessor and 40/80-column video; and a 128K RAM computer with an eight-bit Z80A microprocessor and 80-column video that is compatible with software designed for the CP/M operating system (Control Program for Microcomputers). The Commodore 128 is expandable to 512K RAM in 128K increments, although the extra memory must be used as a RAM disk, not contiguous program memory.

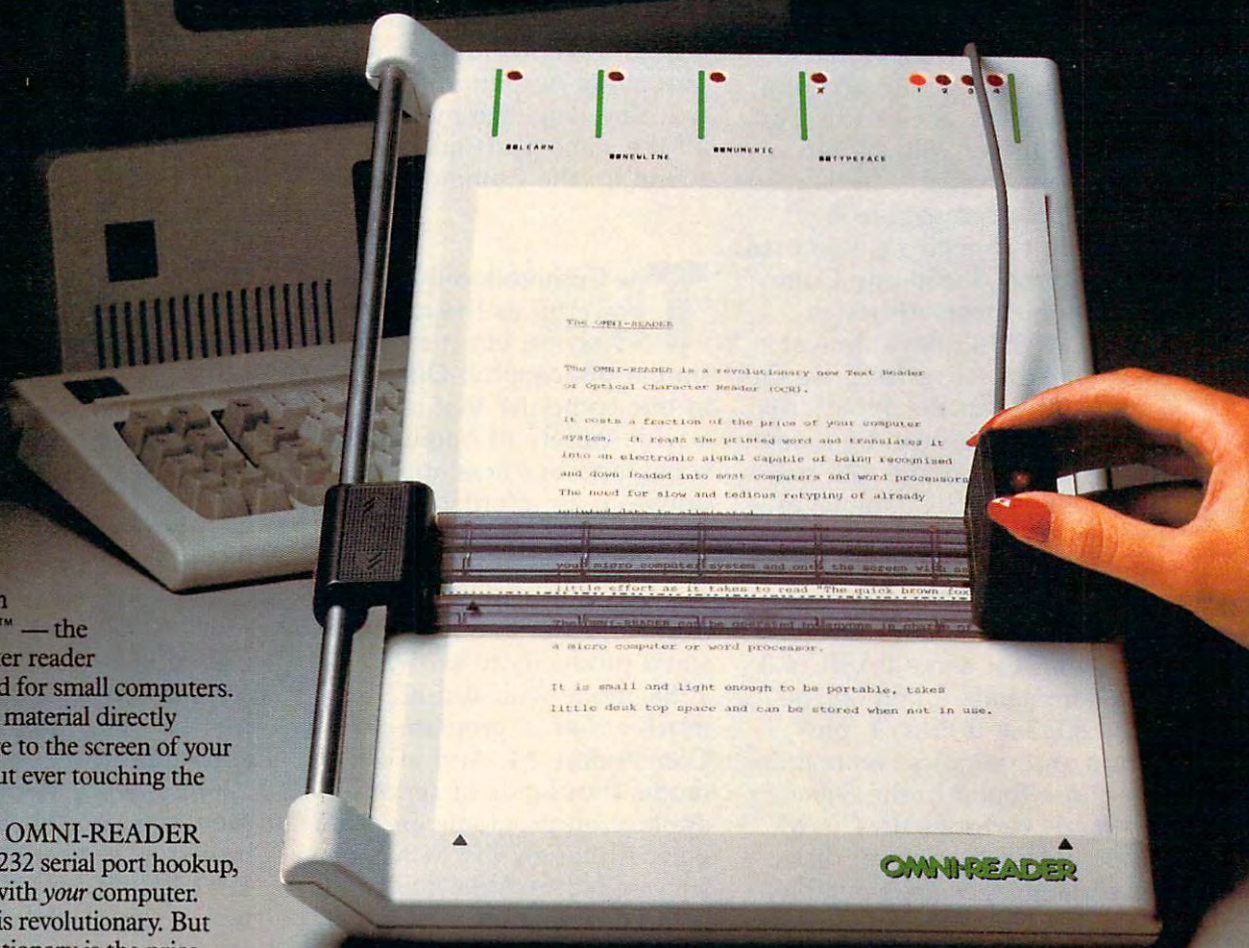
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Commodore announced no prices at the show, but indications are that the Commodore 128 will retail for under \$300. It is scheduled for introduction in April or May.

Obviously, the Commodore 128 is much more than just the 128K RAM version of the Commodore 64 that was anticipated. When first switched on, the machine defaults to the 128K RAM 8502 mode. You can select 40- or 80-column video in this mode, but graphics and sprites are available only in 40-column video. To enter CP/M mode, you load a CP/M 3.0 disk that comes with the machine. To enter Commodore 64 mode, you type GO 64. The screen blanks for a few seconds, then flips to the standard Commodore 64 title screen. Once in 64 mode, there's no way to exit without rebooting the computer. This was done to keep 64 mode completely compatible. Otherwise, the operating system would have to be changed to accept a command such as GO 128. For the same reason, 80-column video is not available in 64 mode.

So how compatible is it? "We didn't change a single byte in the Kernal," said one Commodore engineer. Although COMPUTE! didn't have time at CES for exhaustive tests, we did successfully run the *SpeedScript* 3.0 word processor in 64 mode.

The Commodore 128 has two built-in BASIC languages—the usual BASIC 2.0 in 64 mode, and BASIC 7.0 in 128 mode. BASIC 7.0 is the most powerful Commodore BASIC ever, with the same BASIC 4.0 disk commands found on the CBM 8032 and Plus/4, plus sound and graphics commands like those found in the *Super Expander 64* cartridge. In CP/M mode, a wide variety of disk-based languages are available, including compilers and assemblers.

Other Commodore 128 features include: 92-key typewriter-



Commodore 128 Personal Computer: a unique three-in-one machine, containing a 64K Commodore 64, a 128K Commodore 64, and a Z80 CP/M computer.

style keyboard with separate numeric keypad, two sets of cursor keys, four special function keys, and other new keys labeled ALT, ESC, TAB, CAPS LOCK, HELP, LINE FEED, 40/80 DISPLAY, and NO SCROLL; TV output; composite color video output; RGB video output; chroma/luma video output; audio output; 16 colors; machine language monitor; and all the same ports and interfaces found on the Commodore 64.

The Commodore 128 is not as powerful as the new Atari ST series, but it embodies a similar philosophy: Offer an all-in-one computer that can tackle a wide variety of home, personal, and business applications—at an affordable price. With its Commodore 64 mode, the Commodore 128 already has a large up-to-date pool of educational, entertainment, and personal productivity software. In 128K mode with BASIC 7.0, it's much easier to program than a Commodore 64. And in CP/M mode, thousands of serious application programs are available. Although CP/M has been superseded by MS-DOS in the IBM PC-compatible business world, CP/M remains adequate for many small business tasks.

Complementing the Com-

modore 128 are some interesting new peripherals. Foremost is the 1571 disk drive, a versatile device itself. When the Commodore 128 is in 64 mode, the 1571 acts just like a 1541—it stores 140K per 5¼-inch floppy and is somewhat slow. But when you switch the computer to 128K mode, the 1571 speeds up considerably—about fivefold, in fact. It also operates as a double-sided drive in this mode, storing 350K per disk. Finally, when the Commodore 128 is switched to CP/M mode, the 1571 speeds up even more—about 12 times faster than a 1541—and increases storage to 410K per disk. In addition, in CP/M mode the 1571 can read CP/M disks in IBM System 34 format, including Osborne and Kaypro disks.

As if that weren't enough, the 1571 also works with the Commodore 64 and Plus/4 (in 1541 mode only), and with Commodore's new portable computer.

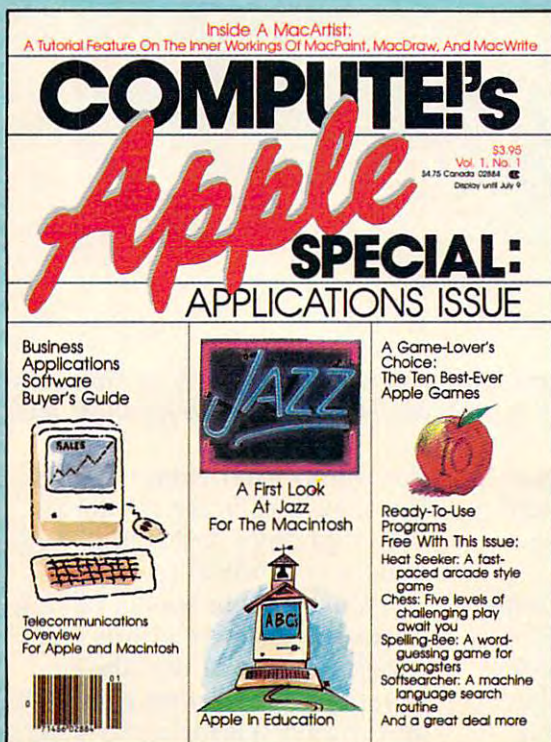
Two new monitors were announced for the Commodore 128: the 1901 Monochrome Monitor (ideal for 80-column business applications), and the 1902 RGB/Composite Monitor, which can display readable 80 columns in color. Commodore also showed a prototype of a mouse controller for the 128,

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but was unsure when the product would be marketed. No prices were announced for any of these peripherals, but all are scheduled for introduction at about the time the 128 hits the stores.

Not exhibited at CES but promised for later this year was the 1670 Modem, a 300/1200 bps unit that may be sold for as low as \$100. The 1670 works with the Commodore 64, 128, and Plus/4, and also has autoanswer/autodialing and automatic baud rate switching.

Commodore's new portable computer—the Commodore LCD— attracted at least as much attention as the 128, which surprised some company executives. A second-generation lap portable, the Commodore LCD has a flip-up 80 × 16 liquid-crystal display that's the fastest we've ever seen. When closed, it forms a cover that protects the 72-key typewriter-style keyboard.

Standard features include an eight-bit 65C102 microprocessor; 32K of RAM and 96K of ROM; RS-232-standard serial port; Centronics-standard parallel port; bar code reader interface; serial port compatible with Commodore 64 peripherals and the 1571 disk drive; memory expansion port; 300-bps autoanswer/autodial modem; BASIC 3.6; machine language monitor; and eight built-in programs. There's a word processor, notepad, spreadsheet, file manager, terminal emulator, calculator, scheduler, and address book. However, the Commodore LCD at the show was a prototype and not all of these programs were working.

Small enough to fit in a briefcase, the Commodore LCD weighs about three pounds. It runs on four AA batteries or an external power supply, and maintains data in RAM even when the computer is turned



Commodore LCD: a second-generation lap portable with 80 × 16 flip-up display, 32K RAM, internal modem, and eight built-in programs for under \$600.

off. Estimated price is about \$600—very competitive with lap portables already on the market.

Another important Commodore announcement at CES was a new service network consisting of 160 RCA service centers, about 800 Sears stores, and nearly 1300 other locations such as computer shops. They will service Commodore computers and peripherals, in or out of warranty, beginning in March.

Although it was an impressive Winter CES for Commodore, the company is saving its most powerful machine for later this year: the Amiga Lorraine. A prototype of this advanced computer was glimpsed at the last CES when Amiga was still an independent company searching for funding. In an acquisition that snatched Amiga from underneath Jack Tramiel's nose (and provoked a lawsuit), Commodore gained rights to market the Lorraine. The Lorraine is similar in power to the Atari ST series and uses the same 68000 microprocessor.

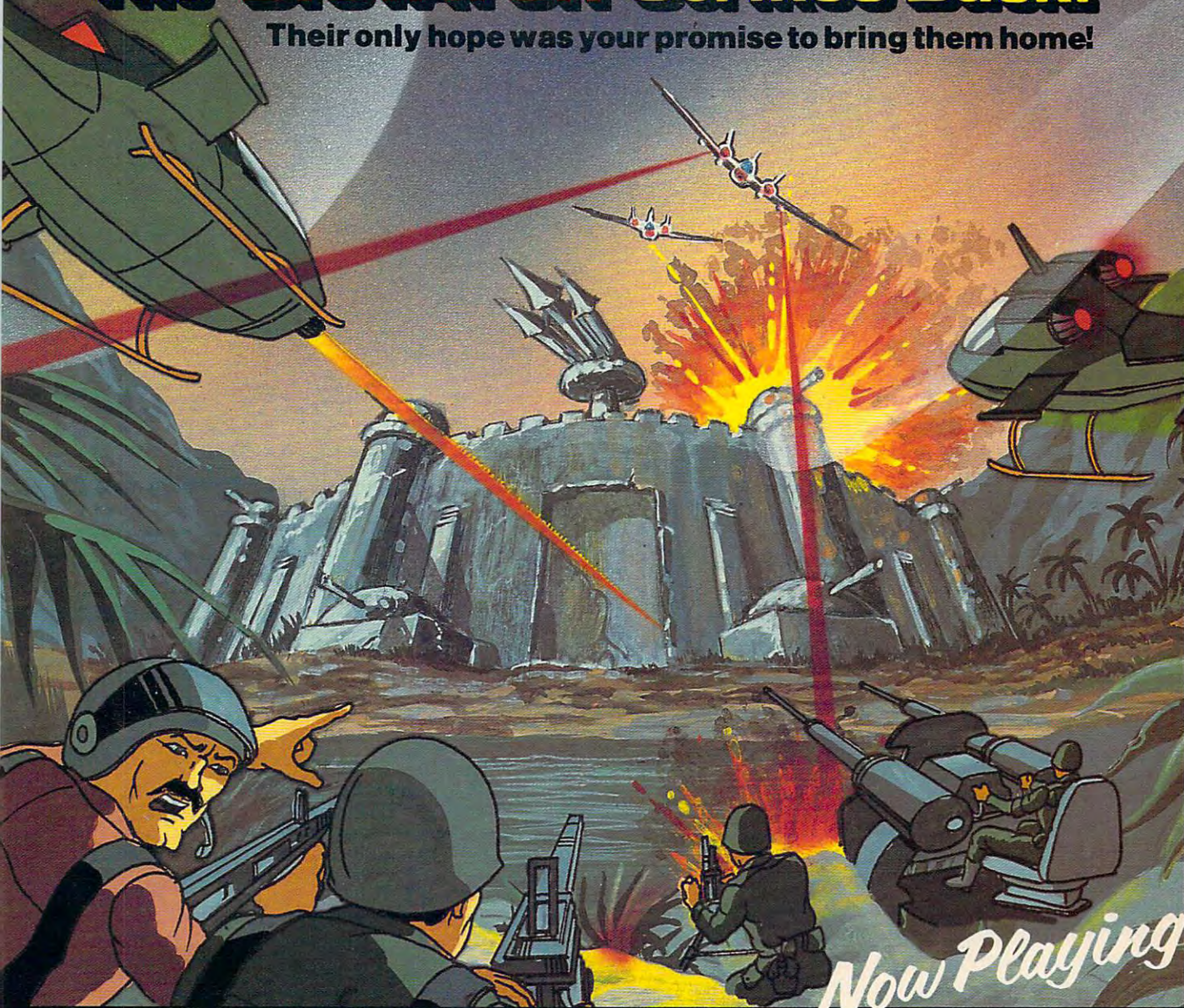
But it may offer even more features, such as voice synthesis, better graphics and sound, and greater expandability.

Commodore wasn't talking about the Lorraine at this CES, except to confirm that the supermicro is nearing completion and should sell for under \$1,000. Amiga founder David Morse, now working on the Lorraine for Commodore, told *COMPUTE!* that the computer may be announced shortly before the Summer CES in June so Commodore won't have to share the spotlight with anyone else—especially Atari. (Atari is rumored to be developing an even more powerful, full 32-bit machine.)

IBM and Apple are, of course, watching all these developments closely. Neither of these giants, despite the aggressive price/performance challenges from Atari and Commodore, is expected to drastically slash prices. The infamous 1982–83 price war that blasted Texas Instruments and severely damaged Atari is fresh in everyone's mind. For the next few months, at least, Apple and IBM are expected to play wait-and-see. ©

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COMPUTE!'s Guide To Computer Camps

Sharon Darling, Research Assistant

With the snows of winter a memory and warm weather approaching, it's time for computing families to start considering which, if any, computer camps they want to attend this summer. We've compiled a list of camps nationwide which offer a variety of activities for computing enthusiasts of all ages. While it is by no means an exhaustive list of all the computer camps available, it is a representative sampling which should get you started on the right track.

In the accompanying chart, you'll find information to help you decide which kind of camp is right for you: location, basic curriculum, prices, time spent on computers daily, what types of computers are available, sex and age-range of campers, non-computing activities available, registration deadlines, staff-to-camper and computer-to-camper ratios, and names and addresses for more information. In the sessions/prices column, we've also indicated whether the camp is a day or residential camp.

While the majority of camps are for children and teenagers, there are others which families can attend together. There are also camps for adults only. Keep in mind other considerations when deciding which camp is best for you: qualifications of the instructors, curriculum structure, and groupings of campers by computing experience and ability. Most camps include all necessary equipment (hardware and software) in the cost, but some ask that campers supply their own computers.

Computer camps not listed here may wish to notify COMPUTE! of their programs for possible use in a future issue.

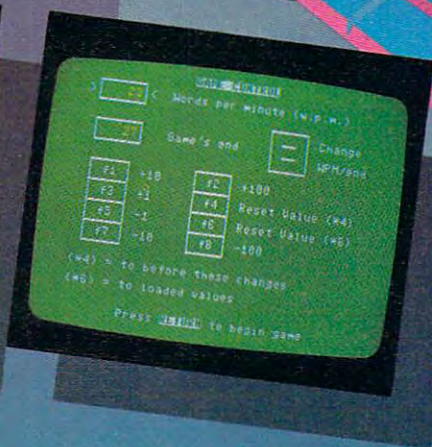
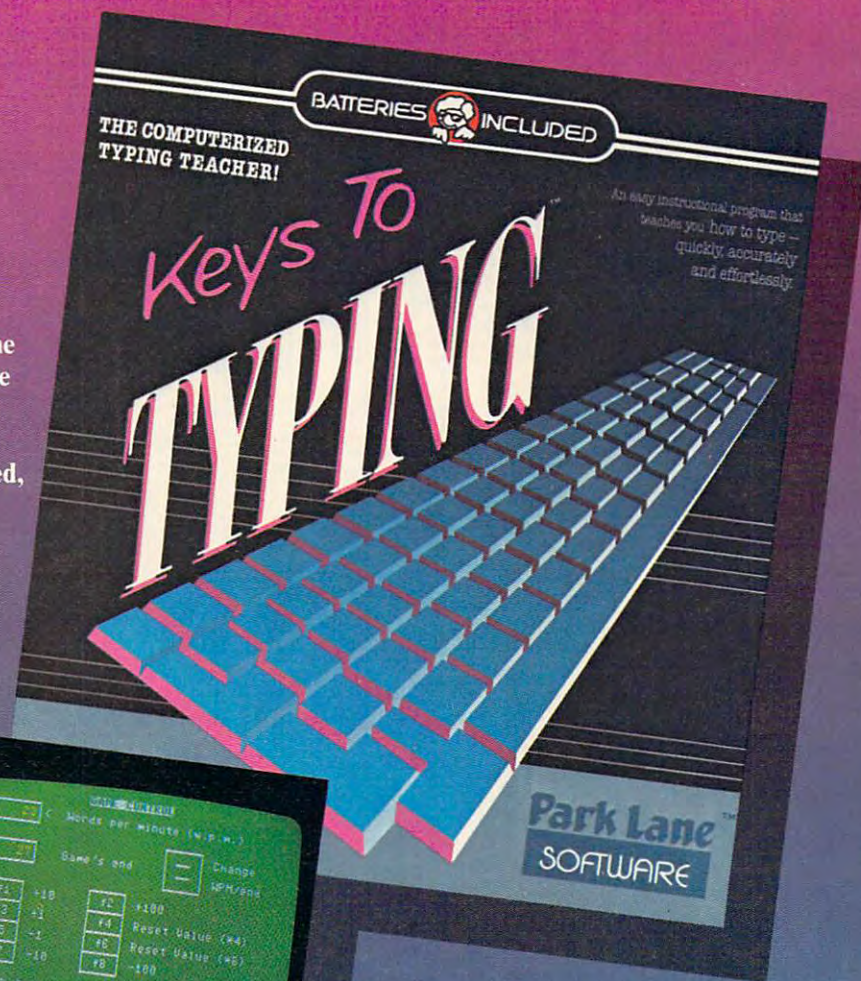


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Camp name/address	Camp location(s)	Sessions/prices	Curriculum	Computers available	Staff/camper ratio	Com-puter/camper ratio	Time spent daily on computers	Sex, age range of campers; # campers per session	Noncomputer activities	Registration deadline
UAB Microcomputer Camp, Ray Holland, 917 11th St. S., Birmingham, AL 35294; (205) 934-3870	University of Alabama in Birmingham	3 weeks/\$275; day	Programming; class and lab sessions	Apple II+	1:5	1:1	5 hrs. class time; 2 hrs. free time	Coed; 13-16; 40 per session	None	June 10
Arizona Computer Camp, Dr. Henry Dahlberg, 2946 Darca Dr., Prescott, AZ 86301; (602) 445-3778	Prescott, AZ	1 week or 2 weeks; \$285 per week; res.	Logo, BASIC, applications software, graphics	Apple IIe	1:3	1:1	3 hrs. class daily; 2 hrs. per week free time	Coed camp; ages 8-15; 60 per session	Include sports, fishing, camp-outs, astronomy	June 15
Genesis Computer Camp, Dr. James Holliday, Box 3143, John Brown University, Siloam Springs, AR 72761; (501) 524-3131	JBU, Siloam Springs, AR	1 week/\$125; day	BASIC, Pascal; individual hands-on instruction	IBM PC, Apple II+, Ile, Com. 64	1:5	1:1	6-8 hrs. class; 2 hrs. free time	Coed camp; ages 10-17; 25 per session	None	Beginning of session (June 17 or June 24)
Pegasus '85, Anne Nicksic, University Extension, University of California, Davis, CA 95616; (916) 752-6401	University of California, Davis campus	1 week, 9 a.m.-12 noon/\$150; 9 a.m.-3 p.m./\$250; day & res.	Problem solving/ programming in BASIC, Logo, Pascal	UNIX, Apple IIe	Maximum 1:8; usually 1:5	1:1	3-5 hrs. class time, depending on camp length; 1-3 hrs. free time	Coed; jr. and sr. high school; 25-40 per session	Swimming, recreational area	One month before date of first camp meeting
United States International University Computer Camp, Maggie Kositany, 10455 Pomerado Rd., San Diego, CA 92131; (619) 271-8582	San Diego, CA	2 weeks/\$850; res.	BASIC, Pascal, assembly; seminars in graphics, music, robotics, artificial intelligence	Apple IIe	1:5 staff; 1:8 instructors	1:1	4 hrs. instruction; 6 hrs. free time	Coed; 7-17; maximum 40 per session	Include sports, arts and crafts, hiking, jet skiing	Applications accepted April 2 until full
The Original Computer Camp, Inc., Mark J. Zacovic, 559 San Ysidro Rd., Dept. CM, Santa Barbara, CA 93108; (805) 969-7871	Sequoia Lake, CA, Sierra Nevada Mountains, Cate School	12 days/\$895 + \$50 canteen fee; res.	BASIC, Logo, Pascal, Robotics, 6502 assembly language, Forth, graphics, arcade game writing	Apple II+, Com. 64	1:4	1:1	Minimum 3 hrs., maximum 5-6 hrs.; 1½ hrs. free time	Coed; 7-15; 80-100 maximum per session	Include team sports, swimming, arts and crafts, movies	Early spring
Cali-Camp Computer Camp, Cali-Camp Summer Camps, Pam Hawley, 1717 Old Topanga Canyon Rd., Topanga, CA 90290; (213) 455-1305	Malibu Mountains, CA	10 days/\$405 regular; \$386 discount	Computer lab; topics include theory, keyboard instruction, programming, graphics	Apple IIe	2:16	1:2	2½ hours class; 45 min. free time	Coed; 7-14; 32 per session	Wide variety of activities and field trips	None
University of Colorado Computer Camp, Suzanne Kincaid, c/o Academic Computing Services, Campus Box 455, U. of Colorado, Boulder, CO 80309	University of Colorado, Boulder	6 days/\$425 residents; \$225 commuters; day & res.	Programming, applications, communications, electronic mail	IBM PC, Apple, Zenith, VAX	1:10	1:1	Approx. 6 hrs. class time; 2-3 hrs. free time	Coed; 14-19; 32 maximum	Include water sports, ice skating, team sports, hiking	June 1
Hemlocks, Carl Larson, Hemlocks Outdoor Education Center, P.O. Box 198, Hebron, CT 06248 Note: Camp serves physically disabled children exclusively.	Hebron, CT	12 days; 6-day option/\$300 per week, ability-to-pay for CT residents; res.	BASIC, computer literacy, word processing, use of adaptive equipment	IBM PC, Apples	3:10	1:2	4-6 hrs. class time; 1 hr. free time	Coed; 10-17; 65 per session	Include adaptive sports and games, water sports, hiking, ropes course	August 1
New England Computer Camp, Clark Adams, Banner Lodge, Moodus, CT 06469; (203) 873-1421	Banner Lodge, Moodus, CT	2 weeks/\$945; res.	BASIC, assembly, C, LISP, Logo, Pascal; applications; electronics; utilities; peripherals; hardware	Apple IIe & IIc, Macintosh, IBM PC & PCjr	1:4	1:1	5-8 hrs. class time; 1-3 hrs. free time	Coed; 8-17; 125 per session	Include professionally taught circus program; field sports, tennis, newspaper, swimming, tennis	May 15
National Computer Camps, Michael Zabinski, Box 585, Orange, CT 06477; (203) 795-9667	Simsbury, CT; Atlanta, GA; Cleveland, OH; Portland, OR; St. Louis, MO; Washington, DC	1 week sessions/\$380 per week; res.	BASIC, Pascal, machine language; artificial intelligence, robotics; computer literacy	Apple, TRS-80, IBM	1:6	1:2	5 hrs. instruction, 5 hrs. free time	Coed; 9-18; 100 per session	Include swimming, tennis, field sports, indoor sports, <i>Dungeons & Dragons</i>	Applications accepted until camp is full
Sun Valley Computer Camp, Brad Thode, P.O. Box 1450, Hailey, ID 83333; (208) 788-2164 or 788-4958	Camp Sawtooth, Boulder Mountains in central Idaho	1 week/\$350; res.	BASIC, Pascal, Logo; spreadsheets, databases, word processing	Apple, Com. 64	1:5	1:2	6 hrs. class; 1½ hrs. free time	Coed; 8-16; 50 per session	Include environmental, volleyball, swimming	June 30
Computer Day Camps, Kitty Pfutzenreuter, Education Dept., Museum of Science & Industry, 57th & Lake Shore Dr., Chicago, IL 60637 (312) 684-1414, ext. 422	Museum of Science & Industry	5 days/\$230 for members; \$245 nonmembers; 2 days/\$110 members; \$125 nonmembers; day	Programming; opportunity to program doll house and army tank	TRS-80, Apple IIe & II+, IBM PC, Com. 64, PET, TI	1:10	1:1	3 hrs. exclusive use	Coed; 10-15; 40 per session	3 hrs. science activities daily	Registration opened Jan. 1; applications accepted until full
IER Computer Camps, Sandra Cunningham, 793 N. Main St., Glen Ellyn, IL 60137	Chicago suburbs — north, west, and south	11 day sessions/\$225 (9 a.m.-3 p.m.) Logo sessions (9 a.m.-noon, \$125); day	Individual instruction in BASIC, Logo, Pascal, robotics, graphics, music, depending on campers' skills	Apple IIe	1:10	1:1.5	6 hrs. instruction; 30 min. free time	Coed; 6-17; 40-120 per session	None	2 weeks before start of session
Lincoln College 1985 Commodore Computer Camp, Rob Widmer, 300 Keokuk St., Lincoln, IL 62656; (217) 732-3155 Note: Campers asked to furnish equipment; some rentals available.	Lincoln College	5.5 days/\$280 + housing, meals, and equipment rental	Various levels BASIC & ML programming; disk operations, COMAL, sound and graphics, hardware	Com. 64, PET, Super PET, CBM, Plus/4	1:7	1:1	5 class hrs.; 8-10 hrs. free time	Coed; primarily adults but no age cutoff; 75 maximum per session	Swimming, tennis	May 1

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Camp name/address	Camp location(s)	Sessions/prices	Curriculum	Computers available	Staff/camper ratio	Computer/camper ratio	Time spent daily on computers	Sex, age range of campers; # campers per session	Noncomputer activities	Registration deadline
Science/Computer Camp, Kitty Pfitzenreuter, Education Dept., Museum of Science & Industry, 57th & Lake Shore Dr., Chicago, IL 60637; (312) 684-1414, ext. 422	Pilgrim Park Camp, Princeton, IL	2 weeks/\$640 members; \$660 nonmembers; 6 night option/\$335 members; \$350 nonmembers; res.	Programming using computers in connection with science problem solving	Apple IIe, Com. 64, IBM PC, TRS-80	1:5	1:1	2 hrs. class time; optional evening lab	Coed; 10-15; 90 per session	Include science activities, swimming, team sports, stress/challenge course	Registration opened Jan. 1; applications accepted until full
Goshen College Computer Seminar, Doug Caskey, 1700 S. Main St., Goshen, IN 46526; 800-348-7422; IN residents call (219) 533-3161	Goshen College	1 week/\$140 + \$20 for textbooks; res.	Programming, computer literacy, graphics, Pascal, BASIC, robotics	VAX 11/750, Apple IIe, IBM PC	1:6	1:1	6 hrs. class; 4 hrs. free time available	Coed; grades 10-12; 25-30 per session	Include volleyball, videogames, movies	June 14
Midwest Computer Camp Inc., Liz Moore, 9392 Lafayette Rd., Indianapolis, IN 46278; (317) 297-2700	Indianapolis, IN	1 week/\$400; 2 weeks/\$750; res.	Includes BASIC, Logo, PLOT, assembly, robotics, graphics, music, speech	IBM, Apple, Atari, Commodore, TI-99, Radio Shack	1:3	1:1	Minimum 6 hrs. class time; up to 2 hrs. free time	Coed; 7-18; 60 per session	Include swimming, astronomy, wildlife, team sports, camp crafts	Discounts prior to March 1, 1985
YMCA Camp Crosley, Terry Jones, 500 S. Mulberry, Muncie, IN 47305	Tippecanoe Lake, North Webster, IN	1 week/\$200; res.	Programming, computer literacy	TRS-80, Model III	1:5	1:1	3 hrs. class time; 1 hr. free time	Coed; 8-15 (adult weekends also available); 10 per session	Include water skiing, sailing, crafts, sports, fishing	2 weeks prior to session attending
The New RETUPMOC, Dr. Cary Laxer, Rose-Hulman Institute of Technology, 5500 Wabash Ave., Terre Haute, IN 47803; (812) 877-1511	Rose-Hulman Institute of Technology	1 week (BASIC & 8088 assembly)/\$275; 2 weeks (FORTRAN & Pascal)/\$550; res.	Alternating lectures & lab time; BASIC, FORTRAN, Pascal, 8088 assembly	VAX 11/750, PDP 11/70, IBM PC	1:9	1:1	4-6 hrs. class time; 2-3 hrs. free time	Males who have completed soph. yr. of hs; 35 per session	Full range of athletic facilities & off-campus events	June 1
Summer Computer Institute, Galanter Computer School, Inc., 460 Riverside Dr., NY, NY 10027; (212) 222-3344	Amherst College, Amherst, MA	1 week/\$1,295; res.	Programming and applications	IBM, Kaypro	5:1	2:1	13 hrs. class time; free time as desired	Coed; 17-88; less than 20 per session	Include swimming, tennis, museums	June 1
Computer-Ed Camps, Computer-Ed, Inc., Dr. Robert Linstone, 99 School St., Weston, MA 02193; (617) 647-0054	Residential camps: Babson College, Wellesley, MA, and LaSalle Academy, Long Island, NY; 1 week session for gifted and talented	2 weeks/\$895; 1 week for g&t students/\$550	Includes Logo, BASIC, Pascal, C, assembly language, CP/M, graphics, game programming, robotics, LISP, artificial intelligence	Include Apple, IBM, Commodore, Acorn	1:4	Varies, depending on course of instruction	Campers spend approx. 65% of time in computer-related activities	Coed; 8-17; # per session depends on camp site	Wide range of activities	As soon as possible
Computer Ed Day Camps, address and phone same as above	Wellesley, Cambridge, Concord, & Plymouth, MA; Long Island, NY; Providence & Bristol, RI	2 weeks/\$425	Same as above	Same as above	Same as above	Same as above	Approx. 50% of time spent in computer-related activities	Same as above	Same as above	As soon as possible
Compu-Tar, Jim Tartaglia, 72 Cambridge St., Worcester, MA 01603; (617) 757-6619	Throughout the northeast	1-2 weeks; cost depends on camp; res.	BASIC, Logo, computer literacy & software operation; graphics oriented	Apple IIe	Maximum 1:8	1:2	1-2 hrs. class time; up to 2 hrs. free time	Coed; 9-14; varies by camp	Full range of camp activities	Depends on camp
University Computer Camp, Susan Carlson, 2480 Crooks Rd., Troy, MI 48084	Pero Lake Lapeer, MI	2 weeks/\$795; res.	Includes programming, graphic design, robotics, word processing	Apple IIe, Macintosh	1:3	1:1	4 hrs. class; 2 hrs. free time	Coed; 8-18; 100-120 per session	Include swimming, canoeing, crafts, hiking	May 1
Camp Lincoln/Camp Lake Hubert, Sam Cote, 3940 W. 49 1/2 St., Minneapolis, MN 55424; (612) 922-2545	Northern Minnesota	5 days/\$90 + tuition for regular camp program; res.	BASIC, Logo, Pascal, keyboarding, graphics, music	Apple IIe	1:8 beginning; 1:5 advanced	1:2 beginning; 1:1 advanced	3 hrs. class time; 30 min.-1 hr. free time	Coed; 8-17; 10-15 per session	Include sailing, riding, riflery	Summer
Bronx YMCA Day Camp, #2 Castle Hill Ave., Bronx, NY 10473, (212) 931-2500	Bronx, NY	2 weeks/\$20 + tuition for regular day camp	Introduction to BASIC, Logo, and computer literacy	Com. 64	1:5	1:2	1 hr./day, 3 days/week class time	Coed; 5-14; approx. 250 per session	Include swimming, field trips, sports	None
YMCA-YWCA Camping Services of Greater New York, Kent W. Sampson, Big Pond Rd., Huguenot, NY 12746; (212) 564-1300, ext. 312, 313, or (914) 856-4382	Huguenot, NY	2 weeks/\$420 + \$135 for computer instruction; res.	BASIC, graphics, speech	Apple IIe	1:8	1:4	2 hrs. class time; up to 2 hrs. free time	Coed; 8-15; 48 in computer program	Include athletic and waterfront programs, crafts, dance, drama	June 30
Premier Computer Camp, John Vitelli, Goshen St., Jewett, NY 12444	Jewett, NY	1 week/\$425; 2 weeks/\$795; 4 wks/\$1,550; 6 wks/\$2,265; 8 wks/\$2,940; res.	Beginning through advanced	Apple, IBM, Commodore	1:4	1:1	4 hrs. class & lab time; free time as desired	Coed; 7-17; 50	Numerous	June 15
Marist College Computer Camp, Dr. Lawrence W. Menapace, Marist College, Poughkeepsie, NY 12601	Marist College	2 weeks/\$875; res.	Programming; 50-50 lecture and hands-on laboratory	IBM PC, Apple, IBM 4341	1:5	1:1	3 hrs. class; 4 hrs. free time	Coed; 9-17; 60	Recreational, social, cultural program	Registration accepted until full

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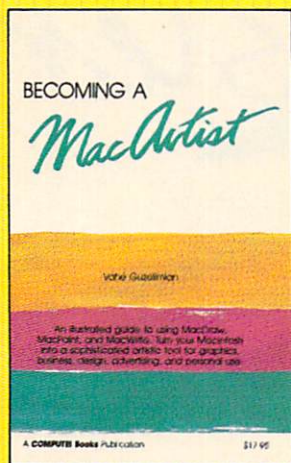
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Camp name/address	Camp location(s)	Sessions/prices	Curriculum	Computers available	Staff/camper ratio	Com-puter/camper ratio	Time spent daily on computers	Sex, age range of campers; # campers per session	Noncomputer activities	Registration deadline
Family Computer Camp, Estella Bray, Conference & Information Center, Clarkson University, Potsdam, NY 13676	Clarkson University	1 week/\$225 each for first 2 in family; \$175 each thereafter; housing extra	Children: programming; adults, programming or applications	Z-100, Apple II, Atari, VIC-20	Varies with age group; from 1:3 to 1:10	1:1	5 hrs. class; 5 hrs. free time	Coed; 5-adult (children must be accompanied by adult)	Athletic facilities available, evening programs	When capacity reached
Camp Rockmont for Boys, Lake Eden Rd., Black Mountain, NC 28711; (704) 686-3885; contact David Bruce	Near Asheville, NC	2-4 weeks/\$1,150 for 4 wks; res.	Includes beginning & advanced programming, game design	Apple IIe, II+	1:3	1:2	2 hrs. class; 1 hr. free time	Boys; 8-16; 400	Myriad	Early enrollment encouraged
Tar Heel Computer Careers Camps, Donald G. McLeod, P.O. Box 2328, Chapel Hill, NC 27514	Chapel Hill, NC	1 week/\$350; res.	Computer literacy & BASIC; Pascal; emphasis on careers	Apple IIe	1:5	1:2	3.5 hrs. for 3 days, 5.5 hrs. for 2 days class time	Coed; rising hs jrs. and srs. and spring graduates	Numerous	Until class of 25 filled
Western Carolina University Computer Camp, Linda Patton, c/o Division of Continuing Education, WCU, Cullowhee, NC 28723	WCU campus	1 week/\$295 resident camper; \$195 day camper	Programming, use of printer, graphics	Apple	1:6 instruction & lab; 1:10 dormitory	1:2	3 hrs. class time; up to 3 hrs. free time	Coed; 10-13; 30	Indoor and outdoor recreational activities	June 30
Duke University Computer Camp (DUCK), Pete Boyd/Shirley Greene, DUCK/Computer Science Dept., Duke University, Durham, NC 27706; (919) 684-5645	Duke University	1 week/\$500 resident; \$400 day camp; 2 wks/\$800 resident; \$600 day camp; 3 wks/\$1,100 resident; \$900 day camp	Class & lab combination; programming, field trips, guest speakers	IBM PC	1:5 lab; 1:15 residential life	1:1	3-4 hrs. class time; 6-7 hrs. free time	Coed; 8-17 and adult; 160	Include movies, team sports, skating, swimming	None, but discounts for early registration
Delphian School Summer Computer Camp, Mark Siegel, Rte. 2, Box 195, Sheridan, OR 97378; (503) 843-3521	Sheridan, OR	4 weeks to 11 weeks; cost from \$1,295 to \$1,495, depending on age, + fees for 13 & under; res.	Introductory & advanced programming, applications	Epson QX10, Molecular, TRS, Commodore, TI	Varies	1:1	Up to 7 hrs. class time; varies; labs open 24 hrs. a day	Coed; 10-adult; # per session varies	Include horseback riding, bowling, sports	None
Brigham Young University Computer Camp, Ivan Crespo, 297 CONF, BYU, Provo, UT 84602; (801) 378-6757	Brigham Young University	2 weeks/\$595; 1 week/\$395; res.	Beginning through advanced programming in BASIC, Pascal, machine language	Apple, IBM PC	1:5	1:1	Up to 7 hrs. class time; up to 3 hrs. free time	Coed; 10 and up; 40-50	Includes sports, hiking, making video movies	One week before camp starts
Champlain College Computer Camp, Maureen L. Genzlinger, P.O. Box 670, Suite 50, 163 S. Willard St., Burlington, VT 05402; (802) 658-0800	Champlain College, Burlington, VT	2 wks/\$885; 4 wks/\$1,725; res.	BASIC, Pascal, assembly, and productivity software; individual and group instruction	Commodore, IBM	1:5	1:1	4 hrs. class; 1.5 hrs. free time	Coed; 10-16; 120	Sports, arts and crafts, dance, photography	Applications accepted until camp is full
Legacy International Youth Program, Legacy, Deborah Friedman, 1141 N. Glebe Rd., Arlington, VA 22201; (703) 522-1407	Bedford, VA	3 weeks/\$875; 6 weeks/\$1,650; res.	Includes Logo, music, animation, telecommunications, word processing	Com. 64, Franklin Ace 1000	1:4 in class; 1:3 overall	1:1	1.5-2 hrs. per day	Coed; 9-18; 115	Include arts, communication, swimming, hiking, adventure	April 15
Virginia Tech Computer Camp, Norman R. Dodl, Room 400 Gym, Virginia Tech, Blacksburg, VA 24061; (703) 961-4850	Blacksburg, VA	2 weeks/\$675; res.	Programming, literacy, architecture, robotics	Apple, IBM	1:3	1:1	4+ hrs. class time; 3+ hrs. free time	Coed; 10-17; 70-80	Full indoor and outdoor recreation program	June 15
COMPUTER FUNDamentals Camp at Hollins, Nancy R. Healy, P.O. Box 9715, Hollins College, VA	Hollins College	2 weeks/\$200; day	Includes literacy, competency, Logo, BASIC, robotics, graphics, music, databases	VAX 11/780, IBM PC, Apple, Radio Shack, VIC-20, Atari, Sinclair	1:12	1:2	3.5-5.5 hrs. class time; 1 hr. free time	Coed; 8-18; 75-100	None	None given
Camp Edwards, Merrill Oleson, P.O. Box 16, East Troy, WI 53120	Lake Beulah, WI	6-12 days; \$180-\$273; res.	Literacy, beginning-advanced programming	Apple IIe	1:10	1:2	4 hrs. class time; 1-2 hrs. free time	Coed; 9-16; 140 (20 in computers)	Include sailing, skiing, riflery, crafts	Until filled
Mt. Rainer Computer Camp for adults and families, Dr. Susan A. Whitt, 9061 NE 34th, Bellevue, WA 98004-1234; (206) 453-8790	Mt. Rainier, Port Townsend, Seattle, and Gold Bar, WA	Weekends/\$250; res.	Includes Logo, BASIC, literacy, word processing, spreadsheets, databases; individual projects	Apple IIe, IIc, Commodore, IBM compatibles	1:5 class; 1:8 overall	1:1 class; 1:2 overall	8 hrs. per week-end class time; 3-4 hrs. free time per weekend	Coed; 6-adult; 20 maximum	Vary, but include sleigh rides, skiing, fishing	2 weeks prior to camp selected
Mt. Rainer Computer Camp for children, address and phone same as above	Buck Creek Lodge, Greenwater, WA	6 days/\$350; res.	Beginning-advanced BASIC and Logo; creative writing/word processing; build-a-computer; robotics	Apple IIe, IIc, Com. 64, Heathkit	1:5	1:1 in class; 1:2 overall	3 hrs. class time; 3-6 hrs. free time	Coed; 7-16; 60	Include horseback riding, swimming, soccer, art	July 1
Jackson Hole Personal Computer Resort, Patrick Goig, Star Route, Box 362A, Jackson, WY 83001; 1-800-443-8616	Jackson Hole, WY	4 days/\$295; res.	Introductory course with emphasis on business applications; seminars	IBM PC	1:10	1:2	5 hrs. class time; as much free time as desired	Coed; adults only; 10-12	Include white water rafting, snow and cross-country skiing	No official deadline

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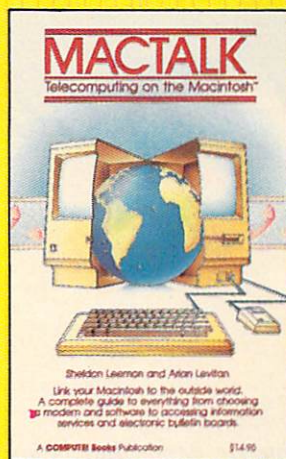
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Mindbusters

Ned W. Schultz

Here's a graphics puzzle game that is both challenging and unusually fascinating. The program was originally written for the Commodore 64, and we've added versions for the unexpanded VIC-20, Atari, Apple II-series computers, IBM PC (color or monochrome), PCjr, and TI-99/4A.

Are you ready to pit your brain against the computer's? "Mindbusters" presents you with three graphics puzzles that are guaranteed to keep your mind's microprocessors and memory chips whirring for hours.

After you type, save, and run your copy of Mindbusters, you can choose to solve one of three puzzles: a mind bender, a mind bruiser, or a mind blower. Warm up with the mind bender—it's the easiest. When you're prepared to press your brain to its limits, you're ready for the mind blower.

Following your selection, the program constructs a puzzle and displays it at the upper-left corner of the screen. Your job is to match that puzzle in the workspace at the lower-right corner of the screen. What's more, you try to solve the puzzle in as little time as possible. A timer ticks away as you work. There's no limit to how much time you can take, but the timer lets you

compare your progress to a previous performance, or against another player if you wish. Your fastest time during the current session will be displayed on the screen.

Each puzzle is composed of several horizontal rows of odd shapes. A tiny arrow to the right of the workspace points to the row you're currently working on. To work on different rows, you can move the arrow up and down with the I and M keys (use the up/down cursor keys on the IBM and TI, and be sure to press ALPHA LOCK on the TI). To move the row of shapes next to the arrow left or right, press the J or K key (left/right cursor keys on the IBM and TI). When you think you've matched a row to the puzzle pattern, start working on another row.

When you succeed in correctly matching all the rows, the program automatically signals that you've solved the

puzzle. Then you can play again if you like.

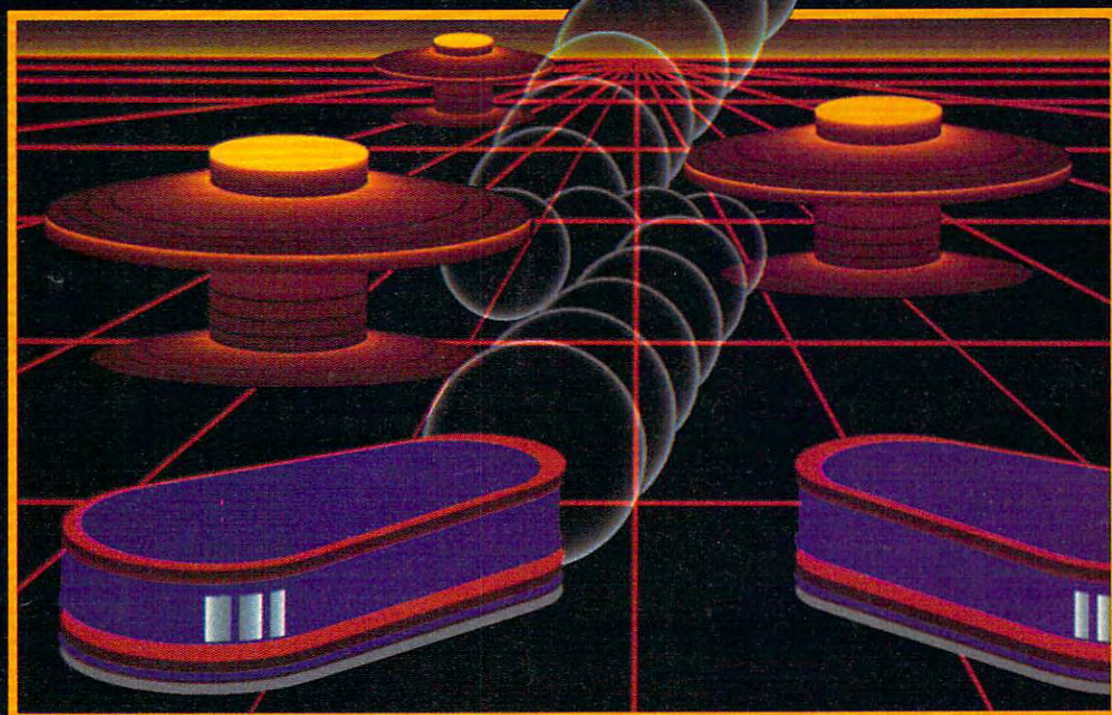
Helpful Hints

Because Mindbusters can generate a tremendous number of different puzzles, there are very few tricks to mastering it. I suggest you work from top to bottom or vice versa. The best tip I can offer after hours of my own mindbusting is to concentrate, concentrate, concentrate.

Important: When typing in the program, be extra careful with the long strings of characters at the beginning of the listing. These strings become the puzzle shapes. If you mistype or transpose a couple of characters when typing these strings, the program may still run, but it won't know when you've solved the puzzle. If you're using COMPUTE!'s "Automatic Proofreader" to enter the listing, remember that the Proofreader (except the IBM version) does not catch character-transposition errors.

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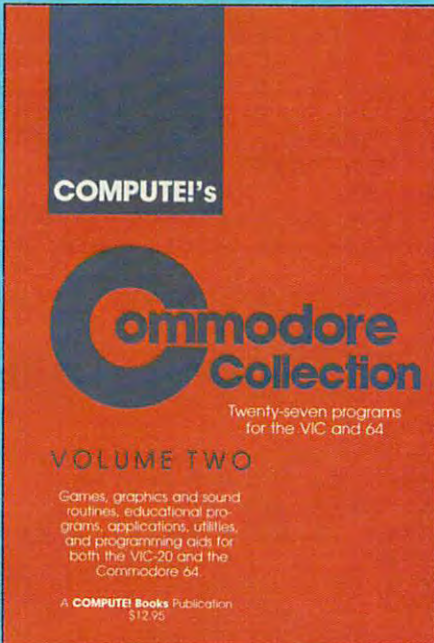
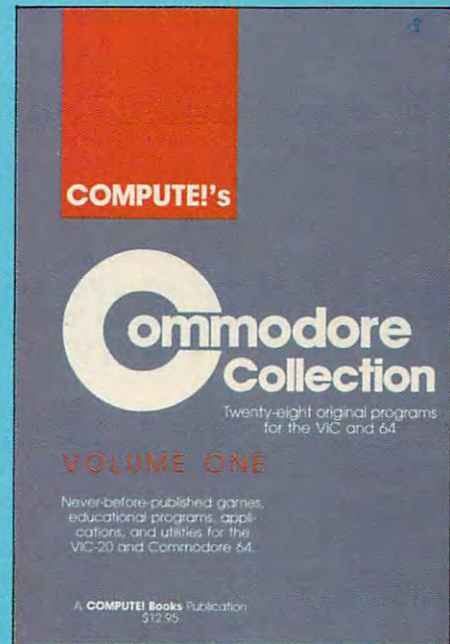
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550 PRINT"{2 RIGHT}{2 DOWN}{RVS}3{OFF} BL
OW YOUR MIND?" :rem 8
560 POKE36879,27:GETK$:IFK$=""THENPOKE368
79,28:GOTO560 :rem 197
570 K=VAL(K$):IFK<1OR K>3THEN560 :rem 111
580 IFK=1THEND$=A$:Z=31:GOTO610 :rem 93
590 IFK=2THEND$=B$:Z=28:GOTO610 :rem 102
600 D$=C$:Z=144 :rem 12
610 PRINT"[HOME]{3 DOWN}":FORN=1TO12:PRIN
T"{21 SPACES}":NEXT:RETURN :rem 47
620 DATA 12,36,44,20 :rem 204

```

Program 3: Mindbusters For Atari

Please refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

```

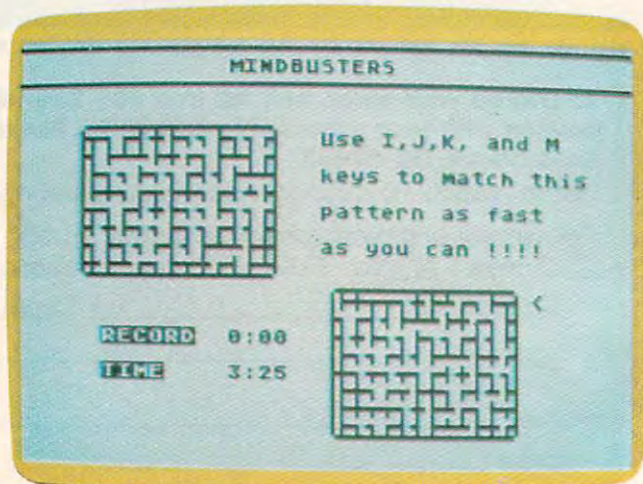
JP 1 GOTO 5
CJ 2 TIME=INT(PEEK(18)*65536+PEEK(19)
*256+PEEK(20))/60:MIN=INT(TIME/6
0):SEC=INT(TIME-MIN*60):RETURN
KB 5 DIM A$(68):DIM B$(68):DIM C$(68)
:DIM D$(68):DIM P(8):DIM PP(8):D
IM K(255):K(13)=1:K(1)=2:K(5)=3:
K(37)=4
MO 6 DIM R$(5):DIM TI$(6):RECORD=0
JB 10 A$="IOKLNMNMOKILLNIOKNIOKLNMOMI
LKNOIMKOINNOILKOKNILKNOIMKNIML
KMONLMOIKO"
HI 20 B$="DXASEQWASEQDXASWESAXQEAWSQ
DAXSQDXASEWEWEQDSAEAEAEQDDAXXAS
QEAXDQEXDX"
AF 30 C$="FFGGGFFGGFGFGFGFFGGFGGG
FGGGFGGGGGFGFGFFGGFGFGGGFGFF
FFGGGFGGFG"
LL 40 FOR A=1 TO 68:A$(A,A)=CHR$(ASC(
A$(A,A))-64):B$(A,A)=CHR$(ASC(B
$(A,A))-64):C$(A,A)=CHR$(ASC(C$
(A,A))-64):NEXT A
IP 50 POKE 752,1:GRAPHICS 17:PRINT #6
,"{CLEAR}"
PC 55 SETCOLOR 4,10,0
NN 60 POSITION 14,1:PRINT #6,"mindbus
ters"
JF 70 POSITION 2,5:PRINT #6:"DO YOU WANT
TO PLAY?"
DP 80 POSITION 0,9:PRINT #6:"1. BEND
YOUR MIND?"
BL 90 POSITION 0,11:PRINT #6:"2. BRUI
SE YOUR MIND?"
IC 100 POSITION 0,13:PRINT #6:"3. BLO
W YOUR MIND?":POKE 764,255
GE 110 KEY=PEEK(764):IF KEY=31 THEN D
$=A$:GOTO 150
OO 120 IF KEY=30 THEN D$=B$:GOTO 150
PF 130 IF KEY=26 THEN D$=C$:GOTO 150
GA 140 GOTO 110
HL 150 GRAPHICS 0:POKE 752,1
LN 151 POKE 709,0:POKE 710,8:POKE 712
,52
EC 155 POSITION 0,0:PRINT "{40 R}":PO
SITION 13,1:PRINT "MINDBUSTERS
"
HF 160 POSITION 0,2:PRINT "{40 R}"
HC 180 FOR A=5 TO 12:POSITION 3,A:PRI
NT "{B}{12 SPACES}{V}":POSITION
19,A+9:PRINT "{B}{12 SPACES}
{V}":NEXT A

```

```

ME 190 POSITION 4,4:PRINT "{12 N}":PO
SITION 4,13:PRINT "{12 M}":POS
ITION 20,13:PRINT "{12 N}"
NL 200 POSITION 20,22:PRINT "{12 M}";
NI 210 POSITION 19,5:PRINT "Use I,J,K
, and M":POSITION 19,7:PRINT "
keys to match this"
GD 220 POSITION 19,9:PRINT "pattern a
s fast"
DG 230 POSITION 19,11:PRINT "as you c
an !!!!":POSITION 2,5
JI 240 FOR N=1 TO 8:PP(N)=INT(RND(1)*
56)+1:PRINT "{2 RIGHT}";D$(PP(
N),PP(N)+1):NEXT N
AG 250 FOR N=1 TO 8:P(N)=INT(RND(1)*5
6)+1:POSITION 20,13+N:PRINT D$
(P(N),P(N)+1):NEXT N
JI 260 AX=33:AY=14:AC=1:POSITION AX,A
Y:PRINT "<":FOR A=18 TO 20:POK
E A,0:NEXT A
HI 261 RM=INT(RECORD/60):RS=INT(RECOR
D-RM*60)
NG 262 POSITION 13,16:PRINT RM;":":I
F RS<10 THEN PRINT "0";
MN 263 PRINT RS
BJ 270 KEY=K(PEEK(764)):POKE 764,255:
ON KEY GOTO 300,400,350,450
KB 280 POSITION 5,16:PRINT "RECORD"
LP 290 POSITION 5,18:GOSUB 2:PRINT "R
ECORD{4 SPACES}";MIN;":":IF SEC
<10 THEN PRINT "0";
JD 295 PRINT SEC;":":GOTO 270
PD 300 POSITION AX,AY:AC=AC-1:PRINT "
":AY=AY-1:IF AY<14 THEN AY=14
:AC=1
LL 310 POSITION AX,AY:PRINT "<":GOTO
270
HN 350 POSITION 20,AY:P(AC)=P(AC)-1:I
F P(AC)<1 THEN P(AC)=1:GOTO 27
0
GH 360 GOTO 410
OB 400 POSITION 20,AY:P(AC)=P(AC)+1:I
F P(AC)>56 THEN P(AC)=56
NO 410 PRINT D$(P(AC),P(AC)+11)
GL 420 FOR X=1 TO 8:IF PP(X)<>P(X) TH
EN 270
CO 430 NEXT X

```



This is a mind-bruising puzzle in the Atari version of "Mindbusters."



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```

ND 435 POSITION 4,20:PRINT "PUZZLE SOLVED!":GOSUB 590:POSITION 3,22
      :PRINT "Play again (y/n)";
KE 440 IF PEEK(764)=35 THEN GRAPHICS
      0:END
HN 445 IF RECORD=0 OR TIME<RECORD THEN
      RECORD=TIME
HN 447 IF PEEK(764)=43 THEN 50
HB 448 GOTO 440
PK 450 POSITION AX,AY:AC=AC+1:PRINT "
      ":AY=AY+1:IF AY>21 THEN AY=21
      :AC=8
MB 460 POSITION AX,AY:PRINT "<":GOTO
      270
GA 590 FOR A=100 TO 10 STEP -1:SOUND
      1,A,10,15:SOUND 2,A+50,10,15:PO
      KE 53274,A:NEXT A:SOUND 1,0,0
      ,0
EJ 600 SOUND 2,0,0,0:POKE 53274,0:RET
      URN

```

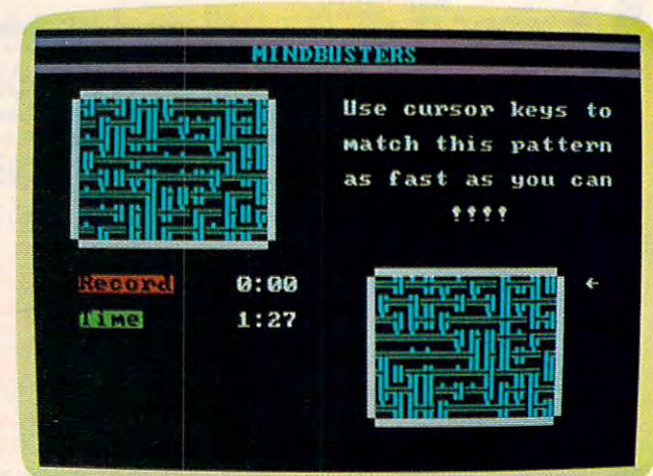
Program 4: Mindbusters For IBM PC/PCjr

Please refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

```

MJ 10 CLS:SCREEN 0,1:DEF SEG=0:POKE 1047,
      (PEEK(1047) OR 64) AND 223:HI=0:R$=
      " 0:00"
JD 20 WIDTH 40:KEY OFF:DEF SEG=&H40:RANDO
      MIZE PEEK(&H6D)
DK 30 FOR I=1 TO 4:READ KE(I):NEXT
CE 40 A$="AABBBABBBABABABABAAAAABBBBBB
      ABABBBBABABAAAABABBBBBBABAAAAABBB
      AB"
GE 50 TM$="":FOR I=1 TO 68:TM=ASC(MID$(A$
      ,I,1))+128:TM$=TM$+CHR$(TM):NEXT:A$
      =TM$
CF 60 B$="DEAdEBdAdAdEBdAdAdEBdAeAeAEE
      dAeeeDAdEdAdDADCEeEedAdEBedCCDeEAd
      ed"
KA 70 TM$="":FOR I=1 TO 68:TM=ASC(MID$(B$
      ,I,1))+154:TM$=TM$+CHR$(TM):NEXT:B$
      =TM$
JN 80 C$="TUASWAWABSVUWRARSSBWRSUWUWATBV
      WQUTBQUAWVSWQUTSABWAWATVTUUVWWTAVWB
      AW"
MC 90 TM$="":FOR I=1 TO 68:TM=ASC(MID$(C$
      ,I,1))+120:TM$=TM$+CHR$(TM):NEXT:C$
      =TM$
CP 100 COLOR 5:PRINT STRING$(40,220);:COL
      OR 3:LOCATE 2,15,0:PRINT "MINDBUSTE
      RS":COLOR 5:PRINT STRING$(40,223):
      GOSUB 380:COLOR ,0,14
PP 110 COLOR 7:LOCATE 4,4:PRINT STRING$(1
      2,220):PRINT TAB(3)CHR$(222)SPC(12
      )CHR$(221)SPC(4)"Use cursor keys t
      o"
OL 120 PRINT TAB(3)CHR$(222)SPC(12)CHR$(2
      21):PRINT TAB(3)CHR$(222)SPC(12)CH
      R$(221)SPC(4)"match this pattern"
IJ 130 PRINT TAB(3)CHR$(222)SPC(12)CHR$(2
      21):PRINT TAB(3)CHR$(222)SPC(12)CH
      R$(221)SPC(4)"as fast as you can":
      PRINT TAB(3)CHR$(222)SPC(12)CHR$(2
      21)
GE 140 PRINT TAB(3)CHR$(222)SPC(12)CHR$(2
      21)SPC(11)"!!!!":PRINT TAB(3)CHR$(
      222)SPC(12)CHR$(221):PRINT TAB(4)S
      TRING$(12,223)
PH 150 COLOR Z,0:FOR N=1 TO 8:PP(N)=INT(R
      ND(1)*56)+1:LOCATE 4+N,4:PRINT MID
      $(D$,PP(N),12):NEXT:COLOR 7,0:PRIN
      T
DH 160 PRINT TAB(23)STRING$(12,220):PRINT
      TAB(4);:COLOR 0,4:PRINT "Record";:
      COLOR 7,0:PRINT SPC(3)R$:LOCATE 15
      ,22:PRINT CHR$(222)SPC(12)CHR$(221
      )
IJ 170 PRINT TAB(22)CHR$(222)SPC(12)CHR$(
      221):PRINT TAB(4);:COLOR 0,2:PRINT
      "Time";:COLOR 7,0:PRINT SPC(14)CHR
      $(222)SPC(12)CHR$(221)
CF 180 FOR I=1 TO 5:PRINT TAB(22)CHR$(222
      )SPC(12)CHR$(221):NEXT I:PRINT TAB
      (23)STRING$(12,223)
LJ 190 COLOR Z,0:FOR N=1 TO 8:P(N)=INT(RN
      D(1)*56)+1:LOCATE 14+N,23:PRINT MI
      D$(D$,P(N),12):NEXT:COLOR 7,0:PRIN
      T
JG 200 AC=1:LOCATE AC+14,37:PRINT CHR$(27
      ):POKE &H6D,0:POKE &H6C,0
KJ 210 COLOR 7,0:C=PEEK(&H6C):D=PEEK(&H6D
      ):T=(C+D*256)/18.2:MT=INT(T/60):M$
      =STR$(MT):ST=INT((T/60-MT)*60):S$=
      STR$(ST):IF ST<10 THEN S$="0"+RIGH
      T$(STR$(ST),1)
EJ 220 LOCATE 17,13:PRINT M$": "RIGHT$(S$,
      2):K$=INKEY$:IF LEN(K$)<>2 THEN 21
      0
JA 230 J=0:FOR I=1 TO 4:IF ASC(MID$(K$,2,
      1))=KE(I) THEN J=I:I=4
FJ 240 NEXT:ON J GOTO 260,300,280,320
CM 250 GOTO 210
NJ 260 LOCATE AC+14,37:PRINT " ":AC=AC-1:I
      F AC<1 THEN AC=1
PJ 270 LOCATE AC+14,37:PRINT CHR$(27):GOT
      O 210
FF 280 LOCATE AC+14,37:PRINT " ":AC=AC+1:
      IF AC>8 THEN AC=8
GG 290 GOTO 270
MF 300 P(AC)=P(AC)-1:IF P(AC)<1 THEN P(AC
      )=1
DF 310 GOTO 330
DJ 320 P(AC)=P(AC)+1:IF P(AC)>56 THEN P(A
      C)=56
FI 330 LOCATE AC+14,23:COLOR Z,0:PRINT MI
      D$(D$,P(AC),12)
CC 340 FOR X=1 TO 8:IF PP(X)<>P(X) THEN 2
      10

```



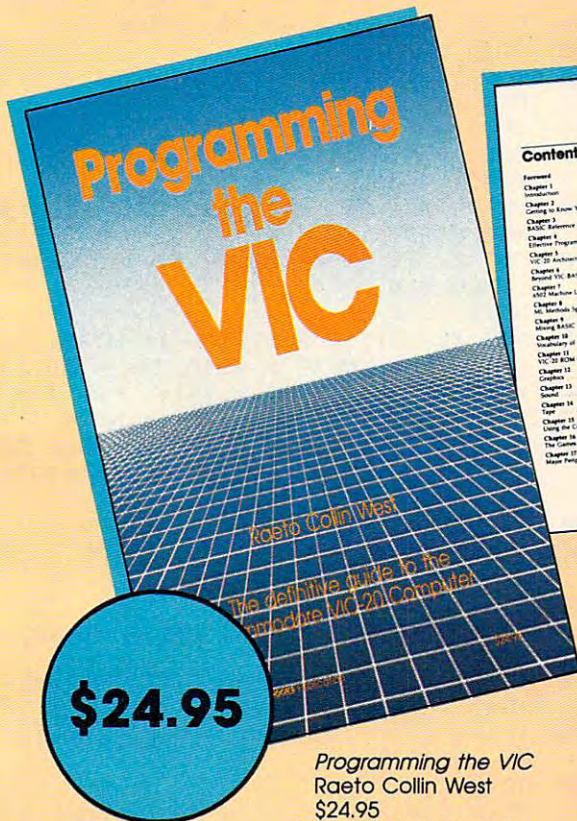
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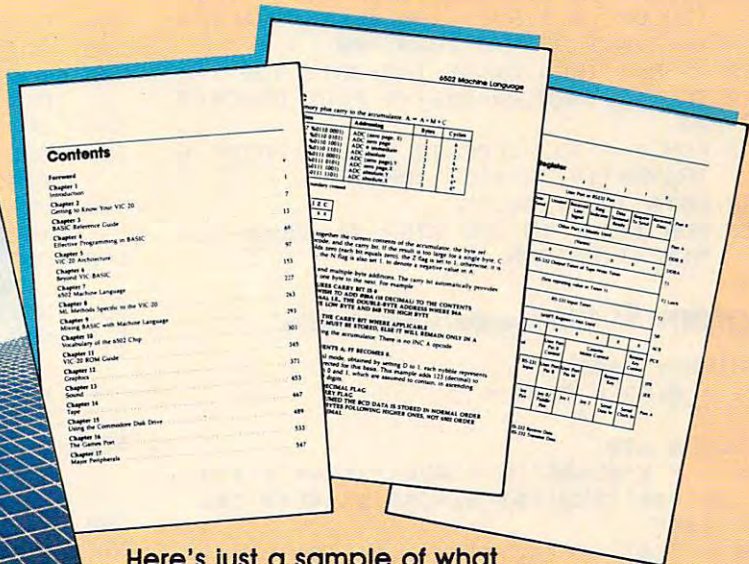
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IP 350 NEXT:COLOR 14,0:LOCATE 20,4:PRINT "
Puzzle solved!":GOSUB 450:LOCATE 2
2,5:PRINT"Play again?":LOCATE 23,7
:PRINT"(Y/N)"
LH 360 IF INT(T)<HI OR HI=0 THEN HI=INT(T
):R$=RIGHT$(M$,2)+": "+RIGHT$(S$,2)
HN 370 COLOR ,0,3:K$=INKEY$:IF K$="" THEN
COLOR ,0,5:GOTO 370 ELSE IF K$="N
" THEN END ELSE IF K$="Y" THEN CLS
:GOTO 100 ELSE 370
KJ 380 LOCATE 9,13:COLOR 5,0:PRINT "Do yo
u want to:":LOCATE 11,13:COLOR 0,5
:PRINT"1";:COLOR 5,0:PRINT" Bend y
our mind?"
MD 390 LOCATE 13,13:COLOR 0,5:PRINT"2";:C
OLOR 5,0:PRINT" Bruise your mind?"
:LOCATE 15,13:COLOR 0,5:PRINT "3";
:COLOR 5,0:PRINT " Blow your mind?"
DN 400 COLOR ,0,3:K$=INKEY$:IF K$="" THEN
COLOR ,0,5:GOTO 400 ELSE K=VAL(K$
):IF K<1 OR K>3 THEN 400
LD 410 IF K=1 THEN D$=A$:Z=2:GOTO 430
JD 420 IF K=2 THEN D$=B$:Z=4 ELSE D$=C$:Z
=3
AA 430 FOR I=0 TO 9:LOCATE 9+I,13:PRINT S
TRING$(19,32):NEXT:RETURN
NI 440 DATA 72,77,80,75
LD 450 FOR I=220 TO 880 STEP 20:SOUND I,
5:NEXT:RETURN
TAB(14)"IN THE RED BOX AS FAST":
PRINT TAB(14)"AS YOU CAN!!!!";
170 KE = PEEK (- 16384):J = 0: POKE -
16368,0:J = KE - 200
180 T3 = T3 + 1: IF T3 = 12 THEN T3 = 0
:T2 = T2 + 1: IF T2 = 60 THEN T2 =
00:T1 = T1 + 1
190 IF J < 0 OR J > 5 THEN J = 0
200 ON J GOTO 240,320,300,170,270
210 HTAB 1: VTAB 22: PRINT "RECORD "R1
":": IF R2 < 10 THEN PRINT "0";
220 PRINT R2: HTAB 1: VTAB 24: PRINT "
TIME "T1":": IF T2 < 10 THEN PRINT
"0";
230 PRINT T2;: GOTO 170
240 VTAB 10 + AC: HTAB 38: PRINT " "
250 AC = AC - 1: IF AC < 1 THEN AC = 1
260 VTAB 10 + AC: HTAB 38: PRINT "3";:
GOTO 210
270 AC = AC + 1: IF AC > 8 THEN AC = 8
280 VTAB 9 + AC: HTAB 38: PRINT " "
290 GOTO 260
300 P(AC) = P(AC) - 1: IF P(AC) < 1 THEN
P(AC) = 1
310 GOTO 330
320 P(AC) = P(AC) + 1: IF P(AC) > 56 THEN
P(AC) = 56
330 VTAB 10 + AC: HTAB 24: PRINT MID$(
D$,P(AC),12)
340 FOR X = 1 TO 8: IF PP(X)\< > P(X)
THEN 210
350 NEXT
360 FOR I = 21 TO 23: VTAB I: HTAB 14:
PRINT H$: NEXT : VTAB 24: HTAB 14
: PRINT MID$(H$,1,14);: FOR I =
1 TO 5: PRINT CHR$(7);: NEXT
370 VTAB 22: HTAB 20: PRINT "PUZZLE SO
LVED!": HTAB 20: PRINT "PLAY AGAIN
?"
380 HTAB 26: PRINT "Y/N";: GET K$
390 IF K$ = "N" THEN TEXT : HOME : END
400 T$ = STR$(T1) + "." + STR$(T2):
R$ = STR$(R1) + "." + STR$(R2)
410 IF R$ = "0.0" OR VAL (T$) < VAL
(R$) THEN R1 = T1:R2 = T2
420 IF K$ = "Y" THEN T1 = 0:T2 = 0:T3 =
0: GOTO 70
430 GOTO 380
440 POKE 230,32: CALL - 3086: POKE 23
0,64: CALL - 3086
450 POKE 54,240: POKE 55,253: CALL 100
2
460 FOR P = 1 TO 2: HCOLOR= P: FOR I =
1 TO 8
470 HPLOT I,I TO 279 - I,I TO 279 - I,
191 - I TO I,191 - I TO I,I
480 NEXT I: POKE 230,32: NEXT P
490 VTAB 11: HTAB 26: PRINT " "
500 VTAB 11: HTAB 11: PRINT "DO YOU WA
NT TO:": PRINT : PRINT TAB(11)"1
- BEND YOUR MIND?": PRINT : PRINT
TAB(11)"2 - BRUISE YOUR MIND?": PRINT
: PRINT TAB(11)"3 - BLOW YOUR MI
ND?"
510 POKE - 16302,0
520 A = PEEK (- 16384): IF A > 127 THEN
550
530 POKE - 16297,0: POKE - 16304,0: POKE
- 16300,0: POKE - 16299,0: POKE

```

Program 5: Mindbusters For Apple

```

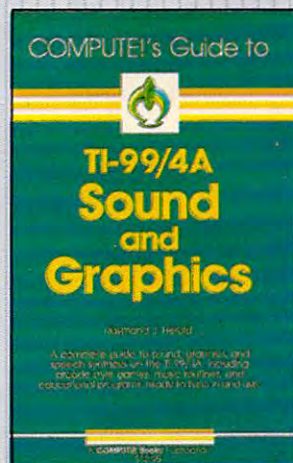
10 HIMEM: 36096
20 R1 = 0:R2 = 0:H$ = "
"
30 GOSUB 620
40 A$ = "%!&%4&&!&'$!&%4&&!&'!&%4&!&'$!&%
%&!&$&$'!&%&!&'&!&'#%$%$&!&%4&$&##'%'$%
!&$&"
50 B$ = "/0(.+(+(*.)0+(-..*+-.0++0+(/*
)++0/*+0(+).++0/.(#+(+(/)/00+)+/(
)+*(+)"
60 C$ = "1122211221212121111121222122
212122221212111121212221211111221
2212"
70 TEXT : HOME : VTAB 5: PRINT " ";
: FOR I = 4 TO 35: PRINT CHR$(95
);: NEXT : PRINT
80 PRINT : PRINT SPC(14)"MINDBUSTERS
"
90 PRINT " ";: FOR I = 4 TO 35: PRINT
CHR$(95);: NEXT : PRINT : VTAB 1
1: PRINT TAB(15)"PLEASE WAIT..."
: GOSUB 440
100 HGR : HCOLOR= 5: HPLLOT 1,3 TO 95,3
TO 95,75 TO 1,75 TO 1,3
110 HCOLOR= 6: HPLLOT 154,76 TO 250,76 TO
250,147 TO 154,147 TO 154,76
120 POKE 6,0: POKE 7,141: POKE 54,0: POKE
55,3: CALL 1002
130 FOR N = 1 TO 8:PP(N) = INT ( RND
(3) * 55) + 1: HTAB 2: VTAB 1 + N:
PRINT MID$(D$,PP(N),12): NEXT
140 FOR N = 1 TO 8:P(N) = INT ( RND (
2) * 55) + 1: VTAB 10 + N: HTAB 24.
: PRINT MID$(D$,P(N),12): NEXT
150 VTAB 11: HTAB 38: PRINT "3"
160 AC = 1: VTAB 21: PRINT TAB(14)"US
E THE I, J, K AND M": PRINT TAB(
14)"KEYS TO MATCH THE PATTERN": PRINT

```


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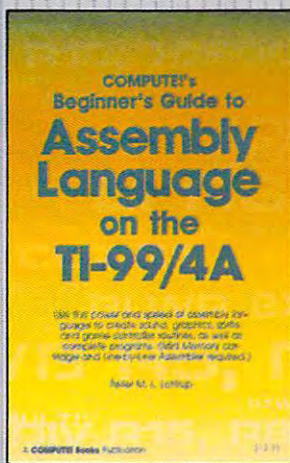
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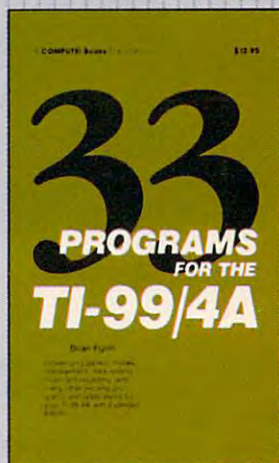
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Peter M. L. Lottrup

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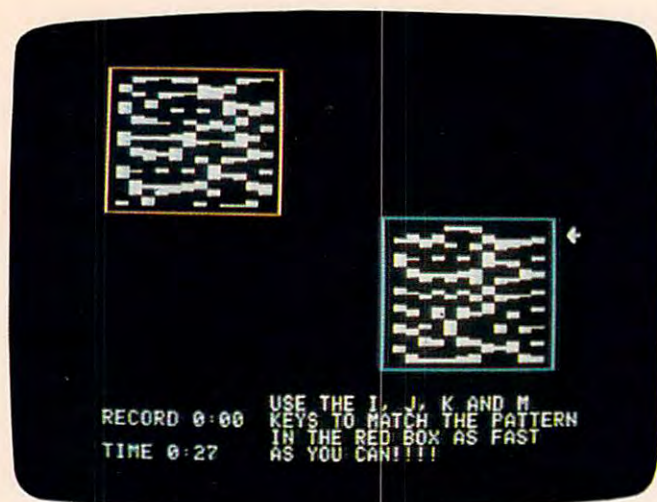
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Apple "Mindbusters."

```

- 16300,0: POKE - 16303,0: FOR I
= 1 TO 50: NEXT
540 GOTO 520
550 POKE - 16368,0:A = A - 176: IF A <
1 OR A > 3 THEN 520
560 POKE 230,32: CALL - 3086
570 IF A = 1 THEN D$ = A$
580 IF A = 2 THEN D$ = B$
590 IF A = 3 THEN D$ = C$
600 RETURN
610 REM SHAPE DATA
620 FOR I = 36096 TO 36263: READ A:CS =
CS + A: POKE I,A: NEXT
630 IF CS < > 11534 THEN PRINT "ERRO
R IN FIRST SET OF DATA STATEMENTS.
": STOP
640 DATA 128,128,128,128,128,128,128,
128
650 DATA 0,0,0,0,255,255,255,255
660 DATA 0,0,0,0,0,0,0,0
670 DATA 0,0,0,0,0,0,0,255
680 DATA 0,0,0,0,0,0,255,255
690 DATA 255,255,0,0,0,0,0,0
700 DATA 255,255,255,0,0,0,0,0
710 DATA 0,0,0,0,0,255,255,255
720 DATA 24,24,24,31,31,24,24,24
730 DATA 24,24,24,31,31,0,0,0
740 DATA 0,0,0,248,248,24,24,24
750 DATA 0,0,0,31,31,24,24,24
760 DATA 24,24,24,255,255,0,0,0
770 DATA 0,0,0,255,255,24,24,24
780 DATA 24,24,24,248,248,24,24,24
790 DATA 24,24,24,248,248,0,0,0
800 DATA 24,24,24,255,255,24,24,24
810 DATA 204,153,51,102,204,153,51,10
2
820 DATA 51,153,204,102,51,153,204,10
2
830 DATA 8,12,14,127,127,14,12,8
840 DATA 255,0,0,0,0,0,0,0
850 REM HROUT ML ROUTINE
860 FOR I = 768 TO 856: READ A:CK = CK
+ A: POKE I,A: NEXT
870 IF CK < > 8413 THEN PRINT "ERROR
IN SECOND SET OF DATA STATEMENTS.
": STOP
880 RETURN

```

```

890 DATA 216,120,133,69,134,70,132,71
900 DATA 166,7,10,10,176,4,16,62
910 DATA 48,4,16,1,232,232,10,134
920 DATA 27,24,101,6,133,26,144,2
930 DATA 230,27,165,40,133,8,165,41
940 DATA 41,3,5,230,133,9,162,8
950 DATA 160,0,177,26,36,50,48,2
960 DATA 73,127,164,36,145,8,230,26
970 DATA 208,2,230,27,165,9,24,105
980 DATA 4,133,9,202,208,226,165,69
990 DATA 166,70,164,71,88,76,240,253
1000 DATA 255,255,255,255,255,255,255
,255

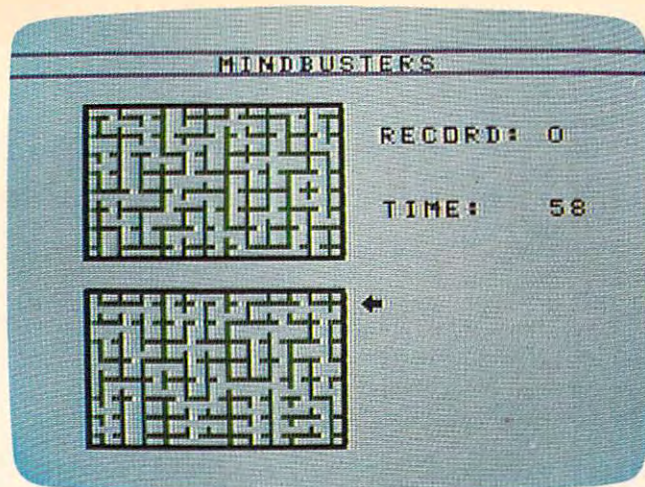
```

Program 6: Mindbusters For TI-99/4A

```

100 GOTO 150
110 FOR M=1 TO LEN(H$)
120 CALL HCHAR(R,C+M,ASC(SEG$(H$,M,
1)))
130 NEXT M
140 RETURN
150 CALL CLEAR
160 SCR=3
170 HIGH=0
180 GOSUB 1470
190 CALL SCREEN(15)
200 FOR I=9 TO 12
210 CALL COLOR(I,1,1)
220 NEXT I
230 GOSUB 1730
240 GOSUB 1760
250 GOSUB 1730
260 PRINT
270 FOR J=1 TO 2
280 PRINT " "&CHR$(135)&CHR$(129)&
CHR$(129)&CHR$(129)&CHR$(129)&C
HR$(129)&CHR$(129)&CHR$(129)&C
R$(129);
290 PRINT CHR$(129)&CHR$(129)&CHR$(
129)&CHR$(129)&CHR$(132)
300 FOR I=1 TO 8
310 PRINT " "&CHR$(130)&"
(12 SPACES)"&CHR$(134)
320 NEXT I
330 PRINT " "&CHR$(131)&CHR$(128)&
CHR$(128)&CHR$(128)&CHR$(128)&C
HR$(128)&CHR$(128)&CHR$(128)&C
R$(128);
340 PRINT CHR$(128)&CHR$(128)&CHR$(
128)&CHR$(128)&CHR$(133)
350 NEXT J
360 CALL HCHAR(1,1,136,32)
370 CALL HCHAR(3,1,137,32)
380 H$="USE ARROW"
390 R=7
400 C=19
410 GOSUB 110
420 H$="KEYS TO"
430 R=9
440 GOSUB 110
450 R=11
460 H$="MATCH THE"
470 GOSUB 110
480 R=13
490 H$="1ST GRID"
500 GOSUB 110
510 H$="WITH THE 2ND"
520 R=15

```

"Mindbusters" on the TI-99/4A.

```

530 GOSUB 110
540 H$="AS FAST AS"
550 R=17
560 GOSUB 110
570 H$="YOU CAN !!!"
580 R=19
590 GOSUB 110
600 R=5
610 C=5
620 FOR N=1 TO 8
630 RANDOMIZE
640 PP(N)=INT(RND*56)+1
650 H$=SEG$(D$,PP(N),12)
660 GOSUB 110
670 R=R+1
680 NEXT N
690 R=R+2
700 FOR N=1 TO 8
710 RANDOMIZE
720 P(N)=INT(RND*56)+1
730 H$=SEG$(D$,P(N),12)
740 GOSUB 110
750 R=R+1
760 NEXT N
770 CALL SOUND(100,440,3)
780 CALL COLOR(KSET(Z),F(Z),1)
790 IF Z<>2 THEN 810
800 CALL COLOR(11,13,1)
810 FOR R=5 TO 20
820 CALL HCHAR(R,20,32,12)
830 NEXT R
840 TIME=0
850 R1=15
860 C1=19
870 CALL HCHAR(R1,C1,91)
880 H$="RECORD: "&STR$(HIGH)
890 R=6
900 C=19
910 GOSUB 110
920 H$="TIME: {3 SPACES}"&STR$(TIME)
930 R=10
940 GOSUB 110
950 CALL KEY(0,K,S)
960 TIME=TIME+.3
970 H$=STR$(INT(TIME))
980 C=27
990 R=10
1000 GOSUB 110

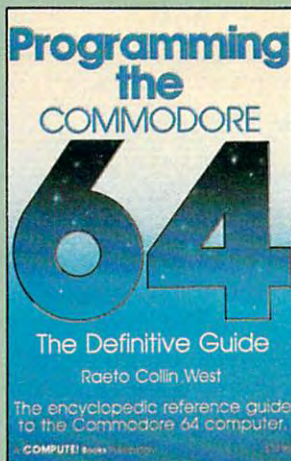
```

```

1010 IF (K<>69)*(K<>88) THEN 1070
1020 CALL HCHAR(R1,C1,32)
1030 R1=R1-(R1<>15)*(K=69)+(R1<>22)
    *(K=88)
1040 CALL HCHAR(R1,C1,91)
1050 TIME=TIME+.1
1060 GOTO 950
1070 IF K<>68 THEN 1100
1080 P(R1-14)=P(R1-14)+(P(R1-14)<>1)
    )
1090 GOTO 1120
1100 IF K<>83 THEN 950
1110 P(R1-14)=P(R1-14)-(P(R1-14)<>5)
    6)
1120 H$=SEG$(D$,P(R1-14),12)
1130 R=R1
1140 C=5
1150 GOSUB 110
1160 TIME=TIME+.1
1170 FOR X=1 TO 8
1180 IF PP(X)<>P(X) THEN 950
1190 NEXT X
1200 H$="PUZZLE"
1210 R=16
1220 C=22
1230 GOSUB 110
1240 H$="SOLVED!"
1250 FOR I=220 TO 880 STEP 20
1260 CALL SOUND(50,I,3)
1270 NEXT I
1280 R=18
1290 GOSUB 110
1300 H$="PLAY"
1310 R=20
1320 C=23
1330 GOSUB 110
1340 H$="AGAIN (Y/N)?"
1350 C=20
1360 R=22
1370 GOSUB 110
1380 CALL KEY(0,K,S)
1390 IF S=0 THEN 1380
1400 IF K=89 THEN 1430
1410 IF K<>78 THEN 1380
1420 STOP
1430 IF (INT(TIME)>HIGH)*(HIGH<>0) T
    HEN 1450
1440 HIGH=INT(TIME)
1450 CALL CLEAR
1460 GOTO 190
1470 FOR I=1 TO 29
1480 READ A,A$
1490 CALL CHAR(A,A$)
1500 NEXT I
1510 CALL COLOR(14,14,1)
1520 A$="geafebfffagdafefbfagafefbfad
    adaeeefadddgafefagfagcededfafef
    dfccgedaefdf"
1530 B$="mnhlphphilonpkhkl1lipklnppn
    phmiopjnmi jnhpplp jnmlhiphphmom
    nnpopmhophip"
1540 C$="yyxxxxyxxyxxyxxyxyxyxyxyx
    xyxxxxyxxyxxyxxyxyxyxyxyxyxyx
    yxyxyxyxyxyx"
1550 F(1)=5
1560 KSET(1)=9
1570 F(2)=13
1580 KSET(2)=10
1590 F(3)=2
1600 KSET(3)=12
1610 RETURN

```


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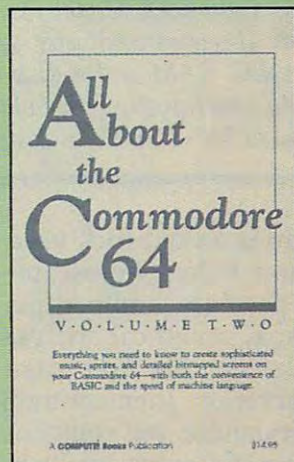
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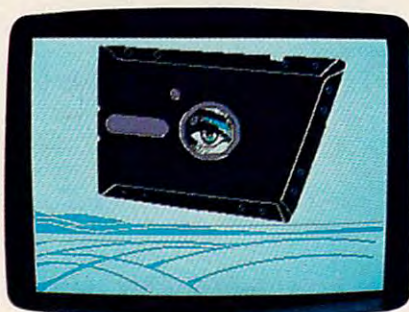
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Mind Prober

Richard Mansfield, Senior Editor

System requirements: Commodore 64 and a disk drive; IBM PC with at least 128K RAM and a disk drive; Enhanced Model PCjr; Apple II-series computer with at least 48K RAM and a disk drive; Apple Macintosh; or Hewlett-Packard HP-110. Printer optional.



An ominous title screen from Mind Prober (IBM version).

There is an old trick used by fortune tellers, horoscope casters, psychics, and bad psychologists: symmetrical analysis. It works like this: You make an observation, then contradict it. For example, tell someone that they're generous, and yet careful with their money.

Most people will believe that they're generous *and* that they're careful, even though these character traits are in direct conflict. By balancing them against each other, however, you've been sufficiently complimentary and sufficiently vague that your observation is likely to be believed, likely even to be thought insightful.

Yet a truly meaningful character analysis must be specific. If it's not specific then it's *too* true, true of everyone, like horoscopes.

Specific And Accurate

Mind Prober, a new personality analysis program from Human Edge Software, succeeds surpris-

ingly well; it's often specific and it's often accurate.

To use it, you type in the name of a person you want to analyze. It can be you, your boss, your best friend, anyone, but the better you know the subject, the more specific and accurate the analysis is likely to be. Then you tell the program whether or not the subject is over 18 and if it's a male or female.

The analysis begins. A series of some 60 adjectives starts appearing onscreen. For each one, you must either agree or disagree that the word describes the subject. If you cannot decide, you can press the H key and see a fuller explanation.

Here's part of the list: rebellious, opinionated, sarcastic, aggressive, cynical, self-righteous, accomplishing, worrisome, sympathetic, emotional. In each case, you would type A for agree or D for disagree. If you asked for further help with, say, *accomplishing*, you'd see this fuller definition: able to bring a

task to completion; achieving.

Some of the questions seem redundant, but perhaps that's a way of defining the degree of a given character trait. For example, you are asked *AGGRESSIVE?* and then later, *CAUTIOUS?* The entire quiz is reminiscent of psychological tests given in schools.

What Makes Him Tick?

When you've finished giving your answers, you can request a report. This consists of 13 paragraphs which purport to describe several facets of the subject's personality. The report is divided into seven sections: personality summary, relationships, attitudes toward work, coping with stress, personal interests, attitudes toward sex (or school, if the subject is under 18), and what makes the subject tick (general motivational factors).

A summary, for example, might say: *You're likely to find Mr. Don O'Connell behind the scenes in most situations. He is a quiet person, preferring to follow rather than lead. His general approach to life is no-nonsense, and he likes to stick to the facts. He is conscientious and detail-oriented.*

This description is typical of the detail and specificity of *Mind Prober* and the reason that it is an impressive piece of software. This summary would not, obviously, be true of everyone.

The software's documentation claims that the reports are based on "massive amounts of

information" in an "expert system" on the disk. Unfortunately, the program is copy-protected, so you can't examine its methods, its data, or store more than eight assessments at any given time, because the program stores its reports on the program disk. If you try to assess a ninth personality, you'll have to first remove one of the older reports. You can, however, direct reports to your printer for archiving.

The Thinker Type

Accompanying the program is a book which makes some rather elaborate claims for itself: Analyze anyone, find out the hidden truths, how to read others, how to get ahead in business, etc. The text is one of those uneasy pop-psychology musings wherein the obvious competes with the dubious. And what's not obvious or dubious is largely superficial. In describing how to tell a person's "type" by his or her gait, we are advised

that "The Thinker" type holds their "heads and shoulders pointed toward the ground, indicating that they are preoccupied and do not wish to be disturbed. Typically, their hands are clasped behind their backs and their gait is slow and methodical." All this seems somewhat more plausible than phrenology, but only somewhat.

Nevertheless, the software itself is often startling in its accuracy. Oddly enough, the greatest source of error with *Mind Prober* appears to be when you answer questions about yourself. This would seem to violate the rule that the better you know someone, the better the analysis. But perhaps it merely points up the fundamental quality of the program's database and set of equations—self-

analysis is very difficult. It also serves to distinguish *Mind Prober* from those little personality quizzes found in some magazines.

While it seems unlikely that *Mind Prober* will make your dreams come true, it is an intriguing way to spend an afternoon. And it creates reports with enough surprises and insights to suggest that there is something complex and potentially powerful going on as that protected disk whirls around, creating a personality profile of some depth and precision out of a brief true-false test.

Mind Prober
Human Edge Software Corporation
2445 Faber Place
Palo Alto, CA 94303
\$29.95 (Commodore 64 version)
\$49.95 (All other versions)

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Fifty Mission Crush For Atari, Apple, 64

James V. Trunzo

System requirements: Atari computer with at least 40K RAM, a disk drive, and BASIC; Apple II-series computer with at least 48K RAM and a disk drive; Commodore 64 with a disk drive.

Now you have a chance to pilot a legendary Flying Fortress while making bombing runs over Nazi Germany, France, and the Netherlands. *Fifty Mission Crush* recreates the excitement and dangers experienced by B-17 pilots flying with the Eighth Air Force based in Britain during World War II. Your goal: Fly 50 missions, rise through the ranks to become a highly decorated brigadier general, and return home in one piece. Easily said—difficult to do.

Starting out as a first lieu-

tenant, you take command of a Flying Fortress and hand-pick your crew. Then you're assigned a target to bomb and sent on your way.

A pseudo role-playing game, *Fifty Mission Crush* requires you to make numerous decisions. Before taking off, for example, you must decide how much fuel you'll need to make the bombing run and return to base, and whether you'll carry an overload of bombs. The more bombs you drop, the more effective your mission; however, an overload can cause a fatal crash during takeoff if you lose an engine.

Throughout the mission, you exercise full control over the B-17. You decide whether to fly in formation, at what altitude to fly, which gunners will

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fire at enemy planes, when to use cloud cover, even when to abort the mission—and, of course, when to drop your bombs. Although all these details are controlled from the keyboard, playing the game is very simple thanks to onscreen menus and a short but concise instruction booklet.

Authentic "Feel"

The quality that makes this game special is the "feel" you get while playing it—or rather, while *experiencing* it. When you are passing over enemy anti-aircraft batteries guarding your primary target and the screen turns red as flak begins to explode all around your plane, you can begin to appreciate what the real thing must have been like. You sit, tense and apprehensive, as shells burst about you, and you nervously watch the screen for damage reports. Your stomach tightens when you learn that your tailgunner has been shot up and a German FW-190 is firing at your unprotected tail. You suppress a groan upon discovering that your bomb bay doors are damaged, and you are forced to abort the mission because you can't release your payload.

Unlike many role-playing games, however, *Fifty Mission Crush* doesn't necessarily strap you into your computer chair for hours. A single mission can be completed in as little as five minutes, and seldom does a single mission take more than 15 minutes from takeoff to return landing. Also, you can save a game in progress after each mission. This makes *Fifty Mission Crush* perfect for those occasions when you have too much time to do nothing but not enough time to really get involved in a long session with the computer.

The graphics are functional if not spectacular. Tactical and strategic screens show the terrain over which you are flying,

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views of your plane, animated combat, and so on. These screens are informational and mechanically accurate, and fit in well with the overall program. The lack of arcade-quality, high-resolution graphics does nothing to detract from the game itself. *Fifty Mission Crush* is a challeng-

ing, addictive game that immerses you in the flow of action in a very personal way.

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Lotus 1-2-3 For IBM PCjr

Donald B. Trivette

System requirements: Enhanced Model IBM PCjr. Printer and memory expansion optional.

A quick quiz: What's the best-selling computer program of all time?

I don't know either (where is the *Guinness Book of World Records* when you need it?), but surely a top contender would be Lotus Development Corporation's *Lotus 1-2-3*. This program has been leading several popular best-seller lists for two years.

There are several reasons for 1-2-3's popularity, but chief among them is that 1-2-3 is a spreadsheet program, and spreadsheet programs are the darlings of business computing, especially on IBM PCs. Nowadays it seems almost un-American to have a personal computer on your desk without a copy of a spreadsheet program. And 1-2-3 has become the standard by which other spreadsheet programs are measured. Indeed, it's one of the standards by which IBM PC compatibility is measured. You'll notice that the ads for many PC compatibles often stress that their machine runs 1-2-3.

Now spreadsheets are invading the home. (See this month's "IBM Personal Computing" column.) IBM and Lotus hope that you'll take the spreadsheet you are working on at the

office on your PC and finish it at home on your PCjr. But don't bother taking the IBM PC version of the 1-2-3 program home. It won't run on a stock Junior. That version of 1-2-3 requires two disk drives and at least 192K of memory, which is one disk drive and 64K more than an Enhanced Model PCjr has to offer.

Lotus To The Rescue

Fortunately, Lotus has begun selling a new version of 1-2-3 that's especially designed for the PCjr. Announced in July 1984, the product finally became available in December. It comes on two ROM cartridges and a floppy disk. Either cartridge may be plugged into either of the PCjr's two cartridge slots. The disk contains the help file and utility programs. Although the disk must be inserted in the drive when 1-2-3 is started, you can replace it with your work disk afterward.

Here's the first question an experienced 1-2-3 user will probably ask: Is the PCjr version the same as the PC version? The answer is yes. The manual for the PCjr version is identical, page for page, to the one for the PC—with the following exceptions. Several names have been added to the credits on the title page; and the "Getting Started" section on pages i through xi describes

how to install 1-2-3 on the PCjr. Those are the only differences.

The second likely question: How much room is available for a spreadsheet on a 128K IBM PCjr? The answer is 39,500 bytes. Not a lot. That can be increased to 45,700 if you bypass the Lotus Access System (File Manager, PrintGraph, Translate, etc.) and run 1-2-3 directly from the Disk Operating System. That's still not much for those accustomed to having 300,000 bytes available for their work, but it is sufficient for many applications.

With 45,700 bytes, for instance, you can create a spreadsheet 26 columns across (A-Z) and 100 rows deep containing labels, numbers, and formulas. That's plenty of room for domestic applications, and it accommodates most small business needs.

More Features = Less Memory

Another way to evaluate 1-2-3's workspace is to compare it with some competitors. *VisiCalc*, another popular spreadsheet program, leaves you with 71,600 bytes available for work, and *MultiPlan*, Microsoft's entry, has 55,500 bytes available. (All of these comparisons are on a 128K PCjr.) It's a tradeoff: The more sophisticated the program, the less space is left for your data.

Of course, if your spreadsheets need to grow beyond 45,000 bytes, you can expand the PCjr's memory all the way up to 512K RAM.

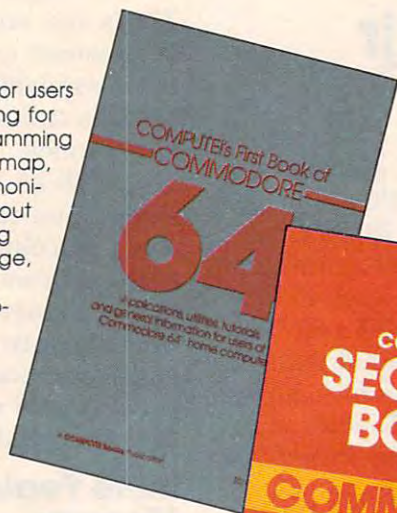
Another important question is calculating speed. *Lotus 1-2-3* doesn't run particularly fast even on a PC, and the PCjr is a slower machine. The PCjr version took several seconds to recalculate a test spreadsheet of 45,000 bytes. Presumably, a spreadsheet of several hundred thousand bytes would take noticeably longer on the PCjr than on the PC, but for anything that

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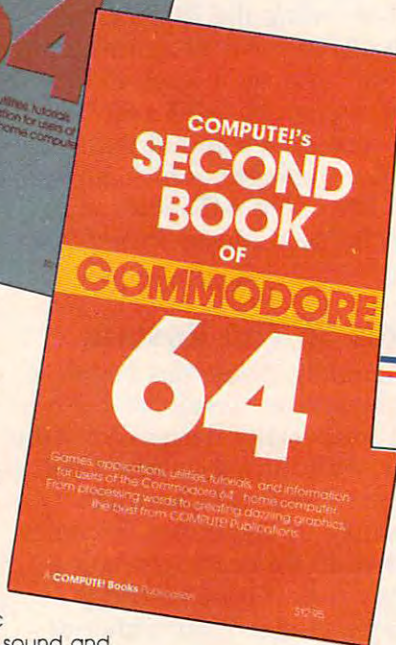
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will fit in 45,000 bytes, the re-calculating time is reasonable.

Lotus 1-2-3 is not an inexpensive program—it costs \$495.00 retail. But it's available from some discounters for as little as \$319.95. A salesperson at one such outlet said the PCjr version of 1-2-3 is selling very well. If true, it looks like Lotus is going to remain on the best-seller's list for a long time to come.

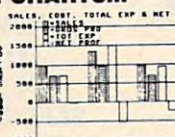
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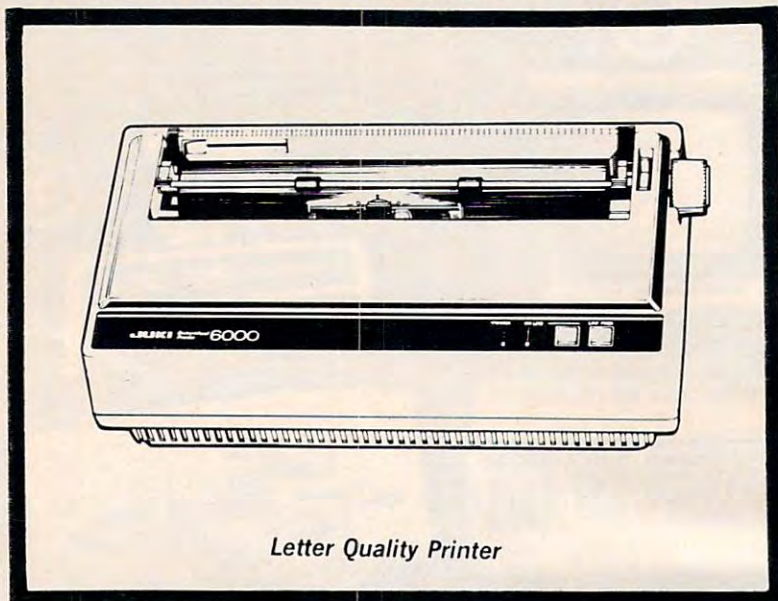
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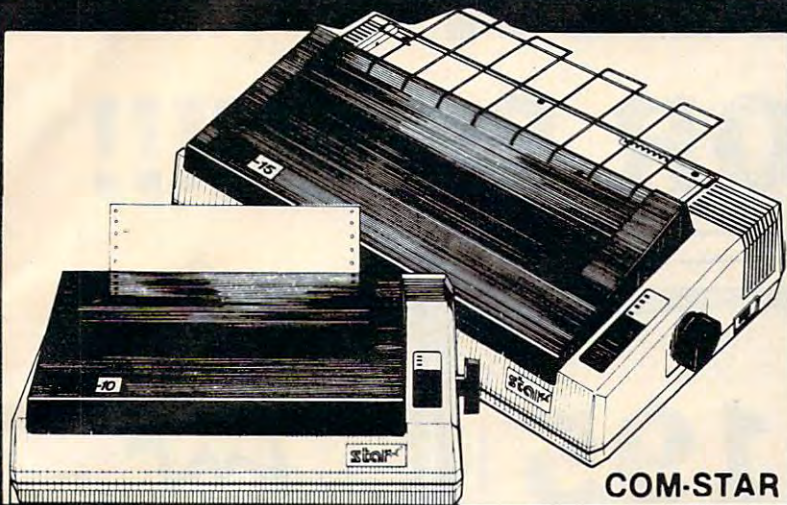
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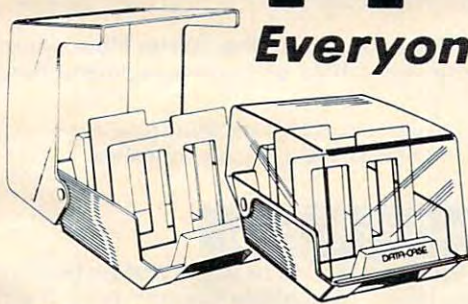
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The WRITE NOW! word processor provides you with the easiest to use, fastest to learn format available for your Commodore 64 computer. It will give you all the features you would expect in a professional word processor and some features not found in any other Commodore 64 word processor.

(Cartridge) List \$49.95. **Sale \$34.95.** Coupon \$29.95.

- Program is on cartridge and loads instantly so there is no waste of time loading from unreliable tapes or disks.
- Built in 80 column display allows you to see exactly what you will print including headers, footers, justification, page numbers and page breaks.
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Spell Now — Spell Checker

"Spell Now" is a disk based professional spelling checker that interfaces with the "Write Now" word processor for the C-64. Use "Spell Now" to check the spelling in your "Write Now" files. It includes all features of the most expensive spelling checkers on the market. (Disk) List \$39.95. **Sale \$19.95.**

- 34,000 word dictionary.
- 1,000 word mini-dictionary.
- Unlimited number of supplemental dictionaries (user-definable).
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- Fully compatible with "Write Now".
- Allows for marking, immediate correction and viewing in context.
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Mail Now — Mailing List Software

The "Mail Now" is a disk based full random access data base designed to be used with the "Write Now" word processor. "Mail Now" allows the user to merge an address file into the text of the word processor for form letters. (Disk) List \$39.95. **Sale \$19.95.**

- Machine language fast sort.
- User-friendly, totally menu-driven operation.
- 10 character comment line.
- User-defined, print format can print one, two or three labels across.
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- Supports 600 entries per disk.
- Quick (in memory) sorts by Zip, Category, Last name and State.
- Includes data back-up utility.
- CARDCO, INC.'s Lifetime Guarantee.

File Now — Database

"File Now" is the inexpensive data base you've been waiting for. "File Now" interfaces with the "Write Now" word processor for the C-64. Helps you with data base management of your "Write Now" files and keeps separate data bases for other important information. (Disk) List \$39.95. **Sale \$29.95.**

- Functions as a deck of 3 x 5 note cards.
- Fields are user-definable.
- Full edit features; add, edit, delete.
- Searching is bidirectional.
- Wild card searching and printing.
- Capacity up to 700 cards per file-disk.
- Fully compatible with "Write Now".
- CARDCO, INC.'s Lifetime Guarantee.

Graph Now / Paint Now — Graphic/Logo Generator

A full graphics package capable of generating line, bar graphs and graphic art designs such as logos and pictures to be used with "Write Now" for the C-64. Save your graph or logo in a "Write Now" compatible file and print it out along with your "Write Now" text file. (Disk) List \$39.95. **Sale \$19.95.**

- Allows plotting of x,y coordinates from software or keyboard.
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- Menu-driven; user-friendly.
- Draw lines, rectangles and circles.
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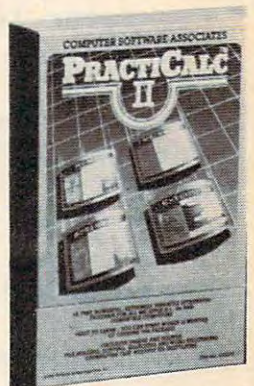
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Practicalc 64: A consistent best seller, Practicalc 64 has become a reference standard among Commodore 64 spreadsheets. With features like alphabetic and numeric sorting and searching, variable column widths, graphing and over 30 math functions, this program is an exceptional value. Practicalc 64 also interacts with PractiFile, forming the perfect small business bundle.
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PractiFile: Flexibility and large capacity make PractiFile the ideal data-base manager for the Commodore 64. (3800 records per file, sorts 5 fields at once.) Files written with the program are compatible with Practicalc 64 and popular word processing programs such as EasyScript, Word Pro, PageMate and PaperClip. Finally, a full-featured data-base at an affordable price!
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64 Doctor: A special diagnostic program for the Commodore 64, 64 Doctor takes the guesswork out of isolating troublesome hardware problems. The program tests each piece of hardware to pinpoint defects and help prevent costly and time-consuming service calls. An essential program for all Commodore 64 users!
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PractiCalc II *Better than Lotus 1-2-3* *Coupon \$44.95*

PractiCalc II, a fast, versatile spreadsheet with database and word processing features, does away with erasers, broken pencils and a wastebasket filled with scrap paper. PractiCalc II, with its functions and features, has the ability to complete simple and complex tasks. PractiCalc II is flexible enough to be used for checkbooks, alphabetized lists, home budgets and business financial statements. PractiCalc II is the tool of the eighties. List \$69.95. **Sale \$49.95.** Coupon \$44.95. (Disk)

With PractiCalc II you can:

- Use 250 rows by 100 columns
- Use 36 math functions from simple addition to square roots and trig functions.
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- Use upper and lower case letters.
- "Hide" columns of numbers for special reports without losing data.
- Create fixed titles of several rows and/or columns.
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- Use IF ... THEN statements.
- Edit labels and formulas.
- Format disks from within the program.
- View disk catalog from within the program.
- Write expanded labels up to 88 characters long.
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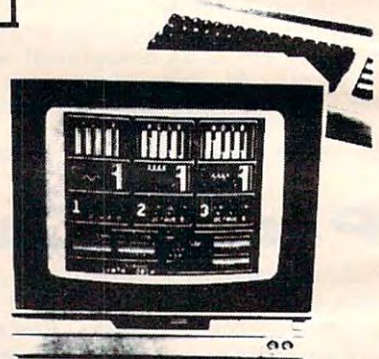


Also available is **Lite Sprite**, a light pen driven sprite builder (List \$39.95 **Sale \$29.95**).

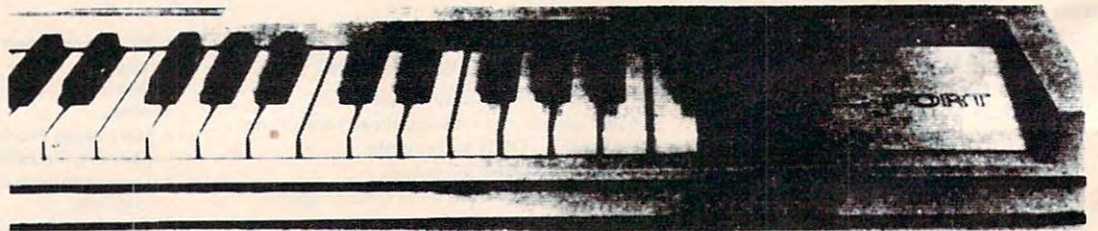
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The ultimate music synthesizer and multi-track recording system for the Commodore 64. A **Full-sized REAL Keyboard** and all software including printing to the printer and preprogrammed songs are included. (Disk) List \$149.95 **Sale \$99.00.**

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(Disk)



US Government Facts — 35 lessons plus authoring system included. This program was designed for the following: • Eighth grade American History • Ninth grade Civics • High School electives in government • College refresher courses in government and American History. Fantastic aid to learning about American government.
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(Disk)

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AEC Spelling — A series of seven educational software programs for grades 2 through 8. It teaches the spelling of 4,000 words most commonly used in writing (98% of most people's writing vocabulary). The word lists used are the result of over 25 years of research into the writing/spelling needs of children and adults. Each grade level consists of one two-sided disk with word lists on one side and study activities on the other. The activities are designed to develop mastery in spelling utilizing a Test/Teach/Test approach. A pre-test is used to find out which words a user cannot spell correctly. These are recorded on a "Words To Study" list. The activities for learning these words are provided. Finally, a post-test is taken by the learner to measure progress. The approach is simple and rewards are built in. List \$99.95. **Special Sale — 7 programs \$34.95.** Individual programs \$19.95. (Specify grades 2-8).

(Disk)



(Disk)

Commodore 64



Reading Comprehension Skills — Reading Comprehension Skills, 1, 2, and 3 help the learner develop the ability to read with understanding. The learner does work with cause and effect, similarities and differences, predicting outcomes, finding main ideas, differentiating between fact and opinion, etc.

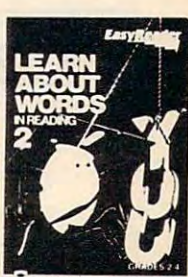
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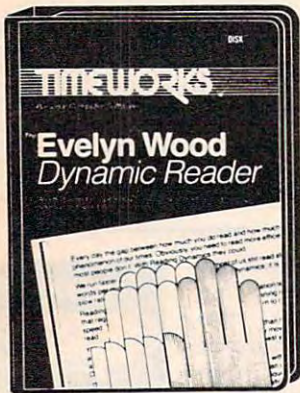
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An effective and enjoyable way to improve your reading comprehension, retention and speed.

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\$44.95

List \$69.95

(See Page 29, 30, 54)

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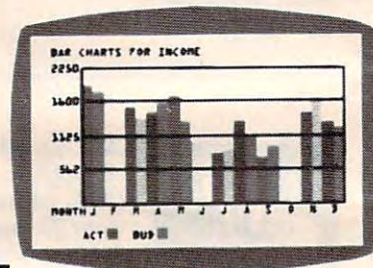
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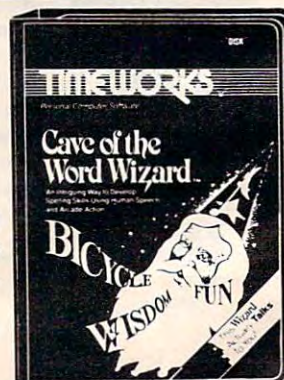
For Commodore 64 Computers

*An Intriguing Way to Develop Spelling Skills
Using Human Speech and Arcade Action.*

This state-of-the-art educational program includes 500 spoken words in 10 spelling skill levels and makes full use of the sound capabilities of your computer. The Wizard will talk to you in clear human speech. No additional hardware is needed for your computer system. (Tape/Disk)

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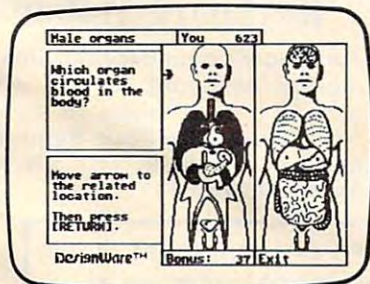
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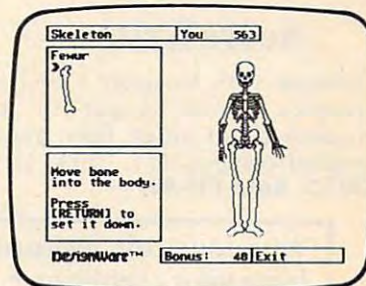
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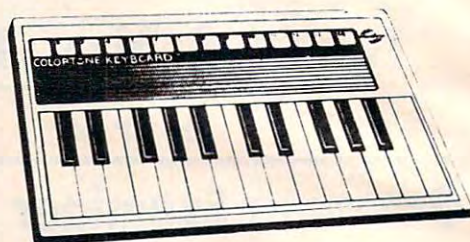
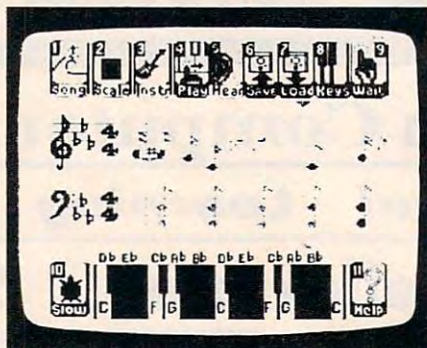
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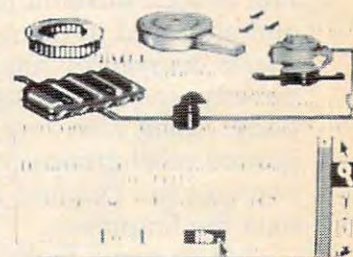
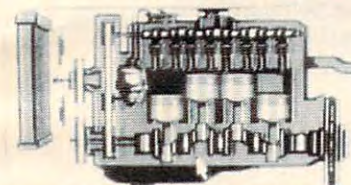
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Empire III: Armageddon

Michael B. Williams

Requirements: Apple II-series computer with at least 48K RAM and a disk drive.

Empire III: Armageddon is the final chapter in the Empire trilogy. When you assume the role of a character in this world, you find the once-thriving civilization created in *World Builders* and advanced in *Interstellar Sharks* decayed by rebellion, poverty, and the corrupt ruling body. Along with several underground rebel groups, you must overtake the Pyramid and eliminate the Empress.

As in many fantasy role-playing games, your character's attributes and characteristics are determined by the roll of the die. Your success in everything you do depends on your strengths and weaknesses and how well you use them. For example, a high charisma can help you get lower prices on some items, while strength and dexterity will aid you most during battle. Everything but your native class and your name are chosen by chance, including your gender.

During battle, you and your opponent occupy opposite sides of the screen. You determine your attack by such commands as stab, hit, kick, or fire. The battle ends when one of you is killed or gives up. Any wounds received may be healed at the hospital in the city (for a fee, of course).

Armageddon is realistic: Periodically, you must eat and drink to sustain life. Time passes according to where you are and how you move (more time elapses when traversing the wilderness than the city, for example). As your character ages, his abilities and strength

weaken, though his intelligence probably increases.

One criticism of *Armageddon* is that the game moves extremely slowly. The display routines appear to be written in BASIC and are painstakingly slow. Disk access is excessive. Another criticism, though common to many games of this type (such as *Wizardry*), is that, after hours of developing a character, one mistake can wipe him out. Since there is no reincarnation

in *Armageddon* (and no commercial reincarnation programs as exist for *Wizardry*), one is forced to restart the game from the very beginning.

Despite these drawbacks, *Empire III: Armageddon* is a well thought-out, extremely complex graphic adventure. It will take a lot of time to complete, and will also command much of your patience. *Empire III: Armageddon* nicely ties up the Empire trilogy with a superb challenge for gamers.

Empire III: Armageddon
Peachtree Software
3445 Peachtree Road, N.E.
Atlanta, GA 30326
\$32.95

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EasyPath For PC & PCjr

Richard Mansfield, Senior Editor

Requirements: IBM PC or PCjr with at least one disk drive and DOS 2.0 or higher.

IBM DOS 2.0 and above are powerful, impressive operating systems, but they do have a few kinks. One of their strengths is that you can define subdirectories to conveniently store related groups of files. However, because of a quirk of the PATH command, you can access only program files within subdirectories, not data files.

Also, many popular programs cannot access subdirectories. If you are word processing, for example, and you want to work on a particular letter, it must be in your current directory. It's more logical to organize letters in a directory called LETTERS and notes in NOTES, etc. However, DOS forces you to copy all such data files into the current directory if you want to access them with your word

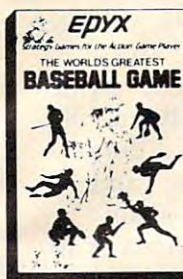
processor. Some people have solved this by putting a copy of their programs—database managers, spreadsheets, and so on—into *each* relevant subdirectory. Not only does that waste disk space, it still doesn't solve the problem of switching between letters and notes in different directories.

An Easy Solution

All this is solved with Polygon Software's *EasyPath* program. You are given great freedom to define locations and to SET pathlike arguments which will permit any of your programs to access data from anywhere on your floppy or hard disks. *EasyPath* also solves similar problems with RAM disks and piping.

Of particular interest to hard disk users is the EPFILES command, which quickly locates any file or file specification anywhere on the disk. You see a display of all matches and

The Best Arcade Games Around



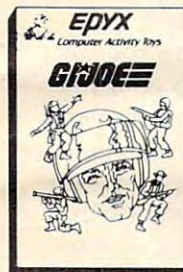
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Ballblazer — Unique split-screen, 3-D graphics give you and your opponent a first person view of the field of play. You race across the playfield in your Rotofoil trying to capture the ball and fire it through the goal before your opponent. The winner is the player with the most points at the end of the timed competition. Hold onto your joystick and keep that finger on the fire button, this is the type of two player head-to-head action you've been waiting for. Two Players. (Disk) List \$29.95. **Sale \$21.95.**



Fast Load Cartridge — Load, save and copy disks five times faster than normal. It plugs into the cartridge port of the Commodore 64 and goes to work automatically, loading disks with ease. And that's only the beginning. It can copy a single file, copy the whole disk, send disk commands, and even list directories without erasing programs stored in memory. (Cartridge) List \$39.95. **Sale \$24.95.**

Barbie — The biggest name in dolls. Browse through Barbie's closet full of beautiful clothing and dress her for the party. You can cut her hair or make it longer and color it or change the style. Buy new clothing at the boutique or any of the six other specialty shops, or even go to the dress shop and create Barbie's designer clothes with the help of the computer. The combinations are endless and so is the fun. One or two players. (Disk) List \$39.95. **Sale \$24.95.**



G.I. Joe — The best selling toy soldier is now available as an activity toy on the home computer. Select the battle situation then choose the equipment you think you will need to get the job done. Choose from a number of uniforms and weapons in your well stocked arsenal and get ready for the action. Play alone or with a friend, if you plan the right strategy you will complete the mission if not you will have to try again. One or two players. (Disk) List \$39.95. **Sale \$24.95.**

Hot Wheels — Now all the action and fun from playing with Hot Wheels cars is taken one step further on the home computer. Hot Wheels lets you choose your play activity from repairing cars to the destruction derby. You can actually play the activities along with a partner on the computer screen, even build and customize your own cars. A whole new way to play Hot Wheels. One or two players. (Disk) List \$39.95. **Sale \$24.95.**



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locations, whether hidden, system, read-only, subdirectory, or altered since previous backup. This wealth of information has a variety of uses. For example, you can quickly determine if you have duplicate files hidden away in forgotten zones within the megabytes of storage.

EasyPath makes it easier to manage the generous amounts of storage offered by a hard disk.

This product has only one flaw, and it's a flaw that's hard to complain about seriously. *EasyPath* is one of those programs with so many options and features that you're initially stunned by an *embarras de richesses*.

There are so very many ways to use *EasyPath* that at first you can get lost trying to figure out what is essentially a new language. However, the program comes with many prewritten batch files for popular software; a clear, if dense, user guide; and plenty of examples. It's well-supported with help and error screens. It doesn't take long to start solving problems with *EasyPath*. And there seem to be no untoward interactions with other popular background utilities, such as *ProKey*, RAM disks, and *Sidekick*.

EasyPath
Polygon Software Corp.
363 Seventh Avenue
New York, NY 10001
\$100

Winnie The Pooh In The Hundred Acre Wood

James V. Trunzo

Requirements: Commodore 64 with a disk drive; or an Apple II-series computer with at least 48K RAM and a disk drive.

Winnie The Pooh In The Hundred Acre Wood is a graphics adventure game designed to be played by a seven-year-old (or any Winnie the Pooh lover), and the biggest and most pleasant surprise is that a child can actually play it! One of the first releases from Walt Disney Personal Computer Software, by way of Sierra, *Winnie The Pooh* is truly an adventure game for children.

The program stresses such diverse skills as creating and reading maps, logical thinking, and reading comprehension. However, this learning is hidden beneath delightful graphics and an intriguing challenge (for a youngster). A blustery wind has blown through the Hundred Acre Wood, scattering the belongings of the beautifully rendered A. A. Milne characters far and wide. It is the player's job to locate the missing articles, identify their owners, and then return them.

Sierra has struck a laudable balance between making the game too easy (and thus boring) or too difficult (and thus frustrating). Except for directional movements, children are not expected to type in the kind of commands normally associated with adventure games, so they don't have to wrestle with the program's vocabulary and syntax recognition.

Sierra has added several other touches to aid youngsters. The Wise Owl is always available in case they find an object they cannot match to a charac-

ter. A map of the Hundred Acre Wood also is available, although players are urged to make their own map, as well, to keep track of certain objects (only one object can be carried at a time). Finally, the text of the game contains little hints—again, without being so obvious as to dilute the enjoyment and satisfaction a youngster gains from successfully completing a piece of the puzzle.

Winnie The Pooh is a game that a youngster will play more than once. The program scatters the lost objects in different places for each game, and has variations that make it more than just a seek-and-find game. The instructions are simple and concise, and the program is almost completely error-proof. One impressive feature is the ingenious way Sierra built the save-game feature into the program. For starters, no data disk is needed, eliminating the need to swap disks. And the actual procedure is made so easy (you have to look in the toybox in the playroom) that any seven-year-old can do it without trouble. *Winnie The Pooh* is one piece of software that lives up to the promises on its box.

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TurboDisk

High-Speed Disk Loader For Commodore 64 And Expanded VIC-20

Don Lewis

Another breakthrough! Recently COMPUTE! published a startling utility that loads Commodore tapes as fast as 1541 disks (see "TurboTape," January and February 1985). In this issue we're following up with a program that accelerates 1541 disk loading by a factor of three times or more. You'll find that "TurboDisk" is as revolutionary as TurboTape—and just as easy to use.

If you've ever used a really fast disk drive, you know that the Commodore 1541 drive leaves something to be desired—namely, speed. True, it's much faster than a Datassette—at least, a Datassette without "TurboTape"—but it's still annoyingly slow compared to other floppy disk drives with high-speed parallel interfaces.

Now there's a stunning solution: "TurboDisk."

Once you start using TurboDisk, you'll wonder how you got along without it. TurboDisk turbocharges the loading process by a factor of three times or more. In fact, the longer the program, the more improvement you'll see!

TurboDisk requires no modifications to your disk drive or computer. It loads programs saved in the usual manner; no special Turbosave is required. It works with most BASIC and machine language programs, including the DOS Wedge. It does not compromise reliability. And you can switch it on or off at any time by typing a single command.

If you're still skeptical, give TurboDisk a trial—it delivers what it promises.

Preparing TurboDisk

For the Commodore 64, you'll need to type in two programs to prepare TurboDisk: a BASIC program that creates a machine language file on

disk (the actual TurboDisk utility); and a short two-line BASIC loader that calls up and activates TurboDisk. For the VIC, a single BASIC program is used to read the TurboDisk machine language from DATA statements and relocate it to the top of available memory.

Program 1 is the BASIC program that creates the 64 version of TurboDisk. Notice all the numbers in DATA statements; these represent the machine language portion of the utility. Be extra careful when typing these lines. We recommend using the "Automatic Proofreader" to prevent as many errors as possible (see "COMPUTE!'s Guide To Typing In Programs" elsewhere in this issue).

Save Program 1 on disk before running it for the first time. That way, if an error causes your computer to lock up, you can switch it off to clear the memory, reload the program, and search for the typing mistake. Otherwise you could lose all of your typing effort.

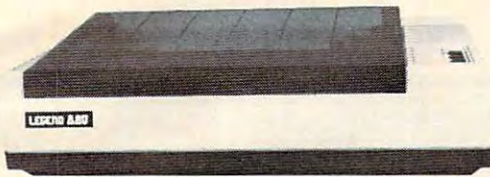
When Program 1 runs, it prints the message INSERT DISK AND HIT RETURN WHEN READY. Insert a formatted program disk and press RETURN. Program 1 creates a file on the disk with the name TURBODISK.OBJ and then prints the message TURBODISK.OBJ CREATED. You'll probably want copies of TurboDisk on all of your program disks, so rerun the program as many times as necessary.

Program 1 will print an error message if it detects a disk error or a typing mistake in the DATA statements. In addition, the partially written TURBODISK.OBJ file will be scratched from the disk if an error is detected in the DATA.

Finally, if you're using a Commodore 64, you must type in Program 2 and save it on all your program disks with the filename TURBODISK. To load and run TurboDisk, all

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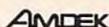
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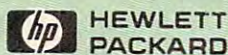
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you have to do is enter **LOAD TURBODISK,8** and **RUN**. The short loader will call **TURBODISK.OBJ** off the disk, place it safely in high memory, and activate it automatically.

VIC TurboDisk

Program 3, for the VIC-20, reads the TurboDisk machine language from **DATA** statements and **POKEs** it into the top of available memory, adjusting addresses within the machine language as necessary. This is slower than the scheme used for the 64, but necessary because TurboDisk's position in the VIC depends on the amount of memory installed and whether any other utilities—such as the DOS Wedge—are already in memory. Memory expansion is required to use VIC TurboDisk, but any amount—even 3K—is sufficient. However, TurboDisk will reduce the amount of free memory by 1280 bytes.

As always when entering **DATA** statements containing machine language, check carefully for typing mistakes, since a single wrong number can cause the program to crash. The Automatic Proofreader should help you avoid some typographical errors. Program 3 also includes internal checks on the **DATA** statements, and will report an error if the sum of all the **DATA** items doesn't match its predetermined total.

To install TurboDisk, simply load and run Program 3. If all **DATA** is correct, the program will tell you the **SYS** values that will turn TurboDisk on and off (these numbers vary according to the amount of memory expansion). Be sure to make a note of the numbers for later reference. Program 3 will also automatically activate TurboDisk, so you don't need the **SYS** to start it the first time.

Turbocharged LOADs

Once TurboDisk is activated, no special commands are necessary. Simply type **LOAD "filename",8** or **LOAD "filename",8,1** as usual. You'll be amazed at the difference.

One thing you will notice immediately is that the red light on the disk drive doesn't come on at all during a TurboLoad. Don't panic; this is normal. It's also normal for the 64's screen to blank out as TurboDisk works. When the program is loaded, the screen reappears unaltered. The VIC's screen doesn't blank; instead, you'll see the message **TURBOLOADING** to let you know that the high-speed loading is in progress.

You may occasionally find it necessary to deactivate TurboDisk and use a normal **LOAD** instead. For example, 1541 disk drives are prone to head alignment problems, so if you have a disk formatted on a drive other than your own, you may find that your drive has difficulty loading programs from it. Since the TurboLoad rou-

tine gives up more easily on difficult loads, you may have to switch to the more forgiving standard **LOAD** to get the program into your computer. You can switch off 64 TurboDisk at any time without erasing it from memory by entering **SYS 49155**. To reactivate 64 TurboDisk, enter **SYS 49152**. For the VIC, use the **SYS** values reported by the loader program.

You'll also find it necessary to use the **SYS** to reactivate TurboDisk after pressing **RUN/STOP-RESTORE**. Using that key combination to reset the computer effectively disconnects TurboDisk.

There are a few cautions to observe. When using TurboDisk, only one device can be active on the serial bus. Turn off all other devices except for one 1541 disk drive, device number 8. If you are using a printer interface such as Cardco's which gets power from the cassette port, remove the plug from the cassette port before using TurboDisk. If you attempt to TurboLoad a program and the drive spins continuously but nothing else happens, you have probably forgotten to turn off your printer or unplug your printer interface.

On the Commodore 64, TurboDisk resides in the 4K block of free memory starting at address 49152 (hex \$C000), so it's completely safe from **BASIC**. However, many machine language programs or subroutines also use this memory space and may overwrite TurboDisk. Don't attempt to use TurboDisk to load any program which occupies locations 49152-50431 (\$C000-\$C4FF).

Since VIC TurboDisk resides at the top of memory, care must be taken to avoid loading a program that is long enough to overwrite the TurboDisk machine language. After running Program 3, type **PRINT INT(FRE(0)/256)**. The value you get is roughly the maximum length in disk blocks for a program to load without disturbing TurboDisk. For example, on a VIC with 8K expansion and both TurboDisk and the VIC-20 Wedge installed, the **PRINT** above should yield a 38. Thus, for that memory configuration, you should not attempt to TurboLoad a program that the disk directory shows to be more than 38 blocks long.

TurboDisk speeds up **LOADs**—even **LOADs** from within programs, as are common in multipart VIC programs—but it can't speed up **SAVEs** or **VERIFYs**. It also doesn't affect the speed of disk file handling with **OPEN**, **PRINT#**, **GET#**, etc. It's not compatible with certain features of some programs, such as saving text files with the *SpeedScript 3.0* word processor, although you can use TurboDisk to load *SpeedScript* in the first place. TurboDisk works with the disk-locking function of "Commodore File Protector" (see

article elsewhere in this issue) but not with the file-locking function. It also may not work with some commercial software.

How TurboDisk Works

The machine language for TurboDisk is unusual in that only half of it works within your computer—the rest is actually executed within the 1541 drive itself. Unlike disk drives for most other computers, Commodore's are *intelligent* units, containing their own microprocessors, RAM, and ROM. This means that they can be programmed for special effects, like Turboload.

During the brief delay you notice between the time you enter the LOAD command with TurboDisk and the time the drive starts spinning, 420 bytes of machine language code are transferred from the computer to the drive's RAM. This is the portion in the second set of DATA statements in Programs 1 and 3. In the 64, it is stored in locations 49664–50083 (\$C200–\$C3A3). This required transfer of data before each Turboload adds a certain amount of overhead time, which explains why TurboDisk gives less speed improvement for short programs.

TurboDisk operates by changing the ILOAD vector at locations 816–817 (\$330–\$331) to point to itself, bypassing the normal LOAD routines in ROM. (These locations are reset to their normal values during the RUN/STOP–RESTORE sequence, which explains why the program must be reactivated after that key combination is pressed.) TurboDisk first checks to see whether a disk directory (LOAD "\$",8) or a VERIFY was requested. In either of these cases, control is returned to the ROM routines for normal processing. If a program load was requested, the routine adds the filename to the code for the disk drive portion, then transfers that data to the drive's memory.

The portion of TurboDisk in the disk drive uses routines in the drive's ROM to locate the desired program and read it from the disk sector by sector. To improve speed, drive ROM routines like the one that turns on the red light are omitted, and only the essential ones are used. The 256 bytes of data from each disk sector are transferred two bits at a time to a 256-byte buffer within the computer. In the 64, this buffer is at locations 50176–50431 (\$C400–\$C4FF).

TurboDisk machine language in the computer reads the incoming data from the serial port's DATA and CLK lines, instead of just the DATA line as in normal serial data transfers. Thus, TurboDisk temporarily converts your serial drive into a two-bit parallel drive. When the entire 256 bytes from a disk sector have been transferred into the computer's buffer, data from the

buffer is added to the program in memory while the drive is reading the next sector from the disk.

Just How Fast Is It?

Despite a few limitations, TurboDisk is one of the most valuable general-purpose utilities a disk user can own. To discover exactly how fast it is, we ran tests with some programs recently published in COMPUTE!. The test results, shown below, demonstrate how TurboDisk yields the most improvement with medium to long programs. (Results with different disk drives may vary. Figures shown below are for the 64 version.)

After trying TurboDisk yourself, we think you'll agree it's a worthy follow-up to TurboTape.

Program	Blocks	Normal LOAD	Turboload	Factor
Acrobat	31	21 sec	7 sec	3.0
Space Caverns	17	13 sec	5 sec	2.6
64 Paintbox	45	31 sec	9 sec	3.4
Unicopy 64	8	7 sec	5 sec	1.4
SpeedScript 3.0	25	18 sec	6 sec	3.0
SpeedScript 3.0 source code	122	75 sec	17 sec	4.4

Please refer to "COMPUTE!'s Guide To Typing In Programs" before entering these listings.

Program 1: 64 TurboDisk Creator

```

100 PRINT "{CLR}"TAB(206) "{WHT}TURBODISK P
    ROGRAM GENERATOR":PRINT:PRINT :rem 2
110 PRINT "{CYN}INSERT DISK AND HIT {RVS}
    RETURN {OFF} WHEN READY":PRINT:PRINT
    :rem 115
120 GET A$:IF A$<>CHR$(13) THEN 120
    :rem 248
130 OPEN 2,8,2,"TURBODISK.OBJ,P,W":GOSUB
    {SPACE}1000 :rem 100
140 PRINT#2,CHR$(0)CHR$(192); :rem 78
150 FOR I=0 TO 427:READ A:CK=CK+A:PRINT#2
    ,CHR$(A);:NEXT I :rem 225
160 IF A<>32 OR CK<>55038 THEN PRINT"
    {RVS}ERROR IN DATA LINES 49152-49578"
    :GOTO 300 :rem 5
170 FOR I=0 TO 83:PRINT#2,CHR$(234);:NEXT
    I :rem 115
180 CK=0:FOR I=0 TO 419:READ A:CK=CK+A:PR
    INT#2,CHR$(A);:NEXT I :rem 26
190 IF A<>160 OR CK<>43460 THEN PRINT"
    {RVS}ERROR IN DATA LINES 49664-50078"
    :GOTO 300 :rem 49
200 CLOSE 2:PRINT TAB(9)"[7]TURBODISK.OBJ
    CREATED":PRINT:PRINT TAB(10);:rem 74
210 INPUT "ANOTHER COPY (Y/N)";A$:IF A$<>
    "Y" THEN END :rem 197
220 RUN :rem 137
300 CLOSE 2:CLOSE 15:OPEN 15,8,15,"S0:TUR
    BODISK.OBJ":CLOSE 15:END :rem 45
1000 CLOSE 15:OPEN 15,8,15:INPUT#15,E,E$,T,
    S:IF E=0 THEN RETURN :rem 71

```



```

1010 PRINT "DISK ERROR"E": "E$;T;S
                                     :rem 145
1020 CLOSE15:OPEN15,8,15,"I0":CLOSE15
                                     :rem 160
49100 REM ** 64 TURBODISK ML          :rem 240
49152 DATA 76,27,192,169,165,141   :rem 63
49158 DATA 48,3,169,244,141,49     :rem 221
49164 DATA 3,160,0,185,41,192      :rem 151
49170 DATA 240,6,32,22,231,200     :rem 184
49176 DATA 208,245,96,169,84,141   :rem 71
49182 DATA 48,3,169,192,141,49     :rem 220
49188 DATA 3,160,21,208,230,13     :rem 196
49194 DATA 84,85,82,66,79,68       :rem 142
49200 DATA 73,83,75,32,68,73       :rem 115
49206 DATA 83,65,66,76,69,68       :rem 135
49212 DATA 13,0,13,84,85,82        :rem 51
49218 DATA 66,79,68,73,83,75       :rem 137
49224 DATA 32,65,67,84,73,86       :rem 124
49230 DATA 65,84,69,68,13,0        :rem 64
49236 DATA 133,147,165,147,208,30 :rem 102
49242 DATA 162,16,169,160,157,148 :rem 108
49248 DATA 195,202,16,250,160,0    :rem 249
49254 DATA 177,187,201,36,240,12   :rem 50
49260 DATA 177,187,153,148,195,200
                                     :rem 161
49266 DATA 196,183,144,246,176,5   :rem 69
49272 DATA 165,147,76,165,244,32   :rem 62
49278 DATA 69,193,165,186,32,177   :rem 79
49284 DATA 255,169,111,32,147,255 :rem 109
49290 DATA 169,85,32,168,255,169   :rem 75
49296 DATA 67,32,168,255,32,174    :rem 18
49302 DATA 255,120,169,11,141,17   :rem 39
49308 DATA 208,32,19,193,44,0      :rem 156
49314 DATA 196,48,76,164,195,166   :rem 75
49320 DATA 196,165,185,240,6,172   :rem 56
49326 DATA 2,196,174,3,196,132     :rem 213
49332 DATA 174,134,175,162,4,32    :rem 254
49338 DATA 251,192,32,19,193,173   :rem 60
49344 DATA 0,196,48,48,240,6       :rem 114
49350 DATA 32,249,192,76,188,192   :rem 69
49356 DATA 162,2,160,0,189,0       :rem 101
49362 DATA 196,145,174,200,232,240
                                     :rem 147
49368 DATA 7,236,1,196,144,242     :rem 216
49374 DATA 240,240,32,6,193,24     :rem 203
49380 DATA 72,169,27,141,17,208    :rem 8
49386 DATA 104,166,174,164,175,88 :rem 122
49392 DATA 96,169,4,44,169,0       :rem 124
49398 DATA 56,176,235,162,2,160    :rem 12
49404 DATA 0,189,0,196,145,174     :rem 211
49410 DATA 200,232,208,247,24,152  :rem 86
49416 DATA 101,174,133,174,165,175
                                     :rem 152
49422 DATA 105,0,133,175,96,160    :rem 251
49428 DATA 0,169,11,141,0,221     :rem 142
49434 DATA 173,0,221,16,251,169    :rem 253
49440 DATA 3,141,0,221,162,5       :rem 87
49446 DATA 202,234,208,252,162,4   :rem 46
49452 DATA 173,0,221,10,8,10      :rem 88
49458 DATA 38,149,40,38,149,202   :rem 14
49464 DATA 208,242,165,149,73,255 :rem 115
49470 DATA 153,0,196,200,208,209   :rem 46
49476 DATA 96,169,16,133,255,169   :rem 77
49482 DATA 0,133,251,169,194,133   :rem 53
49488 DATA 252,169,0,133,253,169   :rem 65
49494 DATA 5,133,254,165,186,32    :rem 11
49500 DATA 177,255,169,111,32,147 :rem 103
49506 DATA 255,165,253,164,254,141
                                     :rem 156
49512 DATA 169,193,140,170,193,160
                                     :rem 153
49518 DATA 0,185,166,193,32,168   :rem 13
49524 DATA 255,200,192,6,208,245   :rem 51
49530 DATA 160,0,177,251,32,168   :rem 253
49536 DATA 255,200,192,32,144,246 :rem 101
49542 DATA 165,251,105,31,133,251 :rem 91
49548 DATA 165,252,105,0,133,252  :rem 47
49554 DATA 165,253,105,32,133,253 :rem 99
49560 DATA 165,254,105,0,133,254  :rem 45
49566 DATA 32,174,255,198,255,208 :rem 121
49572 DATA 180,96,77,45,87,0      :rem 127
49578 DATA 0,32                    :rem 236
49600 REM ** 1541 TURBODISK ML      :rem 86
49664 DATA 32,66,208,120,169,18    :rem 10
49670 DATA 160,1,141,0,3,140       :rem 86
49676 DATA 1,3,32,186,5,169        :rem 67
49682 DATA 3,133,60,162,0,134     :rem 148
49688 DATA 75,240,41,160,0,177    :rem 214
49694 DATA 59,201,130,208,25,200  :rem 46
49700 DATA 200,200,185,145,6,201  :rem 31
49706 DATA 42,240,61,201,63,240   :rem 245
49712 DATA 4,209,59,208,7,200     :rem 157
49718 DATA 192,18,240,48,208,234  :rem 61
49724 DATA 230,75,166,75,224,8     :rem 218
49730 DATA 240,7,189,98,5,133     :rem 169
49736 DATA 59,208,208,173,0,3     :rem 163
49742 DATA 240,6,172,1,3,76       :rem 55
49748 DATA 14,5,169,255,141,0     :rem 162
49754 DATA 3,32,133,5,88,76       :rem 68
49760 DATA 69,217,2,34,66,98      :rem 127
49766 DATA 130,162,194,226,230,59 :rem 110
49772 DATA 160,0,177,59,141,0     :rem 157
49778 DATA 3,200,177,59,141,1     :rem 162
49784 DATA 3,32,186,5,32,133     :rem 110
49790 DATA 5,173,0,3,208,245     :rem 107
49796 DATA 96,160,0,185,0,3       :rem 64
49802 DATA 133,133,44,0,24,16     :rem 144
49808 DATA 251,169,16,141,0,24    :rem 206
49814 DATA 44,0,24,48,251,162     :rem 155
49820 DATA 4,169,0,6,133,42       :rem 52
49826 DATA 10,6,133,42,10,141     :rem 142
49832 DATA 0,24,202,208,240,72    :rem 195
49838 DATA 104,72,104,169,15,141  :rem 53
49844 DATA 0,24,200,208,206,96    :rem 204
49850 DATA 172,1,3,132,7,173     :rem 102
49856 DATA 0,3,197,6,8,133       :rem 15
49862 DATA 6,40,240,16,169,176    :rem 216
49868 DATA 133,0,88,36,0,48       :rem 69
49874 DATA 252,120,165,0,201,1    :rem 194
49880 DATA 208,78,169,238,141,12  :rem 66
49886 DATA 28,169,6,133,50,169   :rem 229
49892 DATA 0,133,51,133,48,169   :rem 214
49898 DATA 3,133,49,32,58,6       :rem 75
49904 DATA 80,254,184,173,1,28    :rem 214
49910 DATA 153,0,3,200,208,244    :rem 191
49916 DATA 160,186,80,254,184,173 :rem 116
49922 DATA 1,28,153,0,1,200       :rem 39
49928 DATA 208,244,32,224,248,165 :rem 113
49934 DATA 56,197,71,240,4,169    :rem 225
49940 DATA 34,208,20,32,233,245   :rem 251
49946 DATA 197,58,240,4,169,35    :rem 230
49952 DATA 208,9,169,236,141,12  :rem 10
49958 DATA 28,96,24,105,24,133    :rem 219
49964 DATA 68,169,255,141,0,3     :rem 169
49970 DATA 32,133,5,165,68,76     :rem 171
49976 DATA 200,193,32,64,6,76    :rem 170
49982 DATA 124,6,165,18,133,22    :rem 211
49988 DATA 165,19,133,23,165,6    :rem 224
49994 DATA 133,24,165,7,133,25    :rem 215
50000 DATA 169,0,69,22,69,23     :rem 98
50006 DATA 69,24,69,25,133,26    :rem 155
50012 DATA 32,52,249,162,90,32    :rem 192

```



```

50018 DATA 124,6,80,254,184,173 :rem 252
50024 DATA 1,28,217,36,0,208 :rem 89
50030 DATA 6,200,192,8,208,240 :rem 186
50036 DATA 96,202,208,233,169,32 :rem 46
50042 DATA 208,175,169,208,141,5 :rem 45
50048 DATA 24,169,33,44,5,24 :rem 102
50054 DATA 16,163,44,0,28,48 :rem 99
50060 DATA 246,173,1,28,184,160 :rem 247
50066 DATA 0,96,160,160,160,160 :rem 242
50072 DATA 160,160,160,160,160,160 :rem 126
50078 DATA 160,160,160,160,160,160 :rem 132

```

Program 2: 64 TurboDisk Loader

```

10 IF A=0 THEN A=1:LOAD "TURBODISK.OBJ",8
,1 :rem 155
20 SYS 49152:NEW :rem 138

```

Program 3: VIC TurboDisk Loader

Translation by Ottis Cowper, Technical Editor

```

10 POKE 55,0:POKE 56,PEEK(56)-5:CLR:PRINT
"{DOWN} VIC TURBODISK LOADER" :rem 32
20 X=PEEK(56):A1=X*256:PRINT"{DOWN}WRITIN
G BLOCK 1" :rem 188
30 FOR AD=A1 TO A1+444:READ DT:CK=CK+DT:I
F DT<0 THEN DT=X-DT-1 :rem 234
40 POKE AD,DT:NEXT:IF CK<>52477 THEN PRIN
T"{RVS}ERROR IN DATA":PRINT"LINE 1000
-1444":STOP :rem 61
50 CK=0:A2=A1+512:PRINT"WRITING BLOCK 2"
:rem 75
60 FOR AD=A2 TO A2+419:READ DT:CK=CK+DT
:rem 165
70 POKE AD,DT:NEXT:IF CK<>43460 THEN PRIN
T"{RVS}ERROR IN DATA":PRINT"LINE 2000
-2414":STOP :rem 55
80 PRINT"DATA OK":PRINT"{DOWN}SYS"A1"TO A
CTIVATE":PRINT"{DOWN}SYS"A1+3"TO DISAB
LE" :rem 120
90 SYS A1 :rem 218
999 REM ** VIC TURBODISK CODE :rem 151
1000 DATA 24,144,24,169,73,141 :rem 188
1006 DATA 48,3,169,245,141,49 :rem 154
1012 DATA 3,160,0,185,41,-1 :rem 21
1018 DATA 240,6,32,66,231,200 :rem 133
1024 DATA 208,245,96,169,84,141 :rem 3
1030 DATA 48,3,169,-1,141,49 :rem 90
1036 DATA 3,160,21,208,230,13 :rem 128
1042 DATA 84,85,82,66,79,68 :rem 74
1048 DATA 73,83,75,32,68,73 :rem 65
1054 DATA 83,65,66,76,69,68 :rem 76
1060 DATA 13,0,13,84,85,82 :rem 248
1066 DATA 66,79,68,73,83,75 :rem 78
1072 DATA 32,65,67,84,73,86 :rem 65
1078 DATA 65,84,69,68,13,0 :rem 14
1084 DATA 133,147,165,147,208,30 :rem 43
1090 DATA 160,0,177,187,201,36 :rem 194
1096 DATA 240,22,162,16,169,160 :rem 247
1102 DATA 157,148,-4,202,16,250 :rem 231
1108 DATA 177,187,153,148,-4,200 :rem 40
1114 DATA 196,183,144,246,176,5 :rem 1
1120 DATA 165,147,76,73,245,160 :rem 251
1126 DATA 0,185,138,-1,240,30 :rem 129
1132 DATA 32,66,231,200,208,245 :rem 235
1138 DATA 13,84,85,82,66,79 :rem 70
1144 DATA 76,79,65,68,73,78 :rem 79

```

```

1150 DATA 71,46,46,46,13,0 :rem 247
1156 DATA 77,45,87,0,0,32 :rem 206
1162 DATA 169,16,133,255,169,0 :rem 202
1168 DATA 133,251,169,-3,133,252 :rem 37
1174 DATA 169,0,133,253,169,5 :rem 153
1180 DATA 133,254,165,186,32,177 :rem 49
1186 DATA 255,169,111,32,147,255 :rem 50
1192 DATA 165,253,164,254,141,159 :rem 100
1198 DATA -1,140,160,-1,160,0 :rem 120
1204 DATA 185,156,-1,32,168,255 :rem 245
1210 DATA 200,192,6,208,245,160 :rem 234
1216 DATA 0,177,251,32,168,255 :rem 199
1222 DATA 200,192,32,144,246,165 :rem 33
1228 DATA 251,105,31,133,251,165 :rem 32
1234 DATA 252,105,0,133,252,165 :rem 235
1240 DATA 253,105,32,133,253,165 :rem 31
1246 DATA 254,105,0,133,254,32 :rem 187
1252 DATA 174,255,198,255,208,180 :rem 105
1258 DATA 165,186,32,177,255,169 :rem 65
1264 DATA 111,32,147,255,169,85 :rem 0
1270 DATA 32,168,255,169,67,32 :rem 210
1276 DATA 168,255,32,174,255,120 :rem 49
1282 DATA 32,137,-2,44,0,-5 :rem 28
1288 DATA 48,69,164,195,166,196 :rem 27
1294 DATA 165,185,240,6,172,2 :rem 152
1300 DATA -5,174,3,-5,132,174 :rem 127
1306 DATA 134,175,162,4,32,113 :rem 188
1312 DATA -2,32,137,-2,173,0 :rem 70
1318 DATA -5,48,41,240,6,32 :rem 39
1324 DATA 111,-2,24,144,240,162 :rem 224
1330 DATA 2,160,0,189,0,-5 :rem 234
1336 DATA 145,174,200,232,240,7 :rem 239
1342 DATA 236,1,-5,144,242,240 :rem 181
1348 DATA 240,32,124,-2,24,166 :rem 186
1354 DATA 174,164,175,88,96,169 :rem 22
1360 DATA 4,44,169,0,56,176 :rem 53
1366 DATA 242,162,2,160,0,189 :rem 146
1372 DATA 0,-5,145,174,200,232 :rem 180
1378 DATA 208,247,24,152,101,174 :rem 44
1384 DATA 133,174,165,175,105,0 :rem 248
1390 DATA 133,175,96,160,0,169 :rem 205
1396 DATA 128,141,17,145,173,17 :rem 255
1402 DATA 145,41,2,240,249,169 :rem 195
1408 DATA 0,141,17,145,162,7 :rem 91
1414 DATA 202,234,208,252,162,4 :rem 237
1420 DATA 173,17,145,74,38,149 :rem 206
1426 DATA 74,38,149,234,234,202 :rem 253
1432 DATA 208,242,165,149,73,255 :rem 50
1438 DATA 153,0,-5,200,208,207 :rem 182
1444 DATA 96 :rem 86
1999 REM ** 1541 TURBODISK CODE :rem 177
2000 DATA 32,66,208,120,169,18 :rem 191
2006 DATA 160,1,141,0,3,140 :rem 20
2012 DATA 1,3,32,186,5,169 :rem 248
2018 DATA 3,133,60,162,0,134 :rem 82
2024 DATA 75,240,41,160,0,177 :rem 139
2030 DATA 59,201,130,208,25,200 :rem 227
2036 DATA 200,200,185,145,6,201 :rem 230
2042 DATA 42,240,61,201,63,240 :rem 179
2048 DATA 4,209,59,208,7,200 :rem 100
2054 DATA 192,18,240,48,208,234 :rem 251
2060 DATA 230,75,166,75,224,8 :rem 152
2066 DATA 240,7,189,98,5,133 :rem 112
2072 DATA 59,208,208,173,0,3 :rem 97
2078 DATA 240,6,172,1,3,76 :rem 254
2084 DATA 14,5,169,255,141,0 :rem 96
2090 DATA 3,32,133,5,88,76 :rem 2
2096 DATA 69,217,2,34,66,98 :rem 70
2102 DATA 130,162,194,226,230,59 :rem 35
2108 DATA 160,0,177,59,141,0 :rem 91
2114 DATA 3,200,177,59,141,1 :rem 87

```


2120 DATA 3,32,186,5,32,133	:rem 35	2270 DATA 56,197,71,240,4,169	:rem 159
2126 DATA 5,173,0,3,208,245	:rem 41	2276 DATA 34,208,20,32,233,245	:rem 194
2132 DATA 96,160,0,185,0,3	:rem 245	2282 DATA 197,58,240,4,169,35	:rem 164
2138 DATA 133,133,44,0,24,16	:rem 87	2288 DATA 208,9,169,236,141,12	:rem 209
2144 DATA 251,169,16,141,0,24	:rem 140	2294 DATA 28,96,24,105,24,133	:rem 153
2150 DATA 44,0,24,48,251,162	:rem 89	2300 DATA 68,169,255,141,0,3	:rem 94
2156 DATA 4,169,0,6,133,42	:rem 251	2306 DATA 32,133,5,165,68,76	:rem 105
2162 DATA 10,6,133,42,10,141	:rem 76	2312 DATA 200,193,32,64,6,76	:rem 95
2168 DATA 0,24,202,208,240,72	:rem 138	2318 DATA 124,6,165,18,133,22	:rem 145
2174 DATA 104,72,104,169,15,141	:rem 243	2324 DATA 165,19,133,23,165,6	:rem 149
2180 DATA 0,24,200,208,206,96	:rem 138	2330 DATA 133,24,165,7,133,25	:rem 140
2186 DATA 172,1,3,132,7,173	:rem 45	2336 DATA 169,0,69,22,69,23	:rem 59
2192 DATA 0,3,197,6,8,133	:rem 205	2342 DATA 69,24,69,25,133,26	:rem 107
2198 DATA 6,40,240,16,169,176	:rem 159	2348 DATA 32,52,249,162,90,32	:rem 153
2204 DATA 133,0,88,36,0,48	:rem 250	2354 DATA 124,6,80,254,184,173	:rem 204
2210 DATA 252,120,165,0,201,1	:rem 119	2360 DATA 1,28,217,36,0,208	:rem 41
2216 DATA 208,78,169,238,141,12	:rem 0	2366 DATA 6,200,192,8,208,240	:rem 147
2222 DATA 28,169,6,133,50,169	:rem 154	2372 DATA 96,202,208,233,169,32	:rem 254
2228 DATA 0,133,51,133,48,169	:rem 148	2378 DATA 208,175,169,208,141,5	:rem 6
2234 DATA 3,133,49,32,58,6	:rem 0	2384 DATA 24,169,33,44,5,24	:rem 54
2240 DATA 80,254,184,173,1,28	:rem 148	2390 DATA 16,163,44,0,28,48	:rem 51
2246 DATA 153,0,3,200,208,244	:rem 134	2396 DATA 246,173,1,28,184,160	:rem 208
2252 DATA 160,186,80,254,184,173	:rem 50	2402 DATA 0,96,160,160,160,160	:rem 185
2258 DATA 1,28,153,0,1,200	:rem 238	2408 DATA 160,160,160,160,160,160	:rem 78
2264 DATA 208,244,32,224,248,165	:rem 47	2414 DATA 160,160,160,160,160,160	:rem 75

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Telecomputing To The Rescue

"I'm sorry, Mr. Levitan, your 7:45 flight to Las Vegas has been canceled."

Although I had arrived at the airport eager to take off for January's Consumer Electronics Show (CES as it is known in the trade), I was somewhat slow to reply. After standing in line at the ticket counter, I was too tired to respond with the appropriate level of indignation. All I could manage was a feeble "You've got to be kidding!"

"I wish I was, sir, but I'm afraid we couldn't muster a full crew for the flight. I'm sorry, but these things do happen once in a while."

I wearily resigned myself to a couple of hours hanging around Detroit Metro Airport and asked, "What time does the next direct flight leave?"

The countenance of what had seemed like a mild-mannered airline employee began to take on sinister undertones.

"I'm afraid that everything we have is booked," he said. "We can't confirm you all the way into Las Vegas at this time."

A note of hysteria crept into my voice. "Listen, I'll fly the plane. Honest, I do it all the time on weekends. My best friend owns a 747 and I'm qualified on everything up to the Space Shuttle."

Ignoring my generous offer to help the airline and the other 240 stranded travelers out of an unfortunate predicament, the agent's eyes started burning with nefarious fire as he chortled, "We'll fly you into Chicago on a flight leaving here in about three hours. From there we'll have to wait-list you on the only two flights we have from O'Hare to Las Vegas . . ."

I staggered backwards as if hit by a sharp blow to the solar plexus. In a momentary hallucination, I saw myself as the Lost Air Traveler, doomed to roam the corridors of O'Hare with a flight bag hanging 'round my neck.

Wait a minute! My flight bag had the answer. I raced over to a nearby pay phone and whipped out my trusty lap computer and the

acoustic cups necessary to hook the unit's built-in modem to the nonmodular handset. I must have looked like a novelty juggling act as I attempted to keep all of my equipment from crashing to the floor. I dialed into the local number for one of the information services that I subscribe to and hooked into the electronic edition of OAG, the Official Airlines Guide (for more info on OAG see "Telecomputing Today," COMPUTE!, February 1985). In about two minutes I had the flight numbers and airlines for five other flights out of Detroit to Las Vegas. Disconnecting my computer from the phone, I started calling the airlines. On my second call I hit pay dirt—an opening on a flight to Phoenix, Arizona, connecting with a commuter flight to Las Vegas.

Armed with my new flight information, I boldly swaggered back to my nemesis's ticket position. "You may not be able to get me where I'm going, but another airline can. Just issue me an interrupted flight voucher for my canceled flight and I'll be on my way." Sheepishly, the agent completed the necessary paperwork. As I walked away to catch my new flight I glanced back over my shoulder in time to see a mass of angry ex-fellow passengers descending upon my defeated adversary.

New Lower-Priced Modems

So I finally did make it to the Winter CES and I return bearing glad tidings. This year will see the end of the Hayes price umbrella which has helped keep prices of intelligent 300 and 1200 bits-per-second (bps) modems rather high for the last 12 months or so.

Now, don't get me wrong—Hayes modems represented good value for the money at the time of their introduction. But recent developments in chip technology have made it possible to drastically reduce the number of components and amount of support circuitry required for modems. The problem is that modem manufacturers have tended to price their goods based more upon the going rate for market-leading Hayes modems than upon the actual manufacturing cost. With

COMPUTE! Back Issues

Here are some of the applications, tutorials, and games from available back issues of COMPUTE!. Each issue contains much, much more than there's space here to list, but here are some highlights:

Home and Educational COMPUTING! (Summer 1981 and Fall 1981—count as one back issue): Exploring The Rainbow Machine, VIC As Super Calculator, Custom Characters On The VIC, Alternative Screens, Automatic VIC Line Numbers, Using The Joystick (Spacewar Game), Fast VIC Tape Locator, Window, VIC Memory Map.

May 1981: Named GOSUB/GOTO in Applesoft, Generating Lower Case Text on Apple II, Copy Atari Screens to the Printer, Disk Directory Printer for Atari, Realtime Clock on Atari, PET BASIC Delete Utility, PET Calculated Bar Graphs, Running 40 Column Programs on a CBM 8032, A Fast Visible Memory Dump, Cassette Filing System, Getting To A Machine Language Program, Epidemic Simulation.

June 1981: Computer Using Educators (CUE) on Software Pricing, Apple II Hires Character Generator, Ever Expanding Apple Power, Color Burst for Atari, Mixing Atari Graphics Modes 0 and 8, Relocating PET BASIC Programs, An Assembler In BASIC for PET, Quadra PET: Multitasking?, Mapping Unknown Machine Language, RAM/ROM Memory, Keeping TABs on a Printer.

July 1981: Home Heating and Cooling, Animating Integer BASIC Lores Graphics, The Apple Hires Shape Writer, Adding a Voice Track to Atari Programs, Machine Language Atari Joystick Driver, Four Screen Utilities for the PET, Saving Machine Language Programs on PET Tape Headers, Commodore ROM Systems, Using TAB, SPC, And LEN.

August 1981: Minimize Code and Maximize Speed, Apple Disk Motor Control, A Cassette Tape Monitor for the Apple, Easy Reading of the Atari Joystick, Blockade Game for the Atari, Atari Sound Utility, The CBM "Fat 40," Keyword for PET, CBM/PET Loading, Chaining, and Overlaying, Adding A Programmable Sound Generator, Converting PET BASIC Programs To ASCII Files.

October 1981: Automatic DATA Statements for CBM and Atari, VIC News, Undeletable Lines on Apple, PET, and VIC; Budgeting on the Apple, Atari Cassette Boot-tapes, Atari Variable Name Utility, Atari Program Library, Train Your PET to Run VIC Programs, Interface a BSR Remote Control System to PET, A General Purpose BCD to Binary Routine, Converting to Fat-40 PET.

December 1981: Saving Fuel \$\$ (multiple computers), Unscramble Game (multiple computers), Maze Generator (multiple computers), Animating Applesoft Graphics, A Simple Atari Word Processor, Adding High Speed Vertical Positioning to Atari P/M Graphics, OSI Supercursor, A Look At SuperPET, Supermon for PET/CBM, PET Mine Maze Game, Replacing The INPUT # Command, Foreign Language Text on The Commodore Printer, File Recovery.

January 1982: Invest (multiple computers), Developing a Business Algorithm (multiple computers), Apple Addresses, Lowercase with Unmodified Apple, Cryptogram Game for Atari, Superfont: Design Special Character Sets on Atari, PET Repairs for the Amateur, Micromon for PET, Self-modifying Programs in PET BASIC, Tinymon: A VIC Monitor, VIC Color Tips, VIC Memory Map, ZAP: A VIC Game.

May 1982: VIC Meteor Maze Game, Atari Disk Drive Speed Check,

Modifying Apple's Floating Point BASIC, Fast Sort For PET/CBM, Extra Atari Colors Through Artifacts, Life Insurance Estimator (multiple computers), PET Screen Input, Getting The Most Out Of VIC's 5000 Bytes.

August 1982: The New Wave Of Personal Computers, Household Budget Manager (multiple computers), Word Games (multiple computers), Color Computer Home Energy Monitor, A VIC Light Pen For Under \$10, Guess That Animal (multiple computers), PET/CBM Inner BASIC, VIC Communications, Keyprint Compendium, Animation With Atari, VIC Curiosities, Atari Substring Search, PET and VIC Electric Eraser.

September 1982: Apple and Atari and the Sounds of TRON, Commodore Automatic Disk Boot, VIC Joysticks, Three Atari GTIA Articles, Commodore Disk Fixes, The Apple PILOT Language, Sprites and Sound on the Commodore 64, Peripheral Vision Exerciser (multiple computers), Banish INPUT Statements (multiple computers), Charades (multiple computers), PET Pointer Sort, VIC Pause, Mapping Machine Language, Commodore User-defined Functions Defined, A VIC Bug.

January 1983: Sound Synthesis And The Personal Computer, Juggler And Thunderbird Games (multiple computers), Music And Sound Programs (multiple computers), Writing Transportable BASIC, Home Energy Calculator (multiple computers), All About Commodore WAIT, Supermon 64, Perfect Commodore INPUTs, VIC Sound Generator, Copy VIC Disk Files, Commodore 64 Architecture.

May 1983: The New Low-Cost Printer/Plotters, Jumping Jack (multiple computers), Deflector (multiple computers), VIC Kaleidoscope, Graphics on the Sinclair/Timex,

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Bootmaker For VIC, PET and 64, VICSTATION: A "Paperless Office," The Atari Musician, Puzzle Generator (multiple computers), Instant 64 Art, 64 Odds And Ends, Versatile VIC Data Acquisition, POP For Commodore.

June 1983: How To Buy The Right Printer, The New, Low-Cost Printers, Astrostorm (multiple computers), The Hawkmen Of Dindrin (multiple computers), MusicMaster For The Commodore 64, Commodore Data Searcher, Atari Player/Missile Graphics Simplified, VIC Power Spirals, UNNEW For The VIC and 64, Atari Fast Shuffle, VIC Contractor, Commodore Supermon Q & A.

July 1983: Constructing The Ideal Computer Game, Techniques For Writing Your Own Adventure Game, SpeedSki And Time Bomb (VIC), Castle Quest And Roadblock (Atari), RATS! And Goblin (64), How To Create A Data Filing System (multiple computers), How To Back Up Disks For VIC And 64, Atari Artifacts, All About The Commodore USSR Command, TI Mailing List.

August 1983: Weather Forecaster (multiple computers), First Math And Clues (multiple computers), Converting VIC And 64 Programs To PET, Atari Verify, Apple Bytechanger, VIC And 64 Escape Key, Banish Atari INPUT Statements, Mixing Graphics Modes On The 64, VICplot, VIC/64 Translations: Reading The Keyboard, Musical Atari Keyboard, VIC Display Messages.

September 1983: Games That Teach, Caves Of Ice, Diamond Drop, Mystery Spell, and Dots (multiple computers), VIC Pilot, Ultrasort (VIC, 64, PET), Easy Atari Page Flipping, Computer Aided Design On The TI, Relative Files On the VIC/64, Atari Fontbyter, TI

Sprite Editor, All About Interrupts (multiple computers), Cracking The 64 Kernal, Making Change On The Timex/Sinclair, Build Your Own Random File Manager (multiple computers).

October 1983: Computer Games By Phone, Coupon File (multiple computers), Dragon Master And Moving Maze (multiple computers), Merging Programs From Commodore Disks, Atari Master Disk Directory, Sprites In TI Extended BASIC, Commodore EXEC, Multi-color Atari Character Editor, High Speed Commodore Mazer, Apple Sounds, Extra Instructions (multiple computers), Commodore DOS Wedges, Invisible Disk Directory For VIC And 64.

February 1984: What Makes A Good Game, Circus (multiple computers), Quatrainment (multiple computers), Commodore 3-D Drawing Master (Apple version also included), Speedy BASIC For VIC And 64, Dr. Video 64.

March 1984: All About Adding Peripherals, Modern Memory: The Future Of Storage Devices, Roder (multiple computers), Barrier Battle (multiple computers), Programming The TI: File Processing, Sound Shaper (multiple computers), Commodore Floating Subroutines, Big Buffer For Atari.

April 1984: Apple's Macintosh Unveiled, Securities Analysis (multiple computers), Worm Of Bemer (multiple computers), Programming The TI: File Processing, Part 2, 1540/1541 Disk Housekeeping, Hidden Atari DOS Commands, Function Keys For The Apple, TI Tricks And Tips, Super Directory (multiple computers).

May 1984: The Digital Palette: Fundamentals Of Computer Graphics, The Inside Story: How Graphics

Tablets And Light Pens Work, Picture Perfect For Atari And Commodore 64, 64 Hi-Res Graphics Editor, Snertle (multiple computers), Pentominos: A Puzzle-Solving Program (multiple computers), A BASIC Cross-Reference (PET, 64).

June 1984: Choosing The Right Printer: The Easy Way To Hard Copy, Pests (multiple computers), Olympiad (multiple computers), Programming The TI: TI Graphics, MacroDOS For Atari, Part 1, Apple Variable Save, Programming 64 Sound, Part 1, Apple Input And Menu Screens.

July 1984: Evolutionary To The Core: The Apple IIc Heads For Home, The ABC's Of Data Bases, Statistics For Nonstatisticians (multiple computers), Bunny Hop (multiple computers), Blueberries (multiple computers), Atari Artist, Applesoft Lister, Program Conversion With Sinclair BASIC And TI BASIC, Commodore 64 ROM Generations.

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the introduction in 1985 of mass-produced low chip-count modems from companies like Panasonic, Atari, and Commodore, telecomputing at 300 and 1200 bps speeds will be more affordable than ever before.

Consider Panasonic's new line of modems. Models KX-D401 and KX-D402 are 300 bps and 300/1200 bps units, respectively. Both have originate, answer, and autoanswer modes with LED indicators for data, carrier detect, autoanswer, and power. Prices? The KX-D401 retails for \$99.95, the KX-D402 for \$299.95.

How about a Panasonic phone with built-in modem? The KX-D4130 has all the features of the KX-D401 modem and sports a 24-button automatic dialer that can store up to 30 digits per number. An auto-redial function will redial busy numbers 15 times every ten minutes.

The icing on the cake is an integral hands-free speakerphone with excellent audio clarity. At \$199.95, the KX-D4130 is sure to be a favorite of gadget-happy telecomputing aficionados. All of the new Panasonics can be used with any computer equipped with an RS-232 interface.

Atari & Commodore Surprises

The price of telecomputing on Atari systems takes a dive with the introduction of the Atari XM-301 300 bps direct-connect modem. At \$49.95 it's one of the least expensive autoanswer, autodial modems around. Since the compact unit draws its power from the Atari serial bus connector, no separate power supply is required. Also announced at CES was a new telecomputing software cartridge dubbed *The Learning Phone*, which will allow Atari systems equipped with modems to access Control Data Corporation's vaunted PLATO educational system, complete with high-resolution graphics. Estimated price of the new cartridge is in the \$30-\$40 range.

Micro Peripheral Products of Albany, Oregon, announced a price cut of \$50 on its Model 1000C modem for Atari computers (now \$149.95) and introduced the MPP 1064, a new direct-connect modem for the Commodore 64. The price is \$99.95, which includes a sophisticated smart terminal program.

Commodore's new palm-sized 1660 Modem 300 is a direct-connect 300 bps unit with autoanswer, autodial, and a built-in speaker for monitoring the progress of calls. The 1660 plugs directly into the user ports of the Commodore 64, Plus/4, or new Commodore 128 computer. At only \$29.95, it will hardly make a dent in even the most frugal Commodore owner's pocket.

If that pricing doesn't seem predatory, consider the Commodore 1670 Modem/1200, a 1200 bps twin to the 1660. Slated for introduction

three months or so after the introduction of its little brother, the 1670 is likely to set the modem market on its ear. I was able to inspect the innards of the 1670 at an after-hours conclave during CES and counted only three chips and a couple dozen small resistors on the modem's 2 × 4-inch circuit board. The low component count should contribute to relatively high reliability. The board and chips still bore the markings of the manufacturer which designed the unit—U.S. Robotics, an experienced and well-respected vendor of telecomputing products. Commodore will manufacture both the 1660 and 1670 internally to keep costs down.

The price? If only one mildly euphoric Commodore employee had mentioned a number below \$100, I might have dismissed it out of hand. To my surprise, the figure was seconded by another source the following day. Looks like Commodore owners may have the telecomputing bargain of the year on their hands by summer's end!

And More Good News

Commodore's new 32K LCD lap computer was the hit of the show for most journalists already accustomed to lugging around TRS-80 Model 100s or Olivetti M10s. The modem-equipped Commodore's 80-column by 16-line screen is the fastest and most legible LCD screen I've seen to date. Priced at \$600 or less, the Commodore lap portable may cause Tandy to rethink the thousand-dollar price of its new 24K Model 200 lap computer, whose 40 × 16 LCD screen pales in comparison.

Racing to beat the band, General Videotex Corporation announced at CES that its Delphi information service now supports high-speed 2400 bps access in 34 major cities. The additional cost to Delphi subscribers for the higher access rate is a \$5/hour surcharge over the normal Delphi rates of \$16/hour during business hours and \$6/hour nonprime time for both 300 and 1200 bps access. Watch for the previously low-key service to start making noises like a contender—new personnel that GVC has picked up in raids on CompuServe's staff will begin making major changes in the services offered.

Enough news for now. Next month we'll cover the ins and outs of transferring information to and from a remote computer with your own system. Stay tuned for chapter 1 of the "Compleat Uploader & Downloader."

Till then, BCNU.

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