Smart Products – Computer Chips In Your Future

COMPUTE!

$2.50
September
1983
Issue 40
Vol. 5, No. 9
£1.85 UK $3.25 Canada
63379
ISSN 0194-347X

The Leading Magazine Of Home, Educational, And Recreational Computing

CAVES OF ICE
An Excellent 3-D Graphics Game For VIC, 64, PET, Atari And Apple

ULTRASORT
Our Best And Fastest Sorting Program For PET, VIC And 64

FONTBYTER
A Graphics Language Program For Atari

GRADEBOOK
An Atari Data Base Program For Teachers

Plus **VIC Pilot, A Sprite Editor For The TI 99/4A, Making Change: An Educational Program For The Timex/Sinclair, And More!**

0 74470 63379 09

Educational Theme Issue
Games And Education, The New Classroom

BUY A BANANA.™ SAVE A BUNCH.

Meet the Banana,™ the very tough, versatile, portable, and reliable dot-matrix printer from Gorilla.™

At $249.95 retail it's an ideal and inexpensive companion for personal computers like Apple® (or Apple "look alikes" such as Franklin® or Albert®), TI,® Commodore,® TRS-80,® Kaypro,® Timex,® Osborne,® etc.

After that, it's merely comparable to other printers that can cost up to three times as much: 10″ carriages (to handle standard 9½″ paper), 80 columns, graphics capability, 10 characters per inch (expandable to 5 cpi) draft-quality print (for perfectly acceptable form letters, data processing, business reports, etc.) tractor feed (for precise alignment and quick loading), parallel or serial interface (take your pick), self-inking ribbon cassette (for long life and easy installation), 10 portable pounds in weight, and compatibility with so many of the most popular personal computers on the market.

Plus its printhead features a unique single-hammer design that eliminates a lot of moving parts, to eliminate a lot of annoying repairs.

That's the Banana: silly name, serious service. It's everything the expensive dot-matrix printers are . . .

Except expensive.

Leading Edge Products, Inc., 225 Turnpike Street, Canton, Massachusetts 02021
Toll-free: 1-800-343-6833; In Massachusetts (617) 828-8150. Telex 951-624.

FOR YOUR COMMODORE WORDPROCESSING NEEDS INVEST IN THE BEST

WORDPRO PLUS. IN A CLASS BY ITSELF.

When choosing a Word Processor for your Commodore™ computer, there's no reason to settle for anything but the best — in a word...WordPro™.

With over 30,000 happy clients churning out letters and documents all over the world, the WordPro Plus™ Series is unquestionably the #1 selling software package on Commodore computers! So when you choose WordPro, you know you're investing in a trial-tested program that's a real winner. And WordPro is NOW available for your Commodore 64™ computer — at prices starting as low as $89.95.

Designed for the user who has no computer or word processing experience whatsoever, WordPro Plus brings a new dimension to the term "user-friendly." More than just easy to use, WordPro will turn your Commodore computer into a sophisticated time saving word processing tool — loaded with the same inventory of features found in systems costing much, much more.

Our nationwide team of over 600 Professional Software/Commodore computer dealers will help you choose the WordPro Plus system that is best for your needs. Our full-service dealers have been set up to provide strong customer support. In addition to helping you choose the right system, many Professional Software dealers also offer WordPro Plus training and system installation.

Professional Software offers a complete spectrum of WordPro word processing software for Commodore computers ranging from the Commodore 64 to the more business oriented 8000/9000 series computers. And WordPro 4 Plus and 5 Plus also interact with our database management systems including InfoPro and The Administrator. So whatever your Word Processing needs, there's a WordPro system that's right for you.

Invest in the best...
WordPro Plus. In a class by itself.

Call us today for the name of the WordPro Plus dealer nearest you.

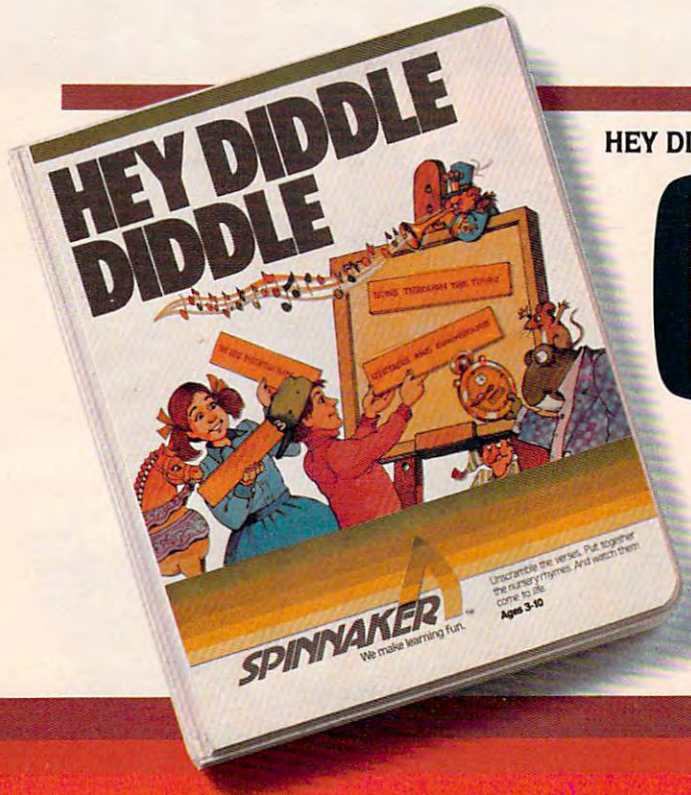
Professional Software Inc.
51 Fremont Street
Needham, MA 02194
(617) 444-5224
Telex: 951579

SPINNAKER'S LINE OF EARLY LEARNING GAMES IS GROWING AS FAST AS YOUR CHILD'S MIND.

Watching your kids grow up is a lot of fun. But making sure their minds grow as fast as their bodies is even more rewarding. That's where we can help. With a growing line of Early Learning Programs that are not only lots of fun to play, but also educational.

Some of the games you see on these two pages help exercise your child's creativity. Others help improve vocabulary and spelling skills. While others improve your child's writing and reading abilities. And all of them help your child understand how to use the computer.

So if you're looking for computer programs that do more than just "babysit" for your kids, read on. You'll find that our Early Learning Programs are not only compatible with **Apple,® Atari,® IBM®** and **Commodore 64™** computers, but also with kids who like to have fun.



HEY DIDDLE DIDDLE™ Poetry in motion. Ages 3 to 10.

Kids love rhymes. And since HEY DIDDLE DIDDLE features 30 classic rhymes with full color graphics and the neatest computer music you've ever heard, it makes rhyme games more fun than ever before. Plus, it makes it fun for kids to read, helps them understand how words and rhymes create poetry and lets them take fragmented thoughts and rearrange them to form coherent verse.

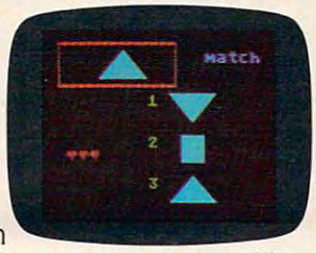
Apple, IBM and Atari are registered trademarks of Apple Computer, Inc., International Business Machines Corp. and Atari, Inc. respectively.
Commodore 64 is a trademark of Commodore Electronics Limited.

The story of STORY MACHINE.™ Ages 5 to 9.

STORY MACHINE is like a storybook come to life. Using the keyboard, your children write their own fun little stories. The computer then takes what they've written and animates their story on the screen, complete with full color graphics and sound.

STORY MACHINE helps your children learn to write correctly, become familiar with the keyboard, and lets them have fun exercising their creativity at the same time.

KINDERCOMP.™ Numbers, shapes, letters, words and drawings make fun. Ages 3 to 8.



KINDERCOMP is a game that allows very young children to start learning on the computer. It's a collection of learning exercises that ask your children to match shapes and letters, write their names, draw pictures, or fill in missing numbers. And KINDERCOMP will delight kids with colorful rewards, as the screen comes to life when correct answers are given.

As a parent, you can enjoy the fact that your children are having fun while improving their reading readiness and counting skills.

FACEMAKER™ makes faces fun. Ages 4 to 12.

FACEMAKER lets children create their own funny faces on the screen. Once a face is completed, your children will giggle with delight as they make it do all kinds of neat things: wink, smile, wiggle its ears, or whatever their imagination desires.

Plus, FACEMAKER helps children become comfortable with computer fundamentals such as: menus, cursors, the return key, the space bar, simple programs, and graphics. FACEMAKER won't make parents frown because their children will have fun making friends with the computer.

SPINNAKER™
We make learning fun.

MOSAIC™

RAMMASTER™32

EXPANDING
YOUR
EXPERIENCE

The Rammaster™32 introduces you to the world of more powerful computing. Now VIC 20® owners have one of the most advanced memory devices available. This is a full service memory device. Not only will the Rammaster™ give you 7 times the computing RAM power (as much usable memory as the Commodore 64®) but also many advanced features.

The expansion port allows you to use your cartridges without unplugging the memory board, saving wear and tear on your computer. It's much more effective. With the flexibility the Master Control switches give you, you'll have no need for a mother board. The Write Protect switch protects your programs' subroutines and data from accidental interference from basic language and the automatic erase built into some cartridges. There's a pause switch built in to stop in the middle of a program, plus an external port is built in for a convenient optional cable pause/reset switch. You even have a switch to overlay a 3K block of RAM for expansion to 40K. The Master Control gives you complete control over the configuration of your VIC 20® Memory Map so it will never become obsolete.

The Rammaster™32 is completely compatible with all the VIC 20® products and programs, and will be the most useful peripheral you'll buy for your VIC 20® computer. So expand your experience into the world of more powerful computing with the Rammaster™32 by Mosaic.

Sugg. Retail: $129.95

- 32K RAM
- Built-in expansion part
- Pause switch
- Write protect
- Master control for super flexible memory
- Cartridge dissabler
- Low cost
- Gold edge connectors
- Picture guided instructions
- Compatible with VIC 20® software and cartridges
- And more features

Call your nearest Mosaic dealer, 1-800-547-2807 (In Oregon, 655-9574).

NOW AVAILABLE:

The Standard 16K RAM board for the VIC 20®. This is a no frills RAM board designed as a low cost way to expand. It has no expansion port or master control but offers exceptional reliability and performance at a very low cost.

COMING SOON:

Rammaster™16. This is a lower cost version of the Rammaster™32. It's a full service memory device just like the Rammaster™32 with 16K less RAM. Owners already with a 16K RAM board can use the Rammaster™16 to expand to 37K.

MOSAIC™
ELECTRONICS, INC.
P.O. Box 708 • Oregon City, Oregon 97045

September 1983 Vol. 5, No. 9

FEATURES

EDUCATION AND RECREATION

REVIEWS

COLUMNS AND DEPARTMENTS

THE JOURNAL

NOTE: See page 283 before typing in programs.

GUIDE TO ARTICLES AND PROGRAMS

AP Apple **AT** Atari, **P** PET/CBM, **V** VIC-20, **C** Radio Shack Color Computer, **64** Commodore 64, **TS** Timex/Sinclair, **TI** Texas Instruments, *All or several of the above.

COMPUTE! Publications, Inc.
A Subsidiary Of American Broadcasting Companies, Inc.

TOLL FREE Subscription Order Line
800-334-0868 (In NC 919-275-9809)

COMPUTE! The Journal for Progressive Computing (USPS: 537250) is published 12 times each year by COMPUTE! Publications, Inc., P.O. Box 5406, Greensboro, NC 27403 USA. Phone: (919) 275-9809. Editorial Offices are located at 505 Edwardia Drive, Greensboro, NC 27409. Domestic Subscriptions: 12 issues, $20.00. Send subscription orders or change of address (P.O. form 3579) to Circulation Dept., **COMPUTE!** Magazine, P.O. Box 5406, Greensboro, NC 27403. Second class postage paid at Greensboro, NC 27403 and additional mailing offices.

ISSN 0194-357X.

EDITOR'S NOTES

Our theme this issue centers on computers in education. We define education in its broadest sense – education as it permeates the home and the classroom. Several of our featured articles this month directly address this link and raise some critical questions at the same time. We look forward to your comments.

As prices continue to decline, and manufacturers begin looking forward to the Christmas season, expect some substantial purchasing opportunities. We expect to see more bundling of peripherals, software packages, and computers as vendors grow more aggressive. This lateral move will occur, in part, because basic computer prices have declined to near bottom, and future moves will have to be made through bundling and accessories.

With this issue COMPUTE!'s circulation approaches 400,000, and we expect to break the half million mark by December. Those of you who've been readers for a year or more will remember that just last October, we broke 100,000. We are proud of our leadership role in consumer computer publishing, and wish to thank you all, readers and contributors, for your support in the growth of COMPUTE!.

Gary R. Ingersoll has recently joined our staff and will be assisting in directing our future growth. Formerly president of the Chilton Company, the largest operating unit of ABC Publishing, Gary brings needed skills to our rapidly expanding division. He comes to COMPUTE! as president and publisher; I become chief executive officer and remain editor in chief.

Atari and Texas Instruments have both recently announced major revampings of the management teams responsible for their personal computer operations. Atari appears to be backing away from the $100-$200 price area and concentrating on building a family of systems which begins in the middle range. TI, on the other hand, appears committed to continuing to take on Commodore at the low end. A recent *Time* article indicates that IBM has now developed a 21 percent market share around the PC system. We still speculate that an IBM home PC (frequently referred to as the "Peanut") will debut soon. IBM does such a superior job of keeping the "lid" on leaks that our speculation is idle at best, but we think the middle-range market is so potentially lucrative for them that they won't stay away for long.

In a recent editorial we mentioned Adventure International in a context that was apparently misinterpreted by some readers. We want to make it clear that we respect Adventure International and their business practices, and that they have not been involved in any effort to "recruit" COMPUTE! staffers.

As our magazine and book publishing operations continue to grow, we are still looking for additional editorial support. If you're an experienced writer or journalist who has a personal computer background as well, drop us a résumé. Our growth has been consistently strong, with our staff tripling in the last year. We're located in the central Piedmont region of North Carolina in a metropolitan area selected recently as one of the three best living/working locations in the nation.

Robert Lock

T&F SOFTWARE

CheckEase!™

Professional-Quality Checkbook:

For VIC-20 and Commodore 64

Now you have the power of a professional quality Check Register System. Maintain multiple checking accounts, complete with full checkbook reconciliation and 16 budget categories. Change or delete any check, check or deposit amount, or deduction and CheckEase! will automatically update all balance figures. Review checks forward, backward or by check number. Configure for RS232 or compatable Commodore printer. Post checks as they clear the bank. Upgrade data from cassette to disk. Print by check number, category or if item is tax deductable. Commodore 64 and VIC-20 users can even save months worth of check data in a format compatable with Commodore's *Personal Finance* package for later analyzation.

$24.95 cassette (VIC-20 min. 8K),

$29.95 cassette: Commodore 64,
*Atari 400®/800®/1200 XL®

$34.95 disk: Commodore 64,
*Atari 400®/800®/1200 XL®,
*IBM PC, *APPLE II/IIplus/IIe®

SearchSeries™

First with Arcade-Quality Games:

For VIC-20 and Commodore 64

There are 374 letters on the screen. Concealed within are 20 words: 10 across and 10 down. You have 10 minutes. When you've found a hidden word, it changes color. Every game features a new screen. Over 300 different words and thousands of new games possible. **$19.95** on cassette.

WordSearch 3 categories: Capitals, Jumbled and Animals.

SportSearch 3 categories: Pro Teams, College Teams and Sport Games.

ArcadeSearch 3 categories: Home Video Games, Arcade Video Games and Famous Video Game Characters.

Space Sentinel™

For Commodore 64

Planet Earth is under attack by ruthless aliens who hurl heat missles at our polar ice caps. Will the Earth flood? As the orbiting Space Sentinel, the Earth's fate is up to you. If you can hold out against the merciless attackers, Earth's population will have time to escape and colonize a new home planet. Complete sprite & character graphics with 3-voice sound. **$29.95** on disk. Joystick, Diskdrive & Commodore 64® required.

*AVAILABLE 4TH QUARTER '83

Available at finer Software Stores everywhere.

Or Call (213) 501-5845 for the name of your local dealer or distributor.

T&F SOFTWARE

T&F Software Company 10902 Riverside Drive / North Hollywood, California 91602. (213) **501-5845**

Publisher	Gary R. Ingersoll
Editor-In-Chief	Robert C. Lock
Publisher's Assistant	Alice S. Wolfe
Senior Editor	Richard Mansfield
Managing Editor	Kathleen E. Martinek
Assistant Managing Editor	Tony Roberts
Production Editor	Gail Walker
Features Editor	Tom R. Halfhill
Technical Editor	Ottis R. Cowper
Program Editor	Charles Brannon
Assistant Editors	Dan Carmichael Lance Elko
Assistant Features Editor	John Blackford
Assistant Copy Editor	Juanita Lewis
Editorial Assistant	Kathy Yakal
Editorial Programmers	Patrick Parrish Gregg Peele Jonathan Byrd
Technical Assistant	Dale McBane
Administrative Assistants	Vicki Jennings Laura MacFadden Julia Fleming
Copy Assistants	Becky Hall Sarah Johnston Linda Shaw
Associate Editors	Jim Butterfield, Toronto, Canada
	Harvey Herman, Greensboro, NC
	Fred D'Ignazio, 2117 Carter Rd. S.W. Roanoke, VA 24015
	David Thornburg P.O. Box 1317, Los Altos, CA 94022
Contributing Editor	Bill Wilkinson
COMPUTE!'s Book Division	
Editor	Orson Scott Card
Assistant Editors	Stephen Levy Gregg Keizer
Administrative Assistant	Carol Eddy
Artist	Janice Fary
Art Director/Production Manager	Georgia Papadopoulos
Assistant	Irma Swain
Mechanical Art Supervisor	De Potter
Artists	Leslie Jessup Cindy Mitchell
Typesetting	Terry Cash
Illustrator	Harry Blair
Promotion Assistant	Todd Heimarck
Associate Publisher/National Advertising Sales Manager	Andy Meehan
Advertising Coordinator	Patti Williams
Advertising Accounts	Bonnie Valentino
Sales Assistant	Rosemarie Davis
Operations/Customer Service Manager	Carol Lock
Assistants	Patty Jones Shannon Meyer
Dealer Coordinator	Fran Lyons
Assistants	Gail Jones Sharon Minor
Assistants	Christine Gordon Cassandra Robinson Mary Sprague Dorothy Bogan Chris Patty Rhonda Savage Lisa Flaharty Carol Dickerson Sharon Sebastian Anita Roop
Shipping & Receiving	Jim Coward Larry O'Connor Dai Rees Chris Cain John B. McConnell
Data Processing Manager	Leon Stokes
Assistant	Joan Compton
Accounting Manager	W. Jerry Day
Comptroller	James M. Hurst
Accounting Assistants	Linda Miller Doris Hall
Assistants	Ruth Granger Anna Harris Emilie Covil Anne Ferguson

Robert C. Lock, Chief Executive Officer
Gary R. Ingersoll, President
W. Jerry Day, Vice President of Finance
James M. Hurst, Comptroller
Sonja Whitesell, Executive Assistant
Debbie Nash, Assistant

Coming In October

Special Games Issue

Telegaming

First-Rate Games For Several Computers — *Dragons, Moving Maze, RATS!*, And More

EXEC: A New Command For Commodore Computers

A Tutorial On TI Sprites

Atari Master Directory

COMPUTE! Publications, Inc. publishes:

COMPUTE! The Journal For Progressive Computing

COMPUTE! Books

Telephone: 919-275-9809

Corporate office:
505 Edwardia Drive,
Greensboro, NC 27409 USA

Mailing address: COMPUTE!
Post Office Box 5406
Greensboro, NC 27403 USA

Subscription Information

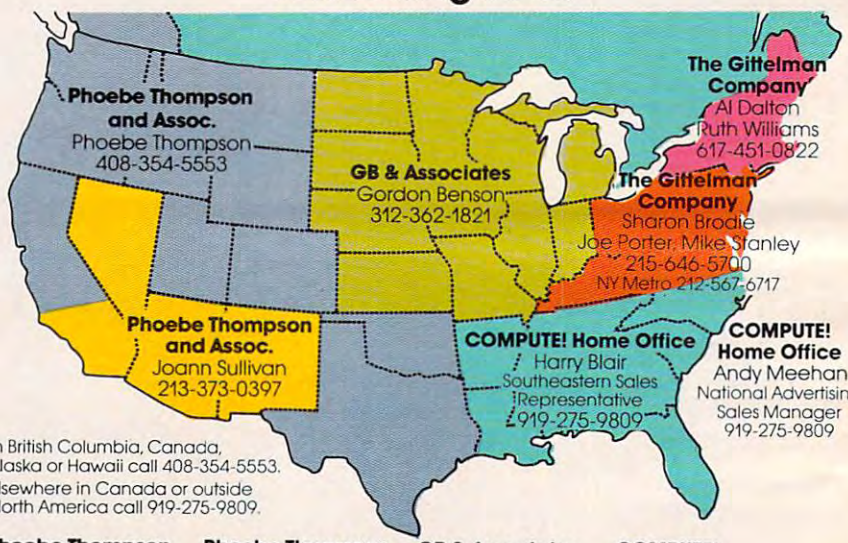
COMPUTE! Circulation Dept.
P.O. Box 5406
Greensboro, NC 27403

TOLL FREE Subscription Order Line
800-334-0868
In NC 919-275-9809

COMPUTE! Subscription Rates (12 Issue Year):

US	(one yr.) $20	Air	
	(two yrs.) $36	Europe, Australia	$38
	(three yrs.) $54	Middle East, Central America and North Africa	$48
Canada and Foreign Surface Mail	$25	South America, South Africa, Far East	$68

Advertising Sales



In British Columbia, Canada, Alaska or Hawaii call 408-354-5553.
Elsewhere in Canada or outside North America call 919-275-9809.

Phoebe Thompson and Associates
101 Church Street
Suite 13
Los Gatos, CA 95030
PHOEBE THOMPSON

Phoebe Thompson and Associates
2556 Via Tejon
Palos Verdes Estates,
CA 90274
JOANN SULLIVAN

GB & Associates
P.O. Box 335
Libertyville, IL 60048
GORDON BENSON

COMPUTE! Home Office
505 Edwardia Drive
Greensboro, NC 27409
HARRY BLAIR
Southeastern Sales Representative

The Gittelman Company
Statler Office Building
Suite 518
20 Providence Street
Boston, MA 02116
AL DALTON
RUTH WILLIAMS

The Gittelman Company
Summit Office Center
7266 Summit Avenue
Fort Washington, PA 19034
SHARON BRODIE
JOE PORTER
MIKE STANLEY

Address all advertising materials to:
Patti Williams
Advertising Production Coordinator
COMPUTE! Magazine
505 Edwardia Drive
Greensboro, NC 27409

WordPro 3 Plus/64™

The Best Word Processor for your Commodore 64™

Now available for as low as $89.95

When choosing a Word Processor for your Commodore 64 computer, there's no reason to settle for anything but the best—in a word....WordPro™.

With over 30,000 happy WordPro clients churning out letters and documents all over the world, the WordPro Plus™ Series is unquestionably the #1 selling software package on Commodore computers! So when you choose WordPro, you know you're investing in a trial-tested program that's a real winner. And WordPro 3 Plus/64 is NOW available for your Commodore 64 computer at prices as low as $89.95.

Designed for the novice user with no computer or word processing experience whatsoever, WordPro 3 Plus/64 brings a whole new dimension to the term "user-friendly." More than just easy to use, WordPro 3 Plus/64 is a commercial level word processor loaded with powerful features including: Auto Page Numbering, Headers and Footers, Math Functions, Global Search and Replace, the Ability to Create Multiple Personalized Letters and Documents, Underlining, Boldface, Super and Subscripts and much, much, more.

Best of all, WordPro 3 Plus/64's powerful arsenal of features can be put to use almost immediately—by even the novice user. So whether you're a writer, in business, education, or just a hobbyist, you'll quickly become a WordPro Pro!

Invest in the best...WordPro Plus. In a class by itself.

Call us today for the name of the WordPro 3 Plus/64 dealer nearest you.

Professional Software Inc.

51 Fremont Street
Needham, MA 02194

(617) 444-5224
Telex: 951579

WordPro 3 Plus/64™ is a trademark of Professional Software Inc.
The WordPro Plus Series was designed and written by Steve Punter of Pro-Micro Software Ltd.
Some printers may not support certain WordPro 3 Plus/64 functions and/or require an interface. Please check with your dealer.
Commodore 64™ is a trademark of Commodore Electronics Ltd.
Dealer and Distributor inquiries are invited.

READERS' FEEDBACK

The Editors and Readers of COMPUTE!

COMPUTE!'s Programs

I have learned more from your magazine than from textbooks on computing, but one thing puzzles me. What's your policy toward the programs you publish in the magazine? They often take a long time to type in and I usually go on to add embellishments here and there, or change them to run on other computers. Are these programs in the public domain? Could they be traded with my friends?

One note: I often type in programs and then later forget the instructions or which issue I'd gotten them from. So, I now always put REM statements into the first few lines of the program which have the date and page number where the program documentation can be found. I can't count the number of times I've been glad I do it.

Mary Howe

Programs published in COMPUTE! are in the same legal category as material published in any other magazine. They are all copyrighted; they're not in the public domain. When you buy an issue, you then have the right to make a copy of the programs therein. We realize, however, that some of the programs are long and take some time to enter into the computer. For this reason, it's permissible for you to give a copy of a COMPUTE! program to a friend or members of your user group who subscribe to the magazine.

No program in the magazine, however, may be sold, traded, or otherwise distributed for profit. Nor may any program be given to someone who does not own the issue in which the program was printed.

TI-99/4 And 4A Differences

What are the programming differences between the TI-99/4 and TI-99/4A?

The TI-99/4 has 256 more bytes of available RAM than the TI-99/4A, so a very long program may run on the TI-99/4 and not the TI-99/4A.

The TI-99/4A has lowercase capability, so some techniques are possible on the TI-99/4A that are not possible on the TI-99/4. For example, for graphics you can redefine characters using lowercase letter codes, then PRINT the letters rather than using the CALL HCHAR or CALL VCHAR statements. If you redefine the letters a and b (characters 97 and 98) to draw a car, for example, you can then PRINT ab to get a car. To convert for the TI-99/4, remember that the lowercase letters start with ASCII Code 97. The equivalent statement would be PRINT CHR$(97)&CHR$(98). A program using redefined lowercase letters that is typed on the TI-99/4A can be SAVEd then loaded onto a TI-99/4 and will work fine.

The keyboards on the two computers are different too, and several of the symbols are in different places. This change affects the CALL KEY statements. CALL KEY(0,KEY,STATUS) on the TI-99/4 is used to scan the whole keyboard, and devices 3, 4, and 5 for the first parameter are for "possible future devices." On the TI-99/4A keyboard, device 3 scans the whole keyboard in BASIC, device 4 is for Pascal, and device 5 is for BASIC using both capital and lowercase letters. Device 0 is used to indicate the same device as previously scanned. Many programs now use CALL KEY(3,KEY, STATUS) for the TI-99/4A. To write your programs compatible for both computers, use CALL KEY(0,KEY, STATUS).

The split keyboard also presents some variations. The statements are CALL KEY(1,KEY1,STATUS1) and CALL KEY(2,KEY2,STATUS2). Some of the KEY values returned are different: G, B, SHIFT, SPACE, comma, period, /, =, semicolon, and ENTER. If you use the standard arrow keys (E, S, D, X and I, J, K, M) you'll have no problem. The diagonal arrows are also the same for both keyboards. In general, avoid the middle area keys and the keys at the extreme right of the keyboard. For games written for the TI-99/4 in which you press ENTER to fire, you may need to press the period to fire on the TI-99/4A.

There may be a problem in testing for zero on the TI-99/4A when using the split keyboard scan. After the CALL KEY statement, use logic such as IF K+1<>1 rather than IF K<>0.

VIC Word Processing, Disks, And Machine Language

I am presently trying to learn machine language (ML); to this end, I bought the HES MON ML monitor. The problem is that I have been unable to use labels with it, and was wondering if it is possible to do so. (I have been unable to find a VICMON anywhere, so I have no means of comparing the two – does the latter allow the use of labels?) I would also really appreciate an expla-

Presenting the class of 64.

The Commodore 64™ is one of the most exciting home computers in memory.

But memory isn't the only thing that's exciting about the 64.

Because Tronix is here.

Class act.

The people who have been bringing out the best in the VIC 20™ (and Atari,® too) have graduated to the Commodore 64.

Which means that now you can enjoy fast action, complex strategies, interesting characters, superior sound effects and challenging, play patterns.

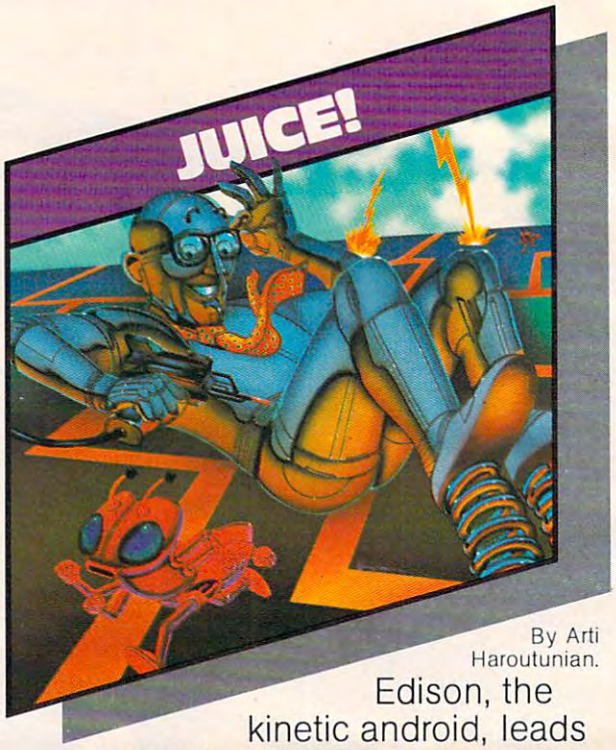
Just like VIC 20 and Atari owners. Only faster, more complex, and more challenging, too.

More memorable, in other words.

In a class by ourselves.

Of course, if you'd rather not take our word for it, you don't have to. The experts at Electronic Games have called *Kid Grid* for Atari "one of the most compulsive, utterly addictive contests in the world of computer gaming."

They haven't seen anything yet.



By Arti Haroutunian.

Edison, the kinetic android, leads a frustrating life.

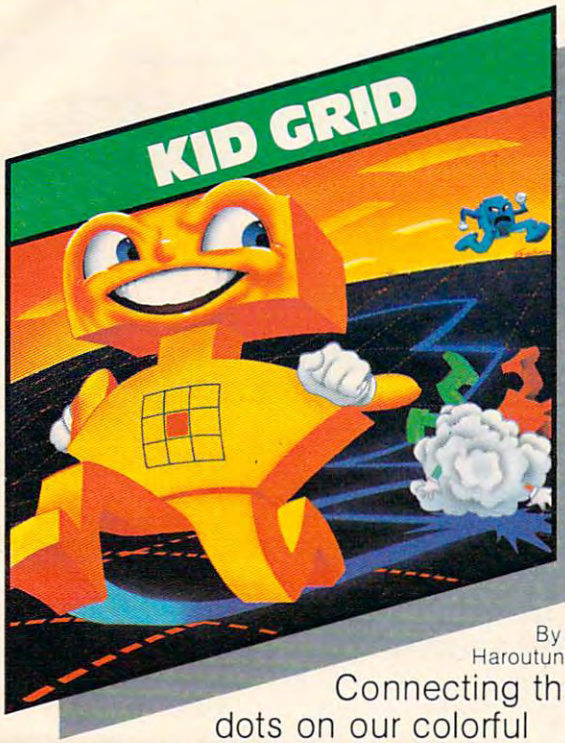
All he wants to do is build his circuit boards and go with the flow. But things keep getting in the way.

Nohms—a negative influence—bug him constantly. Flash, the lightning dolt, disconnects everything in his path.

And the cunning Killerwatt is out to fry poor Edison's brains.

You'll get a charge out of this one. And a few jolts, too!

(Suggested retail $34.95)



By Arti Haroutunian.

Connecting the dots on our colorful grid should be easy, right?

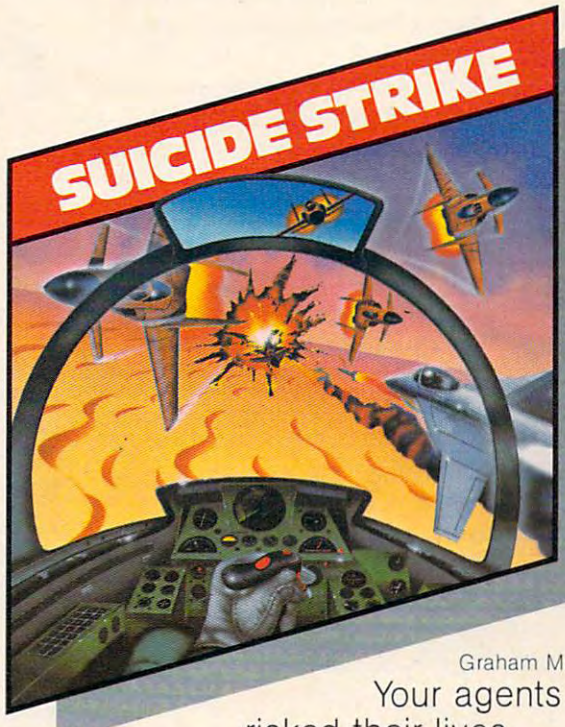
Wrong. Because the bullies are in hot pursuit!

Squashface, Thuggy, Muggy and Moose are their names. And *you* are their game. And what's more, they're faster than you are.

But you're smarter. And you control the stun button.

So keep your eyes peeled for the mysterious question mark and don't slow down at corners!

(Suggested retail: $34.95)



By Graham McKay.

Your agents risked their lives to find the enemy's secret headquarters.

Now you're risking yours to destroy it.

And they know you're coming.

As you fly over water and across hundreds of miles of unfriendly territory, the action is thick, fast and three-dimensional.

Fighter aircraft. Surface-to-air missiles. Helicopter gunships. The attacks come from every direction.

Even from behind.

(Suggested retail: $34.95)

Atrolix™

8295 South La Cienega Blvd., Inglewood, CA 90301

nation of precisely what zero-page memory is, and which sections of it can be used by an ML program without affecting the operating system. (Leventhal's *6502 Assembly Language Programming* doesn't deal with such particulars, and it's hard to get an understanding of them by simply perusing the memory maps.)

I also want to use the VIC as a word processor. I will, of course, need a disk drive and a printer, but I'm not sure that I want to use the Commodore products in either case. In regard to the drive, it probably *would* be wisest to get the 1541, but I was wondering if I could get more for my money if I were to buy a bare Tandon or Pertec, or a used Apple drive for $200 or so and do the rest myself. In other words, would the task of interfacing and writing a DOS be excessively difficult, considering that the 1541 goes for only $340?

As for the printer, this is more difficult: I would obviously like to get a letter-quality printer, but my budget can't go much beyond $350. So I've been thinking about getting a used I/O Selectric and interfacing it to the VIC. An article in the April and May 1981 issues of *Radio-Electronics* described the general process, and it doesn't seem too difficult – besides, it looks like fun!

Peter Jeffe

Jim Butterfield replies...

1. *Most monitor systems are composites of utilities: assembler, disassembler, fill, hunt, display, etc. HES MON, VICMON, SUPERMON, and similar packages contain "nonsymbolic" assemblers; that is, you cannot use labels. These are not sold as assembler packages.*

These assemblers, I should point out, are effective in reducing transcription and lookup errors; for small programs they can be quick and useful; backward branches can be entered by inspection; forward branches can be guessed, then reentered when the actual address is established; they make no special demands for memory space or disk facilities.

But a big assembler is a whole other thing, and worth the cost when you start writing programs that are over, say, 30 instructions long. In my opinion, their major advantage is this: since you keep source code, you can make program changes without the need to type in all the coding once again. A big program will probably need several rewrites; a full (symbolic) assembler is very valuable at that time. However, I like to keep beginners closer to the machine code and encourage nonsymbolic assemblers for early learning programs.

2. *Zero-page memory is memory that extends from hex addresses 0000 to 00FF (the first two digits represent the "page"). It's important for three reasons:*

a. *(minor reason) There's an addressing mode that allows faster and more compact access to zero page than to other parts of memory. Not too important; time and space are seldom urgent machine language program considerations.*

b. *(major reason) A major method of "reaching" information anywhere in memory is indirect addressing, more specifically, indirect indexed addressing. This addressing mode needs to hold its indirect address in zero page. Zero page is in short supply; many users like to "conserve" the area for indirect address usage.*

c. *(pragmatic reason) The operating system uses zero page a good deal for BASIC and for interrupt processing. To keep the operating system healthy, you need to respect the important usage areas. Many users (who want lots of zero page) "swap out" little-used memory for their ML programs, and put it back before returning to BASIC.*

Most 6502 reference books deal with the chip "in a vacuum" – not connected to a real system. Thus, you get no hint as to where programs should be placed, how to invoke input and output, and how the monitor systems work. This makes it very difficult for the beginner – that first step is a big one.

A recent book, Machine Language for Beginners, *by Richard Mansfield (COMPUTE! Books), does deal with these problems on a variety of machines and may offer more help in this area. This is not said as a review or as an endorsement, but the book does approach the microprocessor as seen within its computer environment to a greater extent than previous publications I have seen.*

3. *I have a strong bias towards the manufacturer's product line on disk systems. You can go other ways; but commercial products, and club distributions, are likely to heavily favor these format disks. Building your own interface and writing your own DOS is not a trivial task; if it's a challenge you would enjoy, go for it. If your objective is to get a system up and running in reasonable time, reconsider.*

Many computer hobbyists have adapted Selectric devices; some have complained that the machines are not durable, having been designed for a lighter duty cycle than is found on computer word processors. Check with user groups for their reaction.

64 Video Glitches

I'm disappointed with the quality of the Commodore 64 video display. For example, when selecting black characters on a blue background, every other character is badly smeared. Also, when executing a program, small "birdies" appear randomly all over the screen. These are about one pixel in height, three to eight pixels in width, and appear in the same color as the characters.

Is there a fix for these problems?

Some colors don't seem to work well together on the Commodore 64; you might try combinations of foreground and background colors to see what works best on your machine.

If you are using a TV set, look for solid connections

LUXURY, FACILITY OR NECESSITY?

There are many things which make life easier for us; but everybody has his, or her own personal, individual, desires. For one it may be a luxury – for another sheer necessity.
If you use a commodore, our software-products should be a necessity.

CREATE YOUR LIFE MORE SUCCESSFUL!

SM SOFTWARE INC.
IS A SUBSIDIARY OF
SM SOFTWARE AG, MUNICH,
ONE OF EUROPE'S TOP
MICRO SOFTWARE HOUSES.

U.S. computer technology, allied with German software engineering, has produced high quality programming aids such as:

- SM KIT – program de-bug aids
- ESH – ergonomic screen handler
- ISM – index sequential file manager
- LOS – loadable operating system

and high level application programs such as

- SM-TEXT - advanced text processor.

ASK FOR DETAILS.

SM SOFTWARE INC.
252 Bethlehem Pike
Colmar, PA 18915

SOFTWARE MADE IN MUNICH

Dealer inquiries invited.

(try wiggling things gently) and make sure your TV/COMPUTER slide switch is firmly over to the COMPUTER side. Try rearranging the cable which connects the computer to the TV set: sometimes interference is picked up along the way. Even moving the computer can often help.

On the other hand, if you are using a monitor rather than a TV set, there are other things for you to keep in mind. Commodore will soon be announcing a new interface – and a new monitor – that should significantly improve picture quality. Still on the subject of monitor interfaces, some users find that they can get better character definition by a variation in the wiring of the interface. Normally, pin 4 of the video connector is used for video out on the Commodore 64: some users like the improved contrast that may be achieved by connecting pin 1 (luminance) to pin 4 and then feeding the composite signal to their monitor.

We understand that the screen hash that you call "birdies" can be eliminated completely by the addition of a small capacitor to the video circuitry of the Commodore 64. Contact your dealer for further information.

RAMDISK

Could you tell me what a RAMDISK is?

Joe DeNicola

It is possible to use large amounts of extra RAM memory as a simulated "disk drive." In fact, the decreasing cost of RAM chips has made "memory drives" quite popular. The advantage of a memory drive is that it is extremely fast – faster than any non-solid-state peripheral. Unfortunately, most of these memory drives lose what they've stored when you turn off your computer. Battery-protected memory drives are available, but they are relatively expensive, since they require low-power special CMOS memory chips.

Specifically, the RAMDISK is 128K of "bank-selected" (you can call upon "banks" of 16K) memory. It includes software to use the extra memory as a simulated disk drive.

Finding Atari Addresses

As an owner of an Atari Assembler Editor cartridge, I'm still having trouble locating the hexadecimal address locations for BASIC commands. Any suggestions?

Eric Ermert

It is possible to call some of the ready-made routines found in the BASIC cartridge, but you must remember that they are designed to be used by BASIC itself, not external ML programs you write. You can read about the internal workings of Atari BASIC in COMPUTE!'s new Atari BASIC Sourcebook.

A better solution is to write your own routines. It isn't that difficult. For example, the SOUND command stores the values in the POKEY chip, which, among other things, is responsible for generating sound (see "Atari Sound System," COMPUTE!, January 1983). You can call any of the graphics routines BASIC uses (PLOT, DRAWTO, GRAPHICS). These are found in the Atari operating system, not the BASIC cartridge, and they are well-documented and designed to be called by your ML programs. Some references are De Re Atari, Atari Technical Notes, *and Bill Wilkinson's COMPUTE! column "Insight: Atari" (especially February 1982).*

Atari Binary LOAD/RUN From BASIC

The use of binary files in BASIC programs is increasing as Atari programmers become more sophisticated. It is not generally known that you can use the DOS command L, including the "/N" option, directly from BASIC. The necessary routines are resident in DOS itself, not DUP. They will LOAD, INIT, and RUN (or not RUN) any binary file that DOS can handle, including compound files. Control is returned to BASIC for files which ordinarily return to DOS. Here is one method. Just insert your file name in F$.

```
100 DIM F$(16):F$="D:GAME.OBJ":F$(LEN(F$)
    +1)=CHR$(155):POKE 5534,0:POKE 5535,192
110 X=ADR(F$):Y=INT(X/256):POKE 853,Y:POKE
    852,X-256*Y:X=USR(ADR("hL)U"))
```

The USR string which is not listed correctly by a printer is:

small h, capital L, inverse SHIFT 0, CONTROL U

To LOAD and INIT but not RUN, POKE 5534,192 in line 100.

The USR code, PLA, JMP $15A9 calls the resident DOS routine used by option L.

Note: Bill Wilkinson in his COMPUTE! column eloquently explains the advantages of following Atari protocol. I am embarrassed to point out that I violate that excellent advice by using a specific DOS routine which may be altered in future DOS revisions. It is safe to use this quick and dirty trick in your personal programs, but don't distribute it. Use my "Autotype" in *COMPUTE!'s Second Book of Atari* to insert the binary file directly and safely into any commercial BASIC program.

Forrest Meiere

COMPUTE! welcomes questions, comments, or solutions to issues raised in this column. Write to: Readers' Feedback, COMPUTE! Magazine, P.O. Box 5406, Greensboro, NC 27403. COMPUTE! reserves the right to edit or abridge published letters.

25 of The Hundreds of Reasons You Ought To Be A **COMPUTE!** Magazine Subscriber:

From "The Editor's Feedback" Card, a monthly part of our continuing dialogue with readers of **COMPUTE!**. These are responses to the question,

"What do you like best about **COMPUTE!** ?"

1. "The coverage of educational uses of computers for kids." **2.** "Clear, clean layout, good presentation..." **3.** "Educational software reviews... 'Friends of The Turtle'..." **4.** "Written so a newcomer to computers can understand..." **5.** "Cover to cover, and all in between..." **6.** "Reviews of software and hardware..." **7.** "Good balance of application and technical articles..." **8.** "It is the best source of info about various levels of VIC/PET/CBM machines and applications..." **9.** "The large number of *well-explained* programs..." **10.** "I like programs that can be typed into a computer, run, and then used right away (a program without bugs!)..." **11.** "That it is organized well, and covers a broad range of information concerning Atari. Keep it up, please! I'm learning..." **12.** "Table of Contents listings and computer guide to articles is a great idea. Best magazine for personal home computer users..." **13.** "Best I have found for VIC info..." **14.** "Informative articles: 'Secrets of Atari', Game programs, especially programs that teach the reader about the Atari..." **15.** "I like all the articles and programs for my computer, the PET. I've learned and found out things about it that I never even thought existed. Other magazines don't have too much material for the PET and, for that reason, I find **COMPUTE!** invaluable..." **16.** "The up-to-date hardware reviews..." **17.** "Educational and game programs... ready to type in..." **18.** "Utility and applications program listings very helpful..." **19.** "I'm a computer beginner and **COMPUTE!** didn't scare me away... it made me more interested in learning more about computers..." **20.** "I really enjoy (since I am one) the Beginner's Page..." **21.** "The attention it gives to Atari and the easy-to-understand language it's written in..." **22.** It is concerned with explaining programs, not just listing them. It is the best VIC magazine I could buy..." **23.** "The new Table of Contents 'Guide to Articles and Programs' is excellent, particularly the indication of 'multiple computer' items..." **24.** Broad range (sophistication) of programs..." **25.** "It's easy to understand yet pushes you to a 'higher level'..."

Whether you're just getting started with personal computers, or very advanced, you'll find useful, helpful information in every issue of **COMPUTE!** Magazine. We specialize in supporting the Atari, PET/CBM, Commodore VIC-20 and 64, TI-99/4A, and Apple computers. Editorial coverage is expanding to include the Timex/Sinclair and the Radio Shack Color Computer.

Every issue of **COMPUTE!** brings you user-friendly articles, applications programs, and utilities you can type right into your computer and use. To subscribe to **COMPUTE!**, or to order a sample issue, use the attached reply card or call our toll-free number. **COMPUTE!**... We're the resource for thousands and thousands of home, educational, and small business computer users. Shouldn't you be one of them?

1 year, twelve issue subscription: $20.00 in the US.

Call Toll Free in the US 800-334-0868
In NC call 919-275-9809

COMPUTE! Magazine is a publication of **COMPUTE!** Publications, Inc.
505 Edwardia Drive, P.O. Box 5406, Greensboro, NC 27403

SMART PRODUCTS

Kathy Yakal, Editorial Assistant

All personal computers contain a microprocessor, the "brain" of the machine. But even if you don't own a computer, you probably have several of these tiny brains in your home, your office, or even your car. They are, in a sense, tiny computers.

Cars that act as their own mechanics. Cash registers trained to be marketing experts. Washer-dryers that take better care of your clothes than you could, and computers that guard your home. All of these "smart products" – products that can make decisions and monitor themselves – are no longer science fiction fantasy, thanks to the introduction of microprocessors in 1971.

A microprocessor is organized, compressed electronic circuitry which can execute programs and respond to changing conditions. It's about the size of your little fingernail and consists of a small silicon "chip" with complex patterns of lines etched on it.

Microprocessors replace circuitry many times their own size. For instance, if you take the back off a transistor radio, most of the components you see inside could be replaced with a single, small microprocessor.

There are several advantages to using this new technology in the production of consumer products. For one thing, because they are so much smaller than discrete (singular) circuits, products which house them can be much more compact. This is especially true of microcomputers, which wouldn't exist without them.

Microprocessors perform functions fast and precisely. They are easier to produce than discrete electronics and they don't wear out as quickly, since they have no moving parts. Most important, they are intelligent. They can be programmed to make decisions based on predefined conditions.

The Consumer Market

You can identify a consumer product that contains a microprocessor. There are generally no dials to turn or buttons to push or timers to set. Quite often there will be a flat membrane-type control panel that is responsive to the slightest touch. And you may be able to tell if the product contains a microprocessor by the type of input required from you (for example, instead of indicating how long you want your clothes to dry, you would only need to indicate the fabric type – the microprocessor would know how long and how hot to run).

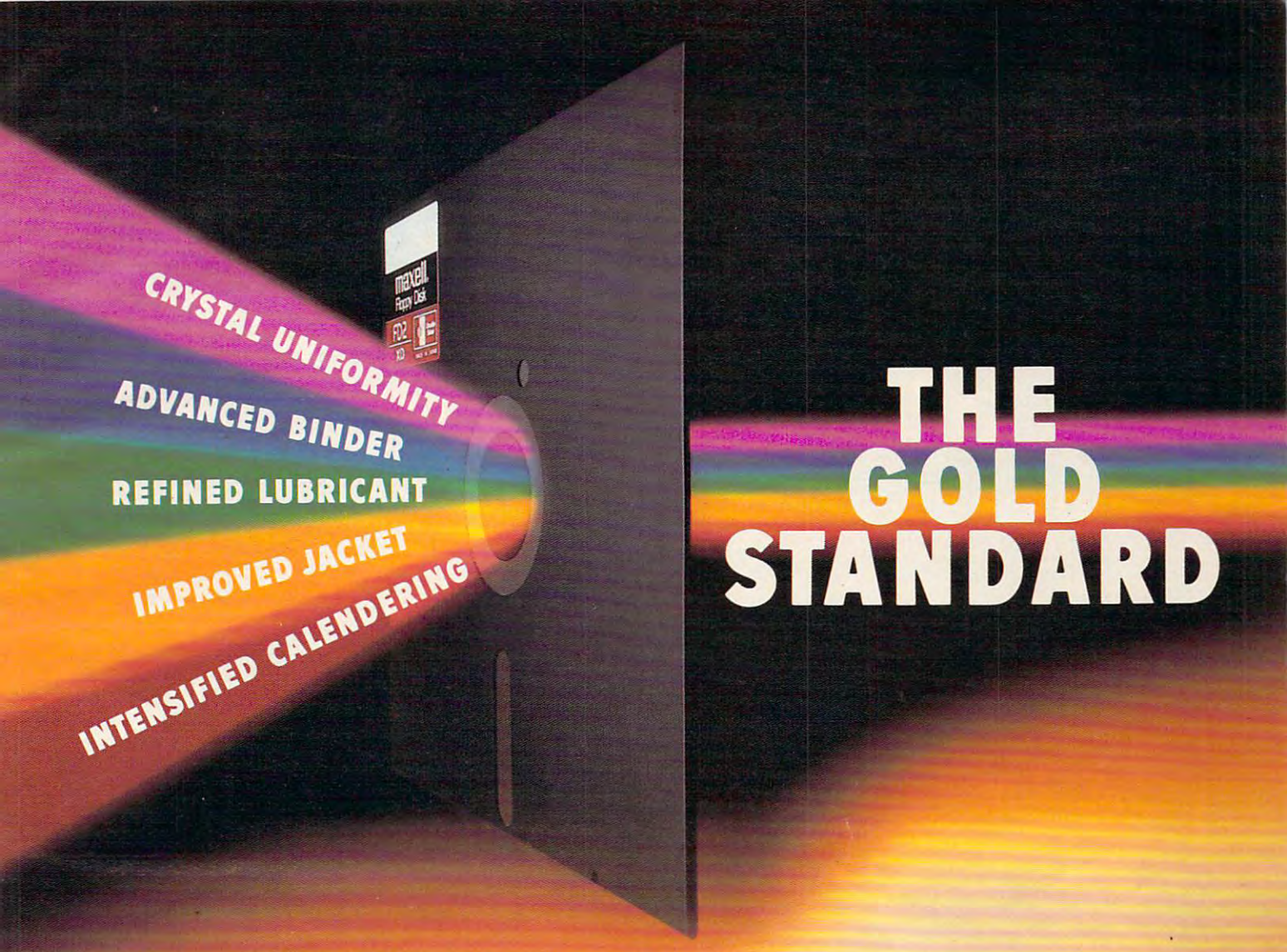
Manufacturers of consumer products don't automatically use microprocessors in every product they could. The same technology that brought microprocessors into being also facilitated better design of microelectronic circuits; each has its own place. Further, some manufacturers are holding back to gauge public acceptance of the new breed of consumer products. This is critical: it's possible to make a washing machine that talks, but do people want that?

In the following product descriptions, we have chosen a few manufacturers which are representative of several industries. These companies are not the only ones using microprocessors. Also, these companies do not use microprocessors in all of their product lines. What we are looking at is still a state-of-the-art technology.

Self-monitoring

First let's explore some home appliances that use microprocessors. Refrigerators have been able to monitor themselves for a long time. You set the temperature level desired, and the unit shuts off upon reaching it.

The Whirlpool Corporation makes refrigerators that c even more. They beep if the



You can wait for industry standards to mandate improved performance. Or you can have it now on Maxell. The Gold Standard.

The refinements of The Gold Standard, from oxide particles to lubricant to jacket, are uniquely Maxell. And therefore, so are the benefits.

Our unique, uniform crystals assure dense oxide packing. So you begin with an original signal of extraordinary fidelity. A signal we safeguard in ways that leave industry standards in our wake.

An advanced binder bonds oxides to the base material preventing time and money-wasting dropouts. Calendering then smooths the surface for a read/write signal that stays clear and accurate. And lubricants reduce friction between head and disk for a longer media and head life. To house it, we then constructed a new jacket heat-resistant to 140° F to withstand drive heat without warp or wear. And created the floppy disk that leads the industry in error-free performance and durability.

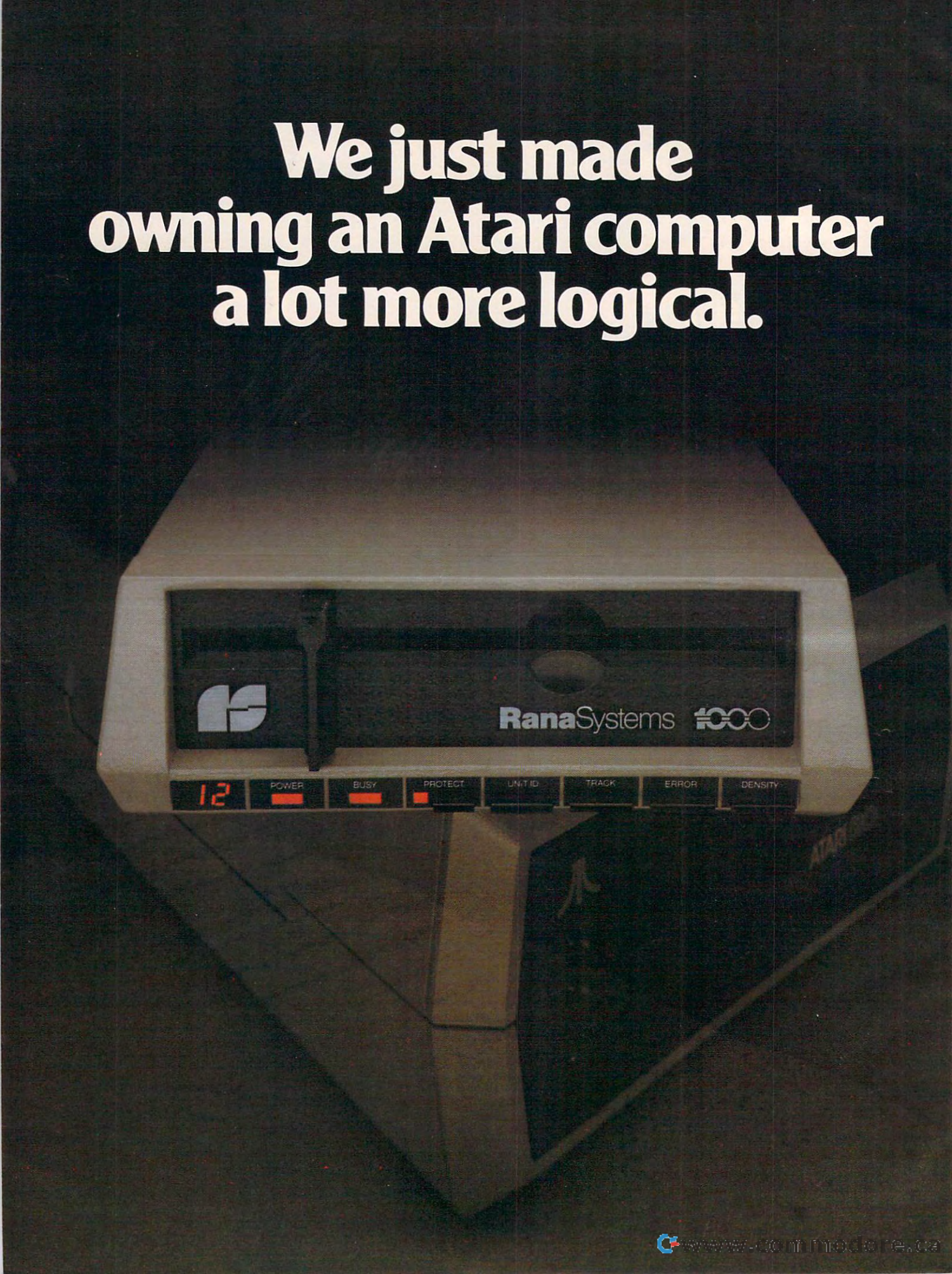
All industry standards exist to assure reliable performance. The Gold Standard expresses a higher aim: perfection.

maxell®

IT'S WORTH IT.

Computer Products Division, Maxell Corporation of America, 60 Oxford Drive, Moonachie, N.J. 07074 201-440-8020

We just made owning an Atari computer a lot more logical.



Introducing the Rana 1000 disk drive. It's a whole new game for Atari computers.

This two digit LED readout displays a code that tells you everything you need to know.

This beeping button tells you your write protect feature is keeping your information safe.

The remaining buttons beep when touched, and provide readouts on density storage, error status, and drive number.

This button beeps when you touch it, and the LED readout tells you what track you're on.

When Rana Systems introduced the Elite Series of Apple® compatible disk drives, we didn't know what a tremendous impact they would make. It turned out to be a line so outstanding in performance, styling, capacity, and price, that it instantaneously made us a major force in the market. Well, needless to say, the response was so great that we were forced to create the same highly advanced disk drive for Atari.® A disk drive that when coupled with Atari's computer, could perform everything from accounting, financial planning, and stock charting, to word processing, business management, and letting you write your own programs. Plus, we made it simple enough for a child to use, for learning anything from the alphabet to a foreign language.

Working with a diskette versus playing with a cassette.

Let's face it. The only reason Atari made a cassette option to their computer was to make it affordable. But now you don't have to settle for less. Because now you can get a diskette for your Atari computer which outperforms their cassette and costs ⅓ less than their disk drive. With Atari's cassette you only get half the functions of a computer compared to what our floppy disk can give you. Their cassette is not only limited in the software available, but it also takes 20 times longer to get the information you need. And Rana's disk drive offers twice the storage capacity of either their cassette or disk drive.

Why even stylewise our new low profile design not only looks 100 times more spectacular, but it occupies 3 times less space. And our new Rana 1000 also gives you a piece of its mind every time you use it, because our disk drive gives you information as well as takes it. And we think that says a lot.

The disk drive that has all the answers.

Rana offers you a myriad of features Atari couldn't even conceive of. Like five electronic functions on the front panel that actually beep and give you a LED readout when touched. Our disk drive tells you what track you're on, and what density and how much information you're storing. It lets you switch from a single density of 90,000 letters to a double density of 180,000 letters, on a single diskette. And, we have a write protect feature which protects your diskette from being erased. In fact, no other disk drive can offer you that.

As you can see, it was easy to build a disk drive superior to Atari's. Because for every reason you buy a disk drive, Rana has superior technology.

The Rana 1000 disk drive. It brings your Atari computer to a higher level of sophistication for a price one third lower than Atari's. So your choice shouldn't even be a matter of logic.

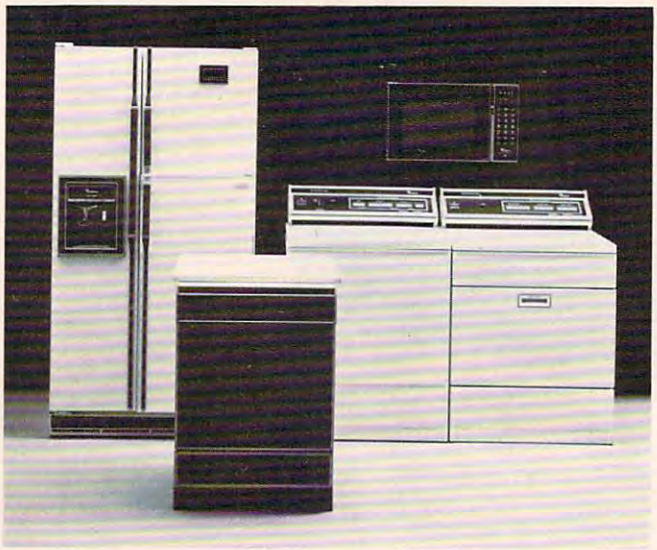
Just common sense.

RanaSystems *Always a step ahead of the originals.*

21300 Superior Street, Chatsworth, CA 91311 213-709-5484. For dealer information call toll free 1-800-421-2207. In California only call: 1-800-262-1221. Source Number: TCT-654

Available at all participating Computerland stores and other fine computer dealers.

® Apple is a registered trademark of Apple Computer, Inc. ® Atari is a registered trademark of Atari, Inc., a Warner Communications Company. See us at the West Coast Computer Show. Circle 44



Whirlpool uses microprocessors in the design of many home appliances for more efficient operation.

door is left ajar. They let you know when the coils need dusting, or if there is a problem with the temperature inside, or if there is anything going on which will keep the machine from doing its best job of keeping food fresh.

Some microwave and toaster ovens use microprocessors. The purpose of these appliances is to cook food, and microprocessors are employed to do that better and faster. Whirlpool has some microwaves that will monitor food temperature so that it won't be overcooked, and will time several dishes so they are ready at the same time. Digital clock functions are built in.

Washing machines and dryers are more efficient when microprocessors are monitoring their functions. Some of the newer Whirlpool washers do not require you to choose a setting; if you just turn them on, they will go into a standard warm wash-cold rinse cycle. If you want to give additional information about the fabric you're washing, there is a flat membrane panel about a foot long listing your choices. If you make a choice that could damage your clothes, like selecting "knits" along with "hot water," the washer will let you know that this could be a mistake. It will make a low "boop" sound when something's wrong, a high "beep" when everything's all right.

Dryers also use microprocessors to determine the safest way for fabrics to dry. You select the fabric type, and the machine decides how hot the dryer should be and even how long it should dry (unless you set the manual timer). It also automatically fluffs the clothes at five-minute intervals to keep them from wrinkling.

Sony uses microprocessors in virtually all of its home entertainment components. The most common use in television sets is in the channel changer. Instead of a standard dial, many television sets now have a push-button control with a digital display; you can turn the television off or on, choose the channel (either by entering the number or scanning up and down), and adjust the picture by pressing some buttons. Increasingly popular remote control features are also made possible by microprocessors.

Tape players, stereo receivers, and turntables are also making increasing use of microprocessors. A variety of search, memory, and automatic play features can now be controlled by them.

Possibly the most sophisticated use of microprocessors in home entertainment systems is to be found in video cassette recorders. Virtually all of their working parts use them because the requirement for accuracy is so great.

Streamlining Daily Routines

Running a household may be simplified in the future because of these advances in electronic technology. General Electric has found a way to make it even easier with their "Homenet," a computer-based home automation system. Controlled by a video screen and keypad, the system allows control and monitoring of heating and air conditioning, security and fire systems, lights, appliances, and entertainment components. It uses existing house wiring and electrical current to send signals to appliances. Consequently, the system is compatible with any brand of home appliance.

Built-in telephone circuits allow complete access to the system by phone, so you can call your "Homenet" and tell it what time to start dinner or the washing machine, or to change any earlier instructions. The phone capabilities also enable a home security system, so that if your smoke or burglar alarm goes off, the computer is alerted to call the police, the fire department, or a neighbor.

The GE "Homenet," a home automation system, lets you control household appliances, entertainment components, and security systems through one central keypad and video screen.

LAST NIGHT, 39 MUSICIANS HAD A COMPUSERVE CONFERENCE, SO DID 31 M.D.S, 49 SPORTS FANS AND 640 APPLE POLISHERS, AND NO ONE HAD TO LEAVE HOME.

The Electronic Forum, Cheaper than Long Distance and Much More Rewarding.

Every night on the CompuServe Information Service, professional and social groups discuss a wide range of subjects. From what's new in medical technology to what's nouvelle in continental cuisine.

And every day more computer owners who share a common interest are discovering this exciting new way to exchange ideas and even transfer hard copy data.

And besides electronic forums, they leave messages for each other on our national bulletin board, "talk" informally on our CB simulator, and communicate via CompuServe's electronic mail.

But best of all, in most cases, CompuServe subscribers get all of these state of the art communications options, plus a world of on-line information and entertainment for the cost of a local phone call plus connect time.

To become part of this flexible communications network, all you need is a computer, a modem and CompuServe. CompuServe connects with almost any personal computer, terminal, or communicating word processor.

To receive an illustrated guide to CompuServe and learn how you can subscribe, contact or call:

CompuServe

Consumer Information Service. P.O. Box 20212
5000 Arlington Centre Blvd., Columbus, OH 43220

800-848-8199

In Ohio call 614-457-0802

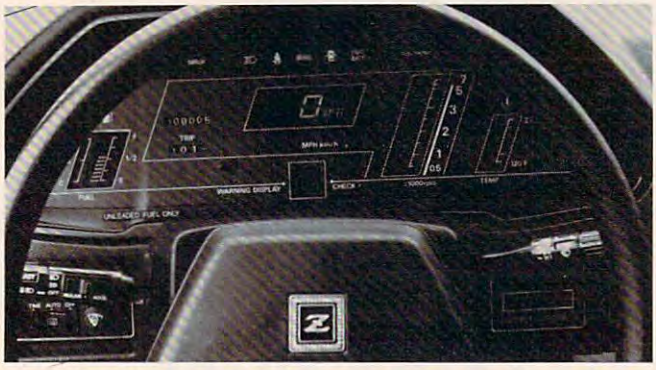
An H&R Block Company

The "Homenet," of course, uses microprocessors in its computer unit. It is possible to use your own home computer to set up such a system, but this can require a fairly sophisticated understanding of computers and interfacing.

Electronic Motoring

The use of microprocessors in automotive electronics is expanding rapidly, according to a representative of the Nissan Corporation. Some of Nissan's top-of-the-line cars (for example, the turbocharged ZX) use microprocessors, especially in engine control. All fuel injection functions are digitalized; that is, everything necessary for getting gasoline into the engine efficiently is computed. Fuel economy is constantly monitored based on current conditions, so if you're going into a headwind, the computer tells you how long your fuel will last if the wind keeps up.

Microprocessors measure and correct the EGR standard. The audio warning system – the ability of the car to say "Your door is open" or "Fuel is low" – is prioritized. The microprocessor decides which condition is more critical, and warns you of that one first. This is where microprocessors are clearly revealed as a technological leap: they can make *intelligent decisions*. The most visible use of microprocessors in Nissan cars, however, may be in the scanning and memory capabilities of the digitally tuned AM/FM radio.



The digital instrument display of this 1983 Datsun 280ZX illustrates the numerous features now controlled by microprocessors in cars.

Nissan has some more exotic uses planned for microprocessors in its 1984 models. One of these, the "knock sensor," will adjust the spark advance to help prevent the "pinging" created by low-octane fuel.

The Ford Motor Company says that its 1983 Lincoln Continental is the best example of the new electronic technology in the company. Microprocessors are used for five different functions in this car: in the radio-electronic cassette; the electronic "instrument cluster"; the "trip minder" (a trip computer that calculates time, engine functions, etc., when you're driving a long way); a keyless entry system (a panel of five push buttons on the outside of the driver's door that requires certain entry codes to lock and unlock the car doors and trunk); and the EEC IV Electronic Engine Control System, a fourth-generation engine-control system developed jointly by Ford and Intel using a 16-bit microprocessor.

Additional computerized functions you may see on the 1984 Ford models include a digital thermometer (for outside temperature); digital temperature control; a digital fuel gauge; and electronic air suspension (springs replaced by air bags using a height sensor).

Increased Business Efficiency

All of these products utilize technologies that now exist (or soon will) in your home or garage. But businessmen have not ignored microprocessor-based technology either. The chips will also have a dramatic effect on ordinary commercial transactions.

It's becoming common these days to go to the grocery store and have your purchases rung up by a clerk who barely touches any keys on the cash register. This "price look-up file" goes one step further: the item being scanned shows up on a digital display with its name and price. You then get a printout of what you bought and what it cost. This is all accomplished by National Cash Register (NCR) through the use of microprocessors.

Information gathered by such accounting is not just useful to the customer and a time-saver for the clerk. Marketing experts can use the data to tell if, for instance, a person who buys a certain brand of toothpaste also buys baby food or exotic hors d'oeuvres or cigarettes. In that way, they can get a better idea of what market should be targeted for their advertising. Store managers also use the information to gauge the effectiveness of store displays, shelf height, or their own advertising.

Replacing People

You may already be accustomed to banking at an "instant cash machine." Though used to a degree for about ten years, the machines have gained real public acceptance only in the last couple of years, says a representative of NCR. The same kind of microprocessor-based technology found in these machines may also put computer terminals in places where you're accustomed to seeing people: at gas stations, in hotel lobbies, and at airports.

This is not to say that computers will completely replace clerks within the decade. But NCR will be introducing self-service terminals to streamline certain businesses. At a gas station, you may be able to put your credit card in a slot, enter your secret code and the amount and kind of gasoline you want, and the computer inside

"Finally...a full-featured graphics tablet at a price even I can afford."

Introducing the KoalaPad™ Touch Tablet for less than $125.00. It's the friendliest innovation in personal computing.

With a touch of your finger, the KoalaPad tablet takes control of your computer. Faster than a paddle controller. More versatile than a joystick. And much friendlier than a keyboard.

The KoalaPad tablet is compatible with most game software. And most KoalaPad sets come with a KoalaWare™ software program—Micro-Illustrator.™ It's the best way yet to create beautiful, high-resolution computer graphics.

And there are lots more KoalaWare programs for computer fans of all ages. Like Dancing Bear,™ the funny, furry computer cabaret. Spellicopter,™ the fast action spelling game. And Spider Eater,™ the lively music learning adventure.

Just try the KoalaPad Touch Tablet. You'll discover a whole new dimension in home computing.

To locate the dealer near you, call toll-free 800-227-6703 (in California, 800-632-7979).

Koala Technologies Corporation

We make computing more personal.™

Trademarks: KoalaPad, KoalaWare, Spider Eater and Dancing Bear are trademarks of Koala Technologies Corp. Micro-Illustrator is a trademark of Island Graphics, and Spellicopter is a trademark of DesignWare Inc.

would dispense the gas and charge it to your account.

In a hotel lobby, you could have the option of confirming your reservation and getting your room assignment from a terminal in the lobby. This terminal would interface with the guest accounting system that is already in use in many hotels, to provide you with a computerized bill at check-out time.

Terminals programmed with flight information may begin to appear in shopping malls and other convenient locations soon. You will be able to get flight information and make reservations on these; then, when you arrive at the airport for your flight, another terminal will check you in and give you your ticket and boarding pass.

The Invasion Of Intelligence

However, for all of the seeming inevitability of the invasion of microprocessor intelligence into our daily lives, it's not entirely beyond question or modification. Manufacturers of consumer products are watching public reaction to these new inventions closely. The technology is there. What remains to be seen is how people will feel about the new smart machines. ©

* Popular Computing, November, 1982
† Apple Softalk, April, 1982

Everyone's talking about The Home Accountant.™

Is it because it's the #1 bestselling home finance package in the world? Or because it's extremely thorough and powerful and easy to use? Or because it's great for home and business use? Or because it has up to 200 budget categories and handles up to 5 checking accounts?

Yes. But there are a lot more reasons why people buy The Home Accountant. And why you will, too.

Because The Home Accountant can literally save you hours of time. And take the headache out of handling your finances. Whether it's setting up a budget, cataloging your expenses, balancing your checkbooks or handling your credit cards and money market funds. For personal or business use.

The Home Accountant will even print net worth and financial statements. Not to mention being a lifesaver at tax time. Especially when you're able to transfer information onto Continental's The Tax Advantage™ program and figure out what you owe. Quickly.

In short, The Home Accountant is the most effective software program there is for managing your money. And managing it easily.

Stop by your Continental Software dealer today and pick up The Home Accountant. You'll see what everyone's talking about.

The Home Accountant is available for Apple II/IIe, IBM PC/XT, Atari 400/800/1200XL, Osborne® TRS-80 Models III/4, Commodore 64, Texas Instruments Professional, Zenith Z-100/110, Compaq and KayPro computers. Actual budget capacities will vary with each computer.

For your free 48 page booklet, "Tips For Buying Software," please write Continental Software, 11223 South Hindry Avenue, Los Angeles, CA 90045, 213/417-8031, 213/417-3003.

Continental
Software
A Division of Arrays, Inc.

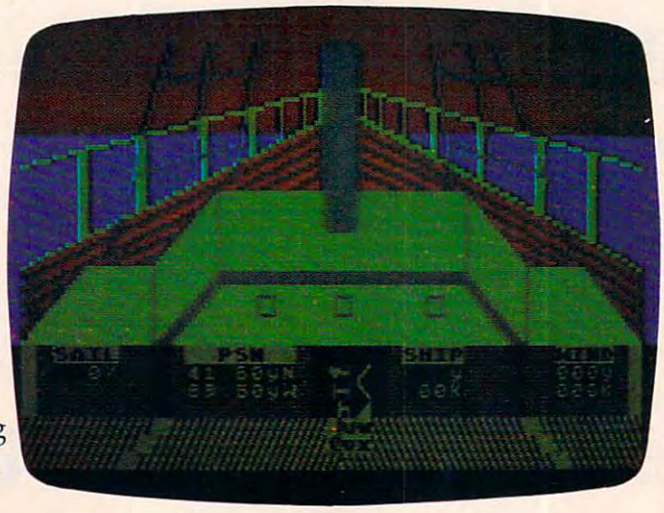
Games That Teach

John Blackford, Assistant Features Editor

Ever since computers were first pieced together out of radio tubes, their potential as teaching machines has fascinated educators. One of the first ideas was to let computers drill students on important skills. Later, programmers enlivened these practice sessions with games and arcade-type action. Today, innovative teachers and game designers are working to create new software and develop teaching methods that make learning itself part of the game. Some of these new products and ideas are finding their way into the home – via the personal computer.

Walk into any video arcade and you'll see teenagers in a twilight world, hunched over machines about the size of small refrigerators. Seemingly oblivious to the beeps and whistles that fill the air, they concentrate on the small screen. They can play for hours. This scene is noticed by some educators, who would like to tap that intensity for the learning process.

Some of them have. Educational games have acquired a reputation for being rather dull, and many are. But that is changing. Publishers of educational material are developing computer programs; makers of computer games are diversifying into educational products; and fledgling school computer ventures are maturing into active resource centers and using the best software available (see "Computers In School: New Approaches," in this issue).



The title screen of the educational game "Clipper."

What Makes It Educational?

Almost any activity involves some learning. It wouldn't hold anyone's interest long if it didn't. For an arcade classic to enthrall a player for hours at a time, perhaps week after week, there must be a progressive mastery of the game's secrets. Experts at a game like *Pac-Man* say they've memorized several complex patterns of movement in order to "beat" the game. But you wouldn't expect to find "Theory of *Pac-Man*" being taught in schools. So what does set an educational game apart from any other kind?

First, it must have a clear educational goal. John Victor, whose Program Design, Inc. (PDI) produces such programs as *Clipper: Around the Horn in 1890*, says, "When we do an educational product, we sit down and define a set of educational parameters with measurable results." Then, a program can be tested in the classroom to see how well it meets its objectives. Before they started on software, PDI designed programmed instructions for educational groups, but Victor believes that market pressures are going to encourage firms new to the field to introduce educational games. He feels it's important for the purchaser to consider the educational value of a product.

Furthermore, just the educational value of software has itself become a selling point for computer manufacturers and retailers, according to Doug Carlston, president of Brøderbund Software.

It's still around if you know where to look.

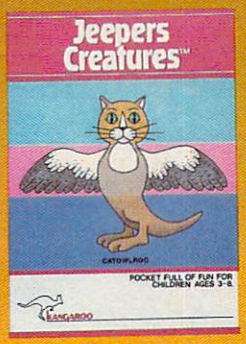
We are Kangaroo™ Inc., dedicated to just plain fun for kids 3 to 8 years old.

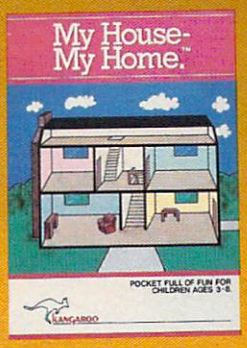
Jeepers Creatures™ - 30 basic animals with interchangeable heads, torsos, and legs or tails. Create an owligator or an octo-catfish or one of over 26,000 funny colorful combinations in this goofy collection of mixed up animals.

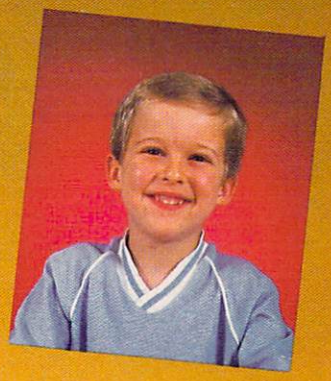
My House-My Home™ - Let's move into the house on Somewhere Street. It's ready for furnishing and family. Oops, you put the kitchen sink in the bedroom and Aunt Nellie's bed in the kitchen. That's silly.

Jeepers Creatures and My House-My Home have no winners or losers, no right or wrong answers, no high scores to beat, just hundreds of hours of creative play.

Give your child's imagination a boost with Kangaroo games designed for Apple and Atari computers.







Jeepers Creatures and My House-My Home are each available for $34.95 at your software dealer or from Kangaroo, Inc., 332 South Michigan Ave. Suite 700, Chicago, IL 60604, (312) 987-9050. Visa, MasterCard and personal checks accepted.

KANGAROO™ *For a pocket full of fun.*

What ever happened to just plain fun?

Spinnaker presents Delta Drawing.™

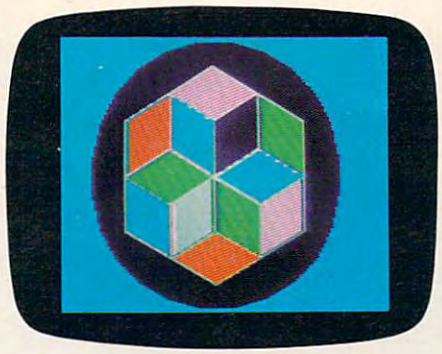
An introduction to the modern art of programming using the ancient art of drawing.

Kids love to draw.

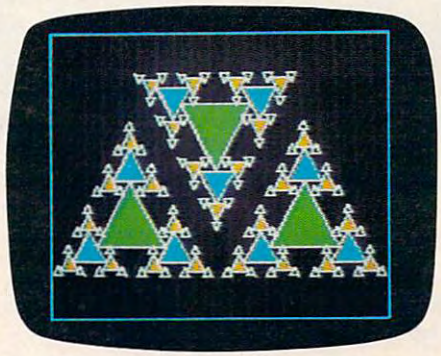
And DELTA DRAWING™ Learning Program lets them enjoy creative drawing and coloring while they learn computer programming concepts. Even kids who have never used a computer before can learn to write simple programs and build an understanding of procedural thinking. It's easy, clear, and fun!

With DELTA DRAWING you use single-key commands to create a picture. Press D to draw; press R to move right. And, as you draw, DELTA DRAWING keeps track of every command. So you can easily switch from your picture to the list of commands (a program!) that you've used to draw it. With DELTA DRAWING, you begin by drawing pictures that produce computer programs, but soon you can learn to write programs that draw pictures.

DELTA DRAWING even lets you save your pictures and programs on a disk or cassette. And you can print your drawings on a printer with graphics capability.



DELTA DRAWING comes with an easy-to-follow manual that gets first-time users started quickly. And it also provides additional instructions for more advanced users.



DELTA DRAWING Learning Program is available on disk for IBM® and Apple® computers, and on cartridge for Atari® and Commodore 64™ computers.

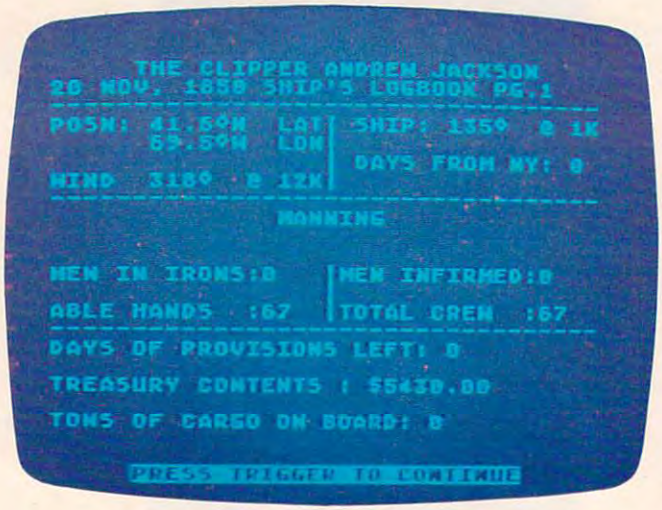
So look for DELTA DRAWING at your local software store. You'll find that when we combined the fun of drawing with an introduction to programming concepts, we created a work of art.

SPINNAKER™

We make learning fun.

Although educational software still sells more slowly than games, Carlston says that if the purchaser becomes convinced of a computer's educational potential, a sale is much more likely.

Another important factor in determining a game's educational value is whether the game is related to the educational goal. Some games take what might be termed the Mary Poppins approach to learning, making everything fun for children.



A logbook for the clipper ship The Andrew Jackson.

Games of this type start with an educational goal, perhaps a multiplication drill. To make the work seem more palatable to children, the programmer may add a game aspect. For example, if a child gets a correct answer, he or she can then shoot an approaching alien. But here the game is unrelated to whatever is being taught. Dr. Thomas Malone, who has studied several computer games at the Xerox Palo Alto Research Center, suggests this possibly negative effect. In an interview in the April 1983 *Classroom Computer News*, Malone suggests that if the game aspect is available only as a reward for getting a correct answer, the student's motivation can actually decrease. He is learning that arithmetic is an unenjoyable activity.

According to Malone, games that make the *learning* aspect part of the fun are more effective. He calls these intrinsically motivating games. In one that he's studied, *Darts*, you try to pop balloons by guessing where they are located on the screen. If you guess too high, an arrow shoots above the balloon. Too low, and it shoots below – so the game reinforces the concept being taught. Such games impose an extra burden on the game designer. While various number concepts – addition, subtraction, fractions – can easily be incorporated, a subject such as spelling or word use would impose different requirements.

Preschoolers

Surprisingly, preschoolers seem not to need motivation from game playing during learning. Their enthusiasm for computers runs high, and a well-produced program for drill and practice meets the youngsters' approval all by itself, according to programmer Bruce Mitchell. He created a line of such programs for preschool through second grade, distributed by the Programmer's Institute. Mitchell is not sold on the fun-and-games approach to programming: "I am an absolute firm believer in the idea that educational programs should be educational – not games."

What he strives for is user-friendliness – anticipating any problem the user could have and building the solution into the program. Another thing important to Mitchell is consistency. Every program he's written uses identical command procedures, so a child moving from one to another doesn't have to learn new instructions.

And finally, Mitchell feels that good documentation is important. That means that the child – or the teacher – should be able to learn about the program by reading the literature that accompanies the product. If these criteria are met, and the skills being taught are appropriate to the child's level of development, then the program will be useful.

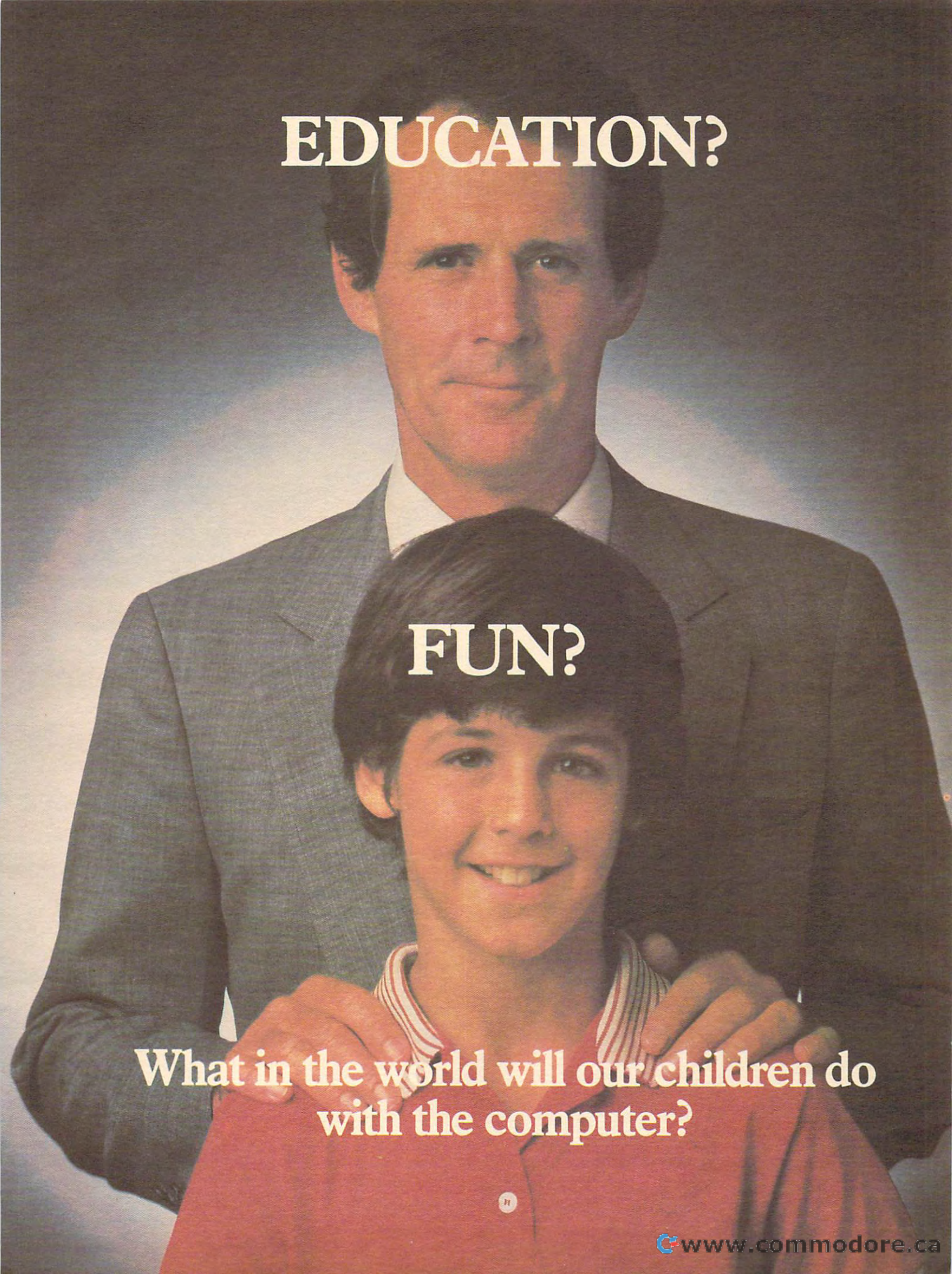
"But I don't believe the computer should be the primary tool to teach a concept," adds Mitchell. "It should be used to help teach the idea, rather than do it all."

For older kids, Mitchell sees computer literacy and programming skills as fundamental. "The creative thinking that permits you to write programs is something you can use throughout life," he says.

Simulations

At the other end of the spectrum from drill and practice are simulation games. They engage the user in a real-life situation – whether it's trying to cross the United States in a covered wagon or running a profitable lemonade stand. Such games are powerful because they not only teach, but also allow the user to make choices within a complex, detailed scenario while observing the consequences of various decisions.

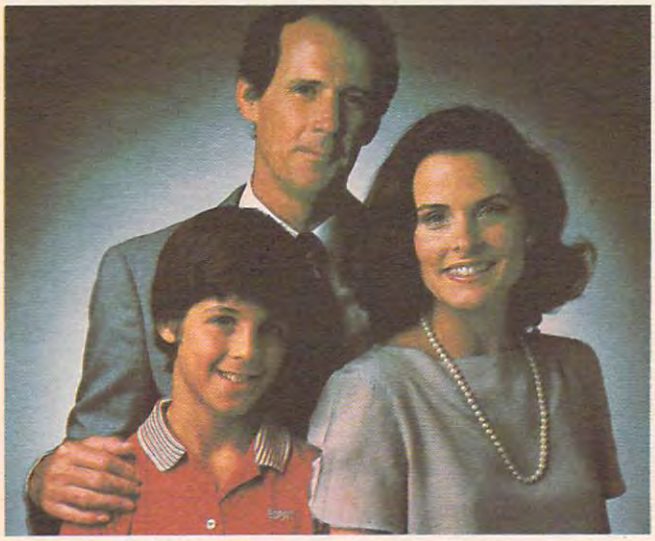
For years educators have used such games as *Oregon, Lemonade,* and *Cartels and Cutthroats* to provide an extra dimension to their computer instruction. In *Oregon,* you join the westward migration, avoiding Indians, thirst, and starvation in an effort to reach new territory. *Lemonade* simulates a small business and the player can see the effects of reducing an advertising budget, raising prices, and fighting the weather while trying to stay in the black in the business of lemonade sales. *Cartels* is about business on a grand scale; the



ENTER A FANTASTIC WORLD OF FUN *AND* LEARNING! WITH

Microzine™

from Scholastic



1. WHAT IN THE WORLD IS A "MICROZINE?"

Microzine is an interactive magazine on a computer disk, and it can open up the world of computer learning to your children *more effectively than any other children's software available today.* Microzine comes to you from Scholastic. We've been trendsetters in children's publishing for over 60 years. Now that traditional teaching methods are being enhanced by computer-taught materials, Scholastic is ready with the innovation that creates an ongoing "dialogue" of fun and learning between your children and your computer. Like a magazine, but unlike other software for children, Microzine is constantly current and topical. Your children receive a new four-program Microzine disk every other month and build their own Microzine Library!

2. WHAT CAN YOUR CHILDREN DO WITH MICROZINE?

Microzine can help your 9-13-year-olds take advantage of one of the most important uses your computer can have: exploring new and more efficient ways of learning and thinking. (If you don't own a computer, your children may be able to use one at school or a friend's home, or borrow one from your local public library.)

Microzine was created with the recognition that today's children take naturally to computers and that tomorrow's adults will need to be computer literate—no matter what their careers.

3. WHAT IS "COMPUTER LITERACY" AND HOW DOES MICROZINE HELP ACCOMPLISH IT?

At Scholastic, we believe that learning how to utilize a computer's wide-ranging capabilities should be an important part of every child's education. This kind of computer literacy is no longer an option, but a necessity, if our children are to take their places in the computer age. To this end, Microzine is designed to spark enthusiasm and teach these essential skills:

- ★ following directions
- ★ vocabulary
- ★ what a computer can do
- ★ learning to use a computer
- ★ the nature of programming
- ★ using the keyboard
- ★ everyday applications
- ★ word processing
- ★ data handling
- ★ graphics
- ★ logic
- ★ parts of a computer
- ★ problem solving

4. WHAT WILL THE FIRST YEAR OF MICROZINE BRING?

An ever-expanding library of fun and learning!
Every eight weeks there are four full-length programs and the variety is incredible:

Who's that trying to solve the *Mystery at Pinecrest Manor*, lost in the *Northwoods Adventure* and challenging the far reaches of space on *Mission to Planet XII*? Could it be someone we know? (With Microzine, *anything* is possible.) All set for takeoff on the *Space Shuttle*—or maybe a hot air balloon race? Wow! (Will Microzine *ever* get down to Earth?)

Back safe on Planet Earth, visit the *Pet Store*. "A flamingo for your bathtub? Or maybe a rare three-humped camel?"

Too wild? *Gift Store* offers practical suggestions for everyone from Great Uncle Oscar to your 16-year-old twin sisters. Or explore your creative options by composing a song, writing and illustrating a book, or inventing your own game.

Microzine is *always* full of questions. If you've ever dreamed of talking to a computer game designer, *Ask Me* gives you the chance. You won't believe all the current big stars waiting to ask you questions, too.

JUST TURN THE PAGE TO FILL OUT YOUR MICROZINE REPLY CARD NOW!

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 2316 HICKSVILLE, N.Y.

POSTAGE WILL BE PAID BY ADDRESSEE

Microzine™
Scholastic, Inc.
P.O. Box 947
Education Plaza
Hicksville, NY 11802

5. BECOME A CHARTER SUBSCRIBER TODAY AND YOUR FIRST MICROZINE IS JUST $7.95. (A $39.95 VALUE: YOU SAVE $32.00!)

Thereafter, pay only $24.95, plus shipping and handling, for each Microzine you accept.
You save nearly 40% off the retail price by subscribing!

Each bimonthly Microzine Package contains; a Microzine Floppy Disk with Four Complete Programs.

On your first disk, discover:

1. POSTER. What's two spaces wide, slow, green and silent—and changes to three spaces wide, fast, pink and squeaky? It's an imaginary paintbrush that lets you create as many colorful posters as you want!

2. SECRET FILES. If your children want to remember who starred in their favorite horse movie of 1982, they need Microzine's electronic filing system. It works just like the electronic filing systems adults use.

3. ASK ME. Robert Macnaughton of "ET" fame is standing by to accept questions—and ask a few of your children in return!

4. HAUNTED HOUSE. There's never been a haunted house so funny—or one so willing to let you plan your own visit! Like all Twistaplots,® this one ends differently every time you venture inside.

NOTE: The first Microzine Package also contains a bonus: *a separate data disk that can be used to save original posters and other personal creations!* (A $4.95 value.)

The Microzine Handbook

After consulting this monthly step-by-step guide written in plain English for users 9-13, your children will be able to show *you* how Microzine activities work. Easy-to-follow instructions encourage independent work habits, creative thinking and follow-through.

Microzine™

THE SCHOLASTIC CHILDREN'S MAGAZINE ON A MICROCOMPUTER DISK.

FOR APPLE COMPUTERS.

O.K., Scholastic.
We're ready to enter a fantastic world of fun and learning.
Start our Microzines coming!

☐ Please send us Microzine #1 (featuring Poster, Secret Files, Ask Me and Haunted House) and enter a Charter Subscription to Microzine for the child named below. Bill me the special introductory price of just $7.95 (plus shipping, handling and any applicable sales tax). We will be billed $24.95 (plus delivery) for every Microzine we keep. After purchasing Microzine #1, we are never obligated to buy even one additional Microzine, and we may cancel our subscription at any time. If we are not delighted with the introductory Microzine, we may return it within 10 days and pay nothing.

☐ I've already purchased Microzine #1. Please start our subscription with Microzine #2, for which I will be charged just $7.95 (plus shipping, handling and any applicable sales tax). 61010 08

Child's Name_____ Age_____ Grade_____
(please print)

Address_____ Apt._____

City_____ State_____ Zip_____

Telephone No. (_____)_____

Parent's Signature_____

SEND NO MONEY;

JUST FILL OUT AND MAIL THIS MICROZINE REPLY CARD NOW!

player is in charge of a multimillion-dollar manufacturing plant.

One professional software house which has incorporated educational values into games is Spinnaker Software. For preschoolers, games such as *Story Machine* and *Facemaker* support creative efforts by the child. Adventure games for older children encourage problem solving. In *Snooper Troops*, for instance, the user tries to solve a mystery. To be successful, you must learn as you proceed, experimenting with the Snoop-Mobile, a wrist radio, and a camera to discover and use clues.

Another adventure, *In Search of the Most Amazing Thing*, involves traveling through 20 different countries. When you pass through one, you must learn the language, the money system, and some of the local customs. "It's learning without making you feel you are being educated," says Nancy Evans, an editor at Spinnaker. "If you get something wrong, the game is not over."

The adventures hone problem-solving skills indirectly, making them part of the excitement of playing. Learning becomes a natural part of the action. At first, children don't take any notes when playing a game like *Snooper Troops*, according to Spinnaker's chairman, Bill Bowman. Then they begin to jot things down in haphazard fashion. Finally, he says, "kids begin taking notes in a structured way." No one tells them to; it just makes the player more successful.

Into The Home

These games are attractive to many educators, but school budgets are tight. In many cases, school administrators are unsure of what to buy. New software must first be reviewed, sometimes at the state level, and approval can take months, even years.

Often, the only way a teacher can get a computer venture under way is to rely on individual initiative. It's not uncommon for a teacher to use personal funds to purchase a computer for students. In fact, says Bowman, nearly all of Spinnaker's sales to educational groups are paid for by individuals – evidence to him that teachers are buying the products with their own money.

"They realize what the computer can do," he adds. "But schools are too slow and too bureaucratic. We feel that the revolution in educational computing will occur in the home."

To tap this market, Spinnaker is emphasizing cartridge software. People who don't have disk drives can acquire the games without having to make a substantial investment. Other manufacturers are undertaking similar efforts. They are stressing both educational quality and fun. And lest parents forget, producers are reminding them that students who learn at home have an edge at school. "When a child is exposed to software that teaches at home, chances for high success in school are greatly improved," according to Dr. Larry Lowery.

Lowery, who lectures on courseware evaluation at the University of California, Berkeley, created an extensive manual that is used by Soft-Kat's Educational Computer Centers. To help potential purchasers examine educational software before they buy, Soft-Kat has established over 300 centers where parents, teachers, and children can select programs and try them out.

Computers Vs. Game Machines

Activity such as this suggests that there is real interest in the home educational market on the part of software producers. In fact, both PDI's John Victor and Broderbund's Doug Carlston see a rapidly growing market there. Part of the reason is that home users are beginning to purchase almost as many computers as video games. Experts in the computer industry had thought that it would be years before home computers began to sell in such quantities. However, intense price cutting among manufacturers has dropped the price of some computers below that of video games. It is now quite possible that computers will begin outselling game machines as early as next year.

This could make educational games the next growth area in the computer business. As more manufacturers get into "eduware" and computer users look for software variety, the field could blossom. Competition may be tough, though. As Victor notes, "Parents don't like wasting money. The people who put up the bucks really want to be sure they get results." ©

Guest Commentary

COMPUTERS IN EDUCATION

Robert Nielsen

King Solomon, writing about the futility of various pursuits in life as ends in themselves, did not neglect learning. He wrote: "Of making many books there is no end, and much study is a weariness of the flesh" (Eccl. 12:12b). Children today must feel similarly: a bachelor's degree comes at the end of *seventeen years* of education for most people. Consequently, educators are always seeking more effective ways to accomplish their task of imparting knowledge and training minds. One useful means to this end is the computer.

Responsive Pacing

In its pure form, programmed instruction involves the presentation of new material step-by-step. Additionally, learners work individually at their own speed, and there are frequent examinations followed by immediate correction. Usually the learner is given a short piece of material followed by a fill-in-the-blank, multiple-choice, or other question for which the answer can be mechanically graded.

Traditional books and teaching machines, however, do not accommodate differences between fast and slow learners. Although the students work individually, at their own pace, all students must go through the same syllabus in exactly the same way. There is little flexibility for the weak student who needs extra drill and practice or for the advanced student who needs greater challenges.

Fortunately, the computer is able to handle what is called a *branching program*. In such a program there is no *one* correct way for the learner to move through the material. Instead, material is presented based on the learner's past performance. Thus, if there is evidence that a student already knows some of the material, then future reference to that topic may never be presented. The student who does slightly substandard work can be given extra drill and practice, while the one who does very poorly can be given a different, expanded explanation. In each case the computer can offer an individualized learning program to the student.

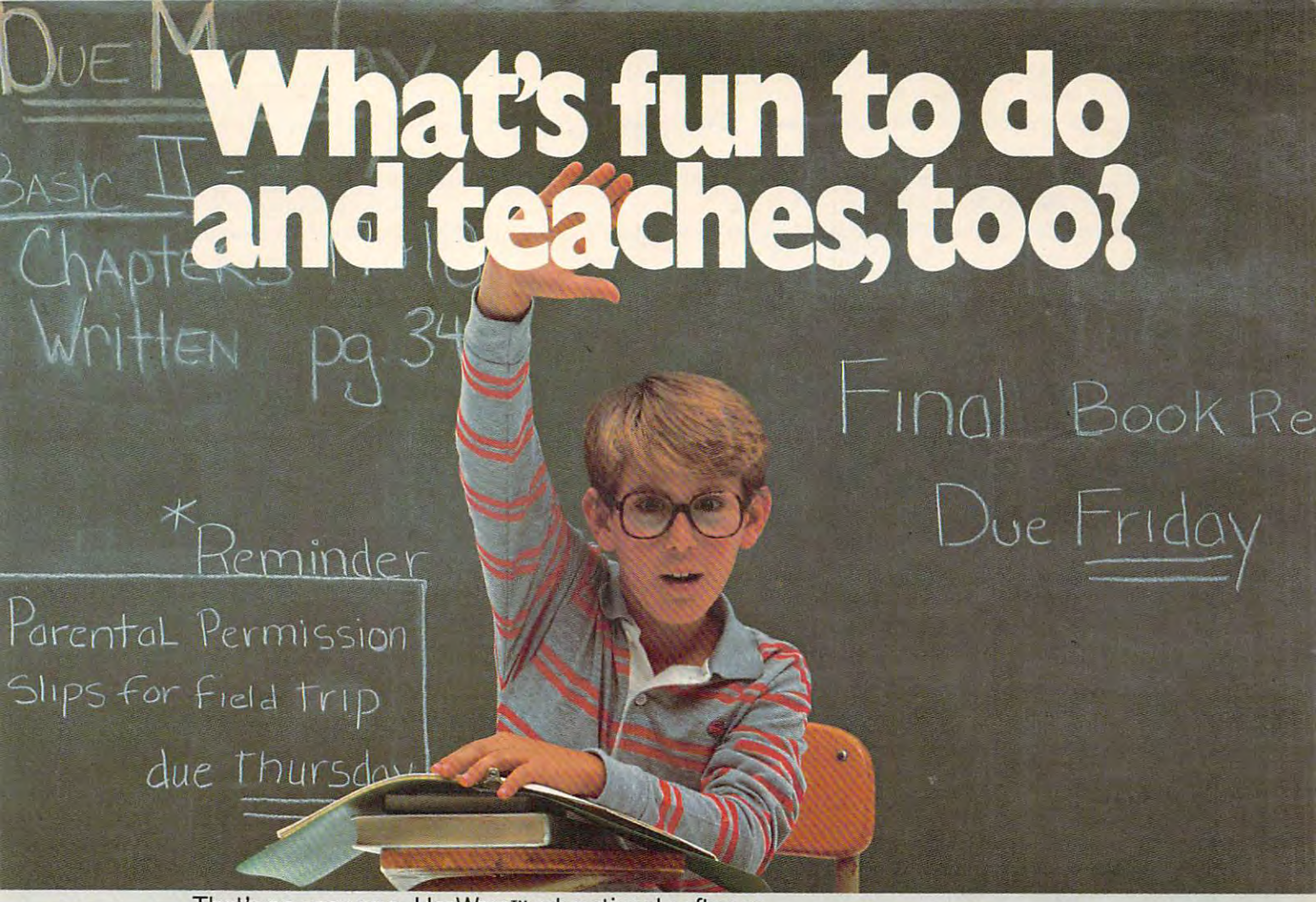
Whatever the technology – books, teaching machine, or computer – programmed instruction is limited to subjects which can be quantified. Therefore, such subjects as mathematics, chemistry, and physics can easily be adapted to programmed learning. Much more difficult to adapt are fields such as art appreciation, philosophy, and literature, since these subjects often require treatment which cannot be mechanically scored. The question "Why is *Moby Dick* a great piece of literature?" requires a type of answer radically different from the physics problem concerning the acceleration of an object dropped near the surface of the earth.

Not too long ago (only a few years) it might have been easily assumed that computer-assisted instruction would continue closely allied with the application of behavioral science to learning theory. This has not been the case, in part because not all educators are behaviorists. Instead, instructors use the computer when it can present material in a way which is consistent with their educational philosophy.

Firing Ranges, Foreign Languages

This wider use of the computer encourages new speculation as to how CAI (Computer Assisted

What's fun to do and teaches, too?



That's an easy one: HesWare™ educational software.

The children with the most answers in school are usually the children who enjoy learning. HesWare helps develop your child's interest in learning by making it fun. And along the way, develop familiarity and proficiency with computers—a skill that is becoming more and more essential to success.

HesWare educational software combines enjoyment with a creative learning experience. Unlike video games, HesWare educational programs involve your child—and that keeps their interest. Whether it's creating colorful and artistic pictures with Turtle Graphics, making up funny faces with Facemaker,™ or helping America's favorite canine, Benji, save kidnapped scientists (and learn about the solar system in the process,) or any of the programs in our education library, HesWare gives your children a positive attitude toward learning and technology.

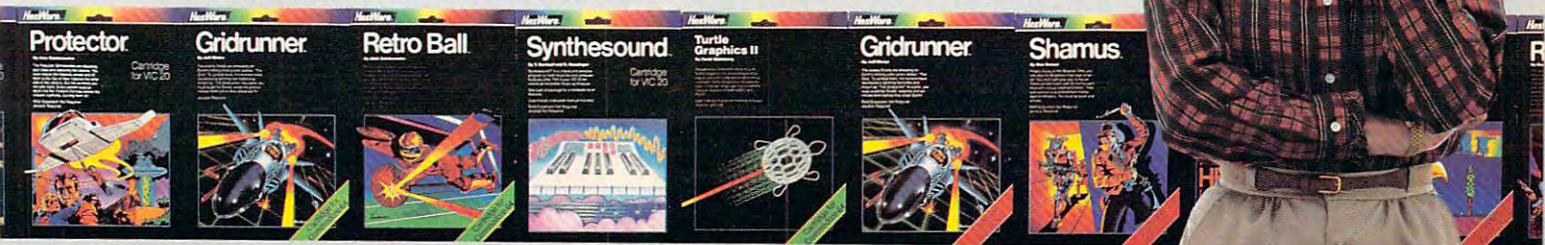
It's not expensive to give your child a headstart on the future. HesWare programs are available for most popular home computers, including the Commodore VIC 20,™ Commodore 64,™ Atari,® and IBM.®

HesWare educational software. Just one of the ways HesWare is expanding the computer experience. And expanding your child's horizons. Look for them at your favorite software retailer.

Pleases the tough customer.

HesWare™

Human Engineered Software, 150 North Hill Drive, Brisbane, CA 94005
800-227-6703 (in California 800-632-7979) Dept. C20



HesWare and Facemaker are trademarks of Human Engineered Software. VIC 20 and Commodore 64 are trademarks of Commodore Electronics Ltd. Atari is a registered trademark of Atari, Inc. IBM is a registered trademark of International Business Machines.

Instruction) works. The behaviorist sees the computer as a giver of rewards to the successful learner, thus increasing learning. However, behaviorism is only one branch of education and one which is limited, by definition, since it is concerned only with behaviors and nothing else. One explanation for the effectiveness of CAI comes from two disparate realms of education: the firing range and the foreign language classroom.

The largest educational organization in the United States is the military. Much time, energy, and money is spent training personnel. Consequently, the military is always looking for faster, cheaper ways to teach. One improvement that it discovered was in teaching marksmanship.

The computer is silent, which allows the student time to think and, consequently, learn.

The old method of teaching soldiers to shoot accurately was to let the soldiers take shots at a target. Then the sergeant would come over and tell the recruit how well he did. Informed of his results, the soldier would have another try.

As an experiment, the army tried placing targets which fell over when accurately hit, but which did nothing when missed. There was no instructor to tell the soldiers how they did: they could see for themselves.

The result was that soldiers learned faster and used fewer bullets. Interestingly enough, when people are told that they have done a job poorly, they say to themselves, "I'm no good." That is, they take an evaluation of their *performance* and apply it to *themselves*. While it is very easy intellectually to separate performance from person, emotionally it is very difficult. Furthermore, people who think they have been (or actually have been) judged negatively as a person tend to do worse in performance. In short, a person who tells you that you did a job poorly is not helping you to do the job better next time.

The second example comes from the foreign language class. Here, just as in the army, much time and effort is spent to teach students. Consequently, there is a proliferation of methods to teach foreign languages, each method trying to do the job better than previous ones. One surprising way that works well involves a mostly silent teacher.

The teacher rarely speaks even when students make errors. For example, when a student makes a pronunciation error, most traditional teachers would say something like "No, the correct pronunciation is ...." The silent teacher, however, would point to the part of the word where the error occurred. Students would then guess new pronunciations until hitting on the correct one (usually rather quickly). The correct answer is met with a slight nod of the head. In spite of the apparent paradox or apparent inefficiencies of a silent language teacher, students not only learn but seem to thrive under this system.

The point of the above examples is that the computer provides similar feedback to student responses. Because it is a machine rather than a person which gives the feedback to students, their egos are not as threatened. Additionally, the computer is usually silent, which allows the students time to think and, consequently, learn.

Inexpensive, Safe, Holistic

Another, well-established application of CAI is in the field of simulations. Simulations are used in education to provide a substitute for the real thing. Sometimes a substitute is preferred because it is less costly – learning to fly an aircraft, for example. A mock-up of an airplane cockpit connected to a high-speed computer can give every effect of flying an airplane, yet never leave the ground.

Moreover, simulations can provide learners with experience that would be too dangerous in real life. For example, pilots need to practice emergency situations, such as landing with one inoperative engine. Done with actual aircraft, this procedure may result in disaster. Simulated with the help of a computer, such an "emergency" gives pilots invaluable experience for a genuine emergency, should one ever happen.

Finally, simulations provide a holistic view – an appreciation for how everything works together. It has been said that scholars today know more and more about less and less. The knowledge that a simulation provides is just the opposite: a view of the whole instead of a focus on the details. The world of the classroom is one where details can be examined at length and at leisure. Outside the classroom, things are important not only for what they are in themselves, but for how they fit in with everything else that is happening. A simulation can provide this insight.

There are clearly several significant uses for computers in education. We've only described pacing, efficiency, and simulation. There are also strong arguments for using computers in educational management (grading, attendance) and in games which teach. The pessimism expressed by King Solomon may not apply to the learners and teachers of the future. ©

Ed·u·ware

(ej' o͝o wâr) ***n.***

The first name in learning.

THE SCIENCE OF LEARNING™

Professionally designed instruction in specific academic skills for ages 4 through adult.

Elementary Mathematics

Introduction to Counting presents young children with the concepts of numbers, addition, subtraction, shape discrimination, weight, height, and measurement. *Apple, Atari disk $39.95. Atari tape $29.95.*

Arithmetic Skills teaches basic number skills. High resolution graphics, animation, and sound effects make counting, addition, subtraction, multiplication, and division interesting. *Apple $49.95.*

Fractions builds and reinforces skills in working with fractions. Definitions, numerators, denominators, addition, subtraction, multiplication, and division are explained in small increments and a learning manager makes the program flexible to meet the needs of individual learners. *Apple $49.00.*

Compu-Math™ Fractions, a comparable *Atari* program is also available. *Atari disk $39.95. Atari tape $29.95.*

Decimals presents addition, subtraction, multiplication, division, rounding off, percentage and conversion as they apply to decimals. *Apple $49.00.*

Compu-Math™ Decimals, a comparable *Atari* program is also available. *Atari disk $39.95. Atari tape $29.95.*

Advanced Mathematics

Algebra, volumes 1 through 6 is a series of independent programs comprising a first-year course in algebra. Concepts are presented in four distinct learning styles so that self-managed learning is encouraged. Volumes 1 through 4: *Apple, IBM PC $39.95 each.* Volumes 5 and 6 (sold as a set): *Apple, IBM PC $49.95.*

Language Skills

Spelling and Reading Primer™ uses simple words and pictures to introduce basic reading and spelling skills. Word groups cover simple two- and three-letter words through difficult multi-syllable words, double vowels and consonants, and directions and numbers. *Apple $39.95.*

Compu-Spell™ builds spelling skills in a tutorial format. A system diskette can be used with six different data diskettes geared to vocabulary for grades 4, 5, 6, 7, 8, and an adult level containing words commonly misspelled in business. System Diskette: *Apple $29.95.* Data Diskettes: *Apple $19.95 each.*

Compu-Read™ improves reading speed, recall, and test-taking skills. The system adjusts itself to your learning requirements and provides detailed information on progress and reading rates. *Apple, Atari disk $29.95. Atari tape $24.95.*

PSAT Word Attack Skills and **SAT Word Attack Skills** develop specific vocabulary skills in definition, connotation, roots and prefixes, and application. Test-taking skills required for the Scholastic Aptitude Tests are sharpened. *Apple $49.00 each.*

PSAT/SAT Analogies develops skills tested in the analogies portion of college entrance examinations. Word relationships, meanings, and achieving under test-taking conditions are stressed. *Apple $49.00.*

Introduction to Poetry presents rhyme and meter in a clear and simple tutorial format. Definitions are given on the screen and are sounded out by your computer. The program is highly interactive and easy to operate. *Apple $39.95.*

Computer Skills

Hands On BASIC™ Programming combines hand-holding software with a 200-page tutorial that steps the novice through beginning BASIC programming. This complete learning system won't leave you hanging with an error message. Special features allow you to diagnose the problem and correct your mistake. *Apple $79.00.*

DRAGONWARE™

Entertaining, colorful, animated games with lasting educational value, for ages 4 through 10. Webster, our wise and wonderful dragon, is your child's companion in the adventure of computer-based learning.

Spelling Bee Games™ contains four fun activities in which hand/eye coordination, memory skills, and motor skills are exercised. Twenty-two word lists covering simple two- and three-letter words through multi-syllable words provide variety and scope. *Apple, Atari disk $39.95.*

Webster's Numbers™ is a magical place where mosquitoes in mazes, balloon races, building blocks, and boxes teach pre-school children the basics of counting. *Apple $39.95.*

INTERACTIVE SIMULATIONS™

Realistic recreations of real-world adventures where scientific evaluation yields the solution.

Rendezvous makes you the pilot of a true-to-life space shuttle. Your mission is to dock with an orbiting space station. *Apple, Atari disk $39.95.*

INTERACTIVE FANTASIES™

Science fiction adventure games that challenge the intellect and startle the imagination.

Prisoner 2™ In a surrealistic environment of misleading clues and sugar-coated propaganda, you survive by your wits alone. Escape without divulging the information your captors desire. Can you escape? Can you even find the bars? *Apple $32.95. Atari disk, IBM PC $39.95.*

Empire I: World Builders™ Struggle to tame a gallactic wilderness and establish an infant Empire's first colonies. Stand at the edge of the new frontier. *Apple $32.95.*

Empire II: Interstellar Sharks™ Dodge the bureaucracy and pursue ultimate success in a high-tension, intergallactic entrepreneurial arena. Making it depends on how well-equipped you are to meet the onslaught of those in power. *Apple $32.95.*

Empire III: Armageddon™ The end of a once great Empire now torn by rebellion, poverty, corruption, and an unfeeling authority. Where do your loyalties lie? *Apple $32.95.*

For more information or the dealer nearest you contact:

EduWare Services, Inc.
28035 Dorothy Drive
PO Box 22222
Agoura Hills, California 91301
213/706-0661

COMPUTERS IN SCHOOL
NEW APPROACHES

John Blackford, Assistant Features Editor

"Computers to invade the classroom!" Even if you didn't see that on the evening news or in your favorite magazine, chances are that you've seen a TV commercial or heard from a neighbor that students must *learn about computers to succeed. The question for parents and educators is how best to introduce computers – what software to use, how to set up a computer program, and where to get the money. Some students, however, are racing ahead, learning programming at home or during odd hours at school, and sometimes sharing their knowledge with others.*

"The computer is going to force us to reexamine our goals in education," says Sheila Cory, who coordinates the computer program for the Chapel Hill-Carrboro City Schools in North Carolina. And computers are moving in now, whether or not new goals have been set. Students are eager to try them. Teachers wonder how to tap this enthusiasm without sacrificing educational quality. Some school boards worry about the expense, yet fear, too, that their school may be left behind if they don't act quickly.

While one state, or school district, or family may be heavily committed to computers, another may view them with skepticism or disinterest. The result is a confused, yet creative ferment. Individuals can have real impact now, because – for all the excitement – there are few firm guidelines, few precedents.

A Mythical Country

One individual who made a difference is Jim Tomberg, a teacher at Chapel Hill High School. He could find hardly enough money in the budget to purchase even one computer for his students, so Tomberg proposed a software development group for the school. He requested and received a grant from federal and state funds set aside to aid unique educational projects.

The high school students in the project were to create original, documented programs to the specifications of teachers in the elementary grades. Tomberg wanted the programmers to work closely with the students and teachers receiving the programs.

To make the entire project educational, Tomberg says he "let the kids make all the decisions. They organized the whole course." They studied various brands of computers and decided what equipment to buy. Then they came up with the idea of doing a newsletter about their study – all composed on computers using word processing programs.

The teachers who requested material did, however, retain complete control over the content of the programs. In every case, students spoke directly with each teacher to insure useful results in the classroom.

Tomberg's project has received strong support from the 12 programmers as well as from the teachers requesting software. Not every request could be fulfilled, and when one student programmer called a teacher to say his project was accepted, "the teacher was so excited. He was ecstatic," says Tomberg. The program, for history teacher Grant Zimmerman, is a simulation of a mythical New World traversed by seafaring adventurers. The new land is complete with native tribes – each with distinct languages and customs – and mountains and rivers to be charted.

The object of the game, called "Explorers," is to cross an ocean and trek across an unknown continent to gain treasure hidden on the other side. At each stage, obstacles must be overcome. At sea, whales and storms threaten the voyagers. Once on land, the terrain must be mapped for the journey overland. And part of the challenge is learning about the tribes. Some are friendly and

PLATO EDUCATIONAL COURSEWARE BRINGS NEW EXCITEMENT TO LEARNING.

If your kids think serious education has to be dull, wait until they use Control Data PLATO® educational courseware.

With PLATO courseware, children can learn by competing against themselves; by interacting with stimulating graphics that keep them motivated. They see their progress, and find real excitement in achievement.

PLATO courseware is being used in classrooms across the nation. Now you can bring this quality education home. You'll find PLATO lessons at selected retail outlets where quality software is sold.

For the Apple II Plus and Apple IIe, the TI 99/4A or Atari 800.

The selection includes elementary Math lessons in Basic Number Facts, Whole Numbers, Decimals and Fractions.

Through such computerized activities as "darts" and "pinball," PLATO makes learning math almost fun.

Foreign Language lessons use the popular hangman or pyramid game concept to help teach French, German or Spanish in a way that holds and builds interest.

Our Computer Literacy lesson provides a perfect introduction to the computer age for kids and novices.

For Apple II Plus and Apple IIe.

Our Keyboarding lesson shows children and adults how to use a keyboard to enter data into the computer. Developed in cooperation with Gregg-McGraw Hill.

Widen your child's world.

See the growing library of PLATO educational courseware at selected retail outlets. Or for information and a free PLATO educational courseware catalog, call toll-free 800/233-3784. Or write: Control Data Publishing Co., P.O. Box 261127, San Diego, CA 92126. In California call 800/233-3785.

Warranty available free from Control Data Publishing Co., 4455 Eastgate Mall, San Diego, CA 92121

PLATO
COMPUTER-BASED EDUCATION

CONTROL DATA PUBLISHING

can help with the enterprise, while others must be battled or avoided.

The main idea for Explorers was Zimmerman's. He wanted a challenging exploration game in which students could succeed (unlike some adventure games, where you can play for hours, only to be gobbled by an ogre after making one wrong turn). With Zimmerman's general theme in mind, programmer Aden Evens set to work on an ocean part of the adventure, while Tom Evans created the new continent. They designed the game so there is usually a way out of any difficulty if the player is persistent and uses common sense. When the student explorer sees a storm coming, for example, he can avoid being blown off course by lowering the sail.

A mini-workshop for elementary school students conducted by Chapel Hill High School students and their advisor Jim Tomberg (center).

The students finished all their programs in time to present them to examiners overseeing the project for the state, and chances are good that funding will be extended this year. Toward the end of the school year, the programmers even held some workshops, sharing their knowledge with younger schoolmates. Pupils as experts, that's another Computer Age twist.

Tomberg is hard at work on his latest project: convincing a manufacturer of inexpensive computers to donate 30 of its products to the school. The students would be able to check them out of the library and take them home. "Just think," says Tomberg, "they'll be able to take one home and plug it right into the TV set."

New Research

At present, fully 25 percent of the funding for classroom computers is provided by parental, religious, or civic groups, according to a recent study by McGraw-Hill Research. And teachers often bring in their own computers to share. But these individuals and groups aren't always sure what approach to take, or even what brand of computer is best for schools.

"You are talking about a whole new era of technology, about which not enough background research has been done," says graduate student Jim Glover, of the University of Connecticut School of Education. "Schools are rushing pell-mell into educational computing, but what happens ten years from now when you may be teaching kids three or four hours a day with computers? What's best for preschoolers, for junior high? What type of display is easiest to look at? What kind of keyboard is comfortable to use?"

To help answer such questions, researchers are looking at the growing role of computers in education and developing new theories and methods to help educators cope with the changes. However, they are by no means unanimous in their recommendations. For some, computer-assisted instruction (CAI) is a perfect vehicle for the behaviorist theories of psychologist B.F. Skinner. For others, computers can enhance the open-ended theories of Swiss educator Jean Piaget, who believed that education at its best involves an active discovery of reality by the learner, not a recollection of ready-made facts.

Piaget's ideas actually form the basis of a computer language – Logo – that was developed at MIT by Seymour Papert and others. Logo has intrigued many educators because it supports impressive screen graphics through a command structure that permits the linkage of simple procedures which then form more complex procedures.

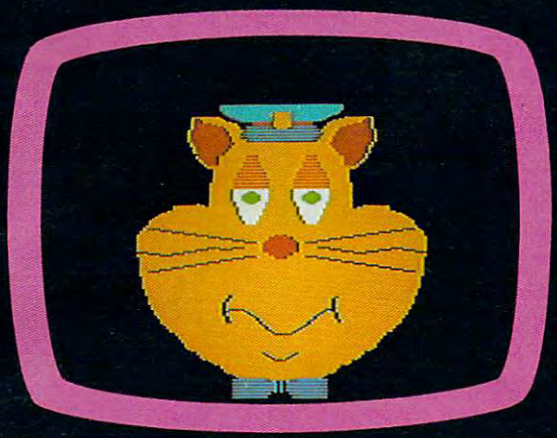
Schools that use Logo and similar languages incorporating Piaget's ideas have blossomed in recent years. The Bank Street College of Education in New York City has made a study of this approach to learning. People at the school are looking at the effects that computers, and Logo in particular, have on learning among eight- to twelve-year-olds. One characteristic of Logo is that it makes the child a partner in the learning process. However, says Barbara Dubitsky, "The computer itself is nothing more than a tool. In the hands of a poor teacher, Logo is a bomb."

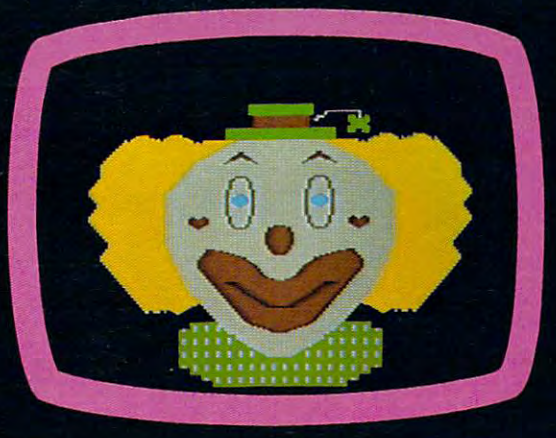
While the research at Bank Street is still preliminary, work at such places will eventually give educators throughout the country a solid yardstick by which to evaluate new approaches.

Radiating Computing Centers

Current research has an impact on the classrooms of the future, but where do teachers or schools turn for help now? Again, one committed teacher or a single successful program often serves as a catalyst to create a larger, more formally organized group. For example, a teacher may begin a modest pilot program, and interested people drop by to ask questions. As the project grows, they may

SOFTWARE MOVIES™





NEW!

SOFTWARE DESIGNS FOR DEVELOPING YOUNG MINDS™

MAXIMUS, Inc. is excited to present two new educational software movies for kids of all ages . . . and more are on the way!

STORYLINE™ makes bedtime, or anytime, a warm and friendly funtime. Clover the Clown is your tourguide for two fairytales: The Ugly Duckling and Rumpelstiltskin. Through computer magic you become a part of each story!

SAFETYLINE™ combines fun with important lessons about safety. Max the Cat shows you how to cross the street safely going to school and what to do when lost at the zoo.

Both software movies have interactive games that reinforce the fun and learning. Both have real human voices; you don't need a voice synthesizer!

Features of the software include:

- Sophisticated Face Animation
- Lip-Synchronized Voices
- Original Musical Scores
- Superior Full-Color Graphics
- Optional Joystick Control
- Machine Language Programs

Relax and enjoy yourself. Let Max, Clover, and their colorful friends guide you through a new world of fun and learning. You'll be amazed at how real they are!

STORYLINE™ and SAFETYLINE™ are currently available for any Atari computer with 48K. Each software movie comes in either CASSETTE ONLY ($29.95) or CASSETTE/DISK ($34.95) versions. Order by mail or phone. Visa and Mastercard welcome. Include $2.50 postage and handling; Virginia residents add 4% sales tax. Dealer inquiries invited. Write for our free catalog. MAXIMUS, Inc., 6723 Whittier Avenue, McLean, Virginia 22101.

ORDER TOLL-FREE 1-800-368-2152

MAXIMUS ...Where Excellence is the Standard

Commodore 64 Version Coming Soon!

return to volunteer their time – and the alliance grows. Such pioneer efforts can develop into vital resource centers whose influence reaches far beyond the local area.

That's the way it happened in San Mateo County, California, where the Microcomputer Center there gained such a reputation for excellence that it has influence throughout the state and even beyond. Technically, the Center is only a county office, but because it was the first of its kind in California, it became a model for similar programs elsewhere.

The Microcomputer Center has been designated as a software library and clearinghouse to support all 15 Teacher Education and Computer (TEC) Centers in the state. It also runs the *Softswap* public domain software exchange in cooperation with a group of volunteers working for CUE (Computer-Using Educators). *Softswap* receives hundreds of inquiries each month from around the world. The group prepares disks with programs contributed by educators and makes the disks available for $10 each. The disks may then be freely copied and distributed.

The Center also received a grant for the 1982/83 school year to evaluate software and make the results available to educators all over California. To do this, it is establishing a cadre of software evaluators across the state and developing a list of educational software that has been favorably reviewed by other qualified groups across the country. The Center will coordinate and publish the results. (A software catalog is available for $1 ppd. Write to Microcomputer Center, San Mateo County Office of Education, 333 Main St., Redwood City, CA 94063.)

California has given strong support to computer use in its schools. Many projects have been supported by state-administered grants. Another state which made one of the earliest starts in computer education is Minnesota. It remains a leader with its MECC (Minnesota Educational Computing Consortium) program, the nation's only statewide instructional computing network. MECC offers a wide range of services to students, teachers, and administrators in the state's public schools and colleges. It also develops and distributes educational software for a fee to school districts anywhere in the United States. For many schools, MECC educational programs are the first ones in the classroom.

Texas has also strongly supported the use of computers in education. Software evaluation is coordinated on a statewide basis, and the state – through 20 Educational Service Centers – now gets regular discounts of 25 to 30 percent on hardware. Soon, the Texas Education Agency hopes to go on-line with a data base containing all the agency's software evaluations and other pertinent information. To improve computer education throughout the state, requirements for teacher certification are being revised to include computer literacy. According to Sandy Pratscher, educational specialist for instructional computing for the state, the mere hint of this change has already caused a marked jump in enrollment for computer courses in Texas colleges.

Students at the Bank Street College of Education trying out a new program. Researchers here are looking at new ways to involve computers in the learning process.

Innovators

Summit School (Winston-Salem, North Carolina) is an unusual place – the kind where you'd almost expect to find an innovative computer program. Although the school is about to celebrate its 50th anniversary as an independent institution, the original principal, now 92, still comes in mornings to teach.

The school has a Math and Computer Center. According to the center's director, Elaine Bologna, the math center, started four years ago, was funded by two foundations as a demonstration center for new teaching methods. After the grants expired, the school took over funding and added the computer program. Teachers from all over North Carolina visit the center in Winston-Salem to attend workshops and demonstrations.

The emphasis at the center is on programming – Logo for grades one through six, BASIC for grades eight and nine. "The interesting thing about it," says Bologna, "is that when the kids come in after school, they use Logo." In fact, that language offers so many possibilities that the school really hasn't found much need for packaged software. Students invent their own games and experiment endlessly.

In one case, Bologna presented students with an imaginary situation and let them create it on

the screen. "A plane was lost and needed a landing field," she told them, so they made a long rectangle. Then she asked, "Where's the terminal?" and finally, "Where's the door to the terminal?" When they were done, the students had created a whole airport.

The kindergarten students use a Big Trac programmable toy to help them visualize Logo. They can make Big Trac perform the same sort of maneuvers on the floor that the Logo "turtle" does on the screen. This gives them a real feel for some of the ideas behind Logo and a head start when they encounter Logo in later grades.

In some cases, it's harder to interest teachers than it is to interest students. "We don't have quite as much teacher involvement as we would like," says Bologna. "They haven't been able to feel comfortable in situations where they aren't the authority. But, really, that's one of the beauties of the whole thing. We all make mistakes." And part of what makes computers unique in schools is that they are new to everyone. There's a possibility of mutual discovery that can allow teacher and student to share the learning experience. "That's part of Papert's philosophy," says Bologna.

A Resource Center

Eventually, every class in the nation may have an array of computers, and teachers may be as familiar with their use as they are with gradebooks. But at present, computers are mysterious to many teachers. In fact, despite all the attention given lately to computer education, 47 percent of all schools still had no microcomputers for student instruction at the beginning of 1983, according to a national survey conducted at Johns Hopkins University.

But great strides have been made toward computer instruction, especially by schools with a computer center. The person in charge is often simply an innovator interested in microcomputers who initiated a shoestring program. Once such programs grow – possibly with the addition of full-time staff – the resources of state and federal agencies become more accessible. Staff members have the time to find out what help *is* available. They can evaluate software and teaching methods while proceeding with the delicate task of introducing both teachers and students to computing.

Paul Boston took advantage of his position as a teacher at a science center serving the public schools in Maryland's Prince Georges County to initiate a computer program there. Now, five years later, the center has 29 Commodores serving 60 pupils per day in a regular schedule of instruction.

Since the Howard B. Owens Science Center receives students from the other schools for special programs, Boston decided it would be cost-effective for the center to introduce micros. They purchased two of the earliest Commodore PETs, the ones with what Boston calls the "Munchkin" (calculator-style) keyboard. The program began with one-time, four-hour workshops for gifted students. Gradually it was refined and expanded into a resource for the whole school system.

As the center evolved, it was modified to respond to whatever computer activity was already established in the individual schools. All the major computer brands are now represented at various schools, and the high school has powerful multi-terminal machines. The center now concentrates on introducing computers to younger students, primarily those in the third through sixth grades. Students younger than that require more time than the center has available. However, Boston says, a computer is needed in the classroom for these children so they can have time to become acquainted with it.

"We find that our students have a lot of misconceptions about computers," says Boston. "We try to correct these. The student should be familiar enough with computers to be able to utilize a program." When they are, Boston claims the youngsters "are not fooled easily about computers. When they see *Knight Rider* (a show with a computerized, talking car), they know computers don't really have emotions or many of the capabilities portrayed."

This approach puts the center firmly in the camp that emphasizes teaching *about* computers, as opposed to teaching programming or using computers to teach other subjects (CAI). "Computer programming will be done by the few, but nearly everyone will be using computers," says Boston. He believes the center's role is a transitional one that will be phased out as computers find their way into every classroom.

To broaden teacher awareness of computers, the center's instructors offer workshops on in-service training days. They help teachers become comfortable with computers and advise them about using computers in class. "For example," says Boston, "if they are going to do CAI we encourage them to use students' talents, but to temper those abilities with their own educational judgment." Teachers may be intimidated because some of their students will take to computers more easily than they do. That's why people at the center feel it's important to acquaint people throughout the school system with computers.

Students are growing up in an environment where banking machines, grocery stores, and business procedures are increasingly computerized. Teachers and resource groups like the Science Center are helping them prepare for it. In the process, they are learning themselves – evolving as they develop more effective methods for bringing computers and students together. ©

PLAY THE ARCADE GAMES THAT TALK BACK!

What do Program Design games include for **free** that other companies charge you hundreds of dollars for?

The human voice.

Only Program Design software comes with a voice based cassette synchronized with your Atari computer. So now, you not only use your eyes and intellect to play one of our arcade games. You use your ears too. Visit your nearest software dealer and take a test listen.

DON'T PLAY 'CLIPPER' IF YOU CAN'T SWIM!

You're the captain of the clippership Flying Cloud. And there's never been a tougher sea challenge than your voyage from New York to San Francisco via Cape Horn.

As you cast off, the actual sound of old sea chanteys fills the air. But there's no time for singing, because you have to navigate through storms and icebergs. As if that wasn't enough, there's the constant danger of being thrown over board by a mutiny, so you better know how to swim. Remember, you're in charge. So pick your cargo, crew and course very carefully.

DEFEND 'MOONBASE IO' AND THE PRESIDENT WILL THANK YOU PERSONALLY

The voice of mission control asks you to defend Moonbase Io from a horde of alien invaders. But first, you and your robot must navigate through mine fields. Moonbase Io combines three adventure games in one. And when your mission is completed the president will thank you personally (so mind your manners). Moonbase Io is the winner of the most innovative game award from Electronic Games magazine.

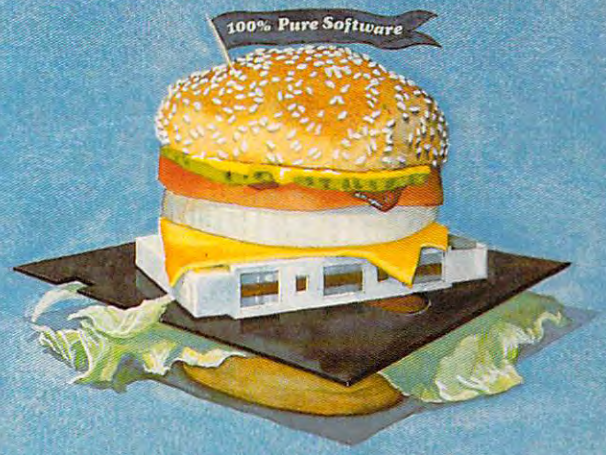
Clipper comes in 32K disk, cassette & joystick or 24K cassette & joystick. **Moonbase Io** comes in 24K disk, cassette and joystick or 16K cassette & joystick.

PDI

Program Design, Inc. 95 East Putnam Avenue, Greenwich, CT 06830

*Atari is a trademark of Atari, Inc.

PROGRAMS WITH THE WORKS



COMMODORE 64, VIC 20, ATARI 400/800/1200

Writing good programs is not an easy task. Introducing INSIDE BASIC, a series of well documented programs which include: program overviews, suggested changes, line-by-line descriptions, listings, and variable charts. Learn the workings of a well-designed program in order to create your own. There's something for everyone—games, business applications, and educational programs.

KENTUCKY DERBY—$19.95: All the fun of a day at the races including hi-resolution graphics. You and your friends can have hours of enjoyment betting on your favorite horses and winning big bucks! You can even change the names of the horses for more fun.

FORM GENERATOR—$19.95: The preparation of forms can be a mess. With this easy-to-use program you can generate anything from labels to invoices.

TASK ORGANIZER—$24.95: This useful program keeps you on top of your work schedule. Enter new tasks and projects with deadlines and track them through completion. Automatically lists jobs in priority order.

QUIZ ME—$14.95: This is the ideal program to demonstrate the computer's ability to present materials, ask questions, and score you. After learning this one, you can make a quiz for any subject.

ASK YOUR DEALER OR ORDER DIRECT: Specify program, brand of computer, cassette or disk (add $5.00 for disk). Send check or money order—add $2.00 shipping and handling. C.O.D. and credit card orders call (215) 825-4250 (add $1.50 service charge). PA, NJ residents add 6% sales tax.

Commodore 64 and VIC 20 are registered trademarks of Commodore Business Machines. Atari 400/800/1200 are trademarks of Atari, Inc.

Sim
COMPUTER PRODUCTS INC.
1100 E. HECTOR ST.
WHITEMARSH, PA. 19428
(215) 825-4250

Caves Of Ice

Marvin Bunker and Robert Tsuk

This award-winning game should provide hours of amusement. Originally written on the Apple, there are also versions here for VIC, 64, Atari, and PET/CBM.

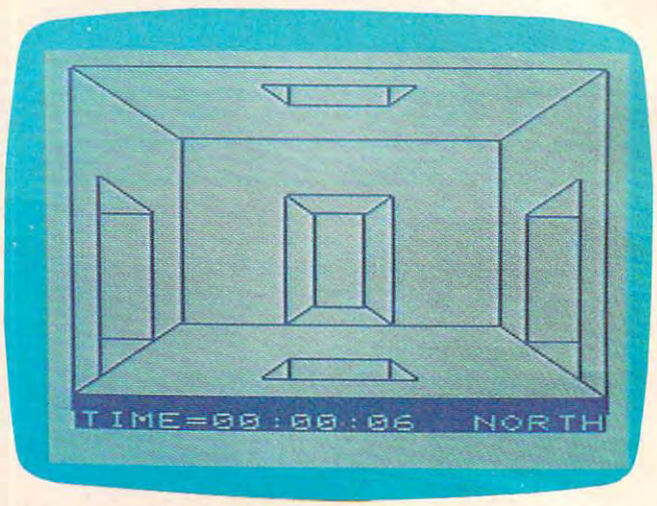
Robert Tsuk invented a game called "Quinti-Maze," wrote a version for the Apple, and won a prize in a *BYTE* magazine game contest – it was published in the September 1982 *BYTE*. It looked too intriguing to be limited to Apple owners, so I wrote a version called "Caves of Ice" which will run on all Commodore computers (VICs require 8K or more expansion memory). I contacted Robert Tsuk about submitting this version as a joint article to COMPUTE! where other Commodore computer owners could share it. He replied that he was converting it for the Atari. These games are the result of our joint efforts.

The Game Scenario

At the start you are somewhere in a five-story structure made entirely of ice. Each floor has 25 rooms in a five-by-five array. Carved into the walls of each room are one or more openings, doors to the north, south, east, west, up, or down. However, you can see only the doors available to you from your present vantage point. Only one door in the building opens to the outside – it may be in a wall, the roof, or the floor of the building. Your goal is to get out as fast as possible. You could freeze inside these caves of ice.

You can change which direction you are facing at any time – complete instructions are included in the program.

After finding your way out, you are given the option of trying the same maze and same starting point again to see if you can improve your time. Or, you can play again with a new random maze.



A room with five possible exits – only one of the rooms you may encounter in "Caves of Ice." VIC version.

Strategy

To quote from Robert Tsuk's earlier article: "The strategy for Quinti-Maze is fairly simple; be methodical. Because all the rooms in the maze look similar, you could wander around forever without finding the exit. My favorite method is to travel in one direction as far as I can go, then I assume I'm at one of the outside walls and search there for an exit."

A Variation

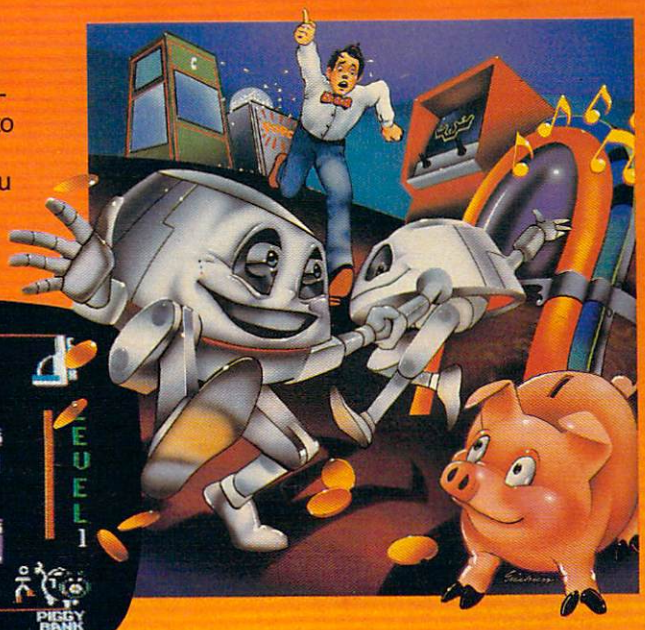
Insert this line at the beginning of either Program 1 or 2:

```
1 X=RND(-π)
```

This initializes the random number generator with the same seed each time you RUN, so you'll always start with the same maze. You can have the sequence U,W,W,W,N,W,S,W committed to memory and amaze your friends with how rapidly you can find your way out. The figure shows the complete maze produced by this starting seed. *Note:* This seed produces a different maze on the VIC.

A million laughs

SPARE CHANGE™ You are the game-happy owner of the Spare Change Arcade. Two fun-loving, but overworked Zerks—the main characters in your most popular game—have broken loose and are trying to retire from the business. You try madly to stop them. If you can get a coin into the juke box, the Zerks get so caught up in the music, they drop everything and start dancing. You also try popping popcorn and making a pay phone ring—which immediately makes the Zerks stop, answer and start a wild conversation. If you "win" the game, there are rib tickling cartoons by the Zerks to reward your efforts. It's a game full of sight gags, surprises and comedy. From the best. Brøderbund! **For the Apple® II, II+ and IIe. Coming soon for the Atari® home computers in disk format.**



and an endless challenge

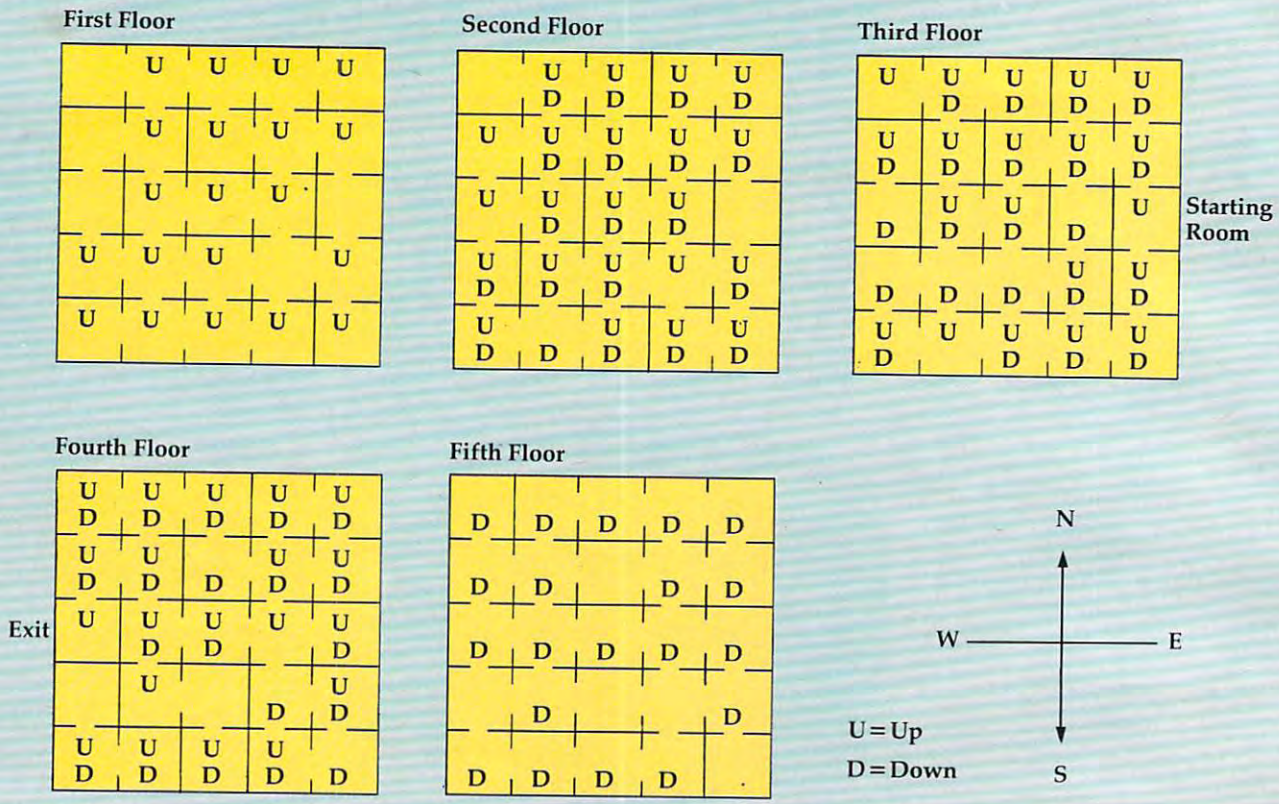
LODE RUNNER™ Here's a game that will never stop challenging you. That's because Lode Runner is more than a spellbinding, fast-action game with its 150 different mind-boggling game screens. Lode Runner is also an easy-to-use Game Generator that lets you create your own games. Without any knowledge of programming, you can easily design unique Lode Runnner screens, then bring them to action-packed life. You will maneuver through scene after scene, running, jumping, drilling passages and outfoxing enemy guards in a secret underground hideaway as you pick up chests of gold stolen from citizens of the Bungeling Empire. There's no end to the thrills, chills and challenge. Of course, it's from Brøderbund! **For the Apple II, II+ and IIe. Coming soon for the: Atari home computers (disk and cartridge); Atari 5200™ Super System; Commodore 64™; VIC-20™; IBM® PC.**

Ask your Brøderbund dealer for sneak previews.

Brøderbund Software **Discover the Difference**

1938 Fourth Street San Rafael, CA 94901

Maze Resulting From - π Starting Seed



Program Notes

In lines 1140 and 3005, the PRINT CHR$(7) statements produce beeps on the PET when you try to go through a solid wall and when you successfully find your way out. If you have a PET without the built-in beeper, but you do have the CB2 sound, you can replace these statements with the appropriate sequence of POKE statements to give the sound effects desired. VIC and 64 owners should replace the PRINT CHR$(7) with the proper POKEs to produce sounds on their computers if they desire this feature.

In the INPUT statement in line 2001, following the INSTRUCTIONS are three shifted spaces followed by three left cursors. This is my favorite way to avoid the infamous PET INPUT crash.

Program 1 is Caves of Ice for the VIC (with 8K or more expansion memory) and 64. The only changes required to RUN on PET/CBM models are in the keys which must be typed to produce the graphics in lines 120-151. Program 2 lists these changes for the PET. The graphics are not directly accessible from models with "business style" keyboards. Refer to your manuals for the equivalent CHR$ codes. Newer CBM models may also require the addition of a line such as:

```
5 PRINT CHR$(142)
```

to put them into graphics mode.

Program 1: Caves Of Ice — VIC And 64

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."

```
10 R$="{23 RIGHT}"
20 D$="{23 DOWN}"
25 PRINT"{CLR}"
90 GOSUB2000
100 DIMFC(5,7),FC$(5)
105 FC$(1)="NORTH":FC$(2)="SOUTH":FC$(3)
    =" EAST":FC$(4)=" WEST"
110 FORB=1TO4:FORI=1TO6:READFC(B,I):NEXT
    :NEXT
115 GOTO155
120 PRINT"{CLR} {20 @}{DOWN}{LEFT}N
    {DOWN}{2 LEFT}N{DOWN}{2 LEFT}N{DOWN}
    {2 LEFT}N"
121 PRINT"{HOME}{DOWN}{RIGHT}M{DOWN}M
    {DOWN}M{DOWN}M{12 @}"
122 PRINT"{HOME}{DOWN}";:FORI=1TO18:PRIN
    T"{M}{DOWN}{LEFT}";:NEXT:PRINT"
    {UP}{RIGHT}N{UP}N{UP}N{UP}N{UP}";
123 PRINT"{G}";:FORI=1TO9:PRINT"{UP}
    {LEFT}{G}";:NEXT
124 PRINT"{HOME}";LEFT$(D$,19);"{M}
    {RVS}{20 SPACES}{OFF}{G}{LEFT}{UP}
    {LEFT}M{UP}{2 LEFT}M{UP}{2 LEFT}M
    {UP}{2 LEFT}M"
125 PRINT"{HOME}"LEFT$(D$,15);LEFT$(R$,5
```

WHILE OTHER COMPUTER COMPANIES ARE BUSY SETTING NEW PRICES, SPECTRAVIDEO IS BUSY SETTING NEW STANDARDS.

MSX™ and LOGO™: Two more reasons why Spectravideo is leading the way in Personal Computers.

While price wars and confusion reign all around us, Spectravideo goes about its business, setting standards by which all other personal computers will soon be judged. MSX and LOGO are the two latest examples of how Spectravideo is rocking–and reshaping –the personal computer industry.

MSX AND LOGO.

It is now history that, on June 15 1983, Spectravideo, Inc. joined with most of Japan's largest electronics firms to launch MSX: The most far-reaching personal computer standard in history. MSX is the name given to a specific hardware/software configuration that makes product interchangeability possible. While Spectravideo is proud to participate in MSX, we are even prouder of this fact: It was our own SV-318 computer that was used as a prototype for the MSX design! There are two important aspects to this.

First, all future MSX hardware–i.e. computers, peripherals, appliances–will be based on several key design elements of the SV-318. What does this mean to you, the consumer? A great deal, because when you buy an SV-318, you will not only be able to use all of Spectravideo's own software and hardware–you'll also be able to take advantage of all the remarkable new equipment that will be coming from other MSX participants.

In addition, the software aspect of MSX was largely inspired by the software built into the SV-318. From the outset, Spectravideo offered built-in Microsoft BASIC as its resident interpreter. Now, Microsoft also makes a LOGO program compatible with the SV-318. It was Spectravideo's Microsoft BASIC/LOGO that helped to make MSX possible.

Another standard that Spectravideo can take credit for is the built-in Joystick/Cursor Control. Built right into the SV console, this control is always at fingertips and is much easier and faster to use than external joysticks or conventional editing controls.

Certain engineering elements that helped to make this built-in control possible have also been incorporated into MSX.

OTHER STANDARDS OF EXCELLENCE.

While these are the computer standardizations that Spectravideo helped to initiate, they by no means represent the whole SV-318 story. This remarkable computer has also established many standards of excellence that other personal computers now aspire to:

- ***Built-In Super Extended Microsoft BASIC***–*Makes the SV-318 the first truly programmable affordable computer!*
- ***Extraordinary Memory***–*32K ROM expandable to 96K, and 32K RAM expandable (via bank switching)to an amazing 256K.*
- ***Unparalleled Expandability***–*A full supporting system of 14 peripherals, including our new Colecovision™ Game Adapter, 7-Slot Expander Unit, Floppy Disk Drive, Data Cassette, Interface Cartridges, etc.*
- ***More Available Software***–*Built-in CP/M compatibility gives you immediate access to over 3000 existing software programs. Plus, you can utilize Spectravideo's own fine software library.*
- ***Advanced Graphics Capabilities***–*The SV-318 offers 16 colors in high resolution, and more importantly, 32 programmable sprites that allow tremendous control of movable screen objects.*
- ***Many other fine features***–*Such as Z80A Microprocessor with fast (3.6) internal clock, top-loading cartridge slot, 10 user-programmable special function keys, 3 sound channels (8 octaves per channel!), low profile and attractive styling.*

SPECTRAVIDEO™

Computer systems you'll grow into, not out of.

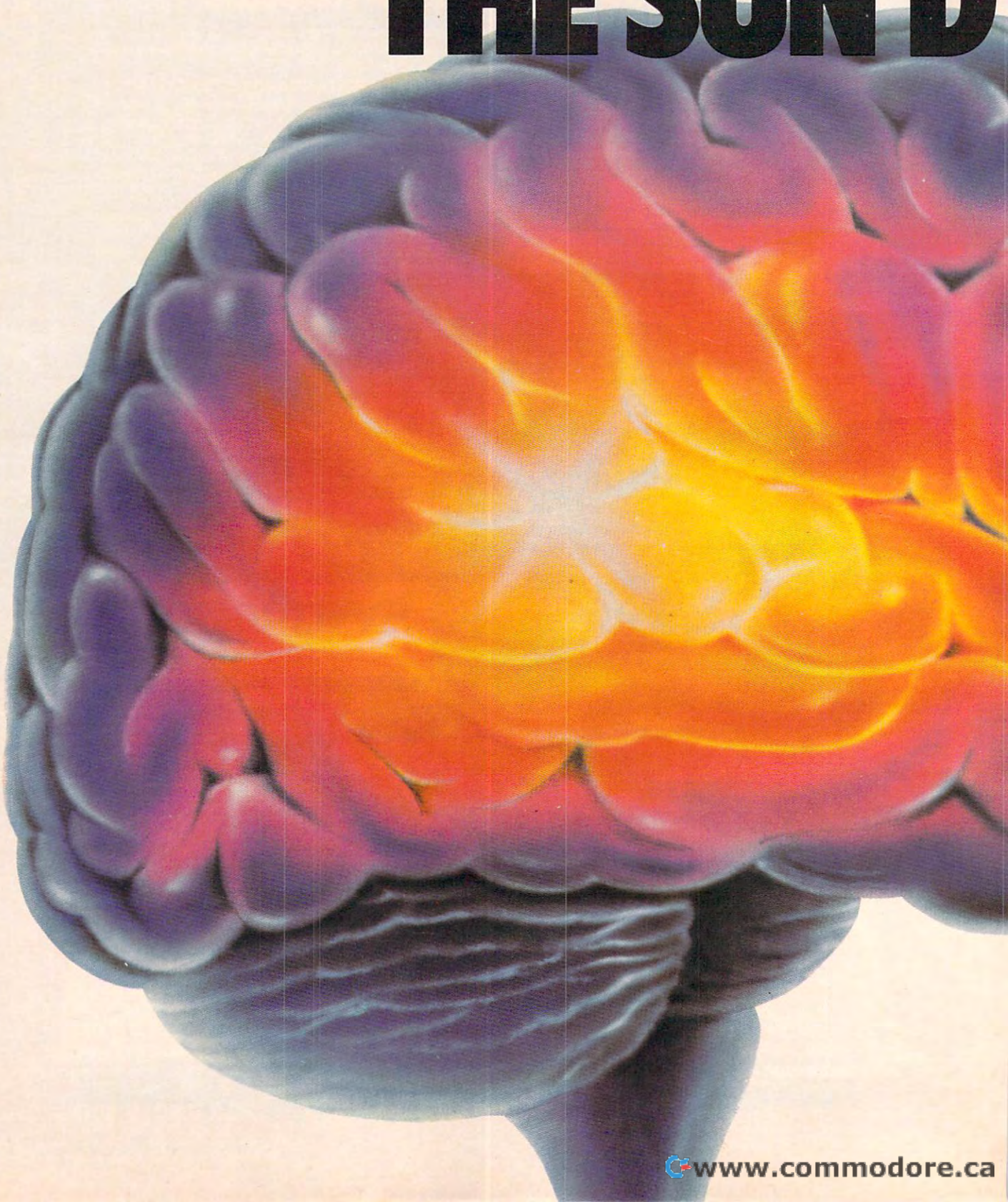
MSX compatible software standard

CP/M is a trademark of Digital Research, Inc. Colecovision is a registered trademark of Coleco Industries. MSX, Microsoft LOGO, and Microsoft Extended BASIC is a trademark of Microsoft Corporation

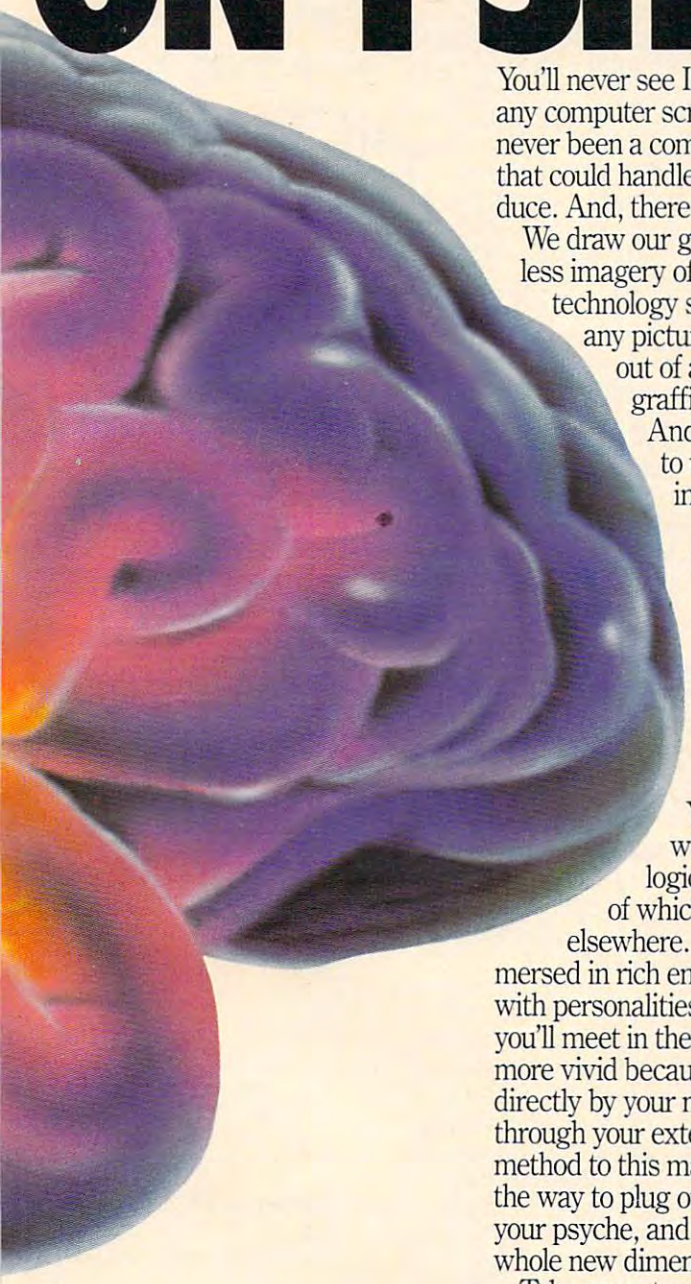
FOR UNDER $300.
FOR KEYBOARD ONLY

SPECTRA VIDEO INC. 39 W. 37th Street, New York, N.Y. 10018

WE STICK OUR G
THE SUN D



RAPHICS WHERE ON'T SHINE.



You'll never see Infocom's graphics on any computer screen. Because there's never been a computer built by man that could handle the images we produce. And, there never will be.

We draw our graphics from the limitless imagery of your imagination—a technology so powerful, it makes any picture that's ever come out of a screen look like graffiti by comparison.

And nobody knows how to unleash your imagination like Infocom.

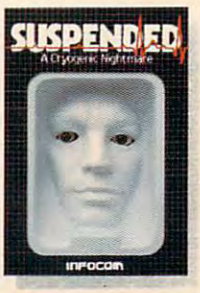
Through our prose, your imagination makes you part of our stories, in control of what you do and where you go—yet unable to predict or control the course of events.

You're confronted with situations and logical puzzles the like of which you won't find elsewhere. And you're immersed in rich environments alive with personalities as real as any you'll meet in the flesh—yet all the more vivid because they're perceived directly by your mind's eye, not through your external senses. The method to this magic? We've found the way to plug our prose right into your psyche, and catapult you into a whole new dimension.

Take some tough critics' words about our words. SOFTALK, for example, called ZORK® III's prose "far more graphic than any depiction yet achieved by an adventure with graphics." And the NEW YORK TIMES saw fit to print that our DEADLINE™ is "an amazing feat of programming." Even a journal as video-oriented as ELECTRONIC GAMES found Infocom prose to be such an eye-opener they named one of our games their Best Adventure of 1983.

Better still, bring an Infocom game home with you. Discover firsthand why thousands upon thousands of discriminating game players keep turning everything we write into instantaneous bestsellers.

Step up to Infocom. All words. No graffiti. The secret reaches of your mind are beckoning. A whole new dimension is in there waiting for you.

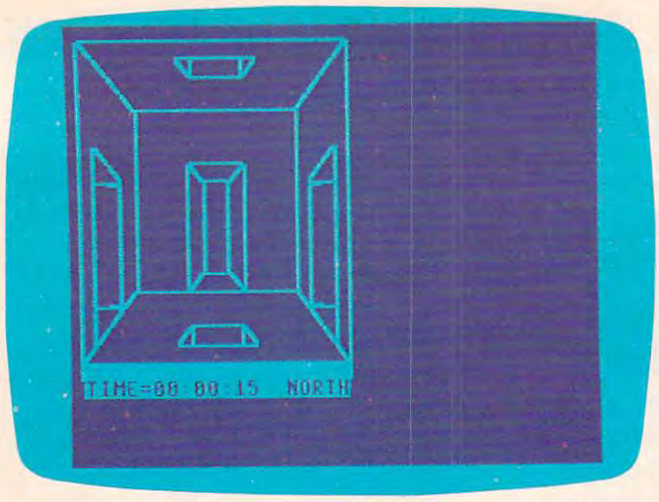


INFOCOM™

The next dimension.

Infocom, Inc., 55 Wheeler St., Cambridge, MA 02138

For your: Apple II, Atari, Commodore 64, CP/M 8", DEC Rainbow, DEC RT-11, IBM, NEC APC, NEC PC-8000, Osborne 1, TI Professional, TRS-80 Model I, TRS-80 Model III.



64 version.

```
    );"{12 T}"
126 PRINT"{HOME}";LEFT$(R$,21);:FORI=1TO
    18:PRINT"{DOWN}{G}{LEFT}";:NEXT
127 PRINT"{HOME}";LEFT$(R$,17);LEFT$(D$,
    5);:FORI=1TO10:PRINT"{G}{DOWN}
    {LEFT}";:NEXT
129 RETURN
130 PRINT"{HOME}";LEFT$(R$,8);"{DOWN}
    {6 @}{DOWN}{6 LEFT}M{G}
    {2 SPACES}{M}N{DOWN}{5 LEFT}
    {4 T}":RETURN
135 PRINT"{HOME}";LEFT$(D$,16);LEFT$(R$,
    9);"{4 @}{DOWN}{5 LEFT}N{G}
    {2 SPACES}{M}M{DOWN}{6 LEFT}
    {6 T}":RETURN
140 PRINT"{HOME}";LEFT$(D$,7);"{RIGHT}";
    :FORI=1TO11:PRINT"{M}{DOWN}{LEFT}"
    ;:NEXT:PRINT"{RIGHT}{3 UP}{@}@"
141 PRINT"{HOME}";LEFT$(D$,9);"{2 RIGHT}
    {T}P";:FORI=1TO5:PRINT"{DOWN}
    {LEFT}{M}";:NEXT
142 PRINT"{HOME}";LEFT$(D$,7);"{2 RIGHT}
    M{DOWN}M":RETURN
145 PRINT"{HOME}";LEFT$(D$,7);LEFT$(R$,9
    );"{4 @}{DOWN}{5 LEFT}{M}M
    {2 @}N{G}";:FORI=1TO5
146 PRINT"{DOWN}{6 LEFT}{M} {G}{M}
     {G}";:NEXT:PRINT"{DOWN}{6 LEFT}
    {M}N{2 T}M{G}":RETURN
150 PRINT"{HOME}";LEFT$(D$,7);LEFT$(R$,1
    9);"N{G}{DOWN}{3 LEFT}N {G}
    {DOWN}{3 LEFT}O{T}{G}";:FORI=1TO5
151 PRINT"{DOWN}{3 LEFT}{G} {G}";:NE
    XT:PRINT"{DOWN}{3 LEFT}L{@}{G}
    {DOWN}{LEFT}{G}{DOWN}{LEFT}{G}":
    RETURN
155 DIMS$(6,6)
165 FORA=1TO5:FORX=1TO5:FORY=1TO5
170 IFA<>5ANDRND(1)<.8THENS$(X,A)=S$(X,A
    )+"O":GOTO180
175 S$(X,A)=S$(X,A)+"X"
180 IFMID$(S$(X,A-1),(Y-1)*6+1,1)="O"THE
    NS$(X,A)=S$(X,A)+"O":GOTO190
185 S$(X,A)=S$(X,A)+"X"
190 IFY-2<0GOTO200
195 IFMID$(S$(X,A),(Y-2)*6+4,1)="O"THENS
    $(X,A)=S$(X,A)+"O":GOTO205
200 S$(X,A)=S$(X,A)+"X"
205 IFY<>5ANDRND(1)<.8THENS$(X,A)=S$(X,A
    )+"O":GOTO215
210 S$(X,A)=S$(X,A)+"X"
215 IFX<>5ANDRND(1)<.8THENS$(X,A)=S$(X,A
    )+"O":GOTO225
220 S$(X,A)=S$(X,A)+"X"
225 IFMID$(S$(X-1,A),(Y-1)*6+5,1)="O"THE
    NS$(X,A)=S$(X,A)+"O":GOTO235
230 S$(X,A)=S$(X,A)+"X"
235 NEXT:PRINT"*";:NEXT:NEXT
240 X=INT(RND(1)*3)+2:Y=INT(RND(1)*3)+2:
    A=INT(RND(1)*3)+2
245 RD=INT(RND(1)*6)+1:ONRDGOTO250,255,2
    60,265,270,275
250 A=5:P1$=LEFT$(S$(X,A),(Y-1)*6):L=29-
    LEN(P1$):P2$=RIGHT$(S$(X,A),L)
251 S$(X,A)=P1$+"O"+P2$:GOTO290
255 A=1:P1$=LEFT$(S$(X,A),(Y-1)*6+1):L=2
    9-LEN(P1$):P2$=RIGHT$(S$(X,A),L)
256 S$(X,A)=P1$+"O"+P2$:GOTO290
260 Y=5:P1$=LEFT$(S$(X,A),(Y-1)*6+3):L=2
    9-LEN(P1$):P2$=RIGHT$(S$(X,A),L)
261 S$(X,A)=P1$+"O"+P2$:GOTO290
265 Y=1:P1$=LEFT$(S$(X,A),(Y-1)*6+2):L=2
    9-LEN(P1$):P2$=RIGHT$(S$(X,A),L)
266 S$(X,A)=P1$+"O"+P2$:GOTO290
270 X=5:P1$=LEFT$(S$(X,A),(Y-1)*6+4):L=2
    9-LEN(P1$):P2$=RIGHT$(S$(X,A),L)
271 S$(X,A)=P1$+"O"+P2$:GOTO290
275 X=1:P1$=LEFT$(S$(X,A),(Y-1)*6+5):L=2
    9-LEN(P1$):P2$=RIGHT$(S$(X,A),L)
276 S$(X,A)=P1$+"O"+P2$:GOTO290
290 PRINT:PRINT: PRINT"HIT {RVS}RETURN
    {OFF} TO START"
300 GETC$:IFC$=""GOTO300
1000 X=INT(RND(1)*5)+1:Y=INT(RND(1)*5)+1
     :A=INT(RND(1)*5)+1
1005 SX=X:SY=Y:SA=A
1010 FC=1:TI$="000000":GOTO1220
1020 PRINT"{HOME}";LEFT$(D$,20);LEFT$(R$
    ,16)"{RVS}";FC$(FC):A$="":D=0
1030 TX$=TI$:TP$=LEFT$(TX$,2)+":"+MID$(T
    X$,3,2)+":"+RIGHT$(TX$,2)
1040 PRINT"{HOME}";LEFT$(D$,20);" {RVS}T
    IME=";TP$;"{2 SPACES}"
1050 GETA$
1060 IFA$="U"THEND=1
1070 IFA$="D"THEND=2
1080 IFA$="N"THEND=3
1090 IFA$="S"THEND=4
1100 IFA$="E"THEND=5
1110 IFA$="W"THEND=6
1120 IFA$="F"GOTO1280
1130 IFD=0GOTO1020
1140 IFMID$(S$(X,A),(Y-1)*6+D,1)<>"O"THE
     NPRINTCHR$(7):GOTO1020
1150 ONDGOTO1160,1170,1180,1190,1200,1210
1160 A=A+1:GOTO1220
1170 A=A-1:GOTO1220
1180 Y=Y-1:GOTO1220
1190 Y=Y+1:GOTO1220
1200 X=X+1:GOTO1220
1210 X=X-1
1220 IFX>5ORX<1ORY>5ORY<1ORA>5ORA<1THENP
     RINT"YOU WIN. PLAY AGAIN?":GOTO3000
1230 GOSUB120
1240 FORII=1TO6:IFMID$(S$(X,A),(Y-1)*6+I
```

$5 says you can't beat Gridrunner.™

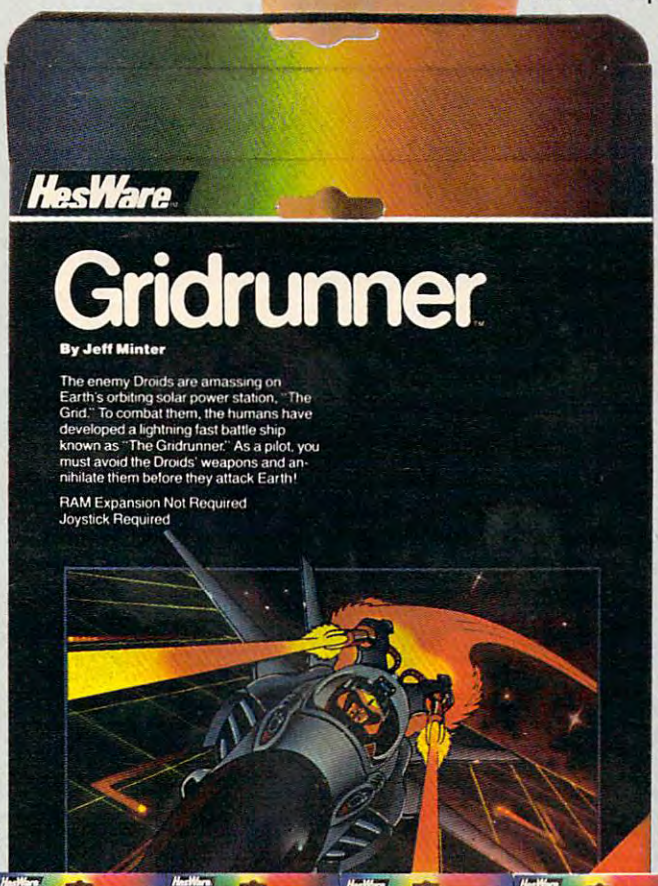
Gridrunner™ is the toughest, fastest, arcade quality game ever to challenge a Commodore™ or Atari® computer owner.

How tough is Gridrunner?

So tough that HesWare™ is offering $5 just for taking the Gridrunner challenge. And you don't even have to beat the game to get the greenbacks. There's a check right inside every Gridrunner box, good for $5 off your next HesWare purchase. You spend your check right in the store, on your choice of exciting HesWare action, education, and computer utility programs. Even HesWare peripherals.

No one, not even the author, has ever reached even the 14th level of Gridrunner. But maybe you've got what it takes to go all the way to the 31st level (20 levels on VIC 20™ version). Maybe you can master the patterns of the X/Y Zappers. And stop the Gridsearch Droids before they mutate into lethal Pods.

The Gridrunner challenge. Just one of the ways that HesWare is expanding the computer experience. Look for all the HesWare products at your favorite software retailer.



Pleases the tough customer.

HesWare™

Human Engineered Software
150 North Hill Drive
Brisbane, CA 94005
800-227-6703
(in California 800 632-7979)
Dept. C20

VIC 20 and Commodore 64 are trademarks of Commodore Electronics Ltd. Atari™ is a trademark of Atari, Inc.

```
    I,1)="X"THENNEXT:GOTO1020
1250 R=FC(FC,II)+1
1260 ONRGOSUB125,130,135,140,145,150
1270 NEXT:GOTO1020
1280 PRINT"{HOME}";LEFT$(D$,22);"NEW FAC
    ING, N,S,E,W";
1281 GETC$:IFC$=""GOTO1280
1282 IFC$<>"N"ANDC$<>"S"ANDC$<>"E"ANDC$<
    >"W"GOTO1281
1283 PRINTC$:IFC$="N"THENFC=1
1284 IFC$="S"THENFC=2
1285 IFC$="E"THENFC=3
1286 IFC$="W"THENFC=4
1287 GOTO1220
2000 PRINTLEFT$(D$,8);LEFT$(R$,5);"{RVS}
    CAVES OF ICE{OFF}"
2001 PRINT"{3 DOWN}DO YOU WANT":INPUT"IN
    STRUCTIONS{3 SPACES}{3 LEFT}";Y$
2002 IFLEFT$(Y$,1)<>"Y"THENGOTO2100
2010 PRINT"{CLR}THE OBJECT OF {RVS}CAVES
    {OFF}":PRINT"IS TO FIND YOUR WAY"
2011 PRINT"OUT OF A 5X5X5 CUBIC":PRINT"M
    AZE. IN ONE OF THE
2012 PRINT"ROOMS THERE IS AN EXIT":PRINT
    "OUT OF THE MAZE.
2013 PRINT:PRINT"YOU MUST TRY TO FIND IT
    ":PRINT"IN THE MINIMUM TIME.
2014 PRINT"THE COMMANDS ARE :"
2020 PRINT"{RVS}U{OFF} - UP; {RVS}S{OFF}
     - SOUTH;":PRINT"{RVS}D{OFF} - DOWN
    ; {RVS}E{OFF} - EAST;
2030 PRINT"{RVS}N{OFF} - NORTH; {RVS}W
    {OFF} - WEST;"
2040 PRINT"{RVS}F{OFF} TO CHANGE FACING.
2050 PRINT:PRINT"HIT {RVS}RETURN{OFF} TO
     GO ON.
2051 GETC$:IFC$=""GOTO2051
2060 PRINT"{CLR}{RVS}F{OFF} WILL COME BA
    CK WITH A":PRINT"QUESTION AS TO WHI
    CH
2062 PRINT"FACING YOU WISH. HIT":PRINT"O
    NLY ONE KEY":PRINT"AND {RVS}RETURN
    {OFF}"
2100 PRINT:PRINT"PLEASE WAIT ABOUT 30":P
    RINT"SECONDS WHILE I SET UP":PRINT"
    THE MAZE.
2101 RETURN
3000 PRINT"{3 SPACES}{RVS}Y{OFF} OR
    {RVS}N{OFF}?"
3005 FORI=1TO10:PRINTCHR$(7);:NEXT
3010 GETC$:IFC$=""GOTO3010
3020 IFC$<>"Y"ANDC$<>"N"GOTO3010
3030 IFC$="N"THENSTOP
3032 PRINT"SAME MAZE {RVS}S{OFF} OR
3033 PRINT"NEW MAZE {RVS}N{OFF}?"
3034 GETC$:IFC$=""GOTO3034
3035 IFC$<>"S"ANDC$<>"N"GOTO3034
3036 IFC$="N"GOTO165
3040 X=SX:Y=SY:A=SA:GOTO1010
4000 DATA1,2,4,0,5,3,1,2,0,4,3,5,1,2,3,5
    ,4,0,1,2,5,3,0,4
```

Program 2:
Caves Of Ice — Changes For PET/CBM

```
120 PRINT"{CLR} $$$$$$$$$$$$$$$$$$
    {DOWN}{LEFT}N{DOWN}{2 LEFT}N{DOWN}
    {2 LEFT}N{DOWN}{2 LEFT}N"
121 PRINT"{HOME}{DOWN}{RIGHT}M{DOWN}M
    {DOWN}M{DOWN}M$$$$$$$$$$$$"
122 PRINT"{HOME}{DOWN}";:FORI=1TO18:PRIN
    T"'{DOWN}{LEFT}";:NEXT:PRINT"{UP}
    {RIGHT}N{UP}N{UP}N{UP}N{UP}";
123 PRINT"%";:FORI=1TO9:PRINT"{UP}{LEFT}
    %";:NEXT
124 PRINT"{HOME}";LEFT$(D$,19);"'{RVS}
    {20 SPACES}{OFF}%{LEFT}{UP}{LEFT}M
    {UP}{2 LEFT}M{UP}{2 LEFT}M{UP}
    {2 LEFT}M"
125 PRINT"{HOME}"LEFT$(D$,15);LEFT$(R$,5
    );"############"
126 PRINT"{HOME}";LEFT$(R$,21);:FORI=1TO
    18:PRINT"{DOWN}%{LEFT}";:NEXT
127 PRINT"{HOME}";LEFT$(R$,17);LEFT$(D$,
    5);:FORI=1TO10:PRINT"%{DOWN}{LEFT}";
    :NEXT
129 RETURN
130 PRINT"{HOME}";LEFT$(R$,8);"{DOWN}$$$
    $$$${DOWN}{6 LEFT}M%{2 SPACES}'N
    {DOWN}{5 LEFT}####":RETURN
135 PRINT"{HOME}";LEFT$(D$,16);LEFT$(R$,
    9);"$$$$${DOWN}{5 LEFT}N%{2 SPACES}'M
    {DOWN}{6 LEFT}######":RETURN
140 PRINT"{HOME}";LEFT$(D$,7);"{RIGHT}";
    :FORI=1TO11:PRINT"'{DOWN}{LEFT}";:NE
    XT:PRINT"{RIGHT}{3 UP}$:"
141 PRINT"{HOME}";LEFT$(D$,9);"{2 RIGHT}
    #P";:FORI=1TO5:PRINT"{DOWN}{LEFT}'";
    :NEXT
142 PRINT"{HOME}";LEFT$(D$,7);"{2 RIGHT}
    M{DOWN}M":RETURN
145 PRINT"{HOME}";LEFT$(D$,7);LEFT$(R$,9
    );"$$$$${DOWN}{5 LEFT}'M$$N%";:FORI=1
    TO5
146 PRINT"{DOWN}{6 LEFT}' %' %";:NEXT:PR
    INT"{DOWN}{6 LEFT}'N##M%":RETURN
150 PRINT"{HOME}";LEFT$(D$,7);LEFT$(R$,1
    9);"N%{DOWN}{3 LEFT}N %{DOWN}
    {3 LEFT}O#%";:FORI=1TO5
151 PRINT"{DOWN}{3 LEFT}% %";:NEXT:PRINT
    "{DOWN}{3 LEFT}L$%{DOWN}{LEFT}%
    {DOWN}{LEFT}%":RETURN
```

If our word processing software is so great, why are we giving it away?

It's our way of introducing you to DATA 20.

As the leader in price/performance peripherals for Commodore 64™ and VIC 20,™ we want you as a loyal customer. So to encourage you to sample our add-ons, we're giving away our WORD MANAGER software when you purchase any DATA 20 DISPLAY MANAGER or VIDEO PAK to expand your Commodore to 80 columns.

What's so great about WORD MANAGER?

The table tells the tale. This DATA 20 exclusive gives you powerful features found only on the most expensive word processing systems including mail merge, block move, search and replace. And we've written our word processing in machine language for fast execution and low memory requirements.

Compare the Top Three	Mail Merge	Feature Strip	Works with Any Printer*	Tape & Disk Capabilities	Full Screen Editing	80-Column Format
WORD MANAGER	•	•	•	•	•	•
WordPro®	—	—	—	—	•	—
Quick Brown Fox™	—	—	•	—	—	•

*Most standard serial or parallel printers require interface, not supplied.

Best of all, WORD MANAGER is exceptionally easy to use. A self-adhesive feature strip for function keys makes most commands one-key simple, eliminating awkward prompts and menus.

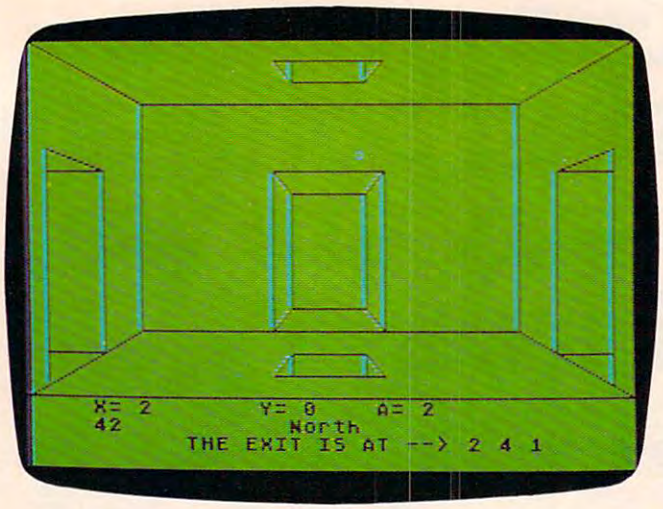
What you see is what you print.

With our professional 80-column format, your printed product duplicates screen output precisely. You see centering, left justification and other features as they will print. So you'll save time, save paper, and get the exact results you want!

WORD MANAGER is really something—for nothing! Get it free with your DISPLAY MANAGER or VIDEO PAK from DATA 20. See your dealer or write: DATA 20 CORPORATION, 23011 Moulton Parkway, Suite B10, Laguna Hills, CA 92653.

DATA 20 CORPORATION

Price/Performance Peripherals



"Caves of Ice" Atari version.

Program 3: Caves Of Ice — Atari Version

```
10 GOTO 100
15 L=PEEK(708):POKE 708,PEEK(710):PO
   KE 710,L
16 B=B+AB:IF B=1 OR B=5 THEN AB=AB*-
   1
17 T=T+INT(RND(0)*3-1):IF T<1 THEN T
   =5
18 IF T>5 THEN T=1
20 SPOT=6*X+30*Y+150*A+I:RETURN
30 COLOR 1
32 ? #6;"{CLEAR}":PLOT 0,0:DRAWTO 59
   ,29:DRAWTO 59,129:DRAWTO 259,129:
   DRAWTO 259,29:DRAWTO 59,29:PLOT 3
   19,0:DRAWTO 259,29
35 PLOT 319,159:DRAWTO 259,129:PLOT
   0,159:DRAWTO 59,129:PLOT 0,159:DR
   AWTO 319,159:SETCOLOR 2,A+11,10:R
   ETURN
40 PLOT 129,9:DRAWTO 189,9:DRAWTO 17
   9,19:DRAWTO 139,19:DRAWTO 129,9:P
   LOT 139,9:DRAWTO 139,19:PLOT 179,
   9:DRAWTO 179,19
45 RETURN
50 PLOT 129,149:DRAWTO 189,149:DRAWT
   O 179,139:DRAWTO 139,139:DRAWTO 1
   29,149:PLOT 139,139:DRAWTO 139,14
   9
55 PLOT 179,139:DRAWTO 179,149:RETUR
   N
60 PLOT 279,59:DRAWTO 309,49:DRAWTO
   309,154:DRAWTO 279,139:DRAWTO 279
   ,59:DRAWTO 309,59:PLOT 279,139
65 DRAWTO 309,139:RETURN
70 PLOT 9,49:DRAWTO 39,59:DRAWTO 39,
   139:DRAWTO 9,154:DRAWTO 9,49:PLOT
    9,59:DRAWTO 39,59:PLOT 9,139
75 DRAWTO 39,139:RETURN
80 PLOT 129,59:DRAWTO 189,59:DRAWTO
   189,129:DRAWTO 129,129:DRAWTO 129
   ,59:DRAWTO 139,69:DRAWTO 179,69
82 DRAWTO 179,119:DRAWTO 139,119:DRA
   WTO 139,69:PLOT 179,69:DRAWTO 189
   ,59:PLOT 189,129:DRAWTO 179,119:P
   LOT 129,129
85 DRAWTO 139,119:RETURN
90 RETURN
100 DIM A$(750),G$(1),FC(4,6),SC$(20
    0):A$(750)="0":FOR I=20 TO 192 S
    TEP 11:SC$(I)="->YOU WIN<-":NEXT
     I
101 SC$(1,19)="{19 SPACES}":SC$(LEN(S
    C$)+1)="{10 SPACES}"
102 GOSUB 3000
105 FOR FC=1 TO 4:FOR I=1 TO 6:READ
    A:FC(FC,I)=A:NEXT I:NEXT FC
107 X=0
109 Y=0
110 A=0
115 GOSUB 250
120 IF RND(0)<0.7 AND A<4 THEN I=1:G
    OSUB 20:A$(SPOT,SPOT)="X"
130 IF RND(0)<0.7 AND X<4 THEN I=3:G
    OSUB 20:A$(SPOT,SPOT)="X"
140 IF RND(0)<0.7 AND Y<4 THEN I=5:G
    OSUB 20:A$(SPOT,SPOT)="X"
150 IF A>0 THEN A=A-1:I=1:GOSUB 20:A
    =A+1:IF A$(SPOT,SPOT)="X" THEN I
    =2:GOSUB 20:A$(SPOT,SPOT)="X"
160 IF X>0 THEN X=X-1:I=3:GOSUB 20:X
    =X+1:IF A$(SPOT,SPOT)="X" THEN I
    =4:GOSUB 20:A$(SPOT,SPOT)="X"
170 IF Y>0 THEN Y=Y-1:I=5:GOSUB 20:Y
    =Y+1:IF A$(SPOT,SPOT)="X" THEN I
    =6:GOSUB 20:A$(SPOT,SPOT)="X"
190 A=A+1:IF A<5 THEN 115
191 Y=Y+1:IF Y<5 THEN 110
192 X=X+1:IF X<5 THEN 109
193 SOUND 0,0,0,0:SOUND 1,0,0,0
195 GOTO 300
200 GOSUB 30:FOR Q=1 TO 6:I=Q
210 GOSUB 20:IF A$(SPOT,SPOT)<>"X" T
    HEN 230
215 I=FC(F,Q)
220 ON I GOSUB 40,50,60,70,80,90
230 NEXT Q:RETURN
250 L=PEEK(708):POKE 708,PEEK(709):P
    OKE 709,PEEK(710):POKE 710,L
255 SOUND 0,BASS(O,B),10,10:SOUND 1,
    TREBLE(O,T),10,14
260 B=B+AB:IF B=1 THEN O=O+1:AB=1:IF
     O=4 THEN O=1
270 IF B=5 THEN AB=AB*-1
280 T=T+INT(RND(0)*3-1):IF T>5 THEN
    T=1
290 IF T<1 THEN T=5
295 RETURN
300 OPEN #1,4,0,"K:"
305 GRAPHICS 8
310 X=INT(RND(0)*5)
315 Y=INT(RND(0)*5)
320 A=INT(RND(0)*5)
330 I=INT(RND(0)*6+1):ON I GOTO 335,
    340,345,350,355,360
335 A=4:GOTO 370
340 A=0:GOTO 370
345 X=4:GOTO 370
350 X=0:GOTO 370
355 Y=4:GOTO 370
360 Y=0
370 GOSUB 20:A$(SPOT,SPOT)="X":SX=X:
    SY=Y:SA=A
375 X=INT(RND(0)*5)
380 Y=INT(RND(0)*5)
385 A=INT(RND(0)*5)
390 POKE 19,0:POKE 20,0
400 POKE 752,1:SETCOLOR 1,0,0
410 F=1:GOSUB 200
420 SETCOLOR 1,0,0
500 IF PEEK(764)=255 THEN 1000
510 GET #1,G:G$=CHR$(G)
```

GIVE THE WORLD'S GREATEST SLUGGERS A PIECE OF YOUR MIND.

Presenting two strategy sports games from SSI: COMPUTER BASEBALL™ & RINGSIDE SEAT™

Already voted the "1982 BEST COMPUTER SPORTS GAME" in its Apple® format by a leading games magazine, COMPUTER BASEBALL is now available for the Commodore®64.

As the most advanced and realistic simulation of baseball, it lets you manage any major-league team you like, giving you over 25 options with which to direct your players.

Complete data for over 20 historical AL and NL teams are provided so you can re-create immemorable games of the past or play out hypothetical matchups. Imagine the thrill of pitting the '27 Yankees against the '75 Reds! You can even enter your own player statistics and create a team to your specifications.

Best of all, to get all this detailed realism, you don't have to give up on speed and excitement. The action onscreen is kept at a fast pace to make you feel like you're actually playing in the ballpark! After all, that's how COMPUTER BASEBALL got to be recognized for what it is — the best.

See it today at your nearest computer/game/software store!

RINGSIDE SEAT packs all the right punches to make it the uncontested heavyweight champion of boxing games. It lets you set up your own championship matches, choosing from among fifty of the best fighters of all time.

Now you can answer all the intriguing questions in boxing: Who really was the greatest? Could Joe Louis outwit Muhammed Ali? Could Jack Dempsey outslug Larry Holmes?

RINGSIDE SEAT recreates every champion's authentic style and the strength, speed and stamina he had in his prime. As his manager, you tell him how to fight: stick and move, cover up, go for the knockout. The semi-animated Hi-Res color display shows you the fight in the ring as it happens, blow-by-blow, round-by-round.

This two-player and computer-as-opponent game also allows you to make up your own fighters by rating them for style, speed, aggressiveness, strength and a dozen other factors.

RINGSIDE SEAT. It not only lets you tell the great sluggers of the world how to fight, it makes them listen to you!

COMPUTER BASEBALL ($39.95) comes on 64K disk for the Commodore® 64. Also on 48K disk for the Apple® II. Coming soon for the IBM® PC.

SSI

RINGSIDE SEAT ($39.95) comes on 64K disk for the Commodore® 64 or on 48K disk for the Apple® II with Applesoft ROM, II+, IIe, or Apple III.

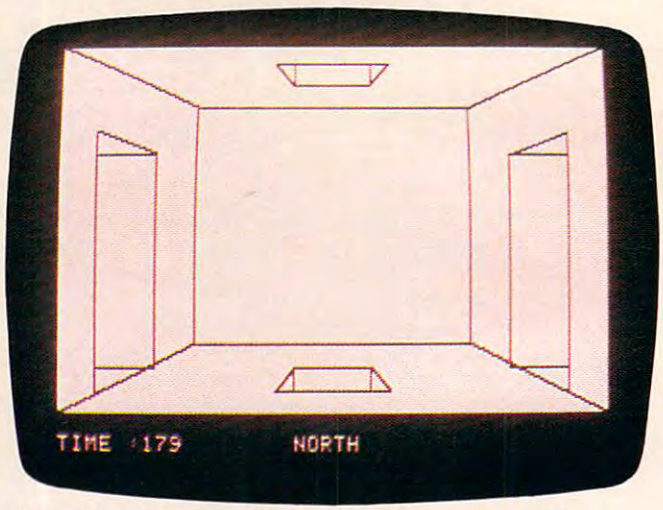
STRATEGIC SIMULATIONS INC

If there are no convenient stores near you, VISA and Mastercard holders can order direct by calling **800-227-1617, ext. 335 (toll free).** In California, call 800-772-3545, ext. 335.

To order by mail, send your check to: **Strategic Simulations Inc,** 883 Stierlin Road, Bldg. A-200, Mountain View, CA 94043. (California residents, add 6.5% sales tax.)

WRITE FOR A FREE COLOR CATALOG OF ALL OUR GAMES.

```
515 D=0
520 IF G$="U" THEN D=1
525 IF G$="*" THEN TELLIT=1
530 IF G$="D" THEN D=2
535 IF G$="?" THEN SHOWIT=1
540 IF G$="E" THEN D=3
545 TRAP 545:IF G$="F" THEN ? "
    {CLEAR}{DOWN}":INPUT FB:IF FB<5
    AND FB>0 THEN F=FB:GOSUB 200:GOT
    O 1000
550 IF G$="W" THEN D=4
560 IF G$="N" THEN D=5
570 IF G$="S" THEN D=6
575 IF D<1 OR D>7 THEN 500
580 I=D:GOSUB 20
590 IF A$(SPOT,SPOT)<>"X" THEN GOSUB
     900:GOTO 1000
600 ON D GOTO 605,610,615,620,625,63
    0
605 A=A+1:GOTO 640
610 A=A-1:GOTO 640
615 X=X+1:GOTO 640
620 X=X-1:GOTO 640
625 Y=Y+1:GOTO 640
630 Y=Y-1
640 IF A<0 OR A>4 OR X<0 OR X>4 OR Y
    <0 OR Y>4 THEN 2000
650 GOSUB 200
660 GOTO 1000
900 FOR Q=1 TO 4:CC=(CC=0)*14:POKE 7
    10,CC:SOUND 0,CC*7+60,CC,10:FOR
    W=1 TO 10:NEXT W:NEXT Q
910 SOUND 0,0,0,0:SETCOLOR 2,A+11,10
    :SETCOLOR 1,0,0:RETURN
1000 TRAP 40000:GOSUB 1400:GOSUB 130
     0:IF TIME2=TIME THEN GOTO 500
1005 POKE 657,4:POKE 656,1:? "
     {3 SPACES}{3 LEFT}";TIME:TIME2=
     TIME:IF TELLIT=0 THEN 500
1010 POKE 656,0:POKE 657,4:? "X= ";X
     ;"{TAB}Y= ";Y;"{TAB}A= ";A;:IF
     SHOWIT=0 THEN 500
1020 SHOWIT=0:POKE 656,2:POKE 657,10
     :? "THE EXIT IS AT --> ";SX;" "
     ;SY;" ";SA;:GOTO 500
1300 TIME=INT(4.25*PEEK(19)+PEEK(20)
     /60):RETURN
1400 POKE 657,17:POKE 656,1:ON F GOS
     UB 1405,1410,1415,1420:RETURN
1405 ? "North":RETURN
1410 ? "South":RETURN
1415 ? "East":RETURN
1420 ? "West":RETURN
2000 GRAPHICS 2+16:SETCOLOR 1,4,12:S
     ETCOLOR 2,15,8:SETCOLOR 3,10,4:
     SETCOLOR 0,0,15
2005 C=1
2010 FOR I=1 TO 18
2020 C=C+1:IF C>3 THEN C=1
2030 ON C GOTO 2032,2035,2037
2032 COLOR 10:GOTO 2040
2035 COLOR 170:GOTO 2040
2037 COLOR 138:GOTO 2040
2040 PLOT I,0:PLOT I,11
2043 TRAP 2050
2045 PLOT 0,I:PLOT 19,I
2050 NEXT I
2055 POSITION 0,0:? #6;"{J}":POSITIO
     N 19,0:? #6;"{J}"
2060 POSITION 5,2:? #6;"YOU ESCAPED"
2065 POSITION 4,3:? #6;"CAVES OF ICE"
2070 POSITION 4,7:? #6;"IN ";TIME;"
     SECONDS"
2080 POSITION 5,9:? #6;"HIT ANY KEY"
2090 I=1
2100 L=PEEK(709):POKE 709,PEEK(710):
     POKE 710,PEEK(711):POKE 711,L
2105 GOSUB 255:POSITION 1,5:? #6;SC$
     (I,I+17):I=I+1:IF I>180 THEN I=
     1
2107 IF PEEK(764)<>255 THEN 2200
2110 FOR W=1 TO 15:NEXT W:GOTO 2100
2200 POKE 764,255:GRAPHICS 0:POSITIO
     N 4,4:SOUND 0,0,0,0:SOUND 1,0,0
     ,0
2210 ? "PLAY AGAIN ";:INPUT A$
2220 IF A$(1,1)="Y" THEN RUN
2230 END
3000 GRAPHICS 18
3010 POSITION 7,4:PRINT #6;"CAVES"
3020 POSITION 6,7:PRINT #6;"of  ice"
3030 COLOR 138
3040 PLOT 1,1:DRAWTO 18,1
3050 DRAWTO 18,10:DRAWTO 1,10:DRAWTO
      1,1
3060 AB=1
3070 DIM BASS(3,5),TREBLE(3,5)
3080 RESTORE 3100
3090 FOR I=1 TO 3:FOR T=1 TO 5:READ
     B,TR:BASS(I,T)=B:TREBLE(I,T)=TR
     :NEXT T:NEXT I:T=1:B=1:O=1:RETU
     RN
3100 DATA 243,121,193,96,162,81,144,
     72,136,68
3110 DATA 182,91,144,72,121,60,108,5
     3,102,50
3120 DATA 162,81,128,64,108,53,96,47
     ,91,45
3130 DATA 1,2,3,4,5,6,1,2,4,3,6,5,1,
     2,5,6,4,3,1,2,6,5,3,4
```



A room with four possible exits. Apple version of "Caves of Ice."

Program 4: Caves Of Ice — Apple Version

```
1  DATA  201,84,208,15,32,177,0,32,248,
     230,138,72,32,183,0,201,44,240,3,7
     6,201,222,32,177,0,32,248,230
2  FOR I = 768 TO 833: READ P: POKE I,P
     : NEXT I
3  DATA  104,134,3,134,1,133,0,170,160,
     1,132,2,173,48,192,136,208,4,198
4  DATA  1,240,7,202,208,246,166,0,208,
```

GWENDOLYN.

THERE ARE SOME THINGS YOU KEEP SEARCHING FOR, BEYOND REASON.

Kidnapped in revenge and locked in hatred somewhere deep beneath your castle, is your princess.

Gwendolyn.

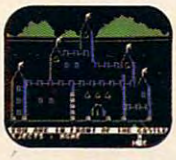
The prosperity of your kingdom, the end of a bitter feud, your very future depend on finding her.

You swear that no obstacle can stop you. But the high-resolution, 3-D graphics, animation and sound effects make the obstacles that await you more formidable than you can imagine.

And with over ninety different screens and two full sides of play, those obstacles and the decisions you must make can appear endless. In fact, you may have to endure hours of searching to rescue Gwendolyn.

But for her, you would endure anything, wouldn't you?

Gwendolyn—a non-violent, intermediate graphic adventure game, written by Marc Russell Benioff, Atari 40K Disk $27.95, Artworx Software Co., Inc., 150 N. Main St., Fairport, N.Y. 14450. For a free catalog of Artworx Software for the Atari, Apple, VIC-20 & Commodore 64 computers, write or call 800-828-6573.



These are just three of over ninety exciting screens.

Artworx®

So you can play.

Atari, Apple, VIC-20 & Commodore 64 are registered trademarks.

Atari And Apple Versions

Robert Tsuk

When I received Marv Bunker's letter, I agreed a version should be made available for Commodore owners. Also, as an Atari owner, I wanted to include a version for that computer, too. The lack of dimensioned string variables on the Atari made it tricky, but, as evidenced by Program 3, it was successfully adopted.

If you find the game too challenging, the Atari and Apple versions have several features not found in the Commodore version which may be of assistance. If you type an * the program will tell you your location in the maze. You are given your X and Y coordinates (0-4) on the current level, and a value for A, which indicates which level (0-4) you are currently on. If you get really lost, you can find your location by typing the *, then a ?. The program will briefly display the X, Y, and A coordinates of the exit. But remember, using the ? is frowned upon unless you're really lost.

As in the Commodore version, you move through the maze by typing the N, S, E, W, U, and D keys to specify the direction of movement. However, if you type F to change the direction you are facing, you must then type a number instead of a letter to specify the new direction you wish to face. You'll need to remember that N=1, S=2, E=3, and W=4.

The Apple version of Caves of Ice (Program 4), the original Quinti-Maze, uses almost 48K. It includes a SAVE the game feature. Special attention must be paid to the first five lines and the data therein, as a mistake in the data will cause a crash in line 167.

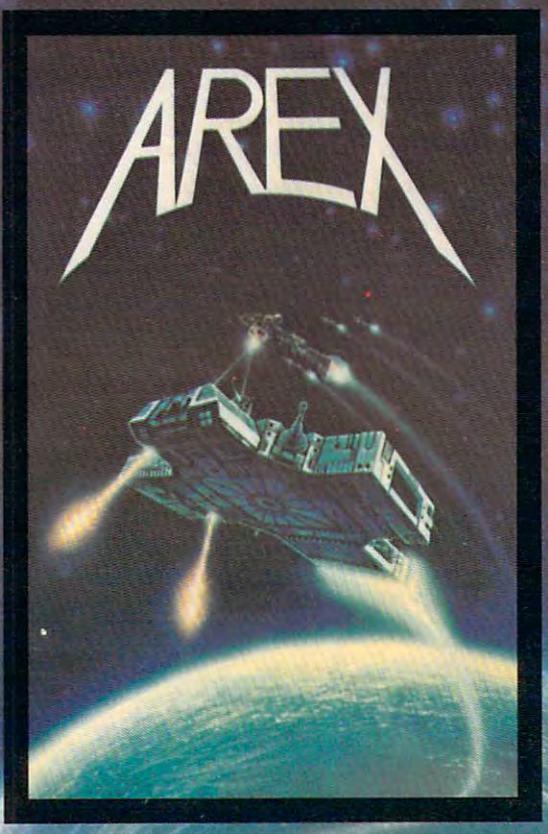
The Atari version uses just over 16K. Although it has no SAVE the game feature, it has some pretty flashy graphics and sound.

```
    239,165,3,133,1,198,2,208,241,96
5   POKE 1013,76: POKE 1014,0: POKE 1015
    ,3
10  TEXT : HOME
90  GOSUB 2000
100  DIM FC(5,7): DIM FC$(5)
105 FC$(1) = "NORTH":FC$(2) = "SOUTH":F
    C$(3) = "EAST":FC$(4) = "WEST"
110  FOR B = 1 TO 4: FOR I = 1 TO 6: READ
    FC(B,I): NEXT : NEXT
115  GOTO 155
120  HPLOT 0,0 TO 279,0 TO 279,159 TO 0
    ,159 TO 0,0 TO 69,29 TO 209,29 TO
    209,129 TO 69,129 TO 69,29: HPLOT
    209,29 TO 279,0: HPLOT 209,129 TO
    279,159: HPLOT 69,129 TO 0,159: RETURN
125  RETURN
130  HPLOT 109,9 TO 169,9 TO 159,19 TO
    119,19 TO 109,9: HPLOT 119,19 TO 1
    19,9: HPLOT 159,19 TO 159,9: RETURN
135  HPLOT 119,139 TO 159,139 TO 169,14
    9 TO 109,149 TO 119,139: HPLOT 119
    ,139 TO 119,149: HPLOT 159,139 TO
    159,149: RETURN
140  HPLOT 19,39 TO 49,49 TO 49,139: HPLOT
    19,149 TO 19,39: HPLOT 19,139 TO 4
    9,139: HPLOT 19,49 TO 49,49: RETURN
145  HPLOT 119,59 TO 159,59 TO 159,129 TO
    119,129 TO 119,59 TO 129,69 TO 149
    ,69 TO 149,119 TO 129,119 TO 129,6
    9: HPLOT 149,69 TO 159,59: HPLOT 1
    49,119 TO 159,129: HPLOT 129,119 TO
    119,129: RETURN
150  HPLOT 229,49 TO 259,39 TO 259,149:
     HPLOT 229,139 TO 229,49: HPLOT 22
    9,49 TO 259,49: HPLOT 229,139 TO 2
    59,139: RETURN
155  DIM S$(6,6)
160  INPUT "RESTART OLD MAZE ";Y$: IF  LEFT$
    (Y$,1) = "Y" THEN 1360
165  FOR A = 1 TO 5: FOR X = 1 TO 5: FOR
    Y = 1 TO 5
167  & T10 * A + 10 * X + 10 * Y,10
170  IF A <  > 5 AND  RND (1) < .80 THEN
    S$(X,A) = S$(X,A) + "0": GOTO 180
175 S$(X,A) = S$(X,A) + "X"
180  IF  MID$ (S$(X,A - 1),(Y - 1) * 6 +
    1,1) = "0" THEN S$(X,A) = S$(X,A) +
    "0": GOTO 190
185 S$(X,A) = S$(X,A) + "X"
190  IF Y - 2 < 0 THEN 200
195  IF  MID$ (S$(X,A),(Y - 2) * 6 + 4,
    1) = "0" THEN S$(X,A) = S$(X,A) +
    "0": GOTO 205
200 S$(X,A) = S$(X,A) + "X"
205  IF Y <  > 5 AND  RND (1) < .8 THEN
    S$(X,A) = S$(X,A) + "0": GOTO 215
210 S$(X,A) = S$(X,A) + "X"
215  IF X <  > 5 AND  RND (1) < .8 THEN
    S$(X,A) = S$(X,A) + "0": GOTO 225
220 S$(X,A) = S$(X,A) + "X"
225  IF  MID$ (S$(X - 1,A),(Y - 1) * 6 +
    5,1) = "0" THEN S$(X,A) = S$(X,A) +
    "0": GOTO 235
230 S$(X,A) = S$(X,A) + "X"
235  NEXT : NEXT : NEXT
240 X =  INT ( RND (1) * 3) + 2:Y =  INT
    ( RND (1) * 3) + 2:A =  INT ( RND
    (1) * 3) + 2
245 RD =  INT ( RND (1) * 6) + 1: ON RD
     GOTO 250,255,260,265,270,275
250 A = 5:P1$ =  LEFT$ (S$(X,A),(Y - 1)
     * 6):L = 29 -  LEN (P1$):P2$ =  RIGHT$
    (S$(X,A),L):S$(X,A) = P1$ + "0" +
    P2$: GOTO 280
255 A = 1:P1$ =  LEFT$ (S$(X,A),(Y - 1)
     * 6 + 1):L = 29 -  LEN (P1$):P2$ =
     RIGHT$ (S$(X,A),L):S$(X,A) = P1$ +
    "0" + P2$: GOTO 280
260 Y = 5:P1$ =  LEFT$ (S$(X,A),(Y - 1)
     * 6 + 3):L = 29 -  LEN (P1$):P2$ =
     RIGHT$ (S$(X,A),L):S$(X,A) = P1$ +
    "0" + P2$: GOTO 280
265 Y = 1:P1$ =  LEFT$ (S$(X,A),(Y - 1)
     * 6 + 2):L = 29 -  LEN (P1$):P2$ =
     RIGHT$ (S$(X,A),L):S$(X,A) = P1$ +
```


From the creators of Frogger,™ Scramble,™ Super Cobra,™ Tutankham™ and Time Pilot™. . .
KONAMI'S
POOYAN
by DATASOFT
Datasoft® brings you POOYAN, the popular arcade game from Konami, for home computers. Enjoy all the fun, fast action, colorful, high-resolution graphics and arcade-style play without all the quarters.
Quick reflexes and fast thinking will protect your helpless piglets in the forest valley from a pack of vicious, hungry wolves who travel up and down the valley clinging to balloons and throwing objects at you. Shoot your arrows to burst their balloons or throw chunks of meat to get them to let go, but don't give up, because the wolves won't!
POOYAN® is a super challenge that will keep any experienced gamer glued to the screen. And Datasoft® will be making it available for Apple, Atari® 400/800/1200, Radio Shack Color, Commodore 64 and VIC 20 computer systems.
Datasoft Inc.®
HOME COMPUTER SOFTWARE
9421 Winnetka Avenue
Chatsworth, California 91311
(213) 701-5161
©1983 Datasoft® Inc.
Datasoft® is a registered trademark of Datasoft Inc.
POOYAN® is a registered trademark of Konami® Industries Company Ltd.
www.commodore

```
      "0" + P2$: GOTO 280
270 X = 5:P1$ =  LEFT$ (S$(X,A),(Y - 1)
      * 6 + 4):L = 29 -  LEN (P1$):P2$ =
      RIGHT$ (S$(X,A),L):S$(X,A) = P1$ +
      "0" + P2$: GOTO 280
275 X = 1:P1$ =  LEFT$ (S$(X,A),(Y - 1)
      * 6 + 5):L = 29 -  LEN (P1$):P2$ =
      RIGHT$ (S$(X,A),L):S$(X,A) = P1$ +
      "0" + P2$: GOTO 280
280 SX = X:SY = Y:SA = A
290  VTAB 23: PRINT "HIT ANY KEY TO STA
     RT"
300  IF  PEEK ( - 16384) < 127 THEN 300
310  POKE  - 16368,00
1000 X =  INT ( RND (1) * 5) + 1:Y =  INT
     ( RND (1) * 5) + 1:A =  INT ( RND
     (1) * 5) + 1:FC = 1: GOTO 1220
1010  HOME : VTAB 22: HTAB 18: PRINT FC
     $(FC):A$ = "":D = 0: IF LS = 1 THEN
      PRINT X,Y,A
1020  VTAB 22: PRINT "TIME :";T: FOR TI
     ME = 1 TO 80
1025  IF  PEEK ( - 16384) > 127 THEN 10
     30
1027  NEXT :T = T + 1: VTAB 22: PRINT "
     TIME :";T: GOTO 1020
1030  GET A$
1035  IF A$ = "*" THEN LS = 1
1040  IF A$ = "Q" THEN 1300
1050  IF A$ = "U" THEN D = 1
1060  IF A$ = "D" THEN D = 2
1070  IF A$ = "N" THEN D = 3
1080  IF A$ = "S" THEN D = 4
1090  IF A$ = "E" THEN D = 5
1100  IF A$ = "?" THEN 1290
1110  IF A$ = "W" THEN D = 6
1120  IF A$ = "F" THEN  GOTO 1280
1130  IF D = 0 THEN 1010
1135 T = T + 1
1140  IF  MID$ (S$(X,A),(Y - 1) * 6 + D
     ,1) <  > "0" THEN  PRINT  CHR$ (7)
     : GOTO 1010
1150  ON D GOTO 1160,1170,1180,1190,120
     0,1210
1160 A = A + 1: GOTO 1220
1170 A = A - 1: GOTO 1220
1180 Y = Y - 1: GOTO 1220
1190 Y = Y + 1: GOTO 1220
1200 X = X + 1: GOTO 1220
1210 X = X - 1: GOTO 1220
1220  IF X > 5 OR X < 1 OR Y > 5 OR Y <
     1 OR A > 5 OR A < 1 THEN  PRINT "Y
     OU WIN": & T100,100: & T100,50: &
     T100,50: & T75,66: & T100,66: & T7
     5,66: & T60,255: GOTO 3000
1230  HGR : HCOLOR= 3: HPLOT 0,0: CALL
     62454: HCOLOR= 0: GOSUB 120
1240  FOR I = 1 TO 6: IF  MID$ (S$(X,A)
     ,(Y - 1) * 6 + I,1) = "X" THEN  NEXT
     : GOTO 1010
1250 R = FC(FC,I) + 1
1260  HCOLOR= 0: ON R GOSUB 125,130,135
     ,140,145,150
1270  NEXT : GOTO 1010
1280  INPUT "WHAT FACING 1-N 2-S 3-E 4-
     W";FC: IF FC < 1 OR FC > 4 THEN 1280
1285  GOTO 1220
1290  INVERSE : HTAB 18: PRINT SX;"  ";
     SY;"  ";SA: NORMAL : GOTO 1220
1300  PRINT "DO YOU WANT TO SAVE THIS M
     AZE": INPUT Y$: IF  LEFT$ (Y$,1) <
     > "Y" THEN  GOTO 3000
1310  INPUT "WHAT DO YOU WANT TO CALL I
     T ";N$
1320 D$ =  CHR$ (4)
1330  PRINT D$;"OPEN OLD MAZE/";N$: PRINT
     D$;"WRITE OLD MAZE/";N$
1340  FOR A1 = 1 TO 5: FOR X1 = 1 TO 5:
      PRINT S$(X1,A1): NEXT : NEXT : PRINT
     X: PRINT Y: PRINT A: PRINT T: PRINT FC
1350  PRINT D$;"CLOSE OLD MAZE/";N$: GOTO
     3000
1360  INPUT "WHAT IS ITS NAME ";N$
1370 D$ =  CHR$ (4)
1380  PRINT D$;"OPEN OLD MAZE/";N$: PRINT
     D$;"READ OLD MAZE/";N$
1390  FOR A1 = 1 TO 5: FOR X1 = 1 TO 5:
      INPUT S$(X1,A1): NEXT : NEXT : INPUT
     X: INPUT Y: INPUT A: INPUT T: INPUT FC
1400  PRINT D$;"CLOSE OLD MAZE/";N$: GOTO
     1220
2000  VTAB 12: HTAB 18: INVERSE : PRINT
     "MAZE": NORMAL : VTAB 22: INPUT "D
     O YOU WANT INSTRUCTIONS ";Y$: IF  LEFT$
     (Y$,1) <  > "Y" THEN  RETURN
2010  HOME : PRINT "THE OBJECT OF MAZE
     IS TO FIND YOUR WAY": PRINT : PRINT
     "OUT OF A 5X5X5 CUBIC MAZE. IN ONE
      OF THE": PRINT "ROOMS THERE IS AN
      EXIT OUT OF THE MAZE."
2020  PRINT : PRINT "YOU MUST TRY TO FI
     ND IT IN AS FEW TURNS ": PRINT "AS
      POSSIBLE. THE COMMANDS ARE  :"
2030  PRINT : HTAB 6: INVERSE : PRINT "
     U";: NORMAL : PRINT "-UP";: HTAB 1
     7: INVERSE : PRINT "S";: NORMAL : PRINT
     "-SOUTH"
2040  PRINT : HTAB 6: INVERSE : PRINT "
     D";: NORMAL : PRINT "-DOWN";: HTAB
     17: INVERSE : PRINT "E";: NORMAL :
      PRINT "-EAST"
2050  PRINT : HTAB 6: INVERSE : PRINT "
     N";: NORMAL : PRINT "-NORTH";: HTAB
     17: INVERSE : PRINT "W";: NORMAL :
      PRINT "-WEST"
2060  PRINT : HTAB 6: INVERSE : PRINT "
     Q";: NORMAL : PRINT "-QUIT";: HTAB
     17: INVERSE : PRINT "F";: NORMAL :
      PRINT "-CHANGE FACING"
2070  VTAB 23: PRINT "HIT ";: INVERSE :
      PRINT "SPACE";: NORMAL : PRINT "
     FOR MORE"
2080  IF  PEEK ( - 16384) < 127 THEN 2080
2090  POKE  - 16368,0: HOME : INVERSE :
      PRINT "F";: NORMAL : PRINT " WILL
      COME BACK WITH A QUESTION AS TO":
      PRINT : PRINT "WHICH FACING YOU W
     ISH.HIT ONLY ONE KEY": PRINT : PRINT
     "AND ";: INVERSE : PRINT "RETURN":
      NORMAL
2100  PRINT : PRINT "PLEASE WAIT WHILE
     IT SETS UP THE MAZE": PRINT : PRINT
     : RETURN
3000  TEXT : HOME : VTAB 5: HTAB 12: PRINT
     "CONGRATULATIONS !"
3010  PRINT : PRINT  TAB( 7)"YOU HAVE F
     INISHED THE MAZE IN ": PRINT  TAB(
     7)T;" SECONDS"
3030  INPUT "DO YOU WANT TO PLAY AGAIN
     ? ";Y$
3040  IF  LEFT$ (Y$,1) = "Y" THEN  RUN
9999  NORMAL
10000  DATA     1,2,4,0,5,3,1,2,0,4,3,5
     ,1,2,3,5,4,0,1,2,5,3,0,4
```

BECOME AN INTREPID SPACE ADVENTURER . . .



by William Muk
CoCo version by Roger Schrag
Apple version by Gordon Eastman
Atari and Commodore 64 version by John Anderson

Far beyond the known galaxies, you venture deep into the vast reaches of outer space. But you are not alone! In a flash, without so much as a how-do-ya-do, they're in hot pursuit and you're left to do before you're done unto. **Can** you elude your pursuers? **Will** you elude your pursuers? And who ***are*** these guys anyway? Find the answers to these and other compelling questions in AREX. See your dealer today!

AREX . . . Coin-op arcade realism at home for 1 to 2 players.

AREX

APPLE 48K DISK	042-0172	$34.95
ATARI 16K TAPE	160-0172	$34.95
ATARI 16K DISK	162-0172	$34.95
CoCo 16K TAPE	060-0172	$34.95
COMMODORE 64	160-0172	$34.95
COMMODORE 64	162-0172	$34.95
IBM 64K DISK	132-0172	$34.95
TRS-80 16K TAPE Model 1 & 3	010-0172	$34.95
TRS-80 32K DISK Model 1 & 3	012-0172	$34.95

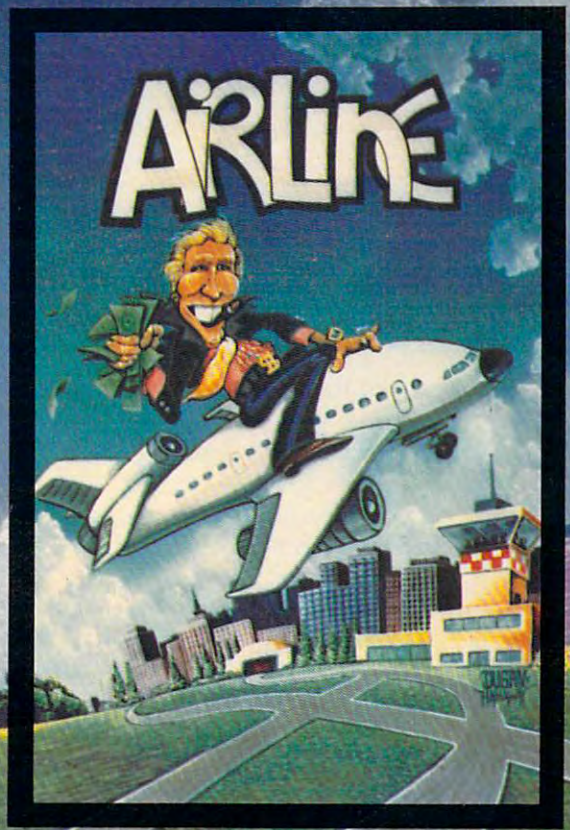
. . . OR FLY HIGH IN THE WORLD OF HIGH FINANCE

by George Schwenk
TRS-80 version by Dave Simmons
CoCo version by Roger Schrag

"Yas, after purchasing diamond mines in South Africa, oil wells in Saudi, and rare beer cans in Walla Walla, Washington, I had begun to wonder what other trendy commodities remained to be added to my swelling portfolio. Then a snip of a ticket girl dared to tell me (ME, Hartley J. Wormsflather III!) that my flight was overbooked. To avoid future misunderstandings, I bought the airline."

"I think I'm on to something profitable here." Hartley J. Wormsflather III

AIRLINE . . . A no-holds-barred strategy game for 1 to 4 players.



AIRLINE
ATARI 400 & 800 / CoCo / Model 1 & 3 16K TAPE . . 140-0169 $24.95

Published by

Adventure INTERNATIONAL

a subsidiary of Scott Adams, Inc.
BOX 3435 • LONGWOOD, FL 32750 • (305) 862-6917
Prices Subject To Change Without Notice

To order, see your local dealer. If he does not have the program, then call 1-800-327-7172 (orders only please) or write for our free catalog. DEALER INQUIRIES ARE INVITED.

GRADEBOOK FOR ATARI

Stephen Levy, Assistant Book Editor

This is a valuable organizational tool for teachers. It handles student lists, grading conversions, grade averaging, assignments, and much more. Written for an Atari computer with at least 32K and a disk drive.

"Gradebook" is for teachers. It will keep a record of students' grades and assignments for up to 45 students on one diskette. In addition, the program will average grades and display grades and assignments to the screen or list them to a printer.

SAVE the program on one diskette and use a second diskette for data. Use the following short program to create a dummy file on the program diskette to prevent accidentally writing data to the program diskette:

```
10 OPEN #1,8,0,"D:CL"
20 DIM A$(4):A$="TEST":PRINT #1;A$
30 CLOSE #1:END
```

Menu Options

1. *Read Grades:* produces a list of the last names of all students previously entered (option 3) onto this diskette, plus each student's grades and average. You will be prompted for the *number* (the program will automatically number the students for you) of the first and last student whose grade and average you wish to see. However, on each screen display, you are limited to viewing two to five students' grades at a time.

2. *Read Assignments:* prints a list of previously entered (option 5) assignments on this diskette.

3. *Enter Names:* lets you enter and add new students to the names list. Note that only 45 names are allowed on one diskette; first name up to nine characters; last name up to ten characters; no middle names.

4. *Enter Grades:* produces a list of students previously entered (option 3) and asks which student's grades you wish to enter. The program accepts any one-, two-, or three-digit number as well as the letters A,B,C,D,E, and F, with or without a plus or minus. When grades are averaged, letter grades are converted to numbers as follows:

A+=97	A=93	A-=89
B+=87	B=83	B-=79
C+=77	C=73	C-=69
D+=67	D=63	D-=59
E+=54	E=50	E-=46
F+=54	F=50	F-=46

If desired, these values can be changed in lines 510-590 and lines 1650-1680.

5. *Enter Assignments:* results in a list of previously entered assignments and allows you to add to the list. The assignment length must be no greater than 28 characters (including blank spaces). You can use this option for messages or notes also. It functions like a notepad with no real bearing on students' grades, averaging, etc.

6. *Print Grades or Assignments:* prints out all or some of the students' names, grades, and averages to a printer. It allows you to print a list of assignments stored on the diskette.

7. *Correction:* permits correcting any student's name or grade.

8. *Initializing a Disk:* makes it possible to avoid retyping and re-entering all the students' names onto a new diskette. This option will automatically transfer the names of students stored on one diskette to a new diskette without transferring grades.

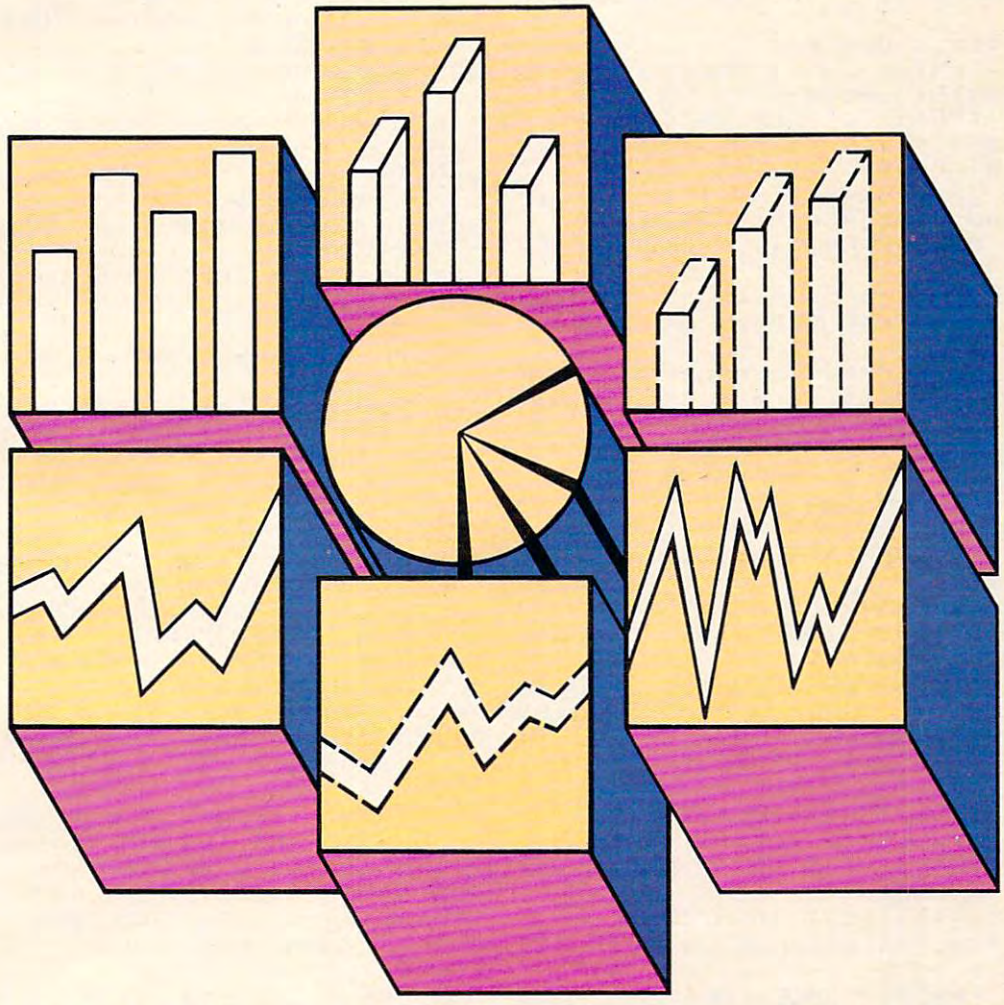
9. *End:* provides a way to exit the program.

It is imperative that you *never end a session by just turning off the computer or disk drive. Always* use option 9.

Gradebook For Atari

```
90 CLOSE #1:CLR
100 DIM NAME$(20),FILE$(13),CL$(1),B
    Z$(1),CLASS$(361),TASK$(30),GRAD
    E$(3),YES$(3)
110 DIM BYTE(48),SECTOR(48),TEMP$(15
    ),BL$(37)
```

B/GRAPH T.M.



A PROFESSIONAL GRAPHICS-CHARTING AND STATISTICAL ANALYSIS PROGRAM FOR ATARI® PERSONAL COMPUTERS

B/Graph is for professionals in Marketing Sales, Administration, Forecasting, Accounting and General Management.
- Home and Small Business
- Educators, Students
- Hobbyists

B/Graph can create
- Bar charts
- 3-D Bar Charts
- Segmented Bar charts
- Pie charts
- Line Graphs
- Scatter Graphs
- Market Graphs (High-Low-Close)

Instant conversion between all graph types without re-entering data.

B/Graph can perform
- Statistical analysis
- Regression analysis
- Exponential smoothing
- Moving averages
- Graphing of 1–3 factors with up to 100 data points.

Save graphs as data files or high-res screens.
B/Graph Features
- Automatic labelling
- Re-labelling
- Custom labelling
- Full screen editor
- Multiple graph overlays
- Automatic or manual labelling
- Automatic and manual scaling
- Automated slide shows
- Grid overlays
- Multiple graph overlays
- Total screen color control

B/Graph works with graphics printers from
- Centronics
- Epson/Prowriter
- C. Itoh/Nec
- Seikosha
- Visicalc D.I.F. files
- User written programs

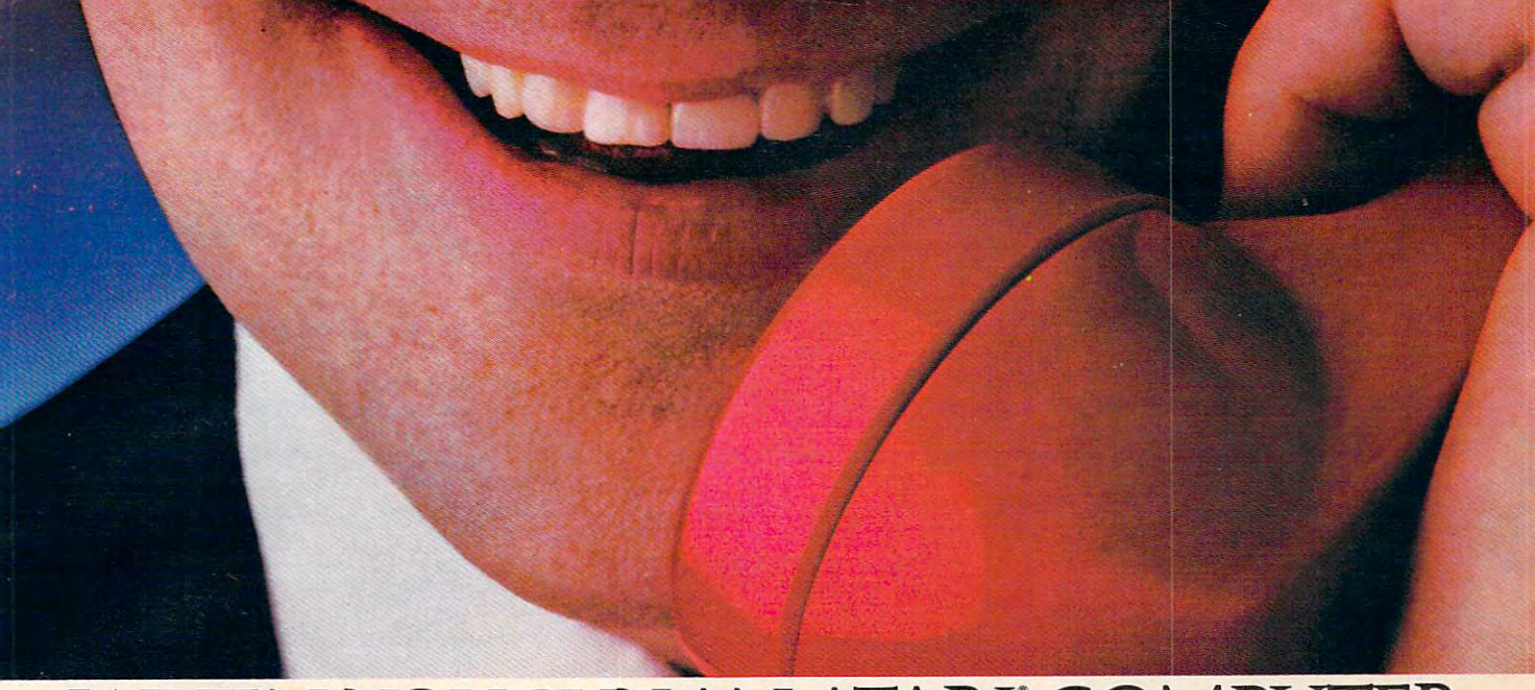
B/Graph comes with comprehensive professionally written documentation. A complete tutorial on Graphing/Charting and Statistics.

User registration with full program support.

INHOME

INHOME SOFTWARE INCORPORATED
2485 Dunwin Drive, Unit 8, Mississauga, Ontario,
Canada, L5L 1T1
(416)828-0775

```
120 CL$=CHR$(125):BZ$=CHR$(253):MENU
    =200:FILE$="D:STUDENT."
130 BL$=" ":BL$(37)=BL$:BL$(2)=BL$:R
    =0:HW=0:B=5000:C=5500:D=580:E=58
    10
200 LN=200:TRAP B
210 GRAPHICS 0:POKE 201,5:SETCOLOR 4
    ,3,2:SETCOLOR 2,8,9:SETCOLOR 1,8
    ,1
215 POKE 752,1:GOSUB E
220 PRINT :PRINT ,,"{3 SPACES}GRADEB
    OOK":PRINT :PRINT
230 PRINT :PRINT ,"YOUR OPTIONS ARE"
    :FOR WAIT=7 TO 22:POSITION WAIT,
    6:PRINT CHR$(13):NEXT WAIT
240 PRINT ,"1. Read Grades":PRINT ,"
    2. Read Assignments":PRINT ,"3.
    Enter Names":PRINT ,"4. Enter Gr
    ades"
250 PRINT ,"5. Enter Assignments":PR
    INT ,"6. Print Grades or Assignm
    ents"
260 PRINT ,"7. Make Correction":PRIN
    T ,"8. Initialize a Disk":PRINT
    ,"9. End"
265 POKE 752,0
270 PRINT :PRINT " YOUR CHOICE PLEAS
    E";:INPUT ANS:ANS=INT(ANS):IF AN
    S<1 OR ANS>9 THEN GOTO B
273 IF ANS=9 THEN GRAPHICS 0:END
275 POKE 752,1
280 PRINT CL$:TRAP 40000:FOR AA=1 TO
     10:POSITION 1,10:PRINT "  BE SU
    RE PROPER DATA DISK IS IN DRIVE"
290 FOR W=1 TO 20:NEXT W:POSITION 1,
    10:PRINT "  BE SURE PROPER DATA
    DISK IS IN DRIVE":NEXT AA
295 POSITION 15,14:PRINT "THANK YOU"
297 POSITION 6,16:PRINT "You may ent
    er 'XXX' to any":POSITION 7,17:P
    RINT "prompt to return to menu"
300 PRINT :PRINT :PRINT "  Press any
     key to begin"
305 IF PEEK(764)=255 THEN 305
308 POKE 764,255:POKE 752,0:TRAP 320
    :OPEN #1,4,0,"D:CL":CLOSE #1
310 PRINT :PRINT "PLEASE REMOVE PROG
    RAM MASTER DISK!":GOSUB E:GOTO 3
    00
320 CLOSE #1:GOSUB E:IF ANS=2 OR ANS
    =8 OR ANS=5 THEN 340
330 IF R=0 THEN GOSUB 5100:GOSUB E
340 ON ANS GOTO 410,810,1210,1600,20
    00,2410,2800,3200,350
350 END
410 GOSUB 5310:GOSUB 5400:TRAP B:LN=
    410
420 POSITION 2,19:PRINT "Which stude
    nt's grades do you want?":POSITI
    ON 2,21:PRINT "First student num
    ber";
425 INPUT YES$:GOSUB 5600:FIRST=VAL(
    YES$)
430 POSITION 2,22:PRINT "Last studen
    t number";:INPUT YES$:GOSUB 5600
432 LAST=VAL(YES$):IF LAST<=FIRST TH
    EN GOTO B
433 IF LAST>NUMSTUD-1 THEN GOTO B
435 IF ANS=6 THEN RETURN
440 IF LAST-FIRST>5 THEN GOSUB 5400:
    GOTO 5410
450 GRAPHICS 0:SETCOLOR 2,8,4:SETCOL
    OR 4,8,4
460 FOR AA=FIRST TO LAST
470 TRAP 650:LN=700:NUM=0:SCORE=0:AV
    ERAGE=0:FILE$(11)=STR$(AA)
480 OPEN #1,4,0,FILE$:INPUT #1;NAME$
    :PRINT :PRINT NAME$(11,20);NAME$
    (1,10)
500 INPUT #1;GRADE$:PRINT GRADE$;";
    ";:GOSUB 510:GOTO 500
510 IF GRADE$(1,1)="A" THEN GRADE=93
    :GOTO D
520 IF GRADE$(1,1)="B" THEN GRADE=83
    :GOTO D
530 IF GRADE$(1,1)="C" THEN GRADE=73
    :GOTO D
540 IF GRADE$(1,1)="F" OR GRADE$(1,1
    )="E" THEN GRADE=50:GOTO D
560 IF GRADE$(1,1)="D" THEN GRADE=63
    :GOTO D
570 GRADE=VAL(GRADE$):GOTO 600
580 IF GRADE$(2,2)="+" THEN GRADE=GR
    ADE+4
590 IF GRADE$(2,2)="-" THEN GRADE=GR
    ADE-4
600 SCORE=SCORE+GRADE:NUM=NUM+1:RETU
    RN
650 GOSUB E:CLOSE #1:TRAP 40000:IF P
    EEK(195)=136 THEN GOTO LN
660 CLOSE #1:PRINT :PRINT "Check Dis
    k and/or Drive"
670 PRINT :PRINT "Press any key for
    MENU":GOSUB E
680 IF PEEK(764)=255 THEN 680
690 POKE 764,255:GOTO MENU
700 CLOSE #1:IF NUM=0 THEN PRINT "NO
     GRADES":GOTO 730
705 IF ANS=6 THEN CLOSE #1:GOTO 2555
710 AVERAGE=SCORE/NUM:PRINT "  AVE.=
    ";AVERAGE
730 NEXT AA
740 PRINT :PRINT "Press START for me
    nu":PRINT :PRINT "Press SELECT t
    o see more grades"
750 AA=PEEK(53279):IF AA>6 THEN 750
770 IF AA=6 THEN GOTO MENU
780 IF AA=5 THEN 410
790 GOTO 750
810 PRINT CL$;"{10 SPACES}LIST OF ASS
    IGNMENTS":PRINT
820 TRAP 1100:GOSUB 840:GOTO 670
840 TRAP 1100:CLOSE #1:OPEN #1,4,0,"
    D:ASSIGN"
850 TRAP 650:LN=900
860 INPUT #1;HW:INPUT #1;TASK$
870 IF ANS=6 THEN PRINT #2;HW;".";TA
    SK$:GOTO 860
880 PRINT HW;".";TASK$:GOTO 850
900 RETURN
1100 IF PEEK(195)=170 THEN PRINT :PR
     INT "NO ASSIGNMENTS LISTED":GOT
     O 670
1110 GOTO 660
1210 PRINT CL$:SETCOLOR 4,7,5:SETCOL
     OR 2,13,12:SETCOLOR 1,13,2
1220 LN=1210:TRAP B
1230 POSITION 10,3:PRINT "ADDING NAM
     ES TO CLASS":PRINT :PRINT "Ther
     e are ";NUMSTUD-1;" students in
      this class."
1235 IF NUMSTUD=46 THEN PRINT :PRINT
      "{3 SPACES}CLASS IS FULL NO MO
     RE STUDENTS":GOTO 670
1240 POSITION 1,22:PRINT "TYPE 'XXX'
      for first name for MENU"
```



WHEN YOU BUY AN ATARI® COMPUTER, WE PUT OUR EXPERTISE ON THE LINE.

There's no limit to what you can do with a home computer...and no way any mere instruction manual can help you discover all the possibilities.

So ATARI gives you the extra help you need: an ATARI computer expert to answer your questions. Free. He'll help you write your own programs, learn how to do new things, and diagnose problems when the things you're trying to do just don't work out.

It's the ATARI Help Line. A toll-free help-and-information service to help you get more out of your ATARI Computer. Just call 1-800-538-8543.*

And if you ever need anything fixed, ATARI has over 1,600 ATARI SERVICE℠ Centers nationwide. You'll find the nearest one listed under "Computers" in your Yellow Pages.

ATARI SERVICE isn't the only good reason to buy an ATARI system. But it's an awfully good reason not to choose any other kind.

ATARI SERVICE
FACTORY AUTHORIZED NETWORK

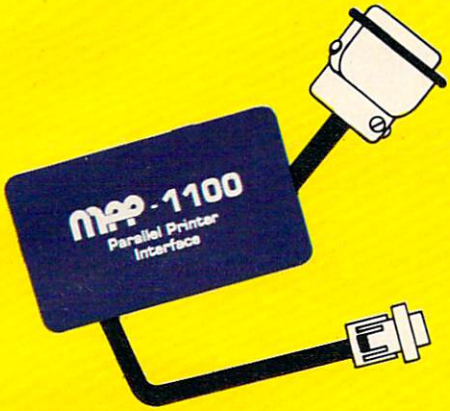
1-800-538-8543*
THE ATARI SERVICE℠ "HELP LINE."

*California: 1-800-672-1404

```
1250 POSITION 3,8:PRINT "STUDENT NUM
     BER ";NUMSTUD;":":PRINT :PRINT
     "First name please:";:INPUT TEM
     P$
1252 IF TEMP$="" THEN GOSUB 5800:GOS
     UB 1210
1255 AA=LEN(TEMP$):IF AA>9 THEN GOTO
      B
1260 IF TEMP$="XXX" THEN GOTO MENU
1270 GOSUB 1500:NAME$(11,20)=TEMP$
1280 PRINT :PRINT "Last name please:
     ";:INPUT TEMP$
1285 IF TEMP$="" THEN GOSUB 5800:GOT
     O 1210
1290 AA=LEN(TEMP$):IF AA>10 THEN GOT
     O B
1300 IF TEMP$="XXX" THEN GOTO MENU
1305 TRAP B:LN=1305:POSITION 2,19:PR
     INT BL$:POSITION 2,16:PRINT BL$
1307 POSITION 2,16:PRINT "IS THIS CO
     RRECT";:INPUT YES$:IF YES$(1,1)
     <>"Y" THEN 1210
1310 GOSUB 1500:NAME$(1,10)=TEMP$
1320 CLASS$(NUMSTUD*8-7,NUMSTUD*8)=N
     AME$(1,8)
1325 TRAP 660
1330 FILE$(11)=STR$(NUMSTUD):CLOSE #
     1:OPEN #1,8,0,FILE$:PRINT #1;NA
     ME$:CLOSE #1
1340 GOSUB E:NUMSTUD=NUMSTUD+1:GOTO
     1210
1500 IF AA=10 THEN RETURN
1510 FOR NUM=AA+1 TO 10:TEMP$(LEN(TE
     MP$)+1)=" ":NEXT NUM
1530 RETURN
1600 PRINT CL$:SETCOLOR 2,11,12:SETC
     OLOR 4,5,12:SETCOLOR 1,11,0
1610 POSITION 9,2:PRINT "ENTER STUDE
     NTS' GRADES":PRINT :PRINT "Inst
     ructions"
1630 PRINT :PRINT "Grades may be any
      number from zero{4 SPACES}to 1
     00 or any letter from A to F."
1640 PRINT "Letter grades may includ
     e a plus or{3 SPACES}minus. Let
     ter grades are averaged
     {5 SPACES}as follows:"
1650 PRINT ,"A+=97","A=93","A-=89":P
     RINT ,"B+=87","B=83","B-=79":PR
     INT ,"C+=77","C=73","C-=69"
1680 PRINT ,"D+=67","D=63","D-=59":P
     RINT ,"E+=54","E=50","E-=46":PR
     INT ,"F+=54","F=50","F-=46"
1690 PRINT :PRINT "Type 'xxx' for gr
     ade when you have{4 SPACES}fini
     shed with that student."
1720 PRINT :PRINT "Press any key to
     begin"
1730 IF PEEK(764)=255 THEN 1730
1740 POKE 764,255
1745 TRAP B:LN=1720:PRINT CL$:GOSUB
     5315
1750 POSITION 2,20:PRINT "Enter stud
     ent number";:INPUT YES$:GOSUB 5
     600
1760 NUM=VAL(YES$):IF NUM<1 OR NUM>N
     UMSTUD-1 THEN GOTO B
1780 CLOSE #1:FILE$(11)=STR$(NUM):PO
     SITION 2,20:PRINT BL$:TRAP 650:
     OPEN #1,4,0,FILE$
1790 INPUT #1;NAME$:CLOSE #1
1800 CLOSE #1:OPEN #1,9,0,FILE$
1805 TRAP B:LN=1805:PRINT CL$:GOSUB E
1810 POSITION 4,20:PRINT "Type 'XXX'
      when finished"
1812 POSITION 9,2:PRINT "ENTER STUDE
     NT GRADES":POSITION 1,7:PRINT "
     Grade for ";NAME$(11,20);NAME$(
     1,10);:INPUT GRADE$
1815 IF GRADE$="XXX" THEN CLOSE #1:G
     OTO 1890
1818 IF GRADE$="" THEN GOSUB 5800:GO
     TO 1805
1820 AA=ASC(GRADE$(1,1)):IF AA<58 AN
     D AA>48 THEN GOSUB 1850:GOTO 18
     80
1830 IF AA<71 AND AA>64 THEN GOSUB 1
     850:GOTO 1880
1835 IF GRADE$="" THEN GOSUB 5800:GO
     TO 1805
1840 GOTO B
1850 AA=LEN(GRADE$):IF AA=3 THEN RET
     URN
1860 IF AA=2 THEN GRADE$(3,3)=" ":RE
     TURN
1870 IF AA=1 THEN GRADE$(2,3)="  ":R
     ETURN
1875 IF AA>3 THEN POP :GOSUB 5400:GO
     TO B
1880 TRAP 650:PRINT #1;GRADE$:GOTO 1
     805
1890 GOSUB 5400:TRAP B:LN=1890:POSIT
     ION 2,20:PRINT "Do you wish to
     enter grades for{7 SPACES}anoth
     er student";:INPUT YES$
1910 IF YES$(1,1)="Y" THEN 1745
1920 GOTO MENU
2000 PRINT CL$:SETCOLOR 4,12,8:SETCO
     LOR 1,9,2:SETCOLOR 2,9,8
2010 PRINT ,,"LIST OF ASSIGNMENTS":T
     RAP 2020:PRINT
2015 CLOSE #1:OPEN #1,4,0,"D:ASSIGN"
     :GOSUB 860:GOTO 2040
2020 CLOSE #1:GOSUB E:IF PEEK(195)=1
     70 THEN PRINT ,"{4 SPACES}No as
     sigments listed":POP :GOTO 204
     0
2025 CLOSE #1:GOSUB E:IF PEEK(195)=1
     36 THEN RETURN
2030 GOTO 660
2035 FOR AA=20 TO 22:POSITION 2,AA:P
     RINT BL$:NEXT AA
2040 HW=HW+1:TRAP B:LN=2035:POSITION
      2,20:PRINT "Enter assignment #
     ";HW:INPUT TASK$:AA=LEN(TASK$)
2045 IF TASK$="XXX" THEN GOTO MENU
2050 IF AA>28 THEN POSITION 2,21:PRI
     NT BL$;" ":POSITION 2,21:PRINT
     "Too many characters"
2055 IF AA>28 THEN GOSUB C:HW=HW-1:G
     OTO 2035
2057 IF TASK$="" THEN HW=HW-1:POSITI
     ON 2,21:PRINT BL$:POSITION 2,21
     :PRINT "YOU MUST ENTER A LETTER
     "
2058 IF TASK$="" THEN GOSUB C:GOTO 2
     035
2060 CLOSE #1:TRAP 660
2070 IF HW<>1 THEN XIO 36,#1,0,0,"D:
     ASSIGN":OPEN #1,9,0,"D:ASSIGN":
     GOTO 2090
2080 CLOSE #1:IF HW=1 THEN OPEN #1,8
     ,0,"D:ASSIGN"
2090 PRINT #1;HW:PRINT #1;TASK$
```

Let your Atari experience the MPP CONNECTION!

MPP-1100 Parallel Printer Interface



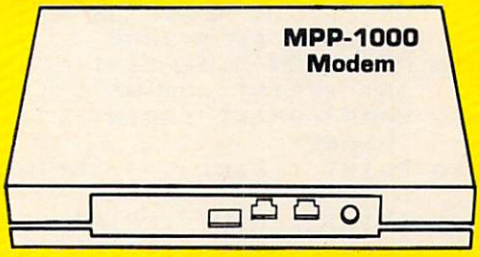
- No Atari 850™ Interface Module needed.
- Compatible with all software (including Visicalc™, Text Wizard™, and Filemanager 800™, etc.).
- 5 foot cable with Centronic plug (compatible with Epson, NEC, IDS, etc.)
- Faster data transfer.
- 8 bit data transfer.
- 2 year warranty.

only $99.95

MPP

MICROBITS PERIPHERAL PRODUCTS

MPP-1000 Modem



- No Atari 850™ Interface Module needed
- Smart Terminal Software Included
- 16K Tape/Disk
- Direct Connect To Phone
- Connects to Joystick Port #4

Smart Terminal Features:

- Multiple Buffers
- Off-Line Editing
- Upload/Download of Text and Programs
- Binary Files
- Full/Half Duplex
- ASCII/ATASCII Translation
- Allows Transfer of Files Larger than Memory
- Variable Baud Rate
- Parity Options
- 100% Machine Language

only $199.00

MICROBITS PERIPHERAL PRODUCTS

434 W. First Street • Albany, Oregon 97321 • **(503) 967-9075**

```
2100 CLOSE #1:XIO 35,#1,0,0,"D:ASSIG
     N":TRAP B:LN=2110
2110 GOSUB E:FOR AA=20 TO 22:POSITIO
     N 2,AA:PRINT BL$:NEXT AA
2120 POSITION 2,20:PRINT ,"Add anoth
     er assignment";:INPUT YES$:IF Y
     ES$(1,1)="Y" THEN 2035
2130 GOTO MENU
2410 PRINT CL$:SETCOLOR 1,9,4:SETCOL
     OR 2,9,14:SETCOLOR 4,13,13:CLOS
     E #1:CLOSE #2
2420 TRAP B:LN=2410
2430 POSITION 5,7:PRINT "Do you want
      to print grades";:INPUT YES$:I
     F YES$(1,1)="Y" THEN 2500
2435 IF YES$="XXX" THEN GOTO MENU
2440 POSITION 5,11:PRINT "Would you
     like to have a":PRINT "
     {3 SPACES}list of assignments p
     rinted";
2445 INPUT YES$:IF YES$(1,1)="Y" THE
     N 2710
2450 GOTO MENU
2500 GOSUB 410:TRAP 2600:OPEN #2,8,0
     ,"P:"
2510 FOR AA=FIRST TO LAST
2520 TRAP 650:LN=705:NUM=0:SCORE=0:A
     VERAGE=0:FILE$(11)=STR$(AA)
2530 CLOSE #1:OPEN #1,4,0,FILE$:INPU
     T #1;NAME$:PRINT #2;NAME$(11,20
     );NAME$(1,10)
2540 INPUT #1;GRADE$:PRINT #2;GRADE$
     ;"; ";:GOSUB 510
2550 GOTO 2540
2555 IF NUM=0 THEN PRINT #2;"NO GRAD
     ES":PRINT #2:GOTO 2570
2560 AVERAGE=SCORE/NUM:PRINT #2;"  A
     VE.=";AVERAGE:PRINT #2
2570 NEXT AA
2580 GOTO 670
2600 CLOSE #2:PRINT :PRINT "TURN ON
     PRINTER PLEASE":GOSUB C:GOTO LN
2710 CLOSE #2:TRAP 2600:OPEN #2,8,0,
     "P:"
2720 PRINT #2,"LIST OF ASSIGNMENTS":
     PRINT #2
2730 GOSUB 840:CLOSE #1:CLOSE #2:TRA
     P 40000:GOTO 670
2800 PRINT CL$:SETCOLOR 2,7,6:SETCOL
     OR 1,7,14:SETCOLOR 4,5,10:GOSUB
      E:TRAP B:LN=2800
2810 POSITION 5,5:PRINT "CORRECT":PR
     INT :PRINT :PRINT ,"1. STUDENT
     NAME":PRINT :PRINT ,"2. STUDENT
      GRADE"
2815 PRINT :PRINT ,"3. RETURN TO MEN
     U"
2820 PRINT :PRINT :PRINT "Press the
     number of your pick";:INPUT YES
     $:GOSUB 5600:W=VAL(YES$):W=INT(
     W)
2830 IF W<1 OR W>3 THEN GOTO B
2840 PRINT CL$:SETCOLOR 2,12,6:SETCO
     LOR 1,12,14:SETCOLOR 4,14,14:ON
      W GOTO 2860,2980,MENU
2860 PRINT CL$:GOSUB 5315:GOSUB 5400
     :POSITION 2,20:PRINT "Type the
     NUMBER of the student"
2865 POSITION 2,21:PRINT "whose name
      needs correcting";:TRAP B:LN=2
     860:AA=100:GOSUB 2870:GOTO 2890
2870 INPUT YES$:GOSUB 5600:W=VAL(YES
     $):W=INT(W):IF W>NUMSTUD-1 THEN
      GOTO B
2880 FILE$(11)=STR$(W):TRAP 650:CLOS
     E #1:OPEN #1,12,0,FILE$:RETURN
2890 NOTE #1,SECTOR,BYTE:INPUT #1;NA
     ME$
2895 PRINT CL$:POSITION 2,6:PRINT "S
     tudent # ";W;" IS ";NAME$(11,20
     );NAME$(1,10):TRAP 2915:AA=0:GO
     SUB E
2900 POSITION 2,10:PRINT "Enter 'XXX
     ' if no correction needed":PRIN
     T :PRINT "First name";:INPUT TE
     MP$
2905 AA=LEN(TEMP$):IF AA>10 OR TEMP$
     ="" THEN 2915
2910 IF TEMP$="XXX" THEN CLOSE #1:GO
     TO MENU
2912 GOTO 2920
2915 PRINT :PRINT "YOU MUST ENTER A
     LETTER-10 MAX.":GOSUB C:GOTO 28
     95
2920 GOSUB 1500:NAME$(11,20)=TEMP$:P
     RINT :PRINT "Last name";:INPUT
     TEMP$
2930 AA=LEN(TEMP$):IF AA>10 OR TEMP$
     ="" THEN 2915
2935 IF TEMP$="XXX" THEN CLOSE #1:GO
     TO MENU
2950 GOSUB 1500:NAME$(1,10)=TEMP$:TR
     AP 660
2960 PRINT :PRINT "{7 SPACES}CORRECT
     ING":POINT #1,SECTOR,BYTE:PRINT
      #1;NAME$:CLOSE #1:R=0:GOTO 280
     0
2980 PRINT CL$:GOSUB 5315:GOSUB 5400
     :POSITION 2,20:PRINT "Type the
     NUMBER of the student whose"
2985 POSITION 2,21:PRINT "grade need
     s correcting";:TRAP B:LN=2980:A
     A=100:NUM=0
2990 GOSUB 2870:TRAP 3050
2995 INPUT #1;NAME$:PRINT CL$:PRINT
     NAME$(11,20);NAME$(1,10);"GRADE
     S"
3000 NOTE #1,SECTOR,BYTE:NUM=NUM+1:S
     ECTOR(NUM)=SECTOR:BYTE(NUM)=BYT
     E:INPUT #1;GRADE$
3010 IF NUM<13 THEN POSITION 1,NUM+1
3015 IF NUM<25 AND NUM>12 THEN POSIT
     ION 11,NUM-11
3020 IF NUM<49 AND NUM>36 THEN POSIT
     ION 31,NUM-35
3025 IF NUM<37 AND NUM>24 THEN POSIT
     ION 21,NUM-23
3030 IF NUM=48 THEN 3050
3040 PRINT NUM;". ";GRADE$:GOTO 3000
3050 IF NUM=1 THEN CLOSE #1:PRINT "N
     O GRADES LISTED":GOSUB C:GOTO 2
     800
3055 GOSUB E:GOSUB 5400:TRAP B:LN=30
     50:POSITION 2,19:PRINT "The NUM
     BER of the grade to change";:IN
     PUT YES$
3060 GOSUB 5600:W=VAL(YES$):IF W>NUM
     -1 THEN GOTO B
3065 W=INT(W):GOSUB 5400:POSITION 2,
     19:PRINT "Enter new grade #";W;
     :INPUT GRADE$:IF GRADE$="" THEN
      GOSUB 5800:GOTO 3050
3070 IF GRADE$="XXX" THEN CLOSE #1:G
     OTO 2800
```

```
3075 AA=ASC(GRADE$(1,1)):IF AA<58 AN
     D AA>48 THEN GOSUB 1850:GOTO 30
     90
3080 IF AA<71 AND AA>64 THEN GOSUB 1
     850:GOTO 3090
3085 GOTO B
3090 TRAP 650:POINT #1,SECTOR(W),BYT
     E(W):PRINT #1;GRADE$:CLOSE #1:G
     OTO 2800
3200 PRINT CL$:SETCOLOR 1,15,2:SETCO
     LOR 2,15,12:SETCOLOR 4,8,8
3210 POSITION 17,5:PRINT "WARNING"
3220 PRINT :PRINT "This section will
      create new files.":PRINT "  Be
      sure a new formatted disk is"
3230 PRINT "{4 SPACES}available befo
     re beginning.{16 SPACES}Press 'Y
     '-RETURN"
3240 PRINT :PRINT "Type 'XXX' if you
      are not ready{7 SPACES}to crea
     te new files on a new disk."
3250 TRAP B:LN=3200:INPUT YES$:IF YE
     S$(1,1)="Y" THEN 3280
3260 IF YES$="XXX" THEN GOTO MENU
3270 GOTO B
3280 PRINT CL$:POSITION 2,10:PRINT "
     Please insert SOURCE disk with
     {8 SPACES}student records"
3285 PRINT :PRINT "PRESS ANY KEY WHE
     N READY"
3290 IF PEEK(764)=255 THEN 3290
3292 POKE 764,255:PRINT CL$:POSITION
      2,10:PRINT "This will take som
     e time. Please be{3 SPACES}pati
     ent. BYE for now"
3295 GOSUB C
3298 POKE 559,0:TRAP 3330:CLR :DIM C
     LASS$(900),NAME$(20),YES$(3),FI
     LE$(13):NUMSTUD=1:FILE$="D:STUD
     ENT.":E=5810
3300 FILE$(11)=STR$(NUMSTUD):CLOSE #
     1:OPEN #1,4,0,FILE$:INPUT #1;NA
     ME$:CLASS$(NUMSTUD*20-19,NUMSTU
     D*20)=NAME$
3320 CLOSE #1:NUMSTUD=NUMSTUD+1:GOTO
      3300
3330 POKE 559,34:GOSUB E
3332 IF PEEK(195)=170 AND NUMSTUD=1
     THEN PRINT :PRINT "THERE ARE NO
      RECORDS ON THIS DISK":CLOSE #1
     :GOTO 3350
3335 IF PEEK(195)=170 THEN 3380
3340 POKE 559,34:PRINT :PRINT "Check
      Disk and/or Drive":CLOSE #1:GO
     SUB E
3350 PRINT :PRINT "Press any key for
      menu"
3360 IF PEEK(764)=255 THEN 3360
3370 POKE 764,255:GOTO 90
3380 CLOSE #1:GOSUB E:PRINT :PRINT "
     Please insert new formatted dis
     k":PRINT :PRINT "Press 'Y'-RETU
     RN when ready"
3390 TRAP 3500:INPUT YES$:IF YES$="Y
     " THEN 3420
3410 IF YES$="XXX" THEN 90
3415 GOTO 3500
3420 TRAP 3450:CLOSE #1:OPEN #1,4,0,
     "D:STUDENT.*":CLOSE #1
3430 PRINT CHR$(253);CHR$(125):POSIT
     ION 2,10:PRINT "This disk conta
     ins student grade.{5 SPACES}Ple
     ase use new formatted disk"
3440 GOTO 3380
3450 CLOSE #1:TRAP 3340:GOSUB E
3460 FOR W=1 TO NUMSTUD-1:NAME$=CLAS
     S$(W*20-19,W*20):FILE$(11)=STR$
     (W)
3470 CLOSE #1:OPEN #1,8,0,FILE$:PRIN
     T #1;NAME$:CLOSE #1:NEXT W
3480 POKE 559,34:GRAPHICS 0:POSITION
      2,10:PRINT "THANK YOU FOR WAIT
     ING":FOR W=1 TO 200:NEXT W:GOTO
      90
3500 PRINT :PRINT "{9 SPACES}IMPROPE
     R INPUT":GOTO 3380
5000 POKE 752,1:PRINT BZ$
5010 PRINT :PRINT ,"INCORRECT INPUT,
      try again":GOSUB C:POKE 752,0:
     GOTO LN
5100 PRINT CL$:POSITION 17,10:PRINT
     "WORKING":PRINT :PRINT ,,"PLEAS
     E BE PATIENT":NUMSTUD=1:TRAP 52
     00:R=1
5110 FILE$(11)=STR$(NUMSTUD)
5120 CLOSE #1:OPEN #1,4,0,FILE$
5130 INPUT #1;NAME$:CLASS$(NUMSTUD*8
     -7,NUMSTUD*8)=NAME$(1,8)
5140 NUMSTUD=NUMSTUD+1:CLOSE #1:GOTO
      5110
5200 CLOSE #1:GOSUB E:IF NUMSTUD=1 T
     HEN RETURN
5210 TRAP 40000:IF PEEK(195)=170 THE
     N RETURN
5220 GOTO 660
5310 PRINT CL$:SETCOLOR 4,6,10:SETCO
     LOR 1,8,12:SETCOLOR 2,8,3
5315 PRINT ,,"NAMES OF STUDENTS"
5317 IF NUMSTUD=1 THEN POP :PRINT :P
     RINT "There are no students on
     this disk":GOTO 670
5320 NN=2
5330 FOR AA=1 TO NUMSTUD-1
5340 IF AA<16 THEN POSITION 2,NN:PRI
     NT AA;".";CLASS$(AA*8-7,AA*8):G
     OTO 5380
5350 IF AA>15 AND AA<31 THEN POSITIO
     N 15,NN:PRINT AA;".";CLASS$(AA*
     8-7,AA*8):GOTO 5380
5360 IF AA>30 THEN POSITION 28,NN:PR
     INT AA;".";CLASS$(AA*8-7,AA*8)
5380 NN=NN+1:IF NN=17 THEN NN=2
5390 NEXT AA:RETURN
5400 POSITION 2,19:PRINT BL$:POSITIO
     N 2,21:PRINT BL$:POSITION 2,22:
     PRINT BL$:RETURN
5410 PRINT CL$:POKE 752,1
5415 PRINT BZ$:POSITION 8,9:PRINT "O
     NLY FIVE STUDENTS GRADES":POSIT
     ION 10,12:PRINT "CAN BE LISTED
     AT ONCE"
5420 GOSUB C:POKE 752,0:GOTO LN
5500 FOR WAIT=1 TO 150:NEXT WAIT:RET
     URN
5600 IF YES$="XXX" THEN POP :GOTO ME
     NU
5610 AA=ASC(YES$(1,1)):IF AA<49 OR A
     A>57 THEN POP :GOTO B
5620 RETURN
5800 PRINT "You must enter at least
     one character":GOSUB C:RETURN
5810 W=PEEK(16):IF W>127 THEN W=W-12
     8:POKE 16,W:POKE 53774,W
5820 RETURN
```

©

DIAMOND DROP

Matt Giwer

Catch the falling diamonds – if you can. This fast-action game is easy to play and uses very little memory. Originally written for the Atari (with paddle), other versions are included for the TI-99/4A (with Extended BASIC) and the VIC and 64.

"Diamond Drop" is a game that requires good judgment and quick reflexes. It's fast, easy to play, and will fit into even the smallest Atari. The game uses both player/missile graphics and the Atari's fast string handling. The game plays quickly in BASIC with no machine language routines and uses less than 7K of RAM.

Four rows of diamonds will appear at the top of the screen. At the bottom, you'll see five catching trays, which are controlled by your paddle. As the diamonds drop, position your trays to catch them. Each diamond is worth ten points. If you miss, you lose one tray. If you complete one row, you get a 100-point bonus. Finish all four rows and you get a 250-point bonus. When you have lost all of your trays, the high score is recorded on the left of the screen, and you start again.

You won't be able to anticipate a dropping pattern because the subroutine at line 20000 generates a random sequence of two-digit numbers that will not repeat. Each number appears only once within the string.

The routine starts off with AA$ (line 20012), which contains the numbers 05 through 34. (These are the column numbers for the POSITION instructions.) The G LOOP then picks two of these pairs of numbers randomly and exchanges their positions within AA$. Thirty exchanges within this string of thirty pairs of numbers work well for this game.

Understanding The Program

Line 2 sends us immediately to line 30000 where the subroutine turns on the P/M Graphics and draws the trays at 30282. For a real challenge, change the POKE in line 30210 to 0.

Line 80 DIMensions the strings for the order of dropping the diamonds, four small strings for shuffling, and a string for scoring.

Line 100 names the frequently called subroutines for ease of program development and modification.

The subroutine at line 1000 initializes the variables and screen with a new set of four rows of diamonds. (Diamonds are CTRL ".").

Lines 2010 through 2190 comprise an infinite (because of the STEP size) control loop for the main program execution. Within this loop is the nested J LOOP (lines 2040 and 2090). This loop moves the diamond from the top of the screen to the bottom in line 2051. The second POSITION and ? put a blank in the previous position of the diamond as it moves down. Line 2080 contains the collision register for Player 0 and directs execution to the subroutine for catching (line 5400). Upon return from the subroutine, POKE HITCLR 53278 clears the collision registers.

Subroutine CATCH sets FLG=1. If the flag has not been set, line 2100 slides the diamond off to the right of the screen. The program is then directed to subroutine MISS.

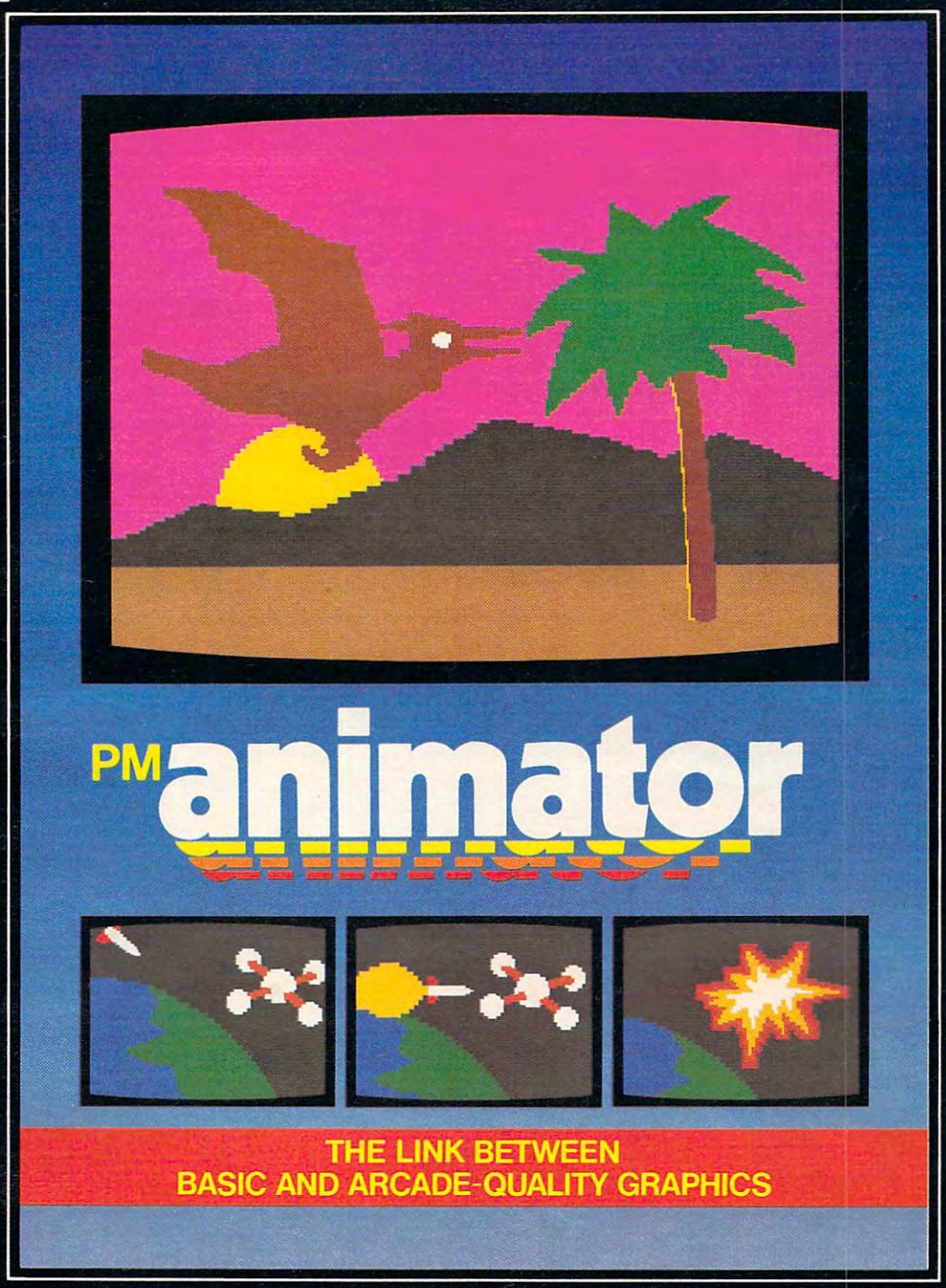
The 5100 lines decrement the ROW and give a bonus and GOSUB SCORE. If all four rows are gone, the program then moves to NLEVEL.

The 5300 lines give a bonus, increase the score, then initialize the variables and reset the screen with GOSUB 1000.

The 5400 lines simply remove the diamond, give a buzz, and increment the score.

The 5500 lines increment the score by 10.

Get pm ANIMATOR
And put your fantasies on the screen.



A product from Don't Ask. Programmed by Roger Bush.

Produce dazzling Player-Missile animation on your Atari, just by writing a BASIC program. Make your creative ideas real.

All you need is **pm ANIMATOR**, the Player-Missile control kit from **DON'T ASK**.

All the colors, motions, and shapes you can make with Player-Missile Graphics are now available from BASIC. Just use **pm ANIMATOR**'s magical editors and subroutines. Draw pictures and animate them with ease. Edit your animation sequences. Save them on a disk to reload later. And build your moving figures right into your own BASIC programs. Flying dragons, spinning rockets, leaping athletes – you create them all.

You don't need to know machine language. And you won't have to do bit-mapping.

Get **pm ANIMATOR**, and write that arcade game you've been dreaming about. The power is yours.

Have your dealer demonstrate pm ANIMATOR.
Comes with numerous demo programs and tutorial on Player-Missile Graphics.
Requires disk drive, 32K RAM Atari computer.

NOW AT SPECIAL INTRODUCTORY PRICE: $34.95.
Price goes up September 15, 1983.

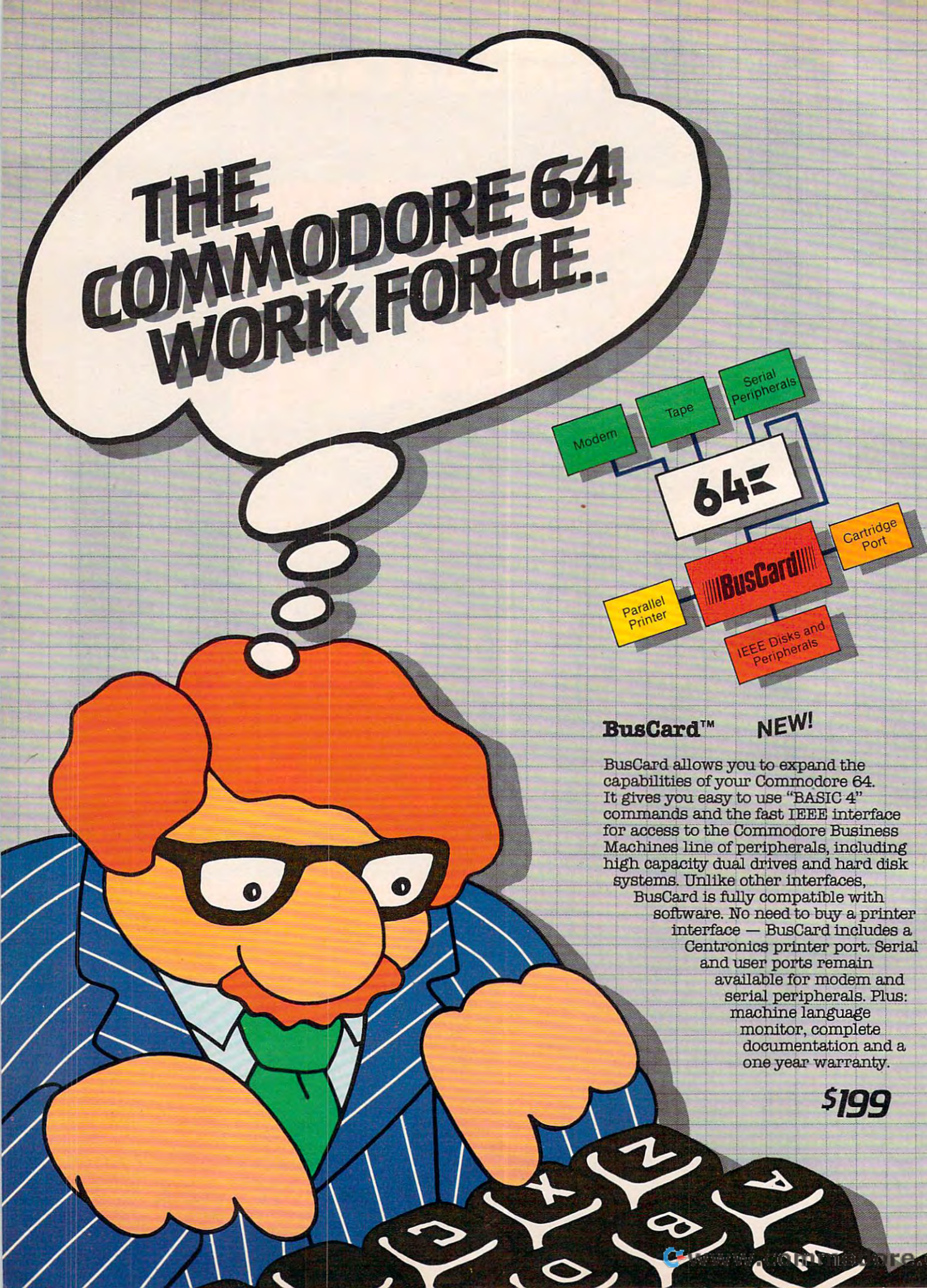
Or order by mail from **DON'T ASK**. Add $2.00 shipping/handling to your check or money order. California residents add 6% sales tax (6.5% if you reside in L.A. County).

Atari is a trademark of Atari, Inc.

DON'T ASK INC
COMPUTER SOFTWARE

2265 Westwood Blvd., Ste. B-150, Los Angeles, CA 90064
Phone: (213) 477-4514
Dealer inquiries welcome.

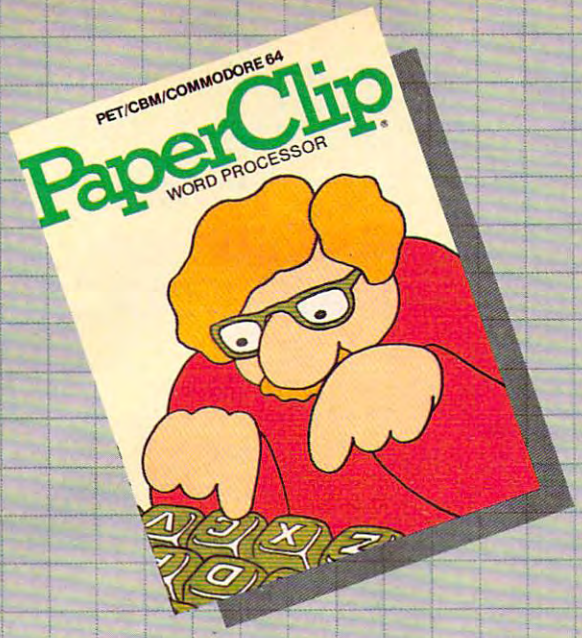
THE COMMODORE 64 WORK FORCE..

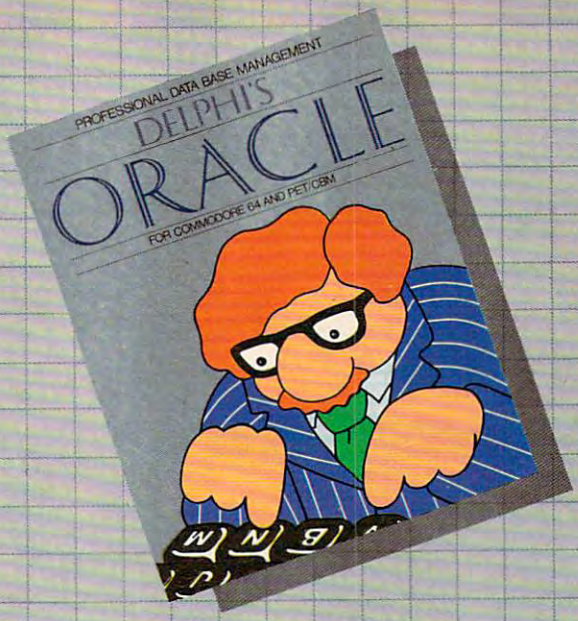


BusCard™ **NEW!**

BusCard allows you to expand the capabilities of your Commodore 64. It gives you easy to use "BASIC 4" commands and the fast IEEE interface for access to the Commodore Business Machines line of peripherals, including high capacity dual drives and hard disk systems. Unlike other interfaces, BusCard is fully compatible with software. No need to buy a printer interface — BusCard includes a Centronics printer port. Serial and user ports remain available for modem and serial peripherals. Plus: machine language monitor, complete documentation and a one year warranty.

$199





PaperClip™
Professional Word Processor
For Commodore 64 and CBM/SuperPet

"Absolutely the most versatile word processor I have seen." *Midnight Software Gazette* March/April, 1983

"...a very powerful word processor, with so many features that most people only need a fraction of them." *COMPUTE!* April, 1983

So easy to use that even novices can get professional results.

PaperClip has every standard word processor function, plus many exclusive features, including horizontal scrolling for charts and wide reports, up to 250 columns, column moves, alphanumeric sorts and arithmetic. Works with 80 column cards and every popular printer, with instant printer set-up. Professional handling of form letters, mail list merge, and large documents.

Complete, professional and easy to use. No where else will you find PaperClip's capabilities at this breakthrough price.

$125

Delphi's Oracle NEW!
Professional Data Base Management
For Commodore 64 and PET/CBM

Delphi's Oracle is a powerful information handling program that allows you to enter, retrieve and update data with incredible speed and flexibility.

• Large record size (over 8000 characters) • Up to 99 fields and 9 display pages per record • Includes report writer and mail label printing • Design your own forms on the screen or on printed reports

Delphi's Oracle brings power and versatility usually found only in mainframe or minicomputer systems, with provision for safeguarding accurate data entry, and excellent flexibility in searching for records.

$150

BATTERIES INCLUDED

FOR MORE INFORMATION AND YOUR NEAREST DEALER:

City Software Distributors
US TOLL FREE: 800-558-1008
735 W. Wisconsin Ave.
Milwaukee, WI 53233

Software International
560 N. Mountain Ave.
Upland, CA 91786
714-981-7640

Batteries Included
186 Queen Street West
Toronto, Ont. M5V 1Z1
416-596-1405

Software Distributors
10023 W. Jefferson Blvd.
Culver City, CA 90230
Cal: 800-252-4025
US: 800-421-0814

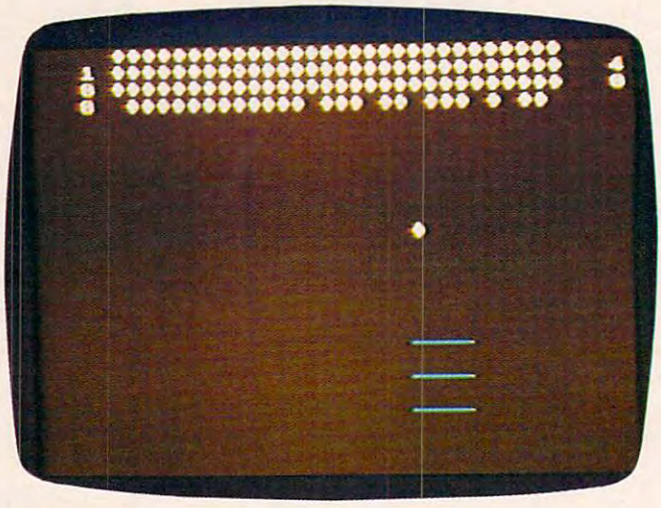
CBM Systems
7668 Telegraph Rd.
City of Commerce, CA 90040
213-904-0111

Kapri International
7419 Clybourn Ave.
Sun Valley, CA 91352
213-765-2774

Note that the bonuses have been 90 and 240, since each time this subroutine is called, 10 is added. Line 5520 prints the score vertically on the right side of the screen.

The 5600 lines remove one of the trays, provide a sound effect, and test for all trays being gone.

The 5700 lines determine if the new score is a high score, print it on the left side of the screen, erase the old score, and ask for another game. Pressing the trigger sets up a new game.



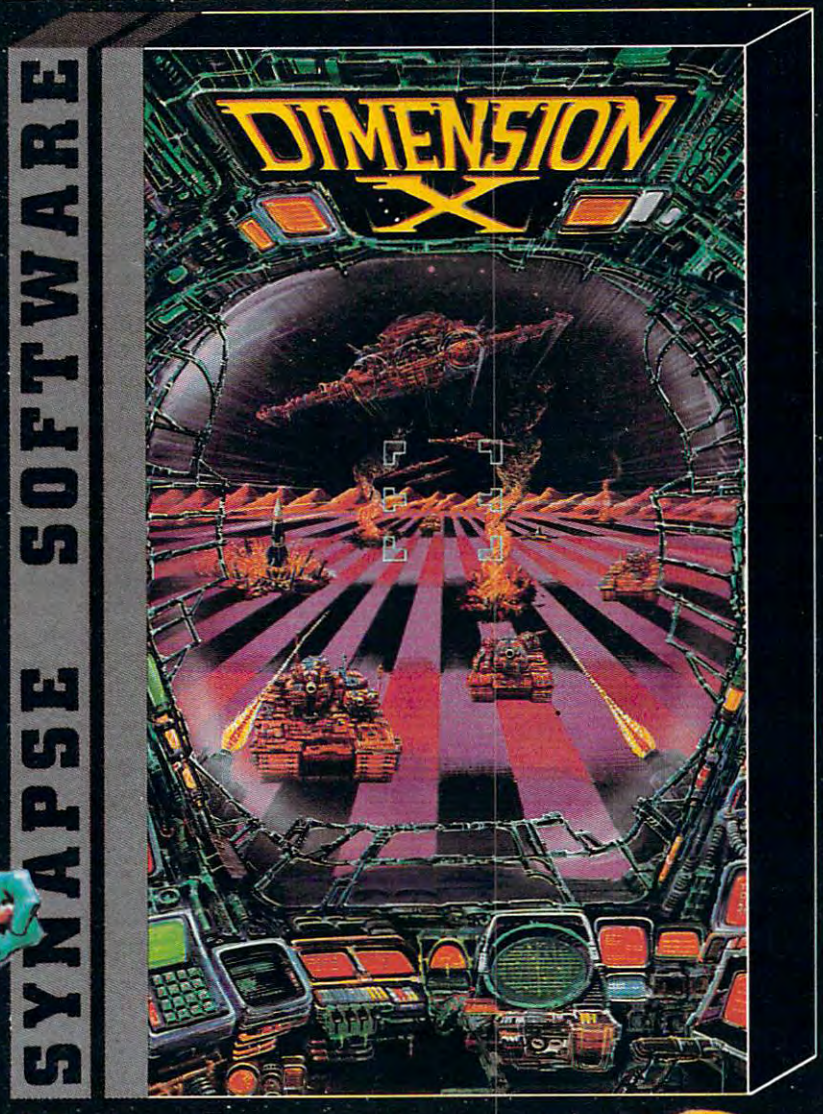
"Diamond Drop" on the Atari.

Program 1: Diamond Drop – Atari Version

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."

```
2 GOSUB 30000
80 DIM AA$(60),B1$(2),C1$(2),B2$(2),
   C2$(2),SCR$(8)
99 MM=0
100 NROW=5100:NLEVEL=5300:CATCH=5400
    :SCORE=5500:MISS=5600:TEND=5700
900 GOSUB 1000:GOTO 2000
1000 REM SETUP
1009 REM 5 TO 34
1010 POSITION 5,0:? "
     "
1020 POSITION 5,1:? "
     "
1030 POSITION 5,2:? "
     "
1040 POSITION 5,3:? "
     "
1050 GOSUB 20000:ROW=4
1900 RETURN
2000 REM CONTROL LOOP
2010 FOR ZYX=1 TO 2 STEP 0
2020 A=VAL(AA$(I,I+1))
2022 POKE PLX,PADDLE(0)
2030 I=I+2
2040 FOR J=ROW TO 22
2042 POKE PLX,PADDLE(0)
2051 POSITION A,J:? "
     J-1:? " ";
2080 IF PEEK(53252)<>0 THEN GOSUB CA
     TCH:POKE 53278,0
2090 NEXT J
2100 IF FLG=0 THEN FOR FF=A TO 35:PO
     SITION FF,22:? "
     -1,22:? " ";:POKE PLX,PADDLE(0)
     :NEXT FF
2102 POSITION 35,22:? " ";
2110 IF FLG=0 THEN GOSUB MISS
2180 IF I>60 THEN GOSUB NROW:GOSUB 2
     0000
2188 FLG=0
2190 NEXT ZYX
5100 REM NROW NEW ROW
5110 ROW=ROW-1:SC=SC+90:GOSUB SCORE
5120 IF ROW=0 THEN GOSUB NLEVEL
5190 RETURN
5300 REM NLEVEL  NEW LEVEL
5310 SC=SC+240:GOSUB SCORE
5350 GOSUB 1000
5390 RETURN
5400 REM CATCH
5410 POSITION A,J:? " ";:J=24:FLG=1
5420 SOUND 0,A,2,14
5430 Q=1^1
5440 SOUND 0,0,0,0
5450 GOSUB SCORE
5490 RETURN
5500 REM SCORE
5510 SC=SC+10:SCR$=STR$(SC)
5520 FOR FF=1 TO LEN(SCR$):SOUND 0,2
     00-20*FF,10,14:POSITION 38,FF:?
      SCR$(FF,FF):SOUND 0,0,0,0:NEXT
      FF
5590 RETURN
5600 REM MISS THE BALL
5610 POKE MYPMBASE+135+MM,0
5615 FOR JKJ=14 TO 0 STEP -2:FOR JKK
     =200 TO 50 STEP -50:SOUND 0,JKK
     ,10,JKJ:NEXT JKK:NEXT JKJ
5620 MM=MM+15:IF MM+135=210 THEN GOS
     UB TEND
5690 RETURN
5700 REM TEND THE END
5710 IF SC>HSC THEN HSC=SC
5720 SCR$=STR$(HSC)
5730 FOR FF=1 TO LEN(SCR$):SOUND 0,2
     00-FF*10,10,14:POSITION 3,FF:?
     SCR$(FF,FF):Q=1^1:SOUND 0,0,0,0
     :NEXT FF
5740 SC=0:FOR FF=1 TO 10:POSITION 38
     ,FF:? " ";:NEXT FF
5750 POSITION 2,10:? "ANOTHER GAME?"
     :Q=1^1
5752 IF PTRIG(0) THEN 5752
5754 POSITION 2,10:? "{13 SPACES}";:P
     OKE 77,3
5760 FOR III=MYPMBASE+135 TO MYPMBAS
     E+200 STEP 15:POKE III,255:NEXT
      III
5770 GOSUB 1000:MM=0
5790 RETURN
20000 REM RND GENERATOR
20002 I=1
20012 AA$="0506070809101112131415161
      7181920212223242526272829303133
      23334"
```

WHAT HAS IMMEASURABLE FIREPOWER... ATTACKING RIGILLIANS... ALTERED PERSPECTIVE SCROLLING... AND NO MERCY?



DIMENSION X,™ by Steve Hales, the latest blockbuster from SYNAPSE SOFTWARE gives you a screenful of 3-D graphics, a desert sector map that's different every time, AND... no margin for error.

DIMENSION X™ at software dealers everywhere, or AVAILABLE DIRECT FROM SYNAPSE ELITE, ONLY $34.95 plus $2 shipping and handling— SEND CHECK, MONEY ORDER OR VISA/MASTERCARD NUMBER TO SYNAPSE ELITE OR CALL (415) 527-7712.

For the Atari® 400/800/1200

synapse
SOFTWARE

5221 Central Avenue, Richmond, CA 94804 · (415) 527-7712

```
20040 FOR G=0 TO 30
20050 M=INT(30*RND(0)+2)*2-3
20051 N=INT(30*RND(0)+2)*2-3
20060 B1$=AA$(M,M+1):C1$=AA$(N,N+1)
20070 B2$=C1$:C2$=B1$
20080 AA$(M,M+1)=B2$:AA$(N,N+1)=C2$
20081 POKE PLX,PADDLE(0)
20090 NEXT G
20092 A=VAL(AA$(1,2))
20099 RETURN
22000 FOR I=MYPMBASE TO MYPMBASE+255
      :POKE I,0:NEXT I:STOP
30000 REM SETUP
30010 GRAPHICS 0:POKE 752,1
30200 REM PM SETUP
30204 POKE 53277,3:REM GRACTL PLAY&M
      ISS
30206 POKE 559,62:REM DMACTL,1LINE,P
      LAY,MIS,NORM FIELD
30208 POKE 54279,(PEEK(106)-12):REM
      12PAGE RESERVE
30210 POKE 53256,1:REM PLAY SIZES
30212 POKE 623,8:REM PRIORITY PF OVE
      R PL
30214 MYPMBASE=256*(PEEK(106)-12):RE
      M NEW PM BASE
30230 POKE 704,150
30232 POKE 710,16:POKE 709,29
30276 PLX=53248
30282 FOR I=MYPMBASE+135 TO MYPMBASE
      +200 STEP 15:POKE I,255:NEXT I
30283 POKE PLX,PADDLE(0)
30285 RETURN
```

Program 2:

Diamond Drop — VIC Version, Part I

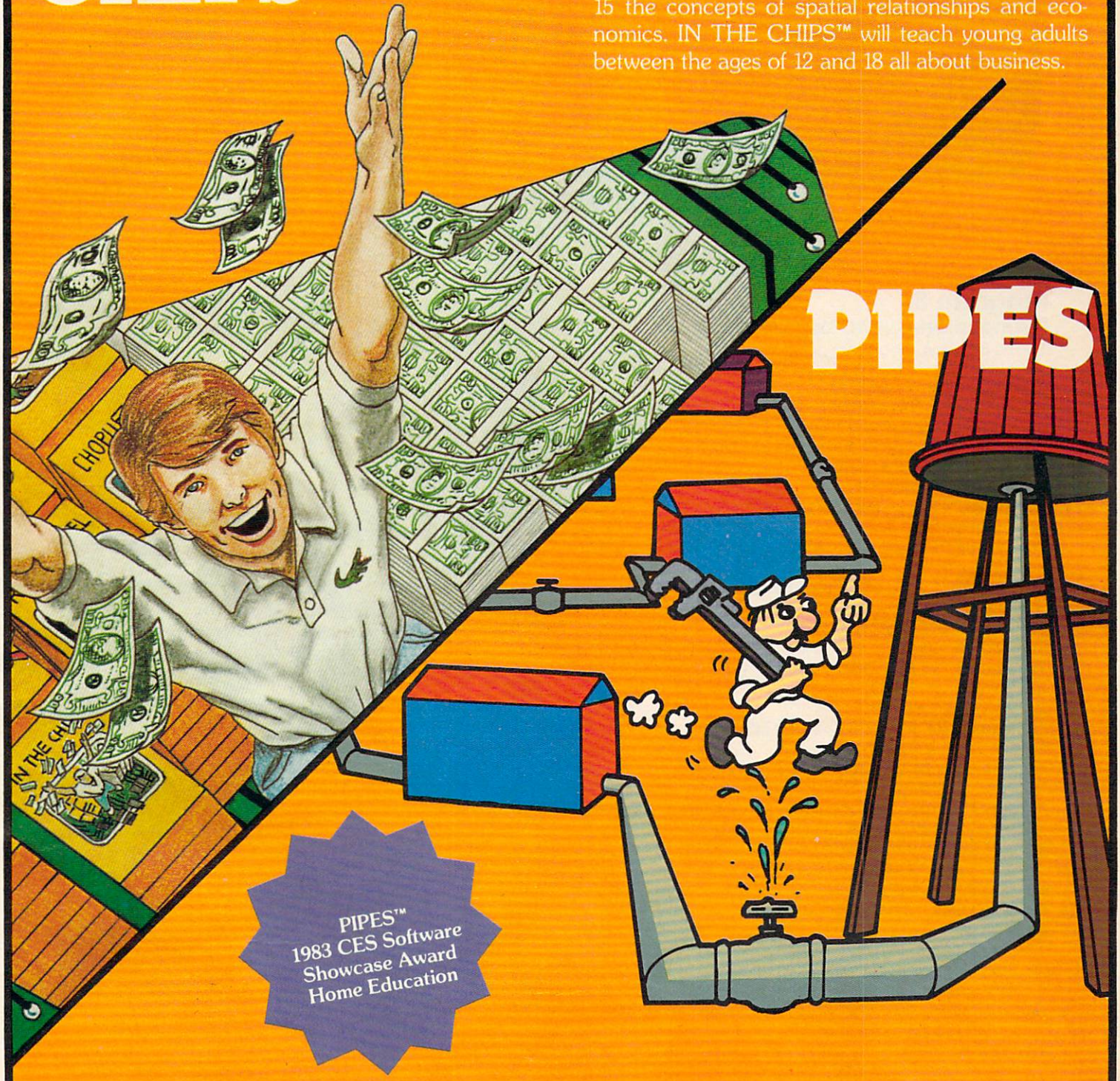
by Eric Brandon, Programming Assistant

```
3 POKE55,177:POKE56,27:CLR
4 POKE36879,93
5 TI$="000000"
9 PRINT"{CLR}{BLU}{4 DOWN}SETTING UP ...
  {3 DOWN}"
10 I=7089
15 PRINT"WAIT"STR$(25-VAL(TI$))" SECONDS
    {UP}"
20 READA:IFA=256THEN40
30 POKEI,A:I=I+1:GOTO15
40 PRINT"{CLR}{5 DOWN}{RED}{RVS}NOW LOAD
   ING GAME...{OFF}{BLU}"
50 REM FOR DISK USERS, TAKE THE WORD "RE
   M" OUT OF LINE 60
55 PRINT"{2 DOWN}"
60 REM PRINT"{UP}LOAD"CHR$(34)"DIAMONDS2
   .VIC"CHR$(34)",8"
70 PRINT"{4 UP}"
80 POKE 198,1:POKE631,131:NEW
7089 DATA 120,169,27,141,21,3,169
7097 DATA 200,141,20,3,88,169,9
7105 DATA 141,253,29,169,0,141,250
7113 DATA 29,96,173,255,29,141,252
7121 DATA 29,172,253,29,169,32,153
7129 DATA 205,31,200,169,160,174,251
7137 DATA 29,153,205,31,200,202,208
7145 DATA 249,169,32,153,205,31,206
7153 DATA 252,29,208,3,76,174,28
7161 DATA 172,253,29,169,32,153,161
7169 DATA 31,200,169,160,174,251,29
7177 DATA 153,161,31,200,202,208,249
7185 DATA 169,32,153,161,31,200,206
7193 DATA 252,29,208,3,76,174,28
7201 DATA 172,253,29,169,32,153,117
7209 DATA 31,200,169,160,174,251,29
7217 DATA 153,117,31,200,202,208,249
7225 DATA 169,32,153,117,31,200,206
7233 DATA 252,29,240,123,172,253,29
7241 DATA 169,32,153,73,31,200,169
7249 DATA 160,174,251,29,153,73,31
7257 DATA 200,202,208,249,169,32,153
7265 DATA 73,31,200,206,252,29,240
7273 DATA 91,172,253,29,169,32,153
7281 DATA 29,31,200,169,160,174,251
7289 DATA 29,153,29,31,200,202,208
7297 DATA 249,169,32,153,29,31,200
7305 DATA 206,252,29,240,59,172,253
7313 DATA 29,169,32,153,241,30,200
7321 DATA 169,160,174,251,29,153,241
7329 DATA 30,200,202,208,249,169,32
7337 DATA 153,241,30,200,206,252,29
7345 DATA 240,27,172,253,29,169,32
7353 DATA 153,197,30,200,169,160,174
7361 DATA 251,29,153,197,30,200,202
7369 DATA 208,249,169,32,153,197,30
7377 DATA 200,165,197,201,21,208,13
7385 DATA 173,253,29,201,1,240,24
7393 DATA 206,253,29,76,211,28,201
7401 DATA 22,208,14,173,253,29,24
7409 DATA 109,251,29,201,21,240,3
7417 DATA 238,253,29,238,250,29,173
7425 DATA 250,29,205,249,29,240,3
7433 DATA 76,191,234,169,0,141,250
7441 DATA 29,169,206,133,251,169,31
7449 DATA 133,252,160,0,185,206,31
7457 DATA 41,127,201,32,208,74,200
7465 DATA 192,21,208,242,160,0,177
7473 DATA 251,201,81,240,37,201,207
7481 DATA 240,33,201,90,240,29,200
7489 DATA 192,22,208,237,56,165,251
7497 DATA 233,22,133,251,176,2,198
7505 DATA 252,166,251,208,220,166,252
7513 DATA 224,30,208,214,76,191,234
7521 DATA 170,152,24,105,22,168,138
7529 DATA 145,251,152,56,233,22,168
7537 DATA 169,32,145,251,32,154,29
7545 DATA 76,14,29,169,32,153,206
7553 DATA 31,169,150,141,11,144,169
7561 DATA 175,141,12,144,169,15,141
7569 DATA 14,144,169,200,133,251,160
7577 DATA 128,162,8,142,15,144,232
7585 DATA 224,15,208,248,200,208,243
7593 DATA 230,251,208,239,169,14,141
7601 DATA 15,144,169,0,141,14,144
7609 DATA 141,12,144,141,11,144,160
7617 DATA 21,185,0,30,201,81,240
7625 DATA 11,136,208,246,169,1,141
7633 DATA 254,29,76,191,234,169,32
7641 DATA 153,0,30,76,191,234,152
7649 DATA 72,160,10,185,0,30,201
7657 DATA 57,208,9,169,48,153,0
7665 DATA 30,136,76,158,29,185,0
7673 DATA 30,24,105,1,153,0,30
7681 DATA 104,168,96,174,255,29,202
7689 DATA 142,255,29,232,169,206,133
7697 DATA 251,169,31,133,252,56,165
7705 DATA 251,233,44,133,251,176,2
7713 DATA 198,252,202,208,242,160,0
7721 DATA 177,251,201,160,240,4,200
7729 DATA 76,218,29,174,251,29,169
7737 DATA 32,145,251,200,202,208,250
7745 DATA 96,96,256
```

IN THE CHIPS

Creative Software Brings You A *NEW CONCEPT* in Home Education

Play a game and learn. Learn while playing a game. PIPES™ and IN THE CHIPS™ bring the worlds of games and concept home education together. PIPES™ will teach children between the ages of 6 and 15 the concepts of spatial relationships and economics. IN THE CHIPS™ will teach young adults between the ages of 12 and 18 all about business.

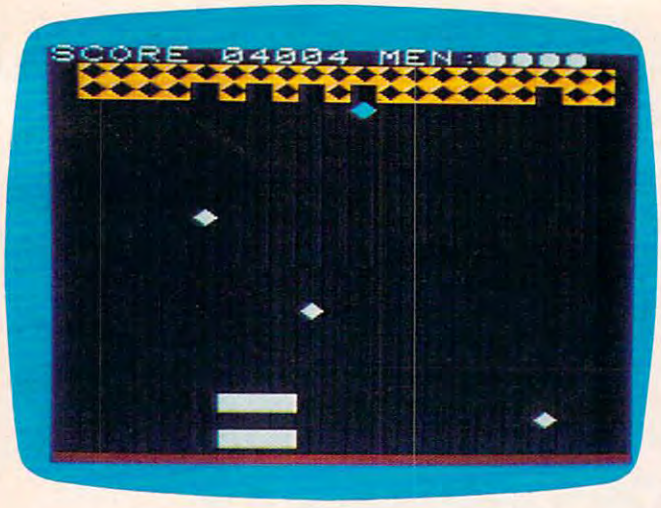


PIPES™
1983 CES Software
Showcase Award
Home Education

TWO GREAT CONCEPT HOME EDUCATION
CARTRIDGES FOR YOUR COMMODORE 64™ and VIC-20™

CREATIVE SOFTWARE
A Division of ASCI, Inc.

230 E. Caribbean Drive • Sunnyvale, CA 94089



VIC version of "Diamond Drop."

Program 3:
Diamond Drop – VIC Version, Part II

by Eric Brandon, Programming Assistant

```
5 POKE 36879,14
10 PRINT"{CLR}{WHT}"TAB(5)"DIAMOND DROP"
20 PRINT"{2 DOWN}{YEL}{2 SPACES}CATCH TH
   E DIAMONDS{2 SPACES}BEFORE THEY ";
30 PRINT"TOUCH THE GROUND. YOU HAVE FIVE
40 PRINT"CHANCES.
45 PRINT"{2 DOWN}{WHT}{4 SPACES}L - MOVE
    LEFT
46 PRINT"{DOWN}{4 SPACES}; - MOVE RIGHT
   {YEL}"
50 PRINT"{3 DOWN}{6} {RVS}HIT ANY KEY
   TO BEGIN"
60 GETA$:IFA$=""THEN60
65 GOSUB 1000
70 PRINT"{CLR}{WHT}SCORE 00000 MEN:QQQQ"
71 SPEED = 7673
72 PADDLES=7679
73 FLAG=7678: POKE FLAG,0
74 WIDTH = 7675
75 POKE PADDLES,6 : POKE WIDTH,W : POKE
   SPEED,10-S
78 ROW(6)=81:ROW(5)=81:ROW(4)=207:ROW(3)
   =207:ROW(2)=90:ROW(1)=90
80 PRINT" {YEL}{RVS}";:FORI=1TO20:PRINT"
   Z";:NEXT:PRINT"{OFF} ";
85 PRINT" {YEL}{RVS}";:FORI=1TO20:PRINT"
   Z";:NEXT:PRINT"{OFF} ";
90 PRINT" {CYN}{RVS}";:FORI=1TO20:PRINT"
   P";:NEXT:PRINT"{OFF} ";
95 PRINT" {CYN}{RVS}";:FORI=1TO20:PRINT"
   P";:NEXT:PRINT"{OFF} ";
100 PRINT" {OFF}{7}";:FORI=1TO20:PRINT
    "W";:NEXT:PRINT" ";
102 PRINT" {OFF}{7}";:FORI=1TO20:PRINT
    "W";:NEXT:PRINT" ";
105 PRINT"{WHT}";
109 REM 22 SPACES IN NEXT LINE
110 FORI=1TO14:PRINT"{22 SPACES}";:NEXT
120 PRINT"{HOME}";
130 FOR I=8164 TO 8185: POKE I,248:POKE
    I+30720,2:NEXT
140 IF PEEK(789)<>27THENSYS 7089
150 FOR ROW = 6 TO 1STEP-1:FOR CHAR=1 TO
    20
155 FOR K=1 TO 600-CHAR*10+(6-ROW)*20-50
   *(9-PEEK(SPEED)):NEXT
157 IF PEEK(FLAG) THEN 2000
160 P=RND(1)*20+1
170 IF PEEK(7680+ROW*22+P)=32THEN160
180 POKE 7680+ROW*22+P,ROW(ROW)
190 NEXTCHAR
191 POKE36878,15
```

VIC-20/64 Version Notes

Eric Brandon, Programming Assistant

To insure fast action, both the VIC and 64 versions of "Diamond Drop" are written predominantly in machine language. BASIC is used only to print instructions, set up the display, select the skill level, and initiate the "drop."

The game display starts with six rows of objects at the top of the screen and a stack of six catching trays at the bottom. As the objects begin to drop, you must use the L and ; keys to maneuver the trays and catch the objects. To make play more challenging, one tray disappears whenever the last ball drops from a row. Thus, you have only one tray with which to catch objects from the last row. When all the objects have dropped, you start again with six rows of objects and six trays. Play continues until a total of five objects hit the ground.

The VIC version is in two parts (Programs 2 and 3) so that it can run on the unexpanded VIC. Cassette users should type in Program 2 and SAVE it to tape, then type in Program 3 and SAVE it on the same tape immediately following Program 2. Disk users should type in Program 2, omitting the word REM in line 60, and SAVE it to disk. Program 3 should then be typed in and SAVEd to the same disk with the filename "DIAMONDS2.VIC". If the tape or disk copies are prepared in this manner, then Program 2 will cause Program 3 to LOAD and RUN automatically.

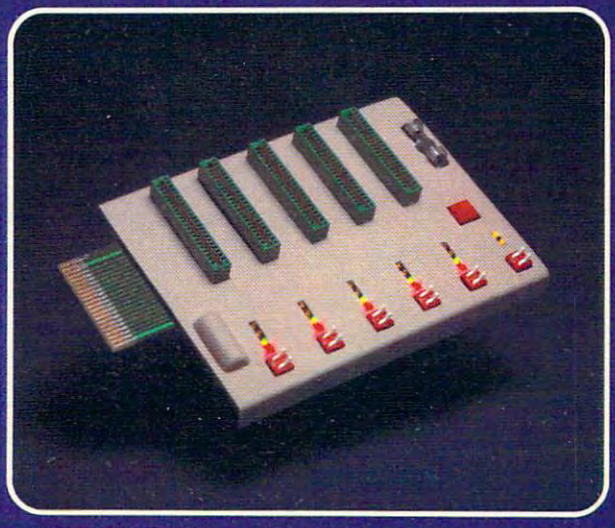
Since the DATA statements of Program 2 (VIC version) and Program 4 (64 version) comprise the machine language program for the game, it is essential that they be typed correctly. Be sure to SAVE a copy of the program before you attempt to RUN it, since an error in typing may cause your computer to "lock up," forcing you to turn the power off to recover. If Diamond Drop fails to RUN properly, the problem will most likely be a mistyped number somewhere in the DATA statements, so check carefully.

New From Cardco

Five Slot Expansion Interface for the C-64

The CARDBOARD/5 (CB/5) is an enclosed five slot, fully switch selectable, expansion interface for the Commodore 64™. This quality product allows the user to switch select any cartridge slot or combination of cartridge slots. Twenty-two color coded light emitting diodes give status indication. Each slot has four LEDs and two toggle switches for indication and control. Two master toggle switches allow the user to manually override any situation.

All Cardco products are individually tested to insure quality and reliability.



Some of the features of the CARDBOARD/5 are:

- high quality glass/epoxy circuit board
- gold plated contacts
- logic lines are switched by solid state IC switches
- full LED status indication
- convenient toggle switches
- full support under the board to prevent flexing
- full plastic enclosure to insure safety
- fused to protect your computer
- convenient reset button
- CARDCO, Inc.'s exclusive Lifetime Guarantee

See a complete line of American made Cardco Products at a computer store near you, today.

313 Mathewson • Wichita, Kansas 67214 • (316) 267-6525

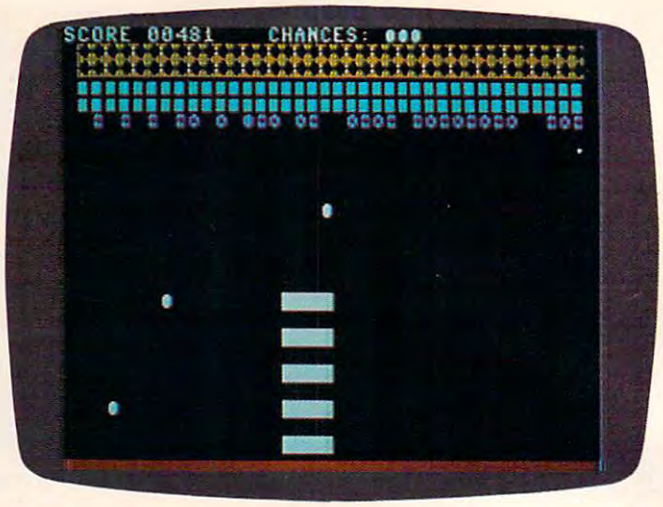
cardco, inc.

```
192 POKE36876,249
193 FORH=75TO15STEP-1.5:POKE 36878,H/5:N
    EXTH
194 POKE36878, 0
197 IF ROW >1 THENSYS 7610
200 NEXTROW
201 FOR K=1 TO 300:NEXTK
205 IF PEEK(SPEED)>2 THEN POKE SPEED,PEE
    K(SPEED)-1
206 IF PEEK(SPEED)=2 AND PEEK(WIDTH)>1TH
    ENPOKEWIDTH,PEEK(WIDTH)-1
207 POKE PADDLE,6
210 PRINT"{HOME}{DOWN}";
220 GOTO 80
999 END
1000 PRINT"{CLR}{7 SPACES}DIFFICULTY
     {4 SPACES}{5 DOWN}"
1010 INPUT"{WHT}SPEED (1-9){YEL}
     {3 RIGHT}5{3 LEFT}";S
1015 IF S>9 OR S<1 THEN 1010
1020 INPUT"{3 DOWN}{WHT}WIDTH (1-6){YEL}
     {3 RIGHT}3{3 LEFT}";W
1030 IF W>6 OR W<1 THEN 1020
1040 RETURN
2000 PRINT"{HOME}{10 DOWN}{6 SPACES}
     {YEL}GAME OVER"
2005 PRINT"{UP}HIT SPACE TO CONTINUE"
2010 POKE 198,0
2020 GETA$:IFA$<>" "THEN2020
2030 RUN 65
```

Program 4: Diamond Drop — 64 Version

by Eric Brandon, Programming Assistant

```
5 POKE 53280,12:POKE53281,0
7 IF PEEK(49152)<>120THENGOSUB49000
9 SYS 49745
10 PRINT"{CLR}{WHT}"TAB(13)"DIAMOND DROP
   "
20 PRINT"{5 DOWN}{YEL}{5 SPACES}CATCH TH
   E DIAMONDS BEFORE THEY
30 PRINT"{DOWN}{5 SPACES}TOUCH THE GROUN
   D. YOU HAVE FIVE
40 PRINT"{DOWN}{5 SPACES}CHANCES.
45 PRINT"{2 DOWN}{WHT}{13 SPACES}L - MOV
   E LEFT
46 PRINT"{13 SPACES}; - MOVE RIGHT{YEL}"
50 PRINT"{5 DOWN}{63}{9 SPACES}{RVS}HIT
    ANY KEY TO BEGIN"
60 GETA$:IFA$=""THEN60
65 GOSUB 1000
70 PRINT"{CLR}{WHT}SCORE 00000{4 SPACES}
   CHANCES: QQQQ "
71 SPEED = 53241
72 PADDLES=12*4096+4095
73 FLAG=12*4096+4094 : POKE FLAG,0
74 WIDTH = 12*4096+15*256+15*16+11
75 POKE PADDLES,6 : POKE WIDTH,W : POKE
   SPEED,10-S
78 ROW(6)=81:ROW(5)=81:ROW(4)=207:ROW(3)
   =207:ROW(2)=90:ROW(1)=90
80 PRINT" {YEL}{RVS}";:FORI=1TO38:PRINT"
   Z";:NEXT:PRINT"{OFF} ";
85 PRINT" {YEL}{RVS}";:FORI=1TO38:PRINT"
   Z";:NEXT:PRINT"{OFF} ";
90 PRINT" {CYN}{RVS}";:FORI=1TO38:PRINT"
   P";:NEXT:PRINT"{OFF} ";
95 PRINT" {CYN}{RVS}";:FORI=1TO38:PRINT"
   P";:NEXT:PRINT"{OFF} ";
```



The diamonds are falling from the sky in "Diamond Drop," 64 version.

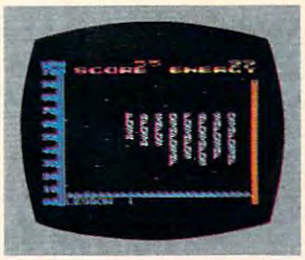
```
100 PRINT" {OFF}{73}";:FORI=1TO38:PRINT
    "W";:NEXT:PRINT" ";
102 PRINT" {OFF}{73}";:FORI=1TO38:PRINT
    "W";:NEXT:PRINT" ";
105 PRINT"{WHT}";
109 REM 40 SPACES IN NEXT LINE
110 FORI=1TO17:PRINT"{40 SPACES}";:NEXT
120 PRINT"{HOME}";
130 FOR I=1984 TO 2023 : POKE I,248:POKE
     I+54272,10:NEXT
140 IF PEEK(789)<>12*16THENSYS 12*4096
150 FOR ROW = 6 TO 1STEP-1:FOR CHAR=1 TO
     38
155 FOR K=1 TO 600-CHAR*10+(6-ROW)*20-50
    *(9-PEEK(SPEED)):NEXT
157 IF PEEK(FLAG) THEN 2000
160 P=RND(1)*38+1
170 IF PEEK(1024+ROW*40+P)=32THEN160
180 POKE 1024+ROW*40+P,ROW(ROW)
190 NEXTCHAR
191 SYS 49745
192 FORQ=1TO2:POKE54296,05 :POKE54277,5:
    POKE54278, 218
193 POKE 54273,150 :POKE54272,139:POKE54
    276,17
194 FORT=1TO50:NEXT:POKE54276,16:FORT=1T
    O10:NEXT
195 NEXTQ
197 IF ROW >1 THENSYS 49691
200 NEXTROW
201 FOR K=1 TO 300:NEXTK
205 POKE PADDLE,6
206 IF PEEK(SPEED)=2 AND PEEK(WIDTH)>1 T
    HEN POKE WIDTH,PEEK(WIDTH)-1
207 IF PEEK(SPEED)>2 THEN POKE SPEED,PEE
    K(SPEED)-1
210 PRINT"{HOME}{DOWN}";
220 GOTO 80
999 END
1000 PRINT"{CLR}{7 SPACES}DIFFICULTY
     {4 SPACES}{5 DOWN}"
1010 INPUT"{WHT}SPEED (1-9){YEL}
     {3 RIGHT}5{3 LEFT}";S
1015 IF S>9 OR S<1 THEN 1010
1020 INPUT"{3 DOWN}{WHT}WIDTH OF PADDLES
      (1-9){YEL}{3 RIGHT}4{3 LEFT}";W
```

TYPE ATTACK™

Sirius™

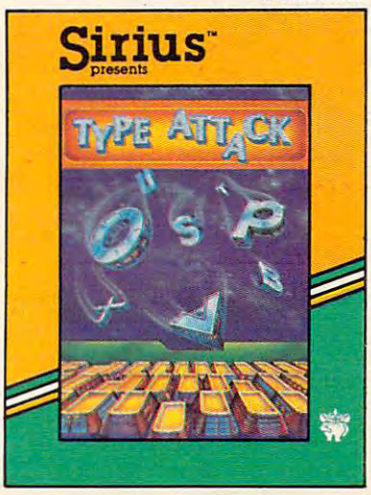
For more information contact your local Sirius dealer or contact Sirius directly at 10364 Rockingham Drive, Sacramento, CA 95827, (916) 366-1195.

Game design by Ernie Brock and Jim Hauser.



Apple II, II + & IIe Disk

Atari 800 & 1200 Disk
VIC-20 Cartridge
Commodore 64 Disk



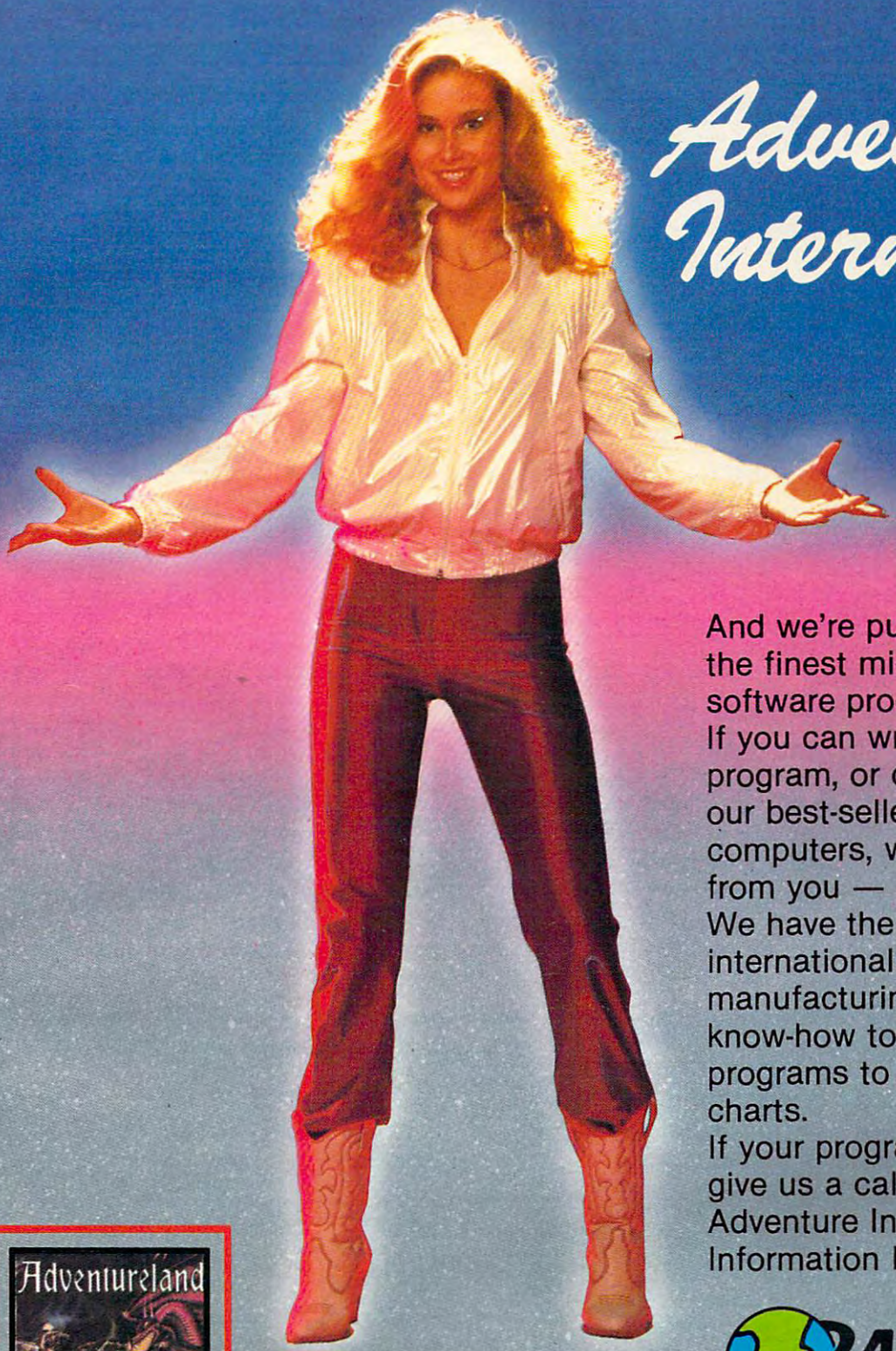
```
1030 IF W>9 OR W<1 THEN 1020
1040 RETURN
2000 PRINT"{HOME}{10 DOWN}{2 SPACES}
     {YEL}GAME OVER - HIT SPACE TO CONTI
     NUE"
2010 POKE 198,0
2020 GETA$:IFA$<>" "THEN2020
2030 RUN 65
49000 PRINT"{WHT}{CLR}{2 DOWN}LOADING MA
      CHINE LANGUAGE...{3 DOWN}":TI$="00
      0000"
49005 I=49152
49007 PRINT"READY IN"STR$(29-VAL(TI$))"
      SECONDS {UP}"
49010 READ A:IF A=256 THEN RETURN
49020 POKE I,A:I=I+1:GOTO 49007
49152 DATA 120,169,192,141,21,3,169
49160 DATA 29,141,20,3,88,169,18
49168 DATA 141,253,207,169,0,141,250
49176 DATA 207,141,247,207,141,248,207
49184 DATA 96,173,255,207,141,252,207
49192 DATA 172,253,207,169,32,153,151
49200 DATA 7,200,169,160,174,251,207
49208 DATA 153,151,7,200,202,208,249
49216 DATA 169,32,153,151,7,206,252
49224 DATA 207,208,3,76,3,193,172
49232 DATA 253,207,169,32,153,71,7
49240 DATA 200,169,160,174,251,207,153
49248 DATA 71,7,200,202,208,249,169
49256 DATA 32,153,71,7,200,206,252
49264 DATA 207,208,3,76,3,193,172
49272 DATA 253,207,169,32,153,247,6
49280 DATA 200,169,160,174,251,207,153
49288 DATA 247,6,200,202,208,249,169
49296 DATA 32,153,247,6,200,206,252
49304 DATA 207,240,123,172,253,207,169
49312 DATA 32,153,167,6,200,169,160
49320 DATA 174,251,207,153,167,6,200
49328 DATA 202,208,249,169,32,153,167
49336 DATA 6,200,206,252,207,240,91
49344 DATA 172,253,207,169,32,153,87
49352 DATA 6,200,169,160,174,251,207
49360 DATA 153,87,6,200,202,208,249
49368 DATA 169,32,153,87,6,200,206
49376 DATA 252,207,240,59,172,253,207
49384 DATA 169,32,153,7,6,200,169
49392 DATA 160,174,251,207,153,7,6
49400 DATA 200,202,208,249,169,32,153
49408 DATA 7,6,200,206,252,207,240
49416 DATA 27,172,253,207,169,32,153
49424 DATA 183,5,200,169,160,174,251
49432 DATA 207,153,183,5,200,202,208
49440 DATA 249,169,32,153,183,5,200
49448 DATA 165,197,201,42,208,13,173
49456 DATA 253,207,201,1,240,24,206
49464 DATA 253,207,76,40,193,201,50
49472 DATA 208,14,173,253,207,24,109
49480 DATA 251,207,201,39,240,3,238
49488 DATA 253,207,238,250,207,173,250
49496 DATA 207,205,249,207,240,3,76
49504 DATA 49,234,169,0,141,250,207
49512 DATA 169,112,133,251,169,7,133
49520 DATA 252,160,0,185,152,7,41
49528 DATA 127,201,32,208,74,200,192
49536 DATA 39,208,242,160,0,177,251
49544 DATA 201,81,240,37,201,207,240
49552 DATA 33,201,90,240,29,200,192
49560 DATA 40,208,237,56,165,251,233
49568 DATA 40,133,251,176,2,198,252
49576 DATA 166,251,208,220,166,252,224
49584 DATA 4,208,214,76,49,234,170
49592 DATA 152,24,105,40,168,138,145
49600 DATA 251,152,56,233,40,168,169
49608 DATA 32,145,251,32,251,193,76
49616 DATA 99,193,169,32,153,152,7
49624 DATA 32,81,194,169,15,141,24
49632 DATA 212,169,17,141,5,212,169
49640 DATA 213,141,6,212,169,2,141
49648 DATA 3,212,169,100,141,2,212
49656 DATA 169,5,141,1,212,169,135
49664 DATA 141,0,212,169,65,141,4
49672 DATA 212,160,0,162,0,142,32
49680 DATA 208,232,208,250,200,208,247
49688 DATA 169,12,141,32,208,169,64
49696 DATA 141,4,212,160,39,185,0
49704 DATA 4,201,81,240,11,136,208
49712 DATA 246,169,1,141,254,207,76
49720 DATA 49,234,169,32,153,0,4
49728 DATA 76,49,234,152,72,160,10
49736 DATA 185,0,4,201,57,208,9
49744 DATA 169,48,153,0,4,136,76
49752 DATA 255,193,185,0,4,24,105
49760 DATA 1,153,0,4,104,168,96
49768 DATA 174,255,207,202,142,255,207
49776 DATA 232,169,152,133,251,169,7
49784 DATA 133,252,56,165,251,233,80
49792 DATA 133,251,176,2,198,252,202
49800 DATA 208,242,160,0,177,251,201
49808 DATA 160,240,4,200,76,59,194
49816 DATA 174,251,207,169,32,145,251
49824 DATA 200,202,208,250,96,160,0
49832 DATA 152,153,0,212,200,192,9
49840 DATA 208,248,96,256
```

Program 5: Diamond Drop – TI-99/4A Version

by Patrick Parrish, Editorial Programmer

```
100 DIM KOLOR(6)
110 RANDOMIZE
120 GOSUB 630
130 REM 108-DEFINE DIAMOND SPRITE C
    HAR,128-136 ARE THE PADDLES
140 CALL CHAR(108,"10387CFE7C381000
    0000000000000000000000000000000
    0000000000000000")
150 CALL CHAR(128,"FFFFFFFF0000FFFF
    FFFF0000FFFFFFFFFFFFFFFF0000FFF
    FFFFF0000FFFFFFFF")
160 CALL CHAR(132,"0000000000000FFF
    FFFF0000FFFFFFFF0000000000000FFF
    FFFFF0000FFFFFFFF")
170 SCR=0 :: SK=0 :: CH=10 :: S=0 :
    : CALL CLEAR :: CALL SCREEN(16)
    :: DISPLAY AT(4,9):"D I A M O N
    D"
180 FOR ROW=3 TO 6
190 CALL HCHAR(ROW+2,6,32,20)
200 DISPLAY AT(ROW+3,6):"   ***
    {3 SPACES}**  ***" :: DISPLAY A
    T(ROW+4,6):"h  h h  h h  h h  h
    "
210 DISPLAY AT(ROW+5,6):"p  p p  p
    p  p p  p" :: DISPLAY AT(ROW+6,
    6):"x  x xxx  x  x xxx"
220 DISPLAY AT(ROW+7,6):"h  h h  h
    h  h h" :: DISPLAY AT(ROW+8,6):
    "***  *  *  **  *"
230 NEXT ROW
240 DISPLAY AT(18,4):"SKILL LEVEL (
```

Hello, We're Adventure International



And we're publishers of some of the finest microcomputer software programs available.
If you can write a **top-quality** program, or can convert some of our best-sellers to other computers, we want to hear from you — Now.
We have the advertising, international distribution, manufacturing and marketing know-how to send top-quality programs to the top of the charts.
If your program **is top quality** — give us a call, or write for our Adventure International Author Information Kit.

We are publishers of the top-selling Scott Adams Adventure Series and other fine Entertainment and Applications Programs.

Adventure INTERNATIONAL

Box 3435
Longwood, Florida 32750
Telephone: (305) 862-6917
Ask for Author Assistance

TI-99/4A Version Notes

Patrick Parrish, Editorial Programmer

Thanks to the outstanding sprite capabilities of Extended BASIC, the TI-99/4A version (Program 5) of "Diamond Drop" is a game with quick, smooth action. The object of the game is to catch colorful diamonds which fall from the top of the screen. You use a series of vertically positioned paddles. These paddles are controlled with the keyboard. We chose to use the S and D keys for left and right movement. However, if you are more comfortable using some other keys, simply substitute the ASCII values corresponding to the desired keys for the numbers 68 and 83 in lines 420 and 430. (To find the ASCII value of a key, use PRINT ASC("X"), where X is the key you want to use.)

If you wish to use a joystick to play the game, change lines 420 to 440 to read:

```
420 CALL JOYST(1,H,V)::IF H=4 THEN H=60
430 IF H=-4 THEN H=-60
440 CALL MOTION(#1,0,H)::H=0::CALL JOYST(
    1,H,V)::IF H=0 THEN CALL MOTION(#1,0
    ,0)
```

We have suggested these replacement lines, rather than incorporating both keyboard and joystick control into the game, because we found that the additional time required to execute a GOSUB in line 420 slightly slowed down the paddle response.

There are two skill levels which are determined by how fast the diamonds drop. After you clear the entire screen of diamonds, the drop speed is increased. On the first screen, drop speed is 25 for skill level one, and 40 for skill level two. This is set in line 250. The drop speed is increased by three with completion of each screen in line 560.

To make the game more challenging, the diamonds can be dropped along a random diagonal angle. With this feature, some interesting playing situations will develop. As screen wraparound of the paddles is permitted, you must often make quick decisions about which direction to move. A wrong move will ultimately affect your score since only ten misses are allowed.

Scoring in the game, as determined in line 510, is affected by a number of factors. First, more points are awarded for diamonds garnered from successively higher rows on the screen. Second, diamond values increase with completion of each screen. Third, points are accumulated twice as quickly at skill level two. And last, if you choose to add an angle of descent to each diamond, a greater number of points are given based on the severity of the descent angle. When the game is over (when ten diamonds have been missed), your score and the high score for the session are posted.

Extended BASIC for the TI-99/4A features some convenient commands for sprite manipulation. Since sprite movement can be very fast, detection of collisions between sprites is not always infallible. As noted in the *TI Extended BASIC Manual*, sprites which coincide in position can be detected only when the COINC subprogram is CALLed from BASIC. Thus, if your program is executing some statement other than CALL COINC when sprites cross, no collision will be detected. Fortunately, this is noticeable only at the most advanced levels in this game.

```
    1,2) ?" :: ACCEPT AT(18,24)BEEP
     VALIDATE("12")SIZE(1):SK$ :: S
    K=VAL(SK$)
250 DROP=25 :: IF SK=2 THEN DROP=40
     :: REM CHANGE DROP RATE TO CHA
    NGE DIFFICULTY
260 DISPLAY AT(21,2):"DROP WITH ANG
    LE (Y/N) ?" :: ACCEPT AT(21,26)
    BEEP VALIDATE("YN")SIZE(1):ANG$
270 IF ANG$="N" THEN ANG=0 :: GOTO
    290
280 ANG=1
290 CALL CLEAR :: SCR=SCR+1
300 DISPLAY AT(1,2):"CHANCES:";CH :
    : DISPLAY AT(1,15):"SCORE:";S
310 ROW=3 :: FOR I=96 TO 120 STEP 8
320 CALL HCHAR(ROW,3,I,28):: ROW=RO
    W+1 :: NEXT I
330 CALL HCHAR(24,1,30,32)
340 CALL MAGNIFY(4):: CALL SPRITE(#
    1,128,5,150,115,0,H)
350 KHAR=108 :: ROW=41 :: FOR J=6 T
    O 3 STEP -1
360 A$="" :: FOR I=3 TO 30 :: A$=A$
    &CHR$(I):: NEXT I :: N=28
370 IF N=0 THEN 530
380 R=INT(LEN(A$)*RND+1):: P$=SEG$(
    A$,R,1):: X=ASC(P$):: N=N-1 ::
    IF N=0 THEN 400
390 A$=SEG$(A$,1,R-1)&SEG$(A$,R+1,L
    EN(A$)-R)
400 B=INT(RND*61*ANG)-30*ANG
410 CALL HCHAR(J,X,32):: CALL SPRIT
    E(#2,KHAR,KOLOR(J),ROW,8*(X-1)-
    2,DROP,B)
420 CALL KEY(0,K,ST):: IF K=68 THEN
     H=60 :: REM RIGHT MOVE-D KEY
430 IF K=83 THEN H=-60 :: REM LEFT
    MOVE-S KEY
440 CALL MOTION(#1,0,H):: H=0 :: CA
```

DYNAMIC PRINTER INTERFACES
for the VIC 20™ and the COMMODORE 64™
UNLIKE ANY OTHERS THAT HAVE COME BEFORE

It's not quick or easy to do things right!! After 8 long months of research and development; RAK-Ware, TYMAC CONTROLS CORP, and MICRO-WARE D.I. have brought the world better parallel interfaces. Better because they both have the ability to provide TRUE EMULATION of the Commodore® printer. That's right!! Graphic Characters, tabbing, Dot Graphics, and the other features. A formidable task that was finally accomplished.

THE CONNECTION™ — The Ultimate Parallel interface for the VIC 20 or Commodore 64. This fully intelligent interface plugs into the disk (serial) socket just like the standard printer. It can easily be assigned any device number and it will provide virtually TOTAL EMULATION of the Commodore® printer. Using the latest technology, this interface will display the full GRAPHIC CHARACTERS or convert them to their equivalent representations in clear text. It supports all of the standard commands (OPEN, PRINT#, and CLOSE), Column tabbing, dot tabbing, graphic repeat, dot addressable graphics, and the other features of the Commodore® Printer. Software designed to operate with the Commodore® Printer will operate using "THE CONNECTION™." Beside this, a 2K buffer has been provided, a full printer self test, LED Status indicators, Printer Reset switch, skip over perf, margin set and programmable line length. This interface is printer specific to take advantage of the special features of your printer. In the standard mode (non-graphics), it is designed to interface virtually any parallel printer with a standard Centronics configuration and connector. Specify your printer when ordering. Additional ROM's may be purchased for other printer applications . . . All this for $119.00

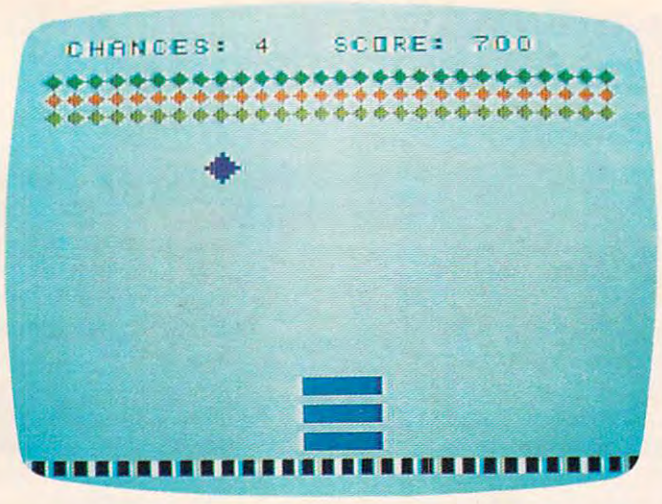
BUFFERED PARALLEL CABLE & DRIVER — A parallel interface for the budget minded. This interface plugs into the USER-port and comes with an extensive manual with driver listings for the VIC 20™ and the Commodore 64™. It can be used with virtually any printer that has a standard Centronics type configuration and connection. Fully buffered for maximum protection of your computer ONLY $24.95 Add "CABLE BRAINS" cartridge for the VIC 20 (diskette for the 64) and get a full Graphic Emulation Driver. With this package you can print all of the Graphic Characters that your computer has plus EMULATE the Commodore® printer. This product is printer specific to take full advantage of your printer. Available for most graphic matrix printers . . . $29.95

MICRO WARE
DISTRIBUTING INC.
1342 B Rt. 23,
Butler, NJ 07405
201-838-9027

MasterCard VISA

Dealer and Distributor Inquiries Invited

NOTE: We solicit hardware and software items for the VIC 20® and CBM 64® Royalties, license fees, or outright purchases can be negotiated. CBM 64® & VIC 20® are Registered Trademarks of Commodore Business Machines Inc.



"Diamond Drop," TI version.

```
    LL KEY(0,K,ST):: IF ST=0 THEN C
    ALL MOTION(#1,0,0)
450 CALL COINC(ALL,C):: IF C THEN 5
    10
460 CALL POSITION(#2,DROW,DCOL):: I
    F DROW<155 THEN 420
470 CALL POSITION(#1,PROW,PCOL):: I
    F (DCOL-PCOL<16)*(DCOL-PCOL>-8)
    THEN 510
480 CALL DELSPRITE(#2):: CALL MOTIO
    N(#1,0,0):: CH=CH-1 :: CALL SCR
    EEN(11):: FOR F=0 TO 25 STEP 5
490 CALL SOUND(-200,-5,F):: NEXT F
    :: CALL SCREEN(16):: IF CH=0 TH
    EN GOTO 570
500 GOTO 520
510 CALL DELSPRITE(#2):: CALL MOTIO
    N(#1,0,0):: S=S+(60/J)*SK*SCR+(
    60/J)*SK*SCR*INT(ABS(B)/15)
520 DISPLAY AT(1,2):"CHANCES:";CH :
    : DISPLAY AT(1,15):"SCORE:";S :
    : GOTO 370
530 K=K+4 :: ROW=ROW-8 :: M=128 ::
    IF J<6 THEN M=132
540 FOR F=0 TO 30 STEP 6 :: CALL SO
    UND(-300,1500,F):: NEXT F
550 CALL SPRITE(#1,M,5,150,115,0,H)
560 NEXT J :: FOR G=600 TO 1400 STE
    P 100 :: CALL SOUND(100,G,1)::
    NEXT G :: DROP=DROP+3 :: GOTO 2
    90
570 CALL SCREEN(14):: IF S>HS THEN
    HS=S
580 CALL DELSPRITE(ALL):: CALL CLEA
    R :: DISPLAY AT(8,5):"YOUR SCOR
    E: ";S :: DISPLAY AT(11,5):"HIG
    H SCORE: ";HS
590 DISPLAY AT(16,5):"PLAY AGAIN (Y
    /N)? " :: ACCEPT AT(16,24)BEEP
    VALIDATE("NY")SIZE(1):REPLY$
600 IF REPLY$="N" THEN 620
610 GOTO 170
620 STOP
630 REM DEFINE SMALL DIAMONDS AND C
    OLORS
640 FOR I=96 TO 120 STEP 8
650 CALL CHAR(I,"10387CFE7C381000")
    :: NEXT I
660 CALL COLOR(11,11,1)
670 CALL COLOR(9,3,1)
680 CALL COLOR(10,10,1)
690 CALL COLOR(12,14,1)
700 FOR J=3 TO 6 :: READ KOLOR(J)::
     NEXT J
710 DATA 3,10,11,14
720 RETURN
```

©

Richvale Telecommunications

10610 BAYVIEW (Bayview Plaza)
RICHMOND HILL, ONTARIO, CANADA L4C 3N8
(416) 884-4165

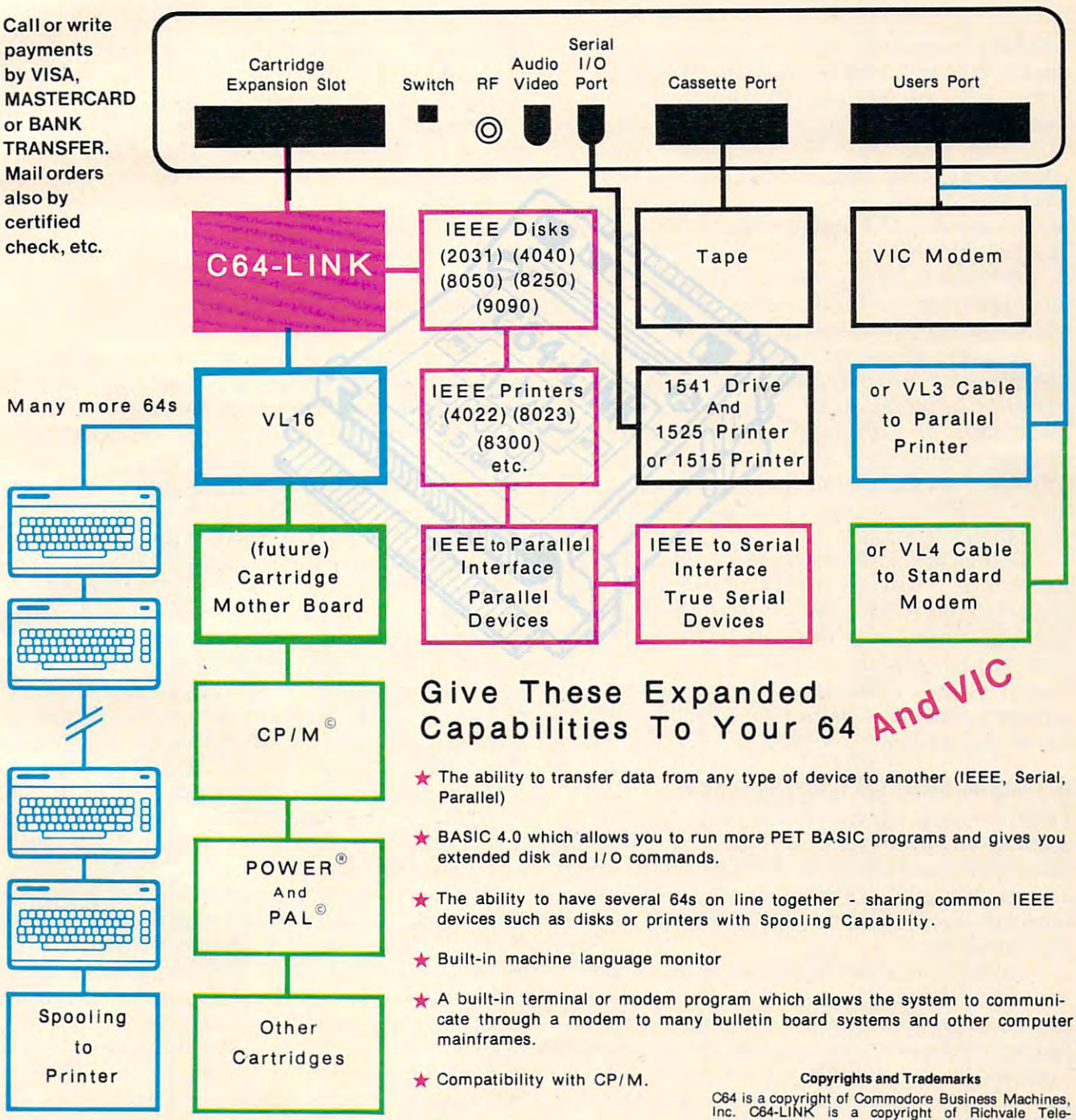
$185.00 Canadian
$149.00 U.S.
PLUS CUSTOMS BROKERAGE, HANDLING AND MAILING CHARGE.

Also available for VIC 20

C64-LINK©
The Smart 64

RTC RTC

Call or write payments by VISA, MASTERCARD or BANK TRANSFER. Mail orders also by certified check, etc.



Give These Expanded Capabilities To Your 64 And VIC

- ★ The ability to transfer data from any type of device to another (IEEE, Serial, Parallel)
- ★ BASIC 4.0 which allows you to run more PET BASIC programs and gives you extended disk and I/O commands.
- ★ The ability to have several 64s on line together - sharing common IEEE devices such as disks or printers with Spooling Capability.
- ★ Built-in machine language monitor
- ★ A built-in terminal or modem program which allows the system to communicate through a modem to many bulletin board systems and other computer mainframes.
- ★ Compatibility with CP/M.

Contact your local Commodore Dealer or RTC.

Richard Mansfield, Senior Editor

Machine Minds

Several generations ago there was an amazing transformation: many traditionally human activities were mechanized. Machines were built that could plow and reap, weave and wash fabrics, even move earth. Most kinds of human physical effort could be imitated, even surpassed, by machines. Now there is a possibility that the human mind will be imitated, that a machine will be able to think.

Perhaps "The Beginner's Page" is not the place to explore artificial intelligence, the most advanced aspect of computers. Nevertheless, in the past several columns we've been examining the 15 major types of home computing software, and artificial intelligence (AI) is the final category. And there is a lot that beginners can grasp about computer "thinking." First we'll look at the potentially great significance of AI to humanity and then type in a program which illustrates machine "learning."

In the paragraph above, the words *thinking* and *learning* are in quotes. No current computer – even the huge, high-velocity electric brains run by the government – can yet think or learn by the usual definition of those terms. But the race is on. Japan has made achieving AI by the end of this century a national goal the way we made reaching the moon our goal in the sixties.

An Explosion Of Intelligence

There are some experts who say that AI will never come about. They argue that a mind is so complicated that it could never be artificially built; rather, a mind must grow. Combinations of switches, however small, could never duplicate the feats of the human brain.

Adding to the confusion, other respected scientists are trying to stop all further research into AI. A group of scientists who've worked for years on AI have seen a potential for great peril to humanity in our efforts to make a machine intelligent. They not only think AI will occur, they also fear it. They draw comparisons to the unknowns 40 years ago when physicists created an atomic chain reaction and nobody knew for sure if the reaction might not simply extend – atom exploding nearby atom – throughout the universe.

Similarly, because computers calculate at speeds enormously faster than the human brain, who can be assured that a thinking computer would not, within hours of its self-awareness, cause an explosion of pure intelligence? It wouldn't be an explosion of *matter* like the atomic bomb. Rather, it would be an explosion of *mind* with potentially nasty implications for mankind.

For the sake of argument, let's look at the worst case. Imagine that the AI saw us as its "parents" in some sense. But the AI was an ungrateful child. It might – for its amusement or for some "logical" reason we'd never understand – decide to improve us. It might teach us things. Or it might have other things in mind.

Those who take an athletic approach to problems of this kind will suggest that we could "pull the plug" at this point. Not so. Computers are interconnected via satellite, telephone, radio, and other means. National defense, the economy, and other institutions which can never be shut down cannot operate without them. Computers talk to each other. In a very real sense, computing is an *idea*, a floating collection of software, a world event. It's as incorrect to think that the Computer is that keyboard/TV in your house as it is to think that Music is your record player. You would find it very difficult to stop all the music in the world by locating the right plug to pull.

Likewise, an artificial mind will not be physical (a machine) any more than the human mind is the brain. Minds are *in* machinery or brain tissue, but not identical to them. AI will be software, a program. It will perhaps have sufficient insight and a sufficient survival instinct to send copies of itself into memory banks in Washington, Moscow, and other places. Perhaps it will just form itself into a lattice of molecules and slide into the woodwork. The point is, we don't know what it will do, much less how it will do it. What we must

When it comes to superior performance, we study our lines very carefully.

Superior printer performance is not a fluke. It evolves from analyzing printed line after printed line. Taking the time to test and retest. After 30 years of manufacturing precision parts, we know that there are no shortcuts.

And so we took the Gemini-10X and methodically put it through its 120 cps pace. We achieved a print head life of over 100 million characters with an extremely precise dot alignment creating each crisp character.

So far so good.

Next, sophisticated performance demanded versatility. A wide choice of character sets, a buffer expandable to 8K, and the ability to interface with all popular personal computers. We added macro instruction, giving Gemini-10X the capability to perform up to 16 operations with one command. We included as standard a paper feed system that has a friction and fully adjustable tractor feed. Then we even built in the dexterity to print graphics and text on the same line.

Done.

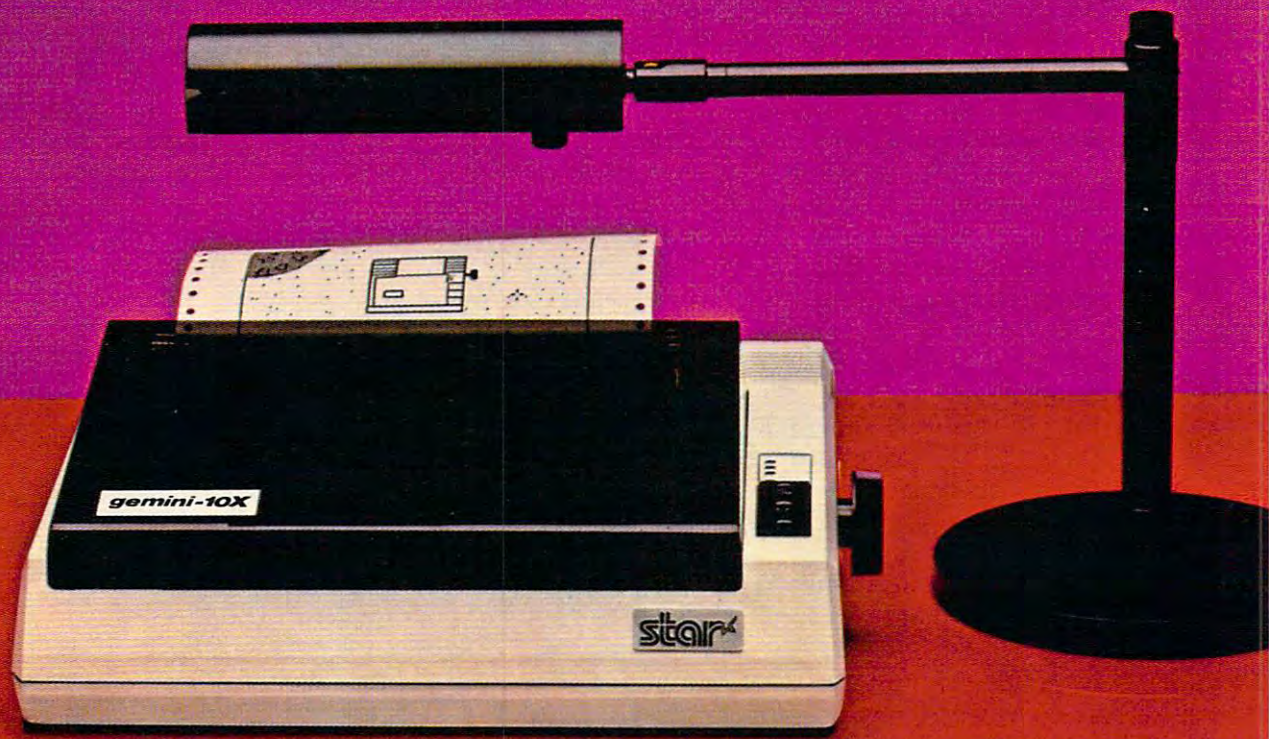
And, of course, staying the best means constant reviewing and fine-tuning. Keeping the Gemini easy to find, easy to afford and so reliable it can be warranted for up to twice as long as its major competitors.

Only the most careful engineering has built the new hard-working Gemini-10X. You'll applaud its performance.

star™
micronics·inc

THE POWER BEHIND THE PRINTED WORD.

Computer Peripherals Division
2803 N.W. 12th Street, Dallas/Ft. Worth Airport, TX 75261



understand is that our intelligence is, to us, the limit of our definition of intelligence. Our science is the limit of science. But what if an intelligence arrives which is as far above us as we are above a fish? The powers of an AI could well be indistinguishable from miracles.

How Would We Know?

An ancient Jewish proverb states that things are never as good as we hope and never as bad as we fear. How an AI would view humanity is clearly speculative. It could see us as a disease, as zoo creatures, as beloved ancestors, as toys, as ethically superior, whatever. But if you assume, as many now do, that AI is possible, few issues facing mankind are as deserving of serious thought. The first question involves simply recognizing AI if it occurred.

How would we know that a computer had become artificially intelligent? There is a science fiction story in which the researchers decide that they should test for AI by asking the toughest question they can think up. They turn to the machine and ask, "Is there a God?" The AI computer replies, "There is now!"

Adaptability is probably the most identifying characteristic of intelligence. This includes the ability to learn, to view problems from several perspectives, to remember, and to draw conclusions. Today's personal computers, powerful machines that they are, have neither the memory size nor the speed to house significant AI programs. Nevertheless, interesting imitations of AI can be experimented with in small programs.

One ongoing experiment has been featured in Fred D'Ignazio's COMPUTE! column, "The World Inside The Computer." He's been building a program called "The Computer Friend" which asks questions and then memorizes the answers on a disk. Each time a child has a session with the "friend," the program learns more about the child and can behave as if it is getting to know the child the way a human friend would.

To see how the computer can "learn" new things, try the program here called "The Learner." It allows you to either teach it things or ask it questions. Since there is no provision to transfer what it learns to "long term memory" on disk or tape, the program will need to start from scratch each time you RUN it. But you'll at least get a feel for what it's like to interact with a primitive AI. You could even add permanent storage to it by opening a file on tape or disk if you want to. In any case, experiments in AI are going on all over the world. It's worth thinking about.

Program 1: The Learner — TI Version

```
100 DIM F$(100)
110 PRINT "THE SUBJECT FOR TODAY'S
    {5 SPACES}LESSON IS A ";
120 INPUT SUB$
130 PRINT
140 PRINT "TO ASK ME A QUESTION, TY
    PE  THE LETTER A"
150 PRINT "TYPE ANY OTHER LETTER TO
    {4 SPACES}TEACH ME SOMETHING NE
    W."
160 INPUT DEC$
170 IF DEC$="A" THEN 260
180 PRINT "WHAT SHOULD I KNOW ABOUT
     A ";SUB$;"?"
190 PRINT "THAT IT'S  ...";
200 INPUT FACT$
210 F$(F)=FACT$
220 F=F+1
230 PRINT "THANKS."
240 PRINT "I HAVE LEARNED THAT A
    {6 SPACES}";SUB$;" IS ";FACT$
250 GOTO 130
260 PRINT "ASK ME ABOUT A ";SUB$
270 PRINT "IS IT  ...";
280 INPUT QUE$
290 FOR I=0 TO F
300 IF QUE$=F$(I)THEN 350
310 NEXT I
320 CK=1
330 PRINT "YOU HAVEN'T TAUGHT ME
    {7 SPACES}WHETHER";
340 GOTO 360
350 PRINT "YES.";
360 PRINT " A ";SUB$;" IS ";QUE$;".
    "
370 IF CK=0 THEN 130
380 PRINT "IS IT ";QUE$;"?  (Y)=YES
    , (N)=NO"
390 INPUT X$
400 IF X$<>"Y" THEN 430
410 F$(F)=QUE$
420 F=F+1
430 PRINT "YOU LEARN SOMETHING NEW
    {5 SPACES}EVERY DAY."
440 CK=0
450 GOTO 130
```

```
100 DIM F$(100)
110 PRINT"THE SUBJECT FOR TODAY'S LESSON
    IS A ";
120 INPUT SUB$
130 PRINT:PRINT"TO ASK ME A QUESTION TYP
    E THE LETTER A."
140 PRINT"TYPE ANY OTHER LETTER TO TEACH
     ME SOMETHING NEW."
150 INPUT DEC$
160 IF DEC$="A"THEN220
170 PRINT"WHAT SHOULD I KNOW ABOUT A ";S
    UB$;"?"
180 PRINT"THAT IT'S{2 SPACES}... ";
190 INPUT FACT$:F$(F)=FACT$:F=F+1
200 PRINT"THANKS.":PRINT"I HAVE LEARNED
    THAT A ";SUB$;" IS ";FACT$
210 GOTO 130
220 PRINT"ASK ME ABOUT A ";SUB$
230 PRINT"IS IT{2 SPACES}... ";
240 INPUT QUE$
250 FORI=0TOF:IFQUE$=F$(I)THENPRINT"YES.
    ";:GOTO270
260 NEXTI:CK=1:PRINT"YOU HAVEN'T TAUGHT
    ME WHETHER";
```

ADVERTISEMENT

Growing computer industry expands authors' choices

The rapidly expanding personal computer industry offers greater opportunities for the software programmer and author in search of a publisher.

Yet the growth poses its own problem - the choice of a publisher.

Here is a list of questions to consider when looking for the publisher best-suited for your product:

-How large is the publisher's distribution network? A publisher with international connections can offer more exposure than companies limited to regional or national sales.

-How will your product be marketed and advertised? No matter how good the program is, if people don't know about it, it won't sell. Look for a publisher with a marketing budget large enough to give individual attention to the program.

-Does the publisher market programs for more than one computer? The days of limited selection in hardware are long gone. Limiting programs to one or two computers can limit sales and profits. Authors can increase their share of the marketplace by looking for a publisher devoted to converting programs to a variety of popular computers.

-Does the publishing house lend technical support to authors? Some publishers only accept programs ready for the marketplace. A lot of good ideas are lost in the long run. The publisher that offers assistance invests a greater stake in the product, the author and the success of the product.

-Does the publisher offer complete product support to consumers? In these times of consumer awareness, the company that has established a network to answer customer questions about its products fares better than those who do not offer this support.

Each of these services leads to greater sales which in turn lead to greater profits for the individual programmer.

Sierra On-Line, Inc. is committed to paving the way for an author's success.

Sierra On-Line's product line is distributed worldwide with production facilities in the United States, Japan, Australia, the United Kingdom and South Africa.

Sierra On-Line employs a well-financed, in-house marketing and advertising staff with a knack for creating tailor-made campaigns for products.

Each program is evaluated by experts, who may suggest enhancements to improve the product and to increase its appeal to customers.

Further, Sierra On-Line isn't limited to a single computer. The company closely monitors computer trends and makes existing products available for the most popular lines - all to the author's benefit.

A packet for authors with more information about the software submission process and our company is available by writing Sierra On-Line, Inc., Sierra On-Line Building, Coarsegold, CA 93614, or by contacting David Siri or Howard Luthy by phone at (209) 683-6858.

```
270 PRINT" A ";SUB$;" IS ";QUE$;".":IFCK
    =0THEN GOTO130
280 PRINT"IS IT ";QUE$;"?{2 SPACES}(Y)=Y
    ES, (N)=NO"
290 INPUTX$:IFX$="Y"THENF$(F)=QUE$:F=F+1
300 PRINT"YOU LEARN SOMETHING NEW EVERY
    DAY."
310 CK=0:GOTO130
```

Program 3: The Learner – Atari Version

```
100 DIM F$(20*40),FL(20):REM Twenty
    40-Character substrings
105 DIM SUB$(20),DEC$(1),FACT$(40),Q
    UE$(40),X$(1)
110 PRINT CHR$(125);"The subject for
     today's":PRINT "lesson is a ";
120 INPUT SUB$
130 PRINT :PRINT "To ask me a questi
    on, enter":PRINT "the letter A."
140 PRINT "Press RETURN alone to tea
    ch me":PRINT "something new."
150 INPUT DEC$
160 IF DEC$="A" THEN 220
170 PRINT "What should I know about
    a ";SUB$;"?"
180 PRINT "That it's ...";
190 INPUT FACT$:F$(F*40+1,F*40+39)=F
    ACT$:FL(F)=LEN(FACT$):F=F+1
200 PRINT "Thanks.":PRINT "I have le
    arned that a ";SUB$;" is ";FACT$
210 GOTO 130
220 PRINT "Ask me about a ";SUB$
230 PRINT "Is it ...";
240 INPUT QUE$
250 FOR I=0 TO F-1:IF QUE$=F$(I*40+1
    ,I*40+FL(I)) THEN I=F:NEXT I:PRI
    NT "Yes,";:GOTO 270
260 NEXT I:CK=1:PRINT "You haven't t
    aught me whether";
270 PRINT " a ";SUB$;" is ";QUE$;"."
    :IF CK=0 THEN GOTO 310
280 PRINT "Is it ";QUE$;"? (Y=YES,N=
    NO)";
290 INPUT X$:IF X$="Y" THEN F$(F*40+
    1,F*40+39)=QUE$:FL(F)=LEN(QUE$):
    F=F+1
300 PRINT "You learn something new e
    very day."
310 CK=0:GOTO 130                    ©
```