Apple's Macintosh Unveiled



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The Leading Magazine Of Home, Educational, And Recreational Computing

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F	ATURES	
34 44	The Shakeout Begins: A Watershed Winter CES How COMPUTE! Readers Use Personal Computers In Their Businesses Apple's Macintosh Unveiled Securities Analysis	Bernie Ghiselin Fred D'Ignazio
E	DUCATION AND RECREATION	
74	Worm Of Bemer	Stephen D. Fultz

REVIEWS

99	B.C.'s Quest For Tires	James V. Trunzo
100	Radiotap	Dan Carmichael

COLUMNS AND DEPARTMENTS

The Editor's Notes
Computers And Society: Beyond BASIC David D. Thornburg
The Beginner's Page: Size, Speed, Or ClarityRichard Mansfield
On The Road With Fred D'Ignazio:
Grandmother Goes To Computer Camp, Part 2 Fred D'Ignazio
Readers' Feedback
Machine Language: A Program Critique, Part 1 Jim Butterfield
64 Explorer Larry Isaacs
INSIGHT: Atari
Programming The TI: File Processing, Part 2

THE JOURNAL

140	1540/1541 Disk Housekeeping	Michael Majone
143	Hidden Atari DOS Commands	
	Function Keys For The Apple	
147	Variable Lister	Kenneth D. Day
152	Qwikload/Save For VIC And 64	Richard L. Witkover
154	VIC/64 Screenprint	Frank C. Gutowski
157	Advanced Disk Logging On The 64	Jim Butterfield
159	Complex Disk Copies For The 64	Jim Butterfield
161	Atari Display List Interrupts	Karl E. Wiegers
165	TI Tricks And Tips	Michael A. Covington
167	Commodore Disk Datamaker	Eric Brandon
170	Super Directory	Michael Contino

- 138 The Automatic Proofreader For VIC, 64, And Atari
- 179 A Beginner's Guide To Typing In Programs 180 How To Type COMPUTE!'s Programs
- 180 How To Type COMPUTE!'s Programs 181 CAPUTE! Modifications Or Correction
- 181 CAPUTE! Modifications Or Corrections To Previous Articles
- 182 News & Products 191 Product Mart
- 192 Advertisers Index

NOTE: See page 180 before typing in programs. GUIDE TO ARTICLES AP 64/V/AT/PC/PCir V/64/TI/PC/PCir AP/AT/64/AD V/64 64 AT TI V/64 AT AP V/64/AT V/64 V/64 64 64 AT TI PN/64 64/P/V/AT/PC/PCjr

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EDITOR'S NOTES

Richard Mansfield, senior editor of COMPUTE!, has some reservations about the nearly unanimous praise which has greeted the introduction of Apple's new Macintosh computer. This month, I'm turning over this space to him for a guest editorial.

Robert Lock Editor In Chief

In the brouhaha surrounding the introduction of Apple's new Macintosh, little has been said about the most shocking thing about this "new generation" computer—it doesn't include a language. You can't program it. There's no BASIC inside. BASIC and other programming languages will be available later, but the essence of this machine, its spirit, is a rejection of programming itself.

In this respect, it's more like a streetcar than a passenger car. The places you can go with it are predetermined, tracks laid down in the pavement. For now, there are three destinations: word processing, spreadsheet analysis, and picture painting. Do you have something else in mind? You'll need to wait until the software is available and you'll need to buy another disk.

Expressions of doubt about this new machine have been few and faint. The media, aided by computer industry gurus, has sent up a nearly unanimous cry of joy. It's been called the first true consumer computer, an appliance computer. It's been called the computer that's easiest to learn. Perhaps we could raise a few questions, just a brief pause for reflection. What is the spirit of Macintosh? To find out, let's look at what happens when you turn it on. A picture of a diskette appears on screen with an arrow pointing at it. Unlike other computers which might print "INSERT DISK" on screen (or not print anything, expecting you to remember to insert a disk), Macintosh's message is easy to understand. You don't need to know how to read.

Next, you insert the disk and the disk drive activates itself. Until now, you had to be able to type in something like "LOAD" to pull the software in from the disk. Macintosh does that for you. You don't need to know how to type.

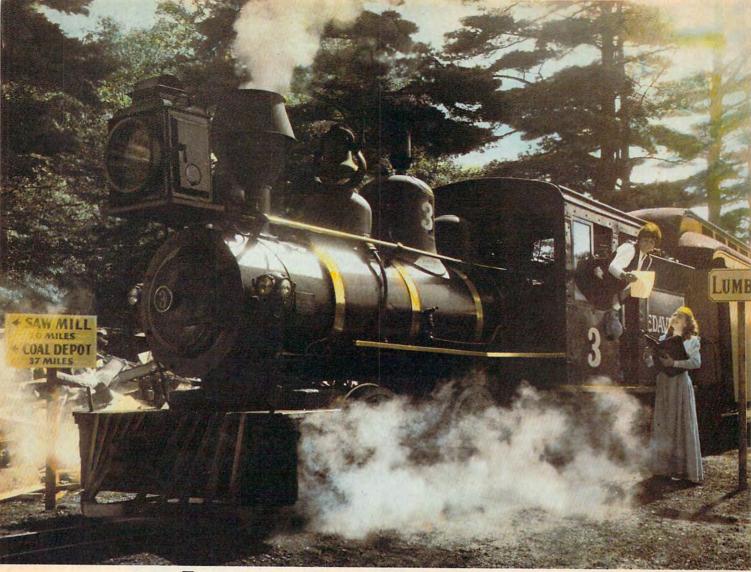
From here on it gets a bit more challenging—you have to be able to point the screen arrow to a picture and press a button. This is not done from the keyboard, however. Attached to the computer is a "mouse," a little rolling device that moves the arrow around the screen as you push the mouse around a table. On top of the mouse is the button you press when the arrow is on the picture you want.

You might have a screen with a picture of a hand holding a pen, a hand painting, a file folder, a memo pad—whatever symbols represent different software on the disk. If you select, say, the hand holding the pen, a new set of picture choices appears and you're well on your way. You're setting things up to begin word processing, to begin writing something. At this point, though, you'll have to abandon the mouse and start typing your own words.

Clearly, there are always tradeoffs between convenience and freedom, between what's easy to learn and what's versatile in use. Some people will opt for the former, arguing that computing isn't very interesting, they're not going to be using a computer that often, and whenever they do use it they want it to be convenient and simple. That's their right, of course. I feel the same way about telephones. I don't like using them. I wouldn't want one that could remember 50 numbers, could record messages, or could locate me anywhere in the city and set off an alarm hanging on my belt.

I want to dial, communicate a message, and get on with my life. For people who feel this way about computers, a taskoriented, prepackaged software machine like the Macintosh is ideal. Mouse, little pictures, and all.

But if you like computing, if you find it challenging and creative to work with programs, all the menus within menus and the mousing will just get in the way. The first few times, it will be easier to get into the word processing mode by the see-itpoint-at-it method. However, I suspect all this could become rather tiresome rather quickly.



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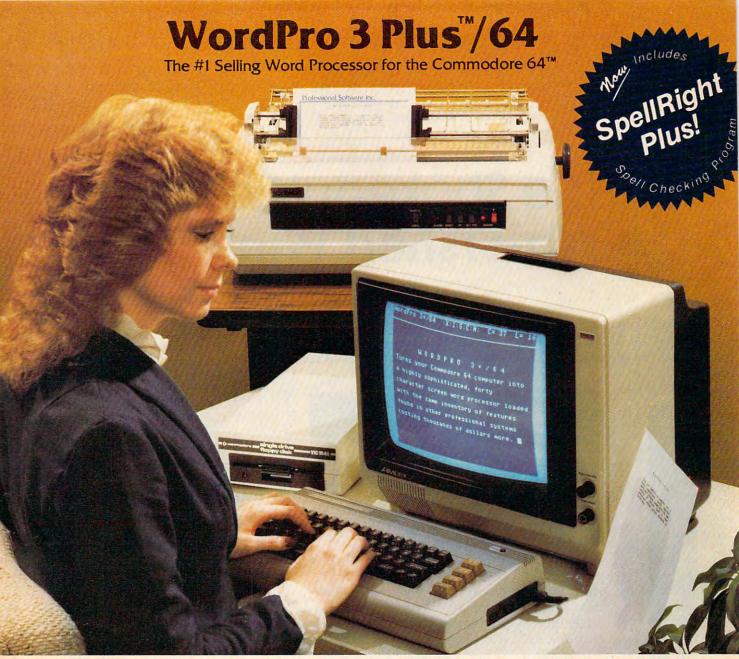
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The Shakeout Begins: A Watershed Winter CES

Tom R Halfhill, Features Editor

BULLETIN:

Commodore's New Computers In Doubt

After this CES report was written, Commodore's top management underwent a radical shake-up which casts doubt on the new products announced at CES.

In a surprise move, Commodore founder Jack Tramiel resigned as president and chief executive officer. Two weeks later, four more top executives resigned. Commodore is now reorganizing its entire management structure.

As a result, the new Commodore 264 computer is being delayed indefinitely. General Manager Sol Davidson told *The Wall Street Journal* that Commodore is reexamining the computer and will introduce it "when there's a need for it...[the 264] could come before the end of 1984, we'll just have to watch carefully." Davidson also was quoted as saying, "I think our zeal [in announcing the computer] was greater than our determination in [bringing it to] the marketplace." At this year's Winter Consumer Electronics Show, held in January in Las Vegas, there was more of almost everything—more attendees (an estimated 90,000), more reporters, more buildings, more exhibits, more aisles, more video, more audio, more computer-related products. But for the first time, there were not more home computers.

No doubt about it—the personal computer industry speeds through life in the fast lane. Evolutionary changes which would take years or even decades to develop in other industries transform the personal computer industry in months. The sides of the computer turnpike are littered with stalled and broken-down companies which ran out of gas or couldn't afford the tolls. And in the face of fierce competitive realities, the laid-back camaraderie which once symbolized the jeans-clad hobby industry is rapidly becoming excess baggage, something to be flung out the window to reduce weight.

All of this was visible at the most recent Consumer Electronics Show.

CES is a great place for industry-watchers. For one thing, it's the biggest trade show

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In systems equipped with a diskette drive, there's a program that lets you explore computer fundamentals at your own pace, with PCjr as your teacher.

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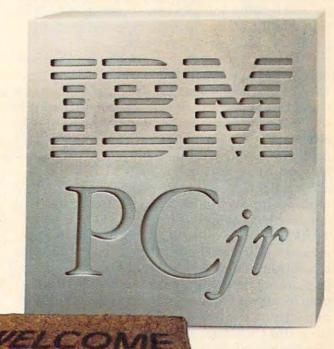
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in the world, a fantastic extravaganza for anyone who is into gadgets. It's the show where consumer electronics manufacturers gather en masse twice a year (Las Vegas in January and Chicago in June) to exhibit their newest wares.

Despite the show's name, consumers are barred. The 80,000–90,000 attendees are all exhibitors, dealers, celebrities, or journalists. Exhibitors come to entice dealers. Celebrities come at the expense of exhibitors to help lure the dealers and journalists. And journalists come to interview exhibitors and skip from press party to press party hosted by celebrities.

Besides all that, for industry observers and journalists CES is also a crystal ball. Sometimes a cloudy crystal ball, but nonetheless invaluable for divining the near future. It's like peering into the windows of the cars flashing by on the computer turnpike. This year's Winter CES was an indication that the heavy traffic building up for the last couple of shows is turning into a demolition derby.

Computer Wars Among The Wares

Most noticeable was the glaring lack of new home computers introduced. This was a significant change from the Summer CES, where no less than 17 new computers were on display (see "The Fall Computer Collection At The Summer Consumer Electronics Show," COMPUTE!, August 1983). In fact, a few companies which introduced new machines at the Summer CES were emptyhanded at the Winter CES, having decided to cut their losses early and abandon the market. Other companies were absent altogether. This doesn't mean that home computing is fizzling out. Sales are still healthy and growing. Instead, it's a sure sign that the market is tightening and the longpredicted "shakeout" has begun.

The big news at the latest CES was Commodore, which attracted the most attention by far with its new 264/364 series. The large Commodore exhibit was crowded all four days of the show.

But aside from Commodore, almost nobody else was displaying new home computers. A newly formed British company had a few prototypes. Atari was there with its XL series announced at the Summer CES-minus the now officially canceled 1400XL, and with vague speculations concerning the future of the top-line 1450XLD. Apple was at CES for the first time in about three years-minus its new computer, the Macintosh, which Apple preferred to introduce at its stockholders meeting later in January. IBMwhich created a stir when it exhibited at the Summer CES for the first time in history-didn't show up at this CES at all. Instead, IBM preferred to display its new PCjr at the Comdex trade show a month earlier in Las Vegas. Texas Instruments was stuck with a large exhibit at CES, reserved

long before the TI-99/4A was dropped. Not a single TI-99/4A was in evidence, and the TI booth looked forlornly deserted since it just happened to be directly across the aisle from the busy Commodore exhibit.

Another odd juxtaposition of booths in the Convention Center revealed just how fierce the competition is getting. Coleco's large exhibit, humming with activity around dozens of Adams and ColecoVisions, happened to face the Spectra-Video exhibit right across the aisle. SpectraVideo has been at the last couple of CES shows with its heavily advertised but unavailable SV-318 and SV-328 computers. At this CES, SpectraVideo said the SV-318 has been dropped in favor of an upgraded SV-328 Mark II and a new model, the SVI-728 MSX. To promote its new computersand, one suspects, to wage psychological warfare against the Coleco representatives across the aisle—SpectraVideo continuously staged a little presentation during the show.

The woman conducting the presentation compared the SpectraVideo computers against the Commodore 64 and especially the Coleco Adam. At one point, she prepared to demonstrate how much louder the Adam's (letter-quality) printer is than the SpectraVideo's (dot-matrix) printer. "But first," she smiled, "union rules require that I wear these." Then she donned a pair of industrial-duty ear protectors.

Later in the presentation, when asserting that the SpectraVideo is a better buy than the Adam, she asked rhetorically, "Just how much of a Coleco Adam could you buy for the price of a SpectraVideo? Let's find out." Then she switched on a screaming circular saw and disappeared for a few seconds behind a counter. She emerged holding an Adam presawed in half, spilling out chips and wires. Finally she dropped the mangled computer into a large trash can while the sound of a flushing toilet echoed through a PA system aimed at the Coleco booth.

Meanwhile, the Coleco people tried their best to ignore the psychological attack. "The first day of the show, they were using an actual toilet instead of a trash can," said Coleco press representative Barbara Wruck, "but the show management made them take it down."

Somehow this typifies what a dog-eat-dog battle for survival the home computer market has become.

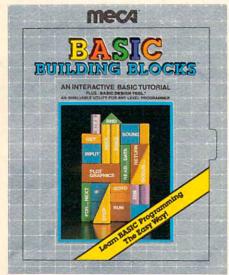
Commodore's Built-In Software

Yet this CES clearly belonged to Commodore. The company announced a new series of personal computers accompanied by a line of peripherals, plus more software for all its machines.

To set the record straight, Commodore flatly denied rumors that it plans to drop the VIC-20

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and Commodore 64 to make room for the new products. Commodore officials said it would be crazy to discontinue the 64 at a time when sales are booming, and that the VIC—whose sales are slackening—will be carried as long as demand warrants. Although some trade papers have been predicting the quick demise of the VIC, its life may have been prolonged by recent changes in the low-end market. Now that Atari has dropped the 400 and Texas Instruments has left the market work like this: When you buy a 264 or 364V, you get to choose from a selection of application software on ROM chips. If you want a computer with a built-in word processor, for example, the dealer either sells you one with that option already installed or plugs in the proper chip himself. The chips are internal and not designed to be installed by average users. It's like ordering a car with various options.

et When you first switch on a 264 or 364V, a message at the top of the scr talls what type of software is



The Commodore 264. Note the unusual arrow-shaped cursor keys. The Commodore 364V is similar, but has a numeric keypad to the right of the keyboard.

altogether, the VIC is the only widely available home computer for under \$100 (except for the small Timex/Sinclair TS-1000 and Radio Shack Micro Color Computer).

Two new computers head up Commodore's latest product line: the Commodore 264 and the Commodore 364V. No prices were announced, but Commodore says the 264 will retail for under \$500 and the 364V for slightly more. Commodore says the 264 will be available by April 1 and the 364V a few months later, but based on past experience, these target dates may well be optimistic. We were told privately that most likely the 264 will hit the stores in quantity this summer (see box).

The new computers' main features over current machines include built-in application software, more usable memory, and a more powerful BASIC. The 264 and 364V are almost identical except the 364V has a numeric keypad and built-in speech synthesizer. New peripherals include a faster, parallel disk drive, a redesigned serial disk drive, a redesigned color monitor, a plug-in speech module, a daisy wheel printer, an inexpensive dot-matrix printer, and a color dot-matrix printer. Most of these peripherals will work with the Commodore 64 and VIC-20 as well.

The most significant new feature is probably the built-in software. Commodore says it will 16 **COMPUTE**! April 1984 message at the top of the screen tells what type of software is installed. You can run this program at the touch of a key. In effect, it's a permanently plugged-in ROM cartridge. There's still a cartridge slot behind the computer if you want to plug in something else. And, of course, you can always load in programs from disk or tape as usual. The built-in software does not interfere with anything or deprive other applications of memory.

The selection of ROM software will be limited to whatever Commodore offers. At CES, various prototype 264s were running *SuperScript 264*, a word processor; *EasyCalc 264*, an elec-

tronic spreadsheet; *Commodore 3-Plus-1*, an integrated package which includes a word processor, file manager, spreadsheet, and business graphics; Logo; PILOT; and *Magic Desk II*, an integrated package with Lisa-like icons, a text editor, spreadsheet, file manager, and calculator. One 264 was even running an educational game. All of these programs will be available on cartridge as well as installed ROM chips.

A Step Sideways?

Although Commodore's new computers were generally well-received at CES, there were some questions raised about software compatibility and how the 264/364V will fit into Commodore's existing product line. Compared to the Commodore 64, they offer intriguing new features, but they're also missing a few. If, as expected, the 264 and 364V retail in the \$400–\$600 range, more than one observer noted that it may be advantageous to buy a 64 and upgrade it instead. But as usual, there will be tradeoffs involved both ways.

The Commodore 264 has 64K RAM (Random Access Memory); 32K ROM (Read Only Memory); a 40-column by 25-line screen display in text mode; a high-resolution graphics mode of 320 by 200 screen dots; 128 colors; a 67-key full-stroke keyboard; four programmed (and reprogrammable)

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Notice the similarities to and differences from the Commodore 64. Both have 64K RAM, 40x25 text modes, 320x200 graphics modes, PET graphics characters, and four function keys. But while the 64 leaves only about 39K out of 64K free for BASIC programming, the 264/364V leaves a whopping 60K. This was accomplished by a more advanced system of bank-selection (sharing memory in the same address space).

The Commodore 64 is limited to 16 colors, while the 264/364V have 128 colors. This is because each of the 264/364V's 16 standard colors has eight luminances (shades). This is very much like the color graphics on Atari computers. Early Ataris also had 128 colors (16 colors x 8 luminances), and current Ataris have 256 colors (16 colors x 16 luminances).

The Commodore 64 and 264/364V each have four function keys, but the 264/364V's keys are more advanced. For one thing, they are preprogrammed. Frequently used commands such as LIST, RUN, LOAD, and SAVE are only a keystroke away. For another thing, the keys are easier to reprogram by average users. One line of BASIC does the trick.

Another welcome addition to the 264/364V keyboard is the four separate cursor keys. These arrow-shaped keys are conveniently arranged in a diamond pattern at the lower-right corner of the keyboard (see photo). There are also two CON-TROL keys. The extra one is where the RESTORE key used to be on the VIC and 64. However, this means the RUN/STOP–RESTORE combination to reset the computer no longer is available. There's a reset button on the right side of the 264/364V, next to the power switch, but it's a cold start reset—pressing it wipes out your BASIC program (not true of RUN/STOP–RESTORE).

You'll also notice that the 264/364V have a few other things missing, too, compared to the Commodore 64. There are no sprite graphics and no synthesizer chip. Two of the 64's strongest features are its multicolored sprites—which make computer animation a lot easier—and its SID chip (Sound Interface Device), the most advanced sound chip in any home computer. Instead of a SID, the 264/364V have a two-channel sound generator. This is similar to the VIC's sound generator, but with two channels instead of three.

More Powerful BASIC

Perhaps to make up for these drawbacks, the 264/ 18 COMPUTE: April 1984 364V have the most powerful version of BASIC ever built into a Commodore computer. Oddly, it's named BASIC 3.5. This would seem to imply that in terms of power it is halfway between the BASIC 2.0 (Upgrade BASIC) found in the VIC and 64 and the BASIC 4.0 found in the Commodore 8032 and SuperPET machines. Yet BASIC 3.5 includes the disk commands of 4.0 and adds dozens of other instructions.

We weren't able to get a list of all the new 3.5 commands by press time, but we did manage to ferret out most of them by exploring the ROMs with the 264/364V's built-in machine language monitor. Disk commands include DLOAD and DSAVE, DIRECTORY, HEADER, SCRATCH, COLLECT, COPY, RENAME, BACKUP, and DELETE. Sound and graphics commands include SOUND, VOL, RLUM, RDOT, GRAPHIC, PAINT, BOX, CIRCLE, GSHAPE, SSHAPE, DRAW, COLOR, SCNCLR, and SCALE. There's also a JOY command for the joysticks. Programmers will appreciate commands such as DEC and HEX\$ (for converting decimal and hexadecimal numbers), MONITOR (to enter the built-in machine language monitor), ERR\$ (read error message), TRAP (to divert the program to a specified line number on an error), TRON and TROFF (trace on/trace off for debugging), AUTO (auto line-numbering), LOCATE, HELP, DOLOOP, EXIT, WHILE-UNTIL, PRINT USING, and KEY (for reprogramming the function keys).

Most of the graphics commands are selfexplanatory. GRAPHIC instantly switches the screen into the specified graphics mode. SCNCLR clears the graphics screen. We aren't sure about GSHAPE, SSHAPE, and SCALE, but one Commodore representative mentioned something about shape tables for animation, so these commands may be a replacement of sorts for the missing sprites.

For Productivity-Minded Users

As you can see, the new computers do offer interesting features beyond those found in the Commodore 64. Commodore says the 264/364V will not be aimed at the same market as the 64, so the higher prices, missing sprites, and simple sound will not be a handicap. Commodore envisions the 264/364V as computers for "productivity-minded" users who prefer the convenience of built-in application software. They see the 64 as a generalpurpose home computer for entertainment as well as more practical applications. Yet the 264/ 364V's luxurious graphics commands suggest there may be some overlap in this area.

Critics of the new computers point out that you could put together the virtual equivalent of a 264 by starting with a Commodore 64 and adding the extra features. You could buy a 64 for under

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The two slide-out shelves put the keyboard at the proper operating height while allowing easy access to the disk drives. The bronze tempered glass door protecting the keyboard and disk drives simply lifts up and slides back out of the way during use.

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

Behind the lower door are a top shelf for paper, feeding the printer, and a bottom shelf to receive printer copy as well as additional storage. Stand fits same computers as the CS-1632 as well as the Apple I and II, IBM-PC, Franklin and many others.

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

 \$200, add a Simon's BASIC cartridge to get a similar array of advanced commands, and get one or more application programs on cartridge for \$100 or so. That way you'd have the sprites and SID chip, and if the 264 sells for \$400 to \$500, the 64 system might even be cheaper. Add a voice synthesizer, and the 64 system would resemble a 364V.

You still wouldn't have as much usable memory, however—remember the new computers leave 60K free for BASIC. Your programs wouldn't 60K free RAM in an eight-bit computer which also includes 32K ROM (normally eight-bit computers are limited to 64K total memory).

Commodore says its most popular software for the 64 will be converted to the 264/364V as soon as possible. Intermediate home programmers probably could convert many BASIC programs. Programs with extensive machine language probably will require the talents of advanced programmers.

be as transportable to other machines, because not every one would have Simon's BASIC. The application software on cartridge would be marginally less convenient than the new computer's built-in software. But otherwise, the beefed-up 64 system would be quite similar to the 264/364V. Which is the better buy? We cannot presume to know what's best for every user. As always, it depends on individual tradeoffs—like whether to buy a Commodore or an Atari versus a Coleco or a Radio Shack. The question will be resolved in the marketplace.



The sleek Elan Enterprise from Britain. Notice the built-in joystick. Two more sticks can also be plugged in.

Software Compatibility

There was some confusion at CES over how much Commodore 64 software will be compatible with the new 264/364V. Generally speaking, not much.

About the only programs that will work without modification are those written in straight BASIC without PEEKs or POKEs. BASIC 3.5 appears to be upward-compatible from BASIC 2.0, which means that BASIC programs written on a VIC or 64 might work on a 264/364V, but not necessarily vice versa. PEEKs and POKEs are important because they directly access memory, and the 264/364V's internal memory maps are not the same as those in the older computers. For instance, the cassette buffer in the new computers starts at address 819 instead of 828—a small difference, but one which could affect some programs using the buffer for storing machine language subroutines.

Because of the memory differences, nearly all machine language programs will have to be modified or rewritten (which includes the vast majority of commercial software). Fortunately, at least the machine language itself is compatible. Don't let the 7501 CPU chip in the 264/364V throw you; it's still fundamentally identical to the 6502/6510 chips in the VIC and 64. The instruction set is the same. The differences are in the hardware. The 7501 has extra lines to control a more advanced bankselection system. This makes it possible to have 20 **COMPUTE**! April 1984

Superfast New Commodore Disk

Commodore also announced a complete line of charcoal gray peripherals designed to match the 264/364V. No prices or availability dates were released by press time. Most of these peripherals are also compatible with the VIC and 64.

One which isn't directly compatible is the SFS 481 parallel disk drive. This hooks up to the new computers via a rear parallel port and is markedly faster than the current 1541 serial disk drive. (Parallel peripherals are faster than serial devices because they exchange data with the computer in bundles of eight bits, rather than one bit at a time.) The SFS 481 stores up to 170K of data on one side of a 5¹/₄-inch floppy disk, a format compatible with the older 1541, 4040, and 2031 drives, as well as the new 1542 disk drive. Although there is no way to plug the SFS 481 into a VIC or 64, it's possible that an independent company could design an adapter.

The new 1542 drive is a slightly redesigned 1541. Colored charcoal gray to match the 264/364V, it works with the VIC and 64, too. Disks are compatible with the 1541, SFS 481, 4040, and 2031.

The DPS 1101 daisy wheel printer works at 18 characters per second, uses friction feed, is bidirectional, and has spacing modes of 10, 12, and 15 characters per inch, plus proportional. Although no price was released, it is expected to be relatively inexpensive for a daisy wheel printer

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(probably well under \$1000).

The MPS 802 dot-matrix printer uses an 8x8 matrix, has all the PET graphics characters, dotaddressable graphics, prints at 60 characters per second, and prints up to 80 columns. It is bidirectional and has tractor feed only.

The MCS 801 color dot-matrix printer can produce dot-addressable graphics in black, yellow, purple, cyan, green, red, and blue. It can reproduce all the PET graphics characters. It is unidirectional only, prints at 38 characters per second, and has both friction and tractor feed.

Commodore has redesigned its popular 1701/ 1702 color monitor, now called the 1703. Specifications are virtually identical: 13-inch screen; builtin speaker; audio/video inputs on the front; separate chrominance, luminance, and audio inputs on the rear; and compatibility with video cassette recorders.

Peripherals That Talk And Feel

One of the more interesting Commodore peripherals at CES was the C64850 Magic Voice Speech Module for the Commodore 64. It has a built-in vocabulary of 235 words, and more can be loaded from optional cartridges or disks. The voice is pleasant and female, a relief from the usual robotized computer voices. You can vary the voice's speed from .65 to 1.4 times normal. It is programmable in BASIC or machine language so you can write your own talking programs. The module plugs into the cartridge slot, and has an additional slot so you can piggyback a program cartridge at the same time. There's also an audio output jack so you can hook it up to a TV or sound system.

Since the voice module doesn't monopolize the 64's SID chip, you can program voice and music simultaneously. Talking can even be synchronized with graphics. A special line of software designed to work with the module is on its way, including talking versions of *Gorf*, *Wizard of Wor*, *A Bee C's*, and *Counting Bee*. The module will sell for only \$59.95.

Another fascinating peripheral is still on the drawing boards, but an experimental prototype was demonstrated at CES. It's a clear plastic touchsensitive mat that overlays your TV or monitor screen. When perfected, this would bring touchscreen technology to existing home computers. The mat is wired so you can simply touch your finger to the screen to pick an option, select an answer, or whatever the program calls for. One problem to be overcome is designing differentsized mats to work with TV screens of varying sizes. It will probably be at least a year before the touch-screen is ready for sale.

One long-awaited peripheral we won't see for a while is the add-on synthesizer keyboard for the Commodore 64. First shown a year ago at the last Winter CES, it was supposed to include three additional SID chips and sophisticated music software, all for under \$100. Unfortunately, a Commodore spokesperson said this project is on a back burner. We heard that Commodore is thinking about reworking it as a stand-alone synthesizer, possibly in addition to the Commodore 64 add-on version.

Another new product announced at the Winter CES a year ago is just now becoming available: the transportable version of the Commodore 64. It showed up at this CES renamed again as the SX64 (previously known as the SX-100 and Executive 64). Specifications are the same—basically it's a Commodore 64 built into a carrying case. It has a built-in 5-inch color monitor and 1541-type disk drive. The detachable keyboard (which forms the top of the carrying case) has all the same keys as the 64. The SX64 works with all Commodore 64-software and peripherals. Retail price is \$995.

More Commodore Software

Here's a summary of the new Commodore software at CES. Most was developed for Commodore by outside software companies and will be sold under Commodore's name:

• Commodore Logo. Designed for the Commodore 64 and 264 by Terrapin, this Logo has all the features of Terrapin's Apple Logo plus more commands, seven programmable sprites, music, and 30 percent more usable memory. It's available on disk for \$80.

• *Micro Illustrator*. Designed by Island Graphics for the 64 and 264, this drawing program works with a joystick or light pen and has a magnification mode for fine details. Commodore says the 64 version will be available by the time you're reading this. The 264 version will use all 128 colors and be available when the computer reaches the market. No price yet.

• *Micro Cookbook.* Developed by Virtual Combinatics for the Commodore 64, this program helps plan meals (including leftovers), comes up with recipes using odds and ends in an understocked kitchen, suggests how to combine supermarket specials into recipes, and supplies calorie and nutritional information. Available immediately for about \$40.

• International Soccer. We played this on a 64 at CES and it's great. Three-dimensional graphics, realistic animation, and options for one or two players. The winning team even gets a trophy to the cheers of a crowd. Available immediately for \$34.95.

• Viduzzles, Jack Attack, and Solar Fox. There will be versions of these games for the 64 and 264. Viduzzles is a video jigsaw puzzle—great for kids—

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and the other two are action games. Available in the spring; no prices yet.

• *Vidtex*. This terminal program, developed by the CompuServe Information Service, lets you download files into a 32K buffer with the Commodore 64. There's also a printer option, ten programmable function keys, and color graphics support. No price yet.

• Ten educational programs on disk and cartridge for the VIC and 64, including the *Milliken Edufun!* series developed

under National Science Foundation grants, and the *Kinder Koncepts* series.

Atari's Revised Line-Up

Instead of introducing loads of new products, at this CES Atari seemed to be retrenching from recent losses and concentrating on getting previously announced products to market.

The new XL line of home computers, introduced at last summer's CES, has been revised slightly. Originally composed of the 600XL, 800XL, 1400XL, and

The Atari light pen plugs into a joystick port.

1450XLD, the line now consists of only the 600XL and 800XL. The 1400XL has been quietly dropped, and the 1450XLD sounds iffy. The 1400XL, remember, was the successor to the ill-fated 1200XL and included 64K RAM; four special function keys in addition to START, SELECT, and OP-TION; a HELP key; and a built-in modem and speech synthesizer. Atari officials had little to say about why the 1400XL was dropped before it reached the marketplace, but the company's recent financial and production troubles probably had something to do with it. Atari seems to be scaling down its ambitions somewhat in an effort to recover its fiscal health.

The 1450XLD was displayed at CES, but Atari officials would not say when it would go into production or how much it would cost. Said one official, "The fact that we're displaying the computer here indicates our intentions to eventually produce such a product. But we cannot give any details at this time."

Atari fans eagerly await the 1450XLD because it's the flagship of the XL series and luxuriously equipped. Besides all the features of the 1400XL including the on board modem and speech synthesizer—the 1450XLD also has a built-in, doublesided, double-density disk drive with direct mem-24 **COMPUTE**! April 1984 ory access for high speed. Retail prices in the \$1000 range have been kicked around. The deciding factor in whether the 1450XLD survives its gestation period may be whether Atari wants to enter the high-end home/low-end personal market. And that might depend on how the competition fares—such as the IBM PCjr and the Apple IIe.

Pascal And Super PILOT

Instead of new computers, Atari showed up at

CES with some new accessories and software. Almost everything works with original-model Atari computers as well as the XL series.

The Atari 1064 Memory Module plugs into the rear expansion port of the 600XL to upgrade its memory from 16K to 64K RAM. No price was announced, but it should be in the \$100 range.

The Atari Translator is a two-sided disk with an operating system more like the old one instead of the XL operating system. This allows a greater percentage of

software written for older Ataris to work on the XLs. It requires 64K RAM. It's available from Atari Customer Service and the Atari Program Exchange for \$9.95. Atari also released DOS 3, which supports the new double-density 1050 disk drives, and announced that copies of DOS 3 will be free to those who'd already bought 1050 drives. It will be packed with all future 1050s.

A perfected version of the long-awaited Atari light pen was shown, along with its new *Atari-Graphics* software. At CES, an artist was using the pen to draw very nice impromptu portraits of showgoers. It requires only 16K and retails for \$99.95, including software.

AtariLab, the first in a series of electronic science kits, is aimed at students aged 9 to 18 and adults. The AtariLab is a module that plugs into the computer, allowing you to add various sensors and probes. The idea is to turn the computer into a science station. Accompanying software demonstrates science theories and lets you run experiments. The AtariLab Starter Set with temperature sensor retails for \$89.95. The add-on light module will cost \$49.95.

AtariLab is the first product from Atari Learning Systems, a newly formed group within Atari which will concentrate on educational software.

FAX. WHO DISCOVERED AMERICA?



Chances are, you got the answer right. But not all the questions in this computer version of the popular Exidy Arcade Quiz-game are so easy. Can you name the only bachelor to become the

President of the United States? Or identify what the initials stand for in O. J. Simpson's name? (If you guessed "Orange Juice," you *won't* score any points.)

Remember, FAX isn't just a thinking game it's a fast thinking game. FAX pits your knowledge and reflexes against the clock...or an opponent. *snqunno_soudopsuy_ The faster you respond, the more points you score.

So get the FAX. You'll find over 3700 questions and answers on Football, Baseball, Television, Movies, Music, History, Science, Art, Literature and other subjects. FAX is multiple choice, multiple fun. If only school could be like this.

One or two players, keyboard controlled.





Strategy Games for the Action Game Mayer Commodore.ca

Other new products from the group include Atari Pascal 2.0, a programming language available on disk for \$69.95; Atari Super PILOT, another language with extended sound and graphics commands, \$39.95; *Player Maker*, a utility for creating player-missile graphics, \$39.95; and *Screen Maker*, a utility for mixing text, graphics, and combining up to 15 different graphics modes on the screen simultaneously, \$39.95. All require 48K RAM.

More Atari Software

Here are highlights of the new Atari software introduced at CES. Most is compatible with both the XL and older computers:

• AtariMusic I and AtariMusic II, music instruction programs which combine tutorials, simulations, drills, and tests with a videogame. Both were developed by a university computer music professor. AtariMusic I covers note-reading and whole and half steps; AtariMusic II covers major scales and keys. Each is available on disk for \$39.95 and requires 24K.

• *Captain Hook's Revenge*, a two-part game that is the result of a joint venture between Atari and Walt Disney Productions. The game is designed to teach map, math, and strategy skills. Available on disk for \$44.95; 32K required.

• SynFile, SynCalc, and SynTrend, three integrated programs for home management. Not only are they compatible with each other, but the last two also work with AtariWriter. For example, spreadsheets created with SynCalc and mailing lists compiled on SynFile can be combined with documents on AtariWriter. SynTrend is a two-part graphics and statistics package. All were developed for Atari by Synapse Corp. They are available on disk for \$99.95 each and require 48K.

• New videogames include *The Legacy*, placed in a world decimated by nuclear war; *Mario Bros.*, a sequel to *Donkey Kong*; *Donkey Kong Jr.*; and *Millipede* (all for \$49.95 each).

AtariSoft, Atari's third-party software division, also announced seven new games for the Commodore 64, VIC-20, IBM PC, Apple II, and TI-99/4A. These are *Joust, Battlezone, Pole Position, Ms. Pac-Man, Moon Patrol, Galaxian,* and *Jungle Hunt.* (*Battlezone* and *Galaxian* are not available on the TI.) Each game costs \$34.95 on disk or \$44.95 on cartridge.

IBM Emulator For Adam?

Coleco, which stole the show at the Summer CES with its introduction of the Adam, announced several new peripherals for its all-in-one system including hints that some sort of IBM PC emulator might be on the way.

Coleco officials were rather vague about this device. They said only that an accessory which would allow the Adam to run PC programs was in planning stages, and that it probably wouldn't be ready until later this year. They gave no indication of how it would work or how much it would cost.

Since the Adam and PC are completely different computers, right down to their CPUs, a PC emulator would be quite a trick. Basically it would require shrinking down a PC to an add-on board or box. This could easily end up costing more than the Adam itself. Observers greeted Coleco's announcement with skepticism.

More Than 170 Programs

The more conventional peripherals announced were a second Digital Data Drive for installation in the Adam's Memory Console (under \$150); a 51/4-inch double-sided, double-density disk drive which stores up to 360K per disk (under \$350); the AdamLink 1200 direct-connect modem, which has automatic 300/1200 baud switching and its own telecommunications software (under \$175); the 64K Memory Expander, which upgrades the Adam from 80K to 144K RAM (under \$150); the SmartWriter Printer Tractor Feed, which snaps onto the Adam's printer (under \$100); and the Adam Accessory Kit, which includes three extra daisy wheels and a carbon ribbon cartridge for the printer, plus a blank data pack and tape head cleaner (under \$35).

Coleco and CompuServe jointly announced a new information service for Adam users—Adam On-Line. It will contain new product developments, the latest news on the Adam, hints and tips on use and maintenance, a message center/ bulletin board, a CB radio simulation for conversing with other users, a software exchange for uploading and downloading programs, a Consumer Feedback Forum, and an Adam Electronic Mail Hotline. Two hours of free use come with the purchase of the AdamLink 1200 modem.

Coleco and Honeywell Information Systems, Inc., jointly announced a new service arrangement for the Adam. Honeywell already has six service centers operating, and 35 are planned to be opened by this spring. Adam owners can locate the nearest one by calling Coleco's toll-free information number.

Coleco and Digital Research announced that Digital's Personal CP/M operating system will be available for the Adam for under \$75. This is an easy-to-use version of the standard CP/M (Control Program for Microcomputers) operating system. It will be sold on data packs and disks. As CP/M programs are transferred to the Adam's disk format and data packs, a large pool of software will become available.

Coleco also announced more than 170 new programs for the Adam. Only a few were ready for CES. They fall into four categories: Family

DRAGONRIDERS OF PERN. FLY THE UNFRIENDLY SKIES.



Shooting down the menacing and constantly multiplying Threads isn't easy, but it's only one of the challenges in this official computer game version of Anne McCaffrey's famous book series.

Your strategy will be put to the test as you try to negotiate alliances with Pern's Lord Holders in an attempt to form the most powerful Weyr on the planet. Should you take a firm stance or compromise? Will asking a Craftmaster for assistance increase your chances for success? Maybe you should invite prospective allies to a Wedding or even a Dragon Hatching. Remember to check the Lord Holders personality traits first. It may be critical to your success.

Numerous screens combine to create truly unique and challenging game play. There's even a practice screen to sharpen your Thread Fighting skills.

If you liked the books, you'll love the game. After all, how often do you get the chance to actually fly a dragon?

One to four players, joystick and keyboard controlled.





Strategy Games for the Action Game Player commodore.ca

Learning, Languages/Programming Aids, Home Information Management, and Entertainment. Examples are Dr. Seuss' Word Factory, Smurf Paint 'N' Play Theatre, Presidential Campaign, Electronic Flashcards, SmartLogo, SmartBASIC II, Smart-Picture Processor, SmartWriting Checker, SmartFiler, SmartSheet, SuperCalc, Dragon's Lair, Star Trek, Donkey Kong, Mr. Do's Castle, Omega-Race, Gorf, The Official Zaxxon, Rocky Super Action Boxing, The Dukes of Hazzard, Password, Jeopardy, and Cabbage Patch Kids.

SpectraVideo Joins MSX Movement

Besides the absence of new home computers in general, something else missing from this CES was the expected Japanese invasion of MSXstandard machines. What is MSX? It's a hardware/ software configuration developed by Microsoft which several Japanese companies have adopted for their forthcoming home computers. The idea is to introduce into the U.S. market a number of Japanese computers using MSX as their standard. The companies hope MSX will become the standard for home computers in the same way that the MS-DOS (PC-DOS) operating system seems to be taking over the business-computer market. MSX backers believe a home computer standard will simplify choices for consumers and help create a pool of software compatible with several different machines. Among the Japanese companies reportedly supporting MSX are Fujitsu, Hitachi, Mitsubishi, Pioneer, Sony, and Yamaha.

Some people were expecting a Japanese invasion of MSX computers at this CES, but it looks like we'll have to wait until the Summer CES in Chicago. The only company exhibiting an MSX computer was SpectraVideo, which had prototypes of the SVI-728 MSX. Billed as "the first American MSX computer," the SVI-728 is designed around the eight-bit Z80A CPU and contains 80K RAM expandable to 144K, 32K ROM expandable to 96K, MSX BASIC in ROM, and CP/M capability. Other features include a fullstroke, 87-key keyboard with numeric keypad, ten programmable special function keys, and a topside cartridge slot. SpectraVideo announced no definite price or release date.

The company did confirm that its SV-318 home computer, widely advertised since it was announced at the last Winter CES, will no longer be sold in the U.S. Only a few of these computers actually reached the marketplace. A higher model, the also-unavailable SV-328, has been redesigned as the SVI-328 Mark II to replace both models. Again, no definite price or release date. The Mark II is similar to SpectraVideo's MSX computer but has Microsoft BASIC instead of MSX BASIC. The Mark II also has 32 sprites and a three-channel sound chip with an eight-octave range and programmable sound envelopes. Since the Mark II does not adhere to the MSX standard, it won't be compatible with the SVI-728.

SpectraVideo is offering the Mark II in two bundled packages with peripherals and software: the Family Pak and the Pro System.

The Family Pak (\$599) includes the Mark II computer; the Single Slot Expander (a peripheral interface); a fast 1800-baud cassette recorder; an 80-column dot-matrix printer with graphics capability; a parallel printer interface; two Spectra-Video Quickshot joysticks; the *Spectra Word* cartridge (a word processor); the arcade game *Spectron*; and another program called *Spectra Diary*.

The Pro System (no price announced) includes the Mark II; a six-slot expansion box with two 5¹/₄-inch disk drives, disk controller card, 80column video card, and parallel printer interface; an 80-column dot-matrix printer; a 12-inch greenscreen monitor; Microsoft Business BASIC on disk; CP/M 2.2 disk; and four programs from Perfect Software—Perfect Writer, Perfect Speller, Perfect Filer, and Perfect Calc.

A Sleek Computer From Britain

If nothing else, the new Elan Enterprise computer ought to win a prize for sleek design. Elan Computers Ltd., a new British company, showed prototypes of the Enterprise at CES. It is enclosed in a low-profile black case with black, red, green, and blue keys, plus a built-in joystick.

But most interesting are the specs. How about stereo sound? The four-channel, eight-octave sound chip is wired to a stereo output port that connects to your sound system or headphones. It also has low/high-pass filtering and ring modulation like the Commodore 64. Then there's a text mode which can display up to 84 columns by 56 lines on the screen at once—plus smooth scrolling.

Do you need lots of memory? The Enterprise comes with 64K or 128K of RAM, and Elan says a sophisticated bank-selection system allows expansion up to 4000K (four megabytes). The 64K model leaves 58K free for BASIC. There's a built-in word processor, and a level meter to help you adjust settings when loading cassettes. Both parallel and serial interfaces are standard. For educational applications, 32 Enterprises can be wired together to talk to each other and share peripherals.

Are you into graphics? The Enterprise has a hi-res mode of 672 by 512 screen dots, more than twice the resolution of an Atari or Commodore 64. Like the Atari, the Enterprise has 256 colors, but unlike the Atari, all 256 colors can be displayed at once. And the BASIC includes graphics commands like PLOT, CIRCLE, PAINT, DESK,

WELCOME TO APSHAI. YOU'RE JUST IN TIME FOR LUNCH.



Boy, have you taken a wrong turn. One moment you're gathering treasure and the next you're being eyed like a side of beef. You're in the Gateway

You're in the Gateway to Apshai." The new cartcomputer Game of the Year*

ridge version of the Computer Game of the Year,* Temple of Apshai."

Gateway has eight levels. And over 400 dark, nasty chambers to explore. And because it's joystick controlled, you'll have to move faster than ever. But first you'll have to consider your strategy.

*Game Manufacturers Association, 1981

Is it treasure you're after? Or glory? You'll live longer if you're greedy, but slaying monsters racks up a higher score.

The Apshai series is the standard by which all other adventure games are judged. And novices will not survive.

They'll be eaten.

One player; Temple of Apshai, disk/cassette; Gateway to Apshai, cartridge, joystick control.

STRATEGY GAMES FOR THE ACTION-GAME PLAYER.



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PAPER, INK, and PALETTE—plus turtle graphics. There are sound commands like PITCH, PLAY, TUNE, RELEASE, BEEP, BOOM, and SPLAT. And how about these examples of fascinating BASIC commands: CAUSE EXCEPTION, CHAIN, HELP, IMAGE, LOOP, MERGE, TOGGLE, TRACE, FKEY, TAPE SOUND, CHARSET FROM, CAPTURE, ECHO, XOR, TRUNCATE, and ZAP.

Elan says the Enterprise will debut in the U.K. this April, and will be available in the U.S. this fall. U.S. prices are expected to be about \$290 for 64K, \$435 for 128K. A dual microfloppy disk drive (Sony 31/2-inch standard) should cost around \$450.

Is it all too good to be true? So many computers we've seen at previous CES shows, especially those from start-up companies, never make it on the market. Maybe Elan-and its refreshingly different machine-will have better luck.





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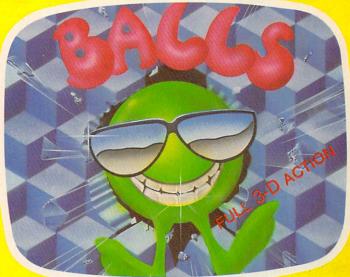
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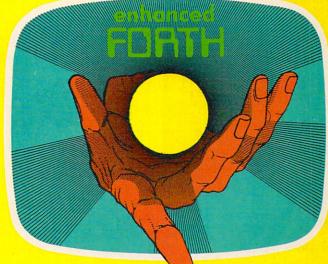
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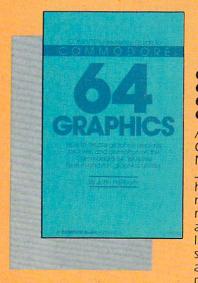
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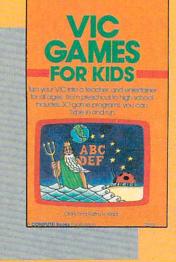
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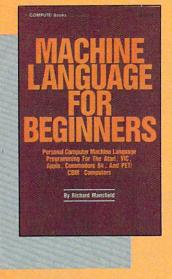
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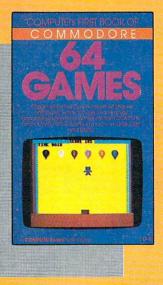
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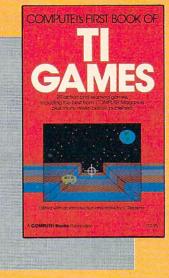




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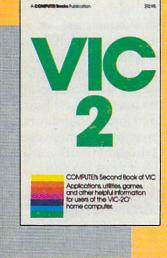


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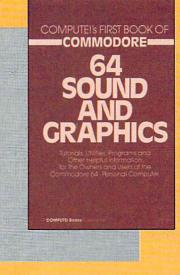


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Bernie Ghiselin

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Eight miles off the coast of Texas a fire breaks out on an oil rig. By 2:30 a.m. workers have lost control and begin piling into standby boats. Some are burned. Others have suffered fractures and need to be lifted to a hospital.

When the call comes into Rockport, near Corpus Christi, Jerry Evans goes through a wellpracticed routine. He checks for a weather briefing. Checks a map of the gulf. Calls a doctor. Files a flight plan with the FCC. He's ready to scramble.

But just before he runs out the door, he punches a few keys on his Commodore 64. Between Grand Island, Louisiana, and Corpus Christi there might be 1000 oil or gas platforms. A sequential file in his disk drive gives him the exact distance and time to any pickup point.

Saving Precious Time

As he fires up the helicopter, he also switches the LORAN (Long Distance Radio Navigation), which gives him time and destination coordinates. But Evans doesn't have to wait for the LORAN. He's already steering the course. Long hours programming his own computer have paid off. He has shaved a few precious minutes off an emergency flight. And 75 percent of Evans' missions are medical emergencies.

"My normal reaction time is 20 minutes or less," he said. "If I already know the coordinates, then I can tell instantly if the LORAN is working." Now, Professional Helicopters, Inc. doesn't require its pilots to be programmers and Evans doesn't have to bring his own computer to work. It gives him a professional edge. "Maybe I'm looking for a little bit shorter shortcut. I pride myself on being a professional and being prepared," he said from his home in San Antonio.

This is not to suggest the business uses of a home computer are always as dramatic as helicopter rescue flights at sea in the dark of night. But telephone interviews with several dozen people suggest that all kinds of COMPUTE! subscribers are finding very creative business uses for their home computers. There are salesmen and accountants, engineers and professors, sergeants, seamen, and comic book collectors, all of whom have other uses for a computer besides *Star Raiders* or teaching Johnny how to spell.

Meat Packing And Hairdressing

In Norman, Oklahoma, Richard Adkins, a student at Oklahoma State University Technical Institute, has written business software for a meat packing firm. His wife, Tina, works full time as a hairdresser and uses a data base management program on their VIC-20 to list clients, services, and various mixtures for permanents. "She's virtually the breadwinner right now," said Adkins.

In Garden City, New York, a publishing company executive bought a computer for his children, but also wrote a personnel program to keep track of his staff, their performance, salary history, and attendance. A systems analyst in Mesa, Arizona, bought a home computer just out of curiosity. But his wife also uses it to keep track of expenses in her sideline businesses—distributing cosmetics

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and selling flower arrangements. And in Brooklyn, New York, Jim McQuade, an accountant in private practice who's been hacking with computers for 20 years, is very up-to-date. On his home computer the various packages—such as accounts payable and accounts receivable—are all integrated; that is, "they all feed into the general ledger without having to go through manual entries."

Taking The Computer To Work

In several respects, though, Evans is typical of the home computer user who works for a large company, perhaps the military, that cannot customize programs for each individual or manager. This kind of user takes pride in his work, sees a better way to do things or make money, and enjoys programming, regardless of previous experience.

Like Evans, David Loomis takes his computer to work. A master sergeant with 22 years in the Air Force, Loomis can't wait for the mainframe at Pease Air Force Base, New Hampshire, to do his work. Among other things, Loomis must keep track of retraining in nuclear safety for 80 to 100 airmen each year. "It's not popular training. It's like flu shots," he said from his home in Somersworth. "They're supposed to help you. But that doesn't mean you have to like it."

Decentralizing The Paperwork

As it happens, the Air Force has no system to keep Loomis abreast of who has undergone which stage of training. "Everything used to be done by a central computer some place on the base. More and more they're realizing this is not the most modern way of doing things," he added. "But the Air Force does not want to decentralize too much."

So Loomis trots out his own computer and does it himself. "The work I do is cut out for my use and comes on a whistle," he said. "Otherwise, it would take me a couple of months to find out where someone is and when they would be available for retraining."

A Machine For Repetitious Work

Since the Air Force is obviously not paying Loomis for this work, why does he agonize? "I spent a year at a remote island in the Aleutians doing punch cards to put into a busy file system." He was listing test equipment on 5x8 cards. "About 98 percent of the work I did on that program could have been done in a tenth of the time using a microcomputer," he said. "I hate dull, boring, repetitious work and if I can get a machine to do it, I will."

Again and again it's the same story. Time. Money. Convenience. And the use of a home computer for business tasks has led a few COM-PUTE! subscribers into the world of telecommuting: They don't have to go to the office.

Of course, not all work can be done at home. Steel must be forged in blast furnaces. Autos come off assembly lines. But the U.S. economy is changing, depending less on heavy industry and more on information. John Naisbitt, author of *Megatrends*, estimates that around 60 percent of American jobs now involve handling information.

Where information is the product, telecommuting comes into its own. And the father of telecommuting, the microcomputer, is growing smarter and cheaper. Another boost for telecommuting has been the rapid growth of organized, easy-to-access data bases, the semifinished materials against which many telecommuters apply their computers and energy.

"I've probably tripled my business in a year," said Charlie Seyffer of Albany, New York, a sales engineer for Eastern Heating and Cooling. Seyffer's task is to design heating and cooling systems. With a modem attached to a Commodore 64, he taps into computers at large firms like Carrier or York. He feeds in the dimensions—square footage, types of windows, perhaps 15 inputs for homes, 100 for office buildings. And then Seyffer gets a full load analysis on his terminal: the cheapest fuel, all the costs.

But it doesn't stop there. Seyffer and his fellow salesmen also manage their inventories and track each job much more closely, the costs, taxes, profits. "We have a much more in-depth look at each job," he said. "We're even writing some of our own programs now."

The use by salesmen of computers at home has been so successful the company is paying for them. "We're knocking the heck out of the other businesses in this area," said Seyffer.

Customized Farming Software

On the farm, computers are keeping track of hogs and soybeans. According to a recent study by Frost & Sullivan, a marketing research firm, farmers will spend \$428 million on microcomputers and data processing between 1983 and 1987. More than 94,000 systems will be purchased during this period, with unit sales increasing an average of 35 percent annually during the four years.

In Arlington, Texas, Bill Asher set out on his own, selling agricultural products during a recession year. "It's been sort of a tough year on all of us," he said. "Some 30 percent of the acreage has been knocked out. This killed chemical sales." To diversify, Asher is writing agriculture-related programs he hopes to sell. For example, nutritional and feed conversion programs are needed in swine operations. "My program lets you keep a herd record on the rate of gain," he said.

Stan Dibbet owns a 240-acre farm near Maurice, Iowa. He grows mainly corn and soy-

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beans, sometimes breeds livestock, and currently has some hogs. To help keep his farming operations competitive, Dibbet bought a Commodore 64.

Each year a consultant from the Northwest Iowa Farm Business Association drops by to help Dibbet with his books and do his taxes. Dibbet gets a tax return from this, but the service costs him \$400 each year. However, now that Dibbet has software customized for farm business, he can program his own inventory, depreciation, and figure his own taxes. He's not only saved \$400, he says, he's also having fun learning about computers, "just [enjoying] the fact that you can take a relatively dumb machine and make it do what you want it to do."

Unlike people who buy a home computer for games or education, people who use their microcomputers in their work often watch the bottom line. By and large, they seek a return on their investment, either in hard cash, greater efficiency on the job, or both.

Accountants, bookkeepers, and financial and stock market wizards are especially interested in return on investment. Andy Larson of Jupiter, Florida, first bought a VIC-20, then a Commodore 64, mainly for his son. But Larson tracks about ten stocks and has put his entire system on a spreadsheet "primarily to tell me when to sell and buy," he said. He tracks the stock's moving average over a three-week period. He watches the cash positions of mutual funds, the advance-decline line, the Standard & Poor 500, and other barometers.

Stock Profits Pay For Computer

James Welker, a professor of finance and management information systems at the Indiana campus of the University of Pennsylvania, goes even deeper. Aside from his teaching, Welker does private accounting for small businesses, some financial consulting and systems design. One of his more creative projects last year was to compile evidence needed in a court case on mail fraud. A dealer had allegedly made unauthorized trades in options on IBM stock in "discretionary" accounts. There were six indictments.

Since the dealer had never matched the trades, someone needed to pore through the books and match each buy and sell. That's when they called on Welker. "You have to go through, find out when he opened a position and when he covered it. It took about three months. I worked from copies of brokerage statements.

"I had to design a program especially for the option transactions, compute the profit; those over 20 percent, those over 60 percent, and so on," he said. "It took a little while."

Computers can trace people as easily as they trace money. And increasingly, managers, supervisors, or administrators are using home computers to do personnel work. There is a bundle of personnel software on the market.

Nearly everyone interviewed found uses for word processing. In the last few months, though, perhaps no one has had greater use for it than Richard Carls of Racine, Wisconsin. A partner in an insurance agency, Carls also prepares taxes for about 950 clients. He's been running his own show for about 25 years, and the tax business has gotten so large Carls' daughter pitches in to help. Using a service bureau, Carls became discouraged after his first attempt to computerize and went back to figuring all those taxes by hand. But last October he bought a 64, a printer, and a disk drive, and began building a data file on all his clients.

"We will start on a limited scale on the computer at first, just to get our feet wet. No business returns at first. There are too many carry-over figures from one schedule to another, too much chance of missing some information."

And how does Carls stay in touch with those 950 clients? Word processing. There are 11 different tax classifications and 11 different letters. For example, Carls' letter to a person who is single, does not own a home, and does not itemize deductions will be different from his letter to a couple making mortgage payments and itemizing. And so on.

Mailing Lists In 22 Categories

If he chooses, Carls can segregate his mailing list by any of 22 categories, for example, by phone exchange, by zip code, month of birth, social security number, and so on.

Here again is a man looking at the bottom line as he plugs away at his home computer. But there is something else on that bottom line besides money, profits, efficiency, and clean data guiding logical decisions.

Regardless of age, geographical location, or profession, there is also plain, old-fashioned enjoyment.

Take D. Anthony Valentine, an engineer for TVA and in the naval reserve for Uncle Sam. Lieutenant Commander Valentine collects all kinds of books, including comic books. He has so many that his hobby is almost becoming a sideline business.

Keeping Track Of Collections

"When you get about 10,000 comic books, they're a little hard to keep track of," he said. Valentine has them packed in plastic bags, lined along four shelves 15 feet wide. A few date back to the 40s, but most are from the 60s and 70s.

"I enjoy them, for one thing. I like the art work. And I've been collecting for quite a while, for speculation. The value goes up and down."

Valentine paid 12 cents for the first issue of *Conan* and today the issue sells for about \$65. But

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his prize is the first issue of *Fantastic Four*, a Marvel Publication which came out in 1962. Valentine paid five cents for the comic at a flea market. The catalogue value is now between \$900 and \$1000. "That's the one I keep in my safe deposit box," he said.

To cope with *Conan*, *The Fantastic Four*, the science fiction, the hardbacks, the paperbacks, the coins and stamps and what-all, Valentine realizes, "They need to be catalogued. I'm trying to come up with a program to catalogue all that."

For Valentine, the fun far outweighs the profits.

"I Just Enjoy The Thing"

Late one night last October, Jerry Evans was already airborne on a routine flight when the radio alerted him. Two drilling platforms joined by a catwalk were in trouble. "They were both ablaze when we got there," he said. "We carried 83 people to the beach. No one was injured."

In this case, Evans' flight navigation program wouldn't have done any good because his computer is not on the helicopter and the LORAN was doing its job. In other words, there will not always be a payoff for his long hours programming his Commodore.

"But it doesn't matter if it pays or not," said Evans (and many others interviewed). "I just enjoy the thing."

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SURGE SUPPRESSOR

Apple's Macintosh Unveiled

Fred D'Ignazio, Associate Editor

Fred D'Ignazio was there when Apple's new Macintosh computer introduced itself to the world.

The Apple Macintosh had its coming-out party at the monthly meeting of the Boston Computer Society on Monday evening, January 30.

The atmosphere was a cross between a football pep rally and a gala rock concert. People jammed into the elegant John Hancock Hall and filled it to the chandeliers. Everyone was talking loudly and pointing up at the stage.

On the stage was a dark brown podium and a table with a fabric bag on top.

High-Tech Rock Video

The lights dimmed. Huge speakers on the stage blasted the audience with a hard, driving rock beat. The audience began clapping to the beat.

Two giant video screens above the stage lit up, showing pictures of men, women, kids, old people, young people, black, and white people using Apple's new Macintosh computer. The pictures appeared on the screen, one after another, accompanied by the theme from *Flashdance*.

The music stopped. The clapping grew louder. Steve Jobs, the inventor of the Apple computer and the project manager of the Macintosh, climbed onto the stage, smiling and waving. People began cheering. The noise was deafening.

And Now A Word From Mac

"The Macintosh is the third milestone in the personal computing revolution," Jobs said, as he walked over to the table at the center of the stage. "First came the Apple II in 1977." An Apple II appeared on the giant screen overhead.

"Next came the IBM PC in 1981." A PC ap-

peared on the video screen. The audience began laughing. The image of the PC on the screen was out of focus and almost unrecognizable.

"And now, in 1984," Jobs said, as he reached the table and put his hands on the box, "we have the Macintosh, the third milestone and definitely the greatest. It is so great it is insanely great." People laughed. The words "INSANELY GREAT" appeared in giant letters over Jobs' head.

"This machine eats 8088s for breakfast," Jobs continued. "Its Motorola 68000 cranks along at 8 megahertz and processes over a million instructions a second. It has four musical voices and a speech synthesizer built-in. Its screen has twice the dots of an Apple II or a PC. Yet the whole computer weighs only a third of an IBM box.

"Now it's time to meet Mac in person." With a theatrical flourish, Jobs unzipped the fabric case and lifted the Macintosh out of the bag. An instant later he had connected the power cord, the keyboard, and the mouse.

He switched on the computer. The screen over Jobs' head turned sky blue. "All the images you see," he said, "are generated by the Mac."

Jobs looked at the blank screen. "Ah, yes," he said. "We need a disk." He reached in his shirt pocket and pulled a tiny 3¹/₂-inch disk out and waved it at the audience.

Jobs inserted the disk in the computer. The letters M - A - C - I - N - T - O - S - H marched, one by one, across the Mac's screen and across the giant screen above the stage. The letters marched in time to the theme from *Chariots of Fire* that blared from the stage's gigantic speakers.

"And now," Steve said, "a word from Mac." He gestured to the computer.

Mac came suddenly to life. "Thank you,



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A Prentice-Hall Company 11480 Sunset Hills Rd. Reston, VA 22090 Available at your local bookstore and computer retailer, or call us at (800) 336-0338 MovieMaker¹⁶ brings the art of computer animation to your Atari Home Computer[®]. And turns you into the director. No programming is necessary, just imagination, flair and a desire to experiment. MovieMaker¹⁶ is a powerful, innovative tool that lets you devise the action, set the scene, create the actors and stage the action. The "Compose" mode lets you draw characters and background, with a special "Mirror" function for quick and easy duplication of shapes. The "Zoom" lets you add incredible detail for astounding realism. When you "Record," you film and edit up to 300 frames of continuous action, controlling speed, sequence, colors, camera angles and layers of sound. And the "Smooth" function eliminates all flicker. The results are so professional, you'll want to film one dream after another. And you can, without ever leaving your keyboard. That's the reason why MovieMaker" is the best selling software from Creative Pastime ".

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Coming soon for Apple,¹⁵ IBM-PC¹⁶ Commodere 6-3¹⁶ For the Atari 800/1200[®] Computer Atari is a registered trademark of Atari, Inc. Steve," it said. Its voice was mechanical and computer-like, but it was easy to understand and strangely imbued with personality.

Mac gave a quick, crisp introduction to itself. It showed the audience how to access files and how to use its *MacWrite* and *MacPaint* programs. Then it gave a dazzling graphics display. It finished its performance with words of advice: "Never trust a computer you can't lift."

"And now," said Mac, when the audience finished clapping, "back to Steve."

The Second Desktop Appliance

Jobs then spoke about the potential market for the new computer. "The Mac is a desk appliance," he said, "the first since the telephone.

"Up until now computers have been like telegraphs. Over a century ago, when the telegraph was invented, people predicted the day when telegraph terminals would be on everyone's desk. But telegraphs were too difficult to use.

"Then the telephone was invented. It was easy to use so everyone could use it. It brought people in touch with other people so it was useful to everyone. Soon everyone was using the telephone and the telegraph virtually disappeared.

"The same thing will happen with personal computers. Only a fraction of the 235 million people in this country can use personal computers. But the Mac is different. Like the telephone, it is a desk appliance. It is the computer for the rest of us."

A Means To An End

Earlier in the evening, at the press reception, I had been talking with Mike Murray, marketing manager for the Macintosh. Like Jobs, Murray called the Macintosh an appliance. "I looked up appliance in the dictionary," Murray said, "and it said that an appliance was 'a means to an end.' That's the Mac. It's a means to an end."

That night, filled with the thrill of the occasion, I just nodded at Mike and grinned. "A means to an end," I thought. "That's neat."

At that time, it looked to me that Apple had solved the problem of making computers useful and attractive to everybody. In the Mac they had created the first mass-market computer appliance.

The following morning I returned home to Roanoke. That afternoon I looked up appliance in my own dictionary. *My* dictionary defined appliance as "a machine designed for a particular use."

All of a sudden I realized that Apple had cleared only one of the two hurdles that have prevented the average person from using a computer. First, despite manufacturers' claims, computers have never been easy to use. Second, no one has yet come up with a computer with a *particular use* which makes everyone want to use it.

The Mac isn't as easy to use as a telephone, but it is still easy to use, so I'd say Apple has cleared the first hurdle. Unfortunately, unlike the telephone, the Mac does not have a clearly defined use that is obvious to everybody. The telephone puts people in touch with each other. But what does the Mac do that is comparable?

The Mac is clearly a milestone in the personal computing revolution. It does *everything* more easily than almost any other affordable computer. But it does nothing new.

The First Activity Appliance

Yet Mac is special, so special that it still may eventually become an appliance on everyone's desk.

One way for Mac to become a mass-market computer is to eliminate the whole question of "What do I do with it?" One way to sidestep this question is to replace it with another question: "What kind of appliance is Mac?"

Some people say Mac is an information appliance. Others say it is a knowledge appliance. Still others say it is a graphics arts appliance. Like the phone, it is also a communications appliance. So what kind of appliance is Mac?

I think it is an appliance unlike any appliance we've seen before. I think it is an *activity appliance*. It lets you do activities. *You* decide which activities you want to do using Mac.

This is a disappointing definition—until you look at *how* Mac lets you do activities. What Mac does is less important than how it does it.

First, Mac lets you individualize everything you do. You can personalize the way you play, the way you work, the way you interact with the rest of the world. Mac becomes an extension of yourself. It lets you put your stamp, your personal image, on everything you do. This is a supremely satisfying feeling.

Second, and most important of all, Mac makes whatever activity you do exciting.

If this sounds like gobbledygook, good! I advise you to be skeptical. Don't take my word for it. Go down to your local Apple dealer and try Mac for yourself. Then reread this article and see if I'm not right.

Apple will be able to sell tens of millions of Macs if it can just convey these two simple qualities to people. Mac cannot do anything new. But it can make whatever you do more joyful, and more exciting. It makes everything you do a personal statement of who you are and how you see the world.

What Makes Mac Exciting?

The excitement you feel when using Mac is difficult to describe because it comes from lots of little, intangible, almost subconscious features.

These are the things I noticed when I first played with the Macintosh:

First, using Mac is *intuitive*. At most points when you want to do something, you can guess how to do it. Mac does things the way you feel they ought to be done.

Second, Mac is a graphic arts machine. Everything the computer can do is represented pictorially. There are no exotic commands, no unintelligible error messages, and no control characters. When you do something, you see the end result on the screen, almost instantly.

Third, the Mac is manageable. When you take it out of its box, you are not overwhelmed with snakelike cables, power cord adapters, disk drives, and hefty manuals. It was easier to set up the Mac than it was to set up the new TV my family got for Christmas.

Fourth, the Mac's keyboard is unlike all other computer keyboards. It looks familiar—like a small typewriter keyboard. There are no rows of intimidating function keys and ominous keys like HELP, ESCAPE, BREAK, and RUN.

Fifth, even a simplified keyboard is still too much for many people. This is where the Mac's mouse comes in. Believe it or not, the mouse really is easy to use. For many applications, the mouse completely replaces the keyboard.

Sixth, the Mac's menus are very friendly *and* they do not slow you down. After only a couple of minutes practice I was zipping around inside an activity, using the menus without breaking my stride.

Seventh, like a nice person, the Mac is "user forgiving." The Mac lets you get out of any mistake by selecting the UNDO function. No matter how disastrous your last action was, you can immediately undo it.

Eighth, the Mac is light (only 20 pounds). Its bag (at \$100), its few parts and cables, and its light weight make it easy to carry around with you. To be personal a computer should be portable. Now, wherever you go, you can take your computer with you.

Last, the Mac does away with some of computers' most irritating habits. For example, many computers are extremely sensitive to voltage fluctuations and momentary brownouts in household electrical current. The Mac is not.

Also, the Mac is tall and skinny. Unlike most computers, it does not hog your whole desk or kitchen table.

This Crazy Group Of People

After Jobs and Mac completed their presentations in John Hancock Hall that night in Boston, Jobs called his core team of Mac engineers and programmers up on the stage to demonstrate the Mac and to answer the audience's questions.

The Mac team ran down the aisles and poured up on the stage. People in the audience began clapping wildly. The team responded by waving and grinning.

The Mac team—twelve men and one woman were as diverse in their dress and personalities as they could be. Some wore ties, others wore blue jeans and T-shirts. Some were shy and withdrawn. Others were just as outgoing and theatrical as Jobs and Mac.

Jobs spoke of his team as "artists." He presented a slide show of the team members at work on the Mac. "We prepared this slide show," he said, "to try to capture some of the energy of this crazy group of people."

At the conclusion of the slide show, one of the programmers, Bill Atkinson, speaking for the team, said, "We are hoping that through the Mac we can leverage our energy into the world at large."

The last slide showed the inside of the case that covers the Mac's monitor, disk drive, and circuit boards. On the side of the case of every Macintosh are inscribed the names of the members of Mac's team.

The Right Stuff

Many people have begun comparing the team to the original astronauts. The members of the team are called the "astronauts of computing." Their idealism, their individual genius, their devotion to their work, and their standards of excellence are like the manned space program astronauts' highly touted "right stuff."

There's no question that the Mac team has the right stuff. But I'm not sure they should be called astronauts. In fact, there is no direct comparison with the manned space program.

The small number of astronauts in the space program were just the top of a pyramid of thousands of anonymous individuals whose efforts made the astronauts' great achievements possible.

With Apple this pyramid is upside down. The right stuff demonstrated by the team of Mac programmers and engineers has been infused into the Macintosh computer. This team represents the small point at the bottom of the upsidedown pyramid. The Macintosh will perhaps eventually be used by millions of us. We represent the broad base at the upside-down pyramid's top.

The team, unlike their counterparts in the space program, have received well-deserved recognition and praise for their efforts.

And who are the astronauts of computing? We are, all of us. New generations of computers like Mac will give all of us the right stuff. With new computers like Mac we can all soar.

Securities Analysis

Fred Schobert, Jr.

The home computer is ideally suited for the task of investment analysis and can quickly perform calculations that would take hours to do by hand, even with a calculator. This program provides you with some of the same powerful tools used by professional financial analysts in evaluating stocks and bonds and the companies that issue them. Versions are included for the 64 and VIC with 3K or more expansion, Atari, and IBM PC and PCjr.

In today's financial environment, even the most modest investor can participate in a wide variety of investment opportunities through discount brokers or stock accumulation plans like Merrill Lynch's Sharebuilder account.

If you're interested in the stock market but don't know anything about investing, you should know that most brokers will be happy to assist you. Also, there are many excellent sources of investment information available. Some of the best are: the PBS television program *Wall Street Week, The Wall Street Journal, Barron's, Forbes, Fortune, Business Week,* Moody's Investors Service, the Value Line Investment Survey, and Standard and Poor's *Outlook* and *Stock Guide.* These sources are available in most libraries and brokerage houses.

You must clearly understand, however, that the market is risky and that usually the higher the profit potential, the higher the accompanying risk. This program is not a get-rich-quick scheme. It merely gives you a set of fundamental analytical tools that you can use to make informed, intelligent investment decisions.

The program is written for the average person. However, if you are completely unfamiliar with fundamental analysis, it would be helpful if you first read two free pamphlets distributed by the nation's largest stockbroker, Merrill Lynch. They are *How to Read a Financial Report* and *The Bond Book*. Familiarity with these and the notes in this article should allow you to use this program correctly and evaluate its output even though you've never been exposed to investments or financial matters before.

The program is divided into five main subroutines. Two are used for stock valuation, one for fundamental analysis, one for bond valuation, and the final one for printing to the screen.

The Gordon Valuation Model

The Gordon stock valuation model is located in lines 205–580. Although limited in its usefulness, it is academically sound and is the basis for the more complex models used by professional securities analysts. It is based on the premise that stock prices are determined as the present value of a stream of cash flows (dividends). The major drawback of the model is that it assumes that the growth rate and dividend policy of the company are perpetual and unchanged.

The subroutine asks you to estimate the company's annual growth rate in earnings. Due to the importance of accurately estimating earnings growth, it is best to use the estimates of professional analysts who have the most up-to-date objective and subjective information at their fingertips. These estimates can often be found in the sources listed earlier. However, if no growth estimates are available, the program will request more data from you and estimate a growth rate itself.

In line 230 the model also defines what is known as the market risk premium as 5.5 percent over the long term Treasury rate, adjusted for risk. This is an estimate and differs slightly from year to year and from stock to stock. The figure was derived, however, from a study which calculated the average market risk premium for Standard and Poor's 400 Industrials over the past 20 years. Another study, based on figures from 1926– 1978 found the market risk premium to average 6.2 percent over the U.S. T-bill rate. If you feel more comfortable dealing with the T-bill rate, you can make the appropriate changes in lines 220–230. A quick comparison of the two figures shows that they are approximately equivalent.

Another, more general, model is located in lines 750–940. This is a revision of the famous Graham valuation model and was designed to yield a value closely approximating the values obtained from much more complex models. An earnings multiple is obtained and then multiplied by normalized earnings to obtain the price of the stock.

Although this method leaves something to be desired, namely subjective input, you can normalize earnings by fitting a least squares linear trend line to the last five years' earnings per share in lines 790–820 and then pick off the current year's normalized earnings per share (EPS).

To obtain a growth rate, calculate a mean

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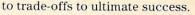
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CUT & PASTE[™] displays its commands on a single line at the bottom of the screen. This makes working with it easier and also gives you more usable space on the screen.

f all word processors on the market today, Cut & Paste may well be the easiest to use. In fact, by the time you finish reading this section of the ad, you'll know how to work with Cut & Paste. So read on. START TYPING. Working with Cut & Paste is like working with a typewriter. If you know how to use a typewriter, you already know how to type in your draft with Cut & Paste. The only real difference is, with Cut & Paste it's easier to correct typos. MAKING CHANGES. Let's say you've decided to make a cut in your rough draft. To do this you put the cursor (the bright block) at the start of the text you want to delete, and

stretch it through to the end of your cut. Then you send the cursor down to the "CUT" command on the bottom of the screen. Done.

If, on the other hand, you want to keep that line, but put it in a different part of your draft, you use the "PASTE" command. You mark the point of insert with the cursor. Then you put the cursor over "PASTE." That's all there is to it.

PRINTING IT OUT. When you like the way your work looks, you print it. Put the cursor on the "PRINT" command. Then set your margins, in inches. That's it.

You now know how to use Cut & Paste.

OKAY, IT'S SIMPLE. BUT HOW GOOD IS IT? Cut & Paste has all the features you'll ever need to use at home. Here are a few of them:

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- 7. Automatic page numbering
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- 9. Headings
- 10. Scrolling text windows

11. Automatic widow and orphan control

12. Clear and concise manual

In other words, Cut & Paste will do just about everything other word processors do. But Cut & Paste will do it more easily. Without complex commands and modes.

If you think about a word processor in terms of what it replaces (typewriters, pens and paper, files), Cut & Paste begins to look very good indeed.

And when you consider that *all this power can be had for approximately* \$50, we think you'll see why we believe Cut & Paste is something of an achievement.

A PHILOSOPHY OF DESIGN. The people who designed, developed and programmed Cut & Paste have some fairly heavy credentials.

They are people who worked on the internationally-famous user interface designs that led to the Xerox Star^{*} and Apple's Lisa.^{*} They are also



THE CHANGING OF THE GUARD. Until quite recently we used pens and paper and typewriters to write with, mostly because we knew how to use them. They have been good tools, but limited. You tend to make messes when you work with them, and getting rid of those messes makes extra work. Cut & Paste is an inexpensive and practical alternative. Because it is as easy to use as a typewriter, you really will use it. Which may make it the first sensible word processor for the home. Thus an alleged labor-saving device has come to a position where it really can save a significant amount of labor, i.e., yours.



THE MEN WHO MADE CUT & PASTE. The Linotype machine pictured here was the 19th century's most important contribution to word processing technology. It let typesetters compose and rearrange text in the form of metal castings. The importance of <u>Cut</u> <u>& Paste</u>, of course, must await the judgment of history. Nevertheless, the seven men who developed it look confident here. Standing left to right, they are: Norm Lane, Steve Shaw, David Maynard, Dan Silva, Steve Hayes and Jerry Morrison. Seated at the console is Tim Mott, whose idea this was in the first place.

people who have in common a very lucid philosophy of design.

Computers and the programs they run are tools, they believe. Tools are never noticed unless they are bad tools. When they're good, they become, in effect, invisible. And if you want to make a good tool—an invisible toolyou'd best study the way people use the tools they already have.

As a result of this thinking, Cut & Paste was designed to work much in the same way that you already work with a typewriter or with pen and paper. The most complex and powerful parts of the program are hidden from view. The work they do takes place deep in the machine. All you get to see are the results.

But beyond that, there is something almost indefinable about a good design. Things about it just seem to work crisply. Little touches and features that you notice make you want to smile.

If it's really good, it *feels* good.

Cut & Paste feels good.



THE PRODUCTS of Electronic Arts can be found in your favorite computer stores, software centers, and in leading department stores throughout the country. Both <u>Cut & Paste</u> and <u>Financial Cookbook</u>[™] are now available at a suggested retail price of \$50 for the Apple IIe and the Commodore 64 and will soon be available for the IBM-PC and Atari.

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OUR COMMITMENT TO HOME MANAGEMENT.

Cut & Paste is just one of a growing number of products we're publishing within the category of "home management software." These products are all built around the same program architecture, making them all equally "friendly," as well as remarkably straightforward and practical. We believe that designs like these will soon make home computers as functional and efficient as today's basic appliances.

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To find out more about these home management products and about what we have planned for the future, call or write: Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403 (415) 571-7171. growth rate and add one standard deviation to obtain a high value and subtract one standard deviation to obtain a low value in lines 830–860. The program prints out the last four years' growth rates to allow you to determine if growth is accelerating, declining, or remaining stable.

The program allows you to make your own growth and normalized earnings estimates, but since it is difficult to find seven- to ten-year growth estimates, it might be best to allow the program to calculate these for you.

Before leaving stock valuation, one word of caution. These models only approximate the theoretical value of stock. Although useful in arriving at a "buy, sell or hold" recommendation, it is important to bear in mind that something is worth only as much as people are willing to pay for it.

The subroutine located in lines 600–720 will give you an abbreviated fundamental analysis of the corporation. The data input stage requires a large amount of data to be entered which can be obtained from a variety of easily accessible sources. The company's yearly or quarterly financial reports are the best sources of information here, and these are readily available from the company itself. Even if it takes a week or two for the information to arrive, it will be well worth the wait. Other sources of this information are brokers' Standard and Poor's sheets and Moody's Investors Service.

You can get printouts of both the entered data and the calculated ratios. Enter the requested data carefully and check it. If the data is incorrect, your ratios will also be incorrect. Be sure to keep your units equivalent. For example, if you start out in millions, stay with millions. If you switch from millions to hundreds of thousands, the affected ratios will be meaningless, unless you entered all of the significant digits throughout. And that's both unnecessary and time-consuming. For example, 327,700,000 would be entered 327.7.

A Few Definitions

The prompts should be self-explanatory, but a few notes are in order.

• Interest expense and income tax are normally entered as positive numbers, even though they are negative numbers on the income statement. If the company receives a net tax benefit, however, income tax should be entered as a negative number. Naturally, if the company loses money, then net income and income before tax would show up and be entered as negative numbers.

• COGS means *cost of goods sold*, but may also be *cost of sales* if it is a service industry where inventory turnover is of less importance.

• Sinking fund is the principal repayment of long-term debt. It is usually found in the "notes 52 COMPUTE! April 1984 to the financial statements' section of the company's annual report. But if no figure is available, the program calculates it as 5 percent of the longterm debt, which is usually not far from the truth.

• Stockholder's equity is sometimes referred to as net worth or shareholder's equity.

• Retained earnings means accumulated retained earnings.

• The *burden coverage ratio* is a measure of risk and represents how well the company is able to service its total debt burden.

• If you don't know the beta of a stock, use 1, which is the beta of the market as a whole.

It is important to remember that the ratios themselves are of little value unless they are compared to something, such as the industry averages or the firm's leading competitors. Also, historical trends can be identified if the ratios for the same firm are calculated over a period of years using historical data.

Finally, this subroutine calculates a bankruptcy score in lines 625–630 based on the Altman bankruptcy model. It's very accurate in forecasting impending financial troubles for companies with total assets of between \$1–\$25 million. Its applicability for firms outside that range is disputed, but it ought to be a good indicator of trouble for firms of any size.

Bond Valuation

In the bond valuation subroutine located in lines 1000–1130, the user is asked to enter the appropriate interest rate for the bond. This rate is your required rate of return for the bond, and you should consider these factors before determining this crucial figure: interest rate risk, inflation risk, maturity risk, default risk, callability risk, and liquidity risk. These are obviously subjective evaluations, but are no less important than the equation itself.

To help you with this, you can quickly and easily determine a proxy for this figure by looking on the credit page of *The Wall Street Journal* to see what the coupon rate (or current yield) is for newly issued bonds of equivalent rating. This figure is what professional analysts, investment bankers, and individual investors are currently using for an appropriate rate for newer, but similar, bonds. Also, when the appropriate rate you enter yields a bond value closely approximating that day's selling price of the bond, that rate is the bond's yield to maturity and is your yearly rate of return should you buy the bond at that price and hold it to maturity.

Finally, there is no substitute for common sense in interpreting the results of the program. Remember that the program was designed to be a set of investment tools and cannot guarantee financial success.

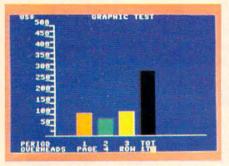
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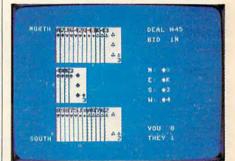
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Program 1: VIC And 64 Securities Analysis

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

10 GOSUB 5000 :rem 166 20 PRINT"{CLR}{10 DOWN}{RIGHT}SECURITIES [SPACE] ANALYSIS" :rem 241 FORI=1T01500:NEXTI :rem 44 30 4Ø DEFFNR(X)=INT(((10²)*X)+.5)/(10²) :rem 79 50 PRINT" {CLR} {9 RIGHT} {2 DOWN} {RVS} MENU (OFF)" :rem 201 52 PRINT" { 2 DOWN } USE DECIMALS TO": PRINT"E XPRESS PERCENTAGES. " :rem 192 55 PRINT"OMIT DOLLAR SIGNS &":PRINT"KEEP {SPACE}UNITS EQUIVALENT. {DOWN}" :rem 220 57 PRINT"CHOOSE: { DOWN }" :rem 73 60 PRINT" (RVS)1.STOCK VALUATION (OFF) [DOWN]":PRINT" [RVS]2.FUNDAMENTAL ANALY SIS{OFF}" :rem 36 62 IFCP=2THENPRINT :rem 181 PRINT" {RVS } 3. BOND VALUATION {OFF } {DOWN } 65 ":PRINT" [RVS]4.END[OFF]" :rem 16 70 GETAS :rem 172 75 ONVAL(A\$)GOTO200,600,1000,3000 :rem 11 90 GOTO70 :rem 9 200 PRINT" {CLR} {8 DOWN} {RVS}F5 FOR GORDO N MODEL. [OFF]": PRINT" [DOWN] [RVS]F7 F OR GRAHAM MODEL. [OFF]" :rem 95 :rem 216 201 **GETA\$** :rem 118 IFA\$=CHR\$(135)THEN205 202 :rem 125 203 IFA\$=CHR\$(136)THEN750 :rem 98 2Ø4 GOTO2Ø1 PRINT" {CLR } {RVS } {5 RIGHT } GORDON MODEL 205 {OFF}" :rem 106 INPUT"STK SYMBOL"; S\$ 210 :rem 225 220 INPUT"LT US TREAS"; RF :rem 2 230 INPUT"BETA"; B:KI=RF+B*.055 :rem 4 24Ø INPUT"CURRENT DIV";D(Ø):IFD(Ø)=ØTHENP RINT" {RVS } PRICE INDETERMINATE { OFF } ":G :rem 90 OT0435 280 PRINT"EST AVG ANNUAL GROWTH": PRINT"RA TE (Y/N)" :rem 45 282 GETA\$:rem 225 284 IFA\$="Y"THEN340 :rem 50 286 IFA\$="N"THEN295 :rem 50 29Ø GOTO282 :rem 112 295 INPUT"CURRENT EPS"; EPS: IFEPS=ØTHENPRI NT" { RVS } PRICE INDETERMINATE { OFF } ":GOT 0435 :rem 175 300 PRINT"CURRENT NET INCOME" :rem 41 305 INPUTNT :rem 191 310 PRINT"STOCKHOLDERS EQUITY" :rem 219 315 INPUTNW :rem 206 ROE=NI/NW:RET=1-(D(Ø)/EPS) 320 :rem 16 330 G=RET*ROE:GOTO400 :rem 28 34Ø INPUTG :rem 110 350 PRINT"GRWTH CONSTANT(Y/N)" :rem 134 352 GETAŞ :rem 223 IFAS="Y"THEN400 354 :rem 45 356 IFAS="N"THEN470 :rem 43 36Ø GOTO352 :rem 108 400 D1 = D(0) * (1+G):rem 41 41Ø IFKI=<GTHEN47Ø :rem 66 420 P=D1/(KI-G) :rem 32 430 DEFFNR(X)=INT(((10^{2})*X)+.5)/(10^{2}):P RINT" [RVS] GORDON MODEL VALUES" :rem 169 432 PRINT" {RVS}"S\$" AT \$"FNR(P) :rem 119 435 PRINT"F1-MENU, F3-PRINT" :rem 165 54 COMPUTE! April 1984

437 PRINT"F5 FOR GORDON MODEL":PRINT"F7 F :rem 214 OR GRAHAM MODEL"; :rem 221 440 GETAS 445 IFA\$=CHR\$(133)THENCLR:GOTO40 :rem 158 450 IFA\$=CHR\$(134)THENCLR:GOSUB2000 :rem 64 452 IFAS=CHR\$(135)THENCLR:GOTO205:rem 209 455 IFAS=CHRS(136)THENCLR:GOTO750:rem 218 :rem 107 460 GOTO440 470 PRINT"EST LENGTH OF GRWTH": PRINT"PERI :rem 36 OD IN YEARS" :rem 235 480 INPUTN:N=N-1 :rem 35 500 FORI=0TON $510 D(I+1) = (D(0)*(1+G)\uparrow(I+1))*(1/(1+KI)\uparrow($:rem 5 I+1)) 520 DI=DI+D(I+1) :rem 83 530 DMAX=D(0)*(1+G) \uparrow (I+1) :rem 54 :rem 33 540 NEXTI PRINT"SUBSEQUENT GRWTH RATE?"; : PRINT" 550 MUST BE <"KI :rem 87 :rem 192 INPUTNG 56Ø 570 C=(DMAX*(1+NG)/(KI-NG)) :rem 217 580 P=C*(1/(1+KI)^(I))+DI:GOTO430 :rem 67 600 PRINT" [CLR] ": PRINTTAB(3) " [RVS] DATA IN :rem 34 PUT STAGE [OFF] " 601 INPUT"STOCK SYMBOL"; S\$:rem 119 602 INPUT"AVG MKT PRICE"; MP :rem 129 603 INPUT"NET SALES";NS :rem 168 :rem 95 604 INPUT"COGS";CG 605 INPUT"INTEREST EXP"; I :rem 78 606 INPUT"INC BEFORE TX"; IB:E=IB+I:rem 42 607 INPUT"INCOME TAX"; TP :rem 248 608 INPUT "NET INCOME"; NI :rem 230 609 INPUT"CURRENT ASSETS"; CA :rem 40 610 INPUT"CURRENT LIAB";CL :rem 112 611 INPUT "TOTAL ASSETS"; TA :rem 147 INPUT"RET EARNINGS"; RE :rem 129 612 INPUT"# SH OUTSTDG"; SH :rem 44 613 INPUT"LT DEBT";LT :rem 9 614 INPUT"INVENTORIES"; IV :rem 160 615 PRINT"SINKING FUND-Ø IF UNK" :rem 136 616 INPUTSF: IFSF=ØTHENSF=.05*LT :rem 248 617 618 PRINT"PRINT ENTRIES (Y/N)?"; :rem 184 :rem 229 619 GETAŞ 620 IFA\$="Y"THENGOSUB2000 :rem 215 621 IFA\$="N"THEN625 :rem 40 622 GOTO619 :rem 115 X1=((CA-CL)/TA)*100:X2=(RE/TA)*100:X3 625 =(E/TA)*100 :rem 67 627 X4=((SH*MP)/(LT+CL))*100:X5=NS/TA :rem 106 630 Z=.012*X1+.014*X2+.033*X3+.006*X4+.99 9*X5 :rem 74 635 TR=1-(TP/IB) :rem 142 640 CR=CA/CL: PM=NI/NS*100:RI=X5*PM:BR=E/((I)+(SF/TR)):IT=CG/IV :rem 10 PRINT"{CLR}{RVS}FUNDAMENTAL ANALYSIS :rem 10 65Ø {OFF}":PRINT" {RVS}FOR "S\$" {OFF} {DOWN} :rem 152 660 PRINT"BANKRUPTCY ANALYSIS ": PRINT"FOR "S\$" YIELDS": PRINT "A SCORE OF"FNR(Z) :rem 57 670 PRINT">2.68 NON-BANKRUPT":PRINT"<1.81 BANKRUPT":PRINT"=1.81-2.68 UNCERTAIN :rem 35 680 PRINTTAB(6)" {RVS }LIQUIDITY {OFF }": PRIN T"CURRENT RATIO="FNR(CR) :rem 229 690 PRINTTAB(6)" [RVS] ACTIVITY [OFF]" :rem 223 695 PRINT"ASSET TURNS="FNR(X5):PRINT"INVE NTORY TURNS="FNR(IT) :rem 24

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700 PRINTTAB(4)" {RVS} PROFITABILITY {OFF}" :rem 74 705 PRINT"PROFIT MARGIN="FNR(PM)"%":PRINT "ROI="FNR(RI)"%" :rem 230 710 PRINTTAB(9)" {RVS }RISK {OFF }": PRINT" BUR DEN COVERAGE="FNR(BR) :rem 198 :rem 110 720 GOTO435 750 PRINT" {CLR } {RVS } REVISED GRAHAM MODEL {OFF}":INPUT"STOCK SYMBOL";S\$:rem 241 INPUT"AAA CORP YLD"; AA: DEFFNR(X)=INT(755 $((10^{\dagger}2)*X)+.5)/(10^{\dagger}2):AA=AA*100$:rem 109 760 PRINT"EST ANNUAL GROWTH RATE"; : IFCP=2 THENPRINT :rem 226 761 PRINT"OVER 7-10 YRS{2 SPACES}(Y/N)" :rem 149 :rem 228 762 GETA\$ 764 IFA\$="Y"THEN870 :rem 61 :rem 52 766 IFAS="N"THEN780 77Ø GOTO762 :rem 118 780 PRINT" {DOWN } LIST CURRENT YR FIRST."; :rem 124 :rem 237 781 IFCP=2THENPRINT 782 PRINT"SEPARATE ENTRIES WITH COMMAS" :rem 221 785 PRINT" [RVS] YEAR [3 SPACES] EPS [OFF] " :rem 50 $79\emptyset X(1)=2:X(2)=1:X(3)=\emptyset:X(4)=-1:X(5)=-2$:rem 85 800 FORN=1TO5:INPUTR(N),Y(N) :rem 242 805 IFY(N)=0THENPRINT"DIV BY 0.ENTER AGAI N":N=N-1:NEXTN :rem 131 810 YT=YT+Y(N):XY=XY+Y(N)*X(N):NEXTN:rem 55 820 A=YT/5:B=XY/10:NE=A+B*X(1) :rem 223 83Ø FORN=1TO4 :rem 21 831 IFY(N+1) < Y(N) ANDY(N+1) < 0 THENG(N) = (Y(N)))-Y(N+1))/ABS(Y(N+1))*100 :rem 199 832 IFY(N+1)<Y(N)ANDY(N+1)<ØTHENGT=GT+G(N):GOT0836 :rem 14 833 IFY(N+1) > Y(N) ANDY(N) < 0 THENG(N) = (Y(N) -Y(N+1))/ABS(Y(N+1))*100 :rem 111 834 IFY(N+1)>Y(N)ANDY(N)<ØTHENGT=GT+G(N): GOTO836 :rem 182 835 G(N) = (Y(N) - Y(N+1))/Y(N+1) * 100 : GT = GT + G:rem 137 (N) :rem 46 836 NEXTN :rem 107 840 GM=GT/4 850 FORN=1TO4:GS=(G(N)-GM) 12+GS:NEXTN :rem 60 :rem 200 SD=SOR(GS/3):GOTO880 86Ø INPUTGM:GM=GM*100 :rem 29 87Ø :rem 35 875 INPUT "NORMALIZED EPS"; NE 880 HI=(37.5+8.8*(GM+SD))/AA*NE:LO=(37.5+ 8.8*(GM-SD))/AA*NE :rem 206 885 ME=(37.5+8.8*GM)/AA*NE :rem 135 890 PRINT"{CLR} RVS REVISED GRAHAM MODEL {OFF}":PRINT" {RVS}CALCULATIONS FOR "S S:PRINT :rem 160 895 IFNE<ØTHENPRINT "VALUE UNCERTAIN. {2 SPACES}NEG NORMALIZED EPS.":GOTO91 Ø :rem 122 900 IFGM+SD=>-4.2614THENPRINT"HI VALUE=\$" FNR(HI):GOTO904 :rem 156 902 PRINT"HI VALUE UNCERTAIN" :rem 35 904 IFGM=>-4.2614THENPRINT"MEAN VALUE=\$"F NR(ME):GOTO9Ø8 :rem 115 906 PRINT "MEAN VALUE UNCERTAIN" :rem 183 908 IFGM-SD=>-4.2614THENPRINT"LO VALUE=S" FNR(LO):GOTO910 :rem 183

909 PRINT"LO VALUE UNCERTAIN" :rem 52 910 PRINT"AVG ANNUAL GROWTH RATE";: IFCP=2 THENPRINT :rem 209 PRINT"FOR "S\$"="FNR(GM)"%" 912 :rem 128 915 PRINT"STD DEV="FNR(SD)"%" :rem 174 920 PRINT"GROWTH RATES WERE:" :rem 51 930 FORN=1TO4:PRINTR(N), FNR(G(N))"%":NEXT :rem 71 N 935 PRINT "NORMALIZED EPS=\$"FNR(NE) :rem 122 94Ø GOTO435 :rem 114 1000 PRINT" {CLR }": PRINTTAB(4)" {RVS }BOND V ALUATION {OFF } ": :rem 64 1010 PRINT"FOR \$ 1,000 PAR VALUE": PRINT"B ONDS. INTEREST PAID" :rem 38 1015 PRINT"SEMI-ANNUALLY. [DOWN]" :rem 150 1020 INPUT"BOND NAME"; B\$:rem 124 1030 INPUT"COUPON RATE";C:CI=C/2 :rem 189 1040 PRINT"APPROPRIATE INTEREST": INPUT"RA TE FOR BOND";K:KD=K/2 :rem 199 1050 PRINT"# OF FULL PERIODS TO" :rem 59 1055 INPUT "BOND MATURITY"; NY :rem 35 1060 IST=CI*1000 :rem 107 1070 PRINT"NUMBER DAYS UNTIL NEXT"; :rem 153 1072 IFCP=2THENPRINT :rem 23 1074 PRINT"INTEREST PAYMENT. {2 SPACES } IF" :rem 230 1075 PRINT"UNKNOWN, USE Ø." :rem 69 1080 INPUTD: IFD=0THENPRINT"PRICE MAY VARY BY AS." :rem 226 1085 IFD=0THENPRINT "MUCH AS THE COUPON" :rem 132 1090 PA = (1 - (1/(1 + KD))/KD):rem 247 1100 PF=1/(1+KD) NY :rem 54 1110 V=IST*PA+1000*PF:IFD<>0THENV=(V+IST) $*(1/(1+KD))^{(D/183)}$:rem 189 1120 PRINT" {RVS}PRICE OF "B\$"=\$"FNR(V)" {OFF}" :rem 29 1130 GOTO435 :rem 154 2000 OPEN4, 4:SYS 828:RETURN :rem 125 3000 END :rem 154 5000 FOR I=828 TO 919:READ A:CK=CK+A:POKE I,A:NEXT:IF CK=13169 THEN RETURN :rem 239 5010 PRINT" {DOWN } CHECK DATA STATEMENTS": P RINT"ERROR IN TYPING. ": END :rem 110 5020 DATA 162,004,032,201,255,169 :rem 78 5030 DATA 013,032,210,255,169,000 :rem 70 5040 DATA 133,253,173,136,002,133 :rem 78 5050 DATA 254,032,237,255,134,251 :rem 88 5060 DATA 152,170,134,252,160,000 :rem 73 5070 DATA 177,253,041,127,133,195 :rem 96 5080 DATA 041,064,010,005,195,041 :rem 76 5090 DATA 191,133,195,041,032,073 :rem 89 5100 DATA 032,010,005,195,032,210 :rem 62 5110 DATA 255,200,196,251,208,226 :rem 87 5120 DATA 169,013,032,210,255,024 :rem 76 5130 DATA 165,253,101,251,133,253 :rem 80 5140 DATA 165,254,105,000,133,254 :rem 79 5150 DATA 166,252,202,208,199,032 :rem 93 5160 DATA 204,255,169,004,032,195 :rem 92 5170 DATA 255,096 :rem 78

Program 2: Atari Securities Analysis

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

NC 10 ? "{CLEAR}":OPEN #1,4,0,"K:" AH 15 GOSUB 1300:REM REMOVE IF YOU DON 'T HAVE A PRINTER

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BO 20 POKE 752,1: POSITION 10,5:? "SECU RITIES ANALYSIS" 68 30 FOR I=1 TO 1000:NEXT I:? " (CLEAR) " CLR :? "{CLEAR}":DIM 5\$(85),D(85 NH 50),A\$(192),X(5),R(5),Y(5),G(5),B\$ (85) 152 FOR I=1 TO 5:R(I)=0:G(I)=0:NEXTI PD 55 POSITION 18,3:? "MINTER": POSITION 2,5:? "USE DECIMALS TO EXPRESS P ERCENTAGES. " Nº 56 PRINT "OMIT \$ SIGNS AND KEEP UNI TS": PRINT "EQUIVALENT. " C6 57 ? :? "CHOOSE 1, 2, 3 OR 4:" NO 60 ? :? : PRINT "ID STOCK VALUATION" :? :? "2) FUNDAMENTAL ANALYSIS" 60 65 ? : PRINT " SO BOND VALUATION" :? : 4) END PROGRAM 4170 GET #1,A KF 73 IF A=49 THEN 200 KD 75 IF A=50 THEN 600 ML 80 IF A=51 THEN 1000 OF 83 IF A=52 THEN END AJ 9Ø GOTO 7Ø BF 200 ? "(CLEAR)": POSITION 10,6:? " FOR GORDON MODEL.": POSITION 10 10:? "2) FOR GRAHAM MODEL." DE 201 GET #1, A NE 202 IF A=49 THEN 205 NC 203 IF A=50 THEN 750 CA 205 ? "(CLEAR)": POSITION 14,2:? "CC RDON MODEL" KO 210 POSITION 14,4:PRINT "STOCK SYMB OL";: INPUT S\$ 01 220 POSITION 8,6:? "LONG TERM U.S. TREASURY":: INPUT RF CH 230 POSITION 16,8:? "BETA";: INPUT B :KI=RF+B*Ø.055 GL 240 POSITION 12, 10:? "CURRENT DIVID END"; : INPUT D BI 245 D(Ø)=D: IF D(Ø)=Ø THEN POSITION 10,12:? "PRICE INDETERMINETE":G OTO 435 JL 280 ? :? " EST AVG ANNNUAL GROWTH R ATE (Y/N)" DN 282 GET #1,A 00 284 IF A=89 THEN 340 01 286 IF A=78 THEN 295 HA 290 GOTO 282 FL 295 POSITION 7, 14:? "CURRENT EARNIN GS PER SHARE";:INPUT EPS #297 IF EPS=Ø THEN ? "(CLEAR)":POSIT ION 12,4:? "PRICE INDEFERMINATE ":GOTO 435 U 300 POSITION 10,16:? "CURRENT NET I NCOME": LP 305 INPUT NI GN 310 POSITION 10, 18:? "STOCKHOLDERS EQUITY"; M0 315 INPUT NW BA 320 ROE=NI/NW:RET=1-(D(0)/EPS) BM 33Ø G=RET*ROE: GOTO 400 60 340 INPUT G PP 350 POSITION 8,14:? "GROWTH CONSTAN T (Y/N)" DL 352 GET #1, A NN 354 IF A=89 THEN 400 0E 356 IF A=78 THEN 470 GM 360 GOTO 352 03400 D1 = D(0) * (1+G)EC 410 IF KI<=G THEN 470 CA 420 P=D1/(KI-G) LG 43Ø X=P:GOSUB 12ØØ:? :? " 58 COMPUTE! April 1984

(3 SPACES) GORDON MODEL VALUES " :5\$:" AT \$":X EP 435 POSITION 11, 23:? "PRINT ENTRIES CY/ND" DJ 440 GET #1.A IK 443 IF A=89 THEN GOSUB 2000 BN 445 IF A<>78 THEN 440 ? "(CLEAR)": GOTO 50 49 450 ME 470 ? :? "EST. LENGTH OF GROWTH PER IDD IN YEARS" OL 480 INPUT N:N=N-1 CD 500 FOR I=0 TO N AF 51Ø $D(I+1) = (D(Ø) * (1+G)^{(I+1)} * (1/(1))$ +KI)^(I+1)) FD 52Ø DI=DI+D(I+1) DE 53Ø DMAX=D(Ø)*(1+G)^(I+1) CB 540 NEXT I 18 550 ? :? "SUBSEQUENT GROWTH RATE MU ST BE <";KI HA 560 INPUT NG NJ 57Ø C=(DMAX*(1+NG)/(KI-NG)) ED 580 P=C#(1/(1+KI)^(I))+DI:GOTO 430 08 600 ? "(CLEAR)": POSITION 12,2:? "DE TA INPUT STAGE" 60 601 POSITION 12,4:? "STOCK SYMBOL"; : INPUT S\$ 68 602 POSITION 10,6:? "AVERAGE MARKET PRICE"; : INPUT MP JK 603 POSITION 15,8:? "NET SALES";:IN PUT NS M6 604 POSITION 11, 10:? "COST OF GOODS SOLD"; : INPUT CG JD 605 POSITION 12,12:? "INTEREST EXPE NSE"; : INPUT I GH 606 POSITION 11, 14:? "INCOME BEFORE TAX";: INPUT IB:E=IB+I LO 607 POSITION 15,16:? "INCOME TAX";: INPUT TP:POSITION 15,18:? "NET INCOME"; : INPUT NI 1K 608 POSITION 12,20:? "PRINT ENTRIES CYZND": EA 609 GET #1, A 16 610 IF A=89 THEN GOSUB 2000 BP 611 IF A<>78 THEN 609 EF 612 ? " (CLEAR) ": POSITION 12, 2:? "CU RRENT ASSETS"; : INPUT CA @ 613 POSITION 10,4:? "CURRENT LIABIL ITIES"; : INPUT CL IF 614 POSITION 14,6:? "TOTAL ASSETS"; : INPUT TA 18 615 POSITION 12,8:? "RETAINED EARNI NG"; : INPUT RE K6 616 POSITION 6, 10:? "NUMBER OF OUTS TANDING SHARES"; : INPUT SH ON 617 POSITION 11, 12:? "LONG TERM DEB T";: INPUT LT MB 618 POSITION 14, 14:? "INVENTORIES"; : INPUT IV K0 620 POSITION 4,16:? "SINKING FUND. TYPE E IF UNKNOWN" ? "{3 SPACES}";: INPUT SF: IF SF= BL 621 Ø THEN SF=Ø.Ø5*LT FB 622 POSITION 11, 18:? "ERENTE ENTRY CYZED" DH 623 GET #1, A IL 624 IF A=89 THEN GOSUB 2000 CA 625 IF A<>78 THEN 623 EJ 626 X1=((CA-CL)/TA) #100:X2=(RE/TA) # 100:X3=(E/TA) #100:X4=((SH*MP)/(LT+CL)) #100:X5=NS/TA KN 630 X=0.012*X1+0.014*X2+0.033*X3+6. ØE-Ø3*X4+Ø.999*X5 10 635 TR=1-(TP/IB)

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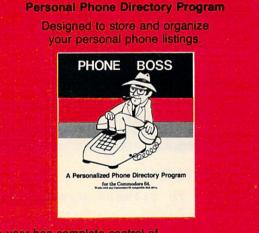
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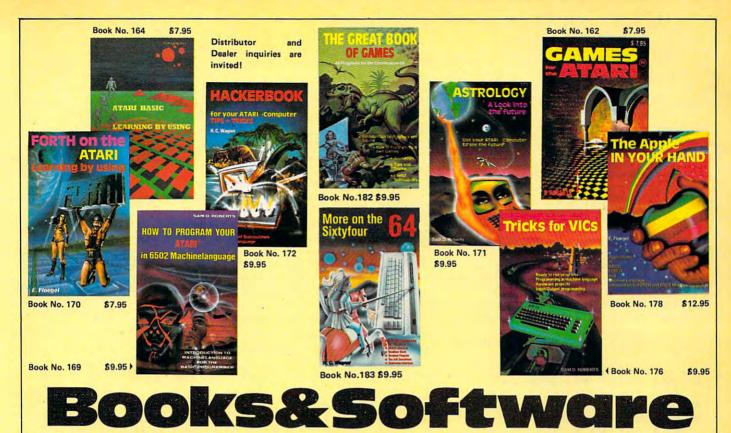
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- AK 640 CR=CA/CL:PM=NI/NS*100:RI=X5*PM: BR=E/((I)+(SF/TR)):IT=CG/IV
- ? "(CLEAR)": POSITION 6,2:? "EUK KH 650 DAMENTAL ANALYSIS FOR "; S\$
- ED 660 POSITION 10,4:? "BANKRUPTCY ANA LYSIS": POSITION 10,6:? "YIELDS A SCORE OF ";:GOSUB 1200:? X:?
- ND 670 ? > 2.68 IS NON-BANKRUPT":? 1.81 IS BANKRUPT":? " < BET WEEN 1.81 & 2.68 IS UNCERTAIN"
- JM 680 POSITION 15, 12:? "INTRUMPENTY": PO SITION 14,14:? "RATIO EQUALS "; :X=CR:GOSUB 1200:? X
- N 690 POSITION 15,16:? "ETCHOLOUTY":POS ITION 12,18:? "ASSET TURNS =";: X=X5:GOSUB 1200:? X
- GL 695 POSITION 12, 19:? "INVENTORY TUR NS =";:X=IT:GOSUB 1200:? X
- F6 696 POSITION 11,21:? "PRINT ENTRIES CY/N)"
- EH 697 GET #1, A
- J6 698 IF A=89 THEN GOSUB 2000 D6 699 IF A<>78 THEN 697
- PJ 700 ? "(CLEAR)": POSITION 13,2:? "DE CENTREMENT": POSITION 12,4:? "P ROFIT MARG'IN =";:X=PM:GOSUB 120 Ø:? :X:"%"
- MH 705 POSITION 9,6:? "RETURN ON INVES TMENT="::X=RI:GOSUB 1200:? X:"%
- DH 710 POSITION 18,8:? "DIST: POSITION 9,10:? "BURDEN COVERAGE ="::X= BR: GOSUB 1200:? X
- M 718 POSITION 12, 20:? "PRENT ENTRIES CYZND";
- GET #1,A EC 719
- 11720 IF A=89 THEN GOSUB 2000
- CC 721 IF A<>78 THEN 619
- 10 722 ? " (CLEAR) ": CLR : GOTO 50 DK 750 ? "(CLEAR)": POSITION 10,2:? "DE
- VISED GRAHAM MODEL
- GL 752 POSITION 14,4:? "STOCK SYMBOL"; : INPUT S\$
- DN 755 POSITION 11,6:? "AAA CORPORATE YIELD"; : INPUT AA: AA=AA*100
- IF 760 POSITION 6,8:? "ESTIMATED ANNUA L GROWTH RATE": POSITION 9,9:? " OVER 7-1Ø YEARS (Y/N)"
- EA 762 GET #1, A
- ON 764 IF A=89 THEN 870 CJ 765 IF A<>78 THEN 762
- CB 780 POSITION 3, 11:? "INPUT CURRENT YEAR FIRST. SEPARATE ": POSITION 10,12:? "ENTRIES WITH COMMAS."
- EC785 ? "YEAR EPS (EARNINGS PER SHAR (2) "
- FF 79Ø X(1) = 2: X(2) = 1: X(3) = 0: X(4) = -1: X(3)5) = -2
- 06 800 FOR N=1 TO 5: INPUT R, Y:R(N)=R:Y (N) = Y
- # 805 IF Y(N)=0 THEN ? " DIVISION BY ZERO, ENTER AGAIN": N=N-1: NEXT N DH 81Ø YT=YT+Y(N):XY=XY+Y(N) *X(N):NEXT
- N NP 820 A=YT/5: B=XY/10: NE=A+B*X(1)
- EN 822 POSITION 11, 20:? "PRENTERNINGS
- CY/ND" D0 823 GET #1,A
- IN 824 IF A=89 THEN GOSUB 2000
- CE 825 IF A<>78 THEN 823
- BF 83Ø FOR N=1 TO 4
- 11 831 IF Y(N+1)/Y(N) AND Y(N+1)<Ø THE N G(N) = (Y(N) - Y(N+1)) / ABS(Y(N+1))) \$100:GT=GT+G(N):GOTO 835

- DP832 IF Y(N+1)>Y(N) AND Y(N)<0 THEN G(N) = (Y(N) - Y(N+1)) / ABS(Y(N+1)) *100:GT=GT+G(N):GOTO 835
- IH 833 G(N) = (Y(N) Y(N+1)) / Y(N+1) * 100:GT = GT + G(N)
- CN 835 NEXT N
- 6L 840 GM=GT/4
- DM 850 FOR N=1 TO 4:65=(G(N)-GM)^2+65: NEXT N
- MI 860 SD=SQR(GS/3):GOTO 880
- 60 870 PRINT "(10 SPACES)";: INPUT GM:GM =GM#1ØØ
- # 875 ? :? "{11 SPACES NORMALIZED EPS" ; : INPUT NE
- 10 88Ø HI=(37.5+8.8*(GM+SD))/AA*NE:LO= (37.5+8.8*(GM-SD))/AA*NE
- IH 885 ME=(37.5+8.8*GM)/AA*NE
- ? "(CLEAR)": POSITION 10,1:? "ETE EE 89Ø UISED GRAHAM MODEL" : POSITION 10 2:? "CALCULATIONS FOR "; S\$
- 19895 IF NE<Ø THEN POSITION 2,4:? "VA LUE UNCERTAIN. NEG NORMALIZED E PS":GOTO 910
- MC 900 IF GM+SD=-4.2614 DR GM+SD>-4.26 14 THEN POSITION 11,4:? "HIGH V ALUE =\$";:X=HI:GOSUB 1200:? X:G **DTD 904**
- NE 902 POSITION 10,4:? "HIGH VALUE UNC ERTAIN"
- EK 904 IF GM>-4.2614 OR GM=-4.2614 THE N POSITION 11,6:? "MEAN VALUE = \$";:X=ME:GOSUB 1200:? X:GOTO 90 8
- NL 906 POSITION 10,6:? "MEAN VALUE UNC ERTAIN"
- KL 908 IF GM-SD=-4.2614 OR GM-SD>-4.26 14 THEN POSITION 11,8:? "LOW VA LUE =\$";:X=LO:GOSUB 1200:? X:GO TO 91Ø
- LB 909 POSITION 10,8:? "LOW VALUE UNCE RTAIN"
- CC 910 POSITION 4, 10:? "AVERAGE ANUUAL GROWTH RATE =";:X=GM:GOSUB 120 Ø:? X;"%"
- FL 915 POSITION 7, 12:? "STANDARD DEVIA TION =";:X=SD:GOSUB 1200:? X;"%
- FH 920 POSITION 2, 14:? "GROWTH RATES W ERE:"
- ";:X=G(N KI 930 FOR N=1 TO 4:? R(N);"): GOSUB 1200:? X; "%":NEXT N 0H 931 POSITION 10, 20:? "NORMALIZED EP
- S =\$";:X=NE:GOSUB 1200:? X
- FB 933 POSITION 11,22:? "DRINT ENTRIES CYZND"
- EC 935 GET #1, A
- JE 937 IF A=89 THEN GOSUB 2000
- C0 939 IF A<>78 THEN 935
- JA 940 ? "(CLEAR)": CLR : GOTO 50
- OF 1000 ? " (CLEAR) ": POSITION 13, 2:? "E OND VALUATION"
- PA 1010 ? :? "{4 SPACES}FOR \$ 1,000 PA R VALUE BONDS. ":? "(4 SPACES) I NTEREST PAID SEMI-ANNUALLY."
- 6N 1020 POSITION 15,7:? "BOND NAME";:I NPUT B\$
- JH 1030 POSITION 14,9:? "COUPON RATE"; : INPUT C: C1=C/2
- K0 1040 ? :? "APPROPRIATE INTEREST RAT E FOR BOND";: INPUT K: KD=K/2
- AL 1050 POSITION 8, 13:? "NUMBER OF FUL L PERIODS": POSITION 11, 14:? "T O BOND MATURITY"
- PK 1055 ? "{13 SPACES}"; : INPUT NY



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FD 1969	IST=C1#1000
	POSITION 7,16:? "NUMBER OF DAY
	S UNTIL NEXT": POSITION 11, 17:?
	"INTEREST PAYMENT."
CN 1075	POSITION 12,18:? "IF UNKNOWN,
	USE Ø."
0E 1080	? "{10 SPACES}";: INPUT D: IF D=0
	THEN ? :? "PRICE MAY VERY AS
	MUCH AS THE COUPON"
PH 1090	PA=(1-(1/(1+KD)^NY))/KD
D6 1100	PF=1/(1+KD)^NY
LN 1110	V=IST*PA+1000*PF:IF D<>0 THEN
	$V = (V + IST) * (1 / (1 + KD))^{(D/183)}$
BM 112Ø	POSITION 10, 20:? "PRICE OF ";B
	\$;" = \$";:X=V:GOSUB 1200:? X
HI 1122	POSITION 11,22:? "PRINT ENTRIE
	5 (Y/N)"
	GET #1,A
	IF A=89 THEN GOSUB 2000
	IF A<>78 THEN 1123
	? "{CLEAR}":CLR :GOTO 50
PC 1200	X=INT(((1Ø^2)*X)+Ø.5)/(1Ø^2):R
	ETURN
JK 1300	OPEN #2,4,0,"S:":OPEN #3,8,0,"
	P: ":RETURN
	RETURN
	PRINT #3; CHR\$ (10)
HI 2010	FOR Y=Ø TO 23
18 2020	FOR X=2 TO 39
	POSITION X, Y
60 2040	
DL 2045	IF G>127 THEN G=G-128
1J 2050	
FP 2060	NEXT X
	PRINT #3 NEXT Y
	POSITION Ø,Ø RETURN
10 2100	REIURN
Progr	am 3: PC And PCjr Securities Analysis
	and of of an all all a contraction for an all and a state

10 DEF SEG=0: POKE 1047, PEEK (1047) OR 64: WIDTH 40:KEY OFF 20 CLS:LOCATE 12,11,0:PRINT"Securities A nalysis" 30 FOR I=1 TO 1000 : NEXT I 40 CLS:DEF FNR(X)=INT(((10^2)*X)+.5)/(10 ^2) 50 COLOR 0,7:LOCATE 3,18:PRINT"Menu":COL OR 7,0: LOCATE 6,1:PRINT" (Use decimals t o express percentages." 55 PRINT"Omit \$ signs and keep units equ ivalent.)" 60 LOCATE 11,8:PRINT"Choose 1, 2, 3, or 4:" 62 LOCATE 14,8:PRINT"1) Stock valuations ":LOCATE 16,8:PRINT"2) Fundamental analy sis" 64 LOCATE 18,8:PRINT"3) Bond valuation": LOCATE 20,8:PRINT"4) End" 70 A\$=INKEY\$ 75 DN VAL(A\$) GDTD 200,600,1000,3000 90 GOTO 70 200 CLS:LOCATE 8,9:PRINT "Choose: ":COLOR 0,7:LOCATE 12,10:PRINT"(1) For Gordon m odel":LOCATE 16,10:PRINT"(2) For Graham model":COLOR 7,0 201 A\$=INKEY\$ 202 ON VAL(A\$) GOTO 205,750 204 GOTD 201 205 CLS:COLOR 0,7:LOCATE 1,14:PRINT"Gord on model":COLOR 7,0

220 INPUT"Long term U.S. Treasury rate"; RF 230 INPUT"Beta"; B:KI=RF+B*.055 240 INPUT"Current dividend"; D(0): IF D(0) =0 THEN COLOR 0,7:LOCATE 12,1:PRINT"Pric e indeterminate":COLOR 7,0:FOR I=1 TO 20 OO:NEXT I:GOTO 435 280 PRINT"Estimated average annual growt h rate (Y/N)"; 282 A\$=INKEY\$ 284 IF A\$="Y" THEN 340 286 IF A\$="N" THEN 295 290 GOTO 282 295 PRINT: INPUT"Current earnings per sha re"; EPS 297 IF EPS=0 THEN COLOR 0,7:LOCATE 12,1: PRINT"Price indeterminate":COLOR 7,0:FOR I=1 TO 2000:NEXT I:GOTO 435 300 INPUT"Current net income";NI 310 INPUT"Stockholders equity";NW 320 RDE=NI/NW:RET=1-(D(0)/EPS) 330 G=RET*RDE:GOTD 400 340 INPUT G 350 PRINT"Growth constant (Y/N)"; 352 A\$=INKEY\$ 354 IF A\$="Y" THEN 400 356 IF A\$="N" THEN 470 360 GOTO 352 400 D1=D(0)*(1+G) 410 IF KI=<G THEN 470 420 P=D1/(KI-G) 430 DEF FNR(X)=INT(((10^2)*X)+.5)/(10^2) 433 PRINT:COLOR 0,7:PRINT"Gordon model v alues "S\$" at \$"FNR(P):COLOR 7,0 435 LOCATE 20, 1: PRINT"1) Menu 2) Frint": PRINT"3) Gordon Model 4) Gra ham Model" 440 A\$=INKEY\$ 442 IF VAL(A\$)<1 OR VAL(A\$)>4 THEN 440 445 IF A\$="1" THEN CLEAR: GOTO 40 450 IF A\$="2" THEN CLEAR: GOSUB 2000: GOTO 440 455 IF A\$="3" THEN CLEAR: GOTO 205 460 IF A\$="4" THEN CLEAR: GOTO 750 470 PRINT:PRINT"Estimated length of grow th period in years" 480 INPUT N:N=N-1 500 FOR I=0 TO N:D(I+1)=(D(0)*(1+G)^(I+1))*(1/(1+KI)^(I+1)) 520 DI=DI+D(I+1) 530 DMAX=D(0)*(1+G)^(I+1):NEXT I 550 PRINT"Subsequent growth rate?":PRINT "(must be <"KI")"; 560 INPUT NG 570 C=(DMAX*(1+NG)/(KI-NG)) 580 P=C*(1/(1+KI)^(I))+DI:GOTO 430 600 CLS:LOCATE 1,12:COLOR 0,7:PRINT"Data input stage":COLOR 7.0 601 PRINT: INPUT "Stock symbol";S\$ 602 INPUT "Average market price"; MP 603 INPUT "Net sales";NS 604 INPUT "Cost of goods sold";CG 605 INPUT "Interest expense"; I 606 INPUT "Income before tax"; IB:E=IB+I 607 INPUT "Income tax"; TP 608 INPUT "Net income";NI 609 INPUT "Current assets";CA 610 INPUT "Current liability";CL

210 PRINT: INPUT"Stock symbol";5\$

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611 INPUT "Total assets"; TA 612 INPUT "Retained earnings";RE 613 INPUT "# shares outstanding";SH 614 INPUT "Long term debt";LT 615 INPUT "Inventories"; IV 616 INPUT "Sinking fund (0 if unknown)"; SF: IF SF=0 THEN SF=.05*LT 618 PRINT: PRINT "Print entries (Y/N) ?"; 619 A\$=INKEY\$ 620 IF A\$="Y" THEN GOSUB 2000 621 IF A\$="N" THEN 625 622 GOTO 619 625 X1=((CA-CL)/TA) *100: X2=(RE/TA) *100: X 3=(E/TA) \$100:X4=((SH*MP)/(LT+CL)) \$100:X5 =NS/TA 630 Z=.012*X1+.014*X2+.033*X3+.006*X4+.9 99*X5 635 TR=1-(TP/IB) 640 CR=CA/CL:PM=NI/NS*100:RI=X5*PM:BR=E/ ((I)+(SF/TR)):IT=CG/IV 650 CLS:COLOR 0,7:PRINT"Fundamental Anal ysis for "S\$:COLOR 7,0 660 PRINT: PRINT "Bankruptcy Analysis for "S\$" yields":PRINT"a score of "FNR(Z)"." 670 PRINT"(>2.68 non-bankrupt, <1.81 ban krupt" 675 PRINT "1.8.-2.68 uncertain)" 680 PRINT:PRINT TAB(6);:COLOR 0,7:PRINT" Liquidity":COLOR 7,0:PRINT"Current ratio = "FNR (CR) 690 PRINT TAB(6);:COLOR 0,7:PRINT"Activi ty":COLOR 7,0:PRINT"Asset turns="FNR(X5) :PRINT"Inventory turns="FNR(IT) 700 PRINT TAB(4);:COLOR 0,7:PRINT"Profit ability":COLOR 7,0:PRINT"Profit margin=" FNR(PM) "%": PRINT"Return on investment="F NR (RI) "%" 710 PRINT TAB(8);:COLOR 0,7:PRINT "Risk" :COLOR 7,0:PRINT"Burden coverage="FNR(BR 720 GDTO 435 750 CLS:COLOR 0,7:PRINT"Revised Graham M odel":COLOR 7,0:PRINT:INPUT"Stock symbol ";5\$ 755 INPUT"AAA corp yield";AA:DEF FNR(X)= INT((((10^2)*X)+.5)/(10^2):AA=AA*100 760 PRINT"Estimated annual growth rate o ver 7-10 yrs (Y/N) "; 762 A\$=INKEY\$ 764 IF A\$="Y" THEN 870 766 IF A\$="N" THEN 780 770 GOTO 762 780 PRINT"List current yr first (Separat e entries": PRINT" with commas) ": COLOR 0,7 :PRINT"Year EPS (Earnings per share)" :COLOR 7,0 790 X(1)=2:X(2)=1:X(3)=0:X(4)=-1:X(5)=-2800 FOR N=1 TO 5: INPUT R(N), Y(N) 805 IF Y(N)=0 THEN PRINT"Division by zer o - Enter again":N=N-1:GOTO 815 810 YT=YT+Y(N):XY=XY+Y(N) *X(N) 815 NEXT N 820 A=YT/5:B=XY/10:NE=A+B*X(1) 830 FOR N=1 TO 4 831 IF Y(N+1) (Y(N) AND Y(N+1) (O THEN G(N) = (Y(N) - Y(N+1)) / ABS(Y(N+1)) * 100: GT = GT + G(N): GOTO 835 832 IF Y(N+1) > Y(N) AND Y(N) < 0 THEN G(N) =(Y(N)-Y(N+1))/ABS(Y(N+1))*100:GT=GT+G(N)

:GOTO 835 833 G(N)=(Y(N)-Y(N+1))/Y(N+1)*100:GT=GT+ G(N)835 NEXT N 840 GM=GT/4 850 FOR N=1 TO 4:GS=(G(N)-GM)^2+GS:NEXT 860 SD=SQR(GS/3):GOTO 880 870 INPUT GM: GM=GM*100 875 INPUT"Normalized Earnings per share" ; NE 880 HI=(37.5+8.8*(GM+SD))/AA*NE:LO=(37.5 +8.8*(GM-SD))/AA*NE:ME=(37.5+8.8*GM)/AA* NE 890 CLS:COLOR 0,7:PRINT"Revised Graham M odel":PRINT"Calculations For "S\$:COLOR 7 , O: PRINT 895 IF NE<O THEN PRINT "Value uncertain. Neg. normalized EPS. ":GOTO 910 900 IF GM+SD=>-4.2614 THEN PRINT"High va 1ue=\$"FNR(HI):GOTO 904 902 PRINT"Hi value uncertain" 904 IF GM=>-4.2614 THEN PRINT"Mean value =\$"FNR(ME):GOTO 908 906 PRINT"Mean value uncertain" 908 IF GM-SD=>-4.2614 THEN PRINT"Low Val ue=\$"FNR(LO):GOTO 910 909 PRINT"Low value uncertain" 910 PRINT"Avg. annual growth rate for "S \$"="FNR(GM)"%":PRINT"Standard Deviation= "FNR (SD) "%" 920 PRINT"Growth rates were:" 930 FOR N=1 TO 4: PRINT R(N), FNR(G(N)) "%" :NEXT N 935 PRINT"Normalized EPS=\$"FNR(NE) 940 GOTO 435 1000 CLS:LOCATE 1,10:COLOR 0,7:PRINT"Bon d valuation":COLOR 7,0 1010 PRINT:PRINT "For \$1,000 par value b onds. Interest": PRINT" paid semi-annually . " 1015 PRINT 1020 INPUT"Bond name"; B\$ 1030 PRINT: INPUT "Coupon rate"; C:CI=C/2 1040 PRINT: INPUT"Appropriate interest ra te for bond";K:KD=K/2 1050 PRINT: PRINT"Number of full periods to bond maturity": INPUT NY 1060 IST=CI*1000 1070 PRINT: PRINT "Number days until next interest":PRINT"payment. If unknown, use 0." 1080 INPUT D: IF D=0 THEN PRINT: PRINT"Pri ce may vary as much as the coupon." 1090 PA=(1-(1/(1+KD)^NY))/KD 1100 PF=1/(1+KD)^NY 1110 V=IST*PA+1000*PF:IF D<>0 THEN V=(V+ IST) * (1/(1+KD))^(D/183) 1120 COLOR 0,7:PRINT:PRINT"Price of "B\$" =\$"FNR(V):COLOR 7,0 1130 GOTO 435 2000 LOCATE 23,1:PRINT"Press (Shift-PrtS c) to print entries. ": PRINT "Press (ENTER } when printer is done."; 2003 A\$=INKEY\$:IF A\$<>CHR\$(13) THEN 2003 2005 LOCATE 23, 1: PRINT STRING\$ (38, 32): PR INT STRING\$ (38, 32); 2010 RETURN O 3000 END

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Computers And Society

David D. Thornburg, Associate Editor

Beyond BASIC

One topic that can always be counted on to fill my mailbox with angry responses is the replacement of BASIC by other languages. Based on the responses I received last March, many personal computer users seem convinced that BASIC is the only computer language we will ever need, and that attempts to replace BASIC with something else will somehow destroy the nature of personal computing.

If I had a dime for each letter I receive telling me how "good" BASIC is, I could probably retire soon. To pick just one example of blind support for BASIC, I overheard a salesman at a major computer retailer tell a customer that he should buy Logo for his kids and use BASIC for his own programming. After the confused (and seriously misinformed) customer left, I asked the salesman if he knew what he had done. I told him that he might as well have said that the customer should buy a Porsche for his kids and a rusty bike for himself.

I think one reason people get so defensive about BASIC is that they don't want to feel that their own investment of time and energy has been wasted. This is a natural and completely understandable response.

Not A Wasted Investment

It is important that BASIC users realize that their investment won't be wasted as they learn new languages. A knowledge of BASIC (or any other computer language) not only eases the learning of new languages, but also helps the user grasp the features of new languages.

I know this to be true because I, too, was once a BASIC enthusiast. My initial enthusiasm for BASIC arose from my reluctance to learn machine language (I'm really not a bit-twiddler at heart), and from the absence of any other highlevel language for personal computers.

While the use of BASIC on personal computers is largely an accident of history, it offered the beginning personal computer user a smorgasbord of features—a little arithmetic, a little string manipulation, a little screen formatting, etc. In fact, BASIC was designed to be a jack-of-all-trades (and a master of none). When compared with FORTRAN (the language from which BASIC was derived), BASIC was clearly the better choice for first-time programmers—especially if they were *not* going to become computer scientists.

Freedom Of Choice, Finally

But, like almost everything else, languages do not stand still. Since 1978, quite a few alternatives to BASIC have appeared on personal computers. One of the highlights of the personal computer industry occurred when Atari decided to sell computers *without* a built-in language. The freedom of choice this offered the user was most refreshing. Unfortunately, most other manufacturers of home-based personal computers still give BASIC "free" (you pay for it—don't worry about that!) with the purchase of the computer.

As I became more interested in languages like PILOT, Logo, and PROLOG, I kept trying to identify one aspect of these languages that made them more appealing to me than BASIC. On the surface they are all quite similar: Programs in all four of these languages are collections of words and symbols. Each of these languages has a vocabulary and a grammar, and, on this basis, one may be tempted to argue that all languages are equivalent.

But this is not true. Without trying to be too philosophical, there is much to be said for the idea that the very nature of the things we think about is influenced by the language in which we do our thinking.

Languages Encourage Versatility

When this idea is applied to the computer, it suggests that the types of programs we create are influenced by the computer languages we use. This implies that, to be a versatile programmer, one benefits from knowing several computer languages. From my own experience, I find that this is true. I use Logo for most of my mathematical calculations, PILOT for text programming, and PROLOG for data base programs.

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ТМ THE COMPUTER EDUCATION DIVISION OF MICROLAB. INC. But my desire to be multilingual was not what pulled me from BASIC. Until recently, I had only a vague idea why I preferred other languages, or why I preferred parts of these languages over other parts.

I think I have finally found the key to understanding the fundamental differences between various computer languages, and their "ease of use" by casual programmers. Computer programs can be classified as either *prescriptive* or *descriptive*. A prescriptive program (or procedure) is one that tells the computer *how* to perform a computational task, and a descriptive program or procedure tells the computer *what* task to perform, without specifying how it is to be done.

Fundamental Distinctions

To my way of thinking, these distinctions are fundamental. By examining various computer languages on the basis of their prescriptive or descriptive nature, we can begin to see why some languages (or parts of languages) may be perceived as "friendlier" than others.

For example, the turtle graphics component of Logo is so popular that many Logo users remain blissfully unaware that Logo contains a very powerful list processing environment suitable for many exciting programming tasks. On closer examination, one finds that turtle graphics programs consist largely of *descriptions* of the tasks the turtle is to perform.

Many list processing programs, on the other hand, consist mainly of *prescriptions* telling the computer *how* to manipulate the text or other data on which the program operates. In PILOT, the match command (M:) allows the programmer to search for any set of characters or words inside a user's response without having to specify *how* this search is done. Neither BASIC, Logo, nor PROLOG has this feature. The match command is descriptive, not prescriptive.

The entire predicate calculus portion of PROLOG is descriptive. Not surprisingly, this aspect of PROLOG is starting to be explored by children with the ease and facility of Logo's turtle graphics.

Easy To Learn And Powerful

This all suggests that descriptive languages are easier to learn than prescriptive languages. Based on the kinds of programs that can be created with PILOT, Logo, and PROLOG, it is also clear that a descriptive environment is no less powerful than a prescriptive one.

While all languages presently used with personal computers have prescriptive components, it is exciting to imagine the creation of purely descriptive languages. By freeing us from the arduous task of telling the computer *how* to perform the chores we want it to carry out, we become free to tell the computer *what* we want it to do instead.

This descriptive component of newer languages will, more than anything else, allow us to move well beyond BASIC in the future. I once predicted that BASIC would be displaced as the language of choice for nonprofessional programmers within five years. One year has passed, and there are indications that this prediction is still on target.

I realize that many of you may remain unconvinced. You should try PILOT or Logo for a while (I would encourage you to try a nonprocedural language like PROLOG, but it is still hard to find in the United States). Once you have spent a few days away from BASIC, let me know what you think. Remember that there is no perfect computer language, but PILOT, Logo, and PROLOG may be pointing to a new model for computer programming that will make the power of the computer accessible to all who care to use it.

David Thornburg's other column "Friends of the Turtle" will reappear later this year.



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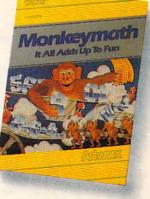
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THE BEGINNER'S PAGE

Richard Mansfield, Senior Editor

Size, Speed, Or Clarity

As you progress as a programmer, you'll start to notice that there are several ways to write a given program. Sometimes dozens of ways. Is it better to have the program use up as little memory as possible? Should it run at maximum speed? Or should you include extensive REMarks and subroutines to make the program LISTing easy to read and understand?

The following three programs all accomplish the same thing. They print the words *one two three four five* 100 times on screen. However, there are significant differences. They use up varying amounts of the computer's RAM memory; they run at different speeds; and they are of differing degrees of comprehensibility. This program emphasizes clarity:

Program 1: Clarity

- 10 TIS="000000":REM TIMER SET AT ZERO
- 20 DATA ONE, TWO, THREE, FOUR, FIVE: REM ITEMS TO BE PRINTED
- 30 FORI=1TO5:REM START OF LOOP
- 40 GOSUB 400:REM SUBROUTINE FOR READ AND {SPACE}PRINT
- 50 NEXT: REM REDO LOOP
- 60 RESTORE: REM RESET DATA POINTER TO FIRS T ITEM
- 70 X=X+1:REM RAISE COUNTER
- 80 PRINT: REM PRINT CARRIAGE RETURN
- 90 IFX<100THEN30:REM CHECK TO SEE IF 100 {SPACE}IS REACHED
- 100 PRINTTIS: REM PRINT ELAPSED TIME
- 110 END: REM FINISH OF PROGRAM
- 120 REM-----
- 400 REM SUBROUTINE TO READ AND PRINT DATA
- 410 READ D\$:REM GET DATA ITEM
- 420 PRINTD\$" ";:REM PRINT DATA ITEM 430 RETURN

This version includes extensive REMark statements to define the purpose of each action. It also has a *subroutine* between lines 400–430. A subroutine is a portion of a program which is used more than once and is set apart from the main program. The subroutine in this example first 68 **COMPUTE**: April 1984 READs, then PRINTs one of the words we're putting on screen, and then it RETURNs to the main program. The subroutine is set apart from the main program visually by the REM in line 120. Putting a subroutine off by itself like this contributes to the readability of the program's LISTing.

REMs Have Disadvantages

REMarks have no effect on what a program actually does. They do slow it down slightly when it RUNs, and they take up extra space in RAM memory. However, REMs make reading a program LISTing easier. You might want to modify your program at a later date and might then find the REMarks helpful when trying to follow the logic of the programming. Likewise, if someone else is trying to understand your program, REMarks can be of great assistance.

The TI\$ in lines 10 and 100 is specific to Commodore computers. It first clears and then prints out the computer's internal clock. We've included it so that we can easily see how fast these different versions RUN.

But let's go for brevity now. We'll strip off all the REMarks, put the subroutine back inside the main program, and see how this changes things:

Program 2: Brevity

- 10 TI\$="000000"
- 20 DATA ONE, TWO, THREE, FOUR, FIVE
- 30 FORI=1T05:READ D\$:PRINTD\$" ";:NEXT:PRI NT:RESTORE:X=X+1:IFX<100THEN30</pre>
- 50 PRINTTIŞ

This version is far shorter than the first version: Program 1 uses up 507 bytes in RAM memory; this one uses only 104 bytes. It's easy to see that overly enthusiastic REMarking could use up too much memory. Each character in a REMark takes up one byte in RAM memory. If you are writing a long program on, say, a VIC computer with only 3583 bytes of RAM, you have to be con-

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servative about REMarking. If you REMarked to the same degree as in Program 1, you'd have only about 700 bytes of RAM in which to write your actual program.

Maximizing Speed

Program 2 runs faster than Program 1: seven seconds versus twelve. In our little illustration program, this doesn't much matter. But if you are programming a game or writing an inventory program, for example, where you have to manipulate large amounts of data, speed can matter a great deal. Each REMark, each additional line number, each jump from a main program to a subroutine (and back) is one more thing for the computer to interpret during the execution of a program.

Here's the same program maximized for speed:

Program 3: Speed

	mr.c 1100	aaaau
10	TI\$="00	

- 20 PRINT "ONE TWO THREE FOUR FIVE"
- 30 X=X+1:IFX<100THEN20
- 40 PRINTTI\$

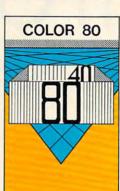
We've eliminated many actions here: DATA reading, RESTOREing, multiple PRINTing, and FOR-NEXT looping. Execution speed is now 5 seconds. And in the act of reducing and simplifying the actions the computer must take during its RUN, we've shortened the program as well. It now uses up 79 bytes in RAM. Although maximizing speed will not always maximize brevity, it often does.

Which is the best program? They're each fine, they simply emphasize different things. While you're a novice, it's often helpful to comment your programs heavily. You'll be writing short practice programs anyway. Then, as you become more familiar with reading LISTings, you can restrict your REMarks to the less obvious things. And as you gain programming experience, you'll discover ways to improve execution speed and conserve memory too.



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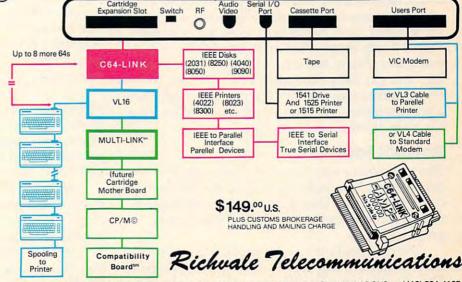


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Worm Of Bemer

Stephen D. Fultz

Nerm the worm is lost in Bemer Castle and needs your help to get home. You must guide him through 11 rooms and help him find magic mushrooms to eat along the way. The journey is a navigator's nightmare, because you never know where the next mushroom will grow, and if Nerm hits a wall or gets trapped by his tail, he loses one of his lives. Written for the Atari, versions are included for the VIC, 64, TI-99/4A, and IBM PC/PCjr. A joystick is required for some versions.

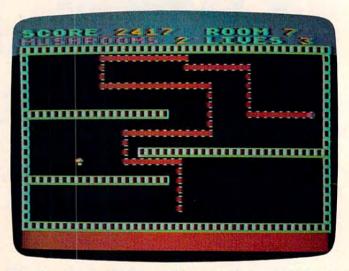
"Worm of Bemer" is a fast-paced arcade game in which Nerm the Worm travels through rooms eating magic mushrooms. Nerm is lost in Bemer Castle and wants to return home. Guide Nerm to a mushroom so he can keep up his strength for the journey. After eating five mushrooms in a room, Nerm can exit to the next room. You must guide Nerm through 11 rooms before he finds his home. You start out with four lives. If you touch anything besides a mushroom you will lose a life.

At the top of the screen will be the current score, what room Nerm is in, how many mushrooms Nerm must eat to open the exits, and how many lives Nerm has left, including the current life. You get 100 points, plus bonus points, for every mushroom you eat. Nerm gets a bonus life after completing the first two rooms and another for every third room thereafter.

Special Features

The game takes advantage of Atari's graphic capabilities. Special features include customdesigned display lists, a display list interrupt, a redefined character set, and special four-color graphics mode.

Nerm uses four custom display lists. The most important display list is for the main screen. This display list mixes three graphics modes on one screen. The first two display lines are in



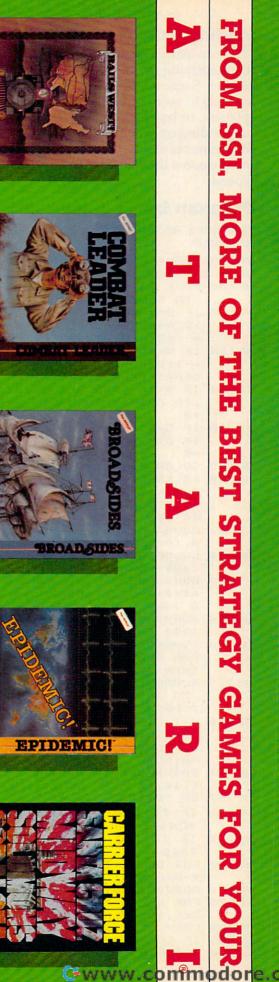
The player has reached Room 7 in the Atari version of "Worm of Bemer."

graphics mode 2. The next ten lines are in a special graphics mode that allows four-color characters. The last part of the screen is in graphics mode 0. A display list interrupt is used to change the background color. The other three custom display lists mix modes 0, 1, and 2.

A special character set was needed to take advantage of the four-color character graphics mode. Characters were redesigned for walls, the mushroom, and the body of Nerm. The original set was copied to a location in memory not used by BASIC, and the new characters added.

Worm of Bemer is written in BASIC with two machine language subroutines; one makes a fast copy of the character set, and the other is the display list interrupt.

Be sure to save the game before running it. If you make a mistake in entering the two machine language subroutines, it is likely that your system will crash and you will have to reboot.





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Adding More Features

You can learn a lot about programming and games by modifying the action and settings in Worm of Bemer. Some features you might add include a routine to save the high score to disk, adding more players, or having Nerm go to a different room depending on which exit he takes. Simpler enhancements would be changing the number of mushrooms that Nerm must eat or changing his speed.

Program 1: Worm Of Bemer—Atari Version

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

PB 5 SCREEN=PEEK(88)+256*PEEK(89)

FP 1Ø GOTO 5ØØØ

- IP 100 POKE 53761,0:S=STICK(0):FOR D=1 TO SPEED:NEXT D
- FF 11Ø IF S=7 OR S=6 OR S=5 THEN DXA=1 :DYA=Ø:DIR=1:IF ODIR=2 THEN DXA =-1:DYA=Ø:DIR=2
- KP 12Ø IF S=11 OR S=1Ø OR S=9 THEN DXA =-1:DYA=Ø:DIR=2:IF ODIR=1 THEN DXA=1:DYA=Ø:DIR=1
- LN 13Ø IF S=14 THEN DYA=-1:DXA=Ø:DIR=4 :IF ODIR=3 THEN DIR=3:DYA=1:DXA =Ø
- LO 14Ø IF S=13 THEN DYA=1:DXA=Ø:DIR=3: IF ODIR=4 THEN DIR=4:DYA=-1:DXA =Ø
- NL 145 COLOR 42: PLOT XA, YA: ODIR=DIR
- DN 150 XA=XA+DXA:YA=YA+DYA:L=LEN(XA\$): XA\$(L+1)=CHR\$(XA):YA\$(L+1)=CHR\$ (YA):LOCATE XA,YA,Z:IF Z<>32 TH EN 200
- IB 162 SOUND Ø,4Ø,8,6:COLOR 17Ø:PLOT X A,YA:IF L<WORMZ THEN 1ØØ
- NM 190 COLOR 32:PLOT ASC(XA\$),ASC(YA\$) :XA\$=XA\$(2):YA\$=YA\$(2):GOTO 100
- PD 200 SOUND 0,200,10,16:POKE SCREEN+Y A*40+XA,132:GOSUB 6600:IF Z<>BU G THEN 260
- D210 WORMZ=WORMZ+15+(3*LOC):IF WORMZ >240 THEN WORMZ=240
- AD 22Ø XX=RND(2)*36+2:X=RND(1)*18+2:CO LOR BUG:LOCATE XX,X,Y:IF Y<>32 THEN 22Ø
- H0 221 SCORE=SCORE+100+LOC*7:FOR DEL=8 TO 16:SOUND 0,55,10,17-DEL:NEX T DEL
- HD 226 HIT=HIT-1:IF HIT<1 THEN COLOR 1 60:PLOT 20,1:PLOT 19,20:PLOT 0, 12:POKE SCREEN+12*40+39,128:HIT =0:GOTO 100
- 6E 227 GOSUB 6600:PLOT XX,X:SOUND 0,10 0,10,16
- FP 230 GO TO 100
- HP 26Ø IF Z<>16Ø AND LIVES>1 THEN CNT =CNT-1:GOSUB 75ØØ:GOTO 29Ø
- 6K 265 IF Z<>16Ø THEN CNT=CNT-1:GOTO 75ØØ
- M6 27Ø FOR DEL=1 TO 16:SOUND Ø,90,10,1 7-DEL:NEXT DEL
- FB 271 GOSUB 7000: POSITION 0,23
- PE 275 FOR DEL=1 TO 24:PRINT :SOUND Ø, DEL,1Ø,1Ø:NEXT DEL
- MG 280 LDC=LOC+1:WORMZ=5:CNT=0
- EH 285 IF LOC>EXTRA THEN GOSUB 9100
- EL 290 GRAPHICS 0:COLOR 35:POKE 752,1:
- 76 COMPUTE! April 1984

POKE 710,0:GOSUB 6500:POKE 712, 162 OH 291 POKE 710, ASC (BOL\$ (LOC)) ON LOC GOTO 5020,400,500,550,60 PD 300 0,700,800,450,550,1000,1100,1200 KJ 399 GO TO 5015 PE 400 REM SECOND SCREEN J6 410 PLOT 5, 10: DRAWTO 35, 10 J6 420 GO TO 5020 DN 450 REM SCREEN 0A 460 PLOT 5, 10: DRAWTO 35, 10: PLOT 18, 5: DRAWTO 18,20 1 470 GO TO 5020 KA 500 REM THE FOUTH SCREEN DP 510 PLOT 5,5: DRAWTO 35,5 KE 520 PLOT 5, 16: DRAWTO 35, 16 11 53Ø GO TO 5020 BO 550 REM FRAME 5 EG 560 PLOT 7,6:DRAWTO 33,6 K0 575 PLOT 18,7:DRAWTO 18,20 JN 580 GO TO 5020 NG 600 REM FRAM 6 PLOT 1, 10: DRAWTO 18, 10: PLOT 22, AC 610 10: DRAWTO 38, 10 JI 620 GOTO 5020 NI 700 REM FRAM 7 EB 710 FOR I=6 TO 14:PLOT 6, I:DRAWTO 1 2, I:PLOT 20, I:DRAWTO 32, I:NEXT I JJ 720 GOTO 5020 NK 800 REM FRAM 8 EG 811 PLOT 1,8:DRAWTO 18,8 KD 812 PLOT 1, 15: DRAWTO 18, 15 NF 813 PLOT 15,12:DRAWTO 38,12 KB 890 GOTO 5020 AB 900 REM THE 8 FRAME K6 910 FOR I=5 TO 12 STEP 3: PLOT 11, I: DRAWTO 30, I:NEXT I JL 920 GO TO 5020 DM 1000 FOR I=2 TO 19:PLOT 1, I:DRAWTO 38, I:NEXT I:COLOR 32:FOR I=2 T O 19: PLOT 1, I: DRAWTO 22, I: NEXT I:GOTO 5020 CD 1100 FOR I=2 TO 19:PLOT 1, I:DRAWTO 38, I:NEXT I:COLOR 32:FOR I=2 T O 19: PLOT 1, I: DRAWTO 30, I: NEXT I:COLOR 35 JA 1101 GOTO 400 JE 1200 REM YOU WIN J0 1205 FOR 0Z=1 TO 3 HO 1210 GRAPHICS 18 ED 1211 POSITION 4,5:PRINT #6; "NERM'S HOME" JO 1212 PRINT #6; " (5 SPACES) THANK YOU" DN 1215 FOR G=1 TO 5 GH 1220 FOR I=1 TO 10 FA 1229 SOUND 1, I+200, 10, 16-I MA 1230 SOUND 0, I+6, 10, I+5: POKE 712, I* 16 AP 1240 NEXT I:NEXT G 01 1245 FOR I=1 TO 200:SOUND 0, I, 10, 15 :NEXT I PD 1250 NEXT QZ: GOTO 7700 PE 5000 GOSUB 10000:REM UP THE GAME PI 5005 GOSUB 11100: BUG=33 EN 5010 DIM XA\$(250), YA\$(250), XB\$(250) ,YB\$(25Ø),A\$(15),B\$(15) EB 5011 SPEED=35:LIVES=4:SCORE=0:LOC=1 :GOSUB 5500:HIT=5:WORMZ=5:EXTR A=2 R 5015 GRAPHICS 0:POKE 752,1:POKE 710 , Ø: GOSUB 6500: POKE 710, ASC (BOL

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\$(LOC)):POKE 77,0:POKE 712,162

FA 5020 XA\$="":YA\$="":XB\$="":YB\$="":XA

Jumpon10 monsters,10 monsters,

A Mutated Wonderwhisk whisks by. The Spinning Top almost topples him!



Close. But Pogo Joe bounces back. Bouncing from cylinder to cylinder, screen to screen, Pogo Joe racks up point after point.

You guide him from

cylinder to cylinder, changing the color on top of each. Change the top of each cylinder

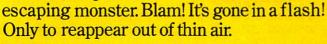
> PLAYER JOES 4

10ES-2

on a screen, then you're on to the next.

The more screens you complete, the nastier the monsters you face, and the faster they attack.

Press the fire button! Jump two cylinders to safety. Hop into a transport tube, and then whoosh! Pogo Joe appears across the screen. Jump on an



Keep bouncing Joe to original music on realistic 3-dimensional cylinders. All the characters in this rollicking

-also 3-dimensional and fully animated. The graphics almost jump off the screen, leaving the arcades behind.



What's ahead with *Pogo Joe*[™] is \$10,000. Simply tell us what magic word appears



after *Pogo Joe's* tenth screen. If your name is drawn from among the correct answers you'll win \$10,000!

No purchase is necessary. You'll find entry forms at

any store that sells Screenplay[™] games. But if you don't win you can't lose. *Pogo Joe*[™] is so much fun you'll jump

for joy no matter what.





Pogo Joe in 48-64K on the Atari and Commodore 64. See your local software dealer.

KA 7705 SOUND 0,0,0,0 =20:YA=19:XB=25:YB=20:DXA=0:DX B=Ø:DYA=-1:DYB=-1:T=Ø:IF HIT<Ø OF 7710 GRAPHICS 17: POKE 710,0 THEN HIT=Ø 6A 7715 IF SCORE>HSCORE THEN HSCORE=SC BB 5021 IF LOC=3 THEN YA=15 ORE: GOSUB 9000: GRAPHICS 17: POK LP 5030 DIR=4: IF HIT>5 THEN HIT=5 E 710,0 PB 5050 COLOR 35: PLOT 0,1: DRAWTO 39,1: LH 7716 DL=PEEK (560) +256*PEEK (561) POKE DL+6+8,2:POKE DL+7,7:POKE DRAWTO 39,20:DRAWTO 0,20:DRAWT DE 7717 0 Ø,1 DL+8.7 AP 5056 IF HIT<1 THEN COLOR 160:PLOT 2 LC 7718 POSITION 7,2:PRINT #6; "NERM " Ø,1:PLOT 19,20:PLOT Ø,12:POKE N 7720 POSITION 2, 5: PRINT #6; "Dour se OFG "; SCORE SCREEN+12*40+39,128:HIT=0:GOTO 150 DF 7730 POSITION 2,7:PRINT #6; "high sc HB 5060 XX=RND(2) #36+2: X=RND(1) #18+2:C ore ";HSCORE FK 7735 GOSUB 7800: RESTORE 7790 OLOR BUG:LOCATE XX, X, Y: IF Y<>3 PN 7736 PRINT #6:PRINT #6; "(3 SPACES)P 2 THEN 5060 ED 5065 PLOT XX, X RESS TRIGGER" KB 5085 GOTO 150 KC 7737 PRINT #6;"{3 SPACES}TO PLAY AG 1 5090 GO TO 220 AIN, " DM 5500 REM START 13 7738 PRINT #6; "(3 SPACES) ANY KEY TO BK 5510 GRAPHICS 18: POKE 712,15 END" ML 5520 POSITION 5,5:PRINT #6; "get rea 01774Ø FOR X=1 TO 10:READ PN:SOUND Ø. PN, 10, 10: SOUND 1, PN+1, 10, 10: FO dv" LM 5530 RESTORE 5600 R D=1 TO 20:NEXT D:NEXT X LL 554Ø FOR X=1 TO 14:READ NN:SOUND Ø, KM 7745 SOUND Ø,Ø,Ø,Ø;SOUND 1,Ø,Ø,Ø NN, 10, 10: SOUND 1, NN+1, 10, 5: FOR AL 7780 IF STRIG(0)=0 THEN GO TO 5011 FE 7783 IF PEEK (53775) < 255 THEN POKE 7 D=1 TO 25:NEXT D:NEXT X KI 5545 SOUND Ø,Ø,Ø,Ø:SOUND 1,Ø,Ø,Ø 64,255:GRAPHICS Ø:END KP 555Ø RETURN OK 7785 GOTO 778Ø KE 5600 DATA 121,91,0,91,81,0,81,72,60 BA 779Ø DATA 91, Ø, 121, 128, 121, 1Ø8, 121, ,72,60,72,91,0,121,91,0,91 0,96,91 KN 6500 DL=PEEK(560)+256*PEEK(561) CM 7800 REM RANK THE GAMER 11 6501 SOUND Ø,Ø,Ø,Ø P 7810 PRINT #6:PRINT #6:"(7 SPACES)Y AN 6502 POKE 756, CHSET/256 OU NEW RANK IS "; IA 7820 IF LOC=1 THEN PRINT #6; "ZERO" HC 6550 FOR I=0 TO 20 LOC=2 THEN PRINT #6; "ROOKIE AL 783Ø IF MF 6560 POKE DL+6+1,4 FK 657Ø NEXT I AM 7835 IF LOC=3 THEN PRINT #6; "NOVICE PJ 6572 POKE 712,0 FK 6573 POKE DL+6+20,4:POKE DL+6+1,132 EF 7836 IF LOC=4 THEN PRINT #6; "AVERAG 60 6574 POKE DL+6+25,65:POKE DL+6,6:PO E " KE DL+3, 6+64: POKE 54286, 192 BI 7837 IF LOC=5 THEN PRINT #6; "MASTER CD 6575 GOSUB 6600 LD 658Ø RETURN IF LOC=6 THEN PRINT #6; "GRAND 167838 LJ 6600 REM PRINT SCORE MASTER" LA 6605 POSITION Ø, Ø: PRINT "score "; SC CB 7839 IF LOC=7 THEN PRINT #6; "WIZARD ORF 0H 6606 POSITION 12,0:PRINT "room ";LO 16 7840 IF LOC=8 THEN PRINT #6; "GRAND C WIZARD" AA 6610 POSITION 19,0:PRINT " MUSHPOCK HE 7841 IF LOC=9 THEN PRINT #6; "SUPER E ";HIT; " lives ";LIVES STAR" BM 7842 IF LOC>9 THEN PRINT #6; "HALL O KO 6620 RETURN F FAME" CF 7000 REM CLEAN UP THE CENTIPEDE RETURN 1F 7860 EK 7002 SPEED=SPEED-5 00 9000 REM NEW HIGH SCORE KI 7004 GOSUB 6600:HIT=5 IF 9002 GRAPHICS 18 EC 7005 L=LEN(XA\$) PK 9003 POSITION 3,5:PRINT #6; "NEW HIG LD 7010 FOR I=1 TO L-1 H SCORE" 01 7020 SOUND 0, 1, 12, 6 FC 9005 FOR Y=1 TO 3 AP 7190 COLOR 32: PLOT ASC(XA\$), ASC(YA\$ EF 9010 FOR N=1 TO 5): XA\$=XA\$(2): YA\$=YA\$(2) MH 9020 FOR D=1 TO 5:SOUND 1,D*20,10,5 FB 7200 NEXT I :NEXT D KK 7210 RETURN JP 9025 POKE 712, N*20 PB 7500 REM DOPS HM 9030 SOUND 0, N*30, 10, 7 AD 7510 GRAPHICS 18: POKE 712, ASC (BOL\$ (FL 9050 NEXT N LOC)) GH 9060 NEXT Y FD 7515 SPEED=SPEED-5 NM 7520 POSITION 7,5:PRINT #6; "OOPS!" DA 9065 FOR D=1 TO 30:NEXT D HJ 9070 POKE 712, 163: RETURN HA 7521 LIVES=LIVES-1 FA 7525 FOR DEL=1 TO 20:NEXT DEL LI 7530 FOR DEL=1 TO 10:SOUND 0,DEL*20 FC 9100 REM EXTRA LIFE IE 9110 GRAPHICS 17 CB 9115 POSITION 5,5:PRINT #6; "BONUS L 10, DEL+4:NEXT DEL IFE" ED 7550 FOR DEL=1 TO 20:NEXT DEL ED 7560 IF LIVES<1 THEN 7700 AB 9130 FOR J=100 TO 200 LO 7599 RETURN AC 9140 SOUND 0, J, 10, 5: SOUND 1, 200-J, 1 DM 7700 REM THE GAMES OVER 0,5

78 COMPUTE! April 1984

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An educational ad about educational software.

You studied all the computers and finally chose the one your family found most useful. One of the main reasons you wanted a computer in the first place is to help your children in school. Not just to teach them how to use a computer, but also to help them get good grades in basic school subjects like reading or geography.

That's why you should know about AEC, American Educational Computer – one of the country's most important developers and publishers of educational software.



AEC grew up on education.

The management of AEC started in educational publishing, with collectively over 100 years of experience in the field. AEC knows curriculum and how American education is practiced in the classroom. That's important because children should learn at home the same way they learn at school. Otherwise, you'll have a very confused child, and confusion is not the way to better grades or better learning.



AEC knows that good grades are important.

Any educational software could help school performance in some way. That's because the computer is such a patient teacher, giving instant feedback to questions and allowing children to learn at their own pace.

But AEC software has an important advantage. Our approach has been student tested under actual classroom conditions. So we know it keeps the child's interest while it teaches.

AEC gets parents involved in the learning process.

With either AEC's MATCHMAKER[™] or EASYREADER[™] Series, you can take your child through the grades in subjects such as Phonics, Word Attack Skills, Reading Comprehension, Spanish, World or US Geography, and Grammar. Our teacher tested system allows parents to enter material into a lively, interactive format. And because AEC's programs are gradelevel oriented, you can help your child all the way through school.

AEC doesn't play games with education.

AEC programs do contain games, but only as rewards for learning achievement. For example, once your child successfully completes the objective in the Matchmaker Geography program, he or she can play an exciting, action-packed



Sure, the games are fun. But they're not the basis, and certainly not the primary focus, of any AEC software. Our focus is strictly on learning. And isn't that what you buy educational software for? If you have more questions about educational software, contact your nearest AEC educational software center. And thanks for being a concerned parent.

American Educational Computer 🖻

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BC 9145 POKE 712, J FI 9150 NEXT J KF 9160 SOUND 0,0,0,0:SOUND 1,0,0,0 HE 9170 EXTRA=EXTRA+3 HB 9180 LIVES=LIVES+1 LD 9190 RETURN SF 10000 DIM DUM(10), BOL\$(100): GRAPHIC 5 17 GF 10001 RESTORE 10015:FOR I=1 TO 19:R EAD A: BOL\$ (I, I) = CHR\$ (A) : NEXT GA 10015 DATA 196, 52, 164, 198, 18, 54, 50, 196 ML 10016 DATA 52,50,180,196,74,79,76,7 6,76,76,76 NL 10017 DL=PEEK(56Ø)+256*PEEK(561) KI 10018 POKE DL+10,7 EG 10020 POSITION 2,2:PRINT #6;" WELC OME TO" DE 10025 POSITION 3,7:PRINT #6; "nerm o f bemer" FI 10035 POSITION 0, 14: PRINT #6; " RIGGER TO START CK 10045 IF STRIG(0)=1 THEN 10045 IF 10060 GOSUB 20110:RETURN DD 11100 CHBAS=756 DC 11110 CHSET=(PEEK(106)-8)*256 PD 11143 DIM E\$ (5Ø) ND 11144 RESTORE 11160:FOR I=1 TO 41:R EAD A:E\$(I,I)=CHR\$(A):NEXT I JP 11145 CD=USR (ADR (E\$), CHSET, 4) PK 11160 DATA 104, 104, 133, 207, 104, 133, 206,104 KH 11162 DATA 104,133,212,169,0,133,20 4,169 EB 11164 DATA 224,133,205,162,1,160,0, 177 AM 11166 DATA 204,145,206,200,208,249, 230,205 EA 11168 DATA 230, 207, 232, 228, 212, 208, 240,96,0 DL 1118Ø POKE 756, CHSET/256 AN 1119Ø RESTORE 1124Ø: GRAPHICS 19 LC 11200 FOR I=0 TO 31:READ A:POKE CHS ET+I, A:NEXT I BN 11205 FOR I=0 TO 7:READ A:POKE CHSE T+8Ø+1, A:NEXT I LG 11240 DATA Ø,00,00,00,00,00,00,0,0 KH 11250 DATA 0,20,85,85,255,40,40,000 LA 11251 DATA 85,85,85,85,85,85,85,85,85 BD 11252 DATA 170, 190, 190, 190, 190, 190, 170,170 PM 11260 DATA 000,020,255,255,255,255, 020,000 NL 11270 RETURN 0L 20110 RESTORE 20150:FOR I=0 TO 10 FE 20120 READ C NH 20130 POKE 1536+1,C HP 20140 NEXT I C6 20150 DATA 72,169,0,141,10,212,141, 26,208,104,64

1 20170 POKE 512, 0: POKE 513, 6: RETURN

Program 2: Worm Of Bemer—VIC Version (Program Loader)

Translation by Kevin Martin, Editorial Programmer

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

- 10 POKE631,13:POKE198,1
- 11 REM POKE631,131:POKE198,1 :rem 56

:rem 34

- 15 REM WITH TAPE, DELETE LINES 10 AND 40,
- AND REMOVE THE REM IN LINE 11 :rem 85 80 COMPUTE April 1984

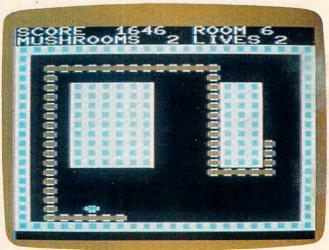
20 POKE43,1:POKE44,32:POKE8192,0 :rem 80 30 POKE36869,240:POKE36866,150:POKE648,30 :rem 54 35 PRINT"{CLR}" :rem 204 40 PRINT"{2 DOWN}LOAD";CHR\$(34);"NM";CHR\$ (34);",8":PRINT"{4 DOWN}RUN{HOME}" :rem 179 50 NEW :rem 79

Program 3: Worm Of Bemer—VIC Version (Main Program)

Translation by Kevin Martin, Editorial Programmer

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

ØR	EM THIS PROGRAM MUST BE SAVED	AS "NM"
{:	SPACE TO LOAD WITH THE LOADER	PROGRAM
		:rem 201
	S=768Ø	:rem 236
	DKE37139,Ø	:rem 196
	DKE36879,8	:rem 217
The second second	GOTO5000	:rem 95
100		:rem 103
110		DI=1:IFO
100	D=2THENDX=-1:DY=Ø:DI=2	:rem 18
120		=Ø:DI=2:
		:rem 108
130		
140	I=3:DY=1:DX=0	:rem 122
140		
145	=4:DY=-1:DX=Ø	:rem 123
145	PO=VS+XA+YA*22:OD=DI:POKEPO,4	
150	+\$0,9	:rem 161
120	XA=XA+DX:YA=YA+DY:L=LEN(XA\$):	Contraction of the second s
155	CHR\$(XA):YA\$=YA\$+CHR\$(YA)	:rem Ø
133	Z=PEEK(VS+XA+YA*22):IFZ<>32TH	
162	POKE26976 150 DOKE26076 0. DO	:rem 43
102	POKE36876,150:POKE36876,0:PO= *22:POKEPO,36:POKEPO+SO,13:IF	
	100	
190	PO=VS+ASC(XA\$)+22*ASC(YA\$):LL	:rem 250
1 70)-1:XA\$=RIGHT\$(XA\$,LL)	:rem 208
191	POKEPO, 32: POKEPO+SO.Ø	:rem 43
195	YA\$=RIGHT\$(YA\$,LL):GOTO100	:rem 19
200	POKE36876, 200: FORQQ=1TO20:NEX	
201	POKE36876, Ø: PO=VS+XA+22*YA: PO	
	POKEPO+SO, 13:GOSUB6600:IFZ<>B	
		:rem 133



VIC version of "Worm of Bemer."

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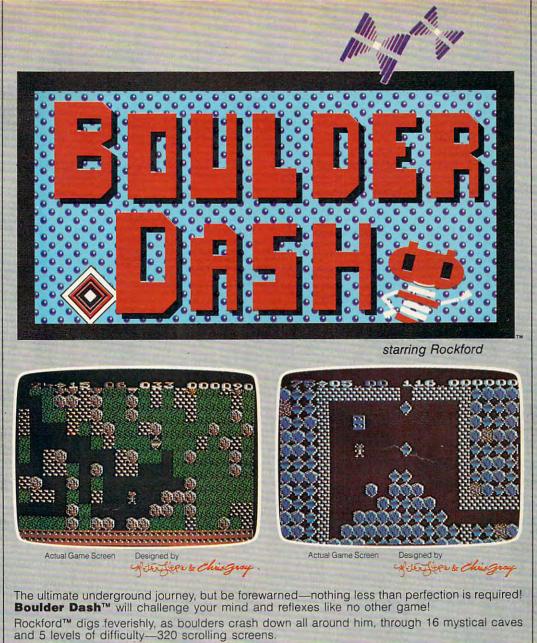
W-CCOMP MICES (

210 WO=WO+5+3*LO:IFWO>127THENWO=127 :rem 146 22Ø XX=INT(RND(1)*18+2):X=INT(RND(1)*18+3):IFPEEK(VS+XX+22*X)<>32THEN220 :rem 235 221 SC=SC+100+LO*7 :rem 225 225 HI=HI-1:GOSUB6600:IFHI>0THEN229 :rem 112 226 PO=VS+11+22*2: POKEPO, 160: POKEPO+SO, 0: :rem 198 PO=VS+11+21*22:POKEPO,160 227 POKEPO+SO, Ø: PO=VS+22*12: POKEPO, 160: PO :rem 120 KE36876,175 228 PO=VS+22*12+21: POKEPO, 160: POKEPO+SO, 0 :GOTO100 :rem 203 229 PO=VS+XX+X*22: POKEPO, BUG: POKEPO+SO, 13 :rem 133 :rem 95 23Ø GOTO1ØØ 260 IFZ <> 160ANDLI > 1THENGOSUB7500: GOTO290 :rem 242 :rem 146 265 IFZ<>160THEN7500 270 POKE36876,140 :rem 151 271 GOSUB7ØØØ:PRINT" [HOME] [23 DOWN]" :rem 134 275 FORDE=1T023:PRINT:POKE36876,DEL*2+140 :NEXT:POKE36876,Ø :rem 43 280 LO=LO+1:WO=5:IFLO=12THEN1200 :rem 177 282 PP=PEEK(36879):IFPP=15THENPP=10 :rem 121 283 POKE36879, PP+1 :rem 5 285 IFLO>EXTHENGOSUB9100 :rem 29 290 PRINT" {CLR}": GOSUB6600 :rem 133 ONLO GOTO5020,400,500,550,600,700,800 300 ,450,550,1000,1100,1200 :rem 176 :rem 169 399 GOTO5Ø15 400 REM SECOND SCREEN :rem 244 410 FORI=VS+3+10*22TOVS+18+10*22:POKEI,35 :rem 192 :POKEI+SO,9:NEXT :rem 150 420 GOTO5020 :rem 61 450 REM SCREEN 460 FORI=VS+4+10*22TOVS+17+10*22:POKEI,35 :rem 197 : POKEI+SO, 9:NEXT 465 FORI=VS+10+6*22TOVS+10+20*22STEP22:PO :rem 102 KEI, 35: POKEI+SO, 9:NEXT :rem 155 470 GOTO5020 500 REM THE FOURTH SCREEN :rem 242 510 FORI=VS+3+5*22TOVS+18+5*22:POKEI,35:P :rem 105 OKEI+SO,9:NEXT 520 FORI=VS+3+18*22TOVS+18+18*22:POKEI,35 :rem 210 :POKEI+SO,9:NEXT :rem 152 53Ø GOTO5Ø2Ø 550 REM FRAME 5 :rem 30 560 FORI=VS+5+6*22TOVS+16+6*22:POKEI,35:P OKEI+SO, 9:NEXT :rem 112 575 FORI=VS+9+7*22TOVS+9+20*22STEP22:POKE I,35:POKEI+SO,9:NEXT :rem 25 580 GOTO5020 :rem 157 600 REM FRAME 6 :rem 27 610 FORI=VS+1+10*22TOVS+9+10*22:POKEI,35: POKEI+SO,9:NEXT :rem 144 615 FORI=VS+13+10*22TOVS+20+10*22:POKEI,3 5:POKEI+SO,9:NEXT :rem 241 62Ø GOTO5Ø2Ø :rem 152 700 REM FRAME 7 :rem 29 710 FORJ=6T014:FORI=VS+4+J*22TOVS+9+J*22: POKEI, 35: POKEI+SO, 9: NEXT :rem 76 715 FORI=VS+15+J*22TOVS+17+J*22:POKEI,35: POKEI+SO, 9:NEXT:NEXT :rem 69 720 GOTO 5020 :rem 153 800 REM FRAME 8 :rem 31 811 FORI=VS+1+8*22TOVS+10+8*22:POKEI, 35:P OKEI+SO,9:NEXT :rem 105

82 COMPUTE! April 1984

812 FORI=VS+1+15*22TOVS+10+15*22:POKEI,35 : POKEI+SO, 9:NEXT :rem 198 813 FORI=VS+9+12*22TOVS+21+12*22:POKEI,35 :POKEI+SO,9:NEXT :rem 203 89Ø GOTO5Ø2Ø :rem 161 1000 FORJ=4T019:FORI=VS+1+J*22TOVS+19+J*2 2: POKEI, 35: POKEI+SO, 9: NEXT: NEXT :rem 31 1005 FORJ=4T019:FORI=VS+1+J*22TOVS+11+J*2 2: POKEI, 32: POKEI+SO, 9: NEXT: NEXT :rem 25 1010 GOTO5020 :rem 194 1100 FORJ=4T019:FORI=VS+1+J*22TOVS+19+J*2 2: POKEI, 35: POKEI+SO, 9: NEXT: NEXT :rem 32 1105 FORJ=4T019:FORI=VS+1+J*22TOVS+14+J*2 2: POKEI, 32: POKEI+SO, 9: NEXT: NEXT :rem 29 111Ø GOTO4ØØ :rem 144 1200 REM YOU WIN :rem 146 1205 FORZZ=1TO3 :rem 167 121Ø PRINT"{CLR}{6 DOWN}{5 RIGHT}NERM'S H OME" :rem 244 1212 PRINT" [5 DOWN] [6 RIGHT] THANK YOU" :rem 13 1215 FORG=1T05 :rem 61 1220 FORI=1T010 :rem 103 1230 POKE36876, I+130 :rem 55 1240 NEXT:NEXT :rem 127 1245 FORI=1T0127: POKE36876, I+128:NEXT :rem 210 1250 NEXT: GOTO7700 :rem 72 4000 POKE37154,127:S3=-((PEEK(37152)AND12 8)=Ø)::POKE37154,255 :rem 75 4010 P1=PEEK(37137):S1=-((P1AND8)=0):S2=((PlAND16)=0):S0=((PlAND4)=0) :rem 24 4020 S=JP(S2+S3+1,S0+S1+1) :rem 141 4030 FR=-((PlAND32)=0):RETURN :rem 171 5000 REM UP THE GAME :rem 73 5005 GOSUB10000:GOSUB11100:BUG=33:rem 163 5011 SP=35:LI=4:SC=0:LO=1:GOSUB5500:HI=5: WO=5:EX=2 :rem 40 5012 POKE36879,10 :rem 149 5015 PRINT" {CLR}": GOSUB6500 :rem 180 5020 XA\$="":YA\$="":XB\$="":YB\$="":XA=11:YA =19:DX=Ø :rem 161 5021 IFLO=3THENYA=18 :rem 209 5025 DY=-1:T=0:IFHI<0THENHI=0 :rem 242 5030 DI=4:IFHI>5THENHI=5 :rem 197 5050 FORI=VS+22*2TOVS+21+22*2:POKEI,35:PO KEI+19*22,35:POKEI+SO,9 :rem 35 5051 POKEI+SO+19*22,9:NEXT :rem 17 5055 FORI=VS+22*2TOVS+22*20STEP22:POKEI,3 5:POKEI+21,35:POKEI+S0,9 :rem 213 5056 POKEI+SO+21,9:NEXT:IFHI>0THEN5060 :rem 67 5057 I=VS+11+22*2:POKEI,160:POKEI+SO,0:I= VS+11+21*22: POKEI, 160: POKEI+SO,0 :rem 42 5058 POKEVS+12*22,160:POKEVS+12*22+S0,0 :rem 224 5059 POKEVS+12*22+21,160:POKEVS+12*22+SO+ 21,0:GOTO150 :rem 6 5060 XX=RND(1)*19+2:X=RND(1)*18+3:IFPEEK(VS+XX+X*22) <> 32THEN5060 :rem 226 5065 POKEVS+XX+X*22, BU: POKEVS+XX+X*22+SO, 13 :rem 178 5085 GOTO150 :rem 161 5500 PRINT" {CLR}" :rem 46 5510 PRINT" {11 DOWN } {6 RIGHT } GET READY" :rem 90

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In his restless quest for gleaming jewels, Rockford works around walls of rock and avoids swirling fireflies. To win, he must turn his enemies into opportunities! He drops boulders through an enchanted wall, blocks the growing amoeba, transforms butterflies—magically turning them into precious stones! If he collects his required number of diamonds, the mysterious escape tunnel is revealed. After every 4 caves there is a playable intermission.

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 \mathbf{a}

5540 FORX=1T014: POKE36876, NN(X): FORD=1T01 20:NEXT:NEXT:POKE36876,Ø :rem 57 555Ø RETURN :rem 175 6500 REM REDEFINING SCREEN :rem 74 6575 GOSUB 6600 :rem 35 658Ø RETURN :rem 179 6600 REM PRINT SCORE :rem 185 6605 PRINT" [YEL] [HOME] SCORE "; SC :rem 160 6606 PRINT" [HOME] [13 RIGHT] ROOM"; LO :rem 66 6610 PRINT"MUSHROOMS ";HI;"LIVES";LI :rem 9 662Ø RETURN :rem 174 7000 REM CLEAN UP THE CENTIPEDE :rem 37 7002 SP=SP-5 :rem 174 7004 GOSUB 6600:HI=5 :rem 84 7005 L=LEN(XA\$): IFL>127THENL=127 :rem 129 7010 FORI=1TOL-1 :rem 179 7020 POKE36876, I+128: FORQQ=1T010:NEXT :rem 239 719Ø PO=VS+ASC(XA\$)+22*ASC(YA\$):LL=LEN(XA \$)-1:XA\$=RIGHT\$(XA\$,LL) :rem 7 7195 YA\$=RIGHT\$(YA\$,LL):POKEPO,32:POKEPO+ SO,1 :rem 17 7200 NEXT: POKE36876,0 :rem 219 721Ø RETURN :rem 170 7500 REM OOPS :rem 241 751Ø PRINT"{CLR}{PUR}" :rem 205 7515 SP=SP-5 :rem 183 7520 PRINT" [10 DOWN] [9 RIGHT] OOPS" :rem 143 7521 LI=LI-1 :rem 148 7525 FORDE=1TO20:NEXT :rem 47 7530 FORDE=1T010:POKE36876,DE*10+150:FORQ Q=1T010:NEXT:NEXT:POKE36876,0:rem 35 7550 FORDE=1TO20:NEXT :rem 45 7560 IFLI <1 THEN 7700 :rem 96 7599 RETURN :rem 190 7700 REM THE GAMES OVER :rem 6Ø 7705 POKE36876,0 :rem 108 7710 PRINT" {CLR }" :rem 51 IF SC>HSTHENHS=SC:GOSUB9000:PRINT" 7715 {CLR}[8]" :rem 43 7718 PRINT"{2 DOWN} {9 RIGHT}NERM" :rem 1 7720 PRINT" [YEL] [4 DOWN]YOUR SCORE ";SC :rem 31 7730 PRINT"[6] [5 DOWN]HIGH SCORE ";HS :rem 2 7735 GOSUB 7800 :rem 37 7736 PRINT" { WHT } { DOWN } PRESS TRIGGER TO PL AY,Q TO QUIT" :rem 155 774Ø FORX=1T015:POKE36876,PN(X):FORD=1T01 ØØ:NEXT:NEXT:POKE36876,Ø :rem 62 :rem 27 778Ø GOSUB4ØØØ:IFFR<>ØTHEN5Ø11 7783 IFPEEK(197)=48THENPOKE198, Ø:PRINT" {CLR} {BLU}"; : POKE36879, 27: POKE36869, 240:END :rem 215 :rem 234 7785 GOTO 7780 7800 REM RANK THE GAMER :rem 44 7810 PRINT" [CYN] [2 DOWN] [3 SPACES] YOUR NE W RANK IS " :rem 99 7820 IFLO=1THENPRINT" [9 SPACES]ZERO" :rem 169 7830 IFLO=2THENPRINT" [8 SPACES] ROOKIE" :rem 52 7840 IFLO=3THENPRINT" [8 SPACES]NOVICE" :rem 49 7850 IFLO=4THENPRINT" {7 SPACES } AVERAGE" :rem 106 7860 IFLO=5THENPRINT" {8 SPACES }MASTER"

7870 IFLO=6THENPRINT" {5 SPACES } GRAND MAST ER" :rem 171 7880 IFLO=7THENPRINT" [8 SPACES]WIZARD" :rem 7Ø 7890 IFLO=8THENPRINT" [5 SPACES] GRAND WIZA RD" :rem 180 7900 IFLO=9THENPRINT" [6 SPACES] SUPER STAR :rem 57 7910 IFLO>9THENPRINT" [5 SPACES] HALL OF FA ME " :rem 65 792Ø RETURN :rem 178 9000 REM NEW HIGH SCORE :rem 51 9002 PRINT"{CLR}" :rem 47 9003 PRINT"{CYN} 6 DOWN} 7 RIGHT NEW HIGH :rem 119 9004 PRINT" [4 DOWN] [8 RIGHT] SCORE": rem 70 9005 FORY=1TO3 :rem 82 9010 FORN=1T05 :rem 69 9020 FORD=1TO5:NEXT :rem 181 9030 POKE36876, N*20+150 :rem 208 9050 NEXT :rem 13 9060 NEXT: POKE36876.0 :rem 225 9065 FORD=1T030:NEXT :rem 236 9070 RETURN :rem 176 9100 REM EXTRA LIFE :rem 82 9110 PRINT"{CLR}" :rem 47 9115 PRINT" {CYN } {10 DOWN } {6 RIGHT } BONUS L IFE" :rem 63 9120 FORJ=100TO200 :rem Ø 914Ø POKE36876, J+5Ø :rem 17 9150 NEXT :rem 14 9160 POKE36876,0 :rem 105 917Ø EX=EX+3 :rem 166 9180 LI=LI+1 :rem 149 919Ø RETURN :rem 179 10000 DIM PN(15), NN(18), JP(2,2): PRINT" [CLR] [88]" :rem 130 10005 SO=38400-VS :rem 170 10010 PRINT" [RED] [6 DOWN] [6 RIGHT] WELCOME TO" :rem 162 10020 PRINT" [CYN] [6 DOWN] [4 RIGHT] NERM OF BEMER" :rem 111 10030 PRINT" [YEL] [4 DOWN] [RIGHT] HIT TRIGG ER TO START" :rem 238 10045 GOSUB4000: IFFR<>0THENRETURN :rem 88 :rem 42 10060 GOTO10045 11100 PRINT"{CLR} [CYN] {10 DOWN} REDEFINING {2 SPACES } CHARACTERS" :rem 91 11105 FORI=0TO2:FORJ=0TO2:READJP(J,I):NEX :rem 79 TJ,I 11110 FORI=7168T07168+64*8:POKEI, PEEK(I+2 5600):NEXTI :rem 46 1118Ø FORI=ØTO39:READA:POKE7168+I+32*8,A: NEXT :rem 201 11185 FORI=ØTO7:READA:POKE7168+I+42*8,A:N :rem 154 EXT :rem 3 1119Ø POKE36869,255 :rem 243 11195 POKE36878,14*16+15 11200 FORI=1T018:READNN(I):NEXT :rem 163 11210 FORI=1T015:READPN(I):NEXT :rem 163 11230 DATA 10,14,6,11,15,7,9,13,5 :rem 62 11240 DATA 0,0,0,0,0,0,0,0 :rem 198 11250 DATA 0,40,170,170,255,60,60,0 :rem 163 11260 DATA 85,85,85,85,85,85,85,85,85 :rem 176 11261 DATA 170, 190, 190, 190, 190, 190, 170, 17 :rem 19 Ø 11262 DATA Ø,60,170,170,170,170,60,0 :rem 214 :rem 61 11263 DATA Ø,40,85,85,85,85,40,0 :rem 39

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- 1127Ø RETURN :rem 219 12000 DATA 195,209,0,209,215,0,215,219,22 5,219,225,219,209,0,195,209,0,209 :rem 52
- 12100 DATA 209,0,0,195,191,195,201,201,19 5,0,0,0,207,207,209 :rem 108

Program 4: Worm Of Bemer-64 Version

Translation by Kevin Martin, Editorial Programmer

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

1 P(DKE52,48:POKE56,48:CLR	:rem 230
	OKE53270, PEEK(53270) AND15	:rem 62
5 PC	DKE53280,0:POKE53281,0	:rem 138
	GOTO5000	:rem 95
100	S=PEEK(56320)AND15:FORD=1TOSF	NEXT
		:rem 98
110	IFS=70RS=60RS=5THENDX=1:DY=0:	DI-LATEO
	D=2THENDX=-1:DY=0:DI=2	
120	IFS=11ORS=10ORS=9THENDX=-1:DY	:rem 18
120		
1 20	IFOD=1THENDX=1:DY=0:DI=1	:rem 108
130	IFS=14THENDY=-1:DX=0:DI=4:IFC	D=3THEND
	I=3:DY=1:DX=Ø	:rem 122
140	IFS=13THENDY=1:DX=0:DI=3:IFOD	=4THENDI
	=4:DY=-1:DX=Ø	:rem 123
145	PO=1024+XA+YA*40:OD=DI:POKEPO	. 42 : POKE
	PO+SO,L1	:rem 3
150	XA=XA+DX:YA=YA+DY:L=LEN(XA\$):	XAS=XAS+
	CHR\$(XA):YA\$=YA\$+CHR\$(YA)	:rem Ø
155	Z=PEEK(1024+XA+YA*40):IFZ<>32	TUENDAG
133	D-1 DER(1024+7A+1A-40):1124(752	
101	DOVEROUL AG DOVEROULA 17	:rem 73
161	POKESO+1, 40: POKESO+4, 17	:rem 83
162	PO=1024+XA+YA*40:POKEPO,42:PO	
	10:POKESO+4,16:IFL <wothen100< td=""><td>:rem 3</td></wothen100<>	:rem 3
190	PO=1024+ASC(XA\$)+40*ASC(YA\$):	LL=LEN(X
	A\$)-1:XA\$=RIGHT\$(XA\$,LL)	:rem 238
191	POKEPO, 32: POKEPO+SO,Ø	:rem 43
195	YA\$=RIGHT\$(YA\$,LL):GOTO100	:rem 19
200	POKESO+1, 20: POKESO+4, 17: POKES	0+4 16
		:rem 72
2Ø1	PO-1024+YA+40*YA . DOVEDO 42. DO	
201	PO=1024+XA+40*YA: POKEPO, 42: PO	
	10:GOSUB6600:IFZ<>BUTHEN260	:rem 202
21Ø	WO=WO+15+3*LO:IFWO>240THENWO=	240
	in the second	:rem 187
22Ø	XX=INT(RND(1)*36+2):X=INT(RND	
):IFPEEK(1024+XX+40*X)<>32THE	N22Ø
		:rem 9
221	SC=SC+100+LO*7:POKESO+4,55:PO	KESO+4,1
	7	:rem 223
225	HI=HI-1:GOSUB6600:IFHI>0THEN2	
		:rem 112
226	PO=1024+20+40*2:POKEPO,160:PO	
220	Ø:PO=1024+20+21*40:POKEPO,160	
227		
227	POKEPO+SO, Ø: PO=1024+40*12: POK	
	POKEPO+SO,Ø:POKESO+1,100:POKE	
	and the second	:rem 169
228	PO=1024+40*12+39:POKEPO,160:P	OKEPO+SO
	,Ø:GOTO1ØØ	:rem 242
229	PO=1024+XX+X*40:POKEPO,BUG:PO	KEPO+SO,
	13	:rem 163
230	GOTO1ØØ	:rem 95
	IFZ <> 16ØANDLI > 1THENGOSUB7500:	GOT0290
200		:rem 242
265		:rem 146
	POKESO+1,90:POKESO+4,17	:rem 89
271	GOSUB7000:PRINT" [HOME] [24 DOW	
		:rem 151
	FORDE=1TO24:PRINT:POKESO+1,DE	
	+4,17:NEXT:POKESO+4,16	:rem 40
28Ø	LO=LO+1:WO=5:IFLO=12THEN1200	:rem 177
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VIC, 64, And TI-99/4A Notes

Patrick Parrish, Programming Supervisor

The object of all versions of "Worm of Bemer" is to safely guide Nerm the Worm through 11 levels, or rooms, to his home. Each room, of course, offers a different arrangement of obstructing walls. To advance from one room to another, you must eat five magic mushrooms. If you bump into a wall or into your own trail along the way, you lose a life. Fortunately, you have four lives. Every third room, you are awarded another life.

The VIC-20 version of Worm of Bemer is a two-part program requiring at least 8K of additional memory. Type in Program 2 and SAVE it. If you are using tape, delete lines 10 and 40 in the program and remove the REM in line 11 before you SAVE it. Then enter Program 3 and SAVE it just after Program 2 on the tape. On the other hand, if you are using a disk drive, type in and SAVE Program 2 as it is. Next, enter Program 3 and SAVE it as "NM".

To LOAD the VIC version of Worm of Bemer from tape, LOAD Program 2 and RUN it. Program 2 will automatically LOAD and RUN Program 3. To LOAD Worm of Bemer from disk, LOAD and RUN Program 2. Program 2 will automatically LOAD Program 3 and place the cursor over the RUN command. When the disk drive stops spinning, press RETURN (to execute the RUN command) to start the game.

The VIC version of Worm of Bemer, like the Atari version, is played with a joystick. The 64 version (Program 4) is also played with a joystick. If you have a 64, plug your joystick into port 2 to play.

Written with single statement lines, the TI-99/4A version of Worm of Bemer (Program RUNs in either regular or Extended BASIC. With this version, use keyboard control (E, S, D, and X keys, with the arrows on them) to maneuver Nerm through each room.

281	L1=L1+1:IFL1>15THENL1=11	:rem 99
285	IFLO>EXTHENGOSUB9100	:rem 29
	PRINT" {CLR} ": GOSUB 4100	:rem 132
290	GOSUB66ØØ	:rem 231
300	ONLO GOTO5020,400,500,550,	600,700,800
	,450,550,1000,1100,1200	:rem 176
399	GOTO5Ø15	:rem 169
400	REM SECOND SCREEN	:rem 244

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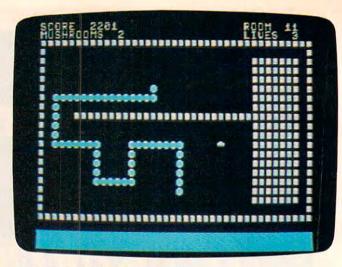
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410	FORI=1024+5+10		
	I,35:POKEI+SO,	9:NEXT	:rem 253
42Ø	GOTO5Ø2Ø		:rem 150
450	REM SCREEN		:rem 61
46Ø	FORI=1024+5+10		
	I,35:POKEI+SO,		:rem 2
465	FORI=1024+18+5		
170	Ø: POKEI, 35: POKI	SI+SO, 9:NEX	
470	GOTO5020	CODEEN	:rem 155
500 510	REM THE FOURTH		:rem 242
510	FORI=1024+5+5*4		
520	35:POKEI+SO,9:1		:rem 166
520	FORI=1024+5+18		
53Ø	I,35:POKEI+SO,9 GOTO5Ø2Ø	SINEAT	:rem 15 :rem 152
550			
560	REM FRAME 5	10001004100	:rem 30
200	FORI=1024+7+6*4		
575	35:POKEI+SO,9:1 FORI=1024+18+7*		:rem 173
515	Ø:POKEI, 35:POKE	40101024+18	3+20-40STEP4
58Ø	GOTO5020	SITSO, 9:NEXT	
600	REM FRAME 6		:rem 157
610	FORI=1024+1+10*	A0TO1024+10	:rem 27
010	I,35:POKEI+SO,9	+0101024+10	
615	FORI=1024+22+10	*40001024+3	:rem 252
010	EI, 35: POKEI+SO,	9 • NEYT	:rem 54
620	GOTO5Ø2Ø	Jendal	:rem 152
700	REM FRAME 7		:rem 29
710	FORJ=6TO14:FORI	=1024+6+,T*4	
	J*40:POKEI,35:F	OKET+SO.9.N	JEXT . rem 180
715	FORI=1024+20+J*	40TO1024+32	+.T*40 . POKET
	,35:POKEI+S0,9:	NEXT : NEXT	:rem 122
720	GOTO 5020		:rem 153
800	REM FRAME 8		:rem 31
811	FORI=1024+1+8*4	ØT01Ø24+18+	-8*40: POKEI.
	35: POKEI+SO, 9:N	EXT	:rem 173
812	FORI=1024+1+15*	40T01024+18	8+15*40:POKE
	I,35:POKEI+SO,9	:NEXT	:rem 1Ø
813	FORI=1024+15+12	*40T01024+3	8+12*4Ø:POK
	EI,35:POKEI+SO,	9:NEXT	:rem 6Ø
-	GOTO5Ø2Ø		:rem 161
1000			
	+J*40:POKEI,35	: POKEI+SO, 9	
			:rem 91
1002	FORJ=4T019:FOR		
	+J*40:POKEI,32	:POKEI+SO,9	
1010	GOTO5Ø2Ø		:rem 87
	FORJ=4T019:FOR	T-1024+1+T*	:rem 194
1100	+J*40:POKEI,35		
	+0 40.PORE1,55	.FORE1+50,5	:rem 92
1105	FORJ=4T019:FOR	T=1024+1+,T*	
	+J*40:POKEI,32		
			:rem 87
1110	GOTO4ØØ		:rem 144
	REM YOU WIN		:rem 146
	FORZZ=1TO3		:rem 167
1210	PRINT"{CLR}{8	DOWN } { 14 RI	GHT] NERM'S
	{SPACE }HOME"		:rem 27
1212	PRINT" {5 DOWN }	{15 RIGHT}T	HANK YOU"
			:rem 18
1215	FORG=1TO5		:rem 61
1220	FORI=1TO1Ø		:rem 103
1229	POKESO+1, I+6:P	OKES0+4,17	:rem 207
	NEXT:NEXT		:rem 127
1245	FORI=1TO200:PC	KESO+1, I:PC	
	EXT		:rem 242
1250	NEXT: GOTO7700		:rem 72
4100	FORI=56216T056		
-	36 : NEXT : RETURN		:rem 232
	REM UP THE GAM	IE	:rem 73
88 CC	MPUTE! April 1984		

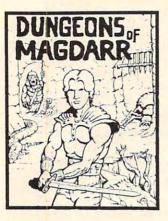


64 version of "Worm of Bemer."

5005 GOSUB10000:GOSUB11100:BUG=33:rem 163 5011 SP=35:LI=4:SC=0:LO=1:GOSUB5500:HI=5: WO=5:EX=2:L1=11 :rem 126 5012 POKE53270, PEEK(53270)OR16 :rem 163 5015 PRINT" {CLR }": GOSUB6500 :rem 180 5020 XAS="":YAS="":XBS="":YBS="":XA=20:YA =19:DX=Ø :rem 161 5021 IFLO=3THENYA=18 :rem 209 5025 DY=-1:T=0:IFHI<0THENHI=0 :rem 242 5030 DI=4:IFHI>5THENHI=5 :rem 197 5050 FORI=1024+40*2T01024+39+40*2:POKEI,3 5:POKEI+19*40,35:POKEI+SO,9 :rem 104 5051 POKEI+SO+19*40,9:NEXT :rem 17 5055 FORI=1024+40*2T01024+40*20STEP40:POK EI, 35: POKEI+39, 35: POKEI+SO, 9 :rem 26 5056 POKEI+SO+39,9:NEXT:IFHI>0THEN5060 :rem 76 5057 I=1024+20+40*2:POKEI,160:POKEI+SO,0: I=1024+20+21*40:POKEI,160:POKEI+SO,0 :rem 102 5058 POKE1024+12*40,160:POKE1024+12*40+SO ,Ø :rem 28 5059 POKE1024+12*40+39,160:POKE1024+12*40 +SO+39,0:GOSUB4100:GOTO150 :rem 211 5060 XX=RND(1)*36+2:X=RND(1)*18+3:IFPEEK(1024+XX+X*40) <> 32THEN5060 :rem 255 5065 POKE1024+XX+X*40, BU: POKE1024+XX+X*40 +SO,13 :rem 238 5070 GOSUB4100 :rem 17 5Ø85 GOTO15Ø :rem 161 5500 PRINT" {CLR}" :rem 46 5510 PRINT" {11 DOWN } {15 RIGHT } GET READY" :rem 95 5540 FORX=1TO14:POKESO+1,NN(X):POKESO+4,1 :rem 84 7:FORD=1TO120:NEXT:NEXT :rem 150 5545 POKESO+4,16 :rem 175 5550 RETURN :rem 74 6500 REM REDEFINING SCREEN :rem 143 6510 POKESO+4,16 :rem 35 6575 GOSUB 6600 :rem 179 658Ø RETURN 6600 REM PRINT SCORE :rem 185 6605 PRINT" [YEL] [HOME] SCORE "; SC :rem 160 6606 PRINT" [HOME] [30 RIGHT] ROOM ";LO :rem 47 6610 PRINT"MUSHROOMS ";HI; "{17 SPACES}LIV :rem 9 ES ";LI :rem 174 662Ø RETURN 7000 REM CLEAN UP THE CENTIPEDE :rem 37 :rem 174 7002 SP=SP-5 :rem 84 7004 GOSUB 6600:HI=5

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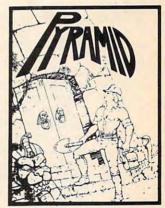
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7005 L=LEN(XAS) :rem 66 7010 FORI=1TOL-1 :rem 179 7020 POKESO+1, I: POKESO+4, 17: FORQO=1T010:N EXT :rem 23 7190 PO=1024+ASC(XA\$)+40*ASC(YA\$):LL=LEN(XA\$)-1:XA\$=RIGHT\$(XA\$,LL) :rem 37 7195 YA\$=RIGHT\$(YA\$,LL):POKEPO, 32:POKEPO+ S0,1 :rem 17 7200 NEXT: POKESO+4, 16 :rem 5 721Ø RETURN :rem 170 7500 REM OOPS :rem 241 751Ø PRINT" {CLR} {PUR}" :rem 205 7515 SP=SP-5 :rem 183 7520 PRINT" {12 DOWN } [18 RIGHT } OOPS" :rem 182 7521 LI=LI-1 :rem 148 7525 FORDE=1TO20:NEXT :rem 47 7530 FORDE=1TO10: POKESO+1, DE*20: POKESO+4, 17:FORQQ=1TO10:NEXT:NEXT:POKESO+4,16 :rem 123 7550 FORDE=1TO20:NEXT :rem 45 7560 IFLI < 1THEN7700 :rem 96 7599 PRINT" {CLR} ": RETURN :rem 92 7700 REM THE GAMES OVER :rem 60 7705 POKESO+4,16 :rem 150 7710 PRINT" {CLR}": POKE53270, PEEK(53270)AN D15 :rem 121 7715 IF SC>HSTHENHS=SC:GOSUB9000:PRINT" {CLR}[8]" :rem 43 7718 PRINT" [6 DOWN] [18 RIGHT] NERM": rem 74 7720 PRINT" [YEL] [4 DOWN]YOUR SCORE "; SC :rem 31 7730 PRINT [6] 4 DOWN HIGH SCORE ";HS :rem 241 7735 GOSUB 7800 :rem 37 7736 PRINT" { WHT } { 2 DOWN } PRESS THE TRIGGER TO PLAY AGAIN, Q=QUIT" :rem 135 7740 FORX=1T015:POKESO+1,PN(X):POKESO+4,1 7:FORD=1T0100:NEXT:NEXT :rem 89 7745 POKESO+4,16 :rem 154 778Ø S=PEEK(5632Ø)AND16:IFS=ØTHEN5Ø11 :rem .149 7783 IFPEEK(197)=62THENPOKE198,0:SYS2048 :rem 135 7785 GOTO778Ø :rem 234 7800 REM RANK THE GAMER :rem 44 7810 PRINT" [CYN] [2 DOWN] [7 SPACES] YOUR NE W RANK IS "; :rem 158 7820 IFLO=1THENPRINT"ZERO" :rem 169 7830 IFLO=2THENPRINT"ROOKIE" :rem 52 7840 IFLO=3THENPRINT"NOVICE" :rem 49 7850 IFLO=4THENPRINT"AVERAGE" :rem 106 786Ø IFLO=5THENPRINT"MASTER" :rem 61 7870 IFLO=6THENPRINT"GRAND MASTER" :rem 171 7880 IFLO=7THENPRINT"WIZARD" :rem 70 7890 IFLO=8THENPRINT"GRAND WIZARD" :rem 180 7900 IFLO=9THENPRINT"SUPER STAR" :rem 57 7910 IFLO>9THENPRINT"HALL OF FAME":rem 65 7920 RETURN :rem 178 9000 REM NEW HIGH SCORE :rem 51 9002 PRINT"{CLR}" :rem 47 9003 PRINT"{CYN} {8 DOWN} {16 RIGHT} NEW HIG H" :rem 158 9004 PRINT" {4 DOWN } {17 RIGHT } SCORE" :rem 75 9005 FORY=1TO3 :rem 82 :rem 69 9010 FORN=1T05 9020 FORD=1T05:POKESO+1,D*20:POKESO+4,17: :rem 22 NEXT 90 COMPUTE! April 1984

9030 POKESO+1, N*30: POKESO+4, 17 :rem 254 9050 NEXT :rem 13 9060 NEXT :rem 14 9065 FORD=1TO30:NEXT :rem 236 9070 RETURN :rem 176 9100 REM EXTRA LIFE :rem 82 9110 PRINT"{CLR}" :rem 47 9115 PRINT" [CYN] [12 DOWN] [15 RIGHT] BONUS {SPACE}LIFE" :rem 102 -9120 FORJ=100TO200 :rem Ø 9140 POKESO+1, J: POKESO+4, 17 :rem 111 915Ø NEXT :rem 14 9160 POKESO+4,16 :rem 147 9170 EX=EX+3 :rem 166 918Ø LI=LI+1 :rem 149 9190 RETURN :rem 179 10000 DIM PN(15), NN(18): PRINT" {CLR} 83" :rem 219 10005 SO=54272:POKESO+24,15:POKESO+5,17:P OKESO+6,241:POKESO,100 :rem 253 10010 PRINT" {6 DOWN } {15 RIGHT } WELCOME TO" :rem 139 10020 PRINT" {CYN} {4 DOWN} {14 RIGHT} NERM O F BEMER" :rem 111 10025 PRINT"[1] [3 DOWN] [13 RIGHT] USE JO YSTICK #2" :rem 168 10030 PRINT"[6][6 DOWN][11 RIGHT]HIT TR IGGER TO START" :rem 45 10045 S=PEEK(56320)AND16:IFS=0THENRETURN :rem 210 10060 GOTO10045 :rem 42 11100 PRINT" [CLR] [CYN] [12 DOWN] [9 RIGHT] R EDEFINING{2 SPACES}CHARACTERS" :rem 130 11109 POKE56334, PEEK(56334) AND254: POKE1, P EEK(1)AND251 :rem 29 11110 FORI=12288T012288+64*8: POKEI, PEEK(I +40960):NEXTI :rem 146 11120 POKE1, PEEK(1) OR4: POKE56334, PEEK(563 34) OR1 :rem 228 11180 FORI=0TO39:READA:POKE12288+I+32*8,A :NEXT :rem 248 11185 FORI=ØTO7:READA:POKE12288+I+42*8.A: NEXT :rem 201 1119Ø POKE53272, (PEEK(53272) AND24Ø)+12 :rem 27 11200 FORI=1T018:READNN(I):NEXT :rem 163 11210 FORI=1TO15:READPN(I):NEXT :rem 163 11240 DATA 0,0,0,0,0,0,0,0 :rem 198 11250 DATA 0,20,85,85,255,40,40,0 :rem 71 11260 DATA 85,85,85,85,85,85,85,85,85 :rem 176 11261 DATA 170,190,190,190,190,190,170,17 Ø :rem 19 5 :rem 42 11263 DATA Ø, 20, 255, 255, 255, 255, 20, Ø :rem 223 1127Ø RETURN :rem 219 12000 DATA 33,44,0,44,50,0,50,56,67,56,67 ,56,44,0,33,44,0,44 :rem 114 12100 DATA 44,0,0,33,31,33,37,37,33,0,0,0 ,42,42,44 :rem 108

Program 5: Worm Of Bemer—TI Version

Translation by Patrick Parrish, Programming Supervisor

3 DIM NN(29),RANK\$(12) 5 GOSUB 11000 10 GOTO 5000 20 FOR I=1 TO LEN(H\$)

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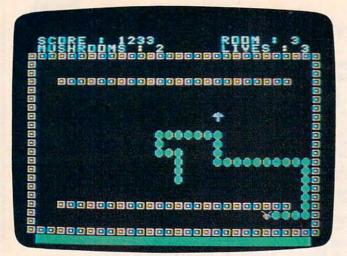
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TI version of "Worm of Bemer."

11 version of vvorm of Bemer.
30 CALL HCHAR(ROW,COL+I,ASC(SEG\$(H\$
,I,1)))
35 NEXT I
4Ø RETURN
100 CALL KEY(0,K,ST)
105 IF (K<>68)+(OD=2)THEN 110
106 DX=1
1Ø7 DY=Ø
1Ø8 DI=1
110 IF (K<>83)+(OD=1)THEN 115
111 DX = -1
112 DY=Ø
113 DI=2
115 IF (K<>69)+(OD=3)THEN 120
116 DY = -1
117 DX=Ø
118 DI=4
12Ø IF (K<>88)+(0D=4)THEN 14Ø
125 DY=1
13Ø DX=Ø
135 DI=3
140 CALL HCHAR(YA, XA, 136)
145 OD=DI
150 XA=XA+DX
152 YA=YA+DY
154 L=LEN(XA\$)
156 XA\$=XA\$&CHR\$(XA)
158 YA\$=YA\$&CHR\$(YA)
160 CALL GCHAR(YA, XA, Z)
162 IF Z<>32 THEN 200
164 CALL HCHAR(YA, XA, 128)
166 CALL SOUND(1,622,2)
168 IF L <wo 100<="" td="" then=""></wo>
170 CALL HCHAR (ASC(YA\$), ASC(XA\$), 32)
172 LL=LEN(XA\$)-1
174 XA\$=SEG\$(XA\$,2,LL)
176 YA\$=SEG\$(YA\$,2,LL)
18Ø GOTO 1ØØ
200 CALL SOUND (100,311,2)
201 CALL HCHAR (YA, XA, 128)
203 GOSUB 6600
205 IF Z<>MUSH THEN 260
210 W0=W0+15+2*L0
212 IF WO<185 THEN 215
215 RANDOMIZE
216 XX=RND*28+3
218 X=RND*19+4
220 CALL GCHAR(X, XX, H1)
222 IF H1<>32 THEN 216

224 SC=SC+100+L0*7 228 HI=HI-1 230 GOSUB 6600 232 IF HI>Ø THEN 245 234 CALL HCHAR(3, 17, 104) 236 CALL HCHAR(13, 2, 104) 238 CALL HCHAR(13, 31, 104) 24Ø CALL HCHAR(23,17,104) 241 FOR I=3 TO 30 STEP 3 242 CALL SOUND (100, 1900, I) 243 NEXT I 244 GOTO 100 245 CALL HCHAR(X, XX, MUSH) 25Ø GOTO 1ØØ 260 IF Z=104 THEN 270 261 IF LI=1 THEN 7500 264 GOSUB 7500 266 GOTO 29Ø 270 CALL HCHAR (YA, XA, 136) 272 GOSUB 7000 275 FOR DE=110 TO 880 STEP 32 277 PRINT 279 CALL SOUND (1, DE, 2) 280 CALL SOUND (-1, DE, 2) 281 NEXT DE 282 L0=L0+1 283 IF LO=12 THEN 1200 284 W0=5 285 L1=L1+1 286 IF LO>EX THEN 9100 287 CALL COLOR(14, L1, 1) 288 CALL CLEAR 289 GOSUB 1300 29Ø GOSUB 66ØØ 300 ON LO GOTO 5080,400,500,550,600 ,700,800,450,550,1000,1100,1200 399 GOTO 5080 400 REM SECOND SCREEN 410 CALL HCHAR(13, 5, 120, 24) 42Ø GOTO 5Ø8Ø 449 REM SCREEN 450 CALL VCHAR(7,15,120,16) 455 CALL HCHAR(9,6,120,22) 460 GOTO 5080 499 REM FOURTH SCREEN 500 CALL HCHAR(6,5,120,24) 505 CALL HCHAR(20,5,120,24) 510 GOTO 5080 549 REM FIFTH SCREEN 550 CALL HCHAR (7, 6, 120, 22) 555 CALL VCHAR (8, 15, 120, 16) 56Ø GOTO 5Ø8Ø 599 REM FRAME 6 600 CALL HCHAR(12,3,120,13) 610 CALL HCHAR(12, 19, 120, 12) 62Ø GOTO 5Ø8Ø 699 REM FRAME 7 700 FOR I=8 TO 18 710 CALL HCHAR(1,7,120,7) 715 CALL HCHAR(1,18,120,8) 72Ø NEXT I 725 GOTO 5080 799 REM FRAME 8 800 CALL HCHAR (8, 3, 120, 13) 805 CALL HCHAR(14,12,120,19) 810 CALL HCHAR(18, 3, 120, 13) 815 GOTO 5Ø8Ø 999 REM FRAME 9 1000 GOSUB 1400 1015 FOR T=5 TO 21 1020 CALL HCHAR(T, 4, 32, 16) Cwww.commodore.ca

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```
1025 NEXT T
1030 GOTO 5080
1100 GOSUB 1400
1110 FOR T=5 TO 21
1115 CALL HCHAR(T,4,32,20)
1120 NEXT T
112Ø NEXT T
1125 GOTO 400
1199 REM YOU WIN!!
1200 CALL CLEAR
1205 CALL SCREEN(3)
1206 FOR I=4 TO 8
1207 CALL COLOR(1,2,1)
1208 NEXT I
1210 PRINT TAB(9); "NERM'S HOME!"
1220 PRINT
1230 PRINT
1240 PRINT TAB(10); "THANK YOU!"
1250 FOR T=1 TO 9
1260 PRINT
127Ø NEXT T
1275 FOR T=1 TO 3
1280 FOR I=110 TO 880 STEP 30
1283 CALL SOUND(1,1,2)
1284 CALL SOUND(-1,1,2)
1285 NEXT I
1286 FOR I=880 TO 110 STEP -30
1287 CALL SOUND (1, I, 2) 5520 NEXT T
1288 CALL SOUND (-1, 1, 2)
1289 NEXT I
1290 NEXT T
1291 CALL SCREEN(2)
1293 GOTO 7700
1300 CALL CLEAR

        1300
        CALL
        CLEAR
        6600
        H$=STR$ (SC)

        1305
        PRINT
        "SCORE :";TAB(20);"ROOM
        6603
        ROW=1

     : "
1310 PRINT "MUSHROOMS :"; TAB(20); "L 6605 GOSUB 20
     IVES :"
1320 FOR T=1 TO 21
1330 PRINT
1340 NEXT T
1350 RETURN
1400 FOR T=5 TO 21
1410 CALL HCHAR(T,4,120,26)
1420 NEXT T
143Ø RETURN
4999 REM UP THE GAME
5000 GOSUB 10000
5005 MUSH=112
5Ø1Ø LI=4
5Ø15 SC=Ø
5020 LO=1
5Ø35 HI=5
5040 W0=5
5Ø45 EX=2
5050 L1=3
5055 GOSUB 5500
5060 CALL CLEAR
5065 CALL SCREEN(2)
5066 FOR I=3 TO 8
5067 CALL COLOR(I,16,1)
5068 NEXT I
5070 GOSUB 1300
5075 GOSUB 6600
5Ø8Ø XA$=""
5081 YA$=""
5085 XA=17
5086 YA=18
5091 DX=0
5093 DY=-1
5103 IF HI<6 THEN 5107
51Ø5 HI=5
5107 IF HI>-1 THEN 5110
94 COMPUTE! April 1984
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```
5109 HI=Ø
     511Ø DI=4
     5115 FOR I=2 TO 31 STEP 29
     5120 CALL VCHAR(3, 1, 120, 21)
     5125 NEXT I
     5130 FOR I=3 TO 23 STEP 20
     5135 CALL HCHAR(1,3,120,28)
     514Ø NEXT I
     5145 CALL HCHAR(24,3,137,28)
     515Ø IF HI>Ø THEN 5174
    5155 CALL HCHAR(3,17,104)
5160 CALL HCHAR(12,2,104)
5165 CALL HCHAR(12,31,104)
  5167 CALL HCHAR(23,17,104)
5171 GOTO 150
     5174 RANDOMIZE
    5175 XX=RND*28+3
 5178 X=RND*19+4
     518Ø CALL GCHAR(X, XX, H1)
     5185 IF H1<>32 THEN 5174
     5190 CALL HCHAR(X, XX, MUSH)
   5200 GOTO 150
    5500 CALL CLEAR
     5505 PRINT TAB(10); "GET READY!"
     551Ø FOR T=1 TO 12
     5515 PRINT
     5525 FOR I=1 TO 14
    5530 CALL SOUND (100, NN(I), 2)
     5535 NEXT I
      554Ø RETURN
6599 REM PRINT SCORE
    6604 COL=10
      6607 H$=STR$(LO)
      6608 COL=28
      6609 GOSUB 20
      661Ø H$=STR$(HI)
     6611 ROW=2
     662Ø COL=14
    6625 GOSUB 20
     663Ø H$=STR$(LI)
     6635 COL=29
      664Ø GOSUB 2Ø
      665Ø RETURN
      6999 REM NERM LEAVES
      7000 SP=SP-5
      7005 GOSUB 6600
      7Ø1Ø HI=5
      7015 L=LEN(XA$)
      7020 FOR I=1 TO L
      7025 CALL SOUND(2,110+1*2,2)
      7030 CALL HCHAR (ASC(YA$), ASC(XA$), 3
           2)
      7035 LL=LEN(XA$)-1
      7040 XA$=SEG$(XA$,2,LL)
      7045 YA$=SEG$(YA$,2,LL)
      7050 NEXT I
      7060 RETURN
      7499 REM. 00P!!
      7500 CALL CLEAR
      7505 PRINT TAB(13); "00PS"
     7510 FOR I=1 TO 12
     7515 PRINT
     752Ø NEXT I
     7525 LI=LI-1
     7547 FOR I=14 TO 24
     7549 CALL SOUND (10, 1*40, 2)
     7551 NEXT I
    7553 FOR I=1 TO 30
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```

7555 NEXT I 7560 IF LI<1 THEN 7700 7575 GOSUB 1300 7600 RETURN 7699 REM THE GAME ENDS 7700 CALL CLEAR 77Ø4 FOR I=3 TO 8 7705 CALL COLOR(1,16,1) 7706 NEXT I 771Ø IF HS>SC THEN 775Ø 772Ø HS=SC 7721 FOR I=1 TO 5 7722 PRINT 7723 NEXT I 7725 PRINT TAB(8); "NEW HIGH SCORE" 7728 FOR T=110 TO 1760 STEP 50 7729 CALL SOUND (2, T, 2) 773Ø NEXT T 774Ø FOR I=1 TO 5 7743 PRINT 7745 NEXT I 7750 PRINT TAB(7); "YOUR SCORE: ";SC 7755 PRINT 7760 PRINT TAB(7); "HIGH SCORE: "; HS 777Ø FOR I=1 TO 3 7775 PRINT 778Ø NEXT I 7785 PRINT TAB(5); "YOUR NEW RANK IS : " 779Ø PRINT 7795 PRINT TAB(9); RANK\$(LO) 7796 FOR I=15 TO 29 7797 CALL SOUND(100, NN(I), 2) 7798 NEXT I 7800 PRINT 78Ø5 PRINT 7806 PRINT 7810 PRINT "(C TO CONTINUE Q TO QU 11085 NEXT I IT) 7815 FOR T=1 TO 4 7816 PRINT 7817 NEXT T 7820 CALL KEY(0,K,ST) 7830 IF ST=0 THEN 7820 784Ø IF (K<>67)*(K<>81)THEN 782Ø 7845 IF K=67 THEN 5000 785Ø STOP 9099 REM EXTRA LIFE 9100 CALL CLEAR 9110 PRINT TAB(11); "BONUS LIFE" 9120 FOR I=1 TO 12 9125 PRINT 913Ø NEXT I 9132 FOR I=1 TO 30 STEP 2 9134 CALL SOUND (100, 1175, I) 9136 NEXT I 9140 EX=EX+3 9145 LI=LI+1 915Ø GOTO 287 10000 CALL CLEAR 10001 FOR T=3 TO 8 10003 CALL COLOR(T, 2, 1) 10006 NEXT T 10010 CALL COLOR(14,3,1) 10015 CALL SCREEN(15) 10020 PRINT TAB(10); "WELCOME TO" 10021 FOR T=1 TO 4 10022 PRINT 10023 NEXT T 10025 PRINT TAB(8); "NERM OF BEMER" 10028 FOR T=1 TO 9 10030 PRINT

```
10032 NEXT T
10034 PRINT "USE E.S.D. & X KEYS TO
        MOVE"
10036 PRINT
10040 CALL HCHAR(21,3,136,4)
10042 CALL HCHAR(21,8,128)
10045 FOR I=1 TO 22
10047 CALL HCHAR(21,6+1,136)
10050 CALL HCHAR(21,7+1,128)
10052 CALL SOUND (10, 622, 2)
10055 CALL HCHAR(21,2+1,32)
10057 FOR T=1 TO 20
10058 NEXT T
10060 NEXT I
10065 FOR T=1 TO 100
10070 NEXT T
10075 RETURN
10999 REM REDEFINE CHARS
11000 FOR I=104 TO 136 STEP 8
11015 READ A$
11020 CALL CHAR(I,A$)
11025 NEXT I
 11030 DATA FFFFFFFFFFFFFFFF, 187EFFF
      F18181818, FF81BDA5A5BD81FF
11032 DATA 8142243C7E5A3C18, 387CFEF
       EFEFE7C38
11033 CALL COLOR(10,2,2)
11035 CALL COLOR(11,14,1)
11040 CALL COLOR(12,2,10)
11045 CALL COLOR(13,7,1)
11050 CALL CHAR(137,"FFFFFFFFFFFFFFF
       FF")
11060 FOR I=1 TO 9
11065 READ RANK$(I)
11070 NEXT I
11075 FOR I=10 TO 12
 11080 RANK$(I)="HALL OF FAME"
 11090 DATA ZERO, ROOKIE, NOVICE, AVERA
       GE
 11092 DATA MASTER, GRAND MASTER, WIZA
       RD, GRAND WIZARD
11094 DATA SUPER STAR
11100 FOR I=1 TO 29
1111Ø READ NN(I)
1112Ø NEXT I
 11130 DATA 262,349,40000,349,392,40
       000,392,440,523,440,523,440,3
       49,40000
 11135 DATA 349,40000,40000,262,247,
       262,294,294,262,40000,40000,4
       0000,330,330,349
 1114Ø RETURN
 Program 6: Worm Of Bemer—PC/PCjr Version
Translation by Patrick Parrish, Programming Supervisor
 2 DEF SEG=0: POKE 1047, 80: SCREEN 0,1
 4 WIDTH 40:KEY OFF
 5 DEF SEG=&HB800
 7 DIM RANK$(12):GOSUB 11000
 10 GOTO 5000
 100 A$=RIGHT$(INKEY$,1):FOR D=1 TO SP:NE
 XT D
 110 IF A$=CHR$(77) THEN DX=1:DY=0:DI=1:I
 F OD=2 THEN DX=-1:DY=0:DI=2
 120 IF A$=CHR$(75) THEN DX=-1:DY=0:DI=2:
```

IF OD=1 THEN DX=1:DY=0:DI=1

IF OD=3 THEN DI=3:DY=1:DX=0

130 IF A\$=CHR\$(72) THEN DY=-1:DX=0:DI=4:

140 IF A\$=CHR\$(80) THEN DY=1:DX=0:DI=3:I

F OD=4 THEN DI=4:DY=-1:DX=0 Cwww.commodore.ca

Notes For PC And PCjr

Program 6 is written for the IBM PC or PCjr with 64K of memory and will RUN on any BASIC (PCjr with disk requires Cartridge BASIC). With the PC, a Color Adaptor is necessary. If you have the PCjr, enhance the sounds produced in the game by adding the following line:

1 SOUND ON

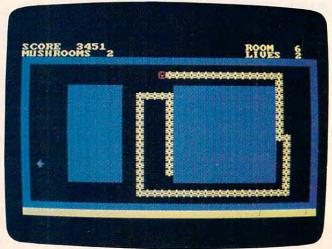
This statement causes all sounds to be emitted from the TV or monitor speaker in addition to the PCjr's internal speaker.

The PC/PCjr version of "Worm of Bemer" is played with the keyboard. Use the arrow keys (found on the numeric keypad on the PC) to control Nerm's movements. In this program, two skill levels are featured—easy and difficult. The skill level you choose determines the speed of the game. If you find that the game loses its challenge for you even on the difficult level, set variable A2(2) to 0 in line 10000. This will further increase the speed, and thus, the challenge of the game.

145 PO=2*XA+YA*80:0D=DI:POKE PO,15:POKE PO+1,L1

150 XA=XA+DX:YA=YA+DY:L=LEN(XA\$):XA\$=XA\$ +CHR\$(XA):YA\$=YA\$+CHR\$(YA) 155 Z=PEEK(XA*2+YA*80): IF Z<>32 THEN 200 161 SOUND 500,.5 162 PD=XA*2+YA*80:POKE PO+1,12:POKE PO,1 : IF L<WO THEN 100 190 PD=ASC(XA\$) *2+80*ASC(YA\$):LL=LEN(XA\$)-1:XA\$=RIGHT\$(XA\$,LL) 191 POKE PD, 32: POKE PO+1,0 195 YA\$=RIGHT\$(YA\$,LL):GOTO 100 200 PO=XA*2+YA*80:POKE PO+1,12:POKE PO,1 :GOSUB 6605: IF Z<>BU THEN 260 210 WD=WD+15+3*LO:IF WD>240 THEN WD=240 220 XX=INT(RND(1)*36+2):X=INT(RND(1)*18+ 3): IF PEEK(XX*2+80*X)<>32 THEN 220 ELSE A5=XX*2+80*X 225 SC=SC+100+LD*7:FOR I=1900 TD 1950 ST EP 10:SOUND I, . 5:NEXT 226 HI=HI-1: GOSUB 6605: IF HI>0 THEN 229 227 POKE 198,219: POKE 199,0: POKE 1878,21 9:POKE 1879, 0:POKE 960, 219:POKE 961, 0:PO KE 1038,219:POKE 1039,0 228 FOR I=900 TO 990 STEP 10:SOUND I,.5: NEXT: GOTO 100 229 PD=2*XX+X*80:POKE PO,BU:POKE PO+1,5: GOTO 100 260 IF Z<>219 AND LI>1 THEN GOSUB 7510:G OTO 290 265 IF Z<>219 THEN 7510 270 GOSUB 7002:LOCATE 24,1:PRINT STRING\$ (1,11)STRING\$(24,31) 275 FOR DE=1 TO 24:PRINT:SOUND DE+99,.5 277 NEXT DE 280 LO=LO+1:WO=5: IF LO=12 THEN 1200 281 L1=L1+1: IF L1>15 THEN L1=9

285 IF LO>EX THEN GOSUB 9105 287 CLS: GOSUB 4100 290 GOSUB 6605 300 ON LO GOTO 5020,400,500,550,600,700, 800, 450, 550, 1000, 1100, 1200 395 GOTO 5015 399 REM SECOND SCREEN 400 FOR I=10+13*80 TO 70+13*80 STEP 2:PD KE I, 178: POKE I+1, 65: NEXT I 420 GOTO 5020 449 REM THIRD SCREEN 450 FOR I=10+13*80 TD 70+13*80 STEP 2:PD KE I, 178: POKE I+1, 65: NEXT I 460 FOR I=40+5*80 TO 40+20*80 STEP 80:PD KE I+1,65:POKE I,178:NEXT I:GOTO 5020 499 REM FOURTH SCREEN 500 FOR I=10+6*80 TO 70+6*80 STEP 2:POKE I, 178: POKE I+1, 65: NEXT I 520 FDR I=10+19*80 TD 70+19*80 STEP 2:PD KE I+1,65:POKE I,178:NEXT I:GOTO 5020 549 REM FRAME 5 550 FOR I=14+6*80 TO 64+6*80 STEP 2:POKE I+1,65:POKE I,178:NEXT I 560 FOR I=36+7*80 TO 36+22*80 STEP 80:PO KE I+1,65:POKE I,178:NEXT I:GOTO 5020 599 REM FRAME 6 600 FOR I=2+11*80 TO 32+11*80 STEP 2:POK E I+1,65:POKE I,178:NEXT I 610 FOR I=44+11*80 TO 76+11*80 STEP 2:PO KE I+1,65:POKE I,178:NEXT I:GOTO 5020 699 REM FRAME 7 700 FOR J=6 TO 19:FOR I=12+J*80 TO 24+J* 80 STEP 2: POKE I, 178: POKE I+1, 65: NEXT I 710 FOR I=40+J*80 TO 66+J*80 STEP 2:POKE I, 178: POKE I+1, 65: NEXT: NEXT: GOTO 5020 799 REM FRAME 8 800 FOR I=2+9*80 TO 36+9*80 STEP 2:POKE I+1,65:POKE I,178:NEXT I 810 FOR I=2+17*80 TO 36+17*80 STEP 2:POK E I+1,65:POKE I,178:NEXT I 815 FOR I=28+13*80 TO 76+13*80 STEP 2:PO KE I+1,65:POKE I,178:NEXT I 820 GOTO 5020 999 REM FRAME 9 1000 FOR J=4 TO 21:FOR I=4+J*80 TO 74+J* 80 STEP 2:POKE I+1,65:POKE I,178:NEXT:NE XT 1005 FOR J=4 TO 21:FOR I=4+J*80 TO 44+J* 80 STEP 2:POKE I+1, 0:POKE I, 32:NEXT:NEXT



PC/PCjr version of "Worm of Bemer."

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BEGINNING PROGRAMMERS

If you're new to computing, please read "How To Type COMPUTE!'s Programs" and "A Beginner's Guide To Typing In Programs."

1010 GOTO 5020 1099 REM FRAME 10 1100 FOR J=4 TO 21:FOR I=4+J*80 TO 74+J* BO STEP 2:POKE I+1,65:POKE I,178:NEXT:NE XT 1105 FOR J=4 TO 21:FOR I=4+J*80 TO 60+J* 80 STEP 2: POKE I+1, 0: POKE I, 32: NEXT: NEXT 1110 GOTO 400 1199 REM YOU WIN 1200 FOR Z=1 TO 3:CLS:COLOR 5:LOCATE 10, 14: PRINT "NERM'S HOME !": COLOR 9: LOCATE 1 5,15:PRINT"THANK YOU !" 1205 FOR I=220 TO 660 STEP 20:SOUND I,.5 :NEXT I 1220 FOR G=1 TO 250:NEXT:NEXT:GOTO 7700 4100 LOCATE 25, 1:COLOR L1:PRINT STRING\$(39,219);:POKE 1998,219:POKE 1999,L1:COLO R 7: RETURN 4999 REM UP THE GAME 5000 GOSUB 10000:BU=6 5011 SP=35:LI=4:SC=0:LO=1:GOSUB 5500:HI= 5:W0=5:EX=2:L1=9 5015 CLS: GOSUB 6500 5020 XA\$="":YA\$="":XB\$="":YB\$="":XA=19:Y A=19:DX=0 5021 IF LO=3 THEN YA=18 5025 DY=-1: IF HI<O THEN HI=O 5030 DI=4: IF HI>5 THEN HI=5 5050 FOR I=160 TO 239 STEP 2:POKE I+1,65 :POKE I, 178:NEXT I:FOR I=1840 TO 1919 ST EP 2: POKE I+1, 65: POKE I, 178: NEXT I 5055 FOR I=240 TO 1839 STEP 80:POKE I+1, 65: POKE I, 178: NEXT I: FOR I=318 TO 1917 S TEP 80: POKE I+1, 65: POKE I, 178: NEXT I 5056 IF HI>0 THEN 5060 5057 POKE 198,219: POKE 199,0: POKE 1878,2 19: POKE 1879, 0: POKE 960, 219: POKE 961, 0: P DKE 1038,219:POKE 1039,0 5059 GOSUB 4100:GOTO 150 5060 XX=RND(1) *36+2: X=RND(1) *18+3: IF PEE K(XX*2+X*80)<>32 THEN 5060 5065 POKE XX*2+X*80, BU: POKE XX*2+X*80+1, 5 5070 GOSUB 4100:GOTO 150 5500 CLS:COLOR 10:LOCATE 12,16:PRINT"GET READY !" 5510 FOR I=440 TO 880 STEP 10:SOUND I,1: NEXT I 5550 RETURN 6500 REM REDEFINING SCREEN 6575 GOSUB 6605 6580 RETURN 6600 REM PRINT SCORE 6605 COLOR 14:PRINT STRING\$(1,11)"SCORE "SC 6606 PRINT STRING\$(1,11)STRING\$(30,28)"R "LO; DOM 6610 PRINT "MUSHROOMS "HI;:PRINT STRING\$ (17,32)"LIVES "LI 6620 COLOR 7: RETURN 7000 REM CLEAN UP THE CENTIPEDE 7002 SP=SP+5*(SP>M2)

7004 GOSUB 6605:HI=5 7005 L=LEN(XA\$) 7010 POKE PO+1, L1: POKE PO, 15: FOR I=1 TO 1 7020 SOUND 220+3*I,1 7190 PD=2*ASC(XA\$)+80*ASC(YA\$):LL=LEN(XA \$)-1:XA\$=RIGHT\$(XA\$,LL) 7195 YA\$=RIGHT\$(YA\$,LL):POKE PD, 32:POKE PO+1,1 7200 NEXT I 7210 RETURN 7500 REM DOPS 7510 CLS:COLOR 5:SP=SP+5*(SP>M2) 7515 LOCATE 12, 18: PRINT" OOPS !" 7521 LI=LI-1 7545 FOR T=250 TO 50 STEP -5:SOUND T,1:N EXT 7550 FOR DE=1 TO 200:NEXT DE:FOR T=1 TO 10:A\$=INKEY\$:NEXT T 7560 IF LI<1 THEN 7700 7599 CLS: RETURN 7699 REM THE GAMES OVER 7700 CLS 7715 IF SC>HS THEN HS=SC:GOSUB 9000:CLS 7718 LOCATE 6, 18: PRINT "NERM" 7720 COLOR 14:LOCATE 10,12:PRINT"YOUR SC ORE "SC 7730 LOCATE 14,12: PRINT"HIGH SCORE "HS 7735 GOSUB 7800 7740 COLOR 7:LOCATE 22, 1:PRINT"Press the space bar to play again, Q=quit" 7745 FOR T=220 TO 880 STEP 100:SOUND T,1 :NEXT:FOR T=880 TO 220 STEP -100:SOUND T ,.5:NEXT 7780 AS=INKEYS: IF AS="Q" THEN END 7784 IF A\$=" " THEN 5000 ELSE 7780 7800 REM RANK THE GAMER 7810 COLOR 3:LOCATE 18, INT((22-LEN(RANK\$ (LO)))/2):PRINT "YOUR NEW RANK IS "RANK\$ (LO) ". ": RETURN 9000 REM NEW HIGH SCORE 9002 CLS:COLOR 3:LOCATE 9,16:PRINT"NEW H IGH" 9004 LOCATE 13,17:PRINT"SCORE!" 9005 SOUND 261, 5: SOUND 440, 5: SOUND 392, 1 5 9060 FOR DE=1 TO 1000:NEXT DE 9070 RETURN 9100 REM EXTRA LIFE 9105 CLS:LOCATE 12, 15: COLOR 3: PRINT "BON US LIFE !" 9120 FOR I=1500 TO 3000 STEP 50:SOUND I, 1:NEXT 9130 FOR T=1 TO 1000:NEXT 9170 EX=EX+3:LI=LI+1:RETURN 10000 A2(1)=30:A2(2)=20 10005 CLS:LOCATE 8,16,0:COLOR 9:PRINT"We lcome to" 10020 COLOR 5:LOCATE 12,14:PRINT"NERM OF BEMER" 10021 GOSUB 12000 10022 LCCATE 17,8:COLOR 9:PRINT"Use curs or keys to play." 10025 COLOR 6:LOCATE 20,11:PRINT"Choose skill level:" 10030 LOCATE 22,8:PRINT"Easy (1) Diffi cult (2)" 10040 A\$=INKEY\$:IF A\$="" OR (A\$<>"1" AND A\$<>"2") THEN X=RND(1):GOTO 10040 10050 M2=A2(VAL(A\$)):RETURN CFwww.commodore.ca



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