A Printer In Every Kiosk? Peripherals In 1999

COMPUTE!

$2.95
March
1984
Issue 46
Vol. 6, No. 3
£2.25 UK $3.25 Canada
02193
ISSN 0194-347X

The Leading Magazine Of Home, Educational, And Recreational Computing

Coleco's Adam: A Hands-On Report

All About Adding Peripherals: What You Should Know *Before* You Buy

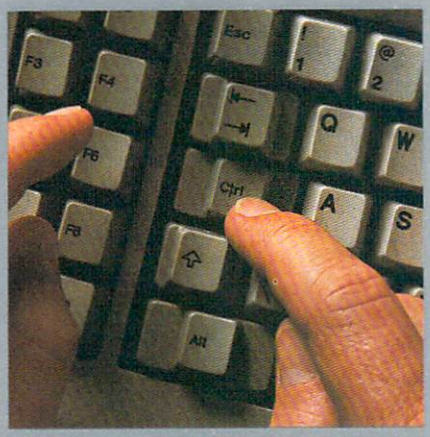
Shaping Sounds: Techniques To Make More Realistic Music On The Commodore 64, TI-99/4A, VIC-20, And Atari

***Roader*: An Exciting Game For Atari, IBM PC And PCjr, VIC-20, TI-99/4A, Commodore 64, Apple, And Radio Shack Color Computer**

***Barrier Battle*: A Fast Action Game For Atari, VIC-20, Apple, Commodore 64, And Radio Shack Color Computer**

0 71486 02193 03

History will record as a profound irony
that the most powerful word processing package
ever created for the IBM® Personal Computer
can be worked with two fingers.



It was created by Leading Edge,® specifically to take advantage of the power of the IBM PC, plus the simplicity that all that power ought to be able to give you—but didn't.

Until now, you could go for the simplicity, and end up with a somewhat glorified typewriter. Or you could go for the power, and go nuts performing dozens of commands to do even the simplest things.

But with Leading Edge Word Processing™ you get both.

You don't have to start with an ounce of understanding about word processing.

You don't even have to be a terrific typist. (Matter of fact, the worse you type, the more the help.)

So come along:

Hunt and peck your way into the future.

LEADING EDGE®

Leading Edge Products Inc., Headquarters and Retail Division, 225 Turnpike Street, Canton, Mass. 02021 (800) 343-6833 (617) 828-8150

*IBM is a registered trademark of International Business Machines Corporation.

Call Margie for the dealer nearest you.

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

IF YOU'RE LIKE MOST BUY A SINGLE

YOU'LL BUY LOTS OF SPINNAKER GAMES.

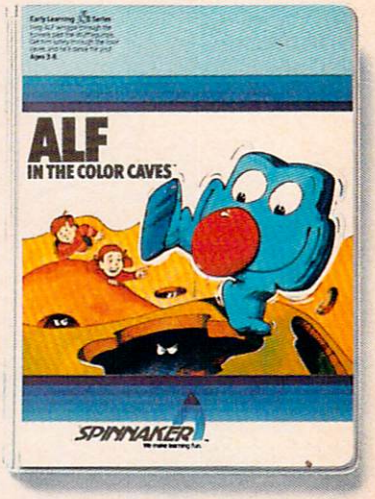
And not just because they're educational, but also because they happen to be a lot of fun to play.

In fact, they're so much fun, parents have been known to sneak in a few hours of play when the kids are asleep.

After all, if your kids are actually enjoying a learning game, there must be something to it. And there is: fun, excitement and real educational value. That's what sets Spinnaker games apart from all the rest. And what brings parents back for more.

We offer a wide range of learning games for a wide range of age groups: 3 to 14. One look at these two pages will show you how we carefully designed our line of learning games to grow right along with your child.

So if you're looking for a line of learning games that are as much fun to play as they are to buy, consider Spinnaker games. They're compatible with **Apple,® Atari,® IBM® PC, PCjr, Commodore 64,™ Coleco Adam™** and parents who don't mind their kids having fun while they learn.



It's new! BUBBLE BURST™ is bursting with fun! Ages 4 to 8.

Soapie the Sea Serpent is counting on your kids to keep the pesky Zeobingers from spoiling her bubble-bath fun.

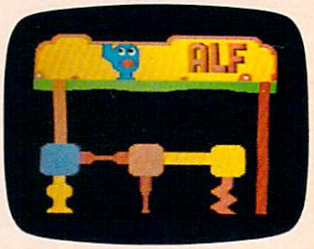
And while children are helping Soapie, they're developing strategy and prediction skills plus an understanding of cause-and-effect relationships.

BUBBLE BURST provides hours of fun – and it comes with a workbook full of challenging projects.

It's new! ALF in the Color Caves™: a colorful adventure! Ages 3 to 6.

This cheerful game lets children guide lovable Alf through the color caves to the color room at the bottom where he dances to his own special music.

As kids maneuver Alf through the maze and past the Wufflegumps, they're improving their routing and prediction skills. And the enclosed activities workbook offers a rainbow of colorful projects!



PARENTS, YOU WON'T SPINNAKER GAME.

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

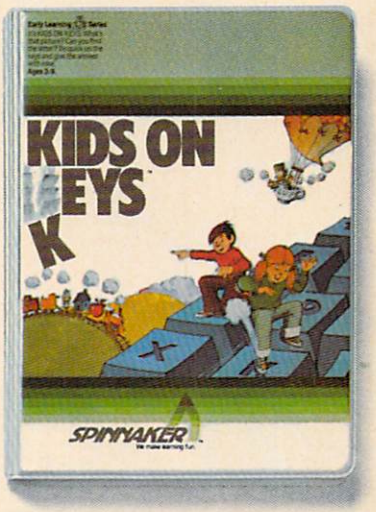
STORY MACHINE is like a storybook come to life. Using the keyboard, your children write their own fun little stories. The computer then takes what they've written and animates their story on the screen, complete with full color graphics and sound.

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.

DELTA DRAWING.™ Have fun creating pictures and computer programs. Ages 4 to Adult.

Kids love to draw. And DELTA DRAWING Learning Program lets them enjoy creative drawing and coloring while they learn computer programming concepts.

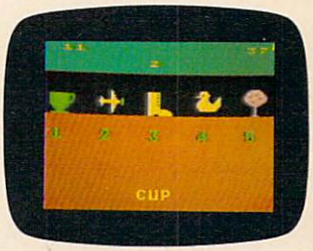
With DELTA DRAWING, even kids who have never used a computer before can learn to write programs and build an understanding of procedural thinking. It's easy, clear, and lots of fun!



KIDS ON KEYS™ helps kids catch on to letters, numbers – and computers. Ages 3-9.

KIDS ON KEYS offers children three terrific games that teach them the location of the letters and numbers while they have fun with the computer.

The games are fast and fun, with exciting sound effects and colorful graphics. It's a great way for kids to enjoy learning to identify numbers, letters, and words and associating them with images on the screen. And KIDS ON KEYS certainly do have fun!



SPINNAKER™
We make learning fun.

Disks for: Apple, Atari, IBM PC and PCjr, Commodore 64.
Cartridges for: Atari, IBM PCjr, Commodore 64, Coleco Adam.

ATARI® OWNERS

have made Mosaic™ #1 because MOSAIC MEMORY gives you the best ways to boost the power of your Atari® computer. Mosaic boosted RAM means that the most advanced programs, games and peripherals designed for the Atari® computer will be available for you. With MOSAIC MEMORY you'll have every advantage the Atari® computer offers you.

32K RAM

FOR ATARI 400/800

This is the memory board that sets the standard for others. Its compatibility and reliability are legend. Interboard communication with 800.

48K RAM KIT

FOR ATARI 400

This RAM KIT converts your own Atari® 16K RAM board to a full 48K RAM. Only 5 wires to solder. Complete picture guided instructions.

THE MOSAIC ADAPTER™

FOR ATARI 800 WITH THREE 16K BOARDS

800 owners can now open slot three and maintain 48K RAM. The adapter accepts the chips off of two 16K RAM boards to become a single 32K board. Used with the SELECT™ you'll have 112K RAM!

THE MOSAIC EXPANDER™

FOR ATARI 400/800

This converts to a 32K RAM board with the chips from one Atari® 16K RAM board. 400 owners will have 32K RAM and 800 owners with two 16K boards will have 48K RAM.

64K RAM SELECT™

FOR ATARI 400/800

This is the most advanced memory board for the Atari® Computer. Awarded as "one of the most innovative computer products of 1983" at Chicago C.E.S. The SELECT™ gives you 52K continuous RAM and at least three banks of 4K RAM. 800 owners with two 16K boards have 96K RAM and can use up to three SELECTS for a 192K RAM total. No other board offers you the computing possibilities that the SELECT™ does.

XL OWNERS — Mosaic Memory available soon. Look forward to Mosaic Memory advancing Atari® XL computers into new worlds.

CABLE CONNECTOR PACKAGE #1

FOR ATARI® 400/800. This is the cable connector needed when you buy your first 64K SELECT™. It includes a free software program, SUPER DRIVE, a high speed disk simulator specially written to take advantage of the SELECT™ features, a $29.95 value.

CABLE CONNECTOR PACKAGE #2

FOR ATARI® 800. This cable is required by 800 owners who add additional SELECTS to their Atari®. This will enable the 800 owner to have up to 3 SELECT BOARDS installed for 192K RAM total.

For your nearest Mosaic™ dealer, call
1-800-2-ADD-RAM (1-800-223-3726)
In Oregon 653-7885

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

March 1984 Vol. 6, No. 3

FEATURES

EDUCATION AND RECREATION

REVIEWS

COLUMNS AND DEPARTMENTS

THE JOURNAL

NOTE: See page 180 before typing in programs.

GUIDE TO ARTICLES AND PROGRAMS

24	*
38	*
44	*
54	*
60	V/64/AT
66	V/64/AT/TI/AP/PC/PCjr/C
80	V/64/C/AT/AP
92	AT/64
106	64/AT/AD
107	V-64
110	AT
118	TS
122	V/64/AP/AT
124	64
6	*
10	*
126	*
132	*
142	*
145	*
153	AT
156	TI
168	*
172	64
179	*
138	TI
139	P/V/64/AT/TI/AP/PC/PCjr/C/TS
149	V/64/AT/TI
160	V/64/P
165	AT
166	V/64
176	V/AT/64
182	64

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

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

COMPUTE! Publications, Inc.
One of the ABC Publishing Companies

One of the ABC Publishing Companies:
ABC Publishing, President, Robert G. Burton
1330 Avenue of the Americas, New York, New York 10019

COMPUTE! The Journal for Progressive Computing (USPS: 537250) is published monthly by COMPUTE! Publications, Inc., P.O. Box 5406, Greensboro, NC 27403 USA. Phone: (919) 275-9809. Editorial Offices are located at 324 West Wendover Avenue, Greensboro, NC 27408. Domestic Subscriptions: 12 issues, $24. Send subscription orders or change of address (P.O. form 3579) to **COMPUTE!** Magazine, P.O. Box 914, Farmingdale, NY 11737. Second class postage paid at Greensboro, NC 27403 and additional mailing offices.

ISSN 0194-357X.

EDITOR'S NOTES

In a surprise announcement, Commodore President and Chief Executive Officer Jack Tramiel resigned on Friday, January 13. Tramiel's reported replacement, Marshall F. Smith, is expected to assume his duties in late February. Smith is currently president and chief executive officer of the U.S. unit of a Netherlands-based company, Thyssen-Bornemisza. To Commodore, Smith brings a track record of experience in major manufacturing operations and finance. His U.S. operation had 1982 sales approaching $1 billion. Smith does not have computer industry experience—it had been anticipated that Commodore Chairman Irving Gould would stress other variables in his selection.

The end of an era? Tramiel's resignation was met with surprise and some consternation within Commodore. His direct, aggressive style has been a critical factor in driving Commodore to its position of preeminence in the low-priced personal computer market. Tramiel was quoted as saying the company needed a "professional executive" to head it, given that the company has now reached the billion dollar sales mark.

What price stability? Commodore has had a series of senior management turnovers during the years of its growth as a personal computer manufacturer. All have been subordinate to Tramiel, and most who were brought in at the level of president had short-lived tenures. Tramiel's aggressive, active intervention in most facets of the company's operations and planning caused some internal conflict, visible externally in the high turnover.

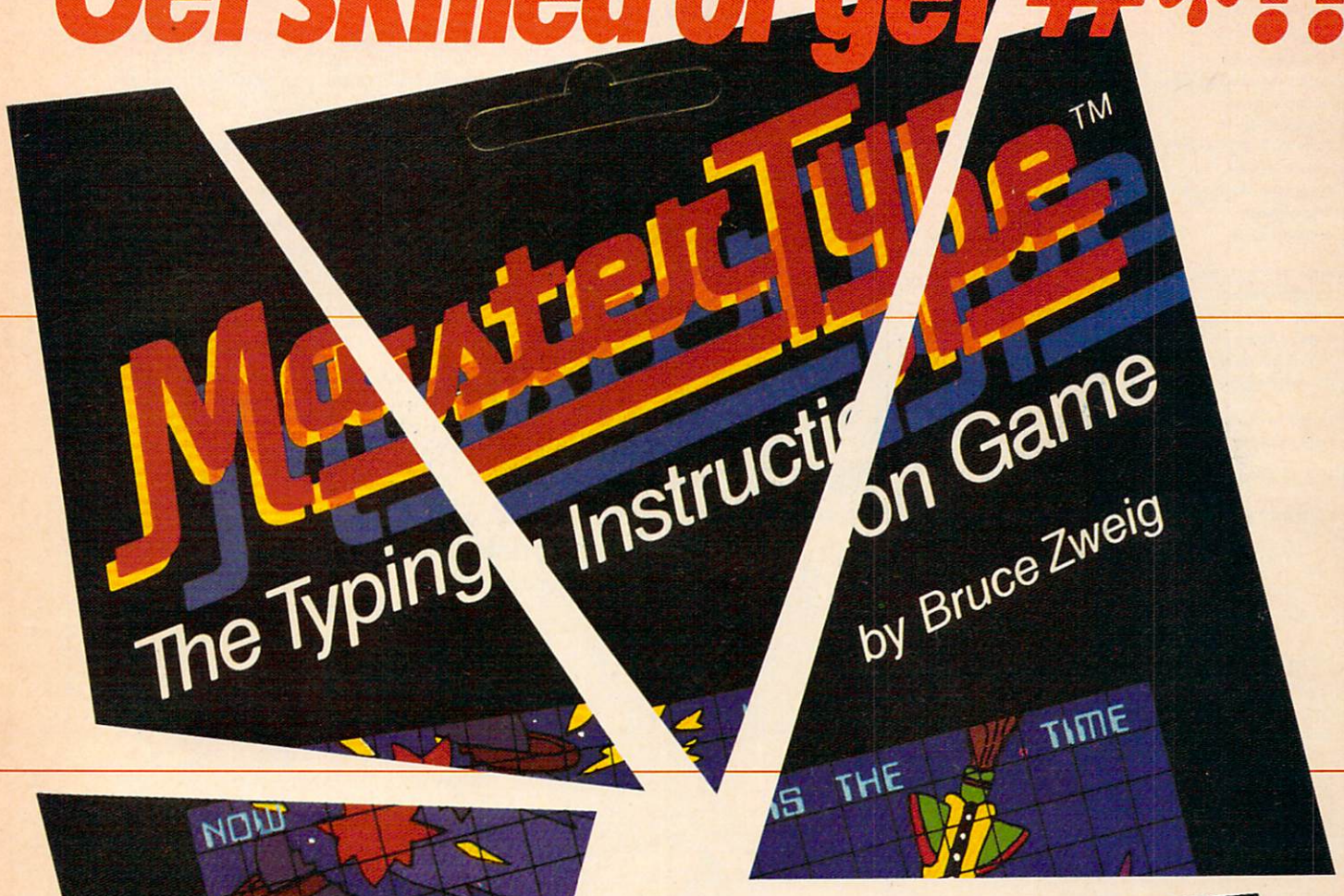
Growth of the sort that Commodore has experienced can be damaging to a poorly run company, yet Commodore weathered its growth well, given that its annualized sales have increased by a factor of roughly 25 times in the last six or seven years. At the same time, Commodore has experienced some hardware problems, the most recent example centering around last fall's delays and disputed defects in the company's 1541 disk drive. Mr. Smith will bring to this situation experience in multisite manufacturing operations, and seasoned talent as the head of a company of roughly comparable revenues.

Tramiel, perhaps not considering himself a "professional executive," did run the company with a ruthless understanding of the marketplace. The year of the computer (1983) in many ways became the year of Commodore in the low-end market, as Tramiel's aggressive product introduction and pricing forced Texas Instruments out of the market and, at least temporarily, damaged Atari's position.

While we can now anticipate more internal stability at Commodore, and perhaps streamlined manufacturing operations, our concern will be the impact of Tramiel's absence on the company's aggressive stance. We've already heard rumors of a push to increase prices. Depending on the extent of such increases, Commodore might well find itself moving away from a market it opened up, and eventually trading market share to competition from overseas. Time will, of course, tell. We wish Mr. Tramiel well, and thanks for those 25 years of Commodore. And we welcome Mr. Smith, who's taking on a two-fisted job.

Robert Lock
Editor In Chief

Get skilled or get #*?!



Disk:
Apple®,
Atari®,
Commodore 64®,
IBM-PC®
Cartridge:
Atari®,
Commodore 64®

The Scarborough System.

You'll grow with us.

25 N. Broadway Tarrytown, New York 10591

Coming In Future Issues

How COMPUTE! Readers Use Their Computers In Their Businesses

Two Exciting Games For Several Computers: *Devastator* And *The Worm Of Bemer*

Advanced Disk Management For Commodore Computers

TI Bar Chart Maker

Atari Hidden Commands

COMPUTE! Publications, Inc. publishes:

COMPUTE!
The Journal For Progressive Computing

COMPUTE!'s GAZETTE
For VIC 20 And Commodore 64 Personal Computers

COMPUTE! Books

Corporate office:
324 West Wendover Avenue
Greensboro, NC 27408 USA
Mailing address: COMPUTE!
Post Office Box 5406
Greensboro, NC 27403 USA
Telephone: 919-275-9809

Subscription Orders

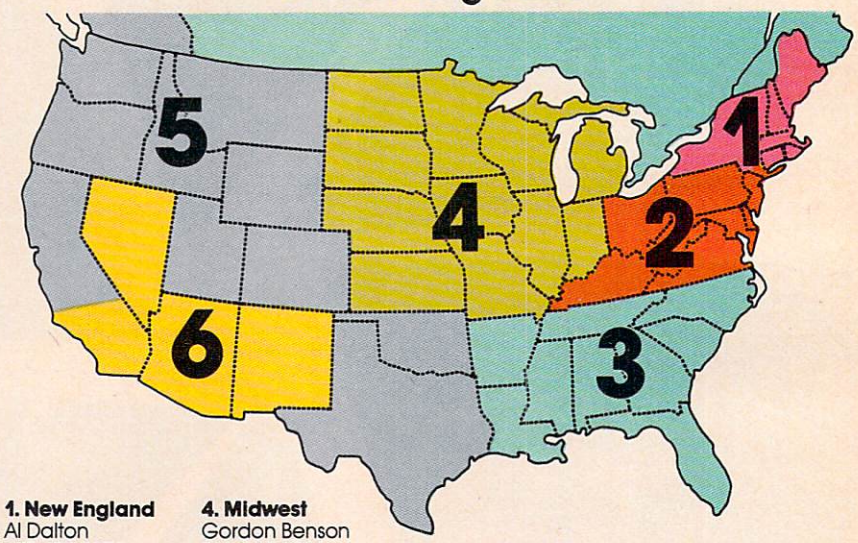
COMPUTE! Circulation Dept.
P.O. Box 914
Farmingdale, NY 11737

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

COMPUTE! Subscription Rates (12 Issue Year):

US	(one yr.) $24	Air	
	(two yrs.) $45	Europe, Australia	$42
	(three yrs.) $65	Middle East, Central America and North Africa	$52
Canada and Foreign Surface Mail	$30	South America, South Africa, Far East	$72

Advertising Sales



1. New England
Al Dalton
617-451-0822

2. Mid Atlantic
Sharon Brooks
Joe Porter
Kathy Hicks
215-646-5700
212-567-6717 (NY)

3. Southeast & Foreign
Harry Blair
919-275-9809

4. Midwest
Gordon Benson
312-362-1821

5. Northwest/Mountain/Texas
Phoebe Thompson
408-354-5553
Jerry Thompson
415-348-8222

6. Southwest
JoAnn Sullivan
619-941-2313
Ed Winchell
213-378-8361

Director of Advertising Sales
Ken Woodard

COMPUTE! Home Office 919-275-9809.

Address all advertising materials to:
Patti Williams
Advertising Production Coordinator
COMPUTE! Magazine
324 West Wendover Avenue,
Greensboro, NC 27408

WordPro 3 Plus™/64

The #1 Selling Word Processor for the Commodore 64™

Now Includes SpellRight Plus! Spell Checking Program

WordPro 3 Plus™/64 and SpellRight Plus™ provide a total word processing solution for the Commodore 64™ which gives you:

- ★ Sophisticated Word Processing
- ★ Built-in Mail Merging for Form Letters
- ★ Math Functions for Column Totals
- ★ Fast and Complete Spell Checking via SpellRight Plus
- ★ A Super Value (two programs) for Only $99.95!

WordPro and SpellRight are both specifically designed for the novice user with no computer or word processing experience whatsoever. And with over 40,000 WordPro versions sold, you can be sure that WordPro is a very sophisticated word processor loaded with powerful features including: Transfer, Insert, Delete, and Rearrange Text, Auto Page Numbering, Math Functions, Headers, Footers, Global Search and Replace, the Ability to Create Multiple Personalized Letters and Documents, and much more. WordPro can create documents of virtually any length and will print up to 165 columns wide. You get all of this PLUS fast and complete spell checking using SpellRight Plus!

SpellRight Plus locates and highlights misspelled words and then allows you to quickly correct the misspellings — improving the quality of your letters and reports.

And, best of all, WordPro and SpellRight's powerful arsenal of features can be put to use almost immediately — by even the novice user. So whether you're a student, professional writer, in business, education or a hobbyist, you'll quickly become a WordPro Pro!

Both WordPro and SpellRight Plus are also available separately at popular computer outlets nationwide.

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

Professional Software Inc.

51 Fremont Street
Needham, MA 02194

(617) 444-5224
Telex: 951579

Dealer and Distributor inquiries are invited.

READERS' FEEDBACK

The Editors and Readers of COMPUTE!

Can Your Computer Tattoo A TV?

I am considering purchasing a VIC or 64, and I plan to use the family TV with the computer. Do the images from a computer damage a TV by leaving imprints on the screen?

Timothy J. Prusinski

The problem you are describing is known as image burn-in. *It usually affects a video unit on which the same message is displayed continuously in the same place on the screen. This practice causes uneven wear in the screen's phosphor coating, which eventually results in the message being visible on the screen even when the unit is turned off. Using your TV with a computer will not cause image burn-in, unless you leave your computer on and continually display the same pattern on your TV for a very long time—several days, at least.*

Easy Memory For The 64?

I recently purchased a 64, and discovered that only about 38K of BASIC RAM are available for my use. I have found a POKE that increases it by 5888 bytes. After turning your 64 off, then on, try the following:

```
PRINT FRE(0)
POKE 56, 137
PRINT FRE(0)
```

After entering these commands in the direct mode, the first result was –26627. After the POKE, the result was –32515, a difference of 5888 bytes.

My question is, why does it do this? Does it have any harmful side effects?

Jeff Lewis

The memory location you POKEd (byte 56) is one of two bytes (55 and 56) that tell the operating system the highest address used by BASIC.

*As you discovered, these locations can be POKEd with new values. By POKEing location 56, you told the 64's operating system that the top of BASIC memory had been changed. The normal values for 55 and 56 are 0 and 160 respectively, signaling that the top of BASIC memory is 40960 (0+256*160). If you POKEd a value* higher *than 160 into location 56, you would be telling the computer it has more memory than it actually does.*

When you POKEd 56 with a value of 137, you actually lowered *the top of BASIC memory, which decreased the amount of RAM available for use. This is a legal POKE, and might be used, for example, if you wanted to protect a machine language program in high memory.*

This won't damage your computer. To reset the pointers to normal, simply turn your 64 off, then back on. However, POKEing values into the memory pointers can cause strange RUNs if you're using a BASIC program.

TI-99/4A And COMPUTE!

I would like to know if you will still be writing games and other programs for the TI-99/4A, even though Texas Instruments has discontinued production.

Curtis Tsui

We'll continue to support the TI-99/4A.

Mysterious Commodore SYS

Our users group, Richmond Area Commodore Enthusiasts, would like to find out all about the SYStem commands. We know that SYS 64802 will cold start the VIC. Is there any publication, book, or article that has a list of all the SYS commands? Our computer manuals give the definition of the SYS command, but other than a few examples, offers nothing further.

E. M. Rexrode

The SYS command is used to transfer control from a BASIC program to a machine language program. The format for the SYS command is SYS NNNNN, *where* NNNNN *is any memory location. The computer will start executing the machine language at the address specified by NNNNN.*

SYS is user-controlled. That is, in the VIC and the 64, you can SYS to any memory location between 1 and 65535. The memory location can be the start of a machine language program in user RAM, or an ML routine within BASIC or Kernal ROM. The SYS command is not a prewritten package of routines.

There is only one SYS command, but it can access many routines within the computer (such as "cold start," which simulates turning the computer on). To learn these addresses you need a map of your computer's memory. These maps are found in various COMPUTE! Books such as COMPUTE!'s First Book of VIC,

Finally, aliens your kids can reason with instead of destroy.

Spinnaker computer games are lots of fun. They're also instructive. Not destructive. That's why IN SEARCH OF THE MOST AMAZING THING™ lets your kids negotiate with aliens. Not destroy them.

It's Amazingly Fun!

The Most Amazing Thing is out there somewhere. Finding it won't be easy. Luckily, your kids will have the help of old Uncle Smoke Bailey. Because they'll have to fly the B-liner, avoid dangerous Mire Crabs, and trade with aliens.

It takes skill, persistence and imagination to find The Most Amazing Thing. Because it's the most elusive thing in the whole wide galaxy. But that's what makes it so exciting.

It's Amazingly Educational!

Like all Spinnaker games, IN SEARCH OF THE MOST AMAZING THING has real educational value.

Your kids will sharpen their ability to estimate distances and quantities, and will become more aware of direction and time. They'll develop a knack for economic principles, and learn to solve problems through trial and error.

So if you're looking for exciting computer games that give your kids something to think about, just go IN SEARCH OF THE MOST AMAZING THING at your local retailer.* It's so much fun you'll probably be tempted to play it yourself.

*IN SEARCH OF THE MOST AMAZING THING is compatible with **Apple,®** **IBM,®** **Atari®** and **Commodore 64™** computers

SPINNAKER™

We make learning fun.

Mapping the VIC, Mapping the 64, The 64 Toolkit, *and* Machine Language for Beginners.

Atari Background Music

I recently bought an Atari 1010 program recorder. I have several Atari programs that play music while loading. I was wondering if it is possible to do this to my own programs.

Chris Seay

The Atari cassette system is based on two-track stereo. One track is used to record programs and data by means of audio tones (one frequency for 1, another for 0). The other track can be used to record and play back normal audio. You need to do your recording on another cassette recorder, as there is no provision for the 1010 (or 410) recorder to accept a microphone.

You can turn on or off the cassette motor from a BASIC program with two POKEs: POKE 54018,52 to turn the motor on, and POKE 54018,60 to turn the motor off. When the motor is on, any sound on the audio track will begin to play through the TV speaker. You can use timing loops to synchronize your program with the recorded sound.

The audio track can also be heard during tape operations such as CLOAD, but will be mixed with the normal tones you hear during CLOAD. Use POKE 65,0 to turn off the sound of the data track. You will need to use a stereo cassette recorder to mix programs and sound on the same segment of tape.

You can find more information in COMPUTE!'s First Book of Atari*: "Adding a Voice Track to Atari Programs."*

A Disk Disaster

I own a VIC and a 1541 disk drive. In the three years I've had them, I've written and saved many programs on a certain disk. But now the disk won't give me access to all my programs. When I ask for the directory, it gives me either the first half of it, or just garbage. Then I get the message 23 READ ERROR 1807.

I think I've found the problem. There's a scratch about a centimeter long in the middle of the disk. How can I get to the programs beyond the scratch? Is there any way to fix my disk or make it work more than it does now?

Mike DiPiero

Since you are getting a READ ERROR when you access the directory, the scratched area probably includes some sectors of track 18, where the directory is stored. The LOAD command uses the directory to locate files on the disk; if the directory information for a file is destroyed, the file cannot be LOADed.

There is no way to fix your disk, because the scratch has destroyed the magnetic coating as well as the information that was stored on it. To make the best of a bad situation, format a new disk, and transfer to it any programs which will still LOAD from your damaged disk. Also, to avoid a similar disaster in the future, it's a good idea to make a backup copy of your salvaged programs, because floppy disks do not last forever. Even if used infrequently in an absolutely dust-free, cool environment, a disk will eventually wear out. When that happens, you will have all your programs intact and safe on your backup copy. And before you press your backup into service, make another backup disk, in case of accidents.

More On 64 Video Cable

I own a 64 and recently purchased the 1702 monitor. However, to my chagrin, I soon discovered that the 8-pin cable packed with the monitor is not compatible with my 64, which has a 5-pin video output.

In COMPUTE!, November 1983, Jim Butterfield wrote an article on how to improve the 64's video quality. He said that a 5-pin cable is available to access the 1702's rear three inputs. Where can I buy this cable?

Steve M. Walsh

Any store with a good supply of video or electronics parts should have the cable you want. Be sure the cable has a 5-pin DIN connector on one end, and at least three RCA connectors on the other end.

A Fifth Voice For Atari

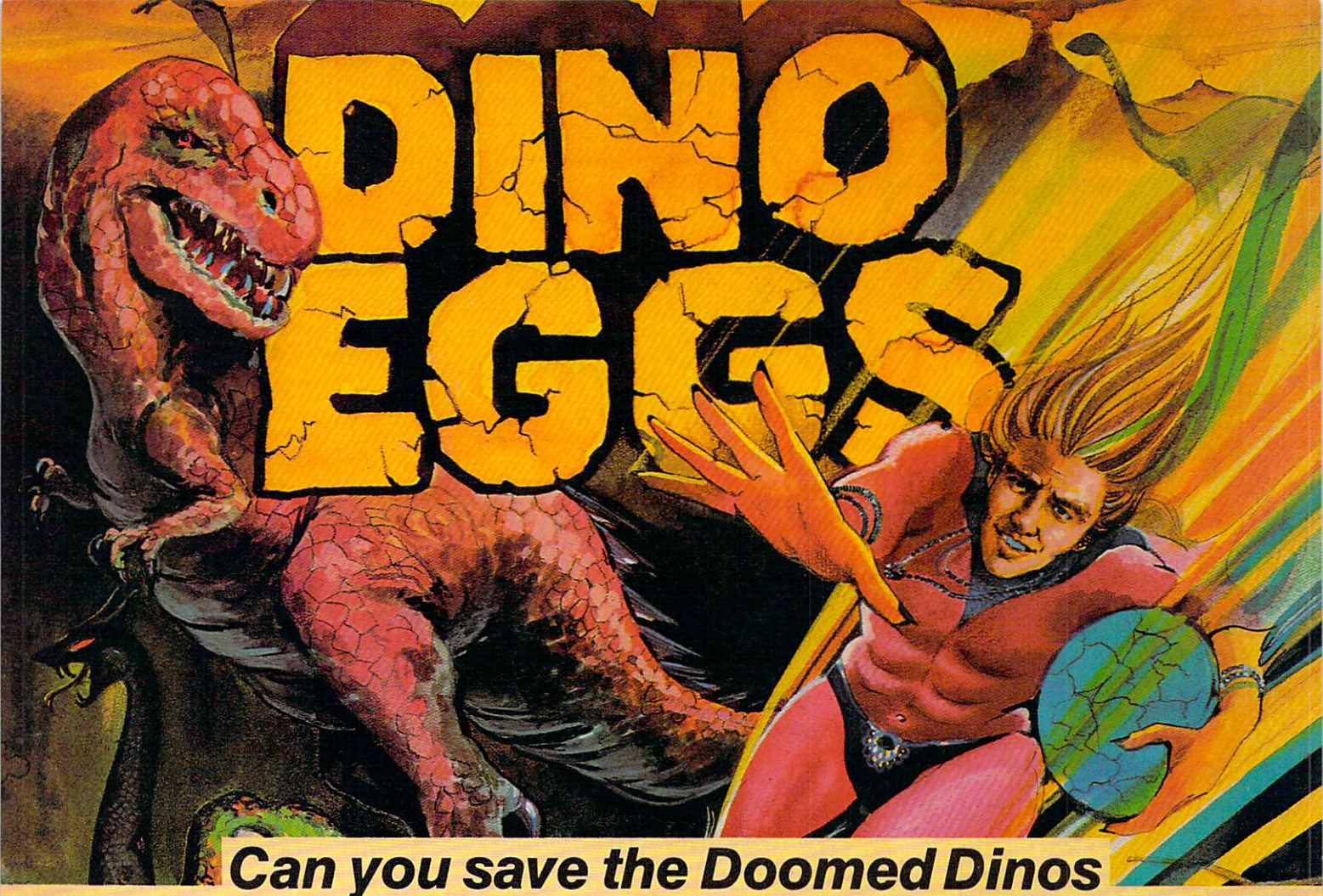
I have had an Atari 800 for quite a while now, and love it. Also, being a musician, I like working with the Atari sounds and *Music Composer*. One thing that intrigues me is the Apple's ability to produce sounds through its internal speaker. Even though I have no need for this on the Atari, I want to know if this is possible, perhaps to produce a fifth voice, or even stereophonic sound.

Freddie Scudiero

The internal speaker on the Atari 400 and 800 can be programmed in much the same way as the Apple. If you POKE 53279 with a 0, the internal speaker will emit a small click. The operating system turns off the speaker within 1/60 second, during the periodic vertical blank. Every time you POKE 53279,0 to pop out the speaker, the OS (operating system) pops it back in.

If you disable the vertical blank, you can push or pop the speaker at your own rate. Machine language is required to click the speaker fast enough to generate tones. An article and program to use the internal speaker as a "fifth voice" can be found in COMPUTE!'s Second Book of Atari*: "The Atari Keyboard Speaks Out."*

Incidentally, the new XL computers do not have an internal speaker. All access to location 54018 is routed to the TV or monitor speaker.



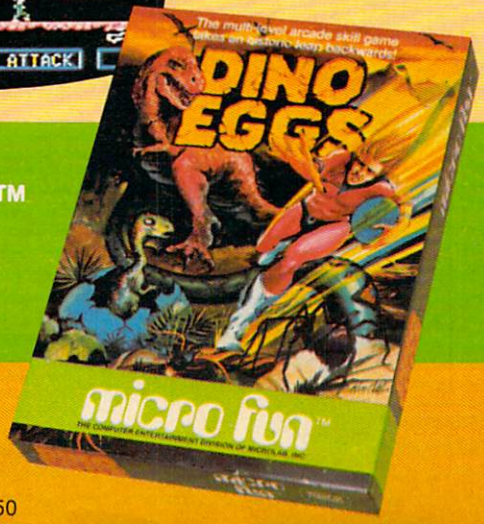
Can you save the Doomed Dinos and escape the Dino Mom's stomp?

Warped into a prehistoric world you've contaminated the dinosaurs. You must climb nine deadly cliffs, find the dino eggs and carry them back to the 21st century.

Dodge the radioactive snakes and spiders when you climb, leap and jump over the challenging cliffs to locate the eggs. As you fight your way up the nine levels your skills must increase if you are to survive the deadly creatures.

Fire is the only weapon you have to keep the Dino Mom from putting her foot down and crushing YOU!

Can you escape the Dino Mom's stomp, avoid the crawling, clawing creatures, find the eggs and save the dinosaurs from extinction? Only you can face the challenges of survival in the prehistoric time warp of DINO EGGS™ from MicroFun, Inc. *...the fun goes on forever.*



Created by David Schroeder

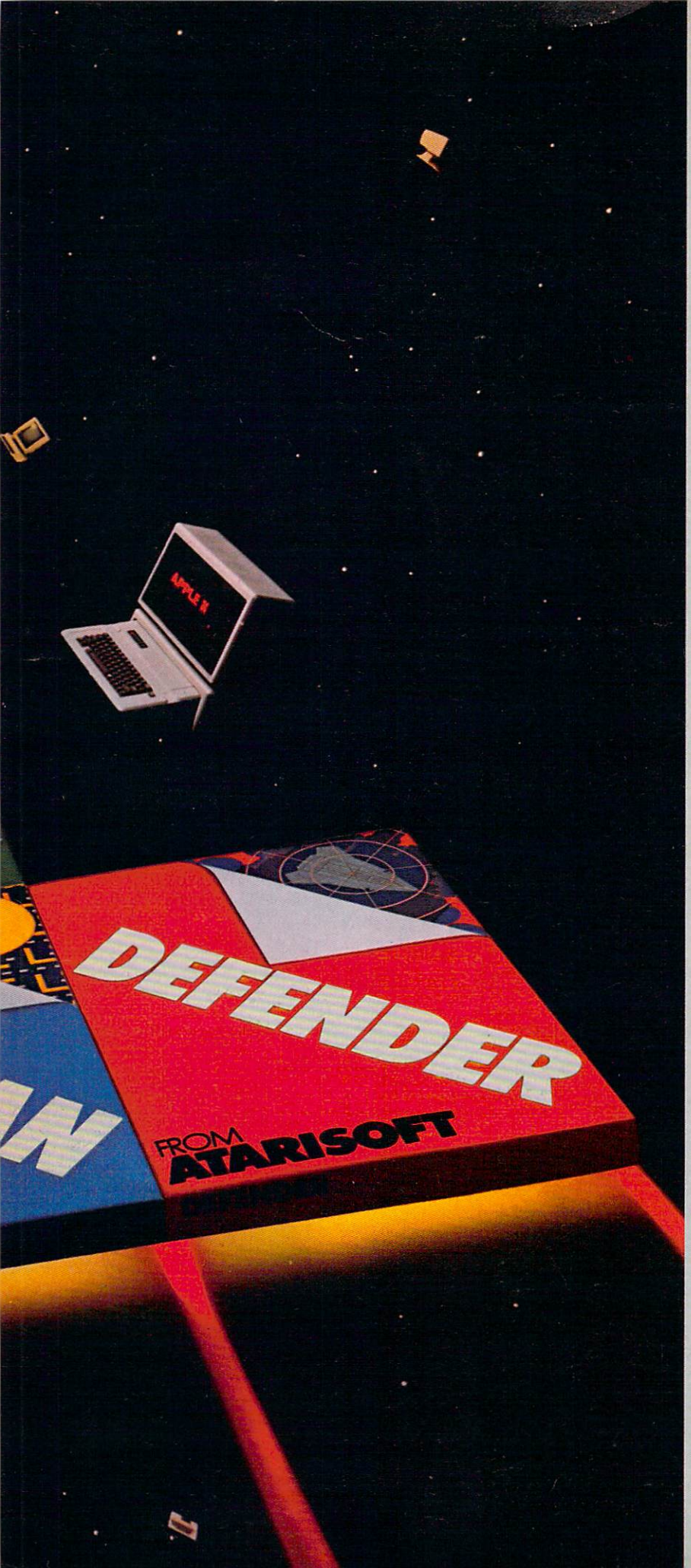
micro fun™

...the fun goes on forever

Available for:
Apple II™ & IIe™
Atari 800™
IBM PC™
ColecoVision™
Commodore 64™

2699 Skokie Valley Road, Highland Park, IL 60035 312/433-7550

NOW YOUR COMPUTER FITS THE ORIGINAL ARCADE HITS.



Now the excitement of original arcade graphics and sound effects comes home to your computer.

Introducing ATARISOFT.™ A new source for computer software.

If you own a Commodore VIC 20 or 64, a Texas Instruments 99/4A, an IBM or an Apple II, you can play the original arcade hits.

DONKEY KONG by Nintendo, CENTIPEDE,™ PAC-MAN, DEFENDER, ROBOTRON: 2084, STARGATE and DIG DUG. (On the TI 99/4A you can also play Protector II, Shamus, Picnic Paranoia and Super Storm.)

So, start playing the original hits on your computer.

Only from ATARISOFT.

Some games also available on ColecoVision and Intellivision.

ATARISOFT™

Now your computer fits the arcade hits.

Complete this coupon and we'll keep you up to date on the newest hits from ATARISOFT.™

Name _____

Address _____

City _____ State _____ Zip _____

Telephone _____

PRODUCT OWNED: (Check one)

1 ☐ TI-99/4A
2 ☐ IBM PC
3 ☐ Commodore 64
4 ☐ ColecoVision
5 ☐ Commodore Vic 20
6 ☐ Intellivision
7 ☐ Apple II
8 ☐ _____

Mail to:
Atari, Inc., P.O. Box 2943,
So. San Francisco, CA 94080.

ASM 3

Taking Your Computer Abroad

I am the owner of a Commodore 64 computer and a 1541 disk drive. Being in the military, and changing duty stations often, I need to know how to change the frequency of the internal timer from 60 hertz to 50 hertz while using a step-down transformer to reduce voltage from 220 to 110 volts. The *Commodore 64 Programmer's Reference Guide* touches upon this, but doesn't go into any detail. I believe this is done with a POKE, but I'm not entirely sure what to change. You're my last hope; can you help?

Louis D. Steinritz

We've received many inquiries lately about European computing. To change the North American model of the 64 to successfully operate in Europe, the VIC-II chip and a crystal have to be changed from the standard 60 hertz model to one that operates at 50 hertz. Unfortunately, the 50 hertz VIC-II chip is not for sale to the public. However, there is another way to use your U.S. model 64 in Europe. If you take an American monitor with you, you should have no problems. As long as the 64 and the monitor are compatible, the change from 50 to 60 hertz shouldn't affect performance.

For VIC-20 owners, however, the VIC chip is available in the 50 hertz version, so conversion should be simple. For more information, contact your local Commodore service representative.

Atari Cassette LOADs

I am very eager to expand my Atari 400 computer from 16K to 48K. But, I've heard rumors that doing this sometimes messes up the cassette buffer, causing the 410 recorder only to load 50 percent of the time. Is this rumor true? Is there any other way the expansion changes the computer and its memory?

Mike Cohen

We've never heard that rumor, and can't see how it could be true. Unless the upgrade was improperly engineered so as to cause timing problems, it should merely add more memory. The cassette buffer is located in the lower 16K of memory anyway. However, there is a problem with SYSTEM RESET. Pressing SYSTEM RESET can sometimes leave the cassette improperly initialized. Atari recommends that you issue a LPRINT command (with or without a printer) before you try to CSAVE a program.

Synthesizer Check Routine For TI "Crazy Climber"

Here is a neat trick to use on TI computer programs (Extended BASIC only) that have CALL SAY statements. (See "Crazy Climber" for the TI-99/4A, COMPUTE!, November 1983.) If there is no speech synthesizer attached, the program stops at line 320 with an error message, because the computer can't talk without its talker.

COMPUTE! puts in a REM about removing the CALL SAY if no synthesizer is attached, but there is an easier way. Edit lines 110 and 320 to read:

```
110 CALL PEEK(-28672,SP)::GOTO 140
320 T=1::V=2::CALL DELSPRITE(#1)::
IF SP=96 THEN CALL SAY ("UHOH")
```

Here's how it works:

In the TI editor/assembler manual, page 354, there is a way to check to see if the synthesizer is attached or not. Without going into machine language (which I don't understand that well), it boils down to CALL PEEK(-28672,SP). This PEEK should be placed ahead of any CALL SAY statement and need be executed only once.

When the program runs, the PEEK looks to see if the synthesizer is attached. It sets the variable SP to 0 if not attached, and 96 if attached.

Try this two-liner:

```
100 CALL PEEK(-28672,@)::CALL CLEAR
110 IF @ THEN CALL SAY("HELLO,HOW AR
    E YOU")ELSE DISPLAY AT(12,3):"NO
     SYNTHESIZER ATTACHED."
```

No, I didn't goof by using the @ for a variable name— it is valid.

After running the above, you will get the message one way or another. Try it with and without the synthesizer.

Caution: Do not attach or remove the synthesizer with your console power on. Lockup will occur, and you will have to turn the console power off, then on again, to recover.

Jim Pate

Thank you for the suggestion.

Speakers With Monitors

I understand that an unshielded speaker's magnets will cause problems with a video monitor. But rather than buy an expensive shielded speaker, I prefer to buy an inexpensive, bookshelf speaker for the audio output from my 64. Can you tell me what is considered a safe distance to place a small speaker from a monitor?

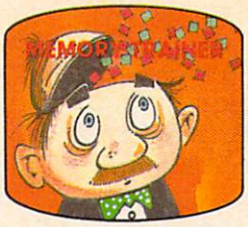
Russell Baksic

The speaker will probably not affect your monitor unless you place it directly above or beside the monitor.

Smooth Scroll On The 64

I own a 64 and do a lot of programming in BASIC. I know that this computer is able to perform a smooth scroll in four directions. After consulting my *Programmer's Reference Guide* and several COM-

Get the jump on the weatherman by accurately forecasting the local weather yourself!

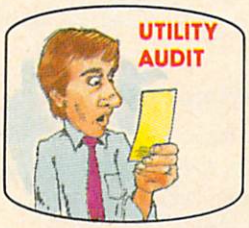


A scientifically proven way to develop an awesome memory.

You are trapped in a five-story, 125-room structure made entirely of ice. Find the exit before you freeze!

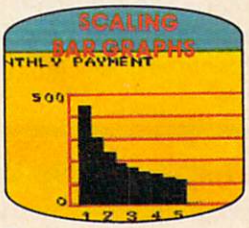
Take control of your personal finances in less than one hour a month.

The beautiful princess is held captive by deadly dragons. Only a knight in shining armor can save her now!



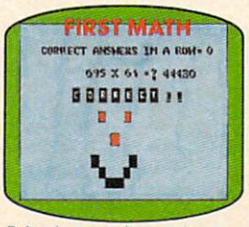
Cut your energy costs by monitoring your phone, electric and gas bills.

Computerize car maintenance to improve auto performance, economy and resale value.

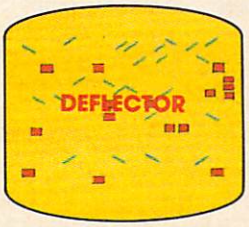


Create multi-colored bar graphs with a surprisingly small amount of memory.

A time-saving organizer for coupons, receipts and more.



School-age and pre-school children are rewarded for right answers, corrected on their wrong ones.



A real brainflexer. Deflect random balls into targets on a constantly changing playfield.

A fun way to dramatically increase typing speed and accuracy.

Get up to 30 new programs and games for less than 15 cents each— every month in COMPUTE!

Every month, COMPUTE! readers enjoy up to 30 brand new, ready-to-run computer programs, even arcade quality games.

And when you subscribe to COMPUTE! at up to 40% off the newsstand price, you'll get them all for less than 15 cents each!

You'll find programs to help you conserve time, energy and money. Programs like Cash Flow Manager. Retirement Planner. Coupon Filer. Dynamic Bookkeeping.

You'll enjoy games like Air Defense, Boggler, Slalom and High Speed Mazer.

Your children will find learning fast and fun with First Math, Guess That Animal and Mystery Spell.

Looking for a challenge? You can write your own games. Customize BASIC programs. Even make beautiful computer music and pictures.

It's all in COMPUTE! All ready to type in and run on your Atari, Apple, Commodore, PET/CBM, TI 99/4A, Radio Shack Color Computer, IBM PC or IBM PCjr.

What's more, you get information-packed articles, product reviews, ideas and advice that add power and excitement to all your home computing.

CALL TOLL-FREE
1-800-334-0868

And when it's time to shop for peripherals or hardware, check COMPUTE! first. Our product evaluations can save you money and costly mistakes. We'll even help you decide what to buy: Dot-matrix or daisy-wheel printer? Tape storage or disk drive? What about modems? Memory expansion kits? What's new in joysticks, paddles and track balls?

SAVE UP TO 40% OFF THE NEWSSTAND PRICE ON COMPUTE!

Return the coupon or postpaid card today!

SUBSCRIBE NOW AND SAVE UP TO 40% ON COMPUTE!

Yes! Start my subscription to COMPUTE! for:

☐ 1 year $24—32% off!
☐ 2 years $45—36% off!
☐ 3 years $65—40% off!

☐ Payment enclosed ☐ Bill me

Charge my ☐ Visa ☐ MasterCard ☐ Am.Ex.

Account No. _____ / _____
EXP. DATE

Name _____

Address _____

City _____ State _____ Zip _____

COMPUTE! P.O. Box 914, Farmingdale, NY 11737

PUTE! articles, I figured out how to do this, but only seven pixels each way. Only when I was scrolling up was I able to scroll more than seven pixels. There is a noticeable flicker when going from the seventh pixel to the first. Is there a way to get a truly smooth scroll?

Andrew Werth

Because BASIC is relatively slow, you will always have a flicker when you scroll from one character to the next. To achieve a truly smooth scroll, you need to write a routine in machine language, which is far faster than BASIC.

64 Tape LOADs With Supermon

I have one of the many versions of Supermon64 (COMPUTE!, January 1983), which I have been running on my Commodore 64. I have used it successfully to assemble and run some simple machine language subroutines to move sprites.

My problem is, I cannot successfully save a BASIC program that includes these subroutines.

According to my *Programmer's Reference Guide*, I should be able to load the machine language routines from within the BASIC program by using LOAD "Machine Language Name",1,1. When I try this, it says PRESS PLAY, stops at the proper place, and says FOUND Machine Language Name. However, when I press the Commodore key, it won't load properly. It will run to the end of the tape if left alone. This leads to the following questions:

1. Does the Supermon program record the machine language programs in the proper format to be loaded as above?

2. Is there a way to force the Commodore key character into the keyboard buffer so as not to have that interruption?

3. I have a *Frogger* cassette from Sierra On-Line that has you load the program the same way that Commodore recommends for machine language, with LOAD "Frogger",1,1. Yet this program does seem to have a short BASIC program with a SYS command as part of it, that can be loaded in the normal BASIC way. How do they make both the BASIC and machine language sections load sequentially with the same LOAD command? And how do they make the program come up running, even though only a LOAD command was used?

Furthermore, is there a way that the Supermon program can be relocated, perhaps at the top of memory, so that the BASIC program can be written after the machine language is complete? As it is now, the beginning machine language parts of Supermon seem to come in just above the BASIC program section, at around $0880. I have been able to resave the Supermon program on another tape without the problems mentioned earlier.

Also, I have seen in many programs the use of the memory location at 197 (decimal) to determine which key on the keyboard is being pressed. Although I see in my reference guide that this location holds the value of the key being pressed, that value does not correspond to either ASCII or screen display codes. I must assume that this is some sort of keyboard scan code, but I don't find a key to that anywhere in the reference guide. Can you outline this decoding for me?

John A. Schmitz

Jim Butterfield replies:

1. *The .S (Save) command in Supermon64 writes program tapes which may be loaded from BASIC. Some special considerations:*

a) Tape is written in a special "nonrelocatable" format, so that a simple LOAD "NAME" will return the program to the addresses from which it was saved. It is not necessary (but doesn't hurt) to say LOAD "NAME",1,1 since the tape format means that the program will never be relocated. By the way, this format tape may be read on VIC or 64, but not on PET/CBM.

b) Commodore machines have a bug that makes it virtually impossible to write tape from addresses above 32766 (hex 7FFE). Supermon doesn't fix the bug, so you cannot write useful tapes from high addresses.

c) If you have a BASIC program that contains a command to LOAD a machine language program, the load will take place correctly, but then the BASIC program will go back and start to execute from its first statement. This can give the impression that the computer is "locked up." The coding to get around this is quite easy:

```
100 IF A=1 GOTO 200
110 A=1
120 LOAD "NAME"
200 ... continuing
```

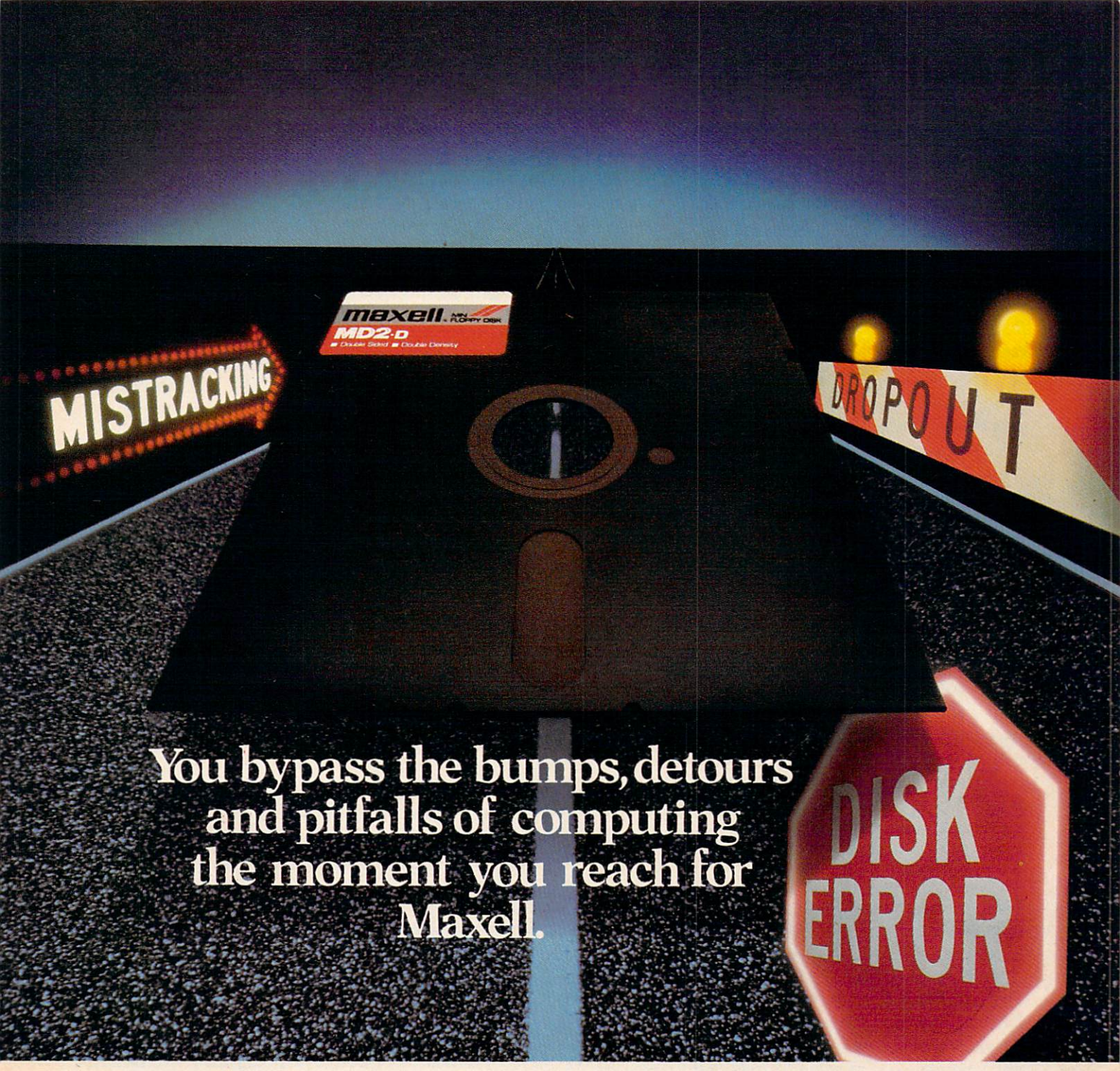
2. *No. The computer looks at the "keyswitch" indicator (address 145) to see if you are holding down the key. In any case, the Commodore key doesn't ever go into the buffer; it's a type of shift key.*

Newer models of the Commodore 64 will automatically continue a Load after a pause of a few seconds. Only the early models wait forever for you to tap a key.

3. *Machine language can be "batched" together with BASIC so that both may be loaded in one shot. The most popular methods are:*

a) Placing machine language directly above the BASIC program. Programs constructed in this way handle as easily as simple BASIC programs: They can be loaded or saved easily with no special knowledge. But the BASIC program must not be changed once the whole thing has been put together.

b) Placing machine language below BASIC. Programs constructed in this way must usually be loaded with LOAD "NAME",1,1 to avoid relocation problems.



You bypass the bumps, detours and pitfalls of computing the moment you reach for Maxell.

The road to floppy success is paved with Gold Standards.

Maxell can speed your success in computing. Helping you avoid the traps that can block the way to the information you've stored. After all, our disk has outpaced every other in performance tests. And earned a lifetime warranty.

Consider this: disks travel through a disk drive where heat builds up. And up. Only Maxell designed its protective outer jacket to defy 140°F. So the disk keeps its shape. And keeps your information on track.

How good is Gold? Maxell's the disk that many floppy drive manufacturers trust to put new equipment through its final paces.

And the unique way we pack our oxide particles and bind them together means quality for the long run.

Dropouts? Disk errors? Just pass them by. You're on the Gold Standard.

maxell®

IT'S WORTH IT.

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

They are difficult to save, since the user must know the address at which the machine language program begins. An extra feature that can be implemented with this method: We can change some of the computer's "pointers" that lie below BASIC, and cause the machine to change its behavior. For example, pointers can be changed to make the computer "come up running."

Other questions:

Once you run Supermon, it will automatically relocate itself to the top of memory. You are free to return to BASIC and load new programs. Supermon may be recalled with SYS 8.

The value in 197 on VIC and 64 indicates the key being pressed as part of a keyboard x-y grid. Any value less than 64 indicates a key: 64 is no key.

It's probably best to use PEEK(197) together with the GET command. GET tells you which key; 197 tells you if it is still being held down.

"Atari Softkeys" Printer Utility

I've grown tired of typing myriads of CHR$(X) printer control commands, and looked for something better. I checked through my files, and rediscovered Bill Wilkinson's program "Atari Softkeys" ("Insight: Atari," COMPUTE!, May 1982). This program is an ideal solution to my problem, except for the caution that the equates to the OS routines are for the Revision A ROMs.

I suspect that most people now have Revision B ROMs, so could Wilkinson (or someone) please provide the equate changes necessary for the program to run with Revision B ROMs.

G. J. Marrs

True, the majority of Atari owners now have the new upgraded Operating System (and many may not even know they do). The improvements required some changes, primarily in the interrupt handling system. Fortunately, both operating systems are fairly compatible, as long as no illegal calls are made. The Softkeys program required patching into some of those illegal entry points, so Wilkinson warned that his equates were for the Revision A ROMs.

As it turns out, none of the entry addresses required by the Softkeys program changed; Softkeys will run on either Revision A or Revision B ROMs. It won't run on the 1200XL, and likely won't run on any of the newer XL series computers, since more drastic changes have been made to their operating systems.

Load Errors With 64 CP/M

I have a 64 with a 1541 disk drive, and have just bought a Commodore 64 CP/M Cartridge. While making a backup copy of the CP/M System, I got a READ ERROR message. This error occurred on every attempt. I finally made a copy on my dealer's disk drive. I don't have any problem with my disk drive in loading and saving other programs.

Also, while using the Editing Command such as ED SAMPLE.TXT to create a new file, I got BDOS ERROR ON A: BAD SECTOR, no matter which disk drive was used.

Would you please answer these questions:

1. Do I have a bad disk drive or a bad diskette of the CP/M System?

2. I intend to add a second 1541 disk drive instead of using a CBM 4040 dual disk drive. Will CP/M recognize them as Drive A & B?

3. Do I have to specify the computer and disk drive I use when ordering a COBOL Compiler?

W. P. Ling

1. *This sounds like an alignment problem. If your 1541 is only slightly out of alignment, you may still be able to access most files without getting read or write errors. Alignment problems are more likely to show up when the drive accesses the innermost and outermost tracks of the disk. This is because the read/write head is at the limits of its range, and CP/M stores its system files on tracks 1 and 2, the outermost tracks. Since the system files are accessed frequently, correct alignment is critical if CP/M is to operate properly.*

2. *On the 4040, the drives are designated drive 0 and drive 1, which CP/M recognizes as drives A and B. However, if you connect two 1541 disk drives to your 64, both are designated as drive 0, with different device numbers (usually 8 and 9). Since CP/M looks at the drive number and not the device number to find drive A or B, it will not accept the second 1541 as drive B.*

3. *Yes. However, we know of no COBOL compilers currently available which operate under CP/M for the 64.*

Return To BASIC From Machine Language

I am a VIC computerist, proficient in BASIC and learning machine language. I have a question.

When I have a BASIC program with machine language subroutines and control is transferred between them, what ways are there to transfer back *from* the machine language routines besides using BRK?

Drew Jenkins

The machine language instruction you want to use is RTS (ReTurn from Subroutine). The RTS command ($60 or decimal 96) is a single-byte instruction that will transfer control of a machine language program back to BASIC.

It works like this. When a SYS command (branch to machine language program) is issued from within a BASIC program, the operating system automatically pushes necessary information onto the stack that tells the computer which BASIC line is to be executed next.

What do voice synthesizers have in common with movies?

They don't make them like they used to.

Because now there is S.A.M. The Software Automatic Mouth.™ The first software-only speech synthesizer for Commodore 64, Atari and Apple computers.

Developed by Mark Barton of Don't Ask Software, S.A.M. is designed to give you all the power of conventional hardware speech devices. Without the hardware.

And without the high price.

S.A.M. is the program that makes other programs talk. Business programs. Educational programs. Recreational programs, too.

You can use it in any number of useful ways.

To write instructions that talk. Stories that tell themselves. And creative new games with characters that converse or opponents that crack jokes.

And you can do it all with ease. With phonetic or plain English input.

S.A.M. can say anything you like, any way you like—you choose the pitch, tone, speed and inflection.

If you want, you can even choose the voice.

Here's talking to you, kid.

(The Apple version includes an 8-bit digital-to-analog converter and audio amplifier on a card. It requires 48K and a speaker. The Atari version requires 32K.)

Say it again, S.A.M.

Developed by Don't Ask Computer Software, Inc.

tronix™

8295 South La Cienega Blvd.
Inglewood, CA 90301 (213) 215-0529

Control of the program is then transferred to the machine language subroutine.

When an RTS is encountered within a machine language program, this "return address" information is pulled off the stack, and control is transferred back to the BASIC program at the proper place.

PET Printer TAB Solution

My computer system consists of a 2001 series BASIC 4 PET, MX100 printer, and 2130 disk drive. Most of my software was obtained from magazines, especially COMPUTE!. By extracting portions of many programs, I developed the programs I needed to keep track of rental property, income tax, and other business applications.

One problem I have is with tabulation. Tab works fine on the CRT, but poorly on the printer. However, I find my printer will tab properly if I include the line A$=CHR$(141) in the program and insert the variable, in this case A$, before the TAB statement.

When the variable is used, the printer tabs from the beginning of the line, and without the variable the printer tabs from the last cursor position.

Ernest R. Walker

```
5 REM SAMPLE PROGRAM                :rem 243
10 OPEN130,4:CMD130                  :rem 41
20 A$=CHR$(141)                     :rem 236
30 REM LINE WITH VARIABLE A$         :rem 86
40 PRINTTAB(10)"COMMODORE";A$TAB(20)"PET"
   ;A$TAB(24)"COMPUTER"             :rem 155
50 PRINT                            :rem 242
60 REM LINE WITHOUT VARIABLE A$      :rem 81
70 PRINTTAB(10)"COMMODORE";TAB(20)"PET";T
   AB(24)"COMPUTER"                 :rem 212
80 PRINT#130:CLOSE130               :rem 240
```

Calculating Branches

I have just started programming my VIC-20 with machine language. I don't have an assembler/monitor and I don't know how to calculate the offset for branch instructions. Could you please clear this up for me?

Keith Stout

The "offset" branches you've asked about (which include BCC, BCS, BEQ, BMI, BNE, BPL, BVC, and BVS) are easily calculated. The format for the commands is OPERAND / OFFSET, where OPERAND is the desired branch command (BEQ, BNE, etc.) and OFFSET is a single-byte value.

Whether branching forward or backward, the offset is calculated by counting from the next byte after the offset byte of the branch instruction. For an example, take a look at the following program sample.

```
1000 LDA $C000
1003 STA $FB
1005 CMP #$FF
1007 BNE $1000
1009 BEQ $1011
100B JSR $2000
100E JSR $3000
1011 RTS
```

The branch (BNE) at address 1007 is calculated by counting backward starting at address 1009 (the byte following the offset value). In this case, the offset value would be 256–9 or 247. Backward branches are calculated by subtracting the offset value from 256. The forward branch (BEQ) at address 1009 is accomplished by counting forward from byte 100B. In this case, the offset byte's value is 6.

Because the offset type of branch instruction uses a single byte for the offset value, the distance you can branch within the program is limited to 128 bytes backward and 127 bytes forward.

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.

An educational ad about educational software.

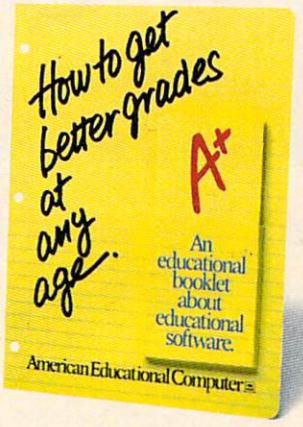
YOU studied all the computers and finally chose the one your family found most useful. One of the main reasons you wanted a computer in the first place is to help your children in school. Not just to teach them how to use a computer, but also to help them get good grades in basic school subjects like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

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

You can help your child all the way through school and beyond.

AEC grew up on education.

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



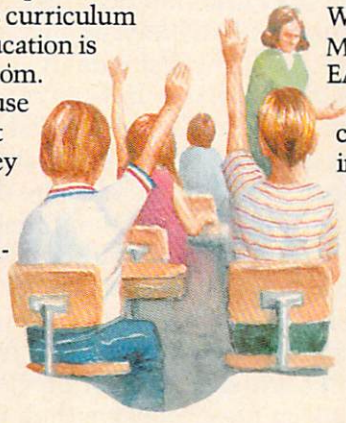
Look for our display in your favorite software store, and pick up your free educational leaflet.

AEC knows that good grades are important.

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

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

AEC gets parents involved in the learning process.



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

AEC doesn't play games with education.

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

Sure, the games are fun. But they're not the basis, and certainly not the primary focus, of any AEC software. Our focus is strictly on learning. And isn't that what you buy educational software for?

If you have more questions about educational software, contact your nearest AEC educational software center. And thanks for being a concerned parent.

A+

American Educational Computer

2450 Embarcadero Way, Palo Alto, CA 94303

All About **Adding Peripherals**

Ottis R. Cowper, Technical Editor

In the November 1983 issue we examined some of the factors to be considered when purchasing computer peripherals. This month, let's look at some add-ons available for home computers, how they work, and why you might want them.

Tape And Disk Drives

Mass storage devices—disk drives and tape recorders—are a necessity unless you're only planning to use cartridge software.

Tape units and disk drives really aren't luxury items—you've got to have one or the other, unless you're using only cartridge software or you're willing to type in a program every time you want to use the computer. The drives are called mass storage units because they allow you to store large amounts of information for later use.

Despite their different appearances, tape and disk drives use a similar technology. Both create and interpret specific magnetic patterns on a special recording medium, the same process used in audio recordings.

In a tape drive, the recording and reading head is fixed, and the tape moves past it. As the tape goes by, the head can either create a new magnetic pattern on the tape (record) or interpret the magnetic pattern currently on the tape (read). A tape drive is a sequential device; to get to the last program on a tape you have to wait for all the preceding programs to pass by.

The Head Moves In A Disk Drive

You may understand a disk drive better if you think of the diskette as a circular slab of recording tape, which is just what it is. In a disk drive, the head is not fixed, but can move back and forth across the surface of the disk. The advantage of this is that the disk head, unlike a tape head, doesn't have to wait for the desired part of the recording to come along. Instead, it can jump directly to the spot on the disk where the desired information is stored. The drawback is that the disk drive's moving head must be positioned very precisely, to within a small fraction of an inch. It is this added degree of precision that makes disk drives more expensive than tape units.

Which storage device you choose is to some extent a matter of personal preference and to some extent is determined by your planned application. If you're only planning to store programs and small amounts of data, and you feel that waiting a little longer for programs to load is a good trade-off for a much lower price, a tape unit will probably

THERE'S A COMPUTER BORN EVERY MINUTE...

GIVE IT A HOME.

For **$89.95** with the CS-1632 you can house your computer, peripherals, and accessories without spending a fortune.

For those with a large computer family the CS-2748 gives you all the room you need for your computer, monitor, printer, peripherals, software, etc. at a price that's hard to believe: **$299.95.**

The CS-1632 computer storage cabinets compact yet functional design fits almost anywhere while housing your computer monitor, joysticks, software, books and peripherals all for only $89.95.

The slide out shelf puts the computer at the right height and position for easy comfortable operation.

The fold up locking door keeps unwanted fingers off the key board when not in use.

To store joysticks just turn them upside down and slide them into the inverted storage rack.

Twist tabs on the back of center panel allow for neat concealed grouping of wires, while power packs rest hidden behind center panel on shelf.

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

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

Cabinet dimensions overall 36" high x 33-7/8" wide x 16" deep.

To order CS-1632 send $89.95 to:

To order CS-2748 send $299.95 to:

HYTEC SYSTEMS

P. O. Box 446
West Lynn, OR 97068
For Fast Phone Orders Call Toll Free **1-800-547-3100**
Inside Oregon Call **(503) 635-6667**

Name _____

Address _____

City _____ State _____ Zip _____

Quantity_____ CS-1632 Quantity_____ CS-2748

☐ Golden Oak Finish ☐ Natural walnut finish

☐ My personal check, cashiers check or money order is enclosed.
☐ Bill my VISA # _____ Exp. Date ____
☐ Bill my MasterCard # _____ Exp. Date ____
☐ Please include freight charge on my VISA or MasterCard.

Card Holders Signature _____

Immediate shipment if in stock. If not, allow 3-4 weeks for delivery. If personal check is sent allow additional 2 weeks. CS-1632 ships UPS freight collect from Oregon. CS-2748 ships by truck freight collect from Oregon. Prices subject to change. Shipment subject to availability.

Both the CS-1632 and CS-2748 ship unassembled in two cartons. Assembly requires only a screwdriver, hammer, and a few minutes of your time.
Choice in simulated woodgrain of warm golden oak or rich natural walnut finish.

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

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

Twist tabs on the back of the center panel allow for neat concealed grouping of wires while a convenient storage shelf for books or other items lies below.

The printer sits behind a fold down door that provides a work surface for papers or books while using the keyboard. The lift up top allows easy access to the top and rear of the printer. A slot in the printer shelf allows for center as well as rear feed printers.

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

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

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

Keyboard shelf 20" deep x 26" wide. Disk drive shelf 15-34" deep x 26" wide. Top shelf for monitor 17" deep x 27" wide. Printer shelf 22" deep x 19" wide.

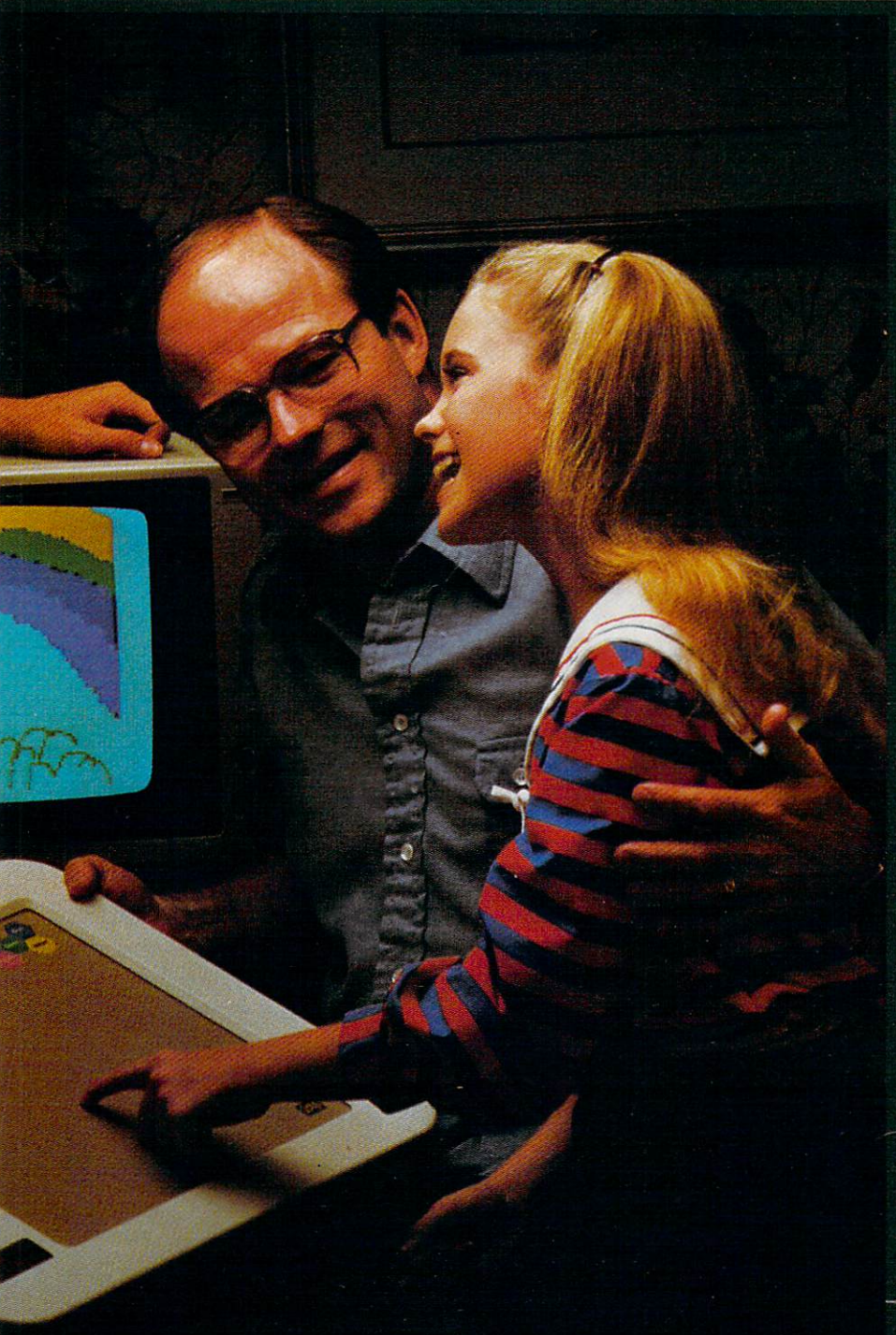
HYTEC SYSTEMS

PowerPad™ from Chalk B
a multi-colored canvas, a pia
a gameboard

Chalk Board's revolutionary PowerPad eliminates fear of keyboards and opens up a new world of fun and adventure with computer systems. PowerPad's 12″x12″ touch-sensitive, multiple contact point surface literally puts users *in touch* with their computers. Without the limitations of confusing keyboards and commands, users can now draw on the PowerPad and see their ideas appear on the screen.

The touch-sensitive PowerPad surface is a drawing pad, a multi-colored canvas, a piano keyboard, a jigsaw puzzle, a gameboard. It stimulates and reinforces creativity for users of any age. Chalk Board has turned the computer game into a learning experience.

oard. It's a drawing pad, no keyboard, a jigsaw puzzle, ...and more.



Chalk Board's Educational Advisory Panel works closely with leaders in technology to merge *what we know about learning* and *what we can do with computers.* The result is a library of packages that free the mind to explore and learn at its own speed.

Children and adults follow their interests from one success to the next...exploring the elemental patterns of visual arts, music, mathemathics, science, language arts and social studies. Chalk Board software packages span interest and learning levels to suit any member of the family.

Available for Commodore, Apple, IBM, Atari and other select home computer systems.

Chalk Board Inc,
3772 Pleasantdale Road,
Atlanta, Georgia 30340.
(404) 496-0101 or
(800) 241-3989 (outside GA)

CHALK BOARD INC.

A touch of genius.

be sufficient. Using tape might also be a good idea if children are the primary users of the computer. Cassettes, unlike diskettes, are sturdy and can withstand quite a bit of abuse.

On the other hand, if you are handling large amounts of data or if you don't want to wait several minutes for long programs to load, a disk drive is the obvious choice. For word processing, most users choose the disk drive because of the volume of data which must be stored and retrieved.

Also, if you will be purchasing software on a regular basis, consider the format in which most software for your computer is available. For example, most commercial software for those computers which do not accept cartridges is available on disk, which would necessitate a disk drive.

Disk And Tape Alternatives

Alternatives to tape drives and disk drives are available. For example, there's the stringy floppy, or wafer tape drive. Stringy floppies store data on tape, but the tape is in a loop and operates much faster than standard cassette. These devices usually cost more than tape drives, but less than disk drives.

For the really high-volume user who must handle very large amounts of data at very high speeds, there is the hard disk. The technology is the same as for diskettes, except that the recording medium is bonded to a metal plate that rotates at very high speeds.

Most hard disks are permanently mounted in their drives, although a number of models have been recently introduced for which the disk is in a removable cartridge. Many diskettes would be required to hold the amount of data which can be stored on a single hard disk, and the data can be stored and retrieved much faster. However, hard disk drives tend to be quite expensive, so they are common only among the most serious home computer users.

Game Controllers

Despite all the claims of utilitarian applications, most home computers are at least occasionally used to play games. Almost all games require the player to control some sort of action on the screen. While the keyboard is useful for entering programs into the computer, you will, unless you have exceptionally nimble fingers, find it only marginally acceptable as a game controller. Fortunately, there is a wide range of alternatives.

The most common game controllers are the ubiquitous joysticks. These come in two basic types. In joysticks for the Atari, Commodore, TI, and Coleco computers, moving the handle of the joystick closes one or two of four switches. If only one switch is closed, one of the four horizontal or vertical directions has been selected (left, right, up, or down). Pulling the handle in one of the four diagonal directions causes two of the switches to close simultaneously. Thus, these joysticks allow you to select one of eight directions.

Game controllers come in a variety of styles, each of which has a different "feel." Shown here are paddles, a joystick, a trackball, and a pressure-sensitive controller.

Directional vs. Positional

If we call the previous type a directional joystick, then the type used on the Apple, TRS-80, and IBM is a positional joystick. Moving the handle changes the setting of a pair of variable resistors, one on the horizontal axis and one on the vertical axis. This has the effect of changing the voltage level of the joystick output.

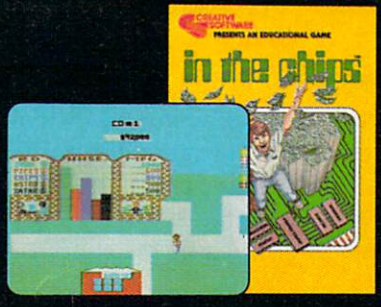
Though the switches in a directional joystick can be read directly as a number by the computer, additional circuitry is required to measure the voltage levels from a positional joystick and to calculate an appropriate value for the horizontal and vertical (X,Y) position of the handle. In a typical positional joystick, holding the handle in the upper-left corner produces a reading of 0,0. The upper-right corner is 0,255; the lower-left 255,0; and the lower-right 255,255. Values for other positions fall somewhere in this range, the center being around 127,127.

Many varieties of both types of joysticks are available, and choosing among them is strictly a matter of taste. Some joysticks have huge handgrips, some have slim handles, and others have knobs on top. Some have a push button on the base of the unit, others have one on the handle, and others offer you a choice of either. Some people prefer heavy joysticks with firm handle motion; others prefer lightweight models with handles that move freely. Before selecting a particular joystick, it's wise to go to your local computer products dealer and take a few "test drives."

The next most common type of game controller is the paddle. A paddle is essentially half of one of the positional joysticks described above.

BRUTAL! RUTHLESS! UNPREDICTABLE!

IN THIS GAME, YOU REALLY GET THE BUSINESS.



Okay, boss, now what do we do? Research & Development is working 'round the clock coming up with new products, the warehouse is overflowing, the advertising agency wants more money, your customers are fickle, and the competition just slashed their prices. We're all waiting for your decision.

Put yourself at the helm of this enterprising new software company. Every major decision is in your hands. Use your logic and intuition to spot market trends. Keep a close eye in your balance sheet. Get a grip on your company, a leg up on your competition, and a stranglehold on the market. Do you have what it takes to be King of Silicon Valley? Or will you end up selling apples on skid row?

Intense strategic challenge combined with a real education in the workings of big business make In The Chips one game anyone can profit from.

IN THE CHIPS.™ Concept Education for the VIC-20, Commodore 64, IBM PC and PCjr.

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

The knob on the paddle controls a variable resistance, hence a variable voltage, which is translated by computer hardware into a number that reflects how far left or right the paddle is turned. Paddles are generally used in those games which involve only left-right or up-down movement, but not both. Paddle controllers usually come in pairs, but are not available for all computers.

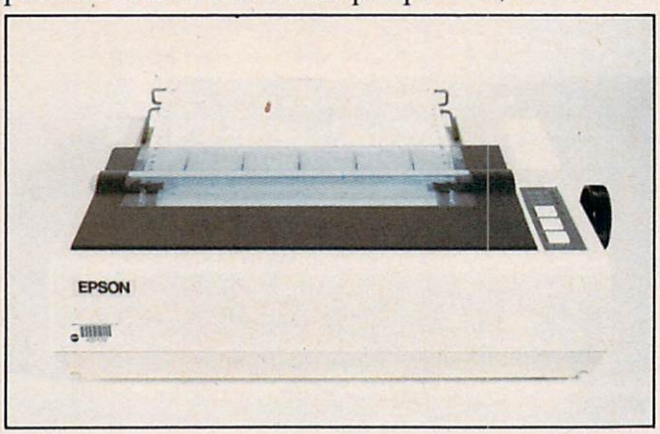
Some Specialized Controllers

The other types of game controllers tend to be highly specialized. For example, there is the trackball, which can be used in place of a directional joystick. Briefly, spinning the ball activates circuitry which produces the same effect as rapidly pushing the joystick in the direction that the ball is spun. Thus, the trackball can be a good replacement for a joystick in games that require rapid movement all over the screen.

Before you buy any game controller, take a minute to measure just how far from the computer you'd like to sit when you're playing a game. Then, when you pick out a controller, make sure its cord is long enough. Of course, if the one you want comes up short, joystick extension cords are available. Or, if you want to free yourself from all those wires, Atari has a joystick with no wires at all. A small radio transmitter, built into the base of the joystick, signals to a receiver which you plug into the computer's joystick port.

Printers

Printers are among the most popular peripheral devices, and most computer owners plan to add one sooner or later. Printers allow you to make permanent copies of program listings and output, as well as copies of screen displays and graphics patterns. As with all other peripherals, the available printers vary widely in price and quality.



A printer, among the most popular of peripheral devices, allows you to make permanent copies of program listings and program output.

There are three basic types of printers for home computers: thermal, dot matrix, and daisywheel. All function by accepting character codes and translating them into printer commands to place the image of the desired character on the page. They differ in how the character images are produced.

The printhead of a thermal printer consists of a horizontal or vertical row of small electrodes. As the printhead moves across the paper (or, depending on the printer, as the paper moves past the printhead), the electrodes burn a tiny dark spot in the specially coated surface of the paper. The printer creates the dots in patterns that form the various alphanumeric characters, just as characters are formed on the video screen by lighting up tiny dots.

The advantages of thermal printers are that they are quiet, durable, and inexpensive. The disadvantages are that the special paper required is more expensive and usually a bit more difficult to find than regular printer paper, and some types of the paper tend to turn dark with age.

Dot-Matrix Printers

The concept behind dot-matrix printers is similar to thermal printers—in both the printed characters are formed from patterns of dots. However, rather than burning the dots into special paper, the printheads of dot-matrix printers have a vertical row of tiny wires or *needles* that strike an inked ribbon against standard paper. The number and size of the dots produced per character determine the printing quality.

The characters to be printed are formed within a grid, like the eight-by-eight grid used for designing characters on most home computer screens. A common arrangement is nine dots high by five dots wide. More dense arrangements allow for better character definition and hence better looking characters.

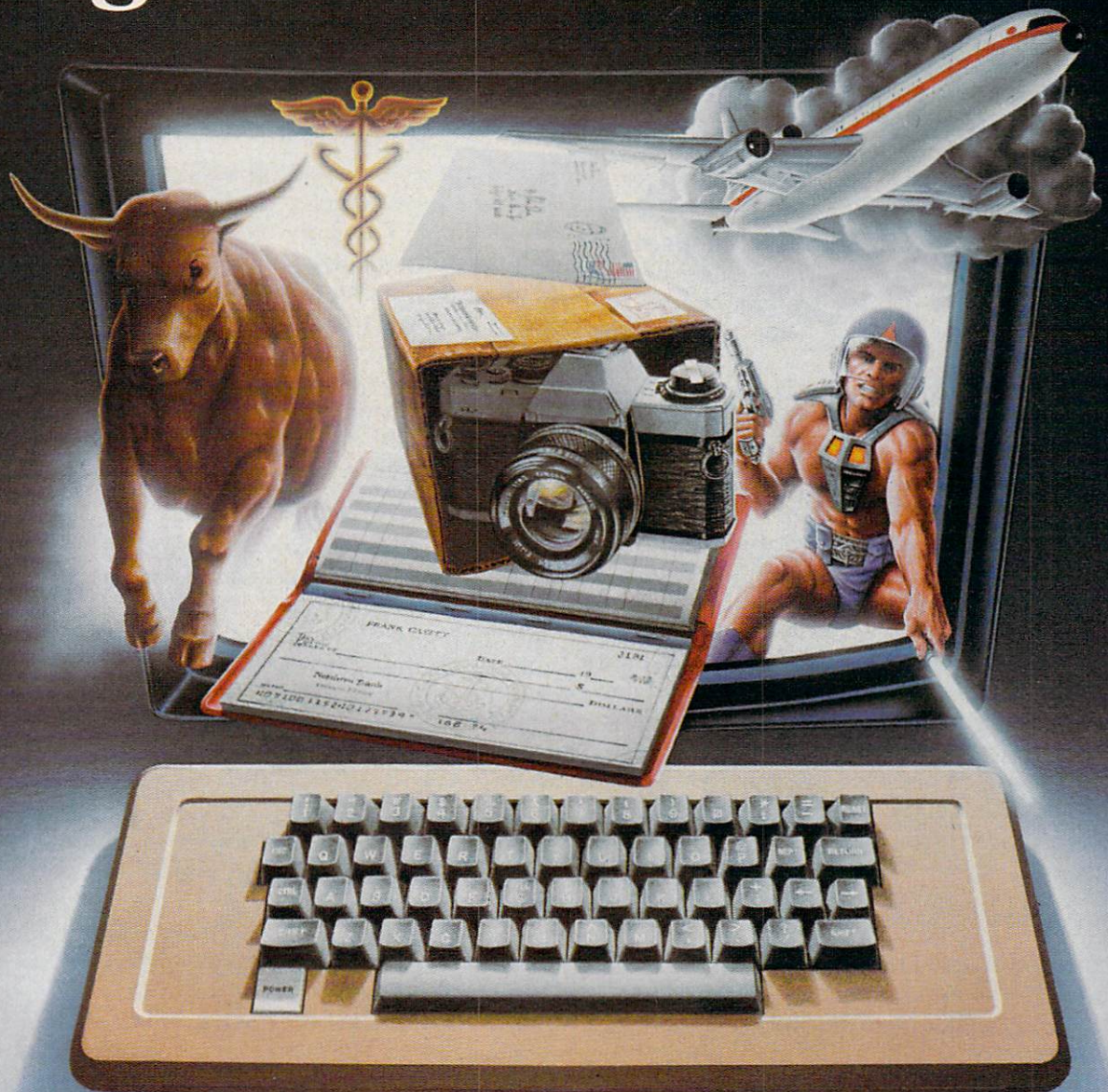
The daisywheel in printers of that type has the characters that can be printed arranged on the *petals* of the printwheel. It's as if someone picked all the letters out of a standard typewriter and arranged them in a circle. To print a character, the printer rotates the printwheel until the desired character petal is at the top, then strikes the petal against an inked ribbon just as in a regular typewriter.

Superior Print Quality

As might be expected, the printing quality of a daisywheel is also similar to that of a typewriter. Balanced against this superior print quality, daisywheel printers are both more expensive and, in general, slower than thermal or dot-matrix printers.

When deciding which type of printer to buy, consider how you will be using the printer. For example, if you simply need to whip out an occasional program listing, an inexpensive 40-column thermal or dot-matrix printer should suffice. If

We don't care which computer you own. We'll help you get the most out of it.



CompuServe puts a world of information, communications, and entertainment at your fingertips.

CompuServe is the easy to use videotex service designed for the personal computer user and managed by the communications professionals who provide business information services to over one fourth of the FORTUNE 500 companies.

Subscribers get a wealth of useful, profitable, or just plain interesting information like national news wires, electronic banking and shop at home services, and sophisticated financial data. Plus, a communications network for electronic mail, a bulletin board for selling, swapping, and personal notices and a multi-channel CB simulator.

You get games on CompuServe, too. Classic puzzlers, educational, sports and adventure games and fantastic space games featuring MegaWars, the "ultimate computer conflict."

To learn more about CompuServe, call toll-free, 800-848-8199, for an illustrated guide to the CompuServe Information Service. The videotex service for you, no matter which computer you own.

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

you wish to do word processing, you'll probably want a printer that can give 80 or more columns of output so that you can use standard paper. For casual writing or correspondence, a good quality dot-matrix printer is quite acceptable. However, a daisywheel printer is usually required for serious word processing which demands a professional, typewritten appearance. On the other hand, if you're interested in printing out charts and graphs or screen images, you'll need the graphics capabilities of the thermal or dot-matrix printer. In any case, try to see a sample of the printer's output before you buy so that the print quality won't come as a rude shock the first time you use it.

Serial And Parallel Interfaces

There are two methods of sending data to printers, serially (one bit at a time) and in parallel (eight bits at a time). Some computers allow printers to be plugged in directly, but most require special interfaces. You should choose the interface before, not after, you buy the printer, so that you can be assured of being able to connect the printer to the computer.

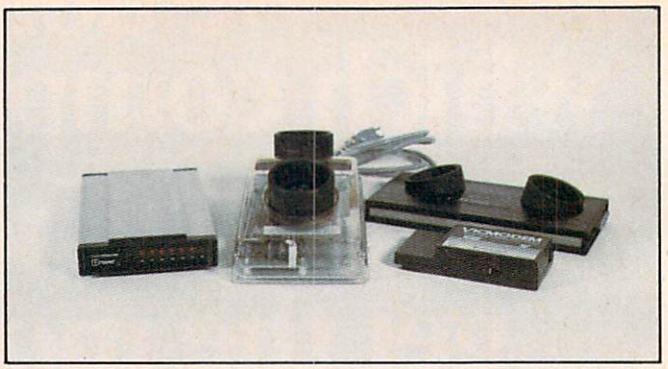
There's really no compelling reason to choose serial interfacing over parallel or vice versa, except that parallel printers are generally less expensive. Your computer could be a determining factor, since some computers have their built-in printer handling routines set up to prefer one method over the other.

Other types of printers are available. For example, there are dot-matrix printers which can print in a variety of colors. There are ink jet printers which produce exceptionally sharp characters on the page by spraying microscopic droplets of ink in carefully controlled patterns. There are even printers which use a laser to form characters which almost match the quality of typesetting. However, these printers are currently too expensive for most home users.

Modems

Modems (modulator/demodulators) are your computer's link to the outside world. They open to you the world of telecommunications, allowing your computer to exchange information with other computers.

A modem translates digital data from the computer into sound signals that can be transmitted over the phone lines, and converts sound signals from other modems back into digital data for the computer. There are two types: acoustic and direct connect. With an acoustic modem there is no direct connection between the computer and the phone line. The mouthpiece and earpiece on the phone handset fit into cups on the modem.



Modems let your computer exchange information with other computers via telephone lines. Direct connect modems plug directly into the phone line. With an acoustic modem, the telephone handset fits into a pair of soft cups.

A direct connect modem plugs into the phone line. Rather than creating audio signals, it impresses the equivalent electrical signals directly on the phone lines. This prevents the direct connect unit from picking up stray noises as data, which is sometimes a problem with acoustic modems. Plugging into the phone lines also makes possible several advanced features, such as auto-dial and auto-answer, whereby the computer can dial or answer the phone by itself. However, these features are found only on the more advanced direct connect modems.

Who Do You Want To Talk To?

To determine if you can use a modem, you must first ask yourself if there is anyone out there you and your computer want to talk to. There are several companies that specialize in providing telecommunications services to small computer owners, most notably CompuServe and The Source. Many modems come with information on accessing one or both of these services. In addition to the large companies, many computer clubs and user groups around the country maintain electronic *bulletin boards* that you can call for exchanging information, messages, and perhaps even programs.

If you have a friend with a computer and modem, you can exchange programs and messages directly between your computers. Keep in mind that unless there are a number of services you can use locally, you may find yourself running up excessive long distance charges to make use of your modem.

Memory Expanders

Memory expanders do just what they say: give you more memory for programming and storage. If you find yourself running into OUT OF MEMORY errors on a regular basis, or if you're planning an application which will involve the storage and manipulation of large amounts of data, you may want to consider purchasing one of these units.

If you want to stay ahead of the personal computing revolution ...

...welcome to *COMPUTE!'s PC & PCjr!*

This exciting new magazine from *COMPUTE!* takes you inside the PC and the incredible new PCjr to bring you inside information you'll find nowhere else.

You'll discover how to get the most computer power for your money. At home. At school. At work. With easy-to-run programs. Challenging projects for advanced users. Brand new sound and graphics applications. Plus some of the most exciting computer functions outside of the top-secret research labs!

We'll help you decide what to buy. With independent evaluations of hardware, software and peripherals. Comprehensive reviews of new products as they're introduced. Hard-nosed evaluations of each machine's strengths and weaknesses.

COMPUTE!'s PC & PCjr will keep you on the leading edge of personal computing like no other publication can. Here are some of the features you can look forward to:

Welcome to the PCjr! A complete introduction to IBM's newest personal computer, and a fascinating peek at the 8088 microprocessor – the tiny-but-talented brain of the PCjr.

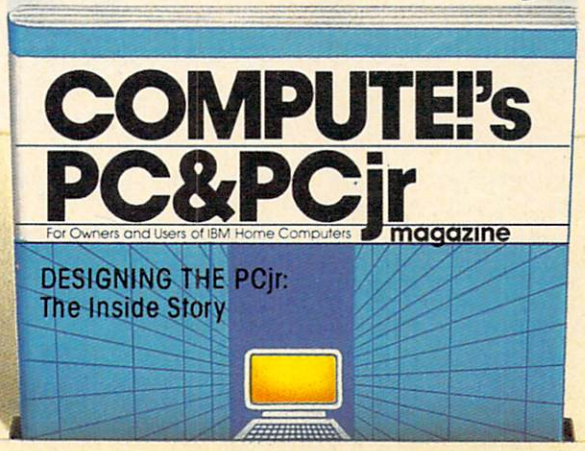
Designing PCjr — The Inside Story. PCjr's creators tell how they designed the new computer – from original planning to trade-offs to ultimate success.

Telecomputing with Your IBM. How to link up with distant computers over ordinary phone lines, access information services, even do office work at home with your own machine!

Music and Graphics. How to play songs and create sound effects with your PC or PCjr. Programs to generate impressive hi-res graphics and computer animation.

From the publishers of COMPUTE!

Announcing the magazine that takes you inside the IBM PC and the PCjr.



Your First Hour with an IBM. How to avoid those opening night jitters and get your computer up and running fast!

Financial Analysis. Ready-to-run programs to help you make intelligent investments.

PC vs. PCjr. Which one is right for you? *COMPUTE!'s PC & PCjr* helps you decide!

PLUS: Programming the function keys to suit *you*. Speeding up BASIC without resorting to machine language. Tape, disk, or hard disk? Buyer's guides. How to take advantage of free public-domain software. Computing activities for the whole family. Reviews. Games. Educational programs for children. And much, much more!

Subscribe right now and you can enjoy special Charter Subscriber Savings on *COMPUTE!'s PC & PCjr* – just $24 for the first 12 big issues. That's 33% off the cover price!

To start receiving *COMPUTE!'s PC & PCjr*, just mail the postpaid card in this issue or the coupon below today.

CHARTER SAVINGS OFFER

OR CALL TOLL FREE
1-800-334-0868

[ ] ENTER my Charter Subscription to *COMPUTE!'s PC & PCjr*. I pay just $24 for the first 12 issues—a 33% saving off the cover price. What's more, I reserve the right to cancel at any time for a full pro-rata refund.

[ ] Payment enclosed
[ ] Bill me
Charge
[ ] VISA [ ] MasterCard
[ ] American Express

Acct. No.

Exp. Date

NAME
ADDRESS
CITY
STATE/ZIP

MAIL TO:
COMPUTE!'s PC&PCjr
P.O. Box 974, Farmingdale, NY 11737

Memory expanders give you additional work room within your computer. Expanders range from simple memory chips to complicated boards with cartridge slots and reset buttons.

On the other hand, if you aren't experiencing these problems, you probably don't need any additional memory, unless you're troubled by the fact that your neighbor has more kilobytes than you.

The simplest memory expanders just give you more of what you don't have enough of, RAM (Random Access, or read/write, Memory) chips, along with the circuitry to determine the addresses of the new memory locations. These are for computers which haven't yet reached their full memory capacity.

There are also more sophisticated memory expanders for computers which already have as much memory installed as their microprocessors can address. These use a special technique called *bank switching*, whereby blocks of memory can share the same addresses as long as only one of the blocks is in use at a time. The blocks of memory that are not switched in will still retain data until they are again selected. This switching, of course, requires extra circuitry and hence extra cost.

Some memory expander packages, especially those for the VIC, add extra features such as cartridge slots and reset buttons. Some memory expander cards for other computers allow you to buy the card with less than the maximum number of memory chips installed, so you don't have to pay for all the extra memory at once, but won't need another card when you purchase additional memory later. Try to buy a card that holds the greatest possible number of memory chips so that future expansion will take no additional card slots. These are the sorts of features that you should consider when shopping for memory expansion.

Additional Input Devices

A number of peripherals are available which make it easier to communicate with your computer. These include the numeric keypad, the light pen, the touch pad, and the mouse. All provide ways to get information into the computer without touching the keyboard.

Most home computers have keyboards like those of typewriters. This is fine for typing in text, but programming often involves entering lots of numbers. Here the typewriter keyboard fails, because having the number keys in a row across the top slows down your numeric typing. A numeric keypad is essentially a small second keyboard you plug into your computer. It has the number keys laid out in the familiar calculator pattern, with perhaps a few extra keys for additional functions. You'll need a program to allow your computer to read the keys. This add-on will be especially useful in financial applications where many figures must be entered.

The light pen is a device that lets you point to a location on the screen and have the computer know where you are pointing. To understand how it works, a short description of the TV display is in order. A video display is not a static picture. The image on the screen is actually flickering constantly, but at a rate of 60 times per second, which is too fast for your eyes to notice. An electron beam draws a series of stacked horizontal lines on the screen from top to bottom to form the display.

When you hold a light pen to the screen, the computer times how long it takes the beam to draw from its starting position at the upper left of the screen to the point where you're holding the pen. From this, the horizontal and vertical position of the pen on the screen can be calculated.

Using A Light Pen With Menus

Light pens are most often used with screen drawing routines. In fact, this is such a common application that many people don't realize that light pens can be used for anything *except* drawing on the screen. Even the name is somewhat misleading. Light pens are suited for any application which involves getting information on or off the screen. For example, a program in which the user must select an option from a menu on the screen could be set up so the user makes his selection by touching the light pen to the desired option instead of having to type in a letter or number to indicate the choice.

A touchpad is an input device consisting of a tablet with a square sensing surface. If you press down somewhere on the surface, the pad will provide a pair of values that represent the horizontal and vertical location of the point being pressed. The pad uses thin sheets of resistive film instead of a variable resistor, but the principle of operation is otherwise the same as that described for positional joysticks.

As with light pens, touchpads are most often used to create screen drawings. In fact, you've probably seen engineers on TV using very

Jump on 10 monsters, 64 screens and $10,000 with Pogo Joe.™

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

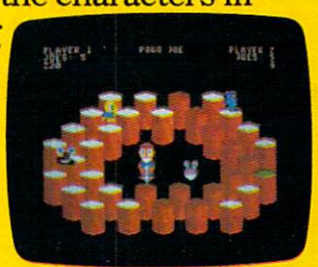
Close. But Pogo Joe bounces back. Bouncing from cylinder to cylinder, screen to screen, Pogo Joe racks up point after point.

You guide him from cylinder to cylinder, changing the color on top of each. Change the top of each cylinder on a screen, then you're on to the next.

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

Press the fire button! Jump two cylinders to safety. Hop into a transport tube, and then whoosh! Pogo Joe appears across the screen. Jump on an escaping monster. Blam! It's gone in a flash! Only to reappear out of thin air.

Keep bouncing Joe to original music on realistic 3-dimensional cylinders. All the characters in this rollicking game are also 3-dimensional and fully animated. The graphics almost jump off the screen, leaving the arcades behind.



What's ahead with *Pogo Joe*™ is $10,000. Simply tell us what magic word appears after *Pogo Joe's* tenth screen. If your name is drawn from among the correct answers you'll win $10,000!

No purchase is necessary. You'll find entry forms at any store that sells Screenplay™ games.

But if you don't win you can't lose. *Pogo Joe*™ is so much fun you'll jump for joy no matter what.

screenplay™

Box 3558, Chapel Hill, NC 27514 800-334-5470

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

sophisticated touchpads and mainframe computers to do very complex designs like blueprints for cars or airplanes. The simple touchpads available for home computers can't match that, but the principle is the same.

The hottest new input peripheral on the computer scene is the mouse. A mouse is essentially a small trackball turned upside down. Mice (or mouses—the proper plural for the computer version has not yet been decided) are used to position

Light pens, touch tablets, and numeric keypads provide alternative ways of entering data into your computer.

a cursor on the screen. Instead of typing cursor control keys, you place your hand on the mouse and roll it up, down, left, or right on the table. The program using the mouse will cause the cursor to move accordingly. The mouse is supposed to be more user-friendly for beginners than the cursor keys, and mice are featured prominently in new software for such computers as the IBM PC and Apple Lisa. Experienced typists may find, however, that taking their hands off the keyboard to move the mouse is more distracting than using the keyboard cursor controls.

Exotic Additions

Speech synthesizers. Talking computers have long been a favorite of science fiction writers. Now it seems that their day has arrived. The production of speech by a computer is similar to the production of musical tones, except that instead of producing notes, the speech synthesizers produce *phonemes*, the sounds which make up basic units of human speech. By stringing these phonemes together, speech synthesizers can produce words. We've even seen packages that allow the computer to sing, play background music, and display a face which moves its mouth in synchronization with the song.

The limitations of speech synthesis in home computers relate largely to memory. The sounds of human phonemes are complex and require extensive programming to simulate. Also, the sound production capability of many of today's home computers is somewhat limited. Nevertheless, speech synthesizers are available now for most home computers, and as units with more memory and better sound become available, the use of the synthesizers should become more widespread.

Speech recognition units. These are the opposite of speech synthesizers. Instead of allowing the computer to speak, they allow the computer to understand spoken commands. Speech recognition is not yet as advanced as speech synthesis because there are so many subtleties to human speech. For example, regional dialects cause people to pronounce the same word in different ways. Then there is the problem of words with different meanings which are pronounced the same or nearly the same, such as *for* and *four*, *eight* and *ate*, etc.

However, speech recognition units are available for several computers, and even a version of BASIC called SpeechBASIC to accept spoken commands. Since so much of human communication is based on the spoken word, the ability to talk directly to your personal computer would certainly make it more personal. Watch for progress in this area.

Plotters. A plotter is essentially a mechanical drawing arm. It consists of a pen which can move horizontally and vertically across a drawing surface under computer control. By carefully controlling the pen's movements, detailed drawings can be created. Sophisticated plotters can even select from several different pens for multicolor artwork. If you're interested in producing graphics of a higher quality than is possible with a dot-matrix printer, you may want to investigate the variety of plotters available. Be forewarned that some serious programming may be necessary to get your computer to produce draftsman-quality work.

Coprocessors. Adding an additional microprocessor to your computer is like giving it a second brain. For example, Z-80 microprocessor add-on boards are available for the Apple and Commodore 64 to allow those computers access to the wide array of software written for the CP/M operating system. A special math processor is available for the IBM PC to increase the speed at which mathematical calculations can be performed.

Many other types of peripherals are available for today's home computers. For example, there are interfaces which allow your computer to turn the lights in your home off and on at programmed times, or to adjust your home thermostat. Other interfaces allow your computer to control video cassette recorders. There's even a peripheral to allow your computer to monitor the temperature, humidity, and barometric pressure to forecast the weather.

This continuing stream of new products shows that we're still far from reaching a limit to what can be connected to a home computer. ©

BRISTLES

designed by Fernando Herrera

Starring Peter the Painter

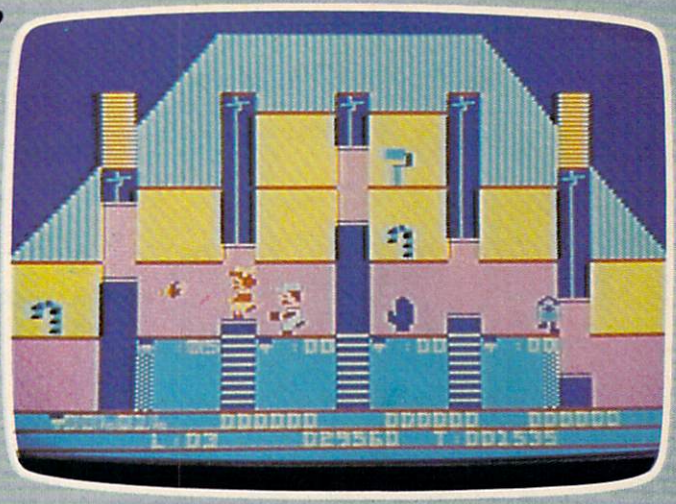
C-64 conversion by Adam Bellin

From the creator of ***ASTRO CHASE***™ (Sci-Fi/Fantasy COMPUTER GAME OF THE YEAR, 1984)[1] and My First Alphabet™ (winner of the Atari® Star Award) comes BRISTLES.

☐ Reviews: A+ "The action is fast and frenetic … If you want a game with definite patterns, strategies, great sounds and plenty of action—this is the one."[2] #1 Best Selling computer software in New York.[3]

☐ Features: Real Time Animation™, Sex-Select™, Slow motion, 1 to 4 player option, hidden messages, 8 game screens each with 6 skill levels, hi-res graphics and "invisible paint."

☐ Systems: **COMMODORE 64™** & **ATARI HOME COMPUTERS™**



Actual Game Screens

FLIP and FLOP

Starring Flip the Kangaroo and Mitch the Monkey

designed by James Nangano

C-64 conversion by Paul Kanevsky

This number one Best Seller is Jim's first game for First Star. Here's what the reviewers say about this award winning designer's first computer game.

☐ Reviews: "The audio-visuals are excellent … A definite HOTLINE picked hit."[4] ★★★★ (highest rating) … "quite a different game"[5] "… super graphics, first class sound effects and challenging game play"[6]

☐ Features: 7 different animated intermissions, game screen actually *flips upside down*, 36 levels, 13 different scrolling screens, arcade sounds and music, solo or 2 player option.

☐ Systems: **COMMODORE 64** & **ATARI HOME COMPUTERS**

ASTRO CHASE™

designed by Fernando Herrera

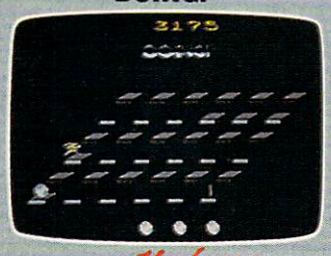
ATARI HOME COMPUTERS
COMMODORE 64
conversion by Mike Crick

BOULDER DASH™

Peter Liepa and Chris Gray

ATARI HOME COMPUTERS
PC/PC jr.™ conversion by Peter Liepa

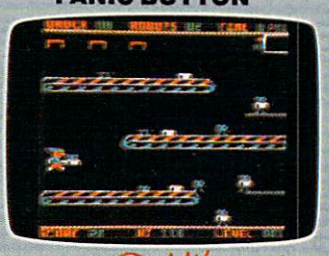
BOING!™



designed by Alan Lawes and Shirley A. Russell

ATARI VCS 2600™

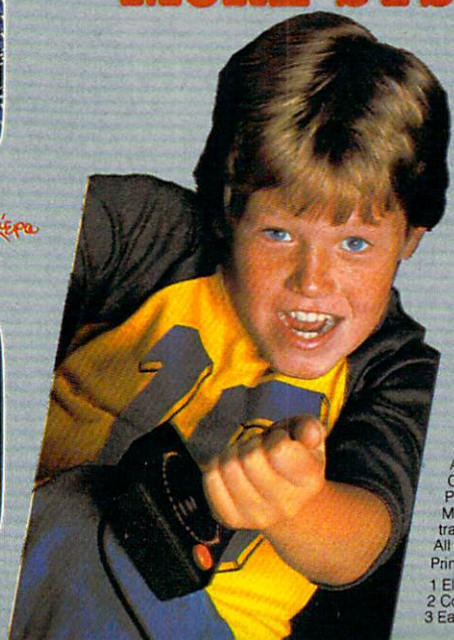
PANIC BUTTON™



designed by Paul Konevsky

TRS-80 COLOR COMPUTER™

MORE GOOD NEWS... MORE GAMES! MORE SYSTEMS!



All computer software available in DISK, TAPE and CARTRIDGE IN A STORE NEAR YOU.

Call **1 800-223-1545**

For your local dealer/distributor.
In New York 212 532-4666

FIRST STAR SOFTWARE INC. 22 East 41 St., New York, NY 10017

in affiliation with Warner Software, Inc. a Warner Communications Company

1 Electronic Games Magazine
2 Computer Games Magazine
3 East Side Express
4 Electronic Games Hotline
5 Video Game Update
6 Dealerscope Magazine

A Printer In Every Kiosk?

Peripherals In The Year 1999

Kathy Yakal, Editorial Assistant

Is it compatible with my computer? Will I need to buy extra cables? What if I decide to buy a different computer a year from now—can I still use the same modem? The issues of standardization and compatibility are likely to change in the next decade. What's more, new technologies are continually appearing in each new generation of peripherals.

Purchasing the *right* peripherals for your computer can be complicated. The buyer must make some complex technical choices: IEEE-488. Hayes-compatible. RS-232. Requires 80-column card. Requires special cables (available separately). IBM-compatible.

A Package Deal

One possible response to the compatibility problem is to avoid third-party hardware manufacturers and buy everything for your system from the company which made your computer.

Coleco encourages this with their new Adam system. "The reason we're offering a package concept is that we perceived a great deal of confusion in the home market," says Barbara Wruck, director of corporate communications at Coleco. "Many consumers were buying inexpensive CPU's, only to find out that that's all they had—a CPU.

"It's important to give the new computer owner every piece of equipment that lets them do it immediately, a system that is useful, easy to operate, and affordable." As an Adam owner grows in knowledge and needs new equipment, says Wruck, Coleco will continue to produce "carefully selected peripherals" to expand the power of the system.

Is this the answer to peripheral problems? "I think the consumer is saying that it is," says Wruck. "We believe this is the correct approach."

Like Buying A Stereo

Others disagree with this approach. "I think there will continue to be a niche for people who want to buy things separately and put together a system themselves," says Dan Baker, research manager for disk manufacturer Percom Data. "It might be the way component stereos are," he says. "You have different performance criteria for each piece to fit your needs.

"However, the move toward portable computers is something of a package concept, where you have built-in peripherals. This isn't necessarily a trend—it just shows that you can include storage in the main package."

A Standard

Buying any computer, disk drive, printer, and modem and having them work together at once might seem like high-tech heaven, but it's not

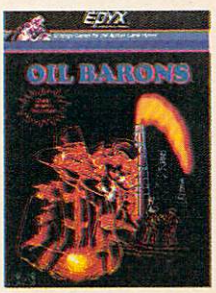
OIL BARONS.
IF YOU'RE SMART, YOU'LL GET FILTHY RICH.

Are you a gambler, eager for new challenges... ready to pit your skill and luck against others in an attempt to corner the world oil market? If so, Oil Barons is your game.

Starting with 4 parcels of land and over $1 million, you search for that ever-elusive gusher. The computer does all the work, including banking and scorekeeping, freeing you to plan your strategy and make decisions that will ultimately determine your success.

Obstacles like government regulations, well fires, and hurricanes complicate matters, but the fun of increased land holding, striking it rich, and even unloading worthless parcels on the uninitiated, more than make up for the setbacks.

One to eight players, 4 color gameboard and playing pieces included, keyboard controlled.



EPYX™ COMPUTER SOFTWARE

Strategy Games for the Action-Game Player

likely to happen. "I have thoughts in both directions," says Robert Pearce, director of marketing for Comrex, a subsidiary of Epson.

"As technology advances, that will wipe out any standardization that existed before," he says. "New technologies generally don't conform to the standards of the previous one. There *could* be standardization for a while, but then a new technology comes along and requires a whole new set of standards.

Next year more modems will be manufactured than have been built to date.

"If some uniform compatibility code does emerge, it will be because the masses force it. That may have to happen in order for computers to have the mass appeal that they lack now. If nothing else, at least in packaging, like Coleco and IBM have done."

Interfacing Your Computer And A Stereo

In 1999, it may be that electronic equipment which we don't now consider computer peripherals will act as such. Home entertainment equipment is an example.

To a degree, you can do some interfacing now. By hooking up a couple of cables, you can play *Missile Command* on your Atari 800 and hear the sound through your stereo.

For more sophisticated kinds of interfacing, special cables or cards may be necessary. Digital Controls, Inc. has a line of interface cards that turn videodisc players into microcomputer peripherals. An Apple II interface card is available for $500, and a generic RS-232 interface for $865.

A Different Approach

Telecommunications will most likely be a part of everyone's life by 1999. Presently, a home computer owner has a wide choice of modem, but there is an equally wide variation in compatibility. Some modems are completely compatible with one computer, but require special cables and interfaces for another computer.

B. F. Kessler, president of modem manufacturer Novation, Inc., feels that the answer to compatibility lies not in hardware, but in software. He points out that technology is changing so rapidly that modem makers are having a difficult time designing one generation of products that is compatible with the next.

"The fact that all modems should be compatible is obvious," he says. "But with an industry still in its infancy, it would seem stifling to set hardware standards that could become obsolete overnight."

Kessler believes that a good programmer is well equipped to solve compatibility problems. The emphasis should be on getting programmers to include software commands for expansion and compatibility with all popular protocols.

"Personal communication via microprocessors is gaining momentum at an amazingly rapid rate," says Kessler. "Next year more modems will be manufactured than have been built to date. Inevitably, new designs and technology will be introduced. And the marketplace will continue to respond positively to appropriate innovations.

"It will be far easier for software programmers to keep up with state-of-the-art than it would be to shackle hardware manufacturers with compatibility standards that undoubtedly would hinder rather than help the growth of the modem marketplace."

Visible Beginnings

Remember the scene in the movie *Blade Runner* when Harrison Ford needs to zoom in on a small area of a photograph and make a reproduction of it? There's nothing resembling an Apple IIe in his apartment, and no keyboard is visible anywhere. He sits down in front of some kind of electronic console, talks to it and tells it what he wants, and he ends up with a blowup of a tiny corner of the original that was barely visible to the naked eye. In seconds. Without touching anything.

High science fiction, certainly. Yet voice recognition is possible now. You can buy a Lang Systems, Inc., unit called the Videoslide 35 that will let you photograph the images on your computer screen and turn them into slides in less than an hour.

"The equipment is already here to accomplish many of the things that won't necessarily be commonplace for many years," says Comrex's Pearce. "We have high-speed modems that can transmit data from urban area to urban area, but it will be a while before we can give that kind of service to rural communities. Whether we continue to use the phone lines or switch to something like satellite communications, we'll still be using something like the modems we're using today."

A printer in every kiosk? "That's already happening to a certain extent, at places like automatic teller machines," says Pearce.

PITSTOP.
WHERE WINNING IS THE PITS.

You'll never make Grand Prix champion just driving in circles.

You've got to stop sometime. The question is when. Right now you're in the lead. But the faster you go, the more gas you consume. And the quicker your tires wear down.

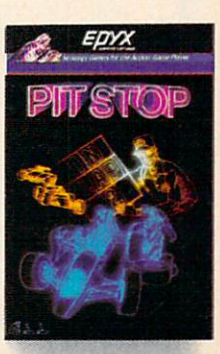
If you do pull into the pits, though, you lose precious seconds. So it's up to you to make sure the pit crew is quick with those tires. And careful with that gas. Otherwise, poof! you're out of the race.

So what'll it be, Mario? Think your tires will hold up for another lap? Or should you play it safe and go get some new ones?

Think it over. Because Pitstop™ is the one and only road race game where winning is more than just driving. It's the pits.

Goggles not included.

One or two players; 6 racecourses, joystick control.



EPYX COMPUTER SOFTWARE

STRATEGY GAMES FOR THE ACTION-GAME PLAYER.

See your retailer for available computer formats.

"I suppose you might find printers in places like phone booths, say to print out time and charges after a call," he says. "But I think it makes more sense to have a credit card number and get a printed bill at the end of the month instead of carrying around all those little slips of paper."

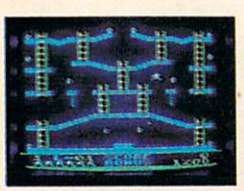
People, Not Peripherals

Emphasis on consumer education will help people deal with compatibility and sophisticated peripherals, Pearce believes. "I would like to see more education of the masses. I'd like to see dealers really taking care of customers.

"The computer is a sophisticated piece of equipment. Consumer confusion is partly the manufacturer's fault. He says, 'Here, just touch this screen, press this button. It's easy to use!' That only frustrates people when they find out it's not.

"I don't think we're going to see the trend of packaged systems go very far. I've always liked the concept of components—they give the consumer limited flexibility. There will always be a peripheral market." ©

JUMPMAN'S A GREAT GAME. BUT YOU'VE GOT TO WATCH YOUR STEP.



Meet the Alienators. A fiendish bunch who've planted bombs throughout your Jupiter Command Headquarters.

Your job? Use your lightning speed to scale ladders, scurry across girders, climb ropes and race through 30 levels to defuse the bombs before they go off.

That's the kind of hot, non-stop action we've packed into the award-winning,* best-selling Jumpman,™ and into Jumpman Jr.,™ our new cartridge version with 12 all-new, different and exciting screens.

Both games force you to make tough choices. Should you avoid that Alienator, climb to the top and try to work your way down, or try to hurdle him and defuse the bombs closest to you before they go off?

If you move fast you'll earn extra lives. But if you're not careful, it's a long way down.

So jump to it. And find out why Jumpman and Jumpman Jr. are on a level all their own.

One to four players; 8 speeds; joystick control. Jumpman has 30 screens. Jumpman Jr. has 12 screens.

EPYX COMPUTER SOFTWARE

STRATEGY GAMES FOR THE ACTION-GAME PLAYER.

*1983 C.E.S. award winner.

Modern Memory: The Future Of Storage Devices

Selby Bateman, Assistant Editor, Features

Big business is already using microfloppies, Winchester discs, and laser technology for data storage. As some of these innovations filter down to the home computer market, your tape recorder could become as obsolete as a paper tape punch.

Linda Helgerson was up to her ears in floppy discs. Something had to be done. Three or four hundred of the 5¼-inch discs were stored in her home—row upon row of mailing lists, bibliographical data, and spreadsheet analyses.

"I just didn't have enough storage. My mailing list itself was on five floppies that had to be merged," says Helgerson. "There's just no way I could manage that amount of data using floppies."

After a careful study of her needs, she purchased a 10-megabyte hard disc drive. The result has been dramatic. Since she put her mailing list on the hard disc system, she has added another 6000 names, and there's still plenty of room to spare.

Mass Storage Isn't For Everyone

As head of her own northern Virginia consulting company, which is run out of her home, Helgerson admittedly has extraordinary storage needs. The two TRS-80 Model 3 computers which serve her business, Quarry Hill, Inc., also double as teaching tools, game machines, and word processors for her two teenage daughters.

Helgerson is one of a growing minority of personal computer users who are finding that their needs are not met by minifloppy disc or cassette tape storage systems. Newer, faster, larger-capacity storage devices aren't yet available for home computer users. But industry observers are seeing the first real stirrings of interest in those products among the more adventurous home computer owners.

Whether you need a different storage system now or not, it's worth knowing about *perpendicular recording, microfloppy discs, interactive videodiscs,* and *Winchester disc drives*. They'll be increasingly important to future home computing.

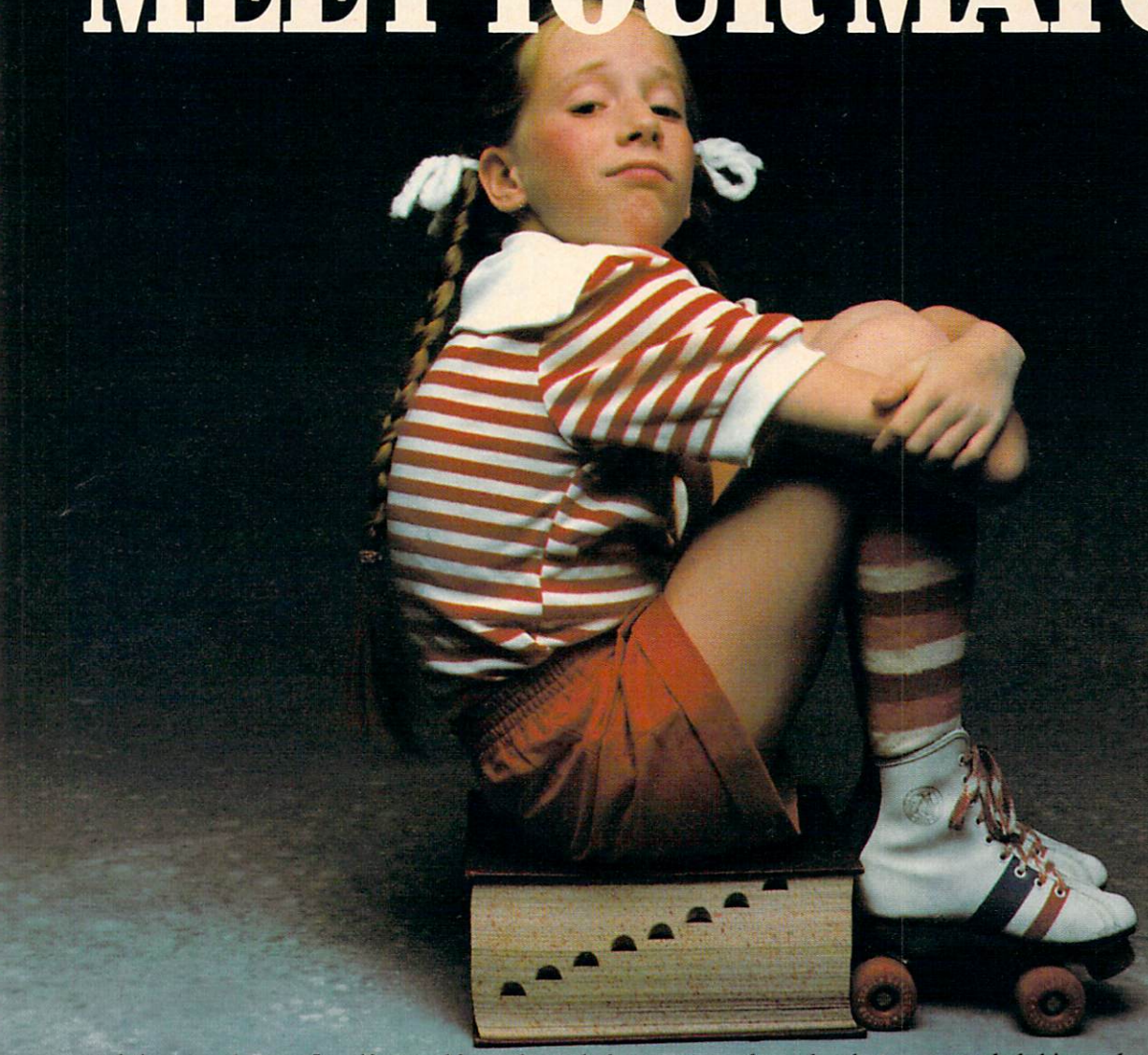
First, The Bad News

For those who have mass storage needs like Linda Helgerson's or who are dedicated computer hackers itching to use the latest technological innovations, there is some bad news and some good news.

The bad news, says Jim Porter, editor of the respected annual market study *Disk/Trend Report*, is that advances like microfloppy discs and inexpensive hard discs for the home market are at best several years away. And even then, Porter is doubtful there will be a large enough body of computer users who will want the products.

The good news, he adds, is that somebody

NOAH WEBSTER, MEET YOUR MATCH.



A few months ago, Jennifer would rather have gone to the dentist than do her spelling homework.

Then Mom bought Crypto Cube™ by DesignWare.™ Now Jennifer has become a word fiend. In fact, she spends hours paging through the dictionary to find words that will stump her parents. And, as she does, she builds her word skills.

Crypto Cube, like all DesignWare software products, combine computer game fun with sound educational principles.

THE THREE DIMENSIONAL COMPUTER WORD PUZZLE.

Five minutes after Jennifer sat down at the computer with Crypto Cube, she was hooked. First she worked her way through the many word puzzles that come with the game. Then her parents typed her spelling homework into new puzzles.

Then Jennifer started making puzzles for her parents!

So now, Crypto Cube is the favorite family game in Jennifer's home.

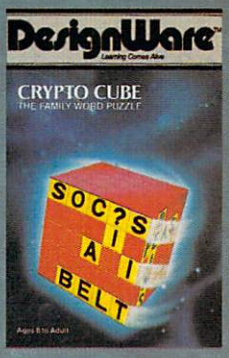
As Jennifer would say, "indubitably."

DESIGNWARE MAKES LEARNING COME ALIVE.

If you own an Apple][plus, Apple //e IBM-PC, Atari 400, 800, or 1200XL with a disk drive, you should take a close look at all the DesignWare software.

Another word game, Spellicopter,™ is an action-packed spelling game. You'll fly perilous missions through crowded skies and mountainous terrain to rescue words. And you'll want to keep an eye out for our new math and science games. See your local dealer or call DesignWare at (800) 572-7767, in California (415) 546-1866 for our free software catalog. You'll be delighted with the way your kids will learn with DesignWare.

And they'll be playing for the fun of it.

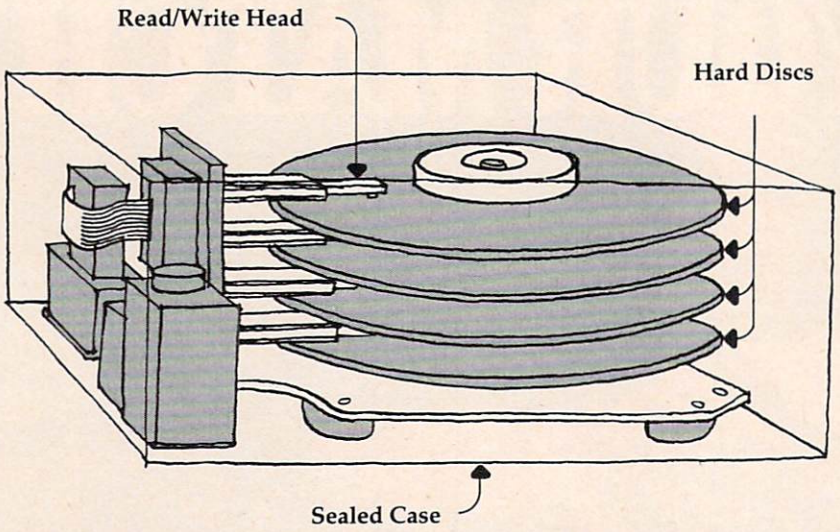


DesignWare™

LEARNING COMES ALIVE.

"Atari 400, 800, and 1200XL, IBM-PC and Apple][plus and Apple //e" are trademarks of Atari, Inc., IBM Corp. and Apple Computer, Inc. and are not related to DesignWare.

Figure 1: A Hard-Disc Drive



somewhere is probably working right now on the product you want. "I really think in the small computer area almost every whim will be responded to. And if something has a following there, then the response will be fairly prompt. I've seen it over and over again. It's hard to see how any niche will not be checked out."

Before we look at some of the most important trends in storage, consider where 99 percent of us are today.

Tape Or Disc Most Common

Virtually all home computer users now have either a tape drive system or a floppy disc drive. Both of these devices use a magnetic coating that records the electronic signal from a computer. When you tell the computer to store something on either tape or disc, it writes on the magnetic medium by magnetizing small areas in a form of binary notation, magnetic ones and zeros. Once these areas are magnetized, they have a self-locking mechanism which preserves the integrity of the stored information.

As computer owners quickly find out, a tape recorder is the least expensive memory storage device. But what you save in money you pay for in time. In order to find something, the tape must physically pass in front of the stationary read-write head so the recorder can check each byte of data, in a sequential search.

Computer users did not relish waiting while the tape drive did its work, and that led to the introduction of disc drives for home use.

First developed by IBM in 1965 in an 8-inch format, then adapted by Shugart in 1976 to the familiar 5¼-inch size, floppy discs have quickly become the medium of choice for microcomputer data storage. The floppy disc (or diskette) is a random access device, in which both the read/write head and the disc move. In its protective paper sleeve, the disc is inserted into a disc drive, where it spins at about 300 revolutions per minute while the head seeks out the requested information anywhere on the surface of the disc.

Hard Choices

A typical 5¼-inch minifloppy disc might contain as much as 350–400K (kilobytes, or 358,400–409,600 characters) if the tracks on which information is stored are on both sides of the disc and densely packed. Many 5¼-inch discs are single-sided, single-density, and hold about half that much.

Compare that to the hard disc drive, often called a Winchester drive, which Linda Helgerson purchased. Storage capacity for that drive is 10Mb (10 megabytes, more than 10 million characters) of data.

Hard disc drives cost more (Helgerson's was close to $2000) and have been used almost exclusively in business settings, where large quantities of information must be stored and retrieved quickly. As their name implies, hard discs are rigid. They are made of aluminum (also in 8-inch and 5¼-inch sizes) and are permanently sealed inside a case. Although some hard discs can be removed from the drive, most cannot. The hard disc spins at faster speeds (usually 3600 rpm) than a floppy, and the read/write head actually floats just above the disc rather than directly contacting it as with floppies. Hard discs also have faster access times.

More Interest Than Need

Why not use a hard disc for your home computer?

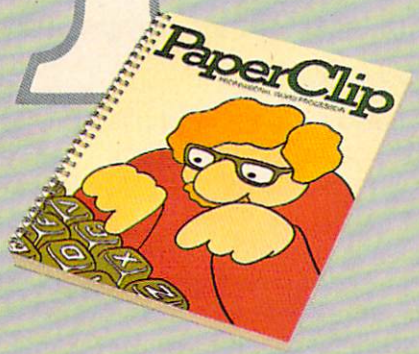
"We've had more than just casual inquiries about hard discs for the Atari 800," says Bob Gerwer, vice president of marketing for Percom Data of Dallas, Texas. "The people who originally bought the 800 were genuine hackers. And the ones who bought it for four or five hundred bucks have got a lot invested in it. Now, some of those people are interested in hard discs."

Kevin Burr, director of communications for Shugart, a company that has been a leader in the original equipment manufacturing (OEM) industry, reports that his organization has also seen some limited interest in hard disc drives for the home market.

"But it's not a dramatic increase of interest,"

YOUR 3 BEST REASONS TO OWN A COMMODORE 64™

1



The best word processing program of its kind

PaperClip* is the program that makes word processing so simple you'll never use a typewriter again. Advanced features you might only expect on a much more expensive system, yet so easy to use even a novice can get professional results.

2

The easy file management system with awesome capabilities

Delphi's Oracle* is like a computerized filing cabinet with a brain. Organize your files any way you want. Then search, sort and analyse your information with effortless speed. So versatile, its power will amaze you.

3

The interface to end all interfaces

BusCard* is a magic box that lets you add disk drives, hard disk, virtually any printer, and a whole range of other peripherals without any costly additional equipment. Gives you extended BASIC, and other impressive capabilities your 64 could never handle before!

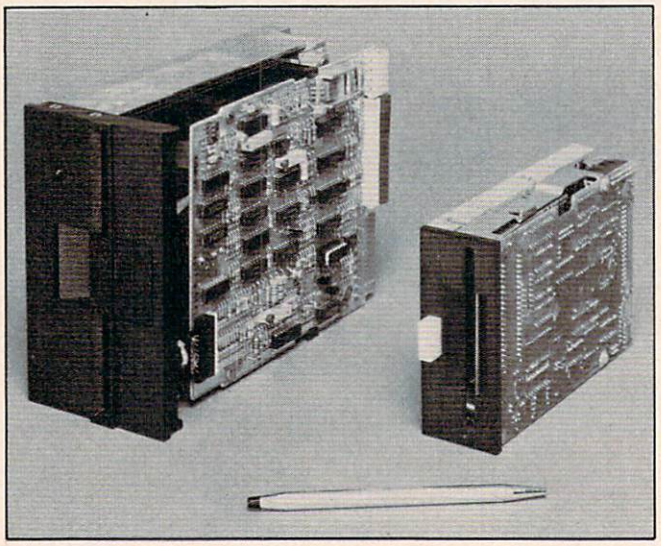
BATTERIES INCLUDED

*PaperClip, Delphi's Oracle and BusCard have been developed specifically for Commodore computers by Batteries Included. For a full-color brochure on all 3 of these packages, write to Batteries Included, 186 Queen St. W., Toronto, Ontario, Canada M5V 1Z1, or call (416) 596-1405.

he cautions. "A home user typically does not need that kind of capacity. I think it's more of a novelty rather than a strong need from those users."

Hard Discs More Delicate

At the Tandon Corporation, which during 1983 reportedly had about a 60 percent market share of the $4.3 million 5¼-inch floppy disc drive industry, marketing manager Bob Abraham concurs with Burr about the immediate future of hard discs in the home.



Shugart's 3½-inch SA300 (right) is a single-sided microfloppy drive offering 500K bytes of capacity. It is compatible with the standard 5¼-inch minifloppy disc drives.

"The hard disc just doesn't lend itself to the home environment. I think the industry as a whole has to learn and to educate the user about the care and feeding and handling of hard disc systems. It's really a very different ball game."

One of the problems with a hard disc system for home use is that since the head floats just above the disc, it jars easily and is susceptible to crashes. When a floating head is only .0001 of an inch from a disc, a human hair takes on the dimensions of a felled sequoia. Even a puff of smoke could cause a head crash.

"I guess I would have to say that in the long term, there will be ruggedness built-in. The drives will be well-protected and shock-mounted," says Abraham. "And to a large extent, there will be a greater degree of user education. People will just learn that they'll have to be a little more careful with those kinds of things."

Microfloppies For The Home

While industry observers are less than optimistic about the future of hard discs in the home, that is not the case for the microfloppy disc.

"There's a great deal of movement in the industry toward smaller devices that won't sacrifice performance," says Tandon's Abraham.

Adds Shugart's Kevin Burr, "The home market is going to be the key audience for the microfloppy. That's why it was developed."

Microfloppies, floppy discs either 3, 3¼, or 3½ inches in diameter, have been a hotly debated topic in the microcomputer industry for several years. Disagreements center not on whether microfloppies are a good idea, but on what size should be standard. The question is still open, but the 3½-inch microdisc appears to have an edge.

A Standard Is Emerging

"We feel the standard has now been reached, particularly with the recent signing of Apple and Gavilan in a 3½-inch format," says Burr. "And IBM is rumored to be following suit.

"It is probably already the de facto standard in terms of volume and production. Shugart and Sony are the only two manufacturers currently shipping products in volume. We have a lot more products out there than anybody else."

By the end of 1983, Shugart alone expects to have shipped about 10,000 microfloppy products.

Several Advantages

There are several reasons why microdiscs are attractive for home computer data storage. Because of the ability to pack data magnetically in a more compact area, microfloppies can already equal the storage capacities of 5¼-inch or even 8-inch discs. They are less susceptible to temperature and humidity changes and, when packaged in hard plastic-and-metal casings, are less prone to damage. They are particularly suited for use in portable computers where space is at a premium.

While the question of a standard size and available software for the microdiscs may hold back development slightly, there is every indication that microdiscs are on the way to the home. But how soon?

"There will be only a gradual build-up in the total number of microfloppies shipped," cautions industry analyst Jim Porter. "And as for their use with the home computer, for the next several years microfloppy drives are not likely to be lower in cost than equivalent quantities of minifloppy drives."

Vertical Recording Devices

Advances in magnetic media technology will also help to prepare the way for microfloppies. One of the most promising new developments is in perpendicular, or vertical, recording.

Significant increases in storage capacity can be achieved by aligning the magnetic particles on a disc in a vertical pattern rather than in the longitudinal arrangement presently used. While

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+/IIe, Atari® Computers, and Commodore 64™ 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+/IIe; Atari® Computers; Commodore 64™ (disk and cartridge); VIC-20™ (cartridge); IBM® PC.**

Ask your Brøderbund dealer for sneak previews.

Brøderbund Software **Discover the Difference**

17 Paul Drive San Rafael, CA 94903

proponents of vertical recording maintain that products will be on the market within the next year, how soon can owners of home computers expect to find them in stores?

"You're not likely to see perpendicular recording used in products in the home for quite a while," says Jim Porter. "It's probable that flexible disc drives using perpendicular recordings will be shipped by early 1985 in limited quantities. But they'll be the furthest thing from mainstream. There will not be many producers, and the technology is likely to be fussy for quite a while. It probably will end up mainstream, but I think you should be thinking in terms of the end of the decade."

One of the leaders in vertical recording is the Minnesota-based firm, Vertimag Systems. Later this year, the company plans to market a vertical recording system with over six and a half megabytes per 5¼-inch disc. "We're just at the beginning of this technology," says a Vertimag spokesperson. "Just imagine what it will be five or ten years from now."

Although there are very few American companies in the perpendicular recording field, the Toshiba Corporation of Japan is expected to market a vertical recording system, probably sometime in 1985.

An Interactive Dragon On Videodisc

Last year while on a trip, Kent Wood, who directs the Videodisc Innovations Project at Utah State University, glanced into a videogame arcade and saw most of the machines deserted. Around one of the consoles, however, stood a crowd of people watching a new game called *Dragon's Lair*. With color video quality far superior to the surrounding games, *Dragon's Lair* offered 38 short action-adventure scenes with a total of 200 different decisions confronting the player before victory could be achieved.

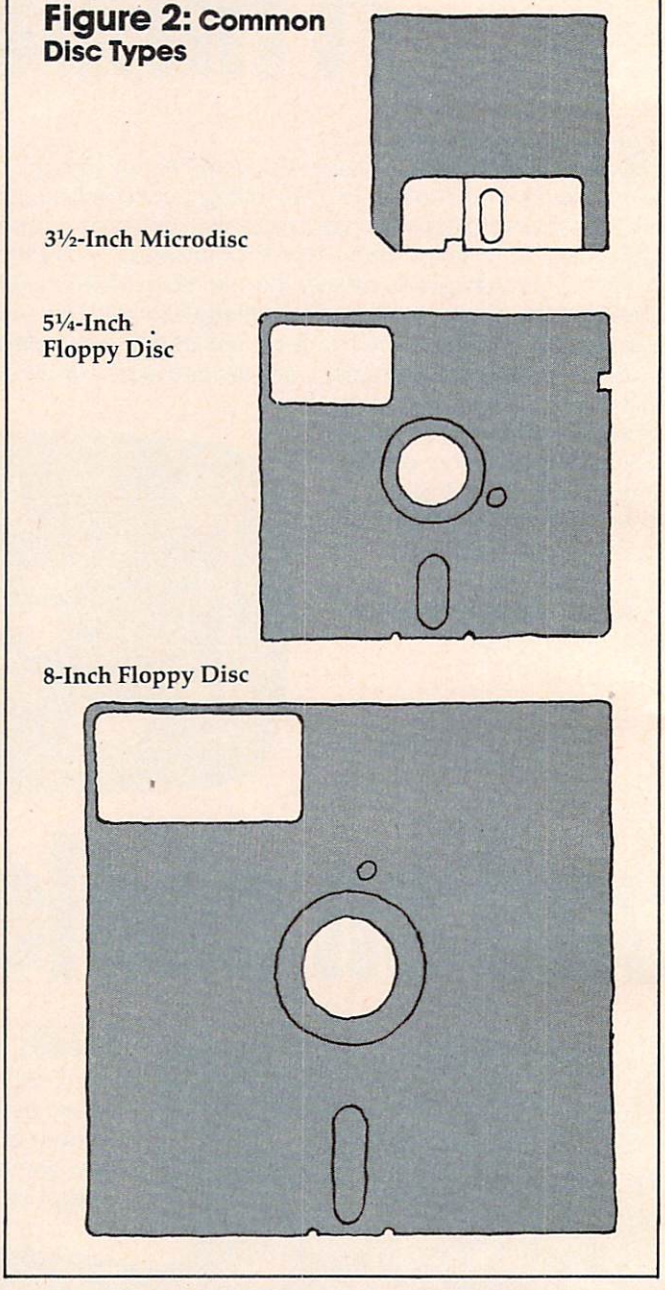
The crowd around the machine that day didn't surprise Wood. The colorful animated game is based on a Pioneer PR-7820 interactive videodisc system. About 14 minutes of the 30-minute capacity of *Dragon's Lair* is interactive. That is, decisions that a player makes cause the laser beam that reads data off the disc to jump to different positions on the disc itself.

Wood doesn't believe he saw just a crowd around a game machine that day. He believes he saw the future. The next step will be low-cost videodisc systems that will be brought into homes as peripherals for personal computers as well as part of overall home information and entertainment centers.

But first, he says, people must have a greater understanding of the possibilities.

"As the level of sophistication increases in the home market about the potential of interactive video, it will overcome the people limitation. When we compare 1984 with what we had when we started in 1977 and 1978, the technology has advanced remarkably. And it will continue, though not quite as fast."

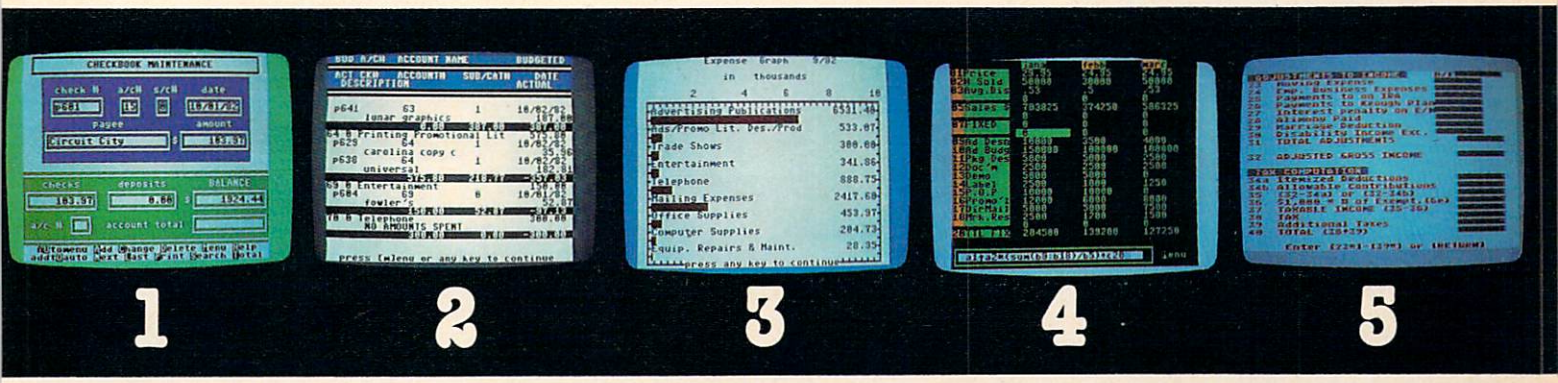
Figure 2: Common Disc Types



Reading The Pits

One of the most promising forms of videodisc technology is optical recording. A laser writes on the disc by burning tiny pits into the surface. A second laser then reads the pits. No head comes in contact with the disc, so wear is reduced. And videodiscs can hold immense amounts of information, say, 4000 megabytes (4 gigabytes, more than 4 billion bytes). An entire set of encyclopedias can be put on a videodisc.

Five Easy Ways To Clean Up Your Finances.



actual screen display *indicates function being shown

Chart of Accounts
*Checkbook Maintenance
Check Search
Prints Checks

*Detail Budget Analysis
Summary Budget Analysis
Income/Expense Statements
Net Worth Statement

Appointments Calendar
Payments Calendar
*Color Chart Package
Mailing List

*Spreadsheet
Compatible with Finance 1, 2 and 5

*Income Tax
Prints forms
Most schedules
Uses Finance 1, 2 and 4

the Complete Personal Accountant™

Whether you're cleaning up at home or around the office, there's NOW a COMPLETE line of money management software that will attend to all the details, while letting you see the whole financial picture. The *Complete Personal Accountant's* exclusive combination of easy to use programs give the wise investor a quick and dependable way to control finances and plan for the future.

FINANCE 1 gets you organized with a standard chart of accounts adaptable to any situation. The Checkbook Maintenance program with *full screen editing* and special 'Help' commands let you find any check by any field. You can flag tax deductibles, reconcile your bank statement, print checks and more.

FINANCE 2 tells you where your money is, where it's going and where it's coming from. The Detail and Summary Budget programs show exactly where you're spending your money. The Income/Expense and Net Worth programs provide professional-looking statements that can be printed with any 80 column printer.

FINANCE 3 separates the CPA from the competition. No other finance package for the home or small business gives you Appointments and Payments Calendars for scheduling your time and money. Few packages offer the ability to chart each account in color. And only the CPA includes a mailing list with a 1200 name capacity*. All reports are printable with an 80 column printer.

FINANCE 4 lets you determine the "what if's" of your financial future. With this easy to learn spreadsheet you'll spend more time making decisions and less time crunching numbers.

FINANCE 5, The Tax Handler™, uses your files from Finance 1, 2 and 4 to complete your taxes in a fraction of the normal time.

The Complete Personal Accountant™ line of money management software is simply the most comprehensive, easy to use financial software available anywhere.

	Disk	Cassette
Finance 1	39.95	34.95
Finance 2	29.95	24.95
Finance 3	29.95	24.95
Finance 4	29.95	24.95
Finance 5	59.95	54.95
SAVE when you purchase Finance 1, 2 and 3 as a set	79.95	74.95

Available for Atari 400/800/1200™, Commodore 64™, IBM PC™, TRS 80 Color™ and Vic 20™

Prices subject to change without notice. Add $3.00 for postage and handling.

Ask you local deal to see a running demo or call 1-800-334-SOFT to order direct.

*Varies according to computer.

programmer's institute a division of futurehouse

p.o. box 3470, department c, chapel hill, north carolina 27514

But to be truly interactive, a videodisc must be able to withstand repeated rewritings, just as magnetic disks do. In burning a pit into the surface of a videodisc, however, the laser eats away some of the material.

Magneto-opticals is one of the possible solutions.

Erasing With A Laser

In magneto-opticals, the laser is used to heat a special coating until it reaches the Curie point (named for Madame Curie), the temperature at which magnetic materials revert to a neutral magnetic orientation. Information is added or erased in this manner. A second, weaker laser, using a polarized filter, then reads the materials. Wedding the laser to magnetic media in this way means vastly reduced wear on the videodisc and allows repeated rewritings.

"It's a strange kind of marriage between optical technology and magnetic technology," says Porter. "Many companies have been working in the area, such as IBM, Phillips, Xerox, and several Japanese companies."

While magneto-opticals and another laser-writing experiment called *phase-change* have been demonstrated in the laboratory, Porter says there are quite a few difficulties in making them producible. Commercial products using either technology are at least several years away.

Videodisc For The Commodore 64

Videodisc systems are being used on a growing basis with computers for job training, education, and data base archives. There are a number of compatible systems currently being marketed, but they can be expensive.

For owners of Commodore 64 computers who want to go interactive, Micro-Ed, Incorporated of Minnesota offers a product called Lasersoft, an interactive videodisc microcomputer instructional system aimed at the low-end market.

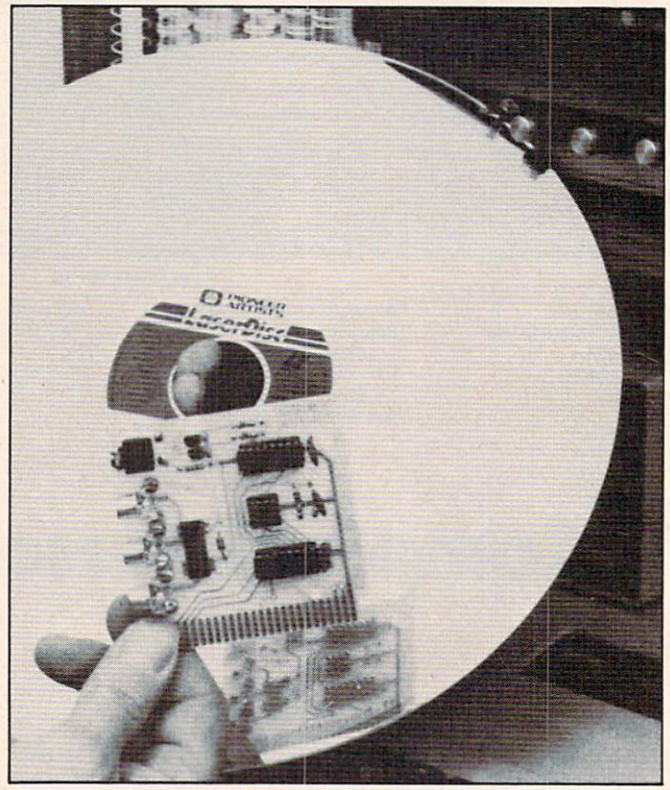
The system is designed to work with a Commodore 64 with 1541 disc drive, a color monitor, Pioneer 8210 videodisc player, and the Micro-Ed controller box, which links the computer and the videodisc player. The company plans to make the controller box available for other computers as well.

Marketed at under $200, the controller box enables the computer to access at random any of the thousands of frames on the videodisc and present them on the monitor. (Micro-Ed, Incorporated, P.O. Box 444005, Eden Prairie, MN 55344, (612) 944-8750.)

LaserDisc Interface For Apple

Another company, Anthro-Digital, Inc., offers a $275 Omniscan LaserDisc interface which connects an Apple computer to a Pioneer, Sylvania, or Magnavox LaserDisc. Omniscan allows the computer to duplicate the functions of the videodisc control panel, but under programmed control. (Anthro-Digital, Inc., P.O. Box 1385, Pittsfield, MA 01202, (413) 448-8278.)

Judith Paris, who edits the quarterly trade publication *Videodisc/Videotex*, believes that the increase in use of videodisc players as microcomputer peripherals depends on the availability of inexpensive generic interfaces and software to control the videodisc player.



Anthro-Digital, Inc.'s Omniscan LaserDisc interface for use with an Apple computer and appropriate videodisc systems.

She estimates that by the end of the 1980s, government agencies and the armed forces will often be using interactive video systems for archival purposes and training devices. Increasingly, large companies are moving to more sophisticated use of integrated information systems with interactive video.

A Solid Market Base

"The videodisc industry is still in search of its identity," says Paris. "But the fact that government is pushing it, and that business systems are developing a lot of uses that will have an impact on home use, means that it will really start coming into its place."

Jim Porter agrees. "There are companies putting together hardware using videodiscs and computers for business to make data bases, store digitalized material for character-by-character retrieval, and sometimes for the creation of im-

ages. These include a lot of training areas and management functions.

"I really doubt that there's much real demand to have, say, the *Encyclopaedia Britannica* available on your personal computer. It's going to take a lot of experimentation and entrepreneurial effort to find out just what people will want to buy."

A Cloudy Crystal Ball?

In forecasting computer industry trends, the future must often be measured in months, not years or decades. That can turn even the best crystal ball cloudy. As Porter notes, in the free-market competition of the microcomputer field, anything can happen.

"So-called predictive research is usually not worth the powder to blow it up," he says. "When someone is asked to put up money to buy some specific thing and then that individual establishes his own priorities as to where he's going to spend his money, that's a lot different from saying 'Would you like to have....?' in a questionnaire."

Personal computer owners should have plenty of opportunity to show what they do and don't want in the field of mass storage devices, he concludes. "There are literally hundreds of small operations out there that will do these things. And if they've got what people want, it'll blossom." ©

Coleco's Adam:
A Hands-On Report

Selby Bateman, Assistant Editor, Features
Tom R. Halfhill, Features Editor

Coleco's long-awaited Adam, first promised for delivery early last fall, began appearing on retail shelves in limited quantities by mid-October. The company is counting on a combination of low price (initially $600, now $700) and attractively bundled hardware/software to capture a significant segment of the home computer market this year. Here's a hands-on look at Coleco's entry into this crowded field.

Since its first appearance at the 1983 Summer Consumer Electronics Show in Chicago, Coleco's Adam has stirred great curiosity among consumers and has forced competitors to change some of their marketing strategies. Suddenly, bundled seemed better. The Adam's grouping of computer, detached keyboard, daisy wheel printer, high-speed cassette drive, joysticks, and software prompted announcements of similar packaging options from Commodore, Atari, and others almost overnight.

Coleco launched the Adam with a multimillion-dollar advertising campaign, including TV commercials and lavish color ads in leading magazines. Unfortunately, the Adam was never shipped in sufficient quantities to satisfy demand before Christmas. A few retail chains reportedly backed away from planned Christmas ads for the Adam because of the delayed deliveries.

Since then, Coleco has run up against quality-control problems and bugs in early production models. One major department store chain, J. C. Penney, announced in December it was not carrying the Adam because of problems with quality control. We'll get to this in a minute.

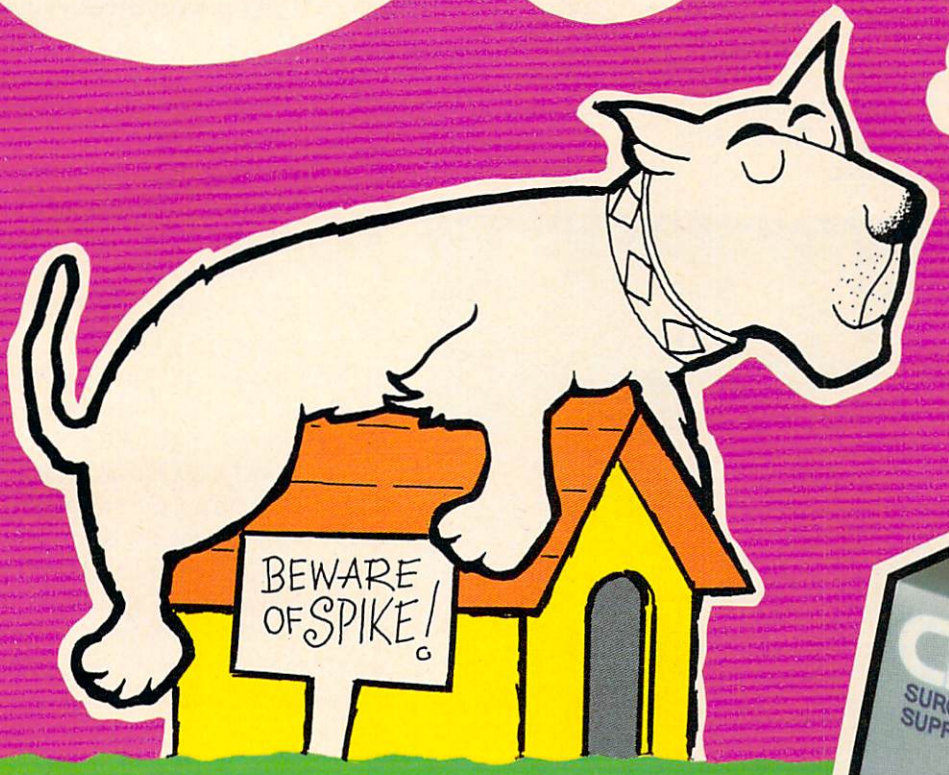
The System Approach

There are two functionally identical versions of the Adam. You can buy the whole system from scratch for about $700, or get an expansion package for about $500 that converts a ColecoVision videogame machine into an Adam. Thousands of ColecoVision owners may be predisposed to buy an Adam instead of another home computer. The Adam even runs all the ColecoVision game cartridges.

When you buy an Adam, getting it home is a challenge because everything comes packed in one huge box that barely fits into today's economy cars. Inside the box is the Memory Console, a low, rectangular enclosure which contains the Central Processing Unit (CPU) and the Digital Data Drive (a high-speed cassette recorder); a 75-key, full-stroke, detachable, typewriter-style keyboard; a letter-quality daisy wheel printer; two joystick controllers with built-in numeric keypads and coiled cords; enough cables to hook everything together; three digital data packs (cassettes); plus three manuals and two reference guides.

Two of the data packs are prerecorded: One contains *SmartBASIC*, the Adam's standard programming language; and the other is *Buck Rogers Planet of Zoom*, an arcade game. The third data pack is a preformatted blank tape. Besides this software, the Adam itself contains a built-in word processing program, SmartWriter. Accompanying booklets include *Getting Started: Adam Set-Up Manual* (64 pages); *Programming With Adam: A Simple Guide to SmartBASIC* (222 pages); *Typing With Adam: Using Easy-to-Learn SmartWriter Word Proc-*

BONES...
MAILMEN...
CATS...
COMPUTERS!



DON'T LET SPIKE BITE YOUR BYTES AND BITS.

Dymarc's new Clipper keeps your computer from going to the dogs. At a price that won't cost you a lot of bytes and bits.

Dymarc, the people who brought you the Clipstrip and ClipCube, now bring you the new Clipper with advanced power protection for your computer. Like all their products, the new Dymarc Clipper has high quality circuit designs to stop harmful surges and spikes.

With this innovative, advanced protection, surges and spikes are prevented from disrupting important programs or destroying delicate computer circuits.

Protect your computer investment now! Insist on the Clipper to put a leash on Spike before he takes a byte out of your computer.

See your local computer dealer today or call Dymarc.

For the Dymarc Dealer nearest you, call toll-free: 800/638-9098

Clipper™ SURGE SUPPRESSOR

DYMARC INDUSTRIES, INC. 21 GOVERNOR'S CT., BALTIMORE, MD 21207

essing (101 pages); *Adam SmartWriter Easy Reference Guide*; and *Adam Super Game Pack* (instructions for the arcade game).

As the advertisements promise, you get a complete computer system that is ready to run and do something useful when you first get it home. That fact, plus the attractive package price, may well be Coleco's strongest selling point—competitors require you to add some extras separately.

The alternative "separate components" approach to building a home computer system would allow more freedom to choose certain peripherals and software, since you can buy compatible products from independent manufacturers. If assembled correctly, the resulting system may well outperform a comparable system made up of a single manufacturer's components. On the other hand, there are many products available, and compatibility can be hard to ascertain. Many people (especially beginners) feel more comfortable buying a prepackaged system. The Coleco Adam is aimed at the latter market.

The Coleco Adam comes with everything shown here, plus software and manuals. manuals.

Adam's Features

For the money, the Adam's features look impressive. It comes with 80K of Random Access Memory (RAM), which Coleco says will be expandable to 144K in the future. A Texas Instruments sound chip and a TI graphics chip endow the Adam with three sound channels, 16 colors, and 32 sprites (programmable screen objects for animation). The Memory Console has three internal expansion slots and one external expansion connector (although no expansion modules are yet available); a topside slot for ROM cartridges and ColecoVision games; connectors for the joysticks, printer, keyboard, TV, a monitor, and auxiliary video; and room for a second Data Drive (not yet available).

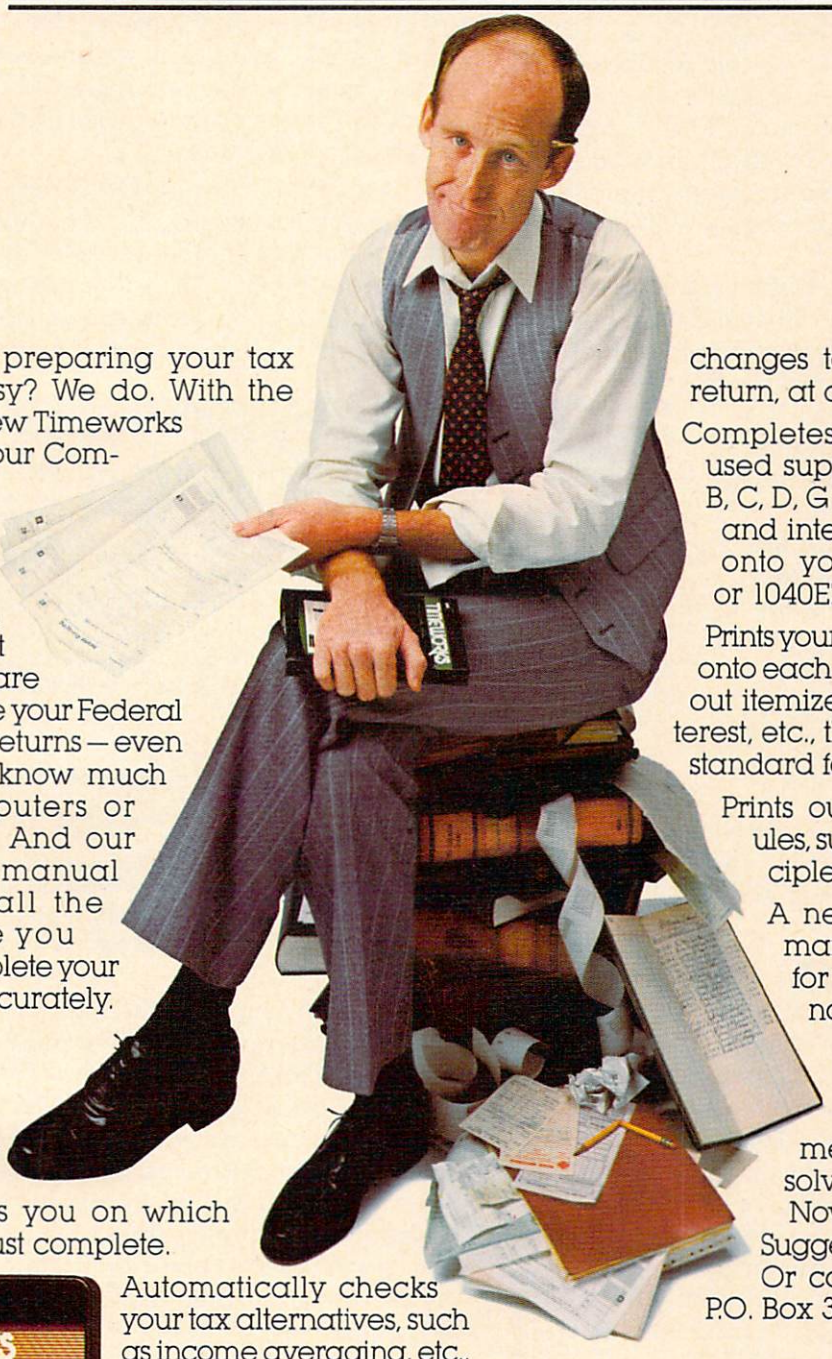
The keyboard is impressive, particularly given the system's price. The keys are sculpted Selectric-style and have a nice feel. Many keys are specially labeled to work with the built-in word processor. For instance, when the computer is first switched on you can boot up SmartWriter simply by pressing the ESCAPE/WP key in the upper-left corner. Other dedicated keys include MOVE/COPY, STORE/GET, PRINT, UNDO, WILD CARD, CLEAR, INSERT, and DELETE. In addition, there are six special function keys with preprogrammed functions for SmartWriter. Four independent cursor keys are arranged in a convenient diamond pattern around a HOME key. Lightweight and fairly flat, the keyboard can rest in your lap while connected with its coiled phone cord to the Memory Module. A plastic attachment snaps onto the side of the keyboard to hold one of the joysticks.

The Coleco printer has been widely criticized as noisy and slow (ten characters per second is much faster than most people can type, but annoyingly tedious for a printer). However, you'll have to balance these debits against the much higher cost of buying a daisy wheel printer separately—most of them would cost as much as the whole Adam system.

The Adam's CPU is the widely used Z80A microprocessor chip. Z80-family chips (made by Zilog) are found in TRS-80, Epson, Timex/Sinclair, Osborne, Kaypro, and many other personal computers. An eight-bit chip, the Z80A cannot address more than 64K of memory at a time. Since the Adam has 80K (with room for another 64K), not all of this memory is contiguous. That is, anything above the maximum addressable 64K must be *bank-switched*, or flipped in and out as needed. Usually this is handled by the operating system for you. Other eight-bit computers overcome their 64K limits the same way (such as the Atari 1200XL and Commodore 64, which each have at least 80K of RAM and ROM).

One advantage of the Z80 over other chips is that it runs an operating system called CP/M (Control Program for Microcomputers), for which a large pool of mostly business-oriented software is available. This means the Adam may work with CP/M someday, although you would still need a way to obtain the software in a format the Adam could read (its data packs are not compatible with other storage media). A CP/M-compatible disk drive is in planning stages.

NOW! FOR $49.95 SWIFTAX WILL PREPARE YOUR INCOME TAX RETURN SWIFTLY.

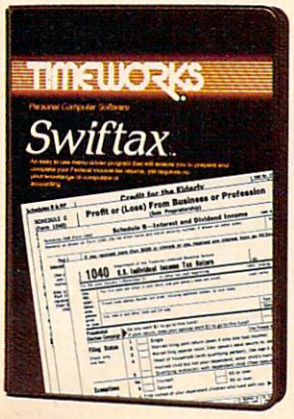


Who says preparing your tax return is easy? We do. With the incredible new Timeworks Swiftax for your Commodore 64.*

With an easy-to-operate, menu-driven program that lets you prepare and complete your Federal income tax returns—even if you don't know much about computers or accounting. And our easy-to-use manual gives you all the knowledge you need to complete your tax return accurately.

Features:

Guides you through the tax preparation process, and instructs you on which forms you must complete.



Automatically checks your tax alternatives, such as income averaging, etc., and calculates the lowest amount of income tax you must pay.

Sets up a unique Taxpayer File, enabling you to make changes to your completed tax return, at a later date.

Completes the most commonly used supporting schedules—A, B, C, D, G and W, stores the totals, and integrates this information onto your Form 1040, 1040A or 1040EZ.

Prints your tax information directly onto each IRS schedule and prints out itemized lists of dividends, interest, etc., that are too long for the standard forms.

Prints out amortization schedules, summarizing yearly principle and interest payments.

A new program disk and manual can be obtained for each future year at a nominal charge.

Swiftax! It's just another good example of Timeworks' commitment to quality, problem-solving programming.

Now at your favorite dealer Suggested retail price, $49.95. Or contact Timeworks, Inc., P.O. Box 321, Deerfield, IL 60015.

TIMEWORKS

Software With Substance —For Everyone.

Faster Than Regular Tapes

The data packs appear to be ordinary cassettes, but the plastic shells lack capstan holes and will not fit into a standard cassette recorder. The tape itself is a gamma ferric oxide formulation, similar to the tape in some good-quality audio cassettes. However, Coleco says ordinary audio cassettes will not work, and that blank data packs must be purchased from Coleco dealers for about $10. Coleco explains that the data packs are specially engineered for high-speed use, and that tape path accuracy is ten times better than with ordinary cassettes. Also, the data packs must be preformatted at the factory—they won't work unformatted.

Coleco compares its Digital Data Drive to the floppy disk drives commonly used with other computers. The digital drive *is* much faster than an ordinary cassette recorder, but is not quite as fast as most disk drives. Then again, most disk drives cost at least half as much as the entire Adam system.

The file directories for the data packs—analogous to disk directories—are located in the center of the tape to help speed up the searching and loading process.

Each data pack stores 500K (half a megabyte), or the equivalent of about 250 typed pages of text. This *does* compare favorably with disks, since most minifloppies store perhaps only ¼ that amount.

This version of the Adam converts the ColecoVision videogame machine into the computer system. It is functionally identical to the regular Adam.

Apple Compatible?

Another interesting feature of the Adam is its *SmartBASIC*. Most home computers have BASIC built into ROM, so it's ready instantly after power-up. Application programs, such as word processors, must be loaded from disk or tape.

Coleco took exactly the opposite approach with the Adam. SmartWriter is built into ROM, accessible with a keystroke after power-up, but *SmartBASIC* must be loaded from tape. This takes a couple of minutes. Coleco evidently figured that more Adam users will be interested in word processing than programming.

Coleco says *SmartBASIC* is designed to be compatible with Applesoft, the Apple II/IIe's Microsoft BASIC. This will be welcomed by people who already are familiar with Applesoft. Most of the *SmartBASIC* commands are the same. Since many school systems have Apples, Coleco obviously decided that an Applesoft-compatible BASIC would be an added attraction for purchasers with school-age children.

However, this does not mean you can simply load up an Apple program into the Adam and type RUN. For one thing, you'd have to manually type in the Applesoft listing, since Applesoft programs are not available on Coleco data packs. Also, remember that the Apple has a 6502 CPU instead of the Z80A and an entirely different memory layout. Therefore, Applesoft programs with PEEK, POKE, and CALL statements will not work on the Adam without extensive modifications. (Most Applesoft programs use numerous PEEKs, POKEs, and CALLs.)

SmartBASIC's Applesoft compabibility has another drawback, too. The Adam has advanced features not found on the Apple—such as three-channel sound and 32 sprites. *SmartBASIC*, patterned after Applesoft, does not, however, effectively support all these special features. Conspicuously missing are the many commands needed to manipulate sprites and play music.

Coleco also adopted an Apple-type, line-oriented screen editor. The INSERT, DELETE and cursor keys that are so handy with SmartWriter are of little use with *SmartBASIC*. When you mistype a character in a program line, the manual recommends retyping the entire line. Although you can move the cursor up to the typo and fix it on the screen, hitting RETURN wipes out the rest of the line.

Software, Hardware To Come

Aside from the software which comes bundled with the Adam, there isn't much else available—at least not yet. However, Coleco says it is working hard to remedy the situation. A company spokesman said that by early December agreements had already been worked out with such software producers as Spinnaker, Brøderbund, Sierra On-Line, and Infocom. Coleco is encouraging other inde-

pendent software publishers as well, and is preparing its own line of programs. Since all ColecoVision cartridges work on the Adam, of course, there is a good supply of game software.

The word processing software built into the Adam is menu-driven and easy to use, although a bit sluggish for fast touch-typists. Margins and column positions are shown at the top of the screen. The letters appear on a black line at the bottom of the screen as you type. They shift above that line when more words are typed. The word processor can also be used in an "electronic typewriter mode" (each keystroke triggers the printer to type one character).

Besides lining up additional software, Coleco also is readying some more hardware. A Coleco spokesman says that, with an expansion module costing about $70, the Adam will accept videogame cartridges designed for the Atari 2600 VCS game machine. To add a second Data Drive, it would cost about $150. Other planned options include a CP/M compatible disk drive (about $350), a memory expansion card (under $200), a ROM cartridge (about $30), a telephone modem (about $125), and an RS-232-C serial interface (approximately $50).

Quality And Availability

As mentioned, there has been considerable speculation about the quality of the Adam. Partly this is due to skepticism over how Coleco can assemble a complete system for such a low price. Coleco staunchly denies that the Adam's failure rates are greater than any other home computer's. The company maintains that initial failure rates were under ten percent, and that many of those were caused by customer misuse.

However, consistent problems have been reported, both by users and by the industry press. COMPUTE! encountered one of these problems, which reportedly afflicts thousands of new Adam owners (including other magazines doing test reports). After working with the system for several days, we suddenly found that the *SmartBASIC* tape would no longer load. It turns out that switching on the Adam generates a strong magnetic field, strong enough to erase a data pack sitting near the computer or even in the Data Drive. Since there is no way to back up *SmartBASIC* (or any other data pack) without two Data Drives, users can be left without a BASIC language.

To solve this problem, Coleco is making replacement tapes available to those who call the company's toll-free number (1-800-842-1225). Also, Coleco is adding a notice to the manual and a sticker to the computer warning new users about the hazard.

As for the Adam's printer, it's obviously not intended for heavy use. One unusual feature we noticed is that the power switch for the entire Adam system is on the printer, not the computer; if the printer does break down someday, the computer cannot be turned on until the printer returns from the repair shop.

Regarding availability, Coleco says it plans to increase shipments to 150,000 units a month during the first quarter of 1984. The Adam is being marketed through major retail chains and is still being heavily advertised. It's still too early to tell if the recent price increase will significantly affect sales. (The increase boosted the wholesale cost from $525 to $650; retailers are free to charge what they like since Coleco does not suggest a retail price.)

It's also too early to tell which competitor, if any, will be hurt most by the Adam. The Adam still costs less than a Commodore or Atari equipped with a disk drive and dot-matrix printer, and costs much less than a fully configured IBM PCjr or Apple IIe.

The Adam's main impact may well be to change the way manufacturers approach the home computer market. As more and more neophytes take the plunge into home computing, there could be greater demand for bundled packages which take the guesswork (and expense) out of piecing together a workable, useful, personal computer system. ©

The Automatic Proofreader

For VIC, 64, And Atari

Charles Brannon, Program Editor

At last there's a way for your computer to help you check your typing. "The Automatic Proofreader" will make entering programs faster, easier, and more accurate.

We all know it's hard to type in a program correctly the first time. Seemingly trivial typing errors can cause dreaded ERROR messages, or even a *system crash* (the keyboard will not respond to RUN/STOP—RESTORE or BREAK keys). Usually, the only way to recover from such a crash is to reset the computer by turning it off, then on again—wiping out the memory (and all your typing) in the process.

Even when you locate and correct the mistyped lines, there always seem to be more, lurking in the hundred-odd lines of the program. Sometimes you feel like giving up.

Elusive Errors

Some errors are almost impossible to spot, especially for beginners who know little or nothing about programming. For instance, can you spot the mistake in this line?

```
100 C=C+LEN(STR$(VAL(L$))+1
```

Here's how it should read:

```
100 C=C+LEN(STR$(VAL(L$)))+1
```

Did you catch the difference? A right parenthesis was missing before the +1. (A left parenthesis must always have a matching right parenthesis. If you add up all the parentheses in a statement, you should get an even number.)

An Impossible Dream?

The strong point of computers is that they excel at tedious, exacting tasks. So why not get your computer to check your typing for you?

With "The Automatic Proofreader" nestled in your VIC-20, Commodore 64, or Atari computer, every line you type in will be verified. It displays a special code, called a *checksum*, at the top of the screen. The checksum, either a number (VIC/64) or a pair of letters (Atari), corresponds to the line you've just typed. It represents every character in the line summed together. A matching code in the program listing lets you compare it to the checksum which the Proofreader displays. A glance is all it takes to confirm that you've typed the line correctly.

The Automatic Proofreader is a small machine language program that resides in a normally unused area of memory. On the Atari, the program is stored in Page 6 ($0600), where it will safely remain until you turn your machine off, or run another program that uses Page 6. The Proofreader goes into the cassette buffer on the VIC and 64. Putting the Proofreader here does not use any of your BASIC program memory, but it can cause problems, which we'll cover a little later.

Entering The Automatic Proofreader

Commodore (VIC/64) owners should type in Program 1. Program 2 is for Atari users. Since the Proofreader is a machine language program, be especially diligent. Watch out for typing extra commas, or a letter O for a zero, and check every number carefully. If you make a mistake when typing in the DATA statements, you'll get the message "Error in DATA statements" when you RUN the program. Check your typing and try again.

When you've typed in The Automatic Proofreader, SAVE it to tape or disk at least twice *before running it for the first time.* If you mistype the Proofreader, it may cause a system crash when you first run it. By SAVEing a copy beforehand, you can reLOAD it and hunt for your error. Also, you'll want a backup copy of the Proofreader because

FCM™: The Filing, Cataloging and Mailing List Program that does everything.

FCM, formerly 1st Class Mail, is a lot more than just the best mailing list program you can buy. Because along with being the most flexible and easy-to-use mailing list program there is, FCM also handles a number of other tasks more easily than any other program of its kind.

You can use FCM for anything you'd keep on file. Like your address book, household bills, stamp or coin collections, Christmas card list (know who sent you a card last year), fishing gear inventory or medical records.

Or how about a list of important dates (FCM will let you flag them by name, date and occasion). Or maybe you'd like to use FCM for a guest list for a wedding. FCM will even record RSVP's, gifts and thank you notes.

What's more, FCM is incredibly easy to use.

Special Features

FCM lets you create your own mailing label. Which means you can make your labels look the way you want them to. You can even decide to print right on the envelope. Or add a special message line like "Merry Christmas" or "Attention: Sales Manager." FCM is extremely flexible.

And speaking of flexible, FCM lets you search and sort in any of 12 different categories. So you can organize mailings any way you want: by state, company name, zip code or whatever you like. If you're using FCM to catalog your home library, you might want to sort by title, author or category. It's completely up to you.

But one of the best parts about FCM is being able to create your own headings. Because that lets you store, file and catalog just about anything you'd like to keep tabs on.

The Form Letter Feature*

FCM is compatible with many word processing programs such as Screenwriter II, Applewriter I/II/IIe, Apple Pie, Pie Writer, WordStar/MailMerge and Magic Window I/II. Just a few simple commands and you can automatically combine your form letters with your mailing list for professionally formatted documents.

Stop by your Continental Software dealer. Or call us today to find out all about FCM. No matter what you're cataloging, from a household inventory for insurance purposes to a 25,000 person mailing list, FCM is the best program you can buy.

It's true, you still have to lick the stamp. But we're working on it.

Available for: Apple II/IIe, IBM PC/PC XT, Commodore 64, Texas Instruments Professional.

*Available on most versions.

For your free 64 page booklet, "Tips for Buying Software" and complete product catalog, please write Continental Software, Dept. COM, 11223 S. Hindry Avenue, Los Angeles, CA 90045, 213/417-8031, 213/417-3003.

Well, almost.

Continental Software

A division of Arrays, Inc.

you'll use it again and again—every time you enter a program from COMPUTE!.

When you RUN the Proofreader, the program will be POKEd safely into memory, then it will activate itself. If you ever need to reactivate it (RUN/STOP—RESTORE or SYSTEM RESET will disable it), just enter the command SYS 886 (VIC/64) or PRINT USR(1536) for the Atari.

Using The Proofreader

Now, let's see how it works. LIST the Proofreader program, move the cursor up to one of the lines, and press RETURN. If you've entered the Proofreader correctly, a checksum will appear in the top-left corner of your screen.

Try making a change in the line and hit RETURN. Notice that the checksum has changed. All VIC and 64 listings in COMPUTE! now have a number appended to the end of each line, for example, :rem 123. *Don't enter this statement.* It is just for your information. The rem is used to make the number harmless if someone does type it in. It will, however, use up memory if you enter it, and it will cause the checksum displayed at the top of the screen to be different, even if you entered the rest of the line correctly.

The Atari checksum is found immediately to the left of each line number. This makes it impossible to type in the checksum accidentally, since a program line must start with a number.

Just type in each line (without the printed checksum), and check the checksum displayed at the top of the screen against the checksum in the listing. If they match, go on to the next line. If they don't, there's a mistake. You can correct the line immediately, instead of waiting to find the error when you RUN the program.

The Proofreader is not picky with spaces. It will not notice extra spaces or missing ones. This is for your convenience, since spacing is generally not important. Occasionally proper spacing is important, but the article describing the program will warn you to be careful in these cases.

Nobody's Perfect

Although the Proofreader is an important aid, there are a few things to watch out for. If you enter a line by using abbreviations for commands, the checksum will not match up. This is because the Proofreader is very literal: It looks at the individual letters in a line, not at tokens such as PRINT. There is a way to make the Proofreader check such a line. After entering the line, LIST it. This makes the computer spell out the abbreviations. Then move the cursor up to the line and press RETURN. It should now match the checksum. You can check whole groups of lines this way. Atari users should beware of using ? as an abbreviation for PRINT—they're not the same thing in the Proofreader's eyes.

The checksum is a sum of the ASCII values of the characters in a line. VIC and 64 owners may wonder why the numbers are so small, never exceeding 255. This is because the addition is done only in eight bits. A result over 255 will roll over past zero, like an odometer past 99999. On the Atari, the number is turned into two letters, both for increased convenience and to make the Proofreader shorter. For the curious, the letters correspond to the values of the left and right nybbles added to 33 (to offset them into the alphabet). This number is then stored directly into screen memory.

Due to the nature of a checksum, the Proofreader will not catch all errors. Since 1+3+5=3+1+5, the Proofreader cannot catch errors of transposition. In fact, you could type in the line in any order, and the Proofreader wouldn't notice. Anytime the Proofreader seems to act strange, keep this in mind. Since the ASCII values of the number 18 (49+56) and 63 (54+51) both equal 105, these numbers are equal according to the Proofreader. There really is no simple way to catch these kinds of errors. Fortunately, the Proofreader will catch the majority of the typing mistakes most people make.

If you want the Proofreader out of your way, just press SYSTEM RESET or RUN/STOP—RESTORE. If you need it again, enter SYS 828 (VIC/64) or PRINT USR(1536) (Atari). You must disable the Proofreader before doing any tape operations on the VIC or 64.

Hidden Perils

The Proofreader's home in the VIC and 64 is not a very safe haven. Since the cassette buffer is wiped out during tape operations, you need to disable the Proofreader with RUN/STOP—RESTORE before you SAVE your program. This applies only to tape use. Disk users or Atari owners have nothing to worry about.

Not so for VIC and 64 owners with tape drives. What if you type in a program in several sittings? The next day, you come to your computer, LOAD and RUN the Proofreader, then try to LOAD the partially completed program so you can add to it. But since the Proofreader is trying to hide in the cassette buffer, it is wiped out!

What you need is a way to LOAD the Proofreader after you've LOADed the partial program. The problem is, a tape load to the buffer destroys what it's supposed to load.

After you've typed in and RUN the Proofreader, enter the following lines in direct mode (without line numbers) *exactly* as shown:

```
A$="PROOFREADER.T": B$="{10 SPACES}": FOR
   X = 1 TO 4: A$=A$+B$: NEXTX

FOR X = 886 TO 1018: A$=A$+CHR$(PEEK(X)):
   NEXTX
```

Strengthen your hand

with

Superbase 64 T.M.

The complete information control system for the Commodore 64.

The World Famous Commodore 64.

No matter what your business or interest, with Superbase 64 you have a totally flexible 'record' system, as big as you want it, as fast as you need it.

Create your own formats, enter your records, change layouts and datafields.

Superbase gives you unrivalled control in home or office, business or professional practice, with a range of features including:

YOUR OWN RECORDS
- Design **your** layout using text, numeric, calculated result, date, linking and key fields
- Record size up to 1100 characters spread over up to 127 items
- Number of records limited **only by your equipment.** Can be thousands
- As many databases as you want – each with up to 15 files
- Learn fast through built-in HELP screens – then add your own notes

FAST ACCESS
- Keyed records for high speed retrieval – 3 secs for any file size
- Select and search for any name, description, number, date, etc. in multiple combinations
- Sort records into any order
- Display selections or generate printed reports
- Browse through records matching on any criteria

TOTAL CONTROL
- Links to other programs and EASY SCRIPT for personalised mailings, high-quality letters, quotes, tables, etc.
- Effective management of invoices, addresses, stock, membership, appointments – any and every kind of record
- English like commands for easy conversational programming, plus built-in BASIC

DATABASE MANAGEMENT
- Easy to understand menus
- Add or amend fields, or alter length – no file rebuilding needed
- Update files with automatic batch processing option
- Calendar arithmetic for effective time management
- Display quantities, values, totals, as you enter them.
- Formulae for on-screen result calculation.

Superbase 64 T.M.

Precision Software

Precision Software (USA), Inc.
Suite 11D
1675 York Avenue
NEW YORK
N.Y. 10128
(212) 410 3418

OFFICIALLY APPROVED BY COMMODORE

```
OPEN 1,1,1,A$:CLOSE1
```

After you enter the last line, you will be asked to press record and play on your cassette recorder. Put this program at the beginning of a new tape. This gives you a new way to load the Proofreader. Anytime you want to bring the Proofreader into memory without disturbing anything else, put the cassette in the tape drive, rewind, and enter:

OPEN1:CLOSE1

You can now start the Proofreader by typing SYS 886. To test this, PRINT PEEK(886) should return the number 173. If it does not, repeat the steps above, making sure that A$ ("PROOFREADER.T") contains 13 characters and that B$ contains 10 spaces.

You can now reload the Proofreader into memory whenever LOAD or SAVE destroys it, restoring your personal typing helper.

Incidentally, you can protect the cassette buffer on the Commodore 64 with POKE 178,165. This POKE should work on the VIC, but it has caused numerous problems, probably due to a bug in the VIC operating system. With this POKE, the 64 will not wipe out the cassette buffer during tape LOADs and SAVEs.

Program 1: VIC/64 Proofreader

```
100 PRINT"{CLR}PLEASE WAIT...":FORI=886TO
    1018:READA:CK=CK+A:POKEI,A:NEXT
110 IF CK<>17539 THEN PRINT"{DOWN}YOU MAD
    E AN ERROR":PRINT"IN DATA STATEMENTS.
    ":END
120 SYS886:PRINT"{CLR}{2 DOWN}PROOFREADER
     ACTIVATED.":NEW
886 DATA 173,036,003,201,150,208
892 DATA 001,096,141,151,003,173
898 DATA 037,003,141,152,003,169
904 DATA 150,141,036,003,169,003
910 DATA 141,037,003,169,000,133
916 DATA 254,096,032,087,241,133
922 DATA 251,134,252,132,253,008
928 DATA 201,013,240,017,201,032
934 DATA 240,005,024,101,254,133
940 DATA 254,165,251,166,252,164
946 DATA 253,040,096,169,013,032
952 DATA 210,255,165,214,141,251
958 DATA 003,206,251,003,169,000
964 DATA 133,216,169,019,032,210
970 DATA 255,169,018,032,210,255
976 DATA 169,058,032,210,255,166
982 DATA 254,169,000,133,254,172
988 DATA 151,003,192,087,208,006
994 DATA 032,205,189,076,235,003
1000 DATA 032,205,221,169,032,032
1006 DATA 210,255,032,210,255,173
1012 DATA 251,003,133,214,076,173
1018 DATA 003
```

Program 2: Atari Proofreader

```
100 GRAPHICS 0
110 FOR I=1536 TO 1700:READ A:POKE I
    ,A:CK=CK+A:NEXT I
120 IF CK<>19072 THEN ? "Error in DA
    TA statements. Check typing":END
130 A=USR(1536)
140 ? :? "Automatic Proofreader now
    activated."
150 END
1536 DATA 104,160,0,185,26,3
1542 DATA 201,69,240,7,200,200
1548 DATA 192,34,208,243,96,200
1554 DATA 169,74,153,26,3,200
1560 DATA 169,6,153,26,3,162
1566 DATA 0,189,0,228,157,74
1572 DATA 6,232,224,16,208,245
1578 DATA 169,93,141,78,6,169
1584 DATA 6,141,79,6,24,173
1590 DATA 4,228,105,1,141,95
1596 DATA 6,173,5,228,105,0
1602 DATA 141,96,6,169,0,133
1608 DATA 203,96,247,238,125,241
1614 DATA 93,6,244,241,115,241
1620 DATA 124,241,76,205,238,0
1626 DATA 0,0,0,0,32,62
1632 DATA 246,8,201,155,240,13
1638 DATA 201,32,240,7,72,24
1644 DATA 101,203,133,203,104,40
1650 DATA 96,72,152,72,138,72
1656 DATA 160,0,169,128,145,88
1662 DATA 200,192,40,208,249,165
1668 DATA 203,74,74,74,74,24
1674 DATA 105,161,160,3,145,88
1680 DATA 165,203,41,15,24,105
1686 DATA 161,200,145,88,169,0
1692 DATA 133,203,104,170,104,168
1698 DATA 104,40,96
```

Developing a mind for the Future.

RTC

SUPER BASIC $39.95 U.S.*

- Gives you 3 different versions of Commodore Basic Programing Language Version 4 PLUS!
  A Built in Machine Language Monitor!
- Disk & File Maintenance Commands
  Data Handling Commands
  Graphics Plus Basic
  Compatible with Commmodore's "B" Series &
  Much Much More!

RECREATE PROGRAM $39.95 U.S.*

RTC's Answers to Program Recreation
Converts Printer's File to SCRIPT 64's Files

SUPER COPY $29.95 U.S.*

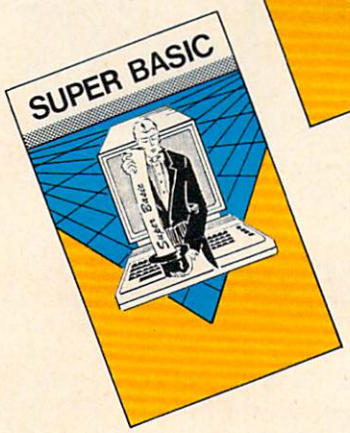
Super Fast Disk Copies on a 1541
Copy Entire Disk in 7 Minutes or Less
Copy Selected Files
Complete Pattern Matching
Full Prompts

BASIC AID $39.95 U.S.*

Your Aid to Writing Programs
Allows Scrolling Through Programs
Adds 33 more Commands to the Basic Language
Has Find, Change, Merge, Move Commands
Convert Hex, Binary and Decimal Numbers and More!

Color 80 $49.95 U.S.*

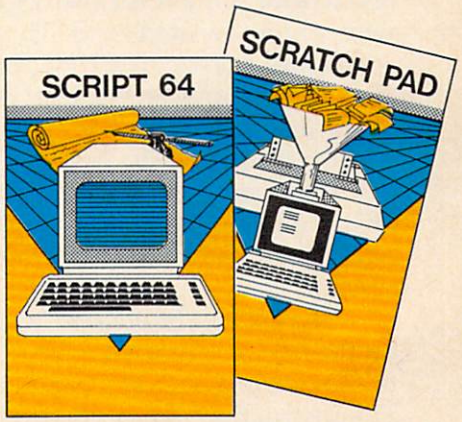
Produces 80 Columns With Color!
Needs No Extra Hardware
Use With Terminal Programs
Uses No Basic Memory in the 64
Develop Your Own Programs



NEW Combined PACKAGE

SCRIPT 64 & SCRATCH PAD 64 $105.00 U.S.*

Script 64:
Word Processor in French and English
80 Columns
Global Search and Replace
User Created Dictionary
Spelling Check
Scratch Pad 64:
The Database/Mail List in One!
Merges with Script 64 Word Processor
Print out Labels, Envelopes, Mail List & More!
Suitable with both Single and Dual Disk Drives
Fully C64 Link Compatible



*SUGGESTED RETAIL PRICE F.O.B. in U.S. FUNDS, Toronto, CANADA

C64 LINK©

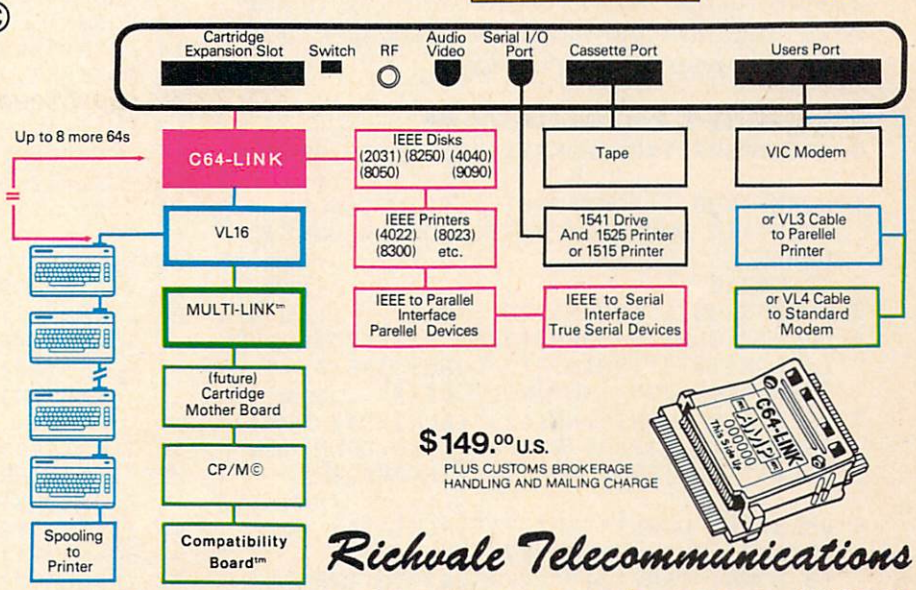
The Smart 64

Give These Expanded Capabilities to Your 64 and VIC 20

- 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.
- Compatability with CP/M.

Contact your local Commodore dealer or RTC.

Payments by VISA, MASTERCARD or BANK TRANSFER.
Mail orders also by certified cheque, etc.



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

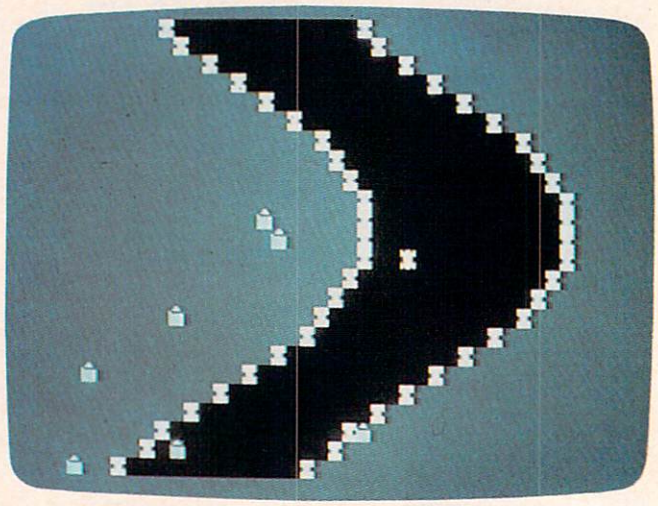
Richvale Telecommunications

10610 Bayview Avenue (Bayview Plaza) Richmond Hill, Ontario, Canada L4C 3N8 (416) 884-4165

ROADER

Your driving skills and endurance are put to the test as you careen around curves and dodge highway hazards in "Roader." Versions for Commodore 64, VIC, Atari, TI-99/4A, Apple, IBM PC, and TRS Color Computer. See the "Automatic Proofreader" article on page 60 before typing in VIC, 64, or Atari versions.

Brian Foley



The car speeds down an ever-narrowing roadway in the Commodore 64 version of "Roader."

The object of "Roader" is to control a car on a winding road while dodging obstacles. As you drive farther, the road becomes more and more narrow, making a crash more likely. The longer you stay on the road, the higher your score.

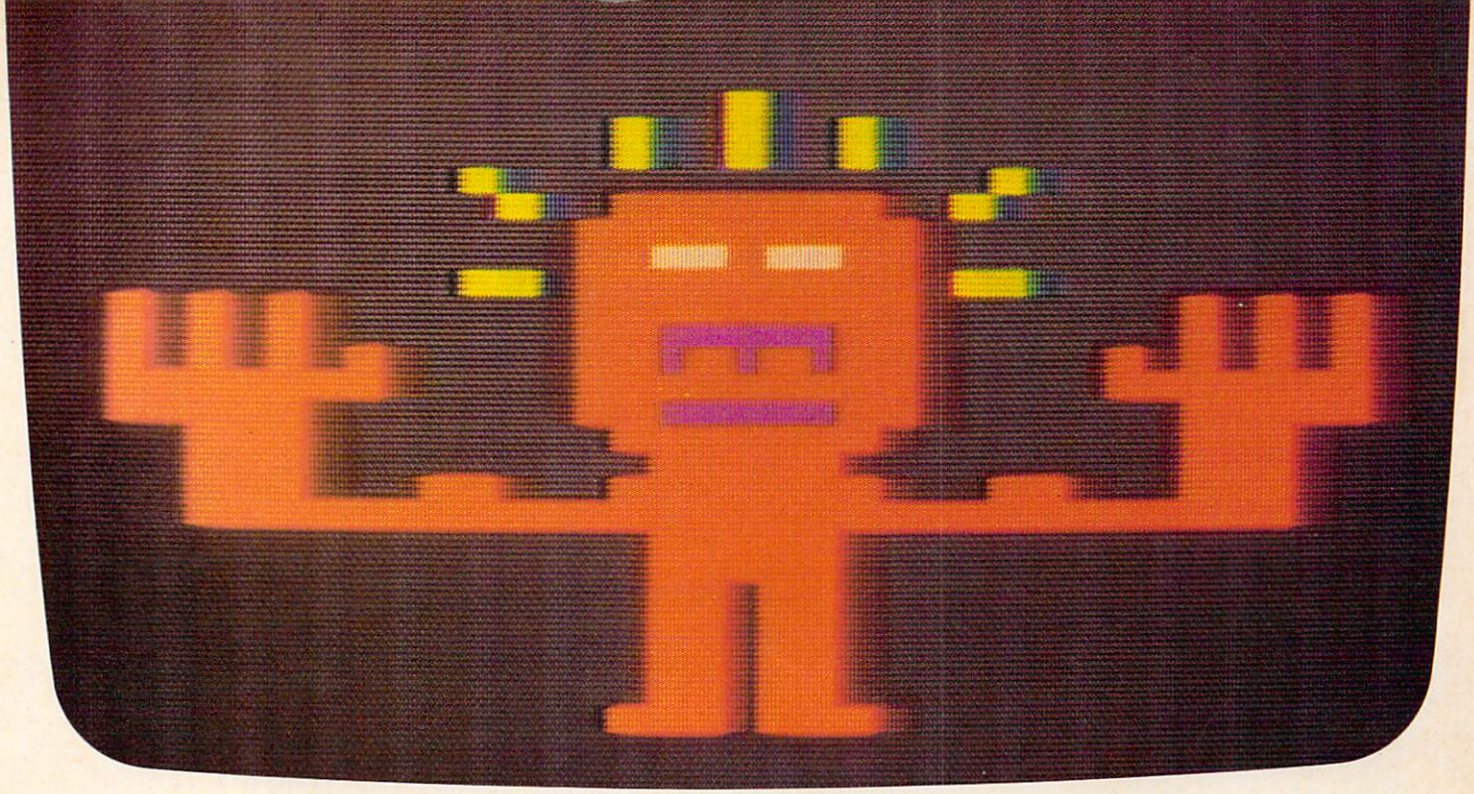
When you RUN the program, the computer will wait for you to set the level of difficulty, from one to four. One is for the beginner, two is faster, with a more twisted road. Three selects a slower speed and a less curvy road, but one which has obstacles. Four selects a fast, curvy road with obstacles. With these four levels of difficulty, Roader should be challenging for everyone.

If you hit the side of the road or crash into an obstacle, you'll hear three explosions. The width of the road and your score then appear on the screen.

The car can be steered with a joystick (port 2 on the 64) or with the keyboard. Push the C key to move it left, and the M key to move it right. The instructions for keyboard control are in line 50 of Program 1 and can easily be changed to any other characters of your choice.

Program 1: Roader For The 64

```
Ø PRINTCHR$(142):POKE52,48:POKE56,48:CLR
                                    :rem 149
1 POKE53280,1:POKE53281,1:PRINT"{CLR}
  {RED}{10 DOWN}{10 RIGHT}JUST A MOMENT P
  LEASE"                            :rem 31
2 GOSUB260                          :rem 74
3 POKE53280,15:POKE53281,15        :rem 244
4 PRINT"{CLR}{3 DOWN}{5 RIGHT}{RED}ENTER
  {SPACE}:{7}":PRINT"{3 DOWN}"TAB(12)"
  {BLK}1{4} FOR {WHT}NOVICE{7}"    :rem 121
5 PRINT"{3 DOWN}"TAB(12)"{BLK}2{4} FOR
  {SPACE}{WHT}PRO{7}":PRINT"{3 DOWN}"TA
  B(12)"{BLK}3{4} FOR {WHT}EXPERT{7}"
                                    :rem 157
6 PRINT"{3 DOWN}"TAB(12)"{BLK}4{4} FOR
  {SPACE}{WHT}PERFECT{7}":PRINT"
  {3 DOWN}"TAB(12)"{BLK}5{4} TO {WHT}QU
  IT{7}"                            :rem 225
7 GETB$:IFB$=""THEN7                :rem 147
8 J=VAL(B$):IFJ<1ORJ>5THEN7         :rem 157
9 L=54272:IFJ=5THENPOKE53272,21:SYS2048
                                     :rem 66
10 IFA$="N"THEN14                   :rem 184
11 PRINT"{CLR}{WHT}{6 DOWN}{6 SPACES}USE
   {SPACE}C AND M KEYS TO MOVE LEFT AND R
   IGHT RESPECTIVELY"               :rem 178
12 PRINT"{DOWN}YOU CAN ALSO USE THE JOYST
   ICK IN PORT 2"                   :rem 143
13 FORS=1TO3000:NEXTS               :rem 62
14 PRINTCHR$(147)                   :rem 224
15 POKE650,255:N=1516               :rem 138
16 POKE53280,11:POKE53281,11         :rem 32
17 I=.1:IFJ=2ORJ=4THENI=.2:N=1518:rem 212
18 AM$="DDDDDDDDDDDDD"              :rem 144
22 FORQ=1TO4                        :rem 225
23 FORC=13TOØSTEP-1                 :rem 157
25 FORA=1TO7.2STEPI                 :rem 188
26 Y=COS(A)                         :rem 117
27 F=F+1:R=RND(Ø)                   :rem 188
28 IFPEEK(N+40)=65ORPEEK(N-1)=65ORPEEK(N+
   1)=65ORPEEK(N-40)=65THEN110      :rem 39
29 PRINTTAB(10*Y+13);"{8}A";"{BLK}";LEF
   T$(AM$,C);"{8}A{WHT}":IFR>.5THEN40
                                    :rem 168
30 IFJ=1ORJ=2THEN40                 :rem 151
32 IFF>25THENX=INT(25*RND(1)):POKE1944+X+
   L,3:POKE1944+X,66                :rem 192
40 IFF>=25THENPOKEN+L,1:POKEN,64:FORT=1TO
   50:NEXTT:POKEN+L,Ø:POKEN,68      :rem 123
42 IFPEEK(N+40)=65ORPEEK(N-1)=65ORPEEK(N+
   1)=65ORPEEK(N-40)=65THEN110      :rem 35
```



WOULD YOU SHELL OUT $1000 TO MATCH WITS WITH THIS?

SUSPENDED,™ The WITNESS,™ PLANETFALL,™ ENCHANTER,™ and INFIDEL™—has become an instant best-seller. For the simple reason that Infocom offers you something as rare and valuable as anything in software—real entertainment.

Meet your match. Meet Infocom games: perhaps the best reason in software for owning a personal computer.

In fact, people have been known to purchase computers and disk drives solely for the purpose of playing our games. And they haven't been disappointed. Because Infocom's prose stimulates your imagination to a degree nothing else in software approaches. Instead of putting funny little creatures on your screen, we put you inside our stories. And we confront you with startlingly realistic environments alive with situations, personalities, and logical puzzles the like of which you won't find elsewhere. The secret? We've found the way to plug our prose right into your imagination, and catapult you into a whole new dimension.

If you think such an extraordinary experience is worth having, you're not alone. Everything we've ever written—ZORK® I, II, and III, DEADLINE,™ STARCROSS,™

At last, you can fritter away your evenings playing a computer game without feeling like you're frittering away your computer investment.

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

(For more information on Infocom games contact: Infocom, Inc., P.O. Box 855, Garden City, NY 11530.)

INFOCOM™

The next dimension.

For your: Apple II, Atari, Commodore 64, CP/M 8;DEC Rainbow, DEC RT-11, IBM, MS-DOS 2.0, NEC APC, NEC PC-8000, Osborne, TI Professional, TI 99/4A, TRS-80 Model I, TRS-80 Model III.

Notes For The VIC, Atari, TI, Apple, IBM PC, And Color Computer Versions

"Roader" is a fast and exciting game, which puts you, the driver, on a difficult raceway. You must control your car skillfully, negotiating sharp turns while avoiding the pylons along the side of the road and the obstacles that appear randomly in levels 3 and 4.

In the VIC and Atari versions, your car is steered with the C and M keys. The TI-99/4A version of Roader uses the < and > keys or joystick 1, while the Apple version uses paddle (0). The TRS-80 Color Computer and the IBM PC versions use the left and right arrow keys to control the movement of the car.

The arrow keys on the TRS-80 Color Computer and the IBM PC should be tapped briskly, and not held down. The Caps Lock key on the IBM PC must be off for proper steering. If you use the joystick with the TI-99/4A version, be sure to release the ALPHA LOCK key.

```
43 IFF>=25THENP=PEEK(56320):D=15-(PAND15)
                                    :rem 120
44 IFD=4THENN=N-1:GOTO51            :rem 235
45 IFD=8THENN=N+1:GOTO51            :rem 238
46 IFD=6THENN=N+39:GOTO51            :rem 40
47 IFD=10THENN=N+41:GOTO51           :rem 77
49 GETB$                            :rem 179
50 N=N+(B$="C")-(B$="M")            :rem 150
51 IFPEEK(N)=66ORPEEK(N+40)=66ORPEEK(N-1)
   =66ORPEEK(N+1)=66THEN110         :rem 150
80 NEXTA:NEXTC:NEXTQ                :rem 110
110 POKEN,67:POKEN+L,2               :rem 52
120 POKEN-1,67:POKEN-1+L,7          :rem 246
130 POKEN+1,67:POKEN+1+L,7          :rem 243
140 POKEN+40,67:POKEN+40+L,15       :rem 137
150 POKEN-40,67:POKEN-40+L,15       :rem 142
160 V=54296:W=54276:A=54277:H=54273:L=542
    72                              :rem 86
170 FORX=45TO0STEP-1:POKEV,X:POKEW,129:PO
    KEA,15 :POKEH,40:POKEL,200:NEXT
                                    :rem 30
180 POKEW,0:POKEA,0:F=0:D=0         :rem 89
190 POKE198,0:PRINT"THE ROAD IS ";C;"FEET
     WIDE"                          :rem 191
200 PRINT"SO YOUR SCORE IS ";INT(10000/C)
                                    :rem 70
210 PRINT"PLAY AGAIN (Y/N)?...OR FIRE BUT
    TON"                            :rem 141
215 P=PEEK(56320):FR=PAND16:IFFR=0THEN14
                                    :rem 150
220 GET A$:IFA$=""OR(A$<>"Y"ANDA$<>"N"AND
    FR<>0)THEN215                   :rem 22
230 IFA$="Y"THEN14                  :rem 247
240 IFA$="N"THEN3                   :rem 187
260 POKE56334,PEEK(56334)AND254     :rem 225
270 POKE1,PEEK(1)AND251              :rem 55
280 FORI=0TO511:POKEI+12288,PEEK(I+53248)
    :NEXT                           :rem 232
290 POKE1,PEEK(1)OR4                :rem 163
300 POKE56334,PEEK(56334)OR1         :rem 64
310 POKE53272,(PEEK(53272)AND240)OR12
                                    :rem 41
320 FORC=12800TO12839:READZ:POKEC,Z:NEXT
                                    :rem 252
330 DATA153,255,189,60,60,189,255,153
                                    :rem 94
340 DATA255,255,255,60,60,255,255,255
                                    :rem 89
350 DATA24,60,128,255,255,255,255,255
                                    :rem 89
360 DATA154,82,0,27,216,0,74,137    :rem 83
365 DATA255,255,255,255,255,255,255,255
                                    :rem 204
370 RETURN                          :rem 122
```

Program 2: VIC Roader

```
0 POKE56,28:POKE52,28:CLR           :rem 225
1 POKE36879,110:PRINT"{CLR}{WHT}{10 DOWN}
  JUST A MOMENT PLEASE"             :rem 141
2 GOSUB280                           :rem 76
3 POKE36879,59                       :rem 13
4 PRINT"{CLR}{3 DOWN}{BLK}ENTER:":PRINT"
  {2 DOWN}"TAB(6)"{BLK}1{BLK} FOR {RED}NO
  VICE"                             :rem 250
5 PRINT"{2 DOWN}"TAB(6)"{BLK}2{BLK} FOR
  {RED}PRO":PRINT"{2 DOWN}"TAB(6)"{BLK}3
  {BLK} FOR {RED}EXPERT"            :rem 13
6 PRINT"{2 DOWN}"TAB(6)"{BLK}4{BLK} FOR
  {RED}PERFECT":PRINT"{2 DOWN}"TAB(6)"
  {BLK}5{BLK} TO {RED}QUIT"         :rem 235
7 GETB$:IFB$=""THEN7                :rem 147
8 J=VAL(B$):IFJ<1ORJ>5THEN7         :rem 157
9 L=30720:IFJ=5THENPRINT"{CLR}":END
                                    :rem 231
10 IFA$="N"THEN14                   :rem 184
11 PRINT"{CLR}{BLK}{6 DOWN}USE C AND M KE
   YS TO{3 SPACES}MOVE LEFT AND RIGHT"
                                    :rem 158
13 FORS=1TO3000:NEXTS                :rem 62
14 PRINTCHR$(147)                   :rem 224
15 POKE650,255:N=7908               :rem 149
16 REM POKE36879,25                  :rem 30
17 I=.1:IFJ=2ORJ=4THENI=.2:N=7905:rem 218
19 AM$="''''''''''"                 :rem 252
22 FORQ=1TO4                        :rem 225
23 FORC=9TO0STEP-1                  :rem 114
25 FORA=1TO7.2STEPI                 :rem 188
26 Y=COS(A)                         :rem 117
27 F=F+1:R=RND(1):IFF>23THENPOKE36878,15
                                    :rem 111
29 PRINTTAB(5*Y+6);"{BLU}$";"{BLK}";LEFT$
   (AM$,C);"{BLU}$":IFR>.5THEN40    :rem 23
30 IFJ=1ORJ=2THEN40                 :rem 151
32 IFF>23THENX=INT(23*RND(1)+1):POKE8142+
   X+L,2:POKE8142+X,37              :rem 15
40 IFF>=23THENPOKEN+L,0:POKEN,35:FORT=1TO
   90:NEXTT:POKEN+L,0:POKEN,39      :rem 120
42 IFPEEK(N)=36ORPEEK(N+22)=36ORPEEK(N-1)
   =36ORPEEK(N+1)=36THEN110         :rem 138
49 GETB$                            :rem 179
50 N=N+(B$="C")-(B$="M")            :rem 150
51 IFPEEK(N)=37ORPEEK(N+22)=37ORPEEK(N-1)
   =37ORPEEK(N+1)=37THEN110         :rem 142
80 NEXTA:NEXTC:NEXTQ                :rem 110
110 POKEN,38:POKEN+L,2               :rem 50
120 POKEN-1,38:POKEN-1+L,7          :rem 244
```

Last Year Over 20,000 Americans Were Committed To Asylum.

Once people enter *Asylum*™, they don't *want* to leave. And neither will you.

Inside this thrilling adventure game from Screenplay™ challenges lie around every corner, behind every door. There are hundreds of doors, too!

You've gone crazy from playing too many adventure games. You've been placed in the asylum to act out your delusions. To cure yourself, you must make good your escape.

There's no one you can turn to for help. Almost every turn leads to a dead end. Or worse, vigilant guards stand in your way. If you can't outmuscle them, can you outthink them? Inmates line hallways offering help.

Asylum runs in 48K on the Atari, Commodore 64 and IBM PC computers. See your local software dealer. $29.95.

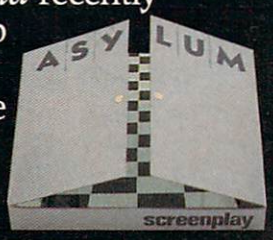
But can they be trusted?

While getting out of the asylum may take months, you'll get into our game instantly.

Smooth scrolling three dimensional graphics give you a very eerie sense of reality. This feeling is also heightened by the use of full sentence commands.

No wonder thousands of people bought *Asylum*™ last year, and *PC World* recently named *Asylum*™ one of the top ten games for the IBM PC.

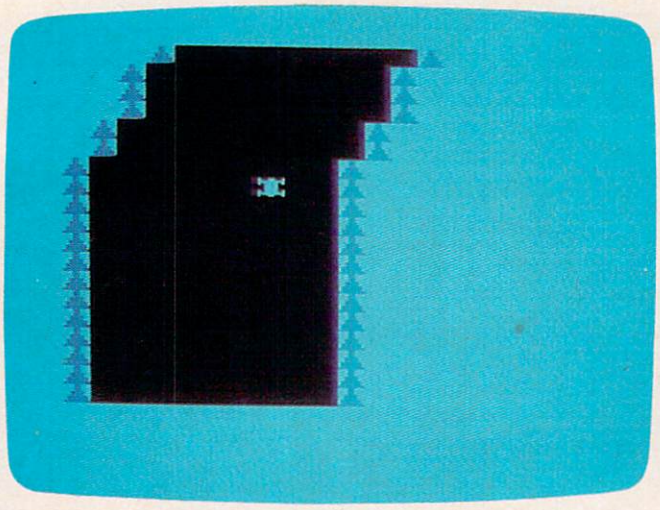
Play *Asylum*™. All you have to be committed to is fun.



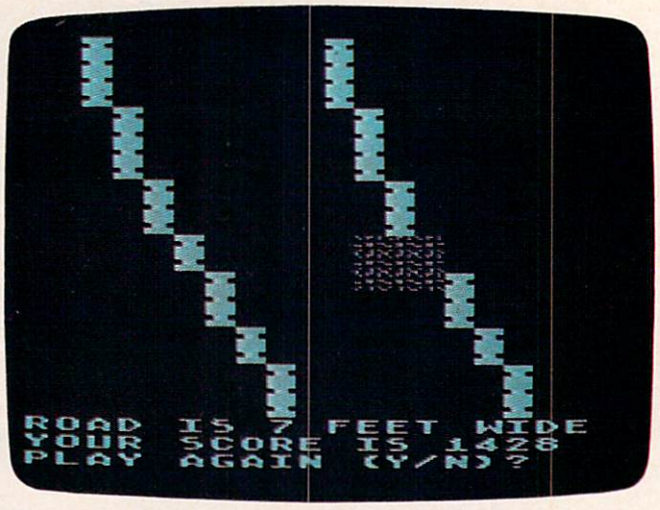
screenplay™

Box 3558, Chapel Hill NC 27514 800-334-5470

You could win $10,000 from Screenplay anywhere our games are sold.



"Roader," VIC version.



The car has crashed in the Atari version of "Roader."

```
130 POKEN+1,38:POKEN+1+L,7          :rem 241
140 POKEN+22,38:POKEN+22+L,4        :rem 85
150 POKEN-22,38:POKEN-22+L,4        :rem 90
160 POKE36877,220:FORT=15TO0STEP-1:POKE36
    878,T                           :rem 19
170 FORM=1TO50:NEXTM                 :rem 8
180 NEXTT:POKE36877,0:POKE36878,0:F=0
                                    :rem 194
190 POKE198,0:PRINT"{BLU}{DOWN}ROAD WIDTH
     "; C;"FEET"                    :rem 201
200 PRINT"YOUR SCORE IS ";INT(10000/C)
                                    :rem 164
210 PRINT"{DOWN}PLAY AGAIN (Y/N)? "
                                    :rem 113
220 GET A$:IFA$=""OR(A$<>"Y"ANDA$<>"N")TH
    EN220                           :rem 253
230 IFA$="Y"THEN14                  :rem 247
240 IFA$="N"THEN3                   :rem 187
280 FORI=0TO511:POKEI+7168,PEEK(I+32768):
    NEXT                            :rem 189
310 FORC=7448TO7455:READZ:POKEC,255-Z:NEX
    T                               :rem 110
320 FORC=7456TO7487:READZ:POKEC,Z:NEXT
                                    :rem 170
330 DATA153,255,189,60,60,189,255,153
                                     :rem 94
340 DATA24,24,24,60,60,126,126,255
                                    :rem 177
350 DATA24,60,128,255,255,255,255,255
                                     :rem 89
360 DATA154,82,0,27,216,0,74,137   :rem 83
365 DATA255,255,255,255,255,255,255,255
                                    :rem 204
370 POKE36869,255:RETURN            :rem 187
```

Program 3: Atari Roader

```
CL 10 POKE 106,PEEK(106)-8:GOSUB 400:G
      OSUB 1500:POKE 708,13
LO 20 SCR=PEEK(88)+PEEK(89)*256:DIM AM
      $(10)
GA 30 POSITION 2,2:? #6;"{CLEAR}ENTER:
      ":POSITION 6,4:? #6;"1 FOR NOVIC
      E"
FI 40 POSITION 6,6:? #6;"2 FOR PRO":PO
      SITION 6,8:? #6;"3 FOR EXPERT"
PC 50 POSITION 6,10:? #6;"4 FOR PERFEC
      T":POSITION 6,12:? #6;"5 TO QUIT
      "
IC 60 J=PEEK(764):IF J<>24 AND J<>26 A
      ND J<>29 AND J<>30 AND J<>31 THE
      N 60
MA 70 IF J=29 THEN POKE 764,255:END
KB 75 IF A=35 THEN 100
OK 80 POSITION 1,10:? #6;"{CLEAR} USE
      + AND * KEYS TO MOVE LEFT AND RI
      GHT RESPECTIVELY"
CO 90 FOR I=1 TO 2000:NEXT I
JJ 100 ? #6;"{CLEAR}":N=SCR+246
CN 110 I=0.1:IF J=30 OR J=24 THEN I=0.
       2
MG 120 AM$="{10 SPACES}"
BB 130 FOR Q=1 TO 4
KA 140 FOR C=7 TO 0 STEP -1
PM 150 FOR R=1 TO 7.2 STEP I
LF 160 Y=COS(R)
PA 165 F=F+1:S=RND(0)
PO 166 IF F>23 THEN F=23:A=USR(1536)
DL 170 POSITION 4*Y+6,F:? #6;"$";AM$(1
       ,C);"$":IF S>0.5 THEN 200
FP 180 IF J=31 OR J=30 THEN 200
IB 190 IF F=23 THEN L=INT(420*RND(1)+2
       0):POKE N+L,69
DO 200 IF F=23 THEN POKE N,131:FOR T=1
       TO 20:NEXT T:POKE N,0
ON 210 IF PEEK(N)=4 OR PEEK(N+1)=4 OR
       PEEK(N-1)=4 OR PEEK(N+20)=4 THE
       N 275
GG 220 P=PEEK(764):IF P=18 THEN N=N-1:
       GOTO 240
HP 230 IF P=37 THEN N=N+1
CO 240 POKE 764,255
NO 260 IF PEEK(N)=69 OR PEEK(N+1)=69 O
       R PEEK(N-1)=69 OR PEEK(N+20)=69
       THEN 275
LA 270 NEXT R:NEXT C:NEXT Q
HA 275 FOR M=20 TO 29:SOUND 1,M,8,15:F
       OR V=1 TO 7:NEXT V
KJ 280 POKE N,198:POKE N-1,198:POKE N+
       1,198
LI 290 POKE N+20,198:POKE N-20,198:POK
       E N-19,198:POKE N-21,198
IG 300 POKE N+21,198:POKE N+19,198
CI 310 NEXT M:SOUND 1,0,0,0
HJ 320 REM
LH 330 F=0:POSITION 0,21
LI 340 ? #6;"ROAD IS";" ";C;" ";"FEET
       WIDE"
GP 350 ? #6;"YOUR SCORE IS";" ";INT(10
       000/C)
KM 360 ? #6;"PLAY AGAIN (Y/N)?  "
```

A SOFTWARE STAR IS BORN

MovieMaker™ brings the art of computer animation to your Atari Home Computer®. And turns you into the director. No programming is necessary, just imagination, flair and a desire to experiment. MovieMaker™ is a powerful, innovative tool that lets you devise the action, set the scene, create the actors and stage the action. The "Compose" mode lets you draw characters and background, with a special "Mirror" function for quick and easy duplication of shapes. The "Zoom" lets you add incredible detail for astounding realism. When you "Record," you film and edit up to 300 frames of continuous action, controlling speed, sequence, colors, camera angles and layers of sound. And the "Smooth" function eliminates all flicker. The results are so professional, you'll want to film one dream after another. And you can, without ever leaving your keyboard. That's the reason why MovieMaker™ is the best selling software from Creative Pastime™.

MovieMaker™ is a Creative Pastime™ from Reston Software™

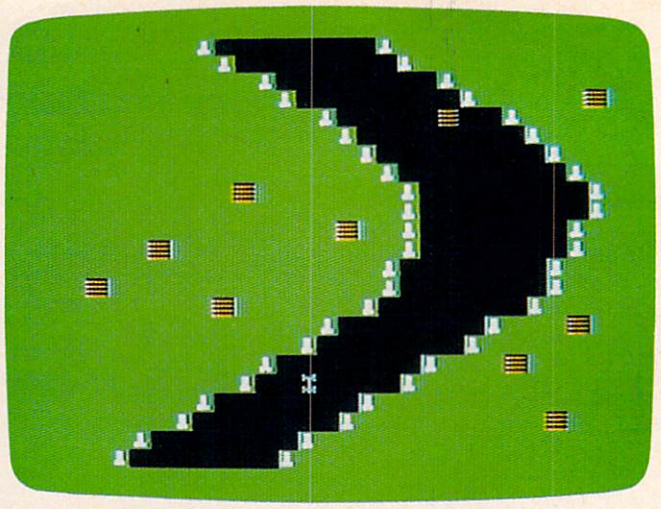
A Prentice-Hall Company
11480 Sunset Hills Rd.
Reston, VA 22090
Available at your local bookstore and computer retailer, or call us at
(800) 336-0338

Coming soon for Apple,™ IBM-PC,™ Commodore 64™
For the Atari 800/1200® Computer
Atari is a registered trademark of Atari, Inc.

```
NJ 370 A=PEEK(764):IF A<>43 AND A<>35
       THEN 370
EO 380 IF A=43 THEN ? #6;"{CLEAR}":N=S
       CR+246:GOTO 140
AG 390 ? #6;"{CLEAR}":GOTO 30
HI 400 GRAPHICS 1+16:POSITION 0,12:? #
       6;"JUST A MOMENT PLEASE"
AH 405 ST=(PEEK(106)-8)*256
IB 410 FOR K=0 TO 511:POKE ST+K,PEEK(5
       7344+K):NEXT K:POKE 756,ST/256
NL 415 READ Y:IF Y=-1 THEN RETURN
HA 420 FOR X=Y TO Y+7:READ Z:POKE X+ST
       ,Z:NEXT X:GOTO 415
PB 430 DATA 24,153,255,189,60,60,189,2
       55,153
OL 440 DATA 32,255,255,255,60,60,255,2
       55,255
OK 450 DATA 40,24,60,128,255,255,255,2
       55,255
OM 460 DATA 48,154,82,0,27,216,0,74,13
       7
OK 470 DATA 56,255,255,255,255,255,255
       ,255,255,-1
PA 1500 FOR I=1536 TO 1595:READ A:CK=C
        K+A:POKE I,A:NEXT I
FI 1510 IF CK<>7887 THEN PRINT "Error
        in DATA--check typing."
KI 1520 RETURN
PJ 1536 DATA 24,165,88,133,203,105
PG 1542 DATA 20,133,205,165,89,133
OM 1548 DATA 204,105,0,133,206,162
PL 1554 DATA 23,160,19,177,205,145
PJ 1560 DATA 203,136,16,249,24,165
BK 1566 DATA 205,133,203,105,20,133
FD 1572 DATA 205,165,206,133,204,105
PD 1578 DATA 0,133,206,202,208,227
MI 1584 DATA 160,19,169,0,145,203
JC 1590 DATA 136,16,251,104,96,0
```

Program 4: Roader For The TI-99/4A

```
100 F=12
110 GOTO 200
120 FOR VOL=1 TO 30 STEP 10
130 CALL SOUND(-1000,-7,VOL)
140 CALL SCREEN(INT(VOL/2.5)+1)
150 F=19-F
160 CALL COLOR(9,F,1)
170 NEXT VOL
180 CALL COLOR(9,7,1)
190 RETURN
200 CALL CHAR(99,"223E2A08082A3E2A")
210 CALL CHAR(100,"447C54100A2E3F7F
    ")
220 CALL CHAR(101,"00080C1E1E3E3F7F
    ")
230 CALL CHAR(104,"0018181818183C3C00
    ")
240 CALL CHAR(120,"FFFFFFFFFFFFFFFF
    ")
250 CALL CHAR(128,"00FF00FF00FF00FF
    ")
260 CALL COLOR(9,5,1)
270 CALL COLOR(10,16,1)
280 CALL COLOR(11,9,1)
290 CALL COLOR(12,2,1)
300 CALL COLOR(13,9,2)
310 CALL CLEAR
320 CALL SCREEN(15)
330 PRINT
340 PRINT TAB(8);"c R O A D E R c"
350 FOR T=1 TO 6
360 PRINT
370 NEXT T
380 PRINT "STEER WITH THE < AND > K
    EYS"
390 PRINT
400 PRINT TAB(6);"OR USE JOYSTICK #
    1"
410 FOR T=1 TO 5
420 PRINT
430 NEXT T
440 FOR I=110 TO 120 STEP .5
450 CALL SOUND(-150,I,2)
460 NEXT I
470 FOR I=120 TO 110 STEP -.3
480 CALL SOUND(-150,I,2)
490 NEXT I
500 FOR T=110 TO 120 STEP .8
510 CALL SOUND(-75,T,2)
520 NEXT T
530 GOSUB 120
540 CALL SCREEN(15)
550 CALL COLOR(9,5,1)
560 FOR T=1 TO 250
570 NEXT T
580 CALL CLEAR
590 CALL COLOR(9,8,2)
600 OSKILL=1
610 PRINT TAB(2);"ENTER YOUR SKILL
    LEVEL..."
620 FOR T=1 TO 3
630 PRINT
640 NEXT T
650 PRINT TAB(4);"ENTER :"
660 PRINT
670 PRINT
680 PRINT TAB(8);"1 FOR NOVICE"
690 PRINT
700 PRINT TAB(8);"2 FOR PRO"
710 PRINT
720 PRINT TAB(8);"3 FOR EXPERT"
730 PRINT
740 PRINT TAB(8);"4 FOR PERFECT"
750 FOR D=1 TO 3
760 PRINT
770 NEXT D
780 CALL KEY(1,K,S)
790 RANDOMIZE
800 IF S=0 THEN 780
810 IF K<>18 THEN 840
820 SKILL=OSKILL
```



"Roader," TI version.

Play blackjack against the world's greatest casinos without ever leaving home.

Play *Ken Uston's Professional Blackjack*™ from Screenplay.

Developed by the world's top player, *Ken Uston's Professional Blackjack*™ is the most realistic blackjack game ever devised for home computers. And it'll bring 70 casinos from Las Vegas to Atlantic City right into your home.

This blackjack teaching system accurately simulates every casino's house rules and game variations. Cards are dealt and bets can be made just like they are in each casino.

In all, *Ken Uston's Professional Blackjack*™ can create over 39 million different playing situations, complete with sound effects. So you can use the same strategies playing the computer as you would playing the real casinos.

In addition to game play, *Ken Uston's Professional Blackjack*™ includes extensive card counting exercises to help you improve your skills. The techniques you'll learn helped Ken Uston win over $5 million in the very same casinos you'll be playing against.

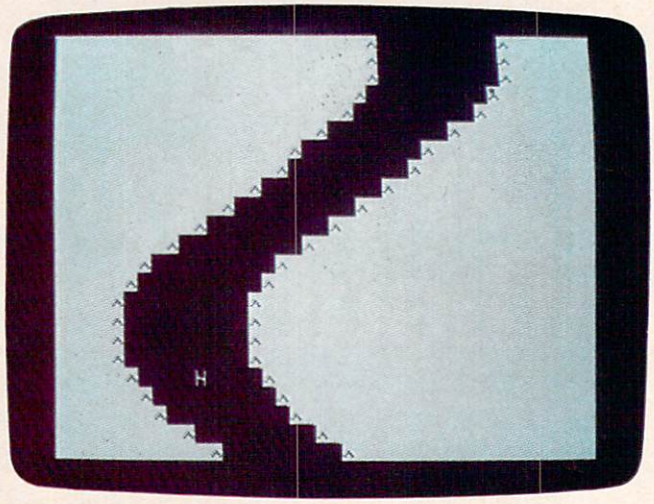
With *Ken Uston's Professional Blackjack*™ you'll develop the skills needed to win at home. And at the casino.

screenplay™

Box 3558, Chapel Hill NC 27514 800-334-5470

Ken Uston's Professional Blackjack™ runs in 48K on the Atari, Commodore 64, Apple and IBM PC.

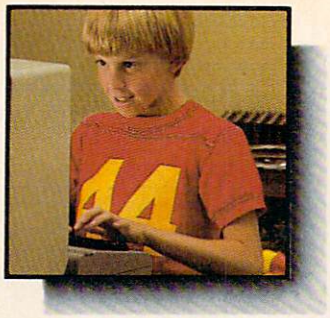
```
830 GOTO 860
840 SKILL=-(K=19)-(K=7)*2-(K=8)*3-(
    K=9)*4
850 IF SKILL=0 THEN 780
860 OSKILL=SKILL
870 PRINT
880 PRINT TAB(8);"HERE WE GO!!!"
890 PRINT
900 PRINT
910 FOR T=1 TO 400
920 NEXT T
930 CALL CLEAR
940 CALL SCREEN(3)
950 I=.1
960 IF (SKILL<>2)*(SKILL<>4)THEN 98
    0
970 I=.2
980 N=24
990 J=0
1000 OLDN=24
1010 B$="xxxxxxxx"
1020 FOR C=1 TO 4
1030 PRINT TAB(18);"h";B$;"h"
1040 NEXT C
1050 FOR Q=1 TO 4
1060 FOR C=9 TO 6 STEP -1
1070 IF C<>9 THEN 1090
1080 B$="xxxxxxxx"
1090 FOR A=0 TO 6.25 STEP I
1100 Y=COS(A)
1110 J=J+1
1120 PRINT TAB(8*Y+10);"h";B$;"h"
1130 IF (RND>.5)+(SKILL=1)+(SKILL=2
    )THEN 1160
1140 IF J<25 THEN 1160
1150 CALL HCHAR(23,28*RND+2,128)
1160 CALL GCHAR(20,N,G)
1170 CALL HCHAR(19,OLDN,120)
1180 IF (G=104)+(G=128)+(G=32)THEN
    1390
1190 CALL HCHAR(20,N,99)
1200 OLDN=N
1210 CALL KEY(0,K,S)
1220 IF S<>0 THEN 1240
1230 CALL JOYST(1,XR,YR)
1240 N=N+(K=44)-(K=46)+XR/4
1250 NEXT A
1260 B$=SEG$(B$,1,C-2)
1270 FOR D=110 TO 129-C STEP .5
1280 CALL SOUND(-150,D,2)
1290 NEXT D
1300 NEXT C
1310 NEXT Q
1320 CALL CLEAR
1330 CALL SCREEN(11)
1340 PRINT TAB(5);"YOU MADE IT, MAR
    IO !!"
1350 FOR T=1 TO 10
1360 PRINT
1370 NEXT T
1380 GOTO 1480
1390 CALL HCHAR(20-1,N,101)
1400 CALL HCHAR(20,N,100)
1410 GOSUB 120
1420 CALL SCREEN(3)
1430 FOR T=1 TO 500
1440 NEXT T
1450 CALL CLEAR
1460 CALL COLOR(9,8,2)
1470 GOTO 1510
1480 FOR I=1 TO 500
1490 NEXT I
1500 CALL CLEAR
1510 CALL SCREEN(15)
1520 PRINT TAB(6);"YOUR SCORE IS";J
    *10*SKILL
1530 FOR T=1 TO 5
1540 PRINT
1550 NEXT T
1560 PRINT TAB(8);"? PLAY AGAIN ?"
1570 PRINT
1580 PRINT
1590 PRINT TAB(4);"<FIRE BUTTON> OR
     <S>"
1600 PRINT TAB(8);"- FOR SAME LEVEL
    "
1610 PRINT
1620 PRINT TAB(4);"<C> - TO CHANGE
    LEVELS"
1630 PRINT
1640 PRINT TAB(4);"<E> - TO END PRO
    GRAM"
1650 CALL KEY(1,K,S)
1660 IF S=0 THEN 1650
1670 IF (K=18)+(K=2)THEN 930
1680 IF (K<>5)*(K<>14)THEN 1650
1690 IF K=14 THEN 580
1700 END
```



"Roader," Apple version.

Program 5: Roader For The Apple

```
100 N$ = " REDAOR":D = 0:A = 0:B = 0
110  HOME
120  FOR I = 1 TO 7:N$(I) =  MID$ (N$,
    I,1): NEXT I
130  FOR I = 1 TO 7:A = A + .4:N =  INT
    ( COS (A) * 8)
140  VTAB 24 - D - I: HTAB 20 + N: PRINT
    N$(I)
150  NEXT I:B = B + .4:A = B: IF D = 1
    6 THEN 170
160 D = D + 1: GOTO 130
170  VTAB 12: PRINT " WHAT SKILL LEVEL
     DO YOU WISH TO PLAY?"
180  PRINT : PRINT "1) EASY";: HTAB 26
    : PRINT "2) INTERMEDIATE"
190  PRINT "3) DIFFICULT";: HTAB 26: PRINT
    "4) EXPERT"
200  PRINT : PRINT "  USE PADDLE 0 TO
    CONTROL YOUR CAR.": PRINT
```



Computers may be the world's best spellers, but they're the world's worst spelling teachers.

Or at least they used to be. Until Chatterbee.

Chatterbee is a unique piece of home computer software that not only makes teaching possible, it makes learning fun. For little people. And big people, too.

If that sounds like something you've never heard of before, you're right. You haven't. Because Chatterbee does something that no other spelling software can do.

Talk.

It's equipped with a customized version of the S.A.M. speech synthesizer, developed by Don't Ask for Tronix to provide voice output.

Instead of drawing pictures, scrambling words, beating around the bush or playing "Hangman," Chatterbee teaches spelling the sensible, old-fashioned way.

Each word is spoken, then put in a contextual sentence. Just like a spelling bee. With one important difference.

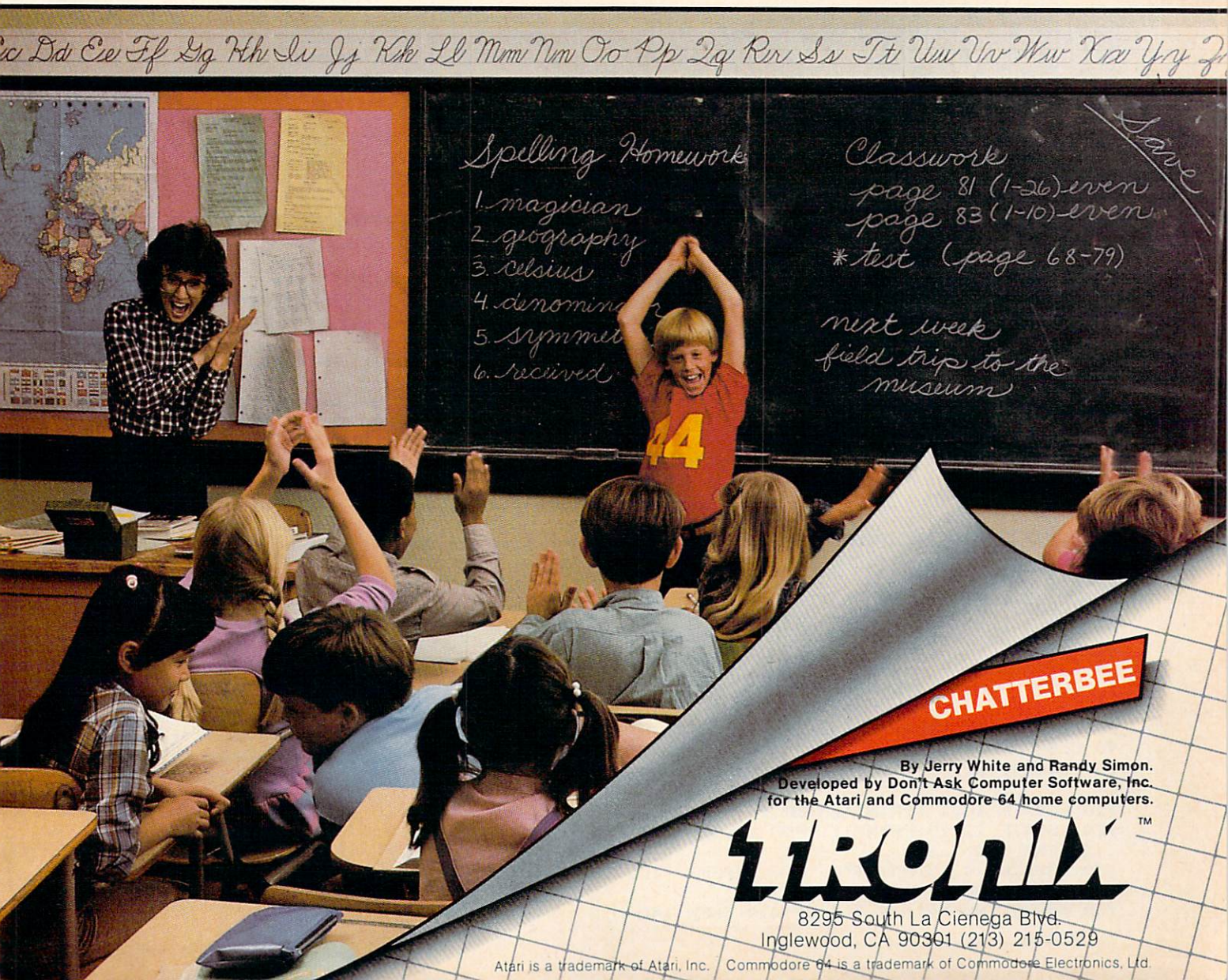
Since there's no classroom, there's no pressure. And no embarrassment.

Each of the 2500 words have been selected from current educational literature. And there's an internal scoring system that automatically places each player at the right level of difficulty and challenge.

The external scoring system rewards success and turns the whole thing into a game, complete with music.

Chatterbee. The spelling bee without the sting.

Hear today, spell tomorrow.



By Jerry White and Randy Simon.
Developed by Don't Ask Computer Software, Inc.
for the Atari and Commodore 64 home computers.

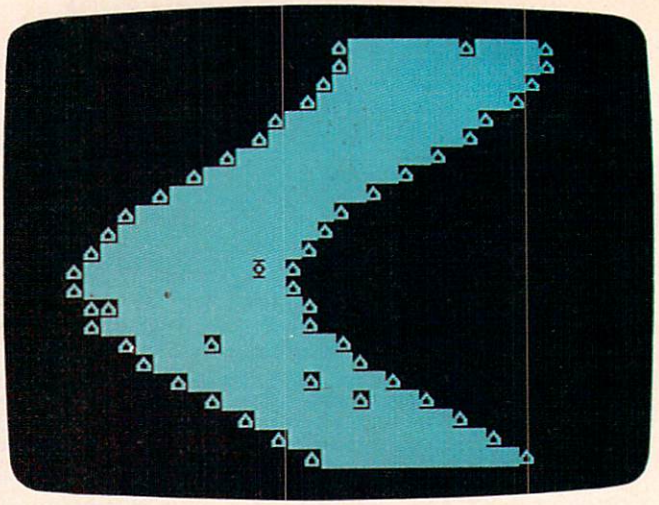
TRONIX™

8295 South La Cienega Blvd.
Inglewood, CA 90301 (213) 215-0529

```
210  GET LV$:LV =  VAL (LV$)
220  IF LV < 1 OR LV > 4 THEN 210
230 C = Ø: IF LV = 2 OR LV = 4 THEN C =
    .Ø5
240 C = C + .Ø5:C1 = 14:C2 = 25:A = Ø:
    SC = 8
250 N$ = "
                "
260  HOME
270 A = A + C + LV / 16:Y =  INT ( COS
    (A) * 1Ø)
280  POKE YLOC,16Ø: INVERSE
290  PRINT  LEFT$ (N$,C1 + Y);: PRINT
    "^";: HTAB C2 + Y: PRINT "^";: PRINT
     LEFT$ (N$,C1 - Y + 1);
300 N =  INT ( PDL (Ø) / 7):XLOC = N +
    136Ø
310  IF  PEEK (XLOC) = 3Ø OR  PEEK (XL
    OC) = 42 OR  PEEK (XLOC) = 32 THEN
    38Ø
320  NORMAL : POKE XLOC,2ØØ:YLOC = XLO
    C
330  IF LV = 1 OR LV = 2 THEN 35Ø
340 G =  INT ( RND (1) * 12Ø): IF G =
    1 THEN G =  INT ( RND (1) * 39): POKE
    1872 + G,42
350 D = D + 1: IF D / 12Ø =  INT (D /
    12Ø) AND D < 48Ø THEN C1 = C1 + 1
    :SC = SC - 1
360  IF C < .25 THEN C = C + .ØØ1
370  GOTO 27Ø
380  FOR I = 1 TO 2Ø
390  FOR C = 1 TO 15:W =  PEEK ( - 163
    36): NEXT C
400  POKE XLOC - 128,22Ø: POKE XLOC -
    128,225: POKE XLOC - 128,239: POKE
    XLOC - 128,223
410  NEXT I: NORMAL
420  HOME : VTAB 5: HTAB 1Ø: PRINT " Y
    OUR SCORE IS ";: INVERSE : PRINT
     INT (1ØØØØ / SC): NORMAL
430  VTAB 1Ø: PRINT "HIT THE PADDLE BU
    TTON TO PLAY AGAIN AT": HTAB 1Ø: PRINT
    "THE SAME LEVEL, OR:": PRINT
440  PRINT "TYPE (S) TO START OVER, (E
    ) TO END."
450  IF  PEEK ( - 16384) = 197 THEN  POKE
     - 16287,Ø: END
460  IF  PEEK ( - 16384) = 211 THEN  POKE
     - 16287,Ø: GOTO 1ØØ
470  IF  PEEK ( - 16287) > 127 THEN 23
    Ø
480  GOTO 45Ø
```

Program 6: PC Roader

```
10  DEF SEG=&HB800
20 CLS
30 COLOR 7,0
40 WIDTH 40
50 KEY OFF
60 J = 1000
70 COLOR 2,0:LOCATE 12,13:PRINT "R  O  A  D
 E  R"
80 FOR I=1 TO 2000:NEXT I
90 CLS
100 LOCATE 6,7 :PRINT"CHOOSE YOUR SKILL LEVE
L"
110 LOCATE 10,1 :PRINT"ENTER :"
120 LOCATE 12,15:PRINT"1. FOR NOVICE
  2. FOR PRO"
130 LOCATE 14,15:PRINT"3. FOR EXPERT
  4. FOR PERFECT"
140 A=VAL(INKEY$):IF A<1 OR A>4 THEN 140
```



The IBM version of "Roader" includes plenty of obstacles at higher levels.

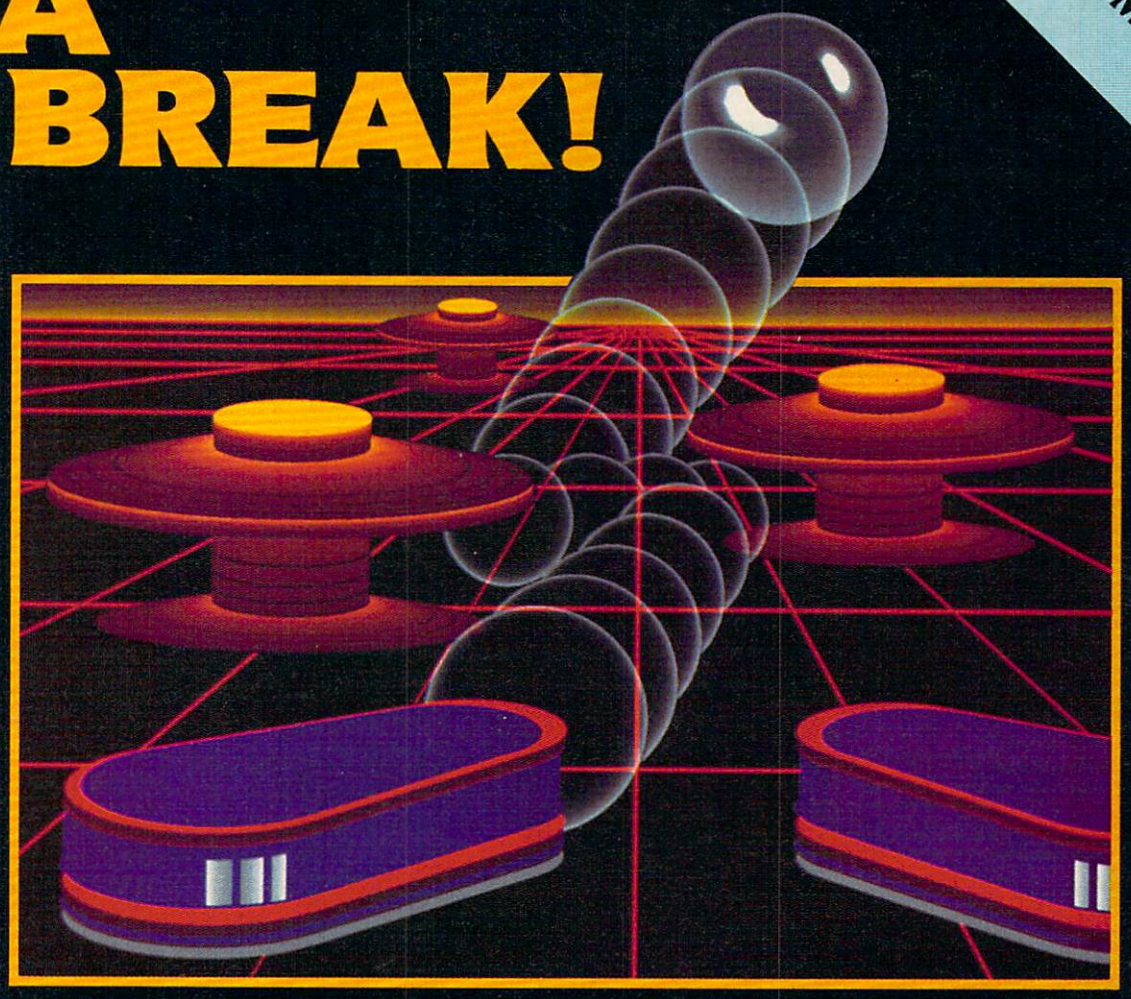
```
150 COLOR 7,0
160 CLS
170 WI = 12
180 FOR T = 0 TO 6.25 STEP A/16 :B$ =STRING$
(2,255)+CHR$(127)+STRING$(WI,219)+CHR$(127)+
STRING$(2,255)
190 SOUND T^3+100,.0001
200 IF A >2 AND RND(1)<.05*(A-1)THEN MID$(B$
,RND(1)*(LEN(B$)-6)+4,1)=CHR$(127)
210 K= COS (T)
220 PRINT TAB(K*8+14);B$
230 IF Z >50 THEN WI =WI-1:Z=0:IF WI<=3 THEN
 WI=3
240 Z=Z+1
250 POKE J+1,120:POKE J,232
260  GOSUB 290
270 NEXT
280 GOTO 180
290 OF = F :OF2 = F2: F= PEEK(J+80):F2= PEEK
(J+81)
300 OJ = J
310 I$ = INKEY$:IF LEN (I$)=2 THEN G$=RIGHT$
(I$,1)ELSE G$=""
320 IF G$ =CHR$(75) AND J >960 THEN J=J-2
330 IF G$=CHR$(77) AND J  <1036  THEN  J= J+
2
335 F= PEEK(J+80):F2= PEEK(J+81)
340 IF F  = 127 OR F = 255 THEN FOR T = 0 TO
 255:POKE OJ,T :NEXT :SOUND 32767,1: GOTO 37
0
350 POKE OJ,OF:POKE OJ+1 ,OF2
360 RETURN
370 CLS :LOCATE 8,16:PRINT "Score";INT (1000
0/WI)
380 LOCATE 14,12:PRINT"Play Again Y or N?"
390 A$ = INKEY$ :IF A$="" THEN 380
400 IF A$<>"y" AND A$<>"n"THEN 380
410 IF A$= "y" THEN RUN
420 END
```

Program 7: Roader For The Color Computer

```
1ØØ  CLS:A=Ø:B=Ø:A$=" REDAOR":D=Ø
11Ø  FOR I=1 TO 7:A$(I)=MID$(A$,I,1)
     :NEXT I
12Ø  FOR I=1 TO 7:A=A+.25:N=INT(SIN(
     A)*8)
13Ø  PRINT@48Ø-I*32-D*32:PRINT TAB(1
     8+N)A$(I)
```

TAKE A BREAK!

For Apple, Atari, Commodore 64, and IBM-PC



WITH NIGHT MISSION PINBALL

You deserve the best. You've earned it. Now reward yourself with a session of Night Mission PINBALL, the most realistic and challenging arcade simulation ever conceived! ■ Stunning graphics and dazzling sound effects put Night Mission PINBALL in a class by itself. Game features: multi-ball and multi-player capabilities, ten different professionally designed levels of play, and an editor that lets you create *your own* custom modes. ■ So take a break with Night Mission PINBALL from SubLOGIC. Winner of *Electronic Games* magazine's 1983 Arcade Award for Best Computer Audio/Visual Effects.

See your dealer . . .

or write or call for more information. For direct orders please add $1.50 for shipping and specify UPS or first class mail delivery. Illinois residents add 5% sales tax. American Express, Diner's Club, MasterCard, and Visa accepted.

Order Line: 800/637-4983

subLOGIC Corporation
713 Edgebrook Drive
Champaign IL 61820
(217) 359-8482 Telex: 206995

```
140 NEXT I:B=B+.4:A=B: IF D=8 THEN
    160
150 D=D+1:GOTO 120
160 PRINT@260,"CHOOSE YOUR SKILL LE
    VEL"
170 PRINT@288," 1) EASY";:PRINT@304
    ,"2) INTERMEDIATE"
180 PRINT@320," 3) DIFFICULT";:PRIN
    T@336,"4) EXPERT":PRINT
190 PRINT@384,"USE LEFT AND RIGHT A
    RROW KEYS TO";
200 PRINT@425,"MOVE YOUR CAR."
210 LV=VAL(INKEY$):IF LV<1 OR LV>4
    THEN 210
220 CLS:C=0:IF LV=2ORLV=4 THEN C=.2
    :XLOC=328:GOTO240
230 C=.1:XLOC=335
240 C1=14:C2=25:A=0:YLOC=494:D=0:A=
    0:B=0:S=8:P=80:YLOC=XLOC:H=0
250 J=144:FOR I=1 TO 9:N$=N$+CHR$(J
    ):NEXT I
260 FOR I=1 TO 17:A=A+C:Y=INT(COS(A
    )*7)
270 PRINT @490+Y,CHR$(191);:PRINT@4
    91+Y,RIGHT$(N$,S);:PRINT@491+Y+
    S,CHR$(191):NEXT I
280 PRINT@XLOC,CHR$(175);
290 PRINT@5,"HIT (B) TO BEGIN PLAY"
300 K$=INKEY$:IF K$<>"B" THEN 300
310 A=A+C:Y=INT(COS(A)*7)
320 PRINT@490+Y,CHR$(191);:PRINT@49
    1+Y,RIGHT$(N$,S);:PRINT@491+Y+S
    ,CHR$(191)
330 PRINT@YLOC-32,CHR$(144);
340 F$=INKEY$:IF F$=CHR$(8) THEN XL
    OC=XLOC-1:GOTO 360
350 IF F$=CHR$(9) THEN XLOC=XLOC+1
360 IFPEEK(1024+XLOC)=96 OR PEEK(10
    24+XLOC)=255 OR PEEK(1024+XLOC)
    =191 THEN 450
370 D=D+1:IF D/75=INT(D/75) AND S>2
    THEN S=S-1
380 PRINT@XLOC,CHR$(175);
390 YLOC=XLOC
400 IF LV=1 OR LV=2 THEN 420
410 G=RND(3):IFG=1 THEN G=RND(31):P
    RINT@448+G,CHR$(255);
420 C=C+.00025:P=P-.2:H=H+1
430 FOR I=1TOP:NEXTI
440 GOTO 310
450 FOR I=255 TO 100 STEP -30:SOUND
     I,1:NEXT I
460 FOR I=0 TO 105: PRINT@XLOC,CHR$
    (143+I);:NEXT I
470 CLS:PRINT@70,"YOUR SCORE IS ";H
    *10*LV
480 PRINT@129,"<SPACE BAR> TO PLAY
    AGAIN ON":PRINT@169,"THE SAME L
    EVEL"
490 PRINT@229,"TYPE (S) TO START OV
    ER":PRINT
500 PRINT@296,"TYPE (E) TO END"
510 S$=INKEY$
520 IF S$="E" THEN END
530 IF S$="S" THEN 100
540 IF S$=" " THEN 220
550 GOTO 510
560 END
```

If you own a Commodore 64 T.M.

(or are thinking of owning one)

– be sure that you also get a Calc Result

Calc Result is the worlds most cost effective spread sheet for the worlds most cost effective computer–The Commodore 64 T.M.

Calc Result at home

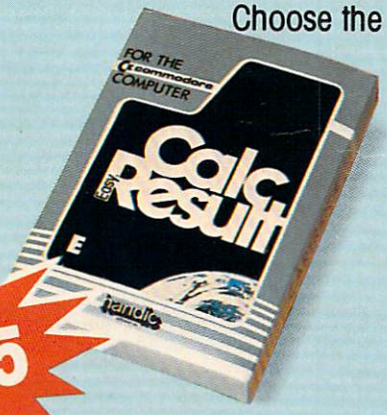
Use it for loans and mortgages, home budget and cash flow, stock portfolio, personal net worth, IRA analysis, travel expenses, gas and electricity bills, bar charts and many more areas.

In business

Use it for budgets, calculation, simulation, construction, planning etc. Used by managers, salesmen, scientists, doctors, lawyers, dentists, consultants, accountants...

There are two versions of Calc Result

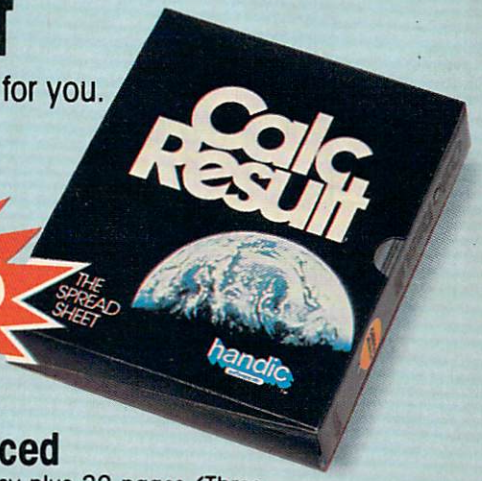
Choose the one that is most suitable for you.



$79.95

Calc Result Easy

Single page spreadsheet (64 columns × 254 rows). Built in graphics. Formula protection, flexible printout, color, conditional functions and mathematical functions. Delivered on plug–in cartridge. Data storage on cassette or disk.



$149.95

Calc Result Advanced

All functions in Calc Result Easy plus 32 pages (Three-dimensional viewing). Page add, window, split screen (up to four pages on the screen at the same time), and help functions. Delivered on plug-in cartridge plus disk. Requires disk drive.

Get your Calc Result today! Buy it at your nearest computer dealer.

Commodore 64 is a trademark of Commodore Business Machines.

609-663-0660

handic software inc.

Fellowship Business Center,
Fellowship Rd. B-206,
Mt. Laurel, New Jersey 08054

Barrier Battle

Heath Lawrence

Here's an exciting, challenging game for the VIC, 64, TRS-80 Color Computer, Atari, and Apple. Try to outwit your opponent and plan ahead—things get dicey at the end.

An article about writing arcade-style games (COMPUTE!, February 1983) piqued my curiosity enough to make me write this simple, but challenging game. It uses a redefined character set and the technique of POKEing character locations from that article. I found that toying with the simple commands provided yields some satisfying results.

That tutorial did an excellent job of explaining this method, so I won't go into it in any great detail here.

The following is a basic explanation of the setup of the program and a description of game play. There is also a variable list for anybody who wants a more thorough understanding of the program.

Game Strategy

The object of "Barrier Battle" is to build barriers, using your joystick, and to cut off your opponent so that he or she runs out of room and collides with a wall or barrier.

By pressing the trigger, you can create a hole in your barrier. You can do this five times. This can be a very helpful strategy because escape routes become quite scarce near the conclusion of the conflict. At the bottom of the screen you can see how many holes each player has left.

A player is destroyed when he or she hits one of the side boundaries (the Atari symbols) or one of the player-built barriers.

The end of the game is marked by the appearance of the victorious player jumping for joy in the center of the screen. The winning player's identity is then revealed (in case of a close call) and the option to play again is offered.

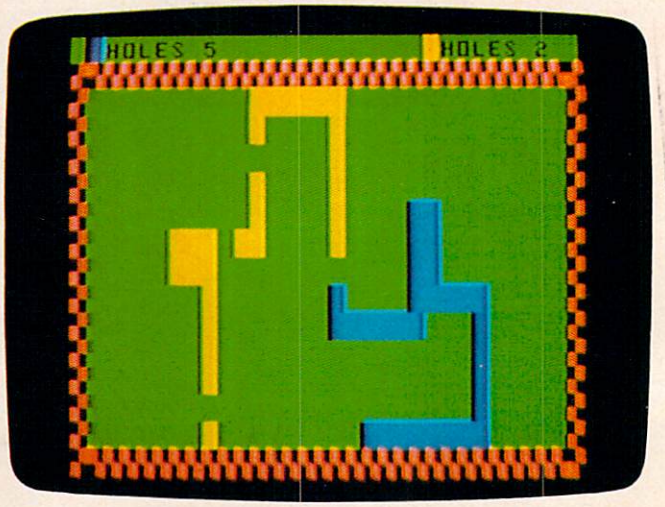
Playing Tips

At the beginning of the game it is a good idea to cut yourself a large part of the playfield to maneuver in. In the long run, it is the player with the most real estate left who is victorious.

When you find yourself out of room, try pressing the trigger and moving back and forth. This will only delay the inevitable, but it may stall long enough for the other player to smash into a barrier.

Variable List

SCR	Screen Memory Start address.
SIDE,WALL,BARR,BLANK	Player wall and blank characters which appear on screen when POKEd into SCR.
LN	Length of a single screen line.
VECTR,DIR	Variables that contain current player distance and direction.
LOC,POS	Current location of players.
M,N	Joystick variables.



"Barrier Battle," Color Computer version.

A computerized instructional system so advanced it'll actually teach your kids 2+2=4.

At Screenplay,™ we use a high level of computerized sophistication to reduce the complexities of math to child's play.

Playful Professor™ makes a game out of learning addition, subtraction, division and multiplication. After a correct answer, players are rewarded by moving closer to the golden key inside the castle. Whoever escapes from the castle by unlocking the door is the winner.

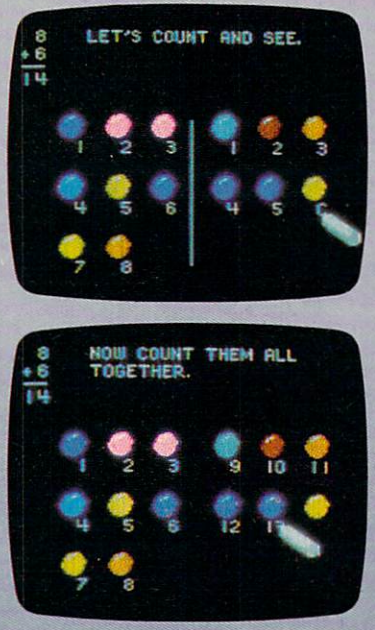
After an incorrect answer our professor uses chalk and a blackboard to work the problem through.

Step by step, he gives a simple explanation to every problem from adding one-digit numbers to working with fractions. There are also drills your children can do at their own speed.

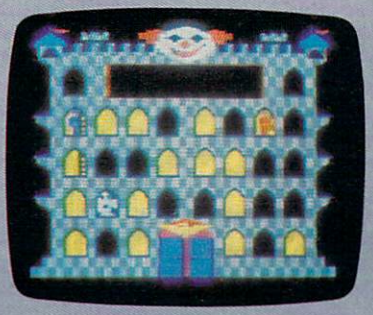
The Professor works an incorrect answer through step by step so your kids can easily follow along.

Because the professor can advance through higher skill levels as your children's math ability improves, *Playful Professor*™ will help them with the math taught in all grades of elementary school.

You can enjoy *Playful Professor* ™ with your family too. There are several different skill levels so you can participate at a harder level than your children while spending productive, quality time with them.



The Professor uses colorful graphics to provide children with an identifiable illustration to convey an abstract idea.



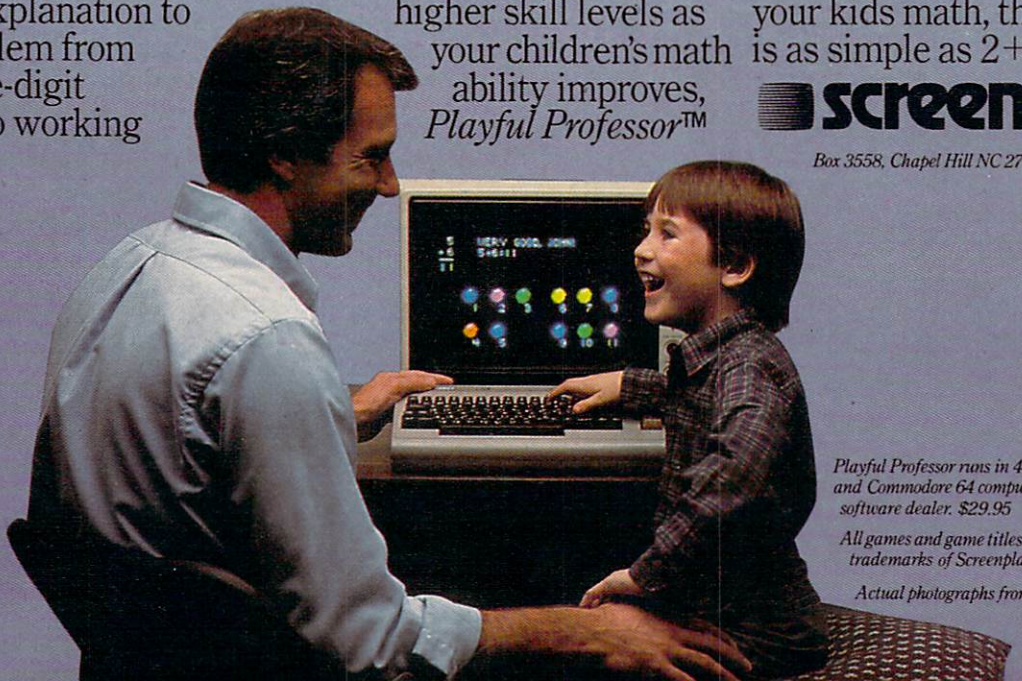
After each correct answer a player moves closer to capturing the key from the ghost and leaving the castle a winner.

Playful Professor™ from Screenplay.™

If you're trying to figure out the best way to teach your kids math, the answer is as simple as 2+2=4.

screenplay™

Box 3558, Chapel Hill NC 27514 800-334-5470



Playful Professor runs in 48K on the Atari and Commodore 64 computers. See your local software dealer. $29.95

All games and game titles are registered trademarks of Screenplay.

Actual photographs from Commodore 64.

Program Rundown (Atari Version)

Lines 94–115. Set starting address for screen memory. Assign characters to variables. Set start positions and directions for both players. Set line length.

Lines 200–240. Set stick variables. Check sticks and assign direction.

Lines 300–312. Move players. Check for collisions. Check trigger to see if hole should be created.

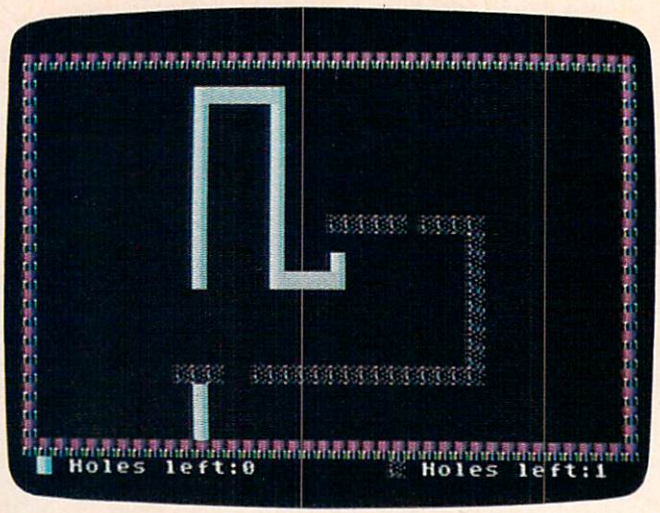
Lines 1000–1016. Routine to alter the character set.

Lines 5000–5006. Boundary routine (from Richard Mansfield's sample program).

Lines 6030–6038. Display winner and display play again?

Lines 6030–6038. Explosion sound and game over display.

Lines 7500–7520. Instructions and opening music.



In the Atari version of "Barrier Battle," the white player is about to crash into the wall.

Program 1: Atari Barrier Battle

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."

```
93 REM INITIALIZATION
94 LEV=5:GOSUB 1000
96 DIM A$(18),B$(18),S$(10)
98 A$=" {T} {DOWN}{3 LEFT}{B}■{V}
   {DOWN}{3 LEFT}{B} {V}":B$="{G}
   {T}{F}{DOWN}{3 LEFT}{B}■{V}{DOWN}
   {3 LEFT}{C} {Z}"
100 SIDE=31:WALL=128:BARR=32:BLANK=0
    :VAL1=5:VAL2=5
105 SCR=PEEK(88)+256*PEEK(89)
110 LN=40:VECTR=LN:DIR=-VECTR
115 LOC=SCR+LN*10+LN/2:POS=LOC
125 GOSUB 5000
199 REM CHECK STICKS
200 M=STICK(0):N=STICK(1)
205 IF M=14 THEN VECTR=-LN:GOTO 225
210 IF M=13 THEN VECTR=LN:GOTO 225
215 IF M=7 THEN VECTR=1:GOTO 225
220 IF M=11 THEN VECTR=-1
225 IF N=14 THEN DIR=-LN:GOTO 300
230 IF N=13 THEN DIR=LN:GOTO 300
235 IF N=7 THEN DIR=1:GOTO 300
240 IF N=11 THEN DIR=-1
299 REM MOVE PLAYERS
300 FOR SP=1 TO LEV:NEXT SP
302 LOC=LOC+VECTR:IF PEEK(LOC)=WALL
    OR PEEK(LOC)=BARR OR PEEK(LOC)=S
    IDE THEN P=1:GOTO 6000
304 IF STRIG(0)=0 AND VAL1<>0 THEN P
    OKE LOC,BLANK:VAL1=VAL1-1:POSITI
    ON 14,22:? VAL1:GOTO 308
306 POKE LOC,WALL:SOUND 1,LOC,10,8
308 POS=POS+DIR:IF PEEK(POS)=WALL OR
     PEEK(POS)=BARR OR PEEK(POS)=SID
    E THEN P=2:GOTO 6000
310 POKE POS,BARR:SOUND 1,POS,10,8
312 IF STRIG(1)=0 AND VAL2<>0 THEN P
    OKE POS,BLANK:VAL2=VAL2-1:POSITI
    ON 37,22:? VAL2
314 GOTO 200
999 REM REDEFINE
1000 GOSUB 7500
1002 POSITION 13,17:? "Please Wait"
1004 ST=(PEEK(106)-8)*256:IF PEEK(ST
     +256)=137 THEN 1012
1006 FOR X=0 TO 1023:POKE ST+X,PEEK(
     57344+X):NEXT X
1008 FOR X=0 TO 7:READ A:POKE ST+256
     +X,A:NEXT X
1010 FOR X=0 TO 7:READ A:POKE ST+248
     +X,A:NEXT X
1012 GOSUB 7510
1014 DATA 137,34,132,17,132,144,68,1
     37
1016 DATA 42,42,42,42,107,73,73,73
1018 RETURN
4999 REM DRAW BORDER
5000 ? CHR$(125):POKE 756,ST/256:SET
     COLOR 2,0,0:FOR I=0 TO LN-1:POK
     E SCR+I,SIDE:NEXT I:FOR I=0 TO
     LN-1
5002 POKE SCR+LN*21+I,SIDE:NEXT I
5004 FOR I=0 TO 21:POKE SCR+I*LN,SID
     E:NEXT I:FOR I=0 TO 21:POKE SCR
     +LN-1+I*LN,SIDE:NEXT I
5006 POSITION 1,22:? "■ Holes left:"
     ;VAL1:POKE SCR+LN-16+22*LN,BARR
     :POSITION 25,22:? " Holes left:
     ";VAL2
5008 RETURN
5999 REM END OF GAME ROUTINE
6000 GOSUB 6030:GRAPHICS 0:POKE 756,
     ST/256:POKE 752,1:SETCOLOR 2,0,
     0:POSITION 13,9:? "Player "
6002 IF P=1 THEN POKE SCR+LN-20+9*LN
     ,BARR
6004 IF P=2 THEN POKE SCR+LN-20+9*LN
     ,WALL
6006 POSITION 21,9:? " Wins!!"
6008 GOSUB 7000:POSITION 10,11:? "Pr
     ess trigger to play"
6010 IF STRIG(0) AND STRIG(1) THEN 6
     010
6012 GOTO 100
6029 REM EXPLOSION
```

QUESTRON

Live the Fantasy and the Adventure.

STRATEGIC SIMULATIONS INC. PRESENTS A FANTASY ADVENTURE GAME: QUESTRON™
ONE OF THE FINEST CHAPTERS IN THE NEVER-ENDING SAGA OF THE BATTLE BETWEEN GOOD AND EVIL
Starring YOU as THE HERO • MESRON, THE GOOD WIZARD • MANTOR, THE EVIL SORCEROR
AND HIS HORDES OF HERO-CRUNCHING MONSTERS • Written and directed by CHARLES DOUGHERTY
ON 48K DISK FOR YOUR APPLE® II WITH APPLESOFT ROM CARD, APPLE II+, IIe, OR APPLE III. ALSO FOR ATARI® HOME COMPUTERS.

APPLE® version now showing at a computer/software or game store near you. ATARI® version coming Spring 1984.

SSI

PG | THIS GAME RATED POSITIVELY GREAT. Ideal for Fantasy Adventurers of all ages.

APPLE is a registered trademark of Apple Computer, Inc.

STRATEGIC SIMULATIONS INC

ATARI is a registered trademark of Atari, Inc.

If there are no convenient stores near you, VISA & Mastercard holders can order direct by calling 800-227-1617, ext. 335 (toll free). In California, call 800-772-3545, ext. 335. QUESTRON™ goes for $49.95, plus $2.00 for shipping and handling.

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.) All our games carry a "14-day satisfaction or your money back" guarantee.

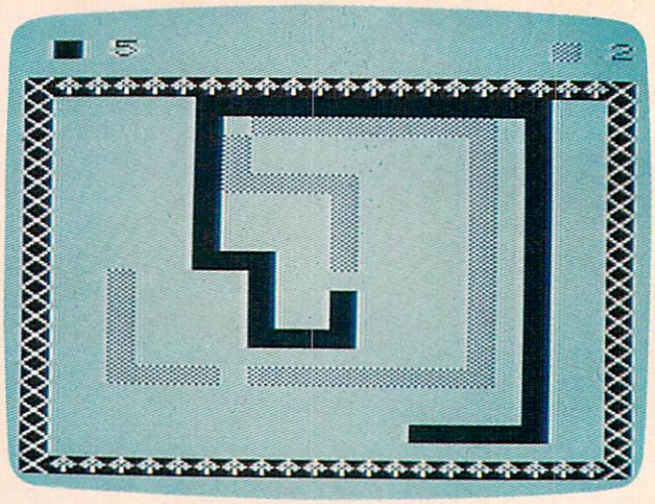
WRITE FOR A FREE COLOR CATALOG OF ALL OUR GAMES.

```
6030 POKE 752,1:FOR I=15 TO 0 STEP -
     0.2:SOUND 0,20,8,I:SOUND 1,75,8
     ,I+1:SOUND 2,175,8,I+3:SOUND 3,
     255,8,I+5:NEXT I
6032 FOR SO=1 TO 3:SOUND SO,0,0,0:NE
     XT SO
6034 ? CHR$(125):SETCOLOR 2,0,0
6036 POSITION 14,11:? "GAME
     {5 SPACES}OVER"
6038 FOR LOOP=1 TO 5:POSITION 19,10:
     ? A$:FOR D=1 TO 25:NEXT D:POSIT
     ION 19,10:? B$:FOR D=1 TO 45:NE
     XT D:NEXT LOOP:RETURN
7000 RESTORE 7002:FOR D=1 TO 8:READ
     Z:FOR DEL=0 TO 15 STEP 3:SOUND
     1,Z,10,DEL:NEXT DEL
7001 FOR DEL=15 TO 0 STEP -3:SOUND 1
     ,Z,10,DEL:NEXT DEL:FOR DEL=1 TO
      10:NEXT DEL:NEXT D
7002 DATA 162,121,128,121,96,108,121
     ,108
7004 RETURN
7500 REM INSTRUCTIONS
7502 GRAPHICS 0:POKE 752,1:SETCOLOR
     2,0,0:POSITION 9,1:? "** BARRIE
     R BATTLE **"
7504 ? :? :? :? :? :? "Use your joys
     tick to barricade your
     {3 SPACES}opponent into a colli
     sion with a wall."
7506 ? :? "You have 5 holes to use.
     These can be created by pressin
     g the trigger."
7508 RETURN
7510 TRAP 7550:POSITION 9,17:? "Spee
     d Level  (1-4)";:INPUT SK
7511 TRAP 40000
7512 IF SK<1 OR SK>4 THEN FOR I=1 TO
      37:POSITION I,15:? CHR$(32):NE
     XT I:GOTO 7510
7513 LEV=(SK-1)*10:POSITION 9,15:? "
     Press trigger to play"
7514 IF STRIG(0) AND STRIG(1) THEN 7
     514
7516 REM MUSIC
7518 RESTORE 7520:FOR D=1 TO 8:READ
     Z:FOR DEL=0 TO 15 STEP 3:SOUND
     1,Z,10,DEL:NEXT DEL
7519 FOR DEL=15 TO 0 STEP -3:SOUND 1
     ,Z,10,DEL:NEXT DEL:FOR DEL=1 TO
      10:NEXT DEL:NEXT D
7520 DATA 121,121,121,121,102,108,12
     1,136
7522 RETURN
7550 TRAP 40000:FOR I=1 TO 37:POSITI
     ON I,15:? CHR$(32):NEXT I:GOTO
     7510
```

Program 2: VIC Barrier Battle

Translation by Jeff Hamdani, Editorial Programmer

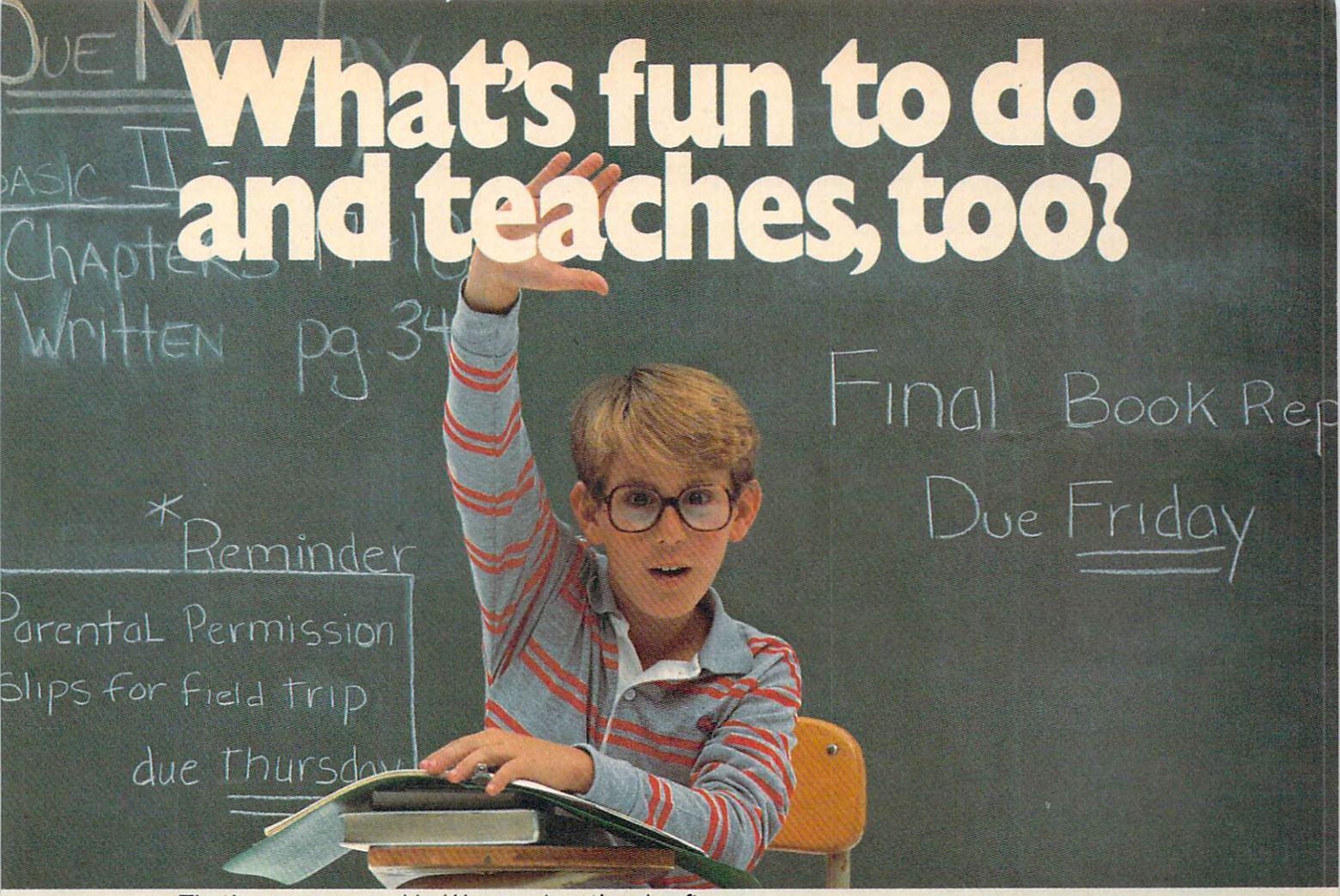
```
93 REM INITIALIZATION
94 POKE36879,25:LV=5:GOSUB1000
98 DIM A$(18),B$(18),M(18)
100 X=11:Y=12:SR=7680+X+22*Y:SD=216:SS=10
    2:C=30720
101 POKE198,0:WL=160:BR=214:BK=32:V1=5:V2
    =5
105 LN=22:VE=LN:DR=-LN:
115 LC=SR:PS=LC
130 PRINT"{CLR}{RIGHT}{BLK}{RVS} {OFF}" V
    1;
140 PRINT"{14 RIGHT}{BLU}{RVS}[+]{OFF}"
    ;V2
```



VIC version of "Barrier Battle."

```
145 GOSUB5000
199 REM CHECK JOYSTICKS
200 DD=37154:P1=37151:P2=37152:IF V2=2 TH
    EN FOR I=1 TO 40000:NEXT
201 POKEDD,127:P=PEEK(P2)AND128:J0=-(P=0)
203 IFJ0=1THENVE=1:GOTO229
204 POKEDD,255:P=PEEK(P1)
205 FB=-((PAND32)=0)
221 J3=-((PAND4)=0):IFJ3=1THENVE=-LN:GOTO
    229
223 J1=-((PAND8)=0):IFJ1=1THENVE=LN:GOTO2
    29
227 J2=-((PAND16)=0):IFJ2=1THENVE=-1
229 GETZ$:IFZ$=""THENGOTO300
230 IFZ$="I"THENDR=-LN:GOTO300
233 IFZ$="M"THENDR=LN:GOTO300
236 IFZ$="K"THENDR=1:GOTO300
239 IFZ$="J"THENDR=-1
299 REM MOVE PLAYERS
300 FORSP=1TOLV:NEXTSP
301 LC=LC+VE:GOSUB7600
302 IFPEEK(LC)<>BKTHENP=1:GOTO6000
304 IFFB=0ORV1=0THEN307
305 POKELC,BK:V1=V1-1:POKE7683,V1+48:GOTO
    308
307 POKELC,WL:POKELC+C,0
308 PS=PS+DR
309 IFPEEK(PS)<>32THENP=2:GOTO6000
310 IFZ$<>" "ORV2=0THEN314
312 POKEPS,BK:V2=V2-1:POKE7701,V2+48:GOTO
    315
314 POKEPS,SS:POKEPS+C,6
315 GOTO200
999 REM REDEFINING
1000 GOSUB7502:PRINT"{2 DOWN}{2 RIGHT}TO
     {SPACE}START, PRESS THE":PRINT"{RVS}
     TRIGGER{OFF} OR {RVS}SPACEBAR{OFF}."
1010 GETX$:P=PEEK(37151):FB=-((PAND32)=0)
     :IF(FB=0)AND(X$="")THEN1010
1018 GOSUB7510:RETURN
4999 REM DRAW BORDER
5000 FORI=7724TO7745:POKEI,SD:POKEI+C,2:N
     EXT
5002 FORI=8164TO8185:POKEI,SD:POKEI+C,2:N
     EXT
5004 FORI=7724TO8164STEP22:POKEI,BR:POKEI
     +C,2:NEXT
5005 FORI=7745TO8185STEP22:POKEI,BR:POKEI
     +C,2:NEXT
```

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 is a trademark of Human Engineered Software. Facemaker is a trademark of Spinnaker 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.

```
5008 RETURN
5999 REM END OF GAME ROUTINE
6000 GOSUB6030:PRINT"{CLR}{13 DOWN}
     {4 RIGHT}{BLU}PLAYER{RIGHT}";
6002 IFP=1THENPOKE7977,SS:POKE7977+C,6
6004 IFP=2THENPOKE7977,WL:POKE7977+C,0
6006 PRINT"{2 RIGHT}WINS":FORI=1TO700:NEX
     TI:GOSUB 7000
6008 PRINT"{7 DOWN}{2 RIGHT}PRESS :":PRIN
     T"{DOWN}{RIGHT}{RVS}TRIGGER{OFF} OR
     {SPACE}{RVS}SPACEBAR{OFF}{3 SPACES}T
     O{RIGHT}CONTINUE, {RVS}{BLK}Q-QUIT
     {OFF}{BLU}"
6009 POKE198,0:P=PEEK(P1):FB=-((PAND32)=0
     )
6010 IFPEEK(197)=48THENPOKE198,0:END
6012 IFFB<>1ANDPEEK(197)<>32THEN6009
6013 GOTO100
6029 REM EXPLOSION
6030 POKE36877,220:FORL=15TO0STEP-1:POKE3
     6878,L
6035 FORM=1TO50:NEXTM:NEXTL:POKE36877,0
6040 POKE36878,0:RETURN
7000 PRINT"{CLR}{8 DOWN}{6 RIGHT}GAME OVE
     R{OFF}"
7005 RESTORE
7006 FORT=1TO18:READM(T):NEXT
7007 FORT=1TO9:READL(T):NEXT
7010 FORI=1TO5
7020 FORJ=1TO9:POKEL(J),M(J):POKEL(J)+C,6
     :NEXT
7030 FORK=1TO9:POKEL(K),M(K+9):POKEL(K)+C
     ,6:NEXT:NEXT
7050 DATA32,81,32,78,160,77,122,32,76,77,
     81,78,32,160,32,122,32,76
7060 DATA7909,7910,7911,7931,7932,7933,79
     53,7954,7955
7070 RETURN
7502 PRINT"{CLR}{4 RIGHT}{RVS}{BLU}BARRIE
     R BATTLE{OFF}{3 DOWN}"
7503 PRINT"{2 RIGHT}ONE PLAYER MUST USE":
     PRINT"JOYSTICK AND THE":PRINT"OTHER
     {SPACE}KEYBOARD (I,J,"
7504 PRINT"K,M).{2 SPACES}WITH THESE,":PR
     INT"CAUSE YOUR OPPONENT TOCOLLIDE WI
     TH A WALL."
7506 PRINT"{2 DOWN}{2 RIGHT}YOU HAVE 5 HO
     LES TO USE.{2 SPACES}CREATE THEM BY"
7507 PRINT"PRESSING THE TRIGGER{2 SPACES}
     OR SPACEBAR."
7508 RETURN
7510 PRINT"{CLR}{6 DOWN}SPEED LEVEL (1-4)
     ?"
7511 PRINT"{2 DOWN}(1 IS FASTEST)"
7512 GETS$:IFS$=""THEN7512
7513 SK=VAL(S$):IFSK<1ORSK>4THEN7512
7520 LV=(SK-1)*10:RETURN
7600 POKE36878,15
7610 FORL=1TO5:POKE36876,INT(RND(1)*128)+
     128
7620 NEXTL
7630 POKE36876,0:POKE36878,0:RETURN
```

Program 3: 64 Barrier Battle

Translation by Jeff Hamdani, Editorial Programmer

```
10 FORL=54272TO54296:POKEL,0:NEXTL:POKE54
   296,15:POKE54277,17
20 POKE54278,241
93 REM INITIALIZATION
94 POKE53280,1:POKE53281,1:LV=5:GOSUB1000
98 DIM A$(18),B$(18),M(18)
100 X=20:Y=11:SR=1024+X+40*Y:SD=171:SS=10
    2
101 WL=160:BR=214:BK=32:V1=5:V2=5
105 LN=40:VE=LN:DR=-LN:C=54272
115 LC=SR:PS=LC
130 PRINT"{CLR}{23 DOWN}{RIGHT}[4]{RVS}
     {OFF} HOLES LEFT"V1;
140 PRINT"{8 RIGHT}{BLU}{RVS}[+]{OFF} H
    OLES LEFT";V2
145 GOSUB5000
199 REM CHECK JOYSTICKS
200 K1=PEEK(56321):K2=PEEK(56320)
201 J1=15-(K1AND15):J2=15-(K2AND15)
203 F1=K1AND16:F2=K2AND16
221 IFJ1=1THENVE=-LN:GOTO230
223 IFJ1=2THENVE=LN:GOTO230
225 IFJ1=8THENVE=1:GOTO230
227 IFJ1=4THENVE=-1
230 IFJ2=1THENDR=-LN:GOTO300
233 IFJ2=2THENDR=LN:GOTO300
236 IFJ2=8THENDR=1:GOTO300
239 IFJ2=4THENDR=-1
299 REM MOVE PLAYERS
300 FORSP=1TOLV:NEXTSP
301 LC=LC+VE:GOSUB7600
302 IFPEEK(LC)<>BKTHENP=1:GOTO6000
304 IFF1=16ORV1=0THEN307
306 POKELC,BK:V1=V1-1:POKE1958,V1+48:GOTO
    308
307 POKELC+C,11:POKELC,WL
308 PS=PS+DR
309 IFPEEK(PS)<>32THENP=2:GOTO6000
310 IFF2=16ORV2=0THEN314
311 POKEPS,BK:V2=V2-1:POKE1981,V2+48
313 GOTO315
314 POKEPS+C,6:POKEPS,SS
315 GOTO200
1000 GOSUB7502:PRINT"{5 DOWN}{7 RIGHT} PR
     ESS TRIGGER TO CONTINUE"
1010 F1=PEEK(56321)AND16:F2=PEEK(56320)AN
     D16:IFF1=16 AND F2=16 THEN1010
1018 GOSUB7510:RETURN
4999 REM DRAW BORDER
5000 FORI=1024TO1063:POKEI+C,9:POKEI,SD:N
     EXT
5002 FORI=1904TO1943:POKEI+C,9:POKEI,SD:N
     EXT
5004 FORI=1024TO1904STEP40:POKEI+C,9:POKE
     I,BR:NEXT
5005 FORI=1063TO1943STEP40:POKEI+C,9:POKE
     I,BR:NEXT
5008 RETURN
5999 REM END OF GAME ROUTINE
6000 GOSUB6030:PRINT"{CLR}{10 DOWN}
     {14 RIGHT}{2}PLAYER{RIGHT}";
6002 IFP=1THENPOKE1445,SS:POKE1445+54272,
     6
6004 IFP=2THENPOKE1445,WL:POKE1445+54272,
     11
6006 PRINT"{2 RIGHT}WINS":FORI=1TO700:NEX
     TI
6008 GOSUB7000:PRINT"{8 DOWN}{7 RIGHT}TRI
     GGER TO CONTINUE:{RVS}{BLK}Q-QUIT
     {OFF}{RED}"
6009 POKE198,0:F1=PEEK(56321)AND16:F2=PEE
     K(56320)AND16
6010 IFPEEK(197)=62THENPOKE198,0:END
6012 IFF1=16ANDF2=16THEN6009
6013 GOTO100
6029 REM EXPLOSION
6030 W=54276:A=54277:H=54273
```

KRELL *is* EDUCATION

KRELL'S SAT* PREP SERIES

70 POINT SAT* SCORE INCREASE WARRANTY

42 program series. Complete coverage of all SAT* topics including The Test of Standard Written English. All materials presented in SAT* format and at the same level of difficulty encountered in SAT* Exams. Scoring and explanations provided instantly. Krell's unique logical design customizes this multi-disk set for each individual user. *Beware of imitations!* **$299.95**

***Bonus Included*: The As & Bs of Academic Scholarships by Robert Leider and Shelly Schwab, 6th Edition.**

Available at Selected Dealers

CONNECTIONS

Krell's *Connections* is the most exciting development in educational computing since LOGO. *Connections* offers children of all ages a new world of entertainment and intellectual challenge. Parents and educators will be gratified by the intriguing yet serious nature of *Connections*.

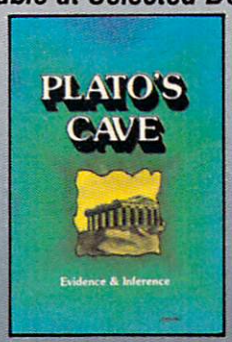
Connections is accompanied by an initial set of data bases (included free with the game system) that deal with geography, chemistry, mammals, mathematics, tools, and everyday objects. *Connections* helps users to build their own data bases and to utilize the data bases created by others via the *Connections User Group Exchange Program*, 48K. **$99.95**

KRELL'S LOGO

The M.I.T. authorized version. Comprehensive 4-disk set includes two copies of LOGO for Apple II™, all utility programs and Sprite drivers, all M.I.T. demonstration programs, shape editor, music editor, 21 program *Alice in Logoland* Tutorial Series, and massive documentation including full color wall chart. THIS IS THE GENUINE ARTICLE! Unlike the version marketed by Apple Corporation, KRELL'S LOGO offers the full package of M.I.T. features including the ability to save pictures.

Spectacular Price **$89.95**

TOP RATED IN INFOWORLD
EXCELLENT IN ALL CATEGORIES!



New! ALEXANDER THE GREAT

Available at last!!! *Alexander The Great* is the ultimate game for developing word and arithmetic skills, far better than Scrabble™. *Alexander The Great* permits equal competition between players at different skill levels. Complete graphics and range of options make *Alexander The Great* the best and most challenging, educational tool ever devised. Available for all microcomputers and in a board version, 48K. **$39.95**

New! PLATO'S CAVE

Spectacular game for aspiring scientists of all ages. Players probe *Plato's Cave* with light beams as they explore the relation between illusion and reality and the relation between evidence and inference. Graphic, dynamic, and challenging, with difficulty levels suitable for all, 48K. **$49.95**

CALL OR WRITE FOR A COMPLETE CATALOG

ACORN, APPLE, ATARI, COMMODORE, IBM-PC, RADIO SHACK

Trademarks of Acorn Computer Co., Apple Comp. Corp., Atari Comp., Commodore Corp., IBM, Tandy Corp.

THE GREAT AMERICAN S.A.T. CONTEST

CALL OR WRITE FOR DETAILS

VISA MasterCard

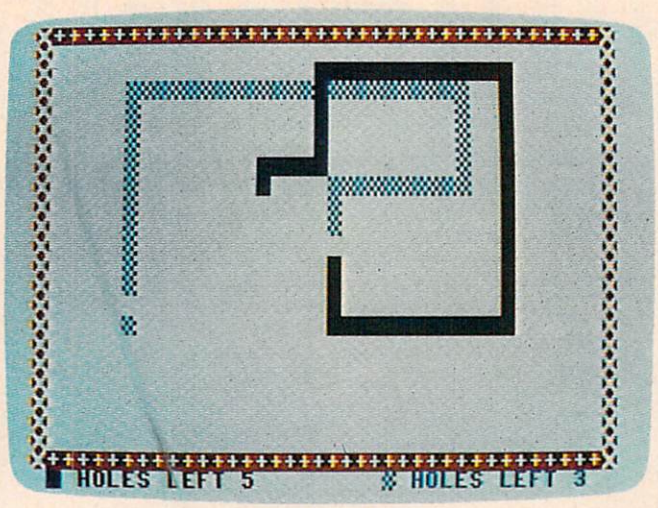
N.Y. Residents add sales tax
Payment in U.S. dollars only
Prices slightly higher outside U.S.

DEALER INQUIRIES INVITED

KRELL SOFTWARE CORP.
The state of the art in educational computing
1320 Stony Brook Road
Stony Brook, New York 11790

For all orders outside New York State
800-24-KRELL
For information (516) 751-5139

"SAT" and "College Board" are registered trademarks and service marks of the College Entrance Examination Board. Krell Software Corp. has no affiliation with the CEEB and is solely responsible for these programs. Krell's M.I.T. LOGO © 1981, Massachusetts Institute of Technology. Infoworld ©1983 by Popular computing, Inc., a subsidiary of CW Communication, Inc., Framingham, MA. Scrabble is a registered trademark of Selchow and Righter Company.



64 Version of "Barrier Battle."

```
6035 POKEW,129:POKEA,15:POKEH,40:POKEC,20
     0:FORI=1TO500:NEXT
6040 POKEW,128:POKEA,0:RETURN
7000 PRINT"{CLR}{8 DOWN}{15 RIGHT}GAME OV
     ER{OFF}"
7005 RESTORE
7006 FORT=1TO18:READM(T):NEXT
7007 FORT=1TO9:READL(T):NEXT
7010 FORI=1TO5
7020 FORJ=1TO9:POKEL(J)+C,9:POKEL(J),M(J)
     :NEXT
7030 FORK=1TO9:POKEL(K)+C,9:POKEL(K),M(K+
     9):NEXT:NEXT
7050 DATA32,81,32,78,160,77,122,32,76,77,
     81,78,32,160,32,122,32,76
7060 DATA1482,1483,1484,1522,1523,1524,15
     62,1563,1564
7070 RETURN
7502 PRINT"{CLR}{14 RIGHT}{3 DOWN}{RVS}
     {BLU}BARRIER BATTLE{OFF}{4 DOWN}"
7504 PRINT"{4 RIGHT}USING YOUR JOYSTICK,
     {SPACE}CAUSE YOUR"
7505 PRINT"{4 RIGHT}OPPONENT TO COLLIDE W
     ITH A WALL."
7506 PRINT"{DOWN}{4 RIGHT}YOU HAVE 5 HOLE
     S TO USE. CREATE"
7507 PRINT"{4 RIGHT}HOLES BY PRESSING THE
      TRIGGER."
7508 RETURN
7510 PRINT"{CLR}{9 DOWN}{10 RIGHT}SPEED L
     EVEL (1-4) ?"
7512 PRINT"{2 DOWN}{11 RIGHT}(1 IS THE FA
     STEST)"
7513 GETS$:IFS$=""THEN7513
7515 SK=VAL(S$):IFSK<1ORSK>4THEN7513
7520 LV=(SK-1)*10:RETURN
7600 POKE54276,17:X1=PEEK(162):X2=PEEK(16
     2)
7610 POKE54273,X1:POKEC,X2
7620 POKE54276,16:RETURN
```

Program 4: TRS-80 Barrier Battle

Translation by Jeff Hamdani, Editorial Programmer

```
93 REM INITIALIZATION
94 CLS:LV=5:GOSUB1000
100 CLS:X=16:Y=8:SR=1024+X+32*Y:SD=
    249:BR=246
101 WL=175:SS=159:BK=96:V1=5:V2=5
105 U=1:LN=32:VE=LN:DR=-LN
115 LC=SR:PS=SR
126 CLS:PRINT@1,CHR$(175);"HOLES";V
    1:PRINT@22,CHR$(159);"HOLES";V2
127 GOSUB 5000:IFU=1 THEN 300
199 REM JOYSTICK ROUTINE
200 H0=JOYSTK(0):H1=JOYSTK(1):H2=JO
    YSTK(2):H3=JOYSTK(3)
210 H0=INT(H0/2):H1=INT(H1/4):H2=IN
    T(H2/2):H3=INT(H3/4):I=0
215 IF H1<=3 AND H1>=0 AND H0>2 THE
    N VE=-LN :GOTO 235
220 IF H1>=13 AND H1<=15 AND H0<29
    THEN VE=LN:GOTO 235
225 IF H0>22 THEN VE=1:GOTO 235
230 IF H0<9 THEN VE=-1
235 IF H3<=3 AND H3>=0 AND H2>2 THE
    N DR=-LN:GOTO 300
240 IF H3>=13 AND H3<=15 AND H2<29
    THEN DR=LN:GOTO 300
245 IF H2>22 THEN DR=1:GOTO 300
250 IF H2<9 THEN DR=-1
299 REM MOVE PLAYERS
300 FORSP=1TOLV:NEXTSP
301 LC=LC+VE:Q1=PEEK(LC):GOSUB7600
302 IF Q1 <> BK THEN 6000
304 B1=PEEK(65280):IF B1=126 OR B1=
    254 OR B1=124 OR B1=252 THEN 30
    6 ELSE 307
306 POKELC,BK:V1=V1-1:IF V1>=0 THEN
     POKE 1032,V1+112:GOTO 308
307 POKELC,WL
308 PS=PS+DR:Q2=PEEK(PS):SOUND X,1
309  IF Q2 <> BK THEN 6010
310 B2=PEEK(65280):IF B2=125 OR B2=
    253 OR B2=124 OR B2=252 THEN 31
    2 ELSE 313
312 POKEPS,BK:V2=V2-1:IF V2>=0 THEN
     POKE 1053,V2+112:GOTO 315
313 POKEPS,SS
315 U=U+1:GOTO200
1000 GOSUB7502:PRINT@452,"PRESS TRI
     GGER TO START"
1010 B1=PEEK(65280):IF B1=126 OR B1
     =254 OR B1=124 OR B1=252 THEN1
     018
1012 B2=PEEK(65280):IF B2=125 OR B2
     =253 OR B2=124 OR B2=252 THEN
     1018 ELSE 1010
1018 GOSUB7510:RETURN
4999 REM DRAW BORDERS
5000 FORI=1056TO1087:POKEI,SD:NEXTI
5002 FORI=1504TO1535:POKEI,SD:NEXTI
5004 FORI=1056TO1504STEP32:POKEI,BR
     :NEXTI
5005 FORI=1087TO1535STEP32:POKEI,BR
     :NEXTI
5008 RETURN
6000 GOSUB 6030:CLS:PRINT@233,"PLAY
     ER ";CHR$(159);" WINS";:FORI=1
     TO700:NEXTI:GOTO6015
6010 GOSUB 6030:CLS:PRINT@233,"PLAY
     ER ";CHR$(175);" WINS";:FORI=1
     TO700:NEXTI:GOTO6015
6015 PRINT@161,"<C> OR <FIREBUTTON>
      TO CONTINUE"
6016 PRINT@193,"<S> CHANGE SPEED &
     CONTINUE"
6017 PRINT@225,"<Q> QUIT"
6018 PRINT@326,"CHOOSE YOUR OPTION"
6020 A$=INKEY$:IF A$="" THEN 6021 E
     LSE 6023
```

Books&Software

BOOKS for ATARI 400/600XL/800XL 1200XL

ATARI BASIC – Learning by Using
An excellent book for the beginner. Many short programs and learning exercises. All important features of the ATARI computers are described (screen drawings, special sounds, keys, paddles, joysticks, specialized screen routines, graphics, sound applications, peeks, pokes, and special stuff).
Order-No. 164 **$7.95**

Games for the ATARI Computer
This book describes advanced programming techniques like player-missile-graphics and use of the hardware-registers. Contains many ready to run programs in BASIC and one called GUNFIGHT in machine language.
Order-No. 162 **$7.95**

How to program your ATARI in 6502 Machine Language
Introduction to machine language for the BASIC programmer.
Order-No. 169 **$9.95**

FORTH on the ATARI – Learning by Using
Introduction, programs, applications, learning exercises.
Order-No. 170 **$7.95**
All programs from book No. 170 on disk.
Order-No. 7319 **$22.00 only!**

A Look into the Future–ASTROLOGY on your ATARI 800. How to calculate your own horoscope. Including listing of the program.
Order-No. 171 **$9.95**

HACKERBOOK for your Atari computer
Tips+tricks–Very important subroutines in 6502 machine language. How to make bootable cassettes, disks, and EPROMs. Complete construction article and software on how to build an EPROM burner.
Order-No. 172 **$9.95**

SMALL BUSINESS SOFTWARE FOR ALL ATARI COMPUTERS

SUPERMAIL (500 addresses on 1 disk) Completely written in FORTH. Comes on autoboot disk. No cartridge, no DOS, no FORTH language required.
Order-No. 7312 **$49.00**

SUPERINVENTORY (1000 items p.disk) Completely written in FORTH. Same as above. (Disk only)
Order-No. 7320 **$49.00**

BUSIPACK-1 (written in FORTH). Complete order entry, inventory, mailing and invoicing. (Disk only).
Order-No. 7313 **$98.00**

Microcomputer Hardware Handbook
Order-No. 29 **$ 14.95**

ATCASH
Convert your ATARI 800 into a powerful cash register. (Disk only).
Order-No. 7303 **$49.95**

Invoicing program in BASIC
Order-No. 7201 (C) **$29.95**
Order-No. 7200 (D) **$39.95**

Mailing List in BASIC
Order-No. 7212 (C) **$19.95**
Order-No. 7213 (D) **$24.95**

Inventory control in BASIC
Order-No. 7214 (C) **$19.95**
Order-No. 7215 (D) **$24.95**

SOFTWARE IN MACHINE LANGUAGE FOR ATARI

ATMONA-1
Machine language monitor.
Order-No. 7022 (C) **$19.95**

ATMONA-2
This is a tracer (debugger) that lets you explore the ATARI RAM/ROM area. You can stop at previously selected address, opcode, or operand. Also very valuable in understanding the microprocessor. At each stop, all registers of the CPU may be changed. Includes Atmona-1.
Order-No. 7049 cassette **$49.95**
Order-No. 7050 disk **$54.00**

ATMAS
Macro-Assembler for ATARI-800/48K. One of the most powerful editor assemblers on the market. Versatile editor with scrolling. Up to 17k of source-code. Very fast, translates 5k source-code in about 5 seconds. Source code can be saved on disk or cassette (Incl.Atmona-1).
Order-No. 7099 disk **$89.00**
Order-No. 7999 cartridge **$129.00**

ATMS APPLICATION DISK
All programs and machine language subroutines from Book No.169 on disk.
Order-No. 7311 **$20.00**

ATAS
Same as ATMAS but without macro-capability. (32K and 48K RAM)
Order-No. 7098 **$49.95**

ATEXT-1
This wordprocessor is an excellent buy for your money. It features screen oriented editing, scrolling, string search (even nested), left and right margin justification. Over 30 commands. Text can be saved on disk or cassette.
Order-No. 7210 cassette **$29.95**
Order-No. 7216 disk **$34.95**
Order-No. 7217 cartridge **$69.00**

FORTH for the ATARI
FORTH from ELCOMP PUBLISHING, Inc. is an extended Fig-Forth-version, Editor and I/O package included. Utility package includes decompiler, sector copy, Hexdump (ASCII), ATARI filehandling, total graphic and sound, joystick program and player missile. Extremely powerful!
Order-No.7055(D) reg.$99.00 sale $39.95

Floating point package with trigonometric functions (0 – 90°).
Order-No. 7230 disk **$29.95**

Learn FORTH
A subset of Fig-Forth for the beginner. On disk (32k RAM) or cass. (16k RAM).
Order-No.7053 reg. 79.00 **sale $19.95**

HARDWARE-ADD-ONs for ATARI

PRINTER INTERFACE
This construction article comes with printed circuit board and software. You can use the EPSON printer without the ATARI printer interface. (Works with gameport 3 and 4).
Order-No. 7211 **$19.95**

300 Baud serial interface (RS232+5V) Software with connector and construction article.
Order-No. 7291 **$19.95**

EPROM BURNER for ATARI 400/800 KIT. Printed circuit board incl. software and extensive construction article.
Order-No. 7292 **$49.00**

EPROM BOARD (CARTRIDGE)
Holds two 4k EPROMs (2532). EPROMs not included.
Order-No. 7043 **$29.95**

EPROM BOARD KIT
Same as above but bare board only with description.
Order-No. 7224 **$14.95**

Astrology and Biorhythm for ATARI
Order-Nol 7223 D/C **$29.95**

Birth control with the Atari(Knaus Ogino)
Order-No. 7222 **disk only!** **$29.95**

The APPLE in your Hand, BRAND NEW! Book includes introduction to 6502 Machine Language and FORTH. BASIC programs never published before!
Order-No. 178 (200 pages) **$12.95**

CP/M –MBASIC and the OSBORNE computer
Business Applications, compl. listings of mailing list, datablock, inventory, invoicing and more.
Order-No. 177 **$9.95**

SUPERSOFTWARE f.the Commodore-64

BLIZTEXT! – The best wordprocessor for the C-64 in the whole universe. Includes terminal software for electronic mail.
Order-No. 4965(62 pages manual)$89.00

MACROFIRE – Editor/Assembler for the C-64
The best macroassembler you can buy!
Order-No. 4963 **$89.00**

SUPERBOOKS for your C-64

The Great Book of Games, Vol. I
64 programs for the Commodore-64.
Order-No. 182 **$9.95**
Programs from this book on disk **$19.95**

MORE ON THE SIXTYFOUR
Tips, tricks, hints, very important subroutines.
Order-No. 183 **$9.95**
Programs from this book on disk **$19.95**

How to program in 6502 Machine Language on your C-64
Order-No. 184 **$12.95**

Commodore-64 Tune-up, Vol. I
How to expand your C-64.
Order-No. 185 **$12.95**

Small Business Programs for the C-64
Order-No. 186 **$12.95**

HARDWARE ADD-ONs for your C-64

Parallel printer interface, KIT
Order-No. 4990 **$19.95**

Universal Experimenter Board
Order-No. 4970 **$9.95**

Expansion Board (holds 4 exp. boards)
Order-No. 4992 **$29.95**

BOOKS, SOFTWARE, ADD-ONs for VIC-20, APPLE II, OSBORNE, TIMEX + OSI computers

Tricks for VICs (Book)
Order-No. 176 **$9.95**

Universal Experim.board for the VIC-20 (Save money with this great board). This board plugs right into the expansion slot of the VIC-20.
Order-No. 4844 reg. $19.95 **sale $9.95**

Programming in BASIC and machine language on the ZX-81 (82) TIMEX1000
Order-No. 174 (book) **$9.95**

The Custom APPLE + Other Mysteries
A complete guide to customizing the APPLE software and hardware.
Order-No. 680 **$24.95**
We also stock the boards which are used in the book No. 680 (bareboards).

HOFACKER

PAYMENT: Check, money order, VISA, MASTER CARD, Eurocheck, ACCESS, Interbank
Prepaid orders add $3.50 for shipping (USA)
$5.00 handling for C.O.D.
All orders outside USA: add 15% shipping, California residents add 6.5 % sales tax.

Elcomp Publishing, Inc, 53 Redrock Lane, Pomona CA 91766, Phone: (714) 623-8314, Telex: 29 81 91

Notes For Commodore 64, VIC-20, TRS-80 Color Computer, And Apple Versions

Jeff Hamdani, Editorial Programmer

In "Barrier Battle," you must maneuver your barrier in an effort to contain your opponent. The fire button on the joystick (or the space bar for the versions using keyboard) allows you to leave spaces (holes) within your barrier. Clever use of this feature lets you corner your opponent and still leave yourself a means of escape. You can create a maximum of five holes in each game.

The VIC and 64 versions of Barrier Battle are similar to the Atari version. However, in the Commodore versions, the characters are not redefined. Instead, the existing graphic characters are used to draw the borders and the barriers. After you or your opponent crashes, the winner is picked, and you are asked if you want to continue or quit. To continue, press the trigger button on your joystick, or press the Q key to quit. Since only one joystick can be used on the VIC-20, the second player must use keys I, J, K, and M to move up, left, right, and down, respectively.

Like the Commodore versions, the TRS-80 Color Computer version draws the barrier with existing graphic characters. In this version, use the left and right joysticks and their fire buttons for movement and spacing, respectively.

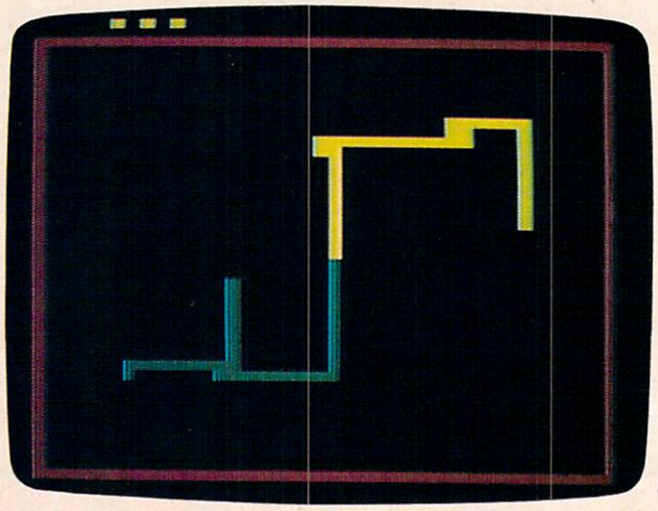
Unlike the other versions, Barrier Battle on the Apple is over when you or your opponent wins four rounds. The barriers are drawn on the low-resolution graphics screen. Paddles were chosen to control each player's movement. Direction is based upon the change of the values in functions PDL(0) and PDL(1). A positive change of more than eight units will move you to the right. A negative change of more than eight units will turn you to the left. If you find that the paddles are too sensitive (or not sensitive enough), increase or decrease this number (8) in lines 340 and 400 to suit you.

```
6021 B1=PEEK(65280):IF B1=126 OR B1
     =254 OR B1=124 OR B1=252 THEN
     100
6022 B2=PEEK(65280):IF B2=125 OR B2
     =253 OR B2=124 OR B2=252 THEN1
     00ELSE 6020
6023 IF A$="C" THEN 100
6024 IF A$="S" THEN GOSUB 1018:GOTO
      100
6025 IF A$="Q" THEN END
6026 IF A$<>"C" OR A$<>"S" OR A$<>"
     Q" THEN6015
6030 SOUND 178,5:SOUND 250,4:SOUND
     252,3:SOUND 255,2:RETURN
7502 PRINTTAB(7)"**BARRIER BATTLE**
     ":PRINT:PRINT
7504 PRINTTAB(2)"BARRICADE YOUR OPP
     ONENT INTO{4 SPACES}A COLLISIO
     N WITH A WALL.":PRINT:PRINT
7505 PRINTTAB(2)"YOU HAVE FIVE HOLE
     S TO USE.{5 SPACES}THESE CAN B
     E CREATED BY"
7506 PRINTTAB(2)"PRESSING THE TRIGG
     ER.":RETURN
7510 CLS:PRINT@230,"SPEED LEVEL (1-
     4)":PRINT@295,"(1 IS FASTEST)"
7511 S$=INKEY$:IF S$="" THEN 7511
7512 SK=VAL(S$):IF SK<1 OR SK>4 THE
     N 7511
7515 LV=(SK-1)*10:RETURN
7600 X=RND(50)
7610 SOUND X, 1:RETURN
```

Program 5: Apple Barrier Battle

Version by Chris Poer, Editorial Programmer

```
10  TEXT : HOME :PI = 3.1415927 / 180
20 A = 0:B = 0
30  GOSUB 660
40  REM  INITIALIZATION
50 FIR = 0:SEC = 0
60 XLOC = 20:YLOC = 26:ALOC = 20:BLAC =
     25:AVAR = 0:BVAR =  - 1
70 T1 = 0:T2 = 180:XVAR = 0:YVAR = 1
80 S = 0:T = 0
90  REM  PADDLE SETTING
100  PRINT : PRINT "NOW SET YOUR PADDLE
      ON THE CENTER VALUE OF 125": PRINT
     : PRINT : PRINT
110  VTAB 22: PRINT ,"   ";: HTAB 1: PRINT
     B$;" IS AT": VTAB 22: PRINT , PDL
     (1)
120  VTAB 23: PRINT ,"   ";: HTAB 1: PRINT
     A$;" IS AT": VTAB 23: PRINT , PDL
     (0)
```



Players have gone opposite ways in the Apple version of "Barrier Battle."

```
130  IF  PDL (1) < 123 OR  PDL (1) > 12
     7 OR  PDL (0) < 122 OR  PDL (0) >
     127 THEN 110
140  PRINT " HIT A PADDLE BUTTON TO CON
     TINUE"
150  IF  PEEK ( - 16287) < 128 AND  PEEK
     ( - 16286) < 128 THEN 150
160 N1 =  PDL (1):N2 =  PDL (0)
170  HOME
180  REM  SET SCREEN
190  GR : HOME : POKE  - 16302,0: CALL
      - 1998
200  COLOR= 1: HLIN 0,39 AT 4: HLIN 0,3
     9 AT 47: VLIN 47,4 AT 0: VLIN 47,4
      AT 39
210  COLOR= 13: FOR I = 1 TO 10 STEP 2:
      PLOT I,2: NEXT
220  COLOR= 4: FOR I = 20 TO 29 STEP 2:
      PLOT I,2: NEXT
230  COLOR= 13: PLOT ALOC,BLOC: COLOR=
     4: PLOT XLOC,YLOC
240  FOR I = 1 TO 300: NEXT
250  GOTO 330
260  REM  MOVE PLAYERS
270  COLOR= 13
280  IF S < 5 AND  PEEK ( - 16286) > 12
     7 THEN  COLOR= 0:S = S + 1: PLOT S
      * 2 - 1,2
290  PLOT ALOC,BLOC
300  COLOR= 4
310  IF T < 5 AND  PEEK ( - 16287) > 12
     7 THEN T = T + 1: COLOR= 0: PLOT 1
     8 + (T * 2),2
320  PLOT XLOC,YLOC
330 O1 = N1:N1 =  PDL (0):O2 = N2:N2 =
      PDL (1)
340  IF  ABS (O1 - N1) < 8 THEN 390
350 S1 =  SGN (O1 - N1)
360  IF S1 = 1 THEN T1 = T1 + 90: GOTO
     380
370 T1 = T1 - 90
380 XVAR =  INT ( SIN (T1 * PI) + .1):Y
     VAR =  INT ( COS (T1 * PI) + .1)
390 XLOC = XLOC + XVAR:YLOC = YLOC + YV
     AR
400  IF  ABS (O2 - N2) < 8 THEN 450
410 S2 =  SGN (O2 - N2)
420  IF S2 = 1 THEN T2 = T2 + 90: GOTO
     440
430 T2 = T2 - 90
440 AVAR =  INT ( SIN (T2 * PI) + .1):B
     VAR =  INT ( COS (T2 * PI) + .1)
450 ALOC = ALOC + AVAR:BLOC = BLOC + BV
     AR
460 PNT =  SCRN( XLOC,YLOC):POT =  SCRN(
     ALOC,BLOC)
470  IF PNT = 0 AND POT = 0 THEN  FOR I
      = 1 TO LEV: GOTO 270
480  IF PNT = 4 OR PNT = 1 OR PNT = 13 THEN
     FIR = 1
490  IF POT = 4 OR POT = 13 OR POT = 1 THEN
     SEC = 1
500  FOR I = 1 TO 1000: NEXT
510  REM  DETERMINING WINNER
520  GOSUB 790: TEXT : HOME
530  IF FIR = 1 AND SEC = 1 THEN  PRINT
     "IT WAS A TIE": GOTO 560
540  IF FIR = 1 THEN B = B + 1: PRINT B
     $;" WON THIS ROUND": GOTO 560
550 A = A + 1: PRINT A$;" WON THIS ROUN
     D"
560  PRINT "THE SCORE IS ": PRINT B;" V
     ICTORIES FOR ";B$
570  PRINT A;" VICTORIES FOR ";A$
580  IF B = 4 THEN C$ = B$: GOTO 630
590  IF A = 4 THEN C$ = A$: GOTO 630
600  PRINT "HIT YOUR PADDLE BUTTON TO C
     ONTINUE"
610  IF  PEEK ( - 16287) > 127 OR  PEEK
     ( - 16286) > 127 THEN 40: GOTO 620

620  GOTO 610
630  PRINT : PRINT : PRINT C$;" IS THE
     WINNER"
640  END
650  IF  PEEK ( - 16287) > 127 OR  PEEK
     ( - 16286) > 127 THEN 40: GOTO 650

660  INVERSE : HTAB 15: PRINT "BARRIER
     BATTLE"
670  NORMAL : PRINT : PRINT : PRINT "TH
     E OBJECT OF THE GAME IS TO FORCE Y
     OUR OPPONENT INTO A WALL."
680  PRINT : PRINT "YOU CANNOT RUN INTO
      YOUR OWN WALL OR THE";: PRINT "BO
     UNDARY."
690  PRINT : PRINT "YOU CAN MAKE FIVE H
     OLES IN THE WALL PER ROUND BY PRES
     SING THE BUTTON ON YOUR": PRINT "P
     ADDLE.": PRINT : PRINT "THE NUMBER
      OF HOLES YOU HAVE LEFT IS": PRINT
     "SHOWN AT THE TOP OF THE SCREEN."
700  PRINT : PRINT "THE FIRST MAN TO WI
     N FOUR ROUNDS WINS": PRINT "THE GA
     ME."
710  PRINT : PRINT "WHAT SPEED DO YOU W
     ANT (1-4) ? <4 IS THE";: PRINT "FA
     STEST>": INPUT LEV
720 LEV = (4 / LEV - 1) * 40
730  PRINT "WHO IS PLAYER ONE": INPUT B
     $
740  PRINT "WHO IS PLAYER TWO": INPUT A
     $
750  HOME
760  PRINT : PRINT B$;" IS ON TOP AND U
     SES PADDLE 1": PRINT A$;" IS UNDER
     NEATH AND USES PADDLE 0"
770  RETURN
780  REM  NOISE
790  FOR I = 1 TO 40
800 F =  PEEK ( - 16336)
810  NEXT
820  RETURN
```

TRIDENT

C. O. Dickerson

Join the crew of the USS Trident *as they test their skills to the limit in a naval simulation. As missile officer, you have only a limited arsenal available to stop wave after wave of enemy missiles. Joystick required for Atari and 64. The 64 version must be entered using MLX (presented elsewhere in this issue). See the "Automatic Proofreader" article on page 60 before typing in this program.*

You are missile officer aboard the *USS Trident*, the world's newest and most powerful nuclear submarine. Suddenly, the Priority One Channel signals a red alert: The enemy has launched an all-out attack.

You don't know it, but this is actually a drill. Since the *Trident* is completely computerized, your only information on the world outside the sub comes from your status console. It's a simple enough matter to keep missile officers like you on their toes: Program the computers to simulate an attack.

You're not only fighting for your theoretical country, but for that next promotion, too!

The enemy missiles come in waves, increasing in number and speed with each new attack. You must meet this massive assault alone, matching the speed and power of your computer against an onslaught of simulated juggernauts. Your defensive missiles can hover in ambush or rocket through the atmosphere at twice the speed of anything the enemy can launch against you. But even with such weapons at your disposal, you know that lightning reflexes and all your skill will be required to repel the attack.

Inside The *Trident* Computer

"Trident" is an arcade-style game making extensive use of machine language. It will run in 24K RAM on the Atari. Three machine language routines are used, stored in a string. A$ contains "Textplot II" by Mark Grebe (COMPUTE!, December 1982); it is used to place numerical data in the various screen readouts. M$ contains D. K. Titchenell's MOV$ (COMPUTE!, March 1983). This routine speeds up initialization and clears the P/M graphics area. The third routine, stored in D$, is the actual game routine. It reads the joystick, keeps track of the incoming missiles, homes them in on the target, handles their movement, and detects collision.

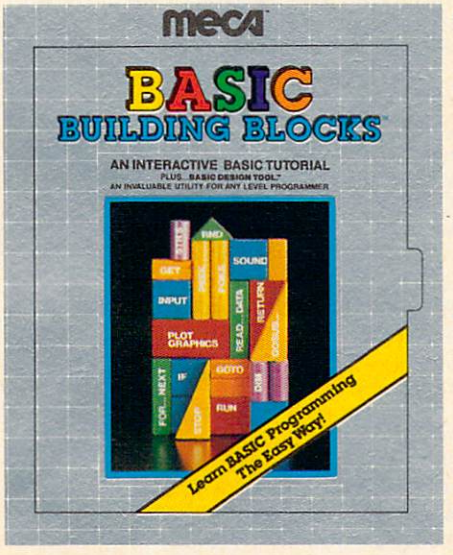
If all is well, D$ returns a 17 PEEK(207), directing the program to reexecute the routine. A 16 indicates a missile has gotten through and the game is over. A value of 1–15 is returned when an incoming missile is destroyed. This number is used to indicate which missiles were destroyed and to compute the score.

Because this program does make extensive use of machine language, a five-line BASIC routine is included (beginning at line 1000) to aid in verifying each DATA line. After entering the program and before typing RUN, type GOTO 1000. If screen output matches the chart below, DATA statements have been entered correctly; you can delete lines 1000–1020 and RUN the program. If there is a discrepancy, the line with the incorrect DATA will be indicated by the number to the left.

Line No.	Check No.	Line No.	Check No.
515	4701	585	3829
520	4304	590	4282
525	4139	595	4278
530	4147	600	4378
535	4403	605	4480
540	4417	610	4003
545	4465	615	4648
550	4191	620	4718
555	4416	625	4685
560	4733	630	4365
565	4620	635	1094
570	4609	640	4931
575	4714	645	2326
580	2841		

"How MECA experts taught us more Basic in one hour than we learned in 12 hours from a book."

"BASIC BUILDING BLOCKS™ lets us interact with our computer and learn at our own pace. Dad says it's so easy to use, it even eliminates the need for him to read the manual. You should see all the programs Mom has written by herself. I like it because it really gets into the fun of the computer...fast. BASIC BUILDING BLOCKS is like having personal computer experts in our house."



- A unique, challenging and entertaining introduction to BASIC programming.
- Consumer testing shows that 9 out of 10 people didn't even need the manual.
- BASIC commands fully demonstrated, including disk access, sound and graphics.
- Over 60 sample programs executing so you can see how BASIC commands work, learn program structure and flow of control.
- Innovative program design for freedom of movement anywhere in the tutorial. This lets you test sample programs at your own pace until you understand how they work.
- Actually encourages you to write and test your own programs.
- Design useful programs, trace their flow and detect programming errors.

Designed for IBM, Atari and Apple Personal Computers. Available where fine software is sold.

meca™ Software that makes your home computer worth having.™

Launching Your Missile

To stop the incoming wave of enemy missiles, release an antimissile from your base (centered in the radar grid) by pressing the fire button on joystick 1. Use the joystick to direct the antimissile toward the nearest incoming missile as shown on the radar screen. Once you have picked off the incoming missile, you are ready to release another antimissile from your base. Be sure to keep your antimissiles on the radar grid.

If you destroy all missiles in an incoming wave, you move to a higher difficulty level where the frequency and speed of the missiles are increased. If you lose, start over by hitting the fire button.

Console Indicators (from top to bottom)

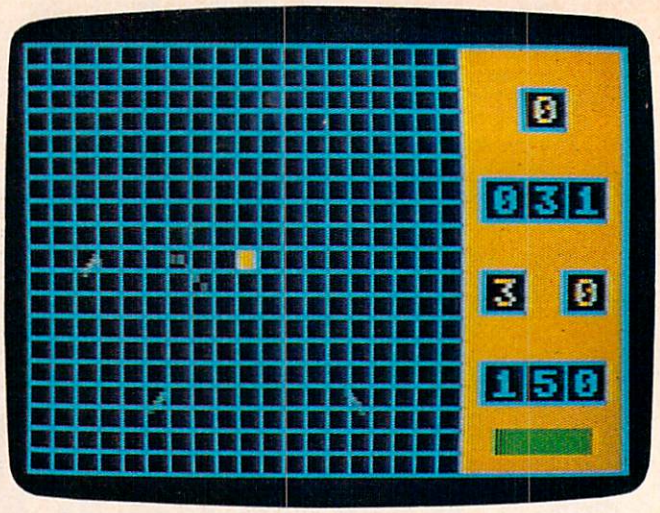
Number of antimissiles launched

Score

Number of missiles in the wave and number of missiles destroyed

Incoming missile speed

Scoring begins at two points for each incoming missile destroyed, increasing by one with each new speed level. A bonus is given for each antimissile not used during the wave. Thus, if each hit counts four points and you are able to destroy four incoming missiles using only three antimissiles, your score for that wave is 20 (4 points for each missile destroyed plus a bonus of 4 points for the antimissile you didn't use).



Incoming missiles speed toward the base at center screen in the Atari version of "Trident."

Program 1: Trident For Atari

```
BG 10  GRAPHICS 0:POKE 752,1:POSITION 1
       2,12:? "STANDBY PLEASE":Q=100:S=
       0:GOSUB 240:GOSUB 345:GOSUB 160:
       GOSUB 285
LI 15  REM  MISSILE ALERT{17 SPACES}
NO 20  FOR I=1 TO 10:FOR D=30 TO 20 STE
       P -1:SOUND 0,D,10,8:NEXT D:NEXT
       I:Z=USR(ADR(A$),48+PEEK(1691),1,
       122,51)
BN 25  T=10-(Q/10):Z=USR(ADR(A$),T+48,2
       ,122,71):Z=USR(ADR(A$),53,2,133,
       71)
IF 30  POKE 1690,0:POKE 1692,0:POKE 203
       ,128:POKE 204,PM+1:POKE 208,105:
       POKE 209,61:POKE 53278,0:POKE 77
       ,0:C=0
EM 35  FOR I=1 TO PEEK(1691):POKE 53247
       +I,PEEK(1663+I):Z=USR(ADR(M$),16
       74,ST+384+I*128+PEEK(1667+I),4):
       NEXT I
EK 40  FOR I=1 TO 4*PEEK(1691)
BN 45  IF PEEK(710)=198 THEN POKE 704,1
       4:POKE 705,14:POKE 706,14:POKE 7
       07,14:POKE 710,52:SOUND 0,60,12,
       8:GOTO 55
LL 50  POKE 704,10:POKE 705,44:POKE 706
       ,202:POKE 707,106:POKE 710,198:S
       OUND 0,0,0,0
LG 55  FOR D=1 TO 100:NEXT D:NEXT I
EL 60  REM  MAIN LOOP ( LINES 55 & 60 )
       {3 SPACES}
LE 65  FOR D=0 TO Q:NEXT D
LO 70  Z=USR(ADR(D$)):POKE 53278,0:IF P
       EEK(207)=17 THEN 65
HC 75  IF PEEK(207)=16 THEN 320
ME 80  REM  HIT ON MISSILE{16 SPACES}
DD 85  T=PEEK(207):IF T>7 THEN T=T-8:C=
       C+1:POKE 1667,0:Z=USR(ADR(M$),16
       84,ST+896+PEEK(1671),4)
EJ 90  IF T>3 THEN T=T-4:C=C+1:POKE 166
       6,0:Z=USR(ADR(M$),1684,ST+768+PE
       EK(1670),4)
EG 95  IF T>1 THEN T=T-2:C=C+1:POKE 166
       5,0:Z=USR(ADR(M$),1684,ST+640+PE
       EK(1669),4)
OG 100 IF T=1 THEN C=C+1:POKE 1664,0:Z
       =USR(ADR(M$),1684,ST+512+PEEK(1
       668),4)
KJ 105 Z=USR(ADR(M$),M,M+1,128):FOR I=
       15 TO 0 STEP -0.5:SOUND 0,10,10
       ,I:NEXT I:Z=USR(ADR(A$),48+C,1,
       144,51)
PP 110 Z=USR(ADR(A$),PEEK(1692)+48,1,1
       33,11):POKE 203,128:POKE 204,PM
       +1:POKE 208,105:POKE 209,61
HJ 115 Z=USR(ADR(M$),M,M+1,640):IF C=P
       EEK(1691) THEN 130
AB 120 POKE 53278,0:GOTO 70
GP 125 REM  INCREASE NUMBER/SPEED
       {8 SPACES}
IK 130 Z=(C-PEEK(1692)+C)*((120-Q)/10)
       :S=S+Z:T1=INT(S/100):I=S-T1*100
       :T2=INT(I/10):T3=S-T1*100-T2*10
EI 135 Z=USR(ADR(A$),T1+48,2,122,31):Z
       =USR(ADR(A$),T2+48,2,133,31):Z=
       USR(ADR(A$),T3+48,2,144,31)
CL 140 FOR D=1 TO 500:NEXT D:POKE 1691
       ,PEEK(1691)+1:IF PEEK(1691)=5 T
       HEN POKE 1691,1:Q=Q-10:IF Q<0 T
       HEN 320
DA 145 Z=USR(ADR(A$),48,1,122,51):Z=US
       R(ADR(A$),48,1,144,51):Z=USR(AD
       R(A$),48,2,122,71):Z=USR(ADR(A$
       ),48,2,133,71)
HJ 150 Z=USR(ADR(A$),48,1,133,11):GOSU
       B 285:GOTO 20
GH 155 REM  DRAW PLAYFIELD{15 SPACES}
EM 160 GRAPHICS 23:POKE 559,0:POKE 708
       ,42:POKE 709,152:POKE 710,198:P
       OKE 712,2
```

TO HELP EDUCATE YOUR CHILD, WE ASSEMBLED THIS DISTINGUISHED FACULTY.

It's a rare teacher who can make a child think learning's fun.

But we've found several of them. And they make Monkeymath™ more fun than your child ever dreamed an educational game could be.

Monkeymath
by Dennis Zander

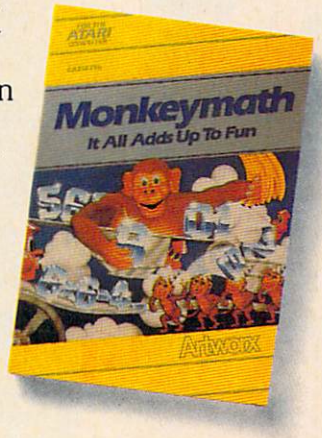
Of course Monkeymath helps give your child a better understanding of addition, subtraction, multiplication and division. That's the part *you'll* like.

But the part your *child* will like is Monkeymath's arcade-type action and animation, three skill levels and scoring. So, like any good arcade game, kids just can't stop playing it.

In fact, in a recent issue of Antic magazine, David Plotkin called Monkeymath ". . . one of the most entrancing educational games ever written." (And Monkeynews™ and Monkeybuilder,™ our soon to be released reading comprehension and word recognition games will be every bit as entrancing.)

So Monkeymath does more than help your child understand math—it teaches him that learning can be fun.

And, as you can see, you don't find teachers like that just anywhere.

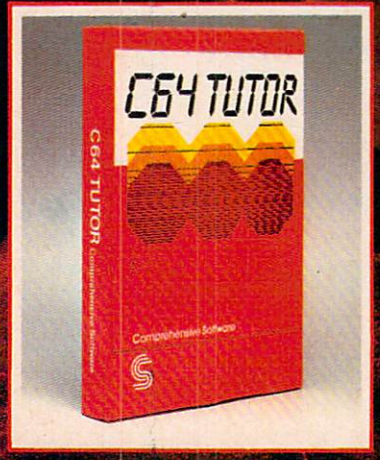


Monkeymath,™ *Monkeynews,*™ and *Monkeybuilder*™—a new educational series from Artworx.® For the Commodore 64, Atari, Apple and VIC-20 computers. Cassette/Diskette from $23.95. Artworx Software Co., Inc., 150 North Main St., Fairport, N.Y. 14450. For a free catalog of Artworx Software write or call 800-828-6573.

Artworx®

So you can play.

BREATHE LIFE INTO YOUR C64



Now that you have it, put it to work. C64 TUTOR puts you in charge with a Commodore 64 tutorial, screen display editor, sprite editor, music synthesizer & programmer's calculator.

Use the tutorial to learn what your Commodore 64 can do. And how to do it. Create, edit & save one page of letters and/or pictures with the screen display editor. Enter sprites from the Commodore Manual. Or make up your own. Then edit and save them using the sprite editor. Sprite creation is quick, and easy. Play music with the music synthesizer. Use the programmer's calculator to add, subtract, multiply & divide in decimal, hexadecimal and binary. Includes AND, OR, XOR, Shift and 1's complement functions.

Great for new users. C64 TUTOR cures computerphobia and promotes computer literacy.

Take it from me, with a little power, the possibilities are endless.

Available for $29.95 at your computer dealer.

Comprehensive Software Support,

2316 Artesia Bl. Suite B.
Redondo Beach, CA 90278
213/318-2561

```
IE 165 COLOR 2:PLOT 114,95:DRAWTO 159,
       95:DRAWTO 159,0:DRAWTO 114,0:PO
       SITION 114,95:POKE 765,1
BB 170 XIO 18,#6,0,0,"S:":FOR I=0 TO 1
       14 STEP 6:PLOT I,0:DRAWTO I,95:
       NEXT I:FOR I=0 TO 95 STEP 5:PLO
       T 0,I
DL 175 DRAWTO 114,I:NEXT I:PLOT 131,10
       :DRAWTO 142,10:DRAWTO 142,19:DR
       AWTO 131,19:DRAWTO 131,10:PLOT
       120,30
NP 180 DRAWTO 153,30:DRAWTO 153,39:DRA
       WTO 120,39:DRAWTO 120,30:PLOT 1
       31,30:DRAWTO 131,39:PLOT 142,30
       :DRAWTO 142,39
OH 185 PLOT 120,50:DRAWTO 131,50:DRAWT
       O 131,59:DRAWTO 120,59:DRAWTO 1
       20,50:PLOT 142,50:DRAWTO 153,50
       :DRAWTO 153,59
PB 190 DRAWTO 142,59:DRAWTO 142,50:PLO
       T 120,70:DRAWTO 153,70:DRAWTO 1
       53,79:DRAWTO 120,79:DRAWTO 120,
       70:PLOT 131,70
DF 195 DRAWTO 131,79:PLOT 142,70:DRAWT
       O 142,78:X=132:Y=11:GOSUB 230:X
       =121:Y=31:GOSUB 230:X=132:Y=31:
       GOSUB 230
OM 200 X=143:Y=31:GOSUB 230:X=121:Y=51
       :GOSUB 230:X=143:Y=51:GOSUB 230
       :X=121:Y=71:GOSUB 230:X=132:Y=7
       1:GOSUB 230
EK 205 X=143:Y=71:GOSUB 230:COLOR 1:FO
       R I=46 TO 49:PLOT 55,I:DRAWTO 5
       9,I:NEXT I:COLOR 3
NO 210 FOR I=85 TO 90:PLOT 124,I:DRAWT
       O 149,I:NEXT I
DN 215 Z=USR(ADR(A$),48,1,133,11):Z=US
       R(ADR(A$),48,2,122,31)
CG 220 Z=USR(ADR(A$),48,2,133,31):Z=US
       R(ADR(A$),48,2,144,31):Z=USR(AD
       R(A$),48,1,122,51):Z=USR(ADR(A$
       ),48,1,144,51)
PN 225 Z=USR(ADR(A$),48,2,122,71):Z=US
       R(ADR(A$),48,2,133,71):Z=USR(AD
       R(A$),48,2,144,71):POKE 559,46:
       RETURN
AA 230 COLOR 0:FOR I=Y TO Y+7:PLOT X,I
       :DRAWTO X+9,I:NEXT I:RETURN
BK 235 REM INITIALIZE...{16 SPACES}
BM 240 DIM A$(354),D$(241),M$(39),N$(1
       6),T$(9)
LC 245 FOR I=1 TO 354:READ A:A$(I,I)=C
       HR$(A):NEXT I:FOR I=1536 TO 155
       7:READ A:POKE I,A:NEXT I
BD 250 FOR I=1 TO 241:READ A:D$(I,I)=C
       HR$(A):NEXT I:FOR I=1 TO 39:REA
       D A:M$(I,I)=CHR$(A):NEXT I
HG 255 T$="{TRIDENT}":N$="{16 SPACES}":
       POKE 1664,0:Z=USR(ADR(M$),1664,
       1665,44)
OM 260 PM=PEEK(106)-24:ST=PM*256:POKE
       ST,0:Z=USR(ADR(M$),ST,ST+1,1024
       ):POKE 54279,PM:POKE 53277,3:M=
       ST+384
DP 265 POKE 1675,24:POKE 1676,24:POKE
       1680,255:POKE 1681,255:POKE 168
       4,24:POKE 1685,60:POKE 1686,60:
       POKE 1687,24
CE 270 POKE 1691,1:POKE 623,1:POKE 170
       1,0:POKE 1702,128:POKE 1703,0:P
       OKE 1704,128:POKE 1705,PM+2:POK
       E 1706,PM+2
DN 275 POKE 1707,PM+3:POKE 1708,PM+3:R
       ETURN
JH 280 REM SELECT RANDOM MISSILE POSI
       TS
KH 285 FOR I=1 TO PEEK(1691):Z=INT(4*R
       ND(0)+1):ON Z GOTO 290,295,300,
       305
BL 290 POKE (1667+I),16:POKE (1663+I),
       INT(112*RND(0)+46):GOTO 310
CK 295 POKE (1663+I),157:POKE (1667+I)
       ,INT(92*RND(0)+16):GOTO 310
EF 300 POKE (1667+I),108:POKE (1663+I)
       ,INT(112*RND(0)+46):GOTO 310
OI 305 POKE (1663+I),46:POKE (1667+I),
       INT(92*RND(0)+16)
DG 310 NEXT I:RETURN
KD 315 REM END OF GAME{18 SPACES}
OP 320 Z=USR(ADR(M$),M,M+1,640):POKE 5
       3761,143:FOR I=255 TO 0 STEP -1
       :POKE 712,I:POKE 53760,I:NEXT I
       :POKE 53761,0
KE 325 POKE 1691,1:Q=100:S=0:FOR I=0 T
       O 7:POKE 53248+I,0:POKE 1664+I,
       0:NEXT I:POKE 77,254
PH 330 IF PEEK(53279)<>6 AND STRIG(0)
       THEN 330
BE 335 GOSUB 215:GOSUB 285:POKE 77,0:G
       OTO 20
LH 340 REM GAME TITLE{19 SPACES}
AI 345 GRAPHICS 7:POKE 710,146:POKE 71
       2,146:POKE 709,42:POKE 752,1:PO
       KE 559,0:COLOR 2
CA 350 FOR I=1 TO 9:Z=USR(ADR(A$),ASC(
       T$(I,I)),2,15+I*8,15):NEXT I:PL
       OT 21,15:DRAWTO 23,15
KG 355 PLOT 17,16:DRAWTO 23,16:PLOT 13
       ,17:DRAWTO 23,17:PLOT 11,18:DRA
       WTO 23,18:PLOT 11,19:DRAWTO 23,
       19:PLOT 13,20
FC 360 DRAWTO 23,20:PLOT 17,21:DRAWTO
       23,21:PLOT 21,22:DRAWTO 23,22:F
       OR I=0 TO 5:PLOT 80-I,10+I:DRAW
       TO 100-I,10+I
JD 365 NEXT I:FOR I=0 TO 5:PLOT 80-I,2
       8-I:DRAWTO 100-I,28-I:NEXT I:CO
       LOR 1:FOR I=0 TO 4:PLOT 110-2*I
       ,15+I
DL 370 DRAWTO 112+2*I,15+I:NEXT I:DRAW
       TO 159,19:FOR I=4 TO 0 STEP -1:
       PLOT 110-2*I,23-I:DRAWTO 112+2*
       I,23-I:NEXT I
LD 375 FOR I=1 TO 16:Z=USR(ADR(A$),ASC
       (N$(I,I)),2,7+I*8,45):NEXT I
NN 380 SOUND 0,60,4,4:? "{8 SPACES}PRE
       SS START TO BEGIN":? :? "
       {3 SPACES}PRESS OPTION FOR INST
       RUCTIONS":POKE 559,34
FA 385 IF PEEK(53279)=6 OR STRIG(0)=0
       THEN SOUND 0,0,0,0:RETURN
EL 390 T=T+1:POKE 708,T:IF T=255 THEN
       T=0
CE 395 IF PEEK(53279)=3 THEN SOUND 0,0
       ,0,0:GOTO 410
GN 400 GOTO 385
FM 405 REM INSTRUCTIONS ( MESSAGE FOR
       M )
JI 410 GRAPHICS 0:POKE 710,30:POKE 712
       ,30:POKE 752,1:? "{13 SPACES}-TR
       IDENT-{14 SPACES}":? :? :?
MF 415 ? "STANDBY FOR HIGH PRECEDENCE
       MESSAGE{13 SPACES}FROM PENTAGON"
       :FOR I=1 TO 10:FOR D=1 TO 25:SO
       UND 0,20,10,6
LG 420 NEXT D:FOR D=1 TO 25:SOUND 0,0,
       0,0:NEXT D:NEXT I:? "{CLEAR}"
```

```
GC 425 ? "Z 152347Z JAN 87":? "FM CHIE
       F OF NAVAL OPERATIONS":? "TO US
       S TRIDENT (SSBN-12)":? "BT":?
NG 430 ? "{5 SPACES}R E D{3 SPACES}A L
        E R T{3 SPACES}D R I L L":? :?

DN 435 ? "1. HEAVY MISSILE ATTACK ON U
       SS TRIDENTIS IMMINENT. INTELLIG
       ENCE SOURCES"
NH 440 ? "INDICATE THAT ATTACK WILL OC
       CUR IN{4 SPACES}WAVES, INCREASI
       NG MISSILE NUMBER AND"
KC 445 ? "SPEED WITH EACH ATTACK.":? "
       2. YOU ARE DIRECTED TO PLACE YO
       UR{5 SPACES}BEST MISSILE OFFICE
       R AT THE DEFENSIVE"
DJ 450 ? "MISSILE CONSOLE. INSURE HE I
       S AWARE{3 SPACES}THAT USS TRIDE
       NT POSSESSES A LIMITED"
KK 455 ? "NUMBER OF ANTI-MISSILE MISSI
       LES. EXTRACREDIT WILL BE GIVEN
       FOR MULTIPLE{5 SPACES}KILLS ON
       ENEMY TARGETS.":?
CC 460 ? "press TRIGGER to continue wi
       th message";
AG 465 IF STRIG(0) THEN 465
JC 470 ? "{CLEAR}":? :? :? :? :? "3. I
       NFORM MISSILE OFFICER THAT UPPE
       R  INDICATOR OF CONSOLE WILL RE
       PORT"
EO 475 ? "NUMBER OF ANTI-MISSILES FIRE
       D, NEXT{3 SPACES}INDICATOR WILL
        REPORT SCORE. THE TWO"
JO 480 ? "INDICATORS BELOW THAT WILL R
       EPORT THE NUMBER OF ENEMY MISSI
       LES IN THE WAVE"
AF 485 ? "AND THE NUMBER DESTROYED. TH
       E FINAL{3 SPACES}INDICATOR WILL
        REPORT INCOMING ENEMY  MISSILE
        SPEED."
HN 487 ? "4. RELEASE MISSILES WITH THE
        FIRE{5 SPACES}BUTTON.  IF YOU
       SHOULD LOSE, HIT FIRE BUTTON FO
       R ANOTHER DRILL."
DF 490 ? "5. GOOD LUCK!!! YOUR COUNTRY
        DEPENDS  ON YOU. ADMIRAL IMA C
       OMPUTER SENDS.":? "BT":? :? :?
GO 495 ? "{7 SPACES}press TRIGGER to b
       egin{7 SPACES}"
PC 500 IF STRIG(0) THEN 500
HK 505 RETURN
LL 510 REM  DATA STATEMENTS - warning
       -{3 SPACES}machine language - t
       ype carefully{4 SPACES}
BC 515 DATA 104,240,10,201,4,240,13,17
       0,104,104,202,208,251,169,22,13
       3,185,76,64,185,104,133,195,104
       ,201,128
IB 520 DATA 144,4,41,127,198,195,170,1
       41,22,6,224,96,176,15,169,64,22
       4,32,144,2,169,224,24,109,22,6
OB 525 DATA 141,22,6,104,104,141,23,6,
       104,104,141,24,6,201,4,144,5,56
       ,233,4,176,247,133,214,201,0
OF 530 DATA 240,7,169,4,56,229,214,133
       ,214,78,24,6,78,24,6,6,214,24,1
       04,104,141,25,6,133,186,166
OK 535 DATA 87,169,10,224,3,240,8,169,
       20,224,5,240,2,169,40,133,207,1
       33,187,165,88,133,203,165,89,13
       3
PE 540 DATA 204,32,0,6,24,173,24,6,101
       ,203,133,203,144,2,230,204,24,1
       65,203,101,212,133,203,165,204,
       101
CJ 545 DATA 213,133,204,173,22,6,133,1
       87,169,8,133,186,32,0,6,165,212
       ,133,205,173,244,2,101,213,133,
       206
BD 550 DATA 160,0,162,8,169,0,133,209,
       133,208,177,205,69,195,72,104,1
       0,72,144,8,24,173,23,6,5,208
PJ 555 DATA 133,208,224,1,240,8,6,208,
       38,209,6,208,38,209,202,208,228
       ,104,152,72,160,0,132,215,132,2
       12
DC 560 DATA 166,214,240,88,56,38,215,2
       02,208,250,177,203,5,215,69,215
       ,145,203,165,215,73,255,133,215
       ,200,200
MG 565 DATA 177,203,5,215,69,215,145,2
       03,166,214,6,209,38,212,202,208
       ,249,160,0,24,177,203,101,212,1
       45,203
LH 570 DATA 169,8,56,229,214,170,132,2
       12,70,208,102,212,202,208,249,2
       40,2,208,135,160,2,24,177,203,1
       01,212
CF 575 DATA 145,203,24,165,208,101,209
       ,160,1,145,203,24,144,9,165,209
       ,145,203,200,165,208,145,203,10
       4,168,24
NA 580 DATA 165,203,101,207,133,203,14
       4,2,230,204,200,192,8,208,206,9
       6
LB 585 DATA 169,0,133,212,162,8,70,186
       ,144,3,24,101,187,106,102,212,2
       02,208,243,133,213,96
HC 590 DATA 104,169,17,133,207,162,0,1
       89,128,6,201,0,240,83,56,233,10
       2,48,5,222,128,6,208,3,254,128
HD 595 DATA 6,189,128,6,157,0,208,189,
       165,6,133,205,189,169,6,133,206
       ,189,132,6,56,233,63,48,5,222
MK 600 DATA 132,6,208,3,254,132,6,188,
       132,6,173,138,6,145,205,200,173
       ,139,6,145,205,200,173,140,6,14
       5
DF 605 DATA 205,200,173,141,6,145,205,
       189,4,208,201,1,208,5,169,16,13
       3,207,96,232,224,4,208,161,173,
       154
FE 610 DATA 6,201,1,240,11,169,1,205,1
       32,2,208,1,96,238,156,6,141,154
       ,6,173,120,2,201,14,208,4
NO 615 DATA 198,209,198,209,201,13,208
       ,4,230,209,230,209,201,11,208,4
       ,198,208,198,208,201,10,208,8,1
       98,208
CA 620 DATA 198,208,198,209,198,209,20
       1,9,208,8,198,208,198,208,230,2
       09,230,209,201,7,208,4,230,208,
       230,208
AE 625 DATA 201,6,208,8,230,208,230,20
       8,198,209,198,209,201,5,208,8,2
       30,208,230,208,230,209,230,209,
       165,208
MA 630 DATA 141,4,208,164,209,162,0,18
       9,142,6,145,203,200,232,224,6,2
       08,245,173,8,208,201,0,240,7,13
       3
PO 635 DATA 207,169,0,141,154,6,96
PH 640 DATA 104,104,133,215,104,133,21
       4,104,133,217,104,133,216,104,1
       33,218,104,170,160,0,177,214,14
       5,216,200,208
```

Go on line in the world's fastest growing technology.

NEW! DATA COMMUNICATIONS TRAINING FROM NRI

Practical training includes computer, modem, test instruments, and access to exclusive NRI communications network.

Satellites . . . microwave . . . fiber optics . . . dedicated land lines. Suddenly the world is communicating in a new and different way, via digital data systems. People talking to computers . . . computers to computers . . . information is stored, retrieved, and relayed in nanoseconds.

Industry, opportunities to triple

Data and telecommunications is already a $150 billion industry and is expected to triple over the next five years. One typical company has grown from $85 million to $650 million . . . a 765% growth since 1978 alone. The need for qualified technicians to install, maintain, and service this enormous investment in high-tech equipment is tremendous even now. Opportunities and salaries can go nowhere but up and up.

NRI will train you at home

You can learn at home in your spare time to become a data communications technician with NRI at-home training. NRI will start you with the basics, build upon your knowledge with easy-to-follow, bite size lessons to take you into the world of digital data communications. You'll learn what it takes to work on satellite, microwave, fiber optic, and telephone data links.

And you'll learn at your own comfortable pace, without classroom pressures or evenings away from your family. Over the past 70 years, NRI has taught the latest high-tech skills to almost 2 million students to become the world's largest and most successful school of its kind.

Hands-on training includes computer, modem, breakout box and much more

NRI takes you far beyond "book learning." As part of your course, you receive plenty of practical hands-on training that gives you real-world skills. You get the Radio Shack Color Computer, with 16K memory to teach you the systems and language of data communications plus you get an operating modem to let you tie in with world-wide communications networks.

You build your own RS-232C interface breakout box, an indispensable installation and trouble-shooting instrument you'll use throughout your career. You receive a professional digital multimeter and the NRI Discovery Lab, where you construct solid-state circuits and demonstrate practical applications of the theory you've learned.

Exclusive NRI data network

You'll learn what data communications is all about by actually becoming part of an operating network. You'll go on line to "talk" to your instructor, take your final exam by computer link, communicate with other NRI students and leave messages on the NRI "bulletin board."

As part of your course, you'll also receive membership in THE SOURCE [sm], a regular $100 value. A phone call ties you into computers loaded with instant news, stock quotes, electronic mail, educational programs, games, even discount shopping and travel reservations.

Move into the future, send for Free Catalog

You can't find training like this anywhere else . . . only NRI trains you at home for an exciting and rewarding career in the brilliant new world of Data Communications. Mail the coupon right now for our big catalog of high-tech electronic careers showing all the equipment you get, detailed lesson descriptions, and career opportunities. Look it over and decide where you want your future to grow. Act now. There's a real need for trained data communications technicians.

Training includes all this equipment you keep . . . 16K computer, modem, breakout box, digital multimeter and the exclusive NRI Discovery Lab.

NRI Schools
McGraw-Hill Continuing Education Center
3939 Wisconsin Avenue
Washington, D.C. 20016
We'll give you tomorrow.

All Career courses approved under GI bill.
☐ Check for details

198-034

CHECK ONE FREE CATALOG ONLY

- ☐ Data Communications
- ☐ Computer Electronics with Microcomputers
- ☐ Color TV, Audio, and Video System Servicing
- ☐ Electronics Design Technology
- ☐ Digital Electronics
- ☐ Communications Electronics • FCC Licenses • Mobile CB • Aircraft • Marine
- ☐ Industrial Electronics
- ☐ Basic Electronics
- ☐ Small Engine Servicing
- ☐ Appliance Servicing
- ☐ Automotive Servicing
- ☐ Auto Air Conditioning
- ☐ Air Conditioning, Heating, Refrigeration, & Solar Technology
- ☐ Building Construction

Name _____ (Please Print) Age _____

Street _____

City/State/Zip _____

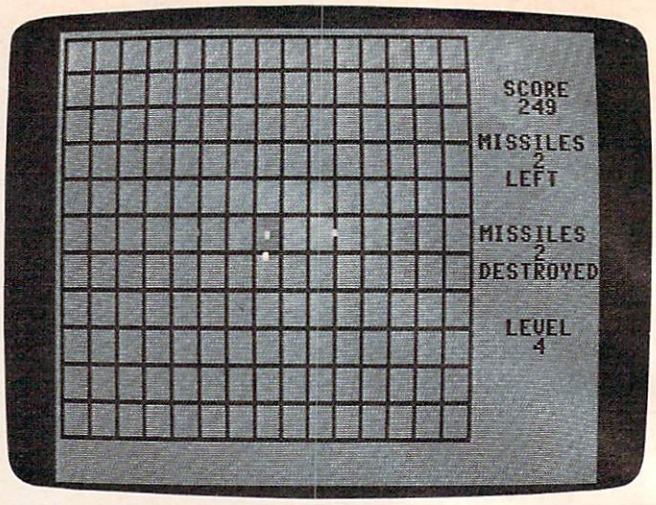
Accredited by the Accrediting Commission of the National Home Study Council 000-000

TRS-80 is a trademark of the Radio Shack division of Tandy Corp.
SM a service mark of Source Telecomputing Corp., a subsidiary of the Reader's Digest Association, Inc.

```
MP 645 DATA 4,230,215,230,217,202,208,
      242,198,218,16,238,96
KP 1000 REM THIS PORTION OF PROGRAM IS
      (3 SPACES)USED TO VERIFY THAT
      DATA LINES HAVE(3 SPACES)BEEN
      READ CORRECTLY BEFORE RUNNING.
      ..
CE 1005 GRAPHICS 0:S=PEEK(136)+PEEK(13
      7)*256
AG 1010 N=PEEK(S)+PEEK(S+1)*256:IF N>5
      14 THEN ? N;" - ";:A=0:FOR I=S
      +5 TO S+PEEK(S+2)-2:A=A+PEEK(I
      ):NEXT I:? A
IG 1015 IF N=645 THEN END
CM 1020 S=S+PEEK(S+2):GOTO 1010
```

Program 2: 64 Trident

```
49152 :032,041,197,169,000,141,068
49158 :032,208,169,011,141,033,088
49164 :208,169,060,141,132,003,213
49170 :169,147,032,210,255,173,236
49176 :030,208,169,000,141,120,180
49182 :003,169,144,032,210,255,075
49188 :160,000,185,071,201,201,086
49194 :008,240,007,153,000,050,244
49200 :200,076,038,192,169,138,093
49206 :133,252,169,197,133,253,167
49212 :160,000,177,252,201,000,082
49218 :240,012,032,210,255,230,021
49224 :252,208,243,230,253,076,054
49230 :062,192,169,063,141,021,214
49236 :208,169,200,141,248,007,033
49242 :141,250,007,141,251,007,119
49248 :141,252,007,141,253,007,129
49254 :169,201,141,249,007,169,014
49260 :000,162,000,157,000,208,123
49266 :232,224,015,208,248,169,186
49272 :015,141,039,208,169,146,070
49278 :141,000,208,169,141,141,158
49284 :001,208,169,140,141,002,025
49290 :208,169,135,141,003,208,234
49296 :169,002,141,040,208,169,105
49302 :004,141,041,208,169,014,215
49308 :141,042,208,169,007,141,096
49314 :043,208,169,013,141,044,012
49320 :208,169,000,141,016,208,142
49326 :169,255,141,062,003,032,068
49332 :011,194,169,255,141,015,197
49338 :212,169,128,141,018,212,042
49344 :173,030,208,169,049,032,085
49350 :136,196,169,254,141,066,136
49356 :003,169,255,141,067,003,074
49362 :032,154,196,169,017,141,151
49368 :005,212,169,243,141,006,224
49374 :212,169,033,141,004,212,225
49380 :032,249,192,032,139,193,041
49386 :032,249,192,032,193,194,102
49392 :032,064,196,032,015,197,008
49398 :076,228,192,141,060,003,178
49404 :142,061,003,173,000,220,083
49410 :041,008,208,039,174,000,216
49416 :208,232,224,000,208,014,126
49422 :173,016,208,009,001,141,050
49428 :016,208,141,137,197,076,027
49434 :042,193,173,016,208,041,187
49440 :001,201,001,208,005,224,160
49446 :009,208,001,202,142,000,088
49452 :208,173,000,220,041,004,178
49458 :208,039,174,000,208,202,113
```



"Trident," 64 version.

```
49464 :224,000,208,014,173,016,179
49470 :208,041,254,141,016,208,162
49476 :141,137,197,076,088,193,132
49482 :173,016,208,041,001,201,202
49488 :000,208,005,224,026,208,239
49494 :001,232,142,000,208,173,074
49500 :000,220,041,001,208,012,062
49506 :174,001,208,202,224,054,193
49512 :208,001,232,142,001,208,128
49518 :173,000,220,041,002,208,242
49524 :012,174,001,208,232,224,199
49530 :228,208,001,202,142,001,136
49536 :208,173,060,003,174,061,039
49542 :003,032,060,195,096,173,181
49548 :062,003,041,003,168,173,078
49554 :129,197,201,000,208,033,146
49560 :192,000,240,111,173,130,230
49566 :197,201,000,208,022,192,210
49572 :001,240,100,173,131,197,238
49578 :201,000,208,011,192,002,016
49584 :240,089,173,132,197,201,184
49590 :000,240,082,185,129,197,247
49596 :201,000,240,069,170,192,036
49602 :001,208,032,173,137,197,174
49608 :041,008,201,000,240,023,201
49614 :138,056,233,001,201,000,067
49620 :208,027,173,137,197,041,227
49626 :195,141,137,197,138,056,058
49632 :233,002,076,241,193,138,083
49638 :201,146,144,005,233,001,192
49644 :076,241,193,105,001,153,237
49650 :129,197,185,133,197,201,004
49656 :141,144,005,233,001,076,080
49662 :002,194,105,001,153,133,074
49668 :197,136,192,255,208,175,143
49674 :096,238,062,003,173,062,132
49680 :003,206,132,003,041,003,148
49686 :141,063,003,170,160,000,047
49692 :169,000,141,064,003,238,131
49698 :063,003,206,064,003,153,014
49704 :129,197,200,192,004,208,202
49710 :248,169,028,141,129,197,190
49716 :169,192,141,137,197,173,037
49722 :027,212,041,127,105,044,102
49728 :141,133,197,224,000,240,231
49734 :069,169,008,141,130,197,016
49740 :169,008,013,137,197,141,229
49746 :137,197,173,027,212,041,101
49752 :127,105,044,141,134,197,068
```

AARDVARK LTD.

NOW THE BEST COST LESS

DUNGEONS OF DEATH - A serious role playing game for up to 6 players. You get a choice of race and characters that grow from game to game. You also get a graphic maze and a 15 page manual.

Available On: TRS80C 16K EXT., CMD64, VIC20 13K, IBMPC, TRS80C 32K, MC10 16K

TAPE $14.95 **DISK $19.95**

BAG-IT-MAN - The ultimate arcade game for TRS80C or MCD64. This one has three screens full of BAGS OF GOLD, CARTS & ELEVATORS TO RIDE IN, MINE SHAFTS, and TWO NASTY GUARDS. Great sound and color and continuous excitement.

Available On: TRS80C 32K, CMD64

TAPE $19.95 **DISK $24.95**

QUEST - A different kind of Graphic Adventure, it is played on a computer generated mape of Alesia. You'll have to build an army and feed them through combat, bargaining, exploration of ruins and temples, and outright banditry! Takes 2 - 5 hours to play and is different each time.

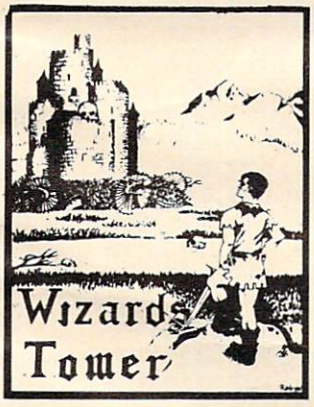
Available On: TRS80C 16K, CMD64, VIC20 13K, MC10 16K, TI99 (EXT. BASIC), IBMPC

TAPE $14.95 **DISK $19.95**

STARFIRE - If you enjoyed StarRaiders or StarWars, you will love Starfire. It is not a copy, but the best shoot-em-up, see them in the window space game on the CMD64 or TRS80C. The fantastic graphics will put you right in the control room as you hyperspace from quadrant to quadrant fighting the aliens and protecting your bases.

Available On: TRS80C 16K, CMD64

TAPE $19.95 **DISK $24.95**



WIZARDS TOWER - A fantasy game played on a map of forests and dungeons - with dragons and wizards to kill. Similar to QUEST and fun for adults, but a little simpler and playable for the younger set (8 - 60).

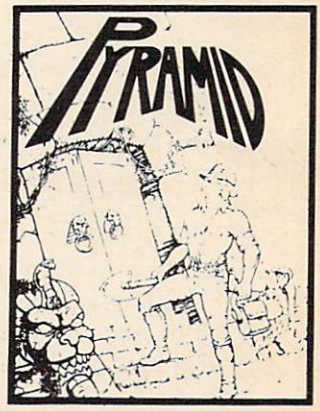
Available On: TRS80C 16K EXT., CMD64, VIC20 13K, TI99, IBMPC

TAPE $14.95 **DISK $19.95**

PYRAMID - ONE OF THE TOUGHEST ADVENTURES. Average time through the pyramid is 50 - 70 hours. Clues are everywhere and some ingenious problems make this popular around the world.

Available On: TRS80C 16K, CMD64, MC10 16K, TIMEX, IBM PC, TI99, VIC20 13K

TAPE $14.95 **DISK $19.95**



AARDVARK offers over 120 original high quality programs. Send one dollar for a current catalog and receive a $1.00 gift certificate good towards your next purchase.

Authors - **AARDVARK** pays top dollar for high quality programs. Send a copy today for a personal review and editorial help.

TO ORDER: Send amount indicated plus $2.00 shipping, per order. Include quantity desired and your preference of tape or disk. Be sure to indicate type of system and amount of memory. When using charge card to order by mail, be sure to include expiration date.

MasterCard CHARGE CARDS WELCOME VISA

1-313-669-3110

PHONE ORDERS ACCEPTED
8:00 a.m. to 8:00 p.m. E.S.T., MON-FRI

AARDVARK *Action Software*

2352 S. COMMERCE • WALLED LAKE, MI 48088 • (313) 669-3110

CMD64 / TRS80C / IBMPC / VIC20 / TI99

Notes On The Commodore 64 Version

Kevin Martin, Editorial Programmer

To stop the incoming missiles, you must direct your defensive missile to its target with a joystick plugged into port 2. Once you destroy one of the enemy missiles, preparations are made by the computer to launch another antimissile. If you destroy all the incoming missiles in one attack wave, you are moved on to a higher difficulty level where the speed of the incoming missiles is increased. If you lose, you can start over by pressing the fire button.

The 64 version of "Trident" is similar to the Atari version. It is written entirely in machine language and must be entered with MLX, the machine language editor program found elsewhere in this issue. Be sure you read the MLX article and understand how to use that program before you start typing the data for Program 2. MLX requires that you input the starting and ending addresses for your machine language. For Trident, the starting address is 49152 and the ending address is 51659. After typing in Trident, be sure to use the MLX Save option to store a copy of your work on tape or disk. After saving, you can load it back into the computer by typing:

```
LOAD "TRIDENT",8,1      for disk
```

or

```
LOAD "TRIDENT",1,1      for tape.
```

To run Trident, type:

```
SYS 49152
```

The Commodore 64 version has one major enhancement. It allows you to choose a level of difficulty, which determines the speed of the incoming missiles. Each successive level has an increased speed. You have four choices, which can be selected by pressing the appropriate function key:

f1: Beginner
f3: Intermediate
f5: Advanced
f7: Expert

```
49758 :169,203,045,137,197,141,218
49764 :137,197,224,001,240,034,165
49770 :169,055,141,135,197,173,208
49776 :027,212,041,127,105,067,179
49782 :141,131,197,224,001,240,028
49788 :015,169,227,141,136,197,241
49794 :173,027,212,041,127,105,047
49800 :067,141,132,197,224,000,129
49806 :208,005,169,007,141,021,181
49812 :208,224,001,208,005,169,195
49818 :015,141,021,208,224,002,253
49824 :208,005,169,031,141,021,223
49830 :208,224,003,208,005,169,215
49836 :063,141,021,208,238,063,138
49842 :003,032,013,196,173,132,215
49848 :003,201,014,240,003,238,115
49854 :132,003,096,173,129,197,152
49860 :201,000,240,012,141,004,026
49866 :208,173,133,197,141,005,035
49872 :208,076,222,194,169,000,053
49878 :141,004,208,169,000,141,109
49884 :005,208,173,130,197,201,110
49890 :000,240,012,141,006,208,065
49896 :173,134,197,141,007,208,068
49902 :076,251,194,169,000,141,045
49908 :006,208,169,030,141,007,037
49914 :208,173,131,197,201,000,136
49920 :240,012,141,008,208,173,014
49926 :135,197,141,009,208,076,004
49932 :024,195,169,000,141,008,037
49938 :208,169,070,141,009,208,055
49944 :173,132,197,201,000,240,199
49950 :012,141,010,208,173,136,198
49956 :197,141,011,208,076,053,210
49962 :195,169,000,141,010,208,253
49968 :169,111,141,011,208,173,093
49974 :137,197,141,016,208,096,081
49980 :173,030,208,141,065,003,168
49986 :173,065,003,041,004,201,041
49992 :004,208,022,169,000,141,104
49998 :129,197,032,013,196,032,165
50004 :217,196,173,021,208,041,172
50010 :251,141,021,208,076,154,173
50016 :196,173,065,003,041,008,070
50022 :201,008,208,030,169,000,206
50028 :141,130,197,173,137,197,059
50034 :041,247,141,137,197,032,141
50040 :013,196,032,238,196,173,200
50046 :021,208,041,247,141,021,037
50052 :208,076,154,196,173,065,236
50058 :003,041,016,201,016,208,111
50064 :022,169,000,141,131,197,036
50070 :032,013,196,032,249,196,100
50076 :173,021,208,041,239,141,211
50082 :021,208,076,154,196,173,222
50088 :065,003,041,032,201,032,030
50094 :208,022,169,000,141,132,078
50100 :197,032,013,196,032,004,142
50106 :197,173,021,208,041,223,025
50112 :141,021,208,076,154,196,220
50118 :096,169,015,141,024,212,087
50124 :169,010,141,132,003,162,053
50130 :255,142,001,212,202,142,140
50136 :068,003,032,015,197,174,193
50142 :068,003,224,000,208,239,196
50148 :169,050,141,132,003,032,243
50154 :015,197,238,032,208,173,073
50160 :032,208,041,015,201,000,225
50166 :208,241,169,000,141,024,005
50172 :212,173,000,220,041,016,146
50178 :208,249,104,104,104,104,107
50184 :104,104,076,003,192,169,144
50190 :146,141,000,208,169,141,051
50196 :141,001,208,162,007,160,187
50202 :035,024,032,240,255,206,050
50208 :063,003,238,064,003,173,064
```

Looks like a Ferrari. Drives like a Rolls. Parks like a Beetle.

Ask your computer dealer to take the cover off a world-class disk drive.

The all new, 1984 Indus GT.™

The most advanced, most handsome disk drive in the world.

A flick of its power switch can turn an Atari into a Ferrari.

Or an Apple into a Red Hot Apple.

Looks like a Ferrari.

The Indus GT is only 2.65" high. But under its front-loading front end is slimline engineering with a distinctive European-Gran flair.

Touch its LED-lit CommandPost™ function control AccuTouch™ buttons. Marvel at how responsive it makes every Atari or Apple home computer.

Drives like a Rolls.

Nestled into its soundproofed chassis is the quietest and most powerful disk drive power system money can buy. At top speed, it's virtually unhearable. Whisper quiet.

Flat out, the GT will drive your Atari track-to-track 0-39 in less than one second. Increasing data transfer 400%. (Faster than any other drive. And as fast as any Apple disk drive.)

And each GT comes with the exclusive *GT DrivingSystem*™ of software programs.* World-class word processing is a breeze with the *GT Estate WordProcessor.*™ And your dealer will describe the two additional programs that allow GT owners to accelerate their computer driving skills. *Included as standard equipment.

Also, the 1984 Indus GT is covered with the *GT PortaCase.*™ A stylish case that conveniently doubles as a 80-disk storage file.

Parks like a Beetle.

The GT's small, sleek, condensed size makes it easy to park.

And its low price makes it easy to buy.

$449 for Atari. $329 for Apple.

So see and test drive the incredible new 1984 Indus GT at your nearest computer dealer soon.

The drive will be well worth it.

INDUS™

The all-new 1984 Indus GT Disk Drive.

The most advanced, most handsome disk drive in the world.

For dealer information, call 1-800-33-INDUS. In California, 1-800-54-INDUS, 213/882-9600.

```
50214 :063,003,024,105,048,032,057
50220 :210,255,162,012,160,035,110
50226 :024,032,240,255,173,064,070
50232 :003,024,105,048,032,210,222
50238 :255,096,165,197,201,004,212
50244 :208,011,169,060,141,132,021
50250 :003,169,049,032,136,196,147
50256 :096,201,005,208,011,169,002
50262 :042,141,132,003,169,050,111
50268 :032,136,196,096,201,006,247
50274 :208,011,169,035,141,132,026
50280 :003,169,051,032,136,196,179
50286 :096,201,003,208,011,169,030
50292 :027,141,132,003,169,052,128
50298 :032,136,196,096,173,141,128
50304 :002,041,001,201,000,208,069
50310 :247,096,141,082,003,162,097
50316 :017,160,035,024,032,240,136
50322 :255,173,082,003,032,210,133
50328 :255,096,173,066,003,174,151
50334 :067,003,024,105,002,144,247
50340 :001,232,141,066,003,142,237
50346 :067,003,173,062,003,074,040
50352 :074,141,072,003,173,066,193
50358 :003,174,067,003,024,109,050
50364 :072,003,144,001,232,141,013
50370 :066,003,142,067,003,162,125
50376 :004,160,034,024,032,240,182
50382 :255,173,067,003,174,066,176
50388 :003,032,205,189,096,173,142
50394 :004,208,201,138,144,003,148
50400 :076,199,195,096,173,004,199
50406 :208,201,138,144,248,076,221
50412 :199,195,173,006,208,201,194
50418 :156,176,003,076,199,195,023
50424 :096,173,009,208,201,133,044
50430 :144,003,076,199,195,096,199
50436 :173,011,208,201,151,176,156
50442 :003,076,199,195,096,142,209
50448 :060,003,140,061,003,162,189
50454 :000,160,000,232,208,253,107
50460 :200,204,132,003,208,247,254
50466 :174,060,003,172,061,003,251
50472 :096,169,147,032,210,255,181
50478 :169,000,141,032,208,169,253
50484 :011,141,033,208,169,154,000
50490 :032,210,255,162,012,160,121
50496 :016,024,032,240,255,162,025
50502 :000,189,036,201,201,000,185
50508 :240,007,232,032,210,255,028
50514 :076,071,197,162,021,160,001
50520 :007,024,032,240,255,162,040
50526 :000,189,044,201,201,000,217
50532 :240,007,232,032,210,255,052
50538 :076,095,197,169,000,162,037
50544 :000,157,000,208,232,224,165
50550 :017,208,248,173,000,220,216
50556 :041,016,208,237,096,000,210
50562 :000,000,000,000,000,000,130
50568 :000,252,019,176,195,178,188
50574 :195,178,195,178,195,178,237
50580 :195,178,195,178,195,178,243
50586 :195,178,195,178,195,178,249
50592 :195,178,195,178,195,178,255
50598 :195,178,195,174,032,032,204
50604 :032,032,032,032,032,032,108
50610 :032,221,032,221,032,221,169
50616 :032,221,032,221,032,221,175
50622 :032,221,032,221,032,221,181
50628 :032,221,032,221,032,221,187
50634 :032,221,032,221,032,221,193
50640 :032,221,032,032,032,032,077
50646 :032,032,032,032,032,171,033
50652 :195,219,195,219,195,219,182
50658 :195,219,195,219,195,219,188
50664 :195,219,195,219,195,219,194
50670 :195,219,195,219,195,219,200
50676 :195,219,195,219,195,179,166
50682 :032,032,032,032,032,032,186
50688 :032,032,032,221,032,221,058
50694 :032,221,032,221,032,221,253
50700 :032,221,032,221,032,221,003
50706 :032,221,032,221,032,221,009
50712 :032,221,032,221,032,221,015
50718 :032,221,032,221,032,032,088
50724 :083,067,079,082,069,032,192
50730 :032,171,195,219,195,219,049
50736 :195,219,195,219,195,219,010
50742 :195,219,195,219,195,219,016
50748 :195,219,195,219,195,219,022
50754 :195,219,195,219,195,219,028
50760 :195,179,032,032,032,032,062
50766 :032,032,032,032,032,221,203
50772 :032,221,032,221,032,221,075
50778 :032,221,032,221,032,221,081
50784 :032,221,032,221,032,221,087
50790 :032,221,032,221,032,221,093
50796 :032,221,032,221,032,221,099
50802 :032,032,032,032,032,032,050
50808 :032,032,032,171,195,219,033
50814 :195,219,195,219,195,219,088
50820 :195,219,195,219,195,219,094
50826 :195,219,195,219,195,219,100
50832 :195,219,195,219,195,219,106
50838 :195,219,195,179,077,073,064
50844 :083,083,073,076,069,083,111
50850 :032,221,032,221,032,221,153
50856 :032,221,032,221,032,221,159
50862 :032,221,032,221,032,221,165
50868 :032,221,032,221,032,221,171
50874 :032,221,032,221,032,221,177
50880 :032,221,032,032,032,032,061
50886 :032,032,032,032,032,171,017
50892 :195,219,195,219,195,219,166
50898 :195,219,195,219,195,219,172
50904 :195,219,195,219,195,219,178
50910 :195,219,195,219,195,219,184
50916 :195,219,195,219,195,179,150
50922 :032,032,076,069,070,084,085
50928 :032,032,032,221,032,221,042
50934 :032,221,032,221,032,221,237
50940 :032,221,032,221,032,221,243
50946 :032,221,032,221,032,221,249
50952 :032,221,032,221,032,221,255
50958 :032,221,032,221,032,032,072
50964 :032,032,032,032,032,032,212
50970 :032,171,195,219,195,219,033
50976 :195,219,195,219,195,219,250
50982 :195,219,195,219,195,219,000
50988 :195,219,195,219,195,219,006
50994 :195,219,195,219,195,219,012
51000 :195,179,032,032,032,032,046
51006 :032,032,032,032,032,221,187
51012 :032,221,032,221,032,221,059
51018 :032,221,032,221,032,221,065
51024 :032,221,032,221,032,221,071
51030 :032,221,032,221,032,221,077
51036 :032,221,032,221,032,221,083
```

```
51042 :077,073,083,083,073,076,051
51048 :069,083,032,171,195,219,105
51054 :195,219,195,219,195,219,072
51060 :195,219,195,219,195,219,078
51066 :195,219,195,219,195,219,084
51072 :195,219,195,219,195,219,090
51078 :195,219,195,179,032,032,218
51084 :032,032,032,032,032,032,076
51090 :032,221,032,221,032,221,137
51096 :032,221,032,221,032,221,143
51102 :032,221,032,221,032,221,149
51108 :032,221,032,221,032,221,155
51114 :032,221,032,221,032,221,161
51120 :032,221,068,069,083,084,221
51126 :082,079,089,069,068,171,228
51132 :195,219,195,219,195,219,150
51138 :195,219,195,219,195,219,156
51144 :195,219,195,219,195,219,162
51150 :195,219,195,219,195,219,168
51156 :195,219,195,219,195,179,134
51162 :032,032,032,032,032,032,154
51168 :032,032,032,221,032,221,026
51174 :032,221,032,221,032,221,221
51180 :032,221,032,221,032,221,227
51186 :032,221,032,221,032,221,233
51192 :032,221,032,221,032,221,239
51198 :032,221,032,221,032,032,056
51204 :032,032,032,032,032,032,196
51210 :032,171,195,219,195,219,017
51216 :195,219,195,219,195,219,234
51222 :195,219,195,219,195,219,240
51228 :195,219,195,219,195,219,246
51234 :195,219,195,219,195,219,252
51240 :195,179,032,032,076,069,111
51246 :086,069,076,032,032,221,050
51252 :032,221,032,221,032,221,043
51258 :032,221,032,221,032,221,049
51264 :032,221,032,221,032,221,055
51270 :032,221,032,221,032,221,061
51276 :032,221,032,221,032,221,067
51282 :032,032,032,032,032,032,018
51288 :032,032,032,171,195,219,001
51294 :195,219,195,219,195,219,056
51300 :195,219,195,219,195,219,062
51306 :195,219,195,219,195,219,068
51312 :195,219,195,219,195,219,074
51318 :195,219,195,179,032,032,202
51324 :032,032,032,032,032,032,060
51330 :032,221,032,221,032,221,121
51336 :032,221,032,221,032,221,127
51342 :032,221,032,221,032,221,133
51348 :032,221,032,221,032,221,139
51354 :032,221,032,221,032,221,145
51360 :032,221,032,032,032,032,029
51366 :032,032,032,032,032,171,241
51372 :195,219,195,219,195,219,134
51378 :195,219,195,219,195,219,140
51384 :195,219,195,219,195,219,146
51390 :195,219,195,219,195,219,152
51396 :195,219,195,219,195,179,118
51402 :032,032,032,032,032,032,138
51408 :032,032,032,221,032,221,010
51414 :032,221,032,221,032,221,205
51420 :032,221,032,221,032,221,211
51426 :032,221,032,221,032,221,217
51432 :032,221,032,221,032,221,223
51438 :032,221,032,221,032,032,040
51444 :032,032,032,032,032,032,180
51450 :032,173,195,177,195,177,175
51456 :195,177,195,177,195,177,092
51462 :195,177,195,177,195,177,098
51468 :195,177,195,177,195,177,104
51474 :195,177,195,177,195,177,110
51480 :195,189,032,032,032,032,024
51486 :032,032,032,032,032,000,190
51492 :084,082,073,068,069,078,234
51498 :084,000,080,082,069,083,184
51504 :083,032,070,073,082,069,201
51510 :032,066,085,084,084,079,228
51516 :078,032,084,079,032,083,192
51522 :084,065,082,084,000,224,093
51528 :000,000,224,000,000,224,008
51534 :000,000,000,000,000,000,078
51540 :000,000,000,000,000,000,084
51546 :000,000,000,000,000,000,090
51552 :000,000,000,000,000,000,096
51558 :000,000,000,000,000,000,102
51564 :000,000,000,000,000,000,108
51570 :000,000,000,000,000,000,114
51576 :000,000,000,000,000,000,120
51582 :000,000,000,000,000,000,126
51588 :000,000,000,127,254,000,001
51594 :127,254,000,127,254,000,132
51600 :127,254,000,127,254,000,138
51606 :127,254,000,127,254,000,144
51612 :127,254,000,127,254,000,150
51618 :127,254,000,127,254,000,156
51624 :127,254,000,127,254,000,162
51630 :127,254,000,000,000,000,043
51636 :000,000,000,000,000,000,180
51642 :000,000,000,000,000,000,186
51648 :000,000,000,000,000,000,192
51654 :008,013,013,013,013,013,015
```

Dancing Feats For Commodore 64, Atari, And Coleco Adam

Tony Roberts, Assistant Managing Editor

Take a Commodore 64, Atari, or Coleco Adam, add a joystick and a program from Softsync, and you have created a musical instrument that can be played easily by nonmusicians.

The program, *Dancing Feats*, is subtitled *The One Man Joystick Band*. *Dancing Feats* provides the backup, and you use the joystick to make a melody. The music rings out instantly, because there's virtually nothing—in terms of music—to learn.

The kind of music *Dancing Feats* makes is dependent on the decisions you make from a series of menus. The main menu provides the following choices: Choose Bass, Choose Beat, Choose Style, Choose Tempo, and Choose Ending. For each of these choices, there is a submenu. For example, if you select Choose Beat, the submenu asks you to choose from Jazz, Rock, Blues, or Boogie Woogie.

Go through the process for each of the main menu headings, and then you're ready to play.

Making Music

Dancing Feats follows your instructions and begins performing in its role as a backup band. It goes through a chord progression, playing in the style and tempo you selected.

Your joystick provides the melody. As you push it in various directions, different notes are added to the composition. The program sees to it that the note you're playing is compatible with the chord being played by the computer. Pressing the fire button on the joystick will change the octave of the note you're playing.

Once a song is under way, you play as long as you like. When you're ready to end your composition, press the space bar, and the program will begin to play the ending you selected before you began. The possible endings are The Duke, The Elvis, The Chance, and The Mozart.

As you play, the screen displays a visual accompaniment to your music. Colored bars dance on the screen for each note you play. The positioning of the bars is relative to the pitch of the note being played. Low notes are displayed on the left, high notes are displayed on the right.

The screen also shows you what chord the computer is playing and what note you are playing.

The program includes an a cappella mode, in which you can play melody without accompaniment.

An Educational Tool

Dancing Feats does provide the user with a simple musical instrument, but there are some differences between it and a conventional instrument. With *Dancing Feats*, the musician is not in full control. You can't use your joystick to play *Mary Had a Little Lamb* or your favorite pop tune. You can play only notes that are compatible with the chords the computer is playing.

If, for example, you keep the joystick in the same position while the computer plays a C chord, you'll get the same note. But when the computer switches to an F chord, that same position on the joystick will play a different note.

The music that results from *Dancing Feats*, while lively and enjoyable, cannot be composed note for note in the conventional sense. Nevertheless, *Dancing Feats* does provide nonmusicians or beginning musicians with the opportunity to learn something about music and music theory. For example, by experimenting with the options under Choose Tempo in the main menu, the user will learn the differences among adagio, allegretto, allegro, and vivace.

Dancing Feats cannot hope to duplicate what might result from solid training and years of practice on a conventional instrument, but it certainly allows those who haven't had such training to make a little music that sounds pretty good.

Children too young to tackle the intricacies of a violin or saxophone will enjoy the upbeat computer backup, and will be thrilled to make music many times more sophisticated than their dimestore xylophone can produce.

Dancing Feats
Softsync, Inc.
14 East 34th St.
New York, NY 10016
(212) 685-2080
Atari or Commodore 64 disk $29.95
Atari or Commodore 64 tape $24.95
Coleco Adam, $29.95

A Singing/ Talking Voice For VIC And 64

Arthur B. Hunkins

The Alien Group of New York City has come up with a significant advance in microcomputer voice synthesis with Voice Box, a peripheral for the VIC and 64 that can *sing* as well as speak. And with Voice Box you can program vocal *inflection* to create voices which are expressive and lifelike with virtually unlimited nuance.

Voice Box consists of the hardware peripheral, speech synthesis software on tape or disk, and *Music System* software, which drives both the singing voice and three-voice music from the Commodore SID chip (available only for the 64, on disk).

Plugs Into The User Port

The Voice Box itself is a sturdy, secure, 1.5 × 3 × 4-inch black box that plugs into the User Port. It consists of a 3 × 4-inch circuit board with seven chips and assorted components, an internal 2 × 3-inch speaker (.8 watt), and two external dials. One dial regulates the volume, the other the pitch range (the higher the faster for spoken material).

Voice Box produces only the vocal sound; sounds coming from the 64 SID chip require an external amplifier and speaker.

Volume is adequate for personal or small group use, but there is no provision for external amplification or headphones.

Voice Box software is different for VIC and 64, though the documentation—which is thorough and clear—differs only in detail. Software is offered on cassette for VIC and on disk for 64.

All Phonemes Are Used

Voice Box synthesizes phonemes, and is capable of

producing all 64 phonemes used by the English language. The software permits programming either in English, in phonemes, or in BASIC, using number codes for phonemes.

You can incorporate the SPEAK subroutine into your BASIC programs (2K free memory required) to permit English or phoneme speech coding. If your program leaves only about 700 bytes free, you can use the PSPEAK subroutine, that allows phoneme coding only.

The Talking Head

There are three other programs in the driving software. One is the SPEAK routine with an alien face added in character graphics with a moving mouth for vocal animation. A second program allows the user to type in words to be spoken by the face.

Most elaborate and perhaps most fascinating is a SPELL program, in which an alien professor asks you to spell words, and either congratulates or chastises you, depending on your answers.

There also is a provision for adding your own words. All you need to do is to furnish the phonetic spellings in DATA statements.

Changing The Pronunciation

Many of the spoken words provided by Voice Box are difficult to understand, even though the professor will repeat them as often as you like. But you can experiment with inflection, vowel length, and timing to have Voice Box speak the way you want. The documentation provides a number of hints on improving pronunciation.

The software normally permits speech in four pitches, to give you vocal inflections through a simple system of notated slashes. But in combination with the *Music System*, Voice Box has the potential for continuous, infinite inflection.

The *Music System*

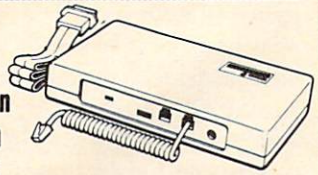
Unfortunately, the *Music System* software is available only for the 64, because it uses the SID chip. I recommend it even if you don't have Voice Box, since it provides an outstanding method for programming your own SID sound arrangements.

Music System is menu-driven. From a main menu, select SYNTHESIZER SETTINGS, and a densely packed screen displays SID sound options. You use the cursor controls, and the + and – keys, to select options. After you choose the new instrumentation, press the f7 key to hear the results.

By pressing other function keys, you can record a melody. Pitch is entered in a piano-like arrangement of the upper two rows on the keyboard. After you record your melody, you can go back and edit the pitch and rhythm.

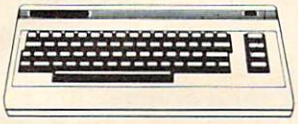
SPECIALS on INTEGRATED CIRCUITS
6502 @ 4.90 6520 @ 4.00 6522 @ 5.00 4116 @ 1.85
2532 @ 5.90 2716 @ 4.45 6116 @ 6.45 4164 @ 6.90

Anchor Automation Signalman MODEMS



FREE SOURCE MEMBERSHIP WITH SIGNALMAN
All Signalman Modems are Direct Connect, and provide the best price-performance values. **Dealer/OEM inquiries invited**

Volksmodem with computer cable	**68**
Mark VII Auto Dial/Auto Answer	99
Mark XII Smart Model 1200/300	299
DC HAYES Smartmodem	**219**
DC Hayes Smartmodem 1200/300	519



PROM QUEEN for VIC	**170**
Apple Emulator for Commodore 64	**Call**
STAT Statistics Package for C64	**95**
Solid Oak 2 Level Stand for C64 or VIC	**29**
C64/VIC Switch (networking)	129
BACKUP V1.0 tape copier for C64 or VIC	**20**
CARDBOARD/6 Motherboard - VIC	64
CARDBOARD/5 Motherboard - C64	56
CARD PRINT G Printer Int. with Graphics	72
CARD PRINT B Printer Interface—C64/VIC	40
CARDBOARD/3s Motherboard - VIC	22
CARDCO C64/VIC Calculator Keypad	32
CARDRAM/16 RAM Expansion - VIC	44
Complete CARDCO Line in stock	
CIE and VIE IEEE Interfaces in stock	
MSD SuperDrive for C64 or IEEE	**365**
MAE Assembler for C64	50
Koala Pad Touch Tablet—C64 or VIC	**79**
CBC 4/12 Analog to Digital 4 chan/12 bit	**199**
MULTIPLAN for C64	**79**
Dust Cover for C64 or VIC	6
Grand Master Chess for C64	24
COMAL Language for C64	**17**
with sprites, color graphics, sound, turtle graphics.	
Super BusCard by Batteries Included	**159**
ULTRA BASIC – 64 with Turtle Graphics	37
Super Disk Utility – C64 – includes backup	19
MicroChess – C64 – 8 levels of play	17
HES MODEM with software	**55**
Commodore 64 Programmers Reference Guide	16
WordPro 3+/64 with Spellright	**85**
VIController (also C64) – BSR Controller	50
COM VOICE Synthesizer for C64 or VIC	139
VIC products in stock – call for extra discounts.	
Victory Software for VIC and C64 in stock.	

APPLE—FRANKLIN ITEMS

FRANKLIN—complete line in stock	
QUENTIN Drives for Apple/Franklin	**219**
Swapper Stopper	**26**
automatic switch between paddles and joystick	
KRAFT Apple Joystick	**40**
Kraft Apple Paddle Pair	30
Koala Pad Touch Tablet-Apple/Franklin	**90**
SPINNAKER Software in stock	
Broderbund Software in stock	
16K RAM Card for Apple	59
Multiplan—Microsoft	**185**
Solid Oak 2 Level Stand for Apple	**29**
Serial Card for Apple	89
MCP RAM/80 column card for IIe (AP/TXT)	**139**
Z80 Softcard and CP/M (Microsoft)	235
RANA Elite I with Controller	389
Parallel Printer Interface/Cable	69
Microtek and MCP Interfaces in stock	
Grappler + Interface	129
DC Hayes Micromodem II	299
PFS: File or PFS: Report or PFS: Graph	**95**
Videx 80 Column Card	209
Apple Blue Book	**19**

commodore

See us for Personal, Business, and Educational requirements. Educational Discounts available.

PETSCAN I $245 base price
Allows you to connect up to 30 CBM/PET Computers to shared disk drives and printers. Completely transparent to the user. Perfect for schools or multiple word processing configurations. Base configuration supports 2 computers. Additional computer hookups $100 each.

COMPACK/STCP $115
Intelligent Terminal Package for PET, CBM, C64
Includes ACIA Hardware / STCP Software

SCREENMAKER 80 Column Adapter for C64 **139**
Provide big screen capability for business applications.

Copy-Writer Word Processor for C64 **49**
Full-featured package with 800 lines of text in memory. Includes double column printing, graphic capability, full printer support.

Special Screenmaker/Copy-Writer Combo **179**

VICTORY Software for VIC and C64

Metamorphosis	16	Creator's Revenge	16
Labyrinth of Creator	16	Galactic Conquest	16
Kongo Kong	16	Annihilator	16
Chomper Man	16	Grave Robbers	13
Bounty Hunter	16	Adventure Pack I or II	16

PAPER CLIP Word Processor – CBM/C64	**75**
ORACLE Data Base from Batteries Included	**109**
SPINNAKER Software C64, Apple, IBM, Atari	
Computel's First Book of PET/CBM	11
POWER ROM Utilities for PET/CBM	78
WordPro 4+ - 8032, disk, printer	295
VISICALC for PET, ATARI, or Apple	189
Compute's First Book of 64 Sound & Graphics	**10.40**
SM-KIT enhanced PET/CBM ROM Utilities	**40**
PET Spacemaker II ROM Switch	36
Compute's First Book of Games	10.40
Dust Cover for PET, CBM, 4040, or 8050	8
CmC Interfaces (ADA1800, ADA1450, SADI in stock)	
Compute's Reference Guide to 64 Graphics	**10.40**
Computel's Machine Language for Beginners	11
HES Software and Hardware in stock	
UMI products in stock	

FlexFile for PET/CBM/C64 $49
DataBase, Report Writer with calculations, Mailing Lists. Easy to use, and can be modified.

FORTH for PET/C64 full FIG model – Cargile/Riley **50**
includes all FORTH 79 Standard extensions, structured 6502 assembler with nested decision macros, standard 16x64 screens, agility to read/write BASIC sequential files, sample programs, introductory + reference manual.

Metacompiler for FORTH for independent object code **30**
Floating Point for FORTH **20**

KMMM PASCAL IV for PET/CBM/C64 **99**
Virtually full Jensen-Wirth implementation is now suitable for advanced placement courses.

EARL for PET/CBM Disk-based ASSEMBLER **65**

SuperGraphics – BASIC Language Extensions **45**
Fast graphics, sound, turtle graphics routines for PET/CBM.

RAM/ROM for PET/CBM 4K $75 8K $90

CBM Public Domain Software–C64/PET 27 disks **75**

STAT for PET/CBM/C64 and Apple **95**
Comprehensive Statistical Analysis Routines
Includes complete file handling capabilities, summary statistics, confidence intervals, hypothesis tests, exponential mean tests, multiple and power series regression, analysis of variance, histograms, and non-parametric tests.

PageMate 60 Command Word Processor **40**
Full-featured package for all Commodore computers (incl. VIC with 16K). Full screen editing, and supports disk, tape, and all printers.

DISK SPECIALS

Scotch (3M) 5" ss/dd	10/ 2.20	50/ 2.00	100/ 1.95
Scotch (3M) 5" ds/dd	10/ 3.05	50/ 2.80	100/ 2.75
Scotch (3M) 8" ss/sd	10/ 2.30	50/ 2.10	100/ 2.06
Scotch (3M) 8" ss/dd	10/ 2.85	50/ 2.70	100/ 2.65

We stock VERBATIM DISKS
Write for Dealer and OEM prices.

Sentinal 5" ss/dd	10/ 1.90	50/ 1.85	100/ 1.75
Sentinal 5" ds/dd	10/ 2.55	50/ 2.50	100/ 2.35

We stock Dysan disks

Wabash 5" ss/sd	10/ 1.50	50/ 1.45	100/ 1.40
Wabash 5" ss/dd	10/ 1.90	50/ 1.85	100/ 1.75
Wabash 5" ds/dd	10/ 2.60	50/ 2.50	100/ 2.40

We stock MAXELL DISKS
Write for dealer and OEM prices.

Disk Storage Pages 10 for $4 Hub Rings 50 for $6
Disk Library Cases 8"—3.00 5"—2.25
Head Disk Cleaning Kits 12
AMARAY Disk Storage Systems in stock.
Innovative Concepts FLIP 'N' FILES in stock.

CASSETTE TAPES—AGFA PE-611 PREMIUM

C-10	10/ .61	50/ .58	100/ .50
C-30	10/ .85	50/ .82	100/ .70

Hewlett Packard
Write or call for prices.

DATASHIELD BACKUP POWER SOURCE $265
Battery back up Uninterruptible Power Supply with surge and noise filtering. The answer to your power problems.

MultiPlan—IBM or Apple	**185**
Quadboard for IBM available	
KOALA PAD Touch Tablets—Apple, Atari, IBM, CBM	
Peachtext 5000 Software Package	**209**
PFS Software for IBM and Apple in stock	
SPINNAKER Software C64/VIC, Apple, IBM, Atari	
VOTRAX Personal Speech System	280
BMC 9191 Color Monitor	**229**
BMC 12A 12" Green Monitor	79
Dynax (Brother) DX-15 Daisy Wheel Printer	**469**
Brother HR-25 Daisy Wheel Printer (25 cps)	**769**
Itoh Prowriter Parallel Printer	379
Panasonic 1090 Printer with Correspondence Mode	**279**
Daisywriter 2000 with 48K buffer	1020
Gemini 10X	**299**
EPSON, Okidata, Star Micronics printers in stock	
USI CompuMOD 4 R F Modulator	29
We Stock AMDEK Monitors	
Amdek DXY-100 Plotter	590
A P Products	15% OFF
COMPUTER COVERUPS IN STOCK	
BROOKS 6 Outlet Surge Suppressor/Noise Filter	**54**
Surge Suppressor-6 outlet	29
Electrohome 1302-2 13" Hi-res RGB Monitor	335
Panasonic 12" Monitor (20 MHz) with audio	135
Synertek SYM-1 Microcomputer	**189**

ALL BOOK and SOFTWARE PRICES DISCOUNTED

USI Video Monitors—Green or AMBER 20 MHz hi-res.
Dealer and OEM inquiries invited

ZENITH data systems

ZVM-122A	109	ZVM-123G	95
ZVM-131	300	ZVM-135	490
Z29 Terminal (DEC and ADM compatible)			680
ZT-10 Intel. Terminal with Serial Port			340
Z100 16-bit/8-bit System			CALL

We stock entire Zenith line.

ATARI – WE STOCK ENTIRE LINE
SPINNAKER and Broderbund Software in Stock.

215-822-7727
252 Bethlehem Pike
Colmar, PA 18915

A B Computers

WRITE FOR CATALOG. Add $1.50 per order for United Parcel. We pay balance of UPS surface shipping charges on all prepaid orders (add extra for mail, APO/FPO, air). Prices include cash discount. Regular prices slightly higher. Prices subject to change.

Three-Voice Digital Recorder

What *Music System* gives you is a three-voice digital recorder with synchronizing click track (metronome), changeable tempo independent of pitch, and the ability to vary the sound of any line. You can try out and rerecord arrangements at will. And all this uses about 90 percent of the SID chip's potential. You have the ability to program pitch, waveform (including pulse width), filter type, filter resonance, filter routing select, filter cutoff point, overall amplitude, and all ADSR parameters.

You can get a single-speed phasing by internally cycling the pulse width, and you can set the rate of sweep of the filter cutoff point during a note.

This switchable effect requires specifying a beginning and ending cutoff point. (The sweep can be triggered by any selected oscillator, as it begins a new note.)

A third option, here exercised on playback (like the rhythmic editing mentioned earlier), provides for the addition of *accents* for selected notes per voice. The programming techniques behind these three effects bode well for the future of SID sound synthesis.

There are a few limitations, though. There is no pitch transposition, and no microtones. Only one type of filtering can be selected at a time, there is no ring modulation, only 15 pulse-width settings are available, and the modulating capabilities of both ADSR and Oscillator 3 are not implemented.

The Singing Voice

To work with the singing voice, select LYRIC EDITOR from the main menu. Text is entered in phonemes, with slashes between the sounds to be sung to different notes. A total of nine lines of text with 77 phonemes each is permitted. As a pronunciation aid, there is a "trial" line; a series of phonemes entered here will be sung in monotone when you hit RETURN.

After text is entered, pitch is added in the same way as with the SID oscillators, using the top two keyboard rows—complete with vocal tone and text. As before, rhythm can be edited later. The voice has a fixed-rate amplitude vibrato that can be edited in later, and a programmable glissando on selected pitches. It is this variable-rate slide that can theoretically be applied to achieve subtlety of inflection in speech synthesis. You are not told how to do this, but it can be done. Perhaps Alien Group or an enterprising independent programmer will soon show us.

Disk Save Option

Several other choices are available from the main menu. One allows SAVEing to disk; both a text and a music file are stored. There is a MEDLEY option, where you can string together several selections to be played in succession. And there is a program to redraw the face. During playback of any song, you can select video of a male singer with moving mouth and eyebrows, by choosing among mouth and eyebrow shapes.

Actually, the entire screen can be changed in high-resolution, multicolor graphics mode, and you can SAVE these new faces.

Voice Box represents a substantial step forward in speech synthesis. The cost, considering software and hardware flexibility, is reasonable. With all its power and options, it is remarkably easy to use, either alone or incorporated into other programs.

Voice Box
(for VIC-20 or Commodore 64; tape, disk for 64 only)
$95

Music System *(disk, for 64 only)*
$25
The Alien Group
27 West 23rd St.
New York, NY 10010

AMDC 3-Inch Disk Drives For Atari

Richard DeVore

The AMDC-1 is a single-drive, single-sided, dual-density 3-inch disk drive with a parallel printer port. The AMDC-2 is the dual drive version. AMDC-2 lists for $850. However, AMDEK has announced special introductory pricing. Through June 30, 1984, the AMDC-1 will sell for $550, and the price of the AMDC-2 will be $760. The AMDC-1 may be upgraded to the AMDC-2 for $300. The Atari 810 single-density single drive lists for the same price as the AMDC-1 but has only half the storage capacity and cannot run a parallel printer.

The AMDISK AMDC-1 uses 3-inch disks which are designed to be used on both sides. A nice feature is that the drive has a LED which is keyed to whichever side of the disk is in use. When the A side is in position, the LED is green. When the B side is in position, the LED is red. This eliminates confusion over which side of the disk is in use, and prevents problems such as formatting the wrong side. A simple slide switch on the disk write-protects it, eliminating the need for a supply of write-protect tabs.

A Disk In Your Pocket

These disks are available from Amdek and Maxell for a suggested retail price of $6.99. Extra protection is offered by the disk enclosure, which seals the disk surfaces completely until the disk is inserted into the drive.

The enclosure is made of a hard plastic and has a sliding metal cover over the read/write

LET US ANALYZE YOUR RETURN BEFORE THE I.R.S. DOES IT FOR YOU...

introducing . . .

THE TAX CONSULTANT™

(FOR ATARI 400/800 AND THE COMMODORE 64 COMPUTERS)

NOW YOU CAN HAVE COMPLETE TAX PREPARATION AT HOME!

only **$95.00** tax deductible!

and your return will be closely checked and analyzed before the I.R.S. ever sees it! THE TAX CONSULTANT™ is a sophisticated yet very friendly program for the novice user. THE TAX CONSULTANT™ will help you to calculate, prepare and print your return. But then, at your request, THE TAX CONSULTANT™ will check your return very closely and issue an itemized print-out indicating those items that in its judgment may be questioned. *No other tax preparation package offers this feature!*

- **Features –**
- On-screen Prompts
- Continuous tax/refund readout
- Fast, 100% machine language
- All required I.R.S. forms included
- Easy to follow tutorial in manual
- Prints all necessary forms
- Multi-color screens
- Inexpensive updates

Plus!

A TAX PLANNING MODULE THAT, WHEN USED WITH THE ANALYSIS MODULE, WILL PROVIDE YOU WITH A YEAR-ROUND TOOL TO PLOT YOUR TAX STRATEGIES

Dealer inquiries welcome!

Information

(707) 422-9591

Mail Orders to: **Morbius Software Co., Inc.**
Dept. CP, P.O. Box 1702
Vacaville, CA 95696

Name _____

Address _____

City, State _____

☐ CHECK/MONEY ORDER ZIP _____

☐ VISA Interbank #(MC) _____

☐ MASTERCARD Expires _____

Card No. _____

Signature _____

Price $95.00 plus $4.00 shipping and handling. Calif. residents add 6% sales tax. Please allow two weeks for checks to clear.
System Requirements: Atari 400/800 with 48K & one disk drive; Commodore 64 with one disk drive. Printer recommended.
ATARI 400/800 is a trademark of Atari, Inc.
Commodore 64 is a trademark of Commodore Electronics, Ltd.
THE TAX CONSULTANT is a trademark of GMG Associates

MASTERCARD/VISA CALL TOLL-FREE!

CALIF **1-800-821-6771** NATION **1-800-821-6770**

Telephone operators standing by Mon.-Fri. 8 am to 5 pm, Saturdays 9 am to 1 pm, PST

area of the disk surface. This cover is automatically moved aside when the disk is inserted into the drive. This cover, and their small size, allows them to be carried in a shirt pocket with relative impunity. Their small size also makes it possible to mail them in a standard envelope.

The drive formats the 3-inch disks so that they are fully compatible with the 5¼-inch disks you're used to. This, in effect, makes them transparent to the computer, which accepts them as a 5¼-inch disk.

During my tests of the AMDC-2 I used it in both single- and double-density modes with no problems at all. I was able to fill all the disk sectors in both single- and double-density modes, and consistently read all the information. In transferring full disks of programs from one drive to the other, including from 3-inch to 5¼-inch and back, the units performed perfectly.

Four Drives And A Printer

The drives contain a controller which will take care of four drives and a Centronics-type parallel printer or plotter. It also allows the use of 5¼-inch and the 3-inch drives in any combination. DIP (dual in-line pin) switches mounted on the rear panel of the unit allow the 3-inch drives to be used as any drive, from drive 1 to drive 4. The factory setting is drive 1 for the AMDC-1 and drives 1 and 2 for the AMDC-2.

Being able to add noncontroller disk drives to the AMDC is a bonus. Low-cost units are available and may be single- or double-sided. You may also use 40- or 80-track drives. These capabilities allow for a massive amount of storage at reasonable cost. The use of double-sided or 80-track drives requires the DOS/XL operating system to access the additional storage potential.

Connecting the external drives requires setting the drive to respond to the proper signal, connecting them to the cable, and plugging the power cord in. External drives must have their own power supplies and cabinets.

Switches Select Options

There are eight DIP switches located on the upper right-rear panel of the AMDC. These allow the following configurations:

Switches 1 through 4 are density selection switches that allow you to configure the drives for either single or double density on boot-up. The density of the boot drive is determined by the disk installed at boot-up. These switches have no effect if the controller is set for DOS 3.0.

Switches 5 and 6 determine which drive will be the boot drive. The factory setting is for drive 1, but any drive up to and including 4 may be selected for this function.

Switch 7 is used when more than three drives are connected to the controller, and is particularly useful when there is a 5¼-inch drive attached. When this switch is on, the external drive will be recognized as drive 1. When it is off, the 3-inch drives are 1 and 2, and the external drive is drive 3.

Switch 8 sets drives that have been selected as dual density to 256 bytes per sector when off. When switch 8 is on, it sets all drives to be Atari 1050 compatible for use with DOS 3.0. When switch 1 is on, disks with 256 bytes per sector will not be recognized.

The 3-inch drives are also available as a dual drive without a controller. This version is called the AMDISK IIIB and is fully compatible with the AMDC-1 or 2. The AMDISK IIIB in conjunction with an AMDC-2 lets you have a total of four double-density drives that take up about the same desk space as one Atari disk drive.

If you have 5¼-inch dual-density disk drives with controllers that use the industry standard 34-pin ribbon cable for drive connection, you can use the AMDISK IIIB as add-on drives.

Parallel Printer Port

The printer port on the AMDC is software-compatible with the Atari 850 interface. This enables the use of data base programs, word processors, and LPRINT statements from BASIC. The printer port also uses the same 15 pin D connector as the 850. This port is located on the upper rear panel of the AMDC. Since the pinout is the same as the 850 interface, any Atari-compatible printer cable will work with your printer or plotter.

Should you already own an Atari 850 interface, one printer/plotter may be attached to it, and another to the AMDC. Since they both respond to the same signals from the computer, it is possible to have the equivalent of a printer switch by simply turning on the unit you wish to use and turning off the other.

Drives Supplied With DOS/XL

The AMDC drives will be supplied with the DOS/XL operating system by Optimized Systems Software, Inc., of Cupertino, CA. This is a menu-driven version of OSA+ Version 2.0 and OSA+ Version 4.1. This allows compatibility with the Atari operating system as well as the use of double-sided or 80-track drives. DOS/XL was not ready at the time of this review, but both OSA+ versions performed as advertised.

Amdek also will provide a group of utility programs and a patch to Atari DOS which will permit it to function under double density. Most of these utilities are quite complex and are intended for programmers who wish to take full advantage of all the drives' capabilities.

Two of these utilities, however, will be of value to anyone: Config and Version. Config configures the drives as to type and density, and Version tells you

the version number and date of the AMDC operating software which may help should you have a problem.

The more complex utilities are:

FREFORM – This allows you to specify the sector order on the disk. This would be a way to protect programs from being copied.

TIME EXTEND – This may be used to change the printer port time-out value from the normal 20 seconds to any value from 1 to 255 seconds. This may be useful when setting up a plotter or if you want to make it 5 seconds to match the normal 850 interface timing.

CONTD – Use this program to set the controller and drives to match the diskettes in the drives.

IDTABLE – Use this program to change the drive numbers as far as the computer is concerned. You may make drive 2 your boot drive, for instance.

IDENT – A program to check how many drives are presently attached and operating in the system.

The AMDC-1 and 2 have a formatted capacity of 92K per side in 40-track single-density, and 184K per side in 40-track double-density. In DOS 3 mode they have 127K in double-density. Each of the figures above is doubled since you can use both sides of the disk. If you connect an 80-track, double-density, double-sided drive to the system using DOS/XL, you can get 736K.

Software Compatibility

At the time this review was written the following software vendors had agreed to make all of their software available on the 3-inch format: LJK, Synapse, Brøderbund, Sirius, and Penguin, with more expected, including some educational vendors. This may make it unnecessary to have any other drive to get full use of your computer.

The AMDC-2 takes up less space than the 5¼-inch dual drive I have been using, not to mention the fact that the Atari 850 interface was not needed. This space saving also eliminated the additional expense, cables, and power supplies that would have been required with another configuration.

This, and the fact that software will be available in the 3-inch disk format, makes the AMDC disk drives an impressive alternative to the standard 5¼-inch drives. The extra protection of the media and ease of use make them especially good in teaching environments. In short, if you are in the market for a disk drive, the AMDC suits your needs perfectly and deserves serious consideration.

AMDC Disk Drive
AMDEK Corp.
2201 Lively Blvd.
Elk Grove, IL 60007
(312) 364-1180
AMDC-1 $599
AMDC-2 $850

MORE DISK DRIVE FOR YOUR MONEY .....

In fact, with the ASTRA 1620, you get two superb Disk Drives for the price of one. The ASTRA 1620 is Single or Double Density (software selectable) and completely compatible with ATARI DOS or OSA+ DOS. When used as Double Density, the ASTRA 1620 has the same capacity as Four ATARI 810® Disk Drives.

DOUBLE OR SINGLE DENSITY

The ASTRA 1620 can be either single or double density, depending on the software selected. One drive can be configured for single density and the other drive for double density, or any combination desired. The ASTRA 1620 is compatible with virtually any software available for ATARI® Disk Drives. The ASTRA 1620 is smooth, quiet and fast. In Single Density mode, the ASTRA 1620 stores 88K bytes of programs or files. In Double Density, the ASTRA 1620 stores 176K bytes, simply twice as much.

TWO DRIVES ... Yes, two superb disk drives in the same size enclosure normally used for one drive. The ASTRA 1620 measures 7⅞" wide x 11⅞" deep x 5⅞" high.

Two drives will open a new dimension of computing for you. The program disk can be in one drive and the data disk can be in the other. This will eliminate time consuming disk changes. Backing up disks and copying files will never be easier. Just follow the instructions on the screen and walk away. The job will be completed within minutes. We have simplified copying from single to double density. With two drives, it's just as easy as copying in one mode. No disk switching!

Two double density drives give you the power that much larger and more expensive computers have without giving up any of the features available on the ATARI® Home Computer.

EASY TO USE ... The ASTRA 1620 comes complete with everything you need. Just plug it in, chain it up, and turn it on.

The ASTRA 1620 comes with OSA+ DOS (The best disk operating system available for the ATARI® computer!). The OSA+ DOS is completely compatible with all existing ATARI DOS files. Because the OSA+ user manual is very complete and technical, we include our own simplified user manual. Between the two furnished manuals, you have the information necessary to perform any task required of your disk drive.

The ASTRA 1620 also contains a data cord, power transformer, and operator manual.

ASTRA SYSTEMS

5230 Clark Avenue, Suite 19
Lakewood, California 90712

Phone
(213) 804-1475

COMMODORE 64
(more power than Apple II at half the price)

$99.50*

- 170K DISK DRIVE $159.00*
- TRACTION FRICTION PRINTER $109.00*

COMPUTER AND SOFTWARE SALE

WE HAVE THE BEST SERVICE

WE HAVE THE LOWEST PRICES

VIC-20
(a real computer at the price of a toy)

$69.50

- 40-80 COLUMN BOARD $59.00
- 32K RAM EXPANDER $95.00

*** COMMODORE 64 COMPUTER $99.50**
You pay only $199.50 when you order the powerful 84K COMMODORE 64 COMPUTER! LESS the value of the SPECIAL SOFTWARE COUPON we pack with your computer that allows you to SAVE OVER $100 off software sale prices!! With only $100 of savings applied, your net computer cost is $99.50!!

SOFTWARE BONUS PACK $29.95
When you buy the Commodore 64 Computer from Protecto Enterprizes you qualify to purchase ONE SOFTWARE BONUS PACK for a special price of $29.95!! Normal price is $49.95 (40 programs on disk or 24 programs on 5 tapes).

*** 170K DISK DRIVE $159.00**
You pay only $259.00 when you order the 170K Disk Drive! LESS the value of the SPECIAL SOFTWARE COUPON we pack with your disk drive that allows you to SAVE OVER $100 off software sale prices!! With only $100 of savings applied, your net disk drive cost is $159.00.

*** TRACTION FRICTION PRINTER $109.00**
You pay only $209.00 when you order the Comstar T/F deluxe line printer that prints 8 1/2 x 11 full size, single sheet, roll or fan fold paper, labels etc. 40, 66, 80, 132 columns. Impact dot matrix, bi-directional, 80 CPS. LESS the value of the SPECIAL SOFTWARE COUPON we pack with your printer that allows you to SAVE OVER $100 off software sale prices!! With only $100 of savings applied your net printer cost is only $109.00.

80 COLUMN BOARD $99.00
Now you program 80 COLUMNS on the screen at one time! Converts your Commodore 64 to 80 COLUMNS when you plug in the 80 COLUMN EXPANSION BOARD!! List $199 **SALE $99** PLUS—you also can get an 80 COLUMN BOARD WORD PROCESSOR with mail merge, terminal emulator, ELECTRONIC SPREAD SHEET. List $59.00 **SALE $24.95** if purchased with 80 COLUMN BOARD!! (Tape or Disk)

80 COLUMNS IN COLOR EXECUTIVE WORD PROCESSOR $69.00
This EXECUTIVE WORD PROCESSOR is the finest available for the COMMODORE 64 computer! The ULTIMATE for PROFESSIONAL Wordprocessing application! DISPLAYS 40 OR 80 COLUMNS IN COLOR or Black and White! Simple to operate, powerful text editing with a 250 WORD DICTIONARY, complete cursor and insert/delete key controls line and paragraph insertion, automatic deletion, centering, margin settings and output to all printers! Includes a powerful mail merge. List $99.00 **SALE $69.00.** 20,000 WORD DICTIONARY - List $24.95 **SALE $19.95.** EXECUTIVE DATA BASE - List $89.00 **SALE $59.00.** (Disk only).

SPECIAL SOFTWARE COUPON

We pack a SPECIAL SOFTWARE COUPON with every COMMODORE 64 COMPUTER-DISK DRIVE-PRINTER-MONITOR we sell! This coupon allows you to SAVE OVER $100 OFF SALE PRICES! $200-$300 savings are possible!! (example)

PROFESSIONAL SOFTWARE COMMODORE 64

Name	List	Sale	Coupon
Executive Word Processor	$99.00	$69.00	$59.00
Executive Data Base	$89.00	$59.00	$46.00
20,000 Word Dictionary	$24.95	$19.95	$14.95
Electronic Spreadsheet	$89.00	$59.00	$46.00
Accounting Pack	$69.00	$49.00	$32.00
Total 5.2 Word Processor			
Tape	$69.00	$56.00	$37.00
Disk	$79.95	$63.00	$42.00
Total Text 2.6 Word Processor			
Tape	$44.95	$39.00	$26.00
Disk	$49.00	$42.00	$29.00
Total Label 2.6			
Tape	$24.95	$18.00	$12.00
Disk	$29.95	$23.00	$15.00
Programmers Helper (Disk)	$59.00	$39.00	$29.95
Basic Tutor (Tape/Disk)	$29.95	$24.95	$15.00
Typing Teacher (Tape/Disk)	$29.95	$24.95	$15.00
Sprite Designer (Disk)	$16.95	$14.95	$10.00
Medicinemen (Tape)	$19.95	$17.95	$12.00
Weather War II (Tape)	$19.95	$17.95	$12.00
Professional Joy Stick	$24.95	$15.95	$11.00
Light Pen	$39.95	$19.95	$16.95
Dust Cover	$ 8.95	$ 6.95	$ 4.60

(See other items in our catalog!)
Write or call for Sample SPECIAL SOFTWARE COUPON!

EXECUTIVE QUALITY PROFESSIONAL BUSINESS SOFTWARE

The Cadillac of business programs for Commodore 64 Computers

Item	List	*SALE
Inventory Management	$99.00	$59.00
Accounts Receivable	$99.00	$59.00
Accounts Payable	$99.00	$59.00
Payroll	$99.00	$59.00
General Ledger	$99.00	$59.00

(*COUPON PRICE $49.00)

VIC-20 COMPUTER $69.50
This 25K VIC-20 computer includes a full size 66 key typewriter keyboard color and graphics keys, upper/lower case, full screen editor, 16K level II microsoft basic, sound and music, real time floating point decimal, self teaching book, connects to any T.V. or monitor!

40-80 COLUMN BOARD $59.00
Now you can get 40 OR 80 COLUMNS on your T.V. or monitor at one time! No more running out of line space for programming and making columns! Just plug in this Expansion Board and you immediately convert your VIC-20 computer to 40 OR 80 COLUMNS!! List $129. **SALE $59.00.** You can also get an 80 COLUMN BOARD WORD PROCESSOR with mail merge, terminal emulator, ELECTRONIC SPREAD SHEET!! List $59.00. **SALE $24.95** if purchased with 80 COLUMN BOARD! (Tape or Disk).

32K RAM EXPANDER $95.00
This cartridge increases programming power over **8 times!!** Expands total memory to 57K (57,000 bytes). Block switches are on outside of cover! Has expansion port!! Lists for $199 **(OUR BEST BUY!)**

60K MEMORY EXPANDER $49.00
Sixslot — Switch selectable — Reset button — Ribbon cable — CARDCO. A must to get the most out of your VIC-20 Computer!

8K RAM CARTRIDGE $39.00
Increases programming power 2 1/2 times. Expands total memory to 33K (33,000 bytes). Memory block switches are on outside of cover! Includes FREE $16.95 game.

16K RAM CARTRIDGE $55.00
Increases programming power 4 times. Expands total memory to 41K (41,000 bytes). Memory block switches are an outside cover! CARDCO Includes FREE $29.95 adventure game!!

12" GREEN SCREEN MONITOR $99.00
Excellent quality GREEN PHOSPHOROUS VIDEO MONITOR with antiglare, 1920 characters (80 characters x 24 rows). Save your TV! a must for 80 column word processors. PLUS $9.95 for VIC 20 or Commodore 64 Cable.

12" AMBER SCREEN MONITOR $119.00
Premium quality AMBER VIDEO MONITOR With antiglare, (80 characters x 24 rows), exceptionally clear screen, faster scanning. PLUS $9.95 for VIC 20 or Commodore 64 Cable.

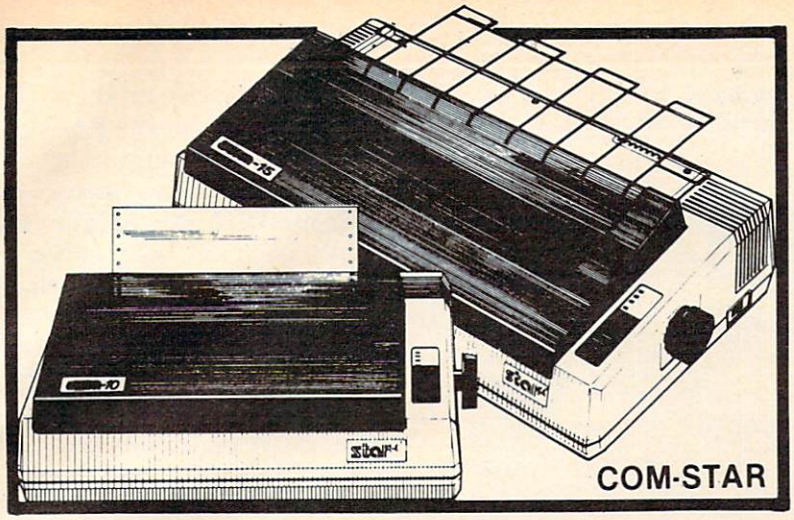
• LOWEST PRICES • 15 DAY FREE TRIAL • 90 DAY FREE REPLACEMENT WARRANTY
• BEST SERVICE IN U.S.A. • ONE DAY EXPRESS MAIL • OVER 500 PROGRAMS • FREE CATALOGS

Add $10.00 for shipping, handling and insurance. Illinois residents please add 6% tax. Add $20.00 for CANADA, PUERTO RICO, HAWAII orders. WE DO NOT EXPORT TO OTHER COUNTRIES.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! Canada orders must be in U.S. dollars. VISA — MASTER CARD — C.O.D.

PROTECTO
ENTERPRIZES (WE LOVE OUR CUSTOMERS)

BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order



FANTASTIC PRINTER SALE

as low as **$149.00**

- *15 Day Free Trial - 180 Day Immediate Replacement Warranty*

	LIST	SALE
80 COLUMN THERMAL PRINTER — 60 CPS Bi-directional, dot matrix, prints 8½" letter size paper, full 80 columns, high resolution graphics, dot bit addressable, special symbols and true decenders! (Centronics parallel interface)	$199	**$149**
80 COLUMN TRACTOR-FRICTION PRINTER — 80 CPS Bi-directional, dot matrix, impact, prints single sheets, continuous feed paper, adjustable columns, 40 to 132 characters! Roll paper adapter $32.95. Centronics parallel interface)	$399	**$209**
PREMIUM QUALITY 10" CARRIAGE T/F PRINTER — 120 CPS Bi-directional, impact, 9 x 9 dot matrix with double strike for 18 x 18 dot matrix. High resolution bit image (120 x 144 dot matrix) underlining back spacing, left and right margin settings, true lower decenders, with super and sub scripts. Prints standard, italic, block graphics, special characters, plus 24 of user definable characters and much more!! Prints single sheets, continuous feed and roll paper! (Centronics parallel interface)	$499	**$289**
PREMIUM QUALITY 15½" CARRIAGE PRINTER — 120 CPS Has all the features of the Premium Quality 10" Carriage T/F Printer above plus a 15½" carriage and more powerful electronic components to handle large business forms! (Centronics parallel interface)	$599	**$379**
HIGH SPEED PREMIUM QUALITY T/F 10" PRINTER — 160 CPS Save printing time with these plus features: 160 CPS speed, 100% duty cycle, 8K buffer diverse character fonts special symbols and true decenders, vertical and horizontal tabs. This is Red Hot Efficiency!!! (Serial or Centronics parallel interface)	$699	**$499**
HIGH SPEED PREMIUM QUALITY T/F 15½" PRINTER — 160 CPS Has all the features of the 10" Carriage high speed printer plus a 15½" carriage and more powerful electronics to handle larger business forms! (Serial or Centronics parallel interface)	$799	**$599**

PARALLEL PRINTER INTERFACES: (IN STOCK)

- For VIC-20 and COMMODORE 64 **$49.00**
- For all APPLE COMPUTERS **$69.00**
- For ATARI 400 and 800 COMPUTERS **$79.00**

NOTE: *Other printer interfaces are available at computer stores!*

SALE SALE

WE DO NOT EXPORT TO OTHER COUNTRIES EXCEPT CANADA.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! Canada orders must be in U.S. dollars. We accept Visa and MasterCard. We ship C.O.D.

PROTECTO ENTERPRIZES (WE LOVE OUR CUSTOMERS)

BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

The Timex/Sinclair 2068

John Krause, Assistant Technical Editor

The Timex/Sinclair 2068 offers 72K of internal memory, eight colors, and sound.

The Timex/Sinclair 2068 is the latest addition to the Timex line of home computers. Retailing for $199.95, the 2068 features 72K of internal memory, eight colors, and sound, making it the most powerful Timex computer yet. The 72K is achieved through the use of bank switching and consists of 24K of ROM and 48K of RAM, of which about 38K is available for BASIC programs. The 2068 comes with three programs on cassette tape so you can put the computer to good use immediately if you have a suitable tape recorder.

The keyboard is full size and has 42 keys arranged in the familiar QWERTY layout. Timex describes the keys as being "full-travel," but they feel more like those on a calculator. They click into position when pressed and snap back when released. Each time a key is pressed, a faint sound can be heard from the internal speaker. This enables you to type without having to look up at the screen to verify that each keystroke was entered. All keys repeat when held down. And small raised dots on the F and J keys make it easier for touch-typists to find the home keys.

To the right of the keyboard is a cartridge port. Timex sells ready-to-run programs on cartridge which you use by simply opening the cartridge door and inserting the cartridge in the slot. Two joystick ports are available—one on the right side of the computer and one on the left. Both are standard Atari-style ports, compatible with a wide variety of joysticks. Located in the back of the computer are ports for connecting a tape recorder and a television or monitor, as well as a port for peripherals such as a printer or modem.

Using The Keyboard

As Timex admits in the manual, the keyboard may seem hopelessly complicated at first. Most of the keys have five or more different functions. The reason for so many functions is that the 2068, like all Timex computers, uses one-key BASIC commands. On most other computers, if you want the PRINT command, for example, you would type the letters P-R-I-N-T. But on the 2068, all you do is hit the P key. (It's not always that simple, as we'll see in a moment.) Since there are more BASIC commands than keys, each key must serve more than one function. Which function the computer uses depends on which shift key is pressed, if any, and which mode the computer is in at the time.

Five modes are available: keyword, letter, extended, capital, and graphic. The current mode is indicated on the screen by the cursor, which displays the initial of the mode—either K, L, E, C, or G. The extended, capital, and graphic modes can be switched in and out using keyboard commands. The keyword and letter modes are chosen automatically by the computer depending on which would be correct for the particular situation.

Let's examine all the different functions available via the P key. To get a lowercase P, you press the P key when in letter mode. To get a capital P, press P when in capital mode, or press CAPS SHIFT-P while in letter mode. To get the PRINT command, press P while in keyword mode. The quotation mark is chosen by pressing SYMBOL SHIFT-P while in either keyword, letter, or capital mode. To get TAB, you press P when in extended mode. To choose RESET, press SYMBOL SHIFT-P while in extended mode. The same general procedure applies to the other letter keys. This keyboard might be difficult to *learn*, but it's not difficult to *use* once you get used to it.

Two-Part Screen

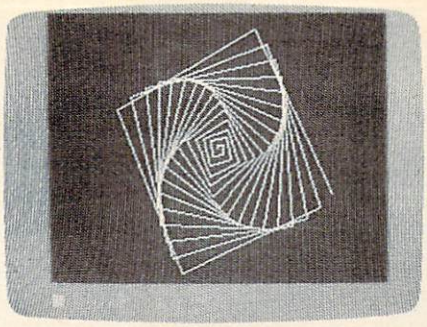
The screen can display 24 lines with 32 characters each and is divided into two parts. The top part, normally 22 lines, is used for program output and listings. The bottom two lines are for entering commands and program lines, and also for displaying error messages by the computer. When you type in a

program, each step is entered in the bottom part and is added to the listing above when ENTER is pressed. You can change any program step by moving an arrow to the step, using the up-arrow and down-arrow keys, and pressing EDIT. The step will appear in the bottom part, allowing you to insert or delete characters and then replace the step by pressing ENTER.

Several Graphics Modes

Characters can appear on the screen in many forms. Each character position has six parameters: PAPER, INK, FLASH, BRIGHT, INVERSE, and OVER. INK sets the character color and PAPER sets the background color. The available colors are blue, red, magenta, green, cyan, yellow, white, and black. The border color can also be changed using the BORDER command. INVERSE reverses the colors of INK and PAPER to print inverse characters. FLASH causes characters to flash by rapidly switching INVERSE on and off. BRIGHT makes characters appear brighter for emphasis. OVER allows you to create special characters by overstriking one character with another, as on a typewriter. For example, you could underline a letter by printing over it with the underline character.

Eight graphics characters are available from graphic mode. Eight more can be obtained by using the inverse of these characters. You can also create your own graphics characters and store them "under" the letter keys A-U. Most computers give you the ability to define your own characters, but the procedure is not easy and usually requires sacrificing other characters. On the 2068, however, it's a breeze. Each character consists of an 8-by-8 matrix of pixels. Each pixel can show either the INK color or the PAPER color. Think of the INK color as a 1 and the PAPER color as a 0. Each row of eight pixels is defined



High-resolution graphics is available on the 2068.

separately. To define the top row of pixels for a character stored "under" the E key, for example, you would type

```
POKE USR "e", BIN 01001100
```

The other seven rows are similarly defined. Then if you press the E key while in graphic mode, you'll get your character. It's that easy. Moreover, you don't have to sacrifice any of the normal characters.

One of the best features of the 2068 is its high-resolution graphics capability. The screen is 256 pixels wide and 192 pixels high. Three commands are available for drawing in high resolution. The PLOT command puts a dot at a specified place on the screen. DRAW draws a line and CIRCLE draws a circle or arc.

Simple Or Complex

The 2068 has both simple and complex ways of creating sounds. If all you need is a simple beep, you can use the BEEP command followed by two numbers representing the pitch, which has a range of ten octaves, and the duration of the note. For more complex sounds, you use the SOUND command. It allows you to play up to three notes at once and produce special effects. Consequently, it is also more difficult to use.

The SOUND command is followed by up to 15 pairs of numbers. Each pair specifies a number to be stored in one of 15 registers within the sound synthesizer chip. These registers control the pitch (eight octaves), duration, and volume of up to three voices or channels. Each channel can play either a tone or a noise waveform. The envelope of the sound can be changed by specifying the rate of attack (increasing volume), and decay (decreasing volume). You can play the envelope once or make it repeat automatically.

With all these features, you can create a wide variety of sounds. But it's a shame that these sounds must be heard through the small internal speaker. It would have been better to have an audio output to give you the option of using your monitor's speaker or an audio system. This would give higher quality sound and better volume control.

Included Software

Like all Timex computers, the 2068 has the ability to use a conventional tape recorder for loading and storing programs. Using an ordinary tape recorder has its drawbacks, however. The volume level must be set just right or the program will not load properly. Fortunately, the same volume level works for all programs, so you should have to adjust the volume only once. If you do not already own a cassette recorder, you can purchase the Timex/Sinclair 2020 Computer Program Recorder. It is designed especially for use with Timex/Sinclair computers and can also be used as a conventional tape recorder for speech or music.

The first program is Keyboard Tutorial. It summarizes the material covered in the manual to familiarize you with the keyboard. It also demonstrates the sound and graphics capabilities of the 2068. As each key is introduced, a picture of the keyboard is drawn, using high-resolution graphics accompanied by sound effects. The appropriate key flashes, allowing the user to find its exact location on the keyboard. At the end of the tutorial is a practice session to test your ability to use the keyboard.

A Perfect "5" for Your 64

Every American has to pay taxes. Why pay more than you should?

Soft People's TaxWare™

$44.95

TAX DEDUCTIBLE AS Tax Preparation aid

With TaxWare, a year round record keeping system...you store all tax related info on electronic copies of the most popular tax forms. With TaxWare you may calculate tax due at any time. Make one change on one form and all other forms are re-computed.

- You can do endless 'what ifs', i.e. "what if your spouse takes a job", "what if I sell my stock", "what is the credit for child care"...
- You may tag any item belonging to husband/wife or joint and see the different tax consequences.
- Handles itemized deductions, income averaging, dividends, stocks, self-employment, rents, royalties, childcare, marriage deductions and more...
- Create lists as you need for income, medical deductions, IRA payments or anything else.
- Lists are easily displayed and updated totals automatically transferred to the proper tax forms.
- Handles all popular forms: 1040 Schedule A, B, G, Schedule C, C1, D, E, W, 2441.
- An Annual Update Plan/and or Major Update if significant tax laws change will be available for the next year.

dMOS™

Meet the Tough Manager.

The Best data base managing tool for the collection, arrangement and display of alphanumeric data. The unique pattern matching and searching capabilities make dMOS the best researching program available.

Pattern matching:

- Can be used on either or both sides of the string.
- Map search technique to achieve a "logical AND", while searching between fields.
- Display either those records found by a search or those NOT found.

Printer control:

- Rearrange and supress fields.
- Supress Field titles.
- Insert short (10 character) texts.
- Selectively print records.

$39.95

Missing Key™

The Key you've looked for, but wasn't there.

After programming for hours you press RUN for a final check of your work - the computer locks up. Nothing appears on the screen. You press RUN/STOP ...nothing - you press RESTORE...nothing - you look for the missing key but it isn't there. Now you don't have to turn off your computer and lose hours of work.

Add the Missing Key:

- Press this key and the computer resets itself from any kind of lock-up.
- Load and run the program included with the Missing Key and your 'BASIC' program is restored.
- Takes nothing away from your computer, neither memory or a plug-in port.
- Fits onto your Commodore 64 keyboard (No wiring to add).
- Will not void your CBM warranty.

$29.95

Phone Boss™

A powerful and dedicated Data Manager.

Designed to store and organize your personal phone listings. The User has complete control of 15 category titles and entries.

9 Options available:

1. Add a new listing to directory
2. Change a listing now in directory.
3. List full directory.
4. List a phone#, giving a name.
5. List all entries in a class.
6. Change the list of catagories.
7. Write the directory onto a disk.
8. Read a directory from disk.
9. Exit the program.

$29.95

Softloc™

The Program Security System for the Commodore 64

Set up program security in minutes.
Lock up your personal, financial or business records.

3 Types of protection:

- 7 Digit access code
- Encodes program
- Modified diskette directory

$29.95

VISA MasterCard

Credit Card Order Now

1-800-447-3273

Dealers inquires & Special P.O.P. Packages & Prices available

by Softpeople, Inc.

"Connecting People With Great Ideas"

Softpeople, Inc.

2042 Marshall Ave.
St. Paul, MN 55104
(612) 644-1551


WAREHOUSE PRICES
Call us toll free for prices directly from our warehouse inventory. Save on our volume purchases.
Largest selection of discounted hardware and software.
800-372-0214 / 800-432-0368 IN FLORIDA
13" Color Monitor $199.00
(for Commodore & Atari)
Seikosha Dot Matrix Printer $199.00
Direct Connect to Atari (no 850 interface needed)
Gemini 15 Dot Matrix Printer $325.00
Elephant Disk 10 pack (SS/SD) . . . . $ 16.99
Maxell Disk 10 pack (SS/DD) . . . . . $ 23.99
RANA 1000 Disk Drive (for Atari) $319.00
ATARI
COLECO
COMMODORE
SANYO
NEC
and more
VISA
MasterCard
Send $1 for our complete catalog.
COMPUTER WAREHOUSE
Computers and Software at warehouse prices.
8764 S.W. 133 STREET, MIAMI, FLORIDA 33156
(305)271-8072

The second program is Turtle Graphics. It lets you draw high-resolution pictures by guiding a "turtle" around on the screen. By typing commands from the keyboard you can tell the turtle to move forward so many pixels and turn left or right so many degrees. As the turtle moves, it leaves behind a trail. The power of Turtle Graphics is its ability to repeat a sequence of commands many times to create interesting patterns on the screen.

The third program is Home Accounting, which helps you keep track of your household budget or business records. You enter your budget and actual amount spent for each month, and the computer calculates the difference. You can display a bar graph of each month's budget versus your actual expenses.

Timex seems to realize the importance of software. They promise to have a "plentiful" supply of programs ranging in price from $9.95 to $19.95 on cassette, $12.95 to $29.95 on cartridge. Cassette programs developed for the ZX Spectrum can also be used on the 2068.

Documentation

The 290-page *User Manual* explains all the features of the 2068 well. Part I introduces the major features and assumes the user has no computer experience. It also explains how to load programs on tape cassettes so the included software can be used right away. For those who want to write their own programs, Part II provides an introduction to programming in T/S 2068 BASIC. It covers the use of variables, arrays, arithmetic functions, subroutines, and the concepts of looping and branching. Part III describes more advanced features to allow the experienced computer user to get the most from the computer. Such features include user-defined graphics, input and output, and music and sound effects.

The appendices go into detail about the memory configuration and briefly mention several "enhanced display modes," including a 64-character wide screen, a dual screen mode, and an extended color mode. Exactly how these modes are used is not clear, but they are discussed in more detail in the *T/S 2068 Advanced Programming Concepts Manual*.

Throughout the manual there are illustrations showing exactly which keys to press and roughly what should appear on the screen. Beginners will enjoy the cartoons, featuring an old woman and her cat, which have nothing to do with the computer, but help make the computer less intimidating.

Besides a tape recorder, you can add two more peripherals. The 2068 is compatible with the Timex/Sinclair 2040 Thermal Printer used by the TS1500 and TS1000 computers. It prints graphics and text and retails for $99.95. A modem is also available to provide access to data banks and telecommunications services. Special programs for use with the modem provide home shopping and banking capabilities. Other peripherals will be announced, including bulk storage devices. Peripherals are connected to the expansion port, which can accept only two at a time.

In terms of memory, graphics, and sound, the Timex/Sinclair 2068 is an impressive entry into the under $200 market. And, where some other computers require that you spend an additional $60 to $70 for a cassette recorder, you can use any player with the 2068. Furthermore, the included software enables you to use the computer immediately, without spending another cent.

Timex/Sinclair 2068 Personal Color Computer
Timex Computer Corporation
Waterbury, CT 06720
(203) 573-5000
$199.95 ©

Snake Byte For VIC, 64, Apple, And Atari

Tony Roberts, Assistant Managing Editor

Since the advent of microcomputers, snake games have been a mainstay of the menu of available entertainment software. Generally, snake games are simple, yet they have the power to charm and challenge.

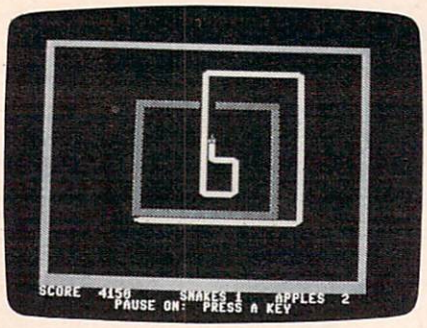
One of my favorite games in this genre is *Cleanup*, which was programmed years ago for the TRS-80 Model I. Despite its lack of color, sound, or sophisticated graphics, *Cleanup* remains one of the most frequently played programs in my game collection.

A more modern program of the same ilk is *Snake Byte* from Sirius Software. This program takes the same captivating idea, mixes in color and sound, a number of screens, and a time factor, and the result is a game I'll play again and again.

Gobbling Up Apples

The object of *Snake Byte* is to guide your snake to the apples that appear on the screen. Gobble up an apple, and another appears. Your snake also grows longer. Gobble up ten apples without hitting a wall or any part of your own ever-growing body, and a door to the next level opens. Thread your way through the door and you start over again, this time on a more complicated screen. As you move from level to level, the obstacles become more difficult.

As you play, bars on each side of the display inch toward the top of the screen. Should they complete their journey before you've eaten an apple, you are penalized: Three more apples are added to the total you must



In Snake Byte, *the snake gobbles up apples and grows longer as it threads its way to more complicated screens.*

eat before completing the level.

Your snake is controlled from the keyboard; there is no provision for joysticks. The keyboard, however, offers several options. You can control up-down movement with your left hand and right-left movement with your right. Or you can play with one hand using the I, J, K, and M keys. A third option allows you to use the › and ‹ keys to achieve clockwise and counterclockwise movement. Despite its simplicity, I was unable to master this variation.

Perilous Purple Plums

Another aspect of *Snake Byte* that adds to the challenge is the option for playing with one or two purple plums in the arena. The plums offer the potential for higher scores, but at the same time they add to your headaches.

The plums bounce around the screen, deflecting off walls, obstacles, and your snake. Unless a plum hits your snake on the head, no harm is done. Sometimes it is possible to use the snake's body to corral the plums, temporarily keeping them out of your way.

The Commodore 64 version is a little easier to control. Guiding the snake into the door that leads to the next level is more difficult on the VIC than it is on the Commodore 64. The more highly defined screen on the 64 provides additional room to maneuver through tight spots, and that's the part of the game you'll probably enjoy most. Even people who aren't normally exhibitionistic seem to love to play this type of game with an audience and have them ooh and aah as the player escapes impossible predicaments.

This game is more akin to a ballet than to a battlefield. It generates neither the hyperactivity associated with hyperspace flight nor the heart-pounding excitement of protecting a planet.

Snake Byte can even be a relaxing game. The snake, winding its way around the screen, has a hypnotic quality—a tonic that calms the nerves. It's enjoyable both when played for a few minutes as a counterpoint to more serious pursuits and when played seriously for the challenge.

Snake Byte
Sirius Software
10364 Rockingham Drive
Sacramento, CA 95827
(916) 366-1195
Apple and Atari disk, $29.95
Commodore 64 disk, $34.95
VIC-20 cartridge, $39.95 ©

WordPro 3 Plus/64

Larry Bihlmeyer

As word processing programs compete in the Commodore 64 market, better programs are available at lower costs. *WordPro 3 Plus/64*, by Professional Software Inc., is part of this trend.

WordPro, in its other versions, has long been the standard for comparison in office and small business word processing applications.

WordPro 3 Plus/64 comes on disk with a complete instruction manual of 160 pages. The manual is well organized into these categories: introduction, getting started, functions, editing text, advanced functions, file handling, disk drive commands, summaries, programmer's notes, example letter, care of diskettes, glossary, warranty and disclaimer, printer information, index and addenda.

There are far too many commands to adequately cover, so this review will only highlight some of the more interesting features.

Set-up Options

To start *WordPro*, you load a short boot program and then load the main word processing program. This process takes about 90 seconds. Then the screen clears and a message appears with the title "Word Processor Three Plus" and you are asked what kind of printer you have. Six printers can be selected—Spinwriter, Diablo, Qume, Tec, 8027, and Other.

Next, the number of lines available for main text is shown, and you can choose up to about 329 lines. A second storage area, called "Extra Text" (it's like a buffer), can also be allocated.

Finally, the main screen appears with a status line at the top. First, you see a sequence of characters like :X:I:S:C:N. Here, X indicates the extra text mode, I insert mode, S shift lock mode, C control mode, and N numeric mode. When you select one of these modes, the corresponding indicator letter will be highlighted (background color changes) so you can tell quickly what mode you are in.

Advanced Features

Editing is done with the normal 64 cursor controls. Special functions, selected with the "control" key, then get you into more advanced features. For example, Control-D will delete words and sentences. And Control-F will search for a given string of characters. Other more unique control functions allow you to append lines from the extra text area, put a variable block on

screen, duplicate a range of lines, go to numeric mode, set up tabs, transfer a range of lines, underline, access bold type or disk utilities or subscript and superscript, add and subtract columns of numbers, sound a beeper, and perform global functions.

There are 23 format commands and 47 control functions. For instance, cn turns on centering and pt sets the pitch.

The Extra Text area is like a buffer where you can store text, for reference or for eventual addition to the main text. You can write and store standard or "boilerplate" paragraphs to use repeatedly in letters. Extra text can be used either manually or automatically, with the variable blocks feature.

Although there are a lot of commands to learn, the instruction manual includes many examples which you can copy, and in no time you'll be using the commands on your own. You can also copy the feature summary sheets and have them nearby for quick reference.

Finally, there is a section called "Programmer's Notes" which will help if you run into complications, or want to do more with the input/output features. This will be useful for readers with various types of printers.

Printer Connections

And speaking of printers, this is the only area where I find any shortcomings with *WordPro 3 Plus/64*. The program supports only printing to device #4 on the serial port, so if you use the RS-232 port with a printer interface, you will not be able to print using *WordPro 3 Plus/64*.

If you are unsure of your printer/interface requirements, you should either contact your *WordPro* dealer for an actual try-out on your equipment or find out what interface you need.

Overall, *WordPro 3 Plus/64* is one of the most complete word processing programs on the market in its price range. It'll handle home needs and even most needs of small business.

WordPro 3 Plus/64
Professional Software Inc.
51 Fremont Street
Needham, MA 02194
$89.95

Richard Mansfield, Senior Editor

Computer Amnesia

Here's a nasty little problem that can completely baffle you if you don't know what's causing it. We'll provide a short utility program that will cure this deadly error—but first, let's explore the symptoms. It appears in several disguises.

As you begin to write longer and more complicated programs, sooner or later your computer will halt execution and announce that you're OUT OF MEMORY. You know you're not. When you ask for a report of free memory (? FRE, or whatever command your BASIC uses), there's a lot of room left. But the computer is claiming that it has no more memory left. What's going on?

Something's Gone Awry

Try Program 1. After you type RUN, the computer will obediently follow your instructions and then grind to a halt. Your machine won't smolder, but something's gone awry. Clearly, these three lines cannot be using up all the memory in even the smallest computer.

Notice that there is no RETURN instruction to match the GOSUB. We are continuously GOSUBing, but always jumping back without a proper RETURN. That's variation one of this problem. Whenever the computer comes upon a GOSUB, it makes a mental note of where it is currently located so it can RETURN there. In Program 1, the computer would make a note that "line 150" was the correct place to RETURN. These mental notes are put on a *stack*, a zone in memory from addresses 256–511 (in 6502-based computers). As each note gets put on the stack, it takes up more room in the stack.

When the computer comes upon a RETURN instruction, it pulls off the most recent note and knows where to jump back to. Program 1, however, has no RETURN and so those notes keep piling up in the stack. Pretty soon, the computer is out of stack memory because each GOSUB puts a two-byte-sized note on the stack. To make things worse, some versions of BASIC use part of stack memory for their own purposes, making the stack smaller still.

A Common Stack Stuffer

In a cleanly written program, you'll always RETURN from every GOSUB. When you're writing large programs, however, that's easier said than done. It's hard to keep track of everything. Added to that, there's an even more subtle way to run out of stack space: early exit loops.

Look at Program 3. It's a very common technique to set up a loop and then test something, exiting the loop if the test succeeds. In such cases, you keep bouncing between FOR and NEXT until the IF part is satisfied. (For the moment, don't pay any attention to lines 10–20 and the SYS statement.) When, in line 110, A=1, we jump out of that FOR/NEXT loop and into another one. And we start searching for B. *The first loop was never completed*. That is, we left an unsatisfied NEXT A because it didn't get to count up to 5 as it wanted to. It wouldn't make much difference if these NEXTs were unsatisfied except that this condition, too, leaves something on the stack. This isn't quite the stack stuffer that unRETURNed GOSUBs are, but it does eventually cause an overflow and an OUT OF MEMORY.

Solving The Problem

So, if you run into this mysterious memory loss, check through your program first for early exits from GOSUBs (that's the most likely cause). Then, if that's not it, look at your FOR/NEXT loops. The cure for GOSUBs is to create a RETURN to satisfy each one. The cure for the loops is to *use the same variable name again*. In Program 3, if we write IF A, IF A, IF A, instead of IF A, IF B, IF C, there would be no problem. Reusing an IF variable will clean the stack for you.

Experienced programmers make it a habit to use I for almost every FOR/NEXT loop, J if they need a loop within the I loop, and T for timing loops. That way, they keep the stack clean without having to think about it.

Lines 10–20 in Programs 2 and 3 are a short utility that can be attached to any program and give a report of the memory left within the stack.

Jeff and Marilyn Mitchell "designed" their new program themselves. CodeWriter wrote all the computer code. The Mitchells' dream is thriving on fulfilling other people's wishes. Their new home business needs very special information fast: Which fantasies are still open? What's our next completion date? Can we get a list of all fantasies needing out of state travel?

They got it all—with no computer hassle.

And you can too, with CodeWriter. No programming. No. 'computerese'. At home or at the office, you create your own programs to handle any information you want—at your fingertips; Payables, receivables, inventory, credit cards, tax details, club or church records—always organized your way.

You work with CodeWriter in plain English. Simply 'draw' any screen layout, add any calculations you'd like done—or help messages you need—and you're done. CodeWriter writes all the BASIC code.

In minutes you've got YOUR OWN PROGRAM on YOUR OWN DISK. You don't need CodeWriter again until you want a new program.

You can begin with **Home FileWriter™** and expand to more complete business systems with full report and menu design features.

You can get CodeWriter for the Commodore 64®, Atari®, Apple®, IBM PC®, Commodore Business Machine®, Victor 9000®, and Kay Pro II®, computers. Prices range from $69 to $249.

You think this much power can't come this easy? There are thousands of CodeWriter systems in use all over the world—80% are first time computer owners. CodeWriter writes solutions the first time you try!

"This is our first business, our first computer, and our first program—and we really did it ourselves!"

CodeWriter™ A Dynatech Company
Dynatech Microsoftware Inc.
7847 N. Caldwell Ave. Niles, Ill. 60648
Toll-Free 1-800-621-4109 (in Ill. 312-470-0700)

AVAILABLE AT **TOYS "R" US®** All Locations Check White Pages

COMPUTER MAIL ORDER

TERMINALS

914 ..... $569.00
924 ..... $689.00
925 ..... $739.00
950 ..... $929.00
970 ..... $1039.00

COMPUTERS

Teleport Portable ..... CALL
800A $1099.00
802 ..... $2699.00
803 ..... $1949.00
802H $4695.00
806/20 ..... $4999.00
816/40 ..... $9199.00
1602 ..... $3399.00
1603 ..... CALL

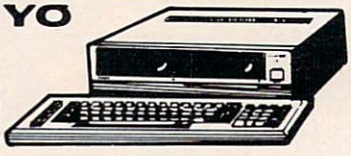
TeleVideo

Spirit XL Portable $3999.00
IIE-1 ..... $1569.00
IIE-2 ..... $1899.00
IIE-3 ..... $2399.00
IIE-4 ..... $3299.00
PC-E $1579.00
PC-1 ..... $2399.00
PC-2 ..... $2799.00
PC-XL $3599.00
1620 ..... $3599.00
1630 ..... $5499.00
1640 ..... $6499.00
Cyma Software ..... CALL

SANYO

MBC-550 PC ... CALL
MBC-555 PC ... CALL

MBC 1100 ..... $1499.00
FDD 3200-320K Drive $389.00
MBC 1150 ..... $1899.00
MBC 1200 ..... $1849.00
FDD 6400-640K Drive $469.00
MBC 1250 ..... $2099.00
PR 5500 Printer $599.00



MONITORS

AMDEK

300 Green $149.00
300 Amber $159.00
310 Amber $169.00
Color 1 ..... $279.00
Color 1 Plus $299.00
Color 2 ..... $399.00
Color 2 Plus $419.00
Color 3 ..... $349.00
Color 4 ..... $699.00

BMC

12" Green $79.99
12" Green HI-RES $119.99
9191-13" Color $249.99

GORILLA

12" Green $88.99
12" Amber $95.99

NEC

JB 1260 Green $109.99
JB 1201 Green $149.99
JB 1205 Amber $159.99
JC 1215 Color $299.99
JC 1216 RGB $429.99

PRINCETON GRAPHICS

HX-12 RGB $519.00

TAXAN

12" Green $119.00
12" Amber $129.00
Taxan 1 RGB $279.00

USI

Pi 1, 9" Green $99.99
Pi 2, 12" Green $119.99
Pi 3, 12" Amber $149.99
Pi 4, 9" Amber $139.99
1400 Color $269.99

ZENITH

ZVM 122 Amber $109.99
ZVM 123 Green $89.99
ZVM 135 Color/RGB $469.99

MODEMS

ANCHOR

Mark I (RS-232) $79.00
Mark II (Atari) $79.00
Mark III (TI-99) $109.00
Mark IV (CBM/PET) $125.00
Mark V (Osborne) $95.00
Mark VI (IBM-PC) $169.00
Mark VII (Auto Ans/Auto Dial) ... $119.00
Mark XII (1200 Baud) $299.00
TRS-80 Color Computer $99.00
9 Volt Power Supply $9.00

HAYES

Smartmodem 300 ..... $219.00
Smartmodem 1200 ..... $509.00
Smartmodem 1200B $459.00
Micromodem II $265.00
Micromodem II Plus $299.00
Micromodem IIE $269.00
Micromodem 100 ..... $299.00
Smart Com II $89.00
Chronograph $199.00

NOVATION

J-Cat $99.99
SmartCat 103 ..... $179.00
SmartCat 103/212 ..... $399.00
AutoCat $219.00
212 AutoCat $549.00
Apple Cat II $249.00
212 Apple Cat $569.00
Apple Cat 212 Upgrade $309.00
Cat $139.99
D-Cat $149.00
PC-Cat $339.00

ZENITH

ZT-1 ..... $309.00
ZT-10 ..... $339.00
ZT-11 ..... $369.00

APPLE INTERFACE CARDS & BUFFERS

Choose from PKASO, Orange Micro, MPC, MicroMax, Tymac, Quadram & Practical Peripherals ..... CALL

NEC PRINTERS

NEC 2050 ..... $999.00
NEC 3550 ..... $1699.00

PERCOM/TANDON DRIVES

5¼" 320K Floppy $229.00
5 Meg Hard w/Controller ... $1399.00
10 Meg Hard w/Controller ... $1699.00
15 Meg Hard w/Controller ... $2095.00
20 Meg Hard w/Controller ... $2399.00

AMDEK

310A Amber Monitor $169.00
DXY 100 Plotter $599.00
Color II $399.00

AST RESEARCH, INC.

Six Pak Plus...from $279.00
Combo Plus II...from $279.00
Mega Plus...from $309.00
I/O Plus II...from $139.00

QUADRAM

Quadlink $519.00
Quadboard...as low as $289.00
Quad 512 Plus...as low as ... $249.00
Quadcolor...as low as $219.00
Chronograph $89.00
Parallel Interface Board $89.00
64K RAM Chips Kit $59.00

MICRO PRO

WordStar/Mail Merge $349.00
InfoStar $299.00
SpellStar $159.00
CalcStar $99.00

MICROSTUF

Crosstalk $105.00

MICROSOFT

Multiplan $159.00

pfs

	APPLE	IBM
Write:	79.00	89.00
Graph:	79.00	89.00
Report:	79.00	79.00
File:	79.00	89.00
Solutions*: as low as	16.00	16.00

*Call On Titles

IBM

ASHTON-TATE

dBASE II $389.00
Friday! $185.00

IUS

EasyWriter II $249.00
EasySpeller $119.00
EasyFiler $229.00

CONTINENTAL SOFTWARE

1st Class Mail/Form Letter ... $79.00
The Home Accountant Plus ... $88.00

SYNAPSE

File Manager $89.00

LOTUS

1-2-3 ..... $319.00

PROFESSIONAL SOFTWARE

PC Plus/The Boss $349.00

VISICORP

	IBM	APPLE
VisiCalc		159.00
VisiCalc 4	159.00	
VisiCalc-Advanced		269.00
VisiWord/Spell	249.00	
Visitrend/Plot	199.00	199.00
VisiLink		169.00
VisiFile	199.00	169.00
VisiSchedule	199.00	199.00
Visidex		159.00
VisiPlot		135.00
VisiTerm		75.00
Desktop Plan	199.00	169.00
Bus. Forecast Model	75.00	75.00
Stretch Calc	75.00	75.00
VisiTutor Calc	59.00	59.00
VisiTutor-Advanced	75.00	75.00
VisiTutor Word	59.00	59.00
Vision Calc	249.00	
Vision Graph	129.00	
Vision Mouse	159.00	
Vision Host	319.00	

PRINTERS

AXIOM

AT-100 Atari Interface $239.00
CD-100 CBM 64/VIC 20 ..... $239.00
GP-100 Parallel Interface ... $199.00

BMC

401 Letter Quality $589.00
BX-80 Dot Matrix $269.00

CENTRONICS

122 Parallel $399.00
739-1 Parallel $299.00
739-3 Serial $349.00

C.ITOH

Gorilla Banana $209.00
Prowriter 8510P $379.00
Prowriter 1550P $679.00
A10 (18 cps) $569.00
F10-40 ..... $999.00
F10-55 ..... $1499.00

COMREX

ComWriter II Letter Quality ... $499.00

DIABLO

620 Letter Quality $949.00
630 Letter Quality $1749.00

DAISYWRITER

2000 ..... $999.00
Tractor Feed $109.00

EPSON

MX-80FT, MX-100, RX-80, RX-80FT, FX-80, FX-100 ..... CALL

IDS

Prism 80...For Configurations... CALL
Prism 32...For Configurations... CALL

MANNESMAN TALLY

160L $589.00
180L $799.00
Spirit 80 ..... $309.00

NEC

2010/2030 ..... $899.00
8023 Dot Matrix $379.00
8025 Dot Matrix $669.00
3510 Serial/Letter Quality ... $1449.00
3530 Parallel/Letter Quality ... $1499.00
7710/7730 Serial/Parallel ... $1949.00

OKIDATA

82.83.84.92.93.2350.2410 ... CALL

SMITH CORONA

TP-2 ..... $439.00
Tractor Feed $119.00

SILVER REED

500 Letter Quality $469.00
550 Letter Quality $699.00

STAR

Gemini 10X $299.00
Gemini P15 ..... $399.00
Delta 10 ..... $559.00
Serial Board $75.00

TOSHIBA ..... CALL
TRANSTAR ..... CALL

PRINTER CABLES

Available for Atari, Commodore, IBM, Apple, Epson, Kaypro, Televideo, Franklin, Eagle, Sanyo, Osborne, NEC, Zenith and many others. We supply all your computer needs!

PAPER SUPPLIES

1000 shts. 8½x11 Tractor Paper...19.99
1000 shts. 14½x11 Tractor Paper..$24.99
1 or 2" Address Labels $9.99

WEST 800·648·3311

In NV call (702)588-5654. Dept 0306
Order Status Number: 588-5654
P.O. Box 6689. Stateline, NV 89449

CANADA 800·268·4559

In Toronto call (416)828-0866. Dept 0306
Order Status Number: 828-0866
2505 Dunwin Drive, Unit 1B
Mississauga, Ontario, Canada L5L1T1

EAST 800·233·8950

In PA call (717)327-9575. Dept 0306
Order Status Number: 327-9576
Customer Service Number: 327-1450
477 E. Third St., Williamsport, PA 17701

VISA

No risk, no deposit on C.O.D. orders. Pre-paid orders receive free shipping within the UPS Continental United States with no waiting period for certified checks or money orders. Add 3% (minimum $5.00) shipping and handling on all C.O.D. and credit card orders. Larger shipments may require additional charges. NV and PA residents add sales tax. All items subject to availability and price change. We stock manufactuer's and third party software for most all computers on the market. Call today for our new catalog.

COMPUTER MAIL ORDER

FRANKLIN

ACE 1000 Color Computer ....CALL
ACE Family Pack System .....CALL
ACE PRO PLUS System .....CALL
ACE 1200 Office Mgmt. System ...CALL
"NOT IIE EXPENSIVE"

APPLE/FRANKLIN DISK DRIVES

MICRO-SCI

A2 .....$219.00
A40 .....$299.00
A70 .....$319.00
C2 Controller $79.00
C47 Controller $89.00

RANA

Elite 1 .....$279.00
Elite 2 .....$389.00
Elite 3 .....$569.00

APPLE IIe STARTER PACK

64K Apple IIe, Disk Drive & Controller, 80 Column Card, Monitor II & DOS 3.3 COMPLETE $1199

commodore

C 64 $199

CBM 4032.....$599.00
CBM 8096 .....$869.00
CBM 9000.....$999.00
B128-80.....$769.00
CBM 64K Memory Board....$269.00
8032 to 9000 Upgrade $269.00
2031 LP Disk Drive $299.00
8050 Disk Drive $949.00
8250 Disk Drive $1199.00
4023 Printer.....$379.00
8023 Printer.....$569.00
6400 Printer $1399.00
Z-RAM.....$499.00
Silicon Office $699.00
The Manager.....$199.00
Soft ROM.....$125.00
VisiCalc $159.00

PROFESSIONAL SOFTWARE

Word Pro 2 Plus.....$159.00
Word Pro 3 Plus.....$189.00
Word Pro 4 Plus/5 Plus...each...$279.00
InfoPro $179.00
Administrator $399.00
Power.....$79.00

MSD

SD1 Disk Drive $349.00

VIC 20 .....CALL
CBM 8032..... $599

C1541 Disk Drive $249.00
C1530 Datasette $69.00
C1520 Color Printer/Plotter...$169.00
M-801 Dot Matrix/Parallel...$219.00
C1526 Dot Matrix/Serial $279.00
C1702 Color Monitor $249.00
C1311 Joystick $4.99
C1312 Paddles $11.99
C1600 VIC Modem $59.00
C1650 Auto Modem.....$89.00
Logo 64.....$49.00
Pilot 64 .....$39.00
Simon's Basic $19.00
Word Pro 64 Plus.....$59.00
Parallel Printer Interface.....$49.00
Calc Result 64 .....$129.00
Codewriter 64 .....$75.00
Quick Brown Fox.....$49.00
Word Pro 64 Plus.....$59.00

We stock a full inventory of software for Commodore, such as: Artworx, Broderbund, Commercial Data, Creative Software, Epyx, HES, MicroSpec, Nufekop, Romox, Sirius, Synapse, Thorn EMI, Tronix, UMI, Victory, Spinnaker, Rainbow & Timeworks!
CALL FOR DETAILS!

HANDHELD COMPUTERS

hp

41CX $249.99
41CV $199.99
41C $144.99
HP 10C $51.99
HP 11C $69.99
HP 12C $88.99
HP 15C $88.99
HP 16C $88.99
HP 75C $749.99
HPIL Module $98.99
HPIL Cass. or Printer $359.99
Card Reader.....$143.99
Extended Function Module ...$63.99
Time Module $63.99

SHARP

PC-1500A...$165.99
PC-1250A....$88.99
CE-125 Printer/Cassette....$128.99
CE-150 Color Printer/Cassette...$171.99
CE-155 8K RAM $93.99
CE 161 16K RAM $134.99
CE 500 ROM Library $29.99

NEC

PC-8201 Personal Computer...$599.00
PC-8221A Thermal Printer...$149.00
PC-8281A Data Recorder $99.00
PC-8201-06 8K RAM Chips...$105.00
PC-8206A 32K RAM Cartridge...$329.00

TIMEX/SINCLAIR

Timex/Sinclair 1000 .....$24.99
Timex/Sinclair 2068 .....CALL
16K Memory.....$25.00
2040 Printer.....$99.99
VuCalc.....$17.99
Mindware Printer.....$99.99

ATARI

HOME COMPUTERS

600XL..... $199
800XL..... $299
1200XL .... CALL
1400XL .... CALL

1010 Recorder $74.00
1020 Color Printer.....$249.00
1025 Dot Matrix Printer.....$449.00
1027 Letter Quality $299.00
1030 Direct Connect Modem....CALL
1050 Disk Drive.....$379.00
CX30 Paddle $12.00
CX40 Joystick.....each...$8.00
CX77 Touch Tablet $64.00
CX80 Trak Ball $48.00
CX85 Keypad $105.00
488 Communicator II.....$229.00
4003 Assorted Education....$47.00
4011 Star Raiders.....$33.00
4012 Missile Command $29.00
4013 Asteroids.....$29.00
5049 VisiCalc $159.00
7097 Logo.....$79.00
7101 Entertainer.....$69.00
7102 Arcade Champ $75.00
8026 Dig Dug $33.00
8030 E.T. Phone Home $33.00
8031 Donkey Kong.....$39.00
8033 Robotron $35.00
8034 Pole Position.....$39.00
8036 Atari Writer.....$79.00
8040 Donkey Kong, Jr. $39.00
8043 Ms. PacMan.....$39.00
8044 Joust $39.00

DISKETTES

MAXELL

5¼" MD-1.....$29.00
5¼" MD-2.....$39.00
8" FD-1 (SS/DD).....$39.00
8" FD-2 (DS/DD).....$49.00

VERBATIM

5¼" SS/DD $26.99
5¼" DS/DD $36.99

ELEPHANT

5¼" SS/SD $18.49
5¼" SS/DD $22.99
5¼" DS/DD $28.99

HEAD

5¼" Disk Head Cleaner.....$14.99

DISK HOLDERS

INNOVATIVE CONCEPTS

Flip-n-File 10 .....$3.99
Flip-n-File 50 .....$17.99
Flip-n-File(400/800ROM)Holder..$17.99

LJK ENTERPRISES

Atari Letter Perfect-Disk(40/80)...$79.99
Atari Letter Perfect-ROM(40 col)...$79.99
Atari Letter Perfect-ROM(80 col)...$79.99
Atari Data Perfect-ROM(80 col).....$79.99
Atari Spell Perfect-DISK $59.99
Atari Utility/MailMerge.....$21.00
Apple Letter Perfect.....$99.00
Apple Data Perfect $75.00
Apple LJK Utility $21.00
Apple Lower Case Generator ...$19.00

PERCOM

AT 88-S1 .....$329.00
AT 88-A2 .....$259.00
AT 88-S2 .....$529.00
AT 88-S1PD $429.00
AT 88-DDA $119.00
RFD 40-S1 .....$449.00
RFD 40-A1 .....$269.00
RFD 40-S2 .....$699.00
RFD 44-S1 .....$539.00
RFD 44-S2 .....$869.00

TEXAS INSTRUMENTS

TX 99-S1 .....$279.00

RANA

1000.....$319.00

TRAK

AT-D2.....$389.00

MEMORY BOARDS

Axlon 32K $59.00
Axlon 48K $99.00
Axlon 128K.....$299.00
Intec 32K $59.00
Intec 48K $85.00
Intec 64K $99.00
Intec Real Time Clock $29.00

ALIEN VOICE BOX

Atari $119.00
Apple.....$149.00

KOALA PAD

Atari.....$75.00
Apple $85.00
IBM $95.00
CBM 64 .....$75.00

CONTROLLERS & JOYSTICKS

WICO

Joystick.....$21.99
3-way Joystick.....$22.99
Famous Red Ball.....$23.99
Power Grip.....$21.99
BOSS Joystick $17.99
ATARI/VIC Trak Ball.....$34.99
Apple Trak Ball.....$54.99
Apple Adapter.....$15.99
Apple Analog.....$37.99

KRAFT

Joystick.....$41.99
Atari Single Fire.....$12.99
Atari Switch Hitter.....$15.99
Apple Paddles.....$34.99
IBM Paddles.....$34.99
IBM Joystick $46.99

AMIGA

3100 Single $13.99
3101 Pair $19.99
Joyboard $37.99

TG

Atari Trak Ball $47.99
Apple Joystick $47.99
Apple Trak Ball.....$47.99

WEST
800·648·3311
In NV call (702)588-5654. Dept 0306
Order Status Number: 588-5654
P.O. Box 6689. Stateline. NV 89449

CANADA
800·268·4559
In Toronto call (416)828-0866. Dept 0306
Order Status Number: 828-0866
2505 Dunwin Drive. Unit 1B
Mississauga. Ontario. Canada L5L1T1

EAST
800·233·8950
In PA call (717)327-9575. Dept 0306
Order Status Number: 327-9576
Customer Service Number: 327-1450
477 E. Third St., Williamsport. PA 17701

MasterCard

CANADIAN ORDERS: All prices are subject to shipping, tax and currency fluctuations. Call for exact pricing in Canada.
INTERNATIONAL ORDERS: All shipments outside the continental United States must be pre-paid by certified check only. Include 3% (minimum $5.00) shipping and handling. EDUCATIONAL DISCOUNTS: Additional discounts are available to qualified Educational Institutions.
APO & FPO: Add 3% (minimum $5.00) shipping and handling.

As written, the DATA line contains the information for the Commodore 64 version of this utility, "Stackwatch." Replacements for this line to make it work on other computers are given below.

If you've been working on a long, complicated program and are getting an odd out-of-memory error, add lines 10–20 to the long program. They'll stick a machine language program down in a safe place. Then, put SYS 864 into various places in your program. You can then quickly locate which loop or GOSUB is unclosed. When the number printed on screen by Stackwatch takes a big dip, hit the STOP key and see where you are.

To make Stackwatch work on other Commodore computers and the Apple, you must change the last three items in the DATA line, line 10, as follows:

for Original ROM PET:	159,220,96
Upgrade ROM PET:	217,220,96
4.0 BASIC PET:	131,207,96
VIC-20:	205,221,96
64:	(as printed)
For Apple:	10 DATA 186,169,0,32,36,207,96

There is no comparable number printing routine within the Atari operating system, but Charles Brannon has provided the following replica for those who know machine language and want to implement Stackwatch on the Atari.

For TI, you can run these BASIC tests, but the TI's brain chip will not run Stackwatch.

```
0000          0100          *=    $600
0600          0110          .OPT OBJ
              0120 ;Test routine
0600 A900     0130          LDA   #0
0602 A264     0140          LDX   #100
0604 200806   0150          JSR   PRNUM
0607 60       0160          RTS
              0170 ;
              0180 ;MSB in A, LSB in X
              0190 ;Prints number to screen
              0200 ;
0608 86D4     0210 PRNUM    STX   $D4
060A 85D5     0220          STA   $D5
060C 20AAD9   0230          JSR   $D9AA
060F 20E6D8   0240          JSR   $D8E6
              0250 ;
              0260 ;Print ASCII number pointed to
              0270 ;by $F3 and $F4
              0280 ;The last digit of the number will be signalled by bit 7
              0285 ;If it is set, then we have the last digit
0612 A000     0290          LDY   #0
0614 84CB     0300 LOOP     STY   $CB         ;Save Y index
0616 B1F3     0310          LDA   ($F3),Y     ;Get char
0618 48       0320          PHA               ;save it on stack
0619 297F     0330          AND   #$7F        ;mask off high bit (or it would be invers
e)
061B 202706   0340          JSR   PRCHAR      ;print character
061E 68       0350          PLA               ;restore character
061F 3005     0360          BMI   EXIT        ;test for high bit set
0621 A4CB     0370          LDY   $CB         ;restore Y index
0623 C8       0380          INY
0624 D0EE     0390          BNE   LOOP
0626 60       0400 EXIT     RTS
              0410 ;
              0411 ;This routine pushes the high,low bytes of the address
              0412 ;of the CIO print character routine onto the stack,
              0413 ;creating an artificial return address
              0414 ;In effect, we have an indirect jump
0627 AA       0415 PRCHAR   TAX
0628 AD4703   0420          LDA $0347
062B 48       0430          PHA
062C AD4603   0440          LDA $0346
062F 48       0450          PHA
0630 8A       0460          TXA
0631 A092     0470          LDY #$92
0633 60       0480          RTS
              0490 ;
0634          0500          .END
```

Program 1: Memory Collapse

```
100 GOSUB 150
150 X = X + 1:PRINT X
160 GOTO 100
```

Program 2:
Stackwatch Attached To Program 1

```
10 DATA 186, 169, 0, 32, 205, 189, 96
20 FOR A=864TO870:READ D:POKE A,D:NEXT A
100 GOSUB 150
150 X=X+1:PRINTX
160 SYS864:GOTO100
```

Program 3: Too Many Loops

```
10 DATA 186,169,0,32,205,189,96
20 FORA=864TO870:READD:POKEA,D:NEXTA
100 FORA=1TO5
110 IFA=1THEN130
120 NEXTA
130 SYS864:FORB=1TO5
140 IFB=1THEN160
150 NEXTB
160 SYS864:FORC=1TO5
170 IFC=1THEN190
180 NEXTC
190 SYS864:FORD=1TO5
200 IFD=1THEN220
210 NEXTD
220 SYS864:FORE=1TO5
230 IFE=1THEN250
240 NEXTE
250 SYS864:FORF=1TO5
260 IFF=1THEN280
270 NEXTF
280 SYS864:FORG=1TO5
290 IFG=1THEN310
300 NEXTG
310 SYS864:FORH=1TO5
320 IFH=1THEN340
330 NEXTH
340 SYS864:FORI=1TO5
350 IFI=1THEN370
360 NEXTI
370 SYS864:FORJ=1TO5
380 IFJ=1THEN400
390 NEXTJ
```

New Directions For Computer Camps

Fred D'Ignazio, Associate Editor

I thought that this camp would be about programming. I didn't know that it would be so much fun!

Ashley Bell, age 8

Ashley was one of the youngest campers at the Computer FUNdamentals camp at Hollins College, in Roanoke, Virginia, last summer. Her comments reflect the kind of computer activities she participated in at the camp. However, if she had gone to another camp, she might have learned about computers in a completely different way.

The Changing Face Of Computer Camps

Most educators agree that the first computer camp was organized by Dr. Michael Zabinski in Connecticut, in 1978. Now, six years later, Zabinski's organization offers five camps annually, in locations from Simsbury, Connecticut, to Portland, Oregon. In addition to Zabinski's camps there are hundreds of other computer camps throughout the U.S.

The first camps were mostly attended by boys. The boys studied "hard-core" computer subjects like BASIC programming, computer hardware, and hooking up different devices to computers. Compared to today's models, the computers at the first camps were primitive. They consisted of early Apple computers, TRS-80 (Model I's), Commodore PETs, and other computers whose names we have all but forgotten.

Today's campers enter a new world filled with the latest personal computers and peripheral devices such as speech synthesizers, graphics pads, light pens, and robots. They study a variety of subjects, including the impact of computers on society, computers for handicapped people, and computers in the arts and humanities.

Today, girls represent a much larger proportion of the campers. In some camps, they number as many as a third.

At most camps you will also see a few campers who have some sort of mental or physical disability. Campers in wheelchairs are a common sight at many camps.

So are adults. The newest computer camps cater to both youngsters and oldsters. In fact, it's predicted that many of the most avid campers in 1984 will be men and women in their 60s and 70s.

How To Choose A Computer Camp

There are hundreds of computer camps to choose from, each with its own philosophy and personality. And you can find the right one for you, if you look hard enough.

The first thing you should look at is the type of camp. Is it sponsored locally or nationally? Is it for children, adults, or both? Do the counselors concentrate on programming or on computer literacy and applications? Is the camp residential or a day camp?

There are benefits and drawbacks associated with each type of camp. For example, if a camp is locally sponsored, it may be more suited to the needs of the people in your community. But local sponsorship doesn't necessarily mean high-quality sponsorship. Generally speaking, the best local computer camps are affiliated with a community college or university.

Residential computer camps are nice because they take the children away from home for a week

Fred D'Ignazio is a computer enthusiast and author of several books on computers for young people. His books include Katie and the Computer *(Creative Computing),* Chip Mitchell: The Case of the Stolen Computer Brains *(Dutton/Lodestar),* The Star Wars Question and Answer Book About Computers *(Random House), and* How To Get Intimate With Your Computer (A 10-Step Plan To Conquer Computer Anxiety) *(McGraw-Hill).*

As the father of two young children, Fred has become concerned with introducing the computer to children as a wonderful tool rather than as a forbidding electronic device. His column appears monthly in COMPUTE!.

COMPUTE!'s First Book of VIC Games

Authors: COMPUTE! Magazine Contributors
Price: $12.95
On Sale: Now

The VIC-20 is a versatile computer. Its programmable color, graphics, and sound can add a lot to game programs.

Over the past few years, COMPUTE! Magazine has published a wide variety of games for the VIC. But some back issues are hard to find or unavailable.

That's why the editors of COMPUTE! have chosen the best games, revised them, and added previously unpublished games, putting them together into *COMPUTE!'s First Book of VIC Games*. Each game has been tested and debugged and is ready to type into a VIC-20.

First Book of VIC Games contains fast-action arcade games that require quick reflexes, as well as strategy games that test logical skills. For $12.95 you get two dozen games, including:

Time Bomb — You hear the time bomb ticking, and you have to find your way through the maze to defuse it. But the maze is larger than the screen, and you can't always see where the dead ends are.

Closeout — The local department store is having a sale. You try to snatch as many sale items as possible, while avoiding the horde of bargain hunters who are trying to thwart you.

Cryptic Numbers — A good logic game. The computer picks a pattern of numbers that you have to guess. After each turn you learn how close you were.

Air Defense — Missiles are falling out of the sky onto your city. Aim carefully; you get only one shot at each missile.

Thunderbird — Your goal is to break out of the playing field by using the thunderbird that controls the satellite.

Sky Diver — Put on your parachute, jump out of the plane, and try to land on one of the targets. Watch out for wind currents that may blow you off course.

Deflector — A ball is bouncing around the screen. You can aim it toward targets by strategically placing deflectors that change its direction.

Hidden Maze — Lost in a maze, you're trying to get out. But it is dark, and you can see only a few spaces in front of you.

Outpost — Your small fortress is under siege. You have two types of lasers and some torpedoes. Unfortunately, the energy supply is dwindling and the computer is on the blink. The supply ship may (or may not) show up in time to make repairs.

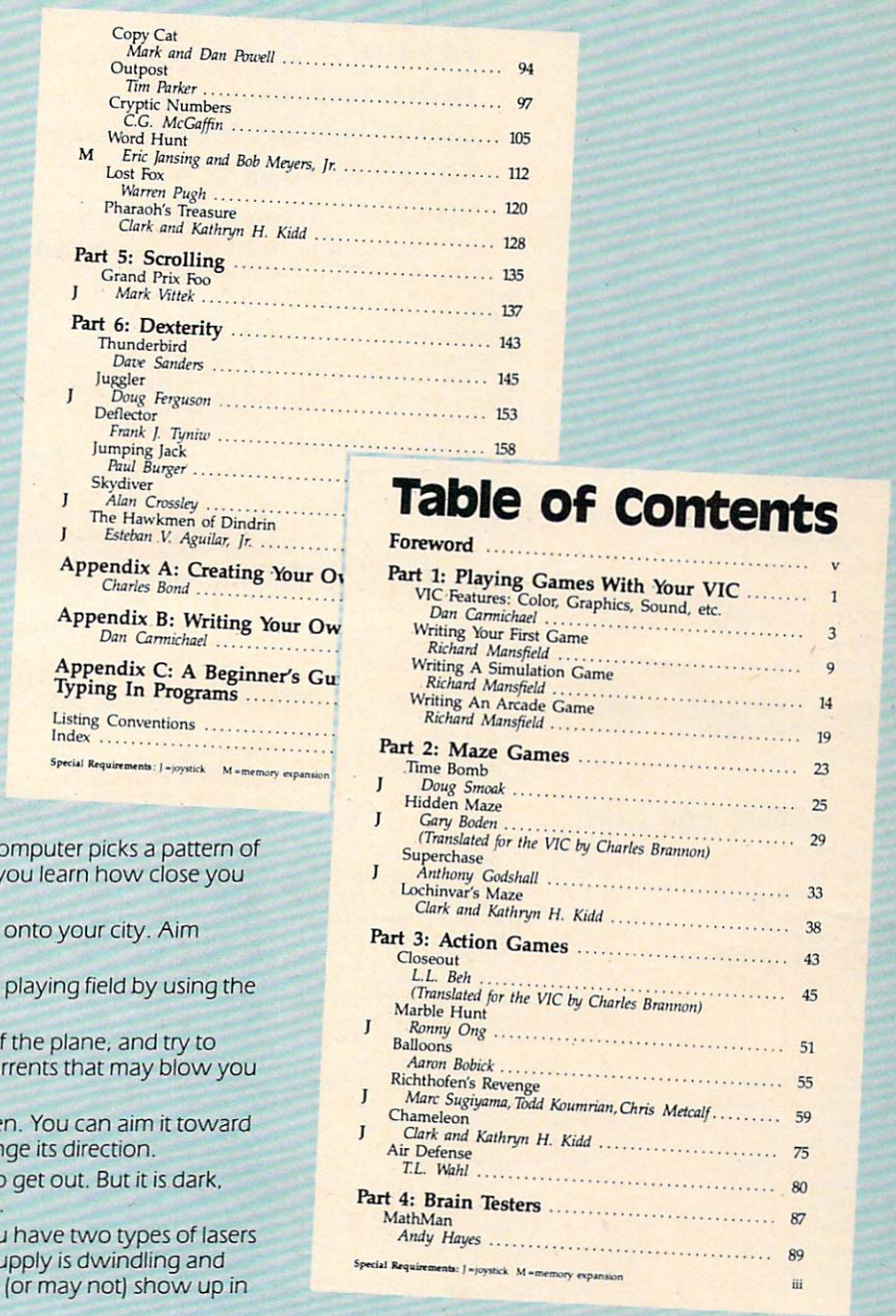


Table of Contents

First Book of VIC Games is more than just a book of program listings. Each program is annotated and explained; you can modify the games if you like or use the many programming techniques in your own games. Also included is a useful program you can use to draw mazes for games you write. Three chapters show you how to develop a game program. Another tells you how to take advantage of the VIC's sound, graphics, and color capabilities. The index lists references where you can learn more about programming. And *First Book of VIC Games* is spiral bound to lie flat while you are typing in programs.

To order directly, call
TOLL FREE
800-334-0868
(919-275-9809 in NC)

ORDER NOW

Available at computer dealers and bookstores nationwide. Or send a check or money order to COMPUTE! Books, P. O. Box 5406, Greensboro, NC 27403.

Add $2 shipping and handling. Outside the U.S. add $5 for air mail, $2 for surface mail. All orders prepaid, U. S. funds only.

Computer Outlet

Business Specials

Bank Street Writer
$48.00

Home Accountant
$48.00

Household Finance (D)
$23.00

Home Inventory (D)
$12.00

Paper Clip
Word Processor
$89.00

Omnicalc (D)
$34.00

Practicalc (D) 64
$39.00

Multiplan
$65.00

HESWARE
Hes Modem 69

COMMODORE
Automodem 95

CHALKBOARD
Power Pad 89
Programming Kit 18

KOALA TECHNOLOGIES CORPORATION
Koala Pad Touch Tablet 69

Commodore 64

"New" 801 Graphics Printer $269
1530 Datasette . . . . . $ 64
1541 Disk Drive . . . . . $ 259
1600 Modem . . . . . $ 89
1702 Commodore Monitor . $289
VIC 1311 Joystick . . . . . $ 8
VIC 1312 Game Paddles . . . $ 16

Avalon Hill

B-1 Nuclear Bomber (C)	$ 12
Midway Campaign (C)	$ 12
Nukewar (C)	$ 12
Planet Miners (C)	$ 12
Computer Stocks & Bonds (C)	$ 15
Andromeda Conquest (C)	$ 14
Computer Football Strategy (C)	$ 12
Telengard (C)	$ 16

Broderbund

David's Midnight Magic	$ 23
Choplifter (CT)	$ 34
Serpentine (CT)	$ 27
Sea Fox (CT)	$ 27

CBS Software

Math/Addition & Subtraction (D)	$ 17
Math/Mult./Division (D)	$ 17

Datamost

Monster Smash	$ 23
Paint Magic	$ 33

Davidson

Speed Reader II/D	$ 17
Word Attack/D	$ 34
Mathblaster/D	$ 34

Don't Ask (Tronix)

S.A.M.	$ 45
Chatterbee	$ 27

EPYX/Automated Simulations

Jump Man (D)	$ 27
Temple of Apshai	$ 27
Jumpman Jr./CRT	$ 27
Pitstop/CRT	$ 27

Hayden

Micro Addition (D or C)	$ 15
Micro Division (D or C)	$ 15
Micro Multiplication (D or C)	$ 15
Micro Subtraction (D or C)	$ 15
Monkey See, Monkey Spell	$ 20
Sargon II	$ 23

Human Engineered Software

Retro Ball (CRT)	$ 27
Hesmon (CRT)	$ 27
Turtle Graphics II (CRT)	$ 45
Heswriter 64 (CRT)	$ 35
Gridrunner (CRT)	$ 23
Paint Brush (CRT)	$ 23
Synthesound 64	$ 23

Infocom

Zork I, II, III Ea.	$ 27
Deadline (D)	$ 34
Starcross	$ 27
Witness	$ 34
Planetfall	$ 34
Infidel	$ 34

Lightning

Mastertype/D	$ 27
Songwriter/D	$ 27

Spinnaker

Snopper Troops #1 (D)	$ 30
Face Maker (D)	$ 23
Kindercomp (D)	$ 20
Hey Diddle	$ 20
In Search of the Most Amazing Things	$ 27
Fraction Fever (CRT)	$ 20
Alphabet Zoo (CRT)	$ 20
Delta Drawing (CRT)	$ 20
Kids of Keys (CRT)	$ 23
Delta Music (CRT)	$ 23

Sierra On-Line

Frogger (D)	$ 25
Crossfire	$ 15
Jaw Breaker	$ 20
Threshold (CRT)	$ 27
Sammy Light Foot (CRT)	$ 20
Apple Cider Spider	$ 23

Sirius Software

Blade of Blackpool (D)	$ 27
Type Attack (CRT)	$ 27
Critical Mass (D)	$ 27
Bandits	$ 23

Strategic Simulations

Combat Leader	$ 27
Geopolitique 1990	$ 27
Knights of the Desert	$ 27

Sub-Logic

Flight Simulator II/D	$ 39
Night Mission Pinball	$ 20

Timeworks

Data Manager	$ 17
Wall Street	$ 17
Electronic Checkbook	$ 17
Money Manager	$ 17
General Ledger	$ 65

Apple Hit List

The Quest	$ 17
Minit Man	$ 17
The Coveted Mirror	$ 17
Zork I, II, III ea.	$ 29
Deadline	$ 35
Starcross	$ 35
Witness	$ 35
Plantfall	$ 35
Enchanter	$ 35
Infidel	$ 34
Wizardry	$ 34
Knight of Diamonds	$ 25
Legacy of Llylgammon	$ 29
Spare Change	$ 25
Lode Runner	$ 29
Temple of Apshai	$ 29
Jumpman	$ 29
Zaxxon	$ 29
Pooyan	$ 22
Sargon III	$ 35
Songwriter	$ 29
Sammy Lightfoot	$ 22

Apple/Educational

Sticky Bear Numbers/Xerox	$ 30
Sticky Bear ABC/Xerox	$ 30
Sticky Bear Opposites/Xerox	$ 30
Sticky Bear Shapes/Xerox	$ 30
In Search of Most Amazing Thing Spinnaker	$ 29
Hey Diddle Diddle/Spinnaker	$ 22
Snooper Troops 1 & 2/Spinnaker Ea.	$ 30
Delta Drawing/Spinnaker	$ 34
Story Machine/Spinnaker	$ 23
Face Maker/Spinnaker	$ 23
Rhymes & Riddles/Spinnaker	$ 20
Alphabet Zoo/Spinnaker	$ 20
Plato Whole Numbers	$ 39
Plato Decimals	$ 39
Plato Fractions	$ 39
PDI Preschool Builder	$ 24
Match Wits/CBS	$ 20
Mastering the S.A.T./CBS	$ 99
Early Games for Young Children/ Counterpoint	$ 22
Early Games Music/Counterpoint	$ 22
Wizare Microzine/Scholastic	$ 29
Juggles Rainbow/Learning Co.	$ 22
Bumble Games/Learning Co.	$ 29
Bumble Plot/Learning Co.	$ 29
Gertrudes Secrets/Learning Co.	$ 30
Gertrudes Puzzles/Learning Co.	$ 30
Rocky's Boots/Learning Co.	$ 34
Compu-Read/Edu Ware	$ 23
Spelling Bee with Reading Primer	$ 27
Algebra I/Eduwae	$ 34
Fractions/Eduware	$ 34
Decimals/Eduware	$ 34
Master Type/Lighting	$ 29
Type Attack/Sirius	$ 29
S.A.T. Word Attack/Hartcourt Base	$ 35
Word Attack/Davidson	$ 36
Math Blaster/Davidson	$ 36
Speed Reader II/Davidson	$ 48
Spellicopter/Designware	$ 29
Micro Multiplication/Hayden	$ 22

VIC 20 Software

Kindercomp/CRT	$ 23
Story Machine/CRT	$ 23
FaceMaker/CRT	$ 23
Lode Runner/CRT	$ 23
Mastertype/CRT	$ 27
Q Bert/CRT	$ 35
Frogger/CRT	$ 35
Star Trek/CRT	$ 27
Buck Rogers/CRT	$ 27
Early Games/CASS	$ 20
Early Games Match Maker	$ 20
Pipes/CRT	$ 20
Serpentine/CRT	$ 20
A.E./CRT	$ 23
Sea Fox/CRT	$ 23
Sky Blazer/CRT	$ 23
Temple of Apshai	$ 27
Fun with Music	$ 27
Submarine Commander	$ 27
Computer War	$ 27
B-1 Nuclear Bomber	$ 12
Tank Arcade	$ 12

Computer Outlet

We offer the largest selection of software and hardware for Apple, Atari, Commodore, IBM and Kaypro at 25 to 40% off retail.

1095 East Twain, LasVegas, NV 89109 ● Mon.-Fri. 8AM to 6PM, Sat. 9AM to 5PM

Cuts Prices

Atari Specials

Atari, Inc.

Entertainer System	$ 64
482 Educator	$110
483 Programmer	$ 52
Communicator II	$209
Atari Accounting	$169
CX4104 Mailing List	$ 19
CXL4007 Music Composer	$ 42
Programming 2 & 3	Ea. $ 22
Conversational Languages	Ea. $ 45
CX4018 Pilot	$ 55
CX405 Pilot	$ 99
CXB 126 Microsoft Basic II	$ 62
CXL 4020 Centipede	$ 33
CXL4006 Super Breakout	$ 26
CXL4008 Space Invaders	$ 26
CXL4009 Computer Chess	$ 26
CXL4011 Star Raiders	$ 33
CXL4012 Missile Command	$ 26
CXL4013 Asteroids	$ 26
The Bookeeper	$102
Home Filing Manager	$ 65
Atari Speed Reading	$ 54
Home Manager Kit	$ 55
Family Finance	$ 36
Time Wise	$ 23
Galaxian	$ 33
Defender	$ 33
Paint	$ 33
Qix	$ 33
Dig Dug	$ 33
ET Phone Home	$ 34
Atari Writer	$ 75
Donkey Kong	$ 36
Donkey Kong, Jr.	$ 38
Pac Man	$ 33
Ms. Pac Man	$ 36
Atari Logo	$ 72
Mickey in the Great Outdoors/D	$ 30
Peter Pan's Daring Escape	$ 36
Joust	$ 43
Robotron 2084	$ 33
Pole Position	$ 36
Eastern Front CT	$ 42

Business & Utilities

Visicalc	$169
Computari's Financial Wizard	$ 45
New Color Accountant	$ 65
Spell Wizard	$ 65
Letter Perfect	$ 69
Letter Wizard	$ 45
Bank Street Writer	$ 48
Money Wizard	$ 45
Text/Spell Wizard Combo	$ 53
Syn File +	$ 65
Syn Text	$ 23
Syn Mail	$ 34
Basic Compiler	$ 55
Graphics Generator	$ 17
Micropainter	$ 23
Graphics Master	$ 23
Miles Payroll System	$119
Homeword	$ 39

Atari Specials

600XL	CALL
800XL	CALL
1400XL	CALL
1450XLD	CALL
1010 Recorder	$ 85
1050 Disk Drive	$ 415
1027 Printer	$299
1025 Printer	$429
830 Modem	$145
850 Interface	$179

Educational

My First Alphabet (D)	$ 26	Hey Diddle Diddle (D)	$ 20
Monkey See, Monkey Spell (C)	$14 (D) $ 17	Snooper Troops 1&2 (D) ea.	$ 30
Pop'R Spell	$ 20 (D) $22	Story Machine (D) $ 23 (CT)	$27
Do It Yourself Spelling (C)	$ 16	Face Maker (D or CT)	$ 23
Vocabulary Builder (C)	$ 13 (D) $ 19	Delta Drawing (CT)	$ 27
Preparing for the SAT (C)	$ 66 (D) $ 79	Rhymes & Riddles (D)	$ 20
Crossword Magic (D)	$ 34	Fraction Fever (CT)	$ 23
Wizware Microzine (D)	$ 27	Kindercomp (D or CT)	$ 20
Einstein Memory Trainer (D)	$ 53	Magic Melody Box	$ 14
Compumath Fractions (C)	$ 23 (D) $ 29	States & Capitals (C)	$ 12
Compumath Decimals (C)	$ 23 (D) $ 29	European Countries & Captials (C)	$ 12
Addition/Subtraction (C)	$ 14 (D) $ 17	Sammy the Sea Serpent (C)	$ 13 (D) $ 19
Mult/Division (C)	$ 14 (D) $ 17	Preschool IQ Builder (C)	$ 13 (D) $ 24

SUPER SAVINGS

Verbatim Disks S/D (10 per box)	$ 26.00
Disk Savers (Plastic Sleeves)	$ 4.50
Disk Savers (Plastic Sleeves) multi-colored	$ 4.50
Flip 'n File Diskette Holder w/Lock (holds 25)	$ 19.00
Flip 'n File Diskette Box (holds 50)	$ 22.50
Library Carrying Case (holds 10)	$ 2.50
Gorilla Banana Printer	$209.00
Percom Printer Port Drive 88S1PD	$489.00
Percom Single Density Drive	$339.00
Rana 1000 Disk Drive S/D with DOS	$375.00
Alphacom 80 Col. Graphics Printer	$189.00
Amdek Color I Monitor	$315.00

Modems

Hayes Smartmodem 300 Baud	$209
Hayes Smartmodem 1200	$499
Signalman Modem II	$ 79
Atari Modem	$115

Monitors

Leading Edge Green Hi-Res 12"	$ 89
USI Amber	$169
NEC Green Screen	$169
Leading Edge Amber Hi-Res 12"	$ 89

Atari Hit List

Q Bert/CRT	$ 35
Frogger/CRT	$ 35
Popeye/CRT	$ 35
Chess/CRT	$ 39
Astrochase	$ 35
Songwriter	$ 27
Deadline	$ 35
Zork I, II, III ea.	$ 27
Starcross	$ 27
Witness	$ 35
Planetfall	$ 35
Enchanter	$ 35
Infidel	$ 35
Temple of Apshai	$ 27
Gateway to Apshai	$ 27
Pitstop	$ 27
M.A.S.H.	$ 27
Porky's	$ 27
Baja Buggies	$ 23
Starleague Baseball	$ 23
Starleague Football	$ 23
Zaxxon	$ 27
In Search of the Most Amazing Thing	$ 27
Cosmic Balance II	$ 27
Chopliter	$ 23
Sky Blazer (D)	$ 22
Serpentine (D)	$ 22
Sea Fox (D)	$ 20
Blue Max	$ 23
Arcade Machine (D)	$ 39
Dark Crystal (D)	$ 26
Flight Simulator	$ 36
Chess (D)	$ 45
Checker (D)	$ 34
Raptillian (D,C)	$ 23
Submarine Commander (CT)	$ 34
Jumbo Jet Pilot (CT)	$ 34
Soccer (CT)	$ 34
Starcross (D)	$ 27
Zaxxon (D,C)	$ 27
Miner 2049er (CT)	$ 34
Twerps (D)	$ 23
Flip Out (D)	$ 20
The Birth of the Phoenix	$ 16
Protector II	(D) $ 23 (CT) $ 29
Baseball (CT)	$ 34
Preppie II (D,C)	$ 23
Arcade Machine (D)	$ 39
Cap n' Cosmos (D)	$ 29
Spy's Demise (D)	$ 15
Repton (D)	$ 27
Critical Mass (D)	$ 27
Millionaire (D)	$ 55
Poker Sam (D)	$ 17
Jump Man (D)	$ 27
Hellfire Warrior (D,C)	$ 27
Trion (D)	$ 27
Adventure in Time (D)	$ 20
Wavy Navy (D)	$ 23
Final Orbit (CT)	$ 23
Pharoah's Curse (D,CT)	$ 23

Printers

Leading Edge Gorilla	$209
NEC 8023A	$459
Okidata MS 82A	Call
Okidata ML 83A	Call
Okidata Ml 84P	Call
Okidata ML 92P	Call
C. ITOH 8510 Prowriter	$399
Mannesmann Tally 160L	$629
Gemini 10X	$315

COMPUTER OUTLET

To Order Call Toll Free 1-800-634-6766

Information & Inquiries 1-702-369-5523 • We accept VISA and MasterCard

ORDERING INFORMATION AND TERMS: *For Fast Delivery send cashier checks, money orders or direct bank wire transfers. Personal and company checks allow 3 weeks to clear. Charges for C.O.D. orders are $3.00 minimum or 1% for orders over $300. School purchase orders welcomed. Prices reflect a cash discount only and are subject to change without notice. Please enclose your phone number with any orders.* ***SHIPPING: — Software:*** *$3.00 minimum.* ***SHIPPING — Hardware:*** *(Please call)* ***SHIPPING — Foreign Orders:*** *APO & FPO orders: $10 minimum and 15% of all orders over $100. Nevada residents add 5 3/4% sales tax. All goods are new and include factory warranty. Due to our low prices, all sales are final. All returns must be accompanied by a return authorization number. Call 702-369-5523 to obtain one before returning goods for replacement.*

or two of fun, physical exercise, and computer instruction. But some educators feel that residential camps are a fad. Their outdoor activities are often an afterthought, and the camps cannot compare, in terms of staff, program, or facilities, to the regular summer camps, which, on their own, are beginning to offer computer activities. Also, residential camps are expensive and relatively inefficient if your main goal is to introduce your child to computers.

Campers draw on each other's skills and interests to program a computer. Courtesy of Computer FUNdamentals Camp. (Photo by Walker Healy, Jr.)

In the past, most computer camps were for kids. Now adult camps are springing up all over the country.

Many families send their kids to computer camp so they can come back and tell the family which computer to buy. But why let your kids have all the fun? Why not attend computer camp at the same time as your son or daughter? Then you and your kids can decide together which computer is right for the family.

New "mixed-age" camp classes are springing up that include people of all ages. Being in a class with several bright youngsters can be unnerving, but it can also add a new dimension to your computing. Kids approach computers as *explorers*. By imitating them you can begin computing fearlessly and playfully.

The Need For Continuing Support

The best computer camps offer a balanced approach—some computer programming and some computer activities. But beware. If you get your child started in either side of computing, his or her appetite for more computing is liable to increase. When you look for a computer camp you should try to find one that will be around to satisfy your and your child's computing interests no matter how sophisticated they become.

Dr. Zabinski, for example, believes that computer camps "breed kids who are sophisticated with computers, so they can't just drop them." His camps emphasize programming as opposed to computer activities. "We train the youngsters in computers, so it is our responsibility to be around when they become more sophisticated and need more advanced training."

Zabinski's philosophy is "to motivate kids and excite them with examples they can relate to and identify with." His camps have been so popular and successful that he and his staff have to revamp their curriculum each year just to keep up with the kids they trained the previous year.

According to Zabinski, "We used to be content teaching kids to program in BASIC and Pascal. Now I feel that teaching new programming languages is just moving sideways. We can't afford to move sideways. Kids can master new languages in just a couple of weeks. Our objective in 1984 is to teach kids how to interface computers with each other and how to interface computers with other machines. We'll teach kids how to create their own computer languages, and how to use modems and bulletin boards and get computers communicating over the telephone."

Zabinski emphasizes that his highly technical curriculum is not aimed at just teenagers and older children. "Take nine-year-olds," he says. "Nine and ten-year-olds are not what they used to be. We have one nine-year-old who learned Assembler and won a national Assembler Language contest on the TRS-80 computer.

"There are plenty of sophisticated kids at all ages," contends Zabinski. "Computer camps are often these kids' only outlet. We've helped to create these kids, so we have to be ready when they come back to us each year. We can't abandon them."

Computer FUNdamentals

Nancy Healy and Dr. Barbara Kurshan run the Computer FUNdamentals Camp at Hollins College, in Roanoke, Virginia. Kurshan and Healy agree with Zabinski that computer camps need to keep upgrading their curriculum to keep up with the newest computers and the increasing sophistication of the average camper. But Kurshan and Healy stress computer applications as opposed to computer programming. And, above all, they want their campers to have fun.

According to Healy, "What makes our camp different is that it is oriented toward fun, and, at the same time, the kids become good computer users. Also, we don't mix physical activities and computer instruction. This lets our handicapped campers do everything that all the other kids do.

"Another reason our camp is different," Healy continues, "is that our camp isn't just for math and science freaks. Kids who love music

and the arts are equally interested and involved.

"After the first few days at camp, it is easy to see who knows what. The 'knowers' are those who attract people around them. But the great thing is that each child brings a different skill with him, like typing, music, art, programming, or math. The kids work together and draw on each other's skills and interests. That way everybody gets a chance to shine."

The Computer That Ate Manhattan

Like their counterparts at other camps, computer campers at Hollins spent most of their time last summer using real computers as electronic notebooks, typewriters, telephones, libraries, and mailboxes. But camp counselors also encouraged the children to spend time inventing totally new fantasy computers. Children described these computers and what things they could do. One boy, for example, made up a story about a computer that ate Manhattan.

One of the big projects during the camp was for the children to build their own *junk computers*. The children designed and built the junk computers out of all kinds of things, including buttons, wires, beads, tupperware, TV sets, and aluminum foil. One boy built a computer out of a nonworking TV set and a working walkie-talkie. The boy hid the walkie-talkie inside the TV set. Another boy built a junk computer that played beach music. The cardboard computer had a tape recorder hidden inside.

A local elementary school PTA in Roanoke sent two children to the camp on scholarships. The children were to learn as much as possible about computers during camp so they could help their teachers use the school's two new computers the following fall. The children, one 10 and the other 11, were chosen on the basis of an essay on why they wanted to go to computer camp. They wrote down everything they learned at camp in a spiral notebook, and were among the camp's most conscientious students.

Training A Future Sally Ride

While the camp was in progress at Hollins, America was glued to the TV set watching its first female astronaut, Sally Ride, blast off the earth in the Space Shuttle. This inspired the kids to create a computer-controlled rocket launching at camp.

The rocket was finally launched on the same day that Sally and her teammates brought the real Shuttle back to the earth. It even featured a computer-screen simulation of the rocket taking off and a speech synthesizer, in robot nasal monotone, doing the countdown: 5 ... 4 ... 3 ... 2 ... 1 ... IGNITION!

In honor of Sally Ride, the girl campers got to operate the computer to control the rocket launch.

Computer mania at the National Computer Camps. Courtesy of National Computer Camps. (Photo by Walker Healy, Jr.)

And the local TV station in Roanoke was so excited by this project that they filmed the rocket launch and, on the evening news, mixed the tape with a film of the real Space Shuttle take-off.

Computer Camp Resources

If you're interested in learning more about computer camps, you might want to send for *The Computer Camp Book*. It's a complete guide to computer camps and features a national directory of computer camps. The book is available for $12.95 from

The Computer Camp Book
P.O. Box 292
Yellow Springs, OH 45387

For an additional $4, you can get a copy of an updated directory of computer camps.

Two of the leading computer camps in the U.S. are the Atari Computer Camps and the National Computer Camps. You can learn more about them by writing:

Dr. Linda Gordon
Atari Computer Camps
Dept. AL
40 E. 34th Street
New York, NY 10012

Dr. Michael Zabinski,
Director
National Computer Camps
P.O. Box 585
Orange, CT 06477

You can learn more about the Hollins College Computer FUNdamentals Camp by writing:

Dr. Barbara Kurshan
Nancy Healy
Computer FUNdamentals Camp
Hollins College
Hollins, VA 24020

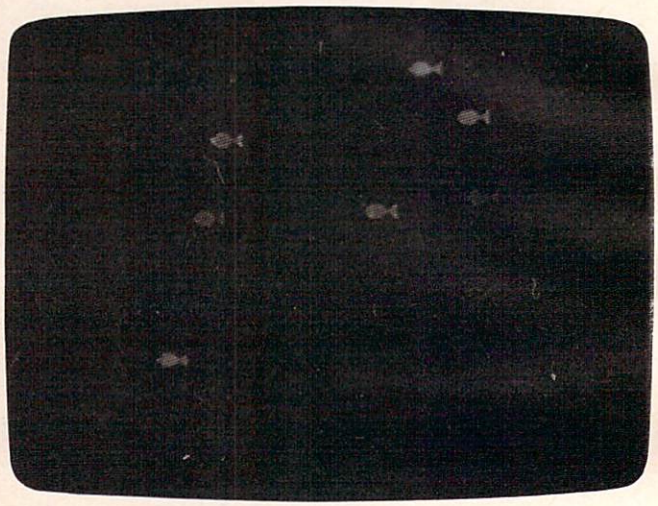
To find out more about the Hollins camp's robot mascot, you can write:

Bill Glass
TASMAN TURTLE & TURTLE TOT
Harvard Associates, Inc.
260 Beacon Street
Somerville, MA 02143

TI Aquarium

Michael A Covington

Turn your TI into an aquarium. And the best part is, you never have to change the water. For TI-99/4A with Extended BASIC. The program also demonstrates some basic sprite techniques.



Relax and watch the fish glide by in "TI Aquarium."

Recent studies have shown that the relaxing experience of watching fish glide around in an aquarium can lower your blood pressure and have other beneficial effects. This program (which we present somewhat with tongue in cheek) enables you to avoid the expense and bother of a real aquarium by using your TI-99/4A to simulate one.

Lines 310 to 330 establish the characteristics of a double-sized, fish-shaped sprite. Lines 400 to 430 read a number from the DATA statement (340) and, treating it both as a sprite number and as a color number, create a fish accordingly. When the sprite is created, it has the same color as the background (color 1, "transparent").

It is made visible by a separate COLOR statement because newly created sprites tend to appear momentarily in the wrong place before jumping to the specified location. If this phenomenon were visible, it would detract from the atmosphere of tranquility.

The subroutine at line 610, which is called several times while the fish are being created and repeatedly after they are on the screen, makes random changes in sprite motion so that the fish move in realistic bobbing movements rather than in straight lines at constant speed.

TI Aquarium

```
140 ! REQUIRES EXTENDED BASIC.
150 CALL SCREEN(2)
160 CALL CLEAR
170 FOR I=1 TO 14 :: CALL COLOR(I,1
    5,1):: NEXT I
180 PRINT "TI AQUARIUM": : : :
190 PRINT "This program allows you
    to"
200 PRINT "use your TI-99 to enjoy
    the"
210 PRINT "relaxing sight of fish"
220 PRINT "swimming by, without the
    "
230 PRINT "expense and bother of a"
240 PRINT "real aquarium."
250 PRINT : :"To end the program, p
    ress"
260 PRINT "any key while the fish a
    re"
270 PRINT "being displayed."
280 FOR D=1 TO 1500 :: NEXT D
290 CALL CLEAR
300 RANDOMIZE
310 A$="000000000081C3E7FFFFE7C381000
    0000000000000000F0F8FCFEFEFCF8F000
    000000"
320 CALL CHAR(120,A$)
330 CALL MAGNIFY(3)
340 DATA 9,6,4,7,8,10,11,12,14,0
350 CALL SCREEN(2)
360 !
```

```
370 ! Put fish on the screen, with
    sprite numbers and
380 ! colors based on the DATA stat
    ement
390 !
400 READ Q
410 IF Q=0 THEN 540
420 CALL SPRITE(#Q,120,1,90+30*(RND
    -0.5),1,4*RND-3,5*RND+1)
430 CALL COLOR(#Q,Q)
440 GOSUB 610
450 GOSUB 610
460 GOSUB 610
470 FOR D=1 TO 300 :: NEXT D
480 GO TO 400
490 !
500 ! Now that all the fish are on
    the screen, make
510 ! random changes in their motio
    n and check for
520 ! a key being pressed.
530 !
540 GOSUB 610
550 CALL KEY(5,CODE,STATUS)
560 IF STATUS<>0 THEN CALL CLEAR ::
     STOP
570 GO TO 540
580 !
590 ! Subroutine: Change the motion
     of a
600 ! randomly chosen sprite
605 !
610 CALL MOTION(#INT(11*RND)+3,4*RN
    D-2,5*RND+2)
620 RETURN
```


RELATIONAL OPERATORS

Eric Brandon

Relational operators can make your BASIC programs more efficient. Here are some techniques which use relational operators on the Commodore, Atari, TI, Apple, IBM PC and PCjr, Color Computer, and Timex/Sinclair machines.

BASIC has a very useful, but little-known feature. A relational expression such as 2+3>4 is interpreted by BASIC as a value of –1 (or 1, depending on the computer) if the expression is true, and a value of 0 if the expression is false. On all Commodore machines, the TI-99/4A, the Color Computer, the IBM PC and the PCjr, a relational expression which is true gives a value of –1. A relational expression which is true on the Atari, Apple, and Timex/Sinclair computers produces a value of 1. A value of 0 results for a relational expression which is false on each computer.

As an example, enter PRINT 2=2. You should get a result of –1 (or 1) since the expression is true. Now type in: PRINT 2=3. This time, the result is 0 because the expression is false.

Related to this is the fact that the statement

```
IF Q THEN 100
```

will be interpreted identically to the statement

```
IF Q<>0 THEN 100
```

Can you see why? Both expressions evaluate as true, if Q is nonzero.

Cycling A Variable

Suppose you wanted to continually cycle a variable, say J, from 1 to 10. One way to do this would be:

```
10 J=0
20 J=J+1
25 PRINT J
30 IF J<10 THEN 20
40 GOTO 10
```

However, by using a relational expression, we can do this:

```
5 N=-1:REM N=-1 FOR TRUE (MAY BE 1 DEPEND
  ING ON YOUR MACHINE)
10 J=0
20 J=J*(J<10)*N+1
25 PRINT J
40 GOTO 20
```

In this routine, N must be defined as +1 or –1, depending on your machine. Of course, there's really no need for a separate statement to define N. You could easily incorporate the value of N into the expression in line 20. If a true statement produces a –1 on your computer, line 20 becomes J=–J*(J<10)+1. In this case, as long as J is less than 10, BASIC returns a value of –1 for (J<10). So, –J

times –1 plus 1 increases the value of J by one. When J reaches a value of 10, (J<10) gives a value of zero. Adding one to zero starts the cycle over again.

Note that the relational operators are the last items to be resolved. Recall that numeric arguments are resolved in this order: *, /, +, –. This can be easily demonstrated by these two examples: PRINT 2*3=3. This gives a result of 0 since it is equivalent to PRINT 6=3.

Now try PRINT 2*(3=3). This gives –2 (or 2) since it is equivalent to 2*(–1) [or 2*(1)].

More Efficient Tabulation

For another example, suppose you wish to tabulate a score in a math drill program within a subroutine beginning at line 100. A scoring scheme is devised so that the player is awarded a greater number of points the more problems he has solved. You would like the player to get 100 points for each of the first five correct answers, and 1000 points for any correct answers thereafter. If we let X be the total number of correct answers, a common way of doing this would be:

```
99 REM SCORING SUB
100 IF X>5 THEN 130
110 TALLY=TALLY+100
120 GOTO 140
130 TALLY=TALLY+1000
140 RETURN
```

Using relational operators, however, we can shorten this to (defining N as +1 or –1 as before):

```
99 REM SCORING SUB
100 N=-1
110 TALLY=TALLY+(X<6)*100*N+(X>5)*1000*N
120 RETURN
```

Fewer IF-THEN Statements

Still another example: If you want to transfer program execution to line 1000 if the value of variable I is 100, and to line 2000, if I is 500, several IF-THEN statements would usually be required:

```
100 IF I=100 THEN 1000
110 IF I=500 THEN 2000
```

On most machines, this can be easily done with relational operators as:

```
90 N=-1
100 ON N*(I=100)+N*2*(I=500) GOTO 1000,20
    00
```

On the Timex/Sinclair, since the ON-GOTO statement is not supported in BASIC, you would use GOTO with a conditional expression in the following manner (N=1, so it's not included here):

```
100 GOTO (I=100)*1000+(I=500)*2000+(I<>10
    0 AND I<>500)*200
200 REM RETURN TO MAIN LOOP OF PROGRAM
```

If you use this powerful technique with imagination, you will find that your programs can be shorter, faster, and easier to write. ©

Egghead Bytes Back

For people who don't know the difference between a microchip and a potato chip.

Introducing Egghead.

Everybody's been discounting computer hardware. It's about time some smart egg figured out how to sell the hot quality software brokers want at lower prices.

That's eggsactly what the hottest new discounter in software is doing.

Simply order from Egghead's new Software Simplified Catalog & Buyers' Guide. Hundreds of items—listed by popularity, with the differences between products, what they do and the hardware with which they're compatible. You'll get eggsactly what you want. Fast. With no hassle. No intimidation. Save time. Save money. You'll be eggstatic.

The Catalog/Buyers' Guide is *free* with any software program order. For Catalog only send $1 plus 4 bits postage & handling today.

For ordering software programs only by phone, *24 hours a day, 7 days a week,* in all states except California: 1-800-227 1617 Ext. 445. In California: 1-800-772-3545 Ext. 445.

Just give your VISA or MasterCard number. To order *Catalog* by phone: (206) 451-8155.

FINANCIAL MANAGEMENT BUSINESS

PRODUCT	MANUFACTURER	COMPUTERS	RETAIL PRICE	EGGHEAD PRICE
FINANCIAL SPREADSHEETS				
1. 123 Lotus	Lotus	IBM,DEC,TIP,WANG	495	325
2. Visicalc	Visicorp	AP,AT,IBM ,COM	250	177
3. Multiplan	Microsoft	IBM	275	170
4. Supercalc 3	Sorcim	IBM	395	260
5. Supercalc 2	Sorcim	AP,CP/M,IBM,DEC,TIP	295	190
ACCOUNTING				
6. General Accounting	BPI	AP,CP/M,IBM,DEC	395	263
7. General Ledger	Peachtree	IBM	750	475

FINANCIAL MANAGEMENT PERSONAL

8. Home Accountant	Continental	AP,TRS,AT,	75 AP	49
9. Home Accountant	Continental	C64,TIP ,IBM	150 IBM	95
10. Dollars & Sense	Monogram	AP,IBM	125	84
11. Tax Preparer	Howard	AP,IBM	250	187
12. Tax Manager	MicroLab	AP,IBM	180	120
13. Tax Strategist	XQ Software	IBM	395	295
14. Investment Strategist	XQ Software	IBM	395	295

WORD PROCESSING

BUSINESS				
15. WordStar	MicroPro	AP,IBM	495	295
16. Multimate	Softword	IBM	495	325
17. Easy Writer II	IUS	IBM	395	225
18. Pie Writer	Hayden	AP,IBM	200	131
19. Word Perfect with Math, Mail-Merger and Speller	Satellite Software	IBM,TIP	495	320
PERSONAL				
20. Volkswriter	Lifetree	IBM	195	155
21. Peachtree Text 5000	Peachtree	IBM	395	239
22. Word	MicroSoft	IBM	375	275
23. Word/Mouse	MicroSoft	IBM	475	348
24. PFS Write	Software Pub.	IBM, APe	140	95
PERSONAL				
25. Bank Street Writer	Broderbund	AP,AT,C64	69.95	46
26. Homeword	Sierra-on-line	AP	49.95	35
27. Word Handler	Silicon Valley	AP	59.95	38
COMMUNICATIONS				
28. Crosstalk	Microstuf	IBM	195	136

DATA MANAGEMENT/UTILITY

DATA MANAGEMENT				
29. dBase II	Ashton-Tate	AP,CP/M,IBM,DEC,VTR,TIP	700	450
30. PFS File	Software Pub.	AP,IBM,TIP	140	95
31. PFS Report	Software Pub.	AP,IBM,TIP	125	85
32. PFS Graph	Software Pub.	AP,IBM,TIP	140	95
33. DB Master	Stoneware	AP,IBM	595	395
34. VisiFile	Visicorp	AP,IBM,TIP	300	210
35. Mailmerge	MicroPro	AP,CP/M, IBM,DEC,TIP	250	148
36. File Manager	Synapse	AT,IBM	99.95	66
UTILITIES				
37. Norton Utility	Peter Norton	IBM	80	55
38. Basic Compiler	MicroSoft	AP,DEC,IBM,Cp/M	395	276
39. Macro Assembler	MicroSoft	CP/M	200	143
40. ProKey 3.0	RoseSoft	IBM	129.95	87
41. ProKey 1.0	RoseSoft	IBM	75.00	52

CHILDREN'S EDUCATIONAL AND GAMES
Hundreds listed in brochure—
average 20-35% below retail

For mail use Money Orders, Check or Cashier's Check, VISA or MasterCard #. No C.O.D.'s please.

Shipping and handling: UPS Surface, add $3 per item. UPS Blue Label (faster) add $7 per item. Washington State Residents add 7.9% sales tax.

While most software suppliers charge a surcharge for credit card purchases, Egghead charges nothing extra.

We encourage the use of your credit cards. All prices subject to availability and price change. All products shipped with manufacturers' warranty.

Name_____

Address_____

City, State, Zip_____

☐ VISA or ☐ MasterCard #_____

1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐ 8☐ 9☐ 10☐ 11☐ 12☐ 13☐ 14☐ 15☐ 16☐
17☐ 18☐ 19☐ 20☐ 21☐ 22☐ 23☐ 24☐ 25☐ 26☐ 27☐ 28☐ 29☐ 30☐ 31☐ 32☐
33☐ 34☐ 35☐ 36☐ 37☐
38☐ 39☐ 40☐ 41☐

c

EGGHEAD SOFTWEAR
SM

10636 Main St. #206
Bellevue, WA 98004
Phone (206) 451-8155

Learning With Computers

Glenn M. Kleiman

GETTING STARTED

Let's consider some of the steps involved in the introduction of computers in schools, and some of the difficult issues teachers, parents, and school administrations must face.

Computers are tools. They are different from most other tools in that they operate on information and can be programmed to serve a wide variety of purposes. But they are the same as other tools in that they can be used well or poorly. A hammer can be used to build furniture or to destroy it. A computer can be used to create original stories, music, and art; to explore complex scientific relationships; or to play the most mindless of games.

How computers affect students depends upon how the students use them, the quality and appropriateness of computer activities and software, and the manner in which computers are integrated with other educational activities.

In many schools, individual teachers, parents, or students have brought computers into classrooms. Since those who do so are typically knowledgeable and excited about computers, they are usually successful in integrating computers with classroom activities, and in teaching students about them. However, implementing computers on a school-wide or district-wide basis is a more complex task, one that requires a great deal of thought, careful planning, and an ongoing effort.

Computer Comfort

The first step towards using computers as educational tools is for teachers, administrators, parents, and students to become aware of the possibilities, to develop an interest in trying some of them. Understanding the possible uses of computers and having a general understanding of their nature is often called *computer awareness*.

The next step is *computer comfort*. This means that everyone involved should actually use a computer and become comfortable with the mechanics of loading and running programs, entering information, using printers and so on. There is no substitute for hands-on experience in coming to appreciate the potential of computers. At this stage, it is best to try a variety of programs to experience the different possibilities. The aim is to develop more concrete knowledge about what computers can do, and to gain critical skills in evaluating software.

Once past the awareness and comfort levels, the real work begins. Decisions have to be made about how computers will be used and whether some students or classes will have priority over others. How will computers be integrated into the curriculum at each grade level? Will they be used primarily for lessons and drills or to teach computer programming?

If programming is to be taught, which language (Logo, BASIC, Pascal) will be selected? Should the computers be used primarily in math and science classes or mainly for word processing? Will educational computer games be used? What about computer art and music? Will all students get equal access to the computers? Should gifted children or those in need of remedial assistance be given priority?

There are no "right" answers to these difficult questions. Each group of decision makers must decide how to best allocate the available computer resources to meet the needs of their school or district.

Selecting Products

Other important questions focus on the setting in which the computers will be used. Will they be

$u¢h A Deal

*Lowest Prices — Guaranteed!**

COMMODORE 64

Just for You!

PERSONAL FINANCE

Continental Home Accountant (D) $47
Continental Tax Advantage (D) $33
Continental FCM First Class Mail $29
Softsync Personal Accountant (D&C) .. $23
CheckEase (C&D) $24
Timeworks Electronic Checkbook (D&C) $19
Timeworks Money Manager (D&C) $19
M.S.I. Inventory (D) $16
Creative Household Finance (D) $23
Creative Household Finance (C) $19
Creative Home Inventory (D) $13
Creative Home Inventory (C) $10
Creative Loan Analyzer (D) $13
Creative Loan Analyzer (C) $10

WORD PROCESSING

Broderbund Bank St. Writer (D) $45
Hesware Omniwriter (D) $49
Rainbow Writers Asst. (D) $49
Blue Sky Script 64 (D) $69
Cardco Write N ow! (D) $39
Muse Supertext (D) $88
On-Line HomeWord (D) $39

ELECTRONIC SPREADSHEETS

Hesware Multiplan (D) $75
Hesware Omnicalc (D) $37
MSI Practicalc (D&C) $35
MSI Programmable Spreadsheet (D) ... $55
B. SKY CALC Result Easy (D) $49
Home Calc (D) $26
Home Calc (C) $22

HOME APPLICATIONS

Spinnaker Aerobics (D) $33
Softsync Computer Mechanic (D) $19
Softsync Computer Mechanic (C) $16
Creative Car Costs (D) $13
Creative Car Costs (C) $10
Creative Decision Maker (D) $13
Creative Decision Maker (C) 10
Hesware Time & Money Manager (D) $39
Timeworks Data Manager (D&C) $19
Compuserve Starter Kit (5 hrs) $29

ART & MUSIC

Epyx Fun with Art (CT) $27
Epyx Fun with Music (CT) $27
Hesware Synthesound (CT) $33
Hesware Paintbrush (CT) $19
Spinnaker Delta Drawing (CT) $26
Koala SpiderEater $23
Koala Geometric Designs $23
Koala Crystal Flowers $23
Koala Logo Designs $29
Delta Music (CT) $26

EDUCATION

Spinnaker Alphabet Zoo (CT) $23
Spinnaker Cosmic Life (CT) $23
Spinnaker Facemaker (CT) $23
Spinnaker Fraction Fever (CT) $23
Spinnaker Kids on Keys (CT) $23
Spinnaker Kindercomp (CT) $19
Spinnaker Story Machine (CT) $26
Spinnaker Up For Grabs (CT) $26
Spinnaker Delta Drawing (CT) $26
Creative I Am Your 64 I (D) $19
Cretive I Am Your 64 II (D) $19
Hesware Turtle Graphics II (CT) $39
Hesware Type 'N' Writer (CT) $26
Delta Music (CT) $26

COMMODORE 64 Cont'd.

LANGUAGES & UTILITIES

Hesware 6502 Pro Devel Sys (D) $19
Hesware Hesmon 64 (CT) $26
Hesware 64 Forth (CT) $45
Acess Spritemaster (D&C) $23
Timeworks Programmer Kits I, II, III (D&C) ..... each $19
Blue Sky Last One (D) $79
Blue Sky 80 Column (D) $29
Blue Sky Graphic Designer (D) $29
Blue Sky 64 Statistics (D) $29
Blue Sky Super Basic (D) $29
Blue Sky Add On Basic (D) $29
Blue Sky Super Copy (D) $29

BUSINESS SOFTWARE

Total Business 3.6 (D) $65
Total Time Mgmt. (D) $25
Total Lable-Mail (D) $15
Total Research Asst. (D&C) $25
Cymbal General Ledger (D) $45
Cymbal Acct. Receivable (D) $45
Cymbal Acct. Payable (D) $45
Cymbal Inventory Control (D) $45
Cymbal Invoice Writer (D) $45

GAMES

Epyx Dragon Riders of Pern (D&C) $25
Epyx Silicon Warrier (CT) $25
Sega Congo Bongo (CT) $25
Synapse Blue Max (D&C) $22
Sublogic Pinball (D&C) $20
Hesware Maze Master (CT) $26
Broderbund Choplifter (CT) $27
Epyx Pitstop (CT) $27
SubLogic Flight Simulator $27

COMMODORE VIC 20

PERSONAL PRODUCTIVITY

Creative Home Office (D) $22
Creative Home Office (C) $19
Creative Household Finance (D) $17
Creative Household Finance (C) $13
Creative Home Inventory (D) $13
Creative Home Inventory (C) $10
M.S.I. Practicalc Plus (D) $35
M.S.I. Practicalc Plus (T) $33
M.S.I. Practicalc (D) $32
M.S.I. Practicalc (T) $29
Hesware Vic Fourth (CT) $39
Hesware Hes Mon (CT) $26
Cardco Write Now $27
Hesware 6502 Pro Dev Sys $19
Epyx Fun with Art (CT) $26
Epyx Fun with Music (CT) $26
Broderbund Mastertype (CT) $24

EDUCATIONAL SOFTWARE

Hesware-Spinnaker KinderComp (CT) $23
Story Machine (CT) $23
Face Maker (CT) $23
Kids On Keys (CT) $23
Alphabet Zoo (CT) $23
Hesware Turtle Graphics (CT) $26
Creative Pipes (C) $19
Creative Spills & Fills (C) $19
Creative Hangman & Hangmath (C) ... $10

GAMES

Creative Choplifter (CT) $19
Epyx Temple of Apshai (C) $24
Sega Congo Bongo (CT) $25
Sega Star Trek (CT) $25

Rock Bottom Prices on Peripherals!

HESWARE Just for You!

Hescard Vic 5 Slot $39
HesModem Vic & C64 ..... $47

GRAPHICS TABLET

CHALKBOARD POWERPAD ..... $79 (C64 & Atari)

Software Packages
Logic Master $27
Leo's Links $27
Programmers Kit $19
BearJam $25
KOALAPAD ATARI C64 ..... $67

PRINTERS

STAR MICRONICS

FREE freight & ribbon!
STX-80 Thermal 60CPS $177
GEMINI 10X Dot 120CPS $287
GEMINI 15X Dot 120CPS $497
DELTA 10X Dot 160CPS $597
DELTA 15X Dot 160CPS $747
POWER T DAISY 18CPS $497
RADIX 10 Dot 200 50CPS $847
RADIX 15 Dot 200 50CPS $997

BMC PRINTERS

BMC BX80 ..... $267
BMC DAISY 101 ..... $597
BMC DAISY 401 ..... $697

MODEMS

NOVATION

Smart Cat 103-212 1200 ..... $415
212 Auto Cat $575
Cat $137
D-Cat $155
J-Cat $119

ANCHOR MODEMS

(with power & cable)
Mark 7 300 baud $129
Mark 12 300-1200 baud $319
Volksmodem 300 baud $79

MONITORS

BMC 13" Composite Color $229
BMC 12" Low Res Green $85
BMC 12" Low Res Amber $99
BMC 12" Hi Res Green $119
BMC 12" Hi Res Amber $129
USI 12" Green Hi-Hi Res $129
USI 12" Amber Hi-Hi Res $139
USI 14" Composite Color $279
Monitor cable w above $10

COMMODORE DISK DRIVES

Concord Disk Drive $279
Commodore 1541 ..... $269

WICO JOYSTICKS

The Boss $14
3 Way Grip Stick $21

CARDCO

Numeric Keypad C64 ..... $29
Graphic Printer Interface $69
Economy Printer Interface $39
Commodore 64 5 Slot $49
16K Board $53
Cassette Interface $27

MAXELL DISKS

MD1 SS-DD $27
MD2 DS-DD $40

COMMODORE 64 and ATARI COMPUTERS

Pinball Construction Set (D) $40
M.U.L.E. (D) $40
Worms? (D) $35
Archon (D) $40
Hard Hat Mack (D) $35
Murder on the Zinderneuf (D) $40
The Tesseract Strategy (D) $40
Word Flyer (D) $35
The Cut & Paste Word Processor (D) .. $50
D-Bug (D) $35
Axis Assassin (D) $35
Music Construction Set (D) $40
Financial Cookbook (D) $50
Dr. J. & Larry Bird One on One (D) .. $40

ELECTRONIC ARTS™

Home Software for the Commodore 64
The Standard for Sophicated Software in the '80's

FREE DISKETTE with each purchase of electronic arts software

$u¢h A Deal

CALL TOLL FREE
1-800-431-8697
Orders Only!

12629 N. Tatum Blvd., #138
Phoenix, AZ 85032
602-968-9128

For Information, Customer Service Release Dates, etc. Call
602-955-3857

(C) = Tape (D) = Disk (CT) = Cartridge

*TERMS OF OFFER: If you find a price for any software or peripheral in this issue that is lower than our advertised price, we'll guarantee to beat it! Valid only on product in similar in-stock conditions. Valid only on prices appearing in print in this issue.
ORDERING & TERMS: Send cashier check, money order; personal/company checks allow 3 weeks bank clearance. VISA/MasterCard accepted. Provide phone number with order. SHIPPING: Software add $4.00 for first piece, add $1.00 each additional piece. Hardware add 3% or $10.00 whichever is greater. Returns must have authorization number (call 602-968-9128 for authorization number). All returned merchandise subject to restocking fee and **must** come with **all** original packaging. No returns allowed after 30 days from shipping date. Prices are for cash; VISA and MasterCard add 3%. Prices subject to change without notice. All products subject to availability from manufacturers and/or suppliers. All prices in U.S. dollars.

placed in classrooms, in the library, or in a special computer laboratory room? How will their use be supervised, and by whom? Who will take care of maintenance and demonstrations of how to properly use the computers?

After decisions are made about how the computers will be used, by whom, and in what settings, it's time to start selecting hardware and software. Again, there are many questions. Should one brand of computers be purchased, or are different ones best for different purposes? For which brands of computers is the best software available? For which computers are good versions of the BASIC, Logo, and Pascal languages available? How much memory is needed, and are disk drives and printers needed for each computer? Are color video monitors essential, or will black-and-white do? Are modems needed? Which word processing program is best for students? What about lesson and drill programs? Where can good science simulations be obtained? These are just some of the questions that need to be addressed.

The relative importance of such questions, and the appropriate answers to each, depends on the prior decisions about how computers will be used, as well as the constraints imposed by the available budget, space, and personnel.

Hardware Is Not The Only Budget Item

At this stage, careful budget planning is critical so that sufficient money will be available for software, peripherals such as printers, staff training, maintenance, and supplies (such as disks and paper). This point cannot be overemphasized. Many schools have invested all their available funds in hardware, only to discover that it is useless without appropriate software and staff training.

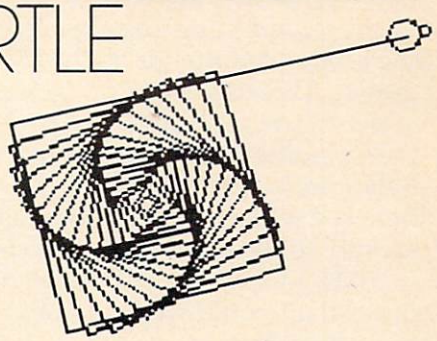
Once the computers are installed, there is another set of concerns. How will requests to use computers be handled? What about keeping up with new developments and the ongoing acquisition of new hardware and software? What should be done to encourage students and teachers who are uncomfortable using computers? What should be done about students who are so interested in computers they neglect other areas of study? How are computers changing the social structure of classes? Has a group of interested students evolved into a computer elite which tries to monopolize the computers? If so, how can this clique be led to serve as peer tutors to help and encourage the other students? Will teachers be uncomfortable because some students will know more than they do about the computers? What about students interested in more advanced programming or in forming a computer club?

The Challenge Of Computers In Education

As with any educational innovation, many new questions arise. This presents an exciting new challenge to educators: to adapt new technology to improve children's education.

Current claims about computers can be compared to prior claims about the educational potential of television, and this comparison raises serious concerns. Computers in education are now at a stage similar to that of television a few decades ago.

The enormous educational potential of television is well established; most children have learned a great deal from television. Unfortunately, much of what they have learned consists of advertising jingles and other trivia. With a few notable exceptions, television has not fulfilled its potential as an educational tool. The same could happen with computers; they could end up being used primarily as mindless electronic toys. Since computers are just beginning to be widely used, the directions we set in the next few years will be critical in determining whether their potential as educational tools will be fulfilled. ©

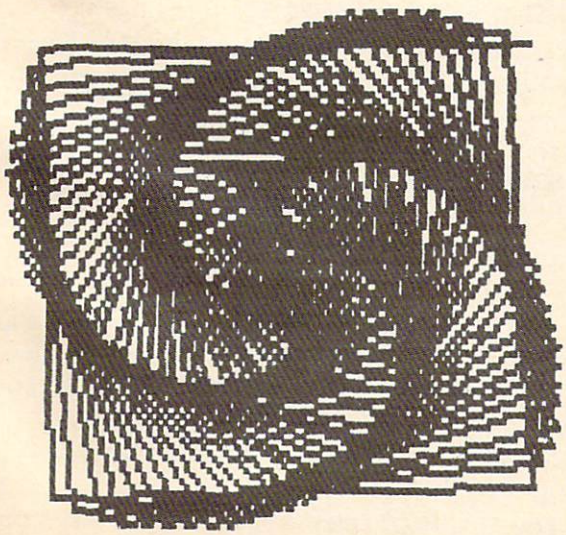


David D. Thornburg, Associate Editor

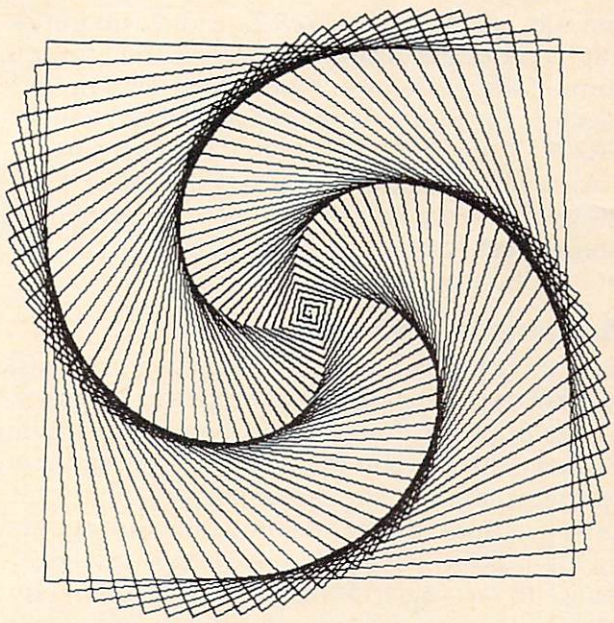
Atari Logo— The Plot Thickens

Perhaps it is because I am in the somewhat enviable position of working with four versions of Logo on a daily basis, but I sometimes get concerned about issues that might not bother most people. In the case of Atari Logo, I find myself wishing that I could draw lines with a higher resolution than that available from graphics mode 7. Unfortunately, even though the computer supports many other graphic modes, Atari Logo does not.

For example, if I draw a closely spaced squiral pattern on the screen, I get a dense and somewhat fuzzy picture like this:



Instead, I would like to get a nice crisp picture like this:



Obviously, since I *did* get a nice crisp picture, I was able to solve the problem. The trick is to have your turtle graphics pictures drawn with the Atari 1020 color graphics printer. This device is a four-color pen plotter that draws pictures on plain white paper with black, blue, green, or red ballpoint pens. As you can see from the picture above, the resolution of this plotter is quite high and the lines are crisp and thin.

Plotter Commands

The key to plotting Logo procedures is to generate the plotter commands as the picture is being drawn. This task was first tackled by Peter Cann at the Atari Cambridge Research Laboratory and then modified by Jason Gervich in Atari Customer Relations before being given to me. Naturally, I tinkered with the procedures some, so the results should not be blamed on anyone at Atari.

My goal was to build a set of plotting procedures that would work in the following way: If a procedure to draw a picture was typed by itself, it would appear only on the display screen. If, instead, the user typed

```
DRAW [procedurename]
```

the procedure would be drawn *both* on the screen and on the plotter. Having two ways to examine a procedure lets you save the plotter for the final debugged version. This saves on pen wear and on time, since the plotter is not nearly as fast as the screen turtle.

The key procedure is shown below:

```
TO DRAW :LIST
SETWRITE "P:
( TYPE CHAR 27 CHAR 27 CHAR 7 )
( PR "M240,0\*I\*M INT 2 * YCOR ", INT (-2) *
  XCOR )
RUN :LIST
SETWRITE [ ]
END
```

Basically, all this does is set the plotter up in the graphics mode and zero the pen position prior to running the procedure. Once the procedure is finished, the plotter is turned off (with the SETWRITE [ ] command). Note that the line that looks cryptic includes some backslashes (\ ). These are used to let Logo know that the following asterisks are to be taken literally, and do not indicate multiplication.

Movement And Color

Well, if we just run our procedure, we might ask by what magic the plotter is supposed to know how to draw the lines. The answer is that anytime we move the location of the turtle, we must send this information to the plotter as well. Since the turtle graphics commands for turtle movement are FD and BK, we must create new ones that also send messages to the plotter. Because I am intrinsically lazy, it was appealing to define new motion commands called F and B as follows:

```
TO F :X
FD :X
PLOT
END

TO B :X
BK :X
PLOT
END
```

Clearly, from these procedures, you can see that our PLOT is very thin. To thicken the PLOT, we add:

```
TO PLOT
( PR IF PEN = "PD ["D] ["M] INT 2 * YCOR ", INT
  (-2) * XCOR )
END
```

This procedure examines the pen position of the turtle along with the turtle location, and sends the plotter pen scurrying to its corresponding position. In order to take maximum advantage of the plotter paper width, I rotated the plot by 90 degrees so that as the screen image moves from left to right, the plotted image moves from top to bottom. This gives a very nice-sized image, even though the plotter paper is only 4.5 inches wide.

Of course, there is always the possibility that you might want to clear the screen. Since this should also move the plotter pen to the origin, we add the command:

```
TO C
CS
PR "M0,0
END
```

Changing the pen color is also easy—especially with these procedures:

```
TO PENBLACK
( TYPE CHAR 67 CHAR 48 )
END

TO PENBLUE
( TYPE CHAR 67 CHAR 49 )
END

TO PENGREEN
( TYPE CHAR 67 CHAR 50 )
END

TO PENRED
( TYPE CHAR 67 CHAR 51 )
END
```

The crafty among you will no doubt find that you can modify these four procedures to change the screen pen and pen colors as well.

Printing Procedures

The remaining plotter procedure that I find useful lets you get a "plotted" printout of your procedure listings:

```
TO P.PROCS
SETWRITE "P:
( TYPE CHAR 27 CHAR 27 CHAR 14 )
POPS
SETWRITE [ ]
END
```

I suggest that you enter these procedures into an otherwise empty workspace and save them in a file called PLOTTER. Then, whenever you want to plot the results of your handiwork later on, you can read these into your workspace by typing:

```
LOAD "D:PLOTTER
```

A High-Res Pen At A Low-Res Price!

Our NEW Edumate Light Pen™ is revolutionizing the world of computer graphics. Before the Edumate, hi-resolution light pens cost in excess of $100.00. Now for $29.95 you can accurately draw on your TV or monitor, play games or utilize educational programs.

Each Edumate Light Pen™ comes with FREE programs* including a draw routine, games and a disk utility that allows you to enter information into the computer with just a touch of your pen. Our entire line of Playground Software™, a fun-filled educational series for kids is light pen compatible.

It's EASY to use; just connect the light pen to your computer's joystick port and load the software. Within seconds you'll be able to use your computer by simply touching the screen!

The Edumate Light Pen™ is ideal for preschoolers, artists, engineers, educators, and all computer enthusiasts seeking a quick and easy way to interact with their computer.

* 5 programs for Atari 400/800™ computers
* 4 programs for Vic 20™ computers
* 3 programs for Commodore 64™ computers

Enjoy the world of computer graphics with the Edumate Light Pen™ — It's still the right pen at the right price — only better.

For Atari 400/800/1200®, Commodore 64®, Vic 20®

Prices subject to change without notice. See your local dealer or order direct. New catalog available.
Add $3.00 for postage and handling. Credit card orders call toll free: 1-800-334-SOFT
P.O. Box 3470, Dept. C, Chapel Hill, NC 27514 919-967-0861

futurehouse

and get your masterpiece recorded for posterity.

The squiral pattern at the beginning of this article was obtained by entering:

```
DRAW [SQUIRAL 91]
```

in which SQUIRAL had the following definition:

```
TO SQUIRAL :ANGLE
MAKE "SIDE 0
REPEAT 180 [F :SIDE RT :ANGLE MAKE "SIDE
  :SIDE +1]
END
```

To see an even more spectacular picture (one that I call a snowflake sunset), enter:

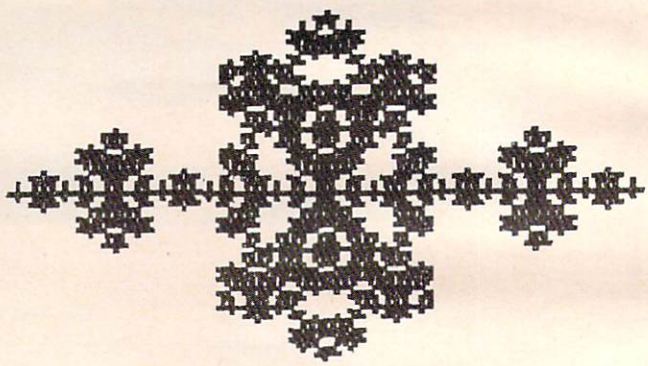

```
DRAW [SETUP SN 300 9]
```

in which SETUP and SN have the following definitions:

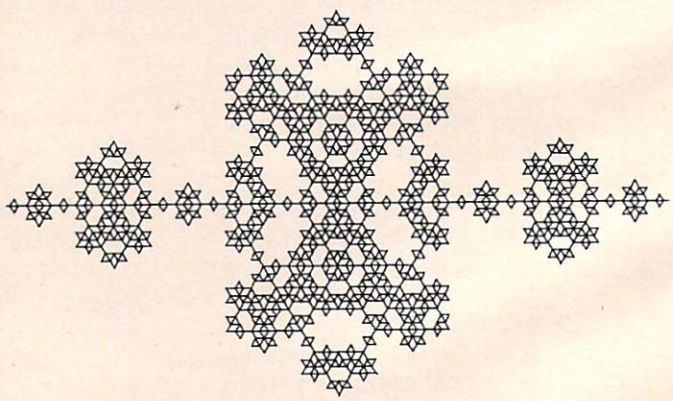
```
TO SETUP
PU SETPOS [-150 0] PLOT SETH 90 PD
HT
END

TO SN :S :L
IF :S < :L [F :S STOP]
SN :S / 3 :L
LT 60
SN :S / 3 :L
RT 120
SN :S / 3 :L
RT 120
SN :S / 3 :L
LT 120
SN :S / 3 :L
LT 120
SN :S / 3 :L
RT 60
SN :S / 3 :L
END
```

On the screen you get this:



And, on the plotter, you get this:



The snowflake sunset is one level of a fractal curve. You can experiment with different generations of this curve by changing the second number when you use SN (for example, SN 300 30). For the purposes of this month's column, this curve nicely demonstrates the value of connecting a pen plotter to your Atari Logo system! ©

SOUND SHAPER

Steven Kaye

"Sound Shaper" manipulates volume and frequency to give the VIC a smoother, more musical sound. We've also included versions for the 64, Atari, and TI. See the "Automatic Proofreader" article on page 60 before typing in the 64 and Atari versions.

One of the main differences between the sound the Commodore 64 can produce and sound produced by the VIC is the shape of the sound's waveform. The VIC produces only square waves. One microsecond the sound is off, the next it's on. This abrupt onset of sound produces somewhat nonmusical music. The tones sound electronic and unlike any acoustic instrument.

The Commodore 64, on the other hand, can simulate musical instruments by controlling the waveshape of the sound produced. Instead of turning the sound on and off abruptly, it can increase and decrease the amplitude (volume) more gradually under control of the programmer. It is important to bear in mind that the onset-offset or rise-fall time is still on the order of fractions of milliseconds, but it is not instantaneous as is the case with the VIC. It is this programmable rise-fall time that allows the Commodore 64 to sound more like a traditional acoustic instrument. We cannot control the actual waveshape of sounds on the VIC, but we can simulate wave-shaping by modulating the volume.

The first part of Program 1 demonstrates a simple application of this technique. It plays the entire frequency range for one of the VIC's four voices. First, the program asks for two inputs, the rise time and the fall time. Values between .5 and 10 seem to work best. Then the frequency value is POKEd into the appropriate register (line 140). Two separate FOR-NEXT loops (lines 150 and 180) control the rise and fall times. As the volume varies between 0 and 15, the input variables control the rate of volume change. Experiment with different rise-fall time values.

Frequency manipulation can also be used to produce unique effects. The second part of Program 1 shows how to produce an echo effect by rapidly alternating a frequency with its complementary frequency. Again we move through the frequency scale. In line 270 we use the amplitude modulation technique described above. Lines 280 and 300 POKE the frequency and then the frequency subtracted from 383 into the appropriate voice register.

On the first time through the loop, voice 2 (36875) is POKEd with 128 and then rapidly alternated with 255 (255 = 383 –128) while the sound fades as variable DB decreases. The timing loops in 290 and 310 as well as the step value in line 270 can be manipulated to increase or decrease the reverberation effect. Voice 2 was chosen for the example, but any of the four voices will produce interesting sounds.

Program 1: VIC Sound Shaper

```
40 PRINT"{CLR}{9 DOWN}"TAB(2)"{RVS}SHAPIN
   G{OFF} {RVS}VIC{OFF} {RVS}SOUNDS{OFF}"
                                  :rem 179
45 FOR T=1 TO 1500:NEXT           :rem 244
50 PRINT"{CLR}{7 DOWN}{6 RIGHT}SHAPED (1)
   "                              :rem 37
55 PRINTTAB(9);"{DOWN}OR":PRINTTAB(7)"
   {DOWN}ECHO (2)"                :rem 166
60 PRINT"{4 DOWN}{9 RIGHT}";:INPUT I$:IFV
   AL(I$)<1OR VAL(I$)>2THEN50     :rem 15
70 ONVAL(I$)GOTO100,240           :rem 49
100 REM*** THIS PART PRODUCES "SHAPED" MU
    SICAL NOTES***                :rem 213
110 PRINT "{3 DOWN}{2 RIGHT}RISE AND FALL
     TIME"                        :rem 36
115 PRINT"VALUES MUST EXCEED 0"   :rem 95
116 INPUT R,D:IF (R=0)OR(D=0) THEN 116
                                  :rem 45
120 V=36878:S=36875               :rem 13
130 FOR F=128 TO 255 STEP3        :rem 71
```

Notes For 64, Atari, And TI Versions

Since the Commodore 64 has a programmable sound envelope, we added Program 2 to make the SID chip more accessible. By changing values entered for attack, decay, sustain and release, you can control the shape of the sounds produced by the program. The second part of the program produces an echo effect very similar to the effect produced in the VIC version. The parameters set in the first part are also used for the sounds produced in the second part.

The Atari and TI versions of "Sound Shaper" are designed to alter the shape of sounds in the same fashion as the VIC version. Since sound generation in these computers is similar to the VIC's, the logic in these versions is essentially the same as in the VIC version. In the Atari version (Program 3), you may also change the distortion quality of the sound. Since the execution speed differs considerably between TI console and Extended BASIC, users with console BASIC will not hear a smooth shaping of the sounds in the first part of the TI version (Program 4). Extended BASIC provides much better results.

```
140 POKE S,F                              :rem 137
150 FOR DB=0 TO 15 STEP 5/R               :rem 107
160 POKE V,DB                             :rem 206
170 NEXT                                  :rem 215
180 FOR DB=15 TO 0 STEP -5/D              :rem 141
190 POKE V,DB                             :rem 209
200 NEXT                                  :rem 209
210 FORT=1 TO 50:NEXT                     :rem 189
220 NEXT                                  :rem 211
230 POKE V,0:END                          :rem 135
240 REM*** THIS PART CREATES AN ECHO EFFE
    CT***                                  :rem 71
250 V=36878:S=36875                        :rem 17
260 FOR P=128 TO 255 STEP 3                :rem 85
270 FOR DB=15 TO 1 STEP -.5                :rem 73
280 POKE V,DB:POKE S,P                      :rem 9
290 FOR T=1 TO 10:NEXT                    :rem 193
300 POKE S,383-P                           :rem 92
310 FOR J=1 TO 10:NEXT                    :rem 176
320 NEXT:NEXT                              :rem 77
330 POKE V,0                              :rem 119
```

Program 2: 64 Sound Shaper

```
15 PRINT"{CLR}SET PARAMETERS FOR SOUND AN
   D ECHO"                                 :rem 12
20 CHIP = 54272                           :rem 199
22 FOR T=CHIP TO CHIP + 24 : POKET,0:NEXT
                                          :rem 234
30 INPUT "ATTACK RATE (0-15)";AT$:AT=VAL(
   AT$):IF AT<0 OR AT>15 THEN 30  :rem 82
40 INPUT "DECAY RATE (0-15)";DE$:DE=VAL(D
   E$):IF DE<0 OR DE>15THEN 40    :rem 198
50 INPUT "SUSTAIN VOLUME (0-15)";SU$:SU=V
   AL(SU$):IF SUS<0OR SU>15THEN50 :rem 35
60 INPUT "RELEASE RATE(0-15)";RE$:RE=VAL(
   RE$):IF RE<0ORRE>15THEN60      :rem 171
80 POKECHIP+24,15:POKECHIP+5,16*AT+DE
                                          :rem 209
90 POKECHIP+6,16*SU+RE                     :rem 68
100 FOR T= 20{2 SPACES}TO 80 STEP 5:POKEC
    HIP+4,17                              :rem 103
110 POKECHIP,50:POKECHIP+1,T              :rem 223
115 FORJ= 1 TO 500+1.7↑AT+1.7↑DE:NEXTJ
                                          :rem 141
120 POKECHIP+4,16:FORH=1TO2↑RE:NEXT:NEXT
                                          :rem 107
200 FOR T= 20 TO 80 STEP 5                :rem 232
210 FOR DB = 15 TO 1STEP -.5               :rem 67
215 PRINT"{HOME}{5 DOWN}*ECHO*{6 LEFT}
    {7 SPACES}"                           :rem 242
220 POKECHIP+4,17:POKECHIP+24,DB:POKECHIP
    +1,T:FORP=1TO10:NEXT                  :rem 111
230 POKECHIP+1,100-T:FORJ=1TO10:NEXT:NEXT
    :NEXT                                 :rem 202
240 POKECHIP+4,16                         :rem 219
```

Program 3: Atari Sound Shaper

```
NN 3 ? "{CLEAR}":POSITION 12,12:? "SOU
     NDSHAPER"
FO 4 POKE 752,1
OK 5 DIM I$(5),VO$(5),DS$(5)
OC 6 FOR T=1 TO 300:NEXT T
MD 10 PRINT "Shape (1) or Echo (2)";
FP 20 INPUT I$
EC 21 IF VAL(I$)<1 OR VAL(I$)>2 THEN 1
      0
EF 40 REM *** THIS PROGRAM PRODUCES SH
      APED MUSICAL NOTES ***
NL 50 PRINT "Voice (0-3)";:INPUT VO$
AF 55 IF VAL(VO$)>3 OR VAL(VO$)<0 THEN
       50
EL 57 VO=VAL(VO$)
DJ 60 PRINT "Distortion(0-14)";:INPUT
      DS$
BN 65 IF VAL(DS$)<0 OR VAL(DS$)>14 THE
      N 60
DA 67 DS=VAL(DS$)
BH 68 ON VAL(I$) GOTO 70,195
FC 70 ? "Rise Fall Time";:INPUT R,D
KC 75 IF R<1 OR D<1 THEN 70
LJ 95 ? "{CLEAR}";:POSITION 12,12:? "*
      Shaped Notes*"
JE 100 FOR F=121 TO 60 STEP -4.1
EF 120 FOR DB=0 TO 15 STEP (1/R)*15
KJ 130 SOUND VO,F,DS,DB
FK 140 NEXT DB
GH 150 FOR DB=15 TO 0 STEP -(1/D)*15
KM 160 SOUND VO,F,DS,DB
GB 165 NEXT DB
BG 170 FOR T=1 TO 50:NEXT T
BO 180 NEXT F
NE 190 POKE 752,0:END
AA 195 ? "{CLEAR}";:POSITION 12,12:? "
       ***ECHO EFFECT***"
JP 200 FOR P=121 TO 60 STEP -4.1
HD 210 FOR DB=15 TO 1 STEP -0.5
LD 220 SOUND VO,P,DS,DB
AP 230 FOR T=1 TO 10:NEXT T
HM 240 SOUND VO,181-P,DS,DB
PN 250 FOR J=1 TO 10:NEXT J
CG 260 NEXT DB:NEXT P
ND 270 POKE 752,0:END
```

ATARI®

600XL	CALL
800XL	CALL
1200XL	$409*

*Reflects $100 Atari Rebate

1050 DRIVE	$335	MICROBITS INFC	$78
1025 PRINTER	$399	80 COLUMN BD	$249
1020 COLOR PTR	$219	TECHNICAL NOTES	$25
1027 PRINTER	$279	REAL TIME CLK	$38
1010 RECORDER	$72	810 DRIVE	$419

DRIVES

ASTRA 1620	$469
RANA 1000	$295
PERCOM 88-S1	$298
PERCOM 40-S1	$418
PERCOM 40-S2	$718
PERCOM 44-S1	$510
PERCOM 44-S2	$929

MEMORIES

48K RAM (INTEC)	$95
64K RAM (INTEC)	$119
48K RAM (MOSAIC)	$109
64K RAM (MOSAIC)	$145
128K RAM DISK	$299
32K RAM (MOSAIC)	$68

ATARI SOFTWARE

ADVENTURE INT'L
Adv. 1-12 each (C) $18
Preppie (C/D) $20
Preppie II (C/D) $23
Diskey (D) $33
Sea Dragon (C/D) $23

APX
Eastern Front (C/D) $23
747 Land Sim. (C/D) $17
Fig-Forth (C) $30

ATARI INC.
Microsoft Basic II (R) $62
Mickey in Great Outdoors (C/D) $36
Paint (D) $30
Speed Reading (C) $54
Qix (R) $30
Dig Dug (R) $30
Atari Writer (R) $68
Donkey Kong (R) $30
Time Wise (D) $23
Visicalc (D) $139
Juggles House (C/D) $22
Juggles Rnbw (C/D) $22
Pilot (Home) $55
Galaxian $30
Defender $30
ET $34
Microsoft Basic (D) $62
Macro Ass. & Edit (D) $62
Assembler Editor (R) $42
Basic Cartridge (R) $45
Pac Man (R) $30
Centipede (R) $30
Caverns of Mars (D) $28
Star Raiders (R) $30
Conv. Lang. Ea. (C) $42
Music Composer (R) $31
Super Breakout (R) $26
My First Alphabet (D) $26
Prog. 2 & 3 (ea.)(C) $21
Word Processor (D) $102
Pilot (Educ.) $92
Touch Typing (C) $19
Home File Mngr (D) $36

AUTOMATED SIMUL.
Hellfire Warrior (C/D) $27
Kng Arthr's Heir (C/D) $20
Invasion Orion (C/D) $17
Temple of Aps. (C/D) $27
Star Warrior (C/D) $27
Dragon's Eye (D) $20
Crush Crumble (C/D) $20

AVALON HILL
VC (D) $17
B-1 Nuc. Bomber (C) $12
Legionnaire (C) $23

BRODERBUND
Sky Blazer (D) $22
Bank St. Writer (D) $46
A.E. (D) $23
Arcade Machine (D) $39
Choplifter (D) $23

CBS
Mountain King (R) $27
Boulders & Bombs (R) $27
Krazy (each) $34

CONTINENTAL SOFT.
Home Accountant (D) $48
Tax Advantage (D) $39

DATASOFT
Text Wizard (D) $65
Graphic Master (D) $27
Micro Painter (D) $23
Lisp Interpreter (D) $79
Graphics Gen.(D) $17
Basic Compiler (D) $65
Zaxxon (C/D) $27

DON'T ASK
Sam (D) $39
P.M. Animator (D) $23
Teletari (D) $27

EDU-WARE
Prisoner II (D) $27
Spelling Bee (D) $27
Compu-Read (D) $20
Compu-Math Fr. (D) $27
Compu-Math Dec. (D) $27

EDUCATIONAL SOFT.
Tricky Tutorial 1,2,3 or 4 (C/D) $15
Tricky Tutorial 5,6 or 7 (C/D) $22

INFOCOM
Suspended (D) $34
Zork I, II or III (D) $27
Starcross (D) $27
Deadline (D) $34

JV SOFTWARE
Jrny to Plnts (C/D) $20
Action Quest (C/D) $20
Ghost Encount. (C/D) $20

LJK
Letter Perfect (D) $74
Data Perfect (D) $74

ON-LINE
Ultima II (D) $39
Marauder (D) $23
Lunar Leeper (D) $20
Wiz & Princess (D) $22
Frogger (C/D) $23
Crossfire (R) $23

OPTIMIZED SYSTEMS
C-65 (D) $58
Bug-65 (D) $23
Max-65 (D) $58
Basic A+ (D) $58

ROKLAN
Gorf (D) $27
Gorf (R) $30
Wizard of Wor (D) $27
Wizard of Wor (R) $30

SIRIUS
Alpha Shield (R) $27
Wavy Navy (D) $23
Bandits (D) $23

SPINNAKER
Snooper Troop 1,2 (D) $30
Kindercomp (D) $20
Rhymes & Riddles (D) $20
Hey Diddle Diddle (D) $20
Srch Amzng Thngs (D) $27
Story Machine (D) $23
Face Maker (D) $23

STRATEGIC SIM.
Cosmic Balance (D) $27
Cosmic Balance II (D) $27
Tigers In Snow (C/D) $27
Battle of Shiloh (C/D) $27
Battle of Norm. (C/D) $27
Galactic Gladiator (D) $27
Cytron Masters (D) $27

SYNAPSE SOFTWARE
File Mngr 800+ $65
Protector II (D) $23 (R) $29
Shamus (D) $23 (R) $29
Fort Apocalypse (C/D) $23
Shamus II (C/D) $23
Necromancer (C/D) $23
Pharoh's Curse (C/D) $23

THORN EMI
Soccer (R) $34
Jumbo Jet (R) $34
Submarine Comm. (R) $34

USA
Atari World (D) $39
3-D Sprgrphcs (C/D) $27

MISCELLANEOUS
Sargon II (C) $20 (D) $23
Financial Wizard (D) $41
Castle Wolfenstein (D) $20
Master Type (D) $27
Millionaire (D) $52
Astro Chase (D) $22
Ali Baba (D) $22
Miner 2049er (R) $34
Sammy Sea Serp. (C) $13
Pinball (D) $20

SPECIALS

Gemini 15X Printer	$399		
Axiom AT-100 Printer (with interface	$229		
Astra Double Density Dual Drive	$469		
Rana 1000 Drive	$319		
Bit-3 80 Column Board	$245		
Mannesmann Talley 160L Printer	$589		
Atari 400 Keyboard (In Home)	$35		
Programmer Kit	$48	Entertainer Kit	$64
Wico Joystick	$23	Wico Trackball	$49

*ASTRA 1620
DISK DRIVE SYSTEM

MORE FOR YOUR MONEY
DOUBLE OR SINGLE DENSITY
TWO DRIVES

SPECIAL $469

Printers/Etc.

GEMINI 10X	$279	PROWRITER	$345
GORILLA	$199	SMITH TPI	$488

CITOH
Prowriter $345
Prowriter II $629
Starwriter $1149
Printmaster $1448

NEC
8023 A-C $409
3510 $1375
3530 $1579
3550 $1779
7710/7730 $1998

SILVER REED P $669
QUME 11/40+ $1299

OKI-DATA
Microline 82A $398
Microline 83A $638
Microline 84P $958
Microline 92 $488
Microline 93 $858

DIABLO
620R $939
630R $1719

MONITORS

AMDEK
Color I $289
V300 $139
V300A $149
Color II $449

NEC
GRN (JB1260) $115
GRN (JB1201) $155
Color Composite $298
RGB Color $598

MODEMS

HAYES
Smartmodem $209
Smartmodem 1200 $498
Micromodem II $259

NOVATION
J-Cat $99
Apple Cat II $259
D-Cat $149

D = Disk
R = ROM (Cartridge)
C = Cassette

COSMIC COMPUTERS
UNLIMITED

727 BREA CANYON RD., SUITE 16
WALNUT, CA 91789
ORDER LINES OPEN MON-SAT 8 am - 8 pm

(800) 626-7642
PLEASE FOR ORDERS ONLY
SORRY, NO COD'S

(714) 594-5204
FOR TECHNICAL INFO, ORDER INQUIRIES, OR FOR CALIFORNIA ORDERS

Add $2.50 shipping per software order in continental U.S. Add $5.00 shipping per software order for AK, HI, FPO-APO. Add $10.00 or 15% (whichever is greater) per software order for non-U.S. Call for cost of hardware shipping. Calif. residents add 6½% sales tax. Cashiers checks or money orders filled within 24 hours for items in stock. Personal checks require 4 weeks to clear. MasterCard and Visa OK for software only within continental U.S., add 3% surcharge. Include card no., expiration date and signature. Due to our low prices, all sales are final. All defective returns must have a return authorization number. Please call to obtain one before returning goods for replacement or repair. Prices & availability subject to change.

COMMODORE

CBM 64	CALL
1541 DISK DRIVE	$239

1701 Color Monitor	$255	1530 Recorder	$59
1525 Printer	$239	1600 Modem	$59
1520 Color Ptr	$169	1650 Auto Modem	$89
Card ? (Infc)	$60	CMB 64 Ref Guide	$18
Light Pen	$29	The Connection (Infc)	$85
Cassette Infc	$29	MSD Disk Drive	$339
Card ? Software	$16	PTI 45 Lot Board	$59

64 SOFTWARE 64

Multiplan ..... CALL
Script 64 ..... $77
Calc Result Prof. $114
Calc Result Easy $68
The Home Accountant $48
Delphis Oracle $89
Word Pro 3 with Spell $78

ACCESS SOFTWARE
Neutral Zone (C/D) $26
Sprite Master (C/D) $27

AVALON HILL
Nukewar (C) $12
Planet Miners (C) $12
Androm. Conquest (C) $14
Midway Campaign (C) $12
North Atl. Convoy (C) $12
Comp. Stcks/Bnds (C) $15
Computer Football (C) $18
Telengard (C) $16

BATTERIES INCLUDED
Paper Clip (D) $85
Delphis Oracle(D) 89

BRODERBUND
Choplifter (R) $29
Serpentine (R) $27
Seafox (R) $27
David's Midnight (D) $23

COMMODORE
Easy File (D) $75
Easy Finance (D) $38
Easy Mail (D) $38
Easy Script (D) $75
Easy Schedule (D) $59
Logo (R) $75
Pilot (D) $75
Assembler (D) $38
Music Machine (D) $25
Music Composer (D) $25
Meza Music (D) $75
Video/Music Supt. (D) $38
Jupiter Lander (R) $25
Radar Rat Race (R) $25
Sea Wolf (R) $25
Kickman (R) $25

COMM-DATA
Pakacuda (C) $14 (D) $18
Escp. MCP (C) $14 (D) $18
Centropods (C) $14 (D) $18

COMPUTERMAT
Arcade-Pak (C) $18
Education-Pak (C) $18

CREATIVE SOFTWARE
Moondust (R) $25
Trashman (R) $25
Save New York (R) $25
Astroblitz (R) $25
Household Fin. (D) $25

DATA 20
Video Pak 80 $139
Z80 Video Pak $229

EN-TECH
Finance Calc 64 $34
Data Base 64 $56
Invoice Ease 64 $56

EPYX
Temple of APS (D) $27
Upper Reach. APS (D) $14
Jumpman (D) $27

HES
HES Modem $59
6502 Prof.Dev.Sys.(C) $22
Hesmon 64 (R) $27
Turtle Grapics II (R) $41
Heswriter 64 (R) $32
Gridrunner (R) $27
Retroball (R) $27

INFOCOM
Zork I, II or III (D) $27
Deadline (D) $35
Starcross (D) $27

JIN SAM
Mini-Jini (R) $75

LITTLE WIZARD
Pro.Mail.List (C) $22 (D) $25
Stockmaster (Inventory) (C) $25 (D) $28

LOGISTIC
Datacalc 64 (C) $55 (D) $59
Home Journal (D) $55

MICROSPEC
Payroll System (D) $73
Inventory Pkg (D) $73
General Ledger (D) $73
Disk Data Mgr (D) $62
Mail List Mgr (D) $41
Checkbook Mgr (D) $39

M-SOFT
M-File (D) $89

ON-LINE
Frogger (D) $23
Jawbreaker (D) $20

PACIFIC COAST SOFT.
PCS (80 Col BD, Word Proc, D.Base, Spreadsheet) CALL
Account PAC (C/D) $34
File PAC (D) $30
Editor PAC (D) $39
Inquire PAC (D) $57
Happy Tutor Typng (D) $18

PROFESS. SOFTWARE
Wordpro 3+/64 (D) $68

QUICK BROWN FOX
Prof.Word Proc. (R) $50

RAINBOW
Writers Assistant $95
Spreadsheet Assist. $95
File Assistant $95

SIRIUS
Blade/Blackpoodle (D) $27
Type Attack (D) $27
Repton (D) $27
Critical Mass (D) $27
Snake Byte (D) $23
Way Out (D) $27
Fast Eddie (D) $23
Turmoil (D) $23
Spider City (D) $27
Squish'Em (D) $23
Final Orbit (D) $27
Alpha Shield (D) $27

SKYLES ELEC. WORKS
Busicalc (C/D) $52
Busiwriter (D) $72

SPINNAKER
Snooper Troops 1 (D) $29
Facemaker (D) $23
Kindercomp (D) $20
Hey Diddle (D) $20
Most Amaz. Thing (D) $27

SYNAPSE
Fort Apocalypse (C/D) $23
Survivor (C/D) $23
Drelbs (C/D) $23
Pharoh's Curse (C/D) $23
Protector II (D) $23
Morgal (D) $23
Shamus (D) $23

TAYLORMADE
Touch Typing Tutor 3.0 (D) $21

TIMEWORKS
Rbbrs/Lost Tomb (C/D) $21
Wall Street (C/D) $21
Money Manager (C/D) $21
Data Master (C/D) $21
Dungeons of Alg. Dragons (C/D) $21

TOTL
Text 2.6 (C) $32 (D) $34
Label 2.6 (C) $15 (D) $17
Time Manager 2.6 (C) $24
Time Manager 2.6 (D) $27
Resrch Assist. 2.0 (C) $24
Resrch Assist. 2.0 (D) $27

UMI
Motor Mania (C) $20
Renaissance (C) $27

VICTORY
Annihilator (C/D) $16
Kongo Kong (C/D) $16
Trek (C/D) $14
Adv. Pack #1 (C/D) $16
Adv. Pack #2 (C/D) $16
Grave Robbers (C/D) $13
Chomper Man (C/D) $18

Program 4: TI Sound Shaper

```
100 CALL CLEAR
110 CALL SCREEN(15)
120 PRINT TAB(7);"SHAPING TI SOUNDS
    "
130 FOR T=1 TO 6
140 PRINT
150 NEXT T
160 PRINT "CHOOSE:"
170 PRINT
180 PRINT
190 PRINT TAB(4);"1) SHAPED MUSICAL
     NOTES"
200 PRINT
210 PRINT TAB(4);"2) ECHO"
220 PRINT
230 PRINT TAB(4);"3) QUIT"
240 PRINT
250 INPUT A$
260 IF (VAL(A$)<1)+(VAL(A$)>3)THEN
    250
270 ON VAL(A$)GOTO 290,520,690
280 REM  THIS PART PRODUCES "SHAPED
    " MUSICAL NOTES
290 CALL CLEAR
300 CALL SCREEN(13)
310 PRINT TAB(3);"* SHAPED MUSICAL
    NOTES *"
320 FOR T=1 TO 10
330 PRINT
340 NEXT T
350 PRINT "ENTER RISE AND FALL TIME
    S -"
360 PRINT "USE VALUES GREATER THAN
    ZERO";
370 PRINT
380 INPUT R,D
390 IF (R=0)+(D=0)THEN 380
400 FOR F=110 TO 880 STEP 30
410 FOR DB=30 TO 0 STEP -5/R
420 CALL SOUND(-10,F,DB)
430 NEXT DB
440 FOR DB=0 TO 30 STEP 5/D
450 CALL SOUND(-10,F,DB)
460 NEXT DB
470 FOR T=1 TO 50
480 NEXT T
490 NEXT F
500 GOTO 100
510 REM  THIS PART CREATES AN ECHO
    EFFECT
520 CALL CLEAR
530 CALL SCREEN(14)
540 PRINT TAB(8);"* ECHO EFFECT *"
550 FOR T=1 TO 12
560 PRINT
570 NEXT T
580 FOR F=110 TO 880 STEP 30
590 FOR DB=1 TO 30
600 CALL SOUND(-10,F,DB)
610 FOR T=1 TO 10
620 NEXT T
630 CALL SOUND(-10,990-F,DB)
640 FOR J=1 TO 10
650 NEXT J
660 NEXT DB
670 NEXT F
680 GOTO 100
690 END
```

INSIGHT: Atari

Bill Wilkinson

In this column, we continue the discussion of formatted screen techniques.

PUT And GET And The Text Screen

This is another one of those "Did you know?" tidbits. Did you know that when you use GRAPHICS 0 from Atari BASIC you have automatically opened the screen for GETting and PUTting via file number 6? It's true, and it is because Atari BASIC does not check the mode number for the GRAPHICS statement.

GRAPHICS 0 is thus exactly equivalent to:

```
OPEN #6,12+16,0,"S:"
```

So if you need to GET or PUT from or to the screen, you can do it directly to file #6 without any further ado.

Unfortunately, there are a few gotchas involved in using GET and PUT to the Atari Screen graphics driver ("S:"), some of which you may have seen before, so let's discuss them, as well as ways around them.

The first problem is that if you use PUT #6 combined with POSITION statements or PRINT statements, you will probably end up leaving some inverse video spaces (white boxes) around on the screen, as Program 1 illustrates. This is because the screen graphics driver works almost (but not quite) like the screen editor driver ("E:", the normal channel #0 device which PRINT and INPUT use). Unfortunately, "S:" can't seem to handle its cursor properly, so it may be best to avoid using PUT #6.

Program 1: Problems With PUT #6

```
10 GRAPHICS 0
20 POSITION 30*RND(0),20*RND(0)
30 PUT #6,65+20*RND(0)
40 GOTO 20
```

How can we avoid PUT #6 if we have something we need on the screen? Simple. Use PUT#0 (if you have BASIC XL or any other product which allows PUT to file #0) or PRINT. If you use PRINT, of course, you will have to use

```
PRINT CHR$(X);
```

in place of PUT #0,X. And why does outputting to file #0 work where using #6 does not? Because #0 is opened to "E:", and there are several subtle differences between "E:" and "S:" where cursor positioning and character I/O are concerned.

Unfortunately, while the problems with PUT #6 are fairly easy to get around, the problems with GET #6 must be dealt with directly. And why can't we simply use GET #0 in place of #6 here, as we did with PUT? Because, when you ask "E:" (channel #0) for a character, it waits until the user actually types in an entire line—terminated by a RETURN character—before returning anything at all to its caller (you are the caller via BASIC in this case).

The whole reason for using GET #6 is to allow ourselves to read individual characters from the screen. We simply can't use GET #0 or anything else which accesses "E:".

But this is putting the cart before the horse a little. Before "fixing" the problem, let's illustrate it with Program 2.

Program 2: Problems With GET #6

```
10 GRAPHICS 0
20 PRINT "ABCDEFGHIJKLMNOP"
30 FOR I=2 TO 12 : POSITION I,0
40 GET #6,CHAR
50 POSITION 20,20 : PRINT CHAR
60 FOR J=1 TO 200 : NEXT J : REM jus
   t a delay loop
70 NEXT I
```

I hope you actually stopped while reading to try out that listing. Bizarre, isn't it? It seems that you can't GET data from the screen without destroying it. Now, most of the articles which I have seen which note this problem suggest that the only safe fix is the following:

1. POSITION yourself on the character you want.
2. GET the character to a variable.
3. POSITION yourself again to the same location.
4. PRINT the character back onto the screen.

That fix will indeed work, but I would propose that an alternate solution is to simply print a "left arrow" (backspace) and then the character, thus avoiding the extra POSITION statement. In Program 2, we could simply add this line to fix things up:

```
45 PRINT CHR$(30);CHR$(CHAR);
```

Now that you know how to properly PUT and GET to the screen, you probably have a fair idea of how I built my onscreen editor. It isn't too hard to do anything you want to the GRAPHICS

0 screen, once you get past the quirks in the Atari OS.

Fettering Your NEXT

Probably every BASIC book you have ever seen tells you to properly nest FOR/NEXT loops. Aside from the neatness of it, there are some good and practical reasons. Consider Program 3.

Program 3: Obviously Invalid Nesting

```
10 FOR I=1 TO 6
20   FOR J=1 TO 3
30 NEXT I
40   NEXT J
```

Very few of you would deliberately write a BASIC program which looked like that. Even with the indentation I have given it, it should be obvious that something is wrong.

And, yet, it is fairly easy to write a program which will look proper and yet have the effect of that listing! Don't believe it? Try Program 4.

Program 4: A Subtle Problem

```
100 REM Program task: Print all numb
    ers from 1 to 9, in a nested loo
    p fashion.  When the first sum o
    f 15 or
101 REM greater is found, cease the
    operation.  When the sum is 10 o
    r more, don't print the result.
102 REM Repeat for the products of t
    he same numbers in the same fash
    ion.
110 print "I","J","SUM"
120 FOR I=1 TO 9
130   FOR J=1 TO 9
140     SUM = I+J
150     IF SUM > 14 THEN 200
160     IF SUM > 10 THEN 190
170     PRINT I,J,SUM
180   NEXT J
190 NEXT I
200 PRINT "I","J","PRODUCT"
210 FOR J=1 TO 9
220   FOR I=1 TO 9
230     PROD = I*J
240     IF PROD > 14 THEN 290
250     IF PROD > 10 THEN 280
260     PRINT J,I,PROD
270   NEXT I
280 NEXT J
290 END
```

Now this looks perfectly harmless, if somewhat pointless, right? It looks like it should work fine. Yet, if you will type it in and RUN it, you will find that line 280 will give you a NEXT WITHOUT MATCHING FOR error the first time it is reached. How? Surely line 210 is the FOR which matches the NEXT of line 280.

The Interpreter's Dilemma

If Atari BASIC were a compiler language, it would probably execute that program correctly. However, since it is an interpreter, it must work within the strictures of that mode. Interpreters, by their very nature, cannot easily keep a history of all NEXT usages. It is enough that they remember where the FOR statements are, so that when a NEXT is encountered they can go back to the FOR to execute the loop another time.

Consider, then, the dilemma of the poor interpreter in the above program. In line 160, we are asking it to bypass the end of the inner FOR loop (since we know we are done with the previous usage of it) and start the next iteration of the outer loop (NEXT I). But wait. There is still a FOR J on the runtime stack, yet we are executing a NEXT I. What can we do?

Atari BASIC does what most modern "smart" BASICs do. If it finds a loop variable NEXT which does not match the last FOR on the stack, it presumes that the user has jumped out of the inner loop (as indeed we have here) since that is a common occurrence. So BASIC looks backward in the stack for a matching FOR. Eureka! It finds the FOR I only one level down in the stack, without any intervening GOSUBs, so its supposition seems confirmed. All works well.

However, look at line 150, wherein we jump out of all the loops. What have we left on the runtime stack now? Obviously, both a FOR I and a FOR J. Well, no real problem. After all, we know we jumped all the way out of the loop, don't we? We don't. Why not? Because a BASIC interpreter must presume that the BASIC programmer knows what he or she is doing. It is, unfortunately, perfectly legal to jump in and out of a loop in Atari BASIC. It is, in fact, even legal to have more than one NEXT for any given FOR.

So what can BASIC think when it gets to line 210 but that it is starting the inner FOR loop over again? It leaves the FOR I in place (for all it knows, the next statement it encounters might be a NEXT I) and adds a new FOR J.

Disaster really strikes in line 220. Poor BASIC *is* trying its best. Knowing that it is not uncommon for BASIC programmers to jump out of loops or to jump to the beginning of a loop to start it again, BASIC almost *has* to presume that the FOR I of line 220 is the beginning of a new outer loop. Besides, it already has a FOR I on its runtime stack. How can it allow another?

Well, if this is the beginning of a new outer loop, better throw away the old outer loop and any of its inner loops. Say good-by to the old FOR I and FOR J; we're ready for another outer loop with a new FOR I. Right?

Wrong. But BASIC doesn't know about it while it stays in the FOR I loop, since it encounters no other FORs or NEXTs. In fact, the entire loop executes nicely with no problems, and the FOR is properly removed from the stack when the last value of I is reached. Did you notice that the stack is now empty?

Where did this NEXT J come from? FOR J was an inner loop and was thrown away when the outer loop was restarted.

The Fix In Atari BASIC

Actually, Atari BASIC is not a culprit here. Virtually every BASIC will have this same problem unless it makes a pre-pass through the user's program to detect possible inconsistencies (such as jumping out of nested loops). In point of fact, Atari BASIC is almost a good guy here. Recognizing that even with the best interpretation we could do, we could not prevent users from writing (or needing to write) structures such as I have shown you, we designed a "fix" into Atari BASIC.

The fix takes the form of the POP statement. POP simply removes the last level of the runtime stack. In Program 4, the easiest fix is

```
150 IF SUM > 9 THEN POP : POP : GOTO 200
```

(and a similar fix is needed in line 240, of course).

Notice I said that was the easiest fix. POP is usually not the best fix. Generally, you can write good and properly structured programs, with properly terminating FOR loops, without ever resorting to such extreme measures as the POP statement. Still, it is comforting to know that POP is around. Personally, I tend to use it whenever an error condition occurs and I want to get all the way back out to (for example) the menu level without leaving nasty GOSUBs or FORs on the runtime stack.

A curiosity: Did you notice that if the nesting in lines 200 through 290 is reversed (that is, if the FOR I occurs before the FOR J), the program will work correctly? Do you see why? Fundamentally, because you are now doing what BASIC expected you to do. Go try this example both ways on a Commodore or Radio Shack or whatever computer. Does either method work? I'd be interested in knowing.

If you ever get a NEXT WITHOUT MATCHING FOR error, look for this kind of structure in your program. If you find it, you can fix it with POP, but wouldn't it be nicer to write the program correctly?

A footnote to all of that: Can you begin to get an appreciation of what language designers must contend with? It is not enough that a language do what it is expected to do. A good language will come halfway toward helping its users over the rough spots.

Reading Object Code Files

Here's a loader for binary object files which will place them in memory at the location they were assembled for. The routine is written entirely in Atari BASIC, so it is slow. Next month, we'll present the same routine written in machine language, perhaps even in a version callable from a BASIC program (just to speed things up).

Atari object files have a fixed and reasonable format. The first two bytes of the file are always $FF and $FF (255 and 255, in decimal). They serve as a check that the file is indeed an object file. The next two bytes are the starting address in memory of the first (and perhaps only) "segment," while the following two bytes are the ending address of the segment. These header bytes are followed by enough object bytes to fill up the memory from the starting address through and including the ending address.

If a file has multiple segments, each segment may or may not (programmer's option) be preceded by the same $FF and $FF bytes. Each segment must always be headed by both a start and an end address. Without further ado, then, the loader program, Program 5.

Program 5: Load A Binary Object File

```
100 REM binary object file loader
110 DIM NAME$(30)
120 PRINT "WHAT FILE TO LOAD ";
130 INPUT NAME$
140 OPEN #1,4,0,NAME$
200 REM get and check header
210 TRAP 400
220 GET #1,LOW : GET #1,HIGH
230 TRAP 40000
240 IF LOW=255 AND HIGH=255 THEN GET
    #1,LOW : GET #1,HIGH
250 START = LOW + 256*HIGH
260 GET #1,LOW : GET #1,HIGH
270 QUIT  = LOW + 256*HIGH
300 REM read in a segment
310 FOR ADDR = START TO QUIT
320 GET #1,BYTE
330 POKE ADDR,BYTE
340 NEXT ADDR
350 GOTO 200 : REM try for another s
    egment
400 REM trapped to here, assume end-
    of-file
410 CLOSE #1
```

Since I'm running out of time and space this month, I will let the explanation of object file format, above, serve for now as an explanation of this program. I will warn you, however, that I cheated a bit in line 240 to make the multiple segment loading easier. The routine will try to load *anything* into memory, whether or not it is truly a binary object file. If your memory dies a violent death (fixable only by turning power off and back on), you tried to load something other than an object file with this. Naughty.

Next month some notes on destination strings in Atari BASIC. And maybe—just maybe—we'll play around with Atari screen I/O a little more. ©

C. Regena

File Processing

I've received quite a few letters wondering about files on the TI-99/4A. Files on a computer can be compared to those ordinary big, gray file drawers. Each *file* is a drawer, and you can label your drawers. Each *record* is one of the file folders inside a drawer. On the computer your file cabinet can be either a cassette or a diskette.

You can read about file processing in the *User's Reference Guide* that comes with the computer (pages II-118 to II-136 for the TI-99/4A and pages 144 to 162 for the TI-99/4), so I won't repeat that information here. For some example programs, you can refer to "Color Computer General-Purpose Data Base" in COMPUTE! (May 1983).

If you prefer not to do your own programming, there are several business programs available for the TI, as well as some command modules which utilize file processing. Home Budget Management keeps personal finance records. Personal Record Keeping is a versatile module that helps you set up your own files and records for a small business.

A Spelling Drill

Let's get to an example. This "Spelling Quiz" program presents a drill for spelling words. In many schools, students are sent home with a list of words each Monday with instructions to practice, then a test is given on Friday. TI to the rescue! Enter the spelling words and save them on cassette. Let the computer conduct the drill.

Line 100 DIMensions or reserves space for 30 spelling words on the list. If you have more words, you can change this statement and lines 460–470 to handle more words. Lines 110–150 define graphics characters, and line 1630 draws a smiling face for a correct answer. Please feel free to add your own graphics. Lines 160–310 print the main menu screen of options. When you RUN the program, you have your choice of entering a new word list, editing the existing list, loading a list of previously saved words, saving the present list, reviewing the complete word list, actually performing the quiz, or ending the program.

The first time you RUN the program, you would press 1 to enter a word list, edit the list if necessary, then save the list on cassette for future use. Lines 320–370 contain the procedure that tells you when you try to access an empty list.

Enter The Number Of Words

When you enter a new word list, you are first asked how many words it will contain. This number, N, is unchanged throughout the program and is necessary for saving N items and for performing the quiz for N words. Lines 490–530 ask for the new words, and you type the words in one at a time, pressing ENTER after each word. When you have entered the right number of words, the program returns to the main menu screen.

The edit option is contained in lines 550–960. The complete word list is printed, then you can enter the word you want changed. Lines 640–660 compare the word you entered to the word list so the word can be replaced. If you prefer to delete the word, you can just press the ENTER key. Lines 730–770 adjust N and the positions of the other words if you delete a word.

Lines 1070–1150 save the list of words. The first time you use the program you would enter the words, then save the list for future use.

The OPEN statement is the crux of a file processing program. Line 1090 is OPEN #1:"CS1",INTERNAL,OUTPUT,FIXED which readies device number 1 (you can choose any number or even a variable name that corresponds to a number) labeled Cassette 1. The data file we create is for OUTPUT—we will be filing information on the tape. The format for this output is INTERNAL (versus DISPLAY) and FIXED (versus VARIABLE). This means that the computer will save the output in internal machine format rather than printable ASCII format, and that each record is FIXED at a certain length. Since I didn't specify a length, the computer will assume FIXED 64, or a record length of 64 characters.

COMPUTE!'s Programmer's Reference Guide to the TI-99/4A

Author: C. Regena
Price: $14.95
On Sale: Now

Just about the best way to learn how to program a computer is to sit down with a patient friend who already knows how, and ask questions while you experiment with the computer. Owners of the popular Texas Instruments home computer will find that C. Regena is that kind of friend, and *Programmer's Reference Guide to the TI-99/4A* is that kind of book.

Regena carefully explains every BASIC command and function, and all the techniques needed to program TI graphics, sound, and speech. It's hard to think of a question that she doesn't answer simply and clearly, with hints about ways to write programs that do exactly what you want.

The book also provides dozens and dozens of programs, ranging from very short examples to full-length commercial-quality software. In effect, readers can look over Regena's shoulder as she goes through the programming process step by step, explaining what she's doing as she goes along. Not to mention the fact that the finished programs are valuable in their own right.

Even readers who are familiar with the computer will find this book valuable as a reference, where they can look up information they need and find the answers to particular questions.

Above all, *Programmer's Reference Guide to the TI-99/4A* is a book that lets readers use it however they like. You don't have to start at page one and read through, following someone else's plan for what you should learn first and what can wait until later. Instead, you can explore this book from any point of view, to solve almost any programming problem, and find the answer quickly and easily.

C. Regena is **COMPUTE!** Magazine's regular columnist on the TI-99/4A. She's an experienced and resourceful programmer. Like most of her readers, she taught herself how to program, and she hasn't forgotten what it's like to be a beginner, just starting out with the computer. And with *Programmer's Reference Guide*, TI users now have Regena to help them learn how to make their computer do exactly what they want it to do.

Programmer's Reference Guide to the TI-99/4A is available from **COMPUTE!** Publications, the leading publisher of books and magazines for home, educational, and recreational computing.

Available at computer dealers and bookstores nationwide. To order directly call TOLL FREE 800-334-0868. In North Carolina call 919-275-9809. Or send check or money order to **COMPUTE! Books**, P.O. Box 5406, Greensboro, NC 27403.

Add $2 shipping and handling. Outside the U.S. add $5 for air mail, $2 for surface mail. All orders prepaid, U.S. funds only.

Table of Contents

Store The Program And Data Separately

To try this program, use one tape to store the actual program, then place a blank tape in the recorder to save this word list. This tape will be called the data tape. If you have diskettes you could call it a data diskette.

On the screen you will see cassette operating instructions. The PRINT #1 statement is used to put information on the tape, so line 1100 PRINT #1:N writes the number of words N on the tape. Lines 1110–1130 use PRINT #1 to record the words on the tape. When the data is being recorded you will hear a longer header tone, then a sort of dot-dot-dot sound, a little different sound than a regular program recording. CLOSE #1 closes the file and gives you instructions to turn off the recorder.

There are more efficient ways to save data (by combining strings, for example), but I used this method so it would be easier to understand. As you program, you will probably want to economize to save both memory and time.

The next time you run this program and want to use a previously saved list of words, press option 3, Load Previous List. Lines 970–1050 retrieve the data. The OPEN statement tells the computer what kind of information to expect. Line 990 OPEN #2:"CS1",INTERNAL,INPUT,FIXED opens device number 2—again, you can use any number here. For clarity I used #1 to save the data and #2 for retrieving the data, but you could use the same number for both processes. This statement matches line 1090 in the format of the data saved. Lines 1000–1030 are similar to the output lines. First N is read as input (INPUT #2, or input from device #2), then the words are read in. Line 1040 CLOSE #2 closes the file.

The Quiz Routine

Option 6 is to perform the spelling quiz. Lines 1250–1810 contain this procedure. The word list is in the W$ array, but an identical array T$ is defined for the quiz. A word is chosen in random order, and is printed on the screen. The student reads the word, then presses the ENTER key to erase it. The student then must type the word and press ENTER. If you prefer to have the word flash on the screen for a certain length of time, you can replace lines 1470–1480 with a delay loop or sound delay such as

```
1470 FOR D=1 TO 800
1480 NEXT D
```

or

```
1470 CALL SOUND(1000,9999,30)
1480 CALL SOUND(1,9999,30)
```

If the student spells the word correctly, a smiling face is printed on the screen and TI plays an arpeggio. Correctly spelled words will not be chosen again, but a word that is missed will reappear later in the quiz.

F and FL are variables to keep track of words that are spelled incorrectly. SC is the score and is incremented only if the word is spelled correctly the first try.

Next month I'll have programs that show an easy way to set up a data file and print reports from the file.

Spelling Quiz

```
100 DIM W$(30),T$(30),FL(30)
110 CALL CHAR(97,"0718204044C8C808")
120 CALL CHAR(98,"E018040232310101"
    )
130 CALL CHAR(99,"80988C4740201807"
    )
140 CALL CHAR(100,"011931E2020418E"
    )
150 CALL COLOR(9,12,1)
160 CALL CLEAR
170 PRINT TAB(5);"** SPELLING QUIZ
    **": : : :
180 PRINT "CHOOSE:"
190 PRINT :"1 ENTER NEW WORD LIST"
200 PRINT :"2 EDIT LIST"
210 PRINT :"3 LOAD PREVIOUS LIST"
220 PRINT :"4 SAVE PRESENT LIST"
230 PRINT :"5 SEE WORD LIST"
240 PRINT :"6 PERFORM QUIZ"
250 PRINT :"7 END PROGRAM": :
260 CALL SOUND(150,1497,4)
270 CALL KEY(0,K,S)
280 IF (K<49)+(K>55)THEN 270
290 CALL CLEAR
300 ON K-48 GOSUB 380,550,970,1060,
    1160,1250,1820
310 GOTO 160
320 PRINT :"SORRY, NO WORDS IN LIST
    ."
330 CALL SOUND(100,330,4)
340 CALL SOUND(100,262,4)
350 CALL SOUND(1000,9999,30)
360 CALL SOUND(1,9999,30)
370 GOTO 160
380 PRINT "** ENTER NEW WORD LIST *
    *"
390 PRINT : :"HOW MANY WORDS?"
400 CALL SOUND(150,1497,4)
410 INPUT N
420 IF N=0 THEN 160
430 IF N>0 THEN 460
440 PRINT :"PLEASE ENTER A NUMBER":
    "GREATER THAN ZERO."
450 GOTO 390
460 IF N<31 THEN 490
470 PRINT :"SORRY, THIS PROGRAM CAN
     ONLYHANDLE UP TO 30 WORDS."
480 GOTO 390
490 PRINT : :"ENTER WORDS ONE AT A
    TIME.": : :
500 FOR I=1 TO N
510 CALL SOUND(150,1497,4)
520 INPUT W$(I)
530 NEXT I
540 RETURN
550 CALL CLEAR
560 PRINT "** EDIT LIST **": :
570 IF N=0 THEN 320
```

```
580 FOR I=1 TO N
590 PRINT W$(I),
600 NEXT I
610 PRINT : :"CHANGE WHICH WORD?"
620 CALL SOUND(150,1497,4)
630 INPUT E$
640 FOR I=1 TO N
650 IF E$=W$(I)THEN 710
660 NEXT I
670 PRINT :"THAT WORD IS NOT IN LIS
    T."
680 CALL SOUND(100,330,4)
690 CALL SOUND(100,262,4)
700 GOTO 780
710 PRINT :"ENTER NEW WORD OR":"PRE
    SS <ENTER> TO DELETE": :
720 INPUT W$(I)
730 IF W$(I)<>"" THEN 780
740 FOR J=I TO N-1
750 W$(J)=W$(J+1)
760 NEXT J
770 N=N-1
780 PRINT : :"PRESS:"
790 PRINT "1 EDIT MORE WORDS"
800 PRINT "2 SEE CURRENT WORD LIST"
810 PRINT "3 RETURN TO MENU SCREEN"
820 CALL KEY(0,K,S)
830 IF K=49 THEN 550
840 IF K=51 THEN 160
850 IF K<>50 THEN 820
860 CALL CLEAR
870 IF N=0 THEN 320
880 FOR I=1 TO N
890 PRINT W$(I),
900 NEXT I
910 PRINT : :"PRESS:"
920 PRINT "1 EDIT A WORD"
930 PRINT "2 RETURN TO MENU SCREEN"
940 CALL KEY(0,K,S)
950 IF K=49 THEN 610
960 IF K=50 THEN 160 ELSE 940
970 PRINT "** LOADING PREVIOUS LIST
    **"
980 PRINT : :"INSERT DATA CASSETTE.
    ": : :
990 OPEN #2:"CS1",INTERNAL,INPUT ,F
    IXED
1000 INPUT #2:N
1010 FOR I=1 TO N
1020 INPUT #2:W$(I)
1030 NEXT I
1040 CLOSE #2
1050 RETURN
1060 CALL CLEAR
1070 PRINT "** SAVING LIST **"
1080 IF N=0 THEN 320
1090 OPEN #1:"CS1",INTERNAL,OUTPUT,
     FIXED
1100 PRINT #1:N
1110 FOR I=1 TO N
1120 PRINT #1:W$(I)
1130 NEXT I
1140 CLOSE #1
1150 RETURN
1160 PRINT "** WORD LIST **": :
1170 IF N=0 THEN 320
1180 FOR I=1 TO N
1190 PRINT W$(I),
1200 NEXT I
1210 PRINT : :"PRESS <ENTER> TO CON
     TINUE.";
1220 CALL KEY(0,K,S)
1230 IF K<>13 THEN 1220
1240 RETURN
1250 CALL CLEAR
1260 IF N=0 THEN 320
1270 FOR I=1 TO N
1280 T$(I)=W$(I)
1290 FL(I)=0
1300 NEXT I
1310 PRINT "YOU WILL SEE A WORD."
1320 PRINT :"PRESS <ENTER>."
1330 PRINT :"WHEN THE WORD CLEARS,"
1340 PRINT :"SPELL THE WORD THEN"
1350 PRINT :"PRESS <ENTER>."
1360 PRINT : : :"PRESS ANY KEY TO S
     TART."
1370 CALL KEY(0,K,S)
1380 IF S<1 THEN 1370
1390 SC=0
1400 FOR I=1 TO N
1410 CALL CLEAR
1420 F=0
1430 RANDOMIZE
1440 R=INT(N*RND+1)
1450 IF T$(R)="" THEN 1440
1460 PRINT T$(R): : :
1470 CALL KEY(0,K,S)
1480 IF K<>13 THEN 1470
1490 CALL CLEAR
1500 INPUT X$
1510 IF X$=T$(R)THEN 1630
1520 CALL SOUND(100,330,2)
1530 CALL SOUND(100,262,2)
1540 FL(R)=1
1550 F=F+1
1560 IF F=2 THEN 1590
1570 PRINT : :"TRY AGAIN."
1580 GOTO 1490
1590 PRINT : :"THE CORRECT SPELLING
      IS:":T$(R)
1600 PRINT : :"PRESS <ENTER> TO CON
     TINUE."
1610 CALL KEY(0,K,S)
1620 IF K=13 THEN 1410 ELSE 1610
1630 PRINT TAB(10);"ab":TAB(10);"cd
     ": :
1640 CALL SOUND(100,262,2)
1650 CALL SOUND(100,330,2)
1660 CALL SOUND(100,392,2)
1670 CALL SOUND(150,524,2)
1680 IF F>0 THEN 1410
1690 T$(R)=""
1700 IF FL(R)>0 THEN 1720
1710 SC=SC+1
1720 NEXT I
1730 CALL CLEAR
1740 PRINT "OUT OF";N;"WORDS,"
1750 PRINT :"YOU SPELLED";SC;"CORRE
     CTLY"
1760 PRINT :"ON THE FIRST TRY."
1770 PRINT : : :"TRY AGAIN? (Y/N)"
1780 CALL KEY(0,K,S)
1790 IF K=89 THEN 1250
1800 IF K<>78 THEN 1780
1810 RETURN
1820 PRINT "PRESS:"
1830 PRINT :"1 SAVE WORD LIST"
1840 PRINT :"2 END PROGRAM"
1850 CALL KEY(0,K,S)
1860 IF K=49 THEN 1060
1870 IF K<>50 THEN 1850
1880 CALL CLEAR
1890 END
```

COMMODORE
Floating Subroutines

Louis F. Sander

Here is a subroutine that lets you automatically combine BASIC and machine language. It's easy, flexible, and inventive. For all VIC, 64, and all PETs except Original ROM models.

It's often desirable to include one or more machine language (ML) subroutines in your Commodore BASIC program, especially when the program must be optimized for speed. There are several ways of combining the BASIC and ML, each having its own advantages and disadvantages. The method described here puts your ML in a protected area at the end of the BASIC program, where it will automatically SAVE and LOAD along with the BASIC. Other ways of doing the same thing have one huge disadvantage—after the ML is in place, the BASIC program cannot be changed in any way, ever. *This* method overcomes that drawback, letting you make any number of subsequent changes to the BASIC program.

Our new technique requires your ML to be completely relocatable. That is, it requires that your ML will work properly at any place in memory, so long as the proper entry point is used. In some cases this restriction will keep you from using the new technique, but this may not happen often. Many, if not most, useful ML subroutines are completely relocatable, or can be made so.

Reserving Space

As a BASIC program runs, the operating system keeps track of certain important addresses by storing them in zero page locations called *pointers*. One of these is the Start Of Variables (SOV) pointer, which normally holds an address one byte higher than the end of whatever BASIC program is in memory. If that program changes size, the SOV pointer keeps track of its end + 1, so the computer knows where to store its variables without writing over the program. By altering the SOV pointer to make it point artificially high in memory, we can reserve space for ML between the end of BASIC and the newly redefined Start Of Variables.

When we put our ML program into the reserved space, it is effectively made a part of our BASIC program, and there are several accompanying benefits. Since it's part of the BASIC program, the computer will never overwrite it unless told to. Since it lies above the end of program marker (three zeros at the very end of a BASIC program), the computer won't try to relink it when BASIC lines are changed. And when the BASIC program is SAVEd, the ML will go right along with it, because the computer automatically saves everything from the Start Of BASIC to the Start Of Variables.

The trouble comes when we change the BASIC program—as the *real* BASIC program's end moves up or down in memory, our ML moves with it. If our ML program is completely relocatable, it runs the same in any part of memory, so moving it doesn't matter, as far as proper execution goes. What *does* matter is that our ML's entry point is then no longer known, so we can't tell what number to put in our SYS statement.

If we could find the first byte of the relocated ML, we could adjust our SYS statement accordingly, and everything would be fine. Fortunately, BASIC has a pointer which makes the ML easy to find; the pointer in question always holds the address of the first byte in whatever BASIC line is currently being executed. If our BASIC program's final line adds its own length to the address in that pointer, and stores the result in a variable, the variable holds the address of the first byte of our ML. Once we execute this line, say as a subroutine, the BASIC program knows where the ML is, and can easily make the proper SYS calls.

Setting It Up

To use the new technique, you add the ML finder line as the last line in your main BASIC program, then change the SOV pointer so it points above the highest byte you want to reserve for ML. Finally, you execute a CLR (not CLEAR SCREEN, the other one), which corrects some other pointers.

A short BASIC subroutine can make these things automatic and foolproof. You append it to

MICRO-SYS DISTRIBUTORS. THE COMMODORE CONNECTION.

commodore

SOFTWARE FOR C-64

Business

Multiplan	$ 89.00
WordPro 3 + /64 w/SpellRight Plus	$ 79.00
SpellRight Plus	$ 55.00
Calc Result (Advanced)	$ 125.00
Calc Result (Easy)	$ 75.00
Mirage Concepts (data base)	$ 95.00
Mirage Concepts (40 & 80 clm W/P)	$ 95.00
Home Accountant (Continental)	$ 69.00
Tax Advantage (Continental)	$ 49.00
The Last One 64 (writes basic programs)	$ 89.00
Check Book Helper	$ 34.95
Easy Finance	$ 22.00
Info Designs Accounting G/L, A/R, A/P, P/R, I/M each	$ 70.00

Utilities

Super Basic 64	$ 35.00
Super Copy 64	$ 35.00
Sketch Pad 64	$ 75.00
64 Fourth	$ 45.00
MTS Terminal Package (up and down load)	$ 35.00
HED — The Graphics Designer	$ 35.00
80 Column Expander	$ 55.00

ACCESSORIES

CBM 1541 Disk Drive	$ 249.00
MSD Super Disk (Single)	$ 395.00
MSD Super Disk (Dual)	$ 695.00
Vic 1650 Automatic Modem	$ 109.95
Hayes Smart 300 Modem	$ 249.00
Hayes Smart 1200 Modem	$ 629.00
Vic 1530 Datasette	$ 65.00
CBM 1520 Printer Plotter	$ 179.95
5 Slot Expander (64)	$ 65.00
64 Relay Cartridge	$ 45.00
Numeric Key Pad w/Adapter	$ 49.00
Alien Voice Box (Talks & Sings)	$ 89.00
Verbatim Diskettes:	
Single Sided/Single Density	$ 26.00
Single Sided/Double Density	$ 30.00
Double Sided/Double Density	$ 42.00
Texas Instruments LCD Programmer	$ 55.95
CBM 4023 Ribbons	$ 12.00
CBM 8023 Ribbons	$ 12.95
Flip N' File	Call
Power Strips w/surge stopper	Call
Computer Care Kit	$ 19.95

INTERFACES

Interpod (full compatibility!!) (Intelligent IEEE & RS232)	Call
C-64 Link IEEE Interface	$ 129.95
The Connection (full graphics of 64)	$ 95.00
Cardco + G Parallel Interface	$ 79.00
Vic Switch	$ 149.95
ADA 1800 (Parallel)	$ 129.00
ADA 1450 (Serial)	$ 149.00
Pet-to-IEEE Cable	$ 39.00
IEEE-to-IEEE Cable	$ 49.00
4 Prong A/V Cable	$ 15.00
Custom Computer Cables (we make to your specifications)	Call

MONITORS

CBM 1702 Color Monitor	$ 249.00
Panasonic CT-160 Color	Call
Panasonic TR-120 (Green)	Call
Panasonic TR-120 (Amber)	Call

LETTER QUALITY PRINTERS

Transtar 120 (80 column)	$ 535.00
Transtar 130 (132 column)	$ 725.00
CBM 6400 Printer	$1425.00
NEC Spinwriter	Call

DOT MATRIX PRINTERS

CBM MPS-801 Printers Replaces 1525 (50 cps)	$ 235.00
Okidata 82A	$ 412.50
Okidata 83	$ 635.00
Okidata 84P	$1165.00
Okidata 92P	$ 519.00
Okidata 93P	$ 810.00
Panasonic KX-P1090 Printer	Call
Panasonic KX-P1092 Printer	Call
Star Gemini 10X	$ 329.00
Star Gemini 15	$ 499.00
Star Gemini Delta 10	Call

DEALERS INQUIRIES WELCOME

Call to Order

1-800-527-1738

All Others Call

1-214-231-2645

COMMODORE BUSINESS MACHINES

Executive 64 portable (new)	Call
B128-80 128k Bus. Machine (new)	Call
SuperPet (5 languages)	$1059.00
CBM 8032	$ 625.00
CBM 2031 single disk	$ 295.00
CBM 8050 Dual Disk 1 meg.	$ 995.00
CBM 8250 Dual Disk 2 meg.	$1295.00
CBM D9060 Hard Disk 5 meg.	$1995.00
64K Expansion Board	$ 275.00
SuperPet Upgrade Kit	$ 695.00

BUSINESS SOFTWARE — 8032

WordPro 4 + or 5 +	$ 305.00
Visicalc	$ 225.00
The Manager	$ 199.00
BPI Accounting System (5 separate modules)	$ 325.00
Southern Solutions Accounting System III (Per/Module)	$ 285.00
McTerm Communications Package	$ 175.00

BUSINESS SOFTWARE — B128-80

Superscript II	Call
Superbase	Call
Superoffice	Call
Complete Accounting Systems	Call
Mailing List Manager	Call

INTERFACEABLE TYPEWRITERS

Silver Reed EXD-10	$ 269.00
IF-10 Interface	$ 109.00
Silver Reed EXD-15	$ 475.00
IF-15 Interface	$ 119.00
Silver Reed EX-43	$ 595.00
IF-43 Interface	$ 175.00

TERMS

Orders under 50.00 add 10.00 Handling fee
MasterCard, VISA, Money Order, Bank Check
COD (add 5.00)
Add 3% For Credit Cards
All Products Shipped Within 24 Hours
F.O.B. Dallas, Texas
All Products Shipped With Manufacturers
90 Day Warranty

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE.

Micro-Sys

DISTRIBUTORS

641 Presidential Drive • Richardson, Texas 75081 • 9:30 a.m.-6:30 p.m. (Mon.-Fri.) • 10:30 a.m.-2:30 p.m. (Sat.)

Important Addresses

	64	VIC	Upgrade & 4.0 PET/CBM
Start Of Variables Pointer	45–46	45–46	42–43
Current Line Pointer	61–62	61–62	58–59
USR Vector	785–786	1–2	1–2

your main BASIC program, RUN it, then delete most of its lines. If your library includes an APPEND program, the automation is easy; if you lack APPENDing capability, doing things manually may be easier. The accompanying programs are the subroutine I use, in versions for all Commodore machines except Original ROM PETs. The comments below apply to all versions:

Line 63991 checks the accuracy of the all-important line 63999, which is the line that finds our machine language.

Lines 63992, 63995, and 63996 move the SOV pointer, which requires the temporary use of two memory locations. The ones used here are the USR vector locations, but you can use others if you'd like.

Line 63997 is a decimal-to-hex converter.

Line 63999 sets variable ML equal to the address of the first byte of the reserved ML area. The line must be entered *exactly* as listed, with no embedded spaces, and must be the last line in your BASIC program. (That's why it has the highest line number allowed in BASIC.)

Here are step-by-step instructions for entering your automation subroutine and checking its accuracy:

1. Type the appropriate subroutine into your computer.

2. SAVE the subroutine onto tape or disk.

3. RUN it and observe the screen. If you get an error message, you've made a mistake in typing line 63999. Reload what you SAVEd, correct your error, then go to step 2.

4. If there is no error message, enter a 6 in response to the # BYTES prompt. You'll get some screen messages and a READY prompt.

5. At this point, there should be six bytes reserved for ML, just above the end of your BASIC program. Your screen should show the addresses of the lowest and highest bytes in the reserved area. Immediately below the ML area should be the three zeros which mark the end of BASIC; immediately above it should be four bytes of 218 decimal, which were put there as a marker by the ZZ% business in line 63996.

If you know how to examine memory, you should check that the zeros and 218's are where they whould be, for proof that your subroutine is working correctly. (If you use a monitor to examine memory, the hex version of the 218's will announce

Here comes the new generation of SM's

GOLDEN TOOL

program series for the 64.

the good news in dramatic fashion. Try it.) If the zeros and 218's aren't in the right places, something is wrong; check your work, find the errors, and start again from step 2.

6. Now put something into those six bytes and SAVE the subroutine. Turn your computer off to destroy what is in memory, then LOAD what you just saved. Check to make sure your six bytes of ML traveled along with the BASIC. If they did, you're finished.

Using It

The subroutine you SAVEd in step 2 has now been proven to work perfectly. The one you saved in step 6 is OK too, but it has some ML appended to it. When you want to add some machine language to the end of a BASIC program, just put the step 2 subroutine at the end of the BASIC program, in one of these ways:

1. LOAD the BASIC program, then use an APPEND routine to add the subroutine, or

2. LOAD the subroutine, then type in the BASIC program, or

3. LOAD and LIST the subroutine, then LOAD the BASIC; add the subroutine to it by putting your cursor on each of the previously LISTed subroutine lines and hitting RETURN. The VIC's screen is too small for this; all others are fine, but you *must* be careful with your cursor, or important subroutine lines will scroll off the screen as the BASIC loads. When LOADing the main program from the Datassette, put your cursor on the first letter of the READY prompt, type LOAD [space] [space], press PLAY, *then* hit RETURN. Doing otherwise may cause too much scrolling. When using a disk, put your cursor on the first letter of the READY prompt, then enter your LOAD command in the normal way.

Once the subroutine is in place, do a RUN 63991 and follow the instructions on the screen. You can reserve any number of bytes for ML, up to the limit of your memory. The subroutine shows the current boundaries of the ML area, and you should put your ML there immediately, since the boundaries will move if you change the BASIC program. *Caution:* When you delete lines, you *must* do it line by line from the keyboard; Toolkit or other programming aids' deletes will detach your ML from the end of BASIC.

You can now make all sorts of changes to the BASIC program, and your ML subroutine will follow its end up and down like a shadow. You can even delete every line of BASIC; in that case, a SAVE will save your ML as though it were a BASIC program itself. And if you ever want to expand an ML area already in use, you can just reappend the subroutine and run it again; it will tack more reserved area onto that you already have!

To use the ML from the BASIC program, have an early line do a GOSUB 63999, which will put the address of the first ML byte into variable ML. Use this information to find the machine language entry point, then call the ML program at will. If the entry point is the first byte of the ML, SYS ML will do the job; otherwise, use SYS ML+X, where X is the offset of the entry point from the first byte.

So there's the ideal technique for combining BASIC and relocatable ML—it's easy to set up, easy to use, and has no undesirable restrictions. Once you SAVE a fully tested subroutine to automate the setup process, it becomes a fine-tuned tool that you can use with ease for many years.

Program 1:

Combining BASIC And ML On The 64

```
63990 REM COMMODORE 64 VERSION
63991 GOSUB63999:IFPEEK(ML-1)+PEEK(ML-2)+
      PEEK(ML-3)THENPRINT"63999 IS BAD":E
      ND
63992 INPUT"{CLR}# BYTES TO RESERVE FOR M
      L";A:J=256:B=PEEK(45)+J*PEEK(46):C=
      A+B
63993 PRINT"{DOWN}NOW PUT THE ML INTO:":P
      RINT"{DOWN}DECIMAL"B"-"C-1:PRINT"
      {DOWN}{4 SPACES}HEX ";
63994 K=4096:H=B:GOSUB63997:PRINT" - ";:H
      =C:GOSUB63997:PRINT
63995 PRINT"{DOWN}THEN DELETE LINES 63991
      -63997.{DOWN}":D=INT(C/J):POKE786,D
63996 POKE785,C-J*D:POKE45,PEEK(785):POKE
      46,PEEK(786):CLR:ZZ%=-9510:END
63997 H=H/K:FORI=1TO4:H%=H:H$=CHR$(48+H%-
      (H%>9)*7):PRINTH$;:H=16*(H-H%):NEXT
63998 REM * 63999 FINDS ML START ADDR
63999 ML=PEEK(61)+256*PEEK(62)+31:RETURN
```

Program 2:

Combining BASIC And ML On The VIC

```
63990 REM VIC-20 VERSION
63991 GOSUB63999:IFPEEK(ML-1)+PEEK(ML-2)+
      PEEK(ML-3)THENPRINT"63999 IS BAD":E
      ND
63992 INPUT"{CLR}# BYTES FOR ML";A:J=256:
      B=PEEK(45)+J*PEEK(46):C=A+B
63993 PRINT"{DOWN}NOW PUT THE ML INTO:":P
      RINT"{DOWN}DECIMAL"B"-"C-1:PRINT"
      {DOWN}{4 SPACES}HEX ";
63994 K=4096:H=B:GOSUB63997:PRINT" - ";:H
      =C:GOSUB63997:PRINT
63995 PRINT"{DOWN}THEN DELETE LINES 63991
      -63997.{DOWN}":D=INT(C/J)
63996 POKE2,D:POKE1,C-J*D:POKE45,PEEK(1):
      POKE46,PEEK(2):CLR:ZZ%=-9510:END
63997 H=H/K:FORI=1TO4:H%=H:H$=CHR$(48+H%-
      (H%>9)*7):PRINTH$;:H=16*(H-H%):NEXT
63998 REM * 63999 FINDS ML START ADDR
63999 ML=PEEK(61)+256*PEEK(62)+31:RETURN
```

Program 3:

Combining BASIC And ML On PET/CBM

```
63990 REM UPGR/4.0 ROM PET/CBM VERSION
63991 GOSUB63999:IFPEEK(ML-1)+PEEK(ML-2)+
      PEEK(ML-3)THENPRINT"63999 IS BAD":E
      ND
63992 INPUT"{CLR}# BYTES TO RESERVE FOR M
      L";A:J=256:B=PEEK(42)+J*PEEK(43):C=
      A+B
63993 PRINT"{DOWN}NOW PUT THE ML INTO:":P
      RINT"{DOWN}DECIMAL"B"-"C-1:PRINT"
      {DOWN}{4 SPACES}HEX ";
63994 K=4096:H=B:GOSUB63997:PRINT" - ";:H
      =C:GOSUB63997:PRINT
63995 PRINT"{DOWN}THEN DELETE LINES 63991
      -63997.{DOWN}":D=INT(C/J)
63996 POKE2,D:POKE1,C-J*D:POKE42,PEEK(1):
      POKE43,PEEK(2):CLR:ZZ%=-9510:END
63997 H=H/K:FORI=1TO4:H%=H:H$=CHR$(48+H%-
      (H%>9)*7):PRINTH$;:H=16*(H-H%):NEXT
63998 REM * 63999 FINDS ML START ADDR
63999 ML=PEEK(58)+256*PEEK(59)+31:RETURN ©
```

Big Buffer For Atari

Jeff Brenner

Add a keyboard buffer to your Atari so you can type in characters while a program is running or listing, and even during a SAVE. See the "Automatic Proofreader" article on page 60 before typing these programs.

This article will show you how to add an extremely powerful feature to your Atari computer—a keyboard buffer. A keyboard buffer is a reserved area of computer memory used to temporarily store keypresses while the keyboard is inactive. When the keyboard is ready for input, any stored keypresses will be printed out onto the screen.

Look at this simple program:

```
10 GOTO 10
```

When you run this program, the computer will be put into an infinite loop. If you type in characters while this program is running, the computer will ignore your input.

With a keyboard buffer, you still see nothing when you run the program and type characters. But as soon as you stop the program by pressing the BREAK key, all of the characters that you typed in previously will be printed out.

Most higher-priced computers, such as the IBM Personal Computer, have intricate keyboard buffers controlled by a separate microprocessor. Some lower-priced computers, such as the Commodore 64 and VIC-20, have simple ten-character buffers built into the operating system.

A 100-Character Buffer

Atari computers do not have a buffer, but "Keyboard Buffer" will give your Atari a 100-character buffer.

Here's how Keyboard Buffer works. Each time a key is pressed, the program will check whether the computer is busy or not. If the computer is not prepared for an input, the number representing that keypress will be stored in the buffer (on Page 6, so it won't interfere with BASIC). As soon as the computer is ready to accept input, the characters stored in the buffer will be displayed.

Program 1 is a BASIC program which loads a machine language program into memory. The program is designed to be a subroutine for any BASIC program requiring keyboard input. After you enter this program, LIST it to tape or disk so you can ENTER it later and merge it with your program.

If you press SYSTEM RESET while using the buffer program, it will be necessary to restart the program by typing:

```
A=USR(1536)
```

Program 1: Keyboard Buffer

```
OC 30000 REM KEYBOARD BUFFER
BD 30010 DATA 104,173,8,2,141,96,6,173
         ,9,2,141,97,6,169,0,141,14,21
         2,120,169,52,141,8,2
ON 30020 DATA 169,6,141,9,2,169,98,141
         ,36,2,169,6,141,37,2,169,192,
         141,14,212,169,0,133,204
JN 30030 DATA 133,205,88,96,173,9,210,
         201,159,240,36,152,72,173,252
         ,2,201,255,240,19,164,204,192
         ,100
MN 30040 DATA 240,9,230,204,200,173,9,
         210,153,143,6,104,168,104,64,
         165,204,197,205,208,231,104,1
         68,76
NB 30050 DATA 95,6,173,252,2,201,255,2
         08,35,165,204,197,205,240,23,
         230,205,164,204,192,120,176,1
         5,164
GE 30060 DATA 205,192,120,176,9,185,14
         3,6,141,252,2,76,98,228,169,0
         ,133,204,133,205,76,98,228
LL 30070 T=0
GM 30080 IF PEEK(521)=6 THEN GOTO 3015
         0
NF 30090 FOR I=1 TO 143
PG 30100 READ N:T=T+N
OA 30110 POKE 1535+I,N
HO 30120 NEXT I
FJ 30130 IF T<>18309 THEN PRINT "CHECK
          DATA STATEMENTS":STOP
```

```
JA 30140 A=USR(1536)
NJ 30150 RETURN
```

After you type in Program 1, LIST it to cassette or disk. If you wish to test your work, do not type NEW. Add the lines from Program 2 and RUN.

Program 2: Buffer Test

```
JA 10 REM KEYBOARD BUFFER TEST
NF 20 GOSUB 30000
DG 30 DIM NAME$(30)
OP 40 PRINT "WHAT IS YOUR NAME?";
DL 50 FOR I=1 TO 500
AP 60 A=RND(0)*255
HP 70 SOUND 1,A,10,8
PA 80 NEXT I
DO 90 INPUT NAME$
OO 100 PRINT "YOUR NAME IS ";NAME$
GJ 110 END
```

A Test With Background Music

If you get an error or a CHECK DATA STATEMENTS message, you have made an error in typing Program 1. Check all the DATA statements carefully.

When everything is correct, the computer will print WHAT IS YOUR NAME? and start playing tones. Even though the music is busy playing, type in your name and press RETURN. After the music is over, your name will be printed out and entered automatically.

This is only one example of an application for Keyboard Buffer. If you would like to use Keyboard Buffer while doing your own programming in BASIC, change line 30150 to:

```
30150 END
```

Then RUN the program. When the READY prompt appears, type NEW. Keyboard Buffer will be operational and you can begin programming.

A keyboard buffer can surely improve the quality of any program requiring user input. Since you can enter characters even while the computer is in a lengthy loop, you save time. After using Keyboard Buffer, you will begin to see the advantage of having a constantly monitored keyboard.©

Commodore Filetracker

Richard C. Wilson

"Filetracker" for VIC or Commodore 64 solves those irritating problems that arise so often, when you can't remember if the file you want is on the disk you're working with, or you can't remember how you spelled the filename. By using Filetracker as a subroutine, you can look up any filename and read or write it while your main program is running.

Other possible uses for Filetracker include cross-checking filenames, generating filenames, compiling a disk library cross-reference index, computing disk space remaining, reformatting directory output to screen or printer, and autorun of programs. See the "Automatic Proofreader" article on page 60 before typing in this program.

Sequential files are very useful tools for storage and retrieval of long data lists on disk. One problem arises occasionally, however: How do you read a sequential file when you don't know its name? The simple answer, of course, is to stop the program, read the disk directory, memorize or write down the filename, then run the program again and enter the correct filename.

This method is less painful if you are using a DOS wedge that allows you to read the disk directory without erasing the program in memory. But it's not very helpful if you are trying to merge data from several related files into a new file, and you must stop repeatedly to look up filenames.

Let The Computer Do It

You can save yourself time and aggravation if you have your computer look up the names on the disk and read the appropriate files. This can be especially useful with a business program which stores each order and account in a separate sequential file. If the account filename is the last four digits of the client's phone number, when an order is written, the account file is read, the account number is added to the order number, and the combined (hyphenated) number becomes the name of the new file. For example, order number 1666 from client 1212 becomes file 1666-1212.

Once the disk starts to fill up (it will hold over 100 such files), sorting out just those order files assigned to account number 1212 can be quite tiresome. "Filetracker" solves such problems.

Selecting The Files You Want

Lines 20–120 read the disk directory. Line 120 prints the number of blocks, name, and file type for each file. (You can delete this line if you don't want to display the entire disk directory.)

The name (only) of each file is stored in the I$ array. Line 150 selects out names of all sequential files and discards the rest. By changing SEQ in this line to PRG, REL, or USR, you can have the line look exclusively for any type of file.

For example, instead of having line 150 return to get another filename when the condition is not met, it could go to one or more secondary routines to create separate arrays for other file types.

Lines 60 and 130 check the Status word to make certain the disk channel is closed. The program ends when there is no more data to be read.

Making It A Subroutine

To use Filetracker in other programs, change the END statement in line 140 to a RETURN, and the program becomes a subroutine.

If you use Filetracker as a subroutine, then the main program should ask for a key word (1212) which would be assigned to a variable (KY$).

Since all the filenames are structured the same way, we can change line 150 to compare KY$ with the account number portion of each sequential filename.

```
150 IF RIGHT$(I$(P),4)<>KY$ THEN I$(P)=""
    :GOTO30
```

If line 120 is left in the routine, all the files listed in the disk directory will be printed on the screen, and the I$ array will contain the names of all (and only) the order files assigned to account number 1212.

You also can write a subroutine to read each of the files into a two- or three-dimensional array, for further processing.

An Array For Each File Type

By adding these lines to Filetracker, you can enter the names of each type of file into a separate array.

```
150 IFLEFT$(N$,3)<>"SEQ"THEN152
151 P=P+1:GOTO30
152 IFLEFT$(N$,3)<>"PRG"THEN154
153 P$(K)=I$(P):I$(P)="":K=K+1:GOTO30
154 IFLEFT$(N$,3)<>"REL"THEN156
155 R$(L)=I$(P):I$(P)="":L=L+1:GOTO30
156 IFLEFT$(N$,3)<>"USR"THENI$(P)+"":GOTO
    30
157 U$(M)=I$(P):I$(P)="":M=M+1:GOTO30
```

Notice that line 150 is modified to branch to line 152, and you will have to DIMension any arrays you introduce into the program.

Filetracker

```
5 DIMI$(151)                          :rem 100
10 PRINT"READING SEQUENTIAL FILES..."
                                      :rem 36
20 P=0:OPEN3,8,0,"$0":GET#3,D1$,D2$
                                      :rem 61
30 GET#3,D1$,D2$:GET#3,D1$,D2$:N=0:rem 20
40 IFD1$<>""THENN=ASC(D1$)           :rem 197
50 IFD2$<>""THENN=N+ASC(D2$)*256      :rem 8
60 GET#3,D2$:IFST<>0THEN140           :rem 64
70 IFD2$<>CHR$(34)THEN60              :rem 88
80 GET#3,D2$:IFD2$<>CHR$(34)THENI$(P)=I$(
   P)+D2$:GOTO80                      :rem 34
90 GET#3,D2$:IFD2$=CHR$(32)THEN90     :rem 84
100 N$=""                             :rem 132
110 N$=N$+D2$:GET#3,D2$:IFD2$<>""THEN110
                                      :rem 144
120 PRINTN;" ";I$(P),N$               :rem 212
130 IFST=0THEN150                     :rem 252
140 CLOSE3:END                         :rem 79
150 IFLEFT$(N$,3)<>"SEQ"THENI$(P)="":GOTO
    30                                :rem 209
160 P=P+1:GOTO30                      :rem 166
```

©

Jim Butterfield, Associate Editor

FACTORS:
A Machine Language Factoring Program
Part 3

This month we conclude the commented listing of our machine language program to find prime factors.

Last month in Part 2, we examined the routines that handle keyboard input and prepare our number for factoring.

Now, here's the division routine. It rolls the dividend left through the joint remainder/quotient area. When we're finished, what's left of the dividend is in the remainder area; the quotient has miraculously appeared on the right.

```
0615  A9 00     DIVIDE LDA  #0          ;CLEAN HOUSE
0617  A2 0B            LDX  #11         ;12 BYTES
0619  9D 6C 03 DLP1    STA  REMDR,X
061C  CA               DEX
061D  10 FA            BPL  DLP1
061F  A2 00            LDX  #0          ;"FROM" POINTER
0621  A0 00            LDY  #0          ;"TO" POINTER
0623  8E 48 03         STX  BCOUNT
0626  BD 50 03 DLP2    LDA  NUMBER,X
0629  D0 06            BNE  DLP4
062B  E8               INX              ;DROP HIGH
                                        BYTES
062C  D0 F8            BNE  DLP2
062E  BD 50 03 DLP3    LDA  NUMBER,X
0631  99 70 03 DLP4    STA  QUOT,Y
0634  E8               INX
0635  C8               INY
0636  EE 48 03         INC  BCOUNT
0639  E0 08            CPX  #8
063B  90 F1            BCC  DLP3
063D  0E 48 03         ASL  BCOUNT      ;TIMES 8
0640  0E 48 03         ASL  BCOUNT      ;CHANGES BYTES
0643  0E 48 03         ASL  BCOUNT      ;TO BITS
0646  18               CLC
0647  A2 0B     DLP5   LDX  #11         ;ROLL ENTIRE
0649  3E 6C 03 DLP6    ROL  REMDR,X     ;..WORK AREA
064C  CA               DEX              ;..LEFT
064D  10 FA            BPL  DLP6
064F  A2 03            LDX  #3
0651  38               SEC              ;COMPARE
0652  BD 6C 03 DLP7    LDA  REMDR,X     ;..DIVIDEND TO
0655  FD 68 03         SBC  DVSR,X      ;..DIVISOR
0658  CA               DEX              ;FOUR BYTES
0659  10 F7            BPL  DLP7
065B  90 0F            BCC  NDIV        ;TOO SMALL
065D  A2 03            LDX  #3          ;NOT TOO SMALL,
065F  38               SEC              ;SUBTRACT..
0660  BD 6C 03 DLP8    LDA  REMDR,X     ;DIVISOR
0663  FD 68 03         SBC  DVSR,X
0666  9D 6C 03         STA  REMDR,X
0669  CA               DEX
066A  10 F4            BPL  DLP8
066C  CE 48 03 NDIV    DEC  BCOUNT      ;COUNT BITS
066F  D0 D6            BNE  DLP5        ;LOOP (CARRY?)
0671  A2 07            LDX  #7          ;FINISHED:
0673  3E 70 03 DLP9    ROL  REMDR+4,X   ;TRIM
                                        REMAINDER
0676  CA               DEX
0677  10 FA            BPL  DLP9
0679  60               RTS
```

This is where we try dividing our number into selected divisors and see if we get an even division (remainder zero)

```
067A  8D 6B 03 FLOOK   STA  DVSR+3      ;PLANT DIVISOR
067D  A9 00    FLOOP   LDA  #0
067F  8D 49 03         STA  EXP         ;ZERO TO START
0682  20 15 06 FPOWR   JSR  DIVIDE
0685  A9 00            LDA  #0          ;CHECK
                                        REMAINDER
0687  A2 03            LDX  #3
0689  1D 6C 03 FLP1    ORA  REMDR,X     ;FOR ZERO
068C  CA               DEX
068D  10 FA            BPL  FLP1
068F  AA               TAX
0690  D0 10            BNE  FEXIT       ;NOT ZERO?
```

Factor Found

We've found a factor. The quotient now becomes our new number; then we can increment the exponent counter and try again.

```
                       ;MOVE QUOTIENT
0692  EE 49 03         INC  EXP         ;ADD ONE
0695  A2 07            LDX  #7
0697  BD 70 03 FLP2    LDA  QUOT,X      ;QUOTIENT TO
069A  9D 50 03         STA  NUMBER,X    ;..ORIG NUMBER
069D  CA               DEX
```

PROSYS

The Professional Systems People And

MICRO WORX

Present Products From

commodore

And

The Software That Makes Them Work!

SOFTWARE

SBSYS

C-64, 8032, 8096 & B-Series
THE SMALL BUSINESS SYSTEM
Available for 1541, 8050 and hard disk drives. GL, AP, AR, INV. and payroll as low as $99.00 each! Call for specific pricing.

PERSYS

VIC 20, C-64, 8032, 8096 & B-Series
THE PERSONAL FINANCIAL SYSTEM
A complete financial package for home and small business, beginning at $69.00 on tape.

VERTICAL PACKAGES INCLUDE:

LEGISYS

8032, 8096 & B-Series.
The total legal office information, accounting and tickler system.

LOADSYS

8032, 8096 & B-Series.
The total truck brokerage accounting system. Call for free intro consulting.

Dealer inquiries invited.

VISA & MasterCard. Add 3% Surcharge.
Shipping paid on prepaid orders.
Prices subject to change without notice.

These are sample unit prices.
We carry support items, cables, games...
WE HAVE IT!

CBM PRODUCTS

8032 Computer	$ 619.00
8050 Disk Drive	979.00
8250 Disk Drive	1279.00
9060 Hard Disk	1979.00
8023 Printer	529.00
6400 Printer	1399.00

C-64 STUFF

C-64 Computer	$219.00
1541 Disk Drive	249.00
1701 Monitor	249.00
1526 Printer	339.00
1600 Modem	69.00

Call Toll-Free by dialing:
Outside Texas:

1-800-221-WORX

Inside Texas:

1-800-692-4265,
wait for beep, then dial 008-3378,
wait for tone and dial 993.
or Lubbock 797-2623,
Ft. Worth: 817/589-2622
807 Melborne Hurst, Tx. 76053

MICRO WORX

4210 D 50th 797-2623 Lubbock, TX 79413

```
069E 10 F7          BPL  FLP2
06A0 30 E0          BMI  FPOWR     ;TRY FOR
                                   ANOTHER
```

We compare the number to the divisor by subtracting. That way, we'll find out whether or not it's time to wrap it up.

```
                    ;CHECK LIMITS
06A2 A2 07     FEXIT LDX  #7       ;EIGHT BYTES
06A4 38              SEC
06A5 BD 70 03  FCHEK LDA  QUOT,X
06A8 FD 64 03        SBC  DVSR-4,X
06AB CA              DEX
06AC 10 F7           BPL  FCHEK
```

If the exponent is nonzero, we've found a divisor and it's time to report it.

```
06AE 08              PHP            ;FREEZE STATUS
06AF AE 49 03        LDX  EXP
06B2 F0 03           BEQ  FPASS
06B4 20 D0 06        JSR  SHOW
06B7 28        FPASS PLP            ;UNFREEZE STAT
06B8 60              RTS
```

Here come the routines for printing numbers SRAP prints the remaining value when we wrap up the line. It's different from printing the other factors, in that the final value might be a very large number.

```
06B9 AD 4A 03  SRAP  LDA  CHAR      ;EQUALS OR PLUS
06BC 20 D2 FF        JSR  $FFD2     ;..PRINT IT
06BF 20 04 07        JSR  SWIPE     ;CLEAR WORK
                                    AREA
06C2 A2 07           LDX  #7        ;EIGHT BYTES!
06C4 BD 50 03  SRAL  LDA  NUMBER,X
06C7 9D 70 03        STA  REMDR+4,X
06CA CA              DEX
06CB 10 F7           BPL  SRAL
06CD 4C 0F 07        JMP  CPR
```

Our main number printing routine coming up. First, the leading character (equals sign or plus sign). Then we place the binary number into a work area, and call the binary-to-decimal output routine, CPR. We may also need to do this for the exponent if it's greater than one.

```
06D0 AD 4A 03  SHOW  LDA  CHAR      ;EQUALS OR PLUS
06D3 20 D2 FF        JSR  $FFD2     ;..PRINT IT
06D6 A9 2A           LDA  #$2A      ;NEXT IS PLUS
06D8 8D 4A 03        STA  CHAR
06DB 20 04 07        JSR  SWIPE     ;CLEAR WORK
                                    AREA
06DE A2 03           LDX  #3        ;FOUR BYTES
06E0 BD 68 03  SLP1  LDA  DVSR,X    ;..TO WORK AREA
06E3 9D 74 03        STA  REMDR+8,X
06E6 CA              DEX
06E7 10 F7           BPL  SLP1
06E9 20 0F 07        JSR  CPR

                    ;PRINT EXPONENT IF APPR
06EC AE 49 03        LDX  EXP
06EF CA              DEX
06F0 F0 11           BEQ  SOUT      ;ONE, DON'T
                                    PRINT
06F2 20 04 07        JSR  SWIPE
06F5 AE 49 03        LDX  EXP
06F8 8E 77 03        STX  REMDR+11
06FB A9 5E           LDA  #$5E      ;UP ARROW
06FD 20 D2 FF        JSR  $FFD2     ;..PRINT IT
0700 20 0F 07        JSR  CPR
0703 60        SOUT  RTS
0704 A2 07     SWIPE LDX  #7        ;EIGHT BYTE
0706 A9 00           LDA  #0        ;CLEAR TO ZERO
0708 9D 70 03  SW1   STA  QUOT,X
070B CA              DEX
070C 10 FA           BPL  SW1
070E 60              RTS
```

Simple, But Curious

CPR, or Character Print, first changes binary into binary coded decimal. To do this, it uses the Decimal mode of the 6502. The method is simple but curious: It shifts the binary bits out of the work area, and shifts them (decimally!) into area DECIML.

```
070F A2 09     CPR   LDX  #9        ;TEN BYTES..
0711 A9 00           LDA  #0        ;..20 DIGITS
0713 9D 78 03  CLP1  STA  DECIML,X  ;..CLEAR
0716 CA              DEX
0717 10 FA           BPL  CLP1
0719 A0 3F           LDY  #63       ;64 BITS
071B A2 07     CLP2  LDX  #7        ;8 BYTES
071D 18              CLC
071E 3E 70 03  CLP3  ROL  REMDR+4,X ;POP OUT A BIT
0721 CA              DEX            ;..INTO CARRY
0722 10 FA           BPL  CLP3
0724 A2 09           LDX  #9        ;TEN BYTES
0726 78              SEI            ;LOCKOUT IRQ
0727 F8              SED            ;DECIMAL MODE
0728 BD 78 03  CLP4  LDA  DECIML,X  ;SHIFT BIT IN
072B 7D 78 03        ADC  DECIML,X
072E 9D 78 03        STA  DECIML,X
0731 CA              DEX
0732 10 F4           BPL  CLP4
0734 D8              CLD            ;BACK TO BINARY
0735 58              CLI            ;RELEASE IRQ
0736 88              DEY
0737 10 E2           BPL  CLP2
```

Now we print out the decimal digits. They are packed two to a byte, so we must unpack them first. Of course, we remove leading zeros.

```
0739 A2 00           LDX  #0        ;Z SUPPRESS ON
073B 8E 4B 03        STX  ZSUP
073E BD 78 03  CLP5  LDA  DECIML,X  ;HIGH END
0741 48              PHA            ;SAVE IT
0742 4A              LSR  A         ;GET HIGH
0743 4A              LSR  A         ;..4 BITS
0744 4A              LSR  A
0745 4A              LSR  A
0746 20 55 07        JSR  COUT      ;SEND 'EM
0749 68              PLA            ;RECALL IT
074A 29 0F           AND  #$0F      ;LOW 4 BITS
074C 20 55 07        JSR  COUT      ;SEND 'EM
074F E8              INX            ;NEXT BYTE
0750 E0 0A           CPX  #10       ;STOP AT 10
0752 90 EA           BCC  CLP5
0754 60              RTS
```

COUT outputs the individual characters, and implements zero suppression.

```
0755 D0 06     COUT  BNE  CFL       ;NOT ZERO,
                                    PRINT
0757 CD 4B 03        CMP  ZSUP      ;ZSUP FLAG ON?
075A D0 01           BNE  CFL       ;NO, PRINT
075C 60              RTS            ;ELSE DON'T
075D EE 4B 03  CFL   INC  ZSUP      ;KILL ZSUP FLAG
0760 09 30           ORA  #$30      ;CHANGE TO
                                    ASCII
0762 4C D2 FF        JMP  $FFD2     ;PRINT & RETURN.
```

Finally, here's our table of offset values. They are a great timesaver.

```
0765 01 07 0B 0D TABLE .BYTE 1,7,11,13
0769 11 13 17 1D       .BYTE 17,19,23,29
```

64 EXPLORER

Larry Isaacs

This month we'll cover two topics. First, we'll add a RESET switch so you can easily recover from a program "crash," and then we'll discuss file access for the 1541 disk drive.

When you're using some of the special hardware features of the 64, and especially when you're experimenting with machine language, a simple mistake can cause the 64 to crash. The display just sits there, if there is a display; nothing happens when keys are pressed; and even pressing RUN/STOP—RESTORE doesn't help.

In such cases, it takes a *reset* to bring the 64 back. Naturally, turning the machine off and back on is one way to recover from a crash. Unfortunately, this means that the contents of RAM will be lost, including the program you were working on.

There is another way to reset the computer, without turning it off. You can connect a switch to the User Port to trigger the reset sequence.

A Clean Start Out Of The Gate

As you would expect, the 6510 microprocessor contains some complex circuitry. If the microprocessor is to operate properly, all the various parts of this circuitry must work together in an exactly defined set of steps. A RESET signal gets everything synchronized. When this signal is grounded, the 6510 is forced through a sequence, like horses going into the starting gate to get ready for a race. When the RESET signal is released from ground, all the processor's components start off together.

At this point, the 6510 is ready to start executing machine language instructions. But where will these instructions first come from? The reset process also deals with this question. The first thing the 6510 will do after the RESET signal is released is fetch two bytes from the top two memory locations in the 64. These bytes are the starting address for executing machine instructions. Two such bytes, used to form an address, are called a *vector*; the two bytes mentioned above are called the RESET vector.

RESET Without Losing The Program

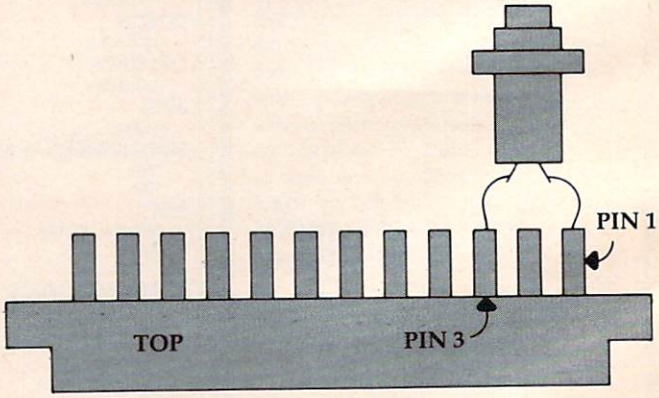
You have access to the RESET signal through two pins in the User Port (the rightmost connector as you face the back of your 64). Triggering a RESET through the User Port will cause a RESET without turning the power off (and memory contents will not be lost). There is a good chance that the program you were working on will still be intact. You can save a fair amount of time while experimenting and debugging by not having to reload the program every time.

To construct a RESET switch, you will need the following items:

Hardware:
1 Momentary contact switch (SPST)
1 24-pin card edge connector
(contacts on .156 inch centers)

You will also need a small amount of wire (preferably stiff wire) as well as a soldering iron and a little solder. If you aren't good at soldering, perhaps you can find a friend who can do the construction for you.

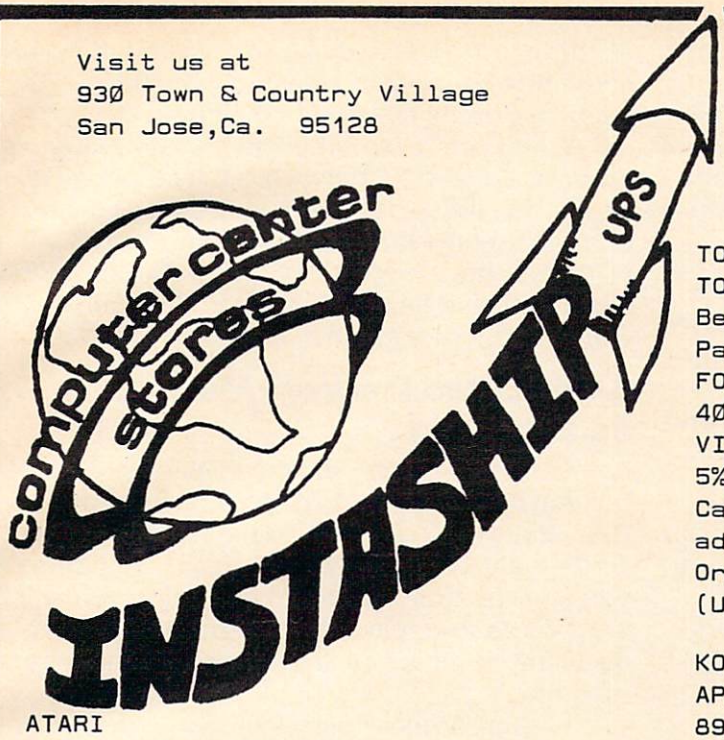
The construction involves connecting one terminal of the switch to pin 1 on the card edge connector, and the other terminal on the switch to pin 3 on the connector:



When construction is finished, plug the connector onto the 64 User Port (with the computer's power off), making sure that the terminals with connected wires are on top. With your switch in place, if your program crashes you just press the switch, and your 64 is RESET.

Visit us at
930 Town & Country Village
San Jose,Ca. 95128

We're also at:
160 East El Camino Real
Mt. View, Ca. 94040



TO ORDER
TOLL FREE 800-841-9494
Between 10am and 5pm
Pacific Standard Time
FOR INFO (OR IN CALIFORNIA)
408-246-5710
VISA/MASTERCHARGE/COD
5% Shipping on all orders
California residents Please
add 6.5% sales tax
Orders Shipped UPS or UPS Blue
(UPS Blue extra)

ATARI

600XL	16K Computer	154.
800XL	64K Computer	264.
1400XL	64K Computer	* *
1450XLD	64K Computer	* *
1027	Letter Qual.printer	265.
1050	Disk Drive	331.
850	Interface	163.
KX7097	Logo	70.
CX4018	Pilot	55.

COMMODORE/ATARI Modem $149.
Auto Dial/Answer send recieve and
Print simultaneously 300 baud
direct connect w/centronics port,
cable and software listings.

COMMODORE
Executive 64 w/drive and moniter * *
444/T.E.D. * *
SUPER 64 Forth $89.95
Supports floating point
sprites,sound & Hires graphics
Card? +G $89.95
Printer Interface w/Graphics
Word pro. 3+ 64 w/Spellright $83.00
We carry all H.E.S. products
including
Graphic Basic 64 * *
Multiplan 64 $84.95
Omniwriter 64 w/Spellchecker * *

MODEMWARE 64 $39.00
Features UP/DOWNloading,save to Disk
, 64 to 64, and out put to printer
OKIDATA * * PRINTERS
GEMINI * * NOW
SMITH/CORONA * * AVAILIBLE

KOALA PAD w/Koala painter For
APPLE ATARI COMMODORE
89.95 84.95 84.95
We carry all INFOCOM For
APPLE ATARI COMMODORE
Including Zork Infidel Enchanter
ULTIMA III EXODUS For
APPLE ATARI COMMODORE
44.95 44.95 * *
We carry all EPYX software For
APPLE ATARI COMMODORE
Including Gateway to Apshai
Pitstop or Jumpman Jr.
Dragonriders of Pern $25.95ea.
We carry all ELECTRONIC ARTS
software For
APPLE ATARI COMMODORE
Including Music Constuction Set
Pinball Construction Set
Archon - Mule $32.95ea
The Finacial Cookbook * *
We carry all BRODERBUND software
For APPLE ATARI COMMODORE
Including Bank Street Writer * *
We carry all SIERRA ON LINE software
For APPLE ATARI COMMODORE
Including B.C.'s Quest for Tires
Sammy Lightfoot $26.95ea
DATA DEFENDER By RING KING $19.95ea.
Diskette storage case holds 70
disks w/dividers,lock and 2 keys.

* * call for Prices
If you don't see it here call
Prices are subject to change.
P.S. Down as well as up,
give us a call.

If you are working strictly with machine language, you may be able to continue working with your program immediately after using the RESET switch. If you are working with BASIC or are using the DOS Wedge, you must do a little more work to get things back to normal. To restart the DOS Wedge, execute the following command:

```
POKE 186,8:SYS 52224
```

The first POKE is necessary to put the 1541's device number where the Wedge expects to find it. Normally it would be put there automatically when the Wedge is loaded from disk. The SYS command links the Wedge into BASIC again.

Recovering A BASIC Program

When you are working with BASIC programs, using the RESET switch will effectively perform a NEW on your program. To recover the BASIC program, a small machine language routine will be necessary. The following program will POKE the required routine into memory.

```
10 AD=49152:FOR I=0 TO 21
20 READ D:POKE AD+I,D:NEXT
30 DATA 169,8,141,2,8,32,51,165,24
40 DATA 165,34,105,2,133,45,165,35
50 DATA 105,0,133,46,96
60 PRINT"TO EXECUTE, USE SYS" ;AD;":CLR"
```

As written, the routine should be located at 49152 ($C000). The routine will run correctly no matter where it is placed, provided it is some place out of the way. You could put the routine in the cassette buffer by simply setting AD to 828 in line 10. You should execute this program before beginning your experiments with the program under development. Should you be forced to use the RESET switch, you can recover the BASIC program by executing the command:

```
SYS 49152:CLR
```

As you might guess, this will also recover a program which has been inadvertently NEWed. The CLR command is necessary to clean up some pointers that BASIC uses to locate where variables and arrays are to be stored.

Finding The Variables Again

Unfortunately, there isn't an automatic way to recover the old values of the variables or arrays. Recovering arrays is too complicated to be practical. However, some of the variables can be recovered, provided you have an idea of how many there were. To recover a given number of variables, substitute that number for n in the following command:

```
?PEEK(45)+PEEK(46)*256+7*n
```

Substitute the value printed into the N in this additional command:

```
POKE48,INT(N/256) :POKE47,N-PEEK(48)*256
```

At this point you should be able to print the values of the first N variables created by the BASIC program, assuming there were that many.

When you're working with machine language programs, the RESET switch can be especially handy. In addition to not having to reload your programs all the time, the variable storage used by the machine language program should still be intact. This can be very helpful in determining where in the program the crash occurred.

A Corrupted Program Must Be Reloaded

As mentioned before, the great majority of memory will be left unchanged after the reset. However, there is a possibility that the program *was* accidentally corrupted by the crash. Therefore, if you must be sure that there is a good copy in memory, you should reload the program. This obviously implies that you saved a copy before you tried it out.

But for simple experimentation, you can assume that the program in memory is still good and simply execute it again. If it crashes right away, or in a different manner, it may be time to reload the program.

If you've managed to live without a reset switch this long, you may wonder whether you should bother building one. When you are debugging a program which crashes the machine, anything which can help minimize the frustration is desirable.

File Access And The 1541

Now to look some more at the 1541 disk drive. Fortunately, we have a nice thick reference manual for the 64 to provide lots of detailed information. Unfortunately, the *Commodore 64 Programmer's Reference Guide* doesn't cover the 1541 disk drive. Instead, we are left with the *1541 User's Manual*, which isn't totally accurate or clean. To help fill this gap, I will pass on any interesting bits of information I can discover concerning operation of the disk drive.

How many disk files can be open at one time? The only hard facts I could find in the *1541 User's Manual* were under DOS Error Message 70: NO CHANNEL. Here it states that six "direct" access (which I assume to mean random access) or five sequential files may be open at one time. From previous experience, I knew these numbers were not correct.

Since my experiments gave inconsistent results, I am unable to give you a simple answer to the question. Instead, I'll just tell you what I observed, and not try to explain it.

Maximum Of Three Sequential Files

First of all, I was able to open only four random

access channels before getting the NO CHANNEL error message. This implies that only three sequential channels may be opened at one time. This I found to be true, provided only one of the three files was opened for writing. Opening three sequential files for writing resulted in an error. It's interesting that opening three sequential files did not result in a NO CHANNEL error, rather there was a DRIVE NOT READY error (74).

Opening two sequential files for writing and one for reading was accepted by the disk drive, provided that the one for reading was opened last. If the file for reading was opened first or second, a DRIVE NOT READY message was returned by the disk drive. Because of this inconsistent operation, I would open no more than two sequential files for writing.

As for relative files, it appears that only one relative file may be opened on the 1541 at one time. Opening a relative file in conjunction with a random access file or sequence file resulted in the same inconsistency as opening two sequential write files. If the relative file was opened first, another file, random or sequential, could be opened afterward without complaints from the disk drive. However, when a random or sequential file was opened first, opening a relative afterward caused the NO CHANNEL error.

Mixing File Types

From these observations, I would say it's safe to use up to four random access files at one time, three squential files (with only one opened for writing), or one relative file. It should also be possible to mix some random access files with sequential channels, if desired. My experiments did not involve reading or writing data to any great extent. To be thorough, this should be done as well. I may be able to report on further experiments in my next column.

I will also try to verify if the 1541 drives currently being sold show the same symptoms as my drive. It is possible that the software inside has been upgraded since I obtained my drive, though I haven't heard any reports of this. ©

Random Music

Roger Hagerty

Looking for some great sound effects for your game programs? "Random Music" plays random combinations of pitch, duration, and volume to produce a wide variety of sounds. And for even more variety, you can use the game paddles to control one of these parameters while the computer selects the others at random.

Displayed on the screen are the digital values of the game paddles (0–255) and paddle buttons (0 or 1). The program plays a random combination of pitch, duration, and volume.

Pressing the right paddle button enables you to control the duration by rotating the right paddle. When the left paddle button is pressed, the pitch is controlled by the value of the left paddle. When both buttons are pressed, the last note is pulsed. By using the noise voice in this mode, you can generate some exciting machine-gun effects. Releasing both buttons returns to the random music mode.

The Atari version uses one voice. The VIC version uses four voices which can be selected by the function keys. In the 64 version, the function keys are used to select the triangle, sawtooth, pulse, and noise waveforms. See the "Automatic Proofreader" article on page 60 before typing in these programs.

Program 1: Random Music—VIC Version

```
5 GOTO9040                                :rem 59
6 POKE36879,76:PRINT"{CLR}"               :rem 173
10 POKE37139,0:DD=37154:PA=37137:PB=37152
                                          :rem 14
20 PX=36872:PY=36873:K1=4                 :rem 163
100 FORI=1TO4                              :rem 6
110 S(I)=36873+I:NEXTI                    :rem 253
130 V=36878                                :rem 55
131 PRINT"{HOME}{4 DOWN}{RIGHT}{DOWN}
    {BLU}{RVS}LEFT{OFF}{2 SPACES}{RVS}FB"
    ,"{GRN}RIGHT{OFF}{2 SPACES}{RVS}FB
    {OFF}"                                :rem 61
132 PRINT"{DOWN}{19 SPACES}"              :rem 120
133 GOSUB9000:PRINT"{UP}" PEEK(PX)TAB(6)X
    ;TAB(10)PEEK(PY)TAB(17)Y               :rem 28
134 D1=PEEK(PX):D=PEEK(PY)                 :rem 66
140 Q=INT(RND(1)*4)+1:L=INT(RND(1)*16)
                                          :rem 117
142 R=INT(RND(1)*128)+128                  :rem 83
143 Q1=INT(RND(1)*4)+1                    :rem 179
145 Z=S(Q):Z1=S(Q1)                        :rem 78
150 POKEZ,R:FORC=1TOD :NEXTC               :rem 18
155 POKEV,L                               :rem 152
160 IFXTHEN200                             :rem 63
165 POKEZ1,0                              :rem 178
170 ONQGOTO134,140,131,134                :rem 157
200 FORI=1TO4:POKES(I),0:NEXT              :rem 50
201 D2=PEEK(PX)+128:IFD2>255THEND2=255
                                          :rem 193
202 PRINT"{UP}"D2TAB(17)Y                  :rem 85
203 KY=PEEK(197):IFKY=39THENK1=1          :rem 188
204 IFKY=47THENK1=2                       :rem 139
205 IFKY=55THENK1=3                       :rem 140
206 IFKY=63THENK1=4                       :rem 141
208 IFKY<>39OR47OR55OR63THENKY=YY:rem 150
209 YY=KY                                  :rem 46
210 POKES(K1),D2:POKEV,10                 :rem 208
215 GOSUB9000                             :rem 225
218 Z=X+Y                                  :rem 14
220 ONZGOTO201,200                         :rem 21
230 GOTO170                               :rem 102
9000 POKEDD,127:Y=-((PEEK(PB)AND128)=0):P
    OKEDD,255                             :rem 129
9010 X=-((PEEK(PA)AND16)=0):RETURN
                                          :rem 246
9040 PRINT"{CLR}{RVS}{PUR}{7 SPACES}CONTR
    OLS{7 SPACES}{OFF}"                   :rem 229
9050 PRINT"{RED}QRIGHT PADDLE-CONTROLS DE
    LAY OF RANDOM MUSIC"                  :rem 155
9060 PRINT"QLEFT PADDLE-CONTROLS
    {2 SPACES}PITCH WHEN LEFT FIRE- BUTT
    ON IS{2 SPACES}DEPRESSED"             :rem 38
9070 PRINT"{DOWN}QFUNCTION KEYS DETER-
    {2 SPACES}MINE VOICE WHEN LEFT
    {2 SPACES}FIREBUTTON IS"              :rem 96
9080 PRINT"{RIGHT}DEPRESSED                :rem 60
9090 PRINT"{DOWN}QWHEN BOTH FIREBUTTONS A
    RE DEPRESSED THE{5 SPACES}LAST VOICE
     USED IS{4 SPACES}PULSED";            :rem 16
10000 PRINT" AND REPEATED                 :rem 189
10010 PRINT"{2 DOWN}{RVS}{YEL}PRESS ANY K
    EY TO START                            :rem 2
10020 GETA$:IFA$=""THEN10020               :rem 9
10030 GOTO6                               :rem 99
```

Program 2: Random Music—64 Version

```
100 GOSUB 440                             :rem 169
110 PRINT"{CLR}{9 DOWN}{13 RIGHT}RANDOM M
    USIC"                                  :rem 74
120 REM CLEAR CHIP                          :rem 2
130 SID =54272:PA=SID+25:FB = 56321:AD=17
    :SR=243:FU=17:D1= 30:WA$="TRIANGLE"
                                          :rem 222
140 FOR T= SID TO SID +24:POKET,0:NEXT
                                          :rem 147
```

```
150 POKESID+24,15                    :rem 200
160 POKE SID+5,AD:POKESID+6,SR       :rem 50
170 IF PEEK(197)>60RPEEK(197)<3THEN190
                                     :rem 162
180 ON PEEK(197)-2GOSUB320,330,340,350
                                     :rem 10
190 F1=PEEK(FB)AND8:F2=PEEK(FB)AND4
                                     :rem 75
200 IFF1<>0ANDF2<>0THENFB$= "{12 SPACES}"
    :GOSUB410:GOSUB370:GOTO240       :rem 63
210 IF F1=0AND F2=0{2 SPACES}THEN FB$="BO
    TH BUTTONS":GOSUB400:GOSUB360:GOTO250
                                     :rem 33
220 IF F1=0THEN FB$="LEFT{2 SPACES}BUTTON
    ":GOSUB400:GOTO250               :rem 194
230 IF F2 =0THEN FB$="RIGHT BUTTON":GOSUB
    360:GOTO250                      :rem 28
240 D1=INT(RND(0)*255):D2=INT(RND(0)*255)
    :GOSUB410:GOSUB370               :rem 166
250 POKE SID+1,D1:POKESID,50:POKE214,12:P
    RINT:POKE211,8:PRINT"PITCH";D1$;
                                     :rem 198
260 POKESID+4,FU                     :rem 205
270 FORT=1 TO D2:NEXT:POKESID+4,FUAND254
                                     :rem 177
280 PRINT"{4 RIGHT}DELAY";D2$;       :rem 94

290 PRINT"{DOWN}{20 LEFT}WAVEFORM {RVS}";
    WA$;                             :rem 108
300 POKE214,14:PRINT:POKE211,13:PRINTFB$
                                     :rem 177
310 GOTO170                          :rem 101
320 FU=129:WA$=" NOISE{2 SPACES}":RETURN
                                     :rem 24
330 FU =17:WA$="TRIANGLE":RETURN     :rem 189
340 FU= 33 :WA$="SAWTOOTH":RETURN:rem 223
350 FU = 65:WA$=" PULSE{2 SPACES}":POKESI
    D+2,245:POKESID+3,7:RETURN       :rem 108
360 D2=PEEK(PA)                      :rem 83
370 D2$=STR$(D2):IF LEN(D2$)=3THEND2$=" "
    +D2$                             :rem 103
380 IF LEN(D2$)=2 THEND2$="{2 SPACES}"+D2
    $                                :rem 114
390 RETURN                           :rem 124
400 D1 = PEEK(PA+1)                  :rem 169
410 D1$=STR$(D1):IF LEN(D1$)=3THEND1$=" "
    +D1$                             :rem 93
420 IF LEN(D1$)=2 THEND1$="{2 SPACES}"+D1
    $                                :rem 106
430 RETURN                           :rem 119
440 PRINT "{CLR}{16 RIGHT}{BLK}CONTROLS":
    POKE53281,1                      :rem 153
450 PRINT"{BLK}{DOWN}{RIGHT}WHEN THE RIGH
    T FIRE BUTTON IS PRESSED,"       :rem 153
460 PRINT"{DOWN}{8 RIGHT}THE RIGHT PADDLE
     CONTROLS"                       :rem 225

470 PRINT"{DOWN}{4 RIGHT}THE DELAY OF THE
     SOUNDS PRODUCED."               :rem 23
480 PRINT"{DOWN}{RIGHT}WHEN THE LEFT FIRE
     BUTTON IS PRESSED,"             :rem 185
490 PRINT"{DOWN}{8 RIGHT}THE LEFT PADDLE
    {SPACE}CONTROLS"                 :rem 145
500 PRINT"{DOWN}{4 RIGHT}THE PITCH OF THE
     SOUNDS PRODUCED."               :rem 26
510 PRINT"{DOWN}{2 RIGHT}IF BOTH BUTTONS
    {SPACE}ARE PRESSED, THEN THE":rem 199
520 PRINT"{DOWN}{2 RIGHT}LAST SOUND PRODU
    CED IS PULSED AND CAN "          :rem 212
530 PRINT"{4 RIGHT}BE CONTROLLED BY EITHE
    R PADDLE."                       :rem 142
540 PRINT"{DOWN}THE FUNCTION KEYS ARE USE
    D TO SELECT THE"                 :rem 75
550 PRINT"{8 RIGHT}WAVEFORM FOR THE SOUND
    ."                               :rem 57
560 PRINT"{9 RIGHT}HIT ANY KEY TO BEGIN"
                                     :rem 47
570 FOR T=1 TO100:NEXT               :rem 242
580 IF PEEK(197)=64 THEN 580         :rem 182
590 RETURN                           :rem 126
```

Program 3: Random Music—Atari Version

```
FD 4 POKE 752,1
OM 5 DIM FB$(12),D2$(3),D1$(3),DT$(3),
     DR$(3),A$(2)
MA 6 ? "{CLEAR}":GOSUB 600:? "{CLEAR}"
JD 8 POSITION 14,10:? "RANDOM MUSIC"
BD 10 F1=PTRIG(0):F2=PTRIG(1)
DM 20 IF F1<>0 AND F2<>0 THEN FB$="
     {12 SPACES}":GOTO 60
NA 30 IF F1+F2=0 THEN FB$="Both Button
     s":GOSUB 350:GOSUB 450:GOTO 70
GH 40 IF F1=0 THEN FB$="Left Button ":
     GOSUB 450:GOTO 70
NL 50 IF F2=0 THEN FB$="Right Button "
     :GOSUB 350:GOTO 70
HK 60 D1=INT(RND(0)*255):D2=INT(RND(0)
     *255):GOSUB 360:GOSUB 460
NP 70 SOUND 0,D1,14,10
FG 80 POSITION 10,12:? "Pitch ";D1$
FA 90 POSITION 20,12:? "Delay ";D2$
BP 100 POSITION 13,13:? FB$
KG 105 FOR T=1 TO D2:NEXT T:SOUND 0,D1
     ,14,0
CM 110 GOTO 10
HH 350 D2=PADDLE(1)
OJ 360 D2$="":DT$=STR$(D2):A=LEN(DT$):
     ON A GOTO 370,380,390
AA 370 D2$(1,2)="  ":D2$(3)=DT$:RETURN
FO 380 D2$(1,1)=" ":D2$(2,3)=DT$:RETUR
     N
CP 390 D2$=DT$
HE 400 RETURN
HG 450 D1=PADDLE(0)
OH 460 D1$="":DR$=STR$(D1):A=LEN(DR$):
     ON A GOTO 470,480,490
PN 470 D1$(1,2)="  ":D1$(3)=DR$:RETURN

FL 480 D1$(1,1)=" ":D1$(2,3)=DR$:RETUR
     N
CN 490 D1$=DR$
HF 500 RETURN
IN 600 SETCOLOR 4,13,10:SETCOLOR 1,8,0
     :SETCOLOR 2,8,10:? "{CLEAR}":PO
     SITION 15,1:? "CONTROLS"
HM 610 POSITION 7,3:? "The right paddl
     e controls "
LG 620 POSITION 3,5:? "the delay of th
     e sounds produced"
AP 630 POSITION 7,7:? "The left paddle
      controls "
MF 640 POSITION 3,9:? "the pitch of th
     e sounds produced "
DH 650 POSITION 4,11:? "When both butt
     ons are pressed,"
CE 660 POSITION 3,13:? "the last note
     played is pulsed "
GF 665 POSITION 9,15:? "Hit any key to
      start"
FC 670 FOR T=1 TO 255:NEXT T
LF 680 A=PEEK(764):POKE 764,255:IF A=2
     55 THEN 680
HP 690 RETURN
```

Questions Beginners Ask

Tom R. Halfhill, Features Editor

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

Q One of the big reasons I bought my computer was for word processing. I have word processing software and a dot-matrix printer. The printer has many print modes for printing expanded characters, condensed characters, double-strike, etc. But my word processor software was not made for this printer and doesn't have commands to switch the printer into these different modes. Is there any way I can use these modes?

A Yes, there is. Review the word processor manual carefully to see if there is a command for sending *escape codes* or *control codes* to the printer. Almost all word processors have some sort of feature like this. Usually they let you embed a nonprinting character in your text—that is, a character that appears on the screen but not in the printout. The escape code (CHR$(27)) followed by a number, or a control code by itself, switches the printer to whatever mode you choose. You'll have to consult your printer manual to learn the code numbers for your particular printer. Look for an appendix.

If you still have no luck, there's yet another solution. Remember that printers can be computers, too. They often contain a microprocessor, RAM, and ROM, though their computing capability is not nearly as powerful as your main computer. Still, printers can often be programmed. Sending codes from your word processor is only one way of doing this. If your word processor does not have this capability, then you'll have to program the printer before you run the word processor.

First, switch on the printer and computer. Second, before loading the word processor, use BASIC to send the proper codes to the printer. Refer to your BASIC manual to find the right command. (Atari and TRS-80 computers use LPRINT; Commodores require you to open a file to the printer and use PRINT#. For example, from a VIC or 64, you could type:

```
OPEN 4,4 : PRINT#4, CHR$(27) + CHR$(7)
```

and this would ring the printer's bell, if it has one.) Next, without turning off the printer, load the word processor. As long as the printer stays on, it should remain in the mode to which you set it. The only drawback of this method is that you cannot switch print modes within a document.

Q I use a cassette tape recorder to store programs on my computer. How safe is it to reuse tapes which have old programs on them? Can I just record over the old programs, or should I erase the tape first?

A We've re-recorded cassette tapes many times with no problems at all. Once with an Atari we even carried this practice to the extreme. It was a charting program that called for weekly updates to keep track of money market interest rates. Each Friday, at the end of the business week, the program was loaded from tape, the figures updated, and the new chart recorded over the old. By year's end, the program had been recorded over itself 52 times before the tape was retired and a new one started for the next year. Not once were there any saving or loading problems. What's more, the tape was the least expensive C-30 cassette sold by Radio Shack. However, this might be stretching things. Maybe we were just lucky.

Nevertheless, this shows that it's quite possible to re-record tapes several times without much risk. Of course, you should always keep a backup in case one recording proves faulty.

If you want to be extra careful, you can erase the tape first. The best way is to use a magnetic bulk tape eraser, available at Radio Shack and other electronic stores. Bulk erasers are electromagnetic devices which wipe a whole tape (or diskette) clean in a matter of seconds. Good erasers clean the tape more thoroughly than the recorder itself can because they generate a much stronger magnetic field, reducing background noise to a minimum. But if you use a bulk eraser, keep it far, far away from your good tapes or disks—you could carelessly destroy an entire software or music library in less time than it would take to hurl the eraser out the window. ©

How To Type COMPUTE!'s Programs

Many of the programs which are listed in COMPUTE! contain special control characters (cursor control, color keys, inverse video, etc.). To make it easy to tell exactly what to type when entering one of these programs into your computer, we have established the following listing conventions. There is a separate key for each computer. Refer to the appropriate tables when you come across an unusual symbol in a program listing. If you are unsure how to actually enter a control character, consult your computer's manuals.

Atari 400/800

Characters in inverse video will appear like: {INVERSE VIDEO}
Enter these characters with the Atari logo key, {🡅}.

When you see	Type	See	
{CLEAR}	ESC SHIFT <	↰	Clear Screen
{UP}	ESC CTRL -	↑	Cursor Up
{DOWN}	ESC CTRL =	↓	Cursor Down
{LEFT}	ESC CTRL +	←	Cursor Left
{RIGHT}	ESC CTRL *	→	Cursor Right
{BACK S}	ESC DELETE	◂	Backspace
{DELETE}	ESC CTRL DELETE	◧	Delete character
{INSERT}	ESC CTRL INSERT	◨	Insert character
{DEL LINE}	ESC SHIFT DELETE	▣	Delete line
{INS LINE}	ESC SHIFT INSERT	▣	Insert line
{TAB}	ESC TAB	▸	TAB key
{CLR TAB}	ESC CTRL TAB	◪	Clear tab
{SET TAB}	ESC SHIFT TAB	◪	Set tab stop
{BELL}	ESC CTRL 2	◱	Ring buzzer
{ESC}	ESC ESC	◟	ESCape key

Graphics characters, such as CTRL-T, the ball character ● will appear as the "normal" letter enclosed in braces, e.g. {T}.

A series of identical control characters, such as 10 spaces, three cursor-lefts, or 20 CTRL-R's, will appear as {10 SPACES}, {3 LEFT}, {20 R}, etc. If the character in braces is in inverse video, that character or characters should be entered with the Atari logo key. For example {■} means to enter a reverse-field heart with CTRL-comma, {5■} means to enter five inverse-video CTRL-U's.

Commodore PET/CBM/VIC/64

Generally, any PET/CBM/VIC/64 program listings will contain words within braces which spell out any special characters: {DOWN} would mean to press the cursor down key. {5 SPACES} would mean to press the space bar five times.

To indicate that a key should be *shifted* (hold down the SHIFT key while pressing the other key), the key would be underlined in our listings. For example, S would mean to type the S key while holding the shift key. If you find an underlined key enclosed in braces (e.g., {10 N}), you should type the key as many times as indicated (in our example, you would enter ten shifted N's). Some graphics characters are inaccessible from the keyboard on CBM Business models (32N, 8032).

For the VIC and 64, if a key is enclosed in special brackets, |< >|, you should hold down the *Commodore key* while pressing the key inside the special brackets. (The Commodore key is the key in the lower left corner of the keyboard.) Again, if the key is preceded by a number, you should press the key as many times as indicated.

Rarely, you'll see in a Commodore 64 program a solitary letter of the alphabet enclosed in braces. These characters can be entered by holding down the CTRL key while typing the letter in the braces. For example, {A} would indicate that you should press CTRL-A.

About the *quote mode*: you know that you can move the cursor around the screen with the CRSR keys. Sometimes a programmer will want to move the cursor under program control. That's why you see all the {LEFT}'s, {HOME}'s, and {BLU}'s in our programs. The only way the computer can tell the difference between direct and programmed cursor control is the quote mode.

Once you press the quote (the double quote, SHIFT-2), you are in the quote mode. If you type something and then try to change it by moving the cursor left, you'll only get a bunch of reverse-video lines. These are the symbols for cursor left. The only editing key that isn't programmable is the DEL key; you can still use DEL to back up and edit the line. Once you type another quote, you are out of quote mode.

You also go into quote mode when you INSerT spaces into a line. In any case, the easiest way to get out of quote mode is to just press RETURN. You'll then be out of quote mode and you can cursor up to the mistyped line and fix it.

Use the following tables when entering special characters:

VIC And 64

When You Read:	Press:		See:	When You Read:	Press:		See:
{CLR}	SHIFT	CLR/HOME		{GRN}	CTRL	6	
{HOME}		CLR/HOME		{BLU}	CTRL	7	
{UP}	SHIFT	CRSR ↕		{YEL}	CTRL	8	
{DOWN}		CRSR ↕		{F1}	f1		
{LEFT}	SHIFT	CRSR ↔		{F2}	f2		
{RIGHT}		CRSR ↔		{F3}	f3		
{RVS}	CTRL	9		{F4}	f4		
{OFF}	CTRL	0		{F5}	f5		
{BLK}	CTRL	1		{F6}	f6		
{WHT}	CTRL	2		{F7}	f7		
{RED}	CTRL	3		{F8}	f8		
{CYN}	CTRL	4		←	←		
{PUR}	CTRL	5		↑	SHIFT	↑	

All Commodore Machines

Clear Screen	{CLR}	Cursor Left	{LEFT}
Home Cursor	{HOME}	Insert Character	{INST}
Cursor Up	{UP}	Delete Character	{DEL}
Cursor Down	{DOWN}	Reverse Field On	{RVS}
Cursor Right	{RIGHT}	Reverse Field Off	{OFF}

Apple II / Apple II Plus

All programs are in Applesoft BASIC, unless otherwise stated. Control characters are printed as the "normal" character enclosed in braces, such as {D} for CTRL-D. Hold down CTRL while pressing the control key. You will not see the special character on the screen.

Texas Instruments 99/4

The only special characters used are in PRINT statements to indicate where two or more spaces should be left between words. For example, ENERGY {10 SPACES} MANAGEMENT means that ten spaces should be left between the words ENERGY and MANAGEMENT. Do not type in the braces or the words 10 SPACES. Enter all programs with the ALPHA LOCK on (in the down position). Release the ALPHA LOCK to enter lowercase text.

A Beginner's Guide To Typing In Programs

What Is A Program?

A computer cannot perform any task by itself. Like a car without gas, a computer has *potential*, but without a program, it isn't going anywhere. Most of the programs published in COMPUTE! are written in a computer language called BASIC. BASIC is easy to learn and is built into most computers (on some computers, you have to purchase an optional BASIC cartridge).

BASIC Programs

Each month, COMPUTE! publishes programs for many machines. To start out, type in only programs written for your machine, e.g., "TI Version" if you have a TI-99/4. Later, when you gain experience with your computer's BASIC, you can try typing in and converting certain programs from one computer to yours.

Computers can be picky. Unlike the English language, which is full of ambiguities, BASIC usually has only one "right way" of stating something. Every letter, character, or number is significant. A common mistake is substituting a letter such as O for the numeral 0, a lowercase l for the numeral 1, or an uppercase B for the numeral 8. Also, you must enter all punctuation such as colons and commas just as they appear in the magazine. Spacing can be important. To be safe, type in the listings *exactly* as they appear.

Braces And Special Characters

The exception to this typing rule is when you see the braces, such as {DOWN}. Anything within a set of braces is a special character or characters that cannot easily be listed in a printer. When you come across such a special statement, refer to the appropriate key for your computer. For example, if you have an Atari, refer to the "Atari" section in "How To Type COMPUTE!'s Programs."

About DATA Statements

Some programs contain a section or sections of DATA statements. These lines provide information needed by the program. Some DATA statements contain actual programs (called machine language); others contain graphics codes. These lines are especially sensitive to errors.

If a single number in any one DATA statement is mistyped, your machine could "lock up," or "crash." The keyboard, break key, and RESET (or STOP) keys may all seem "dead," and the screen may go blank. Don't panic – no damage is done. To regain control, you have to turn off your computer, then turn it back on. This will erase whatever program was in memory, so always SAVE a copy of your program before you RUN it. If your computer crashes, you can LOAD the program and look for your mistake.

Sometimes a mistyped DATA statement will cause an error message when the program is RUN. The error message may refer to the program line that READs the data. *The error is still in the DATA statements, though.*

Get To Know Your Machine

You should familiarize yourself with your computer before attempting to type in a program. Learn the statements you use to store and retrieve programs from tape or disk. You'll want to save a copy of your program, so that you won't have to type it in every time you want to use it. Learn to use your machine's editing functions. How do you change a line if you made a mistake? You can always retype the line, but you at least need to know how to backspace. Do you know how to enter inverse video, lowercase, and control characters? It's all explained in your computer's manuals.

A Quick Review

1. Type in the program a line at a time, in order. Press RETURN or ENTER at the end of each line. Use backspace or the back arrow to correct mistakes.

2. Check the line you've typed against the line in the magazine. You can check the entire program again if you get an error when you RUN the program.

3. Make sure you've entered statements in braces as the appropriate control key (see "How To Type COMPUTE!'s Programs" elsewhere in the magazine).

We regret that we are no longer able to respond to individual inquiries about programs, products, or services appearing in COMPUTE! *due to increasing publication activity. On those infrequent occasions when a published program contains a typo, the correction will appear on the CAPUTE! page, usually within eight weeks. If you have specific questions about items or programs which you've seen in* COMPUTE!, *please send them to Readers' Feedback, P.O. Box 5406, Greensboro, NC 27403.* ©

MLX Machine Language Entry Program For Commodore 64

Charles Brannon, Program Editor

MLX is a labor-saving utility that allows almost fail-safe entry of machine language programs published in COMPUTE!. *You need to know nothing about machine language to use MLX—it was designed for everyone. MLX was conceived and written by Program Editor Charles Brannon. Important: MLX is required to type in the 64 version of "Trident" in this issue.*

MLX is a new way to enter long machine language (ML) programs with a minimum of fuss. MLX lets you enter the numbers from a special list that looks similar to BASIC DATA statements. It checks your typing on a line-by-line basis. It won't let you enter illegal characters when you should be typing numbers. It won't let you enter numbers greater than 255 (forbidden in ML). It won't let you enter the wrong numbers on the wrong line. In addition, MLX creates a ready-to-use tape or disk file. You can then use the LOAD command to read the program into the computer, as with any program:

```
LOAD "filename",1,1   (for tape)
LOAD "filename",8,1   (for disk)
```

To start the program, you enter a SYS command that transfers control from BASIC to machine language. The starting SYS number appears in the article.

Using MLX

Type in and save MLX for your 64 (you'll want to use it in the future). When you're ready to type in an ML program, run MLX. MLX asks you for two numbers: the starting address and the ending address. These numbers are given in the article accompanying the ML program.

You'll see a prompt corresponding to the starting address. The prompt is the current line you are entering from the listing. It increases by six each time you enter a line. That's because each line has seven numbers—six actual data numbers plus a *checksum number*. The checksum verifies that you typed the previous six numbers correctly. If you enter any of the six numbers wrong, or enter the checksum wrong, the computer rings a buzzer and prompts you to reenter the line. If you enter it correctly, a bell tone sounds and you continue to the next line.

MLX accepts only numbers as input. If you make a typing error, press the INST/DEL key; the entire number is deleted. You can press it as many times as necessary back to the start of the line. If you enter three-digit numbers as listed, the computer automatically prints the comma and goes on to accept the next number. If you enter less than three digits, you can press either the comma, SPACE bar, or RETURN key to advance to the next number. The checksum automatically appears in inverse video for emphasis.

MLX Commands

When you finish typing an ML listing (assuming you type it all in one session), you can then save the completed program on tape or disk. Follow the screen instructions. If you get any errors while saving, you probably have a bad disk, or the disk is full, or you've made a typo when entering the MLX program itself.

You don't have to enter the whole ML program in one sitting. MLX lets you enter as much as you want, save it, and then reload the file from tape or disk later. MLX recognizes these commands:

SHIFT-S: Save
SHIFT-L: Load
SHIFT-N: New Address
SHIFT-D: Display

When you enter a command, MLX jumps out of the line you've been typing, so we recommend you do it at a new prompt. Use the Save command to save what you've been working on. It will save on tape or disk as if you've finished, but the tape or disk won't work, of course, until you finish the typing. Remember what address you stop at. The next time you run MLX, answer all the prompts as you did before, then insert the disk or tape. When you get to the entry prompt, press SHIFT-L to reload the partly completed file into memory. Then use the New Address command to resume typing.

To use the New Address command, press SHIFT-N and enter the address where you previously stopped. The prompt will change, and you can then continue typing. Always enter a New Address that matches up with one of the line numbers in the special listing, or else the checksum won't work. The Display command lets you display a section of your typing. After you press SHIFT-D, enter two addresses within the line number range of the listing. You can abort the listing by pressing any key.

The special MLX commands may seem a bit confusing, but as you work with MLX, they will become valuable. For example, what if you forgot where you stopped typing? Use the Display command to scan memory from the beginning to the end of the program. When you reach the end of your typing, the lines will contain a random pattern of numbers. When you see the end of your typing, press any key to stop the listing. Use the New Address command to continue typing from the proper location.

You can use the Save and Load commands to make copies of the completed program. Use Load to reload the tape or disk, then insert a new tape or disk and use Save to make a new copy.

Be sure to save MLX; it will be used for future ML programs in COMPUTE!.

MLX: Machine Language Entry

```
100 PRINT"{CLR}[6]";CHR$(142);CHR$(8);:
    POKE53281,1:POKE53280,1        :rem 67
101 POKE 788,52:REM DISABLE RUN/STOP
                                   :rem 119
110 PRINT"{RVS}{39 SPACES}";       :rem 176
120 PRINT"{RVS}{14 SPACES}{RIGHT}{OFF}
    [*]£{RVS}{RIGHT} {RIGHT}{2 SPACES}
    [*]{OFF}[*]£{RVS}£{RVS}
    {14 SPACES}";                  :rem 250
130 PRINT"{RVS}{14 SPACES}{RIGHT} [G]
    {RIGHT} {2 RIGHT} {OFF}£{RVS}£[*]
    {OFF}[*]{RVS}{14 SPACES}";     :rem 35
140 PRINT"{RVS}{41 SPACES}"        :rem 120
200 PRINT"{2 DOWN}{PUR}{BLK} MACHINE LANG
    UAGE EDITOR VERSION 2.00{5 DOWN}"
                                   :rem 236
210 PRINT"[5]{2 UP}STARTING ADDRESS?
    {8 SPACES}{9 LEFT}";           :rem 143
215 INPUTS:F=1-F:C$=CHR$(31+119*F)
                                   :rem 166
220 IFS<2560R(S>40960ANDS<49152)ORS>53247
    THENGOSUB3000:GOTO210          :rem 235
225 PRINT:PRINT:PRINT              :rem 180
230 PRINT"[5]{2 UP}ENDING ADDRESS?
    {8 SPACES}{9 LEFT}";:INPUTE:F=1-F:C$=
    CHR$(31+119*F)                 :rem 20
240 IFE<2560R(E>40960ANDE<49152)ORE>53247
    THENGOSUB3000:GOTO230          :rem 183
250 IFE<STHENPRINTC$;"{RVS}ENDING < START
    {2 SPACES}":GOSUB1000:GOTO 230
                                   :rem 176
260 PRINT:PRINT:PRINT              :rem 179
300 PRINT"{CLR}";CHR$(14):AD=S:POKEV+21,0
                                   :rem 225
310 A=1:PRINTRIGHT$("0000"+MID$(STR$(AD),
    2),5);":";                     :rem 33
315 FORJ=ATO6                      :rem 33
320 GOSUB570:IFN=-1THENJ=J+N:GOTO320
                                   :rem 228
390 IFN=-211THEN 710               :rem 62
400 IFN=-204THEN 790               :rem 64
410 IFN=-206THENPRINT:INPUT"{DOWN}ENTER N
    EW ADDRESS";ZZ                 :rem 44
415 IFN=-206THENIFZZ<SORZZ>ETHENPRINT"
    {RVS}OUT OF RANGE":GOSUB1000:GOTO410
                                   :rem 225
417 IFN=-206THENAD=ZZ:PRINT:GOTO310
                                   :rem 238
420 IF N<>-196 THEN 480            :rem 133
430 PRINT:INPUT"DISPLAY:FROM";F:PRINT,"TO
    ";:INPUTT                      :rem 234
440 IFF<SORF>EORT<SORT>ETHENPRINT"AT LEAS
    T";S;"{LEFT}, NOT MORE THAN";E:GOTO43
    0                              :rem 159
450 FORI=FTOTSTEP6:PRINT:PRINTRIGHT$("000
    0"+MID$(STR$(I),2),5);":";     :rem 30
451 FORK=0TO5:N=PEEK(I+K):PRINTRIGHT$("00
    "+MID$(STR$(N),2),3);",";      :rem 66
460 GETA$:IFA$>""THENPRINT:PRINT:GOTO310
                                   :rem 25
470 NEXTK:PRINTCHR$(20);:NEXTI:PRINT:PRIN
    T:GOTO310                      :rem 50
480 IFN<0 THEN PRINT:GOTO310       :rem 168
490 A(J)=N:NEXTJ                   :rem 199
500 CKSUM=AD-INT(AD/256)*256:FORI=1TO6:CK
    SUM=(CKSUM+A(I))AND255:NEXT    :rem 200
510 PRINTCHR$(18);:GOSUB570:PRINTCHR$(146
    );                             :rem 94
511 IFN=-1THENA=6:GOTO315          :rem 254
515 PRINTCHR$(20):IFN=CKSUMTHEN530
                                   :rem 122
520 PRINT:PRINT"LINE ENTERED WRONG : RE-E
    NTER":PRINT:GOSUB1000:GOTO310:rem 176
530 GOSUB2000                      :rem 218
540 FORI=1TO6:POKEAD+I-1,A(I):NEXT:POKE54
    272,0:POKE54273,0              :rem 227
550 AD=AD+6:IF AD<E THEN 310       :rem 212
560 GOTO 710                       :rem 108
570 N=0:Z=0                        :rem 88
580 PRINT"[£]";                    :rem 81
581 GETA$:IFA$=""THEN581           :rem 95
582 AV=-(A$="M")-2*(A$=",")-3*(A$=".")-4*
    (A$="J")-5*(A$="K")-6*(A$="L"):rem 41
583 AV=AV-7*(A$="U")-8*(A$="I")-9*(A$="O"
    ):IFA$="H"THENA$="0"           :rem 134
584 IFAV>0THENA$=CHR$(48+AV)       :rem 134
585 PRINTCHR$(20);:A=ASC(A$):IFA=13ORA=44
    ORA=32THEN670                  :rem 229
590 IFA>128THENN=-A:RETURN         :rem 137
600 IFA<>20 THEN 630               :rem 10
610 GOSUB690:IFI=1ANDT=44THENN=-1:PRINT"
    {OFF}{LEFT} {LEFT}";:GOTO690   :rem 62
620 GOTO570                        :rem 109
630 IFA<48ORA>57THEN580            :rem 105
640 PRINTA$;:N=N*10+A-48           :rem 106
650 IFN>255 THEN A=20:GOSUB1000:GOTO600
                                   :rem 229
660 Z=Z+1:IFZ<3THEN580             :rem 71
670 IFZ=0THENGOSUB1000:GOTO570     :rem 114
680 PRINT",";:RETURN               :rem 240
690 S%=PEEK(209)+256*PEEK(210)+PEEK(211)
                                   :rem 149

691 FORI=1TO3:T=PEEK(S%-I)         :rem 67
695 IFT<>44ANDT<>58THENPOKES%-I,32:NEXT
                                   :rem 205
700 PRINTLEFT$("{3 LEFT}",I-1);:RETURN
                                   :rem 7
710 PRINT"{CLR}{RVS}*** SAVE ***{3 DOWN}"
                                   :rem 236
715 PRINT"{2 DOWN}(PRESS {RVS}RETURN{OFF}
     ALONE TO CANCEL SAVE){DOWN}":rem 106
720 F$="":INPUT"{DOWN} FILENAME";F$:IFF$=
    ""THENPRINT:PRINT:GOTO310      :rem 71
730 PRINT:PRINT"{2 DOWN}{RVS}T{OFF}APE OR
     {RVS}D{OFF}ISK: (T/D)"        :rem 228
740 GETA$:IFA$<>"T"ANDA$<>"D"THEN740
                                   :rem 36
750 DV=1-7*(A$="D"):IFDV=8THENF$="@0:"+F$
                                   :rem 222
760 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$
    ):POKE782,ZK/256               :rem 3
762 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
    T$):SYS65469                   :rem 109
763 POKE780,1:POKE781,DV:POKE782,1:SYS654
    66                             :rem 69
765 K=S+1:POKE254,K/256:POKE253,K-PEEK(25
    4)*256:POKE780,253             :rem 109
766 K=E+1:POKE782,K/256:POKE781,K-PEEK(78
    2)*256:SYS65496                :rem 235
770 IF(PEEK(783)AND1)OR(ST AND191)THEN780
                                   :rem 111
775 PRINT"{DOWN}DONE.{DOWN}":GOTO310
                                   :rem 113
780 PRINT"{DOWN}ERROR ON SAVE.{2 SPACES}T
    RY AGAIN.":IFDV=1THEN720       :rem 171
781 OPEN15,8,15:INPUT#15,E1$,E2$:PRINTE1$
    ;E2$:CLOSE15:GOTO720           :rem 103
790 PRINT"{CLR}{RVS}*** LOAD ***{2 DOWN}"
                                   :rem 212
795 PRINT"{2 DOWN}(PRESS {RVS}RETURN{OFF}
     ALONE TO CANCEL LOAD)"        :rem 82
800 F$="":INPUT"{2 DOWN} FILENAME";F$:IFF
    $=""THENPRINT:GOTO310          :rem 144
```

```
810 PRINT:PRINT"{2 DOWN}{RVS}T{OFF}APE OR
    {RVS}D{OFF}ISK: (T/D)"      :rem 227
820 GETA$:IFA$<>"T"ANDA$<>"D"THEN820
                                :rem 34
830 DV=1-7*(A$="D"):IFDV=8THENF$="0:"+F$
                                :rem 157
840 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$
    ):POKE782,ZK/256            :rem 2
841 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
    T$):SYS65469                :rem 107
845 POKE780,1:POKE781,DV:POKE782,1:SYS654
    66                          :rem 70
850 POKE780,0:SYS65493          :rem 11
860 IF(PEEK(783)AND1)OR(ST AND191)THEN870
                                :rem 111
865 PRINT"{DOWN}DONE.":GOTO310  :rem 96
870 PRINT"{DOWN}ERROR ON LOAD.{2 SPACES}T
    RY AGAIN.{DOWN}":IFDV=1THEN800
                                :rem 172
880 OPEN15,8,15:INPUT#15,E1$,E2$:PRINTE1$
    ;E2$:CLOSE15:GOTO800        :rem 102
1000 REM BUZZER                 :rem 135
1001 POKE54296,15:POKE54277,45:POKE54278,
     165                        :rem 207
1002 POKE54276,33:POKE 54273,6:POKE54272,
     5                          :rem 42
1003 FORT=1TO200:NEXT:POKE54276,32:POKE54
     273,0:POKE54272,0:RETURN   :rem 202
2000 REM BELL SOUND             :rem 78
2001 POKE54296,15:POKE54277,0:POKE54278,2
     47                         :rem 152
2002 POKE 54276,17:POKE54273,40:POKE54272
     ,0                         :rem 86
2003 FORT=1TO100:NEXT:POKE54276,16:RETURN
                                :rem 57
3000 PRINTC$;"{RVS}NOT ZERO PAGE OR ROM":
     GOTO1000                   :rem 89
```

©

COMPUTE!

Modifications Or Corrections To Previous Articles

Machine Language: Factors

The commands to prepare the computer to enter Program 2, the VIC and 64 version of the machine language factoring routine from the January "Machine Language" column (p. 178), should read:

```
POKE 4608,0:POKE 44,18:NEW
```

Commodore Files For Beginners, Part 3

On page 193 of the January issue, lines 340, 350, and 360 should have a semicolon (;) following the CHR$(13).

Disk Explorer For Commodore

This program from the December 1983 issue (p. 298) requires the following corrections, supplied by reader Duane Martin:

```
160 INPUT A$: IF LEFT$(A$,1)="$" THEN 190
1100 GETC$:IFC$=""THEN1040
```

Atari MLX

Line 190 of this machine language editor from the December issue (p. 216) creates a count of data blocks for use in the boot process. However, the line as written may cause problems due to rounding of the block count value when partial blocks are involved. Don Klich suggests the following change to avoid this problem:

```
190 BEG=BEG-24:BUFFER$=CHR$(0):BUFFER$(2)
    =CHR$(INT((FIN-BEG+127)/128))
```

This should not be a factor in getting the "Chopperoids" program to operate correctly. See the February issue for the corrections to Chopperoids.

Comparing Commodore Machine Language Programs

Readers attempting to run this utility from the December 1983 issue (p. 340) on the Commodore 64 should note that lines 240 and 350 contain PET 4.0 BASIC disk status variables which are not supported by the 64's BASIC. In addition to the changes noted in the article, the following are also required:

```
225 OPEN 15,8,15
240 INPUT#15,DS,DS$,D1,D2:IF DS<>0 THEN
    PRINT DS$:STOP
350 INPUT#15,DS,DS$,D1,D2:IF DS<>0 THEN
    PRINT DS$:STOP
```

64 Clock

Overseas readers may be interested to learn that the built-in time-of-day clock in the 64's CIA chip can be adjusted for their 50 Hz household current with a simple POKE. C. J. Ayers of Guildford, Surrey, England, notes that adding the line:

```
75 POKE 56334,129
```

to the program from the December issue (p. 344) will cause it to keep proper time on European 64s.

Termulator For The 64

Line 170 of Program 2 of this article from the November 1983 issue (p. 222) should read:

```
170 DATA 133, 106, 32, 189, 255, 169, 192
```

The value 3515 in line 120 will need to be changed to 3485 to reflect the change to the DATA. With this correction, Program 2 will create a tape copy of the data loaded by Program 1 without a filename. To reload "Termulator" from the tape created by Program 2, type:

```
LOAD "",1,1
```

Thanks to Stan Lefkowitz for pointing out this correction.

©

ATARI®

ATARI is a trademark of ATARI, INC.

NEW LOWER PRICES!!

ATARI 800XL ..... Call
Atari 1050 Disk Drive ..... Call
Atari 1010 Recorder 77.00
Atari 1027 Printer ..... Call
Atari 850 Interface ..... Call

MOSAIC

64K Ram/400 ..... 149.00
64K Ram + Cable Kit/400/800 ..... 169.00
48K Ram Kit 94.00
16/32 Expander 64.95
32K Ram 77.95
Mosaic Adaptor 49.95

DISK DRIVES

Percom .....
Trak ..... Call
Rana ..... For
Indus Gt .. Prices

NEW

RS232 Modem Adaptor (Through serial port) 39.95

Koala Touch Tablet 69.95

MONITORS

We carry a full line of AMDEK and USI Monitors.

64 COMODORE 64

Pac-Mac 34.95
Centipede 34.95
Defender 34.95
Dig Dug 34.95
Donkey Kong 34.95
Stargate 34.95
Robotron 34.95

Please call product availability of other 64 software products at same low prices!

3RD Party Printer Interfaces

Interfast I 139.00
Apeface w/cable included 69.95

PRINTERS

SUPER SPECIAL - Prowriter Package with Apeface or Interfast I ..... Call
Axiom AT-100 ..... 229.00
Axiom AT-550 ..... 329.00

ATARI

Programming 2 & 3 - T .. 23.95
Conversational Languages T 44.95
Music Composer - C 32.95
My First Alphabet - D ... 26.95
Touch Typing - T 19.95
Home Filing Manager D 37.95
Mailing List - T 19.95
Caverns of Mars - D 28.95
Computer Chess - C 26.95
Missile Command - C ... 26.95
Super Breakout - C 26.95
Star Raiders - C 32.95
Assembly Editor - C 46.95
Basic - C 41.95
Macroassembler - D 67.95
Pilot (Home Package) C 58.95
Invitation to Programming I T 19.95
Speed Reading - T 55.95
Basketball - C 26.95
Graph-it - T 15.95
Juggles House - D/T 22.95
Pilot (Educator) - C 97.95
Video Easel - C 26.95
Defender - C 32.95
Galaxian - C 32.95
Qix - C 32.95
Dig Dug - C 32.95
ET - C 37.95
Timewise - D 23.95
Atariwriter - C 74.95
Donkey Kong - C 37.95
Ms. Pac-Man - C 39.95
Tennis - C 35.95
Eastern Front - C 32.95
Donkey Kong Jr. - C 39.95
Pengo - C 35.95
Logo -C 79.95
Robitron - C 35.95
Pole Position - C 39.95
Microsoft Basic II - C ... 67.95
Paint - D 33.95
Caverns of Mars - C 32.95
Joust - C 39.95
Visicalc - D 159.95

THORN

War Games - Cart 27.95
Hockey - Cart 27.95
Soccer - Cart 30.95
Submarine Commander - Cart ... 30.95

GAMESTAR

Baja Buggies -D/T 22.95
Starleague Baseball - D/T 22.95
Starbowl Football D/T ... 22.95

SPINNAKER

Up For Grabs - Cart 27.95
Cosmic Life - Cart 23.95
Facemaker - Cart/Disk 23.95
Alphabet Zoo - Cart 23.95
Fraction Fever - Cart 23.95
Kids on Keys - Cart 23.95
Delta Drawing - Cart 27.95
Story Machine - Disk 23.95
Rhymes & Riddles - D 20.95
Amazing Things - D 27.95
Hey Diddle Diddle - D 20.95
Snooper Troops 1 or 2 - D .. 30.95
Trains - D 27.95
Aerobics - D 30.95

SIRIUS

Bandits - D 23.95
Way Out - D 27.95
Repton - D 27.95
Twerps - D 23.95
Blade of Blackpoole - D .. 27.95
Type Attack - D 27.95
Beer Run - D 23.95
Critical Mass - D 27.95
Wavy Navy - D 23.95

SIERRA ON-LINE

Homeword - D 34.95
Dark Crystal - D 27.95
Frogger - D/T 23.95
Quest For Tires - D 23.95
Ultima I - D 23.95
Ultima II - D 41.94
Wizard/Princess - D 22.95

SEGA

Buck Rogers - Cart 27.95
Star Trek- Cart 27.95
Congo Bongo- Cart 27.95
Tac Scan- Cart 27.95

EPYX

Gateway To Apshai Cart 27.95
Pitstop - Cart 27.95
Lunar Outpost - Cart ... 27.95
Swat Rescue - Cart 27.95
Silicon Warrior - Cart ... 27.95
Fun With Music - Cart ... 27.95
Jumpman Jr. - Cart 27.95
Dragonriders of Pern D/C 27.95
Temple Of Apshai D/C 27.95
Hellfire Warrior - D/C ... 20.95
Fun With Art - Cart 27.95

INFOCOM

Deadline - D 34.95
Witness - D 34.95
Zork I, II, III - D 27.95
Starcross - D 27.95
Planetfall - D 34.95
Suspended - D 34.95
Enchanter - D 34.95
Infidel - D 34.95

Hundreds of items available for the ATARI ...please call.

LJK

Letter Perfect - D 74.95
Data Perfect - D 74.95
Spell Perfect - D 64.95

BRODERBUND

AE - D 23.95
Arcade Machine - D 41.95
Bank St. Writer - D 49.95
Lode Runner - D 23.95
Drol - D 23.95
Spare Change - D 23.95
Choplifter - D 23.95

DATA SOFT

Money Wizard - D 49.95
Letter Wizard - D 49.95
Spell Wizard - D 34.95
Genesis - D/T 20.95
Heathcliff - D/T 20.95
Pooyan - D/T 20.95
Zaxxon - D/T 27.95
Micropainter - D 23.95

SYNAPSE

Blue Max - D/T 23.95
Dimension X - D/T 23.95
Drelbs - D/T 23.95
Encounter - D/T 23.95
Necromancer - D/T 23.95
Quasimoto - D/T 23.95
Rainbow Walker - D/T ... 23.95
Shamus Case II - D/T ... 23.95
Zeppelin - D/T 23.95

FIRST STAR

Bristles - D/T 20.95
Flip Flop - D/T 20.95
Astro Chase - D 20.95
Boulder Dash - D/T 20.95

STRATEGIC SIMULATIONS

Carrier Force - D 41.95
Combat Leader - D/T ... 27.95
Battle For Normandy -D/T 27.95
Eagles - D/T 27.95

PARKER BROS.

Astrochase - Cart 34.95
Frogger - Cart 34.95
Q*Bert - Cart 34.95
Popeye - Cart 34.95

MISCELLANEOUS

Castle-Wolfenstein - D .. 20.95
Home Accountant - D ... 52.95
Master Type - D/Cart ... 27.95
Spelunker - D 27.95
Flight Simulator II - D ... 37.95
Zombies - D/T 23.95
Mr. Robot - D 23.95
River Raid - Cart 31.95
Diskey - D 34.95
Chatterbee - D 27.95
Rally Speedway - Cart ... 34.95
Ultima III - D 41.95
Miner 2049'er - Cart 34.95
Scraper Caper - Cart ... 34.95
Basic XL - Cart 74.95
Monkey Wrench II - Cart . 49.95
Omnimon 82.95

BOOKS

Compute's First Bk/Games 12.95
Inside Atari DOS 19.95
Mapping the Atari 14.95
Machine Language/ Beginners 14.95
Your Atari Computer ... 16.95
The Atari Assembler 12.95
Visicalc Book-Atari 14.95

ACCESSORIES

WICO Joystick ..... Call
Flip 'n' File Trunks 20.95
Flip 'n' File Cart 20.95
Joysensor 24.95
Elephant Disks (Box of 10) 20.00
WICO Trakball 37.95
KRAFT Joystick 15.95

D - Disk T - Cassette
C - Cartridge

ComputAbility™

To Order Call Toll Free

For Technical Info, Order Inquiries, or for Wisc. Orders -

800-558-0003 414-351-2007

NO SURCHARGE FOR MASTERCARD OR VISA

COMPUTABILITY
P.O. Box 17882
Milwaukee, WI 53217

MasterCard VISA

ORDER LINES OPEN
Mon-Fri 11 AM - 7 PM CST
Sat 12 PM - 5 PM CST

ORDERING INFORMATION For fast delivery send cashier's check, money order or direct bank transfers. Personal and company checks allow 2 weeks to clear. Charges for COD are $3.00. School Purchase Orders welcome. In CONTINENTAL USA, include $3.00 shipping per software order. Include 3% shipping on all Hardware orders, minimum $3.00. Mastercard & Visa please include card # and expiration date. WI residents please add 5% sales tax. HI, AK, FPO, APO, Canadian orders - add 5% shipping, minimum $5.00. All other foreign orders, please add 15% shipping, minimum $10.00. All goods are new and include factory warranty. Due to our low prices, all sales are final. All defective returns must have a return authorization number. PLease call 414-351-2007 to obtain an RA# or your return will NOT be accepted for replacement or repair. Prices and availability are subject to change without notice.

Lyco Computer Marketing & Consultants

TO ORDER CALL US

TOLL FREE 800-233-8760

In PA 1-717-327-1824

PERCOM

FOR ATARI COMPUTERS

AT88S1 ....$299.00
AT88S2 ....$535.00
AT**S1PD...$439.00
RFD40S1...$399.00
RFD40S2...$675.00
RFD44S1...$449.00
AT88 doubler

HARD DISK DRIVES for APPLE IBM-PC

5MEG.....$1349.00
10MEG ...$1599.00
15MEG ...$1999.00
20MEG ...$2359.00

Add $100.00 for TRS 80 Drives

TEXAS INSTRUMENT

Disk Drive...$245.00

TRAK DISK DRIVES

AT-D1 .....$379.00
AT-D2 .....$399.00
PRINTER CABLE $22.95
Software for ATD-2 ....$22.95

RANA DISK DRIVE

COMPUTER CARE

BIB
5¼ DISK DRIVE CLEANER $12.75
COMPUTER CARE KIT $19.75

BLANK DISKETTES

ELEPHANT

Single Side SD (10).....$17.75
Single Side DD (10).....$21.75
Double Side DD (10).....$26.75

MAXELL

MD I (10) $28.75
MD II (10) $38.75

CERTRON CASSETTES

CC-10 12 for $15.99
CC-20 12 for $17.99

INNOVATIVE CONCEPTS

Disk Storage (holds 10)....$4.95
Disk Storage (holds 15)....$9.95
Disk Storage (holds 50)....$26.95

apple

SSI

Battle of Shilo $26.75
Tigers in the Snow....$26.75
Cosmic Balance $26.75
Knights of the Desert..$26.75
Battle for Normandy..$26.75
Germany 1985 .....$36.75

RANA DISK DRIVES

Elite 1.....$295.00
Elite 2.....$449.00
Elite 3.....$559.00

MICRO-SCI

A2 .....call
A40.....call
A70.....call

MUSE

Castle Wolfenstein $20.75
Caverns of Frietag $20.75
Robot War.....$26.75

CONTINENTAL

Home Accountant $51.75
Book of Apple Software .$16.75

BRODERBUND

Bank Street Writer $49.75
AE $24.75
LODE RUNNER D $24.75
Choplifter $24.75
David's Midnight.....$24.75

SPINNAKER

Kindercomp.....$21.75
Story Machine $23.75
FaceMaker $23.75
Snooper Trooper.....$29.75
Delta Drawing.....$34.75

EPYX

Temple of Apshai.....$26.95
Star Warrior.....$26.95
Crush, Crumble & Chomp .$22.75

ADVENTURE

Saga#1 Adventureland...$29.95
Saga#2 Pirate Adventure.$29.95
Saga#3 Secret Mission...$29.95
Stone of Sisyphus $24.95

ALIEN GROUP

Atari Voice Box $99.00
Apple Voice Box.....$129.00

commodore

1212 Programmers Ad.$44.75
1213 Vicmon.....$44.75
Vic 20 dust cover.....$6.99
Vic 64 dust cover.....$6.99

TIMEWORKS

INVENTORY.....$59.75
ACCOUNTS REC.....$59.75
ACCOUNTS PAY.....$59.75
GENERAL LEDGER.....$59.75
PAYROLL.....$59.75
CASH FLOW $59.75
SALES ANALYSIS.....$59.75
ELEC. CHECKBOOK.....$59.75
MONEY MANAGER $59.75
DATA MANAGER.....$59.75
WALL STREET $59.75

HES 64

Sound Box $9.95
64Forth $55.75
Hesmon.....$25.75
Turtle Graphics.....$37.75
Heswriter $28.75
Gridrunner.....$19.75
Attack of M C $22.75
Turtle Trainer.....$22.75
Turtle Tutor $22.75
Paint Brush $22.75
Benji $25.75
Home Manager.....$28.75
Time Money Mgr $44.97
OmniCalc $33.75
Sword Point.....$19.95
Hes Modem.....$52.75

CARDCO

Cardprinter / LQ1.....$499.00
Cardprint DM1.....$109.00
5 Slot Expansion 64 .....$54.00
64 Write NOW.....$39.00
64 Mail NOW.....$29.00
2.0 Write NOW.....$29.00
64 Keypad $29.00
Universal Cass. Int.....$29.75
Printer Utility.....$19.75
6 Slot Expansion.....$79.95
3 Slot Expansion.....$24.95
PRINTER INTERFACE.....$39.75
PRINTER INTERFACE with full graphics $65.75
LIGHT PEN $29.75

PARKER 20

Frogger (ROM).....$33.75
QBert (ROM).....$33.75
Tutankham (rom).....$33.75

SPINNAKER 64

Kindercomp.....$21.75
Story Machine $23.75
Face Maker $23.75
Snooper Trooper.....$29.75
Delta Drawing.....$34.75
Shamus II c/d.....$24.95
Pinhead c/d $22.95

QUICK BROWN FOX

QBF Word Processor $49.95

LJK

Letter Perfect.....$105.00
Data Perfect.....$95.00

ADVENTURE INTERNATIONAL

S. Adams Adventure.....$28.75

VIC-64

Household Finance C/D...$24.75

VIC 20

King Arthurs Heir Cass....$24.75
Monster Maze Rom.....$24.75

ATARI

Computers for people.

600XL ...$CALL
800XL.....for
1400XL...Lowest
1450 .....Prices
1020 PRINTER.....NOW
1025 PRINTER.....IN
1027 PRINTER .....STOCK
1050 DISK DRIVE ....$SAVES
1010 RECORDER.....$74.75

SYNAPSE

BLUE MAX C/D $24.75
Ft. APOCALYPSE C/D...$24.75
PHAROAH'S CURSE C/D...$24.75

FIRST STAR

ASTRO CHASE C/D....$22.75
BRISTOLS C/D.....$22.75
FLIP FLOP C/D $22.75

ALIEN GROUP

Voice Box 2 . $99.75

DON'T ASK

Sam $41.75
Abuse $15.95
Teleatri.....$27.95
Poker Sam ..$24.95

APX

3R Math $19.95
Typo Attack $24.95
Family Budget $19.95
F. Cash Flow.....$19.95

BRODERBUND

Bank Street Writer D.....$49.75
AE D.....$24.75
Apple Panic D.....$23.75
Choplifter ROM $32.75
David's Midnight.....$24.75
Stellar Shuttle C/D.....$18.75
Ft. Apocalypse.....$24.75

EPYX

GATEWAY TO ASPHI R.....$28.75
JUMPMAN JR R $28.75
PIT STOP R $28.75
GATEWAY TO

SSI

Battle of Shilo C/D.. .....$26.75
Tigers in the Snow C/D....$26.75
Battle for Normandy C/D ..$26.75
Knights of the Desert C/D .$26.75
Cosmic Balance C/D $26.75

ON-LINE

Frogger $24.95
Wizard & Prin $26.95

ROKLAN

Wizard of War.....$29.75
Gorf $29.75
Delux Invader $27.95

BIG 5

Miner 2049.....$32.75

EASTERN HOUSE

Monkey Wrench 2 .....$52.75

BRODERBUND

LODE RUNNER D.....$24.75
OPERATION WIRLWIND D $29.75
DROL D $24.75

PARKER BROTHERS

Tutankham R.....$33.75
Super Cobra R $33.75
Astro Chase R.....$33.75
Frogger R $33.75
QBert R $33.75
Popeye R.....$33.75
Risk R $42.75
Chess R $42.75

SPINNAKER

Story Machine R $26.75
Face Maker R $24.75
Kinderomp R.....$20.75
Fraction Fever R $24.75
Delta Drawing R.....$26.75

Lyco Computer Marketing & Consultants

TO ORDER CALL US

TOLL FREE 800-233-8760

In PA 1-717-327-1824

PRINTER INTERFACING

Available for IBM PC, Apple, Atari, Vic 20 & Vic 64

PRINTER PAPER AVAILABLE

SAVE on these in-stock PRINTERS

LETTER QUALITY

SMITH CORONA TP2...$449.00

DIABLO 630 ..$1719.00

ALPAHCOM 42 .....$89.00
ALPHACOM 81 .....$129.00
NEC 8023 .....$369.00
NEC 8025 .....$699.00
NEC PC-8200 COMPUTER .....$CALL

EPSON

RX-80 .....$SAVE$
RX-80FT .....ON
FX-80 .....In-Stock
FX-100 .....EPSON
MX-80FT .....PRINTERS
MX-100 .....$$CALL$$

MANNESMANN TALLY

SPIRIT 80 .....$CALL
MT 160L .....$CALL

OKIDATA

80 .....$SAVE$
82A .....CALL for
83A .....LOWEST
84 .....PRICES
92 .....on these
93 .....In-Stock
PACEMARK 2350...PRINTERS

ATARI 850 REPLACEMENTS IN-STOCK

CITOH

GORILLA GX100 .....$179.00
PROWRITER 8510 ...$339.00
PROWRITER II $659.00
8600 .....$1025.00
STARWRITER $1099.00
PRINTMASTER $1499.00

STAR MICRONTICS

GEMINI 10X $269.00
GEMINI 15X .....$CALL
DELTA 10 .....$479.00

MODEMS

ANCHOR MARK I ..$79.00
ANCHOR MARK II..$79.00
HAYES SMART ...$239.00
HAYES MICRO II $309.00
Micro Bit
MPP-1000 ..... $129.75
NOVATION
CAT $144.00
D-CAT $155.00
J-CAT $115.00
APPLE CAT II $279.00
212 APPLE CAT ..$589.00

CORDLESS TELEPHONES from ...$69.75

MONITORS

Sakata Color $229.00
Amdek Color I $275.00
Amdek 300 Green $149.00
Amdek 300 Amber $149.00
Gorilla Green $99.00

DUST COVERS

800 .....$3.99
400 .....$3.99
1200 .....$3.99
410 .....$3.99
810 .....$3.99
1050 .....$5.99
PROWRITER $5.99
GEMINI 10X $5.99
PERCOM DISK $5.99
VIC 20/64 .....$5.99

apple®

APPLE DUMPLING GX $99.75
APPLE DUMPLING 64 (16 Buffer) $179.75

INFOCOM

Zork I, II, or III $26.75
Deadline $33.75

HES 20

HES MON Rom . $25.75
Turtle Graphics . $25.75

HES Writer... $25.75
Shamus $25.75
Protector..... $25.75

VIC 64/20

PACMAN $33.75
DONKEY KONG.....$33.75
DIG DUG $33.75
DEFENDER $33.75
CENTIPEDE $33.75

FIRST STAR 64

BRISTOLS C/D.....$22.75
FLIP FLOP C/D $22.75

SYNAPSE 64

ZEPPELIN C/D $24.75
BLUE MAX C/D $24.75
DIMENSION X C/D $24.75

EPYX 64

ASPHI R.....$28.75
JUMPMAN JR R $28.75
PIT STOP R $28.75

commodore

BRODERBUND 64

BANK STREET WRITER.....$49.75
CHOPLIFTER $24.75
LODE RUNNER $24.75
DROL.....$24.75

KOALA TOUCH TABLET...$69.75

PERCOM

AT88S1 ..$299.00
RDF44SI $449.00

GEMINI 10 .....$269.00

IBM	ATARI	APPLE
PACMAN.....$27.95	.....$29.75	PACMAN.....$27.95
DONKEY KONG.....$27.95	.....$29.75	DONKEY KONG.....$27.95
DIG DUG $27.95	.....$29.75	DIG DUG $27.95
DEFENDER.....$27.95	.....$29.75	DEFENDER $27.95
CENTIPEDE $27.95	.....$29.75	CENTIPEDE $27.95
KOALA TOUCH TABLET...$99.75	KOALA TOUCH TABLET...$69.75	KOALA TOUCH TABLET...$84.75
DEADLINE $34.75	.....$34.75	.....$34.75
ENCHANTER $34.75	.....$34.75	.....$34.75
INFIDEL $34.75	.....$34.75	.....$34.75
PLANETFALL $34.75	.....$34.75	.....$34.75
STAR CROSS $34.75	.....$34.75	.....$34.75
SUSPENDED $34.75	.....$34.75	.....$34.75
WITNESS $34.75	.....$34.75	.....$34.75
ZORK I $34.75	.....$34.75	.....$34.75
ZORK II $34.75	.....$34.75	.....$34.75
ZORK III $34.75	.....$34.75	.....$34.75

48K RAM $75.00
64K RAM $99.00

ATARI WRITER $79.00

BUSINESS

Visicalc $159.75
Letter Perfect..... $89.75
Letter Perfect..... $89.75
Data Perfect..... $89.75

TEXT WIZZARD..... $34.75
SPELL WIZZARD $34.75

File Manager..... $69.75
Home File Mgr..... $69.75
Bookeeper..... $119.75
C.R.I.S..... $199.75

ATARI Computers for people.

MasterCard TO ORDER VISA

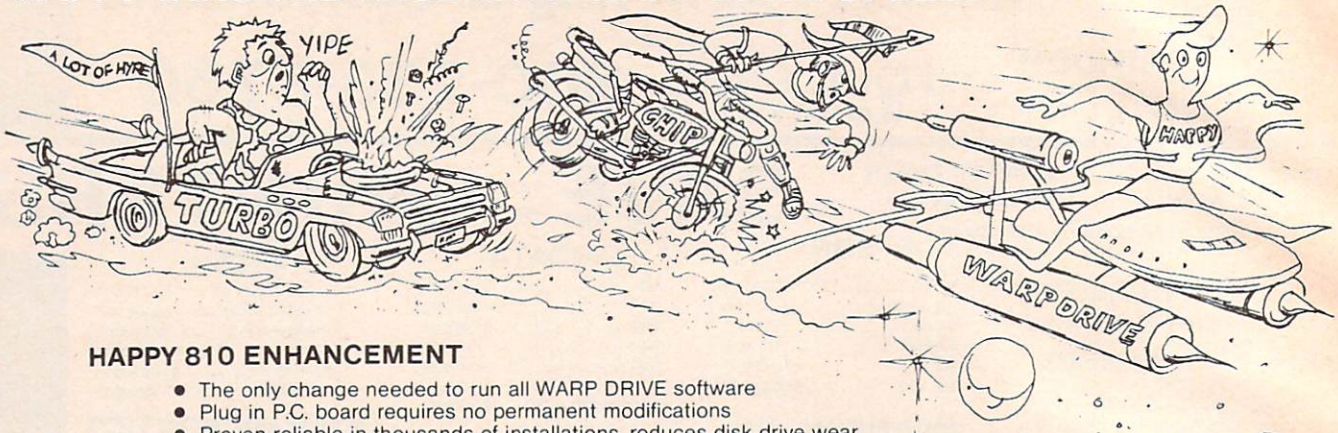
CALL TOLL FREE
800-233-8760
Customer Service 1-717-327-1825

or send order to
Lyco Computer
P.O. Box 5088
Jersey Shore, PA 17740

POLICY

In-stock items shipped within 24 hours of order. Personal checks require four weeks clearance before shipping. No deposit on C.O.D. orders. Free shipping on prepaid cash orders within the continental U.S. PA residents add sales tax. All products subject to availability and price change. Advertised prices show 4% discount offered for cash, add 4% for Master Card or Visa. DEALER INQUIRIES INVITED.

HAPPY WINS THE RACE WITH WARP DRIVE SPEED!



HAPPY 810 ENHANCEMENT

- The only change needed to run all WARP DRIVE software
- Plug in P.C. board requires no permanent modifications
- Proven reliable in thousands of installations, reduces disk drive wear
- Comes completely assembled and tested, just plug in and use
- Full one year parts and labor guarantee, compatible with existing software
- High quality printed circuit board with gold connectors

NO ONE ELSE HAS THIS PERFORMANCE
Unenhanced whole disk (ATARI rev B format) read time: 112 seconds
Unenhanced whole disk (ATARI rev C fast format) read time: 89 seconds
ENHANCED 810 whole disk (any format) read time with standard software: 68 seconds
ENHANCED 810 whole disk (any format) read time with WARP DRIVE software: 43 seconds
Standard software whole disk write and verify time: 238 seconds
WARP DRIVE software whole disk write and verify time: 62 seconds

NEW HAPPY WARP DRIVE SOFTWARE

WARP SPEED HAPPY BACKUP PROGRAM
- Completely automatic: nothing to figure out, insert disks and press return
- Only program on the market guaranteed to backup any disk
- Can write to a blank disk: format write and verify in one operation
- Automatic program tracing: copies only the tracks that are used
- Efficient memory utilization: reduces the number of disk insertions
- Requires only one ENHANCED disk drive, backups will work on a standard drive

WARP SPEED MULTI DRIVE HAPPY BACKUP PROGRAM
- Same features as above plus support of multiple ENHANCED drives
- Can be used with up to 4 ENHANCED drives
- Source and all destination drives read and write in parallel
- Format write and verify 3 complete disks in less than 3 minutes

WARP SPEED HAPPY COMPACTOR PROGRAM
- Reduces the number of disks required to backup your library
- Combines up to 8 self booting disks into 1 disk with a menu
- Compacted disks run only on an ENHANCED drive
- Pays for itself by saving on disks
- Single or dual ENHANCED drive operation

HAPPY WARP DRIVE DOS
- Improves ATARI DOS 2.0S to use warp speed reading and write with verify
- Use all features of BASIC, PILOT, FMS, and DUP at top warp speed
- Warp speed I/O software module available separate from DOS

HAPPY WARP DRIVE SECTOR COPY PROGRAM
- Standard format whole disk read, write and verify in 105 seconds
- Use with sngle or dual drives, mix ENHANCED and NON-ENHANCED drives

HAPPY CUSTOMIZER PROGRAM (sold separately $99.95)
- Creates custom format disks of any specification
- Any type bad sector, duplicate sector numbers, or interleave
- Easy to use but requires an advanced level user to interpret the results

REVIEWED IN POPULAR MAGAZINES

A.N.A.L.O.G. COMPUTING—July/August 1983 *"...The installation instructions for the Happy 810 Enhancement are among the best I have ever seen. ...The Happy 810 Enhancement is one of the most powerful hardware modifications available to ATARI computer owners."*

ANTIC—July 1983 *"The difference between a normal ATARI 810 disk drive and one equipped with Happy is like the contrast between mass transit and the automobile. A car costs you more initially, but improves the quality of your life. Similarly, if you use your disk drive a lot, installing Happy will markedly enhance your programming life."*

SPECIAL SUGGESTED RETAIL PRICE BEFORE FEBRUARY 28, 1984: *Get the HAPPY 810 ENHANCEMENT with the single and multi drive HAPPY BACKUP PROGRAM, plus the HAPPY COMPACTOR PROGRAM, plus the HAPPY DRIVE DOS, plus the HAPPY SECTOR COPY, all with WARP DRIVE speed, including our diagnostic for $249.95. Existing registered ENHANCEMENT owners may upgrade to WARP DRIVE speed for $15.00 with no hardware changes!*

Price includes shipping by air mail to U.S.A. and Canada. Foreign orders add $10.00 and send an international money order payable through a U.S.A. bank. California orders add $16.25 state sales tax. Cashiers check or money order for immediate shipment from stock. Personal checks require 2-3 weeks to clear. Cash COD available by phone order and charges will be added. No credit card orders accepted. ENHANCEMENTS for other ATARI compatible drives coming soon, call for information. Please specify -H model for all drives purchased new after February 1982, call for help in ENHANCEMENT model selection. Dealers now throughout the world, call for the number of the dealer closest to you.

HAPPY COMPUTERS, INC. ● P. O. Box 1268 ● Morgan Hill, California 95037 ● (408) 779-3830

PRODUCT MART

COMPUCAT

Catalog of Computers and Supplies

Our prices are **WHOLESALE + 10%**

Samples!!!

ATARI 850 INTERFACE — $220
Compucat — $163

ATARI 1027 PRINTER — $350
Compucat — $265

We support the complete **ATARI** and **COMMODORE** product lines.
Ask for our free price list.

You may order in the regular manner or download our *TeleCatalog* and order from your computer or terminal.

(408) 353-1836

Instant shipping (or as fast as we can). *Mastercard & Visa Accepted* (no extra charge). Shipping & handling add 5%. California customers add 6.5% sales tax. Order by *phone* (Mon. - Fri. 10 am - 5 pm PST). Order by *modem* (daily 6 pm - 9 am) from our online TeleCatalog.

COMPUCAT
24500 Glenwood Hwy., Los Gatos, CA 95030

DUST COVERS

For Personal Computers, Peripherals, Game Units–Protective, Long-Lasting Vinyl Resists Both Dust and Liquids.

— CHOICE OF COLORS —

Amdek	IBM PC
Apple	Mattel
Atari	Rana Systems
BMC	Sanyo
Commodore	Star Micronics
Coleco	TI 99/4
Epson	TRS 80
Franklin Ace	*PLUS OTHERS*

GROUP/VOLUME DISCOUNTS AVAILABLE

FOR **FREE BROCHURE** WRITE:

ENCHANTED FOREST
P.O. Box 5261, Newport Beach, CA 92662
(1129 W. Balboa Blvd.)

Dealer Inquiries Invited

FLY Your Computer

FLIGHT SIMULATOR GAMES

NEW COCKPIT 64
For the Commodore 64
- 100% Machine Language
- Windshield View
- 7 Airports

$30.

Runway 64 (Commodore 64)	**$25**
Runway 20 (VIC-20	**$25**
Sky Pilot (VIC-20)	**$18**

ADD $2.00 FOR DISK VERSION

SUSIE SOFTWARE
709 Wilshire Dr. Mt. Prospect, IL 60056
(312) 394-5165

Magreeable™

software

TAX HELPER™
Commodore 64™

Tax HELPER 1.83 performs all arithmetic for Form 1040 and Schedules A, B, and G. Does not calculate tax. Saves results to diskette. Diskette: $17.00 plus $1.25 shipping.

Tax HELPER 2.83 also does Schedules C, D, E, F, G, SE, and W and Form 4562. Calculates tax, prints reports, and more. Diskette: $30.00 plus $1.25 shipping.

(M)agreeable software, inc.
5925 Magnolia Lane • Plymouth, MN 55442
(612) 559-1108

HELPER is a trademark of (M)agreeable Software, Inc.
Commodore is a trademark of Commodore Electronics Ltd.

COMPUTE!

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

NEW FOR ATARI
CALORIE AND NUTRITION GUIDE
$39.95

* Analyze 14 vitamins and minerals
* Over 500 foods
* Calculates total calories
* Add or change foods
* Design low calorie diets
* Analyze recipes

Requires 48K memory and 1 disk drive. ATARI 825 printer optional.

Send check or money order to:
V & L ENTERPRISES
P.O. BOX 9667
ALEXANDRIA, VA. 22304
Virginia residents add 4% sales tax
Atari TM of Atari Inc.

Advertise your program or product here and reach hundreds of thousands of readers.

For more information on products advertised in **COMPUTE!**, use the handy reader service cards in the back of the magazine.

Advertisers Index

Reader Service Number/ Advertiser	Page
102 Aardvark Action Software	101
103 Abacus Software	171
A B Computers	109
104 American Educational Computer	23
105 Apropos Technology	123
Aries Marketing	191
Artworx	95
106 Astra Systems	115
107 Atari, Inc.	12,13
Batteries Included	47
Beaumont Products	113
108 Brøderbund Software	49
109 Cardco, Inc.	IBC
Cass-A-Tapes	140
Castle Software	152
110 Chalk Board Inc.	26,27
Commodore Computers	BC
111 Comm 64 Training Tape	125
112 Comprehensive Software Support	96
Compucat	190
113 CompuServe	31
ComputAbility	185
114 Computer Case Company	189
115 Computer Center Stores	173
116 Computer Discount	152
117 Computer Mail Order	128,129
118 ComputerMat	64
119 Computer Outlet	134,135
120 Computer Warehouse	121
The Continental Press, Inc.	191
121 Continental Software	61
Cosmic Computers Unlimited	151
Creative Software	29
122 Design Ware	45
123 Dymarc Industries, Inc.	55
124 Dynatech Microsoftware Inc.	127
125 Eastern House	114
Egghead Softwear	141
Elcomp Publishing, Inc.	89
126 Elek-Tek, Inc.	177
127 Enchanted Forest	190
Epyx	39
Epyx	41
Epyx	43
Expotek	171
128 Festive Fare	140
129 First Star Software Inc.	37
Frontrunner Computer Industries	113
130 Futurehouse	147
131 Futurehouse	51
132 Handic Software Inc.	79
Happy Computing, Inc.	188
133 Harmony Video & Electronics	177
Hot Data	108
Human Engineered Software	85
Hytec Systems	25
Indus Systems	103
Infocom	67
134 Jamestown Software	191
135 Jance Assoc., Inc.	191
Jason-Ranheim	148
John T. Dow	191
136 Kalglo	140
137 Krell Software Corp.	87
K-2 Electronics Design Corporation	105
Leading Edge Products Inc.	IFC
138 Lyco Computer Marketing & Consultants	186,187
139 (M)agreeable Software, Inc.	190
Maxell	19
140 Micro Education Corporation of America	93
141 Microlab, Inc.	13
Micro-Sys Distributors	161
142 Micro Ware	53
143 Micro Ware	164
Micro World Electronix, Inc.	171
144 Micro Worx	169
145 Midwest Micro Inc.	42
146 Morbius Software Co., Inc.	111
Mosaic Electronics, Inc.	4
147 New World Computer	78
148 Nibble Notch	53
NRI Schools	99
149 OSS	22
Pacific Exchanges	144
Pacific Exchanges	131
Pacific Exchanges	167
Pacific Exchanges	91
Pacific Exchanges	148
150 Parsec Research	125
PMI	131
151 Precision Software, Inc.	63
152 Prestige Envelope & Paper Corp.	123
153 The Printer Store	107
154 Professional Software Inc.	1
155 Professional Software Inc.	9
156 Protecto Enterprizes	116,117
Reston Software	71
157 Richvale Telecommunications	65
158 Scarborough Systems, Inc.	7
159 Screenplay	35
160 Screenplay	69
161 Screenplay	73
162 Screenplay	81
Seacliff Electronics	175
SM Software Inc.	163
SM Software Inc.	163
SM Software Inc.	162
SM Software Inc.	162
163 Softpeople, Inc.	120
Software Design, Inc.	191
164 Software Unlimited	175
165 SoftWare Warehouse Outlet	189
Sophisticated Software of America	175
Spinnaker	2,3
Spinnaker	11
Strategic Simulations Inc.	83
166 subLOGIC Corporation	77
167 Such a Deal	143
168 Susie Software	190
Tail-Wheel	191
3G Company, Inc.	59
169 Timeworks, Inc.	57
Timeworks, Inc.	144
Tronix	19
Tronix	75
V & L Enterprises	190
Video Home Library	113
York 10	113

COMPUTE! Subscription	17
COMPUTE!'s First Book of VIC Games	133
COMPUTE!'s Programmer's Reference Guide to the TI-99/4A	157
PC & PCjr Subscription	33

COMPUTE!

For Fastest Service, Call Our **Toll-Free** US Order Line
800-334-0868
In NC call 919-275-9809

My Computer Is:
☐ PET ☐ Apple ☐ Atari ☐ VIC-20 ☐ Commodore 64
☐ TI-99/4A ☐ Timex/Sinclair ☐ Radio Shack Color Computer
☐ Other _____ ☐ Don't yet have one ...

☐ $24.00 One Year US Subscription
☐ $45.00 Two Year US Subscription
☐ $65.00 Three Year US Subscription

(Readers outside of the US, please see our foreign readers subscription card or inquire for rates).

Name

Address

City State Zip

☐ Payment Enclosed ☐ Bill me
☐ VISA ☐ MasterCard ☐ American Express
Account No. _____ Expires _____/_____

Your subscription will begin with the next available issue. Please allow 4-6 weeks for delivery of first issue. Subscription prices subject to change at any time.
The COMPUTE! subscriber list is made available to carefully screened organizations with a product or service which may be of interest to our readers. If you prefer not to receive such mailings, please check this box. ☐ 343201

COMPUTE! Books

Quan.	Title	Price	S/H	Total
____	**Machine Language for Beginners**	$14.95	+ $2.00	_____
____	**Home Energy Applications**	14.95	+ 2.00	_____
____	**COMPUTE!'s First Book of VIC**	12.95	+ 2.00	_____
____	**COMPUTE!'s Second Book of VIC**	12.95	+ 2.00	_____
____	**COMPUTE!'s First Book of VIC Games**	12.95	+ 2.00	_____
____	**COMPUTE!'s First Book of 64**	12.95	+ 2.00	_____
____	**COMPUTE!'s First Book of Atari**	12.95	+ 2.00	_____
____	**COMPUTE!'s Second Book of Atari**	12.95	+ 2.00	_____
____	**COMPUTE!'s First Book of Atari Graphics**	$12.95	+ $2.00	_____
____	**COMPUTE!'s First Book of Atari Games**	12.95	+ 2.00	_____
____	**Mapping The Atari**	14.95	+ 2.00	_____
____	**Inside Atari DOS**	19.95	+ 2.00	_____
____	**The Atari BASIC Sourcebook**	12.95	+ 2.00	_____
____	**Programmer's Reference Guide for TI-99/4A**	14.95	+ 2.00	_____
____	**COMPUTE!'s First Book of TI Games**	12.95	+ 2.00	_____
____	**Every Kid's First Book of Robots and Computers**	4.95	+ 1.00	_____
____	**The Beginner's Guide to Buying A Personal Computer**	3.95	+ 1.00	_____

For Fastest Service Call Our **TOLL FREE** US Order Line **800-334-0868**. In NC call 919-275-9809.
All orders must be prepaid (money order, check, or charge). All payments must be in US funds. NC residents add 4% sales tax.
☐ Payment enclosed. Please charge my: ☐ VISA ☐ MasterCard ☐ American Express
Acc't. No. Expires

Name

Address

City State Zip

Country

Allow 4-5 weeks for delivery. For air mail outside US: $5.00 3456789101112C

COMPUTE!

Foreign Readers

Subscription rates outside the US:
☐ $30.00 Canada
☐ $42.00 Europe, Australia, New Zealand/Air Delivery
☐ $52.00 Middle East, North Africa, Central America/Air Delivery
☐ $72.00 South America, South Africa, Far East, Elsewhere/Air Delivery
☐ $30.00 International Surface Mail (lengthy, unreliable delivery)

Name

Address

City Postal Code

Country

Payment must accompany this card.
Payment in US Funds drawn on a US Bank; International Money Order; or charge card: ☐ VISA ☐ MasterCard ☐ American Express
Account No. _____ Expires _____/_____

Your subscription will begin with the next available issue. Please allow 4-6 weeks for delivery of first issue. Subscription prices subject to change at any time.
The COMPUTE! subscriber list is made available to carefully screened organizations with a product or service which may be of interest to our readers. If you prefer not to receive such mailings, please check this box. ☐ 343201

The Editor's Feedback:

Computer: ☐ PET ☐ Apple ☐ Atari ☐ VIC-20 ☐ Commodore 64
☐ TI-99/4A ☐ Timex/Sinclair ☐ Radio Shack Color Computer
☐ Other _____ ☐ Don't yet have one ...

Are you a COMPUTE! Subscriber? ☐ Yes ☐ No I would like to see:

More	Just Right	Fewer		More	Just Right	Fewer	
☐	☐	☐	Specific applications programs.	☐	☐	☐	Games.
☐	☐	☐	BASIC programs.	☐	☐	☐	Reviews of game software.
☐	☐	☐	Machine language programs.	☐	☐	☐	Reviews of business software.
☐	☐	☐	Tutorials.	☐	☐	☐	Reviews of educational software.
☐	☐	☐	Educational articles.	☐	☐	☐	Reviews of hardware.
☐	☐	☐	Detailed explanations of programs.				

What do you like best about COMPUTE!?

What do you like least?

3456789101112C

Place
Postage
Here

COMPUTE! Magazine
P.O. Box 914
Farmingdale, NY 11737

Place
Postage
Here

COMPUTE! Magazine
P.O. Box 5406
Greensboro, NC 27435-0406

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 2312 GREENSBORO, NC

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTE! Magazine
P.O. Box 914
Farmingdale, NY 11737

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 2312 GREENSBORO, NC

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTE! Books
Post Office Box 5406
Greensboro, NC 27403

COMPUTE!'s FREE Reader Information Service

Use these cards to request FREE information about the products advertised in this issue. Clearly print or type your full name and address. Only one card should be used per person. Circle the numbers that correspond to the key number appearing in the advertisers index.

Send in the card and the advertisers will receive your inquiry. Although every effort is made to insure that only advertisers wishing to provide product information have reader service numbers, COMPUTE! cannot be responsible if advertisers do not provide literature to readers.

Please use these cards *only* for subscribing or for requesting product information. Editorial and customer service inquiries should be addressed to: COMPUTE!, P.O. Box 5406, Greensboro, NC 27403. Check the expiration date on the card to insure proper handling.

Use these cards and this address only for COMPUTE!'s Reader Information Service. Do not send with payment in any form.

COMPUTE!

101	102	103	104	105	106	107	108	109	110	111
112	113	114	115	116	117	118	119	120	121	122
123	124	125	126	127	128	129	130	131	132	133
134	135	136	137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152	153	154	155
156	157	158	159	160	161	162	163	164	165	166
167	168	169	170	171	172	173	174	175	176	177
178	179	180	181	182	183	184	185	186	187	188
189	190	191	192	193	194	195	196	197	198	199
200	201	202	203	204	205	206	207	208	209	210
211	212	213	214	215	216	217	218	219	220	221
222	223	224	225	226	227	228	229	230	231	232
233	234	235	236	237	238	239	240	241	242	243
244	245	246	247	248	249	250	251	252	253	254
255	256	257	258	259	260	261	262	263	264	265
266	267	268	269	270	271	272	273	274	275	276
277	278	279	280	281	282	283	284	285	286	287
288	289	290	291	292	293	294	295	296	297	298
299	300	301	302	303	304	305	306	307	308	309
310	311	312	313	314	315	316	317	318	319	320
321	322	323	324	325	326	327	328	329	330	331
332	333	334	335	336	337	338	339	340	341	342
343	344	345	346	347	348	349	350			

Circle 101 for a one year new U.S. subscription to COMPUTE!: you will be billed for $24.

Please print or type your full name and address. Limit one card per person.

Name

Address

City

State/Province Zip

Country

Please include zip code. Expiration 5/31/84 CO384

COMPUTE!

101	102	103	104	105	106	107	108	109	110	111
112	113	114	115	116	117	118	119	120	121	122
123	124	125	126	127	128	129	130	131	132	133
134	135	136	137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152	153	154	155
156	157	158	159	160	161	162	163	164	165	166
167	168	169	170	171	172	173	174	175	176	177
178	179	180	181	182	183	184	185	186	187	188
189	190	191	192	193	194	195	196	197	198	199
200	201	202	203	204	205	206	207	208	209	210
211	212	213	214	215	216	217	218	219	220	221
222	223	224	225	226	227	228	229	230	231	232
233	234	235	236	237	238	239	240	241	242	243
244	245	246	247	248	249	250	251	252	253	254
255	256	257	258	259	260	261	262	263	264	265
266	267	268	269	270	271	272	273	274	275	276
277	278	279	280	281	282	283	284	285	286	287
288	289	290	291	292	293	294	295	296	297	298
299	300	301	302	303	304	305	306	307	308	309
310	311	312	313	314	315	316	317	318	319	320
321	322	323	324	325	326	327	328	329	330	331
332	333	334	335	336	337	338	339	340	341	342
343	344	345	346	347	348	349	350			

Circle 101 for a one year new U.S. subscription to COMPUTE!: you will be billed for $24.

Please print or type your full name and address. Limit one card per person.

Name

Address

City

State/Province Zip

Country

Please include zip code. Expiration 5/31/84 CO384

Place
Postage
Here

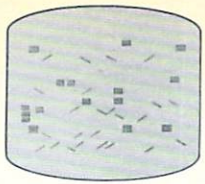
COMPUTE! Reader Service
P.O. Box 11747
Philadelphia, PA 19101

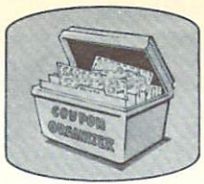
Place
Postage
Here

COMPUTE! Reader Service
P.O. Box 11747
Philadelphia, PA 19101

Place
Postage
Here

COMPUTE! Reader Service
P.O. Box 11747
Philadelphia, PA 19101





Save UP TO 40% on COMPUTE!

Every issue of COMPUTE! contains up to 30 new programs and games. And a year's subscription brings them to you for less than 15 cents each! Plus you'll enjoy the most useful home computer advice, ideas and information anywhere! Subscribe now at up to 40% off the newsstand price. At less than 15 cents per program, this COMPUTE! offer is too good to pass up!

☐ 1 year $24—Save 32%! ☐ 2 years $45—Save 36%!
☐ 3 years $65—Save 40%!

Name _____

Address _____

City _____ **State** _____ **Zip** _____

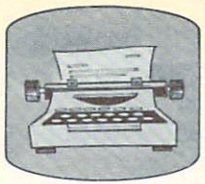
☐ Payment enclosed ☐ Bill me

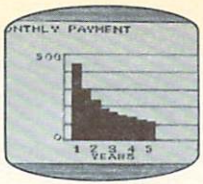
Charge my ☐ Visa ☐ MasterCard ☐ American Express

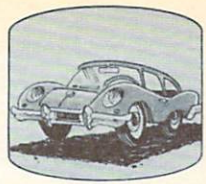
_____ ____/____
Account No. **Exp. date**

COMPUTE! brings you programs and games for the following machines: Atari, PET/CBM, VIC-20, TI 99/4A, Apple, Commodore 64, Radio Shack Color Computer, IBM PC and IBM PCjr.

343B01







Save UP TO 40% on COMPUTE!

Every issue of COMPUTE! contains up to 30 new programs and games. And a year's subscription brings them to you for less than 15 cents each! Plus you'll enjoy the most useful home computer advice, ideas and information anywhere! Subscribe now at up to 40% off the newsstand price. At less than 15 cents per program, this COMPUTE! offer is too good to pass up!

☐ 1 year $24—Save 32%! ☐ 2 years $45—Save 36%!
☐ 3 years $65—Save 40%!

Name _____

Address _____

City _____ **State** _____ **Zip** _____

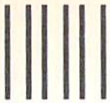
☐ Payment enclosed ☐ Bill me

Charge my ☐ Visa ☐ MasterCard ☐ American Express

_____ ____/____
Account No. **Exp. date**

COMPUTE! brings you programs and games for the following machines: Atari, PET/CBM, VIC-20, TI 99/4A, Apple, Commodore 64, Radio Shack Color Computer, IBM PC and IBM PCjr.

343B01



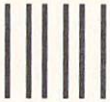
NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 2312 GREENSBORO, NC

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTE!
P.O. Box 914
Farmingdale, NY 11737



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

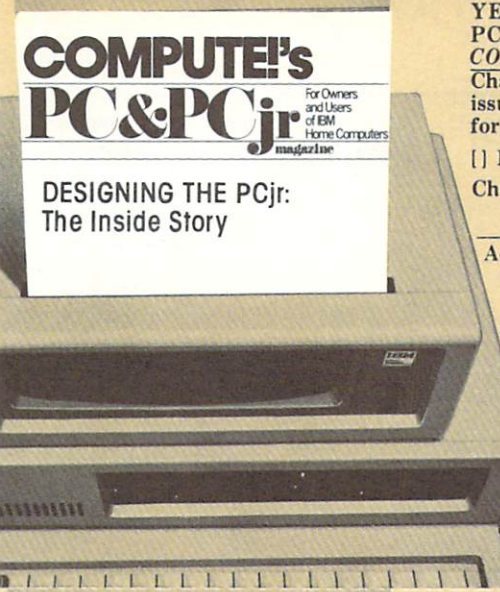
BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 2312 GREENSBORO, NC

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTE!
P.O. Box 914
Farmingdale, NY 11737

Get inside the PC and PCjr and save 33%



YES. I want to get inside the PC and the PCjr with the information I'll find only in *COMPUTE!'s PC & PCjr!* Please enter my Charter Subscription at only $24 for the first 12 issues. I save 33%, and I may cancel at any time for a prompt refund on all unmailed issues.

[ ] Payment enclosed [ ] Bill me

Charge [ ] VISA [ ] MasterCard [ ] Am. Ex.

Acct. No. Exp. Date

OR CALL TOLL-FREE 1-800-334-0868

Name

Address

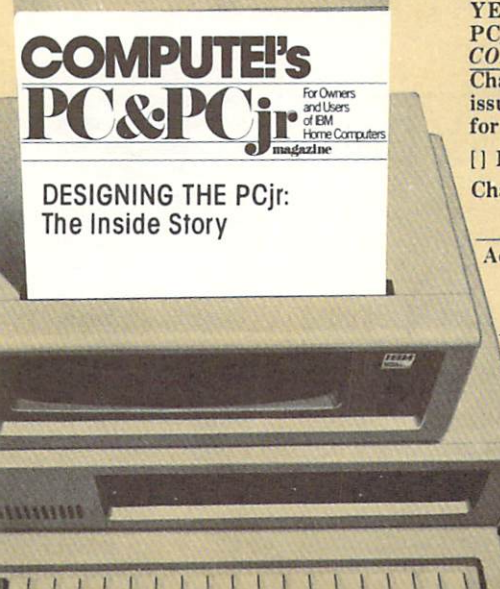
City

State/Zip

343101

COMPUTE!'s PC&PCjr.

Get inside the PC and PCjr and save 33%



YES. I want to get inside the PC and the PCjr with the information I'll find only in *COMPUTE!'s PC & PCjr!* Please enter my Charter Subscription at only $24 for the first 12 issues. I save 33%, and I may cancel at any time for a prompt refund on all unmailed issues.

[ ] Payment enclosed [ ] Bill me

Charge [ ] VISA [ ] MasterCard [ ] Am. Ex.

Acct. No. Exp. Date

OR CALL TOLL-FREE 1-800-334-0868

Name

Address

City

State/Zip

343101

COMPUTE!'s PC&PCjr.

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT #2312 GREENSBORO, NC

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTE!'s PC&PCjr.
P.O. Box 974
Farmingdale, NY 11737

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT #2312 GREENSBORO, NC

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTE!'s PC&PCjr.
P.O. Box 974
Farmingdale, NY 11737

The Most Powerful $49.95 Cartridge Word Processor for the Commodore 64™

WRITE NOW!

The *WRITE NOW!* Word Processor provides you with the easiest to use & fastest to learn format available for your C-64. It gives you the features you expect in a professional word processor & some unique features not available in any other C-64 word processor.

With *WRITE NOW!* you have unlimited recall of often used text; global string search makes it easy to find or replace any copy. Editing copy is made easy with simple commands and the full block command enables you to move or delete blocks of copy. You can insert or delete text at will as you scroll up or down through your document line by line, page by page, or you can jump directly to the beginning or the end of your document. *WRITE NOW!* gives you the option of text centering & justification, along with the use of multiple line headers & footers. Page numbering can be set at the top or bottom of a page and either in Arabic or Roman numbers.

Other features of *WRITE NOW!* include:

- INTERFACES with:

  MAIL NOW! Professional mailing list processor for the C-64.

  SPELL NOW! 30,000 word dictionary.

  GRAPH NOW! Full featured graphics and chart processor.
- program on cartridge (time not wasted loading from disk or tape).
- save text to tape or disk.
- sends any 'special' codes to the printer — even in the middle of text (special codes are 'user-definable').
- optional joystick control for scrolling.

Included with *WRITE NOW!* is a 100 plus page easy-to-understand instruction booklet — all for the Manufacturer's Suggested Retail Price of $49.95.

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

C-64 is a registered trademark of Commodore International

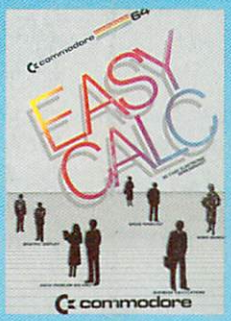
commodore 64

INDISPENSABLE SOFTWARE

For Your Most Important Computing Needs

EasyScript 64
Displays 764 lines × 240 characters. Prints to 130 columns. Works with EasySpell 64.

EasySpell 64
20,000 word Master Dictionary and automatic spelling checker. Works with EasyScript 64.



EasyCalc 64
Multiple electronic spreadsheet with color bar graph feature. 63 columns × 254 rows.

The Manager
Sophisticated database system with 4 built-in applications, or design your own. Text, formulas, graphics.

SuperExpander 64
21 special commands. Combine text with high resolution graphics. Music and game sounds.

Easy Finance I—Loan Analysis
12 loan functions. Bar graph forecasting as well as calculation.

Easy Finance II—Basic Investment Analysis
16 stock investment functions. Investment bar graph.

Easy Finance III—Advanced Investment Analysis
16 capital investment functions. Bar graphs.

Easy Finance IV—Business Management
21 business management features. Bar graphs.

Easy Finance V—Statistics and Forecasting
Assess present/future sales trends with 9 statistics and forecasting functions.

Accounts Payable/ Checkwriting
11 functions. Automatic billing. 50 vendors/disk.

Accounts Receivable/Billing
11 billing functions. Printed statements.

General Ledger
8 general ledger options. Custom income statement, trial balances, reports.

Inventory Management
1000 inventory items. Full reports.

Payroll
24 different payroll functions. Integrated with G/L system.

commodore COMPUTERS

First In Quality Software